



Test Report: LPVL-150-12

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

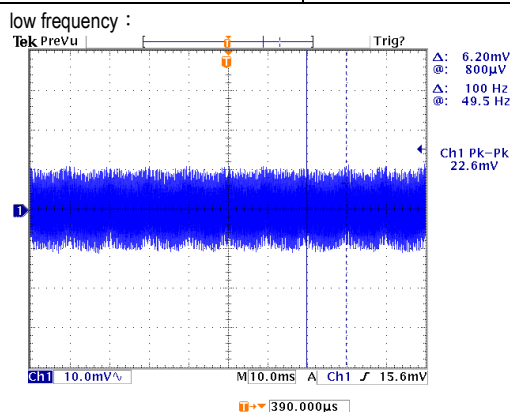
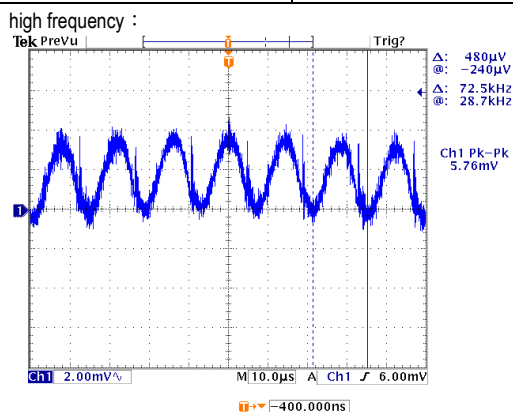
Environment Test



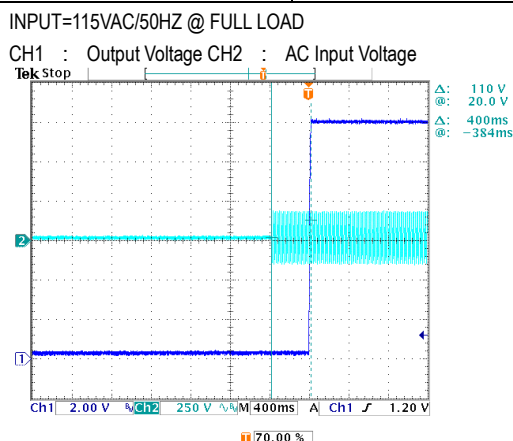
DESIGN VERIFY TEST

OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE(Max) TOLERANCE	V1: -5%~5%	I/P: 90VAC /132VAC O/P: FULL/ NO LOAD Ta: 25°C	V1: -0.83%~0.58%
2	LINE REGULATION (Max)	V1: -1%~1%	I/P: 90VAC~132VAC O/P: FULL LOAD Ta: 25°C	V1: 0%~0%
3	LOAD REGULATION(Max)	V1: -2%~2%	I/P: 115VAC O/P: FULL ~NO LOAD Ta: 25°C	V1: -0.58%~0.58%
4	OVER/UNDERSHOOT TEST	< ± 5%	I/P: 115VAC O/P: FULL LOAD Ta: 25°C	<5%
5	RIPPLE & NOISE(Max)	V1: 200 mVp-p	I/P: 115VAC O/P: FULL LOAD Ta: 25°C	V1: 22.6mVp-p



