



# Test Report: LRS-75-24

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75W 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

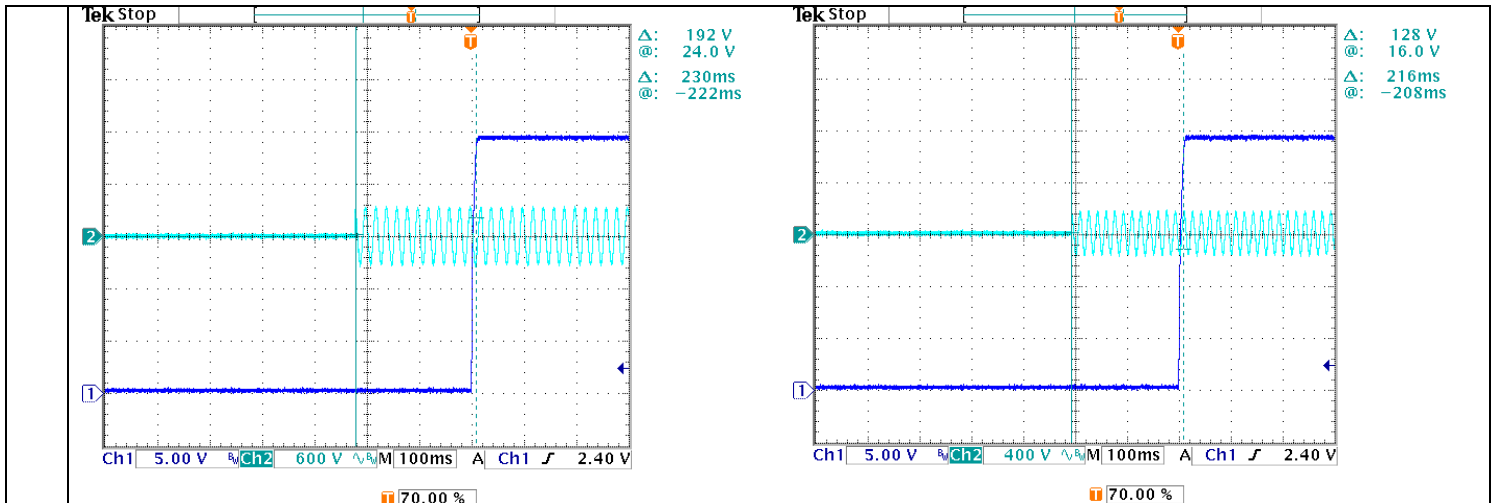
## ■ RELIABILITY TEST

ENVIRONMENT TEST

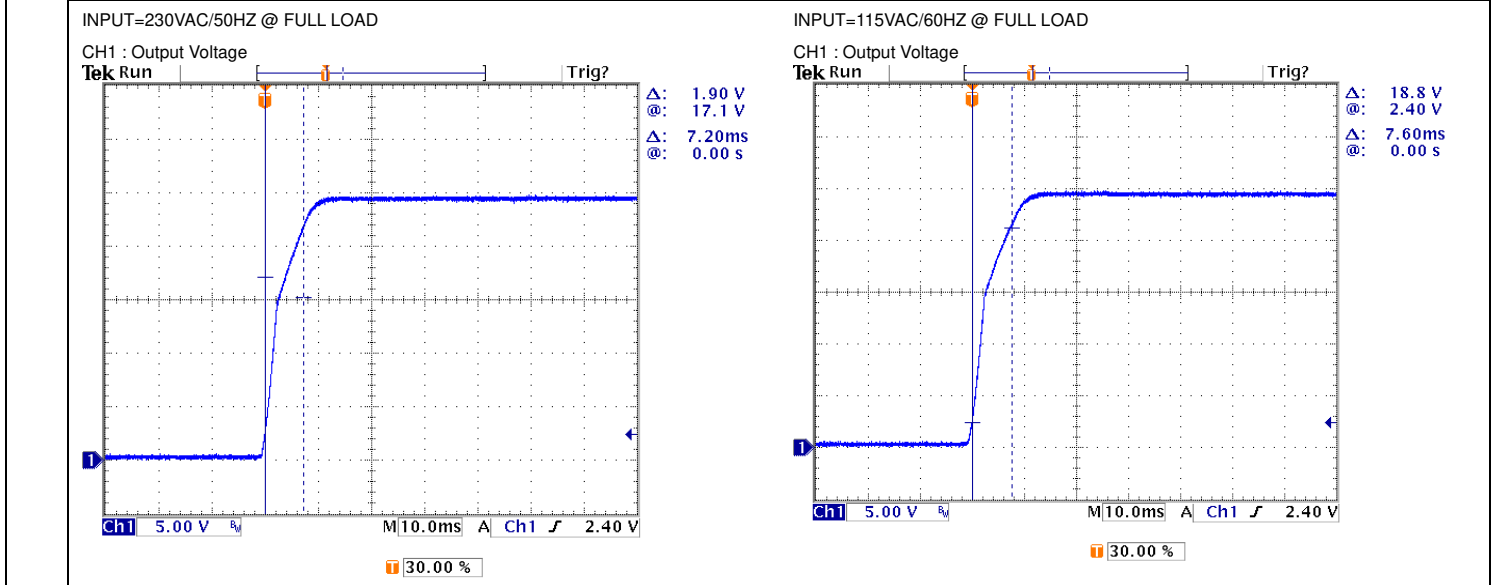
DESIGN VERIFY TEST

OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 21.6 V~28.8 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	20.19V~ 30.33 V/230VAC 20.19V~ 30.33 V/115VAC
2	OUTPUT VOLTAGE(Max) TOLERANCE	V1: -1 %~ 1 %	I/P: 100VAC /264VAC O/P:FULL/ MIN. LOAD Ta:25°C	V1: -0.05%~ 0.025%
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: -0.5%~ 0.5 %	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25°C	V1: -0.05%~ 0.025%
5	OVER/UNDERSHOOT TEST	< ± 5 %	I/P: 230VAC O/P:FULL LOAD Ta:25°C	< ± 5 %
6	RIPPLE & NOISE(Max )	V1: 150 mVp-p	I/P:230VAC O/P:FULL LOAD Ta:25°C	V1: 59.6 mVp-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/ 500 ms 115VAC/ 500 ms	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 230 ms 115VAC/ 216 ms
		<p>INPUT=230VAC/50HZ @ FULL LOAD                      INPUT=115VAC/60HZ @ FULL LOAD</p> <p>CH1 : Output Voltage CH2 : AC Input Voltage                      CH1 : Output Voltage CH2 : AC Input Voltage</p>		

