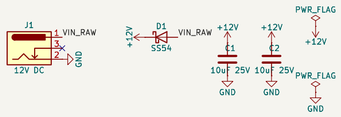
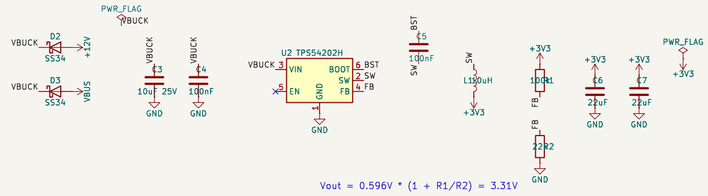
12V input (wall adapter, 5.5x2.1mm centre +)

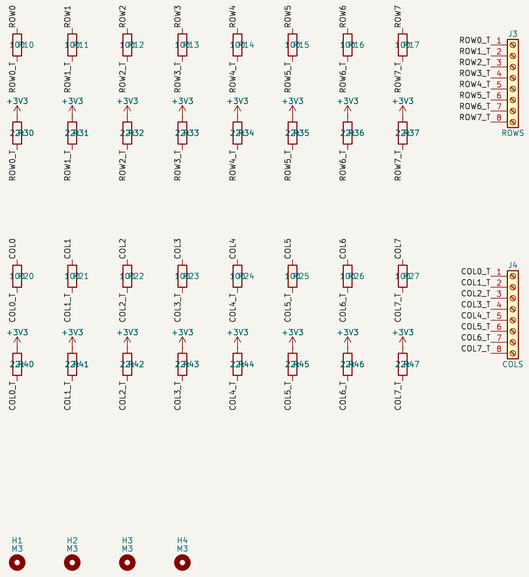


Logic supply: 12V or USB VBUS (diode-OR) -> TPS54202 buck -> 3.3V

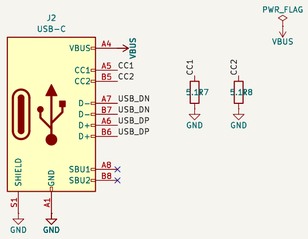


Vout = 0.596V * (1 + R1/R2) = 3.31V

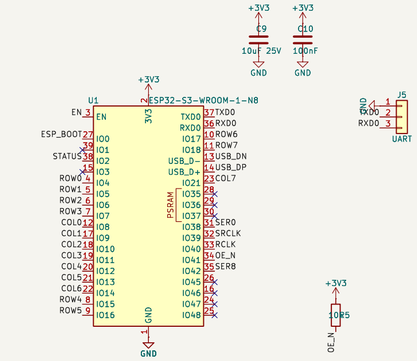
Button matrix (8 rows x 8 columns, diodes on the buttons).
100R series resistors protect the GPIOs, 22k pull-ups keep long wires defined.
Rows/columns are plain GPIOs, so diode direction is set in firmware.



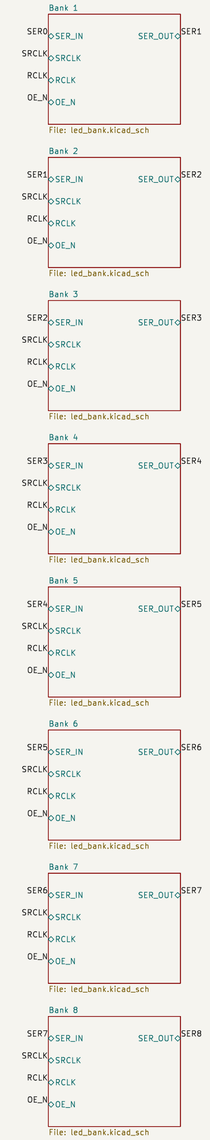
USB-C: firmware upload + serial console (native USB of the ESP32-S3)



ESP32-S3-WROOM-1-N8



LED banks: 74HC595 chain, bank 1 is first in the chain (LEDs 0-7)



