



Test Report: LPF-40-24

40W 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 : 150 mVp-p (Max)	I/P : 230VAC O/P : FULL LOAD Ta : 25°C	V1 : 16.8 mVp-p (Max)	P
2	CONSTANT CURRENT REGION	V1= 14.4V~24V	I/P : 230VAC O/P : CV MODE Ta : 25°C	O/P= 14.4V : 1.747 A O/P= 23V : 1.749 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 : 0.09 %~ -0.09 %	P
4	LINE REGULATION	V1 : 0.5 %~ -0.5 % (Max)	I/P : 100 VAC ~ 305 VAC O/P : FULL LOAD Ta : 25°C	V1 : 0.025 %~ -0.025 %	P
5	LOAD REGULATION	V1 : 0.5 %~ -0.5 % (Max)	I/P : 230 VAC O/P : FULL ~MIN LOAD Ta : 25°C	V1 : 0.08 %~ -0.08 %	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/ 408 ms 115VAC/ 734 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/ 19 ms 115VAC/ 19 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/ 71 ms 115VAC/ 38 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 : 2400 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)199 mVp-p (2)211 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	69 V~305V	P
			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)	TEST : OK	
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= 0.9716 / 100% PF= 0.9956 / 100% PF= 0.93 / 100%	P
4	EFFICIENCY	87% (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	89.233 %	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= 0.20 A/ 230 VAC I= 0.40 A/ 115 VAC	P
6	INRUSH CURRENT	230V/ 50 A (TYP) COLD START	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	I= 45 A/ 230 VAC	P
7	LEAKAGE CURRENT	< 0.75 mA / 240 VAC	I/P : 240 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	104.61 %/ 230 VAC 104.61 %/ 115 VAC Constant Current Limiting ,recovers automatically after fault condition is removed.	P
2	OVER VOLTAGE PROTECTION	CH1 : 28 V ~ 35 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	30.621 V/ 230 VAC 30.604 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 : STP9NK70ZFP 7.5A/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) 633 V (2) 488 V (3) 632 V	P
2	Diode Peak Voltage	D101 Rated : FME-220B 20A/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) 107 V (2) 112 V (3) 106 V	P
3	Input Capacitor Voltage	C5 Rated : 33u/450V 105°C 16*20 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) 424.54 V (2) 419.74 V (3) 421.34 V	P
4	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) 21.890 V (2) 21.896 V (3) 21.899 V	P
5	Power Transistor (D to S) or (C to E) Peak Voltage	Q1 Rated : NDF10N60ZG 10A/600V	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) 468 V (2) 444 V (3) 448 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 : 2.465 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 ≥ 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-40-24 1. ROOM AMBIENT BURN-IN : 2.5 HRS I/P : 230VAC O/P : 95% LOAD Ta=29 °C °C 2. HIGH AMBIENT BURN-IN : 3.5 HRS I/P : 230VAC O/P : 95% LOAD Ta=50.4 °C °C <table><tr><th>NO</th><th>Position</th><th>P/N</th><th>ROOM AMBIENT Ta= 29 °C</th><th>HIGH AMBIENT Ta= 50.4 °C</th></tr><tr><td>1</td><td>C11</td><td>474/450V 10% P=10 MEX</td><td>45.4°C</td><td>62.8°C</td></tr><tr><td>2</td><td>L3</td><td>TF2221</td><td>45.9°C</td><td>63.5°C</td></tr><tr><td>3</td><td>BD1</td><td>4A/800V SILICON