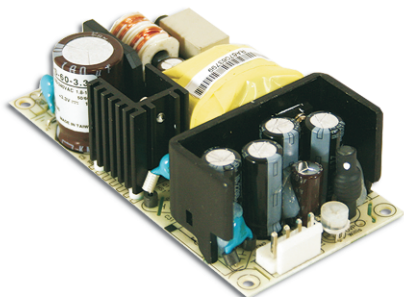




60W Single Output Medical Type

RPS-60 series



■ Features :

- 4"x2" miniature size
- Universal AC input/Full range
- Low leakage current<200uA
- Protections: Short circuit / Overload / Over voltage
- Cooling by free air convection
- UL60601-1/IEC60601-1/EN60601-1 medical safety approved
- UL60950-1/IEC60950-1/EN60950-1 ITE safety approved
- No load power consumption<0.75W
- Fixed switch frequency at 100KHz
- 3 years warranty

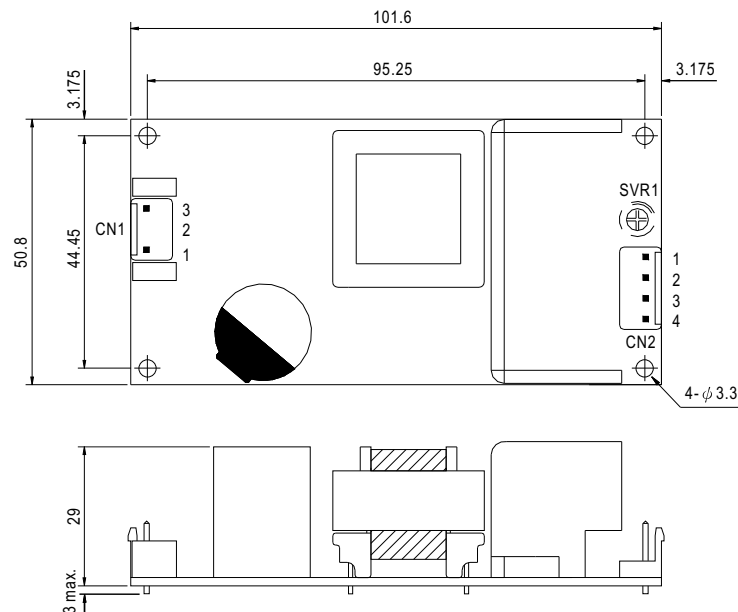


SPECIFICATION

MODEL		RPS-60-3.3	RPS-60-5	RPS-60-12	RPS-60-15	RPS-60-24	RPS-60-48
OUTPUT	DC VOLTAGE	3.3V	5V	12V	15V	24V	48V
	RATED CURRENT	10A	10A	5A	4A	2.5A	1.25A
	CURRENT RANGE	0 ~ 11A	0 ~ 11A	0 ~ 5.5A	0 ~ 4.4A	0 ~ 2.75A	0 ~ 1.375A
	RATED POWER	33W	50W	60W	60W	60W	60W
	PEAK LOAD(10sec.) Note.4	36.3W	55W	66W	66W	66W	66W
	RIPPLE & NOISE (max.) Note.2	80mVp-p	80mVp-p	120mVp-p	150mVp-p	240mVp-p	300mVp-p
	VOLTAGE ADJ. RANGE	3.1 ~ 3.6V	4.75 ~ 5.5V	11.4 ~ 13.2V	13.5 ~ 16.5V	22.8 ~ 27.6V	45.6 ~ 52.8V
	VOLTAGE TOLERANCE Note.3	±2.0%	±2.0%	±2.0%	±2.0%	±1.0%	±1.0%
	LINE REGULATION	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%
	LOAD REGULATION	±1.0%	±1.0%	±1.0%	±1.0%	±1.0%	±1.0%
	SETUP, RISE TIME	500ms, 30ms/230VAC 500ms, 30ms/115VAC at full load					
	HOLD UP TIME (Typ.)	50ms/230VAC 13ms/115VAC at full load					
INPUT	VOLTAGE RANGE	90 ~ 264VAC 127 ~ 370VDC					
	FREQUENCY RANGE	47 ~ 63Hz					
	EFFICIENCY (Typ.)	74%	79%	83%	84%	85%	86%
	AC CURRENT (Typ.)	1.8A/115VAC 1 A/230VAC					
	INRUSH CURRENT (Typ.)	COLD START 60A/230VAC 30A/115VAC					
	LEAKAGE CURRENT	For earth <200uA / 264VAC, For patient <100uA/264VAC					
PROTECTION	OVER LOAD	115 ~ 150% rated output power Protection type : Hiccup mode, recovers automatically after fault condition is removed					
	OVER VOLTAGE	3.8 ~ 5V	5.75 ~ 6.75V	13.8 ~ 16.2V	17.25 ~ 20.25V	28.4 ~ 32.4V	55.2 ~ 64.8V
		Protection type : Shut down o/p voltage, re-power on to recover					
