Test Report: LPF-25D-42

25W 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 : 30 mVp-p (Max)	P
2	CONSTANT CURRENT REGION	V1= 23.1V~42V	I/P : 230VAC O/P : CV MODE Ta : 25℃	O/P= 23.1V : 0.620 A O/P= 41V : 0.619 A	P
3	OUTPUT VOLTAGE TOLERANCE	V1 : 4 %~ -4 % (Max)	I/P : 100 VAC / 305 VAC O/P : FULL/ MIN LOAD Ta : 25℃	V1 : 0.560 %~ -0.050 %	P
4	LINE REGULATION	V1 : 0.5 %~ -0.5 % (Max)	I/P : 100 VAC ~ 305 VAC O/P : FULL LOAD Ta : 25℃	V1 : 0.002 %~ -0.002 %	P
5	LOAD REGULATION	V1 : 0.5 %~ -0.5 % (Max)	I/P : 230 VAC O/P : FULL ~MIN LOAD Ta : 25℃	V1 : 0.0024 %~ -0.026 %	P
6	SET UP TIME	230VAC : 500 ms (Max) 115VAC : 1500 ms(Max)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25℃	230VAC/ 282.852 ms 115VAC/ 291.427 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/ 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℃	230VAC/ 77 ms 115VAC/ 77 ms	P
9	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230 VAC O/P : FULL LOAD Ta : 25℃	TEST : <5 %	P
10	DYNAMIC LOAD	V1 : 4200 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) 340 mVp-p (2) 440 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	0.051A	0.112A	0.169A	0.230A	0.295A	0.357A	0.411A	0.475A	0.534A	0.592A
	%	8.50%	18.67%	28.17%	38.33%	49.17%	59.50%	68.50%	79.17%	89.00%	98.67%
2	Dimming value	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V
	Output current	0.052A	0.115A	0.172A	0.234A	0.299A	0.361A	0.416A	0.479A	0.538A	0.596A
	%	8.67%	19.17%	28.67%	39.00%	49.83%	60.17%	69.33%	79.83%	89.67%	99.33%
3	Duty value	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
	Output current	0.053A	0.114A	0.175A	0.236A	0.298A	0.359A	0.419A	0.481A	0.541A	0.597A
	%	8.83%	19.00%	29.17%	39.33%	49.67%	59.83%	69.83%	80.17%	90.17%	99.50%

