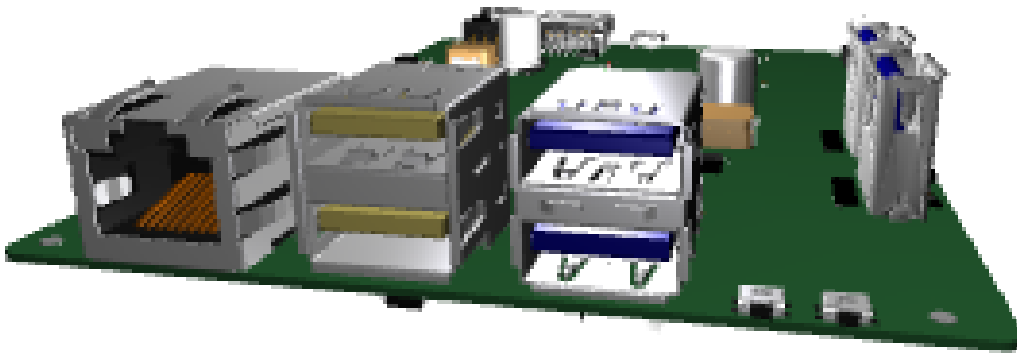


HurraCloud v0.3



This board was designed and built by Geppetto

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No Minimum Order

Automated Supply Chain

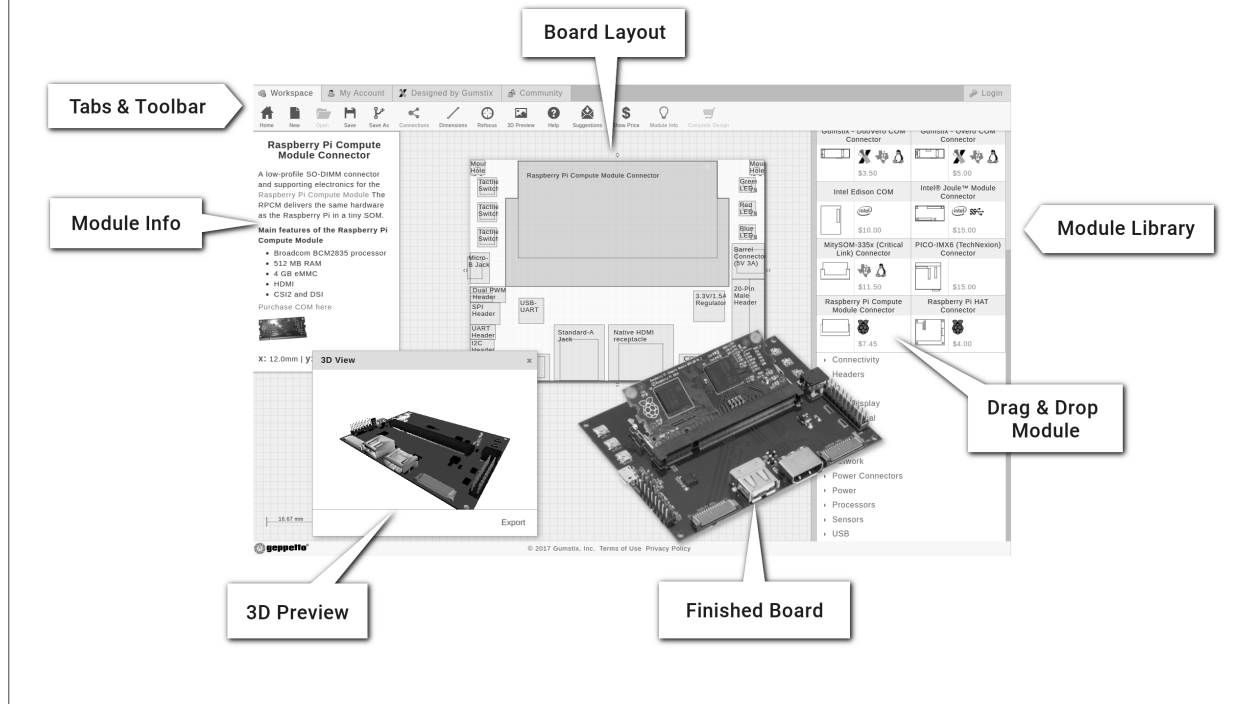
Reduce Cost and Errors



Thanks for using Geppetto to design this board!

