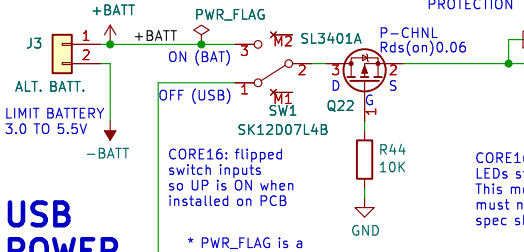
# POWER SUPPLY

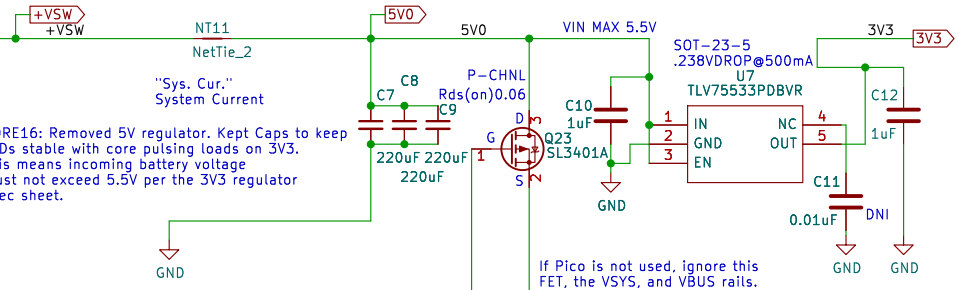
## BATTERY SWITCH RPP

REVERSE POLARITY PROTECTION




## +V SWITCHED = 5V0

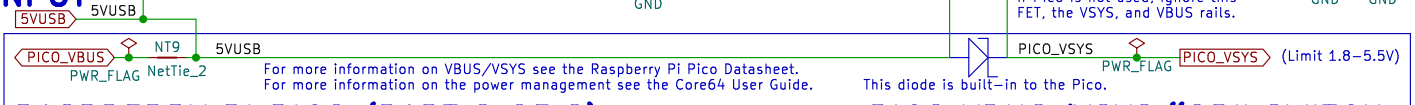
LED ARRAY, MCU, 3V3 REGULATOR, OPTIONAL ACCESSORIES




## 3V3 REGULATOR

CORE MATRIX, OPTIONAL ACCESSORIES, ALL LOGIC

## USB POWER INPUT




## RASPBERRY PI PICO (PART 2 OF 2)

## PICO VBUS/VSYS "OR" SWITCH

## POWER FLOW
## MORE DETAIL IN CORE64 USER GUIDE

PRIMARY SWITCHED POWER SOURCES:
ON (BAT) : From battery on LED Array Board
OFF (USB) : From USB port on Pico

ALTERNATE/OPTIONAL SWITCHED POWER SOURCES:
ON (BAT) : From battery on Logic Board
OFF (USB) : From USB port of LiPo Charger on LED Array Board
* Requires closing USB Charge Enable solder jumper on the back of the LED Array Board. *

TWO POWER INPUT SOURCES SELECTED BY SPDT SWITCH.

Power Switch ON (BAT), USB cable is NOT connected:
P−FET (gate is low) conducts 5V0 (or less if the battery is less than about 5.2V) so that PICO_SYS is powered.
PICO_VBUS is not energized because of built−in Zener diode on the Pico.

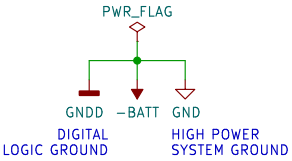
Power Switch OFF (USB), USB cable is NOT connected:
System is off and does not receive power from the battery.

Power Switch ON (BAT), USB cable IS connected:
If USB voltage is greater than 5V0, the Pico will operate with VSYS at the USB voltage. The rest of the system will operate from whatever the 5V0 rail voltage is.
If USB voltage is less than 5V0, the Pico will operate with VSYS at 5V0 along with the rest of the system. The Pico diode prevents current flow from 5V0 back out through USB.

