

Waveshare ESP32-S3-4.3inch-Touch-LCD-B-BOX

Waveshare ESP32-S3 4.3-inch LCD Touch Screen Development Board User Manual

Model: ESP32-S3-4.3inch-Touch-LCD-B-BOX

1. INTRODUCTION

The Waveshare ESP32-S3-Touch-LCD-4.3B-BOX is a microcontroller development board designed for Human-Machine Interface (HMI) and other ESP32-S3 applications. It integrates a 4.3-inch capacitive touch screen with an 800x480 resolution and 65K colors, along with 2.4GHz Wi-Fi and Bluetooth 5 (LE) connectivity. The board features an Xtensa 32-bit LX7 dual-core processor, high-capacity Flash, and PSRAM, making it suitable for running GUI programs like LVGL and interfacing with various peripherals. This manual provides essential information for setting up, operating, and maintaining your development board.

2. PACKAGE CONTENTS

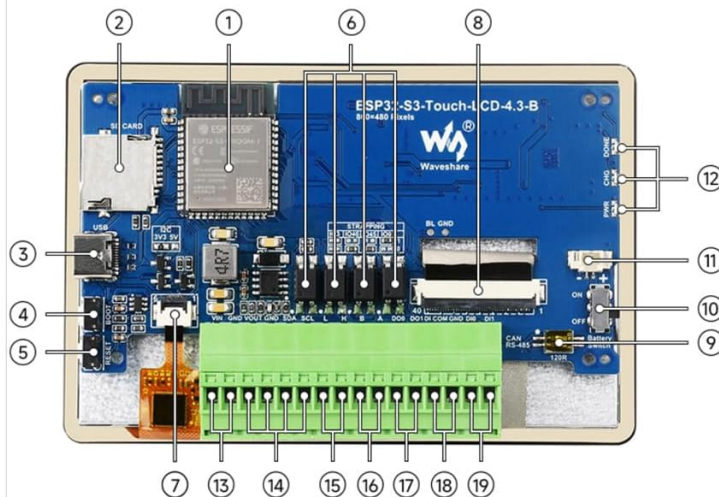
- ESP32-S3-Touch-LCD-4.3B-BOX Development Board x1

Please inspect the package contents upon receipt to ensure all items are present and undamaged. If any components are missing or damaged, please contact customer support.

3. PRODUCT OVERVIEW

The ESP32-S3-Touch-LCD-4.3B-BOX features a comprehensive layout of components and interfaces. Understanding these components is crucial for proper setup and operation.

What's On Board



1. ESP32-S3-WROOM-1-N16R8

The SoC with WiFi and Bluetooth, up to 240MHz operating frequency, integrated 8MB PSRAM and 16MB Flash

2. TF card slot

3. USB Type-C port

4. BOOT button

Press and hold while powering on for program burning

5. RESET button

6. Optocoupler isolation

7. Touch panel connector

8. 4.3inch display panel connector

9. RS485 and CAN terminal resistors selection

close by default

10. Battery power supply ON/OFF

11. 3.7V single lithium battery GH1.25 header

12. Status Indicators

DONE: Lithium battery charging completed indicator

CHG: Lithium battery charging indicator

PWR: Power supply indicator

(the CHG will blink and DONE will light on when connecting with DC power supply and without lithium battery connected or battery switch is OFF)

13. 7-36V DC power supply terminal

14. I2C interface terminal

VOUT pin output 5V/3.3V (switching by onboard resistor)

15. CAN interface terminal

16. RS485 interface terminal

17. Digital output

5-36V, open-drain output, output load: 450mA per channel (MAX)

18. Input signal common terminal

NC: dry contact passive input

Connect to power supply positive: digital input low active, for NPN wet contact active input, 5V-36V DC

Connect to power supply negative: digital input high active, for PNP dry contact active input, 5V-36V DC

19. Digital input

5-36V, supports passive / active input (NPN or PNP)

Figure 3.1: ESP32-S3-Touch-LCD-4.3B-BOX Component Layout

Component Identification:

1. **ESP32-S3-WROOM-1-N16R8:** The System-on-Chip (SoC) with Wi-Fi and Bluetooth, up to 240MHz operating frequency, integrated 8MB PSRAM and 16MB Flash.
2. **TF card slot:** For external storage.
3. **USB Type-C port:** For power supply and data communication.
4. **BOOT button:** Press and hold while powering on for program burning.
5. **RESET button:** Resets the board.
6. **Optocoupler isolation:** Provides electrical isolation for digital I/O.
7. **Touch panel connector:** Connects to the capacitive touch screen.
8. **4.3inch display panel connector:** Connects to the LCD display.
9. **RS485 and CAN terminal resistors selection:** Jumpers for enabling/disabling terminal resistors (closed by default).
10. **Battery power supply ON/OFF:** Switch for controlling battery power.
11. **3.7V single lithium battery GH1.25 2P header:** Connector for a 3.7V lithium battery.
12. **Status Indicators:**
 - **DONE:** Lithium battery charging completed indicator.
 - **CHG:** Lithium battery charging indicator.
 - **PWR:** Power supply indicator. (CHG and DONE LEDs illuminate when connected to DC power supply and with battery connected or battery switch is OFF).
13. **7-36V DC power supply terminal:** Main power input.
14. **I2C interface terminal:** VOUT pin outputs 5V/3.3V (switching via onboard resistor).

15. **CAN interface terminal:** For CAN bus communication.
16. **RS485 interface terminal:** For RS485 communication.
17. **Digital output:** 5-36V, open-drain output, output load: 450mA per channel (MAX).
18. **Input signal common terminal:** NC: dry contact passive input. Connect to power supply positive: digital input low active, for NPN wet contact active input, 5V-36V DC. Connect to power supply negative: digital input high active, for PNP dry contact active input, 5V-36V DC.
19. **Digital input:** 5-36V, supports passive / active input (NPN or PNP).

4. SETUP

4.1 Powering the Board

The board can be powered via the USB Type-C port or the 7-36V DC power supply terminal. For portable applications, a 3.7V lithium battery can be connected to the GH1.25 2P header.

4.2 Wiring Methods

The ESP32-S3-Touch-LCD-4.3B-BOX supports two primary wiring methods for integrating into various application scenarios, such as DIN rail or embedded devices. The case version does not support bottom wiring.



Figure 4.1: Supported Wiring Methods

4.3 Peripheral Connections

The board offers various interfaces for expanding functionality:

- **I2C Interface:** For connecting I2C compatible sensors and modules.

- **CAN Interface:** For Controller Area Network communication.
- **RS485 Interface:** For serial communication over long distances.
- **Digital Isolated I/O:** Supports passive and active digital input with bi-directional optocoupler isolation, and digital output with optocoupler isolation providing up to 450mA sinking current.

