Test Report: LPF-40D-36

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	V1：250 mVp-p (Max)	I/P： 230VAC O/P：FULL LOAD Ta：25℃	V1： 16.4 mVp-p (Max)	P
2	CONSTANT CURRENT REGION	V1= 21.6V~36V	I/P： 230VAC O/P：CV MODE Ta：25℃	O/P= 21.6V： 1.17 A O/P= 35V： 1.171 A	P
3	OUTPUT VOLTAGE TOLERANCE	V1： 4 %~ -4 % (Max)	I/P：100 VAC / 305 VAC O/P：FULL/ MIN LOAD Ta：25℃	V1： 0.06 %~ -0.06 %	P
4	LINE REGULATION	V1： 0.5 %~ -0.5 % (Max)	I/P：100 VAC ~ 305 VAC O/P：FULL LOAD Ta：25℃	V1： 0.02 %~ -0.02 %	P
5	LOAD REGULATION	V1：0.5 %~ -0.5 % (Max)	I/P： 230 VAC O/P：FULL ~MIN LOAD Ta：25℃	V1： 0.05 %~ -0.05 %	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℃	230VAC/ 274 ms 115VAC/ 350 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℃	230VAC/ 24 ms 115VAC/ 24 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℃	230VAC/ 70 ms 115VAC/ 20 ms	P
9	OVER/UNDERSHOOT TEST	< ±5%	I/P： 230 VAC O/P：FULL LOAD Ta：25℃	TEST： <5 %	P
10	DYNAMIC LOAD	V1： 3600 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℃	(1)197 mVp-p (2)239 mVp-p	P

11	DIMMER TEST	SPEC: *Output constant current level can be adjusted through output cable by 1 ~ 10Vdc, PWM signal or resistor between ADJ1(+) and ADJ2(-). *Reference resistance value for output current adjustment (Typical)	P

Resistance value	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K
Output current	**10%**	**20%**	**30%**	**40%**	**50%**	**60%**	**70%**	**80%**	**90%**	**100%**

*1 ~ 10V dimming function for output current adjustment (Typical)

Dimming value	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V
Output current	**10%**	**20%**	**30%**	**40%**	**50%**	**60%**	**70%**	**80%**	**90%**	**100%**

*10V PWM signal for output current adjustment (Typical)

Duty value	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Output current	**10%**	**20%**	**30%**	**40%**	**50%**	**60%**	**70%**	**80%**	**90%**	**100%**

TEST RESULT: I/P： 230 VAC ;Ta：25℃

1	Resistance value	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K
	Output current	0.110A	0.219A	0.330A	0.442A	0.553A	0.663A	0.771A	0.881A	1.039A	1.113A
	%	**9.80%**	**19.51%**	**29.46%**	**39.45%**	**49.35%**	**59.23%**	**68.81%**	**78.63%**	**92.77%**	**99.33%**
2	Dimming value	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V
	Output current	0.113A	0.226A	0.337A	0.448A	0.559A	0.671A	0.783A	0.896A	1.008A	1.120A
	%	**10.10%**	**20.18%**	**30.06%**	**40.02%**	**49.95%**	**59.93%**	**69.88%**	**80.01%**	**90.00%**	**100.02%**
3	Duty value	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
	Output current	0.085A	0.201A	0.318A	0.434A	0.551A	0.668A	0.785A	0.902A	1.019A	1.126A
	%	**7.59%**	**17.95%**	**28.39%**	**38.75%**	**49.20%**	**59.64%**	**70.09%**	**80.54%**	**90.98%**	**100.54%**

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℃	70 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℃	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℃	PF= 0.971 / 100% PF= 0.998 / 100% PF= 0.93 / 100%	P
4	EFFICIENCY	88% (TYP)	I/P： 230 VAC O/P：FULL LOAD Ta：25℃	90.35 %	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℃	I = 0.19 A/ 230 VAC I = 0.39 A/ 115 VAC	P
6	INRUSH CURRENT	230V/ 50 A (TYP) COLD START	I/P： 230 VAC O/P：FULL LOAD Ta：25℃	I = 44 A/ 230 VAC	P
7	LEAKAGE CURRENT	< 0.75 mA / 240 VAC	I/P： 277 VAC O/P：Min LOAD Ta：25℃	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℃	104.5 %/ 230 VAC 104.5%/ 115 VAC Constant Current Limiting ,recovers automatically after fault condition is removed.	P
2	OVER VOLTAGE PROTECTION	CH1： 41 V ~ 49 V	I/P： 230 VAC I/P： 115 VAC O/P：MIN LOAD Ta：25℃	44.34 V/ 230 VAC 44.24 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℃ 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℃	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)Fulll load continue Ta：25℃	(1) 630 V (2) 560 V (3) 628 V	P
2	Diode Peak Voltage	D101 Rated： STTH3002CT 30A/200V	I/P：High-Line +3V = 308 V O/P： (1)Full Load Turn on (2)Output Short (3)Fulll load continue Ta：25℃	(1) 168 V (2) 180 V (3) 166 V	P
3	Input Capacitor Voltage	C5 Rated： 33u/450V 105℃ 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℃	(1) 424.42 V (2) 428.37 V (3) 429.68 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℃	(1) 21.874 V (2) 21.925 V (3) 21.938 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)Fulll load continue Ta：25℃	(1) 486 V (2) 452 V (3) 450 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℃	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℃/70%RH	I/P-O/P： 18 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℃	PASS	P
2	CONDUCTION	EN55015 CLASS B	I/P: 230 VAC (50HZ)/115V[60HZ] O/P:FULL/60% LOAD Ta:25℃	PASS Test by certified Lab	P
3	RADIATION	EN55015 CLASS B	I/P: 230 VAC (50HZ)/115V[60HZ] O/P:FULL LOAD Ta:25℃	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℃	CRITERIA A	P
5	E.F.T	EN61000-4-4 INDUSTRY INPUT: 2KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25℃	CRITERIA A	P
6	SURGE	IEC61000-4-5 INDUSTRY L-N :2KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25℃	CRITERIA A	P
7	Test by certified Lab & Test Report Prepare				