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button-grid

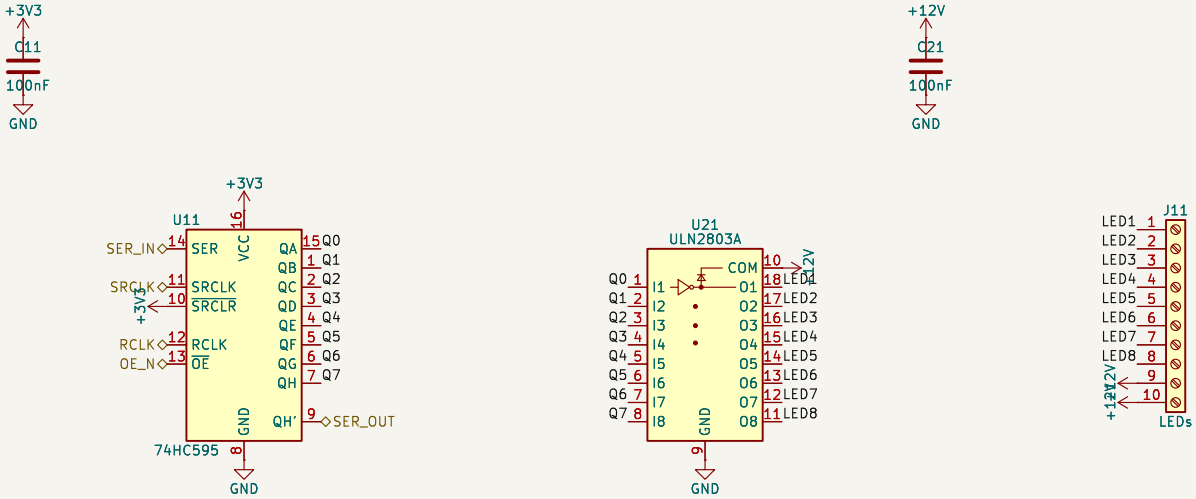
Sheet: /

File: button-grid.kicad_sch

Title: 8x8 button grid controller

Size: A2	Date:	**Rev:**
KiCad E.D.A. 9.0.9		Id: 1/9

One LED bank: 8 LED outputs, low-side switched.
LED wiring per channel: +12V terminal -> LED (+ its resistor) -> LEDn terminal.
74HC595 output HIGH = LED on.



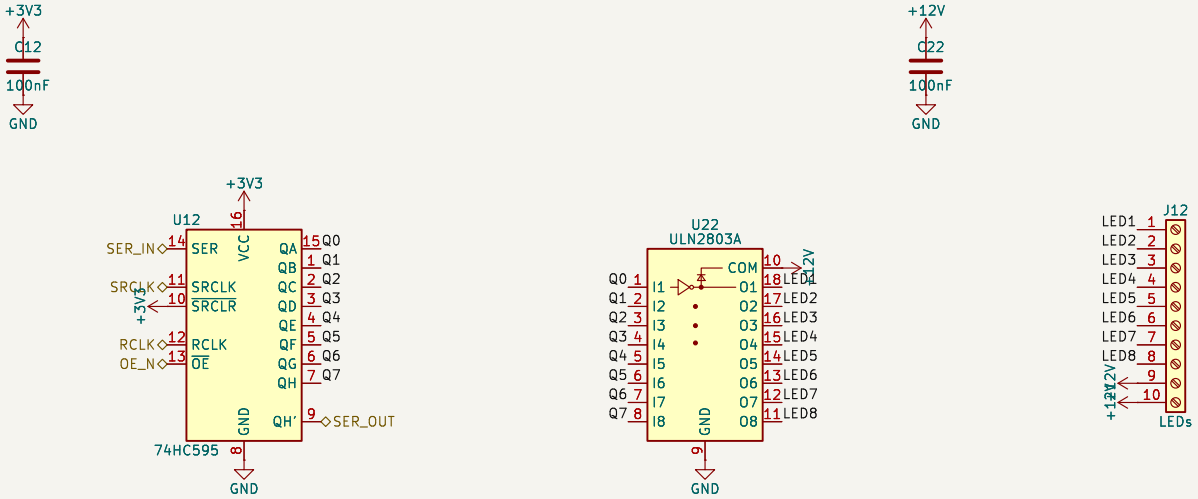
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button-grid

