radxa ROCK 5C 8K Credit Card Sized Single Board Computer User Guide

Contents

ROCK 5C 8K Credit Card Sized Single Board Computer

Radxa ROCK 5C Product Brief
8K Credit Card-Sized Single Board Computer

Revision 1.0
2024-03-24

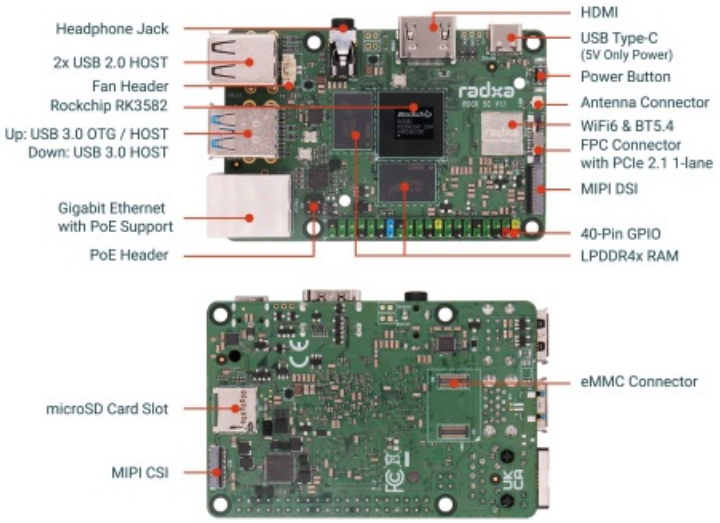
1 Revision Control Table

Version	Date	Changes from previous version
1.0	2024/03/24	First version

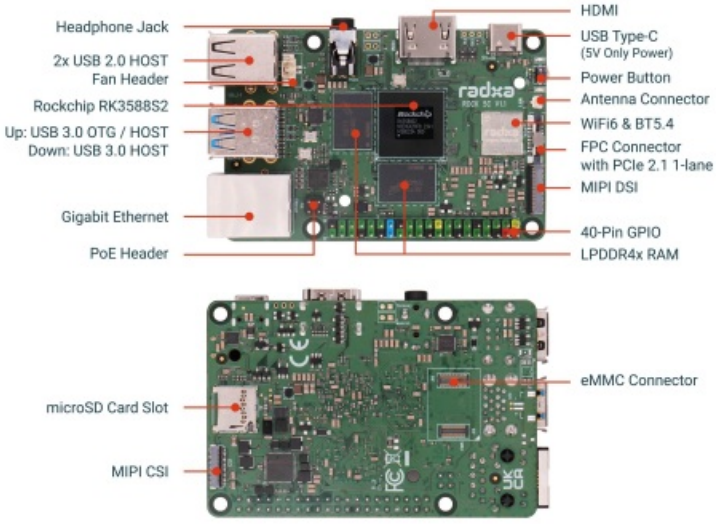
2 Introduction

The Radxa ROCK 5C is a Single Board Computer (SBC) in a compact form factor packed with a wide range of class-leading functionality, features and expansion options. The ROCK 5C is an ideal choice for makers, IoT enthusiasts, hobbyists, gamers, PC users and everyone who need an extremely highly specified platform with outstanding performance and reliability. Radxa ROCK 5C offers two versions: one is the Radxa ROCK 5C Lite based on RK3582, and the other is based on RK3588S2.

2.1 Radxa ROCK 5C Lite



2.2 Radxa ROCK 5C



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

3 Features
3.1 Hardware

	ROCK 5C	ROCK 5C Lite
SoC	Rockchip RK3588S2	Rockchip RK3582
CPU	Quad Cortex®-A76 and Quad Cortex®-A55	Dual Cortex®-A76 and Quad Cortex®-A55
GPU	Arm Mali-G610MC4	N/A
NPU	6TOPs@INT8	5TOPs@INT8
Memory	2GB / 4GB / 8GB / 16GB / 32GB LPDDR4x	1GB / 2GB / 4GB / 8GB / 16GB LPDDR4x
Multimedia	H.265 and VP9 decoder by 8K@60fps H.264 decoder by 8K@30fps AV1 decoder by 4K@60fps H.264 and H.265 encoder by 8K@30fps	H.264 and H.265 encoder by 4K@60fps

