Test Report: RS-25-24

25W 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

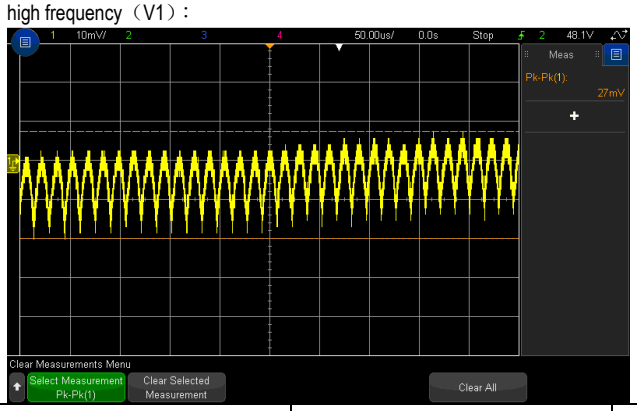
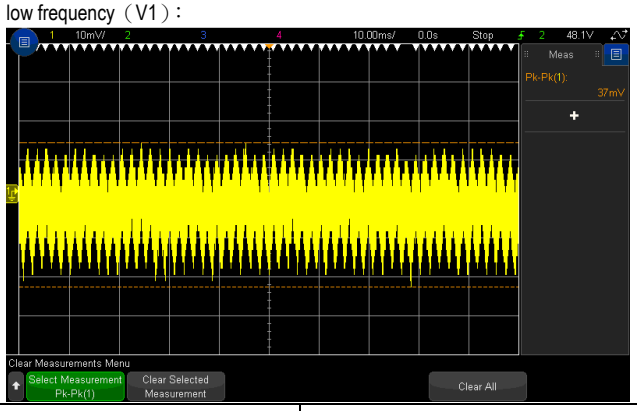
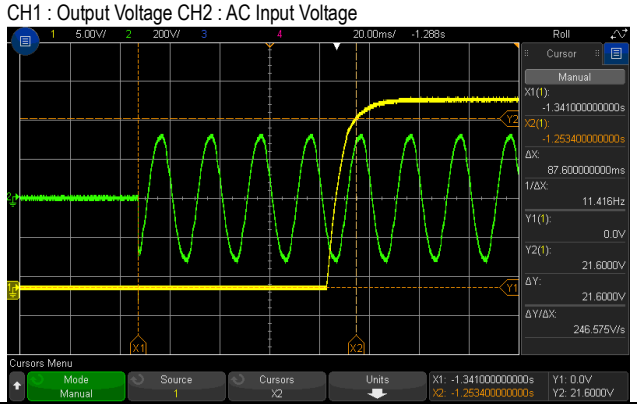
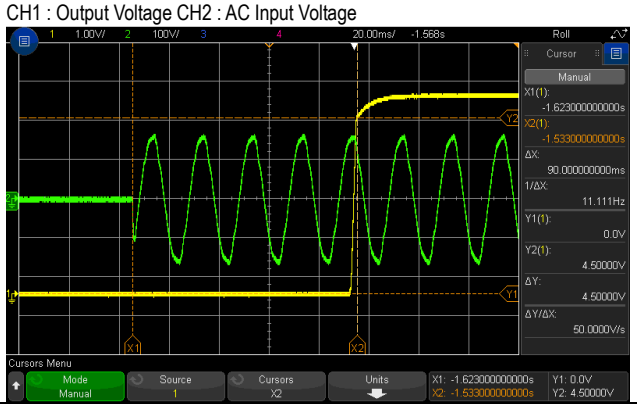
Safety Test
E.M.C. Test