Sheet: /Bank 1/
File: led_bank.kicad_sch

Title: LED bank (8 channels)

Size: A4	Date:	**Rev:**
KiCad E.D.A. 9.0.9		Id: 2/9

One LED bank: 8 LED outputs, low-side switched.
LED wiring per channel: +12V terminal -> LED (+ its resistor) -> LEDn terminal.
74HC595 output HIGH = LED on.



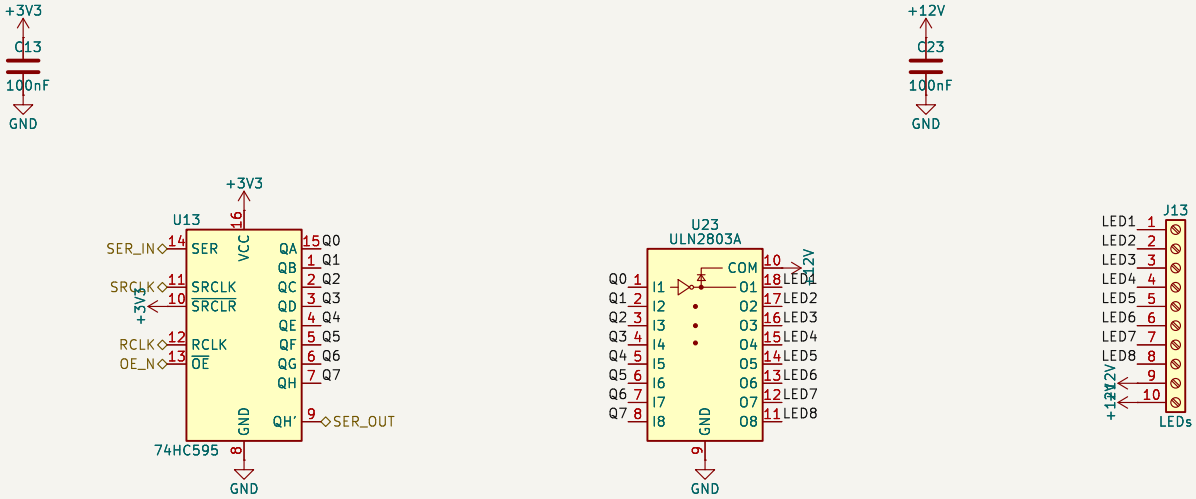
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button-grid

Sheet: /Bank 2/
File: led_bank.kicad_sch

Title: LED bank (8 channels)

Size: A4	Date:	**Rev:**
KiCad E.D.A. 9.0.9		Id: 3/9

One LED bank: 8 LED outputs, low-side switched.
LED wiring per channel: +12V terminal -> LED (+ its resistor) -> LEDn terminal.
74HC595 output HIGH = LED on.



