



240W Single Output with PFC Function

SP-240 series



■ Features :

- Universal AC input / Full range
- Built-in active PFC function, PF>0.95
- Protections: Short circuit / Overload / Over voltage / Over temperature
- Forced air cooling by built-in DC Fan
- Built-in fan ON / OFF control
- LED indicator for power on
- Fixed switching frequency at 90KHz
- 3 years warranty

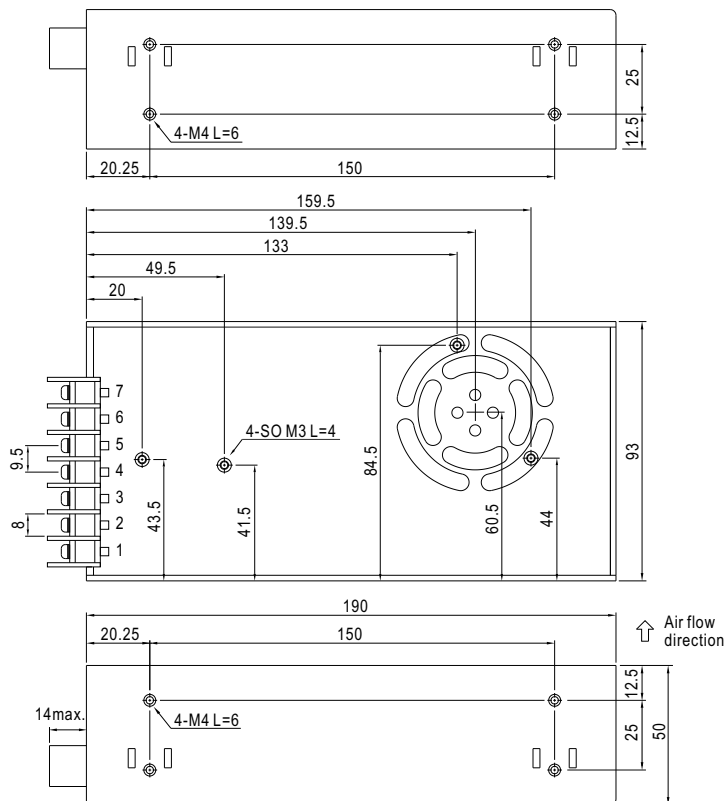


SPECIFICATION

MODEL		SP-240-5	SP-240-7.5	SP-240-12	SP-240-15	SP-240-24	SP-240-30	SP-240-48
OUTPUT	DC VOLTAGE	5V	7.5V	12V	15V	24V	30V	48V
	RATED CURRENT	45A	32A	20A	16A	10A	8A	5A
	CURRENT RANGE	0 ~ 45A	0 ~ 32A	0 ~ 20A	0 ~ 16A	0 ~ 10A	0 ~ 8A	0 ~ 5A
	RATED POWER	225W	240W	240W	240W	240W	240W	240W
	RIPPLE & NOISE (max.) Note.2	150mVp-p	150mVp-p	150mVp-p	150mVp-p	150mVp-p	150mVp-p	150mVp-p
	VOLTAGE ADJ. RANGE	4 ~ 6V	6 ~ 9V	10 ~ 14V	12 ~ 18V	20 ~ 28V	27 ~ 33V	41 ~ 56V
	VOLTAGE TOLERANCE Note.3	±2.0%	±2.0%	±1.0%	±1.0%	±1.0%	±1.0%	±1.0%
	LINE REGULATION	±0.5%	±0.5%	±0.3%	±0.3%	±0.2%	±0.2%	±0.2%
	LOAD REGULATION	±1.0%	±1.0%	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%
	SETUP, RISE TIME	800ms, 50ms/230VAC 1500ms, 50ms/115VAC at full load						
	HOLD UP TIME (Typ.)	20ms/230VAC 20ms/115VAC at full load						
INPUT	VOLTAGE RANGE Note.5	88 ~ 264VAC 124 ~ 370VDC						
	FREQUENCY RANGE	47 ~ 63Hz						
	POWER FACTOR (Typ.)	PF>0.95/230VAC PF>0.98/115VAC at full load						
	EFFICIENCY (Typ.)	79%	83%	86%	86%	87%	88%	89%
	AC CURRENT (Typ.)	3.6A/115VAC 1.8A/230VAC						
	INRUSH CURRENT (Typ.)	25A/115VAC 40A/230VAC						
	LEAKAGE CURRENT	<2mA / 240VAC						