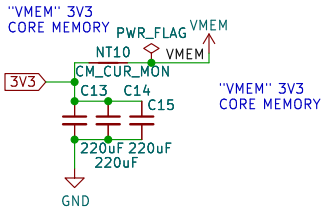
Power Switch OFF (USB), USB cable IS connected:
The USB voltage will be greater than 5V0 (because there is a voltage drop through the 5V0 regulator). The P−FET will be off, the Pico will run at the USB voltage, the rest of the system will run at slightly less than the USB voltage.

## SYSTEM GROUNDS

Core16: Removed large ground rings.




## CORE MATRIX POWER

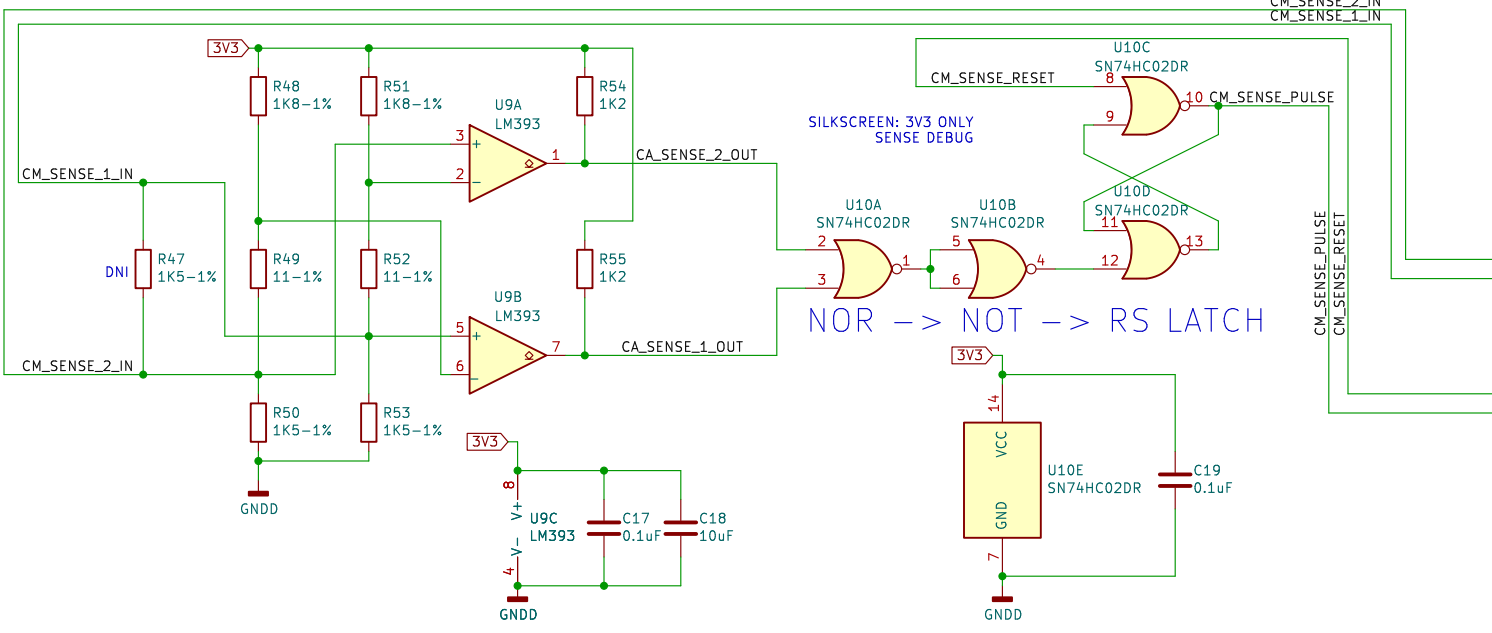



Core16: Moved LED driver to lower left sheet.

# CORE MATRIX SENSE

## SENSE SIGNAL DIFFERENTIAL AMPLIFIERS

## SENSE SIGNAL OUTPUT LATCH

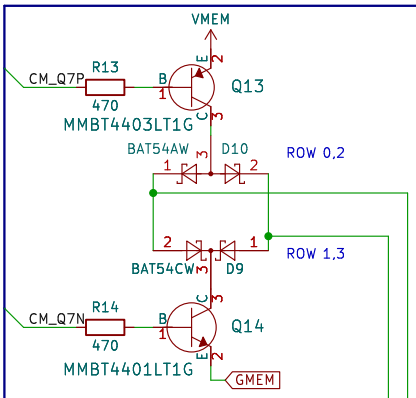


# CORE MATRIX DRIVER

QxN (NPN) is normally low, high to activate matrix transistor.

