



Test Report: OWA-90U-15

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 : 30 mVp-p (Max) | PASS |
| 2 | CONSTANT CURRENT REGION | V1 : 9V ~ 15V | I/P : 230VAC O/P : LED MODE Ta : 25°C | O/P= 14V : 6.082 A O/P= 9V : 6.081 A | PASS |
| 3 | OUTPUT VOLTAGE TOLERANCE | V1 : -4%~ 4% (Max) | I/P : 100 VAC / 264 VAC O/P : 95%/ NO LOAD Ta : 25°C | V1 : -1.139 %~ 1.247 % | PASS |
| 4 | LINE REGULATION | V1 : -0.5%~ 0.5% (Max) | I/P : 100 VAC ~ 264 VAC O/P : 95% LOAD Ta : 25°C | V1 : -0.03 %~ 0.03 % | PASS |
| 5 | LOAD REGULATION | V1 : -1.0%~ 1.0% (Max) | I/P : 230 VAC O/P : 95%-NO LOAD Ta : 25°C | V1 : -0.704 %~ 0.704 % | PASS |
| 6 | 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/ 311.447 ms 115VAC/ 320.173 ms | PASS |
| 7 | 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/ 28.457 ms 115VAC/ 26.224 ms | PASS |
| 8 | 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/ 20.502 ms 115VAC/ 19.323 ms | PASS |
| 9 | OVER/UNDERSHOOT TEST | < ±5% | I/P : 230 VAC O/P : 95% LOAD Ta : 25°C | TEST : < 5 % | PASS |
| 10 | DYNAMIC LOAD | V1 : 1500 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) 820 mVp-p (2) 1020 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 | 90% / 230 VAC(TYP) 89% / 115 VAC(TYP) | I/P : 230 VAC I/P : 115 VAC O/P : 95% LOAD Ta : 25°C | 90.50% / 230VAC 89.29% / 115VAC | 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 = 0.437 A/ 230 VAC I = 0.874 A/ 115 VAC | PASS |
| | | | | | |
| 6 | INRUSH CURRENT | 230V/ 60 A (TYP) 115V/ 30 A (TYP) Twidth =550 us measured at 50% Ipeak COLD START | I/P : 230 VAC I/P : 115 VAC O/P : 95% LOAD Ta : 25°C | I = 58.375 A/ 230 VAC I = 25.906 A/ 115 VAC Twidth = 428 us | PASS |
| | | | | | |
| 7 | LEAKAGE CURRENT | < 0.25 mA / 240 VAC < 0.125 mA / 120 VAC | I/P : 240 VAC I/P : 120 VAC O/P : NO LOAD Ta : 25°C | L-CASE : 0.003 mA /240VAC N-CASE : 0.003 mA /240VAC L-CASE : 0.003 mA /120VAC N-CASE : 0.003 mA /120VAC | PASS |
| | | | | | |
| 8 | NO LOAD POWER CONSUMPTION | < 0.15 W | I/P : 230 VAC I/P : 115 VAC O/P : NO LOAD Ta : 25°C | 0.072W / 230VAC 0.069W / 115VAC | PASS |
| | | | | | |
| 9 | TOTAL HARMONIC DISTORTION | Total harmonic distortion will be lower than 20% when output loading is 60% or higher at 230V/115 V | I/P : 230VAC I/P : 115VAC O/P : 60% LOAD Ta : 25°C | TDH= 12.48% /230 VAC TDH= 5.32 % /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 | 101.67 %/ 230 VAC 101.67 %/ 115 VAC Constant current limiting ,recovers automatically after fault condition is removed | PASS |
| 2 | OVER VOLTAGE PROTECTION | CH1 : 17.5 V ~ 21 V | I/P : 230 VAC I/P : 115 VAC O/P : NO LOAD Ta : 25°C | 19.378 V/ 230 VAC 19.370 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) 690 V (2) 524 V (3) 688 V | PASS |
| 2 | Diode Peak Voltage | Q101 Rated 75 V 80 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) 52.8 V (2) 33.6 V (3) 52.4 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) 446 V (2) 446 V (3) 442 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) 17.3 V (2) 16.9 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) 470 V (2) 408 V (3) 458 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 : 2.341 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-90U-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℃ | TEST : OK | PASS |
| 3 | HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST | AFTER 12 HOURS IN CHAMBER ON CONTROL 50 ℃ NO DAMAGE | I/P : 272 VAC O/P : 95% LOAD Ta= 50 ℃ HUMIDITY= 95 %R.H | TEST : OK | PASS |
| 4 | TEMPERATURE COEFFICIENT | ±0.03 %(0-50℃) | I/P : 230 VAC O/P : 95% LOAD | ±0.005 %(0-50℃) | PASS |
| 5 | STORAGE TEMPERATURE TEST | 1. Thermal shock Temperature : -45℃~ +85℃ 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 | PASS |
| 6 | THERMAL SHOCK TEST | 1. Thermal shock Temperature : -45℃~ +55℃ 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/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℃ | | TEST : OK | PASS |
| 8 | CAPACITOR LIFE CYCLE | OWA-90U-12: SUPPOSE C105 IS THE MOST CRITICAL COMPONENT (1) I/P : 230VAC O/P : 95% LOAD Ta=25 ℃ LIFE TIME (2) I/P : 230VAC O/P : 95% LOAD Ta=50 ℃ LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta=50 ℃ LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta=50 ℃ LIFE TIME | | (1) 341985.6 HRS (2) 75510.6 HRS (3) 87964.8 HRS (4) 122634.6 HRS | PASS |
| 9 | MTBF | Conducted by Parts Stress Analysis Prediction 3044.3K hrs min. Telcordia SR-332 (Bellcore) ; 292.9K hrs min. MIL-HDBK-217F (25℃) | | | PASS |
| 10 | DMTBF/Accelerated Life Test | Demonstration Mean Time Between Failure(Expected Life) : 50000 hours @ Tcase 75℃ | | | PASS |

| TEST RESULT | TESTER | APPROVAL |
|-------------|---------------|----------|
| PASS | ZHOUB/ ZHUOKB | LIUWY |

2009/08/04 A50-G058