



TEST REPORT: RPS-200-12

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

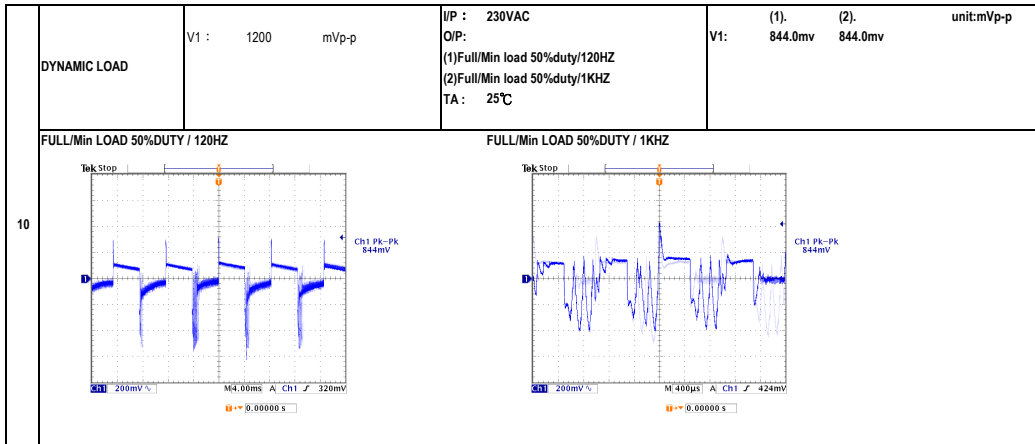
E.M.C. Test

■ RELIABILITY TEST

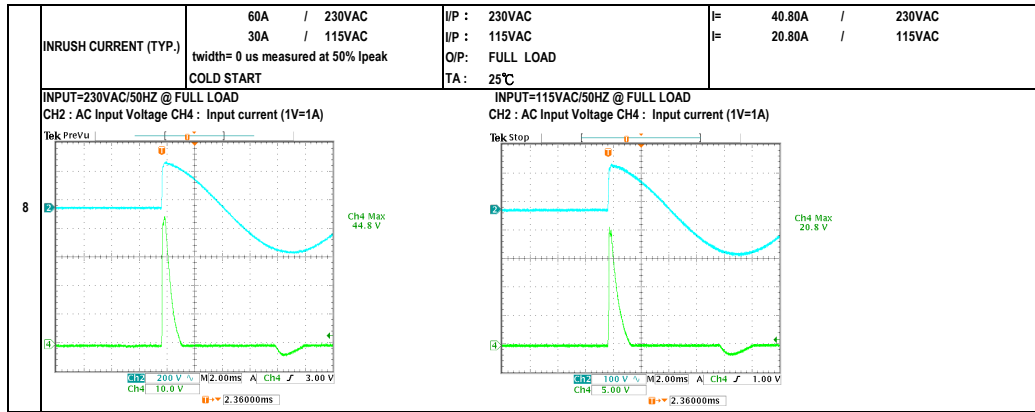
ENVIRONMENT TEST

DESIGN VERIFY TEST
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 11.40V ~ 12.60V	I/P : 230VAC O/P: MIN LOAD TA : 25°C	CH1: 11.04V ~ 12.93V
2	OUTPUT VOLTAGE TOLERANCE (Max)	V1 : 2.0% ~ -2.0%	I/P : 115VAC / 264VAC O/P: FULL / MINLOAD TA= 25°C	V1: 0.67% ~ 0.42%
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: 0.17% ~ -0.08%
5	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230VAC O/P: FULL LOAD TA : 25°C	TEST< 1.333 %
6	RIPPLE & NOISE(Max)	V1 : 100 mVp-p	high frequency :	low frequency :
7	SET UP TIME (MAX.)	230VAC : 700ms 115VAC : 700ms	I/P : 230VAC I/P : 115VAC	230VAC : 556ms 115VAC : 488ms
		INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage 	INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage 	
8	RISE TIME (MAX.)	230VAC : 30ms 115VAC : 30ms	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25°C	230VAC : 5.8ms 115VAC : 5.4ms
		INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage 	INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage 	
9	HOLD UP TIME (TYP.)	230VAC : 16ms 115VAC : 16ms	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25°C	230VAC : 17.2ms 115VAC : 17.0ms
		INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage 	INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage 	



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)	68.0VAC ~ 264VAC 96.1VDC ~ 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= 0.99A / 230VAC I= 1.95A / 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: 0.034 mA
5	NO LOAD POWER CONSUMPTION	< 0.50W	I/P : 230VAC O/P: MIN LOAD TA: 25°C	< 0.3442 W
6	POWER FACTOR (TYP.)	0.94 / 230VAC 0.98 / 115VAC	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA: 25°C	PF= 0.9566 / 230VAC PF= 0.993 / 115VAC
7	EFFICIENCY (TYP.)	93.0%	I/P : 230VAC O/P: FULL LOAD TA: 25°C	93.693 %



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	125.2% 264VAC 125.2% 230VAC 125.0% 115VAC Hiccup Mode
2	OVER VOLTAGE PROTECTION	13.20V ~ 15.60V	I/P: 264VAC I/P: 230VAC I/P: 80VAC O/P: MIN LOAD TA: 25°C	14.50V 264VAC 14.60V 230VAC 14.50V 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	11.505 V/ 0.4997 A ripple & noise: * mv Tolerance: -4.125 %

