



# TEST REPORT: GSM220A12

## 220W 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

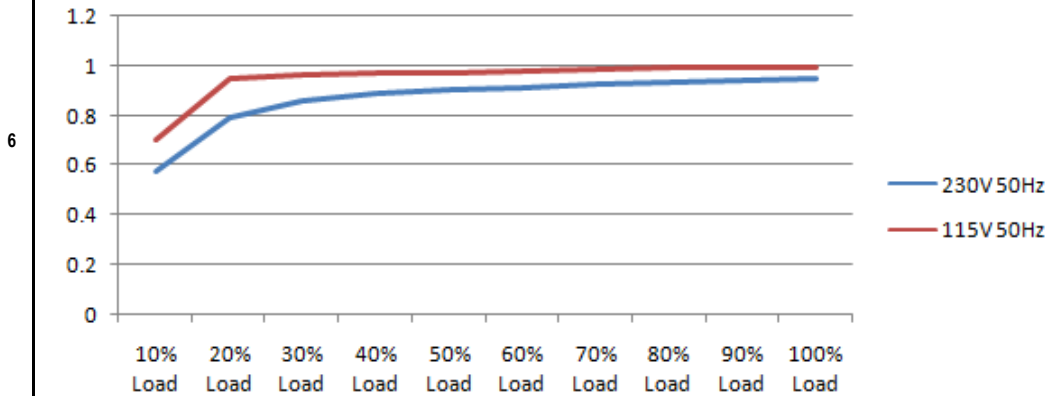
DESIGN VERIFY TEST  
OUTPUT FUNCTION

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE TOLERANCE (Max)	V1 : 5.0% ~ -5.0%	I/P : 100VAC / 264VAC O/P: FULL / MINLOAD TA: 25°C	V1: 1.33% ~ -2.42%
2	LINE REGULATION (MAX.)	V1 : 1.0% ~ -1.0%	I/P : 100VAC / 264VAC O/P: FULL LOAD TA: 25°C	V1: 0.00% ~ 0.00%
3	LOAD REGULATION (MAX.)	V1 : 5.0% ~ -5.0%	I/P : 230VAC O/P: MIN LOAD ~ FULL LOAD TA: 25°C	V1: 2.18% ~ -1.60%
4	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230VAC O/P: FULL LOAD TA: 25°C	TEST< 1.0 %
5	RIPPLE & NOISE(Max)	V1 : 80 mVp-p	I/P : 230VAC O/P: FULL LOAD TA: 25°C	V1 : 15.8 mVp-p
6	SET UP TIME (MAX.)	230VAC : 2000ms 115VAC : 2000ms	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA: 25°C	230VAC : 744ms 115VAC : 1208ms
6	INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage		INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage	
				<p>Δ: 158 V @: 8.00 V Δ: 744ms @: -728ms</p>

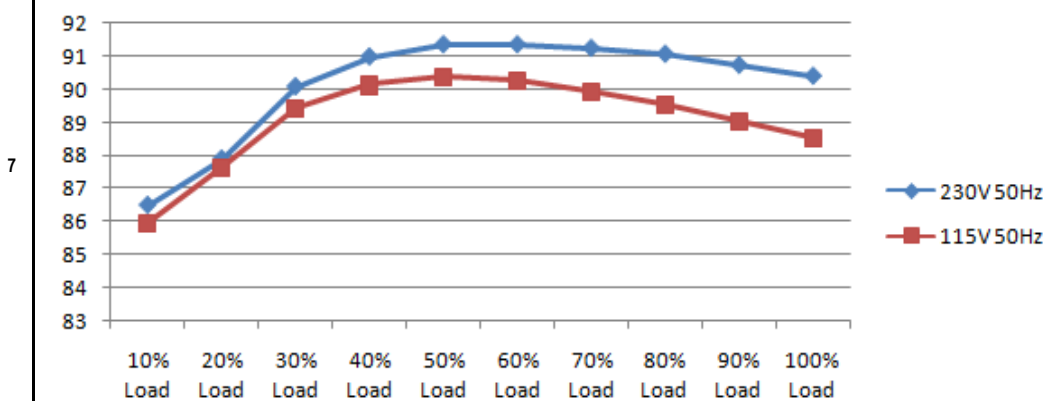
7	RISE TIME (MAX.)	230VAC : 50ms 115VAC : 50ms	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25°C	230VAC : 13.6ms 115VAC : 14.8ms
	INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage		INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage	
8	HOLD UP TIME (TYP.)	230VAC : 20ms 115VAC : 20ms	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25°C	230VAC : 30.8ms 115VAC : 28.8ms
	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 : 1200 mVp-p	I/P : 230VAC O/P: (1)Full/Min load 50%duty/120HZ (2)Full/Min load 50%duty/1KHZ TA : 25°C	V1: (1). 658mv (2). 640mv unit:mVp-p
	FULL /Min LOAD 50%DUTY / 120HZ		FULL /Min LOAD 50%DUTY / 1KHZ	

