Changes from Coral Schematic:
- removed PMIC, added individual switching regs (TPS54) and LDOs (TPS7A)
- added MRAM on FlexSPI A CS1 to test booting from it.
- 24mhz crystal -> TCXO
- changed NAND flash to be 2GB instead of 1GB (since that is what is available on JLCPCB)
- changed USB-C component to use same P/N as PyCubed
- changed some of the GPIO banks from 1.8V to 3.3V
- added a few connectors for RBF + interface with a PyCubed
-- removed USB-C controller (since we do not need OTG functionality)
- changed most unused pin names to generic RT1176 names
-- left: SD Card, Camera, TPU, ethernet (in order of likelihood that we add these things)

Power
File: power.kicad_sch

Boot Config
File: boot_config.kicad_sch

RT1176 #1
File: rt1176_1.kicad_sch

RT1176 #2
File: rt1176_2.kicad_sch

RT1176 #3
File: rt1176_3.kicad_sch

MRAM
File: mram.kicad_sch

SDRAM
File: sdram.kicad_sch

Interface
File: interface.kicad_sch

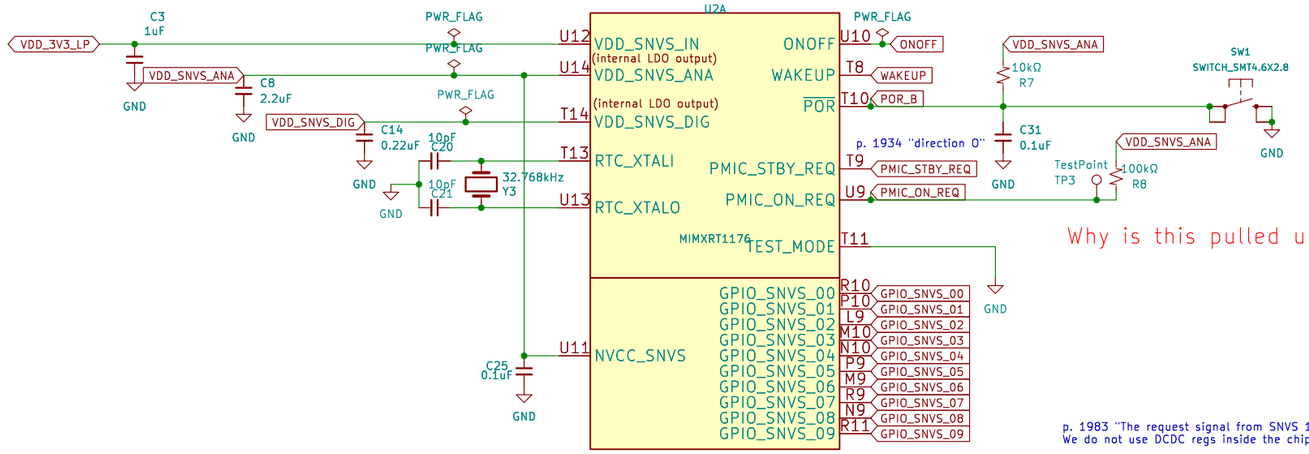
USB-C
File: usbc.kicad_sch

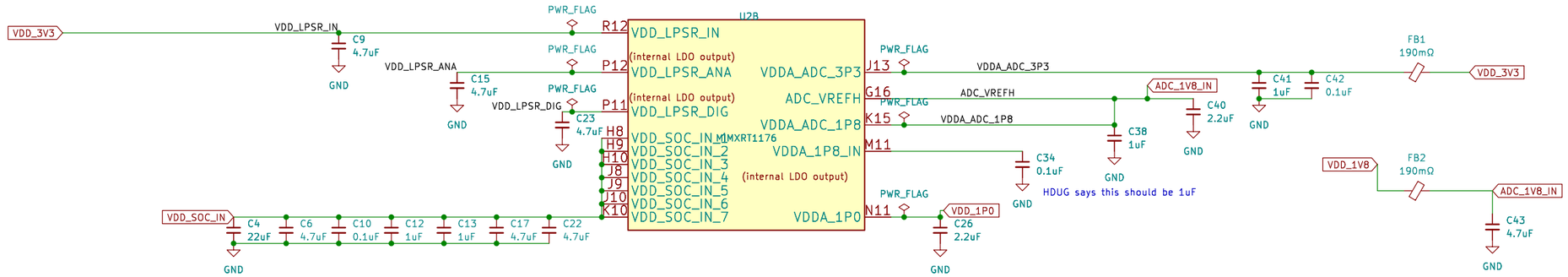
Board to Board
File: board_to_board.kicad_sch

