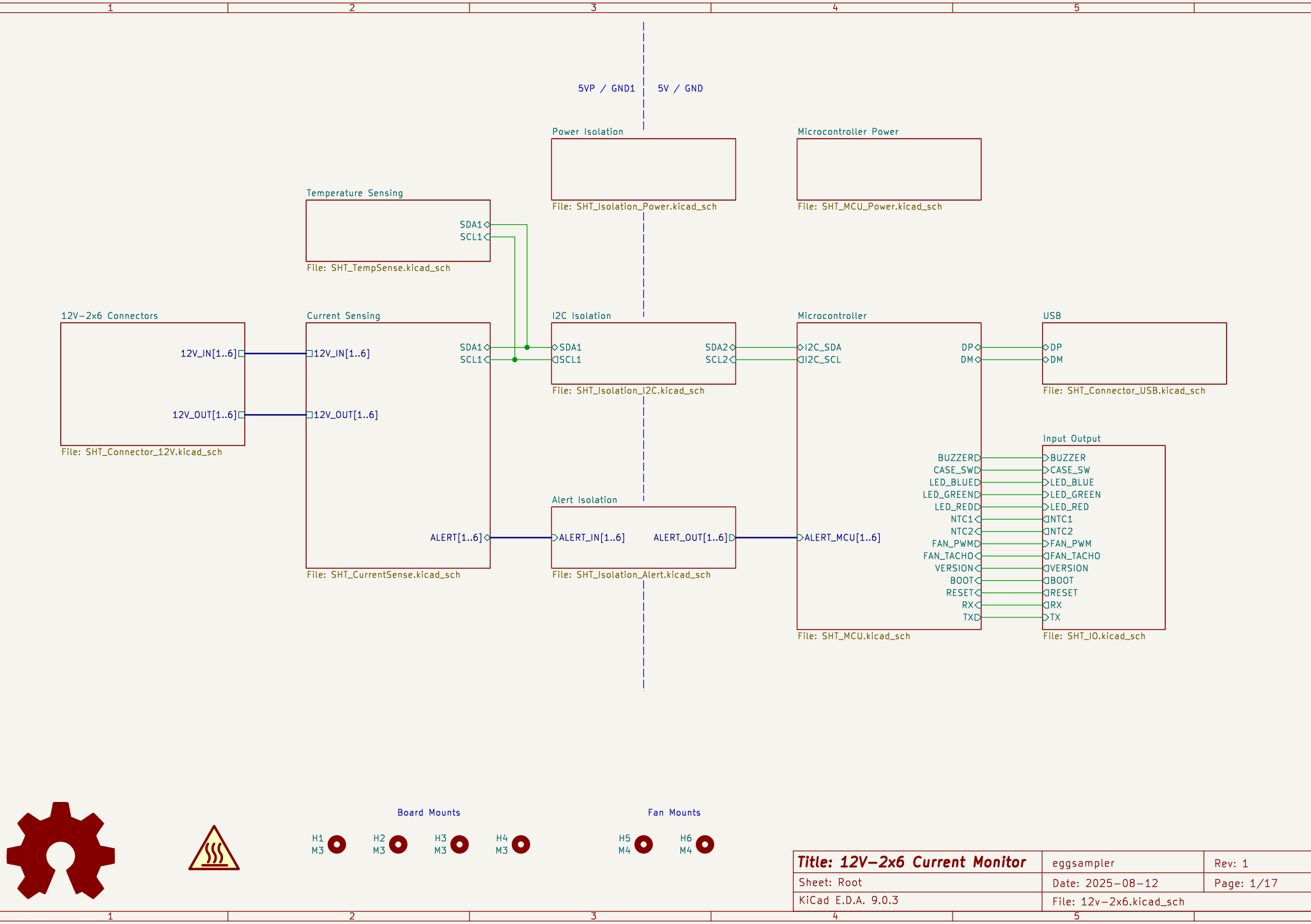
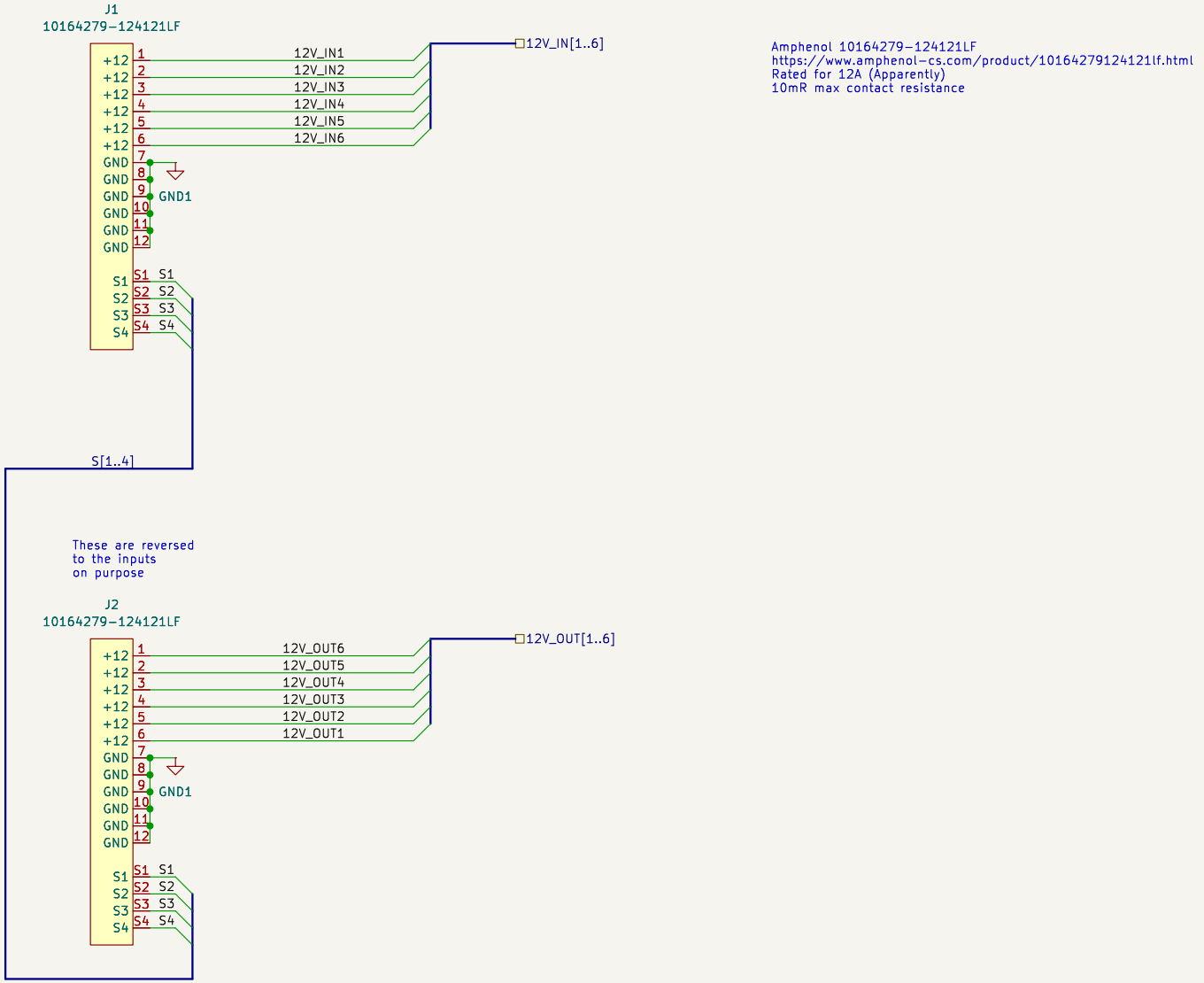
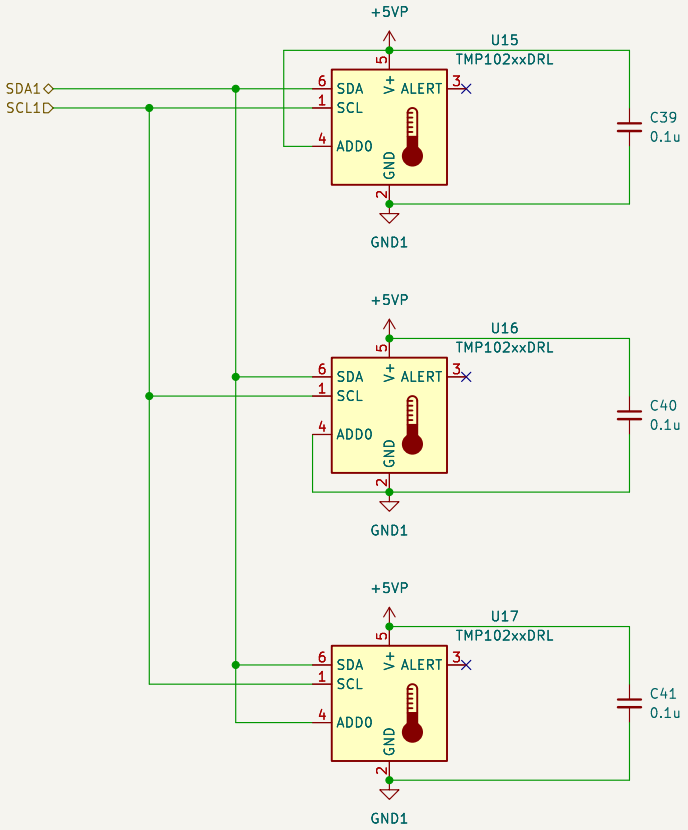

