



# Test Report: RS-100-15

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100W Single Output Switching Power Supply

## ■ DESIGN VERIFY TEST

Output Function Test

Input Function Test

Protection Function Test

Control Function Test

Component Stress Test

## ■ SAFETY & E.M.C. TEST

Safety Test

E.M.C. Test

## ■ RELIABILITY TEST

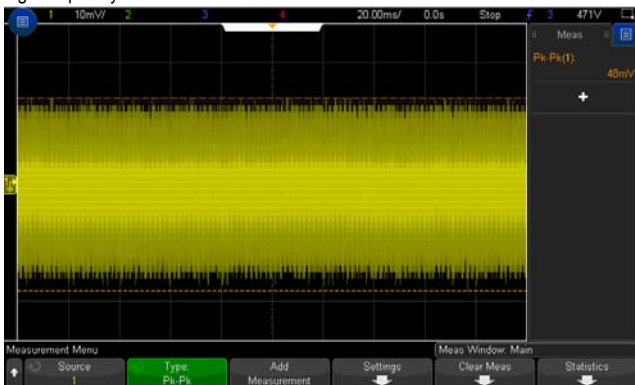
ENVIRONMENT TEST

DESIGN VERIFY TEST

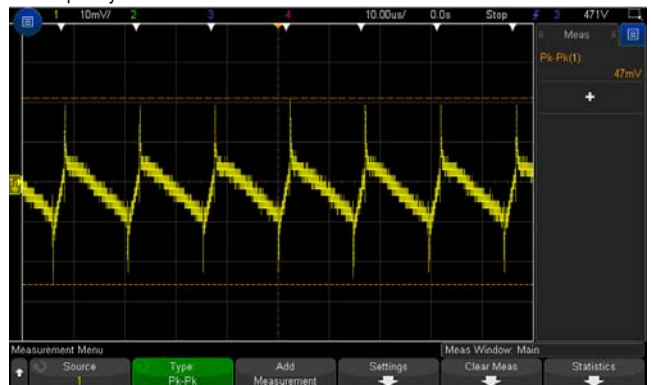
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 14.25 V~16.5 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	14.21V~17.22V/230VAC 14.21V~17.22V /115VAC
2	OUTPUT VOLTAGE(Max) TOLERANCE	V1: -1%~ 1 %	I/P: 88VAC /264VAC O/P:FULL/ MIN. LOAD Ta:25°C	V1: -0.04 %~0.04%
3	LINE REGULATION (Max)	V1: -0.5 %~ 0.5 %	I/P: 88VAC~ 264VAC O/P:FULL LOAD Ta:25°C	V1: -0.01 %~0.01%
4	LOAD REGULATION(Max)	V1: -0.5 %~0.5 %	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25°C	V1: 0.04 %~ 0.04 %
5	OVER/UNDERSHOOT TEST	< ±5%	I/P: 230VAC O/P:FULL LOAD Ta:25°C	2.0 %
6	RIPPLE & NOISE(Max )	V1: 120 mVp-p	I/P:230VAC O/P:FULL LOAD Ta:25°C	V1: 48mVp-p

high frequency :



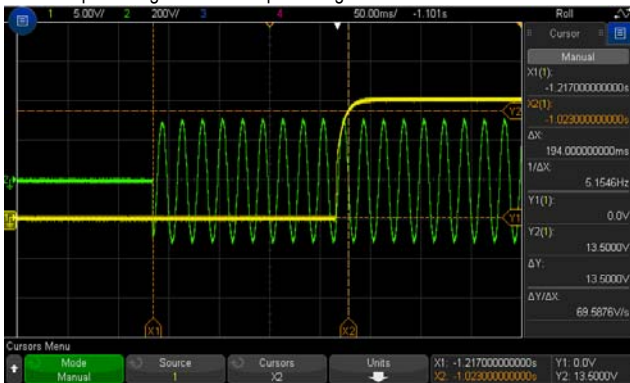
low frequency :



