



Test Report: HVG-150-54

150W Constant Voltage + Constant Current LED Driver

■ 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

■ **ESIGN VERIFY TEST**

OUTPUT FUNCTION TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT |
|----|-----------------------------|--|---|--|
| 1 | RIPPLE & NOISE | V1 : 200 mVp-p (Max) | I/P : 347VAC O/P : FULL LOAD Ta : 25°C | V1 : 29.6 mVp-p (Max) |
| 2 | CONSTANT CURRENT REGION | 29.7V~54 V | I/P: 230 VAC O/P:CV MODE Ta:25°C | O/P=29.7V : 2.835A O/P=53 V : 2.837A |
| 3 | OUTPUT VOLTAGE ADJUST RANGE | CH1 : 49V ~ 58 V | I/P : 480 VAC I/P : 347 VAC O/P : MIN LOAD Ta : 25°C | 46.97 V ~ 60.25 V/ 480 VAC 46.95 V ~ 60.25 V/ 347 VAC |
| 4 | OUTPUT CURRENT ADJUST RANGE | CH1 : 1.53A~2.78 A | I/P : 480 VAC I/P : 347 VAC O/P : CV MODE Ta : 25°C | 1.316 A~ 2.997 A/ 480 VAC 1.315 A~ 2.998 A/ 347 VAC |
| 5 | OUTPUT VOLTAGE TOLERANCE | V1 : 1%~-1 % (Max) | I/P : 180 VAC / 480 VAC O/P : FULL/ MIN LOAD Ta : 25°C | V1 : 0.04 %~- -0.04 % |
| 6 | LINE REGULATION | V1 : 0.5 %~- 0.5% (Max) | I/P : 180 VAC ~ 480 VAC O/P : FULL LOAD Ta : 25°C | V1 : 0 %~- 0 % |
| 7 | LOAD REGULATION | V1 : 0.5 %~-0.5% (Max) | I/P : 347 VAC O/P : FULL -MIN LOAD Ta : 25°C | V1 : 0.04 %~- -0.04 % |
| 8 | SET UP TIME | 480 VAC : 500 ms (Max) 347VAC : 500 ms(Max) 230VAC : 500 ms(Max) | I/P : 480 VAC I/P : 347 VAC I/P : 230 VAC O/P : FULL LOAD Ta : 25°C | 480 VAC/ 247 ms 347VAC/ 289 ms 230VAC/ 342 ms |
| 9 | RISE TIME | 480 VAC : 80 ms (Max) 347VAC : 80 ms (Max) 230VAC : 80 ms (Max) | I/P : 480 VAC I/P : 347 VAC I/P : 230 VAC O/P : FULL LOAD Ta : 25°C | 480 VAC/ 28 ms 347VAC/ 59 ms 230VAC/ 59 ms |
| 10 | HOLD UP TIME | 480 VAC : 18 ms (TYP) 347VAC : 18 ms (TYP) | I/P : 480 VAC I/P : 347 VAC O/P : FULL LOAD Ta : 25°C | 480 VAC/ 35 ms 347VAC/ 25 ms |
| 11 | OVER/UNDERSHOOT TEST | < ±5% | I/P : 347 VAC O/P : FULL LOAD Ta : 25°C | TEST : <5 % |

| | | | | |
|----|--------------|-----------------|---|---|
| 12 | DYNAMIC LOAD | V1 : 5400 mVp-p | I/P : 347 VAC (1).O/P : FULL /Min LOAD 90%DUTY/ 1KHZ (2).O/P : FULL /Min LOAD 90%DUTY/ 3KHZ (3).O/P : FULL /Min LOAD 90%DUTY/ 5KHZ (4).O/P : FULL /Min LOAD 50%DUTY/ 120HZ Ta : 25°C | (1)404 mVp-p (2)288 mVp-p (3)280 mVp-p (4)1010 mVp-p |
|----|--------------|-----------------|---|---|

