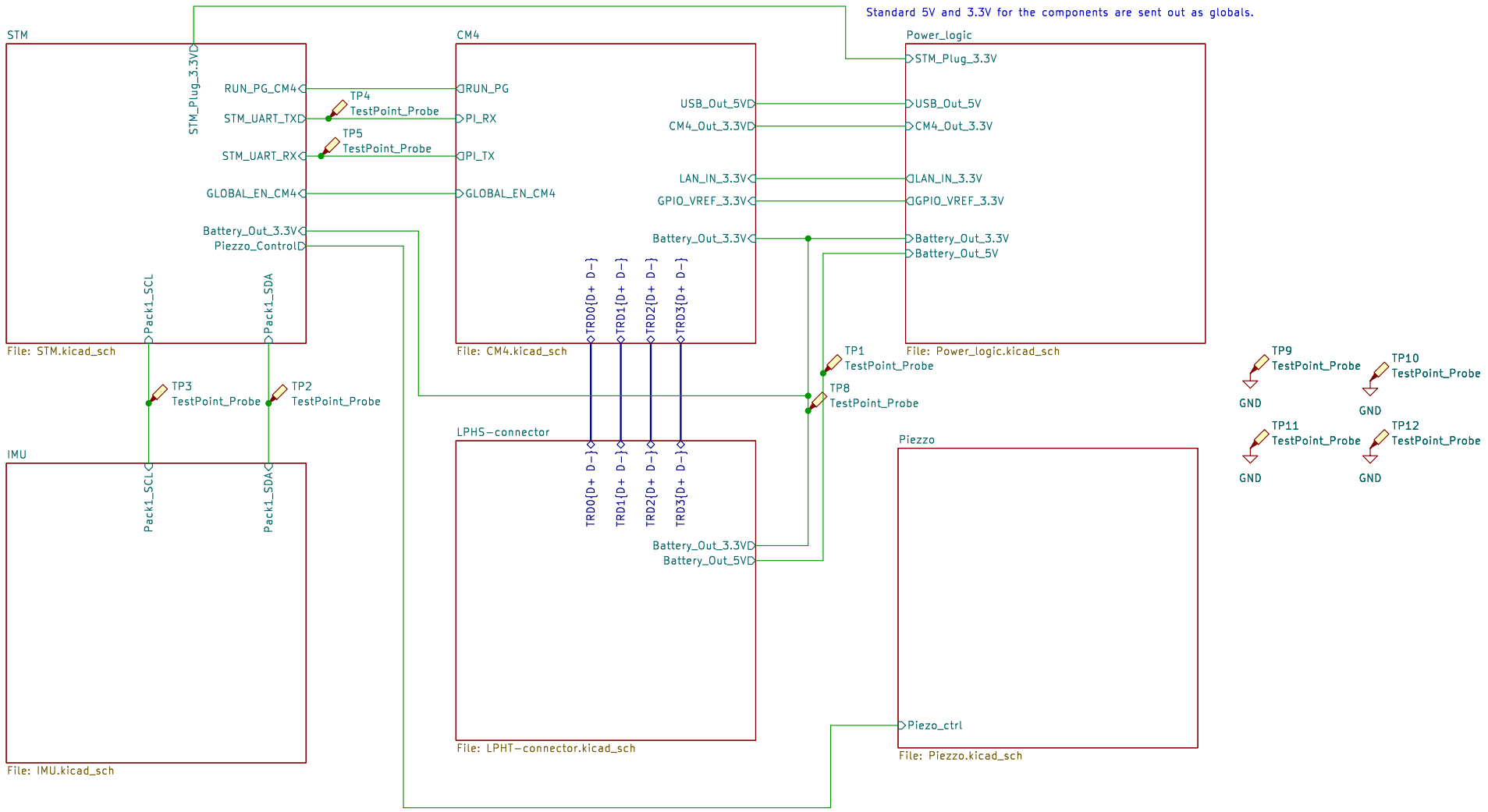
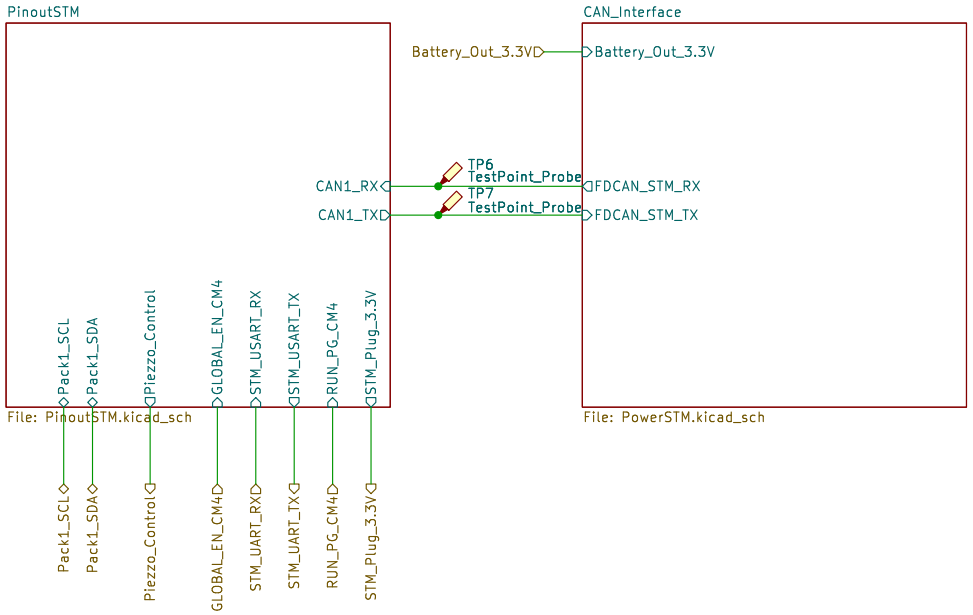
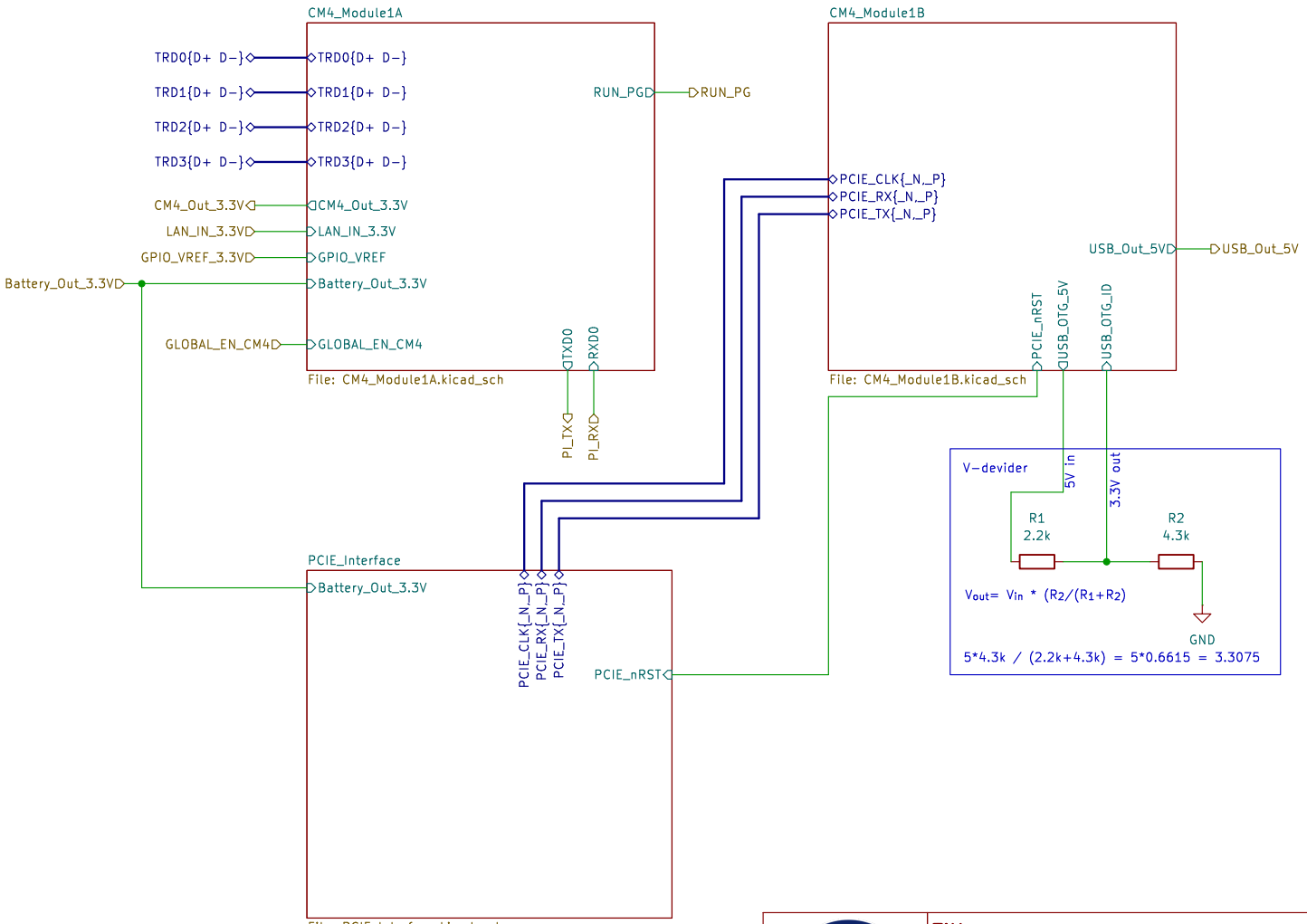

