



# Test Report: HLG-240-54

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240W Single Output Switching Power Supply

## ■ DESIGN VERIFY TEST

Output Function Test

Input Function Test

Protection Function Test

Other Test

Component Stress Test

## ■ SAFETY & E.M.C. TEST

Safety Test

E.M.C. Test

## ■ RELIABILITY TEST

## DESIGN VERIFY TEST

### OUTPUT FUNCTION TEST

| NO | TEST ITEM                   | SPECIFICATION                                  | TEST CONDITION   | RESULT   | VERDICT |
|----|-----------------------------|--|--|--|---------|
| 1  | RIPPLE & NOISE              | V1: 350 mVp-p (Max)                            | I/P: 230 VAC<br>O/P:FULL LOAD<br>Ta:25°C                         | V1: 56.4 mVp-p (Max)                           | P       |
| 2  | OUTPUT VOLTAGE ADJUST RANGE | CH1: 50 V~ 57 V                                | I/P: 230 VAC<br>I/P:115VAC<br>O/P:MIN LOAD<br>Ta:25°C            | 48.76V~60.13V /230VAC<br>48.76V~60.13 V/115VAC | P       |
| 3  | CURRENT ADJ RANGE           | 2.23 A~ 4.45 A                                 | I/P: 230 VAC<br>O/P: CV=Vo-2V<br>Ta:25°C                         | 0.5A~4.881 A                                   | P       |
| 4  | CONSTANT CURRENT REGION     | 27 V~ 54V                                      | I/P: 230 VAC<br>O/P:CV MODE<br>Ta:25°C                           | O/P=27V: 4.553 A<br>O/P=53V: 4.508 A           | P       |
| 5  | OUTPUT VOLTAGE TOLERANCE    | V1: -1 % ~ 1 % (Max)                           | I/P: 100 VAC /264VAC<br>O/P:FULL/ 0 % LOAD<br>Ta:25°C            | V1: -0.07 %~ 0.07 %                            | P       |
| 6  | LINE REGULATION             | V1: - 0.5% ~ 0.5 % (Max)                       | I/P:100 VAC ~264 VAC<br>O/P:FULL LOAD<br>Ta:25°C                 | V1: 0 %~ 0 %                                   | P       |
| 7  | LOAD REGULATION             | V1: - 0.5% ~ 0.5 % (Max)                       | I/P: 230 VAC<br>O/P:FULL ~MIN LOAD<br>Ta:25°C                    | V1: -0.06 %~ 0.06 %                            | P       |
| 8  | SET UP TIME                 | 230VAC/ 2500 ms (Max)<br>115VAC/ 2500 ms (Max) | I/P: 230 VAC<br>I/P: 115 VAC<br>O/P:FULL LOAD<br>Ta:25°C         | 230VAC/ 1747 ms<br>115 VAC/ 1798 ms            | P       |
| 9  | RISE TIME                   | 230VAC/ 80 ms (Max)<br>115VAC/ 80 ms (Max)     | I/P: 230 VAC<br>I/P: 115 VAC<br>O/P:FULL LOAD<br>Ta:25°C         | 230VAC/ 52 ms<br>115 VAC/ 52 ms                | P       |
| 10 | HOLD UP TIME                | 230VAC/ 15 ms (Typ)<br>115VAC/ 15 ms (Typ)     | I/P: 230 VAC<br>I/P: 115 VAC<br>O/P:FULL LOAD<br>Ta:25°C         | 230VAC/ 17.3 ms<br>115 VAC/ 17 ms              | P       |
| 11 | OVER/UNDERSHOOT TEST        | < ±5%  | I/P: 230 VAC<br>O/P:FULL LOAD<br>Ta:25°C                         | TEST:< 5 %                                     | P       |
| 12 | DYNAMIC LOAD                | V1: 5400 mVp-p                                 | I/P: 230 VAC<br>O/P:(1)FULL /Min LOAD<br>90%DUTY/1KHZ<br>Ta:25°C | 198mVp-p                                       | P       |

