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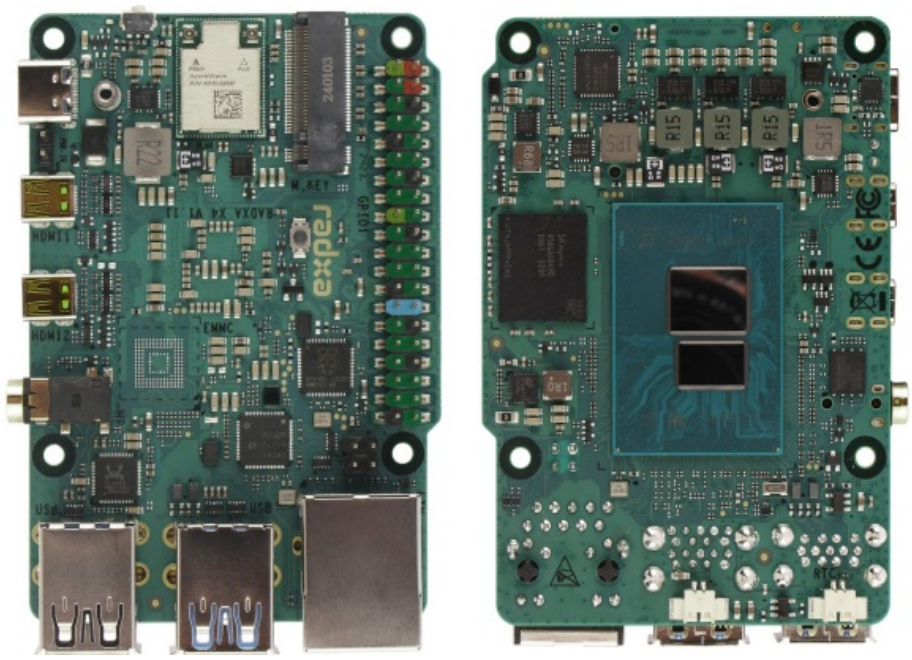
radxa D8E High Performance SBC with Intel Processor



Specifications

- LPDDR5 RAM
- Optional Onboard eMMC
- SPI Flash for BIOS
- Wireless Connectivity
- Dual Display Outputs via Two Micro HDMI up to 4Kp60
- 1x 2.5G Ethernet Port with PoE Support
- 1x M.2 M Key Connector with PCIe 3.0 4lane for M.2 2230 NVMe SSD
- 1x USB 2.0 HOST Type A Port
- 3x USB 3.0 HOST Type A Ports
- 1x RTC Battery Socket
- 1x 3.5mm Headphone Jack with Microphone Input
- 1x 2Pin 1.25mm Fan Header
- 2x Buttons

Product Usage Instructions

Powering the Device

The Radxa X4 supports power input via USB Type-C PD Version 2.0 with a requirement of 12V/2.5A. Alternatively, it can also be powered through a PoE HAT. Ensure that the power source can provide at least 18W without any power-consuming devices on USB

or 25W with a full load on the USB ports.

Connecting Peripherals

- Connect your display devices to the Dual Display Outputs using the Micro HDMI ports.
- For network connectivity, use the 2.5G Ethernet port.
- Add storage using the M.2 M Key Connector for NVMe SSD.
- Utilize the USB ports for additional peripherals such as keyboards, mice, and external storage devices.
- Connect headphones or microphones to the dedicated audio jack.

Software Setup

The Radxa X4 comes with pre-installed software but may require updates. Follow the provided instructions to configure the device according to your needs.

Revision Control Table

Version	Date	Changes from previous version
1.0	2024/06/24	First Version
1.1	2024/07/26	Modified the Message for 40-Pin

Introduction

The Radxa X4 is powered by the Intel N100 processor, making it a high-performance, cost- effective single board computer. It aims to deliver exceptional computing power and versa- tility. Whether you require enhanced office efficiency, seamless multitasking, or immersive entertainment experiences, this device is designed to meet all your needs.

