



# Test Report: GSM60A9

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60W 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 : 100 mVp-p (Max)	I/P : 230VAC O/P : FULL LOAD Ta : 25°C	V1 : 46.5 mVp-p (Max)	P
2	OUTPUT VOLTAGE TOLERANCE	V1 : -5 %~ +5 % (Max)	I/P : 80 VAC / 264 VAC O/P : FULL/ MIN LOAD Ta : 25°C	V1 : -1.37 %~ 1.37 %	P
3	LINE REGULATION	V1 : -1 %~ +1 % (Max)	I/P : 100 VAC ~ 264 VAC O/P : FULL LOAD Ta : 25°C	V1 : -0.067 %~ 0 %	P
4	LOAD REGULATION	V1 : -5 %~ +5 % (Max)	I/P : 230 VAC O/P : FULL ~MIN LOAD Ta : 25°C	V1 : -1.37 %~ 1.29 %	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/ 520 ms 115VAC/ 1133 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/ 8.2 ms 115VAC/ 10.1 ms	P
7	HOLD UP TIME	230VAC : 50 ms (TYP) 115VAC : 18 ms (TYP)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 51 ms 115VAC/ 20 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 : 1800 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) 396 mVp-p (2) 406 mVp-p (3) 402 mVp-p (4) 410 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	87.5% (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	88.070 %	P
4	INPUT CURRENT	230V/ 1 A (TYP) 115V/ 1.4 A (TYP)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I = 0.49 A/ 230 VAC I = 0.97 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 = 39.3 A/ 230 VAC I = 21.2 A/ 115 VAC	P
6	LEAKAGE CURRENT	< 100 uA/ for earth leakage current  < 100 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 84.6 uA N-FG 84.6 uA  L-V- 85.3 uA N-V- 85.3 uA	P
7	NO LOAD CONSUMPTION	< 0.1 W	I/P : 240VAC O/P : NO LOAD Ta : 25°C	< 0.0608 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	141.0 %/ 230 VAC 136.6 %/ 115 VAC Hiccup Mode	P
2	OVER VOLTAGE PROTECTION	CH1 : 9.4 V ~ 12.2 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	10.8 V/ 230 VAC 10.9 V/ 115 VAC Shut down Re- power ON	P
3	OVER TEMPERATURE PROTECTION	Shut down Re- power ON	I/P : 230 VAC O/P : FULL LOAD	O.T.P. Active Shut down Re- power ON	P
4	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 88.6% 115V 87.8%	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) 596 V (2) 528 V (3) 568 V	P
2	Diode Peak Voltage	D100 Rated : 60 V 30 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) 55.2 V (2) 46.4 V (3) 53.4 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) 368 V (2) 368 V (3) 368 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) 17.4 V (2) 17.3 V (3) 14.9 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) 564 V (4) 445 V (3) 484 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-FG : 2 KVAC/min	I/P-O/P : 4.2KVAC/min I/P-FG : 2.4KVAC/min Ta : 25°C	I/P-O/P : 1.768 mA I/P-FG : 1.994 mA NO DAMAGE	P
2	ISOLATION RESISTANCE	I/P-O/P : 500VDC>100MΩ I/P-FG : 500VDC>100MΩ	I/P-O/P : 500 VDC I/P-FG : 500 VDC Ta : 25°C/70%RH	I/P-O/P : 9999 MΩ I/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	11 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	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:15KV / Contact:8KV	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 :1KV L,N-FG:2KV	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 : GSM60A12 1. ROOM AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta= 20.1 °C 2. HIGH AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta= 45°C			P
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230 VAC O/P : 119 % 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= -35 °C	TEST : OK	P
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 40 °C NO DAMAGE	I/P : 272 VAC O/P : FULL LOAD Ta= 40.8°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%/°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~ +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) 521664HRS (2) 65208 HRS (3) 108108 HRS (4) 214728 HRS	P
10	MTBF	MIL-HDBK-217F NOTICE S2 PARTS COUNT TOTAL FAILURE RATE : 720 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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