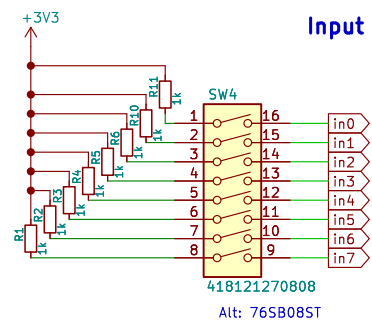


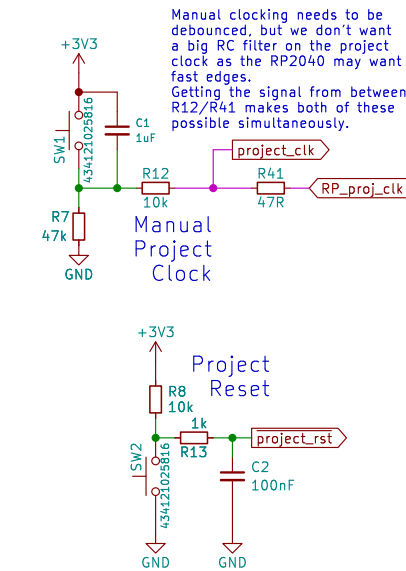
Tiny Tapeout 4/5 Demo Board

User Input + Config

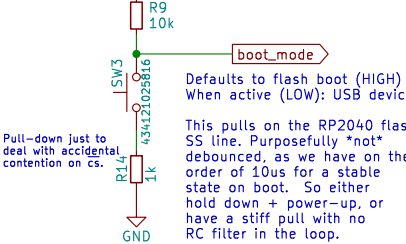
Input DIP



Momentary Switches (debounced)

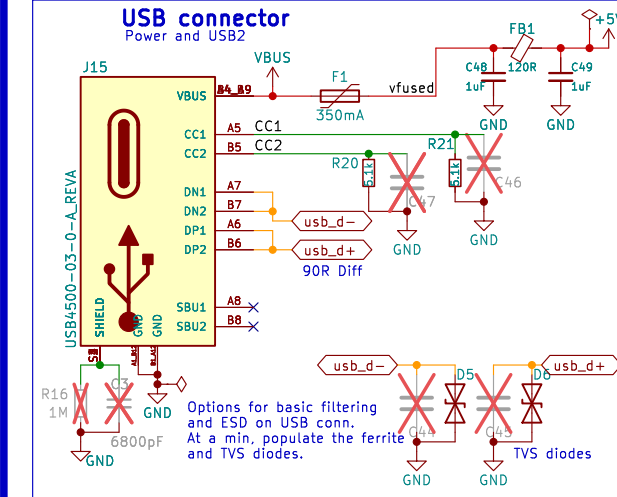


RP Boot Mode

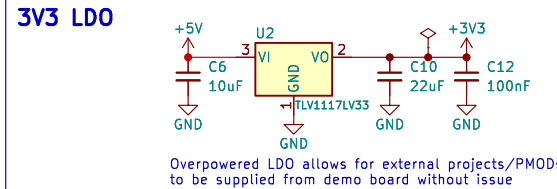


Power

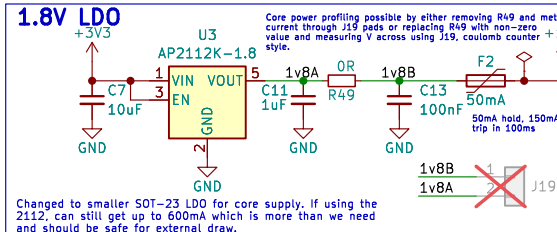
USB connector



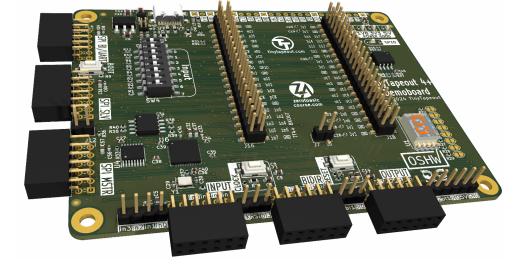
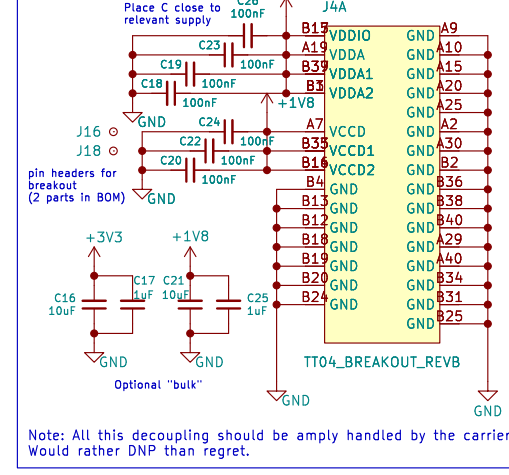
3V3 LDO