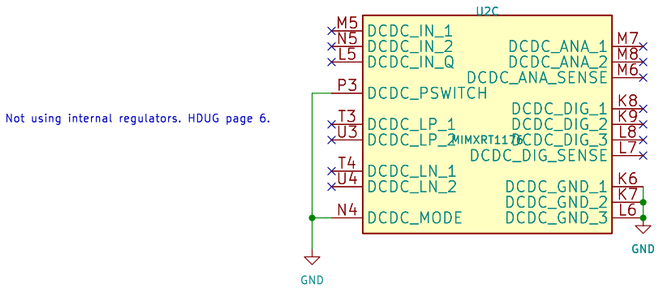
Sheet: /
File: cpu_board.kicad_sch

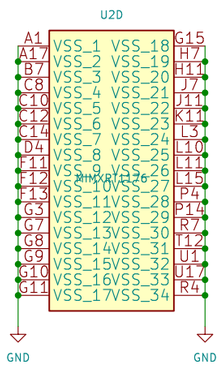
**Title:**

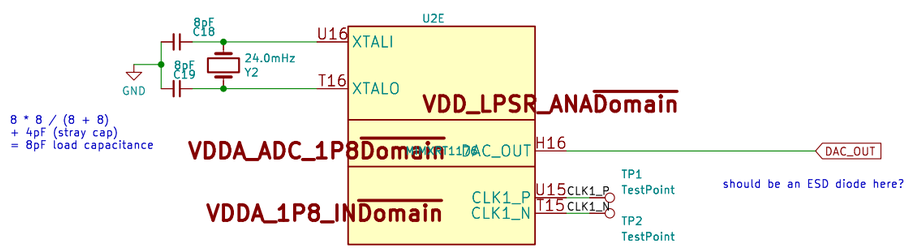
| Size: A4 | Date: | **Rev:** |
|---|---|---|
| KiCad E.D.A. kicad 7.0.7 | | Id: 1/11 |




| | | |
|---|---|---|
| Sheet: /RT1176 #1/ | | |
| File: rt1176_1.kicad_sch | | |
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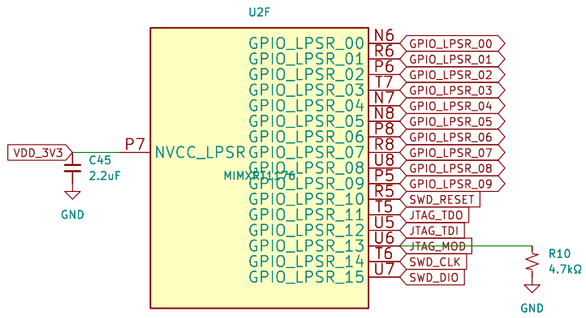
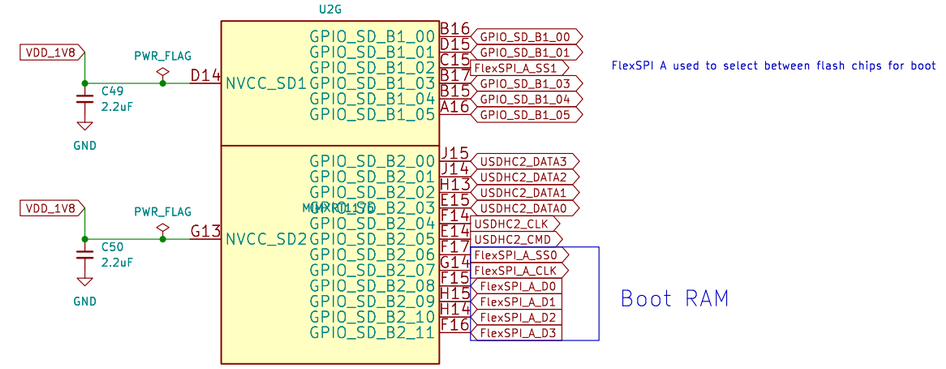
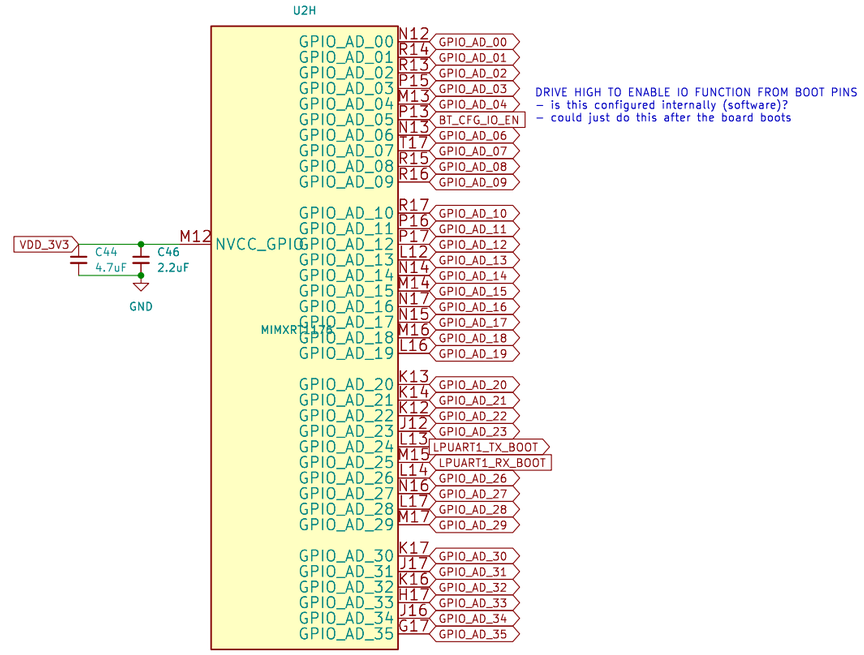
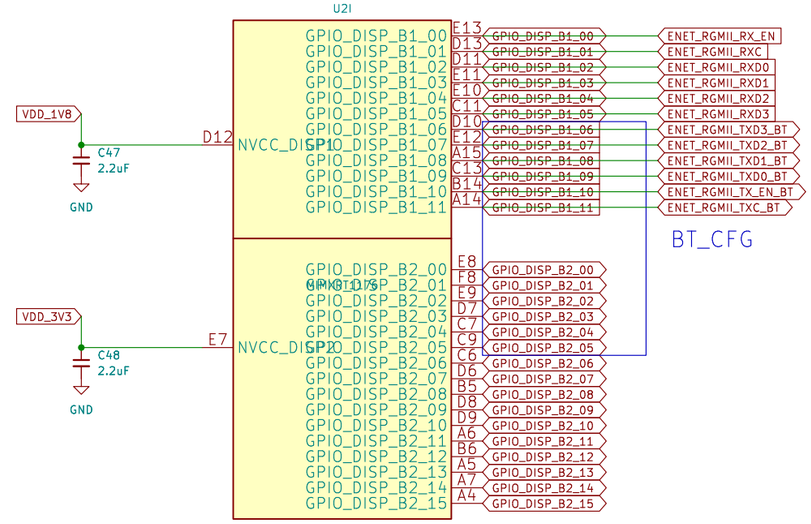
| Size: A3 | Date: | **Rev:** |
| KiCad E.D.A. kicad 7.0.7 | | Id: 2/11 |

