



# TEST REPORT: RPS-200-48

## 200W Reliable Green Medical Power Supply

### ■ DESIGN VERIFY TEST

Output Function Test

Input Function Test

Protection Function Test

Component Stress Test

### ■ SAFETY & E.M.C. TEST

Safety Test

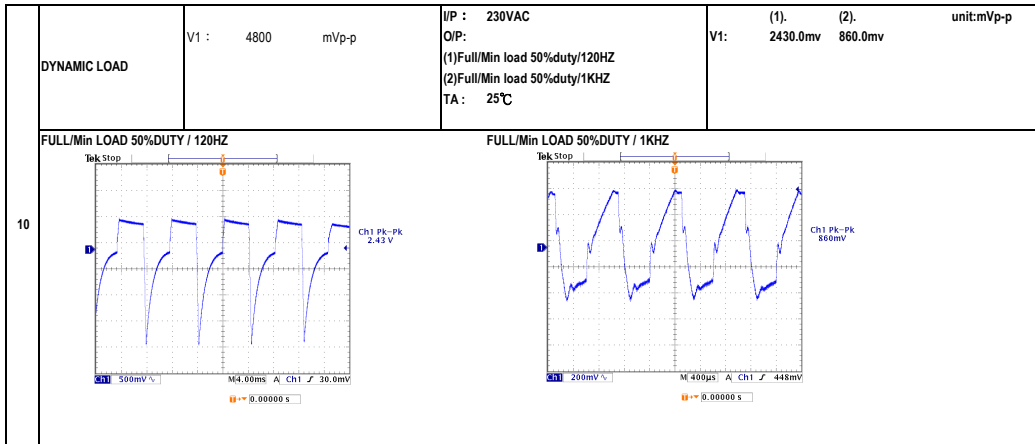
E.M.C. Test

### ■ RELIABILITY TEST

ENVIRONMENT TEST

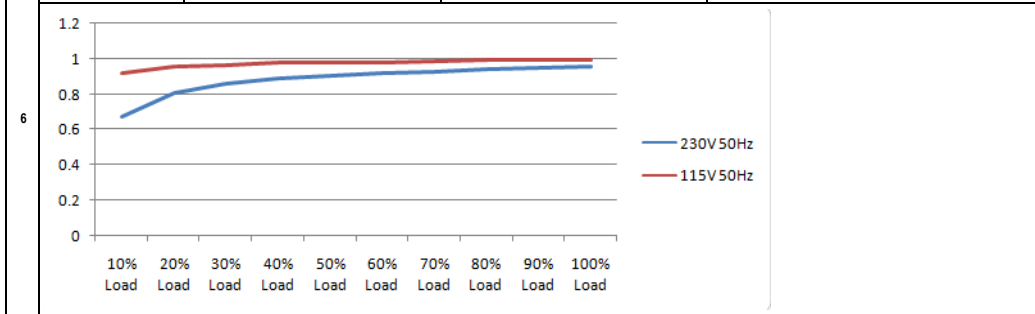
DESIGN VERIFY TEST  
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 45.60V ~ 50.40V	I/P : 230VAC O/P: MIN LOAD TA : 25°C	CH1: 44.41V ~ 51.42V
2	OUTPUT VOLTAGE TOLERANCE (Max)	V1 : 1.0% ~ -1.0%	I/P : 115VAC / 264VAC O/P: FULL / MINLOAD TA= 25°C	V1: 0.42% ~ 0.37%
3	LINE REGULATION (MAX.)	V1 : 0.5% ~ -0.5%	I/P : 115VAC / 264VAC O/P: FULL LOAD TA : 25°C	V1: 0.00% ~ 0.00%
4	LOAD REGULATION (MAX.)	V1 : 1.0% ~ -1.0%	I/P : 230VAC O/P: MIN LOAD ~ FULL LOAD TA : 25°C	V1: 0.00% ~ -0.02%
5	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230VAC O/P: FULL LOAD TA : 25°C	TEST < 2.083 %
6	RIPPLE & NOISE(Max)	V1 : 120 mVp-p	high frequency :	low frequency :
7	SET UP TIME (MAX.)	230VAC : 700ms 115VAC : 700ms	I/P : 230VAC I/P : 115VAC	230VAC : 504ms 115VAC : 216ms
		<p>INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage</p>	<p>INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage</p>	
8	RISE TIME (MAX.)	230VAC : 30ms 115VAC : 30ms	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25°C	230VAC : 15.2ms 115VAC : 15.2ms
		<p>INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage</p>	<p>INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage</p>	
9	HOLD UP TIME (TYP.)	230VAC : 16ms 115VAC : 16ms	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25°C	230VAC : 21.8ms 115VAC : 21.8ms
		<p>INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage</p>	<p>INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage</p>	

