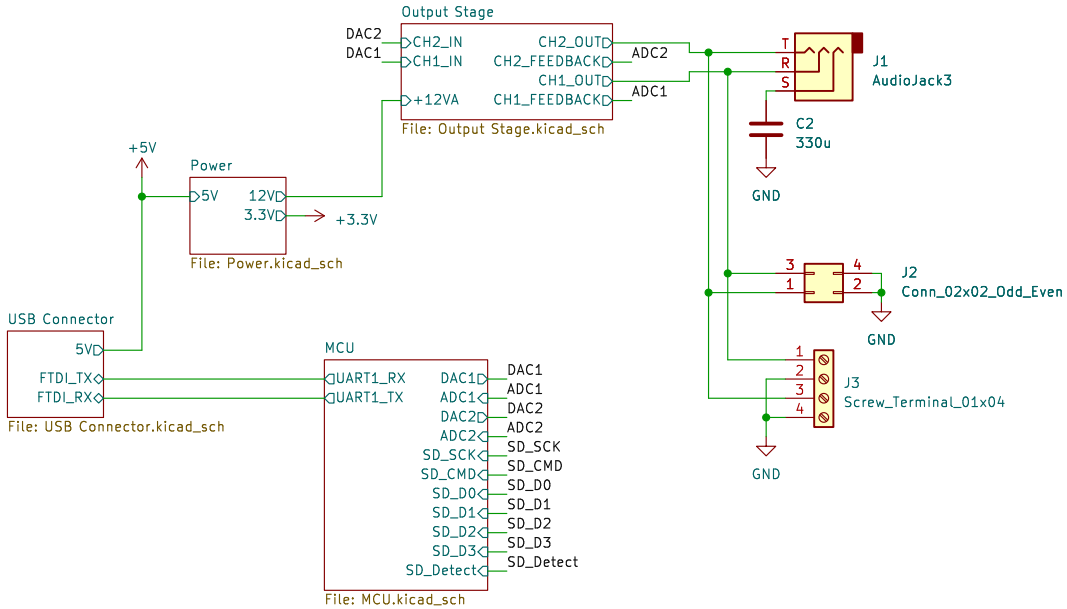
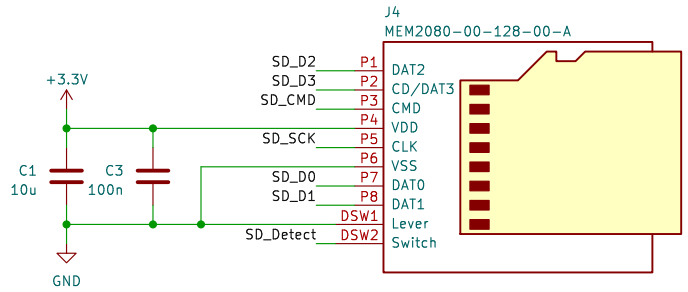
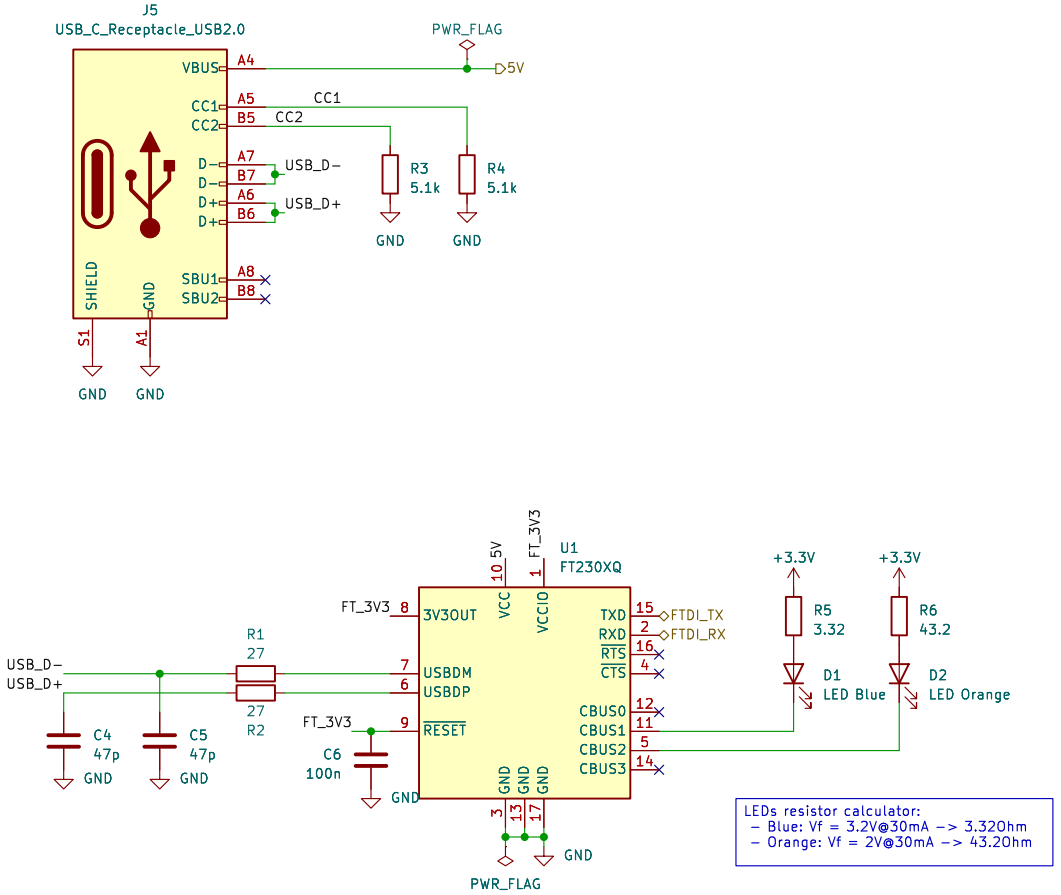


