SPECIFICATION

For

SWITCHING POWER SUPPLY

M/N: MPM-U300 series

BF direct patient contact rated

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, EN 60601-1, UL 60601-1 type BF rated
- Two units parallel possible with worst case leakage current less than 300μA (see section 9 option)

1. Description

MPM-U300 series is a fan-less 300W, U-frame, switching power supply with active PFC function for medical application.

Model Number	Output Voltage Range (Note 1)	Min. Output Current	Rated Output Power	Max. Output Power (Note 7)	Total Regulation (Note 2)	Ripple & Noise p-p (Note 3)	Initial Setting Accuracy (Note 4)
MPM-U303	+12-14V / 12V	0A	300W	360W	±2%	±1%	1%
MPM-U305	+19-28V / 24V	0A	300W	360W	±2%	±1%	1%
MPM-U30R	+36V	0A	8.05A	9.72A	±2%	±1%	1%
	+5V (floating)	0A	1.5A	2A	±5%	120mV	5%

Total Output Power: total maximum power is rated 300W, peak 360W max. 5 seconds with convection cooled; max. 360W continuously with minimum 23.3CFM (Note 5) forced air cooling at 50°C environment temperature (Note 6).

Note:
1) Output voltage can be adjusted by variable resistor with nominal 12/24V which would be adjusted at factory.
2) Total regulation is measured a setting output voltage. Input voltage is from 90-264VAC and output from 0W to 360W.
3) Measured by a 20MHz bandwidth limited oscilloscope and the each output is connected with a 10μF Electrolytic Capacitor and a 0.1μF Ceramic Capacitor.
4) Voltage setting is at nominal AC input voltage 60% rated load and 25°C.
5) Higher forced air cooling up to 40.6CFM is recommended for MPM-U303.
6) While environment temperature over 25°C, an accessory L-type heat sink (min. 30 * 12.3 + 30 * 4 cm with 2.5mm- -thickness) Is recommended to be added at the bottom of the power supply itself for MPM-U303.
7) Max. output power at 19V output is 350W.

2. Input Specification

Parameter	Conditions/Description	Min.	Nom.	Max.	Units
Input Voltage	Continuous input range	90	115/230	264	VAC
Input Frequency	AC input.	47	50/60	63	Hz
Hold Up Time		16			ms
Inrush Current				60	A

3. Output Specification

Parameter	Conditions/Description	Min.	Nom.	Max.	Units
Efficiency	AC 230V input, rated load			91	%
Minimum load		See Chart of Description			
Ripple & Noise	Rated load, 20MHz bandwidth	See Chart of Description			
Total Regulation	On condition of a setting output voltage, input voltage from 90-264VAC and output from 0W to 360W.	See Chart of Description			

4. Interface Signals and Internal Protection

Parameter	Conditions/Description
Remote Voltage sense	Compensates for wire voltage drop.
Short Circuit Protection	Fully protected against output overload and short circuit. Automatic recovery upon of overload condition.
Over Voltage 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.

5. Part number coding

MPM-U30 X - W

Confirm availability of P/N with Magic Power.

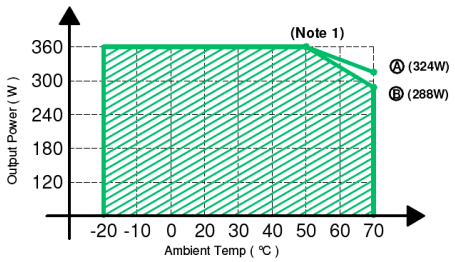
Output voltage
X = 3: +12Vdc
X = 3-1: +13.8Vdc
X = 5-19: +19Vdc
X = 5-20: +20Vdc
X = 5: +24Vdc
X = 5-28: +28Vdc
X = R: +36Vdc, +5Vdc

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.
W = S: with direction reverse protection available in two pieces serial connection application. (for MPM-U305 & MPM-U30R only)

