

Układ sterujący ekspresem do herbaty

Autor: Łukasz Nowarkiewicz

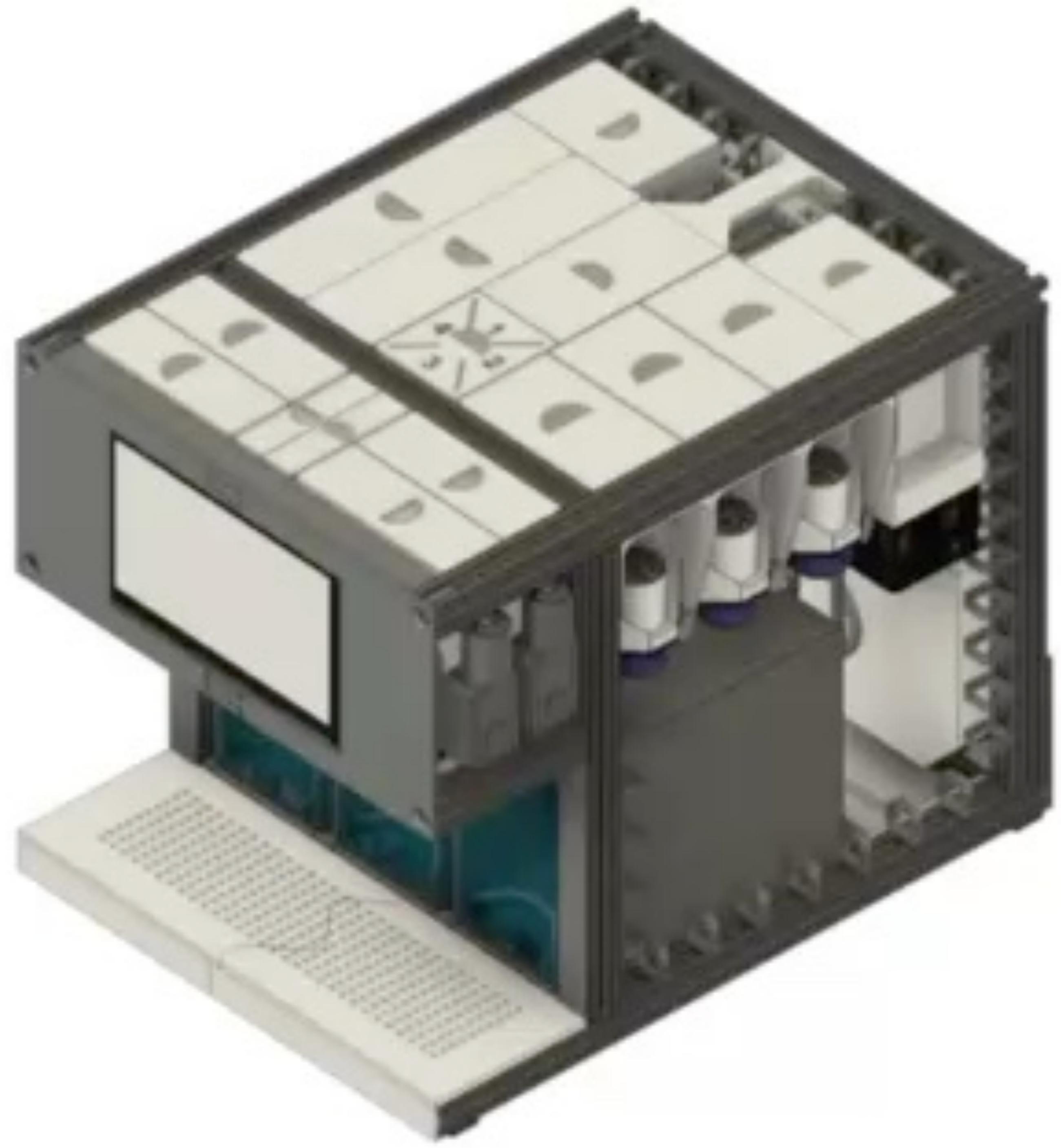
Promotor: dr. hab. inż. Maciej Krasicki





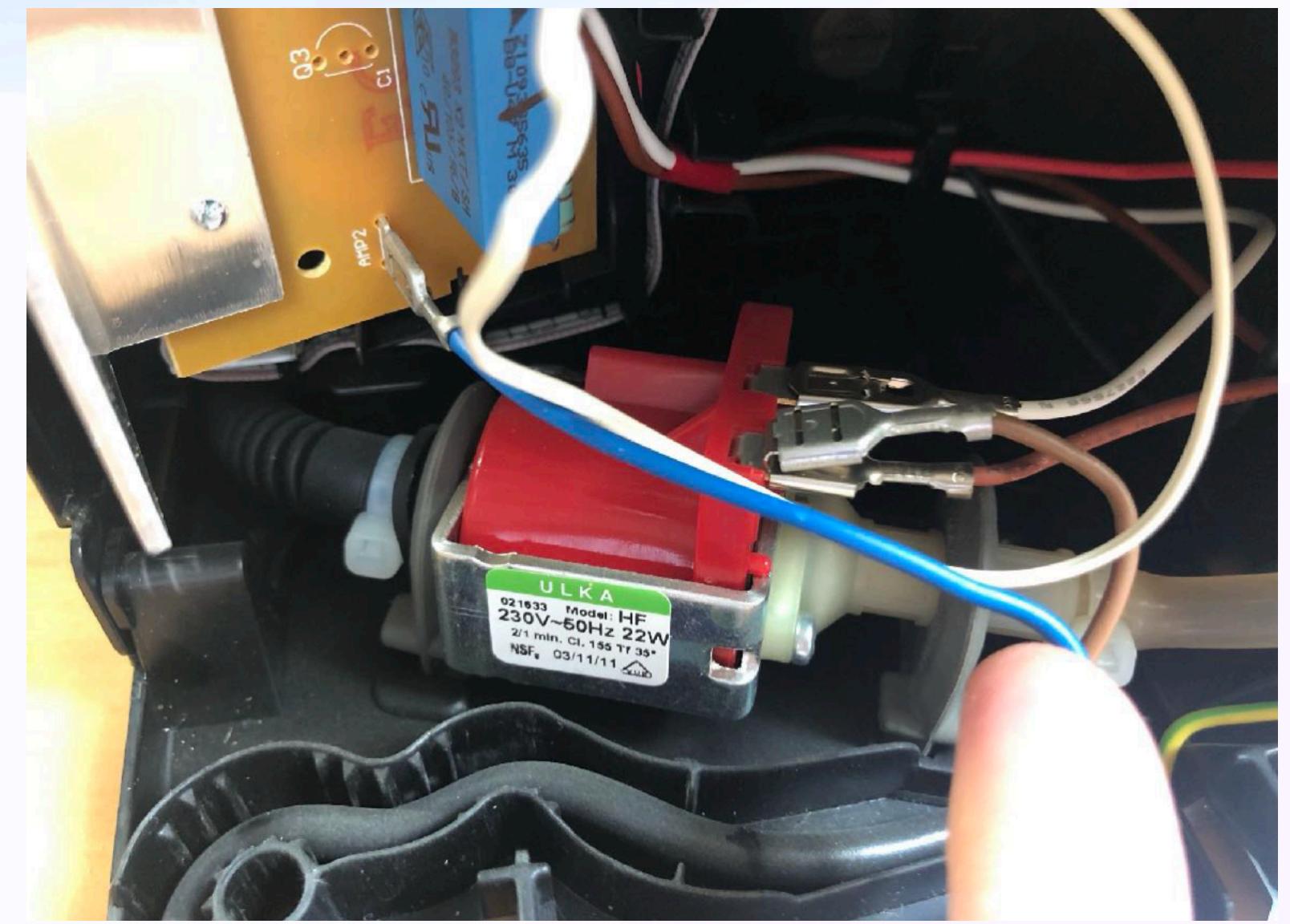
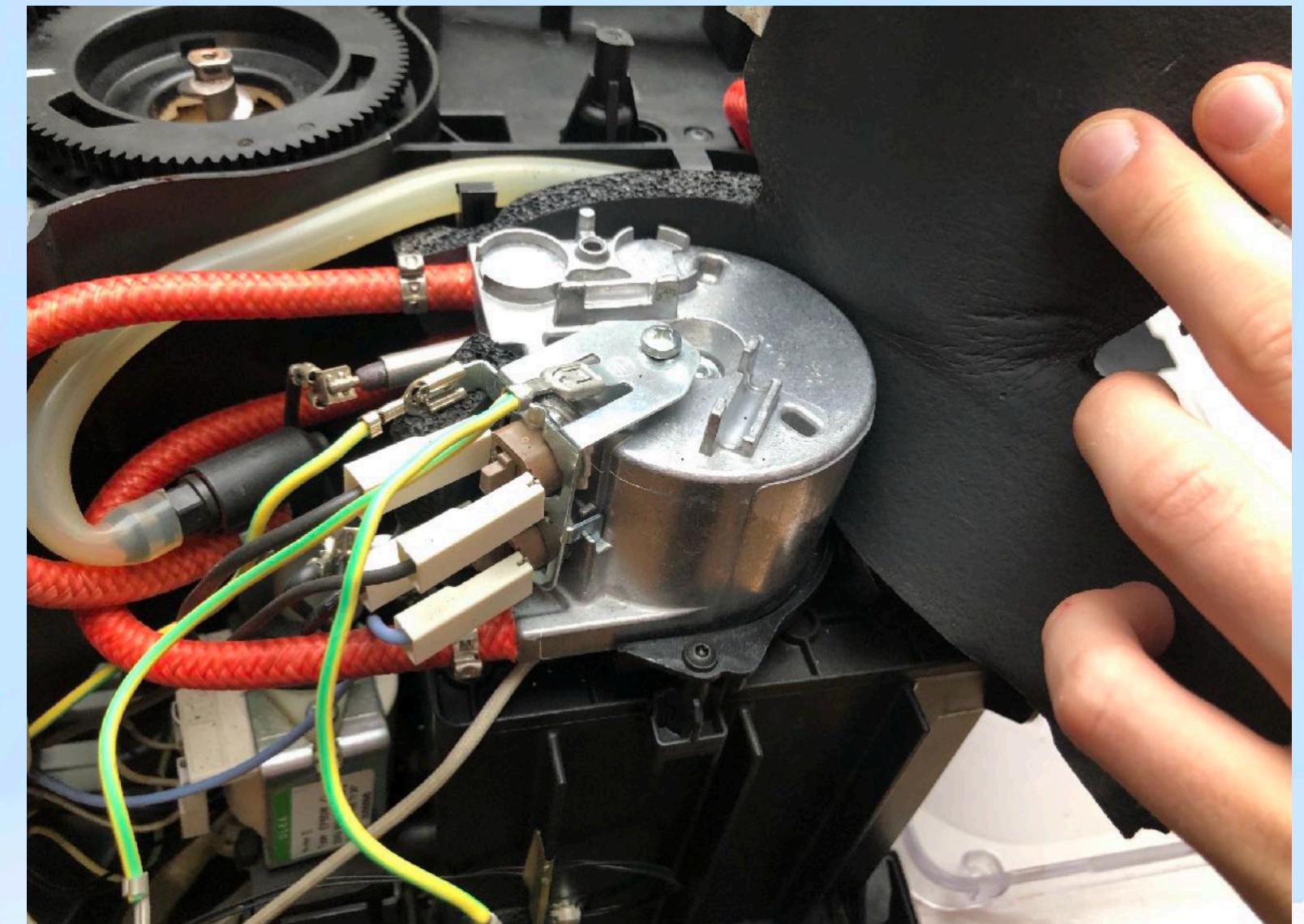
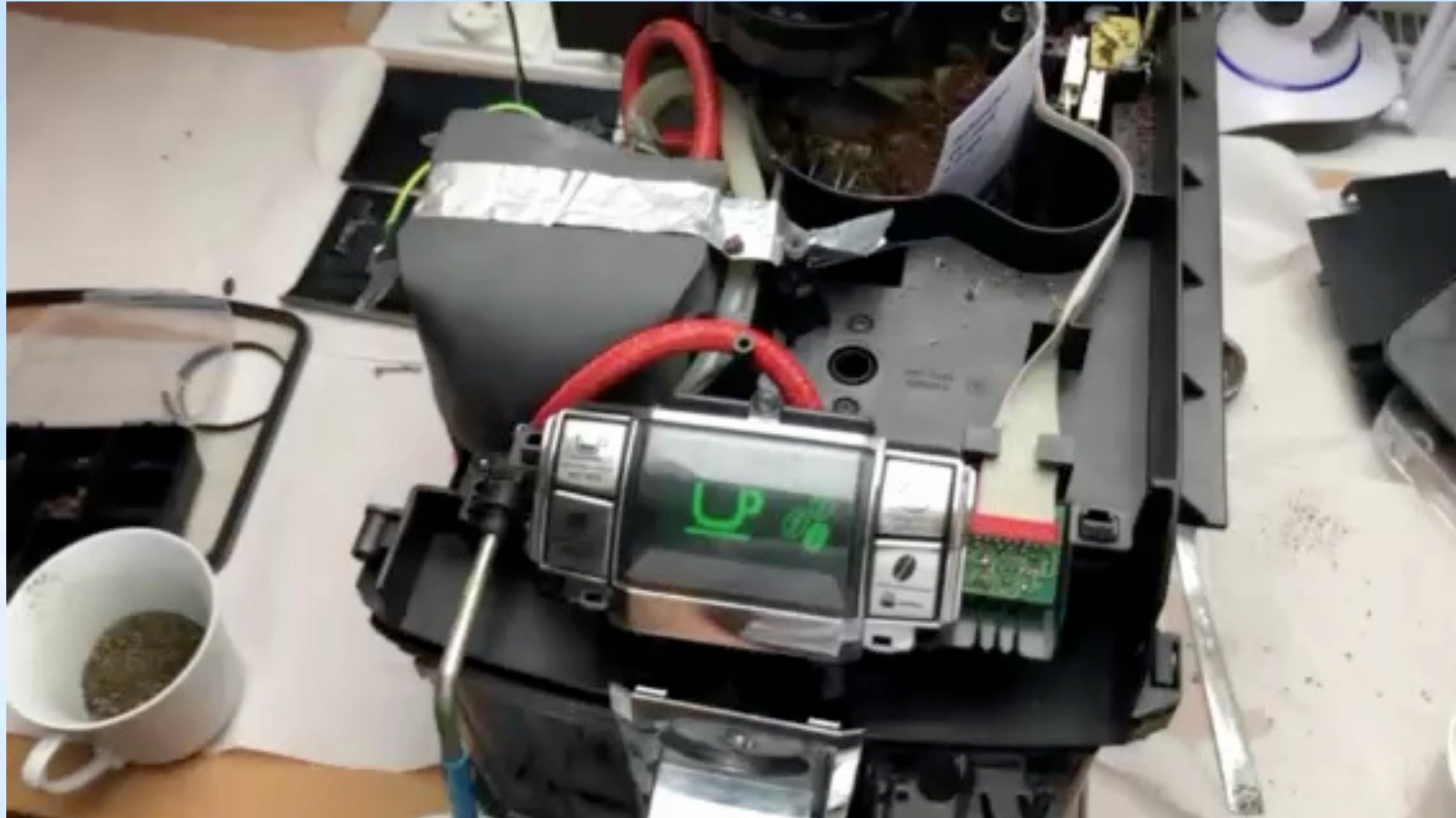


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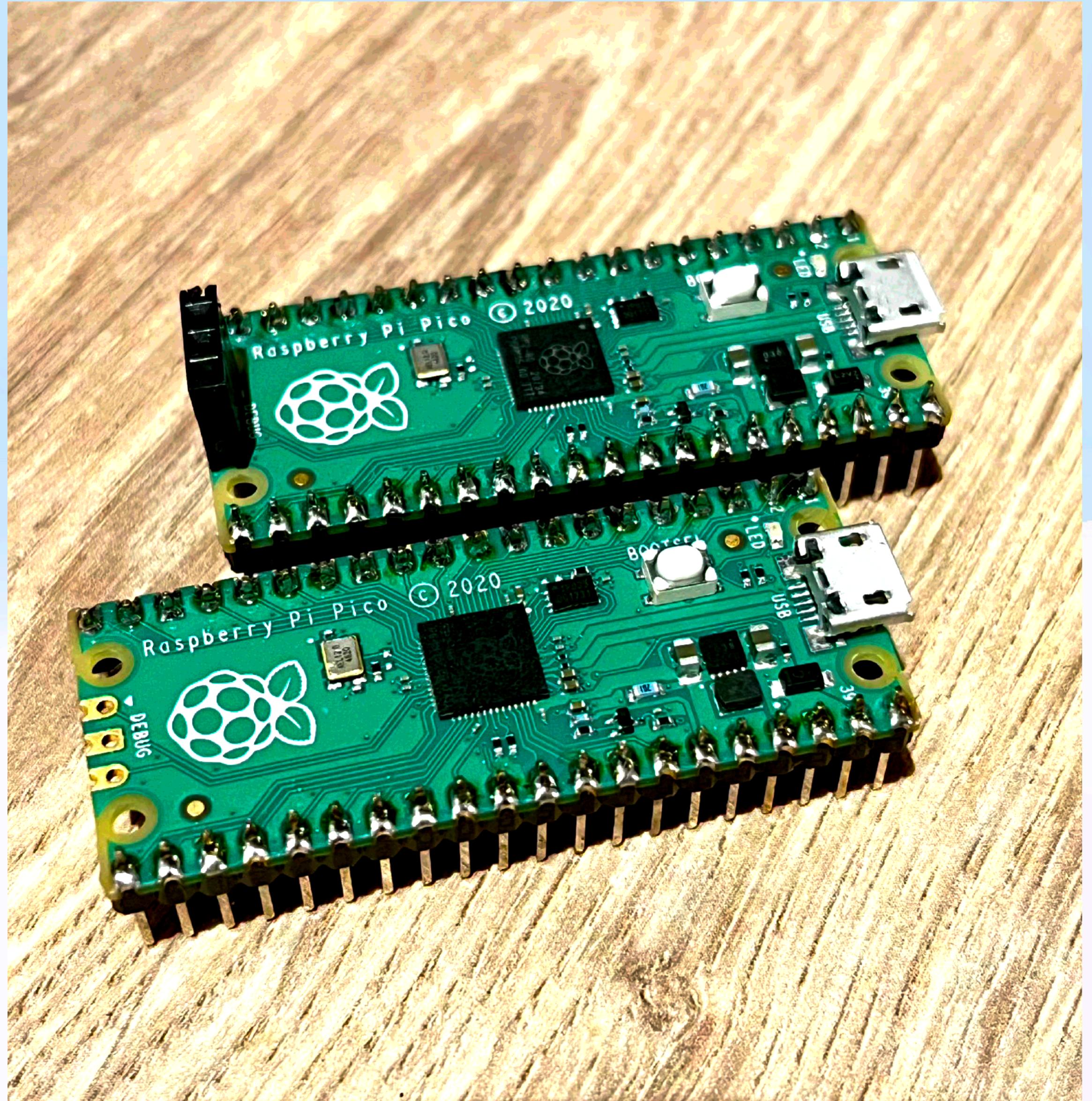




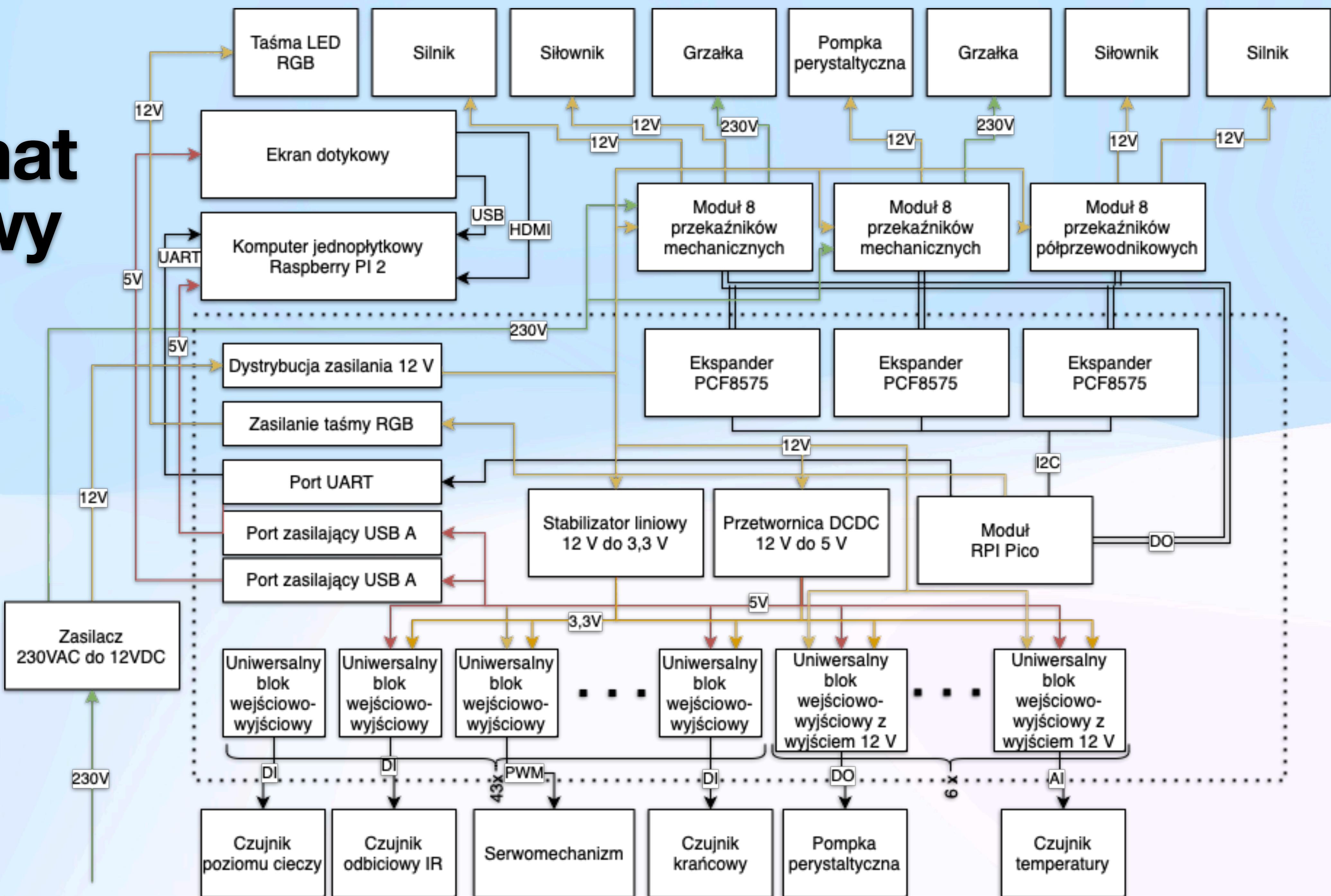


Wybór rozwiązań:

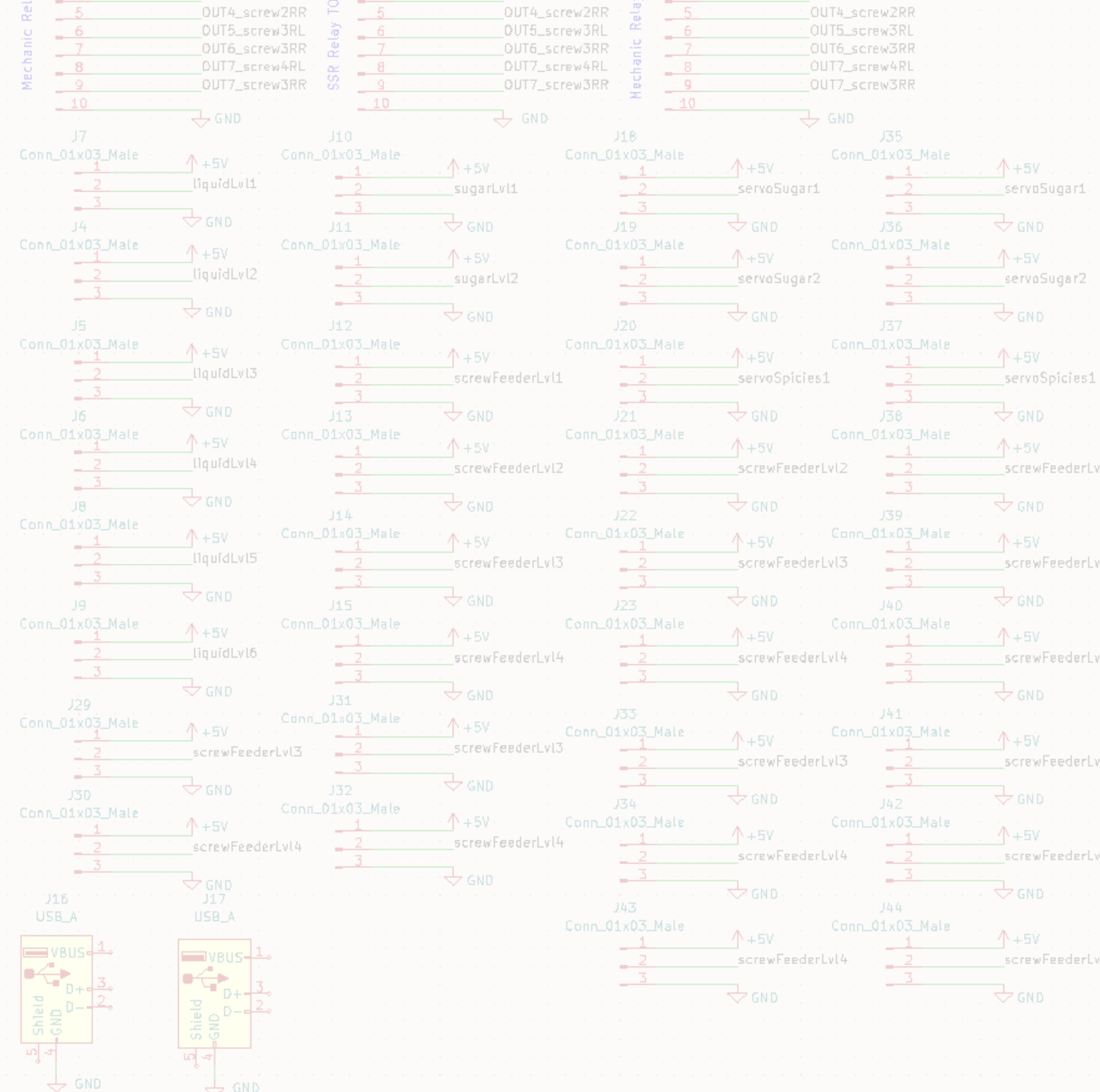
- Realizacja w oparciu o mikrokontroler Raspberry PI Pico
- Ze względu na niewystarczającą ilość GPIO - 3 ekspandery wejść i wyjść PCF8575 podłączane na magistrali I2C
- Zasilanie - przetwornica step-down w oparciu o układ XL4015 oraz stabilizator liniowy NCP1117
- Sterowanie wysokimi prądami i napięciami za pomocą gotowych modułów przekaźników