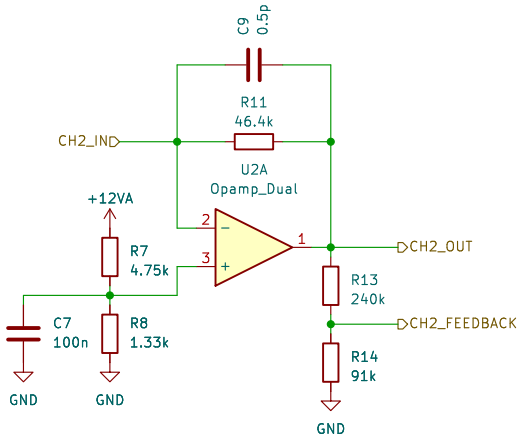


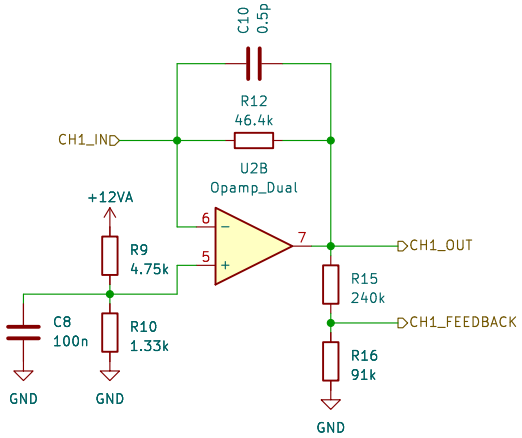
TODO:
- [x] Determinare valori resistenze per OpAmp
- [x] Controllare cortocircuiti nell'inserire il Jack -> Application note SLOA043
- [x] Aggiungere micro SD
- [x] Aggiungere led RGB addressable
- [x] Assegnare valori e PN
- [x] Completare BOM
- [x] Aggiungere connettore ST-Link
- [x] Cambiare stm32f103 con stm32f205
- [x] Cambiare oscillatore da 16MHz a 25MHz
- [x] Collegare la micro SD con SDIO invece che SPI

Title: Signal Generator		
Size: A4	Date: 2023-02-28	**Rev: 2**
KiCad E.D.A. kicad (7.0.0-0)		Id: 1/5



Title: USB Connector		
Size: A4	Date: 2023-01-16	**Rev: 0**
KiCad E.D.A. kicad (7.0.0-0)		Id: 2/5





When buffer is off:
- DAC output resistance 15k max, 12.5k typ
- Output speed follows the RC constant

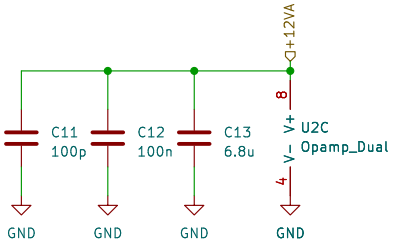
When internal buffer is on:
- OpAmp configured as an inverting amplifier
- DAC output resistance almost zero
- Speed determined by the buffer: T_settling = 4us max (250KHz)

The most limiting factor when using only the internal DAC is the output impedance on the pin. To improve the DAC performance an external OpAmp can be used.