Standard 5V and 3.3V for the components are sent out as globals.
STM
STM_Plug_3.3V
RUN_PG_CM4
STM_UART_TX
STM_UART_RX
GLOBAL_EN_CM4
Battery_Out_3.3V
Piezzo_Control
Pack1_SCL
Pack1_SDA
File: STM.kicad_sch
TP4
TestPoint_Probe
TP5
TestPoint_Probe
TP3
TestPoint_Probe
TP2
TestPoint_Probe
IMU
Pack1_SCL
Pack1_SDA
File: IMU.kicad_sch
CM4
RUN_PG
PI_RX
PI_TX
GLOBAL_EN_CM4
TRD0{D+ D-}
TRD1{D+ D-}
TRD2{D+ D-}
TRD3{D+ D-}
File: CM4.kicad_sch
LPHS-connector
TRD0{D+ D-}
TRD1{D+ D-}
TRD2{D+ D-}
TRD3{D+ D-}
Battery_Out_3.3V
Battery_Out_5V
File: LPHT-connector.kicad_sch
Power_logic
STM_Plug_3.3V
USB_Out_5V
CM4_Out_3.3V
LAN_IN_3.3V
GPIO_VREF_3.3V
Battery_Out_3.3V
Battery_Out_5V
File: Power_logic.kicad_sch
TP1
TestPoint_Probe
TP8
TestPoint_Probe
Piezzo
Piezo_ctrl
File: Piezzo.kicad_sch
TP9
TestPoint_Probe
GND
TP10
TestPoint_Probe
GND
TP11
TestPoint_Probe
GND
TP12
TestPoint_Probe
GND
Title:
Sheet: /
Rev: 0
Author: Evan & Davide
Date: 2025-11-19
Size: A4
Id: 1/20
File: nautilus_mainboard.kicad_sch



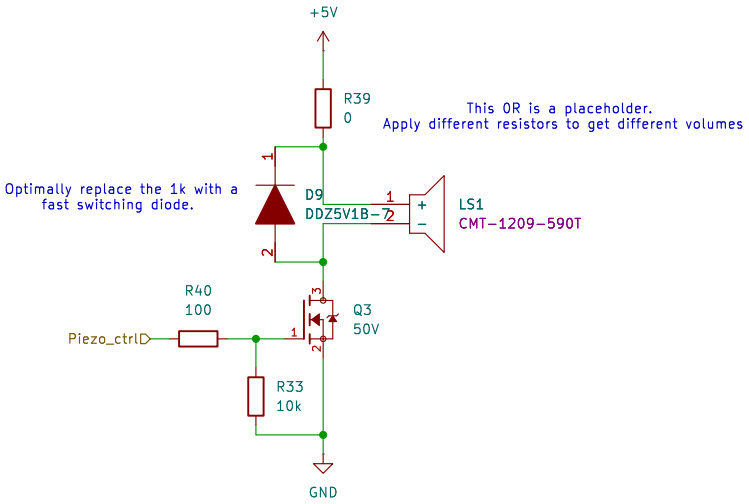
Title:		
Sheet: /STM/		Rev: 0
Author: Evan		
Date: 2025-11-19	Size: A4	Id: 2/20
File: STM.kicad_sch		



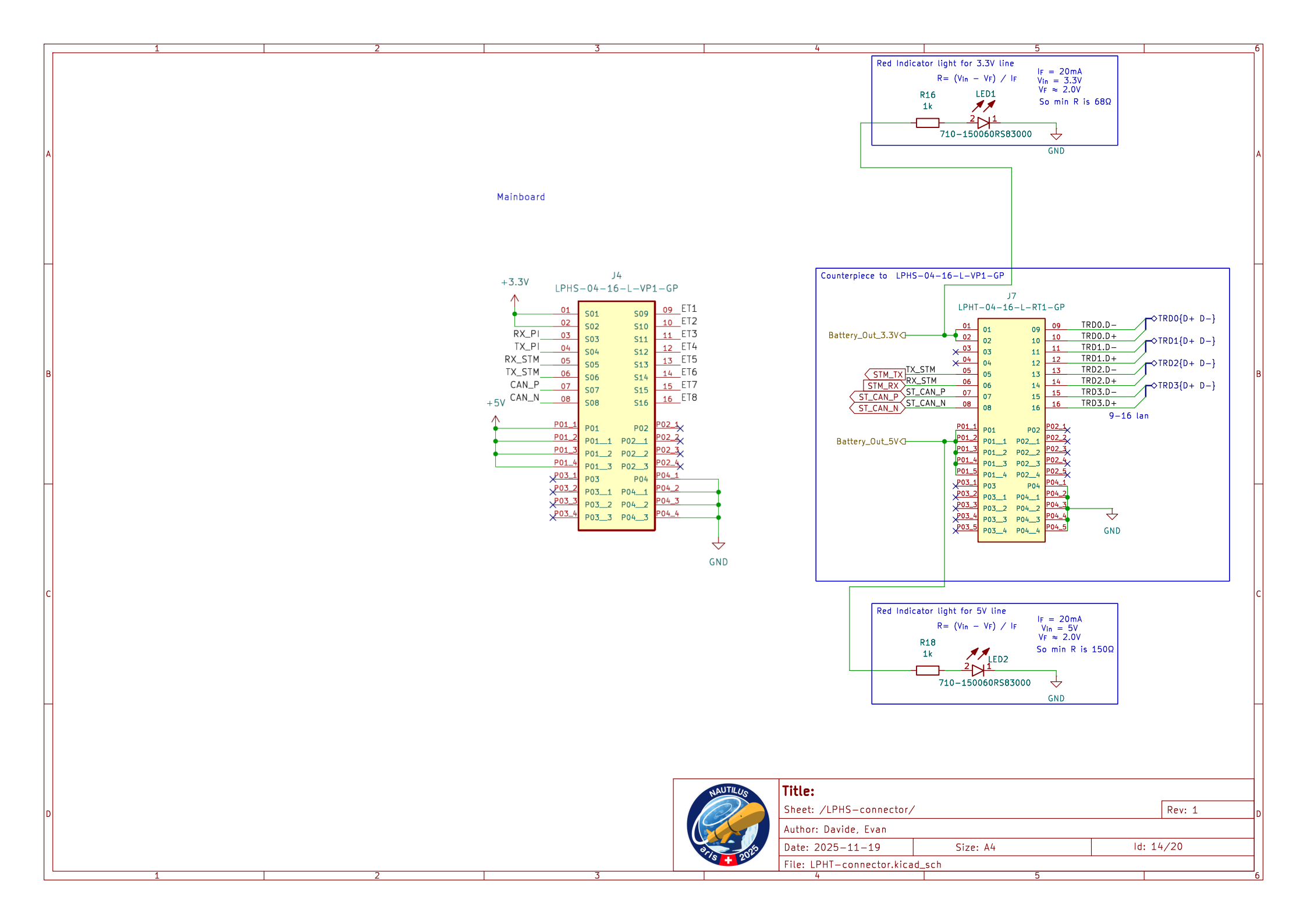
Title:

Sheet: /CM4/		Rev: 0
Author: Davide		
Date: 2025−11−19	Size: A4	Id: 3/20
File: CM4.kicad_sch		

Not in the PCB yet as we dont know if we actually need it.



Title:			
Sheet: /Piezzo/			Rev: 0
Author: Evan			
Date: 2025-11-19	Size: A4		Id: 4/20
File: Piezzo.kicad_sch			


Red Indicator light for 3.3V line
R= (Vin − Vf) / If
If = 20mA
Vin = 3.3V
Vf ≈ 2.0V
So min R is 68Ω
R16
1k
LED1
710−150060RS83000
GND
Mainboard
J4
LPHS−04−16−L−VP1−GP
+3.3V
+5V
RX_PI
TX_PI
RX_STM
TX_STM
CAN_P
CAN_N
ET1
ET2
ET3
ET4
ET5
ET6
ET7
ET8
GND
Counterpiece to LPHS−04−16−L−VP1−GP
J7
LPHT−04−16−L−RT1−GP
Battery_Out_3.3V
Battery_Out_5V
STM_TX
STM_RX
ST_CAN_P
ST_CAN_N
TRD0.D−
TRD0.D+
TRD1.D−
TRD1.D+
TRD2.D−
TRD2.D+
TRD3.D−
TRD3.D+
TRD0{D+ D−}
TRD1{D+ D−}
TRD2{D+ D−}
TRD3{D+ D−}
9−16 lan
GND
Red Indicator light for 5V line
R= (Vin − Vf) / If
If = 20mA
Vin = 5V
Vf ≈ 2.0V
So min R is 150Ω
R18
1k
LED2
710−150060RS83000
GND
Title:
Sheet: /LPHS−connector/
Rev: 1
Author: Davide, Evan
Date: 2025−11−19
Size: A4
Id: 14/20
File: LPHT−connector.kicad_sch

some rules:
USB wont power the STM32.
STM_Plug wont power the CM4
The GPIO_VREF of the CM4 needs to be STM32's 3.3V
The Lan Vin is only powered when running on Battery
Battery preferrably powers everything.

Whenever the CM4 runs, also run the LED signals AND the SSD voltage. all "core" tasks tied to the CM4.

Different Power Sources.

Reference power sources

Battery

Battery_Out_3.3V

Battery_Out_5V

STM_Plug

STM_Plug_3.3V

CM4 Vout

CM4_Out_3.3V

USB Cable

USB_Out_5V

Lan only if plugged in (battery)

place to deactivate

R46 0

R47 0

3.3V_Logic

R44 0

R45 0

place to activate

Battery_Out_3.3V

STM_Plug_3.3V

STM_In_3.3V

File: 3.3V_Logic.kicad_sch

LAN_IN_3.3V

+3.3V

place to deactivate

R38 0

R41 0

GPIO_REF3.3V

R42 0

R43 0

place to activate

STM_IN_3.3V

CM4_OUT_3.3V

GPIO_VREF_3.3V

File: GPIO_REF3.3V.kicad_sch

GPIO_VREF_3.3V

place to deactivate

0

0

5V_Logic

R35

R36 0

R37 0

place to activate

Battery_Out_5V

USB_Out_5V

CM4_In_5V

File: 5V_Logic.kicad_sch

+5V

Title:

Sheet: /Power_logic/

Rev: 1

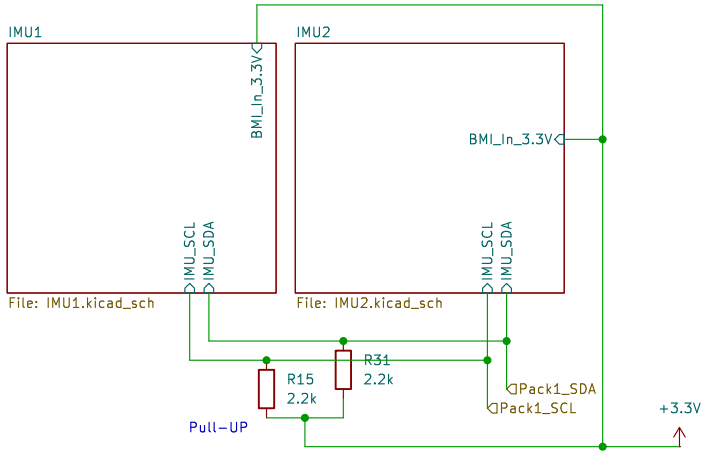
Author: Davide

Date: 2025-11-19

Size: A4

Id: 14/20

File: Power_logic.kicad_sch



Title:		
Sheet: /IMU/		Rev: 0
Author: Davide		
Date: 2025-11-19	Size: A4	Id: 18/20
File: IMU.kicad_sch		

Module1A
DF40C-100DS-0.4V(51)

GPIO

NB SD signals are only available on modules without eMMC

connect Wlan to gnd if off, and leave floating for on.
Please use a 2 pin connector here with a jumper cap. (has to be done)

GLOBAL_EN needs to be pulled low for >1ms after software shutdown.

Ethernet connection

CM4_Ethernet

File: CM4_Ethernet.kicad_sch

GLOBAL_EN logic

Q2
50V

Decoupling for CM4 5V inputs

CM4_LED2

File: CM4_LED2.kicad_sch

CM4_LED1

File: CM4_LED1.kicad_sch

Title:	
Sheet: /CM4/CM4_Module1A/	Rev: 0
Author: Davide	
Date: 2025-11-19	Size: A4
File: CM4_Module1A.kicad_sch	Id: 5/20

EXTERNALFAN5V1

Fan controller

J5
1792876

I am a fan.