Schemat blokowy



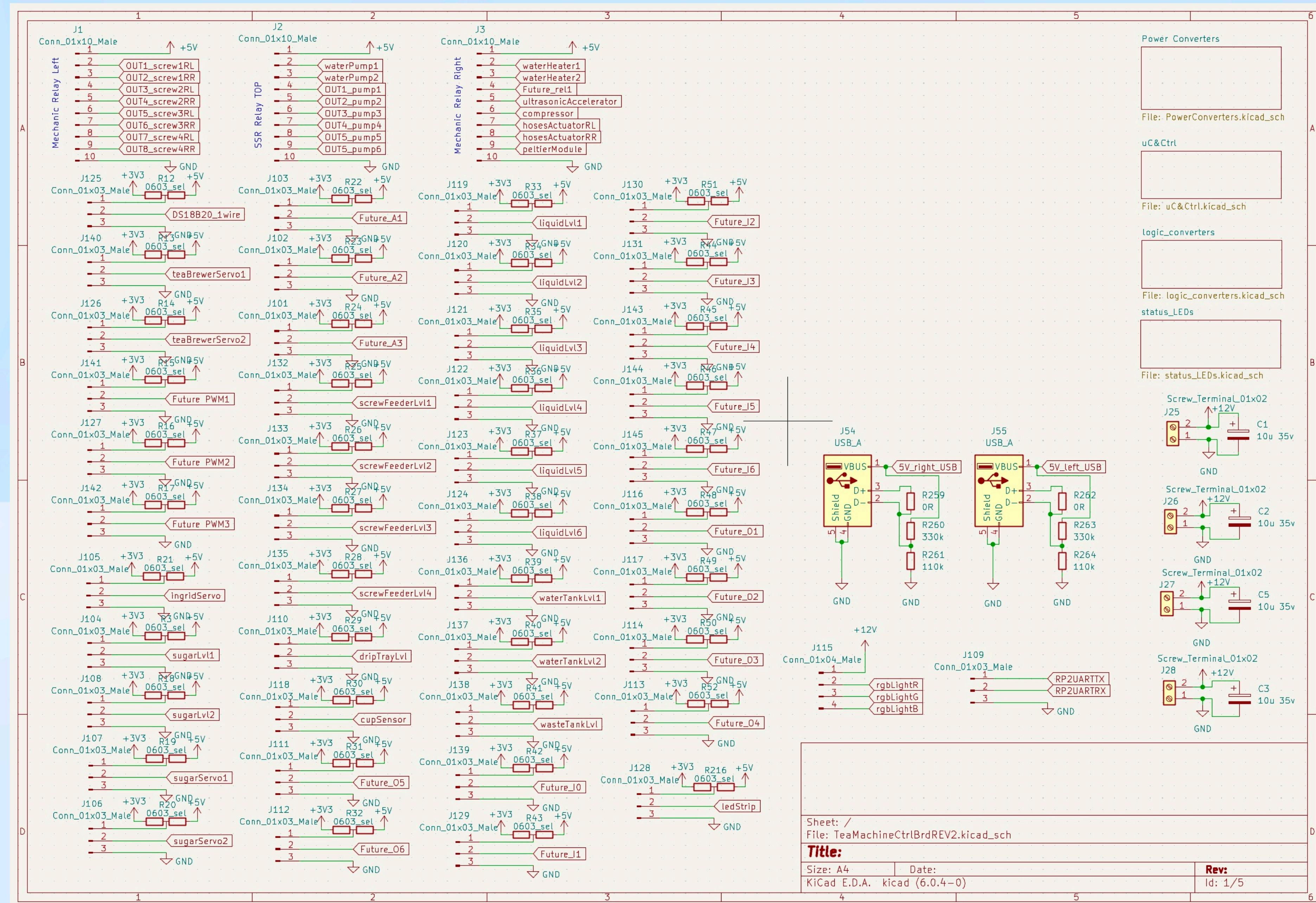
Schemat płytka

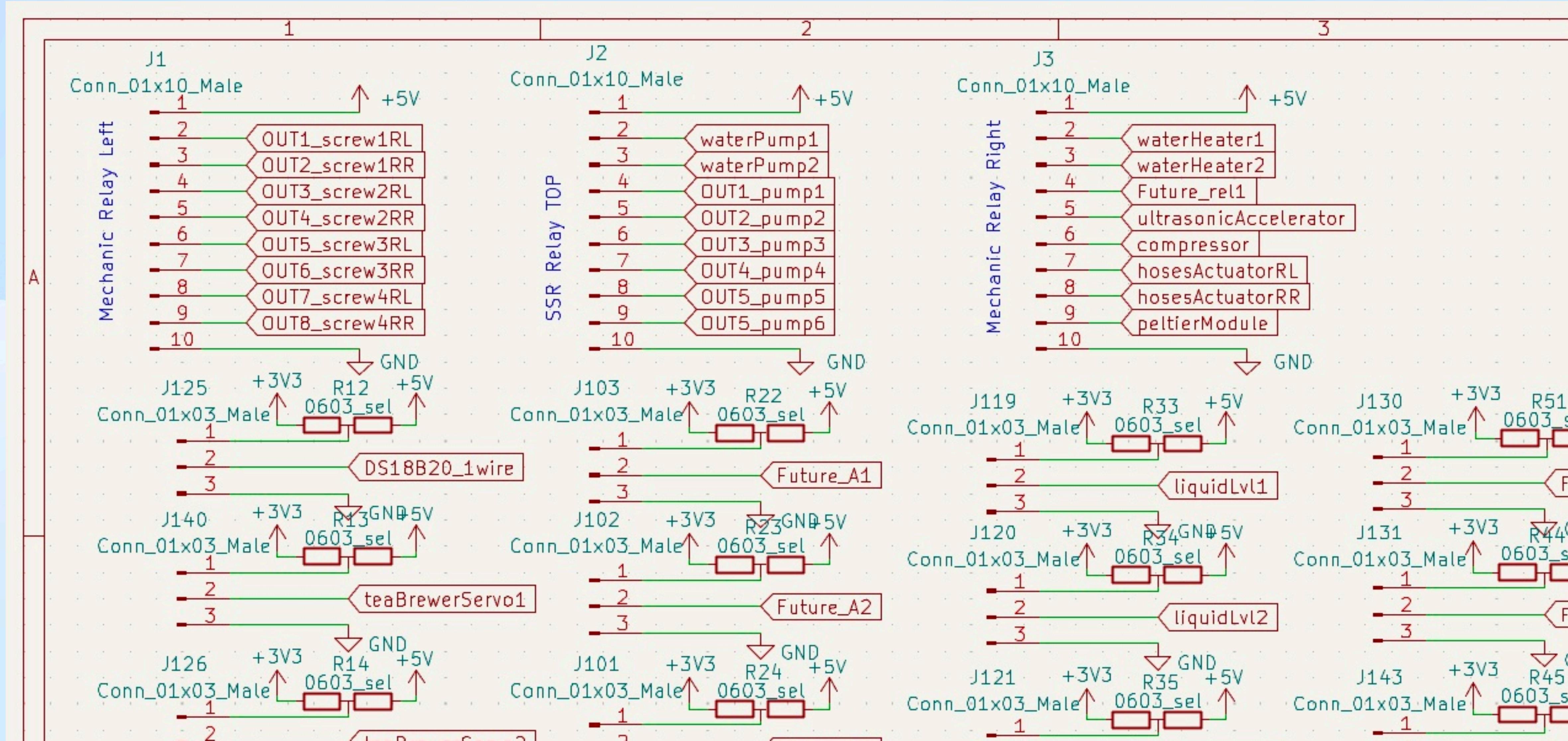


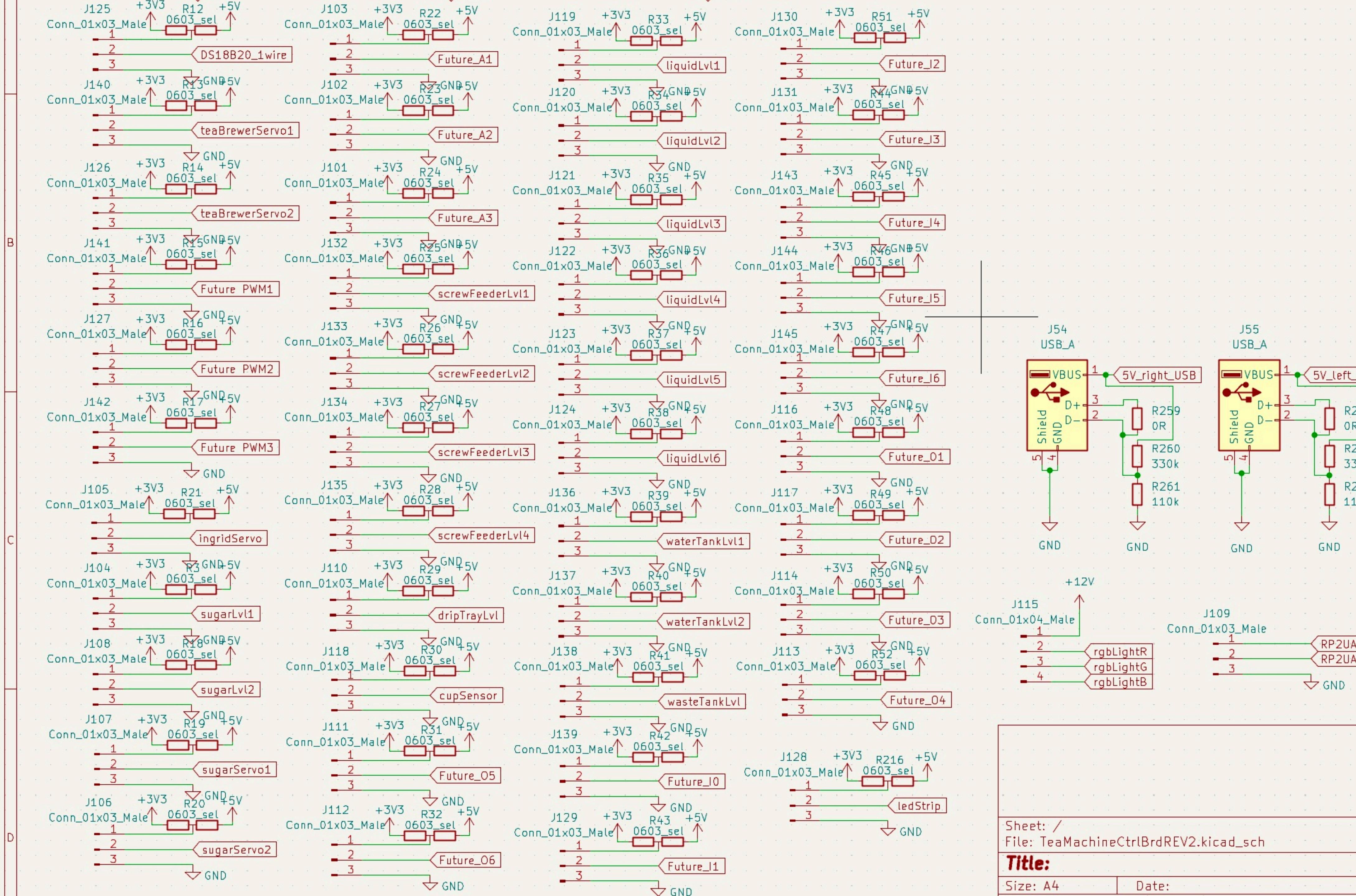
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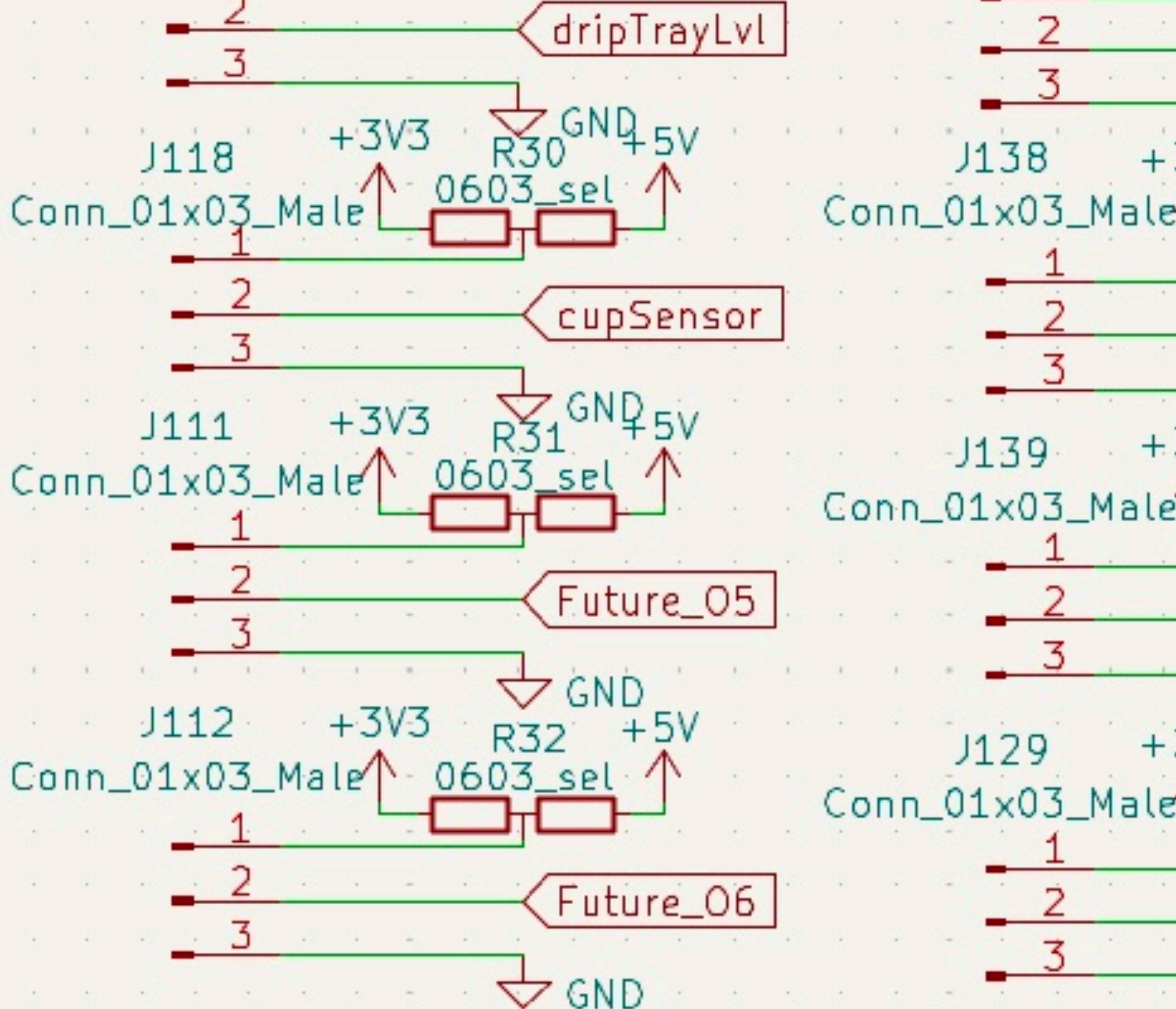
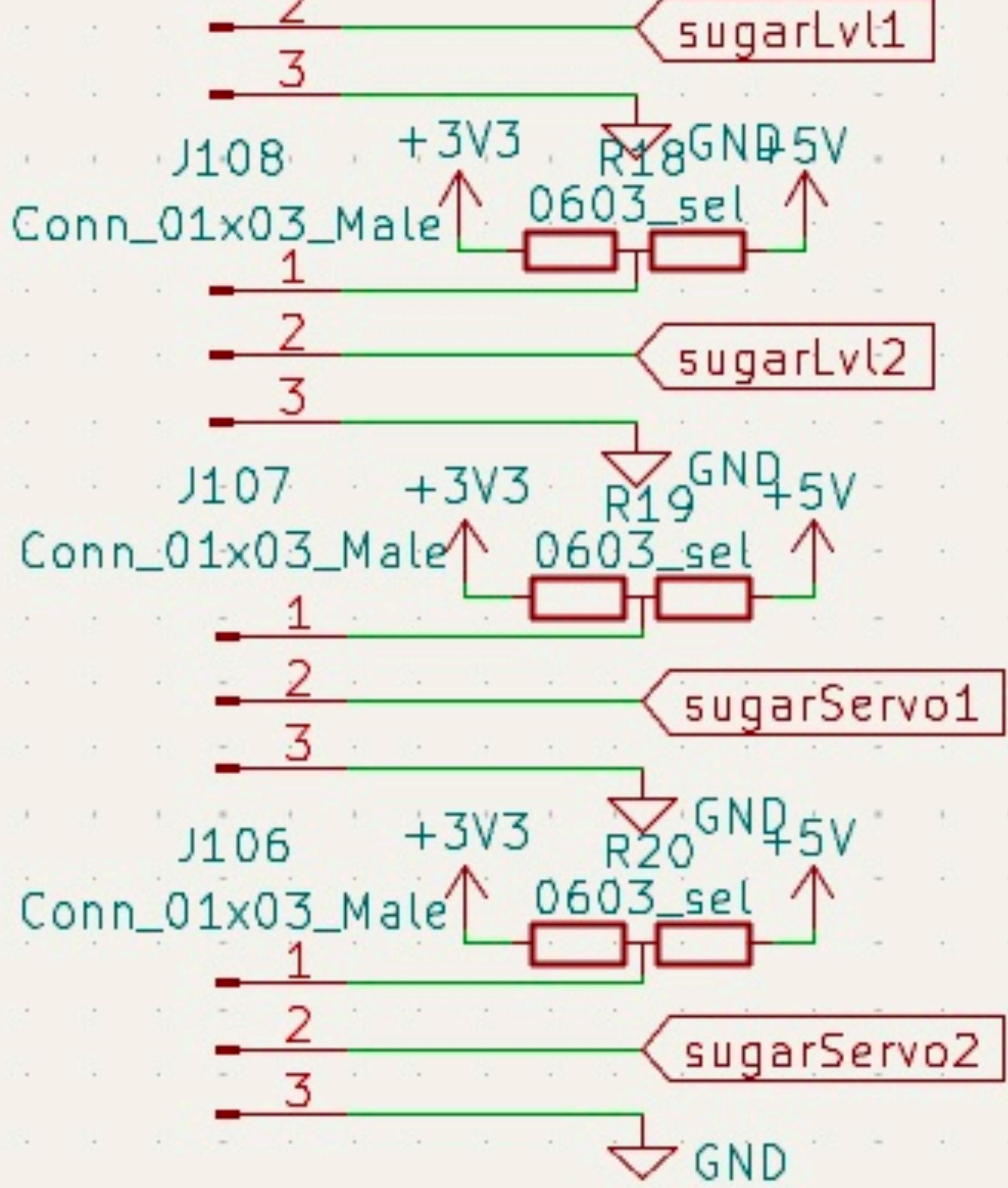
uC&Ctrl

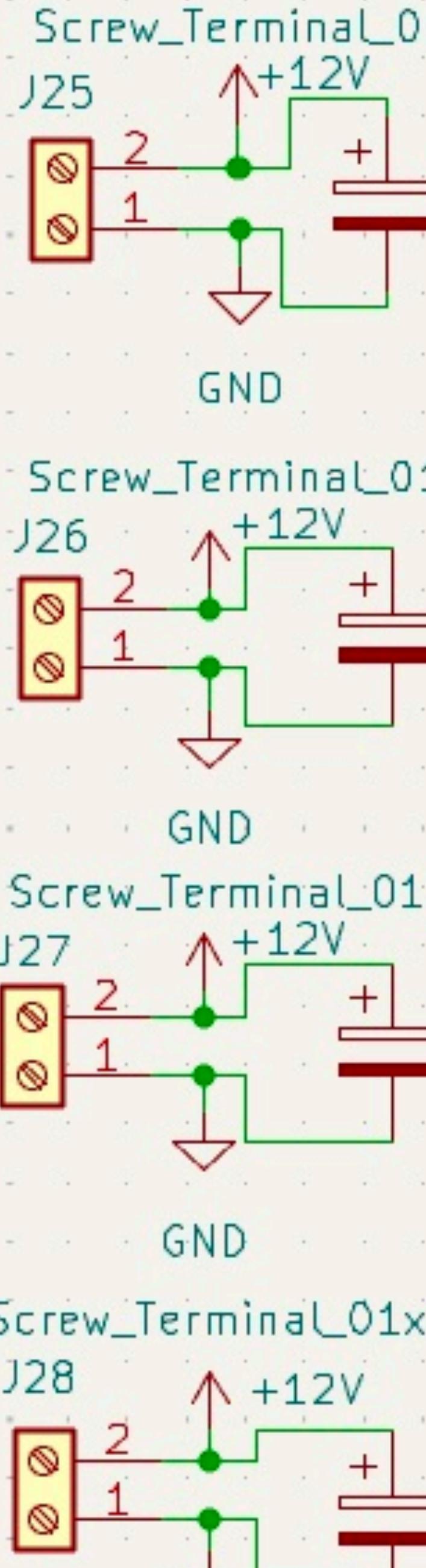
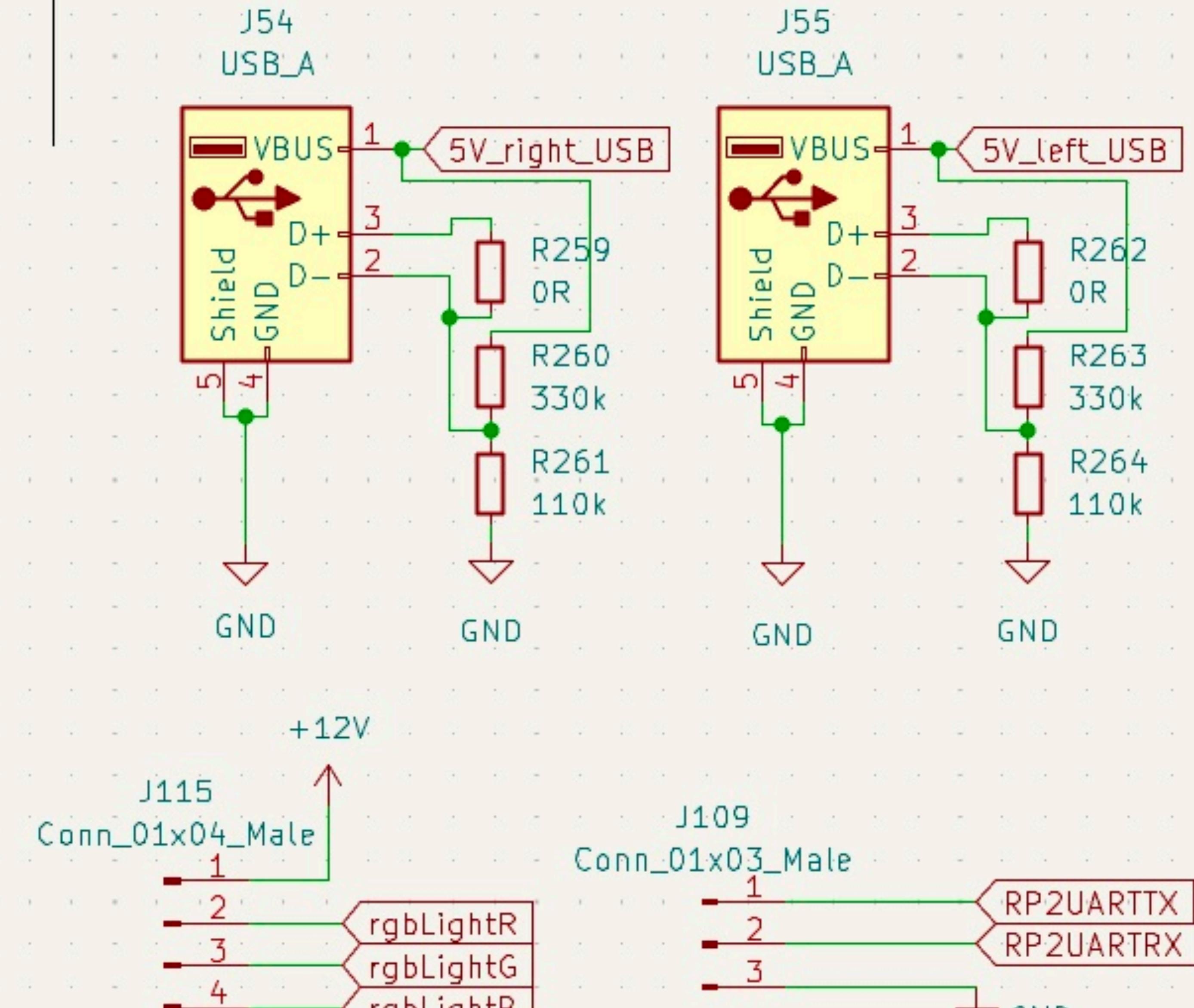
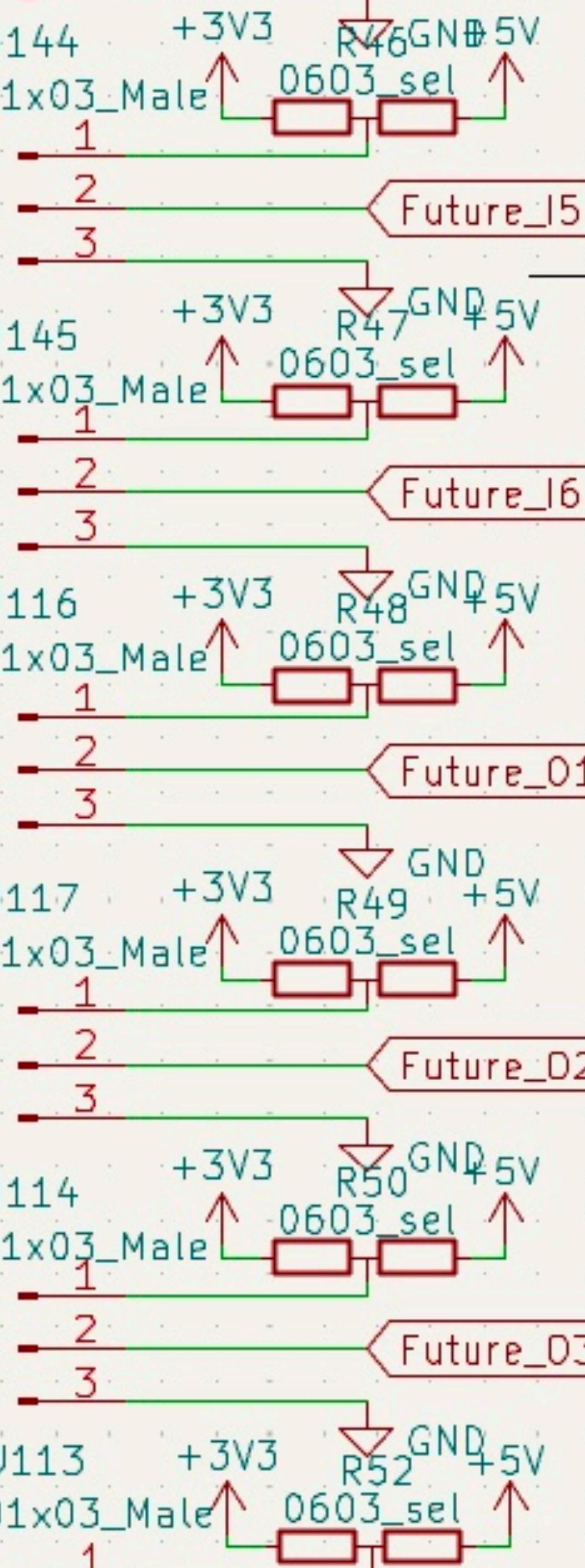
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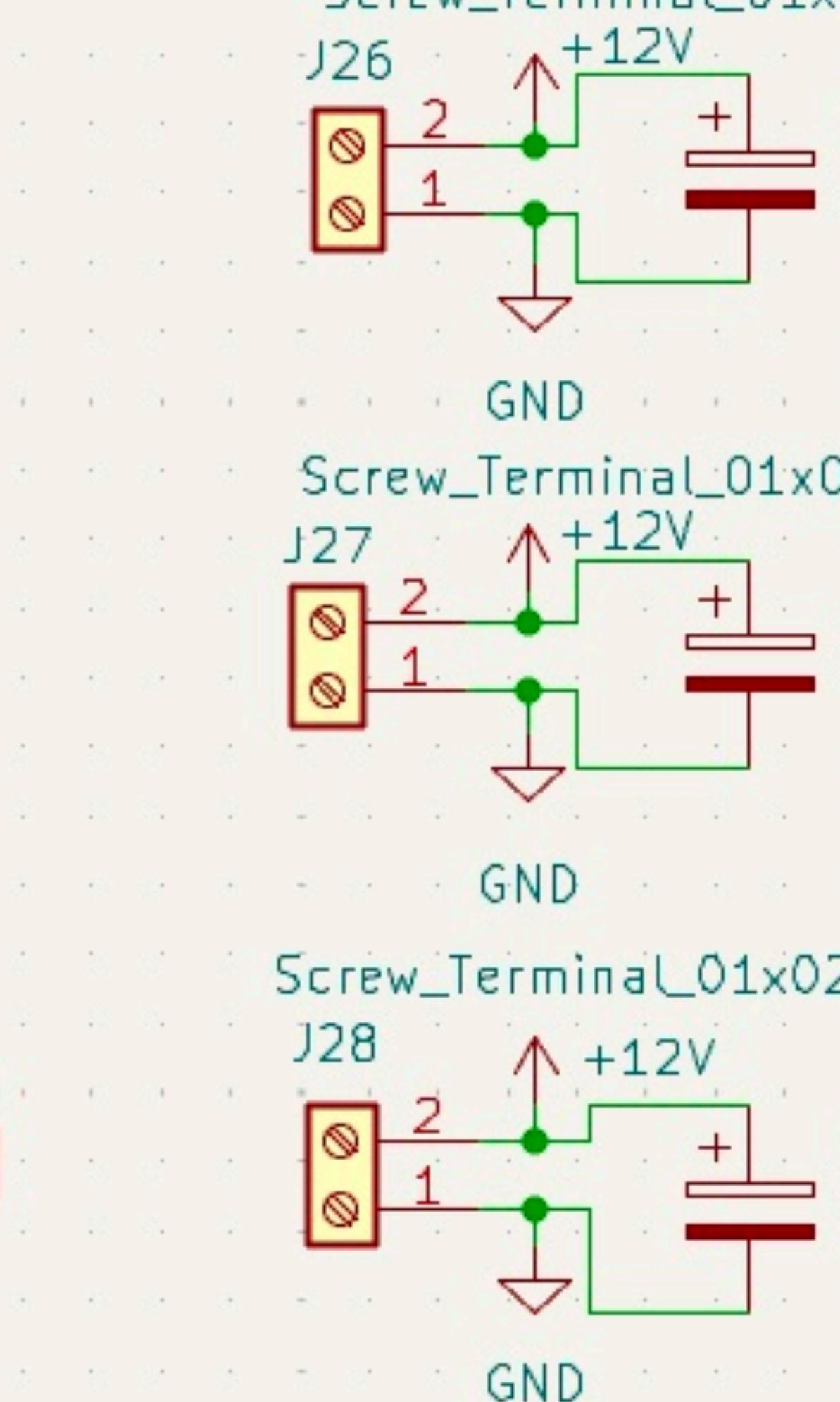
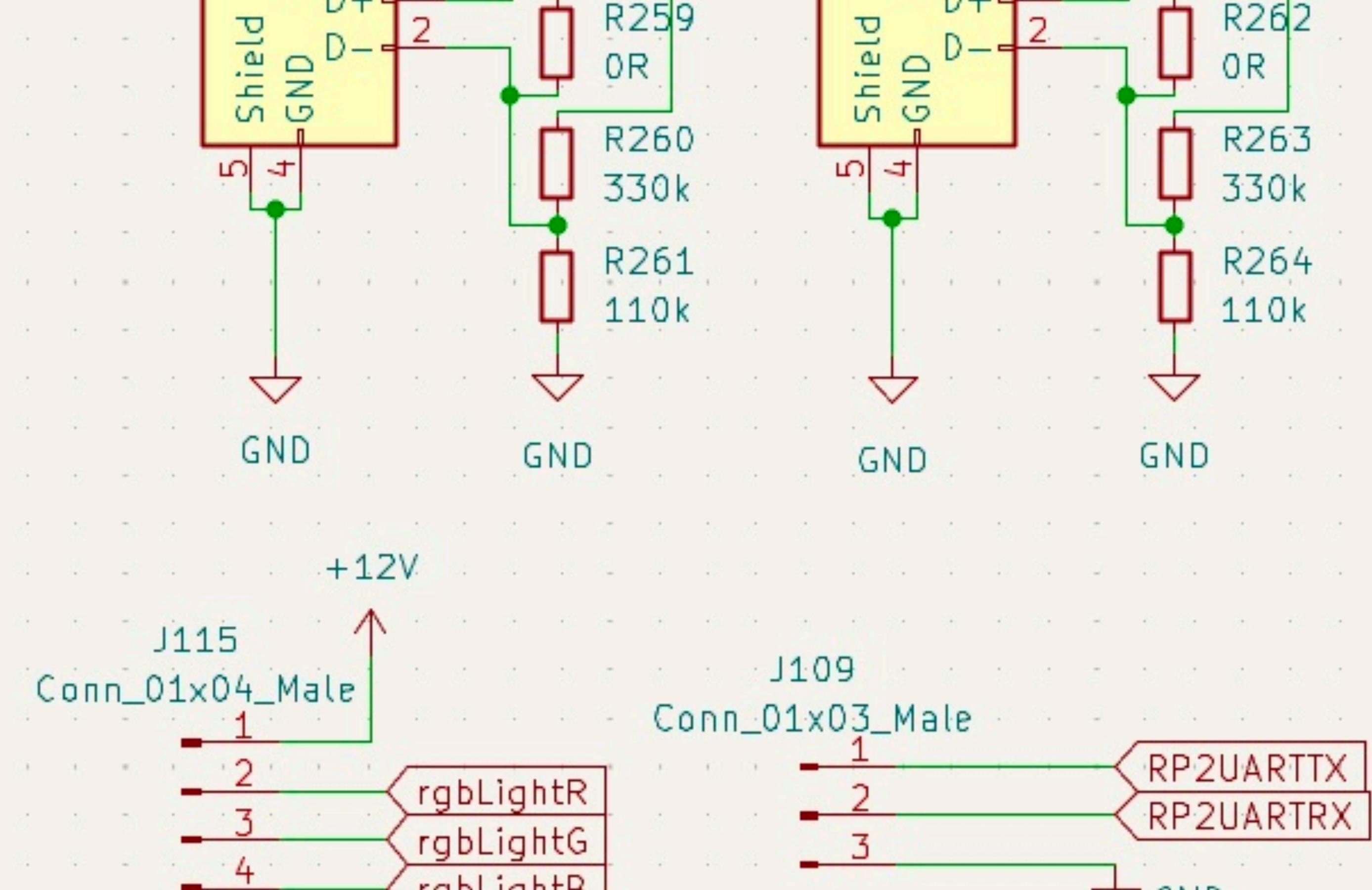
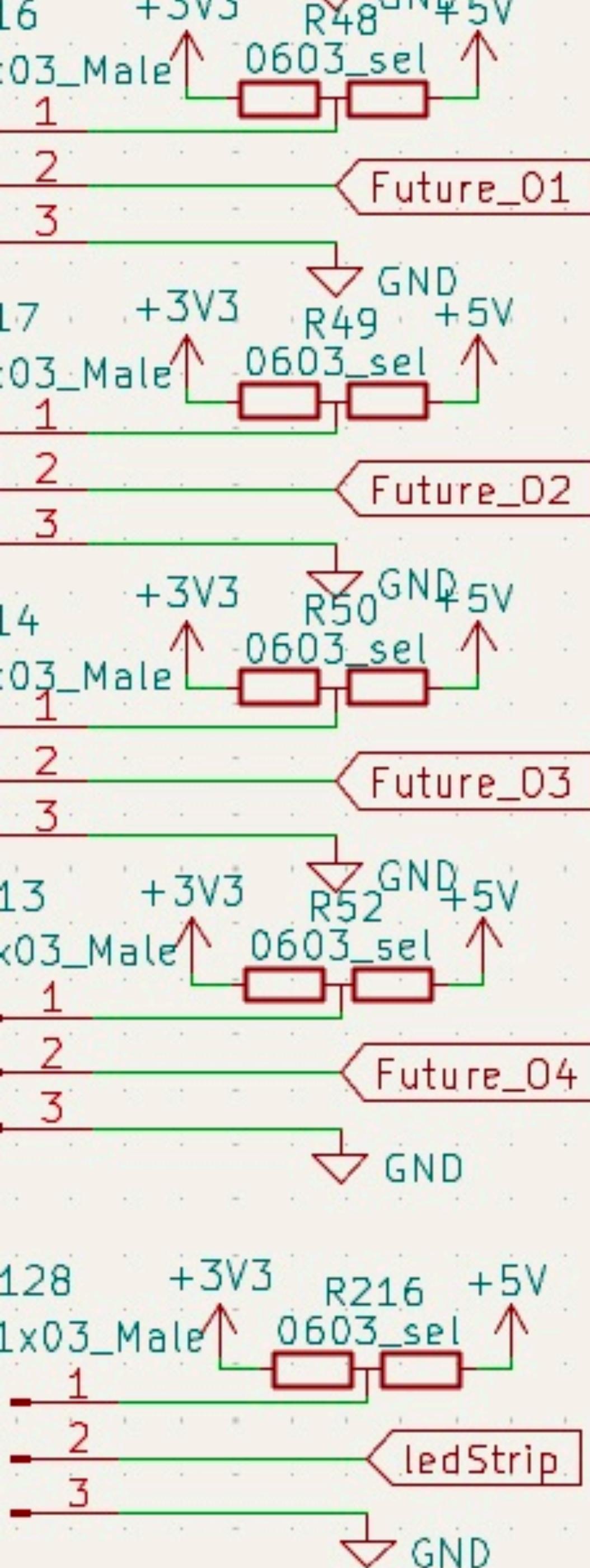




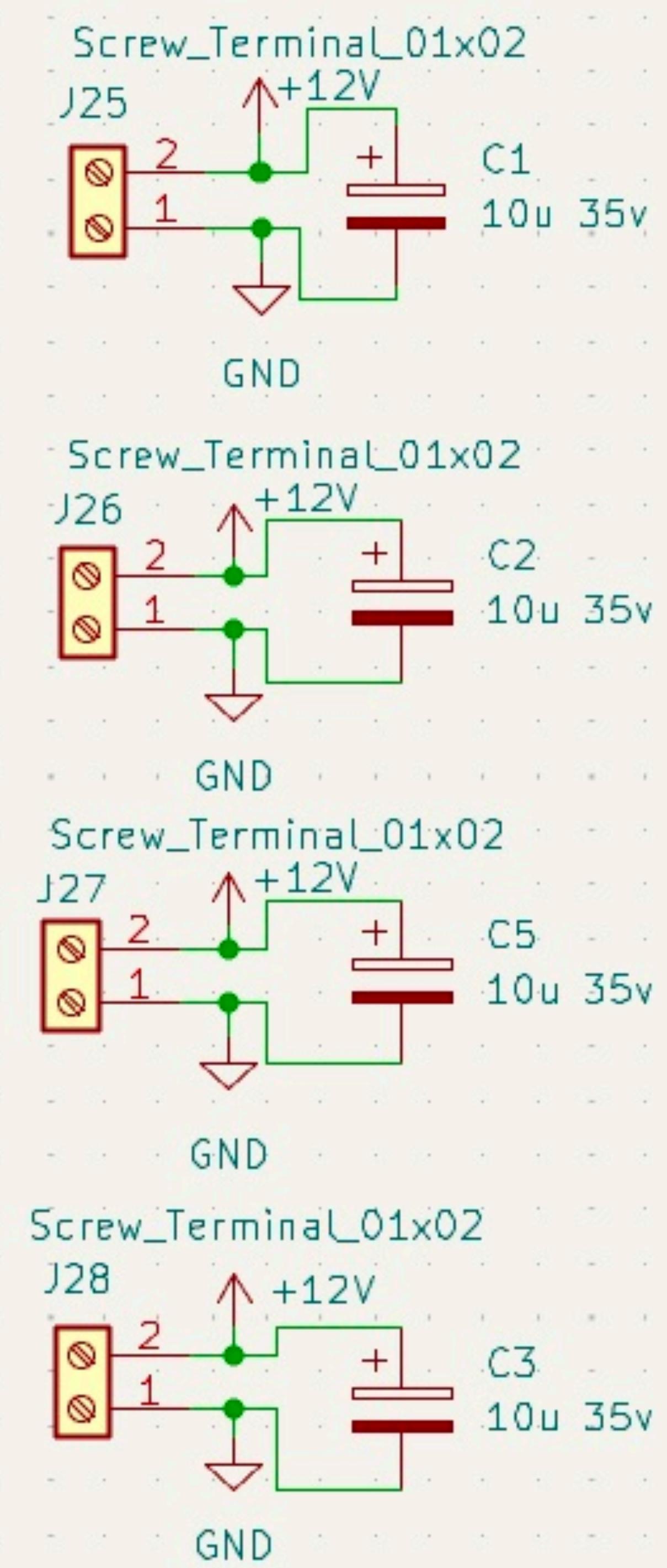
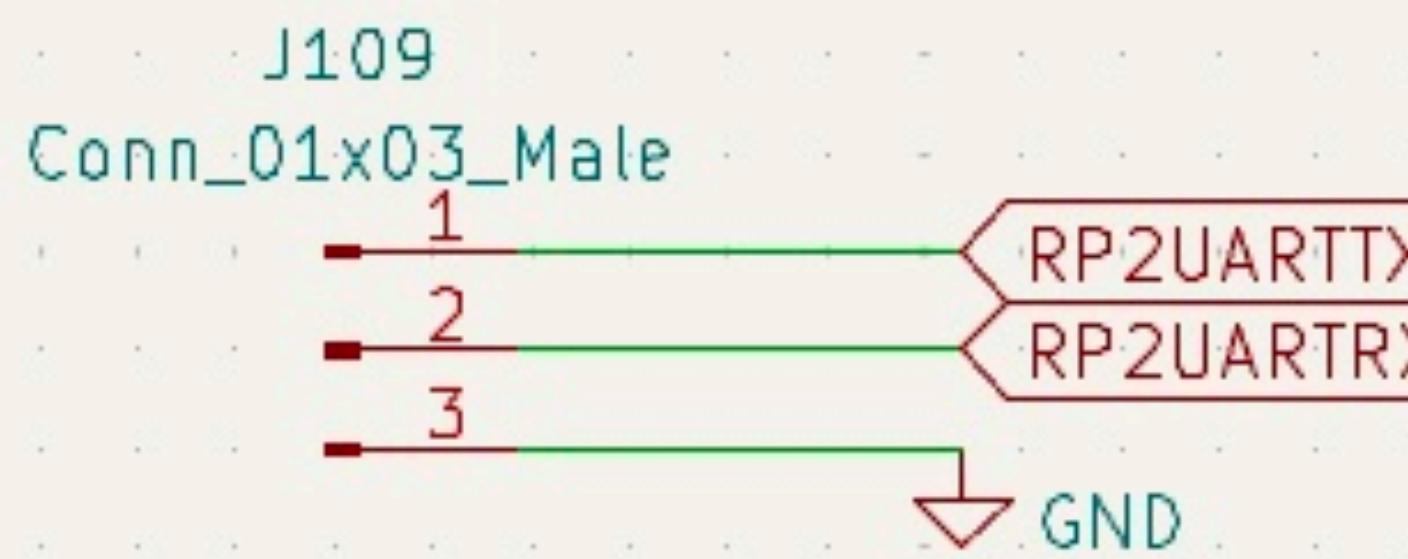
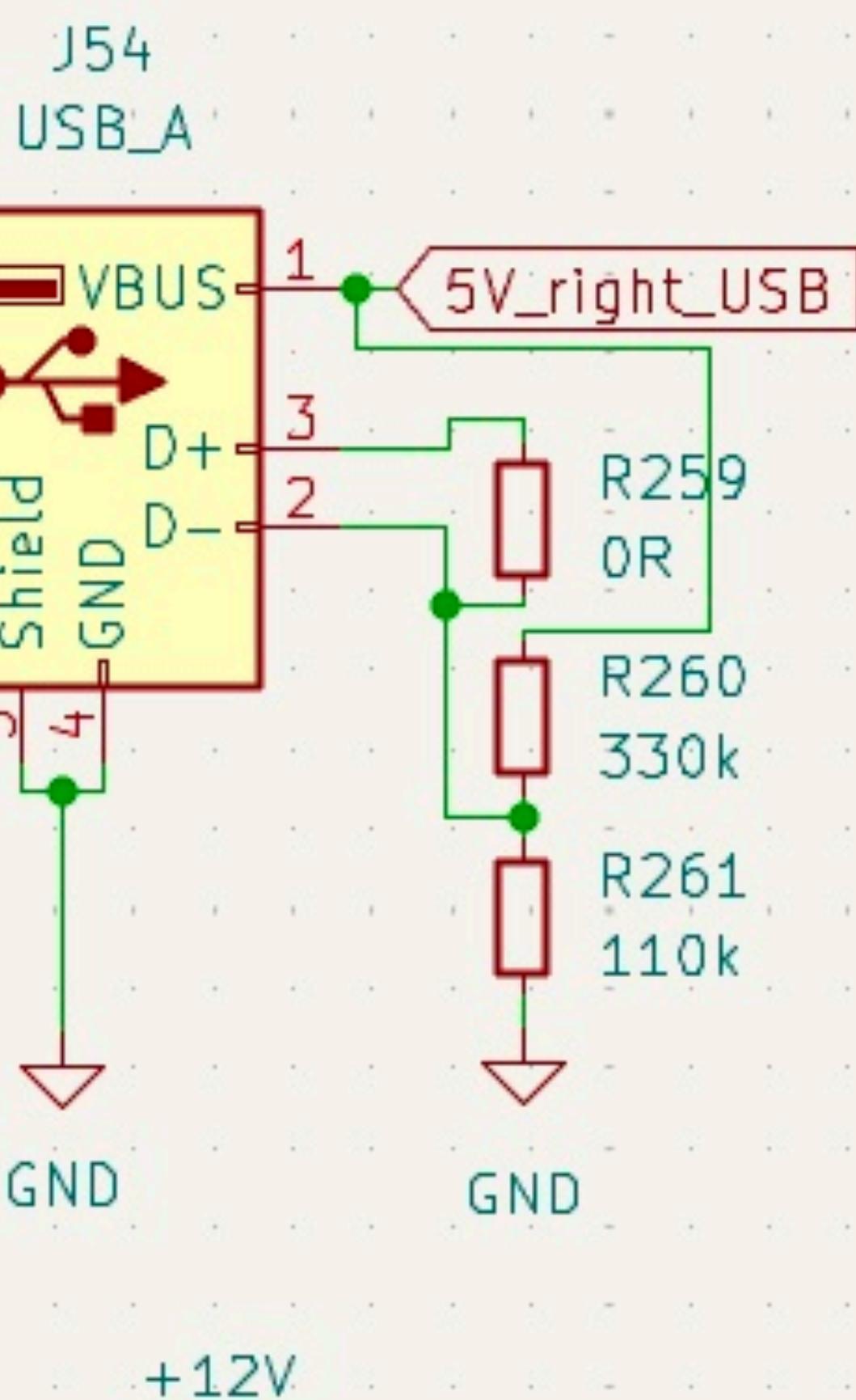




