Radxa ROCK 5C Product Brief

8K Credit Card-Sized Single Board Computer

Revision 1.0

2024-03-24

Radxa Computer

Contents

1 Revision Control Table

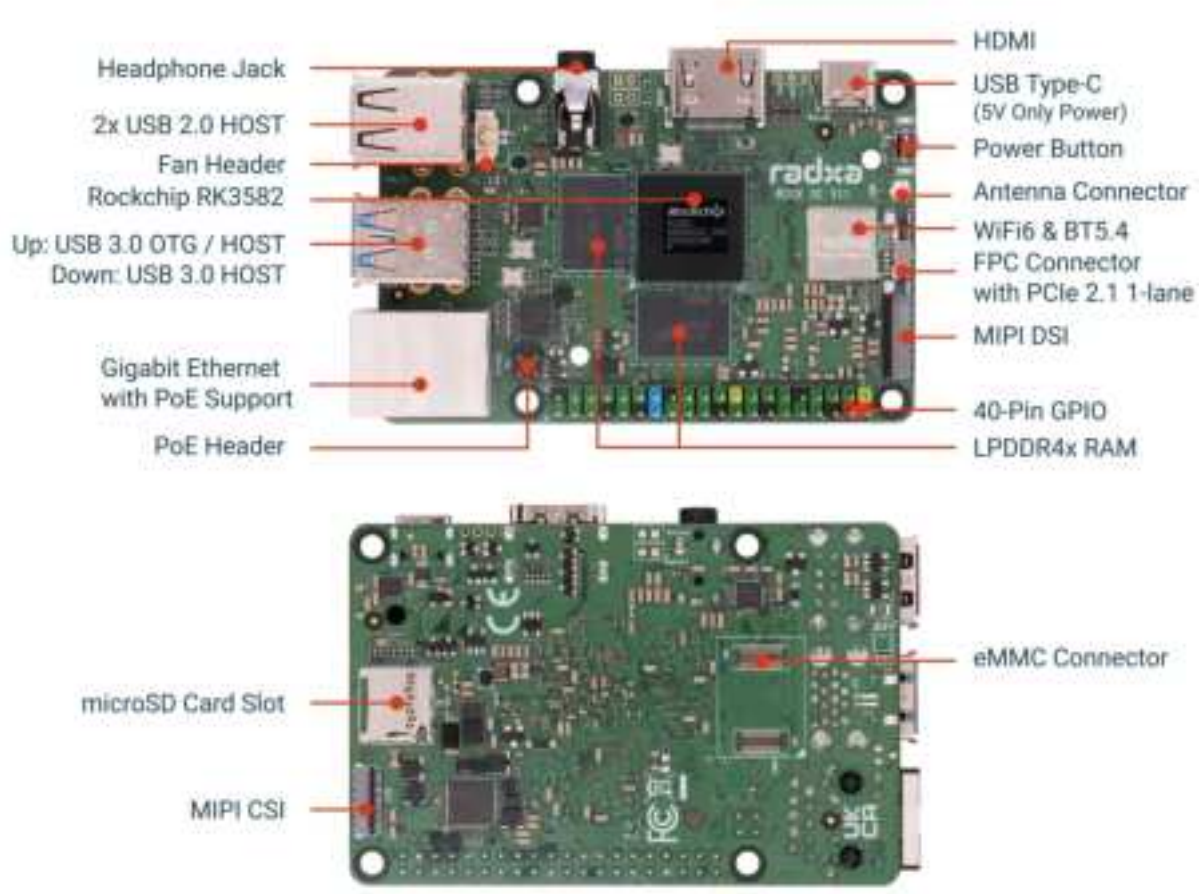
Version	Date	Changes from previous version
1.0	2024/03/24	First version

