CORE 64 INTERACTIVE CORE MEMORY BADGE V0.4 LOGIC BOARD

Sheet: Power

File: Core64 LB v0.4 Power.sch

Sheet: Driver

File: Core64 LB v0.4 Driver.sch

Sheet: Sense_LEDs_ID

File: Core64 LB v0.4 Sense_LEDs_ID.sch

Sheet: Expansion

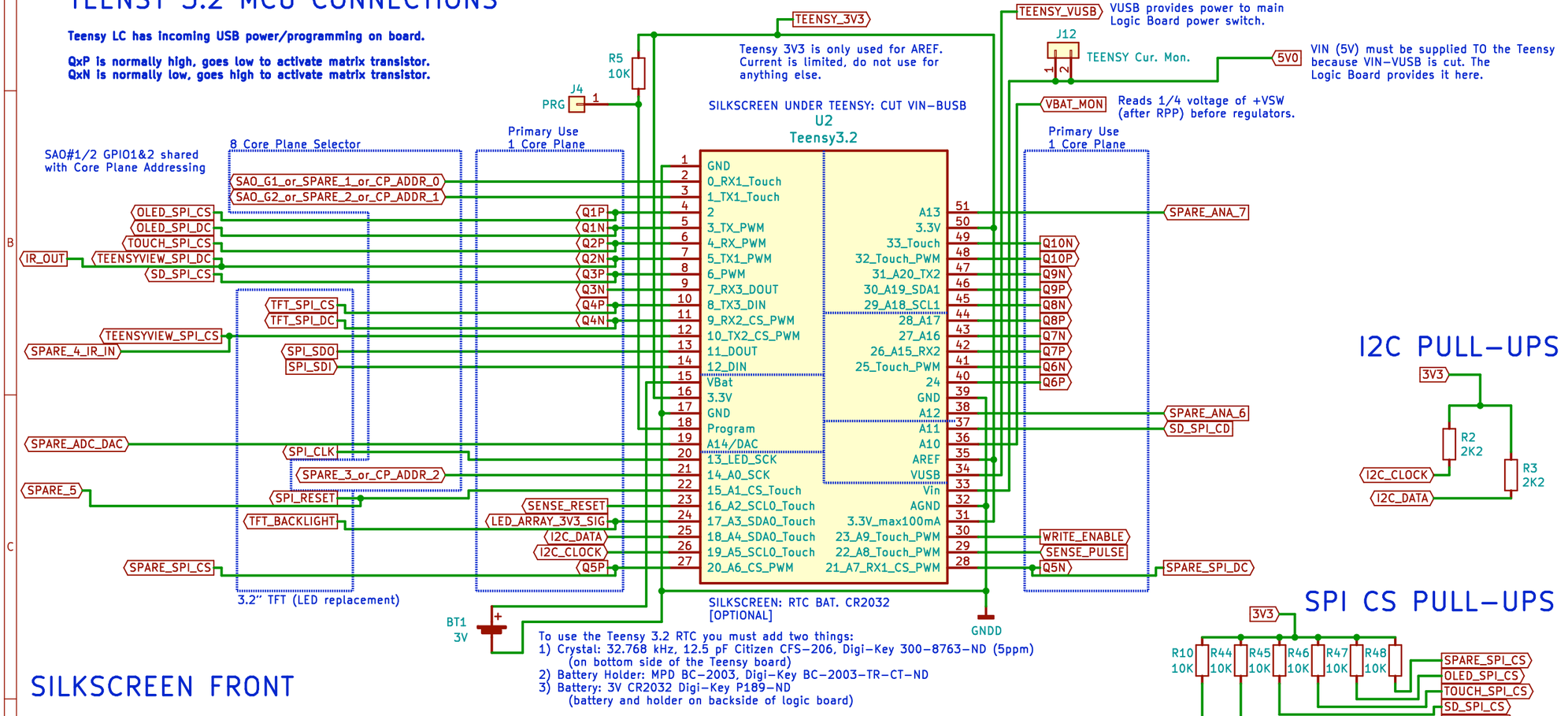
File: Core64 LB v0.4 Expansion.sch

*** CUT THE USB–VIN bridge on TEENSY 3.2 ***

TEENSY 3.2 MCU CONNECTIONS

Teensy LC has incoming USB power/programming on board.

