TEST REPORT: RPS-120-12

120W Single Output Green 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

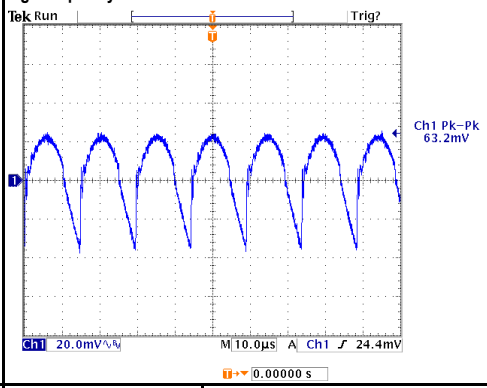
- ENVIRONMENT TEST

■ DESIGN VERIFY TEST

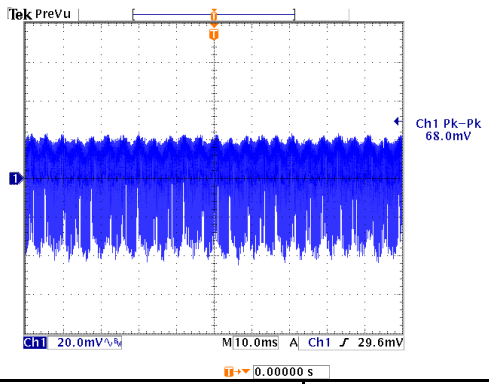
OUTPUT FUNCTION

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 11.40V ~ 12.60V	I/P : 230VAC O/P: MIN LOAD TA : 25℃	CH1: 10.90V ~ 13.03V
2	OUTPUT VOLTAGE TOLERANCE (Max)	V1 : 2.0% ~ -2.0%	I/P : 115VAC / 264VAC O/P: FULL / MINLOAD TA= 25℃	V1: 0.75% ~ -1.33%
3	LINE REGULATION (MAX.)	V1 : 0.5% ~ -0.5%	I/P : 115VAC / 264VAC O/P: FULL LOAD TA : 25℃	V1: 0.08% ~ -0.34%
4	LOAD REGULATION (MAX.)	V1 : 1.0% ~ -1.0%	I/P : 230VAC O/P: MIN LOAD ~ FULL LOAD TA : 25℃	V1: 0.75% ~ -0.67%
5	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230VAC O/P: FULL LOAD TA : 25℃	TEST< 1.658 %
6	RIPPLE & NOISE(Max)	V1 : 100 mVp-p	I/P : 230VAC O/P: FULL LOAD TA : 25℃	V1 : 68 mVp-p
7	SET UP TIME (MAX.)	230VAC : 500ms 115VAC : 500ms	I/P : 230VAC I/P : 115VAC	230VAC 236ms 115VAC 110ms

high frequency :

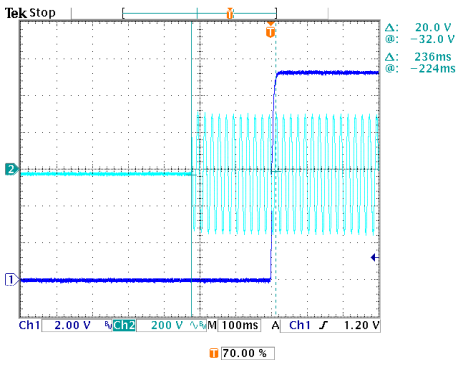


low frequency :



