MINICORSO POUL: PCB

EDA PROPRIETARI

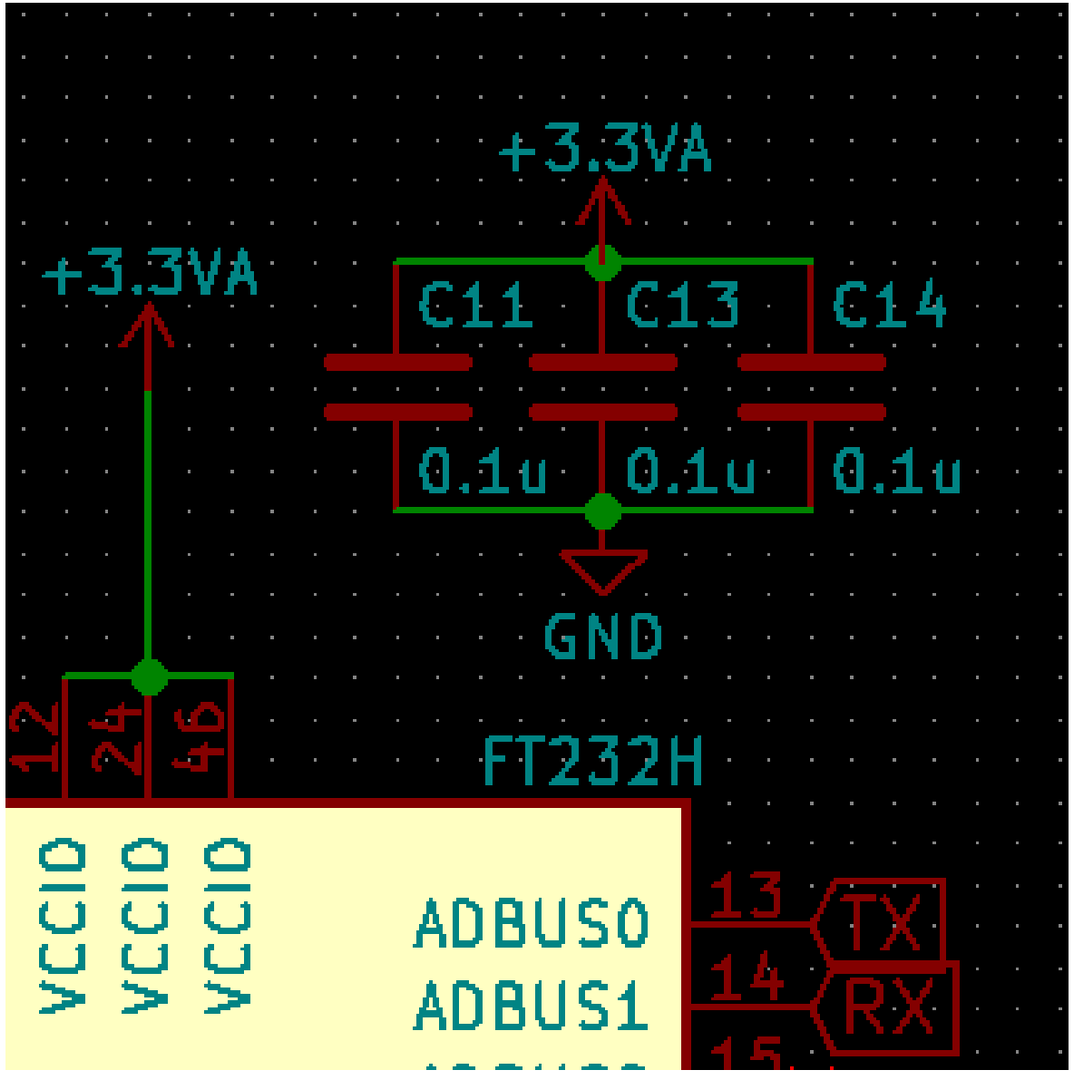
- Altium
- Eagle
- ...

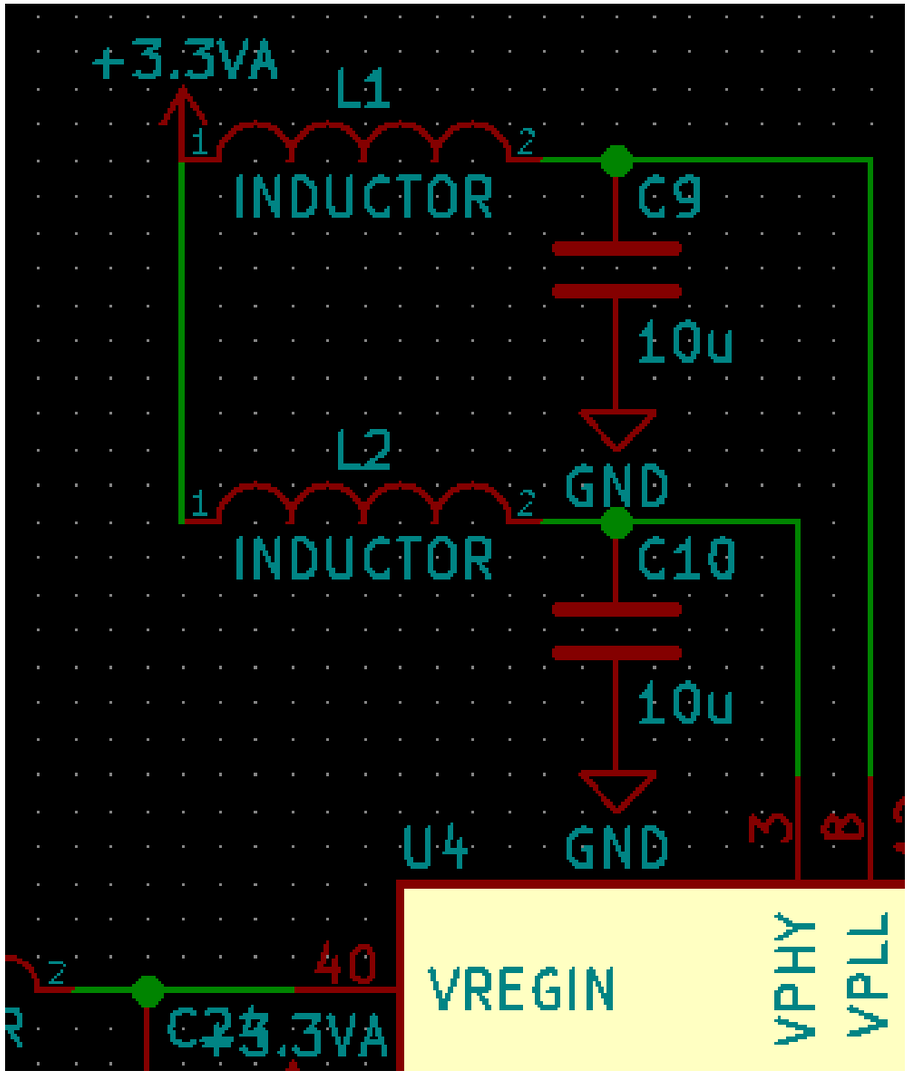
EDA FOSS

- KiCad
- gEDA
- Fritzing
- ...

