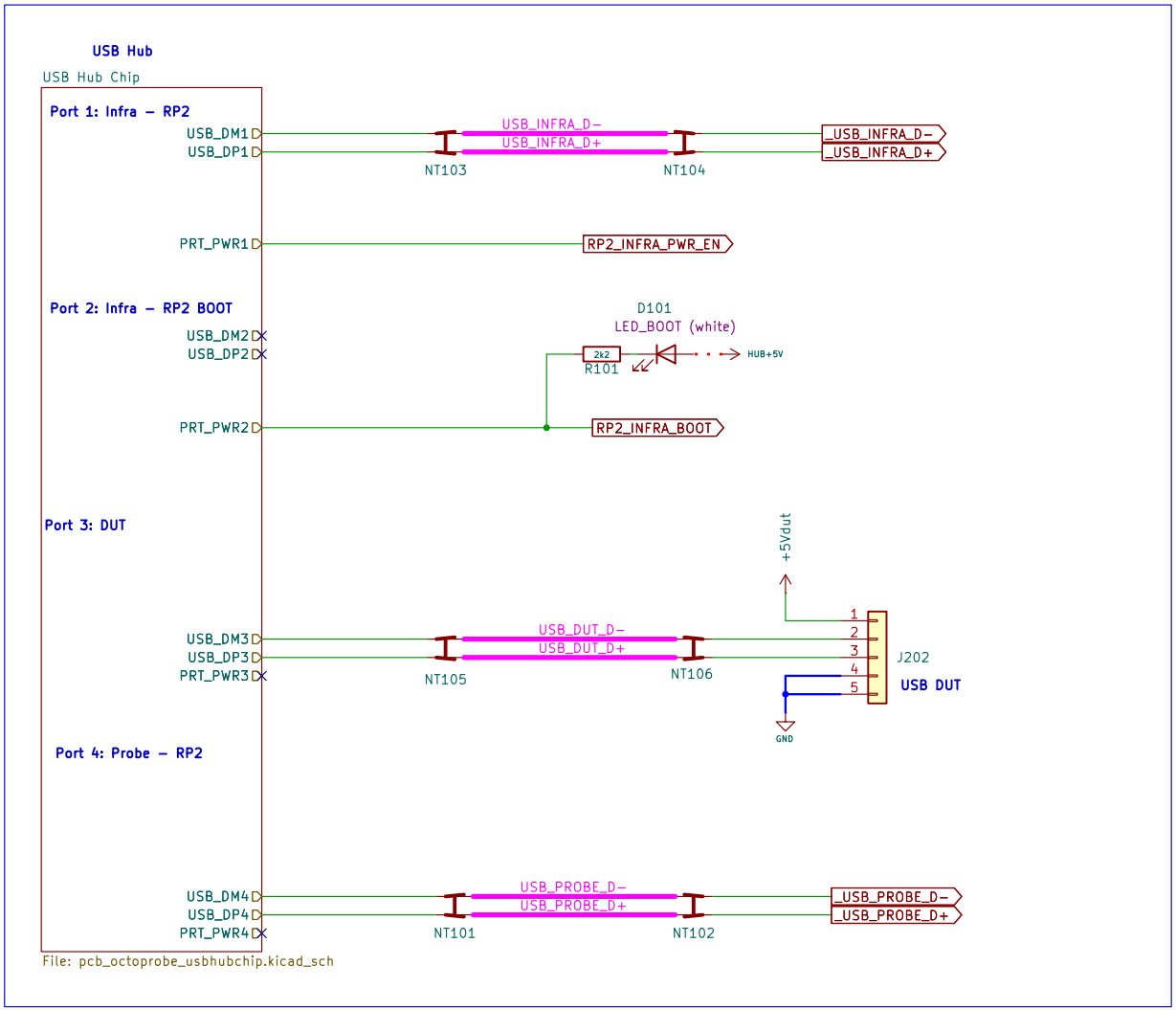

Regulator 3V3

File: pcb_octoprobe_regulator3V3.kicad_sch

RP2 CPU

12MHz

File: pcb_octoprobe_cpu.kicad_sch

RP2 PROBE

12MHz

File: pcb_octoprobe_probe.kicad_sch

Relay Breakout

File: pcb_octoprobe_relay_breakout.kicad_sch

Prototype Area

File: pcb_octoprobe_prototype_area.kicad_sch

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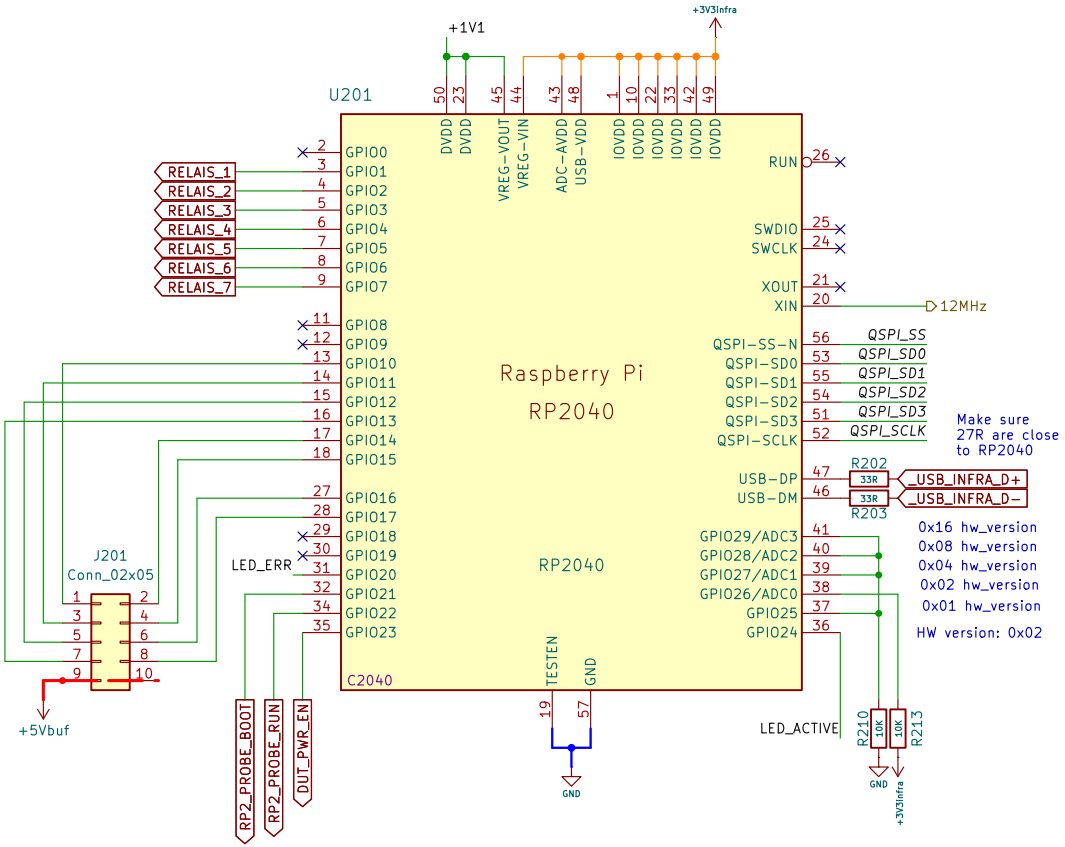
Sheet: /
File: pcb_octoprobe.kicad_sch

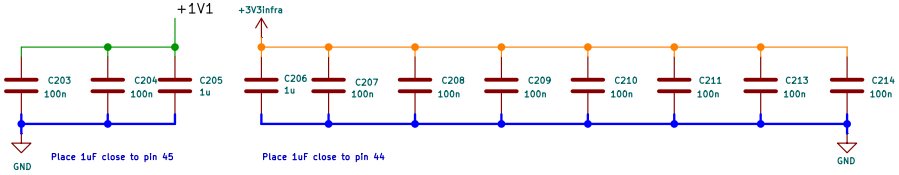