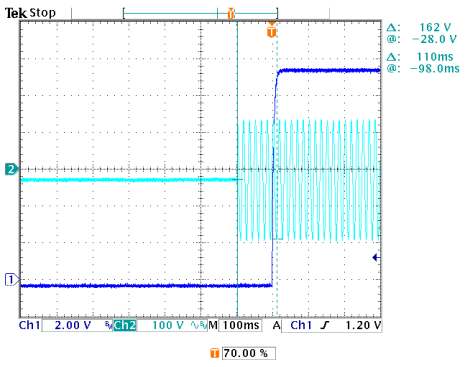
INPUT=230VAC/50HZ @ FULL LOAD

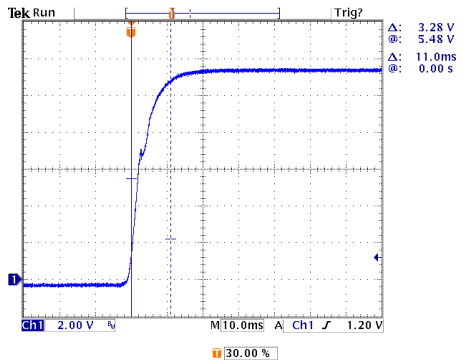
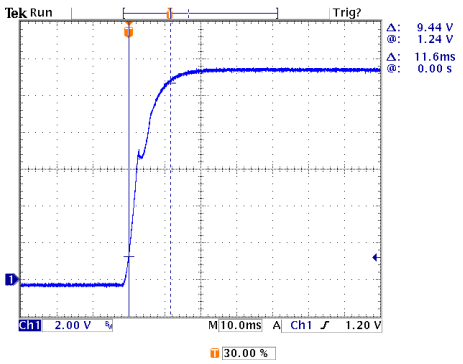
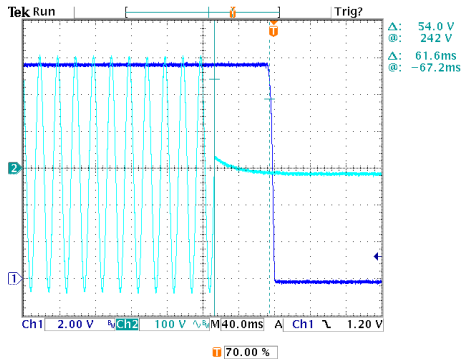
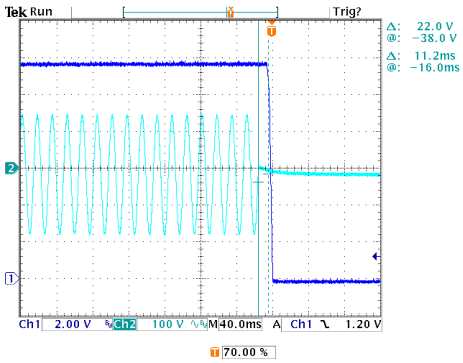
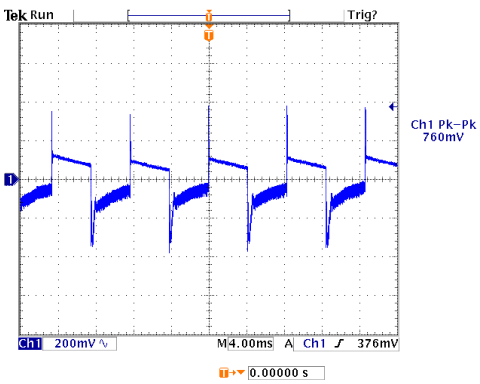
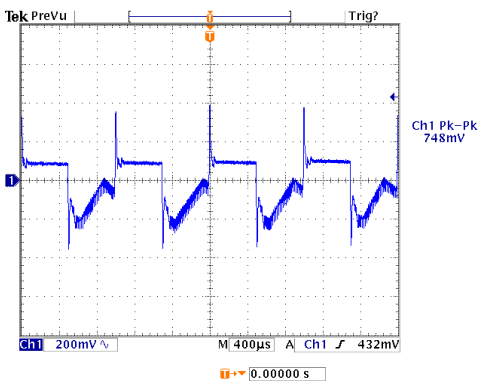
CH1 : Output Voltage CH2 : AC Input Voltage



INPUT=115VAC/60HZ @ FULL LOAD

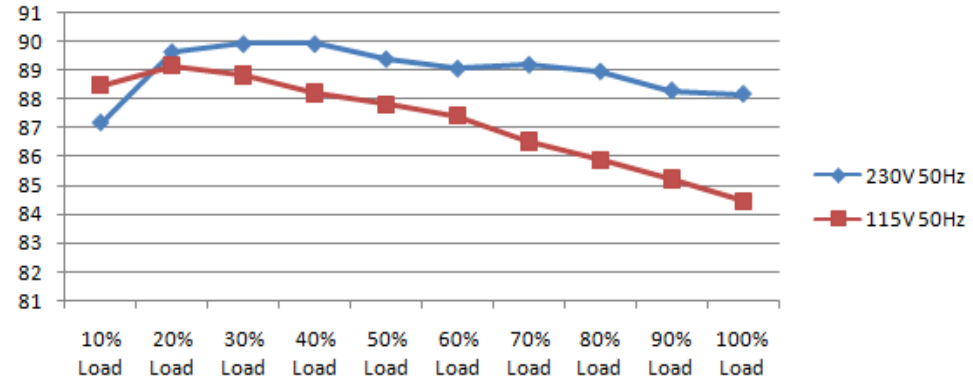
CH1 : Output Voltage CH2 : AC Input Voltage



