Test Report: RS-35-5

35W 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

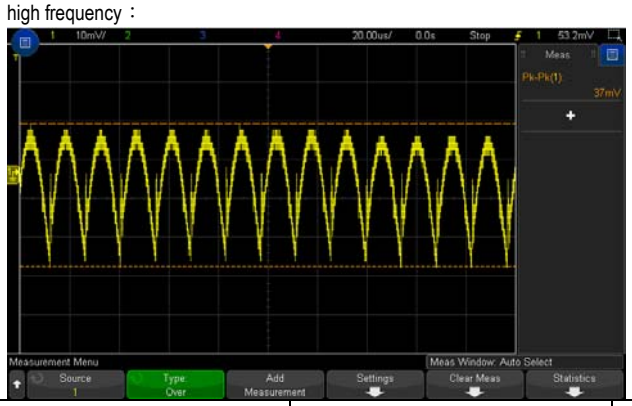
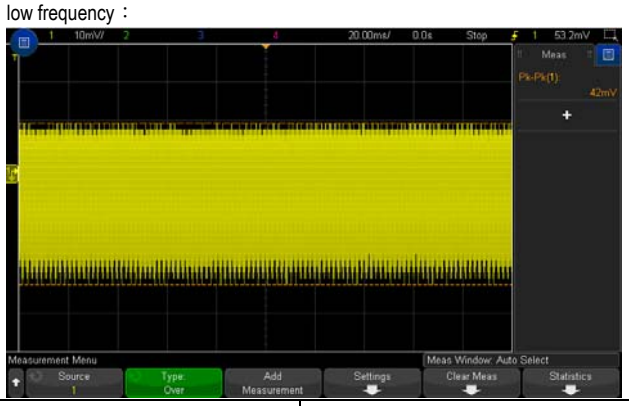
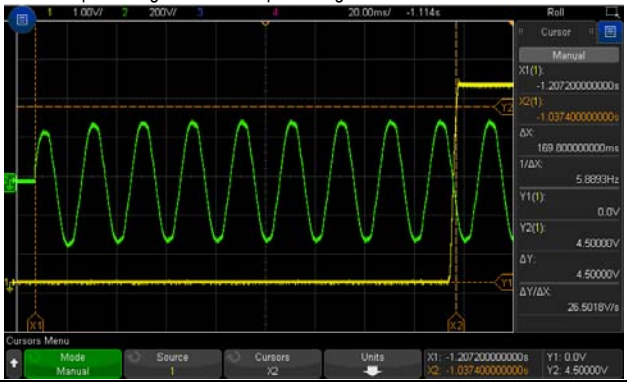
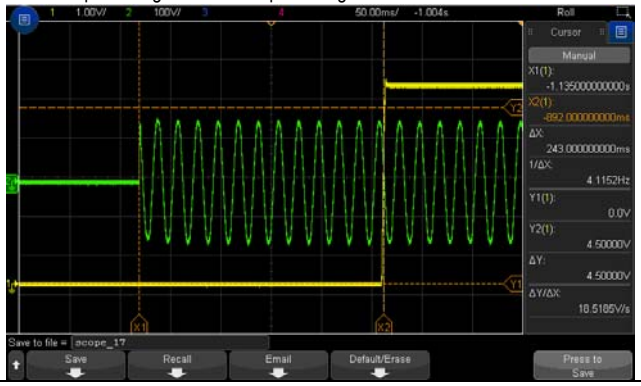
Safety Test
E.M.C. Test

