



# Test Report: HLG-120-36

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120W 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: 38 mVp-p (Max)	P
2	OUTPUT VOLTAGE ADJUST RANGE	CH1: 33V~40 V	I/P: 230 VAC I/P:115VAC O/P:MIN LOAD Ta:25°C	31.41 V~ 41.07 V /230VAC 31.38 V~ 41.07 V/115VAC	P
3	CURRENT ADJ RANGE	1.7A~3.4A	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	1.503 A~ 3.722 A	P
4	CONSTANT CURRENT REGION	18V~36V	I/P: 230 VAC O/P:CV MODE Ta:25°C	O/P=18V: 3.533 A O/P=35V:3.527 A	P
5	OUTPUT VOLTAGE TOLERANCE	V1: -1% ~ 1% (Max)	I/P: 100 VAC /264VAC O/P:FULL/ 0% LOAD Ta:25°C	V1: -0.06 %~ 0.06 %	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: -0.05 %~ 0.05 %	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/ 810 ms 115 VAC/ 1620 ms	P
9	RISE TIME	230VAC/ 50 ms (Max) 115VAC/ 50 ms (Max)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25°C	230VAC/ 6.9 ms 115 VAC/ 7 ms	P
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/ 23 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: 3600 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	450 mVp-p 1500 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	0.387A	0.736A	1.057A	1.381A	1.720A	2.043A	2.366A	2.665A	3.037A	3.369A
		%	11.38%	21.65%	31.09%	40.62%	50.59%	60.09%	69.59%	78.38%	89.32%	99.09%		
	2	Dimming value	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V		
		Output current	0.388A	0.728A	1.062A	1.397A	1.729A	2.070A	2.399A	2.730A	3.066A	3.401A		
		%	11.41%	21.41%	31.24%	41.09%	50.85%	60.88%	70.56%	80.29%	90.18%	100.03%		
	3	Duty value	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%		
		Output current	0.418A	0.757A	1.092A	1.425A	1.759A	2.093A	2.428A	2.764A	3.100A	3.434A		
		%	12.29%	22.26%	32.12%	41.91%	51.74%	61.56%	71.41%	81.29%	91.18%	101.00%		

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## INPUT FUNCTION TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	90VAC~264 VAC	I/P:TESTING O/P:FULL LOAD Ta:25°C	77 V~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)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25°C	PF=0.9627/230V/100%LOAD PF=0.9946 /115V/100%LOAD	P
4	EFFICIENCY	94% (TYP)	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	94.09 %	P
5	INPUT CURRENT	230 V/ 0.6 A 115 V/ 1.4 A	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25°C	I = 0.58 A/ 230VAC I = 1.14 A/ 115VAC	P
6	INRUSH CURRENT	230 V/ 60A (Typ) COLD START	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	I = 51 A/ 230VAC	P

## PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	OVER LOAD PROTECTION	95 %-108 %	I/P: 264VAC I/P: 230 VAC I/P: 100 VAC O/P:TESTING Ta:25°C	106 %/264VAC 106 %/ 230VAC 106 %//100VAC Constant current limiting, recovers automatically after fault condition is removed	P
2	OVER VOLTAGE PROTECTION	V1: 41V~ 46V	I/P: 264VAC I/P: 230 VAC I/P: 90 VAC O/P:MIN LOAD Ta:25°C	42.46 V/ 264VAC 42.48 V/ 230VAC 42.51 V/ 100VAC Shut down o/p voltage with auto recovery or re-power on to recovery	P
3	OVER TEMPERATURE PROTECTION	SPEC: RTH2: 85±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: 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	Q5 Rated STF13NM50N 12A/500V	I/P : High-Line +3V = 267V O/P : (1) Full Load Turn on (2) Output Short (3) Full load continue Ta : 25°C	(1) 478 V (2) 454 V (3) 454 V	P
2	Diode Peak Voltage	Q101 Rated STP40NF12L 40A/120V	I/P : High-Line +3V = 267V O/P : (1) Full Load Turn on (2) Output Short (3) Full load continue Ta : 25°C	(1) 112 V (2) 81.6 V (3) 87.6 V	P
		Q102 Rated STP40NF12L 40A/120V	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) 112 V (2) 80.8 V (3) 87.2 V	
3	Input Capacitor Voltage	C5 Rated: 82u/450V 105°C KXG	I/P : High-Line +3V = 267V O/P : (1) Full Load Turn on /Off (2) Min load Turn on /Off (3) Full Load /Min load Change Ta : 25°C	(1) 434.4 V (2) 435 V (3) 435 V	P
4	Control IC Voltage Test	U 900 Rated L6599AD 8.85V~16V	I/P : High-Line +3V = 267V O/P : (1) Full Load Turn on /Off (2) Min load Turn on /Off (3) Full Load /Min load Change Ta : 25°C	(1) 12.608 V (2) 12.574 V (3) 12.575 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 = 267 V O/P : (1) Full Load Turn on (2) Output Short (3) Full load continue Ta : 25°C	(1) 488 V (2) 458 V (3) 454 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:2 KVAC/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: 2.620 mA I/P-FG: 2.317 mA O/P-FG: 3.62 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: 10.26 GΩ I/P-FG: 5.86 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	11 mΩ	P
4	LEAKAGE CURRENT	IEC60950-1 < 0.75 mA / 240VAC	I/P: 240 VAC O/P:Min LOAD Ta:25°C	L-FG: 0.22 mA N-FG: 0.22 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
1	TEMPERATURE RISE TEST	MODEL : HLG-120H-24 1. ROOM AMBIENT BURN-IN : 2.5 HRS I/P : 230VAC O/P : FULL LOAD Ta= 27.6 °C 2. HIGH AMBIENT BURN-IN : 5.5HRS I/P : 230VAC O/P : FULL LOAD Ta= 54.8 °C			P
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR ( MIN )	I/P : 264 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 : 264VAC/230 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 : 264 VAC O/P : 95% 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	± 0.002 %(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 TURN ON/58 'SEC.;TURN OFF/2SEC.	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-120H-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) 749931 HRS (2) 107625 HRS (3) 124599 HRS (4) 142065HRS	P
10	MTBF	MIL-HDBK-217F NOTICES2 PARTS COUNT TOTAL FAILURE RATE : 192.2K HRS		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