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File: rt1176_2.kicad_sch

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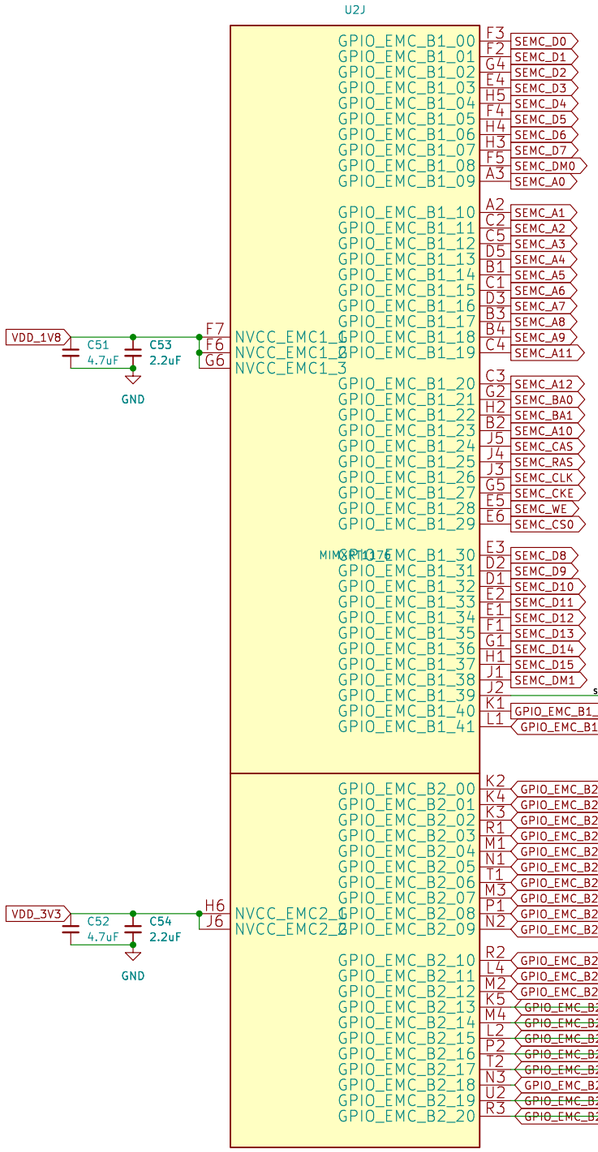
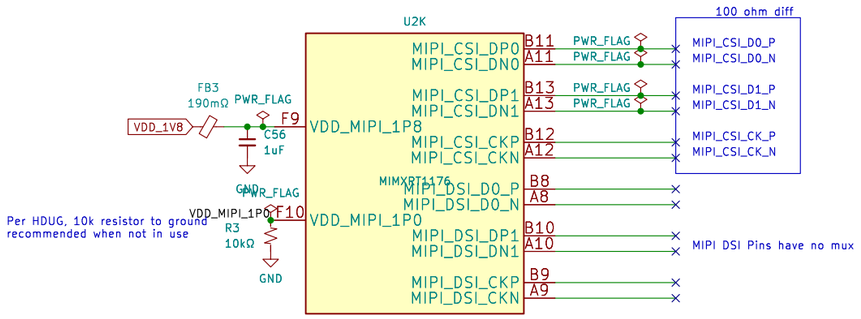
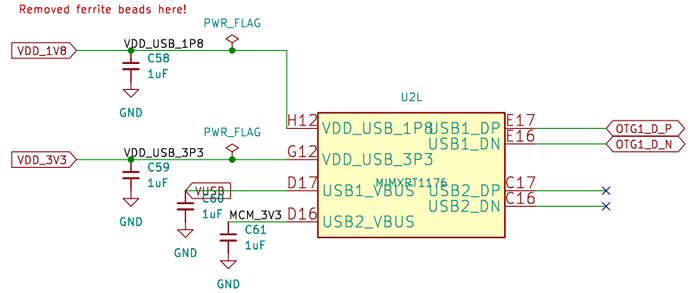
| KiCad E.D.A. kicad 7.0.7 | | Id: 3/11 |

