



Test Report: RS-25-3.3

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

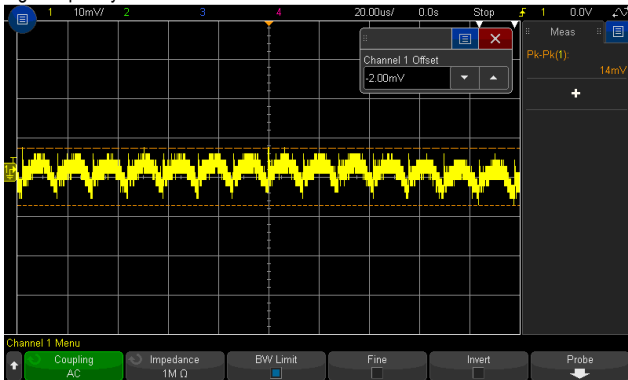
ENVIRONMENT TEST

DESIGN VERIFY TEST

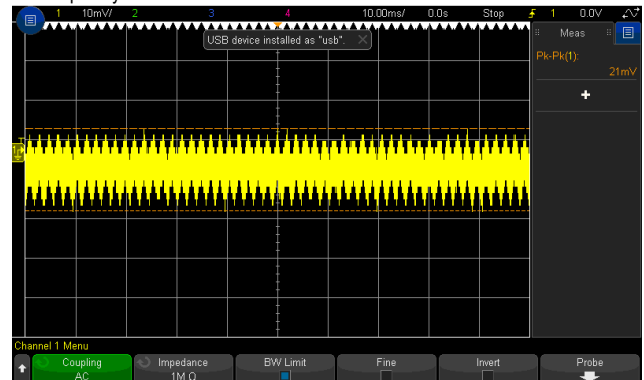
OUTPUT FUNCTION TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT |
|----|-------------------------------|-----------------|--|-------------------|
| 1 | OUTPUT VOLTAGE ADJUST RANGE | CH1: 2.85V~3.6V | I/P : 230 VAC O/P : MIN LOAD Ta : 25°C | 2.72V~3.98V |
| 2 | OUTPUT VOLTAGE(Max) TOLERANCE | V1: -3.0%~3.0% | I/P: 85VAC /264VAC O/P:FULL/ MIN. LOAD Ta:25°C | V1 : -0.6%~0.6% |
| 3 | LINE REGULATION (Max) | V1: -0.5%~0.5% | I/P: 85VAC~ 264VAC O/P:FULL LOAD Ta:25°C | V1 : -0.01%~0.03% |
| 4 | LOAD REGULATION(Max) | V1: -2.0%~2.0% | I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25°C | V1 : -0.6%~0.6% |
| 5 | OVER/UNDERSHOOT TEST | < ±15% | I/P: 230VAC O/P:FULL LOAD Ta:25°C | 1.8% |
| 6 | RIPPLE & NOISE(Max) | V1: 80mVp-p | I/P:230VAC O/P:FULL LOAD Ta:25°C | V1: 21mVp-p |

high frequency (V1) :



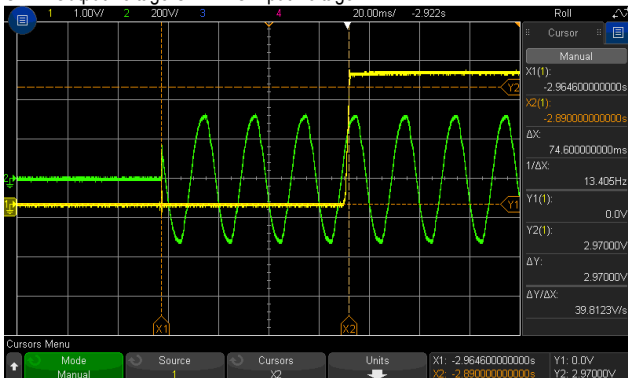
low frequency (V1):