| 13 | <p>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)</p> <table border="1"> <tr> <th>Resistance value</th> <th>Short</th> <th>10K</th> <th>20K</th> <th>30K</th> <th>40K</th> <th>50K</th> <th>60K</th> <th>70K</th> <th>80K</th> <th>90K</th> <th>100K</th> <th>OPEN</th> </tr> <tr> <td>Output current</td> <td>0%</td> <td>10%</td> <td>20%</td> <td>30%</td> <td>40%</td> <td>50%</td> <td>60%</td> <td>70%</td> <td>80%</td> <td>90%</td> <td>100%</td> <td>95%~108%</td> </tr> </table> <p>*1 ~ 10V dimming function for output current adjustment (Typical)</p> <table border="1"> <tr> <th>Dimming value</th> <th>Short</th> <th>1V</th> <th>2V</th> <th>3V</th> <th>4V</th> <th>5V</th> <th>6V</th> <th>7V</th> <th>8V</th> <th>9V</th> <th>10V</th> <th>OPEN</th> </tr> <tr> <td>Output current</td> <td>0%</td> 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6V | 7V | 8V | 9V | 10V | OPEN | Output current | 0% | 10% | 20% | 30% | 40% | 50% | 60% | 70% | 80% | 90% | 100% | 95%~108% | Duty value | Short | 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% | 1 | Resistance value | SHORT | 10K | 20K | 30K | 40K | 50K | 60K | 70K | 80K | 90K | 100K | OPEN | Output current | 0.000A | 0.290A | 0.580A | 0.830A | 1.110A | 1.410A | 1.670A | 1.920A | 2.200A | 2.500A | 2.780A | 2.880A | % | 0.00% | 10.43% | 20.86% | 29.86% | 39.93% | 50.72% | 60.07% | 69.06% | 79.14% | 89.93% | 100.00% | 103.60% | 2 | Dimming value | SHORT | 1V | 2V | 3V | 4V | 5V | 6V | 7V | 8V | 9V | 10V | OPEN | Output current | 0.000A | 0.280A | 0.550A | 0.830A | 1.100A | 1.380A | 1.650A | 1.930A | 2.210A | 2.480A | 2.760A | 2.880A | % | 0.00% | 10.07% | 19.78% | 29.86% | 39.57% | 49.64% | 59.35% | 69.42% | 79.50% | 89.21% | 99.28% | 103.60% | 3 | Duty value | SHORT | 10% | 20% | 30% | 40% | 50% | 60% | 70% | 80% | 90% | 100% | OPEN | Output current | 0.000A | 0.370A | 0.630A | 0.900A | 1.160A | 1.430A | 1.690A | 1.960A | 2.230A | 2.500A | 2.760A | 2.880A | % | 0.00% | 13.31% | 22.66% | 32.37% | 41.73% | 51.44% | 60.79% | 70.50% | 80.22% | 89.93% | 99.28% | 103.60% |
|------------------|--|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|----------|---------|------------------|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|----------------|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|----------|---------------|-------|----|----|----|----|----|----|----|----|----|-----|------|----------------|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|----------|------------|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|----------------|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|----------|---|------------------|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|---------|---|---------------|-------|----|----|----|----|----|----|----|----|----|-----|------|----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|---|------------|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|
| 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% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dimming value | Short | 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% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Duty value | Short | 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% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Resistance value | SHORT | 10K | 20K | 30K | 40K | 50K | 60K | 70K | 80K | 90K | 100K | OPEN | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Output current | 0.000A | 0.290A | 0.580A | 0.830A | 1.110A | 1.410A | 1.670A | 1.920A | 2.200A | 2.500A | 2.780A | 2.880A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | % | 0.00% | 10.43% | 20.86% | 29.86% | 39.93% | 50.72% | 60.07% | 69.06% | 79.14% | 89.93% | 100.00% | 103.60% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | Dimming value | SHORT | 1V | 2V | 3V | 4V | 5V | 6V | 7V | 8V | 9V | 10V | OPEN | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Output current | 0.000A | 0.280A | 0.550A | 0.830A | 1.100A | 1.380A | 1.650A | 1.930A | 2.210A | 2.480A | 2.760A | 2.880A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | % | 0.00% | 10.07% | 19.78% | 29.86% | 39.57% | 49.64% | 59.35% | 69.42% | 79.50% | 89.21% | 99.28% | 103.60% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | Duty value | SHORT | 10% | 20% | 30% | 40% | 50% | 60% | 70% | 80% | 90% | 100% | OPEN | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Output current | 0.000A | 0.370A | 0.630A | 0.900A | 1.160A | 1.430A | 1.690A | 1.960A | 2.230A | 2.500A | 2.760A | 2.880A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | % | 0.00% | 13.31% | 22.66% | 32.37% | 41.73% | 51.44% | 60.79% | 70.50% | 80.22% | 89.93% | 99.28% | 103.60% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

