



Test Report: RD-85B

85W Dual 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

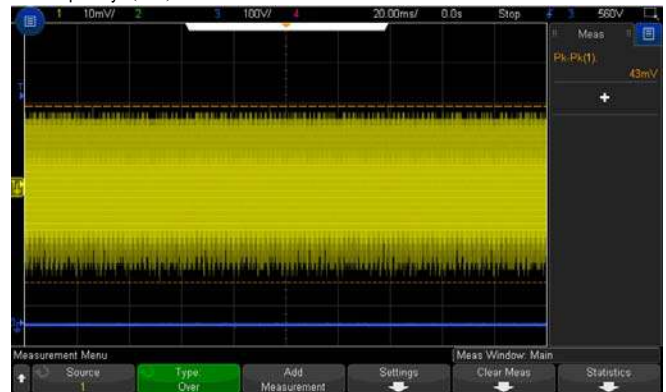
OUTPUT FUNCTION TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT |
|----|-------------------------------|-------------------------------|---|---|
| 1 | OUTPUT VOLTAGE ADJUST RANGE | CH1: 4.75V~ 5.5 V | I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C | 4.71V~5.66V/230VAC 4.71V~5.66VV/115VAC |
| 2 | OUTPUT VOLTAGE(Max) TOLERANCE | V1 : -2%~2 % V2 : -5%~5% | I/P: 88VAC /264VAC O/P:FULL/ MIN. LOAD Ta:25°C | V1 : -0.07%~0.07% V2 : -2.27%~2.13% |
| 3 | LINE REGULATION (Max) | V1: -0.5%~0.5% V2: -1%~ 1% | I/P: 88VAC~ 264VAC O/P:FULL LOAD Ta:25°C | V1 : -0.01%~0.01% V2 : -0.04%~0.06% |
| 4 | LOAD REGULATION(Max) | V1: -1%~1% V2: -3%~3% | I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25°C | V1 : -0.07%~0.07% V2 : -2.27%~2.13% |
| 5 | OVER/UNDERSHOOT TEST | < ±10% | I/P: 230VAC O/P:FULL LOAD Ta:25°C | 1.2% |
| 6 | RIPPLE & NOISE(Max) | V1: 80mVp-p V2: 120mVp-p | I/P:230VAC O/P:FULL LOAD Ta:25°C | V1: 43mVp-p V2: 69mVp-p |

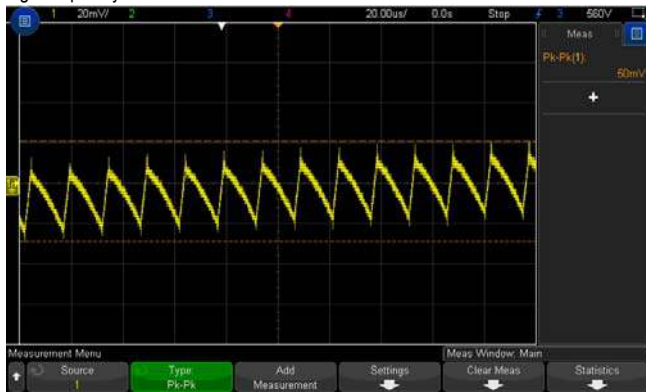
high frequency (V1) :



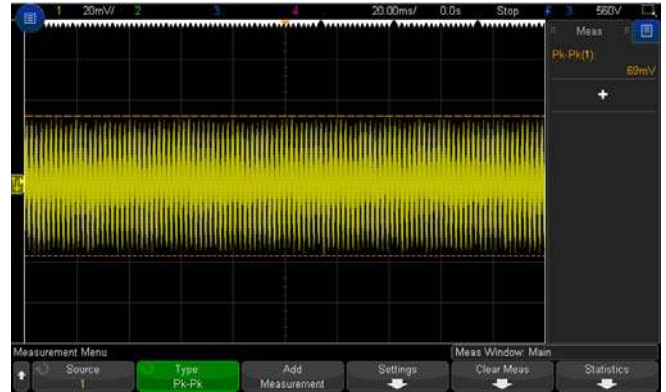
low frequency (V1) :



