Product Brief

# Radxa ROCK 3C Product Brief

## Well established form factor Single Board Computer

Revision 1.3

2022-12-19

Radxa Computer

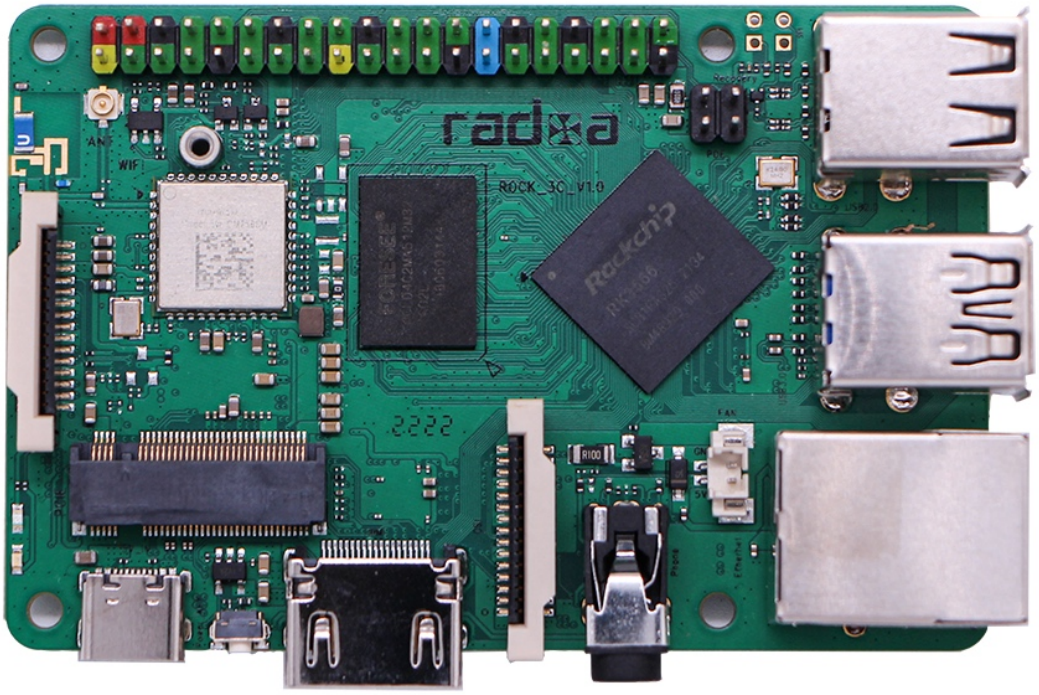
# Contents

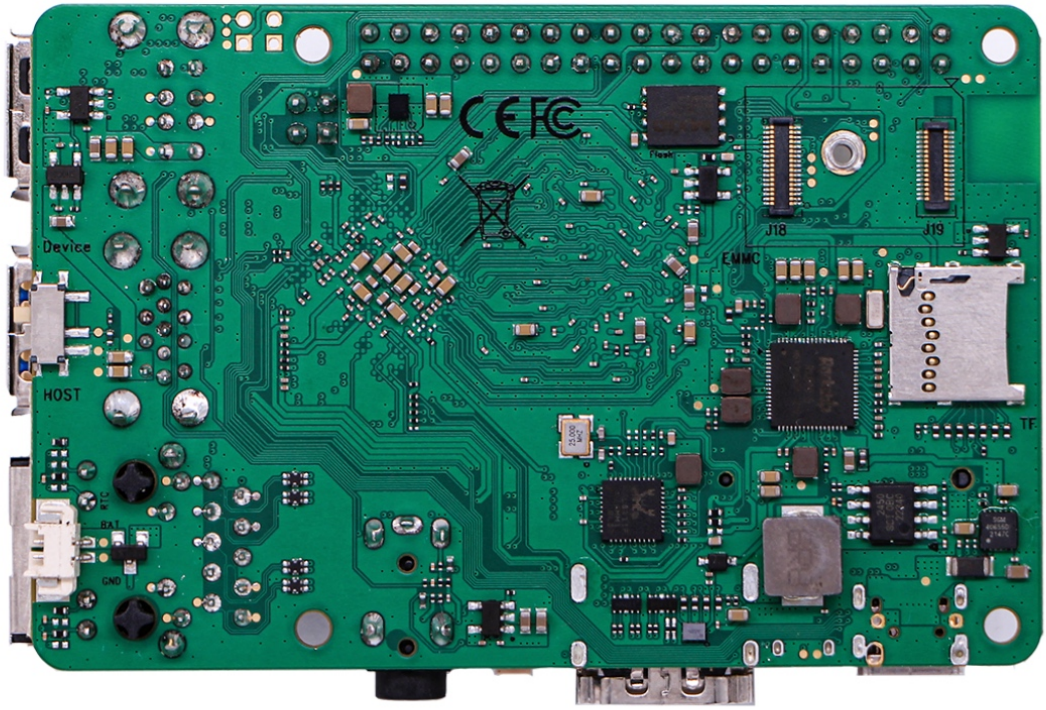
# 1 Revision

| Version | Date | Changes from previous version |
|---|---|---|
| 1.0 | 16/11/2022 | First version |
| 1.1 | 19/11/2022 | Update GPIO table, remove can bus support |
| | | Use new product brief cover |
| 1.2 | 08/12/2022 | Improve readability |
| 1.3 | 19/12/2022 | Add USB 2.0 information |
| | | eMMC maximum size |

## 2 Introduction

Radxa ROCK 3C is a Single Board Computer (SBC) in an ultra-small form factor that offers class-leading performance while leveraging outstanding mechanical compatibility. Radxa ROCK 3C offers makers, IoT enthusiasts, hobbyists, PC DIY enthusiasts and others a reliable and extremely capable platform for building and tinkering their ideas into reality.






# 3 Features

## 3.1 Hardware

- Rockchip RK3566 SoC
- Quad-core Arm® Cortex®-A55 (ARMv8) 64-bit @ 1.6GHz
- Arm Mali™-G52-2EE, OpenGL® ES1.1/2.0/3.2, Vulkan® 1.1, OpenCL™ 2.0
- NPU 0.8 TOPs@INT8, support INT8, INT16, FP16, BFP16, support deep learning frameworks such as TensorFlow, Caffe, Tflite, Pytorch, Onnx, Android™ NN, etc
- 1GB LPDDR4 available at lunch.  Possibility of building a 2/4GB LPDDR4 memory on request
- Storage is supported by eMMC storage, micro SD card and SSD through the M.2 connector
- Display via HDMI or MIPI DSI. They can not work at the same time
- H.264/H.265 decoder up to 4K@60fps

- H.264/H.265 encoder up to 1080@60fps

## 3.2 Interfaces

- 802.11 b/g/n/ac Wireless LAN supporting WiFi 5
- BT 5.0
- 1x HDMI 2.0 port supporting displays up to 4K@60fps resolution
- 1x SD Card slot
- 2x USB2 HOST ports
- 1x USB2 OTG/HOST port
- 1x USB3 HOST port
- 1x Gigabit Ethernet port. It supports PoE with add-on PoE HAT