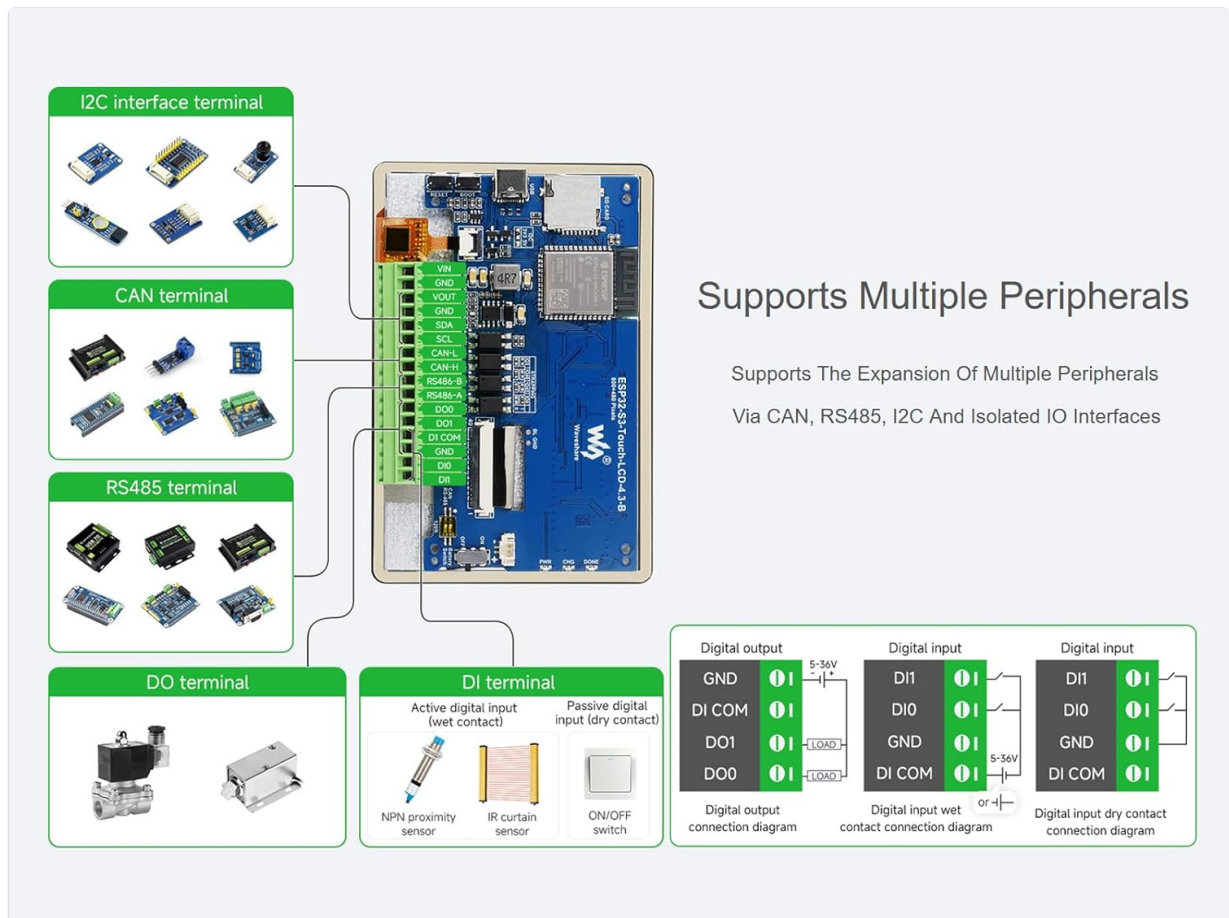


Figure 4.2: Multiple Peripheral Support

5. OPERATING INSTRUCTIONS

5.1 Basic Operation

1. **Power On:** Connect a 7-36V DC power supply to the terminal or a 3.7V lithium battery (ensure the battery switch is ON), or connect the USB Type-C cable to a power source. The PWR indicator LED will illuminate.
2. **Touch Screen:** The 4.3-inch capacitive touch screen supports 5-point touch control via an I2C interface. It is designed for smooth GUI interaction.
3. **Wi-Fi & Bluetooth:** The ESP32-S3 SoC supports 2.4GHz Wi-Fi (802.11 b/g/n) and Bluetooth 5 (LE) with an onboard antenna. These features can be utilized through appropriate firmware development.

IPS Display Panel

Excellent Display Performance, 160° Wide Viewing Angle



Capacitive 5-Point Touch

Supports Touch Function With I2C Interface, 5-Point Touch For Flexible Operation And Smooth Multi-Point UI Interaction



Figure 5.1: IPS Display Panel and Capacitive Touch Functionality

5.2 Software Development

The board is suitable for GUI development using frameworks such as LVGL. Developers can utilize the ESP-IDF or Arduino IDE for programming the ESP32-S3. Refer to the official Espressif documentation and Waveshare's provided resources for detailed programming guides and examples.

5.3 Application Scenarios

The ESP32-S3-Touch-LCD-4.3B-BOX is versatile for various applications:

- **Human-Machine Interface (HMI):** Ideal for creating interactive control panels and displays.
- **LVGL GUI Development:** A powerful platform for developing rich graphical user interfaces.
- **IoT Devices:** With Wi-Fi and Bluetooth, it can serve as a central control unit for smart home or industrial IoT applications.

