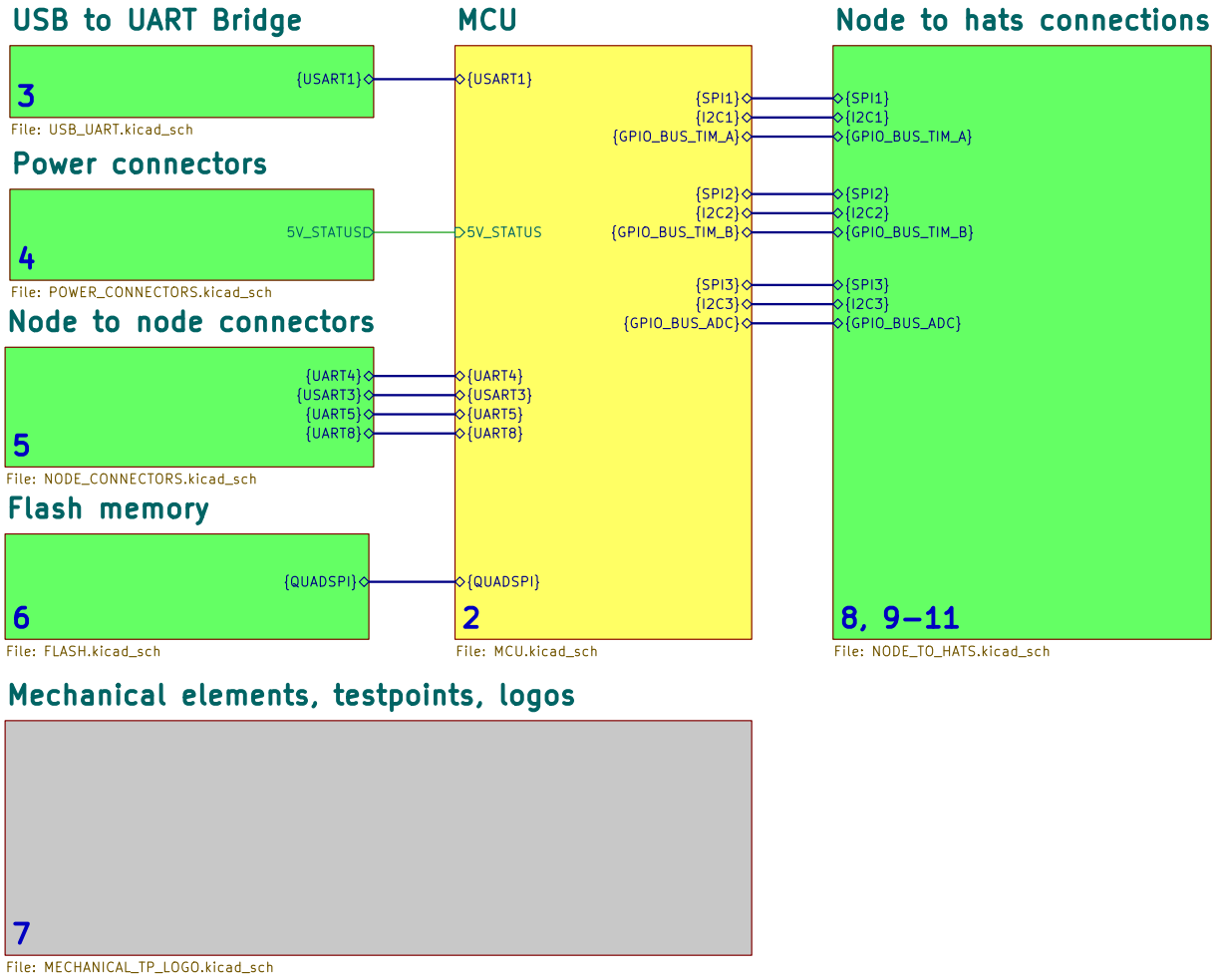
Orion PCB node overview



Author: Vincent Nguyen

EPFL Xplore

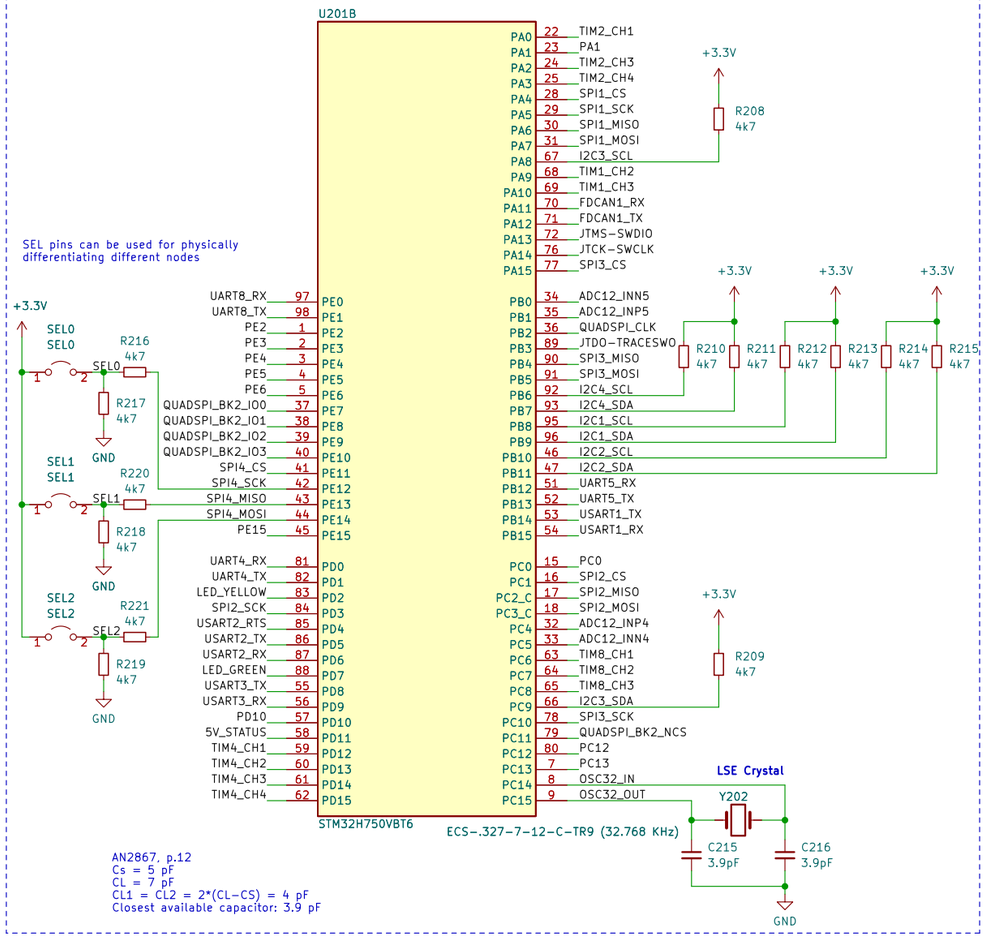
Sheet: /
File: orion_pcb.kicad_sch

Title: Orion PCB Node Overview

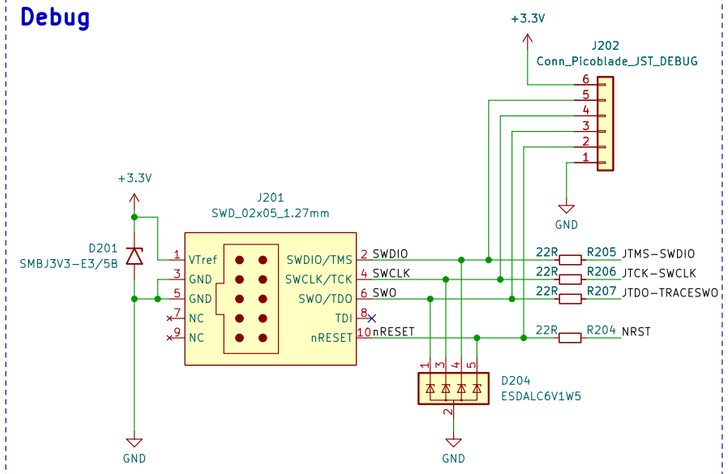
Size: A4	Date:	Rev: 2
KiCad E.D.A. eeschema (6.0.8)		Id: 1/11

MCU (STM32H750VBT6)

GPIO, UART, SPI, TIMERS, I2C, ADC

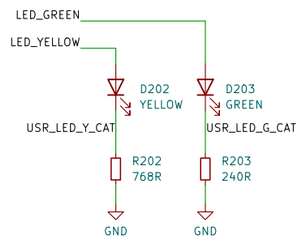


Debug



See AN5612, 3.6.1

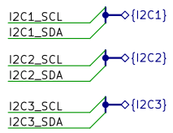
Status LEDs (user-controlled)



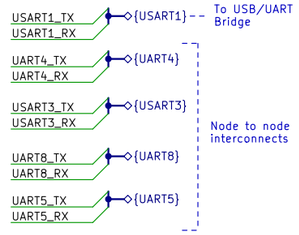
We aim for ~30% rel. lum. for green LED
If = 5 mA
Vf = 2.1 V
R = (3.3 V - 2.1 V)/(5 mA) = 240 Ohm

Buses

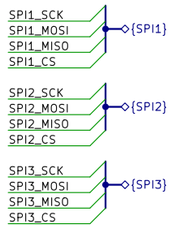
I2C



UART

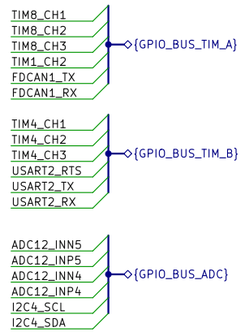


SPI

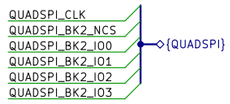


We only use one slave select pin per SPI bus. This means we are limited to one slave per SPI

