



# Test Report: LPV-150-24

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150W 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 : 230 VAC O/P : FULL LOAD Ta : 25°C	V1 : 20 mVp-p (Max)	PASS
2	OUTPUT VOLTAGE TOLERANCE	V1 : -5%~ 5% (Max)	I/P : 180 VAC / 305 VAC O/P : FULL/ NO LOAD Ta : 25°C	V1 : -0.175%~ 0.238%	PASS
3	LINE REGULATION	V1 : -1%~ 1% (Max)	I/P : 180 VAC ~ 305 VAC O/P : FULL LOAD Ta : 25°C	V1 : 0%~ 0%	PASS
4	LOAD REGULATION	V1 : -2%~ 2% (Max)	I/P : 230 VAC O/P : FULL~NO LOAD Ta : 25°C	V1 : -0.175%~ 0.175%	PASS
5	SET UP TIME	230VAC : 500 ms (Max) 277VAC : 500 ms(Max)	I/P : 230 VAC I/P : 277 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 328 ms 277VAC/ 277 ms	PASS
6	RISE TIME	230VAC : 50 ms (Max) 277VAC : 50 ms (Max)	I/P : 230 VAC I/P : 277 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 14 ms 277VAC/ 14 ms	PASS
7	HOLD UP TIME	230VAC : 18 ms (TYP) 277VAC : 20 ms (TYP)	I/P : 230 VAC I/P : 277 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 27 ms 277VAC/ 43 ms	PASS
8	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	TEST : < 5%	PASS
9	DYNAMIC LOAD	V1 : 2400 mVp-p	I/P : 230 VAC (1).O/P : FULL /NO LOAD 90%DUTY/ 1KHZ (2).O/P : FULL /NO LOAD 50%DUTY/ 120HZ Ta : 25°C	(1) 608 mVp-p (2) 796 mVp-p	PASS

**INPUT FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	180 VAC~305 VAC	I/P : TESTING O/P : FULL LOAD Ta : 25°C	177 V~305 V	PASS
			I/P : LOW-LINE=3V=177 V HIGH-LINE=305 V O/P : FULL/NO 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 : 180 VAC ~ 305 VAC O/P : FULL ~NO LOAD Ta : 25°C	TEST : OK	PASS
3	EFFICIENCY	89% (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	90.34%	PASS
4	INPUT CURRENT	230V/ 1.7 A (TYP) 277V/ 1.5 A (TYP)	I/P : 230 VAC I/P : 277 VAC O/P : FULL LOAD Ta : 25°C	I = 1.236 A/ 230 VAC I = 1.066 A/ 277 VAC	PASS
5	INRUSH CURRENT	230V/ 60 A (TYP) Twidth =900 us measured at 50% Ipeak COLD START	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	I = 33.7 A  Twidth = 684 us	PASS
6	LEAKAGE CURRENT	< 0.25 mA / 240 VAC	I/P : 240 VAC O/P : NO LOAD Ta : 25°C	L-CASE : 0.002 mA N-CASE : 0.002 mA	PASS

**PROTECTION FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	OVER LOAD PROTECTION	110 % ~ 150 %	I/P : 180 VAC I/P : 230 VAC I/P : 305 VAC O/P : TESTING Ta : 25°C	124.0 %/ 180 VAC 131.1 %/ 230 VAC 135.1 %/ 305 VAC Hiccup mode,recovers automatically after fault condition is removed	PASS
2	OVER VOLTAGE PROTECTION	CH1 : 27 V ~ 35 V	I/P : 180 VAC I/P : 230 VAC I/P : 305 VAC O/P : NO LOAD Ta : 25°C	30.6 V/ 180 VAC 31.2 V/ 230 VAC 31.3 V/ 305 VAC Shut down o/p voltage, re-power on to recover	PASS
3	OVER TEMPERATURE PROTECTION	SPEC : 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	PASS
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.	PASS

### COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	Power Transistor ( D to S) or (C to E) Peak Voltage	Q1 Rated 800 V 19A	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) 740 V (2) 596 V (3) 688 V	PASS
2	Diode Peak Voltage	Q100 Rated 200 V 65 A	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) 117 V (2) 154 V (3) 117 V	PASS
3	Input Capacitor Voltage	C5 Rated 150uF / 450 V	I/P : High-Line +3V = 308 V O/P : (1) FULL LOAD Turn on /Off (2) NO load Turn on /Off (3) FULL LOAD /Min load Change Ta : 25°C	(1) 448 V (2) 450 V (3) 442 V	PASS
4	Control IC Voltage Test	U1 Rated 28V	I/P : High-Line +3V = 308 V O/P : (1) FULL LOAD Turn on /Off (2) NO load Turn on /Off (3) FULL LOAD /Min load Change Ta : 25°C	(1) 17.4 V (2) 17.1 V (3) 17.4 V	PASS

### ■ SAFETY & E.M.C. TEST

#### SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	WITHSTAND VOLTAGE	I/P-O/P : 3 KVAC/min	I/P-O/P : 3.6 KVAC/min Ta : 25°C	I/P-O/P : 3.87 mA NO DAMAGE	PASS
2	ISOLATION RESISTANCE	I/P-O/P : 500VDC>100MΩ	I/P-O/P : 500 VDC Ta : 25°C/70% RH	I/P-O/P : >9999 MΩ NO DAMAGE	PASS

