



Test Report: GSM160B24

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

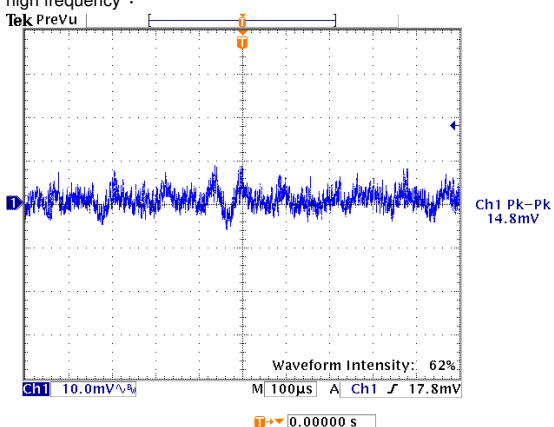
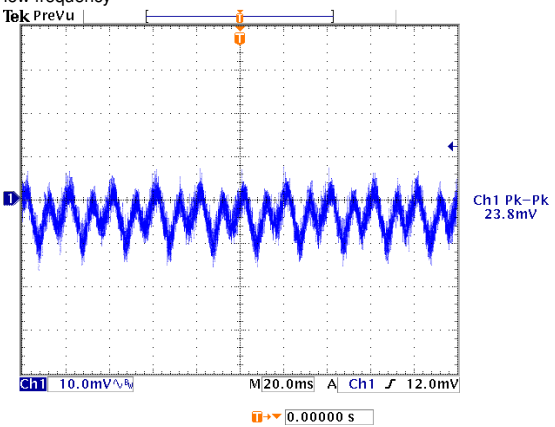
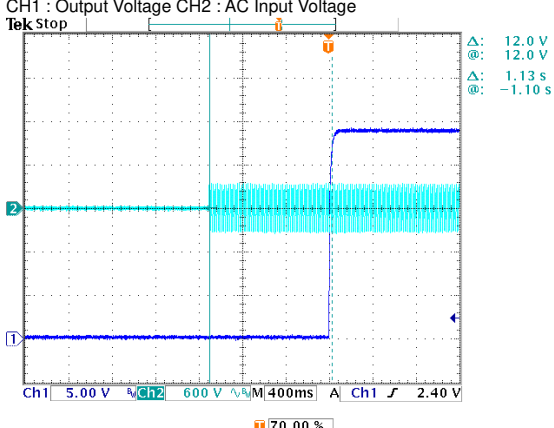
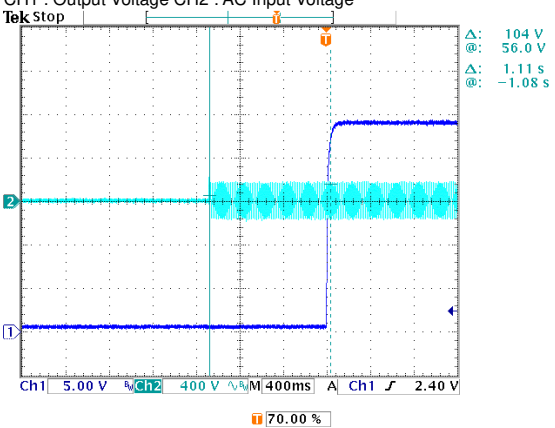
E.M.C. Test

