



# Test Report: HLG-240H-20

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240W 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: 150 mVp-p (Max)	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	V1: 20 mVp-p (Max)
2	OUTPUT VOLTAGE ADJUST RANGE	CH1: 18.6V~21.4 V	I/P: 230 VAC I/P:115VAC O/P:MIN LOAD Ta:25°C	17.64V~ 22.27 V /230VAC 17.64V~ 22.27 V/115VAC
3	CURRENT ADJ RANGE	6A~12A	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	1.58A~ 12.2 A
4	CONSTANT CURRENT REGION	10V~20V	I/P: 230 VAC O/P:CV MODE Ta:25°C	O/P=10V: 12.27 A O/P=19V: 12.2 A
5	OUTPUT VOLTAGE TOLERANCE	V1: -1% ~ 1% (Max)	I/P: 100 VAC /305VAC O/P:FULL/ 0% LOAD Ta:25°C	V1: -0.41%~ 0.41%
6	LINE REGULATION	V1: -0.5% ~ 0.5% (Max)	I/P:100 VAC ~305 VAC O/P:FULL LOAD Ta:25°C	V1: -0.03%~0.03%
7	LOAD REGULATION	V1: -1% ~ 1% (Max)	I/P: 230 VAC O/P:FULL ~MIN LOAD Ta:25°C	V1: -0.34%~0.41%
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/ 362 ms 115 VAC/ 704 ms
9	RISE TIME	230VAC/ 80 ms (Max) 115VAC/ 80 ms (Max)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25°C	230VAC/ 29 ms 115 VAC/ 30 ms
10	HOLD UP TIME	230VAC/ 15 ms (Typ) 115VAC/ 15 ms (Typ)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25°C	230VAC/ 26 ms 115 VAC/ 26 ms
11	OVER/UNDERSHOOT TEST	< ±5%	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	TEST:< 5%
12	DYNAMIC LOAD	V1: 2000 mVp-p	I/P: 230 VAC O/P:(1)FULL /Min LOAD 90%DUTY/1KHZ Ta:25°C	339mVp-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	1.259A	2.517A	3.694A	4.975A	6.103A	7.334A	8.448A	9.541A	10.664A	11.431A
%	10.49%		20.98%	30.78%	41.46%	50.86%	61.12%	70.40%	79.51%	88.87%	95.26%		
2	Dimming value	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V		
	Output current	1.302A	2.570A	3.758A	4.961A	6.163A	7.380A	8.617A	9.849A	11.061A	12.034A		
	%	10.85%	21.42%	31.32%	41.34%	51.36%	61.50%	71.81%	82.08%	92.18%	100.28%		
3	Duty value	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%		
	Output current	1.395A	2.695A	3.865A	5.053A	6.231A	7.403A	8.568A	9.734A	10.904A	12.077A		
	%	11.63%	22.46%	32.21%	42.11%	51.93%	61.69%	71.40%	81.12%	90.87%	100.64%		

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	68V~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) 0.9/ 230 VAC 65% LOAD (TYP) 0.9/ 115 VAC 65%LOAD (TYP)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD / 65% LOAD Ta:25°C	PF=0.96 /230V/100%LOAD PF=0.994/115V/100%LOAD PF=0.926/230V/65%LOAD PF=0.99/115V/65%LOAD
4	EFFICIENCY	91.5% (TYP)	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	92.01 %
5	INPUT CURRENT	277V/1.2 A (Typ) 230 V/ 2 A (Typ) 115 V/ 4 A (Typ)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25°C	I =1.01 A/ 277VAC I = 1.067 A/ 230VAC I = 2.082 A/ 115VAC
6	INRUSH CURRENT	230 V/ 75A (Typ) COLD START	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	I = 61 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 : 6.04 /115VAC THD : 12.17 /230VAC  THD : 12.44 /277VAC

**PROTECTION FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	95 %~108 %	I/P: 305 VAC I/P: 230 VAC I/P: 100 VAC O/P: TESTING Ta: 25°C	101 %/305VAC 101 %/ 230VAC 101 %/100VAC Constant Current Limiting
2	OVER VOLTAGE PROTECTION	V1: 23.5V~27.5V	I/P: 305 VAC I/P: 230 VAC I/P: 90 VAC O/P: MIN LOAD Ta: 25°C	23.4 V/305VAC 23.4 V/ 230VAC 23.4 V/ 90VAC Shunt down Re- power ON
3	OVER TEMPERATURE PROTECTION	NO DAMAGE	I/P: 230 VAC O/P: FULL LOAD	O.T.P. Active Shut down o/p volotage , 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 Hiccup Mode

**COMPONENT STRESS TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	Power Transistor ( D to S) or (C to E) Peak Voltage	Q4 Rated 16A/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) 446 V (2) 450 V (3) 438 V
2	Diode Peak Voltage	Q101 Rated 80A/75V	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) 47.6 V (2) 8 V (3) 46 V
		Q102 Rated 80A/75V	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) 75 V (2) 29 V (3) 50 V
3	Input Capacitor Voltage	C5 Rated: NCC: 150μ/450 V	I/P : High-Line +3V = 308 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) 435 V (2) 432 V (3) 436 V
4	Control IC Voltage Test	U 70 Rated 8.85V~16 V	I/P : High-Line +3V = 308 V O/P : (1)Full Load Turn on /Off (2) Min load Turn on /Off	(1) 13.2 V (2) 12.9 V (3) 12.87 V

