

waveshare RP2350-USB-A

Waveshare RP2350 USB Mini Development Board User Manual

Model: RP2350-USB-A | Brand: Waveshare

1. PRODUCT OVERVIEW

The Waveshare RP2350 USB Mini Development Board is a compact and powerful microcontroller board designed for embedded systems development. It is based on the Raspberry Pi RP2350 dual-core and dual-architecture microcontroller, offering flexible clock speeds up to 150 MHz. This board is ideal for a wide range of applications, from basic prototyping to complex IoT projects.

Key Features:

- Integrated Raspberry Pi RP2350 microcontroller with dual-core Arm Cortex-M33 and dual-core Hazard3 RISC-V processors.
- Flexible clock frequency up to 150 MHz.
- 520KB of SRAM and 2MB of onboard Flash memory.
- Modern Type-C USB connector for power and data.
- Castellated module design for direct soldering to carrier boards.
- USB 1.1 support with device and host capabilities.
- Onboard 1x USB Type-A expansion port via PIO, compatible with USB 2.0/1.1 transmission.
- Low-power sleep and dormant modes for efficient energy management.
- Drag-and-drop programming via USB mass storage.
- 15 multi-function GPIO pins, including 2 SPI, 2 I2C, 2 UART, 4 12-bit ADC, and 14 controllable PWM channels.
- 12 Programmable I/O (PIO) state machines for custom peripheral support.

2. TECHNICAL SPECIFICATIONS

Feature	Detail
Product Dimensions	1.3 x 0.69 x 0.59 inches
Item Weight	0.352 ounces
Manufacturer	Waveshare
Item Model Number	RP2350-USB-A
Brand	waveshare
CPU Socket	BGA
Compatible Devices	Personal Computer
RAM Memory Technology	SRAM
Compatible Processors	Raspberry Pi RP2350, Cortex-M33, Hazard3 RISC-V
Chipset Type	Raspberry Pi RP2350A
Memory Clock Speed	150 MHz
Model Name	RP2350 USB Mini Dev Board
Memory Storage Capacity	0.52 MB
RAM Memory Maximum Size	520 KB

3. SETUP GUIDE

3.1 Initial Connection

1. Connect the RP2350 USB Mini Development Board to your computer using a USB Type-C cable. The board will typically be recognized as a mass storage device.
2. Ensure your operating system has the necessary USB drivers. For most modern systems, these drivers are installed automatically.

3.2 Entering Bootloader Mode

To upload new firmware or programs, the board needs to be in bootloader mode. This is typically achieved by:

- Pressing and holding the BOOT button while connecting the board to your computer via USB.
- Alternatively, some development environments may allow entering bootloader mode via software commands.

4. OPERATING INSTRUCTIONS

4.1 Programming the Board

The RP2350 USB Mini Development Board supports drag-and-drop programming. Once the board is in bootloader mode and recognized as a mass storage device, you can simply drag and drop compiled firmware files (e.g., .uf2 files) directly onto the board's drive. The board will automatically reset and run the new program.

4.2 Debugging and Communication

The board provides several interfaces for debugging and communication:

- **SWD Interface:** A 3-pin SWD (Serial Wire Debug) interface is available for hardware debugging, compatible with most ARM-based microcontrollers.
- **UART Interface:** A UART (Universal Asynchronous Receiver/Transmitter) interface is provided for serial communication, useful for sending and receiving data during development and debugging.
- **I2C Interface:** An I2C (Inter-Integrated Circuit) port is available for connecting various sensors and peripherals.
- **USB Type-A Expansion Port:** This port allows for USB 2.0/1.1 transmission via PIO, expanding connectivity options.

4.3 Supported Development Environments

The RP2350 microcontroller supports various programming languages and development environments, including:

- **C/C++ SDK:** The official Raspberry Pi C/C++ SDK can be used for command-line development or integrated into popular IDEs like Visual Studio Code and Eclipse.
- **MicroPython:** A full implementation of the Python 3 programming language optimized for embedded hardware, similar to Raspberry Pi Pico.

Waveshare Electronics provides extensive online development resources and example materials to assist with basic function implementations and complex project cases. These resources can be quickly integrated into your applications.

5. MAINTENANCE AND CARE

5.1 Handling Precautions

- **Static Electricity:** Electronic components are sensitive to electrostatic discharge (ESD). Always handle the board with care, preferably using an anti-static wrist strap or by touching a grounded object before handling.
- **Moisture:** Protect the board from moisture and humidity. Store it in a dry environment to prevent damage.
- **Physical Stress:** Avoid applying excessive force or bending the board, as this can damage components.

or solder joints.

5.2 Cleaning

If cleaning is necessary, gently wipe the board with a soft, dry cloth. For stubborn dirt, use a small amount of isopropyl alcohol on a cotton swab, ensuring the board is powered off and completely dry before re-powering.

