

ENGINEERING SPECIFICATION
230 WATT POWER SUPPLY

MODEL NAME : HA-1231-24L1

EFFECTIVE DATE: 2026.6.15

REVISION: A

PREPARED BY: Dan Tai

APPROVAL BY: Joe Tsai

Revision History

2025/6/15

Initial version: REV.A.

CONTENTS

1.	SCOPE.....	5
2.	INPUT REQUIREMENTS	5
2.1.	Input voltage	5
2.2.	Power factor.....	5
2.3.	Frequency	5
2.4.	Voltage selection	5
2.5.	No load and light load operation	5
2.6.	Input current	5
2.7.	Inrush current	6
2.8.	Power supply efficiency	6
3.	OUTPUT REQUIREMENTS.....	7
3.1.	Static dc load	7
3.2.	Dynamic load	7
3.3.	Ripple and noise.....	7
3.4.	Power on time	7
3.5.	Hold up time	7
3.6.	Overshoot	8
3.7.	Peak load	8
3.8.	Primary to secondary ground	8
3.9.	ISN resistors	8
4.	NO LOAD OPERATION	8
5.	TEMPERATURE COEFFICIENT	8
6.	PROTECTION.....	9
6.1.	Over voltage protection.....	9
6.2.	Over current protection	9
6.3.	Short circuit protection	9
6.4.	Over temperature protection	9
7.	SAFETY REQUIREMENTS	9
7.1.	Dielectric strength.....	9
7.2.	Insulation resistance	9
7.3.	Ground leakage current.....	9
8.	ELECTROMAGNETIC COMPATIBILITY.....	10
8.1.	EMI	10
8.1.1.	FCC requirements.....	10
8.1.2.	VDE requirements	10
8.1.3.	VCCI requirements	10
8.2.	EMS.....	10
8.2.1.	Lighting surge	10
8.2.2.	ESD.....	10
8.2.3.	EFT	10

9.	RELIABILITY.....	10
9.1.	E-cap life time	10
10.	ENVIRONMENT.....	12
10.1.	Operating.....	12
10.2.	Shipping and storage	12
11.	MECHANICAL CHARACTERISTICS:.....	12
11.1.	Acoustic test.....	12
11.2.	Temperature rise of case surface	12
11.3.	Drop.....	12

1. SCOPE

This specification defines the performance characteristics of a single phase, 230-WATT, single outputs power supply. This specification also defines worldwide safety and electromagnetic compatibility requirements for the power supply which is intended for use in IA products.

2. INPUT REQUIREMENTS

2.1. INPUT VOLTAGE

	MINIMUM	MAXIMUM	NOMINAL
LOW RANGE	90 Vac	132 Vac	100-120 Vac
HIGH RANGE	180 Vac	264 Vac	200-240 Vac

2.2. Power factor

Adapter with PFC shall comply with harmonic input current requirements as detailed in EN61000-3-2 and JEIDA MITI standards. The harmonic input current requirements must be met under the following operating conditions:

Load Requirements: 100% and with output load set in order to have 75W input power.

Input Voltage: 230Vac/50Hz.

For active power factor correction, the power factor at 100% load shall be **greater than 0.9** over the entire input voltage 90Vac & 240Vac input.

2.3. FREQUENCY

	MINIMUM	MAXIMUM	NOMINAL
SINGLE PHASE	47 Hz	63 Hz	50-60 Hz

2.4. VOLTAGE SELECTION

A full range will be provided to select the appropriate range.

2.5. NO LOAD AND LIGHT LOAD OPERATION

The device shall conform to the EPA Energy Star Requirements Level VI for External Power Supplies

Test Condition		Design Requirement	
AC Input	DC Output	Pout	Pin
115V 60Hz 230V 50Hz	24V	0.00 W	0.21W
		0.25 W	0.50W
		0.50 W	1.00W
		1.00 W	1.70W
		1.50 W	2.40W

- The PSU shall operate at 100% load for 30 min before efficiency measurements.
- Use integration method and the integral time is 10 minutes at Ta=25°C)

2.6. INPUT CURRENT

Maximum steady state input current shall be less than 3.5 Amperes RMS at 90 VAC and maximum load.

