



Test Report: HLG-60H-24

60W Single Output Switching 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	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	RIPPLE & NOISE	V1 150 mVp-p (Max)	I/P 230VAC O/P FULL LOAD Ta 25	V1 15.6 mVp-p (Max)	P
2	OUTPUT VOLTAGE ADJUST RANGE	CH1 22 V ~ 27 V	I/P 230 VAC I/P 115 VAC O/P MIN LOAD Ta 25	21.461 V ~ 28.075 V / 230 VAC 21.468 V ~ 28.075 V / 115 VAC	P
3	CURRENT ADJUST RANGE	CH1 1.5A ~ 2.5A	I/P 230 VAC I/P 115 VAC O/P MIN LOAD Ta 25	1.384 A ~ 2.715 A / 230 VAC 1.384 A ~ 2.711 A / 115 VAC	P
4	OUTPUT VOLTAGE TOLERANCE	V1 1 %~ -1 % (Max)	I/P 100 VAC / 305VAC O/P FULL/ MIN LOAD Ta 25	V1 0.21 %~ -0.21 %	P
5	LINE REGULATION	V1 0.5 %~ -0.5 % (Max)	I/P 100VAC ~ 305VAC O/P FULL LOAD Ta 25	V1 0.05 %~ -0.05 %	P
6	LOAD REGULATION	V1 0.5 %~ -0.5 % (Max)	I/P 230 VAC O/P FULL ~MIN LOAD Ta 25	V1 0.21 %~ -0.21 %	P
7	SET UP TIME	230VAC 1000 ms (Max) 115VAC 1500 ms(Max)	I/P 230 VAC I/P 115 VAC O/P FULL LOAD Ta 25	230VAC/ 485 ms 115VAC/ 970 ms	P
8	RISE TIME	230VAC 80 ms (Max) 115VAC 80 ms (Max)	I/P 230 VAC I/P 115 VAC O/P FULL LOAD Ta 25	230VAC/ 15 ms 115VAC/ 16 ms	P
9	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	230VAC/ 76 ms 115VAC/ 41 ms	P
10	OVER/UNDERSHOOT TEST	< ±5%	I/P 230 VAC O/P FULL LOAD Ta 25	TEST <5 %	P
11	DYNAMIC LOAD	V1 2400 mVp-p	I/P 230 VAC (1).O/P FULL /Min LOAD 90%DUTY/ 1KHZ (2).O/P FULL /Min LOAD 50%DUTY/ 120HZ Ta 25	(1)146 mVp-p (2)1341 mVp-p	P

12	DIMMER TEST (for 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										
			Resistance value	10K	20K	30K	40K	50K	60K	70K	80K	90K
	Output current	0.223A	0.480A	0.748A	1.011A	1.274A	1.546A	1.800A	2.008A	2.364A	2.502A	
	%	8.92%	19.20%	29.92%	40.44%	50.96%	61.84%	72.00%	80.32%	94.56%	100.08%	
	Dimming value	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V	
	Output current	0.222A	0.480A	0.734A	0.991A	1.247A	1.504A	1.762A	2.016A	2.273A	2.503A	
	%	8.88%	19.20%	29.36%	39.64%	49.88%	60.16%	70.48%	80.64%	90.92%	100.12%	
	Duty value	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	
	Output current	0.291A	0.576A	0.841A	1.099A	1.347A	1.586A	1.817A	2.044A	2.271A	2.493A	
	%	11.64%	23.04%	33.64%	43.96%	53.88%	63.44%	72.68%	81.76%	90.84%	99.72%	

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 I/P LOW-LINE-3V= 87 V HIGH-LINE+15%=305 V O/P FULL/MIN LOAD ON 30 Sec . OFF 30 Sec 10MIN (AC POWER ON/OFF NO DAMAGE)	71 V~305V TEST OK	P
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE OSC	I/P 90 VAC ~ 305 VAC O/P FULL -MIN LOAD Ta 25	TEST OK	P
3	POWER FACTOR	0.95 / 230 VAC(TYP) 0.98 / 115 VAC(TYP) 0.92 / 277 VAC(TYP)	I/P 230 VAC I/P 115 VAC O/P FULL LOAD Ta 25	PF= 0.968 / 230 VAC PF= 0.998 / 115 VAC PF= 0.93610 / 277 VAC	P
4	EFFICIENCY	89.5% (TYP)	I/P 230 VAC O/P FULL LOAD Ta 25	89.56 %	P
5	INPUT CURRENT	277V/ 0.3 A (TYP) 230V/ 0.32 A (TYP) 115V/ 0.64 A (TYP)	I/P 277 VAC I/P 230 VAC I/P 115 VAC O/P FULL LOAD Ta 25	I = 0.256 A/ 277 VAC I = 0.30 A/ 230 VAC I = 0.589 A/ 115 VAC	P
6	INRUSH CURRENT	230V/ 55 A (TYP) COLD START	I/P 230 VAC O/P FULL LOAD Ta 25	I = 58 A/ 230 VAC	P
7	LEAKAGE CURRENT	< 0.75 mA / 277 VAC	I/P 277 VAC O/P Min LOAD Ta 25	L-FG 0.22 mA N-FG 0.20 mA	P