5.3 Storage

When not in use, store the RP2350 USB Mini Development Board in its original packaging or an anti-static bag in a cool, dry place away from direct sunlight and extreme temperatures.

6. TROUBLESHOOTING

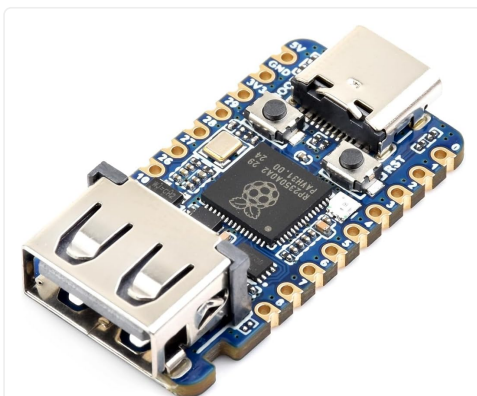
If you encounter issues with your RP2350 USB Mini Development Board, consider the following common troubleshooting steps:

- **Board Not Recognized:** Ensure the USB cable is securely connected and functional. Try a different USB port or cable. Verify the board is in bootloader mode if attempting to upload firmware.
- **Programming Errors:** Double-check your code for syntax errors. Ensure the correct development environment and SDK are installed and configured. Confirm the board is in bootloader mode.
- **No Power/LEDs Off:** Check the USB connection and power source. Ensure the cable is providing sufficient power.
- **Peripheral Issues:** Verify wiring connections to GPIO pins. Ensure correct pin assignments in your code. Check power supply to external components.

For more detailed troubleshooting guides and solutions, please refer to the official Waveshare online development resources and technical support channels.

7. PRODUCT MEDIA

7.1 Product Images



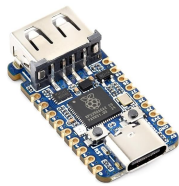
Top-down view of the Waveshare RP2350 USB Mini Development Board, showcasing

its compact design and main components.

RP2350-USB-A Mini Development Board

Based On Raspberry Pi RP2350A, Onboard USB-A Port

Catalyzed Module, Suitable For SMD Applications



- Tiny Size Easy Integration
- Dual-core & Dual-architecture
- High Operating Performance
- Multi-Function GPIO Pins

An illustrative image of the RP2350-USB-A Mini Development Board, highlighting its core features such as tiny size, dual-core CPU, high operating performance, and multi-function GPIO pins.

Board Specifications

- RP2350A microcontroller chip designed by Raspberry Pi in the United Kingdom
- Adopts unique dual-core and dual-architecture design: dual-core Arm Cortex-M33 processor and dual-core Hazard3 RISC-V processor, flexible clock running up to 150 MHz
- 512KB of SRAM, and 2MB of onboard Flash memory
- Type-C connector, keeps it up to date, easier to use
- Catalyzed module allows soldering directly to carrier boards
- USB 1.1 with device and host support
- Onboard 1x USB Type A expansion port via PICO, compatible with USB 2.0/1.1
- Isolation
- Low-power sleep and dormant modes
- Drag-and-drop programming using mass storage over USB
- Adapting 16 × multi-function GPIO pins
- 2 × SPI, 2 × I2C, 2 × UART, 4 × 12-bit ADC, 14 × configurable PWM channels
- Accurate clock and timer on-chip
- Temperature sensor
- Accelerated floating-point libraries on-chip
- 12 × Programmable I/O (PIO) state machines for custom peripheral support

A visual representation of the board's detailed specifications, including microcontroller type, memory, and connectivity options.

Dual-Core, Dual-Architecture

Adopts Dual-Core Arm Cortex-M33 Processor And Dual-Core Hazard3 RISC-V Processor
Flexible Clock Running Up To 150 MHz

Supports C/C++, Arduino IDE

Comprehensive SDK, Dev Resources, Tutorials To Help You Easily Get Started

Pico C/C++ SDK

The Raspberry Pi official C/C++ SDK can be used from the command line, or from popular integrated development environments like Visual Studio Code and Eclipse.

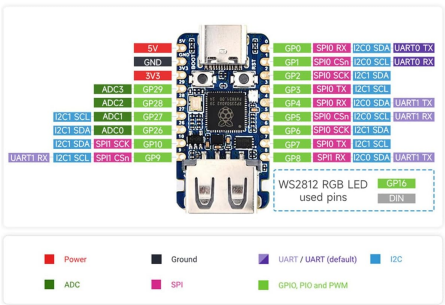
Arduino IDE

Arduino IDE is a open source electronic prototyping platform, convenient and flexible, easy to get started.