7	SET UP TIME(Max)	500ms /230VAC 1200ms /115VAC	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 194 ms 115VAC/ 222ms
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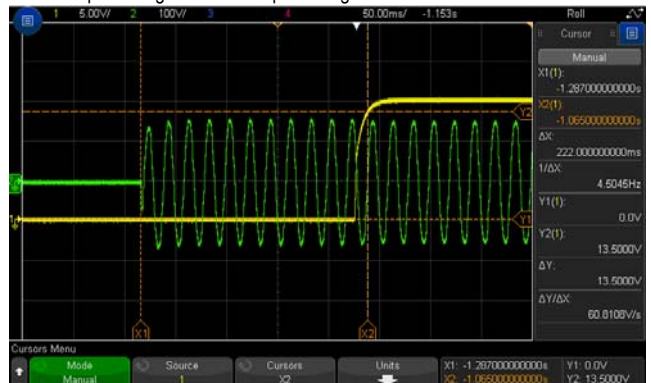
INPUT=230VAC/50HZ @ FULL LOAD

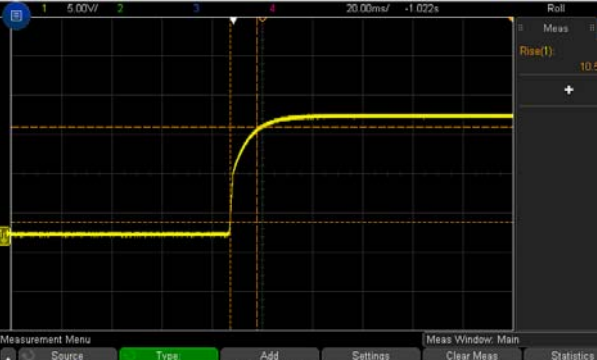
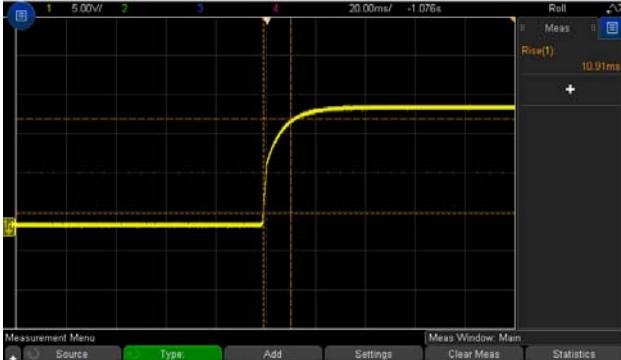
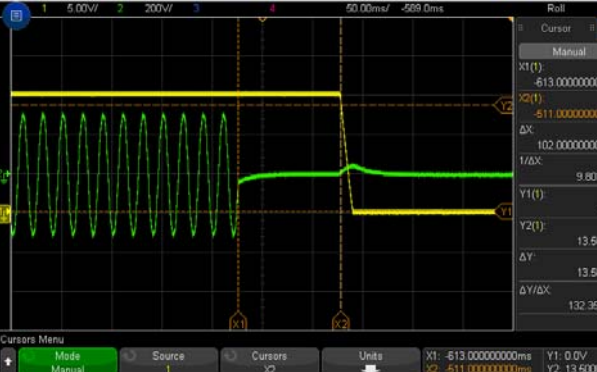

