



TEST REPORT: GSM220A24-R7B

220W AC-DC High Reliability Medical Adaptor

■ DESIGN VERIFY TEST

Output Function Test
Input Function Test
Protection Function Test
Component Stress Test

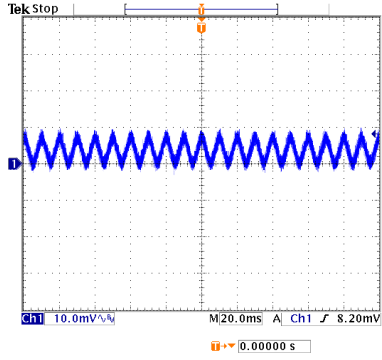
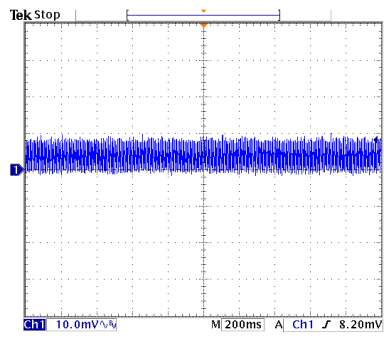
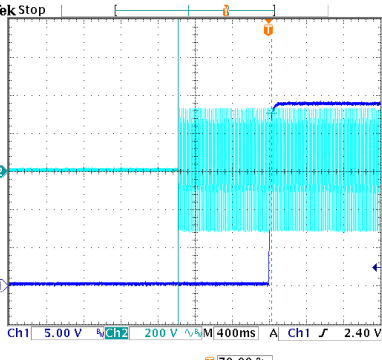
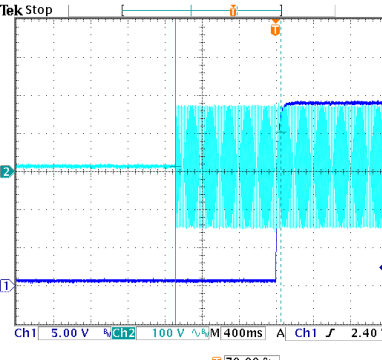
■ SAFETY & E.M.C. TEST

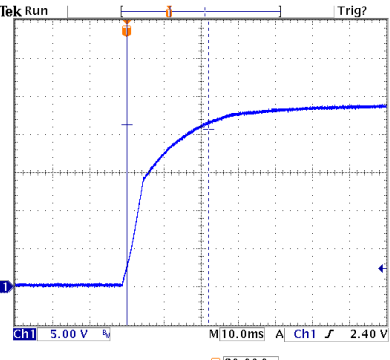
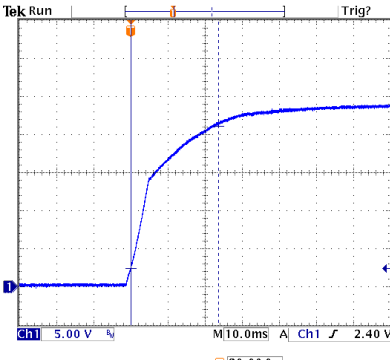
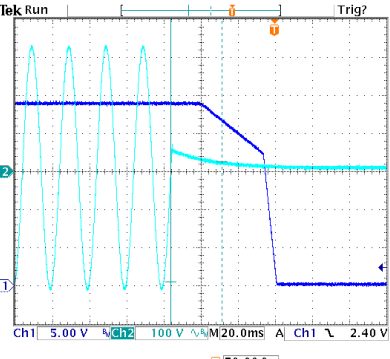
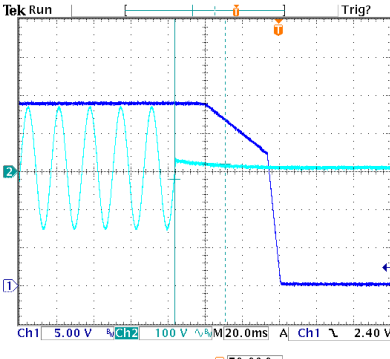
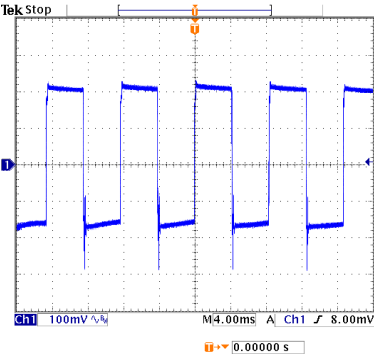
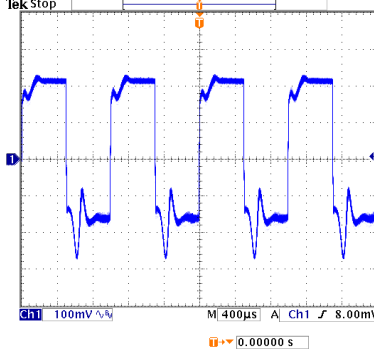
Safety Test
E.M.C. Test