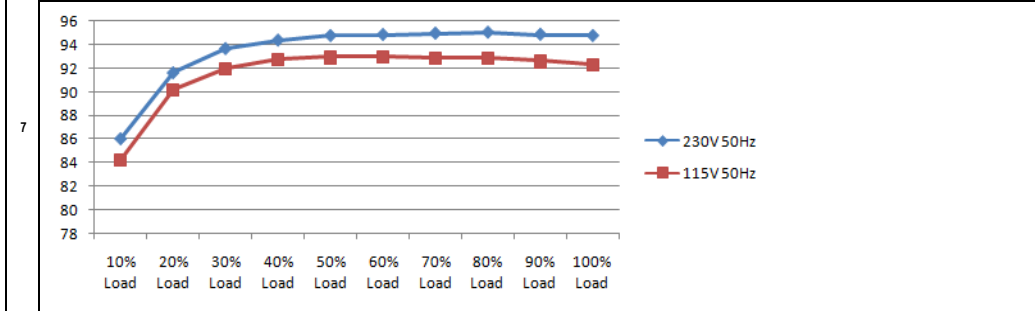


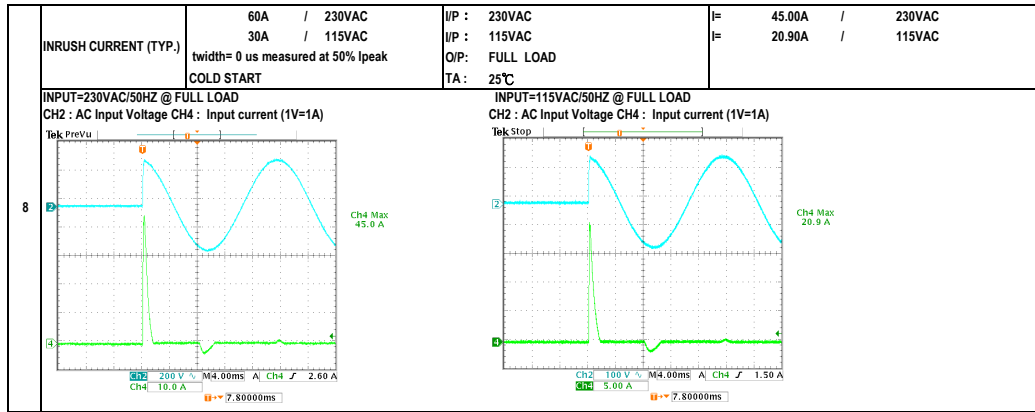
INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	80VAC ~ 264VAC 113VDC ~ 370VDC	I/P : TESTING O/P : FULL LOAD Ta : 25°C I/P : LOW-LINE = 77VAC HIGH-LINE = 300VAC O/P : FULL/MIN LOAD ON:30 Sec ; OFF:30 Sec 10MIN (POWER ON/OFF NO DAMAGE)	69.0VAC ~ 264VAC 98.6VDC ~ 370VDC TEST : OK
2	INPUT FREQUENCY RANGE	47HZ ~ 63HZ NO DAMAGE	I/P : 115VAC ~ 264VAC O/P : FULL-MIN LOAD Ta : 25°C	TEST : OK
3	INPUT CURRENT (TYP.)	1.00A / 230VAC 2.00A / 115VAC	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25°C	I= 0.97A / 230VAC I= 1.93A / 115VAC
4	LEAKAGE CURRENT	< 0.13mA Earth leakage current < 0.04mA Touch leakage current	I/P : 264VAC O/P: MIN LOAD TA : 25°C	Earth: 0.104 mA Touch: 0.035 mA
5	NO LOAD POWER CONSUMPTION	< 0.50W	I/P : 230VAC O/P: MIN LOAD TA : 25°C	< 0.3922 W
	POWER FACTOR (TYP.)	0.94 / 230VAC 0.98 / 115VAC	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25°C	PF= 0.954 / 230VAC PF= 0.993 / 115VAC