ENVIRONMENT	WORKING TEMP.	-20 ~ +70℃ (Refer to output load derating curve)					
	WORKING HUMIDITY	20 ~ 90% RH non-condensing					
	STORAGE TEMP., HUMIDITY	-40 ~ +85℃, 10 ~ 95% RH					
	TEMP. COEFFICIENT	±0.03%/℃ (0 ~ 45℃)					
	VIBRATION	10 ~ 500Hz, 2G 10min./1cycle, period for 60min. each along X, Y, Z axes					
SAFETY & EMC (Note 5)	SAFETY STANDARDS	UL60950-1, TUV EN60950-1, UL60601-1, TUV EN60601-1, IEC60601-1 approved					
	WITHSTAND VOLTAGE	I/P-O/P:4KVAC I/P-FG:1.5KVAC O/P-FG:1.5KVAC					
	ISOLATION RESISTANCE	I/P-O/P, I/P-FG, O/P-FG:100M Ohms/500VDC					
	EMI CONDUCTION & RADIATION	Compliance to EN55011 (CISPR11), EN55022 (CISPR22) Class B					
	HARMONIC CURRENT	Compliance to EN61000-3-2,-3					
	EMS IMMUNITY	Compliance to EN61000-4-2,3,4,5,6,8,11; ENV50204, EN55024, EN60601-1-2, EN61204-3, medical level, criteria A					
OTHERS	MTBF	353.6Khrs min. MIL-HDBK-217F (25℃)					
	DIMENSION	101.6*50.8*29mm (L*W*H)					
	PACKING	0.15Kg; 96pcs/15.4Kg/0.89CUFT					
NOTE	1. All parameters NOT specially mentioned are measured at 230VAC input, rated load and 25℃ of ambient temperature. 2. Ripple & noise are measured at 20MHz of bandwidth by using a 12" twisted pair-wire terminated with a 0.1uf & 47uf parallel capacitor. 3. Tolerance : includes set up tolerance, line regulation and load regulation. 4. 33% Duty cycle maximum within every 30 seconds. Average output power should not exceed the rated power. 5. The power supply is considered a component which will be installed into a final equipment. The final equipment must be re-confirmed that it still meets EMC directives. 6. Length of set up time is measured at cold first start. Turning ON/OFF the power supply may lead to increase of the set up time.						

Mechanical Specification

Unit:mm



AC Input Connector (CN1) : JST B3P-VH or equivalent

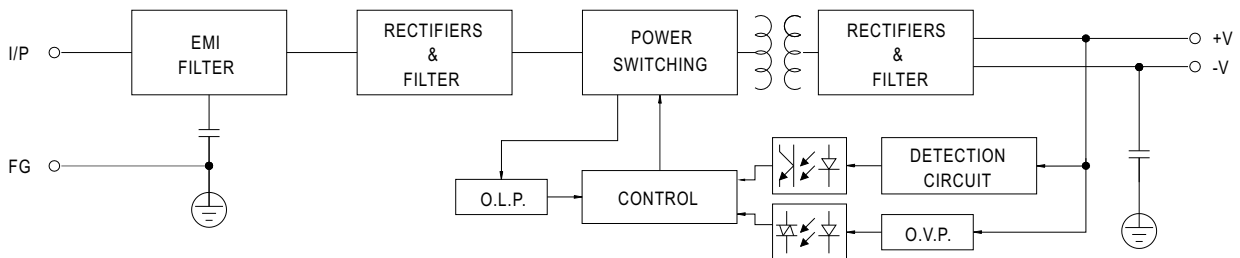
Pin No.	Assignment	Mating Housing	Terminal
1	AC/N	JST VHR or equivalent	JST SVH-21T-P1.1 or equivalent
2	No Pin		
3	AC/L		

