



Test Report: GSM160B20-R7B

160W 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

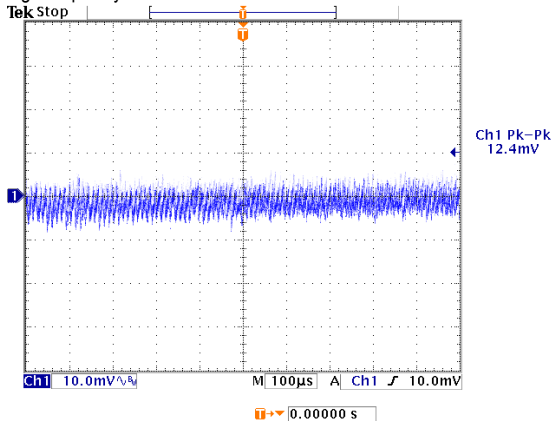
ENVIRONMENT TEST

DESIGN VERIFY TEST

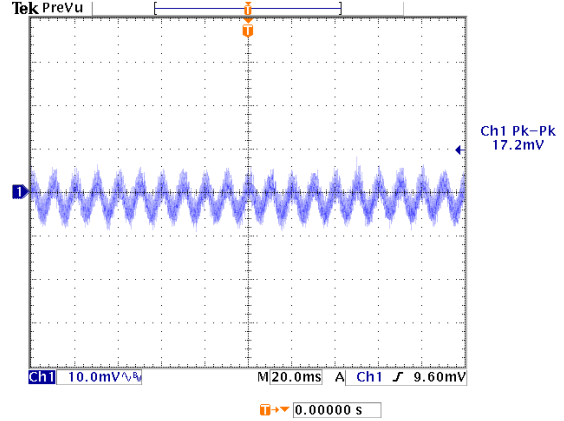
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE(Max) TOLERANCE	V1: -4%~ 4%	I/P: 100VAC /264VAC O/P:FULL/ MIN. LOAD Ta:25°C	V1: -0.786%~ 0.944%
2	LINE REGULATION (Max)	V1: -1%~ 1%	I/P: 100VAC~ 264VAC O/P:FULL LOAD Ta:25°C	V1: -0.03%~ 0.03%
3	LOAD REGULATION(Max)	V1: -4%~ 4%	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25°C	V1: -0.786%~ 0.944%
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: 17.2mVp-p

high frequency :



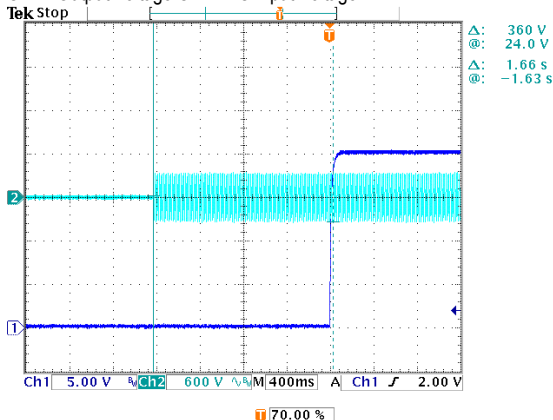
low frequency :



6	SET UP TIME(Max)	230VAC/2000ms 115VAC/2500ms	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 1660 ms 115VAC/ 1090ms
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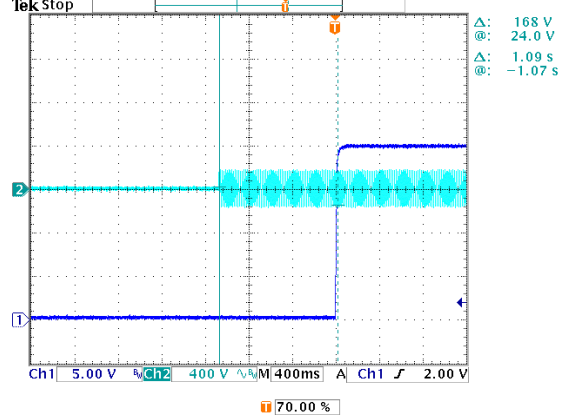
INPUT=230VAC/50HZ @ FULL LOAD