GPIO



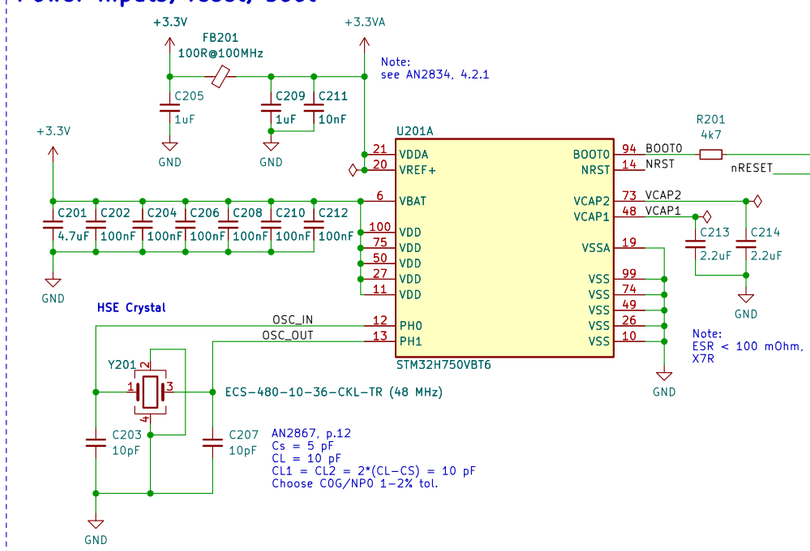
QUADSPI



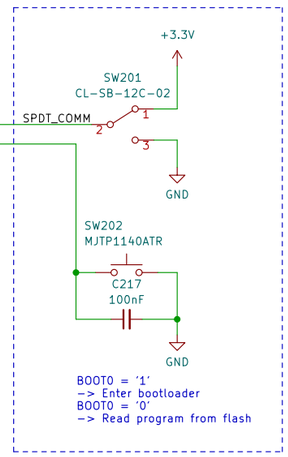
5V power source status

3.3V if board is powered by external source
0V if board is powered by USB through LDO
Should be used to prevent powering high current peripherals (motors, LEDs) directly from USB port

