



# Test Report: HLG-240-30

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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	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: 64.4 mVp-p (Max)	P
2	OUTPUT VOLTAGE ADJUST RANGE	CH1: 28V~ 32 V	I/P: 230 VAC I/P:115VAC O/P:MIN LOAD Ta:25°C	25.87V~32.87V /230VAC 25.87V~32.87 V/115VAC	P
3	CURRENT ADJ RANGE	4A~8A	I/P: 230 VAC O/P: CV=Vo-2V Ta:25°C	1.761 A~ 8.828 A	P
4	CONSTANT CURRENT REGION	15V~30V	I/P: 230 VAC O/P:CV MODE Ta:25°C	O/P=15V: 8.480 A O/P=29V: 8.312 A	P
5	OUTPUT VOLTAGE TOLERANCE	V1: -1% ~ 1% (Max)	I/P: 100 VAC /264VAC O/P:FULL/ 0% LOAD Ta:25°C	V1: 0.2 %~-0.2 %	P
6	LINE REGULATION	V1: -0.5% ~ 0.5% (Max)	I/P:100 VAC ~264 VAC O/P:FULL LOAD Ta:25°C	V1: 0 %~ 0 %	P
7	LOAD REGULATION	V1: -0.5% ~ 0.5% (Max)	I/P: 230 VAC O/P:FULL ~MIN LOAD Ta:25°C	V1: 0.2 %~-0.2 %	P
8	SET UP TIME	230VAC/ 2500 ms (Max) 115VAC/ 2500 ms (Max)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25°C	230VAC/ 1874 ms 115 VAC/ 1978 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/ 23 ms 115 VAC/ 22 ms	P
10	HOLD UP TIME	230VAC/ 15 ms (Typ) 115VAC/ 15 ms (Typ)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25°C	230VAC/ 15.8 ms 115 VAC/ 15.8 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: 3000 mVp-p	I/P: 230 VAC O/P:(1)FULL /Min LOAD 90%DUTY/1KHZ Ta:25°C	268mVp-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												
				Resistance value	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K
			1	Output current	0.615A	1.519A	2.358A	3.437A	3.946A	4.758A	5.482A	6.336A	7.081A	7.500A
		%	7.69%	18.99%	29.48%	42.96%	49.33%	59.48%	68.53%	79.20%	88.51%	93.75%		
		Dimming value	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V		
	2	Output current	0.630A	1.551A	2.375A	3.140A	3.945A	4.753A	5.566A	6.396A	7.209A	8.046A		
		%	7.88%	19.39%	29.69%	39.25%	49.31%	59.41%	69.58%	79.95%	90.11%	100.58%		
		Duty value	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%		
	3	Output current	0.718A	1.654A	2.478A	3.249A	4.041A	4.841A	5.641A	6.445A	7.225A	8.065A		
		%	8.98%	20.68%	30.98%	40.61%	50.51%	60.51%	70.51%	80.56%	90.31%	100.81%		

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### INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	90VAC~264 VAC	I/P:TESTING O/P:FULL LOAD Ta:25°C	57V~264V	P
			I/P: (1)LOW-LINE-3V=87 V (2)HIGH-LINE=264 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 ~264VAC 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) 0.9/ 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=0.959 /230V/100%LOAD PF=1 /115V/100%LOAD PF=0.92 /230V/65%LOAD PF= 1 /115V/65%LOAD	P
4	EFFICIENCY	93% (TYP)	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	93.91 %	P
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 = 1.16 A/ 230VAC I = 2.29 A/ 115VAC	P
6	INRUSH CURRENT	230 V/ 75A (Typ) COLD START	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	I = 63 A/ 230VAC	P

### PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	OVER LOAD PROTECTION	95 %~108 %	I/P: 264 VAC I/P: 230 VAC I/P: 100 VAC O/P:TESTING Ta:25°C	103 %/264VAC 103 %/ 230VAC 103 %//100VAC Constant Current Limiting	P
2	OVER VOLTAGE PROTECTION	V1: 32.5V~ 36.5V	I/P: 264 VAC I/P: 230 VAC I/P: 90 VAC O/P:MIN LOAD Ta:25°C	34.82 V/264VAC 34.81 V/ 230VAC 34.91 V/ 90VAC Shunt down Re- power ON	P
3	OVER TEMPERATURE PROTECTION	SPEC: TSW1: 105±5°C O.T.P. 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	P
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 264VAC 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	Q3 Rated IRFB20N50K 20A/500V	I/P : High-Line +3V = 267 V O/P : (1) Full Load Turn on (2) Output Short (3) Full load continue Ta : 25°C	(1) 444 V (2) 428 V (3) 442 V	P
2	Diode Peak Voltage	Q101 Rated STP40NF10L 40A/100V	I/P : High-Line +3V = 267 V O/P : (1) Full Load Turn on (2) Output Short (3) Full load continue Ta : 25°C	(1) 72 V (2) 12 V (3) 68.3 V	P
		Q102 Rated STP40NF10L 40A/100V	I/P : High-Line +3V = 267 V O/P : (1) Full Load Turn on (2) Output Short (3) Full load continue Ta : 25°C	(1) 79 V (2) 25 V (3) 70 V	
3	Input Capacitor Voltage	C5 Rated: NCC: 150µ/420 V/105°C	I/P : High-Line +3V = 267 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) 396 V (2) 411 V (3) 411 V	P
4	Control IC Voltage Test	U 70 Rated L6599AD : 8.85V~16 V	I/P : High-Line +3V = 267 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) 12.99 V (2) 12.89 V (3) 12.99 V	P
5	P.F.C Transistor (D to S) or (C to E) Peak Voltage	Q1 Rated STW25NM50N 22A/500V	I/P : High-Line +3V = 267 V O/P : (1) Full Load Turn on (2) Output Short (3) Full load continue Ta : 25°C	(1) 498 V (2) 482 V (3) 468 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: 4.84 mA I/P-FG: 3.98 mA O/P-FG: 5.02 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: 14.1 GΩ I/P-FG: 13.9 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	13 mΩ	P
4	LEAKAGE CURRENT	IEC60950-1 < 0.75 mA / 240VAC	I/P: 264 VAC O/P:Min LOAD Ta:25°C	L-FG: 0.36 mA N-FG: 0.36 mA	P
5	APPROVAL	TUV: Certificate NO : R50171244 UL: File NO : E127738			P

### E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	HARMONIC	EN61000-3-2 CLASS A CLASS C	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 LIGHT 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 LIGHT INDUSTRY INPUT: 2KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A	P
6	SURGE	IEC61000-4-5 LIGHT 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
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			P
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	P
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	P
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 60 °C NO DAMAGE	I/P : 264 VAC O/P : CV=23V Ta= 61.7 °C HUMIDITY= 95 %R.H	TEST : OK	P
5	TEMPERATURE COEFFICIENT	± 0.03 %(0~50°C)	I/P : 230 VAC O/P : FULL LOAD	± 0.003 %(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	P
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	P



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-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) 196640 HRS (2) 27898.3 HRS (3) 54198.9 HRS	P
10	MTBF	MIL-HDBK-217F NOTICES2 PARTS COUNT Mean Time Between Failure : 207.9K HRS		P
11	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure(Expected Life) : 50,000 hours @ Tcase 70°C		P

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
2009/12/2	PRODUCT SAMPLE W0910C36	PASS	SANFORD SU	VINCENT TSENG

2003/12/12 A50-F023