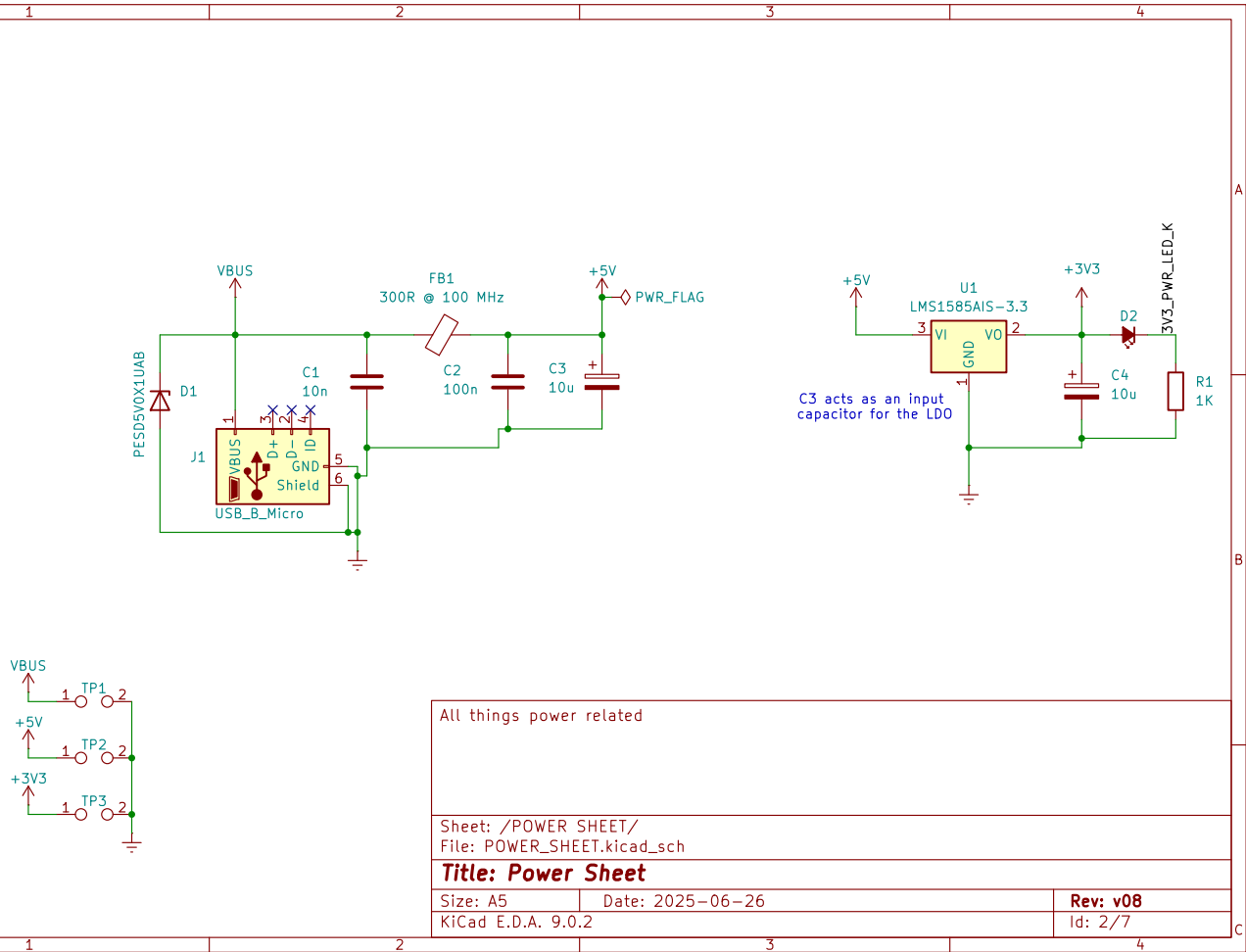


Sheet: /		
File: spekky_matrix.kicad_sch		
Title: <b>Spekky Matrix Schematic</b>		
Size: A5	Date: 2025-06-29	Rev: v24
KiCad E.D.A. 9.0.2		Id: 1/7