1.8V LDO



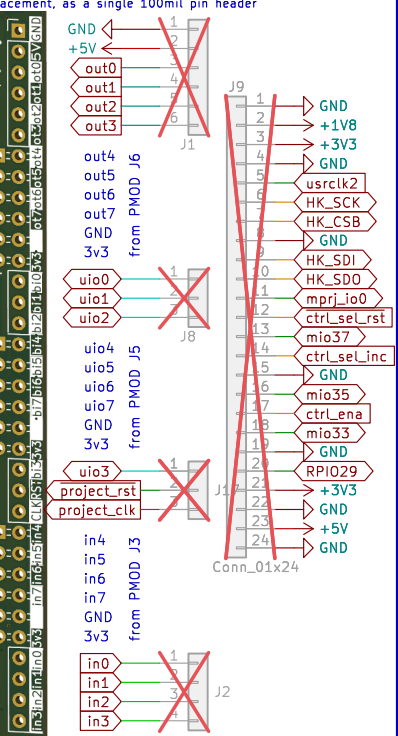
TT Carrier Power



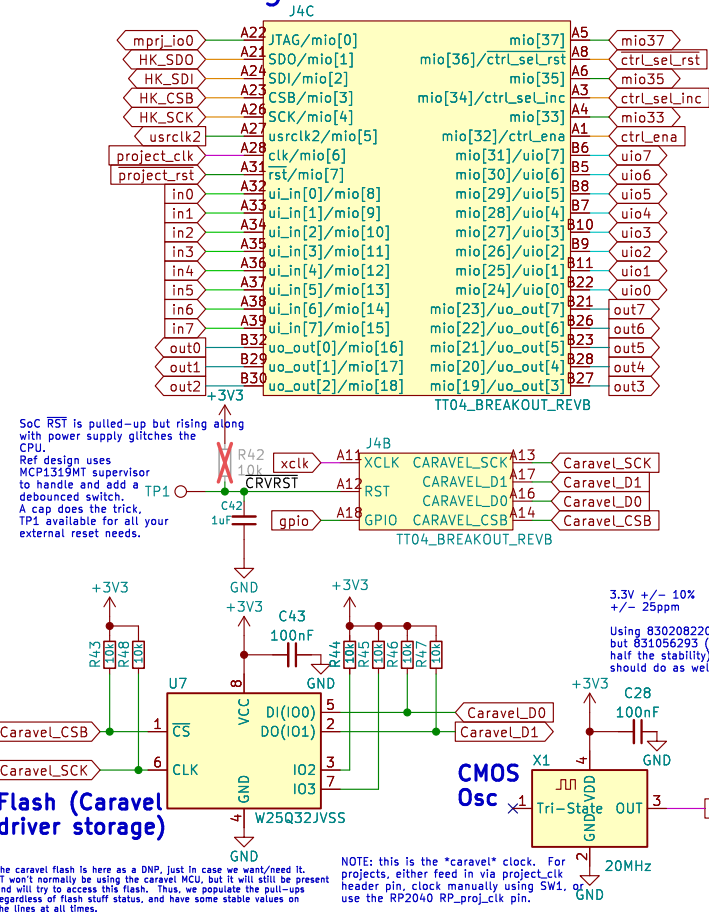
Extensive labelling, designed for TT4+ with new MUX, RP2040 on board, accessed via USB. Project clock from RP2040, external or manual, DIP switches for inputs, 7-segment display (remappable with jumpers) on outputs, full access to 8 in, out and bidirectionals via PMODs, all pins broken out in headers.

