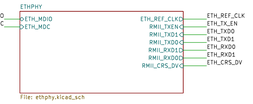
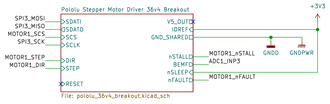
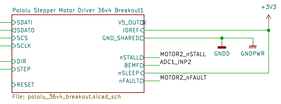
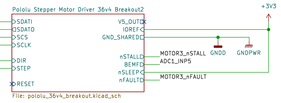
ADC1 is connected to 4 thermocouple amplifiers and 4 voltage/current measurement ports. These are (names of labels)

ADC2 is connected to 4 thermocouple amplifiers and 4 voltage/current measurement ports. These are (names of labels)

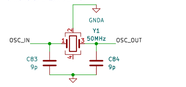




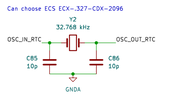


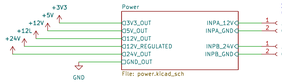


Can choose Wurth WE-XTAL 830108208809
CL = 10pF, CO= 5 pF max, ESR = 70 ohm
Drive level = 100 uW max.

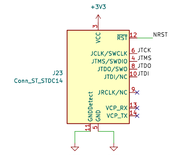


Can choose ECS ECX-.327-CDX-2096





XT60 PCB Connectors or Terminal Block (second option preferred)

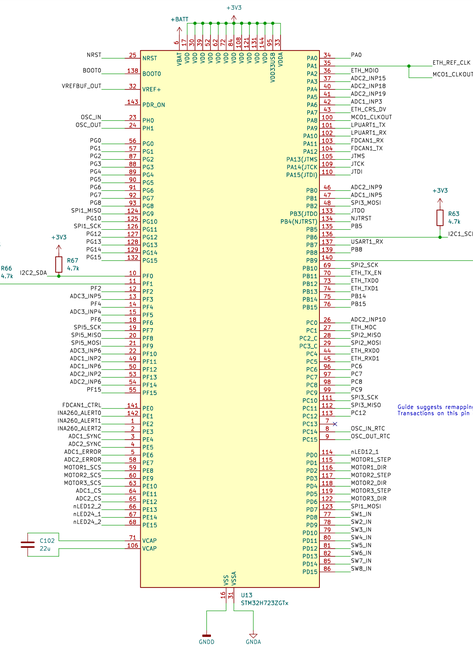


ST JTAG connector, using default KICAD design
Need to connect NJTRST somewhere or just NC?

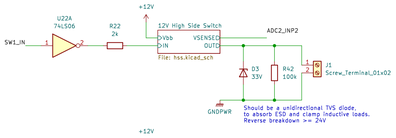
Used values from E24 resistor series for voltage divider, hopefully makes it a bit cheaper? but get like E96

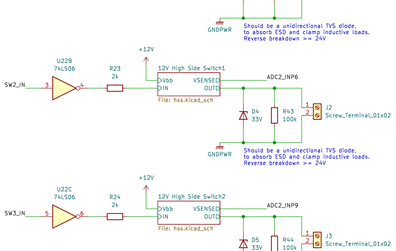
STM32 H723 FT_xxx* pins can be 5.5V** tolerant, so we use a reasonable Zener.
*All connected ADC pins in root sheet are FT_xxx.
**Actually more like 7.3V, datasheet pg 111/297

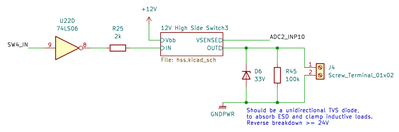
Should this have an opamp or buffer?
Putting a zener directly on VCC seems a bit sketch lol

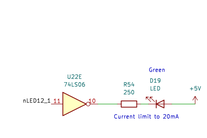


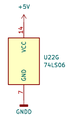
Guide suggests remapping RTC_TS from PC13.
Transactions on this pin can affect RTC clock oscillator

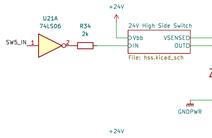


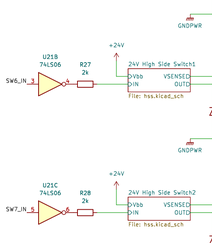


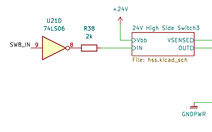


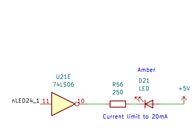


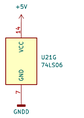




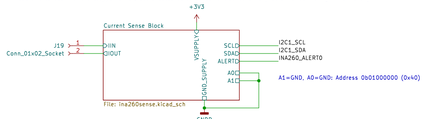


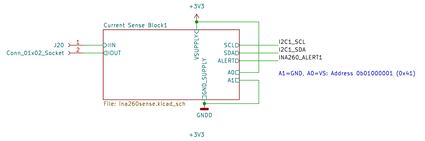


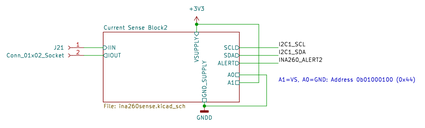




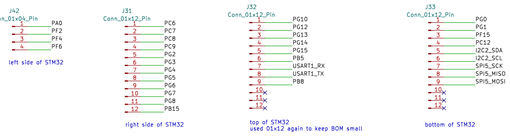
External connection for the current sense
Need this to use with the stepper driver, but enables us to do current sense on any other random thing if we want :)

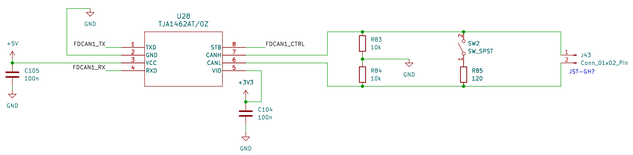


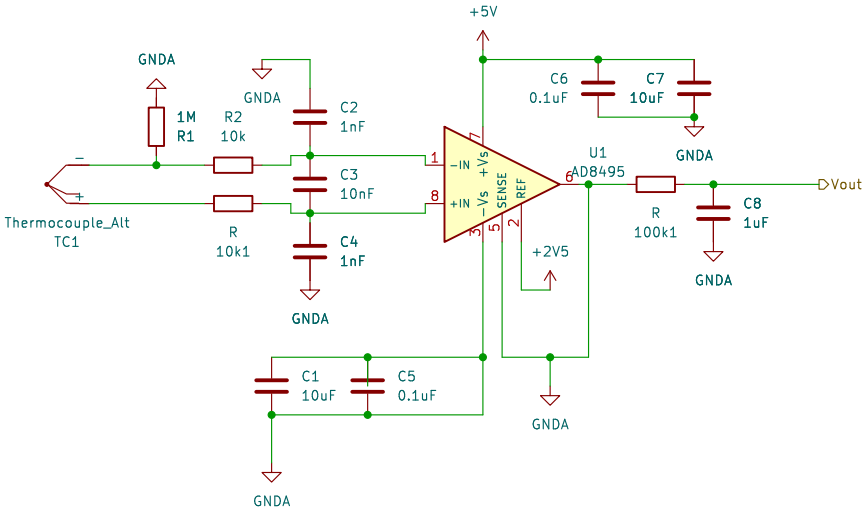




Exposing the unused pins on a few headers
Arranged mostly based on footprint of STM32, with a few exceptions