6. Environment Specification

Parameter	Conditions/Description	Min.	Nom.	Max.	Units
Storage Temperature		-20		+85	˚C
Relative Humidity	Non-condensing.	5		95	%RH
Altitude	Operating Non-operating			2K 4K	Meter
Operating Temperature	Could be start up at -20˚C. Derate above 50˚C to a maximum temperature of 70˚C as curves below:	-20		+50 +70	˚C

Derating curves



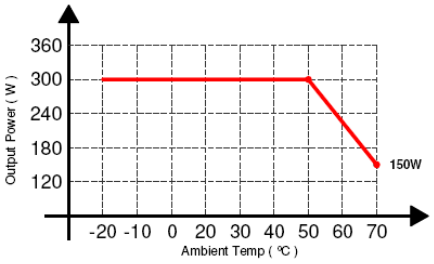
: With 23.3 CFM forced air cooling

Note: 1) The max output power at 19V output is 350W.

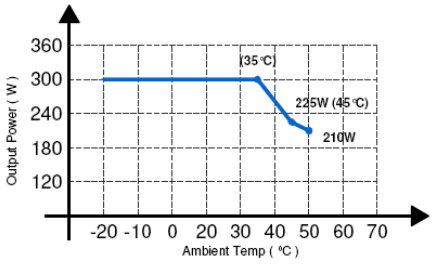
Ⓐ 14V output (Maximum adjustable output voltage of MPM-U303-C), 36V output (MPM-U30R-C)

Ⓑ 12V output (Minimum adjustable output voltage of MPM-U303-C), MPM-U305-C

1. MPM-U303:

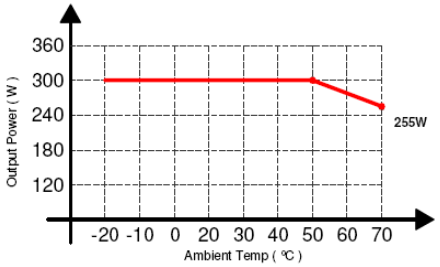


Convection cooled
(MPM-U303 ; 12V & 14V output)

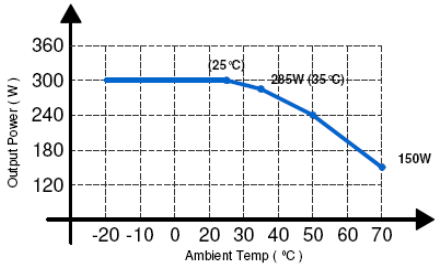


Convection cooled with optional cover
(MPM-U303-C ; 12V & 14V output)

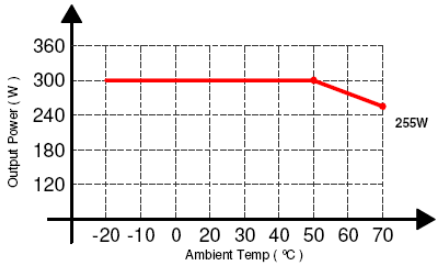
2. MPM-U305



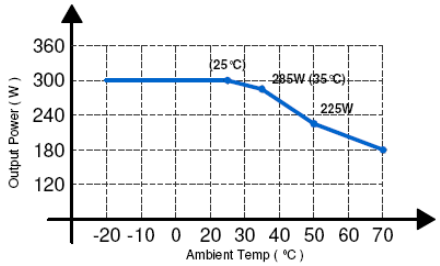
Convection cooled
(MPM-U305 ; 28V output)



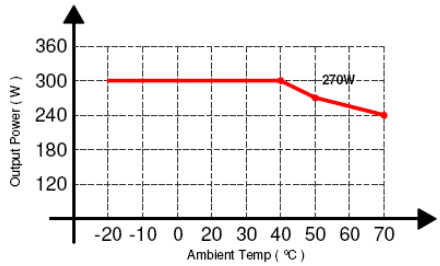
Convection cooled with optional cover
(MPM-U305-C ; 28V output)



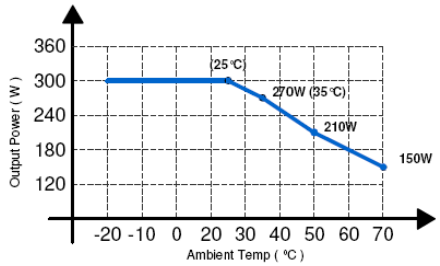
Convection cooled
(MPM-U305 ; 24V output)



