Product Brief

Radxa ROCK 3A Product Brief

Revision 1.4

2022-12-05

Radxa Computer

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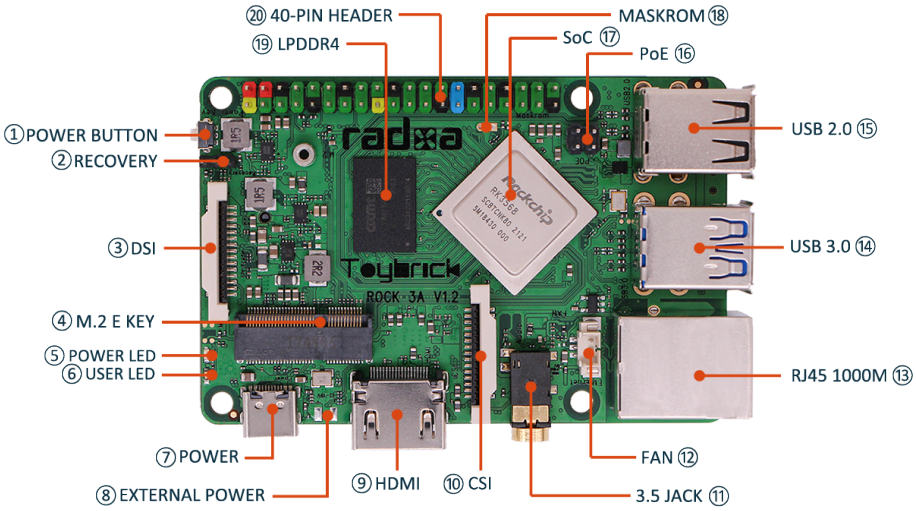
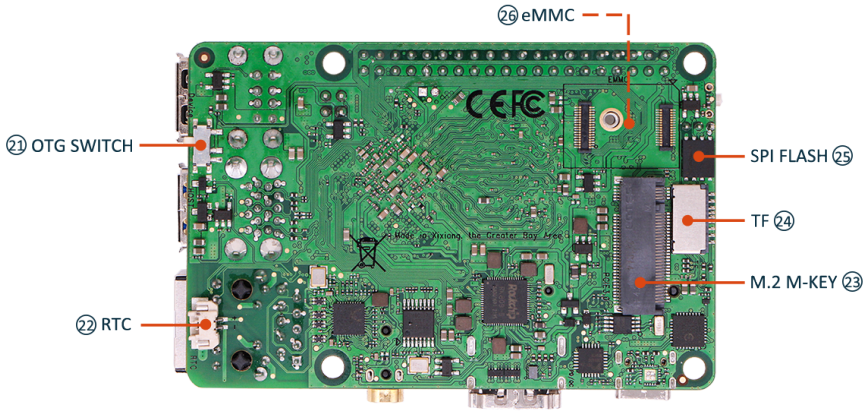
1 Revision Control Table

Version	Date	Changes from previous version
1.0	06/10/2022	First version
1.1	27/10/2022	Format clean
		Add FCC/CE logo
1.2	25/11/2022	Improve readability
1.3	28/11/2022	Improve readability
1.4	05/12/2022	Improve readability

2 Introduction

The Radxa ROCK 3 Model A (ROCK 3A) 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 3A is an ideal choice for makers, IoT enthusiasts, hobbyists, gamers, PC users and everyone who needs an extremely highly specified platform with outstanding performance and reliability. Radxa offers the ROCK 3A board in various LPDDR4 RAM memory options: - 2GB - 4GB - 8GB





3 Features

3.1 Hardware

- Rockchip RK3568 SoC
- Quad-core Arm® Cortex®-A55 (ARMv8) 64-bit @ 2.0GHz
- Mali™ G52 GPU, supporting:
  - OpenGL® ES1.1, 2.0 and 3.2
  - OpenCL™ 2.0
  - Vulkan® 1.1
- NPU upto 0.8 TOPS
- 32bit LPDDR4 RAM options:
  - 2GB
  - 4GB
  - 8GB
- Able to provide 2 display outputs via one HDMI 2.0 and one MIPI DSI
- H.265/H.264 and VP9 video decoder up to 4K@60fps
- H.264/H.265 video encodecoder up to 1080@60fps

3.2 Interfaces

- 1x M.2 E-key connector for WiFi/BT
- 1x M.2 M-key connector for SSD
- 1x Micro SD card slot
- HDMI 2.0 port supporting displays up to 4K@60fps resolution
- 2x USB 2.0 HOST ports
- 1x USB 3.0 HOST port, 1x USB 3.0 OTG/HOST port
- 1x Gigabit Ethernet port enabling PoE HATs
- 1x Camera port with 2-lane MIPI CSI
- 1x Display port with 2-lane MIPI DSI
- 3.5mm jack with mic
- 40x user GPIO supporting various interface options:
  - 5 x UART
  - 1 x SPI bus
  - 2 x I2C bus

