



TEST REPORT: RPS-45-5

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

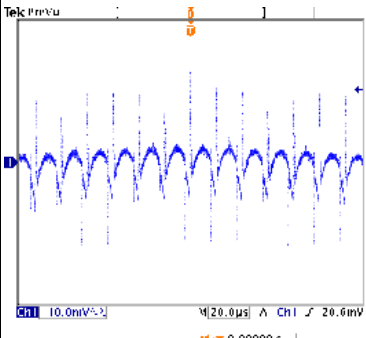
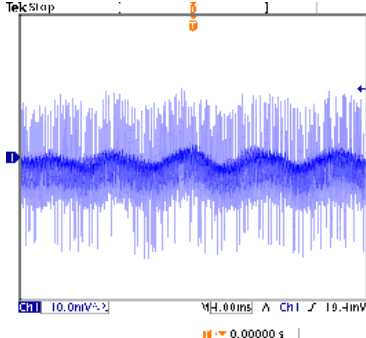
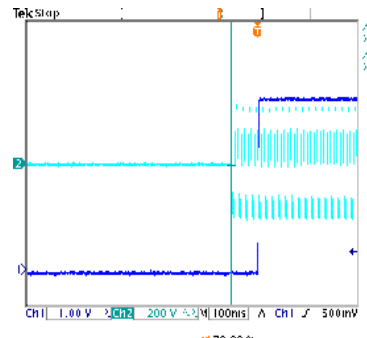
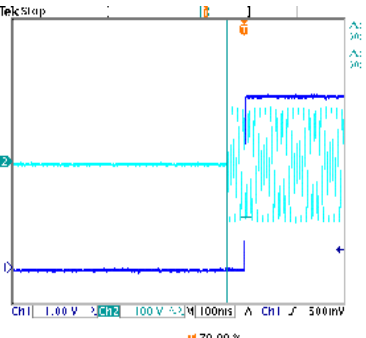
Safety Test

E.M.C. Test

■ RELIABILITY TEST

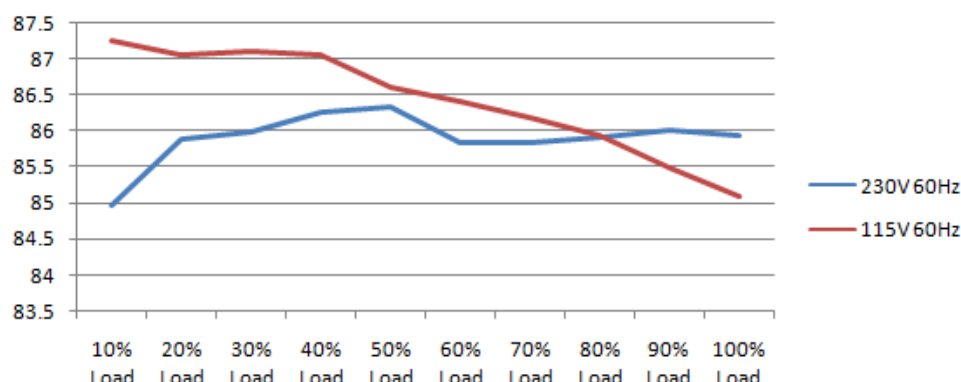
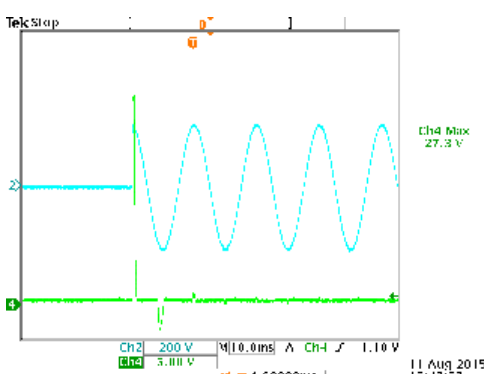
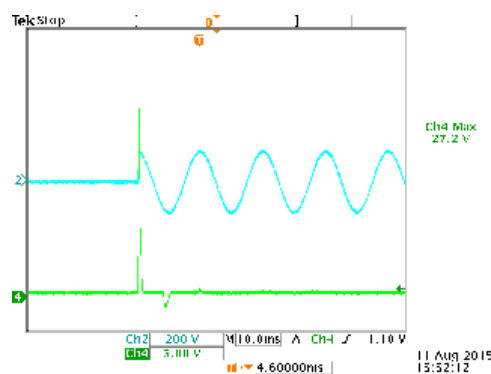
ENVIRONMENT TEST

