Test Report: LPF-90D-42

90W 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	V1：200 mVp-p (Max)	I/P： 230VAC O/P：FULL LOAD Ta：25℃	V1： 22.8 mVp-p (Max)	P
2	CONSTANT CURRENT REGION	V1= 25.2V~42V	I/P： 230VAC O/P：CV MODE Ta：25℃	O/P= 41V/ 2.173 A O/P= 25.2V/ 2.179 A	P
3	OUTPUT VOLTAGE TOLERANCE	V1： 4 %~ -4 % (Max)	I/P：100 VAC / 305 VAC O/P：FULL/ MIN LOAD Ta：25℃	V1： 0.1 %~ -0.1 %	P
4	LINE REGULATION	V1： 0.5 %~ -0.5 % (Max)	I/P：100 VAC ~ 305 VAC O/P：FULL LOAD Ta：25℃	V1： 0.1 %~ -0.1 %	P
5	LOAD REGULATION	V1：0.5 %~ -0.5 % (Max)	I/P： 230 VAC O/P：FULL ~MIN LOAD Ta：25℃	V1： 0.04 %~ -0.05 %	P
6	SET UP TIME	230VAC： 500 ms (Max) 115VAC： 1200 ms(Max)	I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	230VAC/ 276 ms 115VAC/ 280 ms	P
7	RISE TIME	230VAC： 200 ms (Max) 115VAC： 200 ms (Max)	I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	230VAC/ 29.961 ms 115VAC/ 27.078 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/ 77.269 ms 115VAC/ 32.868 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)280 mVp-p (2)749 mVp-p	P

11	DIMMER TEST	SPEC:	P

*Reference resistance value for output current adjustment (Typical)

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	0.241A	0.444A	0.652A	0.863A	1.071A	1.272A	1.484A	1.672A	1.901A	2.083A
	%	**11.21%**	**20.65%**	**30.33%**	**40.14%**	**49.81%**	**59.16%**	**69.02%**	**77.77%**	**88.42%**	**96.88%**
2	Dimming value	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V
	Output current	0.246A	0.458A	0.670A	0.881A	1.094A	1.306A	1.520A	1.730A	1.941A	2.153A
	%	**11.44%**	**21.30%**	**31.16%**	**40.98%**	**50.88%**	**60.74%**	**70.70%**	**80.47%**	**90.28%**	**100.14%**
3	Duty value	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
	Output current	0.254A	0.466A	0.677A	0.889A	1.102A	1.314A	1.527A	1.740A	1.954A	2.165A
	%	**11.81%**	**21.67%**	**31.49%**	**41.35%**	**51.26%**	**61.12%**	**71.02%**	**80.93%**	**90.88%**	**100.70%**

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℃ 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)	76.59V~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℃	TEST： OK	P
3	POWER FACTOR	0.96 / 230 VAC(TYP) 0.97 / 115 VAC(TYP) 0.95 / 277 VAC(TYP)	I/P： 230 VAC I/P： 115 VAC I/P： 277 VAC O/P：FULL LOAD Ta：25℃	PF= 0.9896 / 100% PF= 0.9972 / 100% PF= 0.9837 / 100%	P
4	EFFICIENCY	90.5% (TYP)	I/P： 230 VAC O/P：FULL LOAD Ta：25℃	91.37 %	P
5	INPUT CURRENT	230V/ 0.5 A (TYP) 115V/ 0.95 A (TYP) 277V/ 0.4 A (TYP)	I/P： 230 VAC I/P： 115 VAC I/P： 277 VAC O/P：FULL LOAD Ta：25℃	I = 0.4327 A/ 230 VAC I = 0.8661 A/ 115 VAC I = 0.3634 A/ 277 VAC	P
6	INRUSH CURRENT	230V/ 55 A (TYP) COLD START	I/P： 230 VAC O/P：FULL LOAD Ta：25℃	I = 67.757 A/ 230 VAC	P
7	LEAKAGE CURRENT	< 0.75 mA / 277 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℃	101.44 %/ 230 VAC 101.53%/ 115 VAC Constant Current Limiting ,recovers automatically after fault condition is removed.	P
2	OVER VOLTAGE PROTECTION	CH1 : 47 V ~ 53 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25℃	51.2V/ 230 VAC 51.2V/ 115 VAC Shut down 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 2 Rated : TK10A60D 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℃	(1) 436 V (2) 448 V (3) 432 V	P
2	Diode Peak Voltage	Q101 Rated : STTH3002CT 30A/200V	I/P : High-Line +3V = 308 V O/P : (1)Full Load Turn on (2)Output Short (3)Full load continue Ta : 25℃	(1) 170 V (2) 128 V (3) 170 V	P
3	Input Capacitor Voltage	C5 Rated : 82u/450V 105℃	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) 449 V (2) 436 V (3) 440 V	P
4	Control IC Voltage Test	U 1 Rated : TEA1752T 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) 22.2 V (2) 21.6 V (3) 21.8 V	P
5	Power Transistor (D to S) or (C to E) Peak Voltage	Q1 Rated : 2SK3677-01MR 12A/700V	I/P : High-Line +3V = 308 V O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25℃	(1) 624 V (2) 506 V (3) 632 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： 3.93 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： 30 GΩ NO DAMAGE	P