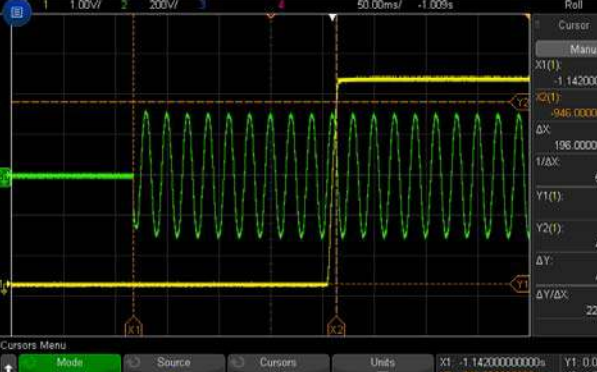
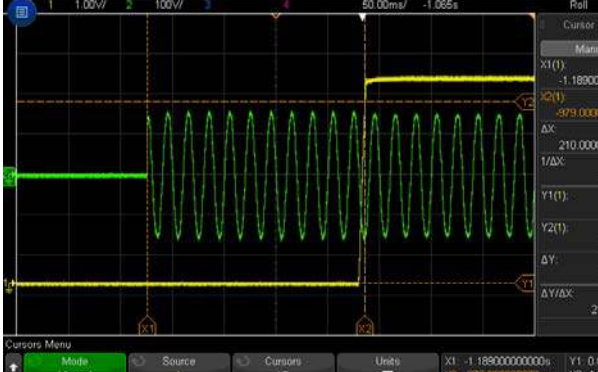




high frequency (V2) :

