



# Test Report: LAD-240C

240W Economical Security/ Fire Alarm PSU with Battery  
Charger/UPS

## ■ DESIGN VERIFY TEST

Output Function Test  
Input Function Test  
Protection Function Test  
Control Function Test  
Component Stress Test

## ■ SAFETY & E.M.C. TEST

Safety Test  
E.M.C. Test

## ■ RELIABILITY TEST

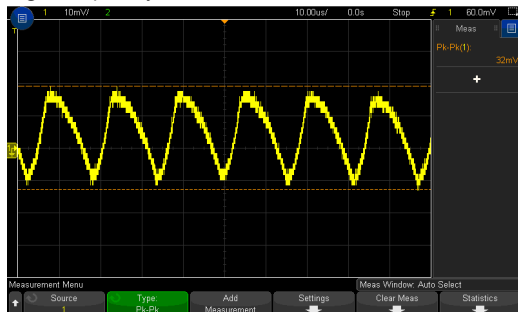
ENVIRONMENT TEST

## DESIGN VERIFY TEST

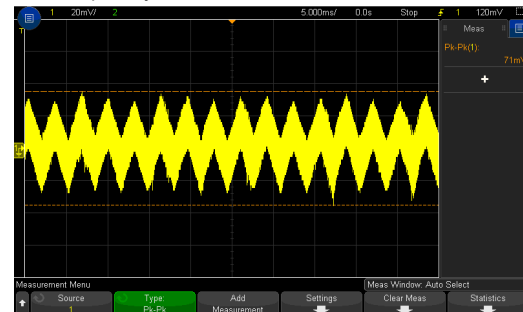
### OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 32.4V~ 43.5 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	30.67V~44.91V/230VAC 30.677V~44.911V/115VAC
2	OUTPUT VOLTAGE(Max) TOLERANCE	V1: -1.0%~ +1.0 %	I/P: 90VAC /264VAC O/P:FULL/ MIN. LOAD Ta:25°C	V1: -0.0554%~0.0602%
3	LINE REGULATION (Max)	V1: -0.5 %~ +0.5 %	I/P: 90VAC~ 264VAC O/P:FULL LOAD Ta:25°C	V1: -0.0073%~ 0.0193%
4	LOAD REGULATION(Max)	V1: -0.5 %~ +0.5 %	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25°C	V1: -0.0554%~0.0602%
5	OVER/UNDERSHOOT TEST	< ±5%	I/P: 230VAC O/P:FULL LOAD Ta:25°C	1.4 %
6	RIPPLE & NOISE(Max )	V1: 240mVp-p	I/P:230VAC O/P: TESTING LOAD Ta:25°C	V1: 71mVp-p

high frequency :

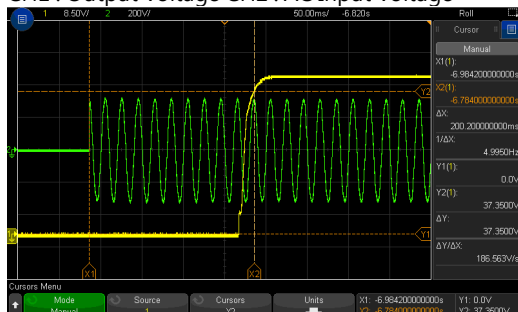


low frequency :

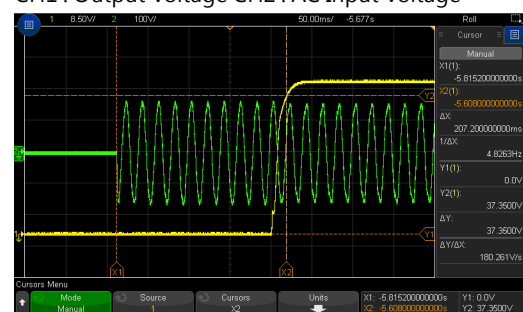


7	SET UP TIME(Max)	230VAC/2000ms 115VAC/2000ms	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 200.2 ms 115VAC/ 207.2ms
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INPUT=230VAC/50HZ @ FULL LOAD  
CH1 : Output Voltage CH2 : AC Input Voltage