■ RELIABILITY TEST

ENVIRONMENT TEST

■ DESIGN VERIFY TEST

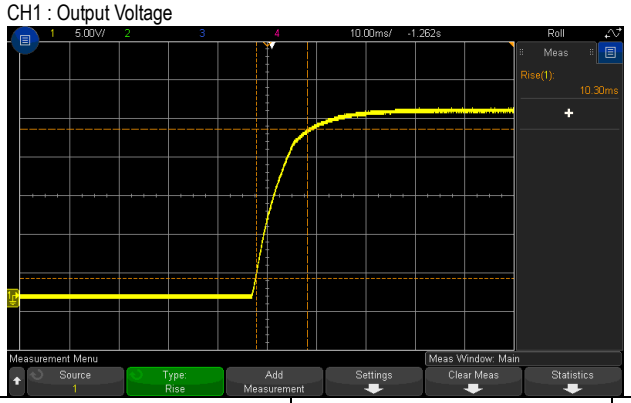
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 22V~27.6V	I/P： 230 VAC O/P：MIN LOAD Ta：25℃	20.3V~28.2V
2	OUTPUT VOLTAGE(Max) TOLERANCE	V1： -1.0%~1.0%	I/P: 88VAC /264VAC O/P:FULL/ MIN. LOAD Ta:25℃	V1 : -0.04%~0.03%
3	LINE REGULATION (Max)	V1: -0.5%~ 0.5%	I/P: 88VAC~ 264VAC O/P:FULL LOAD Ta:25℃	V1： -0.02%~0.02%
4	LOAD REGULATION(Max)	V1: -0.5%~0.5%	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25℃	V1 : -0.04%~0.03%
5	OVER/UNDERSHOOT TEST	< ±5%	I/P: 230VAC O/P:FULL LOAD Ta:25℃	2.5%
6	RIPPLE & NOISE(Max)	V1: 120mVp-p	I/P:230VAC O/P:FULL LOAD Ta:25℃	V1: 37mVp-p
	high frequency（V1）：  		low frequency（V1）：  	
7	SET UP TIME(Max)	230VAC/1800ms 115VAC/4000ms	I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	230VAC/87.6ms 115VAC/ 90.0ms
	INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage  		INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage  	

8	RISE TIME (Max)	230VAC/23ms 115VAC/30ms	I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	230VAC/10.3ms 115VAC/10.7ms

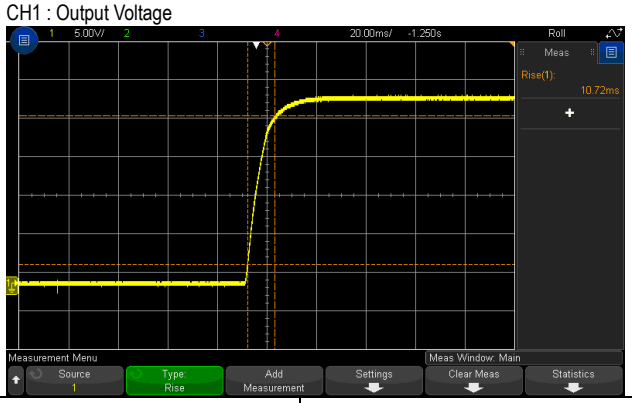
INPUT=230VAC/50HZ @ FULL LOAD

CH1 : Output Voltage



INPUT=115VAC/60HZ @ FULL LOAD

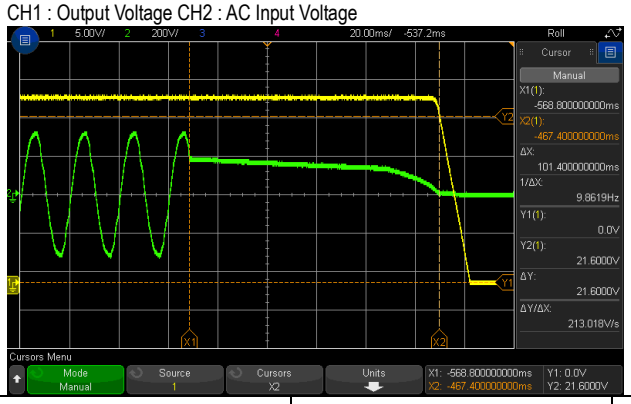
CH1 : Output Voltage



9	HOLD UP TIME (Typ.)	230VAC/80ms 115VAC/14ms	I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	230VAC/101.4.ms 115VAC/25.2ms