One Stop Design-to-Order

Simply place displays, sensors, processors, and Geppetto connects it all.
No routing needed.



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Board Description

Uses Raspberry Pi CM4 as its COM/processor.

Functional modules include:

USB-UART

USB Micro-B Jack

Camera Connector (CSI-2)

M.2 Key M Connector

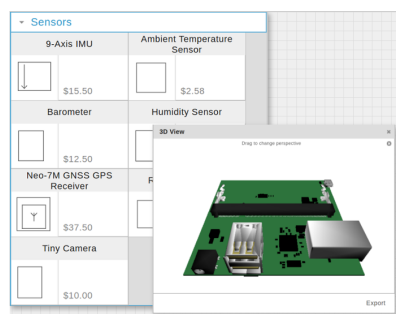
Ethernet Connector

Powered by a Barrel Connector.

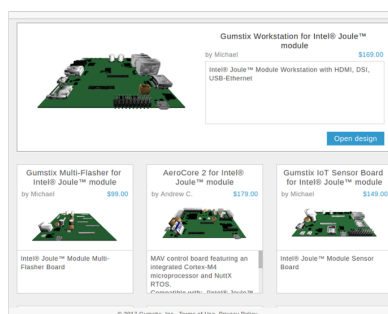
Board Dimensions

11.95cm x 8.9cm

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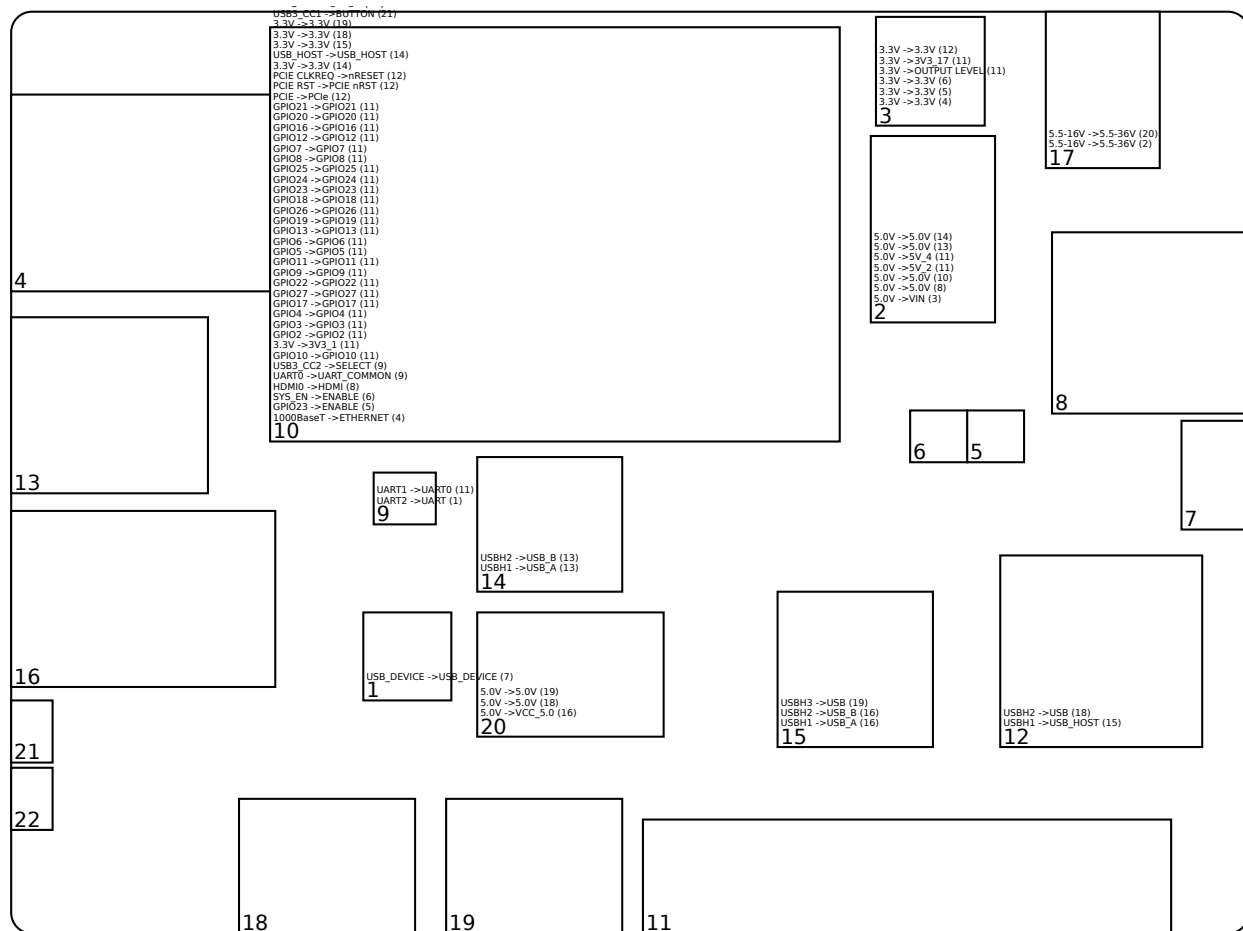
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1 Modules on Board