#### E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	HARMONIC	EN61000-3-2 CLASS A	I/P: 230 VAC/50HZ O/P: FULL LOAD Ta:25°C	PASS	PASS
2	CONDUCTION	EN55022 CLASS B	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	PASS Test by certified Lab	PASS
3	RADIATION	EN55022 CLASS B	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	PASS Test by certified Lab	PASS
4	E.S.D	EN61000-4-2 LIGHT INDUSTRY AIR:8KV / Contact:4KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A	PASS

5	E.F.T	EN61000-4-4 LIGHT INDUSTRY INPUT: 1KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A	PASS
6	SURGE	IEC61000-4-5 LIGHT INDUSTRY L-N :1KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A	PASS
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 : LPV-150-24 1. ROOM AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta=25.9 °C 2. HIGH AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta=53.2 °C <table border="1" data-bbox="470 896 1173 1406"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta= 25.9 °C</th> <th>HIGH AMBIENT Ta= 53.2 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>ZNR1</td><td>60.9°C</td><td>81.8°C</td></tr> <tr><td>2</td><td>LF2</td><td>62.2°C</td><td>87.0°C</td></tr> <tr><td>3</td><td>C5</td><td>64.9°C</td><td>90.0°C</td></tr> <tr><td>4</td><td>Q1</td><td>78.3°C</td><td>106.4°C</td></tr> <tr><td>5</td><td>U1</td><td>68.2°C</td><td>93.8°C</td></tr> <tr><td>6</td><td>C24</td><td>72.7°C</td><td>98.7°C</td></tr> <tr><td>7</td><td>D5</td><td>83.1°C</td><td>111.9°C</td></tr> <tr><td>8</td><td>D6</td><td>79.0°C</td><td>107.2°C</td></tr> <tr><td>9</td><td>C25</td><td>72.0°C</td><td>97.3°C</td></tr> <tr><td>10</td><td>T1</td><td>78.8°C</td><td>104.3°C</td></tr> <tr><td>11</td><td>Q101</td><td>80.1°C</td><td>105.4°C</td></tr> <tr><td>12</td><td>C103</td><td>65.1°C</td><td>89.5°C</td></tr> <tr><td>13</td><td>TSW1</td><td>72.1°C</td><td>98.4°C</td></tr> <tr><td>14</td><td>C201</td><td>68.7°C</td><td>92.8°C</td></tr> <tr><td>15</td><td>C111</td><td>56.5°C</td><td>80.1°C</td></tr> <tr><td>16</td><td>Tc</td><td>70.1°C</td><td>95.4°C</td></tr> <tr><td>17</td><td>D200</td><td>74.4°C</td><td>99.7°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta= 25.9 °C	HIGH AMBIENT Ta= 53.2 °C	1	ZNR1	60.9°C	81.8°C	2	LF2	62.2°C	87.0°C	3	C5	64.9°C	90.0°C	4	Q1	78.3°C	106.4°C	5	U1	68.2°C	93.8°C	6	C24	72.7°C	98.7°C	7	D5	83.1°C	111.9°C	8	D6	79.0°C	107.2°C	9	C25	72.0°C	97.3°C	10	T1	78.8°C	104.3°C	11	Q101	80.1°C	105.4°C	12	C103	65.1°C	89.5°C	13	TSW1	72.1°C	98.4°C	14	C201	68.7°C	92.8°C	15	C111	56.5°C	80.1°C	16	Tc	70.1°C	95.4°C	17	D200	74.4°C	99.7°C			PASS
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2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 305VAC/180VAC O/P : FULL LOAD Ta= -30°C	TEST : OK	PASS																																																																								
3	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50 °C NO DAMAGE	I/P : 315 VAC O/P : FULL LOAD Ta= 50 °C HUMIDITY= 95% R.H	TEST : OK	PASS																																																																								
4	TEMPERATURE COEFFICIENT	±0.03 %(0~50°C)	I/P : 230 VAC O/P : FULL LOAD	±0.005 %(0~50°C)	PASS																																																																								
5	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -45°C ~ +85°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	PASS																																																																								

6	THERMAL SHOCK TEST	1. Thermal shock Temperature : -30°C~ +45°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	PASS
7	VIBRATION TEST	1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10~500Hz (3) Sweep Time : 10min/sweep cycle (4) Acceleration : 3G (5) Test Time : 90min in each axis (X.Y.Z) (6) Ta : 25°C	TEST : OK	PASS
8	CAPACITOR LIFE CYCLE	LPV-150-24: SUPPOSE C103 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=40 °C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta=40 °C LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta=40 °C LIFE TIME	(1) 194126 HRS (2) 42016 HRS (3) 74046 HRS (4) 101942 HRS	PASS
9	MTBF	Conducted by Parts Stress Analysis Prediction 3642.1K hrs min. Telcordia SR-332 (Bellcore) ; 417.9K hrs min. MIL-HDBK-217F (25°C)		PASS
10	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure(Expected Life) : 20000 hours @ Tcase 90°C		PASS

TEST RESULT	TESTER	APPROVAL
PASS	ZHOUB/ ZHUOKB	LIUWY

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