



Test Report: LRS-150F-36

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

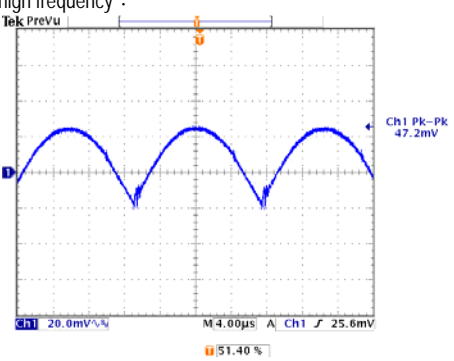
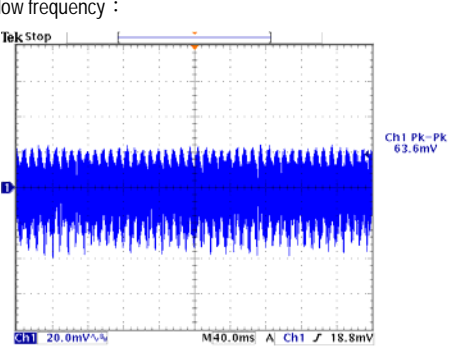
E.M.C. Test

■ RELIABILITY TEST

ENVIRONMENT TEST

■ DESIGN VERIFY TEST

OUTPUT FUNCTION TEST

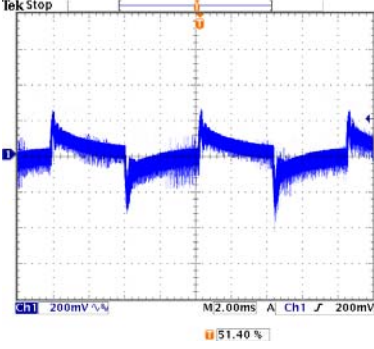
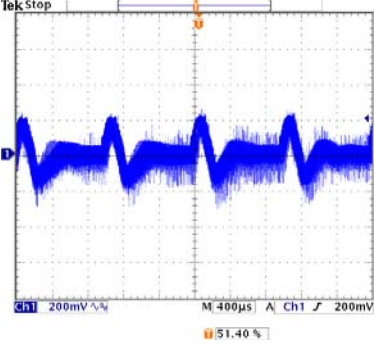
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 32.4V~ 39.6 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	31.20V~41.08V/230VAC 31.20V~41.08V/115VAC
2	OUTPUT VOLTAGE(Max) TOLERANCE	V1: 1 %~ -1 %	I/P: 100VAC /264VAC O/P:FULL/ MIN. LOAD Ta:25°C	V1:0.02 %~-0.02%
3	LINE REGULATION (Max)	V1: 0.5 %~ -0.5 %	I/P: 100VAC~ 264VAC O/P:FULL LOAD Ta:25°C	V1:0%~-0.03%
4	LOAD REGULATION(Max)	V1: 0.5 %~ -0.5 %	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25°C	V1: 0.02 %~0%
5	OVER/UNDERSHOOT TEST	< ±5%	I/P: 230VAC O/P:FULL LOAD Ta:25°C	< ±5%
6	RIPPLE & NOISE(Max)	V1: 200 mVp-p	I/P:230VAC O/P:FULL LOAD Ta:25°C	V1: 63.6mVp-p
<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>high frequency :</p>  </div> <div style="text-align: center;"> <p>low frequency :</p>  </div> </div>				
7	SET UP TIME(Max)	230VAC/500ms 115VAC/500ms	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/226ms 115VAC/160ms
INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage			INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage	



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<p>8 RISE TIME (Max)</p>	<p>230VAC/30ms 115VAC/30ms</p>	<p>I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C</p>	<p>230VAC/5.2ms 115VAC/6.4ms</p>
<p>INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage</p>	<p>INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage</p>		
<p>9 HOLD UP TIME (Typ.)</p>	<p>230VAC/16ms 115VAC/12ms</p>	<p>I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C</p>	<p>230VAC/79.6ms 115VAC/16.8ms</p>
<p>INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage</p>	<p>INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage</p>		
<p>10 DYNAMIC LOAD</p>	<p>V1: 3600 mVp-p</p>	<p>I/P: 230VAC O/P: (1)FULL /50% LOAD 50%DUTY / 120HZ (2)FULL /50% LOAD 50%DUTY / 1KHZ Ta:25°C</p>	<p>572mVp-p 504mVp-p</p>
<p>FULL /50% LOAD 50%DUTY / 120HZ</p>		<p>FULL /50% LOAD 50%DUTY / 1KHZ</p>	

