



# Test Report: GSM160B12

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160W AC-DC Reliable Green 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

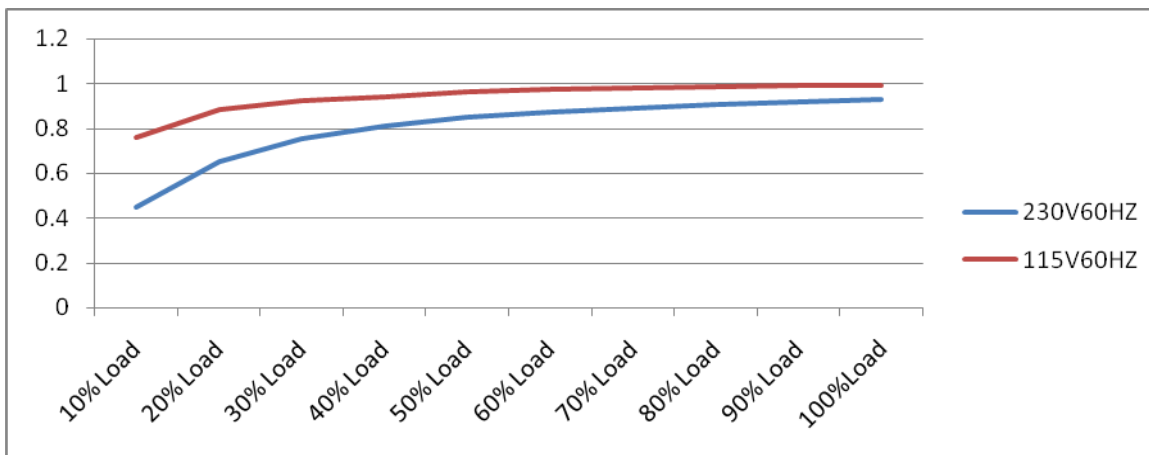
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE(Max) TOLERANCE	V1: -5%~ 5%	I/P: 100VAC /264VAC O/P:FULL/ MIN. LOAD Ta:25°C	V1: -2.43%~ 1.51%
2	LINE REGULATION (Max)	V1: -1%~ 1%	I/P: 100VAC~ 264VAC O/P:FULL LOAD Ta:25°C	V1: 0%~ 0%
3	LOAD REGULATION(Max)	V1: -5%~ 5%	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25°C	V1: -2.43%~ 1.51%
4	OVER/UNDERSHOOT TEST	< ±5%	I/P: 230VAC O/P:FULL LOAD Ta:25°C	< ±5%
5	RIPPLE & NOISE(Max)	V1: 80mVp-p	I/P:230VAC O/P:FULL LOAD Ta:25°C	V1: 21.4mVp-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/ 960ms 115VAC/ 1620ms
<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/ 12.4ms 115VAC/ 14.6ms

		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/ 26.6ms 115VAC/ 27.0ms
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: 1200mVp-p	I/P: 230VAC O/P: (1)FULL /50% LOAD 50%DUTY / 120HZ (2)FULL /50% LOAD 50%DUTY / 1KHZ Ta:25°C 554mVp-p 548mVp-p
FULL /50% LOAD 50%DUTY / 120HZ		FULL /50% LOAD 50%DUTY / 1KHZ	

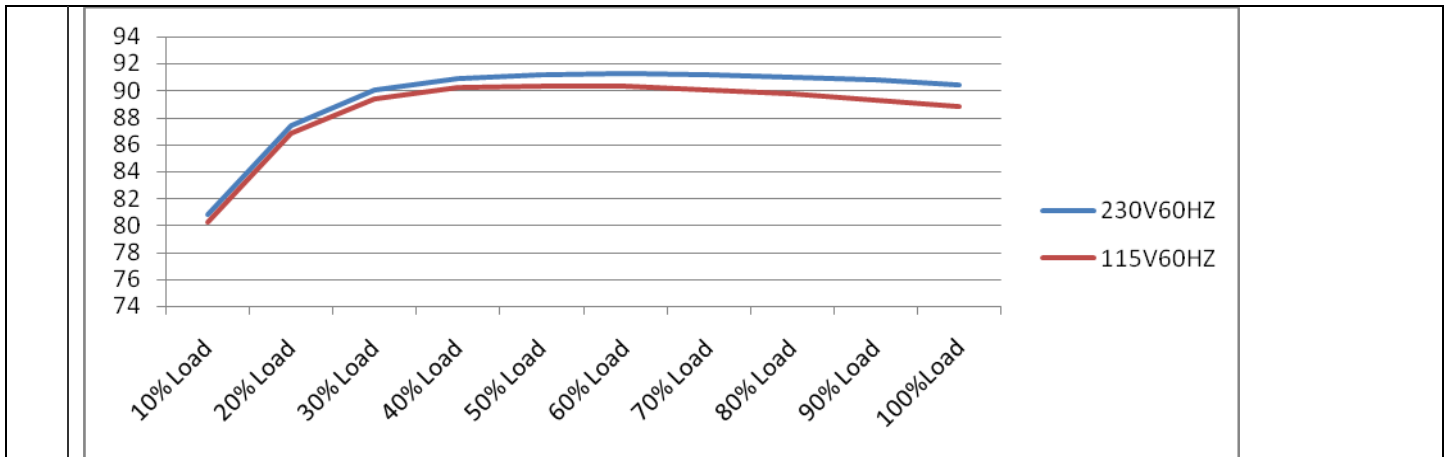
### INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	80VAC~264VAC 113VDC~370VDC	I/P:TESTING O/P:FULL LOAD Ta:25°C	77VAC~264VAC 110VDC~370VDC
			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=0.667A/ 230VAC I=1.302A/ 115VAC
4	LEAKAGE CURRENT	<0.1 mA / 264 VAC	I/P : 264 VAC O/P : Min LOAD Ta : 25°C	L-FG : 0.072 mA N-FG : 0.072 mA
5	NO LOAD CONSUMPTION	< 0.15W	I/P : 115VAC I/P : 230VAC O/P : NO LOAD Ta : 25°C	< 0.0956 W < 0.1175 W
6	POWER FACTOR (Typ.)	0.93/ 230VAC 0.98/115VAC	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	PF=0.95/230VAC PF=0.99/115VAC