5VP / GND1
5V / GND
Power Isolation
File: SHT_Isolation_Power.kicad_sch
Microcontroller Power
File: SHT_MCU_Power.kicad_sch
Temperature Sensing
SDA1
SCL1
File: SHT_TempSense.kicad_sch
12V-2x6 Connectors
12V_IN[1..6]
12V_OUT[1..6]
File: SHT_Connector_12V.kicad_sch
Current Sensing
12V_IN[1..6]
12V_OUT[1..6]
SDA1
SCL1
ALERT[1..6]
File: SHT_CurrentSense.kicad_sch
I2C Isolation
SDA1
SCL1
SDA2
SCL2
File: SHT_Isolation_I2C.kicad_sch
Alert Isolation
ALERT_IN[1..6]
ALERT_OUT[1..6]
File: SHT_Isolation_Alert.kicad_sch
Microcontroller
I2C_SDA
I2C_SCL
DP
DM
ALERT_MCU[1..6]
File: SHT_MCU.kicad_sch
USB
DP
DM
File: SHT_Connector_USB.kicad_sch
Input Output
BUZZER
CASE_SW
LED_BLUE
LED_GREEN
LED_RED
NTC1
NTC2
FAN_PWM
FAN_TACHO
VERSION
BOOT
RESET
RX
TX
File: SHT_IO.kicad_sch
Board Mounts
H1 M3
H2 M3
H3 M3
H4 M3
Fan Mounts
H5 M4
H6 M4
Title: 12V-2x6 Current Monitor
eggsampler
Rev: 1
Sheet: Root
Date: 2025-08-12
Page: 1/17
KiCad E.D.A. 9.0.3
File: 12v-2x6.kicad_sch