■ RELIABILITY TEST

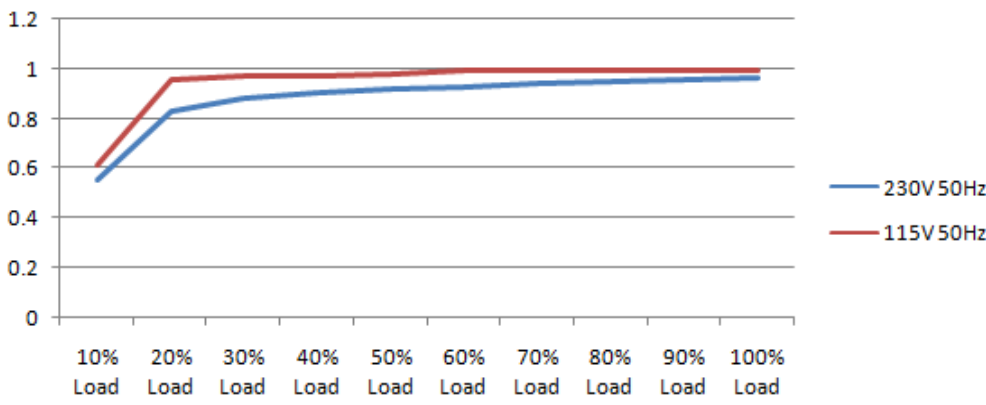
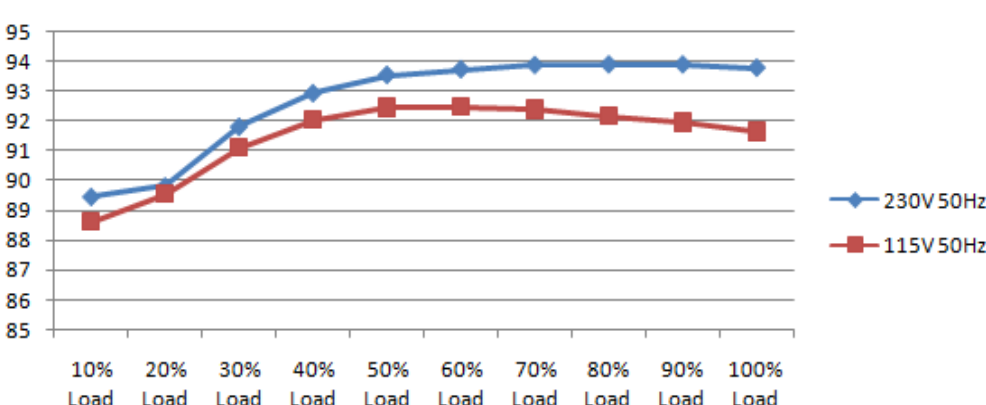
ENVIRONMENT TEST