P.F vs LOAD



7	EFFICIENCY(Typ.)	90%	I/P:230 VAC O/P:FULL LOAD Ta:25°C	90.21%
EFFICIENCY vs LOAD				



8	INRUSH CURRENT(Typ.)	230V/110A 115V/90A COLD START	I/P : 230 VAC/115V O/P : FULL LOAD Ta : 25°C	I=108A/ 230VAC I=49.2A/ 115VAC
	<p>INPUT=230VAC/50HZ @ FULL LOAD</p> <p>CH2 : AC Input Voltage CH4 : Input current (1V=1A)</p> <p>Ch2 200 V M 20.0ms A Ch4 21.2 V Ch4 Max 108 V</p>		<p>INPUT=115VAC/ 60HZ @ FULL LOAD</p> <p>CH2 : AC Input Voltage CH4 : Input current (1V=1A)</p> <p>Ch2 100 V M 1.00ms A Ch4 26.8 V Ch4 Max 49.2 V</p>	

### 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	130.8%/ 264VAC 130.8%/ 230VAC 130.8%/100VAC PROTECTION TYPE : Hiccup mode,recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	12.6V~16.2V	I/P: 264VAC I/P: 230VAC I/P: 90VAC O/P: MIN LOAD Ta:25°C	13.9V/ 264VAC 13.9V/ 230VAC 13.9V/ 90VAC PROTECTION TYPE : Shot down o/p voltage,re-power on to recover
3	OVER TEMPERATURE PROTECTION	Protection type : Shut down o/p voltage,repower on to recover	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 Ta:25°C	NO DAMAGE PROTECTION TYPE : Hiccup mode,recovers automatically after fault condition is removed

### COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Transistor ( D to S) or (C to E) Peak Voltage	Q5 Rated : 12A/ 500V	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) 450V (2) 456V (3) 438V
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) 526V (2) 534V (3) 510V
3	P.F.C DIODE	D1 Rated : 9A/ 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 Ta:25°C	(1) 438V (2) 438V (3) 438V (4) 442V
4	Diode Peak Voltage	Q101 Rated : 120 A/40 V	I/P:High-Line +3V =267 V AC ON/OFF O/P: (1)Full Load (2)Output Short (3) Full Load Continue Ta:25°C	Q101: VDS: (1)29.9V (2)9.20V (3)30.1V
5	Input Capacitor Voltage	C5 Rated: : 150 $\mu$ / 420V 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)414V (2)414V (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) 24.9V (2) 20.0V (3) 20.0V (4) 27.6V

### SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P: 4KVAC/min	I/P-O/P: 4.4 KVAC/min Ta:25°C	I/P-O/P: 1.905mA NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P:500VDC>100M $\Omega$	I/P-O/P: 600 VDC Ta:25°C	I/P-O/P: 9999M $\Omega$ NO DAMAGE

