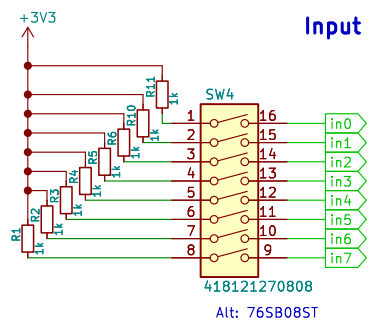


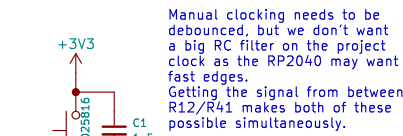
Tiny Tapeout 4/5 Demo Board

User Input + Config

Input DIP

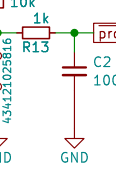


Momentary Switches (debounced)

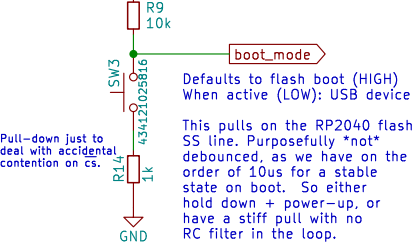


Manual Project Clock

Project Reset

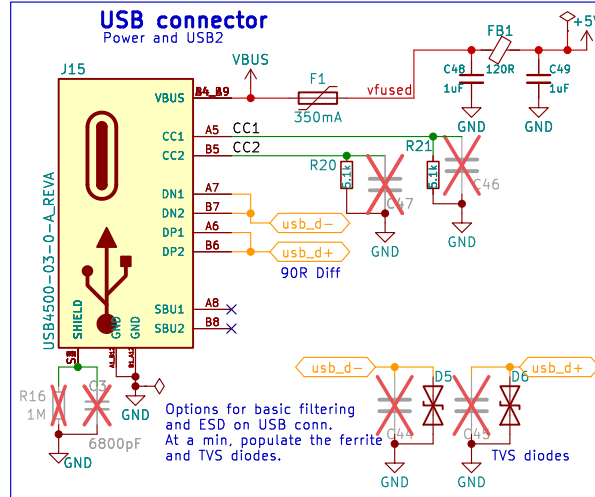


RP Boot Mode

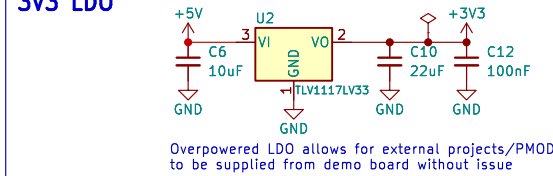


Power

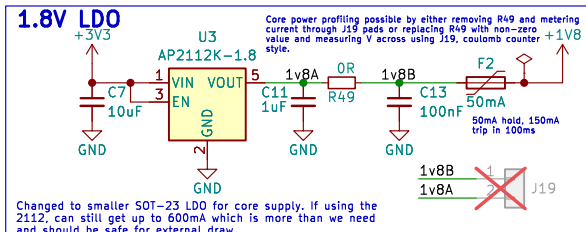
USB connector



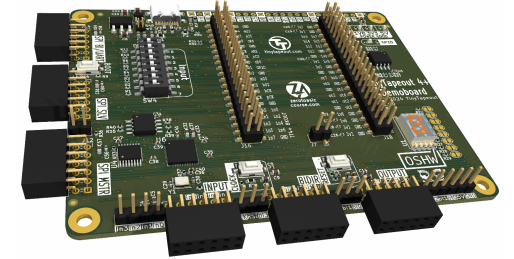
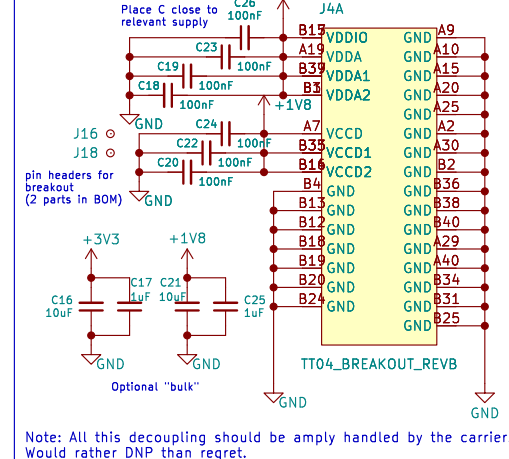
3V3 LDO