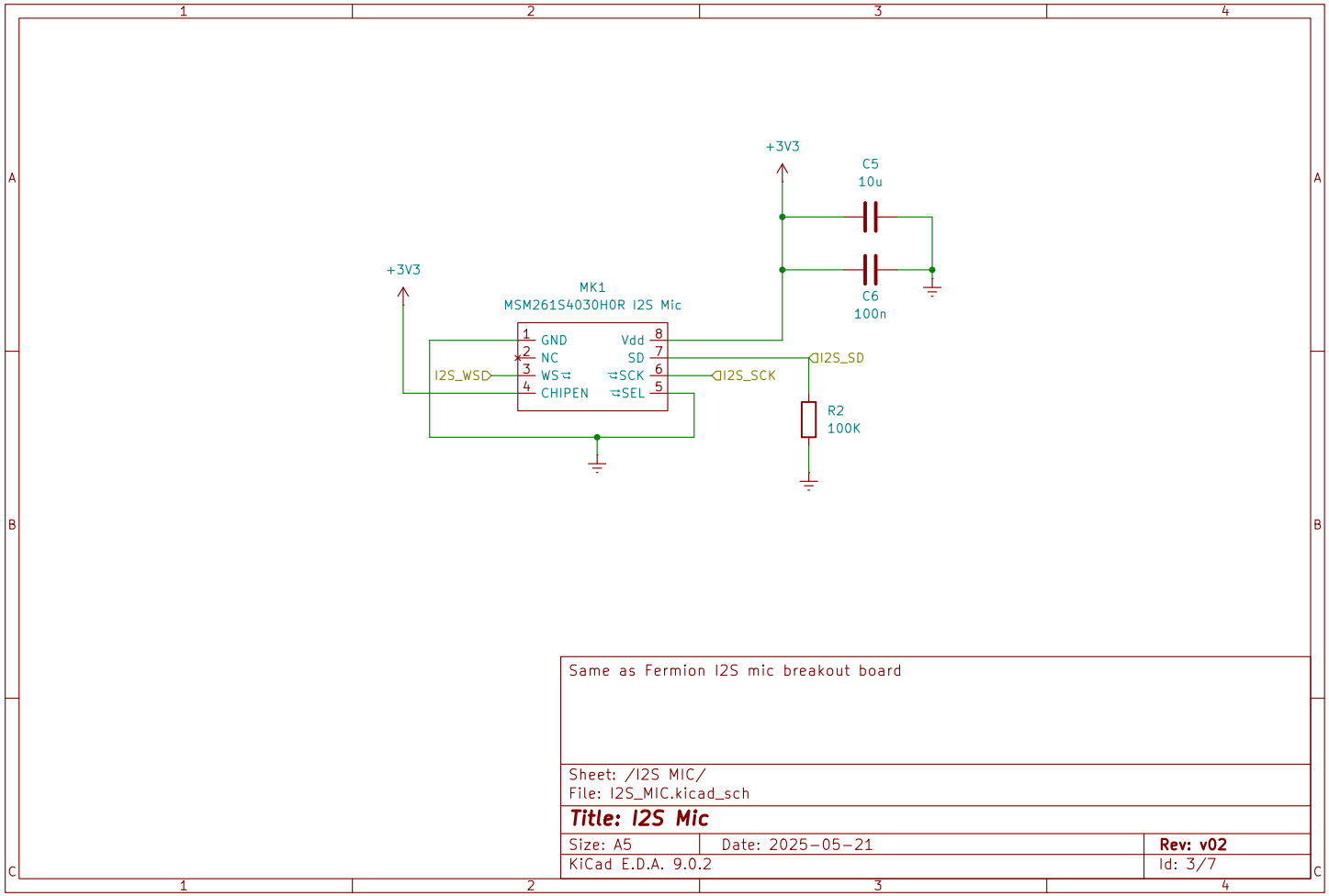
All things power related

Sheet: /POWER SHEET/  
File: POWER\_SHEET.kicad\_sch

**Title: Power Sheet**

Size: A5 Date: 2025-06-26  
KiCad E.D.A. 9.0.2

Rev: v08  
Id: 2/7

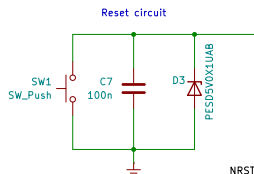


Same as Fermion I2S mic breakout board

Sheet: /I2S MIC/  
File: I2S\_MIC.kicad\_sch

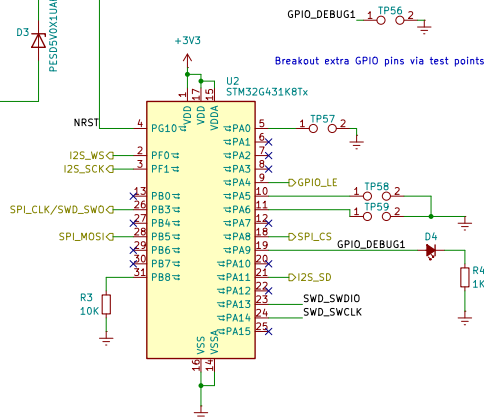
Title: I2S Mic		
Size: A5	Date: 2025-05-21	Rev: v02
KiCad E.D.A. 9.0.2		Id: 3/7

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



Reset circuit

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



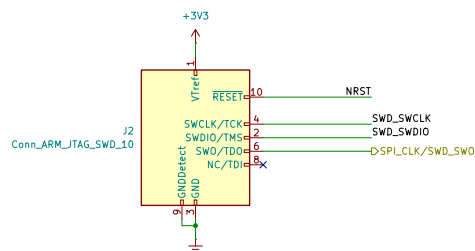
Breakout extra GPIO pins via test points

I2S Fsamp calculation: via STM32G431x reference manual

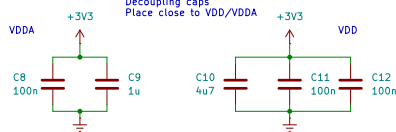
$$Fsamp = FI2sclock / [(64)(2(I2SDIV + ODD))]$$

Currently FI2sclock 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 GND to GND

