



# Test Report: HLG-120H-C350

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150W Constant Current Mode LED Driver

## ■ DESIGN VERIFY TEST

Output Function Test

Input Function Test

Protection Function Test

Component Stress Test

## ■ SAFETY & E.M.C. TEST

Safety Test

E.M.C. Test

## ■ RELIABILITY TEST

ENVIRONMENT TEST

## DESIGN VERIFY TEST

### OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT																																																																																																																																						
1	CONSTANT CURRENT REGION	215V~430V	I/P : 230VAC O/P : CV MODE : 215V~429V Ta : 25°C	TEST : OK																																																																																																																																						
2	CURRENT TOLERANCE	± 5%	I/P : 230VAC O/P : CV MODE : 215V~429V Ta : 25°C	± 1.1 %																																																																																																																																						
3	CURRENT RIPPLE	8%	I/P : 230VAC O/P : LED : 215V~429V Ta : 25°C	LED=215V 5.3 % LED=429V 1.9 %																																																																																																																																						
4	OUTPUT CURRENT ADJUST RANGE	CH1 : 175mA~ 350mA	I/P : 230VAC I/P : 115 VAC O/P : CV MODE : 428V Ta : 25°C	0.1563 A~ 0.3866 A/ 230VAC 0.1563 A~ 0.3866 A/ 115 VAC																																																																																																																																						
5	SET UP TIME	115 VAC : 1000 ms (Max) 230VAC : 500 ms(Max)	I/P : 115 VAC I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	115 VAC/ 712 ms 230VAC/ 359 ms																																																																																																																																						
6	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	TEST : <5 %																																																																																																																																						
7	<p><b>DIMMING TEST</b></p> <p>※Built-in 3 in 1 dimming function, IP67 rated. Output constant current level can be adjusted through output cable by connecting a resistance or 1 ~ 10Vdc or 10V PWM signal between DIM+ and DIM-.</p> <p>※ Please DO NOT connect "DIM-" to "-V".</p> <p>※Reference resistance value for output current adjustment (Typical)</p> <table border="1" style="width:100%; text-align:center;"> <tr> <td>Resistance value</td> <td>10K</td><td>20K</td><td>30K</td><td>40K</td><td>50K</td><td>60K</td><td>70K</td><td>80K</td><td>90K</td><td>100K</td><td>OPEN</td> </tr> <tr> <td>Output current</td> <td>10%</td><td>20%</td><td>30%</td><td>40%</td><td>50%</td><td>60%</td><td>70%</td><td>80%</td><td>90%</td><td>100%</td><td>102%~108%</td> </tr> </table> <p>*1 ~ 10V dimming function for output current adjustment (Typical)</p> <table border="1" style="width:100%; text-align:center;"> <tr> <td>Dimming value</td> <td>1V</td><td>2V</td><td>3V</td><td>4V</td><td>5V</td><td>6V</td><td>7V</td><td>8V</td><td>9V</td><td>10V</td><td>OPEN</td> </tr> <tr> <td>Output current</td> <td>10%</td><td>20%</td><td>30%</td><td>40%</td><td>50%</td><td>60%</td><td>70%</td><td>80%</td><td>90%</td><td>100%</td><td>102%~108%</td> </tr> </table> <p>*10V PWM signal for output current adjustment (Typical)</p> <table border="1" style="width:100%; text-align:center;"> <tr> <td>Duty value</td> <td>10%</td><td>20%</td><td>30%</td><td>40%</td><td>50%</td><td>60%</td><td>70%</td><td>80%</td><td>90%</td><td>100%</td><td>OPEN</td> </tr> <tr> <td>Output current</td> <td>10%</td><td>20%</td><td>30%</td><td>40%</td><td>50%</td><td>60%</td><td>70%</td><td>80%</td><td>90%</td><td>100%</td><td>102%~108%</td> </tr> </table> <p>TEST RESULT: I/P : 230 VAC ;Ta : 25°C</p> <table border="1" style="width:100%; text-align:center;"> <tr> <td rowspan="3">1</td> <td>Resistance value</td> <td>10K</td><td>20K</td><td>30K</td><td>40K</td><td>50K</td><td>60K</td><td>70K</td><td>80K</td><td>90K</td><td>100K</td><td>OPEN</td> </tr> <tr> <td>Output current</td> <td>0.041A</td><td>0.076A</td><td>0.112A</td><td>0.145A</td><td>0.187A</td><td>0.225A</td><td>0.255A</td><td>0.287A</td><td>0.327A</td><td>0.362A</td><td>0.364A</td> </tr> <tr> <td>Percentage of rated current</td> <td>11.74%</td><td>21.74%</td><td>31.86%</td><td>41.54%</td><td>53.43%</td><td>64.34%</td><td>72.77%</td><td>82.00%</td><td>93.34%</td><td>103.32%</td><td>103.99%</td> </tr> <tr> <td rowspan="2">2</td> <td>Dimming value</td> <td>1V</td><td>2V</td><td>3V</td><td>4V</td><td>5V</td><td>6V</td><td>7V</td><td>8V</td><td>9V</td><td>10V</td><td>OPEN</td> </tr> <tr> <td>Output current</td> <td>0.041A</td><td>0.075A</td><td>0.110A</td><td>0.144A</td><td>0.179A</td><td>0.213A</td><td>0.247A</td><td>0.281A</td><td>0.316A</td><td>0.350A</td><td>0.364A</td> </tr> </table>				Resistance value	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K	OPEN	Output current	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	102%~108%	Dimming value	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V	OPEN	Output current	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	102%~108%	Duty value	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	OPEN	Output current	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	102%~108%	1	Resistance value	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K	OPEN	Output current	0.041A	0.076A	0.112A	0.145A	0.187A	0.225A	0.255A	0.287A	0.327A	0.362A	0.364A	Percentage of rated current	11.74%	21.74%	31.86%	41.54%	53.43%	64.34%	72.77%	82.00%	93.34%	103.32%	103.99%	2	Dimming value	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V	OPEN	Output current	0.041A	0.075A	0.110A	0.144A	0.179A	0.213A	0.247A	0.281A	0.316A	0.350A	0.364A
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3	Percentage of rated current	11.69%	21.51%	31.34%	41.09%	51.00%	60.86%	70.57%	80.41%	90.20%	100.10%	103.99%
	Duty value	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	OPEN
	Output current	0.044A	0.079A	0.113A	0.147A	0.182A	0.216A	0.250A	0.285A	0.319A	0.354A	0.364A
	Percentage of rated current	12.66%	22.43%	32.23%	42.03%	51.86%	61.68%	71.49%	81.34%	91.17%	101.03%	103.99%