R3
1k

Q1
50V

+5V

GND

Fan_ctrl

Connected to PB7

J2
61300211121

fan only active when battery is connected.
Mby add an external power pin to externally power the fan for testing.

FAN

3v3 ext was first implemented here

External interfaces

J1
FTSH-107-02-L-DV

Vdd
GND
USART1_RX
JTAG_TMS/SWDIO
JTAG_TCK/SWCLK
JTAG_TDO/SWO
JTAG_ TDI
nRST
USART1_TX

STM_Plug_3.3V
USART1_RX
USART1_TX
STM_BOOT0
GND
J4
22284054

R4
10k

SW1
B3F-1052

C19
100nF

IC1
STM32H7B0RBT6

Vdd
Vss
Pack1_SDA
Pack1_SCL
STM_BOOT0
Fan_ctrl
JTAG_TDO/SWO
JTAG_ TDI
JTAG_TCK/SWCLK

VBAT
PC13
PC14-OSC32_IN
PC15-OSC32_OUT
PH0-OSC_IN
PH1-OSC_OUT
NRST
PC0
PC1
PC2
PC3
VSSA
VDDA
PA0
PA1
PA2

VDD_3
VSS_3
VCAP_2
PA13
PA12
PA11
PA10
PA9
PA8
PC9
PC7
PC6
PB15
PB14
PB13
PB12

PA3
VSS_1
VDD_1
PA4
PA5
PA6
PA7
PC4
PC5
PB0
PB1
PB2
PB10
VCAP_1
VSS_2
VDD_2

CC4V-T1A-32.768kHz-6pF-20PPM-TA-QC
Y1
C8
4.7pF
C9
4.7pF
C15
2.2pF
C10
2.2pF

nRST
RUN_PG_CM4
GLOBAL_EN_CM4
JTAG_TMS/SWDIO
CAN1_TX
CAN1_RX
USART1_RX
USART1_TX
Piezzo_Control

Chose a Pin here please.
I chose 7 but please make sure its an actual pin evan. I just gambled.

must be hirarchical lable RX,TX
STM_TX
STM_RX
STM_USART_TX
UART4_TX
UART4_RX
USART2_TX

USART2_RX
SPI1_NSS
SPI1_SCK
SPI1_MISO
SPI1_MOSI

+3.3V
logic handled in power section

C11 100nF
C12 100nF
C13 100nF
C14 100nF
C17 100nF
C18 100nF
C16 10uF

STDC14 for STLINK-V3MINI (STM32 JTAG/SWD and VCP)

Figure 11. CN5 STDC14 connector (Top view)

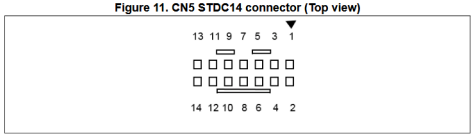


Table 4. CN5 STDC14 connector pinout

STDC14 Pin #	ARM10 Pin #	Pin description	Type
1	-	Reserved(1)	-
2	-	Reserved(1)	-
3	1	T_VCC(2)	I
4	2	T_JTMS/T_SWDIO	I/O
5	3	GND	S
6	4	T_JCLK/T_SWCLK	O
7	5	GND	S
8	6	T_JTDO/T_SWO(3)	I
9	7	T_JCLK	O
10	8	T_JTDI/NC(4)	O
11	9	GNDDetect	O
12	10	T_NRST	O
13	-	T_VCP_RX	O
14	-	T_VCP_TX	I

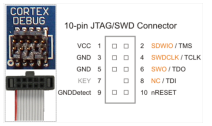
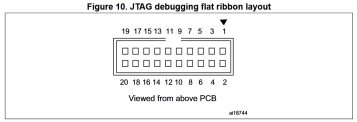


Figure 10. JTAG debugging flat ribbon layout



Title:

Sheet: /STM/PinoutSTM/

Rev: 0

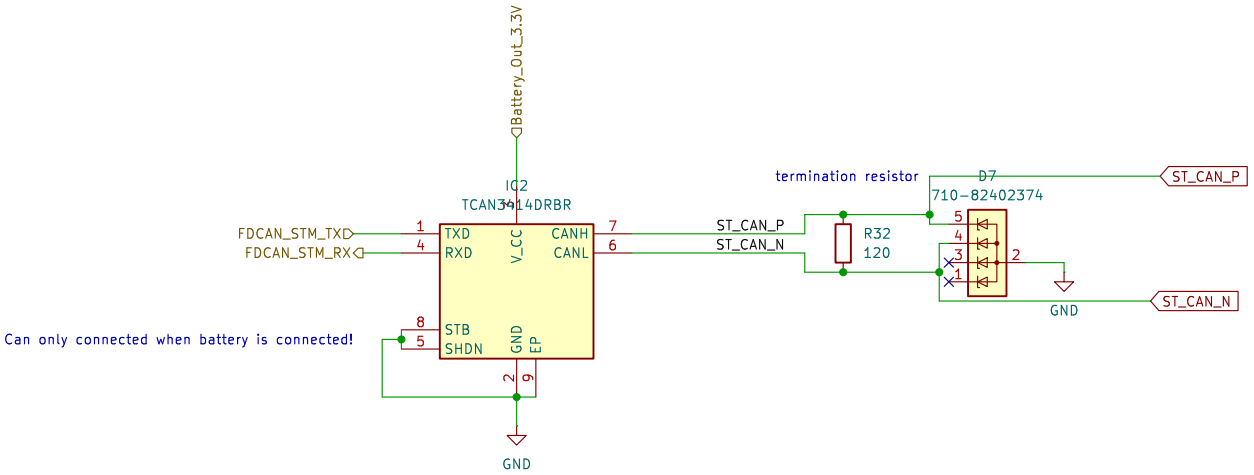
Author: Evan

Date: 2025-11-19

Size: A4

Id: 6/20

File: PinoutSTM.kicad_sch



Title:		
Sheet: /STM/CAN_Interface/		Rev: 0
Author: Evan		
Date: 2025-11-19	Size: A4	Id: 7/20
File: PowerSTM.kicad_sch		

Module1B
DF40C-100DS-0.4V(51)

