



Test Report: LRS-35-5

35W 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

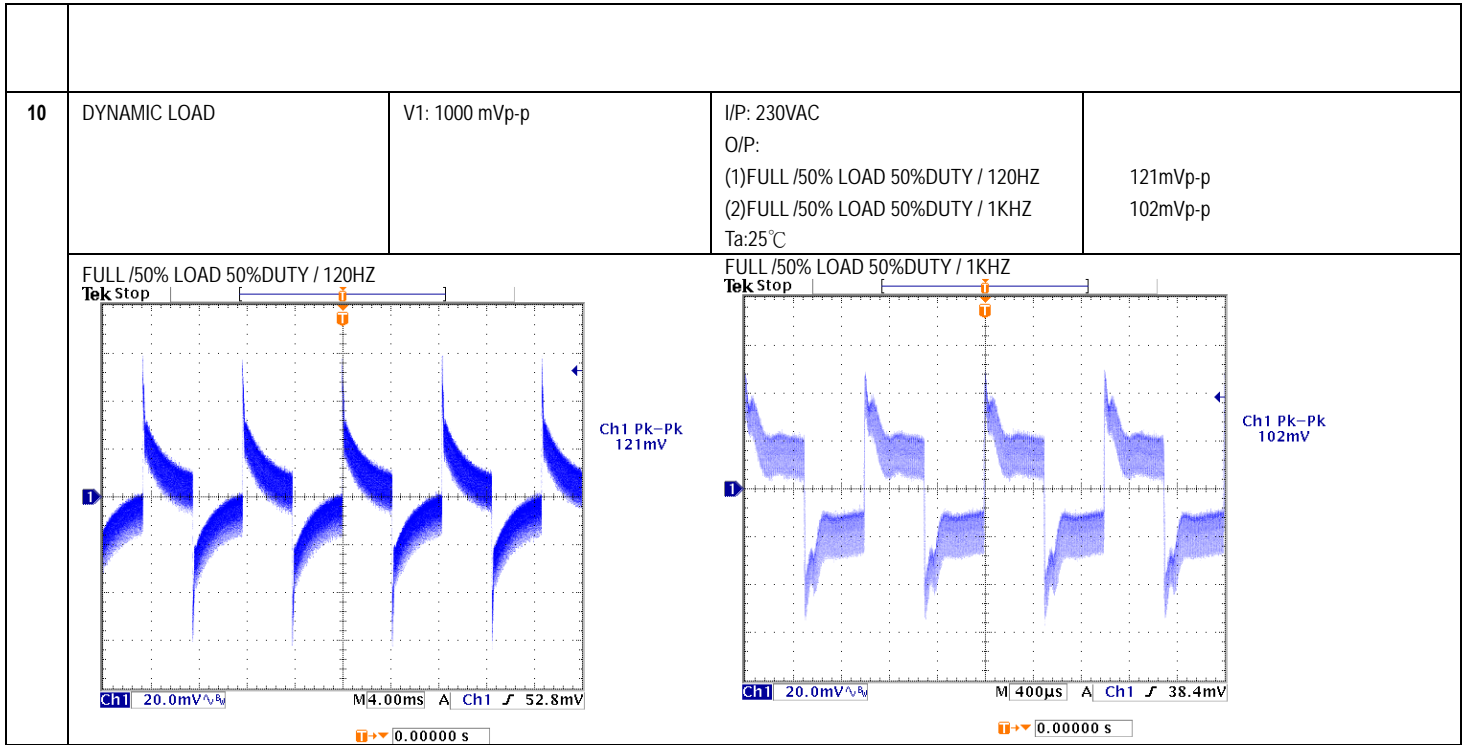
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 4.5 V~ 5.5 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	4.51V~5.73V/230VAC 4.51V~5.73V/115VAC
2	OUTPUT VOLTAGE(Max) TOLERANCE	V1: 2 %~ -2 %	I/P: 100VAC /264VAC O/P:FULL/ MIN. LOAD Ta:25°C	V1: -0.118%~ 0.236%
3	LINE REGULATION (Max)	V1: 0.5 %~ -0.5 %	I/P: 100VAC~ 264VAC O/P:FULL LOAD Ta:25°C	V1: 0%~ 0 %
4	LOAD REGULATION(Max)	V1: 1 %~ -1 %	I/P: 230VAC O/P:FULL -MIN LOAD Ta:25°C	V1: -0.118%~ 0.236%
5	OVER/UNDERSHOOT TEST	< ±5%	I/P: 230VAC O/P:FULL LOAD Ta:25°C	< ±5%
6	RIPPLE & NOISE(Max)	V1: 80 mVp-p	I/P:230VAC O/P:FULL LOAD Ta:25°C	V1: 21.4mVp-p
<p>high frequency :</p>		<p>low frequency :</p>		
7	SET UP TIME(Max)	230VAC/1000ms 115VAC/2000ms	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/340ms 115VAC/ 596ms
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/15.0ms 115VAC/ 12.6ms</p> <p>INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage</p>	<p>70.00 %</p> <p>INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage</p>
<p>9 HOLD UP TIME (Typ.)</p> <p>230VAC/30ms 115VAC/12ms</p> <p>I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C</p> <p>230VAC/ 41.6ms 115VAC/ 15.2ms</p> <p>INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage</p>	<p>70.00 %</p> <p>INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage</p>