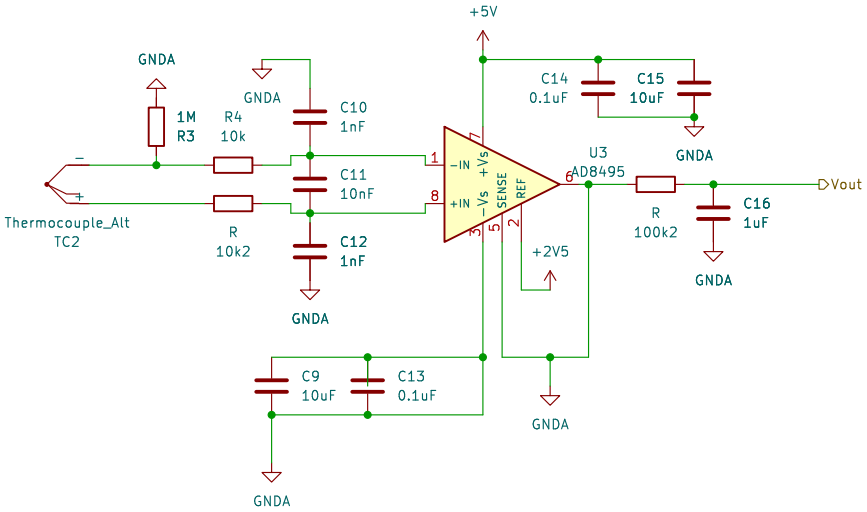




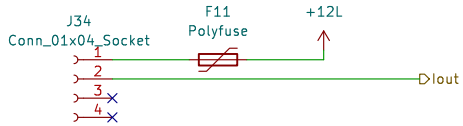
Sheet: /ADC1/Thermocouple Input and Amplifier2/
File: thermocouple.kicad_sch

Title:

Size: A4	Date:	**Rev:**
KiCad E.D.A. 8.0.0		Id: 2/43

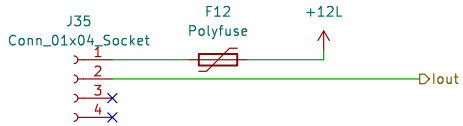


Sheet: /ADC1/Thermocouple Input and Amplifier/		
File: thermocouple.kicad_sch		
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. 8.0.0		Id: 3/43



super simple.
fuse on the output to prevent damage by connecting to sketchy peripheral.
sensor should drive the current, so shouldn't see too much noise => no filter required

Sheet: /ADC1/Current Input Filtering2/		
File: current_input_filtering.kicad_sch		
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. 8.0.0		Id: 4/43

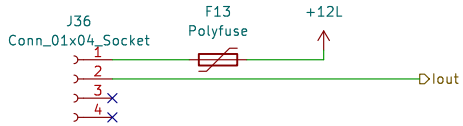


super simple.
fuse on the output to prevent damage by connecting to sketchy peripheral.
sensor should drive the current, so shouldn't see too much noise => no filter required

Sheet: /ADC1/Current Input Filtering3/
File: current_input_filtering.kicad_sch

Title:

Size: A4	Date:	**Rev:**
KiCad E.D.A. 8.0.0		Id: 5/43

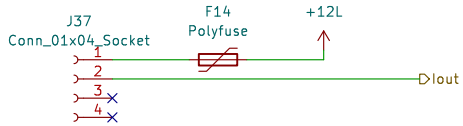


super simple.
fuse on the output to prevent damage by connecting to sketchy peripheral.
sensor should drive the current, so shouldn't see too much noise => no filter required

Sheet: /ADC1/Current Input Filtering1/
File: current_input_filtering.kicad_sch

Title:

Size: A4	Date:	**Rev:**
KiCad E.D.A. 8.0.0		Id: 6/43



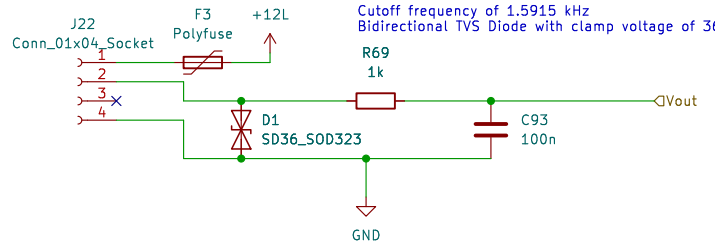
super simple.
fuse on the output to prevent damage by connecting to sketchy peripheral.
sensor should drive the current, so shouldn't see too much noise => no filter required

Sheet: /ADC1/Current Input Filtering/
File: current_input_filtering.kicad_sch

Title:

Size: A4	Date:	**Rev:**
KiCad E.D.A. 8.0.0		Id: 7/43

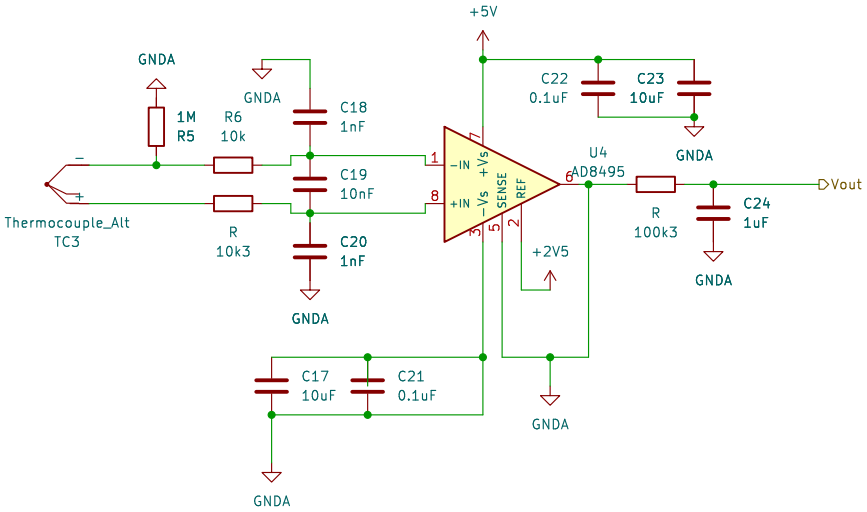
Would remove the connector from this sheet. Move to root sheet.
Nah fuck that
Unless someone else wants to...



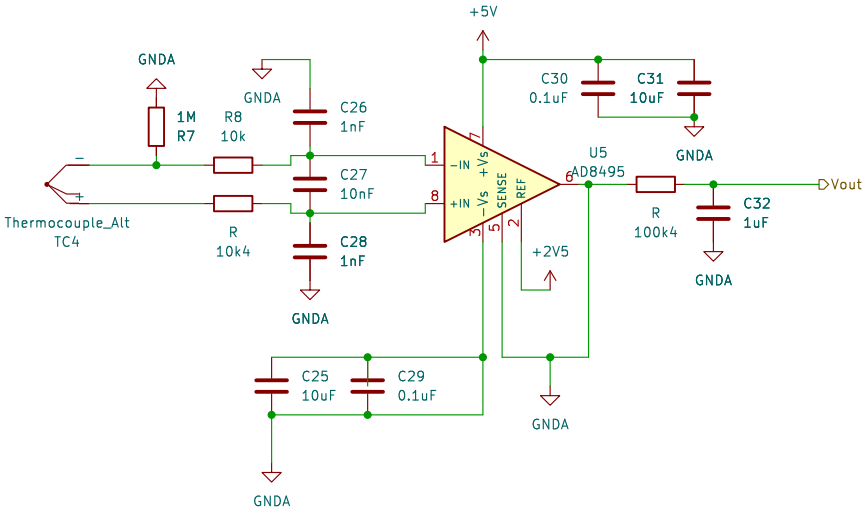
OWD_COMP

Not gonna do open-wire detection.
Left it as a NC to make it easier to add later though

