



# Test Report: HVGC-150-700

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150W Single Output LED 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  | RIPPLE & NOISE              | V1 : 1 Vp-p (Max)                                                        | I/P : 347VAC<br>O/P : FULL LOAD<br>Ta : 25°C                                    | V1 : 249 mVp-p (Max)                                       |
| 2  | CURRENT ACCURACY            | ± 5%                                                                     | I/P : 347VAC<br>O/P : LED MODE : 21V~215V<br>Ta : 25°C                          | -0.17 %~ 0.02 %                                            |
| 3  | OUTPUT VOLTAGE RANGE        | 21V ~ 215V                                                               | I/P : 347 VAC<br>O/P : FULL LOAD<br>Ta : 25°C                                   | O/P=21V : 0.702A<br>O/P=214V : 0.702A                      |
| 4  | OUTPUT CURRENT ADJUST RANGE | CH1 : 420mA~700m A                                                       | I/P : 480 VAC<br>I/P : 347 VAC<br>O/P : LED : 214V<br>Ta : 25°C                 | 0.3734 A~ 0.7681 A/ 480 VAC<br>0.3736 A~ 0.7698 A/ 347 VAC |
| 5  | SET UP TIME                 | 480 VAC : 400 ms (Max)<br>347VAC : 400 ms(Max)<br>230VAC : 500 ms(Max)   | I/P : 480 VAC<br>I/P : 347 VAC<br>I/P : 230 VAC<br>O/P : FULL LOAD<br>Ta : 25°C | 480 VAC/ 199 ms<br>347VAC/ 278 ms<br>230VAC/ 358 ms        |
| 6  | RISE TIME                   | 480 VAC : 150 ms (Max)<br>347VAC : 150 ms (Max)<br>230VAC : 150 ms (Max) | I/P : 440 VAC<br>I/P : 347 VAC<br>I/P : 230 VAC<br>O/P : FULL LOAD<br>Ta : 25°C | 480 VAC/ 15 ms<br>347VAC/ 31 ms<br>230VAC/ 31 ms           |
| 7  | HOLD UP TIME                | 480 VAC : 18 ms (TYP)<br>347VAC : 18 ms (TYP)                            | I/P : 480 VAC<br>I/P : 347 VAC<br>O/P : FULL LOAD<br>Ta : 25°C                  | 480 VAC/ 42 ms<br>347VAC/ 28 ms                            |
| 8  | OVER/UNDERSHOOT TEST        | < ±5%                                                                    | I/P : 347 VAC<br>O/P : FULL LOAD<br>Ta : 25°C                                   | TEST : <5 %                                                |

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### DIMMER TEST

(B Type only)

SPEC:

※Built-in 3 in 1 dimming function, IP67 rated. Output constant current level can be adjusted through output cable by connecting a resistance or

0 ~ 10Vdc or 10V PWM signal between DIM+ and DIM-.

※Please DO NOT connect "DIM-" to "-V".

※Reference resistance value for output current adjustment (Typical)

| Resistance value | Short | 10K | 20K | 30K | 40K | 50K | 60K | 70K | 80K | 90K | 100K | Open     |
|------------------|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|----------|
| Output current   | 0%    | 10% | 20% | 30% | 40% | 50% | 60% | 70% | 80% | 90% | 100% | 95%~108% |

\*1 ~ 10V dimming function for output current adjustment (Typical)

| Dimming value  | 0V | 1V  | 2V  | 3V  | 4V  | 5V  | 6V  | 7V  | 8V  | 9V  | 10V  | Open     |
|----------------|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|----------|
| Output current | 0% | 10% | 20% | 30% | 40% | 50% | 60% | 70% | 80% | 90% | 100% | 95%~108% |

\*10V PWM signal for output current adjustment (Typical)

| Duty value     | 0% | 10% | 20% | 30% | 40% | 50% | 60% | 70% | 80% | 90% | 100% | Open     |
|----------------|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|----------|
| Output current | 0% | 10% | 20% | 30% | 40% | 50% | 60% | 70% | 80% | 90% | 100% | 95%~108% |

