



# 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

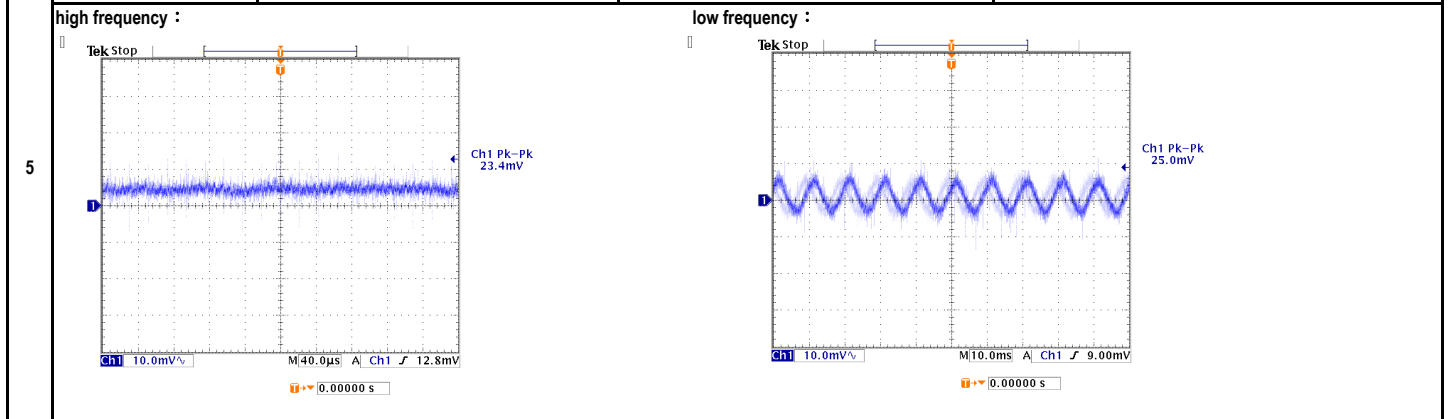
### ■ RELIABILITY TEST

ENVIRONMENT TEST

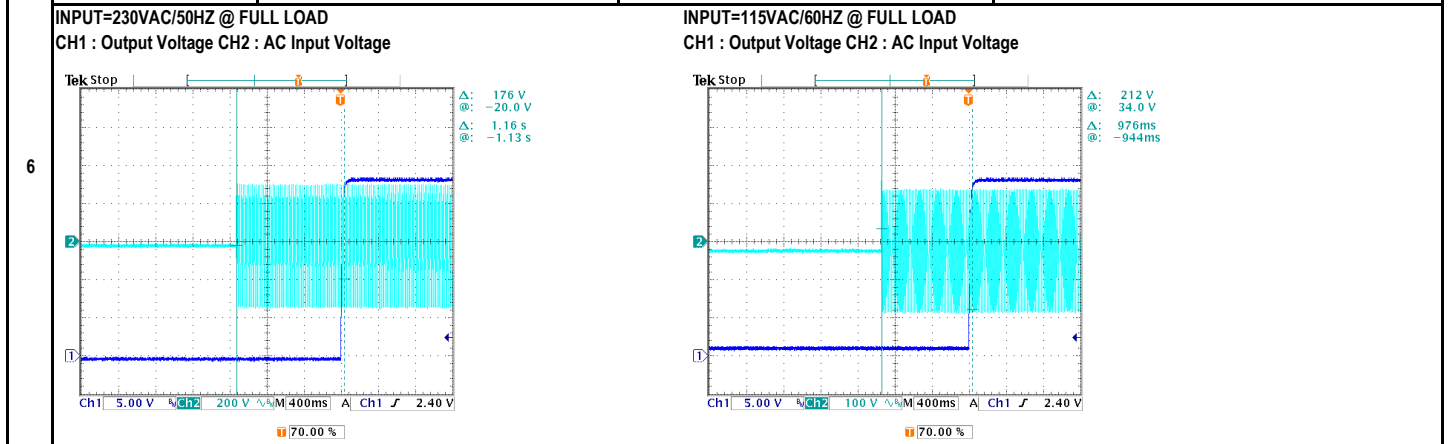


DESIGN VERIFY TEST  
OUTPUT FUNCTION

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 %
	RIPPLE & NOISE(Max)	V1 : 120 mVp-p	I/P : 230VAC O/P: FULL LOAD TA: 25°C	V1 : 25 mVp-p