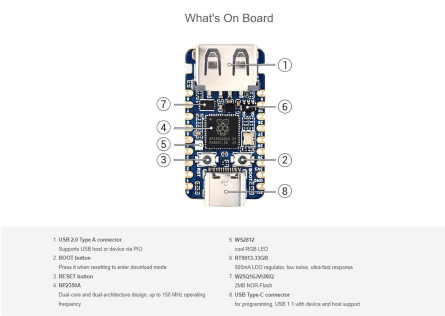
A diagram illustrating the dual-core, dual-architecture of the RP2350, featuring ARM Cortex-M33 and Hazard3 RISC-V processors, and support for C/C++ and Arduino IDE.

15 × Multi-Function GPIO Pins

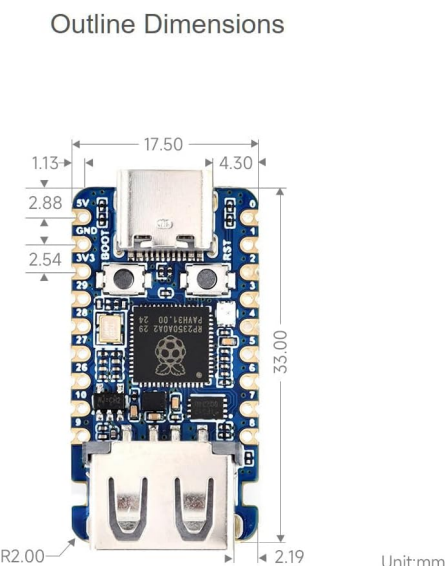
Configurable Pin Function, Allows Flexible Development And Integration



Detailed pinout diagram showing the configuration and functions of the 15 multi-function GPIO pins, including power, ground, UART, ADC, SPI, I2C, and PWM.



An annotated diagram pointing out key components on the board, such as the USB 2.0 Type-A connector, BOOT button, RESET button, RP2350A chip, WS2812 RGB LED, LDO regulator, NOR-Flash, and USB Type-C connector.



Technical drawing showing the precise outline dimensions of the RP2350-USB-A board in millimeters.

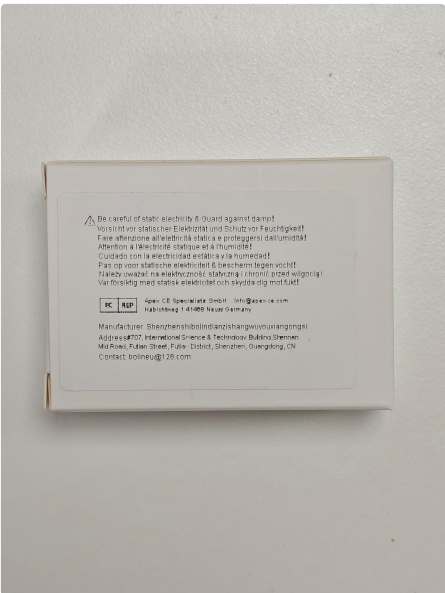


Image of the product packaging, displaying

important warning labels about static electricity and moisture protection, along with manufacturer information.

7.2 Official Product Videos

RP2350 GEEK Overview

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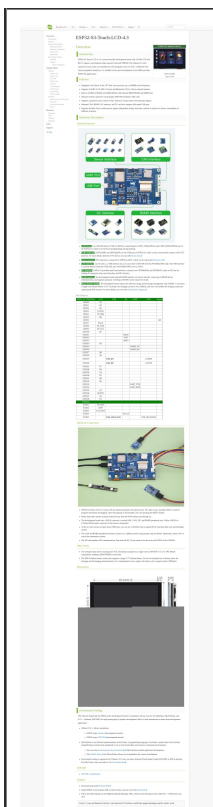
This video provides an overview of the RP2350 GEEK development board, highlighting its dual-core processor, operating frequency, integrated LCD display, and various interfaces for debugging and development. It also demonstrates the drag-and-drop programming feature and support for C/C++ and MicroPython.

8. WARRANTY AND SUPPORT

Waveshare provides online development resources and technical support for the RP2350 USB Mini Development Board. Should you encounter any problems or require assistance, please do not hesitate to contact Waveshare's customer support. Detailed documentation, tutorials, and example code are available through their official channels to help you with your projects.