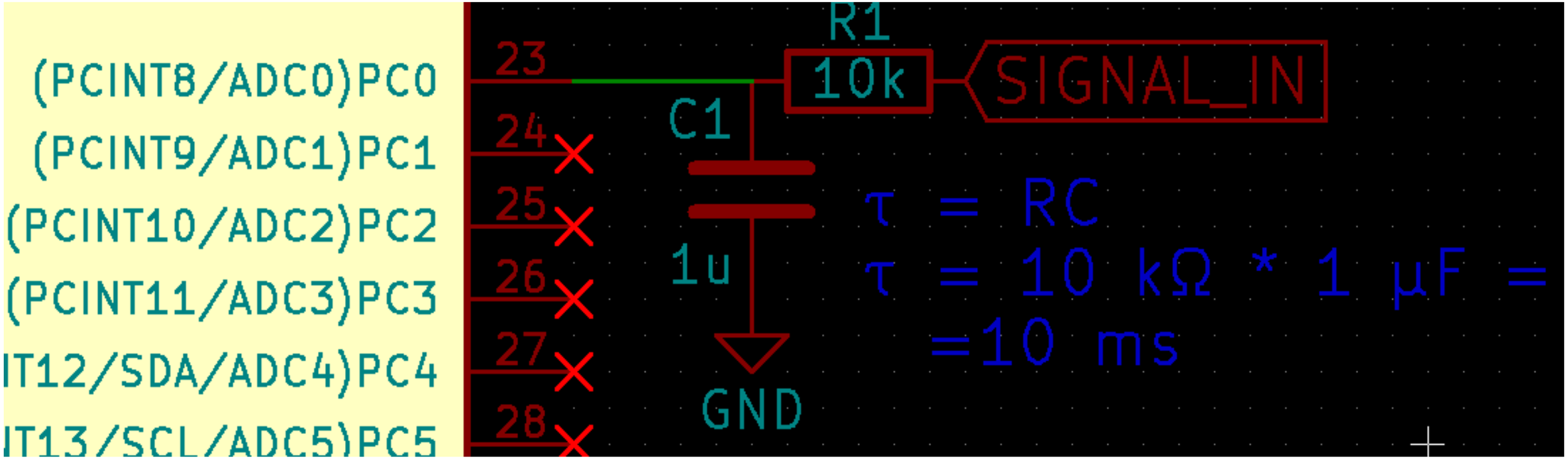
ESEMPI E CONSIGLI

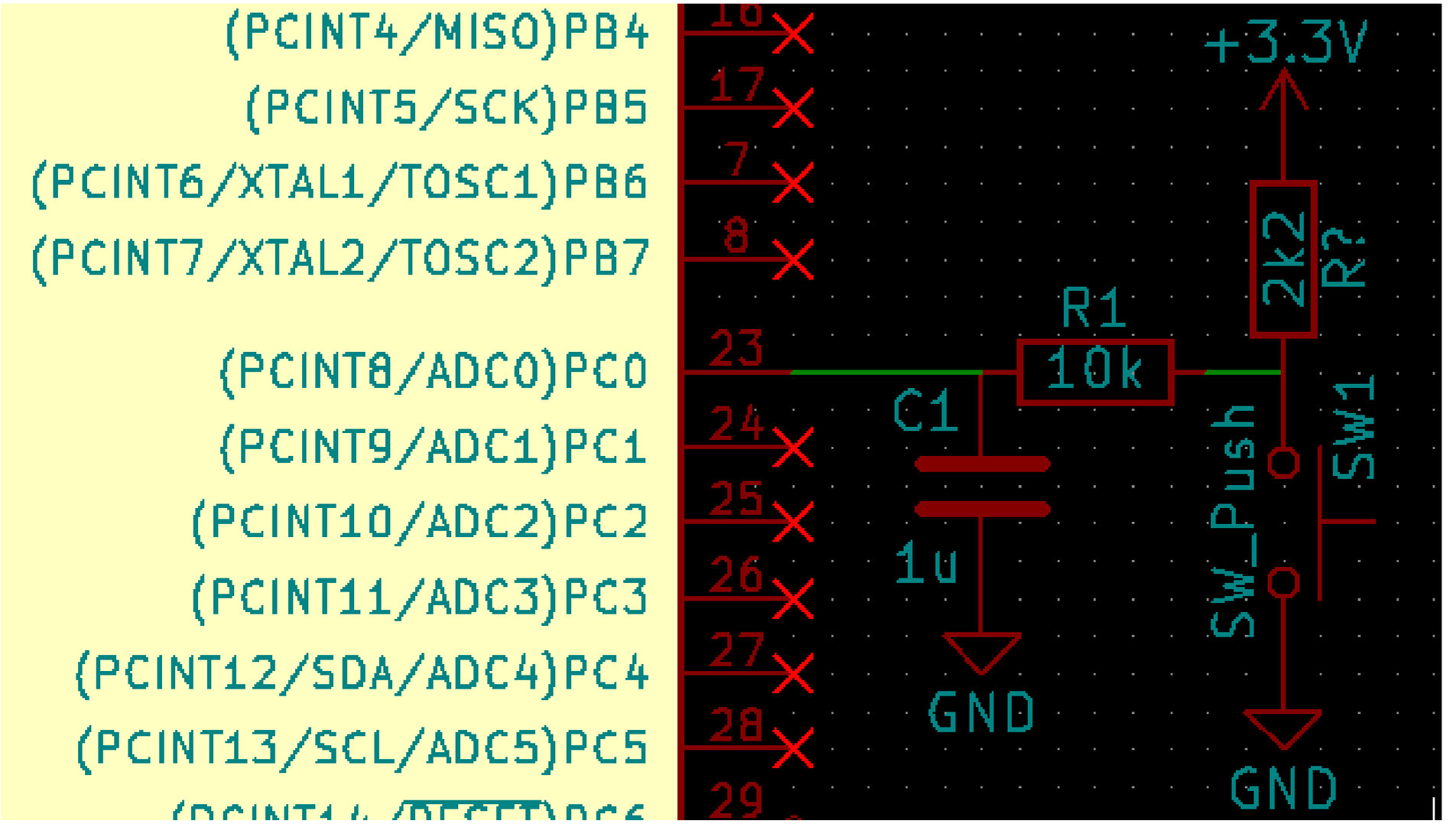
ALIMENTAZIONI

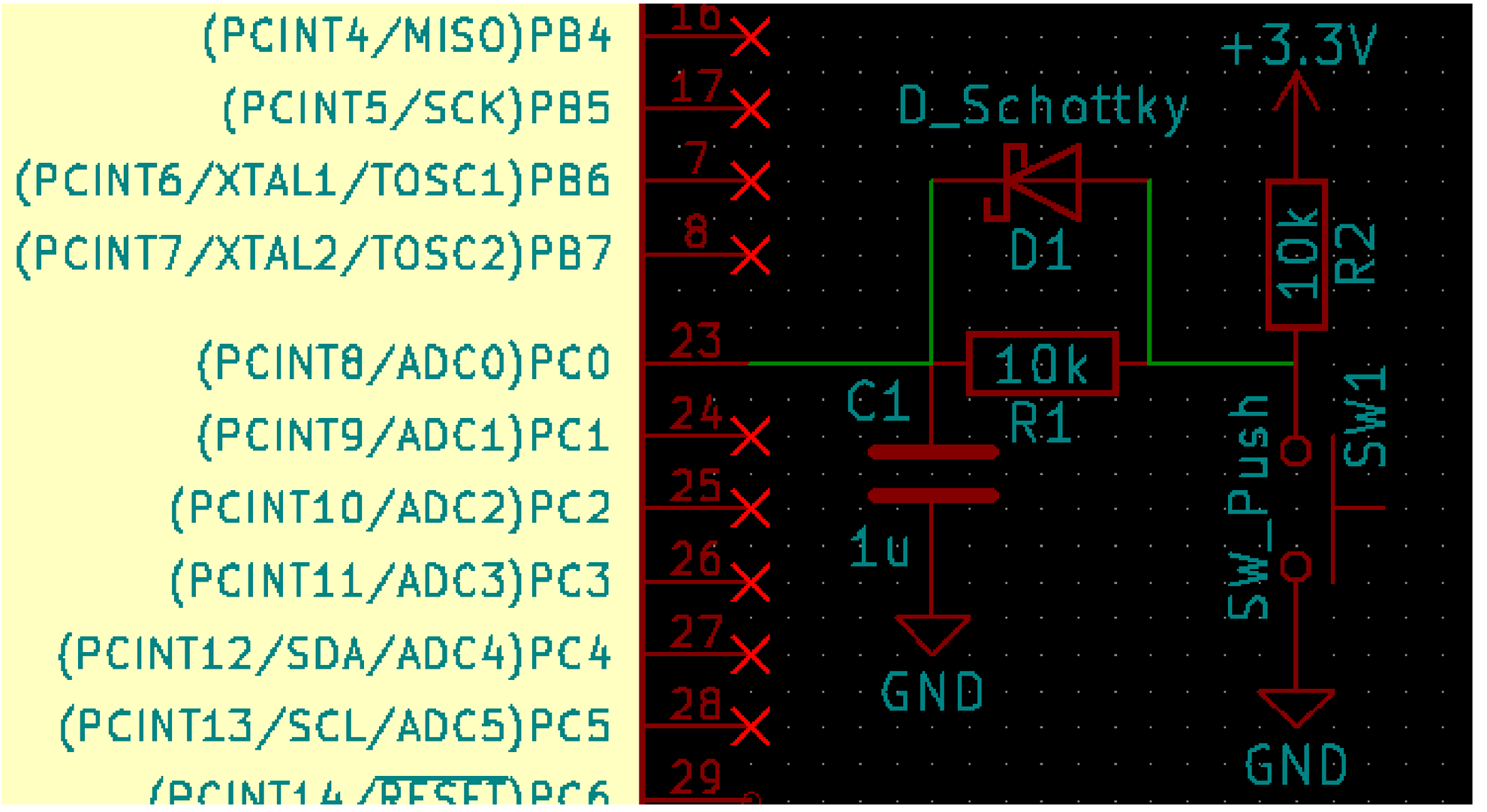



+3.3VA
L1
1
2
INDUCTOR
C9
10u
L2
GND
1
2
INDUCTOR
C10
10u
GND
U4
3
B
40
VREGIN
VPHY
VPLL
2
C73
3.3VA

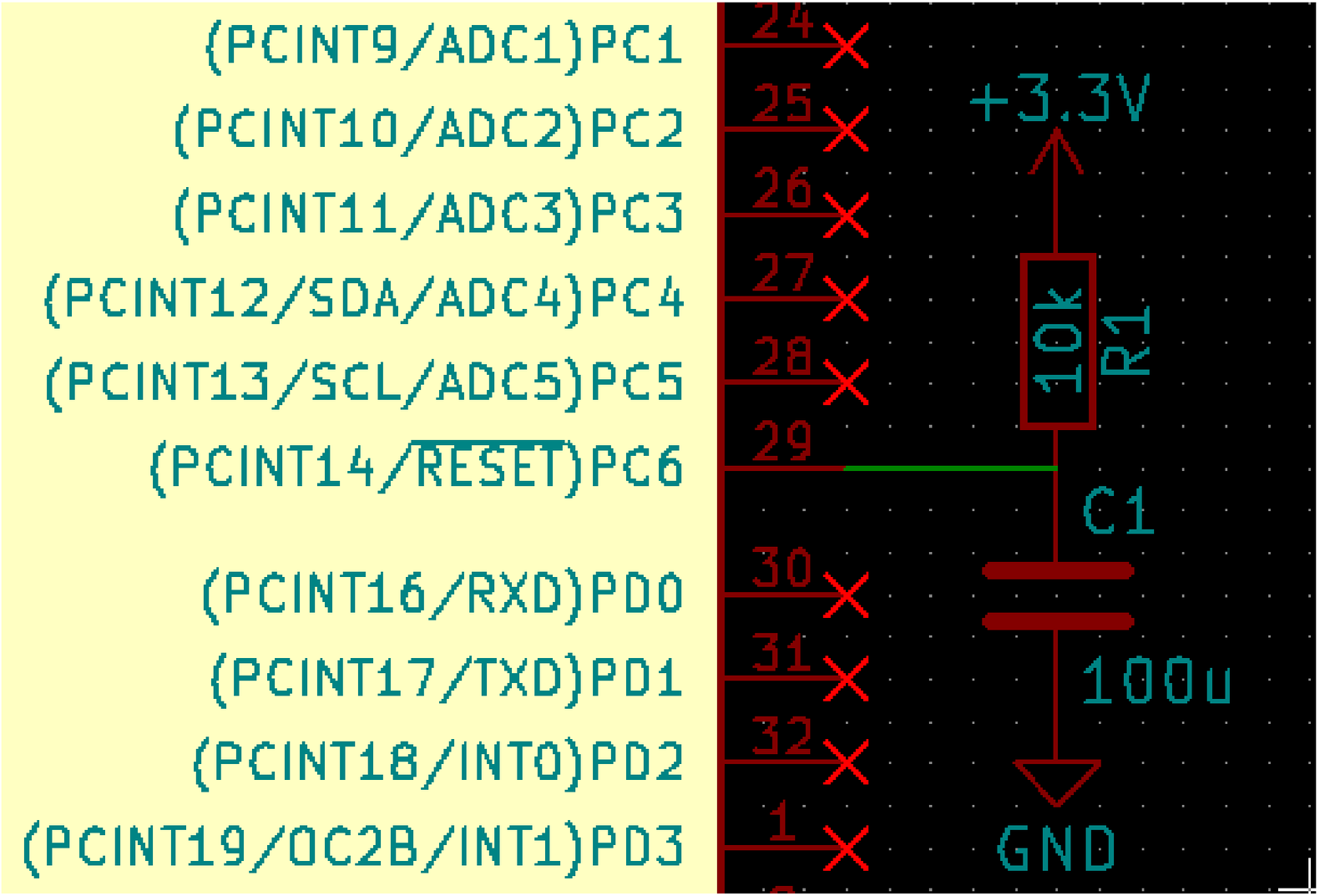
DEBOUNCE


(PCINT8/ADC0)PC0
(PCINT9/ADC1)PC1
(PCINT10/ADC2)PC2
(PCINT11/ADC3)PC3
IT12/SDA/ADC4)PC4