2.7. INRUSH CURRENT

Maximum inrush current, from power-on (with power on at any point on the AC sine wave) and including but not limited to, three-line cycles, shall be limited to a **29%** margin of the I2t rating of the input fuse and bridge rectifier:

2.7.1 COLD START

Cool the disconnected power supply long enough to ensure that all components are within 3°C of the minimum temperature as specified in Section 9. Apply the maximum input voltage in section 2.1 to the power supply.

2.7.2 HOT START

Operate the power supply the maximum ambient operating air temperature as specified in Section 9. for 15 minutes. Cycle power to the power supply by removing and reconnecting maximum input voltage as specified in Section 2.1.

2.8. POWER SUPPLY EFFICIENCY

This Adaptor shall be designed to meet DOE requirement. Average Efficiency value of 25%,50%, 75%, 100% load condition with 115Vac/230Vac input voltage shall be follow the below table:

Test Condition		Average Efficiency (%)
Input Voltage (V)	Output Power (W)	
115V / 60Hz	24V / 9.59A	89%
230V / 50Hz		89%

- The PSU shall operate at 100% load for 30 min before conducting efficiency measurement.

3. OUTPUT REQUIREMENTS

3.1. STATIC DC LOAD (CV domain)

NOMINAL VOLTAGE (V)	LOAD CURRENT(A)	REGULATION
24V	0 ~ 9.59A	22.8V – 25.2V

3.2. DYNAMIC LOAD

Input Voltage	Output VOLTAGE (V)	LOAD CURRENT(A)	REGULATION
90 ~ 264V (47~63Hz)	24V	0.1A ~ 4.795A	22.8V – 25.2V
		4.795A ~ 9.59A	

- Frequency: 1 Hz / 100 Hz / 5KHz; Slew Rate: 0.25A/us; Duty: 50%
- The 24.0V output voltage shall be add Capacitor 2200uF on the load and measure at DC cable-end.

3.3. RIPPLE AND NOISE

The ripple and noise of the outputs shall be measured at the load end if the output cables when terminated to load impedance as specified in paragraph 3.1.

OUTPUT VOLTAGE	RIPPLE & NOISE(P-P)
24V	150mV

- Use 20M Hz Bandwidth frequency scope.
- Output load adds 1uF ceramic capacitor and 10uF tantalum capacitor.
- Vo < 650mVp-p when load < 1A.

3.4. POWER ON TIME

Test Condition		Design Requirement
AC input	DC Output	
90V 47Hz	24V	5s (max)

- With 2200uF Capacitor on the load.
- Measured from AC on point to the 90% point of the output voltage.

3.5. HOLD UP TIME

Test Condition		Design Requirement
AC input	DC Output	
115V 60Hz	24V / 9.59A	5ms (min)

3.6. OVERSHOOT

During power-on or power-off, the output voltage shall be monotonically increasing or decreasing with respect to the overshoot which shall neither each output volts peak nor be outside the regulation requirements for more than 10 milliseconds.

OUTPUT VOLTAGE	Design Requirement
24V	26.0V

3.7. PEAK LOAD

Input Voltage	LOAD CURRENT(A)	REGULATION
100Vac	7.67A(450m seconds) ~ 12.47A(300m seconds)	19.69V(MIN)
	10.55A(30 seconds) ~ 9.49A(300 seconds)	21.6V(MIN)
	11.51A(4 seconds) ~ 9.40A(40 seconds)	
	14.39A(1m seconds) ~ 9.11A(10m seconds)	
	16.25A(110u seconds) ~ 8.93A(1100u seconds)	

- Slew Rate: 0.25A/us
- Only measured at none burn-in condition.

