



# Test Report: GSM160B24-R7B

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160W AC-DC High Reliability Medical Adaptor

## ■ DESIGN VERIFY TEST

Output Function Test

Input Function Test

Protection 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

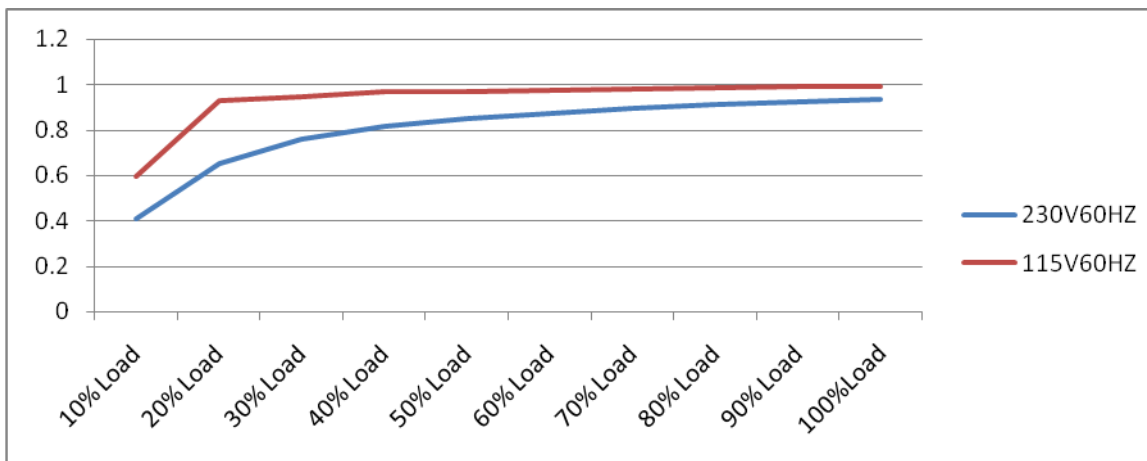
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE(Max) TOLERANCE	V1: -3%~ 3%	I/P: 100VAC /264VAC O/P:FULL/ MIN. LOAD Ta:25°C	V1: -0.548%~ 0.653%
2	LINE REGULATION (Max)	V1: -1%~ 1%	I/P: 100VAC~ 264VAC O/P:FULL LOAD Ta:25°C	V1: -0.076%~ 0.05%
3	LOAD REGULATION(Max)	V1: -3%~ 3%	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25°C	V1: -0.548%~ 0.653%
4	OVER/UNDERSHOOT TEST	< ±5%	I/P: 230VAC O/P:FULL LOAD Ta:25°C	< ±5%
5	RIPPLE & NOISE(Max)	V1: 120mVp-p	I/P:230VAC O/P:FULL LOAD Ta:25°C	V1: 23.8mVp-p
<div style="display: flex; justify-content: space-around;"> <div style="width: 45%;"> <p>high frequency :</p> </div> <div style="width: 45%;"> <p>low frequency :</p> </div> </div>				
6	SET UP TIME(Max)	230VAC/2000ms 115VAC/2500ms	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 1130ms 115VAC/ 1110ms
<div style="display: flex; justify-content: space-around;"> <div style="width: 45%;"> <p>INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage</p> </div> <div style="width: 45%;"> <p>INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage</p> </div> </div>				
7	RISE TIME (Max)	230VAC/50ms 115VAC/50ms	I/P : 230 VAC I/P : 115 VAC	230VAC/ 17.3ms 115VAC/ 19.2ms

		O/P : FULL LOAD Ta : 25°C	
INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage		INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage	
8	HOLD UP TIME (Typ.)	230VAC/24ms 115VAC/24ms	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C
		230VAC/ 25.0ms 115VAC/ 25.4ms	
INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage		INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage	
9	DYNAMIC LOAD	V1: 2400mVp-p	I/P: 230VAC O/P: (1)FULL /50% LOAD 50%DUTY / 120HZ (2)FULL /50% LOAD 50%DUTY / 1KHZ Ta:25°C
			562mVp-p 564mVp-p
FULL /50% LOAD 50%DUTY / 120HZ		FULL /50% LOAD 50%DUTY / 1KHZ	