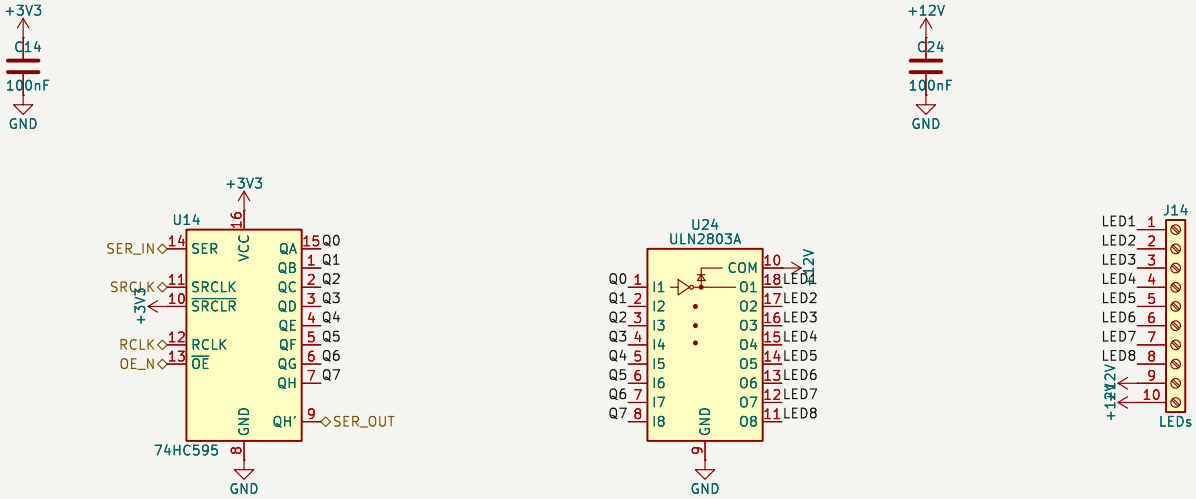
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button-grid

Sheet: /Bank 3/
File: led_bank.kicad_sch

Title: LED bank (8 channels)

Size: A4	Date:	**Rev:**
KiCad E.D.A. 9.0.9		Id: 4/9

One LED bank: 8 LED outputs, low-side switched.
LED wiring per channel: +12V terminal -> LED (+ its resistor) -> LEDn terminal.
74HC595 output HIGH = LED on.



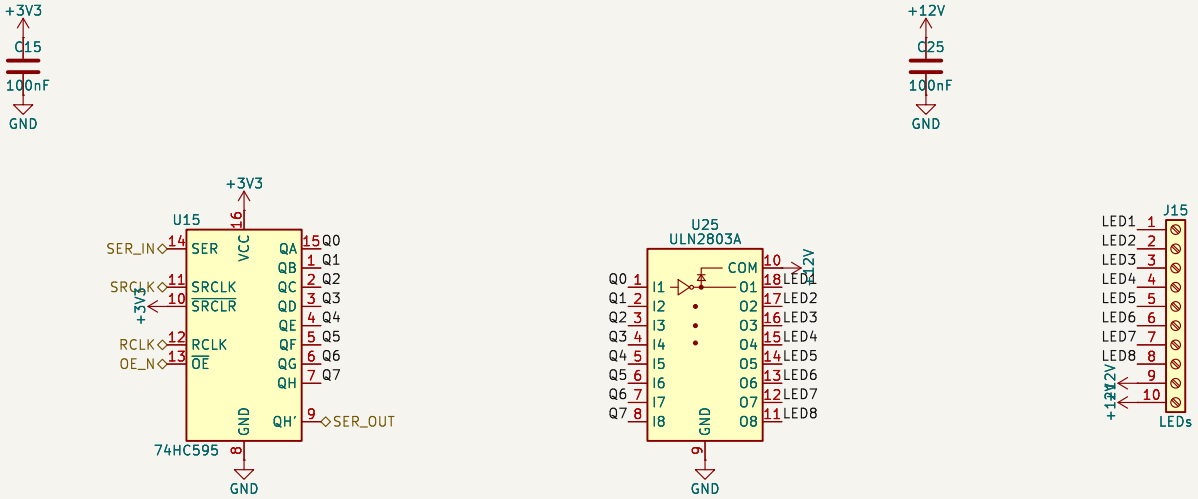
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button-grid

Sheet: /Bank 4/
File: led_bank.kicad_sch

Title: LED bank (8 channels)

Size: A4	Date:	**Rev:**
KiCad E.D.A. 9.0.9		Id: 5/9

One LED bank: 8 LED outputs, low-side switched.
LED wiring per channel: +12V terminal -> LED (+ its resistor) -> LEDn terminal.
74HC595 output HIGH = LED on.