DC Output Connector (CN2) : JST B4P-VH or equivalent

Pin No.	Assignment	Mating Housing	Terminal
1,2	+V	JST VHR or equivalent	JST SVH-21T-P1.1 or equivalent
3,4	-V		

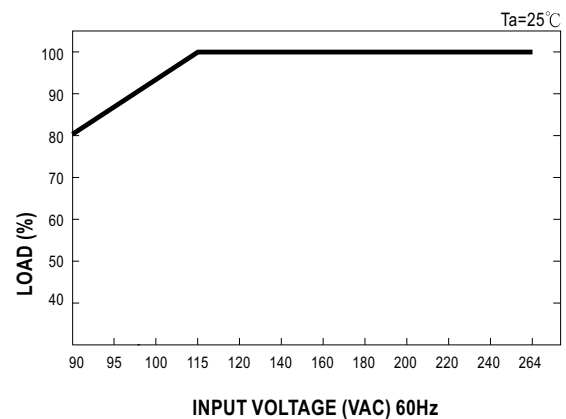
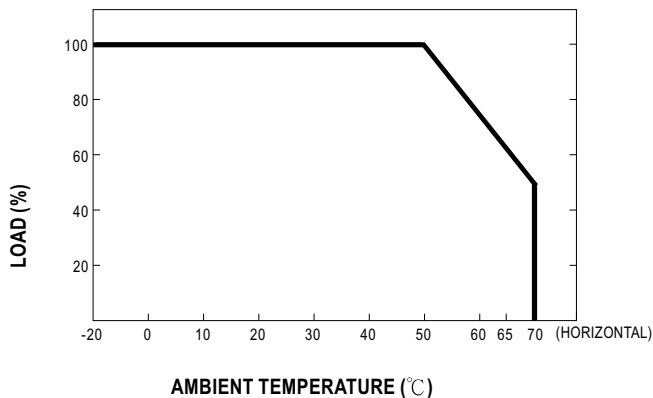
Block Diagram

fosc : 100KHz



Output Derating

Output Derating VS Input Voltage



MODEL : RPS-60-15

OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	RIPPLE & NOISE	V1: 150 mVp-p (Max)	I/P: 230VAC O/P:FULL LOAD Ta:25°C	V1: 16 mVp-p (Max)	P
2	OUTPUT VOLTAGE ADJUST RANGE	CH1: 13.5V~ 16.5V	I/P: 230 VAC I/P: 115 VAC O/P:MIN LOAD Ta:25°C	13.19 V~ 16.84 V/ 230 VAC 13.19 V~ 16.84 V/ 115 VAC	P
3	OUTPUT VOLTAGE TOLERANCE	V1: 2 %~ -2 % (Max)	I/P: 115 VAC / 264 VAC O/P:FULL/ MIN LOAD Ta:25°C	V1: 0.2 %~ -0.2 %	P
4	LINE REGULATION	V1: 0.5 %~ -0.5 % (Max)	I/P: 115VAC ~ 264 VAC O/P:FULL LOAD Ta:25°C	V1: 0.17 %~ -0.17 %	P
5	LOAD REGULATION	V1: 1%~ -1 % (Max)	I/P: 230 VAC O/P:FULL ~MIN LOAD Ta:25°C	V1: 0.2 %~ -0.2 %	P
6	SET UP TIME	230VAC: 500 ms (Max) 115 VAC: 500 ms (Max)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25°C	230VAC/ 355 ms 115VAC/ 379 ms	P
7	RISE TIME	230VAC: 30 ms (Max) 115VAC: 30 ms (Max)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25°C	230VAC/ 10 ms 115VAC/ 10 ms	P
8	HOLD UP TIME	230VAC: 50 ms (TYP) 115VAC: 14 ms (TYP)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25°C	230VAC/ 72 ms 115VAC/ 14.2 ms	P
9	OVER/UNDERSHOOT TEST	< ±5%	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	TEST: <5 %	P
10	DYNAMIC LOAD	V1: 1500 mVp-p	I/P: 230 VAC O/P:FULL /Min LOAD 90%DUTY/1KHZ Ta:25°C	213 mVp-p	P