The adaptor shall support 10.57A burn in 24 hours at 100-240Vac and 25°C ambient (no damage)

3.8. PRIMARY TO SECONDARY GROUND

The power supply shall have a **1Meg Ohm 1/4W resistor and 0.1uF/100V capacitor** parallel combination between earth ground (FG) and secondary DC ground.

3.9. ISN RESISTORS

The power supply shall have a **470 Ohm (minimum)** resistor between earth ground (FG) and secondary DC ground.

4. NO LOAD OPERATION

The power supply shall be able to operate under no load condition. No damage to the power supply is allowed and internal component cannot be stressed beyond its rating.

5. TEMPERATURE COEFFICIENT

The temperature coefficient of all outputs is 0.05% per degree centigrade maximum.

6. PROTECTION

6.1. OVER VOLTAGE PROTECTION

The power supply should shut down for any cause of over voltage conditions before any output exceeds its limits below.

Test condition			Design Requirement	
AC input	DC output		MAX	Latched
100V/60Hz 240V/50Hz	+24.0V	0A	35V	

6.2. OVER CURRENT PROTECTION

The power supply shall provide over current protection on output. Maximum current inception point of output shall be limited to the following values:

NOMINAL OUTPUT VOLTAGE (V)	CURRENT LIMIT (A)
	MAX.
24V	20A (Auto recovery)

6.3. SHORT CIRCUIT PROTECTION

The power supply shall be auto-recovery once the short error removed. Such that a short from output to return shall not result in a fire hazard, shock hazard, or damage to the power supply.

6.4. OVER TEMPERATURE PROTECTION

The adapter shall provide over temperature protection and if the temperature rises to set temperature point, the PSU will **shut down and latch off** until the AC reset.

7. SAFETY REQUIREMENTS

The power supply must comply with the following national standards:

- CE / CB / UL&CUL / TUV / PSE / FCC / BSMI / CCC / KC&KCC / NRCAM / RCM / NOM / EAC / BIS

7.1. DIELECTRIC STRENGTH

Primary to Secondary: **4242 VDC for 1 sec.**

Primary to PE: **2150 VDC for 1 sec.**

7.2. INSULATION RESISTANCE

Primary to secondary: **30 Meg. Ohms Min, 500VDC**

7.3. GROUND LEAKAGE CURRENT

The power supply ground leakage current shall be less than **80uA** at 250Vac/50Hz.

8. ELECTROMAGNETIC COMPATIBILITY

Power supply for use with the host system will be tested to confirm with the following emission standards.

8.1. EMI

Power supply must be confirmed the following emission standards and it has **4dB** (QP/AV) margin at least.

8.1.1. FCC REQUIREMENTS

Power supply shall comply with the United States Communication Commission (FCC) Rules and Regulations, Part 15, Subpart J, Computing Devices "Class B limits".

8.1.2. VDE REQUIREMENTS

Power supply shall conform to the "Class B" requirements of CISPR 32.

8.1.3. VCCI REQUIREMENTS

Power supply shall conform to the "Class II" requirements of VCCI.

8.2. EMS

8.2.1. LIGHTNING SURGE (EN61000-4-5)

Differential mode: **±2KV** / Common mode: **±4KV**

8.2.2. ESD (EN61000-4-2)

Contact discharge: **±8KV** / Air discharge: **±15KV**

8.2.3. EFT (EN61000-4-4)

Differential mode: **± 1KV** / Common mode: **± 1KV**

9. RELIABILITY

9.1. E-CAP LIFE TIME

All Aluminum electrolytic capacitors shall have a minimum lifetime of **3 years** at ambient temperature of 25 degree C and 100% load. (Measured at 100Vac/60Hz and 240Vac/50Hz)

10. ENVIRONMENT

10.1. OPERATING

Temperature: 0 to 40 degrees centigrade.*
Relative Humidity: 95 percent, non-condensing.
Altitude: 5,000m above sea level.
Note: thermal test shall place on bakelite 42x30x1cm

10.2. SHIPPING AND STORAGE

Temperature: -20 to +85 degrees centigrade.
Relative Humidity: 95 percent, non-condensing.
Altitude: 50,000 feet above sea level.