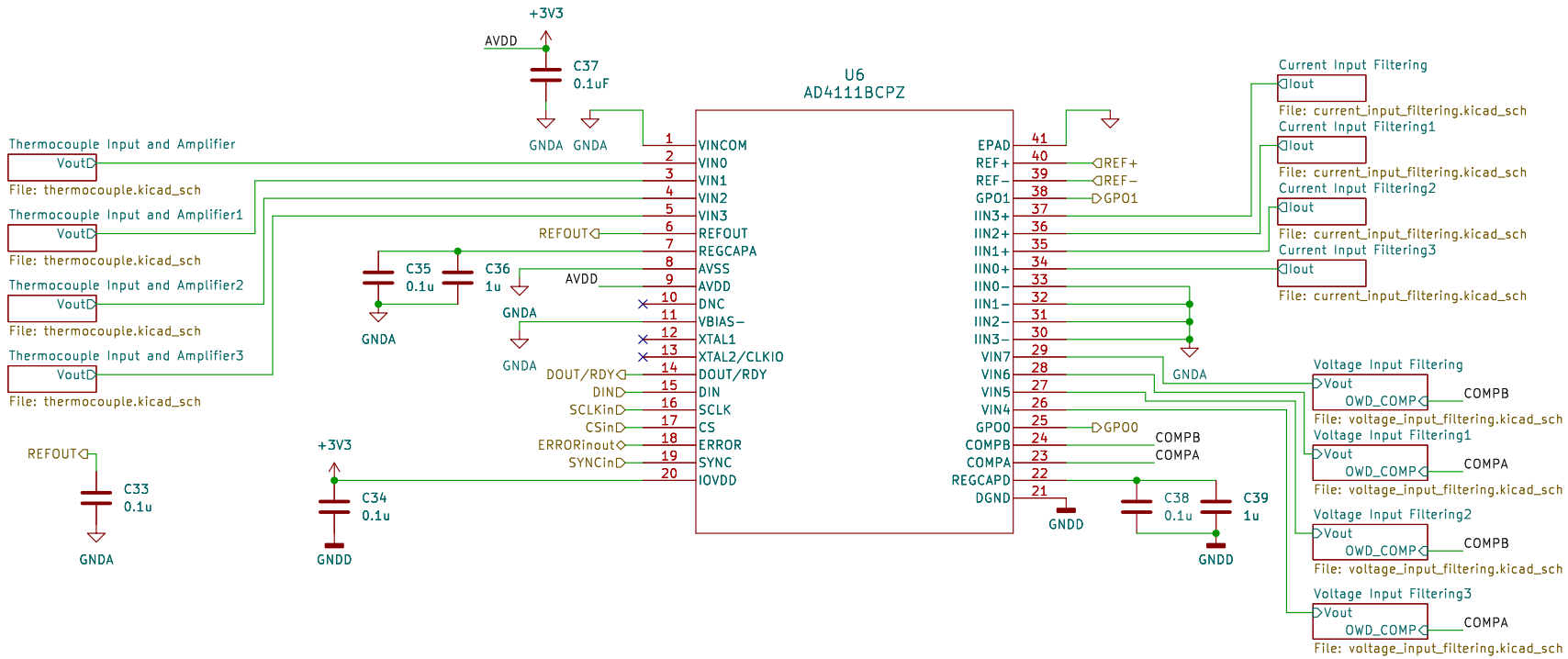
Sheet: /ADC1/Voltage Input Filtering/		
File: voltage_input_filtering.kicad_sch		
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. 8.0.0		Id: 8/43



Sheet: /ADC1/Thermocouple Input and Amplifier3/		
File: thermocouple.kicad_sch		
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. 8.0.0		Id: 9/43



Sheet: /ADC1/Thermocouple Input and Amplifier1/		
File: thermocouple.kicad_sch		
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. 8.0.0		Id: 10/43

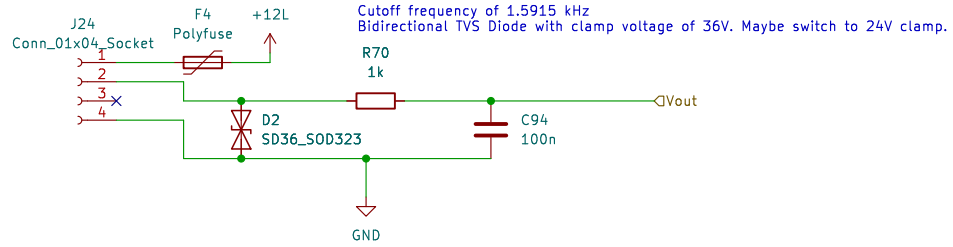


Sheet: /ADC1/
File: adc.kicad_sch

Title:

Size: A4	Date:	**Rev:**
KiCad E.D.A. 8.0.0		Id: 11/43

Would remove the connector from this sheet. Move to root sheet.
Nah fuck that
Unless someone else wants to...

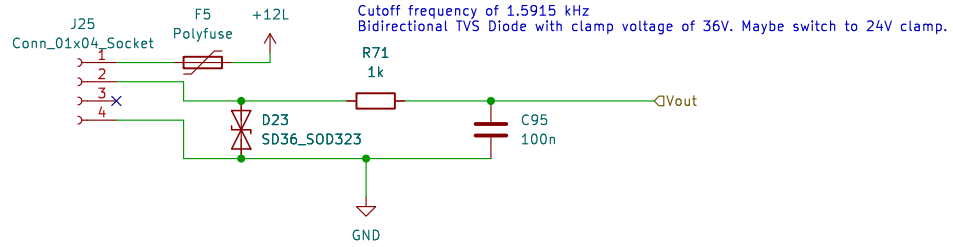


OWD_COMP

Not gonna do open-wire detection.
Left it as a NC to make it easier to add later though

Sheet: /ADC1/Voltage Input Filtering1/ File: voltage_input_filtering.kicad_sch		
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. 8.0.0		Id: 12/43

Would remove the connector from this sheet. Move to root sheet.
Nah fuck that
Unless someone else wants to...

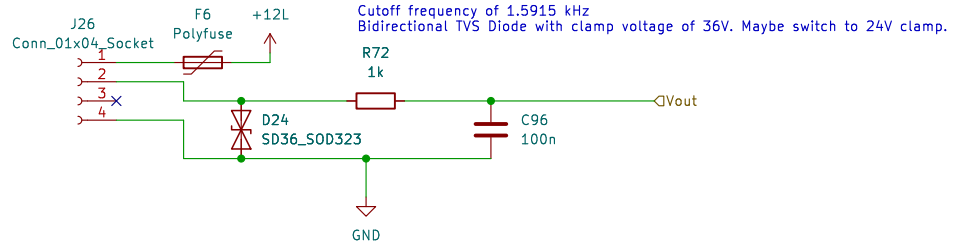


OWD_COMP

Not gonna do open-wire detection.
Left it as a NC to make it easier to add later though

Sheet: /ADC1/Voltage Input Filtering2/		
File: voltage_input_filtering.kicad_sch		
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. 8.0.0		Id: 13/43

Would remove the connector from this sheet. Move to root sheet.
Nah fuck that
Unless someone else wants to...



