



Test Report: HB-80-48

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	VERDICT
1	RIPPLE & NOISE	V1 : 200 mVp-p (Max)	I/P : 230VAC O/P : FULL LOAD Ta : 25°C	V1 : 27 mVp-p (Max)	P
2	OUTPUT VOLTAGE ADJUST RANGE	CH1 : 43V ~ 53 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	41.895 V ~ 55.66 V / 230 VAC 41.912 V ~ 55.66 V / 115 VAC	P
3	CURRENT ADJUST RANGE	CH1 : 1.02 A ~ 1.7 A	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	0.487 A ~ 1.982 A / 230 VAC 0.517 A ~ 1.991 A / 115 VAC	P
4	OUTPUT VOLTAGE TOLERANCE	V1 : 1 % ~ -1 % (Max)	I/P : 100 VAC / 305 VAC O/P : FULL / MIN LOAD Ta : 25°C	V1 : 0.09 % ~ -0.09 %	P
5	LINE REGULATION	V1 : 0.5 % ~ -0.5 % (Max)	I/P : 100VAC ~ 305 VAC O/P : FULL LOAD Ta : 25°C	V1 : 0.02 % ~ -0.02 %	P
6	LOAD REGULATION	V1 : 0.5% ~ -0.5 % (Max)	I/P : 230 VAC O/P : FULL ~ MIN LOAD Ta : 25°C	V1 : 0.04 % ~ -0.04 %	P
7	SET UP TIME	230VAC : 1000 ms (Max) 115VAC : 2000 ms(Max)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 506 ms 115VAC/ 1012 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°C	230VAC/ 23 ms 115VAC/ 20 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°C	230VAC/ 81 ms 115VAC/ 35 ms	P
10	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	TEST : <5 %	P
11	DYNAMIC LOAD	V1 : 4800 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)464 mVp-p (2)994 mVp-p	P

12	DIMMER TEST (for B-type only)	<p>SPEC:</p> <p>*Reference resistance value for output current adjustment (Typical)</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <td>Resistance value</td> <td>10K</td> <td>20K</td> <td>30K</td> <td>40K</td> <td>50K</td> <td>60K</td> <td>70K</td> <td>80K</td> <td>90K</td> <td>100K</td> </tr> <tr> <td>Output current</td> <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> <p>*1 ~ 10V dimming function for output current adjustment (Typical)</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <td>Dimming value</td> <td>1V</td> <td>2V</td> <td>3V</td> <td>4V</td> <td>5V</td> <td>6V</td> <td>7V</td> <td>8V</td> <td>9V</td> <td>10V</td> </tr> <tr> <td>Output current</td> <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> <p>*10V PWM signal for output current adjustment (Typical)</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <td>Duty value</td> <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> <tr> <td>Output current</td> <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> <p>TEST RESULT: I/P : 230 VAC ; Ta : 25°C</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <td rowspan="3">1</td> <td>Resistance value</td> <td>10K</td> <td>20K</td> <td>30K</td> <td>40K</td> <td>50K</td> <td>60K</td> <td>70K</td> <td>80K</td> <td>90K</td> <td>100K</td> </tr> <tr> <td>Output current</td> <td>0.227A</td> <td>0.368A</td> <td>0.540A</td> <td>0.702A</td> <td>0.871A</td> <td>1.036A</td> <td>1.195A</td> <td>1.360A</td> <td>1.541A</td> <td>1.704A</td> </tr> <tr> <td>%</td> <td>13.35%</td> <td>21.65%</td> <td>31.76%</td> <td>41.29%</td> <td>51.24%</td> <td>60.94%</td> <td>70.29%</td> <td>80.00%</td> <td>90.65%</td> <td>100.24%</td> </tr> <tr> <td rowspan="3">2</td> <td>Dimming value</td> <td>1V</td> <td>2V</td> <td>3V</td> <td>4V</td> <td>5V</td> <td>6V</td> <td>7V</td> <td>8V</td> <td>9V</td> <td>10V</td> </tr> <tr> <td>Output current</td> <td>0.228A</td> <td>0.372A</td> <td>0.538A</td> <td>0.705A</td> <td>0.872A</td> <td>1.040A</td> <td>1.208A</td> <td>1.373A</td> <td>1.541A</td> <td>1.705A</td> </tr> <tr> <td>%</td> <td>13.41%</td> <td>21.88%</td> <td>31.65%</td> <td>41.47%</td> <td>51.29%</td> <td>61.18%</td> <td>71.06%</td> <td>80.76%</td> <td>90.65%</td> <td>100.29%</td> </tr> <tr> <td rowspan="3">3</td> <td>Duty value</td> <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> <tr> <td>Output current</td> <td>0.192A</td> <td>0.362A</td> <td>0.516A</td> <td>0.691A</td> <td>0.668A</td> <td>1.041A</td> <td>1.216A</td> <td>1.391A</td> <td>1.567A</td> <td>1.740A</td> </tr> <tr> <td>%</td> <td>11.29%</td> <td>21.29%</td> <td>30.35%</td> <td>40.65%</td> <td>39.29%</td> <td>61.24%</td> <td>71.53%</td> <td>81.82%</td> <td>92.18%</td> <td>102.35%</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%	Dimming value	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V	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%	1	Resistance value	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K	Output current	0.227A	0.368A	0.540A	0.702A	0.871A	1.036A	1.195A	1.360A	1.541A	1.704A	%	13.35%	21.65%	31.76%	41.29%	51.24%	60.94%	70.29%	80.00%	90.65%	100.24%	2	Dimming value	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V	Output current	0.228A	0.372A	0.538A	0.705A	0.872A	1.040A	1.208A	1.373A	1.541A	1.705A	%	13.41%	21.88%	31.65%	41.47%	51.29%	61.18%	71.06%	80.76%	90.65%	100.29%	3	Duty value	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	Output current	0.192A	0.362A	0.516A	0.691A	0.668A	1.041A	1.216A	1.391A	1.567A	1.740A	%	11.29%	21.29%	30.35%	40.65%	39.29%	61.24%	71.53%	81.82%	92.18%	102.35%	P
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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°C <hr/> I/P : LOW-LINE-3V= 87 V HIGH-LINE+15%=300 V O/P : FULL/MIN LOAD ON : 30 Sec . OFF : 30 Sec 10MIN (AC POWER ON/OFF NO DAMAGE)	70 V~305V <hr/> 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°C	TEST : OK	P
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	P
4	EFFICIENCY	91 % (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	91.38 %	P
5	INPUT CURRENT	277V/ 0.4 A (TYP) 230V/ 0.425 A (TYP)	I/P : 277 VAC I/P : 230 VAC	I= 0.34 A/ 277VAC I= 0.4 A/ 230 VAC	P

