



Test Report : HBG-60-2100

60W Single Output LED Power Supply

■ 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	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	RIPPLE & NOISE	3Vp-p (Max)	I/P : 230VAC O/P : 100% LOAD	1.36 Vp-p	PASS
2	CONSTANT CURRENT REGION	19~29V	I/P : 230VAC O/P:LED MODE Ta:25°C	12.958V~30.212V/230VAC	PASS
3	OUTPUT CURRENT ADJUST RANGE	1360mA ~2100mA	I/P : 230 VAC I/P : 115 VAC O/P : SETTING Ta : 25°C	1.1928A~2.1961A/230VAC 1.1759A~2.1657A/115VAC	PASS
4	CURRENT ACCURACY	±5%	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	-1.12%	PASS
5	SET UP TIME	230VAC/ 500 ms (Max) 115VAC/ 1200 ms (Max)	I/P : 230 VAC I/P : 115 VAC O/P : 95% LOAD Ta : 25°C	230VAC/ 298 ms 115VAC/ 497 ms	PASS
6	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	TEST : < 5 %	PASS
7	No Load O/P Voltage	35V (Max)	I/P : 90~295 VAC O/P : NO LOAD	31.338V /90VAC 31.338V /230VAC 31.338V /295VAC	PASS

INPUT FUNCTION TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	90VAC~ 295 VAC	I/P : TESTING O/P : FULL LOAD Ta : 25°C	87 V~ 295 V	PASS
			I/P: (1)LOW-LINE-3V=87 V HIGH-LINE+10V=305 V O/P:FULL/MIN LOAD ON: 30 Sec OFF: 30 Sec 10MIN (2)230Vac ON: 0.5 Sec OFF: 0.5 Sec 20MIN (AC POWER ON/OFF NO DAMAGE) (3)230Vac ON:3Sec OFF:3Sec 12HOURS (AC POWER ON/OFF NO DAMAGE)	TEST : OK	

2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE OSC	I/P : 90 VAC ~ 295 VAC O/P : FULL-MIN LOAD Ta : 25°C	TEST : OK	PASS
3	POWER FACTOR	0.92/ 277 VAC (TYP) 0.95/ 230 VAC (TYP) 0.97/ 115 VAC (TYP)	I/P : 277VAC/230VAC/115VAC O/P : FULL LOAD Ta : 25°C	PF= 0.9570 /277V PF= 0.9827 /230V PF= 0.9960 /115V	PASS
4	EFFICIENCY	89 % (Typ)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	90.76 %	PASS
5	INPUT CURRENT	277 VAC/ 0.30 A (Typ) 230 VAC/ 0.40 A (Typ) 115 VAC/ 0.70 A (Typ)	I/P : 277VAC/230VAC/115VAC O/P : FULL LOAD Ta : 25°C	I = 0.2539 A/ 277VAC I = 0.2959 A/ 230VAC I = 0.5867 A/ 115VAC	PASS
6	INRUSH CURRENT	230 V/ 45A (Typ) Twidth= 100 us measured at 50% Ipeak COLD START	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	I = 5.78 A/ 230VAC Twidth = 56.0 us	PASS
7	LEAKAGE CURRENT	< 0.75 mA /240VAC EN 60950-1	I/P : 295 VAC O/P : NO LOAD Ta : 25°C	L-FG : 2.4 uA N-FG : 2.4 uA	PASS
8	TOTAL HARMONIC DISTORTION	Total harmonic distortion will be lower than 20% when output loading is 65% or higher at 230V/115 VAC	I/P : 115VAC I/P : 230VAC O/P : 65% LOAD Ta : 25°C	THD : 12.658% /115VAC THD : 12.095% /230VAC	PASS
		Total harmonic distortion will be lower than 20% when output loading is 75% or higher at 277VAC	I/P : 277VAC O/P : 75% LOAD Ta : 25°C	THD : 14.18% /277VAC	

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P : 295VAC O/P : FULL LOAD Ta : 25°C	No Damage Hiccup mode , recovers automatically after fault condition is removed	PASS
2	OVER TEMPERATURE PROTECTION	SPEC : O.T.P. NO DAMAGE	I/P : 230 VAC O/P : FULL LOAD	No Damage Shut down o/p voltage , re-power on to recover	PASS