TEST RESULT: I/P : 230 VAC ;Ta : 25℃

|   |                  |        |        |        |        |        |        |        |        |        |        |         |         |
|---|------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|---------|
| 1 | Resistance value | SHORT  | 10K    | 20K    | 30K    | 40K    | 50K    | 60K    | 70K    | 80K    | 90K    | 100K    | OPEN    |
|   | Output current   | 0.000A | 0.079A | 0.146A | 0.222A | 0.287A | 0.361A | 0.426A | 0.490A | 0.552A | 0.632A | 0.700A  | 0.7205A |
|   | %                | 0.00%  | 11.34% | 20.91% | 31.67% | 40.94% | 51.53% | 60.86% | 70.01% | 78.87% | 90.34% | 100.04% | 102.92% |
| 2 | Dimming value    | SHORT  | 1V     | 2V     | 3V     | 4V     | 5V     | 6V     | 7V     | 8V     | 9V     | 10V     | OPEN    |
|   | Output current   | 0.000A | 0.084A | 0.158A | 0.221A | 0.291A | 0.360A | 0.424A | 0.500A | 0.562A | 0.634A | 0.704A  | 0.7205A |
|   | %                | 0.00%  | 11.94% | 22.50% | 31.50% | 41.50% | 51.36% | 60.56% | 71.39% | 80.31% | 90.59% | 100.60% | 102.92% |
| 3 | Duty value       | SHORT  | 10%    | 20%    | 30%    | 40%    | 50%    | 60%    | 70%    | 80%    | 90%    | 100%    | OPEN    |
|   | Output current   | 0.000A | 0.081A | 0.150A | 0.220A | 0.289A | 0.358A | 0.428A | 0.497A | 0.566A | 0.636A | 0.706A  | 0.7205A |
|   | %                | 0.00%  | 11.57% | 21.46% | 31.37% | 41.27% | 51.17% | 61.10% | 70.97% | 80.91% | 90.86% | 100.83% | 102.92% |

