
Radxa ROCK 5T Product Brief

8K Industrial-Grade Single Board Computer

Revision 1.0

2025-01-07



Contents

- 1 Revision Control Table 2
- 2 Introduction 3
- 3 Features 4
 - 3.1 Hardware 4
 - 3.2 Interfaces 4
 - 3.3 Software 6
- 4 Mechanical Specification 7
- 5 Electrical Specification 8
 - 5.1 Power Requirements 8
 - 5.2 GPIO Voltage 8
- 6 Peripherals 8
 - 6.1 GPIO Interface 8
 - 6.1.1 GPIO Alternate Functions 8
 - 6.2 Network 9
 - 6.3 Camera and Display Interfaces 9
 - 6.4 USB 9
 - 6.5 HDMI Output 10
 - 6.6 HDMI Input 10
 - 6.7 Audio Jack 10
 - 6.8 FPC Interface 10
 - 6.9 SIM Card Slot 10
 - 6.10 M.2 Connector 10
 - 6.11 Fan Connector 11
- 7 Order Info and SKU 11
- 8 Availability 12
- 9 Support 12

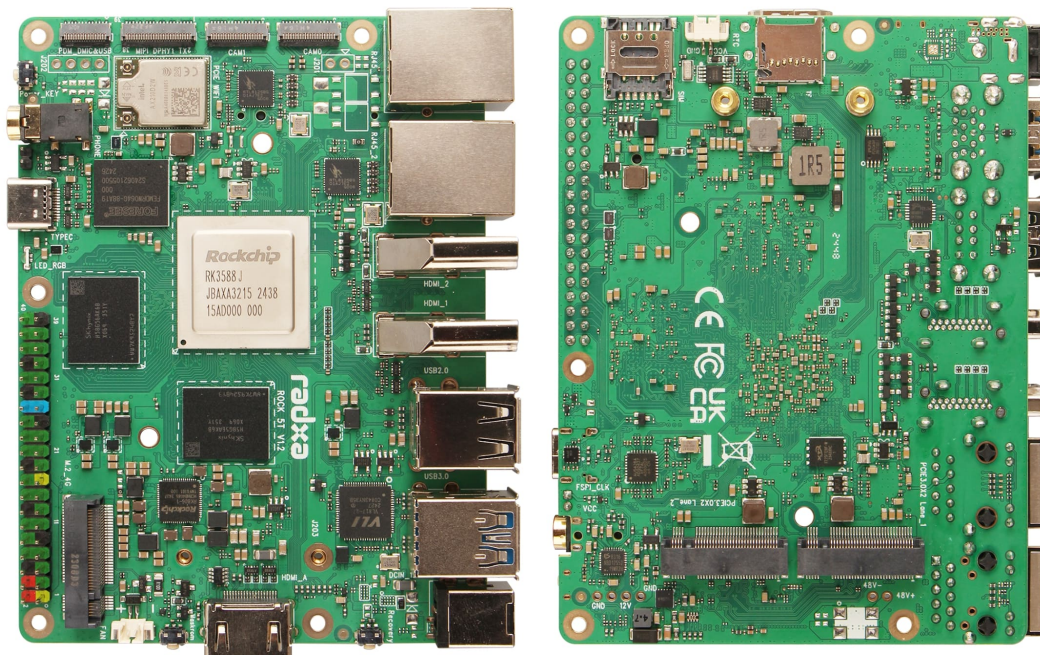
1 Revision Control Table

Version	Date	Changes from previous version
1.0	2025-01-07	First Version

2 Introduction

The ROCK 5T from Radxa is a remarkable high-performance Single Board Computer. Armed with the potent Rockchip RK3588/RK3588J processor, it combines powerful computing with rich features. It excels in multimedia processing and offers diverse interfaces, perfectly handling complex data and high-res video output. Ideal for edge computing and embedded systems, its standout feature is flexibility. Users can self-select configurations to fit industrial-grade wide-temp or consumer-grade needs. Radxa offers various options for LPDDR5 memory configurations on the ROCK 5T board:

