



# Test Report: HLG-240H-24

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240W 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	SPECICATION	TEST CONDITION	RESULT
1	RIPPLE & NOISE	V1: 150 mVp-p (Max)	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	V1: 65 mVp-p (Max)
2	OUTPUT VOLTAGE ADJUST RANGE	CH1: 22.4 V~25.6 V	I/P: 230 VAC I/P:115VAC O/P:MIN LOAD Ta:25°C	21.64V~26.19 V /230VAC 21.64V~26.19 V /115VAC
3	CURRENT ADJ RANGE	5A~10A	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	1.0912A~10.845 A
4	CONSTANT CURRENT REGION	12V~24V	I/P: 230 VAC O/P:CV MODE Ta:25°C	O/P=12V: 10.62 A O/P=23V: 10.56 A
5	OUTPUT VOLTAGE TOLERANCE	V1: -1% ~ 1% (Max)	I/P: 100 VAC /305VAC O/P:FULL/ 0% LOAD Ta:25°C	V1: 0.32 %~-0.32 %
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: 0.32 %~-0.32 %
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/ 362 ms 115 VAC/ 704 ms
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/ 40 ms 115 VAC/ 39 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/ 24 ms
11	OVER/UNDERSHOOT TEST	< ±5%	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	TEST:< 5 %
12	DYNAMIC LOAD	V1: 2400 mVp-p	I/P: 230 VAC O/P:(1)FULL 90%DUTY/1KHZ Ta:25°C	368mVp-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	0.793A	1.867A	2.883A	3.978A	4.886A	5.910A	6.805A	7.927A	8.808A	9.395A
%	7.93%		18.67%	28.83%	39.78%	48.86%	59.10%	68.05%	79.27%	88.08%	93.95%		
2	Dimming value	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V		
	Output current	0.790A	1.893A	2.914A	3.918A	4.932A	5.967A	6.962A	7.996A	9.033A	10.040A		
	%	7.90%	18.93%	29.14%	39.18%	49.32%	59.67%	69.62%	79.96%	90.33%	100.40%		
3	Duty value	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%		
	Output current	0.923A	2.049A	3.066A	4.059A	5.063A	6.061A	7.056A	8.057A	9.052A	10.058A		
	%	9.23%	20.49%	30.66%	40.59%	50.63%	60.61%	70.56%	80.57%	90.52%	100.58%		

### 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	67V~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) 0.9/ 230 VAC 65% LOAD (TYP) 0.9/ 115 VAC 65%LOAD (TYP)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD / 65% LOAD Ta:25°C	PF=0.957 /230V/100%LOAD PF=1 /115V/100%LOAD PF=0.913 /230V/65%LOAD PF=0.997 /115V/65%LOAD
4	EFFICIENCY	92.5% (TYP)	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	93 %
5	INPUT CURRENT	230 V/ 2 A (Typ) 115 V/ 4 A (Typ)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25°C	I =1.15 A/ 230VAC I =2.3 A/ 115VAC
6	INRUSH CURRENT	230 V/ 75A (Typ) COLD START	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	I = 72 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 : 6.18 /115VAC THD : 12.98 /230VAC  THD : 14.91 /277VAC

### PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	95 %~108 %	I/P: 305 VAC I/P: 230 VAC I/P: 100 VAC O/P:TESTING Ta:25°C	104%/305VAC 104%/ 230VAC 104%/100VAC Constant Current Limiting
2	OVER VOLTAGE PROTECTION	V1: 27V~ 34V	I/P: 305 VAC I/P: 230 VAC I/P: 90 VAC O/P:MIN LOAD Ta:25°C	27.81V/305VAC 27.74V/ 230VAC 27.67V/ 90VAC Shunt down Re- power ON

3	OVER TEMPERATURE PROTECTION	NO DAMAGE	I/P: 230 VAC O/P: FULL LOAD	O.T.P. Active Shut down o/p volotage · recovers automatically after temperature goes down
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 305VAC O/P: FULL LOAD Ta:25°C	NO DAMAGE Hiccup Mode

## COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	Power Transistor ( D to S) or (C to E) Peak Voltage	Q4 Rated 16A/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) 502 V (2) 462 V (3) 500 V
2	Diode Peak Voltage	Q101 Rated 80A/75V	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) 53 V (2) 12 V (3) 53 V
		Q102 Rated 80A/75V	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) 56 V (2) 21 V (3) 55 V
3	Input Capacitor Voltage	C5 Rated: NCC: 150µ/450 V	I/P : High-Line +3V = 308 V O/P : (1)Full Load Turn on /Off (2) Min load Turn on /Off (3)Full Load /Min load Change Ta : 25°C	(1) 431 V (2) 437 V (3) 440 V
4	Control IC Voltage Test	U 70 Rated 8.85V~16 V	I/P : High-Line +3V = 308 V O/P : (1)Full Load Turn on /Off (2) Min load Turn on /Off (3)Full Load /Min load Change Ta : 25°C	(1) 12.9 V (2) 12.9 V (3) 12.9 V
5	P.F.C Transistor ( D to S) or (C to E) Peak Voltage	Q1 Rated 20.7A/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) 450 V (2) 460 V (3) 450 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:2KVAC/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: 1.8KVAC/min Ta:25°C	I/P-O/P: 5.27 mA I/P-FG: 4.21 mA O/P-FG: 5.21 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: 28.9 GΩ I/P-FG: 11.9 GΩ O/P-FG: 19.5 GΩ NO DAMAGE
3	GROUNDING CONTINUITY	IEC60950-1 FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40A / 2min Ta:25°C	13 mΩ
4	LEAKAGE CURRENT	IEC60950-1 < 0.75 mA / 277VAC	I/P: 280 VAC O/P:Min LOAD Ta:25°C	L-FG: 0.36 mA N-FG: 0.36 mA
5	APPROVAL	TUV: Certificate NO : R50171244 UL: File NO : E127738		

