Test Report: LAD-120C

120W 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

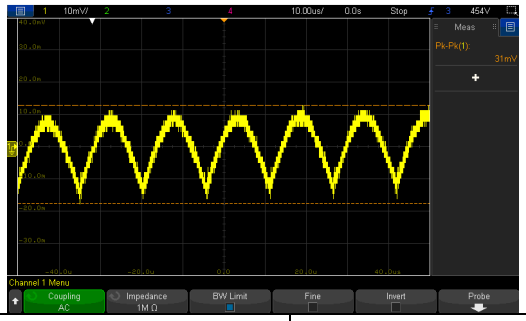
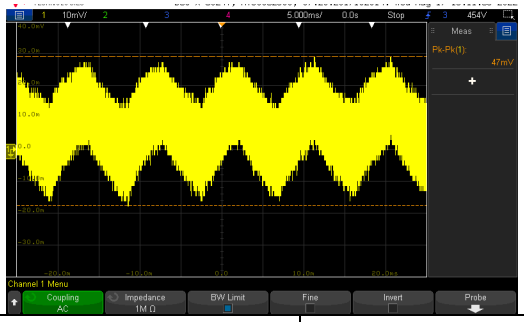
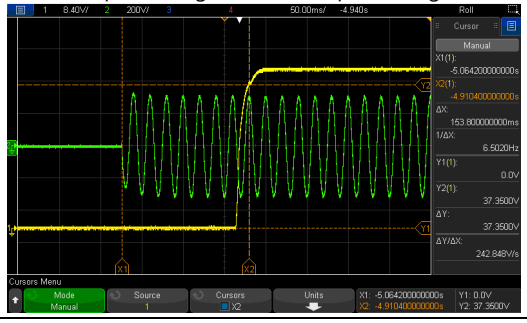
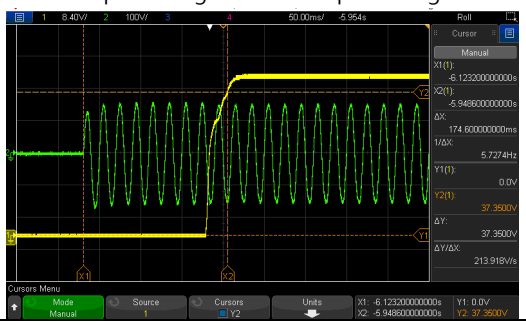
Safety Test
E.M.C. Test

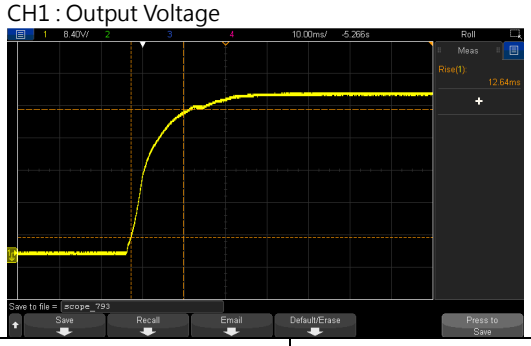
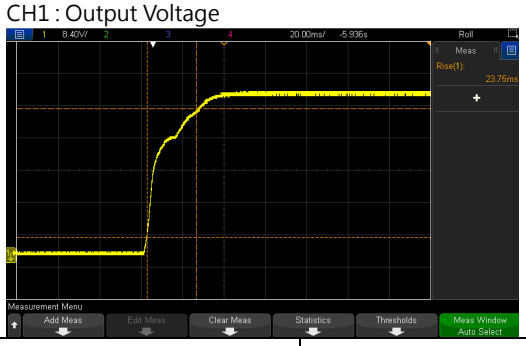
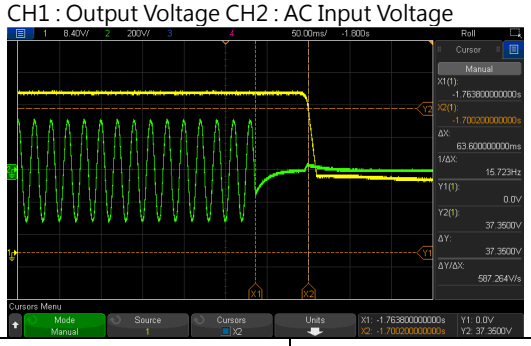
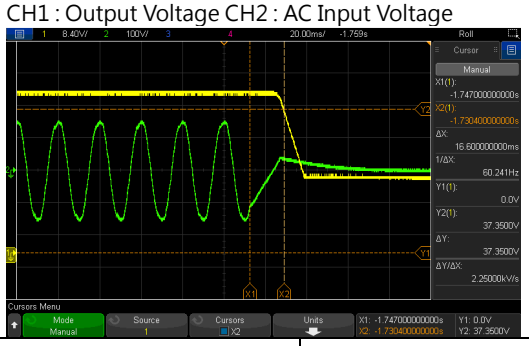
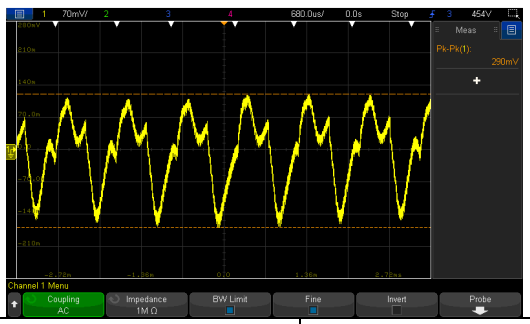
■ RELIABILITY TEST

