Baseboard Schematic Documentation

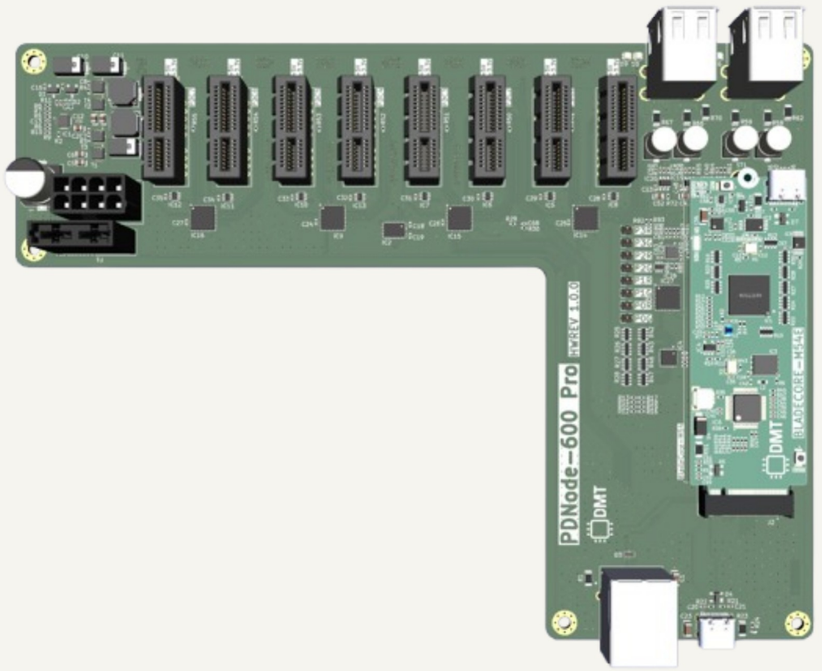
# Project: PDNode-600 Name: Baseboard Var: Pro Rev 1.0.0 2026-02-15

## CONTENT

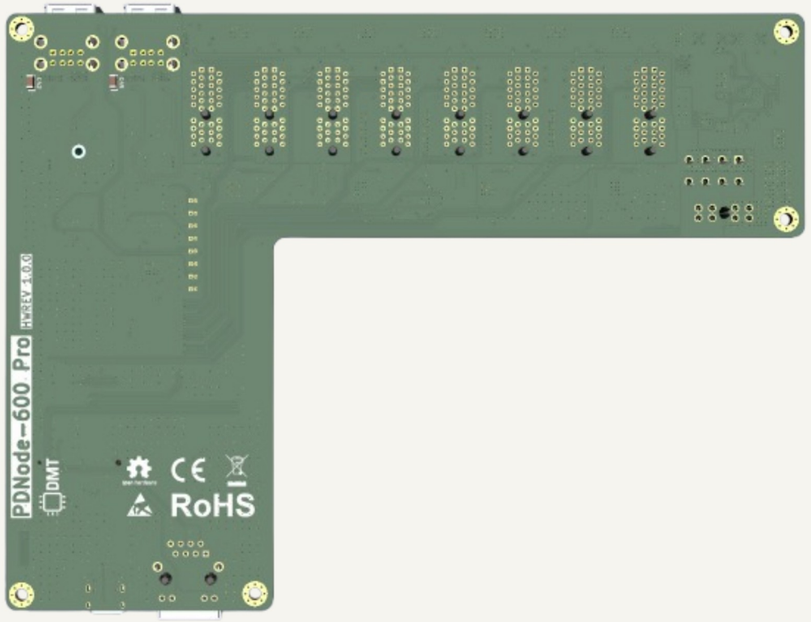


## PCB PREVIEW

### TOP VIEW




### BOTTOM VIEW




## COMMENT GUIDELINES

General comments are black, 50 mil size

Design notes and guidelines are blue, 50 mil size

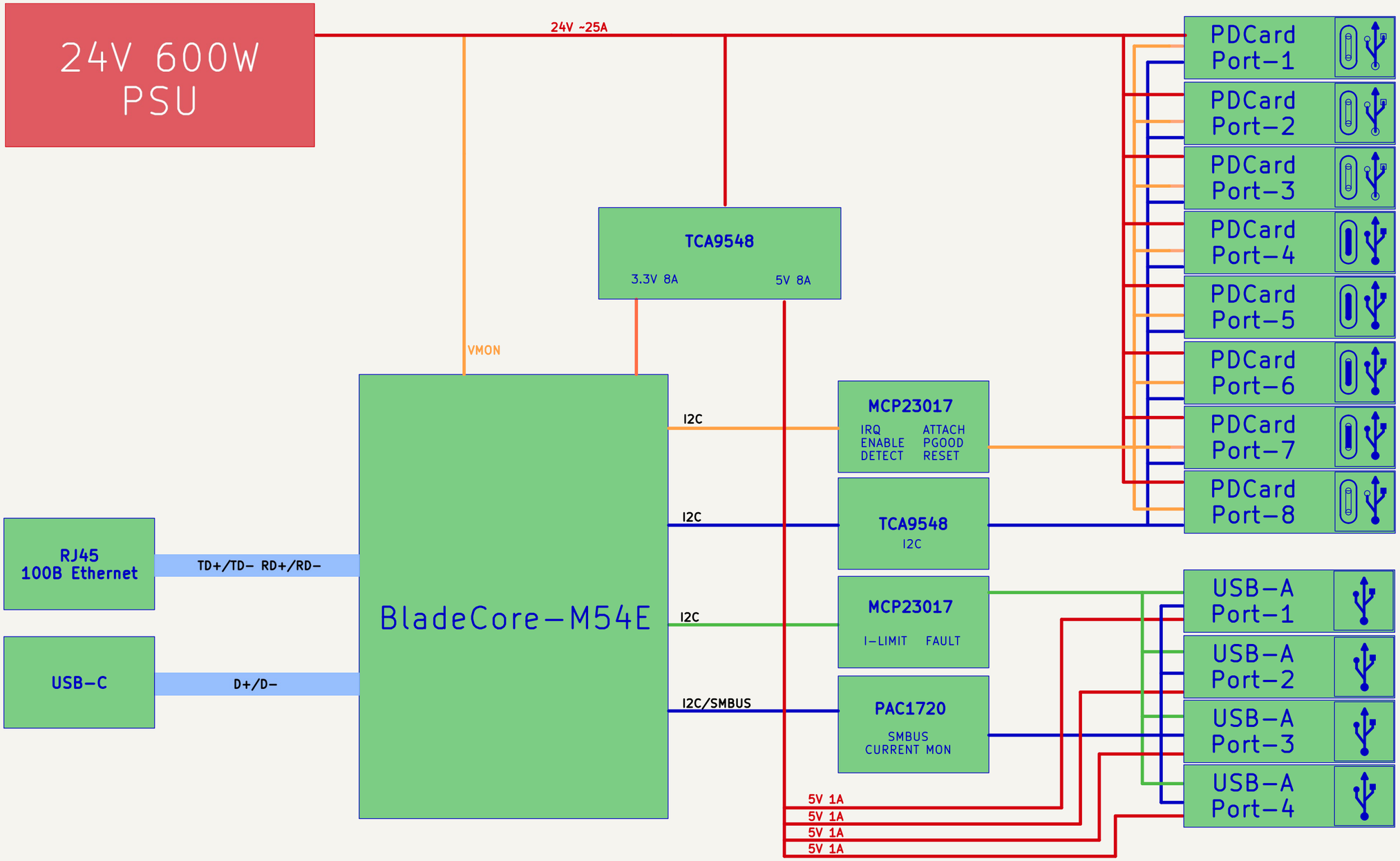
Layout instructions are red, 50 mil size

