

SPECIFICATION

For

SWITCHING POWER SUPPLY

**M/N: MPM-U303(-C)**

Revision		
Version	Revise Date	Change Items
Rev. 01	Mar. 16. 2009	Update mechanical dimension (Height).
Rev. 02	Apr. 20. 2009	Update description of point 1 and derating curve of point 5.
Rev. 03	Jul. 15. 2009	1. Update the information of Safety Approvals in section 6. 2. Adding description of two optional requirements in section 8.
Rev. 04	Aug. 19. 2009	1. Update the photograph of power supply. 2. Adding the voltage of fan at section 7.
Rev. 05	Oct. 8. 2009	Adding detailed description of the special condition of criteria A.
Rev. 06	Oct. 13. 2009	Revised the min. output current.
Rev. 07	Feb. 9. 2010	Updating the efficiency can up to 91%, derating curves with start up at -20°C and adding mechanical drawing with cover provided.
Rev. 08	Mar. 15. 2010	Adding the drawing and spec of screws for fix bottom enclosure.
Rev. 09	Aug. 20. 2010	UL 60601-1 1 <sup>st</sup> edition approved.
Rev. 10	Nov. 4. 2010	Updating spec of fixed screws.
Rev. 11	Nov. 10. 2010	Revising part number coding.
Rev. 12	Dec. 1. 2010	Adding input current specification.
Rev. 13	Dec. 6. 2010	Correcting the descriptions of voltage dips in section 6.
Rev. 14	Mar. 28. 2011	Update the safety approved status.
Rev. 15	Nov. 7. 2011	Revised the derating curves.
Rev. 16	Apr. 5. 2012	Revised the height dimension with cover provided.
Rev. 17	Feb. 7. 2018	Changed new form.
Rev. 18	Mar. 9. 2018	1.Added Designed to meet IEC 60601-1-2 4th ed. EMC. 2.Changed EMC and Safety Approvals.



CB



UL US

BF direct patient contact

### FEATURES

- ✓ 300W convection cooled and 360W forced air cooling single output medical power supply.
- ✓ Active PFC meets Class D.
- ✓ Conducted EMI meets CISPR/FCC Class B.
- ✓ High Efficiency up to 91%.
- ✓ Adjustable output range.
- ✓ Design to meet medical standard IEC 60601-1(2<sup>nd</sup> & 3<sup>rd</sup>), EN 60601-1(3<sup>rd</sup>), UL 60601-1 type BF rated.
- ✓ Designed to meet IEC 60601-1-2 4th ed. EMC.

### Models & Ratings

Model Number	Rated Output Power	Max. Output Power	Output Voltage	Min. Current
MPM-U303	300 W	360 W	+12 ~ +14 V / 12 V (Note 1)	0 A

Total Output Power: Total maximum power is rated 300W, peak 360W max. 5 seconds with convection cooled; max. 360W continuously with 40.6CFM forced air cooling at 50°C environment temperature.

Note:

1. Output voltage can be adjusted by variable resistor with nominal 12V which would be adjusted at factory.

2. Model no. coding:

MPM - U 3 0 X - W

① ②

#### Option

W = C: with cover assembled.  
W = D: voltage dips criteria A complies.  
W = E: with cover assembled & voltage dips criteria A complies.  
W = ET with European terminal blocks both input CN1 and output CN2.

#### Output voltage

X = 3: +12Vdc  
X = 3-1: +13.8Vdc  
X = 3-14: +14Vdc

### Summary

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Input Range	90	115 / 230	264	VAC	Continuous input range.
Input Frequency	47	50 / 60	63	Hz	AC input.
Efficiency			91	%	AC 230V input, rated load.
Operating Temperature	-20		+70	°C	Derate above 50°C to a maximum temperature of 70°C as curves below.
Weight		954		g	
Dimensions	198 (L) x 97 (W) mm, tolerance +/- 0.4mm, with (H) 41 mm, tolerance +0/-0.5 mm.				
EMC	EN 60601-1-2: 2001, EN 55011 / EN 55022, EN 61000-3-2: 2000, EN 61000-3-3: 2001, IEC 61000-4-2: 2001, IEC 61000-4-3: 2002, IEC 61000-4-4: 2004, IEC 61000-4-5: 2001, IEC 61000-4-6: 2004, IEC 61000-4-8: 2001, IEC 61000-4-11: 2004				
Safety Approvals	IEC 60601-1: 1988+A1+A2 (2 <sup>nd</sup> edition), IEC 60601-1: 2005 (3 <sup>rd</sup> edition), EN 60601-1: 2006 (3 <sup>rd</sup> edition) UL 60601-1, 1st Edition, 2006-04-26, CAN/CSA-C22.2 No. 601.1-M90, 2005				

