



# Test Report: LPF-40D-54

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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°C	V1 : 14.2 mVp-p (Max)	P
2	CONSTANT CURRENT REGION	V1= 32.4V~54V	I/P : 230VAC O/P : CV MODE Ta : 25°C	O/P= 25.2V : 0.788 A O/P= 41V : 0.79 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 : 0.03 %~ -0.03 %	P
4	LINE REGULATION	V1 : 0.5 %~ -0.5 % (Max)	I/P : 100 VAC ~ 305 VAC O/P : FULL LOAD Ta : 25°C	V1 : 0.02 %~ -0.02 %	P
5	LOAD REGULATION	V1 : 0.5 %~ -0.5 % (Max)	I/P : 230 VAC O/P : FULL ~MIN LOAD Ta : 25°C	V1 : 0.03 %~ -0.03 %	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/ 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°C	230VAC/ 34 ms 115VAC/ 34 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/ 74 ms 115VAC/ 41 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 : 5400 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)186 mVp-p (2)158 mVp-p	P

11	DIMMER TEST	<p>SPEC:</p> <p>*Output constant current level can be adjusted through output cable by 1 ~ 10Vdc, PWM signal or resistor between ADJ1(+) and ADJ2(-).</p> <p>*Reference resistance value for output current adjustment (Typical)</p> <table border="1"> <tr> <th>Resistance value</th> <th>10K</th> <th>20K</th> <th>30K</th> <th>40K</th> <th>50K</th> <th>60K</th> <th>70K</th> <th>80K</th> <th>90K</th> <th>100K</th> </tr> <tr> <th>Output current</th> <td>10%</td> <td>20%</td> <td>30%</td> <td>40%</td> <td>50%</td> <td>60%</td> <td>70%</td> <td>80%</td> <td>90%</td> <td>100%</td> </tr> </table> <p>*1 ~ 10V dimming function for output current adjustment (Typical)</p> <table border="1"> <tr> <th>Dimming value</th> <th>1V</th> <th>2V</th> <th>3V</th> <th>4V</th> <th>5V</th> <th>6V</th> <th>7V</th> <th>8V</th> <th>9V</th> <th>10V</th> </tr> <tr> <th>Output current</th> <td>10%</td> <td>20%</td> <td>30%</td> <td>40%</td> <td>50%</td> <td>60%</td> <td>70%</td> <td>80%</td> <td>90%</td> <td>100%</td> </tr> </table> <p>*10V PWM signal for output current adjustment (Typical)</p> <table border="1"> <tr> <th>Duty value</th> <th>10%</th> <th>20%</th> <th>30%</th> <th>40%</th> <th>50%</th> <th>60%</th> <th>70%</th> <th>80%</th> <th>90%</th> <th>100%</th> </tr> <tr> <th>Output current</th> <td>10%</td> <td>20%</td> <td>30%</td> <td>40%</td> <td>50%</td> <td>60%</td> <td>70%</td> <td>80%</td> <td>90%</td> <td>100%</td> </tr> </table>										Resistance value	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K	Output current	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	Dimming value	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V	Output current	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	Duty value	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	Output current	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
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		TEST RESULT: I/P : 230 VAC ; Ta : 25°C																																																																											
		1	Resistance value	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K																																																																
			Output current	0.070A	0.144A	0.219A	0.294A	0.368A	0.442A	0.520A	0.590A	0.668A	0.737A																																																																
			%	9.20%	18.95%	28.78%	38.64%	48.47%	58.13%	68.42%	77.61%	87.87%	96.92%																																																																
2	Dimming value	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V																																																																		
	Output current	0.072A	0.148A	0.225A	0.302A	0.378A	0.455A	0.531A	0.607A	0.684A	0.760A																																																																		
	%	9.45%	19.46%	29.57%	39.68%	49.76%	59.80%	69.87%	79.91%	89.96%	99.96%																																																																		
3	Duty value	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%																																																																		
	Output current	0.055A	0.134A	0.214A	0.294A	0.373A	0.453A	0.532A	0.612A	0.692A	0.761A																																																																		
	%	7.24%	17.63%	28.16%	38.68%	49.08%	59.61%	70.00%	80.53%	91.05%	100.13%																																																																		

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 )	69 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= 0.9738 / 100% PF= 0.9965 / 100% PF= 0.93 / 100%	P
4	EFFICIENCY	89% (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	89.98 %	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= 27 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	103.68 %/ 230 VAC 103.68 %/ 115 VAC Constant Current Limiting ,recovers automatically after fault condition is removed.	P
2	OVER VOLTAGE PROTECTION	CH1 : 59 V ~ 65 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	63.40 V/ 230 VAC 63.78 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) 648 V (2) 652 V (3) 632 V	P
2	Diode Peak Voltage	D101 Rated : STTH2003CT 20A/300V	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) 286 V (2) 294 V (3) 250 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) 425.87 V (2) 429.44 V (3) 430.40 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) 21.951 V (2) 21.850 V (3) 21.854 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) 492 V (2) 450 V (3) 454 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 : 2.479 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-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			P																																																																																																				
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19	T1	TF2206	57.3°C	73.9°C																																																																																																					
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°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-40-24: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) 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°C; 50,000 hours @ Tcase70°C		P

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

2009/08/04 A50-F023