POWER SUPPLY

BATTERY SWITCH RPP

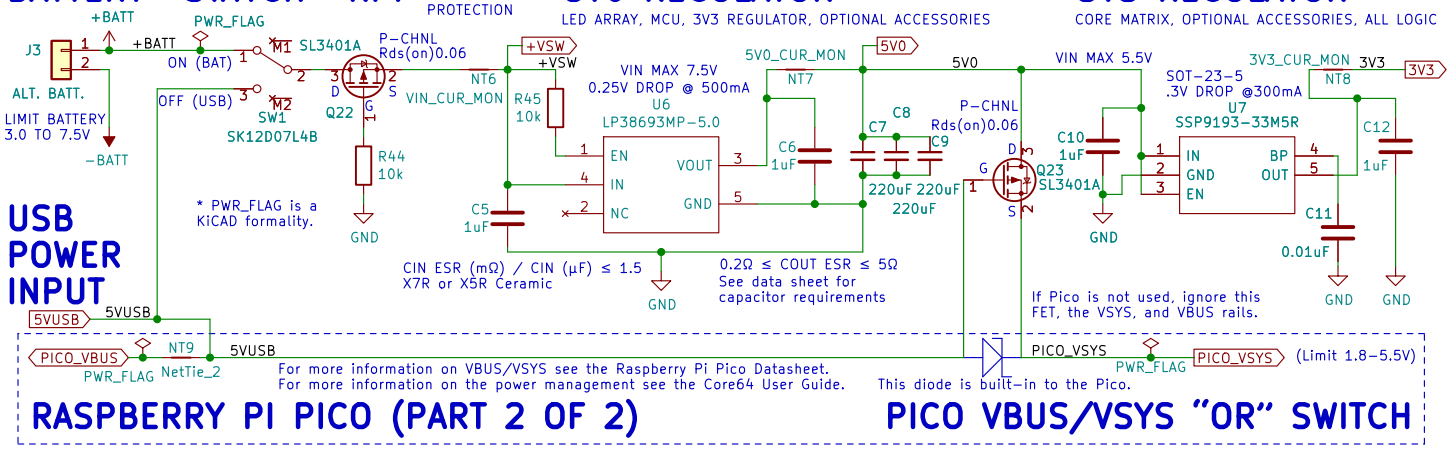
REVERSE POLARITY PROTECTION

5V0 REGULATOR

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.

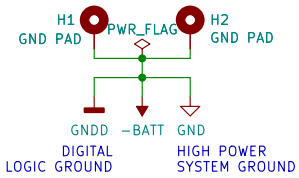
Power Switch OFF (USB), USB cable is NOT connected:
System is off and does not receive power from the battery.

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.

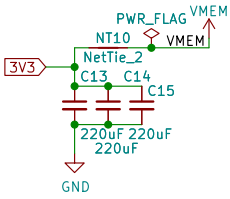
Power Switch OFF (USB), USB cable IS connected:
The USB voltage will be greater than 5V0 (because there is a voltage drop through the 5V0 regulator). The P-FET will be off, the Pico will run at the USB voltage, the rest of the system will run at slightly less than the USB voltage.

SYSTEM GROUNDS

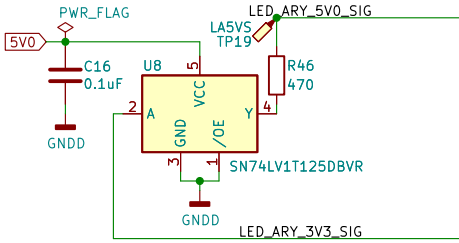
2x GND PAD 3.2 mm (.125 in) thru-hole for M3 or #4 screw