Power inputs, reset, boot



Reset and boot



BOOT0 = '1'
-> Enter bootloader
BOOT0 = '0'
-> Read program from flash

Author: Vincent Nguyen

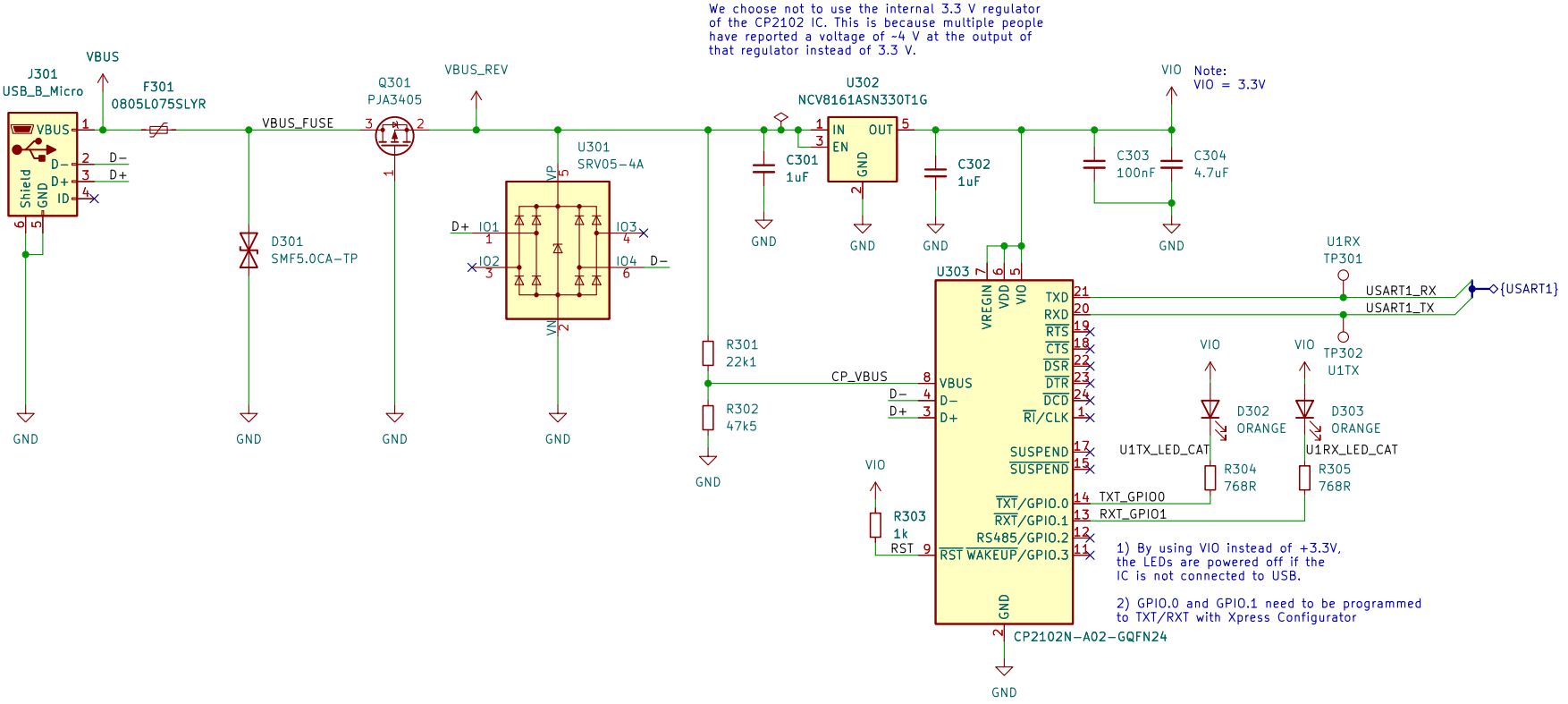
EPFL Xplore

Sheet: /MCU/
File: MCU.kicad_sch

Title: MCU

Size: A3	Date:	Rev:
KiCad E.D.A. eeschema (6.0.8)		Id: 2/11

USB to UART bridge



Author: Vincent Nguyen

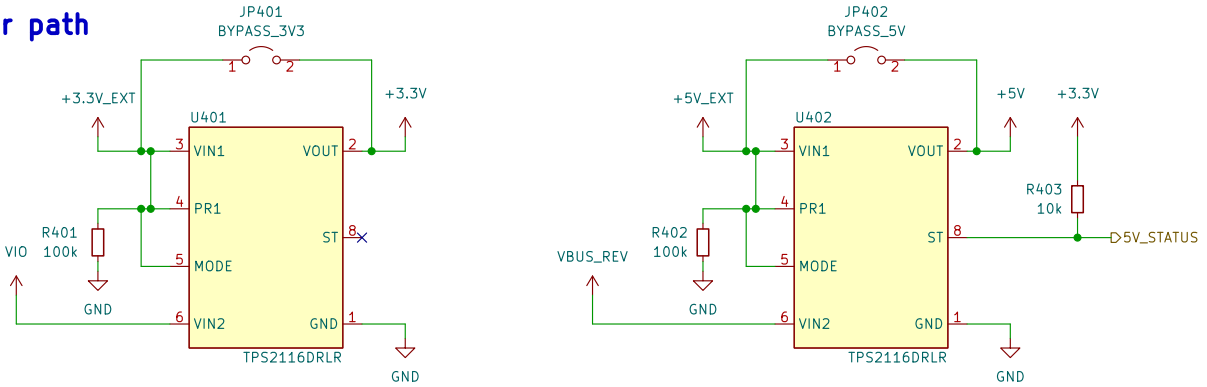
EPFL Xplore

Sheet: /USB to UART Bridge/
File: USB_UART.kicad_sch

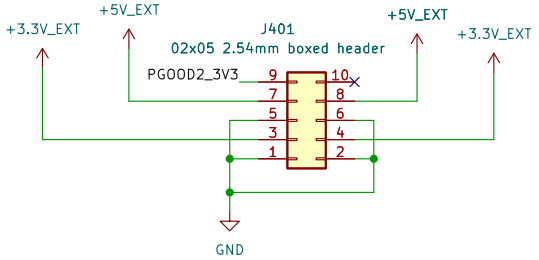
Title: USB to UART Bridge

Size: A4	Date:	**Rev:**
KiCad E.D.A. eeschema (6.0.8)		Id: 3/11

Power path



Switching converter connector



Author: Vincent Nguyen

EPFL Xplore

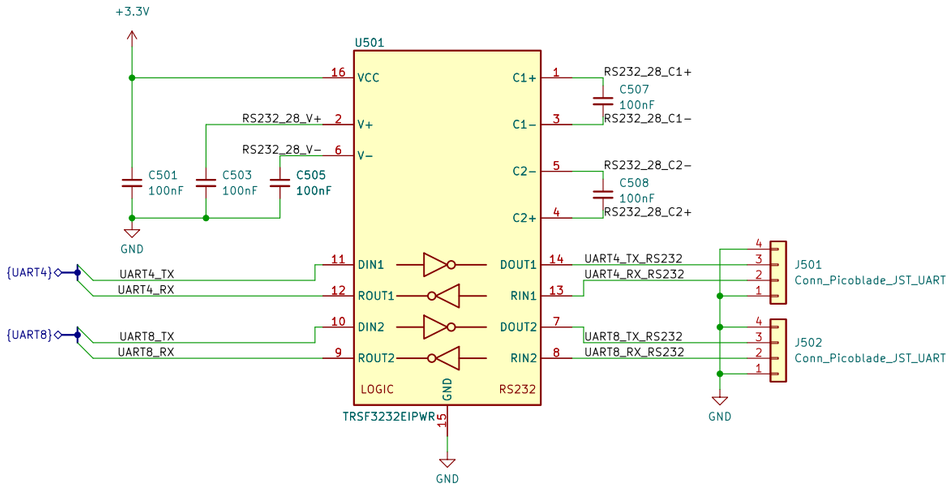
Sheet: /Power connectors/
File: POWER_CONNECTORS.kicad_sch

Title: External Connectors and Power Path

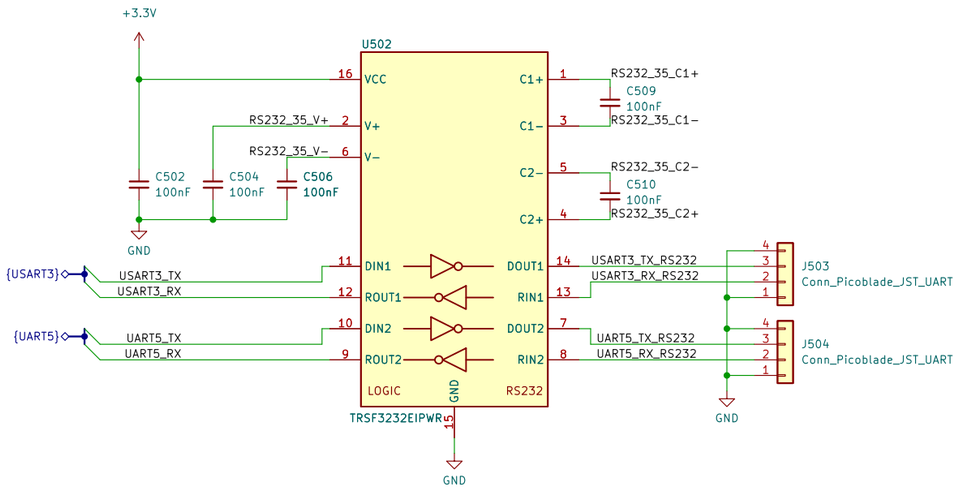
Size: A5	Date:	**Rev:**
KiCad E.D.A. eeschema (6.0.8)		Id: 4/11