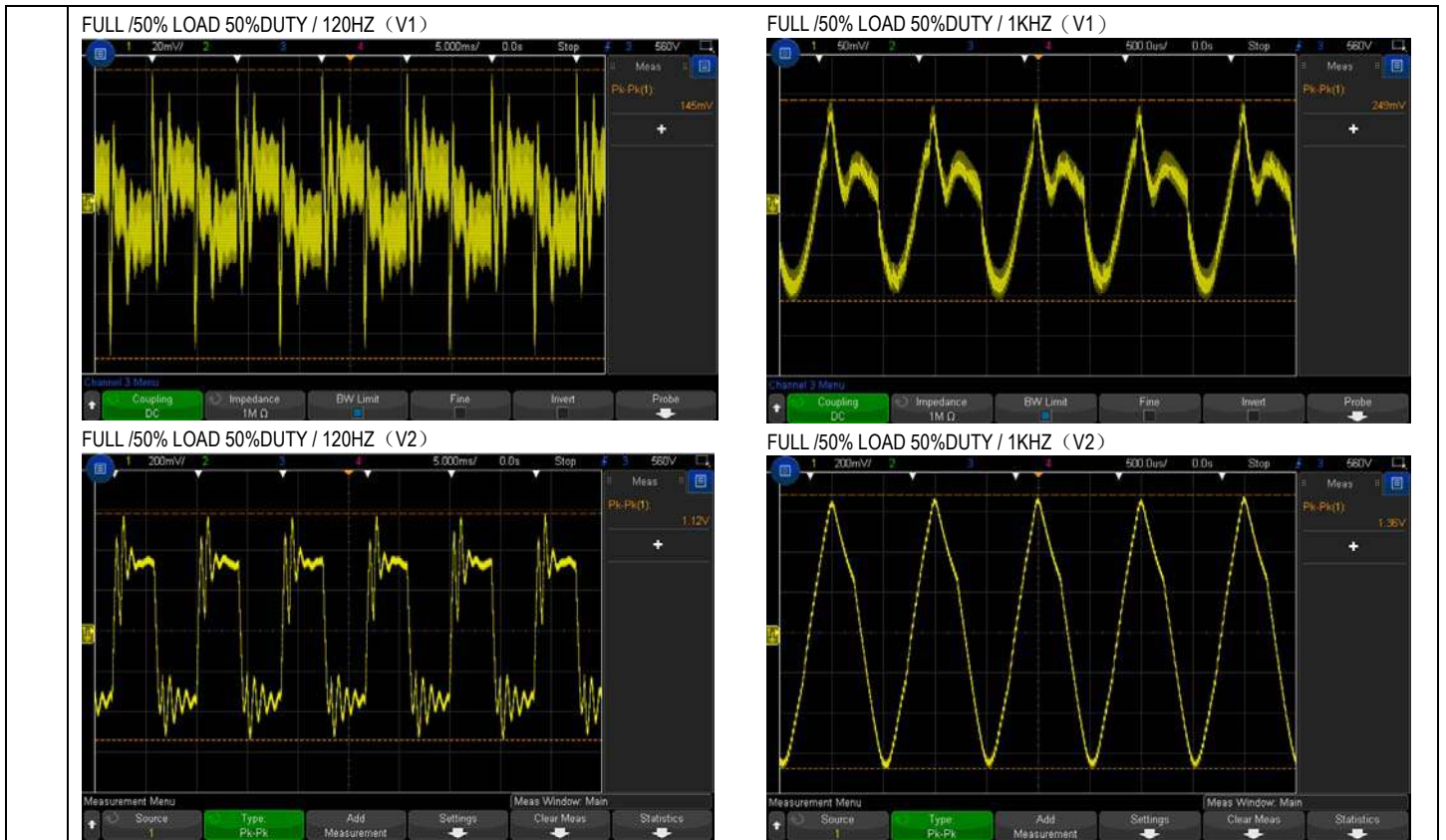


low frequency (V2) :



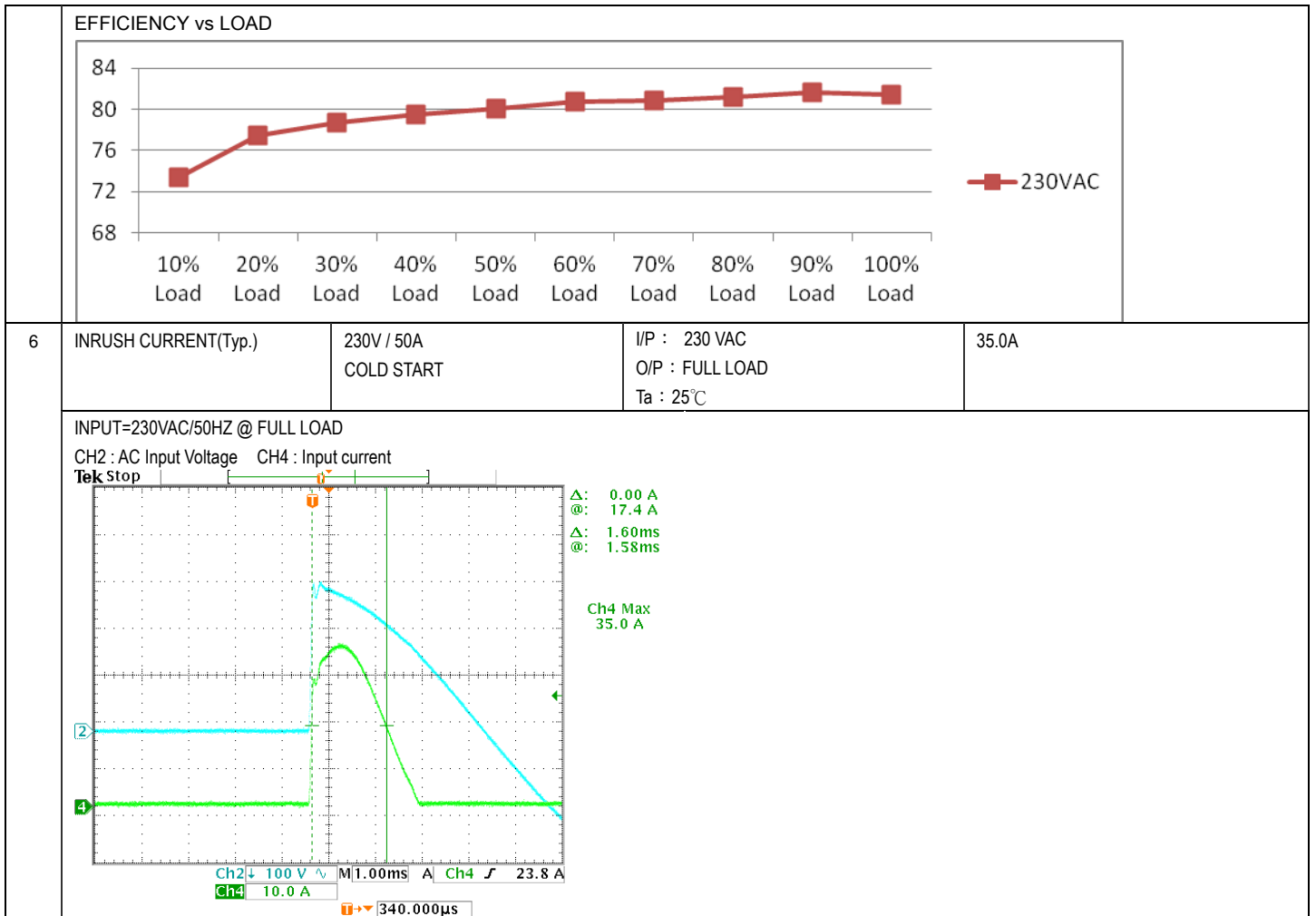
| | | | | |
|---|------------------|-------------------------------|--|--------------------------------|
| 7 | SET UP TIME(Max) | 230VAC/500ms 115VAC/1200ms | I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C | 230VAC/ 196ms 115VAC/ 210ms |
|---|------------------|-------------------------------|--|--------------------------------|

