

# 專案週報:

## 番茄採摘載具v3- 電源分配單元設計

presenter: Lego

Date: 2025/09/26



# 專案目標

電源分配單元(UDP)需要做到:

- 分配各個電壓系統(48v/24v/12v)
- 良好的散熱
- 電池管理系統(BMS)
- 過載斷電機制



# 2025/09/19–26進度

- 學習與參考網路上UDP設計方法
- 在draw.io中呈現電路佈局



# 上週遇到的 問題與解決方案

在重製電路的過程中，發現現有的**電力系統**可能無法滿足整體負載需求，導致主控電腦在高負載時**無法發揮性能**或發生當機情況。

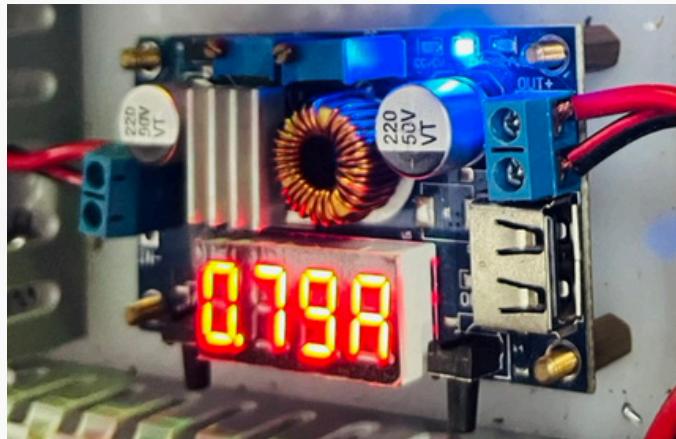
解決方案：  
替換為符合功率需求的 DC-DC 降壓模組

# 進度報告 part 1

## 發現上位機供電問題

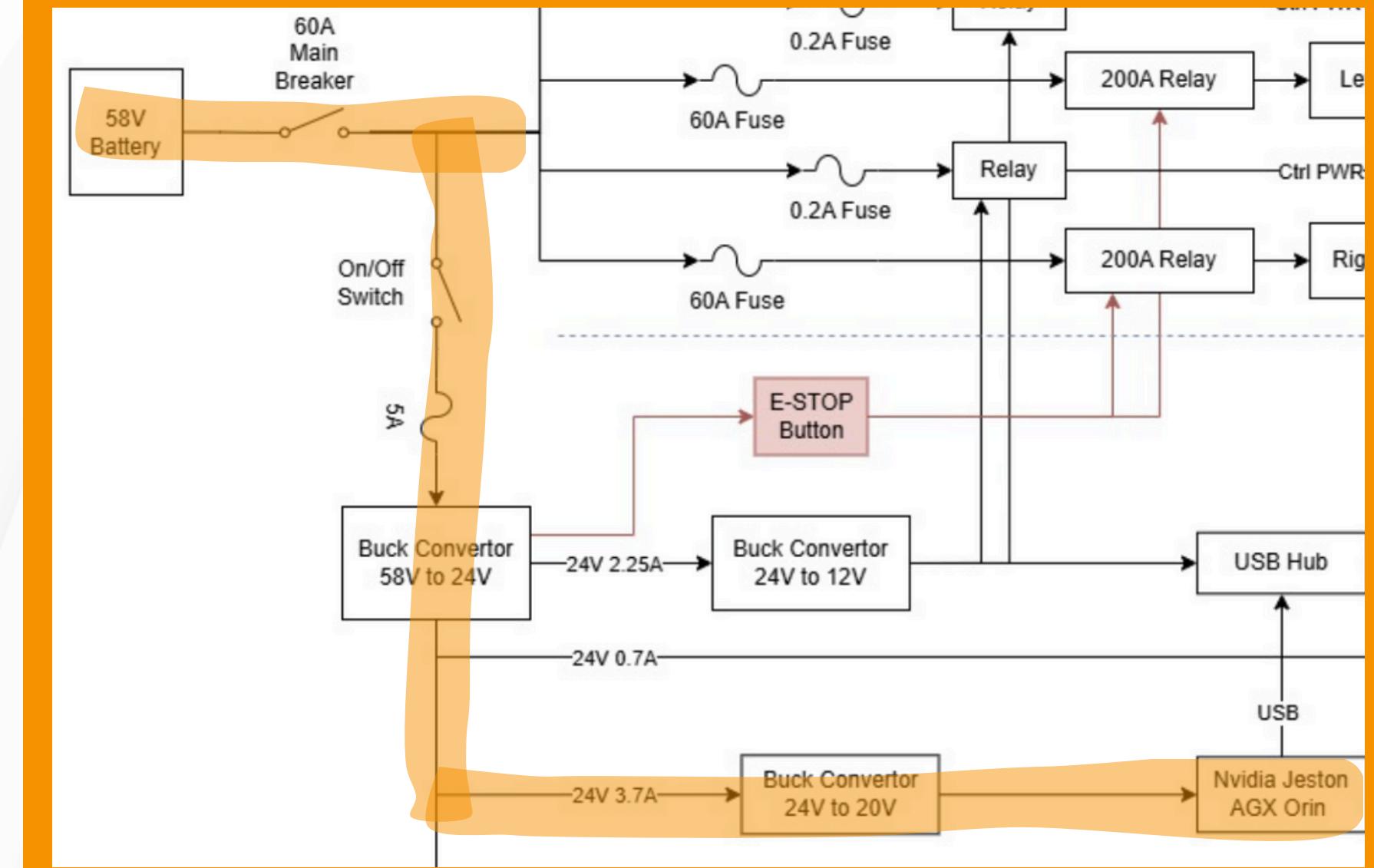
目前Jetson AGX Orin是由**LM2596**經過24V降壓而來。

Jetson agx orin可透過linux內建指令調整功率，最高可達**60w**。在12v供電的情況下會達到5A，已超過目前降壓模組的負荷。



- 輸出電流3A，建議在2.0A內使用，大電流需要加強散熱。
- 輸出功率20W，超過15W請加強散熱。

- LM2596示意圖與效能



### • v2.5 示意圖

Jetson AGX Orin series modules are designed with a high efficiency Power Management Integrated Circuit (PMIC), voltage regulators, and power tree to optimize power efficiency. Jetson AGX Orin 64GB supports three optimized power budgets: 15W, 30W, and 50W. Each power mode caps various component frequencies, and the number of online CPU, GPU TPC, DLA, and PVA cores. Jetson AGX Orin 64GB also supports a MAXN performance mode that can enable up to 60W of performance. Jetson AGX Orin 32GB supports power modes between 15W and 40W. Customers can leverage the nvpmtool tool in Jetson Linux to use one of these pre-optimized power modes or to customize their own power mode within the design constraints provided in our documentation.

