



Test Report: HLN-80H-20

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 : 24.6 mVp-p (Max)
2	OUTPUT VOLTAGE ADJUST RANGE	CH1 : 17V ~ 22 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	16.13 V ~ 22.60 V / 230 VAC 16.13 V ~ 22.60 V / 115 VAC
3	CURRENT ADJUST RANGE	CH1 : 2.4A ~ 4A	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	1.216 A ~ 4.768 A / 230 VAC 1.236 A ~ 4.765 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 : 0.3 %~ -0.3 %
5	LINE REGULATION	V1 : 0.5 %~ -0.5 % (Max)	I/P : 100VAC ~ 305 VAC O/P : FULL LOAD Ta : 25°C	V1 : 0.03 %~ -0.03 %
6	LOAD REGULATION	V1 : 1%~ -1 % (Max)	I/P : 230 VAC O/P : FULL ~MIN LOAD Ta : 25°C	V1 : 0.3 %~ -0.3 %
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/ 26 ms 115VAC/ 22 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/ 85 ms 115VAC/ 37 ms
10	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	TEST : <5 %
11	DYNAMIC LOAD	V1 : 2000 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)361 mVp-p (2)610 mVp-p

12	DIMMER TEST (for B-type only)	SPEC:																																
		*Reference resistance value for output current adjustment (Typical)																																
		<table border="1"> <tr> <th>Resistance value</th> <th>10K</th> <th>20K</th> <th>30K</th> <th>40K</th> <th>50K</th> <th>60K</th> <th>70K</th> <th>80K</th> <th>90K</th> <th>100K</th> </tr> <tr> <th>Output current</th> <td>10%</td> <td>20%</td> <td>30%</td> <td>40%</td> <td>50%</td> <td>60%</td> <td>70%</td> <td>80%</td> <td>90%</td> <td>100%</td> </tr> </table>	Resistance value	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K	Output current	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%										
		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)																																
		<table border="1"> <tr> <th>Dimming value</th> <th>1V</th> <th>2V</th> <th>3V</th> <th>4V</th> <th>5V</th> <th>6V</th> <th>7V</th> <th>8V</th> <th>9V</th> <th>10V</th> </tr> <tr> <th>Output current</th> <td>10%</td> <td>20%</td> <td>30%</td> <td>40%</td> <td>50%</td> <td>60%</td> <td>70%</td> <td>80%</td> <td>90%</td> <td>100%</td> </tr> </table>	Dimming value	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V	Output current	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%										
		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)																																
		<table border="1"> <tr> <th>Duty value</th> <th>10%</th> <th>20%</th> <th>30%</th> <th>40%</th> <th>50%</th> <th>60%</th> <th>70%</th> <th>80%</th> <th>90%</th> <th>100%</th> </tr> <tr> <th>Output current</th> <td>10%</td> <td>20%</td> <td>30%</td> <td>40%</td> <td>50%</td> <td>60%</td> <td>70%</td> <td>80%</td> <td>90%</td> <td>100%</td> </tr> </table>	Duty value	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	Output current	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%										
		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																																		
<table border="1"> <tr> <td rowspan="3">1</td> <th>Resistance value</th> <th>10K</th> <th>20K</th> <th>30K</th> <th>40K</th> <th>50K</th> <th>60K</th> <th>70K</th> <th>80K</th> <th>90K</th> <th>100K</th> </tr> <tr> <th>Output current</th> <td>0.477A</td> <td>0.865A</td> <td>1.219A</td> <td>1.623A</td> <td>2.025A</td> <td>2.428A</td> <td>2.814A</td> <td>3.213A</td> <td>3.654A</td> <td>4.055A</td> </tr> <tr> <th>%</th> <td>11.93%</td> <td>21.63%</td> <td>30.48%</td> <td>40.58%</td> <td>50.63%</td> <td>60.70%</td> <td>70.35%</td> <td>80.33%</td> <td>91.35%</td> <td>101.38%</td> </tr> </table>	1	Resistance value	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K	Output current	0.477A	0.865A	1.219A	1.623A	2.025A	2.428A	2.814A	3.213A	3.654A	4.055A	%	11.93%	21.63%	30.48%	40.58%	50.63%	60.70%	70.35%	80.33%	91.35%	101.38%
1		Resistance value	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K																						
		Output current	0.477A	0.865A	1.219A	1.623A	2.025A	2.428A	2.814A	3.213A	3.654A	4.055A																						
	%	11.93%	21.63%	30.48%	40.58%	50.63%	60.70%	70.35%	80.33%	91.35%	101.38%																							
<table border="1"> <tr> <td rowspan="3">2</td> <th>Dimming value</th> <th>1V</th> <th>2V</th> <th>3V</th> <th>4V</th> <th>5V</th> <th>6V</th> <th>7V</th> <th>8V</th> <th>9V</th> <th>10V</th> </tr> <tr> <th>Output current</th> <td>0.477A</td> <td>0.875A</td> <td>1.218A</td> <td>1.622A</td> <td>2.022A</td> <td>2.422A</td> <td>2.825A</td> <td>3.230A</td> <td>3.627A</td> <td>4.023A</td> </tr> <tr> <th>%</th> <td>11.93%</td> <td>21.88%</td> <td>30.45%</td> <td>40.55%</td> <td>50.55%</td> <td>60.55%</td> <td>70.63%</td> <td>80.75%</td> <td>90.68%</td> <td>100.58%</td> </tr> </table>	2	Dimming value	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V	Output current	0.477A	0.875A	1.218A	1.622A	2.022A	2.422A	2.825A	3.230A	3.627A	4.023A	%	11.93%	21.88%	30.45%	40.55%	50.55%	60.55%	70.63%	80.75%	90.68%	100.58%
2		Dimming value	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V																						
		Output current	0.477A	0.875A	1.218A	1.622A	2.022A	2.422A	2.825A	3.230A	3.627A	4.023A																						
	%	11.93%	21.88%	30.45%	40.55%	50.55%	60.55%	70.63%	80.75%	90.68%	100.58%																							
<table border="1"> <tr> <td rowspan="3">3</td> <th>Duty value</th> <th>10%</th> <th>20%</th> <th>30%</th> <th>40%</th> <th>50%</th> <th>60%</th> <th>70%</th> <th>80%</th> <th>90%</th> <th>100%</th> </tr> <tr> <th>Output current</th> <td>0.389A</td> <td>0.804A</td> <td>1.173A</td> <td>1.592A</td> <td>2.012A</td> <td>2.430A</td> <td>2.849A</td> <td>3.269A</td> <td>3.689A</td> <td>4.103A</td> </tr> <tr> <th>%</th> <td>9.73%</td> <td>20.10%</td> <td>29.33%</td> <td>39.80%</td> <td>50.30%</td> <td>60.75%</td> <td>71.23%</td> <td>81.73%</td> <td>92.23%</td> <td>102.58%</td> </tr> </table>	3	Duty value	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	Output current	0.389A	0.804A	1.173A	1.592A	2.012A	2.430A	2.849A	3.269A	3.689A	4.103A	%	9.73%	20.10%	29.33%	39.80%	50.30%	60.75%	71.23%	81.73%	92.23%	102.58%
3		Duty value	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%																						
		Output current	0.389A	0.804A	1.173A	1.592A	2.012A	2.430A	2.849A	3.269A	3.689A	4.103A																						
	%	9.73%	20.10%	29.33%	39.80%	50.30%	60.75%	71.23%	81.73%	92.23%	102.58%																							