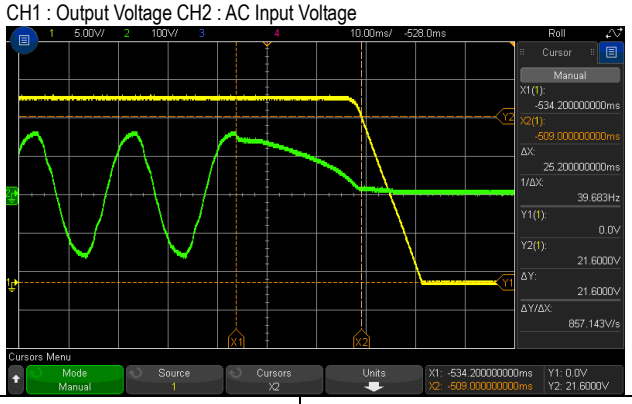
INPUT=230VAC/50HZ @ FULL LOAD

CH1 : Output Voltage CH2 : AC Input Voltage



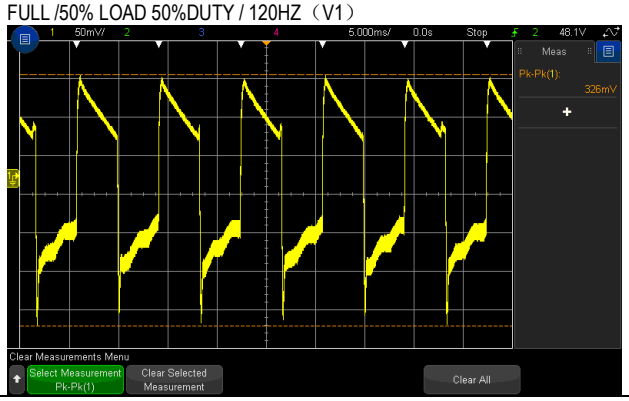
INPUT=115VAC/60HZ @ FULL LOAD

CH1 : Output Voltage CH2 : AC Input Voltage

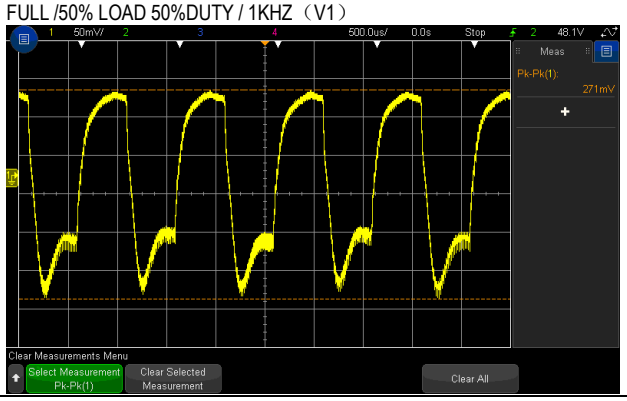


10	DYNAMIC LOAD	V1: 2400 mVp-p	I/P: 230VAC O/P: (1)FULL /50% LOAD 50%DUTY / 120HZ (2)FULL /50% LOAD 50%DUTY / 1KHZ Ta:25℃	（1） （2） V1： 326mVp-p 271mVp-p

FULL /50% LOAD 50%DUTY / 120HZ（V1）



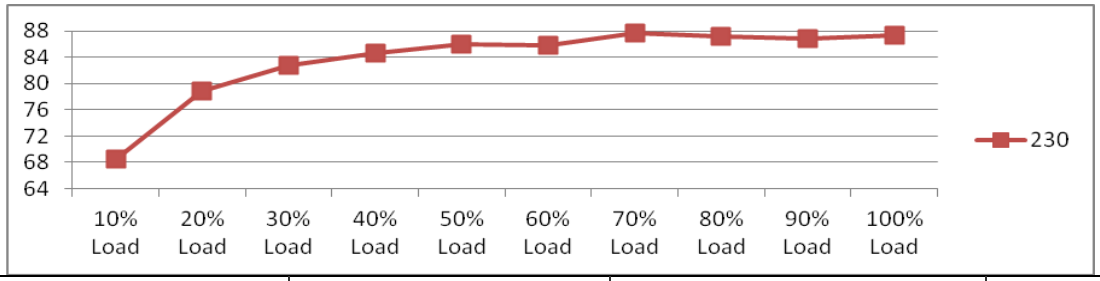
FULL /50% LOAD 50%DUTY / 1KHZ（V1）



INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	88VAC~264VAC 125VDC~373VDC	I/P:TESTING O/P:FULL LOAD Ta:25℃	60VAC~264VAC 125VDC~373VDC
			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℃	TEST: OK
3	INPUT CURRENT (Typ.)	230V/ 0.4A 115V/0.7A	I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	I =0.25A/ 230VAC I = 0.40A/ 115VAC
4	LEAKAGE CURRENT	＜2mA	I/P： 240VAC O/P：Min LOAD Ta：25℃	0.5mA
5	NO LOAD POWER CONSUMPTION	< 0.5W	I/P： 230 VAC O/P：Min LOAD Ta：25℃	0.26W
6	EFFICIENCY(Typ.)	86%	I/P:230 VAC O/P:FULL LOAD Ta:25℃	87.3%

