Test Report: LPF-25D-15

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 : 150 mVp-p (Max)	I/P : 230VAC O/P : FULL LOAD Ta : 25℃	V1 : 100 mVp-p (Max)	P
2	CONSTANT CURRENT REGION	V1=8.25V~15V	I/P : 230VAC O/P : CV MODE Ta : 25℃	O/P= 8.25V : 1.683 A O/P= 14V : 1.687 A	P
3	OUTPUT VOLTAGE TOLERANCE	V1 : 4 %~ -4 % (Max)	I/P : 100 VAC / 305 VAC O/P : FULL/ MIN LOAD Ta : 25℃	V1 : 0.727 %~ -0.172 %	P
4	LINE REGULATION	V1 : 0.5 %~ -0.5 % (Max)	I/P : 100 VAC ~ 305 VAC O/P : FULL LOAD Ta : 25℃	V1 : 0.083 %~ -0.083 %	P
5	LOAD REGULATION	V1 : 1.5 %~ -1.5 % (Max)	I/P : 230 VAC O/P : FULL ~MIN LOAD Ta : 25℃	V1 : 0.172 %~ -0.172 %	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/ 262.879 ms 115VAC/ 267.902 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/ 11 ms 115VAC/ 11 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/ 74 ms 115VAC/ 74 ms	P
9	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230 VAC O/P : FULL LOAD Ta : 25℃	TEST : <5 %	P
10	DYNAMIC LOAD	V1 : 1500 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) 580 mVp-p (2) 748 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	0.144A	0.315A	0.483A	0.655A	0.830A	1.002A	1.173A	1.344A	1.513A	1.672A
	%	8.62%	18.86%	28.92%	39.22%	49.70%	66.00%	70.24%	80.48%	90.60%	100.1%
2	Dimming value	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V
	Output current	0.145A	0.317A	0.485A	0.658A	0.833A	1.006A	1.177A	1.347A	1.517A	1.674A
	%	8.68%	18.98%	29.04%	39.40%	49.88%	60.24%	70.48%	80.66%	90.84%	100.2%
3	Duty value	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
	Output current	0.147A	0.318A	0.490A	0.662A	0.835A	1.007A	1.178A	1.351A	1.522A	1.678A
	%	8.80%	19.04%	29.34%	39.64%	50.00%	60.30%	70.54%	80.90%	91.14%	100.5%

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℃	85 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= 0.975 / 100% PF= 0.997 / 100% PF= 0.953 / 100%	P
4	EFFICIENCY	84% (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25℃	84.18 %	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 = 0.134 A/ 230 VAC I = 0.254 A/ 115 VAC I = 0.112 A/ 277 VAC	P
6	INRUSH CURRENT	230V/ 50 A (TYP) COLD START	I/P : 230 VAC O/P : FULL LOAD Ta : 25℃	I = 37.1 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℃	100.75 %/ 230 VAC 101.25 %/ 115 VAC Constant Current Limiting ,recovers automatically after fault condition is removed.	P
2	OVER VOLTAGE PROTECTION	CH1 : 17.5 V ~ 21 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25℃	18.99 V/ 230 VAC 19.01 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) 644 V (2) 496 V (3) 644 V	P
2	Diode Peak Voltage	D101 Rated : YG868C08: 80V / 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) 60.8 V (2) 42.6 V (3) 58.4 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) 442 V (2) 444 V (3) 432 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) 21.4 V (2) 12.7 V (3) 19.5 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) 440 V (2) 438 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： 1.423 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-12
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=50.9 ℃
<table>
<tr><th>NO</th><th>Position</th><th>P/N</th><th>ROOM AMBIENT Ta= 35.0 ℃</th><th>HIGH AMBIENT Ta= 50.9 ℃</th></tr>
<tr><td>1</td><td>LF2</td><td>LF-802</td><td>55.9℃</td><td>72.6℃</td></tr>
<tr><td>2</td><td>BD1</td><td>UD2KB80</td><td>59.2℃</td><td>74.6℃</td></tr>
<tr><td>3</td><td>L1</td><td>TR-6102</td><td>61.1℃</td><td>76.6℃</td></tr>
<tr><td>4</td><td>Q1</td><td>NDF10N60ZG</td><td>63.2℃</td><td>79.3℃</td></tr>
<tr><td>5</td><td>D1</td><td>MUR460</td><td>64.4℃</td><td>80.2℃</td></tr>
<tr><td>6</td><td>C18</td><td>47uF/50V YXM</td><td>65.5℃</td><td>78.8℃</td></tr>
<tr><td>7</td><td>C54</td><td>22uF/50V YXM</td><td>63.0℃</td><td>81.4℃</td></tr>
<tr><td>8</td><td>C5</td><td>22uF/450V RH</td><td>67.1℃</td><td>82.9℃</td></tr>
<tr><td>9</td><td>U1</td><td>NCP1608B</td><td>64.3℃</td><td>80.4℃</td></tr>
<tr><td>10</td><td>U2</td><td>IP7518</td><td>73.7℃</td><td>91.2℃</td></tr>
<tr><td>11</td><td>T1</td><td>TF-6357</td><td>69.8℃</td><td>85.4℃</td></tr>
<tr><td>12</td><td>D101</td><td>PFR30L60CT 30A/60V</td><td>66.4℃</td><td>81.4℃</td></tr>
<tr><td>13</td><td>C105</td><td>560u/25V ZLH</td><td>64.7℃</td><td>79.5℃</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℃~ +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-25D-12: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) 382565.7 HRS (2) 72953.3 HRS (3) 106912.3 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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