INPUT FUNCTION TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT |
|----|-----------|---------------|----------------|--------|
|----|-----------|---------------|----------------|--------|

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|---|---------------------------|---|---|--|
| 1 | INPUT VOLTAGE RANGE | 180VAC-480 VAC | I/P : TESTING O/P : FULL LOAD Ta : 25°C | 167V~480V TEST : OK |
| | | | I/P : LOW-LINE-3V=177V HIGH-LINE+3V=531 V O/P : FULL/MIN LOAD ON : 30 Sec . OFF : 30 Sec 10MIN (AC POWER ON/OFF NO DAMAGE) | |
| 2 | INPUT FREQUENCY RANGE | 47HZ ~63 HZ NO DAMAGE | I/P : 180VAC ~ 480 VAC O/P : FULL -MIN LOAD Ta : 25°C | TEST : OK |
| 3 | POWER FACTOR | 0.98 / 230 VAC(TYP) | I/P : 230VAC | PF= 0.994 / 230 VAC |
| | | 0.97 / 277VAC(TYP) | I/P : 277VAC | PF= 0.994 / 277 VAC |
| | | 0.95 /347 VAC(TYP) | I/P : 347VAC | PF= 0.983 / 347VAC |
| | | 0.93 / 480 VAC(TYP) | I/P : 480VAC O/P : FULL LOAD Ta : 25°C | PF= 0.952 / 480VAC |
| 4 | EFFICIENCY | 91.5 % (TYP) | I/P : 347 VAC O/P : FULL LOAD Ta : 25°C | 92.27 % |
| 5 | INPUT CURRENT | 347V/ 0.5 A (TYP) | I/P : 347 VAC | I = 0.47 A/ 347 VAC |
| | | 480V/ 0.38 A (TYP) | I/P : 480 VAC O/P : FULL LOAD Ta : 25°C | I = 0.37 A/ 480 VAC |
| 6 | INRUSH CURRENT | 480V/ 35 A (TYP) (twidth=790 us measured at 50% Ipeak) COLD START | I/P : 480VAC O/P : FULL LOAD Ta : 25°C | I = 25 A/ 480VAC T50= 789 us |
| 7 | LEAKAGE CURRENT | < 0.75 mA / 480 VAC | I/P : 480 VAC O/P : Min LOAD Ta : 25°C | L-FG : 0.34 mA N-FG : 0.30 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 I/P : 277VAC I/P : 347VAC O/P : 50% LOAD Ta : 25°C | THD : 12.8 THD : 14.3 THD : 16.7 |
| | | Total harmonic distortion will be lower than 20% when output loading is 75% or higher at 480VAC | I/P : 480VAC O/P : 75% LOAD Ta : 25°C | THD : 15.31 |