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	81V~264V
			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)	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/0.42 A 115V/ 0.7A	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I =0.337A/ 230VAC I =0.6069A/ 115VAC
4	LEAKAGE CURRENT	<0.75 mA / 240 VAC	I/P : 240 VAC O/P : Min LOAD Ta : 25°C	L-FG : 0.532 mA N-FG : 0.532 mA
5	NO LOAD CONSUMPTION	< 0.2W	I/P : 115VAC I/P : 230VAC O/P : NO LOAD	< 0.0512 W < 0.0376 W

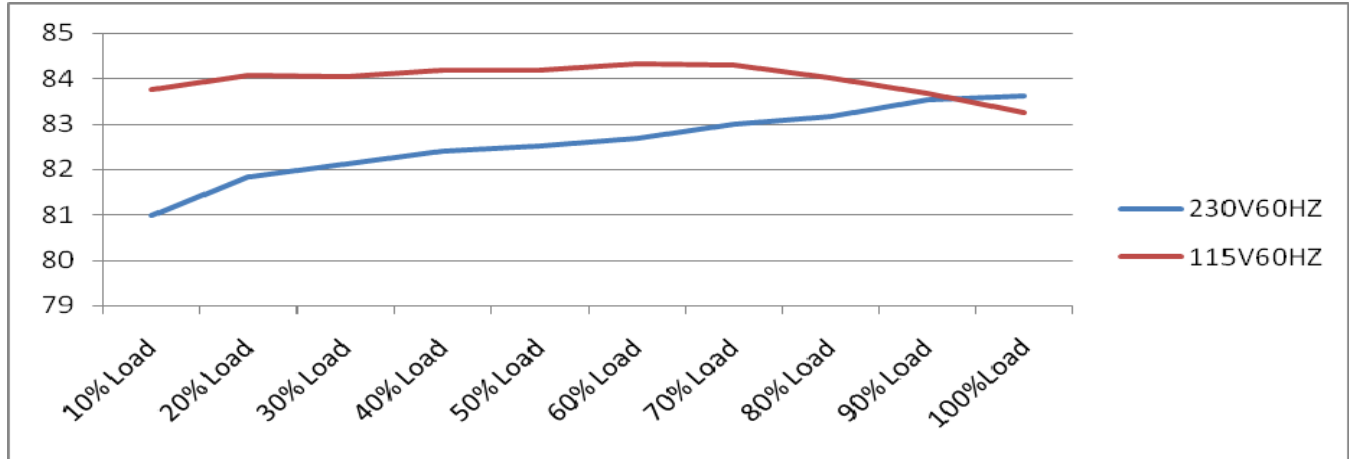


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			Ta : 25°C	
6	EFFICIENCY(Typ.)	82%	I/P:230 VAC O/P:FULL LOAD Ta:25°C	83.68%