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	OVER LOAD PROTECTION	95 % ~ 108 %	I/P 230 VAC I/P 115 VAC O/P TESTING Ta 25	105 %/ 230 VAC 105 %/ 115 VAC Constant current limiting, recovers automatically after fault condition is removed	P
2	OVER VOLTAGE PROTECTION	CH1 28 V ~ 35 V	I/P 230 VAC I/P 115 VAC O/P MIN LOAD Ta 25	30.43 V/ 230 VAC 30.10 V/ 115 VAC Shut down o/p voltage, re-power on to recover	P
3	OVER TEMPERATURE PROTECTION	SPEC RTH2 95±10 O.T.P. NO DAMAGE	I/P 230 VAC O/P FULL LOAD	O.T.P. Active Shut down o/p voltage, re-power on to recover	P
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P 305 VAC O/P FULL LOAD Ta 25	NO DAMAGE HICCUP	P

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	Power Transistor (D to S) or (C to E) Peak Voltage	Q1 Rated TK10A60D 10A/600V	I/P High-Line +3V = 308 V O/P (1) Full Load Turn on (2) Output Short (3) Full load continue Ta 25	(1) 512 V (2) 496 V (3) 492 V	P
2	Diode Peak Voltage	D101 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	(1) 110 V (2) 106 V (3) 108 V	P
3	Clamp Diode Peak Voltage	D2 Rated 2A/800V GP20K	I/P High-Line +3V = 308 V O/P (1) Dynamic Load 90%Duty/1KHz (2) Full load continue Ta 25	(1) 628 V (2) 632 V	P
4	Input Capacitor Voltage	C5 Rated 47u/450V 105 16*25 KXJ	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	(1) 432.22 V (2) 436.68 V (3) 434.85 V	P
5	Control IC Voltage Test	U1 Rated PFC FAN6921MR 11V~30V	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	(1) 21.598 V (2) 21.492 V (3) 21.495 V	P
6	Power Transistor (D to S) or (C to E) Peak Voltage	Q3 Rated 2SK3265 10A/700V	I/P High-Line +3V = 308 V O/P (1) Full Load Turn on (2) Output Short (3) Full load continue Ta 25	(1) 676 V (2) 548 V (3) 688 V	P

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-FG 2KVAC/min O/P-FG 0.5 KVAC/min	I/P-O/P 4 KVAC/min I/P-FG 2.4KVAC/min O/P-FG 0.6 KVAC/min Ta 25	I/P-O/P 2.343 mA I/P-FG 2.426 mA O/P-FG 0.527 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 /70%RH	I/P-O/P 30 GΩ I/P-FG 30 GΩ O/P-FG 30 GΩ NO DAMAGE	P
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40 A / 2min Ta 25 /70%RH	9 mΩ	P

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	HARMONIC	EN61000-3-2 CLASS A CLASS C	I/P: 277VAC/240/230/220/50HZ O/P:100/90/80/70/60% ELECTRONICLOAD O/P:100/60%LED LOAD Ta:25	PASS	P
2	CONDUCTION	EN55022 EN55015 CLASS B	I/P: 230 VAC (50HZ) O/P:FULL/60% LOAD Ta:25	PASS Test by certified Lab	P
3	RADIATION	EN55022 EN55015 CLASS B	I/P: 230 VAC (50HZ) O/P:FULL LOAD Ta:25	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	CRITERIA A	P
5	E.F.T	EN61000-4-4 INDUSTRY INPUT: 2KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25	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	CRITERIA A	P
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 HLG-60H-24 1. ROOM AMBIENT BURN-IN 1.5 HRS I/P 230VAC O/P 95% LOAD Ta= 28 2. HIGH AMBIENT BURN-IN 1 HRS I/P 230VAC O/P 95% LOAD Ta= 68.5			P
2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P 305VAC/100VAC O/P 95 LOAD Ta= -40	TEST OK	P
3	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 60 NO DAMAGE	I/P 305 VAC O/P 95% LOAD Ta= 60 HUMIDITY= 95 %R.H	TEST OK	P
4	TEMPERATURE COEFFICIENT	±0.03 %(0-50)	I/P 230 VAC O/P 95% LOAD	± 0.006%(0-50)	P
5	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
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	P

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 72min in each axis (X.Y.Z) (6) Ta 25	TEST OK	P
8	CAPACITOR LIFE CYCLE	HLG-60H-24 :SUPPOSE C106 IS THE MOST CRITICAL COMPONENT (1) I/P 230VAC O/P FULL LOAD Ta=25 LIFE TIME (2) I/P 230VAC O/P FULL LOAD Ta=60 LIFE TIME (3) I/P 230VAC O/P 75% LOAD Ta= 60 LIFE TIME (4) I/P 230VAC O/P 50% LOAD Ta= 60 LIFE TIME	(1) 374845 HRS (2) 37500 HRS (3) 62686 HRS (4) 78814 HRS	P
9	MTBF	MIL-HDBK-217F NOTICES2 PARTS COUNT TOTAL FAILURE RATE 338K HRS		P
10	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure(Expected Life) : 50,000 hours @ Tcase 80		P

DATE	SAMPLE	TEST RESULT	TESTER	APPROVAL
2011/5/3	PRODUCT SAMPLE	PASS	SANFORD SU	VINCENT TSENG

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