COMPONENT STRESS TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	PWM Power Transistor (D to S) or (C to E) Peak Voltage	Q1 Rated 650V/ 15.5A	I/P : High-Line +3V = 298 V O/P : (1)FULL LOAD Turn on (2) Output Short (3) FULL LOAD continue Ta : 25°C	(1) 638 V (2) 596 V (3) 552 V	PASS

2	Diode Peak Voltage	D100 Rated 300V / 20A	I/P : High-Line +3V = 298 V O/P : (1) FULL LOAD Turn on (2) Output Short (3) FULL LOAD continue Ta : 25°C	(1) 214 V (2) 195 V (3) 198 V	PASS
3	Control IC Voltage Test	U1 Rated 28 V	I/P : High-Line +3V = 298 V O/P : (1) FULL LOAD Turn on /Off (2) NO load Turn on /Off (3) FULL LOAD /Min load Change Ta : 25°C	(1) 19.1 V (2) 16.7 V (3) 19.1 V	PASS

■ SAFETY & E.M.C. TEST

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	WITHSTAND VOLTAGE	I/P-O/P : 3.75 KVAC/min	I/P-O/P : 4.2 KVAC/min Ta : 25°C	I/P-O/P : 2.121 mA NO DAMAGE	PASS
2	ISOLATION RESISTANCE	I/P-O/P : 500VDC>100MΩ	I/P-O/P : 500 VDC Ta : 25°C	I/P-O/P : > 9999 MΩ NO DAMAGE	PASS

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	HARMONIC	EN61000-3-2 CLASS C	I/P : 115VAC/230VAC/50HZ O/P : 65%/FULL LOAD I/P : 277VAC/50HZ O/P : 75%/FULL LOAD Ta:25°C	PASS	PASS
2	CONDUCTION	EN55015 CLASS B	I/P : 230 VAC (50HZ) /115V(60HZ) O/P : FULL/60% LOAD Ta : 25°C	PASS Test by certified Lab	PASS
3	RADIATION	EN55015 CLASS B	I/P : 230 VAC (50HZ)/115V(60HZ) O/P : FULL/60% LOAD Ta : 25°C	PASS Test by certified Lab	PASS
4	E.S.D	EN61000-4-2 LIGHT INDUSTRY AIR : 8KV / Contact : 4KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A	PASS
5	E.F.T	EN61000-4-4 LIGHT INDUSTRY INPUT : 1KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A	PASS

6	SURGE	EN61000-4-5 INDUSTRY L-N : 2KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A	PASS
7	Test by certified Lab & Test Report Prepare				