OWD_COMP

Not gonna do open-wire detection.
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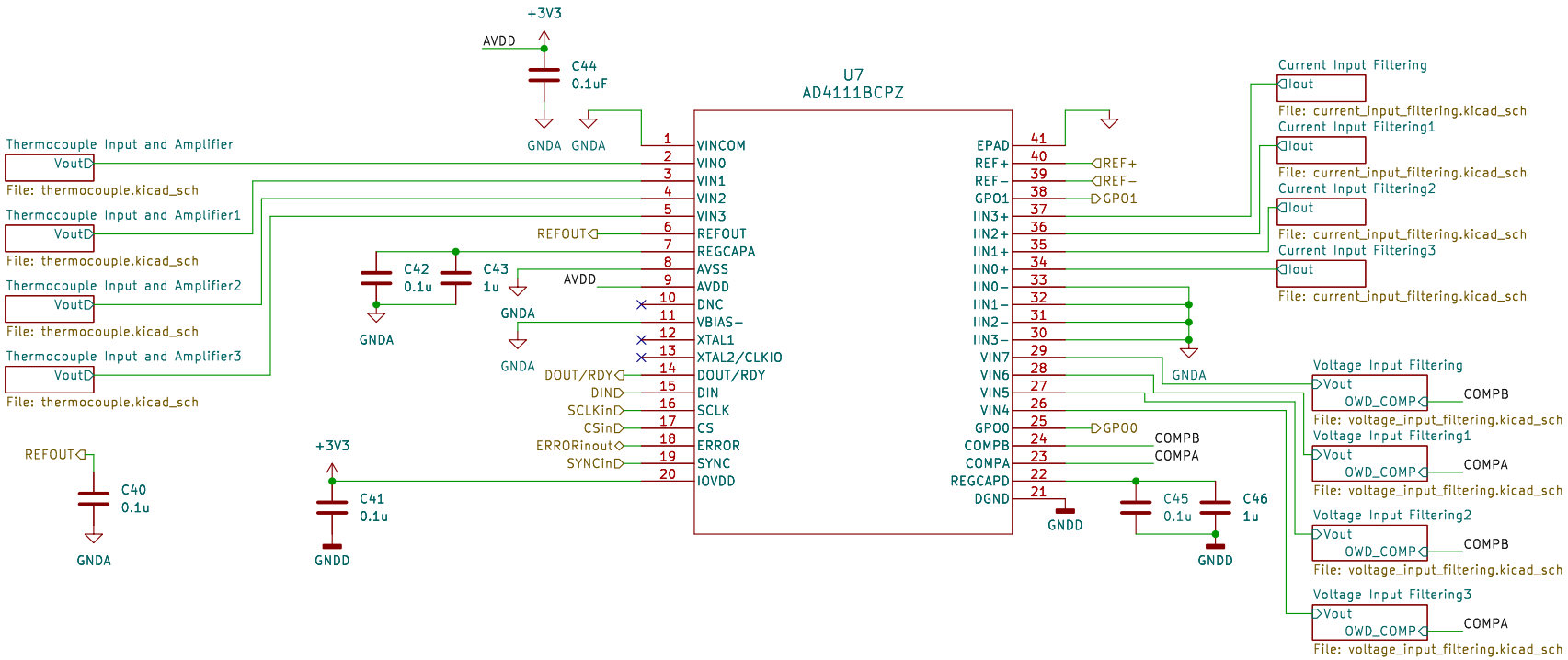
Sheet: /ADC1/Voltage Input Filtering3/
File: voltage_input_filtering.kicad_sch

Title:

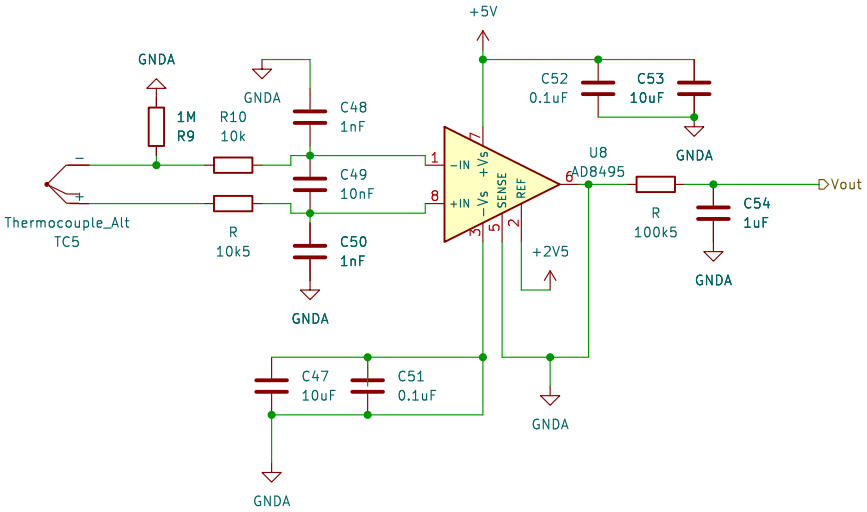
Size: A4	Date:	**Rev:**
KiCad E.D.A. 8.0.0		Id: 14/43



Sheet: /ADC2/
File: adc.kicad_sch

Title:

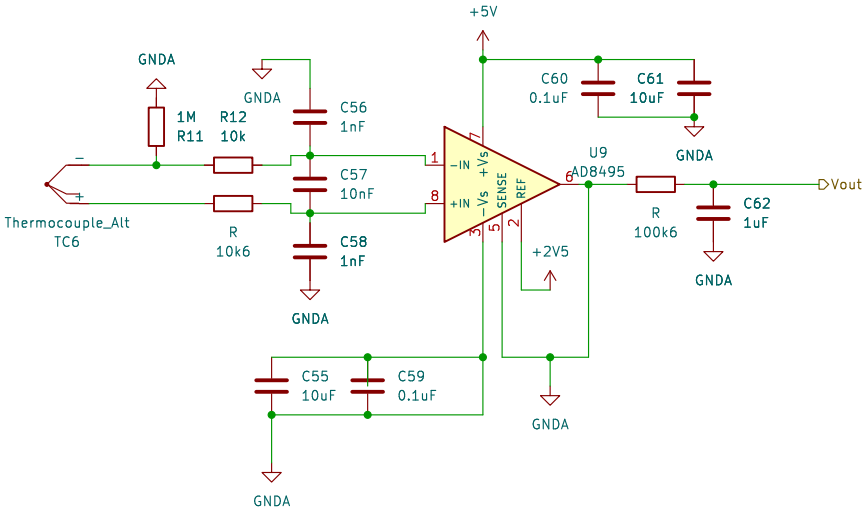
Size: A4	Date:	**Rev:**
KiCad E.D.A. 8.0.0		Id: 15/43



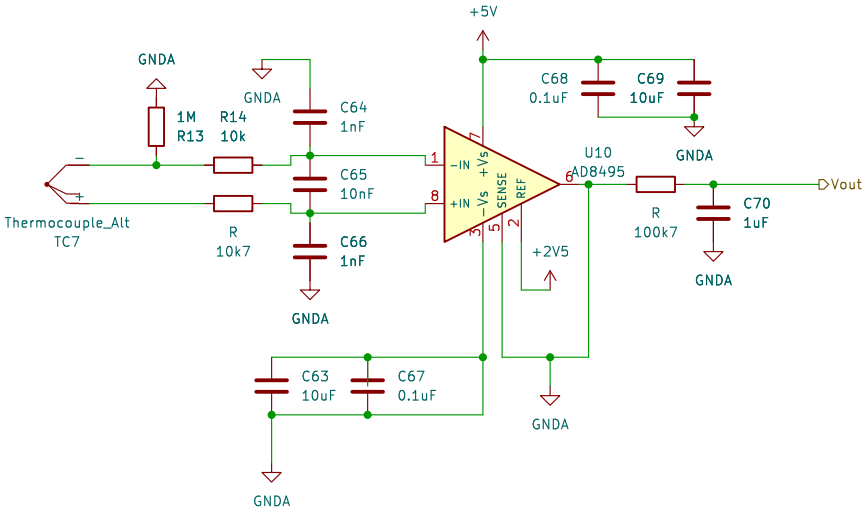
Sheet: /ADC2/Thermocouple Input and Amplifier/
File: thermocouple.kicad_sch