1.8V LDO



TT Carrier Power

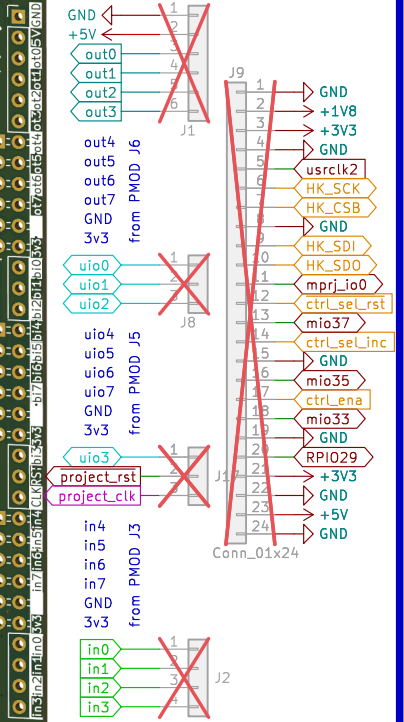


Extensive labelling, designed for TT4+ with new MUX, RP2040 on board, accessed via USB. Project clock from RP2040, external or manual, DIP switches for inputs, 7-segment display (remappable with jumpers) on outputs, full access to 8 in, out and bidirectionals via PMODs, all pins broken out in headers.

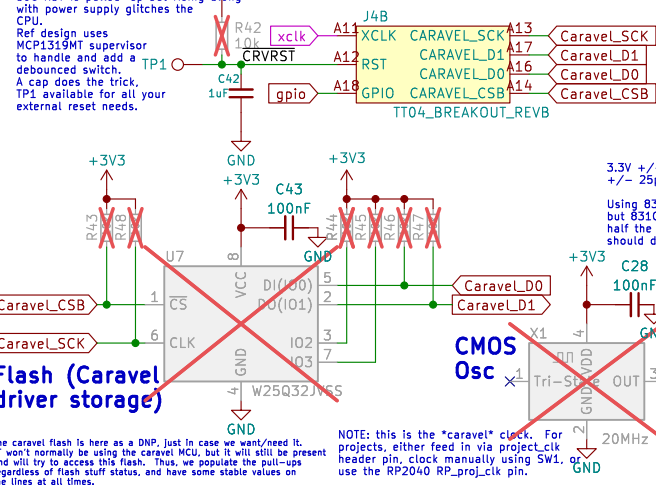
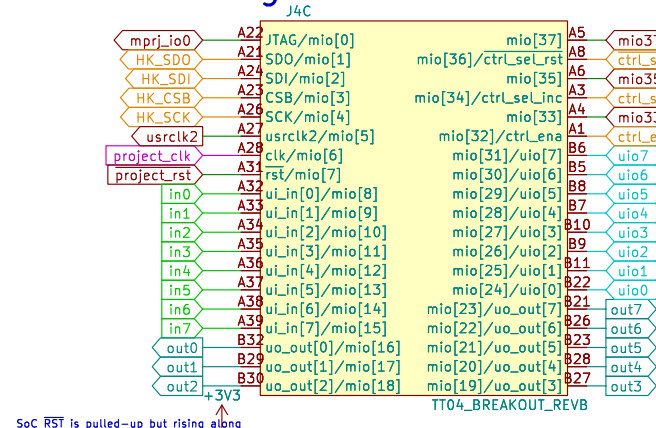
Power via +5V USB, or 5V breakout pin. On-board regulation to 3v3 and 1v8. VDDIO is 3v3, including on PMODs. <https://github.com/TinyTapeout/tt-demo-pcb>

Board edge connectors (pinheaders)