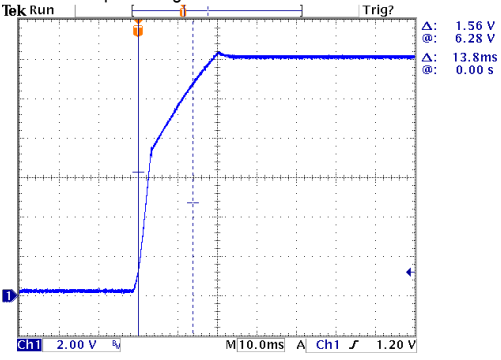
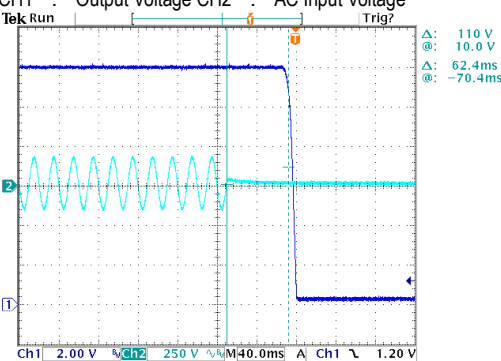
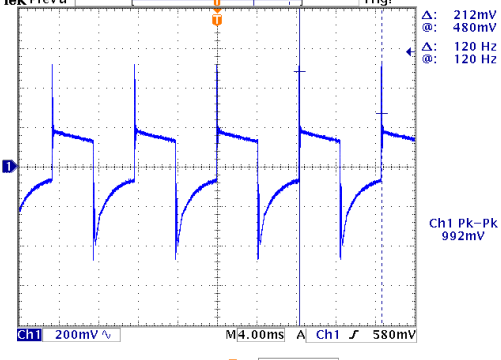
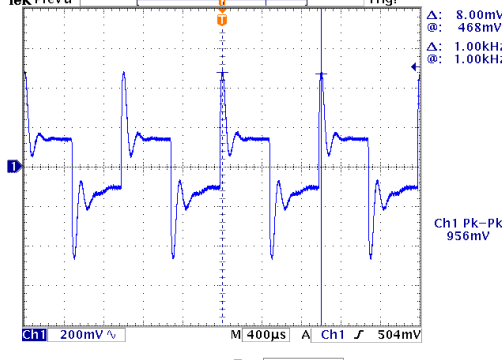
6	SET UP TIME(Max)	115VAC/ 1500ms	I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	115VAC/ 400ms
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150W Single Output Switching Power Supply

LPVL-150 series

7	RISE TIME (Max)	115VAC/ 50ms	I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	115VAC/ 13.8ms
<p>INPUT=115VAC/50HZ @ FULL LOAD</p> <p>CH1 : Output Voltage</p>  <p>Δ: 1.56 V @: 6.28 V Δ: 13.8ms @: 0.00 s</p> <p>Ch1 2.00 V M10.0ms A Ch1 1.20 V</p>				
8	HOLD UP TIME(Typ)	115VAC/ 10ms	I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	115VAC/ 62.4ms
<p>INPUT=115VAC/50HZ @ FULL LOAD</p> <p>CH1 : Output Voltage CH2 : AC Input Voltage</p>  <p>Δ: 110 V @: 10.0 V Δ: 62.4ms @: -70.4ms</p> <p>Ch1 2.00 V Ch2 250 V M40.0ms A Ch1 1.20 V</p>				
9	DYNAMIC LOAD	V1: 1200 mVp-p	I/P: 115VAC O/P : (1)FULL /50% LOAD 50%DUTY / 120HZ (2)FULL /50% LOAD 50%DUTY / 1KHZ Ta: 25°C	(1) 992mVp-p (2) 956mVp-p
<p>FULL /50% LOAD 50%DUTY / 120HZ</p>  <p>Δ: 212mV @: 480mV Δ: 120 Hz @: 120 Hz</p> <p>Ch1 200mV M4.00ms A Ch1 580mV</p> <p>Ch1 Pk-Pk 992mV</p> <p>FULL /50% LOAD 50%DUTY / 1KHZ</p>  <p>Δ: 8.00mV @: 468mV Δ: 1.00KHZ @: 1.00KHZ</p> <p>Ch1 200mV M400μs A Ch1 504mV</p> <p>Ch1 Pk-Pk 956mV</p>				



INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	90VAC~132VAC	I/P: TESTING O/P: FULL LOAD Ta: 25°C	87V~135V
			I/P: LOW-LINE-3V=87 V HIGH-LINE+15%=150 V O/P: FULL/NO LOAD ON: 30 Sec OFF: 30 Sec 10Min (POWER ON/OFF NO DAMAGE)	TEST: OK
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE	I/P: 90 VAC ~132 VAC O/P: FULL~NO LOAD Ta: 25°C	TEST: OK
3	INPUT CURRENT (Typ)	120V/ 3A	I/P: 120 VAC O/P: FULL LOAD Ta: 25°C	I =2.15A/ 120VAC
4	LEAKAGE CURRENT	< 0.25mA / 115 VAC	I/P: 115 VAC O/P: NO LOAD Ta: 25°C	L-FG: 0.0028 mA N-FG: 0.0028 mA
5	INRUSH CURRENT(Typ)	115V/ 75A Twidth =900 us measured at 50% Ipeak COLD START	I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	I = 60.4 A/ 115VAC Twidth =696 us
<p>INPUT=115VAC/50HZ @ FULL LOAD</p> <p>CH2 : Input current CH1 : AC Input Voltage</p> <p>Ch1 50.0 V Ch2 10.0 A M 200 μs A Ch2 29.0 A</p> <p>Ch2 Max 60.4 A</p> <p>Δ: 2.20 A @: 30.2 A Δ: 696 μs @: 696 μs</p> <p>391.600 μs</p>				
6	EFFICIENCY(Typ)	87%	I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	87.41%



PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	110%~ 150%	I/P: 90VAC I/P: 115VAC I/P: 132VAC O/P: TESTING Ta: 25°C	124.2%/ 90VAC 127.1%/ 115VAC 126.4%/ 132VAC Hiccup mode, recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	13.5 V~ 18 V	I/P: 90VAC I/P: 115VAC I/P: 132VAC O/P: NO LOAD Ta: 25°C	16.46V/ 90VAC 16.20V/ 115VAC 16.24V/ 132VAC Shut down o/p voltage, re-power on to recover
3	OVER TEMPERATURE PROTECTION	O.T.P. NO DAMAGE	I/P: 90VAC I/P: 115VAC I/P: 132VAC O/P: FULL LOAD	O.T.P. Active Shut down o/p voltage, recovers automatically after temperature goes down
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 90VAC I/P: 132VAC O/P: FULL LOAD Ta: 25°C	NO DAMAGE Constant Current Limiting

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM POWER Transistor	Q1 Rated 650V/18A	I/P: High-Line +3V =135V O/P: (1) Full Load Turn on (2) Output Short (3) Full load continue Ta: 25°C	(1) 576V (2) 564V (3) 556V
2	O/P Diode (MOSFET)	Q101 Rated 150V/104A	I/P: High-Line +3V =135V O/P: (1) Full Load Turn on (2) Output Short (3) Full load continue Ta: 25°C	(1) 73.2V (2) 102V (3) 73.2V
3	Input Capacitor	C5 Rated 390u/220V	I/P: High-Line +3V =135 V O/P: (1) Full Load input on/off (2) NO load input on /Off (3) Full Load /NO load Change Ta: 25°C	(1) 215V (2) 213V (3) 194V
4	Control IC	U1 Rated 28V	I/P: High-Line +3V =135 V O/P:(1) FULL LOAD (2) Output Short (3) O.L.P (4) O.V.P (5) Low Line No Load Vo(min) Ta: 25°C	(1) 17.1V (2) 17.1V (3) 17.2V (4) 17.1V (5) 15.2V
5	Clamp Diode	D 6 Rated 1000V/3A	I/P: High-Line +3V = 135 V O/P: (1) Full Load input on/off (2) Output Short Ta: 25°C	(1) 576V (2) 608V

**SAFETY TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
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: 2.462mA NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P: 500VDC>100MΩ	I/P-O/P: 500 VDC Ta: 25°C	I/P-O/P: >9999MΩ NO DAMAGE

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	CONDUCTION	FCC part 15	I/P: 115 VAC/50HZ O/P: FULL LOAD Ta: 25°C	PASS Test by certified Lab
2	RADIATION	FCC part 15	I/P: 115 VAC/50HZ O/P: FULL LOAD Ta: 25°C	PASS Test by certified Lab
3	E.S.D	EN61000-4-2 LIGHT INDUSTRY AIR: 8KV / Contact: 4KV	I/P: 115 VAC/50HZ O/P: FULL LOAD Ta: 25°C	CRITERIA A
4	E.F.T	EN61000-4-4 LIGHT INDUSTRY INPUT: 1KV	I/P: 115 VAC/50HZ O/P: FULL LOAD Ta: 25°C	CRITERIA A
5	SURGE	EN61000-4-5 LIGHT INDUSTRY L-N : 1KV	I/P: 115 VAC/50HZ O/P: FULL LOAD Ta: 25°C	CRITERIA A
6	Test by certified Lab & Test Report Prepare			