DESIGN VERIFY TEST OUTPUT FUNCTION

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 4.70V ~ 5.50V	I/P : 230VAC O/P: MIN LOAD TA : 25°C	CH1: 4.53V ~ 5.68V
2	OUTPUT VOLTAGE TOLERANCE (Max)	V1 : 2.0% ~ -2.0%	I/P : 115VAC / 264VAC O/P: FULL / MINLOAD TA= 25°C	V1: 0.73% ~ -0.85%
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: 0.73% ~ -0.85%
5	OVER/UNDERSHOOT TEST	< ±10%	I/P : 230VAC O/P: FULL LOAD TA : 25°C	TEST< 1.250 %
6	RIPPLE & NOISE(Max)	V1 : 60 mVp-p	I/P : 230VAC O/P: FULL LOAD TA : 25°C	V1 : 49.6 mVp-p
		high frequency :		low frequency :
				
7	SET UP TIME (MAX.)	230VAC : 500ms 115VAC : 500ms	I/P : 230VAC I/P : 115VAC	230VAC : 86ms 115VAC : 58ms
	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 : 3.6ms 115VAC : 3.6ms
	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 : 60.8ms 115VAC : 19.2ms
	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 : 1000 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). 332.0mv (2). 289.0mv 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	68.4VAC ~ 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= 0.399 / 230VAC I= 0.657 / 115VAC
4	LEAKAGE CURRENT	< 100uA Touch current	I/P : 264VAC O/P : MIN LOAD TA : 25°C	L-FG: 83 uA N-FG: 84 uA
5	NO LOAD POWER CONSUMPTION	< 0.10W	I/P : 230VAC O/P : MIN LOAD TA : 25°C	< 0.0474 W
6	EFFICIENCY (TYP.)	83.0%	I/P : 230VAC O/P : FULL LOAD TA : 25°C	85.92 %
				
7	INRUSH CURRENT (TYP.)	60A / 230VAC 30A / 115VAC twidth= 0 us measured at 50% Ipeak COLD START	I/P : 230VAC I/P : 115VAC O/P : FULL LOAD TA : 25°C	I= 27.30A / 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	130.8% 264VAC 135.6% 230VAC 129.3% 115VAC Hiccup Mode
2	OVER VOLTAGE PROTECTION	5.70V ~ 6.80V	I/P: 264VAC I/P: 230VAC I/P: 80VAC O/P: MIN LOAD Ta: 25°C	6.07V 264VAC 6.07V 230VAC 6.07V 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). 486.00V (2). 474.00V (3). 474.00V
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). 348.00V (2). 350.00V (3). 348.00V
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). 19.80V (2). 11.70V (3). 20.90V (4). 19.70V (5). 15.50V
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). 34.40V (2). 30.40V (3). 33.40V
5	Clamp Diode	D5 Rated : 800V 2.0A	I/P : 267VAC O/P : (1)Full load continue Ta : 25°C	(1). 464.00V