11. MECHANICAL CHARACTERISTICS:

11.1. ACOUSTIC TEST

The adapter shall not make any acoustical noise. The noise level is less than 25 dB at 10 cm distance at any condition, test load is 0A,0.1A,0.2A,0.3A,...1A,2A,...to full load.

11.2. TEMPERATURE RISE OF CASE SURFACE

No point on the surface of the adapter case's rise temperature shall be less than 50 deg C with 100Vac input voltage with maximum load.

The measurement method shall follow Customer's requirement as below.

1. The ambient temperature is 40°C at least and be alongside the sample 100mm*30mm.
2. The logo of sample is upward or label is downward.
3. The plate is bakelite. The dimension is 65cm*65cm and the thickness is 18mm

11.3.DROP

Drop Height: 36-inch; Impact Surface: Blanket; Orientations: 1 time/face, 6 faces.

NOTES: UNLESS OTHERWISE SPECIFIED.

1. ALL DIMENSIONS ARE IN mm.
2. PARTS SPECIFIED AS FOLLOWS :

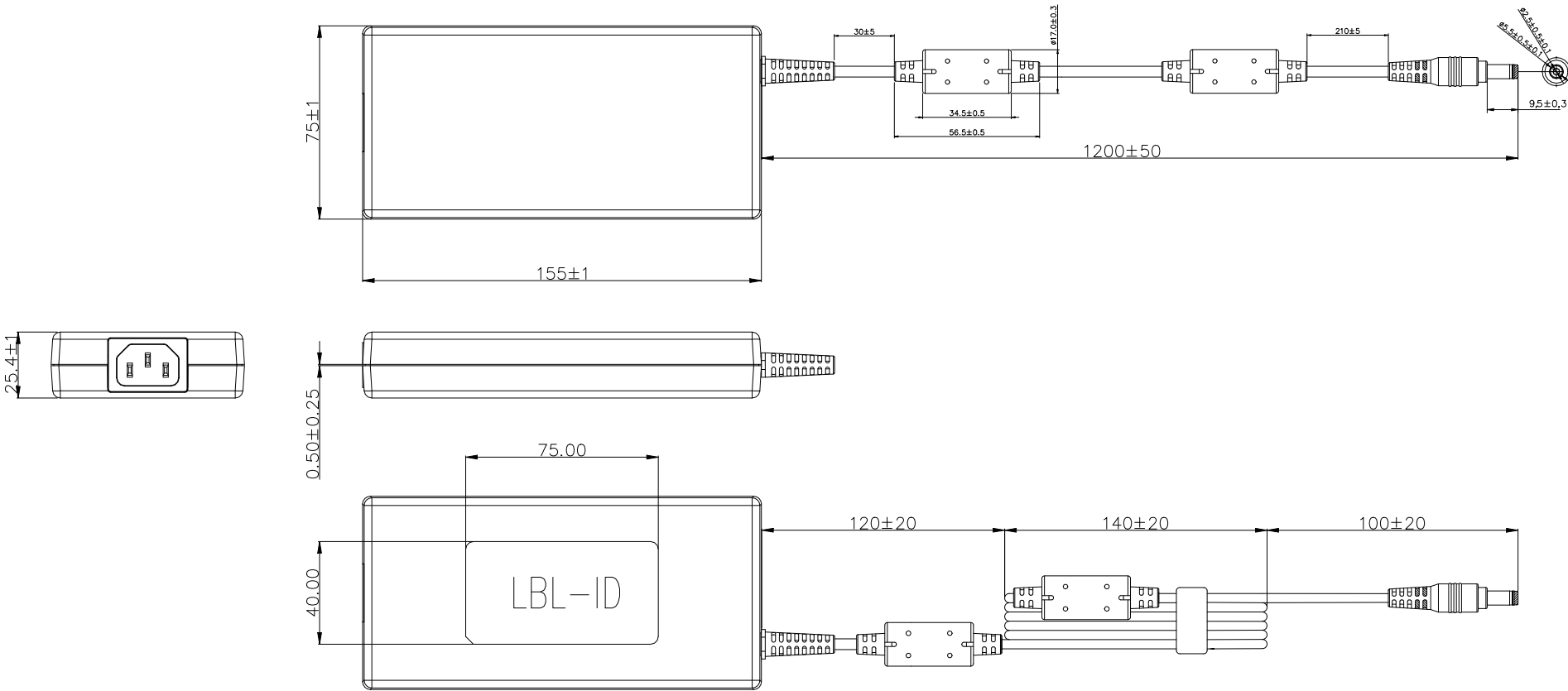
2-1. ENCLOSURE:

- * MEET UL94-V0 RATING
- * COLOR : BLACK
- * TEXTURE : VDI-30

2-2. AC INLET :

- * C14 CERTIFIED,3 WAY
- * COLOR : BLACK

2-3. DC CABLE : REFERENCE CABLE SPEC.



	RELEASE	2026/06/15	Robin	A1~D6
REV.	DESCRIPTION	DATE	EDITOR	ZONE

SHEET	1/1	2D FILE	OUTLINE-HA-1231-24L1
SCALE	1:1	3D FILE	
UNIT	mm		

DESIGNER	Robin Lo	☒ RoHS 2.0	☐ HF	☐ PF
CHECKER	Mika Chuang	APPROVER	Randy RC Chen	

	TITLE: OUTLINE	DRAWING NO.: 0-00XXXX
	PROJECT: HA-1231-24L1	PART NO.: REV.: X01

1. 材質 Material

- 表面附膜: 25#霧面特多龍商標紙, Polyester Film (PET)
型號: 金利寶TPATM(T)(30)(D0404005)
面材厚度: 0.025mm+/-0.004 mm
- 表面附膜背膠: 壓克力膠, 厚度0.018mm+/-0.003mm
- 底材: 75# 壓花白色霧面特多龍合成商標紙, Polyester Film (PET)
型號: 金利寶THYL75(EA)-C5(K180404)
底材厚度: 0.075mm+/-0.004 mm
- 底材背膠: 金利寶壓花膠(網格膠), 厚度0.033mm+/-0.003mm
- 底紙: PE淋膜格拉辛壓花離形紙, 厚度0.102mm+/-0.011mm
壓花深度: 0.013mm~0.023 mm

The details is noted in the component approve sheet

2. 印色 Color

黑底白字

3. The approved vender must be UL recognized and CSA certified.

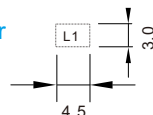
4. The label shall be marked with the CSA vender identification mark as specified in the CAS list. Location approx as shown.

“~”依標籤廠顯示代碼如下

巷泉: XQ
卡東: CT
宏升: FJ
昇彩: ST

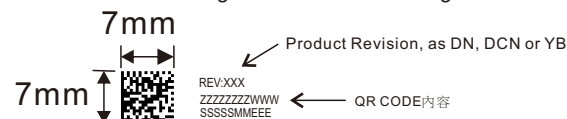
5. Bar code

1. SERIAL MODEL: L1 Printed by Vendor



2. 2D bar code& printing rule Printed by LiteON

- 2D bar code: 2D Data Matrix, 600dpi, numeric grade of Grade 2 or higher



- 2D bar code content:

2D bar code掃出為ZZZZZZZZWWWSSSSSMEEEE, 共21碼

- 條碼文字字體: Arial
- 條碼文字高度: 1.2mm min.
- 條碼文字顏色: black.

ZZZZZZZZZZWWWSSSSSSSMEEEE

ENG. VERSION(CUSTOMER REVISION):
FOLLOW DN or DCN, X01, X02, A01, B01...etc.