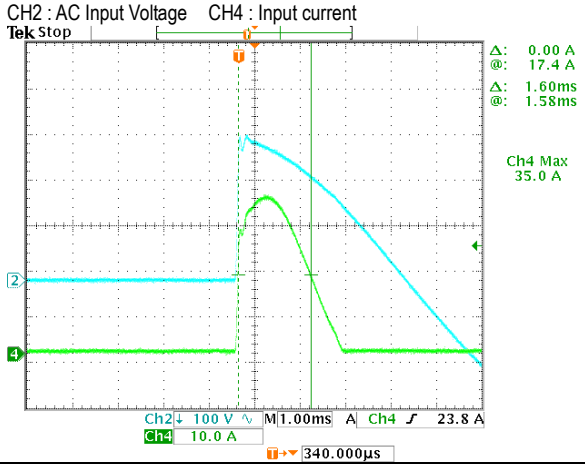
EFFICIENCY vs LOAD



7	INRUSH CURRENT(Typ.)	230V / 45A COLD START	I/P： 230 VAC O/P：FULL LOAD Ta：25℃	I = 35A/ 230VAC

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%~180%	I/P: 264VAC I/P: 230VAC I/P: 88VAC O/P:TESTING Ta:25℃	147%/ 264VAC 152%/ 230VAC 137%/88VAC PROTECTION TYPE： Hiccup mode, recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	27.6V~32.4V	I/P: 264VAC I/P: 230VAC I/P: 88VAC O/P:MIN LOAD Ta:25℃	29.2V/ 264VAC 29.2V/ 230VAC 29.2V/ 88VAC PROTECTION TYPE： Shut down o/p voltage, repower on to recover
3	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 264VAC I/P: 88VAC O/P: FULL LOAD Ta:25℃	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 : 600 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℃	VDS: (1) 567V (2) 586V (3) 567V
2	O/P Diode	D55 Rated : 200 V	AC ON/OFF I/P:High-Line +3V =267 V O/P: (1)Full Load (2)Output Short (3) Full Load Continue Ta:25℃	VDS: (1) 175V (2) 147V (3) 175V
3	Input Capacitor Voltage	C5 Rated :56 μ / 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℃	(1) 386V (2) 386V (3) 386V (4) 382V
4	Clamp Diode	D1 Rated ：1000 V	AC ON/OFF I/P ：High-Line +3V = 267 V O/P ：(1)Full Load (2)Output Short (3)Dynamic Load Full Load/ Min. Load 90%Duty/5KHz (4)Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz Ta:25℃	(1) 531V (2) 454V (3) 531V (4) 531V

5	Control IC	U1 Rated ：8.4V~21V	AC ON/OFF I/P:High-Line +3V =267 V O/P: (1)Full Load (2)Output Short (3)OLP (4) Low Line No Load Vo(min) Ta:25℃	(1) 16.5V (2) 12.9V (3) 16.9V (4) 12.3V

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℃	I/P-O/P:1.94mA I/P-FG:1.31mA O/P-FG:1.06mA 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 O/P- FG: 600 VDC Ta:25℃	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℃/70%RH	4mΩ

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℃	☑PASS ☐FAIL
2	CONDUCTION	EN55032 CLASS B	I/P： 230 VAC (50HZ) O/P：FULL/50% LOAD Ta：25℃	PASS Test by certified Lab
3	RADIATION	EN55032 CLASS B	I/P： 230 VAC (50HZ) O/P：FULL LOAD Ta：25℃	PASS Test by certified Lab
4	E.S.D	EN61000-4-2 ☑LIGHT INDUSTRY AIR：8KV / Contact：4KV □INDUSTRY AIR：8KV / Contact：4KV □Din rail Model : AIR：15KV / Contact：8KV	I/P： 230 VAC/50HZ O/P：FULL LOAD Ta：25℃	CRITERIA A
5	E.F.T	EN61000-4-4 ☑LIGHT INDUSTRY INPUT： 1KV □MEDICAL □INDUSTRY INPUT： 2KV	I/P： 230 VAC/50HZ O/P：FULL LOAD Ta：25℃	CRITERIA A
6	SURGE	IEC61000-4-5 □LIGHT INDUSTRY L-N ：1KV L/N-PE ：2KV	I/P： 230 VAC/50HZ O/P：FULL LOAD Ta：25℃	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