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>

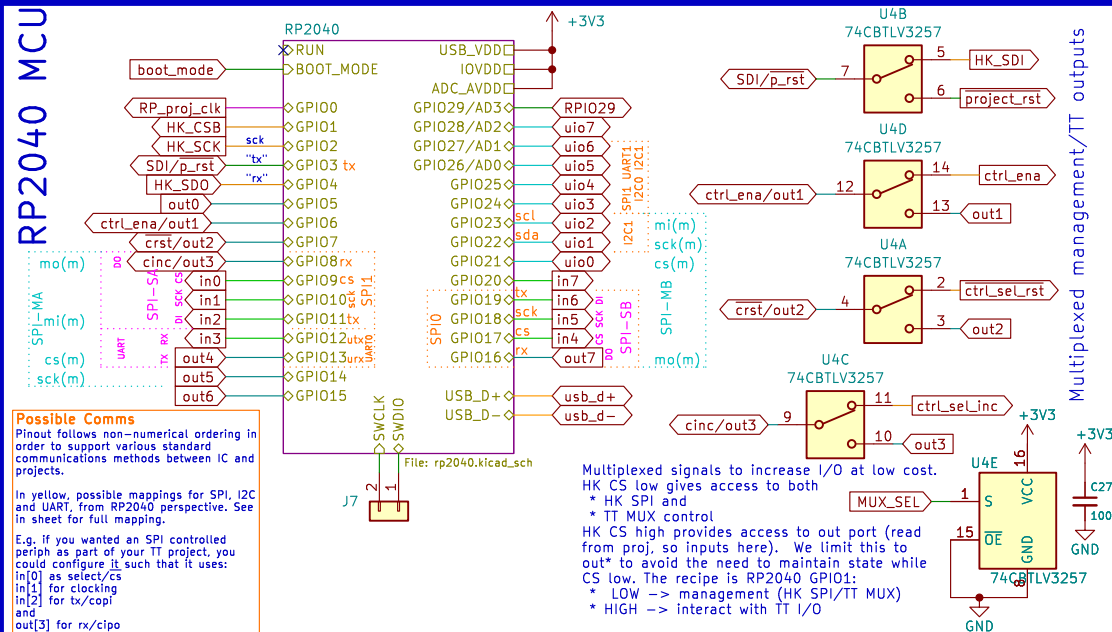
Board edge connectors (pinheaders)