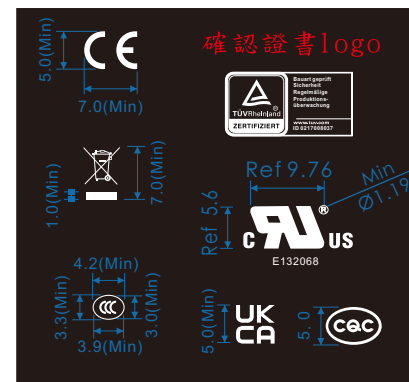
MFG. CODE (FACTORY ID CODE, LITE-ON):
CA USE: P6, WJ USE: PD, CZ USE: PE

SERIAL NUMBER: (RESET FROM 00001 EACH WEEK)
BY 16 CARRY (0~9, A~F)

Liteon P/N: 123124L1

WEEK CODE:
2016 YEAR 10TH WEEK, PRINT 610

6. Safety logo dimension



7. Main label artwork



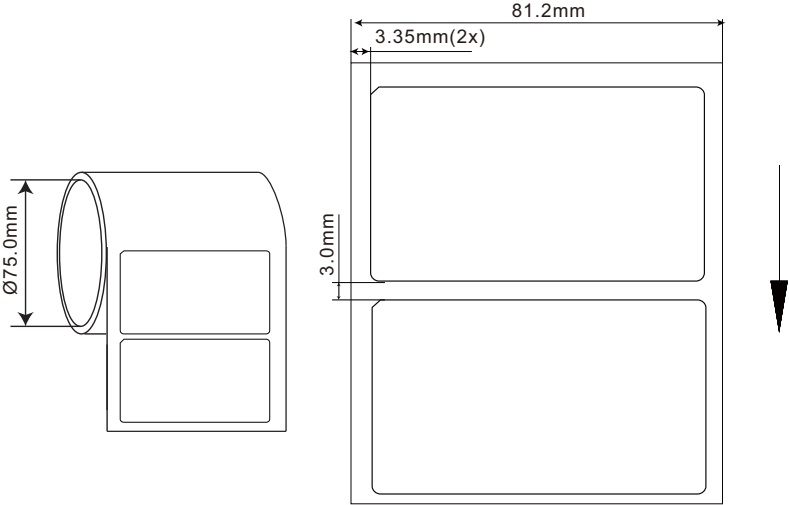
1:1

REV.	RELEASE	2026/01/06	Robin Lo	A1~D6
DESCRIPTION	DATE	EDITOR	ZONE	

SHEET	1/1	2D FILE	HA-1231-24LC	DESIGNER	Robin Lo	APPROVER	Randy RC Chen	TITLE: LBL-ID	DRAWING NO.:
SCALE	1:1	3D FILE		CHECKER				PROJECT: HA-1231-24LC	PART NO.: 93-6A01G9
UNIT	mm								REV.: A