- 1x M.2 M-Key connector for NVMe SSD or SATA SSD
- 1x camera port supporting 2-lane MIPI CSI
- 1x display port supporting 2-lane MIPI DSI
- 3.5mm jack with microphone. The HD codec supports up to 24-bit/96KHz audio
- 40x user GPIO supporting various interface options:
  - up to 5 x UART
  - 1 x SPI bus
  - up to 2 x I2C bus
  - 1 x PCM/I2S
  - up to 6 x PWM
  - up to 28 x GPIO
  - 2 x 5V DC power in
  - 2 x 3.3V power pin

## 3.3 Software

- ARMv8 Instruction Set
- Debian/Ubuntu Linux support
- Android 11 support
- Hardware access/control library for Linux/Android

# 4 Electrical Specification

## 4.1 Power Requirements

Radxa ROCK 3C can only be powered by +5V.

- USB Type-C® 5V
- 5V Power from the GPIO PIN 2 & 4

The recommended power source capacity is at least 5V/3A without M.2 SSD or 5V/4A using with M.2 SSD.

## 4.2 GPIO Voltage

| GPIO | Voltage Level | Tolerance |
|---|---|---|
| All GPIO | 3.3V | 3.63V |

# 5 Peripherals

## 5.1 GPIO Interface

Radxa ROCK 3C offers 40P GPIO expansion which is compatible with most accessories on the market.

### 5.1.1 GPIO Alternate Functions

| Function5 | Function4 | Function3 | Function2 | Function1 | Pin# | Pin# | Function1 | Function2 | Function3 | Function4 | Function5 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | +3.3V | 1 | 2 | +5.0V | | | | |
| | | I2C3_SDA_M0 | UART3_RX_M0 | GPIO1_A0 | 3 | 4 | +5.0V | | | | |
| | | I2C3_SCL_M0 | UART3_TX_M0 | GPIO1_A1 | 5 | 6 | GND | | | | |
| | PWM14_M0 | | | GPIO3_C4 | 7 | 8 | GPIO0_D1 | UART2_TX_M0 | | | |
| | | | | GND | 9 | 10 | GPIO0_D0 | UART2_RX_M0 | | | |
| | | | | GPIO3_A1 | 11 | 12 | GPIO3_A3 | | | | I2S3_SCLK_M0 |
| | I2S3_MCLK_M0 | | | GPIO3_A2 | 13 | 14 | GND | | | | |
| | | | | GPIO3_B0 | 15 | 16 | GPIO3_B1 | UART4_RX_M1 | PWM8_M0 | | |
| | | | | +3.3V | 17 | 18 | GPIO3_B2 | UART4_TX_M1 | PWM9_M0 | | |
| | PWM15_IR_M1 | I2S3_SCLK_M1 | SPI3_MOSI_M1 | GPIO4_C3 | 19 | 20 | GND | | | | |

