Product Brief

# Radxa X2L Product Brief

## An Economical and Low Profile SBC

Revision 1.0

2023-10-20

Radxa Computer

# Contents

# 1 Revision Control Table

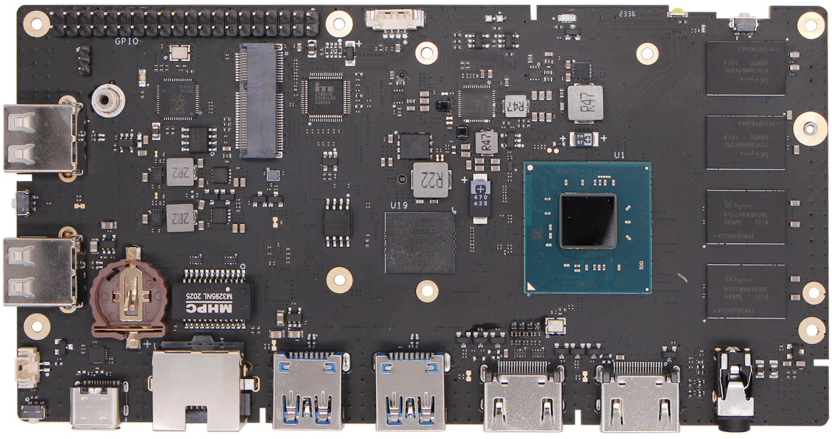
| Version | Date | Changes from previous version |
|---|---|---|
| 1.0 | 2023/10/26 | First version |

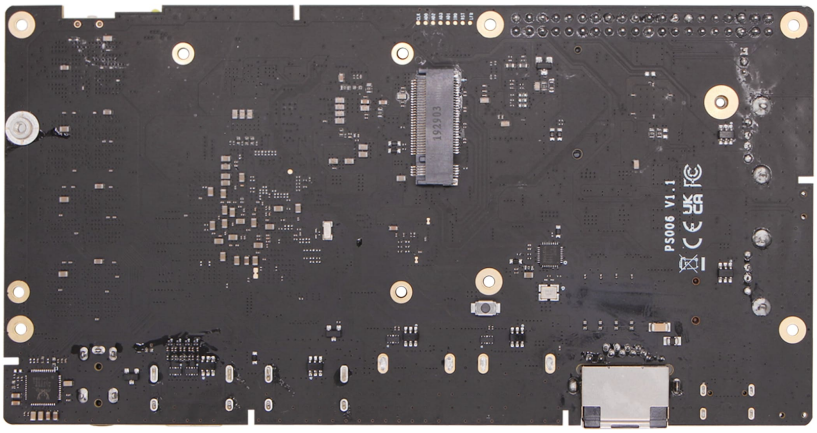
# 2 Introduction

Radxa X2L, featuring the Intel J4125 processor, is a high-performance and budget-friendly single board computer designed to deliver outstanding computing power and versatility. Whether you require efficient office productivity, seamless multitasking, or immersive entertainment, this computer excels in all areas.

Radxa offers the Radxa X2L in various LPDDR4 RAM memory options:

- 2GB
- 4GB
- 8GB





*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

- Intel® Celeron® Processor J4125
  - Total Cores: 4
  - Total Threads: 4
  - Burst Frequency: 2.70 GHz
  - Processor Base Frequency: 2.00 GHz
  - Cache: 4 MB
- Intel® UHD Graphics 600
  - Graphics Base Frequency: 250 MHz
  - Graphics Burst Frequency: 750 MHz
  - DirectX Support: 12
  - OpenGL Support: 4.4
- LPDDR4 RAM up to 2400 MT/s with options
  - 2GB
  - 4GB
  - 8GB

## 3.2 Interfaces

- Dual Display Outputs via Two HDMI up to 4Kp30
- 1x Gigabit Ethernet
- 1x M.2 E Key Connector for WiFi / BT Module
- 1x M.2 M Key Connector for M.2 NVMe SSD for OS Boot and Storage
- 2x USB 2.0 HOST Type A Port
- 2x USB 3.0 HOST Type A Port
- 1x RTC Battery Socket
- 1x 3.5mm Headphone Jack with Microphone Input
- 1x 4-Pin 1.25mm Fan Header
- 1x 3-Pin Debug Header
- 4x Buttons
  - 1x Power Button
  - 1x BOOTSEL Button for RP2040

