



Test Report: EPS-15-27

15W 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 : 180 mVp-p (Max) | I/P : 230VAC O/P : FULL LOAD Ta : 25°C | V1 : 65 mVp-p (Max) | P |
| 2 | OUTPUT VOLTAGE ADJUST RANGE | CH1 : 24.3 V ~ 29.7 V | I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C | 21.76 V ~ 30.48 V / 230 VAC 21.77 V ~ 30.48 V / 115 VAC | P |
| 3 | OUTPUT VOLTAGE TOLERANCE | V1 : -1 % ~ +1 % (Max) | I/P : 85 VAC / 264 VAC O/P : FULL / MIN LOAD Ta : 25°C | V1 : 0 % ~ 0.022 % | P |
| 4 | LINE REGULATION | V1 : -0.5 % ~ +0.5 % (Max) | I/P : 100VAC ~ 264 VAC O/P : FULL LOAD Ta : 25°C | V1 : 0 % ~ 0 % | P |
| 5 | LOAD REGULATION | V1 : -0.5 % ~ +0.5 % (Max) | I/P : 230 VAC O/P : FULL ~ MIN LOAD Ta : 25°C | V1 : 0 % ~ 0 % | P |
| 6 | 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/ 634 ms 115VAC/ 1534 ms | P |
| 7 | RISE TIME | 230VAC : 30 ms (Max) 115VAC : 30 ms (Max) | I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C | 230VAC/ 12.1 ms 115VAC/ 12.0 ms | P |
| 8 | HOLD UP TIME | 230VAC : 50 ms (TYP) 115VAC : 16 ms (TYP) | I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C | 230VAC/ 93.7 ms 115VAC/ 20.6 ms | P |
| 9 | OVER/UNDERSHOOT TEST | < ±5% | I/P : 230 VAC O/P : FULL LOAD Ta : 25°C | TEST : 1.11 % | P |
| 10 | DYNAMIC LOAD | V1 : 2400 mVp-p | I/P : 230 VAC (1).O/P : FULL /Min LOAD 90%DUTY/ 1KHZ (2).O/P : FULL /Min LOAD 90%DUTY/ 3KHZ (3).O/P : FULL /Min LOAD 90%DUTY/ 5KHZ (4).O/P : FULL /Min LOAD 50%DUTY/ 120HZ Ta : 25°C | (1) 208 mVp-p (2) 118 mVp-p (3) 113 mVp-p (4) 374 mVp-p | P |

INPUT FUNCTION TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT | VERDICT |
|----|-----------------------|--|--|--|---------|
| 1 | INPUT VOLTAGE RANGE | 85VAC~264 VAC | I/P : TESTING O/P : FULL LOAD Ta : 25°C I/P : LOW-LINE-3V= 82 V HIGH-LINE+15%=300 V O/P : FULL/MIN LOAD ON : 30 Sec . OFF : 30 Sec 10MIN (AC POWER ON/OFF NO DAMAGE) | 57.7 V~264V TEST : OK | P |
| 2 | INPUT FREQUENCY RANGE | 47HZ ~63 HZ NO DAMAGE OSC | I/P : 85 VAC ~ 264 VAC O/P : FULL~MIN LOAD Ta : 25°C | TEST : OK | P |
| 3 | EFFICIENCY | 84 % (TYP) | I/P : 230 VAC O/P : FULL LOAD Ta : 25°C | 84.8 % | P |
| 4 | INPUT CURRENT | 230V/ 0.2 A (TYP) 115V/ 0.4 A (TYP) | I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C | I = 0.156 A/ 230 VAC I = 0.251 A/ 115 VAC | P |
| 5 | INRUSH CURRENT | 230V/ 45 A (TYP) COLD START | I/P : 230 VAC O/P : FULL LOAD Ta : 25°C | I = 42.25 A/ 230 VAC | P |
| 6 | LEAKAGE CURRENT | < 1 mA / 240 VAC | I/P : 264 VAC O/P : Min LOAD Ta : 25°C | L-FG : 0.26 mA N-FG : 0.24 mA | P |
| 7 | NO LOAD CONSUMPTION | < 0.3 W | I/P : 240VAC O/P : NO LOAD Ta : 25°C | < 0.14 W | P |

PROTECTION FUNCTION TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT | VERDICT |
|----|-------------------------|--|--|---|---------|
| 1 | OVER LOAD PROTECTION | 115 % ~ 150 % | I/P : 230 VAC I/P : 115 VAC O/P : TESTING Ta : 25°C | 130.5 % / 230 VAC 130.3 % / 115 VAC Hiccup Mode | P |
| 2 | OVER VOLTAGE PROTECTION | CH1 : 31.05 V ~36.45 V | O/P : MIN LOAD Ta : 25°C | 34.3 V shut down clamping by zener diode | P |
| 3 | SHORT PROTECTION | SHORT EVERY OUTPUT 1 HOUR NO DAMAGE | I/P : 264 VAC O/P : FULL LOAD Ta : 25°C | NO DAMAGE Hiccup Mode | P |

