



# Test Report: HLN-80H-24

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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 : 27.6 mVp-p (Max)
2	OUTPUT VOLTAGE ADJUST RANGE	CH1 : 22V ~ 27 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	21.083 V ~ 28.163 V / 230 VAC 21.083 V ~ 28.162 V / 115 VAC
3	CURRENT ADJUST RANGE	CH1 : 2.04 A ~ 3.4 A	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	0.991 A ~ 4.102 A / 230 VAC 1.023 A ~ 4.103 A / 115 VAC
4	OUTPUT VOLTAGE TOLERANCE	V1 : 1 %~ -1 % (Max)	I/P : 100 VAC / 305 VAC O/P : FULL/ MIN LOAD Ta : 25°C	V1 : 0.15 %~ -0.15 %
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 : 0.13 %~ -0.13 %
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/ 286 ms 115VAC/ 298 ms
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°C	230VAC/ 19 ms 115VAC/ 19 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/ 87 ms 115VAC/ 36 ms
10	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	TEST : <5 %
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°C	(1)265 mVp-p (2)655 mVp-p

12	DIMMER TEST (for B-type only)	SPEC:																																
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## 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 )	71 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	90.5 % (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	90.7 %

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 = 0.34 A/ 277 VAC I = 0.40 A/ 230 VAC I = 0.79 A/ 115 VAC
6	INRUSH CURRENT	230V/ 70 A (TYP) COLD START	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	I = 69 A/ 230 VAC
7	LEAKAGE CURRENT	< 0.75 mA / 277 VAC	I/P : 277 VAC O/P : Min LOAD Ta : 25°C	L-FG : 0.2 mA N-FG : 0.2 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	100.6 % / 230 VAC 101 % / 115 VAC Constant current limiting, recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	CH1 : 28 V ~ 35V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	30.333V / 230 VAC 30.232V / 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	Q1 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) 628 V (2) 488 V (3) 620 V
2	Diode Peak Voltage	Q101 Rated : 80A/120V	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) 112 V (2) 86 V (3) 108 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) 604 V (2) 600 V
4	Input Capacitor Voltage	C5 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) 420.48 V (2) 432.95 V (3) 432.40 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) 21.342 V (2) 21.187 V (3) 21.193 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) 496 V (2) 464 V (3) 448 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 : 2.376 mA I/P-FG : 2.180 mA O/P-FG : 0.448 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 : 30 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
4	APPROVAL	TUV : Certificate NO : R50202516 UL : File NO : E334687		

**E.M.C TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	EN61000-3-2 CLASS A CLASS C	I/P: 230VAC/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 : HLN-80H-24 1. ROOM AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : 95% LOAD Ta=26.6℃ ℃ 2. HIGH AMBIENT BURN-IN : 4 HRS I/P : 230VAC O/P : 95% LOAD Ta=44.5℃ ℃	<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta= 26.6 ℃</th> <th>HIGH AMBIENT Ta=44.5 ℃</th> </tr> </thead> <tbody> <tr><td>1</td><td>BD1</td><td>64.8℃</td><td>78.2℃</td></tr> <tr><td>2</td><td>C5</td><td>65.8℃</td><td>78.7℃</td></tr> <tr><td>3</td><td>Q1</td><td>68.5℃</td><td>82.2℃</td></tr> <tr><td>4</td><td>D12</td><td>71.2℃</td><td>84.7℃</td></tr> <tr><td>5</td><td>Q2</td><td>66.5℃</td><td>79.8℃</td></tr> <tr><td>6</td><td>T1</td><td>73.2℃</td><td>86.6℃</td></tr> <tr><td>7</td><td>C18</td><td>60.5℃</td><td>73.7℃</td></tr> <tr><td>8</td><td>RTH2</td><td>58.2℃</td><td>71.2℃</td></tr> <tr><td>9</td><td>U1</td><td>63.0℃</td><td>75.5℃</td></tr> <tr><td>10</td><td>Q101</td><td>65.8℃</td><td>80.9℃</td></tr> <tr><td>11</td><td>L100</td><td>54.2℃</td><td>68.8℃</td></tr> <tr><td>12</td><td>C106</td><td>59.2℃</td><td>73.4℃</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta= 26.6 ℃	HIGH AMBIENT Ta=44.5 ℃	1	BD1	64.8℃	78.2℃	2	C5	65.8℃	78.7℃	3	Q1	68.5℃	82.2℃	4	D12	71.2℃	84.7℃	5	Q2	66.5℃	79.8℃	6	T1	73.2℃	86.6℃	7	C18	60.5℃	73.7℃	8	RTH2	58.2℃	71.2℃	9	U1	63.0℃	75.5℃	10	Q101	65.8℃	80.9℃	11	L100	54.2℃	68.8℃	12	C106	59.2℃	73.4℃	
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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℃ / -25℃	TEST : OK																																																				
3	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 40 ℃ NO DAMAGE	I/P : 305 VAC O/P : 95% LOAD Ta= 40 ℃ HUMIDITY= 95 %R.H	TEST : OK																																																				
4	TEMPERATURE COEFFICIENT	± 0.03 %(0-50℃)	I/P : 230 VAC O/P : 95% LOAD	± 0.01 %(0-50℃)																																																				
5	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -45℃~ +90℃ 2. Temperature change rate : 25℃ / 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℃~ +45℃ 2. Temperature change rate : 25℃ / MIN 3. Dwell time low and high temperature : 30 MIN/EACH 4. Total test cycle : 10 CYCLE 5. Input/Output condition : 230VAC/Fu11 Load AC ON/OFF TEST turn on 58sec ; turn off 2sec		OK																																																				



# 80W Single Output Switching Power Supply

# HLN-80H series

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	HLN-80H-24: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=40 °C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta= 40 °C LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta= 40 °C LIFE TIME	(1) 313692 HRS (2) 143345 HRS (3) 199932 HRS (4) 275068 HRS
9	MTBF	MIL-HDBK-217F NOTICES2 PARTS COUNT TOTAL FAILURE RATE : 356.4 KHRS	
10	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure(Expected Life) : 30,000 hours @ Tcase 70°C; 50,000 hours @ Tcase 60°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