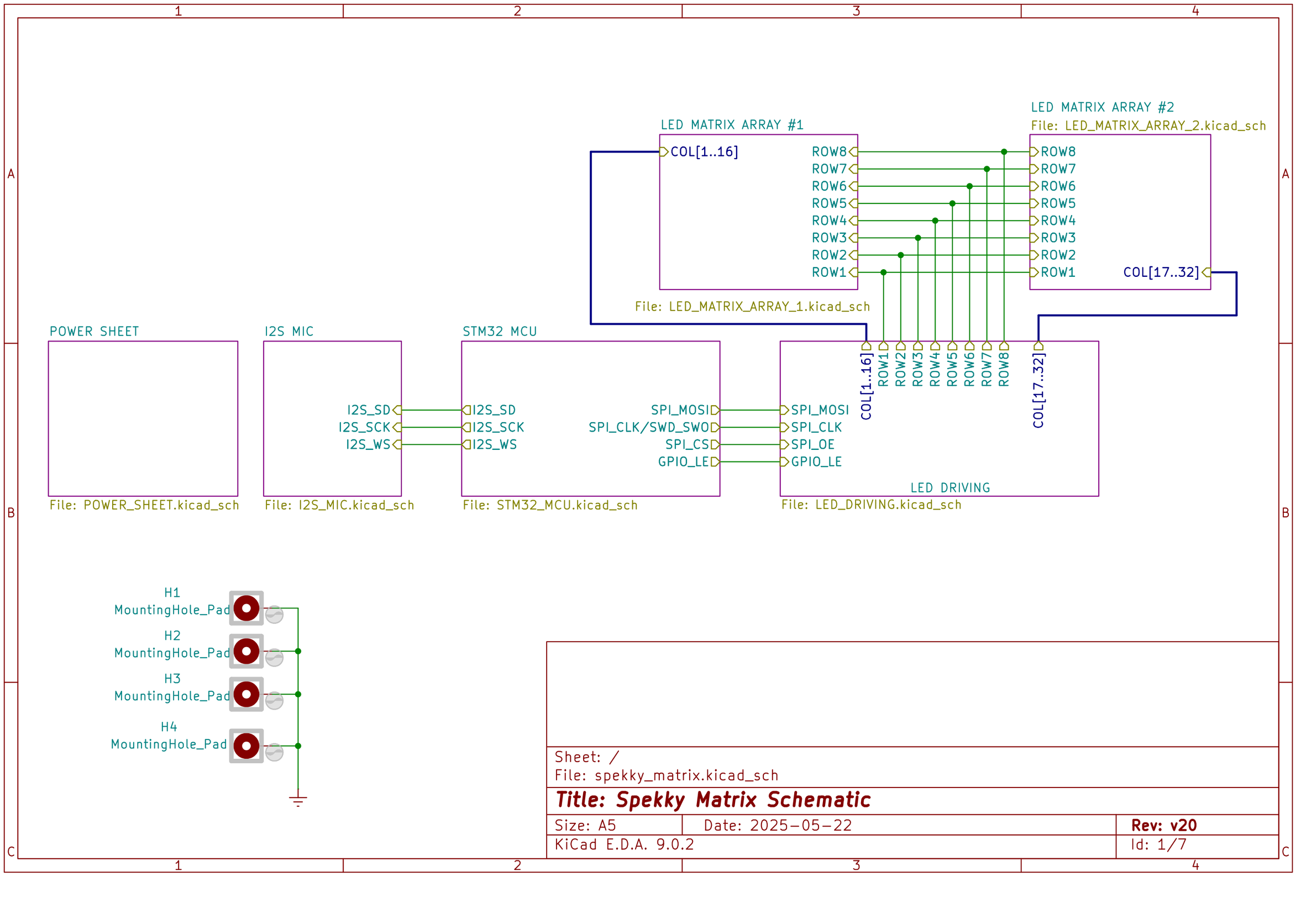
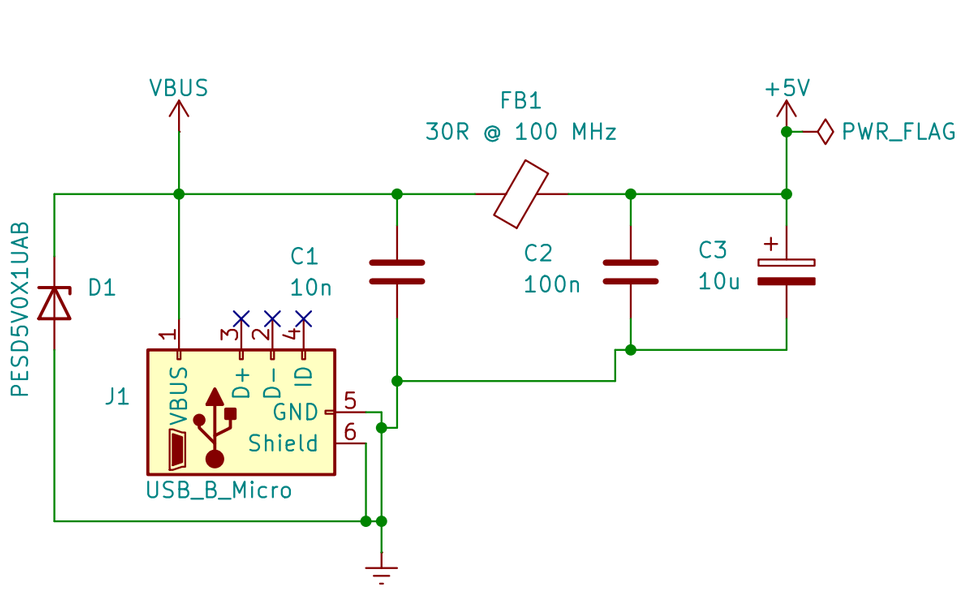
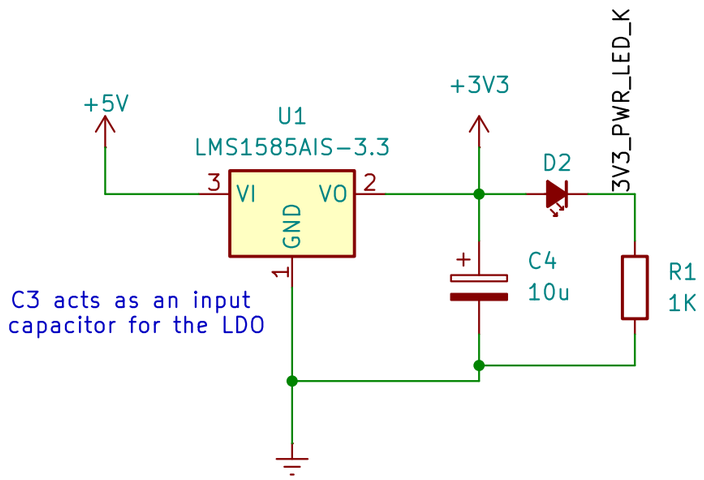

