Test Report: LAD-120B

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

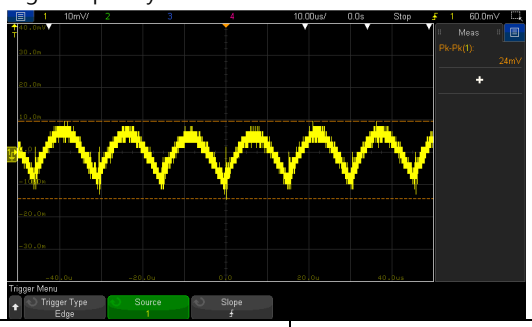
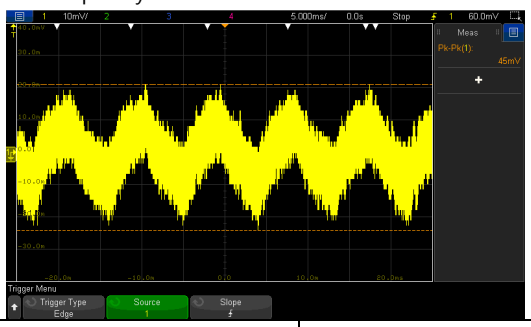
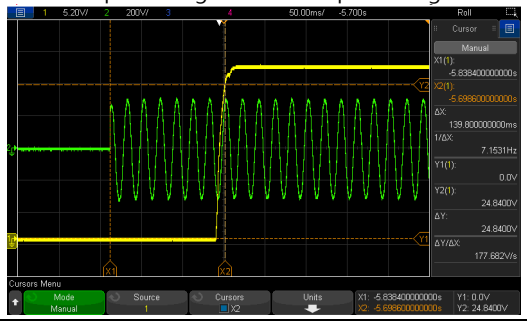
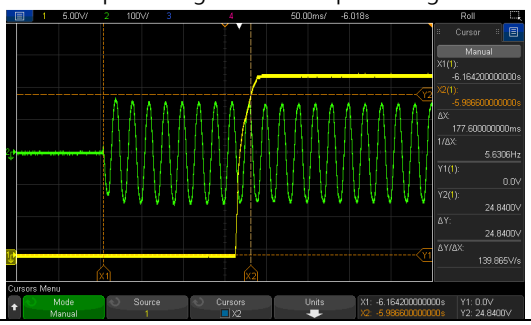
Safety Test
E.M.C. Test

