



# Test Report: HLG-150H-48

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150W Constant Voltage + Constant Current LED Driver

## ■ 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
1	RIPPLE & NOISE	V1: 200 mVp-p (Max)	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	V1: 47.2 mVp-p (Max)
2	OUTPUT VOLTAGE ADJUST RANGE	CH1: 43V-53 V	I/P: 230 VAC I/P: 115VAC O/P: MIN LOAD Ta: 25°C	41.89 V-54.15 V /230VAC 41.89 V-54.15V/115VAC
3	CURRENT ADJ RANGE	1.92A-3.2A	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	1.012 A- 4.027 A
4	CONSTANT CURRENT REGION	24V-48V	I/P: 230 VAC O/P: CV MODE Ta: 25°C	O/P=24V: 3.3 A O/P=47V: 3.3 A
5	OUTPUT VOLTAGE TOLERANCE	V1: -1% ~ 1% (Max)	I/P: 100 VAC /305VAC O/P: FULL / 0% LOAD Ta: 25°C	V1: -0.04 %-0.04 %
6	LINE REGULATION	V1: -0.5% ~ 0.5% (Max)	I/P: 100 VAC ~305 VAC O/P: FULL LOAD Ta: 25°C	V1: -0.02 %-0.02 %
7	LOAD REGULATION	V1: -0.5% ~ 0.5% (Max)	I/P: 230 VAC O/P: FULL -MIN LOAD Ta: 25°C	V1: -0.04 %- 0.04 %
8	SET UP TIME	230VAC/ 500 ms (Max) 115VAC/ 1000 ms (Max)	I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	230VAC/ 396 ms 115 VAC/ 826 ms
9	RISE TIME	230VAC/ 200 ms (Max) 115VAC/ 200 ms (Max)	I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	230VAC/ 6 ms 115 VAC/ 7 ms
10	HOLD UP TIME	230VAC/ 16 ms (Typ) 115VAC/ 16 ms (Typ)	I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	230VAC/ 21 ms 115 VAC/ 21 ms
11	OVER/UNDERSHOOT TEST	< ±5%	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	TEST: < 5 %
12	DYNAMIC LOAD	V1: 4800 mVp-p	I/P: 230 VAC O/P: (1) FULL /Min LOAD 90%DUTY/1KHZ (2) FULL /Min LOAD 90%DUTY/120HZ Ta: 25°C	460 mVp-p 1910 mVp-p

13	DIMMER TEST (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	0.353A	0.672A	0.984A	1.293A	1.604A	1.904A	2.205A	2.479A	2.818A	3.120A
%	11.03%		21.00%	30.75%	40.41%	50.13%	59.50%	68.91%	77.47%	88.06%	97.50%		
2	Dimming value	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V		
	Output current	0.355A	0.663A	0.990A	1.311A	1.627A	1.944A	2.260A	2.579A	2.890A	3.208A		
	%	11.09%	20.72%	30.94%	40.97%	50.84%	60.75%	70.63%	80.59%	90.31%	100.25%		
3	Duty value	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%		
	Output current	0.380A	0.695A	1.017A	1.333A	1.650A	1.967A	2.284A	2.601A	2.919A	3.234A		
	%	11.88%	21.72%	31.78%	41.66%	51.56%	61.47%	71.38%	81.28%	91.22%	101.06%		

**INPUT FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	90VAC~305 VAC	I/P:TESTING O/P:FULL LOAD Ta:25°C	82 V~305V
			I/P: (1)LOW-LINE-3V=87 V (2)HIGH-LINE=305 V O/P:FULL/MIN LOAD ON: 30 Sec . OFF: 30 Sec 10MIN (AC POWER ON/OFF NO DAMAGE )	TEST: OK
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE	I/P: 100 VAC ~305VAC O/P:FULL-MIN LOAD Ta:25°C	OK
3	POWER FACTOR	0.95/ 230 VAC FULL LOAD (TYP) 0.98/ 115 VAC FULL LOAD (TYP) 0.92/ 115 VAC FULL LOAD (TYP)	I/P: 230 VAC I/P: 115 VAC I/P: 277 VAC O/P:FULL LOAD Ta:25°C	PF=0.958 /230V/100%LOAD PF= 0.997 /115V/100%LOAD PF= 0.935/277V/100%LOAD
4	EFFICIENCY	94% (TYP)	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	94.03 %
5	INPUT CURRENT	277V/ 0.7 A 230 V/ 0.75 A 115 V/ 1.7 A	I/P: 277 VAC I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25°C	I = 0.63 A/ 277VAC I = 0.73 A/ 230VAC I = 1.5 A/ 115VAC
6	INRUSH CURRENT	230 V/ 65A (Typ) COLD START	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	I = 56 A/ 230VAC
7	TOTAL HARMONIC DISTORTION	THD< 20% when output loading $\geq$ 60% at 115VAC/230VAC input and output loading $\geq$ 75% at 277VAC input	I/P : 115 VAC I/P : 230 VAC O/P : 60% LOAD  I/P : 277 VAC O/P : 75%LOAD Ta : 25°C	THD : 8.43 /115VAC THD : 14.35 /230VAC  THD : 15.65 /277VAC

