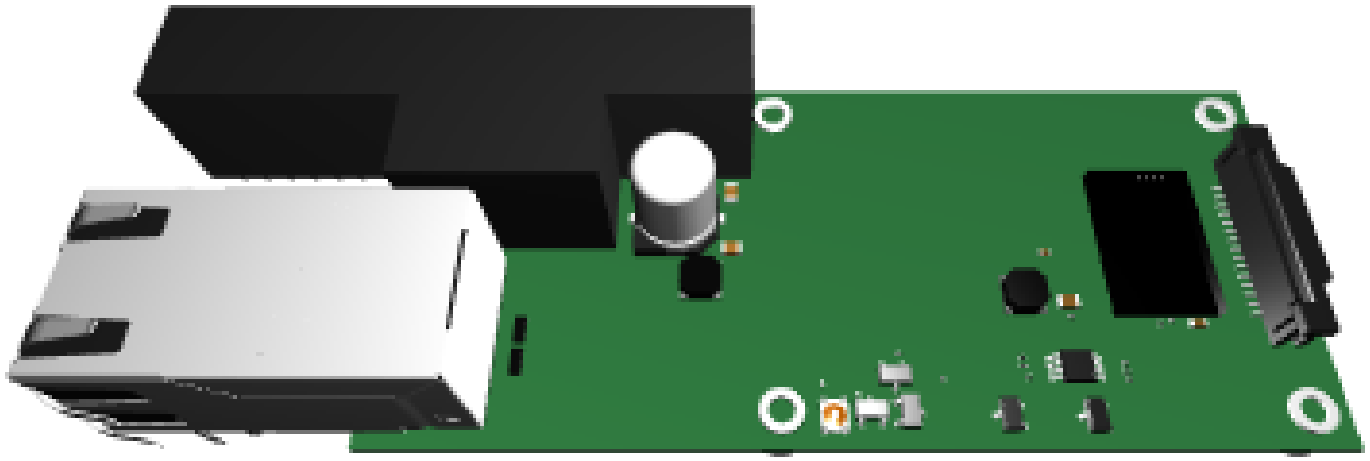
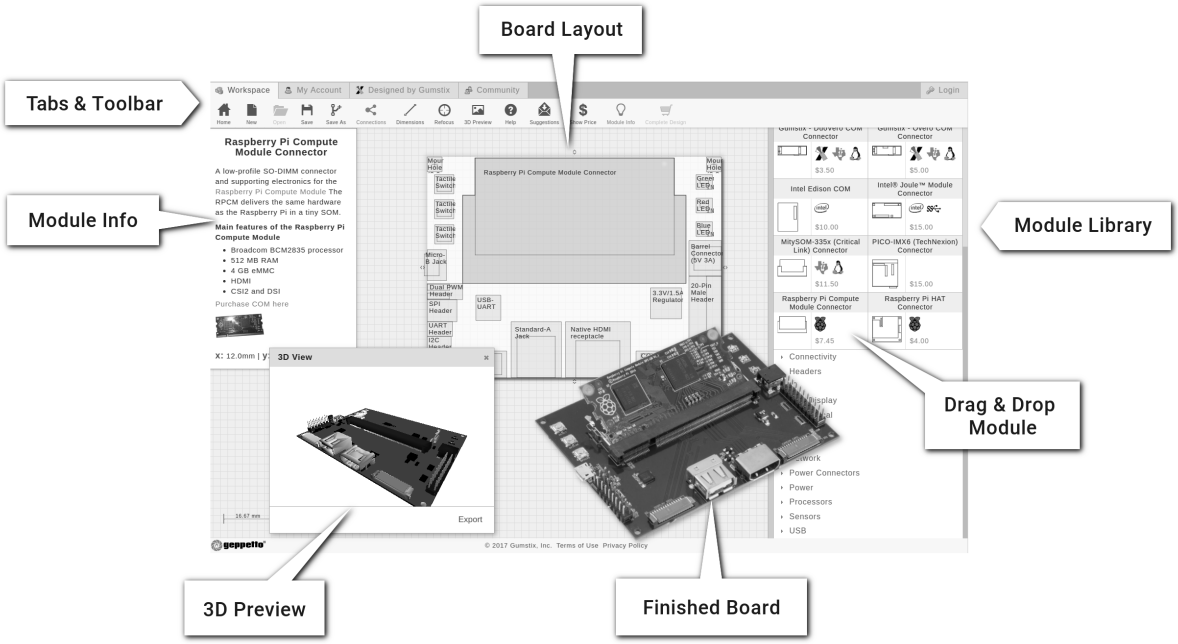
CM4 PoE Smart Camera



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.