Convection cooled with optional cover
(MPM-U305-C ; 24V output)

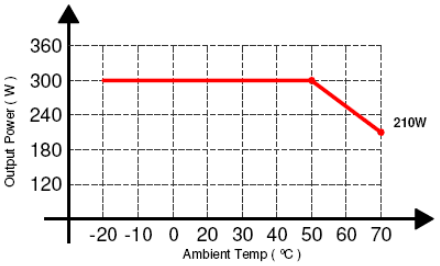


Convection cooled
(MPM-U305 ; 19V output)

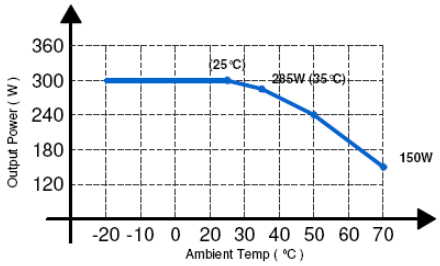


Convection cooled with optional cover
(MPM-U305-C ; 19V output)

3. MPM-U30R



Convection cooled
(MPM-U30R)



Convection cooled with optional cover
(MPM-U30R-C)

7. Safety Approvals, EMI and EMS Specification

Parameter	Conditions/Description	Min.	Nom.	Max.	Units
Approvals	IEC 60601-1: 1988+A1+A2		TUV approved		
	IEC 60601-1: 2005		TUV approved		
	EN 60601-1: 2006		TUV approved		
	UL 60601-1, 1st Edition, 2006-04-26		UL approved		
	CAN/CSA-C22.2 No. 601.1-M90, 2005		cUL approved		
Leakage Current	Patient Leakage Current at 264Vac, 63Hz normal condition	BF			Type
	(Primary to Earth GND)			150	uA
	(Secondary to Earth GND)			100	uA
EMI (Note 1)	EN 60601-1-2: 2001	B			
	EN 55011 / EN 55022	B			Class
PFC	EN 61000-3-2: 2000 & EN 610003-3: 2001	D			
EMS	IEC 61000-4-2: 2001, 8KV air discharge, 6KV contact discharge	A			
	IEC 61000-4-3: 2002, 10V/m	A			
	IEC 61000-4-4: 2004, 2KV line & PE	A			
	IEC 61000-4-5: 2001, 1KV line to line, 2KV line to PE	A			
	IEC 61000-4-6: 2004, 10V/m	A			
	IEC 61000-4-8: 2001, 3A/m	A			
	IEC 61000-4-11: 2004, Voltage dips >95%, 0.5 cycle	A			
	Voltage dips 30%, 25 cycles	A			
	Voltage dips 60%, 5 cycles	A-B*			
	Voltage interruptions >95%, 250 cycles	B			

