



# TEST REPORT: RPS-45-3.3

## 45W Single Output Medical Type

### ■ DESIGN VERIFY TEST

Output Function Test

Input Function Test

Protection Function Test

Component Stress Test

### ■ SAFETY & E.M.C. TEST

Safety Test

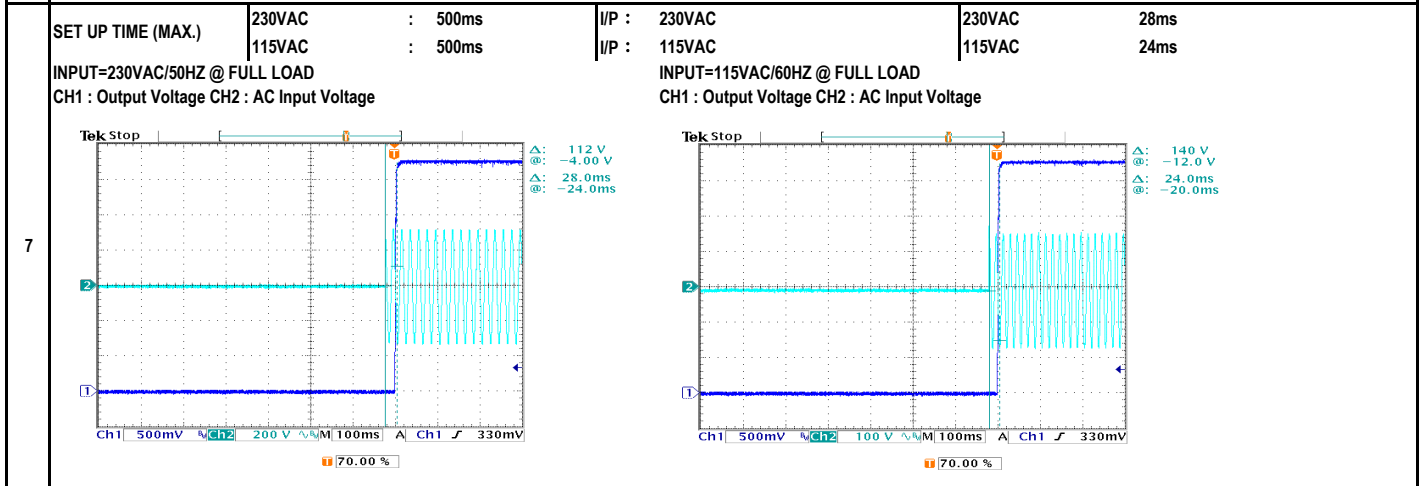
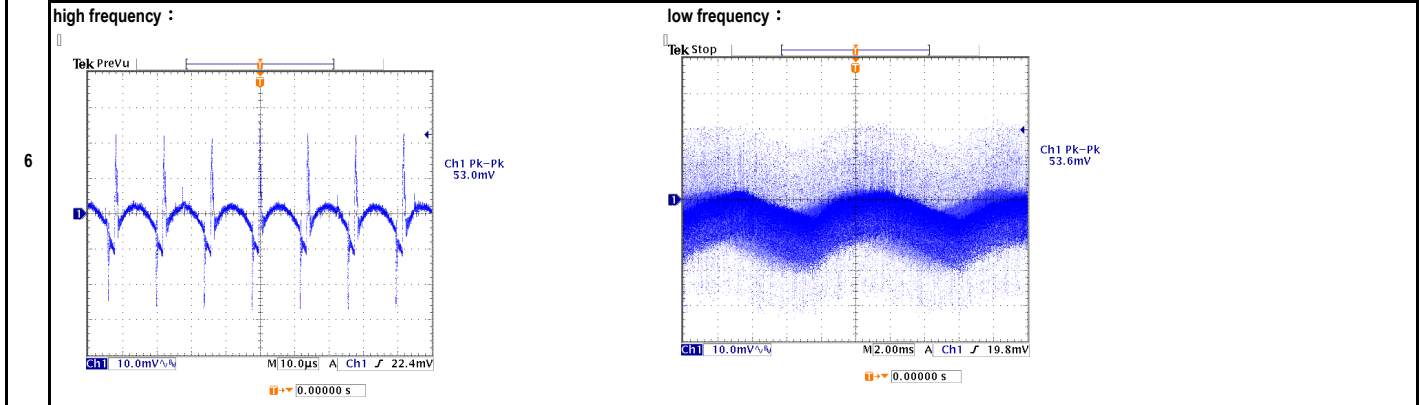
E.M.C. Test