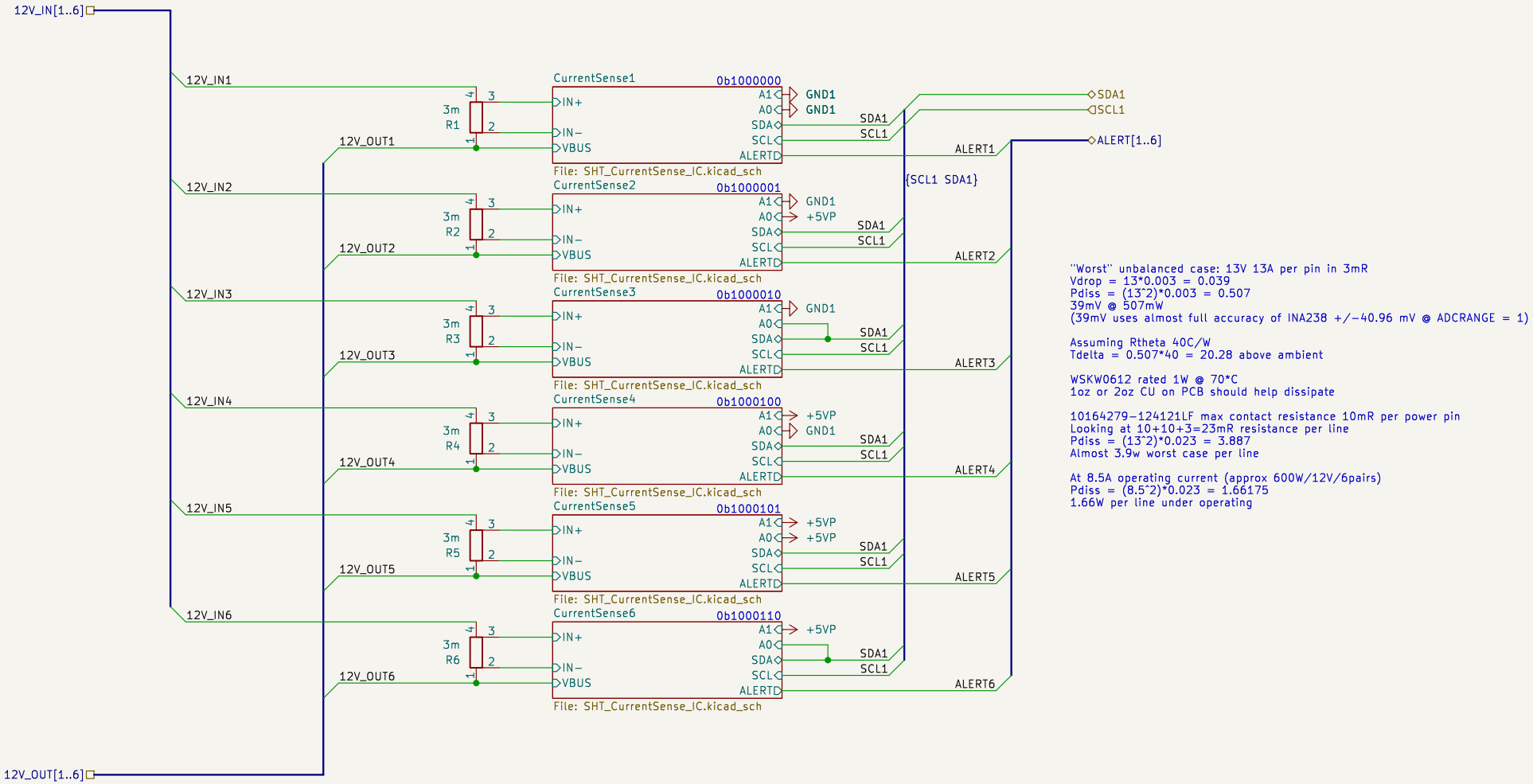


Title: 12V-2x6 Current Monitor	eggsampler	Rev: 1
Sheet: 12V-2x6 Connectors	Date: 2025-08-12	Page: 2/17
KiCad E.D.A. 9.0.3	File: SHT_Connector_12V.kicad_sch	

Placed near the 12v-2x6 connectors to infer close temperature



Title: 12V-2x6 Current Monitor	eggsampler	Rev: 1
Sheet: Temperature Sensing	Date: 2025-08-12	Page: 17/17
KiCad E.D.A. 9.0.3	File: SHT_TempSense.kicad_sch	