Criteria

*** Criteria A option by request separately, find section 9 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.

8. Mechanical

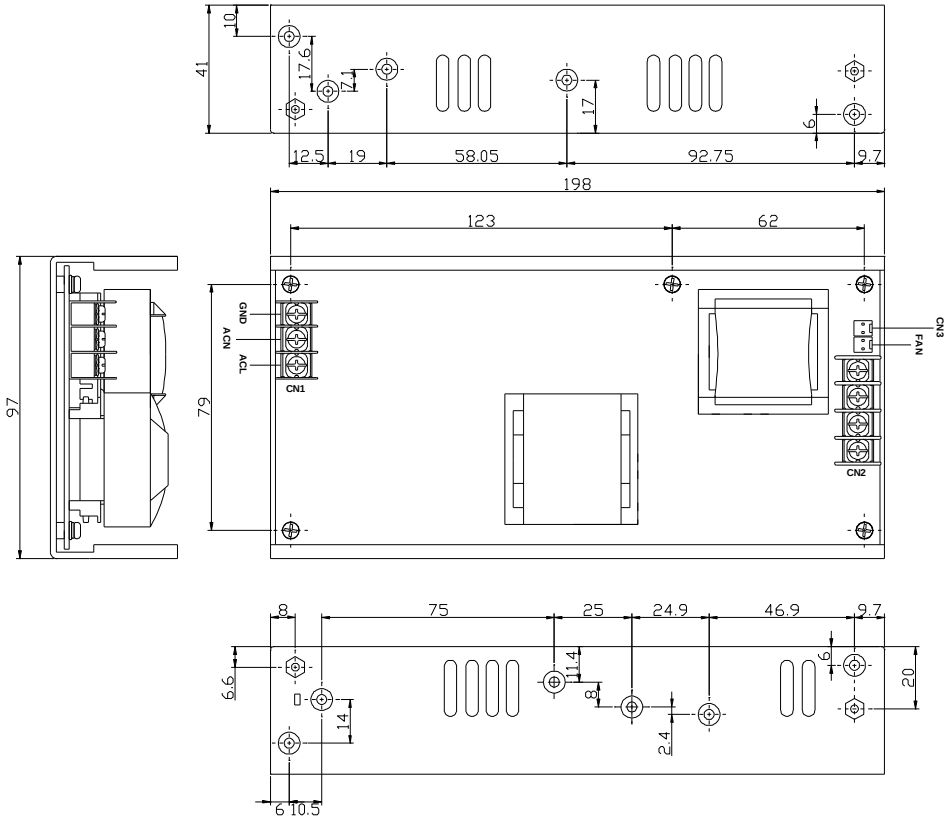
Parameter	Conditions/Description				
Dimension	198 (L) x 97 (W) mm, tolerance +/- 0.4mm, with (H) 41 mm, tolerance +0/-0.5 mm.				
Connector	CN1 --- AC input:	3 Positions Terminal Blocks, European type by request.			
	CN2 --- DC output:	4 Positions Terminal Blocks, European type by request.			
	CN3 --- 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. +	2. -		

Note: 1) The voltage of fan is the same with the output voltage of power supply.

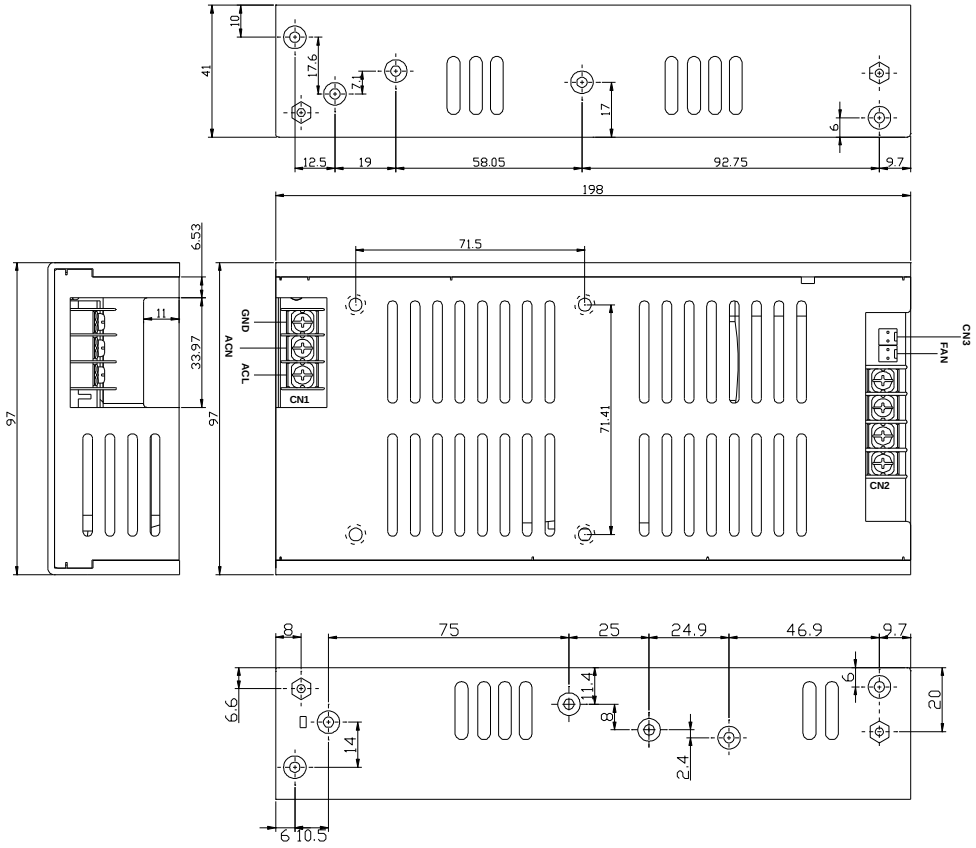
※The mechanical drawing is on next page.

