



# TEST REPORT: GSM220A48-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

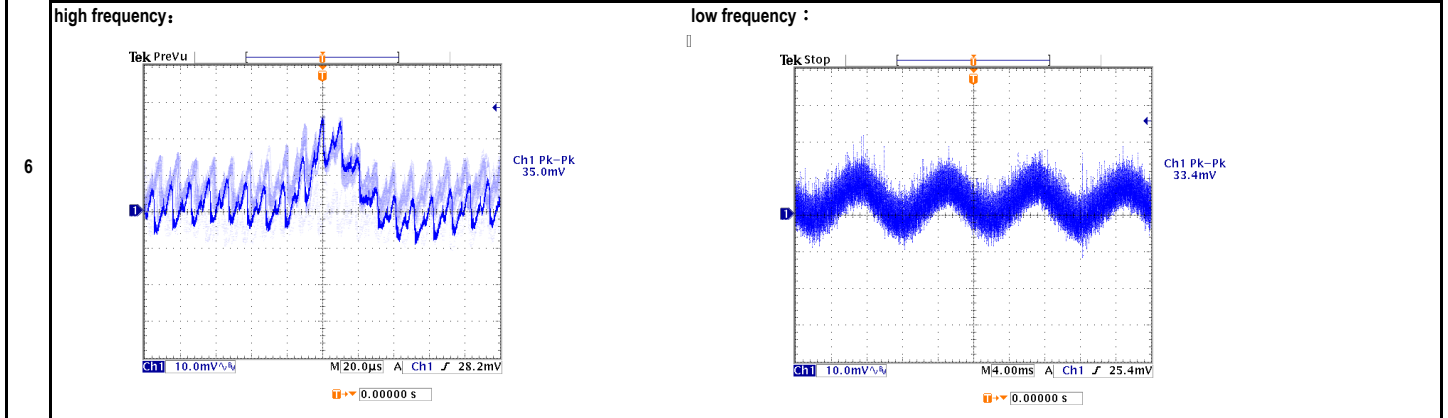
- Safety Test
- E.M.C. Test

### ■ RELIABILITY TEST

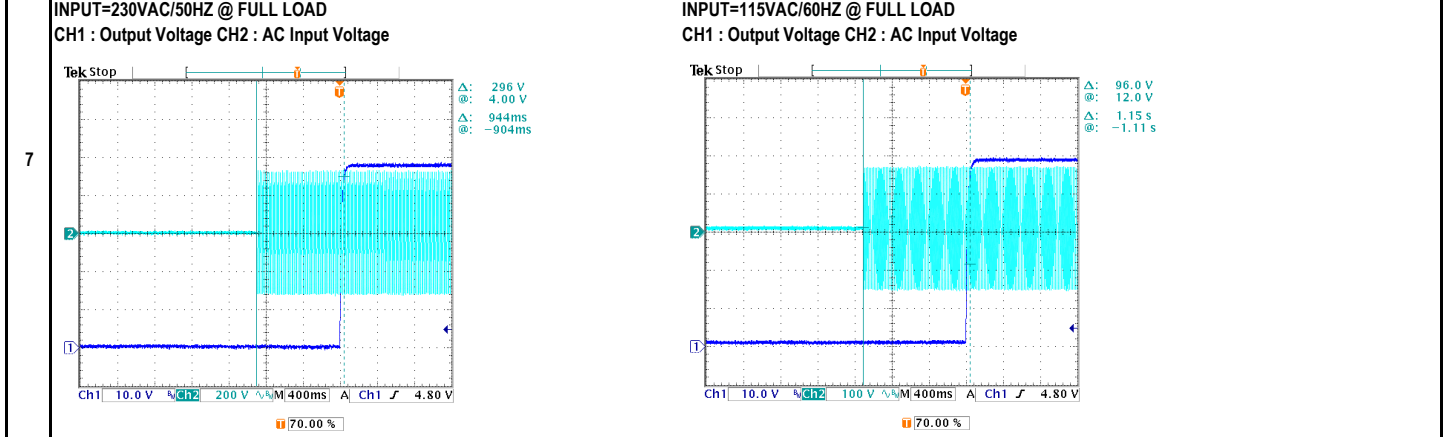
- ENVIRONMENT TEST

DESIGN VERIFY TEST  
OUTPUT FUNCTION

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE RANGE	CH1: 47.04V ~ 48.96V	I/P : 230VAC O/P: MIN LOAD TA : 25°C	CH1: 48.21V
2	OUTPUT VOLTAGE TOLERANCE (Max)	V1 : 2.0% ~ -2.0%	I/P : 95VAC / 264VAC O/P: FULL / MINLOAD TA= 25°C	V1: 0.46% ~ 0.15%
3	LINE REGULATION (MAX.)	V1 : 1.0% ~ -1.0%	I/P : 95VAC / 264VAC O/P: FULL LOAD TA : 25°C	V1: 0.02% ~ 0.00%
4	LOAD REGULATION (MAX.)	V1 : 2.0% ~ -2.0%	I/P : 230VAC O/P: MIN LOAD ~ FULL LOAD TA : 25°C	V1: 0.15% ~ -0.15%
5	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230VAC O/P: FULL LOAD TA : 25°C	TEST< 2.1 %
	RIPPLE & NOISE(Max)	V1 : 150 mVp-p	I/P : 230VAC O/P: FULL LOAD TA : 25°C	V1 : 35 mVp-p