Features

- Equipped with Xtensa 32-bit LX7 dual-core processor, up to 240MHz main frequency
- Supports 2.4GHz Wi-Fi (802.11 b/g/n) and Bluetooth 5 (LE), with onboard antenna
- Built in 512KB SRAM and 384KB ROM, with onboard 16MB Flash and 8MB PSRAM
- Onboard 4.3inch capacitive touch display, 800×480 resolution, 65K color
- Supports capacitive touch control via I2C interface, 5-point touch with interrupt support
- Onboard voltage regulator, supports 7~36V wide range power supply
- Onboard RTC chip and rechargeable battery to ensure time data is not lost when power loss
- Onboard CAN, RS485, I2C interface and TF card slot, GH1.25 2P battery header and digital isolated IO interfaces, etc.
- Supports passive and active digital input, with bi-directional optocoupler isolation
- Supports digital output with optocoupler isolation, provides higher driving capability with up to 450mA sinking current
- Onboard LED indicators for indicating the power and battery recharging status
- Supports flexible clock, module power supply independent setting and other controls to realize low power consumption in different scenarios

Application Scenarios



Human-machine Interface

The Human-machine Interface (also known as the user interface) is the medium of interaction and information exchange between the system and the user, it realizes the transformation between the internal form of information and the form acceptable to human beings.



LVGL GUI Development

LVGL is a free, open-source graphics library that provides everything you need to create embedded GUI with the easy-to-use graphical elements, beautiful visual effects and low memory requirement.

Figure 5.2: Application Scenarios

6. MAINTENANCE

6.1 Cleaning

To clean the display and case, use a soft, dry, lint-free cloth. For stubborn smudges, a slightly damp cloth with water or a mild screen cleaner can be used. Avoid abrasive materials or harsh chemicals.

6.2 Firmware Updates

Periodically check the Waveshare official website or relevant community forums for firmware updates. Keeping the firmware updated can improve performance, add new features, and resolve potential issues. Follow the provided instructions carefully when performing updates.

7. TROUBLESHOOTING

This section addresses common issues you might encounter with the ESP32-S3-Touch-LCD-4.3B-BOX.

7.1 Power Issues

- **Board does not power on:** Ensure the power supply is connected correctly and provides sufficient voltage (7-36V DC or 5V via USB-C). If using a battery, check its charge level and ensure the battery power switch is ON.
- **Charging indicator (CHG) not lit:** Verify the battery is properly connected and the DC power supply is active. The DONE indicator will light when charging is complete.

7.2 Display and Touch Issues

- **Display is blank or distorted:** Check the connection of the display panel. Ensure the firmware loaded supports the display and is initialized correctly.
- **Touch screen unresponsive:** Verify the touch panel connector is secure. Ensure the I2C interface for the touch controller is correctly configured in your software.

7.3 Connectivity Issues (Wi-Fi/Bluetooth)

- **Cannot connect to Wi-Fi/Bluetooth:** Ensure the onboard antenna is not obstructed. Verify your software configuration for Wi-Fi/Bluetooth is correct, including SSID, password, and device discovery settings.

7.4 Development Environment Issues

- **Code compilation errors:** Ensure all necessary libraries are installed and compatible with your ESP-IDF or Arduino IDE version. Refer to the Waveshare documentation and community resources for specific library requirements.
- **GPIO conflicts:** When developing complex applications, be aware of potential GPIO conflicts, especially when using multiple peripherals simultaneously with the display and touch functions. Careful planning of pin assignments in your code is recommended.

8. SPECIFICATIONS

Feature	Specification
Processor	Xtensa 32-bit LX7 dual-core, up to 240MHz
Wireless Connectivity	2.4GHz Wi-Fi (802.11 b/g/n), Bluetooth 5 (LE)
Memory	512KB SRAM, 384KB ROM, 16MB Flash, 8MB PSRAM
Display	4.3-inch capacitive touch, 800x480 resolution, 65K color IPS
Touch Control	I2C interface, 5-point touch with interrupt support
Power Supply	7-36V DC (terminal), 5V via USB Type-C, 3.7V Lithium Battery (GH1.25 2P header)
Onboard Features	RTC chip, rechargeable battery support, CAN, RS485, I2C, TF card slot, Digital Isolated I/O
Digital Output	Optocoupler isolation, up to 450mA sinking current
Digital Input	Passive and active (NPN/PNP) with bi-directional optocoupler isolation
Dimensions	4.58 x 3.11 x 0.7 inches (116.30 x 79.00 x 18.00 mm)
Weight	6.7 ounces (approx. 190g)