Sheet: /STM32 MCU/  
File: STM32\_MCU.kicad\_sch

### Title: STM32G431Kx Schematic

Size: A4 Date: 2025-06-29  
KiCad E.D.A. 9.0.2

Rev: v09  
Id: 4/7

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

**Brightness Control**  
Shunt  $R_{ext}$  for max brightness  
Alternatively, adjust with potentiometer

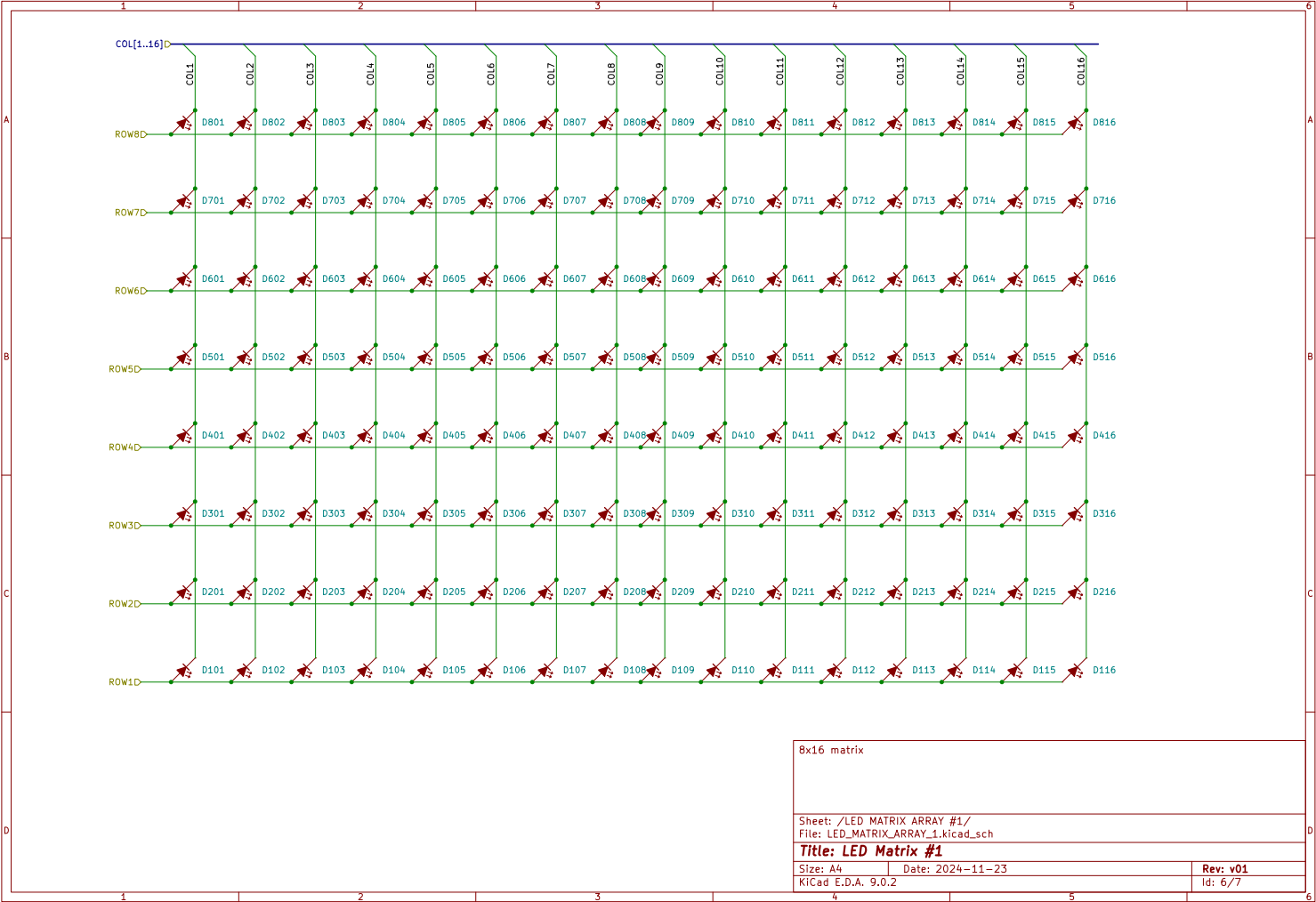
Replace 16 w/ 6k for STPDACH05 device (not used)  
 $R_{ext} = (V_{ref}/I_{out}) * 16$   
 $1K = 16(1.25/I_{out})$   
 $1K/16 = 1.25/I_{out}$   
 $I_{out}(1K/16) = 1.25 \rightarrow I_{out} = 16(1.25/1K) = 0.02A \rightarrow 20mA$

$I_{ch} = (V_{ref} - 3(V_{ref}/R_{reg})/(3 * R_{reg} + R_{ext})) * 16/R_{ext}$   
 Where  $R_{ext} = R_{ext}$   
 Where  $R_{reg} = RV1$   
 $I_{ch\_min} = 0.00263157894736 A \rightarrow 2.6 mA$  (minimum)  
 $I_{ch\_max} = 19.9mA$  (for  $RV1 = 1 ohm$ )

**STP16CP05 based cascaded LED matrices**

Sheet: /LED DRIVING/ File: LED_DRIVING.kicad_sch	Rev: v07
Title: <b>8x32 LED Matrix</b>	
Size: A3   Date: 2025-06-27	
KiCad E.D.A. 9.0.2	Id: 5/7

