



Test Report: GSM90B24

90W 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 : 180 mVp-p (Max)	I/P : 230VAC O/P : FULL LOAD Ta : 25°C	V1 : 45 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 : -0.74 %~ 0.81 %	P
34	LINE REGULATION	V1 : -1 %~ +1 % (Max)	I/P : 100 VAC ~ 264 VAC O/P : FULL LOAD Ta : 25°C	V1 : 0 %~ 0.13 %	P
4	LOAD REGULATION	V1 : -3 %~ +3 % (Max)	I/P : 230 VAC O/P : FULL ~MIN LOAD Ta : 25°C	V1 : -0.74 %~ 0.81 %	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/ 500 ms 115VAC/ 514 ms	P
6	RISE TIME	230VAC : 50 ms (Max) 115VAC : 50 ms (Max)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 20.1 ms 115VAC/ 20.2 ms	P
7	HOLD UP TIME	230VAC : 20 ms (TYP) 115VAC : 20 ms (TYP)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 35.9 ms 115VAC/ 24.1 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) 635 mVp-p (2) 512 mVp-p (3) 525 mVp-p (4) 1440 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)	67 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	POWER FACTOR	0.91/230 VAC(TYP) 0.95/ 115 VAC(TYP)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25°C	PF= 0.957 230VAC PF= 0.988 115VAC	P
4	EFFICIENCY	90 % (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	90.5 %	P
5	INPUT CURRENT	230V/ 0.6 A (TYP) 115V/ 1.3 A (TYP)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I = 0.439 A/ 230 VAC I = 0.865 A/ 115 VAC	P
6	INRUSH CURRENT	230V/ 60 A (TYP) 115V/ 30 A (TYP) COLD START	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I = 44.5 A/ 230 VAC I = 21.9 A/115 VAC	P
7	LEAKAGE CURRENT	< 100 μ A / 264VAC For Touch	I/P : 264 VAC O/P : Min LOAD Ta : 25°C	L-V:- 67.6 μ A N-V:- 66.5 μ A	P
8	NO LOAD CONSUMPTION	< 0.15 W	I/P : 240VAC O/P : NO LOAD Ta : 25°C	< 0.0726 W	P
9	ERP STEP2 COMPLIANT	LEVEL VI	I/P: 230 VAC/115VAC O/P:100/75/50/25% Ta:25°C	230V 90.460 % 115V 89.372 %	P

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	OVER LOAD PROTECTION	110 % ~150 %	I/P : 230 VAC I/P : 115 VAC O/P : TESTING Ta : 25°C	133.6 %/ 230 VAC 128.3 %/ 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	29.59 V/ 230 VAC 29.56 V/ 115 VAC Shut down Re- power ON	P
3	OVER TEMPERATURE PROTECTION	Shut down o/p voltage, re-power on to recover	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

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	Power Transistor (D to S) or (C to E) Peak Voltage	Q32 Rated : 650 V 10.6 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) 612 V (2) 496 V (3) 586 V	P
2	Diode Peak Voltage	Q101 Rated : 150 V 43 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) 138 V (2) 135 V (3) 137 V	P
3	Input Capacitor Voltage	C 5 Rated : 100u /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) 392 V (2) 384 V (3) 396 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) 17.8 V (2) 17.4 V (3) 18.1 V	P
5	CLAMP DIODE	D 3 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	(1) 525 V (2) 426 V (3) 526 V	P
6	Power Transistor (D to S) or (C to E) Peak Voltage	Q31 Rated : 500V 19 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) 428 V (2) 388 V (3) 405 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 Ta : 25°C	I/P-O/P : 1.865 mA NO DAMAGE	P
2	ISOLATION RESISTANCE	I/P-O/P : 500VDC>100MΩ	I/P-O/P : 500 VDC Ta : 25°C/70%RH	I/P-O/P : 9999 MΩ NO DAMAGE	P