RS232 Transceivers

UART4, USART8



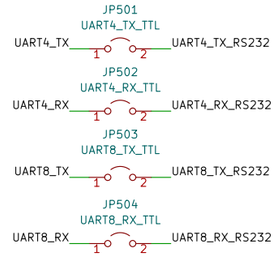
UART3, UART5



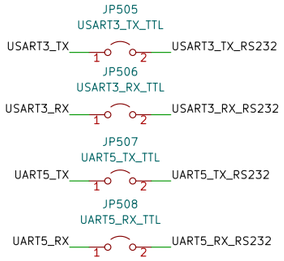
Maximum speed is 250 kb/s if using RS232 transceiver

Jumpers

UART4, USART8



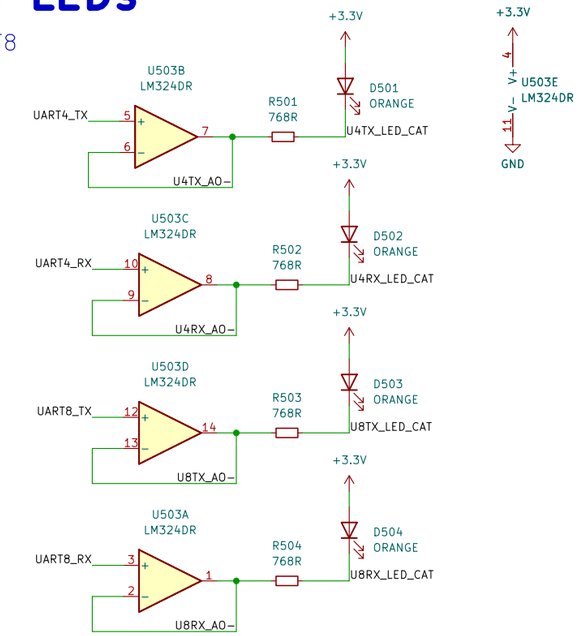
USART3, UART5



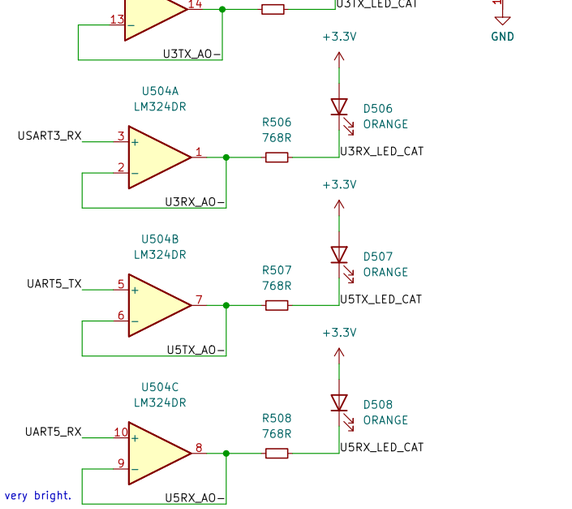
To use TTL voltage levels, short ALL of the jumpers
for both nodes, for the corresponding UART buses.

Activity LEDs

UART4, USART8



UART3, UART5



Activity LEDs don't need to be very bright.
We choose If = 1.7 mA
R = (3.3 V − 2 V)/(2 mA) = 765 Ohm
Closest standard resistor −> 768 Ohm

