
Radxa Cubie A7A Product Brief

New standard for affordable edge AI innovation

Revision 1.0

2025-08-14



Radxa Computer



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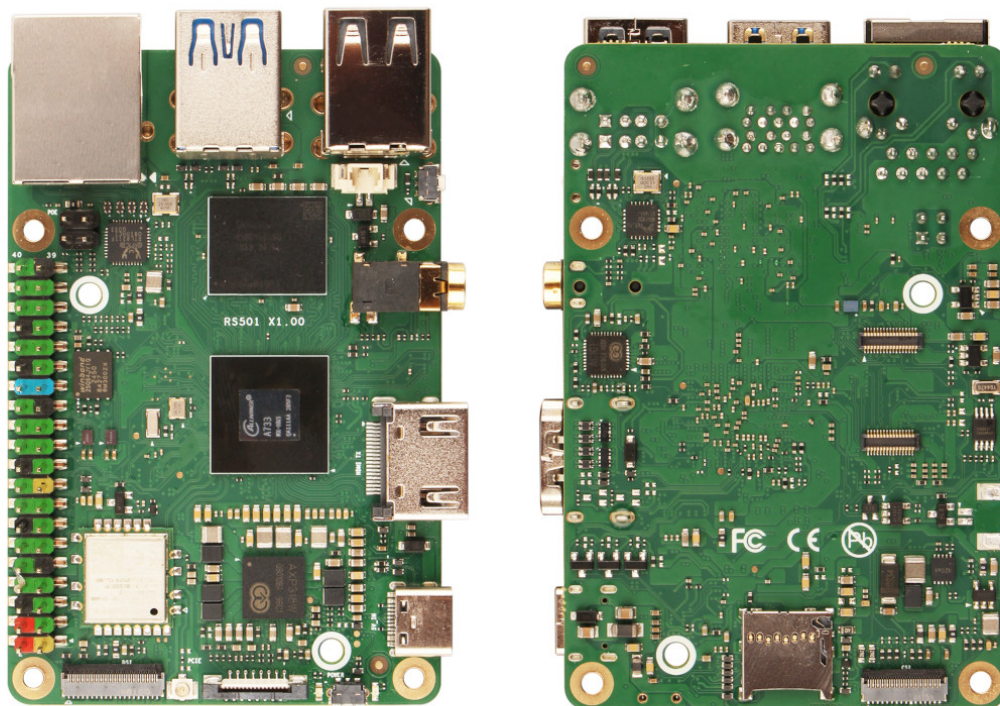
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1 Revision Control Table

Version	Date	Changes from previous version
1.0	2025-08-13	First version

2 Introduction

The Radxa Cubie A7A is an ultra-compact and feature-rich Single Board Computer (SBC) designed to deliver powerful performance in space-constrained environments. With its Allwinner A733 SoC featuring a hybrid octa-core CPU (2× Cortex-A76 up to 2.0GHz + 6× Cortex-A55), 3 TOPS NPU, and Imagination BXM-4-64 MC1 GPU, the Cubie A7A provides robust AI and multimedia processing capabilities. It's an ideal choice for developers, system integrators, and innovators in fields such as edge AI, digital signage, robotics, smart displays, and industrial automation.



Note The board layout or component locations may change over time, but the main connector types and locations will remain the same. Always refer to the latest documentation before manufacturing accessories or enclosures.

2.1 Features

2.1.1 Hardware

- **Allwinner A733 SoC**

- **Octa-core CPU:** Dual-core Cortex-A76 up to 2.0GHz + Hexa-core Cortex-A55 up to 1.8GHz
- **NPU:** 3 TOPS AI accelerator for real-time edge inference
- **Imagination BXM-4-64 MC1 GPU** supporting:
 - OpenGL® ES 3.2
 - Vulkan® 1.3
 - OpenCL™ 3.0
- **LPDDR5 RAM** options:
 - 2GB
 - 4GB
 - 6GB
 - 8GB
 - 12GB
 - 16GB
- Onboard SPI Flash for bootloader
- Onboard eMMC/UFS module connector for high-performance embedded storage
- H.265MP/VP9/AVS2 multivideo decoder up to 8K@24fps
- H.264BL/MP/HP multivideo decoder up to 4K@30fps
- H.264BP/MP/HP multivideo encoder up to 4K@30fps
- MJPEG encoder up to 4K@15fps, JPEG encoder up to 8K × 8K resolution
- Supports AES/DES/3DES/SM4 encryption and decryption algorithms