QxP is normally high, goes low to activate matrix transistor.
QxN is normally low, goes high to activate matrix transistor.



SILKSCREEN FRONT

1)

SILKSCREEN BACK

1) Serial Number Sticker Zone
2) Board name, version, date, Machine Ideas

BOM TO DO: TEENSY requires at least three headers that do not get auto populated in the BOM from KICAD.

SILKSCREEN GRAPHICS

L3
Core_64_Github_Link

L2
Core_64_Logo

L1
Core_64_Logo

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

Andy Geppert – Machine Ideas, LLC

Sheet: /
File: Core64 LB v0.4.sch

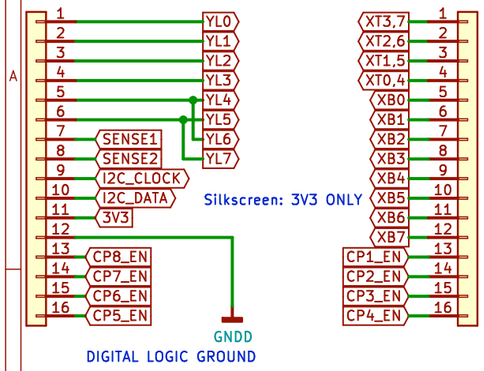
Title: Core 64 – Main Sheet Index

Size: A	Date: 2020–08–27	**Rev: 0.4**