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	90VAC~264 VAC	I/P: TESTING O/P: FULL LOAD Ta: 25°C	64 V~264V	P
			I/P: LOW-LINE-3V= 87 V HIGH-LINE+15%=300 V O/P: FULL/MIN LOAD ON: 30 Sec. OFF: 30 Sec 10MIN (AC POWER ON/OFF NO DAMAGE)	TEST: OK	
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE OSC	I/P: 90VAC ~ 264 VAC O/P: FULL ~MIN LOAD Ta: 25°C	TEST: OK	P
3	EFFICIENCY	84 % (TYP)	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	84.1%	P
4	INPUT CURRENT	230V/ 1 A (TYP) 115V/ 1.8 A (TYP)	I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	I = 0.69 A/ 230 VAC I = 1.1 A/ 115 VAC	P
5	INRUSH CURRENT	230V/ 60 A (TYP) 115V/ 30 A (TYP) COLD START	I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	I = 47 A/ 230 VAC I = 24 A/ 115 VAC	P
6	LEAKAGE CURRENT	< 200 uA/ 264 VAC for earth	I/P: 264 VAC O/P: Min LOAD Ta: 25°C	L-FG: 78 uA N-FG 78 uA	P
		< 100 uA/264 VAC for patient	I/P: 264 VAC O/P: Min LOAD Ta: 25°C	L-FG: 36 uA N-FG 36 uA	

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	OVER LOAD PROTECTION	115 %~ 150 %	I/P: 230 VAC I/P: 115 VAC O/P: TESTING Ta: 25°C	134 %/ 230 VAC 129 %/ 115 VAC Hiccup Mode	P
2	OVER VOLTAGE PROTECTION	CH1: 17.25 V~ 20.25 V	I/P: 230 VAC I/P: 115 VAC O/P: MIN LOAD Ta: 25°C	20.31 V/ 230 VAC 20.31 V/ 115 VAC Shunt down Re- power ON	P
3	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 264 VAC O/P: FULL LOAD Ta: 25°C	NO DAMAGE Hiccup Mode	P

ONTROL FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	No load power consumption	<0.75W	I/P: 240 VAC O/P: NO LOAD	0.45W/240VAC	P

ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT																																																																	
1	TEMPERATURE RISE TEST	MODEL : RPS-60-24 1. ROOM AMBIENT BURN-IN : 1HRS I/P: 230VAC O/P: FULL LOAD Ta= 28.1 °C 2. HIGH AMBIENT BURN-IN : 3 HRS I/P: 230VAC O/P: FULL LOAD Ta= 51.6 °C <table><tr><th>NO</th><th>Position</th><th>P/N</th><th>ROOM AMBIENT Ta= 28.1°C</th><th>HIGH AMBIENT Ta= 51.6 °C</th></tr><tr><td>1</td><td>LF1</td><td>LF158</td><td>56.3°C</td><td>72.7°C</td></tr><tr><td>2</td><td>BD1</td><td>US4K 4A/800V SHI</td><td>60.4°C</td><td>77.2°C</td></tr><tr><td>3</td><td>C5</td><td>100U/400V NCC 105°C</td><td>57.2°C</td><td>74.6°C</td></tr><tr><td>4</td><td>D1</td><td>EGP20J 2A/600V ZOW</td><td>83.0°C</td><td>99.2°C</td></tr><tr><td>5</td><td>Q1</td><td>2SK2545 2A/600V TOS</td><td>95.8°C</td><td>112.6°C</td></tr><tr><td>6</td><td>ZD1</td><td>P6KE100A PAN</td><td>68.9°C</td><td>84.8°C</td></tr><tr><td>7</td><td>C36</td><td>100U/50V NCC 105°C KY</td><td>64.7°C</td><td>79.9°C</td></tr><tr><td>8</td><td>T1 COIL</td><td>TF-1417 LS</td><td>76.1°C</td><td>90.3°C</td></tr><tr><td>9</td><td>D100</td><td>S20LC30 20A/300V SHI</td><td>82.6°C</td><td>97.7°C</td></tr><tr><td>10</td><td>C105</td><td>470U/35V NCC 105°C KY</td><td>66.5°C</td><td>81.1°C</td></tr><tr><td>11</td><td>L100</td><td>RB023D</td><td>59.8°C</td><td>72.7°C</td></tr><tr><td>12</td><td>U1</td><td>NCP1230D</td><td>69.1°C</td><td>83.6°C</td></tr></table>			NO	Position	P/N	ROOM AMBIENT Ta= 28.1°C	HIGH AMBIENT Ta= 51.6 °C	1	LF1	LF158	56.3°C	72.7°C	2	BD1	US4K 4A/800V SHI	60.4°C	77.2°C	3	C5	100U/400V NCC 105°C	57.2°C	74.6°C	4	D1	EGP20J 2A/600V ZOW	83.0°C	99.2°C	5	Q1	2SK2545 2A/600V TOS	95.8°C	112.6°C	6	ZD1	P6KE100A PAN	68.9°C	84.8°C	7	C36	100U/50V NCC 105°C KY	64.7°C	79.9°C	8	T1 COIL	TF-1417 LS	76.1°C	90.3°C	9	D100	S20LC30 20A/300V SHI	82.6°C	97.7°C	10	C105	470U/35V NCC 105°C KY	66.5°C	81.1°C	11	L100	RB023D	59.8°C	72.7°C	12	U1	NCP1230D	69.1°C	83.6°C	P
NO	Position	P/N	ROOM AMBIENT Ta= 28.1°C	HIGH AMBIENT Ta= 51.6 °C																																																																		
1	LF1	LF158	56.3°C	72.7°C																																																																		
2	BD1	US4K 4A/800V SHI	60.4°C	77.2°C																																																																		
3	C5	100U/400V NCC 105°C	57.2°C	74.6°C																																																																		
4	D1	EGP20J 2A/600V ZOW	83.0°C	99.2°C																																																																		
5	Q1	2SK2545 2A/600V TOS	95.8°C	112.6°C																																																																		
6	ZD1	P6KE100A PAN	68.9°C	84.8°C																																																																		
7	C36	100U/50V NCC 105°C KY	64.7°C	79.9°C																																																																		
8	T1 COIL	TF-1417 LS	76.1°C	90.3°C																																																																		
9	D100	S20LC30 20A/300V SHI	82.6°C	97.7°C																																																																		
10	C105	470U/35V NCC 105°C KY	66.5°C	81.1°C																																																																		
11	L100	RB023D	59.8°C	72.7°C																																																																		
12	U1	NCP1230D	69.1°C	83.6°C																																																																		
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P: 230 VAC O/P: 125 % LOAD Ta:25°C	TEST : OK	P																																																																	
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P: 230 VAC O/P:100 % LOAD Ta= -20°C	TEST : OK	P																																																																	
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50 °C NO DAMAGE	I/P: 272 VAC O/P:FULL LOAD Ta= 50°C HUMIDITY= 95 %R.H	TEST : OK	P																																																																	
5	TEMPERATURE COEFFICIENT	± 0.03 %(0~50°C)	I/P: 230 VAC O/P:FULL LOAD	± 0.01 %(0~50°C)	P																																																																	
6	VIBRATION TEST	1 Carton & 1 Set (1) Waveform: Sine Wave (2) Frequency:10~500Hz (3) Sweep Time:10min/sweep cycle (4) Acceleration:2G (5) Test Time:1 hour in each axis (X.Y.Z) (6) Ta:25°C		TEST : OK	P																																																																	

