



# TEST REPORT: GSM160A12-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

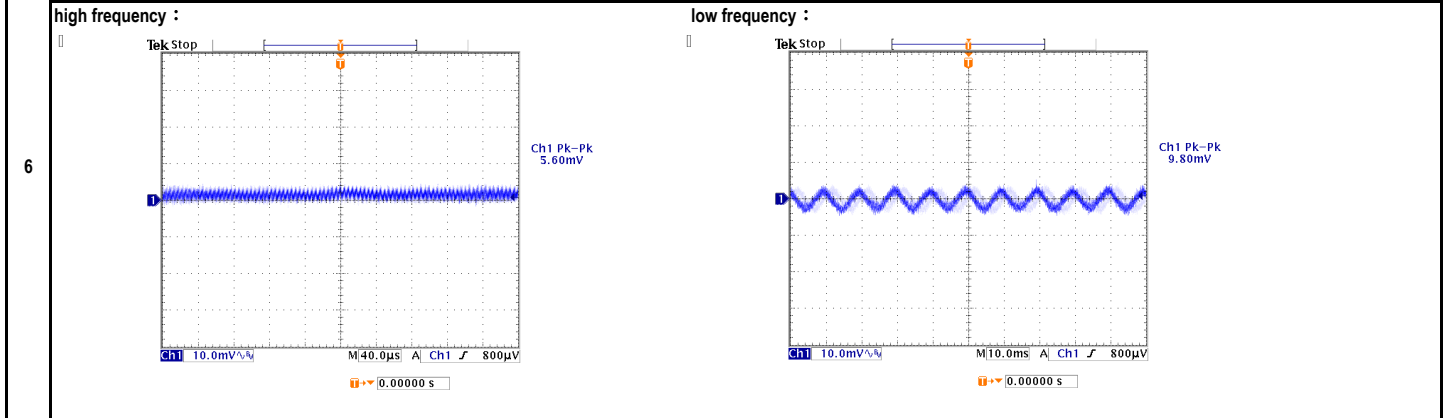
Safety Test  
E.M.C. Test

### ■ RELIABILITY TEST

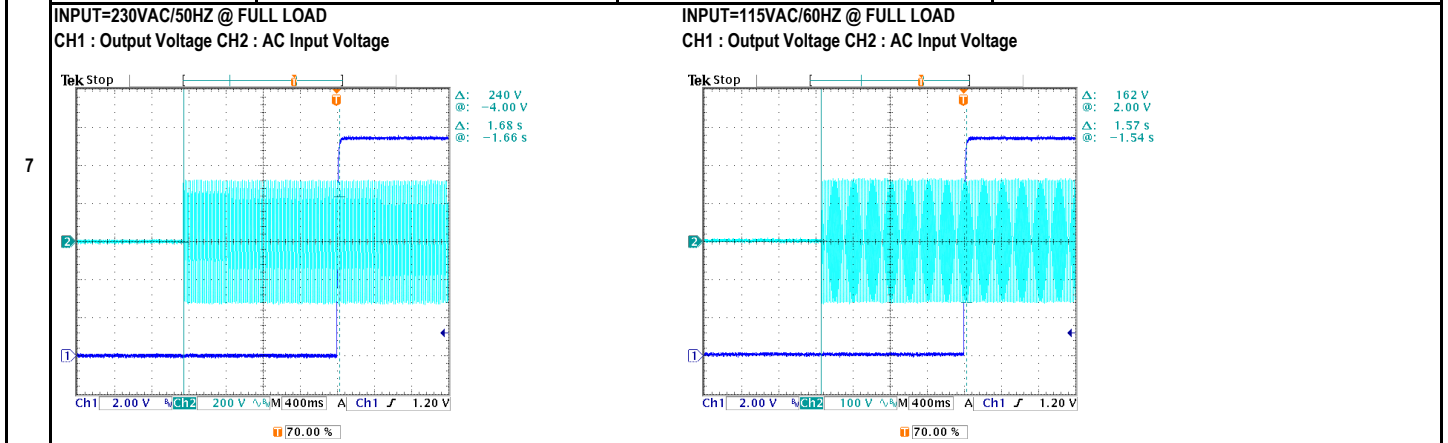
ENVIRONMENT TEST

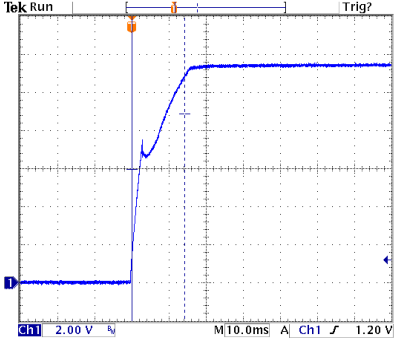
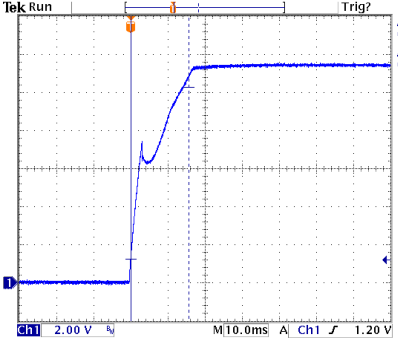
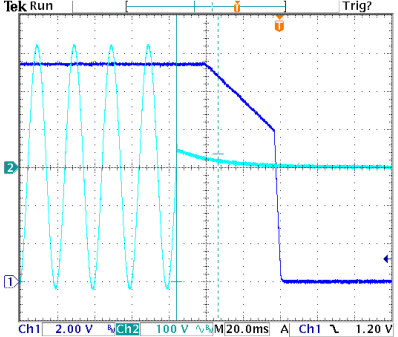
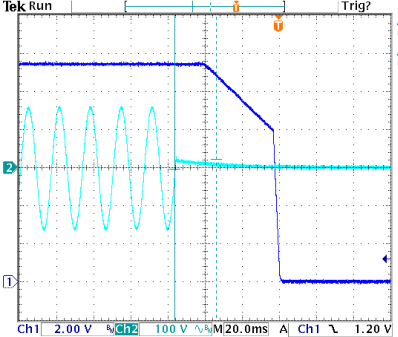
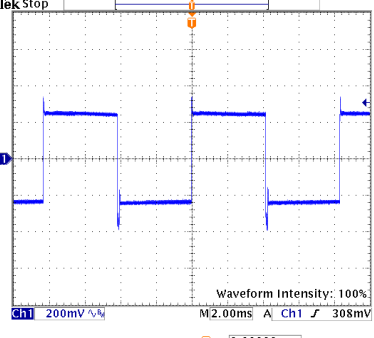
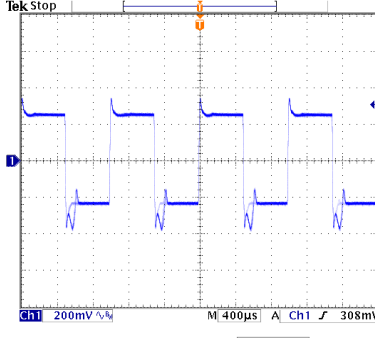
DESIGN VERIFY TEST  
OUTPUT FUNCTION

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE RANGE	CH1: 11.40V ~ 12.60V	I/P : 230VAC O/P: MIN LOAD TA : 25°C	CH1: 12.09V
2	OUTPUT VOLTAGE TOLERANCE (Max)	V1 : 5.0% ~ -5.0%	I/P : 100VAC / 264VAC O/P: FULL / MINLOAD TA= 25°C	V1: 0.75% ~ -3.60%
3	LINE REGULATION (MAX.)	V1 : 1.0% ~ -1.0%	I/P : 100VAC / 264VAC O/P: FULL LOAD TA : 25°C	V1: 0.00% ~ 0.00%
4	LOAD REGULATION (MAX.)	V1 : 5.0% ~ -5.0%	I/P : 230VAC O/P: MIN LOAD ~ FULL LOAD TA : 25°C	V1: 3.07% ~ -2.30%
5	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230VAC O/P: FULL LOAD TA : 25°C	TEST< 1.0 %
	RIPPLE & NOISE(Max)	V1 : 80 mVp-p	I/P : 230VAC O/P: FULL LOAD TA : 25°C	V1 : 9.8 mVp-p



SET UP TIME (MAX.)	230VAC : 2000ms	I/P : 230VAC	230VAC : 1520ms
	115VAC : 2500ms	I/P : 115VAC	115VAC : 1568ms
		O/P: FULL LOAD	
		TA : 25°C	

