



# Test Report: GSM40A7

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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 : 80 mVp-p (Max)                             | I/P : 230VAC<br>O/P : FULL LOAD<br>Ta : 25°C  | V1 : 65 mVp-p (Max)  | P       |
| 2  | OUTPUT VOLTAGE TOLERANCE | V1 : -5 %~ +5 % (Max)                           | I/P : 80 VAC / 264 VAC<br>O/P : FULL/ MIN LOAD<br>Ta : 25°C   | V1 : -1.15 %~ 1.24 %   | P       |
| 3  | LINE REGULATION          | V1 : -1 %~ +1 % (Max)                           | I/P : 100 VAC ~ 264 VAC<br>O/P : FULL LOAD<br>Ta : 25°C   | V1 : -0.08 %~ 0.08 %   | P       |
| 4  | LOAD REGULATION          | V1 : -5 %~ +5 % (Max)                           | I/P : 230 VAC<br>O/P : FULL ~MIN LOAD<br>Ta : 25°C  | V1 : -1.15 %~ 1.15 %   | P       |
| 5  | SET UP TIME              | 230VAC : 1000 ms (Max)<br>115VAC : 1500 ms(Max) | I/P : 230 VAC<br>I/P : 115 VAC<br>O/P : FULL LOAD<br>Ta : 25°C  | 230VAC/ 532 ms<br>115VAC/ 1118 ms                                | P       |
| 6  | RISE TIME                | 230VAC : 30 ms (Max)<br>115VAC : 30 ms (Max)    | I/P : 230 VAC<br>I/P : 115 VAC<br>O/P : FULL LOAD<br>Ta : 25°C  | 230VAC/ 6.9 ms<br>115VAC/ 7.9 ms                                 | P       |
| 7  | HOLD UP TIME             | 230VAC : 50 ms (TYP)<br>115VAC : 15 ms (TYP)    | I/P : 230 VAC<br>I/P : 115 VAC<br>O/P : FULL LOAD<br>Ta : 25°C  | 230VAC/ 67.2 ms<br>115VAC/ 25.5 ms                               | P       |
| 8  | OVER/UNDERSHOOT TEST     | < ±5%   | I/P : 230 VAC<br>O/P : FULL LOAD<br>Ta : 25°C   | TEST : <5 %  | P       |
| 9  | DYNAMIC LOAD             | V1 : 1500 mVp-p                                 | I/P : 230 VAC<br>(1).O/P : FULL /Min LOAD 90%DUTY/<br>1KHZ<br>(2).O/P : FULL /Min LOAD 90%DUTY/<br>3KHZ<br>(3).O/P : FULL /Min LOAD 90%DUTY/<br>5KHZ<br>(4).O/P : FULL /Min LOAD 50%DUTY/<br>120HZ<br>Ta : 25°C | (1) 430 mVp-p<br>(2) 436 mVp-p<br>(3) 440 mVp-p<br>(4) 446 mVp-p | P       |

**INPUT FUNCTION TEST**

| NO | TEST ITEM             | SPECIFICATION  | TEST CONDITION   | RESULT   | VERDICT |
|----|-----------------------|--|--|--|---------|
| 1  | INPUT VOLTAGE RANGE   | 80VAC~264 VAC  | I/P : TESTING<br>O/P : FULL LOAD<br>Ta : 25°C<br><br>I/P :<br>LOW-LINE-3V= 77 V<br>HIGH-LINE+15%=300 V<br>O/P : FULL/MIN LOAD<br>ON : 30 Sec . OFF : 30 Sec 10MIN<br>( AC POWER ON/OFF NO DAMAGE ) | 59.8 V~264V<br><br>TEST : OK                                     | P       |
| 2  | INPUT FREQUENCY RANGE | 47HZ ~63 HZ<br>NO DAMAGE OSC   | I/P : 80 VAC ~ 264 VAC<br>O/P : FULL-MIN LOAD<br>Ta : 25°C   | TEST : OK  | P       |
| 3  | EFFICIENCY            | 85.5 % (TYP)   | I/P : 230 VAC<br>O/P : FULL LOAD<br>Ta : 25°C  | 87.05 %  | P       |
| 4  | INPUT CURRENT         | 230V/ 0.5 A (TYP)<br>115V/ 1 A (TYP)   | I/P : 230 VAC<br>I/P : 115 VAC<br>O/P : FULL LOAD<br>Ta : 25°C   | I = 0.35 A/ 230 VAC<br>I = 0.68 A/ 115 VAC                       | P       |
| 5  | INRUSH CURRENT        | 230V/ 60 A (TYP)<br>115V/ 30 A (TYP)<br>COLD START                           | I/P : 230 VAC/ 115VAC<br>O/P : FULL LOAD<br>Ta : 25°C  | I = 41.1 A/ 230 VAC<br>I = 21.7 A/ 115 VAC                       | P       |
| 6  | LEAKAGE CURRENT       | < 90 uA/ for earth leakage current<br><br>< 90 uA/ for touch leakage current | I/P: 264 VAC<br>O/P:Min LOAD<br>Ta:25°C<br><br>I/P: 264 VAC<br>O/P:Min LOAD<br>Ta:25°C   | L-FG 82.5 uA<br>N-FG 82.5 uA<br><br>L-V- 83.8 uA<br>N-V- 83.8 uA | P       |
| 7  | NO LOAD CONSUMPTION   | < 0.1 W  | I/P : 240VAC<br>O/P : NO LOAD<br>Ta : 25°C   | < 0.057 W  | P       |