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|---|------------------|--------------------------------|--|----------------------------------|
| 7 | SET UP TIME(Max) | 230VAC/1800ms 115VAC/4000ms | I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C | 230VAC/ 74.6ms 115VAC/ 85.2ms |
|---|------------------|--------------------------------|--|----------------------------------|

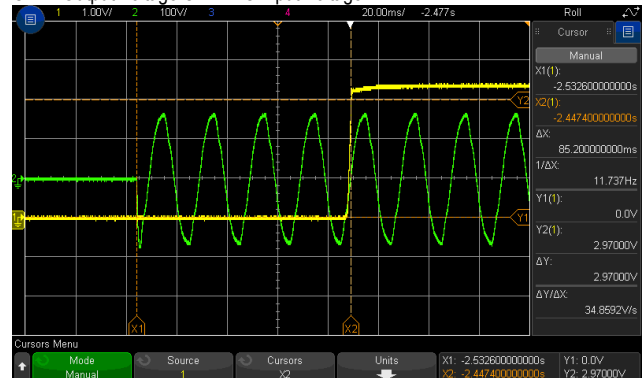
INPUT=230VAC/50HZ @ FULL LOAD

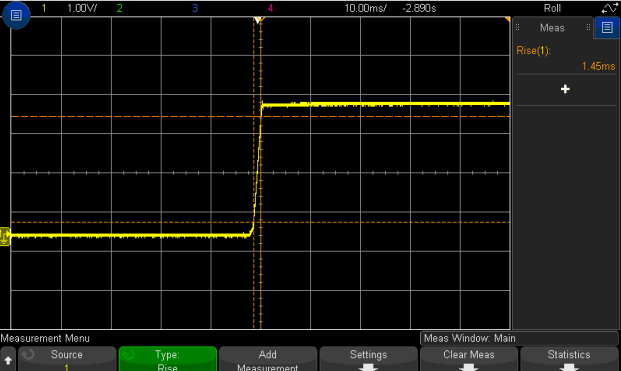
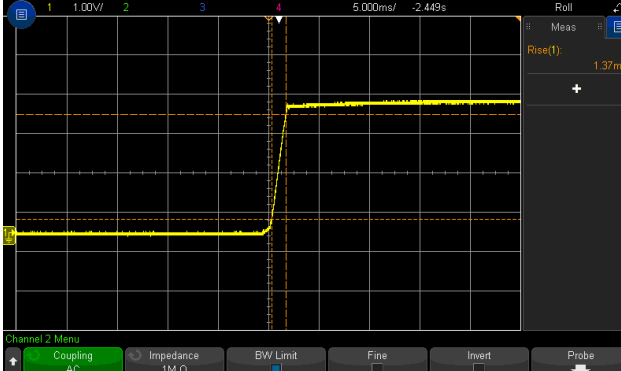
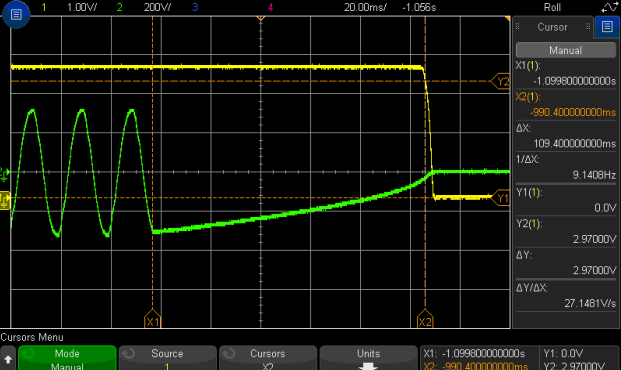
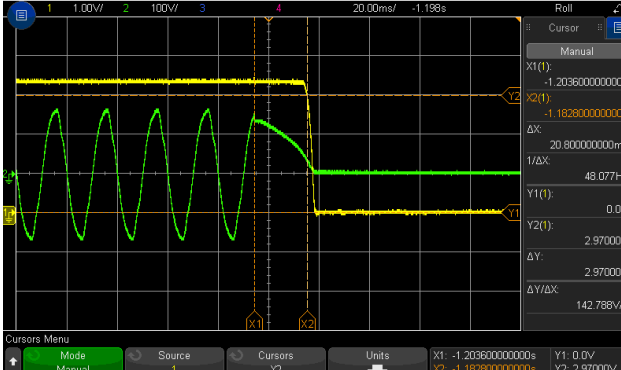
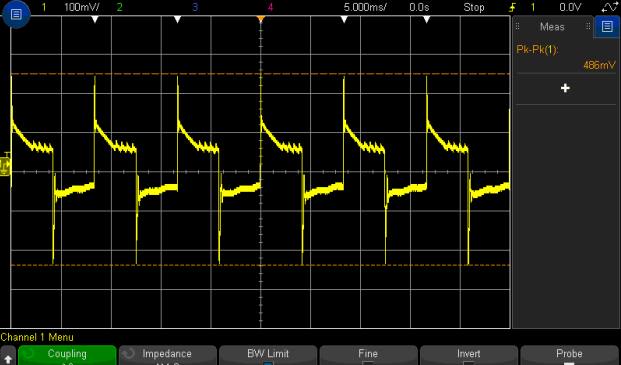
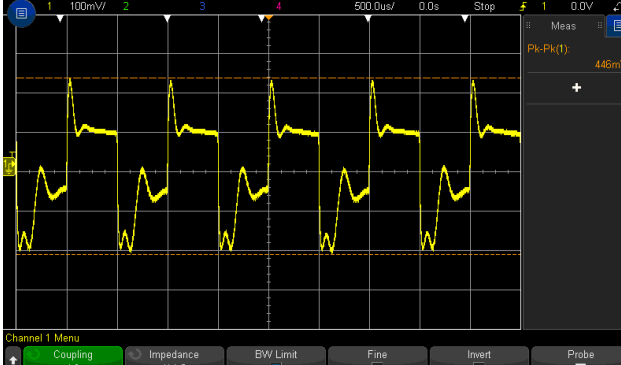
CH1 : Output Voltage CH2 : AC Input Voltage



