



Test Report: HB-100-48

100W Single Output Switching Power Supply

■ DESIGN VERIFY TEST

Output Function Test

Input Function Test

Protection Function Test

Other Test

Component Stress Test

■ SAFETY & E.M.C. TEST

Safety Test

E.M.C. Test

■ RELIABILITY TEST

4DESIGN VERIFY TEST

OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	RIPPLE & NOISE	V1: 200 mVp-p (Max)	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	V1: 40.8 mVp-p (Max)	P
2	OUTPUT VOLTAGE ADJUST RANGE	CH1: 43V~53 V	I/P: 230 VAC I/P: 115VAC O/P: MIN LOAD Ta: 25°C	41.68 V~ 54.24 V /230VAC 41.68 V~ 51.24 V/115VAC	P
3	CURRENT ADJ RANGE	1.25A~2A	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	0.682 A~ 2.987 A	P
4	CONSTANT CURRENT REGION	24V~48V	I/P: 230 VAC O/P: CV MODE Ta: 25°C	O/P=24V: 2.598 A O/P=47V: 2.60 A	P
5	OUTPUT VOLTAGE TOLERANCE	V1: -1% ~ 1% (Max)	I/P: 100 VAC /305VAC O/P: FULL / 0% LOAD Ta: 25°C	V1: -0.02 %~ 0.02 %	P
6	LINE REGULATION	V1: -0.5% ~ 0.5% (Max)	I/P: 100 VAC ~305 VAC O/P: FULL LOAD Ta: 25°C	V1: 0 %~ 0 %	P
7	LOAD REGULATION	V1: -0.5% ~ 0.5% (Max)	I/P: 230 VAC O/P: FULL ~MIN LOAD Ta: 25°C	V1: -0.02 %~ 0.02 %	P
8	SET UP TIME	230VAC/ 2500 ms (Max) 115VAC/ 2500 ms (Max)	I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	230VAC/ 880 ms 115 VAC/ 1760 ms	P
9	RISE TIME	230VAC/ 50 ms (Max) 115VAC/ 50 ms (Max)	I/P: 230 VAC I/P: 115 VAC O/P: FULL LOAD Ta: 25°C	230VAC/ 9.7 ms 115 VAC/ 9.7 ms	P
10	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/ 24 ms 115 VAC/ 26 ms	P
11	OVER/UNDERSHOOT TEST	< ±5%	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	TEST: < 5 %	P
12	DYNAMIC LOAD	V1: 4800 mVp-p	I/P: 230 VAC O/P: (1) FULL /Min LOAD 90%DUTY/1KHZ (2) FULL /Min LOAD 90%DUTY/120HZ Ta: 25°C	368 mVp-p 2280 mVp-p	P