EFFICIENCY (TYP.)	95.0%	I/P : 230VAC O/P: FULL LOAD TA : 25°C	95.184 %
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PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	110% ~ 140%	I/P: 264VAC I/P: 230VAC I/P: 115VAC O/P: TESTING TA : 25°C	123.33% 264VAC 123.33% 230VAC 123.33% 115VAC Hiccup Mode
2	OVER VOLTAGE PROTECTION	52.80V ~ 62.40V	I/P: 264VAC I/P: 230VAC I/P: 80VAC O/P: MIN LOAD TA : 25°C	57.60V 264VAC 57.60V 230VAC 57.60V 80VAC Shut down Re- power ON
3	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 264VAC I/P: 80VAC O/P: FULL LOAD Ta: 25°C	NO DAMAGE Hiccup Mode
4	OVER TEMPERATURE PROTECTION	Shut down Re- power ON	I/P: 264VAC I/P: 80VAC O/P: FULL LOAD	O.T.P. Active Shut down Re- power ON

CONTROL FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	AUXILIARY POWER	12V / 0.5A ripple & noise: * mv Tolerance: -15~15 %	I/P: 230VAC O/P: FULL LOAD TA : 25°C	11.54 V/ 0.4993 A ripple & noise: * mv Tolerance: -3.833 %

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Power Transistor	Q5 Rated : 500V 13.0A Q6 Rated : 500V 13.0A	I/P : 267VAC O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	Q5 Q6 (1). 492.00V 490.00V (2). 488.00V 488.00V (3). 440.00V 450.00V
2	Input Capacitor	C5 Rated : 100uf 420V	I/P : 267VAC O/P : (1)Full Load Turn on /Off (2)Min load Turn on /Off (3)Full Load /Min load Change Ta : 25°C	(1). 418.00V (2). 413.00V (3). 418.00V
3	Control IC	U1 Rated : 38.0V (max) 13.0V (min) U101 Rated : 24V (max) 6V (min)	I/P : 267VAC O/P : (1)Full Load Turn on /Off (2)Output Short Change (4)O.V.P (5)Low Line No Load Vo(min) Ta : 25°C	U1 U101 (1). 26.50V 12.50V (2). 20.10V 1.97V (3). 20.10V 1.97V (4). 28.40V 13.60V (5). 21.40V 10.30V
4	O/P Diode (MOSFET)	Q101 Rated : 150V 18A Q102 Rated : 150V 18A	I/P : 267VAC O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	Q101 Q102 (1). 108.00V 108.00V (2). 10.20V 11.90V (3). 106.00V 206.00V
5	PFC Power Transistor	Q1 Rated : 600V 20.2A	I/P : 267VAC O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	(1). 552.00V (2). 552.00V (3). 502.00V
6	PFC Diode	D1 Rated : 600V 5.0A	I/P : 267VAC O/P : (1)Full Load Turn on (2) Output Short (3)Dynamic Load Full/Min Load 90%Duty/5KHz (4)Dynamic Load Full/Min Load 50%Duty/120Hz Ta : 25°C	(1). 508.00V (2). 458.00V (3). 518.00V (4). 528.00V

■ SAFETY & E.M.C. TEST  
SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P : 4.000KVAC /min I/P-FG : 2.000KVAC /min O/P-FG : 1.500KVAC /min	I/P-O/P: 4.400KVAC /min I/P-FG: 2.400KVAC /min O/P-FG: 1.800KVAC /min Ta : 25°C	I/P-O/P: 1.01mA I/P-FG: 1.38mA O/P-FG: 0.58mA NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P : 500VDC>100MΩ I/P-FG : 500VDC>100MΩ	I/P-O/P: 500VDC I/P-FG: 500VDC Ta : 25°C/70%RH	I/P-O/P: 9999MΩ I/P-FG: 9999MΩ NO DAMAGE

E.M.C. TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	BS EN/EN61000-3-2 CLASS A	I/P : 230VAC /50HZ O/P : FULL LOAD Ta : 25°C	PASS
2	CONDUCTION	BS EN/EN55011 (CISPR11) CLASS B	I/P : 230VAC /50HZ O/P : FULL LOAD / 50% LOAD Ta : 25°C	PASS Test by certified Lab
3	RADIATION	BS EN/EN55011 (CISPR11) CLASS B	I/P : 230VAC /50HZ O/P : FULL LOAD Ta : 25°C	PASS Test by certified Lab
4	E.S.D	BS EN/EN61000-4-2 MEDICAL AIR: 15KV / Contact: 8KV	I/P : 230VAC /50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
5	E.F.T	BS EN/EN61000-4-4 MEDICAL INPUT: 2KV	I/P : 230VAC /50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
6	SURGE	BS EN/EN61000-4-5 MEDICAL L-N:2KV;L/N-PE: 4KV	I/P : 230VAC /50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A