PROTECTION FUNCTION TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT |
|----|-----------------------------|--|---|--|
| 1 | OVER CURRENT | 95% - 108% | I/P : 480 VAC I/P : 347 VAC O/P : TESTING Ta : 25°C | 102%/ 480 VAC 102%/ 347 VAC Constant current limiting, recovers automatically after fault condition is removed |
| 2 | OVER VOLTAGE PROTECTION | CH1 : 59V -65 V | I/P : 480 VAC I/P : 347 VAC O/P : MIN LOAD Ta : 25°C | 61.79 V/ 480VAC 61.79 V/ 347 VAC Shut down o/p voltage with auto-recovery or re-power on to recovery |
| 3 | OVER TEMPERATURE PROTECTION | SPEC : NO DAMAGE | I/P : 347 VAC O/P : FULL LOAD | O.T.P. Active Shut down o/p voltage, recovers automatically after temperature goes down |
| 4 | SHORT PROTECTION | SHORT EVERY OUTPUT 1 HOUR NO DAMAGE | I/P : 528VAC O/P : FULL LOAD Ta : 25°C | NO DAMAGE Constant current limiting, recovers automatically after fault condition is removed |

COMPONENT STRESS TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT |
|----|---|--|---|--|
| 1 | Power Transistor (D to S) or (C to E) Peak Voltage | Q3 Rated : 7A/950V | I/P : High-Line +3V = 531 V O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C | (1) 680 V (2) 332 V (3) 624 V |
| 2 | Diode Peak Voltage | Q101 Rated : 10A/200V | I/P : High-Line +3V = 531 V O/P : (1)Full Load Turn on (2)Output Short (3)Full load continue Ta : 25°C | (1) 161 V (2) 133 V (3) 156 V |
| 3 | Input Capacitor Voltage | C5 Rated : 56u/450V | I/P : High-Line +3V = 531 V O/P : (1)Full Load Turn on /Off (2) Min load Turn on /Off (3)Full Load /Min load Change Ta : 25°C | (1) 412 V (2) 430 V (3) 432 V |
| 4 | Control IC Voltage Test | U1 Rated : 10.3V~22.5V U2 Rated : 11V~28V | I/P : High-Line +3V = 531 V O/P : (1)Full Load Turn on /Off (2) Min load Turn on /Off (3)Full Load /Min load Change (4)Full Load Turn on /Off (5) Min load Turn on /Off (6)Full Load /Min load Ta : 25°C | (1) 17.6 V (2) 17.8 V (3) 17.6 V (4) 16.2 V (5) 15.8 V (6) 16 V |

| | | | | | | |
|---|---|--------------------|---|-----|-----|---|
| 5 | Power Transistor (D to S) or (C to E) Peak Voltage | Q1 Rated : 7A/950V | I/P : High-Line +3V = 531 V O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C | (1) | 880 | V |
| | | | | (2) | 808 | V |
| | | | | (3) | 844 | 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 I/P-FG : 2KVAC/min O/P-FG : 1.5 KVAC/min | I/P-O/P : 4 KVAC/min I/P-FG : 2.4KVAC/min O/P-FG : 1.8 KVAC/min Ta : 25°C | I/P-O/P : 3.62 mA I/P-FG : 2.599 mA O/P-FG : 3.46 mA 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 : 500 VDC I/P-FG : 500 VDC O/P-FG : 500 VDC Ta : 25°C/70%RH | I/P-O/P : 19 GΩ I/P-FG : 16 GΩ O/P-FG : 25 GΩ NO DAMAGE |
| 3 | GROUNDING CONTINUITY | FG(PE) TO CHASSIS OR TRACE < 100 mΩ | 40 A / 2min Ta : 25°C / 70%RH | 15 mΩ |