- *from jetson agx orin datasheet*

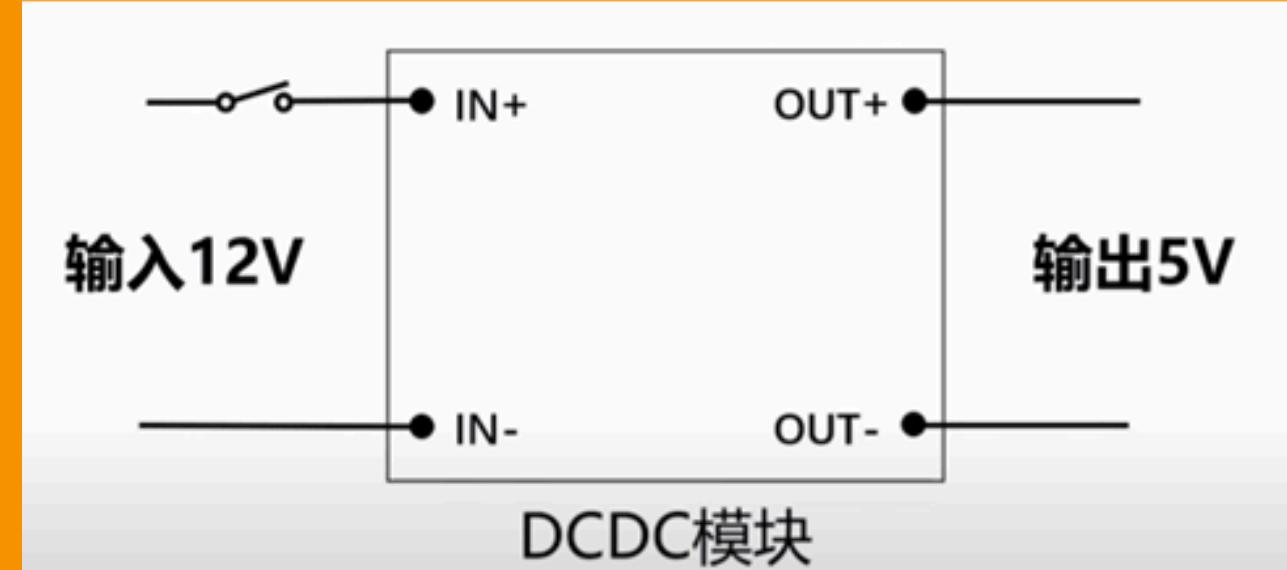
# 進度報告 part 1

## 發現上位機供電問題

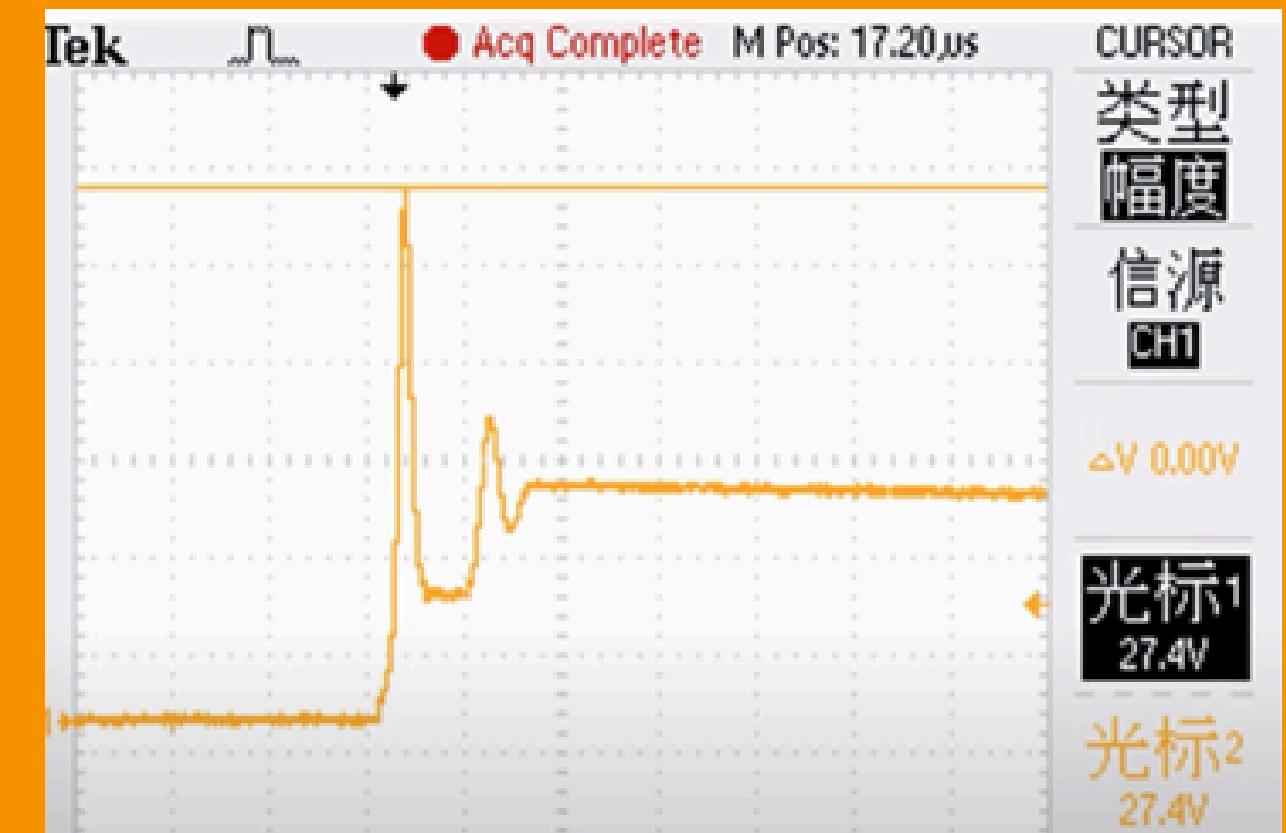
關於現有的降壓模組LM2596:

網路上有人做了實驗發現在瞬間啟動時，會出現紊亂的波型，這可能導致後面接的元件超過工作電壓而燒毀，也有可能使jetson 的供電出現問題。

我認為需要將降電腦的降壓模組**獨立**出來使用並選配**電力品質較佳**的模組。



實驗設計



結果

# 模組選擇(from Mouser)



100W DC-DC Non-Isolated Regulated Converter

NID100 series

結果: 3,442 |  智能篩選 ?

已用篩選: 電源產品 > DC/DC轉換器 ✖ 行業 = Industrial ✖ 標稱輸入電壓 = 24 V ✖ 輸出功率 = Multiple Values ✖

製造商	安裝風格	輸出數	輸出電壓-通道1	輸出電流-通道1
--- 最受歡迎 ---				
TRACO Power	Chassis Mount	1 Output	0 V to - 1 kV	3 mA
RECOM	DIN Rail	2 Output	0 V to - 10 kV	3.13 mA
Murata	Rack	3 Output	0 V to - 12 kV	4 mA
MEAN WELL	SMD/SMT	4 Output	0 V to - 125 V	4.17 mA
XP Power	Through Hole		0 V to - 15 kV	5 mA
Vicor			0 V to - 2 kV	6 mA
Texas Instruments			0 V to - 20 kV	6.25 mA
TDK-Lambda			0 V to - 25 kV	7.5 mA
--- A至Z ---			0 V to - 250 V	8.3 mA
Advanced Energy			0 V to - 30 kV	8.33 mA
Bel Power Solutions			0 V to - 4 kV	10 mA
Calex			0 V to - 40 kV	10.5 mA
Cincon			0 V to - 50 kV	12.5 mA
Cosel			0 V to - 500 V	15 mA



## ■ GTIN CODE

MW Search: <https://www.meanwell.com/serviceGTIN.aspx>

## SPECIFICATION

ORDER NO.	NID100-5	NID100-12	NID100-15	NID100-24
DC VOLTAGE	5V	12V	15V	24V
RATED CURRENT	11A	7.5A	6.5A	4.2A
RATED POWER	55W	90W	97.5W	100.8W
OUTPUT	100mVp-p	120mVp-p	150mVp-p	200mVp-p
LINE REGULATION Note.3	±0.5%	±0.5%	±0.5%	±0.5%
LOAD REGULATION Note.4	±0.5%	±0.5%	±0.5%	±0.5%
VOLTAGE TOLERANCE	±2.0%	±2.0%	±2.0%	±2.0%
SWITCHING FREQUENCY (Typ.)	200KHz			
EXTERNAL CAPACITANCE LOAD (max.)	100uF/16V low ESR	68uf/25V low ESR	47uf/50V low ESR	47uf/50V low ESR
INPUT				
VOLTAGE RANGE	10.5 ~ 53VDC	20 ~ 53VDC	20 ~ 53VDC	30 ~ 53VDC
NORMAL VOLTAGE	24VDC (or 48VDC)	24VDC (or 48VDC)	24VDC (or 48VDC)	48VDC
EFFICIENCY (Typ.)	24Vin 93% (12/24VDC) 48Vin 92%	96%	97%	-----
DC CURRENT	Full load 5400mA/12VDC No load 20mA	4500mA/24VDC 30mA	4600mA/24VDC 30mA	2300mA/48VDC 50mA