KiCad E.D.A. kicad (5.1.2–1)–1		Id: 1/5

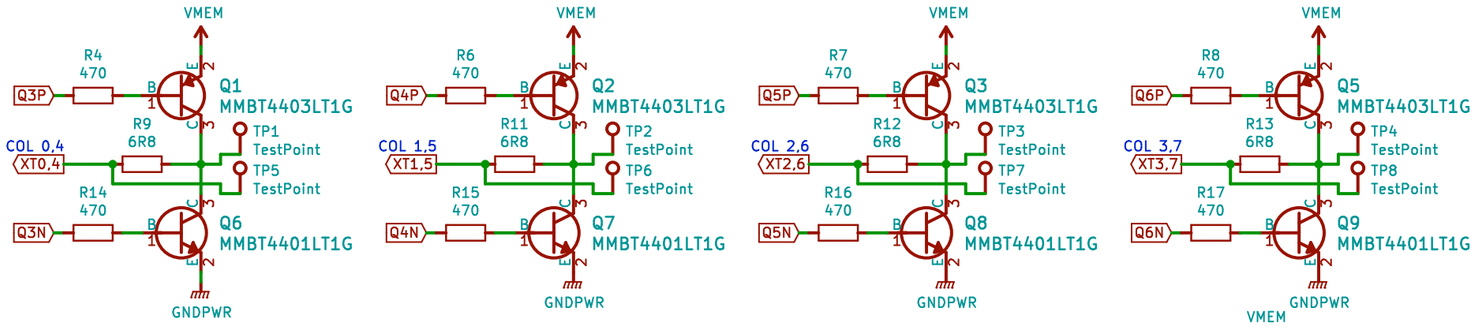
CORE BOARD INTERCONNECTS

J1
SSW-116-22-F-S-VS

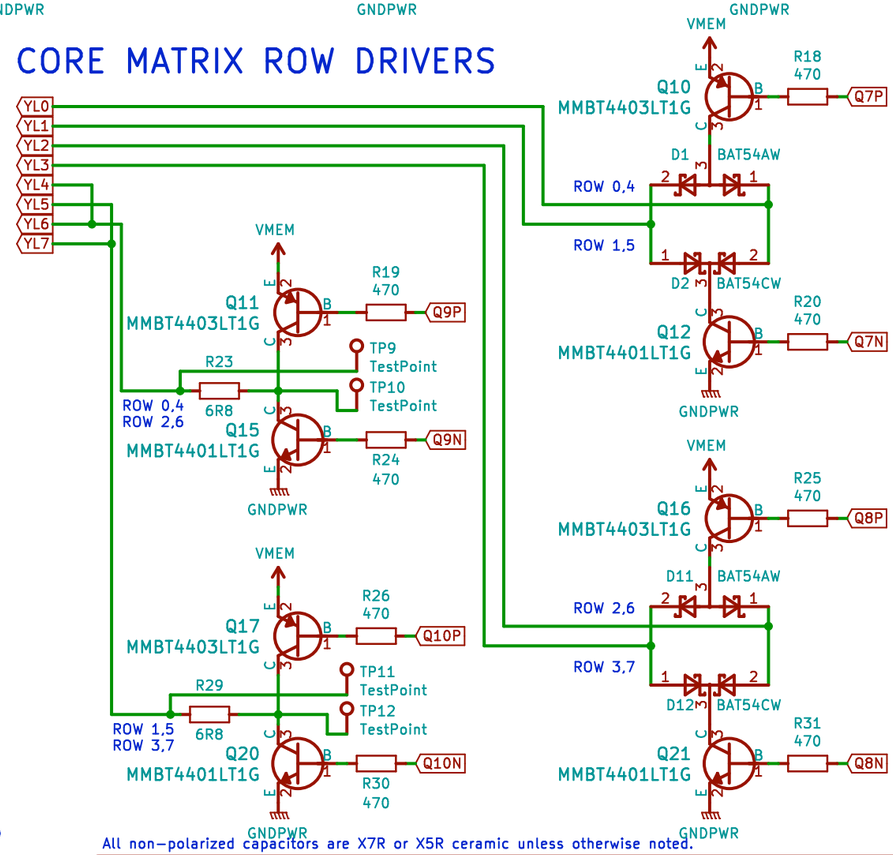
J5
SSW-116-22-F-S-VS



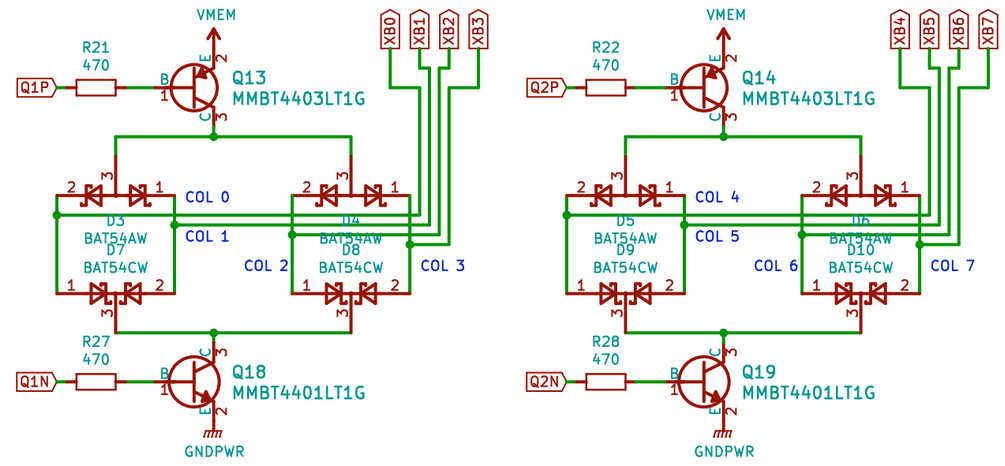
CORE MATRIX TOP COLUMN DRIVERS



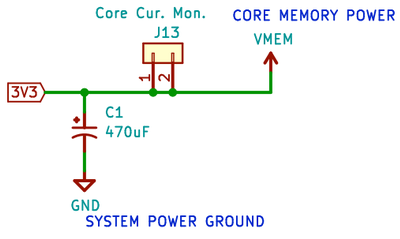
CORE MATRIX ROW DRIVERS



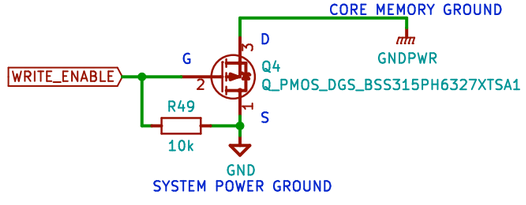
CORE MATRIX BOTTOM COLUMN DRIVERS



CORE MATRIX POWER



CORE MATRIX WRITE ENABLE



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

Drive Transistor current: 3.3/470=7mA (too much for Teensy LC)
Matrix 1/2 select current: 3.3/6.8= 485 mA (does not acccount for voltage drop in transistors)