2.1.2 Interfaces

- **1× IEEE 802.11 a/b/g/n/ac/ax (Wi-Fi 6)** and **Bluetooth® 5.4** with BLE
- **1× External Antenna Connector**
- **1× PCIe 3.0 FPC Connector** (single-lane)
- **1× USB 3.1 HOST** Type-A Port
- **3× USB 2.0 HOST** Type-A Port
- **1× USB 2.0 OTG** Type-C® Port for Data and Power
- **1× MicroSD Card** slot
- **1× eMMC Module and UFS Module** combo connector
- **1× Gigabit Ethernet Port**, supporting PoE (additional PoE HAT required)
- **1× HDMI® Output** Interface, supporting up to 4Kp60 resolution
- **1× Camera Interface** (1× four-lane MIPI CSI or 2× two-lane MIPI CSI)
- **1× MIPI DSI** Interface (four-lane MIPI DSI)
- **1× 3.5mm Audio Jack with Microphone**
- **1× USB BOOT Button**
- **1× Power Button**

- **1x 2Pin PWM Fan header**
- **1x 2Pin RTC Battery header**
- **40-pin 0.1" (2.54mm) header** supporting:
 - UART, I2C, SPI, GPIO, PWM
 - 2 × 5V DC power in/out
 - 2 × 3.3V power out

These interfaces provide excellent expansion possibilities for creating intelligent systems that require high connectivity, multimedia output, and hardware flexibility.

2.2 Software

- **Debian Linux®** support
- **Android™ 13** support

Note: Android 13 support requires the official BSP or vendor-provided SDK. Actual feature set may depend on further validation and licensing.

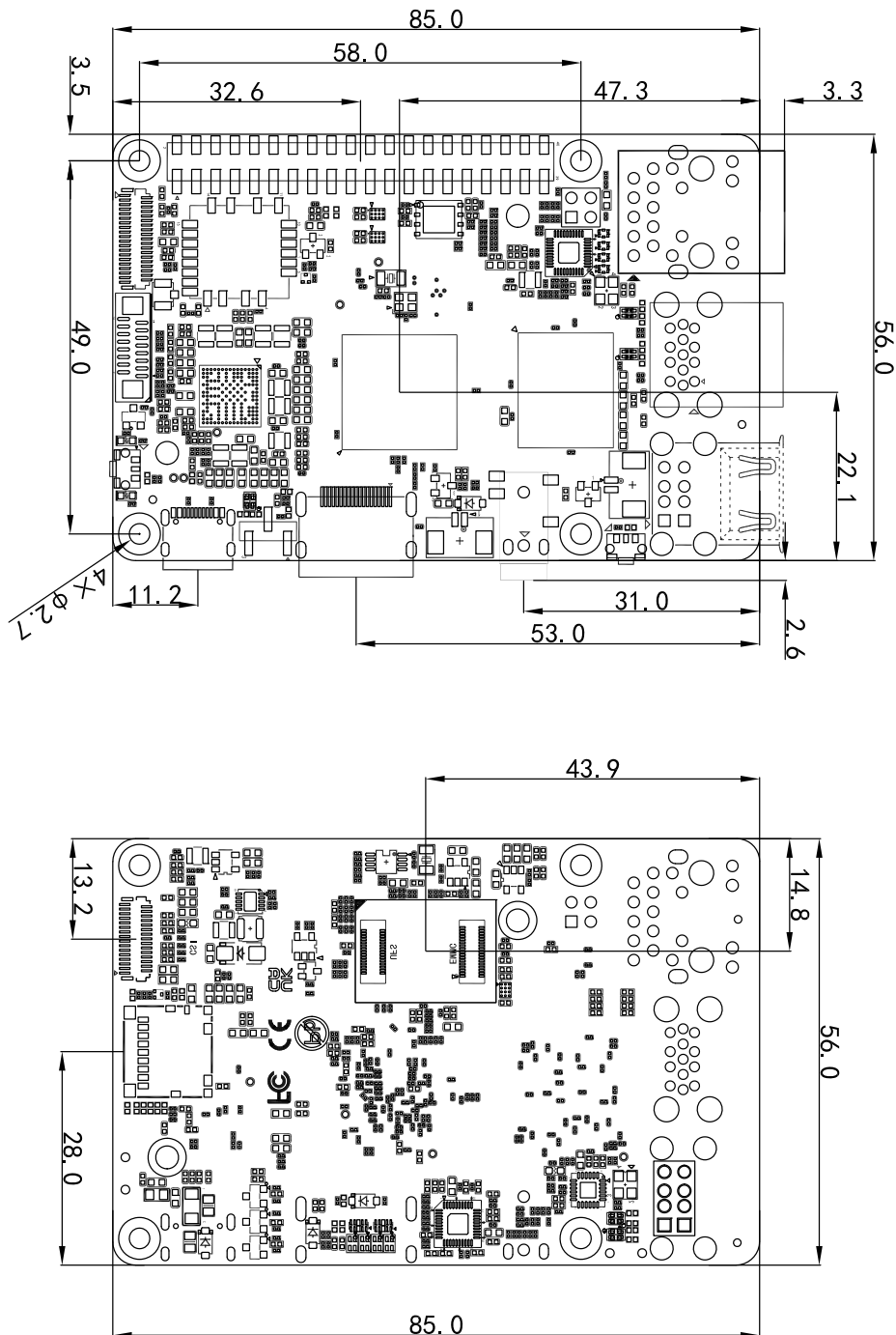
- Hardware access/control library for Linux/Android