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

Features

Hardware

- Intel® Processor N100 (Alder Lake-N)
  - Total Cores: 4
  - Total Threads: 4
  - Max Turbo Frequency: 3.40 GHz
  - Cache: 6 MB Intel® Smart Cache
  - Intel® Gaussian & Neural Accelerator 3.0
  - Intel® Image Processing Unit 6.0
  - Support for Intel® Virtualization Technology
- Intel® UHD Graphics
  - Graphics Max Dynamic Frequency: 750 MHz
  - DirectX Support: 12.1
  - OpenGL Support: 4.6
  - OpenCL Support: 3.0
- LPDDR5 RAM with options:
  - 4GB
  - 8GB
  - 12GB
  - 16GB
- Optional Onboard eMMC
- SPI Flash for BIOS

Interfaces

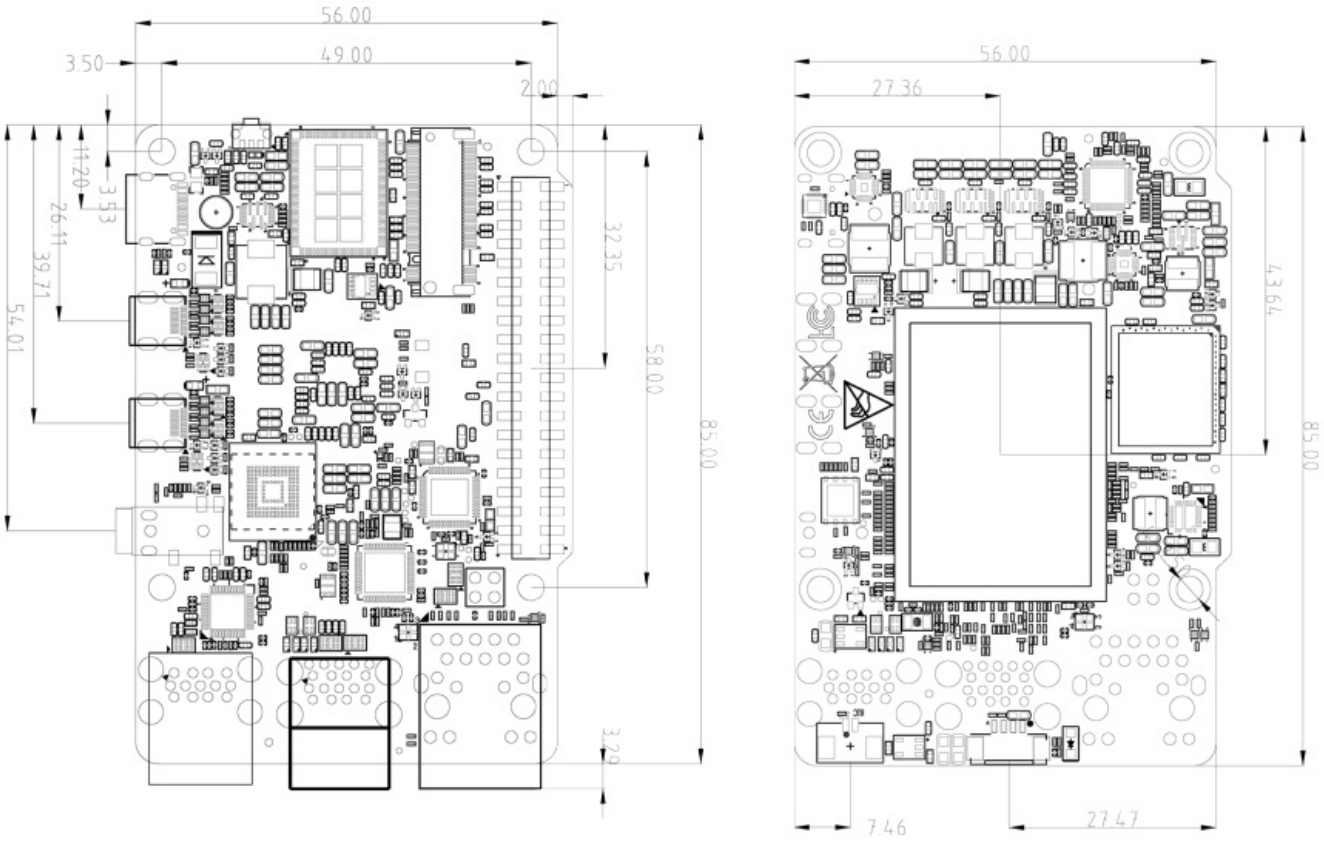
- Wireless Connectivity
  - IEEE 802.11 a/b/g/n/ac/ax (WiFi 6) and Bluetooth 5.2 with BLE (Optional)
  - IEEE 802.11 a/b/g/n/ac (WiFi 5) and Bluetooth 5.0 with BLE (Optional)
- Dual Display Outputs via Two Micro HDMI up to 4Kp60
- 1x 2.5G Ethernet Port with PoE Support(Additional PoE HAT Required)
- 1x M.2 M Key Connector with PCIe 3.0 4-lane for M.2 2230 NVMe SSD
- 1x USB 2.0 HOST Type A Port
- 3x USB 3.0 HOST Type A Ports
- 1x RTC Battery Socket
- 1x 3.5mm Headphone Jack with Microphone Input
- 1x 2-Pin 1.25mm Fan Header

