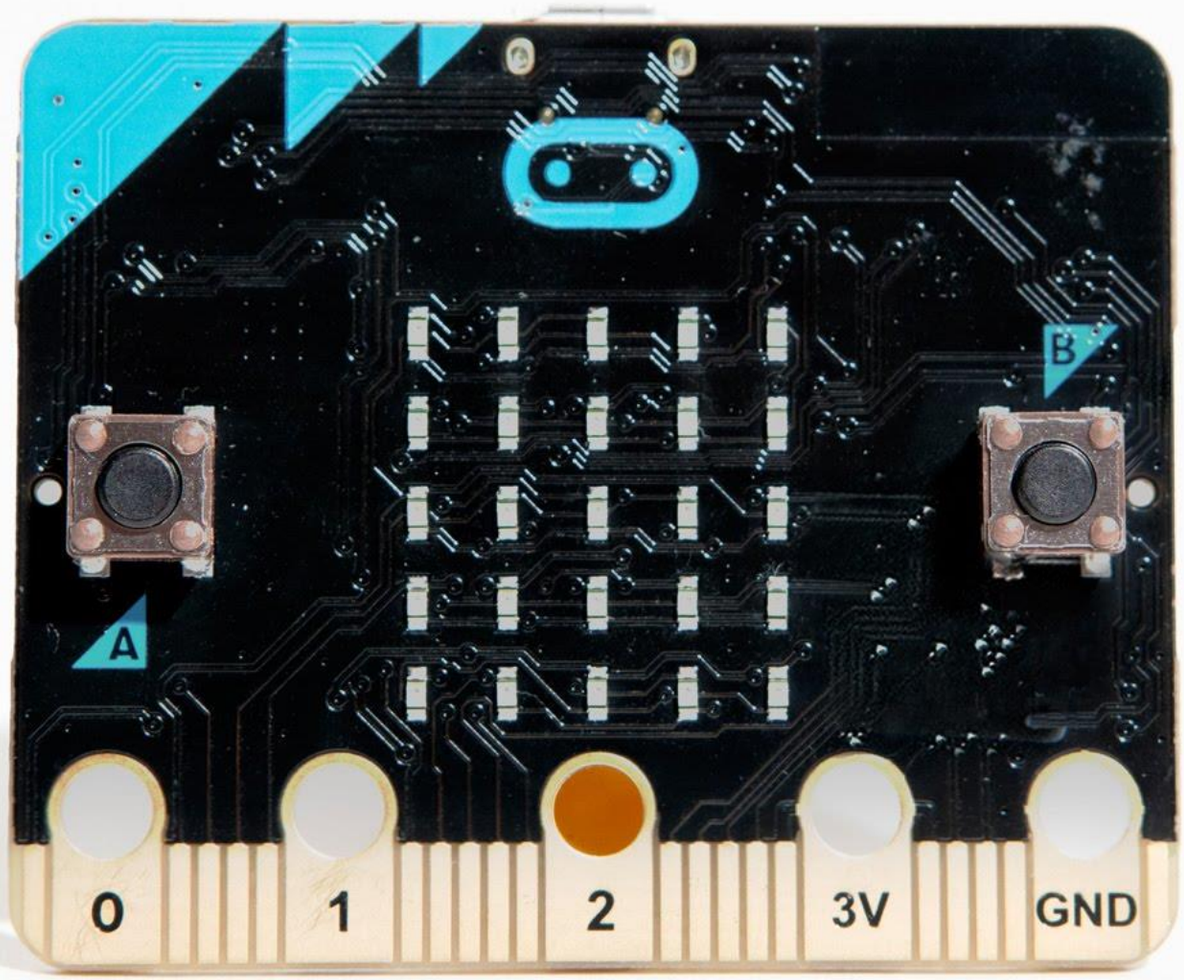
BBC micro:bit

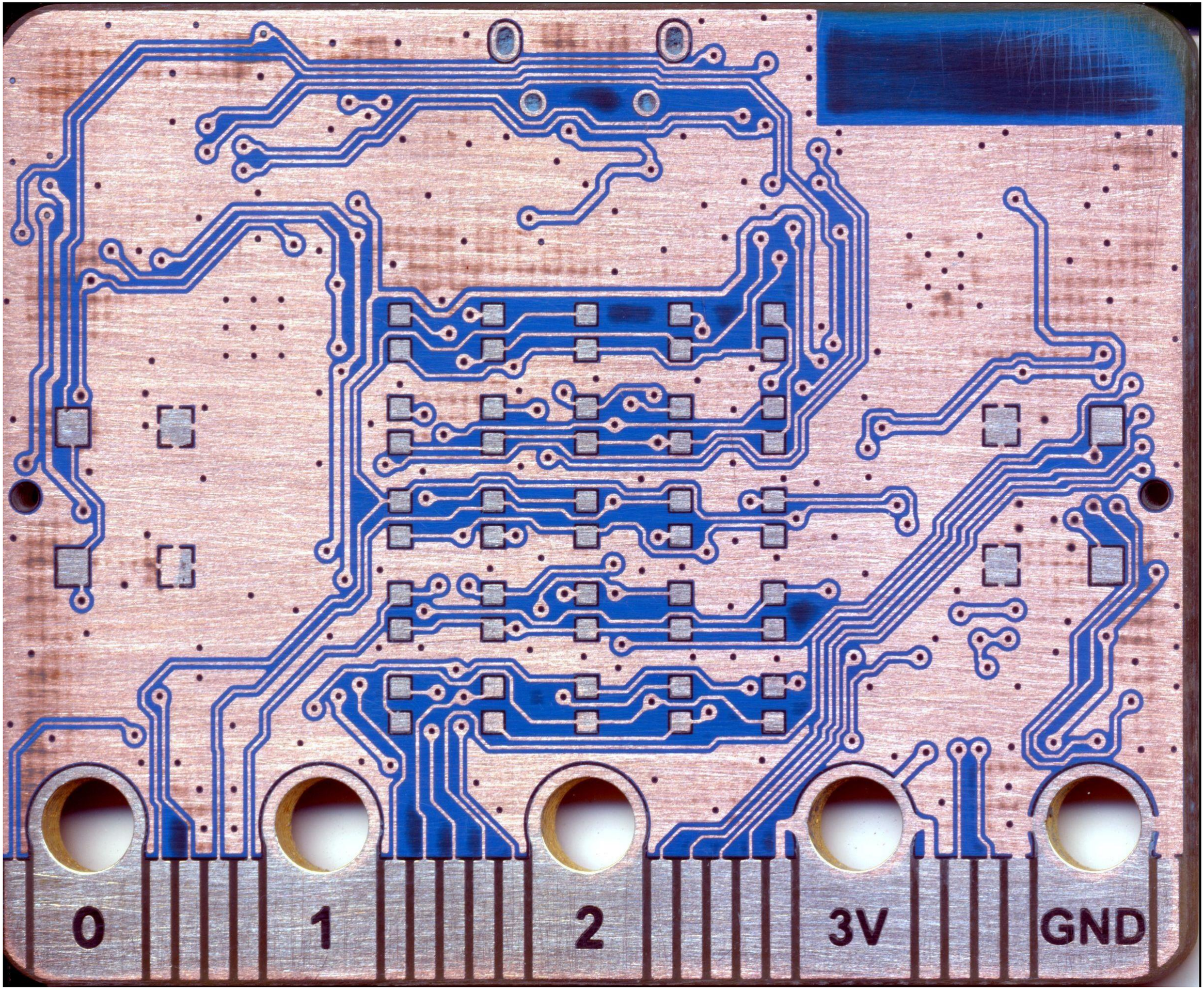
Reengineering
Micro:bit → schematics
V0.95