Can be kept floating. if no usb is connected

PCIE_CLK{_N,_P}
PCIE_CLK._P
PCIE_CLK._N
PCIE_RX{_N,_P}
PCIE_RX._P
PCIE_RX._N
PCIE_TX{_N,_P}
PCIE_TX._P
PCIE_TX._N

maybe RX and TX need to be switched

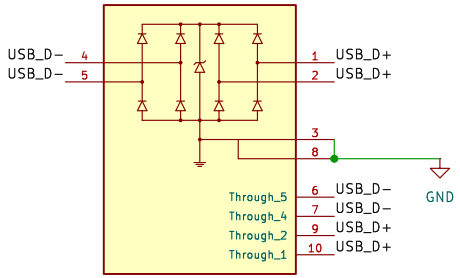
102	PCIe_CLK_nREQ	USB_OTG_ID	101
104	Reserved	USB2_N	103
106	Reserved	USB2_P	105
108	GND	GND	107
110	PCIe_CLK_P	PCIe_nRST	109
112	PCIe_CLK_N	VDAC_COMP	111
114	GND	GND	113
116	PCIe_RX_P	CAM1_D0_N	115
118	PCIe_RX_N	CAM1_D0_P	117
120	GND	GND	119
122	PCIe_TX_P	CAM1_D1_N	121
124	PCIe_TX_N	CAM1_D1_P	123
126	GND	GND	125
128	CAM0_D0_N	CAM1_C_N	127
130	CAM0_D0_P	CAM1_C_P	129
132	GND	GND	131
134	CAM0_D1_N	CAM1_D2_N	133
136	CAM0_D1_P	CAM1_D2_P	135
138	GND	GND	137
140	CAM0_C_N	CAM1_D3_N	139
142	CAM0_C_P	CAM1_D3_P	141
144	GND	HDMI1_HOTPLUG	143
146	HDMI1_TX2_P	HDMI1_SDA	145
148	HDMI1_TX2_N	HDMI1_SCL	147
150	GND	HDMI1_CEC	149
152	HDMI1_TX1_P	HDMI0_CEC	151
154	HDMI1_TX1_N	HDMI0_HOTPLUG	153
156	GND	GND	155
158	HDMI1_TX0_P	DSI0_D0_N	157
160	HDMI1_TX0_N	DSI0_D0_P	159
162	GND	GND	161
164	HDMI1_CLK_P	DSI0_D1_N	163
166	HDMI1_CLK_N	DSI0_D1_P	165
168	GND	GND	167
170	HDMI0_TX2_P	DSI0_C_N	169
172	HDMI0_TX2_N	DSI0_C_P	171
174	GND	GND	173
176	HDMI0_TX1_P	DSI1_D0_N	175
178	HDMI0_TX1_N	DSI1_D0_P	177
180	GND	GND	179
182	HDMI0_TX0_P	DSI1_D1_N	181
184	HDMI0_TX0_N	DSI1_D1_P	183
186	GND	GND	185
188	HDMI0_CLK_P	DSI1_C_N	187
190	HDMI0_CLK_N	DSI1_C_P	189
192	GND	GND	191
194	DSI1_D3_N	DSI1_D2_N	193
196	DSI1_D3_P	DSI1_D2_P	195
198	GND	GND	197
200	HDMI0_SCL	HDMI0_SDA	199

High Speed Serial

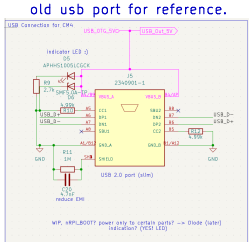
USB_OTG_ID
USB_D-
USB_D+
PCIE_nRST

GND
GND

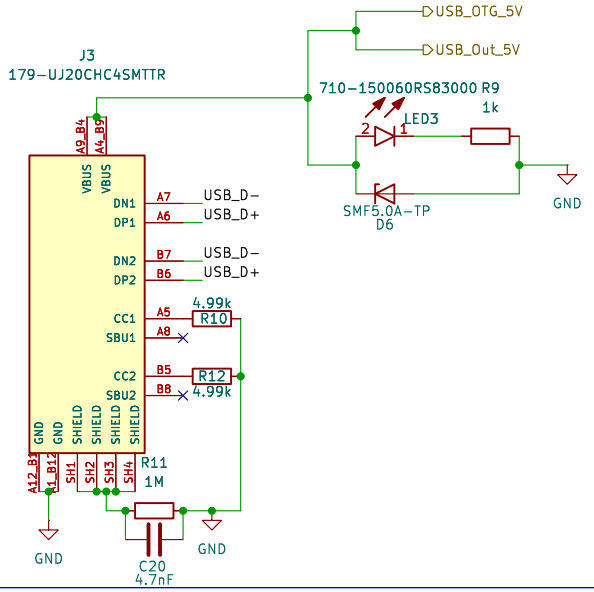
ESD/EMP protection for the USB
Super important to not differ lengths or curve a lot with D+ and D-.
Also should have same hole counts (vias) and same length.
TPD4EUSB30DQAR3



old usb port for reference.



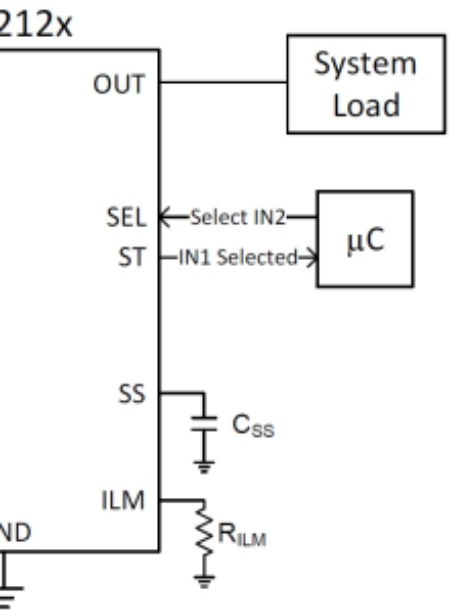
USB Connection for CM4



WIP, nRPI_BOOT? power only to certain parts? -> Diode (later)
indication? (YES! LED)

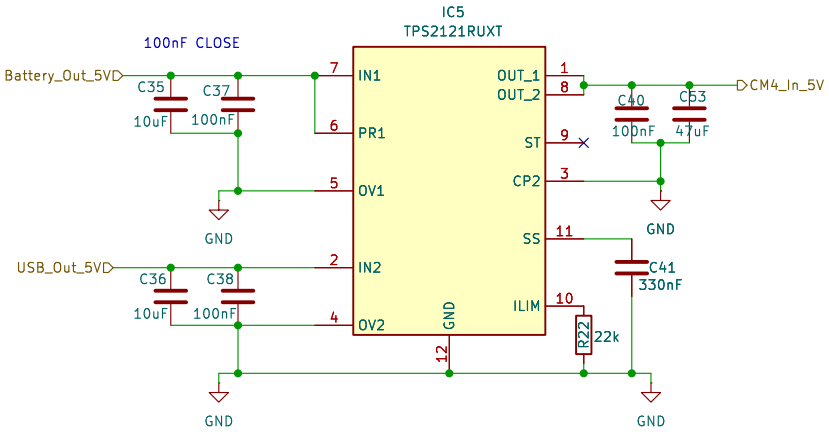
Title:

Sheet: /CM4/CM4_Module1B/		Rev: 0
Author: Davide		
Date: 2025-11-19	Size: A4	Id: 11/20
File: CM4_Module1B.kicad_sch		



for questions about wiring etc please consult the datasheet...
https://www.ti.com/lit/ds/symlink/tps2120.pdf?ts=1761678178328

PR1 > CP2 -> IN1 has prio



		Pins	MIN	MAX	UNIT
V_{IN1} , V_{IN2} , V_{OUT}	Maximum Power Pin Voltage	IN1, IN2, OUT	-0.3	24	V
V_{OV1} , V_{OV2}	Maximum Overvoltage Pin Voltage	OV1, OV2	-0.3	6	V
V_{PRI} , V_{SEL}	Maximum Control Pin Voltage	PRI, SEL	-0.3	6	V
V_{ST}	Maximum Control Pin Voltage	ST	-0.3	6	V
I_{OUT}	Maximum Output Current	OUT	Internally Limited		
$T_{J, MAX}$	Maximum Junction Temperature		Internally Limited		
T_{STG}	Storage temperature		-65	150	°C