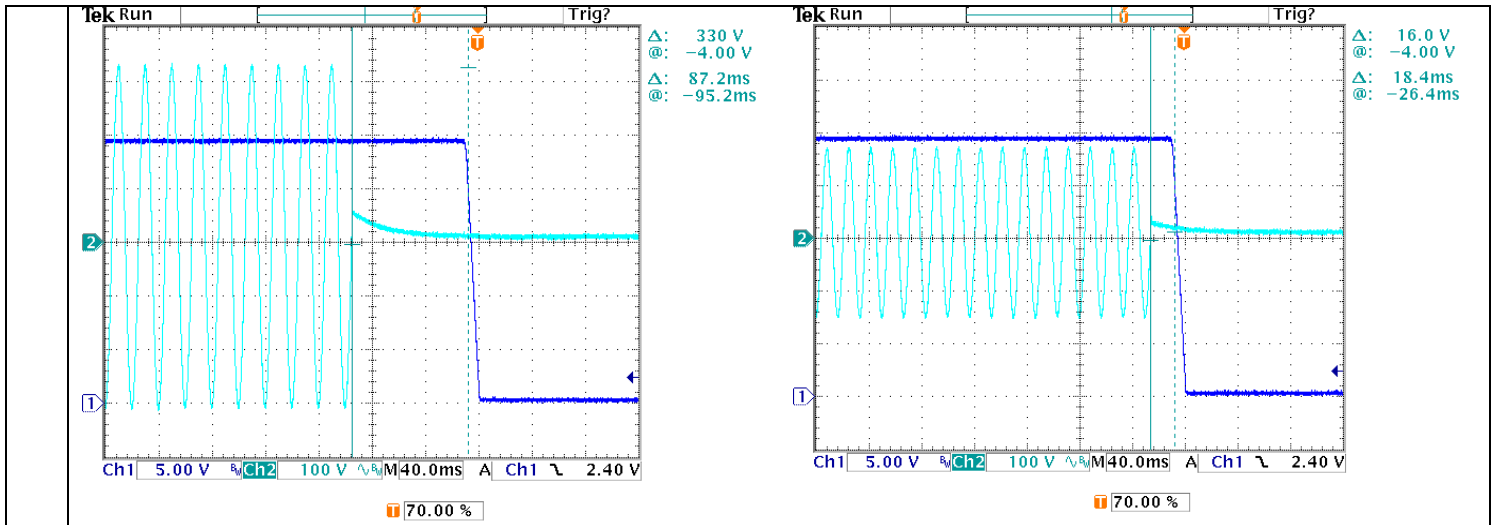


8	RISE TIME (Max)	230VAC/ 30 ms	I/P : 230 VAC	230VAC/ 7.2 ms
		115VAC/ 30 ms	I/P : 115 VAC	115VAC/ 7.6ms
		O/P : FULL LOAD		
		Ta : 25°C		

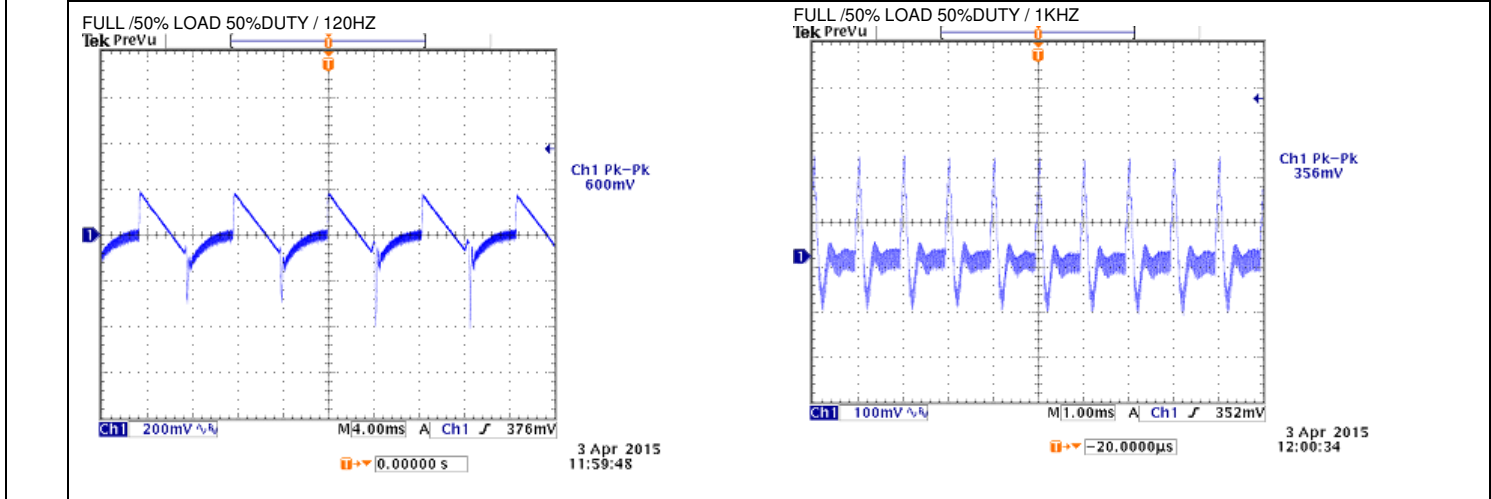


9	HOLD UP TIME (Typ.)	230VAC/ 60 ms	I/P : 230 VAC	230VAC/ 87.2 ms
		115VAC/ 12 ms	I/P : 115 VAC	115VAC/ 18.4 ms
		O/P : FULL LOAD		
		Ta : 25°C		

INPUT=230VAC/50HZ @ FULL LOAD	INPUT=115VAC/60HZ @ FULL LOAD
CH1 : Output Voltage CH2 : AC Input Voltage	CH1 : Output Voltage CH2 : AC Input Voltage