Title: Octoprobe tentacle

Size: A4	Date: 2025-11-24	**Rev: 0.6**
KiCad E.D.A. 9.0.6		Id: 1/14

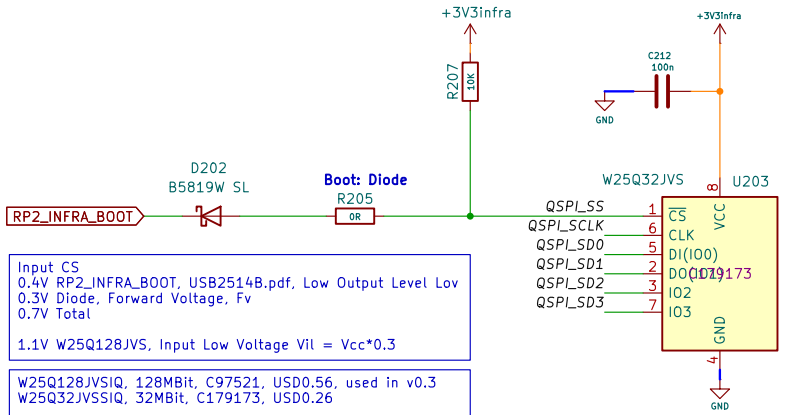
RP2040 Infra

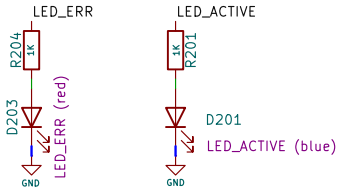


Bypass Capacitors

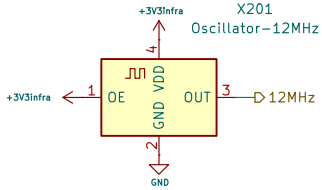


Flash Memory





Oscillator



JLC alternatives

jlc	USD/Stock	Package	Comments
C2831468	0.37/1k	SMD2520-4P	1nd
C2901596	0.37/1k	SMD2520-4P	2nd
C437139	0.29/188	SMD2520-4P	2nd
C387449	0.49/3k	SMD2520-4P	2nd
C409301	0.55/2k	SMD2520-4P	2nd