|    |                              |   |                  |        |        |        |        |        |        |        |        |         |        |
|----|------------------------------|---|------------------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--------|
| 13 | DIMMER TEST<br>(B Type only) | SPEC:   |                  |        |        |        |        |        |        |        |        |         |        |
|    |                              | *Reference resistance value for output current adjustment (Typical) |                  |        |        |        |        |        |        |        |        |         |        |
|    |                              | Resistance value  | 10K              | 20K    | 30K    | 40K    | 50K    | 60K    | 70K    | 80K    | 90K    | 100K    |        |
|    |                              | Output current  | 10%              | 20%    | 30%    | 40%    | 50%    | 60%    | 70%    | 80%    | 90%    | 100%    |        |
|    |                              | *1 ~ 10V dimming function for output current adjustment (Typical)   |                  |        |        |        |        |        |        |        |        |         |        |
|    |                              | Dimming value   | 1V               | 2V     | 3V     | 4V     | 5V     | 6V     | 7V     | 8V     | 9V     | 10V     |        |
|    |                              | Output current  | 10%              | 20%    | 30%    | 40%    | 50%    | 60%    | 70%    | 80%    | 90%    | 100%    |        |
|    |                              | *10V PWM signal for output current adjustment (Typical)             |                  |        |        |        |        |        |        |        |        |         |        |
|    |                              | Duty value  | 10%              | 20%    | 30%    | 40%    | 50%    | 60%    | 70%    | 80%    | 90%    | 100%    |        |
|    |                              | Output current  | 10%              | 20%    | 30%    | 40%    | 50%    | 60%    | 70%    | 80%    | 90%    | 100%    |        |
|    |                              | TEST RESULT: I/P : 230 VAC ; Ta : 25°C                              |                  |        |        |        |        |        |        |        |        |         |        |
|    |                              | 1   | Resistance value | 10K    | 20K    | 30K    | 40K    | 50K    | 60K    | 70K    | 80K    | 90K     | 100K   |
|    |                              |   | Output current   | 0.394A | 0.868A | 1.335A | 1.947A | 2.258A | 2.717A | 3.133A | 3.586A | 4.001A  | 4.401A |
| %  | 8.85%                        |   | 19.51%           | 30.00% | 43.75% | 50.74% | 61.06% | 70.40% | 80.58% | 89.91% | 98.90% |         |        |
| 2  | Dimming value                |   | 1V               | 2V     | 3V     | 4V     | 5V     | 6V     | 7V     | 8V     | 9V     | 10V     |        |
|    | Output current               |   | 0.401A           | 0.873A | 1.341A | 1.797A | 2.264A | 2.738A | 3.207A | 3.653A | 4.121A | 4.455A  |        |
|    | %                            |   | 9.01%            | 19.62% | 30.13% | 40.38% | 50.88% | 61.53% | 72.07% | 82.09% | 92.61% | 100.11% |        |
| 3  | Duty value                   |   | 10%              | 20%    | 30%    | 40%    | 50%    | 60%    | 70%    | 80%    | 90%    | 100%    |        |
|    | Output current               |   | 0.440A           | 0.914A | 1.371A | 1.821A | 2.266A | 2.708A | 3.146A | 3.585A | 4.024A | 4.461A  |        |
|    | %                            |   | 9.89%            | 20.54% | 30.81% | 40.92% | 50.92% | 60.85% | 70.70% | 80.56% | 90.43% | 100.25% |        |