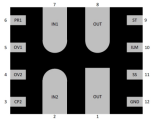


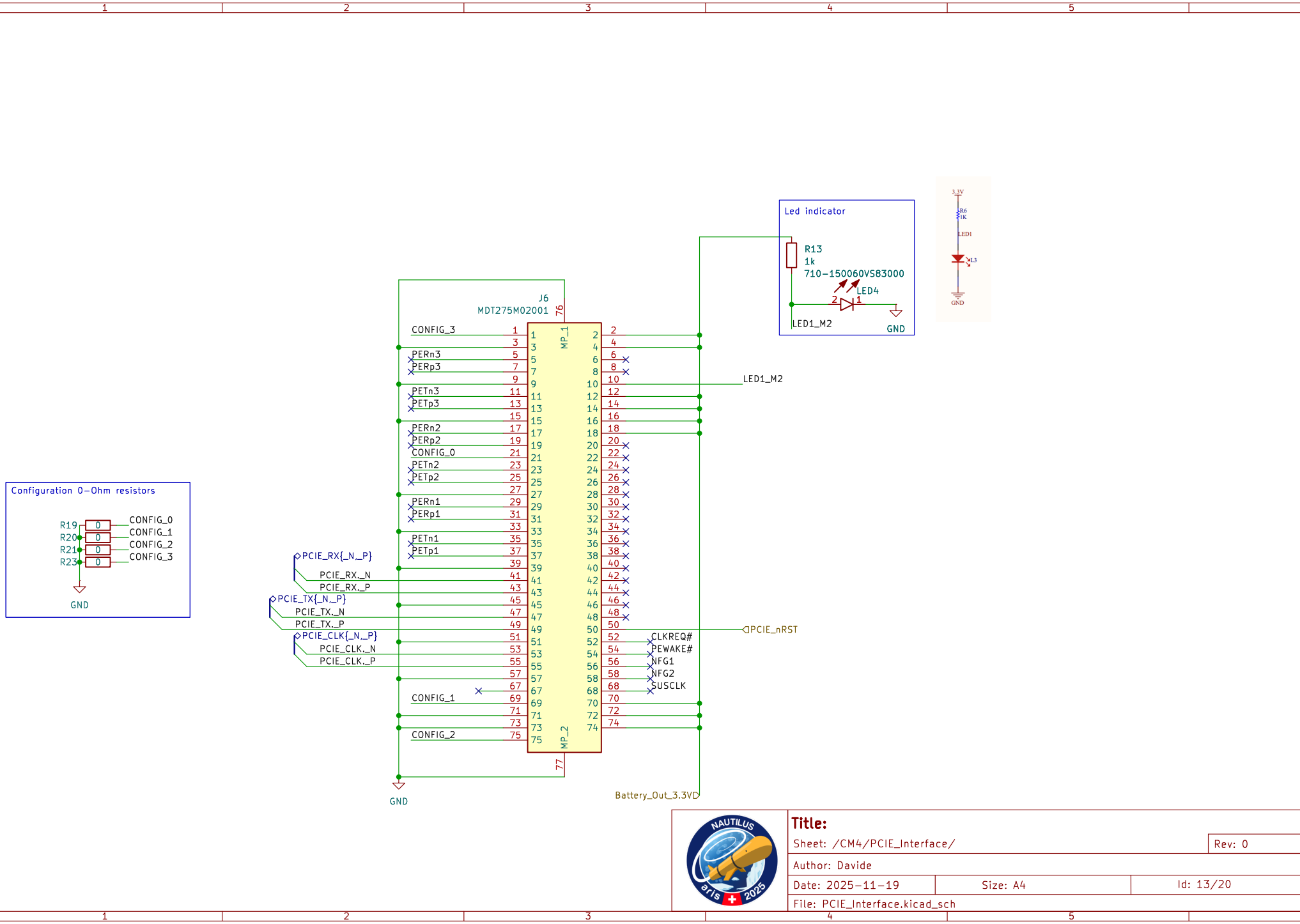
Figure 6-2. TPS2121 (RUX) Package 12-Pin VQFN-HR Bottom View

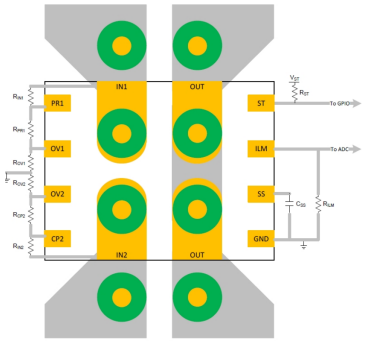
Pin Functions

PIN			I/O	DESCRIPTION
NAME	TPS2120 WCSP	TPS2121 VQFN-HR		
IN1	B1, B2, C1	7	I	Power Input for Source 1
IN2	B3, B4, C4	2	I	Power Input for Source 2
OUT	C2, C3, D1, D2, D3, D4	1, 8	I	Power Output
ST	E1	9	O	Status output indicating which channel is selected. Connect to GND if not required.
ILIM	E2	10	O	Output Current Limiting for both channels.
SS	E3	11	O	Adjusts Input Setting Delay Time and Output Soft Start Time
GND	E4	12	—	Device Ground
PR1	A1	6	I	Enables Priority Operation. Connect to IN1 to set switchover voltage. Connect to GND if not required.
OV1	A2	5	I	Active Low Enable Supervisor for IN1 Overvoltage Protection. Connect to GND if not required.
OV2	A3	4	I	Active Low Enable Supervisor for IN2 Overvoltage Protection. Connect to GND if not required.
SEL	A4	—	I	Active low Enable for IN1. Allows GPIO to override priority operation and manually select IN2. TPS2120 only.
CP2	—	3	I	Enables Comparator Operation and is compared to PR1 to set switchover voltage. Connect to GND if not required. TPS2121 only.

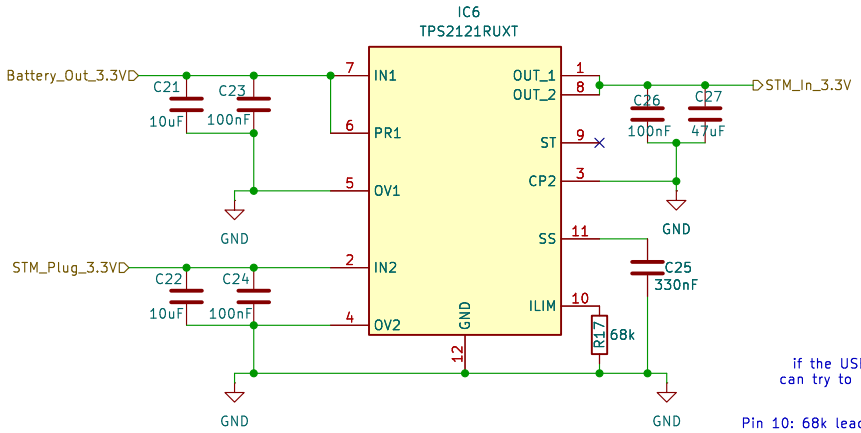
if the USB-only cold start "disconnects" we can try to bump SS to 470nF instead of 330nF.