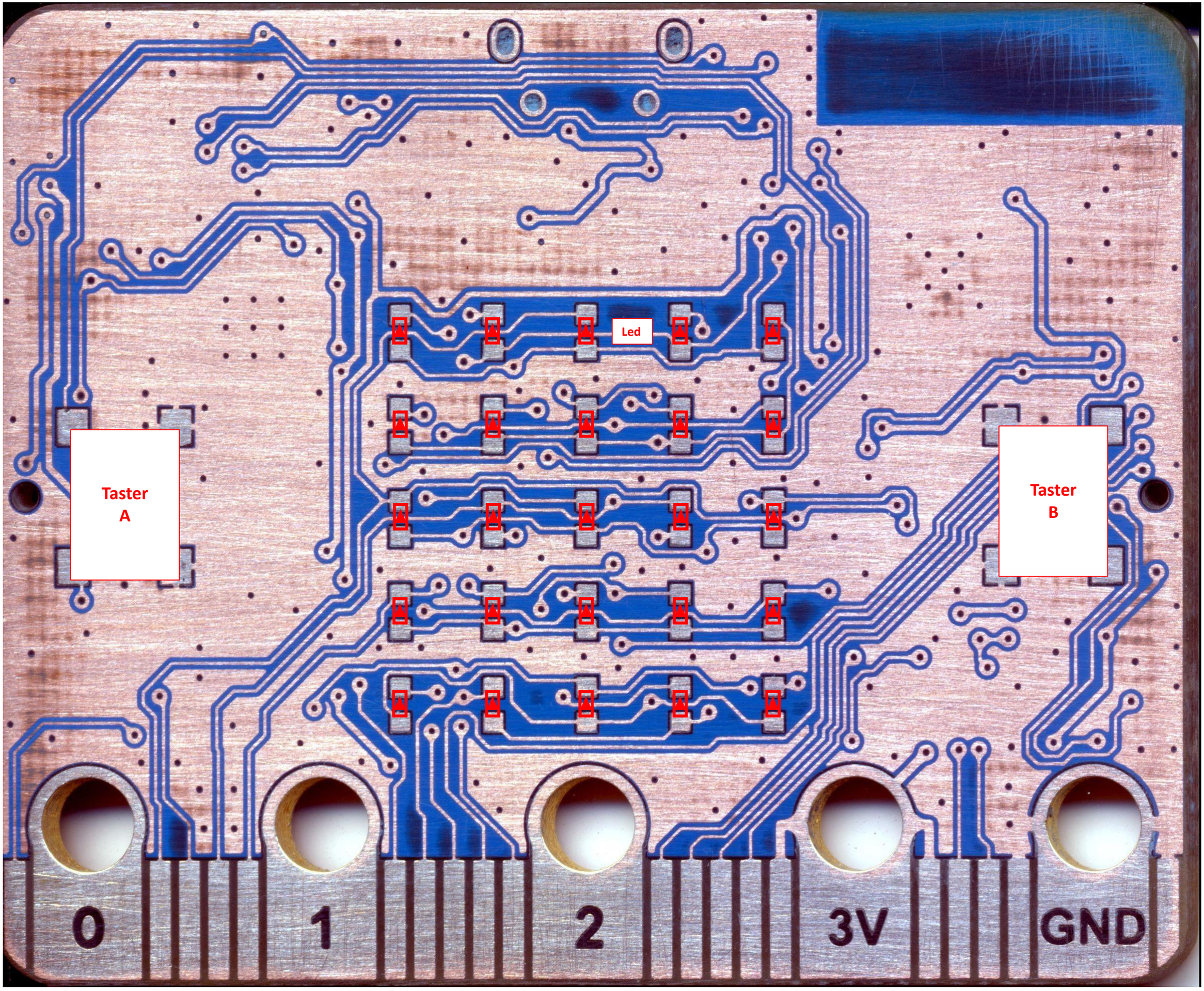


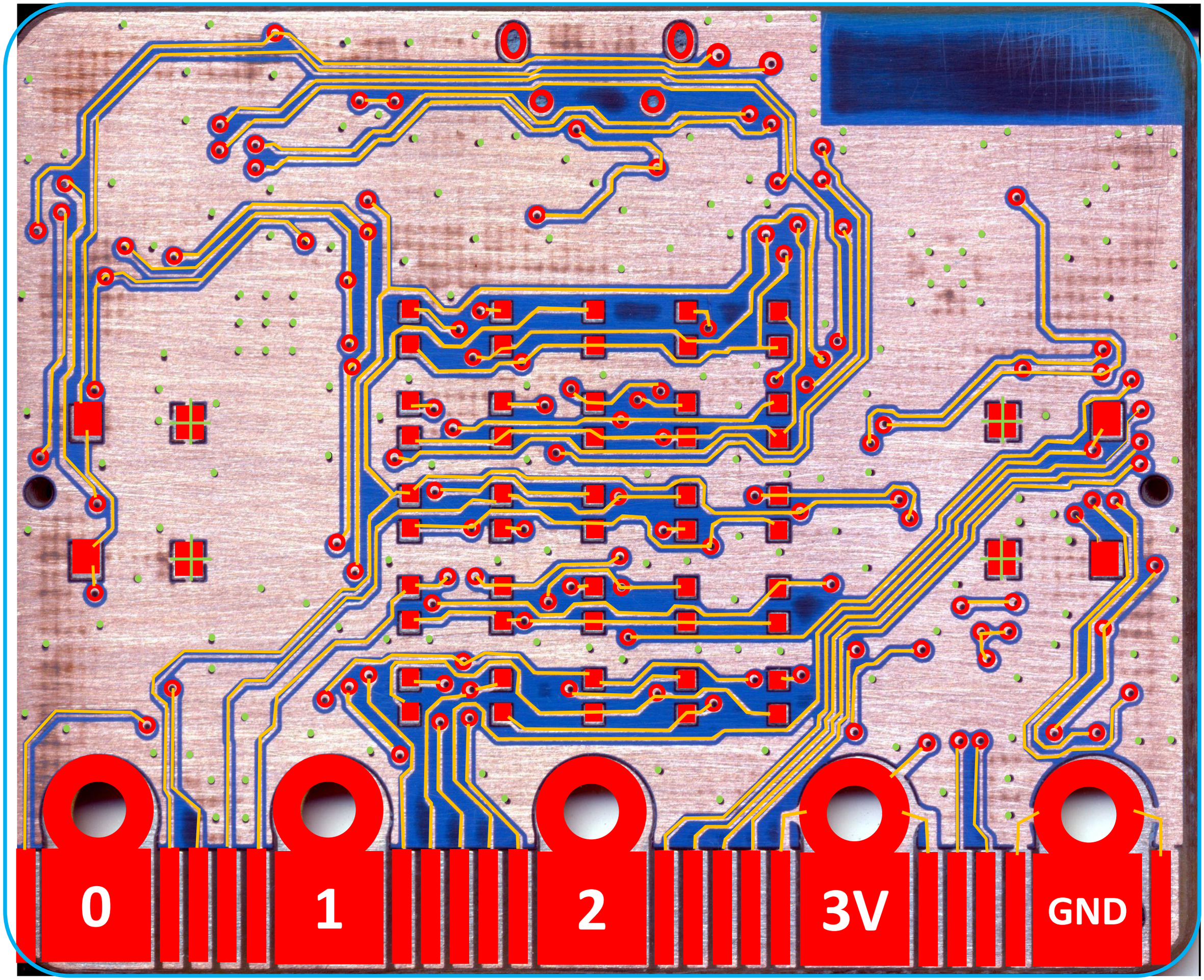
BBC micro:bit

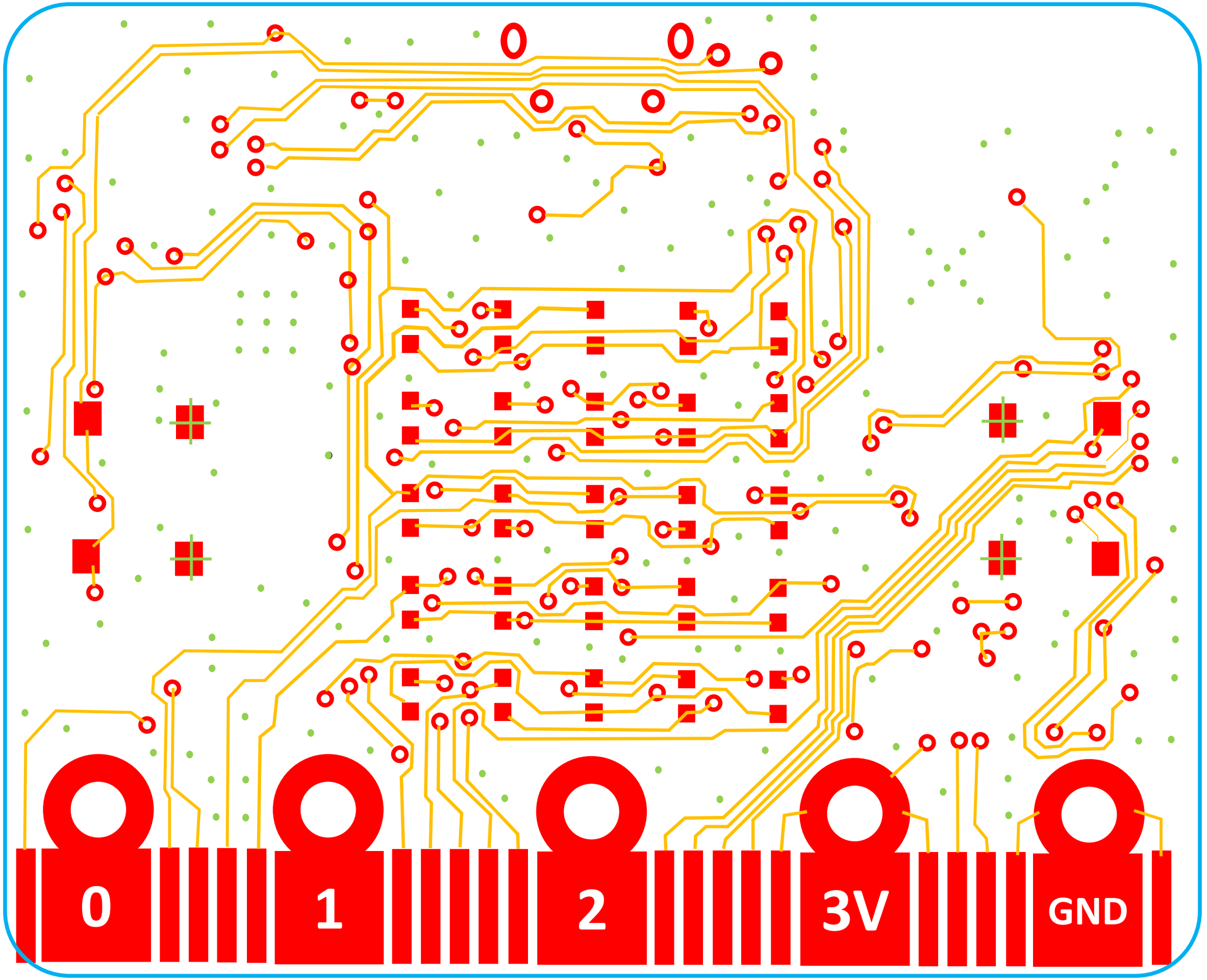
Top Layer

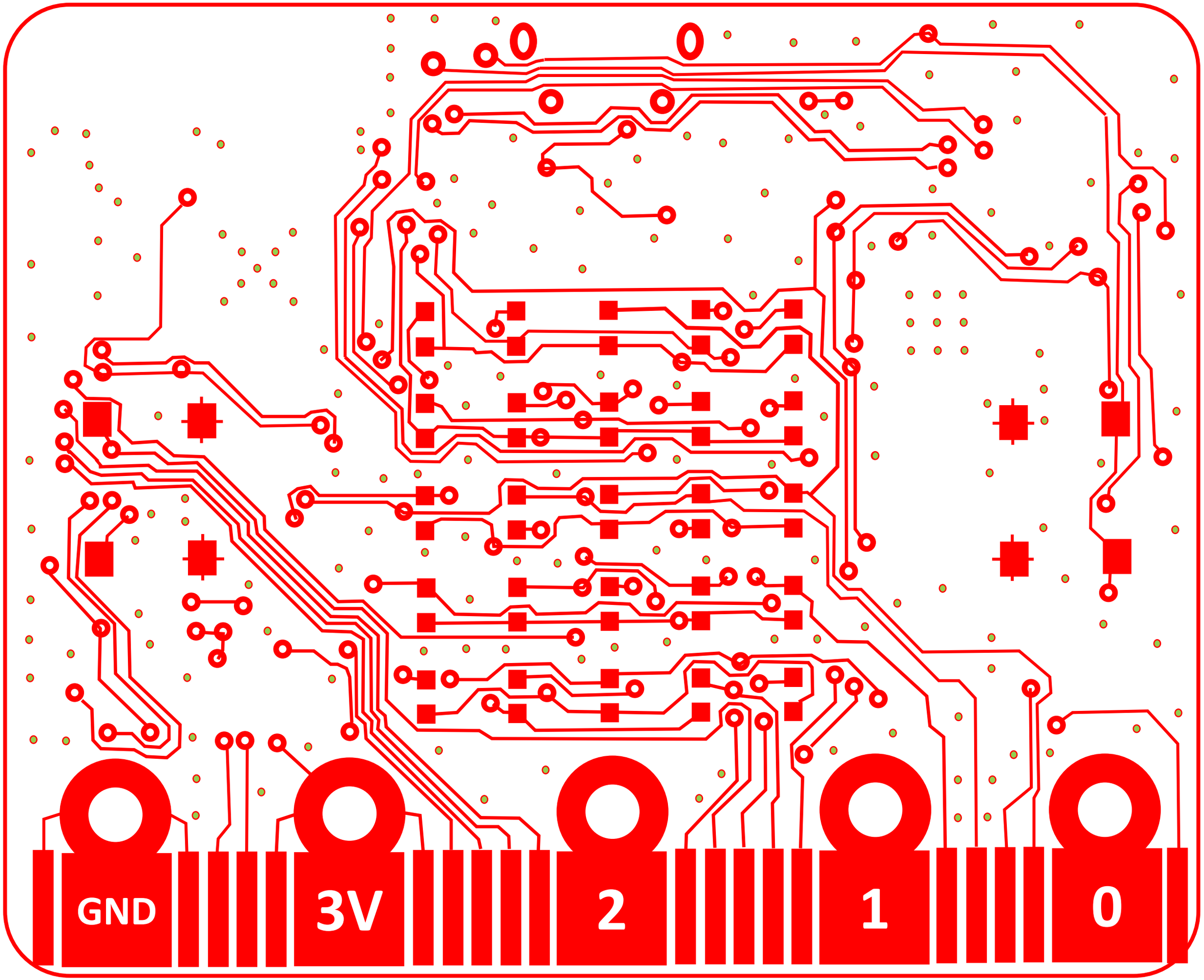
- Bauteile abgelötet
- Lötstopplack abgeschliffen
- Durchkontaktierungen, Via‘s und Leiterbahnen nachgezeichnet
- Zeichnung gespiegelt