## INPUT FUNCTION TEST

| NO | TEST ITEM                 | SPECIFICATION                                                                                                     | TEST CONDITION                                                                                                                               | RESULT                                                                                     |
|----|---------------------------|-------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|
| 1  | INPUT VOLTAGE RANGE       | 180VAC~528VAC                                                                                                     | I/P : TESTING<br>O/P : FULL LOAD<br>Ta : 25°C                                                                                                | 165 V~528V                                                                                 |
|    |                           |                                                                                                                   | I/P :<br>LOW-LINE-3V=177V<br>HIGH-LINE+10V=538 V<br>O/P : FULL/MIN LOAD<br>ON : 30 Sec . OFF : 30 Sec 10MIN<br>( AC POWER ON/OFF NO DAMAGE ) | TEST : OK                                                                                  |
| 2  | INPUT FREQUENCY RANGE     | 47HZ ~63 HZ<br>NO DAMAGE                                                                                          | I/P : 180VAC ~ 528 VAC<br>O/P : FULL~MIN LOAD<br>Ta : 25°C                                                                                   | TEST : OK                                                                                  |
| 3  | POWER FACTOR              | 0.98 / 230 VAC(TYP)<br>0.97 / 277VAC(TYP)<br>0.95 /347 VAC(TYP)<br>0.93 / 480VAC(TYP)                             | I/P : 230VAC<br>I/P : 277VAC<br>I/P : 347VAC<br>I/P : 480VAC<br>O/P : FULL LOAD<br>Ta : 25°C                                                 | PF= 0.9951 / 230 VAC<br>PF= 0.9939 / 277 VAC<br>PF= 0.9858 / 347VAC<br>PF= 0.9590 / 480VAC |
| 4  | EFFICIENCY                | 91 % (TYP)                                                                                                        | I/P : 347 VAC<br>O/P : FULL LOAD<br>Ta : 25°C                                                                                                | 92.109 %                                                                                   |
| 5  | INPUT CURRENT             | 347V/ 0.5 A (TYP)<br>480V/ 0.38 A (TYP)                                                                           | I/P : 347 VAC<br>I/P : 480 VAC<br>O/P : FULL LOAD<br>Ta : 25°C                                                                               | I = 0.4839 A/ 347 VAC<br>I = 0.3609 A/ 480 VAC                                             |
| 6  | INRUSH CURRENT            | 480V/ 35 A (TYP)<br>(twidth=790us measured at 50% Ipeak)<br>COLD START                                            | I/P : 480VAC<br>O/P : FULL LOAD<br>Ta : 25°C                                                                                                 | I = 28 A/ 480VAC<br>T50= 780 us                                                            |
| 7  | LEAKAGE CURRENT           | < 0.75 mA / 480 VAC                                                                                               | I/P : 480 VAC<br>O/P : Min LOAD<br>Ta : 25°C                                                                                                 | L-FG : 0.34 mA<br>N-FG : 0.34 mA                                                           |
| 8  | TOTAL HARMONIC DISTORTION | Total harmonic distortion will be lower than 20% when output loading is 50% or higher at 230VAC / 277VAC / 347VAC | I/P : 230VAC<br>I/P : 277VAC<br>I/P : 347VAC<br>O/P : 50% LOAD<br>Ta : 25°C                                                                  | THD : 14.5<br>THD : 16.3<br>THD : 18.5                                                     |
|    |                           | Total harmonic distortion will be lower than 20% when output loading is 75% or higher at 480VAC                   | I/P : 480VAC<br>O/P : 75% LOAD<br>Ta : 25°C                                                                                                  | THD : 15.66                                                                                |

## PROTECTION FUNCTION TEST

| NO | TEST ITEM                   | SPECIFICATION                          | TEST CONDITION                                                | RESULT                                                                                                     |
|----|-----------------------------|----------------------------------------|---------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
| 1  | OVER VOLTAGE PROTECTION     | CH1 : 226 V ~ 247 V                    | I/P : 480 VAC<br>I/P : 347 VAC<br>O/P : MIN LOAD<br>Ta : 25°C | 232.86V/ 480VAC<br>233.98V/ 347 VAC<br>Shut down o/p voltage with auto-recovery or re-power on to recovery |
| 2  | OVER TEMPERATURE PROTECTION | SPEC :<br>NO DAMAGE                    | I/P : 347 VAC<br>O/P : FULL LOAD                              | O.T.P. Active<br><br>Shut down o/p voltage, recovers automatically after temperature goes down             |
| 3  | SHORT PROTECTION            | SHORT EVERY OUTPUT<br>1 HOUR NO DAMAGE | I/P : 528VAC<br>O/P : FULL LOAD<br>Ta : 25°C                  | NO DAMAGE<br>Constant current limiting, recovers automatically after fault condition is removed            |

