



# Test Report: GSM60A9

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60W AC-DC Reliable Green Medical Adaptor

## ■ 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
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1	INPUT VOLTAGE RANGE	80VAC~264 VAC	I/P : TESTING O/P : FULL LOAD Ta : 25°C	59.8 V~264V  TEST : OK	P
			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 )		
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)	I/P : 230 VAC	I = 0.49 A/ 230 VAC	P
		115V/ 1.4 A (TYP)	I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I = 0.97 A/ 115 VAC	
5	INRUSH CURRENT	230V/ 60 A (TYP)	I/P : 230 VAC/115VAC	I = 39.3 A/ 230 VAC	P
		115V/ 30 A (TYP) COLD START	O/P : FULL LOAD Ta : 25°C	I = 21.2 A/ 115 VAC	
6	LEAKAGE CURRENT	< 100 uA/ for earth leakage current	I/P: 264 VAC O/P:Min LOAD Ta:25°C	L-FG 84.6 uA N-FG 84.6 uA	P
		< 100 uA/ for touch leakage current	I/P: 264 VAC O/P:Min LOAD Ta:25°C	L-V- 85.3 uA N-V- 85.3 uA	
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 Protection type : Hiccup mode, recovers automatically after fault condition is removed	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 Protection type : Shut down o/p voltage, re-power on to recover	P
3	OVER TEMPERATURE PROTECTION	Shut down Re- power ON	I/P : 230 VAC O/P : FULL LOAD	O.T.P. Active Shut down o/p voltage, re-power on to recover	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
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**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
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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

### E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	HARMONIC	BS EN/EN61000-3-2 CLASS A	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	PASS	P
2	CONDUCTION	BS EN/EN55011 (CISPR11), FCC PART 15 / CISPR22, CAN ICES-3(B)/NMB-3(B) CLASS B	I/P : 230 VAC (50HZ) O/P : FULL/50% LOAD Ta : 25°C	PASS Test by certified Lab	P
3	RADIATION	BS EN/EN55011 (CISPR11), FCC PART 15 / CISPR22, CAN ICES-3(B)/NMB-3(B) CLASS B	I/P : 230 VAC (50HZ) O/P : FULL LOAD Ta : 25°C	PASS Test by certified Lab	P
4	E.S.D	BS EN/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	BS EN/EN61000-4-4 INDUSTRY INPUT: 2KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A	P
6	SURGE	BS EN/EN61000-4-5 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
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1	TEMPERATURE RISE TEST	<p>MODEL : GSM60A12</p> <p>1. ROOM AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta=20.1°C</p> <p>2. HIGH AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta=45°C</p> <table border="1" data-bbox="504 427 1342 1151"> <thead> <tr> <th>NO</th> <th>Position</th> <th>PART NUMBER</th> <th>ROOM AMBIENT Ta= 20.1°C</th> <th>HIGH AMBIENT Ta= 45°C</th> </tr> </thead> <tbody> <tr><td>1</td><td>LF1</td><td>TR1082 6-L2012-W902 18.9m GS</td><td>52.8°C</td><td>74.3°C</td></tr> <tr><td>2</td><td>LF2</td><td>TR1083 W620 52~85m GSM60</td><td>55.3°C</td><td>77.4°C</td></tr> <tr><td>3</td><td>BD1</td><td>BD 4A/800V GLASS UD4KB80</td><td>62.8°C</td><td>84.5°C</td></tr> <tr><td>4</td><td>C5</td><td>120u/400V 105°C 18*31.5 VZ EPT</td><td>54.1°C</td><td>76.6°C</td></tr> <tr><td>5</td><td>D1</td><td>RD 2A/800V GP20K T-52mm</td><td>71.6°C</td><td>94.3°C</td></tr> <tr><td>6</td><td>C40</td><td>C/E 33u/50V UL10Kh 6.3*11 YXM</td><td>54.6°C</td><td>72.8°C</td></tr> <tr><td>7</td><td>D100</td><td>SBD PFR30L60CT 30A/60V TO220</td><td>76.0°C</td><td>98.1°C</td></tr> <tr><td>8</td><td>D40</td><td>RD 1A/1KV 1N4007GP T-52mm</td><td>58.6°C</td><td>81.0°C</td></tr> <tr><td>9</td><td>T1(COIL)</td><td>MT TF2484 PQ3220 GSM60-12 B</td><td>64.5°C</td><td>87.0°C</td></tr> <tr><td>10</td><td>T1(CORE)</td><td>MT TF2484 PQ3220 GSM60-12 B</td><td>58.6°C</td><td>80.8°C</td></tr> <tr><td>11</td><td>C105</td><td>C/E 1500u/16V UL10Kh 10*20 ZLH</td><td>62.8°C</td><td>84.9°C</td></tr> <tr><td>12</td><td>U1</td><td>PWM FAN6756MRMY SOIC-8</td><td>52.4°C</td><td>75.5°C</td></tr> <tr><td>13</td><td>Q1</td><td>FET 2SK3673-01MR 10A/700V TO220F</td><td>58.8°C</td><td>81.2°C</td></tr> </tbody> </table>			NO	Position	PART NUMBER	ROOM AMBIENT Ta= 20.1°C	HIGH AMBIENT Ta= 45°C	1	LF1	TR1082 6-L2012-W902 18.9m GS	52.8°C	74.3°C	2	LF2	TR1083 W620 52~85m GSM60	55.3°C	77.4°C	3	BD1	BD 4A/800V GLASS UD4KB80	62.8°C	84.5°C	4	C5	120u/400V 105°C 18*31.5 VZ EPT	54.1°C	76.6°C	5	D1	RD 2A/800V GP20K T-52mm	71.6°C	94.3°C	6	C40	C/E 33u/50V UL10Kh 6.3*11 YXM	54.6°C	72.8°C	7	D100	SBD PFR30L60CT 30A/60V TO220	76.0°C	98.1°C	8	D40	RD 1A/1KV 1N4007GP T-52mm	58.6°C	81.0°C	9	T1(COIL)	MT TF2484 PQ3220 GSM60-12 B	64.5°C	87.0°C	10	T1(CORE)	MT TF2484 PQ3220 GSM60-12 B	58.6°C	80.8°C	11	C105	C/E 1500u/16V UL10Kh 10*20 ZLH	62.8°C	84.9°C	12	U1	PWM FAN6756MRMY SOIC-8	52.4°C	75.5°C	13	Q1	FET 2SK3673-01MR 10A/700V TO220F	58.8°C	81.2°C	P
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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	<p>1. Thermal shock Temperature : -40°C~ +85°C</p> <p>2. Temperature change rate : 25°C / MIN</p> <p>3. Dwell time low and high temperature : 30 MIN/EACH</p> <p>4. Total test cycle : 5 CYCLE</p> <p>5. Input/Output condition : STATIC</p>			OK	P																																																																					
7	THERMAL SHOCK TEST	<p>1. Thermal shock Temperature : -30°C~ +60°C</p> <p>2. Temperature change rate : 25°C / MIN</p> <p>3. Dwell time low and high temperature : 30 MIN/EACH</p> <p>4. Total test cycle : 10 CYCLE</p> <p>5. Input/Output condition : 230VAC/Full Load AC ON/OFF TEST turn on 58sec ; turn off 2sec</p>			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	3597.9K hrs min. Telcordia SR-332 (Bellcore) ; 721.1K hrs min. MIL-HDBK-217F (25°C)		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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