2 Introduction

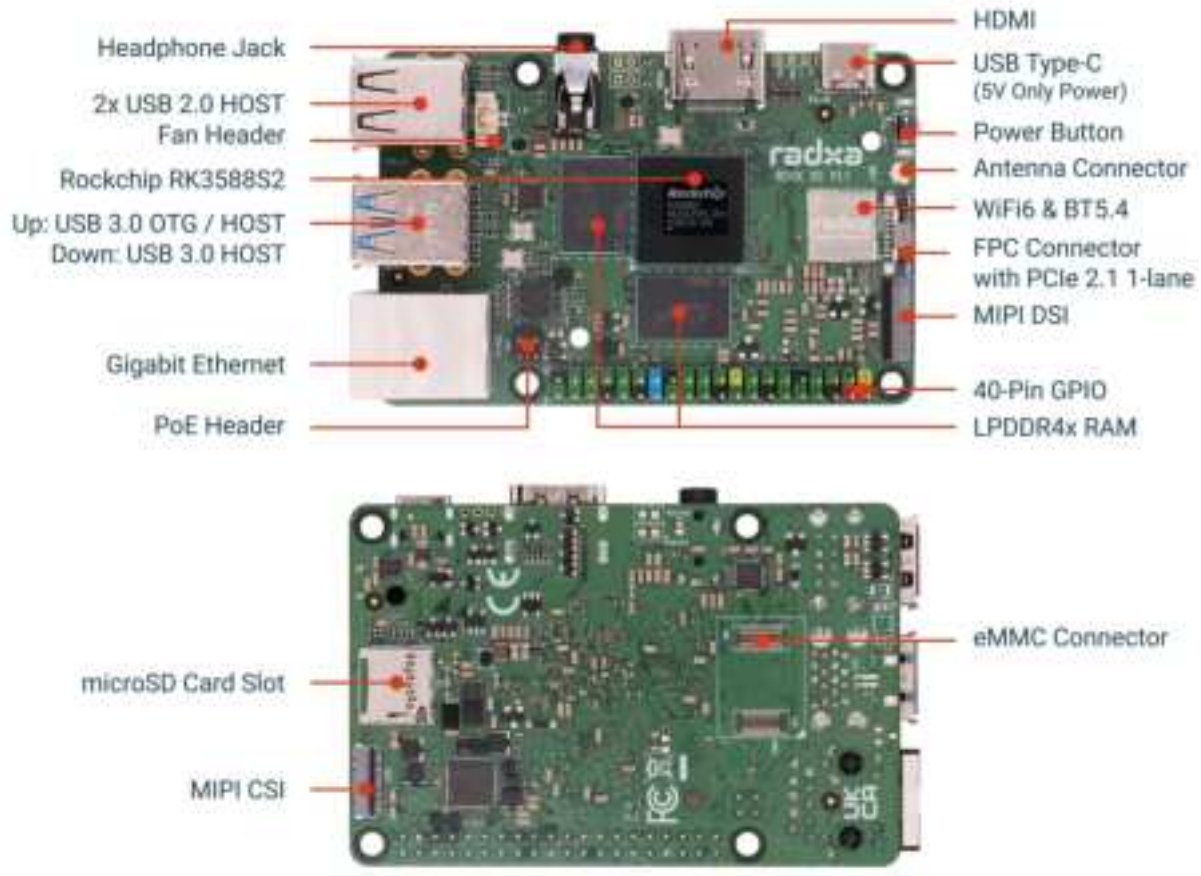
The Radxa ROCK 5C is a Single Board Computer (SBC) in a compact form factor packed with a wide range of class-leading functionality, features and expansion options. The ROCK 5C is an ideal choice for makers, IoT enthusiasts, hobbyists, gamers, PC users and everyone who need an extremely highly specified 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

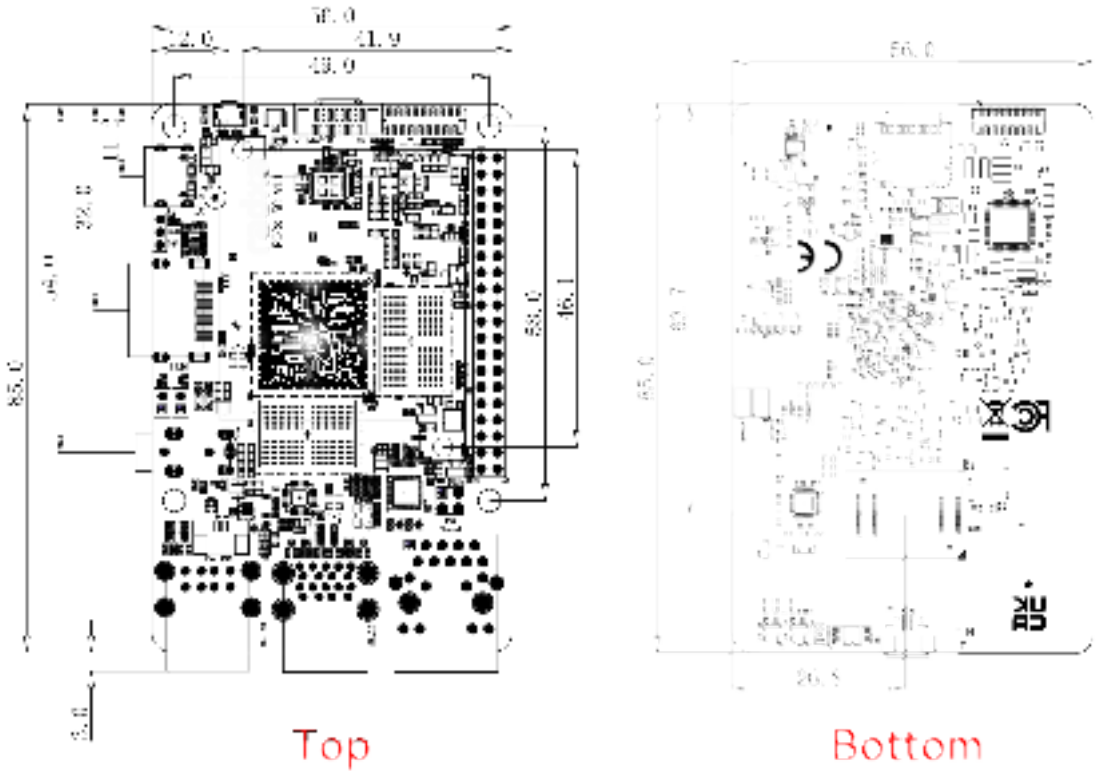
- 1x eMMC Connector
- 1x microSD Card Slot
- 1x Headphone Jack with Microphone Inpu
- 1x HDMI 2.1 supporting up to 8K
- 1x MIPI DSI supporting up 2K
- 1x 4-lane MIPI CSI or 2x 2-lane MIPI CSI
- 2x USB 2.0 Type-A HOST ports
- 1x USB 3.0 Type-A HOST port
- 1x USB 3.0 Type-A OTG / HOST port
- 1x Gigabit 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 Connector
- 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
- Hardware access/control library for Linux/Android

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 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 (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 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 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_CLK1	UART4_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_CLK0	UART7_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 PoE module/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 connectors. 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 expansion 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.