



Test Report: HLG-185H-C500

200W 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	CURRENT TOLERANCE	± 5%	I/P : 230VAC O/P : CV MODE : 200V~400V Ta : 25°C	± 0.08 %
2	CURRENT RIPPLE	5.0% max. @rated current	I/P : 230VAC O/P : LED : 200V~400V Ta : 25°C	LED=200V 4 % LED=400V 2.5 %
3	OUTPUT CURRENT ADJUST RANGE	CH1 : 250mA~ 500mA	I/P : 230VAC I/P : 115 VAC O/P : CV MODE : 400V Ta : 25°C	0.2267 A~ 0.5505 A/ 230VAC 0.2267 A~ 0.5506 A/ 115 VAC
4	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/ 714 ms 230VAC/ 365 ms
5	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	TEST : <5 %

6 DIMMING TEST
 ※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-.
 ※ Please DO NOT connect "DIM-" to "-V".
 ※Reference resistance value for output current adjustment (Typical)

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%

*1 ~ 10V dimming function for output current adjustment (Typical)

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%

*10V PWM signal for output current adjustment (Typical) Frequency range :100Hz ~ 3KHz

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%

TEST RESULT: I/P : 230 VAC ; Ta : 25°C

1	Resistance value	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K	OPEN
	Output current	0.058A	0.113A	0.155A	0.205A	0.257A	0.312A	0.354A	0.399A	0.453A	0.502A	0.520A
	Percentage of rated current	11.68%	22.68%	30.92%	40.92%	51.48%	62.34%	70.70%	79.84%	90.58%	100.38%	103.96%
2	Dimming value	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V	OPEN
	Output current	0.057A	0.107A	0.156A	0.206A	0.254A	0.306A	0.353A	0.403A	0.452A	0.501A	0.520A
	Percentage of rated current	11.44%	21.40%	31.24%	41.16%	50.82%	61.10%	70.68%	80.58%	90.36%	100.16%	103.96%
3	Duty value	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	OPEN

Output current	0.067A	0.116A	0.165A	0.214A	0.263A	0.312A	0.361A	0.410A	0.460A	0.508A	0.520A	
Percentage of rated current	13.48%	23.26%	33.06%	42.86%	52.66%	62.44%	72.24%	82.08%	91.90%	101.64%	103.96%	

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)	79.4V~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) 0.94 /277 VAC(TYP)	I/P : 115VAC I/P : 230VAC I/P : 277VAC O/P : FULL LOAD Ta : 25°C	PF= 0.997 / 115VAC PF= 0.971 / 230VAC PF= 0.945 / 277VAC
4	EFFICIENCY	94 % (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	94.67 %
5	INPUT CURRENT	277V/ 0.85 A (TYP) 230V/ 1 A (TYP) 115V/ 2 A (TYP)	I/P : 277 VAC I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I = 0.79 A/ 277 VAC I = 0.94 A/ 230 VAC I = 1.84 A/ 115 VAC
6	INRUSH CURRENT	230V/ 55 A (TYP) (twidth=900us measured at 50% Ipeak) COLD START	I/P : 230VAC O/P : FULL LOAD Ta : 25°C	I = 49.5 A/ 230VAC T50= 620 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 : 10.94 /115VAC THD : 17.9 /230VAC THD : 16.33 /277VAC

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER VOLTAGE PROTECTION	CH1 : 450V ~ 470 V	I/P : 115 VAC I/P : 230 VAC O/P : MIN LOAD Ta : 25°C	460.27V/ 115VAC 460.21V/ 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) 490 V (2) 458 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) 420 V (2) 3.6 V (3) 418 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) 420 V (2) 3.6 V (3) 418 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) 466 V (2) 474 V (3) 480 V
4	Control IC Voltage Test	U 900 Rated: PWM L6599ATD 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) 14.1 V (2) 14 V (3) 14.1 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) 570 V (2) 474 V (3) 506 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 : 4.2 KVAC/min I/P-FG : 2.4 KVAC/min O/P-FG : 1.8 KVAC/min Ta : 25°C	I/P-O/P : 3.59 mA I/P-FG : 2.805 mA O/P-FG : 2.032 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 : 30 GΩ O/P-FG : 24.1 GΩ NO DAMAGE
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40 A / 2min Ta : 25°C / 70%RH	28 mΩ

