



TEST REPORT: GSM160A24

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

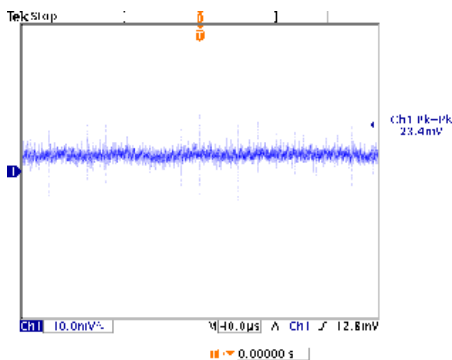
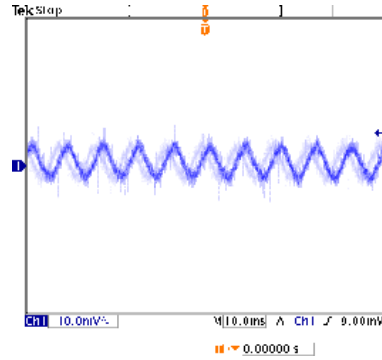
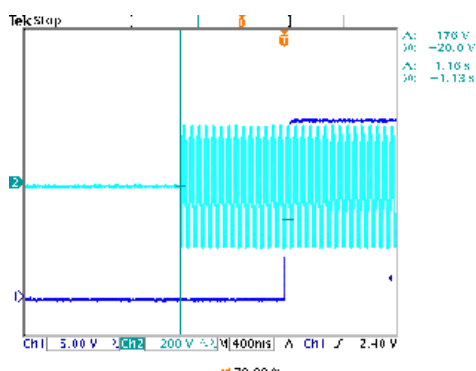
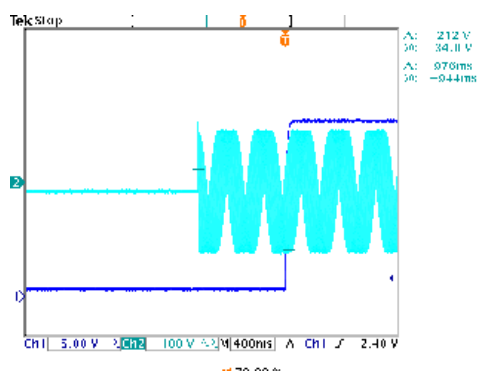
Safety Test

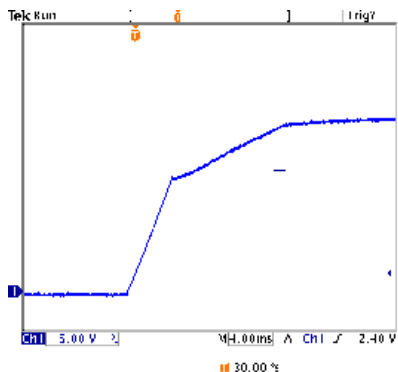
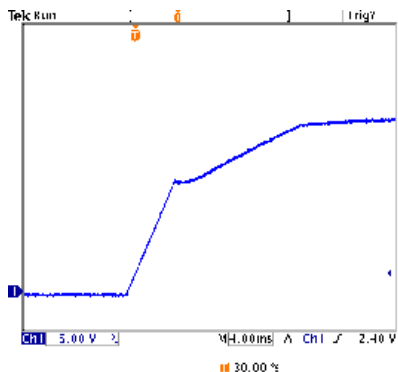
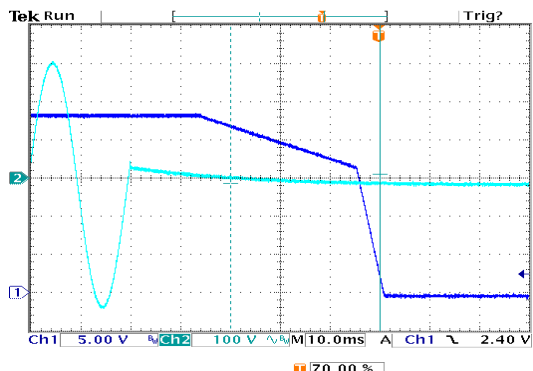
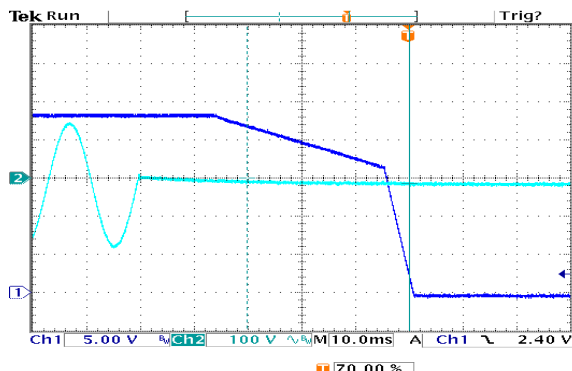
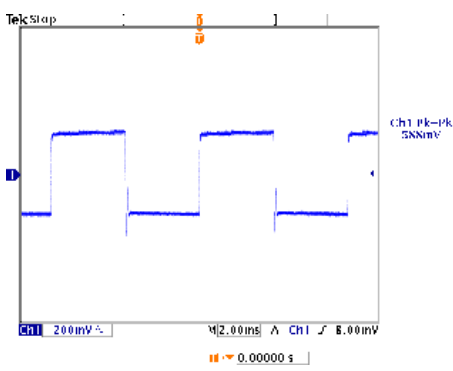
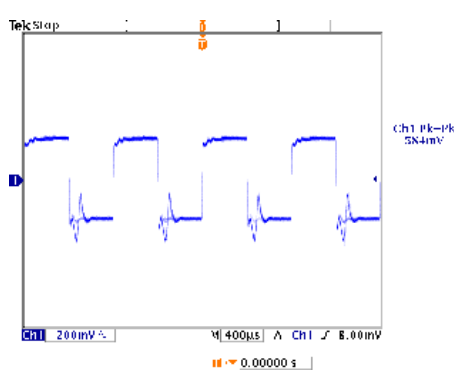
E.M.C. Test