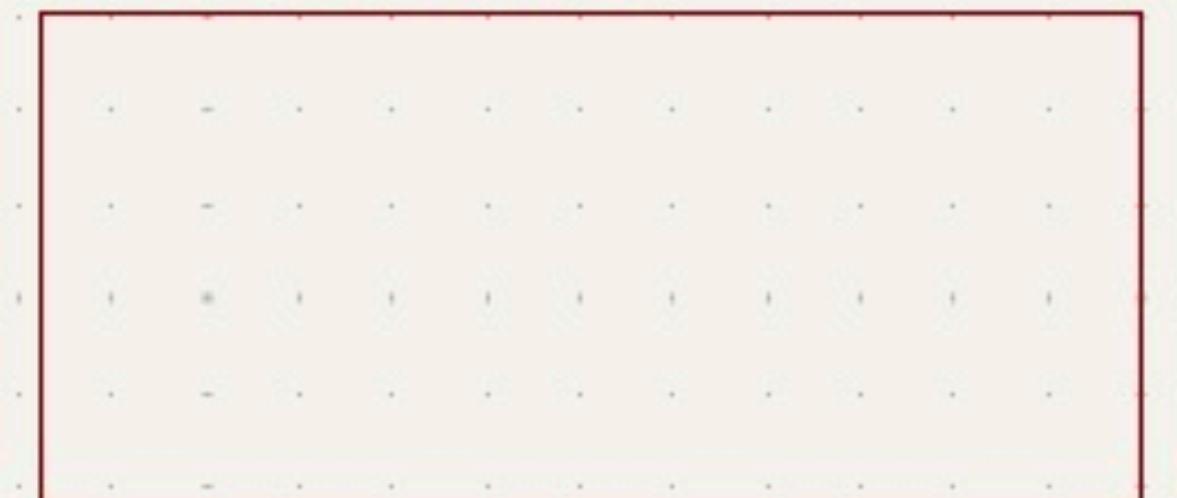




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Power Converters



File: PowerConverters.kicad_sch

A

uC&Ctrl



File: uC&Ctrl.kicad_sch

A

logic_converters



File: logic_converters.kicad_sch

B

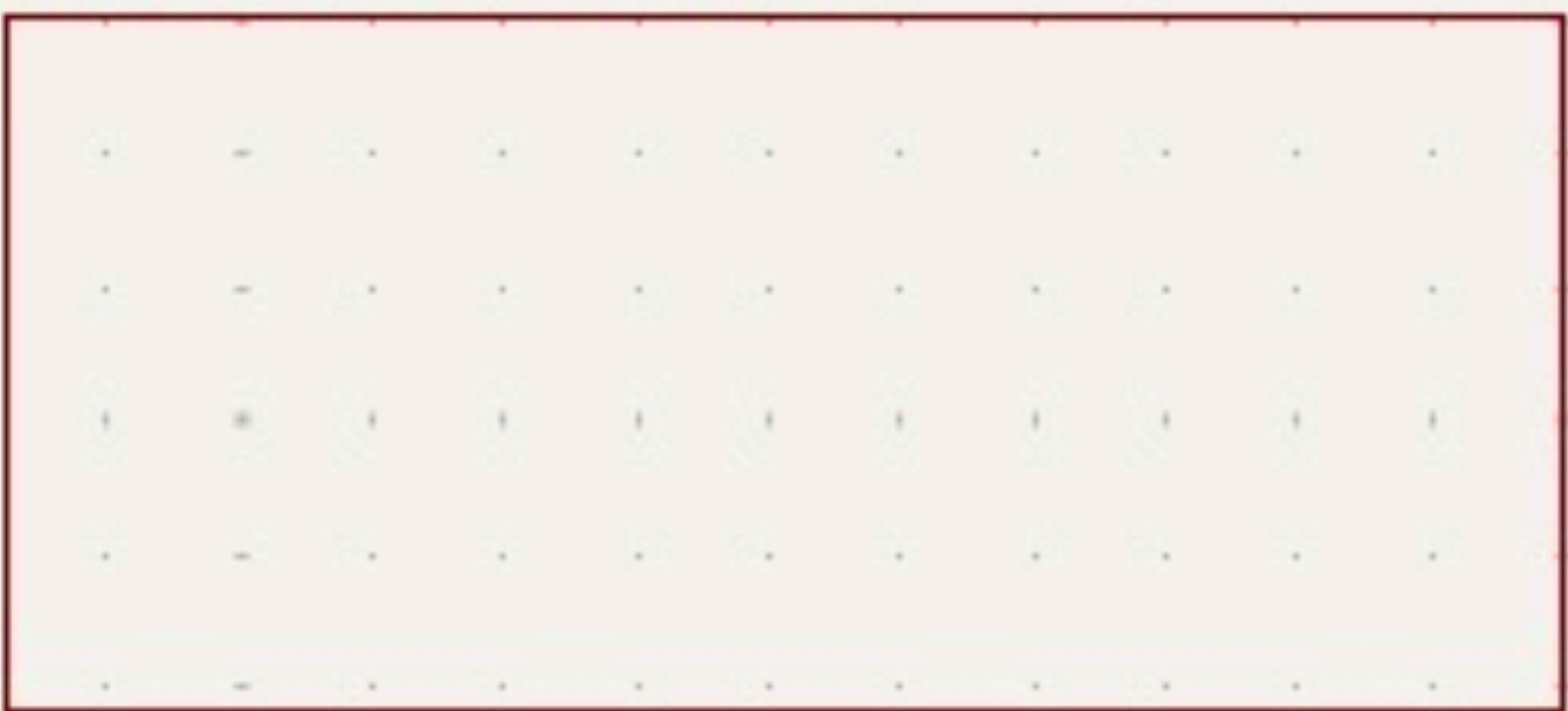
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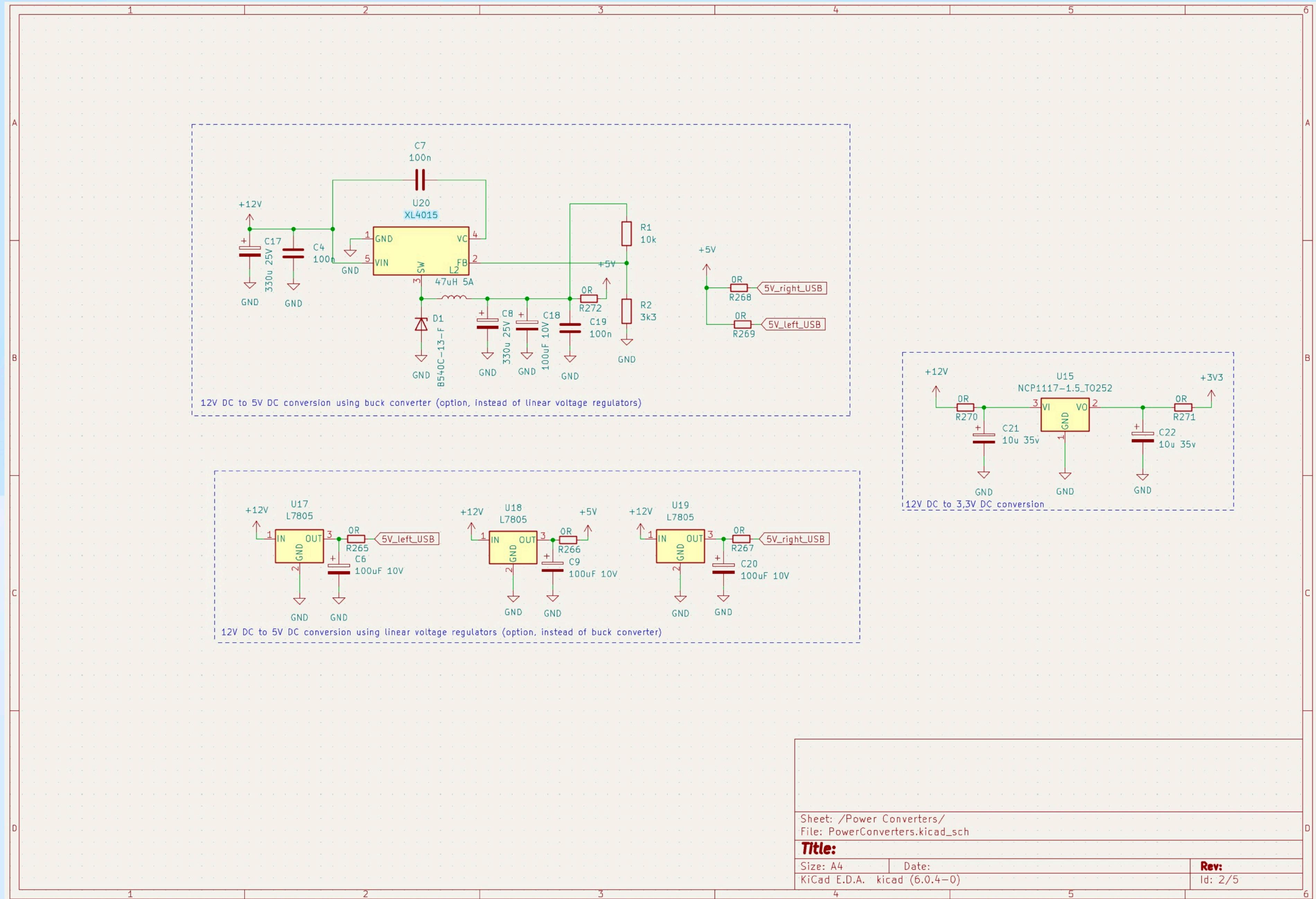
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B

Power Converters



File: PowerConverters.kicad_sch

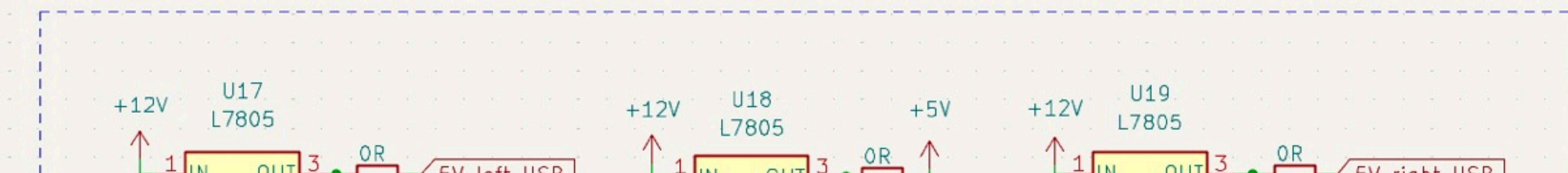
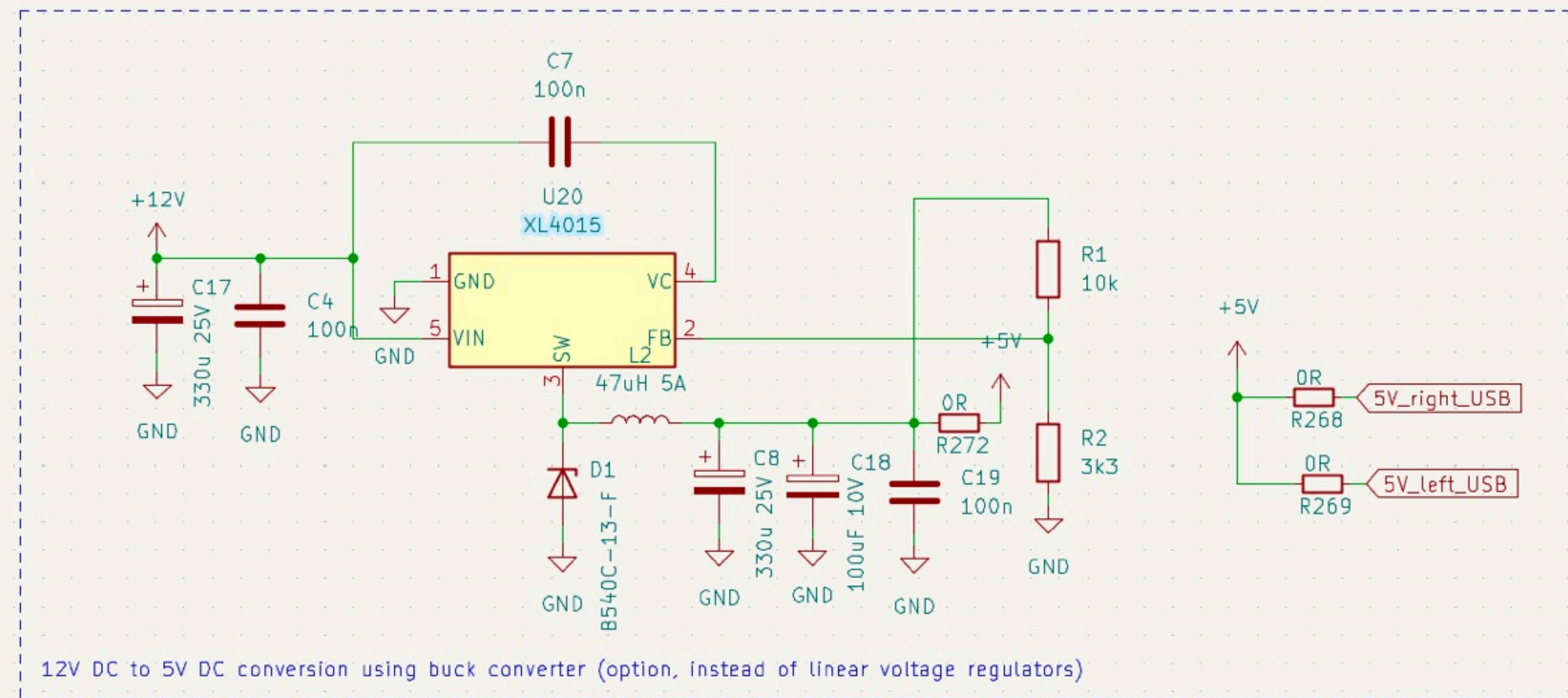


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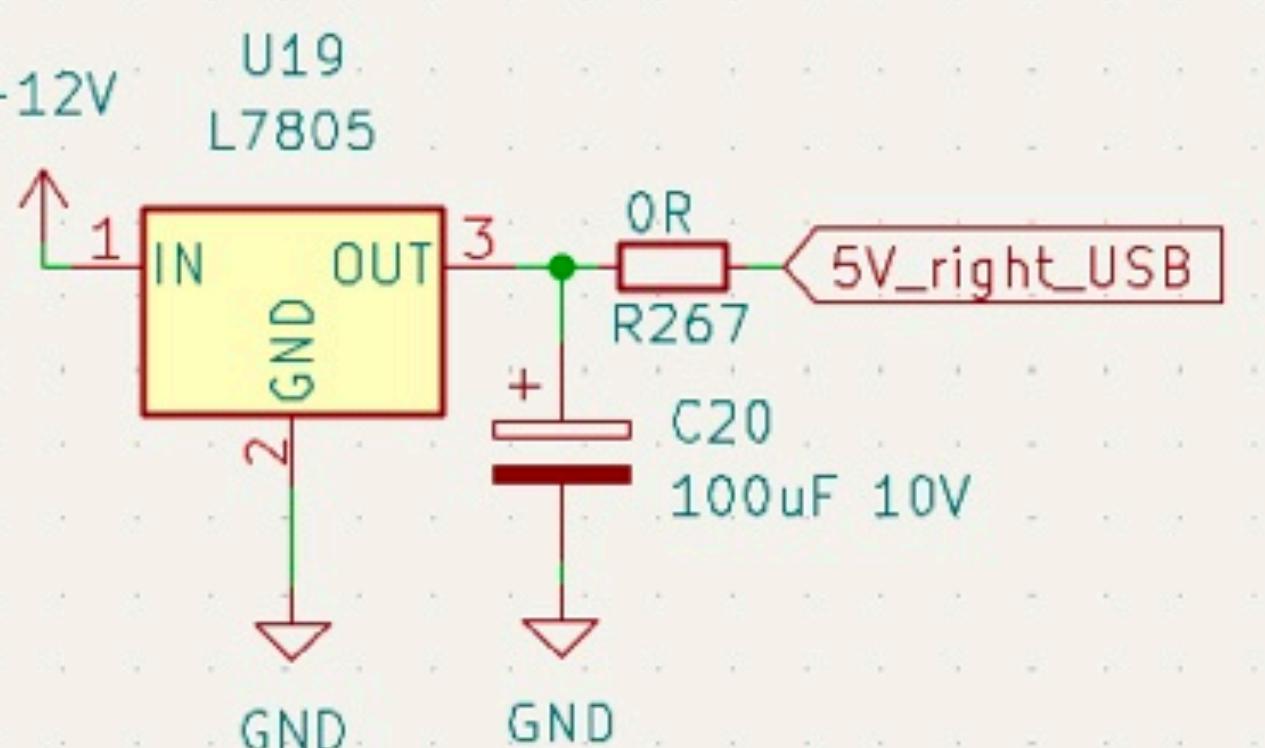
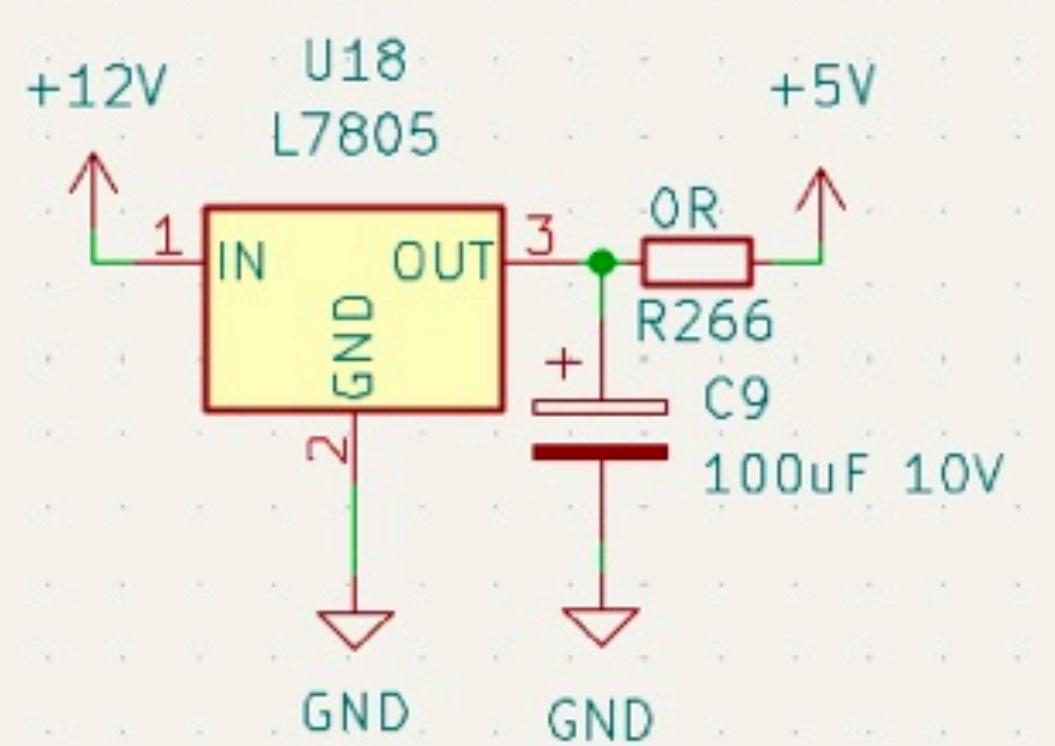
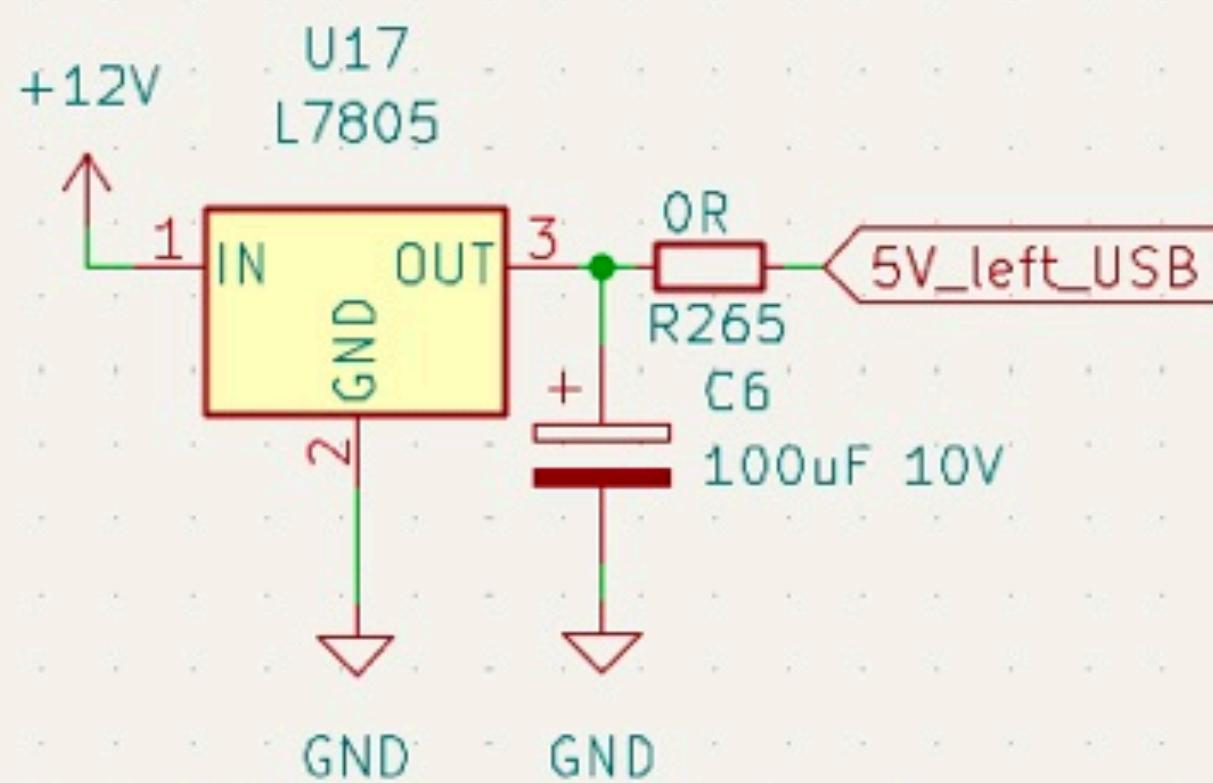
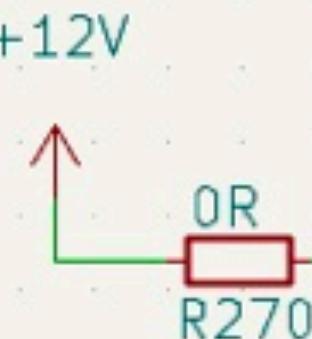
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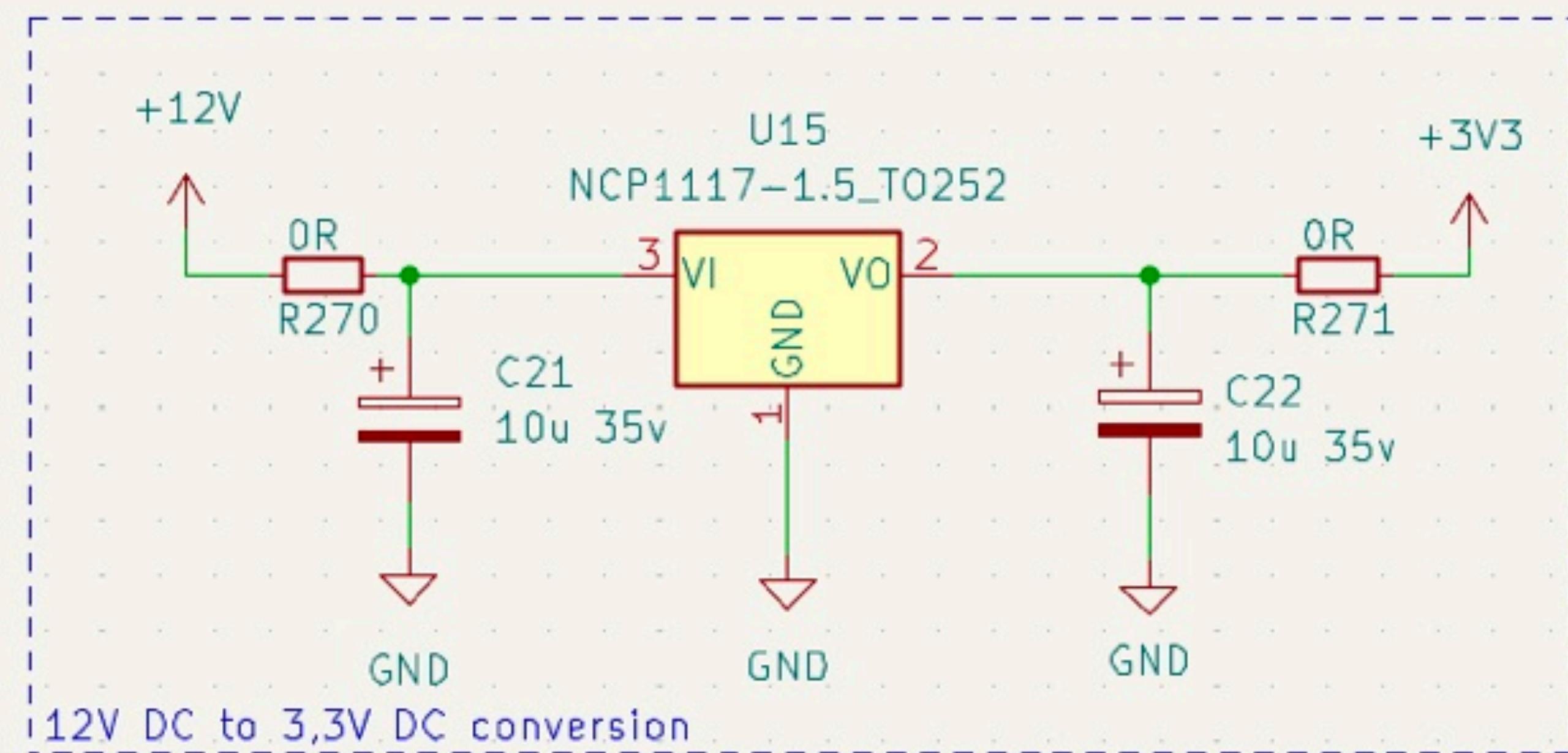
12V DC to 5V DC conversion using buck converter (option, instead of linear voltage regulators)



12V DC to 5V DC conversion using linear voltage regulators (option, instead of buck converter)