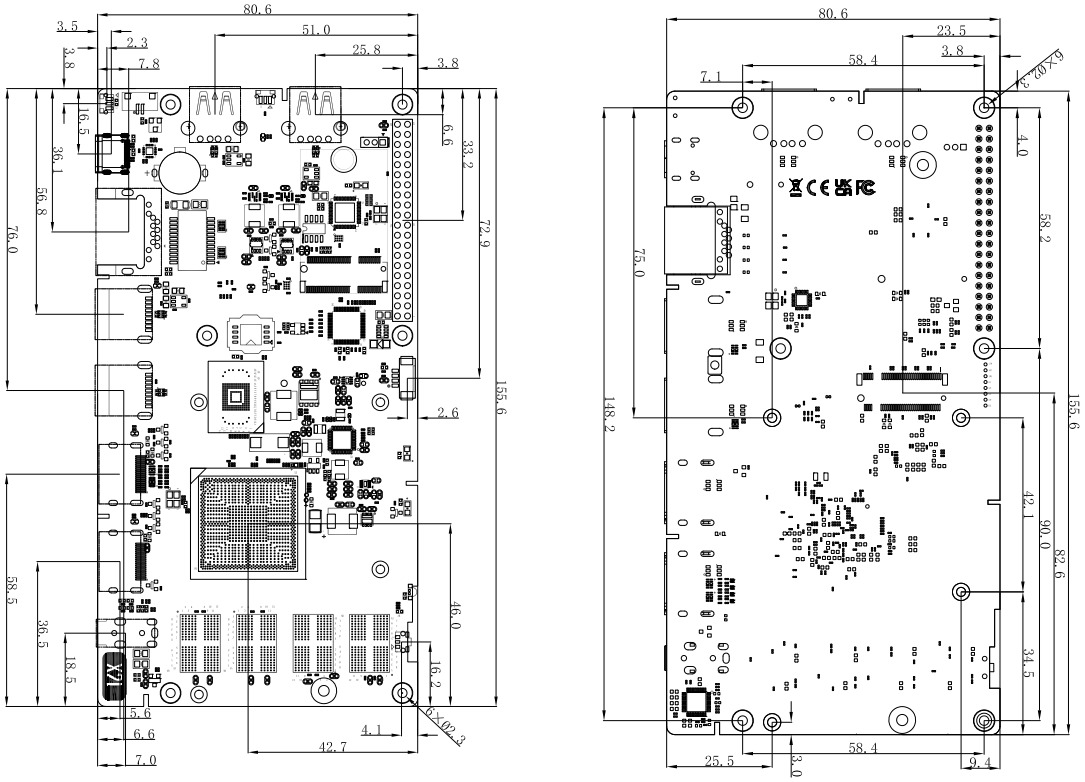
  - 1x User Button
  - 1x Clear CMOS Button

- 40-Pin GPIO Header 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)
  - 1 x 5V DC power in/out
  - 2 x 3.3V power out

## 3.3 Software

- Intel® 64 Instruction Set
- Windows 10 64-bit
- Debian / Ubuntu Linux support
- Hardware access/control library for Linux

# 4 Mechanical Specification




# 5 Electrical Specification

## 5.1 Power Requirements

The Radxa X2L supports the following power input:

- USB Type-C PD Version 2.0 with 9V/2A, 12V/2A, 15V/2A and 20V/2A.
- Power adapter with fixed voltage in 9V to 20V range on the USB Type-C port

The recommended power source should be able to produce, at least, 18W without power consuming devices on USB 3 or 24W with full USB ports load.

## 5.2 GPIO Voltage

| GPIO | Voltage Level | Tolerance |
|---|---|---|
| All GPIO | 3.3V | 3.63V |

# 6 Operating Conditions

The Radxa X2L has been designed to operate between 0°C to 50°C.

The Intel J4125 processor is engineered to operate within a defined temperature range of 0°C to 50°C. This temperature range has been carefully selected to accommodate various computing scenarios. The efficient utilization of processing power, including the capabilities of Intel’ s technology, ensures that the processor is used judiciously for different tasks. Whether it’ s handling lightweight workloads or more demanding computational tasks, the processor adapts to the requirements, resulting in minimal heat generation and a responsive user experience.

# 7 Peripherals

## 7.1 GPIO Interface

The Radxa X2L provides a 40-pin GPIO expansion header through the RP2040, which is widely compatible with a variety of accessories developed for the SBC market.

