



Test Report: GSM220B24

220W 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

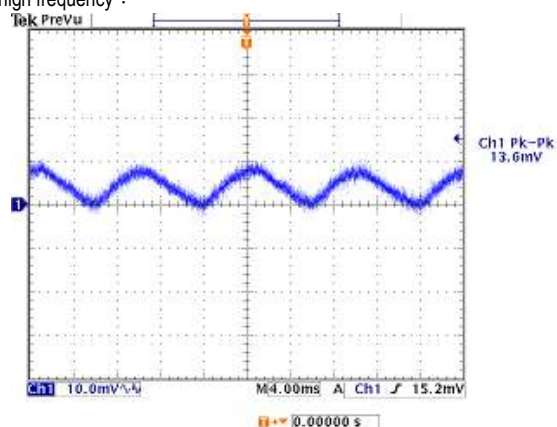
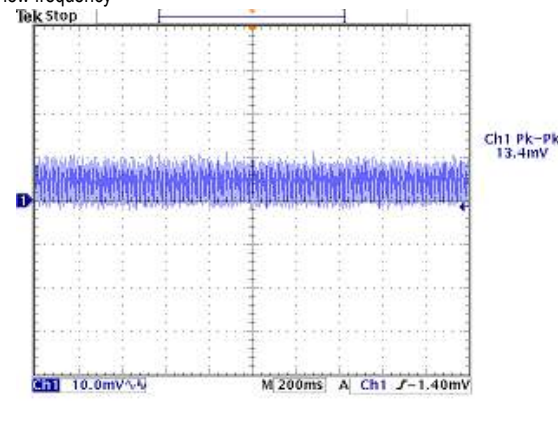
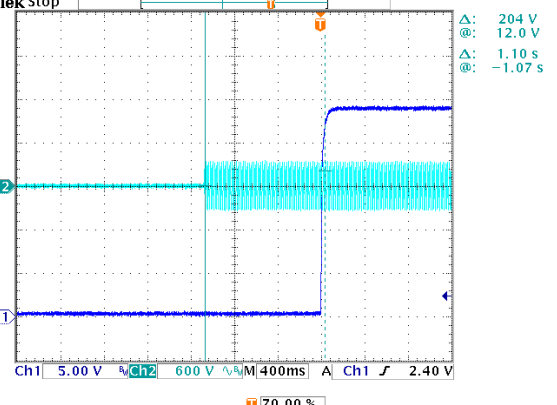
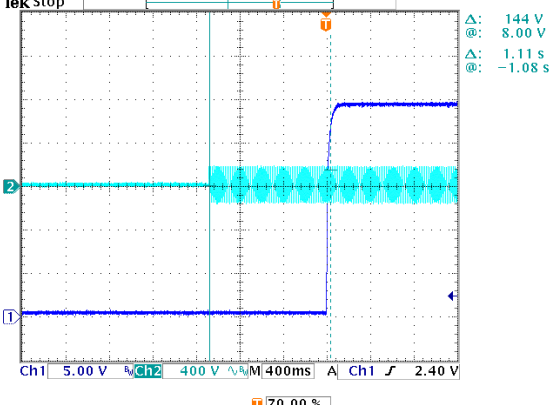
E.M.C. Test