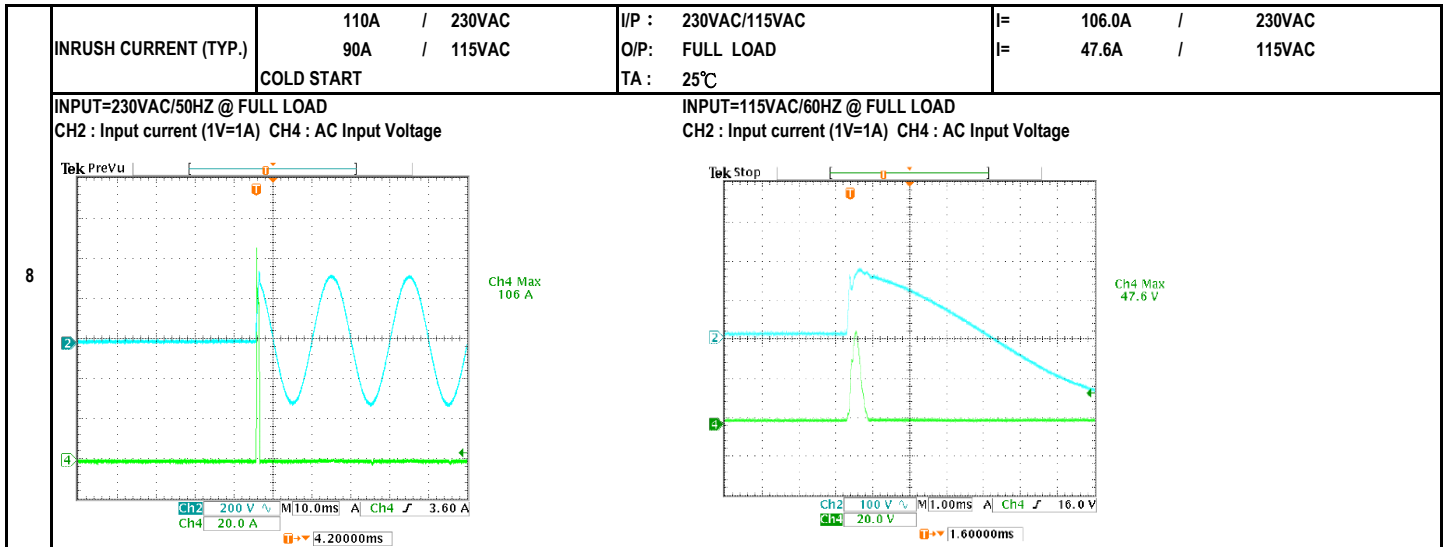
INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	80VAC ~ 264VAC	I/P : TESTING O/P : FULL LOAD Ta : 25°C	58.0VAC ~ 264VAC
			I/P : LOW-LINE = 97VAC HIGH-LINE = 300VAC O/P : FULL/MIN LOAD ON:30 Sec ; OFF:30 Sec 10MIN (POWER ON/OFF NO DAMAGE)	TEST : OK
2	INPUT FREQUENCY RANGE	47HZ ~ 63HZ NO DAMAGE	I/P : 100VAC ~ 264VAC O/P : FULL-MIN LOAD Ta : 25°C	TEST : OK
3	INPUT CURRENT (TYP.)	2.0A / 230VAC 4.0A / 115VAC	I/P : 230VAC I/P : 115VAC O/P : FULL LOAD TA : 25°C	I= 0.8774A / 230VAC I= 1.7226A / 115VAC
4	LEAKAGE CURRENT	<115uA for earth leakage	I/P : 264VAC O/P : MIN LOAD TA : 25°C	L-FG: 63 uA
		<100uA for touch leakage		N-FG: 65 uA L-V: 71 uA N-V: 73 uA
5	NO LOAD POWER CONSUMPTION	< 0.15W	I/P : 230VAC O/P : MIN LOAD TA : 25°C	< 0.0892 W
	POWER FACTOR (TYP.)	0.91 / 230VAC 0.98 / 115VAC	I/P : 230VAC I/P : 115VAC O/P : FULL LOAD TA : 25°C	PF= 0.9523 / 230VAC PF= 0.9939 / 115VAC