ENVIRONMENT TEST

■ DESIGN VERIFY TEST

OUTPUT FUNCTION TEST

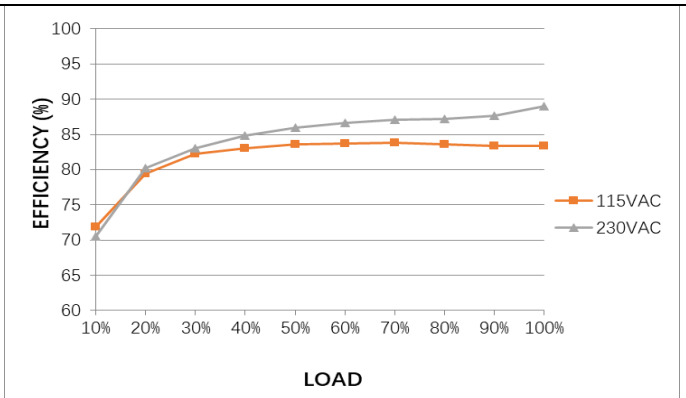
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 32.4V~ 43.5V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25℃	31.417V~45.852V/230VAC 31.447V~45.855V/115VAC
2	OUTPUT VOLTAGE(Max) TOLERANCE	V1: -1.0 %~ +1.0 %	I/P: 90VAC /264VAC O/P:FULL/ MIN. LOAD Ta:25℃	V1: -0.0386%~ 0.0265%
3	LINE REGULATION (Max)	V1: -0.5 %~ +0.5 %	I/P: 90VAC~ 264VAC O/P:FULL LOAD Ta:25℃	V1: 0.0097%~ 0.0073%
4	LOAD REGULATION(Max)	V1: -0.5 %~ +0.5 %	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25℃	V1: -0.0386%~ 0.0265%
5	OVER/UNDERSHOOT TEST	< ±5%	I/P: 230VAC O/P:FULL LOAD Ta:25℃	1.2%
6	RIPPLE & NOISE(Max)	V1: 240mVp-p/ FULL LOAD	I/P:230VAC O/P: TESTING LOAD Ta:25℃	V1: 47mVp-p
	high frequency : 		low frequency : 	
7	SET UP TIME(Max)	230VAC/500ms 115VAC/500ms	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25℃	230VAC/ 153.8ms 115VAC/ 174.6ms
	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/40ms 115VAC/40ms	I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	230VAC/ 12.64 ms 115VAC/ 23.75 ms
	INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage 		INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage 	
9	HOLD UP TIME (Typ.)	230VAC/40ms 115VAC/9ms	I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	230VAC/ 63.6 ms 115VAC/ 16.6 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℃	338mVp-p 290mVp-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	287mVp-p

12	BAT RATED CURRENT	1±0.1A	I/P: 230VAC O/P:CV=36V Ta:25℃	1.02A
13	Battery static discharge current	After battery low protection <100uA	I/P： 230 VAC O/P：TESTING Ta：25℃	31 uA

