

TEST REPORT: GSM90A24-P1M

90W 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

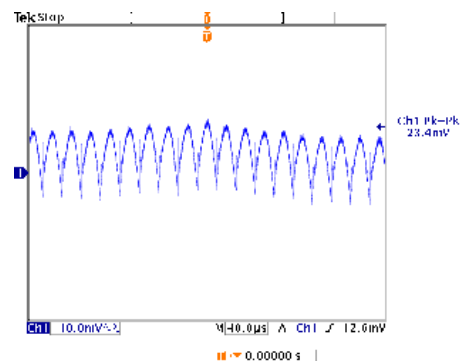
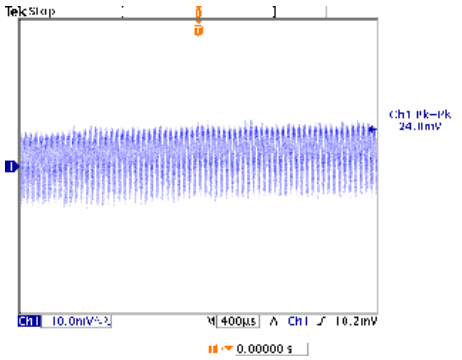
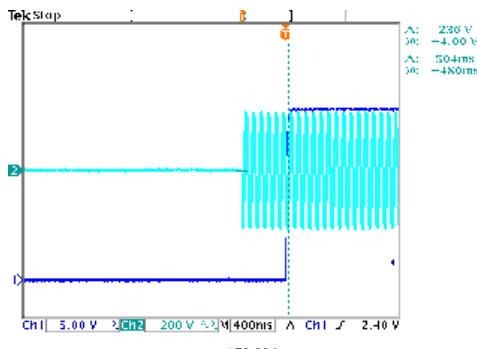
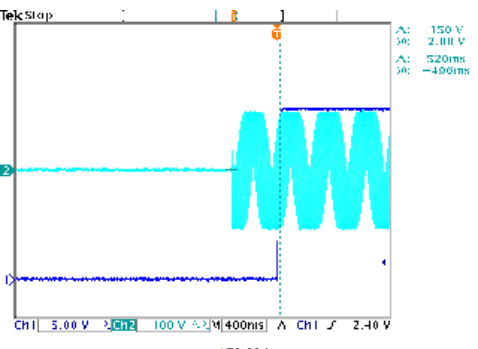
Safety Test

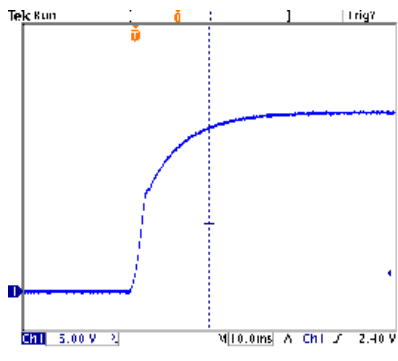
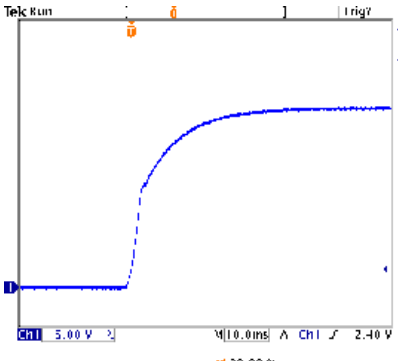
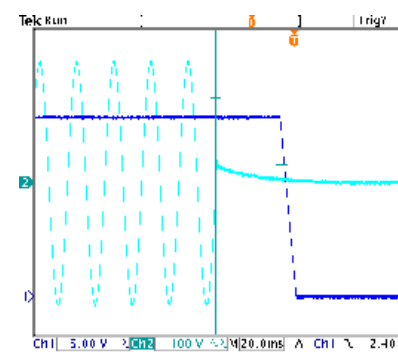
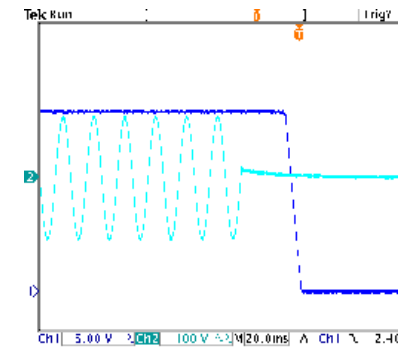
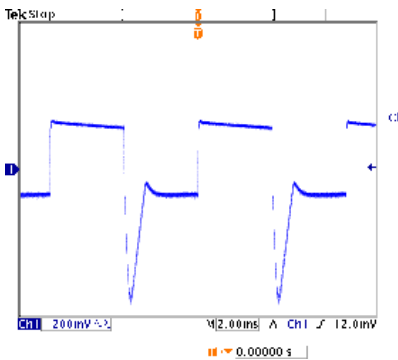
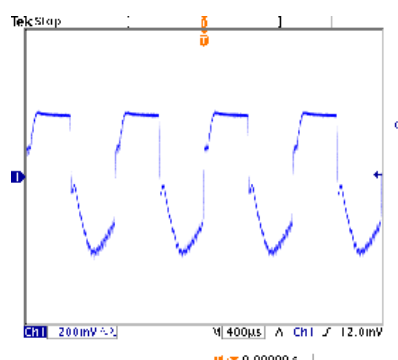
E.M.C. Test