### ■ RELIABILITY TEST

ENVIRONMENT TEST

DESIGN VERIFY TEST  
OUTPUT FUNCTION

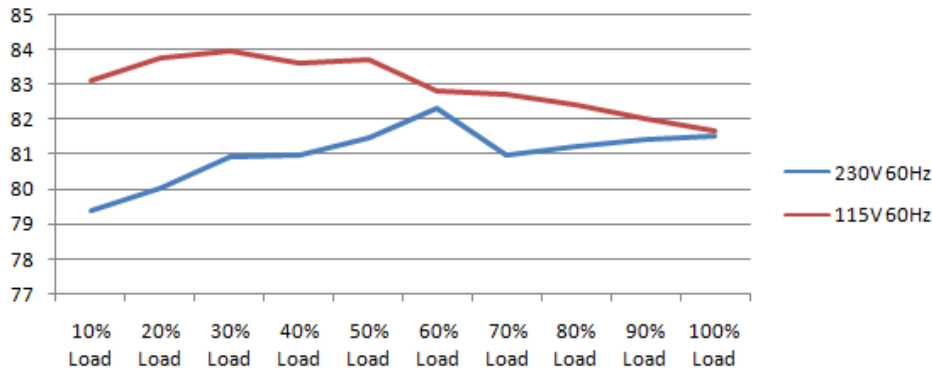
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 3.10V ~ 3.60V	I/P : 230VAC O/P: MIN LOAD TA : 25°C	CH1: 2.85V ~ 3.69V
2	OUTPUT VOLTAGE TOLERANCE (Max)	V1 : 2.0% ~ -2.0%	I/P : 115VAC / 264VAC O/P: FULL / MINLOAD TA= 25°C	V1: 0.54% ~ -0.54%
3	LINE REGULATION (MAX.)	V1 : 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 : 2.0% ~ -2.0%	I/P : 230VAC O/P: MIN LOAD ~ FULL LOAD TA : 25°C	V1: 0.54% ~ -0.54%
5	OVER/UNDERSHOOT TEST	< ±15%	I/P : 230VAC O/P: FULL LOAD TA : 25°C	TEST< 1.330 %
	RIPPLE & NOISE(Max)	V1 : 60 mVp-p	I/P : 230VAC O/P: FULL LOAD TA : 25°C	V1 : 53.6 mVp-p



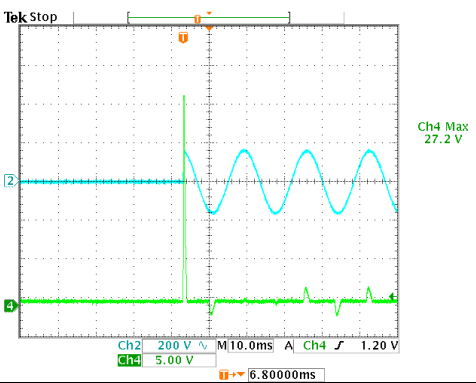
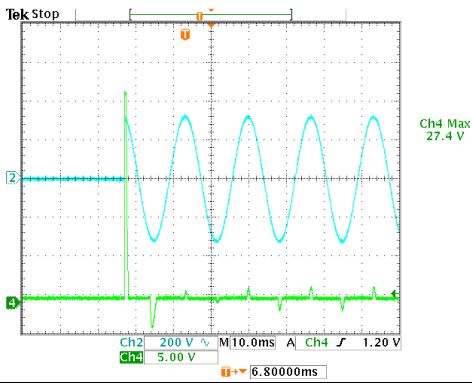
8	RISE TIME (MAX.)	230VAC : 30ms 115VAC : 30ms	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA: 25°C	230VAC : 3.4ms 115VAC : 3.4ms
	INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage	INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage		
9	HOLD UP TIME (TYP.)	230VAC : 30ms 115VAC : 12ms	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA: 25°C	230VAC : 33.6ms 115VAC : 28.8ms
	INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage	INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage		
10	DYNAMIC LOAD	V1 : 990 mVp-p	I/P : 230VAC O/P: (1) Full/Min load 50% duty/120HZ (2) Full/Min load 50% duty/1KHZ TA: 25°C	V1: (1). 308.0mv (2). 272.0mv unit:mVp-p
	FULL /50% LOAD 50%DUTY / 120HZ	FULL /50% LOAD 50%DUTY / 1KHZ		