- 4GB
- 8GB
- 16GB
- 24GB
- 32GB



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

- Rockchip RK3588 / RK3588J SoC
- Quad Cortex[®]-A76 @ 2.2/2.4GHz and a quad Cortex[®]-A55 @ 1.8GHz based on Arm[®] DynamIQ™ configuration
- Arm[®] Mali™ G610MC4 GPU supporting:
 - OpenGL[®] ES1.1, ES2.0, and ES3.2
 - OpenCL[®] 1.1, 1.2 and 2.2
 - Vulkan[®] 1.1 and 1.2
 - Embedded high performance 2D image acceleration module
- NPU supporting INT4 / INT8 / INT16 / FP16 / BF16 and TF32 acceleration and computing power is up to 6TOPs
- 64bit LPDDR5 RAM 5500MT/S options:
 - 4GB
 - 8GB
 - 16GB
 - 24GB
 - 32GB
- Onboard eMMC options:
 - 16GB
 - 32GB
 - 64GB
 - 128GB
 - 256GB
- Able to provide 4 display outputs via two HDMI, one DP (type C) and one MIPI DSI
- H.265 / H.264 / VP9 / AV1 / AVS2 video decoder up to 8K@60fps
- H.264 / H.265 video decoder up to 8K@30fps

3.2 Interfaces

- IEEE 802.11a/b/g/n/ac/ax Wireless LAN (Wi-Fi 6)
- BT 5.2 with BLE
- 1x 5525 DC Jack port for power input

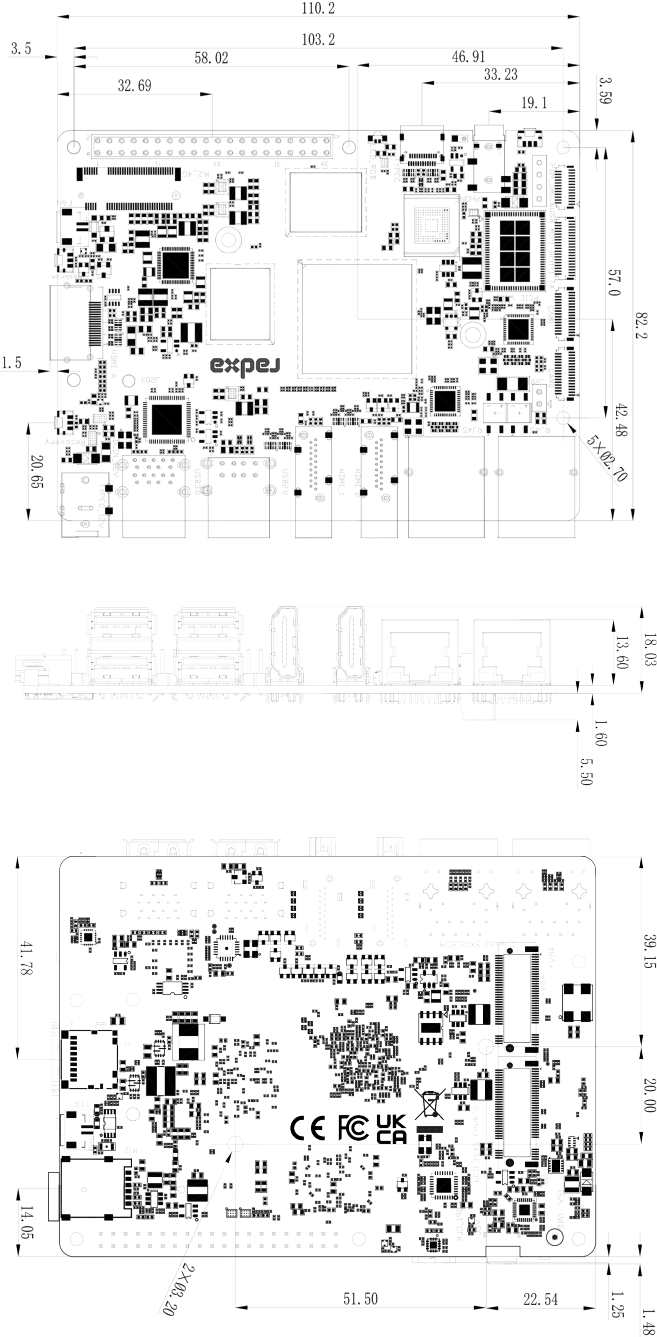
- 1x USB Type-C™ port supporting:
 - DP display up to 4Kp60
 - USB 3.0 OTG / HOST
- 1x Micro SD Card Slot
- 2x Standard HDMI output ports, one supporting displays up to 8Kp60 resolution, one supporting up to 4Kp60
- 1x Standard HDMI input port, supporting up to 4Kp60 display input
- 2x USB2 Type A HOST ports
- 2x USB3 Type A HOST ports
- 1x 2.5 Gigabit Ethernet port with PoE support(Additional PoE Module Required)
- 1x 2.5 Gigabit Ethernet port without PoE support(Near the HDMI interface side)
- 2x M.2 M Key Connectors with PCIe 3.0 2-lane support
- 1x M.2 B Key Connectors with 4G Module support for mobile network
- 1x SIM Card Slot
- 2x Camera Interface (2x four-lane MIPI CSI or 2x two-lane MIPI CSI)
- 1x MIPI LCD Interface (four-lane MIPI DSI)
- 1x Headphone Jack with Microphone Input
- 1x 25-Pin FPC Interface with PDM and USB for Digital Microphone
- Miscellaneous
 - 1x RTC Battery Connector
 - 1x Fan Socket with PWM Control
 - 1x Power button
 - 1x Recovery button
 - 1x Maskrom button
 - 1x RGB power/status/user LED
 - 2x Heatsink Mounting Holes
- 40 pin 0.1” (2.54mm) header supporting a wide range of interface options:
 - 2 x UART
 - 2 x SPI bus
 - 2 x I2C bus
 - 1 x PCM/I2S
 - 1 x SPDIF
 - 1 x PWM
 - 1 x ADC
 - 6 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
- OpenFyde OS(Chromium OS fork) support
- RKNPU2 NPU software stack
- Hardware access/control library for Linux/Android