Author: Vincent Nguyen

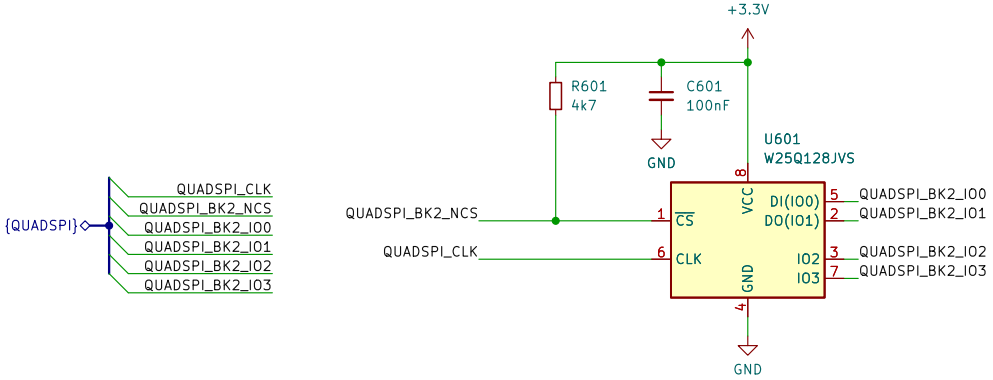
EPFL Xplore

Sheet: /Node to node connectors/
File: NODE_CONNECTORS.kicad_sch

Title: RS232 UART Node to Node Connectors

Size: A3	Date:	**Rev:**
KiCad E.D.A. eeschema (6.0.8)		Id: 5/11

Quad-SPI external flash memory



Author: Vincent Nguyen

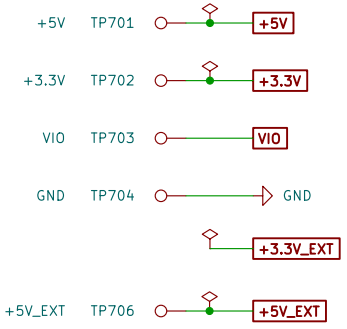
EPFL Xplore

Sheet: /Flash memory/
File: FLASH.kicad_sch

Title: External Flash Memory

Size: A5	Date:	**Rev:**
KiCad E.D.A. eeschema (6.0.8)		Id: 6/11

Test points, power flags



Mounting holes

H701 MountingHole
H702 MountingHole
H703 MountingHole
H704 MountingHole
H705 MountingHole
H706 MountingHole
H707 MountingHole
H708 MountingHole

Logos

Xplore
EPFL
maxon
APCO TECHNOLOGIES
ELCA

Author: Vincent Nguyen

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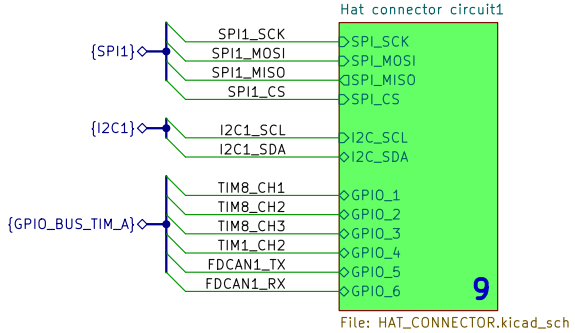
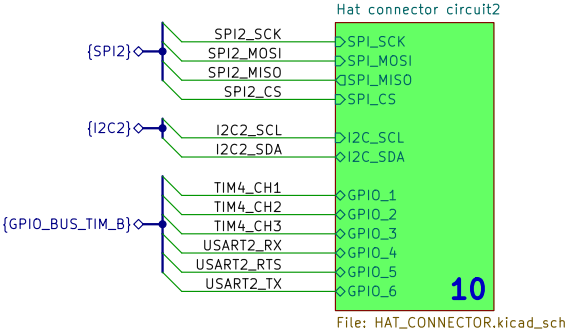
Sheet: /Mechanical elements, testpoints, logos/
File: MECHANICAL_TP_LOGO.kicad_sch

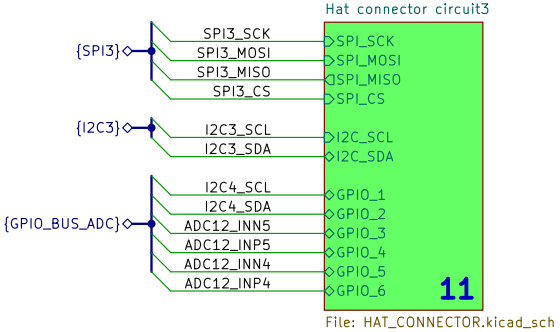
Title: Mechanical Elements and Test Points