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	80VAC ~ 264VAC	I/P : TESTING O/P : FULL LOAD Ta : 25°C	64.5VAC ~ 264VAC
			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 )	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 / 230VAC 1.2 / 115VAC	I/P : 230VAC I/P : 115VAC O/P : FULL LOAD TA : 25°C	I= 0.278 / 230VAC I= 0.472 / 115VAC
4	LEAKAGE CURRENT	< 100uA Touch current	I/P : 264VAC O/P : MIN LOAD TA : 25°C	L-FG: 84 uA N-FG: 85 uA
5	NO LOAD POWER CONSUMPTION	< 0.10W	I/P : 230VAC O/P : MIN LOAD TA : 25°C	< 0.0439 W
	EFFICIENCY (TYP.)	80.0%	I/P : 230VAC O/P : FULL LOAD TA : 25°C	81.57 %



7	INRUSH CURRENT (TYP.)	60A / 230VAC 30A / 115VAC twidh= 0 us measured at 50% Ipeak COLD START	I/P : 230VAC I/P : 115VAC O/P : FULL LOAD TA : 25°C	I= 27.40A / 230VAC I= 27.20A / 115VAC
		INPUT=230VAC/50HZ @ FULL LOAD CH2 : Input current (1V=1A) CH4 : AC Input Voltage	INPUT=115VAC/50HZ @ FULL LOAD CH2 : Input current (1V=1A) CH4 : AC Input Voltage	



**PROTECTION FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	115% ~ 150%	I/P: 264VAC I/P: 230VAC I/P: 115VAC O/P: TESTING TA: 25°C	133.6% 264VAC 134.4% 230VAC 137.1% 115VAC Hiccup Mode
2	OVER VOLTAGE PROTECTION	3.80V ~ 5.00V	I/P: 264VAC I/P: 230VAC I/P: 80VAC O/P: MIN LOAD TA: 25°C	3.99V 264VAC 3.99V 230VAC 3.99V 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

**COMPONENT STRESS TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Power Transistor	Q1 Rated : 600V 9.0A	I/P : 267VAC  VDS : O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	VIN: 267VAC VDS: (1). 474.00V (2). 464.00V (3). 462.00V
2	Input Capacitor	C5 Rated : 100uf 400V	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). 340.00V (2). 342.00V (3). 344.00V
3	Control IC	U1 Rated : 28.0V (max) -0.3V (min)	I/P : 267VAC O/P : (1)Full Load (2)Output Short (3)O.L.P (4)O.V.P (5)Low Line No Load Vo(min) Ta : 25°C	U1 (1). 23.50V (2). 15.50V (3). 24.40V (4). 17.20V (5). 14.90V
4	O/P Diode	D100 Rated : 45V 30.0A	I/P : 267VAC O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	(1). 37.20V (2). 36.20V (3). 32.60V
5	Clamp Diode	D5 Rated : 800V 2.0A	I/P : 267VAC O/P : (1)Full load continue Ta : 25°C	(1). 430.00V

**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-O/P: 4.400KVAC /min Ta : 25°C	I/P-O/P: 1.41mA NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P : 500VDC>100MΩ	I/P-O/P: 500VDC Ta : 25°C/70%RH	I/P-O/P: 9999MΩ NO DAMAGE

**E.M.C. TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	EN61000-3-2 CLASS A	I/P : 230VAC /50HZ O/P : FULL LOAD Ta : 25°C	PASS
2	CONDUCTION	EN55011 CLASS B	I/P : 230VAC /50HZ O/P : FULL LOAD / 50% LOAD Ta : 25°C	PASS Test by certified Lab