1.1 Converters

1.1.1 USB-UART (v21) (1)

Also known as an FTDI, this USB to UART converter allows a USB connection to the board to behave as a virtual RS232 serial connection. It offers direct and complete access to the system from a development machine by way of the FTDI FT232RQ USB – UART IC.

Technical documentation for the FT232RQ is available at:

http://www.ftdichip.com/Support/Documents/DataSheets/ICs/DS_FT232R.pdf

This USB to UART converter connects a host machine from Micro-B Jack (7) to UART2 on UART Mux (2 output) (9).

1.1.2 PCIe to USB 3.1 (v2) (12)

ASM1142 is an ASMedia first Universal Serial Bus 3.1 Gen-II host controller, compliant with Intel eXtensible Hot Controller Interface specification revision 1.1, bridging PCI Express interface to two ports of

USB3.1, up to 10Gbps high speed bandwidth, backward compatible with legacy USB function and devices. It can configure PCI Express as Gen2 x2 or Gen3 x1, compliant with USB Attach SCSI Protocol revision 1.0, supporting the function of debugport.

The Host controller module receives the following inputs:

- 3.3V from 3.3V/1.5A Regulator (3)
- PCIe from Raspberry Pi CM4 Connector (10)
- PCIE nRST from Raspberry Pi CM4 Connector (10)
- nRESET from Raspberry Pi CM4 Connector (10)

USB 3.0 is delivered to the following devices:

- USBH1 to USB_HOST on 4-Port USB 3.0 Hub (15)
- USBH2 to USB on USB 3.0 Standard-A Jack (Vertical) (18)

1.2 Power

1.2.1 5V/5A Regulator (v16) (2)

Takes 5.5 - 36V input from Molex 70553 3-Pin Header (Power Provides) (17) and provides up to 5A at 5V to:

- 3.3V/1.5A Regulator (3)
- HDMI (8)
- Raspberry Pi CM4 Connector (10)
- Raspberry Pi 4 Header (11)
- Raspberry Pi 4 Header (11)
- Dual Stacked USB Type A (13)
- 3-Port USB Hub (14)

1.2.2 3.3V/1.5A Regulator (v22) (3)

This DC to DC step down regulator provides a 3.3V DC output at 1.5A needed by certain components on this board. It is capable of accepting an input voltage between 3.1 to 16V DC and output is controlled by the TI TPS6211 buck regulator.