E.M.C TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT |
|----|---|--|--|-------------------------------|
| 1 | HARMONIC | EN61000-3-2 CLASS C | I/P:230VAC/380VAC/50HZ/60HZ O/P:100/60%ELECTRONIC LOAD O/P:100%LED LOAD Ta:25°C | PASS |
| 2 | CONDUCTION | EN55015 CLASS B FCC Part 15 Subpart B | I/P: 230VAC/380VAC/50HZ/60HZ O/P:FULL/60% LOAD Ta:25°C | PASS Test by certified Lab |
| 3 | RADIATION | EN55015 CLASS B FCC Part 15 Subpart B | I/P: 230VAC/380VAC/50HZ/60HZ O/P:FULL LOAD/60% LOAD Ta:25°C | PASS Test by certified Lab |
| 4 | E.S.D | EN61000-4-2 LIGHT INDUSTRY AIR:8KV / Contact:4KV | I/P: 230VAC/380VAC/50HZ/60HZ O/P:FULL LOAD Ta:25°C | CRITERIA A |
| 5 | E.F.T | EN61000-4-4 LIGHT INDUSTRY INPUT : 1KV | I/P: 230VAC/380VAC/50HZ/60HZ O/P:FULL LOAD Ta:25°C | CRITERIA A |
| 6 | SURGE | IEC61000-4-5 INDUSTRY L-N :2KV L,N-PE:4KV | I/P: 230VAC/380VAC/50HZ/60HZ 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 : HVG-150-24 1. ROOM AMBIENT BURN-IN : 13 HRS I/P : 347VAC O/P : FULL LOAD Ta= 28.4 °C 2. HIGH AMBIENT BURN-IN : 6 HRS I/P : 347VAC O/P : FULL LOAD Ta=60.8 °C | <table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta=28.4 °C</th> <th>HIGH AMBIENT Ta=60.8 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>LF2</td><td>57.8°C</td><td>83.7°C</td></tr> <tr><td>2</td><td>BD1</td><td>60.3°C</td><td>85.9°C</td></tr> <tr><td>3</td><td>L2</td><td>67.3°C</td><td>93.5°C</td></tr> <tr><td>4</td><td>C48</td><td>61.1°C</td><td>86.7°C</td></tr> <tr><td>5</td><td>C46</td><td>60.1°C</td><td>85.7°C</td></tr> <tr><td>6</td><td>C15</td><td>65.1°C</td><td>90.7°C</td></tr> <tr><td>7</td><td>Q1</td><td>65.0°C</td><td>90.7°C</td></tr> <tr><td>8</td><td>C5</td><td>66.8°C</td><td>91.2°C</td></tr> <tr><td>9</td><td>Q4</td><td>69.7°C</td><td>95.2°C</td></tr> <tr><td>10</td><td>C62</td><td>64.3°C</td><td>88.8°C</td></tr> <tr><td>11</td><td>RTH2</td><td>64.0°C</td><td>88.5°C</td></tr> <tr><td>12</td><td>T1</td><td>75.7°C</td><td>100.3°C</td></tr> <tr><td>13</td><td>C203</td><td>71.2°C</td><td>96.5°C</td></tr> <tr><td>14</td><td>Q101</td><td>75.2°C</td><td>100.5°C</td></tr> <tr><td>15</td><td>C104</td><td>68.4°C</td><td>93.8°C</td></tr> <tr><td>16</td><td>C105</td><td>65.2°C</td><td>91.1°C</td></tr> <tr><td>17</td><td>C106</td><td>64.8°C</td><td>90.5°C</td></tr> <tr><td>18</td><td>U2</td><td>64.8°C</td><td>88.6°C</td></tr> </tbody> </table> | NO | Position | ROOM AMBIENT Ta=28.4 °C | HIGH AMBIENT Ta=60.8 °C | 1 | LF2 | 57.8°C | 83.7°C | 2 | BD1 | 60.3°C | 85.9°C | 3 | L2 | 67.3°C | 93.5°C | 4 | C48 | 61.1°C | 86.7°C | 5 | C46 | 60.1°C | 85.7°C | 6 | C15 | 65.1°C | 90.7°C | 7 | Q1 | 65.0°C | 90.7°C | 8 | C5 | 66.8°C | 91.2°C | 9 | Q4 | 69.7°C | 95.2°C | 10 | C62 | 64.3°C | 88.8°C | 11 | RTH2 | 64.0°C | 88.5°C | 12 | T1 | 75.7°C | 100.3°C | 13 | C203 | 71.2°C | 96.5°C | 14 | Q101 | 75.2°C | 100.5°C | 15 | C104 | 68.4°C | 93.8°C | 16 | C105 | 65.2°C | 91.1°C | 17 | C106 | 64.8°C | 90.5°C | 18 | U2 | 64.8°C | 88.6°C | |
| NO | Position | ROOM AMBIENT Ta=28.4 °C | HIGH AMBIENT Ta=60.8 °C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | LF2 | 57.8°C | 83.7°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | BD1 | 60.3°C | 85.9°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | L2 | 67.3°C | 93.5°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | C48 | 61.1°C | 86.7°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | C46 | 60.1°C | 85.7°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | C15 | 65.1°C | 90.7°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | Q1 | 65.0°C | 90.7°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | C5 | 66.8°C | 91.2°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | Q4 | 69.7°C | 95.2°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | C62 | 64.3°C | 88.8°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | RTH2 | 64.0°C | 88.5°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12 | T1 | 75.7°C | 100.3°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 13 | C203 | 71.2°C | 96.5°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14 | Q101 | 75.2°C | 100.5°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15 | C104 | 68.4°C | 93.8°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16 | C105 | 65.2°C | 91.1°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 17 | C106 | 64.8°C | 90.5°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 18 | U2 | 64.8°C | 88.6°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | OVER LOAD BURN-IN TEST | NO DAMAGE 1 HOUR (MIN) | I/P : 347 VAC O/P : 100 % LOAD Ta : 25°C | TEST : OK | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | LOW TEMPERATURE TURN ON TEST | TURN ON AFTER 2 HOUR | I/P : 528VAC/200VAC O/P : 100 % LOAD Ta= -40 °C | TEST : OK | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST | AFTER 12 HOURS IN CHAMBER ON CONTROL 60°C NO DAMAGE | I/P : 531 VAC O/P : FULL LOAD Ta= 60 °C HUMIDITY= 95 %R.H | TEST : OK | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | TEMPERATURE COEFFICIENT | ± 0.03%(0-50°C) | I/P : 347 VAC O/P : FULL LOAD | ± 0.005 % (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 : 5 CYCLE 5. Input/Output condition : STATIC | | OK | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



