
Radxa ROCK 4C+ Product Brief

Single Board Computer with dual HDMI

Revision 1.9

2023-02-02



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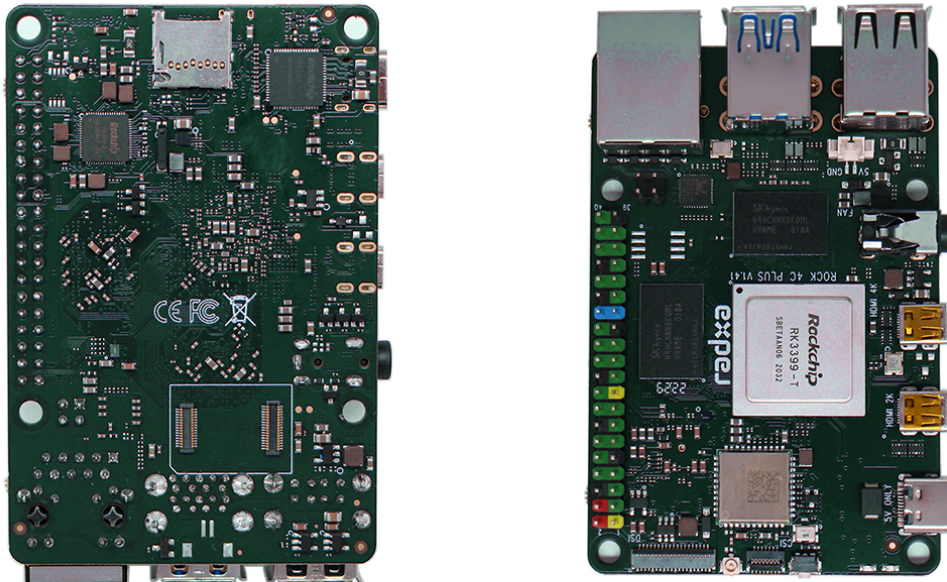
1 Revision Control Table

| Version | Date | Changes from previous version |
|---------|------------|---|
| 1.0 | | |
| 1.1 | | |
| 1.2 | | |
| 1.3 | 23/09/2002 | First Radxa OKdo version |
| 1.4 | 24/10/2022 | Update software content |
| 1.5 | 26/10/2022 | Add compliance symbols |
| 1.6 | 09/11/2022 | Fix incorrect HDMI resolution description |
| 1.7 | 09/11/2022 | Add IMDA compliance symbol |
| 1.8 | 24/11/2022 | Add HK compliance symbol. Add audio information |
| 1.9 | 02/02/2023 | Add JP compliance symbol. Add audio information |

2 Introduction

The Radxa ROCK 4C+ is a Single Board Computer (SBC) in a credit card sized form factor packed with a wide range of class-leading functionality, features and expansion options. The Radxa ROCK 4C+ is an ideal choice for anyone from hobbyists to professionals who need an extremely highly specified platform with outstanding reliability. OKdo offers this board in various memory options including:

- 4GB LPDDR4 RAM.



Note: The actual board layout or chips location may change during the time but the main connectors type and location will remain the same

3 Features

3.1 Hardware

- Rockchip RK3399-T SoC

- Arm® big.LITTLE™ technology (Dual Cortex® A72 frequency 1.5GHz and a Quad Cortex A53 frequency 1.0GHz)
- Arm Mali™ T860MP4 GPU, supporting
 - OpenGL® ES 1.1 /2.0 /3.0 /3.1 /3.2
 - Vulkan® 1.0
 - Open CL® 1.1 1.2
 - DirectX® 11.1
- Dual Arm Cortex – M0
- Dual channel 4GB 64bit LPDDR4
- eMMC connectors
- Display supporting mirror and extended modes
 - Dual micro HDMI
 - MIPI DSI
- H.265/VP9 (HEVC) hardware decode (up to 4Kp60)
- H.264 hardware decode (up to 1080p60)
- USB Type-C™ power input