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	WITHSTAND VOLTAGE	I/P-O/P: 4 KVAC/min I/P-FG: 1.5 KVAC/min O/P-FG: 1.5 KVAC/min	I/P-O/P: 4.2 KVAC/min I/P-FG: 1.8 KVAC/min O/P-FG: 1.8 KVAC/min Ta:25°C	I/P-O/P: 1.98 mA I/P-FG: 1.37 mA O/P-FG: 1.34 mA NO DAMAGE	P
2	ISOLATION RESISTANCE	I/P-O/P:500VDC>100MΩ I/P-FG: 500VDC>100MΩ O/P-FG:500VDC>100MΩ	I/P-O/P: 500 VDC I/P-FG: 500 VDC O/P-FG: 500 VDC Ta:25°C	I/P-O/P: 13 GΩ I/P-FG: 30 GΩ O/P-FG: 30 GΩ NO DAMAGE	P
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40 A / 2min Ta:25°C	8 mΩ	P
4	APPROVAL	TUV: Certificate NO : R 50112371 UL: File NO : E227340			P

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	HARMONIC	EN61000-3-2 CLASS A	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	PASS	P
2	CONDUCTION	EN55022 EN55011 CLASS B	I/P: 230 VAC (50HZ) O/P:FULL/50% LOAD Ta:25°C	PASS Test by certified Lab	P
3	RADIATION	EN55022 EN55011 CLASS B	I/P: 230 VAC (50HZ) O/P:FULL LOAD Ta:25°C	PASS Test by certified Lab	P
4	E.S.D	EN61000-4-2 MEDICAL AIR:8KV / Contact:6KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A	P
5	E.F.T	EN61000-4-4 MEDICAL INPUT: 2KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A	P
6	SURGE	IEC61000-4-5 MEDICAL L-N :1KV L,N-PE:2KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A	P
7	Test by certified Lab & Test Report Prepare				

M.T.B.F & LIFE CYCLE CALCULATION

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	CAPACITOR LIFE CYCLE	SUPPOSE C105 IS THE MOST CRITICAL COMPONENT I/P: 230VAC O/P:FULL LOAD Ta= 25 °C LIFE TIME= 202938 HRS I/P: 230VAC O/P:FULL LOAD Ta= 50 °C LIFE TIME= 66511 HRS			P
2	MTBF	MIL-HDBK-217F NOTICES2 PARTS COUNT TOTAL FAILURE RATE: 353.6K HRS			P
3	ORT (Ongoing Reliability test)	I/P : 230VAC O/P : FULL LOAD TA=50.6°C Sample=20pcs TEST TIME=792HRS			P

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	Power Transistor (D to S) or (C to E) Peak Voltage	Q1 Rated K2545 : 600V 6A	I/P:High-Line +3V = 267 V O/P: (1)Full Load Turn on (2) Output Short Ta:25℃	(1) 570 V (2) 580 V	P
2	Diode Peak Voltage	D100 Rated BYQ28X-200 : 200V 10A	I/P:High-Line +3V = 267 V O/P: (1)Full Load Turn on (2)Output Short Ta:25℃	(1) 172 V (2) 156 V	P
3	Clamp Diode Peak Voltage	D1 Rated EGP20J : 600V 2A	I/P:High-Line +3V = 267 V O/P: (1) Dynamic Load 90%Duty/1KHz Ta:25℃	(1) 456 V	P
4	Input Capacitor Voltage	C5 Rated :100u / 400V/ 105℃	I/P:High-Line +3V = 267 V O/P: (1)Full Load Turn on /Off (2) Min load Turn on /Off (3)Full Load /Min load Change Ta:25℃	(1) 368 V (2) 370 V (3) 368 V	P
5	Control IC Voltage Test	U1 Rated 1230D : 18 V	I/P:High-Line +3V = 267 V O/P: (1)Full Load Turn on /Off (2) Min load Turn on /Off (3)Full Load /Min load Change Ta:25℃	(1) 12.9 V (2) 12.3 V (3) 12.9 V	P

DATE	SAMPLE	TEST RESULT	TESTER	APPROVAL
2006/4/3	RD SAMPLE	PASS	VINCENT TSENG	MAX LIN
2006/6/2	PRODUCT SAMPLE W0605A17	PASS	VINCENT TSENG	MAX LIN
2006/7/20	PRODUCT SAMPLE W0607A12	PASS	VINCENT TSENG	MAX LIN

2003/12/12 A50-F023