0R
R268

0R
R269

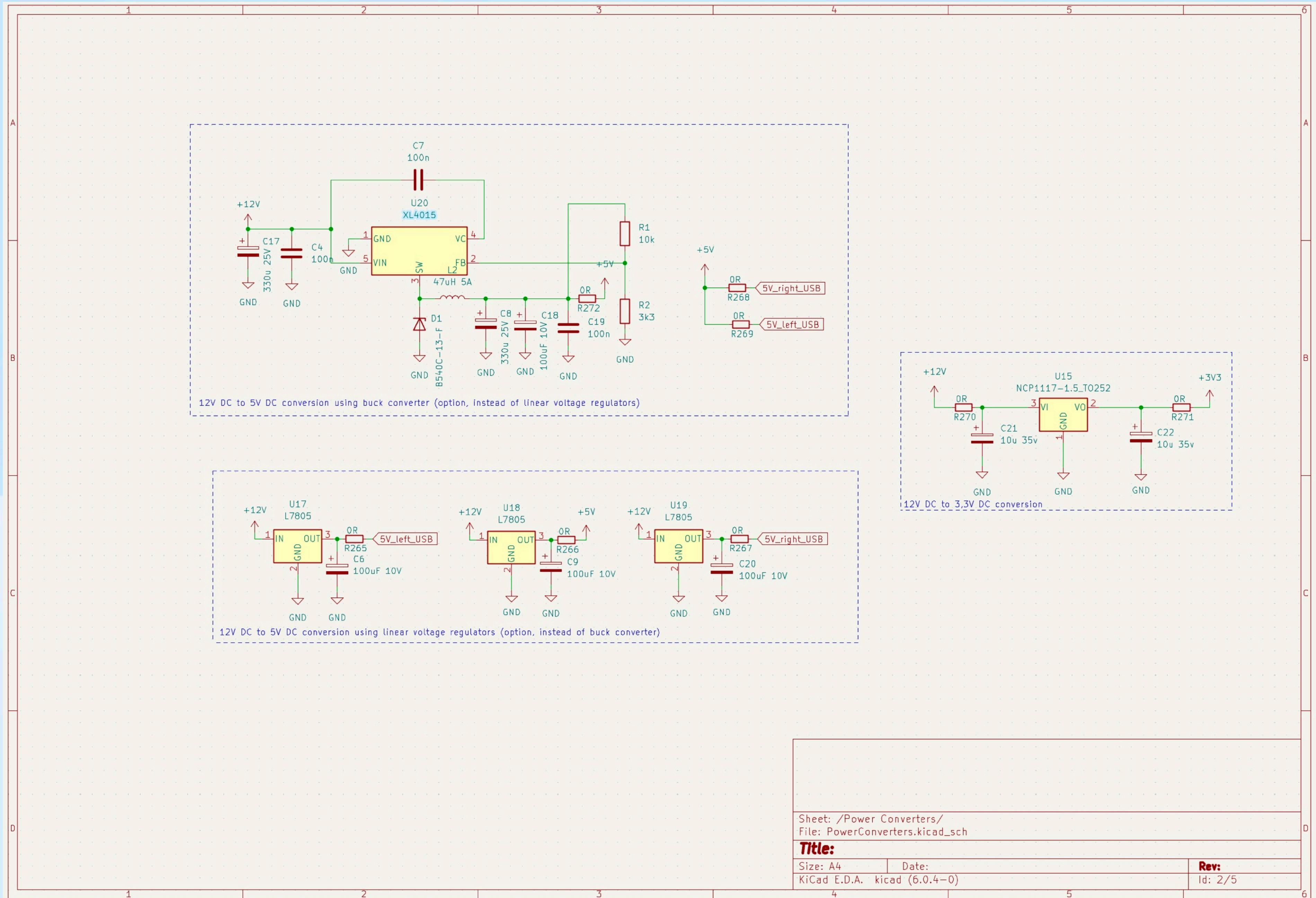


0R
R267

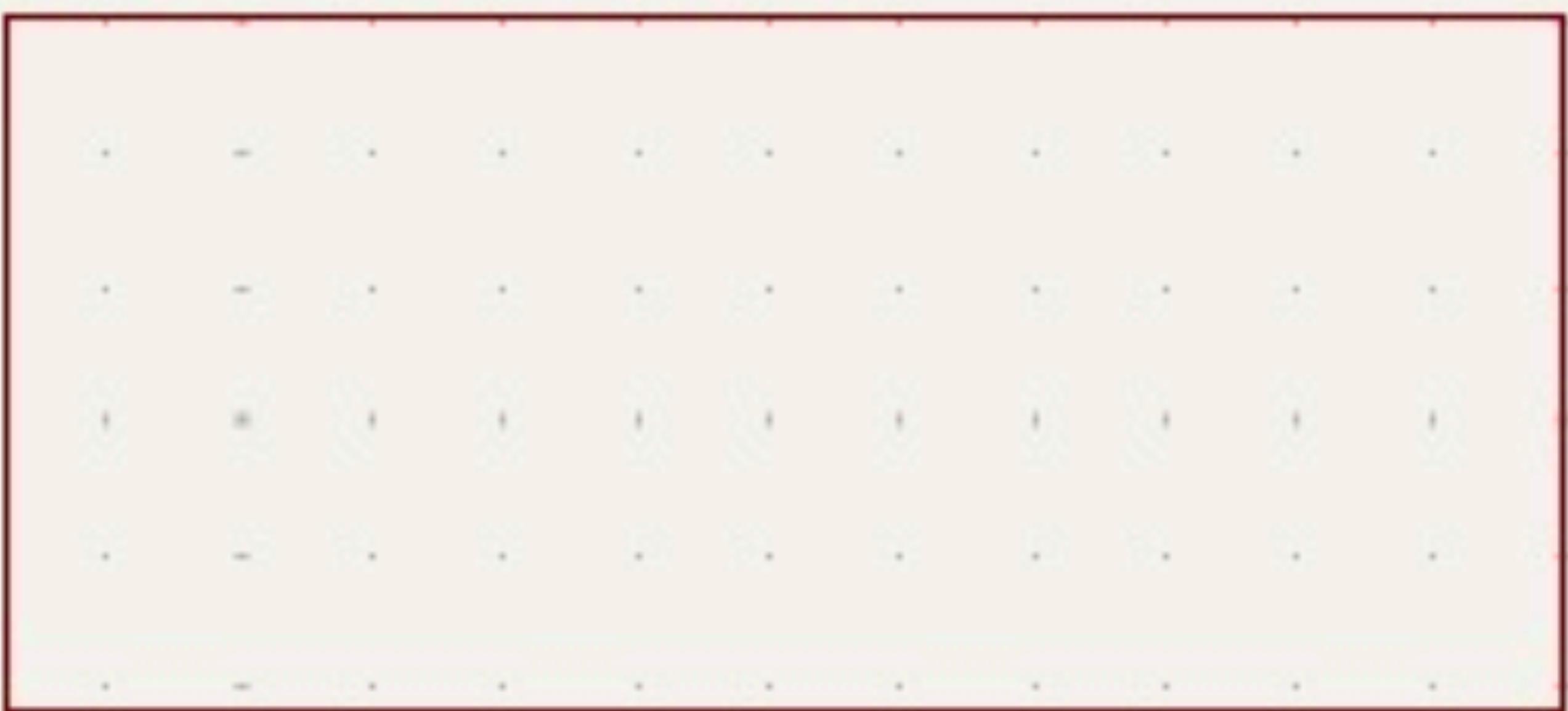
C20
100 μ F 10V

D

C



Power Converters



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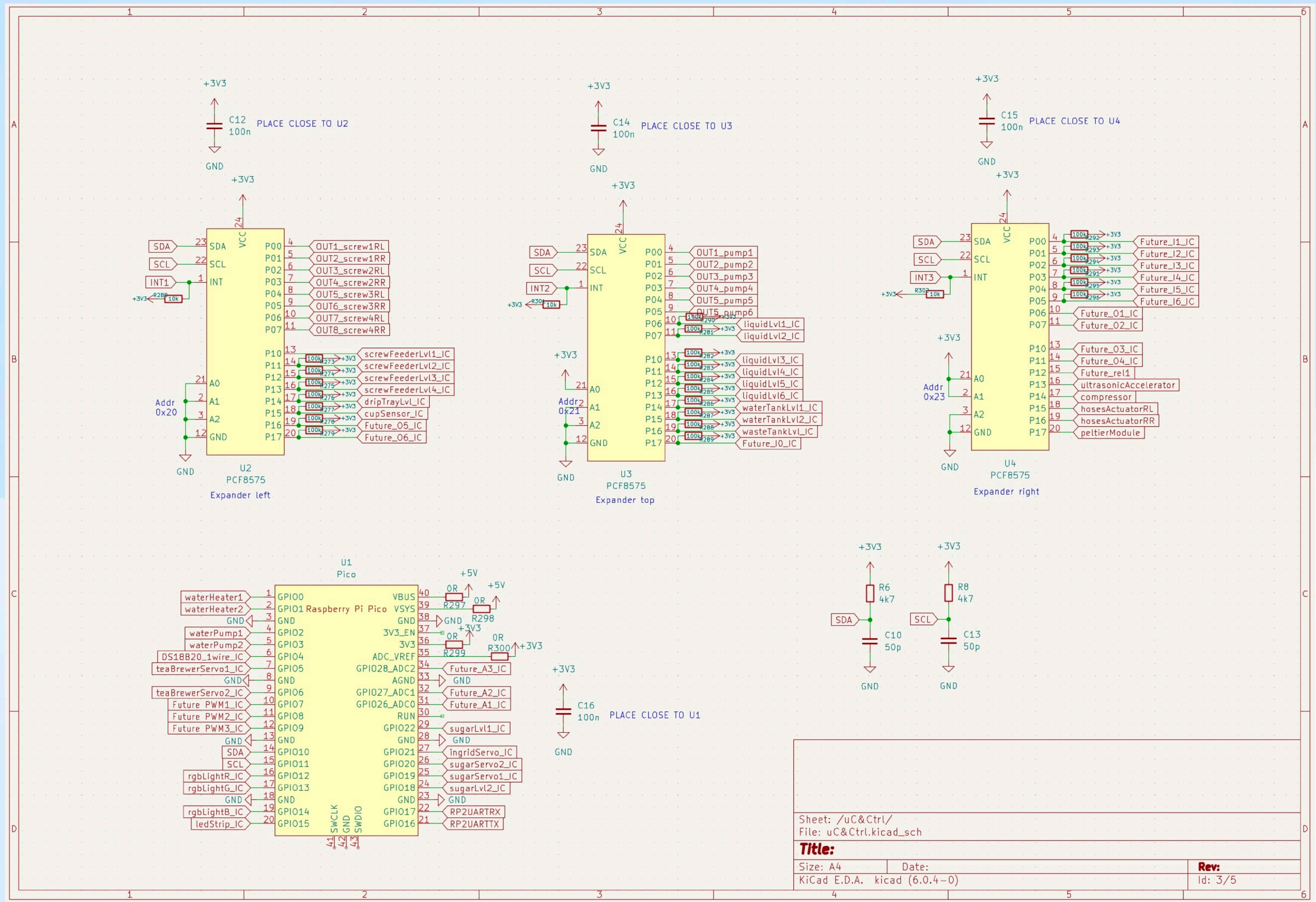
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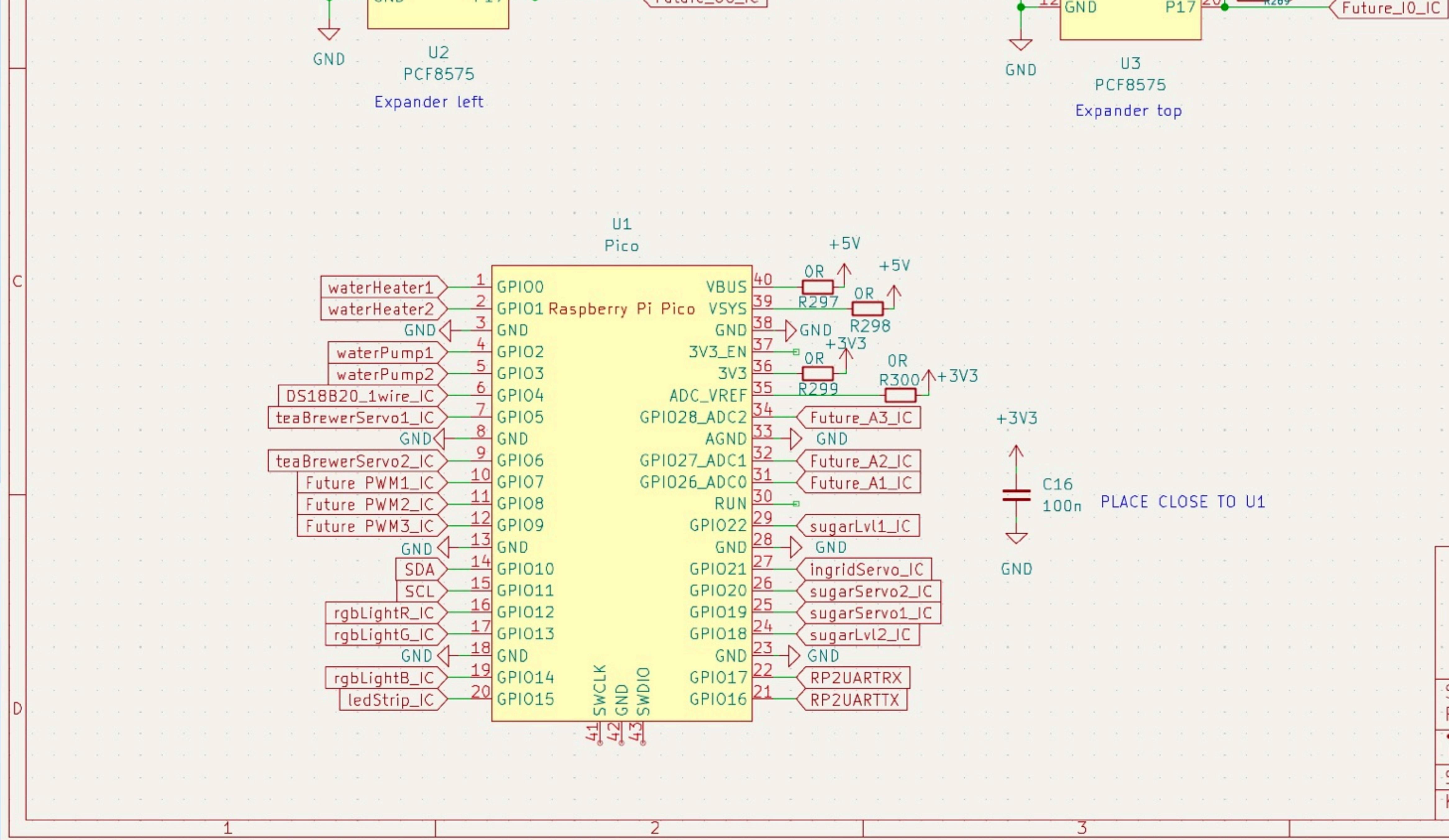
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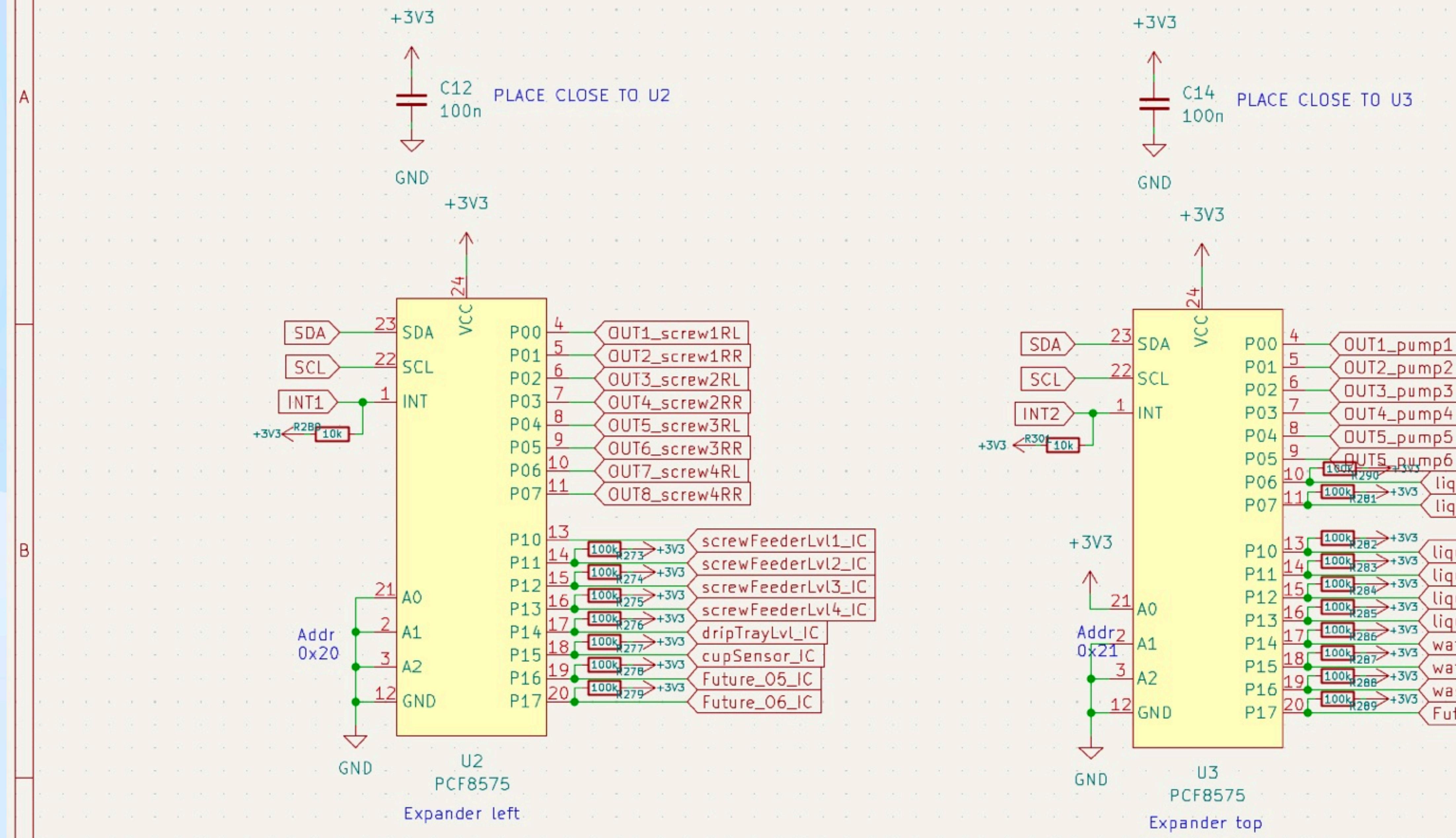
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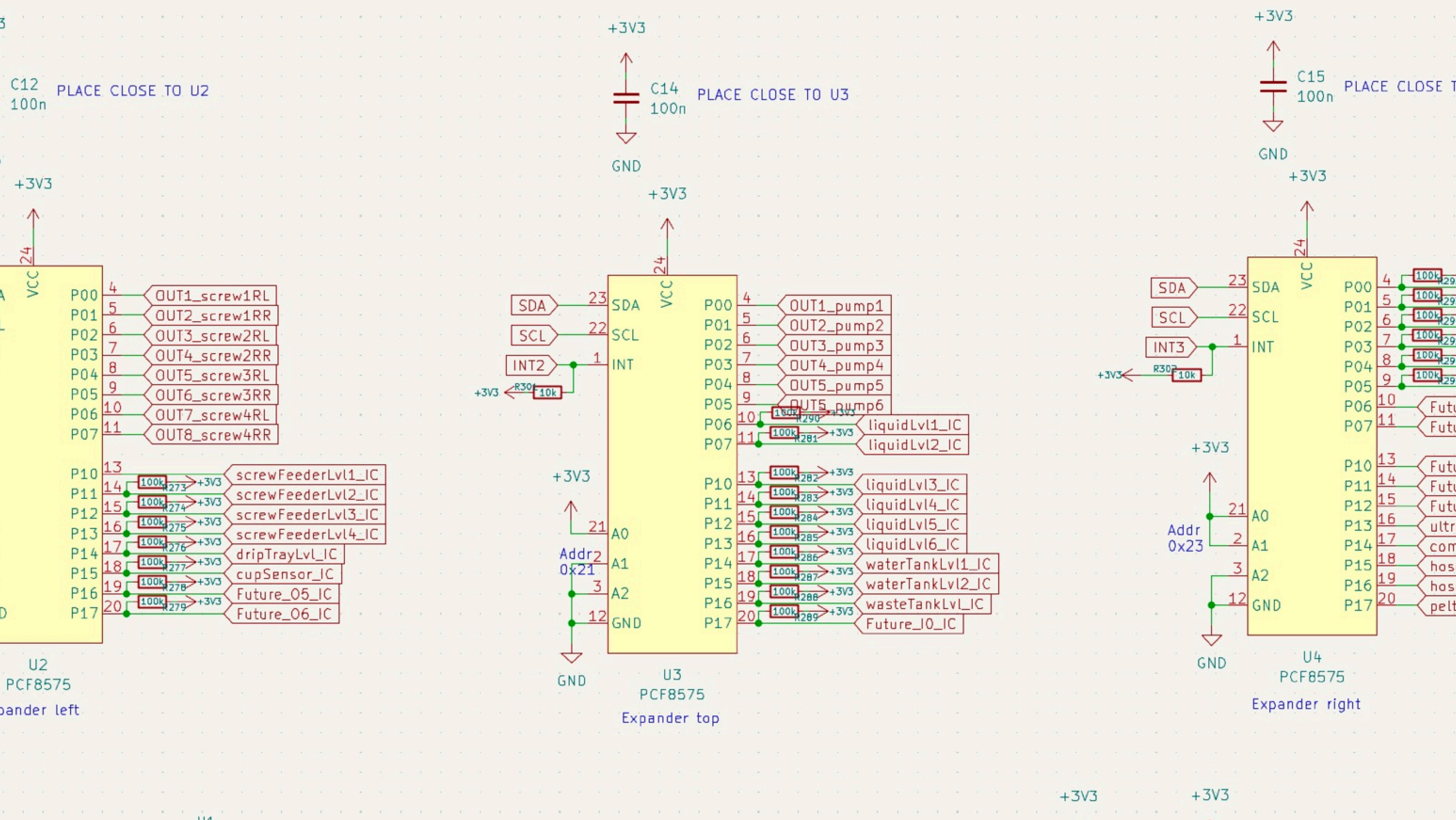
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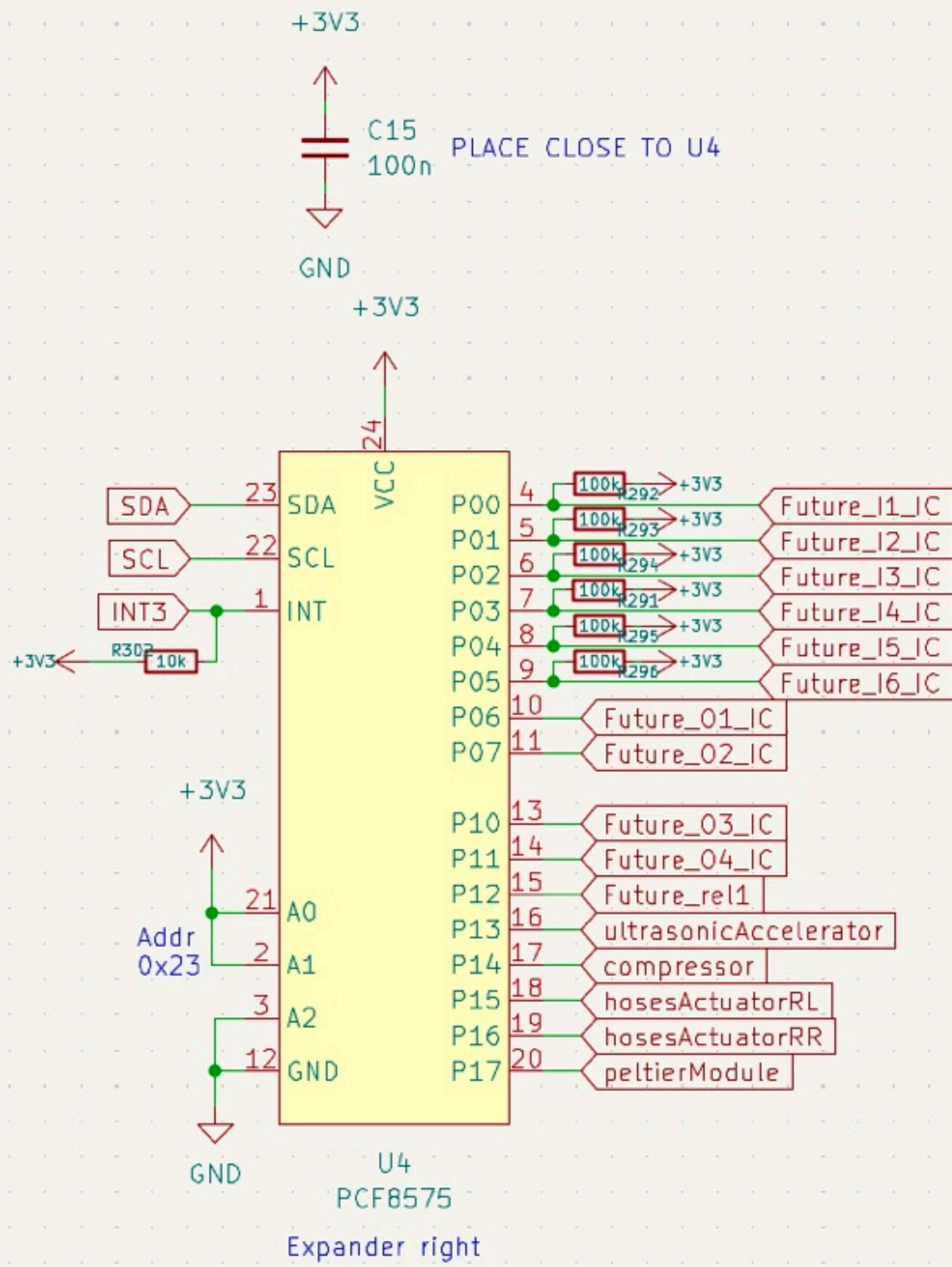
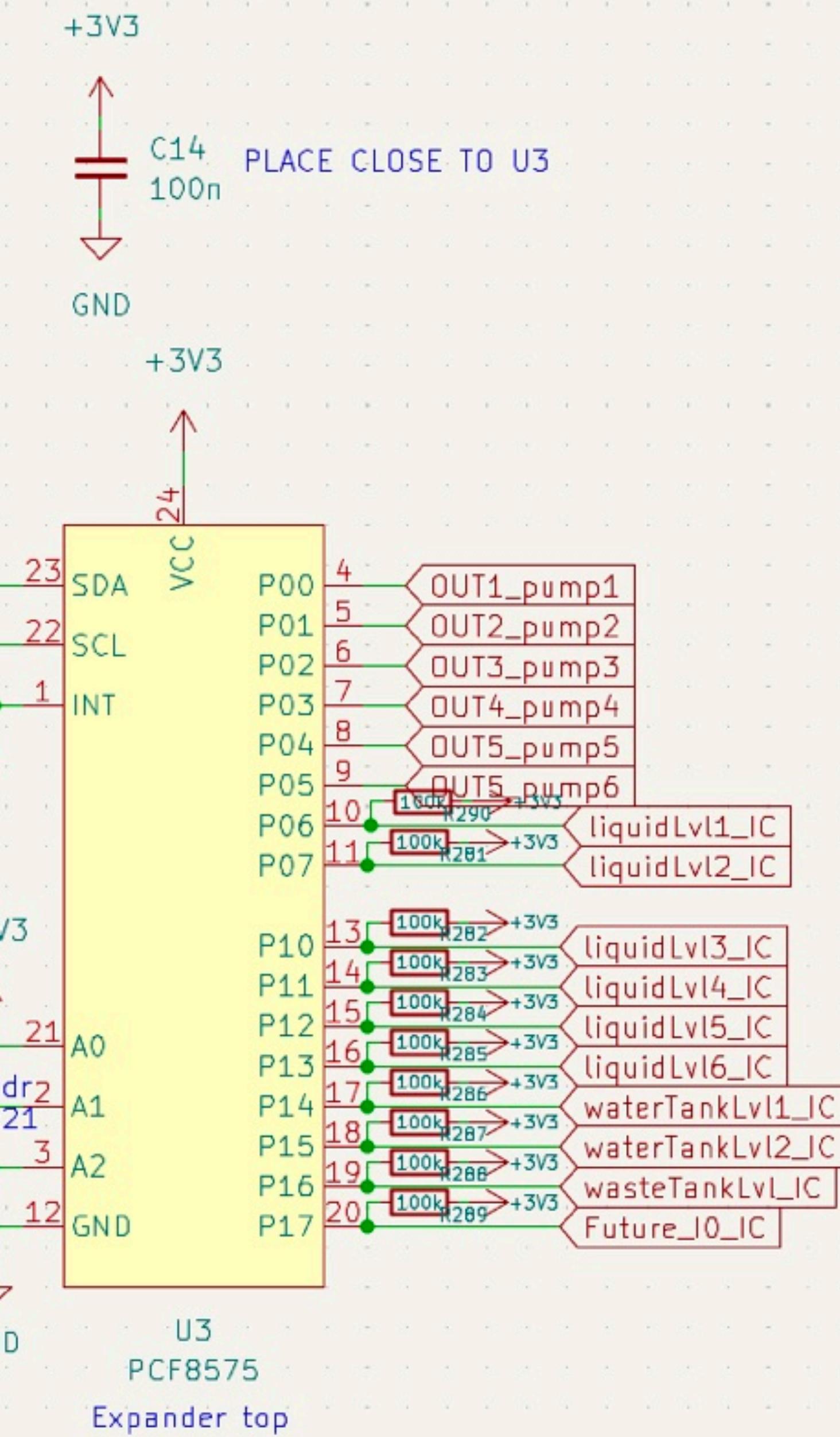
logic_converters











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A

uC&Ctrl

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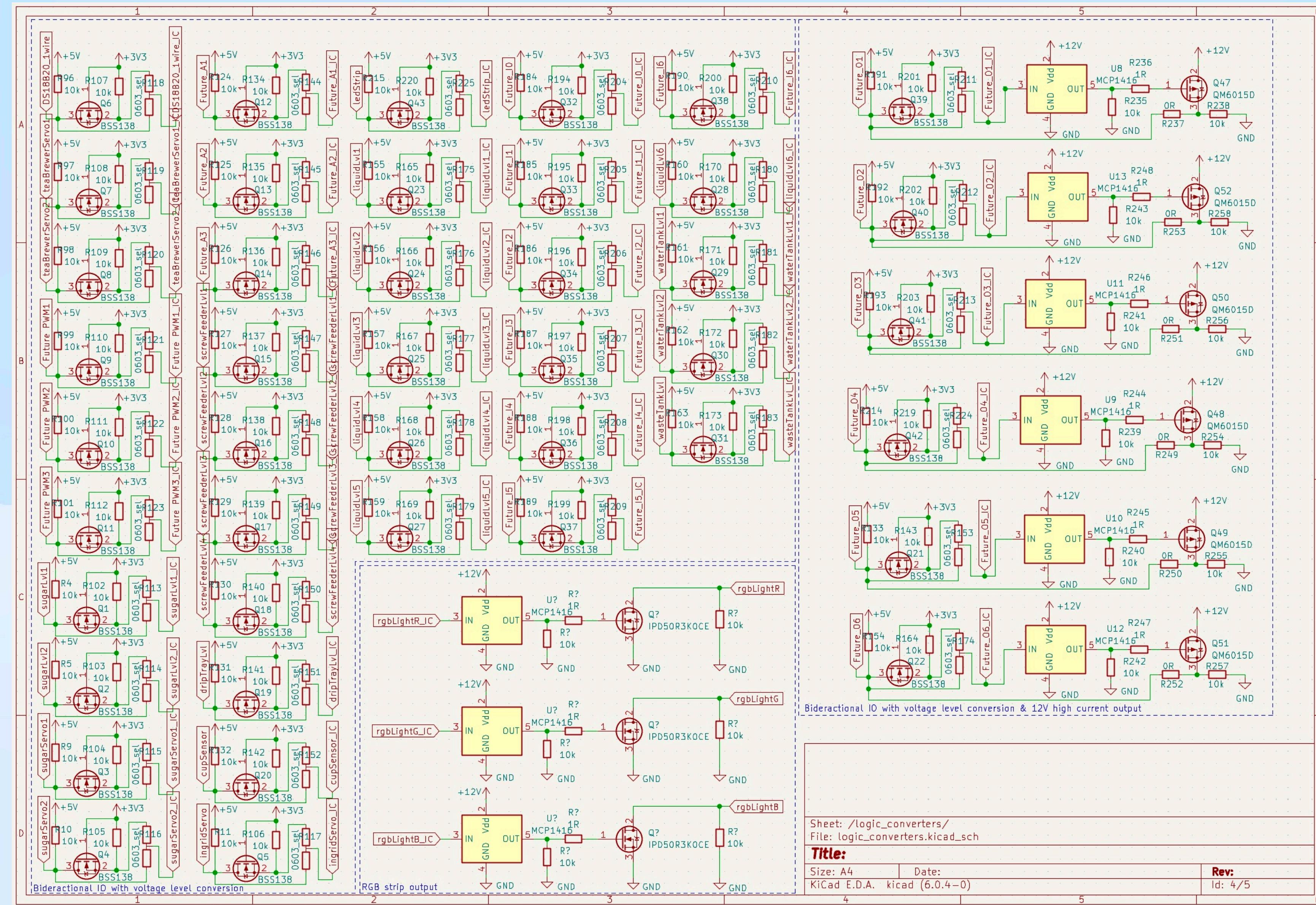
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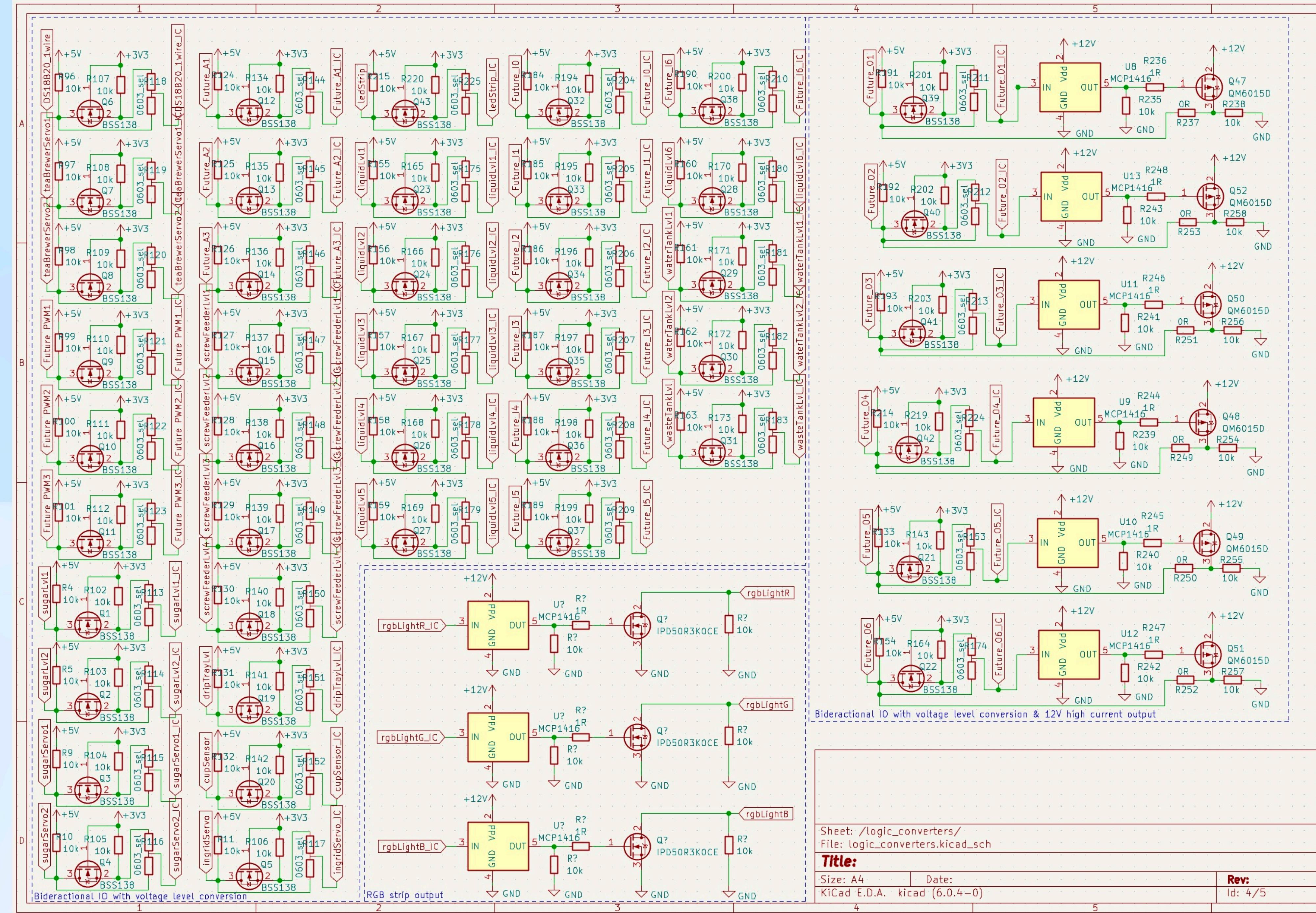
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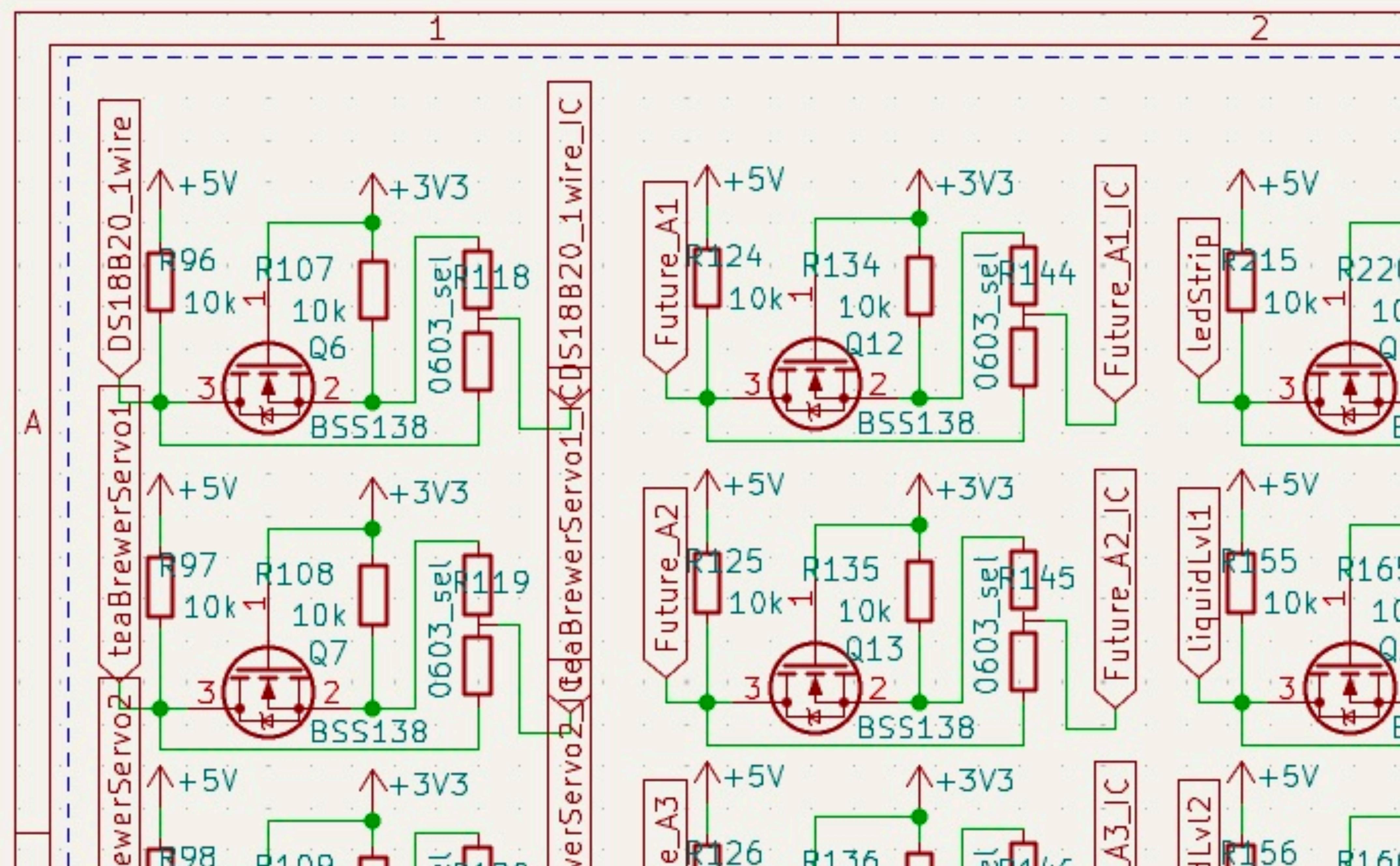
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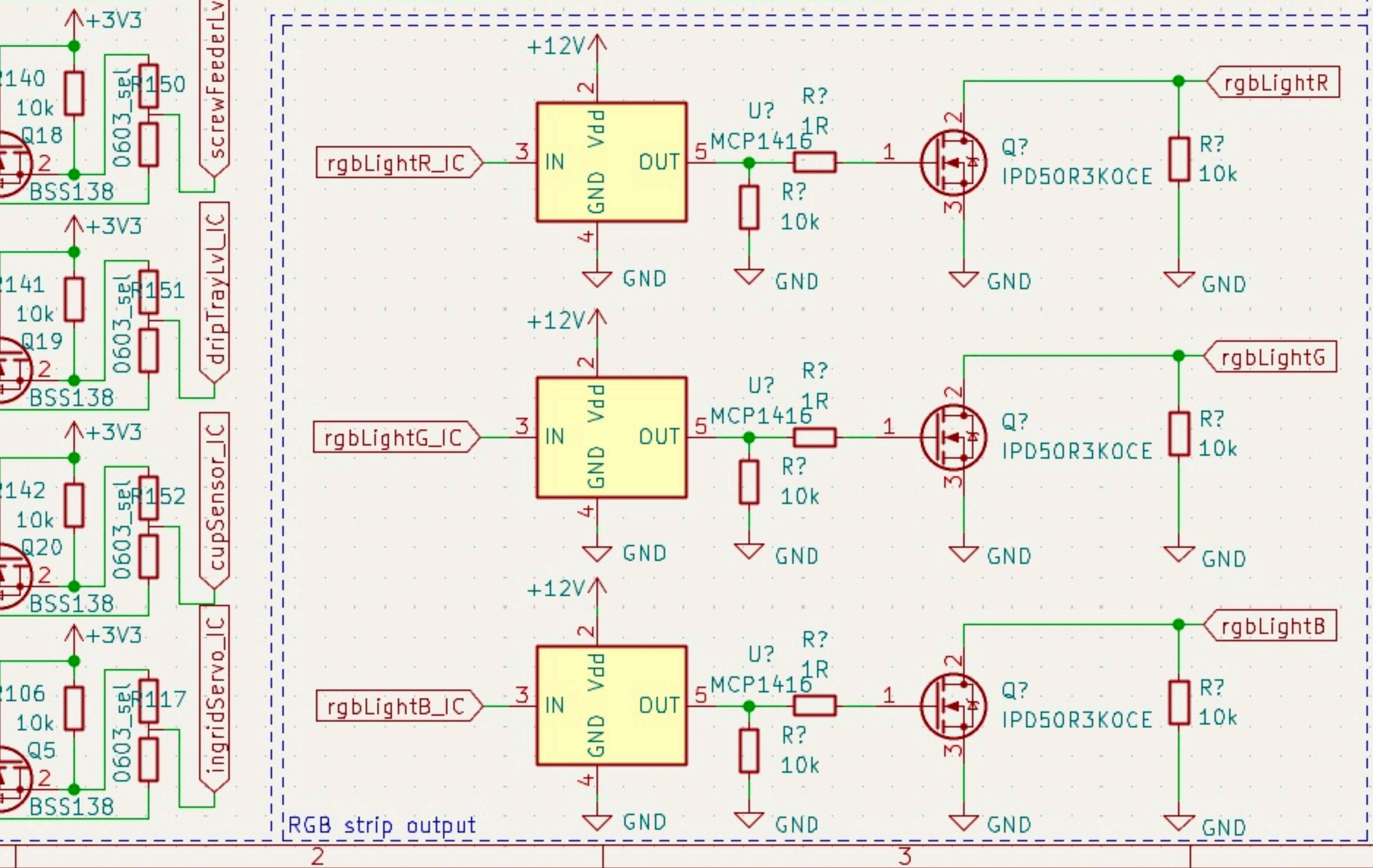
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status_LEDs