CH1 : Output Voltage CH2 : AC Input Voltage



INPUT=115VAC/60HZ @ FULL LOAD

CH1 : Output Voltage CH2 : AC Input Voltage



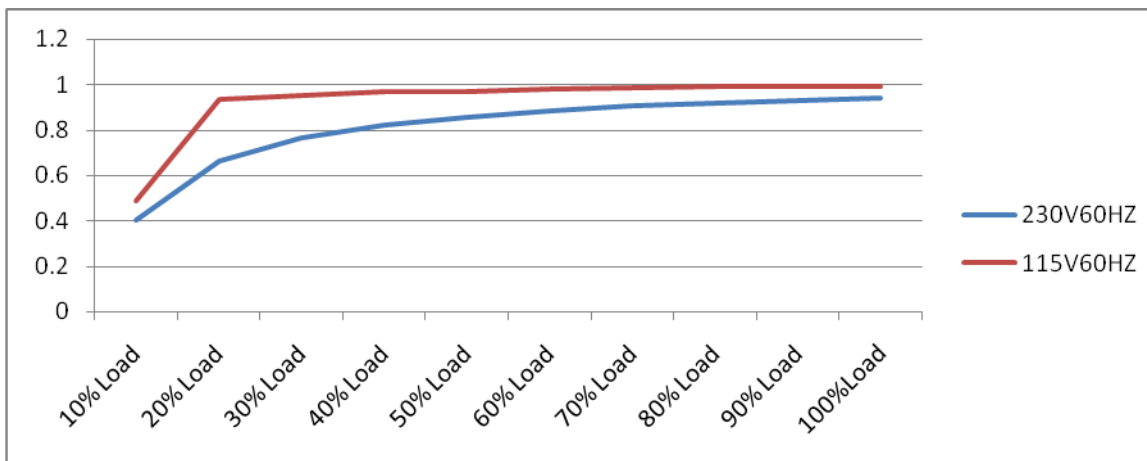
7	RISE TIME (Max)	230VAC/50ms 115VAC/50ms	I/P : 230 VAC I/P : 115 VAC	230VAC/ 17.2 ms 115VAC/ 19.0 ms
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		O/P : FULL LOAD Ta : 25°C	
INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage		INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage	
<p>Δ: 1.70 V @: 16.3 V Δ: 17.2ms @: 0.00 s</p>		<p>Δ: 15.4 V @: 2.00 V Δ: 19.0ms @: 0.00 s</p>	
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/ 26.8ms 115VAC/ 27.2ms
INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage		INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage	
<p>Δ: 20.0 V @: 16.0 V Δ: 26.8ms @: -50.0ms</p>		<p>Δ: 22.0 V @: -8.00 V Δ: 27.2ms @: -50.0ms</p>	
9	DYNAMIC LOAD	V1: 2000mVp-p	I/P: 230VAC O/P: (1)FULL /50% LOAD 50%DUTY / 120HZ (2)FULL /50% LOAD 50%DUTY / 1KHZ Ta:25°C 390mVp-p 390mVp-p
FULL /50% LOAD 50%DUTY / 120HZ		FULL /50% LOAD 50%DUTY / 1KHZ	
<p>Ch1 Pk-Pk 390mV</p>		<p>Ch1 Pk-Pk 390mV</p>	