## NOTES

**Not fitted components are marked as X**

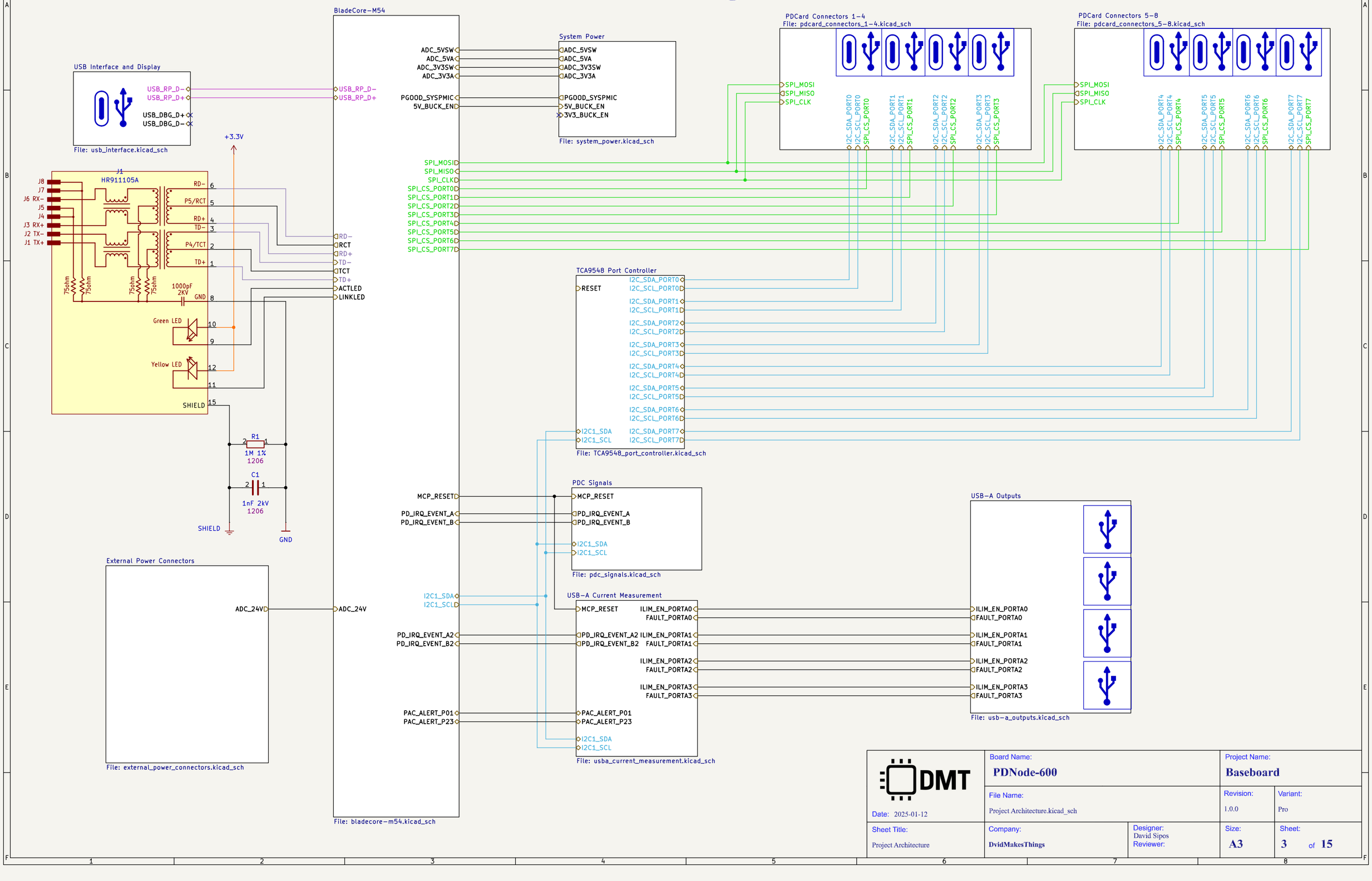
| | | | | |
|---|---|---|---|---|
| DMT<br>Date: 2025-01-12 | Board Name: PDNode-600 | | Project Name: Baseboard | |
| | File Name: PDNode_Baseboard.kicad_sch | | Revision: 1.0.0 | Variant: Pro |
| Sheet Title: Root | Company: DvidMakesThings | Designer: David Sipos<br>Reviewer: | Size: A3 | Sheet: 1 of 15 |

# [2] Block Diagram




| | | | | |
|---|---|---|---|---|
| DMT | Board Name: PDNode-600 | | Project Name: Baseboard | |
| Date: 2025-01-12 | File Name: Block Diagram.kicad_sch | | Revision: 1.0.0 | Variant: Pro |
| Sheet Title: Block Diagram | Company: DvidMakesThings | Designer: David Sipos Reviewer: | Size: A3 | Sheet: 2 of 15 |

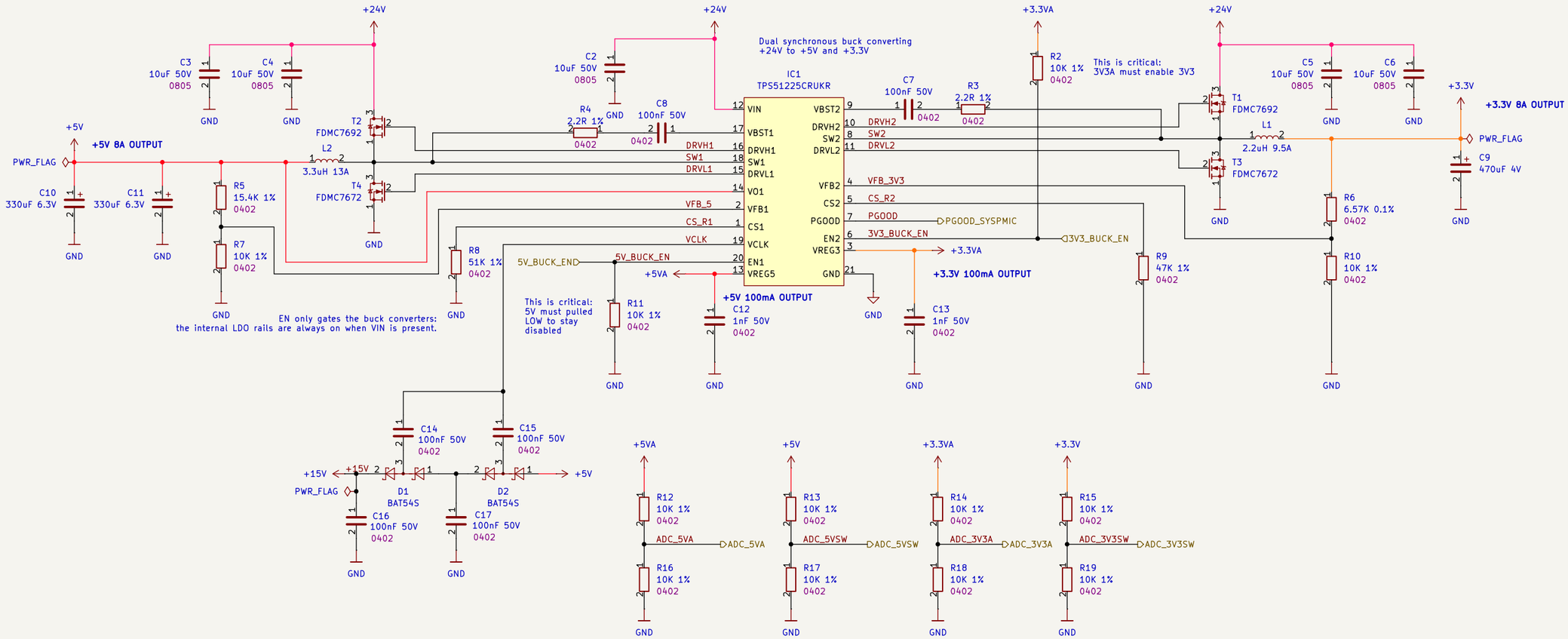
# Block Diagram




| | | | |
|---|---|---|---|
| DMT | Board Name: PDNode-600 | | Project Name: Baseboard |
| Date: 2025-01-12 | File Name: Project Architecture.kicad_sch | | Revision: 1.0.0 / Variant: Pro |
| Sheet Title: Project Architecture | Company: DvidMakesThings | Designer: David Sipos / Reviewer: | Size: A3 / Sheet: 3 of 15 |