IT13/SCL/ADC5)PC5
23
24
25
26
27
28
R1
10k
SIGNAL_IN
C1
1u
GND
τ = RC
τ = 10 kΩ * 1 μF =
=10 ms

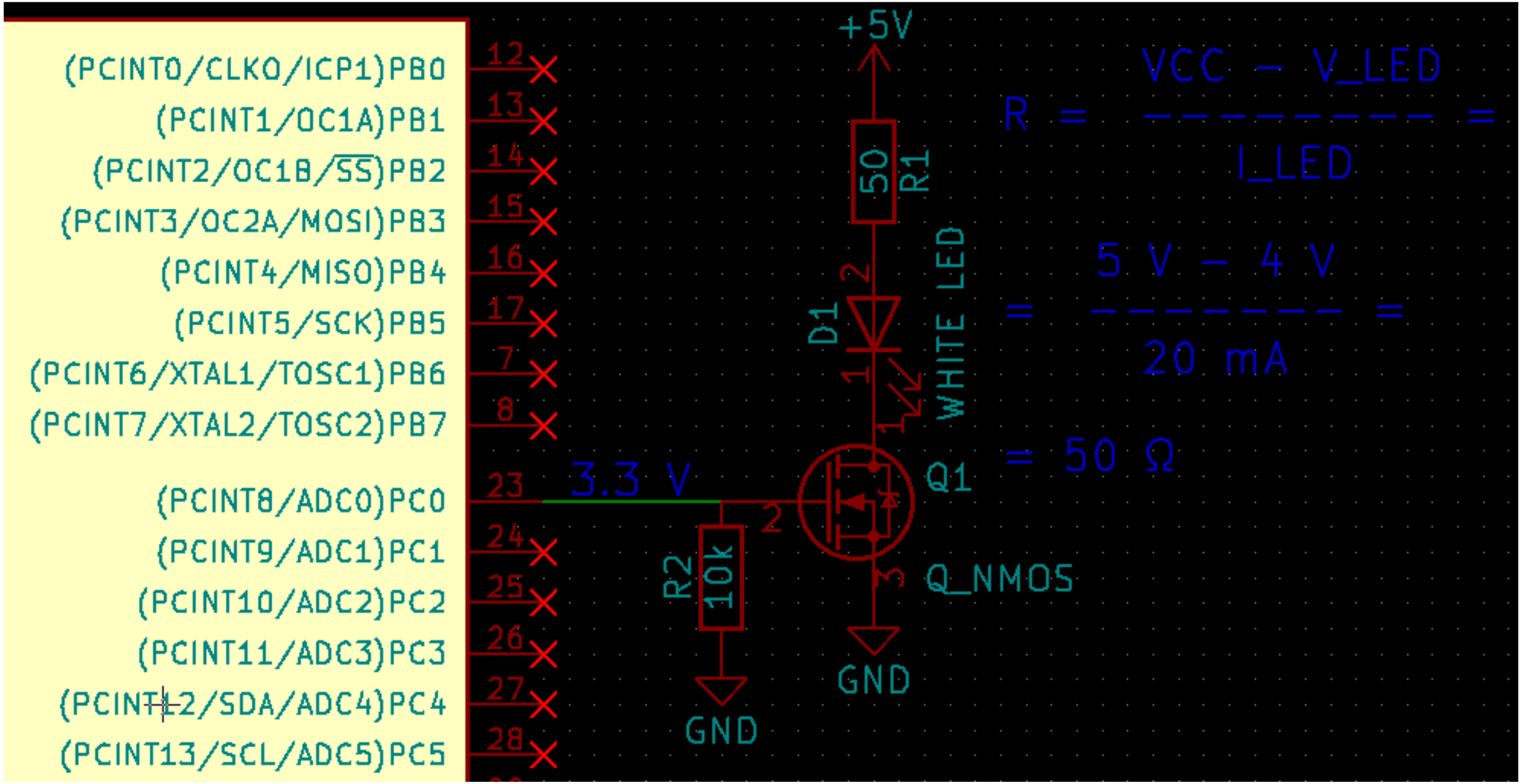

(PCINT4/MISO)PB4
(PCINT5/SCK)PB5
(PCINT6/XTAL1/TOSC1)PB6
(PCINT7/XTAL2/TOSC2)PB7
(PCINT8/ADC0)PC0
(PCINT9/ADC1)PC1
(PCINT10/ADC2)PC2
(PCINT11/ADC3)PC3
(PCINT12/SDA/ADC4)PC4
(PCINT13/SCL/ADC5)PC5
16
17
7
8
23
24
25
26
27
28
29
+3.3V
2k2
R2
R1
10k
C1
1u
GND
SW_Push
SW1
GND