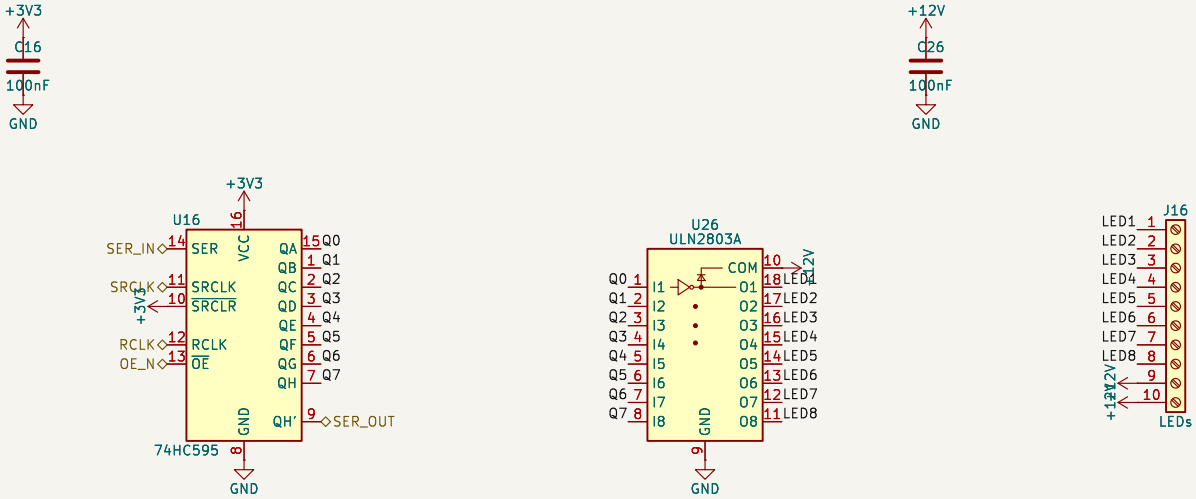
Generated by hardware/gen/build_schematic.py — editable in KiCad
button-grid

Sheet: /Bank 5/
File: led_bank.kicad_sch

Title: LED bank (8 channels)

Size: A4	Date:	**Rev:**
KiCad E.D.A. 9.0.9		Id: 6/9

One LED bank: 8 LED outputs, low-side switched.
LED wiring per channel: +12V terminal -> LED (+ its resistor) -> LEDn terminal.
74HC595 output HIGH = LED on.



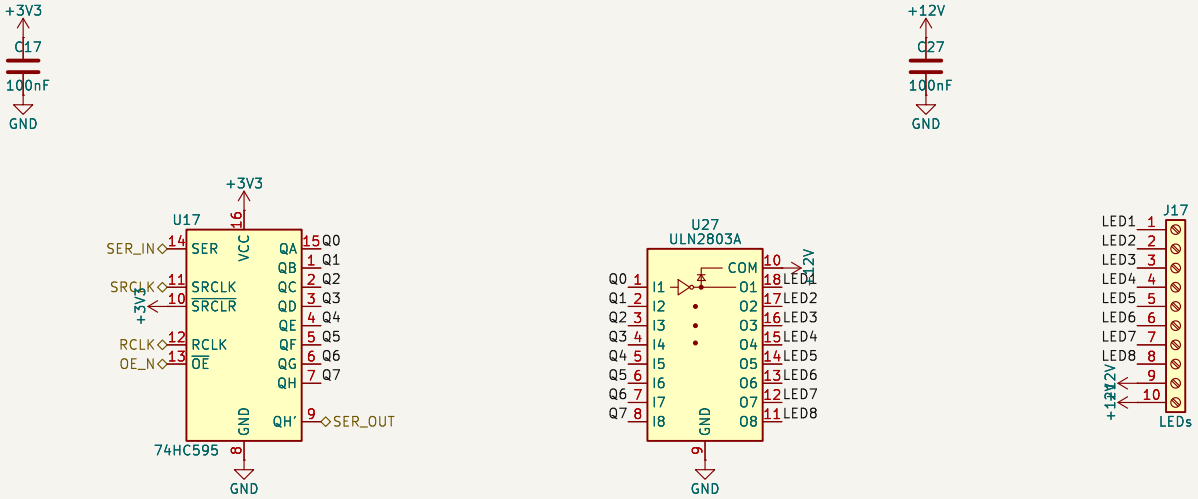
Generated by hardware/gen/build_schematic.py — editable in KiCad
button-grid