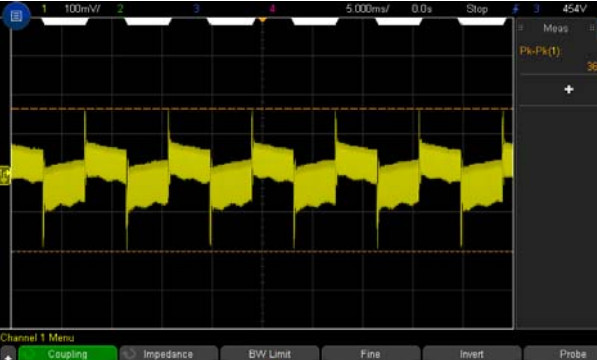
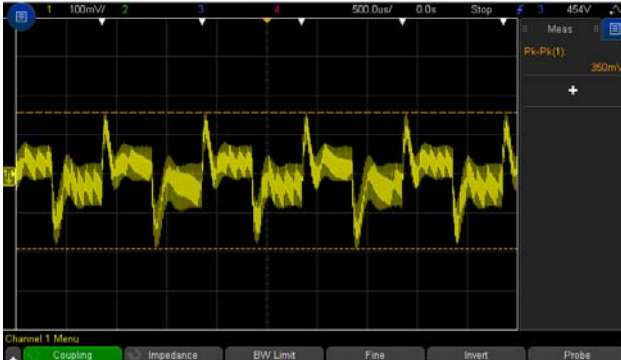
CH1 : Output Voltage CH2 : AC Input Voltage



INPUT=115VAC/60HZ @ FULL LOAD

CH1 : Output Voltage CH2 : AC Input Voltage

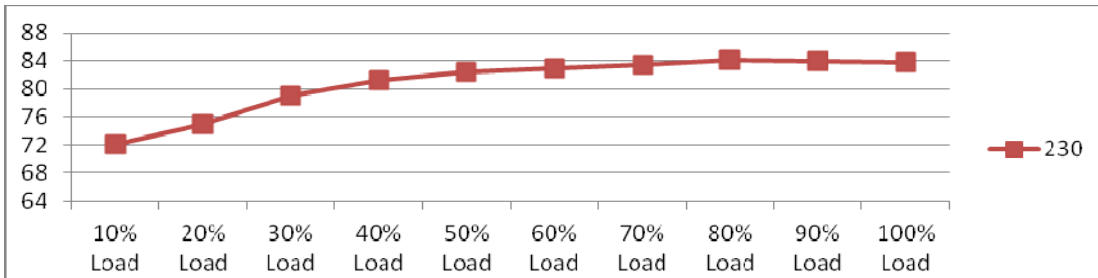


<p>8</p> <p>RISE TIME (Max)</p>	<p>20ms/ 230VAC 30ms/ 115VAC/</p>	<p>I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C</p>	<p>230VAC/ 10.5ms 115VAC/ 10.91 ms</p>
<p>INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage</p> 		<p>INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage</p> 	
<p>9</p> <p>HOLD UP TIME (Typ.)</p>	<p>95ms/ 230VAC 17ms /115VAC</p>	<p>I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C</p>	<p>230VAC/ 102 ms 115VAC/ 19.4 ms</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</p> <p>DYNAMIC LOAD</p>	<p>V1: 1500 mVp-p</p>	<p>I/P: 230VAC O/P: (1)FULL /MIN LOAD 50%DUTY / 120HZ (2)FULL /MIN LOAD 50%DUTY / 1KHZ Ta:25°C</p>	<p>366mVp-p 350mVp-p</p>
<p>FULL /MIN LOAD 50%DUTY / 120HZ</p> 		<p>FULL /MIN LOAD 50%DUTY / 1KHZ</p> 	

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	88VAC~264VAC	I/P:TESTING O/P:FULL LOAD Ta:25°C	75V~264V
			I/P: LOW-LINE-3V=85 V 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:88 VAC ~264 VAC O/P:FULL~MIN LOAD Ta:25°C	TEST: OK
3	INPUT CURRENT (Typ.)	230V/1.5A 115V/2.5A	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I=0.93A/ 230VAC I=1.58A/ 115VAC
4	LEAKAGE CURRENT	< 2 mA / 240 VAC	I/P : 264 VAC O/P : Min LOAD Ta : 25°C	L-FG : 0.6 mA
5	EFFICIENCY(Typ.)	82%	I/P:230 VAC O/P:FULL LOAD Ta:25°C	83.7%