Title:
Sheet: /Power_logic/5V_Logic/
Rev: 0
Author: Davide
Date: 2025-11-19
Size: A4
Id: 12/20
File: 5V_Logic.kicad_sch


Configuration 0-Ohm resistors
R19 0 CONFIG_0
R20 0 CONFIG_1
R21 0 CONFIG_2
R23 0 CONFIG_3
GND
Led indicator
R13
1k
710-150060VS83000
LED4
LED1_M2
GND
J6
MDT275M02001
MP_1
MP_2
CONFIG_3
PERn3
PERp3
PETn3
PETp3
PERn2
PERp2
CONFIG_0
PETn2
PETp2
PERn1
PERp1
PETn1
PETp1
CONFIG_1
CONFIG_2
PCIE_RX{_N,_P}
PCIE_RX._N
PCIE_RX._P
PCIE_TX{_N,_P}
PCIE_TX._N
PCIE_TX._P
PCIE_CLK{_N,_P}
PCIE_CLK._N
PCIE_CLK._P
LED1_M2
PCIE_nRST
CLKREQ#
PEWAKE#
NFG1
NFG2
SUSCLK
GND
Battery_Out_3.3VD
Title:
Sheet: /CM4/PCIE_Interface/
Rev: 0
Author: Davide
Date: 2025-11-19
Size: A4
Id: 13/20
File: PCIE_Interface.kicad_sch



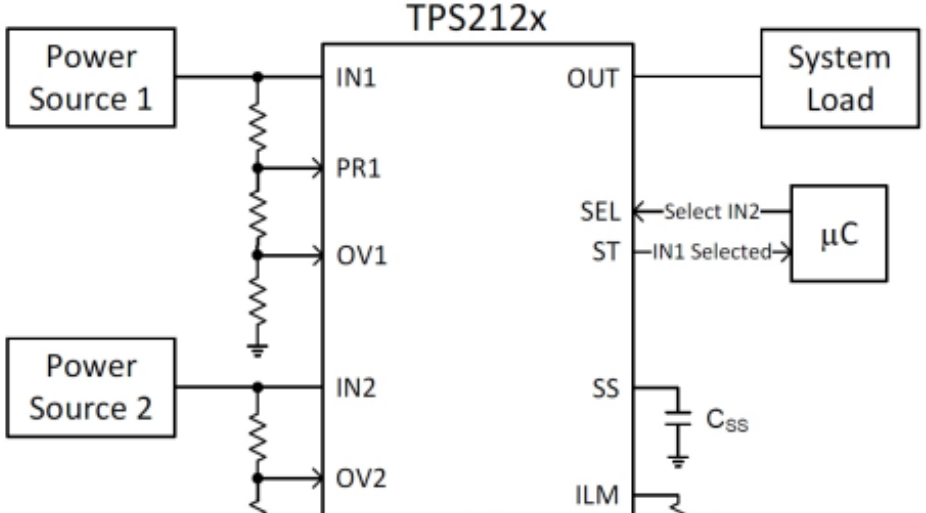
PR1 > CP2 -> IN1 has prio



if the USB-only cold start "disconnects" we can try to bump SS to 470nF instead of 330nF.

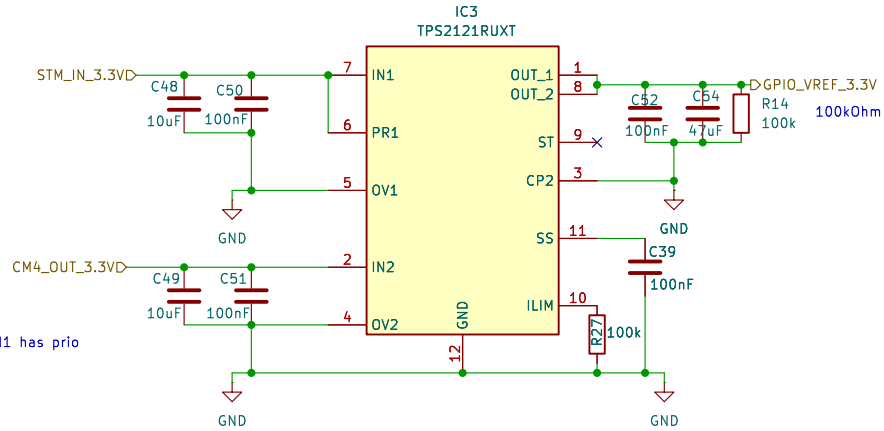
Pin 10: 68k leads to about 1.72A (should be enough for STM)

[R] = [kOhm]	22 kΩ → ~4.55 A
65.2 / R^0.861	39 kΩ → ~2.78 A
	50 kΩ → ~2.25 A
	56 kΩ → ~2.04 A
	68 kΩ → ~1.72 A
	100 kΩ → ~1.24 A



_Logic/ | Rev: 0

Size: A4 | Id: 15/20



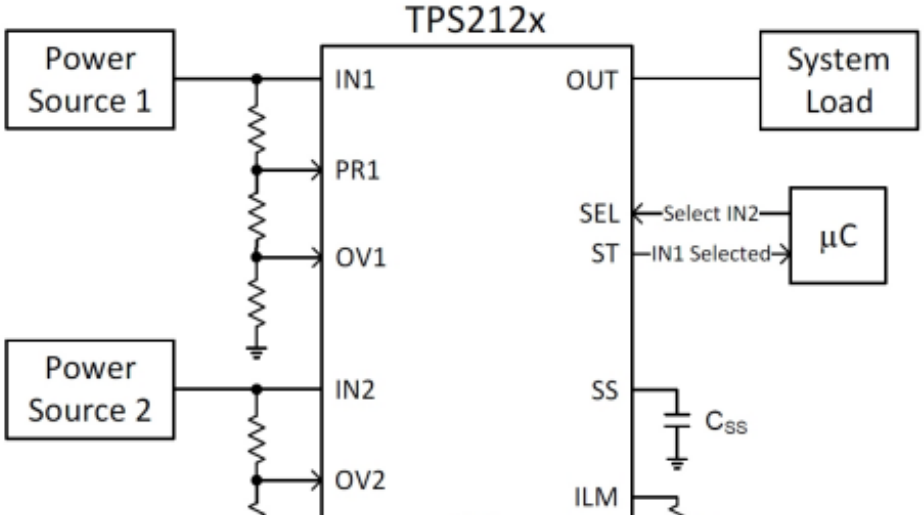
100kOhm pulldown so Vref is low if everything is off (not floating)

PR1 > CP2 –> IN1 has prio

Pin 10: 100kOhm leads to about 1.24A (absolute overkill)

[R] = [kOhm]	22 kΩ → ~4.55 A
65.2 / R^0.861	39 kΩ → ~2.78 A
	50 kΩ → ~2.25 A
	56 kΩ → ~2.04 A
	68 kΩ → ~1.72 A
	100 kΩ → ~1.24 A

Pin SS (11): 100nF soft start cap more than enoug as virtually no load at all at vref