SET UP TIME (MAX.)	230VAC : 2000ms 115VAC : 2000ms	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25°C	230VAC : 944ms 115VAC : 1152ms
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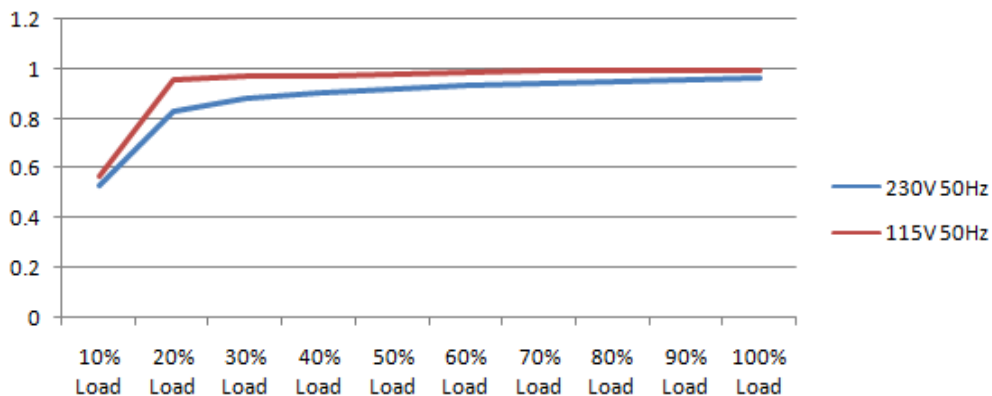




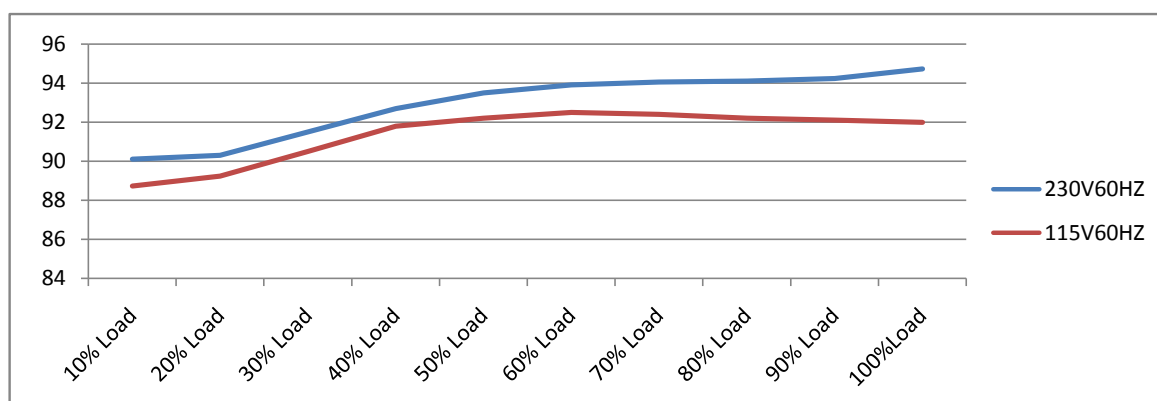
8	RISE TIME (MAX.)	230VAC : 50ms 115VAC : 50ms	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25°C	230VAC : 37.4ms 115VAC : 38.6ms
	INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage		INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage	
9	HOLD UP TIME (TYP.)	230VAC : 20ms 115VAC : 20ms	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25°C	230VAC : 25.6ms 115VAC : 25.2ms
	INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage		INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage	
10	DYNAMIC LOAD	V1 : 4800 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). 478mv (2). 456mv unit:mVp-p
	FULL /Min LOAD 50%DUTY / 120HZ		FULL /Min LOAD 50%DUTY / 1KHZ	

