Test Report: GSM160B12

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

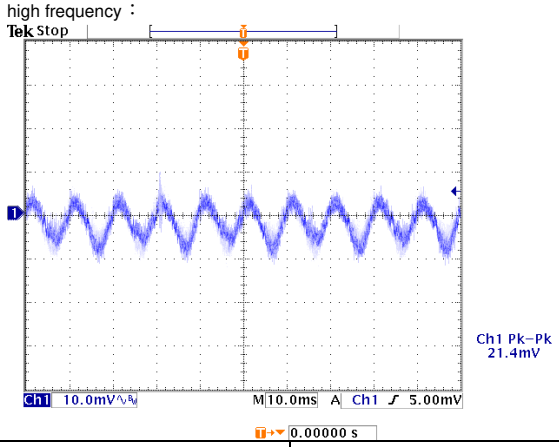
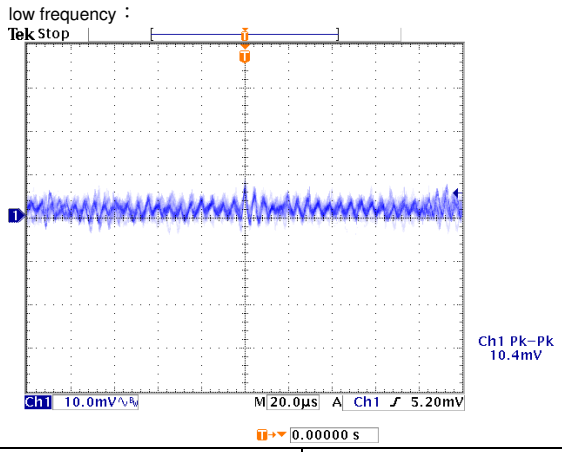
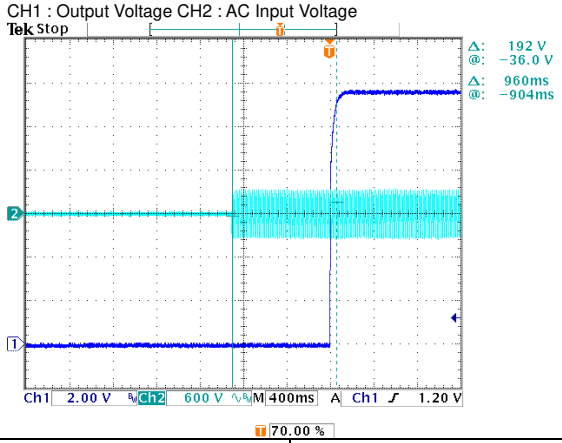
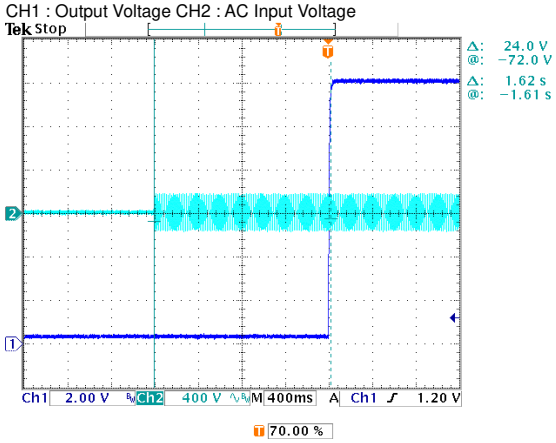
Safety Test
E.M.C. Test