■ RELIABILITY TEST

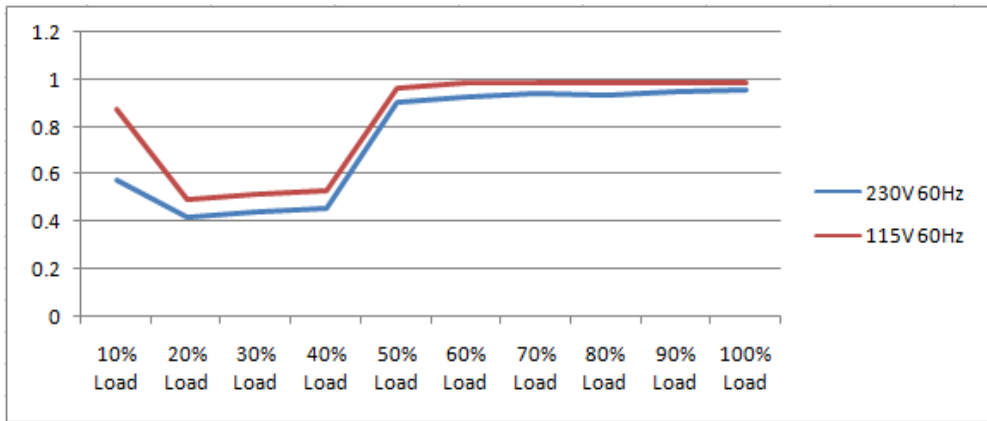
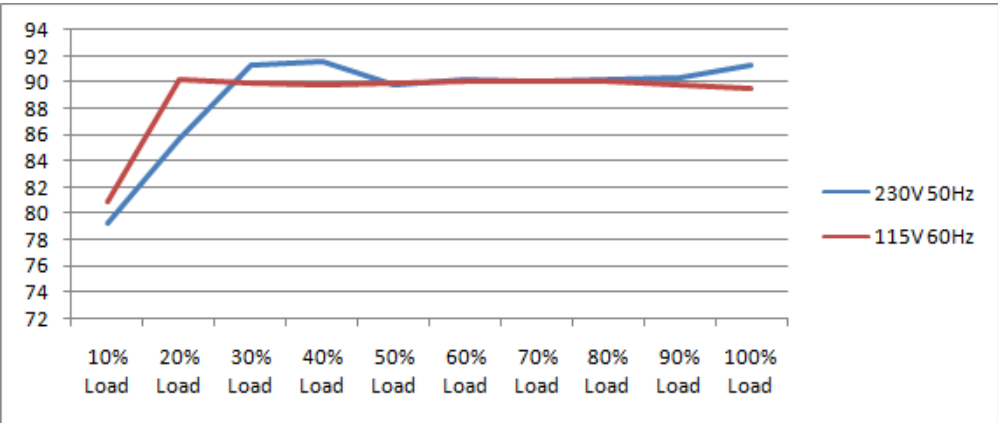
ENVIRONMENT TEST