LED MATRIX ARRAY #1
COL[1..16]
ROW8
ROW7
ROW6
ROW5
ROW4
ROW3
ROW2
ROW1
File: LED_MATRIX_ARRAY_1.kicad_sch
LED MATRIX ARRAY #2
File: LED_MATRIX_ARRAY_2.kicad_sch
ROW8
ROW7
ROW6
ROW5
ROW4
ROW3
ROW2
ROW1
COL[17..32]
POWER SHEET
File: POWER_SHEET.kicad_sch
I2S MIC
I2S_SD
I2S_SCK
I2S_WS
File: I2S_MIC.kicad_sch
STM32 MCU
I2S_SD
I2S_SCK
I2S_WS
SPI_MOSI
SPI_CLK/SWD_SWO
SPI_CS
GPIO_LE
File: STM32_MCU.kicad_sch
COL[1..16]
ROW1
ROW2
ROW3
ROW4
ROW5
ROW6
ROW7
ROW8
COL[17..32]
SPI_MOSI
SPI_CLK
SPI_OE
GPIO_LE
LED DRIVING
File: LED_DRIVING.kicad_sch
H1
MountingHole_Pad
H2
MountingHole_Pad
H3
MountingHole_Pad
H4
MountingHole_Pad
Sheet: /
File: spekky_matrix.kicad_sch
Title: Spekky Matrix Schematic
Size: A5
Date: 2025-05-22
Rev: v20
KiCad E.D.A. 9.0.2
Id: 1/7