Mechanical drawing

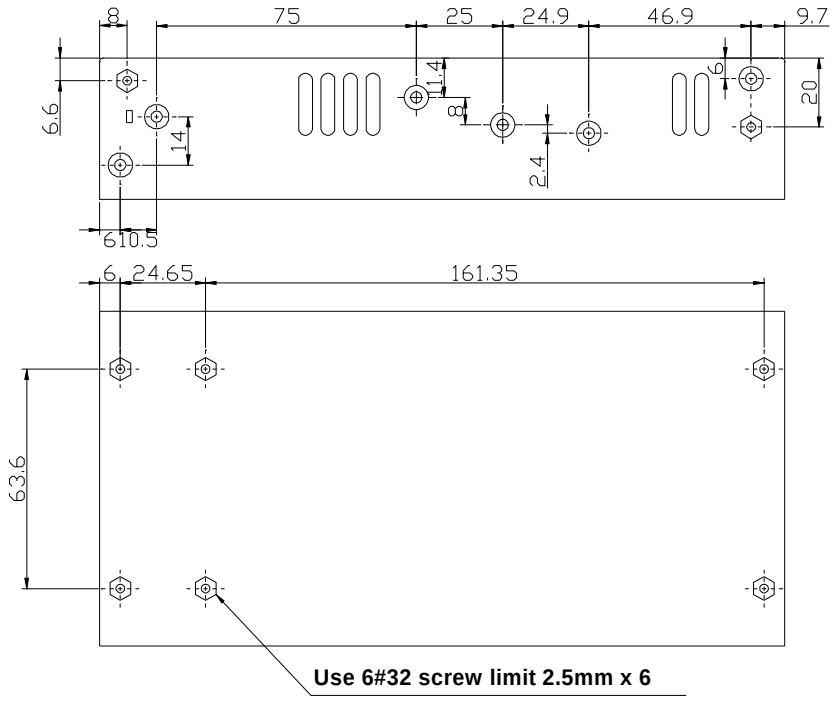
Without cover provided:

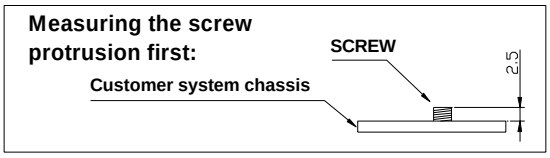


With cover provided (Model number with suffix code: -C):



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





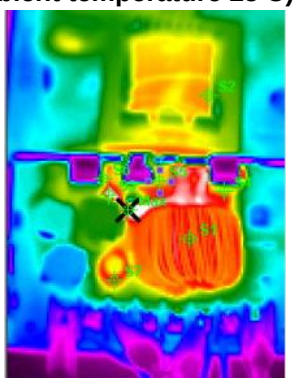
9. Option

Parameter	Conditions/Description *** Please contact us for the availability and pricing**
Cover (P/N 831-U30U)	Order part number with suffix code "–C" with cover assembled.
DIP criteria A (for MPM-U305 only)	Additional storage electronic capacitors provided to comply with criteria A of voltage dips at 100Vac input. Order part number MPM-U305-D.
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.
DIP criteria A (for MPM-U30R only)	Criteria A is only at output loading under (TBD)W condition; When output loading above (TBD)W, it will be criteria B. Order part number MPM-U30R-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.
Available for two pieces in serial connection (for MPM-U305 and MPM-U30R only)	Order part number with suffix code "-S", with direction reverse protection available in two pieces serial connection application.
Redundant module (for MPM-U305 only , P/N 900-RD30)	Additional module available by request separately for redundant function. Earth leakage current with two units parallel mode up to 500/600W is less than 300μA at 264Vac, 63Hz normal condition and 500μA single fault condition.
UPS charger module (not apply to MPM-U30R)	Additional module available by request separately for UPS charger function.
Multi outputs module (not apply to MPM-U30R)	Additional module available by request separately for multi outputs.