Size: A5	Date:	**Rev:**
KiCad E.D.A. eeschema (6.0.8)		Id: 7/11

Node to Hat connectors







Author: Vincent Nguyen

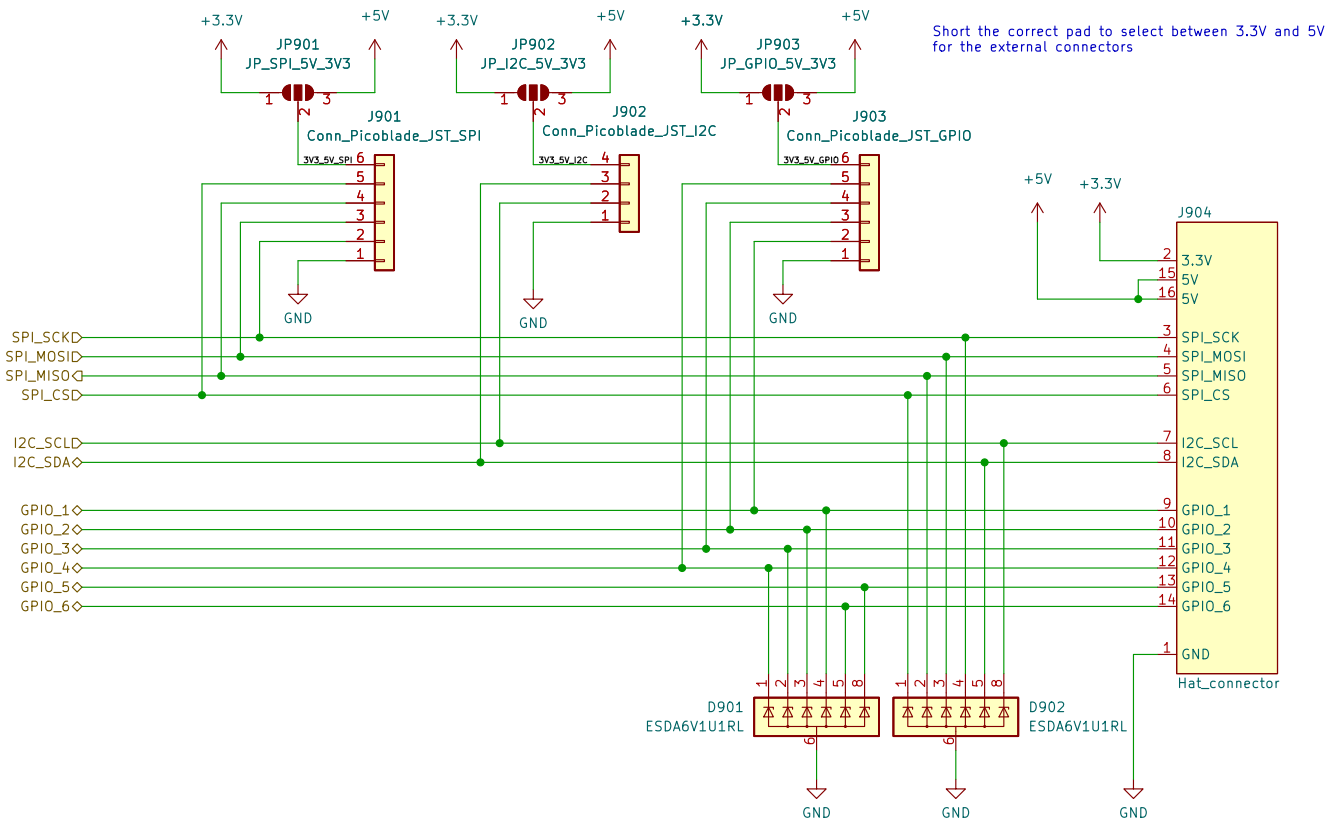
EPFL Xplore

Sheet: /Node to hats connections/
File: NODE_TO_HATS.kicad_sch

Title: Hat Connectors and Delocalized Connectors

Size: A5	Date:	**Rev:**
KiCad E.D.A. eeschema (6.0.8)		Id: 8/11

Hat connector



Author: Vincent Nguyen

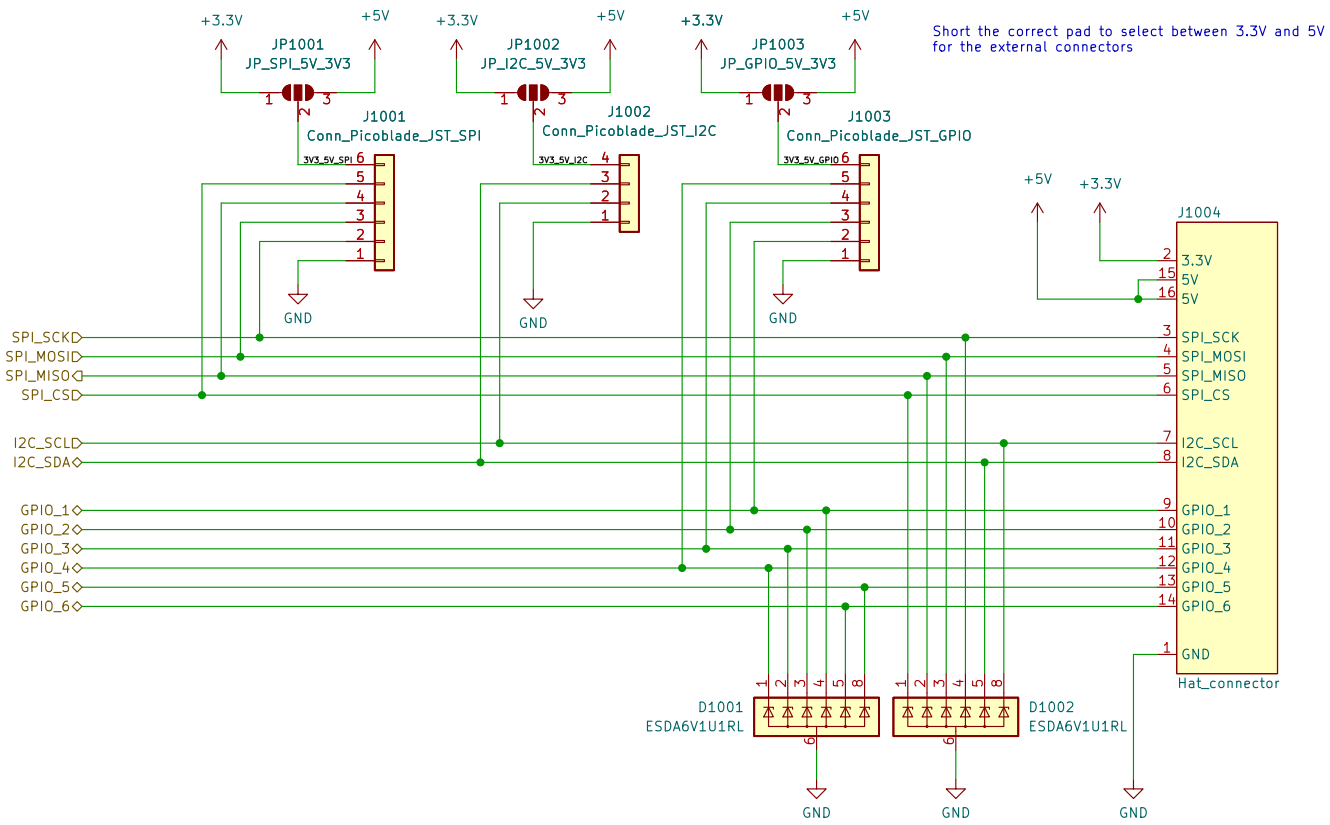
EPFL Xplore

Sheet: /Node to hats connections/Hat connector circuit1/
File: HAT_CONNECTOR.kicad_sch

Title: Hat Connector