**PROTECTION FUNCTION TEST**

| NO | TEST ITEM               | SPECIFICATION                          | TEST CONDITION  | RESULT   | VERDICT |
|----|-------------------------|--|---|--|---------|
| 1  | OVER LOAD PROTECTION    | 105 % ~160 %                           | I/P : 230 VAC<br>I/P : 115 VAC<br>O/P : TESTING<br>Ta : 25°C  | 139.1%/ 230 VAC<br>135.4 %/ 115 VAC<br>Hiccup Mode           | P       |
| 2  | OVER VOLTAGE PROTECTION | CH1 : 7.88 V ~ 10.13 V                 | I/P : 230 VAC<br>I/P : 115 VAC<br>O/P : MIN LOAD<br>Ta : 25°C | 9.02 V/ 230 VAC<br>9.03 V/ 115 VAC<br>Shut down Re- power ON | P       |
| 3  | SHORT PROTECTION        | SHORT EVERY OUTPUT<br>1 HOUR NO DAMAGE | I/P : 264 VAC<br>O/P : FULL LOAD<br>Ta : 25°C                 | NO DAMAGE<br>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<br>O/P:100/75/50/25% LOAD<br>Ta:25°C | 230V 86.9%<br>115V 85.9% | P       |

**COMPONENT STRESS TEST**

| NO | TEST ITEM  | SPECIFICATION                | TEST CONDITION   | RESULT                                 | VERDICT |
|----|--|------------------------------|--|--|---------|
| 1  | Power Transistor<br>( D to S) or (C to E) Peak Voltage | Q1 Rated : 700 V 10 A        | I/P : High-Line +3V = 267 V<br>O/P : (1)Full Load Turn on<br>(2) Output Short<br>(3)Full load continue<br>Ta : 25°C                          | (1) 636 V<br>(2) 576 V<br>(3) 600 V    | P       |
| 2  | Diode Peak Voltage                                     | D100 Rated : 45 V 40 A       | I/P : High-Line +3V = 267 V<br>O/P : (1)Full Load Turn on<br>(2)Output Short<br>(3)Full load continue<br>Ta : 25°C                           | (1) 40.2 V<br>(2) 32.1 V<br>(3) 35.8 V | P       |
| 3  | Input Capacitor Voltage                                | C 5 Rated : 120u /400V/105°C | I/P : High-Line +3V = 267 V<br>O/P : (1)Full Load Turn on /Off<br>(2) Min load Turn on /Off<br>(3)Full Load /Min load<br>Change<br>Ta : 25°C | (1) 376 V<br>(2) 366 V<br>(3) 372 V    | P       |
| 4  | Control IC Voltage Test                                | U 1 Rated : 28 V             | I/P : High-Line +3V = 267 V<br>O/P : (1)Full Load Turn on /Off<br>(2) Min load Turn on /Off<br>(3)Full Load /Min load<br>Change<br>Ta : 25°C | (1) 17.3 V<br>(2) 17.3 V<br>(3) 16.6 V | P       |
| 5  | CLAMP DIODE  | D 1 Rated : 800 V 2 A        | I/P : High-Line +3V = 267 V<br>O/P : (1)Full Load Turn on<br>(2) Output Short<br>(3)Full load continue<br>Ta : 25°C                          | (3) 564 V<br>(4) 500 V<br>(3) 544 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<br>Ta : 25°C    | I/P-O/P : 1.671 mA<br>NO DAMAGE | P       |
| 2  | ISOLATION RESISTANCE | I/P-O/P : 500VDC>100MΩ                 | I/P-O/P : 500 VDC<br>Ta : 25°C /70%RH | I/P-O/P : 9999 MΩ<br>NO DAMAGE  | P       |
| 3  | GROUNDING CONTINUITY | FG(PE) TO CHASSIS<br>OR TRACE < 100 mΩ | 40 A / 2min<br>Ta : 25°C / 70%RH      | 11 mΩ                           | P       |