INPUT=115VAC/60HZ @ FULL LOAD  
CH1 : Output Voltage CH2 : AC Input Voltage





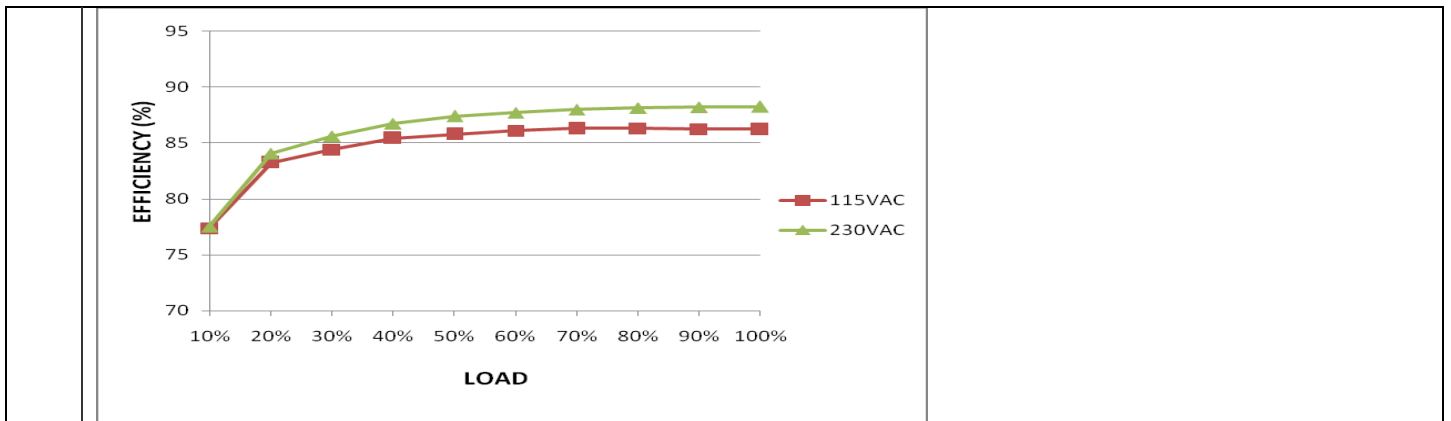
8	RISE TIME (Max)	230VAC/50ms 115VAC/50ms	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 16.33ms 115VAC/ 16.50 ms
INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage		INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage		
9		HOLD UP TIME (Typ.)	230VAC/16ms 115VAC/12ms	230VAC/ 20.4 ms 115VAC/ 14.6 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		
10	DYNAMIC LOAD	V1: 4150mVp-p	I/P: 230VAC O/P: (1)FULL /50% LOAD 50%DUTY / 120HZ (2)FULL /50% LOAD 50%DUTY / 1KHZ Ta:25°C	490mVp-p 406mVp-p
FULL /50% LOAD 50%DUTY / 120HZ		FULL /50% LOAD 50%DUTY / 1KHZ		
11	TRANSIENT RECOVERY TIME	V1: 4150mVp-p	I/P: 230VAC O/P:40% LOAD CHANGE 50%DUTY/120HZ 1.25A/us	410mVp-p



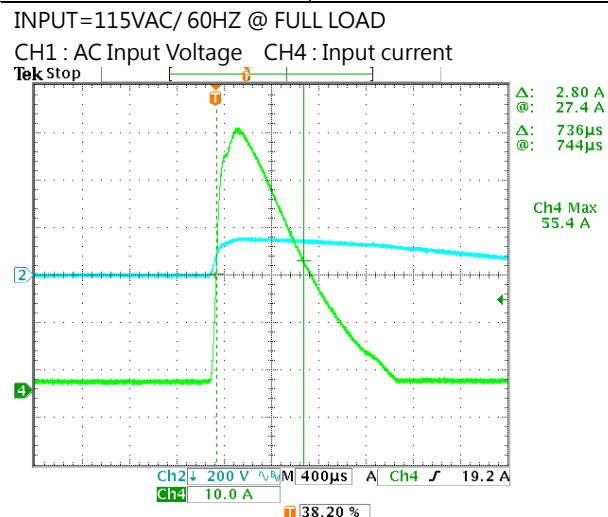
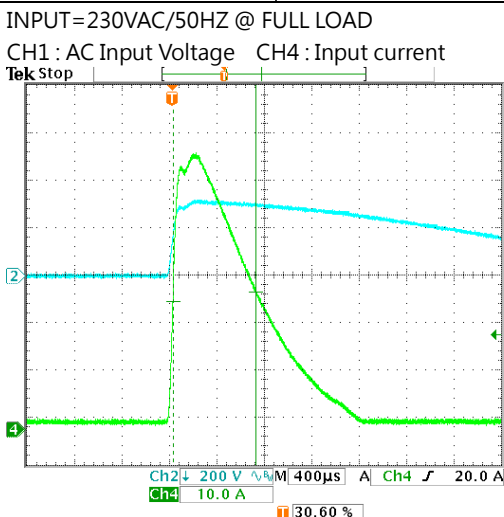
12	Battery static discharge current	After battery low protection <100uA	I/P : 230 VAC O/P : TESTING Ta : 25°C	1.06uA
13	BAT RATED CURRENT	1± 0.1A	I/P: 230VAC O/P:CV=36V Ta:25°C	0.9675A

### INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	90 ~ 132VAC / 180 ~ 264VAC by switch 240 ~ 370VDC (Default switch at 230VAC)	(1) I/P:TESTING O/P:FULL LOAD (2) I/P:DC TESTING(L:+ N:-) O/P: FULL / 80% LOAD (switch on 230VAC) (3) I/P:DC TESTING(L:- N:+) O/P: FULL /80% LOAD (switch on 230VAC) Ta:25°C	(1) 92.26V~132V/ FULL LOAD 87V~132V/ 80% LOAD 166.12V~264V / FULL LOAD ( switch on 230VAC) (2) 225.6Vdc~370Vdc/FULL LOAD 225.6Vdc~370Vdc/80% LOAD (3) 225.6Vdc~370Vdc/FULL LOAD 225.6Vdc~370Vdc/80% LOAD
			I/P: switch on 115VAC : LOW-LINE-3V=87 V HIGH-LINE+15%=150V  switch on 230VAC : LOW-LINE-3V=177 V HIGH-LINE+15%=300 VO/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: 90 ~ 132VAC / 180 ~ 264VAC by switch O/P:FULL~MIN LOAD Ta:25°C	TEST: OK
3	INPUT CURRENT (Typ.)	230V/2.4A 115V/ 4.4A	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I =2.22A/ 230VAC I =4.12A/ 115VAC
4	LEAKAGE CURRENT	< 0.5mA / 240 VAC	I/P : 240 VAC O/P : Min LOAD Ta : 25°C	0.3457 mA / (PEAK) 0.1621 mA / (RMS)
5	EFFICIENCY(Typ.)	88%	I/P:230 VAC O/P:FULL LOAD Ta:25°C	89.39 %
	EFFICIENCY vs LOAD			



6	INRUSH CURRENT(Typ.)	230V/60A 115V/60A COLD START	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I =58.4A/ 230VAC T50= 696 us/230V I =55.4A/ 115VAC T50= 736 us/115V
	<p>INPUT=230VAC/50HZ @ FULL LOAD      INPUT=115VAC/ 60HZ @ FULL LOAD</p> <p>CH1 : AC Input Voltage    CH4 : Input current      CH1 : AC Input Voltage    CH4 : Input current</p>			



### PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	CH1 : 105%~135% CH2 : 90 ~ 110% Protection type : CH1 OLP, CH2 with battery: The unit will enter to UPS mode when CH1 is around 105%~120%, when total output of CH1 + CH2 reach around 125%~135% output shuts down CH1 OLP, CH2 without battery: Shut down o/p voltage, re-power on to removed CH2 : Constant current limiting; fault condition does not affect CH1 working,	I/P: 264VAC I/P: 230VAC I/P: 100VAC O/P: TESTING Ta:25°C	122.32%/ 264VAC 122.32%/ 230VAC 121.80%/100VAC Protection type : CH1 OLP, CH2 with battery: The unit will enter to UPS mode when CH1 is around 105%~120%, when total output of CH1 + CH2 reach around 125%~135% output shuts down CH1 OLP, CH2 without battery: Shut down o/p voltage, re-power on to removed CH2 : Constant current limiting; fault condition does not affect CH1 working, recovers