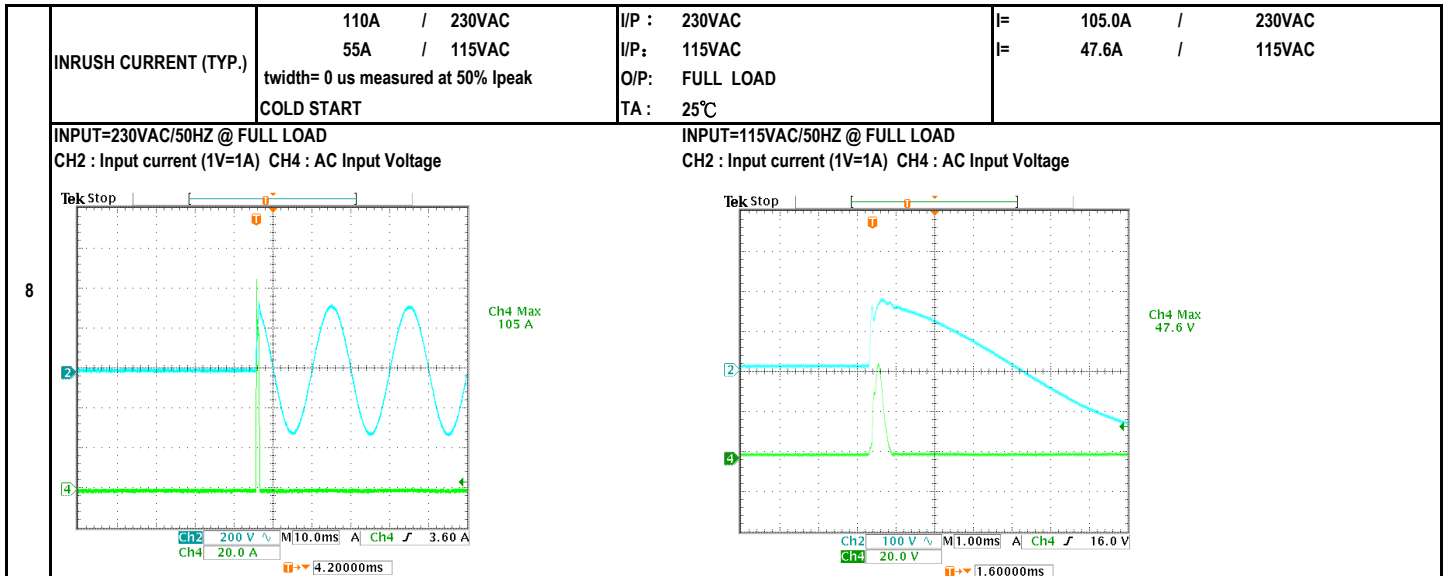
DESIGN VERIFY TEST OUTPUT FUNCTION

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE RANGE	CH1: 23.28V ~ 24.72V	I/P : 230VAC O/P: MIN LOAD TA : 25°C	CH1: 24.18V
2	OUTPUT VOLTAGE TOLERANCE (Max)	V1 : 3.0% ~ -3.0%	I/P : 95VAC / 264VAC O/P: FULL / MINLOAD TA= 25°C	V1: 0.79% ~ -0.33%
3	LINE REGULATION (MAX.)	V1 : 1.0% ~ -1.0%	I/P : 95VAC / 264VAC O/P: FULL LOAD TA : 25°C	V1: 0.00% ~ 0.00%
4	LOAD REGULATION (MAX.)	V1 : 3.0% ~ -3.0%	I/P : 230VAC O/P: MIN LOAD ~ FULL LOAD TA : 25°C	V1: 0.71% ~ -0.42%
5	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230VAC O/P: FULL LOAD TA : 25°C	TEST< 1.3 %
6	RIPPLE & NOISE(Max)	V1 : 120 mVp-p	I/P : 230VAC O/P: FULL LOAD TA : 25°C	V1 : 11.6 mVp-p
		high frequency :		low frequency :
				
7	SET UP TIME (MAX.)	230VAC : 2000ms 115VAC : 2000ms	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25°C	230VAC : 1008ms 115VAC : 1136ms
		INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage		INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage
				

8	RISE TIME (MAX.)	230VAC : 50ms 115VAC : 50ms	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25°C	230VAC : 22.0ms 115VAC : 23.6ms
	<div> <div> INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage </div>  </div> <div> <div> INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage </div>  </div>			
9	HOLD UP TIME (TYP.)	230VAC : 20ms 115VAC : 20ms	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25°C	230VAC : 27.6ms 115VAC : 27.2ms
	<div> <div> INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage </div>  </div> <div> <div> INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage </div>  </div>			
10	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	V1: (1). 514mv (2). 500mv unit:mVp-p
	<div> <div> FULL /Min LOAD 50%DUTY / 120HZ </div>  </div> <div> <div> FULL /Min LOAD 50%DUTY / 1KHZ </div>  </div>			

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	66.0VAC ~ 264VAC
			I/P : LOW-LINE = 92VAC 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 : 95VAC ~ 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= 1.0506A / 230VAC I= 2.0580A / 115VAC
4	LEAKAGE CURRENT	< 0.10mA for earth leakage current	I/P : 264VAC O/P : MIN LOAD TA : 25°C	L-FG: 0.065 mA N-FG: 0.063 mA
		< 0.10mA for touch leakage current	I/P : 264VAC O/P : MIN LOAD TA : 25°C	L-V-: 0.074 mA N-V-: 0.075 mA
5	NO LOAD POWER CONSUMPTION	< 0.15W	I/P : 230VAC O/P : MIN LOAD TA : 25°C	< 0.1066 W
6	POWER FACTOR (TYP.)	0.91 / 230VAC 0.98 / 115VAC	I/P : 230VAC I/P : 115VAC O/P : FULL LOAD TA : 25°C	PF= 0.9655 / 230VAC PF= 0.9947 / 115VAC
				