HA-1231-24LC	DESIGNER	Robin Lo	APPROVER	Randy RC Chen
HA-1231-24LC	CHECKER			

LITEON	TITLE: LBL-ID	DRAWING NO.:
PROJECT: HA-1231-24LC	PART NO.: 93-6A01G9	REV.: A

	1	2	3	4	5	6			
A	9. 測試要求 Test Spec								
	a. 背膠黏著力測試 測試環境: 23±2°C, 1atm, 50±5%RH 樣品: 3pcs, 寬度25.4mm 測試要求: (1)將測試樣品貼附在表面平滑乾淨的鋼板上, 不可碰觸背膠, 貼覆後樣品表面要求平整 (2)以寬度大於樣品的硬質橡膠滾輪來回施力於樣品表面, 使黏貼均勻, 無起泡, 無皺褶 (3)樣品貼附20分鐘後, 撕起樣品一端黏貼於拉力計,拉力計與樣品呈90°, 且以2 inch/min.的速度將樣品剝離鋼板 (4)當拉力計讀值穩定時紀錄紀錄力量公斤數 (5)黏著力要求0.8 kgf/ inch min. (6)三次測試皆須滿足要求			f. 附著力測試 測試要求: (1)以3M #610膠紙, 緊密貼合測試區, 平整按壓30秒, 膠紙以90°向上快速揭起撕開, 重換膠紙測試3回 (2)被測區樣品內容無明顯脫色或脫落, 文字清晰可見, 條碼可正常掃描					
B	b. 高溫測試 測試要求: (1)將測試樣品貼附在表面平滑乾淨的鋼板上, 不可碰觸背膠, 貼覆後樣品表面要求平整, 靜置室溫4小時 (2)置於85°C, 0%RH的烤箱中, 烘烤72小時, 後靜置4小時 (3)測試過程及靜置後, 樣品不可起泡翹曲, 顏色, 黏著力及印刷附著性需符合要求			g. 儲存測試 測試要求: (1)成品燒機後, 靜置24小時, 按儲存測試標準中溫溼度曲線設定溫濕箱環境進行測試 (2)測試過程及靜置後, 樣品不可起泡翹曲, 顏色, 黏著力及印刷附著性需符合要求					
	c. 高低溫測試 測試要求: (1)將測試樣品貼附在對應機殼上, 不可碰觸背膠, 貼覆後樣品表面要求平整, 靜置4小時 (2)先置於-20°C, 0%RH的烤箱中, 12小時, 以105°C/hr升溫, 在85°C下烘烤12小時, 再靜置室溫4小時 (3)測試過程及靜置後, 樣品不可起泡翹曲, 顏色, 黏著力及印刷附著性需符合要求			10. For Incoming Package					
C	d. 高溫高濕測試 測試要求: (1)將測試樣品貼附在對應機殼上, 不可碰觸背膠, 貼覆後樣品表面要求平整, 靜置4小時 (2)置於85°C, 95%RH的烤箱中, 24小時, 再靜置室溫4小時 (3)測試過程及靜置後, 樣品不可起泡翹曲, 顏色, 黏著力及印刷附著性需符合要求			NOTES FOR INCOMING PACKAGE: PACKING METHOD--					
	e. 耐酒精測試 測試要求: (1)將棉紗布包覆300g砝碼, 以95%工業酒精滴在綿紗布上, 綿紗布完整吸收酒精且不流出酒精 (2)將酒精砝碼平放在樣品上, 以每2秒來回一次的速度擦拭, 共30來回 (3)被測區樣品內容無明顯脫色或脫落, 文字清晰可見, 條碼可正常掃描								
D									
ADD DOE VI 2024/11/19 Robin A1~D6 RELEASE 2024/01/19 Robin A1~D6 REV. DESCRIPTION DATE EDITOR ZONE		2D FILE HA-1231-24LC 3D FILE		DESIGNER Robin Lo CHECKER		RoHS 2.0 HF PF APPROVER RANDY CHEN LITEON® TITLE: LBL-ID PROJECT: HA-1231-24LC		DRAWING NO.: PART NO.: 93-6A01G9 REV.: B	