		recovers automatically after fault condition is removed (External fuse is mandatory in series connection with battery for protection)		automatically after fault condition is removed (External fuse is mandatory in series connection with battery for protection)
2	OVER VOLTAGE PROTECTION	CH1: 47V~55V Protection type : Shut down o/p voltage , re-power on to removed	I/P: 264VAC I/P: 230VAC I/P: 90VAC O/P:MIN LOAD Ta:25°C	50.3V/264VAC 50.3V/230VAC 50.3V/90VAC Protection type : Shut down o/p voltage , re-power on to removed
3	OVER TEMPERATURE PROTECTION	Protection type : Shut down o/p voltage , re-power on to removed	I/P: 264VAC I/P: 90VAC O/P:FULL LOAD	O.T.P. Active OK Protection type : Shut down o/p voltage , re-power on to removed
4	BATTERY CUTOFF	32±0.5V	I/P: 230 VAC O/P:BAT. LOAD Ta:25°C	32.16 V ,
5	BATTERY REVERSE POLARITY	Protection type : Protected when reverse polarity , no damage, recovers automatically after fault condition is removed	I/P: 230 VAC O/P:BAT. LOAD Ta:25°C	TEST : <u>OK</u>

### CONTROL FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	AC OK	TTL signal, High / Open : AC Fail ; Low : AC OK ; Ice : max. 30mA@ 50VDC	I/P: 230 VAC O/P:BAT. LOAD Ta:25°C	Test: <u>OK</u>
2	DISCHARGE	TTL signal, High / Open : Charge ; Low : Discharge ; Ice : max. 30mA@ 50VDC	I/P: 230 VAC O/P:BAT. LOAD Ta:25°C	Test: <u>OK</u>
3	BATTERY FULL	TTL signal, High / Open : Battery charging ; Low : Battery full ; Ice : max. 30mA@ 50VDC	I/P: 230 VAC O/P:BAT. LOAD Ta:25°C	Test: <u>OK</u>
4	BATTERY DISCONNECT/ REVERSE POLARITY	TTL signal, High / Open : Battery connect/normal ; Low : Battery disconnect/reverse polarity; Ice : max. 30mA@ 50VDC	I/P: 230 VAC O/P:BAT. LOAD Ta:25°C	Test: <u>OK</u>
5	BATTERY LOW	TTL signal, High / Open : Battery normal ; Low : Battery low; Ice : max. 30mA@ 50VDC	I/P: 230 VAC O/P:BAT. LOAD Ta:25°C	Test: <u>OK</u>
6	FORCE START	CN2: PIN7&PIN8 SHORT	I/P: 230 VAC O/P:BAT. LOAD Ta:25°C	TEST : <u>OK</u>

### COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Transistor ( D to S) or (C to E) Peak Voltage	Q 1/Q2 Rated : 13 A/ 600 V	AC ON/OFF I/P: High-Line +3V =267V VDS: O/P:(1) Full Load (2) Output Short (3) Dynamic Load Full Load/ Min. Load 90%Duty/1KHz (4) Dynamic Load Full Load/ Min. Load 90%Duty/3KHz (5) Dynamic Load Full Load/ Min. Load 90%Duty/5KHz (6) Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz (7)0%→400% Load. Ta:25°C	Q1 Q2 VDS: (1) 490V (2) 559V (3) 486V (4) 494V (5) 486V (6) 486V (7) 490V (1) 499V (2) 555V (3) 503V (4) 499V (5) 507V (6) 503V (7) 503V
2	Diode Peak Voltage	D101 20A/300V D102 20A/400V	AC ON/OFF I/P:High-Line +3V =267V <u>Vo=Vmax</u> O/P: (1)Full Load (2)Output Short (3)Dynamic Load Full Load/ Min. Load 90%Duty/1KHz (4)Dynamic Load Full Load/ Min. Load 90%Duty/3KHz (5)Dynamic Load Full Load/ Min. Load 90%Duty/5KHz (6)Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz (7)0%→400% Load. (8).NO LOAD  <u>Vo=Vnormal</u> O/P: (1)Full Load Ta:25°C	D101: <u>Vo=Vmax</u> VDS: (1) 253V (2) 243V (3) 251V (4) 253V (5) 255V (6) 255V (7) 243V (8) 219V <u>Vo=Vnormal</u> (1) 253V D102: <u>Vo=Vmax</u> VDS: (1) 283V (2) 277V (3) 281V (4) 283V (5) 281V (6) 279V (7) 273V (8) 271V <u>Vo=Vnormal</u> (1) 281V
3	BAT BUCK Transistor ( D to S) or (C to E) Peak Voltage	Q 304 Rated : 10A/120V	AC ON/OFF I/P:High-Line +3V = 267 V VDS : O/P: (1)CV (max)-1 (2)CV(min)=31.5V (3)no load (4)OUTPUT SHORT Ta:25°C	Q304 = VDS : (1) 55.5V (2) 62.8V (3) 51.9V (4) 55.5V
4	BAT BUCK Diode Peak Voltage	D320 Rated : 5A/ 100V	AC ON/OFF I/P:High-Line +3V = 267 V VDS :	D320 VDS : (1) 43.9V