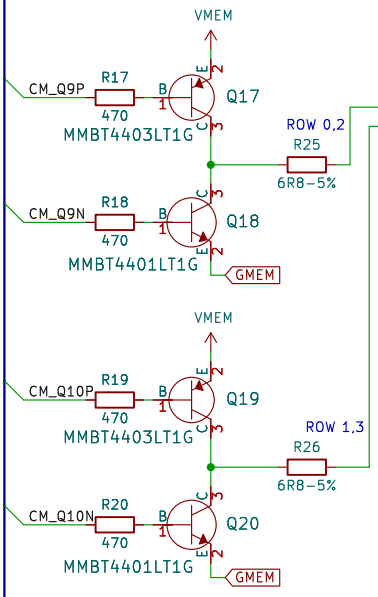
QxP (PNP) is normally high, low to activate matrix transistor.

## CORE MATRIX ROW DRIVERS

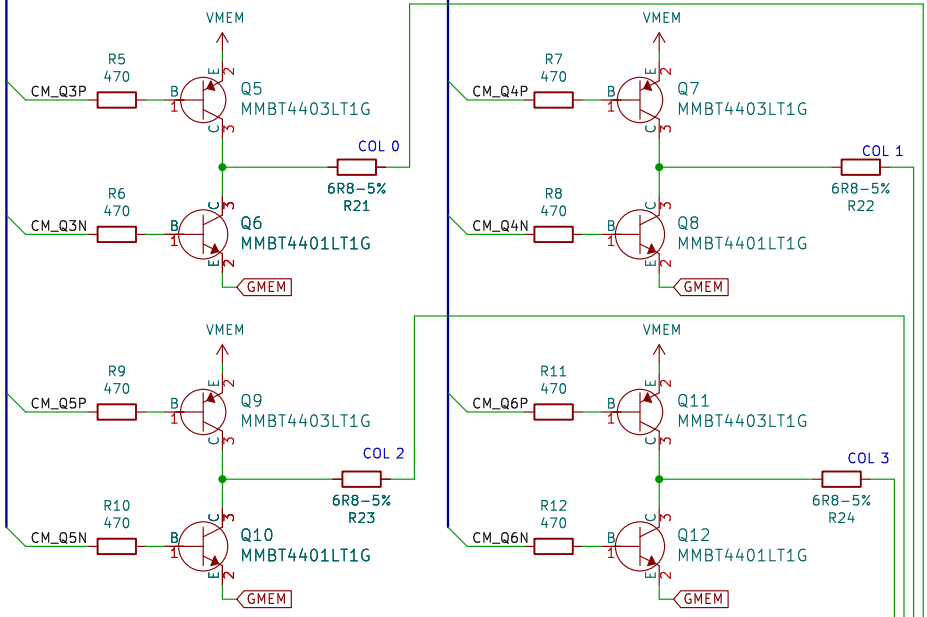



Core16: Removed 2x transistors and diodes from horizontal drive.

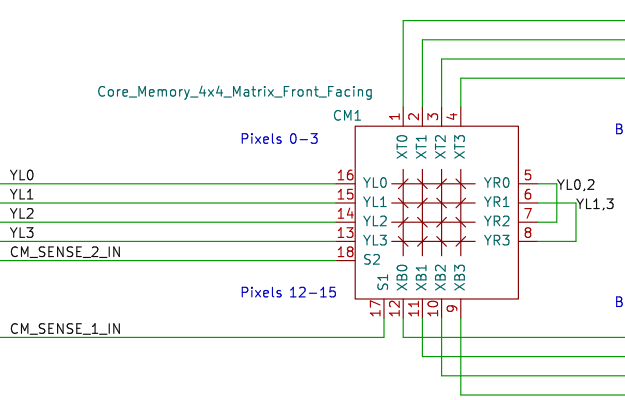
Core16: Removed net-ties and core column 0 / row 0 voltage monitors.