0
1
2
3V
GND


Led
Taster
A
Taster
B
0
1
2
3V
GND

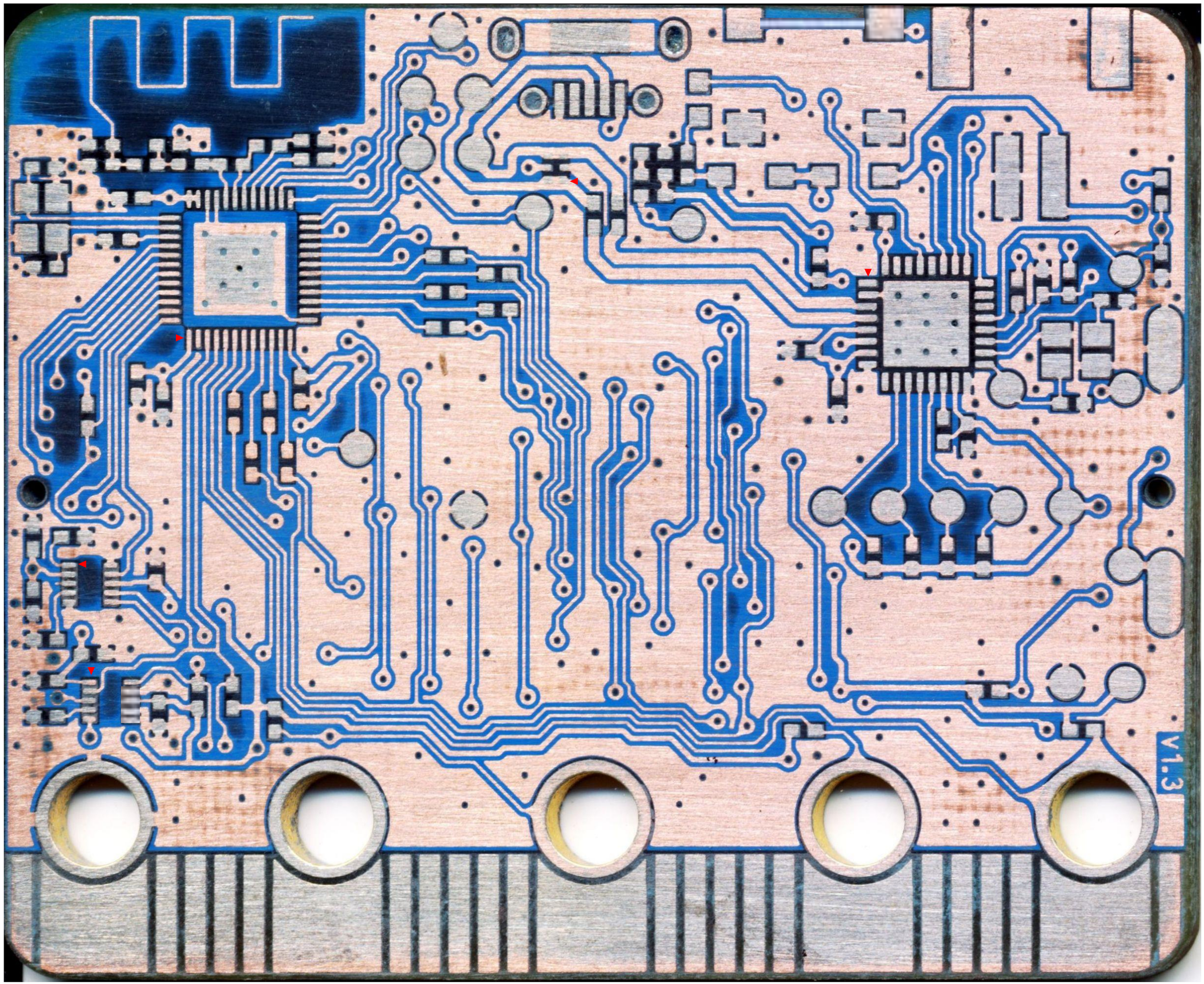

0
1
2
3V
GND

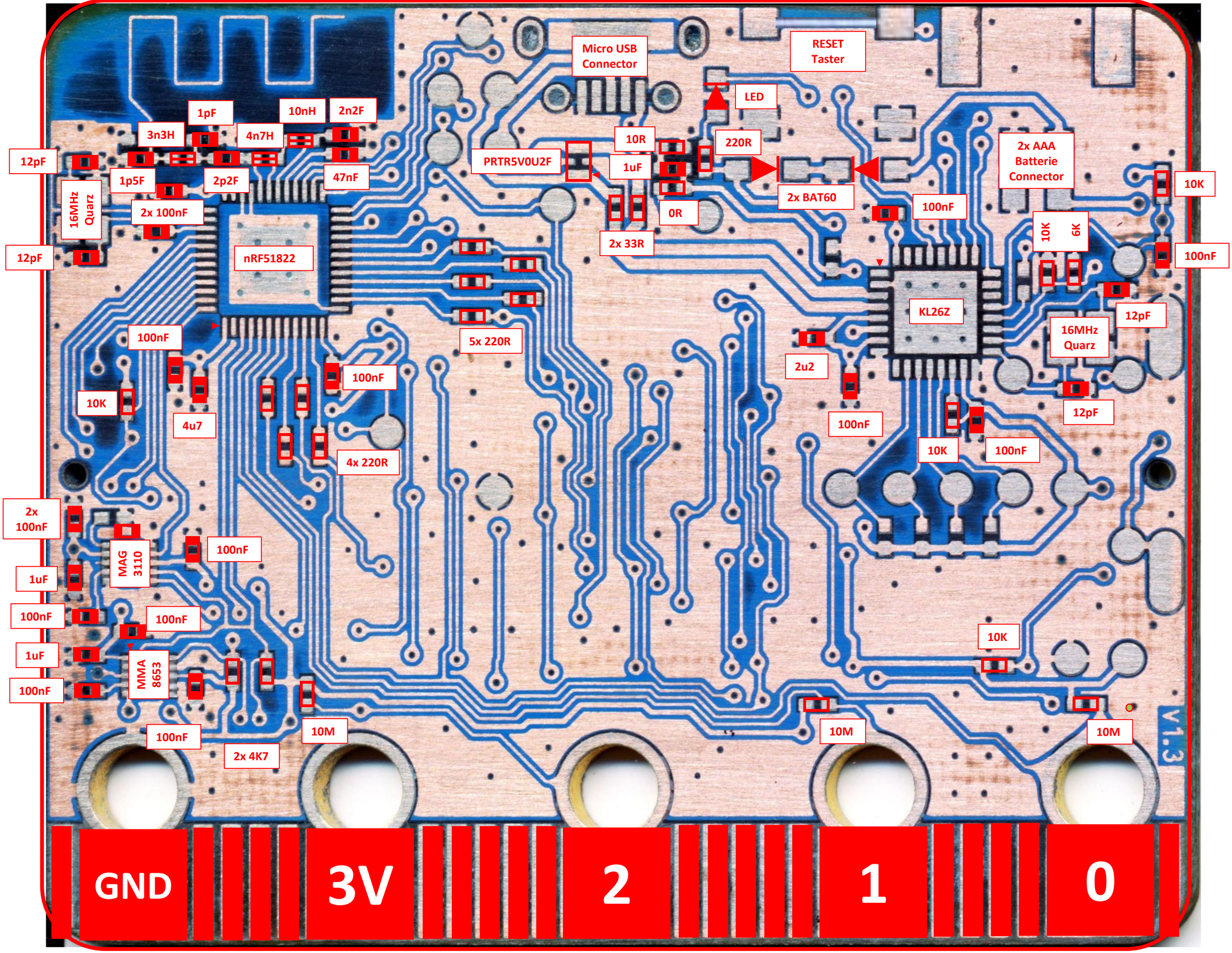

0
1
2
3V
GND


GND
3V
2
1
0

Bottom Layer

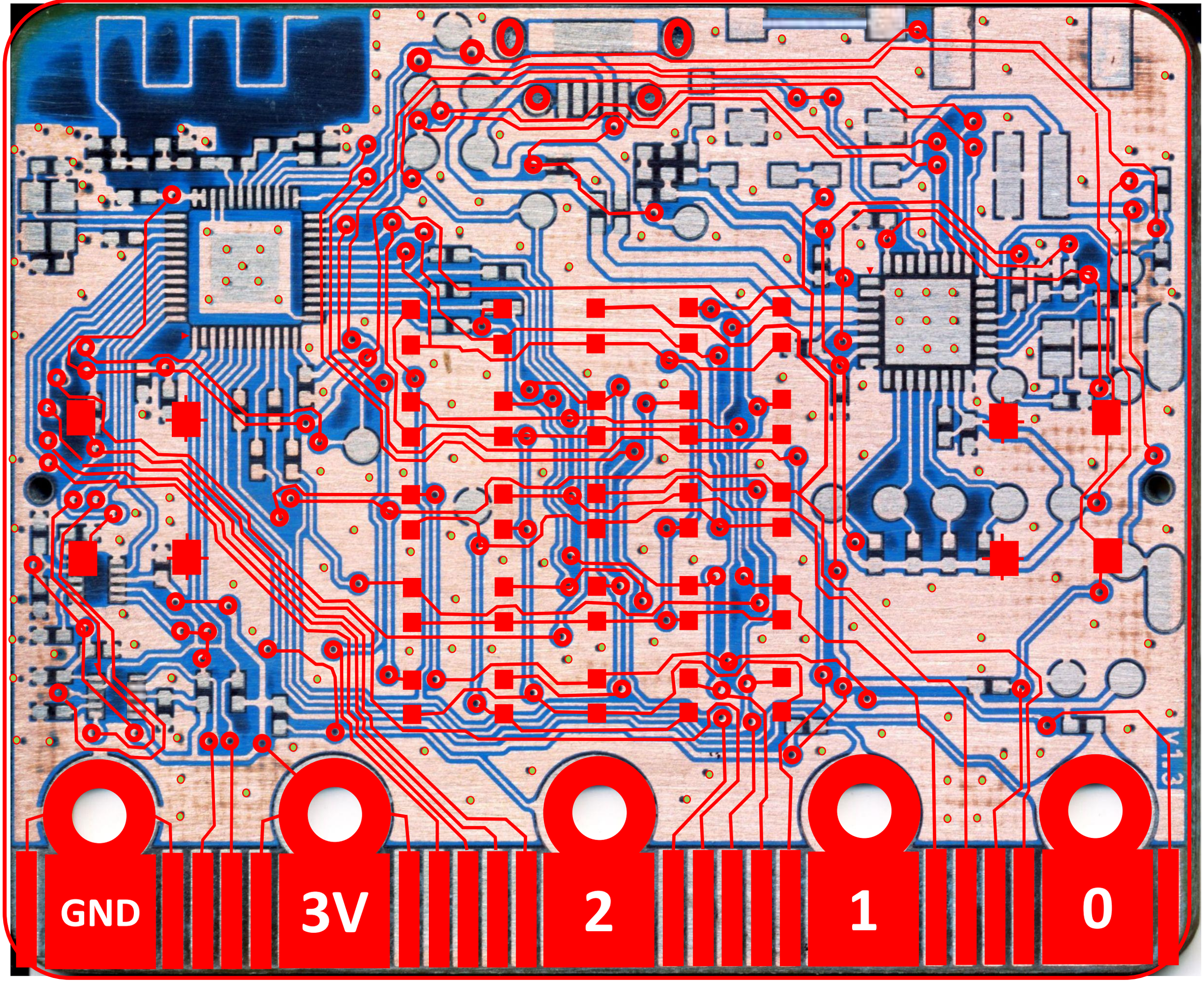
- Bauteile bestimmt und abgelötet
- **!!! Vorsicht bei den Werten der Bauteile !!!**
  - Kleine Bauform, lange Messleitungen zum LCR Meter
  - Kondensatoren, Spulen
  - Werte = ???
- Lötstopplack abgeschliffen
- !!! Veränderungen am Bild !!!
  - 2 Pads vom IC unten links fehlen
  - 1 Pad vom Taster rechts oben und die Leiterbahn zwischen den Pads
  - Fehler wurden grafisch behoben
  - Einfügen kleiner roten Pfeile für 1 Markierung


V1.3


Micro USB Connector
RESET Taster
LED
220R
10R
1uF
PRTR5V0U2F
0R
2x 33R
2x BAT60
2x AAA Batterie Connector
100nF
10K
6K
10K
100nF
12pF
16MHz Quarz
12pF
KL26Z
12pF
16MHz Quarz
1pF
3n3H
4n7H
10nH
2n2F
47nF
12pF
1p5F
2p2F
2x 100nF
nRF51822
12pF
100nF
5x 220R
100nF
10K
4u7
4x 220R
2u2
100nF
10K
100nF
2x 100nF
MAG 3110
100nF
1uF
100nF
100nF
1uF
MMA 8653
100nF
2x 4K7
10M
10M
10M
10K
V1.3
GND
3V
2
1
0

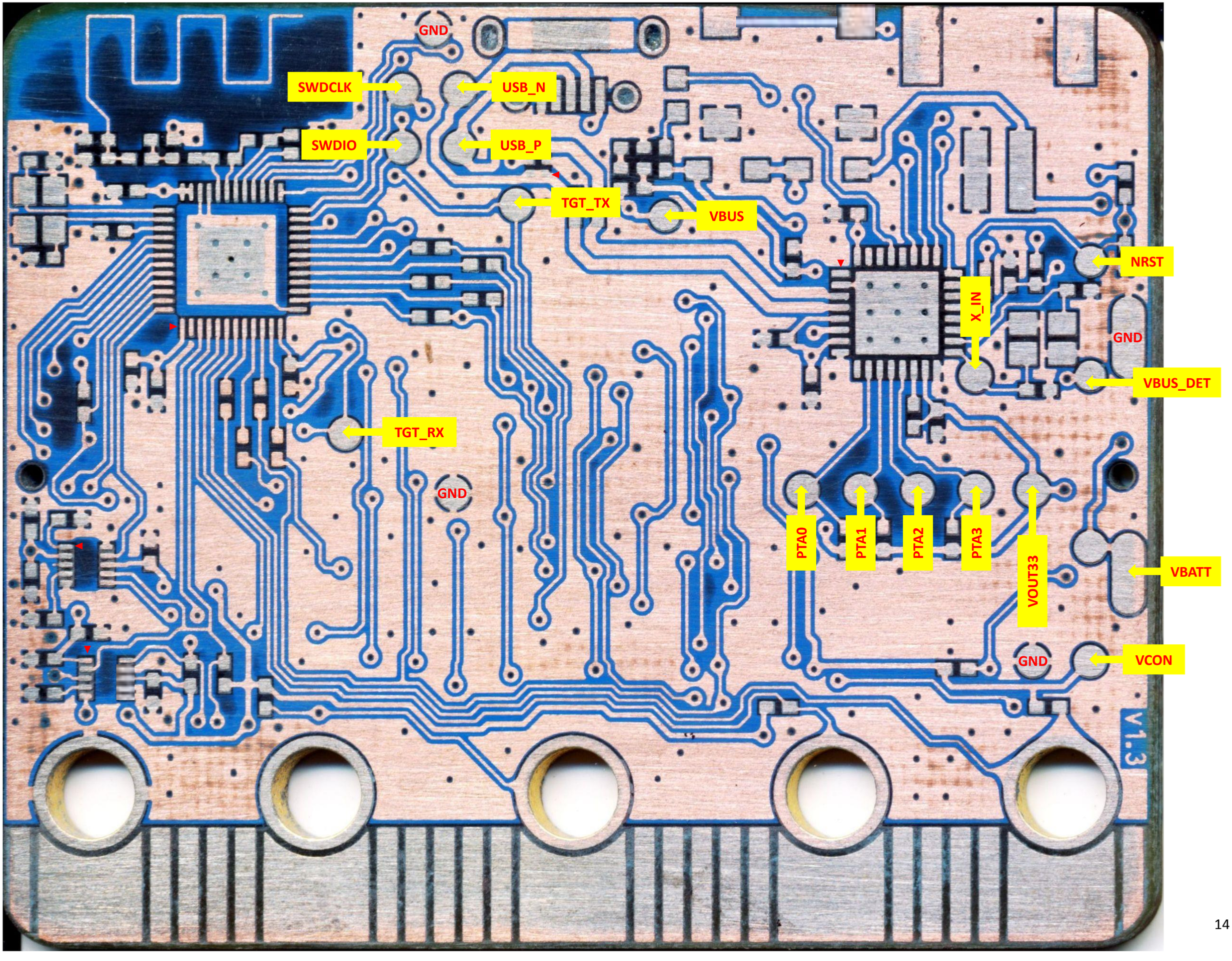
Top & Bottom Layer

- Top Zeichnung und Bottom Bild übereinander gelegt
- Kleinere Ungenauigkeiten durch Skalierung