It receives VIN from 5V/5A Regulator (2).

The datasheet for the TPS6211 regulator is available at:

<http://www.ti.com/lit/ds/symlink/tps62110.pdf>

This regulator provides 3.3V to:

- Ethernet Connector (4)
- Top-side LED (5)
- Top-side LED (6)
- Raspberry Pi 4 Header (11)
- Raspberry Pi 4 Header (11)
- PCIe to USB 3.1 (12)

1.2.3 5V/5A Regulator (v16) (20)

Takes 5.5 - 36V input from Molex 70553 3-Pin Header (Power Provides) (17) and provides up to 5A at 5V to:

- Dual Stacked USB 3.0 Type A (16)
- USB 3.0 Standard-A Jack (Vertical) (18)
- USB 3.0 Standard-A Jack (Vertical) (19)

1.3 Network and Wireless

1.3.1 Ethernet Connector (v6) (4)

This module offers a 10/100 Base-T or 1000 Base-T Ethernet connection.

The module provides ethernet to

1000BaseT on Raspberry Pi CM4 Connector (10)

1.4 Lights and Switches

1.4.1 Top-side LED (v12) (5)

The top-side LED module contains a 1608 standard size LED of a user-selected color, mounted on the top side of a Geppetto board.

The LED is active-high on GPIO23 from Raspberry Pi CM4 Connector (10).

1.4.2 Top-side LED (v12) (6)

The top-side LED module contains a 1608 standard size LED of a user-selected color, mounted on the top side of a Geppetto board.

The LED is active-high on SYS_EN from Raspberry Pi CM4 Connector (10).

1.4.3 Right-Angle Tactile Switch (v1) (21)

This right-angle pull-down touch switch provides a user input for the signal USB3_CC1 on Raspberry Pi CM4 Connector (10).

1.4.4 Right-Angle Tactile Switch (v1) (22)

This right-angle pull-down touch switch provides a user input for the signal nRESET on Raspberry Pi CM4 Connector (10).

1.5 USB

1.5.1 Micro-B Jack (v20) (7)

The USB micro-B port module allows your design to connect as a USB device to a USB host.

This module is connected to USB_DEVICE on USB-UART (1).

This module does not supply power.

1.5.2 Dual Stacked USB Type A (v16) (13)

The dual stacked USB type-A module has two USB ports stacked vertically that allows you to connect USB devices to the board. Included with this module is the TI TPS2052BDGN power distribution switch, providing 5.0V at 500 mA to connected devices.

The Datasheet for the TPS2052BDGN is available at:

<http://www.ti.com/lit/ds/symlink/tps2052b.pdf>

It is connected to:

- USBH1 on 3-Port USB Hub (14)
- USBH2 on 3-Port USB Hub (14)

1.5.3 3-Port USB Hub (v16) (14)

The 3-port USB hub module offers three interfaces for USB ports to a single USB host using the Microchip USB2513 USB 2.0 Hi-Speed Hub Controller.

The datasheet for the USB2513 IC is available at:

<http://ww1.microchip.com/downloads/en/DeviceDoc/00001692C.pdf>

This hub is connected to USB_HOST on Raspberry Pi CM4 Connector (10).

This hub is connected to the following USB ports:

- USB_A on Dual Stacked USB Type A (13)
- USB_B on Dual Stacked USB Type A (13)

1.5.4 4-Port USB 3.0 Hub (v18) (15)

This USB hub offers four interfaces for USB 3.0 or USB 2.0 ports from USBH1 on PCIe to USB 3.1 (12).

1.5.5 Dual Stacked USB 3.0 Type A (v12) (16)

A dual type-A USB 3.0 host stacked vertically that allows you to connect USB devices to the board.