## COMPONENT STRESS TEST

| NO | TEST ITEM                                              | SPECIFICATION                                    | TEST CONDITION                                                                                                                                                                                                                   | RESULT                                                                       |
|----|--------------------------------------------------------|--------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|
| 1  | Power Transistor<br>( D to S) or (C to E) Peak Voltage | Q3 Rated : 7A/950V                               | I/P : High-Line +3V = 531 V<br>O/P : (1)Full Load Turn on<br>(2) Output Short<br>(3)Full load continue<br>Ta : 25°C                                                                                                              | (1) 752 V<br>(2) 764 V<br>(3) 700 V                                          |
| 2  | Diode Peak Voltage                                     | D100 Rated : 3A/1KV                              | I/P : High-Line +3V = 531 V<br>O/P : (1)Full Load Turn on<br>(2)Output Short<br>(3)Full load continue<br>Ta : 25°C                                                                                                               | (1) 610 V<br>(2) 602 V<br>(3) 558 V                                          |
| 3  | Input Capacitor Voltage                                | C5 Rated : 22u/450V                              | I/P : High-Line +3V = 531 V<br>O/P : (1)Full Load Turn on /Off<br>(2) Min load Turn on /Off<br>(3)Full Load /Min load<br>Change<br>Ta : 25°C                                                                                     | (1) 412 V<br>(2) 412 V<br>(3) 432 V                                          |
| 4  | Control IC Voltage Test                                | U1 Rated : 10.3V~22.5V<br><br>U2 Rated : 11V~28V | I/P : High-Line +3V = 531 V<br>O/P : (1)Full Load Turn on /Off<br>(2) Min load Turn on /Off<br>(3)Full Load /Min load<br>Change<br>(1)Full Load Turn on /Off<br>(2) Min load Turn on /Off<br>(3)Full Load /Min load<br>Ta : 25°C | (1) 18 V<br>(2) 18.2 V<br>(3) 18.4 V<br><br>(4) 16.9<br>(5) 16.7<br>(6) 16.9 |
| 5  | Power Transistor<br>( D to S) or (C to E) Peak Voltage | Q1 Rated : 7A/950V                               | I/P : High-Line +3V = 531 V<br>O/P : (1)Full Load Turn on<br>(2) Output Short<br>(3)Full load continue<br>Ta : 25°C                                                                                                              | (1) 896 V<br>(2) 832 V<br>(3) 892 V                                          |

## SAFETY & E.M.C. TEST

### SAFETY TEST

| NO | TEST ITEM            | SPECIFICATION                                                            | TEST CONDITION                                                                      | RESULT                                                                  |
|----|----------------------|--------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------|
| 1  | WITHSTAND VOLTAGE    | I/P-O/P : 3.75 KVAC/min<br>I/P-FG : 2 KVAC/min<br>O/P-FG : 1.5 KVAC/min  | I/P-O/P : 4 KVAC/min<br>I/P-FG : 2.4 KVAC/min<br>O/P-FG : 1.8 KVAC/min<br>Ta : 25°C | I/P-O/P : 3.74 mA<br>I/P-FG : 2.612 mA<br>O/P-FG : 3.65 mA<br>NO DAMAGE |
| 2  | ISOLATION RESISTANCE | I/P-O/P : 500VDC>100MΩ<br>I/P-FG : 500VDC>100MΩ<br>O/P-FG : 500VDC>100MΩ | I/P-O/P : 500 VDC<br>I/P-FG : 500 VDC<br>O/P-FG : 500 VDC<br>Ta : 25°C /70%RH       | I/P-O/P : 30 GΩ<br>I/P-FG : 30 GΩ<br>O/P-FG : 30 GΩ<br>NO DAMAGE        |
| 3  | GROUNDING CONTINUITY | FG(PE) TO CHASSIS<br>OR TRACE < 100 mΩ                                   | 40 A / 2min<br>Ta : 25°C / 70%RH                                                    | 19 mΩ                                                                   |