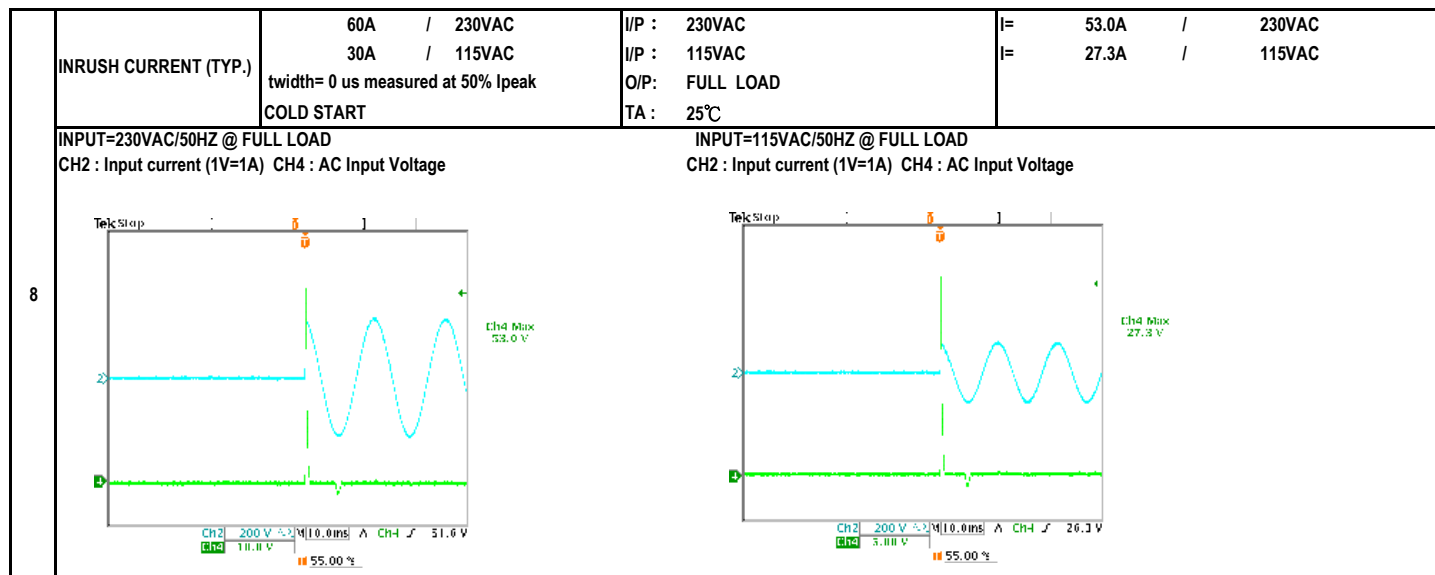
DESIGN VERIFY TEST OUTPUT FUNCTION

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: 23.93V	
2	OUTPUT VOLTAGE TOLERANCE (Max)	V1 : 3.0% ~ -3.0%	I/P : 100VAC / 264VAC O/P: FULL / MINLOAD TA= 25°C	V1: -0.29% ~ -1.42%	
3	LINE REGULATION (MAX.)	V1 : 1.0% ~ -1.0%	I/P : 100VAC / 264VAC O/P: FULL LOAD TA : 25°C	V1: 0.04% ~ 0.00%	
4	LOAD REGULATION (MAX.)	V1 : 3.0% ~ -3.0%	I/P : 230VAC O/P: MIN LOAD ~ FULL LOAD TA : 25°C	V1: 0.59% ~ -0.55%	
5	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230VAC O/P: FULL LOAD TA : 25°C	TEST< 1.26 %	
6	RIPPLE & NOISE(Max)	V1 : 180 mVp-p	I/P : 230VAC O/P: FULL LOAD TA : 25°C	V1 : 24 mVp-p	
		high frequency :		low frequency :	
					