EFFICIENCY (TYP.)	90.0%	I/P : 230VAC O/P : FULL LOAD TA : 25°C	90.628 %
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**PROTECTION FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	105% ~ 135%	I/P: 264VAC I/P: 230VAC I/P: 100VAC O/P: TESTING TA : 25°C	122.5% 264VAC 122.5% 230VAC 122.5% 100VAC Hiccup Mode
2	OVER VOLTAGE PROTECTION	12.60V ~ 16.20V	I/P: 264VAC I/P: 230VAC I/P: 80VAC O/P: MIN LOAD TA : 25°C	14.30V 264VAC 14.30V 230VAC 14.30V 80VAC Shut down Re- power ON
3	OVER TEMPERATURE PROTECTION	Shut down o/p voltage, recovers automatically after temperature goes down	I/P: 264VAC I/P: 80VAC O/P: FULL LOAD	O.T.P. Active Shut down o/p voltage, recovers automatically after temperature goes down
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 264VAC I/P: 80VAC O/P: FULL LOAD Ta: 25°C	NO DAMAGE Hiccup Mode

**COMPONENT STRESS TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Power Transistor	Q5 Rated : 600V 18.0A	I/P : 267VAC VDS : O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	Q5 Q6 VIN: 267VAC 267VAC (1). 500.00V 468.00V (2). 500.00V 522.00V (3). 442.00V 442.00V
		Q6 Rated : 600V 18.0A		
2	O/P Diode (MOSFET)	Q101 Rated : 40V 120A	I/P : 267VAC VDS : O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue (4)Burst mode Ta : 25°C	Q101 Q102 VDS : VDS : (1). 29.30V 28.60V (2). 14.10V 12.30V (3). 29.20V 28.00V (4). 29.90V 29.80V
		Q102 Rated : 40V 120A		
		C5 Rated : 220uf 450V		I/P : 267VAC O/P : (1)Full Load Turn on /Off (2)Min load Turn on /Off (3)Full Load /Min load Change Ta : 25°C



4	Control IC	U1	Rated : 38V (max) -0.4V (min)	I/P : 267VAC O/P : (1)Full Load (2)Output Short (3)O.L.P (4)O.V.P (5)Low Line No Load Vo(min) Ta : 25°C	U1	U101	(1). 26.00V 12.20V (2). 20.00V 2.86V (3). 23.40V 10.60V (4). 28.40V 13.20V (5). 25.10V 12.00V
		U101	Rated : 26V (max) -0.3V (min)				
5	PFC Power Transistor	Q1	Rated : 600V 15.8A	I/P : 267VAC VDS : O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	Q1	Q2	VIN: 267VAC 267VAC (1). 514.00V 524.00V (2). 516.00V 514.00V (3). 482.00V 478.00V
		Q2	Rated : 600V 15.8A	Ta : 25°C			
6	PFC Diode	D2	Rated : 600V 15.0A	I/P : 267VAC O/P : (1)Full Load Turn on (2) Output Short (3)Dynamic Load Full/Min Load 90%Duty/5KHz (4)Dynamic Load Full/Min Load 50%Duty/120Hz Ta : 25°C	D2		(1). 450.00V (2). 460.00V (3). 448.00V (4). 446.00V

