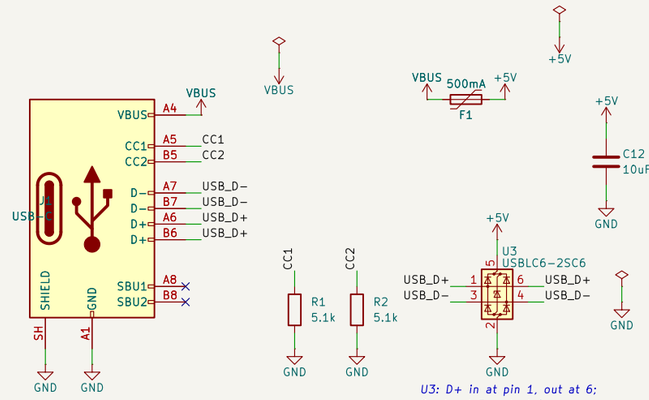
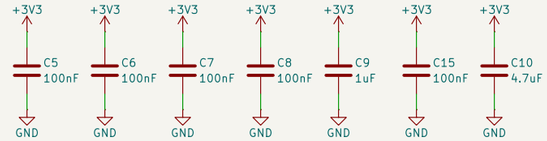
USB-C in, fuse and ESD protection



5.1k on CC1 and CC2, one each:
"a device is here, give 5 V"

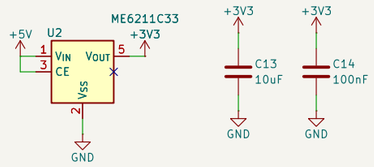
U3: D+ in at pin 1, out at 6;
D− in at 3, out at 4

Decoupling: one capacitor at each supply pin



C5, C6, C7 at VDD pins 24, 36, 48; C8 and C9 at VDDA (9);
C15 at VBAT (1): C10 the bulk store, near the MCU

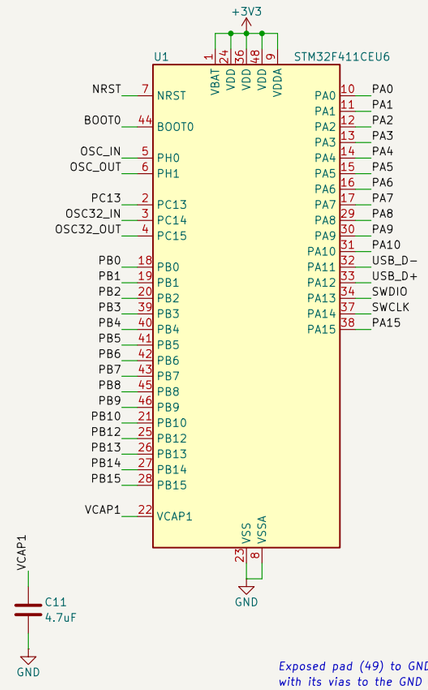
3.3 V regulator



CE (pin 3) on 5 V: on whenever USB is in.
Heat (5 − 3.3) V x I: 0.17 W at 100 mA

Microcontroller STM32F411CEU6

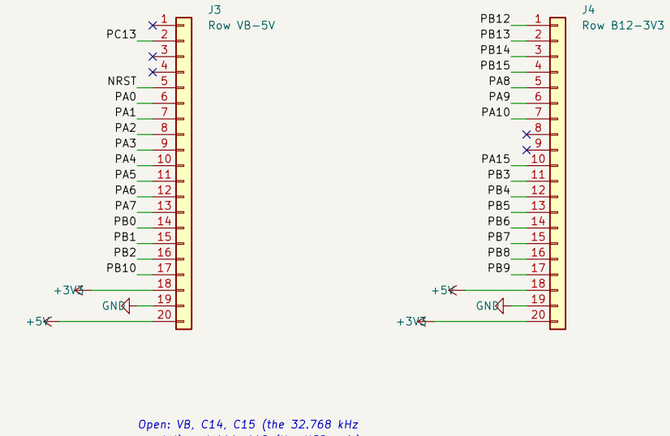
VBAT (1) to 3.3 V: no coin cell



Exposed pad (49) to GND,
with its vias to the GND plane

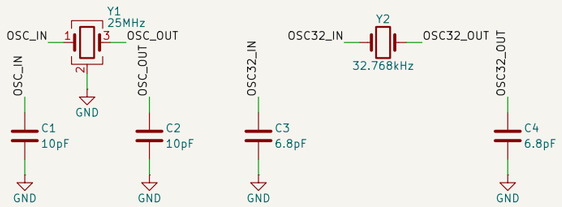
VCAP1: the core regulator's 4.7 uF, nothing else

GPIO headers, Black Pill order



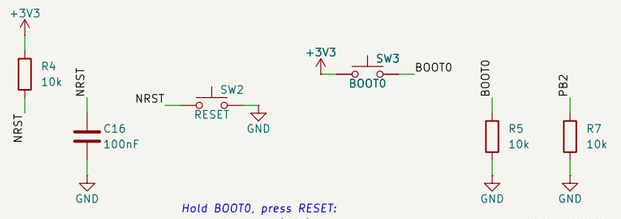
Open: VB, C14, C15 (the 32.768 kHz
crystal) and A11, A12 (the USB pair)

Clocks: 25 MHz (HSE) and 32.768 kHz (LSE)



Each load capacitor: 2 (CL − 5 pF).
25 MHz, CL 10 pF: 2 x (10 − 5) = 10 pF

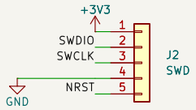
Reset and boot



Hold BOOT0, press RESET:
the USB loader (DFU) starts

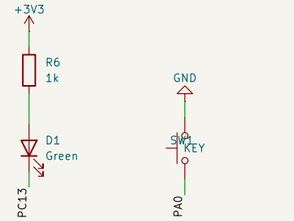
PB2 is BOOT1:
R7 holds it low

SWD debug



ST-Link: 3.3 V, SWDIO,
SWCLK, GND, NRST

User LED and button



PC13 low: LED on, 1.3 mA
(PC13 sinks 3 mA at most)

KEY: PA0 to GND,
pull-up in firmware

55 x 20 mm, four layers: signals / GND / 3.3 V / signals (JLC04161H-7628)
STM32F411CEU6, 25 MHz and 32.768 kHz crystals, USB-C full speed, SWD
Created by siwit.co/PCB4 Approved by Dr. Sam Macharia
siliconwit.com

Sheet: /
File: stm32f411-blackpill.kicad_sch

Title: STM32F411 USB-C Four-Layer Board (Black Pill style)

Size: A3	Date: 2026-11-19	**Rev: A**
KiCad E.D.A. 10.0.8		Id: 1/1