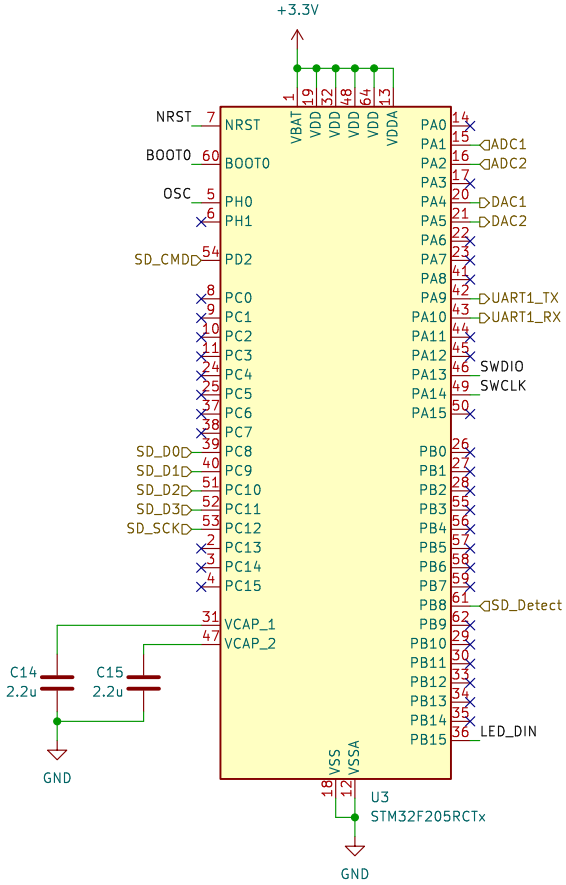
A simple inverting OpAmp configuration allows to fix the DACOUT voltage, thus eliminating the DACOUT capacitance from the equation.
The problem is that the internal DAC output resistance in not known exactly and the gain of the OpAmp can't be calculated exactly.
This problem can be fixed by using and ADC to calibrate the gain.

With this configuration, using an STM32F0 we can theoretically achieve 4.8Msps.

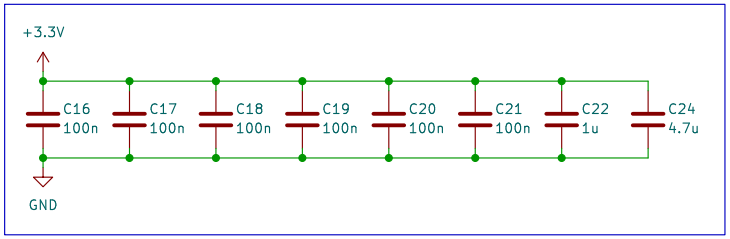
External OpAmp requirements & choice:
- 4.8Msps @ 12V -> 57.7V/us
- GBW >= 9.6MHz
- Open loop gain >= 60dB
- Output voltage swing -> rail to rail
- Input common mode voltage -> rail to rail
- Stable at the used gain



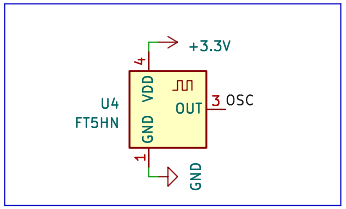
Title: Output Stage		
Size: A4	Date: 2023-01-16	Rev: 0
KiCad E.D.A. kicad (7.0.0-0)		Id: 3/5



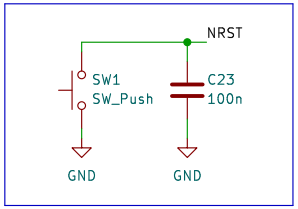
Capacitors:
- 2x 2.2uF for Vcap_1 and Vcap_2
- 1x 4.7uF connected to one of the Vdd pin
- 1x 1uF connected to Vdda
- 6x 100nF connected to Vbat, 5xVdd and Vdda