**SAFETY & E.M.C. TEST**  
**SAFETY TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P : 4.000KVAC /min	I/P-O/P: 4.400KVAC /min	I/P-O/P: 1.53mA
		I/P-FG : 2.000KVAC /min	I/P-FG: 2.400KVAC /min	I/P-FG: 1.03mA
2	ISOLATION RESISTANCE	O/P-FG : 0.500KVAC /min	O/P-FG: 0.600KVAC /min	O/P-FG: 2.05mA
		I/P-O/P : 500VDC>100MΩ	I/P-O/P: 600VDC	I/P-O/P: 9999MΩ
			Ta : 25°C	NO DAMAGE
			Ta : 25°C/70%RH	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 : 230VAC /50HZ O/P : FULL LOAD / 50% LOAD Ta : 25°C	PASS Test by certified Lab
3	RADIATION	EN55011 CLASS B	I/P : 230VAC /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 : 230VAC /50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
5	E.F.T	EN61000-4-4 INPUT: 2KV	I/P : 230VAC /50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
6	SURGE	EN61000-4-5 L-N: 1KV;L/N-PE: 2KV	I/P : 230VAC /50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A



RELIABILITY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	
1	TEMPERATURE RISE TEST	MODEL : GSM220A12			
		1. ROOM AMBIENT BURN-IN : 1.0hrs IP: 230VAC O/P: 100% LOAD TA= 18.0°C			
		2. HIGH AMBIENT BURN-IN : 1.0hrs IP: 230VAC O/P: 100% LOAD TA= 41.7°C			
			NO. Position ROOM AMBIENT 18.0°C HIGH AMBIENT Ta: 41.7°C		
			1 LF1 48.0°C 91.3°C		
			2 LF2 46.7°C 94.1°C		
			3 L2 50.5°C 99.1°C		
			4 BD1 52.0°C 99.0°C		
			5 L1 51.1°C 95.1°C		
			6 Q1 50.9°C 95.7°C		
			7 Q2 52.1°C 95.3°C		
			8 D2 53.2°C 95.7°C		
			9 C5 55.3°C 92.7°C		
			10 TSW1 51.1°C 85.1°C		
			11 C83 58.0°C 93.0°C		
			12 RTH2 54.5°C 88.8°C		
			13 T1 COIL 77.9°C 107.8°C		
			14 C109 67.7°C 96.6°C		
			15 Q102 68.7°C 98.6°C		
			16 Q101 69.5°C 98.6°C		
			17 LF101 82.4°C 110.6°C		
	18 Q5 54.5°C 92.6°C				
	19 Q6 54.4°C 90.5°C				
	20 U1 63.2°C 98.1°C				
	21 D3 50.4°C 92.2°C				
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR ( MIN )	I/P : 230VAC O/P : 116.66% LOAD Ta : 25°C	TEST : OK	
3	LOW TEMPERATURE TURN ON TEST	NO DAMAGE 1 HOUR ( MIN )	I/P : 264VAC / 100VAC O/P : FULL LOAD Ta : -30.0°C	TEST : OK	
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 40°C NO DAMAGE	I/P : 272VAC O/P : FULL LOAD Ta : 40°C HUMIDITY= 95.0% RH	TEST : OK	
5	TEMPERATURE COEFFICIENT	±0.03% /(0°C~50°C)	I/P : 230VAC O/P : FULL LOAD	±0.0109% /(0°C~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		TEST : OK	
7	THERMAL SHOCK TEST	1. Thermal shock Temperature : -35°C ~ +45°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		TEST : OK	
8	VIBRATION TEST	1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10~500Hz (4) Acceleration : 2G (5) Test Time : 60 min in each axis (X.Y.Z) (6) Ta : 25°C		TEST : OK	
9	CAPACITOR LIFE CYCLE	:SUPPOSE C109 IS THE MOST CRITICAL COMPONENT	(1) I/P : 230VAC O/P : FULL LOAD Ta= 25.0°C LIFE TIME (2) I/P : 230VAC O/P : FULL LOAD Ta= 40.0°C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta= 40.0°C LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta= 40.0°C LIFE TIME	(1). 72386.2 HRS (2). 17808.6 HRS (3). 80698.5 HRS (4). 160843.8 HRS	



10	MTBF	2028.6K hrs min. Telcordia SR-332 (Bellcore) ; 210.8K hrs min. MIL-HDBK-217F (25°C)			
11	DMTBF /Accelerated Life test	Demonstration Mean Time Between Failure (Expected Life): Above	30000HRS	@ TA	40°C

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	FRANK	GESG	WANGDZ

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