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℃	83 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) 0.97 / 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= 0.969 / 100% PF= 0.996 / 100% PF= 0.941 / 100%	P
4	EFFICIENCY	85.5% (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25℃	85.52 %	P
5	INPUT CURRENT	230V/ 0.25 A (TYP) 115V/ 0.4 A (TYP) 277V/ 0.2 A (TYP)	I/P : 230 VAC I/P : 115 VAC I/P : 277 VAC O/P : FULL LOAD Ta : 25℃	I = 0.137 A/ 230 VAC I = 0.254 A/ 115 VAC I = 0.119 A/ 277 VAC	P
6	INRUSH CURRENT	230V/ 50 A (TYP) COLD START	I/P : 230 VAC O/P : FULL LOAD Ta : 25℃	I = 36.9 A/ 230 VAC	P
7	LEAKAGE CURRENT	< 0.75 mA / 240 VAC	I/P : 240 VAC O/P : Min LOAD Ta : 25℃	L-CASE : 0.003 mA N-CASE : 0.003 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℃	103.22%/ 230 VAC 103.20%/ 115 VAC Constant Current Limiting ,recovers automatically after fault condition is removed.	P
2	OVER VOLTAGE PROTECTION	CH1 : 46 V ~ 54 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25℃	51.8 V/ 230 VAC 51.8 V/ 115 VAC Shut down and latch off o/p voltage, re-power on to recover	P
3	OVER TEMPERATURE PROTECTION	SPEC : TSW1 : 95± 5℃ 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 : 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	U2 Rated : IP7518: 700V / 2A	I/P : High-Line +3V = 308 V O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25℃	(1) 648 V (2) 478 V (3) 632 V	P
2	Diode Peak Voltage	D101 Rated : STTH3002CT: 200V / 30A	I/P : High-Line +3V = 308 V O/P : (1)Full Load Turn on (2)Output Short (3)Full load continue Ta : 25℃	(1) 186 V (2) 146 V (3) 185 V	P
3	Input Capacitor Voltage	C5 Rated : 22u/450V 105℃ 16*20 RH	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) 436 V (2) 438 V (3) 430 V	P
4	Control IC Voltage Test	U 2 Rated : IP7518:30V	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) 20.4 V (2) 13.7 V (3) 19.3 V	P
5	Power Transistor (D to S) or (C to E) Peak Voltage	Q1 Rated : NDF10N60ZG: 600V/ 10 A	I/P : High-Line +3V = 308 V O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25℃	(1) 486 V (2) 426 V (3) 434 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： 1.525 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： >9999 MΩ 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%,50%LOAD CLASS C ≧ 50% Ta:25℃	PASS	P
2	CONDUCTION	EN55015	I/P: 230 VAC (50HZ)/115V[60HZ] O/P:FULL/50% LOAD Ta:25℃	PASS Test by certified Lab	P
3	RADIATION	EN55015	I/P: 230 VAC (50HZ)/115V[60HZ] O/P: FULL/50% LOAD Ta:25℃	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℃	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℃	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-25D-24
1. ROOM AMBIENT BURN-IN：2.5 HRS
I/P： 230VAC O/P： 95% LOAD Ta=35.0 ℃
2. HIGH AMBIENT BURN-IN：3.5 HRS
I/P： 230VAC O/P： 95% LOAD Ta=53.6 ℃
<table>
<tr><th>NO</th><th>Position</th><th>P/N</th><th>ROOM AMBIENT Ta= 35.0 ℃</th><th>HIGH AMBIENT Ta= 53.6 ℃</th></tr>
<tr><td>1</td><td>LF2</td><td>LF-802</td><td>54.8℃</td><td>73.5℃</td></tr>
<tr><td>2</td><td>BD1</td><td>UD2KB80</td><td>56.9℃</td><td>76.5℃</td></tr>
<tr><td>3</td><td>L1</td><td>TR-6102</td><td>59.1℃</td><td>78.4℃</td></tr>
<tr><td>4</td><td>Q1</td><td>NDF10N60ZG</td><td>60.9℃</td><td>82.3℃</td></tr>
<tr><td>5</td><td>D1</td><td>MUR460</td><td>61.7℃</td><td>80.7℃</td></tr>
<tr><td>6</td><td>C18</td><td>47uF/50V YXM</td><td>64.0℃</td><td>83.5℃</td></tr>
<tr><td>7</td><td>C54</td><td>22uF/50V YXM</td><td>61.4℃</td><td>80.7℃</td></tr>
<tr><td>8</td><td>C5</td><td>22uF/450V RH</td><td>63.2℃</td><td>84.8℃</td></tr>
<tr><td>9</td><td>U1</td><td>NCP1608B</td><td>62.7℃</td><td>82.1℃</td></tr>
<tr><td>10</td><td>U2</td><td>IP7518</td><td>70.0℃</td><td>93.2℃</td></tr>
<tr><td>11</td><td>T1</td><td>TF-6360</td><td>63.8℃</td><td>87.2℃</td></tr>
<tr><td>12</td><td>D101</td><td>YA868C12R</td><td>59.2℃</td><td>83.1℃</td></tr>
<tr><td>13</td><td>C105</td><td>390u/35V ZLH</td><td>58.6℃</td><td>81.3℃</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>± 0.018 %(0~50℃)</td><td>P</td></tr>
<tr><td>5</td><td>STORAGE TEMPERATURE TEST</td><td colspan="2">1. Thermal shock Temperature： -45℃~ +85℃
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>
<tr><td>6</td><td>THERMAL SHOCK TEST</td><td colspan="2">1. Thermal shock Temperature： -45℃~ +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</td><td>OK</td><td>P</td></tr>
</table>

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-25-24: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) 606419.2 HRS (2) 80620.8 HRS (3) 146406.4 HRS	P
9	MTBF	Conducted by Parts Stress Analysis Prediction 3574.2K hrs min. Telcordia SR-332 (Bellcore) ; 391.6K hrs min. MIL-HDBK-217F (25℃)		P
10	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure(Expected Life) : 50,000 hours @ Tcase70℃		P

SAMPLE	TEST RESULT	TESTER	APPROVAL
PRODUCT SAMPLE	PASS	ZOULF	HOWAY

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