Title:

Size: A4	Date:	**Rev:**
KiCad E.D.A. 8.0.0		Id: 16/43

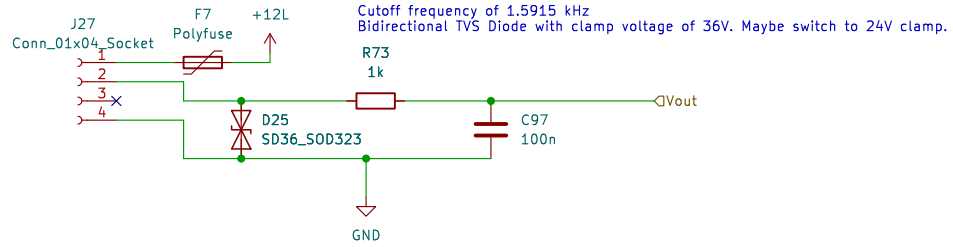


Sheet: /ADC2/Thermocouple Input and Amplifier1/		
File: thermocouple.kicad_sch		
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. 8.0.0		Id: 17/43



Sheet: /ADC2/Thermocouple Input and Amplifier3/		
File: thermocouple.kicad_sch		
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. 8.0.0		Id: 18/43

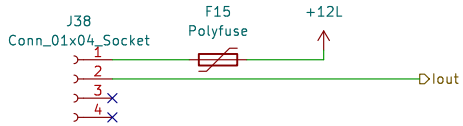
Would remove the connector from this sheet. Move to root sheet.
Nah fuck that
Unless someone else wants to...



OWD_COMP

Not gonna do open-wire detection.
Left it as a NC to make it easier to add later though

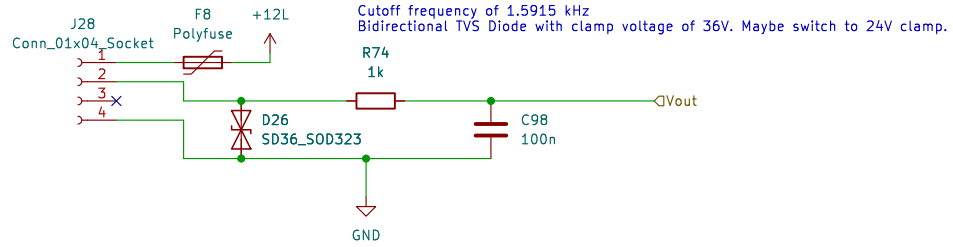
Sheet: /ADC2/Voltage Input Filtering/		
File: voltage_input_filtering.kicad_sch		
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. 8.0.0		Id: 19/43



super simple.
fuse on the output to prevent damage by connecting to sketchy peripheral.
sensor should drive the current, so shouldn't see too much noise => no filter required

Sheet: /ADC2/Current Input Filtering/ File: current_input_filtering.kicad_sch		
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. 8.0.0		Id: 20/43

Would remove the connector from this sheet. Move to root sheet.
Nah fuck that
Unless someone else wants to...

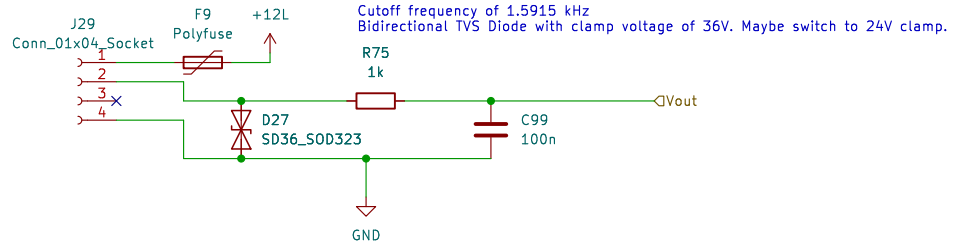


OWD_COMP

Not gonna do open-wire detection.
Left it as a NC to make it easier to add later though

Sheet: /ADC2/Voltage Input Filtering2/		
File: voltage_input_filtering.kicad_sch		
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. 8.0.0		Id: 21/43

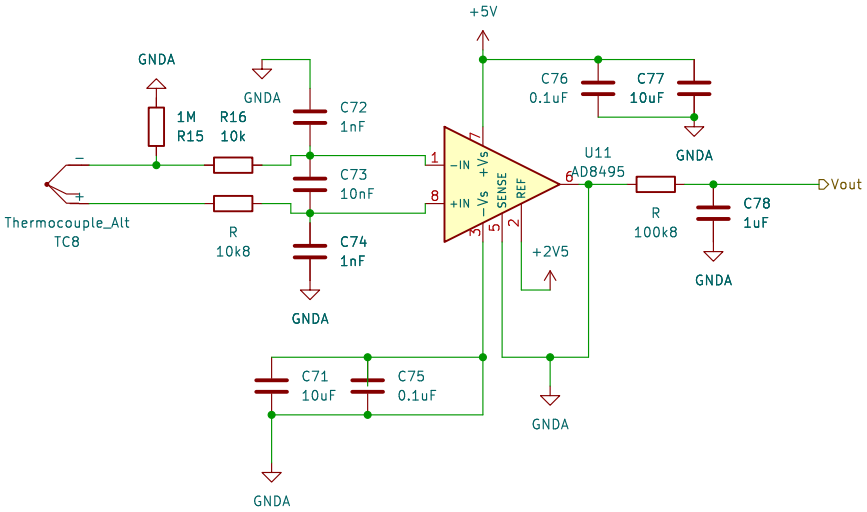
Would remove the connector from this sheet. Move to root sheet.
Nah fuck that
Unless someone else wants to...



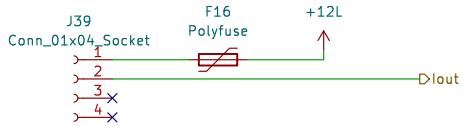
OWD_COMP

Not gonna do open-wire detection.
Left it as a NC to make it easier to add later though

Sheet: /ADC2/Voltage Input Filtering3/		
File: voltage_input_filtering.kicad_sch		
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. 8.0.0		Id: 22/43



Sheet: /ADC2/Thermocouple Input and Amplifier2/		
File: thermocouple.kicad_sch		
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. 8.0.0		Id: 23/43



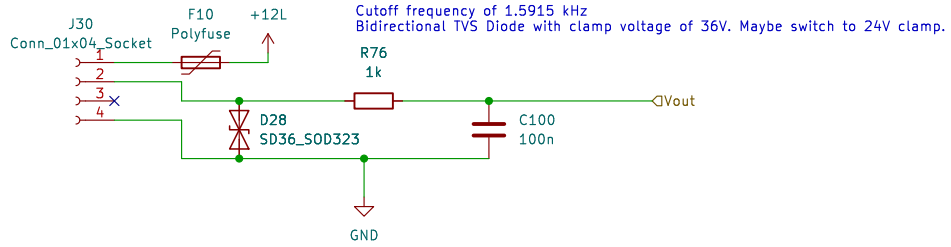
super simple.
fuse on the output to prevent damage by connecting to sketchy peripheral.
sensor should drive the current, so shouldn't see too much noise => no filter required

Sheet: /ADC2/Current Input Filtering1/
File: current_input_filtering.kicad_sch

Title:

Size: A4	Date:	**Rev:**
KiCad E.D.A. 8.0.0		Id: 24/43

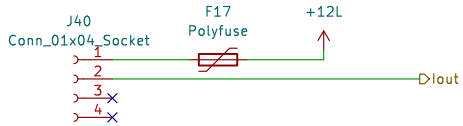
Would remove the connector from this sheet. Move to root sheet.
Nah fuck that
Unless someone else wants to...