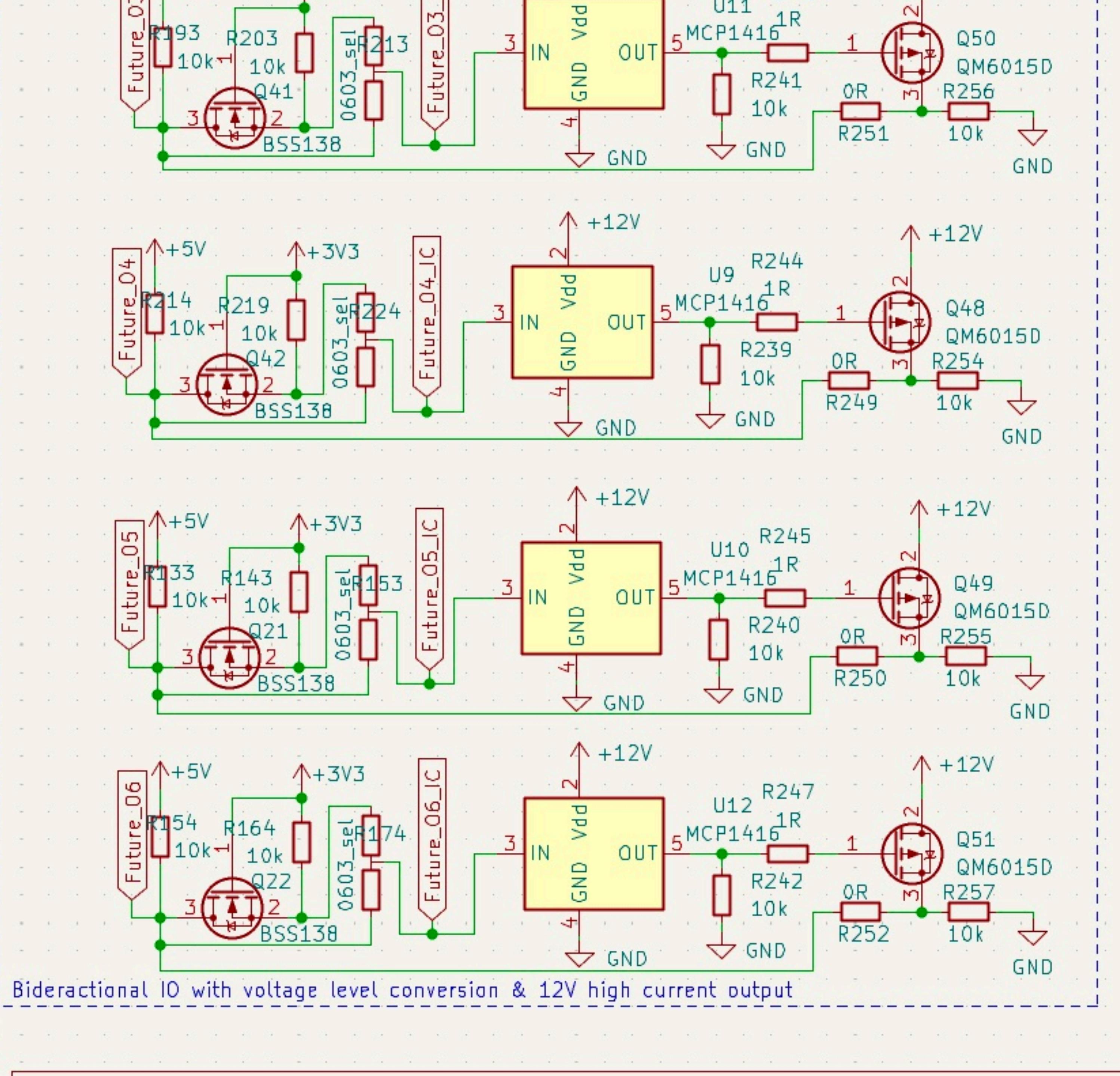
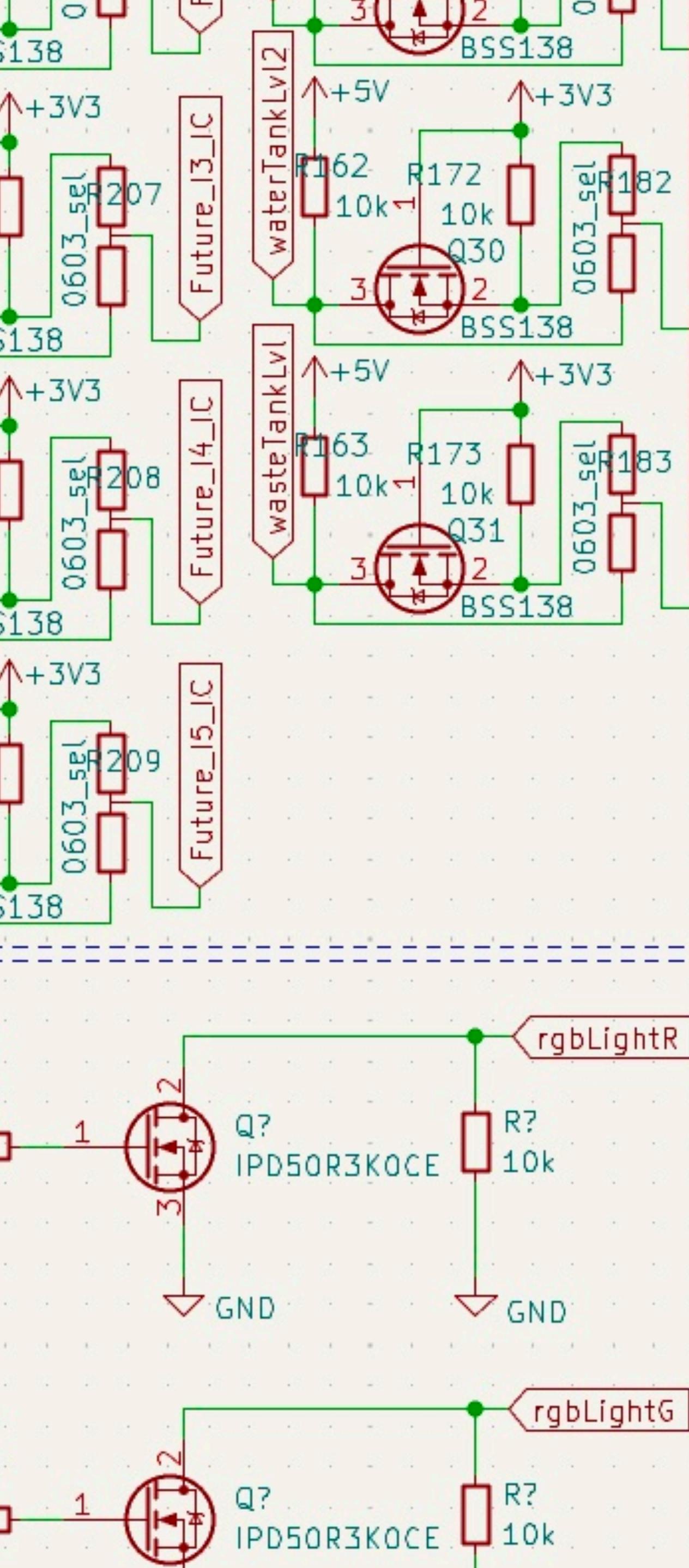


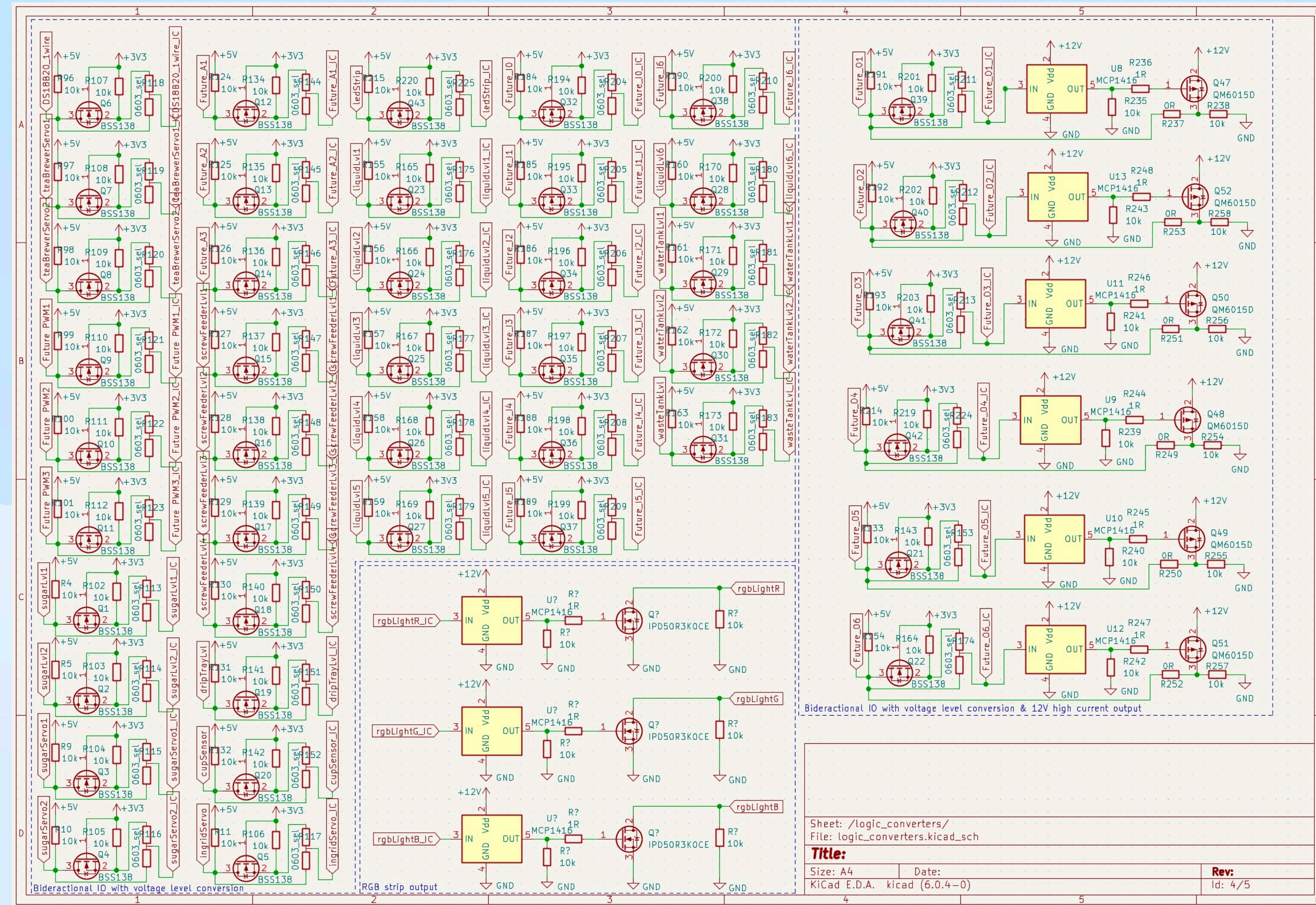
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Title:

Size: A4

KiCad E.D.A.





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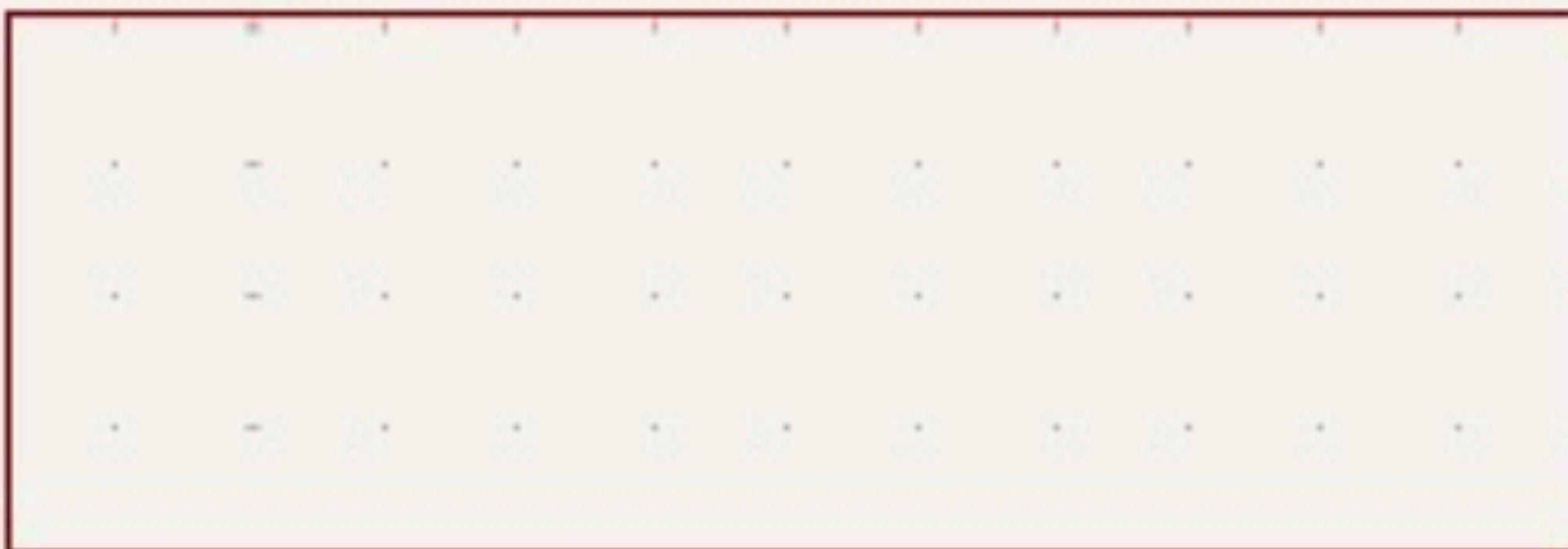
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status_LEDs

File: logic_converters.kicad_sch

status_LEDs



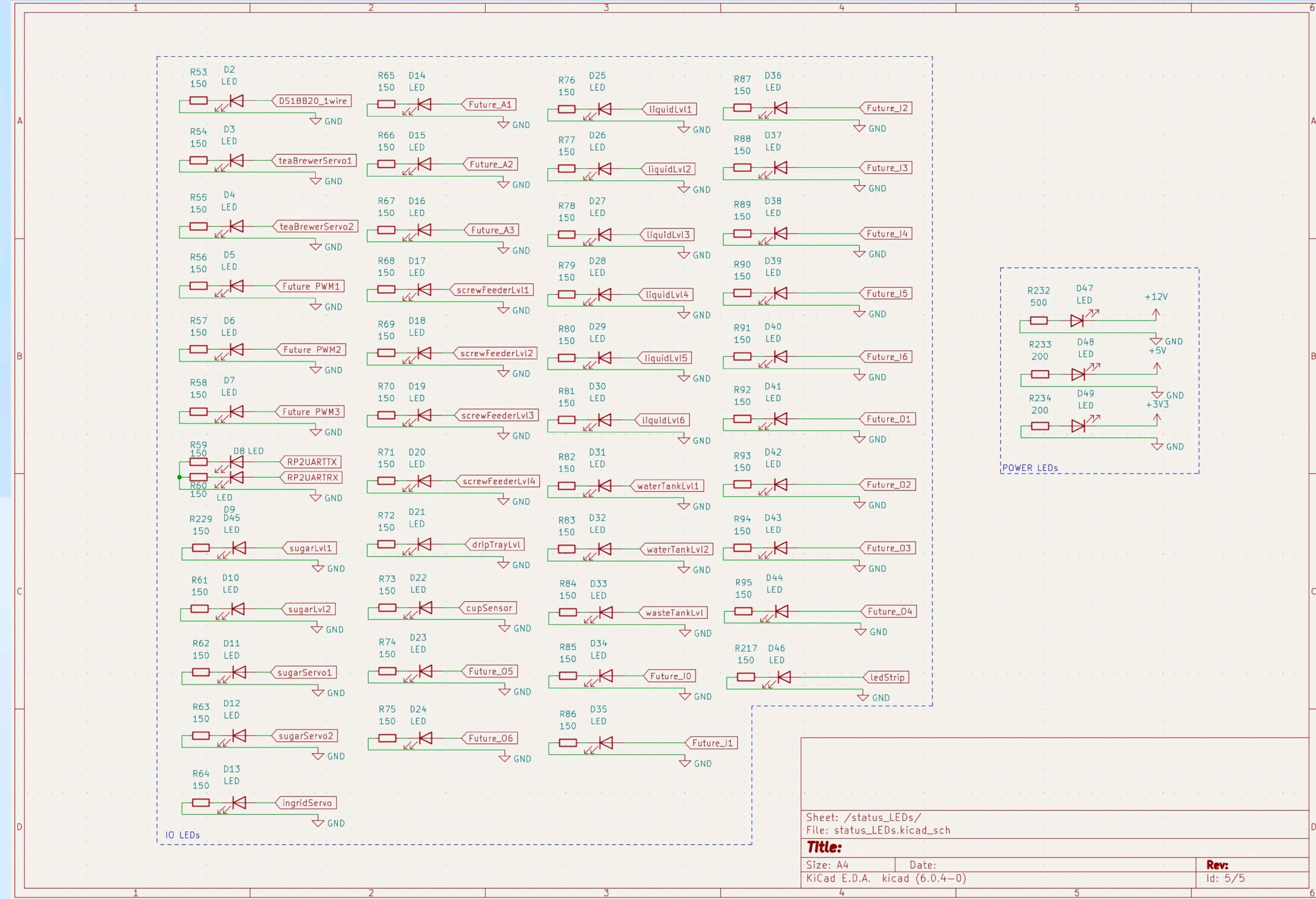
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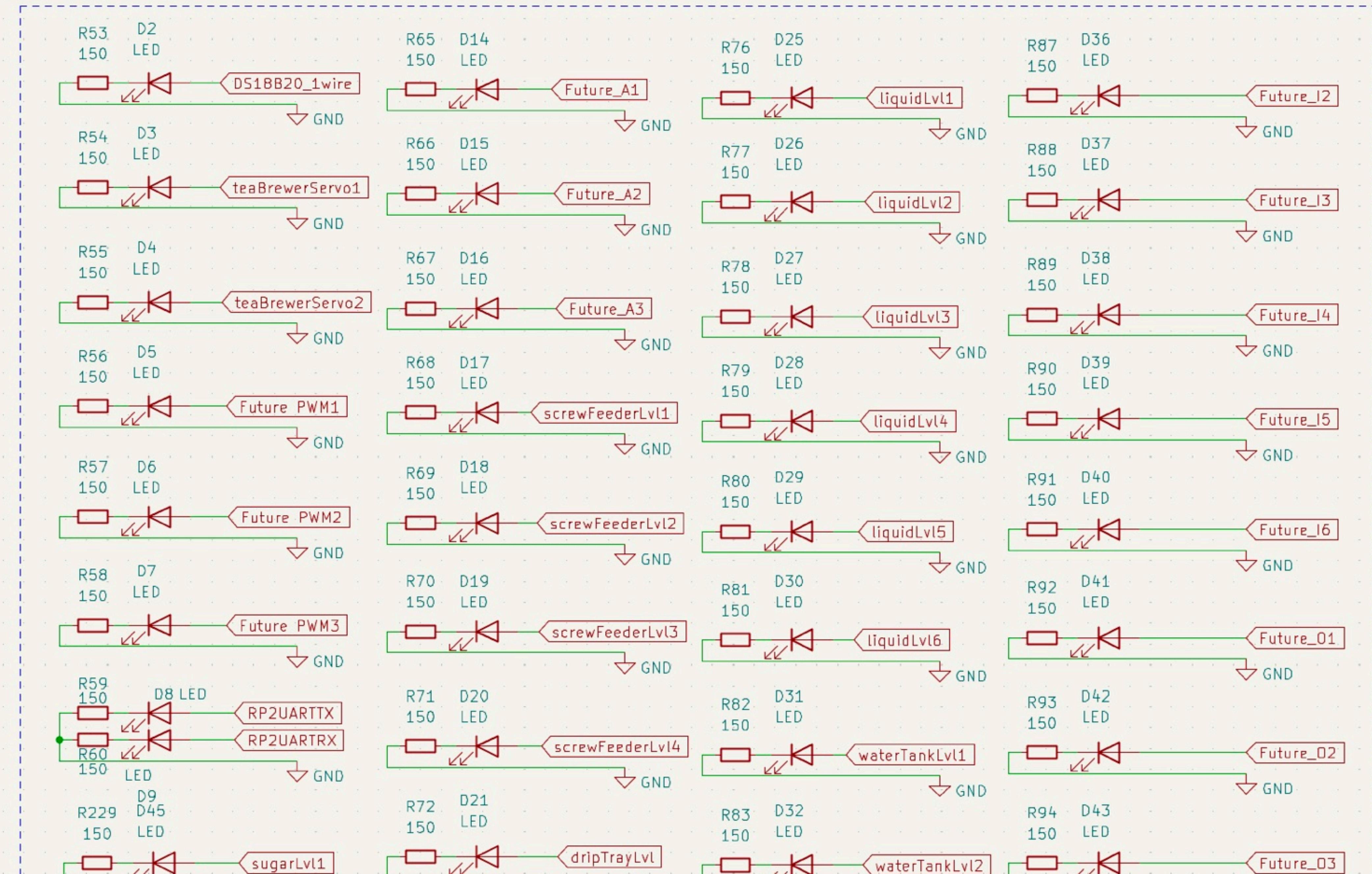
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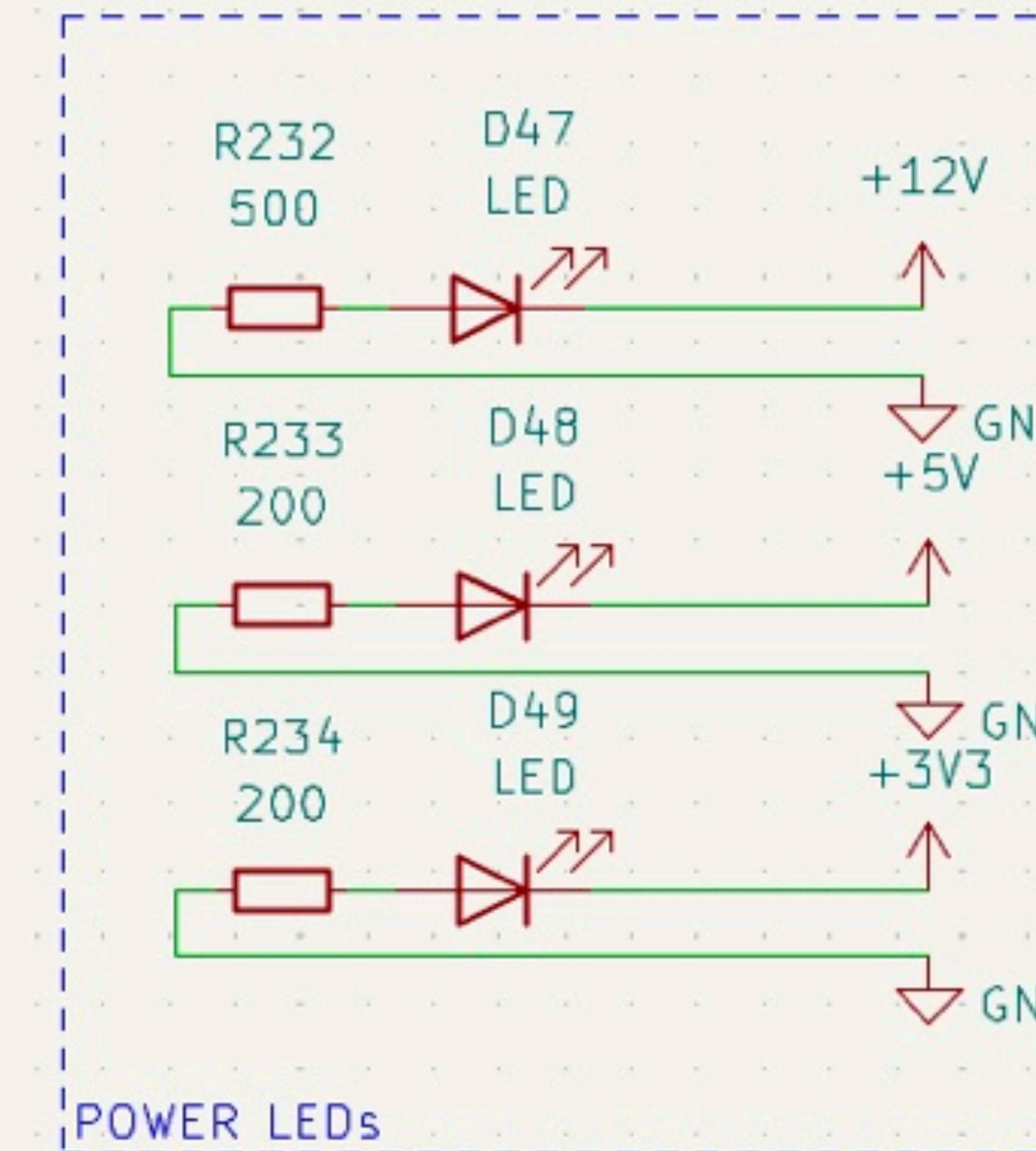
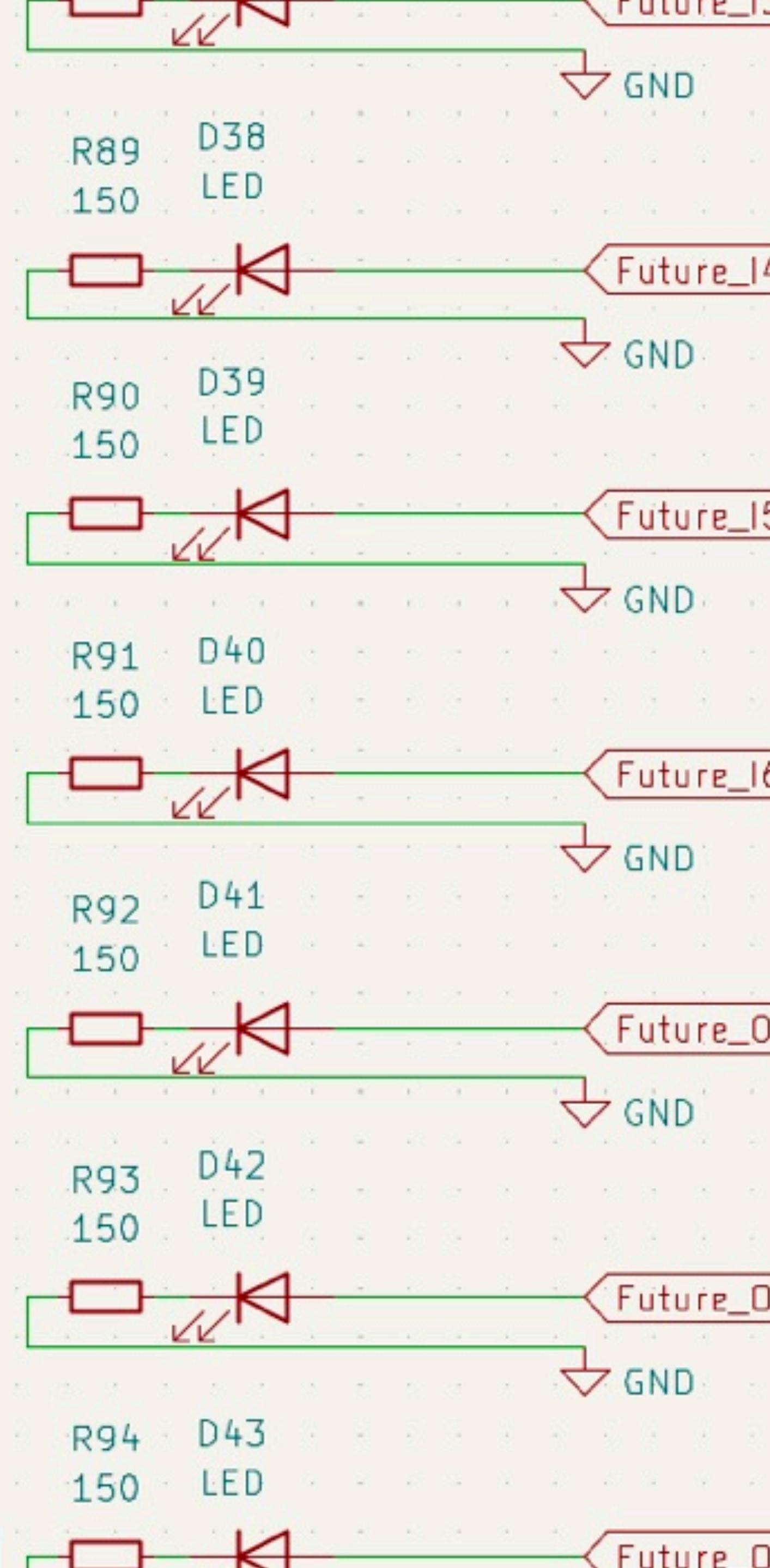
Screw_Terminal_01x02