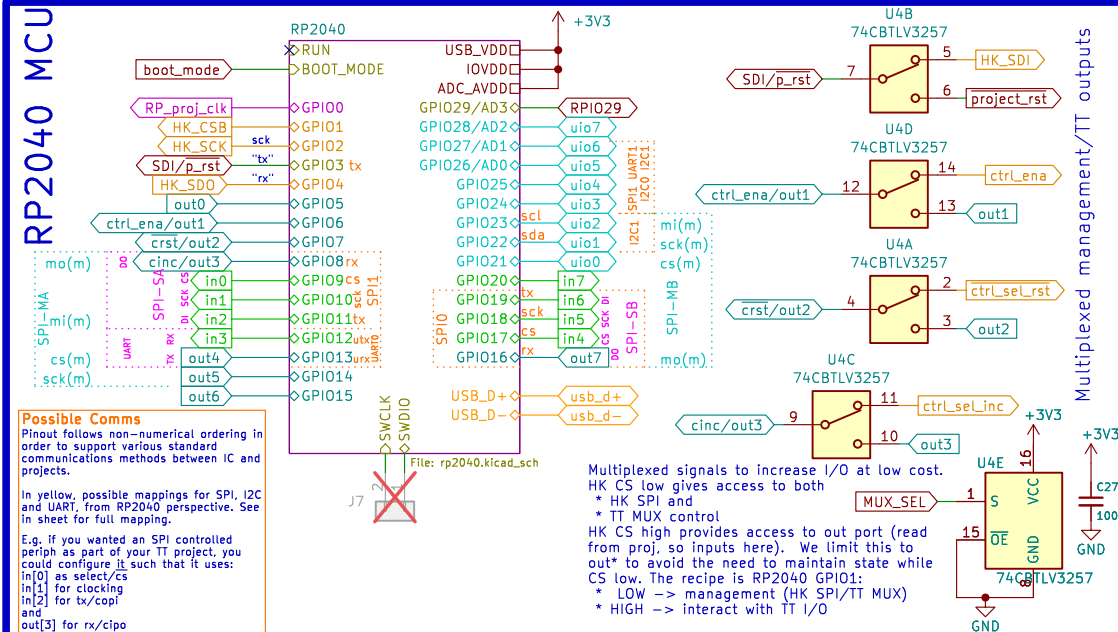
I/O is available through standard PMODs or, with judicious placement, as a single 100mil pin header



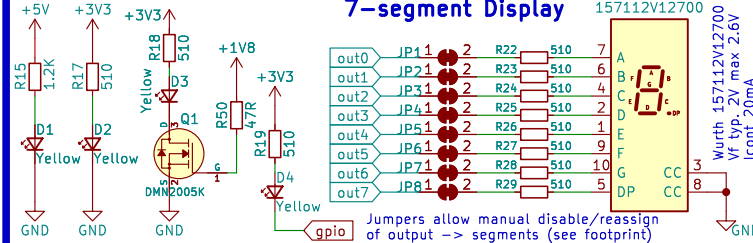
TT Carrier Logic



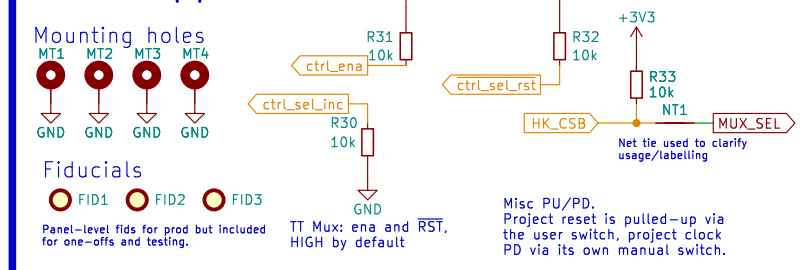
RP2040 MCU



Indication LEDs (Power good, GPIO)

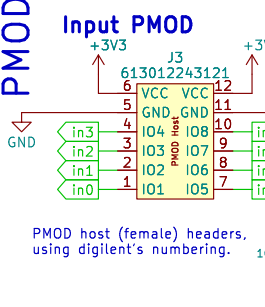


Misc Support

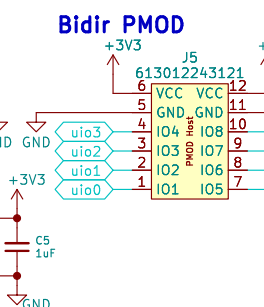


PMOD

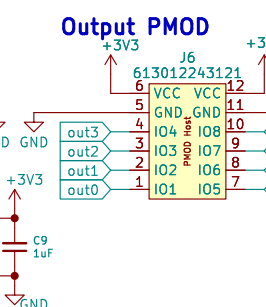
Input PMOD



Bidir PMOD

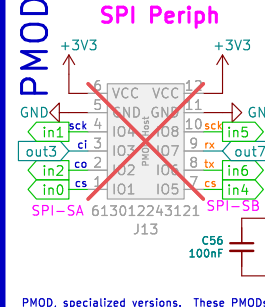


Output PMOD

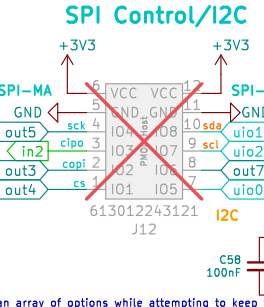


PMOD

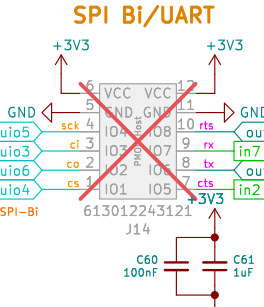
SPI Periph



SPI Control/I2C



SPI Bi/UART



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Sheet: /
File: tinytapeout-demo.kicad_sch