Board Description

Uses Raspberry Pi CM4 Connector (Flip-side) as its COM/processor.

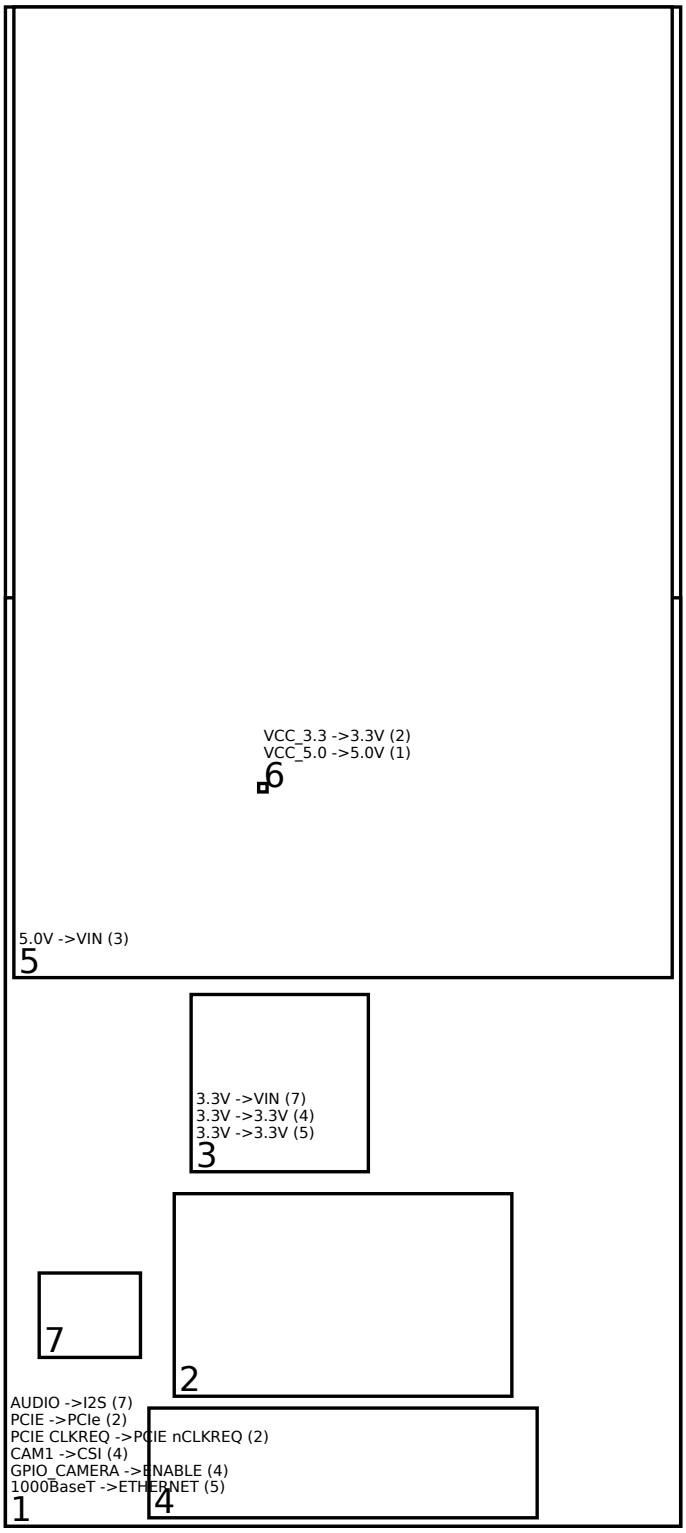
Functional modules include:
Gigabit via USB with Silvertel Ag9700 PoE
Google Coral G313-06329-00 Accelerator
Raspberry Pi Vertical Camera Connector

Board Dimensions

4cm x 9cm

Contents

1 Modules on Board



1.1 COM Connectors

1.1.1 Raspberry Pi CM4 Connector (Flip-side) (v4) (1)

The **R**aspberry **P**i **C**ompute **M**odule 4 (RPCM4) module contains two connectors to interface with the RPCM4 device. The RPCM4 COM connector is ONLY compatible with the RPCM4. The module is placed on the flip-side of the board.