■ RELIABILITY TEST

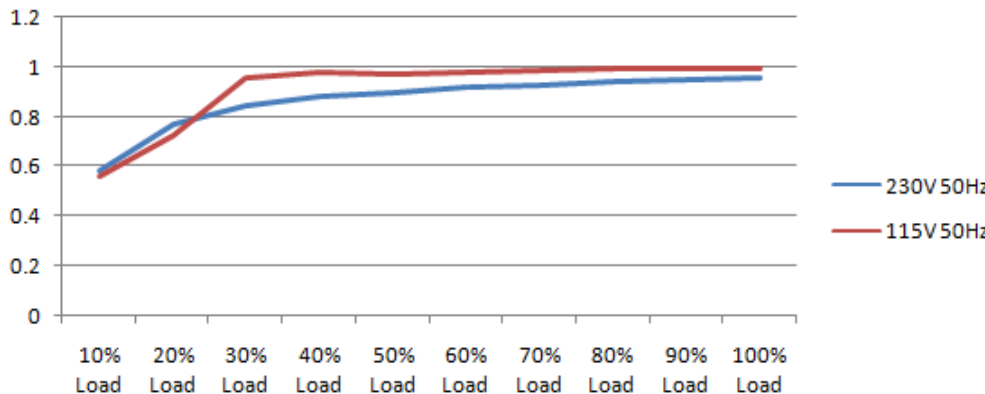
ENVIRONMENT TEST

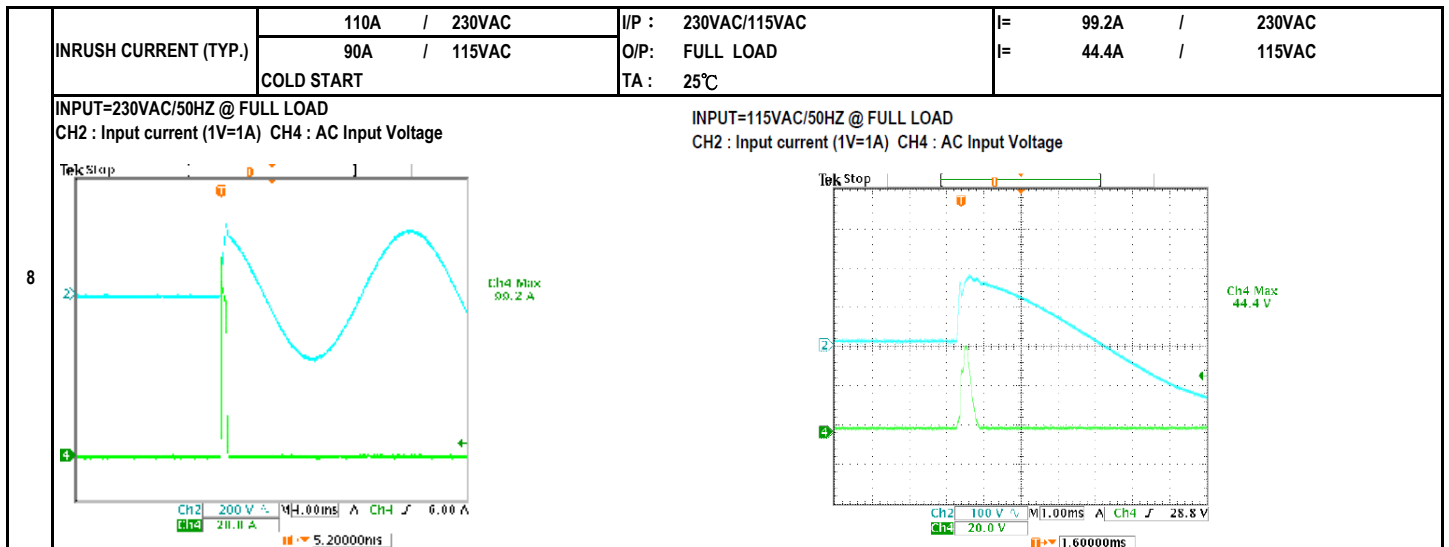
DESIGN VERIFY TEST OUTPUT FUNCTION

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE TOLERANCE (Max)	V1 : 3.0% ~ -3.0%	I/P : 100VAC / 264VAC O/P: FULL / MINLOAD TA= 25°C	V1: -0.33% ~ -2.08%
2	LINE REGULATION (MAX.)	V1 : 1.0% ~ -1.0%	I/P : 100VAC / 264VAC O/P: FULL LOAD TA : 25°C	V1: 0.04% ~ 0.00%
3	LOAD REGULATION (MAX.)	V1 : 3.0% ~ -3.0%	I/P : 230VAC O/P: MIN LOAD ~ FULL LOAD TA : 25°C	V1: 1.40% ~ -0.34%
4	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230VAC O/P: FULL LOAD TA : 25°C	TEST< 1.3 %
5	RIPPLE & NOISE(Max)	V1 : 120 mVp-p	I/P : 230VAC O/P: FULL LOAD TA : 25°C	V1 : 25 mVp-p
		high frequency : 		low frequency : 
6	SET UP TIME (MAX.)	230VAC : 2000ms 115VAC : 2500ms	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25°C	230VAC : 1160ms 115VAC : 976ms
		INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage 		INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage 