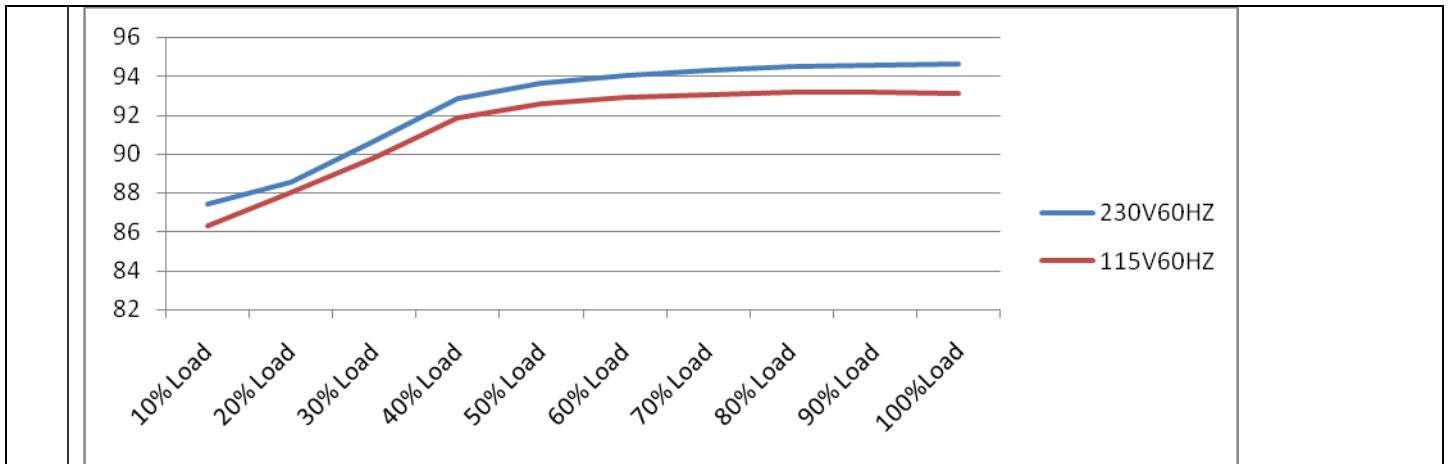
### INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	100VAC~264VAC	I/P:TESTING O/P:FULL LOAD Ta:25°C	66.662V~264V
			I/P: LOW-LINE-3V=97 V HIGH-LINE+15%=300 V O/P:FULL/MIN LOAD (PLEASE CHECK DERATING CURVE) ON: 30 Sec OFF: 30 Sec 10MIN ( POWER ON/OFF NO DAMAGE )	TEST:OK
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE	I/P:100 VAC ~264 VAC O/P:FULL~MIN LOAD Ta:25°C	TEST: OK
3	INPUT CURRENT (Typ.)	230V/ 1A 115V/ 1.85A	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I=0.76A/ 230VAC I=1.49A/ 115VAC
4	LEAKAGE CURRENT	<0.1 mA / 264 VAC For touch leakage current	I/P : 264 VAC O/P : Min LOAD Ta : 25°C	L-V- : 0.069 mA N-V- : 0.069 mA
5	NO LOAD CONSUMPTION	< 0.15W	I/P : 115VAC I/P : 230VAC O/P : NO LOAD Ta : 25°C	< 0.1054 W < 0.1212 W
6	POWER FACTOR (Typ.)	0.94/ 230VAC 0.98/115VAC	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	PF=0.949/230VAC PF=0.994/115VAC