# System Power

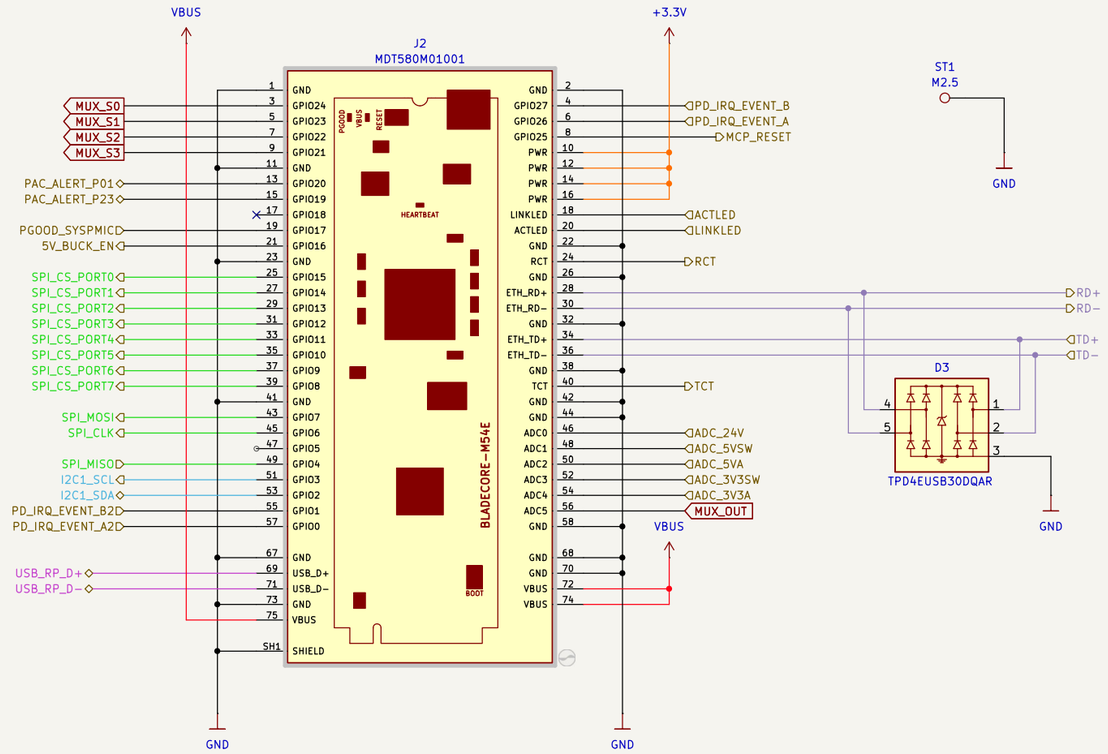
## +24V TO +3.3V AND +5V CONVERTER



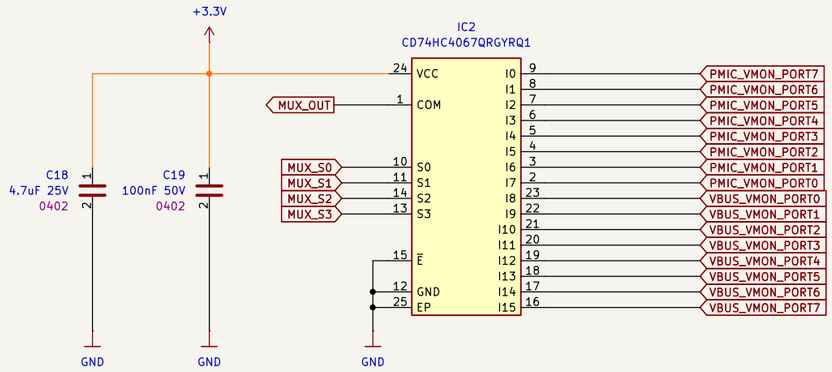

| | | | | |
|---|---|---|---|---|
| DMT | Board Name: PDNode-600 | | Project Name: Baseboard | |
| Date: 2025-01-12 | File Name: system_power.kicad_sch | | Revision: 1.0.0 | Variant: Pro |
| Sheet Title: System Power | Company: DvidMakesThings | Designer: David Sipos<br>Reviewer: | Size: A3 | Sheet: 4 of 15 |

# Microcontroller

## BladeCore–M54 Connector




## PDC ANALOG SIGNAL MUX

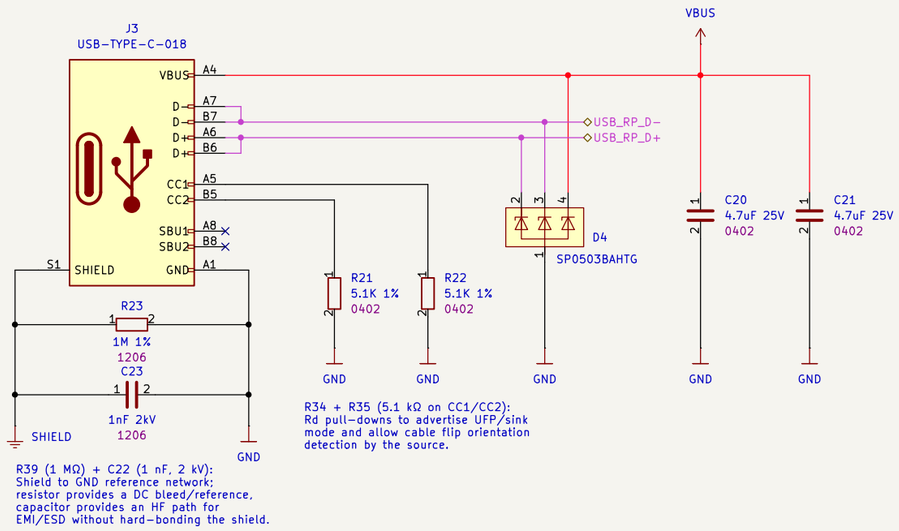



CD74HC4067QRGYRQ1:
==========
- Ron 160 Ω max: compared to THE divider (90.9K/10K) Thevenin (~9 kΩ), that's a ~1–2% scale error worst case if the ADC input were purely resistive. With 1 nF at the ADC INPUT, the mux mostly just charges that cap, so the practical impact is smaller.
- Leakage 800 nA max: into ~9 kΩ source is only ~7 mV worst–case equivalent error.
- Off capacitances (5 pF / 50 pF): 100R + 1 nF kills that nicely. Dummy conversion (throwaway sample) after switching helps too.
  R = 9K + 100R = 9.1K
  C = 1nF
  t = 9.1 us
  -> 5t = 45us after switching the MUX channel is settled

| | | | | |
|---|---|---|---|---|
| DMT<br>Date: 2025-01-12 | Board Name: PDNode-600 | | Project Name: Baseboard | |
| | File Name: bladecore-m54.kicad_sch | | Revision: 1.0.0 | Variant: Pro |
| Sheet Title: BladeCore-M54 | Company: DvidMakesThings | Designer: David Sipos<br>Reviewer: | Size: A3 | Sheet: 5 of 15 |

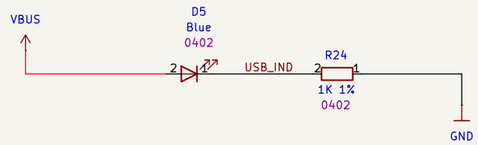
# USB Interface and Display

## USB-C CONNECTOR




## DISPLAY CONNECTOR

## USB INDICATOR LED

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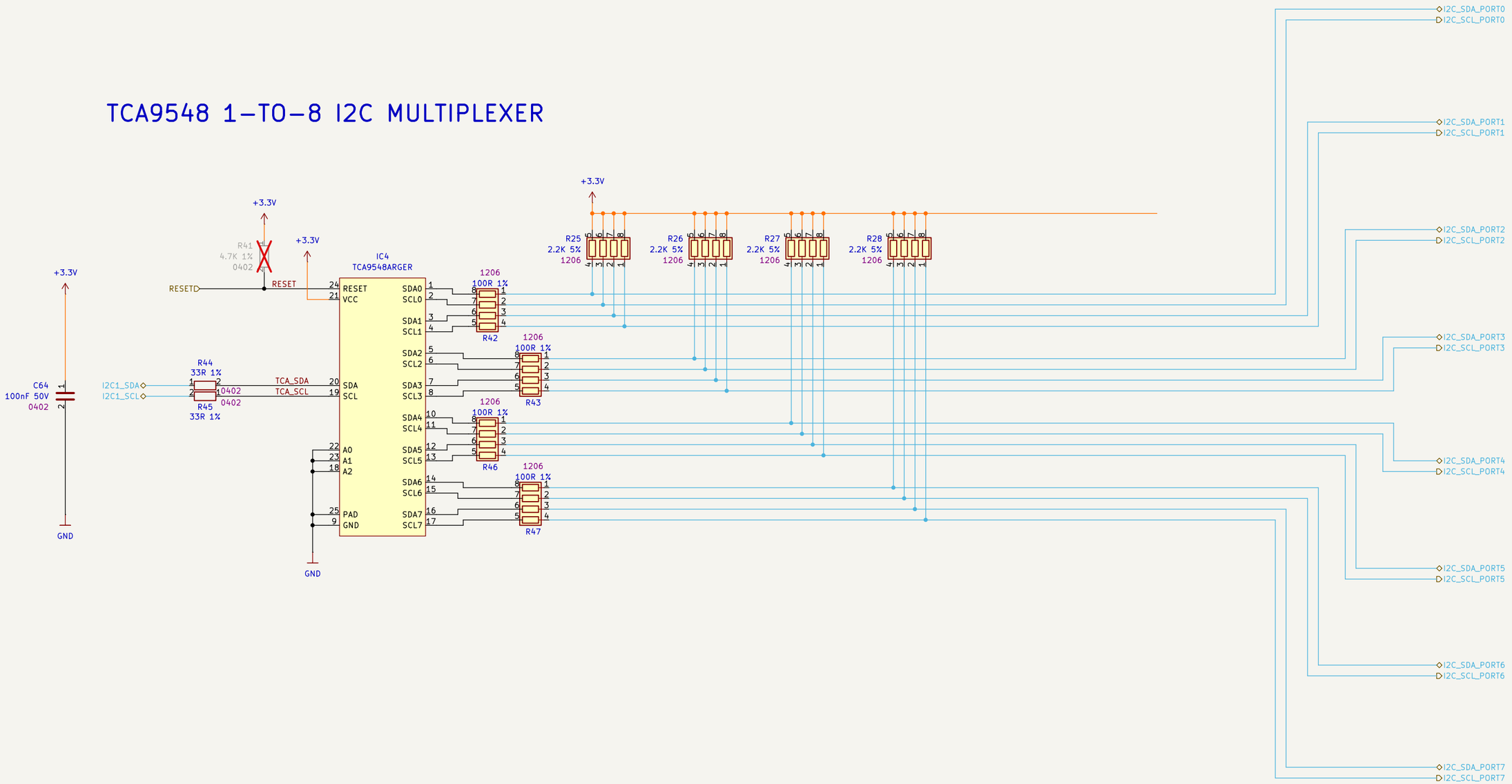
|---|---|---|---|
| DMT | Board Name: PDNode-600 | | Project Name: Baseboard |
| Date: 2025-01-12 | File Name: usb_interface.kicad_sch | | Revision: 1.0.0 / Variant: Pro |
| Sheet Title: USB Interface and Display | Company: DvidMakesThings | Designer: David Sipos / Reviewer: | Size: A3 / Sheet: 6 of 15 |