			O/P: (1)CV (max)-1 (2)CV(min)=31.5V (3)no load (4)OUTPUT SHORT Ta:25°C	(2) 43.9V (3) 42.6V (4) 43.9V
5	Input Capacitor Voltage	C5/C6 Rated: : 330 $\mu$ / 200 V	I/P:High-Line +3V =267V O/P: (1)Full Load input on/off (2) Min load input on /Off (3)Full Load /Min load Change (4)Full load continue Ta:25°C	C5 (1)199V (2)188V (3)186V (4)195V C6 (1)197V (2)197V (3)190V (4)190V
6	Control IC Voltage Test	PWM IC U1 Rated 8V~28V  BAT BUCK IC U304 Rated 8.4V~30V	AC ON/OFF I/P:High-Line +3V =267V U1: O/P:(1)FULL LOAD (2) Output Short (3)O.L.P (4)O.V.P. (5)NO LOAD VRmin(Low LINE) U304: O/P: (1)CV (max)-1 (2)CV(min)=31.5V (3)no load (4)OUTPUT SHORT Ta:25°C	U1 (1) 19.1V (2) 19.5V (3) 19.3V (4) 19.3V (5) 19.1V  U304 (1) 14.2V (2) 14.4V (3) 14.1V (4) 14.1V

## ■ SAFETY& E.M.C. TEST

### SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P: 3KVAC/min I/P-FG :2KVAC/min O/P-FG:0.5KVAC/min	I/P-O/P: 3.6 KVAC/min I/P-FG: 2.4 KVAC/min O/P-FG:0.6 KVAC/min Ta:25°C	I/P-O/P: 2.51mA I/P-FG: 2.23mA O/P-FG: 2.70 mA NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P:500VDC>100M $\Omega$ I/P-FG: 500VDC>100M $\Omega$ O/P-FG:500VDC>100M $\Omega$	I/P-O/P: 600 VDC I/P-FG: 600 VDC O/P-FG: 600 VDC Ta:25°C	I/P-O/P: 9999M $\Omega$ I/P-FG: 9999M $\Omega$ O/P-FG: 9999M $\Omega$ NO DAMAGE
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100m $\Omega$	40A / 2min Ta:25°C	8m $\Omega$



### E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	CONDUCTION	BS EN/EN55032 (CISPR32), EAC TP TC 020 CLASS A	I/P : 230 VAC (50HZ) O/P : FULL/50% LOAD Ta : 25°C	PASS Test by certified Lab
2	RADIATION	BS EN/EN55032 (CISPR32), EAC TP TC 020 CLASS A	I/P : 230 VAC (50HZ) O/P : FULL LOAD Ta : 25°C	PASS Test by certified Lab
3	E.S.D	BS EN/EN61000-4-2 Level 3, 8KV air Level 2, 6KV contact	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	<input checked="" type="checkbox"/> CRITERIA A <input type="checkbox"/> CRITERIA B
4	E.F.T	BS EN/EN61000-4-4 INPUT : 2KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	<input checked="" type="checkbox"/> CRITERIA A <input type="checkbox"/> CRITERIA B
5	SURGE	BS EN/EN61000-4-5 Level 3, 1KV/Line-Line 2KV/Line-FG	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	<input checked="" type="checkbox"/> CRITERIA A <input type="checkbox"/> CRITERIA B
6	Test by certified Lab & Test Report Prepare Any contradictions of the test results, please refer to the latest EMC test report			