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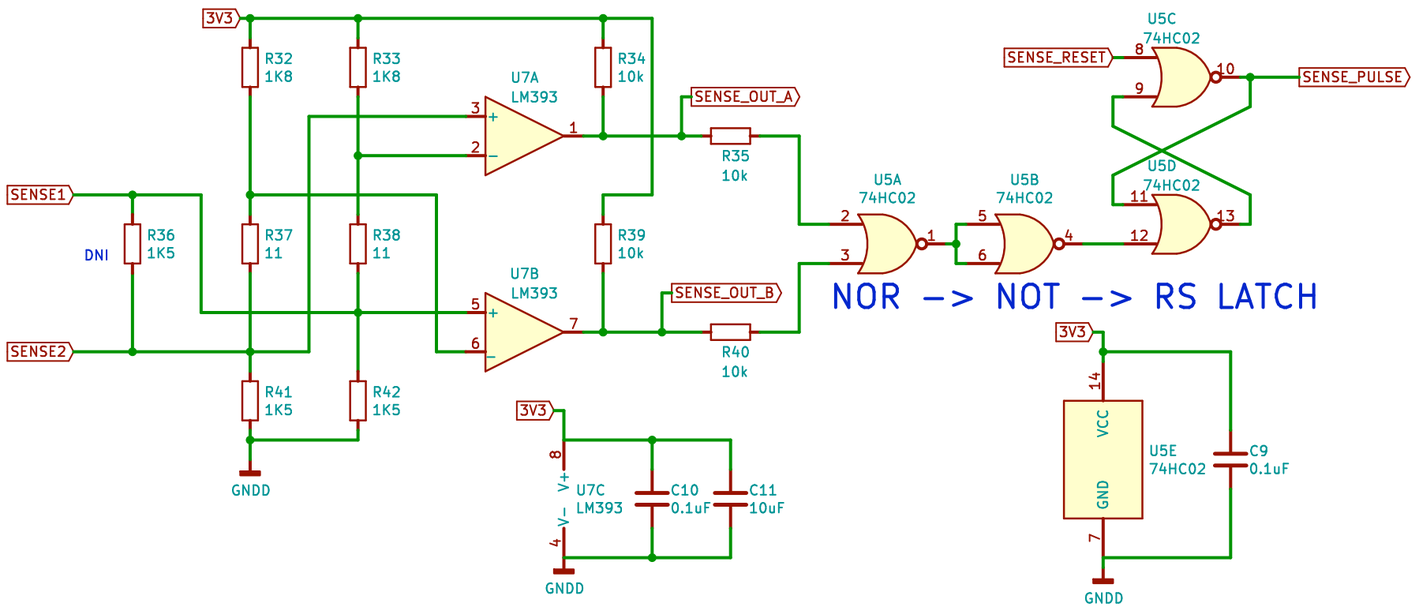
Sheet: /Driver/
File: Core64 LB v0.4 Driver.sch

Title: Core 64 – Core Matrix Driver

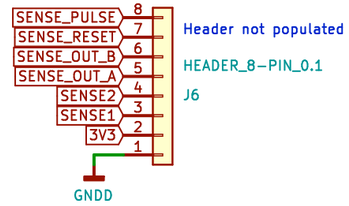
Size: A	Date: 2020-08-27	**Rev: 0.4**
KiCad E.D.A. kicad (5.1.2-1)-1		Id: 2/5

