Product Brief

Radxa ZERO 3E Product Brief

A Light, Compact and Tiny SBC

Revision 1.1

2023-10-13

Radxa Computer

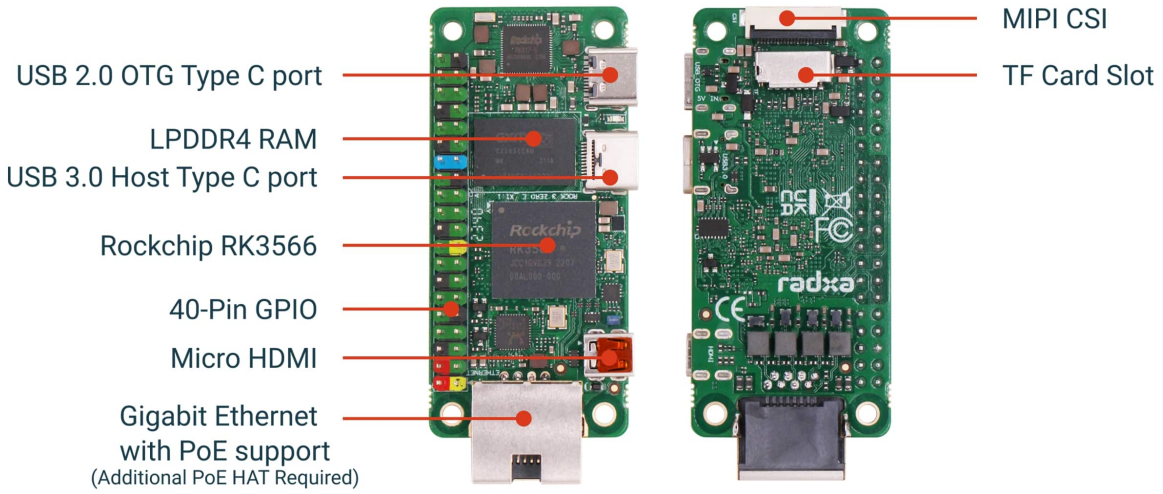
Contents

1 Revision Control Table

Version	Date	Changes from previous version
1.0	01/08/2023	First version
1.1	13/10/2023	Improve readability

2 Introduction

The Radxa ZERO 3E is a high-performance Single Board Computer (SBC) engineered in a compact form factor, designed to deliver unparalleled computational capabilities while maintaining exceptional mechanical compatibility. Tailored for a diverse user base, including makers, IoT developers, hobbyists, and PC DIY enthusiasts, the Radxa ZERO 3E serves as a robust and versatile platform. It is optimized for the development, prototyping, and deployment of various applications, thereby providing a reliable foundation for translating innovative ideas into functional realities.



Note:

The images presented depict a particular configuration of the Radxa ZERO 3E. Please note that the actual component layout and specifications may differ based on the selected Stock Keeping Unit (SKU).

3 Features

3.1 Hardware

- Rockchip RK3566 SoC
- Quad-core Arm® Cortex®-A55 (ARMv8) 64-bit @ 1.6GHz
- Arm Mali™-G52-2EE, OpenGL® ES1.1/2.0/3.2, Vulkan® 1.1, OpenCL™ 2.0
- 1GB / 2GB / 4GB LPDDR4 RAM
- Display via Micro HDMI
- H.264/H.265 decoder up to 4K@60fps
- H.264/H.265 encoder up to 1080P@60fps