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
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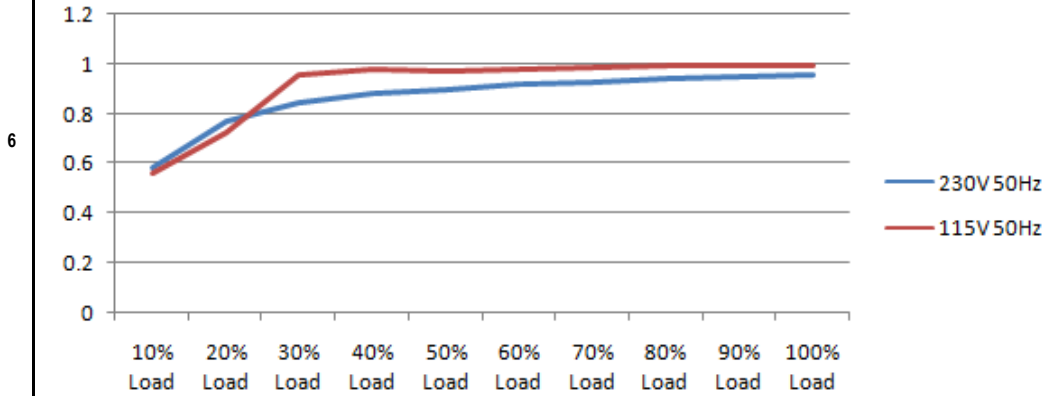


7	RISE TIME (MAX.)	230VAC : 50ms 115VAC : 50ms	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA: 25°C	230VAC : 15.5ms 115VAC : 17.4ms
	INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage		INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage	
8	HOLD UP TIME (TYP.)	230VAC : 24ms 115VAC : 24ms	I/P : 230VAC I/P : 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	V1: (1). 588mv (2). 584mv unit:mVp-p
	FULL /Min LOAD 50%DUTY / 120HZ		FULL /Min LOAD 50%DUTY / 1KHZ	

