



# Test Report: OWA-90E-12

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90W Single Output Switching Power Supply

## ■ DESIGN VERIFY TEST

Output Function Test

Input Function Test

Protection 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 : 150 mVp-p (Max)	I/P : 230VAC O/P : 95% LOAD Ta : 25°C	V1 : 45 mVp-p (Max)	PASS
2	OUTPUT VOLTAGE TOLERANCE	V1 : -4%~ 4% (Max)	I/P : 100 VAC / 264 VAC O/P : 95%/ NO LOAD Ta : 25°C	V1 : -1.139 %~ 1.508 %	PASS
3	LINE REGULATION	V1 : -0.5%~ 0.5% (Max)	I/P : 100 VAC ~ 264 VAC O/P : 95% LOAD Ta : 25°C	V1 : -0.05 %~ 0.05 %	PASS
4	LOAD REGULATION	V1 : -1.5%~ 1.5% (Max)	I/P : 230 VAC O/P : 95%-NO LOAD Ta : 25°C	V1 : -1.139 %~ 1.089 %	PASS
5	SET UP TIME	230VAC : 500 ms (Max) 115VAC : 500 ms(Max)	I/P : 230 VAC I/P : 115 VAC O/P : 95% LOAD Ta : 25°C	230VAC/ 307.164 ms 115VAC/ 322.445 ms	PASS
6	RISE TIME	230VAC : 80 ms (Max) 115VAC : 80 ms (Max)	I/P : 230 VAC I/P : 115 VAC O/P : 95% LOAD Ta : 25°C	230VAC/ 34.735 ms 115VAC/ 32.875 ms	PASS
7	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/ 19.991 ms 115VAC/ 19.165 ms	PASS
8	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230 VAC O/P : 95% LOAD Ta : 25°C	TEST : < 5 %	PASS
9	DYNAMIC LOAD	V1 : 1200 mVp-p	I/P : 230 VAC (1).O/P : 95% /NO LOAD 90%DUTY/ 1KHZ (2).O/P : 95% /NO LOAD 50%DUTY/ 120HZ Ta : 25°C	(1) 700 mVp-p (2) 1163 mVp-p	PASS

**INPUT FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	90VAC~264 VAC	I/P : TESTING O/P : 95% LOAD Ta : 25°C	87 V~264V	PASS
			I/P : LOW-LINE=3V=87 V HIGH-LINE=264 V O/P : 95%/NO 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 : 90 VAC ~ 264 VAC O/P : 95% ~NO LOAD Ta : 25°C	TEST : OK	PASS
3	POWER FACTOR	0.96 / 230 VAC(TYP) 0.98 / 115 VAC(TYP)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	PF= 0.978 / 100% PF= 0.997 / 100%	PASS
4	EFFICIENCY	89% (TYP)	I/P : 230 VAC O/P : 95% LOAD Ta : 25°C	89.01%	PASS
5	INPUT CURRENT	230V/ 0.5 A (TYP) 115V/ 0.95 A (TYP)	I/P : 230 VAC I/P : 115 VAC O/P : 95% LOAD Ta : 25°C	I = 0.445 A/ 230 VAC I = 0.883 A/ 115 VAC	PASS
6	INRUSH CURRENT	230V/ 60 A (TYP) Twidth =550 us measured at 50% Ipeak COLD START	I/P : 230 VAC O/P : 95% LOAD Ta : 25°C	I = 54.984 A/ 230 VAC  Twidth = 416 us	PASS
7	LEAKAGE CURRENT	< 0.25 mA / 240 VAC	I/P : 240 VAC O/P : NO LOAD Ta : 25°C	L-CASE : 0.003 mA /240VAC N-CASE : 0.003 mA /240VAC	PASS
8	NO LOAD POWER CONSUMPTION	< 0.15 W	I/P : 230 VAC I/P : 115 VAC O/P : NO LOAD Ta : 25°C	0.056W / 230VAC 0.053W / 115VAC	PASS

**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	101.35 %/ 230 VAC 101.33 %/ 115 VAC Constant current limiting ,recovers automatically after fault condition is removed	PASS
2	OVER VOLTAGE PROTECTION	CH1 : 15 V ~ 17 V	I/P : 230 VAC I/P : 115 VAC O/P : NO LOAD Ta : 25°C	16.09 V/ 230 VAC 16.09 V/ 115 VAC Shut down o/p voltage, re-power on to recover	PASS
3	OVER TEMPERATURE PROTECTION	SPEC : O.T.P. NO DAMAGE	I/P : 230 VAC O/P : 95% LOAD	O.T.P. Active Shut down o/p voltage, re-power on to recover	PASS
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P : 264 VAC O/P : 95% LOAD Ta : 25°C	NO DAMAGE Hiccup mode, recovers automatically after fault condition is removed.	PASS