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

The ROCK 3A supports various power supply technologies including smart power adapter as well as fixed voltage:

- USB Type-C® PD V2.0 supporting 9V/2A, 12V/2A, 15V/2A and 20V/2A.
- Qualcomm® Quick Charge™ 2.0 QC3.0/2.0 adapter 9V/2A and 12V/1.5A.
- Power adapter with fixed voltage in 6V to 24V range on the USB Type-C® port
- 5V Power applied to the GPIO PIN 2 & 4

4.2 GPIO Voltage

GPIO	Voltage Level	Tolerant
All GPIO	3.3V	3.63V
ADC_IN5	1.8V	1.98V

5 Peripherals

5.1 GPIO Interface

ROCK 3A offers 40P GPIO expansion which is compatible with many accessories on the market.

5.1.1 GPIO Alternate Functions

Function4	Function3	Function2	Function1	Pin#	Pin#	Function1	Function2	Function3	Function4
			+3.3V	1	2	+5.0V			
CAN1_RX_M0	UART3_RX_M0	I2C3_SDA_M0	GPIO1_A0	3	4	+5.0V			
CAN1_TX_M0	UART3_TX_M0	I2C3_SCL_M0	GPIO1_A1	5	6	GND			
	UART3_TX_M1	PWM12_M0	GPIO3_B7	7	8	GPIO0_D1	UART2_TXD		
			GND	9	10	GPIO0_D0	UART2_RXD		
	UART7_TX_M1	PWM14_M0	GPIO3_C4	11	12	GPIO3_A3			
	UART7_RX_M1	PWM15_IR_M0	GPIO3_C5	13	14	GND			
	UART0_RX	PWM1_M0	GPIO0_C0	15	16	GPIO3_A1	SPI1_CS0_M1		
	UART0_TX	PWM2_M0	GPIO0_C1	17	18	GPIO3_B2	UART4_TX_M1	PWM9_M0	
CAN1_TX_M1	SPI3_MOSI_M1	PWM15_IR_M1	GPIO4_C3	19	20	GND			
UART9_TX_M1	SPI3_MISO_M1	PWM12_M1	GPIO4_C5	21	22	ADC_IN5			
CAN1_RX_M1	SPI3_CLK_M1	PWM14_M1	GPIO4_C2	23	24	GPIO4_C6	PWM13_M1	SPI3_CS0_M1	UART9_RX_M1
			GND	25	26	GPIO4_D1	SPI3_CS1_M1		
PWM2_M1	SPI0_MOSI_M0	I2C2_SDA_M0	GPIO0_B6	27	28	GPIO0_B5	I2C2_CLK_M0	SPI0_CLK_M0	PWM1_M1
	UART8_TX_M1	SPI2_MISO_M1	GPIO2_D7	29	30	GND			
	UART8_RX_M1	SPI2_CLK_M1	GPIO3_A0	31	32	GPIO3_C2	SPI1_MISO_M1	UART5_TX_M1	
	UART5_RX_M1	SPI1_CLK_M1	GPIO3_C3	33	34	GND			
			GPIO3_A4	35	36	GPIO3_A2			
	UART3_RX_M1	PWM13_M0	GPIO3_C0	37	38	GPIO3_A6			
			GND	39	40	GPIO3_A5			

5.2 eMMC Socket

ROCK 3A 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.

5.3 Camera and Display Interfaces

The ROCK 3A has one 2-lane MIPI CSI Camera and one 2-lane MIPI DSI Display connector. These connectors are backwards compatible with standard industrial camera and display peripherals.

5.4 USB

The ROCK 3A has two USB 2.0 HOST, one USB 3.0 HOST and one USB 3.0 OTG/HOST type-A connectors. The power output across these ports is 2.8A in aggregate over the four connectors. The board has a hardware switch to set the USB 3.0 operation to either HOST or OTG.

5.5 HDMI

The ROCK 3A has one HDMI port supporting CEC and HDMI 2.0 with resolutions up to 4K@60fps.

5.6 Audio Jack

The ROCK 3A 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 M Key

The ROCK 3A offers a M.2 M-Key supporting up to 8TB M2 NVME SSD socket with 2-lane PCIe 3.0 interface enabling high speed storage access.

5.8 M.2 Connector E Key

The ROCK 3A offers a M.2 E-Key socket with PCIe 2.0 interface, SDIO interface, UART interface and USB interface enabling high speed WiFi/BT connectivity and other standard M.2 Wireless modules.

5.9 Operating conditions

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

The SoC reduces the CPU clock speed and voltage level during low loads to reduce energy use and unnecessary heat dissipation (the dissipation is not a factor of the CPU frequency but rather the temperature itself).

The ROCK 3A is designed to operate without a cooling system under light loads. However, 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 peak temperature limit.

6 Availability

Radxa guarantee availability ROCK 3A until at least September 2029.

7 Support

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