"Worst" unbalanced case: 13V 13A per pin in 3mR
Vdrop = 13*0.003 = 0.039
Pdiss = (13^2)*0.003 = 0.507
39mV @ 507mW
(39mV uses almost full accuracy of INA238 +/−40.96 mV @ ADCRANGE = 1)

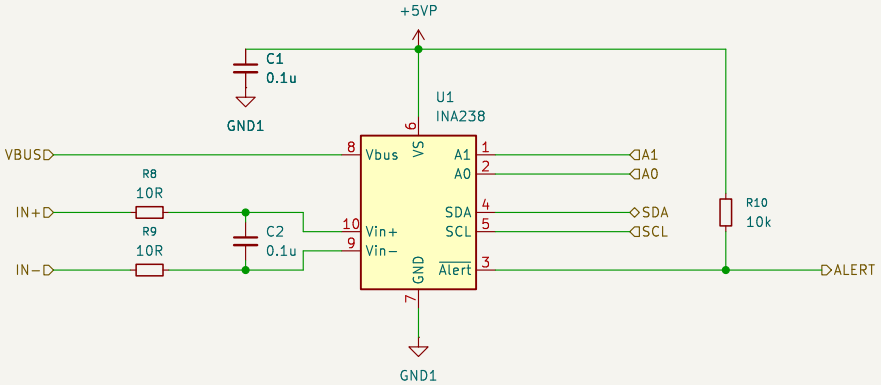
Assuming Rtheta 40C/W
Tdelta = 0.507*40 = 20.28 above ambient

WSKW0612 rated 1W @ 70*C
1oz or 2oz CU on PCB should help dissipate

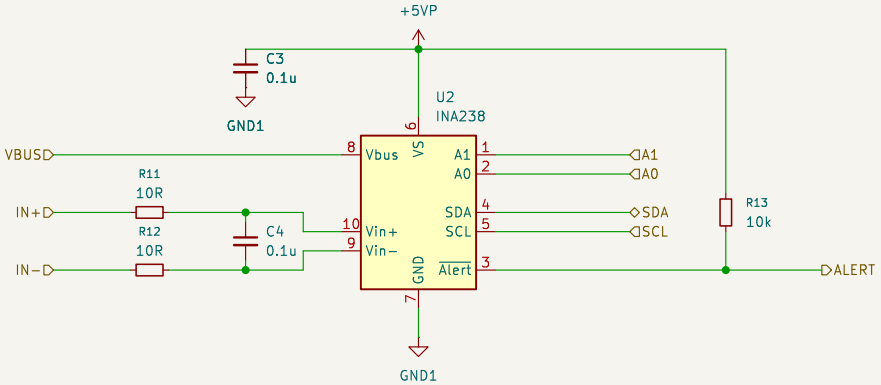
10164279−124121LF max contact resistance 10mR per power pin
Looking at 10+10+3=23mR resistance per line
Pdiss = (13^2)*0.023 = 3.887
Almost 3.9w worst case per line

At 8.5A operating current (approx 600W/12V/6pairs)
Pdiss = (8.5^2)*0.023 = 1.66175
1.66W per line under operating

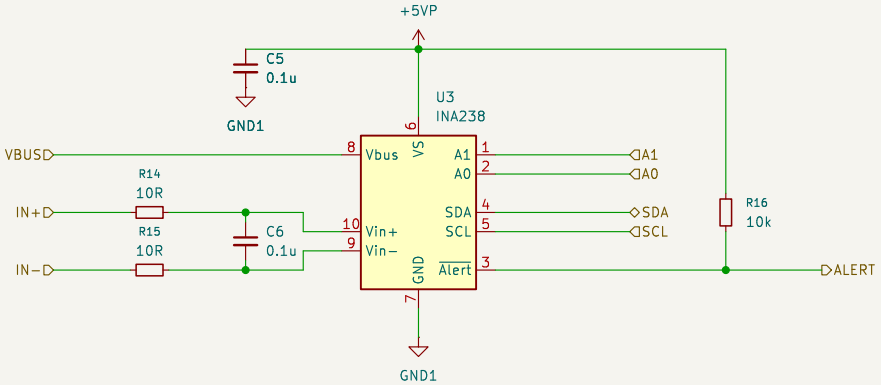
Title: 12V−2x6 Current Monitor	eggsampler	Rev: 1
Sheet: Current Sensing	Date: 2025−08−12	Page: 3/17
KiCad E.D.A. 9.0.3	File: SHT_CurrentSense.kicad_sch	