7	SET UP TIME (MAX.)	230VAC : 1000ms 115VAC : 1000ms	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25°C	230VAC : 504ms 115VAC : 520ms	
		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 : 19.8ms 115VAC : 19.6ms
	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 : 35.6ms 115VAC : 24.8ms
	INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage  INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage 			
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). 1010mv (2). 788mv 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	60.0VAC ~ 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.)	0.6 / 230VAC 1.3 / 115VAC	I/P : 230VAC I/P : 115VAC O/P : FULL LOAD TA : 25°C	I= 0.4412 / 230VAC I= 0.8716 / 115VAC
4	LEAKAGE CURRENT	< 0.10mA	I/P : 264VAC O/P : MIN LOAD TA : 25°C	L-FG: 0.0792 mA N-FG: 0.0793 mA
5	NO LOAD POWER CONSUMPTION	< 0.15W	I/P : 230VAC O/P : MIN LOAD TA : 25°C	< 0.0946 W
6	POWER FACTOR (TYP.)	0.91 / 230VAC 0.95 / 115VAC	I/P : 230VAC I/P : 115VAC O/P : FULL LOAD TA : 25°C	PF= 0.9628 / 230VAC PF= 0.9886 / 115VAC
				
7	EFFICIENCY (TYP.)	90.0%	I/P : 230VAC O/P : FULL LOAD TA : 25°C	91.36 %
				



PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	110% ~ 150%	I/P: 264VAC I/P: 230VAC I/P: 100VAC O/P: TESTING TA : 25°C	133% 264VAC 133% 230VAC 127.10% 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	28.90V 264VAC 28.90V 230VAC 28.90V 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	Q32 Rated : 700V 11.0A	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). 598.00V (2). 580.00V (3). 588.00V
2	O/P Diode (MOSFET)	Q101 Rated : 150V 43A	I/P : 267VAC VDS : O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	Q101 VDS : (1). 137.00V (2). 122.00V (3). 136.00V
3	Input Capacitor	C5 Rated : 100uf 400V	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). 399.00V (2). 396.00V (3). 399.00V

4	Control IC	U2 Rated : 28V (max) -0.3V (min) U101 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	U2 U101 (1). 18.30V 25.00V (2). 15.10V 0.92V (3). 17.60V 21.20V (4). 21.20V 29.50V (5). 17.50V 24.30V
5	PFC Power Transistor	Q31 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). 454.00V (2). 410.00V (3). 436.00V
6	PFC Diode	D1 Rated : 600V 4.0A	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	(1). 440.00V (2). 418.00V (3). 438.00V (4). 438.00V
8	Clamp Diode	D30 Rated : 800V 2.0A	I/P : 267VAC O/P : (1)Dynamic Load Full/Min Load 90%Duty/1KHz (2)Full load continue Ta : 25°C	(1). 542.00V (2). 542.00V