It is connected to:

- USBH1 on 4-Port USB 3.0 Hub (15)
- USBH2 on 4-Port USB 3.0 Hub (15)

1.5.6 USB 3.0 Standard-A Jack (Vertical) (v11) (18)

A standard A USB 3.0 host port that allows you to connect USB devices to the board, oriented vertically. This port is connected to USBH2 on PCIe to USB 3.1 (12).

1.5.7 USB 3.0 Standard-A Jack (Vertical) (v11) (19)

A standard A USB 3.0 host port that allows you to connect USB devices to the board, oriented vertically. This port is connected to USBH3 on 4-Port USB 3.0 Hub (15).

1.6 Monitors

1.6.1 HDMI (v23) (8)

The native HDMI receptacle module provides HDMI video and audio signals to an external display and speakers. This module uses the TI TPD12S016UFQN HDMI companion chip with a standard HDMI port to provide ESD-protected display connectivity.

The datasheet for the TPD12S016 IC can be found at:

<http://www.ti.com/lit/ds/symlink/tpd12s016.pdf>

The module transmits high definition video from **HDMI0** on **Raspberry Pi CM4 Connector (10)**.

1.7 Connectors (Signal)

1.7.1 UART Mux (2 output) (v10) (9)

A bidirectional 2 x SPDT switch connects two UART interfaces (RX/TX only). A SELECT line is used to control which UART is output.

This UART 2-output mux switches between UART0 on Raspberry Pi 4 Header (11) or UART on USB-UART (1) to UART0 on Raspberry Pi CM4 Connector (10).

The output is controlled by USB3_CC2 on Raspberry Pi CM4 Connector (10).

1.8 COM Connectors

1.8.1 Raspberry Pi CM4 Connector (v9) (10)

The **Raspberry Pi Compute Module 4 (RPiCM4)** module contains two connectors to interface with the RPiCM4 device. The RPiCM4 COM connector is **ONLY** compatible with the RPiCM4.

Technical details for the RPiCM4 modules can be found at:

<https://datasheets.raspberrypi.org/cm4/cm4-datasheet.pdf>

It requires:

- 5.0V from 5V/5A Regulator (2)

The Geppetto Pi Compute 4 connector provides the following outputs:

- 1000BaseT to Ethernet Connector (4)
- GPIO23 to:
 - Top-side LED (5)
 - Raspberry Pi 4 Header (11)
- SYS_EN to Top-side LED (6)
- HDMI0 to HDMI (8)
- UART0 to UART Mux (2 output) (9)
- USB3_CC2 to UART Mux (2 output) (9)
- GPIO10 to Raspberry Pi 4 Header (11)
- 3.3V to:
 - Raspberry Pi 4 Header (11)
 - 3-Port USB Hub (14)
 - 4-Port USB 3.0 Hub (15)
 - USB 3.0 Standard-A Jack (Vertical) (18)
 - USB 3.0 Standard-A Jack (Vertical) (19)
- GPIO2 to Raspberry Pi 4 Header (11)
- GPIO3 to Raspberry Pi 4 Header (11)
- GPIO4 to Raspberry Pi 4 Header (11)
- GPIO17 to Raspberry Pi 4 Header (11)
- GPIO27 to Raspberry Pi 4 Header (11)
- GPIO22 to Raspberry Pi 4 Header (11)
- GPIO9 to Raspberry Pi 4 Header (11)
- GPIO11 to Raspberry Pi 4 Header (11)
- GPIO5 to Raspberry Pi 4 Header (11)