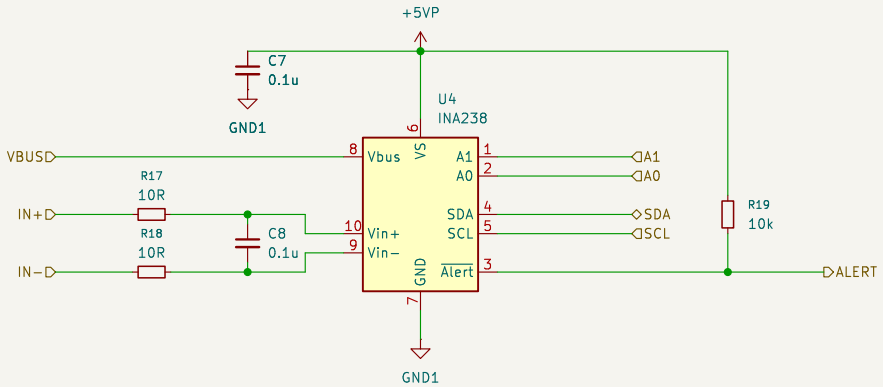
Title: 12V–2x6 Current Monitor	eggsampler	Rev: 1
Sheet: CurrentSense1	Date: 2025–08–12	Page: 4/17
KiCad E.D.A. 9.0.3	File: SHT_CurrentSense_IC.kicad_sch	



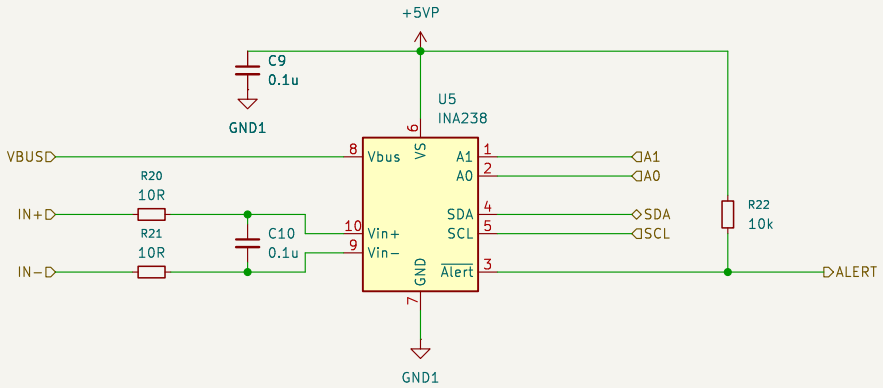
Title: 12V–2x6 Current Monitor	eggsampler	Rev: 1
Sheet: CurrentSense2	Date: 2025–08–12	Page: 5/17
KiCad E.D.A. 9.0.3	File: SHT_CurrentSense_IC.kicad_sch	



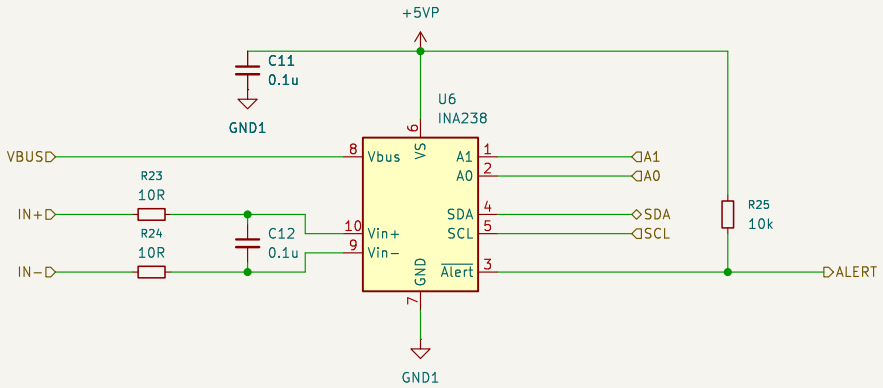
Title: 12V–2x6 Current Monitor	eggsampler	Rev: 1
Sheet: CurrentSense3	Date: 2025–08–12	Page: 6/17
KiCad E.D.A. 9.0.3	File: SHT_CurrentSense_IC.kicad_sch	



Title: 12V–2x6 Current Monitor	eggsampler	Rev: 1
Sheet: CurrentSense4	Date: 2025–08–12	Page: 7/17
KiCad E.D.A. 9.0.3	File: SHT_CurrentSense_IC.kicad_sch	



Title: 12V–2x6 Current Monitor	eggsampler	Rev: 1
Sheet: CurrentSense5	Date: 2025–08–12	Page: 8/17
KiCad E.D.A. 9.0.3	File: SHT_CurrentSense_IC.kicad_sch	

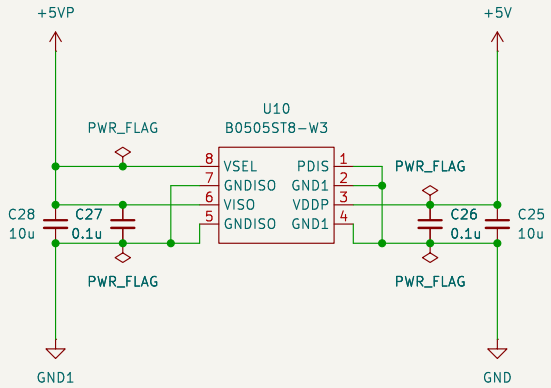


Title: 12V–2x6 Current Monitor	eggsampler	Rev: 1
Sheet: CurrentSense6	Date: 2025–08–12	Page: 9/17
KiCad E.D.A. 9.0.3	File: SHT_CurrentSense_IC.kicad_sch	

Translated from datasheet

电源关断管脚，接GND1芯片正常工作，接逻辑高电平，芯片停止工作。
The power shutdown pin – connect it to GND1 for normal operation; connect it to a logic high level to stop the chip from operating.