MEAN WELL

非隔離式DC/DC轉換器  
55W 24Vin 5Vout Non-Iso Reg SIP

了解更多

規格書

1,400  
預期2025/12/3

1 NT\$357.00

搜尋的條件(左側)和模組資料(右側)

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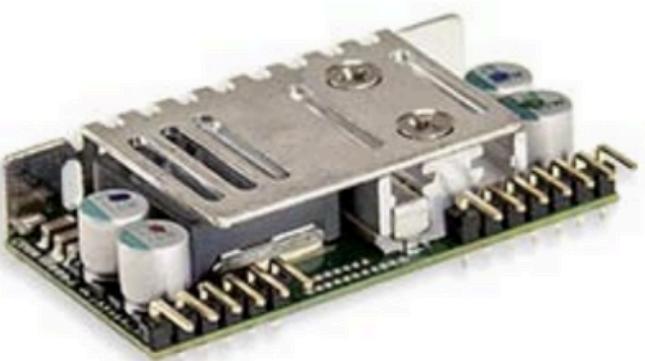
1,400  
預期2025/12/3

1 NT\$357.00



100W DC-DC Non-Isolated Regulated Converter

NID100 series



## ■ Features :

- Economical open frame design
- Wide input range
- High efficiency up to 97%
- Remote ON / OFF control
- Compact size 2.0"x1.082"x 0.472"(SIP package)
- Protections: Short circuit / Overload / Over voltage
- 30~+85°C wide working temperature
- Cooling by free air convection
- Comply to BS EN/EN55032 ClassA without additional components
- Trimming output (optional)
- 3 years warranty



## ■ GTIN CODE

MW Search: <https://www.meanwell.com/serviceGTIN.aspx>

## SPECIFICATION

ORDER NO.	NID100-5	NID100-12	NID100-15	NID100-24
OUTPUT	DC VOLTAGE	5V	12V	15V
	RATED CURRENT	11A	7.5A	6.5A
	RATED POWER	55W	90W	97.5W
	RIPPLE & NOISE (max.) Note.2	100mVp-p	120mVp-p	150mVp-p
	LINE REGULATION Note.3	±0.5%	±0.5%	±0.5%
	LOAD REGULATION Note.4	±0.5%	±0.5%	±0.5%
	VOLTAGE TOLERANCE	±2.0%	±2.0%	±2.0%
	SWITCHING FREQUENCY (Typ.)	200KHz		
INPUT	EXTERNAL CAPACITANCE LOAD (max.)	100uF/16V low ESR	68uF/25V low ESR	47uF/50V low ESR
	VOLTAGE RANGE	10.5 ~ 53VDC	20 ~ 53VDC	20 ~ 53VDC
	NORMAL VOLTAGE	24VDC (or 48VDC)	24VDC (or 48VDC)	24VDC (or 48VDC)
	EFFICIENCY (Typ.)	24Vin 93% (12/24VDC)	96%	97%
		48Vin 92%	95%	95%
	DC CURRENT	Full load 5400mA/12VDC	4500mA/24VDC	4600mA/24VDC
		No load 20mA	30mA	30mA
				50mA

結果: 3,442 |  智能篩選 ?

已用篩選: 電源產品 DC/DC轉換器 行業 = Industrial 標稱

製造商

### ---- 最受歡迎 ----

TRACO Power  
RECOM  
Murata  
MEAN WELL  
XP Power  
Vicor  
Texas Instruments  
TDK-Lambda