## 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  I/P : LOW-LINE-3V=87V HIGH-LINE+10V=315V O/P : FULL/MIN LOAD ON : 30 Sec . OFF : 30 Sec 10MIN ( AC POWER ON/OFF NO DAMAGE )	66.8 V~305V  TEST : OK
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE	I/P : 90VAC ~ 305VAC O/P : FULL~MIN LOAD Ta : 25°C	TEST : OK
3	POWER FACTOR	0.98 / 115VAC(TYP) 0.96 /230 VAC(TYP) 0.93 /277 VAC(TYP)	I/P : 115VAC I/P : 230VAC I/P : 277VAC O/P : FULL LOAD Ta : 25°C	PF= 0.997 / 115VAC PF= 0.968 / 230VAC PF= 0.940 / 277VAC
4	EFFICIENCY	94 % (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	94.06 %
5	INPUT CURRENT	277V/ 0.7 A (TYP) 230V/ 0.8 A (TYP) 115V/ 1.6 A (TYP)	I/P : 277 VAC I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I = 0.61 A/ 277 VAC I = 0.71 A/ 230 VAC I = 1.41 A/ 115 VAC
6	INRUSH CURRENT	230V/ 50 A (TYP) (twidth=600us measured at 50% Ipeak) COLD START	I/P : 230VAC O/P : FULL LOAD Ta : 25°C	I = 42 A/ 230VAC T50= 580 us
7	LEAKAGE CURRENT	< 0.75 mA / 277 VAC	I/P : 277 VAC O/P : Min LOAD Ta : 25°C	L-FG : 0.28 mA N-FG : 0.28 mA
8	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 : 11.62 /115VAC THD : 19.5 /230VAC  THD : 18.54 /277VAC

## PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER VOLTAGE PROTECTION	CH1 : 475V ~ 495 V	I/P : 115 VAC I/P : 230 VAC O/P : MIN LOAD Ta : 25°C	488.51V/ 115VAC 488.49V/ 230 VAC Shut down o/p voltage with auto-recovery or re-power on to recovery
2	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
3	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P : 305 VAC 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 11A/600V	I/P : High-Line +3V = 308V O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	(1) 472 V (2) 460 V (3) 460 V
2	Diode Peak Voltage	D101 Rated 3A/600V	I/P : High-Line +3V =308V O/P : (1)Full Load Turn on (2)Output Short (3)Full load continue Ta : 25°C	(1) 450 V (2) 5.50 V (3) 446 V
		D103 Rated 3A/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) 452 V (2) 5.24 V (3) 450 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) 464 V (2) 460 V (3) 462 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) 13.8 V (2) 13.7 V (3) 13.8 V
5	P.F.C Transistor ( D to S) or (C to E) Peak Voltage	Q1 Rated: 20A/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) 528 V (2) 466 V (3) 496 V

## ■ SAFETY & E.M.C. TEST

### SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P : 3.75 KVAC/min I/P-FG : 2 KVAC/min<4.5mA O/P-FG : 1.5 KVAC/min	I/P-O/P : 4 KVAC/min I/P-FG : 2.4 KVAC/min O/P-FG : 1.8 KVAC/min Ta : 25°C	I/P-O/P : 3.49 mA I/P-FG : 2.798 mA O/P-FG : 2.035 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 /70%RH	I/P-O/P : 30 GΩ I/P-FG : 24 GΩ O/P-FG : 30 GΩ NO DAMAGE
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40 A / 2min Ta : 25°C / 70%RH	19 mΩ

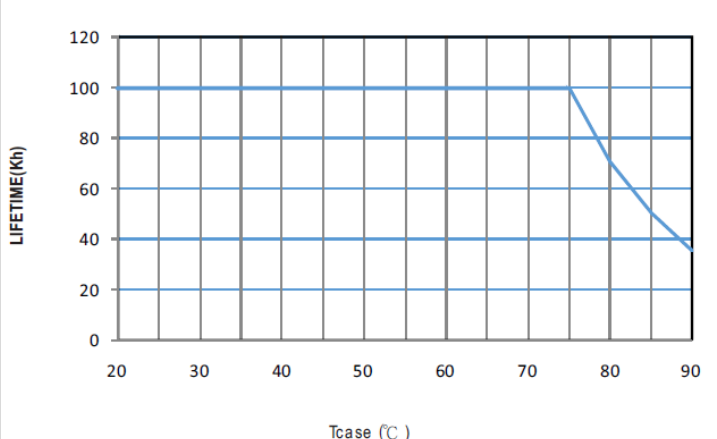
### E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	EN61000-3-2 CLASS C	I/P: 230/347VAC/60HZ O/P:100/60%ELECTRONIC LOAD O/P:100%LED LOAD Ta:25°C	PASS
2	CONDUCTION	EN55015 CLASS B	I/P: 230VAC (50HZ) O/P:FULL/50% LOAD Ta:25°C	PASS Test by certified Lab
3	RADIATION	EN55015 CLASS B	I/P: 230/230 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:230/230 VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A
5	E.F.T	EN61000-4-4 INDUSTRY INPUT: 2KV	I/P: 230/230 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: 230/230 VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A