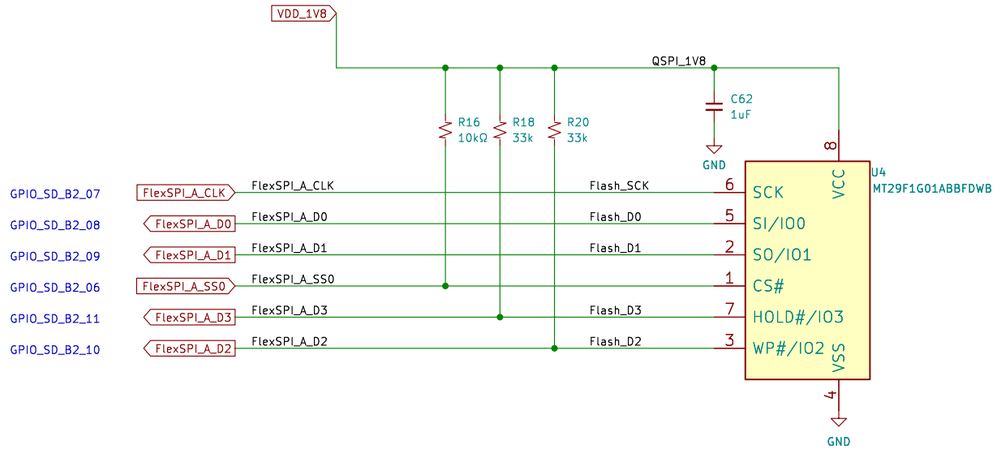


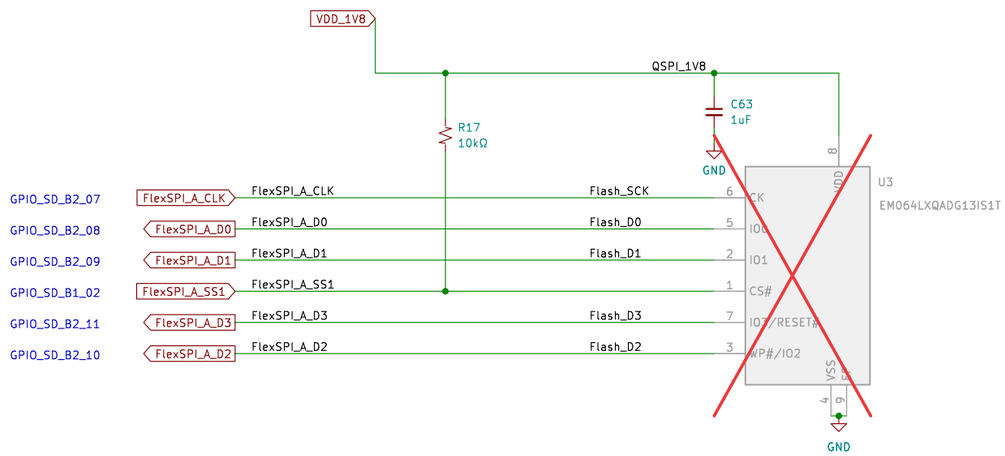




| | | |
|---|---|---|
| Sheet: /RT1176 #3/ | | |
| File: rt1176_3.kicad_sch | | |
| **Title:** | | |
| Size: A3 | Date: | **Rev:** |
| KiCad E.D.A. kicad 7.0.7 | | Id: 4/11 |