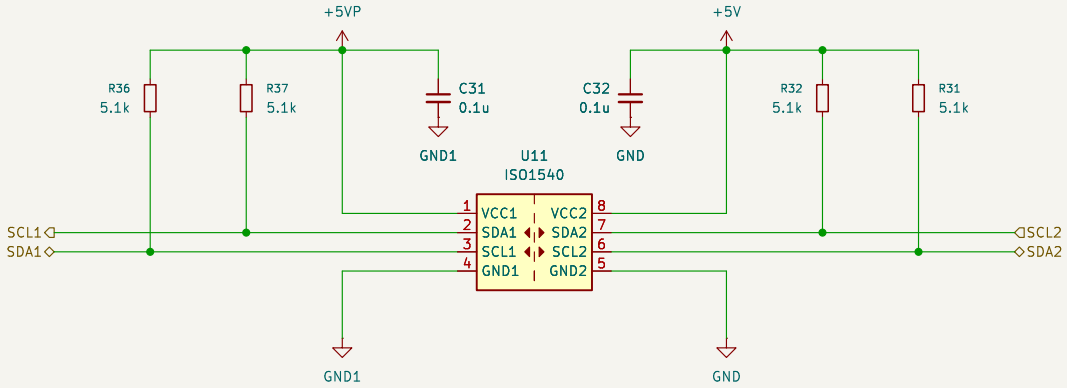
输出电压选择。将VSEL连接到VISO以获得5 V输出或将VSEL连接到GNDISO以获得3.3 V输出。这个引脚有一个较弱的内部上拉；因此，不要让该引脚悬空。
Output voltage selection – connect VSEL to VISO for a 5 V output, or connect VSEL to GNDISO for a 3.3 V output. This pin has a weak internal pull-up, so it should not be left floating.



Title: 12V–2x6 Current Monitor	eggsampler	Rev: 1
Sheet: Power Isolation	Date: 2025-08-12	Page: 10/17
KiCad E.D.A. 9.0.3	File: SHT_Isolation_Power.kicad_sch	

SDA and SCL are interchangeable as the internal circuitry for each is identical
These connections are swapped for PCB placement reasons

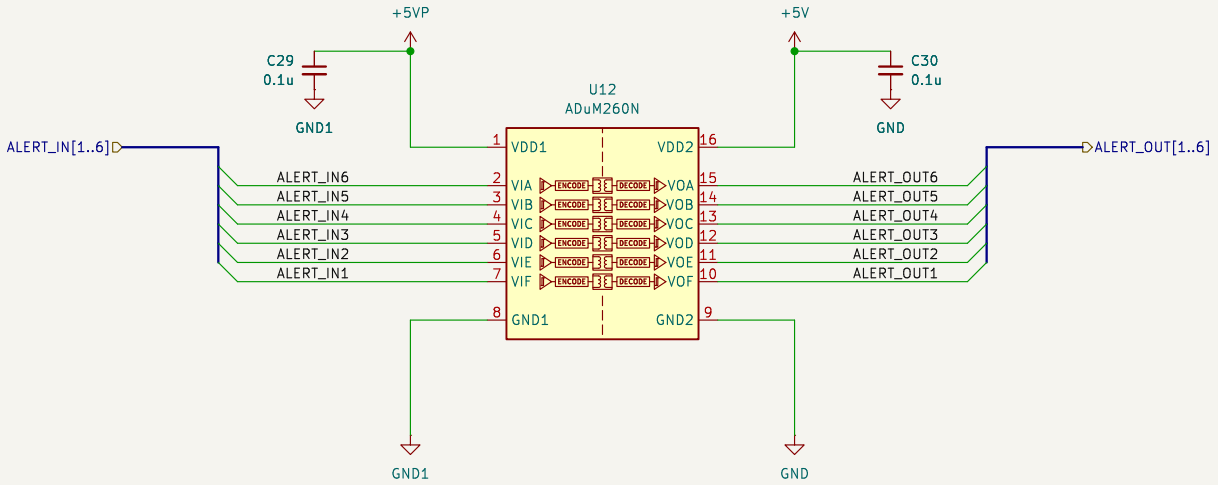
ISO1640 is a drop-in replacement



Title: 12V-2x6 Current Monitor	eggsampler	Rev: 1
Sheet: I2C Isolation	Date: 2025-08-12	Page: 11/17
KiCad E.D.A. 9.0.3	File: SHT_Isolation_I2C.kicad_sch	

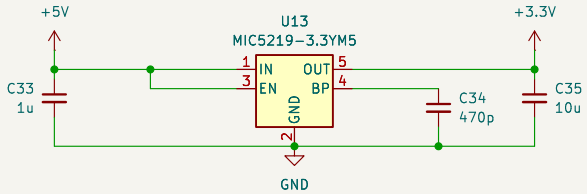
INA238 ALERT pin is an open-drain and active-low by default, using fail safe high state as default