3.2 Interface

1x eMMC Connector

1x microSD Card Slot

1x Headphone Jack with Microphone Inpu

1x HDMI 2.1 supporting up to 8K

1x MIPI DSI supporting up 2K

1x 4-lane MIPI CSI or 2x 2-lane MIPI CSI

2x USB 2.0 Type-A HOST ports

1x USB 3.0 Type-A HOST port

1x USB 3.0 Type-A OTG / HOST port

1x Gigabit Ethernet port with PoE support(Additional PoE HAT Required) 1x FPC Connector with PCIe 2.1 1-lane

1x IEEE 802.11 a/b/g/n/ac/ax (WiFi 6) and BT 5.4 with BLE with External Antenna Con- nector

1x 2-Pin 1.25mm Fan Header

1x Power Button

40-Pin 0.1” (2.54mm) header supporting a wide range of interface options:

– Up to 5 x UART(2x with flow control)

– Up to 3 x SPI bus

– Up to 6 x I2C bus

– Up to 1 x PCM/I2S

– Up to 2 x SPDIF

– Up to 7 x PWM

– Up to 1 x CAN

– Up to 1 x ADC

– Up to 27 x GPIO

– 2 x 5V DC power in/out

– 2 x 3.3V power out

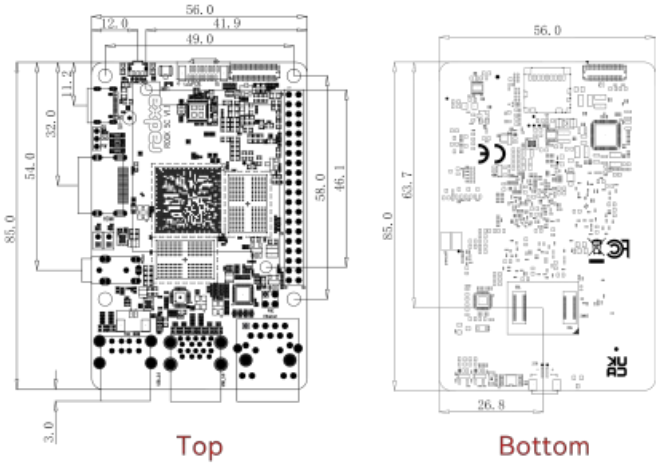
3.3 Software

ArmV8 Instruction Set

Debian/Ubuntu Linux support

Android 12 support

4 Mechanical Specification



5 Electrical Specification

5.1 Power Requirements

The ROCK 5C supports various power supply technologies including smart power adapter as well as fixed voltage:

Power adapter with fixed voltage in 5V range on the USB Type-C port 5V Power applied to the GPIO PIN 2 & 4

The recommended power source should be able to produce, at least, 10W without power consuming devices on USB 3 or 25W with full USB ports and PCIe 2.1 load.

5.2 GPIO Voltage

GPIO Voltage Level Tolerance

All GPIO 3.3V 3.63V

SARADC_IN5 3.3V 3.3V

6 Operating Conditions

The ROCK 5C 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 ROCK 5C 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 de- vices 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 (RK3582 / RK3588S2) 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 ROCK 5C is intended to be used continuously in high performance applica- tions, 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 80°C peak temperature limiter.

7 Peripherals

7.1 GPIO Interface

The ROCK 5C offers a 40 pin GPIO expansion header which provides extensive compatibility with a wide range of accessories developed for the SBC market.

7.1.1 GPIO Alternate Functions

Function6 Function5 Function4 Function3 Function2 Function1 Pin# Pin# Function1 Function2 Function3 Function4 Function5 Function6 Function7