10	DYNAMIC LOAD	V1: 2400 mVp-p	I/P: 230VAC O/P: (1)FULL /50% LOAD 50%DUTY / 120HZ (2)FULL /90%DUTY / 1KHZ Ta:25°C	600 mVp-p 356mVp-p
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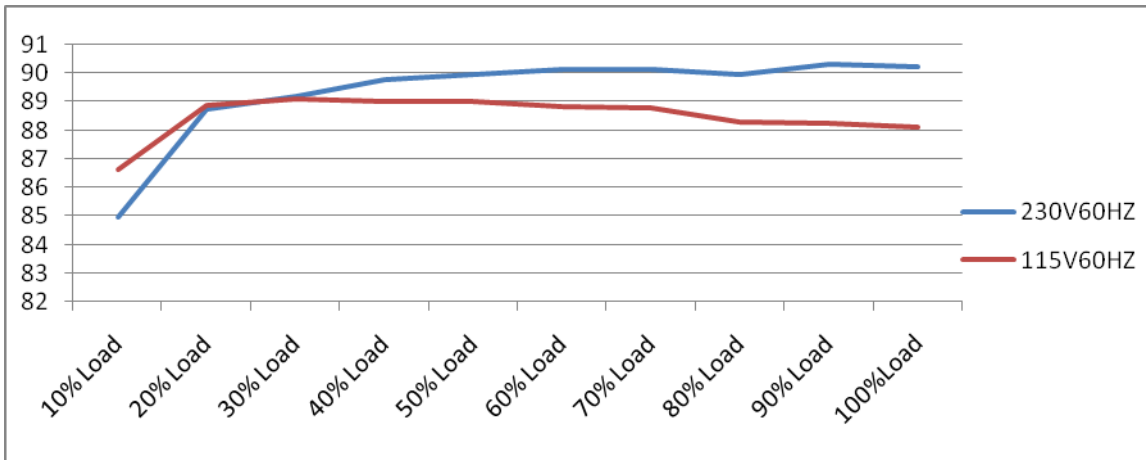
**INPUT FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	85VAC~264VAC	I/P:TESTING O/P:FULL LOAD Ta:25°C	63 V~264V
			I/P: LOW-LINE-3V=82V HIGH-LINE+15%=300 V O/P:FULL/MIN LOAD (PLEASE CHECK DERATING CURVE) 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:100 VAC ~264 VAC O/P:FULL~MIN LOAD Ta:25°C	TEST: OK



3	INPUT CURRENT (Typ.)	230V/ 0.85 A 115V/ 1.4 A	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I = 0.685 A/ 230VAC I = 1.191 A/ 115VAC
4	LEAKAGE CURRENT	< 0.75mA / 240 VAC	I/P : 240 VAC O/P : Min LOAD Ta : 25°C	L-FG : 0.395 mA N-FG : 0.395 mA
5	NO LOAD CONSUMPTION	< 0.3W	I/P : 115VAC I/P : 230VAC O/P : NO LOAD Ta : 25°C	< 0.1233 W < 0.2185 W
6	EFFICIENCY(Typ.)	90%	I/P:230 VAC O/P:FULL LOAD Ta:25°C	90.15%

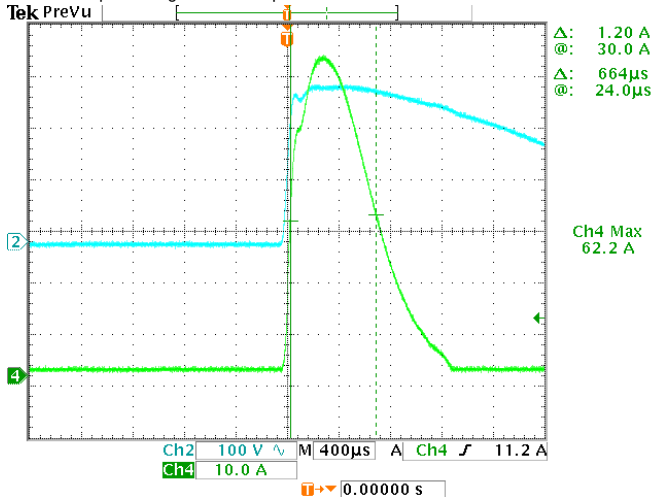
EFFICIENCY vs LOAD



8	INRUSH CURRENT(Typ.)	230V/ 65 A COLD START	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	I = 62.2 A/ 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	121.88%/ 264VAC 125.63%/ 230VAC 119.38%/ 100VAC PROTECTION TYPE : Hiccup mode, recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	28. 8V~ 33.6 V	I/P: 264VAC I/P: 230VAC I/P: 90VAC O/P: MIN LOAD Ta:25°C	31.8V/ 264VAC 31.9V/ 230VAC 31.8V/ 90VAC 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: 90VAC 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) <b>Peak Voltage</b>	Q1 Rated : 10A/ 600V	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) 562V (2) 578V (3) 566V
2	Diode <b>Peak Voltage</b>	Q100 Rated : 20A/ 120V	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) 96.0V (2) 74.8V (3) 95.6V
3	<b>Input Capacitor Voltage</b>	C5 Rated: : 150 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) 366V (2) 368V (3) 370V
4	<b>Control IC Voltage Test</b>	PWM IC U1 Rated : 28V  9.5V(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 MIN. LOW LINE Ta:25°C	(1) 20.9V (2) 12.0V (3) 21.0V (4) 25.4V (5) 16.2V