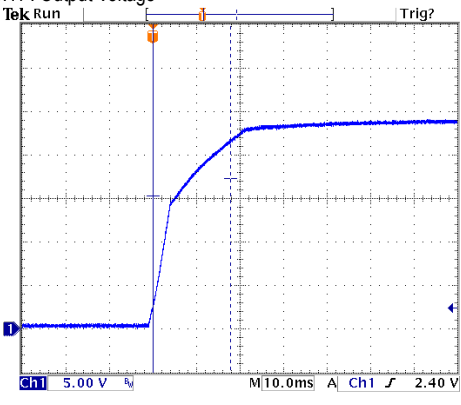
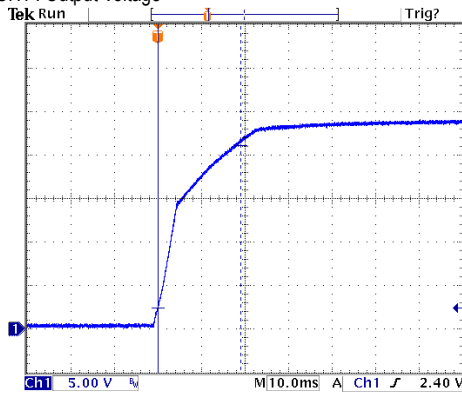
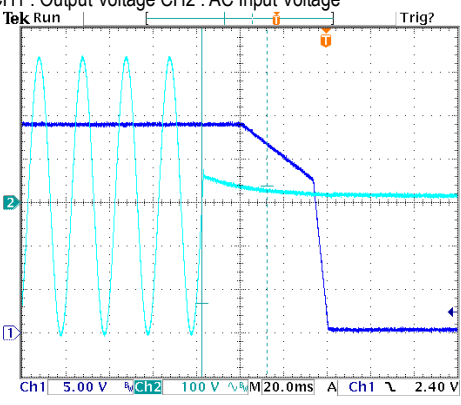
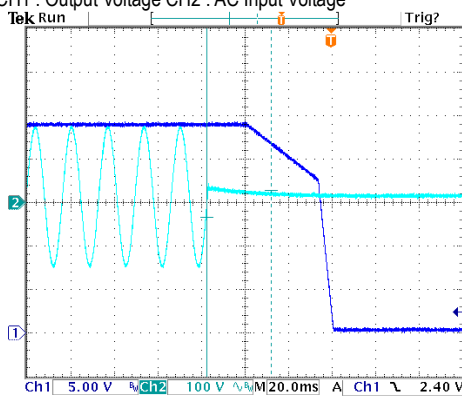
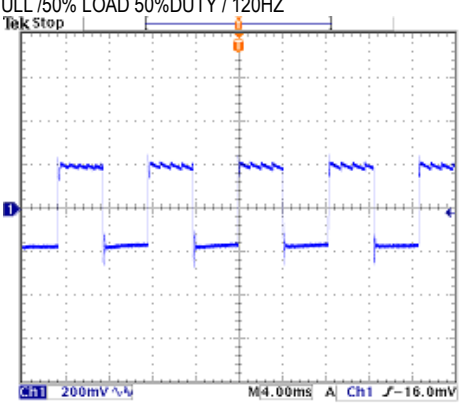
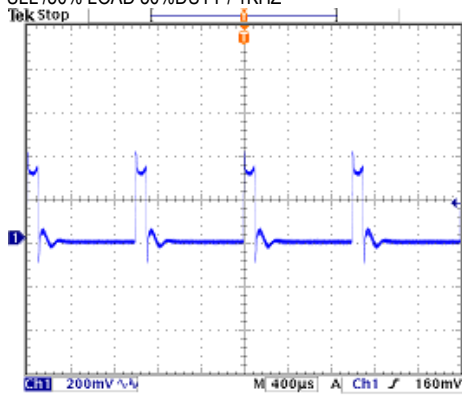
■ RELIABILITY TEST