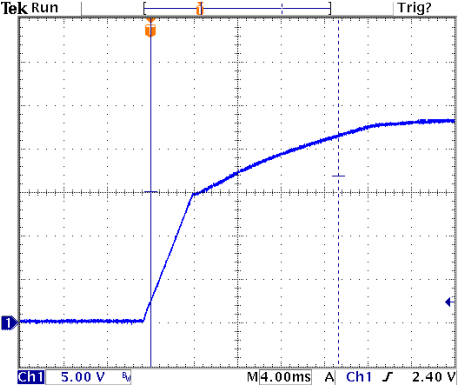
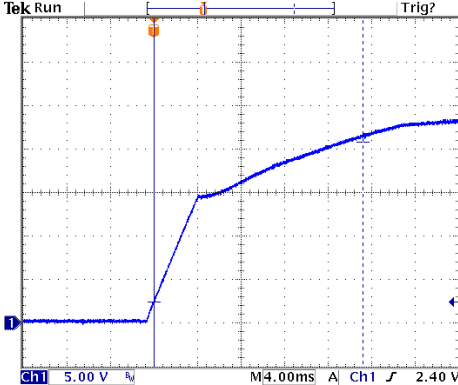
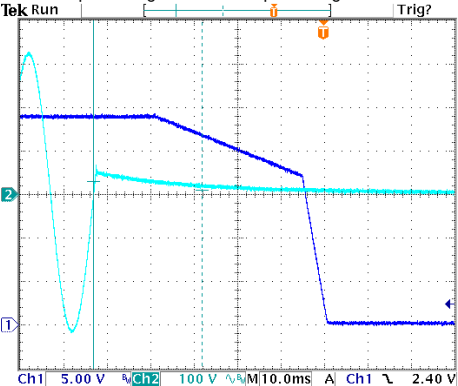
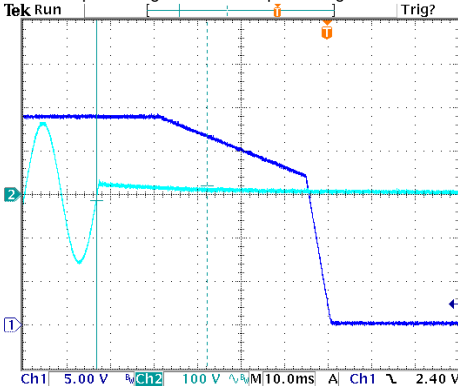
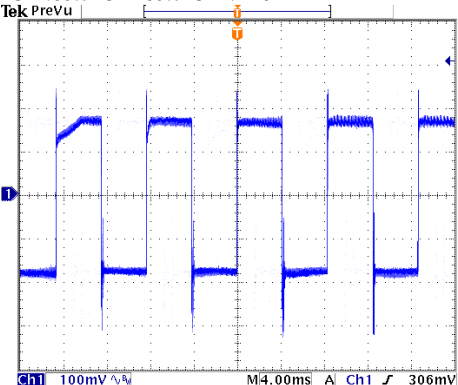
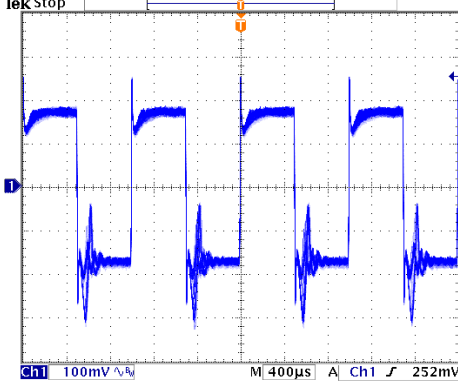
■ RELIABILITY TEST