- GPIO6 to Raspberry Pi 4 Header (11)
- GPIO13 to Raspberry Pi 4 Header (11)
- GPIO19 to Raspberry Pi 4 Header (11)
- GPIO26 to Raspberry Pi 4 Header (11)
- GPIO18 to Raspberry Pi 4 Header (11)
- GPIO24 to Raspberry Pi 4 Header (11)
- GPIO25 to Raspberry Pi 4 Header (11)
- GPIO8 to Raspberry Pi 4 Header (11)
- GPIO7 to Raspberry Pi 4 Header (11)
- GPIO12 to Raspberry Pi 4 Header (11)
- GPIO16 to Raspberry Pi 4 Header (11)
- GPIO20 to Raspberry Pi 4 Header (11)
- GPIO21 to Raspberry Pi 4 Header (11)
- PCIE to PCIe to USB 3.1 (12)
- PCIE RST to PCIe to USB 3.1 (12)
- PCIE CLKREQ to PCIe to USB 3.1 (12)
- USB_HOST to 3-Port USB Hub (14)
- USB3_CC1 to Right-Angle Tactile Switch (21)
- nRESET to Right-Angle Tactile Switch (22)
- I2C.ID to Raspberry Pi 4 Header (11)

1.9 Custom Modules

1.9.1 Raspberry Pi 4 Header (v6) (11)

The 40-pin header module offers up to 40 pins that can be used at the customer's discretion.

This module has the following connections:

- 5V_2 to 5.0V from 5V/5A Regulator (2)
- 5V_4 to 5.0V from 5V/5A Regulator (2)
- OUTPUT LEVEL to 3.3V from 3.3V/1.5A Regulator (3)
- 3V3_17 to 3.3V from 3.3V/1.5A Regulator (3)
- UART0 to UART1 from UART Mux (2 output) (9)
- GPIO10 to GPIO10 from Raspberry Pi CM4 Connector (10)
- 3V3_1 to 3.3V from Raspberry Pi CM4 Connector (10)

- GPIO2 to GPIO2 from Raspberry Pi CM4 Connector (10)
- GPIO3 to GPIO3 from Raspberry Pi CM4 Connector (10)
- GPIO4 to GPIO4 from Raspberry Pi CM4 Connector (10)
- GPIO17 to GPIO17 from Raspberry Pi CM4 Connector (10)
- GPIO27 to GPIO27 from Raspberry Pi CM4 Connector (10)
- GPIO22 to GPIO22 from Raspberry Pi CM4 Connector (10)
- GPIO9 to GPIO9 from Raspberry Pi CM4 Connector (10)
- GPIO11 to GPIO11 from Raspberry Pi CM4 Connector (10)
- GPIO5 to GPIO5 from Raspberry Pi CM4 Connector (10)
- GPIO6 to GPIO6 from Raspberry Pi CM4 Connector (10)
- GPIO13 to GPIO13 from Raspberry Pi CM4 Connector (10)
- GPIO19 to GPIO19 from Raspberry Pi CM4 Connector (10)
- GPIO26 to GPIO26 from Raspberry Pi CM4 Connector (10)
- GPIO18 to GPIO18 from Raspberry Pi CM4 Connector (10)
- GPIO23 to GPIO23 from Raspberry Pi CM4 Connector (10)
- GPIO24 to GPIO24 from Raspberry Pi CM4 Connector (10)
- GPIO25 to GPIO25 from Raspberry Pi CM4 Connector (10)
- GPIO8 to GPIO8 from Raspberry Pi CM4 Connector (10)
- GPIO7 to GPIO7 from Raspberry Pi CM4 Connector (10)
- GPIO12 to GPIO12 from Raspberry Pi CM4 Connector (10)
- GPIO16 to GPIO16 from Raspberry Pi CM4 Connector (10)
- GPIO20 to GPIO20 from Raspberry Pi CM4 Connector (10)
- GPIO21 to GPIO21 from Raspberry Pi CM4 Connector (10)
- I2C.ID to I2C.ID from Raspberry Pi CM4 Connector (10)

1.10 Power Connectors

1.10.1 Molex 70553 3-Pin Header (Power Provides) (v3) (17)

Provides battery power using a Molex 70553 3-Pin Header.