Id: 5/7



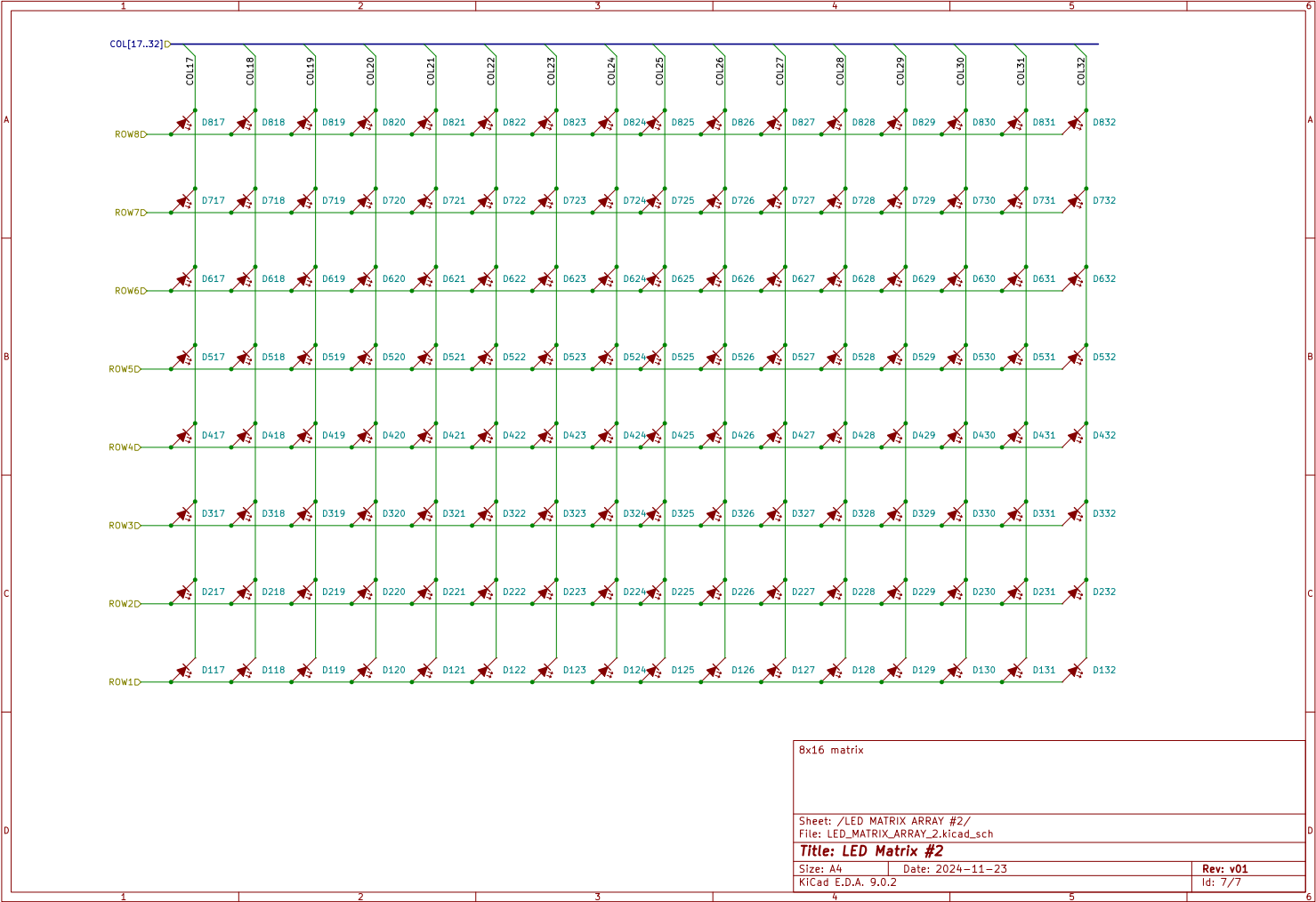
8x16 matrix

Sheet: /LED MATRIX ARRAY #1/  
File: LED\_MATRIX\_ARRAY\_1.kicad\_sch

**Title: LED Matrix #1**

Size: A4      Date: 2024-11-23  
KiCad E.D.A. 9.0.2

**Rev: v01**  
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  
KiCad E.D.A. 9.0.2

Rev: v01  
Id: 7/7