10. Performance

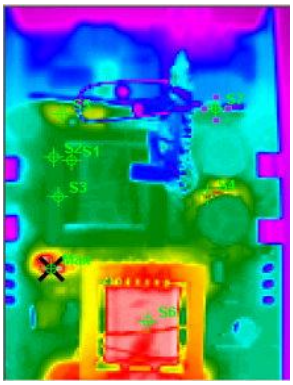
Thermal (input 115V/50Hz, output 24Vdc / full load, ambient temperature 25˚C)

#	Temp.
S1	84.0°C
S2	87.4°C
S3	99.7°C
S4	93.3°C
S5	92.6°C
S6	87.6°C
S7	89.2°C
Primary part	

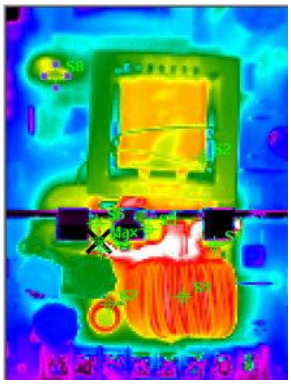


#	Temp.
S1	96.4°C
S2	90.6°C
S3	104.1°C
S4	89.0°C
S5	88.2°C
S6	82.3°C
S7	94.3°C
Secondary part	

Thermal (input 230V/50Hz, output 24Vdc / full load, ambient temperature 25˚C)