2 Module Connections Graph

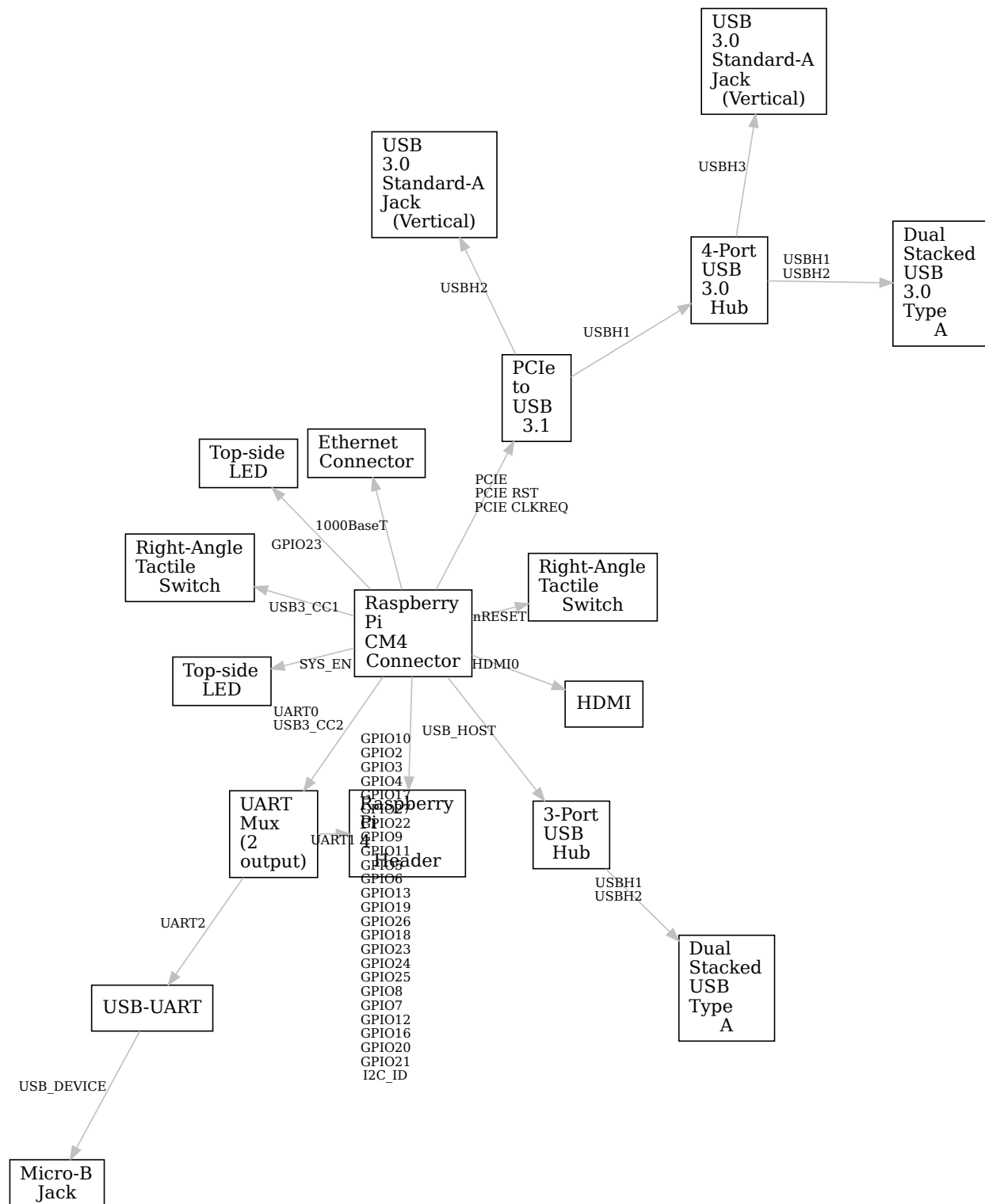


Figure 1: excludes power modules

3 Module Power Graph