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). 498.00V 492.00V (2). 486.00V 490.00V (3). 446.00V 446.00V
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). 417.00V (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 (2)Output Short Change (4)O.V.P (5)Low Line No Load Vo(min) Ta : 25°C	U1 U101 (1). 28.10V 12.50V (2). 20.10V 3.02V (3). 20.10V 3.08V (4). 29.40V 14.20V (5). 24.10V 11.40V
4	O/P Diode (MOSFET)	Q101 Rated : 40V 100A Q102 Rated : 40V 100A	I/P : 267VAC O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	Q101 Q102 (1). 30.40V 31.40V (2). 7.20V 9.16V (3). 29.60V 30.20V
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). 550.00V (2). 550.00V (3). 550.00V
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). 514.00V (2). 462.00V (3). 504.00V (4). 502.00V

■ SAFETY & E.M.C. TEST
SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P : 4.00KVAC /min I/P-FG : 2.00KVAC /min O/P-FG : 1.50KVAC /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: 1.00mA I/P-FG: 1.39mA 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-200-12 1. ROOM AMBIENT BURN-IN : 1.0hrs IP: 230VAC O/P: 100% LOAD TA= 26.6°C 2. HIGH AMBIENT BURN-IN : 1.0hrs IP: 230VAC O/P: 100% LOAD TA= 45.8°C	ROOM AMBIENT Ta: 26.6°C HIGH AMBIENT Ta: 45.8°C																																																																																									
			<table border="1"> <thead> <tr> <th>NO.</th> <th>Position</th> <th>ROOM AMBIENT Ta</th> <th>HIGH AMBIENT Ta</th> </tr> </thead> <tbody> <tr><td>1</td><td>LF1</td><td>58.7°C</td><td>74.0°C</td></tr> <tr><td>2</td><td>LF2</td><td>53.0°C</td><td>73.1°C</td></tr> <tr><td>3</td><td>L2</td><td>67.9°C</td><td>89.5°C</td></tr> <tr><td>4</td><td>BD1</td><td>69.7°C</td><td>90.9°C</td></tr> <tr><td>5</td><td>Q1</td><td>73.7°C</td><td>95.1°C</td></tr> <tr><td>6</td><td>C5</td><td>68.6°C</td><td>89.9°C</td></tr> <tr><td>7</td><td>C81</td><td>61.2°C</td><td>84.4°C</td></tr> <tr><td>8</td><td>L1</td><td>76.2°C</td><td>98.6°C</td></tr> <tr><td>9</td><td>T1</td><td>84.9°C</td><td>101.3°C</td></tr> <tr><td>10</td><td>C105</td><td>80.6°C</td><td>93.5°C</td></tr> <tr><td>11</td><td>L100</td><td>84.4°C</td><td>93.3°C</td></tr> <tr><td>12</td><td>Q5</td><td>76.3°C</td><td>96.5°C</td></tr> <tr><td>13</td><td>Q6</td><td>73.1°C</td><td>99.0°C</td></tr> <tr><td>14</td><td>U1</td><td>77.7°C</td><td>91.9°C</td></tr> <tr><td>15</td><td>R4</td><td>68.6°C</td><td>87.0°C</td></tr> <tr><td>16</td><td>R5</td><td>70.1°C</td><td>90.8°C</td></tr> <tr><td>17</td><td>Q101</td><td>80.0°C</td><td>91.4°C</td></tr> <tr><td>18</td><td>Q102</td><td>87.2°C</td><td>99.1°C</td></tr> <tr><td>19</td><td>D151</td><td>80.7°C</td><td>105.2°C</td></tr> <tr><td>20</td><td>U101</td><td>71.0°C</td><td>95.8°C</td></tr> <tr><td>21</td><td>D1</td><td>64.1°C</td><td>87.3°C</td></tr> </tbody> </table>	NO.	Position	ROOM AMBIENT Ta	HIGH AMBIENT Ta	1	LF1	58.7°C	74.0°C	2	LF2	53.0°C	73.1°C	3	L2	67.9°C	89.5°C	4	BD1	69.7°C	90.9°C	5	Q1	73.7°C	95.1°C	6	C5	68.6°C	89.9°C	7	C81	61.2°C	84.4°C	8	L1	76.2°C	98.6°C	9	T1	84.9°C	101.3°C	10	C105	80.6°C	93.5°C	11	L100	84.4°C	93.3°C	12	Q5	76.3°C	96.5°C	13	Q6	73.1°C	99.0°C	14	U1	77.7°C	91.9°C	15	R4	68.6°C	87.0°C	16	R5	70.1°C	90.8°C	17	Q101	80.0°C	91.4°C	18	Q102	87.2°C	99.1°C	19	D151	80.7°C	105.2°C	20	U101	71.0°C	95.8°C	21	D1	64.1°C	87.3°C	
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230VAC O/P : 142.70% 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	±0.0054% /(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= 45.0°C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta= 45.0°C LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta= 45.0°C LIFE TIME	(1). 35374.5 HRS (2). 28141.7 HRS (3). 87076 HRS (4). 92487.9 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 @ TA 50°C O/P: 80% LOAD	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	FRANK	GESG	WANGDZ

2007/3/20 A50-S014