CORE MATRIX POWER



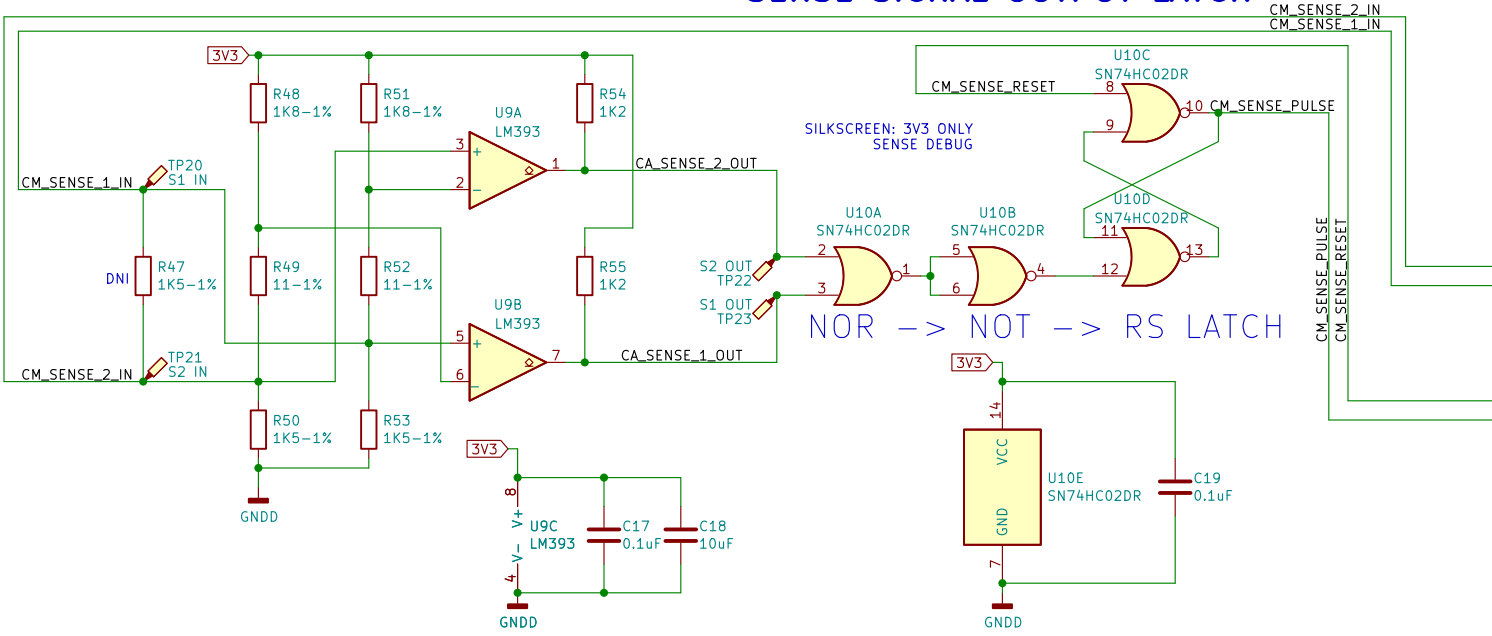
LED ARRAY DRIVE VOLTAGE LEVEL SHIFT



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

CORE MATRIX TOP COLUMN DRIVERS

CORE MATRIX AND LED ARRAY BOARD INTERCONNECTS

CORE MATRIX BOTTOM COLUMN DRIVERS

CORE MATRIX ENABLE

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

BATTERY

Drive Transistor Current: 3.3/470=7mA

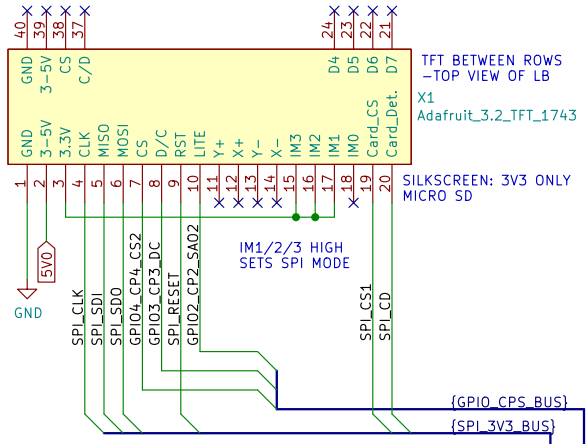
HACKER PLAYGROUND

USER-PROVIDED OPTIONAL ADD-ONS
SEE CORE64 HACKER GUIDE

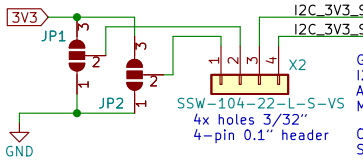
3.2" TFT LCD SPI w/MicroSD

Compatible with https://www.adafruit.com/product/1743
TFT has 5V -> 3V3 regulator onboard.
MicroSD card standalone pins shared between TFT and OLED boards.
Headers 3.0 in. apart

TFT LCD SOCKETS FOR LOGIC BOARD:
1x SAMTEC 20-pin SMD Header SSW-120-22-F-S-VS
2x SAMTEC 4-pin SMD Header SSW-104-22-F-S-VS



OLED MONOCHROME I2C



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)!
Must choose power polarity by soldering SJS.