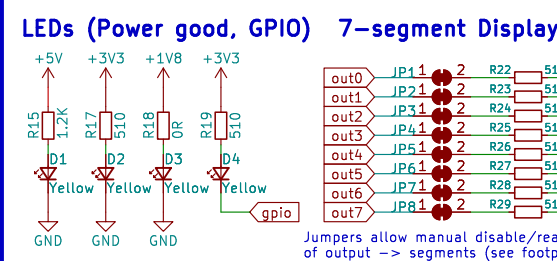
TT Carrier Logic



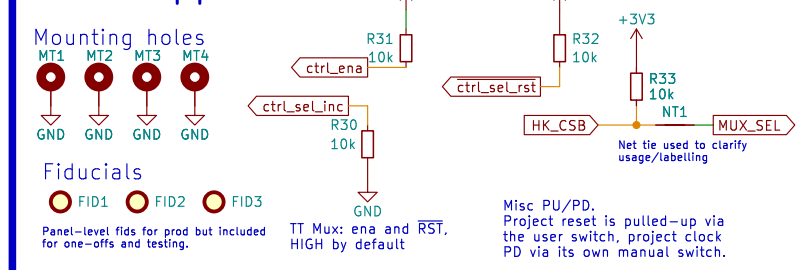
RP2040 MCU



Indication

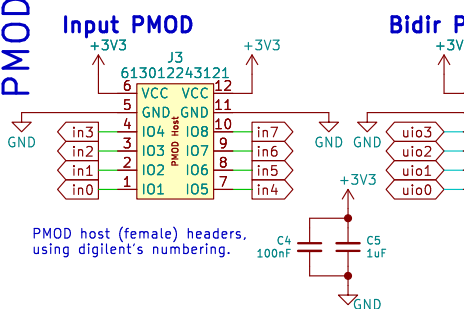


Misc Support

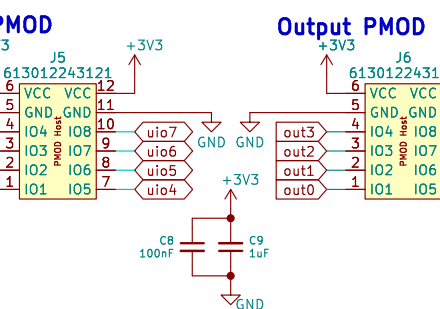


PMOD

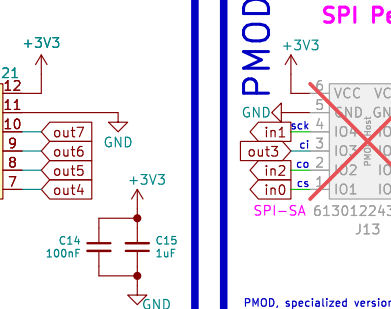
Input PMOD



Bidir PMOD

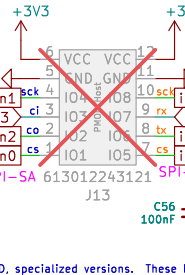


Output PMOD

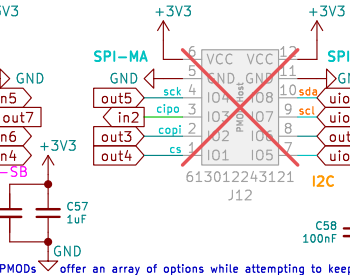


PMOD

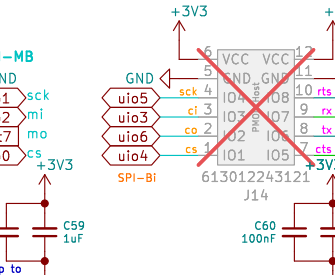
SPI Periph



SPI Control/I2C



SPI Bi/UART



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Psychogenic Technologies
Sheet: /
File: tinytapeout-demo.kicad_sch
Title: Tiny Tapeout 4/5 Demo Board
Size: A3 Date: 2024-04-11
Kicad E.D.A. 8.0.1

Rev: 1.2.0
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.

VREG_VOUT: Int core regulator, 1.1V
Can supply DVDD
Place 1uF in/out bypass near pin.

J10 Short to hold in reset
RUN

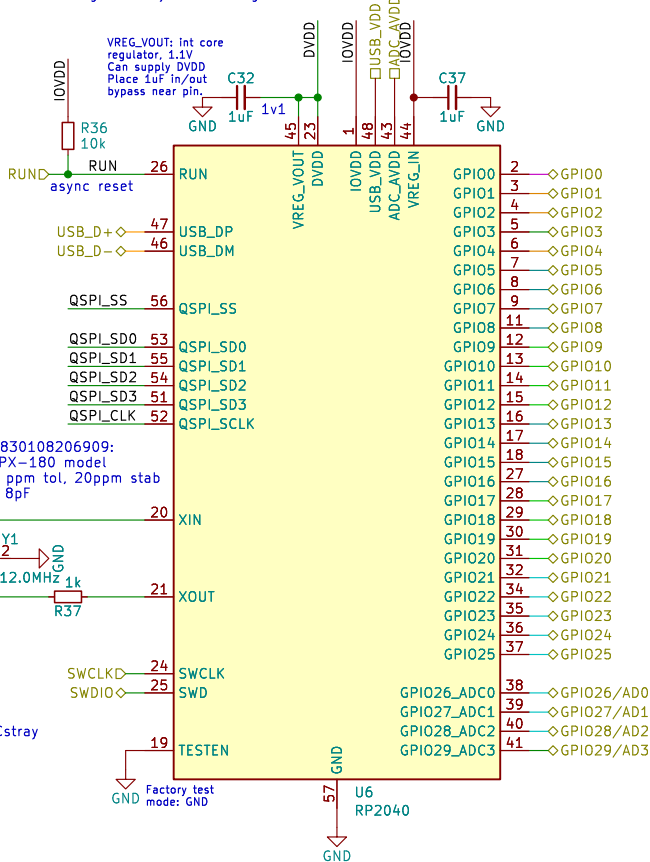
J11
QSPL_SS → +3V3
QSPL_CLK
QSPL_SD0
QSPL_SD1
GND

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

WE 830108206909:
CFPX-180 model
10 ppm tol, 20ppm stab
CL 8pF

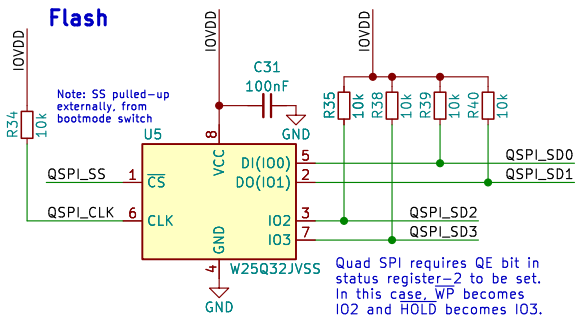
Rule of thumb
 $C1, C2 = 2 * CL - 2 * C_{stray}$
Using a stray cap of 5pF, gives
 $C_n = 6pF$

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



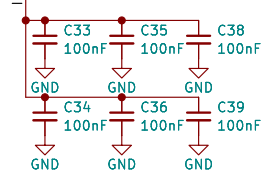
in2 GPIO11, 1RTS
out0 GPIO 5, 1RX
in7 GPIO20, 1TX
out1 GPIO6, 1CTS

Flash

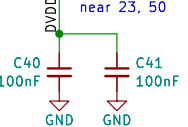


Quad SPI requires QE bit in status register-2 to be set. In this case, WP becomes I02 and HOLD becomes I03.

Supply bypass, place near 1, 10, 22, 33, 42, 49



Supply bypass, near 23, 50



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: RP2040 Basic Support

Size: A4 Date: 2023-11-22

KiCad E.D.A. 8.0.1

Rev: 1.0.3

Id: 2/2