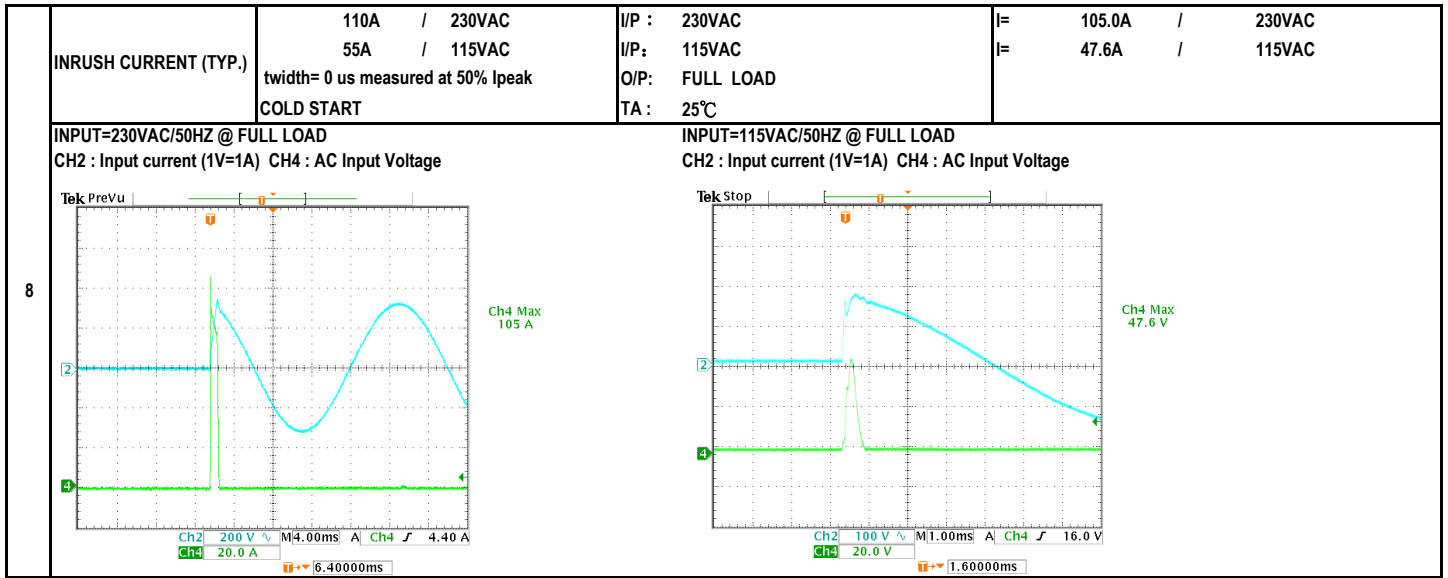
INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	80VAC ~ 264VAC	I/P : TESTING O/P : FULL LOAD Ta : 25°C	65.0VAC ~ 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= 1.0469A / 230VAC I= 2.0681A / 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: 0.064 mA
		< 0.10mA for touch leakage current	I/P : 264VAC O/P : MIN LOAD TA : 25°C	L-V: 0.076 mA N-V: 0.076 mA
5	NO LOAD POWER CONSUMPTION	< 0.15W	I/P : 230VAC O/P : MIN LOAD TA : 25°C	< 0.1186 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= 0.9652 / 230VAC PF= 0.9952 / 115VAC