SENSE SIGNAL DIFFERENTIAL AMPLIFIERS



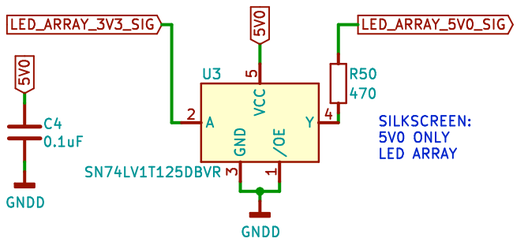
SENSE SIGNAL LATCH

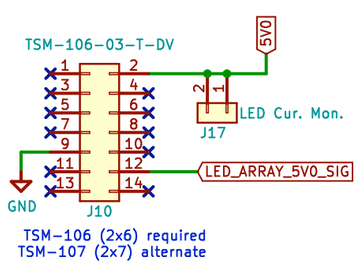
SENSE DEBUG



SILKSCREEN: 3V3 ONLY
SENSE DEBUG

LED ARRAY DRIVE AND LEVEL SHIFT

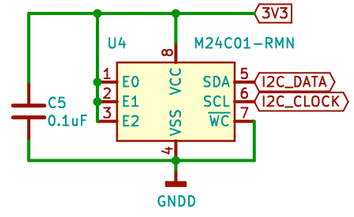




TSM-106 (2x6) required
TSM-107 (2x7) alternate

BOARD ID AND S/N

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



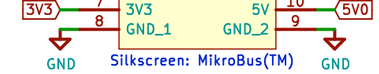
All non-polarized capacitors are X7R or X5R ceramic unless otherwise noted.

Andy Geppert – Machine Ideas, LLC

Sheet: /Sense_LEDs_ID/
File: Core64 LB v0.4 Sense_LEDs_ID.sch

Title: Core 64 – Sense

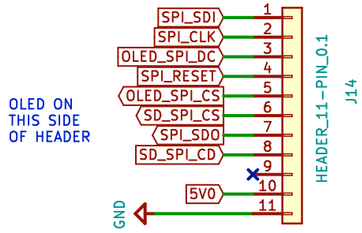
Size: A	Date: 2020-08-27	**Rev: 0.4**
KiCad E.D.A. kicad (5.1.2-1)-1		Id: 3/5



EVERYTHING ON THIS SHEET IS USER-PROVIDED OPTIONAL ADD-ONS

OLED COLOR SPI w/MicroSD

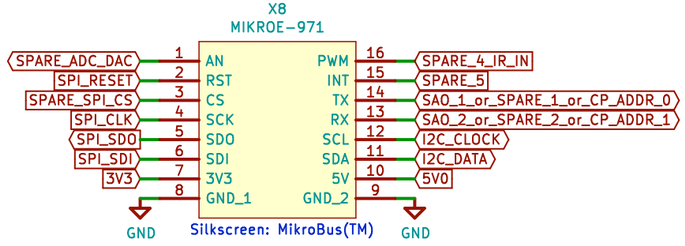
Compatible: https://www.adafruit.com/product/1431
1.5" 128x128, 16-bit color w/MicroSD holder
MicroSD card standalone pins shared between TFT and OLED boards.



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

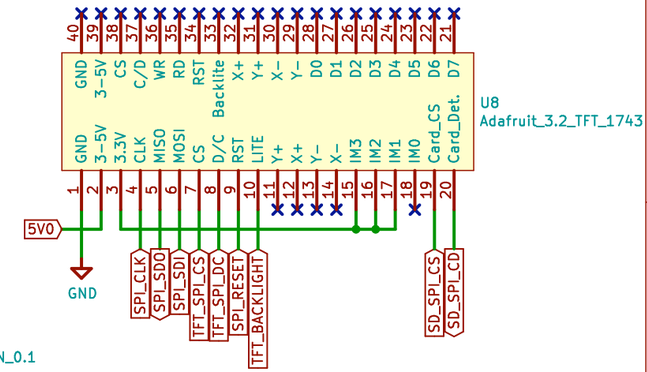
MIKRO BUS

See specifications: https://www.mikroe.com/mikrobus
8-pin 0.1 in. pitch headers spaced 0.9 in. apart



3.2" TFT LCD SPI w/MicroSD

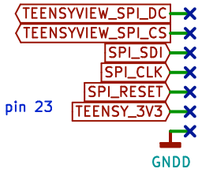
Compatible with https://www.adafruit.com/product/1743
MicroSD card standalone pins shared between TFT and OLED boards.
Headers 3.0 in. apart