■ RELIABILITY TEST

ENVIRONMENT TEST

■ DESIGN VERIFY TEST

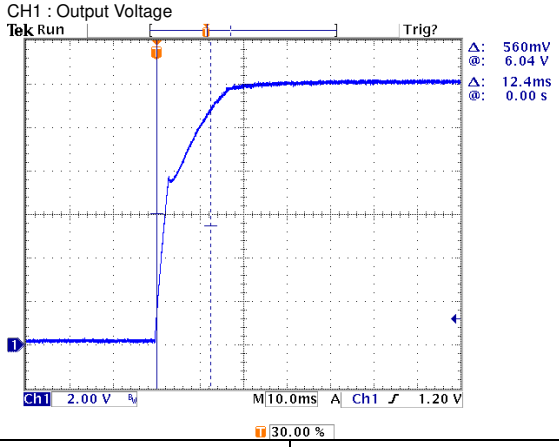
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE(Max) TOLERANCE	V1: -5%~ 5%	I/P: 100VAC /264VAC O/P:FULL/ MIN. LOAD Ta:25℃	V1: -2.43%~ 1.51%
2	LINE REGULATION (Max)	V1: -1%~ 1%	I/P: 100VAC~ 264VAC O/P:FULL LOAD Ta:25℃	V1: 0%~ 0%
3	LOAD REGULATION(Max)	V1: -5%~ 5%	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25℃	V1: -2.43%~ 1.51%
4	OVER/UNDERSHOOT TEST	< ±5%	I/P: 230VAC O/P:FULL LOAD Ta:25℃	< ±5%
5	RIPPLE & NOISE(Max)	V1: 80mVp-p	I/P:230VAC O/P:FULL LOAD Ta:25℃	V1: 21.4mVp-p
	high frequency： 		low frequency： 	
6	SET UP TIME(Max)	230VAC/2000ms 115VAC/2500ms	I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	230VAC/ 960ms 115VAC/ 1620ms
	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/ 12.4ms 115VAC/ 14.6ms

			O/P：FULL LOAD Ta：25℃	

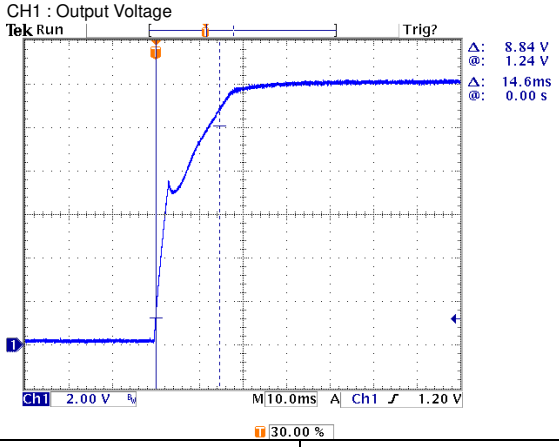
INPUT=230VAC/50HZ @ FULL LOAD

CH1 : Output Voltage



INPUT=115VAC/60HZ @ FULL LOAD

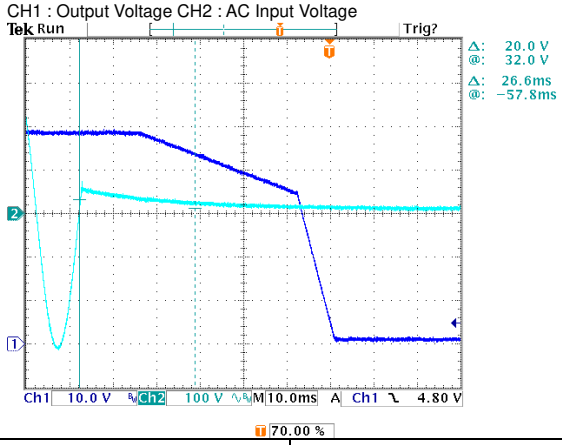
CH1 : Output Voltage



8	HOLD UP TIME (Typ.)	230VAC/24ms 115VAC/24ms	I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	230VAC/ 26.6ms 115VAC/ 27.0ms