9. WARRANTY AND SUPPORT

9.1 Warranty Information

Waveshare products are typically covered by a limited warranty against defects in materials and

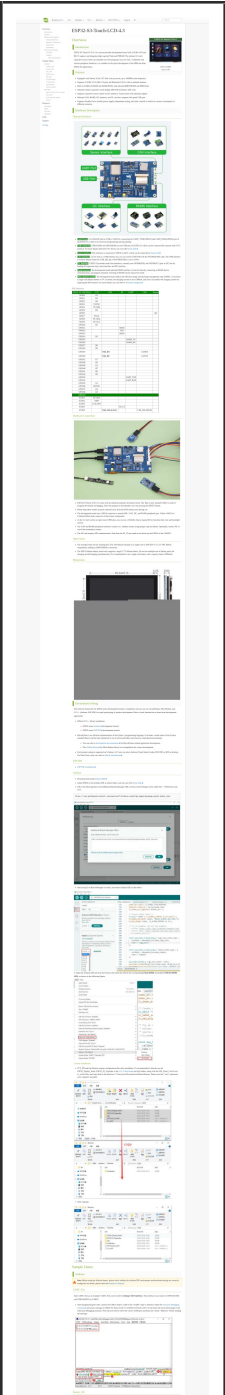
workmanship. Please refer to the official Waveshare website or your purchase documentation for specific warranty terms and conditions.

9.2 Technical Support

For technical assistance, development resources, and further documentation, please visit the official Waveshare website. Online development resources and technical support are provided. If you encounter any problems, please contact Waveshare customer support directly.

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Related Documents - ESP32-S3-4.3inch-Touch-LCD-B-BOX



The image shows a vertical strip of the product page for the ESP32-S3-4.3inch-Touch-LCD-B-BOX. It includes a title, a list of features, a technical specification table, a photograph of the board, a screenshot of the software interface, and a screenshot of the pin configuration.



[Waveshare ESP32-S3-Touch-LCD-4.3 Development Board: Features & Guide](#)

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.

ESP32-S3-Touch-LCD-4.3B

Overview

ESP32-S3-Touch-LCD-4.3B is a microcontroller development board with 4.3-inch capacitive touch display and multiple interfaces like CAN, RS485, I2C, and UART. It is a powerful microcontroller development board from Waveshare. This guide covers its features, hardware description, interface details, and provides instructions for setting up the development environment using ESP-IDF and VSCode.

Features

- ESP32-S3-Touch-LCD-4.3B is a microcontroller development board with 4.3-inch capacitive touch display and multiple interfaces like CAN, RS485, I2C, and UART.
- 4.3-inch capacitive touch display with resolution of 480x320 pixels.
- ESP32-S3-Touch-LCD-4.3B is a microcontroller development board from Waveshare.
- 4.3-inch capacitive touch display with resolution of 480x320 pixels.
- ESP32-S3-Touch-LCD-4.3B is a microcontroller development board from Waveshare.
- 4.3-inch capacitive touch display with resolution of 480x320 pixels.

Hardware Description

ESP32-S3-Touch-LCD-4.3B is a microcontroller development board with 4.3-inch capacitive touch display and multiple interfaces like CAN, RS485, I2C, and UART. It is a powerful microcontroller development board from Waveshare. This guide covers its features, hardware description, interface details, and provides instructions for setting up the development environment using ESP-IDF and VSCode.

[ESP32-S3-Touch-LCD-4.3B: Development Board Overview and Setup Guide](#)

Explore the ESP32-S3-Touch-LCD-4.3B, a powerful microcontroller development board from Waveshare. This guide covers its features, hardware description, interface details, and provides instructions for setting up the development environment using ESP-IDF and VSCode.