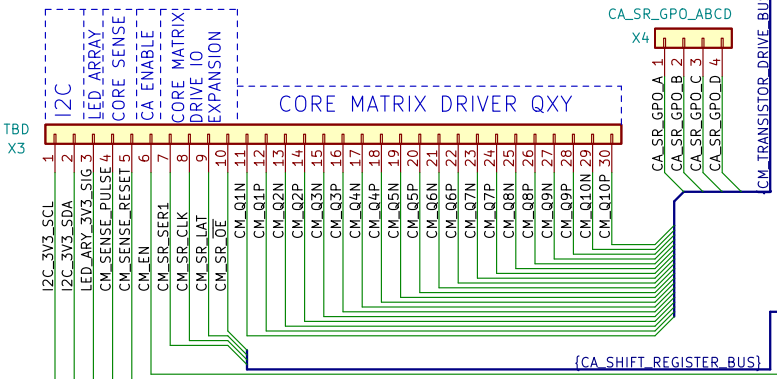
OLED SOCKET FOR LOGIC BOARD:
SAMTEC 4-pin SMD Header SSW-104-22-F-S-VS

SILKSCREEN: 3V3 ONLY, 3V3/GND sides of jumpers,
I2C OLED and pin names

{I2C_3V3_BUS}

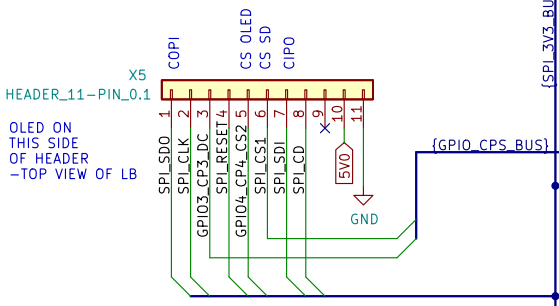
USER PORT A

SPARE SR GPO



OLED COLOR SPI W/MICRO SD

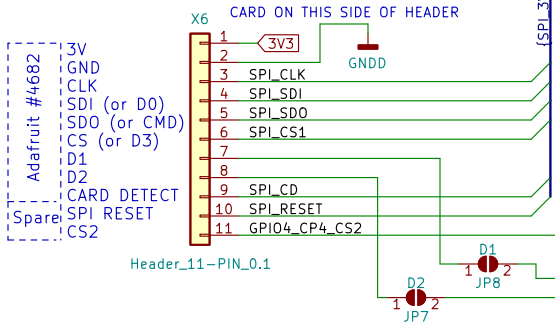
Compatible: https://www.adafruit.com/product/1431
1.5" 128x128, 16-bit color w/MicroSD holder
OLED has 5V -> 3V3 regulator onboard.
MicroSD card standalone pins shared between TFT and OLED boards.



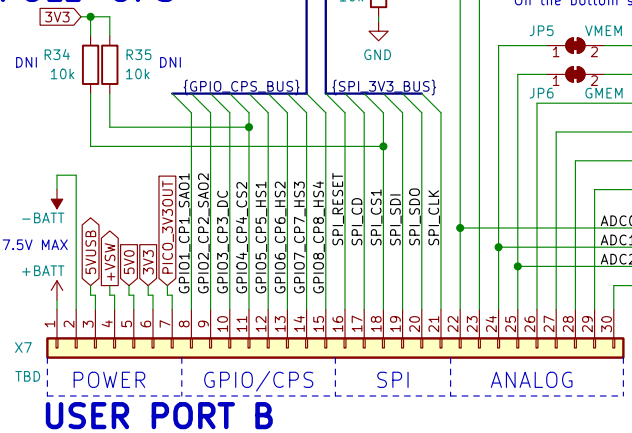
SILKSCREEN: 3V3 Logic ONLY, 3V3/GND sides of jumpers, SPI OLED

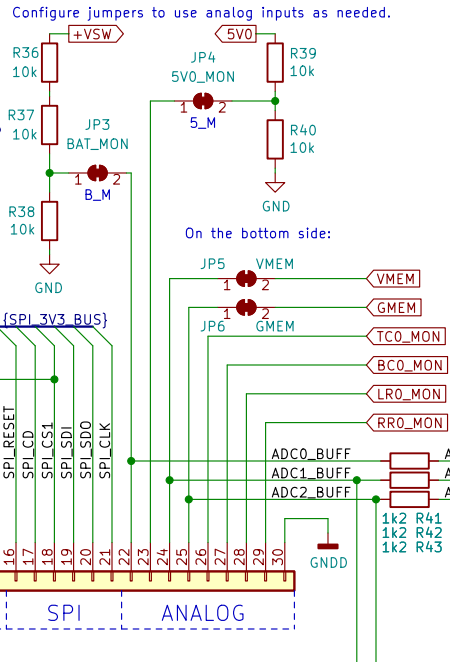
MICRO SD CARD, SPI

Compatible with https://www.adafruit.com/product/4682 (pins 1-6, 9)
MicroSD card standalone pins shared between TFT and OLED boards.