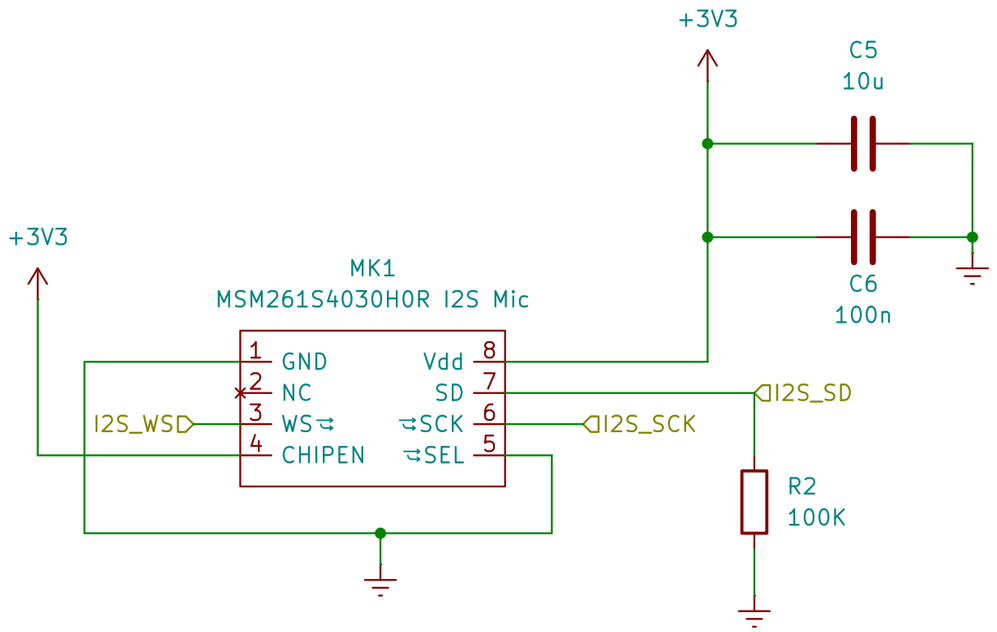


All things power related

Sheet: /POWER SHEET/
File: POWER_SHEET.kicad_sch

Title: Power Sheet

Size: A5	Date: 2025-05-21	**Rev: v07**
KiCad E.D.A. 9.0.2		Id: 2/7



Same as Fermion I2S mic breakout board

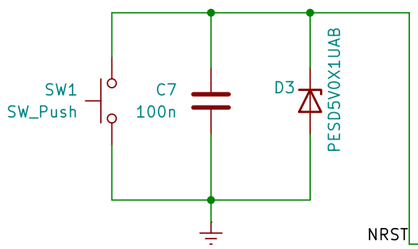
Sheet: /I2S MIC/
File: I2S_MIC.kicad_sch