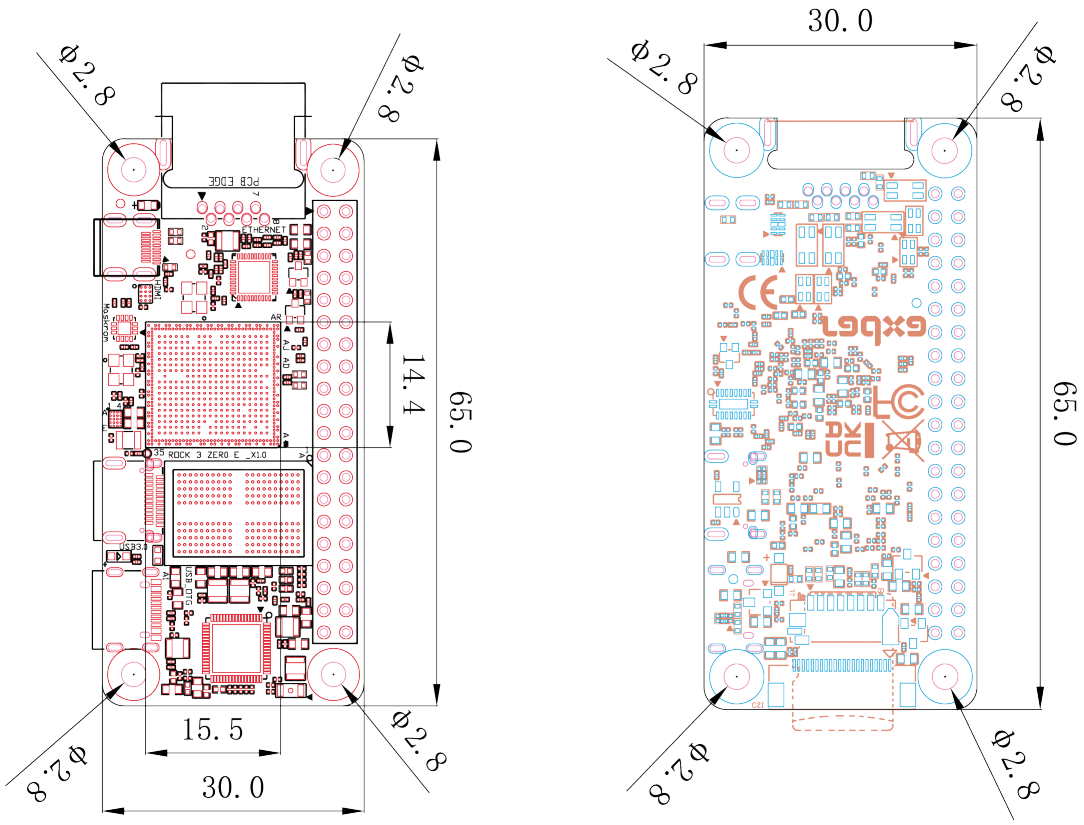
3.2 Interfaces

- 1x Gigabit Ethernet with PoE support(Additional PoE HAT Required)
- 1x TF Card Slot
- 1x Micro HDMI ports supporting displays up to 1080P@60fps resolution
- 1x Micro USB2 OTG port for power and data
- 1x Micro USB2 HOST port
- 1x MIPI CSI
- 40x user GPIO supporting various interface options:
  - up to 5 x UART
  - 1 x SPI bus
  - up to 2 x I2C bus
  - 1 x PCM/I2S
  - up to 6 x PWM
  - up to 28 x GPIO
  - 2 x 5V DC power in
  - 2 x 3.3V power pin

3.3 Software

- ARMv8 Instruction Set
- Debian/Ubuntu Linux support
- Hardware access/control library for Linux

4 Mechanical Specification



5 Electrical Specification

5.1 Power Requirements

The Radxa ZERO 3E support DC +5V voltage:

- Power adapter with 5V/1A on the micro USB power port
- 5V Power from the GPIO PIN 2 & 4