13	DIMMER TEST (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" style="width: 5%; text-align: center;">1</td> <td style="width: 10%;">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>0.219A</td><td>0.415A</td><td>0.616A</td><td>0.825A</td><td>1.012A</td><td>1.201A</td><td>1.377A</td><td>1.595A</td><td>1.798A</td><td>1.996A</td> </tr> <tr> <td>%</td> <td>10.95%</td><td>20.75%</td><td>30.80%</td><td>41.25%</td><td>50.60%</td><td>60.05%</td><td>68.85%</td><td>79.75%</td><td>89.90%</td><td>99.80%</td> </tr> <tr> <td rowspan="3" style="text-align: center;">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>0.219A</td><td>0.413A</td><td>0.605A</td><td>0.801A</td><td>1.002A</td><td>1.204A</td><td>1.403A</td><td>1.602A</td><td>1.795A</td><td>1.994A</td> </tr> <tr> <td>%</td> <td>10.95%</td><td>20.65%</td><td>30.25%</td><td>40.05%</td><td>50.10%</td><td>60.20%</td><td>70.15%</td><td>80.10%</td><td>89.75%</td><td>99.70%</td> </tr> <tr> <td rowspan="3" style="text-align: center;">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>0.240A</td><td>0.434A</td><td>0.628A</td><td>0.824A</td><td>1.024A</td><td>1.226A</td><td>1.424A</td><td>1.622A</td><td>1.821A</td><td>2.017A</td> </tr> <tr> <td>%</td> <td>12.00%</td><td>21.70%</td><td>31.40%</td><td>41.20%</td><td>51.20%</td><td>61.30%</td><td>71.20%</td><td>81.10%</td><td>91.05%</td><td>100.85%</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	0.219A	0.415A	0.616A	0.825A	1.012A	1.201A	1.377A	1.595A	1.798A	1.996A	%	10.95%	20.75%	30.80%	41.25%	50.60%	60.05%	68.85%	79.75%	89.90%	99.80%	2	Dimming value	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V	Output current	0.219A	0.413A	0.605A	0.801A	1.002A	1.204A	1.403A	1.602A	1.795A	1.994A	%	10.95%	20.65%	30.25%	40.05%	50.10%	60.20%	70.15%	80.10%	89.75%	99.70%	3	Duty value	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	Output current	0.240A	0.434A	0.628A	0.824A	1.024A	1.226A	1.424A	1.622A	1.821A	2.017A	%	12.00%	21.70%	31.40%	41.20%	51.20%	61.30%	71.20%	81.10%	91.05%	100.85%	P
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INPUT FUNCTION TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	90VAC~305 VAC	I/P:TESTING O/P:FULL LOAD Ta:25°C	79 V~305V	P
			I/P: (1)LOW-LINE-3V=87 V (2)HIGH-LINE=305 V O/P:FULL/MIN LOAD ON: 30 Sec . OFF: 30 Sec 10MIN (AC POWER ON/OFF NO DAMAGE)	TEST: OK	
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE OSC	I/P: 100 VAC ~305VAC O/P:FULL~MIN LOAD Ta:25°C	OK	P
3	POWER FACTOR	0.95/ 230 VAC FULL LOAD (TYP) 0.98/ 115 VAC FULL LOAD (TYP) 0.93/ 277 VAC FULL LOAD (TYP)	I/P: 230 VAC I/P: 115 VAC I/P: 277 VAC O/P:FULL LOAD Ta:25°C	PF=0.960/230V/100%LOAD PF=0.997/115V/100%LOAD PF=0.935/277V/100%LOAD	P
4	EFFICIENCY	93% (TYP)	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	93.1 %	P
5	INPUT CURRENT	277V /0.5 A 230 V/ 0.55 A 115 V/ 1.2 A	I/P: 277 VAC I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25°C	I = 0.42 A/ 277VAC I = 0.47 A/ 230VAC I = 0.95 A/ 115VAC	P
6	INRUSH CURRENT	230 V/ 75A (Typ) COLD START	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	I = 46 A/ 230VAC	P

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	OVER LOAD PROTECTION	95 %~106 %	I/P: 305VAC I/P: 230 VAC I/P: 100 VAC O/P:TESTING Ta:25°C	102 %/305VAC 102 %/ 230VAC 102 %//100VAC Constant current limiting, recovers automatically after fault condition is removed	P
2	OVER VOLTAGE PROTECTION	V1: 54V~60V	I/P: 305VAC I/P: 230 VAC I/P: 90 VAC O/P:MIN LOAD Ta:25°C	57.04 V/ 305VAC 57.04 V/ 230VAC 57.04V/ 100VAC Shut down o/p voltage with auto recovery or re-power on to recovery	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 with auto recovery or re-power on to recovery	P
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 305VAC O/P: FULL LOAD Ta:25°C	NO DAMAGE Hiccup Mode	P