<table>
<tr><th>NO</th><th>TEST ITEM</th><th>SPECIFICATION</th><th>TEST CONDITION</th><th>RESULT</th></tr>
<tr><td>1</td><td>TEMPERATURE RISE TEST</td><td colspan="3">MODEL：RS-25-24
1. ROOM AMBIENT BURN-IN：1.5 HRS
I/P： 230VAC O/P： FULL LOAD Ta= 22.5 ℃
2. HIGH AMBIENT BURN-IN：1.5 HRS
I/P： 230VAC O/P： FULL LOAD Ta= 48.6 ℃
<table>
<tr><th>NO</th><th>Position</th><th>ROOM AMBIENT Ta= 25.3 ℃</th><th>HIGH AMBIENT Ta= 45.3 ℃</th></tr>
<tr><td>1</td><td>LF1</td><td>46.2℃</td><td>72.4℃</td></tr>
<tr><td>2</td><td>T1</td><td>59.3℃</td><td>83.4℃</td></tr>
<tr><td>3</td><td>Q1</td><td>61.2℃</td><td>86.0℃</td></tr>
<tr><td>4</td><td>L51</td><td>47.3℃</td><td>72.8℃</td></tr>
<tr><td>5</td><td>D55</td><td>67.0℃</td><td>90.7℃</td></tr>
<tr><td>6</td><td>C5</td><td>39.6℃</td><td>65.7℃</td></tr>
<tr><td>7</td><td>R8</td><td>56.9℃</td><td>81.8℃</td></tr>
<tr><td>8</td><td>C57</td><td>50.1℃</td><td>75.1℃</td></tr>
<tr><td>9</td><td>BD1</td><td>46.9℃</td><td>73.0℃</td></tr>
<tr><td>10</td><td>U1</td><td>44.6℃</td><td>70.7℃</td></tr>
<tr><td>11</td><td>D1</td><td>54.0℃</td><td>79.3℃</td></tr>
<tr><td>12</td><td>ZD1</td><td>54.9℃</td><td>79.7℃</td></tr>
</table></td></tr>
<tr><td>2</td><td>OVER LOAD BURN-IN TEST</td><td>NO DAMAGE
1 HOUR (MIN)</td><td>I/P： 230 VAC
O/P：144% LOAD
Ta：25℃</td><td>TEST：OK</td></tr>
<tr><td>3</td><td>LOW TEMPERATURE
TURN ON TEST</td><td>TURN ON AFTER 2 HOUR</td><td>I/P： 264VAC/100VAC
O/P： 100 % LOAD
Ta= -25 ℃</td><td>TEST：OK</td></tr>
<tr><td>4</td><td>HIGH HUMIDITY
HIGH TEMPERATURE
HIGH VOLTAGE
TURN ON TEST</td><td>AFTER 12 HOURS
IN CHAMBER ON
CONTROL 50℃ / 95 %R.H
NO DAMAGE</td><td>I/P： 272 VAC
O/P：FULL LOAD
Ta= 50 ℃
HUMIDITY= 95 %R.H</td><td>TEST：OK</td></tr>
<tr><td>5</td><td>TEMPERATURE
COEFFICIENT</td><td>± 0.03%/℃ (0~50℃)</td><td>I/P： 230 VAC
O/P：FULL LOAD</td><td>± 0.0018 %/℃ (0~50℃)</td></tr>
<tr><td>6</td><td>STORAGE TEMPERATURE TEST</td><td colspan="2">1. Thermal shock Temperature： -45℃~ +90℃
2. Temperature change rate ：25℃ / MIN
3. Dwell time low and high temperature ： 30 MIN/EACH
4. Total test cycle：10 CYCLE
5. Input/Output condition： STATIC</td><td>TEST：OK</td></tr>
<tr><td>7</td><td>THERMAL SHOCK TEST</td><td colspan="2">1. Thermal shock Temperature： -25℃~ +55℃
2. Temperature change rate ：25℃ / 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</td><td>TEST：OK</td></tr>
</table>

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℃	TEST：OK
9	CAPACITOR LIFE CYCLE	SUPPOSE C57 IS THE MOST CRITICAL COMPONENT (1) I/P： 230VAC O/P：FULL LOAD Ta= 25 ℃ LIFE TIME (2) I/P： 230VAC O/P：FULL LOAD Ta=50 ℃ LIFE TIME (3) I/P： 230VAC O/P：75% LOAD Ta= 50 ℃ LIFE TIME (4) I/P： 230VAC O/P：50% LOAD Ta= 50 ℃ LIFE TIME	(1) 347283 HRS (2) 66255.5 HRS (3) 112200.3 HRS (4) 131161.6 HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 309.7K hrs min. MIL-HDBK-217F (25℃)	
11	Ongoing Reliability Test	I/P：230VAC O/P：FULL LOAD TA=50℃ Demonstration Mean Time Between Failure : 30,000 hours	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	LIUTT		Wangdz

2018.4.30 GP-A50-F010