### E.M.C TEST

| NO | TEST ITEM  | SPECIFICATION                                          | TEST CONDITION                                                                             | RESULT                        |
|----|------------|--------------------------------------------------------|--------------------------------------------------------------------------------------------|-------------------------------|
| 1  | HARMONIC   | EN61000-3-2<br>CLASS A<br>CLASS C                      | I/P:230/347VAC/60HZ<br>O/P:100/75/50/25%ELECTRONIC<br>LOAD<br>O/P:100% LED LOAD<br>Ta:25°C | PASS                          |
| 2  | CONDUCTION | EN55015<br>CLASS B                                     | I/P: 230/347VAC (50HZ)<br>O/P:FULL/50% LOAD<br>Ta:25°C                                     | PASS<br>Test by certified Lab |
| 3  | RADIATION  | EN55015<br>CLASS B                                     | I/P: 230/347 VAC (50HZ)<br>O/P:FULL LOAD<br>Ta:25°C                                        | PASS<br>Test by certified Lab |
| 4  | E.S.D      | EN61000-4-2<br>LIGHT INDUSTRY<br>AIR:8KV / Contact:4KV | I/P:230/347 VAC/50HZ<br>O/P:FULL LOAD<br>Ta:25°C                                           | CRITERIA A                    |
| 5  | E.F.T      | EN61000-4-4<br>LIGHT INDUSTRY<br>INPUT : 1KV           | I/P: 230/347 VAC/50HZ<br>O/P:FULL LOAD<br>Ta:25°C                                          | CRITERIA A                    |
| 6  | SURGE      | IEC61000-4-5<br>INDUSTRY<br>L-N :2KV<br>L,N-PE:4KV     | I/P: 230/347 VAC/50HZ<br>O/P:FULL LOAD<br>Ta:25°C                                          | CRITERIA A                    |

