



# Test Report: HLG-120H-15

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120W 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	SPECICATION	TEST CONDITION	RESULT
1	RIPPLE & NOISE	V1: 150 mVp-p (Max)	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	V1: 18.4 mVp-p (Max)
2	OUTPUT VOLTAGE ADJUST RANGE	CH1: 13.5V-17 V	I/P: 230 VAC I/P:115VAC O/P:MIN LOAD Ta:25°C	12.950 V-17.442V /230VAC 12.946 V-17.442 V/115VAC
3	CURRENT ADJ RANGE	4A-8A	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	3.68 A- 8.96 A
4	CONSTANT CURRENT REGION	7.5V-15V	I/P: 230 VAC O/P:CV MODE Ta:25°C	O/P=7.5V: 8.21 A O/P=14V: 8.28 A
5	OUTPUT VOLTAGE TOLERANCE	V1: -2% ~ 2% (Max)	I/P: 100 VAC /305VAC O/P:FULL/ 0% LOAD Ta:25°C	V1: -0.4 %~ 0.4 %
6	LINE REGULATION	V1: -0.5% ~ 0.5% (Max)	I/P:100 VAC ~305 VAC O/P:FULL LOAD Ta:25°C	V1: 0 %~ 0 %
7	LOAD REGULATION	V1: -1.5% ~ 1.5% (Max)	I/P: 230 VAC O/P:FULL -MIN LOAD Ta:25°C	V1: -0.4 %~ 0.4 %
8	SET UP TIME	230VAC/ 500 ms (Max) 115VAC/ 1200 ms (Max)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25°C	230VAC/ 394 ms 115 VAC/ 824 ms
9	RISE TIME	230VAC/ 50 ms (Max) 115VAC/ 50 ms (Max)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25°C	230VAC/ 8 ms 115 VAC/ 8 ms
10	HOLD UP TIME	230VAC/ 12 ms (Typ) 115VAC/ 12 ms (Typ)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25°C	230VAC/ 22 ms 115 VAC/ 22 ms
11	OVER/UNDERSHOOT TEST	< ±5%	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	TEST:< 5 %
12	DYNAMIC LOAD	V1: 1500 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	804 mVp-p 860 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	0.987A	1.765A	2.578A	3.390A	4.240A	5.046A	5.771A	6.612A	7.415A	8.220A
%	12.34%		22.06%	32.23%	42.38%	53.00%	63.08%	72.14%	82.65%	92.69%	102.75%		
2	Dimming value	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V		
	Output current	0.956A	1.759A	2.567A	3.346A	4.136A	4.917A	5.713A	6.505A	7.281A	8.080A		
	%	11.95%	21.99%	32.09%	41.83%	51.70%	61.46%	71.41%	81.31%	91.01%	101.00%		
3	Duty value	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%		
	Output current	0.993A	1.781A	2.592A	3.374A	4.159A	4.973A	5.728A	6.514A	7.302A	8.083A		
	%	12.41%	22.26%	32.40%	42.18%	51.99%	62.16%	71.60%	81.43%	91.28%	101.04%		

INPUT FUNCTION TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	90VAC~305 VAC	I/P:TESTING O/P:FULL LOAD Ta:25°C	76 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) 0.93/ 277 VAC FULL LOAD (TYP)	I/P: 230 VAC I/P: 115 VAC I/P: 277 VAC O/P:FULL LOAD Ta:25°C	PF=0.9627/230V/100%LOAD PF=0.9946 /115V/100%LOAD PF=0.934/277V/100%LOAD
4	EFFICIENCY	92% (TYP)	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	92.84 %
5	INPUT CURRENT	277V/ 0.55 A 230 V/ 0.6 A 115 V/ 1.4 A	I/P: 277 VAC I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25°C	I =0.493 A/ 277VAC I = 0.57 A/ 230VAC I = 1.14 A/ 115VAC
6	INRUSH CURRENT	230 V/ 60A (Typ) COLD START	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	I = 55 A/ 230VAC
7	TOTAL HARMONIC DISTORTION	THD< 20% when output loading $\geq$ 50% at 115VAC/230VAC input and output loading $\geq$ 75% at 277VAC input	I/P : 115 VAC I/P : 230 VAC O/P : 50% LOAD  I/P : 277 VAC O/P : 75%LOAD Ta : 25°C	THD : 11.71 /115VAC THD : 19.02 /230VAC  THD : 17.82 /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
2	OVER VOLTAGE PROTECTION	V1: 18V~ 21V	I/P: 305VAC I/P: 230 VAC I/P: 90 VAC O/P: MIN LOAD Ta:25°C	19.1 V/ 305VAC 19.1 V/ 230VAC 19.1 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 S 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

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) 474 V (2) 450 V (3) 454 V
2	Diode Peak Voltage	Q101 Rated 79A/60V	I/P : High-Line +3V =308V O/P : (1) Full Load Turn on (2) Output Short (3) Full load continue Ta : 25°C	(1) 40.2 V (2) 10.2 V (3) 33 V
		Q102 Rated 79A/60V	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) 53.4 V (2) 58 V (3) 35.2 V
3	Input Capacitor Voltage	C5 Rated: 82u/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) 436.7 V (2) 436.7 V (3) 436.7 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	(1) 13.792 V (2) 13.722 V (3) 13.718 V