8	RISE TIME (MAX.)	230VAC : 30ms 115VAC : 30ms		I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25℃		230VAC : 11.0ms 115VAC : 11.6ms
	INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage			INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage		
						
9	HOLD UP TIME (TYP.)	230VAC : 50ms 115VAC : 10ms		I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25℃		230VAC : 61.6ms 115VAC : 11.2ms
	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 : 1200 mVp-p		I/P : 230VAC O/P: (1)Full/Min load 50%duty/120HZ (2)Full/Min load 50%duty/1KHZ TA : 25℃		(1). (2). unit:mVp-p V1: 760.0mv 748.0mv
	FULL/Min LOAD 50%DUTY / 120HZ			FULL/Min LOAD 50%DUTY / 1KHZ		
						

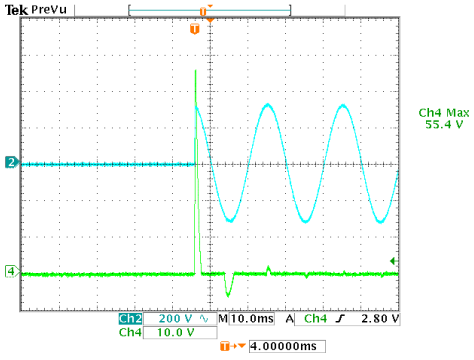
INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	80VAC ~ 264VAC	I/P : TESTING O/P : FULL LOAD Ta : 25℃	73.0VAC ~ 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℃	TEST : OK
3	INPUT CURRENT (TYP.)	1.2 / 230VAC 2.1 / 115VAC	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25℃	I= 0.909 / 230VAC I= 1.82 / 115VAC
4	LEAKAGE CURRENT	< 150uA Earth leakage current	I/P : 264VAC O/P: MIN LOAD TA : 25℃	L-FG 120 uA N-FG 123 uA
		< 80uA Touch leakage current	I/P : 264VAC O/P: MIN LOAD TA : 25℃	L-V-: 58 uA N-V- 59 uA
5	NO LOAD POWER CONSUMPTION	< 0.30W	I/P : 230VAC O/P: MIN LOAD TA : 25℃	< 0.1825 W
6	EFFICIENCY (TYP.)	88.0%	I/P : 230VAC O/P: FULL LOAD TA : 25℃	88.09 %

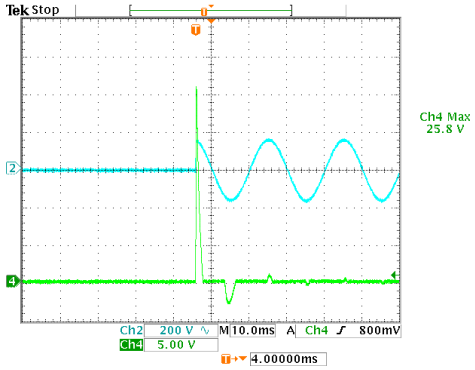


7	INRUSH CURRENT (TYP.)	60A / 230VAC 30A / 115VAC twidth= 0 us measured at 50% Ipeak COLD START	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25℃	I= 55.40A / 230VAC I= 25.80A / 115VAC

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℃	129.7% 264VAC 131.6% 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℃	14.20V 264VAC 14.30V 230VAC 14.40V 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℃	NO DAMAGE Hiccup Mode

CONTROL FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	AUXILIARY POWER	12V / 0.5A ripple & noise: * mv Tolerance: -15~10 %	I/P: 230VAC O/P: FULL LOAD TA : 25℃	11.84 V/ 0.5 A ripple & noise: * mv Tolerance: -1.07 %