# TCA9548 Port Controller

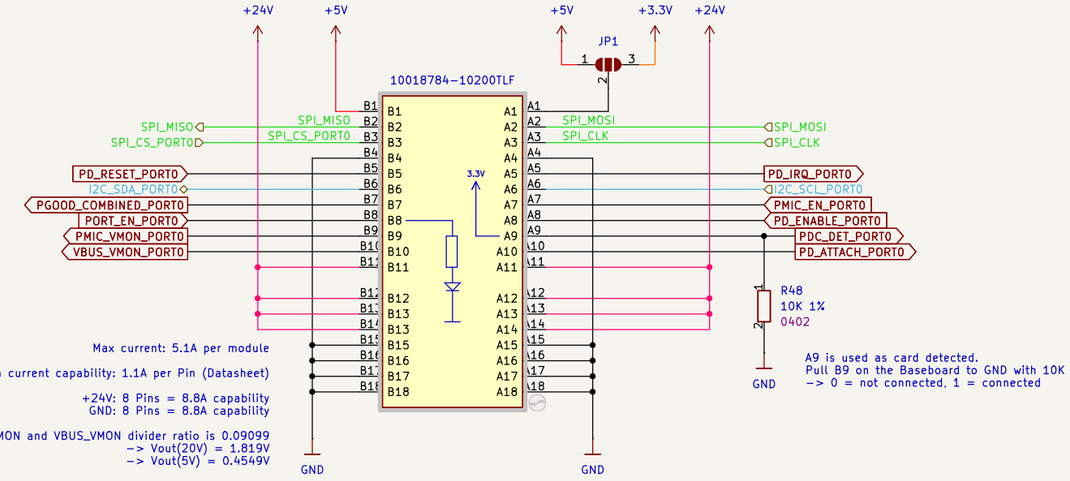
## TCA9548 1-TO-8 I2C MULTIPLEXER



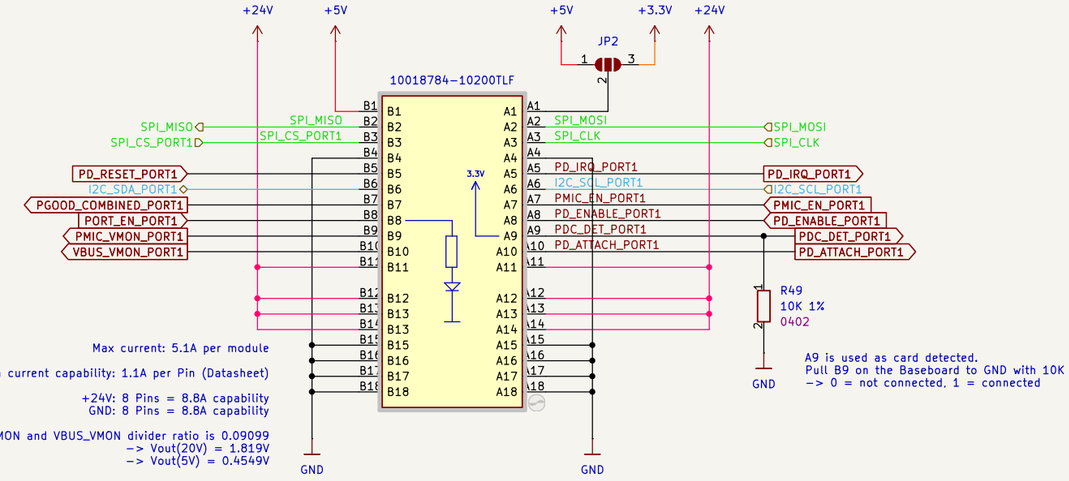

| | | | | |
|---|---|---|---|---|
| DMT<br>Date: 2025-01-12 | Board Name: **PDNode-600** | | Project Name: **Baseboard** | |
| | File Name: TCA9548_port_controller.kicad_sch | | Revision: 1.0.0 | Variant: Pro |
| Sheet Title: TCA9548 Port Controller | Company: **DvidMakesThings** | Designer: David Sipos<br>Reviewer: | Size: **A3** | Sheet: **7** of **15** |