7	RISE TIME (MAX.)	230VAC : 50ms 115VAC : 50ms	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25°C	230VAC : 15.5ms 115VAC : 17.4ms
		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 : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25°C	230VAC : 30.0ms 115VAC : 30.2ms
		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 : 2400 mVp-p	I/P : 230VAC O/P: (1) Full/Min load 50% duty/120HZ (2) Full/Min load 50% duty/1KHZ TA : 25°C	(1). 588mv (2). 584mv 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℃	65.0VAC ~ 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℃	TEST : OK
3	INPUT CURRENT (TYP.)	1.00A / 230VAC 1.85A / 115VAC	I/P : 230VAC I/P : 115VAC O/P : FULL LOAD TA : 25℃	I= 0.7680A / 230VAC I= 1.4736A / 115VAC
4	LEAKAGE CURRENT	<175uA for earth leakage	I/P : 264VAC O/P : MIN LOAD TA : 25℃	L-FG: 129 uA N-FG: 121 uA
		<90uA for touch leakage		L-V-: 72 uA N-V-: 70 uA
5	NO LOAD POWER CONSUMPTION	< 0.15W	I/P : 230VAC O/P : MIN LOAD TA : 25℃	< 0.1316 W
6	POWER FACTOR (TYP.)	0.94 / 230VAC 0.98 / 115VAC	I/P : 230VAC I/P : 115VAC O/P : FULL LOAD TA : 25℃	PF= 0.9502 / 230VAC PF= 0.9938 / 115VAC
				