				
11	TRANSIENT RECOVERY TIME	V1: 3600 mVp-p <500us	I/P: 230VAC O/P:40% LOAD CHANGE 50%DUTY/120HZ 1.25A/us	392mVp-p 0us

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	85VAC~264VAC	I/P:TESTING O/P:FULL LOAD Ta:25°C I/P: (1)LOW-LINE-3V=82 V HIGH-LINE+15%=300 V O/P:FULL/MIN LOAD (PLEASE CHECK DERATING CURVE) ON: 30 Sec OFF: 30 Sec 10MIN (2)230Vac ON: 0.5 Sec OFF: 0.5 Sec 20MIN (3)230Vac ON:3Sec OFF:3Sec 12HOURS (POWER ON/OFF NO DAMAGE)	70V~264V TEST:OK
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE	I/P:100 VAC ~264 VAC O/P:FULL -MIN LOAD Ta:25°C	TEST: OK
3	INPUT CURRENT (Typ.)	230V/ 1.6A 115V/ 2.8A	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I =1.21A/ 230VAC I =2.39A/ 115VAC
4	LEAKAGE CURRENT	< 0.75mA / 240 VAC	I/P : 240 VAC O/P : Min LOAD Ta : 25°C	L-FG : 0.225mA N-FG : 0.225mA
5	NO LOAD CONSUMPTION	< 0.5W	I/P : 115VAC I/P : 230VAC O/P : NO LOAD Ta : 25°C	< 0.1257W < 0.0832W

6	EFFICIENCY(Typ.)	89%	I/P:230 VAC O/P:FULL LOAD Ta:25°C	90.03%																																	
<p>EFFICIENCY vs LOAD</p> <table border="1"> <caption>Efficiency vs Load Data</caption> <thead> <tr> <th>Load (%)</th> <th>230V Efficiency (%)</th> <th>115V Efficiency (%)</th> </tr> </thead> <tbody> <tr><td>10%</td><td>88.3</td><td>89.8</td></tr> <tr><td>20%</td><td>90.5</td><td>90.8</td></tr> <tr><td>30%</td><td>90.8</td><td>90.5</td></tr> <tr><td>40%</td><td>90.8</td><td>90.2</td></tr> <tr><td>50%</td><td>90.7</td><td>89.9</td></tr> <tr><td>60%</td><td>91.0</td><td>89.6</td></tr> <tr><td>70%</td><td>90.8</td><td>89.3</td></tr> <tr><td>80%</td><td>90.8</td><td>89.0</td></tr> <tr><td>90%</td><td>90.3</td><td>88.7</td></tr> <tr><td>100%</td><td>90.1</td><td>88.4</td></tr> </tbody> </table>					Load (%)	230V Efficiency (%)	115V Efficiency (%)	10%	88.3	89.8	20%	90.5	90.8	30%	90.8	90.5	40%	90.8	90.2	50%	90.7	89.9	60%	91.0	89.6	70%	90.8	89.3	80%	90.8	89.0	90%	90.3	88.7	100%	90.1	88.4
Load (%)	230V Efficiency (%)	115V Efficiency (%)																																			
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100%	90.1	88.4																																			
7	INRUSH CURRENT(Typ.)	230V/60A COLD START	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	I =20.2A/ 230VAC T50=2010us/230V																																	
<p>INPUT=230VAC/50HZ @ FULL LOAD CH2 : AC Input Voltage CH4 : Input current (1V=1A)</p>																																					