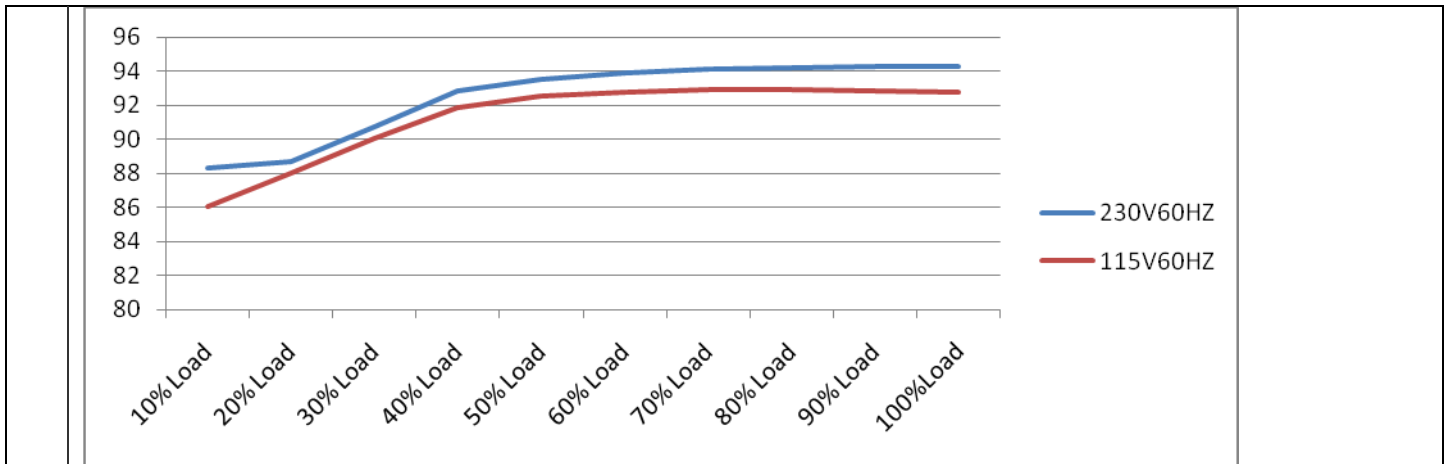
INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	100VAC~264VAC	I/P:TESTING O/P:FULL LOAD Ta:25°C	66.650V~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°C	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°C	I=0.771A/ 230VAC I=1.508A/ 115VAC
4	LEAKAGE CURRENT	<0.1 mA / 264 VAC For touch leakage current	I/P : 264 VAC O/P : Min LOAD Ta : 25°C	L-V- : 0.073 mA N-V- : 0.073 mA
5	NO LOAD CONSUMPTION	< 0.15W	I/P : 115VAC I/P : 230VAC O/P : NO LOAD Ta : 25°C	< 0.0967 W < 0.1230 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°C	PF=0.95/230VAC PF=0.99/115VAC