Introduction



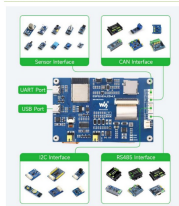
ESD-6000 Series
Type-C USB

Features

- Equipped with Texas Instruments (TI) dual-core processor, up to 240MHz main frequency
- Supports 2.4GHz Wi-Fi IEEE 802.11n and Bluetooth V3.0, with an omnidirectional antenna
- Built-in 11.2mm x 54mm x 24mm PCB, with onboard 500mAh battery and 1GB memory
- Onboard 4.3-inch capacitive touch display, 800 x 480 resolution, 60Hz color
- Supports capacitive touch control via I2C interface, Support touch with infrared support
- Onboard CAN, I2C, SPI, I2C interface, and TV card slot, integrate full-speed USB port
- Supports flexible clock, module power supply independent setting, and other controls to realize low power consumption in different scenarios.

Hardware Description

Onboard Interface

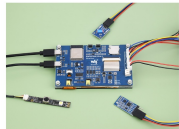


- **UART interface:** Using **CH3201** chip for USB to UART to connect to **ESP8265**, **UART_TX**, **UART_RX**, and **UART_ENABLE**, allowing 9600 baud rate and up to 1024 bytes of data transfer. **CH3201** also has **TX** and **RX** LEDs, and the interface can be used for connecting cameras with protocols such as **UART**. Please click [here](#) to view the **UART** driver.
- **Sensor interface:** This interface is for connecting **ESP8265** to **ACC**, and can be connected to sensors such as:
 - **GPS interface:** The **CH3201** interface chip on **ESP8265** also plays a multifunctional function, utilizing the **GPS/USB/UART** chip for switching. By default, the **USB** interface is used (after the **USB_SIL** pin of **ESP8265** is set to **IO40**).
 - **GPS interface:** **ESP8265** offers multiple non-wired **GPS** interfaces: currently, **UART**, **SDA** and **I2C**. **UART** interface is used as the default due to connected to the 10-pin peripheral chip, **UART** interface, and other **IC** peripherals.
 - **IM400 interface:** The development board is equipped with an onboard **IM400** interface chip, which can be used to connect to **IM400** devices. The **IM400** can automatically switch between transient and remote modes.
- **PIB-I battery backup:** The development board offers the efficient charging and discharging management chip **FSR401**, capable of handling a single lithium battery to **IO**. Currently, the battery is not loaded on the board, but it can be added to the board for replacing the resistor. For further details, please refer to the schematic diagram.

PCN Correction

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Hardware Connection

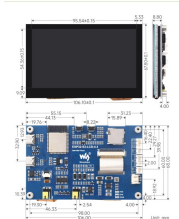


- RFI/ESD-33-Track V-C-D 4.1 comes with an onboard automatic desolder circuit. The Type C part marked LWC1, is used for program downloads and logging. Once the program is downloaded, turn it by pressing the RESET button.
- Please keep other metals or plastic materials away from the PCB antenna area during use.
- The development board uses a P43-2 connector to extend NDC, GND, LDC, and K4949 pins respectively. Utilize a P43-2 and 2.5mm Dupont male connector to link antenna components.
- As the 4.3-inch screen enclosure need Dupont pins, you can use a CH343D pin-to-expand 33 for female pins meet and female header.
- The CAN and K4949 peripheral interfaces connect to a 120ohm resistor using jumper caps by default. Optionally, connect MC to cancel the termination resistor.
- The SD card employs SPI communication. Note that the SD_CS pin needs to be driven by the B0004 of the HC0033.

Other Notes:

- The average frame rate for running the LKGS benchmark example on a single core is 53P-52F v5.1 is 41 FPS. Before compilation, enabling L2PM PSMAN is necessary.
- The P42.8 lithium battery socket only supports a single 3.7V lithium battery. Do not use multiple sets of battery packs for charging and discharging simultaneously. It's recommended to use a single-cell battery with a capacity below 2000mAh.