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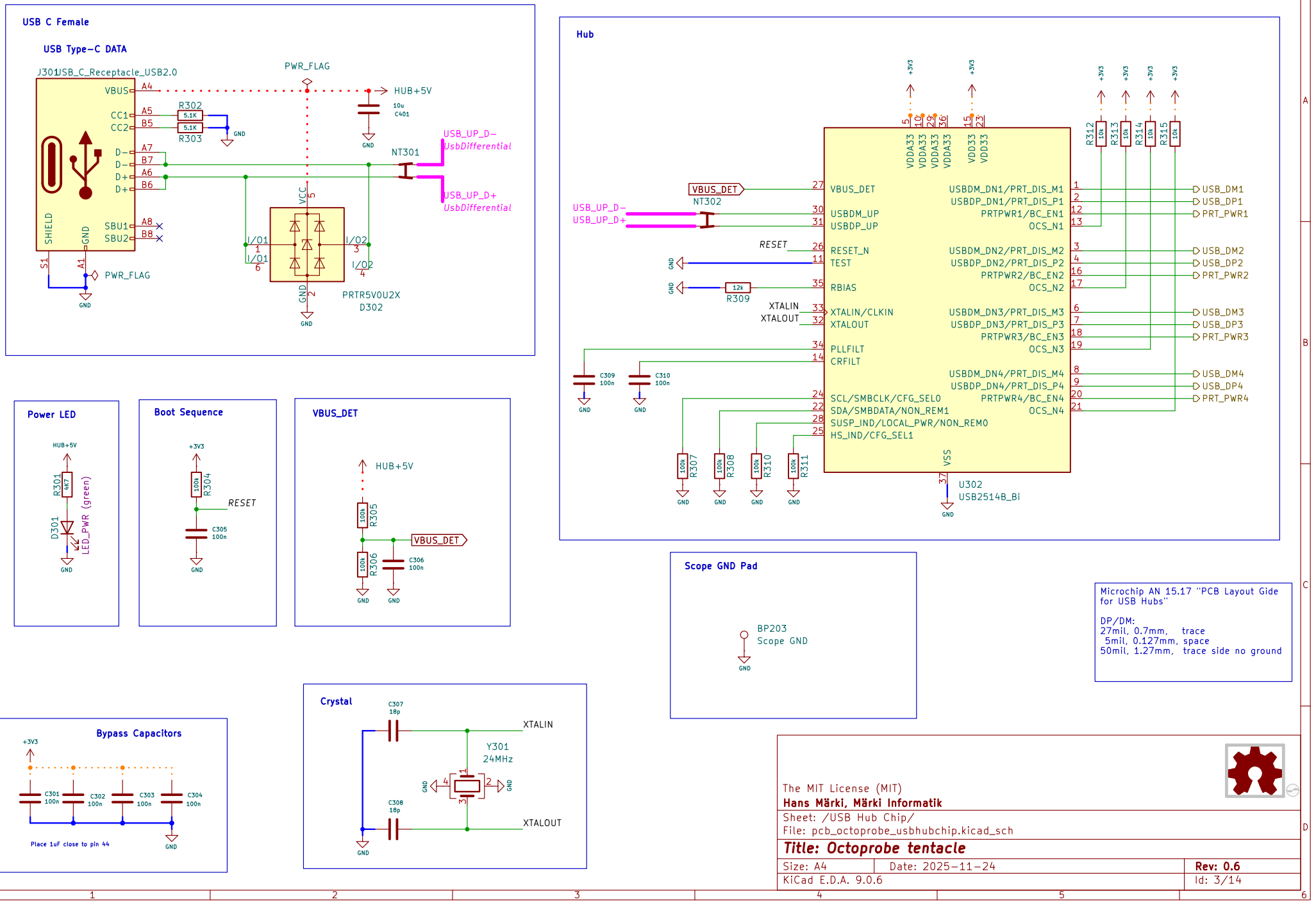
Sheet: /RP2 CPU/
File: pcb_octoprobe_cpu.kicad_sch