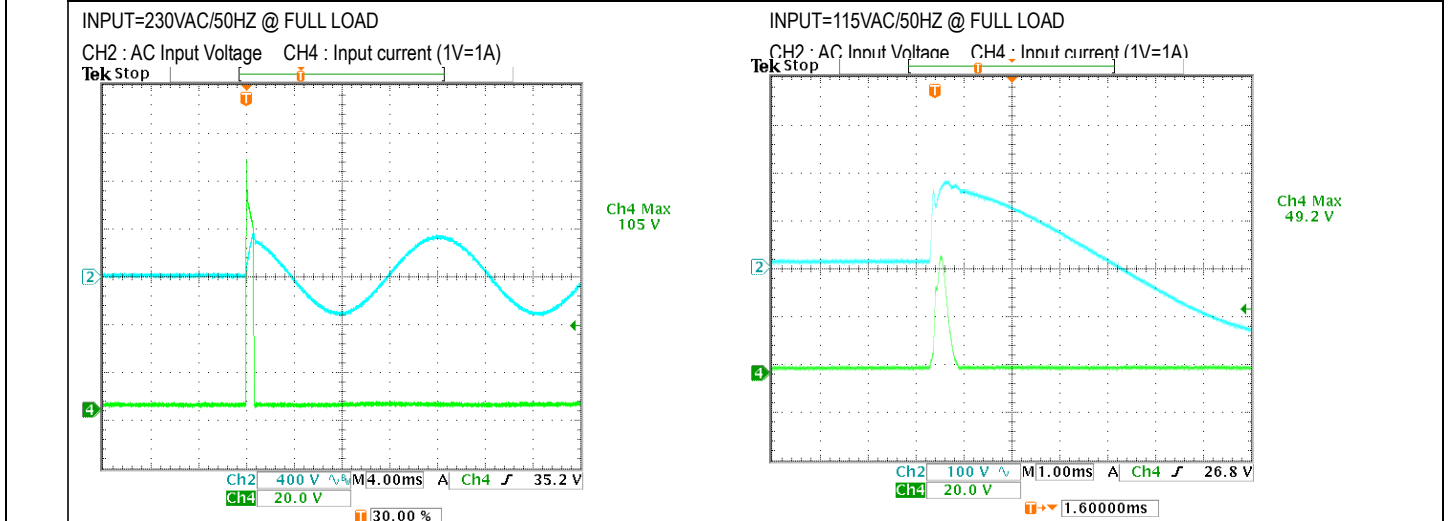
P.F vs LOAD



7	EFFICIENCY(Typ.)	92.5%	I/P:230 VAC O/P:FULL LOAD Ta:25°C	94.11%
EFFICIENCY vs LOAD				



8	INRUSH CURRENT(Typ.)	230V/110A	I/P : 230 VAC	I =105A/ 230VAC
		115V/55A	I/P : 115 VAC	I =49.2A/ 115VAC
		COLD START	O/P : FULL LOAD	
			Ta : 25°C	



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	125.1%/ 264VAC 125.1%/ 230VAC 125.2%/100VAC PROTECTION TYPE : Hiccup mode,recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	21V~27V	I/P: 264VAC I/P: 230VAC I/P: 85VAC O/P: MIN LOAD Ta:25°C	23.5V/ 264VAC 23.5V/ 230VAC 23.5V/ 90VAC PROTECTION TYPE : Shot 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,repower on to recover
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 264VAC I/P: 90VAC O/P: FULL LOAD	NO DAMAGE PROTECTION TYPE : Hiccup mode,recovers automatically after fault

			Ta:25°C	condition is removed
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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°C	VDS: (1) 452V (2) 456V (3) 446V
2	P.F.C Transistor (D to S) or (C to E) Peak Voltage	Q1 Rated : 16A/ 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) 520V (2) 522V (3) 512V
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 Ta:25°C	(1) 422V (2) 424V (3) 428V (4) 430V
4	Diode Peak Voltage	Q101 Rated : 80A/ 75 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°C	Q101: VDS: (1)45.6V (2)6.4V (3)45.8V
5	Input Capacitor Voltage	C5 Rated: : 150 μ / 420V 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)416V (2)412V (3)402V
6	Control IC Voltage Test	IC U1 Rated : 38V -0.4V(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) 28.6V (2) 20.0V (3) 20.0V (4) 29.5V