■ RELIABILITY TEST

ENVIRONMENT TEST

■ DESIGN VERIFY TEST

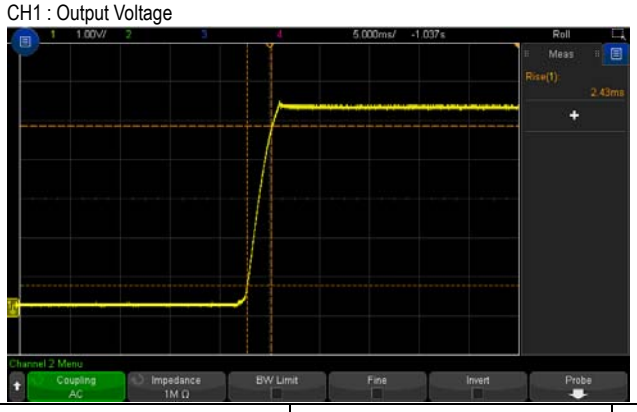
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 4.5 V~5.5 V	I/P： 230 VAC I/P： 115 VAC O/P：MIN LOAD Ta：25℃	4.34V~5.89V/230VAC 4.34V~5.89V V/115VAC
2	OUTPUT VOLTAGE(Max) TOLERANCE	V1: -2%~ 2 %	I/P: 88VAC /264VAC O/P:FULL/ MIN. LOAD Ta:25℃	V1: -0.06 %~ 0.06%
3	LINE REGULATION (Max)	V1: -0.5 %~ 0.5 %	I/P: 88VAC~ 264VAC O/P:FULL LOAD Ta:25℃	V1: -0.01 %~0.01%
4	LOAD REGULATION(Max)	V1: -1 %~1 %	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25℃	V1: -0.06 %~ 0.06%
5	OVER/UNDERSHOOT TEST	< ±10%	I/P: 230VAC O/P:FULL LOAD Ta:25℃	2.8 %
6	RIPPLE & NOISE(Max)	V1: 80 mVp-p	I/P:230VAC O/P:FULL LOAD Ta:25℃	V1: 42mVp-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℃	230VAC/ 169.8ms 115VAC/ 243ms
	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)	50ms/ 230VAC 50ms/ 115VAC/	I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	230VAC/ 2.43ms 115VAC/2.65 ms

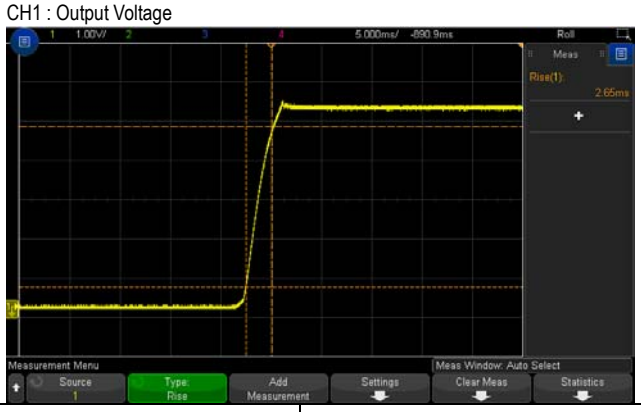
INPUT=230VAC/50HZ @ FULL LOAD

CH1 : Output Voltage



INPUT=115VAC/60HZ @ FULL LOAD

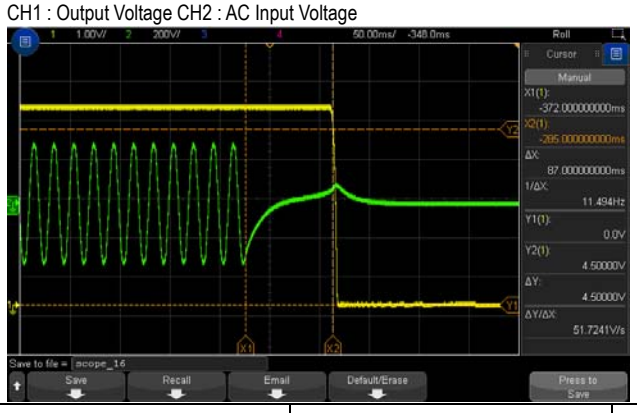
CH1 : Output Voltage



9	HOLD UP TIME (Typ.)	80ms/ 230VAC 15ms /115VAC	I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	230VAC/ 87ms 115VAC/ 15.2 ms