ENVIRONMENT TEST

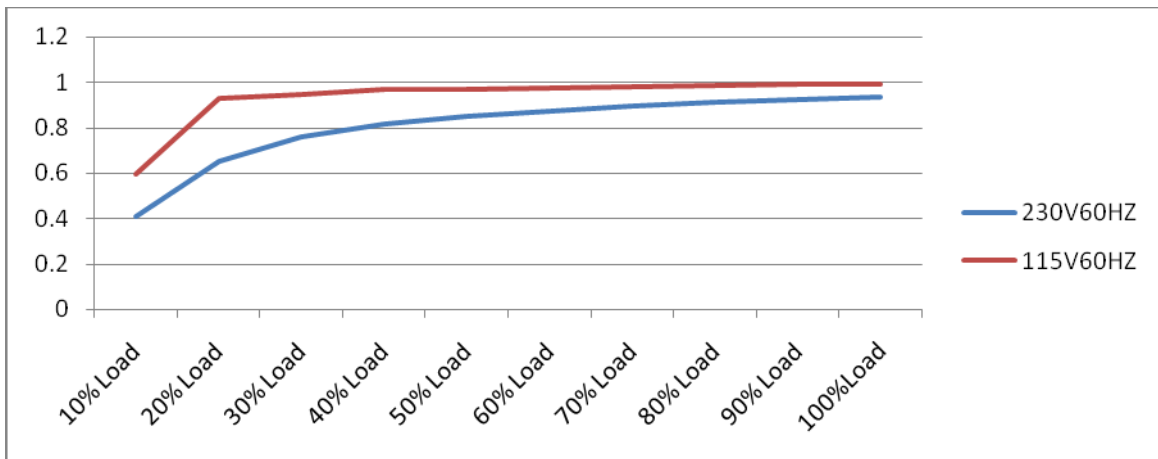
DESIGN VERIFY TEST

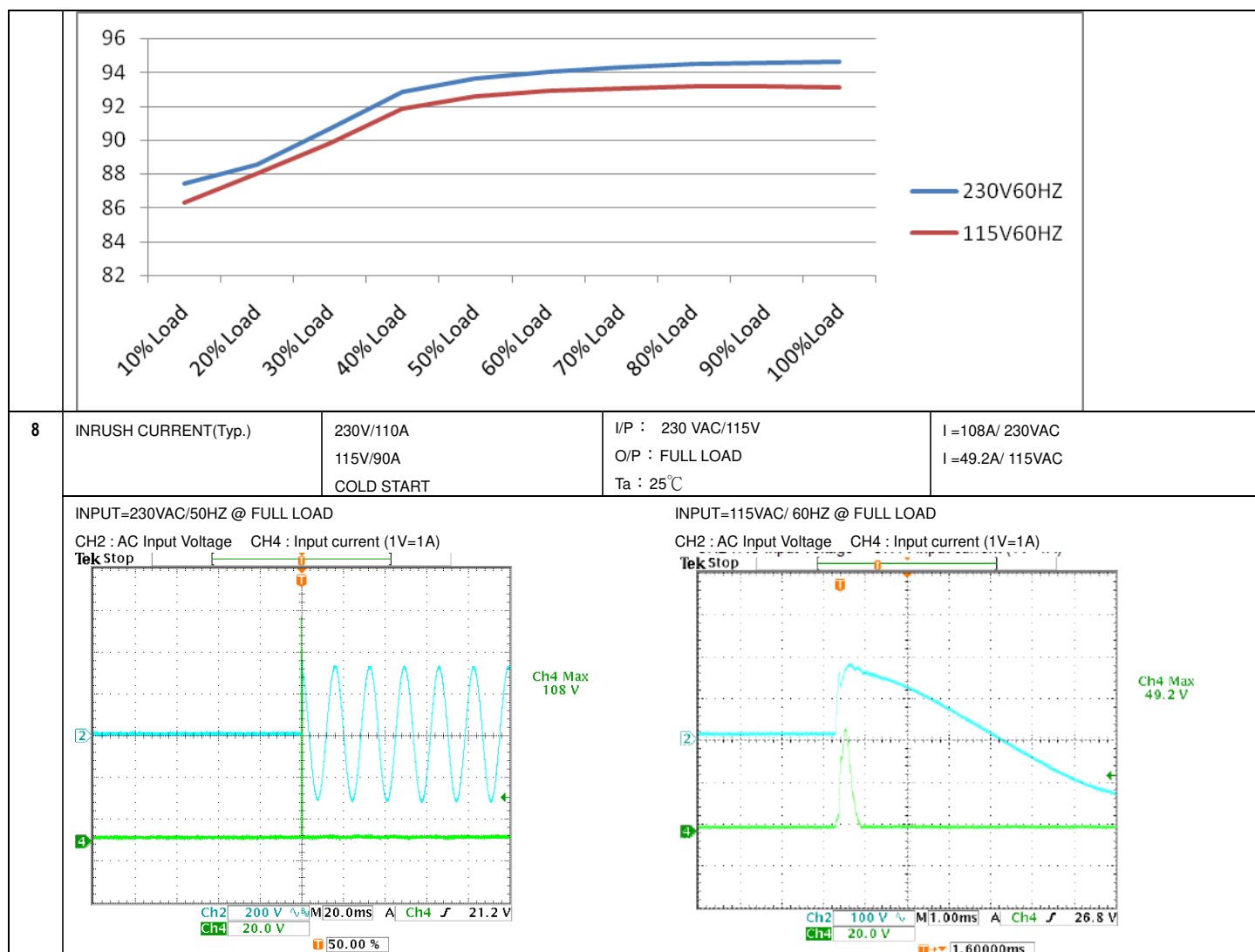
OUTPUT FUNCTION TEST

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: -0.548%~ 0.653%
2	LINE REGULATION (Max)	V1: -1%~ 1%	I/P: 100VAC~ 264VAC O/P:FULL LOAD Ta:25°C	V1: -0.076%~ 0.05%
3	LOAD REGULATION(Max)	V1: -3%~ 3%	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25°C	V1: -0.548%~ 0.653%
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: 23.8mVp-p
high frequency :  Ch1 Pk-Pk 14.8mV Waveform Intensity: 62% Ch1 10.0mV/V M 100µs A Ch1 17.8mV 0.00000 s low frequency :  Ch1 Pk-Pk 23.8mV Ch1 10.0mV/V M 20.0ms A Ch1 12.0mV 0.00000 s				
6	SET UP TIME(Max)	230VAC/2000ms 115VAC/2500ms	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 1130ms 115VAC/ 1110ms
INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage  Δ: 12.0 V @: 12.0 V Δ: 1.13 s @: -1.10 s Ch1 5.00 V Ch2 600 V M 400ms A Ch1 2.40 V 70.00 % INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage  Δ: 104 V @: 56.0 V Δ: 1.11 s @: -1.08 s Ch1 5.00 V Ch2 400 V M 400ms A Ch1 2.40 V 70.00 %				
7	RISE TIME (Max)	230VAC/50ms 115VAC/50ms	I/P : 230 VAC I/P : 115 VAC	230VAC/ 17.3ms 115VAC/ 19.2ms