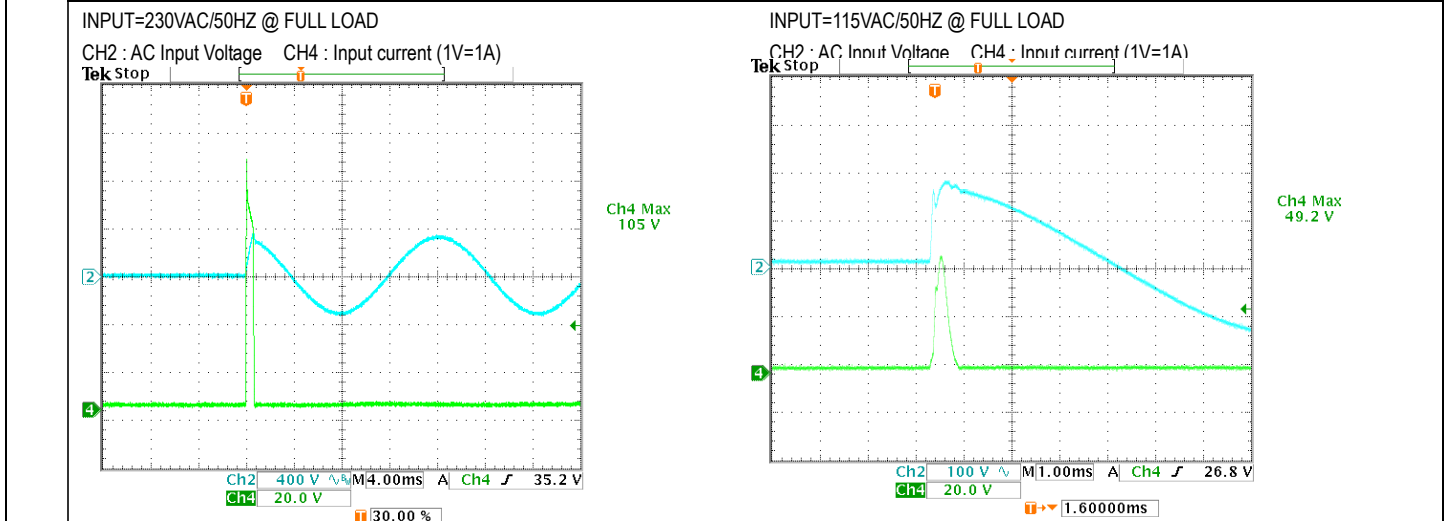
P.F vs LOAD



7	EFFICIENCY(Typ.)	93.5%	I/P:230 VAC O/P:FULL LOAD Ta:25°C	94.53%
EFFICIENCY vs LOAD				



8	INRUSH CURRENT(Typ.)	230V/110A	I/P : 230 VAC	I =105A/ 230VAC
		115V/55A	I/P : 115 VAC	I =49.2A/ 115VAC
		COLD START	O/P : FULL LOAD	
			Ta : 25°C	



### PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	105%~ 150%	I/P: 264VAC I/P: 230VAC I/P: 100VAC O/P: TESTING Ta:25°C	128.6%/ 264VAC 128.6%/ 230VAC 129.4%/100VAC PROTECTION TYPE : Hiccup mode,recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	25.2V~32.4V	I/P: 264VAC I/P: 230VAC I/P: 90VAC O/P: MIN LOAD Ta:25°C	29.2V/ 264VAC 29.2V/ 230VAC 29.2V/ 90VAC PROTECTION TYPE : Shot down o/p voltage,re-power on to recover
3	OVER TEMPERATURE PROTECTION	Protection type :	I/P: 264VAC I/P: 90VAC O/P: FULL LOAD	O.T.P: Active Protection type : Shut down o/p voltage,repower on to recover
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 264VAC I/P: 90VAC O/P: FULL LOAD	NO DAMAGE PROTECTION TYPE : Hiccup mode,recovers automatically after fault

