



# Test Report: HLG-120H-20

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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	SPECIFICATION	TEST CONDITION	RESULT
1	RIPPLE & NOISE	V1: 150 mVp-p (Max)	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	V1: 31.6 mVp-p (Max)
2	OUTPUT VOLTAGE ADJUST RANGE	CH1: 17 V ~ 22 V	I/P: 230 VAC I/P:115VAC O/P:MIN LOAD Ta:25°C	16.52 V~22.46 V /230VAC 16.52 V~22.46 V/115VAC
3	CURRENT ADJ RANGE	3A~6A	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	2.679 A~7.055 A
4	CONSTANT CURRENT REGION	10V~20V	I/P: 230 VAC O/P:CV MODE Ta:25°C	O/P=10V: 6.097 A O/P=19V: 6.127 A
5	OUTPUT VOLTAGE TOLERANCE	V1: -2.5 % ~ 2.5 % (Max)	I/P: 100 VAC /305VAC O/P:FULL/ 0 % LOAD Ta:25°C	V1: -0.3 %~0.3 %
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: -2% ~ 2 % (Max)	I/P: 230 VAC O/P:FULL ~MIN LOAD Ta:25°C	V1: -0.3 %~ 0.3 %
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/ 6.5 ms 115 VAC/ 6.5 ms
10	HOLD UP TIME	230VAC/ 12ms (Typ) 115VAC/ 12 ms (Typ)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25°C	230VAC/ 24 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: 1200 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	524 mVp-p 1680 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	0.748A	1.347A	1.992A	2.502A	3.093A	3.656A	4.205A	4.717A	5.349A	5.916A
	%	12.47%	22.45%	33.20%	41.70%	51.55%	60.93%	70.08%	78.62%	89.15%	98.60%		
2	Dimming value	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V		
	Output current	0.752A	1.343A	1.936A	2.524A	3.140A	3.705A	4.294A	4.883A	5.471A	6.064A		
	%	12.53%	22.38%	32.27%	42.07%	52.33%	61.75%	71.57%	81.38%	91.18%	101.07%		
3	Duty value	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%		
	Output current	0.807A	1.399A	1.993A	2.585A	3.173A	3.762A	4.352A	4.943A	5.534A	6.123A		
	%	13.45%	23.32%	33.22%	43.08%	52.88%	62.70%	72.53%	82.38%	92.23%	102.05%		



# 120W Constant Voltage + Constant Current LED Driver

# HLG-120H series

## 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	79 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=0.94 /277V/100%LOAD
4	EFFICIENCY	93% (TYP)	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	93.57 %
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 = 1.13 A/ 115VAC
6	INRUSH CURRENT	230 V/ 60A (Typ) COLD START	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	I = 50 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 : 10.46 /115VAC THD : 17.21 /230VAC  THD : 15.72 /277VAC

## PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECICATION	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: 23V~27V	I/P: 305VAC I/P: 230 VAC I/P: 90 VAC O/P:MIN LOAD Ta:25°C	25.28 V/ 305VAC 25.26 V/ 230VAC 25.30 V/ 100VAC Shut down o/p voltage with auto recovery or re-power on to recovery



# 120W Constant Voltage + Constant Current LED Driver

# HLG-120H series

3	OVER TEMPERATURE PROTECTION	NO DAMAGE	I/P: 230 VAC O/P: FULL LOAD	O.T.P. Active Shut down o/p voltage with auto recovery or re-power on to recovery
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) 454 V (3) 452 V
2	Diode Peak Voltage	Q101 Rated 80A/75V	I/P : High-Line +3V = 308V O/P : (1) Full Load Turn on (2) Output Short (3) Full load continue Ta : 25°C	(1) 50 V (2) 15.6 V (3) 48.2 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) 71 V (2) 57.6 V (3) 49.6 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) 435.1 V (2) 436.9 V (3) 436.6 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) 12.676 V (2) 12.435 V (3) 12.436 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) 502 V (2) 456 V (3) 454 V



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# HLG-120H series

## 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:2KVAC/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: 2.726 mA I/P-FG: 2.498 mA O/P-FG: 3.74 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	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



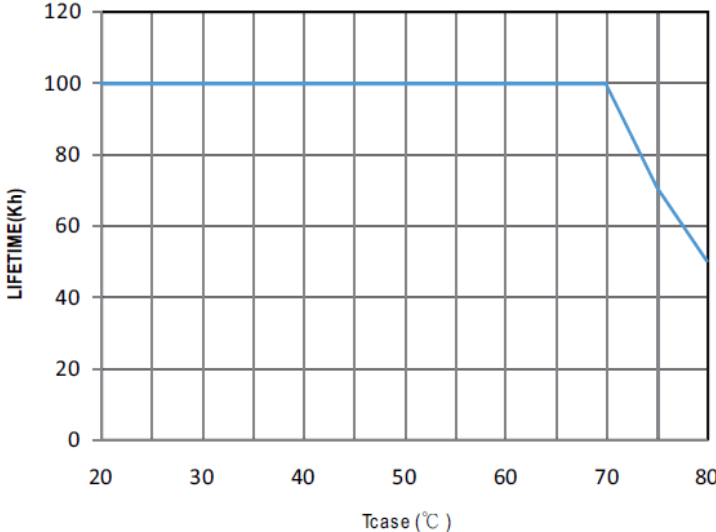
Reliability Test

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	
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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 : 305 VAC O/P : FULL LOAD	± 0 %(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 TURN ON/58 SEC;TURN OFF/2 SEC.		OK																																																																



120W Constant Voltage + Constant Current LED Driver

**HLG-120H series**

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 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) 550477 HRS (2) 75327 HRS (3) 120028 HRS (4) 158681 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	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure(Expected Life) : 62,000 hours @ Tcase 75°C  	OK

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

2003/12/12 A50-F023