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	110%~ 140 %	I/P: 264VAC I/P: 230VAC I/P: 100VAC O/P: TESTING Ta:25°C	124%/ 264VAC 122%/ 230VAC 121%/100VAC PROTECTION TYPE : Hiccup mode, recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	41.4V-48.6V	I/P: 264VAC I/P: 230VAC I/P: 85VAC O/P: MIN LOAD Ta:25°C	46.03V/ 264VAC 46.20V/ 230VAC 45.88V/ 85VAC PROTECTION TYPE : Shut down o/p voltage, re-power on to recover



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3	OVER TEMPERATURE PROTECTION	NO DAMAGE	I/P: 264VAC I/P: 85VAC O/P: FULL LOAD	O.T.P. Active PROTECTION TYPE : Shut down o/p voltage, re-power on to recover
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 264VAC I/P: 85VAC O/P: FULL LOAD Ta:25°C	NO DAMAGE PROTECTION TYPE : Hiccup mode, recovers automatically after fault condition is removed

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Transistor (D to S) or (C to E) Peak Voltage	Q1 Rated :13A/600V	I/P:High-Line +3V =267V AC ON/OFF VDS: O/P: (1)Full Load (2)Output Short (3) Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz (4) 0%→400% Load. I/P:Low-Line -3V = 97V O/P: (1)Full Load (2)Output Short (3) Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz (4) 0%→400% Load. Ta:25°C	VDS: (1) 558V (2) 598V (3) 562V (4) 588V VDS: (1) 332V (2) 282V (3) 328V (4) 340V
2	Diode Peak Voltage	Q101 Rated :20 A/300 V	I/P:High-Line +3V =267 V AC ON/OFF O/P: (1)Full Load (2)Output Short (3) Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz (4) 0%→400% Load. (5).NO LOAD Ta:25°C	Q101: VDS: (1) 251V (2) 286V (3) 273V (4) 272V (5) 200V
3	Input Capacitor Voltage	C5 Rated: : 120 μ/400 V 105 °C	I/P:High-Line +3V =267 V O/P: (1)Full Load input on/off (2) Min load input on /Off (3)Full Load /Min load Change Ta:25°C	(1) 370V (2) 374V (3) 374V
4	Control IC Voltage Test	PWM IC U1 Rated : 28V 10.5V(MIN.)	I/P:High-Line +3V =267 V AC ON/OFF O/P(1)FULL LOAD (2) Output Short (3)O.L.P (4)O.V.P. (5)NO LOAD VR 下限.LOW LINE Ta:25°C	1. 20.5V 2. 12.9V 3. 19.3V 4. 24.6V 5. 16.7V

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P: 4KVAC/min I/P-FG :2KVAC/min O/P-FG:1.25KVAC/min	I/P-O/P: 4.4 KVAC/min I/P-FG: 2.4 KVAC/min O/P-FG:1.5 KVAC/min Ta:25°C	I/P-O/P: 2.67mA I/P-FG: 2.02mA O/P-FG: 1.86m A NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P:500VDC>100MΩ I/P-FG: 500VDC>100MΩ O/P-FG:500VDC>100MΩ	I/P-O/P: 500 VDC I/P-FG: 500 VDC O/P-FG: 500 VDC Ta:25°C	I/P-O/P:9999MΩ I/P-FG: 9999MΩ O/P-FG:9999MΩ NO DAMAGE
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40A / 2min Ta:25°C	28mΩ

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	EN61000-3-2 CLASS A	I/P:230VAC/50HZ O/P:80%LOAD Ta:25°C	PASS
2	CONDUCTION	EN55022 CLASS B	I/P : 230 VAC (50HZ) O/P : FULL/50% LOAD Ta : 25°C	PASS Test by certified Lab



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3	RADIATION	EN55022 CLASS B	I/P : 230 VAC (50HZ) O/P : FULL LOAD Ta : 25°C	PASS Test by certified Lab
4	E.S.D	EN61000-4-2 INDUSTRY AIR : 8KV / Contact : 4KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
5	E.F.T	EN61000-4-4 INDUSTRY INPUT : 2KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
6	SURGE	IEC61000-4-5 INDUSTRY L-N : 2KV L,N-PE : 4KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
7	Test by certified Lab & Test Report Prepare			

RELIABILITY TEST

ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
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LRS-150F series