INPUT=115VAC/60HZ @ FULL LOAD

CH1 : Output Voltage CH2 : AC Input Voltage

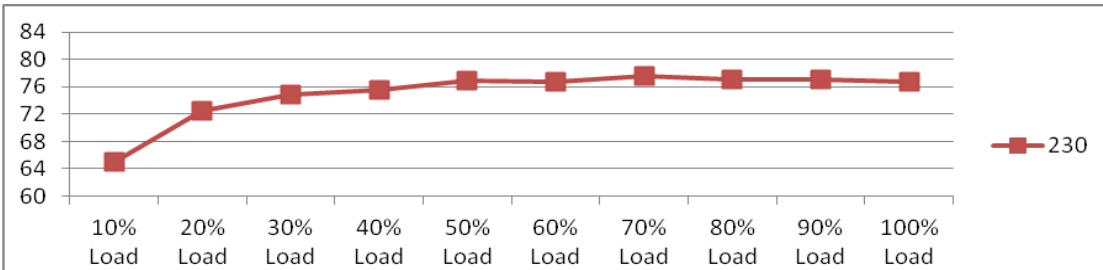


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|--|------------------------------------|---|--|
| <p>8 RISE TIME (Max)</p> | <p>230VAC/23ms 115VAC/30ms</p> | <p>I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C</p> | <p>230VAC/1.45ms 115VAC/1.37 ms</p> |
| <p>INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage</p>  | | <p>INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage</p>  | |
| <p>9 HOLD UP TIME (Typ.)</p> | <p>230VAC/80ms 115VAC/14ms</p> | <p>I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C</p> | <p>230VAC/109.4ms 115VAC/20.8ms</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: 990 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: 486mVp-p 446mVp-p</p> |
| <p>FULL /50% LOAD 50%DUTY / 120HZ (V1)</p>  | | <p>FULL /50% LOAD 50%DUTY / 1KHZ (V1)</p>  | |