Dimensions



Environment Setting

The software framework for ESP32 series development boards is completed, and you can use C/C++, MicroPython, and OC++ (Arduino, ESP-IDF) for rapid prototyping of product development. Here's a brief introduction to these three development approaches:

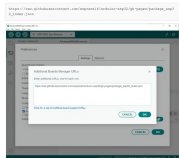
- **development**. Here's a [tutorial](#) to learn these three development approaches:
 - **Grumpy** is a programming language designed to simplify coding tests and learning on small microcontroller boards. It is an open source derivative of the MicroPython programming language, primarily aimed at students and beginners. GrumpyPython development and maintenance are supported by Infineon technologies.
 - You can refer to [development documentation](#) for GrumpyPython-related applications development.
 - The **Grumpy-IO** library for GrumpyPython allows for recompilation for custom development.
- **MicroPython** is an efficient implementation of the Python 3 programming language. It includes a small subset of the Python standard library and has been optimized to run on microcontrollers and hence a constrained environment.
- You can refer to [development documentation](#) for MicroPython-related application development.
- The **Grumpy-IO** library for MicroPython allows for recompilation for custom development.
- The official libraries and support from Express Systems for GCC++ development make it convenient for rapid evaluation.
 - Users can select Arduino
 - Visual Studio Code (VS2019) as their Integrated Development Environment (IDE)

ESP-008

- ESP-DOF installation #

Artículo

- Download and install [Archives IDE 4](#).
- Install [ESP32](#) on the [Archives IDE](#) as shown below, and you can refer to [this link 4](#).
- FE is the following link in the Additional Board Manager URL section of the Settings screen under File -> Preferences and save.



- Search esp32 on Board Manager to install, and restart Arduino IDE to take effect



Resource

- Document

- ESP-ESP 4


- Defini
- Software

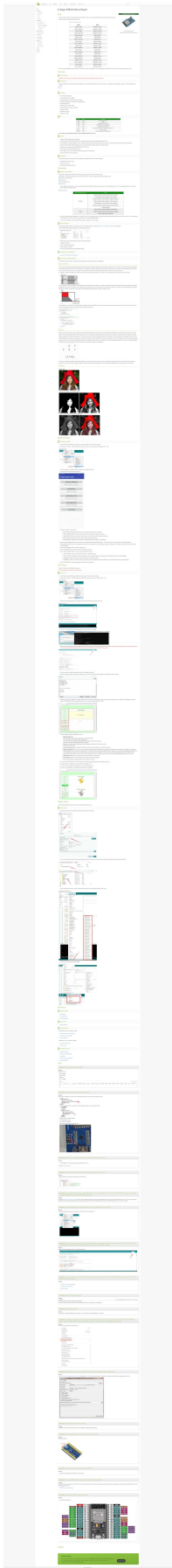
[Datasheet](#)

- **ESP52-E3 Series**

[ESP32-S3-Touch-LCD-4.3 Development Board Overview and Setup](#)

A comprehensive guide to the ESP32-S3-Touch-LCD-4.3 development board, detailing its features, hardware description, pin connections, environmental setup for CircuitPython, MicroPython, and C/C++ (Arduino, ESP-IDF), and configuration within the Arduino IDE.

<div data-bbox="118 73 188 98"><ul style="list-style-type: none">• 2023-12-15: Version 1.0.0• 2023-12-15: Version 1.0.0• 2023-12-15: Version 1.0.0</div> <div data-bbox="118 152 308 280"></div>	<div data-bbox="341 145 1287 174">Waveshare 10.1-inch HDMI LCD (G) User Manual: Setup, Specs, and Connections</div> <div data-bbox="341 185 1433 295"><p>Explore the Waveshare 10.1-inch HDMI LCD (G) with Case. This user manual covers essential specifications, safety warnings, connection guides for Raspberry Pi, Jetson Nano, and PCs, and answers common questions.</p></div>
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[Waveshare E-Paper ESP32 Driver Board: Features, Demos, and Guide](#)

Explore the Waveshare E-Paper ESP32 Driver Board. This guide details its features, hardware connection, Bluetooth and WiFi demos, and common FAQs for e-paper display projects.

[illegible]

Detailed guide for the Waveshare 4inch DSI LCD display, covering features, hardware connection, software installation, screen rotation, backlight control, and troubleshooting for Raspberry Pi.