OWD_COMP

Not gonna do open-wire detection.
Left it as a NC to make it easier to add later though

Sheet: /ADC2/Voltage Input Filtering1/		
File: voltage_input_filtering.kicad_sch		
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. 8.0.0		Id: 25/43

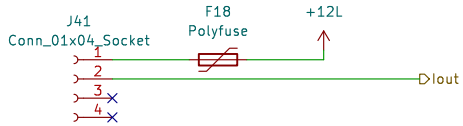


super simple.
fuse on the output to prevent damage by connecting to sketchy peripheral.
sensor should drive the current, so shouldn't see too much noise => no filter required

Sheet: /ADC2/Current Input Filtering2/
File: current_input_filtering.kicad_sch

Title:

Size: A4	Date:	**Rev:**
KiCad E.D.A. 8.0.0		Id: 26/43

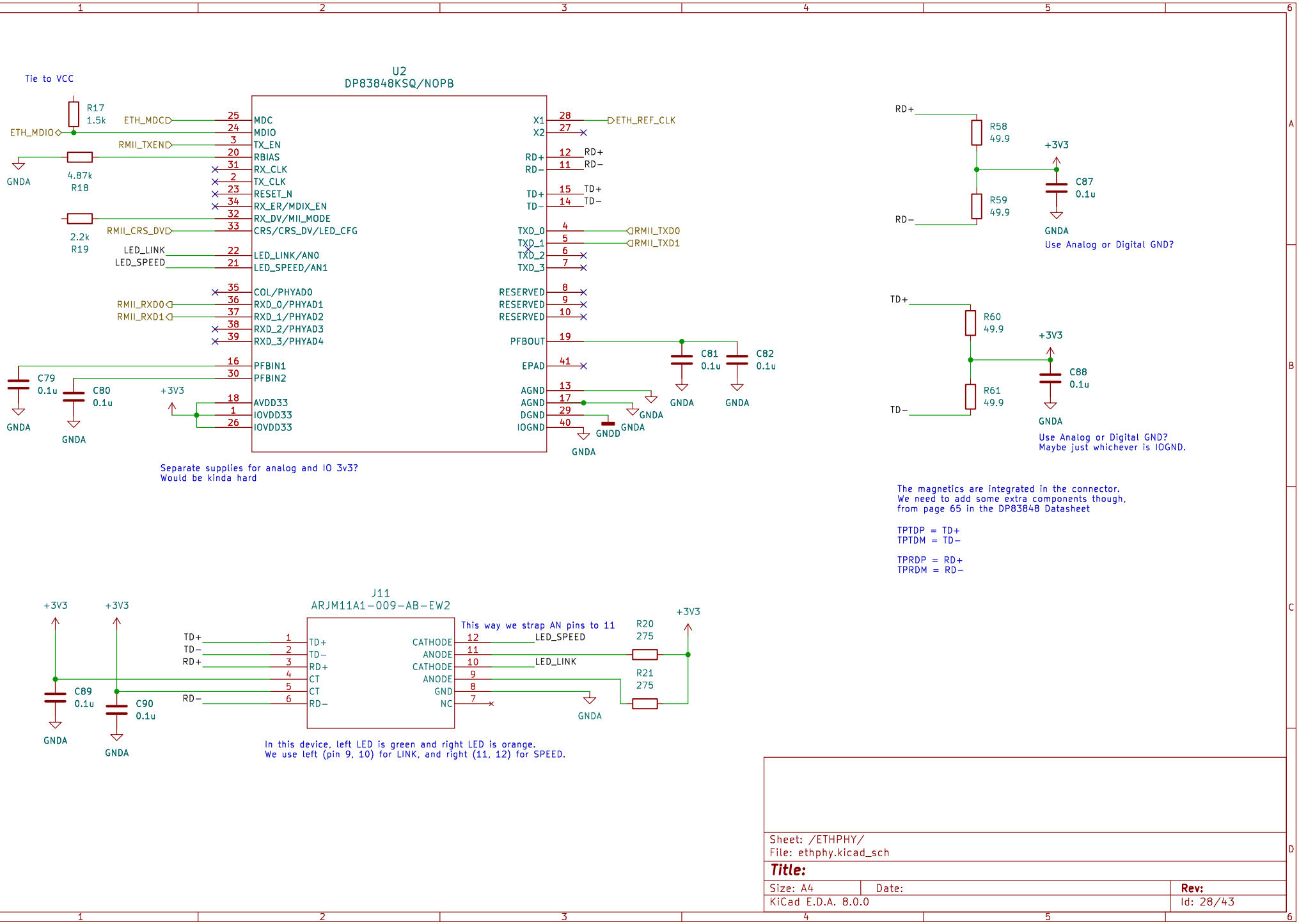


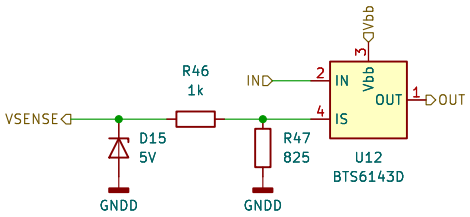
super simple.
fuse on the output to prevent damage by connecting to sketchy peripheral.
sensor should drive the current, so shouldn't see too much noise => no filter required

Sheet: /ADC2/Current Input Filtering3/
File: current_input_filtering.kicad_sch

Title:

Size: A4	Date:	**Rev:**
KiCad E.D.A. 8.0.0		Id: 27/43


Tie to VCC
R17
1.5k
ETH_MDIO
GNDA
4.87k
R18
2.2k
R19
U2
DP83848KSQ/NOPB
ETH_MDC
RMII_TXEN
RMII_CRS_DV
LED_LINK
LED_SPEED
RMII_RXD0
RMII_RXD1
MDC
MDIO
TX_EN
RBIAS
RX_CLK
TX_CLK
RESET_N
RX_ER/MDIX_EN
RX_DV/MII_MODE
CRS/CRS_DV/LED_CFG
LED_LINK/AN0
LED_SPEED/AN1
COL/PHYAD0
RXD_0/PHYAD1
RXD_1/PHYAD2
RXD_2/PHYAD3
RXD_3/PHYAD4
PFBIN1
PFBIN2
AVDD33
IOVDD33
IOVDD33
X1
X2
RD+
RD−
TD+
TD−
TXD_0
TXD_1
TXD_2
TXD_3
RESERVED
RESERVED
RESERVED
PFBOUT
EPAD
AGND
AGND
DGND
IOGND
ETH_REF_CLK
RMII_TXD0
RMII_TXD1
C79
0.1u
C80
0.1u
+3V3
GNDA
GNDD
C81
0.1u
C82
0.1u
Separate supplies for analog and IO 3v3?
Would be kinda hard
RD+
R58
49.9
R59
49.9
RD−
+3V3
C87
0.1u
Use Analog or Digital GND?
TD+
R60
49.9
R61
49.9
TD−
C88
0.1u
Use Analog or Digital GND?
Maybe just whichever is IOGND.
The magnetics are integrated in the connector.
We need to add some extra components though,
from page 65 in the DP83848 Datasheet
TPTDP = TD+
TPTDM = TD−
TPRDP = RD+
TPRDM = RD−
J11
ARJM11A1-009-AB-EW2
TD+
TD−
RD+
RD−
CT
CT
CATHODE
ANODE
CATHODE
ANODE
GND
NC
This way we strap AN pins to 11
LED_SPEED
LED_LINK
R20
275
R21
275
C89
0.1u
C90
0.1u
In this device, left LED is green and right LED is orange.
We use left (pin 9, 10) for LINK, and right (11, 12) for SPEED.
Sheet: /ETHPHY/
File: ethphy.kicad_sch
Title:
Size: A4
Date:
Rev:
KiCad E.D.A. 8.0.0
Id: 28/43



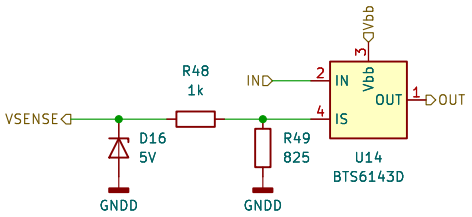
STM32 H723 FT_xxx* pins can be 5.5V** tolerant,
so we use a reasonable Zener.
*All connected ADC pins in root sheet are FT_xxx
**Actually more like 7.3V, datasheet pg 111/257

IS is 4 mA when I_L=40A.
Convert this to 3.3V

Sheet: /12V High Side Switch/
File: hss.kicad_sch

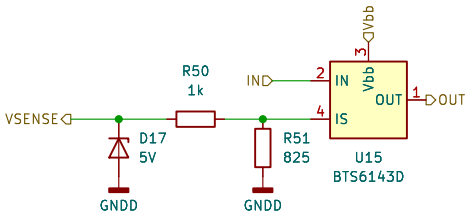
Title:

Size: A4	Date:	**Rev:**
KiCad E.D.A. 8.0.0		Id: 29/43



STM32 H723 FT_xxx* pins can be 5.5V** tolerant,
so we use a reasonable Zener.
*All connected ADC pins in root sheet are FT_xxx IS is 4 mA when I_L=40A.
**Actually more like 7.3V, datasheet pg 111/257 Convert this to 3.3V

Sheet: /12V High Side Switch1/		
File: hss.kicad_sch		
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. 8.0.0		Id: 30/43



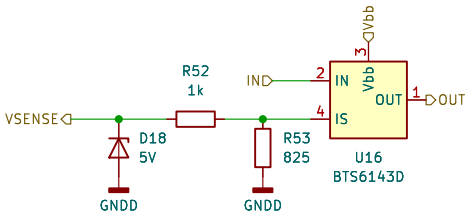
STM32 H723 FT_xxx* pins can be 5.5V** tolerant,
so we use a reasonable Zener.
*All connected ADC pins in root sheet are FT_xxx
**Actually more like 7.3V, datasheet pg 111/257

IS is 4 mA when I_L=40A.
Convert this to 3.3V

Sheet: /12V High Side Switch2/
File: hss.kicad_sch

Title:

Size: A4	Date:	**Rev:**
KiCad E.D.A. 8.0.0		Id: 31/43



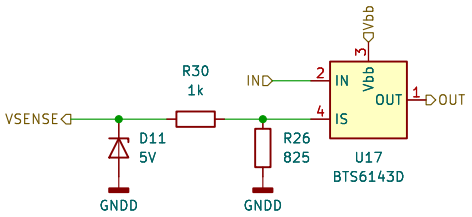
STM32 H723 FT_xxx* pins can be 5.5V** tolerant,
so we use a reasonable Zener.
*All connected ADC pins in root sheet are FT_xxx
**Actually more like 7.3V, datasheet pg 111/257

IS is 4 mA when I_L=40A.
Convert this to 3.3V

Sheet: /12V High Side Switch3/
File: hss.kicad_sch

Title:

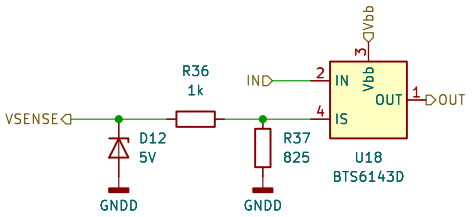
Size: A4	Date:	**Rev:**
KiCad E.D.A. 8.0.0		Id: 32/43



STM32 H723 FT_xxx* pins can be 5.5V** tolerant,
so we use a reasonable Zener.
*All connected ADC pins in root sheet are FT_xxx
**Actually more like 7.3V, datasheet pg 111/257

IS is 4 mA when I_L=40A.
Convert this to 3.3V

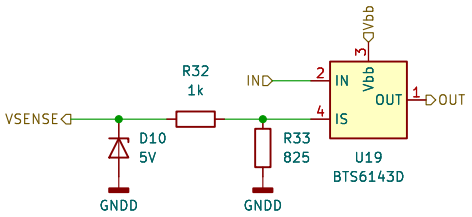
Sheet: /24V High Side Switch/		
File: hss.kicad_sch		
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. 8.0.0		Id: 33/43



STM32 H723 FT_xxx* pins can be 5.5V** tolerant,
so we use a reasonable Zener.
*All connected ADC pins in root sheet are FT_xxx
**Actually more like 7.3V, datasheet pg 111/257

IS is 4 mA when I_L=40A.
Convert this to 3.3V

Sheet: /24V High Side Switch1/		
File: hss.kicad_sch		
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. 8.0.0		Id: 34/43



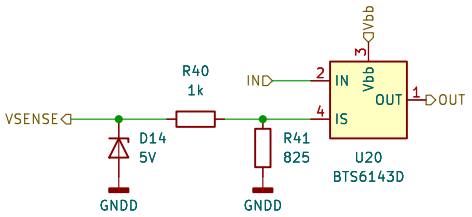
STM32 H723 FT_xxx* pins can be 5.5V** tolerant,
so we use a reasonable Zener.
*All connected ADC pins in root sheet are FT_xxx
**Actually more like 7.3V, datasheet pg 111/257

IS is 4 mA when I_L=40A.
Convert this to 3.3V

Sheet: /24V High Side Switch2/
File: hss.kicad_sch

Title:

Size: A4	Date:	**Rev:**
KiCad E.D.A. 8.0.0		Id: 35/43

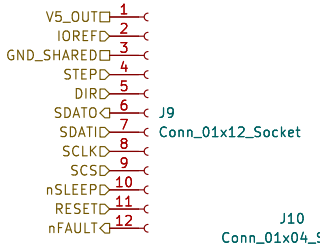


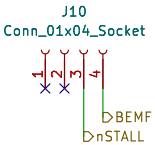
STM32 H723 FT_xxx* pins can be 5.5V** tolerant,
so we use a reasonable Zener.
*All connected ADC pins in root sheet are FT_xxx
**Actually more like 7.3V, datasheet pg 111/257

IS is 4 mA when I_L=40A.
Convert this to 3.3V

Sheet: /24V High Side Switch3/		
File: hss.kicad_sch		
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. 8.0.0		Id: 36/43