Title: Octoprobe tentacle

Size: A4	Date: 2025-11-24	**Rev: 0.6**
KiCad E.D.A. 9.0.6		Id: 2/14


USB C Female
USB Type-C DATA
J301 USB_C_Receptacle_USB2.0
VBUS
CC1
CC2
D-
D-
D+
D+
SHIELD
GND
SBU1
SBU2
A4
A5
B5
A7
B7
A6
B6
A8
B8
S1
A1
PWR_FLAG
R302 5.1K
R303 5.1K
GND
HUB+5V
10u C401
USB_UP_D-
UsbDifferential
USB_UP_D+
UsbDifferential
NT301
VCC
I/O1
I/O2
PRTR5V0U2X
D302
Hub
VBUS_DET
NT302
USB_UP_D-
USB_UP_D+
RESET
R309 12k
XTALIN
XTALOUT
C309 100n
C310 100n
R307 100k
R308 100k
R310 100k
R311 100k
VDDA33
VDD33
VBUS_DET
USBDM_UP
USBDP_UP
RESET_N
TEST
RBIAS
XTALIN/CLKIN
XTALOUT
PLLFILT
CRFILT
SCL/SMBCLK/CFG_SEL0
SDA/SMBDATA/NON_REM1
SUSP_IND/LOCAL_PWR/NON_REM0
HS_IND/CFG_SEL1
VSS
USBDM_DN1/PRT_DIS_M1
USBDP_DN1/PRT_DIS_P1
PRTPWR1/BC_EN1
OCS_N1
USBDM_DN2/PRT_DIS_M2
USBDP_DN2/PRT_DIS_P2
PRTPWR2/BC_EN2
OCS_N2
USBDM_DN3/PRT_DIS_M3
USBDP_DN3/PRT_DIS_P3
PRTPWR3/BC_EN3
OCS_N3
USBDM_DN4/PRT_DIS_M4
USBDP_DN4/PRT_DIS_P4
PRTPWR4/BC_EN4
OCS_N4
R312 10k
R313 10k
R314 10k
R315 10k
USB_DM1
USB_DP1
PRT_PWR1
USB_DM2
USB_DP2
PRT_PWR2
USB_DM3
USB_DP3
PRT_PWR3
USB_DM4
USB_DP4
PRT_PWR4
U302
USB2514B_Bi
Power LED
HUB+5V
R301 4K7
D301
LED_PWR (green)
Boot Sequence
+3V3
R304 100k
RESET
C305 100n
VBUS_DET
HUB+5V
R305 100k
R306 100k
C306 100n
Scope GND Pad
BP203
Scope GND
Microchip AN 15.17 "PCB Layout Gide for USB Hubs"
DP/DM:
27mil, 0.7mm, trace
5mil, 0.127mm, space
50mil, 1.27mm, trace side no ground
Bypass Capacitors
+3V3
C301 100n
C302 100n
C303 100n
C304 100n
Place 1uF close to pin 44
Crystal
C307 18p
C308 18p
Y301 24MHz
XTALIN
XTALOUT
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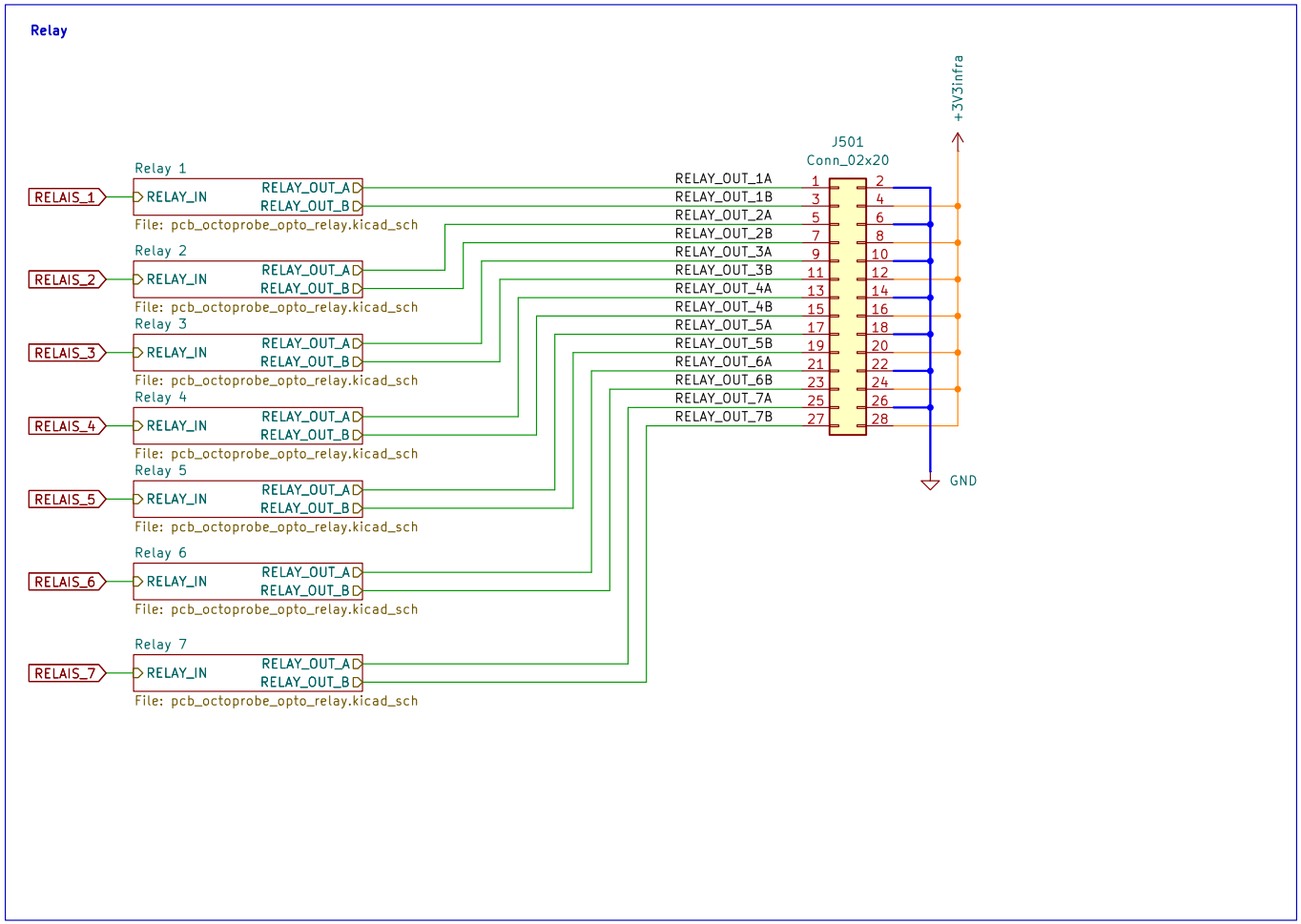
Sheet: /USB Hub Chip/
File: pcb_octoprobe_usbhubchip.kicad_sch
Title: Octoprobe tentacle
Size: A4
Date: 2025-11-24
Rev: 0.6
KiCad E.D.A. 9.0.6
Id: 3/14



