Raspberry Pi Compute Module 4

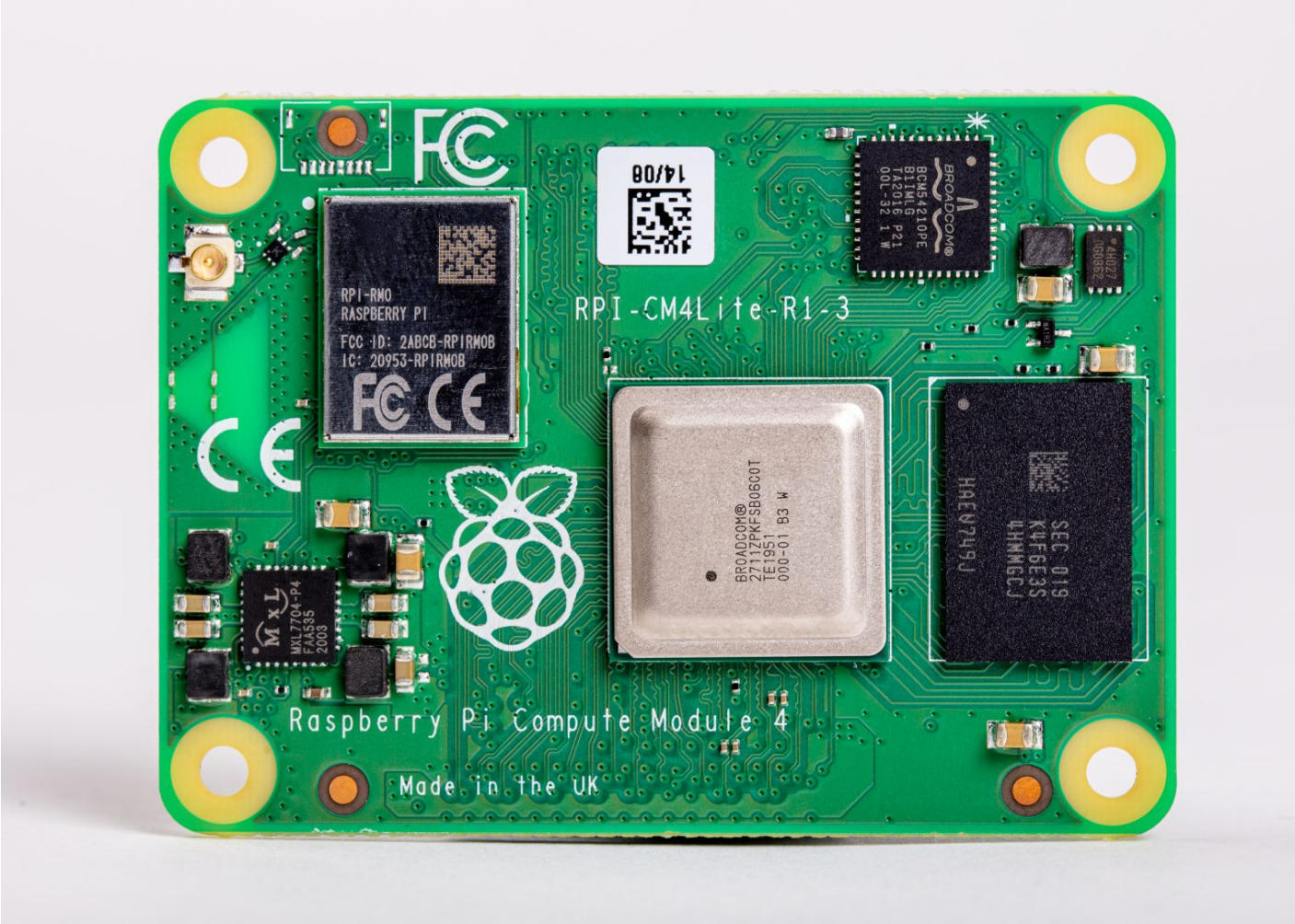
Today October 19th 2020 has seen the long awaited release of the Raspberry Pi Compute module 4. It has come as no surprise since the release of the Raspberry Pi 4 and generally each compute module had followed suit and used the same on-board chip and features.