## CORE MATRIX TOP COLUMN DRIVERS



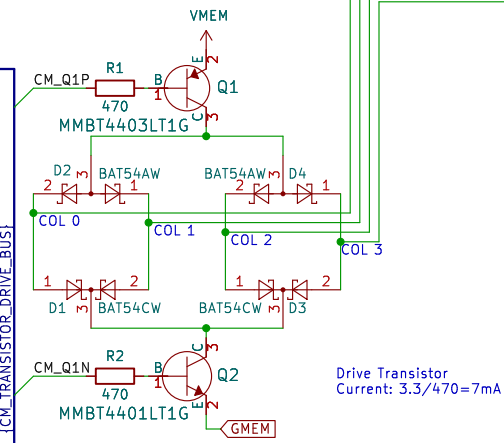

## CORE MATRIX




Core16: Removed stacked headers.

Core16: Removed battery access along with the stacked headers.

## CORE MATRIX BOTTOM COLUMN DRIVERS




Drive Transistor Current: 3.3/470=7mA

Core16: Reorganized QxP and QxN to be 1-8 instead of intermittent to 12.

Core16: Removed test points.

Core16: Removed 2x transistors and diodes from vertical drive.

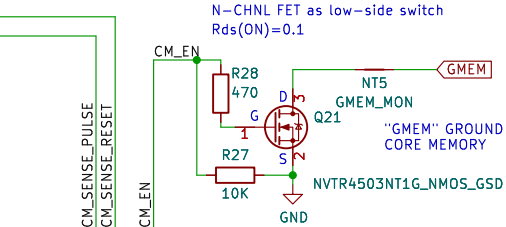
Core16: Organize transistor and resistor ref. des. numbers CCW from lower left. The six current limiting resistors are 21-26.