# PDCard Connectors 1-4

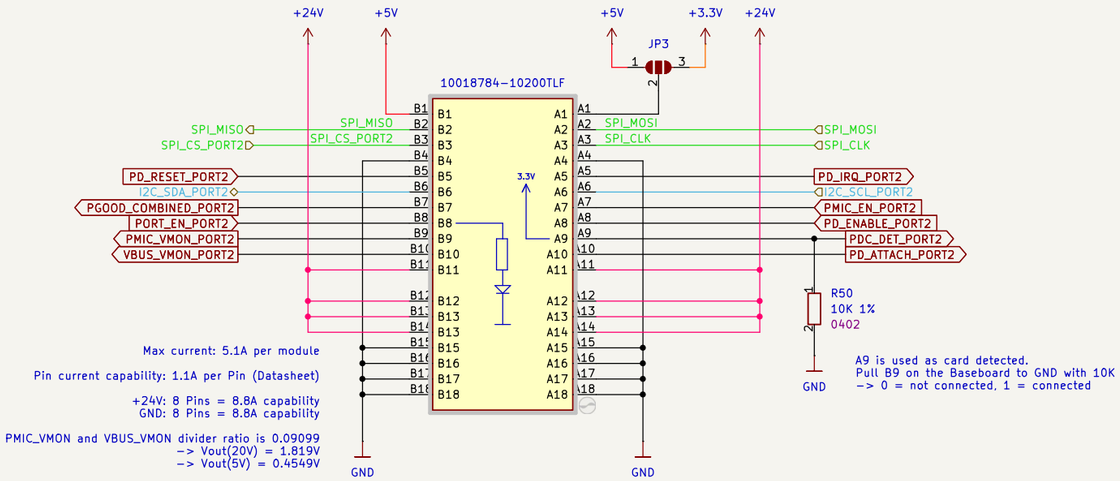
## PORT0 PDC CONNECTOR



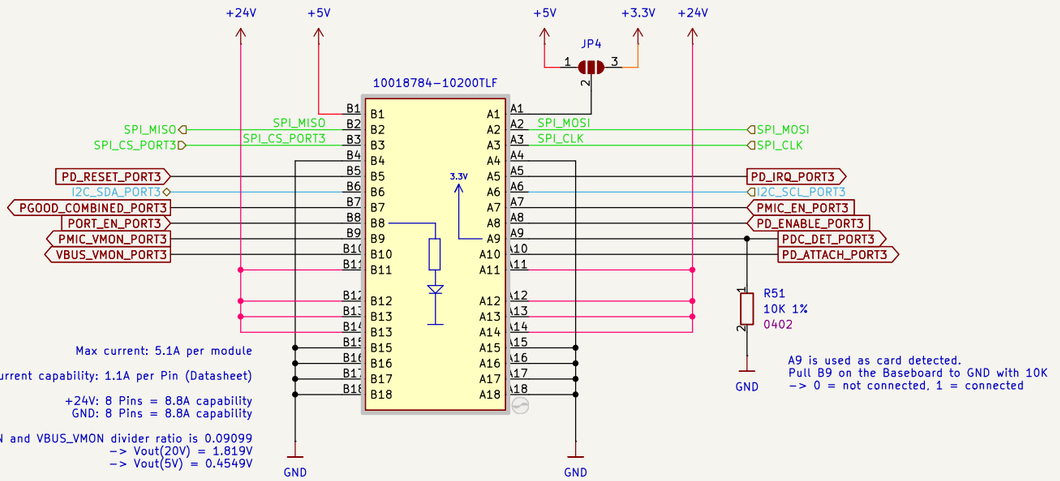

## PORT1 PDC CONNECTOR




## PORT2 PDC CONNECTOR




## PORT3 PDC CONNECTOR

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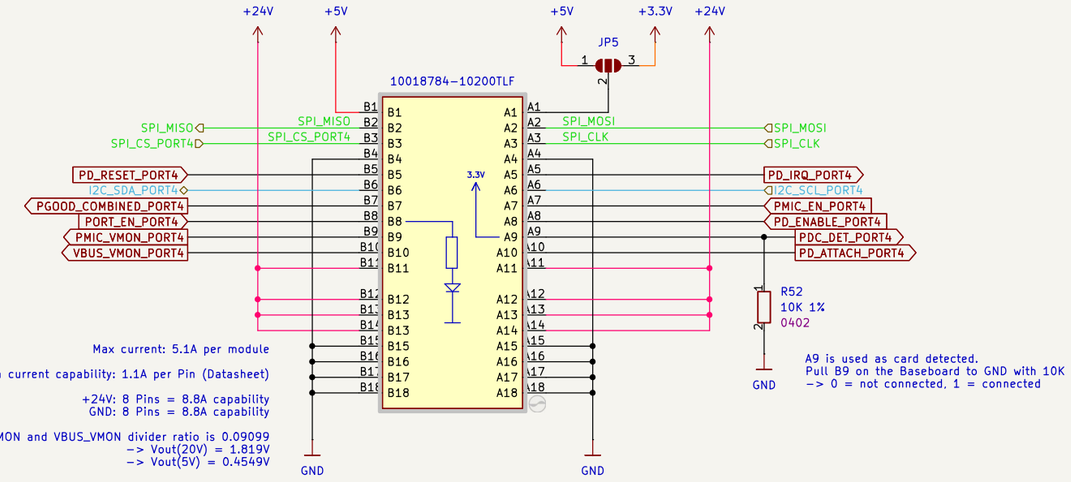
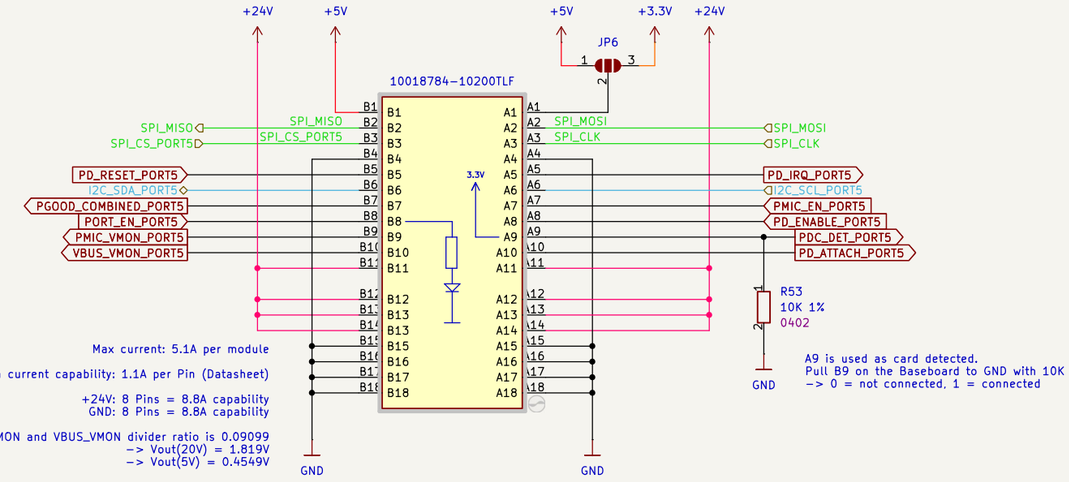
|---|---|---|---|
| DMT<br>Date: 2025-01-12 | Board Name: **PDNode-600** | | Project Name: **Baseboard** |
| | File Name: pdcard_connectors_1-4.kicad_sch | | Revision: 1.0.0 / Variant: Pro |
| Sheet Title: PDCard Connectors 1-4 | Company: **DvidMakesThings** | Designer: David Sipos<br>Reviewer: | Size: **A3** / Sheet: **8** of **15** |

# PDCard Connectors 5-8

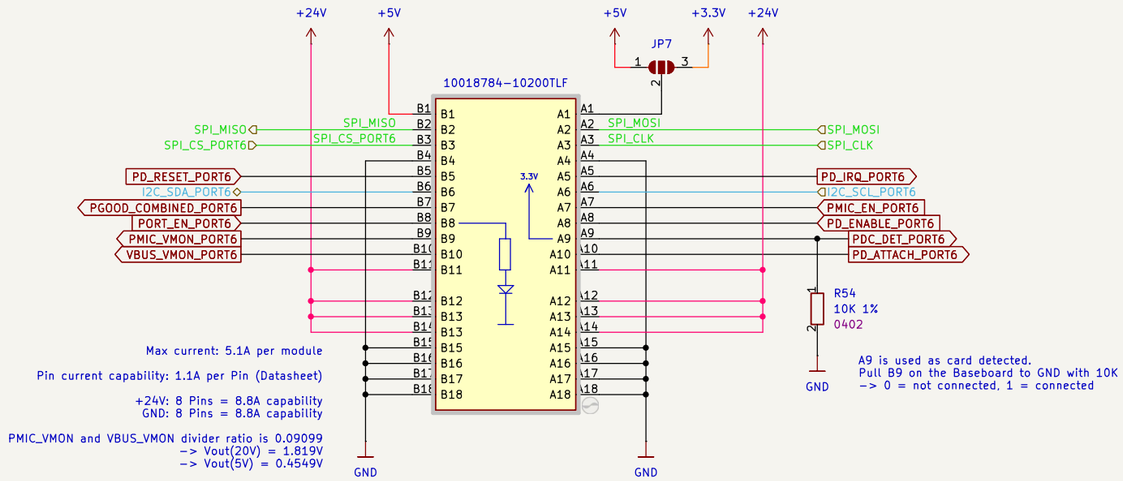
## PORT4 PDC CONNECTOR



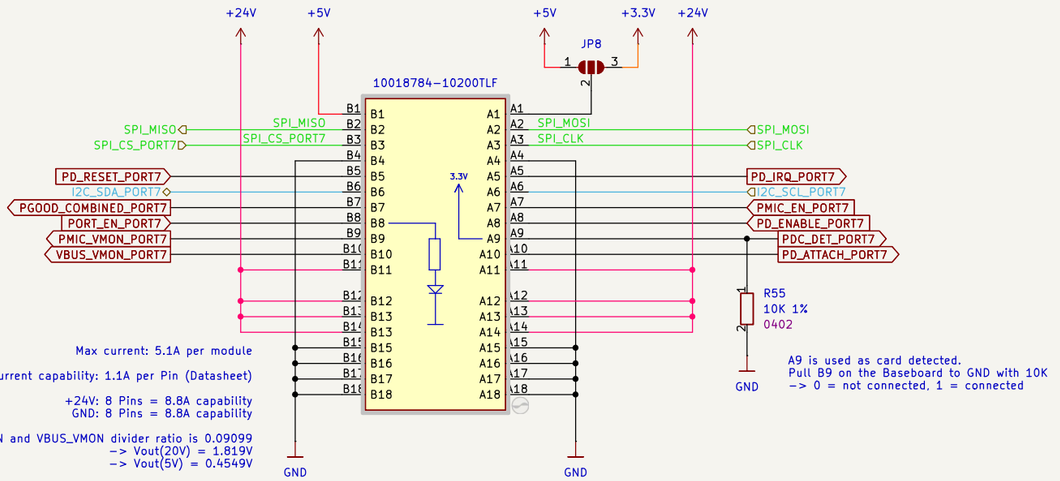

## PORT5 PDC CONNECTOR




## PORT6 PDC CONNECTOR




## PORT7 PDC CONNECTOR

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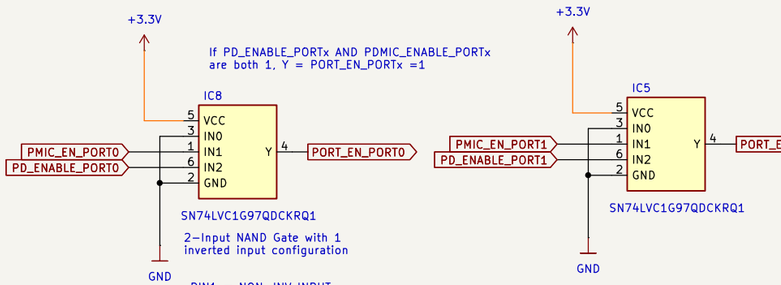
|---|---|---|---|---|
| DMT<br>Date: 2025-01-12 | Board Name: **PDNode-600** | | Project Name: **Baseboard** | |
| | File Name: pdcard_connectors_5-8.kicad_sch | | Revision: 1.0.0 | Variant: Pro |
| Sheet Title: PDCard Connectors 5-8 | Company: **DvidMakesThings** | Designer: David Sipos<br>Reviewer: | Size: **A3** | Sheet: **9** of **15** |