### ■ RELIABILITY TEST

#### ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT																																												
1	TEMPERATURE RISE TEST	MODEL : LAD-240C 1. ROOM AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta= 25 °C 2. HIGH AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta= 50 °C																																														
				<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta= 25 °C</th> <th>HIGH AMBIENT Ta= 50 °C</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>ZNR1</td> <td>32.4°C</td> <td>57.7°C</td> </tr> <tr> <td>2</td> <td>C1</td> <td>32.6°C</td> <td>58.1°C</td> </tr> <tr> <td>3</td> <td>LF2</td> <td>35.2°C</td> <td>60.7°C</td> </tr> <tr> <td>4</td> <td>RTH1</td> <td>67.5°C</td> <td>86.7°C</td> </tr> <tr> <td>5</td> <td>BD1</td> <td>37.4°C</td> <td>62.7°C</td> </tr> <tr> <td>6</td> <td>C5</td> <td>31.0°C</td> <td>56.0°C</td> </tr> <tr> <td>7</td> <td>T2</td> <td>27.9°C</td> <td>53.9°C</td> </tr> <tr> <td>8</td> <td>C37</td> <td>27.5°C</td> <td>53.1°C</td> </tr> <tr> <td>9</td> <td>U2</td> <td>31.4°C</td> <td>56.8°C</td> </tr> <tr> <td>10</td> <td>RTH3</td> <td>47.1°C</td> <td>72.7°C</td> </tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta= 25 °C	HIGH AMBIENT Ta= 50 °C	1	ZNR1	32.4°C	57.7°C	2	C1	32.6°C	58.1°C	3	LF2	35.2°C	60.7°C	4	RTH1	67.5°C	86.7°C	5	BD1	37.4°C	62.7°C	6	C5	31.0°C	56.0°C	7	T2	27.9°C	53.9°C	8	C37	27.5°C	53.1°C	9	U2	31.4°C	56.8°C	10	RTH3	47.1°C	72.7°C
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR ( MIN )	I/P : 230 VAC O/P : 114.2%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= -25°C	TEST : OK																																																																																																																																													
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50 °C/95 %R.H NO DAMAGE	I/P : 272 VAC O/P : FULL LOAD Ta= 49.6°C HUMIDITY= 95 %R.H	TEST : OK																																																																																																																																													



5	TEMPERATURE COEFFICIENT	±0.03%/°C(0~50°C)	I/P : 230 VAC O/P : FULL LOAD	±0.0079%/°C(0~50°C)
6	STORAGE TEMPERATURE TEST	-30~85°C	1. Thermal shock Temperature : -45°C~ +90°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 : STATIC	
7	THERMAL SHOCK TEST	-20~50°C	1. Thermal shock Temperature : -25°C~ +55°C 2. Temperature change rate : 25°C / MIN 3. Dwell time low and high temperature : 30 MIN/EACH 4. Total test cycle : 16 CYCLE 5. Input/Output condition : 15cycle:230V/ FULL LOAD AC ON 3sec/AC OFF 1sec TEST 1cycle:230V/ FULL LOAD Burn In Test	
8	VIBRATION TEST	10 ~ 500Hz, 5G 10min./1cycle, 60min. each along X, Y, Z axes	1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10~500Hz (3) Sweep Time : 12min/sweep cycle (4) Acceleration : 6G (5) Test Time : 180min in each axis (X.Y.Z) (6) Ta : 25°C	
9	CAPACITOR LIFE CYCLE	SUPPOSE C110 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= 50 °C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta= 50 °C LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta= 50 °C LIFE TIME		(1) 1319786.5HRS (2) 228506.1HRS (3) 237447.5HRS (4) 291084.8HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 1394.9K hrs min. Telcordia SR-332 (Bellcore); 156.7K hrs min. MIL-HDBK-217F (25°C)		
11	Ongoing Reliability Test	I/P : 230VAC O/P : FULL LOAD TA=50°C Demonstration Mean Time Between Failure : 30,000 hours		

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	Yuwei	Liutt	Wangdz

2020.10.1 TAG-QA-009