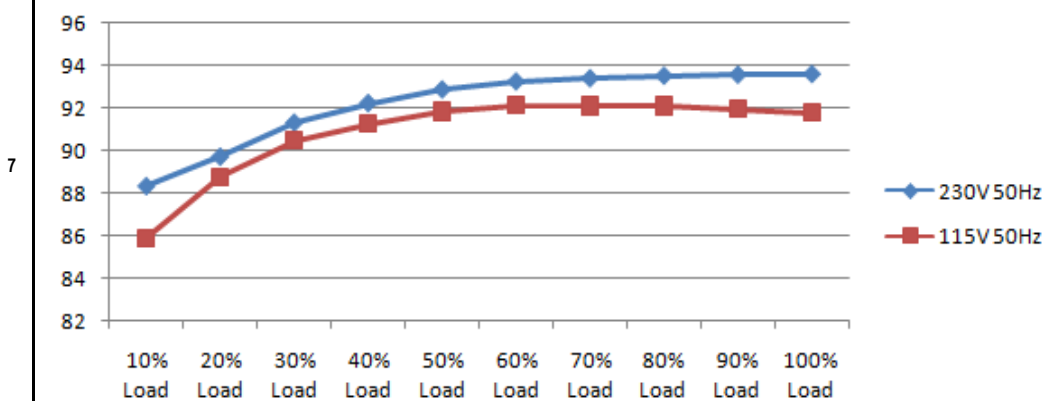


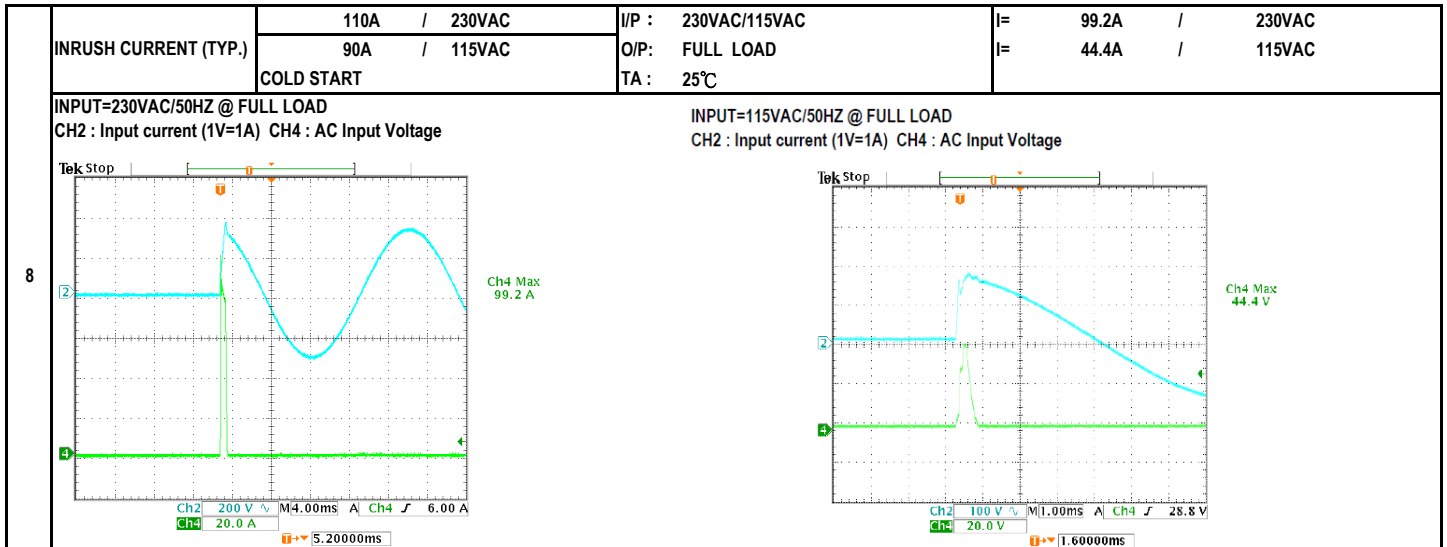
INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	80VAC ~ 264VAC	I/P : TESTING O/P : FULL LOAD Ta : 25°C	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°C	TEST : OK
3	INPUT CURRENT (TYP.)	1.00A / 230VAC 1.85A / 115VAC	I/P : 230VAC I/P : 115VAC O/P : FULL LOAD TA : 25°C	I= 0.7680A / 230VAC I= 1.4736A / 115VAC
4	LEAKAGE CURRENT	<175uA for earth leakage	I/P : 264VAC O/P : MIN LOAD TA : 25°C	L-FG: 129 uA
		<90uA for touch leakage		N-FG: 121 uA L-V: 72 uA N-V: 70 uA
5	NO LOAD POWER CONSUMPTION	< 0.15W	I/P : 230VAC O/P : MIN LOAD TA : 25°C	< 0.1316 W
	POWER FACTOR (TYP.)	0.94 / 230VAC 0.98 / 115VAC	I/P : 230VAC I/P : 115VAC O/P : FULL LOAD TA : 25°C	PF= 0.9502 / 230VAC PF= 0.9938 / 115VAC



7	EFFICIENCY (TYP.)	93.0%	I/P : 230VAC O/P : FULL LOAD TA : 25°C	93.582 %
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**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	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																																																																																					
		<table border="1"> <thead> <tr> <th>NO.</th> <th>Position</th> <th>ROOM AMBIENT 22.9°C</th> <th>HIGH AMBIENT Ta: 40.0°C</th> </tr> </thead> <tbody> <tr><td>1</td><td>LF1</td><td>52.0°C</td><td>69.6°C</td></tr> <tr><td>2</td><td>LF2</td><td>53.6°C</td><td>71.2°C</td></tr> <tr><td>3</td><td>L2</td><td>54.1°C</td><td>71.8°C</td></tr> <tr><td>4</td><td>L1</td><td>56.9°C</td><td>75.0°C</td></tr> <tr><td>5</td><td>C5</td><td>56.4°C</td><td>74.1°C</td></tr> <tr><td>6</td><td>BD1</td><td>56.9°C</td><td>74.4°C</td></tr> <tr><td>7</td><td>Q1</td><td>56.3°C</td><td>73.6°C</td></tr> <tr><td>8</td><td>D1</td><td>56.4°C</td><td>74.0°C</td></tr> <tr><td>9</td><td>Q6</td><td>57.9°C</td><td>75.5°C</td></tr> <tr><td>10</td><td>Q5</td><td>57.7°C</td><td>75.0°C</td></tr> <tr><td>11</td><td>RTH2</td><td>59.1°C</td><td>76.9°C</td></tr> <tr><td>12</td><td>T1</td><td>62.2°C</td><td>79.2°C</td></tr> <tr><td>13</td><td>C81</td><td>59.1°C</td><td>76.3°C</td></tr> <tr><td>14</td><td>Q101</td><td>61.3°C</td><td>78.6°C</td></tr> <tr><td>15</td><td>Q102</td><td>60.4°C</td><td>77.9°C</td></tr> <tr><td>16</td><td>C101</td><td>59.2°C</td><td>76.7°C</td></tr> <tr><td>17</td><td>C102</td><td>60.3°C</td><td>77.6°C</td></tr> <tr><td>18</td><td>LF101</td><td>57.5°C</td><td>74.8°C</td></tr> <tr><td>19</td><td>C110</td><td>47.9°C</td><td>65.3°C</td></tr> <tr><td>20</td><td>U1</td><td>60.9°C</td><td>78.4°C</td></tr> </tbody> </table>	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	
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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 2200.0K hrs min. Telcordia SR-332 (Bellcore) ; 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