SPECIFICATION

For

SWITCHING POWER SUPPLY

M/N: MPM-U304

Revision

Version	Revise Date	Change Items
Rev. 01	July. 27. 2016	Established.
Rev. 02	Feb. 23. 2017	Delete TUV logo and changed Safety Approvals to “design to meet” and “CB approved”.
Rev. 03	Feb. 8. 2018	Changed form.
Rev. 04	Mar. 9. 2018	1.Added Designed to meet IEC 60601-1-2 4th ed. EMC. 2.Changed EMC and Safety Approvals.

MPM-U304

300W Medical AC / DC

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(2nd & 3rd), EN 60601-1(3rd), UL 60601-1 type BF rated.
- ✓ Designed to meet IEC 60601-1-2 4th ed. EMC.

BF direct patient contact

Models & Ratings

Model Number	Rated Output Power	Max. Output Power	Output Voltage	Min. Current
MPM-U304	300 W	360 W	+14-17 V / 15 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 15V which would be adjusted at factory.

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				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 610003-3: 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 (2nd edition), IEC 60601-1: 2005 (3rd edition), EN 60601-1: 2006 (3rd 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：6.3A / 250VAC * 2pcs				

Output

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Output Voltage		+14-17 / 15		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		±2		%	Total regulation is measured a setting output voltage. Input voltage is from 90-264VAC and output from 0W to 360W.
Ripple & Noise		140 – 170 / 150		mV	Measured at rated load by a 20MHz bandwidth limited oscilloscope and the each output is connected with a 10μF Electrolytic Capacitor and a 0.1uF Ceramic Capacitor.
Remote Voltage sense	Compensates for wire voltage drop.				Only applies to 14~16V 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.				

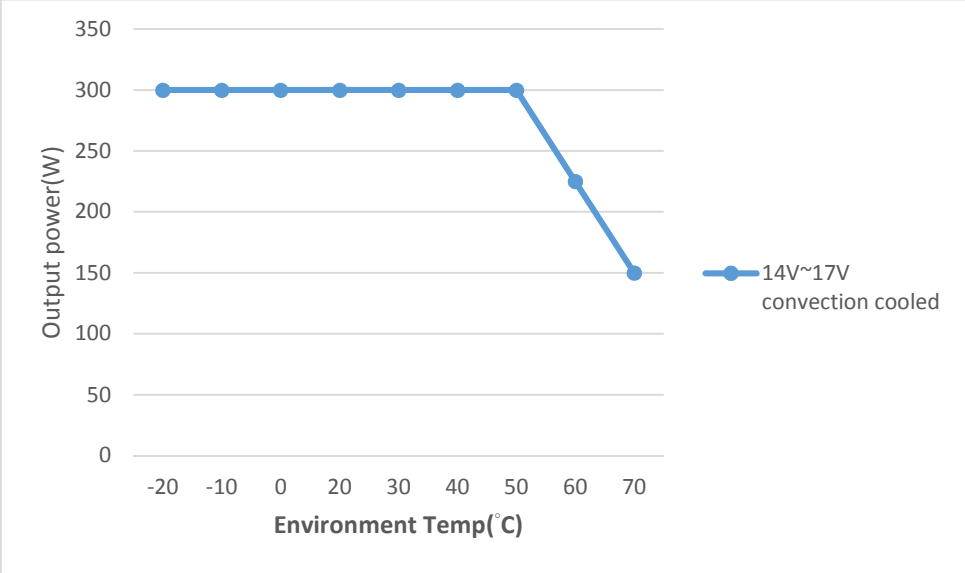
General

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



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:

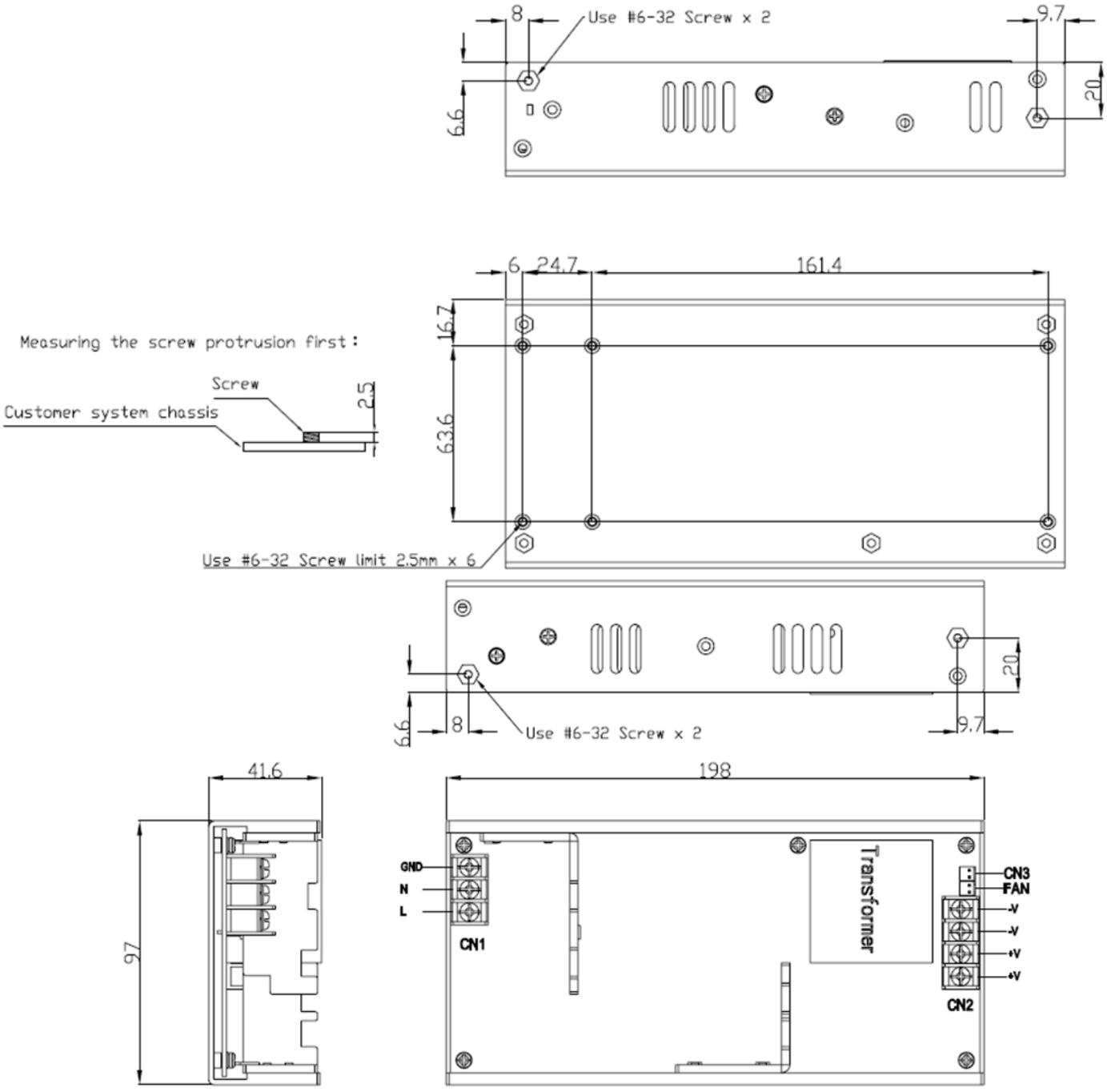
1. As a build-in type power supply, the power supply needs to be installed in a suitable enclosure to pass the EMI/EMC tests. The final assembly has to comply with the valid EMI/EMC and safety.

Safety Approvals

Safety Agency	Safety Standard	Notes & Conditions
TUV	EN 60601-1: 2006 (3rd edition)	Designed to meet.
CB	IEC 60601-1: 1988+A1+A2 (2nd edition) IEC 60601-1: 2005 (3rd 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.



Parameter	Conditions/Description					
Dimension (Note 2)	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. L	2. N	3.GND	
	CN2	Pin	1. V+	2. V+	3. V-	4. V-
	CN3	Pin	1. Remote Sense +		2. Remote Sense –	
	FAN (Note 1)	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 ± 0.5mm 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℃
Q1A	120℃
D5	120℃
C7, C7A, C7B, C7C	105℃
C21, C22, C22A	105℃