P

### INPUT FUNCTION TEST

| NO | TEST ITEM             | SPECIFICATION   | TEST CONDITION  | RESULT   | VERDICT |
|----|-----------------------|---|---|--|---------|
| 1  | INPUT VOLTAGE RANGE   | 90VAC~264 VAC   | I/P:TESTING<br>O/P:FULL LOAD<br>Ta:25°C   | 59V~264V   | P       |
|    |                       |   | I/P:<br>(1)LOW-LINE-3V=87 V<br>(2)HIGH-LINE=264 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 OSC  | I/P: 100 VAC ~264VAC<br>O/P:FULL~MIN LOAD<br>Ta:25°C  | OK   | P       |
| 3  | POWER FACTOR          | 0.95/ 230 VAC FULL LOAD (TYP)<br>0.98/ 115 VAC FULL LOAD (TYP)<br>0.9/ 230 VAC 65% LOAD (TYP)<br>0.9/ 115 VAC 65%LOAD (TYP) | I/P: 230 VAC<br>I/P: 115 VAC<br>O/P:FULL LOAD / 65% LOAD<br>Ta:25°C   | PF=0.953 /230V/100%LOAD<br>PF=1 /115V/100%LOAD<br>PF=0.917 /230V/65%LOAD<br>PF=1 /115V/65%LOAD | P       |
| 4  | EFFICIENCY            | 94 % (TYP)  | I/P: 230 VAC<br>O/P:FULL LOAD<br>Ta:25°C  | 94.14 %  | P       |
| 5  | INPUT CURRENT         | 230 V/ 2 A (Typ)<br>115 V/ 4 A (Typ)  | I/P: 230 VAC<br>I/P: 115 VAC<br>O/P:FULL LOAD<br>Ta:25°C  | I = 1.15 A/ 230VAC<br>I = 2.29 A/ 115VAC   | P       |
| 6  | INRUSH CURRENT        | 230 V/ 75A (Typ)<br>COLD START  | I/P: 230 VAC<br>O/P:FULL LOAD<br>Ta:25°C  | I = 66 A/ 230VAC   | P       |

### PROTECTION FUNCTION TEST

| NO | TEST ITEM                   | SPECIFICATION                              | TEST CONDITION   | RESULT   | VERDICT |
|----|-----------------------------|--|--|--|---------|
| 1  | OVER LOAD PROTECTION        | 95 %~108 %                                 | I/P: 264 VAC<br>I/P: 230 VAC<br>I/P: 100 VAC<br>O/P:TESTING<br>Ta:25°C | 101 %/264VAC<br>101 %/ 230VAC<br>101 %//100VAC<br>Constant Current Limiting                        | P       |
| 2  | OVER VOLTAGE PROTECTION     | V1: 59 V~ 65V                              | I/P: 264 VAC<br>I/P: 230 VAC<br>I/P: 90 VAC<br>O/P:MIN LOAD<br>Ta:25°C | 64.3 V/264VAC<br>64.3 V/ 230VAC<br>64.3V/ 90VAC<br>Shunt down Re- power ON                         | P       |
| 3  | OVER TEMPERATURE PROTECTION | SPEC:<br>TSW1: 105±5°C O.T.P.<br>NO DAMAGE | I/P: 230 VAC<br>O/P:FULL LOAD  | O.T.P. Active<br>Shut down o/p volotage , recovers<br>automatically after temperature<br>goes down | P       |
| 4  | SHORT PROTECTION            | SHORT EVERY OUTPUT<br>1 HOUR NO DAMAGE     | I/P: 264VAC<br>O/P: FULL LOAD<br>Ta:25°C                               | NO DAMAGE<br>Hiccup Mode   | P       |