CONTROL FUNCTION TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT | VERDICT |
|----|-----------|---------------|--|--|---------|
| 1 | PEAK LOAD | 16.6W@10SEC | I/P: 230VAC/115VAC O/P:PEAK LOAD Ta:25°C | 16.6W@10SEC /230V 16.6W@10SEC /115V | P |

COMPONENT STRESS TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT | VERDICT |
|----|--|-----------------------------|--|--|---------|
| 1 | Power Transistor (D to S) or (G to E) Peak Voltage | Q 1 Rated : 600 V 4 A | I/P : High-Line +3V = 267 V O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C | (1) 514 V (2) 556 V (3) 526 V | P |
| 2 | Diode Peak Voltage | Q101 Rated : 200 V 10 A | I/P : High-Line +3V = 267 V O/P : (1)Full Load Turn on (2)Output Short (3)Full load continue Ta : 25°C | (1) 134 V (2) 137 V (3) 129 V | P |
| 3 | Clamp Diode Peak Voltage | D 1 Rated : 800 V 2 A | I/P : High-Line +3V = 267 V O/P : (1) Dynamic Load 90%Duty/1KHz (2)Full load continue Ta : 25°C | (1) 480 V (2) 478 V | P |
| 4 | Input Capacitor Voltage | C5 Rated : 33 u /400V/105°C | I/P : High-Line +3V = 267 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) 378 V (2) 380 V (3) 380 V | P |
| 5 | Control IC Voltage Test | U1 Rated : 28 V | I/P : High-Line +3V = 267 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) 18.1 V (2) 18.0 V (3) 18.0 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 KVAC/min I/P-FG : 2 KVAC/min O/P-FG : 0.5 KVAC/min | I/P-O/P : 3.6 KVAC/min I/P-FG : 2.4 KVAC/min O/P-FG : 0.6 KVAC/min Ta : 25°C | I/P-O/P : 1.29 mA I/P-FG : 0.73 mA O/P-FG : 0.26 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 : 9999 MΩ I/P-FG : 9999 MΩ O/P-FG : 9999 MΩ NO DAMAGE | P |
| 3 | GROUNDING CONTINUITY | FG(PE) TO CHASSIS OR TRACE < 100 mΩ | 40 A / 2min Ta : 25°C / 70%RH | 3 mΩ | P |

E.M.C TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT | VERDICT |
|----|---|---|--|-------------------------------|---------|
| 1 | HARMONIC | EN61000-3-2 CLASS A | I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C | PASS | P |
| 2 | CONDUCTION | EN55022 CLASS B | I/P : 230 VAC (50HZ) O/P : FULL/50% LOAD Ta : 25°C | PASS Test by certified Lab | P |
| 3 | RADIATION | EN55022 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 : EPS-15-24 1. ROOM AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta=13.3 °C 2. HIGH AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta=49.8°C | | | P |
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| 2 | OVER LOAD BURN-IN TEST | NO DAMAGE 1 HOUR (MIN) | I/P : 230 VAC O/P : 133 % LOAD Ta : 25°C | TEST : OK | P |
| 3 | LOW TEMPERATURE TURN ON TEST | TURN ON AFTER 2 HOUR | I/P : 264VAC/100VAC O/P : 100 % LOAD Ta= -30 °C | TEST : OK | P |
| 4 | 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 : FULL LOAD Ta= 50 °C HUMIDITY= 95 %R.H | TEST : OK | P |
| 5 | TEMPERATURE COEFFICIENT | ± 0.03 %/°C (0~50°C) | I/P : 230 VAC O/P : FULL LOAD | ± 0.002 %/°C (0~50°C) | P |
| 6 | STORAGE TEMPERATURE TEST | 1. Thermal shock Temperature : -40°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 | P |
| 7 | THERMAL SHOCK TEST | 1. Thermal shock Temperature : -30°C~ +70°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 AC ON/OFF TEST turn on 58sec ; turn off 2sec | | OK | P |



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|----|-----------------------------|---|---|---|
| 8 | 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 | P |
| 9 | CAPACITOR LIFE CYCLE | EPS-15-24 SUPPOSE C 102 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=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) 526196 HRS (2) 87699 HRS (3) 108750 HRS (4) 135773 HRS | P |
| 10 | MTBF | MIL-HDBK-217F NOTICE S2 PARTS COUNT TOTAL FAILURE RATE : 824.6 KHRS | | |
| 11 | DMTBF/Accelerated Life Test | Demonstration Mean Time Between Failure (Expected Life): Above 30,000 hours @ TA 50°C | | P |

| DATE | SAMPLE | TEST RESULT | TESTER | APPROVAL |
|------------|----------------------------|-------------|--------|----------|
| 2012.9.18 | RD SAMPLE | PASS | Shenym | Wangdz |
| 2012.11.21 | PRODUCT SAMPLE (Y1211B622) | PASS | Shenym | Wangdz |

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