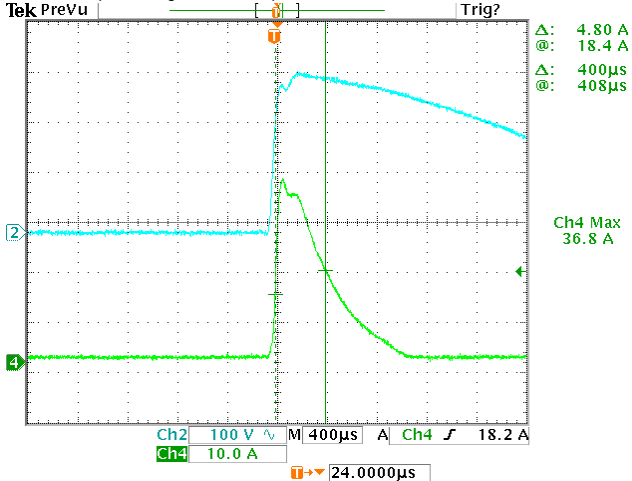
EFFICIENCY vs LOAD



7	INRUSH CURRENT(Typ.)	230V/45A COLD START	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	I = 36.8A/ 230VAC
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INPUT=230VAC/50HZ @ FULL LOAD

CH2 : AC Input Voltage CH4 : Input current



PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	110 %- 150 %	I/P: 264VAC I/P: 230VAC I/P: 100VAC O/P: TESTING Ta: 25°C	127.57%/ 264VAC 128%/ 230VAC 129.14%/100VAC PROTECTION TYPE : Hiccup mode, recovers automatically after fault condition is removed



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2	OVER VOLTAGE PROTECTION	5.75 V-6.9 V	I/P: 264VAC I/P: 230VAC I/P: 85VAC O/P: MIN LOAD Ta:25°C	6.52V/ 264VAC 6.53V/ 230VAC 6.45V/ 85VAC PROTECTION TYPE : Shut down o/p voltage, re-power on to recover
3	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 6A/ 600 V	I/P:High-Line +3V =267V AC ON/OFF VDS: O/P: (1)Full Load (2)Output Short (3)Full load continue Ta : 25°C	VDS: (1) 546V (2) 458V (3) 504V
2	Diode Peak Voltage	Q100 Rated 20A/ 40V	I/P:High-Line +3V =267 V AC ON/OFF O/P: (1)Full Load (2)Output Short (3)Full load continue Ta:25°C	Q100: VDS: (1) 38.4V (2) 38.0V (3) 38.4V
3	Input Capacitor Voltage	C5 Rated: :68 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) 376V (2) 374V (3) 376V
4	Control IC Voltage Test	PWM IC U1 Rated 10.8 V-30V	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 Min. LOW LINE Ta:25°C	(1) 22.3V (2) 14.8V (3) 14.9V (4) 21.4V (5) 14.8V
5	Clamp Diode Peak Voltage	D5 Rated : 3A/600V	I/P : High-Line +3V = 267 V AC ON/OFF O/P : (1) Dynamic Load 90%Duty/1KHz (2)Full load continue Ta : 25°C	(1) 442V (2) 446V

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
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1	WITHSTAND VOLTAGE	I/P-O/P: 3.75KVAC/min I/P-FG :2KVAC/min O/P-FG:1.25KVAC/min	I/P-O/P: 4.125KVAC/min I/P-FG: 2.4 KVAC/min O/P-FG:1.5 KVAC/min Ta:25°C	I/P-O/P:2.72mA I/P-FG:3.85mA O/P-FG:3.75mA 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	22mΩ