ENVIRONMENT TEST

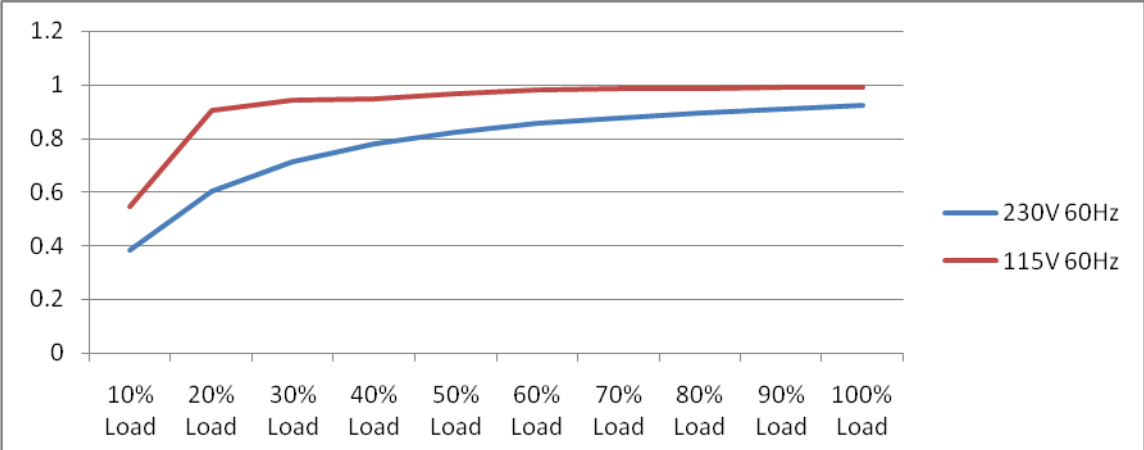
DESIGN VERIFY TEST

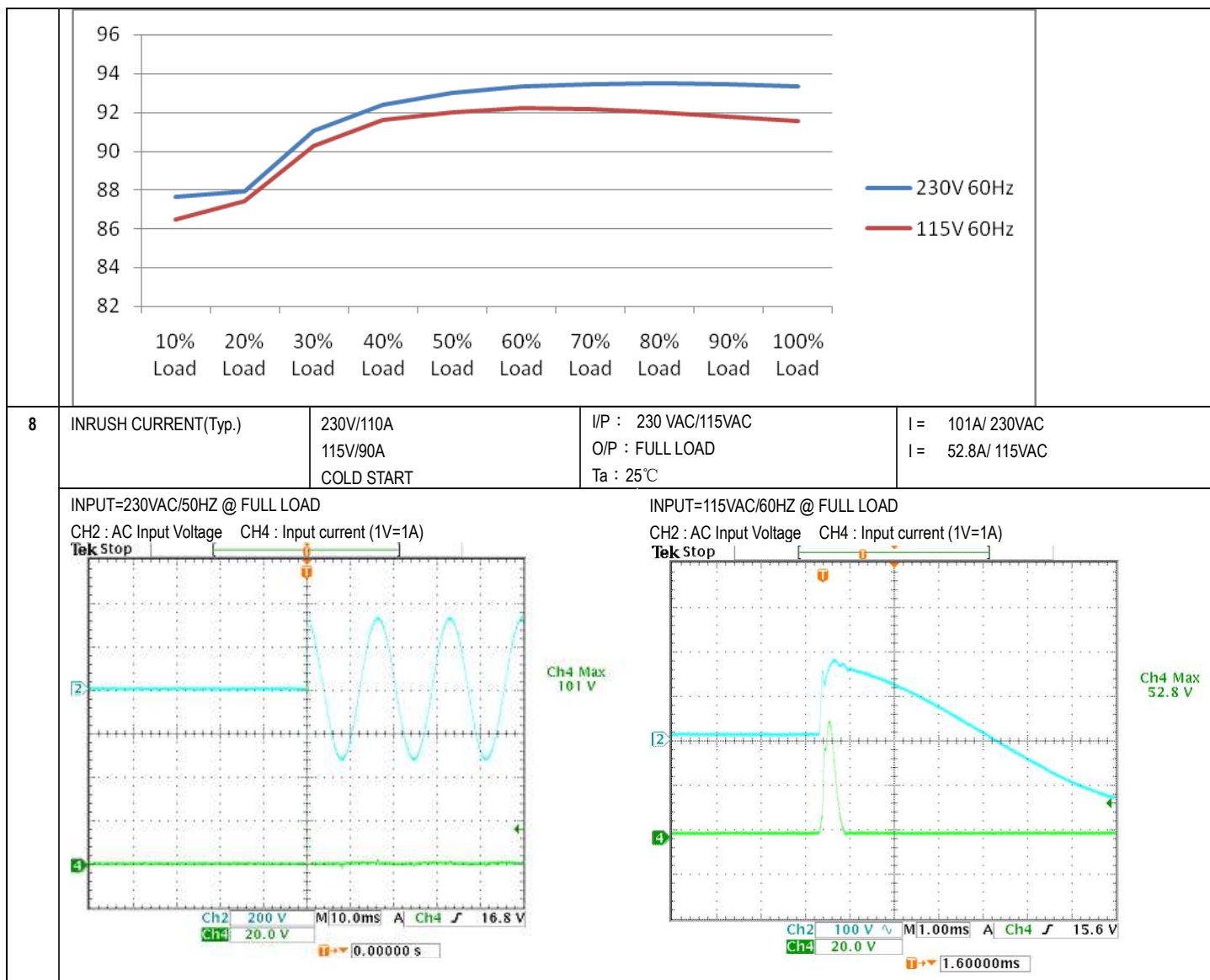
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE(Max) TOLERANCE	V1: -3%~ 3%	I/P: 100VAC /264VAC O/P:FULL/ MIN. LOAD Ta:25°C	V1: 0.041%~ 0.041 %
2	LINE REGULATION (Max)	V1: -1%~ 1%	I/P: 100VAC~ 264VAC O/P:FULL LOAD Ta:25°C	V1: -0.041 %~0 %
3	LOAD REGULATION(Max)	V1: -3%~ 3%	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25°C	V1: 0 %~ 0.041 %
4	OVER/UNDERSHOOT TEST	< ±5%	I/P: 230VAC O/P:FULL LOAD Ta:25°C	< ±5%
5	RIPPLE & NOISE(Max)	V1: 120mVp-p	I/P:230VAC O/P:FULL LOAD Ta:25°C	V1: 13.6 mVp-p
high frequency :  low frequency : 				
6	SET UP TIME(Max)	230VAC/2000ms 115VAC/2000ms	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 1104 ms 115VAC/ 1112 ms
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 : 230 VAC I/P : 115 VAC	230VAC/ 17.8 ms 115VAC/ 19 ms