### Input

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Input Voltage	90	115 / 230	264	VAC	Continuous input range.
Input Frequency	47	50 / 60	63	Hz	AC input.
Input Current			4.5 / 2	A	At AC Input voltage (100VAC/240VAC), rated load.
Inrush Current			60	A	
Leakage Current		150		μA	Primary to Earth GND.
		100			Secondary to Earth GND.
Input Protection	Non-user serviceable internally located AC input line fuse. Fuse : 5A / 250VAC * 2pcs				

### Output

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Output Voltage		+12 ~ +14 / 12		VDC	
Initial Set Accuracy		1		%	Voltage setting is at nominal AC input voltage, 60% rated load and 25°C.
Minimum Load		0		A	
Hold Up Time	16			mS	
Total Regulation		$\pm 2$		%	Total regulation is measured a setting output voltage. Input voltage is from 90-264VAC and output from 0W to 360W.
Ripple & Noise		120 – 140 / 120		mV	Measured at rated load by a 20MHz bandwidth limited oscilloscope and the each output is connected with a 10 $\mu$ F Electrolytic Capacitor and a 0.1 $\mu$ F Ceramic Capacitor.
Remote Voltage sense	Compensates for wire voltage drop.				Only applies to 12~13V output.
Short Circuit Protection	Fully protected against output overload and short circuit. Automatic recovery upon of overload condition.				
Overvoltage Protection	For some reason the power supply fails to control itself, the build-in over voltage protection circuit will shut down the outputs to prevent damaging external circuits.				
Over Temperature Protection	When the power supply operating over the temperature or over load limit, the power supply will be shut down automatically to protect itself.				

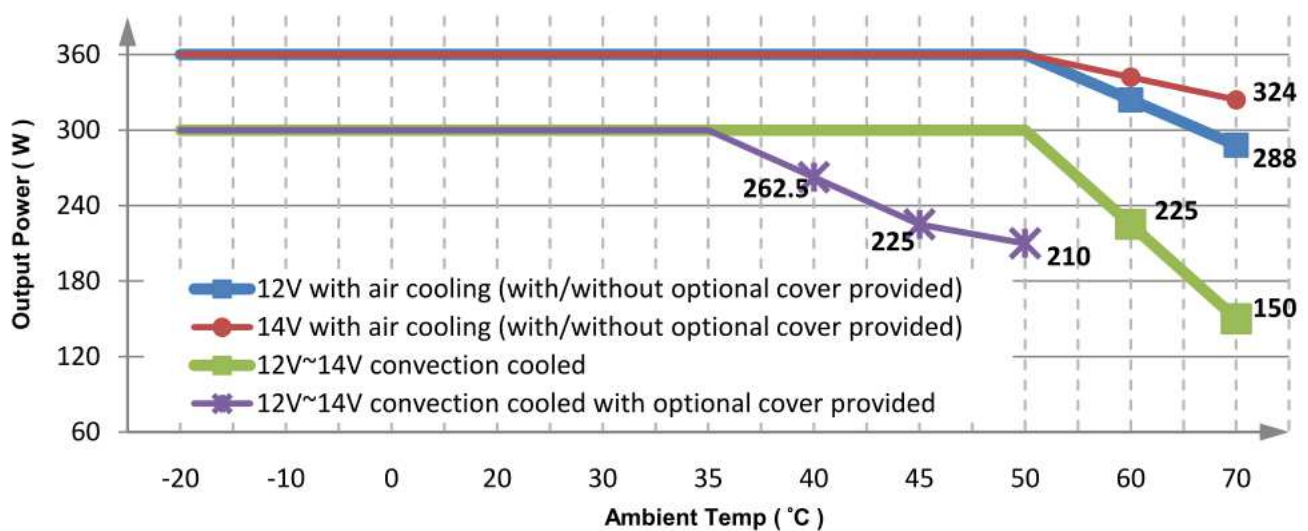
### General

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Efficiency			91	%	AC 230V input, rated load.
Switching Frequency		65		KHZ	

### Environmental

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Low temperature start up	-20			°C	
Operating Temperature	-20		+70	°C	Derate above 50°C to a maximum temperature of 70°C as curves below.
Storage Temperature	-20		+85	°C	
Relative Humidity	5		95	%RH	Non-condensing.
Cooling		40.6		CFM	Forced-cooled @ 360W
Operating / Non-Operating Altitude		3000 / 4000		m	