			Change Ta : 25°C	
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) 508 V (2) 450 V (3) 456 V

**SAFETY & EMC TEST**

**SAFETY TEST**

NO	TEST ITEM	SPECICATION	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: 1.8KVAC/min Ta:25°C	I/P-O/P: 2.607 mA I/P-FG: 2.310 mA O/P-FG: 3.65 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	11 mΩ
4	LEAKAGE CURRENT	IEC60950-1 < 0.75 mA / 240VAC	I/P: 240 VAC O/P:Min LOAD Ta:25°C	L-FG: 0.22 mA N-FG: 0.22 mA
5	APPROVAL	0		

**E.M.C TEST**

NO	TEST ITEM	SPECICATION	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-120H-12 1. ROOM AMBIENT BURN-IN : 2.5 HRS I/P : 230VAC O/P : FULL LOAD Ta= 27.6 °C 2. HIGH AMBIENT BURN-IN : 5.5 HRS I/P : 230VAC O/P : FULL LOAD Ta=54.8 °C	<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta= 27.6 °C</th> <th>HIGH AMBIENT Ta= 54.8 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>BD1</td><td>51.7°C</td><td>72.2°C</td></tr> <tr><td>2</td><td>Q1</td><td>54.5°C</td><td>74.4°C</td></tr> <tr><td>3</td><td>L2</td><td>54.9°C</td><td>74.9°C</td></tr> <tr><td>4</td><td>Q5</td><td>54.9°C</td><td>74.9°C</td></tr> <tr><td>5</td><td>D2</td><td>57.5°C</td><td>76.8°C</td></tr> <tr><td>6</td><td>RTH2</td><td>53.0°C</td><td>73.0°C</td></tr> <tr><td>7</td><td>C5</td><td>51.3°C</td><td>71.5°C</td></tr> <tr><td>8</td><td>T1</td><td>65.8°C</td><td>85.2°C</td></tr> <tr><td>9</td><td>Q101</td><td>59.1°C</td><td>79.7°C</td></tr> <tr><td>10</td><td>D9</td><td>53.6°C</td><td>73.6°C</td></tr> <tr><td>11</td><td>C102</td><td>55.4°C</td><td>76.3°C</td></tr> <tr><td>12</td><td>C201</td><td>54.4°C</td><td>75.1°C</td></tr> <tr><td>13</td><td>C38</td><td>53.6°C</td><td>73.5°C</td></tr> <tr><td>14</td><td>U900</td><td>53.3°C</td><td>73.4°C</td></tr> <tr><td>15</td><td>U1</td><td>55.9°C</td><td>75.8°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta= 27.6 °C	HIGH AMBIENT Ta= 54.8 °C	1	BD1	51.7°C	72.2°C	2	Q1	54.5°C	74.4°C	3	L2	54.9°C	74.9°C	4	Q5	54.9°C	74.9°C	5	D2	57.5°C	76.8°C	6	RTH2	53.0°C	73.0°C	7	C5	51.3°C	71.5°C	8	T1	65.8°C	85.2°C	9	Q101	59.1°C	79.7°C	10	D9	53.6°C	73.6°C	11	C102	55.4°C	76.3°C	12	C201	54.4°C	75.1°C	13	C38	53.6°C	73.5°C	14	U900	53.3°C	73.4°C	15	U1	55.9°C	75.8°C	
NO	Position	ROOM AMBIENT Ta= 27.6 °C	HIGH AMBIENT Ta= 54.8 °C																																																																	
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9	Q101	59.1°C	79.7°C																																																																	
10	D9	53.6°C	73.6°C																																																																	
11	C102	55.4°C	76.3°C																																																																	
12	C201	54.4°C	75.1°C																																																																	
13	C38	53.6°C	73.5°C																																																																	
14	U900	53.3°C	73.4°C																																																																	
15	U1	55.9°C	75.8°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/230 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 %(0~60°C)	I/P : 230 VAC O/P : FULL LOAD	± 0 %																																																																
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 TURN ON/58 SEC;TURN OFF/2 SEC.	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-120H-12:SUPPOSE C102 IS THE MOST CRITICAL COMPONENT (1) I/P : 230VAC O/P : FULL LOAD Tc= 75 °C LIFE TIME (2) I/P : 230VAC O/P : 75% LOAD Tc= 75 °C LIFE TIME (3) I/P : 230VAC O/P : 50% LOAD Tc= 75 °C LIFE TIME	(1) 15360 HRS (2) 63048 HRS (3) 85717 HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 559.5K hrs min. Telcordia SR-332 (Bellcore); 167.1Khrs 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	

TEST RESULT	TESTER	REVIEW	APPROVAL
<b>PASS</b>	<b>DANIEL GAO</b>	<b>SANFORD SU</b>	<b>VINCENT TSENG</b>

2003/12/12 A50-F023