



Test Report: HLP-80H-12

80W Single Output Switching Power Supply

■ DESIGN VERIFY TEST

Output Function Test
Input Function Test
Protection Function Test
Control 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
1	RIPPLE & NOISE	V1 : 150 mVp-p (Max)	I/P : 230VAC O/P : FULL LOAD Ta : 25°C	V1 : 13.4 mVp-p (Max)
2	OUTPUT VOLTAGE ADJUST RANGE	CH1 : 10.8 V ~ 13.5 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	10.516 V ~ 13.784 V / 230 VAC 10.519 V ~ 13.785 V / 115 VAC
3	CURRENT ADJUST RANGE	CH1 : 4A ~ 5A	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	3.378 A ~ 5.813 A / 230 VAC 3.384 A ~ 5.825 A / 115 VAC
4	OUTPUT VOLTAGE TOLERANCE	V1 : 2.5 % ~ -2.5 % (Max)	I/P : 100 VAC / 305 VAC O/P : FULL / MIN LOAD Ta : 25°C	V1 : 0.4 % ~ -0.4 %
5	LINE REGULATION	V1 : 0.5 % ~ -0.5 % (Max)	I/P : 100VAC ~ 305 VAC O/P : FULL LOAD Ta : 25°C	V1 : 0 % ~ 0 %
6	LOAD REGULATION	V1 : 0.5 % ~ -0.5 % (Max)	I/P : 230 VAC O/P : FULL ~ MIN LOAD Ta : 25°C	V1 : 0.4 % ~ -0.4 %
7	SET UP TIME	230VAC : 500 ms (Max) 115VAC : 1200 ms(Max)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 271 ms 115VAC/ 272 ms
8	RISE TIME	230VAC : 200 ms (Max) 115VAC : 200 ms (Max)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 19 ms 115VAC/ 16 ms
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°C	230VAC/ 105 ms 115VAC/ 46 ms
10	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	TEST : <5 %
11	DYNAMIC LOAD	V1 : 1200 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°C	(1)341 mVp-p (2)563 mVp-p

12	DIMMER TEST	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
Output current	0.661A		1.030A	1.501A	2.011A	2.582A	3.067A	3.548A	4.047A	4.602A	5.109A	
%	13.22%		20.60%	30.02%	40.22%	51.64%	61.34%	70.96%	80.94%	92.04%	102.18%	
2	Dimming value	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V	
	Output current	0.653A	1.026A	1.493A	1.989A	2.500A	3.005A	3.520A	4.020A	4.520A	5.018A	
	%	13.06%	20.52%	29.86%	39.78%	50.00%	60.10%	70.40%	80.40%	90.40%	100.36%	
3	Duty value	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	
	Output current	0.548A	1.062A	1.432A	1.943A	2.481A	3.018A	3.554A	4.073A	4.593A	5.126A	
	%	10.96%	21.24%	28.64%	38.86%	49.62%	60.36%	71.08%	81.46%	91.86%	102.52%	

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	90VAC~305 VAC	I/P : TESTING O/P : FULL LOAD Ta : 25°C I/P : LOW-LINE=3V= 87 V HIGH-LINE=305 V O/P : FULL/MIN LOAD ON : 30 Sec. OFF : 30 Sec 10MIN (AC POWER ON/OFF NO DAMAGE)	67 V~305V TEST : OK
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE	I/P : 90 VAC ~ 305 VAC O/P : FULL -MIN LOAD Ta : 25°C	TEST : OK
3	POWER FACTOR	0.96 / 230 VAC(TYP) 0.96 / 115 VAC(TYP) 0.94 / 277 VAC(TYP)	I/P : 230 VAC I/P : 115 VAC I/P : 277 VAC O/P : FULL LOAD Ta : 25°C	PF= 0.964 / 230 VAC PF= 0.989 / 115 VAC PF= 0.945 / 277 VAC
4	EFFICIENCY	87.5 % (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	88.400 %