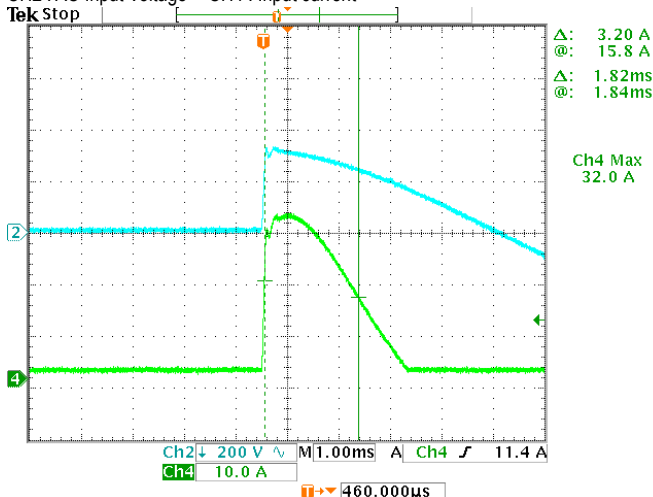
EFFICIENCY vs LOAD



6	INRUSH CURRENT(Typ.)	230V/40A COLD START	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	32A
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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: 115VAC O/P: TESTING Ta:25°C	129.8%/ 264VAC 128.2%/ 230VAC 134.0%/115VAC PROTECTION TYPE : Hiccup mode ,recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	17.25V~20.25V	I/P: 264VAC I/P: 230VAC I/P: 88VAC O/P: MIN LOAD Ta:25°C	18.9V/ 264VAC 18.9V/ 230VAC 18.9V/ 88VAC PROTECTION TYPE : Hiccup mode ,recovers automatically after fault condition is removed
3	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 264VAC 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 : 9A/ 900 V	AC ON/OFF I/P: High-Line +3V =267V VDS: O/P: (1) Full Load (2) Output Short (3) Full load continue Ta:25°C	VDS: (1) 673V (2) 807V (3) 566V
2	O/P DIODE	D60 Rated : 20A/ 200 V	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	(1) 97V (2) 87V (3) 55V
3	Input Capacitor Voltage	C5 Rated : 150 $\mu$ / 400 V	I/P: High-Line +3V =267V O/P: (1) Full Load input on/off (2) Min load input on /Off (3) Full Load /Min load Change (4) Full load continue Ta:25°C	(1) 376V (2) 376V (3) 376V (4) 368V
4	Control IC Voltage Test	U1 Rated : 8.4 V~ 21 V	AC ON/OFF I/P: High-Line +3V =267 V O/P(1) FULL LOAD (2) Output Short (3) O.L.P (4) O.V.P. (5) NO LOAD VRmin(LOW LINE) Ta:25°C	U1 (1) 15.4V (2) 15.6V (3) 15.2V (4) 13.2V (5) 13.2V
5	Clamp Diode	D1 Rated : 2A/ 1000 V	AC ON/OFF I/P : High-Line +3V = 267 V O/P : (1) Dynamic Load 90%Duty/1KHz (2) Full load continue Ta : 25°C	(1) 452V (2) 396V

### SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P: 3KVAC/min I/P-FG:2 KVAC/min O/P-FG: 0.5KVAC/min	I/P-O/P: 3.6 KVAC/min I/P- FG: 2.4 KVAC/min O/P - FG: 0.6 KVAC/min Ta:25°C	I/P-O/P:12.15mA I/P-FG:10.98mA O/P-FG:3.45mA 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: 600 VDC I/P- FG: 600 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	40 A / 2min Ta: 25°C/70%RH	5mΩ

### 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	<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL
2	CONDUCTION	EN55032 CLASS B	I/P : 230 VAC (50HZ) O/P : FULL/50% LOAD Ta : 25°C	PASS Test by certified Lab
3	RADIATION	EN55032 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 <input type="checkbox"/> LIGHT INDUSTRY AIR: 8KV / Contact: 4KV <input checked="" type="checkbox"/> INDUSTRY AIR: 8KV / Contact: 4KV <input type="checkbox"/> Din rail Model : AIR: 15KV / Contact: 8KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
5	E.F.T	EN61000-4-4 <input type="checkbox"/> LIGHT INDUSTRY INPUT : 1KV <input type="checkbox"/> MEDICAL <input checked="" type="checkbox"/> 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 Any contradictions of the test results, please refer to the latest EMC test report.			