1	TEMPERATURE RISE TEST	<p>MODEL : LRS-150F-12</p> <p>1. ROOM AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta=27.2°C</p> <p>2. HIGH AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta=40.6°C</p> <table border="1" data-bbox="507 593 1380 1238"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta= 18.6 °C</th> <th>HIGH AMBIENT Ta=42.1 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>D6</td><td>66.2°C</td><td>77.9°C</td></tr> <tr><td>2</td><td>C6</td><td>67.4°C</td><td>76.7°C</td></tr> <tr><td>3</td><td>Q1</td><td>84.7°C</td><td>96.6°C</td></tr> <tr><td>4</td><td>C35</td><td>66.3°C</td><td>76.3°C</td></tr> <tr><td>5</td><td>BD1</td><td>86.4°C</td><td>95.7°C</td></tr> <tr><td>6</td><td>Q100</td><td>96.9°C</td><td>107.0°C</td></tr> <tr><td>7</td><td>C106</td><td>77.9°C</td><td>89.5°C</td></tr> <tr><td>8</td><td>LF1</td><td>65.6°C</td><td>76.5°C</td></tr> <tr><td>9</td><td>RTH10</td><td>75.4°C</td><td>86.7°C</td></tr> <tr><td>10</td><td>R14</td><td>73.7°C</td><td>86.1°C</td></tr> <tr><td>11</td><td>T1</td><td>82.4°C</td><td>92.4°C</td></tr> <tr><td>12</td><td>TA</td><td>27.2°C</td><td>40.6°C</td></tr> </tbody> </table>			NO	Position	ROOM AMBIENT Ta= 18.6 °C	HIGH AMBIENT Ta=42.1 °C	1	D6	66.2°C	77.9°C	2	C6	67.4°C	76.7°C	3	Q1	84.7°C	96.6°C	4	C35	66.3°C	76.3°C	5	BD1	86.4°C	95.7°C	6	Q100	96.9°C	107.0°C	7	C106	77.9°C	89.5°C	8	LF1	65.6°C	76.5°C	9	RTH10	75.4°C	86.7°C	10	R14	73.7°C	86.1°C	11	T1	82.4°C	92.4°C	12	TA	27.2°C	40.6°C
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12	TA	27.2°C	40.6°C																																																					
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230 VAC O/P : 113% LOAD Ta : 25°C	TEST : OK																																																				
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 264VAC/100VAC O/P : 100 % 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 : 272 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 : 230 VAC O/P : FULL LOAD	±0%/°C (0-40°C)																																																				
6	STORAGE TEMPERATURE TEST	<p>1. Thermal shock Temperature : -40°C~ +85°C</p> <p>2. Temperature change rate : 25°C / MIN</p> <p>3. Dwell time low and high temperature : 30 MIN/EACH</p> <p>4. Total test cycle : 5 CYCLE</p> <p>5. Input/Output condition : STATIC</p>		OK																																																				
7	THERMAL SHOCK TEST	<p>1. Thermal shock Temperature : -20°C~ 70°C</p> <p>2. Temperature change rate : 25°C / MIN</p> <p>3. Dwell time low and high temperature : 30 MIN/EACH</p> <p>4. Total test cycle : 10 CYCLE</p> <p>5. Input/Output condition : 230VAC/Full Load AC ON/OFF TEST turn on 58sec ; turn off 2sec</p>		OK																																																				



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8	VIBRATION TEST	1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10-500Hz (3) Sweep Time : 10min/sweep cycle (4) Acceleration : 5G (5) Test Time : 60min in each axis (X.Y.Z) (6) Ta : 25°C	TEST : OK
9	CAPACITOR LIFE CYCLE	SUPPOSE C105 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) 81305HRS (2) 33047HRS (3) 48975HRS (4) 93362HRS
10	MTBF	MIL-HDBK-217F TOTAL FAILURE RATE : 648.6KHRS	
11	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure (Expected Life): Above 30,000 hours @ TA 50°C	

TEST RESULT	TESTER	APPROVAL
PASS	FRANK	WANGDZ

2007/3/20 A50-S014