PROTECTION	OVERLOAD	105 ~ 135% rated output power Protection type : Hiccup mode, recovers automatically after fault condition is removed						
	OVER VOLTAGE	6.3 ~ 7.5V	9.4 ~ 10.9V	14.7 ~ 17.5V	19 ~ 22.5V	29.5 ~ 35V	34.7 ~ 41V	57.6 ~ 67.2V
	OVER TEMPERATURE	90℃ ±5℃ (5V,7.5V), 85℃ ±5℃ (12V,15V,24V,30V,48V) (TSW1 : detect on heatsink of power transistor)						
		Protection type : Shut down o/p voltage, recovers automatically after temperature goes down						
FUNCTION	FAN CONTROL	RTH2≥40℃ FAN ON, ≤35℃ FAN OFF(Typ.)						
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 ~ 50℃)						
	VIBRATION	10 ~ 500Hz, 2G 10min./1cycle, 60min. each along X, Y, Z axes						
SAFETY & EMC (Note 4)	SAFETY STANDARDS	UL60950-1, TUV EN60950-1 approved						
	WITHSTAND VOLTAGE	I/P-O/P:3KVAC I/P-FG:1.5KVAC O/P-FG:0.5KVAC						
	ISOLATION RESISTANCE	I/P-O/P, I/P-FG, O/P-FG:100M Ohms / 500VDC / 25℃ / 70% RH						
	EMI CONDUCTION & RADIATION	Compliance to 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, light industry level, criteria A						
OTHERS	MTBF	284K hrs min. MIL-HDBK-217F (25℃)						
	DIMENSION	190*93*50mm (L*W*H)						
	PACKING	0.8Kg; 18pcs/15.4Kg/1.04CUFT						
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. 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. 5. Derating may be needed under low input voltages. Please check the derating curve for more details.							

Case No.987A Unit:mm

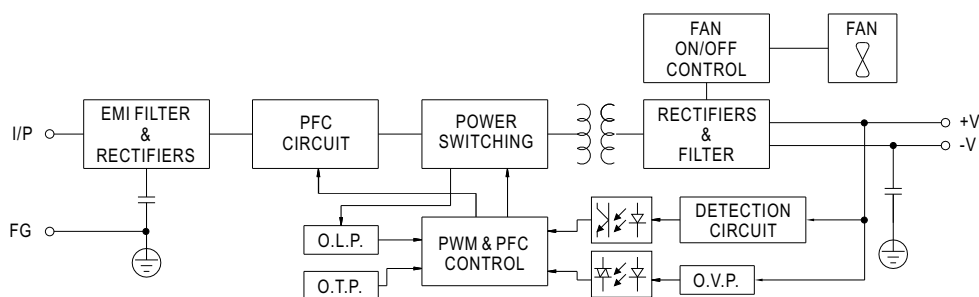
Mechanical Specification



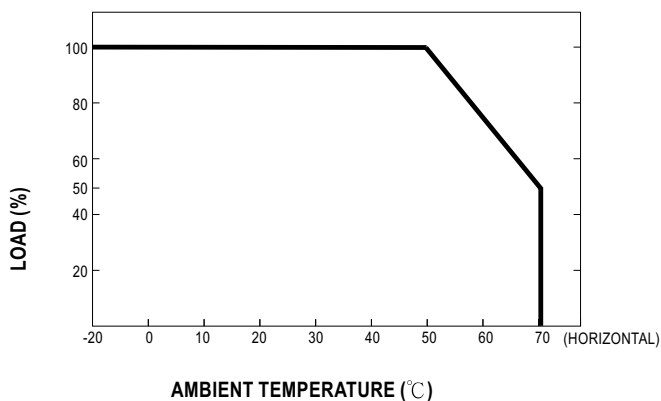
Terminal Pin No. Assignment

Pin No.	Assignment	Pin No.	Assignment
1	AC/L	4,5	DC OUTPUT -V
2	AC/N	6,7	DC OUTPUT +V
3	FG $\perp$		