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	EN55022 CLASS B	I/P: 230 VAC (50HZ)/115V[60HZ] O/P:FULL/60% LOAD Ta:25℃	PASS Test by certified Lab	P
3	RADIATION	EN55022 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-90-24
1. ROOM AMBIENT BURN-IN：1 HRS
I/P： 230VAC O/P： 95% LOAD Ta=37.5 ℃
2. HIGH AMBIENT BURN-IN：2 HRS
I/P： 230VAC O/P： 95% LOAD Ta=51.6℃
<table>
<tr><th>NO</th><th>Position</th><th>P/N</th><th>ROOM AMBIENT Ta=37.5℃</th><th>HIGH AMBIENT Ta= 51.6℃</th></tr>
<tr><td>1</td><td>LF1</td><td>TR-990</td><td>59.5℃</td><td>72.1℃</td></tr>
<tr><td>2</td><td>LF2</td><td>TR-910B</td><td>68.9℃</td><td>81.4℃</td></tr>
<tr><td>3</td><td>L1</td><td>TR-995</td><td>67.3℃</td><td>79.6℃</td></tr>
<tr><td>4</td><td>C11</td><td>564/450V</td><td>70.7℃</td><td>83.1℃</td></tr>
<tr><td>5</td><td>D6</td><td>MUR460</td><td>71.7℃</td><td>84.0℃</td></tr>
<tr><td>6</td><td>Q2</td><td>TK10A60D</td><td>73.4℃</td><td>86.1℃</td></tr>
<tr><td>7</td><td>L3</td><td>TF-2157</td><td>69.1℃</td><td>80.9℃</td></tr>
<tr><td>8</td><td>Q1</td><td>2SK3677</td><td>77.2℃</td><td>90.6℃</td></tr>
<tr><td>9</td><td>C5</td><td>82u/450V KXG</td><td>72.2℃</td><td>84.4℃</td></tr>
<tr><td>10</td><td>D12</td><td>GP20K</td><td>78.1℃</td><td>91.3℃</td></tr>
<tr><td>11</td><td>T1</td><td>TF-2161</td><td>79.8℃</td><td>92.4℃</td></tr>
<tr><td>12</td><td>U1</td><td>TEA1752T</td><td>70.7℃</td><td>82.9℃</td></tr>
<tr><td>13</td><td>C22</td><td>47uF/50V YXM</td><td>70.7℃</td><td>83.1℃</td></tr>
<tr><td>14</td><td>C18</td><td>33u/50V YXM</td><td>71.7℃</td><td>82.4℃</td></tr>
<tr><td>15</td><td>C152</td><td>47uF/50V YXM</td><td>73.6℃</td><td>86.2℃</td></tr>
<tr><td>16</td><td>C153</td><td>47uF/50V YXM</td><td>76.4℃</td><td>94.2℃</td></tr>
<tr><td>17</td><td>Q101</td><td>STP40NF12</td><td>78.6℃</td><td>93.1℃</td></tr>
<tr><td>18</td><td>C106</td><td>1000u/35V ZLH</td><td>71.1℃</td><td>84.4℃</td></tr>
<tr><td>19</td><td>C107</td><td>1000u/35V ZLH</td><td>67.8℃</td><td>81.2℃</td></tr>
<tr><td>20</td><td>L100</td><td>TR-884</td><td>65.8℃</td><td>79.3℃</td></tr>
<tr><td>21</td><td>U151</td><td>LM224ADT</td><td>65.7℃</td><td>78.7℃</td></tr>
<tr><td>22</td><td>RTH2</td><td>100KΩ 3Φ 1%</td><td>68.1℃</td><td>80.6℃</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 ℃/-25℃</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%(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： -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	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	SUPPOSE C106 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 (4) I/P： 230VAC O/P：50% LOAD Ta= 50 ℃ LIFE TIME	(1) 289437 HRS (2) 54102 HRS (3) 74884 HRS (4) 108205 HRS	P
9	MTBF	Conducted by Parts Stress Analysis Prediction 3110.7K hrs min. Telcordia SR-332 (Bellcore)； 267.3K hrs min. MIL-HDBK-217F (25℃)		P
10	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure(Expected Life) : 50,000 hours @ Tcase 70℃		P

DATE	SAMPLE	TEST RESULT	TESTER	APPROVAL
2011/5/13	RD SAMPLE	PASS	SANFORD SU	VINCENT TSENG
2011/5/25	PRODUCT SAMPLE	PASS	SANFORD SU	VINCENT TSENG

■ 2009/08/04 A50-F023