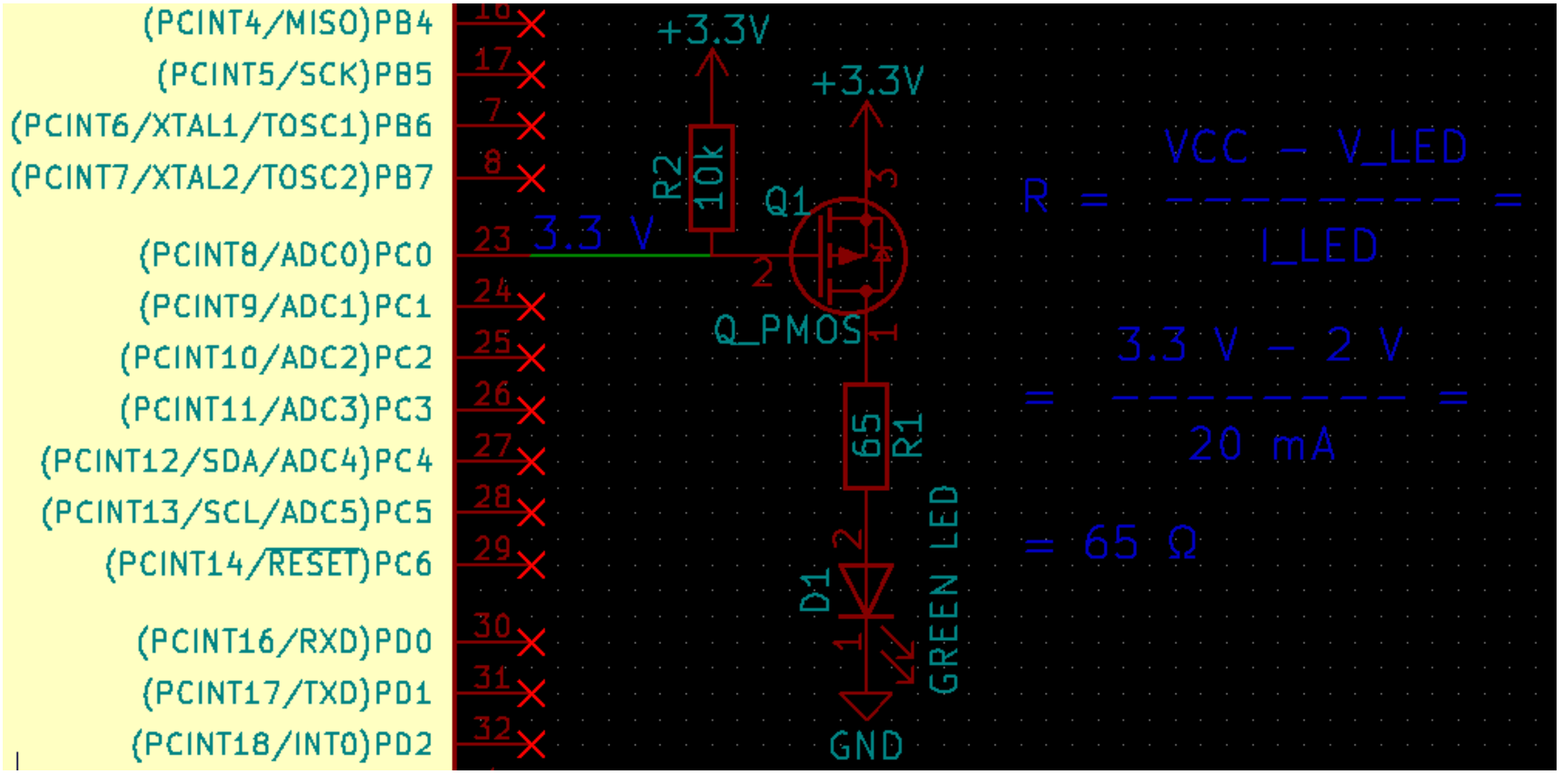

(PCINT4/MISO)PB4
(PCINT5/SCK)PB5
(PCINT6/XTAL1/TOSC1)PB6
(PCINT7/XTAL2/TOSC2)PB7
(PCINT8/ADC0)PC0
(PCINT9/ADC1)PC1
(PCINT10/ADC2)PC2
(PCINT11/ADC3)PC3
(PCINT12/SDA/ADC4)PC4
(PCINT13/SCL/ADC5)PC5
16
17
7
8
23
24
25
26
27
28
29
D_Schottky
D1
+3.3V
10k
R2
10k
R1
C1
1u
GND
SW_Push
SW1
GND

RESET

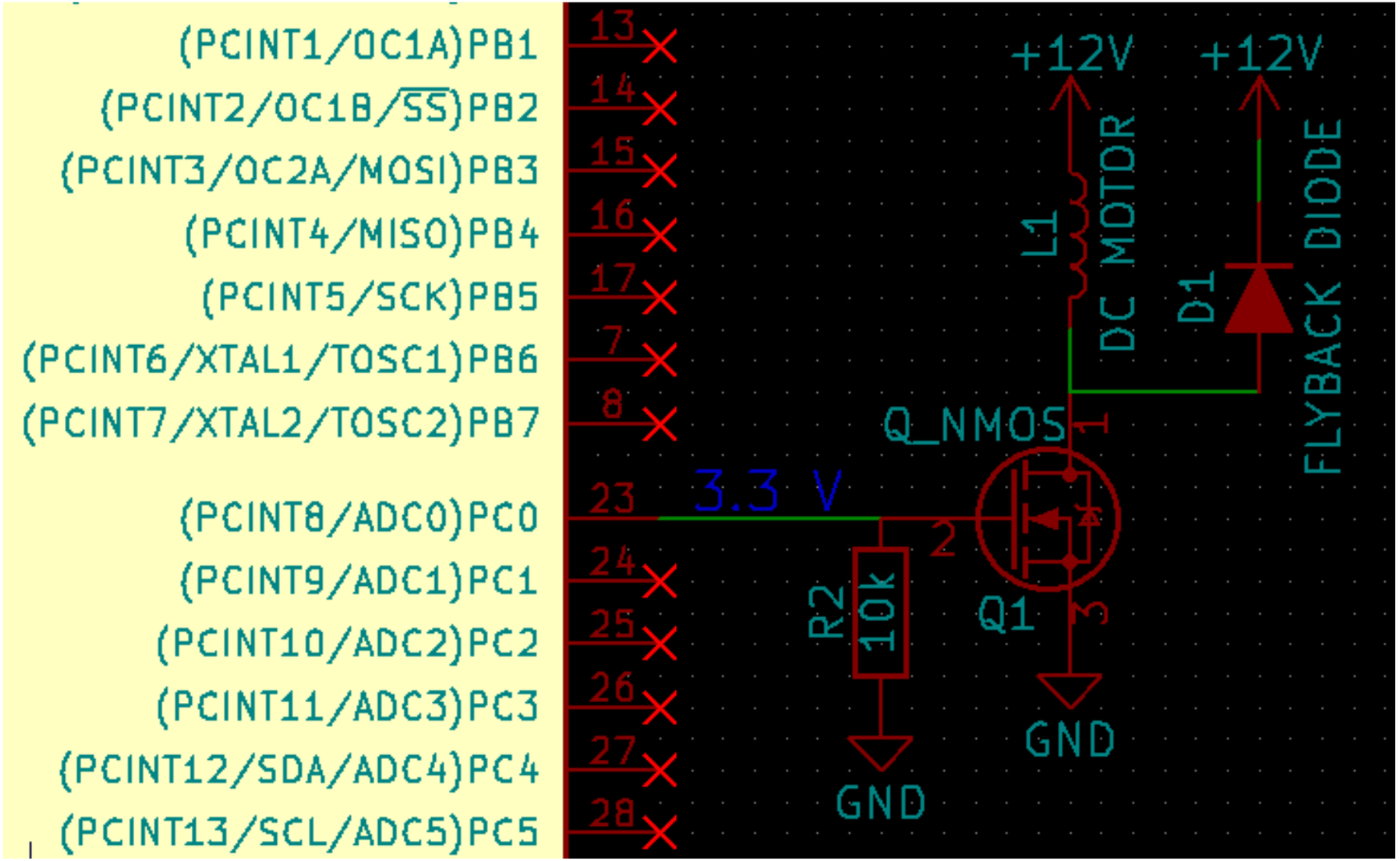

(PCINT9/ADC1)PC1
(PCINT10/ADC2)PC2
(PCINT11/ADC3)PC3
(PCINT12/SDA/ADC4)PC4
(PCINT13/SCL/ADC5)PC5
(PCINT14/RESET)PC6
(PCINT16/RXD)PD0
(PCINT17/TXD)PD1
(PCINT18/INT0)PD2
(PCINT19/OC2B/INT1)PD3
24
25
26
27
28
29
30
31
32
1
+3.3V
10k
R1
C1
100u
GND