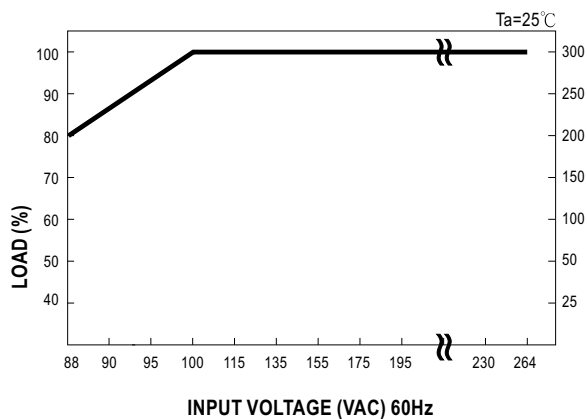
Block Diagram



Derating Curve



Static Characteristics



MODEL : SP-240-12

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 : 10 mVp-p (Max)	P
2	OUTPUT VOLTAGE ADJUST RANGE	CH1 : 10 V ~ 14 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	9.632 V ~ 14.437 V/ 230 VAC 9.631 V ~ 14.437 V/ 115 VAC	P
3	OUTPUT VOLTAGE TOLERANCE	V1 : 1 %~ -1 % (Max)	I/P : 100 VAC / 264 VAC O/P : FULL/ MIN LOAD Ta : 25°C	V1 : 0.049 %~ -0.049 %	P
4	LINE REGULATION	V1 : 0.3 %~ -0.3 % (Max)	I/P : 100 VAC ~ 264 VAC O/P : FULL LOAD Ta : 25°C	V1 : 0 %~ -0.049 %	P
5	LOAD REGULATION	V1 : 0.5 %~ -0.5 % (Max)	I/P : 230 VAC O/P : FULL ~MIN LOAD Ta : 25°C	V1 : 0 %~ 0 %	P
6	SET UP TIME	230VAC : 800 ms (Max) 115VAC : 1500 ms (Max)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 530.2 ms 115VAC/ 735.1 ms	P
7	RISE TIME	230VAC : 50 ms (Max) 115VAC : 50 ms (Max)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 19.76 ms 115VAC/ 19.1 ms	P
8	HOLD UP TIME	230VAC : 20 ms (TYP) 115VAC : 20 ms (TYP)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 27.34 ms 115VAC/ 27.34 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 : 1200 mVp-p	I/P : 230 VAC O/P : FULL /Min LOAD 90%DUTY/ 1KHZ Ta : 25°C	608 mVp-p	P

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	100VAC~264 VAC	I/P : TESTING O/P : FULL LOAD Ta : 25°C	56.13 V~264V	P
			I/P : LOW-LINE-3V= 97 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 : 100VAC ~ 264 VAC O/P : FULL ~MIN LOAD Ta : 25°C	TEST : OK	P
3	POWER FACTOR	0.95 / 230 VAC(TYP) 0.98 / 115 VAC(TYP)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	PF= 0.98 / 230 VAC PF= 0.999 / 115 VAC	P
4	EFFICIENCY	86% (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	86.1 %	P
5	INPUT CURRENT	230V/ 1.8 A (TYP) 115V/ 3.6 A (TYP)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I= 1.252 A/ 230 VAC I= 2.542 A/ 115 VAC	P
6	INRUSH CURRENT	230V/ 40 A (TYP) 115V/ 25 A (TYP) COLD START	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I= 35 A/ 230 VAC I= 17 A/ 115 VAC	P
7	LEAKAGE CURRENT	< 2 mA / 240 VAC	I/P : 264 VAC O/P : Min LOAD Ta : 25°C	L-FG : 0.95 mA N-FG : 0.9 mA	P

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	OVER LOAD PROTECTION	105 %~ 135 %	I/P : 230 VAC I/P : 115 VAC O/P : TESTING Ta : 25°C	121.8%/ 230 VAC 122%/ 115 VAC Hiccup Mode	P
2	OVER VOLTAGE PROTECTION	CH1 : 14.7 V~ 17.5 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	15.2V/ 230 VAC 15.2V/ 115 VAC Shut down Re- power ON	P
3	OVER TEMPERATURE PROTECTION	SPEC : TSW1 : 85± 5°C O.T.P. NO DAMAGE	I/P : 230 VAC O/P : FULL LOAD	O.T.P. Active Shut down o/p voltage , recovers automatically after temperature goes down	P
4	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