5	INPUT CURRENT	277V/ 0.4 A (TYP) 230V/ 0.425 A (TYP) 115V/ 0.85 A (TYP)	I/P : 277 VAC I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I = 0.26 A/ 277 VAC I = 0.3 A/ 230 VAC I = 0.59 A/ 115 VAC
6	INRUSH CURRENT	230V/ 70 A (TYP) COLD START	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	I = 65 A/ 230 VAC
7	LEAKAGE CURRENT	< 0.75 mA / 277 VAC	I/P : 277 VAC O/P : Min LOAD Ta : 25°C	L-FG : 0.18 mA N-FG : 0.18 mA

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	95 % ~ 108 %	I/P : 230 VAC I/P : 115 VAC O/P : TESTING Ta : 25°C	101.6 % / 230 VAC 101.8 % / 115 VAC Constant current limiting, recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	CH1 : 14 V ~ 17 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	15.966 V / 230 VAC 16.079 V / 115 VAC Shut down o/p voltage, re-power on to recover
3	OVER TEMPERATURE PROTECTION	NO DAMAGE	I/P : 230 VAC O/P : FULL LOAD	O.T.P. Active Shut down o/p voltage, re-power on to recover
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P : 305 VAC O/P : FULL LOAD Ta : 25°C	NO DAMAGE HICCUP

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	Power Transistor (D to S) or (C to E) Peak Voltage	Q 1 Rated : 12A/700V	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) 640 V (2) 528 V (3) 636 V
2	Diode Peak Voltage	Q101 Rated : 84A/60V	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) 57 V (2) 54.8 V (3) 57 V
3	Clamp Diode Peak Voltage	D12 Rated : 2A/800V	I/P : High-Line +3V = 308 V O/P : (1) Dynamic Load 90%Duty/1KHz (2)Full load continue Ta : 25°C	(1) 616 V (2) 608 V
4	Input Capacitor Voltage	C 5 Rated : 82u/450V	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) 424.65 V (2) 435.61 V (3) 434.90 V
5	Control IC Voltage Test	U1 Rated : 16V~38V	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) 21.868 V (2) 21.626 V (3) 21.621 V
6	Power Transistor (D to S) or (C to E) Peak Voltage	Q2 Rated : 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°C	(1) 500 V (2) 464 V (3) 456 V

■ SAFETY & E.M.C. TEST

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P : 3.75 KVAC/min I/P-FG : 2 KVAC/min<4.5mA O/P-FG : 1.5 KVAC/min	I/P-O/P : 4 KVAC/min I/P-FG : 2.4 KVAC/min O/P-FG : 1.8 KVAC/min Ta : 25°C	I/P-O/P : 1.689 mA I/P-FG : 1.895 mA O/P-FG : 0.299 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 /70%RH	I/P-O/P : 11.3 GΩ I/P-FG : 30 GΩ O/P-FG : 30 GΩ NO DAMAGE
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40 A / 2min Ta : 25°C / 70%RH	9 mΩ

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	EN61000-3-2 CLASS A CLASS C	I/P: 230 VAC 50HZ O/P:100/75/60% ELECTRONICLOAD O/P:100%LED LOAD Ta:25°C	PASS
2	CONDUCTION	EN55022 EN55015 CLASS B	I/P: 230 VAC (50HZ) O/P:FULL/60% 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

ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT																																																																				
1	TEMPERATURE RISE TEST	MODEL : HLP-80H-12 1. ROOM AMBIENT BURN-IN : 12 HRS I/P : 230VAC O/P : 95% LOAD Ta=24.7 °C 2. HIGH AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : 95% LOAD Ta=51.5 °C	<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta= 24.7 °C</th> <th>HIGH AMBIENT Ta=51.5 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>LF2</td><td>44.5°C</td><td>69.0°C</td></tr> <tr><td>2</td><td>D6</td><td>59.0°C</td><td>80.7°C</td></tr> <tr><td>3</td><td>L3</td><td>52.5°C</td><td>74.9°C</td></tr> <tr><td>4</td><td>BD1</td><td>52.4°C</td><td>76.4°C</td></tr> <tr><td>5</td><td>C5</td><td>55.3°C</td><td>78.1°C</td></tr> <tr><td>6</td><td>Q1</td><td>58.2°C</td><td>82.1°C</td></tr> <tr><td>7</td><td>D12</td><td>63.9°C</td><td>87.2°C</td></tr> <tr><td>8</td><td>Q2</td><td>55.4°C</td><td>79.1°C</td></tr> <tr><td>9</td><td>T1</td><td>64.7°C</td><td>86.9°C</td></tr> <tr><td>10</td><td>C18</td><td>53.3°C</td><td>76.4°C</td></tr> <tr><td>11</td><td>RTH2</td><td>51.5°C</td><td>75.5°C</td></tr> <tr><td>12</td><td>U1</td><td>55.4°C</td><td>78.0°C</td></tr> <tr><td>13</td><td>Q101</td><td>54.0°C</td><td>78.4°C</td></tr> <tr><td>14</td><td>C152</td><td>62.0°C</td><td>85.0°C</td></tr> <tr><td>15</td><td>L100</td><td>47.5°C</td><td>71.9°C</td></tr> <tr><td>16</td><td>C106</td><td>54.3°C</td><td>77.9°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta= 24.7 °C	HIGH AMBIENT Ta=51.5 °C	1	LF2	44.5°C	69.0°C	2	D6	59.0°C	80.7°C	3	L3	52.5°C	74.9°C	4	BD1	52.4°C	76.4°C	5	C5	55.3°C	78.1°C	6	Q1	58.2°C	82.1°C	7	D12	63.9°C	87.2°C	8	Q2	55.4°C	79.1°C	9	T1	64.7°C	86.9°C	10	C18	53.3°C	76.4°C	11	RTH2	51.5°C	75.5°C	12	U1	55.4°C	78.0°C	13	Q101	54.0°C	78.4°C	14	C152	62.0°C	85.0°C	15	L100	47.5°C	71.9°C	16	C106	54.3°C	77.9°C	
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2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 305VAC/100VAC O/P : 95% LOAD Ta= -40°C / -25°C	TEST : OK																																																																				
3	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50 °C NO DAMAGE	I/P : 305 VAC O/P : 95% LOAD Ta= 50 °C HUMIDITY= 95 %R.H	TEST : OK																																																																				
4	TEMPERATURE COEFFICIENT	± 0.03 %(0-50°C)	I/P : 230 VAC O/P : 95% LOAD	± 0.01 %(0-50°C)																																																																				
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																																																																				
6	THERMAL SHOCK TEST	1. Thermal shock Temperature : -45°C~ +55°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																																																																				



7	VIBRATION TEST	1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10-500Hz (3) Sweep Time : 12min/sweep cycle (4) Acceleration : 2G (5) Test Time : 60min in each axis (X.Y.Z) (6) Ta : 25°C	TEST : OK
8	CAPACITOR LIFE CYCLE	HLP-80H-12:SUPPOSE C106 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=50 °C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta= 50 °C LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta= 50 °C LIFE TIME	(1) 365190 HRS (2) 75147 HRS (3) 116328 HRS (4) 160062 HRS
9	MTBF	MIL-HDBK-217F NOTICES2 PARTS COUNT TOTAL FAILURE RATE : 316.2 KHRS	
10	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure(Expected Life) : 30,000 hours @ TA 50°C	

DATE	SAMPLE	TEST RESULT	TESTER	APPROVAL
2010/11/5	RD SAMPLE	PASS	SANFORD SU	VINCENT TSENG
2010/12/24	PRODUCT SAMPLE	PASS	SANFORD SU	VINCENT TSENG

2009/08/04 A50-F023