UR4KB80</td><td>43.5°C</td><td>61.4°C</td></tr><tr><td>4</td><td>L1</td><td>TR991</td><td>44.4°C</td><td>62.0°C</td></tr><tr><td>5</td><td>Q1</td><td>NDF10N60ZG 10A/600V TO220F</td><td>49.1°C</td><td>66.5°C</td></tr><tr><td>6</td><td>D2</td><td>2A/800V GP20K T-52mm</td><td>58.2°C</td><td>75.9°C</td></tr><tr><td>7</td><td>Q3</td><td>STP9NK70ZFP 7.5A/700V TO220F</td><td>57.3°C</td><td>74.7°C</td></tr><tr><td>8</td><td>C16</td><td>22u/50V UL10Kh 5*11 YXM</td><td>52.1°C</td><td>69.0°C</td></tr><tr><td>9</td><td>U1</td><td>FAN6921MR SOP</td><td>57.6°C</td><td>75.2°C</td></tr><tr><td>10</td><td>C201</td><td>47u/50V UL10Kh 6.3*11 YXM</td><td>54.0°C</td><td>70.6°C</td></tr><tr><td>11</td><td>RTH2</td><td>100KΩ 3Φ TTC3A104F4193EY 1%</td><td>49.9°C</td><td>67.0°C</td></tr><tr><td>12</td><td>C5</td><td>33u/450V 105°C 16*20 KXJ</td><td>50.5°C</td><td>67.7°C</td></tr><tr><td>13</td><td>C105</td><td>470u/35V UL7Kh 10*20 KY</td><td>54.2°C</td><td>71.2°C</td></tr><tr><td>14</td><td>D101</td><td>FME-220B 20A/150V TO220F</td><td>56.6°C</td><td>73.6°C</td></tr><tr><td>15</td><td>C111</td><td>220u/35V UL8Kh 8*11.5 ZLH</td><td>51.5°C</td><td>68.5°C</td></tr><tr><td>16</td><td>LF100</td><td>TR895-R2</td><td>49.1°C</td><td>66.7°C</td></tr><tr><td>17</td><td>D3</td><td>2A/800V GP20K T-52mm</td><td>50.2°C</td><td>67.6°C</td></tr><tr><td>18</td><td>LF1</td><td>TR732A-R1</td><td>36.9°C</td><td>55.3°C</td></tr><tr><td>19</td><td>T1</td><td>TF2206</td><td>57.3°C</td><td>73.9°C</td></tr></table>			NO	Position	P/N	ROOM AMBIENT Ta= 29 °C	HIGH AMBIENT Ta= 50.4 °C	1	C11	474/450V 10% P=10 MEX	45.4°C	62.8°C	2	L3	TF2221	45.9°C	63.5°C	3	BD1	4A/800V SILICON UR4KB80	43.5°C	61.4°C	4	L1	TR991	44.4°C	62.0°C	5	Q1	NDF10N60ZG 10A/600V TO220F	49.1°C	66.5°C	6	D2	2A/800V GP20K T-52mm	58.2°C	75.9°C	7	Q3	STP9NK70ZFP 7.5A/700V TO220F	57.3°C	74.7°C	8	C16	22u/50V UL10Kh 5*11 YXM	52.1°C	69.0°C	9	U1	FAN6921MR SOP	57.6°C	75.2°C	10	C201	47u/50V UL10Kh 6.3*11 YXM	54.0°C	70.6°C	11	RTH2	100KΩ 3Φ TTC3A104F4193EY 1%	49.9°C	67.0°C	12	C5	33u/450V 105°C 16*20 KXJ	50.5°C	67.7°C	13	C105	470u/35V UL7Kh 10*20 KY	54.2°C	71.2°C	14	D101	FME-220B 20A/150V TO220F	56.6°C	73.6°C	15	C111	220u/35V UL8Kh 8*11.5 ZLH	51.5°C	68.5°C	16	LF100	TR895-R2	49.1°C	66.7°C	17	D3	2A/800V GP20K T-52mm	50.2°C	67.6°C	18	LF1	TR732A-R1	36.9°C	55.3°C	19	T1	TF2206	57.3°C	73.9°C		P
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2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 305VAC/100VAC O/P : 95 % LOAD Ta= -40 °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℃~ +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	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℃	TEST : OK	P
8	CAPACITOR LIFE CYCLE	LPF-40-24:SUPPOSE C105 IS THE MOST CRITICAL COMPONENT (1) I/P : 230VAC O/P : FULL LOAD Ta=25 ℃ LIFE TIME (2) I/P : 230VAC O/P : FULL LOAD Ta=50 ℃ LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta=50 ℃ LIFE TIME	(1) 370830.7 HRS (2) 88906.3 HRS (3) 109512.6 HRS	P
9	MTBF	MIL-HDBK-217F NOTICES2 PARTS COUNT TOTAL FAILURE RATE : 438.8KHRS		P
10	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure(Expected Life) : 30,000 hours @ Tcase 80℃; 50,000 hours @ Tcase70℃		P

DATE	SAMPLE	TEST RESULT	TESTER	APPROVAL
2010/11/11	RD SAMPLE	PASS	SANFORD SU	VINCENT TSENG
2010/11/19	PRODUCT SAMPLE	PASS	SANFORD SU	VINCENT TSENG

2009/08/04 A50-F023