# 1V8 QSPI Flash – Copied from Coral



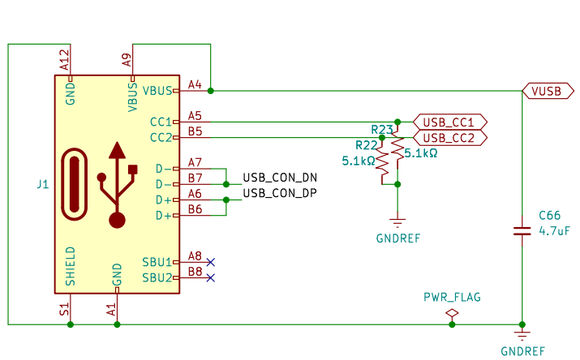

# 1V8 QSPI MRAM – Not the same as PyCubed!
# Uses different MRAM technology that is smaller, and a slightly different SPI interface



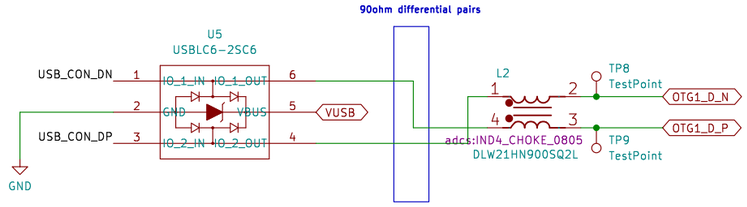

Sheet: /MRAM/
File: mram.kicad_sch

**Title:**

Size: A3 | Date: | **Rev:**
KiCad E.D.A. kicad 7.0.7 | Id: 5/11




New isolation diodes (not on PyCubed)




Sheet: /USB−C/
File: usbc.kicad_sch

**Title:**

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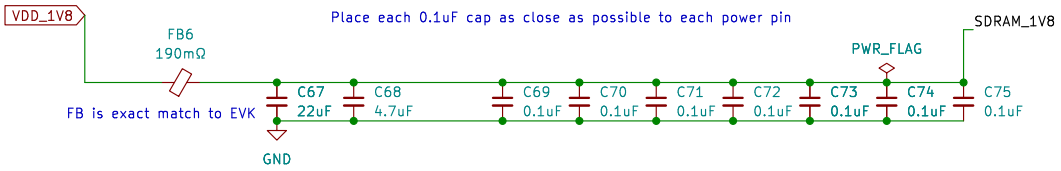
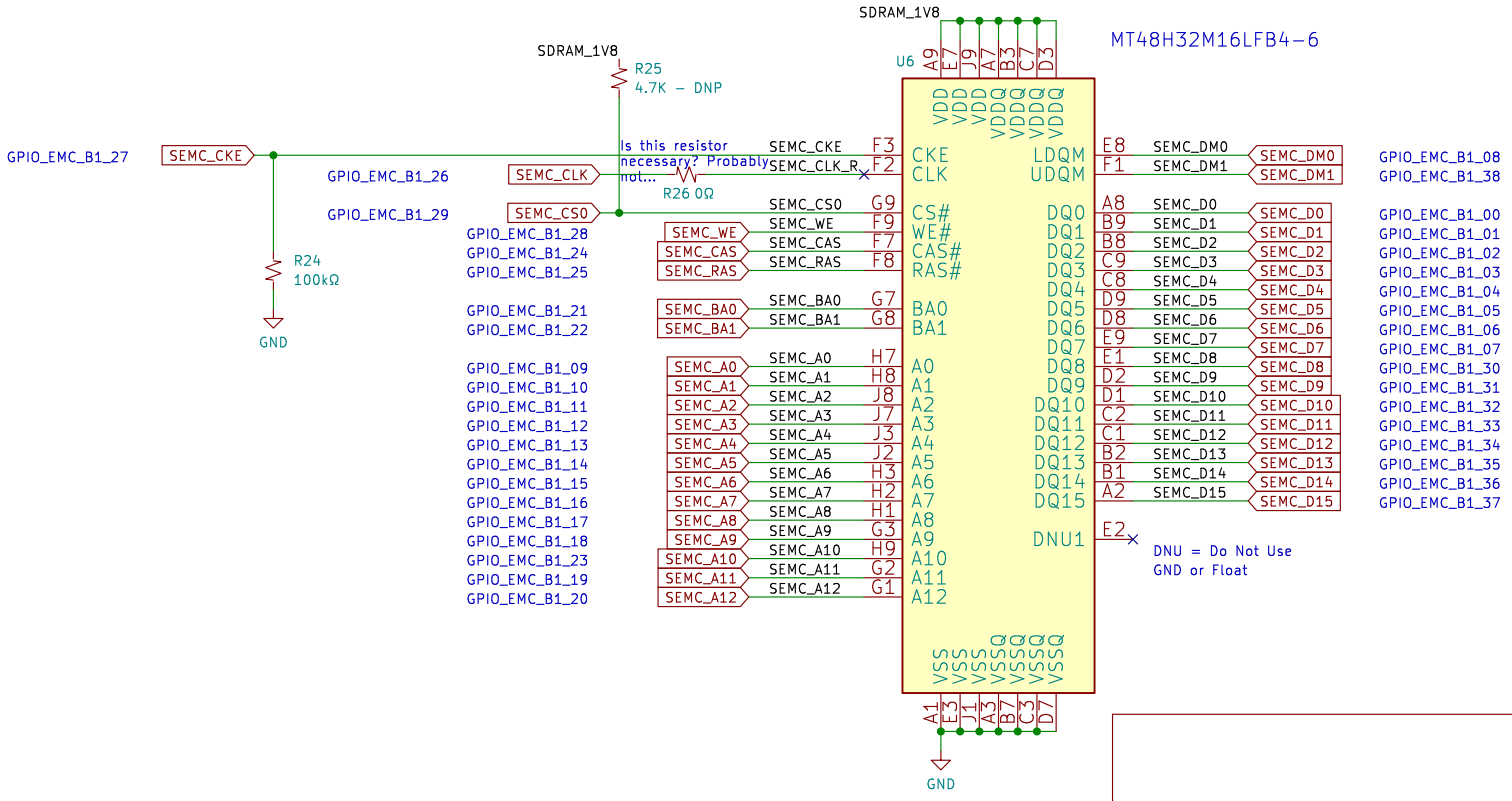
|---|---|---|
| KiCad E.D.A. kicad 7.0.7 | | Id: 6/11 |