J25

↑+12V







File: logic_converters.kicad_sch

status_LEDs



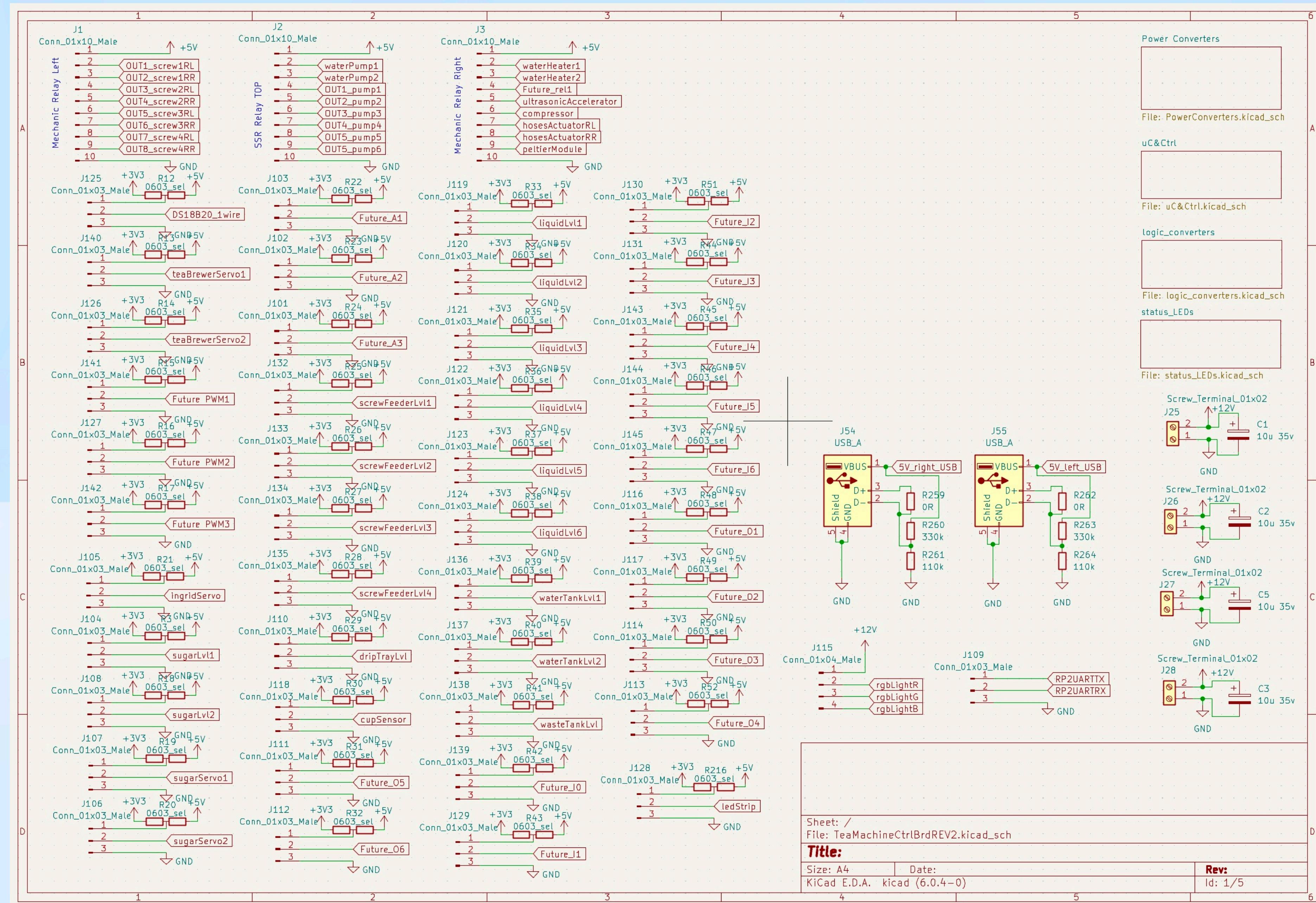
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Screw_Terminal_01x02

J25

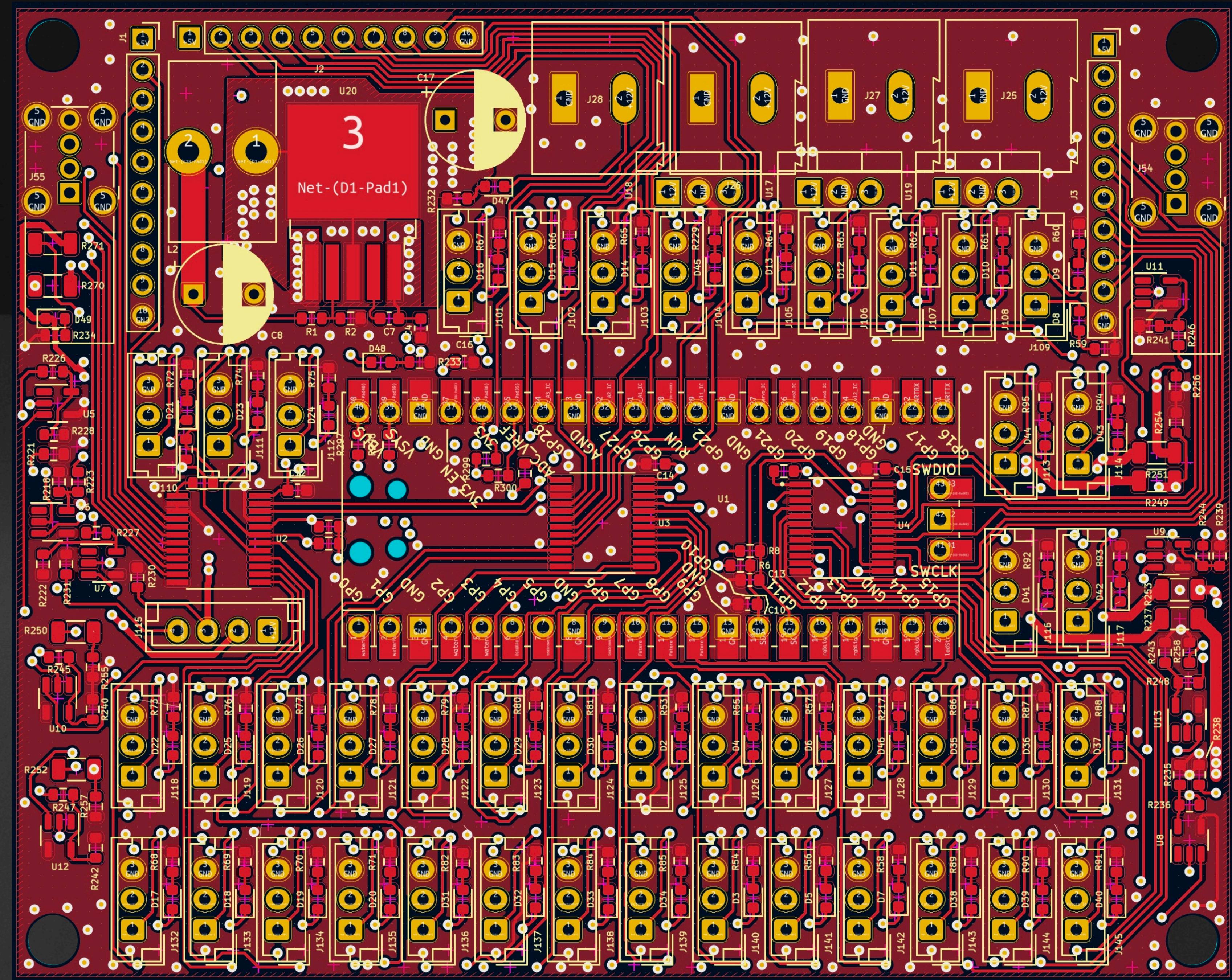
↑+12V



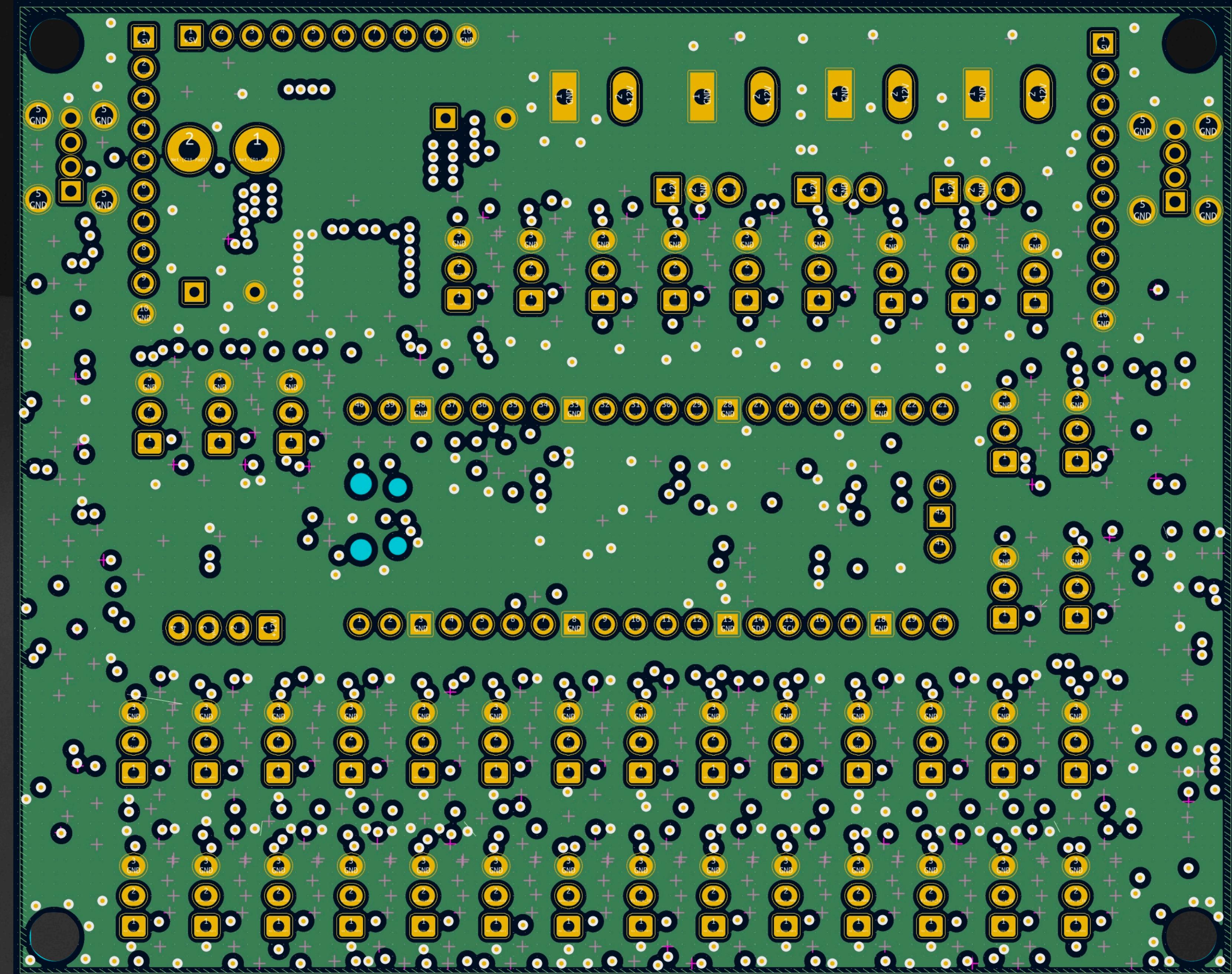
Mozaika ścieżek



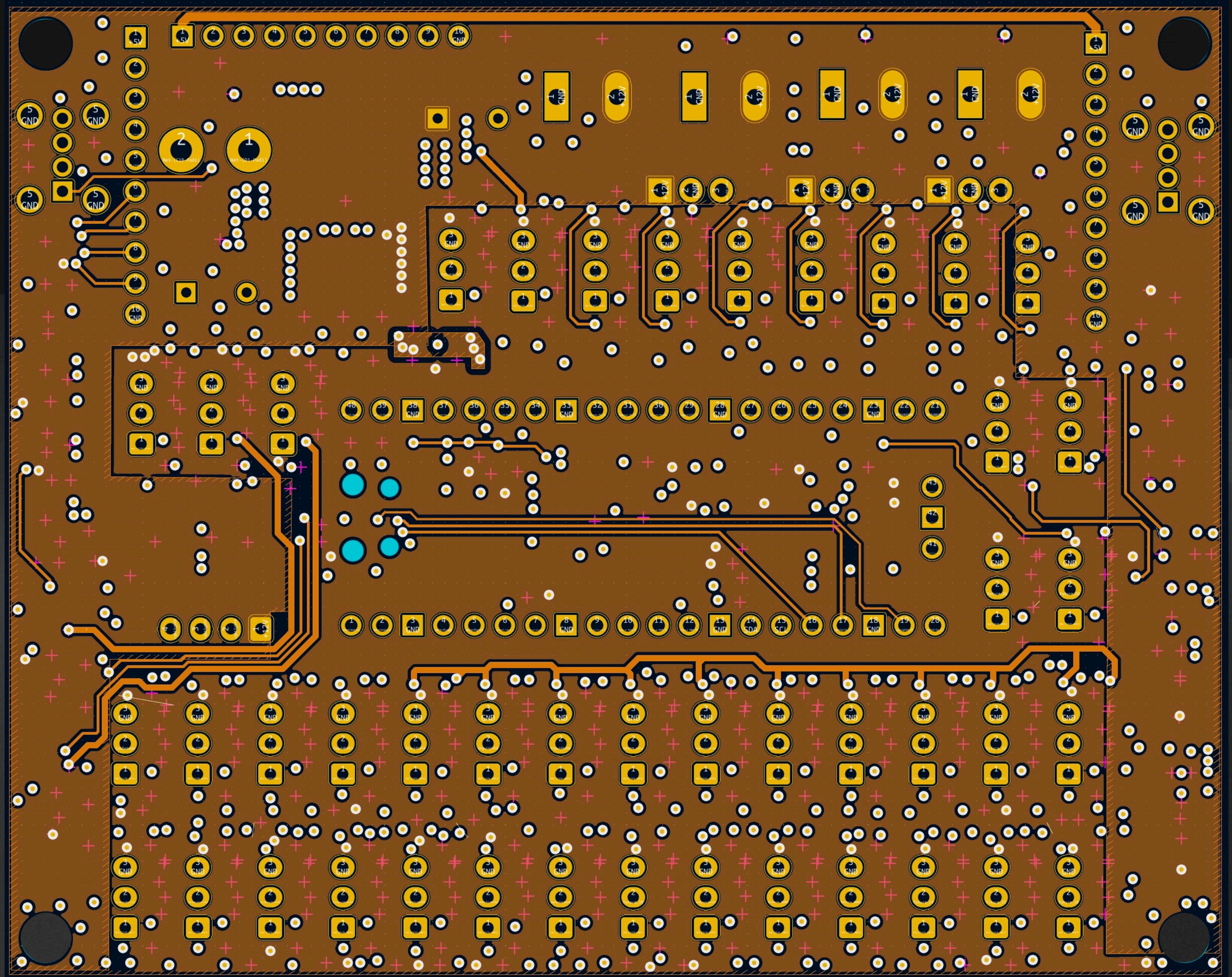
Widok warstwy górnnej GND



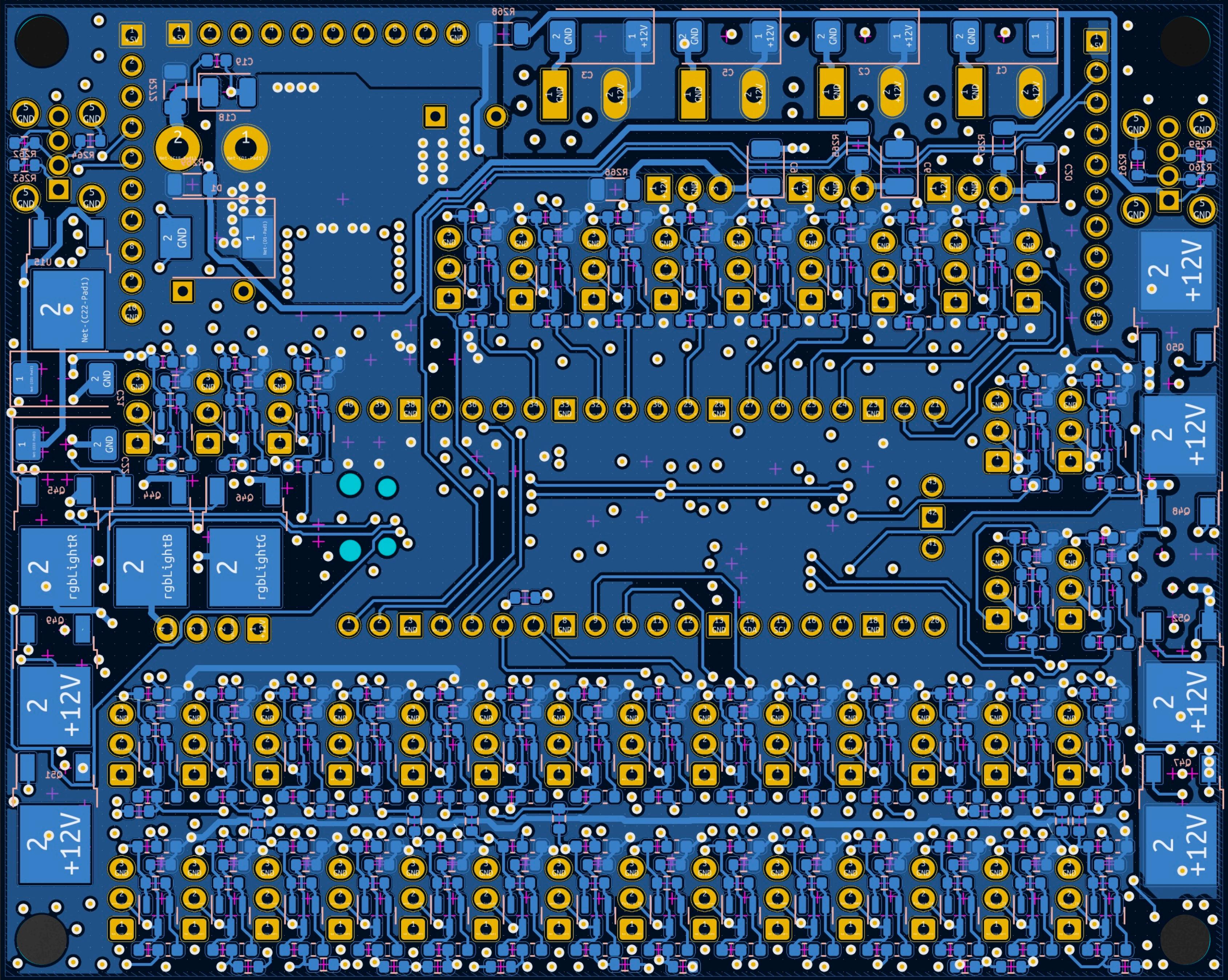
Warstwa wewnętrzna GND



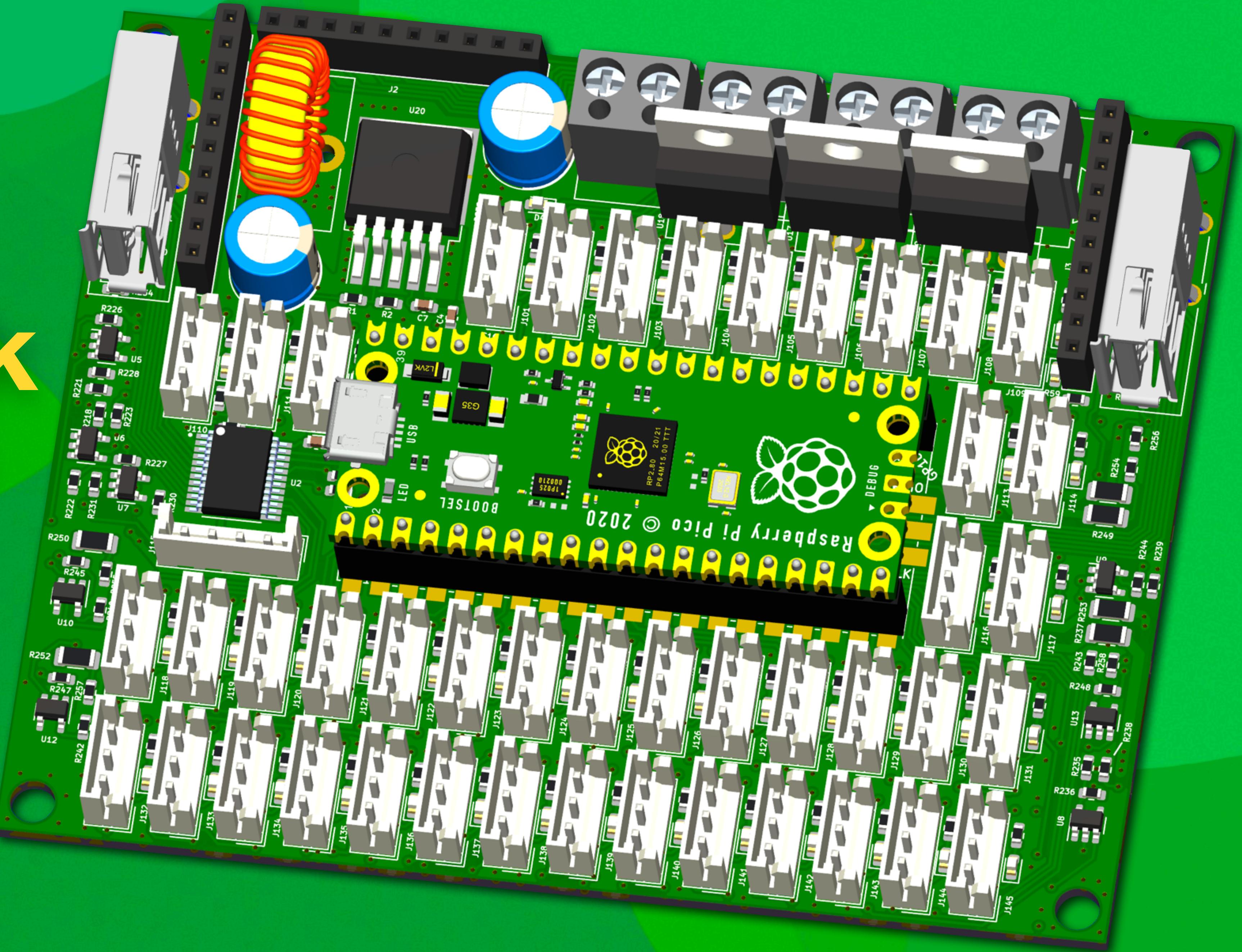
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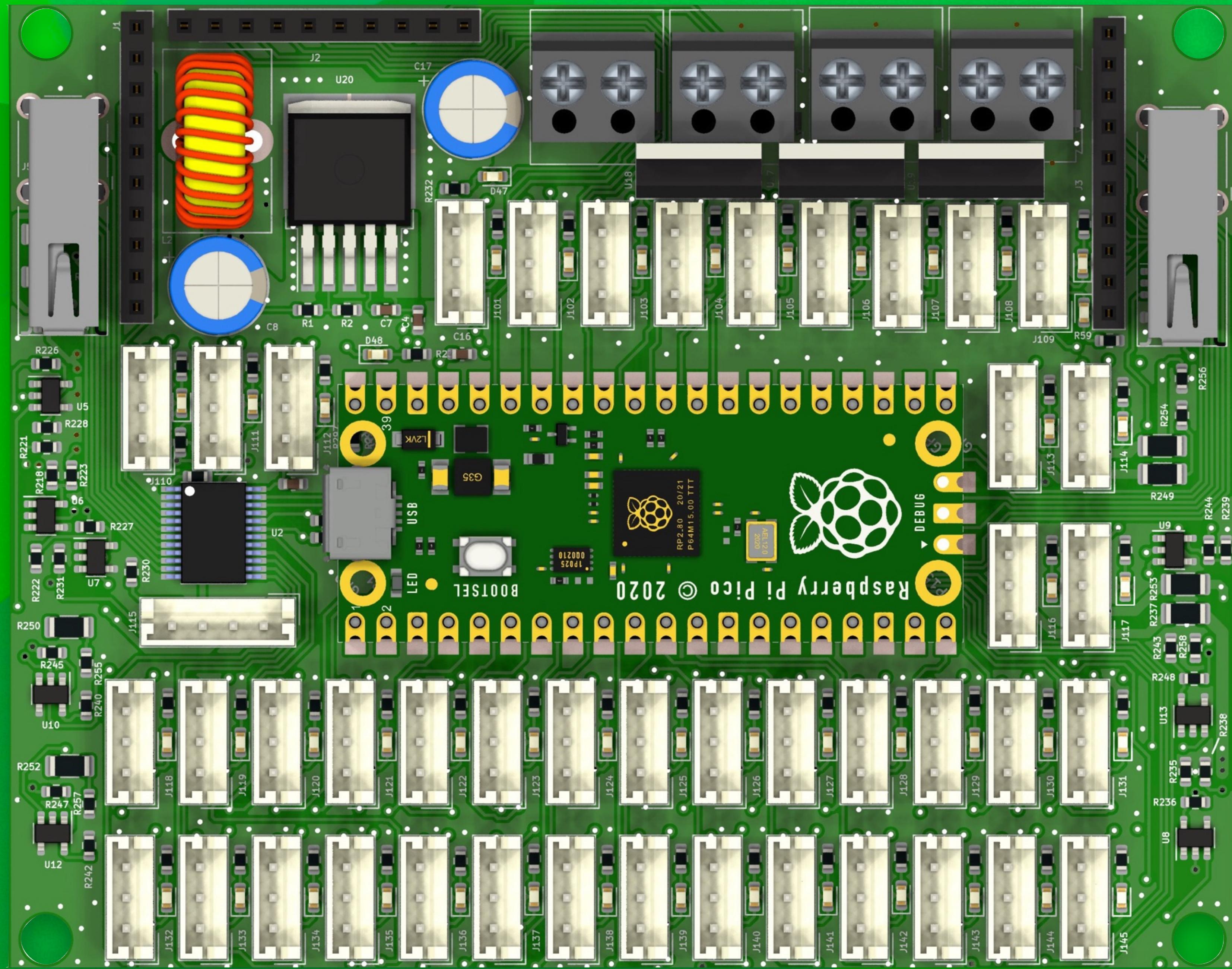