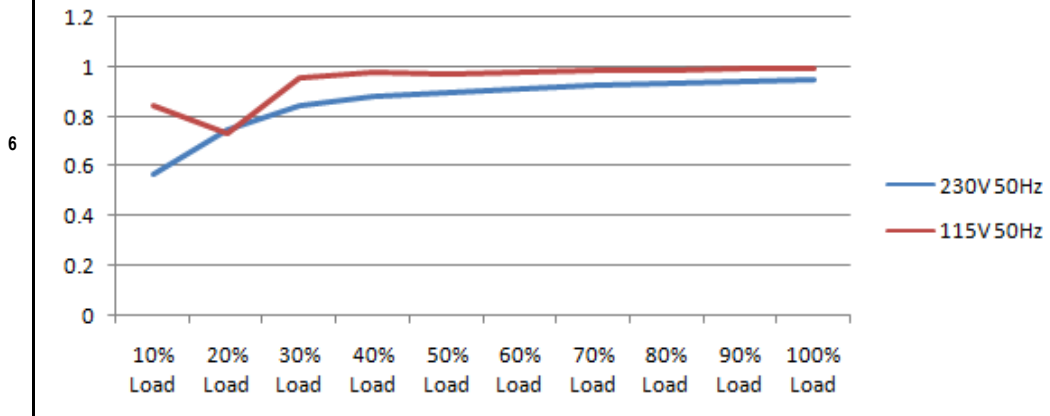


<p>RISE TIME (MAX.)</p>	<p>230VAC : 50ms 115VAC : 50ms</p>	<p>I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25°C</p>	<p>230VAC : 14.2ms 115VAC : 15.6ms</p>
<p>8</p>	<p>INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage</p> 		<p>INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage</p> 
<p>9</p>	<p>HOLD UP TIME (TYP.) 230VAC : 20ms 115VAC : 20ms</p>	<p>I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25°C</p>	<p>230VAC : 22.4ms 115VAC : 22.4ms</p>
	<p>INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage</p> 		<p>INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage</p> 
<p>10</p>	<p>DYNAMIC LOAD V1 : 1200 mVp-p</p>	<p>I/P : 230VAC O/P: (1)Full/Min load 50%duty/120HZ (2)Full/Min load 50%duty/1KHZ TA : 25°C</p>	<p>V1: (1). 728mv (2). 728mv unit:mVp-p</p> <p>FULL /Min LOAD 50%DUTY / 120HZ</p>  <p>FULL /Min LOAD 50%DUTY / 1KHZ</p> 