6 Peripherals

6.1 GPIO Interface

Radxa ZERO 3E offers 40P GPIO expansion which is compatible with many accessories on the 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				
		I2C3_SDA_M0	UART3_RX_M0	GPIO1_A0	3	4	+5.0V				
		I2C3_SCL_M0	UART3_TX_M0	GPIO1_A1	5	6	GND				
	PWM14_M0			GPIO3_C4	7	8	GPIO0_D1	UART2_TX_M0			
				GND	9	10	GPIO0_D0	UART2_RX_M0			
				GPIO3_A1	11	12	GPIO3_A3				I2S3_SCLK_M0
	I2S3_MCLK_M0			GPIO3_A2	13	14	GND				
				GPIO3_B0	15	16	GPIO3_B1	UART4_RX_M1	PWM8_M0		
				+3.3V	17	18	GPIO3_B2	UART4_TX_M1	PWM9_M0		
	PWM15_IR_M1	I2S3_SCLK_M1	SPI3_MOSI_M1	GPIO4_C3	19	20	GND				
UART9_TX_M1	PWM12_M1	I2S3_SDO_M1	SPI3_MISO_M1	GPIO4_C5	21	22	GPIO3_C1				I2S1_SDO2_M2
	PWM14_M1	I2S3_MCLK_M1	SPI3_CLK_M1	GPIO4_C2	23	24	GPIO4_C6	SPI3_CS0_M1	PWM13_M1	UART9_RX_M1	I2S3_SDI_M1
				GND	25	26	GPIO4_D1	SPI3_CS1_M1			
	I2C4_SDA_M0	I2S2_SDI_M1		GPIO4_B2	27	28	GPIO4_B3			I2C4_SCL_M0	I2S2_SDO_M1
				GPIO3_B3	29	30	GND				
				GPIO3_B4	31	32	GPIO3_C2	UART5_TX_M1			I2S1_SDO3_M2
UART5_RX_M1		I2S1_SCLK_RX_M2		GPIO3_C3	33	34	GND				
		I2S3_LRCK_M0		GPIO3_A4	35	36	GPIO3_A7				
		I2S1_SCLK_RX_M0		GPIO1_A4	37	38	GPIO3_A6				I2S3_SDI_M0
				GND	39	40	GPIO3_A5				I2S3_SDO_M0

6.2 USB

The Radxa ZERO 3E is outfitted with a USB 3.0 Host Type-C interface, constrained to a maximum electrical current of 500mA in accordance with USB 3.0 specifications.

Additionally, the unit incorporates a USB 2.0 OTG (On-The-Go) Type-C port, compatible with a 5V power supply adapter as well as standard USB ports on computing devices such as laptops and desktops. This OTG port serves a dual function: it acts as a programming interface compliant with standard flashing protocols for software updates, and facilitates data access for read/write operations. Its multi-purpose design renders it suitable for a range of applications, including but not limited to, experimental data transfers, debugging, and other specialized tasks.

6.3 Gigabit Ethernet

Radxa ZERO 3E is equipped with a Gigabit Ethernet Port, and due to its clever hardware design, it does not require the addition of an extra 4-pin PoE interface on the PCB board. It can support PoE functionality when add additional PoE HAT. Consequently, Radxa ZERO 3E has successfully achieved the capability to provide power and network access through a single Ethernet cable, all while maintaining its compact and aesthetically pleasing design.

6.4 Camera Interfaces

The Radxa ZERO 3E is equipped with a 1x 4-lane MIPI CSI (Mobile Industry Processor Interface Camera Serial Interface) connector for camera integration. This interface is designed to be backward-compatible with standard industrial camera peripherals, ensuring seamless integration and operational flexibility.

6.5 HDMI

The Radxa ZERO 3E features a single Micro HDMI port, engineered to support Consumer Electronics Control (CEC) and HDMI 2.0 standards. This port is capable of outputting video resolutions up to 1080p at 60 frames per second (1080p60).

6.6 Temperature Range and Thermals

The specified ambient operating temperature for optimal performance of the Radxa ZERO 3E ranges from 0°C to 50°C, in accordance with industry standards.

To optimize thermal efficiency, the Radxa ZERO 3E employs dynamic voltage and frequency scaling (DVFS). During idle or low-load conditions, the CPU clock frequency and core voltage are dynamically reduced to minimize thermal dissipation. Conversely, under high-load scenarios, both the clock frequency and core voltage are elevated, resulting in increased thermal output. An internal thermal management governor is in place to regulate these parameters, ensuring that the CPU temperature does not exceed a threshold of 85°C.

Engineered for burst performance, the Radxa ZERO 3E is capable of operating effectively without additional cooling solutions. It is designed to handle light-to-moderate workloads on average, while having the capability to ramp up CPU performance for more demanding tasks, such as webpage loading. For users intending to subject the system to sustained

high-load conditions or operate it in elevated ambient temperatures at full performance, supplementary cooling mechanisms may be advisable.

6.7 Models and SKU

DRAM	SKU
1GB	RS109-D1
2GB	RS109-D2
4GB	RS109-D4
8GB	RS109-D8

7 Availability

Radxa commits to ensuring the availability of the Radxa ZERO 3E model until a minimum date of September 2033, thereby providing long-term support and supply assurance.

8 Support

For technical support and inquiries, kindly refer to the Hardware Documentation section on the Radxa Documentation website. For further assistance and community discussions, please direct your questions to the Radxa Forum.