**COMPONENT STRESS TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	Power Transistor ( D to S) or (C to E) Peak Voltage	Q2 Rated 800 V 9.0A	I/P : High-Line +3V = 267 V O/P : (1)95% Load Turn on (2) Output Short (3) 95% load continue Ta : 25°C	(1) 724 V (2) 552 V (3) 692 V	PASS
2	Diode Peak Voltage	Q101 Rated 60 V 79 A	I/P : High-Line +3V = 267 V O/P : (1) 95% Load Turn on (2)Output Short (3) 95% load continue Ta : 25°C	(1) 49.4 V (2) 33.4 V (3) 49.0 V	PASS
3	Input Capacitor Voltage	C5 Rated 82uF / 450 V	I/P : High-Line +3V = 267 V O/P : (1) 95% Load Turn on /Off (2) NO load Turn on /Off (3) 95% Load /Min load Change Ta : 25°C	(1) 448 V (2) 446 V (3) 446 V	PASS
4	Control IC Voltage Test	U1 Rated 28V	I/P : High-Line +3V = 267 V O/P : (1) 95% Load Turn on /Off (2) NO load Turn on /Off (3) 95% Load /Min load Change Ta : 25°C	(1) 17.1 V (2) 16.8 V (3) 17.1 V	PASS
5	Power Transistor ( D to S) or (C to E) Peak Voltage	Q1 Rated 600 V/ 10 A	I/P : High-Line +3V = 267 V O/P : (1) 95% Load Turn on (2) Output Short (3) 95% load continue Ta : 25°C	(1) 466 V (2) 410 V (3) 464 V	PASS

■ 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-O/P : 4.2 KVAC/min Ta : 25°C	I/P-O/P : 2.370 mA NO DAMAGE	PASS
2	ISOLATION RESISTANCE	I/P-O/P : 500VDC>100MΩ	I/P-O/P : 500 VDC Ta : 25°C /70%RH	I/P-O/P : >9999 MΩ NO DAMAGE	PASS

**E.M.C TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	HARMONIC	EN61000-3-2 CLASS C	I/P:115VAC/230VAC O/P:95%, 60%LOAD Ta:25°C	PASS	PASS
2	CONDUCTION	FCC Part15 Class B	I/P: 230 VAC (50HZ)/115V[60HZ] O/P: 95% LOAD Ta:25°C	PASS Test by certified Lab	PASS
3	RADIATION	FCC Part15 Class B	I/P: 230 VAC (50HZ)/115V[60HZ] O/P: 95% LOAD Ta:25°C	PASS Test by certified Lab	PASS
4	Test by certified Lab & Test Report Prepare				

■ RELIABILITY TEST

**ENVIRONMENT TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	TEMPERATURE RISE TEST	MODEL : OWA-90E-12 1. ROOM AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : 95% LOAD Ta=28.1 °C 2. HIGH AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : 95% LOAD Ta=50.0 °C			PASS

2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 264VAC/100VAC O/P : 95% LOAD Ta= -40/-25°C	TEST : OK	PASS
3	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50 °C NO DAMAGE	I/P : 272 VAC O/P : 95% LOAD Ta= 50 °C HUMIDITY= 95 %R.H	TEST : OK	PASS
4	TEMPERATURE COEFFICIENT	±0.03 %(0-50°C)	I/P : 230 VAC O/P : 95% LOAD	±0.005 %(0-50°C)	PASS
5	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -45°C~ +85°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	PASS
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/95% Load AC ON/OFF TEST turn on 58sec ; turn off 2sec		OK	PASS
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 : 72min in each axis (X.Y.Z) (6) Ta : 25°C		TEST : OK	PASS
8	CAPACITOR LIFE CYCLE	OWA-90E-12: SUPPOSE C105 IS THE MOST CRITICAL COMPONENT (1) I/P : 230VAC O/P : 95% LOAD Ta=25 °C LIFE TIME (2) I/P : 230VAC O/P : 95% 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) 341985.6 HRS (2) 75510.6 HRS (3) 87964.8 HRS (4) 122634.6 HRS	PASS
9	MTBF	MIL-HDBK-217F NOTICES2 PARTS COUNT TOTAL FAILURE RATE : 292.8 KHRS			PASS
10	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure(Expected Life) : 50000 hours @ Tcase 75°C			PASS

TEST RESULT	TESTER	APPROVAL
PASS	ZHOUB/ ZHUOKB	LIUWY

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