



Test Report: LPF-60-30

60W Single Output Switching Power Supply

■ 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 TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	RIPPLE & NOISE	V1 : 200 mVp-p (Max)	I/P : 230VAC O/P : FULL LOAD Ta : 25°C	V1 : 18.4 mVp-p (Max)	P
2	CONSTANT CURRENT REGION	V1= 18V~30V	I/P : 230VAC O/P : CV MODE Ta : 25°C	O/P= 18V : 2.1 A O/P= 29V : 2.1 A	P
3	OUTPUT VOLTAGE TOLERANCE	V1 : 4 %~ -4 % (Max)	I/P : 100 VAC / 305 VAC O/P : FULL/ MIN LOAD Ta : 25°C	V1 : 0.11 %~ -0.11 %	P
4	LINE REGULATION	V1 : 0.5 %~ -0.5 % (Max)	I/P : 100 VAC ~ 305 VAC O/P : FULL LOAD Ta : 25°C	V1 : 0 %~ 0 %	P
5	LOAD REGULATION	V1 : 0.5 %~ -0.5 % (Max)	I/P : 230 VAC O/P : FULL ~MIN LOAD Ta : 25°C	V1 : 0.11 %~ -0.11 %	P
6	SET UP TIME	230VAC : 500 ms (Max) 115VAC : 1000 ms(Max)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 284 ms 115VAC/ 310 ms	P
7	RISE TIME	230VAC : 80 ms (Max) 115VAC : 80 ms (Max)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 15 ms 115VAC/ 15 ms	P
8	HOLD UP TIME	230VAC : 16 ms (TYP) 115VAC : 16 ms (TYP)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 63 ms 115VAC/ 33 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 : 3000 mVp-p	I/P : 230 VAC (1).O/P : FULL /Min LOAD 90%DUTY/ 1KHZ (2).O/P : FULL /Min LOAD 50%DUTY/ 120HZ Ta : 25°C	(1)322 mVp-p (2)320 mVp-p	P

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	100VAC~305 VAC	I/P : TESTING O/P : FULL LOAD Ta : 25°C I/P : LOW-LINE-3V=97 V HIGH-LINE=305 V O/P : FULL/MIN LOAD ON : 30 Sec . OFF : 30 Sec 10MIN (AC POWER ON/OFF NO DAMAGE)	74 V~305V TEST : OK	P
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE OSC	I/P : 100 VAC ~ 305 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) 0.92 / 277 VAC(TYP)	I/P : 230 VAC I/P : 115 VAC I/P : 277 VAC O/P : FULL LOAD Ta : 25°C	PF= 0.974 / 100% PF= 0.998 / 100% PF= 0.93 / 100%	P
4	EFFICIENCY	90% (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	91.28 %	P
5	INPUT CURRENT	230V/ 0.4 A (TYP) 115V/ 0.8 A (TYP)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I= 0.29 A/ 230 VAC I= 0.58 A/ 115 VAC	P
6	INRUSH CURRENT	230V/ 55 A (TYP) COLD START	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	I= 46 A/ 230 VAC	P
7	LEAKAGE CURRENT	< 0.75 mA / 240 VAC	I/P : 277 VAC O/P : Min LOAD Ta : 25°C	L-CASE : 0.01 mA N-CASE : 0.01 mA	P

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	OVER LOAD PROTECTION	95 % ~ 108 %	I/P : 230 VAC I/P : 115 VAC O/P : TESTING Ta : 25°C	105 %/ 230 VAC 105%/ 115 VAC Constant Current Limiting ,recovers automatically after fault condition is removed.	P
2	OVER VOLTAGE PROTECTION	CH1 : 34 V ~ 40 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	38.22 V/ 230 VAC 38.22 V/ 115 VAC Shut down and latch off o/p voltage, re-power on to recover	P
3	OVER TEMPERATURE PROTECTION	SPEC : RTH2 : 90± 10°C O.T.P. NO DAMAGE	I/P : 230 VAC O/P : FULL LOAD	O.T.P. Active Shut down o/p voltage, re-power on to recover	P
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P : 305 VAC O/P : FULL LOAD Ta : 25°C	NO DAMAGE Hiccup mode, recovers automatically after fault condition is removed.	P