- 2x Buttons
  - 1x Power Button
  - 1x BOOTSEL Button for RP2040
- 40-Pin GPIO Header (controlled via RP2040) supporting a wide range of interface options:
  - Up to 2x SPI
  - Up to 2x UART
  - Up to 2x I2C
  - Up to 16x PWM
  - Up to 8 × PIO(Programmable IO)
  - 2 x 5V DC power out
  - 2 x 3.3V power out

Software

- Intel® 64-bit Instruction Set
- Intel® SSE4.1, Intel® SSE4.2, Intel® AVX2 Instruction Set Extensions
- Windows 11 64-bit
- Debian / Ubuntu Linux support
- Hardware access/control library for Linux

Mechanical Specification



Electrical Specification

Power Requirements

The Radxa X4 supports the following power input:

- USB Type-C PD Version 2.0 with 12V/2.5A.
- It can also be powered through a PoE HAT.

The recommended power source should be able to produce, at least, 18W without power consuming devices on USB or 25W with full USB ports load.

GPIO Voltage

GPIO	Voltage Level	Tolerance
All GPIO	3.3V	3.63V

Operating Conditions

The Radxa X4 can operate normally within a temperature range of 0°C to 60°C.

Its BIOS factory settings limit the CPU power consumption (Power Limit 1) to 6W. Similarly, the Thermal Design Power (TDP) of the Intel® Processor N100 is also 6W. This implies that under the high-load workload defined by Intel®, the processor operates at its base fre- quency with all cores active, resulting in an average power consumption of 6 watts.

Peripherals

GPIO Interface

The Radxa X4 provides a 40-pin GPIO expansion header through the RP2040, which is widely compatible with a variety of accessories developed for the SBC market.

GPIO Alternate Functions

FUNCTION5	FUNCTION4	FUNCTION3	FUNCTION2	FUNCTION1	Pin	Pin	FUNCTION1	FUNCTION2	FUNCTION3	FUNCTION4	FUNCTION5
				VCC3	1	2	5V				
PWM6 A	I2C0 SDA	UART0 TX	SPI1 RX	GP28	3	4	5V				
PWM6 B	I2C0 SCL	UART0 RX	SPI1 Csn	GP29	5	6	GND				
PWM2 A	I2C0 SDA	UART1 TX	SPI0 RX	GP04	7	8	GP20	SPI0 RX	UART1 TX	I2C0 SDA	PWM2 A
				GND	9	10	GP21	SPI0 Csn	UART1 RX	I2C0 SCL	PWM2 B
PWM2 B	I2C0 SCL	UART1 RX	SPI0 Csn	GP05	11	12	GP23	SPI0 TX	UART0 RTS	I2C1 SCL	PWM3 B
PWM3 A	I2C1 SDA	UART1 CTS	SPI0 SCK	GP06	13	14	GND				
PWM1 B	I2C1 SCL	UART0 RTS	SPI0 TX	GP03	15	16	GP22	SPI0 SCK	UART1 CTS	I2C1 SDA	PWM3 A
				VCC3	17	18	GP27	SPI1 TX	UART1 RTS	I2C1 SCL	PWM5 B
PWM5 B	I2C1 SCL	UART1 RTS	SPI1 TX	GP11	19	20	GND				
PWM4 A	I2C0 SDA	UART1 TX	SPI1 RX	GP08	21	22	GP24	SPI1 RX	UART1 TX	I2C0 SDA	PWM4 A
PWM5 A	I2C1 SDA	UART1 CTS	SPI1 SCK	GP10	23	24	GP09	SPI1 Csn	UART1 RX	I2C0 SCL	PWM4 B