**PROTECTION FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	95 %-108 %	I/P: 305VAC I/P: 230 VAC I/P: 100 VAC O/P:TESTING Ta:25°C	106 %/305VAC 106 %/ 230VAC 106 %//100VAC Constant current limiting, recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	V1: 54V-60V	I/P: 305VAC I/P: 230 VAC I/P: 90 VAC O/P:MIN LOAD Ta:25°C	55.29 V/ 305VAC 55.31V/ 230VAC 55.30 V/ 100VAC Shut down o/p voltage with auto recovery or re-power on to recovery

3	OVER TEMPERATURE PROTECTION	NO DAMAGE	I/P: 230 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: 305VAC 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	Q5 Rated 12A/500V	I/P : High-Line +3V = 308V O/P : (1) Full Load Turn on (2) Output Short (3) Full load continue Ta : 25°C	(1) 466 V (2) 446 V (3) 450 V
2	Diode Peak Voltage	Q101 Rated 30A/150V	I/P : High-Line +3V = 308V O/P : (1) Full Load Turn on (2) Output Short (3) Full load continue Ta : 25°C	(1) 111 V (2) 12.8 V (3) 109 V
		Q102 Rated 30A/150V	I/P : High-Line +3V = 308 V O/P : (1) Full Load Turn on (2) Output Short (3) Full load continue Ta : 25°C	(1) 111 V (2) 11.5 V (3) 109 V
3	Input Capacitor Voltage	C5 Rated: 100u/450V	I/P : High-Line +3V = 308V O/P : (1) Full Load Turn on /Off (2) Min load Turn on /Off (3) Full Load /Min load Change Ta : 25°C	(1) 435.8 V (2) 436.1 V (3) 436 V
4	Control IC Voltage Test	U 900 Rated 8.85V~16V	I/P : High-Line +3V = 308V O/P : (1) Full Load Turn on /Off (2) Min load Turn on /Off (3) Full Load /Min load Change Ta : 25°C	(1) 12.652 V (2) 12.582 V (3) 12.582 V
5	P.F.C Transistor (D to S) or (C to E) Peak Voltage	Q1 Rated 17A/600V	I/P : High-Line +3V = 308 V O/P : (1) Full Load Turn on (2) Output Short (3) Full load continue Ta : 25°C	(1) 486 V (2) 452 V (3) 458 V

**SAFETY & EMC TEST**

**SAFETY TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	IEC60950-1 I/P-O/P: 3.75KVAC/min I/P-FG:2 KVAC/min<4.5ma O/P-FG:1.5KVAC/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: 2.589 mA I/P-FG: 2.297 mA O/P-FG: 3.41 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	I/P-O/P: 30 GΩ I/P-FG: 30 GΩ O/P-FG: 30 GΩ NO DAMAGE
3	GROUNDING CONTINUITY	IEC60950-1 FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40A / 2min Ta:25°C	9 mΩ
4	LEAKAGE CURRENT	IEC60950-1 < 0.75 mA / 240VAC	I/P: 240 VAC O/P:Min LOAD Ta:25°C	L-FG: 0.2 mA N-FG: 0.2 mA
5	APPROVAL	TUV: Certificate NO : E334940 UL: File NO : R50185176		

**E.M.C TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	EN61000-3-2 CLASS C	I/P: 230VAC/50HZ LOAD:LED/ELECTRONIC LOAD O/P:100% LOAD Ta:25°C	PASS
2	CONDUCTION	EN55022 EN55015 CLASS B	I/P: 230 VAC (50HZ) O/P:FULL/50% LOAD Ta:25°C	PASS Test by certified Lab
3	RADIATION	EN55022 EN55015 CLASS B	I/P: 230 VAC (50HZ) O/P:FULL LOAD Ta:25°C	PASS Test by certified Lab
4	E.S.D	EN61000-4-2 INDUSTRY AIR:8KV / Contact:4KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A
5	E.F.T	EN61000-4-4 INDUSTRY INPUT: 2KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A
6	SURGE	IEC61000-4-5 INDUSTRY L-N :2KV L,N-PE:4KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A
7	Test by certified Lab & Test Report Prepare. Any contradictions of the test results, please refer to the latest EMC test report.			