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	90% (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	90.126 %

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 = 0.39 A/ 230 VAC I = 0.776 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	100.7 % / 230 VAC 100.7 % / 115 VAC Constant current limiting, recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	CH1 : 23 V ~ 30 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	25.16 V / 230 VAC 25.14 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) 644 V (2) 504 V (3) 624 V
2	Diode Peak Voltage	Q101 Rated : 80A/120V	I/P : High-Line +3V =308V O/P : (1)Full Load Turn on (2)Output Short (3)Full load continue Ta : 25°C	(1) 94.6 V (2) 71.6 V (3) 92.4 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) 608 V (2) 596 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) 422.70 V (2) 435.16 V (3) 434.66 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) 21.325 V (3) 21.234 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) 516 V (2) 460 V (3) 460 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 : 1.8KVAC/min Ta : 25°C	I/P-O/P : 2.246 mA I/P-FG : 2.151 mA O/P-FG : 0.430 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-12 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>59.6℃</td><td>72.6℃</td></tr> <tr><td>2</td><td>C5</td><td>61.0℃</td><td>73.6℃</td></tr> <tr><td>3</td><td>Q1</td><td>64.2℃</td><td>77.3℃</td></tr> <tr><td>4</td><td>D12</td><td>69.9℃</td><td>82.7℃</td></tr> <tr><td>5</td><td>Q2</td><td>61.3℃</td><td>74.3℃</td></tr> <tr><td>6</td><td>T1</td><td>66.9℃</td><td>81.4℃</td></tr> <tr><td>7</td><td>C18</td><td>59.6℃</td><td>71.9℃</td></tr> <tr><td>8</td><td>RTH2</td><td>57.4℃</td><td>69.9℃</td></tr> <tr><td>9</td><td>U1</td><td>60.0℃</td><td>72.3℃</td></tr> <tr><td>10</td><td>Q101</td><td>63.0℃</td><td>76.4℃</td></tr> <tr><td>11</td><td>L100</td><td>56.1℃</td><td>69.3℃</td></tr> <tr><td>12</td><td>C106</td><td>59.6℃</td><td>73.7℃</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta= 26.6 ℃	HIGH AMBIENT Ta=44.5 ℃	1	BD1	59.6℃	72.6℃	2	C5	61.0℃	73.6℃	3	Q1	64.2℃	77.3℃	4	D12	69.9℃	82.7℃	5	Q2	61.3℃	74.3℃	6	T1	66.9℃	81.4℃	7	C18	59.6℃	71.9℃	8	RTH2	57.4℃	69.9℃	9	U1	60.0℃	72.3℃	10	Q101	63.0℃	76.4℃	11	L100	56.1℃	69.3℃	12	C106	59.6℃	73.7℃	
NO	Position	ROOM AMBIENT Ta= 26.6 ℃	HIGH AMBIENT Ta=44.5 ℃																																																					
1	BD1	59.6℃	72.6℃																																																					
2	C5	61.0℃	73.6℃																																																					
3	Q1	64.2℃	77.3℃																																																					
4	D12	69.9℃	82.7℃																																																					
5	Q2	61.3℃	74.3℃																																																					
6	T1	66.9℃	81.4℃																																																					
7	C18	59.6℃	71.9℃																																																					
8	RTH2	57.4℃	69.9℃																																																					
9	U1	60.0℃	72.3℃																																																					
10	Q101	63.0℃	76.4℃																																																					
11	L100	56.1℃	69.3℃																																																					
12	C106	59.6℃	73.7℃																																																					
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-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=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) 288489 HRS (2) 132756 HRS (3) 190365 HRS (4) 212676 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