7	EFFICIENCY (TYP.)	94.5%	I/P : 230VAC O/P : FULL LOAD TA : 25°C	94.727 %
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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: 95VAC O/P: TESTING TA : 25°C	108.9% 264VAC 108.7% 230VAC 108.0% 95VAC Hiccup Mode
2	OVER VOLTAGE PROTECTION	50.40V ~ 64.80V	I/P: 264VAC I/P: 230VAC I/P: 80VAC O/P: MIN LOAD TA : 25°C	57.20V 264VAC 57.20V 230VAC 57.20V 80VAC Shut down Re- power ON
3	OVER TEMPERATURE PROTECTION		I/P: 264VAC I/P: 80VAC O/P: FULL LOAD	O.T.P. Active Shut down o/p voltage, recovers automatically after
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). 492.00V 532.00V (2). 510.00V 528.00V (3). 444.00V 450.00V
		Q6 Rated : 600V 18.0A		
2	O/P Diode (MOSFET)	Q101 Rated : 150V 30A	I/P : 267VAC O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue (4)Burst mode Ta : 25°C	Q101 Q102 (1). 111.00V 108.00V (2). 16.10V 12.40V (3). 110.00V 108.00V (4). 105.00V 106.00V
		Q102 Rated : 150V 30A		
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). 442.00V (2). 442.00V (3). 434.00V



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 (1). 25.00V (2). 20.00V (3). 22.30V (4). 28.40V (5). 26.00V
5	PFC Power Transistor	Q1 Rated : 600V 15.8A Q2 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). 512.00V 510.00V (2). 510.00V 508.00V (3). 486.00V 484.00V
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). 448.00V (2). 452.00V (3). 450.00V (4). 450.00V

**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: 1.33mA I/P-FG: 0.88mA O/P-FG: 1.71mA 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 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																																																																																					
		<table border="1"> <thead> <tr> <th>NO.</th> <th>Position</th> <th>ROOM AMBIENT 21.2°C</th> <th>HIGH AMBIENT Ta: 39.6°C</th> </tr> </thead> <tbody> <tr><td>1</td><td>LF1</td><td>55.3°C</td><td>72.2°C</td></tr> <tr><td>2</td><td>LF2</td><td>56.5°C</td><td>73.5°C</td></tr> <tr><td>3</td><td>L2</td><td>59.5°C</td><td>76.2°C</td></tr> <tr><td>4</td><td>BD1</td><td>60.0°C</td><td>76.7°C</td></tr> <tr><td>5</td><td>L1</td><td>63.4°C</td><td>79.9°C</td></tr> <tr><td>6</td><td>Q1</td><td>58.7°C</td><td>75.5°C</td></tr> <tr><td>7</td><td>Q2</td><td>59.7°C</td><td>76.4°C</td></tr> <tr><td>8</td><td>D2</td><td>61.2°C</td><td>77.9°C</td></tr> <tr><td>9</td><td>C5</td><td>63.1°C</td><td>79.3°C</td></tr> <tr><td>10</td><td>TSW1</td><td>56.6°C</td><td>73.2°C</td></tr> <tr><td>11</td><td>C83</td><td>64.1°C</td><td>80.5°C</td></tr> <tr><td>12</td><td>RTH2</td><td>60.4°C</td><td>77.2°C</td></tr> <tr><td>13</td><td>T1 COIL</td><td>75.0°C</td><td>91.3°C</td></tr> <tr><td>14</td><td>C109</td><td>65.7°C</td><td>82.6°C</td></tr> <tr><td>15</td><td>Q102</td><td>68.9°C</td><td>86.1°C</td></tr> <tr><td>16</td><td>Q101</td><td>68.3°C</td><td>85.4°C</td></tr> <tr><td>17</td><td>Q5</td><td>61.7°C</td><td>78.7°C</td></tr> <tr><td>18</td><td>Q6</td><td>61.6°C</td><td>78.7°C</td></tr> <tr><td>19</td><td>U1</td><td>68.1°C</td><td>84.6°C</td></tr> <tr><td>20</td><td>D3</td><td>59.1°C</td><td>75.8°C</td></tr> </tbody> </table>	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	
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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°C

<b>TEST RESULT</b>	<b>TESTER</b>	<b>REVIEW</b>	<b>APPROVAL</b>
PASS	FRANK	GESG	WANGDZ

2007/3/20 A50-S014