### ---- A至Z ----

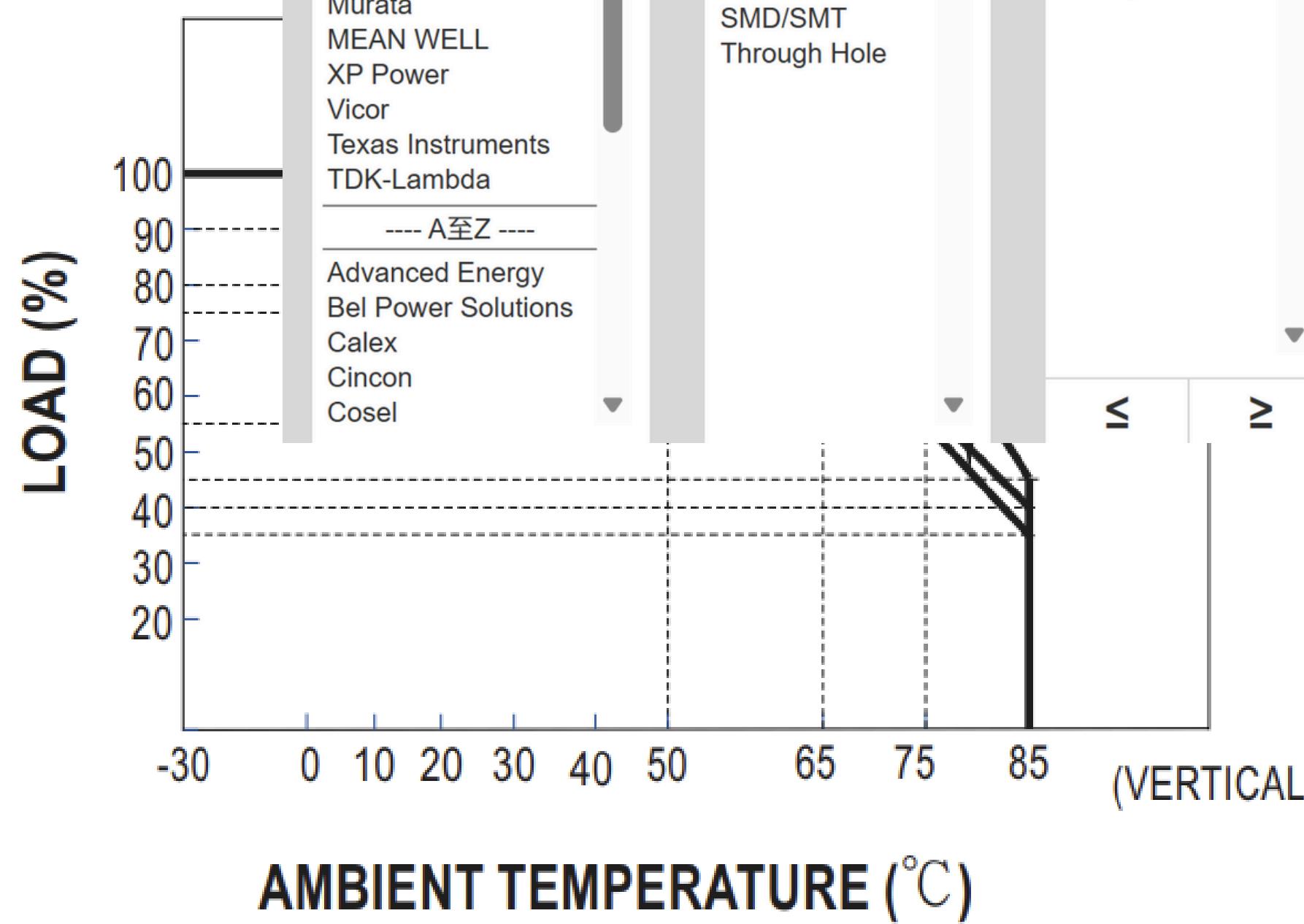
Advanced Energy  
Bel Power Solutions  
Calex  
Cincon  
Cosel