			(3) Full Load /Min load Change Ta : 25°C	
5	P.F.C Transistor (D to S) or (C to E) Peak Voltage	Q1 Rated I 20.7A/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) 548 V (2) 466 V (3) 510 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: 4.98 mA I/P-FG: 4.08 mA O/P-FG: 5.3 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: 24.6 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	13 mΩ
4	LEAKAGE CURRENT	IEC60950-1 < 0.75 mA / 277VAC	I/P: 280 VAC O/P: Min LOAD Ta: 25°C	L-FG: 0.36 mA N-FG: 0.36 mA
5	APPROVAL	TUV: Certificate NO : R50171244 UL: File NO : E127738		

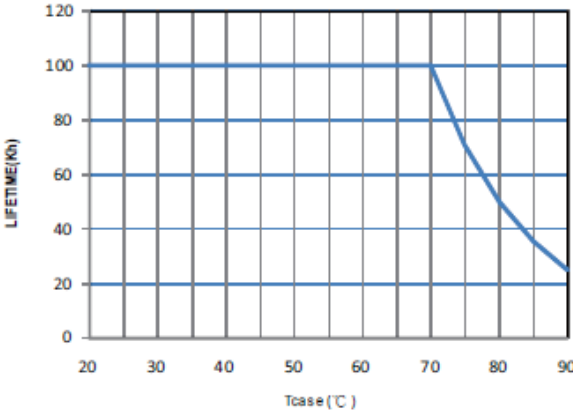
**E.M.C TEST**

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

Reliability Test

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT																																																																				
1	TEMPERATURE RISE TEST	MODEL : HLG-240H-12 1. ROOM AMBIENT BURN-IN : 1.5 HRS I/P : 230VAC O/P : FULL LOAD Ta= 26.5 °C 2. HIGH AMBIENT BURN-IN : 12 HRS I/P : 230VAC O/P : FULL LOAD Ta= 61.7 °C	<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta= 26.5 °C</th> <th>HIGH AMBIENT Ta= 61.7 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>LF1</td><td>62.7°C</td><td>89.2°C</td></tr> <tr><td>2</td><td>C1</td><td>59.8°C</td><td>88.0°C</td></tr> <tr><td>3</td><td>LF2</td><td>59.7°C</td><td>87.8°C</td></tr> <tr><td>4</td><td>BD1</td><td>60.5°C</td><td>89.2°C</td></tr> <tr><td>5</td><td>L2</td><td>59.3°C</td><td>87.7°C</td></tr> <tr><td>6</td><td>L1</td><td>59.6°C</td><td>88.1°C</td></tr> <tr><td>7</td><td>Q1</td><td>60.9°C</td><td>89.6°C</td></tr> <tr><td>8</td><td>C5</td><td>61.0°C</td><td>89.4°C</td></tr> <tr><td>9</td><td>U1</td><td>59.0°C</td><td>87.2°C</td></tr> <tr><td>10</td><td>TSW1</td><td>59.9°C</td><td>88.9°C</td></tr> <tr><td>11</td><td>C35</td><td>63.8°C</td><td>92.2°C</td></tr> <tr><td>12</td><td>Q3</td><td>60.8°C</td><td>89.5°C</td></tr> <tr><td>13</td><td>T1</td><td>78.2°C</td><td>106.1°C</td></tr> <tr><td>14</td><td>Q101</td><td>67.4°C</td><td>96.5°C</td></tr> <tr><td>15</td><td>C102</td><td>69.9°C</td><td>98.3°C</td></tr> <tr><td>16</td><td>LF101</td><td>77.9°C</td><td>106.5°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta= 26.5 °C	HIGH AMBIENT Ta= 61.7 °C	1	LF1	62.7°C	89.2°C	2	C1	59.8°C	88.0°C	3	LF2	59.7°C	87.8°C	4	BD1	60.5°C	89.2°C	5	L2	59.3°C	87.7°C	6	L1	59.6°C	88.1°C	7	Q1	60.9°C	89.6°C	8	C5	61.0°C	89.4°C	9	U1	59.0°C	87.2°C	10	TSW1	59.9°C	88.9°C	11	C35	63.8°C	92.2°C	12	Q3	60.8°C	89.5°C	13	T1	78.2°C	106.1°C	14	Q101	67.4°C	96.5°C	15	C102	69.9°C	98.3°C	16	LF101	77.9°C	106.5°C	
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR ( MIN )	I/P : 230 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 : 230 VAC/100VAC O/P : CV=11V Ta= -35 °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 : CV=11V 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	± 0.003 %(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		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-240H-12:SUPPOSE C102 IS THE MOST CRITICAL COMPONENT (1) I/P : 230VAC O/P : FULL LOAD Ta= 25 °C LIFE TIME (2) I/P : 230VAC O/P : FULL LOAD Ta= 60 °C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta= 60 °C LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta= 60 °C LIFE TIME	(1) 146876 HRS (2) 20799HRS (3) 40591 HRS (4) 70991 HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 207.9K hrs min. MIL-HDBK-217F (25°C)	
11	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure(Expected Life) : 62,000 hours @ Tcase 75°C 	

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

2003/12/12 A50-F023