



Test Report: HLG-185H-54

185W Single Output Switching Power Supply

■ 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	VERDICT
1	RIPPLE & NOISE	V1: 200 mVp-p (Max)	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	V1: 69.6 mVp-p (Max)	P
2	OUTPUT VOLTAGE ADJUST RANGE	CH1: 49V-58 V	I/P: 230 VAC I/P:115VAC O/P:MIN LOAD Ta:25°C	47.84 V-59.43 V /230VAC 47.83 V-59.43 V/115VAC	P
3	CURRENT ADJ RANGE	1.72A-3.45A	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	1.539 A~ 3.868 A	P
4	CONSTANT CURRENT REGION	27V-54V	I/P: 230 VAC O/P:CV MODE Ta:25°C	O/P=27V: 3.64 A O/P=53: 3.63 A	P
5	OUTPUT VOLTAGE TOLERANCE	V1: -1% ~ 1% (Max)	I/P: 100 VAC /305VAC O/P:FULL/ 0% LOAD Ta:25°C	V1: -0.05 %- 0.05 %	P
6	LINE REGULATION	V1: -0.5% ~ 0.5% (Max)	I/P:100 VAC ~305 VAC O/P:FULL LOAD Ta:25°C	V1: -0.02 %- 0.02 %	P
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 %	P
8	SET UP TIME	230VAC/ 500 ms (Max) 115VAC/ 1000 ms (Max)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25°C	230VAC/ 342 ms 115 VAC/ 706 ms	P
9	RISE TIME	230VAC/ 80 ms (Max) 115VAC/ 80 ms (Max)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25°C	230VAC/ 8.9 ms 115 VAC/ 9.4 ms	P
10	HOLD UP TIME	230VAC/ 16 ms (Typ) 115VAC/ 16 ms (Typ)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25°C	230VAC/ 21 ms 115 VAC/ 21 ms	P
11	OVER/UNDERSHOOT TEST	< ±5%	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	TEST:< 5 %	P
12	DYNAMIC LOAD	V1: 5400 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	418 mVp-p 2020 mVp-p	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	0.371A	0.720A	1.071A	1.478A	1.794A	2.136A	2.496A	2.911A	3.257A	3.575A
	%	10.75%	20.87%	31.04%	42.84%	52.00%	61.91%	72.35%	84.38%	94.41%	103.62%		
2	Dimming value	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V		
	Output current	0.359A	0.709A	1.054A	1.394A	1.739A	2.084A	2.428A	2.774A	3.113A	3.479A		
	%	10.41%	20.55%	30.55%	40.41%	50.41%	60.41%	70.38%	80.41%	90.23%	100.84%		
3	Duty value	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%		
	Output current	0.404A	0.746A	1.088A	1.430A	1.773A	2.116A	2.459A	2.802A	3.146A	3.486A		
	%	11.71%	21.62%	31.54%	41.45%	51.39%	61.33%	71.28%	81.22%	91.19%	101.04%		

P

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	90VAC~305 VAC	I/P:TESTING O/P:FULL LOAD Ta:25°C	69 V~305V	P
			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 OSC	I/P: 100 VAC ~305VAC O/P:FULL-MIN LOAD Ta:25°C	OK	P
3	POWER FACTOR	0.95/ 230 VAC FULL LOAD (TYP) 0.98/ 115 VAC FULL LOAD (TYP) 0.92/ 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=0.968 /230V/100%LOAD PF= 0.998 /115V/100%LOAD PF= 0.93 /277V/100%LOAD	P
4	EFFICIENCY	94% (TYP)	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	94.06 %	P
5	INPUT CURRENT	277V/ 0.8 A 230 V/ 0.9 A 115 V/ 2.1 A	I/P: 277 VAC I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25°C	I = 0.75 A/ 277VAC I = 0.89 A/ 230VAC I = 1.76 A/ 115VAC	P
6	INRUSH CURRENT	230 V/ 65A (Typ) COLD START	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	I = 58 A/ 230VAC	P
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 : 8.99 /115VAC THD : 16.1 /230VAC THD : 14.95 /277VAC	P

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	OVER LOAD PROTECTION	95 %-108 %	I/P: 305VAC I/P: 230 VAC I/P: 100 VAC O/P:TESTING Ta:25°C	105 %/305VAC 105 %/ 230VAC 105 %//100VAC Constant current limiting, recovers automatically after fault condition is removed	P
2	OVER VOLTAGE PROTECTION	V1: 59V-65V	I/P: 305VAC I/P: 230 VAC I/P: 90 VAC O/P:MIN LOAD Ta:25°C	61.54 V/ 305VAC 61.69 V/ 230VAC 61.50 V/ 100VAC Shut down o/p voltage with auto recovery or re-power on to recovery	P