The board uses the same 64-bit quad-core BCM2711 processor, which is the same that is used on the Raspberry Pi 4 but has had some additional tweaks in its performance per core. Unlike the previous model of the Compute Module, this Compute Module 4 has a new compact form factor, which is a real shame as current industrial boards out in the market will require a complete re-design if wanted to update to the Compute Module 4. Having said that the new board design offers a more compact design as well as some new features such as on-board Wi-Fi, which could result in a significant cost saving depending on the industrial application type.

https://youtu.be/myAAn-XiG-0

Specification

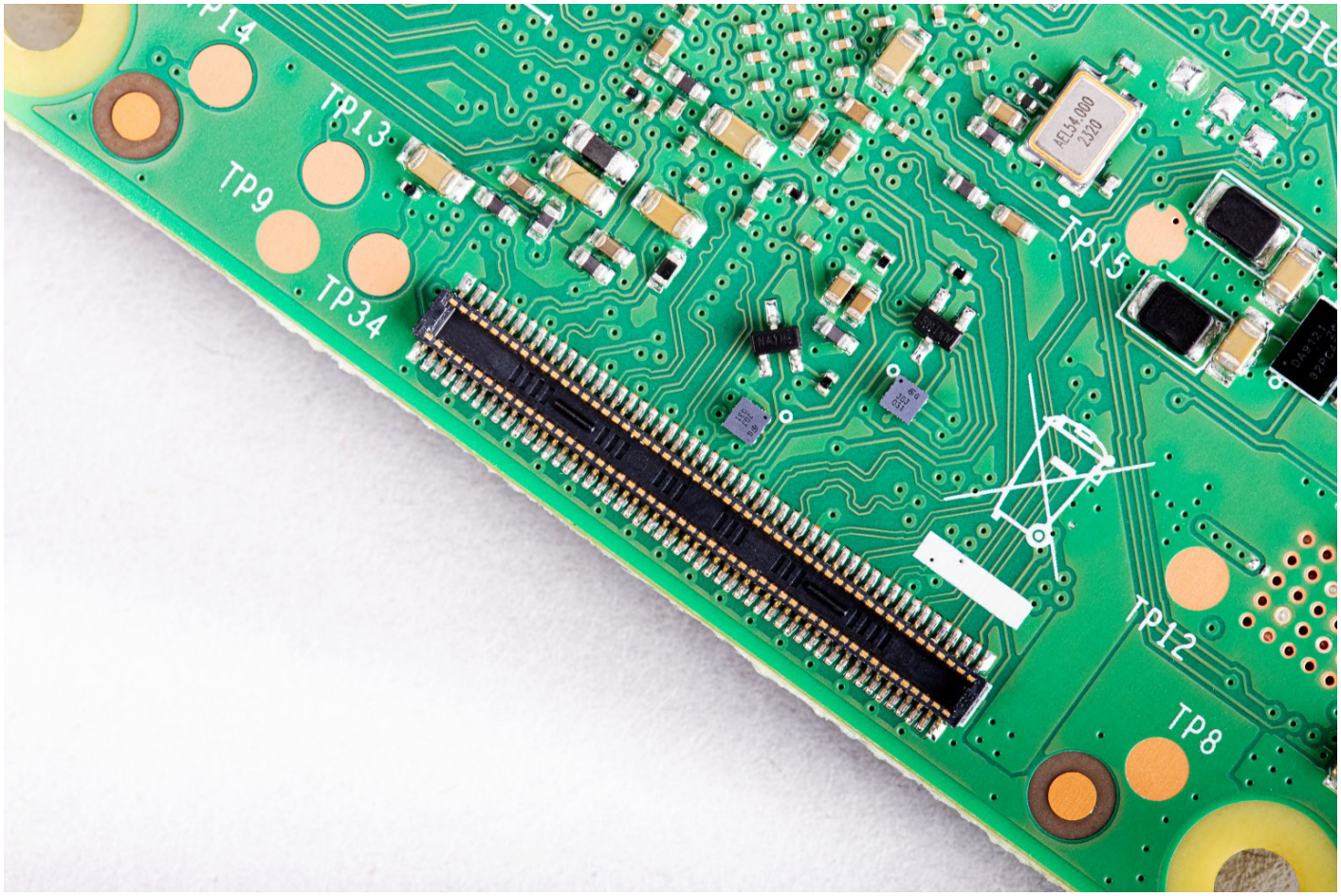
- 1.5GHz quad-core 64-bit ARM Cortex-A72 CPU
- VideoCore VI graphics, supporting OpenGL ES 3.x
- 4Kp60 hardware decode of H.265 (HEVC) video
- 1080p60 hardware decode, and 1080p30 hardware encode of H.264 (AVC) video
- Dual HDMI interfaces, at resolutions up to 4K
- Single-lane PCI Express 2.0 interface
- Dual MIPI DSI display, and dual MIPI CSI-2 camera interfaces
- 1GB, 2GB, 4GB or 8GB LPDDR4-3200 SDRAM
- Optional 8GB, 16GB or 32GB eMMC Flash storage
- Optional 2.4GHz and 5GHz IEEE 802.11b/g/n/ac wireless LAN and Bluetooth 5.0
- Gigabit Ethernet PHY with IEEE 1588 support
- 28 GPIO pins, with up to 6 × UART, 6 × I2C and 5 × SPI