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Power Transistor	Q1 Rated： 600V 16.0A	I/P： 267VAC VDS： O/P： (1)Full Load Turn on (2) Output Short (3)Fulll load continue Ta： 25℃	VIN: 267VAC VDS: (1). 564.00V (2). 532.00V (3). 560.00V
2	Input Capacitor	C5 Rated： 180uf 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℃	(1). 372.00V (2). 370.00V (3). 374.00V
3	Control IC	U1 Rated： 26.0V (max) 9.0V (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℃	U1 (1). 16.30V (2). 12.30V (3). 16.00V (4). 16.20V (5). 12.40V
4	O/P Diode (MOSFET)	Q101 Rated： 100V 97.0A	I/P： 267VAC O/P： (1)Full Load Turn on (2) Output Short (3)Fulll load continue Ta： 25℃	(1). 67.60V (2). 71.60V (3). 67.20V
5	Clamp Diode	D5 Rated： 600V 3.0A	I/P： 267VAC O/P： (1)Fulll load continue Ta： 25℃	(1). 440.00V

■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℃	I/P-O/P: 1.91mA I/P-FG: 2.32mA O/P-FG: 1.07mA NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P : 500VDC>100MΩ I/P-FG : 500VDC>100MΩ O/P-FG : 500VDC>100MΩ	I/P-O/P: 500VDC I/P-FG: 500VDC O/P-FG: 500VDC Ta : 25℃/70%RH	I/P-O/P: 9999MΩ I/P-FG: 9999MΩ O/P-FG: 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℃	PASS
2	CONDUCTION	EN55011 CLASS B	I/P : 230VAC /50HZ O/P : FULL LOAD / 50% LOAD Ta : 25℃	PASS Test by certified Lab
3	RADIATION	EN55011 CLASS B	I/P : 230VAC /50HZ O/P : FULL LOAD Ta : 25℃	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℃	CRITERIA A
5	E.F.T	EN61000-4-4 MEDICAL INPUT： 2KV	I/P : 230VAC /50HZ O/P : FULL LOAD Ta : 25℃	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℃	CRITERIA A

■RELIABILITY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	TEMPERATURE RISE TEST	MODEL : RPS-120-12 1. ROOM AMBIENT BURN-IN : 1.0hrs IP: 230VAC O/P: 100% LOAD TA= 23.5℃ 2. HIGH AMBIENT BURN-IN : 1.0hrs IP: 230VAC O/P: 100% LOAD TA= 45.0℃		
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230VAC O/P : 127% 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

NO.	Position	ROOM AMBIENT 23.5℃	HIGH AMBIENT Ta： 45.0℃
1	LF1	42.1℃	53.2℃
2	LF2	59.8℃	70.8℃
3	BD1	66.5℃	77.1℃
4	Q1	69.5℃	79.8℃
5	C5	64.2℃	74.6℃
6	D5	64.2℃	74.9℃
7	T1	78.4℃	90.1℃
8	C105	76.1℃	96.5℃
9	C106	66.0℃	86.5℃
10	L100	74.5℃	86.3℃
11	Q101	83.1℃	96.7℃
12	U1	68.5℃	78.8℃
13	RTH3	66.8℃	77.2℃

4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 45℃ NO DAMAGE	I/P： 272VAC O/P： FULL LOAD Ta： 45℃ HUMIDITY= 95.0% RH	TEST：OK
5	TEMPERATURE COEFFICIENT	±0.03% /(0℃~50℃)	I/P： 230VAC O/P： FULL LOAD	±0.0038% /(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℃ ~ +50℃ 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： 60 min 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 (2) I/P： 230VAC O/P：FULL LOAD Ta= 45.0℃ LIFE TIME (3) I/P： 230VAC O/P：75% LOAD Ta= 45.0℃ LIFE TIME (4) I/P： 230VAC O/P：50% LOAD Ta= 45.0℃ LIFE TIME	(1). 140948.4 HRS (2). 14103.6 HRS (3). 28119.6 HRS (4). 158118 HRS
10	MTBF	MIL-HDBK-217F TOTAL FAILURE RATE： 653.5 KHRS		
11	DMTBF /Accelerated Life test	Demonstration Mean Time Between Failure (Expected Life): Above 30000HRS @ TA 45℃		

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	FRANK	GESG	WANGDZ