LED

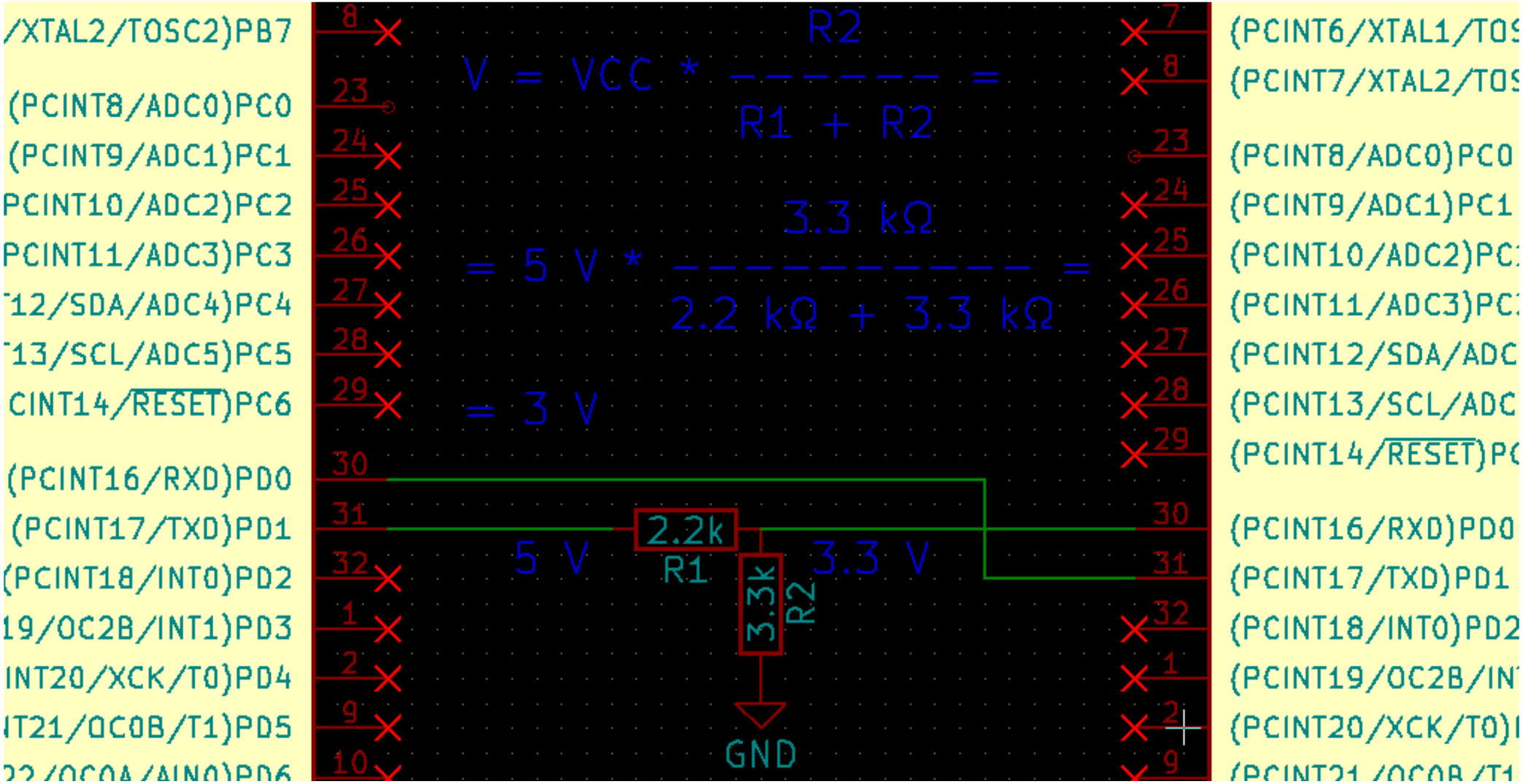

(PCINT0/CLKO/ICP1)PB0
(PCINT1/OC1A)PB1
(PCINT2/OC1B/SS)PB2
(PCINT3/OC2A/MOSI)PB3
(PCINT4/MISO)PB4
(PCINT5/SCK)PB5
(PCINT6/XTAL1/TOSC1)PB6
(PCINT7/XTAL2/TOSC2)PB7
(PCINT8/ADC0)PC0
(PCINT9/ADC1)PC1
(PCINT10/ADC2)PC2
(PCINT11/ADC3)PC3
(PCINT12/SDA/ADC4)PC4
(PCINT13/SCL/ADC5)PC5
12
13
14
15
16
17
7
8
23
24
25
26
27
28
3.3 V
+5V
50
R1
D1
WHITE LED
Q1
Q_NMOS
R2
10k
GND
GND
R = VCC − V_LED / I_LED = 5 V − 4 V / 20 mA = 50 Ω

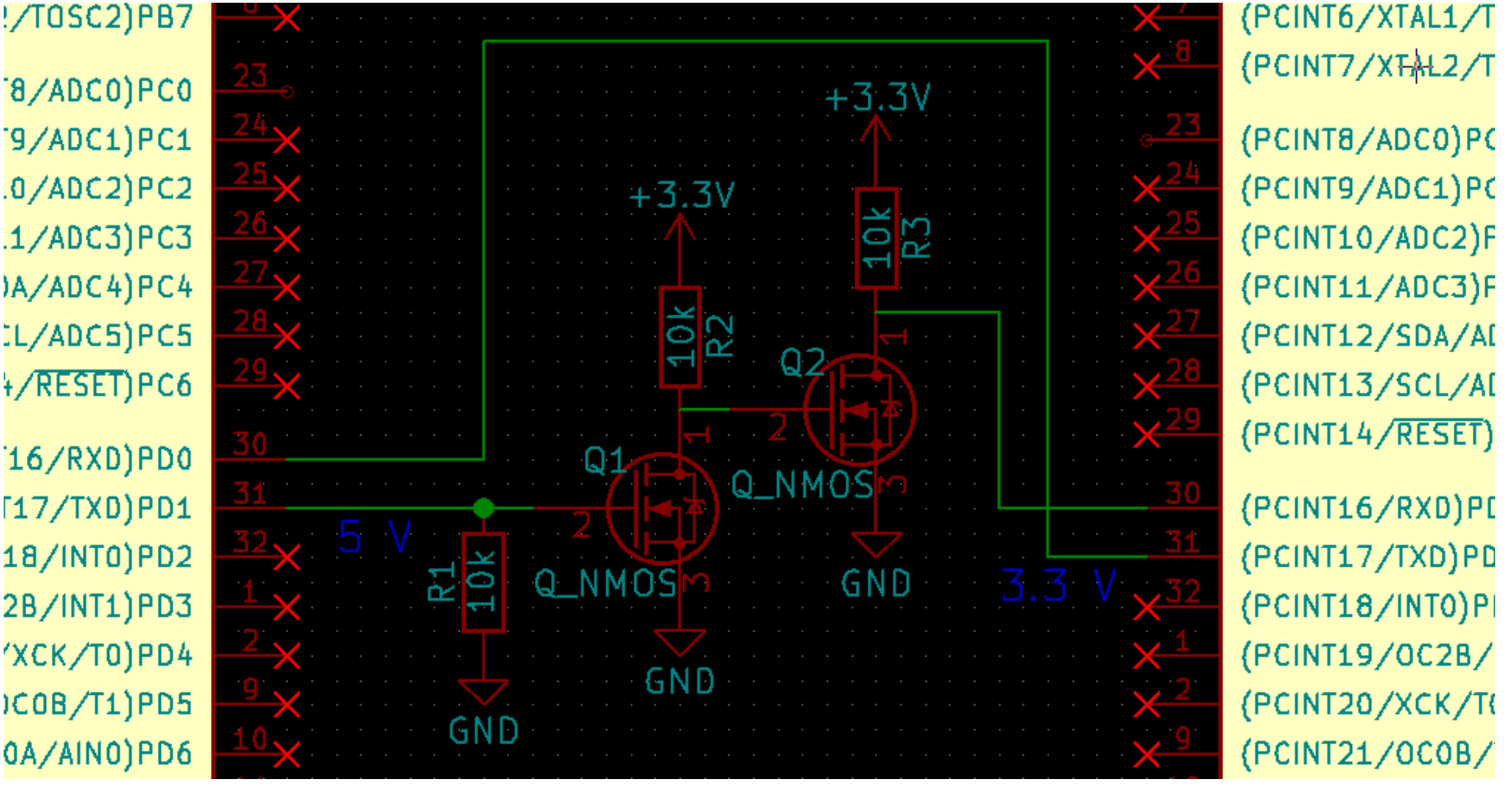

(PCINT4/MISO)PB4
(PCINT5/SCK)PB5
(PCINT6/XTAL1/TOSC1)PB6
(PCINT7/XTAL2/TOSC2)PB7
(PCINT8/ADC0)PC0
(PCINT9/ADC1)PC1
(PCINT10/ADC2)PC2
(PCINT11/ADC3)PC3
(PCINT12/SDA/ADC4)PC4
(PCINT13/SCL/ADC5)PC5
(PCINT14/RESET)PC6
(PCINT16/RXD)PD0
(PCINT17/TXD)PD1
(PCINT18/INT0)PD2
16
17
7
8
23
24
25
26
27
28
29
30
31
32
+3.3V
+3.3V
R2
10k
3.3 V
Q1
Q_PMOS
3
2
1
65
R1
D1
2
1
GREEN LED
GND
R = VCC − V_LED / I_LED =
= 3.3 V − 2 V / 20 mA =
= 65 Ω