Compute Module 4 Lite Board

The New Changes

As mentioned previously the biggest change to the new Compute Module 4 is the form factor, which is more compact. Unlike the previous Compute Modules which had a SODIMM style connector, just like old RAM slots, the new board has two high-density perpendicular connectors underneath the board which would slot into a carrier board. On one side the connector provide power and on the other IO pins. This method would also require the board to be mounted using screws to the carrier board, which begs the question why not just keep the same form factor? It was much easier to hot swap module between devices and now we have to fiddle around with screws and standoffs?



High-density connector

A welcomed feature on some of the variants on the Compute Module 4 is the option to have wireless communication, in particular an external Wi-Fi antenna or a built-in PCB antenna. Most industrial boards would be housed in a rugged case for their respected industries so its important that a Wi-Fi signal is able to penetrate the case or have the ability to add an external antenna.

Personally I can't imagine most industrial boards having Wi-Fi since it can be wholly unreliable and costly, with most industries still relying on good old Ethernet or in some case Power over Ethernet. Never the less having the option of Wi-Fi adds more flexibility in the design process.

Compute Module 4 with Antenna

The Raspberry Pi foundation had also made available the single-lane PCI Express 2.0 interface. This was actually a feature on the Raspberry Pi 4 but wasn't available to the average user. Check out this guide here on how a user managed to utilise the feature on the Pi 4 - http://mloduchowski.com/en/blog/raspberry-pi-4-b-pci-express/

Variants

There are a whopping 32 variants of the Compute Module 4 board. With 4 RAM options, 4 flash options and optional wireless connectivity, this creates 32 boards. The price of these boards would

range from $25 to 90$ per module. The Raspberry Pi foundation has also stated that the Compute Module 4 will remain in production until at least January 2028, however it is unknown if all those variants will be available.

You can find a full price list here

Summary

The Raspberry Pi foundation has definitely shaken things up with the new Compute Module 4 and it seems they have a clear vision on the direction they want to move to by having a compact form factor and adding new features. The 32 variants definitely adds so much flexibility in design terms and design engineers will welcome this. It is rumoured that this could be the last board that features the Broadcom chip as they possibly will be moving over to RISC V architecture having registered as a member in early 2019. Could we also see a system-in-package design like the BeagleBone?