			O/P : FULL LOAD Ta : 25°C	
	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 : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 30 ms 115VAC/ 29.6 ms
	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: 2400mVp-p	I/P: 230VAC O/P: (1)FULL /50% LOAD 50%DUTY / 120HZ (2)FULL /90%DUTY / 1KHZ Ta:25°C	520mVp-p 508mVp-p
	FULL /50% LOAD 50%DUTY / 120HZ 		FULL /50% 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℃	76 V~264V																																	
			I/P: LOW-LINE-3V=92 V HIGH-LINE+15%=300 V O/P:FULL/MIN LOAD (PLEASE CHECK DERATING CURVE) ON: 30 Sec OFF: 30 Sec 10MIN (POWER ON/OFF NO DAMAGE)	TEST:OK																																	
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE	I/P:100 VAC ~264 VAC O/P:FULL~MIN LOAD Ta:25℃	TEST: OK																																	
3	INPUT CURRENT (Typ.)	230V/ 2A 115V/ 4A	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25℃	I =1.04A/ 230VAC I =2.04A/ 115VAC																																	
4	LEAKAGE CURRENT	<0.1mA / 240 VAC	I/P : 240 VAC O/P : Min LOAD Ta : 25℃	L-FG : 0.0754 mA N-FG : 0.0754 mA																																	
5	NO LOAD CONSUMPTION	< 0.15W	I/P : 115VAC I/P : 230VAC O/P : NO LOAD Ta : 25℃	< 0.0809 W < 0.1082 W																																	
6	POWER FACTOR (Typ.)	0.91/ 230VAC 0.98/115VAC	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25℃	PF= 0.955/230VAC PF=0.993 /115VAC																																	
P.F vs LOAD																																					
<table><caption>P.F vs LOAD Data (Estimated from Graph)</caption><thead><tr><th>Load (%)</th><th>230V 60Hz P.F</th><th>115V 60Hz P.F</th></tr></thead><tbody><tr><td>10%</td><td>0.40</td><td>0.55</td></tr><tr><td>20%</td><td>0.60</td><td>0.90</td></tr><tr><td>30%</td><td>0.70</td><td>0.95</td></tr><tr><td>40%</td><td>0.78</td><td>0.96</td></tr><tr><td>50%</td><td>0.82</td><td>0.97</td></tr><tr><td>60%</td><td>0.85</td><td>0.98</td></tr><tr><td>70%</td><td>0.87</td><td>0.98</td></tr><tr><td>80%</td><td>0.88</td><td>0.99</td></tr><tr><td>90%</td><td>0.89</td><td>0.99</td></tr><tr><td>100%</td><td>0.90</td><td>1.00</td></tr></tbody></table>					Load (%)	230V 60Hz P.F	115V 60Hz P.F	10%	0.40	0.55	20%	0.60	0.90	30%	0.70	0.95	40%	0.78	0.96	50%	0.82	0.97	60%	0.85	0.98	70%	0.87	0.98	80%	0.88	0.99	90%	0.89	0.99	100%	0.90	1.00
Load (%)	230V 60Hz P.F	115V 60Hz P.F																																			
10%	0.40	0.55																																			
20%	0.60	0.90																																			
30%	0.70	0.95																																			
40%	0.78	0.96																																			
50%	0.82	0.97																																			
60%	0.85	0.98																																			
70%	0.87	0.98																																			
80%	0.88	0.99																																			
90%	0.89	0.99																																			
100%	0.90	1.00																																			
7	EFFICIENCY(Typ.)	93.5%	I/P:230 VAC O/P:FULL LOAD Ta:25℃	93.82%																																	
EFFICIENCY vs LOAD																																					



PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	105%~ 135%	I/P: 264VAC I/P: 230VAC I/P: 100VAC O/P: TESTING Ta:25°C	106.84%/ 264VAC 107.06%/ 230VAC 10.7.06%/ 100VAC PROTECTION TYPE : Hiccup mode,recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	25.2V~32.4V	I/P: 264VAC I/P: 230VAC I/P: 90VAC O/P: MIN LOAD Ta:25°C	26.9V/ 264VAC 26.9V/ 230VAC 26.9V/ 90VAC PROTECTION TYPE : Shut down o/p voltage,re-power on to recover
3	OVER TEMPERATURE PROTECTION	Protection type :	I/P: 264VAC I/P: 90VAC O/P: FULL LOAD	O.T.P. Active Protection type : 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: 90VAC O/P: FULL LOAD Ta:25°C	NO DAMAGE PROTECTION TYPE : Hiccup mode,recovers automatically after fault condition is removed

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Transistor (D to S) or (C to E) Peak Voltage	Q5 Rated : 18A/ 600V	I/P: High-Line +3V =267V AC ON/OFF VDS: O/P: (1) Full Load (2) Output Short (3) Full Load Continue Ta:25°C	VDS: (1) 434V (2) 486V (3) 478V
2	P.F.C Transistor (D to S) or (C to E) Peak Voltage	Q1 Rated : 15.8 A/ 600 V	I/P: High-Line +3V =267V AC ON/OFF VDS: O/P: (1) Full Load (2) Output Short (3) Full Load Continue Ta:25°C	VDS: (1) 578V (2) 574V (3) 482V
3	P.F.C DIODE	D2 Rated : 15 A/ 600 V	I/P: High-Line +3V =267 V AC ON/OFF O/P: (1) Full Load (2) Output Short (3) Dynamic Load Full Load/ Min. Load 90%Duty/5KHz (4) Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz Ta:25°C	(1) 450V (2) 440V (3) 456V (4) 468V
4	Diode Peak Voltage	Q101 Rated : 80 A/75V	I/P: High-Line +3V =267 V AC ON/OFF VDS: O/P: (1) Full Load (2) Output Short (3) Full Load Continue Ta:25°C	Q101: VDS: (1) 55.8V (2) 7.40V (3) 56.4V

5	Input Capacitor Voltage	C5 Rated: : 220 μ /450 V 105 °C	I/P:High-Line +3V =267 V O/P: (1)Full Load input on/off (2) Min load input on /Off (3)Full Load /Min load Change Ta:25°C	(1) 432V (2) 432V (3) 424V
6	Control IC Voltage Test	PWM IC U1 Rated : 38V -0.4 V(MIN.)	I/P:High-Line +3V =267 V AC ON/OFF O/P(1)FULL LOAD (2) Output Short (3)O.L.P (4)O.V.P. Ta:25°C	(1) 25.2V (2) 19.9V (3) 19.9V (4) 27.0V