			Ta:25°C	condition is removed
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### COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Transistor (D to S) or (C to E) Peak Voltage	Q5 Rated : 12 A/500 V	I/P:High-Line +3V =267V AC ON/OFF VDS: O/P: (1)Full Load (2)Output Short (3) Full Load Continue Ta:25°C	VDS: (1) 448V (2) 454V (3) 432V
2	P.F.C Transistor (D to S) or (C to E) Peak Voltage	Q1 Rated : 16 A/ 600 V	I/P:High-Line +3V =267V AC ON/OFF VDS: O/P: (1)Full Load (2)Output Short (3) Full Load Continue Ta:25°C	VDS: (1) 506V (2) 494V (3) 492V
3	P.F.C DIODE	D1 Rated : 9 A/ 600V	I/P:High-Line +3V =267 V AC ON/OFF O/P: (1)Full Load (2)Output Short (3)Dynamic Load Full Load/ Min. Load 90%Duty/5KHz (4)Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz ITa:25°C	(1) 418V (2) 418V (3) 416V (4) 418V
4	Diode Peak Voltage	Q101 Rated : 80A/ 75V	I/P:High-Line +3V =267 V AC ON/OFF O/P: (1)Full Load (2)Output Short (3) Full Load Continue z Ta:25°C	Q101: VDS: (1)54.2V (2)7.19V (3)53.8V
5	Input Capacitor Voltage	C5 Rated: : 150 $\mu$ / 420 V 105°C	I/P:High-Line +3V =267 V O/P: (1)Full Load input on/off (2) Min load input on /Off (3)Full Load /Min load Change Ta:25°C	(1)408V (2)408V (3)400V
6	Control IC Voltage Test	IC U1 Rated : 38V -0.4 V(MIN.)	I/P:High-Line +3V =267 V AC ON/OFF O/P(1)FULL LOAD (2) Output Short (3)O.L.P (4)O.V.P. Ta:25°C	(1) 26.1V (2) 20.0V (3) 19.8V (4) 28.8V

### SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P: 4KVAC/min	I/P-O/P: 4.125 KVAC/min Ta:25°C	I/P-O/P:1.926mA NO DAMAGE

2	ISOLATION RESISTANCE	I/P-O/P:500VDC>100MΩ	I/P-O/P: 500 VDC Ta:25°C	I/P-O/P: 9999MΩ NO DAMAGE
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### E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	EN61000-3-2 CLASS A	I/P:230VAC/50HZ O/P:FULL LOAD Ta:25°C	PASS
2	CONDUCTION	EN55011 CLASS B	I/P : 230 VAC (50HZ) O/P : FULL/50% LOAD Ta : 25°C	PASS Test by certified Lab
3	RADIATION	EN55011 CLASS B	I/P : 230 VAC (50HZ) O/P : FULL LOAD Ta : 25°C	PASS Test by certified Lab
4	E.S.D	EN61000-4-2 MEDICAL AIR : 15KV / Contact : 8KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
5	E.F.T	EN61000-4-4 MEDICAL INPUT : 2KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
6	SURGE	IEC61000-4-5 MEDICAL L-N : 1KV L,N-PE : 2KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
7	Test by certified Lab & Test Report Prepare			