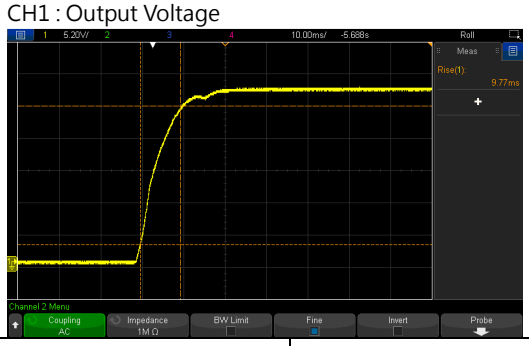
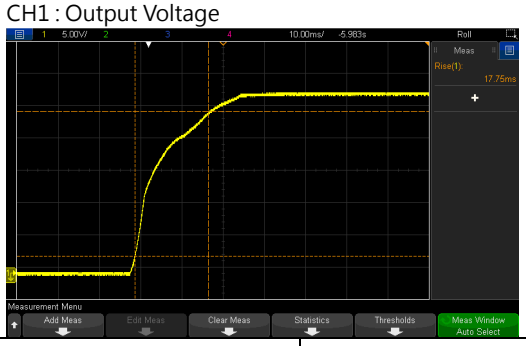
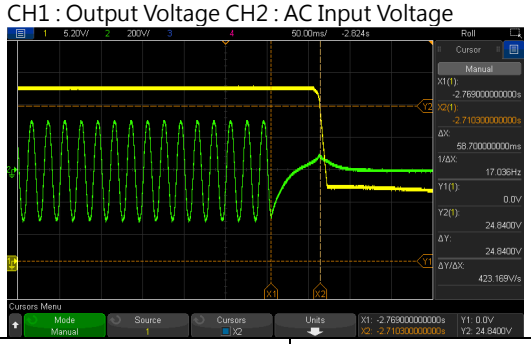
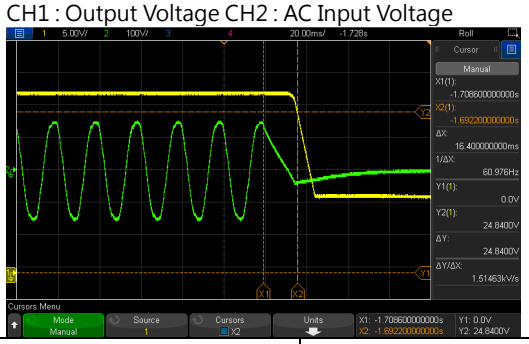
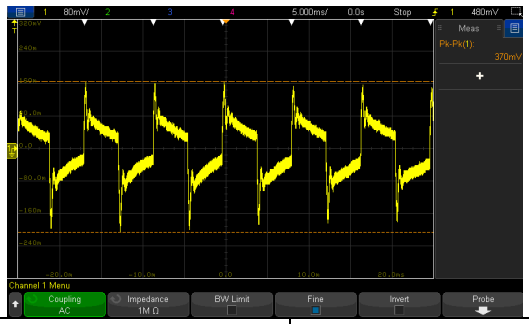
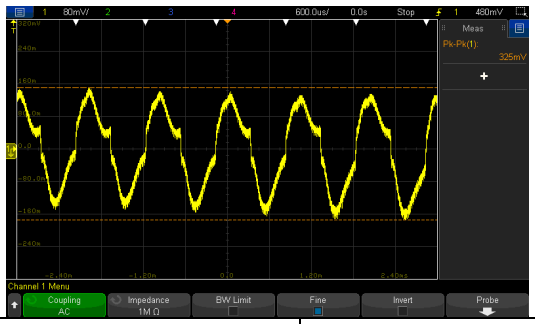
■ RELIABILITY TEST

ENVIRONMENT TEST

■ DESIGN VERIFY TEST

OUTPUT FUNCTION TEST

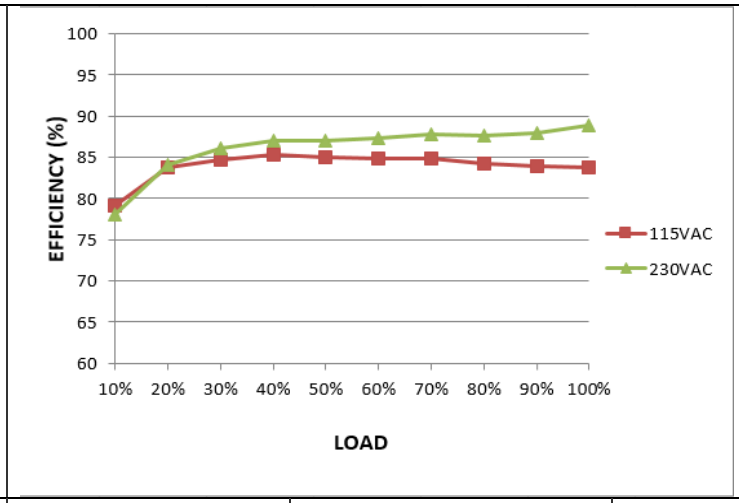
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 21.6V~ 29V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25℃	20.802V~29.848V/230VAC 20.820V~29.849V/115VAC
2	OUTPUT VOLTAGE(Max) TOLERANCE	V1: -1.0 %~ +1.0 %	I/P: 90VAC /264VAC O/P:FULL/ MIN. LOAD Ta:25℃	V1: -0.0687 %~ 0.0687%
3	LINE REGULATION (Max)	V1: -0.5 %~ +0.5 %	I/P: 90VAC~ 264VAC O/P:FULL LOAD Ta:25℃	V1: -0%~ -0.0181%
4	LOAD REGULATION(Max)	V1: -0.5 %~ +0.5 %	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25℃	V1: -0.0687 %~ 0.0687%
5	OVER/UNDERSHOOT TEST	< ±5%	I/P: 230VAC O/P:FULL LOAD Ta:25℃	1.4%
6	RIPPLE & NOISE(Max)	V1: 150mVp-p/ FULL LOAD	I/P:230VAC O/P: TESTING LOAD Ta:25℃	V1: 45mVp-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/ 139.8 ms 115VAC/ 177.6 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 	