Title: Tiny Tapeout 4/5 Demo Board

Size: A3 Date: 2024-06-11
Kicad E.D.A. 8.0.8

Rev: 1.2.3
Id: 1/2

RP2040 Basic Support

IOVDD □ IOVDD

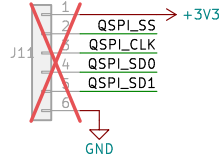
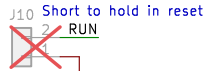
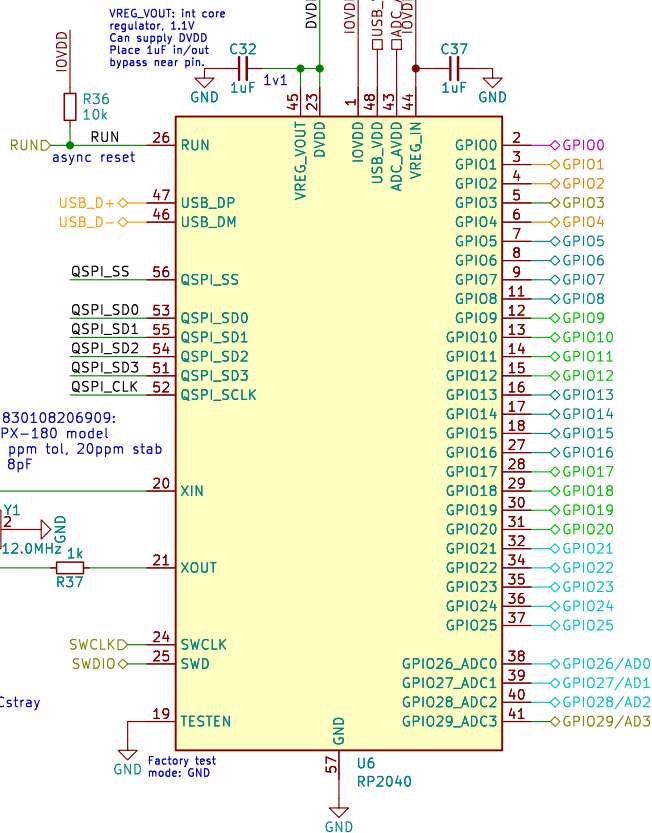
Logic supply, nominally 3v3.

BOOT_MODE □ QSPL_SS

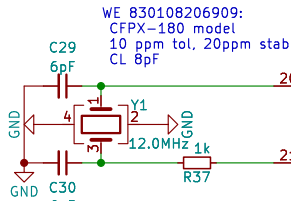
When held low on powerup, flash SS determines boot mode
(HIGH == flash boot, LOW == USB device)

USB_VDD supplies USB PHY, nominal 3v3. If IOVDD is 3v3, can share supply.

In fact, in this and many applications, IOVDD, USB_VDD and ADC_AVDD are all powered directly from a single 3v3 supply, with the 1v1 digital core being handle by on-board regulator.



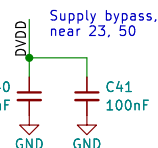
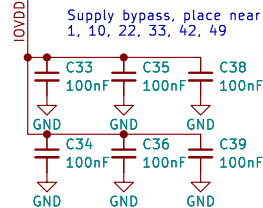
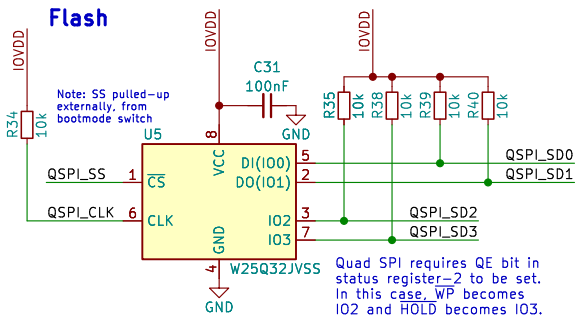
Flash program header
Note: should we replace 3v3 with RUN, to be able to reset/hold while updating flash?



Rule of thumb
 $C1, C2 = 2 * CL - 2 * C_{stray}$
Using a stray cap of 5pF, gives $C_n = 6pF$

Into:
 $CL = (C1 * C2) / (C1 + C2) + C_{stray}$
These $C_n = 6pF$ give
 $CL = 8pF$ -- just what we need.