Combined with support for both Android 13 and Debian Linux, the Cubie A7A enables a flexible software environment for prototyping and deployment across diverse use cases.

3 Applications

- AI-enabled IoT edge nodes
- Smart retail displays and signage
- Compact industrial control systems
- AI vision and robotics modules
- Portable developer kits and maker projects

4 Mechanical Specification



5 Electrical Specification

5.1 Power Requirements

The Cubie A7A supports both a fixed-voltage power adapter and a smart power adapter. Typical scenarios:

- **5V Power** supplied via USB Type-C port
- **5V Power** supplied to the GPIO pin (Pins 2 & 4)
- **PoE** supported via the Gigabit Ethernet port

A minimum 15W power source is recommended without power-consuming USB or PCIe devices, and at least 20W if fully loading USB 2.0/3.1 and PCIe 3.0 peripherals.

5.2 GPIO Voltage

GPIO	Voltage Level	Tolerance
All GPIO	3.3V	3.63V

6 Peripherals

6.1 GPIO Interface

The Cubie A7A offers a 40-pin GPIO expansion header, similar to many popular SBCs, ensuring compatibility with a wide range of accessories.

6.1.1 GPIO Alternate Functions

Pin#	FUNC1	FUNC2	FUNC3	FUNC4	FUNC5	FUNC6	FUNC7	FUNC8
1	+3.3V							
3	PJ23	PWM1-5	UART3-RX	UART2-CTS	TWI7-SDA	TWI3-SDA	TWI11-SDA	PJ-EINT23
5	PJ22	PWM1-4	UART3-TX	UART2-RTS	TWI7-SCK	TWI3-SCK	TWI11-SCK	PJ-EINT22
7	PB0	UART2-TX	UART0-TX	SPI2-CS0	PB-EINT0			
9	GND							
11	PB1	UART2-RX	UART0-RX	SPI2-CLK	JTAG-CK	PB-EINT1		
13	PL6	S-JTAG-DO	S-UART0-TX	S-SPI0-MOSI	S-IR-RX	S-PWM0-4	PL-EINT6	
15	PL7	S-JTAG-DI	S-UART0-RX	S-SPI0-MISO	S-PWM0-5	PL-EINT7		
17	+3.3V							
19	PD12	SPI1-MOSI	PWM1-2	PD-EINT12				
21	PD13	SPI1-MISO	PWM1-3	PD-EINT13				
23	PD11	SPI1-CLK	PWM1-1	PD-EINT11				
25	GND							
27	PD17	LCD0-D23	LVDS1-CKN	DSI1-D2N	TWI2-SDA	UART3-RX	PD-EINT1	
29	PK5	MCSIA-CKP	PCIE-CLKREQN	PWM1-8	PWM1-9	SPI3-CLK	PK-EINT5	
31	PK6	MCSIA-D2N	TWI2-SCK	UART4-TX	UART2-RTS	SPI3-MOSI	PK-EINT6	
33	PK7	MCSIA-D2P	TWI2-SDA	UART4-RX	UART2-CTS	SPI3-MISO	PK-EINT7	
35	PK2	MCSIA-D1N	UART6-DTR	I2S4-LRCK	TWI5-SDA	SGPIO-SDATAIN	PK-EINT2	
37	PK8	MCSIA-D3N	MCSI0-MCLK	UART4-RTS	UART2-TX	SPI3-CS1	PK-EINT8	
39	GND							