安裝風格

Chassis  
Chassis Mount  
DIN Rail  
Rack  
SMD/SMT  
Through Hole

輸出數

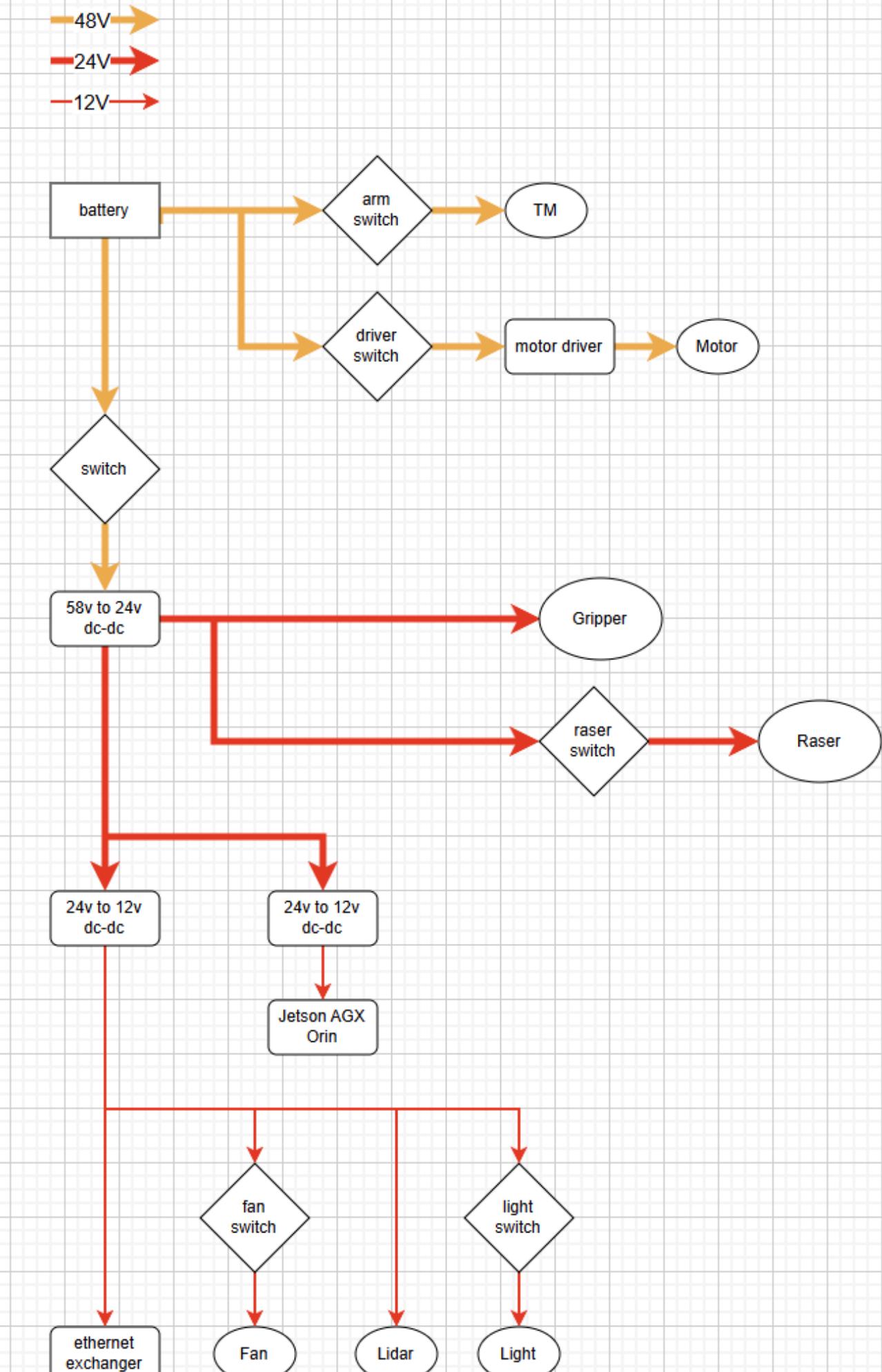
1 Output  
2 Output  
3 Output  
4 Output



# 進度報告 part 2

## 電路系統佈局

- 將各個元件所需要的不同電壓分流 (48v / 24v / 12v)
- 在電流轉換之間的元件增加fuse防止元件被破壞
- 將電路佈局規劃成



# 下周的 計畫

- 畫出更完整的電力系統規畫  
(fuse規格, 線徑等)
- 依照cad圖設計電路元件佈局

