



# Test Report: HLG-120H-36

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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: 200 mVp-p (Max)	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	V1: 38 mVp-p (Max)
2	OUTPUT VOLTAGE ADJUST RANGE	CH1: 33V~40 V	I/P: 230 VAC I/P:115VAC O/P:MIN LOAD Ta:25°C	31.41 V~ 41.07 V /230VAC 31.38 V~ 41.07 V /115VAC
3	CURRENT ADJ RANGE	1.7A~3.4A	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	1.503 A~ 3.722 A
4	CONSTANT CURRENT REGION	18V~36V	I/P: 230 VAC O/P:CV MODE Ta:25°C	O/P=18V: 3.533 A O/P=35V:3.527 A
5	OUTPUT VOLTAGE TOLERANCE	V1: -1% ~ 1% (Max)	I/P: 100 VAC /305VAC O/P:FULL/ 0% LOAD Ta:25°C	V1:-0.06 %~ 0.06 %
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: -0.5% ~ 0.5% (Max)	I/P: 230 VAC O/P:FULL -MIN LOAD Ta:25°C	V1:-0.05 %~ 0.05 %
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/ 6.9 ms 115 VAC/ 7 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/ 24 ms 115 VAC/ 23 ms
11	OVER/UNDERSHOOT TEST	< ±5%	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	TEST:< 5 %
12	DYNAMIC LOAD	V1: 3600 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	450 mVp-p 1500 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	0.387A	0.736A	1.057A	1.381A	1.720A	2.043A	2.366A	2.665A	3.037A	3.369A
%	11.38%		21.65%	31.09%	40.62%	50.59%	60.09%	69.59%	78.38%	89.32%	99.09%		
2	Dimming value	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V		
	Output current	0.388A	0.728A	1.062A	1.397A	1.729A	2.070A	2.399A	2.730A	3.066A	3.401A		
	%	11.41%	21.41%	31.24%	41.09%	50.85%	60.88%	70.56%	80.29%	90.18%	100.03%		
3	Duty value	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%		
	Output current	0.418A	0.757A	1.092A	1.425A	1.759A	2.093A	2.428A	2.764A	3.100A	3.434A		
	%	12.29%	22.26%	32.12%	41.91%	51.74%	61.56%	71.41%	81.29%	91.18%	101.00%		

**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	77 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=0.933 /277V/100%LOAD
4	EFFICIENCY	93% (TYP)	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	94.28 %
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 = 0.58 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 : 9.82 /115VAC THD : 16.59 /230VAC  THD : 15.08 /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, recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	V1: 41V~ 46V	I/P: 305VAC I/P: 230 VAC I/P: 90 VAC O/P:MIN LOAD Ta:25°C	42.46 V/ 305VAC 42.48 V/ 230VAC 42.51 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 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, 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) 478 V (2) 454 V (3) 454 V
2	Diode Peak Voltage	Q101 Rated 40A/120V	I/P : High-Line +3V =308V O/P : (1)Full Load Turn on (2)Output Short (3)Full load continue Ta : 25°C	(1) 112 V (2) 41.6 V (3) 87.6 V
		Q102 Rated 40A/120V	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) 112 V (2) 80.8 V (3) 87.2 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) 434.4 V (2) 435 V (3) 435 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) 12.608 V (2) 12.574 V (3) 12.575 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) 488 V (2) 458 V (3) 454 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: 2.620 mA I/P-FG: 2.317 mA O/P-FG: 3.62 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: 10.26 GΩ I/P-FG: 5.86 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:230 VAC/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-24 1. ROOM AMBIENT BURN-IN : 2.5 HRS I/P : 230VAC O/P : FULL LOAD Ta= 27.6 °C 2. HIGH AMBIENT BURN-IN : 5.5HRS 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>50.1°C</td><td>70.3°C</td></tr> <tr><td>2</td><td>Q1</td><td>51.2°C</td><td>71.2°C</td></tr> <tr><td>3</td><td>L2</td><td>52.2°C</td><td>72.0°C</td></tr> <tr><td>4</td><td>Q5</td><td>51.7°C</td><td>71.6°C</td></tr> <tr><td>5</td><td>D2</td><td>52.6°C</td><td>72.3°C</td></tr> <tr><td>6</td><td>RTH2</td><td>49.6°C</td><td>69.6°C</td></tr> <tr><td>7</td><td>C5</td><td>49.0°C</td><td>68.8°C</td></tr> <tr><td>8</td><td>T1</td><td>54.2°C</td><td>73.4°C</td></tr> <tr><td>9</td><td>Q101</td><td>51.1°C</td><td>71.1°C</td></tr> <tr><td>10</td><td>D9</td><td>50.4°C</td><td>70.4°C</td></tr> <tr><td>11</td><td>C102</td><td>48.3°C</td><td>68.5°C</td></tr> <tr><td>12</td><td>C201</td><td>49.9°C</td><td>69.9°C</td></tr> <tr><td>13</td><td>C38</td><td>51.6°C</td><td>71.5°C</td></tr> <tr><td>14</td><td>U900</td><td>50.1°C</td><td>70.3°C</td></tr> <tr><td>15</td><td>U1</td><td>51.6°C</td><td>71.9°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta= 27.6 °C	HIGH AMBIENT Ta= 54.8 °C	1	BD1	50.1°C	70.3°C	2	Q1	51.2°C	71.2°C	3	L2	52.2°C	72.0°C	4	Q5	51.7°C	71.6°C	5	D2	52.6°C	72.3°C	6	RTH2	49.6°C	69.6°C	7	C5	49.0°C	68.8°C	8	T1	54.2°C	73.4°C	9	Q101	51.1°C	71.1°C	10	D9	50.4°C	70.4°C	11	C102	48.3°C	68.5°C	12	C201	49.9°C	69.9°C	13	C38	51.6°C	71.5°C	14	U900	50.1°C	70.3°C	15	U1	51.6°C	71.9°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 : 305VAC/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% 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	± 0.002 % (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 TURN ON/58 SEC.;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-120H-24: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) 904185HRS (2) 129762 HRS (3) 150329 HRS (4) 171517 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