		115V/ 0.85 A (TYP)	I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	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 = 66 A/ 230 VAC	P
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	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°C	100.9 % / 230 VAC 101 % / 115 VAC Constant current limiting, recovers automatically after fault condition is removed	P
2	OVER VOLTAGE PROTECTION	CH1 : 54 V ~60 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	57.76 V / 230 VAC 57.74 V / 115 VAC Shut down o/p voltage, re-power on to recover	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, 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°C	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	Q 1 Rated : 2SK3677-01MR 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) 620 V (2) 488 V (3) 616 V	P
2	Diode Peak Voltage	Q101 Rated : STTH2003CT 20A/300V	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) 222 V (2) 171 V (3) 220 V	P
3	Clamp Diode Peak Voltage	D12 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°C	(1) 596 V (2) 600 V	P
4	Input Capacitor Voltage	C 5 Rated : 82u/450V 10Kh 105°C KXG	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) 423.63 V (2) 437.98 V (3) 435.37 V	P
5	Control IC Voltage Test	U1 Rated : TEA1752T 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) 21.460 V (2) 21.465 V (3) 21.446 V	P
6	Power Transistor (D to S) or (C to E) Peak Voltage	Q2 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°C	(1) 492 V (2) 464 V (3) 456 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 : 1.88 KVAC/min O/P-FG : 0.5 KVAC/min	I/P-O/P : 4 KVAC/min I/P-FG : 2.26 KVAC/min O/P-FG : 0.6 KVAC/min Ta : 25°C	I/P-O/P : 2.287 mA I/P-FG : 2.109 mA O/P-FG : 0.135 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 /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°C / 70%RH	9 mΩ	P
4	APPROVAL	TUV : Certificate NO : R50202516 UL : File NO : E334687			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: 277VAC/240/230/220/50HZ O/P:100/75/60% ELECTRONICLOAD O/P:100/60%LED LOAD Ta:25°C	PASS	P
2	CONDUCTION	EN55022 EN55015 CLASS B	I/P: 230 VAC (50HZ) O/P:FULL/60% 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
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 : HB-80-48 1. ROOM AMBIENT BURN-IN : 13.5 HRS I/P : 230VAC O/P : 95% LOAD Ta=25.1 °C °C 2. HIGH AMBIENT BURN-IN : 67 HRS I/P : 230VAC O/P : 95% LOAD Ta= 63.8 °C °C			P	
2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 305VAC/100VAC O/P : 95 % LOAD Ta= -40/-25 °C	TEST : OK	P	
3	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 60 °C NO DAMAGE	I/P : 305 VAC O/P : 95% LOAD Ta= 60 °C HUMIDITY= 95 %R.H	TEST : OK	P	
4	TEMPERATURE COEFFICIENT	± 0.03 % (0~50°C)	I/P : 230 VAC O/P : 95% LOAD	± 0.02 % (0~50°C)	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 : -30°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/Fu11 Load AC ON/OFF TEST turn on 58sec ; turn off 2sec		OK	P	

HB-80 series

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 : 60min in each axis (X.Y.Z) (6) Ta : 25°C	TEST : OK	P
8	CAPACITOR LIFE CYCLE	HLG-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= 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) 534992 HRS (2) 76310 HRS (3) 86993 HRS (4) 110121HRS	P
9	MTBF	MIL-HDBK-217F NOTICES2 PARTS COUNT TOTAL FAILURE RATE : 357.8K HRS		P
10	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure(Expected Life) : 50,000 hours @ Tcase 75°C		P