**SAFETY TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
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. 5 KVAC/min I/P-FG: 2.4 KVAC/min O/P-FG:1. 5 KVAC/min Ta:25°C	I/P-O/P: 2. 50 mA I/P-FG: 2. 88 mA O/P-FG: 2. 30 mA 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:>9999 MΩ 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	26 mΩ

**E.M.C TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	EN61000-3-2 CLASS A	I/P:230VAC/50HZ O/P: FULL 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																																																								
1	TEMPERATURE RISE TEST	MODEL : LRS-75-24 1. ROOM AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta= 31.3°C 2. HIGH AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta=52.5°C																																																										
		<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta=31.3°C</th> <th>HIGH AMBIENT Ta=52.5°C</th> </tr> </thead> <tbody> <tr><td>1</td><td>LF1</td><td>54.7°C</td><td>74.8°C</td></tr> <tr><td>2</td><td>BD1</td><td>60.2°C</td><td>80.7°C</td></tr> <tr><td>3</td><td>C5</td><td>57.8°C</td><td>77.9°C</td></tr> <tr><td>4</td><td>D5</td><td>77.4°C</td><td>99.5°C</td></tr> <tr><td>5</td><td>Q1</td><td>75.7°C</td><td>98.5°C</td></tr> <tr><td>6</td><td>C35</td><td>60.7°C</td><td>82.7°C</td></tr> <tr><td>7</td><td>T1</td><td>77.5°C</td><td>97.1°C</td></tr> <tr><td>8</td><td>C106</td><td>56.9°C</td><td>79.4°C</td></tr> <tr><td>9</td><td>C110</td><td>46.5°C</td><td>69.7°C</td></tr> <tr><td>10</td><td>L100</td><td>48.3°C</td><td>69.1°C</td></tr> <tr><td>11</td><td>Q100</td><td>69.6°C</td><td>91.5°C</td></tr> <tr><td>12</td><td>U1</td><td>67.0°C</td><td>87.7°C</td></tr> <tr><td>13</td><td>D30</td><td>58.8°C</td><td>80.8°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta=31.3°C	HIGH AMBIENT Ta=52.5°C	1	LF1	54.7°C	74.8°C	2	BD1	60.2°C	80.7°C	3	C5	57.8°C	77.9°C	4	D5	77.4°C	99.5°C	5	Q1	75.7°C	98.5°C	6	C35	60.7°C	82.7°C	7	T1	77.5°C	97.1°C	8	C106	56.9°C	79.4°C	9	C110	46.5°C	69.7°C	10	L100	48.3°C	69.1°C	11	Q100	69.6°C	91.5°C	12	U1	67.0°C	87.7°C	13	D30	58.8°C	80.8°C		
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR ( MIN )	I/P : 230 VAC O/P : 122% 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 50°C NO DAMAGE	I/P : 272 VAC O/P : FULL LOAD Ta=50°C HUMIDITY= 95 %R.H	TEST : OK																																																								
5	TEMPERATURE COEFFICIENT	±0.008%/°C (0-50°C)	I/P : 230 VAC O/P : FULL LOAD	±0.008%/°C (0-50°C)																																																								
6	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -40°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																																																								
7	THERMAL SHOCK TEST	1. Thermal shock Temperature : -30°C~ +70°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																																																								





8	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 : 60min in each axis (X.Y.Z) (6) Ta : 25°C	TEST : OK
9	CAPACITOR LIFE CYCLE	SUPPOSE C106 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) 491401HRS (2) 79353HRS (3) 151235HRS (4) 182365HRS
10	MTBF	MIL-HDBK-217F TOTAL FAILURE RATE : 681.2KHRS	
11	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure (Expected Life): Above 50,000 hours @ TA 50°C	

TEST RESULT	TESTER	APPROVAL
PASS	FRANK	WANGDZ

2007/3/20 A50-S014