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: 1.38mA 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℃																																																														
		2. HIGH AMBIENT BURN-IN : 1.0hrs																																																														
		IP: 230VAC O/P: 100% LOAD TA= 44.6℃																																																														
		<table><tr><td>NO.</td><td>Position</td><td>ROOM AMBIENT 31.3℃</td><td>HIGH AMBIENT Ta: 44.6℃</td></tr><tr><td>1</td><td>LF1</td><td>49.0℃</td><td>61.6℃</td></tr><tr><td>2</td><td>LF2</td><td>44.4℃</td><td>59.4℃</td></tr><tr><td>3</td><td>BD1</td><td>70.3℃</td><td>85.1℃</td></tr><tr><td>4</td><td>Q1</td><td>74.9℃</td><td>89.6℃</td></tr><tr><td>5</td><td>C5</td><td>57.2℃</td><td>69.9℃</td></tr><tr><td>6</td><td>C40</td><td>66.3℃</td><td>78.4℃</td></tr><tr><td>7</td><td>T1</td><td>69.4℃</td><td>80.8℃</td></tr><tr><td>8</td><td>D100</td><td>94.2℃</td><td>105.4℃</td></tr><tr><td>9</td><td>D101</td><td>94.5℃</td><td>106.7℃</td></tr><tr><td>10</td><td>C105</td><td>76.0℃</td><td>87.7℃</td></tr><tr><td>11</td><td>C106</td><td>73.5℃</td><td>85.3℃</td></tr><tr><td>12</td><td>C107</td><td>53.4℃</td><td>68.0℃</td></tr><tr><td>13</td><td>L101</td><td>58.4℃</td><td>70.9℃</td></tr><tr><td>14</td><td>U1</td><td>61.2℃</td><td>73.6℃</td></tr></table>			NO.	Position	ROOM AMBIENT 31.3℃	HIGH AMBIENT Ta: 44.6℃	1	LF1	49.0℃	61.6℃	2	LF2	44.4℃	59.4℃	3	BD1	70.3℃	85.1℃	4	Q1	74.9℃	89.6℃	5	C5	57.2℃	69.9℃	6	C40	66.3℃	78.4℃	7	T1	69.4℃	80.8℃	8	D100	94.2℃	105.4℃	9	D101	94.5℃	106.7℃	10	C105	76.0℃	87.7℃	11	C106	73.5℃	85.3℃	12	C107	53.4℃	68.0℃	13	L101	58.4℃	70.9℃	14	U1	61.2℃	73.6℃
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13	L101	58.4℃	70.9℃																																																													
14	U1	61.2℃	73.6℃																																																													
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230VAC O/P : 130% LOAD Ta : 25℃	TEST : OK																																																												
3	LOW TEMPERATURE TURN ON TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 264VAC / 115VAC O/P : FULL LOAD Ta : -30.0℃	TEST : OK																																																												
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50℃ NO DAMAGE	I/P : 272VAC O/P : FULL LOAD Ta : 50℃ HUMIDITY= 95.0% RH	TEST : OK																																																												
5	TEMPERATURE COEFFICIENT	±0.03% /℃(0~50℃)	I/P : 230VAC O/P : FULL LOAD	±0.0152% /℃(0~50℃)																																																												
6	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -40℃ ~ +85℃ 2. Temperature change rate : 25℃ / 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℃ ~ +55℃ 2. Temperature change rate : 25℃ / 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℃	TEST : OK																																																													



9	CAPACITOR LIFE CYCLE	:SUPPOSE C105 IS THE MOST CRITICAL COMPONENT					
		(1) I/P : 230VAC	O/P : FULL LOAD	Ta= 25.0℃	LIFE TIME	(1).	158118 HRS
		(2) I/P : 230VAC	O/P : FULL LOAD	Ta= 50.0℃	LIFE TIME	(2).	19885 HRS
		(3) I/P : 230VAC	O/P : 75% LOAD	Ta= 50.0℃	LIFE TIME	(3).	56064 HRS
		(4) I/P : 230VAC	O/P : 50% LOAD	Ta= 50.0℃	LIFE TIME	(4).	158118 HRS
10	MTBF	MIL-HDBK-217F TOTAL FAILURE RATE : 726.2 KHR					
11	DMTBF /Accelerated Life test	Demonstration Mean Time Between Failure (Expected Life): Above 30000HRS @ TA 50℃					

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	FRANK	GESG	WANGDZ

2007/3/20 A50-S014