GND
3V
2
1
0

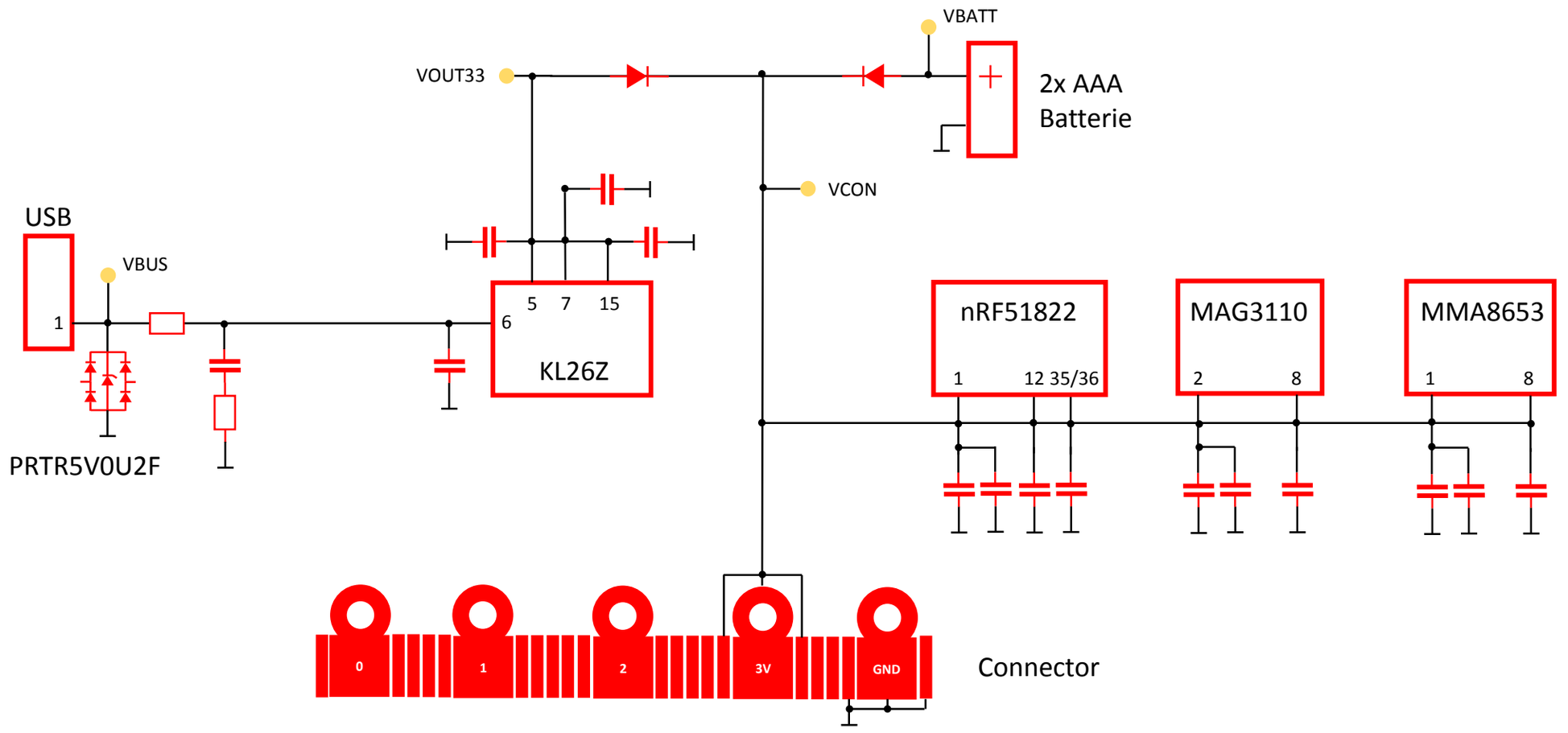
Testpunkte

- Größere runde Goldflächen sind Testpunkte
- Programmierinterface
- Spannungskontrolle
- Frequenzkontrolle


GND
SWDCLK
USB_N
SWDIO
USB_P
TGT_TX
VBUS
NRST
X_IN
GND
VBUS_DET
TGT_RX
GND
PTA0
PTA1
PTA2
PTA3
VOUT33
VBATT
GND
VCON
V1.3

Spannungsversorgung

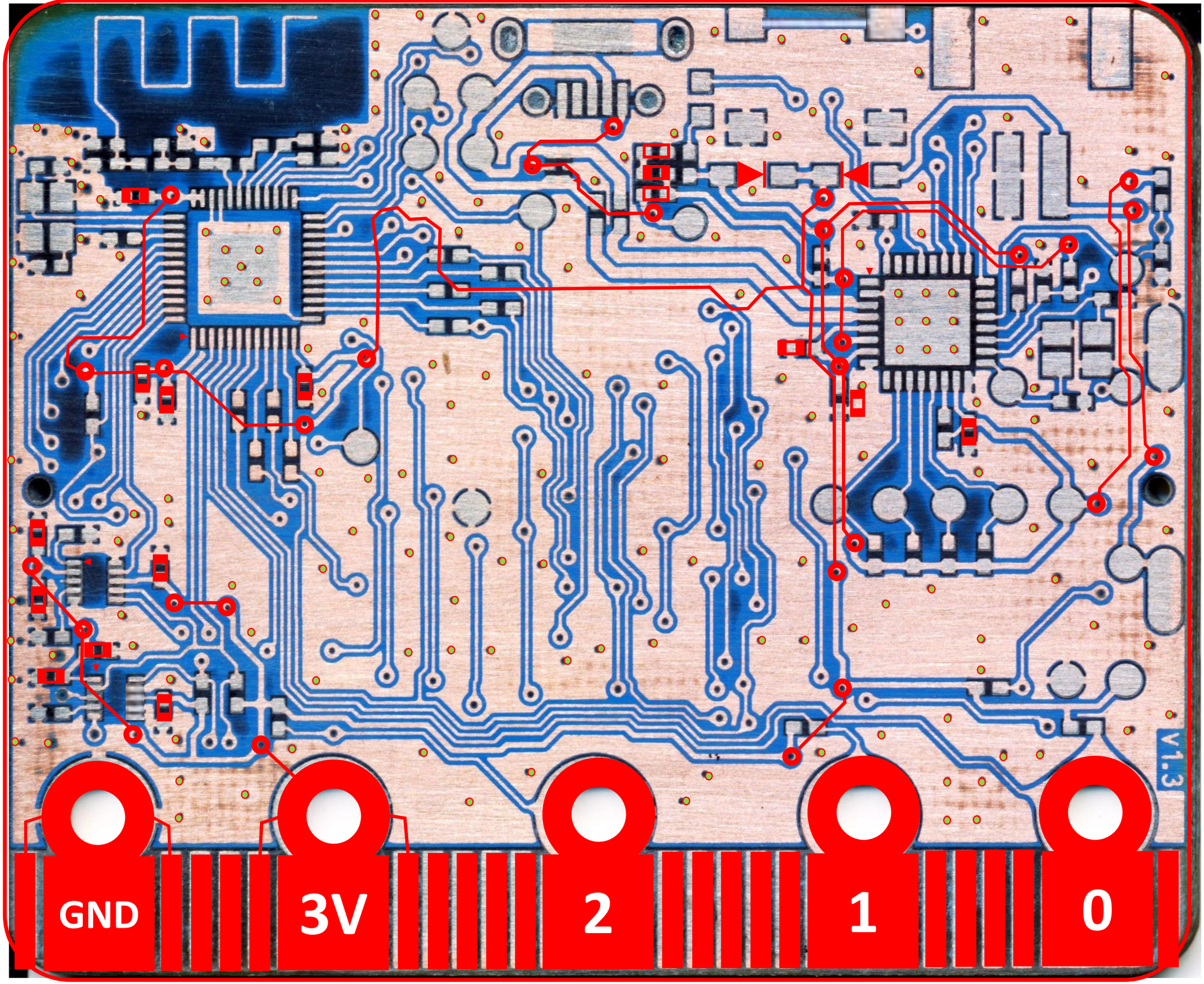
- USB = 5V
- Interner Spannungsregler (KL26Z) 5V -> 3,3V
- Batterie = 2x AAA = 3V
- Connector = 3V



Kondensator

Spule

Widerstand



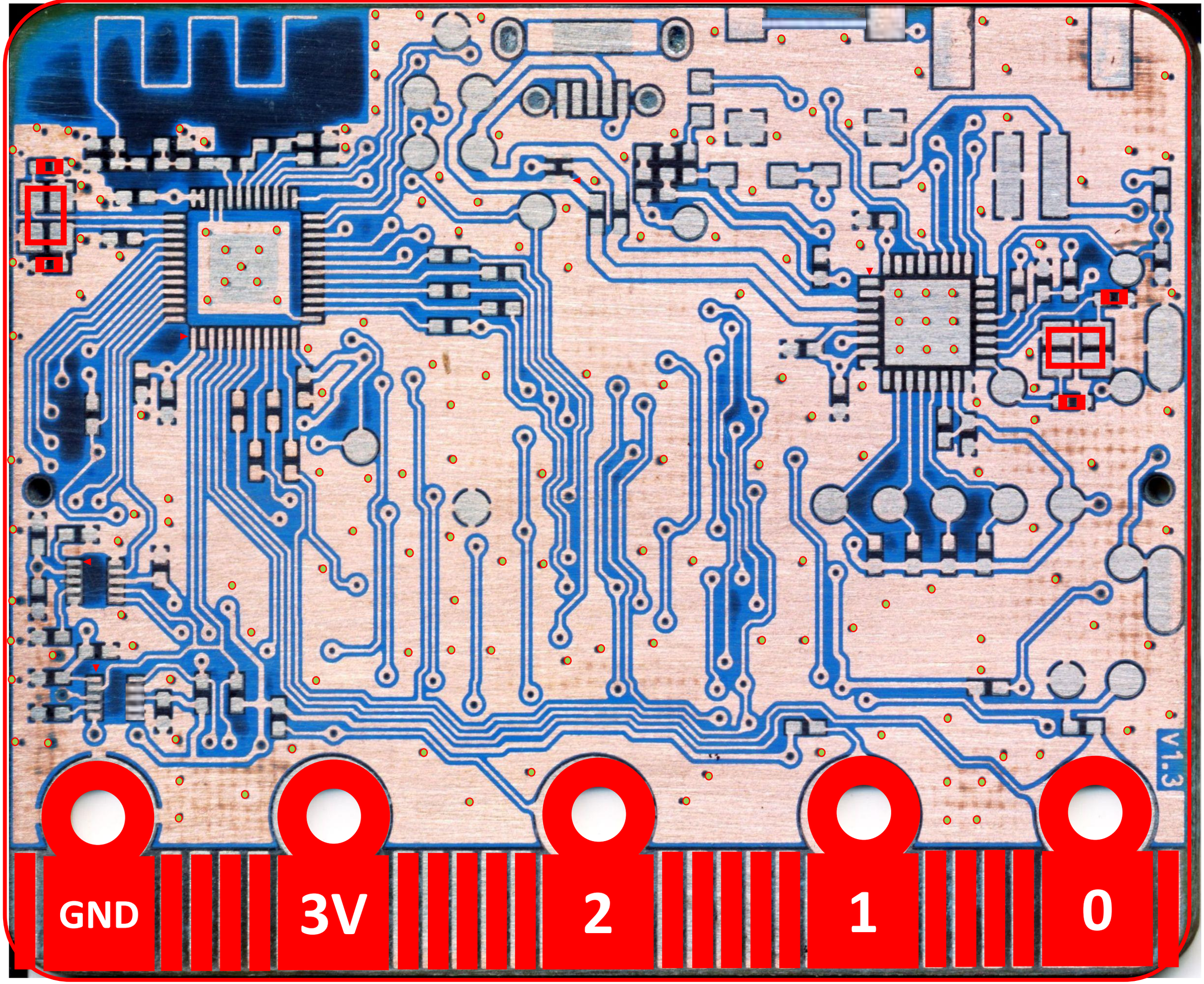
Frequenzerzeugung

- 2x 16MHz Quarz
- Standard Quarzbeschaltung mit je 1 Kondensator am Ein- und Ausgang
- Werte ~ 12pF, hängt vom Quarz und vom IC ab

