
Radxa ROCK 4B+ Product Brief

High Performance 4K Single Board Computer

Revision 1.1

2022-11-3



Contents

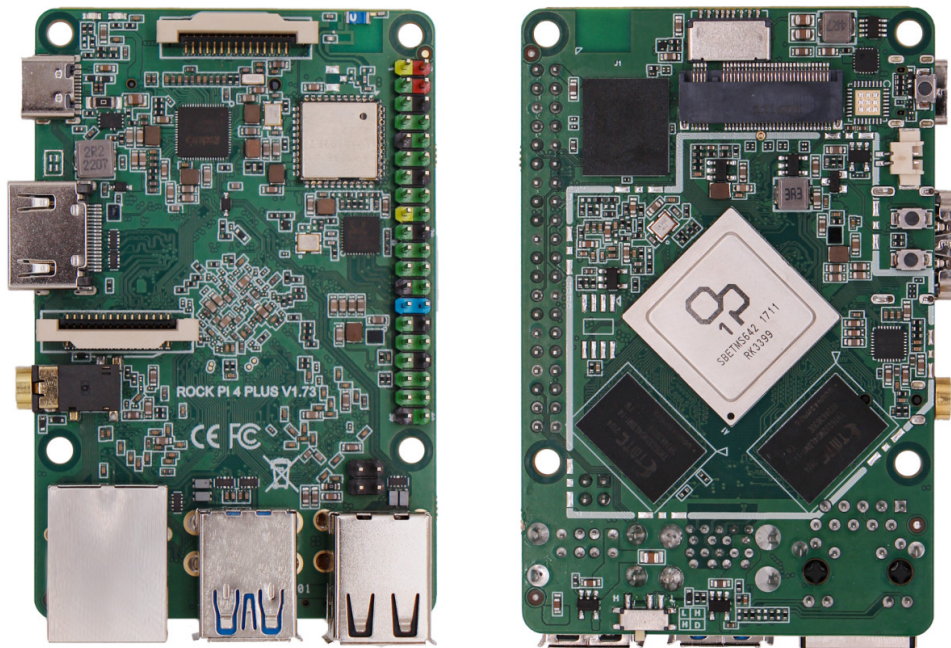
- 1 Revision Control Table 2
- 2 Introduction 3
- 3 Features 3
 - 3.1 Hardware 3
 - 3.2 Interfaces 4
 - 3.3 Software 5
- 4 Mechanical Specification 5
- 5 Electrical Specification 6
 - 5.1 Power Requirements 6
 - 5.2 GPIO Voltage 6
- 6 Operating Conditions 6
- 7 Peripherals 7
 - 7.1 GPIO Interface 7
 - 7.1.1 GPIO Alternate Functions 7
 - 7.2 Camera and Display Interfaces 8
 - 7.3 USB 8
 - 7.4 HDMI 8
 - 7.5 Audio Jack 8
 - 7.6 M.2 Connector 8
- 8 Order Info 9
- 9 Availability 9
- 10 Support 9

1 Revision Control Table

| Version | Date | Changes from previous version |
|---------|------------|---------------------------------|
| 1.0 | 26/10/2022 | First version with new template |
| 1.1 | 3/11/2022 | Add order info |

2 Introduction

The Radxa ROCK 4B+ 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 4B+ is an ideal choice for anyone from hobbyists to professionals who need an extremely highly specified platform with outstanding reliability. Radxa offers this board in various memory and storage options.



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

3 Features

3.1 Hardware

- Rockchip OP1 SoC
- Arm® big.LITTLE™ technology (Dual Cortex® A72 frequency 2.0GHz and a Quad Cortex A53 frequency 1.6GHz)

- 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
- High performance on board eMMC with 8GB, 16GB, 32GB, 64GB, 128GB options
- Display supporting mirror and extended modes
 - HDMI
 - MIPI DSI
- H.265/VP9 (HEVC) hardware decode (up to 4Kp60)
- H.264 hardware decode (up to 1080p60)
- USB Type-C™ PD/QC power input