■ RELIABILITY TEST

ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT																																																												
1	TEMPERATURE RISE TEST	MODEL : HLG-120H-C350 1. ROOM AMBIENT BURN-IN : 4 HRS I/P : 230VAC O/P : FULL LOAD Ta=29.4 °C 2. HIGH AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta=59.2°C	<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta=29.4°C</th> <th>HIGH AMBIENT Ta= 59.2°C</th> </tr> </thead> <tbody> <tr><td>1</td><td>BD1</td><td>53.3°C</td><td>79.7°C</td></tr> <tr><td>2</td><td>L1</td><td>52.2°C</td><td>78.4°C</td></tr> <tr><td>3</td><td>Q1</td><td>55.9°C</td><td>81.6°C</td></tr> <tr><td>4</td><td>C5</td><td>51.5°C</td><td>77.4°C</td></tr> <tr><td>5</td><td>D2</td><td>59.2°C</td><td>83.4°C</td></tr> <tr><td>6</td><td>Q5</td><td>54.0°C</td><td>80.1°C</td></tr> <tr><td>7</td><td>RTH2</td><td>52.1°C</td><td>78.2°C</td></tr> <tr><td>8</td><td>T1</td><td>53.6°C</td><td>79.5°C</td></tr> <tr><td>9</td><td>D103</td><td>51.7°C</td><td>77.8°C</td></tr> <tr><td>10</td><td>LF100</td><td>49.2°C</td><td>75.5°C</td></tr> <tr><td>11</td><td>C110</td><td>49.4°C</td><td>75.5°C</td></tr> <tr><td>12</td><td>U1</td><td>50.7°C</td><td>77.5°C</td></tr> <tr><td>13</td><td>U900</td><td>52.0°C</td><td>78.2°C</td></tr> <tr><td>14</td><td>L2</td><td>53.7°C</td><td>79.9°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta=29.4°C	HIGH AMBIENT Ta= 59.2°C	1	BD1	53.3°C	79.7°C	2	L1	52.2°C	78.4°C	3	Q1	55.9°C	81.6°C	4	C5	51.5°C	77.4°C	5	D2	59.2°C	83.4°C	6	Q5	54.0°C	80.1°C	7	RTH2	52.1°C	78.2°C	8	T1	53.6°C	79.5°C	9	D103	51.7°C	77.8°C	10	LF100	49.2°C	75.5°C	11	C110	49.4°C	75.5°C	12	U1	50.7°C	77.5°C	13	U900	52.0°C	78.2°C	14	L2	53.7°C	79.9°C	
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2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 305VAC/100VAC O/P : 100 % LOAD Ta= -25°C	TEST : OK																																																												
3	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 : FULL LOAD Ta= 60 °C HUMIDITY= 95 %R.H	TEST : OK																																																												
4	TEMPERATURE COEFFICIENT	± 0.03%(0~50°C)	I/P : 230 VAC O/P : FULL LOAD	± 0.0023 %(0~50°C)																																																												
5	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																																																												
6.	THERMAL SHOCK TEST	1. Thermal shock Temperature : -30°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/Fu11 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-120H-C350:SUPPOSE C110 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) 948480 HRS (2) 108334 HRS (3) 109222 HRS (4) 118800 HRS																						
10	MTBF	Conducted by Parts Stress Analysis Prediction 652.2K hrs min. Telcordia SR-332 (Bellcore) ; 191.1K hrs min. MIL-HDBK-217F (25°C)																							
11	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure (Expected Life): Above 62,000 hours @ Tcase 80°C  <table border="1"> <caption>Graph Data: Lifetime (kh) vs Tcase (°C)</caption> <thead> <tr> <th>Tcase (°C)</th> <th>Lifetime (kh)</th> </tr> </thead> <tbody> <tr><td>20</td><td>100</td></tr> <tr><td>30</td><td>100</td></tr> <tr><td>40</td><td>100</td></tr> <tr><td>50</td><td>100</td></tr> <tr><td>60</td><td>100</td></tr> <tr><td>70</td><td>100</td></tr> <tr><td>75</td><td>100</td></tr> <tr><td>80</td><td>70</td></tr> <tr><td>85</td><td>50</td></tr> <tr><td>90</td><td>35</td></tr> </tbody> </table>		Tcase (°C)	Lifetime (kh)	20	100	30	100	40	100	50	100	60	100	70	100	75	100	80	70	85	50	90	35
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90	35																								

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

12.10.30 A50-F031