Sheet: /Bank 6/
File: led_bank.kicad_sch

Title: LED bank (8 channels)

Size: A4	Date:	**Rev:**
KiCad E.D.A. 9.0.9		Id: 7/9

One LED bank: 8 LED outputs, low-side switched.
LED wiring per channel: +12V terminal -> LED (+ its resistor) -> LEDn terminal.
74HC595 output HIGH = LED on.



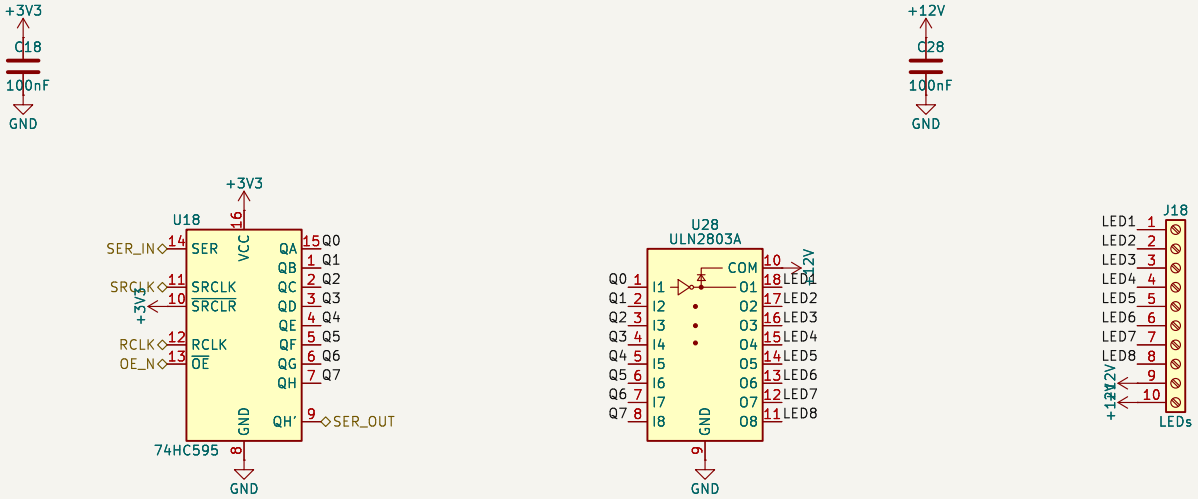
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button-grid

Sheet: /Bank 7/
File: led_bank.kicad_sch

Title: LED bank (8 channels)

Size: A4	Date:	**Rev:**
KiCad E.D.A. 9.0.9		Id: 8/9

One LED bank: 8 LED outputs, low-side switched.
LED wiring per channel: +12V terminal -> LED (+ its resistor) -> LEDn terminal.
74HC595 output HIGH = LED on.



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button-grid

Sheet: /Bank 8/
File: led_bank.kicad_sch

Title: LED bank (8 channels)

Size: A4	Date:	**Rev:**
KiCad E.D.A. 9.0.9		Id: 9/9