■ RELIABILITY TEST

ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT																																																												
1	TEMPERATURE RISE TEST	MODEL : RS-100-24 1. ROOM AMBIENT BURN-IN : 1.5 HRS I/P : 230VAC O/P : FULL LOAD Ta= 23.5 °C 2. HIGH AMBIENT BURN-IN : 1.5 HRS I/P : 230VAC O/P : FULL LOAD Ta= 50.0°C																																																														
				<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta= 23.5 °C</th> <th>HIGH AMBIENT Ta= 50.0 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>LF1</td><td>53.0°C</td><td>76.1°C</td></tr> <tr><td>2</td><td>BD1</td><td>63.2°C</td><td>86.0°C</td></tr> <tr><td>3</td><td>C5</td><td>46.1°C</td><td>70.6°C</td></tr> <tr><td>4</td><td>T1</td><td>84.1°C</td><td>104.4°C</td></tr> <tr><td>5</td><td>D60</td><td>81.3°C</td><td>100.6°C</td></tr> <tr><td>6</td><td>ZD1</td><td>67.7°C</td><td>88.2°C</td></tr> <tr><td>7</td><td>D1</td><td>70.6°C</td><td>92.7°C</td></tr> <tr><td>8</td><td>Q1</td><td>84.6°C</td><td>108.6°C</td></tr> <tr><td>9</td><td>D2</td><td>60.7°C</td><td>84.5°C</td></tr> <tr><td>10</td><td>C65</td><td>58.6°C</td><td>81.9°C</td></tr> <tr><td>12</td><td>U1</td><td>68.8°C</td><td>90.5°C</td></tr> <tr><td>13</td><td>R72</td><td>91.1°C</td><td>101.8°C</td></tr> <tr><td>14</td><td>ZD2</td><td>66.8°C</td><td>89.4°C</td></tr> <tr><td>15</td><td>R59</td><td>74.7°C</td><td>96.9°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta= 23.5 °C	HIGH AMBIENT Ta= 50.0 °C	1	LF1	53.0°C	76.1°C	2	BD1	63.2°C	86.0°C	3	C5	46.1°C	70.6°C	4	T1	84.1°C	104.4°C	5	D60	81.3°C	100.6°C	6	ZD1	67.7°C	88.2°C	7	D1	70.6°C	92.7°C	8	Q1	84.6°C	108.6°C	9	D2	60.7°C	84.5°C	10	C65	58.6°C	81.9°C	12	U1	68.8°C	90.5°C	13	R72	91.1°C	101.8°C	14	ZD2	66.8°C	89.4°C	15	R59	74.7°C	96.9°C
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR ( MIN )	I/P : 230 VAC O/P : 137% LOAD Ta : 25°C	TEST : OK																																																												
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 264VAC/88VAC 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 CONTROL50°C /95 %R.H 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	± 0.0054%/°C (0~50°C)																																																												
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 : 10 CYCLE 5. Input/Output condition : STATIC		TEST : OK																																																												
7	THERMAL SHOCK TEST	1. Thermal shock Temperature : -25°C~ +55°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 : 15cycle:230V/ FULL LOAD AC ON 3sec/AC OFF 1sec TEST 1cycle:230V/ FULL LOAD Burn In Test		TEST : OK																																																												



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 : 180min in each axis (X.Y.Z) (6) Ta : 25°C	TEST : OK
9	CAPACITOR LIFE CYCLE	SUPPOSE C57 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) 327348.5HRS (2) 72237.9HRS (3) 88468.3 HRS (4) 103673.6HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 260.8K hrs min. MIL-HDBK-217F (25°C)	
11	Ongoing Reliability Test	I/P : 230VAC O/P : FULL LOAD TA=50°C Demonstration Mean Time Between Failure : 30,000 hours	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	LIUTT		Wangdz

2018.4.30 GP-A50-F010