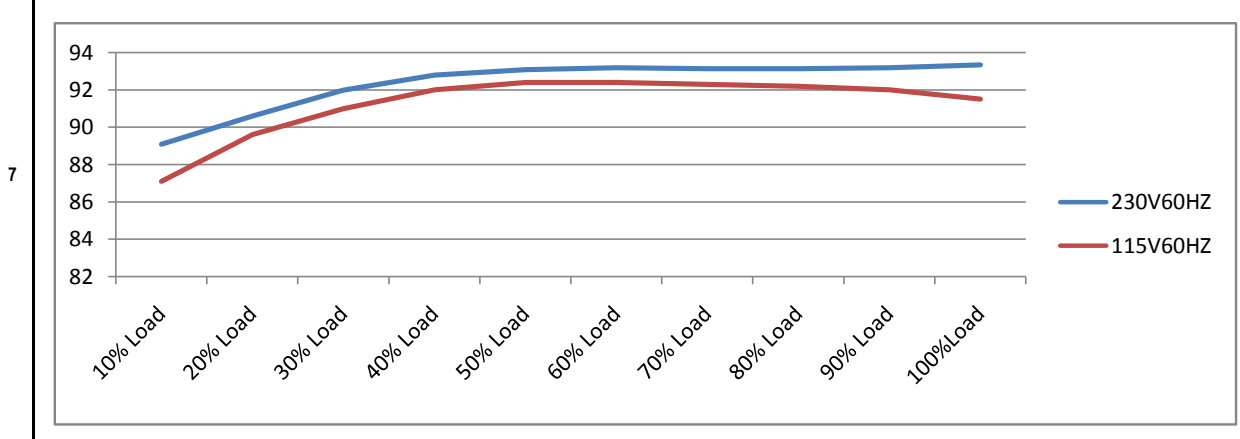


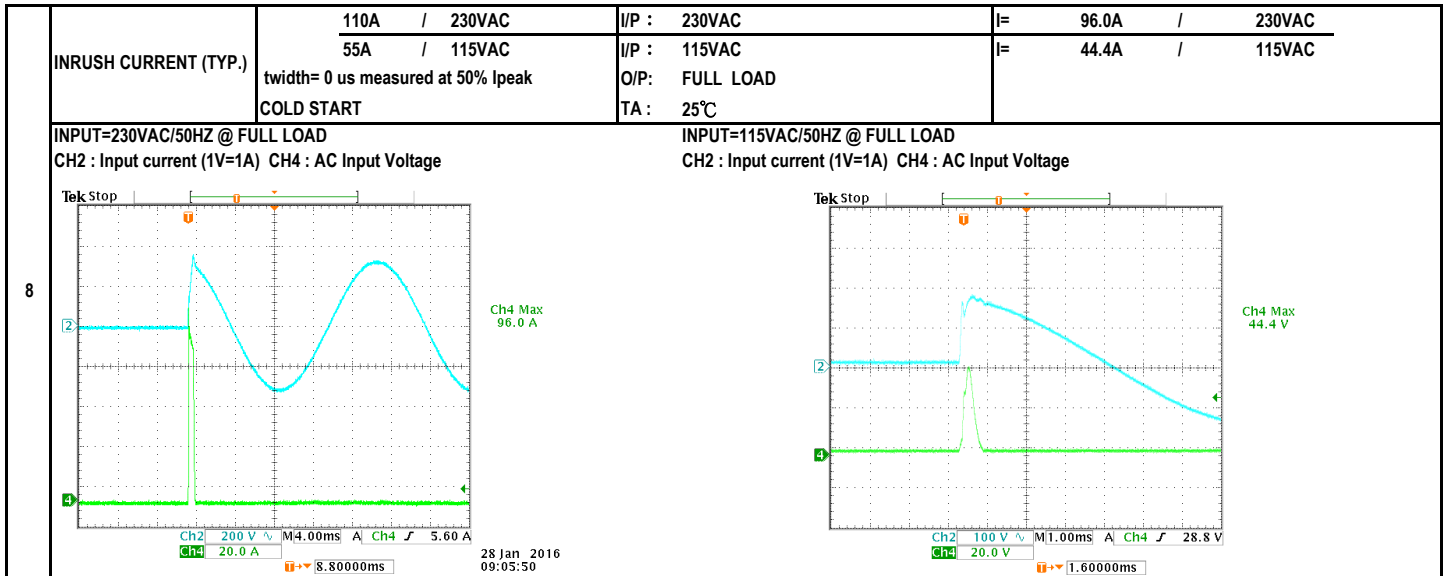
INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	80VAC ~ 264VAC	I/P : TESTING O/P : FULL LOAD Ta : 25°C	61.0VAC ~ 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.)	1.00A / 230VAC 1.85A / 115VAC	I/P : 230VAC I/P : 115VAC O/P : FULL LOAD TA : 25°C	I= 0.6701A / 230VAC I= 1.2909A / 115VAC
4	LEAKAGE CURRENT	< 0.10mA for earth leakage current	I/P : 264VAC O/P : MIN LOAD TA : 25°C	L-FG: 0.081 mA N-FG: 0.079 mA
		< 0.09mA for touch leakage current	I/P : 264VAC O/P : MIN LOAD TA : 25°C	L-V-: 0.08 mA N-V-: 0.079 mA
5	NO LOAD POWER CONSUMPTION	< 0.15W	I/P : 230VAC O/P : MIN LOAD TA : 25°C	< 0.1167 W
	POWER FACTOR (TYP.)	0.93 / 230VAC 0.98 / 115VAC	I/P : 230VAC I/P : 115VAC O/P : FULL LOAD TA : 25°C	PF= 0.9453 / 230VAC PF= 0.9933 / 115VAC



EFFICIENCY (TYP.)	90.0%	I/P : 230VAC O/P : FULL LOAD TA : 25°C	91.33 %
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**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	129.82% 264VAC 128.86% 230VAC 130.08% 100VAC Hiccup Mode
2	OVER VOLTAGE PROTECTION	12.60V ~ 16.20V	I/P: 264VAC I/P: 230VAC I/P: 80VAC O/P: MIN LOAD TA : 25°C	14.10V 264VAC 14.10V 230VAC 14.10V 80VAC Shut down Re- power ON
3	OVER TEMPERATURE PROTECTION	Shut down o/p voltage, recovers automatically after temperature goes down	I/P: 264VAC I/P: 80VAC O/P: FULL LOAD	O.T.P. Active 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: 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	Q5 Rated : 500V 12.0A	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). 452.00V (2). 456.00V (3). 406.00V
1	PWM Power Transistor	Q6 Rated : 500V 12.0A	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). 448.00V (2). 444.00V (3). 410.00V
2	O/P Diode (MOSFET)	Q101 Rated : 40V 120A Q102 Rated : 40V 120A	I/P : 267VAC VDS : O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	Q101 Q102 VDS : VDS : (1). 29.00V 29.30V (2). 11.70V 15.30V (3). 28.40V 28.90V