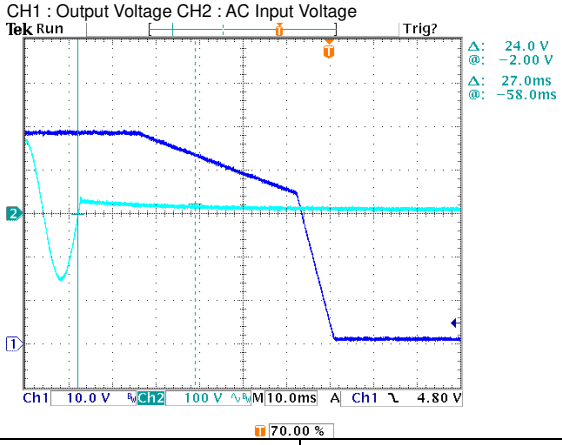
INPUT=230VAC/50HZ @ FULL LOAD

CH1 : Output Voltage CH2 : AC Input Voltage



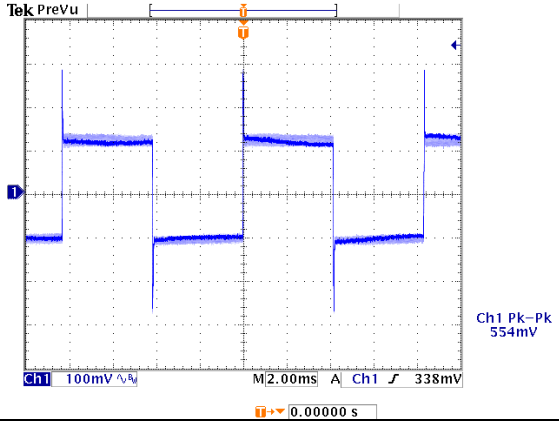
INPUT=115VAC/60HZ @ FULL LOAD

CH1 : Output Voltage CH2 : AC Input Voltage

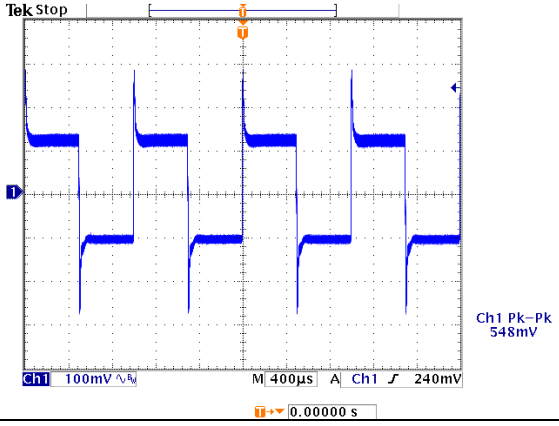


9	DYNAMIC LOAD	V1: 1200mVp-p	I/P: 230VAC O/P: (1)FULL /50% LOAD 50%DUTY / 120HZ (2)FULL /50% LOAD 50%DUTY / 1KHZ Ta:25℃	 554mVp-p 548mVp-p