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	Power Transistor (D to S) or (C to E) Peak Voltage	Q5 Rated STF13NM50N 12A/500V	I/P : High-Line +3V = 308V O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	(1) 474 V (2) 456 V (3) 456 V	P
2	Diode Peak Voltage	Q101 Rated YA868C15RSC 30A/150V	I/P : High-Line +3V =308V O/P : (1)Full Load Turn on (2)Output Short (3)Full load continue Ta : 25°C	(1) 112 V (2) 10.8 V (3) 108 V	P
		Q102 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°C	(1) 114 V (2) 11.8 V (3) 110 V	
3	Input Capacitor Voltage	C5 Rated: 82u/450V 105°C KXG	I/P : High-Line +3V = 308V O/P : (1)Full Load Turn on /Off (2) Min load Turn on /Off (3)Full Load /Min load Change Ta : 25°C	(1) 436.8 V (2) 437.7 V (3) 437.2 V	P
4	Control IC Voltage Test	U 900 Rated L6599AD 8.85V~16V	I/P : High-Line +3V = 308V O/P : (1)Full Load Turn on /Off (2) Min load Turn on /Off (3)Full Load /Min load Change Ta : 25°C	(1) 12.652 V (2) 12.563 V (3) 12.366 V	P
5	P.F.C Transistor (D to S) or (C to E) Peak Voltage	Q1 Rated STP21NM60N 17A/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) 502 V (2) 460 V (3) 458 V	P

SAFETY & EMC TEST

SAFETY TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	WITHSTAND VOLTAGE	IEC60950-1 I/P-O/P: 3.75KVAC/min<10mA I/P-FG:1.88 KVAC/min<10mA O/P-FG:1.5KVAC/min<10mA	I/P-O/P: 4 KVAC/min I/P-FG: 2.256KVAC/min O/P-FG: 1.8 KVAC/min Ta:25°C	I/P-O/P: 2.723 mA I/P-FG: 2.452 mA O/P-FG:3.67 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	I/P-O/P: 30 GΩ I/P-FG: 30 GΩ O/P-FG: 30 GΩ NO DAMAGE	P
3	GROUNDING CONTINUITY	IEC60950-1 FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40A / 2min Ta:25°C	11 mΩ	P
4	LEAKAGE CURRENT	IEC60950-1 < 0.75 mA / 240VAC	I/P: 240 VAC O/P:Min LOAD Ta:25°C	L-FG: 0.22 mA N-FG:0.22 mA	P
5	APPROVAL	TUV: Certificate NO : E334940 UL: File NO : R50185176			P

E.M.C TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	HARMONIC	EN61000-3-2 CLASS A CLASS C	I/P: 240VAC/50HZ LOAD:LED/ELECTRONIC LOAD O/P:100%/50% LOAD Ta:25°C	PASS	P
2	CONDUCTION	EN55022 EN55015 CLASS B	I/P: 230 VAC (50HZ) O/P:FULL/50% 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

Reliability Test

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	TEMPERATURE RISE TEST	MODEL : HB-100-48 1. ROOM AMBIENT BURN-IN : 2.5 HRS I/P : 230VAC O/P : FULL LOAD Ta= 30.7 °C 2. HIGH AMBIENT BURN-IN : 5.5 HRS I/P : 230VAC O/P : FULL LOAD Ta=60.7 °C			P
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 305 VAC O/P : O/P SHORT TEST Ta : 25°C	TEST : OK	P
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 305VAC/230 VAC/100VAC O/P : 95% LOAD Ta= -40 °C	TEST : OK	P
4	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% Ta= 60 °C HUMIDITY= 95 %R.H	TEST : OK	P
5	TEMPERATURE COEFFICIENT	± 0.03 %(0~50°C)	I/P : 230 VAC O/P : FULL LOAD	± 0.002 %(0~50°C)	P
6	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
7	THERMAL SHOCK TEST	1. Thermal shock Temperature : -35°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 TURN ON/58 'SEC.;TURN OFF/2SEC.		OK	P

8	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°C	TEST : OK	P
9	CAPACITOR LIFE CYCLE	HLG-100H-24:SUPPOSE C102 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) 1144515 HRS (2) 116235 HRS (3) 133455 HRS (4) 143049 HRS	P
10	MTBF	MIL-HDBK-217F NOTICES2 PARTS COUNT TOTAL FAILURE RATE : 192.2K HRS	OK	P
11	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure(Expected Life) : 50,000 hours @ Tcase 75°C	OK	P