■ RELIABILITY TEST

ENVIRONMENT TEST

<table>
<tr><th>NO</th><th>TEST ITEM</th><th>SPECIFICATION</th><th>TEST CONDITION</th><th>RESULT</th><th>VERDICT</th></tr>
<tr><td>1</td><td>TEMPERATURE RISE TEST</td><td colspan="3">MODEL： LPF-40-24
1. ROOM AMBIENT BURN-IN：2.5 HRS
I/P： 230VAC O/P： 95% LOAD Ta=29 ℃ ℃
2. HIGH AMBIENT BURN-IN：3.5 HRS
I/P： 230VAC O/P： 95% LOAD Ta=50.4 ℃ ℃
<table>
<tr><th>NO</th><th>Position</th><th>P/N</th><th>ROOM AMBIENT Ta= 29 ℃</th><th>HIGH AMBIENT Ta= 50.4 ℃</th></tr>
<tr><td>1</td><td>C11</td><td>474/450V 10% P=10 MEX</td><td>45.4℃</td><td>62.8℃</td></tr>
<tr><td>2</td><td>L3</td><td>TF2221</td><td>45.9℃</td><td>63.5℃</td></tr>
<tr><td>3</td><td>BD1</td><td>4A/800V SILICON UR4KB80</td><td>43.5℃</td><td>61.4℃</td></tr>
<tr><td>4</td><td>L1</td><td>TR991</td><td>44.4℃</td><td>62.0℃</td></tr>
<tr><td>5</td><td>Q1</td><td>NDF10N60ZG 10A/600V TO220F</td><td>49.1℃</td><td>66.5℃</td></tr>
<tr><td>6</td><td>D2</td><td>2A/800V GP20K T-52mm</td><td>58.2℃</td><td>75.9℃</td></tr>
<tr><td>7</td><td>Q3</td><td>STP9NK70ZFP 7.5A/700V TO220F</td><td>57.3℃</td><td>74.7℃</td></tr>
<tr><td>8</td><td>C16</td><td>22u/50V UL10Kh 5*11 YXM</td><td>52.1℃</td><td>69.0℃</td></tr>
<tr><td>9</td><td>U1</td><td>FAN6921MR SOP</td><td>57.6℃</td><td>75.2℃</td></tr>
<tr><td>10</td><td>C201</td><td>47u/50V UL10Kh 6.3*11 YXM</td><td>54.0℃</td><td>70.6℃</td></tr>
<tr><td>11</td><td>RTH2</td><td>100KΩ 3Φ TTC3A104F4193EY 1%</td><td>49.9℃</td><td>67.0℃</td></tr>
<tr><td>12</td><td>C5</td><td>33u/450V 105℃ 16*20 KXJ</td><td>50.5℃</td><td>67.7℃</td></tr>
<tr><td>13</td><td>C105</td><td>470u/35V UL7Kh 10*20 KY</td><td>54.2℃</td><td>71.2℃</td></tr>
<tr><td>14</td><td>D101</td><td>FME-220B 20A/150V TO220F</td><td>56.6℃</td><td>73.6℃</td></tr>
<tr><td>15</td><td>C111</td><td>220u/35V UL8Kh 8*11.5 ZLH</td><td>51.5℃</td><td>68.5℃</td></tr>
<tr><td>16</td><td>LF100</td><td>TR895-R2</td><td>49.1℃</td><td>66.7℃</td></tr>
<tr><td>17</td><td>D3</td><td>2A/800V GP20K T-52mm</td><td>50.2℃</td><td>67.6℃</td></tr>
<tr><td>18</td><td>LF1</td><td>TR732A-R1</td><td>36.9℃</td><td>55.3℃</td></tr>
<tr><td>19</td><td>T1</td><td>TF2206</td><td>57.3℃</td><td>73.9℃</td></tr>
</table></td><td>P</td></tr>
<tr><td>2</td><td>LOW TEMPERATURE
TURN ON TEST</td><td>TURN ON AFTER 2 HOUR</td><td>I/P： 305VAC/100VAC
O/P： 95 % LOAD
Ta= -40 ℃</td><td>TEST：OK</td><td>P</td></tr>
<tr><td>3</td><td>HIGH HUMIDITY
HIGH TEMPERATURE
HIGH VOLTAGE
TURN ON TEST</td><td>AFTER 12 HOURS
IN CHAMBER ON
CONTROL 50 ℃
NO DAMAGE</td><td>I/P： 305 VAC
O/P：95% LOAD
Ta= 50 ℃
HUMIDITY= 95 %R.H</td><td>TEST：OK</td><td>P</td></tr>
<tr><td>4</td><td>TEMPERATURE
COEFFICIENT</td><td>± 0.03 %(0~50℃)</td><td>I/P： 230 VAC
O/P：95% LOAD</td><td>± 0.004 %(0~50℃)</td><td>P</td></tr>
<tr><td>5</td><td>STORAGE TEMPERATURE TEST</td><td colspan="2">1. Thermal shock Temperature： -45℃~ +90℃
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</td><td>OK</td><td>P</td></tr>
</table>

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