8	RISE TIME (Max)	230VAC/40ms 115VAC/40ms	I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	230VAC/ 9.77 ms 115VAC/ 17.75 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/ 58.7 ms 115VAC/ 16.4 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: 2760mVp-p	I/P: 230VAC O/P: (1)FULL /50% LOAD 50%DUTY / 120HZ (2)FULL /50% LOAD 50%DUTY / 1KHZ Ta:25℃	370mVp-p 325mVp-p
	FULL /50% LOAD 50%DUTY / 120HZ 		FULL /50% LOAD 50%DUTY / 1KHZ 	
11	TRANSIENT RECOVERY TIME	V1: 2760mVp-p	I/P: 230VAC O/P:40% LOAD CHANGE 50%DUTY/120HZ 1.25A/us	309mVp-p

12	BAT RATED CURRENT	1±0.1A	I/P: 230VAC O/P:CV=24V Ta:25℃	1.0256A
13	Battery static discharge current	After battery low protection <100uA	I/P： 230 VAC O/P：TESTING Ta：25℃	52.28 uA

INPUT FUNCTION TEST

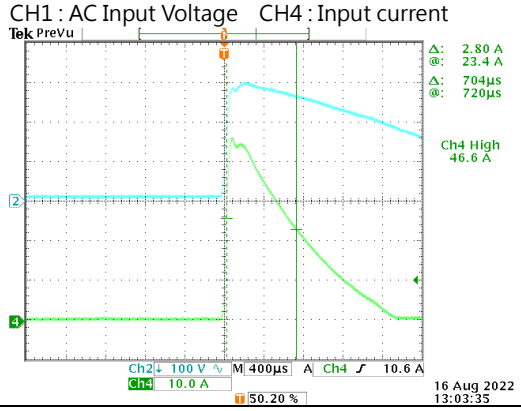
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	90 ~ 264VAC 127 ~ 370VDC	(1) I/P:TESTING O/P: TEST LOAD (2) I/P:DC TESTING(L:+ N:-) O/P: TEST LOAD I/P:DC TESTING(L:- N:+) O/P: TEST LOAD Ta:25℃	(1) 84.58V~264V/ FULL LOAD 80.85V~264V/ 80% LOAD (2) 108.8 Vdc~370Vdc/FULL LOAD 108.7 Vdc~370Vdc/80% LOAD (3) 108.9 Vdc~370Vdc/FULL LOAD 108.5 Vdc~370Vdc/80% 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 =1.208A/230VAC I =2.043A/115VAC
4	LEAKAGE CURRENT	< 0.5mA / 240 VAC	I/P： 240 VAC O/P：Min LOAD Ta：25℃	0.399 mA(PEAK) 0.208 mA (RMS)
5	EFFICIENCY(Typ.)	88%	I/P:230 VAC O/P:FULL LOAD Ta:25℃	88.92%
	EFFICIENCY vs LOAD			



7	INRUSH CURRENT(Typ.)	230V/55A 115V/30A COLD START	I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	I =46.6A/ 230VAC I =26.8A/ 115VAC T50= 704 us/230V

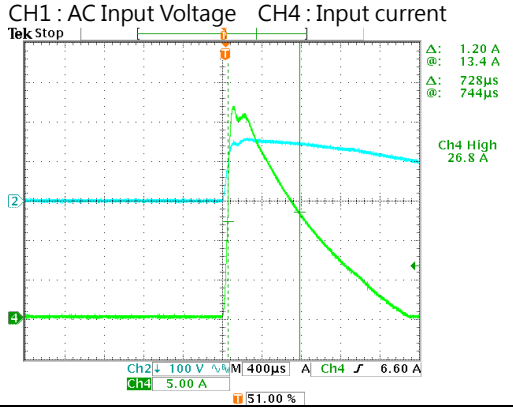
INPUT=230VAC/50HZ @ FULL LOAD

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℃	121.65%/ 264VAC 123.01%/ 230VAC 125.05%/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 on to removed)