## RELIABILITY TEST

### ENVIRONMENT TEST

| NO | TEST ITEM                                                         | SPECIFICATION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | TEST CONDITION                                                     | RESULT            |    |          |                             |                            |   |     |        |        |   |     |        |        |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |    |    |        |        |    |    |        |        |    |     |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |       |        |        |    |    |        |        |
|----|-------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|-------------------|----|----------|-----------------------------|----------------------------|---|-----|--------|--------|---|-----|--------|--------|---|-----|--------|--------|---|-----|--------|--------|---|----|--------|--------|---|----|--------|--------|---|----|--------|--------|---|----|--------|--------|---|-----|--------|--------|----|----|--------|--------|----|----|--------|--------|----|-----|--------|--------|----|-----|--------|--------|----|------|--------|--------|----|------|--------|--------|----|------|--------|--------|----|------|--------|--------|----|------|--------|--------|----|-------|--------|--------|----|----|--------|--------|
| 1  | TEMPERATURE RISE TEST                                             | <div>MODEL : HVGC-150-350</div> <div>1. ROOM AMBIENT BURN-IN : 12 HRS</div> <div>I/P : 347VAC O/P : FULL LOAD Ta=26.2 °C</div> <div>2. HIGH AMBIENT BURN-IN : 1 HRS</div> <div>I/P : 347VAC O/P : FULL LOAD Ta=57.8 °C</div> <table><thead><tr><th>NO</th><th>Position</th><th>ROOM AMBIENT<br/>Ta= 26.2 °C</th><th>HIGH AMBIENT<br/>Ta=57.8 °C</th></tr></thead><tbody><tr><td>1</td><td>C46</td><td>50.4°C</td><td>80.4°C</td></tr><tr><td>2</td><td>LF2</td><td>48.8°C</td><td>79.1°C</td></tr><tr><td>3</td><td>BD1</td><td>53.3°C</td><td>83.3°C</td></tr><tr><td>4</td><td>C48</td><td>52.2°C</td><td>82.2°C</td></tr><tr><td>5</td><td>L2</td><td>57.8°C</td><td>87.8°C</td></tr><tr><td>6</td><td>Q1</td><td>57.0°C</td><td>87.8°C</td></tr><tr><td>7</td><td>C5</td><td>60.5°C</td><td>88.3°C</td></tr><tr><td>8</td><td>T1</td><td>66.4°C</td><td>94.7°C</td></tr><tr><td>9</td><td>C15</td><td>54.7°C</td><td>84.6°C</td></tr><tr><td>10</td><td>T3</td><td>59.6°C</td><td>88.4°C</td></tr><tr><td>11</td><td>Q3</td><td>59.2°C</td><td>88.2°C</td></tr><tr><td>12</td><td>D19</td><td>63.2°C</td><td>91.4°C</td></tr><tr><td>13</td><td>C62</td><td>54.3°C</td><td>83.6°C</td></tr><tr><td>14</td><td>RTH2</td><td>53.9°C</td><td>83.2°C</td></tr><tr><td>15</td><td>D100</td><td>56.1°C</td><td>86.6°C</td></tr><tr><td>16</td><td>C203</td><td>55.7°C</td><td>84.8°C</td></tr><tr><td>17</td><td>C104</td><td>51.5°C</td><td>81.1°C</td></tr><tr><td>18</td><td>C106</td><td>49.0°C</td><td>78.9°C</td></tr><tr><td>19</td><td>LF100</td><td>49.7°C</td><td>79.6°C</td></tr><tr><td>20</td><td>U1</td><td>56.1°C</td><td>85.5°C</td></tr></tbody></table> |                                                                    |                   | NO | Position | ROOM AMBIENT<br>Ta= 26.2 °C | HIGH AMBIENT<br>Ta=57.8 °C | 1 | C46 | 50.4°C | 80.4°C | 2 | LF2 | 48.8°C | 79.1°C | 3 | BD1 | 53.3°C | 83.3°C | 4 | C48 | 52.2°C | 82.2°C | 5 | L2 | 57.8°C | 87.8°C | 6 | Q1 | 57.0°C | 87.8°C | 7 | C5 | 60.5°C | 88.3°C | 8 | T1 | 66.4°C | 94.7°C | 9 | C15 | 54.7°C | 84.6°C | 10 | T3 | 59.6°C | 88.4°C | 11 | Q3 | 59.2°C | 88.2°C | 12 | D19 | 63.2°C | 91.4°C | 13 | C62 | 54.3°C | 83.6°C | 14 | RTH2 | 53.9°C | 83.2°C | 15 | D100 | 56.1°C | 86.6°C | 16 | C203 | 55.7°C | 84.8°C | 17 | C104 | 51.5°C | 81.1°C | 18 | C106 | 49.0°C | 78.9°C | 19 | LF100 | 49.7°C | 79.6°C | 20 | U1 | 56.1°C | 85.5°C |
| NO | Position                                                          | ROOM AMBIENT<br>Ta= 26.2 °C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | HIGH AMBIENT<br>Ta=57.8 °C                                         |                   |    |          |                             |                            |   |     |        |        |   |     |        |        |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |    |    |        |        |    |    |        |        |    |     |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |       |        |        |    |    |        |        |
| 1  | C46                                                               | 50.4°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 80.4°C                                                             |                   |    |          |                             |                            |   |     |        |        |   |     |        |        |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |    |    |        |        |    |    |        |        |    |     |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |       |        |        |    |    |        |        |
| 2  | LF2                                                               | 48.8°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 79.1°C                                                             |                   |    |          |                             |                            |   |     |        |        |   |     |        |        |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |    |    |        |        |    |    |        |        |    |     |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |       |        |        |    |    |        |        |
| 3  | BD1                                                               | 53.3°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 83.3°C                                                             |                   |    |          |                             |                            |   |     |        |        |   |     |        |        |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |    |    |        |        |    |    |        |        |    |     |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |       |        |        |    |    |        |        |
| 4  | C48                                                               | 52.2°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 82.2°C                                                             |                   |    |          |                             |                            |   |     |        |        |   |     |        |        |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |    |    |        |        |    |    |        |        |    |     |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |       |        |        |    |    |        |        |
| 5  | L2                                                                | 57.8°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 87.8°C                                                             |                   |    |          |                             |                            |   |     |        |        |   |     |        |        |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |    |    |        |        |    |    |        |        |    |     |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |       |        |        |    |    |        |        |
| 6  | Q1                                                                | 57.0°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 87.8°C                                                             |                   |    |          |                             |                            |   |     |        |        |   |     |        |        |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |    |    |        |        |    |    |        |        |    |     |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |       |        |        |    |    |        |        |
| 7  | C5                                                                | 60.5°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 88.3°C                                                             |                   |    |          |                             |                            |   |     |        |        |   |     |        |        |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |    |    |        |        |    |    |        |        |    |     |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |       |        |        |    |    |        |        |
| 8  | T1                                                                | 66.4°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 94.7°C                                                             |                   |    |          |                             |                            |   |     |        |        |   |     |        |        |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |    |    |        |        |    |    |        |        |    |     |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |       |        |        |    |    |        |        |
| 9  | C15                                                               | 54.7°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 84.6°C                                                             |                   |    |          |                             |                            |   |     |        |        |   |     |        |        |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |    |    |        |        |    |    |        |        |    |     |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |       |        |        |    |    |        |        |