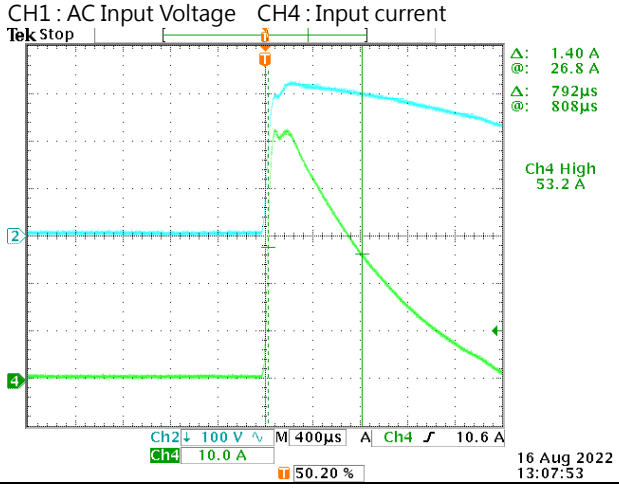
INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	90 ~ 264VAC 127 ~ 370VDC	(1) I/P:TESTING O/P: TEST LOAD (2) I/P:DC TESTING(L:+ N:-) O/P: TEST LOAD (3) I/P:DC TESTING(L:- N:+) O/P: TEST LOAD Ta:25℃	(1) 85.78V~264V/ FULL LOAD 78.16V~264V/ 80% LOAD (2)109.6 Vdc~370Vdc/FULL LOAD 109.2 Vdc~370Vdc/FULL LOAD (3)109.6 Vdc~370Vdc/FULL LOAD 109.3 Vdc~370Vdc/FULL LOAD
			I/P: LOW-LINE-3V=87 V HIGH-LINE+15%=300V 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: 90 ~ 264VAC O/P:FULL~MIN LOAD Ta:25℃	TEST: OK
3	INPUT CURRENT (Typ.)	230V/ 1.5 A 115V/ 2.5 A	I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	I =1.15A/230VAC I =2.03A/115VAC
4	LEAKAGE CURRENT	< 0.5mA / 240 VAC	I/P： 240 VAC O/P：Min LOAD Ta：25℃	0.411 mA(PEAK) 0.200 mA (RMS)
5	EFFICIENCY(Typ.)	88%	I/P:230 VAC O/P:FULL LOAD Ta:25℃	89.04 %
	EFFICIENCY vs LOAD			

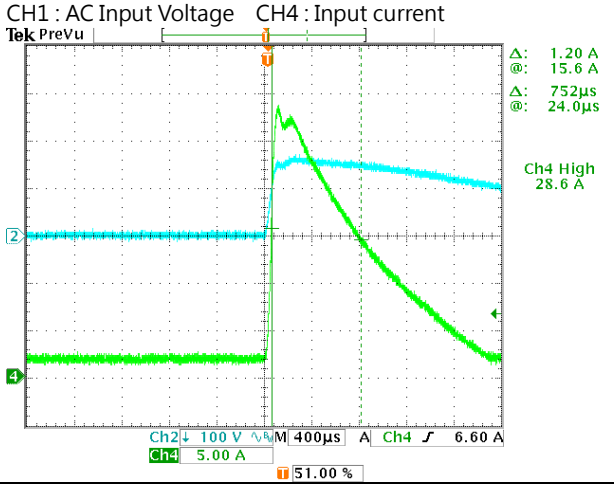


6	INRUSH CURRENT(Typ.)	230V/55A 115V/30A COLD START	I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	I =53.2A/ 230VAC I =28.6A/ 115VAC T50= 792 us/230V

INPUT=230VAC/50HZ @ FULL LOAD
CH1 : AC Input Voltage CH4 : Input current



INPUT=115VAC/ 60HZ @ FULL LOAD
CH1 : AC Input Voltage CH4 : Input current



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%~160%, when total output of CH1 + CH2 reach around 125%~135% output hiccup (120D shuts down) CH1 OLP, CH2 without battery: Hiccup mode o/p voltage, recovers automatically after fault condition is removed (120D shuts down,re-power on to	I/P: 264VAC I/P: 230VAC I/P: 115VAC O/P:TESTING Ta:25℃	119.68%/ 264VAC 120.19%/ 230VAC 121.74%/115VAC Protection type : CH1 OLP, CH2 with battery: The unit will enter to UPS mode when CH1 is around 105%~160%,when total output of CH1 + CH2 reach around 125%~135% output hiccup (120D shuts down) CH1 OLP, CH2 without battery: Hiccup mode o/p voltage, recovers automatically after fault condition is removed (120D shuts down,re-power

		removed) CH2 : Constant current limiting; fault condition does not affect CH1 working, recovers automatically after fault condition is removed (External fuse is mandatory in series connection with battery for protection)		on to removed) CH2 : Constant current limiting; fault condition does not affect CH1 working, recovers 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℃	49.6V/ 264VAC 49.6V/ 230VAC 49.2V/ 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℃	31.886 V。
5	BATTERY REVERSE POLARITY	Protected when reverse polarity , no damage, recovers automatically after fault condition is removed	I/P: 230 VAC O/P:BAT. LOAD Ta:25℃	TEST : OK