| | | | |
|----|--------------------------|--|---|
| 7 | THERMAL SHOCK TEST | 1. Thermal shock Temperature : -45°C~ +65°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 : 347VAC/Full Load AC ON/OFF TEST turn on 58sec ; turn off 2sec | OK |
| 8 | VIBRATION TEST | 1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10-500Hz (3) Sweep Time : 12min/sweep cycle (4) Acceleration : 5G (5) Test Time : 72min in each axis (X.Y.Z) (6) Ta : 25°C | TEST : OK |
| 9 | CAPACITOR LIFE CYCLE | HVG-150-24:SUPPOSE C104 IS THE MOST CRITICAL COMPONENT (1) I/P : 347VAC O/P : FULL LOAD Tc= 75 °C LIFE TIME (2) I/P : 347VAC O/P : FULL LOAD Tc= 75 °C LIFE TIME (3) I/P : 347VAC O/P : 75% LOAD Tc= 75 °C LIFE TIME | (1) 70987HRS (2) 75090HRS (3) 85833 HRS |
| 10 | MTBF | Conducted by Parts Stress Analysis Prediction 158.6K 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 : 50,000 hours | |

| TEST RESULT | TESTER | REVIEW | APPROVAL |
|-------------|------------|------------|---------------|
| PASS | DANIEL GAO | SANFORD SU | VINCENT TSENG |

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