## COMPONENT STRESS TEST

| NO | TEST ITEM  | SPECIFICATION                         | TEST CONDITION   | RESULT                                    | VERDICT |
|----|--|---------------------------------------|--|---|---------|
| 1  | Power Transistor<br>( D to S) or (C to E) Peak Voltage | Q3 Rated<br>IRFB20N50K 20A/ 500V      | I/P : High-Line +3V = 267 V<br>O/P : (1)Full Load Turn on<br>(2) Output Short<br>(3)Full load continue<br>Ta : 25°C                          | (1) 464 V<br>(2) 442 V<br>(3) 460 V       | P       |
| 2  | Diode Peak Voltage                                     | Q101 Rated<br>YA868C15RSC 30A/150V    | I/P : High-Line +3V = 267 V<br>O/P : (1)Full Load Turn on<br>(2)Output Short<br>(3)Full load continue<br>Ta : 25°C                           | (1) 123 V<br>(2) 123 V<br>(3) 123 V       | P       |
|    |  | Q102 Rated<br>YA868C15RSC 30A/150V    | I/P : High-Line +3V = 267 V<br>O/P : (1)Full Load Turn on<br>(2)Output Short<br>(3)Full load continue<br>Ta : 25°C                           | (1) 124 V<br>(2) 27 V<br>(3) 123 V        |         |
| 3  | Input Capacitor Voltage                                | C5 Rated:<br>NCC:<br>150μ/420 V/105°C | I/P : High-Line +3V = 267 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) 399 V<br>(2) 416 V<br>(3) 416 V       | P       |
| 4  | Control IC Voltage Test                                | U 70 Rated<br>L6599AD : 8.85V~16 V    | I/P : High-Line +3V = 267 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) 13.13 V<br>(2) 13.11 V<br>(3) 13.13 V | P       |
| 5  | P.F.C Transistor<br>( D to S) or (C to E) Peak Voltage | Q1 Rated<br>STW25NM50N 22A/500V       | I/P : High-Line +3V = 267 V<br>O/P : (1)Full Load Turn on<br>(2)Output Short<br>(3)Full load continue<br>Ta : 25°C                           | (1) 478 V<br>(2) 462 V<br>(3) 454 V       | P       |

## SAFETY & EMC TEST

### SAFETY TEST

| NO | TEST ITEM            | SPECIFICATION   | TEST CONDITION  | RESULT  | VERDICT |
|----|----------------------|---|---|---|---------|
| 1  | WITHSTAND VOLTAGE    | IEC60950-1<br>I/P-O/P: 3.75KVAC/min<10mA<br>I/P-FG:2 KVAC/min<10mA<br>O/P-FG:0.5KVAC/min<10mA | I/P-O/P: 4 KVAC/min<br>I/P-FG: 2.4KVAC/min<br>O/P-FG: 0.6 KVAC/min<br>Ta:25°C | I/P-O/P: 4.90 mA<br>I/P-FG: 4.05 mA<br>O/P-FG: 5.15 mA<br>NO DAMAGE | P       |
| 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             | I/P-O/P: 27.2 GΩ<br>I/P-FG: 16.8 GΩ<br>O/P-FG: 30 GΩ<br>NO DAMAGE   | P       |
| 3  | GROUNDING CONTINUITY | IEC60950-1<br>FG(PE) TO CHASSIS<br>OR TRACE < 100 mΩ  | 40A / 2min<br>Ta:25°C   | 13 mΩ   | P       |
| 4  | LEAKAGE CURRENT      | IEC60950-1<br>< 0.75 mA / 240VAC  | I/P: 264 VAC<br>O/P:Min LOAD<br>Ta:25°C                                       | L-FG: 0.36 mA<br>N-FG: 0.36 mA                                      | P       |
| 5  | APPROVAL             | TUV: Certificate NO : R50171244<br>UL: File NO : E127738                                      |   |   | P       |

### E.M.C TEST

| NO | TEST ITEM  | SPECIFICATION  | TEST CONDITION   | RESULT                        | VERDICT |
|----|------------|--|--|-------------------------------|---------|
| 1  | HARMONIC   | EN61000-3-2<br>CLASS A<br>CLASS C                        | I/P: 240VAC/50HZ<br>LOAD:LED/ELECTRONIC LOAD<br>O/P:100%/50% LOAD<br>Ta:25°C | PASS                          | P       |
| 2  | CONDUCTION | EN55022 EN55015<br>CLASS B                               | I/P: 230 VAC (50HZ)<br>O/P:FULL/50% LOAD<br>Ta:25°C                          | PASS<br>Test by certified Lab | P       |
| 3  | RADIATION  | EN55022 EN55015<br>CLASS B                               | I/P: 230 VAC (50HZ)<br>O/P:FULL LOAD<br>Ta:25°C                              | PASS<br>Test by certified Lab | P       |
| 4  | E.S.D      | EN61000-4-2<br>LIGHT INDUSTRY<br>AIR:8KV / Contact:4KV   | I/P: 230 VAC/50HZ<br>O/P:FULL LOAD<br>Ta:25°C                                | CRITERIA A                    | P       |
| 5  | E.F.T      | EN61000-4-4<br>LIGHT INDUSTRY<br>INPUT: 2KV              | I/P: 230 VAC/50HZ<br>O/P:FULL LOAD<br>Ta:25°C                                | CRITERIA A                    | P       |
| 6  | SURGE      | IEC61000-4-5<br>LIGHT INDUSTRY<br>L-N :2KV<br>L,N-PE:4KV | I/P: 230 VAC/50HZ<br>O/P:FULL LOAD<br>Ta:25°C                                | CRITERIA A                    | P       |