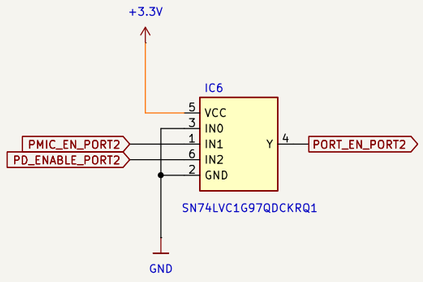
# PDC Signals

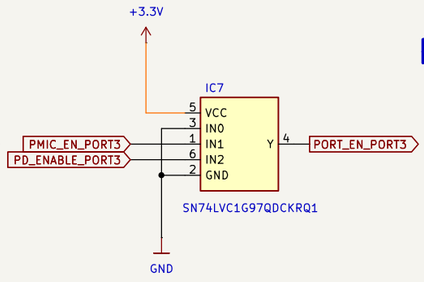
## PDC ENABLE LEDS

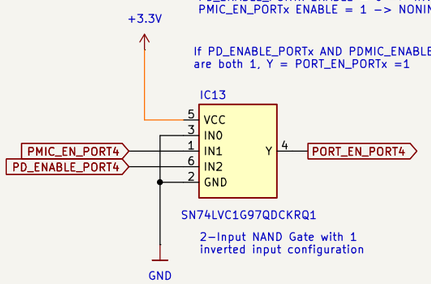


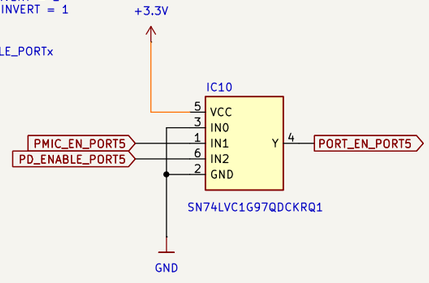


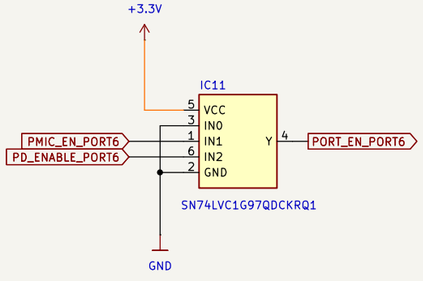


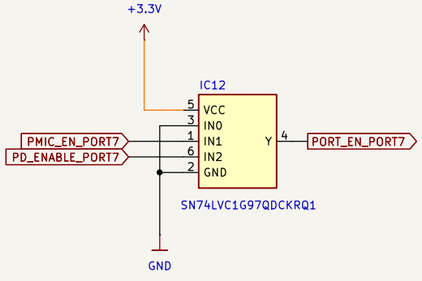


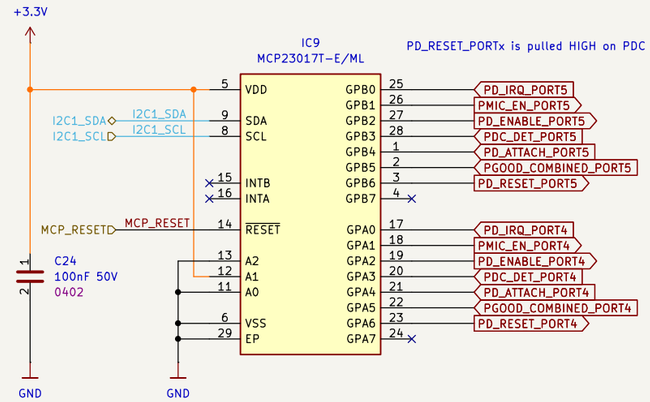



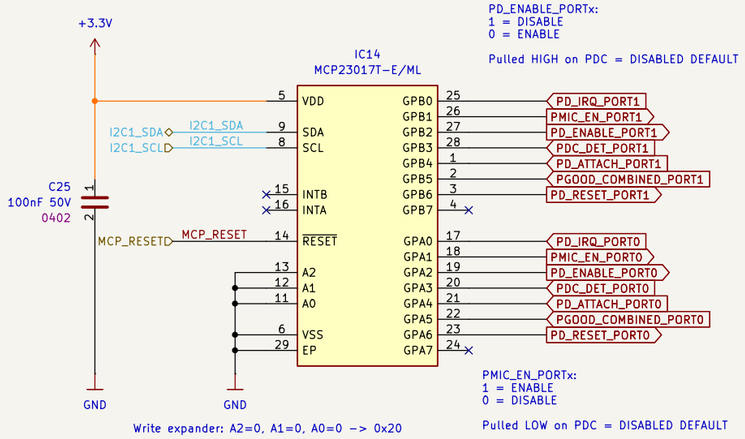



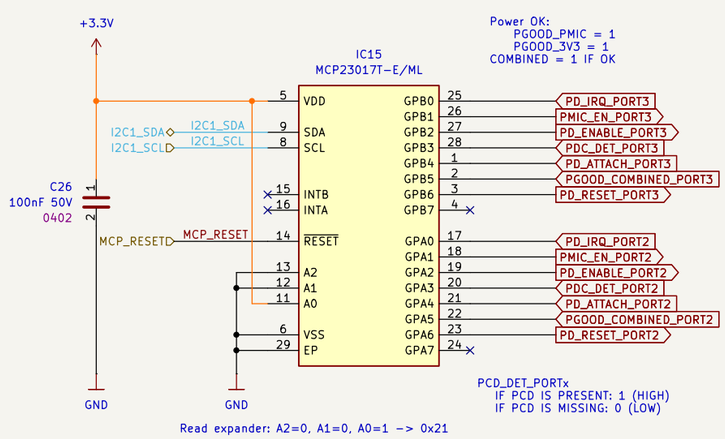

## PDC RESET AND SINK-DETECT



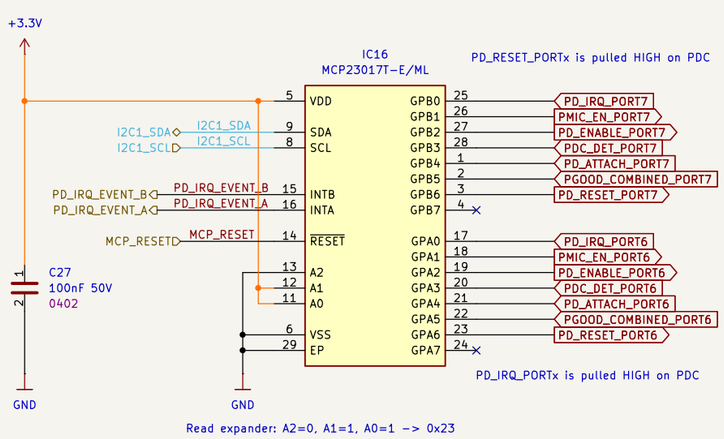

## PDC CONTROL SIGNALS (TO WRITE)



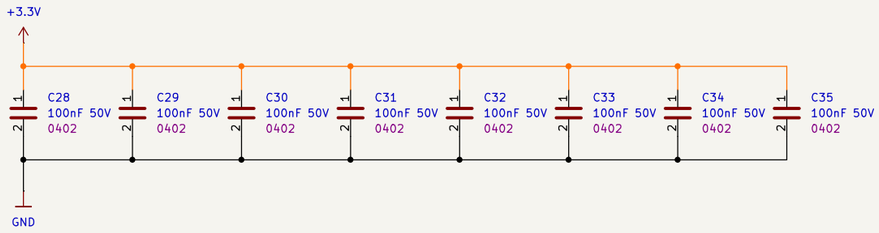

## PDC STATUS SIGNALS (TO READ)




## PDC INTERRUPT AND USB-A SIGNALS



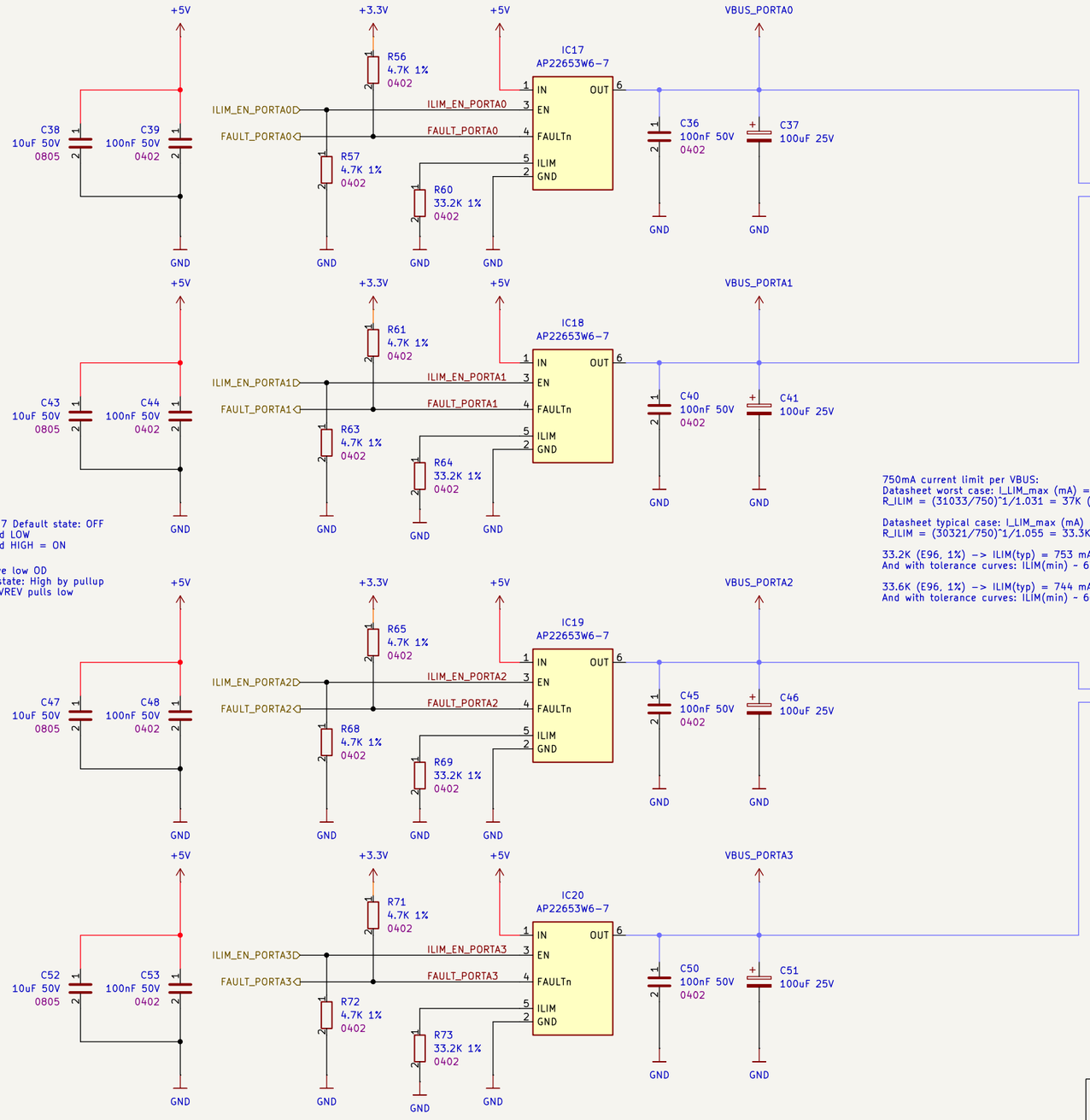

## DECOUPLING




| | | | |
|---|---|---|---|
| DMT<br>Date: 2025-01-12 | Board Name: **PDNode-600**<br>File Name: pdc_signals.kicad_sch | | Project Name: **Baseboard**<br>Revision: 1.0.0<br>Variant: Pro |
| Sheet Title: PDC Signals | Company: **DvidMakesThings** | Designer: David Sipos<br>Reviewer: | Size: **A3**<br>Sheet: **10** of **15** |

# USB-A Outputs

## USB CURRENT LIMIT SWITCH




AP22653W6-7 Default state: OFF
-> EN pulled LOW
-> EN pulled HIGH = ON