# SDRAM (166MHz) – copied from Coral

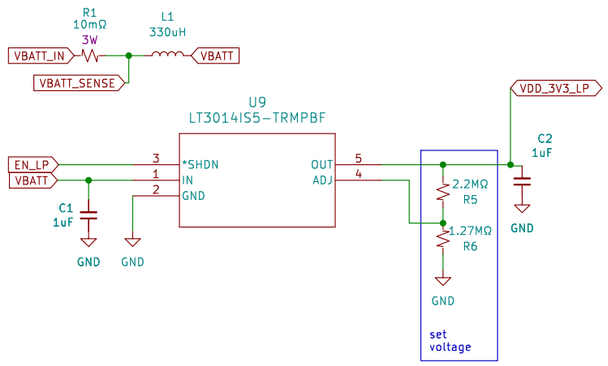



Sheet: /SDRAM/
File: sdram.kicad_sch

**Title:**

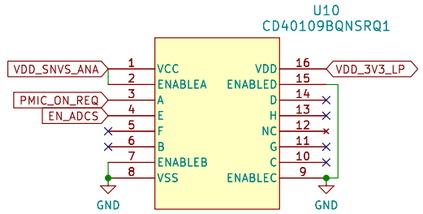
| Size: A4 | Date: | **Rev:** |
|---|---|---|
| KiCad E.D.A. kicad 7.0.7 | | Id: 7/11 |

Do I need a PMIC? In my read of datasheet, PMIC on req and PMIC standby req are just outputs of the RT1176
What should I do with the enables on my regulators?
- I think most effective debugging would be to have a way to power cycle the whole board. But if we do that while the wheels are spinning, we will mess stuff up
- EDIT: decided to put most of the CPU (and eventual peripherals) on a load switch
- Low Power domain + GPS V_BCKP will be powered by an LDO, which is enabled by a pair of FETs



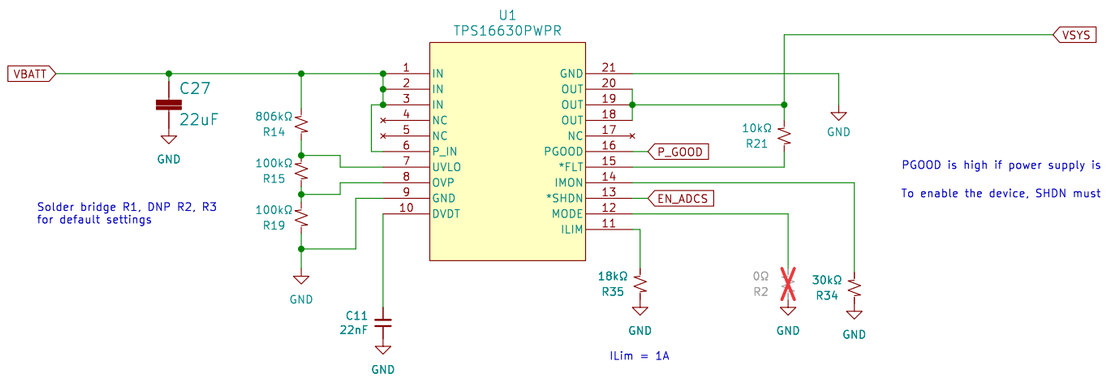

1.22 * (1 + 2.2 / 1.27) + 0.000004 * 2.2 = 3.33V

## Level Shifter




Level shift PMIC_ON_REQ from 1.8V to 3.3V for the Load Switch
Qualified by ESA, page 64 Issue 246