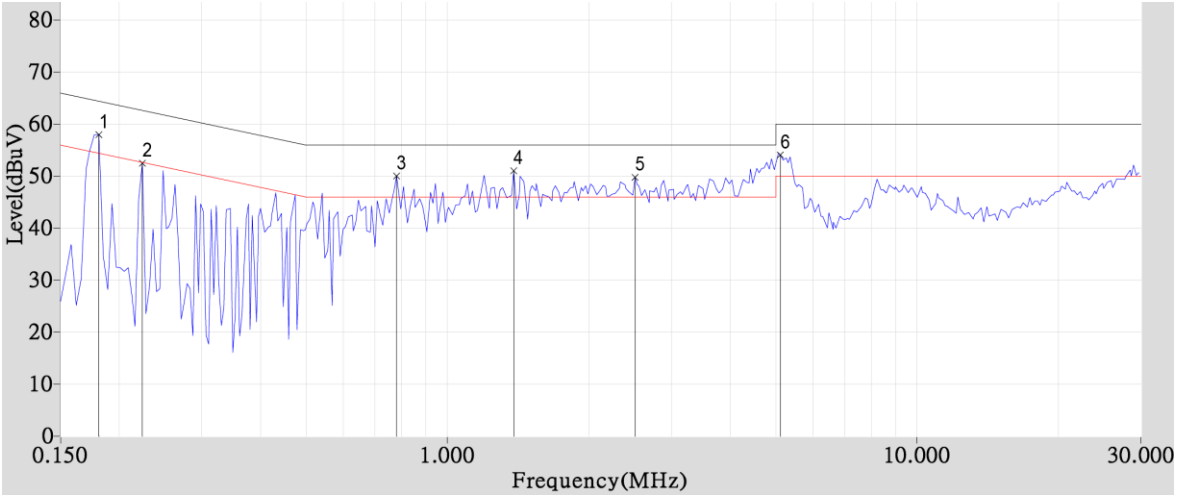


#	Temp.
S1	65.5°C
S2	63.8°C
S3	62.8°C
S4	83.7°C
S5	73.7°C
S6	88.9°C
S7	62.5°C
Primary part	



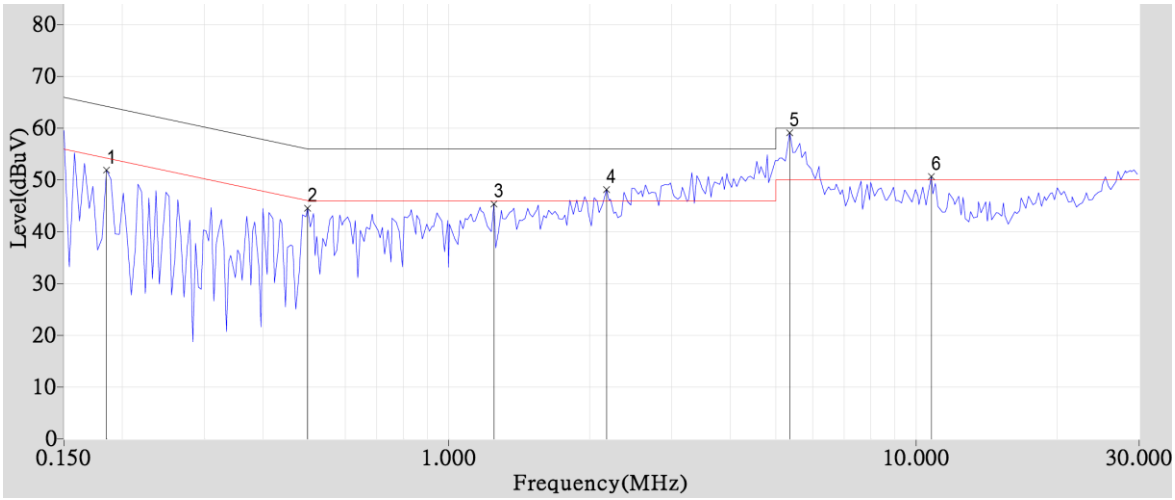
#	Temp.
S1	96.6°C
S2	91.9°C
S3	103.1°C
S4	89.5°C
S5	87.5°C
S6	88.8°C
S7	95.0°C
Secondary part	

Conduction Line (input 230V/50Hz, output 24Vdc, and full load)