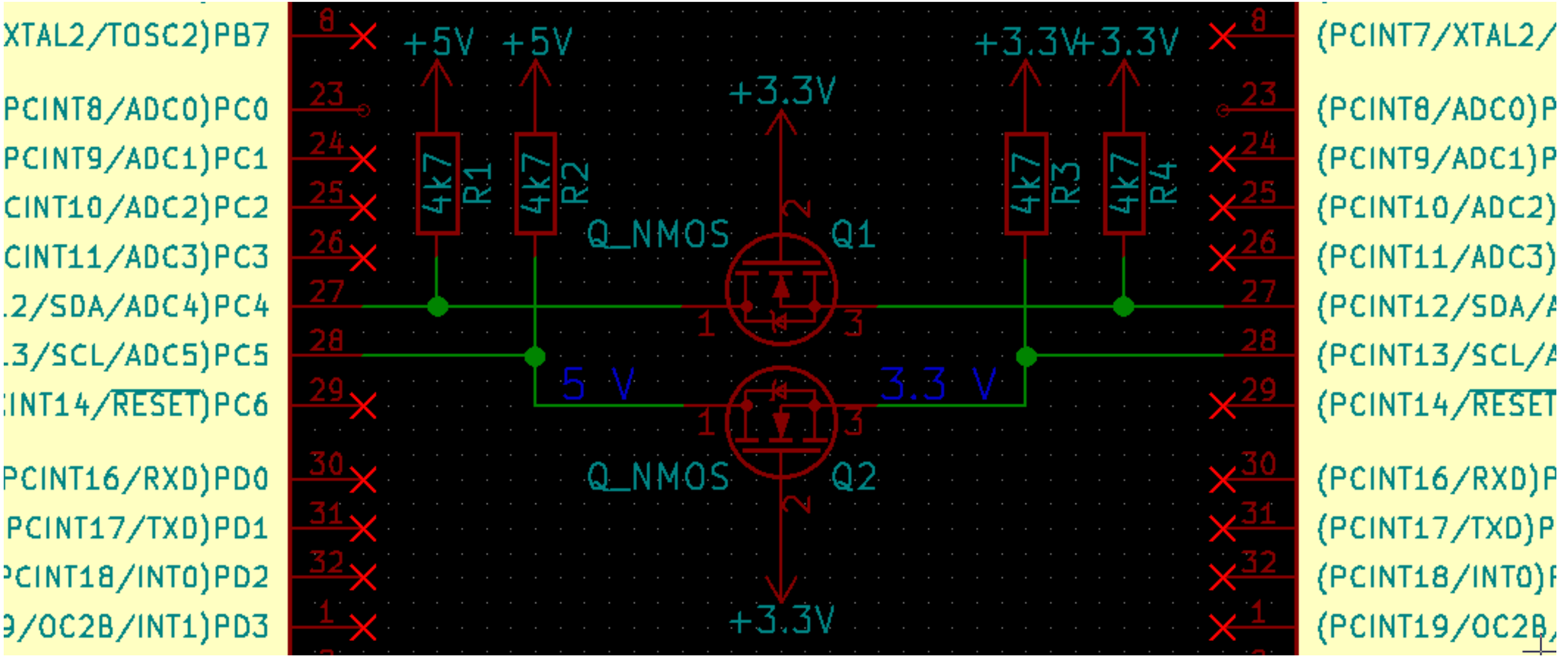
MOTORI


(PCINT1/OC1A)PB1
(PCINT2/OC1B/SS)PB2
(PCINT3/OC2A/MOSI)PB3
(PCINT4/MISO)PB4
(PCINT5/SCK)PB5
(PCINT6/XTAL1/TOSC1)PB6
(PCINT7/XTAL2/TOSC2)PB7
(PCINT8/ADC0)PC0
(PCINT9/ADC1)PC1
(PCINT10/ADC2)PC2
(PCINT11/ADC3)PC3
(PCINT12/SDA/ADC4)PC4
(PCINT13/SCL/ADC5)PC5
13
14
15
16
17
7
8
23
24
25
26
27
28
3.3 V
R2
10k
GND
Q_NMOS
Q1
1
2
3
+12V
L1
DC MOTOR
+12V
D1
FLYBACK DIODE
GND