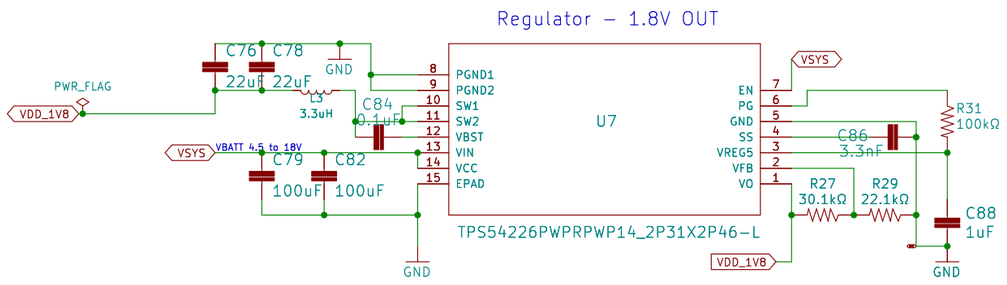
## Load Switch



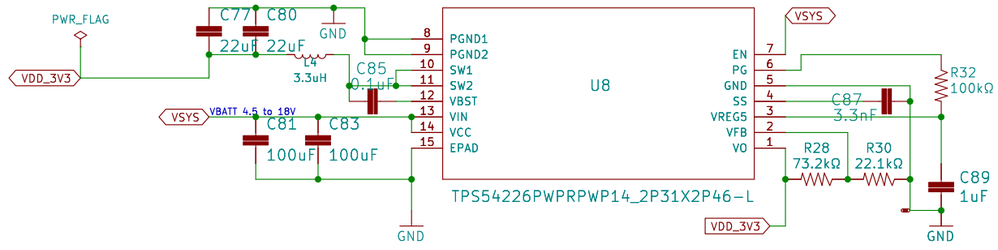

V(OVPR) = 1.2 V and V(UVLOR) = 1.2 V
V_OV = 12V
V_UV = 6V
Set R2 = 100k, solve eq. 8 in datasheet for R1 + R2 = 900k
Solve eq 9. to find R3 = 100k, and compute R1 = 800k

Could also use EN_ADCS here, in case the E-fuse shorts on

## Regulator – 1.8V OUT




## Regulator – 3.3V OUT



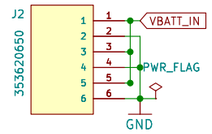

Sheet: /Power/
File: power.kicad_sch

**Title:**

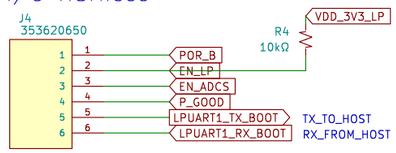
| Size: A3 | Date: | **Rev:** |
|---|---|---|
| KiCad E.D.A. kicad 7.0.7 | | Id: 8/11 |