CM_SENSE_2_IN

CM_SENSE_1_IN

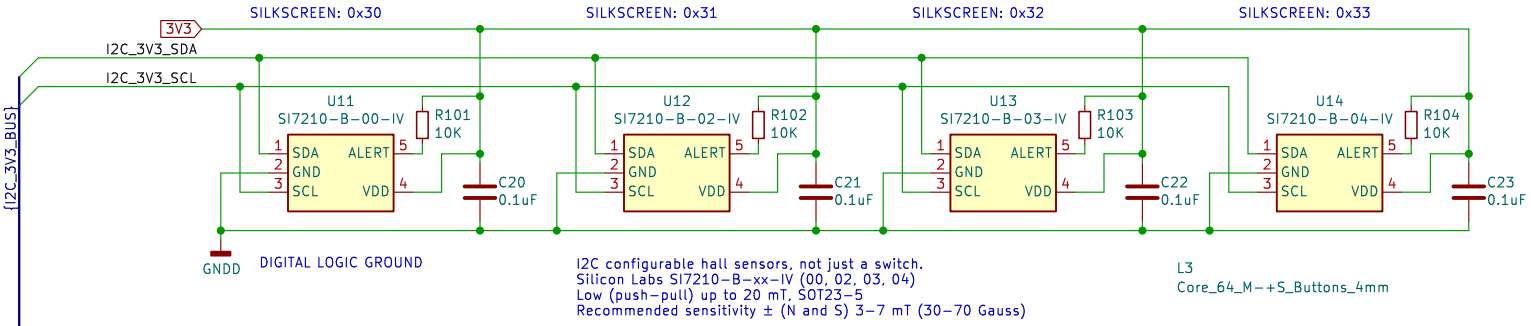
## CORE MATRIX ENABLE

N-CHNL FET as low-side switch
Rds(ON)=0.1



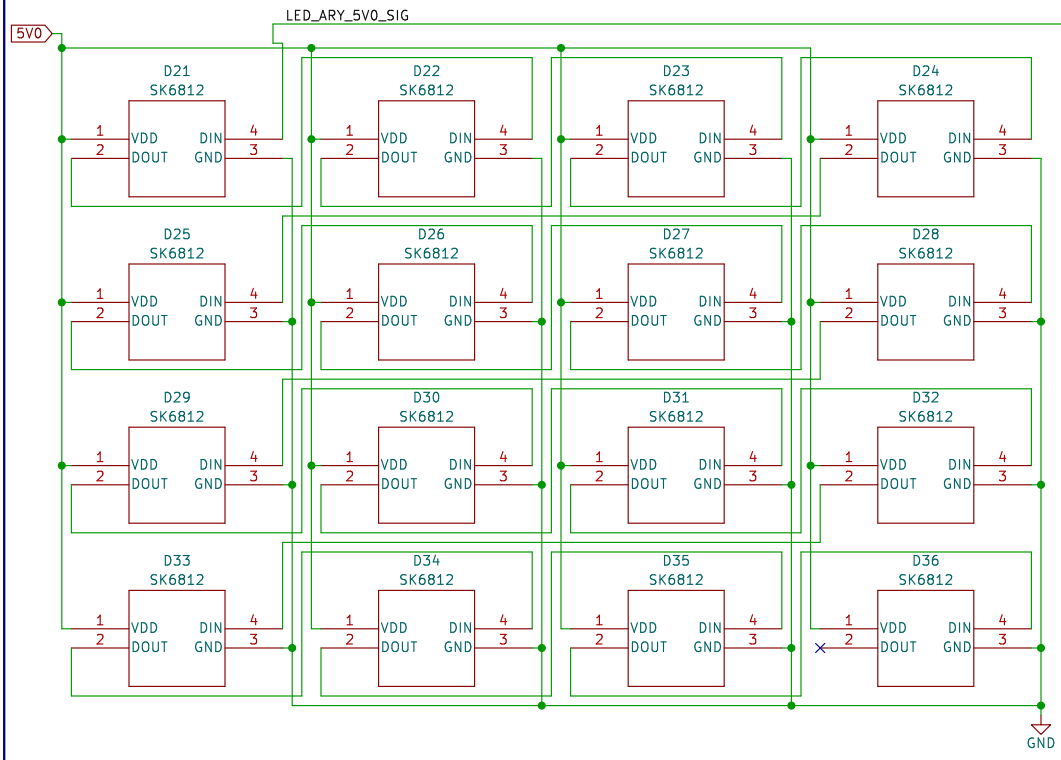
# RGB LED MATRIX AND HALL SENSOR BUTTONS

## HALL SENSORS

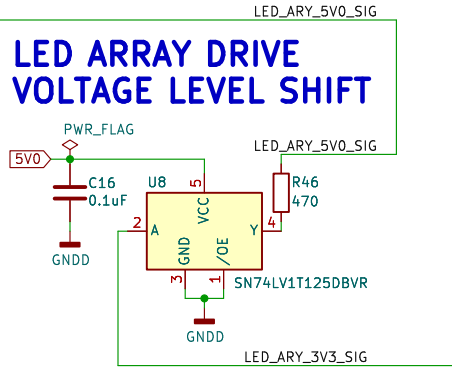


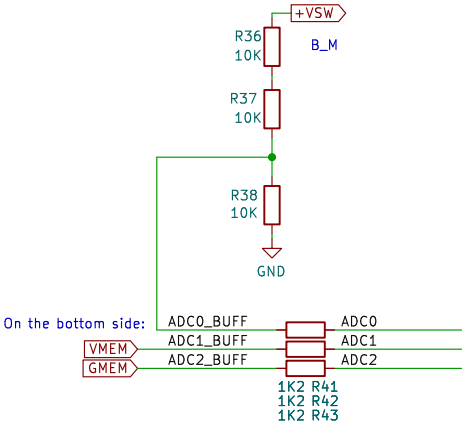

I2C configurable hall sensors, not just a switch.
Silicon Labs SI7210-B-xx-IV (00, 02, 03, 04)
Low (push-pull) up to 20 mT, SOT23-5
Recommended sensitivity ± (N and S) 3-7 mT (30-70 Gauss)