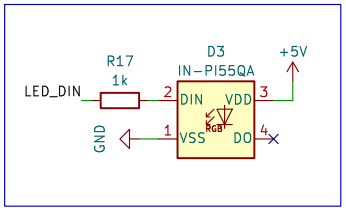
Decoupling



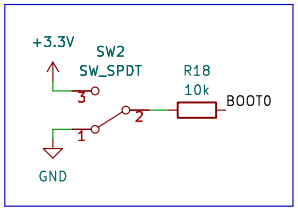
Oscillator (25MHz)



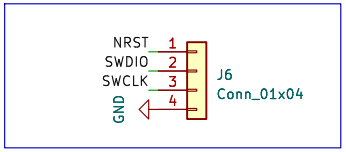
Reset button



Addressable RGBW LED

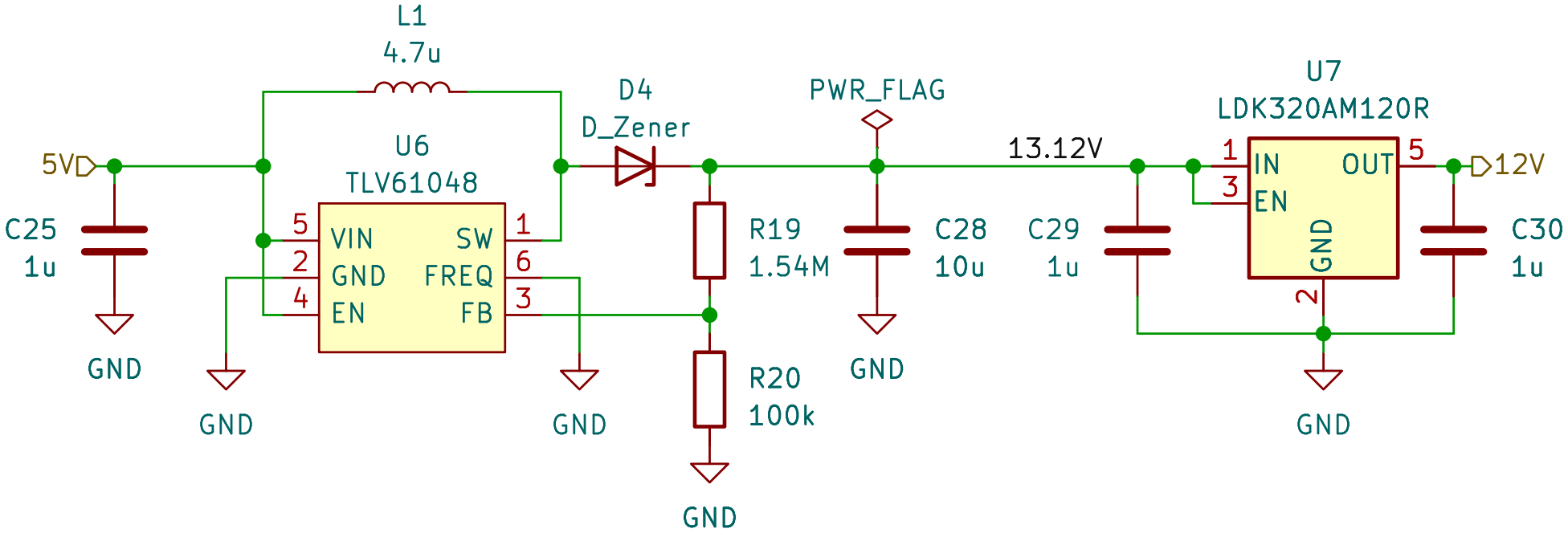


Boot switch



ST-Link connector

Title: Microcontroller Unit		
Size: A4	Date: 2023-04-18	**Rev: 0**
KiCad E.D.A. kicad (7.0.0-0)		Id: 4/5


L1
4.7u
5V
C25
1u
GND
U6
TLV61048
5
VIN
2
GND
4
EN
SW
1
FREQ
6
FB
3
GND
GND
D4
D_Zener
R19
1.54M
R20
100k
GND
PWR_FLAG
C28
10u
GND
13.12V
C29
1u
U7
LDK320AM120R
1
IN
3
EN
GND
2
OUT
5
C30
1u
12V
GND