3	OVER TEMPERATURE PROTECTION	SPEC: RTH2: 100±10°C O.T.P. 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	P
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 305VAC O/P: FULL LOAD Ta:25°C	NO DAMAGE Hiccup Mode	P

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	Power Transistor (D to S) or (C to E) Peak Voltage	Q5 Rated STF13NM50N 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) 472 V (2) 446 V (3) 454 V	P
2	Diode Peak Voltage	Q101 Rated YA868C15RSC 30A/150V	I/P : High-Line +3V = 308V O/P : (1) Full Load Turn on (2) Output Short (3) Full load continue Ta : 25°C	(1) 125 V (2) 9.6 V (3) 120 V	P
		Q102 Rated YA868C15RSC 30A/150V	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) 125 V (2) 10 V (3) 120 V	
3	Input Capacitor Voltage	C5 Rated: 100u/450V 5KHz 105°C KXG	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) 437 V (2) 437.1 V (3) 437 V	P
4	Control IC Voltage Test	U 900 Rated L6599AD 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) 13.455 V (2) 13.367 V (3) 13.367 V	P
5	P.F.C Transistor (D to S) or (C to E) Peak Voltage	Q1 Rated STP21NM60N 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) 476 V (2) 450 V (3) 458 V	P

SAFETY & EMC TEST

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	WITHSTAND VOLTAGE	IEC60950-1 I/P-O/P: 3.75KVAC/min<10mA I/P-FG:2KVAC/min<10mA O/P-FG:0.5KVAC/min<10mA	I/P-O/P: 4 KVAC/min I/P-FG: 2.4KVAC/min O/P-FG:0.6KVAC/min Ta:25°C	I/P-O/P: 2.622 mA I/P-FG: 2.284 mA O/P-FG: 3.39 mA NO DAMAGE	P
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: 29.5 GΩ O/P-FG:30 GΩ NO DAMAGE	P
3	GROUNDING CONTINUITY	IEC60950-1 FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40A / 2min Ta:25°C	9 mΩ	P
4	LEAKAGE CURRENT	IEC60950-1 < 0.75 mA / 240VAC	I/P: 240 VAC O/P:Min LOAD Ta:25°C	L-FG: 0.20 mA N-FG: 0.20 mA	P
5	APPROVAL	TUV: Certificate NO : E334940 UL: File NO : R50185176			P

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	HARMONIC	EN61000-3-2 CLASS A CLASS C CLASS D	I/P: 240VAC/50HZ LOAD:LED/ELECTRONIC LOAD O/P:100%/50% LOAD Ta:25°C	PASS	P
2	CONDUCTION	EN55022 EN55015 CLASS B	I/P: 230 VAC (50HZ) O/P:FULL/50% LOAD Ta:25°C	PASS Test by certified Lab	P
3	RADIATION	EN55022 EN55015 CLASS B	I/P: 230 VAC (50HZ) O/P:FULL LOAD Ta:25°C	PASS Test by certified Lab	P
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	P
5	E.F.T	EN61000-4-4 INDUSTRY INPUT: 2KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A	P
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	P