### 7.1.1 GPIO Alternate Functions

| Function5 | Function4 | Function3 | Function2 | Function1 | Pin# | Pin# | Function1 | Function2 | Function3 | Function4 | Function5 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| PWM0 A | I2C0 SDA | UART0 TX | SPI0 RX | GPIO_0 | 1 | 40 | 5V0_VBUS | | | | |
| PWM0 B | I2C0 SCL | UART0 RX | SPI0 CSn | GPIO_1 | 2 | 39 | 3V3_VSYS | | | | |
| | | | | GND | 3 | 38 | GND | | | | |
| PWM1 A | I2C1 SDA | UART0 CTS | SPI0 SCK | GPIO_2 | 4 | 37 | 3V3_EN | | | | |
| PWM1 B | I2C1 SCL | UART0 RTS | SPI0 TX | GPIO_3 | 5 | 36 | 3V3_OUT | | | | |
| PWM2 A | I2C0 SDA | UART1 TX | SPI0 RX | GPIO_4 | 6 | 35 | ADC_AVDD | | | | |
| PWM2 B | I2C0 SCL | UART1 RX | SPI0 CSn | GPIO_5 | 7 | 34 | GPIO_28 | SPI1 RX | UART0 TX | I2C0 SDA | PWM6 A |
| | | | | GND | 8 | 33 | GND | | | | |
| PWM3 A | I2C1 SDA | UART1 CTS | SPI0 SCK | GPIO_6 | 9 | 32 | GPIO_27 | SPI1 TX | UART1 RTS | I2C1 SCL | PWM5 B |
| PWM3 B | I2C1 SCL | UART1 RTS | SPI0 TX | GPIO_7 | 10 | 31 | GPIO_26 | SPI1 SCK | UART1 CTS | I2C1 SDA | PWM5 A |
| PWM4 A | I2C0 SDA | UART1 TX | SPI1 RX | GPIO_8 | 11 | 30 | RUN_PU | | | | |
| PWM4 B | I2C0 SCL | UART1 RX | SPI1 CSn | GPIO_9 | 12 | 29 | GPIO_22 | SPI0 SCK | UART1 CTS | I2C1 SDA | PWM3 A |

| Function5 | Function4 | Function3 | Function2 | Function1 | Pin# | Pin# | Function1 | Function2 | Function3 | Function4 | Function5 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | GND | 13 | 28 | GND | | | | |
| PWM5 A | I2C1 SDA | UART1 CTS | SPI1 SCK | GPIO_10 | 14 | 27 | GPIO_21 | SPI0 CSn | UART1 RX | I2C0 SCL | PWM2 B |
| PWM5 B | I2C1 SCL | UART1 RTS | SPI1 TX | GPIO_11 | 15 | 26 | GPIO_20 | SPI0 RX | UART1 TX | I2C0 SDA | PWM2 A |
| PWM6 A | I2C0 SDA | UART0 TX | SPI1 RX | GPIO_12 | 16 | 25 | GPIO_19 | SPI0 TX | UART0 RTS | I2C1 SCL | PWM1 B |
| PWM6 B | I2C0 SCL | UART0 RX | SPI1 CSn | GPIO_13 | 17 | 24 | GPIO_18 | SPI0 SCK | UART0 CTS | I2C1 SDA | PWM1 A |
| | | | | GND | 18 | 23 | GND | | | | |
| PWM7 A | I2C1 SDA | UART0 CTS | SPI1 SCK | GPIO_14 | 19 | 22 | GPIO_17 | SPI0 CSn | UART0 RX | I2C0 SCL | PWM0 B |
| PWM7 B | I2C1 SCL | UART0 RTS | SPI1 TX | GPIO_15 | 20 | 21 | GPIO_16 | SPI0 RX | UART0 TX | I2C0 SDA | PWM0 A |

## 7.2 Network Interface

Radxa X2L features efficient Gigabit Ethernet connectivity through the RTL8111H controller, offering both high-speed networking and power efficiency.

## 7.3 HDMI Interfaces

Featuring both 4096 x 2160 resolution at 30Hz, the Radxa X2L ensures your dual-display needs are met. These HDMI interfaces enable you to connect to a wide range of displays, from 4K high-definition monitors to other compatible display devices. Whether you require a seamless dual-display setup for productivity or entertainment purposes, the Radxa X2L's HDMI connectivity options provide the flexibility you need for a rich visual experience.

## 7.4 USB Interface

Radxa X2L features two USB 2.0 HOST Type-A ports, suitable for connecting a variety of USB devices such as keyboards, mice, and more. Additionally, the Radxa X2L offers two USB 3.0 HOST Type-A ports, allowing you to connect high-speed USB 3.0 devices for faster data transfer.

## 7.5 M.2 M Key Connector

The Radxa X2L boasts an M.2 M Key socket featuring a 4-lane PCIe 2.0 interface, specifically designed to support M.2 NVMe SSDs. What sets the Radxa X2L apart is its ability to boot the operating system directly from the M.2 NVMe SSD, ensuring faster startup times and efficient system performance. Whether you need to expand your storage capacity or optimize your system's overall performance, the M.2 M Key socket on the Radxa X2L delivers

a high-speed, high-capacity storage solution while enabling OS booting for enhanced responsiveness.

### 7.6 M.2 E Key Connector

The Radxa X2L features an M.2 E Key socket that not only supports PCIe 2.0 signals but also includes USB connectivity, providing compatibility with wireless modules for both WiFi and Bluetooth.

### 7.7 Audio Jack

The Radxa X2L 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.

## 8 Availability

Radxa guarantees availability of the Radxa X2L until at least September 2030.

## 9 Support

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