■ RELIABILITY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT		
1	TEMPERATURE RISE TEST	MODEL : RPS-200-24				
		1. ROOM AMBIENT BURN-IN : 1.0hrs IP: 230VAC O/P: 100% LOAD TA= 24.3°C				
		2. HIGH AMBIENT BURN-IN : 1.0hrs IP: 230VAC O/P: 100% LOAD TA= 50.6°C				
			NO. Position	ROOM AMBIENT Ta	HIGH AMBIENT Ta	50.6°C
			1	LF1	54.3°C	78.2°C
			2	LF2	50.3°C	75.0°C
			3	L2	63.3°C	88.8°C
			4	BD1	69.3°C	94.0°C
			5	Q1	71.9°C	98.0°C
			6	C5	60.4°C	85.3°C
			7	CB1	53.9°C	80.8°C
			8	L1	69.2°C	95.9°C
			9	T1	77.5°C	106.6°C
			10	C105	61.4°C	99.4°C
			11	L100	56.6°C	91.8°C
			12	Q5	85.7°C	114.6°C
			13	Q6	86.7°C	112.1°C
			14	R4	66.7°C	91.3°C
			15	R5	68.4°C	93.7°C
			16	U1	78.3°C	74.3°C
			17	D151	64.6°C	95.7°C
			18	Q101	64.5°C	97.0°C
			19	Q102	67.0°C	102.4°C
	20	R100	68.5°C	101.4°C		
	21	U101	64.0°C	98.4°C		
	22	D1	79.5°C	106.7°C		
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR ( MIN )	I/P : 230VAC O/P : 119.00% LOAD Ta : 25°C	TEST : OK		
3	LOW TEMPERATURE TURN ON TEST	NO DAMAGE 1 HOUR ( MIN )	I/P : 264VAC / 115VAC O/P : FULL LOAD Ta : -30.0°C	TEST : OK		
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50°C NO DAMAGE	I/P : 272VAC O/P : FULL LOAD Ta : 50°C HUMIDITY= 95.0% RH	TEST : OK		
5	TEMPERATURE COEFFICIENT	±0.03% /(0°C-50°C)	I/P : 230VAC O/P : FULL LOAD	±0.0000% /(0°C-50°C)		



6	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -40°C ~ +85°C 2. Temperature change rate : 25°C / MIN 3. Dwell time low and high temperature : 30 MIN/EACH 4. Total test cycle : 5 CYCLE 5. Input/Output condition : STATIC	TEST : OK
7	THERMAL SHOCK TEST	1. Thermal shock Temperature : -35°C ~ +55°C 2. Temperature change rate : 25°C / MIN 3. Dwell time low and high temperature : 30 MIN/EACH 4. Total test cycle : 10 CYCLE 5. Input/Output condition : 230VAC Full Load AC ON/OFF test turn on 58sec ; turn off 2sec	TEST : OK
8	VIBRATION TEST	1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10-500Hz (4) Acceleration : 2G (5) Test Time : 60 min in each axis (X.Y.Z) (6) Ta : 25°C	TEST : OK
9	CAPACITOR LIFE CYCLE	:SUPPOSE C105 IS THE MOST CRITICAL COMPONENT (1) I/P : 230VAC O/P : FULL LOAD Ta= 25.0°C LIFE TIME (2) I/P : 230VAC O/P : FULL LOAD Ta= 50.0°C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta= 50.0°C LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta= 50.0°C LIFE TIME	(1). 437778 HRS (2). 80132 HRS (3). 179640 HRS (4). 297469.9 HRS
10	MTBF	2669.7K hrs min. Telcordia SR-332 (Bellcore) ; 500.3K hrs min. MIL-HDBK-217F (25 °C)	
11	DMTBF /Accelerated Life test	Demonstration Mean Time Between Failure (Expected Life): Above 30000HRS O/P : FULL LOAD	@ TA 50°C

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	FRANK	GBSG	WANGDZ

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