■ RELIABILITY TEST

ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT																																																																				
1	TEMPERATURE RISE TEST	MODEL: LPVL-150-12 1. ROOM AMBIENT BURN-IN: 2 HRS I/P: 115VAC O/P: FULL LOAD Ta= 31.2 °C 2. HIGH AMBIENT BURN-IN: 2 HRS I/P: 115VAC O/P: FULL LOAD Ta= 45.4 °C																																																																						
				<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta= 31.2 °C</th> <th>HIGH AMBIENT Ta=45.4 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>LF2</td><td>65.5°C</td><td>77.6°C</td></tr> <tr><td>2</td><td>C5</td><td>66.6°C</td><td>79.6°C</td></tr> <tr><td>3</td><td>Q1</td><td>70.8°C</td><td>84.4°C</td></tr> <tr><td>4</td><td>D6</td><td>72.7°C</td><td>86.4°C</td></tr> <tr><td>5</td><td>R4</td><td>72.2°C</td><td>85.6°C</td></tr> <tr><td>6</td><td>U1</td><td>63.8°C</td><td>77.2°C</td></tr> <tr><td>7</td><td>C25</td><td>66.1°C</td><td>79.7°C</td></tr> <tr><td>8</td><td>T1</td><td>75.7°C</td><td>91.2°C</td></tr> <tr><td>9</td><td>Q100</td><td>73.1°C</td><td>89.4°C</td></tr> <tr><td>10</td><td>Q101</td><td>72.0°C</td><td>88.3°C</td></tr> <tr><td>11</td><td>C103</td><td>68.1°C</td><td>83.6°C</td></tr> <tr><td>12</td><td>C105</td><td>67.3°C</td><td>83.0°C</td></tr> <tr><td>13</td><td>LF100</td><td>64.1°C</td><td>79.8°C</td></tr> <tr><td>14</td><td>C201</td><td>67.2°C</td><td>83.0°C</td></tr> <tr><td>15</td><td>TSW1</td><td>67.6°C</td><td>81.1°C</td></tr> <tr><td>16</td><td>TC</td><td>63.3°C</td><td>78.6°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta= 31.2 °C	HIGH AMBIENT Ta=45.4 °C	1	LF2	65.5°C	77.6°C	2	C5	66.6°C	79.6°C	3	Q1	70.8°C	84.4°C	4	D6	72.7°C	86.4°C	5	R4	72.2°C	85.6°C	6	U1	63.8°C	77.2°C	7	C25	66.1°C	79.7°C	8	T1	75.7°C	91.2°C	9	Q100	73.1°C	89.4°C	10	Q101	72.0°C	88.3°C	11	C103	68.1°C	83.6°C	12	C105	67.3°C	83.0°C	13	LF100	64.1°C	79.8°C	14	C201	67.2°C	83.0°C	15	TSW1	67.6°C	81.1°C	16	TC	63.3°C	78.6°C
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (Min)	I/P: 115 VAC O/P: 115 % LOAD Ta: 25°C	TEST: OK																																																																				
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P: 132VAC/90VAC O/P: FULL LOAD Ta= -30°C	TEST: OK																																																																				
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 40°C NO DAMAGE	I/P: 135 VAC O/P: FULL LOAD Ta= 40°C HUMIDITY= 95 %R.H	TEST: OK																																																																				
5	TEMPERATURE COEFFICIENT	±0.03 %/°C (0~50°C)	I/P: 115 VAC O/P: FULL LOAD	±0.012 %/°C (0~50°C)																																																																				



150W Single Output Switching Power Supply

LPVL-150 series

6	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	TEST: OK
7	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: 16 CYCLE 5. Input/Output condition: 115VAC/Full Load AC ON/OFF TEST AC on 3 sec/AC off 1 sec TEST	TEST: OK
8	VIBRATION TEST	1 Carton & 1 Set (1) Waveform: Sine Wave (2) Frequency: 10~500Hz (3) Sweep Time: 10 Min/sweep cycle (4) Acceleration: 2G (5) Test Time: 60 Min in each axis (X.Y.Z) (6) Ta: 25°C	TEST: OK
9	CAPACITOR LIFE CYCLE	LPVL-150-12: SUPPOSE C103 IS THE MOST CRITICAL COMPONENT (1) I/P: 115VAC O/P: FULL LOAD Ta= 25 °C LIFE TIME (2) I/P: 115VAC O/P: FULL LOAD Ta= 40 °C LIFE TIME (3) I/P: 115VAC O/P: 75% LOAD Ta= 40 °C LIFE TIME (4) I/P: 115VAC O/P: 50% LOAD Ta= 40 °C LIFE TIME	(1) 220224 HRS (2) 71151 HRS (3) 170385 HRS (4) 320124 HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 3361.2K hrs min. Telcordia SR-332 (Bellcore) ; 391.9K hrs min. MIL-HDBK-217F (25°C)	
11	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure (Expected Life): Above 20,000 hours @ Tc 90°C	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	ZHANGZJ/ZHUOKB	SKY	LIUWY