**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  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  INPUT : 2KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
6	SURGE	EN61000-4-5  L-N : 1KV	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 : GSM160B15-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>45.8°C</td><td>66.6°C</td></tr> <tr><td>2</td><td>LF2</td><td>49.1°C</td><td>69.5°C</td></tr> <tr><td>3</td><td>L1</td><td>55.7°C</td><td>76.1°C</td></tr> <tr><td>4</td><td>L2</td><td>53.1°C</td><td>73.6°C</td></tr> <tr><td>5</td><td>D2</td><td>54.6°C</td><td>75.1°C</td></tr> <tr><td>6</td><td>C5</td><td>53.2°C</td><td>73.6°C</td></tr> <tr><td>7</td><td>RTH2</td><td>56.7°C</td><td>77.2°C</td></tr> <tr><td>8</td><td>T1 core</td><td>61.8°C</td><td>82.3°C</td></tr> <tr><td>9</td><td>C101</td><td>60.6°C</td><td>80.9°C</td></tr> <tr><td>10</td><td>C102</td><td>62.4°C</td><td>82.7°C</td></tr> <tr><td>11</td><td>BD1</td><td>55.6°C</td><td>75.7°C</td></tr> <tr><td>12</td><td>Q1</td><td>54.7°C</td><td>75.1°C</td></tr> <tr><td>13</td><td>D1</td><td>55.6°C</td><td>75.9°C</td></tr> <tr><td>14</td><td>Q6</td><td>55.7°C</td><td>76.2°C</td></tr> <tr><td>15</td><td>Q5</td><td>56.3°C</td><td>76.8°C</td></tr> <tr><td>16</td><td>Q101</td><td>60.5°C</td><td>81.4°C</td></tr> <tr><td>17</td><td>Q102</td><td>60.4°C</td><td>81.4°C</td></tr> <tr><td>18</td><td>T1Coil</td><td>57.3°C</td><td>77.3°C</td></tr> <tr><td>19</td><td>C13</td><td>61.6°C</td><td>81.4°C</td></tr> <tr><td>20</td><td>ZNR1</td><td>49.6°C</td><td>70.4°C</td></tr> <tr><td>21</td><td>C11</td><td>54.5°C</td><td>75.1°C</td></tr> <tr><td>22</td><td>R5</td><td>54.8°C</td><td>75.3°C</td></tr> <tr><td>23</td><td>C81</td><td>57.2°C</td><td>77.5°C</td></tr> <tr><td>24</td><td>U101</td><td>63.9°C</td><td>84.5°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta= 23.1 °C	HIGH AMBIENT Ta= 44.7 °C	1	LF1	45.8°C	66.6°C	2	LF2	49.1°C	69.5°C	3	L1	55.7°C	76.1°C	4	L2	53.1°C	73.6°C	5	D2	54.6°C	75.1°C	6	C5	53.2°C	73.6°C	7	RTH2	56.7°C	77.2°C	8	T1 core	61.8°C	82.3°C	9	C101	60.6°C	80.9°C	10	C102	62.4°C	82.7°C	11	BD1	55.6°C	75.7°C	12	Q1	54.7°C	75.1°C	13	D1	55.6°C	75.9°C	14	Q6	55.7°C	76.2°C	15	Q5	56.3°C	76.8°C	16	Q101	60.5°C	81.4°C	17	Q102	60.4°C	81.4°C	18	T1Coil	57.3°C	77.3°C	19	C13	61.6°C	81.4°C	20	ZNR1	49.6°C	70.4°C	21	C11	54.5°C	75.1°C	22	R5	54.8°C	75.3°C	23	C81	57.2°C	77.5°C	24	U101	63.9°C	84.5°C		
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR ( MIN )	I/P : 230 VAC O/P : 130 % 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	± 0.00367 %/°C(0~50°C)																																																																																																				





6	STORAGE TEMPERATURE TEST	<ol style="list-style-type: none"> <li>1. Thermal shock Temperature : -40°C~ +85°C</li> <li>2. Temperature change rate : 25°C / MIN</li> <li>3. Dwell time low and high temperature : 30 MIN/EACH</li> <li>4. Total test cycle : 5 CYCLE</li> <li>5. Input/Output condition : STATIC</li> </ol>	OK
7	THERMAL SHOCK TEST	<ol style="list-style-type: none"> <li>1. Thermal shock Temperature : -30°C~ +70°C</li> <li>2. Temperature change rate : 25°C / MIN</li> <li>3. Dwell time low and high temperature : 30 MIN/EACH</li> <li>4. Total test cycle : 10 CYCLE</li> <li>5. Input/Output condition : 230VAC/Full Load AC ON/OFF TEST turn on 58sec ; turn off 2sec</li> </ol>	OK
8	VIBRATION TEST	<p>1 Carton &amp; 1 Set</p> <ol style="list-style-type: none"> <li>(1) Waveform : Sine Wave</li> <li>(2) Frequency : 10~500Hz</li> <li>(3) Sweep Time : 12min/sweep cycle</li> <li>(4) Acceleration : 2G</li> <li>(5) Test Time : 60min in each axis (X.Y.Z)</li> <li>(6) Ta : 25°C</li> </ol>	TEST : OK
9	CAPACITOR LIFE CYCLE	<p>SUPPOSE C 102 IS THE MOST CRITICAL COMPONENT</p> <ol style="list-style-type: none"> <li>(1) I/P : 230VAC O/P : FULL LOAD Ta= 25 °C LIFE TIME</li> <li>(2) I/P : 230VAC O/P : FULL LOAD Ta= 40 °C LIFE TIME</li> <li>(3) I/P : 230VAC O/P : 75% LOAD Ta= 40 °C LIFE TIME</li> <li>(4) I/P : 230VAC O/P : 50% LOAD Ta= 40 °C LIFE TIME</li> </ol>	<ol style="list-style-type: none"> <li>(1) 204288HRS</li> <li>(2) 79040HRS</li> <li>(3) 164768HRS</li> <li>(4) 258521HRS</li> </ol>
10	MTBF	2191.3K hrs min. Telcordia SR-332 (Bellcore) ; 239.1K hrs min. MIL-HDBK-217F (25°C)	
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