L3
Core_64_M-+S_Buttons_4mm




## LED ARRAY DRIVE VOLTAGE LEVEL SHIFT




{I2C_3V3_BUS}

# HACKER PLAYGROUND

## USER-PROVIDED OPTIONAL ADD-ONS
## SEE CORE64 HACKER GUIDE

{GPIO_BUS}

{I2C_3V3_BUS} {I2C_3V3_BUS}

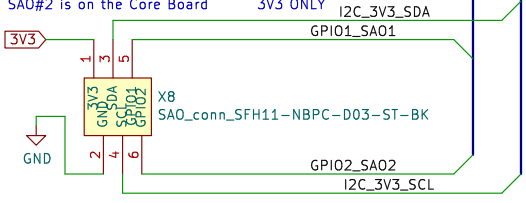
### OLED MONOCHROME I2C

Connect via SAO.

Generic 0.96" (128x64) or 1.5" (128x128)
I2C 4-pins, often ADDRESS: 0x3C (60 decimal)
Alternate is 0x3D, not 0x7A or 0x78 (wrong 8-bit)!

### SAO #1 SIMPLE ADD-ONS

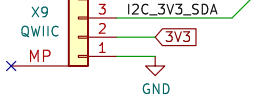
SAO#2 is on the Core Board 3V3 ONLY




https://hackaday.io/project/175182-simple-add-ons-sao
using Sullins SFH11-NBPC-D03-ST-BK female header
https://www.digikey.com/product-detail/en/sullins-connector-solutions/SFH11-NBPC-D03-ST-BK/S9717-ND/4558818

### QWIIC I2C

3V3 ONLY




### I2C ADDRESS TABLE

| OPTIONAL: | |
|---|---|
| AMBIENT PROX. SENSOR | 0x38 (56) |
| OLED | 0x3C (60) |
| AND!XOR IO Exp. MCP23017 | 0x20 (32) |
| AND!XOR EEPROM AT24C32r | 0x50 (80) |
| NFC CLICK PN7120 | 0x50-53 |