Reliability Test

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT																																																																												
1	TEMPERATURE RISE TEST	MODEL : HLG-150H-24 1. ROOM AMBIENT BURN-IN : 15.5 HRS I/P : 230VAC O/P : FULL LOAD Ta= 27.8 °C 2. HIGH AMBIENT BURN-IN : 7 HRS I/P : 230VAC O/P : FULL LOAD Ta=57.8 °C	<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta= 27.8 °C</th> <th>HIGH AMBIENT Ta=57.8 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>BD1</td><td>50.5°C</td><td>77.5°C</td></tr> <tr><td>2</td><td>Q1</td><td>54.3°C</td><td>81.3°C</td></tr> <tr><td>3</td><td>L2</td><td>56.1°C</td><td>83.1°C</td></tr> <tr><td>4</td><td>Q5</td><td>55.2°C</td><td>82.2°C</td></tr> <tr><td>5</td><td>D2</td><td>56.3°C</td><td>83.3°C</td></tr> <tr><td>6</td><td>RTH2</td><td>51.5°C</td><td>78.5°C</td></tr> <tr><td>7</td><td>T1</td><td>56.5°C</td><td>83.5°C</td></tr> <tr><td>8</td><td>Q101</td><td>52.2°C</td><td>79.2°C</td></tr> <tr><td>9</td><td>D9</td><td>53.1°C</td><td>80.1°C</td></tr> <tr><td>10</td><td>C102</td><td>49.9°C</td><td>76.9°C</td></tr> <tr><td>11</td><td>C201</td><td>50.4°C</td><td>77.4°C</td></tr> <tr><td>12</td><td>C16</td><td>52.0°C</td><td>79.0°C</td></tr> <tr><td>13</td><td>C106</td><td>47.9°C</td><td>74.9°C</td></tr> <tr><td>14</td><td>C38</td><td>55.5°C</td><td>82.5°C</td></tr> <tr><td>15</td><td>LF100</td><td>48.7°C</td><td>75.7°C</td></tr> <tr><td>16</td><td>U900</td><td>52.7°C</td><td>79.7°C</td></tr> <tr><td>17</td><td>U1</td><td>53.0°C</td><td>80.0°C</td></tr> <tr><td>18</td><td>C5</td><td>46.4°C</td><td>76°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta= 27.8 °C	HIGH AMBIENT Ta=57.8 °C	1	BD1	50.5°C	77.5°C	2	Q1	54.3°C	81.3°C	3	L2	56.1°C	83.1°C	4	Q5	55.2°C	82.2°C	5	D2	56.3°C	83.3°C	6	RTH2	51.5°C	78.5°C	7	T1	56.5°C	83.5°C	8	Q101	52.2°C	79.2°C	9	D9	53.1°C	80.1°C	10	C102	49.9°C	76.9°C	11	C201	50.4°C	77.4°C	12	C16	52.0°C	79.0°C	13	C106	47.9°C	74.9°C	14	C38	55.5°C	82.5°C	15	LF100	48.7°C	75.7°C	16	U900	52.7°C	79.7°C	17	U1	53.0°C	80.0°C	18	C5	46.4°C	76°C	
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18	C5	46.4°C	76°C																																																																													
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR ( MIN )	I/P : 305 VAC O/P : O/P SHORT TEST Ta : 25°C	TEST : OK																																																																												
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 305 VAC/100VAC O/P : 95% 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 : 305 VAC O/P : 95% LOAD Ta= 60 °C HUMIDITY= 95 %R.H	TEST : OK																																																																												
5	TEMPERATURE COEFFICIENT	± 0.03 %(0-50°C)	I/P : 230 VAC O/P : FULL LOAD	± 0.002 %(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 : -35°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 : 230VAC/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	HLG-150H-24:SUPPOSE C102 IS THE MOST CRITICAL COMPONENT (1) I/P : 230VAC O/P : FULL LOAD Tc= 80 °C LIFE TIME (2) I/P : 230VAC O/P : 75% LOAD Tc= 80 °C LIFE TIME (3) I/P : 230VAC O/P : 50% LOAD Tc= 80 °C LIFE TIME	(1) 64911HRS (2) 64955HRS (3) 66379HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 192.2K hrs min. MIL-HDBK-217F (25°C)	OK
11	Ongoing reliability test	I/P : 230VAC O/P : FULL LOAD TA=50°C Demonstration Mean Time Between Failure : 62,000 hours	OK

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

2003/12/12 A50-F023