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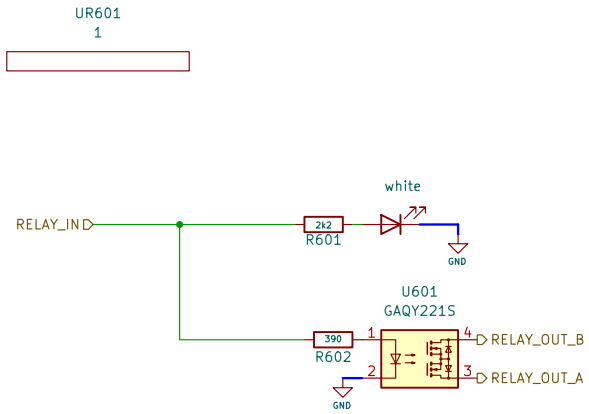
Sheet: /Relay Breakout/
File: pcb_octoprobe_relay_breakout.kicad_sch

Title: Octoprobe tentacle

Size: A4	Date: 2025-11-24	**Rev: 0.6**
KiCad E.D.A. 9.0.6		Id: 5/14



Calculation of the input resistor

Vdiff = 3.3V – Vf = 3.3V– 1.2V = 2.1V
I_Fon = 5mA
R = 2.1V / 5mA = 420 Ohm

390 Ohm

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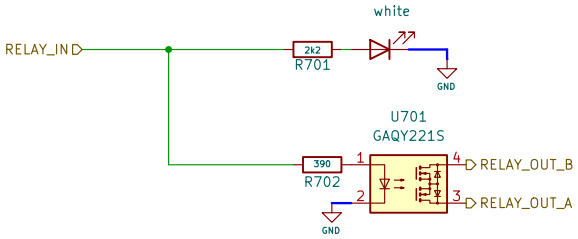
Sheet: /Relay Breakout/Relay 1/
File: pcb_octoprobe_opto_relay.kicad_sch

Title: Octoprobe tentacle

Size: A4	Date: 2025-11-24	**Rev: 0.6**
KiCad E.D.A. 9.0.6		Id: 6/14

UR701
2



Calculation of the input resistor

Vdiff = 3.3V – Vf = 3.3V– 1.2V = 2.1V
I_Fon = 5mA
R = 2.1V / 5mA = 420 Ohm

390 Ohm

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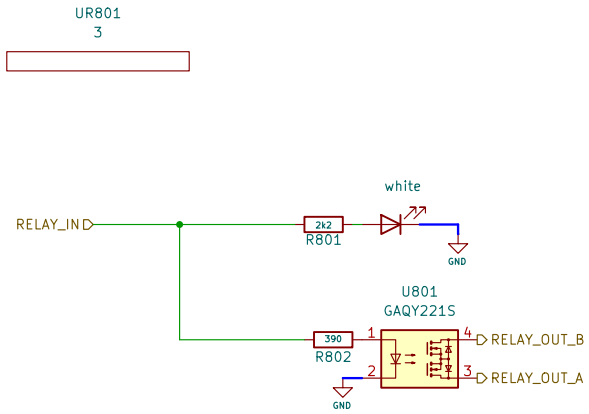
Sheet: /Relay Breakout/Relay 2/
File: pcb_octoprobe_opto_relay.kicad_sch

Title: Octoprobe tentacle

Size: A4	Date: 2025-11-24	**Rev: 0.6**
KiCad E.D.A. 9.0.6		Id: 7/14



Calculation of the input resistor

Vdiff = 3.3V – Vf = 3.3V– 1.2V = 2.1V
I_Fon = 5mA
R = 2.1V / 5mA = 420 Ohm

390 Ohm

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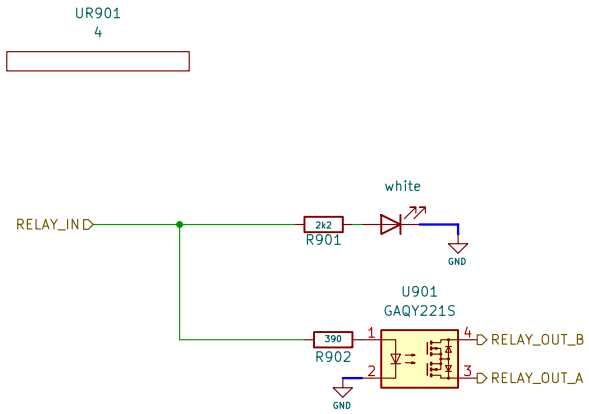
Sheet: /Relay Breakout/Relay 3/
File: pcb_octoprobe_opto_relay.kicad_sch

Title: Octoprobe tentacle

Size: A4	Date: 2025-11-24	**Rev: 0.6**
KiCad E.D.A. 9.0.6		Id: 8/14



Calculation of the input resistor

Vdiff = 3.3V – Vf = 3.3V– 1.2V = 2.1V
I_Fon = 5mA
R = 2.1V / 5mA = 420 Ohm

390 Ohm

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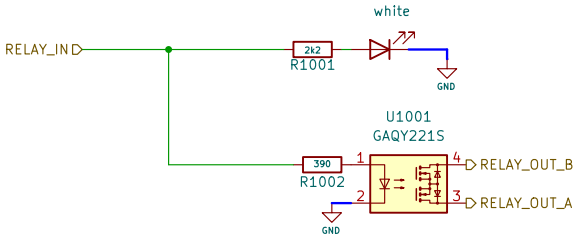
Sheet: /Relay Breakout/Relay 4/
File: pcb_octoprobe_opto_relay.kicad_sch