3.2 Interfaces

- 802.11 b/g/n/ac (WiFi 5) Wireless LAN
- Bluetooth 5.0 with BLE
- 1x micro SD card slot
- 2x HDMI ports supporting displays up to 4Kp60 resolution and 2Kp60
- 2x USB2 HOST ports
- 1x USB3 OTG/HOST port, 1x USB3 HOST port
- 1x Gigabit Ethernet port (supports PoE with add-on PoE HAT)
- 1x camera port (2-lane MIPI CSI)
- 1x display port (4-lane MIPI DSI)
- 40x user GPIO supporting a wide range of interface options:
 - 2 x UART
 - 2 x SPI bus
 - 2 x I2C bus
 - 1 x PCM/I2S
 - 1 x SPDIF

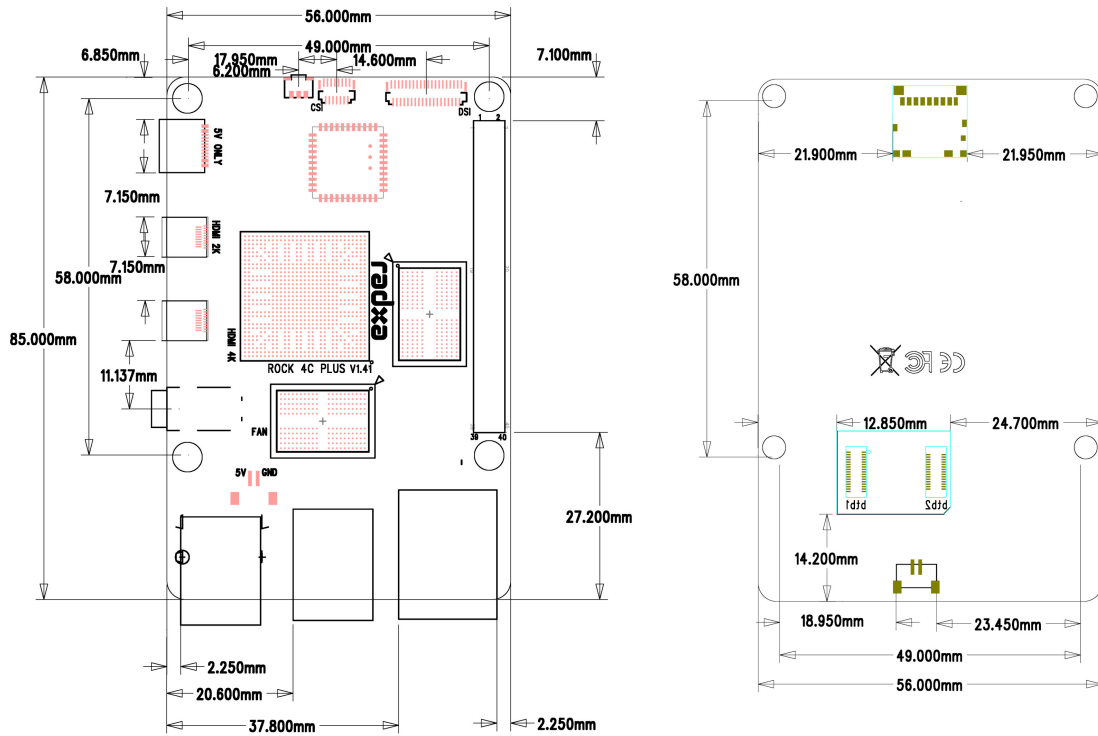
- 1 x PWM
- 1 x ADC
- 6 x GPIO
- 2 x 5V DC power in
- 2 x 3.3V power pin

3.3 Software

- Full implementation of the Arm architecture v8-A instructions set, Arm NEON Advanced SIMD (single instructions, multiple data) support for accelerating media and signal processing
- Armv8 cryptography extensions
- TrustZone® technology support
- Debian/Ubuntu Linux support
- Android 7.1/Android 9.0/Android 10/Android 11 support
- GPU enabled AI stack, (eg. Caffe)
- Hardware access/control library for Linux/Android

Software images can be downloaded from: <https://wiki.radxa.com/Rockpi4/downloads>

4 Mechanical Specification



5 Electrical Specification

5.1 Power Requirements

The Radxa ROCK 4C+ is powered with a 5V source.