Title: I2S Mic

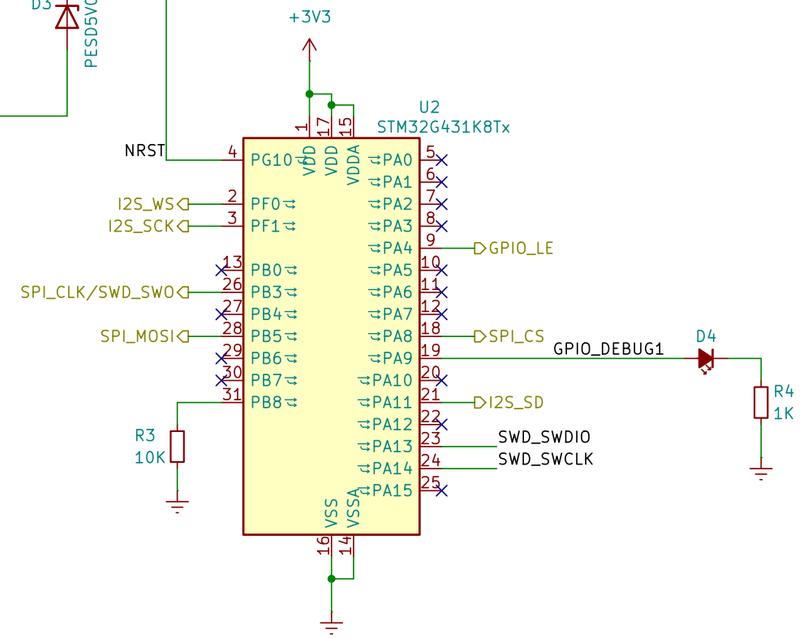
Size: A5	Date: 2025-05-21	**Rev: v02**
KiCad E.D.A. 9.0.2		Id: 3/7

Recommended external reset circuit:
via DS12589 Rev 6 (STM32G4x datasheet)
(plus additional ESD protection)

Reset circuit



PB3 cannot be used for both SPI_CLK and SWO
Programmer must configure between them
Spekky matrix doesn't use SWO

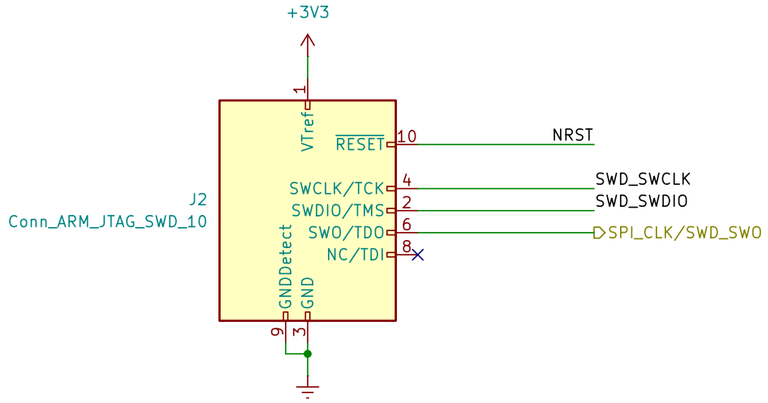


I2S Fsamp calculation: via STM32G431x reference manual

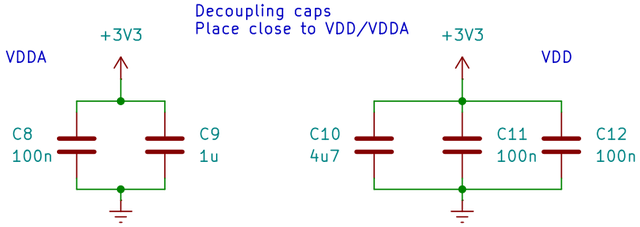
Fsamp = Fi2sclk/[(64)(2(I2SDIV + ODD))]

Currently Fi2sclk is set to the HCLK * APB prescaler (HSI clock, 16 MHz)

(64 as DATALEN != 0b00, instead SD out is 24-bits therefore CHLEN = 1, otherwise replace 64 w/ 32)