Title: Octoprobe tentacle

Size: A4	Date: 2025-11-24	**Rev: 0.6**
KiCad E.D.A. 9.0.6		Id: 9/14

UR1001
5



Calculation of the input resistor

Vdiff = 3.3V – Vf = 3.3V– 1.2V = 2.1V
I_Fon = 5mA
R = 2.1V / 5mA = 420 Ohm

390 Ohm

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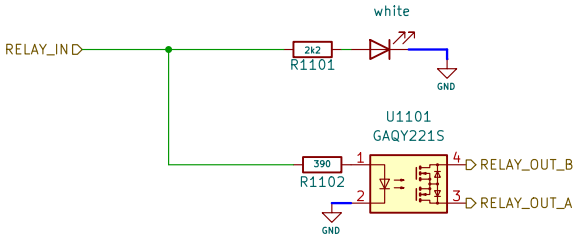
Sheet: /Relay Breakout/Relay 5/
File: pcb_octoprobe_opto_relay.kicad_sch

Title: Octoprobe tentacle

Size: A4	Date: 2025-11-24	**Rev: 0.6**
KiCad E.D.A. 9.0.6		Id: 10/14

UR1101
6



Calculation of the input resistor

Vdiff = 3.3V – Vf = 3.3V– 1.2V = 2.1V
I_Fon = 5mA
R = 2.1V / 5mA = 420 Ohm

390 Ohm

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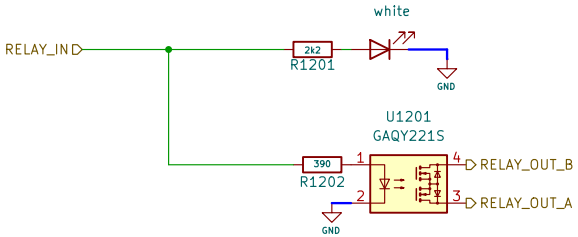
Sheet: /Relay Breakout/Relay 6/
File: pcb_octoprobe_opto_relay.kicad_sch

Title: Octoprobe tentacle

Size: A4	Date: 2025-11-24	**Rev: 0.6**
KiCad E.D.A. 9.0.6		Id: 11/14

UR1201
7



Calculation of the input resistor

Vdiff = 3.3V – Vf = 3.3V– 1.2V = 2.1V
I_Fon = 5mA
R = 2.1V / 5mA = 420 Ohm

390 Ohm

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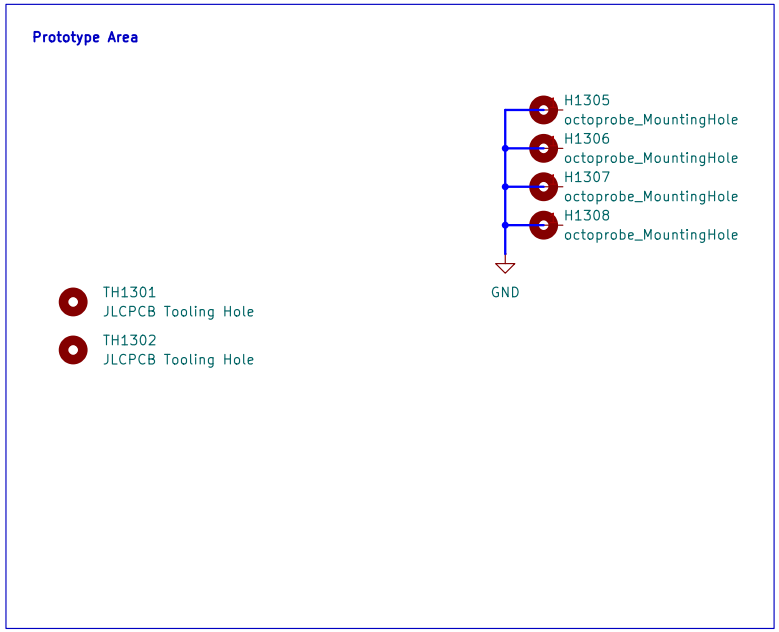
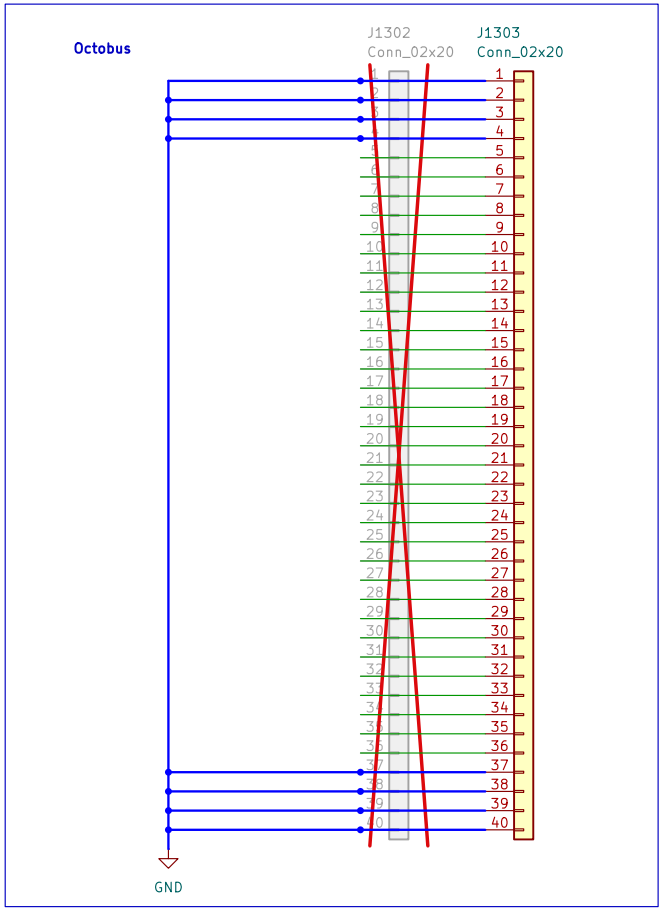
Sheet: /Relay Breakout/Relay 7/
File: pcb_octoprobe_opto_relay.kicad_sch