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P: 4KVAC/min	I/P-O/P: 4.4 KVAC/min Ta:25°C	I/P-O/P: 1.925mA NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P:500VDC>100M Ω	I/P-O/P: 600 VDC Ta:25°C	I/P-O/P: 9999M Ω 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 : 230 VAC (50HZ) O/P : FULL/50% LOAD Ta : 25°C	PASS Test by certified Lab
3	RADIATION	EN55011 CLASS B	I/P : 230 VAC (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 : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
5	E.F.T	EN61000-4-4 INPUT : 2KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
6	SURGE	IEC61000-4-5 L-N : 1KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
7	Test by certified Lab & Test Report Prepare			

■ RELIABILITY TEST

ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT																																																																																																				
1	TEMPERATURE RISE TEST	MODEL : GSM220B20 1. ROOM AMBIENT BURN-IN : 1HRS I/P : 230VAC O/P : FULL LOAD Ta= 17.7℃ 2. HIGH AMBIENT BURN-IN : 1HRS I/P : 230VAC O/P : FULL LOAD Ta=39.5℃ <table><tr><th>NO</th><th>Position</th><th>ROOM AMBIENT Ta= 17.7℃</th><th>HIGH AMBIENT Ta= 39.5℃</th></tr><tr><td>1</td><td>LF1</td><td>40.9℃</td><td>65.2℃</td></tr><tr><td>2</td><td>LF2</td><td>49.1℃</td><td>73.5℃</td></tr><tr><td>3</td><td>L2</td><td>50.9℃</td><td>76.0℃</td></tr><tr><td>4</td><td>D3</td><td>53.0℃</td><td>77.1℃</td></tr><tr><td>5</td><td>Q2</td><td>53.4℃</td><td>77.0℃</td></tr><tr><td>6</td><td>D2</td><td>54.5℃</td><td>78.2℃</td></tr><tr><td>7</td><td>L1</td><td>55.0℃</td><td>79.7℃</td></tr><tr><td>8</td><td>C5</td><td>57.0℃</td><td>80.5℃</td></tr><tr><td>9</td><td>Q5</td><td>53.1℃</td><td>76.9℃</td></tr><tr><td>10</td><td>T1</td><td>72.6℃</td><td>101.8℃</td></tr><tr><td>11</td><td>C81</td><td>54.5℃</td><td>78.7℃</td></tr><tr><td>12</td><td>RTH2</td><td>52.0℃</td><td>75.6℃</td></tr><tr><td>13</td><td>C13</td><td>58.5℃</td><td>82.6℃</td></tr><tr><td>14</td><td>Q101</td><td>60.2℃</td><td>83.9℃</td></tr><tr><td>15</td><td>C109</td><td>59.6℃</td><td>83.4℃</td></tr><tr><td>16</td><td>U1</td><td>61.4℃</td><td>84.7℃</td></tr><tr><td>17</td><td>C101</td><td>58.2℃</td><td>81.7℃</td></tr><tr><td>18</td><td>R5</td><td>53.3℃</td><td>77.9℃</td></tr><tr><td>19</td><td>TSW1</td><td>49.0℃</td><td>72.5℃</td></tr><tr><td>20</td><td>C11</td><td>51.0℃</td><td>75.4℃</td></tr><tr><td>21</td><td>U4</td><td>55.4℃</td><td>79.2℃</td></tr><tr><td>22</td><td>BD1</td><td>52.1℃</td><td>75.7℃</td></tr><tr><td>23</td><td>C1</td><td>46.4℃</td><td>71.0℃</td></tr><tr><td>24</td><td>CASE</td><td>43.2℃</td><td>64.1℃</td></tr></table>			NO	Position	ROOM AMBIENT Ta= 17.7℃	HIGH AMBIENT Ta= 39.5℃	1	LF1	40.9℃	65.2℃	2	LF2	49.1℃	73.5℃	3	L2	50.9℃	76.0℃	4	D3	53.0℃	77.1℃	5	Q2	53.4℃	77.0℃	6	D2	54.5℃	78.2℃	7	L1	55.0℃	79.7℃	8	C5	57.0℃	80.5℃	9	Q5	53.1℃	76.9℃	10	T1	72.6℃	101.8℃	11	C81	54.5℃	78.7℃	12	RTH2	52.0℃	75.6℃	13	C13	58.5℃	82.6℃	14	Q101	60.2℃	83.9℃	15	C109	59.6℃	83.4℃	16	U1	61.4℃	84.7℃	17	C101	58.2℃	81.7℃	18	R5	53.3℃	77.9℃	19	TSW1	49.0℃	72.5℃	20	C11	51.0℃	75.4℃	21	U4	55.4℃	79.2℃	22	BD1	52.1℃	75.7℃	23	C1	46.4℃	71.0℃	24	CASE	43.2℃	64.1℃
NO	Position	ROOM AMBIENT Ta= 17.7℃	HIGH AMBIENT Ta= 39.5℃																																																																																																					
1	LF1	40.9℃	65.2℃																																																																																																					
2	LF2	49.1℃	73.5℃																																																																																																					
3	L2	50.9℃	76.0℃																																																																																																					
4	D3	53.0℃	77.1℃																																																																																																					
5	Q2	53.4℃	77.0℃																																																																																																					
6	D2	54.5℃	78.2℃																																																																																																					