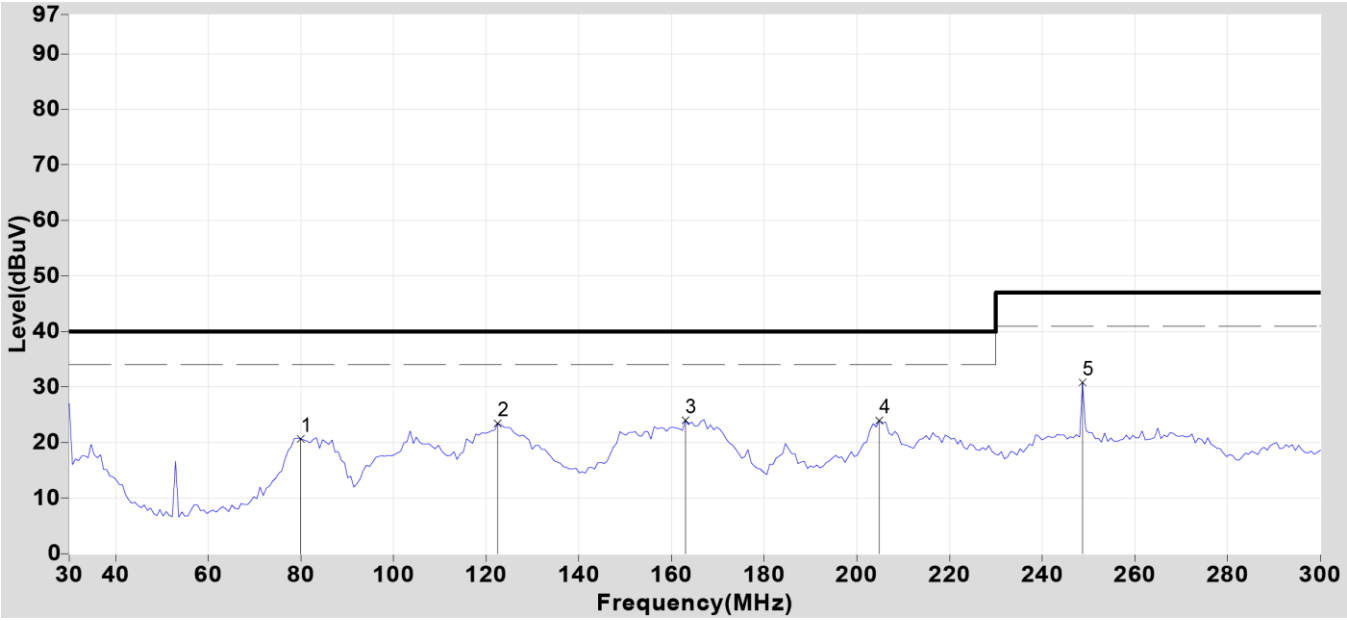
	QP/AV Freq.	QP/AV Level	Margin	Limit Level	Read Level	Total Factor	Ant. Factor	Cable Factor	Other Factor	Det. Mode
	MHz	dBuV	dB	dB	dBuV	dB	dB	dB	dB	
1	0.181	52.17	-12.27	64.44	52.00	0.17	0.07	0.10	0.00	QP
1	0.181	35.37	-19.07	54.44	35.20	0.17	0.07	0.10	0.00	AV
2	0.224	47.86	-14.81	62.67	47.71	0.15	0.06	0.09	0.00	QP
2	0.224	27.89	-24.78	52.67	27.74	0.15	0.06	0.09	0.00	AV
3	0.779	44.52	-11.48	56.00	44.43	0.09	0.06	0.03	0.00	QP
3	0.779	32.92	-13.08	46.00	32.83	0.09	0.06	0.03	0.00	AV
4	1.384	43.08	-12.92	56.00	43.01	0.07	0.07	0.00	0.00	QP
4	1.384	32.84	-13.16	46.00	32.77	0.07	0.07	0.00	0.00	AV
5	2.509	44.35	-11.65	56.00	44.26	0.09	0.09	0.00	0.00	QP
5	2.509	36.88	-9.12	46.00	36.79	0.09	0.09	0.00	0.00	AV
6	5.115	49.31	-10.69	60.00	49.13	0.18	0.18	0.00	0.00	QP
6	5.115	42.11	-7.89	50.00	41.93	0.18	0.18	0.00	0.00	AV

Conduction Line (input 110V/60Hz, output 24Vdc, and full load)



	QP/AV Freq.	QP/AV Level	Margin	Limit Level	Read Level	Total Factor	Ant. Factor	Cable Factor	Other Factor	Det. Mode
	MHz	dBuV	dB	dB	dBuV	dB	dB	dB	dB	
1	0.185	50.25	-14.01	64.26	50.08	0.17	0.07	0.10	0.00	QP
1	0.185	41.37	-12.89	54.26	41.20	0.17	0.07	0.10	0.00	AV
2	0.498	43.04	-12.99	56.03	42.93	0.11	0.05	0.06	0.00	QP
2	0.498	33.01	-13.02	46.03	32.90	0.11	0.05	0.06	0.00	AV
3	1.248	41.26	-14.74	56.00	41.20	0.06	0.06	0.00	0.00	QP
3	1.248	31.76	-14.24	46.00	31.70	0.06	0.06	0.00	0.00	AV
4	2.173	42.78	-13.22	56.00	42.70	0.08	0.08	0.00	0.00	QP
4	2.173	34.25	-11.75	46.00	34.17	0.08	0.08	0.00	0.00	AV
5	5.357	51.99	-8.01	60.00	51.80	0.19	0.19	0.00	0.00	QP
5	5.357	44.29	-5.71	50.00	44.10	0.19	0.19	0.00	0.00	AV
6	10.767	41.62	-18.38	60.00	41.10	0.52	0.42	0.10	0.00	QP
6	10.767	36.40	-13.60	50.00	35.88	0.52	0.42	0.10	0.00	AV

Radiation Vertical (input 230V/50Hz, output 24Vdc, and full load)



Radiation Vertical (input 110V/60Hz, output 24Vdc, and full load)