Title: Octoprobe tentacle

Size: A4	Date: 2025-11-24	**Rev: 0.6**
KiCad E.D.A. 9.0.6		Id: 12/14





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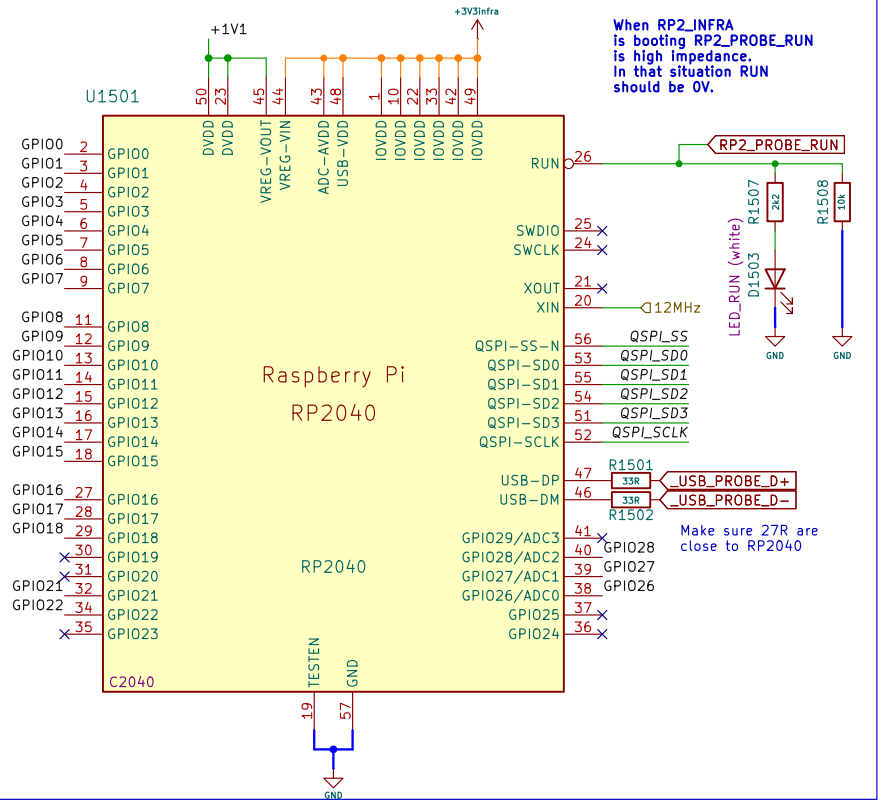
Sheet: /Prototype Area/
File: pcb_octoprobe_prototype_area.kicad_sch