Decoupling caps
Place close to VDD/VDDA



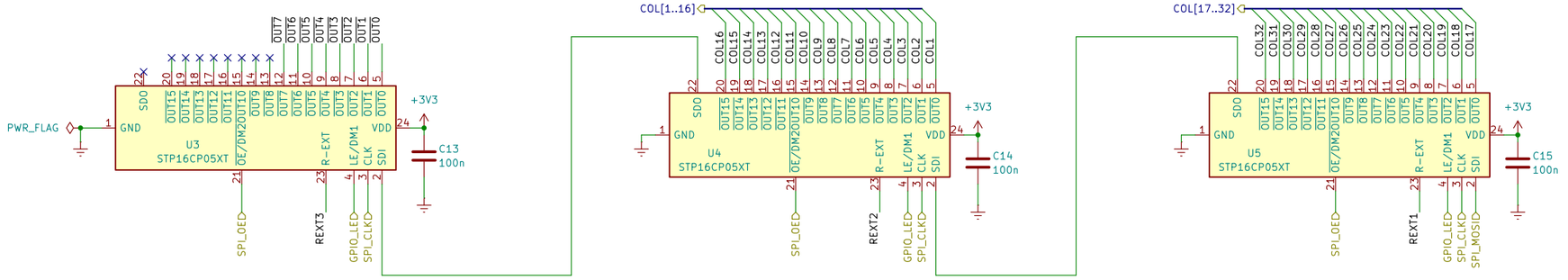
On Nucleo32-STM32G431KB devices PF0 and PF1 are disconnected.
SB11 and SB8 must be connected for this schematic to work.
Decoupling capacitor info can be found on datasheet and application note AN5093
No ADC therefore tying VDDA to VDD and GNDA to GND

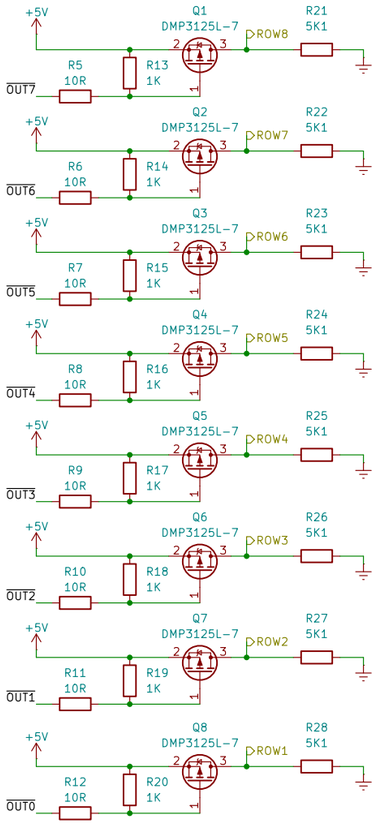
Sheet: /STM32 MCU/
File: STM32_MCU.kicad_sch

Title: STM32G431Kx Schematic

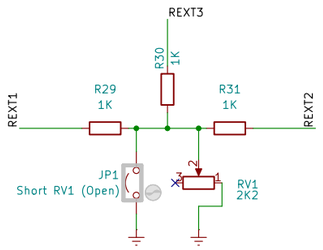
Size: A4	Date: 2025-05-22	**Rev: v08**
KiCad E.D.A. 9.0.2		Id: 4/7

Cascade Direction
Last (in chain) <--- First (in chain)





Brightness Control
Short JP for max brightness
Alternatively, adjust with potentiometer



Replace 16 w/ 64 for STP04CM05 device (not used)

Rext = (Vref/Iout) * 16

1K = 16(1.25/Iout)