		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)		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: 31V~36V Protection type : Shut down o/p voltage, re-power on to removed	I/P: 264VAC I/P: 90VAC O/P:MIN LOAD Ta:25℃	32.70V/264VAC 32.70V/230VAC 32.70V/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 Protection type : Shut down o/p voltage, re-power on to removed
4	BATTERY CUTOFF	21.5± 0.5V	I/P: 230 VAC O/P:BAT. LOAD Ta:25℃	21.675V
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℃	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	DISCHARGE	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 FULL	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 DISCONNECT/ REVERSE POLARITY	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	BATTERY LOW	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) 552V (2) 544V (3) 552V (4) 548V (5) 548V (6) 564V (7) 560V
2	Diode Peak Voltage	Q100 Rated : 20A/200 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) 138V (2) 172V (3) 137V (4) 139V (5) 142V (6) 137V (7) 137V (8) 136V Vo=Vnormal (1) 143V
3	BAT BUCK Transistor	Q 304 Rated : 12A /60 V	AC ON/OFF I/P:High-Line +3V = 267 V	Q304 VDS :

	(D to S) or (C to E) Peak Voltage		VDS : O/P: (1)CV (max)-1=26.6V (2)CV(min)=21V (3)no load (4)OUTPUT SHORT Ta:25℃	(1) 40.1V (2) 44.8V (3) 40.0V (4) 40.8V
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=26.6V (2)CV(min)=21V (3)no load (4)OUTPUT SHORT Ta:25℃	D320 VDS : (1) 33.2V (2) 32.4V (3) 32.8V (4) 32.0V
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)363V (2)363V (3)363V (4)359V
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/U100 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=26.6V (2)CV(min)=21V (3)no load (4)OUTPUT SHORT Ta:25℃	U1 (1) 12.76V (2) 12.76V (3) 12.76V (4) 12.76V (5) 12.67V U304 : (1) 13.47V (2) 13.55V (3) 13.61V (4) 15.06V
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) 497V (2) 493V

■ 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: 3.084mA I/P-FG: 3.372mA O/P-FG: 1.88mA 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℃	10 mΩ

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-120B 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	J108	58.8	79.5
2	U401	70.8	91
3	C6	63.4	82
4	RTH2	86.3	98.8
5	LF1	54.7	75.8
6	ZNR1	43.6	65.4
7	C2	58.6	78.5
8	BD1	69.1	86.8
9	D6	71.3	94.1
10	Q1	78.1	103.2
11	R22	77.2	98.4
12	C37	62.5	85.2
13	T1 Coil	79.8	99.5
14	T1 Core	72.4	91.8
15	C115	65.0	86.9
16	RTH10	71.4	89
17	C105	70.2	92.2
18	C106	69.2	89.1
19	Q100	74.0	95.3
20	Q305	57.2	79
21	L301	53.2	74.3
22	L100	51.9	73.2
23	C112	48.5	70.1
24	C346	51.0	72.1
25	RY101	53.5	74.3
26	U1	68.3	89
27	D30	64.6	87.9
28	D200	68.1	89
29	R14	66.7	89.5
30	U304	70.9	91.8
31	Q304	55.2	76.4
32	D320	52.1	73.6
33	J107	46.7	68.6

		34 | U6 | 60.0 | 81 35 | R100 | 78.6 | 99.4		
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P： 230 VAC O/P： 123.01% 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= 49.3 ℃ HUMIDITY= 95 %R.H	TEST：OK
5	TEMPERATURE COEFFICIENT	± 0.03 %/℃(0~50℃)	I/P： 230 VAC O/P：FULL LOAD	± 0.0085 %/℃(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) 99821.8 HRS (2) 21725 HRS (3) 46265.7 HRS (4) 88775.1 HRS
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

2020.10.1 TAG-QA-009