Technical details for the RPCM modules can be found at:

https://www.raspberrypi.org/documentation/hardware/computemodule/datasheet.md

It requires:

- 5.0V from Dummy Power Provider (6)

The Geppetto Pi Compute 4 connector provides the following outputs:

- 1000BaseT to Gigabit with Silvertel Ag9700 PoE (5)
- GPIO_CAMERA to Raspberry Pi Vertical Camera Connector (4)
- CAM1 to Raspberry Pi Vertical Camera Connector (4)
- PCIE CLKREQ to Google Coral G313-06329-00 Accelerator (2)
- PCIE to Google Coral G313-06329-00 Accelerator (2)
- AUDIO to Knowles SPH0645LM4H-B Microphone (7)

1.2 Sensors

1.2.1 Google Coral G313-06329-00 Accelerator (v2) (2)

The Google Coral Accelerator Module is a multi-chip module (MCM) that includes the Edge TPU and its own power control. The Edge TPU is a small ASIC designed by Google that accelerates Tensor Flow Lite models using little power: it's capable of performing 4 trillion operations per second (4 TOPS), using 2 watts of powerthat's 2 TOPS per watt. For example, it can execute state-of-the-art mobile vision models such as MobileNet v2 at almost 400 frames per second, in a power efficient manner. This on-device ML processing reduces latency, increases data privacy, and removes the need for a constant internet connection. The module provides either of the host interface i.e. PCIe Gen2 x 1 or USB2.0.

The datasheet for the G313-06329-00 module is available at:

`https://coral.ai/static/files/Coral-Accelerator-Module-datasheet.pdf`

The module connects to the following buses:

- PCIE nCLKREQ to PCIE CLKREQ on Raspberry Pi CM4 Connector (Flip-side) (1)
- VLOGIC_PCIE_CTRL to VLOGIC on Raspberry Pi CM4 Connector (Flip-side) (1)
- PCIe to PCIE on Raspberry Pi CM4 Connector (Flip-side) (1)
-

1.3 Power

1.3.1 3.3V/1.5A Regulator (v21) (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 recieves VIN from Gigabit with Silvertel Ag9700 PoE (5).

The datasheet for the TPS6211 regulator is available at:

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

This regulator provides 3.3V to:

- Gigabit with Silvertel Ag9700 PoE (5)
- Raspberry Pi Vertical Camera Connector (4)
- Knowles SPH0645LM4H-B Microphone (7)

1.3.2 Dummy Power Provider (v5) (6)

This module does nothing except as a means to satisfy power requirements in Geppetto web. THIS DOES NOT ACTUALLY PROVIDE POWER.

1.4 Connectors (Signal)

1.4.1 Raspberry Pi Vertical Camera Connector (v6) (4)

The Raspberry Pi Vertical camera connector module is a 15-pin ribbon connector that exposes a 2-lane MIPI camera system to an external high-resolution camera module.

The CSI port is connected to CAM1 on Raspberry Pi CM4 Connector (Flip-side) (1).

I2C communication is connected to on .

ENABLE input provided by GPIO_CAMERA on Raspberry Pi CM4 Connector (Flip-side) (1).

1.5 Network and Wireless

1.5.1 Gigabit with Silvertel Ag9700 PoE (v1) (5)

This module provides a gigabit ethernet interface connected to Raspberry Pi CM4 Connector (Flip-side) (1). This Power over Ethernet module provides 5V to the following modules:

- 3.3V/1.5A Regulator (3)

1.6 Audio

1.6.1 Knowles SPH0645LM4H-B Microphone (v1) (7)

The SPH0645LM4H-B is a miniature, low power, bottom port microphone with an I2S digital output. The solution consists of a proven high performance SiSonic acoustic sensor, a serial Analog to Digital converter, and an interface to condition the signal into an industry standard 24-bit I2S format. The I2S interface simplifies the integration in the system and allow direct interconnect to digital processors, application processors and microcontrollers saving the need of an external audio codec, the SPH0645LM4H-B is perfectly suitable for portable applications where size and power consumption are a constraint. The operating supply voltage range of the microphone is between 1.62V and 3.6V.