3	Input Capacitor	C5 Rated : 150uf 420V	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). 410.00V (2). 406.00V (3). 396.00V
4	Control IC	U1 Rated : 38V (max) -0.4V (min)  U101 Rated : 26V (max) -0.3V (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	U1 U101 (1). 24.70V 12.10V (2). 20.20V 2.90V (3). 20.20V 8.90V (4). 27.50V 13.60V (5). 24.90V 12.10V
5	PFC Power Transistor	Q1 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). 544.00V (2). 548.00V (3). 452.00V
6	PFC Diode	D1 Rated : 600V 9.0A	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	267VAC (1). 424.00V (2). 422.00V (3). 418.00V (4). 418.00V

SAFETY & E.M.C. TEST

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P : 4.000KVAC /min I/P-FG : 2.000KVAC /min O/P-FG : 0.500KVAC /min	I/P-O/P: 4.400KVAC /min I/P-FG: 2.400KVAC /min O/P-FG: 0.600KVAC /min Ta : 25°C	I/P-O/P: 1.49mA I/P-FG: 1.08mA O/P-FG: 1.45mA 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	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 MEDICAL AIR: 15KV / Contact: 8KV	I/P : 230VAC /50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
5	E.F.T	EN61000-4-4 MEDICAL INPUT: 2KV	I/P : 230VAC /50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
6	SURGE	IEC61000-4-5 INDUSTRY L-N: 2KV;L/N-PE: 4KV	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 : GSM160A12-R7B			
		1. ROOM AMBIENT BURN-IN : 1.0hrs			
		IP: 230VAC O/P: 100% LOAD TA= 22.9°C			
		2. HIGH AMBIENT BURN-IN : 1.0hrs			
		IP: 230VAC O/P: 100% LOAD TA= 40.0°C			
			NO. Position ROOM AMBIENT 22.9°C HIGH AMBIENT Ta: 40.0°C		
			1 LF1 52.8°C 70.3°C		
			2 LF2 54.2°C 71.7°C		
			3 L2 55.3°C 73.1°C		
			4 L1 55.9°C 73.6°C		
			5 C5 57.5°C 75.1°C		
			6 BD1 56.7°C 74.1°C		
			7 Q1 56.9°C 74.0°C		
			8 D1 57.4°C 74.8°C		
			9 Q6 57.7°C 75.1°C		
			10 Q5 58.4°C 75.7°C		
			11 RTH2 58.4°C 76.2°C		
			12 T1 65.5°C 83.0°C		
			13 C81 58.1°C 75.3°C		
	14 Q101 63.9°C 81.2°C				
	15 Q102 62.8°C 80.1°C				
	16 C101 66.2°C 83.2°C				
	17 C102 62.8°C 80.0°C				
	18 LF101 66.5°C 83.8°C				
	19 U1 59.5°C 77.0°C				
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR ( MIN )	I/P : 230VAC O/P : 117.39% LOAD Ta : 25°C	TEST : OK	
3	LOW TEMPERATURE TURN ON TEST	NO DAMAGE 1 HOUR ( MIN )	I/P : 264VAC / 100VAC O/P : FULL LOAD Ta : -30.0°C	TEST : OK	
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 40°C NO DAMAGE	I/P : 272VAC O/P : FULL LOAD Ta : 40°C HUMIDITY= 95.0% RH	TEST : OK	
5	TEMPERATURE COEFFICIENT	±0.03% /(0°C~50°C)	I/P : 230VAC O/P : FULL LOAD	±0.0101% /(0°C~50°C)	
6	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -40°C ~ +85°C 2. Temperature change rate : 25°C / 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°C ~ +45°C 2. Temperature change rate : 25°C / 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°C		TEST : OK	



9	CAPACITOR LIFE CYCLE	:SUPPOSE C101 IS THE MOST CRITICAL COMPONENT									
		(1) I/P :	230VAC	O/P :	FULL LOAD	Ta=	25.0°C	LIFE TIME	(1).	97384.5	HRS
		(2) I/P :	230VAC	O/P :	FULL LOAD	Ta=	40.0°C	LIFE TIME	(2).	34654.5	HRS
		(3) I/P :	230VAC	O/P :	75% LOAD	Ta=	40.0°C	LIFE TIME	(3).	88357.5	HRS
		(4) I/P :	230VAC	O/P :	50% LOAD	Ta=	40.0°C	LIFE TIME	(4).	173119.5	HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction T159K hrs min. Telcordia SR-332 (Bellcore) ; 46.3K hrs min. MIL-HDBK-217F (25°C)									
11	DMTBF /Accelerated Life test	Demonstration Mean Time Between Failure (Expected Life): Above 30000HRS @ TA 40°C									

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	FRANK	GESG	WANGDZ

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