RELIABILITY TEST

ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT																																																																
1	TEMPERATURE RISE TEST	MODEL : HBG-60-2100 1. ROOM AMBIENT BURN-IN : 2.0 HRS I/P : 230VAC O/P : 100% LOAD Ta=23.0 °C 2. HIGH AMBIENT BURN-IN : 2.0 HRS I/P : 230VAC O/P : 100% LOAD Ta=61.6 °C <table border="1" data-bbox="469 831 1193 1397"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta= 23.0 °C</th> <th>HIGH AMBIENT Ta= 61.6 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>LF2</td><td>50.8°C</td><td>87.2°C</td></tr> <tr><td>2</td><td>L1</td><td>53.1°C</td><td>89.9°C</td></tr> <tr><td>3</td><td>C8</td><td>57.3°C</td><td>93.9°C</td></tr> <tr><td>4</td><td>R8</td><td>58.5°C</td><td>95.2°C</td></tr> <tr><td>5</td><td>D2</td><td>60.7°C</td><td>97.9°C</td></tr> <tr><td>6</td><td>Q1</td><td>59.0°C</td><td>95.5°C</td></tr> <tr><td>7</td><td>T1</td><td>60.8°C</td><td>96.5°C</td></tr> <tr><td>8</td><td>C47</td><td>57.4°C</td><td>94.4°C</td></tr> <tr><td>9</td><td>U1</td><td>63.3°C</td><td>101.1°C</td></tr> <tr><td>10</td><td>D100</td><td>62.5°C</td><td>97.5°C</td></tr> <tr><td>11</td><td>C105</td><td>53.8°C</td><td>88.8°C</td></tr> <tr><td>12</td><td>C108</td><td>49.1°C</td><td>84.5°C</td></tr> <tr><td>13</td><td>LF100</td><td>43.6°C</td><td>79.7°C</td></tr> <tr><td>14</td><td>RTH1</td><td>57.6°C</td><td>96.2°C</td></tr> <tr><td>15</td><td>TCASE</td><td>50.1°C</td><td>86.1°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta= 23.0 °C	HIGH AMBIENT Ta= 61.6 °C	1	LF2	50.8°C	87.2°C	2	L1	53.1°C	89.9°C	3	C8	57.3°C	93.9°C	4	R8	58.5°C	95.2°C	5	D2	60.7°C	97.9°C	6	Q1	59.0°C	95.5°C	7	T1	60.8°C	96.5°C	8	C47	57.4°C	94.4°C	9	U1	63.3°C	101.1°C	10	D100	62.5°C	97.5°C	11	C105	53.8°C	88.8°C	12	C108	49.1°C	84.5°C	13	LF100	43.6°C	79.7°C	14	RTH1	57.6°C	96.2°C	15	TCASE	50.1°C	86.1°C			PASS
NO	Position	ROOM AMBIENT Ta= 23.0 °C	HIGH AMBIENT Ta= 61.6 °C																																																																		
1	LF2	50.8°C	87.2°C																																																																		
2	L1	53.1°C	89.9°C																																																																		
3	C8	57.3°C	93.9°C																																																																		
4	R8	58.5°C	95.2°C																																																																		
5	D2	60.7°C	97.9°C																																																																		
6	Q1	59.0°C	95.5°C																																																																		
7	T1	60.8°C	96.5°C																																																																		
8	C47	57.4°C	94.4°C																																																																		
9	U1	63.3°C	101.1°C																																																																		
10	D100	62.5°C	97.5°C																																																																		
11	C105	53.8°C	88.8°C																																																																		
12	C108	49.1°C	84.5°C																																																																		
13	LF100	43.6°C	79.7°C																																																																		
14	RTH1	57.6°C	96.2°C																																																																		
15	TCASE	50.1°C	86.1°C																																																																		
2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 295VAC/100VAC O/P : FULL LOAD Ta= -45°C	TEST : OK	PASS																																																																
3	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 60 °C NO DAMAGE	I/P : 303 VAC O/P : 100% LOAD Ta= 60 °C HUMIDITY= 95 %R.H	TEST : OK	PASS																																																																
4	TEMPERATURE COEFFICIENT	±0.03 %(0~60°C)	I/P : 230 VAC O/P : 100% LOAD	±0.009 %(0~60°C)	PASS																																																																
5	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -45°C ~ +85°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	PASS																																																																

6	THERMAL SHOCK TEST	1. Thermal shock Temperature : -45°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	PASS
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 : 90min in each axis (X.Y.Z) (6) Ta : 25°C	TEST : OK	PASS
8	CAPACITOR LIFE CYCLE	HBG-60-2100 : SUPPOSE C105 IS THE MOST CRITICAL COMPONENT (1) I/P : 230VAC O/P : 100% LOAD Ta=25 °C LIFE TIME (2) I/P : 230VAC O/P : 100% LOAD Ta=60 °C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta=60 °C LIFE TIME	(1) 370807 HRS (2) 42017 HRS (3) 69335 HRS	PASS
9	MTBF	Conducted by Parts Stress Analysis Prediction 4523.2K hrs min. Telcordia SR-332 (Bellcore); 455.5K hrs min. MIL-HDBK-217F (25°C)		PASS
10	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure(Expected Life) : 50,000 hours @ Tcase 75°C		PASS

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	ZHANGZJ/ZHUOKB	SKY	LIUWY

2009/08/04 A50-G058