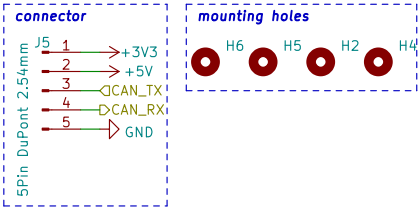


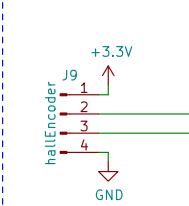
All caps without voltage rating default to 6.3V versions

CAN requierements:
- galvanic isolation
- isolated DC/DC converter
- base is a dedicated PCB due
different chip/converter impl.
(because semiconductor componts are rare)

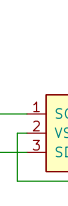


Sheet: /CAN/ File: can.kicad_sch		
Title:		
Size: A4	Date:	Rev:
KiCad E.D.A. kicad 6.0.5-a6ca702e91-116-ubuntu20.04.1		Id: 4/4

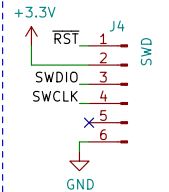
Hall encoder connector



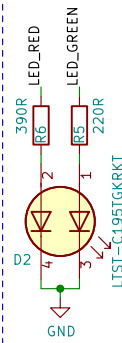
EEPROM



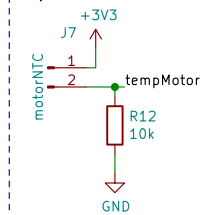
STM Flash Connector



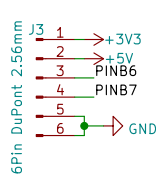
Indicator LEDs



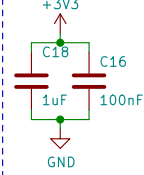
Temperature Measurement



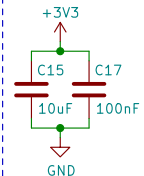
connector for miscellaneous stuff



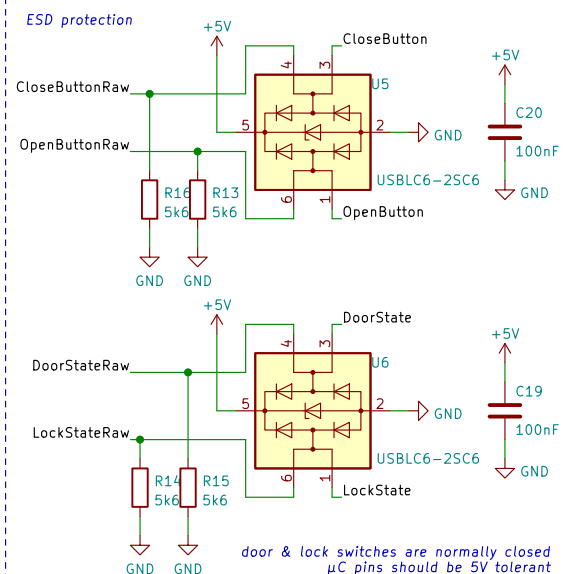
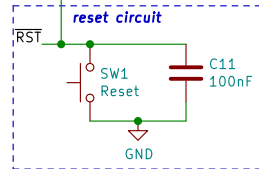
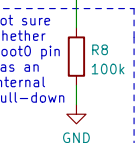
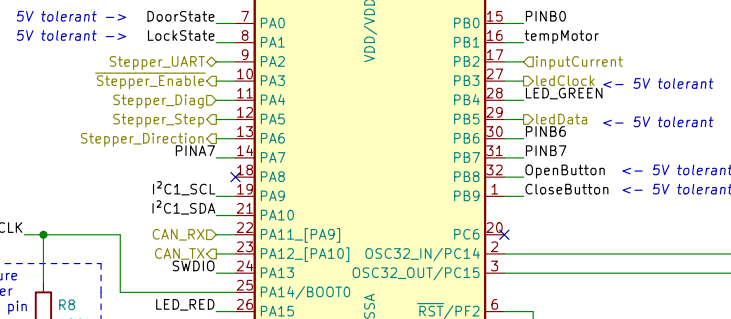
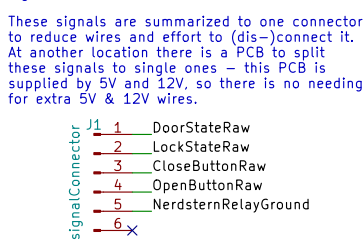
Bypassing Analog



Bypassing Digital

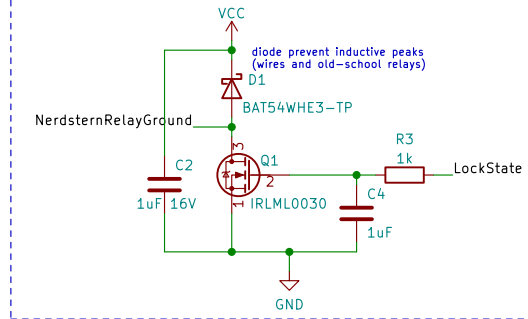


signal lines connector

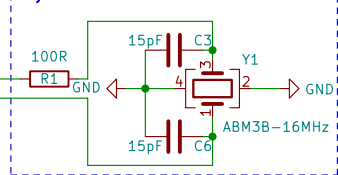


Nerdstern

This MosFET sinks a SSR, which is on another PCB. The SSR is supplied by 12V so we only need to sink the ground pin of SSR.