FAULTn: Active low OD
-> Default state: High by pullup
-> OC, OT, VREV pulls low

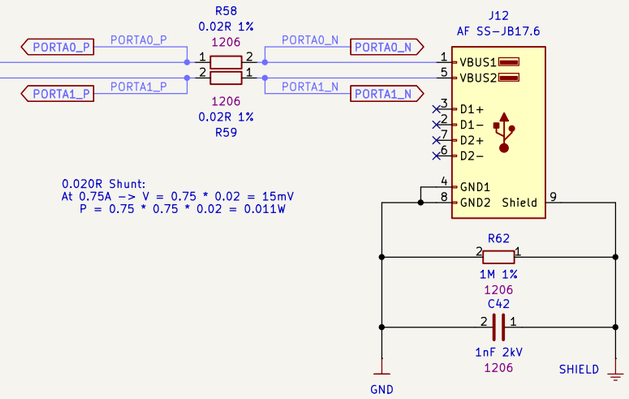
750mA current limit per VBUS:
Datasheet worst case: I_LIM_max (mA) = 30321 / R_ILIM(K)^1.055
R_ILIM = (31033/750)^1/1.031 = 37K (750mA max)

Datasheet typical case: I_LIM_max (mA) = 30321 / R_ILIM(K)^1.055
R_ILIM = (30321/750)^1/1.055 = 33.3K (750mA max)

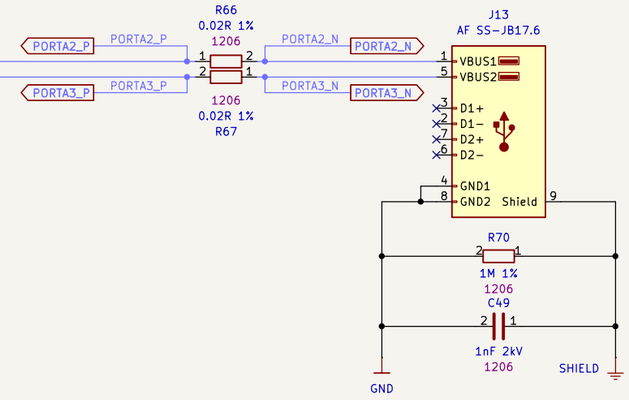
33.2K (E96, 1%) -> ILIM(typ) = 753 mA
And with tolerance curves: ILIM(min) ~ 671 mA, ILIM(max) ~ 839 mA

33.6K (E96, 1%) -> ILIM(typ) = 744 mA
And with tolerance curves: ILIM(min) ~ 662 mA, ILIM(max) ~ 828 mA

## USB-A STACKED OUTPUTS



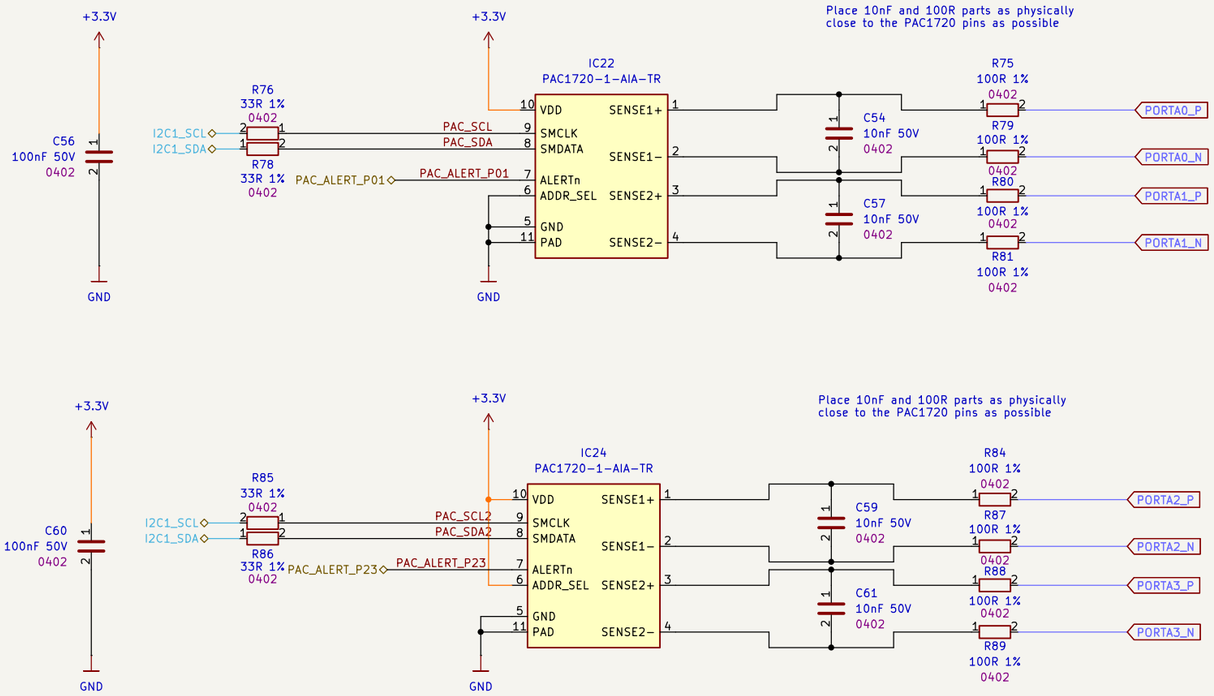

0.020R Shunt:
At 0.75A -> V = 0.75 * 0.02 = 15mV
P = 0.75 * 0.75 * 0.02 = 0.011W



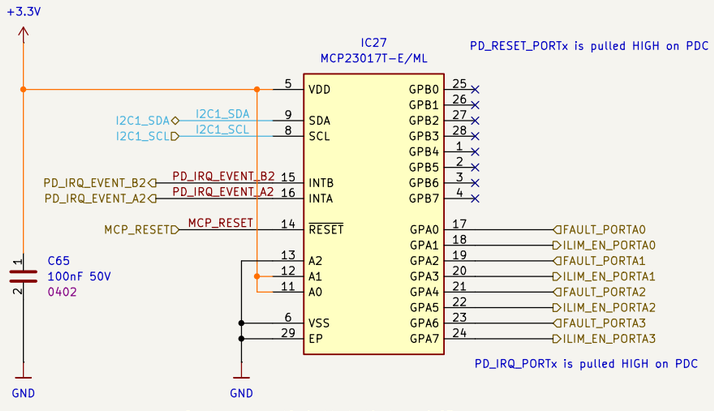

| | | | |
|---|---|---|---|
| DMT<br>Date: 2025-01-12 | Board Name: **PDNode-600** | | Project Name: **Baseboard** |
| | File Name: usb-a_outputs.kicad_sch | | Revision: 1.0.0 / Variant: Pro |
| Sheet Title: USB-A Outputs | Company: **DvidMakesThings** | Designer: David Sipos<br>Reviewer: | Size: **A3** / Sheet: **11** of **15** |