OLED TEENSYVIEW SPI

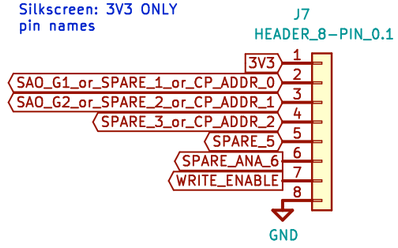
Monochrome 128x32
The TeensyView is designed to stack on the Teensy 3.2
Configuration: https://www.sparkfun.com/products/14048

Use only these Teensy pins:
5: D/C
10: CS
11: MODI
13: SCLK
15: RESET
3.3V Power from Teensy next to pin 23
GND at corner next to pin 0

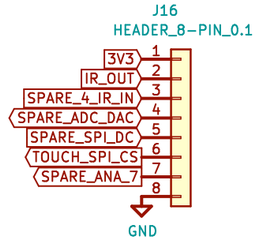


GPIO#1

Silkscreen: 3V3 ONLY
pin names



GPIO#2

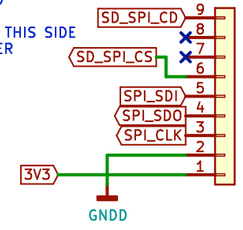


MICRO SD CARD

Compatible with https://www.adafruit.com/product/4682
MicroSD card standalone pins shared between TFT and OLED boards.

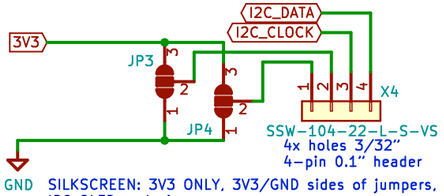
SILKSCREEN: 3V3 ONLY
MICRO SD

CARD ON THIS SIDE
OF HEADER



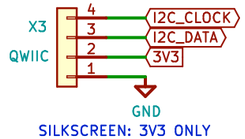
OLED MONOCHROME I2C

0.96" (128x64)
I2C 4-pins, ADDRESS: 0x3C (60 decimal)
Alternate is 0x3D, not 0x7A or 0x78 (wrong 8-bit)!
Must choose power polarity by soldering SJS.



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

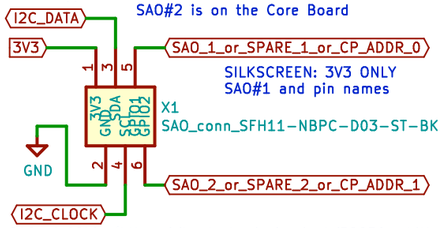
QWIIC I2C



SILKSCREEN: 3V3 ONLY
QWIIC I2C and pin names

SAO #1 SUPERIOR ADD-ON

SAO#2 is on the Core Board



SAO v1.69bis (https://hackaday.io/project/52950-shitty-add-ons)
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

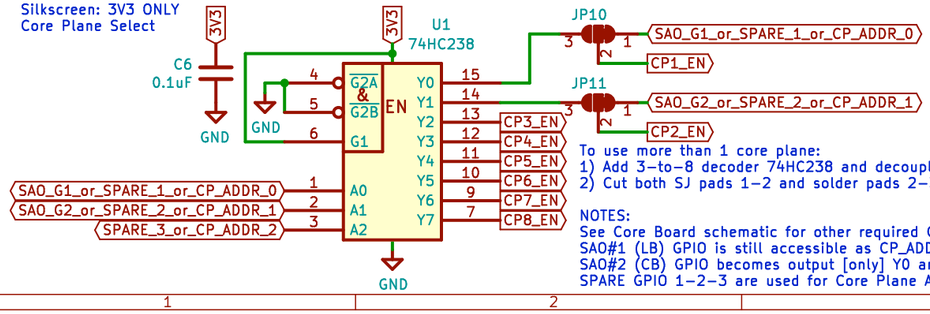
I2C ADDRESS TABLE

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)
OPTIONAL:	
OLED	0x3C (60)
ANDIXOR IO Exp. MCP23017	0x20 (32)
ANDIXOR EEPROM AT24C32r	0x50 (80)
NFC CLICK PN7120	0x50-53

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

CORE PLANE & CORE BOARD SAO #2 GPIO SELECT

Silkscreen: 3V3 ONLY
Core Plane Select



To use more than 1 core plane:
1) Add 3-to-8 decoder 74HC238 and decoupling capacitor.
2) Cut both SJ pads 1-2 and solder pads 2-3.