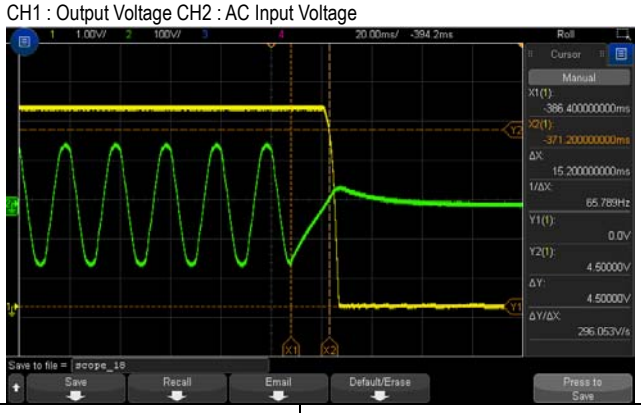
INPUT=230VAC/50HZ @ FULL LOAD

CH1 : Output Voltage CH2 : AC Input Voltage



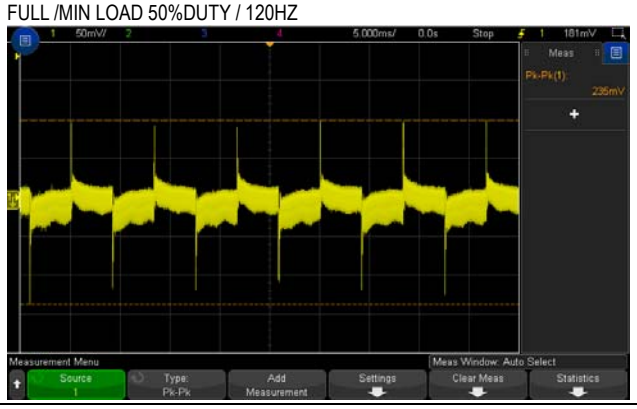
INPUT=115VAC/60HZ @ FULL LOAD

CH1 : Output Voltage CH2 : AC Input Voltage

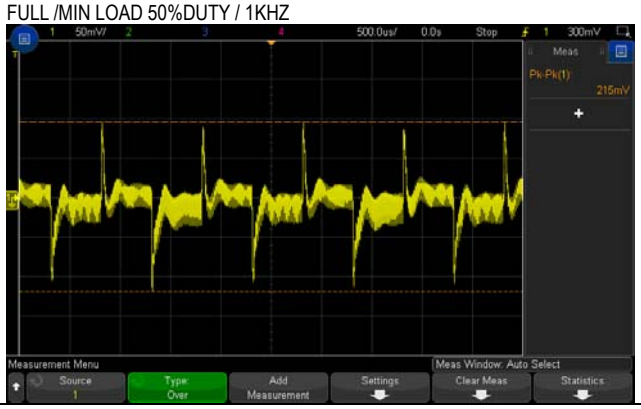


10	DYNAMIC LOAD	V1: 1000 mVp-p	I/P: 230VAC O/P: (1)FULL /MIN LOAD 50%DUTY / 120HZ (2)FULL /MIN LOAD 50%DUTY / 1KHZ Ta:25℃	 221mVp-p 215mVp-p

FULL /MIN LOAD 50%DUTY / 120HZ



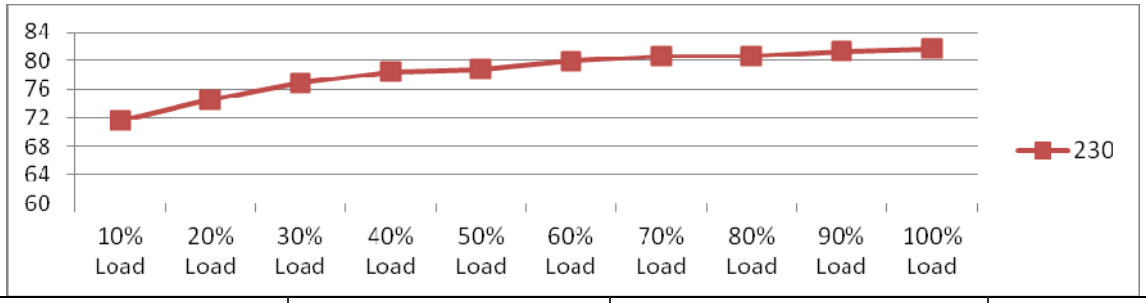
FULL /MIN LOAD 50%DUTY / 1KHZ



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℃	70VAC~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/0.55A 115V/0.8A	I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	I =0.33A/ 230VAC I =0.58A/ 115VAC
4	LEAKAGE CURRENT	< 2 mA / 240 VAC	I/P： 240 VAC O/P：Min LOAD Ta：25℃	1.1 mA
5	EFFICIENCY(Typ.)	80.5%	I/P:230 VAC O/P:FULL LOAD Ta:25℃	81.7%