| | | | |
|------------------------------|--|---|---|
| | <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>8 RISE TIME (Max)</p> | <p>230VAC/20ms 115VAC/30ms</p> | <p>I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C</p> | <p>230VAC/ 7.31ms 115VAC/ 5.41ms</p> |
| | <p>INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage</p>  | | <p>INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage</p>  |
| <p>9 HOLD UP TIME (Typ.)</p> | <p>230VAC/100ms 115VAC/18ms</p> | <p>I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C</p> | <p>230VAC/ 119ms 115VAC/19.8ms</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 DYNAMIC LOAD</p> | <p>V1: 1000 mVp-p V2: 2400 mVp-p</p> | <p>I/P: 230VAC O/P: (1)FULL /50% LOAD 50%DUTY / 120HZ (2)FULL /50% LOAD 50%DUTY / 1KHZ Ta:25°C</p> | <p>(1) (2) V1: 145mVp-p 219mVp-p V2: 1120mVp-p 1360mVp-p</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 | 72V~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 =0.80A/ 230VAC I =1.35A/ 115VAC |
| 4 | LEAKAGE CURRENT | <2 mA / 240 VAC | I/P : 240 VAC O/P : Min LOAD Ta : 25°C | 0.8mA |
| 5 | EFFICIENCY(Typ.) | 80% | I/P:230 VAC O/P:FULL LOAD Ta:25°C | 81.4% |



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 | 117.3%/ 264VAC 130.5%/ 230VAC 141.0%/115VAC PROTECTION TYPE : Hiccup mode, recovers automatically after fault condition is removed |
| 2 | OVER VOLTAGE PROTECTION | 5.75V-6.75V | I/P: 264VAC I/P: 230VAC I/P: 88VAC O/P: MIN LOAD Ta: 25°C | 6.32V/ 264VAC 6.32V/ 230VAC 6.32V/ 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 I/P: 88VAC 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 : 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) 554V (2) 755V (3) 530V |
| 2 | O/P Diode | D55 Rated : 200 V D60 Rated : 60 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°C | D55 D60 (1) 167V (1) 33.3V (2) 175V (2) 53.8V (3) 75.5V (3) 22.5V |
| 3 | Input Capacitor Voltage | C5 Rated :150 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°C | (1) 377V (2) 373V (3) 373V (4) 365V |
| 4 | Control IC Voltage Test | U1 Rated : 8.4V~ 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 | (1) 15.6V (2) 12.6V (3) 15.2V (4) 12.8V (5) 12.8V |
| 5 | Clamp Diode Peak Voltage | D1 Rated :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) 566V (2) 514V |