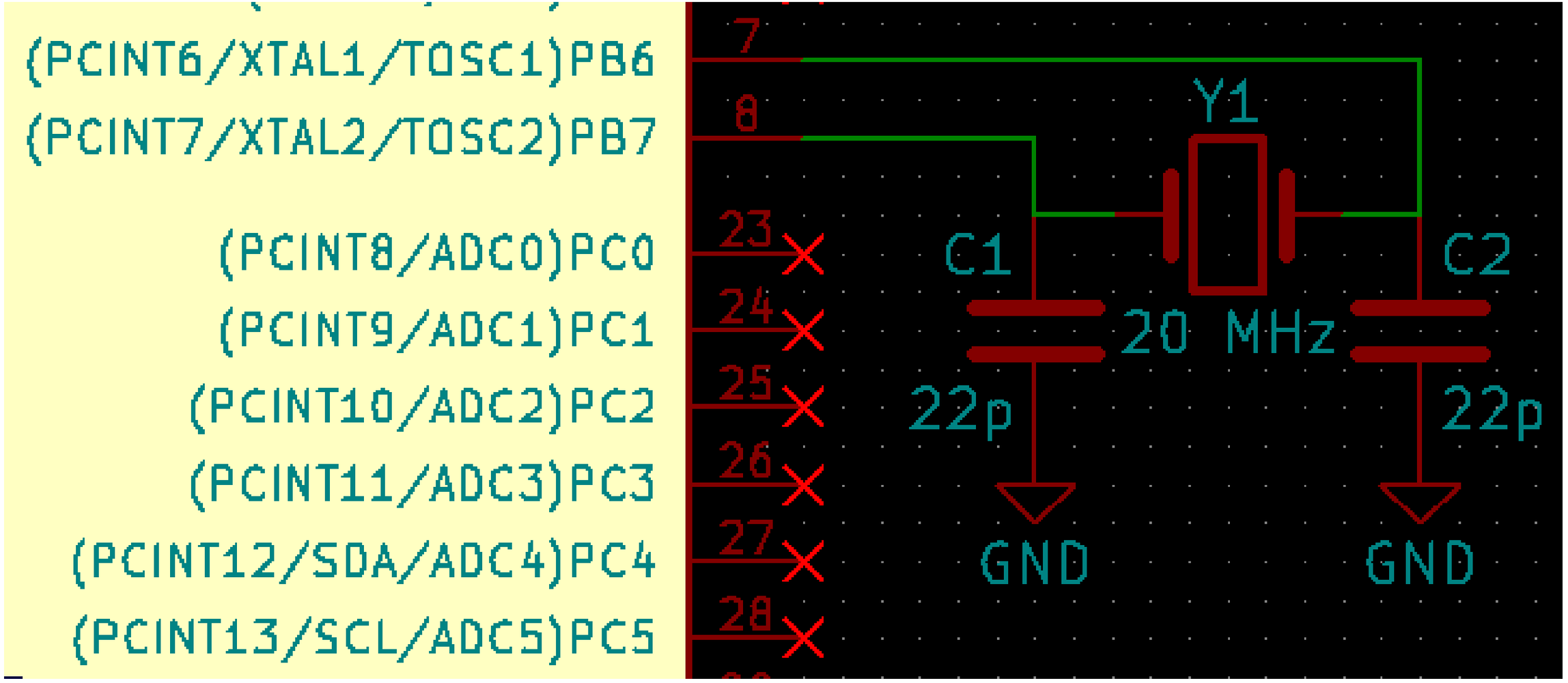
ADATTAMENTO LIVELLI LOGICI



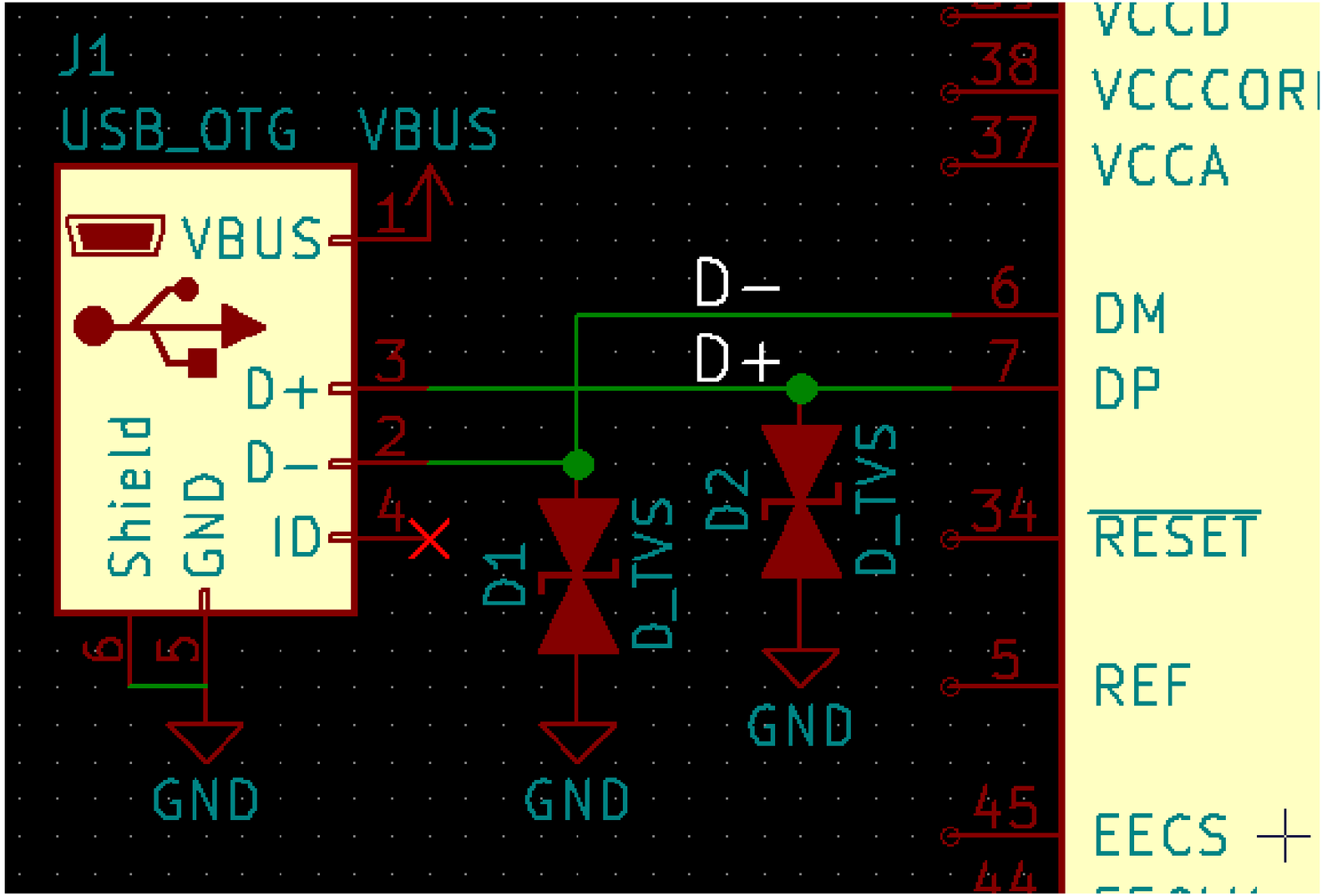

+3.3V
+3.3V
10k
R3
10k
R2
Q2
Q1
Q_NMOS
Q_NMOS
5 V
3.3 V
R1
10k
GND
GND
GND
30
31
32
1
2
9
10
23
24
25
26
27
28
29
8
(PCINT6/XTAL1/T
(PCINT7/XTAL2/T
(PCINT8/ADC0)PC
(PCINT9/ADC1)PC
(PCINT10/ADC2)P
(PCINT11/ADC3)P
(PCINT12/SDA/AD
(PCINT13/SCL/AD
(PCINT14/RESET)
(PCINT16/RXD)PD
(PCINT17/TXD)PD
(PCINT18/INT0)PD
(PCINT19/OC2B/
(PCINT20/XCK/T0
(PCINT21/OC0B/

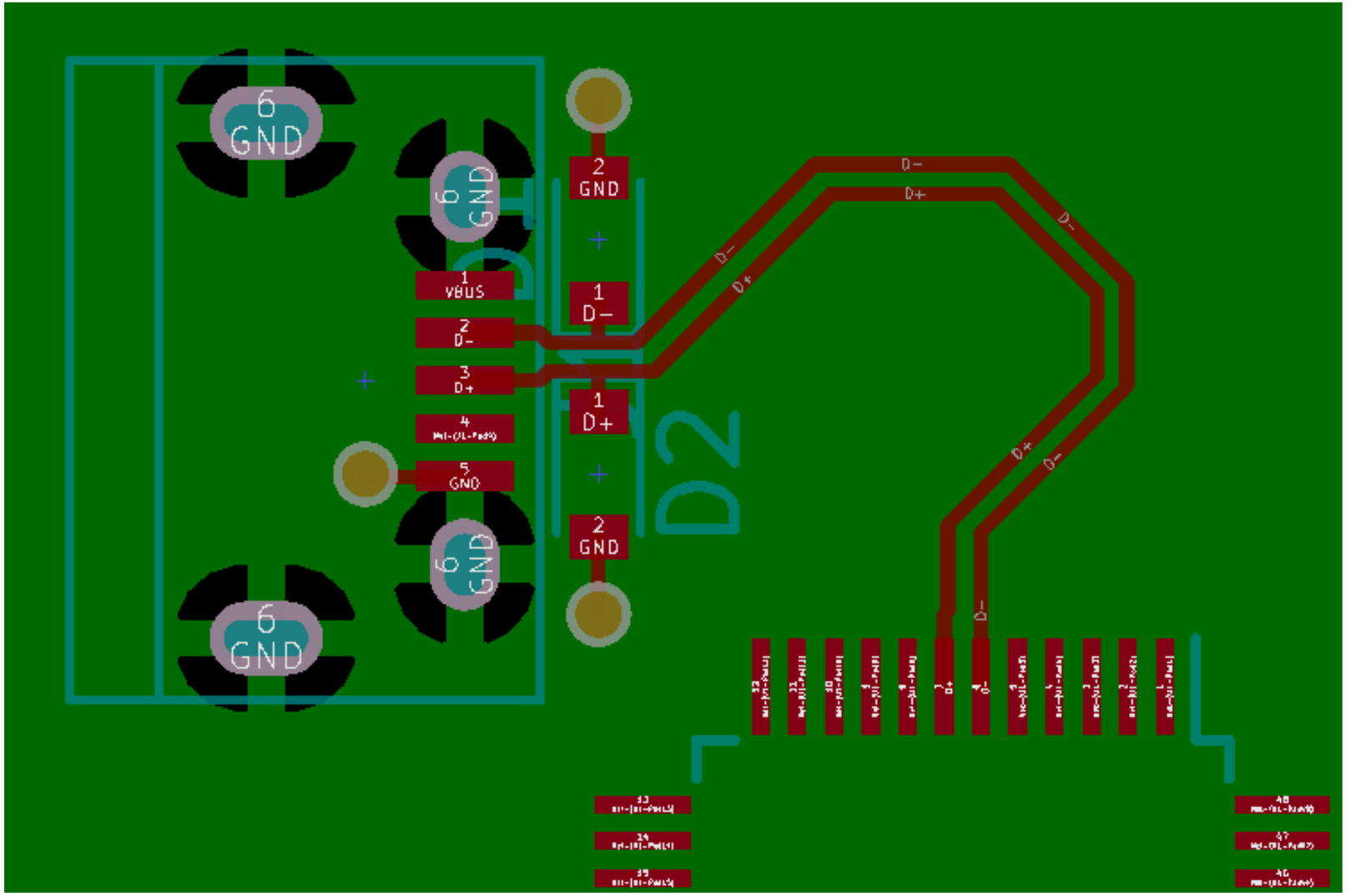

XTAL2/TOSC2)PB7
PCINT8/ADC0)PC0
PCINT9/ADC1)PC1
CINT10/ADC2)PC2
CINT11/ADC3)PC3
.2/SDA/ADC4)PC4
.3/SCL/ADC5)PC5
INT14/RESET)PC6
PCINT16/RXD)PD0
PCINT17/TXD)PD1
PCINT18/INT0)PD2
9/OC2B/INT1)PD3
+5V
+5V
+3.3V
+3.3V
+3.3V
4k7
R1
4k7
R2
4k7
R3
4k7
R4
Q_NMOS
Q1
Q_NMOS
Q2
5 V
3.3 V
+3.3V
(PCINT7/XTAL2/
(PCINT8/ADC0)P
(PCINT9/ADC1)P
(PCINT10/ADC2)
(PCINT11/ADC3)
(PCINT12/SDA/A
(PCINT13/SCL/A
(PCINT14/RESET
(PCINT16/RXD)P
(PCINT17/TXD)P
(PCINT18/INT0)P
(PCINT19/OC2B/