			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/ 25.0ms 115VAC/ 25.4ms
	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 /50% LOAD 50%DUTY / 1KHZ Ta:25°C	562mVp-p 564mVp-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℃	66.662V~264V																																	
			I/P: LOW-LINE-3V=97 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/ 1A 115V/ 1.85A	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25℃	I =0.76A/ 230VAC I =1.49A/ 115VAC																																	
4	LEAKAGE CURRENT	<0.1 mA / 264 VAC	I/P : 264 VAC O/P : Min LOAD Ta : 25℃	L-FG : 0.069 mA N-FG : 0.069 mA																																	
5	NO LOAD CONSUMPTION	< 0.15W	I/P : 115VAC I/P : 230VAC O/P : NO LOAD Ta : 25℃	< 0.1054 W < 0.1212 W																																	
6	POWER FACTOR (Typ.)	0.94/ 230VAC 0.98/115VAC	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25℃	PF=0.949/230VAC PF=0.994/115VAC																																	
P.F vs LOAD  <table><caption>P.F vs LOAD Data</caption><thead><tr><th>Load (%)</th><th>230V60HZ P.F</th><th>115V60HZ P.F</th></tr></thead><tbody><tr><td>10%</td><td>0.40</td><td>0.60</td></tr><tr><td>20%</td><td>0.65</td><td>0.95</td></tr><tr><td>30%</td><td>0.75</td><td>0.98</td></tr><tr><td>40%</td><td>0.80</td><td>0.99</td></tr><tr><td>50%</td><td>0.85</td><td>1.00</td></tr><tr><td>60%</td><td>0.88</td><td>1.00</td></tr><tr><td>70%</td><td>0.90</td><td>1.00</td></tr><tr><td>80%</td><td>0.92</td><td>1.00</td></tr><tr><td>90%</td><td>0.94</td><td>1.00</td></tr><tr><td>100%</td><td>0.95</td><td>1.00</td></tr></tbody></table>					Load (%)	230V60HZ P.F	115V60HZ P.F	10%	0.40	0.60	20%	0.65	0.95	30%	0.75	0.98	40%	0.80	0.99	50%	0.85	1.00	60%	0.88	1.00	70%	0.90	1.00	80%	0.92	1.00	90%	0.94	1.00	100%	0.95	1.00
Load (%)	230V60HZ P.F	115V60HZ P.F																																			
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7	EFFICIENCY(Typ.)	93.5%	I/P:230 VAC O/P:FULL LOAD Ta:25℃	94.53%																																	
EFFICIENCY vs LOAD																																					



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	128.6%/ 264VAC 128.6%/ 230VAC 129.4%/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	29.2V/ 264VAC 29.2V/ 230VAC 29.2V/ 90VAC PROTECTION TYPE : Shut down o/p voltage,re-power on to recover
3	OVER TEMPERATURE PROTECTION	Protection type : Shut down o/p voltage,repower on to recover	I/P: 264VAC I/P: 90VAC O/P: FULL LOAD	O.T.P. Active Protection type :Shut down o/p voltage,repower on to recover
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 : 12 A/500 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℃	VDS: (1) 448V (2) 454V (3) 432V
2	P.F.C Transistor (D to S) or (C to E) Peak Voltage	Q1 Rated : 16 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℃	VDS: (1) 506V (2) 494V (3) 492V
3	P.F.C DIODE	D1 Rated : 9 A/ 600V	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 ITa:25℃	(1) 418V (2) 418V (3) 416V (4) 418V
4	Diode Peak Voltage	Q101 Rated : 80A/ 75V	I/P:High-Line +3V =267 V AC ON/OFF O/P: (1)Full Load (2)Output Short (3) Full Load Continue z Ta:25℃	Q101: VDS: (1)54.2V (2)7.19V (3)53.8V
5	Input Capacitor Voltage	C5 Rated: : 150 μ / 420 V 105℃	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℃	(1)408V (2)408V (3)400V
6	Control IC Voltage Test	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℃	(1) 26.1V (2) 20.0V (3) 19.8V (4) 28.8V