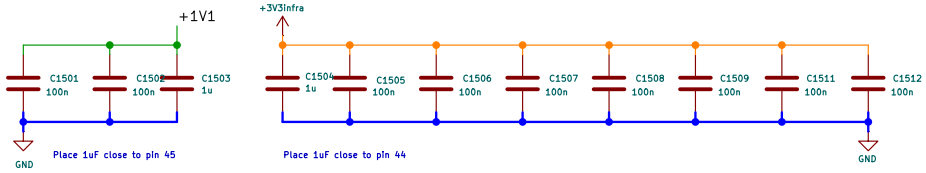
Title: Octoprobe tentacle

Size: A4	Date: 2025-11-24	**Rev: 0.6**
KiCad E.D.A. 9.0.6		Id: 13/14

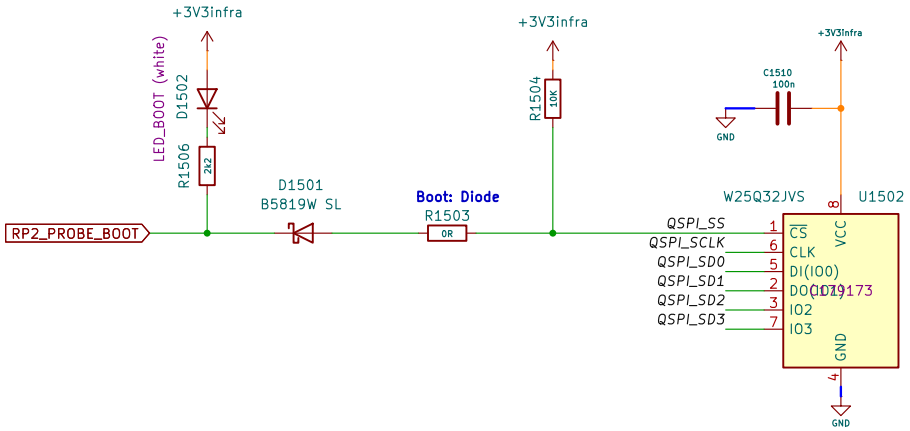
RP2040

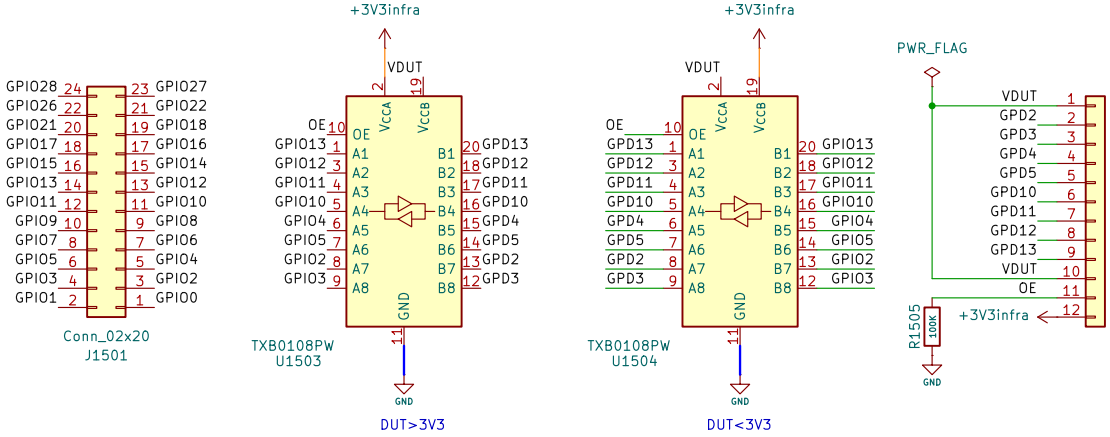


Bypass Capacitors



Flash Memory





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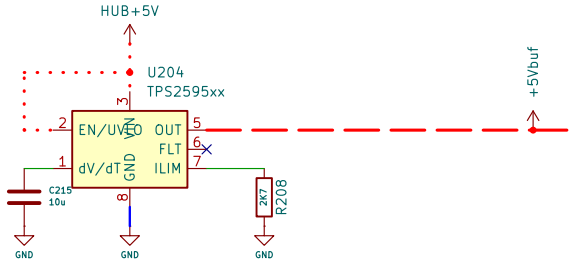
Sheet: /RP2 PROBE/

File: pcb_octoprobe_probe.kicad_sch

Title: Octoprobe tentacle

Size: A4	Date: 2025-11-24	**Rev: 0.6**
KiCad E.D.A. 9.0.6		Id: 15/14

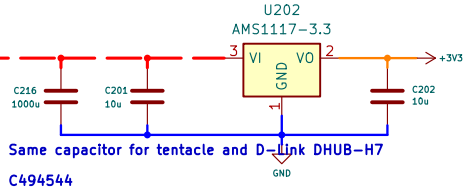
Current Limiter 5V



Datasheet "Active Current Limiting":
Goal: 800mA
Rilm = 2000/(0.8A-0.04) = R2K630, choosen: R2K7

Datasheet "Slew Rate and Inrush Current Control":
Goal: 5V/1000ms
C = 42000/V*ms = 6'363'636pF = 6uF, choosen: 10uF

Regulator 3V3

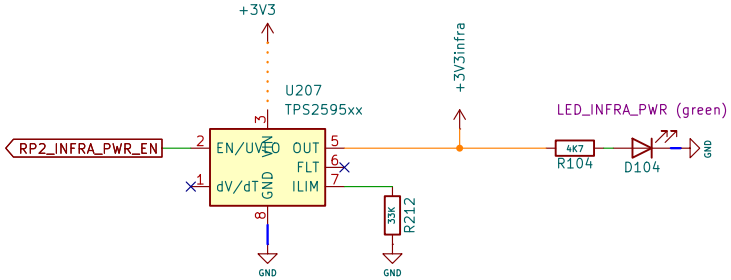


Same capacitor for tentacle and D-Link DHUB-H7

C494544

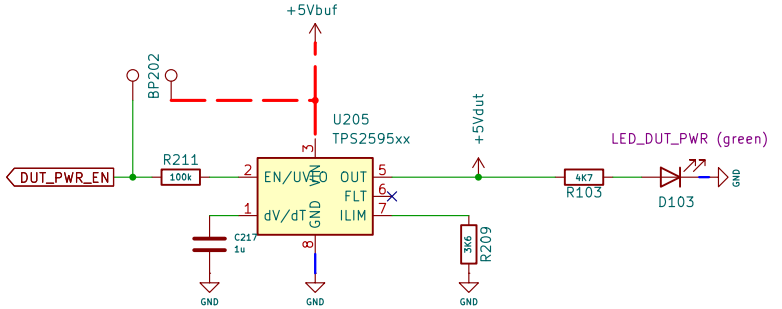
2.5mm distance between wires
6.3mm diameter
11mm height

POWER RP Infra



Datasheet "Active Current Limiting":
Goal: 100mA
Rilm = 2000/(0.1A-0.04) = R33K333, choosen: R33K

Current Limiter 3V3 DUT



Datasheet "Active Current Limiting":
Goal: 600mA
Rilm = 2000/(0.8A-0.04) = R3K571, choosen: R3K6

Datasheet "Slew Rate and Inrush Current Control":
Goal: 3V3/100ms
C = 42000/V*ms = 1'272'272pF, choosen: 1uF

Sheet: /Regulator 3V3/		
File: pcb_octoprobe_regulator3V3.kicad_sch		
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. 9.0.6		Id: 16/14