3	RADIATION	EN55011 CLASS B	I/P : 230VAC /50HZ O/P : FULL LOAD Ta : 25°C	PASS Test by certified Lab
4	E.S.D	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	EN61000-4-4 MEDICAL INPUT: 2KV	I/P : 230VAC /50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
6	SURGE	IEC61000-4-5 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-45-5 1. ROOM AMBIENT BURN-IN : 1.0hrs IP: 230VAC      O/P: 100% LOAD      TA= 31.3°C 2. HIGH AMBIENT BURN-IN : 1.0hrs IP: 230VAC      O/P: 100% LOAD      TA= 44.6°C	<table border="1"> <thead> <tr> <th>NO.</th> <th>Positio</th> <th>ROOM AMBIENT</th> <th>31.3°C</th> <th>HIGH AMBIENT Ta:</th> <th>44.6°C</th> </tr> </thead> <tbody> <tr><td>1</td><td>LF1</td><td>49.0°C</td><td></td><td>61.6°C</td><td></td></tr> <tr><td>2</td><td>LF2</td><td>44.4°C</td><td></td><td>59.4°C</td><td></td></tr> <tr><td>3</td><td>BD1</td><td>70.3°C</td><td></td><td>85.1°C</td><td></td></tr> <tr><td>4</td><td>Q1</td><td>74.9°C</td><td></td><td>89.6°C</td><td></td></tr> <tr><td>5</td><td>C5</td><td>57.2°C</td><td></td><td>69.9°C</td><td></td></tr> <tr><td>6</td><td>C40</td><td>66.3°C</td><td></td><td>78.4°C</td><td></td></tr> <tr><td>7</td><td>T1</td><td>69.4°C</td><td></td><td>80.8°C</td><td></td></tr> <tr><td>8</td><td>D100</td><td>94.2°C</td><td></td><td>105.4°C</td><td></td></tr> <tr><td>9</td><td>D101</td><td>94.5°C</td><td></td><td>106.7°C</td><td></td></tr> <tr><td>10</td><td>C105</td><td>76.0°C</td><td></td><td>87.7°C</td><td></td></tr> <tr><td>11</td><td>C106</td><td>73.5°C</td><td></td><td>85.3°C</td><td></td></tr> <tr><td>12</td><td>C107</td><td>53.4°C</td><td></td><td>68.0°C</td><td></td></tr> <tr><td>13</td><td>L101</td><td>58.4°C</td><td></td><td>70.9°C</td><td></td></tr> <tr><td>14</td><td>U1</td><td>61.2°C</td><td></td><td>73.6°C</td><td></td></tr> </tbody> </table>	NO.	Positio	ROOM AMBIENT	31.3°C	HIGH AMBIENT Ta:	44.6°C	1	LF1	49.0°C		61.6°C		2	LF2	44.4°C		59.4°C		3	BD1	70.3°C		85.1°C		4	Q1	74.9°C		89.6°C		5	C5	57.2°C		69.9°C		6	C40	66.3°C		78.4°C		7	T1	69.4°C		80.8°C		8	D100	94.2°C		105.4°C		9	D101	94.5°C		106.7°C		10	C105	76.0°C		87.7°C		11	C106	73.5°C		85.3°C		12	C107	53.4°C		68.0°C		13	L101	58.4°C		70.9°C		14	U1	61.2°C		73.6°C		
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR ( MIN )	I/P : 230VAC O/P : 130% 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% /°C(0~50°C)	I/P : 230VAC O/P : FULL LOAD	±0.0152% /°C(0~50°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 : 60min 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	(1).	158118 HRS
		(2) I/P : 230VAC	O/P : FULL LOAD	Ta= 50.0°C	LIFE TIME	(2).	19885 HRS
		(3) I/P : 230VAC	O/P : 75% LOAD	Ta= 50.0°C	LIFE TIME	(3).	56064 HRS
		(4) I/P : 230VAC	O/P : 50% LOAD	Ta= 50.0°C	LIFE TIME	(4).	158118 HRS
10	MTBF	MIL-HDBK-217F					
		TOTAL FAILURE RATE : 726.2 KHRS					
11	DMTBF /Accelerated Life test	Demonstration Mean Time Between Failure (Expected Life): Above				30000HRS @ TA 50°C	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	FRANK	GESG	WANGDZ

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