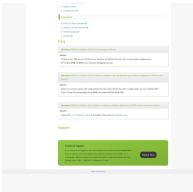
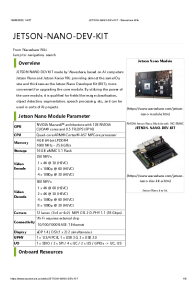


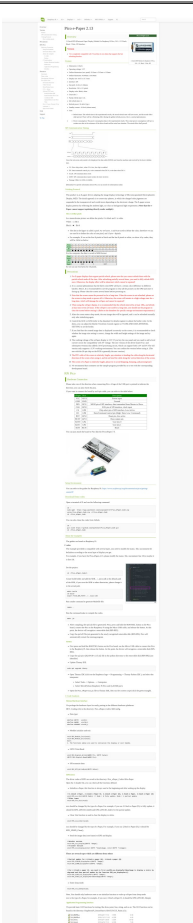
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Related Documents - RP2350-USB-A






Explore the [Waveshare ESP32-S3-Touch-LCD-4.3](#), a powerful microcontroller development board featuring a 4.3-inch capacitive touch display, WiFi, BLE 5, and multiple interfaces like CAN, RS485, and I2C. Learn about its hardware, setup, and sample demos for HMI development.

	
	<p>Waveshare Jetson Nano Dev Kit: Overview, Setup, and Resources</p> <p>A comprehensive guide to the Waveshare Jetson Nano Developer Kit, covering its overview, hardware specifications, software setup using SDK Manager, camera configuration, and troubleshooting.</p>
	<p>Waveshare UART-WIFI232-B2 User Manual: Serial to WiFi IoT Module Guide</p> <p>Explore the Waveshare UART-WIFI232-B2 User Manual, a comprehensive guide for the UART to WiFi converter module. Learn about its features, hardware connections, network configurations, and transparent data transmission capabilities for IoT applications.</p>
	<p>Waveshare e-Paper Driver HAT User Manual: Connect SPI E-Paper Displays to Raspberry Pi, Arduino, STM32</p> <p>User manual for the Waveshare e-Paper Driver HAT, detailing its features, product parameters, interface specifications, and supported e-Paper models. Includes setup guides for Raspberry Pi, Arduino, and STM32 development boards.</p>
	

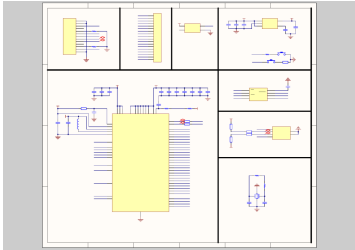


[Waveshare Pico e-Paper 2.13inch EPD Module for Raspberry Pi Pico: Development Guide & API](#)

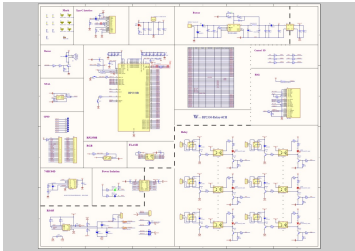
Detailed development guide for the Waveshare Pico e-Paper 2.13inch EPD module with Raspberry Pi Pico. Features include 250x122 resolution, SPI interface, C/C++ & MicroPython demo codes, and comprehensive API documentation.

<div>Hardware Manual (X210II Rev1.0)</div> <div></div>	<div>WaveShare X210II Rev1.0 Hardware Manual</div> <div>Detailed hardware manual for the WaveShare X210II Rev1.0 development board, covering its features, core components, pin definitions, baseboard interfaces, and startup procedures.</div>
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Documents - waveshare – RP2350-USB-A



[\[pdf\]](#)
New Output Altium RP2350 USB A files waveshare wiki |||
1 2 Type-C A MTB PIType0C10MTB GND A1/B12 PIType0C10A10B12 GND A4/B9
PIType0C10A40B9 VBUS B8 PIT ... C401 CCOC55 PIC5012 uF RT9013-33GB
CCOC44 PIC501 PIC402 100nF A GND Waveshare Key COlogo1 **RP2350-USB-A**
GND QSPI_SS PIR202 RUN 1K COR2R2 PIR20P1IKey101 PIKey102 CKOKeeyy11
CROR1166 GND...
lang:i-klngon **score:34** filesize: 313.26 K page_count: 1 document date: 2024-11-21



[\[pdf\]](#)
New Output None II Lib Windows 9x NT 2000 XP User Waveshare M3 M4 DP2 R4 DN AT DN1 5 1K DP
A6 LED1 Hole GPIO34 WL CS XOUT 31 18 GPIO18 GPIO → HLSSL DCSV Relay SV 3V3 R21 4 7K
R23 RP2350 6CH files waveshare wiki |||
1 2 Mark Type-C Interface GND M1 Hole M2 Hole P1 P2 Relay-Cutout Relay-Cutout
M3 Hole M4 Hole P3 P4 Relay-Cutout Relay-Cutout M5 Mark M6 Mark P5 P6 Relay-
Cutout Relay-Cutout A M8 Mark M7 USB Mark-USB 5V R4 5.1K GND C1 2 D1 1uF
GND A12/B1 1 VBUS A9/B4 B5 1N5819 A8 B6 D...
lang:it **score:20** filesize: 227.42 K page_count: 1 document date: 2025-06-23