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	Power Transistor (D to S) or (C to E) Peak Voltage	Q 3 Rated : 2SK3673-01MR 10A/700V	I/P : High-Line +3V = 308 V O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	(1) 643 V (2) 504 V (3) 640 V	P
2	Diode Peak Voltage	D101 Rated : YA868C15RSC 30A/150V	I/P : High-Line +3V = 308 V O/P : (1)Full Load Turn on (2)Output Short (3)Full load continue Ta : 25°C	(1) 148 V (2) 134 V (3) 145 V	P
4	Input Capacitor Voltage	C5 Rated : 47u/450V 105°C 16*25 KXJ	I/P : High-Line +3V = 308 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) 423.47 V (2) 416.17 V (3) 414.35 V	P
5	Control IC Voltage Test	U 1 Rated : PFC FAN6921MR 17V~30V	I/P : High-Line +3V = 308 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) 22.258 V (2) 22.221 V (3) 22.227 V	P
6	Power Transistor (D to S) or (C to E) Peak Voltage	Q1 Rated : STP11NK50ZFP 10A/500V	I/P : High-Line +3V = 308 V O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	(1) 466 V (2) 440 V (3) 456 V	P

SAFETY & E.M.C. TEST
SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	WITHSTAND VOLTAGE	I/P-O/P : 3.75 KVAC/min	I/P-O/P : 4 KVAC/min Ta : 25°C	I/P-O/P : 2.487 mA NO DAMAGE	P
2	ISOLATION RESISTANCE	I/P-O/P : 500VDC>100MΩ	I/P-O/P : 500 VDC Ta : 25°C/70%RH	I/P-O/P : 30 GΩ NO DAMAGE	P
3	APPROVAL	TUV : Certificate NO : UL : File NO :			N/A

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	HARMONIC	EN61000-3-2 CLASS C	I/P:230VAC/240VAC/220VAC50HZ O/P:100%,75%,60%LOAD CLASS C \geq 60% Ta:25°C	PASS	P
2	CONDUCTION	EN55015 CLASS B	I/P: 230 VAC (50HZ)/115V[60HZ] O/P:FULL/60% LOAD Ta:25°C	PASS Test by certified Lab	P
3	RADIATION	EN55015 CLASS B	I/P: 230 VAC (50HZ)/115V[60HZ] O/P:FULL LOAD Ta:25°C	PASS Test by certified Lab	P
4	E.S.D	AIR:8KV / Contact:6KV INDUSTRY	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A	P
5	E.F.T	EN61000-4-4 INDUSTRY INPUT: 2KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A	P
6	SURGE	IEC61000-4-5 INDUSTRY L-N :2KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A	P
7	Test by certified Lab & Test Report Prepare				