Kondensator

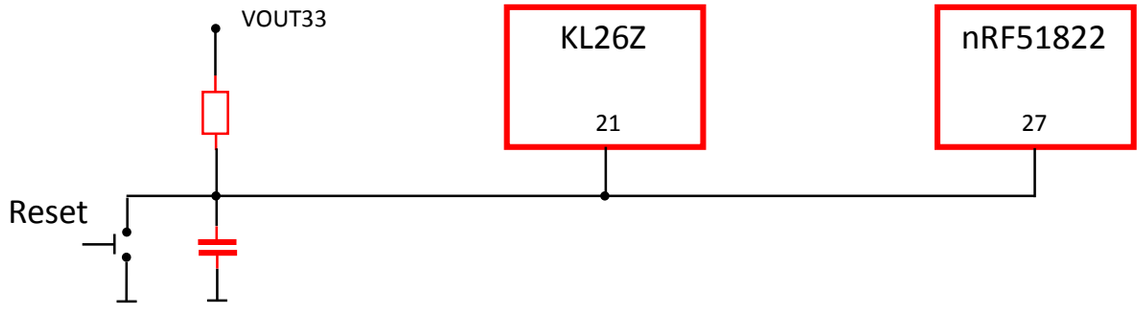
Spule

Widerstand



Reset

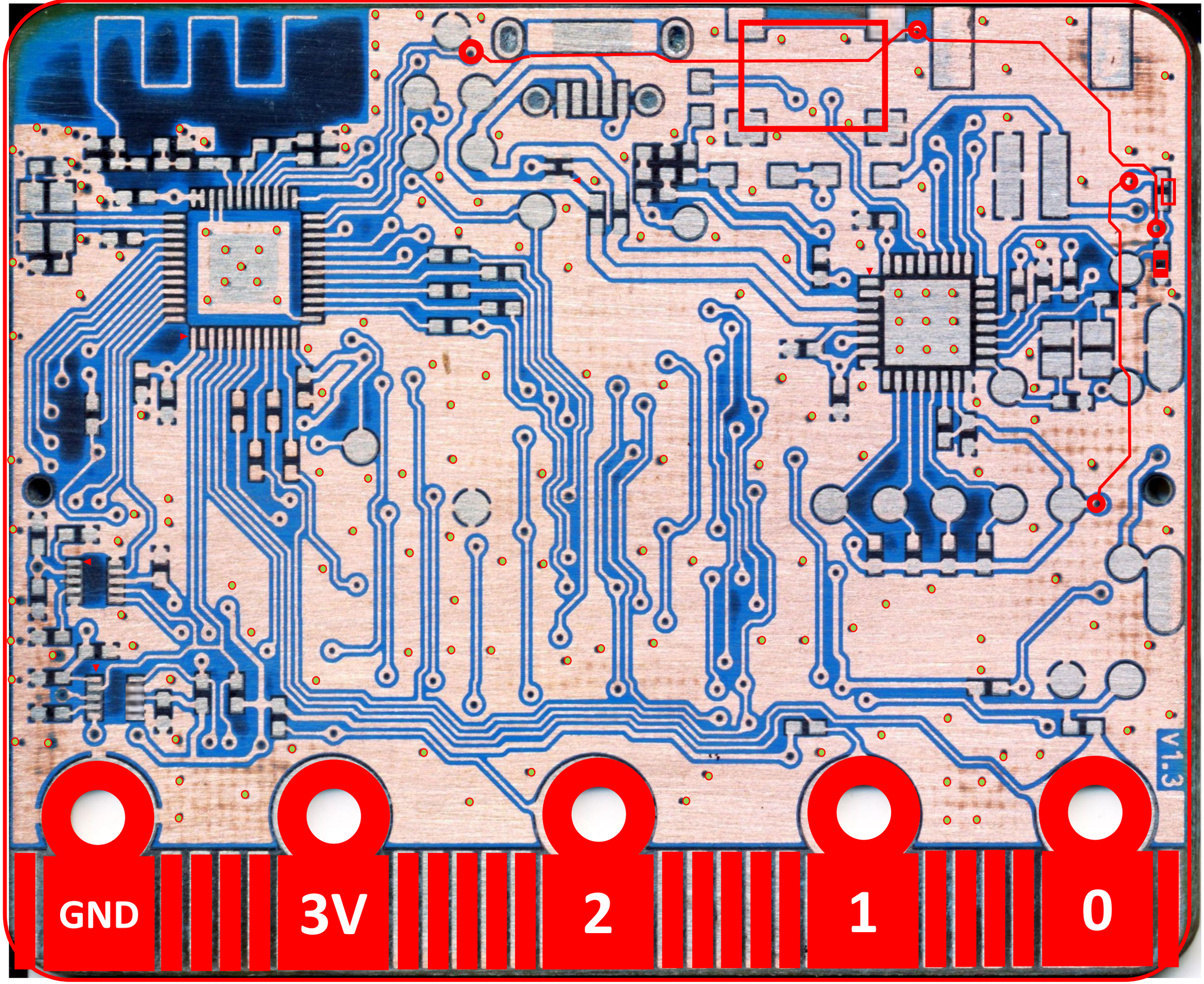
- Taster auf dem Board



Kondensator

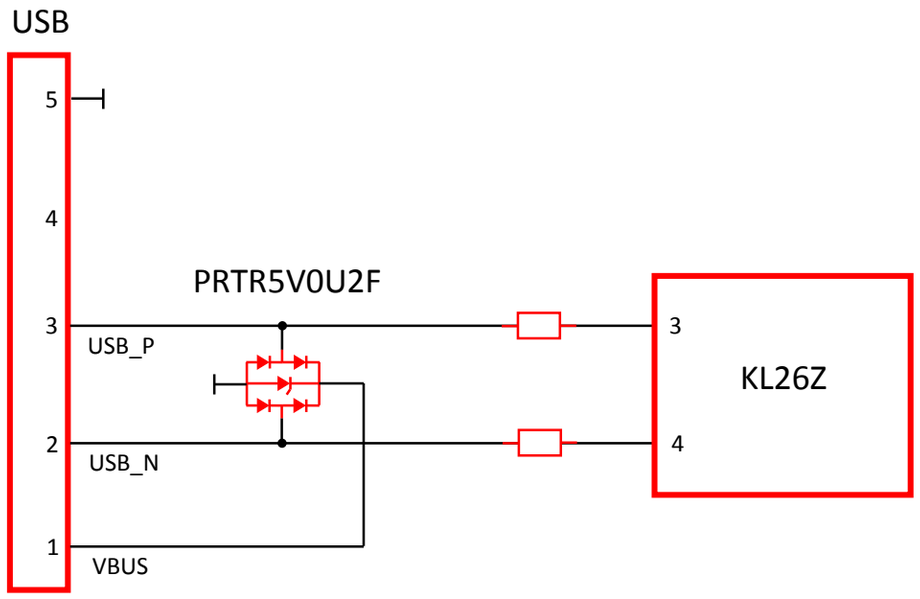
Spule

Widerstand



USB

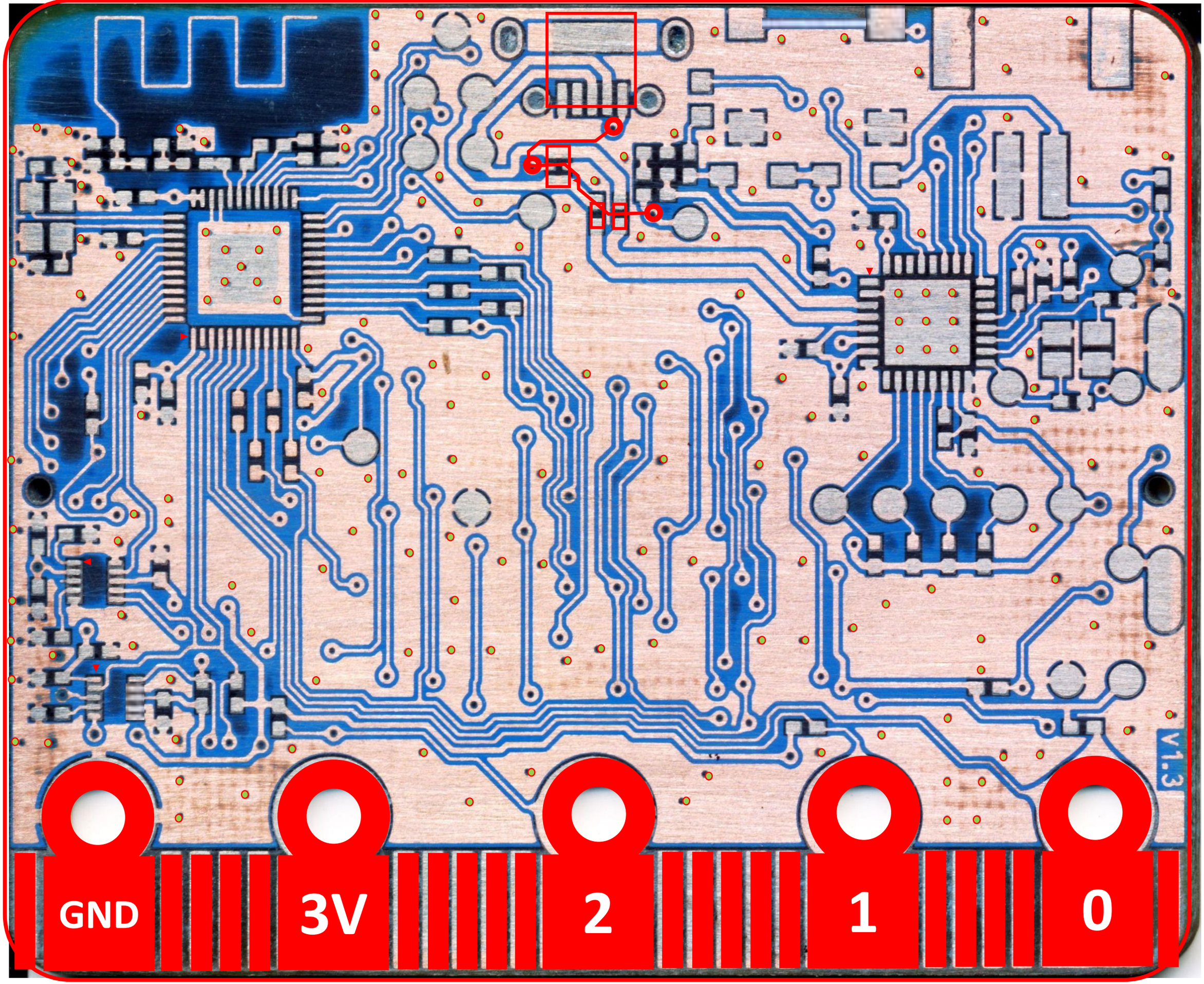
- Connector USB Micro



Kondensator

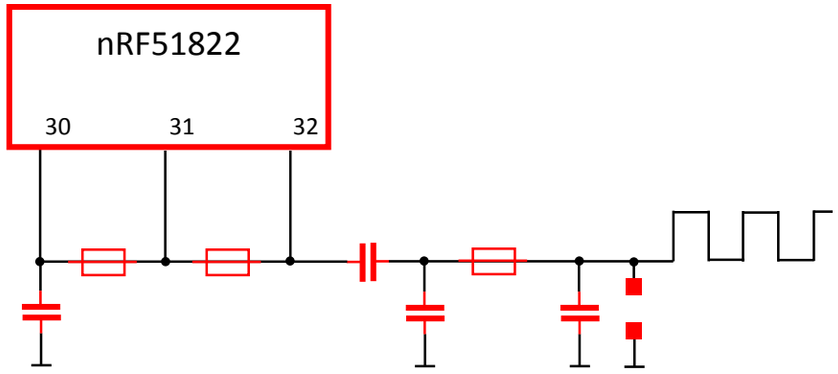
Spule

Widerstand



Bluetooth

- 2,4 GHz



Kondensator

Spule