SPI CHIP SELECT PULL-UPS

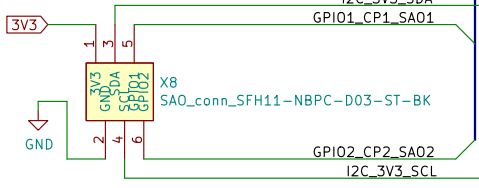




USER PORT B

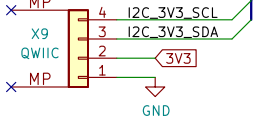
SAO #1 SIMPLE ADD-ONS

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

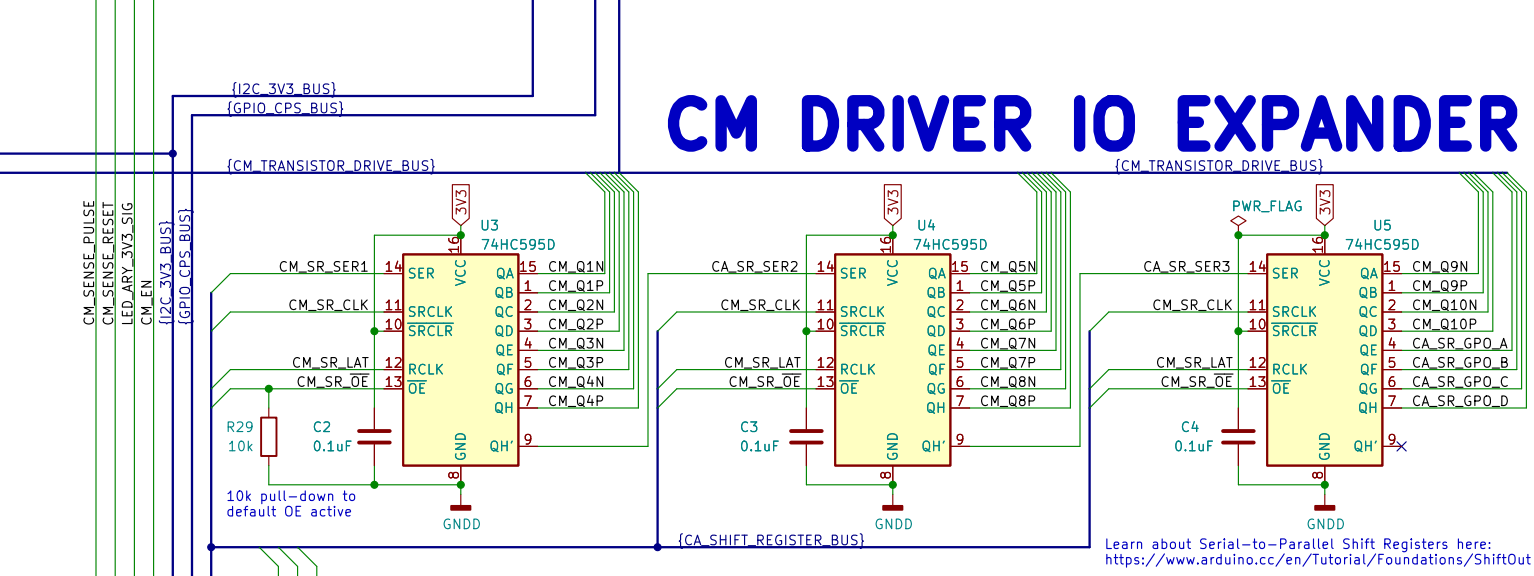
QWIIC I2C



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

CM DRIVER IO EXPANDER

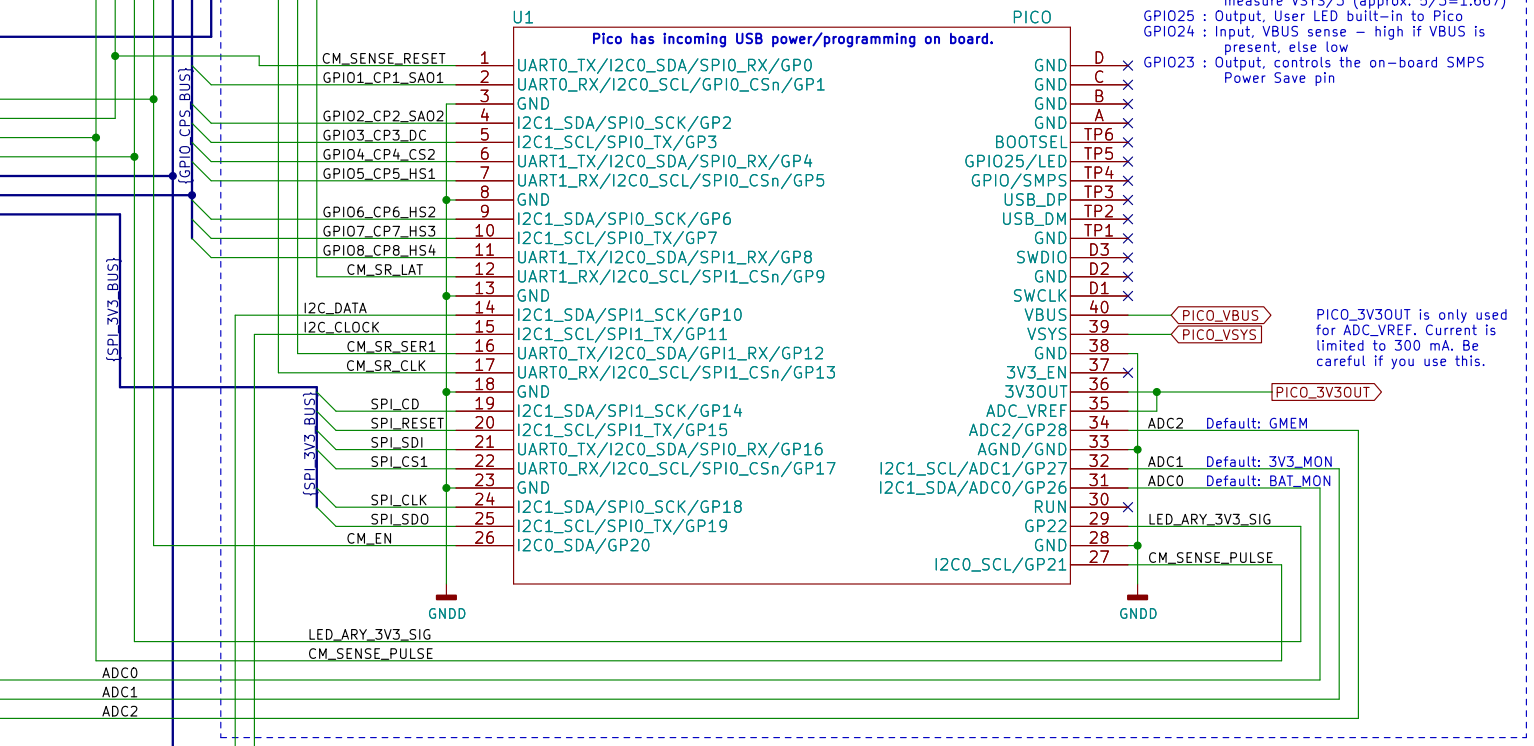


PICO MICROCONTROLLER

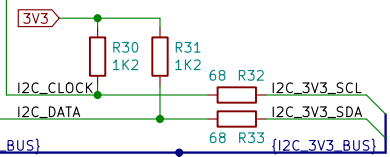
See Core64 User Manual for more detail on Pico and optional Pico W.

RASPBERRY PI PICO (PART 1 OF 2)

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



I2C BUS INTERFACE

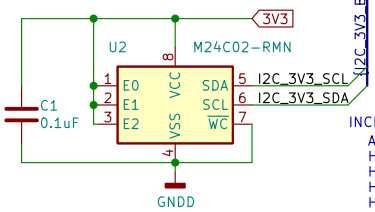


SILKSCREEN FRONT

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.
AS PROTOTYPED
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: Core64 LB.kicad_sch

Title: Core64 Logic Board

Size: C	Date: 2023-02-13	**Rev: 0.7**
KiCad E.D.A. eeschema (6.0.7-1)-1		Id: 1/1