## Reliability Test

| NO | TEST ITEM   | SPECIFICATION  | TEST CONDITION  | RESULT            | VERDICT |
|----|---|--|---|-------------------|---------|
| 1  | TEMPERATURE RISE TEST   | MODEL : HLG-240H-24<br>1. ROOM AMBIENT BURN-IN : 1.5 HRS<br>I/P : 230VAC O/P : FULL LOAD Ta= 26.5 °C<br>2. HIGH AMBIENT BURN-IN : 12 HRS<br>I/P : 230VAC O/P : FULL LOAD Ta= 61.7 °C   |   |                   | P       |
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| 2  | OVER LOAD BURN-IN TEST  | NO DAMAGE<br>1 HOUR ( MIN )  | I/P : 230 VAC<br>O/P : O/P SHORT TEST<br>Ta : 25°C                | TEST : OK         | P       |
| 3  | LOW TEMPERATURE<br>TURN ON TEST                                   | TURN ON AFTER 2 HOUR   | I/P : 230 VAC/100VAC<br>O/P : CV=23V<br>Ta= -35 °C                | TEST : OK         | P       |
| 4  | 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 : 264 VAC<br>O/P : CV=23V<br>Ta= 61.7 °C<br>HUMIDITY= 95 %R.H | TEST : OK         | P       |
| 5  | TEMPERATURE<br>COEFFICIENT  | ± 0.03 %(0~50°C)   | I/P : 230 VAC<br>O/P : FULL LOAD                                  | ± 0.003 %(0~50°C) | P       |
| 6  | 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                | P       |
| 7  | THERMAL SHOCK TEST  | 1. Thermal shock Temperature : -35°C~ +65°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 : 10 CYCLE<br>5. Input/Output condition : 230VAC/Full Load |   | OK                | P       |



|    |                             |  |  |   |
|----|-----------------------------|--|--|---|
| 8  | 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°C                         | TEST : OK  | P |
| 9  | CAPACITOR LIFE CYCLE        | HLG-240H-24:SUPPOSE C102 IS THE MOST CRITICAL COMPONENT<br>(1) I/P : 230VAC O/P : FULL LOAD Ta= 25 °C LIFE TIME<br>(2) I/P : 230VAC O/P : FULL LOAD Ta= 60 °C LIFE TIME<br>(3) I/P : 230VAC O/P : 75% LOAD Ta= 60 °C LIFE TIME | (1) 196640 HRS<br>(2) 27898.3 HRS<br>(3) 54198.9 HRS | P |
| 10 | MTBF                        | MIL-HDBK-217F NOTICES2 PARTS COUNT Mean Time Between Failure : 207.9K HRS  |  | P |
| 11 | DMTBF/Accelerated Life Test | Demonstration Mean Time Between Failure(Expected Life) : 50,000 hours @ Tcase 70°C   |  | P |

| DATE      | SAMPLE                  | TEST RESULT | TESTER     | APPROVAL      |
|-----------|-------------------------|-------------|------------|---------------|
| 2009/7/31 | RD SAMPLE               | PASS        | SANFORD SU | VINCENT TSENG |
| 2009/9/29 | PRODUCT SAMPLE W0907E29 | PASS        | SANFORD SU | VINCENT TSENG |
| 2009/12/2 | PRODUCT SAMPLE W0910C36 | PASS        | SANFORD SU | VINCENT TSENG |

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