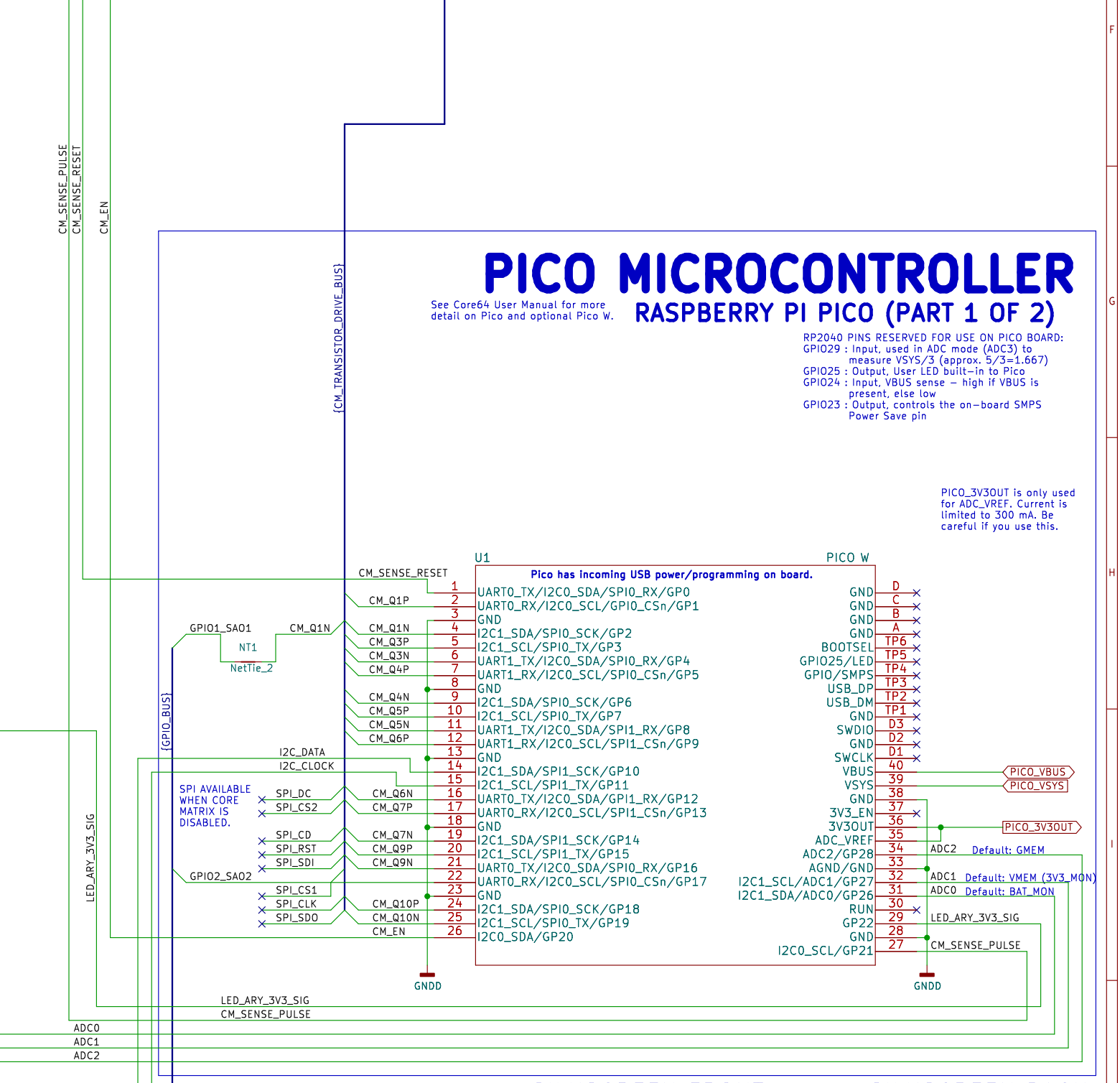
# PICO MICROCONTROLLER

## RASPBERRY PI PICO (PART 1 OF 2)

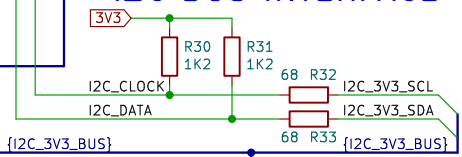
See Core64 User Manual for more detail on Pico and optional Pico W.

RP2040 PINS RESERVED FOR USE ON PICO BOARD:
GPIO29 : Input, used in ADC mode (ADC3) to measure VSYS/3 (approx. 5/3=1.667)
GPIO25 : Output, User LED built-in to Pico
GPIO24 : Input, VBUS sense - high if VBUS is present, else low
GPIO23 : Output, controls the on-board SMPS Power Save pin

PICO_3V3OUT is only used for ADC_VREF. Current is limited to 300 mA. Be careful if you use this.




## I2C BUS INTERFACE

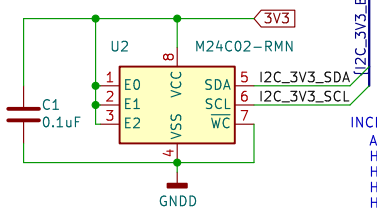



SILKSCREEN FRONT

SILKSCREEN BACK

## BOARD ID AND S/N

EEPROM I2C ADDRESS: 0b1010111, 0x57 (87)




## I2C ADDRESS TABLE

All 7-bit addresses should be greater than 0x07 and less than 0x78 (120).

INCLUDED:

| | |
|---|---|
| AMBIENT LIGHT SENSOR | 0x29 (47) |
| HALL SENSOR 1 | 0x30 (48) |
| HALL SENSOR 2 | 0x31 (49) |
| HALL SENSOR 3 | 0x32 (50) |
| HALL SENSOR 4 | 0x33 (51) |
| EEPROM (BOARD ID) | 0x57 (87) |

All non-polarized capacitors are X7R or X5R ceramic unless otherwise noted.

Visit www.Core64.io for information on assembly and optional features.
Please read the Core64 User Guide for more details.

**Concept and design by Andy Geppert © www.MachineIdeas.com**

Sheet: /
File: Core16_LB.kicad_sch

***Title: Core16 Logic Board***

| | | |
|---|---|---|
| Size: C | Date: 2023-09-16 | **Rev: 0.2** |
| KiCad E.D.A. kicad (7.0.0-0) | | Id: 1/1 |