4 Mechanical Specification



5 Electrical Specification

5.1 Power Requirements

The ROCK 5T supports fixed voltage power supply technologies, specifically:

- 5525 DC Jack Port with 12V Input Support.
- 5V Power that can be applied to the GPIO PIN 2 & 4.

The recommended power source for it should be capable of producing at least 36W (that is, 12V / 3A or larger).

5.2 GPIO Voltage

GPIO	Voltage Level	Tolerance
All GPIO	3.3V	3.63V
SARADC_IN4	1.8V	1.98V

6 Peripherals

6.1 GPIO Interface

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

6.1.1 GPIO Alternate Functions

Function5	Function4	Function3	Function2	Function1	Pin#	Pin#	Function1	Function2	Function3	Function4	Function5
				+3.3V	1	2	+5.0V				
I2S1_SDO2_M0	I2C7_SDA_M3	PWM15_IR_M1	CAN1_TX_M1	GPIO4_B3	3	4	+5.0V				
I2S1_SDO1_M0	I2C7_SCL_M3	PWM14_M1	CAN1_RX_M1	GPIO4_B2	5	6	GND				
SPI1_CS1_M1	I2C8_SDA_M4	UART7_CTSN_M1	PWM15_IR_M0	GPIO3_C3	7	8	GPIO0_B5	UART2_TX_M0	I2S1_MCLK_M1	I2C1_SCL_M0	
				GND	9	10	GPIO0_B6	UART2_RX_M0	I2S1_SCLK_M1	I2C1_SDA_M0	
		SPI1_CLK_M1	UART7_RX_M1	GPIO3_C1	11	12	GPIO3_B5	PWM12_M0	CAN1_RX_M0	UART3_TX_M1	I2S2_SCLK_M1
		SPI1_MOSI_M1	I2C3_SCL_M1	GPIO3_B7	13	14	GND				
	SPI1_MISO_M1	I2C3_SDA_M1	UART7_TX_M1	GPIO3_C0	15	16	GPIO3_A4	SPI4_CS1_M1	UART8_RTSN_M1	I2S3_SDI	

Function5	Function4	Function3	Function2	Function1	Pin#	Pin#	Function1	Function2	Function3	Function4	Function5
				+3.3V	17	18	GPIO4_C4	I2C7_SDA_M1	UART9_RTSN_M0	SPI3_MISO_M0	PWM5_M2
UART4_RX_M2	PDM1_SDI3_M1	SPI0_MOSI_M2	GPIO1_B2		19	20	GND				
	PDM1_SDI2_M1	SPI0_MISO_M2	GPIO1_B1		21	22	SARADC_IN4				
UART4_TX_M2	PDM1_CLK1_M1	SPI0_CLK_M2	GPIO1_B3		23	24	GPIO1_B4	SPI0_CS0_M2	PDM1_CLK0_M1	UART7_RX_M2	
			GND		25	26	GPIO1_B5	SPI0_CS1_M2	UART7_TX_M2		
PWM7_IR_M3	SPI3_CLK_M0	UART7_CTSN_M0	I2C0_SDA_M1	GPIO4_C6	27	28	GPIO4_C5	I2C0_SCL_M1	UART9_CTSN_M0	SPI3_MOSI_M0	PWM6_M2
	UART1_CTSN_M0	I2C8_SDA_M2	PWM15_IR_M3	GPIO1_D7	29	30	GND				
UART1_RX_M1	I2C5_SDA_M3	SPDIF_TX_M0	PWM13_M2	GPIO1_B7	31	32	GPIO3_C2	PWM14_M0	UART7_RTSN_M0	I2C8_SCL_M4	SPI1_CS0_M1
			PWM8_M0	GPIO3_A7	33	34	GND				
I2S2_LRCK_M1	UART3_RX_M1	CAN1_TX_M0	PWM13_M0	GPIO3_B6	35	36	GPIO3_B1	PWM2_M1	UART2_TX_M2		
			REFCLK_OUT	GPIO0_A0	37	38	GPIO3_B2	PWM3_IR_M1	UART2_RX_M2	I2S2_SDI_M1	
				GND	39	40	GPIO3_B3	UART2_RTSN	I2S2_SDO_M1		