NOTES:
See Core Board schematic for other required CB changes.
SAO#1 (LB) GPIO is still accessible as CP_ADDR_0 and 1, shared.
SAO#2 (CB) GPIO becomes output [only] Y0 and Y1 of CP selector.
SPARE GPIO 1-2-3 are used for Core Plane Addressing.

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

Sheet: /Expansion/
File: Core64 LB v0.4 Expansion.sch

Title: Core 64 - Expansion

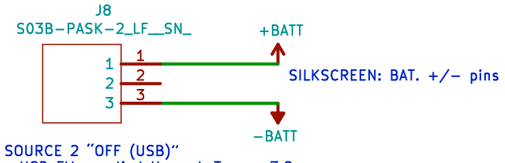
Size: A	Date: 2020-08-27	**Rev: 0.4**
KiCad E.D.A. kicad (5.1.2-1)-1		Id: 4/5

STANDARD MANUFACTURED KIT CONFIGURATION

TWO POWER INPUT SOURCES SELECTED BY SPDT SWITCH

SOURCE 1 "ON (BAT)"
BUILT-IN BATTERY PACK (Keystone 2482CN) WITH 4X "AAA" Primary/Alkaline Cells
OK to use Energizer Ultimate Lithium (light weight!) with open cell 7.2V, loaded will be <7V.
Battery Pack includes wires and 3-pin plug.

Socket: TH, Side Entry, JST PA S03B-PASK-2(LF)(SN), Digikey 455-1848-ND ($0.44/ea)
Socket: SMT, Top Entry, JST PA BM03B-PASS-1-TFT(LF)(SN), Digikey 455-2638-1-ND ($0.80)
Socket: SMT, Side Entry, Keystone 976, Digikey 36-976CT-ND ($2.71/ea)



7.5V MAX !!!

SOURCE 2 "OFF (USB)"
USB 5V supplied through Teensy 3.2
With the VIN-VUSB trace cut on the back of the Teensy, the TEENSY_5VUSB
is routed directly from the USB Port, to the VUSB pin on the back
of the Teensy, over to one side of the SPDT switch. In this position
the VUSB goes back to the Teensy through the 5V regulator.

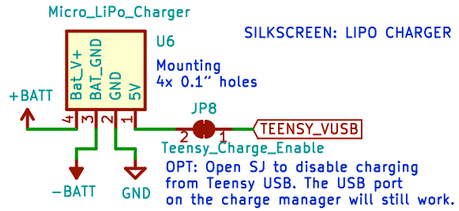
ALTERNATE 1S LIPO BATTERY - USER SUPPLIED

1) Remove the 4x "AAA" battery pack. You can leave

2) Purchase and install a LiPo charge manager.
a) The logic board is designed to accept this one: https://www.adafruit.com/product/1904.
b) Solder the the charge manager directly to the board without headers to keep a low profile to allow the stylus to fit.

3) Purchase and install a 1S LiPo using double-sided tape.
a) Choose a 1S Lipo with built-in cell over/under voltage protection. Recommended:
2500mAh https://www.adafruit.com/product/328 1.8" x 2.4" x 0.26" (47mm x 61mm x 6.7mm)
2000mAh https://www.adafruit.com/product/2011 2.4" x 1.4" x 0.3" (60mm x 36mm x 7mm)
1200mAh https://www.adafruit.com/product/258 1.3" x 2.4" x 0.2" (34mm x 62mm x 5mm)
b) The LiPo can be up to 50 x 65 x 15mm. A maximum SILKSCREEN: +/- pins
a) Make sure no part of the LiPo foil pouch can short-out adjacent pins or pads in the area.
b) Insulate it with Kapton tape or similar.