Widerstand

GND

3V

2

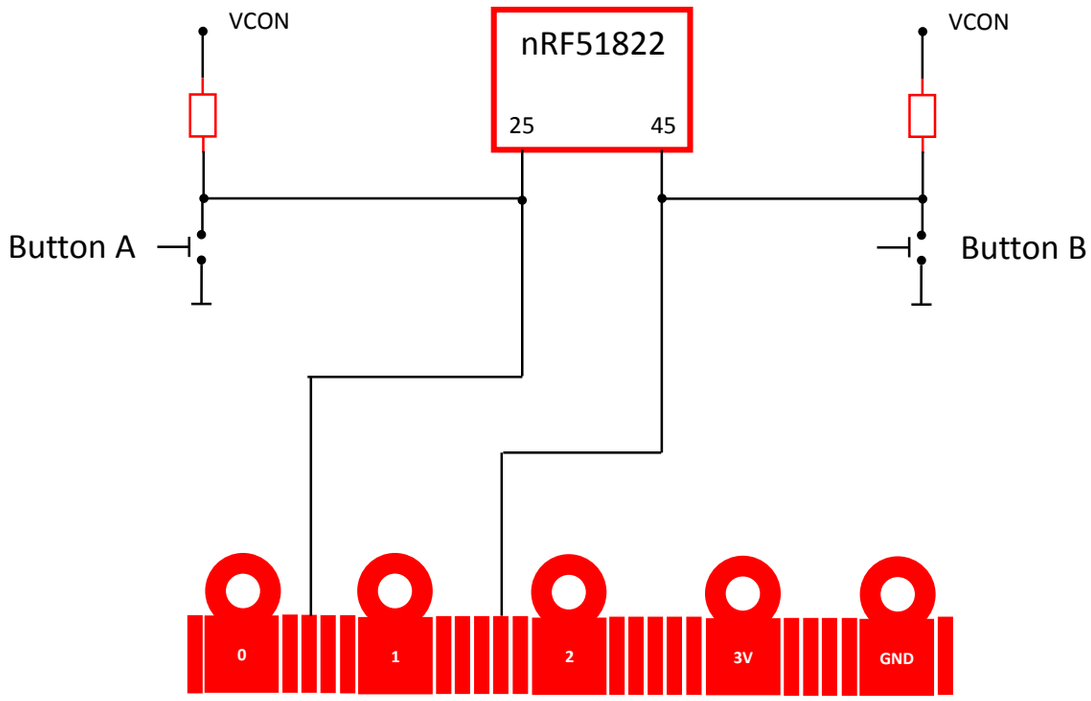
1

0

v1.3

Tasten

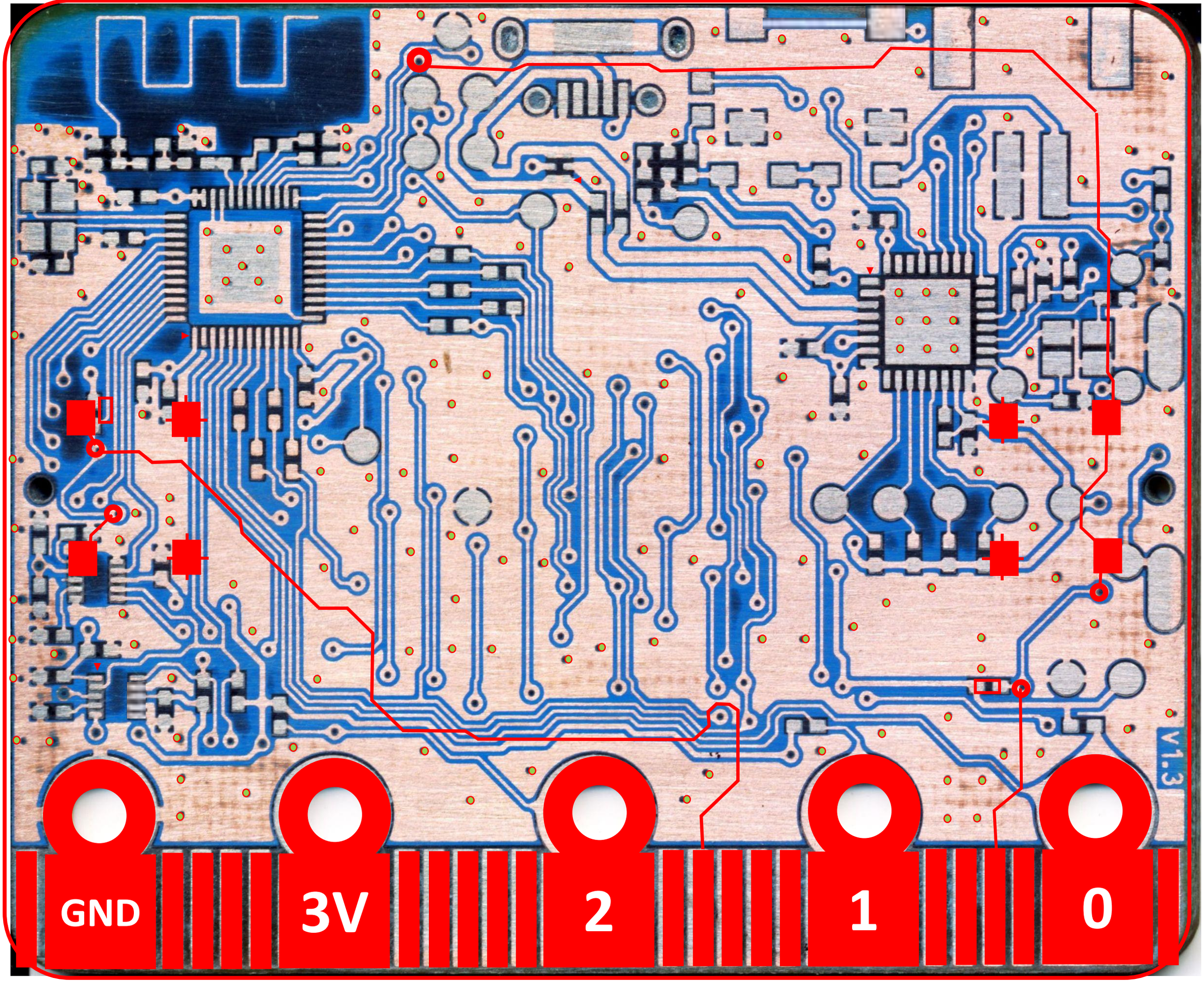
- 2 Tasten, A und B



Kondensator

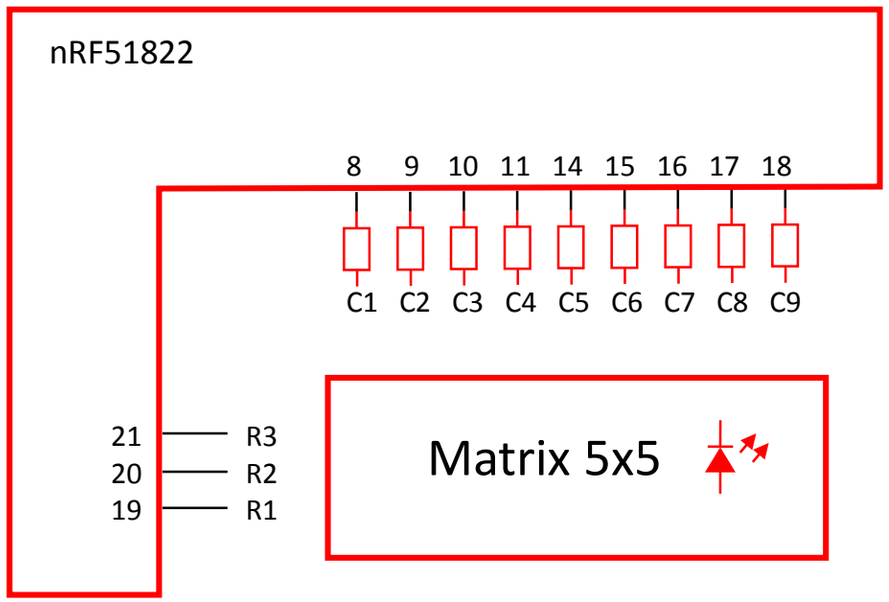
Spule

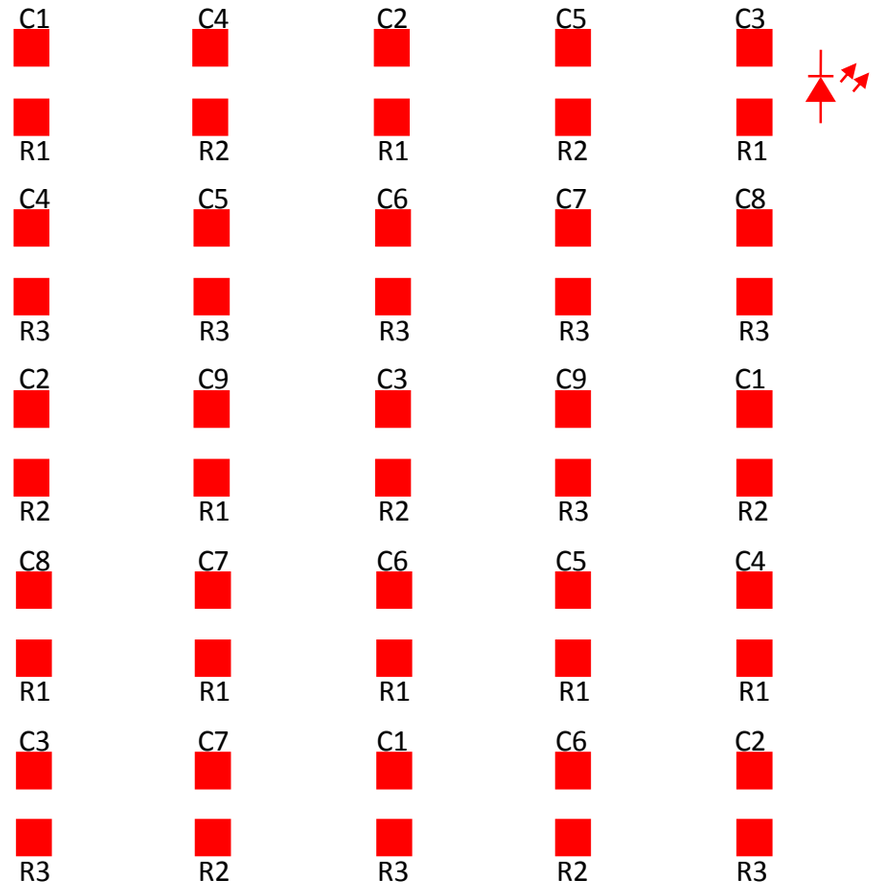
Widerstand



Anzeige

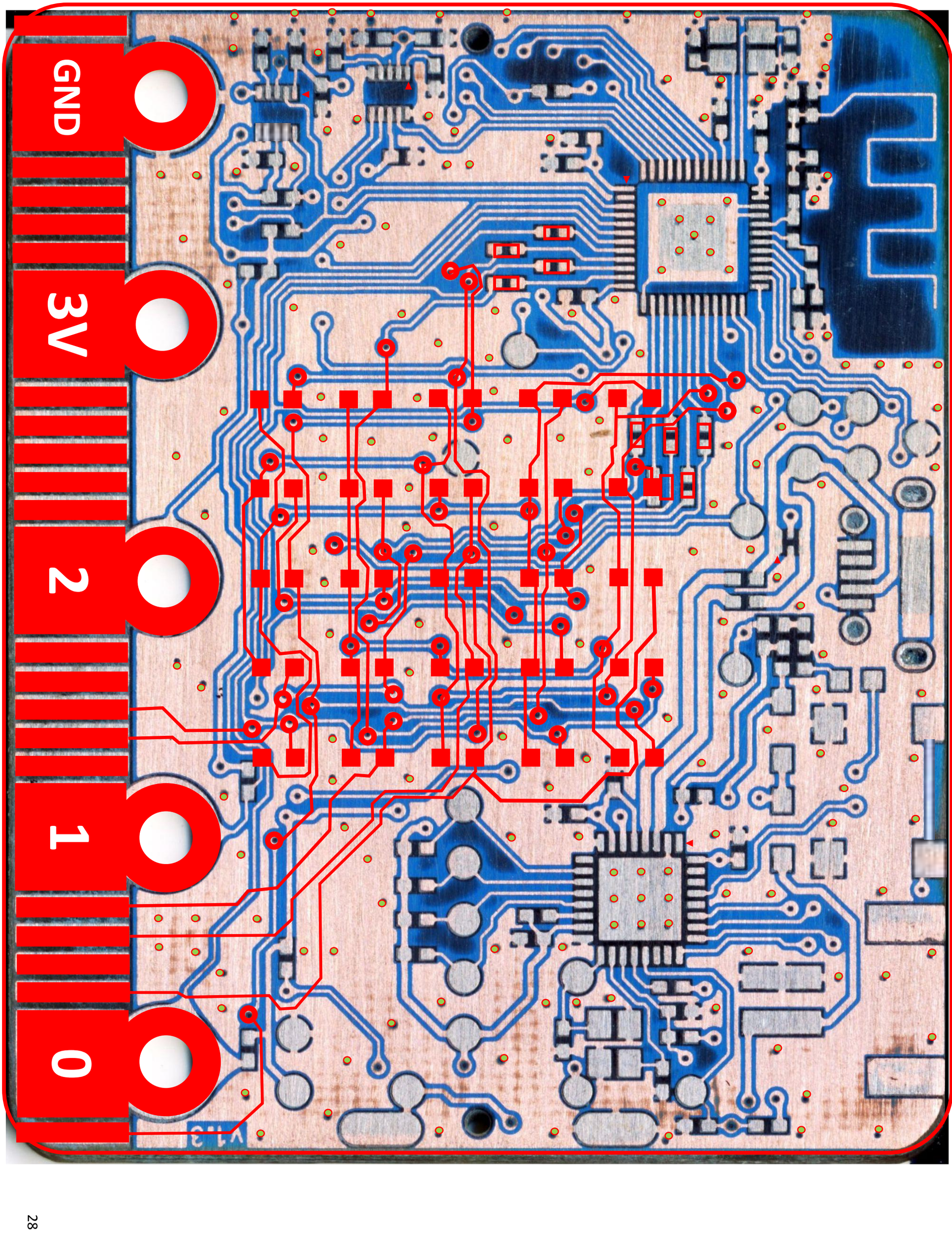
- Led Matrix 5x5
- Column 1..9
- Row 1..3





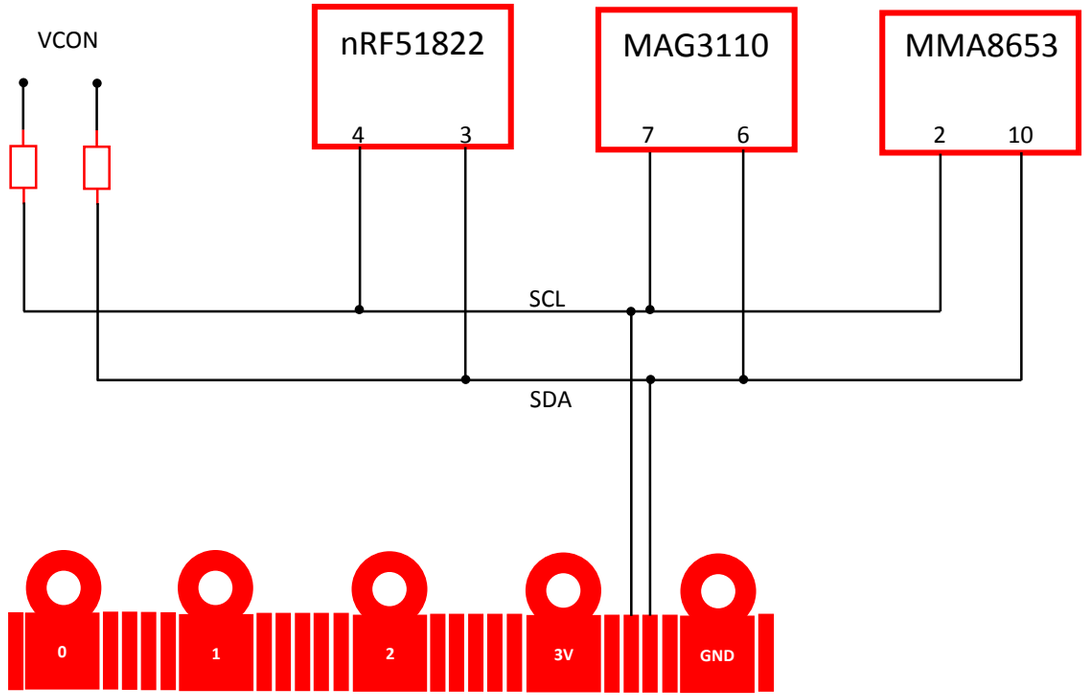
Front View