The motor ground and digital ground must be shared

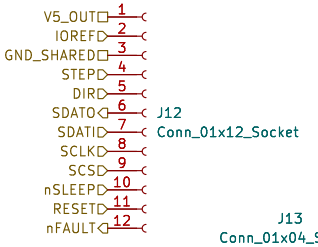


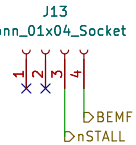


Careful when routing.
Try to keep the spacing the same as the Pololu 36v4 Driver

Sheet: /Pololu Stepper Motor Driver 36v4 Breakout/		
File: pololu_36v4_breakout.kicad_sch		
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. 8.0.0		Id: 37/43

The motor ground and digital ground must be shared

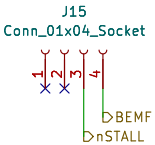




Careful when routing.
Try to keep the spacing the same as the Pololu 36v4 Driver

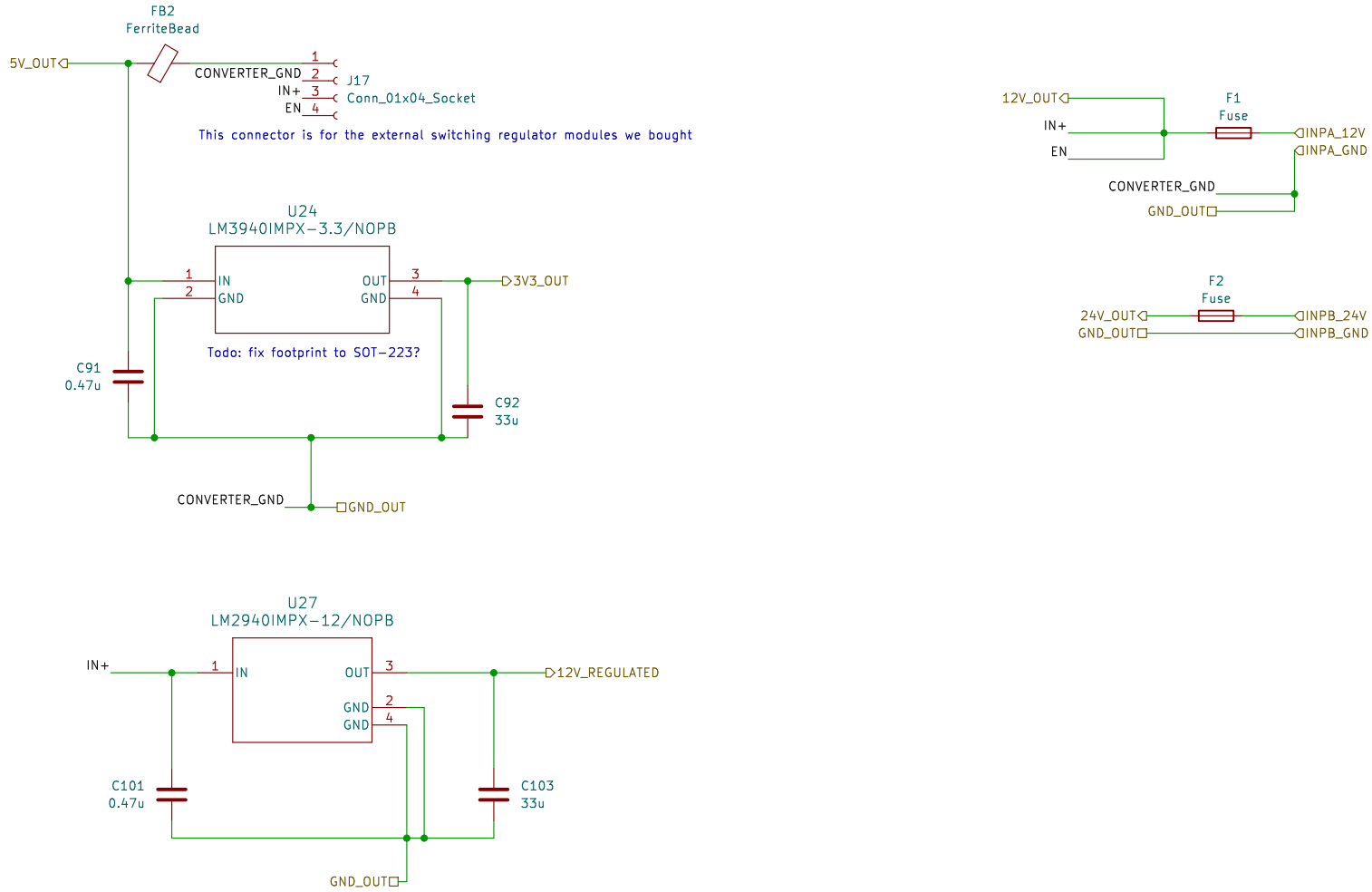
Sheet: /Pololu Stepper Motor Driver 36v4 Breakout1/		
File: pololu_36v4_breakout.kicad_sch		
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. 8.0.0		Id: 38/43

The motor ground and digital ground must be shared



Careful when routing.
Try to keep the spacing the same as the Pololu 36v4 Driver

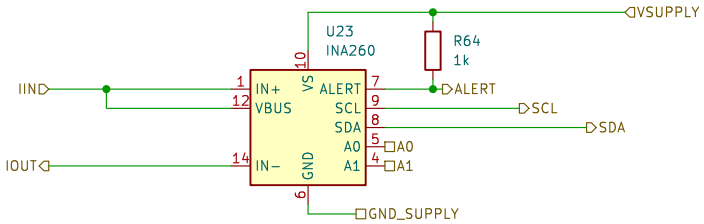
Sheet: /Pololu Stepper Motor Driver 36v4 Breakout2/		
File: pololu_36v4_breakout.kicad_sch		
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. 8.0.0		Id: 39/43



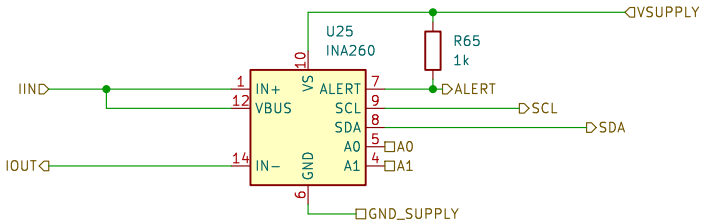
Sheet: /Power/
File: power.kicad_sch

Title:

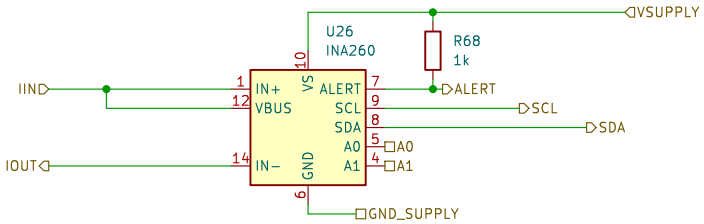
Size: A4	Date:	**Rev:**
KiCad E.D.A. 8.0.0		Id: 40/43



Sheet: /Current Sense Block/ File: ina260sense.kicad_sch		
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. 8.0.0		Id: 41/43



Sheet: /Current Sense Block1/		
File: ina260sense.kicad_sch		
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. 8.0.0		Id: 42/43



Sheet: /Current Sense Block2/		
File: ina260sense.kicad_sch		
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. 8.0.0		Id: 43/43