## Battery Power Harness

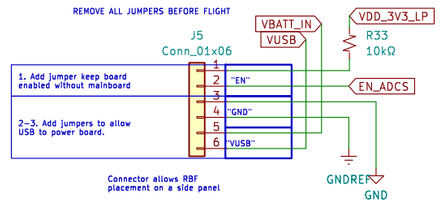
**7–10V input**



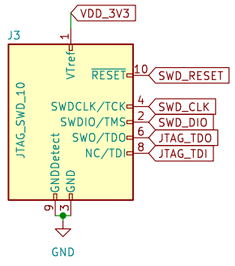

## Control and I/O Harness



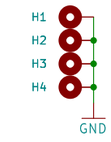

## RBF Harness




## SWD

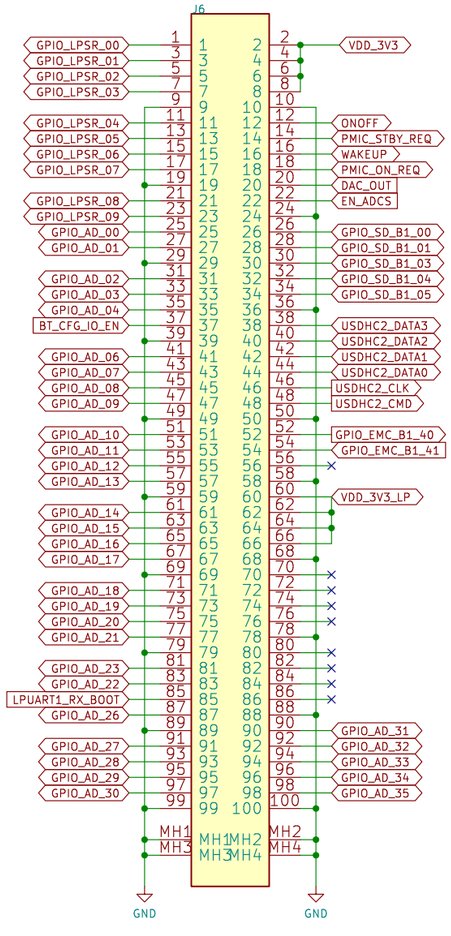


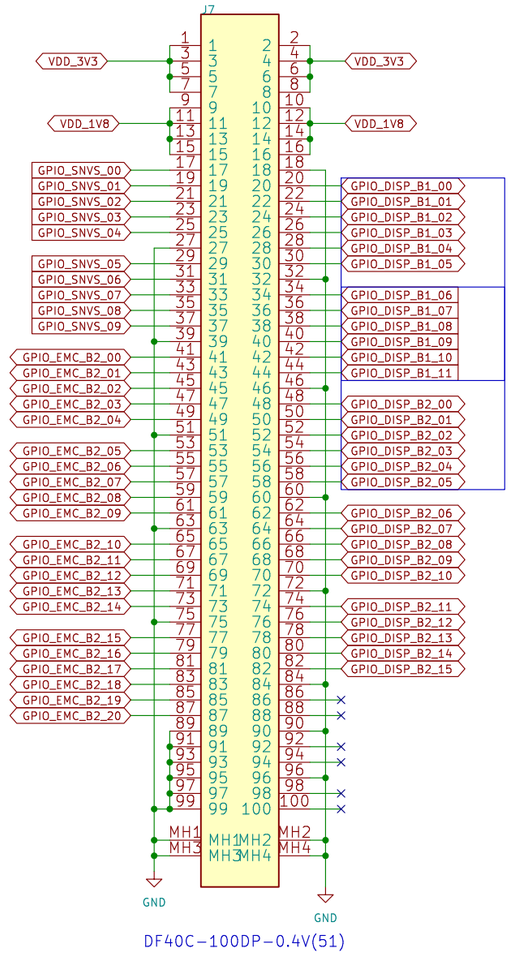

## Mounting Holes




| | | |
|---|---|---|
| Sheet: /Interface/ | | |
| File: interface.kicad_sch | | |
| **Title:** | | |
| Size: A3 | Date: | **Rev:** |
| KiCad E.D.A. kicad 7.0.7 | | Id: 9/11 |

This is still a little bit messy and I need to double check all the labels
I do not think DRC catches global labels that are only present in one spot
(since I left some of the "ethernet" labels, etc. and there are no errors for those)



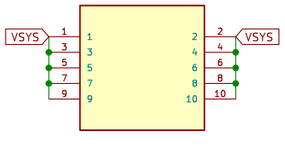




1V8

GPIO_DISP_B1_06 to 11
& GPIO_DISP_B2_00 to 05
NOT FOR GENERAL USE

Requires special consideration to avoid driving these at boot, or board may fail to boot

J8
SAMTEC-FTS-105-03-X-DV

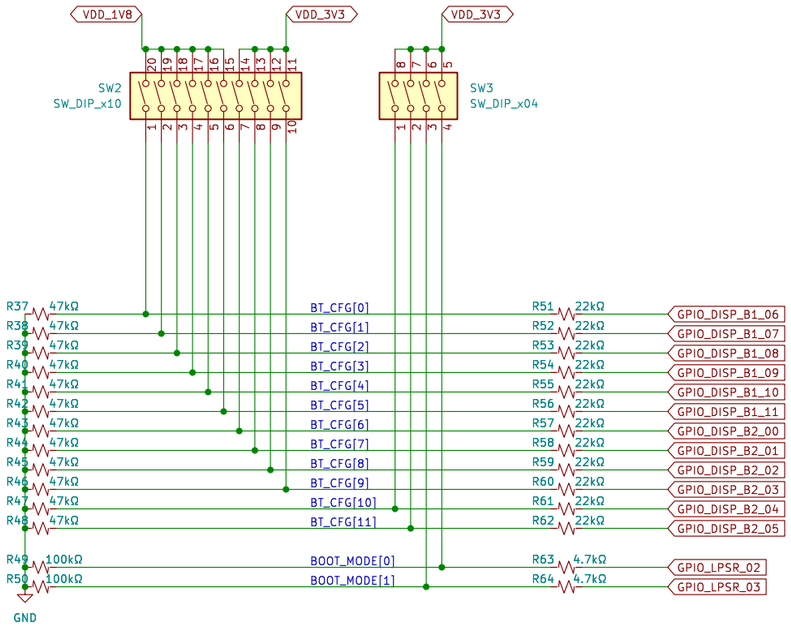



Sheet: /Board to Board/
File: board_to_board.kicad_sch

**Title:**

Size: A3 | Date: | **Rev:**
KiCad E.D.A. kicad 7.0.7 | Id: 11/11

# DOUBLE CHECK LOGIC LEVELS




## Boot MODE pin settings

| BOOT_MODE[1:0] | Boot Type |
|---|---|
| 00 | Boot From Fuses |
| 01 | Serial Downloader |
| 10 | Internal Boot |
| 11 | Reserved |

Sheet: /Boot Config/
File: boot_config.kicad_sch

**Title:**

Size: A3 | Date: | **Rev:**
KiCad E.D.A. kicad 7.0.7 | Id: 12/11