Widerstand Spule Kondensator



I2C

- 2 Leitungsbus (SCL, SDA)
- Pull-up = 4,7K
- Devices auf dem Bus:
  - nRF51822
  - MAG3110 = I2C Adr = 0x0E (7-Bit)
  - MMA8653 = I2C Adr = 0x1D (7-Bit)



Kondensator

Spule

Widerstand

GND

3V

2

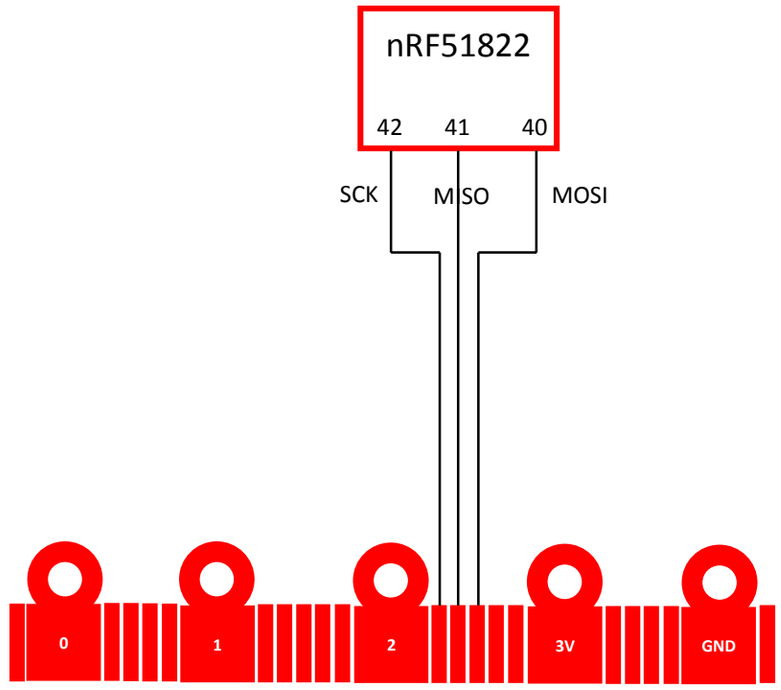
1

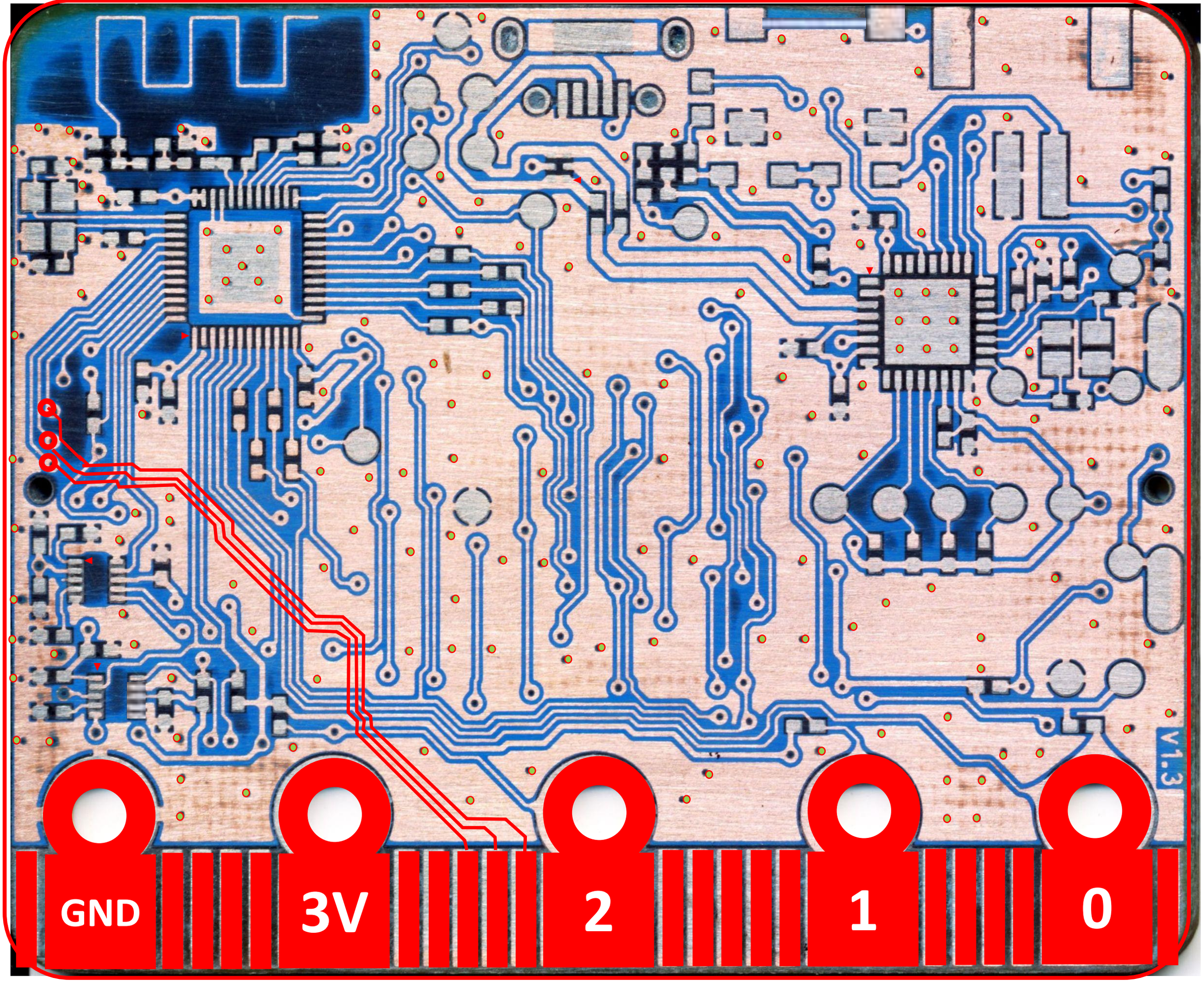
0

V1.3

SPI

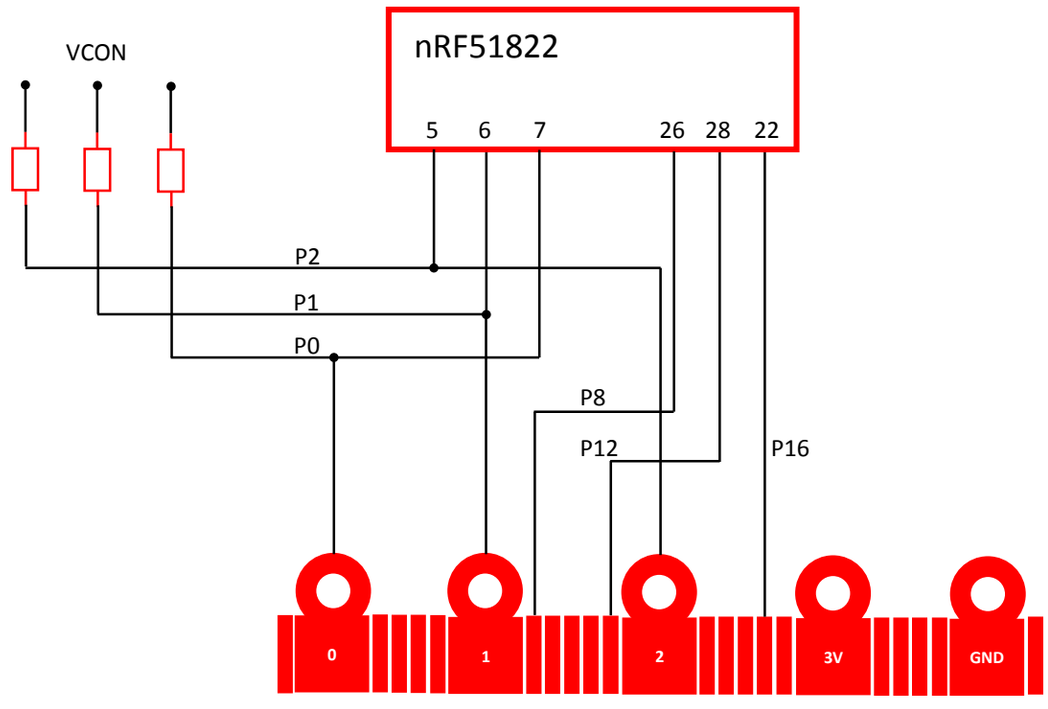
- 3 Leitungsbus (SCK, MISO, MOSI)