## RELIABILITY TEST

### ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT																																																																																																
1	TEMPERATURE RISE TEST	MODEL : GSM160B48-R7B 1. ROOM AMBIENT BURN-IN : 1HRS I/P : 230VAC O/P : FULL LOAD Ta= 23.1 °C 2. HIGH AMBIENT BURN-IN : 1HRS I/P : 230VAC O/P : FULL LOAD Ta= 44.7 °C																																																																																																		
		<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta= 23.1 °C</th> <th>HIGH AMBIENT Ta= 44.7 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>LF1</td><td>44.8°C</td><td>65.4°C</td></tr> <tr><td>2</td><td>LF2</td><td>51.2°C</td><td>71.4°C</td></tr> <tr><td>3</td><td>L1</td><td>54.5°C</td><td>74.5°C</td></tr> <tr><td>4</td><td>L2</td><td>53.4°C</td><td>73.3°C</td></tr> <tr><td>5</td><td>D2</td><td>54.1°C</td><td>74.0°C</td></tr> <tr><td>6</td><td>C5</td><td>53.8°C</td><td>73.6°C</td></tr> <tr><td>7</td><td>RTH2</td><td>57.0°C</td><td>76.9°C</td></tr> <tr><td>8</td><td>T1core</td><td>62.5°C</td><td>81.9°C</td></tr> <tr><td>9</td><td>C101</td><td>54.3°C</td><td>73.6°C</td></tr> <tr><td>10</td><td>C102</td><td>57.6°C</td><td>76.5°C</td></tr> <tr><td>11</td><td>BD1</td><td>54.5°C</td><td>74.3°C</td></tr> <tr><td>12</td><td>Q1</td><td>54.6°C</td><td>74.3°C</td></tr> <tr><td>13</td><td>D1</td><td>55.4°C</td><td>75.0°C</td></tr> <tr><td>14</td><td>Q6</td><td>55.4°C</td><td>75.3°C</td></tr> <tr><td>15</td><td>Q5</td><td>55.8°C</td><td>75.7°C</td></tr> <tr><td>16</td><td>Q101</td><td>57.6°C</td><td>76.8°C</td></tr> <tr><td>17</td><td>Q102</td><td>56.9°C</td><td>76.1°C</td></tr> <tr><td>18</td><td>U1</td><td>60.3°C</td><td>79.7°C</td></tr> <tr><td>19</td><td>C13</td><td>63.4°C</td><td>82.0°C</td></tr> <tr><td>20</td><td>ZNR1</td><td>49.2°C</td><td>69.5°C</td></tr> <tr><td>21</td><td>C11</td><td>53.6°C</td><td>73.5°C</td></tr> <tr><td>22</td><td>R5</td><td>54.2°C</td><td>74.0°C</td></tr> <tr><td>23</td><td>C81</td><td>56.2°C</td><td>75.4°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta= 23.1 °C	HIGH AMBIENT Ta= 44.7 °C	1	LF1	44.8°C	65.4°C	2	LF2	51.2°C	71.4°C	3	L1	54.5°C	74.5°C	4	L2	53.4°C	73.3°C	5	D2	54.1°C	74.0°C	6	C5	53.8°C	73.6°C	7	RTH2	57.0°C	76.9°C	8	T1core	62.5°C	81.9°C	9	C101	54.3°C	73.6°C	10	C102	57.6°C	76.5°C	11	BD1	54.5°C	74.3°C	12	Q1	54.6°C	74.3°C	13	D1	55.4°C	75.0°C	14	Q6	55.4°C	75.3°C	15	Q5	55.8°C	75.7°C	16	Q101	57.6°C	76.8°C	17	Q102	56.9°C	76.1°C	18	U1	60.3°C	79.7°C	19	C13	63.4°C	82.0°C	20	ZNR1	49.2°C	69.5°C	21	C11	53.6°C	73.5°C	22	R5	54.2°C	74.0°C	23	C81	56.2°C	75.4°C		
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR ( MIN )	I/P : 230 VAC O/P : 138 % LOAD Ta : 25°C	TEST : OK																																																																																																
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 264VAC/100VAC O/P : 100 % LOAD Ta= -35 °C	TEST : OK																																																																																																
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= 40.1 °C HUMIDITY= 95 %R.H	TEST : OK																																																																																																
5	TEMPERATURE COEFFICIENT	± 0.03 %/°C (0~50°C)	I/P : 230 VAC O/P : FULL LOAD	± 0.008 %/°C (0~50°C)																																																																																																





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
7	THERMAL SHOCK TEST	1. Thermal shock Temperature : -30°C~ +70°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
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
9	CAPACITOR LIFE CYCLE	SUPPOSE C 102 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) 186479HRS (2) 79510HRS (3) 113972HRS (4) 148355HRS
10	MTBF	MIL-HDBK-217F TOTAL FAILURE RATE : 209.3 KHRS	
11	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure (Expected Life): Above 50,000 hours @ TA 50°C	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	FRANK	GESG	WANGDZ

2007/3/20 A50-S014