### E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	EN61000-3-2 CLASS A CLASS C	I/P: 230VAC/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-240H-24 1. ROOM AMBIENT BURN-IN : 1.5 HRS I/P : 230VAC O/P : FULL LOAD Ta= 26.5 °C 2. HIGH AMBIENT BURN-IN : 12 HRS I/P : 230VAC O/P : FULL LOAD Ta= 61.7 °C	<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta= 26.5 °C</th> <th>HIGH AMBIENT Ta= 61.7 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>LF1</td><td>64.0°C</td><td>91.1°C</td></tr> <tr><td>2</td><td>C1</td><td>61.3°C</td><td>89.3°C</td></tr> <tr><td>3</td><td>LF2</td><td>63.4°C</td><td>91.2°C</td></tr> <tr><td>4</td><td>BD1</td><td>64.0°C</td><td>92.7°C</td></tr> <tr><td>5</td><td>L2</td><td>62.7°C</td><td>90.9°C</td></tr> <tr><td>6</td><td>L1</td><td>61.5°C</td><td>89.9°C</td></tr> <tr><td>7</td><td>Q1</td><td>64.7°C</td><td>93.2°C</td></tr> <tr><td>8</td><td>U1</td><td>61.5°C</td><td>90.2°C</td></tr> <tr><td>9</td><td>TSW1</td><td>64.1°C</td><td>92.7°C</td></tr> <tr><td>10</td><td>Q3</td><td>65.1°C</td><td>93.3°C</td></tr> <tr><td>11</td><td>T1</td><td>79.0°C</td><td>106.6°C</td></tr> <tr><td>12</td><td>Q101</td><td>69.6°C</td><td>98.3°C</td></tr> <tr><td>13</td><td>C102</td><td>66.5°C</td><td>94.9°C</td></tr> <tr><td>14</td><td>LF101</td><td>71.8°C</td><td>100.1°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta= 26.5 °C	HIGH AMBIENT Ta= 61.7 °C	1	LF1	64.0°C	91.1°C	2	C1	61.3°C	89.3°C	3	LF2	63.4°C	91.2°C	4	BD1	64.0°C	92.7°C	5	L2	62.7°C	90.9°C	6	L1	61.5°C	89.9°C	7	Q1	64.7°C	93.2°C	8	U1	61.5°C	90.2°C	9	TSW1	64.1°C	92.7°C	10	Q3	65.1°C	93.3°C	11	T1	79.0°C	106.6°C	12	Q101	69.6°C	98.3°C	13	C102	66.5°C	94.9°C	14	LF101	71.8°C	100.1°C	
NO	Position	ROOM AMBIENT Ta= 26.5 °C	HIGH AMBIENT Ta= 61.7 °C																																																													
1	LF1	64.0°C	91.1°C																																																													
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9	TSW1	64.1°C	92.7°C																																																													
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12	Q101	69.6°C	98.3°C																																																													
13	C102	66.5°C	94.9°C																																																													
14	LF101	71.8°C	100.1°C																																																													
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR ( MIN )	I/P : 230 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 : 230 VAC/100VAC O/P : CV=23V Ta= -35 °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 : CV=23V Ta= 61.7 °C HUMIDITY= 95 %R.H	TEST : OK																																																												
5	TEMPERATURE COEFFICIENT	± 0.03 %(0~50°C)	I/P : 230 VAC O/P : FULL LOAD	± 0.003 %(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		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-240H-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	(1) 477984 HRS (2) 42248 HRS (3) 66755 HRS
10	MTBF	MIL-HDBK-217F NOTICES2 PARTS COUNT TOTAL FAILURE RATE : 207.9K HRS	
11	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure(Expected Life) : 62,000 hours @ Tcase 75°C	

DATE	SAMPLE	TEST RESULT	TESTER	APPROVAL
2009/7/31	RD SAMPLE	PASS	SANFORD SU	VINCENT TSENG
2009/9/29	PRODUCT SAMPLE W0907E29	PASS	SANFORD SU	VINCENT TSENG

2003/12/12 A50-F023