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℃	Test： OK
2	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℃	Test： OK
3	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℃	Test： OK
4	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℃	Test： OK

5	DISCHARGE	TTL signal, High / Open : Charge ; Low : Discharge ; Ice : max. 30mA@ 50VDC	I/P: 230 VAC O/P:BAT. LOAD Ta:25℃	Test： OK
6	FORCE START	CN2：PIN7&PIN8 SHORT	I/P: 230 VAC O/P:BAT. LOAD Ta:25℃	TEST： OK

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Transistor (D to S) or (C to E) Peak Voltage	Q 1 Rated ： 10.6A/ 650V	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℃	Q1 VDS: (1) 526V (2) 526V (3) 530V (4) 522V (5) 526V (6) 534V (7) 534V
2	Diode Peak Voltage	Q100 Rated ： 20A/300 V	AC ON/OFF I/P:High-Line +3V =267V Vo=Vmax 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 Vo=Vnormal O/P: (1) Full Load Ta:25℃	Q100: Vo=Vmax VDS: (1) 242V (2) 236V (3) 240V (4) 240V (5) 240V (6) 236V (7) 236V (8) 231V Vo=Vnormal (1) 242V

3	BAT BUCK Transistor (D to S) or (C to E) Peak Voltage	Q 304 Rated : 10A /120 V	AC ON/OFF I/P: High-Line +3V = 267 V VDS : O/P: (1) CV (max)-1=40.5V (2) CV(min)=32.4V (3) no load (4) OUTPUT SHORT Ta:25℃	Q304 VDS : (1) 54.3V (2) 57.2V (3) 54.7V (4) 53.9V
4	BAT BUCK Diode Peak Voltage	D320 Rated : 5 A/ 150V	AC ON/OFF I/P: High-Line +3V = 267 V VDS : O/P: (1) CV (max)-1=40.5V (2) CV(min)= 32.4V (3) no load (4) OUTPUT SHORT Ta:25℃	D320 VDS : (1) 42.7V (2) 43.1V (3) 42.3V (4) 42.3V
5	Input Capacitor Voltage	C5 Rated: : 100μ / 400V	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℃	C5 (1) 367V (2) 369V (3) 367V (4) 363V
6	Control IC Voltage Test	PWM IC U1 Rated 9.4V~ 35 V BAT BUCK IC U304 Rated 8.4V~ 30V	AC ON/OFF U1 I/P: High-Line +3V =267V O/P:(1) FULL LOAD (2) Output Short (3) O.L.P (4) O.V.P. (5) NO LOAD VRmin (LOW LINE) U304 I/P: High-Line +3V = 267 V VDS : O/P: (1) CV (max)-1=40.5V (2) CV(min)= 32.4V (3) no load (4) OUTPUT SHORT Ta:25℃	U1 (1) 12.64V (2) 12.72V (3) 12.72V (4) 12.72V (5) 12.64V U304 (1) 13.63V (2) 13.63V (3) 13.71V (4) 15.68V
7	Clamp Diode Peak Voltage	D6 Rated : 1000V /3A	AC ON/OFF I/P : High-Line +3V = 267 V O/P : (1) Dynamic Load 90%Duty/1KHz (2)Full load continue Ta : 25℃	(1) 468V (2) 463V

■ 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℃	I/P-O/P: 2.932mA I/P-FG: 2.903mA O/P-FG: 1.938mA NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P:500VDC>100MΩ I/P-FG: 500VDC>100MΩ O/P-FG:500VDC>100MΩ	I/P-O/P: 600 VDC I/P-FG: 600 VDC O/P-FG: 600 VDC Ta:25℃	I/P-O/P: 9999MΩ I/P-FG: 9999MΩ O/P-FG: 9999MΩ NO DAMAGE
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40A / 2min Ta:25℃	10mΩ