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	EN61000-3-2 CLASS A	I/P:230VAC/50HZ O/P:100%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
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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1	TEMPERATURE RISE TEST	<p>MODEL : LRS-35-5</p> <p>1. ROOM AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta=24.6°C</p> <p>2. HIGH AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta=48.6°C</p> <table border="1" data-bbox="507 495 1382 1055"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta= 24.6 °C</th> <th>HIGH AMBIENT Ta=48.6 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>LF1</td><td>47.5°C</td><td>71.4°C</td></tr> <tr><td>2</td><td>BD1</td><td>50.0°C</td><td>73.5°C</td></tr> <tr><td>3</td><td>C5</td><td>50.6°C</td><td>74.0°C</td></tr> <tr><td>4</td><td>D5</td><td>70.4°C</td><td>93.2°C</td></tr> <tr><td>5</td><td>Q1</td><td>67.6°C</td><td>90.6°C</td></tr> <tr><td>6</td><td>C35</td><td>61.3°C</td><td>83.9°C</td></tr> <tr><td>7</td><td>T1coil</td><td>65.0°C</td><td>86.6°C</td></tr> <tr><td>8</td><td>T1core</td><td>67.3°C</td><td>88.4°C</td></tr> <tr><td>9</td><td>C105</td><td>67.8°C</td><td>90.3°C</td></tr> <tr><td>10</td><td>C106</td><td>60.0°C</td><td>83.0°C</td></tr> <tr><td>11</td><td>L100</td><td>57.6°C</td><td>81.5°C</td></tr> <tr><td>12</td><td>Q100</td><td>81.3°C</td><td>104.5°C</td></tr> <tr><td>13</td><td>U1</td><td>61.0°C</td><td>83.8°C</td></tr> <tr><td>14</td><td>D30</td><td>67.5°C</td><td>89.8°C</td></tr> </tbody> </table>			NO	Position	ROOM AMBIENT Ta= 24.6 °C	HIGH AMBIENT Ta=48.6 °C	1	LF1	47.5°C	71.4°C	2	BD1	50.0°C	73.5°C	3	C5	50.6°C	74.0°C	4	D5	70.4°C	93.2°C	5	Q1	67.6°C	90.6°C	6	C35	61.3°C	83.9°C	7	T1coil	65.0°C	86.6°C	8	T1core	67.3°C	88.4°C	9	C105	67.8°C	90.3°C	10	C106	60.0°C	83.0°C	11	L100	57.6°C	81.5°C	12	Q100	81.3°C	104.5°C	13	U1	61.0°C	83.8°C	14	D30	67.5°C	89.8°C
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230 VAC O/P : 115% 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= -25 °C	TEST : OK																																																												
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50 °C NO DAMAGE	I/P : 272 VAC O/P : FULL LOAD Ta= 50 °C HUMIDITY= 95 %R.H	TEST : OK																																																												
5	TEMPERATURE COEFFICIENT	± 0.03 %/°C (0-50°C)	I/P : 230 VAC O/P : FULL LOAD	±0.008%/°C (0-50°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 : -30°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																																																												
8	VIBRATION TEST	<p>1 Carton & 1 Set</p> <p>(1) Waveform : Sine Wave</p> <p>(2) Frequency : 10-500Hz</p> <p>(3) Sweep Time : 10min/sweep cycle</p> <p>(4) Acceleration : 5G</p> <p>(5) Test Time : 60min in each axis (X.Y.Z)</p>		TEST : OK																																																												



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		(6) Ta : 25°C	
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=50 °C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta= 50 °C LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta= 50 °C LIFE TIME	(1) 133770HRS (2) 28709HRS (3) 64621HRS (4) 90758HRS
10	MTBF	MIL-HDBK-217F TOTAL FAILURE RATE : 763.6KHRS	
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