| 10 | T3                                                                | 59.6°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 88.4°C                                                             |                   |    |          |                             |                            |   |     |        |        |   |     |        |        |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |    |    |        |        |    |    |        |        |    |     |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |       |        |        |    |    |        |        |
| 11 | Q3                                                                | 59.2°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 88.2°C                                                             |                   |    |          |                             |                            |   |     |        |        |   |     |        |        |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |    |    |        |        |    |    |        |        |    |     |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |       |        |        |    |    |        |        |
| 12 | D19                                                               | 63.2°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 91.4°C                                                             |                   |    |          |                             |                            |   |     |        |        |   |     |        |        |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |    |    |        |        |    |    |        |        |    |     |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |       |        |        |    |    |        |        |
| 13 | C62                                                               | 54.3°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 83.6°C                                                             |                   |    |          |                             |                            |   |     |        |        |   |     |        |        |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |    |    |        |        |    |    |        |        |    |     |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |       |        |        |    |    |        |        |
| 14 | RTH2                                                              | 53.9°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 83.2°C                                                             |                   |    |          |                             |                            |   |     |        |        |   |     |        |        |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |    |    |        |        |    |    |        |        |    |     |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |       |        |        |    |    |        |        |
| 15 | D100                                                              | 56.1°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 86.6°C                                                             |                   |    |          |                             |                            |   |     |        |        |   |     |        |        |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |    |    |        |        |    |    |        |        |    |     |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |       |        |        |    |    |        |        |
| 16 | C203                                                              | 55.7°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 84.8°C                                                             |                   |    |          |                             |                            |   |     |        |        |   |     |        |        |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |    |    |        |        |    |    |        |        |    |     |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |       |        |        |    |    |        |        |
| 17 | C104                                                              | 51.5°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 81.1°C                                                             |                   |    |          |                             |                            |   |     |        |        |   |     |        |        |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |    |    |        |        |    |    |        |        |    |     |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |       |        |        |    |    |        |        |
| 18 | C106                                                              | 49.0°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 78.9°C                                                             |                   |    |          |                             |                            |   |     |        |        |   |     |        |        |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |    |    |        |        |    |    |        |        |    |     |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |       |        |        |    |    |        |        |
| 19 | LF100                                                             | 49.7°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 79.6°C                                                             |                   |    |          |                             |                            |   |     |        |        |   |     |        |        |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |    |    |        |        |    |    |        |        |    |     |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |       |        |        |    |    |        |        |
| 20 | U1                                                                | 56.1°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 85.5°C                                                             |                   |    |          |                             |                            |   |     |        |        |   |     |        |        |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |    |    |        |        |    |    |        |        |    |     |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |       |        |        |    |    |        |        |
| 2  | LOW TEMPERATURE<br>TURN ON TEST                                   | TURN ON AFTER 2 HOUR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | I/P : 528VAC/200VAC<br>O/P : 100 % LOAD<br>Ta= -45 °C              | TEST : OK         |    |          |                             |                            |   |     |        |        |   |     |        |        |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |    |    |        |        |    |    |        |        |    |     |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |       |        |        |    |    |        |        |
| 3  | HIGH HUMIDITY<br>HIGH TEMPERATURE<br>HIGH VOLTAGE<br>TURN ON TEST | AFTER 12 HOURS<br>IN CHAMBER ON<br>CONTROL 60°C<br>NO DAMAGE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | I/P : 531 VAC<br>O/P : FULL LOAD<br>Ta= 60 °C<br>HUMIDITY= 95 %R.H | TEST : OK         |    |          |                             |                            |   |     |        |        |   |     |        |        |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |    |    |        |        |    |    |        |        |    |     |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |       |        |        |    |    |        |        |
| 4  | TEMPERATURE<br>COEFFICIENT                                        | ±0.03 %(0~50°C)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | I/P : 347 VAC<br>O/P : FULL LOAD                                   | ± 0.007 %(0~50°C) |    |          |                             |                            |   |     |        |        |   |     |        |        |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |    |    |        |        |    |    |        |        |    |     |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |       |        |        |    |    |        |        |
| 5  | STORAGE TEMPERATURE TEST                                          | 1. Thermal shock Temperature : -45°C~ +90°C<br>2. Temperature change rate : 25°C / MIN<br>3. Dwell time low and high temperature : 30 MIN/EACH<br>4. Total test cycle : 5 CYCLE<br>5. Input/Output condition : STATIC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                    | OK                |    |          |                             |                            |   |     |        |        |   |     |        |        |   |     |        |        |   |     |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |    |        |        |   |     |        |        |    |    |        |        |    |    |        |        |    |     |        |        |    |     |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |      |        |        |    |       |        |        |    |    |        |        |