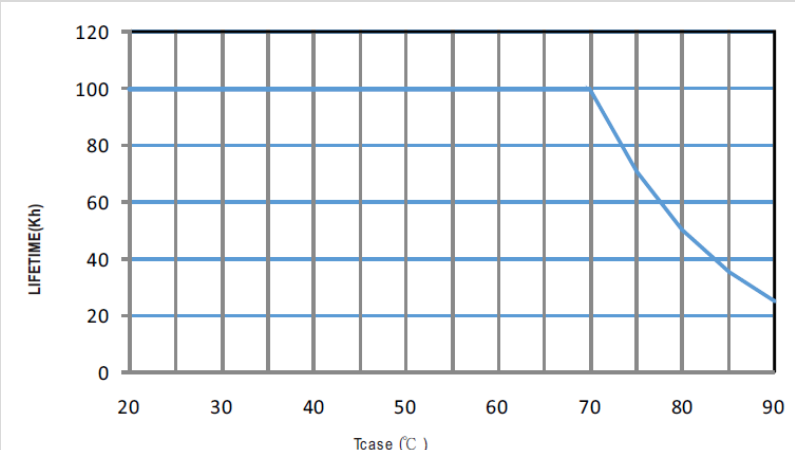
E.M.C TEST

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-185H-C500 1. ROOM AMBIENT BURN-IN : 6.5 HRS I/P : 230VAC O/P : FULL LOAD Ta=30.7 °C 2. HIGH AMBIENT BURN-IN : 4.5 HRS I/P : 230VAC O/P : FULL LOAD Ta=58.4°C	<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta= 30.7 °C</th> <th>HIGH AMBIENT Ta= 58.4 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>BD1</td><td>60.1°C</td><td>85.6°C</td></tr> <tr><td>2</td><td>L1</td><td>58.2°C</td><td>83.8°C</td></tr> <tr><td>3</td><td>D3</td><td>61.5°C</td><td>87.0°C</td></tr> <tr><td>4</td><td>Q1</td><td>61.3°C</td><td>86.3°C</td></tr> <tr><td>5</td><td>C5</td><td>58.1°C</td><td>83.3°C</td></tr> <tr><td>6</td><td>D2</td><td>69.2°C</td><td>93.3°C</td></tr> <tr><td>7</td><td>Q5</td><td>61.5°C</td><td>87.7°C</td></tr> <tr><td>8</td><td>RTH2</td><td>60.0°C</td><td>85.8°C</td></tr> <tr><td>9</td><td>T1</td><td>70.0°C</td><td>96.2°C</td></tr> <tr><td>10</td><td>LF100</td><td>54.7°C</td><td>80.5°C</td></tr> <tr><td>11</td><td>C111</td><td>56.8°C</td><td>82.7°C</td></tr> <tr><td>12</td><td>U1</td><td>58.9°C</td><td>84.5°C</td></tr> <tr><td>13</td><td>U900</td><td>57.4°C</td><td>83.1°C</td></tr> <tr><td>14</td><td>L2</td><td>60.5°C</td><td>86.4°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta= 30.7 °C	HIGH AMBIENT Ta= 58.4 °C	1	BD1	60.1°C	85.6°C	2	L1	58.2°C	83.8°C	3	D3	61.5°C	87.0°C	4	Q1	61.3°C	86.3°C	5	C5	58.1°C	83.3°C	6	D2	69.2°C	93.3°C	7	Q5	61.5°C	87.7°C	8	RTH2	60.0°C	85.8°C	9	T1	70.0°C	96.2°C	10	LF100	54.7°C	80.5°C	11	C111	56.8°C	82.7°C	12	U1	58.9°C	84.5°C	13	U900	57.4°C	83.1°C	14	L2	60.5°C	86.4°C	
NO	Position	ROOM AMBIENT Ta= 30.7 °C	HIGH AMBIENT Ta= 58.4 °C																																																													
1	BD1	60.1°C	85.6°C																																																													
2	L1	58.2°C	83.8°C																																																													
3	D3	61.5°C	87.0°C																																																													
4	Q1	61.3°C	86.3°C																																																													
5	C5	58.1°C	83.3°C																																																													
6	D2	69.2°C	93.3°C																																																													
7	Q5	61.5°C	87.7°C																																																													
8	RTH2	60.0°C	85.8°C																																																													
9	T1	70.0°C	96.2°C																																																													
10	LF100	54.7°C	80.5°C																																																													
11	C111	56.8°C	82.7°C																																																													
12	U1	58.9°C	84.5°C																																																													
13	U900	57.4°C	83.1°C																																																													
14	L2	60.5°C	86.4°C																																																													
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	± 0.004 %(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/Full Load AC ON/OFF TEST turn on 58sec ; turn off 2sec		OK																																																												

7	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
8	CAPACITOR LIFE CYCLE	HLG-185H-C500 :SUPPOSE C111 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) 620144 HRS (2) 62118 HRS (3) 89216 HRS (4) 125546 HRS
9	MTBF	Conducted by Parts Stress Analysis Prediction 651.1K hrs min. Telcordia SR-332 (Bellcore) ; 191.9K hrs min. MIL-HDBK-217F (25°C)	
10	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure (Expected Life): Above 62,000 hours @ Tcase 75 °C 	

RESULT	TESTER	REVIEW	APPROVAL
PASS	DANIEL GAO	SANFORD SU	VINCENT TSENG

12.10.30 A50-F031