Use ADuM260N1 so default idle state is high to match INA238

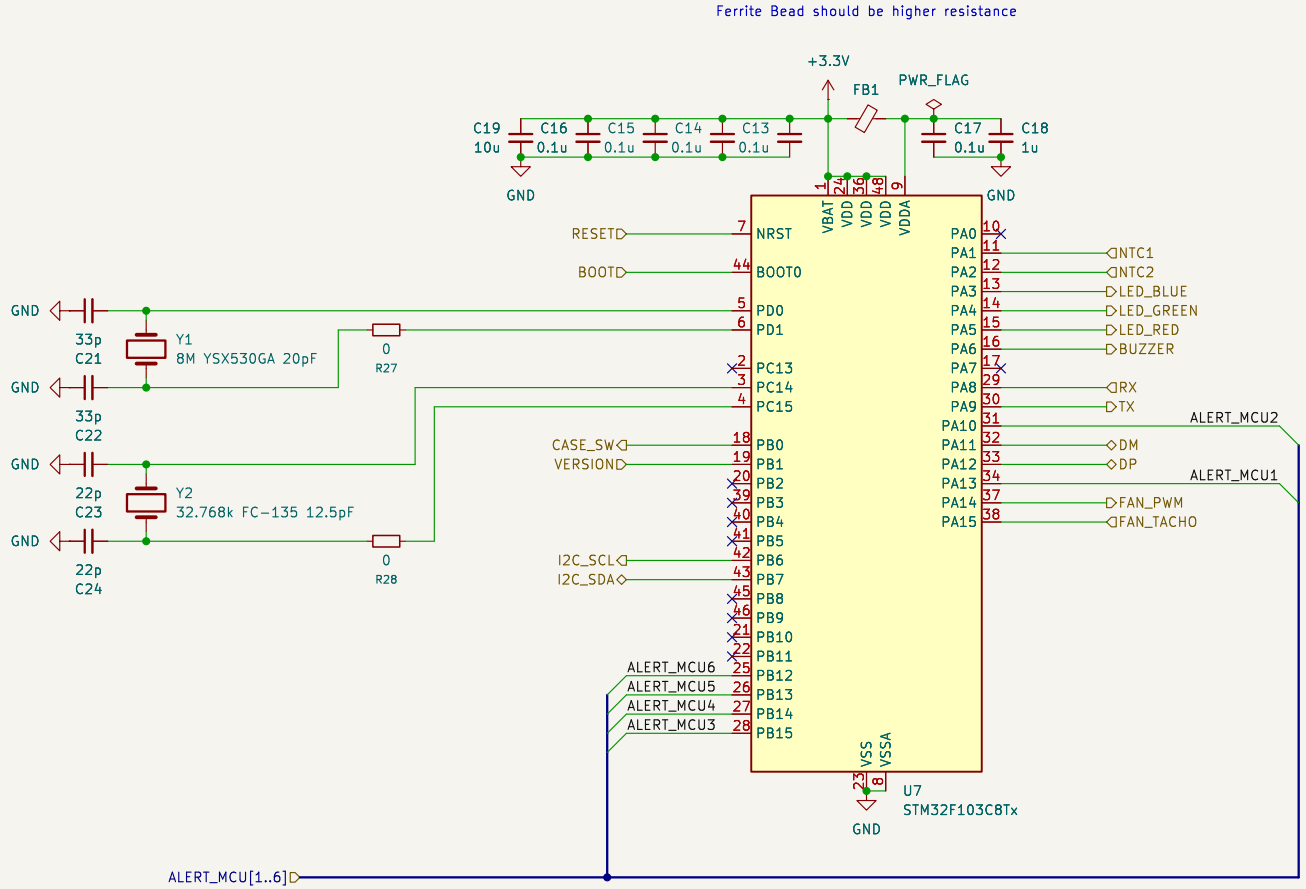


Title: 12V-2x6 Current Monitor	eggsampler	Rev: 1
Sheet: Alert Isolation	Date: 2025-08-12	Page: 12/17
KiCad E.D.A. 9.0.3	File: SHT_Isolation_Alert.kicad_sch	

Using linear regulator not switching for less noise
MIC5219 typically 10mV-500mV dropout, heaps of headroom from 5->3.3
500mA should be more than enough for the STM32



Title: 12V-2x6 Current Monitor	eggsampler	Rev: 1
Sheet: Microcontroller Power	Date: 2025-08-12	Page: 13/17
KiCad E.D.A. 9.0.3	File: SHT_MCU_Power.kicad_sch	

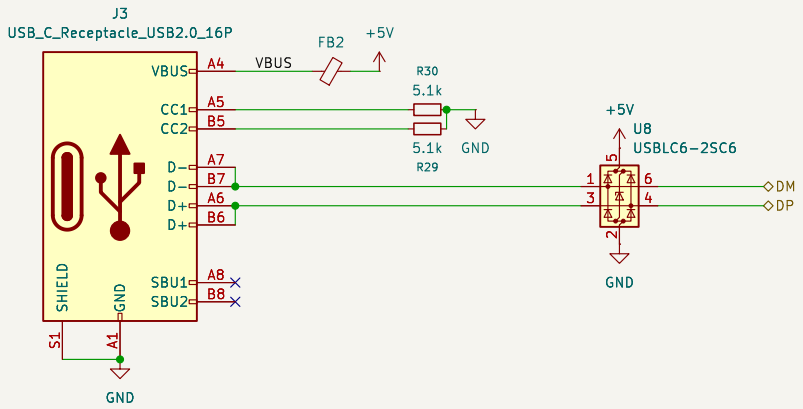


YSX530GA 8MHz 20pF Crystal
CL=((C1*C2)/(C1+C2)) + Cstray
Assume
- C1=C2
- Cstray=5pF
20=C/2+5
C=30pF (or 36pF if Cs=2)
Pick 33pF as closest standard value

