



Test Report: GSM60A15

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 : 55 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 : -0.46 %~ 0.41 %	P
3	LINE REGULATION	V1 : -1 %~ +1 % (Max)	I/P : 100 VAC ~ 264 VAC O/P : FULL LOAD Ta : 25°C	V1 : -0.04 %~ 0 %	P
4	LOAD REGULATION	V1 : -3 %~ +3 % (Max)	I/P : 230 VAC O/P : FULL ~MIN LOAD Ta : 25°C	V1 : -0.45 %~ 0.45 %	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/ 584 ms 115VAC/ 1111 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/ 7.8 ms 115VAC/ 8.9 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/ 56 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 : 1500 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) 322 mVp-p (2) 324 mVp-p (3) 318 mVp-p (4) 358 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	88.5% (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	90.4 %	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 = 0.99 A/ 115 VAC	P
5	INRUSH CURRENT	230V/ 60 A (TYP) 115/ 30 A (TYP) COLD START	I/P : 230 VAC/115VAC O/P : FULL LOAD Ta : 25°C	I = 40.7 A/ 230 VAC I = 22.1 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 89.5 uA N-FG 89.5 uA L-V- 87.6 uA N-V- 87.6 uA	P
7	NO LOAD CONSUMPTION	< 0.1 W	I/P : 240VAC O/P : NO LOAD Ta : 25°C	< 0.0543 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	133.3 %/ 230 VAC 133.6 %/ 115 VAC Hiccup Mode	P
2	OVER VOLTAGE PROTECTION	CH1 : 15.7 V ~ 20.3 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	18.1 V/ 230 VAC 18.1 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 90.1% 115V 88.8%	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) 632 V (2) 516 V (3) 608 V	P
2	Diode Peak Voltage	D100 Rated : 100 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) 68.8 V (2) 56.8 V (3) 66.5 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) 376 V (2) 376 V (3) 376 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) 17.1 V (2) 17.1 V (3) 15.5 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) 512 V (4) 446 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-FG : 2 KVAC/min	I/P-O/P : 4.2KVAC/min I/P-FG : 2.4KVAC/min Ta : 25°C	I/P-O/P : 1.706 mA I/P-FG : 2.013 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 : 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 <table><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	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) 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℃		P

SAMPLE	TEST RESULT	TESTER	APPROVAL
PRODUCT SAMPLE	PASS	Shenym	WANGDZ

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