Size: A4	Date:	**Rev:**
KiCad E.D.A. eeschema (6.0.8)		Id: 9/11

Hat connector



Author: Vincent Nguyen

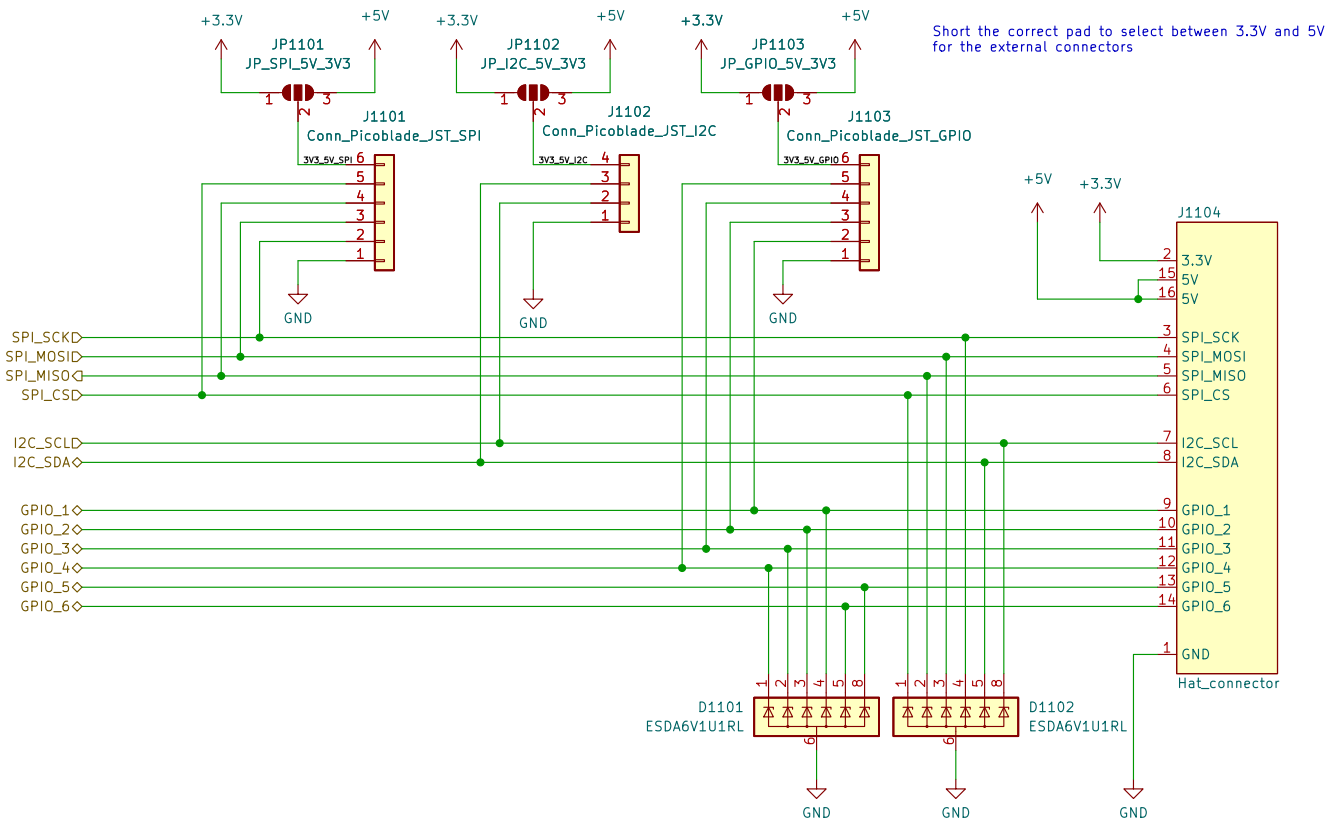
EPFL Xplore

Sheet: /Node to hats connections/Hat connector circuit2/
File: HAT_CONNECTOR.kicad_sch

Title: Hat Connector

Size: A4	Date:	**Rev:**
KiCad E.D.A. eeschema (6.0.8)		Id: 10/11

Hat connector



Author: Vincent Nguyen		
EPFL Xplore		
Sheet: /Node to hats connections/Hat connector circuit3/		
File: HAT_CONNECTOR.kicad_sch		
Title: Hat Connector		
Size: A4	Date:	**Rev:**
KiCad E.D.A. eeschema (6.0.8)		Id: 11/11