- USB C 5V/3A
- 5V Power applied to the GPIO PIN 2 & 4

The recommended power source capacity is at least 5V/3A.

5.2 GPIO Voltage

| GPIO | Voltage Level | Tolerance |
|------------|---------------|-----------|
| GPIO3_C0 | 3.3V | 3.465V |
| ADC_IN0 | 1.8V | 1.98V |
| Other GPIO | 3.0V | 3.14V |

6 Operating Conditions

The Radxa ROCK 4C+ has been designed to operate between 0°C to 50°C.

This temperature range was defined based on typical usage where the efficient use of Arm big.LITTLE technology can automatically select which processor core to utilise for a given task, the result of which is minimal heat generation and responsive user experience.

The Radxa ROCK 4C+ is built on a high-performance mobile chipset which is designed to operate for extended durations on batteries with efficiency at its core. As with all electronic devices heat is a by-product of operation which increases with performance and workload; during basic use cases such as web browsing, editing text or listening to music the SoC will automatically select the smallest processors available or dedicated hardware accelerators to reduce heat generation thus reserving the higher performance processors and thermal window for demanding tasks as and when required.

The SoC (RK3399-T) is specified to limit its maximum internal temperature to 80°C before throttling the clock speeds to maintain reliability within the allowed temperature range. If the Radxa ROCK 4C+ is intended to be used continuously in high performance applications, it may be necessary to use external cooling methods (for example, heat sink, fan, etc.) which will allow the SoC to continue running at maximum clock speed indefinitely below its pre-defined 80°C peak temperature limiter.

7 Peripherals

7.1 GPIO Interface

The Radxa ROCK 4C+ offers a 40P GPIO expansion header which provides extensive compatibility with a wide range of accessories developed for the SBC market.

7.1.1 GPIO Alternate Functions

| GPIO number | Function2 | Function1 | GPIO | Pin# | Pin# | GPIO | Function1 | Function2 | GPIO number |
|-------------|-----------|----------------------|----------|------|------|----------|----------------------|------------------------|-------------|
| | | +3.3V | | 1 | 2 | | +5.0V | | |
| 71 | | I2C7_SDA | GPIO2_A7 | 3 | 4 | | +5.0V | | |
| 72 | | I2C7_SCL | GPIO2_B0 | 5 | 6 | | GND | | |
| 75 | | SPI2_CLK | GPIO2_B3 | 7 | 8 | GPIO4_C4 | UART2_TXD | | 148 |
| | | GND | | 9 | 10 | GPIO4_C3 | UART2_RXD | | 147 |
| 146 | | PWM0 | GPIO4_C2 | 11 | 12 | GPIO4_A3 | I2S1_SCLK | | 131 |
| 150 | | PWM1 | GPIO4_C6 | 13 | 14 | | GND | | |
| 149 | | SPDIF_TX | GPIO4_C5 | 15 | 16 | GPIO4_D2 | | | 154 |
| | | +3.3V | | 17 | 18 | GPIO4_D4 | | | 156 |
| 40 | UART4_TXD | SPI1_TXD | GPIO1_B0 | 19 | 20 | | GND | | |
| 39 | UART4_RXD | SPI1_RXD | GPIO1_A7 | 21 | 22 | GPIO4_D5 | | | 157 |
| 41 | | SPI1_CLK | GPIO1_B1 | 23 | 24 | GPIO1_B2 | SPI1_CS _n | | 42 |
| | | GND | | 25 | 26 | | ADC_IN0 | | |
| 64 | | I2C2_SDA | GPIO2_A0 | 27 | 28 | GPIO2_A1 | I2C2_CLK | | 65 |
| 74 | I2C6_SCL | SPI2_TXD | GPIO2_B2 | 29 | 30 | | GND | | |
| 73 | I2C6_SDA | SPI2_RXD | GPIO2_B1 | 31 | 32 | GPIO3_C0 | SPDIF_TX | UART3_CTS _n | 112 |
| 76 | | SPI2_CS _n | GPIO2_B4 | 33 | 34 | | GND | | |
| 133 | | I2S1_LRCK_TX | GPIO4_A5 | 35 | 36 | GPIO4_A4 | I2S1_LRCK_RX | | 132 |
| 158 | | | GPIO4_D6 | 37 | 38 | GPIO4_A6 | I2S1_SDI | | 134 |
| | | GND | | 39 | 40 | GPIO4_A7 | I2S1_SDO | | 135 |