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°C | 65VAC~264VAC 125VDC~373VDC |
| | | | I/P: LOW-LINE-3V=85V 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/ 0.4A 115V/0.7A | I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C | I = 0.22A/ 230VAC I = 0.35A/ 115VAC |
| 4 | LEAKAGE CURRENT | <2mA | I/P : 240VAC O/P : Min LOAD Ta : 25°C | 0.22mA |
| 5 | NO LOAD POWER CONSUMPTION | < 0.5W | I/P : 230 VAC O/P : Min LOAD Ta : 25°C | 0.39W |
| 6 | EFFICIENCY(Typ.) | 73.5% | I/P: 230 VAC O/P: FULL LOAD Ta: 25°C | 76.8% |

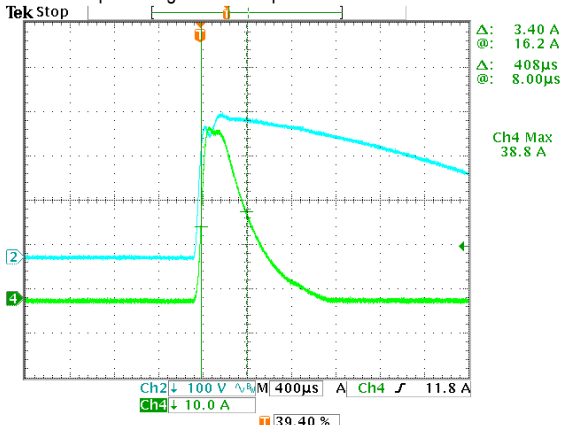
EFFICIENCY vs LOAD



| | | | | |
|---|----------------------|--------------------------|---|-------------------|
| 7 | INRUSH CURRENT(Typ.) | 230V / 45A COLD START | I/P : 230 VAC O/P : FULL LOAD Ta : 25°C | I = 38.8A/ 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°C | 155%/ 264VAC 159%/ 230VAC 143%/88VAC PROTECTION TYPE : Hiccup mode, recovers automatically after fault condition is removed |
| 2 | OVER VOLTAGE PROTECTION | 3.8V~4.45V | I/P: 264VAC I/P: 230VAC I/P: 88VAC O/P: MIN LOAD Ta:25°C | 4.1V/ 264VAC 4.1V/ 230VAC 4.1V/ 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°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 : 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°C | VDS: (1) 576V (2) 580V (3) 576V |
| 2 | O/P Diode | D55 Rated : 40 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 | VDS: (1) 23.8V (2) 20.6V (3) 23.8V |
| 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°C | (1) 383V (2) 375V (3) 379V (4) 375 V |
| 4 | Clamp Diode | D1 Rated : 600 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°C | (1) 391V (2) 391V (3) 391V (4) 391V |

| | | | | |
|---|------------|------------------------|--|--|
| 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°C | (1) 16.9V (2) 12.7V (3) 17.5V (4) 12.9V |
|---|------------|------------------------|--|--|