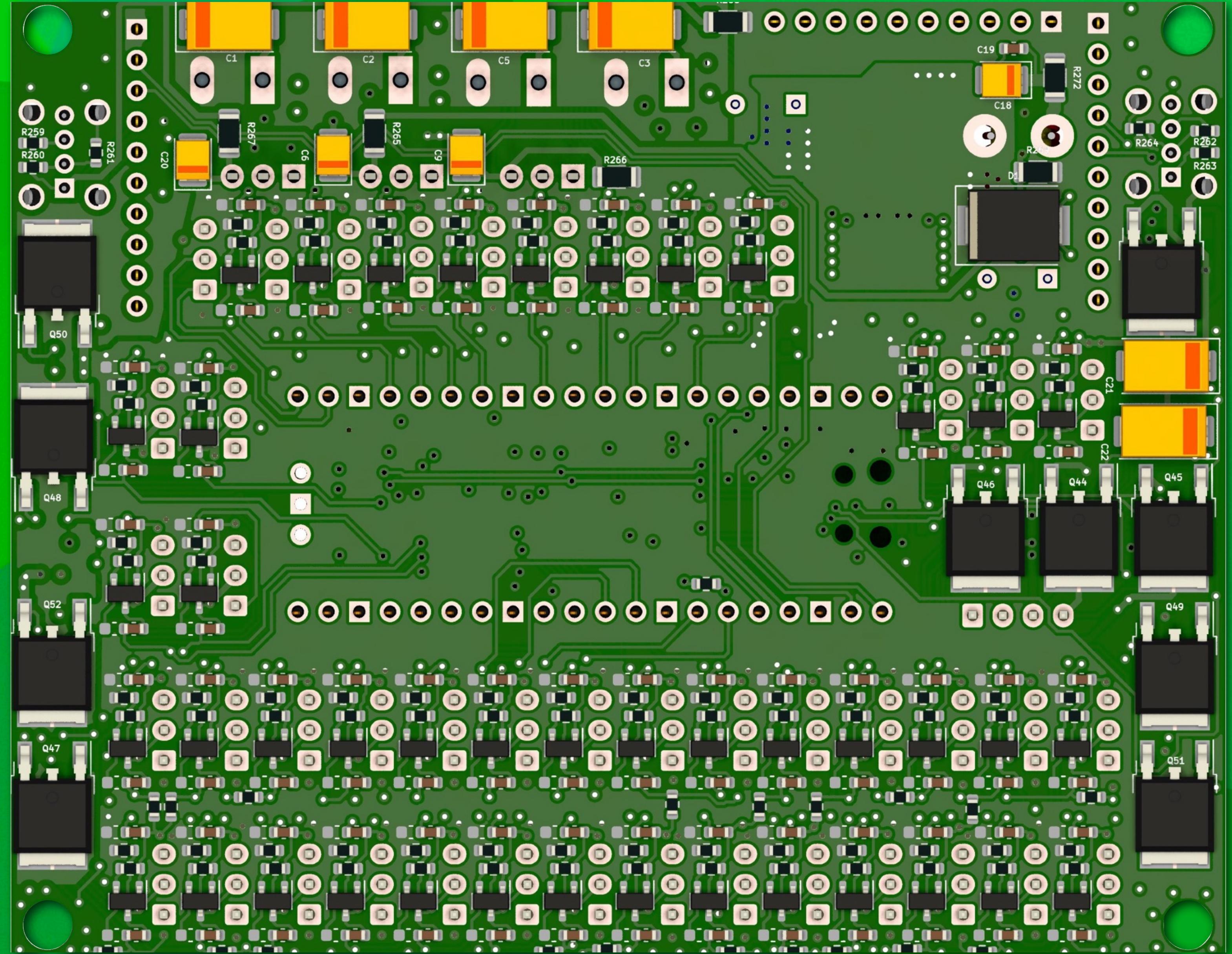
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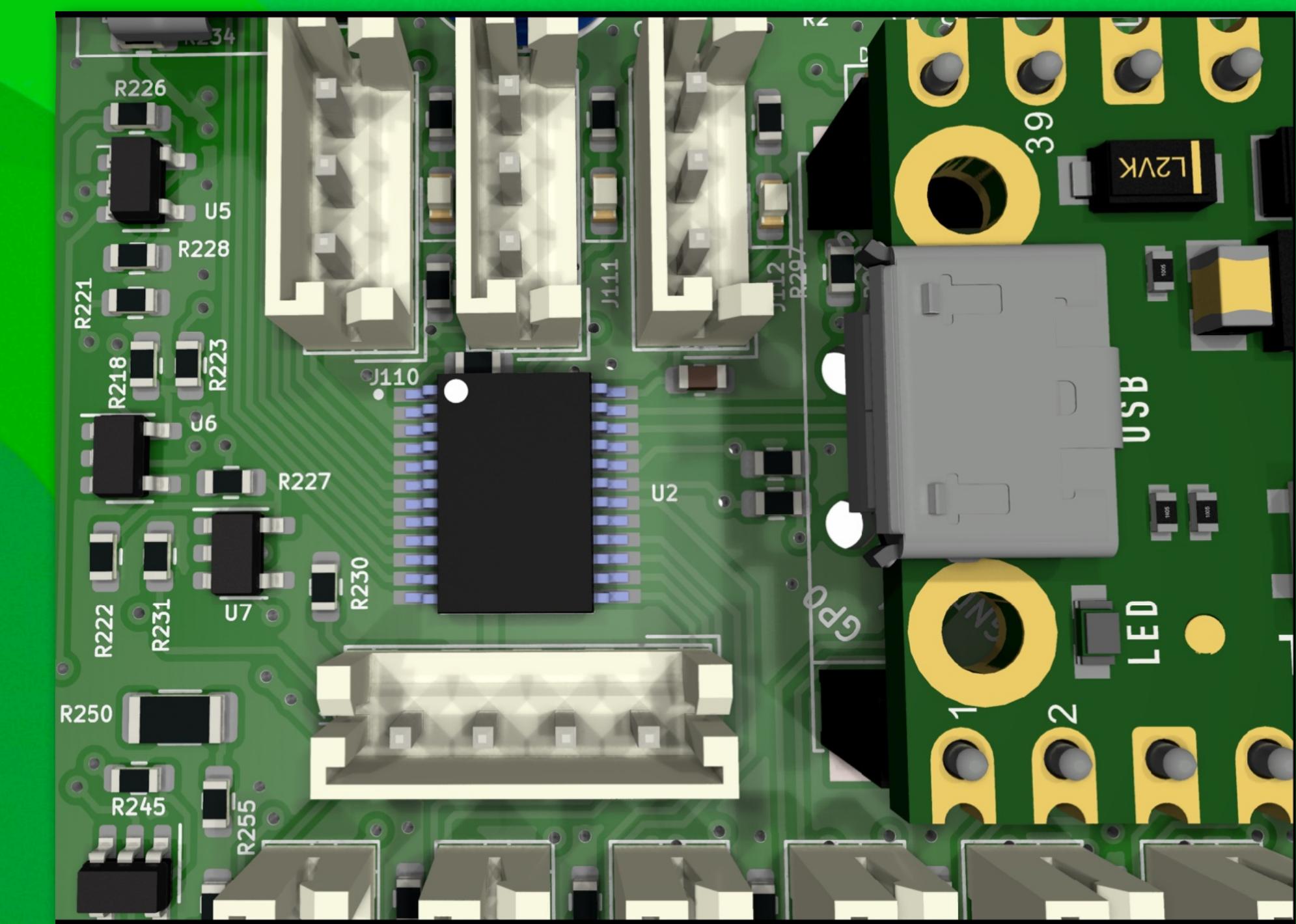
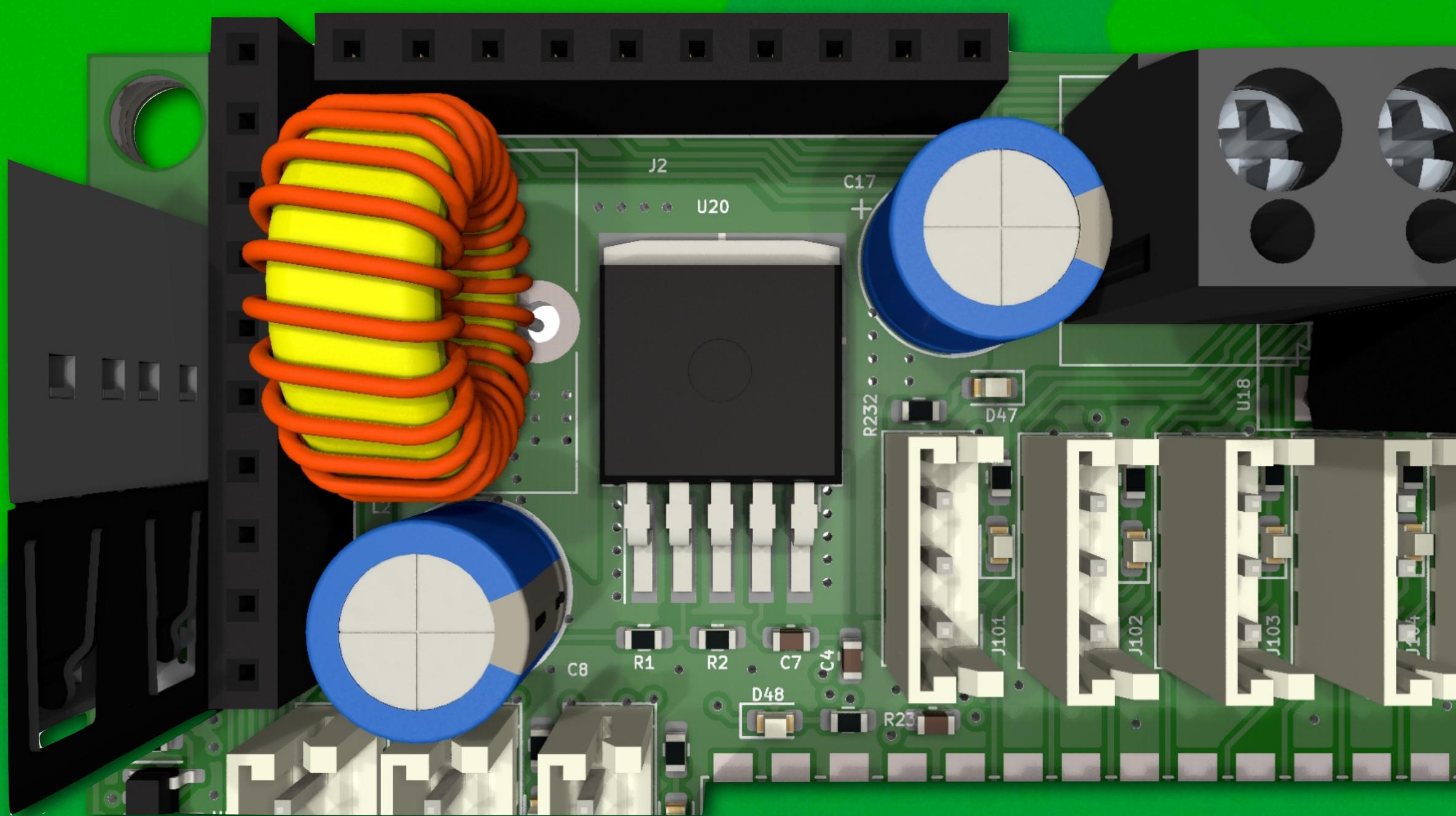
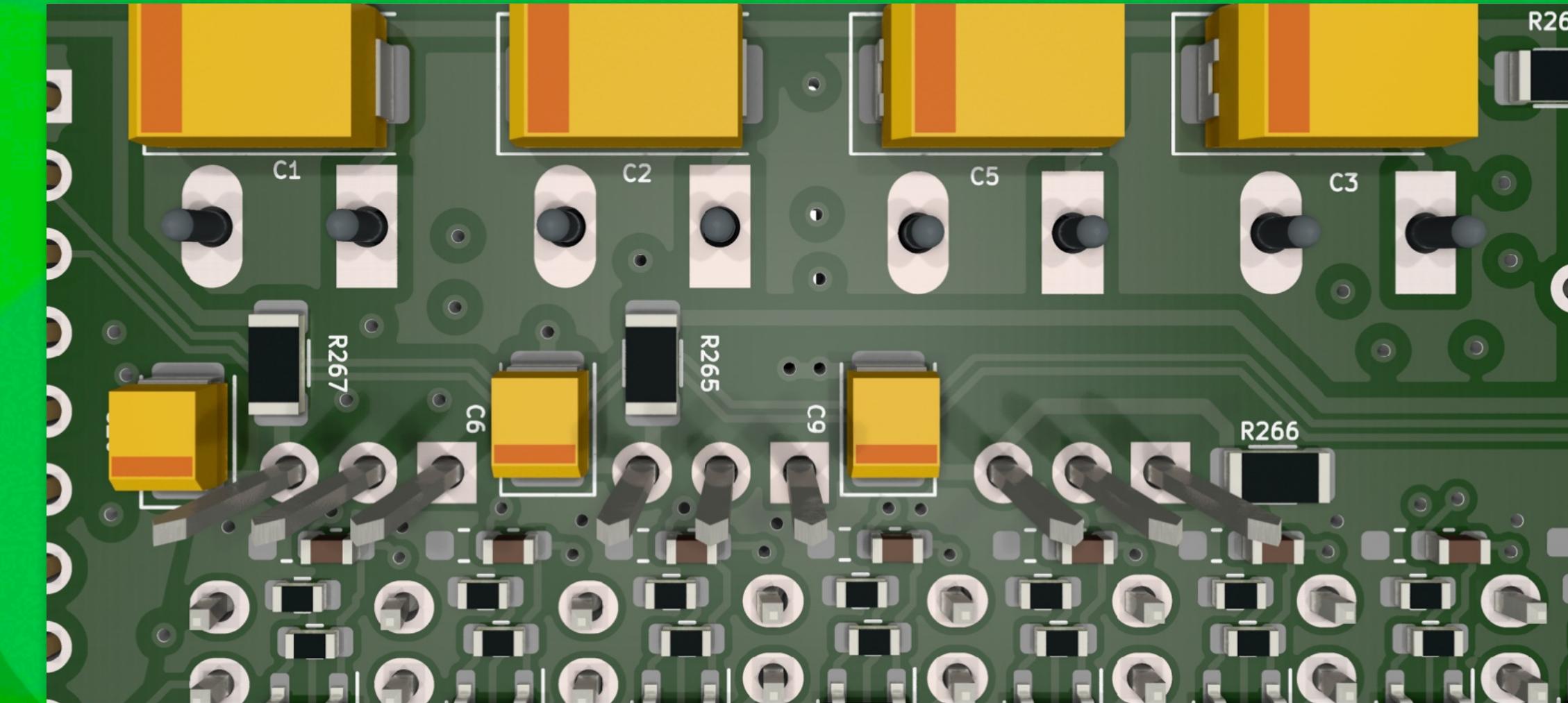
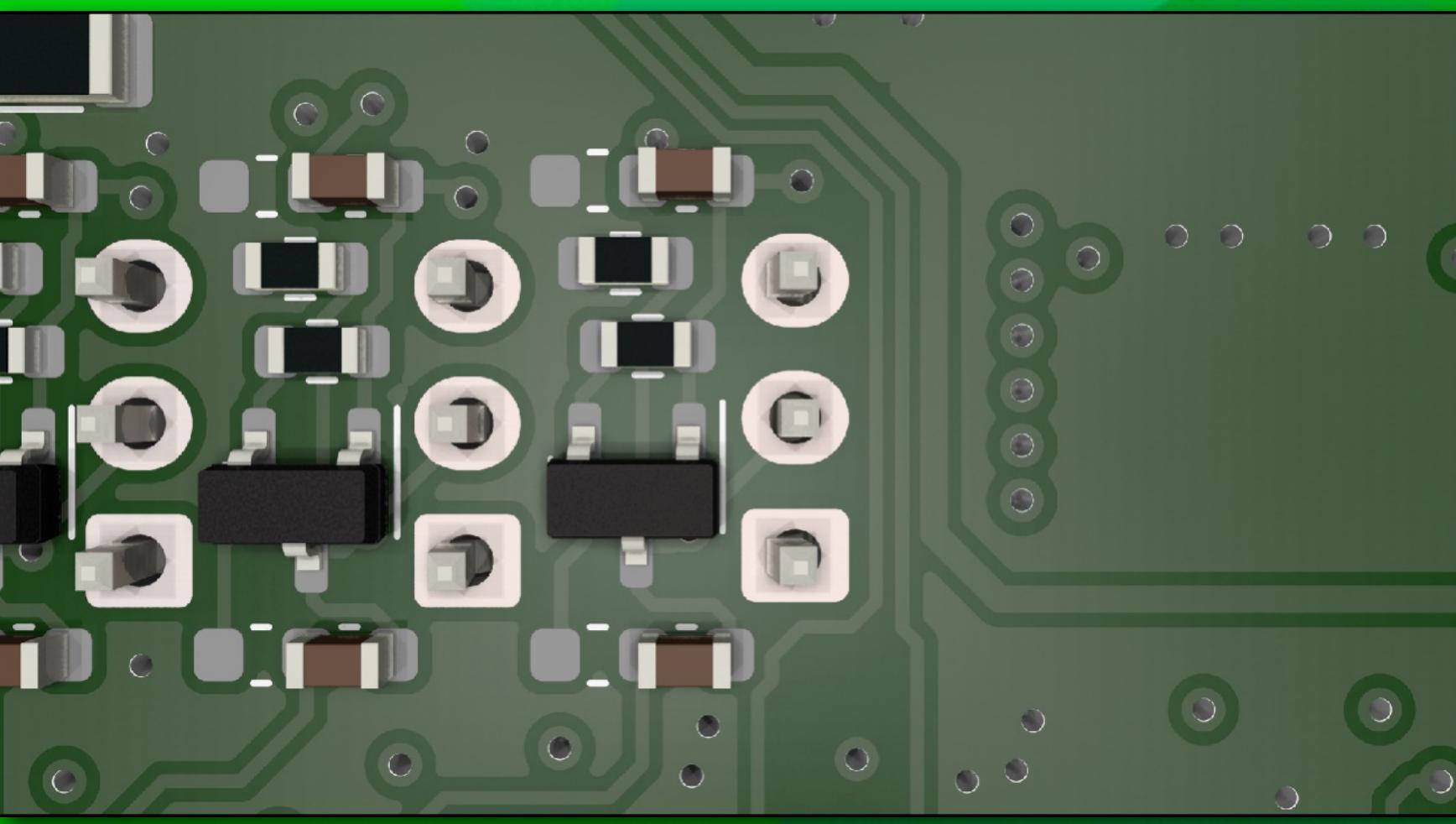


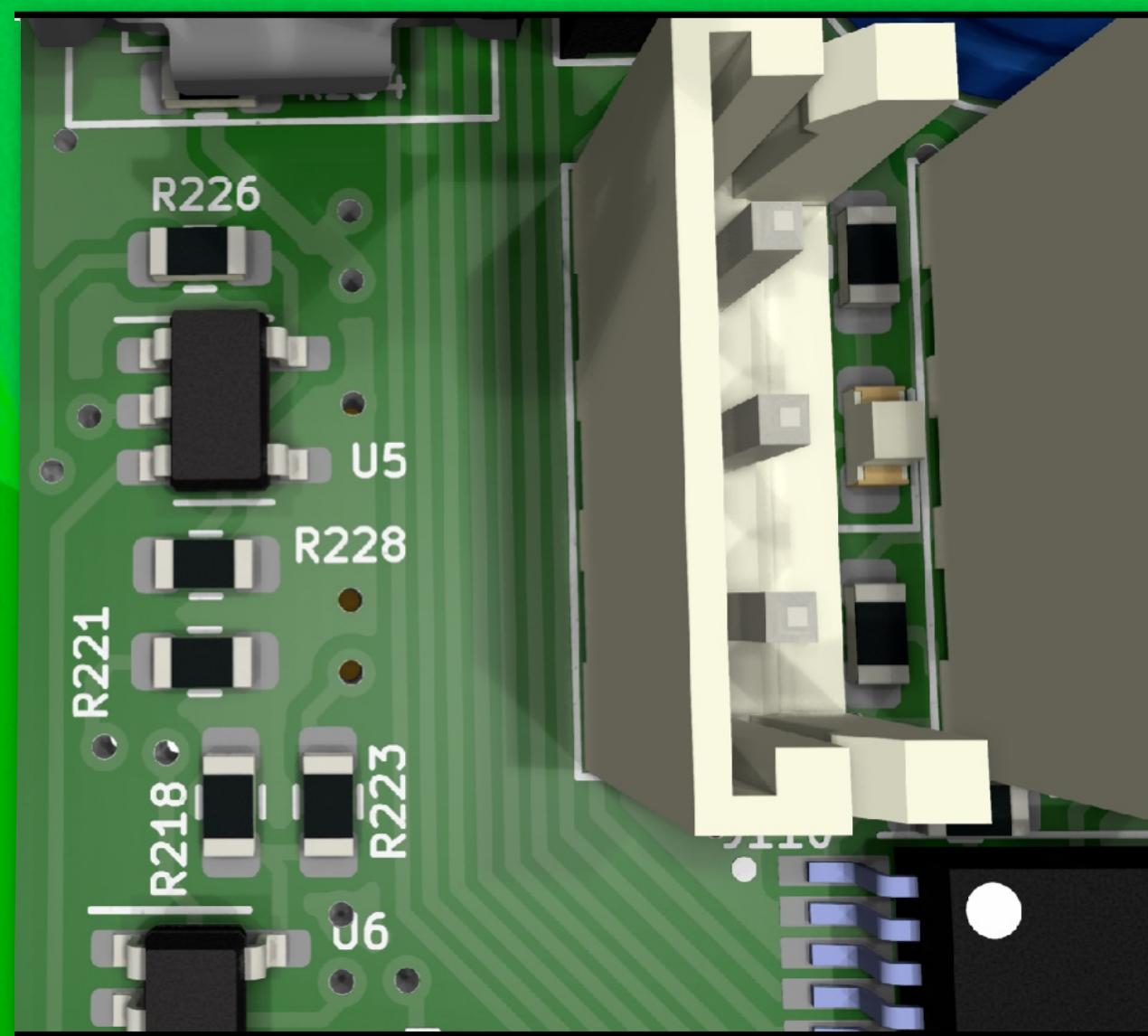
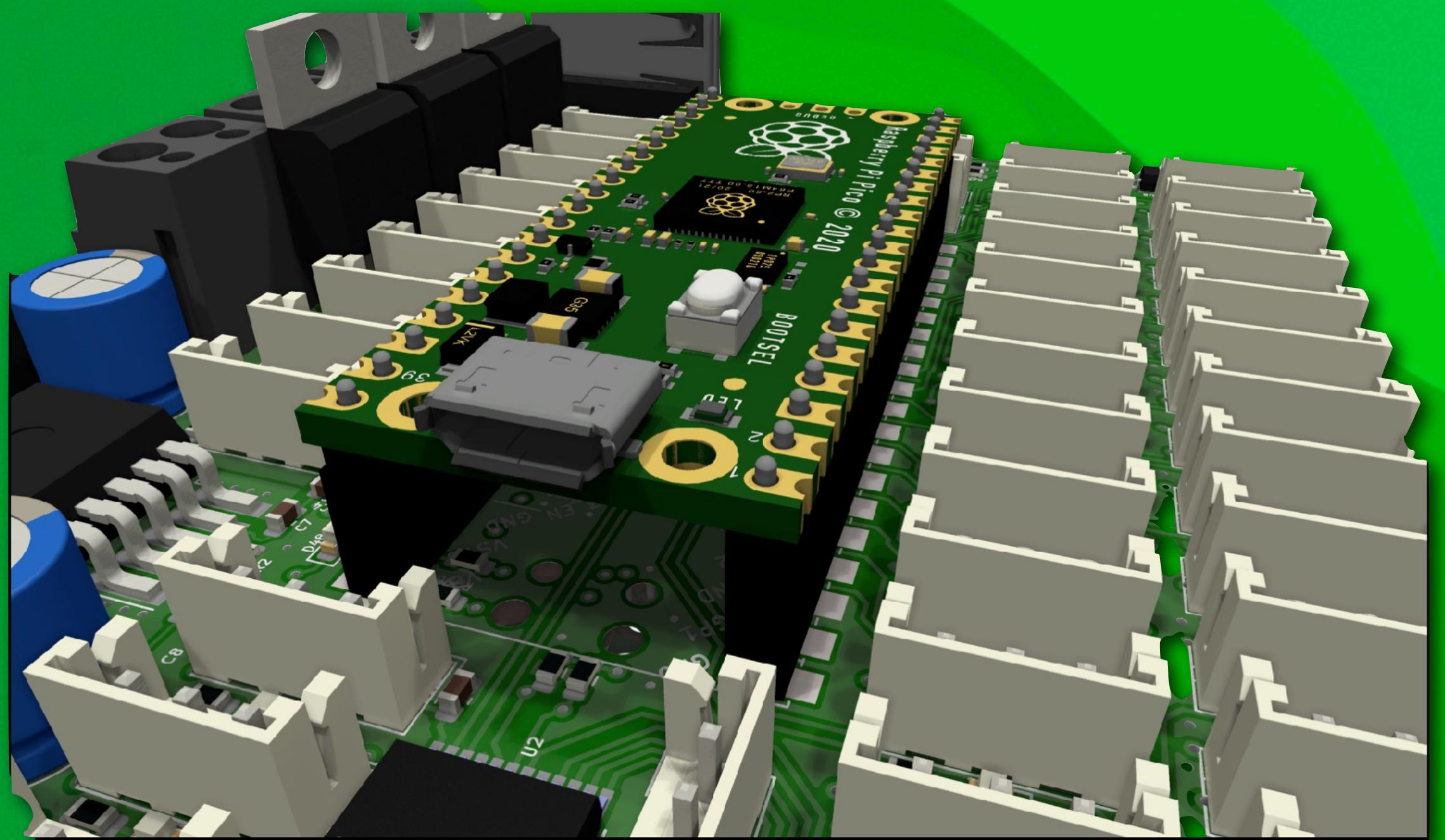
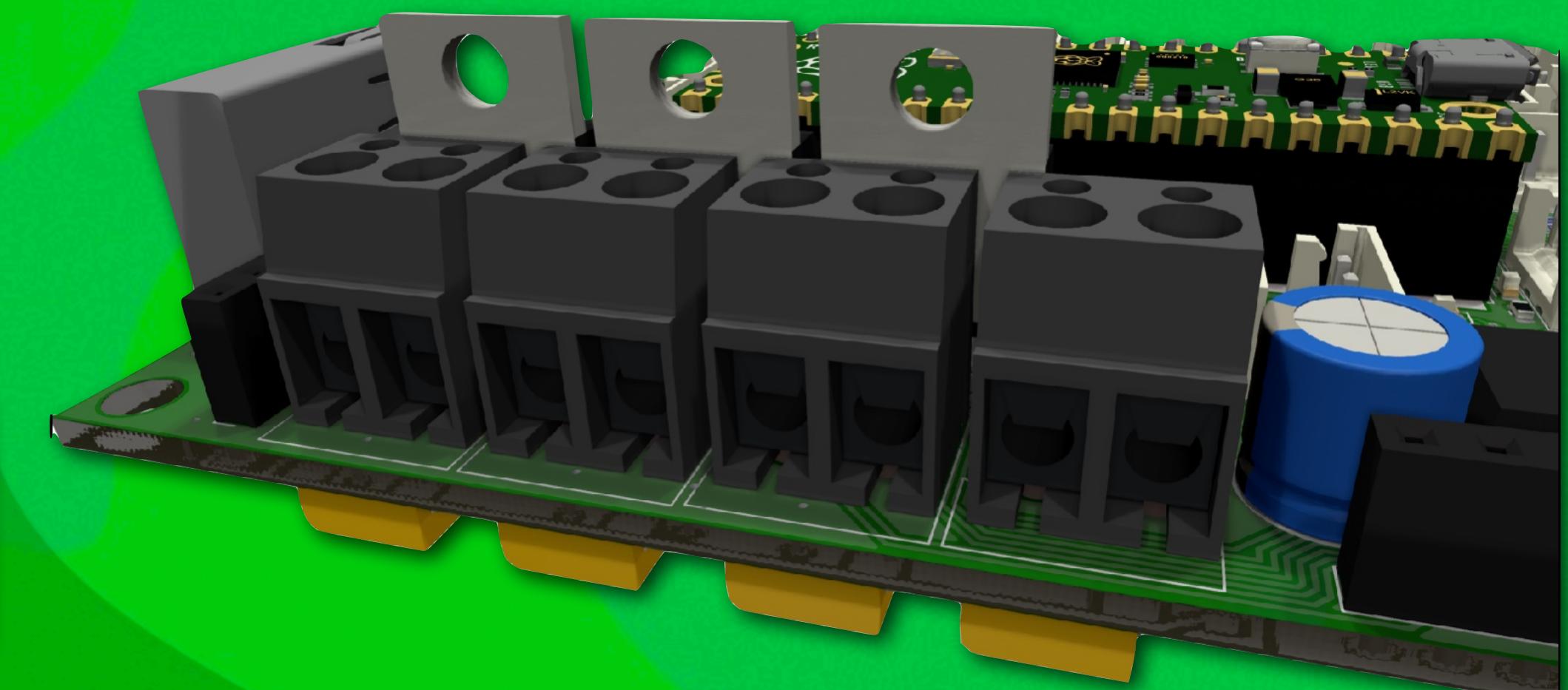
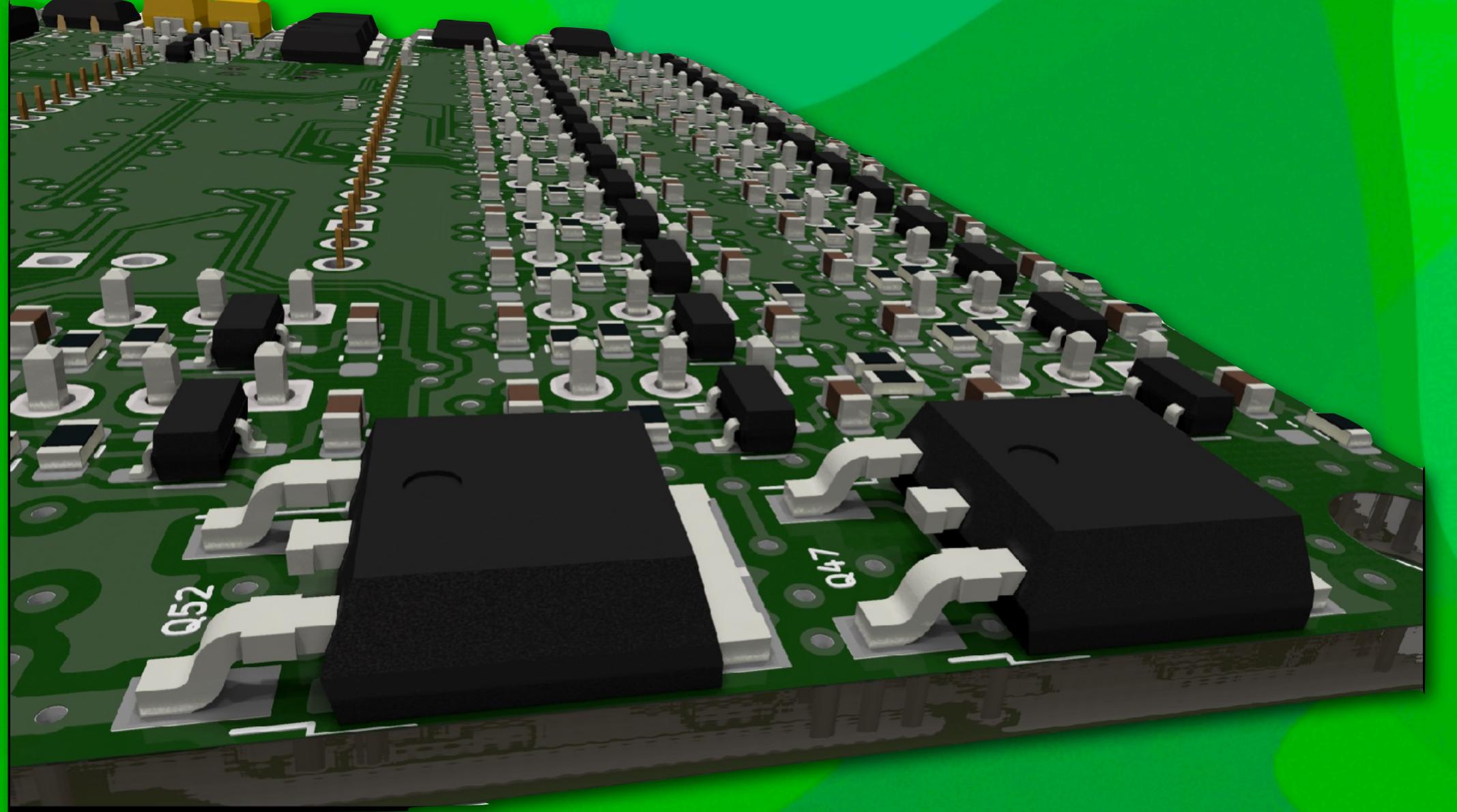
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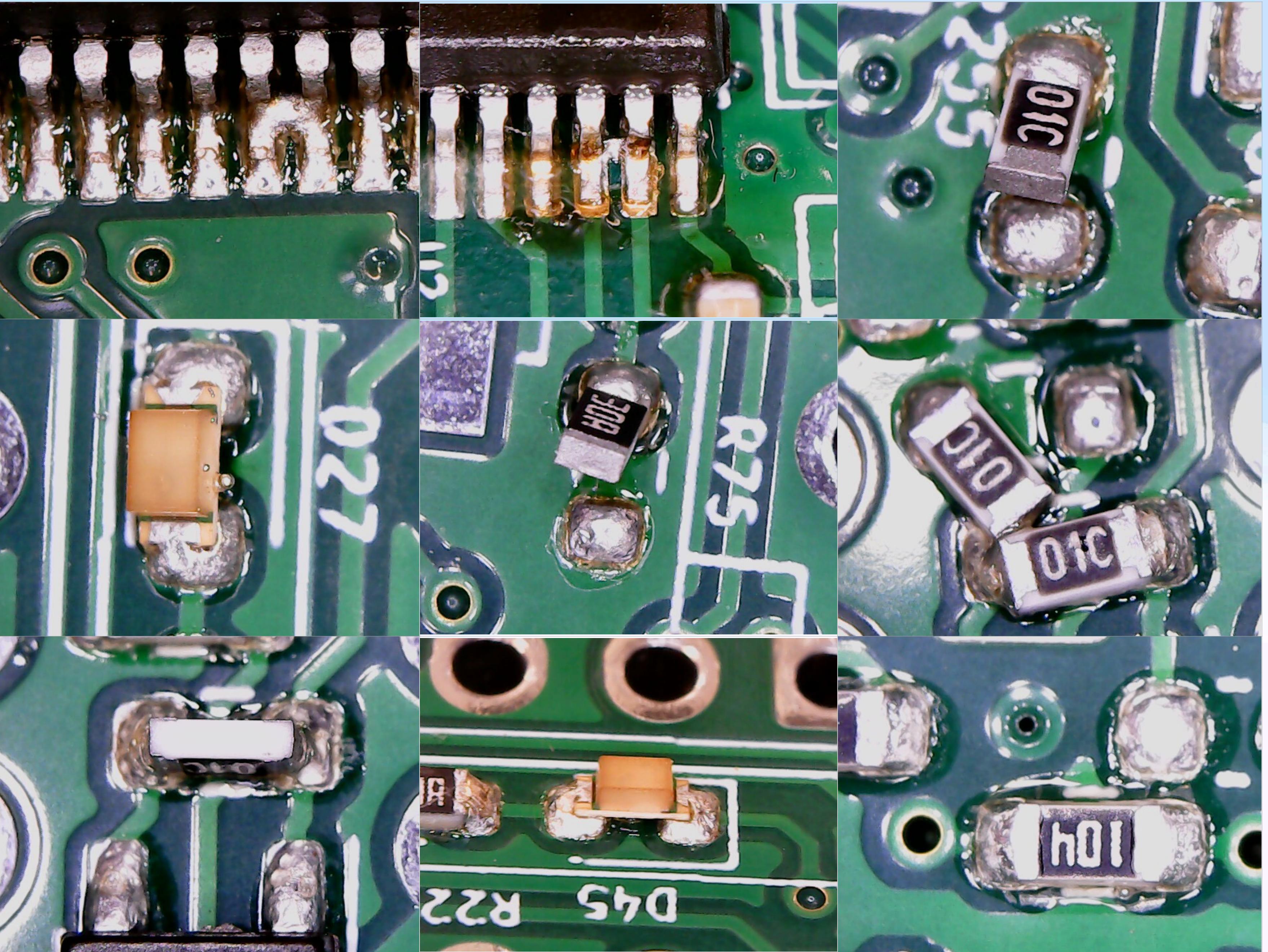


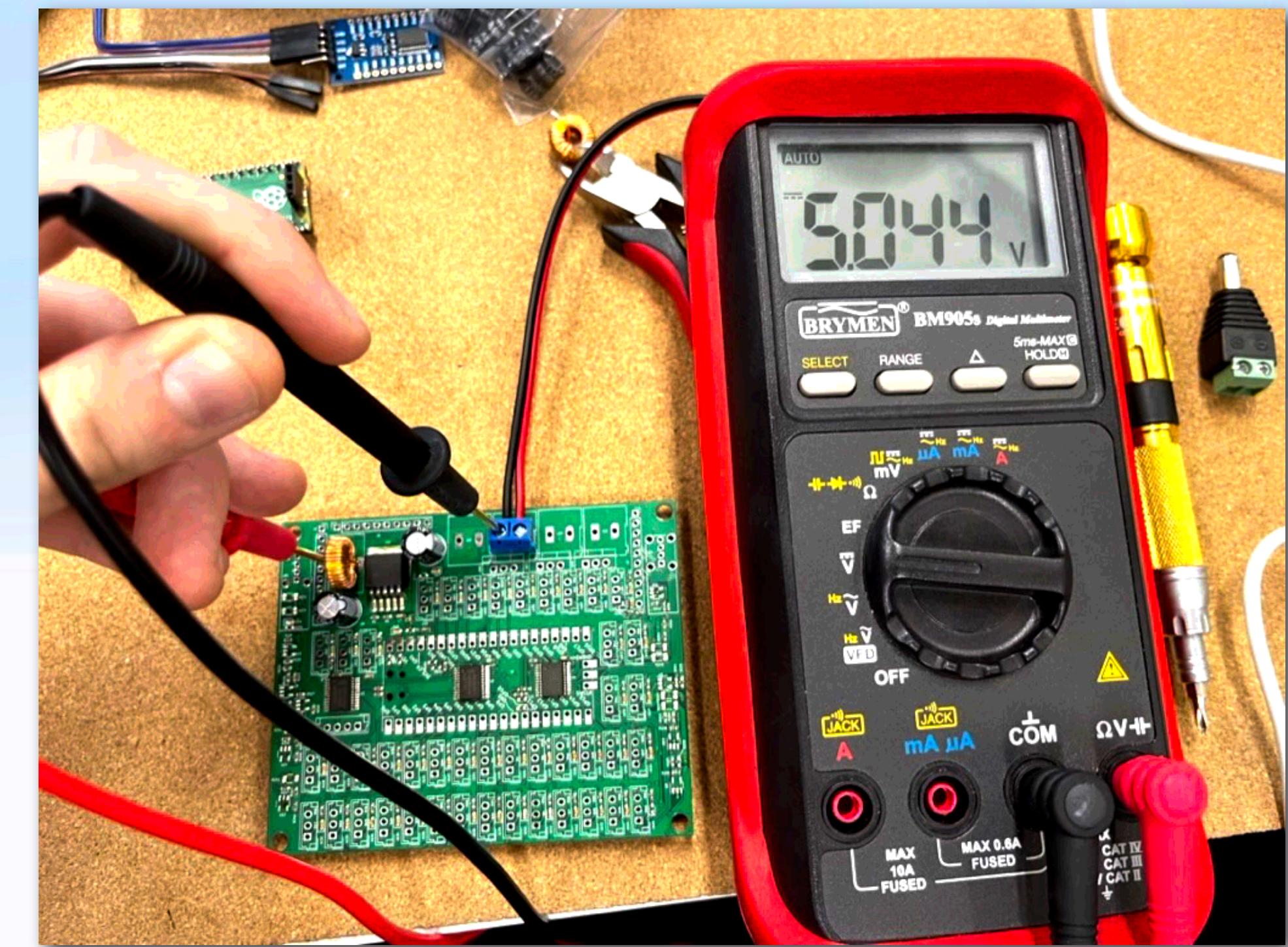
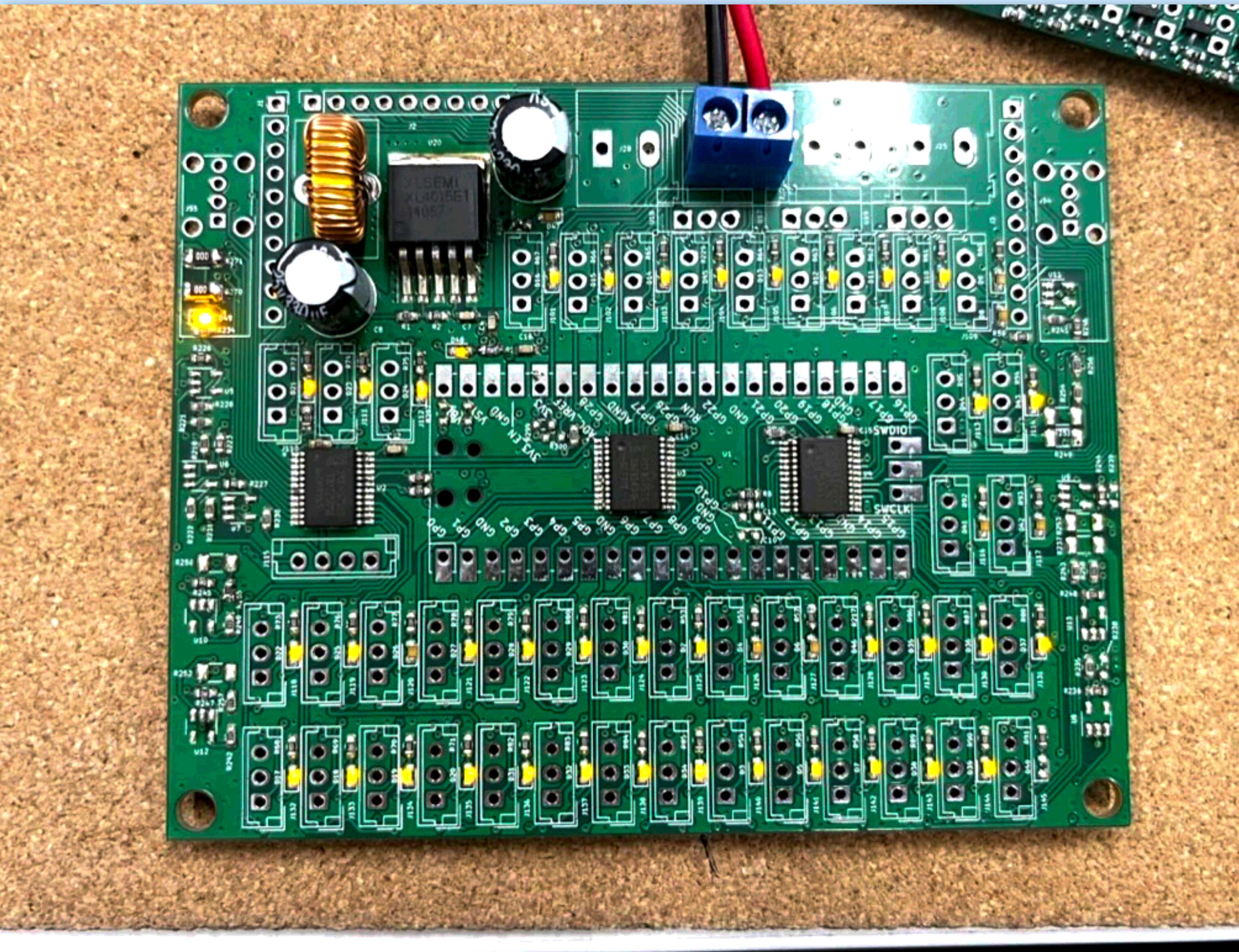