**E.M.C TEST**

| NO | TEST ITEM                                   | SPECIFICATION                                      | TEST CONDITION   | RESULT                        | VERDICT |
|----|---|--|--|-------------------------------|---------|
| 1  | HARMONIC                                    | EN61000-3-2<br>CLASS B                             | I/P : 230 VAC/50HZ<br>O/P : FULL LOAD<br>Ta : 25°C       | PASS                          | P       |
| 2  | CONDUCTION                                  | EN55011<br>CLASS B                                 | I/P : 230 VAC (50HZ)<br>O/P : FULL/50% LOAD<br>Ta : 25°C | PASS<br>Test by certified Lab | P       |
| 3  | RADIATION                                   | EN55011<br>CLASS B                                 | I/P : 230 VAC (50HZ)<br>O/P : FULL LOAD<br>Ta : 25°C     | PASS<br>Test by certified Lab | P       |
| 4  | E.S.D                                       | EN61000-4-2<br>INDUSTRY<br>AIR:8KV / Contact:6KV   | I/P : 230 VAC/50HZ<br>O/P : FULL LOAD<br>Ta : 25°C       | CRITERIA A                    | P       |
| 5  | E.F.T                                       | EN61000-4-4<br>INDUSTRY<br>INPUT: 2KV              | I/P : 230 VAC/50HZ<br>O/P : FULL LOAD<br>Ta : 25°C       | CRITERIA A                    | P       |
| 6  | SURGE                                       | IEC61000-4-5<br>INDUSTRY<br>L-N :2KV<br>L,N-PE:4KV | I/P : 230 VAC/50HZ<br>O/P : FULL LOAD<br>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 : GSM40A12<br>1. ROOM AMBIENT BURN-IN : 2 HRS<br>I/P : 230VAC O/P : FULL LOAD Ta= 15.4 °C<br>2. HIGH AMBIENT BURN-IN : 2 HRS<br>I/P : 230VAC O/P : FULL LOAD Ta= 50.5 °C  |   |                      | P       |
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| 2  | OVER LOAD BURN-IN TEST  | NO DAMAGE<br>1 HOUR ( MIN )   | I/P : 230 VAC<br>O/P : 126 % LOAD<br>Ta : 25°C                      | TEST : OK            | P       |
| 3  | LOW TEMPERATURE<br>TURN ON TEST                                   | TURN ON AFTER 2 HOUR  | I/P : 264VAC/100VAC<br>O/P : 100 % LOAD<br>Ta= -34 °C               | TEST : OK            | P       |
| 4  | HIGH HUMIDITY<br>HIGH TEMPERATURE<br>HIGH VOLTAGE<br>TURN ON TEST | AFTER 12 HOURS<br>IN CHAMBER ON<br>CONTROL 50 °C<br>NO DAMAGE   | I/P : 272 VAC<br>O/P : FULL LOAD<br>Ta= 50.7°C<br>HUMIDITY= 95 %R.H | TEST : OK            | P       |
| 5  | TEMPERATURE<br>COEFFICIENT  | ± 0.03%/°C (0~50°C)   | I/P : 230 VAC<br>O/P : FULL LOAD                                    | ± 0.009%/°C (0~50°C) | P       |
| 6  | STORAGE TEMPERATURE TEST  | 1. Thermal shock Temperature : -40°C~ +85°C<br>2. Temperature change rate : 25°C / MIN<br>3. Dwell time low and high temperature : 30 MIN/EACH<br>4. Total test cycle : 5 CYCLE<br>5. Input/Output condition : STATIC |   | OK                   | P       |

|    |                             |  |   |   |
|----|-----------------------------|--|---|---|
| 7  | THERMAL SHOCK TEST          | 1. Thermal shock Temperature : -30°C~ +60°C<br>2. Temperature change rate : 25°C / MIN<br>3. Dwell time low and high temperature : 30 MIN/EACH<br>4. Total test cycle : 10 CYCLE<br>5. Input/Output condition : 230VAC/Full Load AC ON/OFF TEST<br>turn on 58sec ; turn off 2sec | OK  | P |
| 8  | VIBRATION TEST              | 1 Carton & 1 Set<br>(1) Waveform : Sine Wave<br>(2) Frequency : 10~500Hz<br>(3) Sweep Time : 12min/sweep cycle<br>(4) Acceleration : 2G<br>(5) Test Time : 60min in each axis (X.Y.Z)<br>(6) Ta : 25°C   | TEST : OK   | P |
| 9  | CAPACITOR LIFE CYCLE        | SUPPOSE C105 IS THE MOST CRITICAL COMPONENT<br>(1) I/P : 230VAC O/P : FULL LOAD Ta= 25°C LIFE TIME<br>(2) I/P : 230VAC O/P : FULL LOAD Ta= 50°C LIFE TIME<br>(3) I/P : 230VAC O/P : 75% LOAD Ta= 50°C LIFE TIME<br>(4) I/P : 230VAC O/P : 50% LOAD Ta= 50°C LIFE TIME            | (1) 667912 HRS<br>(2) 84389 HRS<br>(3) 102068 HRS<br>(4) 154830 HRS | P |
| 10 | MTBF                        | MIL-HDBK-217F NOTICE S2 PARTS COUNT<br>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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