6.2 Network

The ROCK 5T is equipped with two 2.5G Ethernet ports. One port supports Power over Ethernet (PoE), allowing the device to be powered through the network cable when connected to a PoE-enabled switch or router with an appropriate PoE Module. The other port, situated near the HDMI interface, does not support PoE.

6.3 Camera and Display Interfaces

The ROCK 5T is equipped with two four-channel MIPI CSI camera connectors and one four-channel MIPI DSI connector. These connectors are specifically designed for Radxa camera and monitor accessories. Moreover, they offer backward compatibility, allowing the use of standard industrial camera and monitor peripherals through Radxa’s adapter FPC cables.

6.4 USB

The ROCK 5T is equipped with a USB 3.0 OTG Type-C port and supports a DP interface, which allows for a maximum resolution of 4Kp60.

Furthermore, the ROCK 5T features two USB 2.0 HOST ports and two USB 3.0 HOST ports, all of which are Type-A connectors. The combined output power for these four ports is 2A.

6.5 HDMI Output

The ROCK 5T is equipped with two standard HDMI output ports, both featuring CEC support and HDMI 2.1 compatibility. These ports offer impressive resolutions, delivering 8Kp60 and 4Kp60, respectively.

6.6 HDMI Input

The ROCK 5T features a single standard HDMI input port, supporting HDMI 2.1 input with a resolution of 4Kp60.

6.7 Audio Jack

The ROCK 5T 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.

6.8 FPC Interface

The ROCK 5T is equipped with a 25-pin FPC interface that supports USB 2.0, I2C, PWM, and PDM signals, offering extensive expansion options and is particularly suitable for connecting digital microphones.

6.9 SIM Card Slot

The SIM card slot on the ROCK 5T provides users with the convenience of directly accessing the mobile communication network. Users can simply combine the 4G module with the SIM card to easily enjoy stable mobile network access, and maintain seamless network connectivity regardless of location.

6.10 M.2 Connector

The ROCK 5T offers three M.2 interfaces:

At the front of the circuit board, there is an M.2 B Key connector providing USB signals and supporting 4G modules. It facilitates mobile network connectivity through the use of a SIM card and is compatible with 3042-sized 4G modules.

At the back of the circuit board, there are two M.2 M Key connectors, offering a total of two dual-channel PCIe 3.0 interfaces. Each M.2 M Key connector on the board features a standard M.2 2280 mounting hole, allowing the installation of M.2 2280 NVMe solid-state drives. It's important to note that M.2 SATA solid-state drives are not supported.

6.11 Fan Connector

The ROCK 5T 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.

7 Order Info and SKU

To meet the customization needs of our clients, Radxa has prepared the following options for customer customization. The following SKU numbers are available for users to choose from, and their meanings are as follows:

Example SKU code:

RS139-D8E32P2J0W16

SKU Code Explanation Table:

D	DRAM	D4	4GB RAM
		D8	8GB RAM
		D16	16GB RAM
		D24	24GB RAM
		D32	32GB RAM
E	eMMC	E0	eMMC chip not soldered
		E16	16GB eMMC
		E32	32GB eMMC
		E64	64GB eMMC
		E128	128GB eMMC
J	Industrial Grade	J0	Commercial Grade(0 ~60)
		J1	Industrial Grade(-40 ~85)
P	PoE support	P0	RJ45 do not support PoE
		P2	with PoE Module built-in
W	WiFi Module	W16	AW-XM548NF WiFi
		W18	AX210 Industrial Grade WiFi

8 Availability

Radxa guarantees availability of the Radxa ROCK 5T until at least September 2032.

9 Support

For support please see the hardware documentation section of the [Radxa Website](#) and post questions to the [Radxa Forum](#).