Please note that pin 3, 5, 27, 28, 29 and 31 have a 4K7 pull up resistor to 3V.

7.2 eMMC Socket

The Radxa ROCK 4C+ offers a high speed eMMC socket for eMMC modules which can be used for OS and data storage. The eMMC socket is compatible with readily available industrial pinout and form factor hardware.

7.3 Camera and Display Interfaces

The Radxa ROCK 4C+ has 1x 2-lane MIPI CSI Camera and 1x 4-lane MIPI DSI Display connector. The connector pitch is 0.3mm, for camera/display module with 1mm pitch FPC, a 0.3mm to 1mm FPC cable is required.

7.4 USB

The Radxa ROCK 4C+ has 2x USB2 HOST, 1x USB3 HOST and 1x USB3 OTG/HOST type-A sockets. Downstream USB current is limited to approximately 2.8A in aggregate over the

four sockets. The middle upper USB3 port provides USB3 OTG function which can be configured as HOST or Device mode by software.

The two native speed USB 2 HOST ports are powered from a shared regulator which also provides power to the lower USB 3 port. The cumulative power output across these three ports is 1.44A. The board also has two USB 3 HOST ports which are driven directly from the RK3399-T SoC which means they can also run at full native speed. The upper USB 3 port can be configured to OTG mode through software.

7.5 HDMI

The Radxa ROCK 4C+ has 2x micro HDMI ports. One supports CEC (Consumer Electronics Control, a feature of HDMI designed to control HDMI connected devices by using only one remote controller) . The port closest to the USB power connector is capable of resolutions up to 2Kp60 and the port closest to the audio jack is capable of 4Kp60.

7.6 Audio Jack

The Radxa ROCK 4C+ supports high quality analogue audio output via a 3 ring (ground sleeve, stereo-right ring and stereo-left tip) 3.5mm headphone jack. The analogue audio output can drive 32 Ohm headphones directly.

7.7 Temperature Range and Thermals

The recommended ambient operating temperature range is 0°C to 50°C.

To reduce thermal output when idling or under light load, the Radxa ROCK 4C+ reduces the CPU clock speed and voltage. During heavier loads the speed and voltage (and hence thermal output) are increased. The internal governor will throttle back both the CPU speed and voltage to ensure the CPU temperature never exceeds 85°C.

The Radxa ROCK 4C+ will operate perfectly well without any additional cooling and is designed for sprint performance - expecting a light use case on average then ramping up the CPU speed when needed (e.g. when loading a webpage). If a user wishes to load the system continually or operate it at a high temperature at full performance, further cooling may be needed.

7.8 Fan Connector

The Radxa ROCK 4C+ has a 2pin 1.25mm header that enables users to connect a 5V fan (or other peripheral). The fan can be PWM controlled without speed feedback.

8 Availability

Radxa guarantees availability of the Radxa ROCK 4C+ until at least September 2029.

9 Support

For support please see the hardware documentation section of the [Radxa Wiki](#) website and post questions to the [Radxa forum](#).