7	EFFICIENCY (TYP.)	93.5%	I/P : 230VAC O/P : FULL LOAD TA : 25°C	93.609 %
				



PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	105% ~ 135%	I/P: 264VAC I/P: 230VAC I/P: 95VAC O/P: TESTING TA : 25°C	110% 264VAC 109% 230VAC 110% 95VAC 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	28.90V 264VAC 28.90V 230VAC 28.90V 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). 528.00V 528.00V (2). 512.00V 532.00V (3). 452.00V 456.00V
		Q6 Rated : 600V 18.0A		
2	O/P Diode (MOSFET)	Q101 Rated : 75V 80A	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). 59.40V 57.20V (2). 21.20V 14.00V (3). 59.00V 57.20V (4). 56.40V 57.60V
		Q102 Rated : 75V 80A		
3	Input Capacitor	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	C5 (1). 432.00V (2). 429.00V (3). 422.00V

4	Control IC	U1	Rated :	38V	(max)	I/P :	267VAC	U1	U101
				-0.4V	(min)	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	(1).	24.70V 13.80V
5	PFC Power Transistor	U101	Rated :	26V	(max)			(2).	20.00V 0.83V
				-0.3V	(min)			(3).	23.00V 12.90V
6	PFC Diode	Q1	Rated :	600V	15.8A	I/P :	267VAC	(4).	29.50V 19.50V
						VDS :		(5).	24.50V 15.30V
7	PFC Diode	Q2	Rated :	600V	15.8A	O/P :	(1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	Q1	Q2
								VIN:	267VAC 267VAC
8	PFC Diode	D2	Rated :	600V	15.0A	I/P :	267VAC	(1).	520.00V 520.00V
						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	(2).	516.00V 520.00V
9	PFC Diode							(3).	492.00V 498.00V
								(4).	458.00V 456.00V

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: 1.52mA
		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
			Ta : 25°C	NO DAMAGE
3	ISOLATION RESISTANCE	I/P-O/P : 500VDC>100MΩ	I/P-O/P: 500VDC	I/P-O/P: 9999MΩ
			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 MEDICAL AIR: 8KV / Contact: 6KV	I/P : 230VAC /50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
5	E.F.T	EN61000-4-4 MEDICAL INPUT: 2KV	I/P : 230VAC /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 : 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 : GSM220A24-R7B		
		1. ROOM AMBIENT BURN-IN : 1.0hrs IP: 230VAC O/P: 100% LOAD TA= 21.2°C		
		2. HIGH AMBIENT BURN-IN : 1.0hrs IP: 230VAC O/P: 100% LOAD TA= 39.6°C		
			NO. Position ROOM AMBIENT 21.2°C HIGH AMBIENT Ta: 39.6°C	
			1 LF1 55.3°C 72.2°C	
			2 LF2 56.5°C 73.5°C	
			3 L2 59.5°C 76.2°C	
			4 BD1 60.0°C 76.7°C	
			5 L1 63.4°C 79.9°C	
			6 Q1 58.7°C 75.5°C	
			7 Q2 59.7°C 76.4°C	
			8 D2 61.2°C 77.9°C	
			9 C5 63.1°C 79.3°C	
			10 TSW1 56.6°C 73.2°C	
			11 C83 64.1°C 80.5°C	
			12 RTH2 60.4°C 77.2°C	
			13 T1 COIL 75.0°C 91.3°C	
			14 C109 65.7°C 82.6°C	
			15 Q102 68.9°C 86.1°C	
			16 Q101 68.3°C 85.4°C	
			17 Q5 61.7°C 78.7°C	
			18 Q6 61.6°C 78.7°C	
			19 U1 68.1°C 84.6°C	
			20 D3 59.1°C 75.8°C	
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230VAC O/P : 114.13% LOAD Ta : 25°C	TEST : OK
3	LOW TEMPERATURE TURN ON TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 264VAC / 95VAC 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	±0.0069% /(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). 146140.8 HRS (2). 57283.2 HRS (3). 145530 HRS (4). 215745 HRS	



10	MTBF	MIL-HDBK-217F
		TOTAL FAILURE RATE : 208.66 KHRS
11	DMTBF /Accelerated Life test	Demonstration Mean Time Between Failure (Expected Life): Above 30000HRS @ TA 40℃

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	FRANK	GESG	WANGDZ

2007/3/20 A50-S014