7	EFFICIENCY (TYP.)	93.0%	I/P : 230VAC O/P : FULL LOAD TA : 25℃	93.582 %



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	132% 264VAC 132% 230VAC 132% 100VAC Hiccup Mode
2	OVER VOLTAGE PROTECTION	25.20V ~ 32.40V	I/P: 264VAC I/P: 230VAC I/P: 80VAC O/P: MIN LOAD TA : 25°C	28.50V 264VAC 28.50V 230VAC 28.50V 80VAC Shut down Re- power ON
3	OVER TEMPERATURE PROTECTION	Shut down Re- power ON	I/P: 264VAC I/P: 80VAC O/P: FULL LOAD TA : 25°C	O.T.P. Active Shut down Re- power ON
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 : 500V 12.0A	I/P : 267VAC VDS : O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	VIN: 267VAC VDS: (1). 440.00V (2). 440.00V (3). 400.00V
1	PWM Power Transistor	Q6 Rated : 500V 12.0A	I/P : 267VAC VDS : O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	VIN: 267VAC VDS: (1). 456.00V (2). 454.00V (3). 398.00V
2	O/P Diode (MOSFET)	Q101 Rated : 75V 80A Q102 Rated : 75V 80A	I/P : 267VAC VDS : O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	Q101 Q102 VDS : VDS : (1). 55.00V 60.20V (2). 7.60V 14.80V (3). 52.20V 59.40V

3	Input Capacitor	C5 Rated : 150uf 420V	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	(1). 392.00V (2). 384.00V (3). 390.00V
4	Control IC	U1 Rated : 38V (max) -0.4V (min) U101 Rated : 26V (max) -0.3V (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). 25.70V 13.70V (2). 20.10V 0.58V (3). 20.10V 6.00V (4). 28.60V 19.10V (5). 24.10V 15.00V
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	VIN: 267VAC VDS: (1). 532.00V (2). 536.00V (3). 440.00V
6	PFC Diode	D1 Rated : 600V 9.0A	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	267VAC (1). 422.00V (2). 408.00V (3). 426.00V (4). 426.00V

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-FG : 2.000KVAC /min O/P-FG : 0.500KVAC /min	I/P-O/P: 4.400KVAC /min I/P-FG: 2.400KVAC /min O/P-FG: 0.600KVAC /min Ta : 25°C	I/P-O/P: 1.20mA I/P-FG: 0.83mA O/P-FG: 1.51mA NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P : 500VDC>100MΩ	I/P-O/P: 500VDC Ta : 25°C/70%RH	I/P-O/P: 9999MΩ 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: ; 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 : GSM160A24		
		1. ROOM AMBIENT BURN-IN : 1.0hrs IP: 230VAC O/P: 100% LOAD TA= 22.9°C		
		2. HIGH AMBIENT BURN-IN : 1.0hrs IP: 230VAC O/P: 100% LOAD TA= 40.0°C		
			NO. Position ROOM AMBIENT 22.9°C HIGH AMBIENT Ta: 40.0°C	
			1 LF1 52.0°C 69.6°C	
			2 LF2 53.6°C 71.2°C	
			3 L2 54.1°C 71.8°C	
			4 L1 56.9°C 75.0°C	
			5 C5 56.4°C 74.1°C	
			6 BD1 56.9°C 74.4°C	
			7 Q1 56.3°C 73.6°C	
			8 D1 56.4°C 74.0°C	
			9 Q6 57.9°C 75.5°C	
			10 Q5 57.7°C 75.0°C	
			11 RTH2 59.1°C 76.9°C	
			12 T1 62.2°C 79.2°C	
			13 C81 59.1°C 76.3°C	
			14 Q101 61.3°C 78.6°C	
			15 Q102 60.4°C 77.9°C	
			16 C101 59.2°C 76.7°C	
			17 C102 60.3°C 77.6°C	
			18 LF101 57.5°C 74.8°C	
			19 C110 47.9°C 65.3°C	
			20 U1 60.9°C 78.4°C	
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230VAC O/P : 127.43% 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	±0.0050% /(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 C101 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). 216933.2 HRS (2). 74583.9 HRS (3). 140146.4 HRS (4). 230884.9 HRS



10	MTBF	Conducted by Parts Stress Analysis Prediction 239.4K 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

2007/3/20 A50-S014