3.2 Interfaces

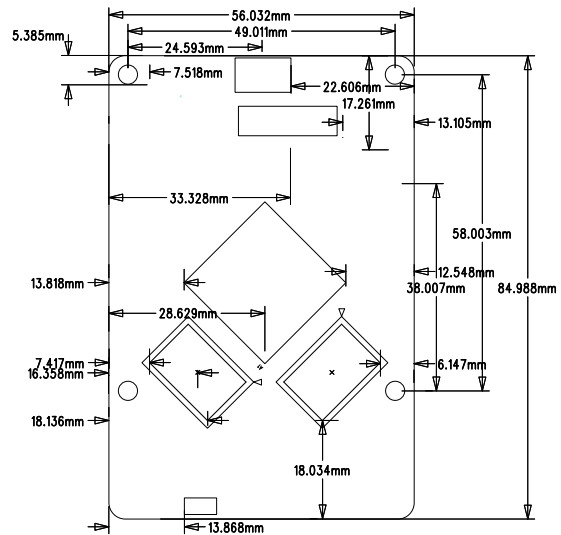
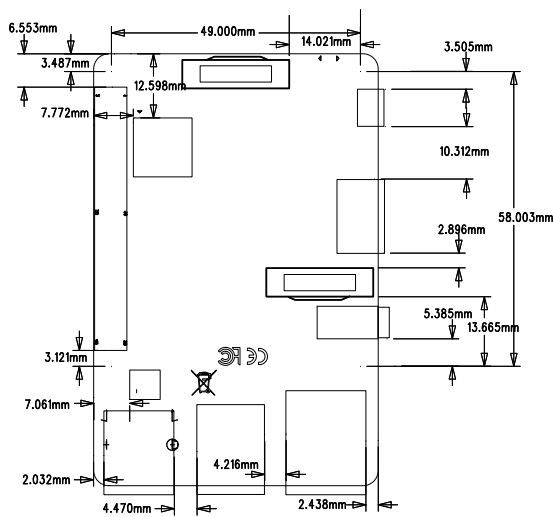
- 802.11 b/g/n/ac (WiFi 5) Wireless LAN
- Bluetooth 5.0 with BLE
- 1x micro SD card slot
- 1x HDMI ports supporting displays up to 4Kp60 resolution
- 2x USB2 HOST ports
- 1x USB3 OTG/HOST port, 1x USB3 HOST port
- 1x Gigabit Ethernet port (supports PoE with add-on PoE HAT)
- 1x camera port (2-lane MIPI CSI)
- 1x display port (4-lane MIPI DSI)
- 1x maskrom button
- 1x reset button
- 1x recovery button
- 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/Rock4/downloads>

4 Mechanical Specification



5 Electrical Specification

5.1 Power Requirements

The ROCK 4B+ supports various power supply technologies including smart power adapter as well as fixed voltage:

- USB Type-C[™] PD 2.0, 9V/2A, 12V/2A
- Qualcomm[®] Quick Charge[™] 2.0 QC3.0/2.0 adapter, 9V/2A, 12V/1.5A
- Power adapter with fixed voltage in 6V to 12V range on the USB C power port
- 5V Power applied to the GPIO PIN 2 & 4

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 4B+ 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 4B+ 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 (Rockchip OP1) 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 4B+ 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 prede- fined 80°C peak temperature limiter.

7 Peripherals

7.1 GPIO Interface

The Radxa ROCK 4B+ 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 Camera and Display Interfaces

The ROCK 4B+ has 1x 2-lane MIPI CSI Camera and 1x 2-lane MIPI DSI Display connector. These connectors are backwards compatible with standard industrial camera and display peripherals.

7.3 USB

The ROCK 4B+ is equipped with 4 USB ports.

There are two native speed USB 2 HOST ports 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 OP1 SoC which means they can also run at full native speed(5Gbps). The upper USB 3 port can be configured to OTG mode by moving the slide switch located on the underside of the board below the USB ports. Power to the upper USB 3 port is driven directly by a regulator which can provide up to 1.44A current.

7.4 HDMI

The ROCK 4B+ has 1x full-sized HDMI port, which supports CEC (Consumer Electronics Control, a feature of HDMI designed to control HDMI connected devices by using only one remote controller) and HDMI 2.0 with UHD resolution up to 4Kp60 (~ 3840 x 2160 px)

7.5 Audio Jack

The ROCK 4B+ supports high quality analogue audio output via a 4-ring 3.5mm headphone jack. The analog audio output can drive 32 Ohm headphones directly. The audio jack also supports microphone input as default.

7.6 M.2 Connector

The ROCK 4B+ offers a M.2 M Key connector with 4-lan PCIe 2.1 interface, providing high speed M.2 NVMe SSD expansions, M.2 SATA SSD is not supported.

8 Order Info

ROCK 4B+ offers the following models and configurations:

| CPU | PoE | SPI Flash | WiFi/BT | Antenna | RAM | EMMC | Model |
|-----|---------|-----------|---------|----------|-----|-------|------------------------------|
| OP1 | Support | N/A | AP6256 | On board | 2GB | 16GB | RS114B-V173-D2E16P1R3S0T0W1 |
| | | | | | 4GB | 16GB | RS114B-V173-D4E16P1R3S0T0W1 |
| | | | | | | 32GB | RS114B-V173-D4E32P1R3S0T0W1 |
| | | | | | | 64GB | RS114B-V173-D4E64P1R3S0T0W1 |
| | | | | | | 128GB | RS114B-V173-D4E128P1R3S0T0W1 |
| | | | | External | 2GB | 16GB | RS114B-V173-D2E16P1R3S0T1W1 |
| | | | | | 4GB | 16GB | RS114B-V173-D4E16P1R3S0T1W1 |
| | | | | | | 32GB | RS114B-V173-D4E32P1R3S0T1W1 |
| | | | | | | 64GB | RS114B-V173-D4E64P1R3S0T1W1 |
| | | | | | | 128GB | RS114B-V173-D4E128P1R3S0T1W1 |

9 Availability

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

10 Support

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