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:3.92mA I/P-FG:2.43mA O/P-FG:1.62mA NO DAMAGE |
| 2 | ISOLATION RESISTANCE | I/P-O/P:500VDC>100M Ω I/P- FG:500VDC>100M Ω O/P- FG:500VDC>100M Ω | I/P-O/P: 600 VDC I/P- FG: 600 VDC Ta:25°C | I/P-O/P: 9999M Ω I/P-FG: 9999M Ω O/P-FG: 9999M Ω NO DAMAGE |
| 3 | GROUNDING CONTINUITY | FG(PE) TO CHASSIS OR TRACE < 100 m Ω | 40 A / 2min Ta: 25°C/70%RH | 10m Ω |

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 : RD-85A 1. ROOM AMBIENT BURN-IN : 1.5 HRS I/P : 230VAC O/P : FULL LOAD Ta= 27.7°C 2. HIGH AMBIENT BURN-IN : 1.5 HRS I/P : 230VAC O/P : FULL LOAD Ta= 41.0°C | | |

| | | NO | Position | ROOM AMBIENT Ta= 27.7 °C | HIGH AMBIENT Ta=41.0 °C |
|---|---|---|----------|---|-------------------------|
| | | 1 | LF1 | 68.2°C | 83.5°C |
| | | 2 | BD1 | 64.6°C | 79.9°C |
| | | 3 | C5 | 51.5°C | 67.3°C |
| | | 4 | C6 | 53.4°C | 68.7°C |
| | | 5 | D1 | 82.3°C | 96.3°C |
| | | 6 | D2 | 89.3°C | 101.7°C |
| | | 7 | D4 | 97.0°C | 109.6°C |
| | | 8 | R55 | 95.6°C | 109.1°C |
| | | 9 | U1 | 91.6°C | 99.6°C |
| | | 10 | Q1 | 85.1°C | 99.9°C |
| | | 11 | C10 | 85.7°C | 98.1°C |
| | | 12 | T1 | 96.9°C | 110.4°C |
| | | 13 | D55 | 102.1°C | 114.8°C |
| | | 14 | D60 | 101.2°C | 114.9°C |
| | | 15 | C56 | 76.4°C | 91.2°C |
| | | 16 | C62 | 74.1°C | 90.0°C |
| | | 17 | L60 | 99.9°C | 101.5°C |
| | | 18 | R2 | 88.1°C | 101.2°C |
| | | 19 | R8 | 74.4°C | 88.3°C |
| | | 20 | R72 | 89.5°C | 104.7°C |
| 2 | OVER LOAD BURN-IN TEST | NO DAMAGE 1 HOUR (MIN) | | I/P : 230 VAC O/P : 113% LOAD Ta : 25°C | TEST : OK |
| 3 | LOW TEMPERATURE TURN ON TEST | TURN ON AFTER 2 HOUR | | I/P : 264VAC/115VAC 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 CONTROL40°C /95 %R.H NO DAMAGE | | I/P : 272 VAC O/P : FULL LOAD Ta=40 °C HUMIDITY= 95 %R.H | TEST : OK |
| 5 | TEMPERATURE COEFFICIENT | ± 0.03%/°C (0~50°C) | | I/P : 230 VAC O/P : FULL LOAD | ± 0.0046%/°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 : -30°C~ +45°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 C56 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=40 °C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta=40 °C LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta= 40 °C LIFE TIME | (1) 150859.6HRS (2) 44541HRS (3) 68309.8 HRS (4) 124411.2HRS |
| 10 | MTBF | Conducted by Parts Stress Analysis Prediction 239.4K 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