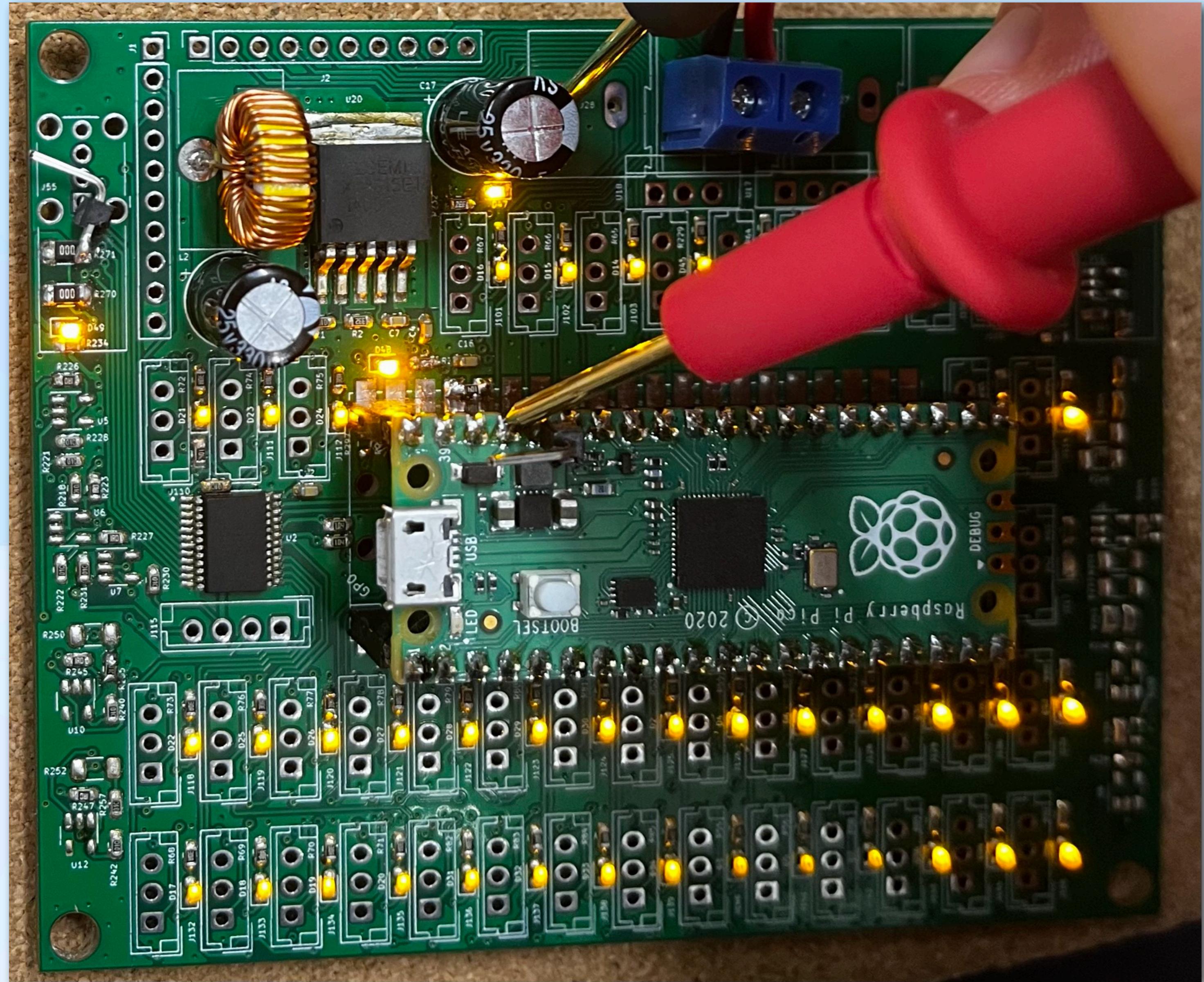


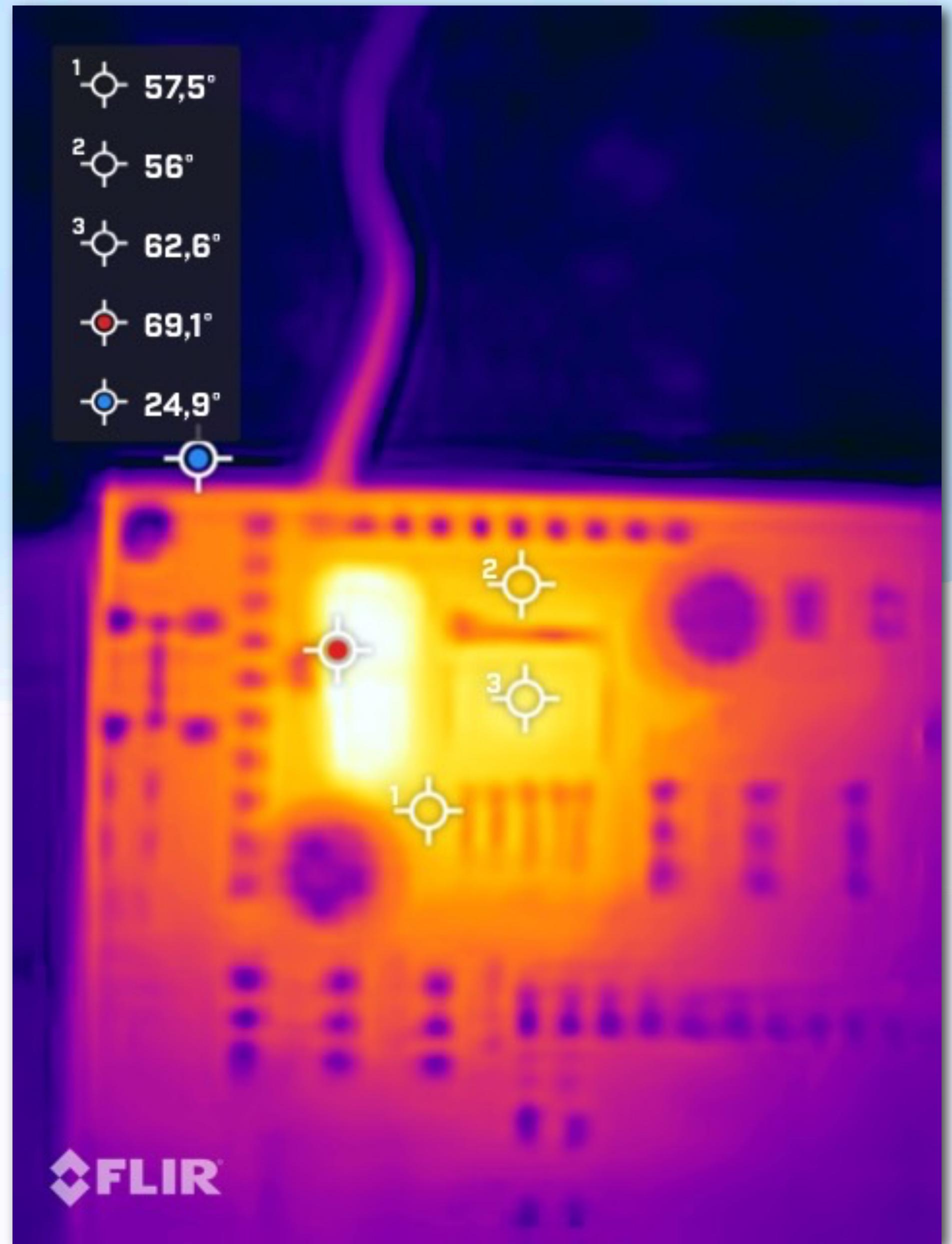
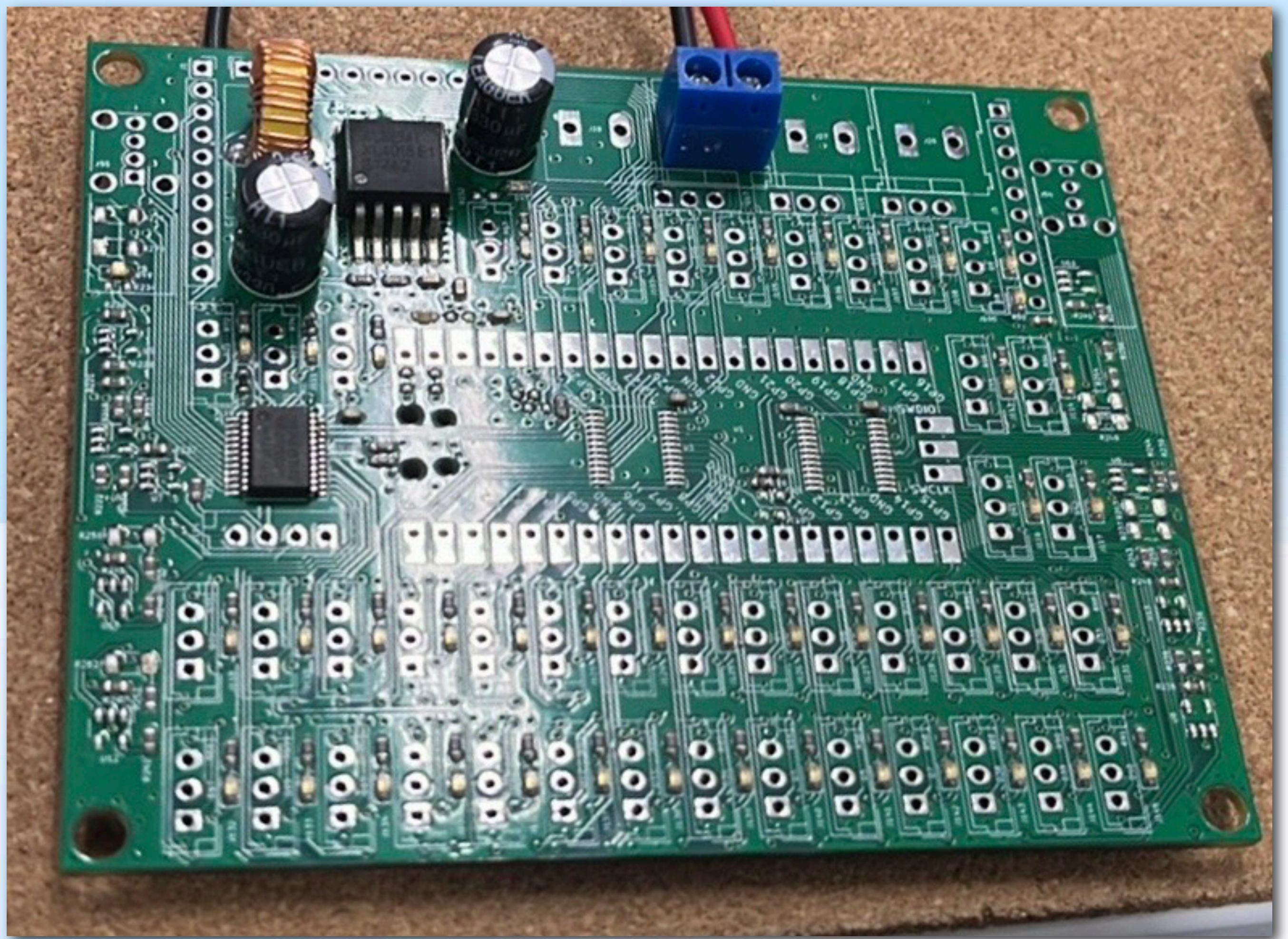


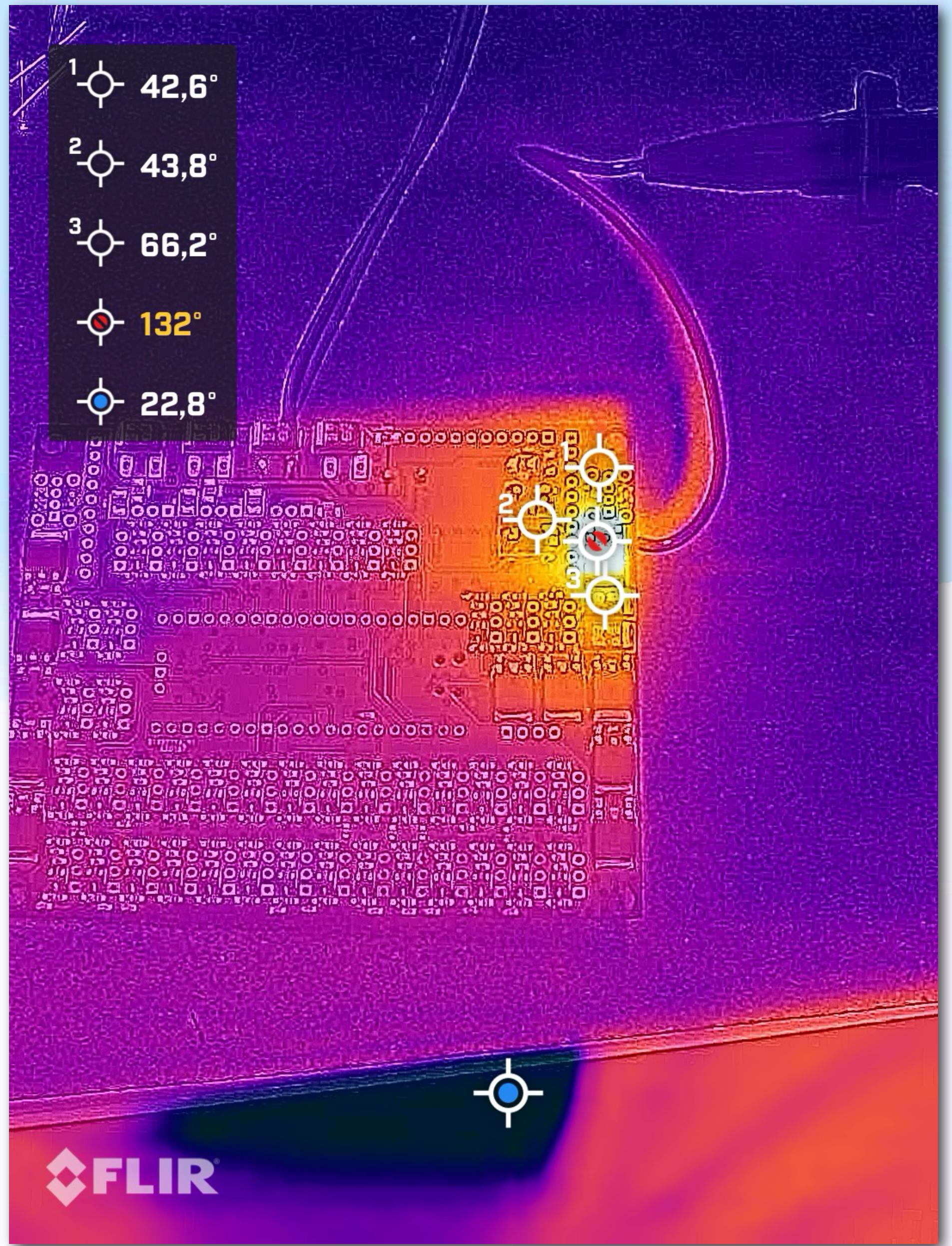
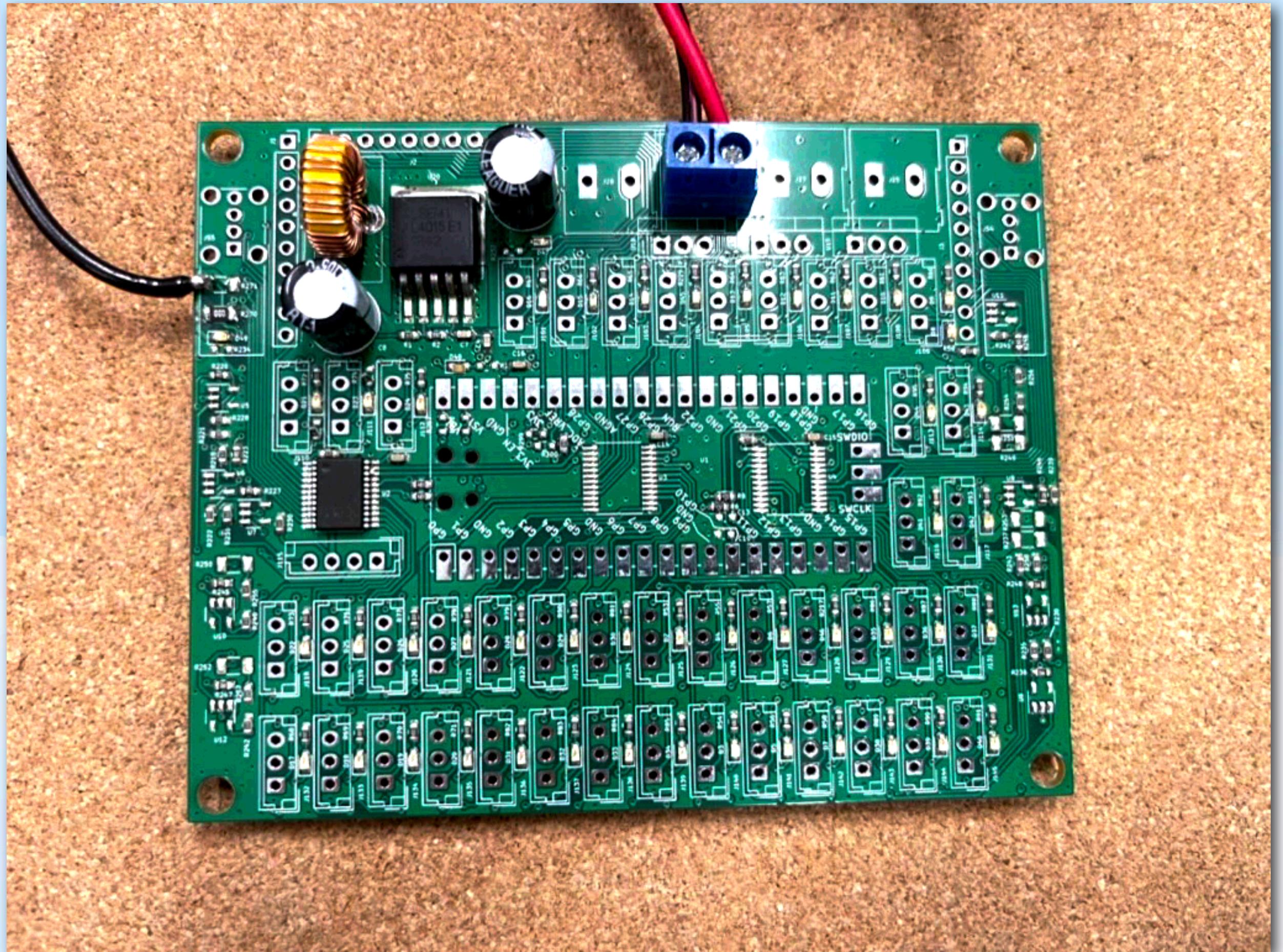
Montaż oraz uruchomienie

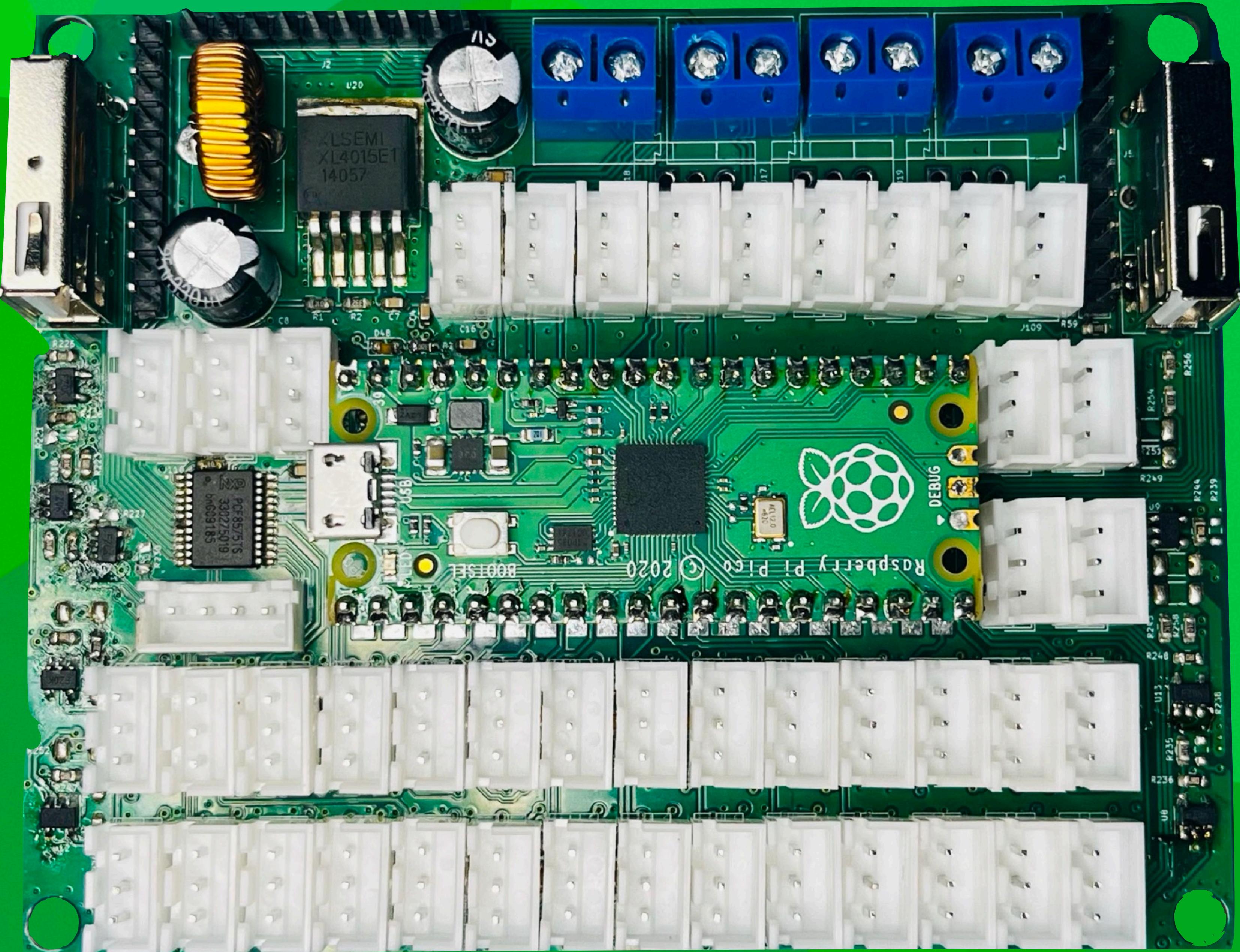


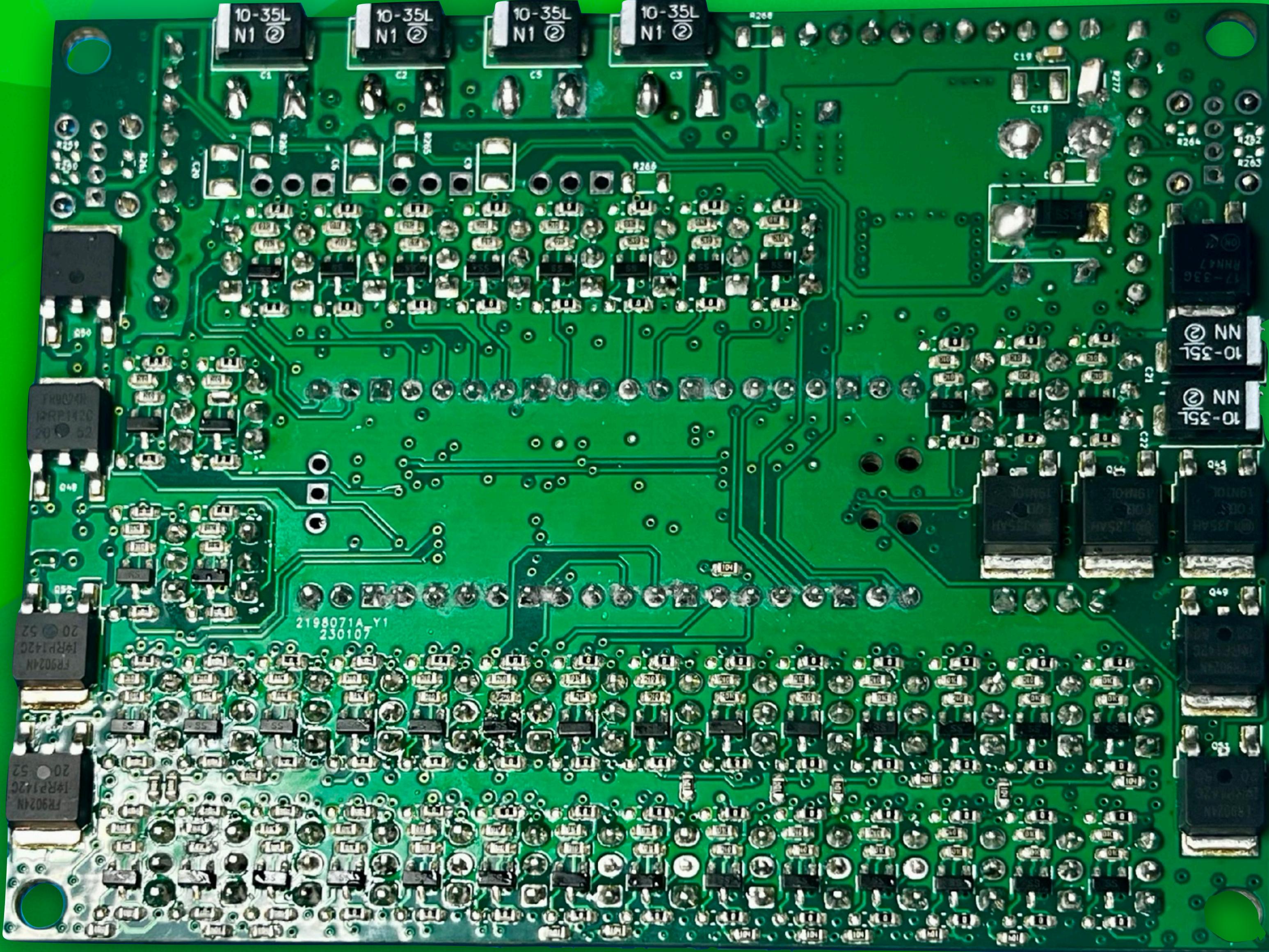


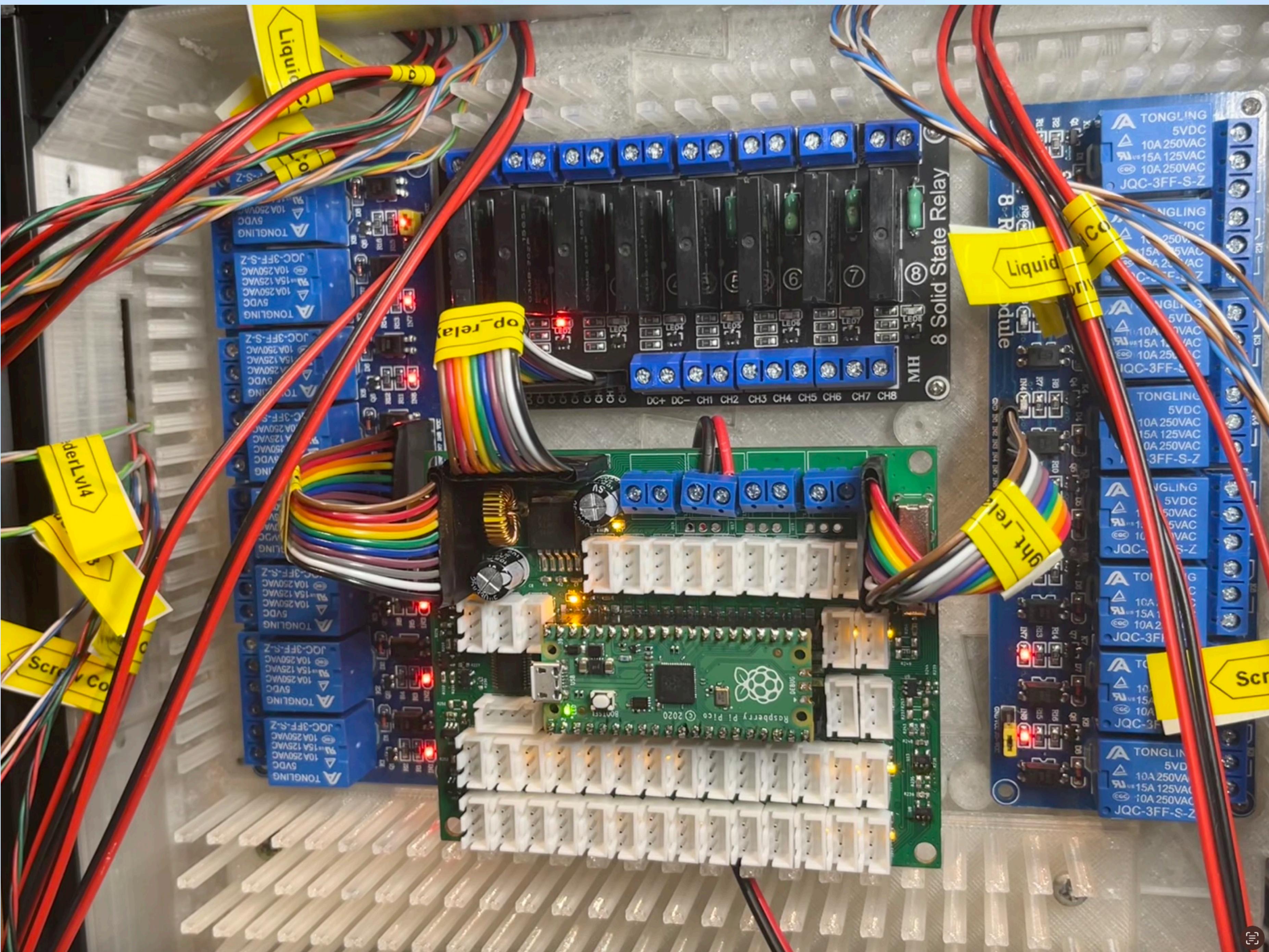


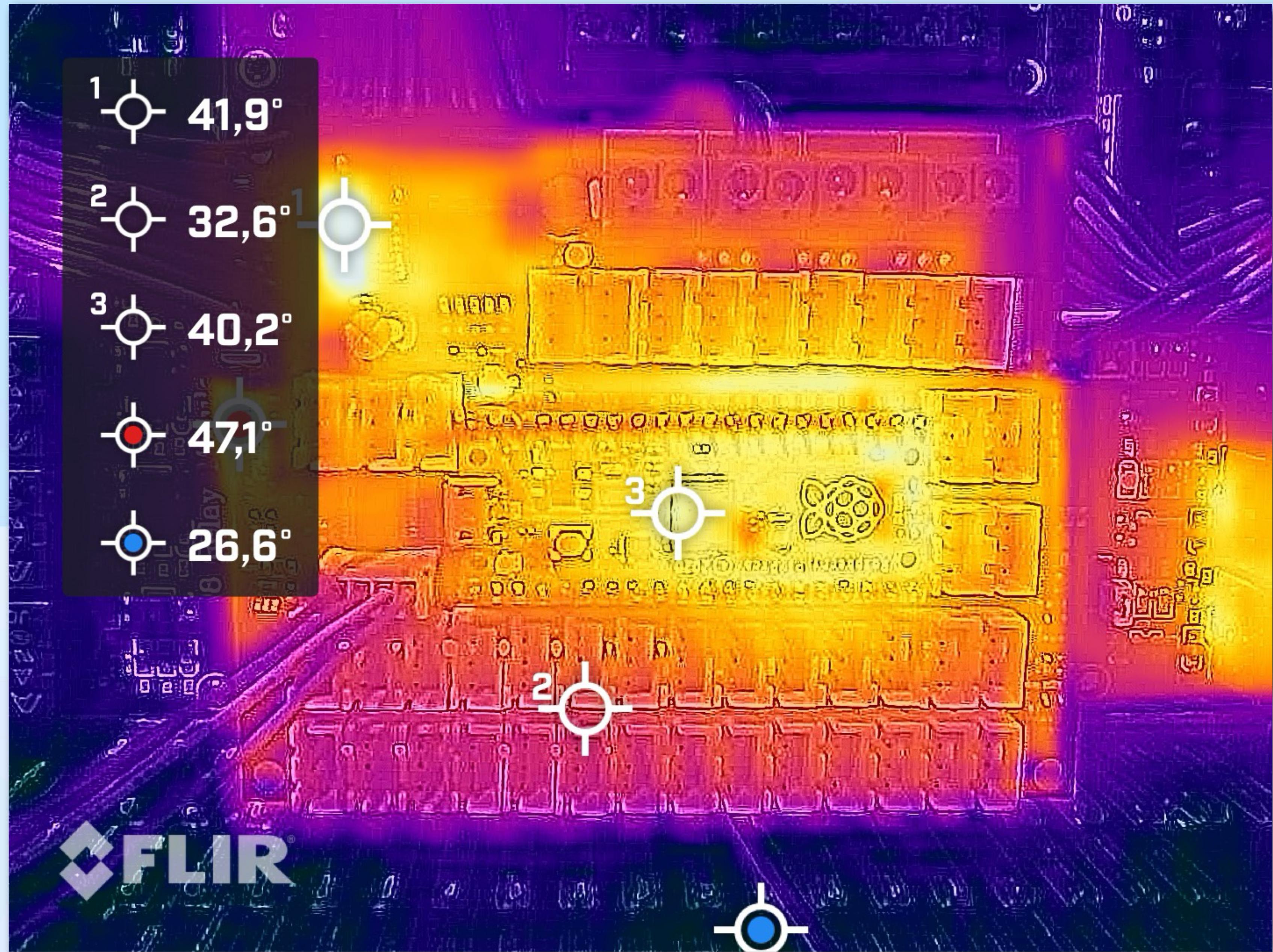














Podsumowanie:

- zrealizowano układ umożliwiający sterowanie ekspresem do herbaty
- sprzęt udało się uruchomić
- projekt wykonano za pomocą programu KiCad 6
- wykorzystując układ możemy sterować poszczególnymi urządzeniami wykonawczymi oraz odczytywać dane z czujników
- układu można użyć do dalszego rozwoju prac nad ekspresem

Dziękuję
za uwagę 😊