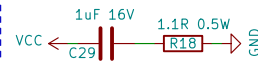
crystal circuit



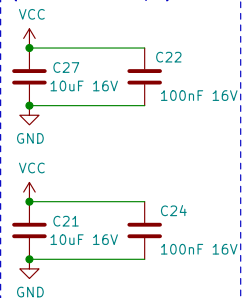
- test points**
- TP6 ○ PINA7
 - TP5 ○ PINB0
 - TP1 ○ OpenButton
 - TP4 ○ CloseButton
 - TP3 ○ LockState
 - TP2 ○ DoorState
 - TP10 ○ Stepper_Enable
 - TP9 ○ Stepper_Direction
 - TP11 ○ Stepper_Step
 - TP8 ○ Stepper_Diag
 - TP7 ○ Stepper_UART

Sheet: /MCU/		
File: mcu.kicad_sch		
Title:		
Size: A4	Date:	Rev:
KiCad E.D.A. kicad 6.0.5-a6ca702e91-116-ubuntu20.04.1		Id: 5/4

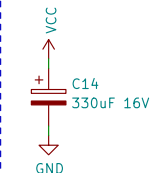
high frequency filtering
place near chip



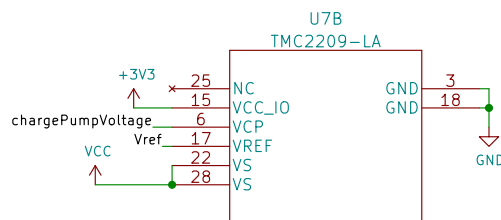
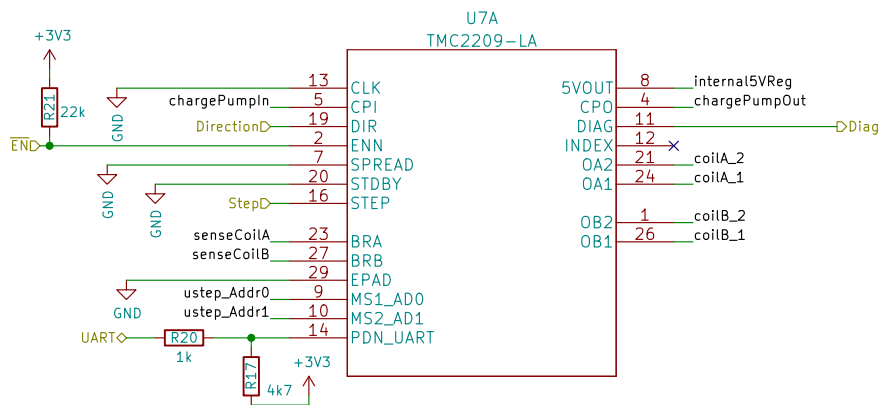
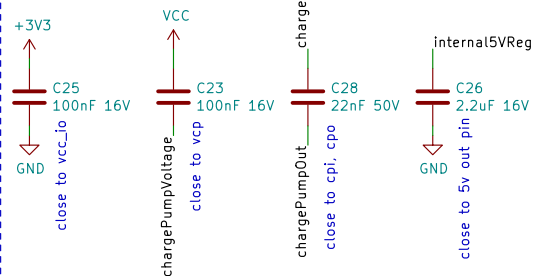
drive stage decoupling
(one for each VS pin)



bulk capacity
select low ESR
electrolytics (<20m)

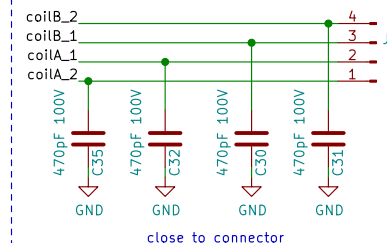


further bypass caps



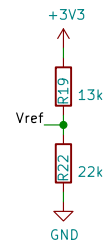
layout: P in high current condition around 1.4W
70x133mm 4 layer board 30 K/W
Junction-Pad 6 K/W

ESD protection caps



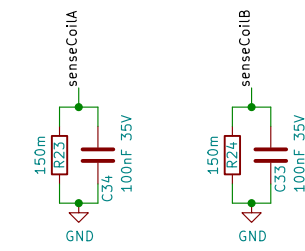
current scaling

100% = 1.2A = Vref >= 2.5V
We use 1A motor
 $1.0A / 1.2A = 83\%$
 $83\% * 2.5V \text{ Vref} = 2.075V$



current sense shunt

sourcing: low L (film/composite type),
 I^2R peak power: $(1.2A)^2 * 150m\Omega = 216mW$
ESD protection caps, voltage will be greater
close to resistors



layout: each shunt must have own vias to ground

micro step selection

00: 8th,
01: 32th,
10: 64th,
11: 16th
or uart address



Sheet: /StepperDriver/
File: TMC2209.kicad_sch

Title:

Size: A4

Date:

KiCad E.D.A. kicad 6.0.5-a6ca702e91-116-ubuntu20.04.1

Rev:

Id: 6/4