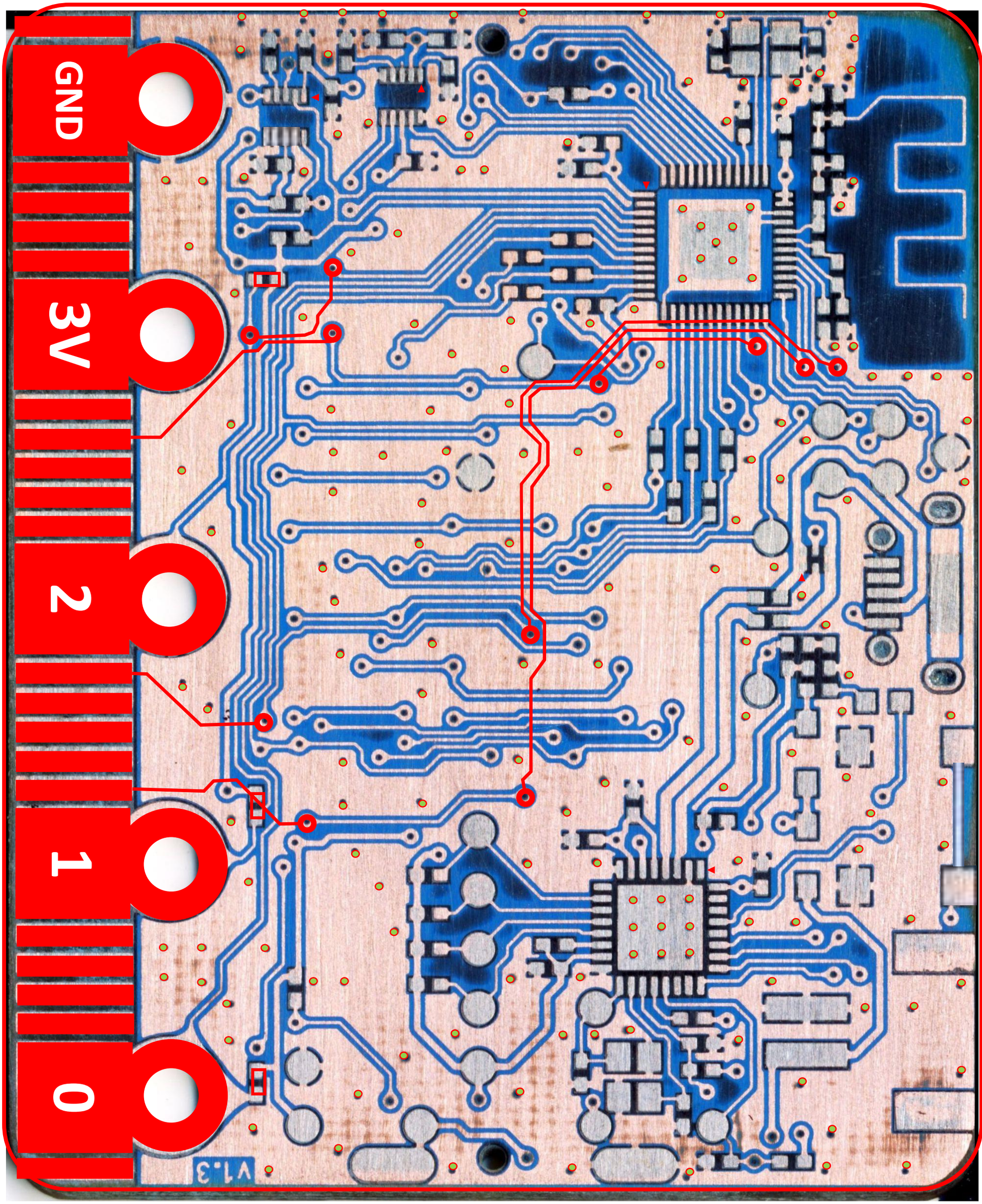

GND
3V
2
1
0
V1.3

Ein- / Ausgänge

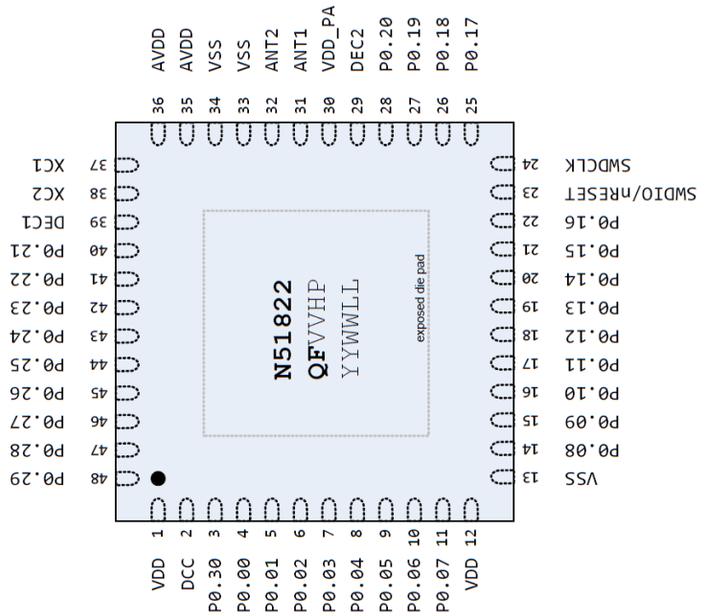
- 3 digitale / analoge Ein- bzw. Ausgänge (P0, P1, P2)
- 3 digitale Ein- bzw. Ausgänge (P8, P12, P16)



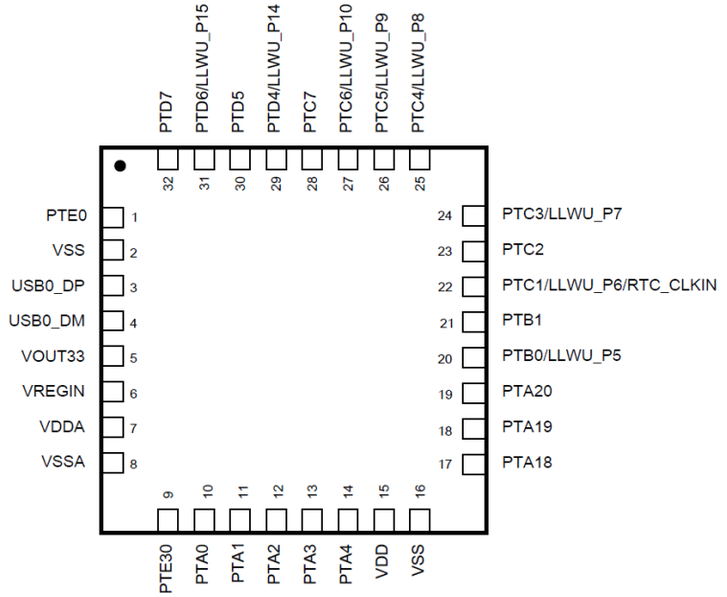
Widerstand Spule Kondensator



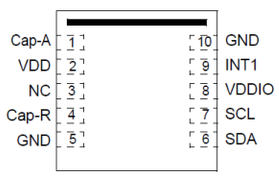
nRF51822



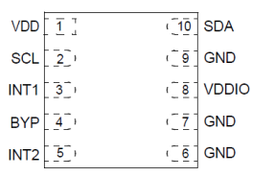
KL26Z



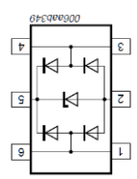
MAG3110



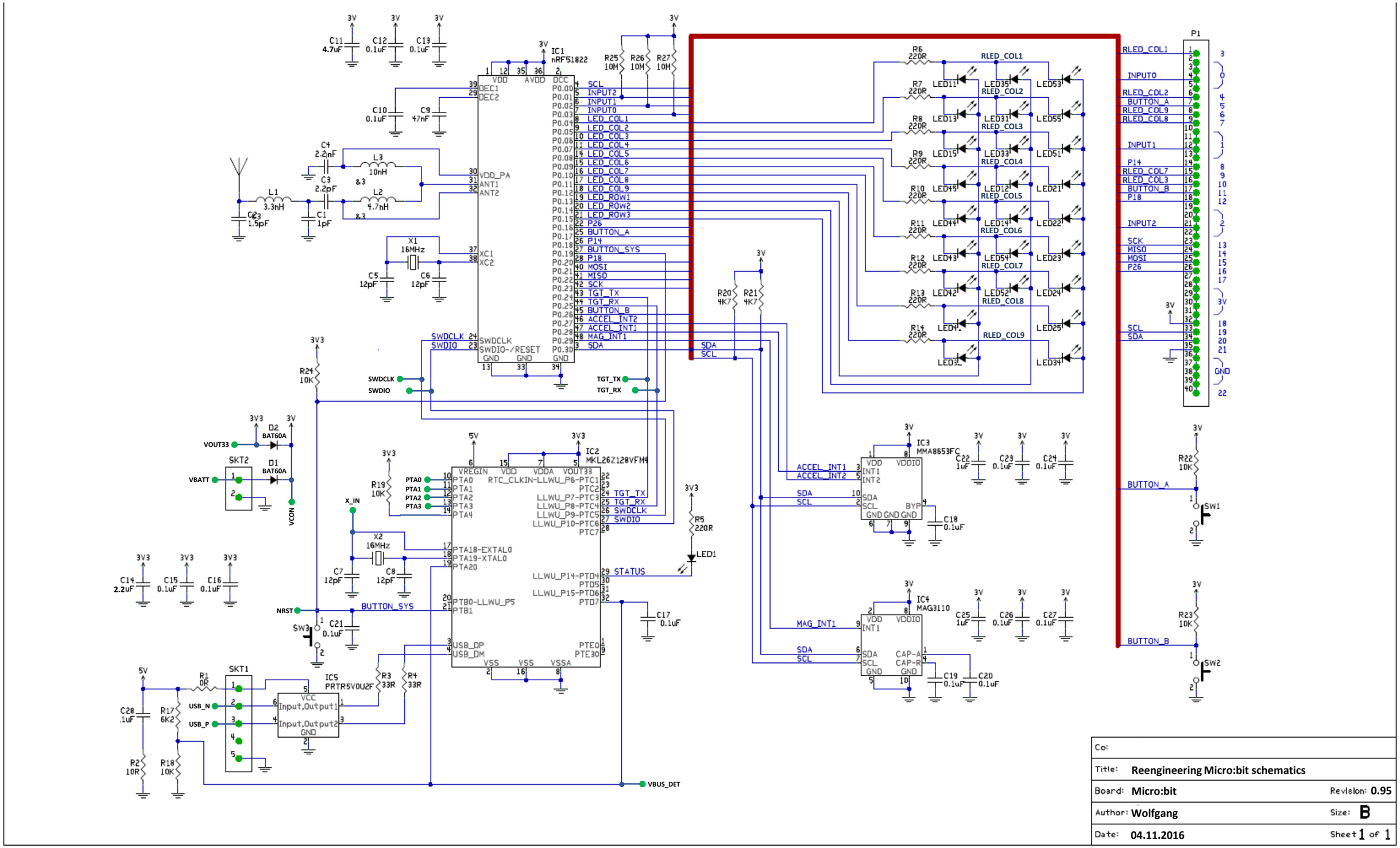
MMA8653



PRTR5V0U2F



Schematics


IC1 nRF51822
IC2 MKL26Z128VFM4
IC3 MMA8653FC
IC4 MAG3110
IC5 PRTR5V0U2F
X1 16MHz
X2 16MHz
SKT1
SKT2
D1 BAT60A
D2 BAT60A
P1
LED1
SW1
SW2
SW3
SWDCLK
SWDIO
TGT_TX
TGT_RX
SDA
SCL
VBUS_DET
VOUT33
VBATT
VCON
BUTTON_A
BUTTON_B
BUTTON_SYS
STATUS
ACCEL_INT1
ACCEL_INT2
MAG_INT1
USB_N
USB_P
RLED_COL1
RLED_COL2
RLED_COL3
RLED_COL4
RLED_COL5
RLED_COL6
RLED_COL7
RLED_COL8
RLED_COL9
Co:
Title: Reengineering Micro:bit schematics
Board: Micro:bit
Revision: 0.95
Author: Wolfgang
Size: B
Date: 04.11.2016
Sheet 1 of 1