### Derating curve



Derating curves of MPM-U303, MPM-U303-C

### EMC: Emissions

Phenomenon	Standard	Class	Notes & Conditions
Conducted	EN 60601-1-2: 2001 EN 55011 / EN 55022	B	
Radiated	EN 60601-1-2: 2001 EN 55011 / EN 55022	B	
Harmonic Current	EN 61000-3-2	D	
Voltage Flicker	EN 61000-3-3	D	

### EMC: Immunity

Phenomenon	Standard	Criteria	Notes & Conditions
ESD	IEC 61000-4-2: 2001	A	8KV air discharge, 6KV contact discharge
Radiated	IEC 61000-4-3: 2002	A	10V/m, 80 - 2700MHz
EFT	IEC 61000-4-4: 2004	A	2KV line & PE
Surges	IEC 61000-4-5: 2001	A	1KV line to line, 2KV line to PE
Conducted	IEC 61000-4-6: 2004	A	10V
Power Magnetic	IEC 61000-4-8: 2001	A	3A/m
Dips and Interruptions	IEC 61000-4-11: 2004	A A A-B* B	DIP: >95%, 0.5 cycle DIP: 30%, 25 cycles DIP: 60%, 5 cycles INT: >95%, 250 cycles

\* Criteria A option by request separately, find Option for detail.

Note:

- As a build-in type power supply, the power supply needs to be installed in a suitable enclosure to pass the EMI/EMC tests. The final assembly has to comply with the valid EMI/EMC and safety.