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℃	I/P-O/P:1.926mA NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P:500VDC>100M Ω	I/P-O/P: 600 VDC Ta:25℃	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	EN61000-4-5 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 : GSM160B48-R7B 1. ROOM AMBIENT BURN-IN : 1HRS I/P : 230VAC O/P : FULL LOAD Ta= 23.1 °C 2. HIGH AMBIENT BURN-IN : 1HRS I/P : 230VAC O/P : FULL LOAD Ta= 44.7 °C <table><tr><th>NO</th><th>Position</th><th>ROOM AMBIENT Ta= 23.1 °C</th><th>HIGH AMBIENT Ta= 44.7 °C</th></tr><tr><td>1</td><td>LF1</td><td>44.8°C</td><td>65.4°C</td></tr><tr><td>2</td><td>LF2</td><td>51.2°C</td><td>71.4°C</td></tr><tr><td>3</td><td>L1</td><td>54.5°C</td><td>74.5°C</td></tr><tr><td>4</td><td>L2</td><td>53.4°C</td><td>73.3°C</td></tr><tr><td>5</td><td>D2</td><td>54.1°C</td><td>74.0°C</td></tr><tr><td>6</td><td>C5</td><td>53.8°C</td><td>73.6°C</td></tr><tr><td>7</td><td>RTH2</td><td>57.0°C</td><td>76.9°C</td></tr><tr><td>8</td><td>T1core</td><td>62.5°C</td><td>81.9°C</td></tr><tr><td>9</td><td>C101</td><td>54.3°C</td><td>73.6°C</td></tr><tr><td>10</td><td>C102</td><td>57.6°C</td><td>76.5°C</td></tr><tr><td>11</td><td>BD1</td><td>54.5°C</td><td>74.3°C</td></tr><tr><td>12</td><td>Q1</td><td>54.6°C</td><td>74.3°C</td></tr><tr><td>13</td><td>D1</td><td>55.4°C</td><td>75.0°C</td></tr><tr><td>14</td><td>Q6</td><td>55.4°C</td><td>75.3°C</td></tr><tr><td>15</td><td>Q5</td><td>55.8°C</td><td>75.7°C</td></tr><tr><td>16</td><td>Q101</td><td>57.6°C</td><td>76.8°C</td></tr><tr><td>17</td><td>Q102</td><td>56.9°C</td><td>76.1°C</td></tr><tr><td>18</td><td>U1</td><td>60.3°C</td><td>79.7°C</td></tr><tr><td>19</td><td>C13</td><td>63.4°C</td><td>82.0°C</td></tr><tr><td>20</td><td>ZNR1</td><td>49.2°C</td><td>69.5°C</td></tr><tr><td>21</td><td>C11</td><td>53.6°C</td><td>73.5°C</td></tr><tr><td>22</td><td>R5</td><td>54.2°C</td><td>74.0°C</td></tr><tr><td>23</td><td>C81</td><td>56.2°C</td><td>75.4°C</td></tr></table>			NO	Position	ROOM AMBIENT Ta= 23.1 °C	HIGH AMBIENT Ta= 44.7 °C	1	LF1	44.8°C	65.4°C	2	LF2	51.2°C	71.4°C	3	L1	54.5°C	74.5°C	4	L2	53.4°C	73.3°C	5	D2	54.1°C	74.0°C	6	C5	53.8°C	73.6°C	7	RTH2	57.0°C	76.9°C	8	T1core	62.5°C	81.9°C	9	C101	54.3°C	73.6°C	10	C102	57.6°C	76.5°C	11	BD1	54.5°C	74.3°C	12	Q1	54.6°C	74.3°C	13	D1	55.4°C	75.0°C	14	Q6	55.4°C	75.3°C	15	Q5	55.8°C	75.7°C	16	Q101	57.6°C	76.8°C	17	Q102	56.9°C	76.1°C	18	U1	60.3°C	79.7°C	19	C13	63.4°C	82.0°C	20	ZNR1	49.2°C	69.5°C	21	C11	53.6°C	73.5°C	22	R5	54.2°C	74.0°C	23	C81	56.2°C	75.4°C
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230 VAC O/P : 138 % LOAD Ta : 25°C	TEST : OK																																																																																																
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 264VAC/100VAC O/P : 100 % LOAD Ta= -35 °C	TEST : OK																																																																																																
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 40 °C NO DAMAGE	I/P : 272 VAC O/P : FULL LOAD Ta= 40.1 °C HUMIDITY= 95 %R.H	TEST : OK																																																																																																
5	TEMPERATURE COEFFICIENT	± 0.03 %/°C (0~50°C)	I/P : 230 VAC O/P : FULL LOAD	± 0.008 %/°C (0~50°C)																																																																																																

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 C 102 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) 186479HRS (2) 79510HRS (3) 113972HRS (4) 148355HRS
10	MTBF	MIL-HDBK-217F TOTAL FAILURE RATE : 239.1 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