1K/16 = 1.25/Iout

Iout (1K/16) = 1.25 ---> Iout = 16(1.25/1K)
= 0.02A ---> 20mA

Ich = [Vref - 3(Vref*Rreg)/((3 * Rreg) + Rset)]*16/Rset

Where Rset = Rext
Where Rreg = RV1

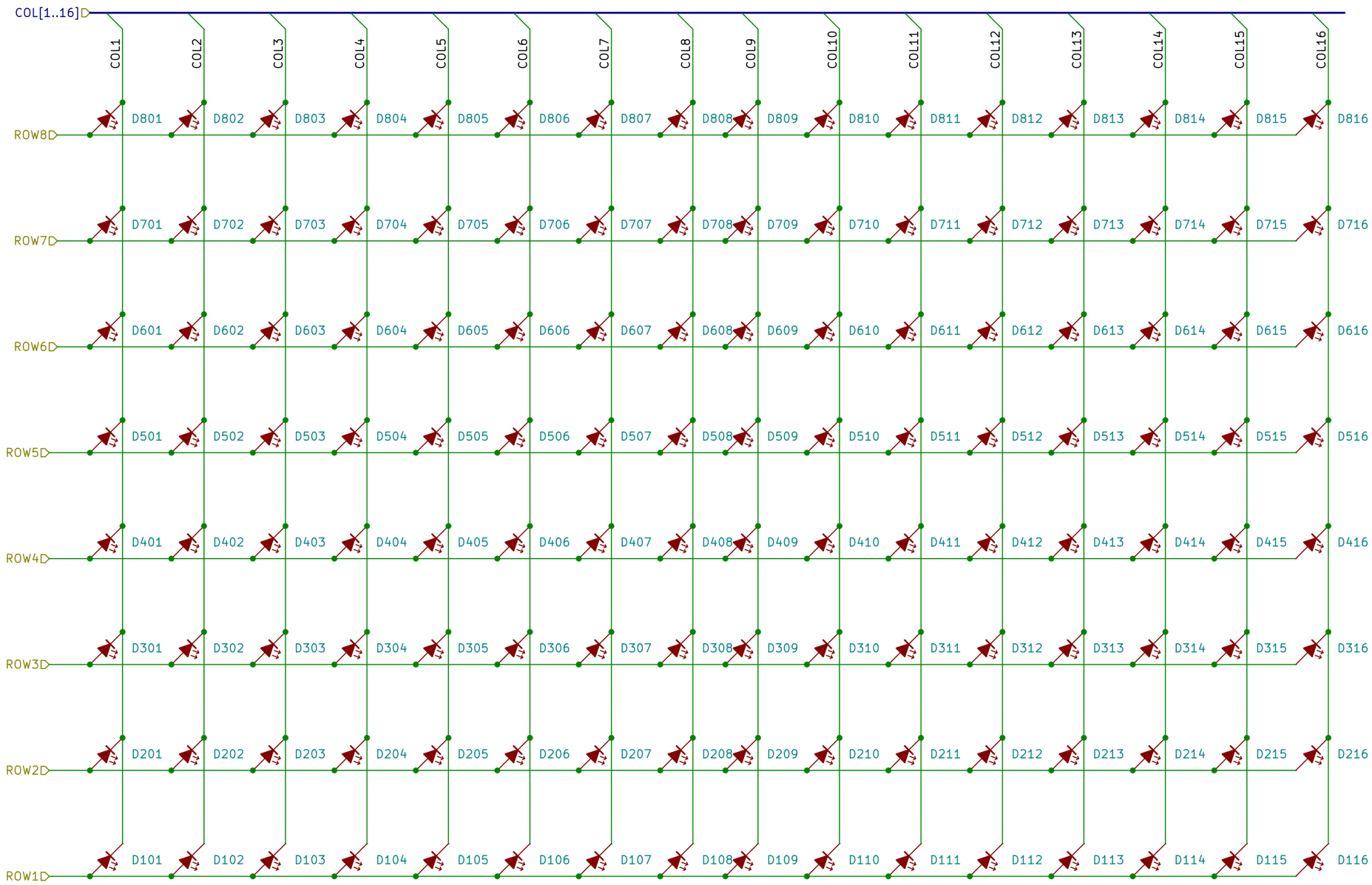
Ich_min = 0.00263157894736 A --> 2.6 mA (minumum)
Ich_max = 19.9mA (for RV1 = 1 ohm)