# USB-A Current Measurement

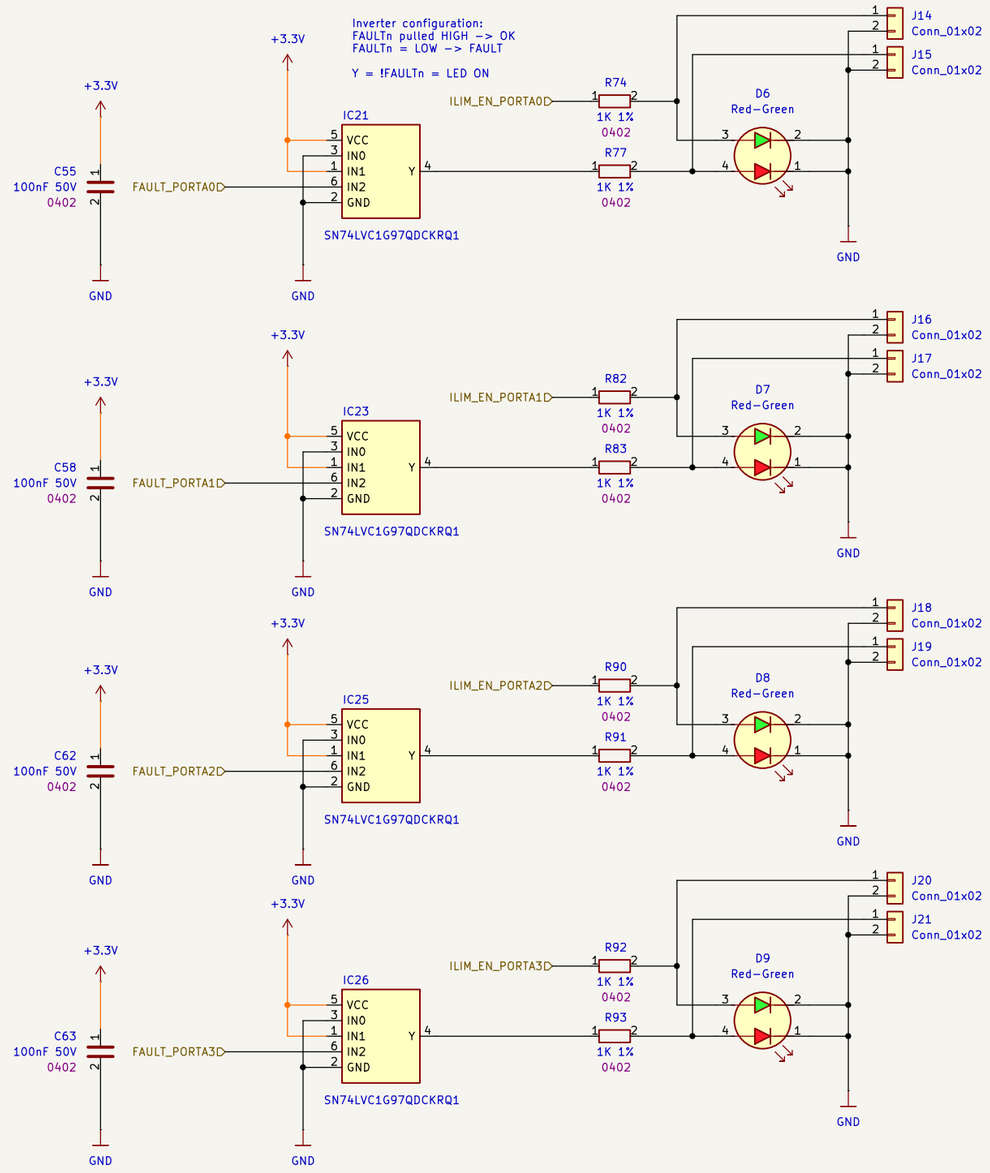
## USB CURRENT MEASUREMENT




## USB-A SIGNALS



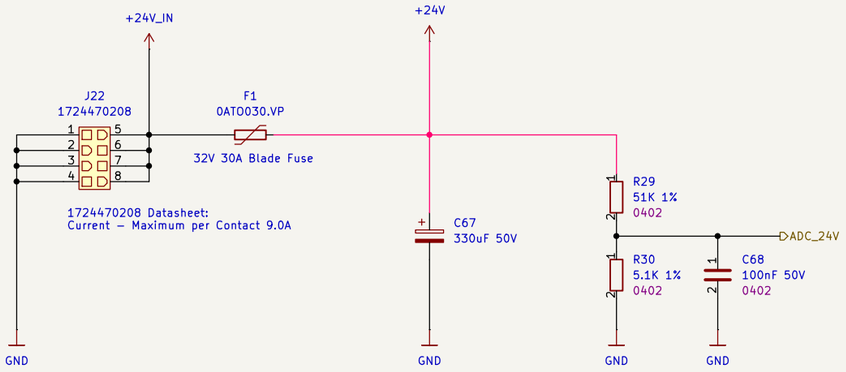

## USB-A CURRENT LIMIT SIGNALS



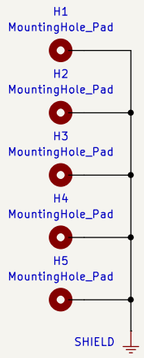

| | | | |
|---|---|---|---|
| DMT<br>Date: 2025-01-12 | Board Name: **PDNode-600**<br>File Name: usba_current_measurement.kicad_sch | | Project Name: **Baseboard**<br>Revision: 1.0.0<br>Variant: Pro |
| Sheet Title: USB-A Current Measurement | Company: **DvidMakesThings** | Designer: David Sipos<br>Reviewer: | Size: **A3**<br>Sheet: **12** of **15** |

# External Power Connectors

## 8 PIN EPS +24V POWER CONNECTOR



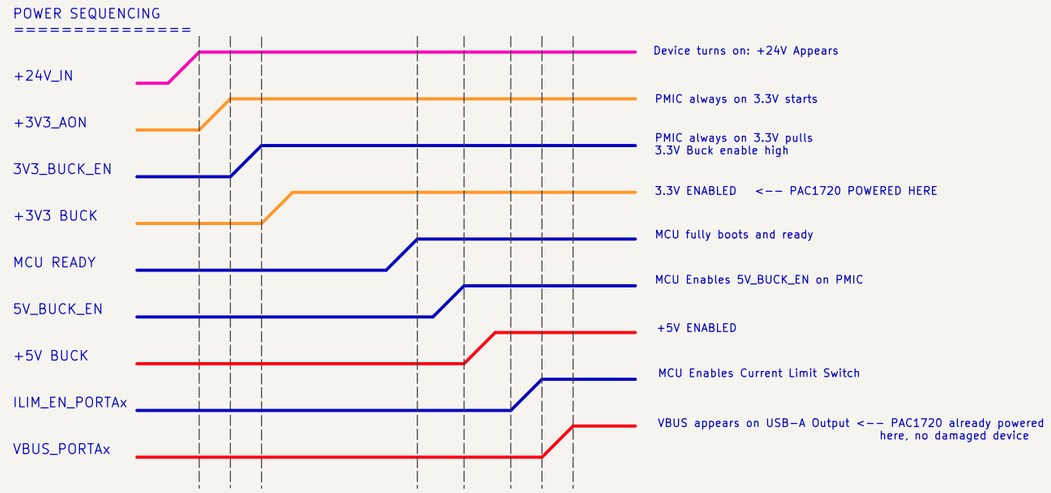

## MOUNTING HOLES




| | | | | |
|---|---|---|---|---|
| DMT<br>Date: 2025-01-12 | Board Name: **PDNode-600** | | Project Name: **Baseboard** | |
| | File Name: external_power_connectors.kicad_sch | | Revision: 1.0.0 | Variant: Pro |
| Sheet Title: External Power Connectors | Company: **DvidMakesThings** | Designer: David Sipos<br>Reviewer: | Size: **A3** | Sheet: **13** of **15** |

# [14] Power - Sequencing

Biggest landmine with PAC1720:
don't let the SENSE pins see VBUS when VDD is unpowered.
If USB 5V can exist while 3.3V is off, mitigation is needed
That's the one thing that can turn "happy board" into "dead board."

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|---|---|---|---|---|
| DMT<br>Date: 2025-01-12 | Board Name: **PDNode-600**<br>File Name: Power - Sequencing.kicad_sch | | Project Name: **Baseboard**<br>Revision: 1.0.0 | Variant: Pro |
| Sheet Title: Power - Sequencing | Company: **DvidMakesThings** | Designer: David Sipos<br>Reviewer: | Size: **A3** | Sheet: **14** of **15** |

# Revision History

| DATE | REVISION | RESPONSIBLE | CHANGE |
|---|---|---|---|
| 15.02.2026 | 1.0.0 | DMT | INITIAL CREATION |
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DMT

Date: 2025-01-12

Board Name: **PDNode-600**

Project Name: **Baseboard**

File Name: Revision History.kicad_sch

Revision: 1.0.0

Variant: Pro

Sheet Title: Revision History

Company: **DvidMakesThings**

Designer: David Sipos

Reviewer:

Size: **A3**

Sheet: **15** of **15**