FULL /50% LOAD 50%DUTY / 120HZ

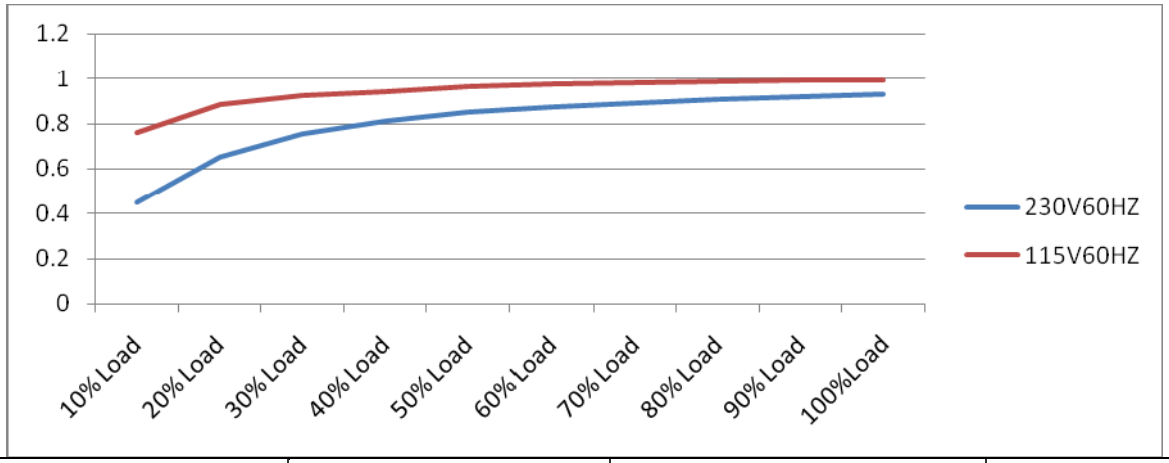


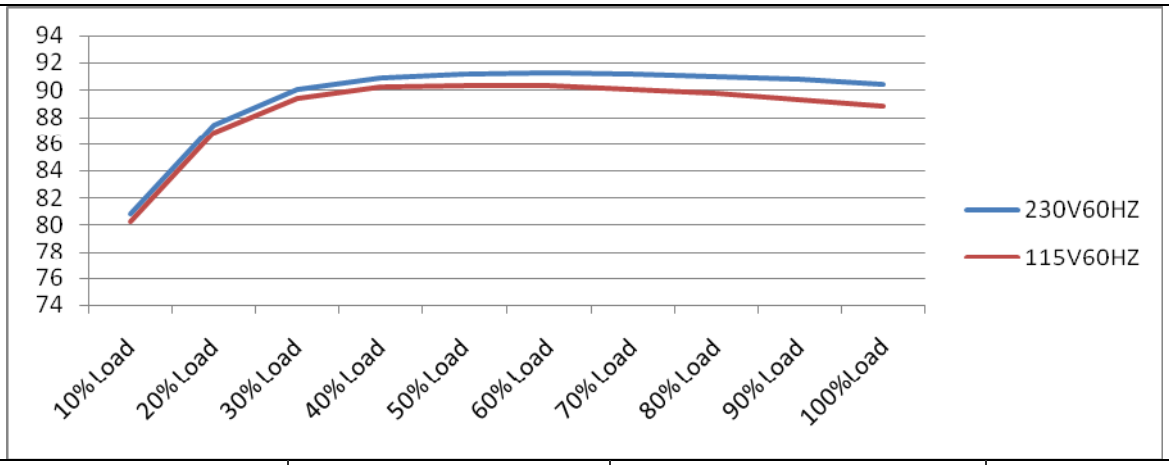
FULL /50% LOAD 50%DUTY / 1KHZ



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℃	77V~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 =0.667A/ 230VAC I =1.302A/ 115VAC
4	LEAKAGE CURRENT	<0.1 mA / 264 VAC	I/P： 264 VAC O/P：Min LOAD Ta：25℃	L-FG： 0.072 mA N-FG： 0.072 mA
5	NO LOAD CONSUMPTION	< 0.15W	I/P：115VAC I/P：230VAC O/P：NO LOAD Ta：25℃	< 0.0956 W < 0.1175 W
6	POWER FACTOR (Typ.)	0.93/ 230VAC 0.98/115VAC	I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	PF=0.95/230VAC PF=0.99/115VAC
	P.F vs LOAD			
7	EFFICIENCY(Typ.)	90%	I/P:230 VAC O/P:FULL LOAD Ta:25℃	90.21%
	EFFICIENCY vs LOAD			

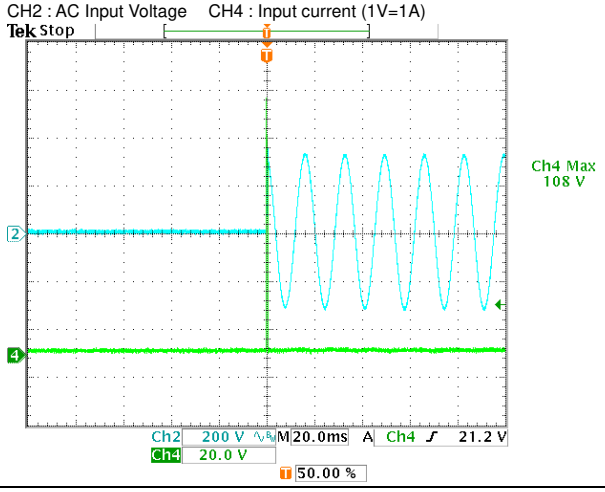




8	INRUSH CURRENT(Typ.)	230V/110A 115V/90A COLD START	I/P ： 230 VAC/115V O/P ： FULL LOAD Ta ： 25℃	I =108A/ 230VAC I =49.2A/ 115VAC

