



Test Report: GSM60A24

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 : 150 mVp-p (Max)	I/P : 230VAC O/P : FULL LOAD Ta : 25°C	V1 : 86.5 mVp-p (Max)	P
2	OUTPUT VOLTAGE TOLERANCE	V1 : -3 %~ +3 % (Max)	I/P : 80 VAC / 264 VAC O/P : FULL/ MIN LOAD Ta : 25°C	V1 : -0.37 %~ 0.39 %	P
3	LINE REGULATION	V1 : -1 %~ +1 % (Max)	I/P : 100 VAC ~ 264 VAC O/P : FULL LOAD Ta : 25°C	V1 : 0 %~ 0.07 %	P
4	LOAD REGULATION	V1 : -3 %~ +3 % (Max)	I/P : 230 VAC O/P : FULL ~MIN LOAD Ta : 25°C	V1 : -0.36 %~ 0.39 %	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/ 674 ms 115VAC/ 1123 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/ 11.3 ms 115VAC/ 14.6 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/ 54 ms 115VAC/ 18.2 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) 300 mVp-p (2) 240 mVp-p (3) 226 mVp-p (4) 395 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	90.5 % (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	91.7 %	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 = 0.50 A/ 230 VAC I = 0.99 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 = 41.6 A/ 230 VAC I = 22.6 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 89.6 uA N-FG 89.6 uA L-V- 89.9 uA N-V- 89.9 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	138.2 %/ 230 VAC 138.8 %/ 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	28.6 V/ 230 VAC 28.7 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℃	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℃	(1) 648 V (2) 546 V (3) 628 V	P
2	Diode Peak Voltage	D100 Rated : 120 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℃	(1) 112 V (2) 94.4 V (3) 104 V	P
3	Input Capacitor Voltage	C 5 Rated : 120u /400V/105℃	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℃	(1) 376 V (2) 380 V (3) 380 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℃	(1) 17.4 V (2) 17.4 V (3) 15.4 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℃	(3) 484 V (4) 412 V (3) 480 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 : 1.995 mA I/P-FG : 2.125 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	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 : GSM60A24 1. ROOM AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta= 20.4 °C 2. HIGH AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta= 46.6°C <table><tr><th>NO</th><th>Position</th><th>PART NUMBER</th><th>ROOM AMBIENT Ta= 20.4°C</th><th>HIGH AMBIENT Ta= 46.6°C</th></tr><tr><td>1</td><td>LF1</td><td>TR1082 6-L2012-W902 18.9m GS</td><td>49.0°C</td><td>69.6°C</td></tr><tr><td>2</td><td>LF2</td><td>TR1083 W620 52~85m GSM60</td><td>51.5°C</td><td>72.9°C</td></tr><tr><td>3</td><td>BD1</td><td>BD 4A/800V GLASS UD4KB80</td><td>58.3°C</td><td>79.1°C</td></tr><tr><td>4</td><td>C5</td><td>120u/400V 105°C 18*31.5 VZ EPT</td><td>50.7°C</td><td>72.0°C</td></tr><tr><td>5</td><td>D1</td><td>RD 2A/800V GP20K T-52mm</td><td>60.8°C</td><td>82.1°C</td></tr><tr><td>6</td><td>C40</td><td>C/E 33u/50V UL10Kh 6.3*11 YXM</td><td>54.7°C</td><td>75.8°C</td></tr><tr><td>7</td><td>D40</td><td>RD 1A/1KV 1N4007GP T-52mm</td><td>62.2°C</td><td>82.7°C</td></tr><tr><td>8</td><td>D100</td><td>SBD PTR30L120CT 30A/120V TO220</td><td>63.8°C</td><td>86.7°C</td></tr><tr><td>9</td><td>T1core</td><td>MT TF2487 PQ3220 GSM60-24 B</td><td>51.3°C</td><td>72.6°C</td></tr><tr><td>10</td><td>T1coil</td><td>MT TF2487 PQ3220 GSM60-24 B</td><td>56.1°C</td><td>77.3°C</td></tr><tr><td>11</td><td>C105</td><td>C/E 470u/35V UL7Kh 10*20 KY</td><td>52.3°C</td><td>73.6°C</td></tr><tr><td>12</td><td>U1</td><td>PWM FAN6756MRMY SOIC-8</td><td>47.2°C</td><td>69.3°C</td></tr><tr><td>13</td><td>Q1</td><td>FET 2SK3673-01MR 10A/700V TO220F</td><td>54.1°C</td><td>75.3°C</td></tr></table>			NO	Position	PART NUMBER	ROOM AMBIENT Ta= 20.4°C	HIGH AMBIENT Ta= 46.6°C	1	LF1	TR1082 6-L2012-W902 18.9m GS	49.0°C	69.6°C	2	LF2	TR1083 W620 52~85m GSM60	51.5°C	72.9°C	3	BD1	BD 4A/800V GLASS UD4KB80	58.3°C	79.1°C	4	C5	120u/400V 105°C 18*31.5 VZ EPT	50.7°C	72.0°C	5	D1	RD 2A/800V GP20K T-52mm	60.8°C	82.1°C	6	C40	C/E 33u/50V UL10Kh 6.3*11 YXM	54.7°C	75.8°C	7	D40	RD 1A/1KV 1N4007GP T-52mm	62.2°C	82.7°C	8	D100	SBD PTR30L120CT 30A/120V TO220	63.8°C	86.7°C	9	T1core	MT TF2487 PQ3220 GSM60-24 B	51.3°C	72.6°C	10	T1coil	MT TF2487 PQ3220 GSM60-24 B	56.1°C	77.3°C	11	C105	C/E 470u/35V UL7Kh 10*20 KY	52.3°C	73.6°C	12	U1	PWM FAN6756MRMY SOIC-8	47.2°C	69.3°C	13	Q1	FET 2SK3673-01MR 10A/700V TO220F	54.1°C	75.3°C		P
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230 VAC O/P : 127 % 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℃~ +60℃ 2. Temperature change rate : 25℃ / 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℃	TEST : OK	P
9	CAPACITOR LIFE CYCLE	SUPPOSE C105 IS THE MOST CRITICAL COMPONENT (1) I/P : 230VAC O/P : FULL LOAD Ta= 25℃ LIFE TIME (2) I/P : 230VAC O/P : FULL LOAD Ta= 50℃ LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta= 50℃ LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta= 50℃ LIFE TIME	(1) 925955HRS (2) 115744HRS (3) 130202 HRS (4) 217446 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℃		P

SAMPLE	TEST RESULT	TESTER	APPROVAL
PRODUCT SAMPLE	PASS	Shenym	WANGDZ

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