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P: 4KVAC/min	I/P-O/P: 4.125 KVAC/min Ta:25°C	I/P-O/P:1.966mA NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P:500VDC>100MΩ	I/P-O/P: 500 VDC Ta:25°C	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 : 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 MEDICAL 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 MEDICAL INPUT : 2KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
6	SURGE	IEC61000-4-5 MEDICAL L-N : 1KV L,N-PE : 2KV	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 : GSM160B15-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 border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta= 23.1 °C</th> <th>HIGH AMBIENT Ta= 44.7 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>LF1</td><td>45.8°C</td><td>66.6°C</td></tr> <tr><td>2</td><td>LF2</td><td>49.1°C</td><td>69.5°C</td></tr> <tr><td>3</td><td>L1</td><td>55.7°C</td><td>76.1°C</td></tr> <tr><td>4</td><td>L2</td><td>53.1°C</td><td>73.6°C</td></tr> <tr><td>5</td><td>D2</td><td>54.6°C</td><td>75.1°C</td></tr> <tr><td>6</td><td>C5</td><td>53.2°C</td><td>73.6°C</td></tr> <tr><td>7</td><td>RTH2</td><td>56.7°C</td><td>77.2°C</td></tr> <tr><td>8</td><td>T1 COIL</td><td>61.8°C</td><td>82.3°C</td></tr> <tr><td>9</td><td>C101</td><td>60.6°C</td><td>80.9°C</td></tr> <tr><td>10</td><td>C102</td><td>62.4°C</td><td>82.7°C</td></tr> <tr><td>11</td><td>BD1</td><td>55.6°C</td><td>75.7°C</td></tr> <tr><td>12</td><td>Q1</td><td>54.7°C</td><td>75.1°C</td></tr> <tr><td>13</td><td>D1</td><td>55.6°C</td><td>75.9°C</td></tr> <tr><td>14</td><td>Q6</td><td>55.7°C</td><td>76.2°C</td></tr> <tr><td>15</td><td>Q5</td><td>56.3°C</td><td>76.8°C</td></tr> <tr><td>16</td><td>Q101</td><td>60.5°C</td><td>81.4°C</td></tr> <tr><td>17</td><td>Q102</td><td>60.4°C</td><td>81.4°C</td></tr> <tr><td>18</td><td>T1Coil</td><td>57.3°C</td><td>77.3°C</td></tr> <tr><td>19</td><td>C13</td><td>61.6°C</td><td>81.4°C</td></tr> <tr><td>20</td><td>ZNR1</td><td>49.6°C</td><td>70.4°C</td></tr> <tr><td>21</td><td>C11</td><td>54.5°C</td><td>75.1°C</td></tr> <tr><td>22</td><td>R5</td><td>54.8°C</td><td>75.3°C</td></tr> <tr><td>23</td><td>C81</td><td>57.2°C</td><td>77.5°C</td></tr> <tr><td>24</td><td>U101</td><td>63.9°C</td><td>84.5°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta= 23.1 °C	HIGH AMBIENT Ta= 44.7 °C	1	LF1	45.8°C	66.6°C	2	LF2	49.1°C	69.5°C	3	L1	55.7°C	76.1°C	4	L2	53.1°C	73.6°C	5	D2	54.6°C	75.1°C	6	C5	53.2°C	73.6°C	7	RTH2	56.7°C	77.2°C	8	T1 COIL	61.8°C	82.3°C	9	C101	60.6°C	80.9°C	10	C102	62.4°C	82.7°C	11	BD1	55.6°C	75.7°C	12	Q1	54.7°C	75.1°C	13	D1	55.6°C	75.9°C	14	Q6	55.7°C	76.2°C	15	Q5	56.3°C	76.8°C	16	Q101	60.5°C	81.4°C	17	Q102	60.4°C	81.4°C	18	T1Coil	57.3°C	77.3°C	19	C13	61.6°C	81.4°C	20	ZNR1	49.6°C	70.4°C	21	C11	54.5°C	75.1°C	22	R5	54.8°C	75.3°C	23	C81	57.2°C	77.5°C	24	U101	63.9°C	84.5°C		
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230 VAC O/P : 130 % 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	± 0.00367 %/°C(0~50°C)																																																																																																				



6	STORAGE TEMPERATURE TEST	<ol style="list-style-type: none"> 1. Thermal shock Temperature : $-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$ 2. Temperature change rate : $25^{\circ}\text{C} / \text{MIN}$ 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	<ol style="list-style-type: none"> 1. Thermal shock Temperature : $-30^{\circ}\text{C} \sim +70^{\circ}\text{C}$ 2. Temperature change rate : $25^{\circ}\text{C} / \text{MIN}$ 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	<p>1 Carton & 1 Set</p> <ol style="list-style-type: none"> (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°C 	TEST : OK
9	CAPACITOR LIFE CYCLE	<p>SUPPOSE C 102 IS THE MOST CRITICAL COMPONENT</p> <ol style="list-style-type: none"> (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 	<ol style="list-style-type: none"> (1) 204288HRS (2) 79040HRS (3) 164768HRS (4) 258521HRS
10	MTBF	<p>MIL-HDBK-217F</p> <p>TOTAL FAILURE RATE : 290.3 KHRS</p>	
11	DMTBF/Accelerated Life Test	<p>Demonstration Mean Time Between Failure (Expected Life): Above 50,000 hours @ TA 50°C</p>	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	FRANK	GESG	WANGDZ

2007/3/20 A50-S014