CONTROL FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	FAN ON/OFF CONTROL (TYP)	RTH2 ≥ 40 °C FAN ON RTH2 ≤ 35 °C FAN OFF	I/P : 230 VAC O/P : FULL LOAD	36.2 °C FAN ON 33.5 °C FAN OFF	P

ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT																																																																																										
1	TEMPERATURE RISE TEST	MODEL : SP-240-5 1. ROOM AMBIENT BURN-IN : 0.5 HRS I/P : 230VAC O/P : FULL LOAD Ta= 26.6 °C 2. HIGH AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta= 49.5 °C <table><tr><th>NO</th><th>Position</th><th>P/N</th><th>ROOM AMBIENT Ta= 26.6 °C</th><th>HIGH AMBIENT Ta= 49.5 °C</th></tr><tr><td>1</td><td>LF1</td><td>LF108-R2</td><td>38.9°C</td><td>56.7°C</td></tr><tr><td>2</td><td>BD1</td><td>6A/800V 梳型 GLASS KBJ608G</td><td>45.2°C</td><td>65.0°C</td></tr><tr><td>3</td><td>TSW1</td><td>ST-22W-R2 90°C</td><td>45.7°C</td><td>64.2°C</td></tr><tr><td>4</td><td>Q1</td><td>IRFB20N50K 20A/500V</td><td>47.2°C</td><td>65.9°C</td></tr><tr><td>5</td><td>D2</td><td>STTH8S06D</td><td>47.7°C</td><td>65.1°C</td></tr><tr><td>6</td><td>C5</td><td>100u/400V 105°C 18*25 KMG</td><td>41.1°C</td><td>58.8°C</td></tr><tr><td>7</td><td>L1</td><td>TR412</td><td>47.6°C</td><td>66.6°C</td></tr><tr><td>8</td><td>Q2</td><td>2SK4115 7A/900V</td><td>53.2°C</td><td>77.5°C</td></tr><tr><td>9</td><td>U1</td><td>FAN4800IN</td><td>48.7°C</td><td>66.1°C</td></tr><tr><td>10</td><td>T1</td><td>TF1926</td><td>80.4°C</td><td>97.0°C</td></tr><tr><td>11</td><td>D3</td><td>BYV26EGP 1A/1KV</td><td>64.3°C</td><td>83.6°C</td></tr><tr><td>12</td><td>RG1</td><td>L7812CV 1.0A/12V</td><td>50.4°C</td><td>69.6°C</td></tr><tr><td>13</td><td>C201</td><td>47u/35V L6Kh 5*11 ZLH</td><td>52.5°C</td><td>77.9°C</td></tr><tr><td>14</td><td>L100</td><td>TR901 Ku106125-2</td><td>52.5°C</td><td>76.7°C</td></tr><tr><td>15</td><td>D101</td><td>STPS30L30CT</td><td>59.3°C</td><td>75.7°C</td></tr><tr><td>16</td><td>C103</td><td>3900u/10V UL10Kh 12.5*25 ZLH</td><td>51.4°C</td><td>69.3°C</td></tr><tr><td>17</td><td>R10</td><td>3W 100Ω 5% MINI</td><td>79.7°C</td><td>99.6°C</td></tr></table>			NO	Position	P/N	ROOM AMBIENT Ta= 26.6 °C	HIGH AMBIENT Ta= 49.5 °C	1	LF1	LF108-R2	38.9°C	56.7°C	2	BD1	6A/800V 梳型 GLASS KBJ608G	45.2°C	65.0°C	3	TSW1	ST-22W-R2 90°C	45.7°C	64.2°C	4	Q1	IRFB20N50K 20A/500V	47.2°C	65.9°C	5	D2	STTH8S06D	47.7°C	65.1°C	6	C5	100u/400V 105°C 18*25 KMG	41.1°C	58.8°C	7	L1	TR412	47.6°C	66.6°C	8	Q2	2SK4115 7A/900V	53.2°C	77.5°C	9	U1	FAN4800IN	48.7°C	66.1°C	10	T1	TF1926	80.4°C	97.0°C	11	D3	BYV26EGP 1A/1KV	64.3°C	83.6°C	12	RG1	L7812CV 1.0A/12V	50.4°C	69.6°C	13	C201	47u/35V L6Kh 5*11 ZLH	52.5°C	77.9°C	14	L100	TR901 Ku106125-2	52.5°C	76.7°C	15	D101	STPS30L30CT	59.3°C	75.7°C	16	C103	3900u/10V UL10Kh 12.5*25 ZLH	51.4°C	69.3°C	17	R10	3W 100Ω 5% MINI	79.7°C	99.6°C	P
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17	R10	3W 100Ω 5% MINI	79.7°C	99.6°C																																																																																											
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230 VAC O/P : 110 % 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= -30 °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 : 3 KVAC/min I/P-FG : 1.5 KVAC/min O/P-FG : 0.5 KVAC/min	I/P-O/P : 3.6 KVAC/min I/P-FG : 1.8 KVAC/min O/P-FG : 0.6 KVAC/min Ta : 25°C	I/P-O/P : 8.09 mA I/P-FG : 6.44 mA O/P-FG : 5.41 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 /70%RH	I/P-O/P : 19.7 GΩ I/P-FG : 17.5 GΩ O/P-FG : 9.69 GΩ NO DAMAGE	P
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40 A / 2min Ta : 25°C / 70%RH	8 mΩ	P
4	APPROVAL	TUV : Certificate NO : R50159049 UL : File NO : E183223			P