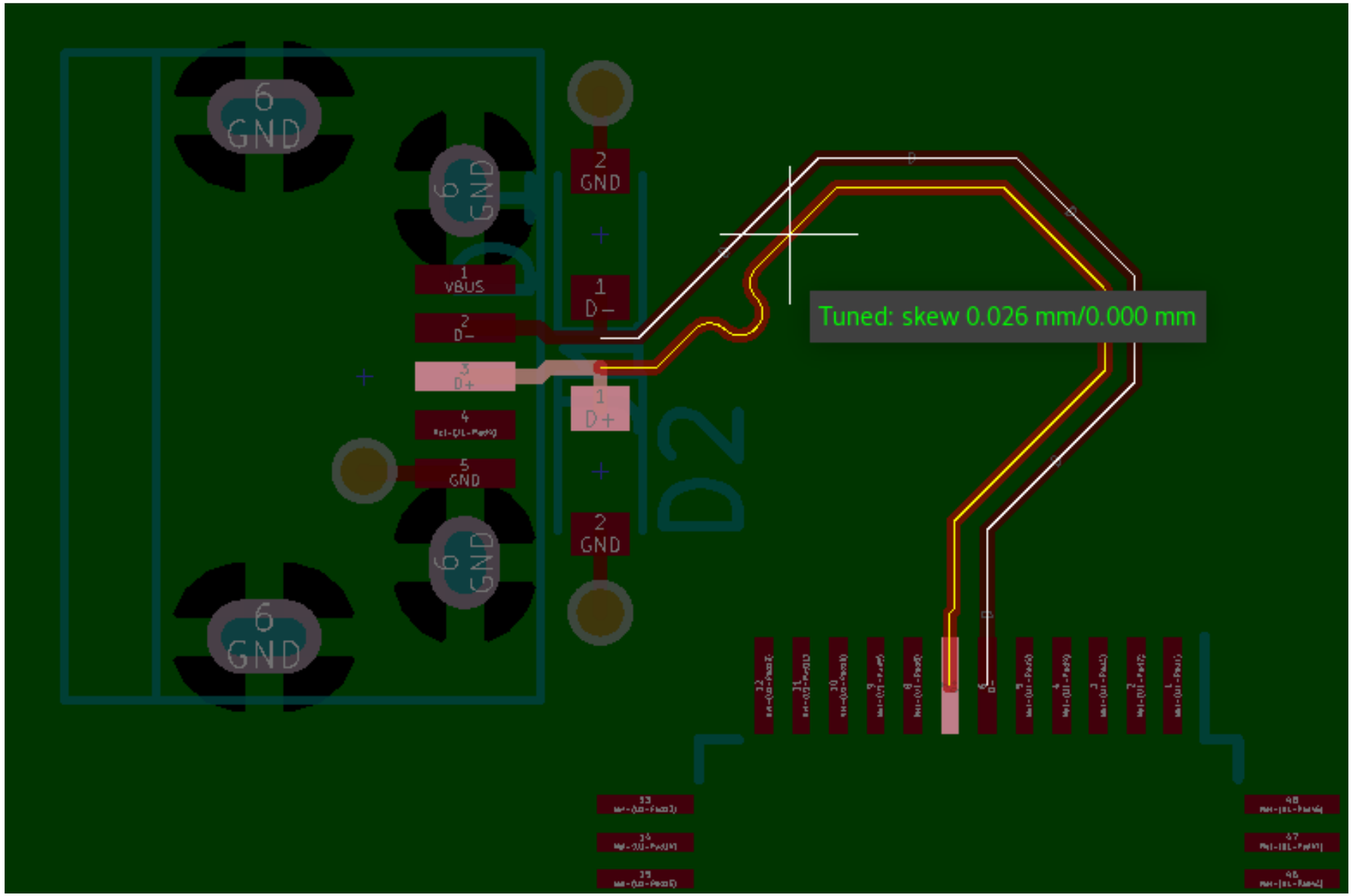
OSCILLATORI

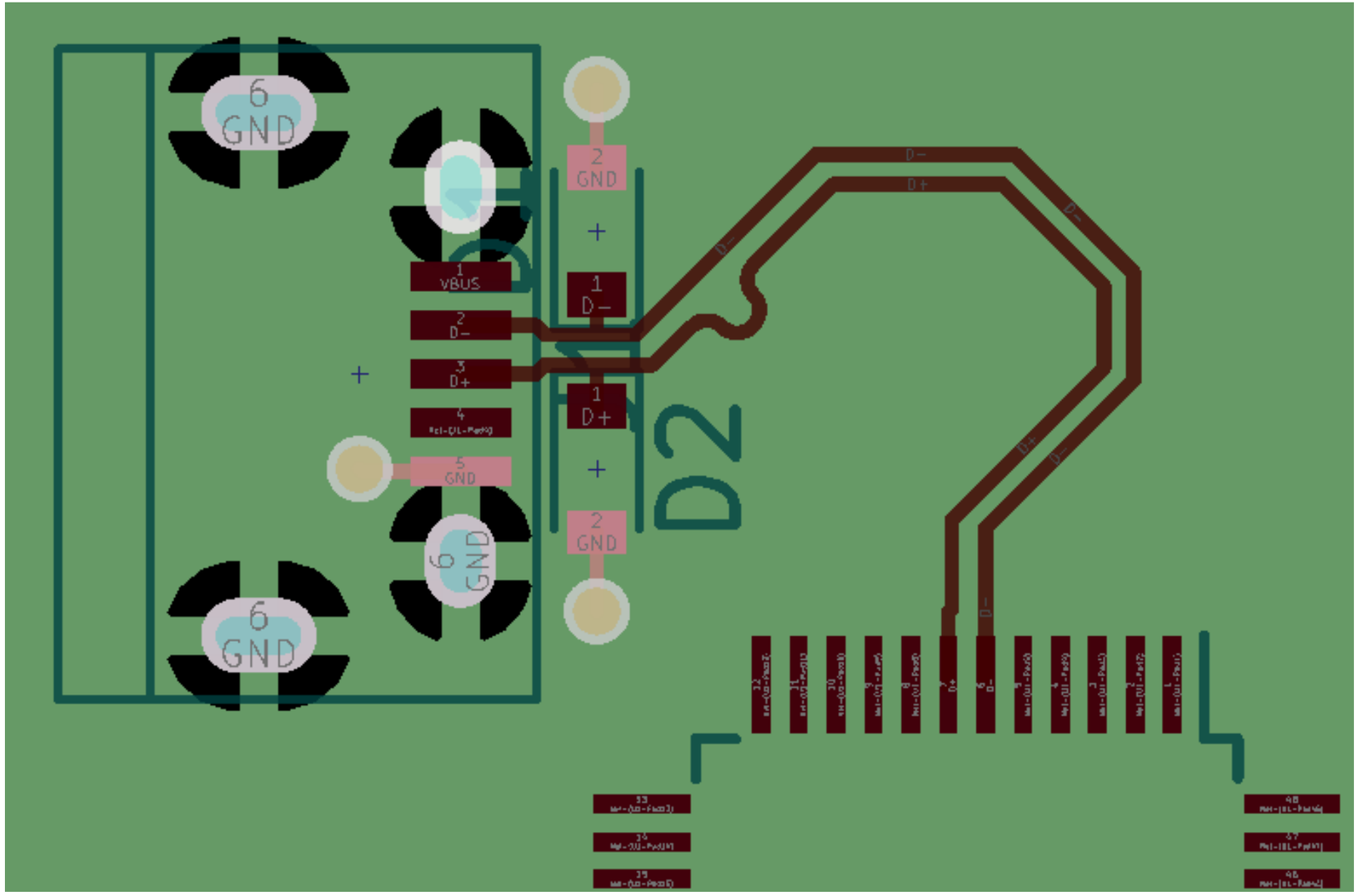


USB (SEGNALI DIFFERENZIALI)




6
GND
6
GND
6
GND
6
GND
1
VBUS
2
D-
3
D+
4
5
GND
2
GND
1
D-
1
D+
2
GND
D2
D-
D+
D-
D+
D+
D-
D-


Tuned: skew 0.026 mm/0.000 mm
VBUS
D-
D+
GND


6
GND
6
GND
6
GND
6
GND
1
VBUS
2
D-
3
D+
4
5
GND
2
GND
1
D-
1
D+
2
GND
D2
D-
D+
D+
D-
D-

KICAD

WORKFLOW:

- Schema elettrico (*eeschema*)
- Associazione componenti → footprint (*CvPcb*)
- Layout (*pcbnew*)

DEMO

FABBRICAZIONE PCB

FOTOINCISIONE

PRO

- Basso costo iniziale
- Basso costo per PCB
- Buona precisione

CONTRO

- Fori e bordi da fare a mano
- Agenti chimici
- Poco affidabile
- Secondo layer complicato

FRESATURA

PRO

- Rapido
- Basso costo per PCB (~5 € per A4)
- Foratura e bordi automatici
- Buona precisione

CONTRO

- Costo iniziale (600-800 €)
- Secondo layer complicato

AZIENDA

PRO

- Altissima precisione e affidabilità
- Alto numero di layer
- Foratura e taglio automatici

CONTRO

- Costo
- Tempi di consegna (2-4 settimane)

THANK YOU!