SAFETY & E.M.C. TEST

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P : 4.000KVAC /min 2.000KVAC /min	I/P-O/P: 4.400KVAC /min I/P-FG: 2.400KVAC /min Ta : 25°C	I/P-O/P: 2.13mA I/P-FG: 2.15mA 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 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: 15K 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: 2 INPUT: 2KV	I/P : 230VAC /50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
6	SURGE	IEC61000-4-5 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 : GSM90A24-P1M																																																																													
		1. ROOM AMBIENT BURN-IN : 1.0hrs																																																																													
		IP: 230VAC O/P: 100% LOAD TA= 20.3℃																																																																													
		2. HIGH AMBIENT BURN-IN : 1.0hrs																																																																													
		IP: 230VAC O/P: 100% LOAD TA= 39.8℃																																																																													
		<table><tr><td></td><td>NO.</td><td>Position</td><td>ROOM AMBIENT 20.3℃</td><td>HIGH AMBIENT Ta: 39.8℃</td></tr><tr><td></td><td>1</td><td>LF1</td><td>59.1℃</td><td>74.9℃</td></tr><tr><td></td><td>2</td><td>LF2</td><td>76.7℃</td><td>86.6℃</td></tr><tr><td></td><td>3</td><td>BD1</td><td>61.9℃</td><td>78.4℃</td></tr><tr><td></td><td>4</td><td>C5</td><td>68.3℃</td><td>83.8℃</td></tr><tr><td></td><td>5</td><td>L2</td><td>64.4℃</td><td>79.7℃</td></tr><tr><td></td><td>6</td><td>LF3</td><td>65.8℃</td><td>81.5℃</td></tr><tr><td></td><td>7</td><td>Q31</td><td>66.7℃</td><td>83.4℃</td></tr><tr><td></td><td>8</td><td>Q32</td><td>66.7℃</td><td>83.3℃</td></tr><tr><td></td><td>9</td><td>T1 COIL</td><td>75.3℃</td><td>90.8℃</td></tr><tr><td></td><td>10</td><td>Q101</td><td>73.7℃</td><td>90.7℃</td></tr><tr><td></td><td>11</td><td>U2</td><td>68.4℃</td><td>84.7℃</td></tr><tr><td></td><td>12</td><td>C101</td><td>61.5℃</td><td>77.9℃</td></tr><tr><td></td><td>13</td><td>LF101</td><td>54.7℃</td><td>72.0℃</td></tr><tr><td></td><td>14</td><td>C52</td><td>72.1℃</td><td>88.4℃</td></tr></table>				NO.	Position	ROOM AMBIENT 20.3℃	HIGH AMBIENT Ta: 39.8℃		1	LF1	59.1℃	74.9℃		2	LF2	76.7℃	86.6℃		3	BD1	61.9℃	78.4℃		4	C5	68.3℃	83.8℃		5	L2	64.4℃	79.7℃		6	LF3	65.8℃	81.5℃		7	Q31	66.7℃	83.4℃		8	Q32	66.7℃	83.3℃		9	T1 COIL	75.3℃	90.8℃		10	Q101	73.7℃	90.7℃		11	U2	68.4℃	84.7℃		12	C101	61.5℃	77.9℃		13	LF101	54.7℃	72.0℃		14	C52	72.1℃	88.4℃
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230VAC O/P : 128.53% LOAD Ta : 25℃	TEST : OK																																																																											
3	LOW TEMPERATURE TURN ON TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 264VAC / 100VAC O/P : FULL LOAD Ta : -30.0℃	TEST : OK																																																																											
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 40℃ NO DAMAGE	I/P : 272VAC O/P : FULL LOAD Ta : 40℃ HUMIDITY= 95.0% RH	TEST : OK																																																																											
5	TEMPERATURE COEFFICIENT	±0.03% /(0℃~40℃)	I/P : 230VAC O/P : FULL LOAD	±0.0196% /(0℃~40℃)																																																																											
6	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -40℃ ~ +85℃ 2. Temperature change rate : 25℃ / 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℃ ~ +45℃ 2. Temperature change rate : 25℃ / 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℃		TEST : OK																																																																											
9	CAPACITOR LIFE CYCLE	:SUPPOSE C101 IS THE MOST CRITICAL COMPONENT (1) I/P : 230VAC O/P : FULL LOAD Ta= 25.0℃ LIFE TIME (2) I/P : 230VAC O/P : FULL LOAD Ta= 40.0℃ LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta= 40.0℃ LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta= 40.0℃ LIFE TIME		(1). 177817.6 HRS (2). 77916 HRS (3). 152206.9 HRS (4). 270922.4 HRS																																																																											
10	MTBF	MIL-HDBK-217F TOTAL FAILURE RATE : 405.6 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