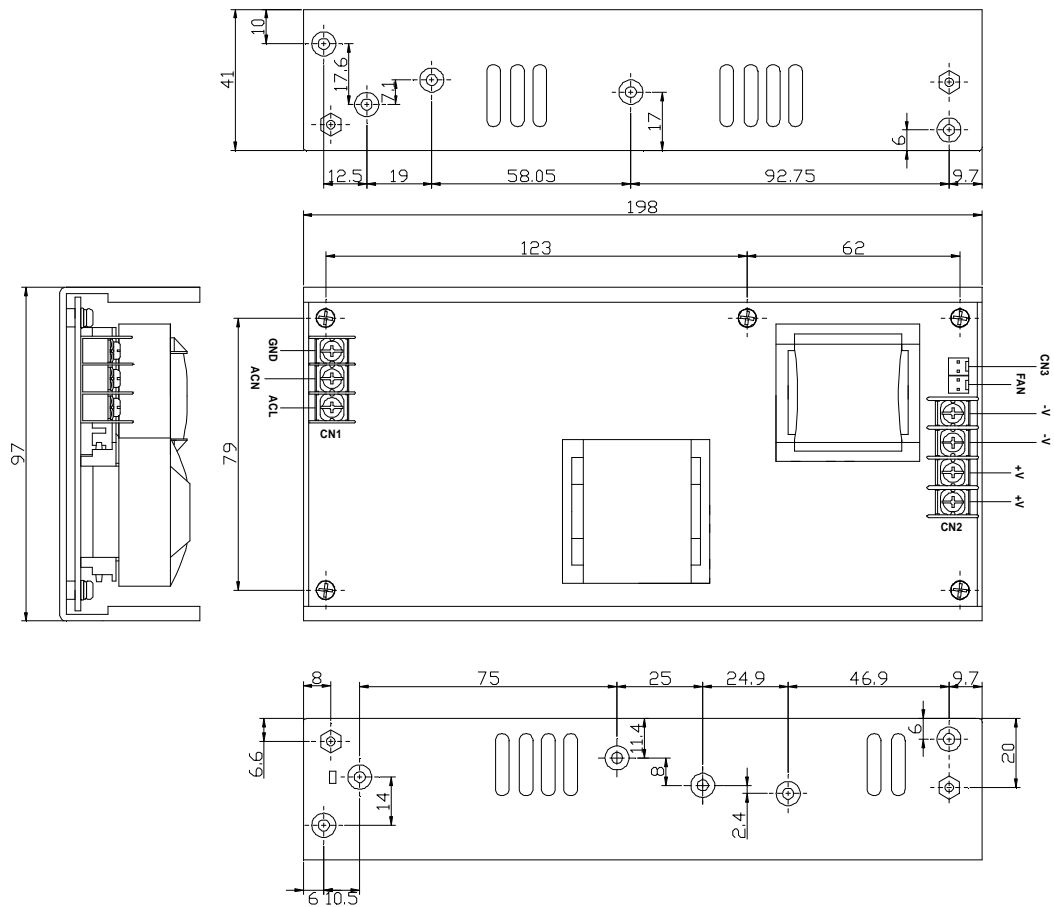
### Safety Approvals

Safety Agency	Safety Standard	Notes & Conditions
TUV	EN 60601-1: 2006 (3 <sup>rd</sup> edition)	Designed to meet.
CB	IEC 60601-1: 1988+A1+A2 (2 <sup>nd</sup> edition) IEC 60601-1: 2005 (3 <sup>rd</sup> edition)	Approved.
UL/cUL	UL 60601-1, 1st Edition, 2006-04-26 CAN/CSA-C22.2 No. 601.1-M90, 2005	Approved.

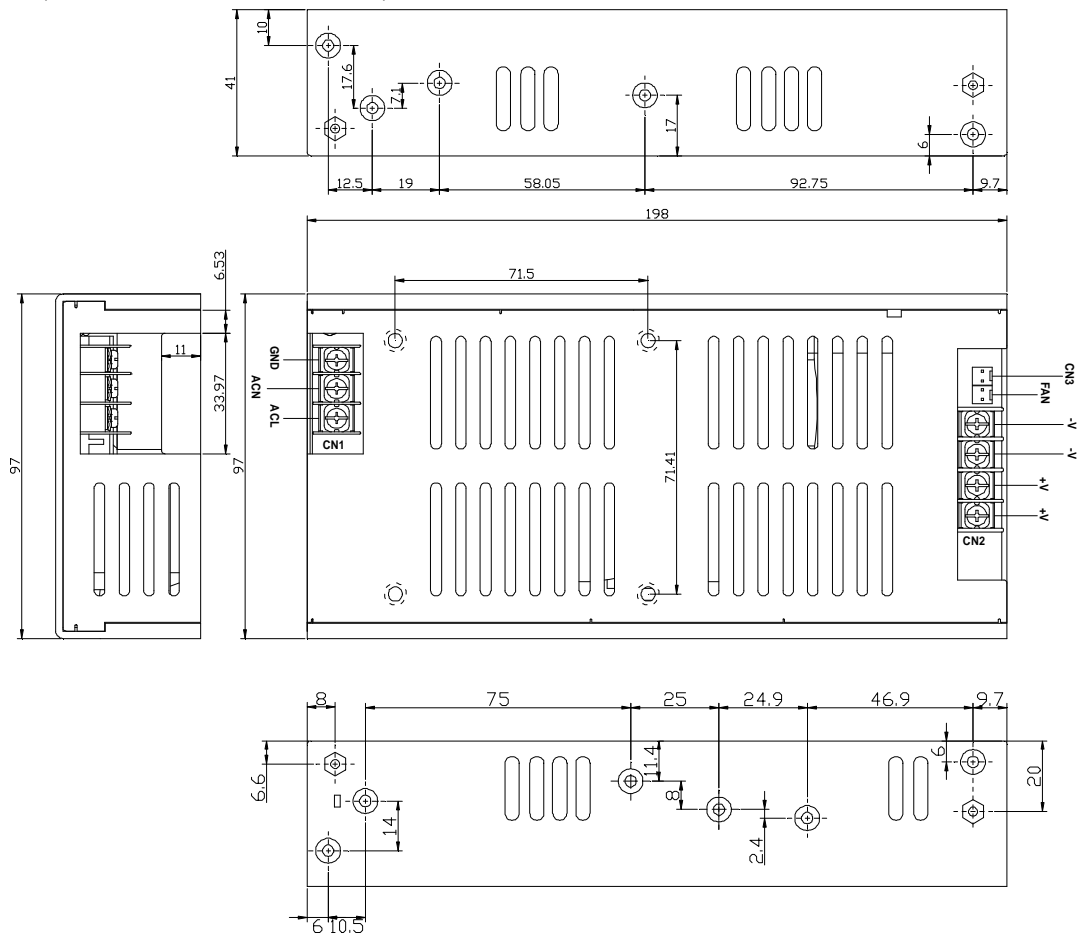
### Mechanical Details

Without cover provided

SIZE : 198 (L) x 97 (W) mm, tolerance +/- 0.4mm, with (H) 41 mm, tolerance +0/-0.5 mm.