|    |                             |                                                                                                                                                                                                                                                                                     |                                                                   |
|----|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| 6  | THERMAL SHOCK TEST          | 1. Thermal shock Temperature : -40℃~ +65℃<br>2. Temperature change rate : 25℃ / MIN<br>3. Dwell time low and high temperature : 30 MIN/EACH<br>4. Total test cycle : 10 CYCLE<br>5. Input/Output condition : 347VAC/Full Load AC ON/OFF TEST<br>turn on 58sec ; turn off 2sec       | OK                                                                |
| 7  | VIBRATION TEST              | 1 Carton & 1 Set<br>(1) Waveform : Sine Wave<br>(2) Frequency : 10~500Hz<br>(3) Sweep Time : 12min/sweep cycle<br>(4) Acceleration : 5G<br>(5) Test Time : 72min in each axis (X.Y.Z)<br>(6) Ta : 25℃                                                                               | TEST : OK                                                         |
| 8  | CAPACITOR LIFE CYCLE        | HVGC-150-350 :SUPPOSE C104 IS THE MOST CRITICAL COMPONENT<br>(1) I/P : 347VAC O/P : FULL LOAD Ta= 25 ℃ LIFE TIME<br>(2) I/P : 347VAC O/P : FULL LOAD Ta= 60 ℃ LIFE TIME<br>(3) I/P : 347VAC O/P : 75% LOAD Ta= 60 ℃ LIFE TIME<br>(4) I/P : 347VAC O/P : 50% LOAD Ta= 60 ℃ LIFE TIME | (1) 514555 HRS<br>(2) 52245 HRS<br>(3) 76974 HRS<br>(4) 88468 HRS |
| 9  | MTBF                        | MIL-HDBK-217F NOTICES2 PARTS COUNT<br>TOTAL FAILURE RATE : 179.5 KHRS                                                                                                                                                                                                               |                                                                   |
| 10 | DMTBF/Accelerated Life Test | Demonstration Mean Time Between Failure (Expected Life): Above 50,000 hours @ Tcase 70℃                                                                                                                                                                                             |                                                                   |

| SAMPLE         | TEST RESULT | TESTER     | APPROVAL      |
|----------------|-------------|------------|---------------|
| PRODUCT SAMPLE | DANIEL GAO  | SANFORD SU | VINCENT TSENG |

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