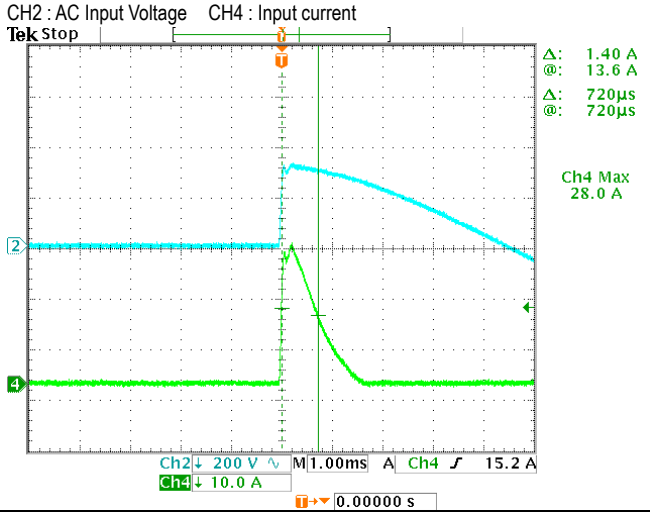
EFFICIENCY vs LOAD



6	INRUSH CURRENT(Typ.)	230V/36A COLD START	I/P： 230 VAC O/P：FULL LOAD Ta：25℃	

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℃	135.1%/ 264VAC 137.1%/ 230VAC 129.4%/115VAC PROTE1CTION TYPE： Hiccup mode ,recovers automatically after fault condition is removerd
2	OVER VOLTAGE PROTECTION	5.75V~6.75V	I/P: 264VAC I/P: 230VAC I/P: 88VAC O/P:MIN LOAD Ta:25℃	6.26V/ 264VAC 6.26V/ 230VAC 6.26V/ 88VAC PROTECTION TYPE： Hiccup mode ,recovers automatically after fault condition is removerd
3	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 264VAC O/P: FULL LOAD Ta:25℃	NO DAMAGE PROTECTION TYPE： Hiccup mode ,recovers automatically after fault condition is removerd

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	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) 500V (2) 476V (3) 492V
2	O/P DIODE	D55 Rated : 10A/ 40 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℃	(1) 35.4V (2) 31.0V (3) 35.0V
3	Input Capacitor Voltage	C5 Rated: : 82 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) 371V (2) 371V (3) 371V (4) 367V
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℃	U1 (1) 17.5V (2) 12.5V (3) 17.7V (4) 15.1V (5) 12.5V
5	Clamp Diode	D1 Rated : 3A/ 600 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℃	(1) 468V (2) 464V

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:1.68mA I/P-FG:0.74mA O/P-FG:0.73mA 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℃	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	7 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℃	☑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-35-5
1. ROOM AMBIENT BURN-IN：1.5 HRS
I/P： 230VAC O/P： FULL LOAD Ta= 27.1 ℃
2. HIGH AMBIENT BURN-IN：1.5 HRS
I/P： 230VAC O/P： FULL LOAD Ta= 50.1 ℃
<table>
<tr><th>NO</th><th>Position</th><th>ROOM AMBIENT Ta= 27.1 ℃</th><th>HIGH AMBIENT Ta= 50.1 ℃</th></tr>
<tr><td>1</td><td>LF1</td><td>47.6℃</td><td>70.0℃</td></tr>
<tr><td>2</td><td>BD1</td><td>56.5℃</td><td>78.4℃</td></tr>
<tr><td>3</td><td>C5</td><td>48.5℃</td><td>72.7℃</td></tr>
<tr><td>4</td><td>Q1</td><td>59.3℃</td><td>86.0℃</td></tr>
<tr><td>5</td><td>D1</td><td>68.7℃</td><td>95.3℃</td></tr>
<tr><td>6</td><td>T1</td><td>78.4℃</td><td>101.4℃</td></tr>
<tr><td>7</td><td>C10</td><td>58.6℃</td><td>85.0℃</td></tr>
<tr><td>8</td><td>D55</td><td>75.6℃</td><td>100.0℃</td></tr>
<tr><td>9</td><td>R4</td><td>81.9℃</td><td>105.7℃</td></tr>
<tr><td>10</td><td>R8</td><td>52.8℃</td><td>81.0℃</td></tr>
<tr><td>11</td><td>C57</td><td>63.2℃</td><td>86.3℃</td></tr>
<tr><td>12</td><td>C58</td><td>59.4℃</td><td>82.5℃</td></tr>
<tr><td>13</td><td>L51</td><td>53.5℃</td><td>77.2℃</td></tr>
<tr><td>14</td><td>U1</td><td>53.8℃</td><td>79.4℃</td></tr>
<tr><td>15</td><td>U3</td><td>58.3℃</td><td>80.2℃</td></tr>
<tr><td>16</td><td>D2</td><td>60.2℃</td><td>84.7℃</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：136% 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/88VAC
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
CONTROL50℃ / 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>± 0.0017%/℃ (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) 111236.1 HRS (2) 19528.1 HRS (3) 48660 HRS (4) 102751.5 HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 249K 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