+3.3V 1 2 +5.0V

UART6_RX SPI4_MISO I2C2_SDA GPIO1_A0 3 4 +5.0V

UART6_TX SPI4_MOSI I2C2_SCL GPIO1_A1 5 6 GND

PDM1_CLK1UART4_TX SPI0_CLK GPIO1_B3 7 8 GPIO0_B5 UART2_TX I2C1_SCL I2S1_MCLK

GND 9 10 GPIO0_B6 UART2_RX I2C1_SDA I2S1_SCLK

PWM0 UART6_RTS SPI4_CLK I2C4_SDA GPIO1_A2 11 12 GPIO4_A1 SPI0_MOSI UART9_CTS I2S1_SCLK

PWM1 UART6_CTS SPI4_CS0 I2C4_SCL GPIO1_A3 13 14 GND

I2S1_SDO3 SPDIF0_TX PWM11 UART9_TX GPIO4_B4 15 16 GPIO1_D6 I2C8_SCL UART1_RTS PWM14

+3.3V 17 18 GPIO1_D7 I2C8_SDA UART1_CTS PWM15

SPI2_MOSI GPIO1_A5 19 20 GND

SPI2_MISO GPIO1_A4 21 22 GPIO1_B5 SPI0_CS1 UART7_TX

SPI2_CLK GPIO1_A6 23 24 GPIO1_A7 SPI2_CS0 PDM1_SDI0 PWM3

GND 25 26 SARADC_VIN5

CAN1_TX I2S1_SDO2 PWM15 UART8_CTS I2C7_SDA GPIO4_B3 27 28 GPIO4_B2 I2C7_SCL SPI0_CS0 UART8_RTS PWM14 I2S1_SDO1 CAN1_RX PDM1_SDI3 UART4_RX SPI0_MOSI GPIO1_B2 29 30 GND

PDM1_SDI2 SPI0_MISO GPIO1_B1 31 32 GPIO4_B0 I2C6_SDA UART8_TX I2S1_SDI3

PDM1_CLK0UART7_RX GPIO1_B4 33 34 GND

I2S1_MCLK UART9_RTS SPI0_MISO GPIO4_A0 35 36 GPIO4_A2 SPI0_CLK I2S1_LRCK

PDM1_SDI1 SPI2_CS1 GPIO1_B0 37 38 GPIO4_A5 I2C3_SDA UART3_TX I2S1_SDI0

GND 39 40 GPIO4_B1 I2C6_SCL SPI0_CS1 UART8_RX SPDIF1_TX I2S1_SDO0

7.2 Network

ROCK 5C offers a 10/100/1000Mbps RJ45 connector for wired networking. With additional PoEmodule/HAT, ROCK 5C can be powered by ethernet cable via RJ45 port by a PoE capable switch/router.

7.3 eMMC Socket

ROCK 5C 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.

It is worth noting that the eMMC module shall be larger than 8GB and there is not maximum size limitation.

7.4 Camera and Display Interfaces

The ROCK 5C has one four-lane(can be split into 2x two-lane) MIPI CSI Camera and one four- lane MIPI DSI Display connector. These connectors are designed for Radxa Camera and Display accessories and also backwards compatible with standard industrial camera and display peripherals with adapter FPC cables by Radxa.

7.5 USB

The ROCK 5C has two USB2 HOST, one USB3 HOST and one USB3 OTG/HOST type-A connec- tors. The power output across these ports is 2.8A in aggregate over the four connectors.

7.6 HDMI Output

The ROCK 5C has one Standard HDMI output ports, both support CEC and HDMI 2.1 with resolutions of 8Kp60.

7.7 Audio Jack

The ROCK 5C 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.

7.8 FPC Connector

The ROCK 5C offers a FPC connector providing PCIe 2.1 one-lane signal, supporting expan- sion of SSD, SATA, 2.5G Ethernet ports and other devices, This requires additional expansion board / HAT.

7.9 Fan Connector

The ROCK 5C 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 ROCK 5C until at least September 2033.

9 Support

For support please see the hardware documentation section of the Radxa Wiki website and post questions to the Radxa forum.

FCC Statement

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

— Reorient or relocate the receiving antenna.

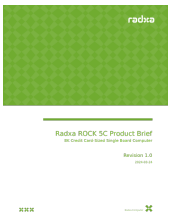
— Increase the separation between the equipment and receiver.

— Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

— Consult the dealer or an experienced radio/TV technician for help

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions (1)this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

Documents / Resources

	**radxa ROCK 5C 8K Credit Card Sized Single Board Computer** [pdf] User Guide ROCK 5C 8K Credit Card Sized Single Board Computer, ROCK 5C, 8K Credit Card Sized Single Board Computer, Sized Single Board Computer, Board Computer, Computer

References

- Radxa Community
- Rock5 - Radxa Wiki
- User Manual

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