7	L1	55.0℃	79.7℃																																																																																																					
8	C5	57.0℃	80.5℃																																																																																																					
9	Q5	53.1℃	76.9℃																																																																																																					
10	T1	72.6℃	101.8℃																																																																																																					
11	C81	54.5℃	78.7℃																																																																																																					
12	RTH2	52.0℃	75.6℃																																																																																																					
13	C13	58.5℃	82.6℃																																																																																																					
14	Q101	60.2℃	83.9℃																																																																																																					
15	C109	59.6℃	83.4℃																																																																																																					
16	U1	61.4℃	84.7℃																																																																																																					
17	C101	58.2℃	81.7℃																																																																																																					
18	R5	53.3℃	77.9℃																																																																																																					
19	TSW1	49.0℃	72.5℃																																																																																																					
20	C11	51.0℃	75.4℃																																																																																																					
21	U4	55.4℃	79.2℃																																																																																																					
22	BD1	52.1℃	75.7℃																																																																																																					
23	C1	46.4℃	71.0℃																																																																																																					
24	CASE	43.2℃	64.1℃																																																																																																					
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230 VAC O/P : 120 % LOAD Ta : 25℃	TEST : OK																																																																																																				
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 264VAC/100VAC O/P : 100 % LOAD Ta= -35℃	TEST : OK																																																																																																				
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 40℃ NO DAMAGE	I/P : 272 VAC O/P : FULL LOAD Ta= 40℃ HUMIDITY= 95 %R.H	TEST : OK																																																																																																				
5	TEMPERATURE COEFFICIENT	± 0.03 %/℃ (0-50℃)	I/P : 230 VAC O/P : FULL LOAD	± 0.009 %/℃ (0-50℃)																																																																																																				

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	OK
7	THERMAL SHOCK TEST	1. Thermal shock Temperature : -30℃~ +70℃ 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	OK
8	VIBRATION TEST	1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10~500Hz (3) Sweep Time : 12min/sweep cycle (4) Acceleration : 2G (5) Test Time : 60min in each axis (X.Y.Z) (6) Ta : 25℃	TEST : OK
9	CAPACITOR LIFE CYCLE	SUPPOSE C109 IS THE MOST CRITICAL COMPONENT (1) I/P : 230VAC O/P : FULL LOAD Ta= 25 °C LIFE TIME (2) I/P : 230VAC O/P : FULL LOAD Ta= 40 °C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta= 40 °C LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta= 40 °C LIFE TIME	(1) 159661HRS (2) 24580HRS (3) 71921HRS (4) 105265HRS
10	MTBF	MIL-HDBK-217F TOTAL FAILURE RATE : 208.66 KHRS	
11	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure (Expected Life): Above 50,000 hours @ TA 50℃	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	FRANK	GESG	WANGDZ

2007/3/20 A50-S014