A

B

C

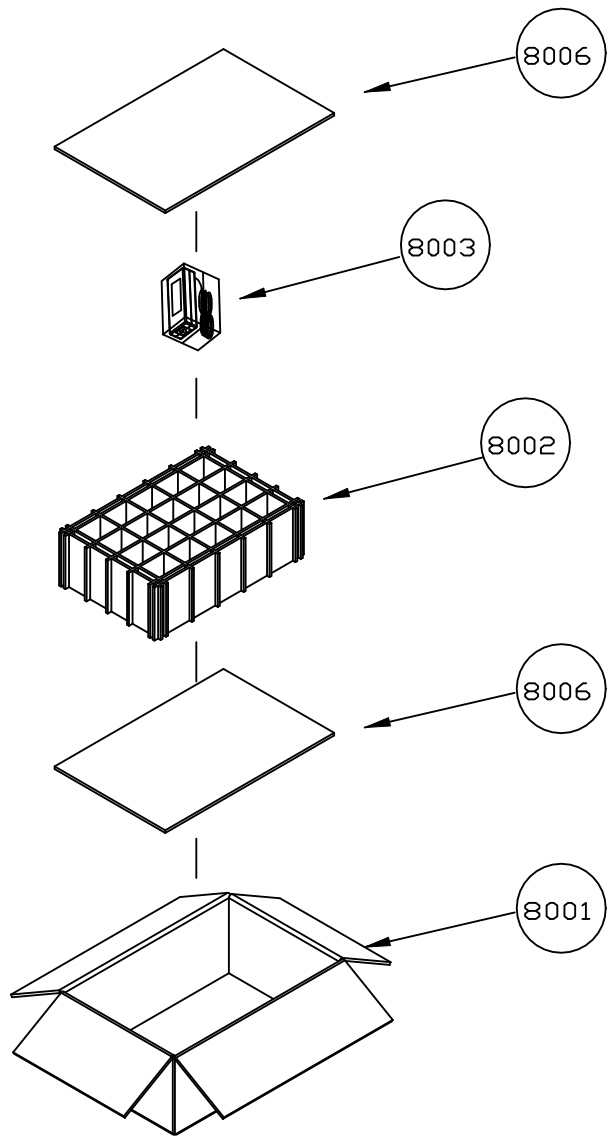
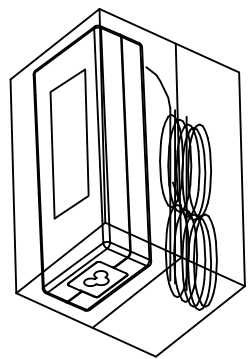
D

A

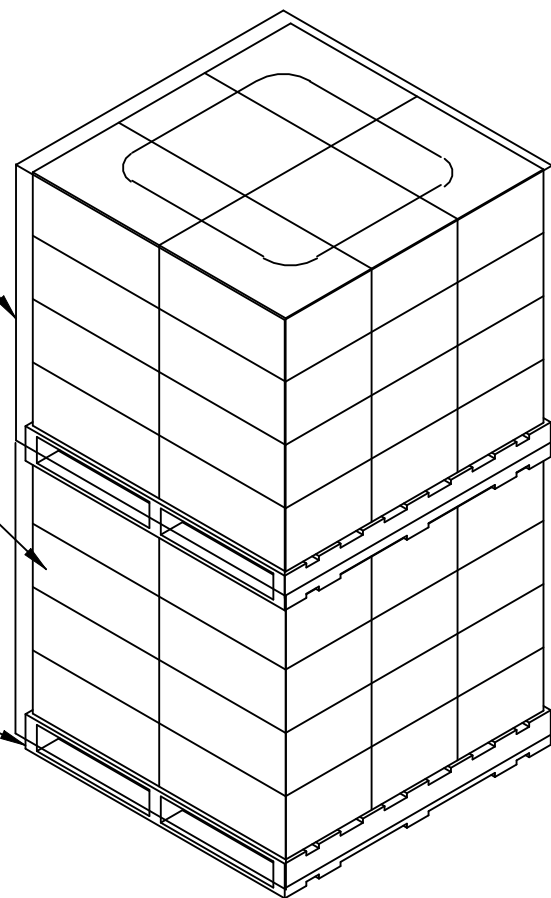
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C

D



POLYESTER FILM



PART NAME	QUANTITY
CARTON	1 CARTON=20 UNITS
PALLET	1 PALLET = 4 LAYERS =24 CARTONS =480 UNITS
POLY FILM	2 LAYERS MIN.
40 FT CONTAINER	1 CONTAINER=40 PALLETS
20 FT CONTAINER	1 CONTAINER=20 PALLETS

☒ RELEASE	2026/06/15	Robin	A1~D6
REV.	DESCRIPTION	DATE	EDITOR

SHEET	1/1	2D FILE	HA-1231-24L1
SCALE	1:1	3D FILE	
UNIT	mm		

DESIGNER	Robin Lo	☒ RoHS 2.0	☐ HF	☐ PF
CHECKER	Mika Chuang	APPROVER	Randy RC Chen	



TITLE:PACKING DRAWING	DRAWING NO.:P-00XXXX
PROJECT:HA-1231-24L1	PART NO.:
	REV.:X01