Reliability Test

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
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1	TEMPERATURE RISE TEST	MODEL : HLG-185H-24 1. ROOM AMBIENT BURN-IN : 15.5 HRS I/P : 230VAC O/P : FULL LOAD Ta= 29 °C 2. HIGH AMBIENT BURN-IN : 7 HRS I/P : 230VAC O/P : FULL LOAD Ta= 61.1 °C			p																																																																																																				
		<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>P/N</th> <th>ROOM AMBIENT Ta= 29 °C</th> <th>HIGH AMBIENT Ta= 61.1 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>V1</td><td>24V</td><td>24.05V</td><td>23.96V</td></tr> <tr><td>6</td><td>BD1</td><td>4A/800V GLASS GBU408</td><td>59.0°C</td><td>81.6°C</td></tr> <tr><td>7</td><td>Q1</td><td>STP21NM60N 17A/600V</td><td>64.6°C</td><td>85.9°C</td></tr> <tr><td>8</td><td>L2</td><td>TF2071</td><td>66.5°C</td><td>87.4°C</td></tr> <tr><td>9</td><td>Q5</td><td>STF13NM50N 12A/500V</td><td>67.3°C</td><td>87.7°C</td></tr> <tr><td>10</td><td>D2</td><td>YG971S6R 8A/600V TO220F</td><td>70.1°C</td><td>89.7°C</td></tr> <tr><td>11</td><td>RTH2</td><td>NTC 330KΩ 3Φ TTC3A334F4573EY 1%</td><td>61.9°C</td><td>83.0°C</td></tr> <tr><td>12</td><td>T1</td><td>TF2065</td><td>74.9°C</td><td>94.8°C</td></tr> <tr><td>13</td><td>Q101</td><td>IRFB3607PBF 80A/75V TO220</td><td>65.8°C</td><td>87.9°C</td></tr> <tr><td>14</td><td>D9</td><td>BYV26EGP 1A/1KV DO-204AC</td><td>64.3°C</td><td>84.9°C</td></tr> <tr><td>15</td><td>C102</td><td>1000u/35V UL10Kh ZLH</td><td>60.7°C</td><td>83.3°C</td></tr> <tr><td>16</td><td>C201</td><td>47u/50V UL10Kh 6.3*11 YXM</td><td>61.1°C</td><td>83.5°C</td></tr> <tr><td>17</td><td>C16</td><td>47u/50V UL10Kh 6.3*11 YXM</td><td>63.0°C</td><td>84.3°C</td></tr> <tr><td>18</td><td>C106</td><td>220u/35V UL8Kh 8*11.5 ZLH</td><td>55.3°C</td><td>78.9°C</td></tr> <tr><td>19</td><td>C38</td><td>100u/25V UL10Kh 6.3*11 YXM</td><td>66.5°C</td><td>87.0°C</td></tr> <tr><td>20</td><td>LF100</td><td>TR891-R1</td><td>57.6°C</td><td>80.8°C</td></tr> <tr><td>21</td><td>U900</td><td>L6599AD SO-16N</td><td>62.1°C</td><td>83.4°C</td></tr> <tr><td>22</td><td>U1</td><td>NCP1608B SOIC-8</td><td>60.8°C</td><td>83.7°C</td></tr> <tr><td>23</td><td>C5</td><td>100u/450V 5Kh 105°C KXG</td><td>46.4°C</td><td>78.5°C</td></tr> </tbody> </table>				NO	Position	P/N	ROOM AMBIENT Ta= 29 °C	HIGH AMBIENT Ta= 61.1 °C	1	V1	24V	24.05V	23.96V	6	BD1	4A/800V GLASS GBU408	59.0°C	81.6°C	7	Q1	STP21NM60N 17A/600V	64.6°C	85.9°C	8	L2	TF2071	66.5°C	87.4°C	9	Q5	STF13NM50N 12A/500V	67.3°C	87.7°C	10	D2	YG971S6R 8A/600V TO220F	70.1°C	89.7°C	11	RTH2	NTC 330KΩ 3Φ TTC3A334F4573EY 1%	61.9°C	83.0°C	12	T1	TF2065	74.9°C	94.8°C	13	Q101	IRFB3607PBF 80A/75V TO220	65.8°C	87.9°C	14	D9	BYV26EGP 1A/1KV DO-204AC	64.3°C	84.9°C	15	C102	1000u/35V UL10Kh ZLH	60.7°C	83.3°C	16	C201	47u/50V UL10Kh 6.3*11 YXM	61.1°C	83.5°C	17	C16	47u/50V UL10Kh 6.3*11 YXM	63.0°C	84.3°C	18	C106	220u/35V UL8Kh 8*11.5 ZLH	55.3°C	78.9°C	19	C38	100u/25V UL10Kh 6.3*11 YXM	66.5°C	87.0°C	20	LF100	TR891-R1	57.6°C	80.8°C	21	U900	L6599AD SO-16N	62.1°C	83.4°C	22	U1	NCP1608B SOIC-8	60.8°C	83.7°C	23	C5	100u/450V 5Kh 105°C KXG	46.4°C	78.5°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		p																																																																																																			
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 305 VAC/100VAC O/P : 95% LOAD Ta= -40 °C	TEST : OK	p																																																																																																				
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	p																																																																																																				
5	TEMPERATURE COEFFICIENT	± 0.03 %(0-50°C)	I/P : 230 VAC O/P : FULL LOAD	± 0.012 %(0-50°C)	p																																																																																																				
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 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	P
9	CAPACITOR LIFE CYCLE	HLG-185H-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) 349243 HRS (2) 59681 HRS (3) 85469 HRS (4) 103889 HRS	P
10	MTBF	MIL-HDBK-217F NOTICES2 PARTS COUNT TOTAL FAILURE RATE : 192.2 K HRS	OK	P
11	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure(Expected Life) : 50,000 hours @ Tcase 75°C	OK	P

DATE	SAMPLE	TEST RESULT	TESTER	APPROVAL
2010/3/3	RD SAMPLE	PASS	SANFORD SU	VINCENT TSENG
2010/5/10	PRODUCT SAMPLE	PASS	SANFORD SU	VINCENT TSENG

2003/12/12 A50-F023