



Test Report: GSM40A24

40W AC-DC Single Output Medical Type

■ 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 : 150 mVp-p (Max) | I/P : 230VAC O/P : FULL LOAD Ta : 25°C | V1 : 76.2 mVp-p (Max) | P |
| 2 | OUTPUT VOLTAGE TOLERANCE | V1 : -2.5%~ +2.5% (Max) | I/P : 80 VAC / 264 VAC O/P : FULL/ MIN LOAD Ta : 25°C | V1 : -0.24%~ 0.27% | P |
| 3 | LINE REGULATION | V1 : -1%~ +1% (Max) | I/P : 100 VAC ~ 264 VAC O/P : FULL LOAD Ta : 25°C | V1 : 0%~ 0.025% | P |
| 4 | LOAD REGULATION | V1 : -2.5%~ +2.5% (Max) | I/P : 230 VAC O/P : FULL ~MIN LOAD Ta : 25°C | V1 : -0.26%~ 0.21% | P |
| 5 | SET UP TIME | 230VAC : 1000 ms (Max) 115VAC : 1500 ms(Max) | I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C | 230VAC/ 668 ms 115VAC/ 1239 ms | P |
| 6 | 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/ 10.1 ms 115VAC/ 12.8 ms | P |
| 7 | HOLD UP TIME | 230VAC : 50 ms (TYP) 115VAC : 15 ms (TYP) | I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C | 230VAC/ 64.1 ms 115VAC/ 29.8 ms | P |
| 8 | OVER/UNDERSHOOT TEST | < ±5% | I/P : 230 VAC O/P : FULL LOAD Ta : 25°C | TEST : <5% | P |
| 9 | 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) 225 mVp-p (2) 175 mVp-p (3) 162 mVp-p (4) 332 mVp-p | P |

INPUT FUNCTION TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT | VERDICT |
|----|-----------------------|--|--|--|---------|
| 1 | INPUT VOLTAGE RANGE | 80VAC~264 VAC | I/P : TESTING O/P : FULL LOAD Ta : 25°C I/P : LOW-LINE-3V= 77 V HIGH-LINE+15%=300 V O/P : FULL/MIN LOAD ON : 30 Sec . OFF : 30 Sec 10MIN (AC POWER ON/OFF NO DAMAGE) | 59.8 V~264V TEST : OK | P |
| 2 | INPUT FREQUENCY RANGE | 47HZ ~63 HZ NO DAMAGE OSC | I/P : 80 VAC ~ 264 VAC O/P : FULL-MIN LOAD Ta : 25°C | TEST : OK | P |
| 3 | EFFICIENCY | 90 % (TYP) | I/P : 230 VAC O/P : FULL LOAD Ta : 25°C | 90.8 % | P |
| 4 | INPUT CURRENT | 230V/ 0.5 A (TYP) 115V/ 1 A (TYP) | I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C | I = 0.353 A/ 230 VAC I = 0.628 A/ 115 VAC | P |
| 5 | INRUSH CURRENT | 230V/ 60 A (TYP) 115V/ 30 A (TYP) COLD START | I/P : 230 VAC/115VAC O/P : FULL LOAD Ta : 25°C | I = 41.625 A/ 230 VAC I = 22.613 A/ 115 VAC | P |
| 6 | LEAKAGE CURRENT | < 90 uA/ for earth leakage current < 90 uA/ for touch leakage current | I/P: 264 VAC O/P:Min LOAD Ta:25°C I/P: 264 VAC O/P:Min LOAD Ta:25°C | L-FG 87.5 uA N-FG 87.5 uA L-V- 87.9 uA N-V- 87.9 uA | P |
| 7 | NO LOAD CONSUMPTION | < 0.1 W | I/P : 240VAC O/P : NO LOAD Ta : 25°C | < 0.058 W | P |

PROTECTION FUNCTION TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT | VERDICT |
|----|-------------------------|--|---|--|---------|
| 1 | OVER LOAD PROTECTION | 105 % ~160 % | I/P : 230 VAC I/P : 115 VAC O/P : TESTING Ta : 25°C | 135.7 %/ 230 VAC 142.3 %/ 115 VAC Hiccup Mode | P |
| 2 | OVER VOLTAGE PROTECTION | CH1 : 25.2 V ~ 32.4 V | I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C | 28.5 V/ 230 VAC 28.6 V/ 115 VAC Shut down Re- power ON | 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 | ERP STEP2 COMPLIANT | LEVEL V | I/P: 230 VAC/115VAC O/P:100/75/50/25% LOAD Ta:25°C | 230V 90.9% 115V 90.1% | P |

COMPONENT STRESS TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT | VERDICT |
|----|--|------------------------------|--|--|---------|
| 1 | Power Transistor (D to S) or (C to E) Peak Voltage | Q1 Rated : 700 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) 608 V (2) 486 V (3) 612 V | P |
| 2 | Diode Peak Voltage | D100 Rated : 120 V 20 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) 91.6 V (2) 78.4 V (3) 91.2 V | P |
| 3 | Input Capacitor Voltage | C 5 Rated : 120u /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) 372 V (2) 373 V (3) 372 V | P |
| 4 | Control IC Voltage Test | U 1 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) 17.3 V (2) 17.4 V (3) 15.0 V | P |
| 5 | CLAMP DIODE | D 1 Rated : 800 V 2 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 | (3) 514 V (4) 412 V (3) 504 V | P |

■ SAFETY & E.M.C. TEST

SAFETY TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT | VERDICT |
|----|----------------------|--|--------------------------------------|--------------------------------|---------|
| 1 | WITHSTAND VOLTAGE | I/P-O/P : 4 KVAC/min | I/P-O/P : 4.2KVAC/min Ta : 25°C | I/P-O/P : 1.67 mA NO DAMAGE | P |
| 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 | P |
| 3 | GROUNDING CONTINUITY | FG(PE) TO CHASSIS OR TRACE < 100 mΩ | 40 A / 2min Ta : 25°C / 70%RH | 10 mΩ | P |

E.M.C TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT | VERDICT |
|----|---|--|--|-------------------------------|---------|
| 1 | HARMONIC | EN61000-3-2 CLASS B | I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C | PASS | P |
| 2 | CONDUCTION | EN55011 CLASS B | I/P : 230 VAC (50HZ) O/P : FULL/50% LOAD Ta : 25°C | PASS Test by certified Lab | P |
| 3 | RADIATION | EN55011 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:6KV | 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 : GSM40A24 1. ROOM AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta= 15.3 °C 2. HIGH AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta= 48.3 °C | | | P |
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| 2 | OVER LOAD BURN-IN TEST | NO DAMAGE 1 HOUR (MIN) | I/P : 230 VAC O/P : 129 % 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= -34 °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= 50.2°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 | ± 0.01%/°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 |

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|----|-----------------------------|--|--|---|
| 7 | THERMAL SHOCK TEST | 1. Thermal shock Temperature : -30°C~ +60°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 |
| 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 | SUPPOSE C105 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) 531677HRS (2) 66459HRS (3) 90703 HRS (4) 115626 HRS | P |
| 10 | MTBF | MIL-HDBK-217F NOTICE S2 PARTS COUNT TOTAL FAILURE RATE : 740 KHRS | | P |
| 11 | DMTBF/Accelerated Life Test | Demonstration Mean Time Between Failure (Expected Life): Above 30,000 hours @ TA 50°C | | P |

| SAMPLE | TEST RESULT | TESTER | APPROVAL |
|----------------|-------------|--------|----------|
| PRODUCT SAMPLE | PASS | Shenym | WANGDZ |

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