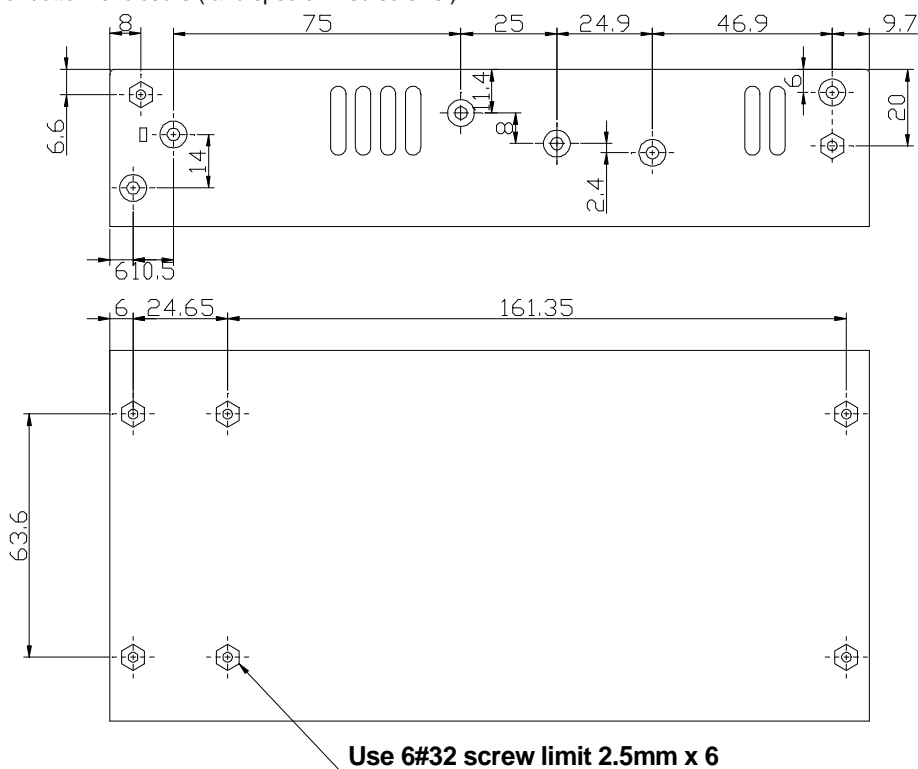


With cover provided ( Model number with suffix code: -C ):





The mechanical drawing of bottom enclosure ( and spec of fixed screws ):



**Measuring the screw protrusion first:**

Customer system chassis

SCREW

2.5

Parameter	Conditions/Description			
Dimension <sup>(Note 2)</sup>	198 (L) x 97 (W) mm, tolerance +/- 0.4mm, with (H) 41 mm, tolerance +0/-0.5 mm.			
Connector	CN1 --- AC input: 3 Positions Terminal Blocks, European type by request. CN2 --- DC output: 4 Positions Terminal Blocks, European type by request. CN3 --- Output remote sense: 2 Positions			
Pin Assignment	CN1	Pin	1. 2. N L	3. GND
	CN2	Pin	1. 2. V+ V	3. V- 4. V-
	CN3	Pin	1. Remote Sense +	2. Remote Sense -
	FAN <sup>(Note 1)</sup>	Pin	1. V+	2. V-

Note:

1. The voltage of fan is the same with the output voltage of power supply.
2. The tolerance of height would be  $\pm 0.5$ mm when with cover provided (model number with suffix code: -C).

Option

\* Please contact us for the availability and pricing.

Parameter	Conditions/Description
Cover (P/N 831-U30U)	Order part number with suffix code "-C", with cover assembled.
DIP criteria A (for MPM-U303 only)	Criteria A is only at output loading under 240W condition; When output loading above 240W, it will be criteria B. Order part number MPM-U303-D.
Cover & DIP criteria A	Both with cover provided and DIP criteria A complies, is with suffix code "-E".
European terminal block appliance	Order part number with suffix code "-ET" with European terminal blocks both input CN1 and output CN2.
UPS charger module	Additional module available by request separately for UPS charger function.
Multi outputs module	Additional module available by request separately for multi outputs.

### Thermal Considerations

In order to ensure safe operation of the PSU in the end-use equipment, the temperature of the components listed in the table below must not be exceeded.

Temperature should be monitored using J type thermocouples placed on the hottest part of the component (out of any direct air flow). See Mechanical Details for component locations.

Temperature Measurements at max. amb.	
Component	Max Temperature
T1	110°C
Q1A	120°C
D5	120°C
C7, C7A, C7B, C7C	105°C
C21, C22, C22A	105°C