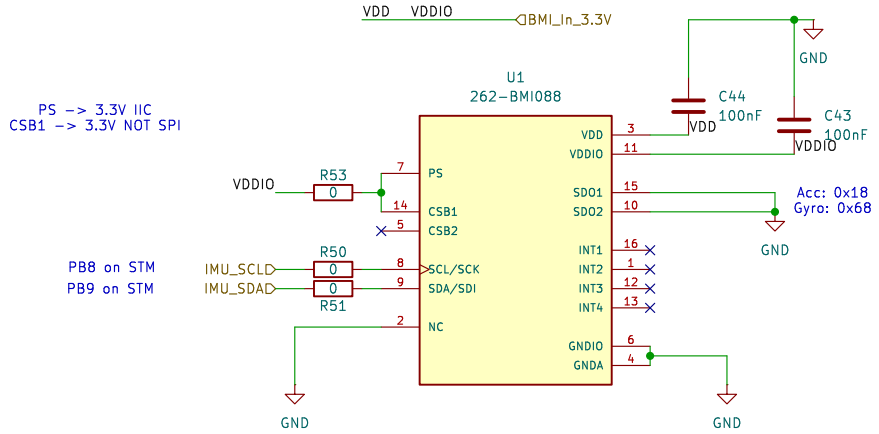


3V/

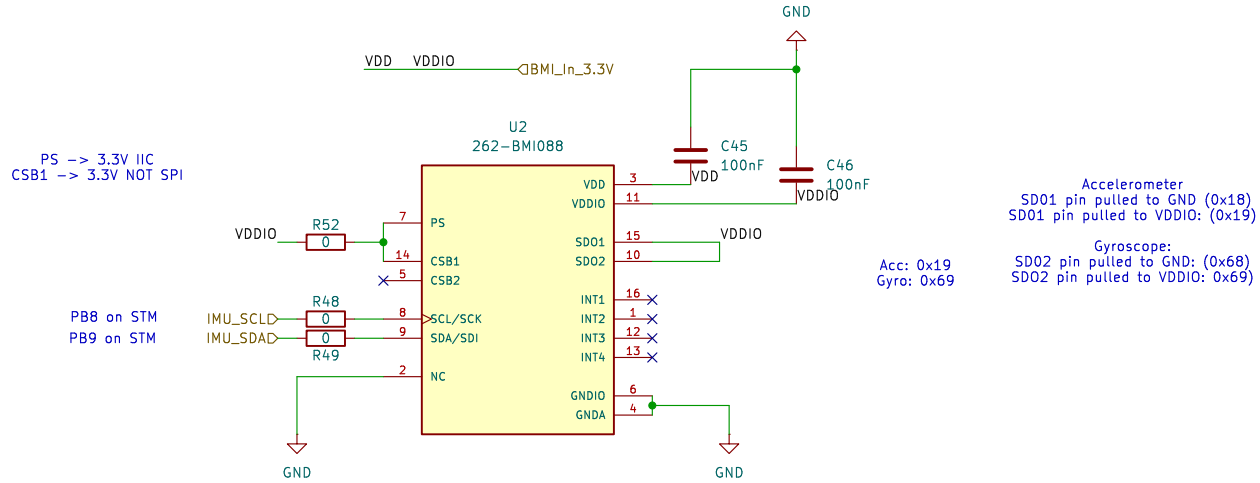
Rev: 0

Size: A4

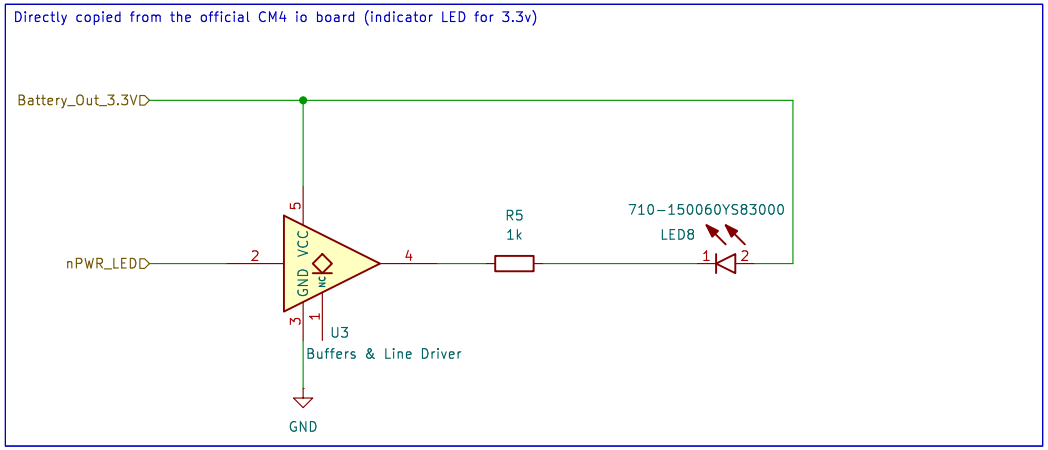
Id: 16/20



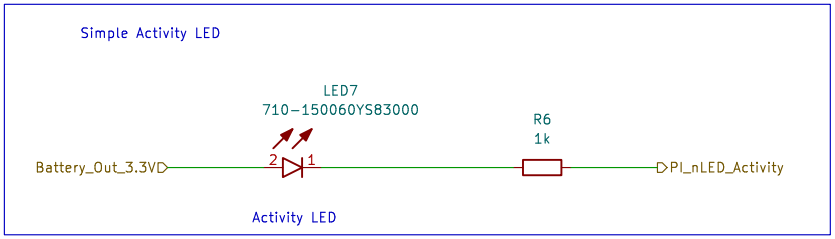
Title:	
Sheet: /IMU/IMU1/	Rev: 0
Author: Davide	
Date: 2025-11-19	Size: A4
File: IMU1.kicad_sch	Id: 19/20



Title:			
Sheet: /IMU/IMU2/			Rev: 0
Author: Davide			
Date: 2025-11-19	Size: A4		Id: 20/20
File: IMU2.kicad_sch			

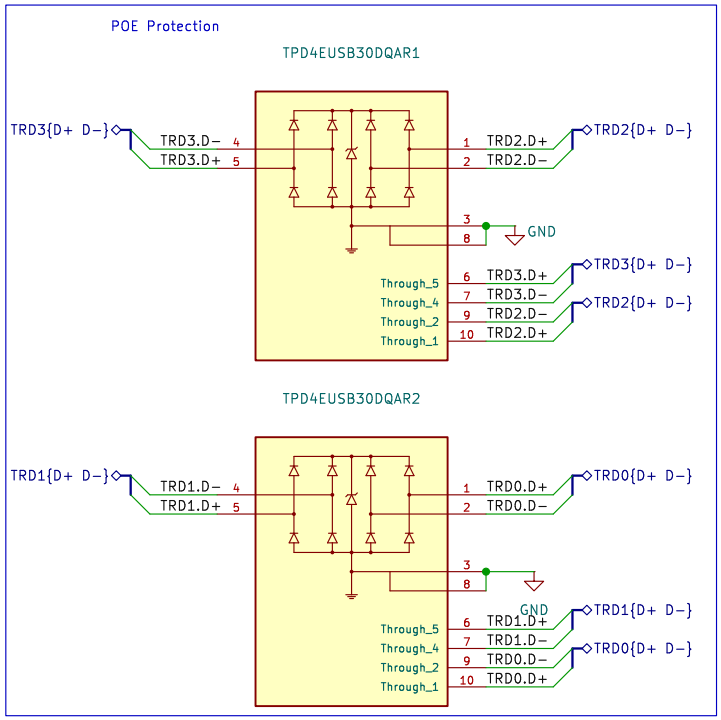


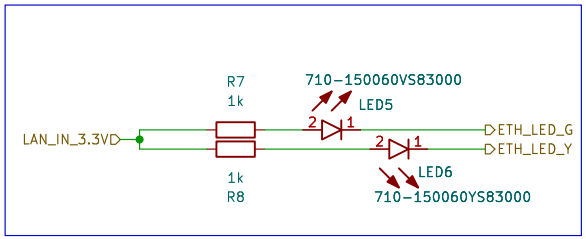
Title:			
Sheet: /CM4/CM4_Module1A/CM4_LED1/			Rev: 0
Author: Davide			
Date: 2025-11-19	Size: A4		Id: 8/20
File: CM4_LED1.kicad_sch			



Title:

Sheet: /CM4/CM4_Module1A/CM4_LED2/		Rev: 0
Author: Davide		
Date: 2025-11-19	Size: A4	Id: 9/20
File: CM4_LED2.kicad_sch		





Title:		
Sheet: /CM4/CM4_Module1A/CM4_Ethernet/		Rev: 0
Author: Davide		
Date: 2025−11−19	Size: A4	Id: 10/20
File: CM4_Ethernet.kicad_sch		