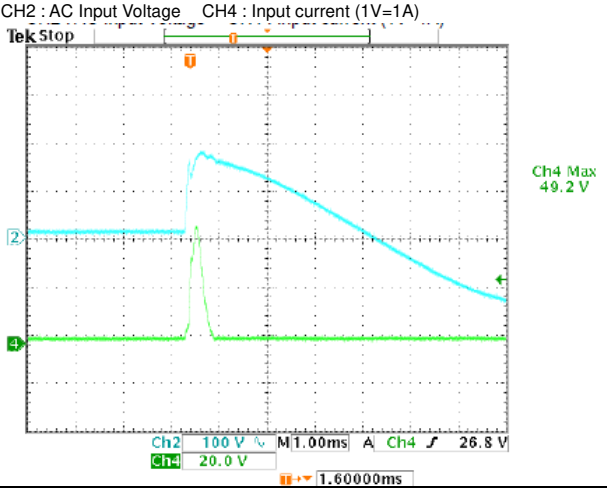
INPUT=230VAC/50HZ @ FULL LOAD

CH2 : AC Input Voltage CH4 : Input current (1V=1A)



INPUT=115VAC/ 60HZ @ FULL LOAD

CH2 : AC Input Voltage CH4 : Input current (1V=1A)



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℃	130.8%/ 264VAC 130.8%/ 230VAC 130.8%/100VAC PROTECTION TYPE ： Hiccup mode,recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	12.6V~16.2V	I/P: 264VAC I/P: 230VAC I/P: 90VAC O/P:MIN LOAD Ta:25℃	13.9V/ 264VAC 13.9V/ 230VAC 13.9V/ 90VAC PROTECTION TYPE ： Shot 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℃	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 : 12A/ 500V	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) 450V (2) 456V (3) 438V
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) 526V (2) 534V (3) 510V
3	P.F.C DIODE	D1 Rated : 9A/ 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 Ta:25℃	(1) 438V (2) 438V (3) 438V (4) 442V
4	Diode Peak **Voltage**	Q101 Rated : 120 A/40 V	I/P:High-Line +3V =267 V AC ON/OFF O/P: (1)Full Load (2)Output Short (3) Full Load Continue Ta:25℃	Q101: VDS: (1)29.9V (2)9.20V (3)30.1V
5	**Input Capacitor Voltage**	C5 Rated: : 150μ / 420V 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)414V (2)414V (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) 24.9V (2) 20.0V (3) 20.0V (4) 27.6V

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: 1.905mA NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P:500VDC>100MΩ	I/P-O/P: 600 VDC Ta:25℃	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℃	PASS
2	CONDUCTION	EN55011 CLASS B	I/P： 230 VAC (50HZ) O/P：FULL/50% LOAD Ta：25℃	PASS Test by certified Lab
3	RADIATION	EN55011 CLASS B	I/P： 230 VAC (50HZ) O/P：FULL LOAD Ta：25℃	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℃	CRITERIA A
5	E.F.T	EN61000-4-4 INPUT： 2KV	I/P： 230 VAC/50HZ O/P：FULL LOAD Ta：25℃	CRITERIA A
6	SURGE	EN61000-4-5 L-N ：1KV	I/P： 230 VAC/50HZ O/P：FULL LOAD Ta：25℃	CRITERIA A
7	Test by certified Lab & Test Report Prepare			

■ RELIABILITY TEST

ENVIRONMENT TEST

<table>
<tr><th>NO</th><th>TEST ITEM</th><th>SPECIFICATION</th><th>TEST CONDITION</th><th>RESULT</th></tr>
<tr><td>1</td><td>TEMPERATURE RISE TEST</td><td colspan="3">MODEL： GSM160B15-R7B
1. ROOM AMBIENT BURN-IN： 1HRS
I/P： 230VAC O/P： FULL LOAD Ta= 23.1 ℃
2. HIGH AMBIENT BURN-IN： 1HRS
I/P： 230VAC O/P： FULL LOAD Ta= 44.7 ℃