* The LiPo charger 5V pin is also connected to the Teensy USB port.
* Connecting a USB cable to the Teensy will power the board, charge the battery and connect to the serial port of the Teensy. If you do NOT want the board to be powered from the USB port of the charger, cut the 5V solder jumper.
* Connecting a USB cable to the LiPO charger will ONLY charge the battery and power the logic board.

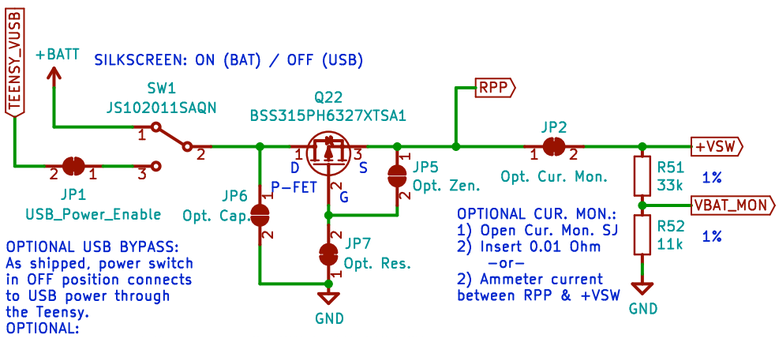


1S LIPO ONLY !!!

SILKSCREEN: BAT. + BAT. -

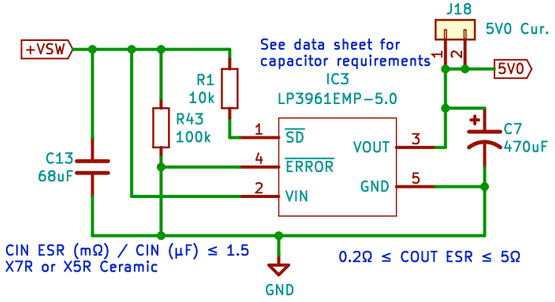
*** ALL CONFIGURATIONS REQUIRE CUTTING VIN-VUSB TRACE ON TEENSY ***

POWER SWITCH, RPP, V & I MONITOR



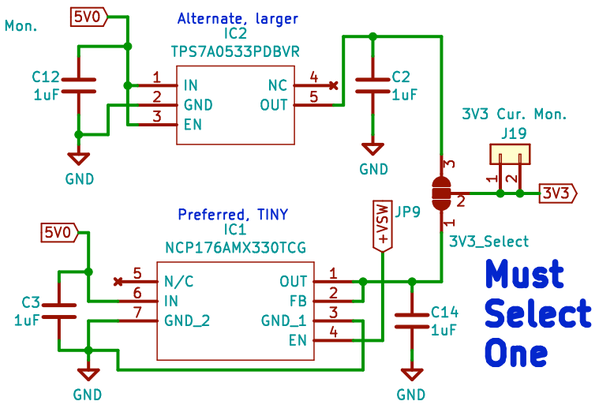
5V POWER SUPPLY

LED ARRAY, TEENSY VIN



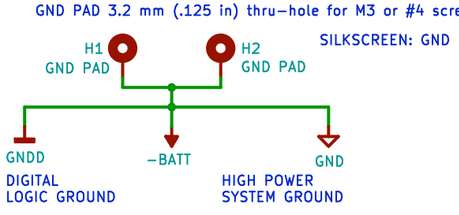
3.3V POWER SUPPLY

CORES AND ACCESSORIES

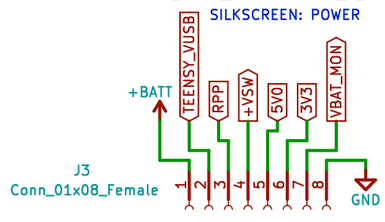


ALL SYSTEM STAR GROUNDING

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



POWER RAILS



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

Andy Geppert - Machine Ideas, LLC

Sheet: /Power/
File: Core64 LB v0.4 Power.sch

Title: Core 64 - Power Schematic

Size: A	Date: 2020-08-27	**Rev: 0.4**
KiCad E.D.A. kicad (5.1.2-1)-1		Id: 5/5