RELIABILITY TEST
ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT																																																																																										
1	TEMPERATURE RISE TEST	MODEL : LPF-60-24 1. ROOM AMBIENT BURN-IN : 4 HRS I/P : 230VAC O/P : 95% LOAD Ta=28.3°C 2. HIGH AMBIENT BURN-IN : 2.5HRS I/P : 230VAC O/P : 95% LOAD Ta=54.1°C			P																																																																																										
		<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>P/N</th> <th>ROOM AMBIENT Ta=28.3°C</th> <th>HIGH AMBIENT Ta=54.1°C</th> </tr> </thead> <tbody> <tr><td>1</td><td>L1</td><td>TR853A</td><td>51.7°C</td><td>74.7°C</td></tr> <tr><td>2</td><td>BD1</td><td>4A/800V SILICON UR4KB80</td><td>50.2°C</td><td>73.5°C</td></tr> <tr><td>3</td><td>Q1</td><td>STP11NK50ZFP 10A/500V</td><td>56.8°C</td><td>79.4°C</td></tr> <tr><td>4</td><td>D2</td><td>2A/800V GP20K</td><td>67.2°C</td><td>91.3°C</td></tr> <tr><td>5</td><td>Q3</td><td>2SK3673-01MR 10A/700V</td><td>66.8°C</td><td>90.5°C</td></tr> <tr><td>6</td><td>C16</td><td>22u/50V UL10Kh 5*11 YXM</td><td>60.4°C</td><td>83.0°C</td></tr> <tr><td>7</td><td>U1</td><td>PFC FAN6921MR</td><td>61.7°C</td><td>84.4°C</td></tr> <tr><td>8</td><td>C201</td><td>47u/50V UL10Kh 6.3*11 YXM</td><td>62.2°C</td><td>84.7°C</td></tr> <tr><td>9</td><td>RTH2</td><td>NTC 100KΩ 3Φ TTC3A104F4193EY 1%</td><td>57.8°C</td><td>80.6°C</td></tr> <tr><td>10</td><td>C5</td><td>47u/450V 105°C 16*25 KXJ</td><td>57.8°C</td><td>80.7°C</td></tr> <tr><td>11</td><td>C105</td><td>820u/25V UL10Kh 10*20 ZLH</td><td>63.6°C</td><td>86.3°C</td></tr> <tr><td>12</td><td>D101</td><td>YA868C15RSC 30A/150V</td><td>66.5°C</td><td>89.2°C</td></tr> <tr><td>13</td><td>C111</td><td>220u/35V UL8Kh 8*11.5 ZLH</td><td>60.2°C</td><td>83.0°C</td></tr> <tr><td>14</td><td>LF100</td><td>TR895-R2</td><td>59.1°C</td><td>82.0°C</td></tr> <tr><td>15</td><td>D1</td><td>MUR460 4A/600V</td><td>58.4°C</td><td>81.1°C</td></tr> <tr><td>16</td><td>LF1</td><td>TR732A-R1</td><td>41.3°C</td><td>64.6°C</td></tr> <tr><td>17</td><td>T1</td><td>TF2200-R1</td><td>53.1°C</td><td>76.5°C</td></tr> </tbody> </table>	NO	Position		P/N	ROOM AMBIENT Ta=28.3°C	HIGH AMBIENT Ta=54.1°C	1	L1	TR853A	51.7°C	74.7°C	2	BD1	4A/800V SILICON UR4KB80	50.2°C	73.5°C	3	Q1	STP11NK50ZFP 10A/500V	56.8°C	79.4°C	4	D2	2A/800V GP20K	67.2°C	91.3°C	5	Q3	2SK3673-01MR 10A/700V	66.8°C	90.5°C	6	C16	22u/50V UL10Kh 5*11 YXM	60.4°C	83.0°C	7	U1	PFC FAN6921MR	61.7°C	84.4°C	8	C201	47u/50V UL10Kh 6.3*11 YXM	62.2°C	84.7°C	9	RTH2	NTC 100KΩ 3Φ TTC3A104F4193EY 1%	57.8°C	80.6°C	10	C5	47u/450V 105°C 16*25 KXJ	57.8°C	80.7°C	11	C105	820u/25V UL10Kh 10*20 ZLH	63.6°C	86.3°C	12	D101	YA868C15RSC 30A/150V	66.5°C	89.2°C	13	C111	220u/35V UL8Kh 8*11.5 ZLH	60.2°C	83.0°C	14	LF100	TR895-R2	59.1°C	82.0°C	15	D1	MUR460 4A/600V	58.4°C	81.1°C	16	LF1	TR732A-R1	41.3°C	64.6°C	17	T1	TF2200-R1	53.1°C	76.5°C		
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2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 305VAC/100VAC O/P : 95 % LOAD Ta=-30.0°C	TEST : OK	P																																																																																										
3	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50 °C NO DAMAGE	I/P : 305 VAC O/P : 95 % LOAD Ta= 50 °C HUMIDITY= 95 %R.H	TEST : OK	P																																																																																										
4	TEMPERATURE COEFFICIENT	± 0.03%(0~50°C)	I/P : 230 VAC O/P : 95 LOAD	± 0.004%(0~50°C)	P																																																																																										
5	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -45°C~ +90°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		OK	P																																																																																										
6	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		OK	P																																																																																										

7	VIBRATION TEST	1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10~500Hz (3) Sweep Time : 12min/sweep cycle (4) Acceleration : 5G (5) Test Time : 72min in each axis (X.Y.Z) (6) Ta : 25°C	TEST : OK	P
8	CAPACITOR LIFE CYCLE	LPF-60-24 : SUPPOSE C105 IS THE MOST CRITICAL COMPONENT (1) I/P : 230VAC O/P : FULL LOAD Ta=25 °C LIFE TIME (2) I/P : 230VAC O/P : FULL LOAD Ta=50 °C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta=50 °C LIFE TIME	(1) 251516HRS (2) 55161HRS (3) 78996HRS	P
9	MTBF	MIL-HDBK-217F NOTICES2 PARTS COUNT TOTAL FAILURE RATE : 440.5KHRS		P
10	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure(Expected Life) : 30,000 hours @ Tcase 80°C; 50,000 hours @ Tcase70°C		P

DATE	SAMPLE	TEST RESULT	TESTER	APPROVAL
2010/11/11	RD SAMPLE	PASS	SANFORD SU	VINCENT TSENG
2010/11/25	PRODUCT SAMPLE	PASS	SANFORD SU	VINCENT TSENG

2009/08/04 A50-F023