Flash



Function		F1	F2	F3	F4	F5	F6	F7	F8	F9
GPIO										
0	SPI0 RX	UART0 TX	I2C0 SDA	PWM0 A	SIO	PI00	PI01			USB OVCUR DET
1	SPI0 CSn	UART0 RX	I2C0 SCL	PWM0 B	SIO	PI00	PI01			USB VBUS DET
2	SPI0 SCK	UART0 CTS	I2C1 SDA	PWM1 A	SIO	PI00	PI01			USB VBUS EN
3	SPI0 TX	UART0 RTS	I2C1 SCL	PWM1 B	SIO	PI00	PI01			USB OVCUR DET
4	SPI0 RX	UART1 TX	I2C0 SDA	PWM2 A	SIO	PI00	PI01			USB VBUS DET
5	SPI0 CSn	UART1 RX	I2C0 SCL	PWM2 B	SIO	PI00	PI01			USB VBUS EN
6	SPI0 SCK	UART1 CTS	I2C1 SDA	PWM3 A	SIO	PI00	PI01			USB OVCUR DET
7	SPI0 TX	UART1 RTS	I2C1 SCL	PWM3 B	SIO	PI00	PI01			USB VBUS DET
8	SPI1 RX	UART1 TX	I2C0 SDA	PWM4 A	SIO	PI00	PI01			USB VBUS EN
9	SPI1 CSn	UART1 RX	I2C0 SCL	PWM4 B	SIO	PI00	PI01			USB OVCUR DET
10	SPI1 SCK	UART1 CTS	I2C1 SDA	PWM5 A	SIO	PI00	PI01			USB VBUS DET
11	SPI1 TX	UART1 RTS	I2C1 SCL	PWM5 B	SIO	PI00	PI01			USB VBUS EN
12	SPI1 RX	UART0 TX	I2C0 SDA	PWM6 A	SIO	PI00	PI01			USB OVCUR DET
13	SPI1 CSn	UART0 RX	I2C0 SCL	PWM6 B	SIO	PI00	PI01			USB VBUS DET
14	SPI1 SCK	UART0 CTS	I2C1 SDA	PWM7 A	SIO	PI00	PI01			USB VBUS EN
15	SPI1 TX	UART0 RTS	I2C1 SCL	PWM7 B	SIO	PI00	PI01			USB OVCUR DET
16	SPI0 RX	UART0 TX	I2C0 SDA	PWM0 A	SIO	PI00	PI01			USB VBUS DET
17	SPI0 CSn	UART0 RX	I2C0 SCL	PWM0 B	SIO	PI00	PI01			USB VBUS EN
18	SPI0 SCK	UART0 CTS	I2C1 SDA	PWM1 A	SIO	PI00	PI01			USB OVCUR DET
19	SPI0 TX	UART0 RTS	I2C1 SCL	PWM1 B	SIO	PI00	PI01			USB VBUS DET
20	SPI0 RX	UART1 TX	I2C0 SDA	PWM2 A	SIO	PI00	PI01	CLOCK GPIN0		USB VBUS EN
21	SPI0 CSn	UART1 RX	I2C0 SCL	PWM2 B	SIO	PI00	PI01	CLOCK GPIN1		USB OVCUR DET
22	SPI0 SCK	UART1 CTS	I2C1 SDA	PWM3 A	SIO	PI00	PI01	CLOCK GPIN2		USB VBUS DET
23	SPI0 TX	UART1 RTS	I2C1 SCL	PWM3 B	SIO	PI00	PI01	CLOCK GPIN3		USB VBUS EN
24	SPI1 RX	UART1 TX	I2C0 SDA	PWM4 A	SIO	PI00	PI01	CLOCK GPIN4		USB OVCUR DET
25	SPI1 CSn	UART1 RX	I2C0 SCL	PWM4 B	SIO	PI00	PI01	CLOCK GPIN5		USB VBUS DET
26	SPI1 SCK	UART1 CTS	I2C1 SDA	PWM5 A	SIO	PI00	PI01			USB VBUS EN
27	SPI1 TX	UART1 RTS	I2C1 SCL	PWM5 B	SIO	PI00	PI01			USB OVCUR DET
28	SPI1 RX	UART0 TX	I2C0 SDA	PWM6 A	SIO	PI00	PI01			USB VBUS DET
29	SPI1 CSn	UART0 RX	I2C0 SCL	PWM6 B	SIO	PI00	PI01			USB VBUS EN

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Sheet: /RP2040/
File: rp2040.kicad_sch

Title: Tiny Tapeout 4/5 Demo Board

Size: A4 Date: 2024-04-12

KiCad E.D.A. 8.0.8

Rev: 1.2.2

Id: 2/2