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	HARMONIC	EN61000-3-2 CLASS B	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 MEDICAL	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A	P
5	E.F.T	EN61000-4-4 MEDICAL	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A	P
6	SURGE	IEC61000-4-5 MEDICAL	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 : GSM90B24 1. ROOM AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta= 21.6℃ 2. HIGH AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta= 40.2℃ <table><thead><tr><th>NO</th><th>Position</th><th>ROOM AMBIENT Ta= 21.6 ℃</th><th>HIGH AMBIENT Ta= 40.2℃</th></tr></thead><tbody><tr><td>1</td><td>LF1</td><td>60.7℃</td><td>81.1℃</td></tr><tr><td>2</td><td>LF2</td><td>57.4℃</td><td>78.6℃</td></tr><tr><td>3</td><td>L2</td><td>65.5℃</td><td>87.3℃</td></tr><tr><td>4</td><td>BD1</td><td>59.4℃</td><td>79.9℃</td></tr><tr><td>5</td><td>LF3</td><td>64.1℃</td><td>86.4℃</td></tr><tr><td>6</td><td>C11</td><td>62.0℃</td><td>83.9℃</td></tr><tr><td>7</td><td>Q31</td><td>66.5℃</td><td>88.5℃</td></tr><tr><td>8</td><td>Q32</td><td>66.3℃</td><td>87.5℃</td></tr><tr><td>9</td><td>D1</td><td>73.8℃</td><td>96.6℃</td></tr><tr><td>10</td><td>D30</td><td>77.4℃</td><td>99.2℃</td></tr><tr><td>11</td><td>C5</td><td>66.3℃</td><td>88.5℃</td></tr><tr><td>12</td><td>C52</td><td>70.0℃</td><td>92.3℃</td></tr><tr><td>13</td><td>RTH30</td><td>67.5℃</td><td>89.4℃</td></tr><tr><td>14</td><td>Q101</td><td>72.0℃</td><td>93.1℃</td></tr><tr><td>15</td><td>C101</td><td>58.6℃</td><td>79.2℃</td></tr><tr><td>16</td><td>LF101</td><td>56.3℃</td><td>76.4℃</td></tr><tr><td>17</td><td>U2</td><td>65.9℃</td><td>87.3℃</td></tr><tr><td>18</td><td>D33</td><td>70.8℃</td><td>94.6℃</td></tr><tr><td>19</td><td>T1</td><td>72.9℃</td><td>93.8℃</td></tr></tbody></table>			NO	Position	ROOM AMBIENT Ta= 21.6 ℃	HIGH AMBIENT Ta= 40.2℃	1	LF1	60.7℃	81.1℃	2	LF2	57.4℃	78.6℃	3	L2	65.5℃	87.3℃	4	BD1	59.4℃	79.9℃	5	LF3	64.1℃	86.4℃	6	C11	62.0℃	83.9℃	7	Q31	66.5℃	88.5℃	8	Q32	66.3℃	87.5℃	9	D1	73.8℃	96.6℃	10	D30	77.4℃	99.2℃	11	C5	66.3℃	88.5℃	12	C52	70.0℃	92.3℃	13	RTH30	67.5℃	89.4℃	14	Q101	72.0℃	93.1℃	15	C101	58.6℃	79.2℃	16	LF101	56.3℃	76.4℃	17	U2	65.9℃	87.3℃	18	D33	70.8℃	94.6℃	19	T1	72.9℃	93.8℃	P
NO	Position	ROOM AMBIENT Ta= 21.6 ℃	HIGH AMBIENT Ta= 40.2℃																																																																																		
1	LF1	60.7℃	81.1℃																																																																																		
2	LF2	57.4℃	78.6℃																																																																																		
3	L2	65.5℃	87.3℃																																																																																		
4	BD1	59.4℃	79.9℃																																																																																		
5	LF3	64.1℃	86.4℃																																																																																		
6	C11	62.0℃	83.9℃																																																																																		
7	Q31	66.5℃	88.5℃																																																																																		
8	Q32	66.3℃	87.5℃																																																																																		
9	D1	73.8℃	96.6℃																																																																																		
10	D30	77.4℃	99.2℃																																																																																		
11	C5	66.3℃	88.5℃																																																																																		
12	C52	70.0℃	92.3℃																																																																																		
13	RTH30	67.5℃	89.4℃																																																																																		
14	Q101	72.0℃	93.1℃																																																																																		
15	C101	58.6℃	79.2℃																																																																																		
16	LF101	56.3℃	76.4℃																																																																																		
17	U2	65.9℃	87.3℃																																																																																		
18	D33	70.8℃	94.6℃																																																																																		
19	T1	72.9℃	93.8℃																																																																																		
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230 VAC O/P : 127% LOAD Ta : 25℃	TEST : OK	P																																																																																
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 264VAC/100VAC O/P : 100 % LOAD Ta= -35 ℃	TEST : OK	P																																																																																
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 40 ℃ NO DAMAGE	I/P : 272 VAC O/P : FULL LOAD Ta= 40℃ HUMIDITY= 95 %R.H	TEST : OK	P																																																																																
5	TEMPERATURE COEFFICIENT	± 0.03%/℃ (0~50℃)	I/P : 230 VAC O/P : FULL LOAD	± 0.01%/℃ (0~50℃)	P																																																																																
6	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -40℃~ +85℃ 2. Temperature change rate : 25℃ / 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 C 101 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= 40°C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta= 40°C LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta= 40°C LIFE TIME	(1) 156516HRS (2) 48146HRS (3) 91764HRS (4) 126246HRS	P
10	MTBF	MIL-HDBK-217F NOTICE S2 PARTS COUNT TOTAL FAILURE RATE : 405.6 KHRS		P
11	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure (Expected Life): Above 30,000 hours @ TA 40°C		P

SAMPLE	TEST RESULT	TESTER	APPROVAL
PRODUCT SAMPLE	PASS	Shenym	Wangdz

2007/3/20 A50-S014