<table>
<tr><th>NO</th><th>Position</th><th>ROOM AMBIENT Ta= 23.1 ℃</th><th>HIGH AMBIENT Ta= 44.7 ℃</th></tr>
<tr><td>1</td><td>LF1</td><td>45.8℃</td><td>66.6℃</td></tr>
<tr><td>2</td><td>LF2</td><td>49.1℃</td><td>69.5℃</td></tr>
<tr><td>3</td><td>L1</td><td>55.7℃</td><td>76.1℃</td></tr>
<tr><td>4</td><td>L2</td><td>53.1℃</td><td>73.6℃</td></tr>
<tr><td>5</td><td>D2</td><td>54.6℃</td><td>75.1℃</td></tr>
<tr><td>6</td><td>C5</td><td>53.2℃</td><td>73.6℃</td></tr>
<tr><td>7</td><td>RTH2</td><td>56.7℃</td><td>77.2℃</td></tr>
<tr><td>8</td><td>T1 core</td><td>61.8℃</td><td>82.3℃</td></tr>
<tr><td>9</td><td>C101</td><td>60.6℃</td><td>80.9℃</td></tr>
<tr><td>10</td><td>C102</td><td>62.4℃</td><td>82.7℃</td></tr>
<tr><td>11</td><td>BD1</td><td>55.6℃</td><td>75.7℃</td></tr>
<tr><td>12</td><td>Q1</td><td>54.7℃</td><td>75.1℃</td></tr>
<tr><td>13</td><td>D1</td><td>55.6℃</td><td>75.9℃</td></tr>
<tr><td>14</td><td>Q6</td><td>55.7℃</td><td>76.2℃</td></tr>
<tr><td>15</td><td>Q5</td><td>56.3℃</td><td>76.8℃</td></tr>
<tr><td>16</td><td>Q101</td><td>60.5℃</td><td>81.4℃</td></tr>
<tr><td>17</td><td>Q102</td><td>60.4℃</td><td>81.4℃</td></tr>
<tr><td>18</td><td>T1Coil</td><td>57.3℃</td><td>77.3℃</td></tr>
<tr><td>19</td><td>C13</td><td>61.6℃</td><td>81.4℃</td></tr>
<tr><td>20</td><td>ZNR1</td><td>49.6℃</td><td>70.4℃</td></tr>
<tr><td>21</td><td>C11</td><td>54.5℃</td><td>75.1℃</td></tr>
<tr><td>22</td><td>R5</td><td>54.8℃</td><td>75.3℃</td></tr>
<tr><td>23</td><td>C81</td><td>57.2℃</td><td>77.5℃</td></tr>
<tr><td>24</td><td>U101</td><td>63.9℃</td><td>84.5℃</td></tr>
</table>
</td></tr>
<tr><td>2</td><td>OVER LOAD BURN-IN TEST</td><td>NO DAMAGE
1 HOUR (MIN)</td><td>I/P： 230 VAC
O/P： 130 % LOAD
Ta：25℃</td><td>TEST：OK</td></tr>
<tr><td>3</td><td>LOW TEMPERATURE
TURN ON TEST</td><td>TURN ON AFTER 2 HOUR</td><td>I/P： 264VAC/100VAC
O/P： 100 % LOAD
Ta= -35 ℃</td><td>TEST：OK</td></tr>
<tr><td>4</td><td>HIGH HUMIDITY
HIGH TEMPERATURE
HIGH VOLTAGE
TURN ON TEST</td><td>AFTER 12 HOURS
IN CHAMBER ON
CONTROL 40 ℃
NO DAMAGE</td><td>I/P： 272 VAC
O/P：FULL LOAD
Ta= 40.1 ℃
HUMIDITY= 95 %R.H</td><td>TEST：OK</td></tr>
<tr><td>5</td><td>TEMPERATURE
COEFFICIENT</td><td>± 0.03 %/℃(0~50℃)</td><td>I/P： 230 VAC
O/P：FULL LOAD</td><td>± 0.00367 %/℃(0~50℃)</td></tr>
</table>

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 ℃ LIFE TIME (2) I/P： 230VAC O/P：FULL LOAD Ta= 40 ℃ LIFE TIME (3) I/P： 230VAC O/P：75% LOAD Ta= 40 ℃ LIFE TIME (4) I/P： 230VAC O/P：50% LOAD Ta= 40 ℃ LIFE TIME	(1) 204288HRS (2) 79040HRS (3) 164768HRS (4) 258521HRS
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