The datasheet for the SPH0645LM4H-B is available at: `https://www.knowles.com/docs/default-source/model-downloads/sph0645lm4h-b-datasheet-rev-c.pdf`

The SPH0645LM4H-B receives:

- I2S from AUDIO on Raspberry Pi CM4 Connector (Flip-side) (1)
- VIN from 3.3V on 3.3V/1.5A Regulator (3)

2 Module Connections Graph

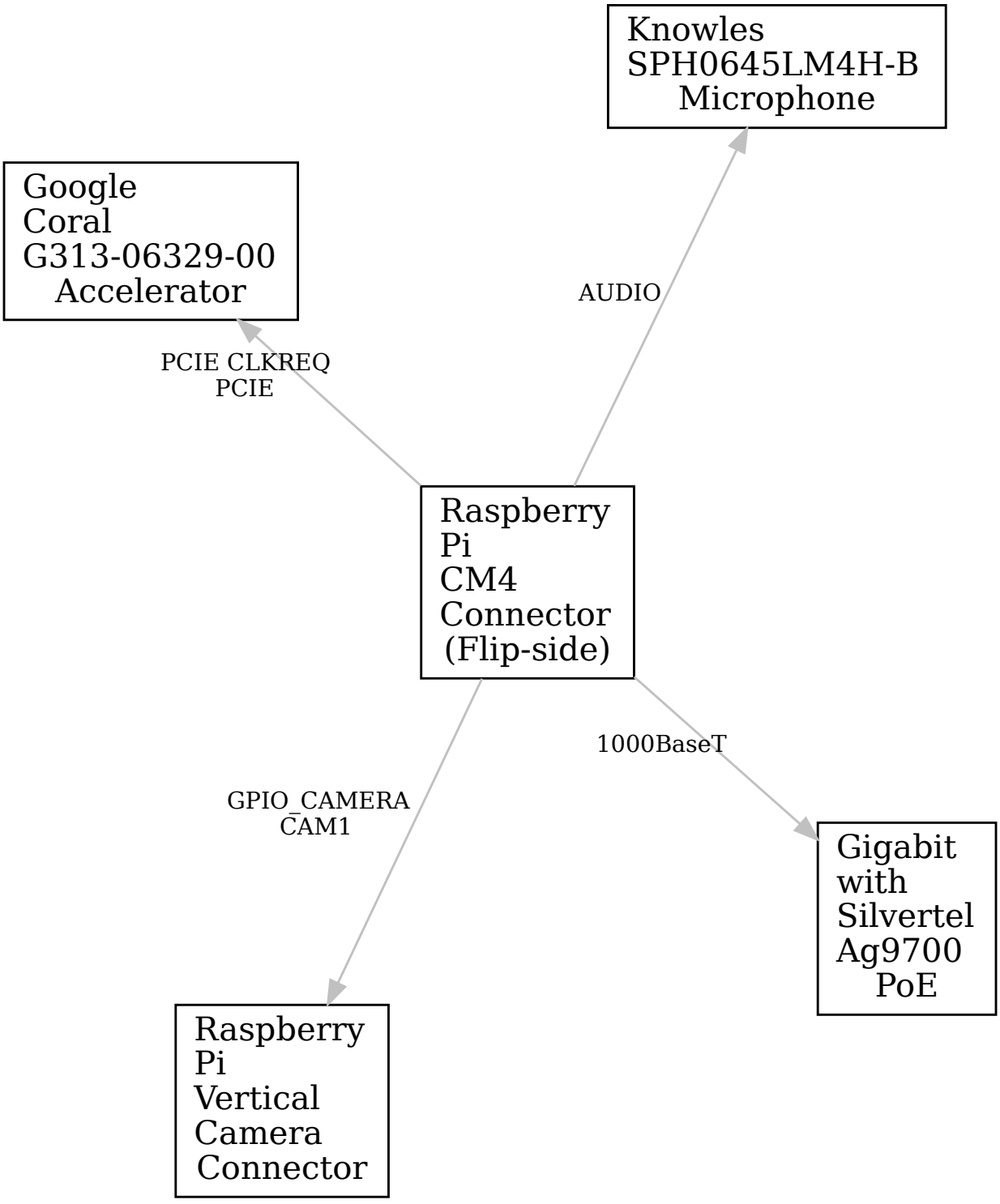


Figure 1: excludes power modules

3 Module Power Graph