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	BS EN/EN61000-3-2 ■ CLASS A	I/P:230VAC/50HZ O/P:85% LOAD Ta:25℃	■ PASS □ FAIL
2	CONDUCTION	BS EN/EN55032 (CISPR32), EAC TP TC 020 CLASS A	I/P： 230 VAC (50HZ) O/P：FULL/50% LOAD Ta：25℃	PASS Test by certified Lab
3	RADIATION	BS EN/EN55032 (CISPR32), EAC TP TC 020 CLASS A	I/P： 230 VAC (50HZ) O/P：FULL LOAD Ta：25℃	PASS Test by certified Lab
4	E.S.D	BS EN/EN61000-4-2 ■ INDUSTRY AIR：8KV / Contact：6KV	I/P： 230 VAC/50HZ O/P：FULL LOAD Ta：25℃	■ CRITERIA A □ CRITERIA B
5	E.F.T	BS EN/EN61000-4-4 ■ INDUSTRY INPUT： 2KV	I/P： 230 VAC/50HZ O/P：FULL LOAD Ta：25℃	■ CRITERIA A □ CRITERIA B
6	SURGE	BS EN/EN61000-4-5 ■ LIGHT INDUSTRY L-N ：1KV L,N-PE：2KV	I/P： 230 VAC/50HZ O/P：FULL LOAD Ta：25℃	■ CRITERIA A □ CRITERIA B
7	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-120C 1. ROOM AMBIENT BURN-IN：2 HRS I/P： 230VAC O/P： FULL LOAD Ta= 25 ℃ 2. HIGH AMBIENT BURN-IN： 2 HRS I/P： 230VAC O/P： FULL LOAD Ta= 50 ℃		

NO	Position	ROOM AMBIENT Ta= 25 ℃	HIGH AMBIENT Ta= 50 ℃
1	ZNR1	40.8	64.8
2	LF1	51.8	76.3
3	BD1	65.7	87
4	RTH2	85.3	100.3
5	C6	56.2	77.5
6	D6	63.4	87.7
7	Q1	69.6	95.2
8	R22	68.3	90.3
9	C37	59.6	82.9
10	RTH10	72.4	92.4
11	R15	63.2	85.9
12	D30	62.2	85.7
13	U1	66.8	88.1
14	Q100	75.3	96.6
15	R100	75.7	96.7
16	C105	71.8	92.7
17	C106	68	89.8
18	T1 Coil	78.8	98.6
19	T1 Core	72.1	92.6
20	C346	55.9	78.6
21	C112	53.4	76
22	L100	58.5	81.1
23	L301	57.8	80.5
24	D200	66.4	87.6
25	C115	64.4	86.1
26	J107	48.6	71.8
27	RY101	58.1	80.6
28	Q305	54.3	77.6
29	Q304	66	88
30	D320	57.6	80.2
31	U304	84	104.9

2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P： 230 VAC O/P： 120.19% LOAD Ta：25℃	TEST：OK
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P： 264VAC/100VAC O/P： 100% LOAD Ta= -25 ℃	TEST：OK
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50 ℃/95 %R.H NO DAMAGE	I/P： 272 VAC O/P：FULL LOAD Ta= 49.4 ℃ HUMIDITY= 95 %R.H	TEST：OK
5	TEMPERATURE COEFFICIENT	± 0.03 %/℃(0~50℃)	I/P： 230 VAC O/P：FULL LOAD	± 0.00961 %/℃(0~50℃)
6	STORAGE TEMPERATURE TEST	-30~85℃	1. Thermal shock Temperature： -45℃~ +90℃ 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： STATIC	
7	THERMAL SHOCK TEST	-20~50℃	1. Thermal shock Temperature： -25℃~ +55℃ 2. Temperature change rate ：25℃ / 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℃	
9	CAPACITOR LIFE CYCLE	SUPPOSE C105 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= 50 ℃ LIFE TIME (3) I/P： 230VAC O/P：75% LOAD Ta= 50 ℃ LIFE TIME (4) I/P： 230VAC O/P：50% LOAD Ta= 50 ℃ LIFE TIME		(1) 128052.2HRS (2) 30077HRS (3) 40397.6HRS (4) 61900.3HRS
10	MTBF	1509.9K hrs min. Telcordia SR-332 (Bellcore); 209.4K hrs min. MIL-HDBK-217F (25℃)		
11	Ongoing Reliability Test	I/P：230VAC O/P：FULL LOAD TA=50℃ Demonstration Mean Time Between Failure : 30,000 hours		

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	Yuwei	Liutt	Wangdz

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