FUNCTION5	FUNCTION4	FUNCTION3	FUNCTION2	FUNCTION1	Pin	Pin	FUNCTION1	FUNCTION2	FUNCTION3	FUNCTION4	FUNCTION5
				GND	25	26	GP18	SPI0 SCK	UART0 CTS	I2C1 SDA	PWM1 A
PWM0 A	I2C0 SDA	UART0 TX	SPI0 RX	GP16	27	28	GP17	SPI0 Csn	UART0 RX	I2C0 SCL	PWM0 B
PWM3 B	I2C1 SCL	UART1 RTS	SPI0 TX	GP07	29	30	GND				
PWM6 A	I2C0 SDA	UART0 TX	SPI1 RX	GP12	31	32	GP19	SPI0 TX	UART0 RTS	I2C1 SCL	PWM1 B
PWM6 B	I2C0 SCL	UART0 RX	SPI1 Csn	GP13	33	34	GND				
PWM7 B	I2C1 SCL	UART0 RTS	SPI1 TX	GP15	35	36	GP26	SPI1 SCK	UART1 CTS	I2C1 SDA	PWM5 A
PWM7 A	I2C1 SDA	UART0 CTS	SPI1 SCK	GP14	37	38	GP02	SPI0 SCK	UART0 CTS	I2C1 SDA	PWM1 A
				GND	39	40	GP25	SPI1 Csn	UART1 RX	I2C0 SCL	PWM4 B

Network

The Radxa X4 offers a 10/100/1000/2500 Mbps RJ45 connector for wired networking. With additional PoE HAT, Radxa X4 can be powered by ethernet cable via RJ45 port by

a PoE capable switch/router.

M.2 M Key Connector

The Radxa X4 offers M.2 M Key Connectors. The M.2 M Key connector with PCIe 3.0 4-lane interface. A standard M.2 2230 mounting hole is on the board to enable the deployment of a M.2 2230 NVMe SSD. Please note that M.2 SATA SSDs are not supported.

Micro HDMI Interfaces

The Radxa X4 features dual Micro HDMI ports, each capable of delivering output at a resolution of 4096 x 2160 @ 60fps. This setup offers users enhanced flexibility and compatibility, enabling seamless connectivity to high-resolution displays or multiple monitors. Whether for multimedia presentations, gaming, or professional applications requiring crisp and fluid visuals, the Radxa X4 provides reliable performance and versatility in display output.

USB

The Radxa X4 integrates three USB 3.0 Host Type-A ports along with a USB 2.0 Host Type- A port. This configuration offers users extensive connectivity options for peripherals and external devices. The USB 3.0 ports ensure high-speed data transfer rates, ideal for tasks such as file transfers, multimedia streaming, and peripheral connectivity, while the USB 2.0 port provides compatibility with a wide range of legacy devices.

Audio Jack

The Radxa X4 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.

Model and SKU

SoC	RAM	eMMC	Wireless	SKU
	4GB	N/A	WiFi / BT	RS866-D4E0R30W23

Intel N100		32GB		RS866-D4E32R30W23
	8GB	N/A	WiFi / BT	RS866-D8E0R30W16
		64GB		RS866-D8E64R30W16
	12GB	N/A		RS866-D12E0R30W16
		128GB		RS866-D12E128R30W16

Availability

Radxa guarantees availability of the Radxa X4 until at least September 2032.

Support

For hardware or software related questions, please send email to support@radxa.com. For business and sales related questions, please send emails to sales@radxa.com.

FCC WARNING

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

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 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 equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator and your body.

FAQ

Q: Can I upgrade the RAM on Radxa X4?

A: The Radxa X4 comes with LPDDR5 RAM with options for different configurations. Check the specifications for available options or contact support for further assistance.

Q: How do I update the BIOS on Radxa X4?

A: To update the BIOS, refer to the user manual or visit the official Radxa website for detailed instructions on BIOS updates.

Documents / Resources

	radxa D8E High Performance SBC with Intel Processor [pdf] User Guide D8E, 2BC6T-D8E, 2BC6TD8E, D8E High Performance SBC with Intel Processor, D8E, High Performance SBC with Intel Processor, Intel Processor

References

- User Manual

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2BC6T-D8E, 2BC6TD8E, D8E, D8E High Performance SBC with Intel Processor, High Performance SBC with Intel Processor, Intel Processor, radxa

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