| Function5 | Function4 | Function3 | Function2 | Function1 | Pin# | Pin# | Function1 | Function2 | Function3 | Function4 | Function5 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| UART9_TX_M1 | PWM12_M1 | I2S3_SDO_M1 | SPI3_MISO_M1 | GPIO4_C5 | 21 | 22 | GPIO3_C1 | | | | I2S1_SDO2_M2 |
| | PWM14_M1 | I2S3_MCLK_M1 | SPI3_CLK_M1 | GPIO4_C2 | 23 | 24 | GPIO4_C6 | SPI3_CS0_M1 | PWM13_M1 | UART9_RX_M1 | I2S3_SDI_M1 |
| | | | | GND | 25 | 26 | GPIO4_D1 | SPI3_CS1_M1 | | | |
| | I2C4_SDA_M0 | I2S2_SDI_M1 | | GPIO4_B2 | 27 | 28 | GPIO4_B3 | | | I2C4_SCL_M0 | I2S2_SDO_M1 |
| | | | | GPIO3_B3 | 29 | 30 | GND | | | | |
| | | | | GPIO3_B4 | 31 | 32 | GPIO3_C2 | UART5_TX_M1 | | | I2S1_SDO3_M2 |
| UART5_RX_M1 | | I2S1_SCLK_RX_M2 | | GPIO3_C3 | 33 | 34 | GND | | | | |
| | | I2S3_LRCK_M0 | | GPIO3_A4 | 35 | 36 | GPIO3_A7 | | | | |
| | | I2S1_SCLK_RX_M0 | | GPIO1_A4 | 37 | 38 | GPIO3_A6 | | | | I2S3_SDI_M0 |
| | | | | GND | 39 | 40 | GPIO3_A5 | | | | I2S3_SDO_M0 |

## 5.2 eMMC Module Connector

ROCK 3C 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. The maximum eMMC size supported is 128GB.

## 5.3 Camera and Display Interfaces

Radxa ROCK 3C has 1x 2-lane MIPI CSI camera connector and 1x 2-lane MIPI DSI display connector. These connectors are backwards compatible with standard industrial camera and display peripherals.

## 5.4 USB

Radxa ROCK 3C has two USB2 HOST connectors, one USB3 HOST connector and one USB2 OTG/HOST connector. The board has a hardware switch to set the USB2 operation to either HOST or OTG. The power output across these ports is 2.8A in aggregate over the four connectors.

## 5.5 HDMI

Radxa ROCK 3C has one HDMI port supporting CEC and HDMI 2.0 with resolutions up to 4Kp60.

## 5.6 Audio Jack

The ROCK 3C supports near-CD-quality analogue audio output via a 4-ring 3.5mm headphone jack. The HD codec supports up to 24 bit at 96Hz. The analog audio output can drive 32 Ohm headphones directly. The headphone jack also supports a mic line input.

## 5.7 M.2 Connector

Radxa ROCK 3C offers a M.2 M-Key 2230 connector with PCIe 2.1 1-lane and SATA 3.0 combo interfaces, providing high speed storage access. The M.2 M-Key can be configured either to support NVMe SSD or SATA devices, an additional adapter board is required for SATA support.

## 5.8 Operating Conditions

The ROCK 3C has been designed to operate between 0°C to 50°C.

The ROCK 3C 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 dedicated hardware accelerators to reduce heat generation.

Radxa ROCK 3C limits its SoC maximum internal temperature to 85°C before throttling the clock speeds to maintain reliability within the allowed temperature range. If the ROCK 3C 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 predefined 85°C peak temperature limiter.

## 5.9 Fan Connector

Radxa ROCK 3C has a 2pin 1.25mm header that enables users to connect to a 5V fan (or other peripheral). The fan can be PWM controlled without speed feedback.

## 6 Availability

Radxa guarantees availability of the ROCK 3C until at least September 2032.

## 7 Support

For support, please see the hardware documentation section of the Radxa Wiki website and post questions to the Radxa forum. For any commercial questions, contact us at https://www.okdo.com/contact-support/