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:1.47mA I/P-FG:0.88mA O/P-FG:0.69mA 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°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 | 9 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 | <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 checked="" type="checkbox"/> LIGHT INDUSTRY AIR: 8KV / Contact: 4KV <input 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 checked="" type="checkbox"/> LIGHT INDUSTRY INPUT : 1KV <input type="checkbox"/> MEDICAL <input type="checkbox"/> INDUSTRY INPUT : 2KV | I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C | CRITERIA A |
| 6 | SURGE | IEC61000-4-5 <input type="checkbox"/> LIGHT INDUSTRY L-N : 1KV L/N-PE : 2KV | 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-25-5 1. ROOM AMBIENT BURN-IN : 1.5 HRS I/P : 230VAC O/P : FULL LOAD Ta= 22.5 °C 2. HIGH AMBIENT BURN-IN : 1.5 HRS I/P : 230VAC O/P : FULL LOAD Ta= 48.6 °C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | <table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta= 25.3 °C</th> <th>HIGH AMBIENT Ta= 45.3 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>LF1</td><td>56.1 °C</td><td>80.7 °C</td></tr> <tr><td>2</td><td>T1</td><td>65.3 °C</td><td>89.8 °C</td></tr> <tr><td>3</td><td>Q1</td><td>65.2 °C</td><td>90.5 °C</td></tr> <tr><td>4</td><td>L51</td><td>64.0 °C</td><td>89.3 °C</td></tr> <tr><td>5</td><td>D55</td><td>93.9 °C</td><td>117.1 °C</td></tr> <tr><td>6</td><td>C5</td><td>47.4 °C</td><td>73.1 °C</td></tr> <tr><td>7</td><td>R8</td><td>68.1 °C</td><td>93.3 °C</td></tr> <tr><td>8</td><td>C56</td><td>74.1 °C</td><td>88.5 °C</td></tr> <tr><td>9</td><td>BD1</td><td>55.3 °C</td><td>80.5 °C</td></tr> <tr><td>10</td><td>U1</td><td>53.6 °C</td><td>78.9 °C</td></tr> <tr><td>11</td><td>D1</td><td>69.5 °C</td><td>94.2 °C</td></tr> <tr><td>12</td><td>ZD1</td><td>91.3 °C</td><td>113.8 °C</td></tr> </tbody> </table> | NO | Position | ROOM AMBIENT Ta= 25.3 °C | HIGH AMBIENT Ta= 45.3 °C | 1 | LF1 | 56.1 °C | 80.7 °C | 2 | T1 | 65.3 °C | 89.8 °C | 3 | Q1 | 65.2 °C | 90.5 °C | 4 | L51 | 64.0 °C | 89.3 °C | 5 | D55 | 93.9 °C | 117.1 °C | 6 | C5 | 47.4 °C | 73.1 °C | 7 | R8 | 68.1 °C | 93.3 °C | 8 | C56 | 74.1 °C | 88.5 °C | 9 | BD1 | 55.3 °C | 80.5 °C | 10 | U1 | 53.6 °C | 78.9 °C | 11 | D1 | 69.5 °C | 94.2 °C | 12 | ZD1 | 91.3 °C | 113.8 °C |
| NO | Position | ROOM AMBIENT Ta= 25.3 °C | HIGH AMBIENT Ta= 45.3 °C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | LF1 | 56.1 °C | 80.7 °C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | T1 | 65.3 °C | 89.8 °C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | Q1 | 65.2 °C | 90.5 °C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | L51 | 64.0 °C | 89.3 °C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | D55 | 93.9 °C | 117.1 °C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | C5 | 47.4 °C | 73.1 °C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | R8 | 68.1 °C | 93.3 °C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | C56 | 74.1 °C | 88.5 °C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | BD1 | 55.3 °C | 80.5 °C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | U1 | 53.6 °C | 78.9 °C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | D1 | 69.5 °C | 94.2 °C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12 | ZD1 | 91.3 °C | 113.8 °C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | OVER LOAD BURN-IN TEST | NO DAMAGE 1 HOUR (MIN) | I/P : 230 VAC O/P : 147% 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= -25 °C | TEST : OK | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST | AFTER 12 HOURS IN CHAMBER ON CONTROL 50°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 | ± 0.0030 %/°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 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



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|----|--------------------------|---|--|
| 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=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) 42066.4 HRS (2) 16732.7 HRS (3) 47284.3 HRS (4) 83863.3 HRS |
| 10 | MTBF | Conducted by Parts Stress Analysis Prediction 309.7K 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