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	HARMONIC	EN61000-3-2 CLASS A CLASS D	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	PASS	P
2	CONDUCTION	EN55022 CLASS B	I/P : 230 VAC (50HZ) O/P : FULL/50% LOAD Ta : 25°C	PASS Test by certified Lab	P
3	RADIATION	EN55022 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 LIGHT INDUSTRY AIR : 8KV / Contact : 4KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A	P
5	E.F.T	EN61000-4-4 LIGHT INDUSTRY INPUT : 1KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A	P
6	SURGE	IEC61000-4-5 LIGHT INDUSTRY 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	SP-240-5 : SUPPOSE C103 IS THE MOST CRITICAL COMPONENT I/P : 230VAC O/P : FULL LOAD Ta= 25 °C LIFE TIME=498365.4 HRS I/P : 230VAC O/P : FULL LOAD Ta=40 °C LIFE TIME=249128.4 HRS			P
2	MTBF	MIL-HDBK-217F NOTICES2 PARTS COUNT TOTAL FAILURE RATE : 284K HRS			P

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	Power Transistor (D to S) or (C to E) Peak Voltage	Q2 Rated : 2SK4115 7A/900V	I/P : High-Line +3V = 267 V O/P : (1)Full Load Turn on (2) Output Short Ta : 25°C	(1) 812 V (2) 832 V	P
2	Diode Peak Voltage	D 100 Rated : STPS30L60CT 30A/60V	I/P : High-Line +3V = 267 V O/P : (1)Full Load Turn on (2)Output Short Ta : 25°C	(1) 49.2 V (2) 51.2 V	P
3	PFC Transistor (D to S) or (C to E) Peak Voltage	Q1 Rated : IRFB20N50K 20A/500V	I/P : High-Line +3V = 267 V O/P : (1)Full Load Turn on (2)Output Short Ta : 25°C	(1) 448 V (2) 420 V	P
4	Input Capacitor Voltage	C 5 Rated : 100u/400V 105°C 18*25 KMG	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°C	(1) 377 V (2) 414 V (3) 393 V	P
5	Control IC Voltage Test	U 1 Rated : PWM FAN4800IN 18V	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°C	(1) 15.27 V (2) 16.09 V (3) 15.24 V	P

DATE	SAMPLE	TEST RESULT	TESTER	APPROVAL
2009/6/5	RD SAMPLE	PASS	SANFORD SU	VINCENT TSENG
2009/7/28	PRODUCT SAMPLE W0907A36	PASS	SANFORD SU	VINCENT TSENG

2003/12/12 A50-F023