STP16CP05 based cascaded LED matrices

Sheet: /LED DRIVING/
File: LED_DRIVING.kicad_sch

Title: 8x32 LED Matrix

Size: A3	Date: 2025-05-21	**Rev: v04**
KiCad E.D.A. 9.0.2		Id: 5/7

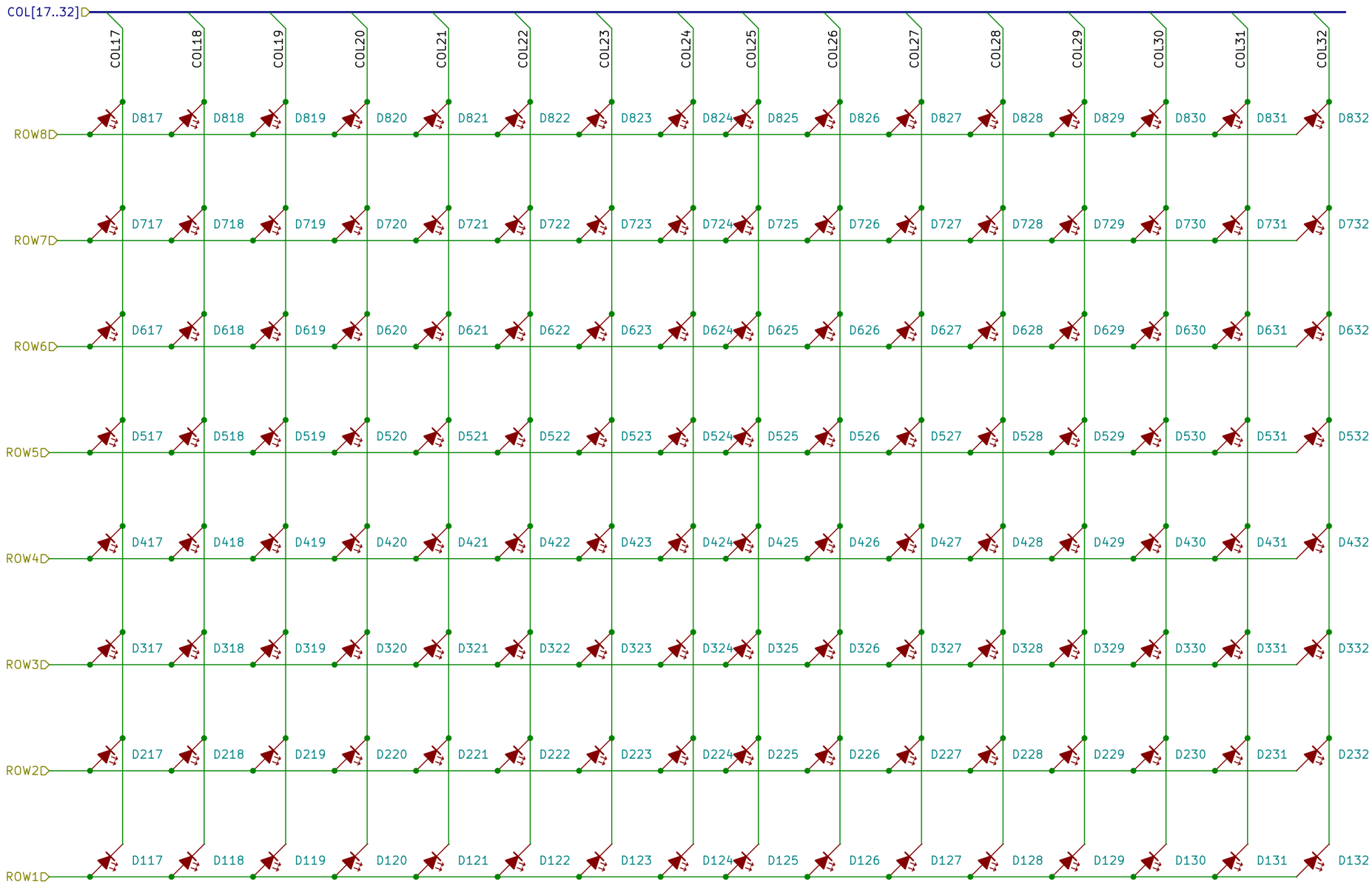


8x16 matrix

Sheet: /LED MATRIX ARRAY #1/
File: LED_MATRIX_ARRAY_1.kicad_sch

Title: LED Matrix #1

Size: A4	Date: 2024-11-23	**Rev: v01**
KiCad E.D.A. 9.0.2		Id: 6/7



8x16 matrix

Sheet: /LED MATRIX ARRAY #2/
File: LED_MATRIX_ARRAY_2.kicad_sch

Title: LED Matrix #2

Size: A4	Date: 2024-11-23	**Rev: v01**
KiCad E.D.A. 9.0.2		Id: 7/7