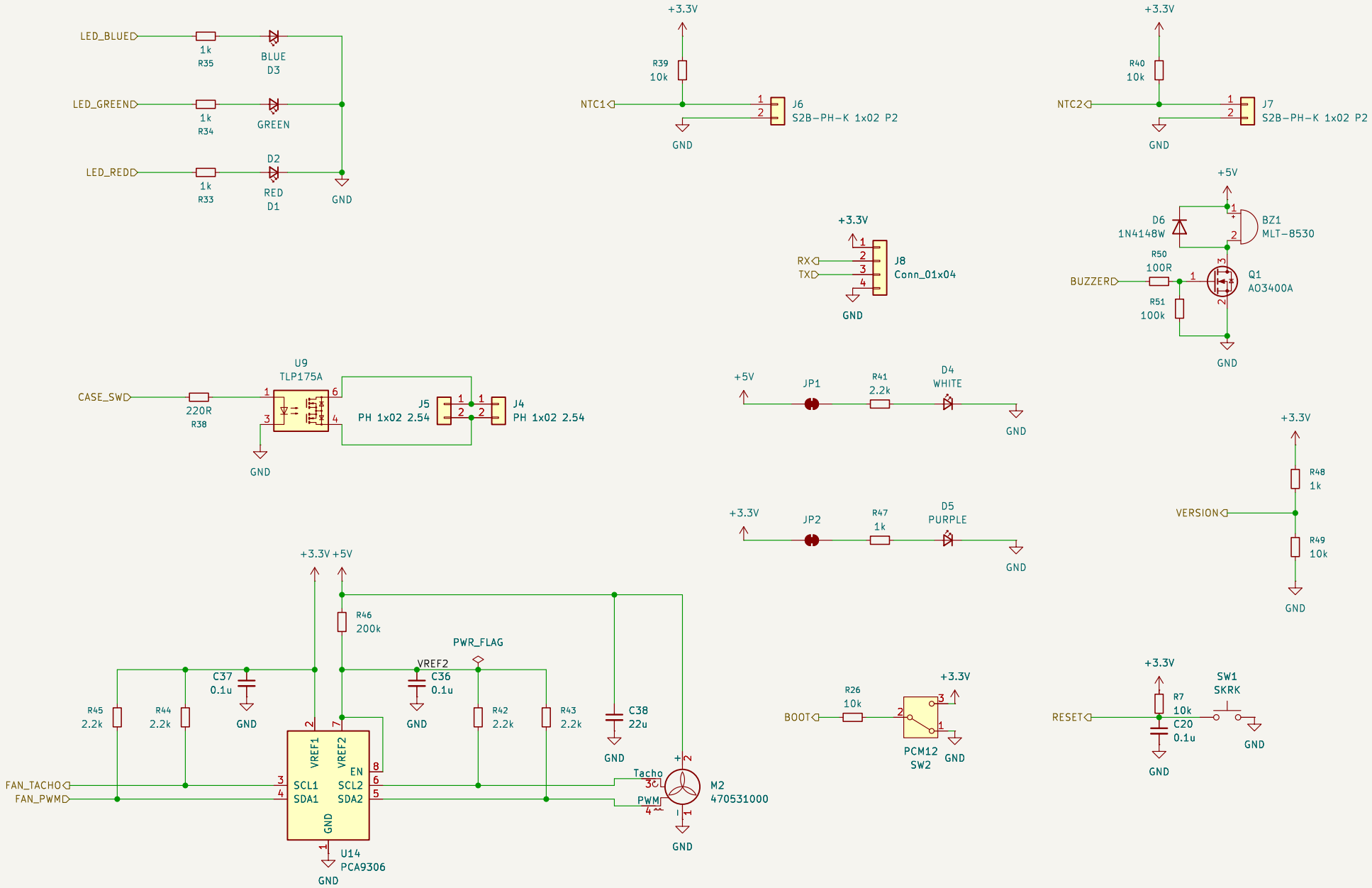
FC-135 32.768kHz 12.5pF
CL=((C1*C2)/(C1+C2)) + Cstray
Assume
- C1=C2
- Cstray=5pF
12.5=C/2+5
C=15pF (or 21pF Cs=2)
Pick 22pF as closest standard value

Title: 12V-2x6 Current Monitor	eggsampler	Rev: 1
Sheet: Microcontroller	Date: 2025-08-12	Page: 14/17
KiCad E.D.A. 9.0.3	File: SHT_MCU.kicad_sch	

Ferrite Bead should be lower resistance



Title: 12V−2x6 Current Monitor	eggsampler	Rev: 1
Sheet: USB	Date: 2025−08−12	Page: 15/17
KiCad E.D.A. 9.0.3	File: SHT_Connector_USB.kicad_sch	



Title: 12V-2x6 Current Monitor	eggsampler	Rev: 1
Sheet: Input Output	Date: 2025-08-12	Page: 16/17
KiCad E.D.A. 9.0.3	File: SHT_IO.kicad_sch	