Pin#	FUNC1	FUNC2	FUNC3	FUNC4	FUNC5	FUNC6	FUNC7	FUNC8
2	+5.0V							
4	+5.0V							
6	GND							
8	PB9	UART0-TX	I2S0-DIN2	I2S0-DOUBT2	PWM1-1	TWI8-SCK	TWI0-SCK	PB-EINT9
10	PB10	UART0-RX	I2S0-DIN3	I2S0-DOUBT3	PWM1-2	TWI8-SDA	TWI0-SDA	PB-EINT10
12	PK0	UART6-DCD	I2S4-BCLK	HDMI-CEC	TWI1-SDA	SGPIO-SLOAD	PK-EINT0	
14	GND							
16	PJ24	PWM1-6	UART4-TX	TWI4-SCK	SPI3-CLK	PJ-EINT24		
18	PJ25	PWM1-7	UART4-RX	TWI4-SDA	SPI3-MOSI	PJ-EINT25		
20	GND							
22	PL10	S-UART0-TX	S-TWI2-SCK	S-UART1-TX	S-PWM0-8	PL-EINT10		
24	PD10	SPI1-CS0	PWM1-0	PD-EINT10				
26	PD14	SPI1-HOLD	UART3-RTS	PD-EINT14				
28	PD16	TWI2-SCK	UART3-TX	PD-EINT16				
30	GND							
32	PD16	EINK-OEH	TWI2-SCK	UART3-TX	PD-EINT16			
34	GND							
36	PK1	UART6-DSR	I2S4-MCLK	TWI1-SCK	SGPIO-SCLK	PK-EINT1		
38	PK3	UART6-RI	I2S4-DIN0	I2S4-DOUBT1	TWI5-SCK	SGPIO-SDATAOUT	PK-EINT3	
40	PK4	I2S4-DOUBT0	I2S4-DIN1	SPI3-CS0	PK-EINT4			

Note: Certain pin functions (SPI, I2C, UART, PWM, etc.) might be mutually exclusive depending on software Device Tree configurations. Users should verify the required pin multiplexer settings.

6.2 Network

Equipped with **one 10/100/1000 Mbps RJ45** connectors, the Cubie A7A offers reliable wired networking. The Gigabit port supports **Power over Ethernet**. To use PoE, an additional **PoE HAT** (compliant with IEEE 802.3af/at) is required.

6.3 USB

The Cubie A7A offers a full range of USB interfaces to meet both data and power requirements:

- **1× USB 3.1 Type-A Port** for high-speed device connection (HOST mode)
- **3× USB 2.0 Type-A Ports** for peripheral expansion (HOST mode)
- **1× USB 2.0 Type-C® Port** for OTG or device mode, also serves as the power input and firmware flashing interface

All USB ports feature overcurrent protection. The total available power output across the USB data ports is up to 2.8A, depending on system power input.

6.4 eMMC / UFS Module Connector

The Cubie A7A offers a high speed eMMC / UFS module connector for eMMC or UFS modules which can be used for OS and data storage. The eMMC / UFS module connector is compatible with readily available industrial pinout and form factor hardware.

The eMMC connector offer eMMC 5.1 high speed interface for small capacity storage(8GB to 128GB) and UFS connector offer UFS 3.0 2-lane up to gear 4 high speed interface for large capacity storage(64G to 1TB).

6.5 Camera and Display Interfaces

The Cubie A7A includes:

- **One four-lane MIPI CSI** camera connector (capable of splitting into 2× two-lane)
- **One four-lane MIPI DSI** display connector

These connectors are designed for Radxa camera and display accessories and are also compatible with many industrial cameras and displays using Radxa adapter FPC cables.

6.6 HDMI Output

An **HDMI Type-A** port (HDMI 2.0) is available, supporting resolutions up to 3840×2160 (4K@60fps) for 2D displays and 4K@30fps for 3D displays. This port also supports CEC and HDCP 1.4. Actual HDCP usage may require appropriate licensing and firmware support.

6.7 FPC Connector

The Cubie A7A offers a FPC connector providing PCIe 3.0 one-lane signal, supporting expansion of SSD, SATA, 2.5G Ethernet ports and other devices, This requires additional expansion board / HAT.

7 Order Info and SKU

Name	CPU	RAM LPDDR5	SPI Flash	WiFi / BT	SKU Code
Cubie A7A 2GB	A733MX-HN3 HDMI / 3 Tops NPU	2GB	8MB	FCU760K WiFi 6 / BT 5.4	RS501-D2S8R42W28
Cubie A7A 4GB		4GB			RS501-D4S8R42W28
Cubie A7A 6GB		6GB			RS501-D6S8R42W28
Cubie A7A 8GB		8GB			RS501-D8S8R42W28
Cubie A7A 12GB		12GB			RS501-D12S8R42W28
Cubie A7A 16GB		16GB			RS501-D16S8R42W28

8 Availability

Radxa guarantees availability of the **Radxa Cubie A7A** until at least **September 2034**. However, certain component shortages or EOL announcements from third-party suppliers may affect lead times. Please check with Radxa for the latest updates.

9 Support

For support, please refer to:

- The hardware documentation section of the [Radxa Website](#)
- [Radxa forum](#) for community discussions and official Q&A

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