### Waveshare ESP32-S3-Touch-LCD-7

# Waveshare ESP32-S3 7-inch Capacitive Touch LCD Development Board User Manual

Model: ESP32-S3-Touch-LCD-7

## 1. Introduction

The Waveshare ESP32-S3 7-inch Capacitive Touch LCD Development Board is a versatile microcontroller development platform. It integrates an Xtensa 32-bit LX7 dual-core processor, supporting 2.4GHz Wi-Fi and Bluetooth 5 (LE). This board features an 800x480 resolution, 65K color capacitive touch display, making it suitable for Human-Machine Interface (HMI) and various ESP32-S3 applications. It includes onboard 8MB PSRAM and 8MB Flash memory, along with multiple peripheral interfaces for expanded functionality.


Figure 1.1: Waveshare ESP32-S3 7-inch Capacitive Touch LCD Development Board.

## 2. Package Contents

Verify that all items listed below are included in your package:

- ESP32-S3-Touch-LCD-7 Development Board x1
- HY2.0 2P to 2PIN male cable 10cm x2
- HY2.0 2P to 3PIN male cable 10cm x1
- HY2.0 2P to 4PIN male cable 10cm x2

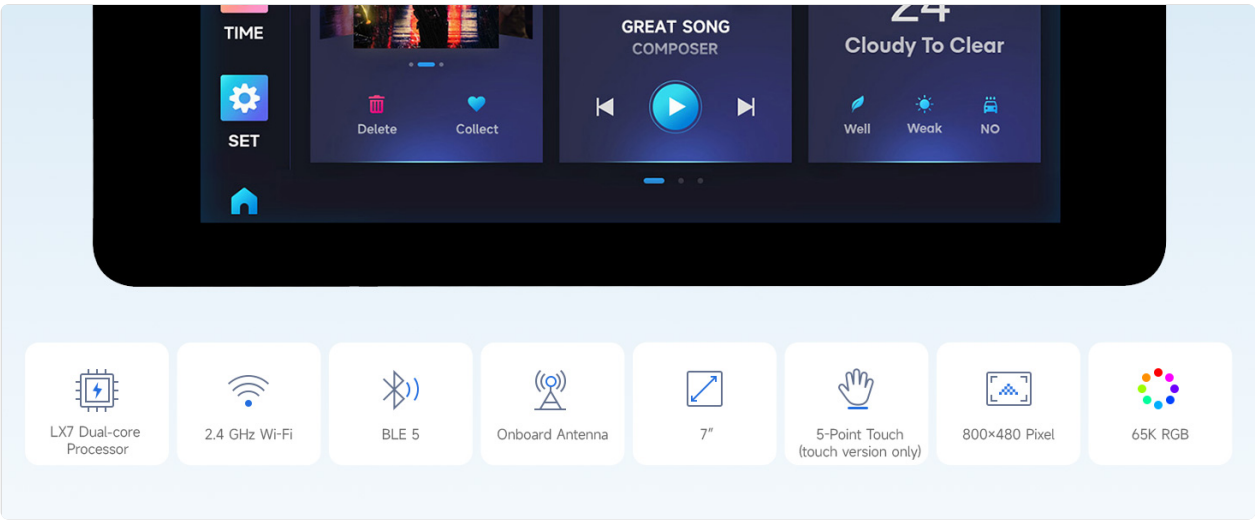


Figure 2.1: Package Contents.

## 3. Key Features

- **Processor:** Xtensa 32-bit LX7 dual-core processor, up to 240MHz main frequency.
- **Wireless Connectivity:** Supports 2.4GHz Wi-Fi (802.11 b/g/n) and Bluetooth 5 (LE) with onboard antenna.
- **Memory:** Built-in 512KB SRAM and 384KB ROM, with onboard 8MB PSRAM and 8MB Flash.
- **Display:** 7-inch capacitive touch display with 800x480 resolution and 65K colors.
- **Touch Control:** 5-point capacitive touch control via I2C interface with interrupt support.
- **Peripheral Interfaces:** Onboard CAN, RS485, I2C interface, TF card slot, and full-speed USB port.
- **Power Management:** Supports flexible clock and module power supply independent setting for low power consumption.


Figure 3.1: Overview of Board Features.

## 4. Technical Specifications

| Specification | Value |
| --- | --- |
| Model Name | ESP32-S3-Touch-LCD-7 |
| Processor | Xtensa 32-bit LX7 dual-core |
| CPU Speed | Up to 240 MHz |
| SRAM | 512 KB |
| ROM | 384 KB |
| PSRAM | 8 MB |
| Flash Memory | 8 MB |
| Wi-Fi | 2.4GHz (802.11 b/g/n) |
| Bluetooth | Bluetooth 5 (LE) |
| Display Size | 7-inch |

| Specification | Value |
|---|---|
| Display Resolution | 800x480 pixels |
| Color Depth | 65K colors |
| Touch Type | Capacitive, 5-point |
| Interfaces | CAN, RS485, I2C, USB Type-C, TF card slot |
| Item Weight | 9.2 ounces (approx. 260g) |
| Package Dimensions | 8.7 x 5.79 x 1.46 inches |

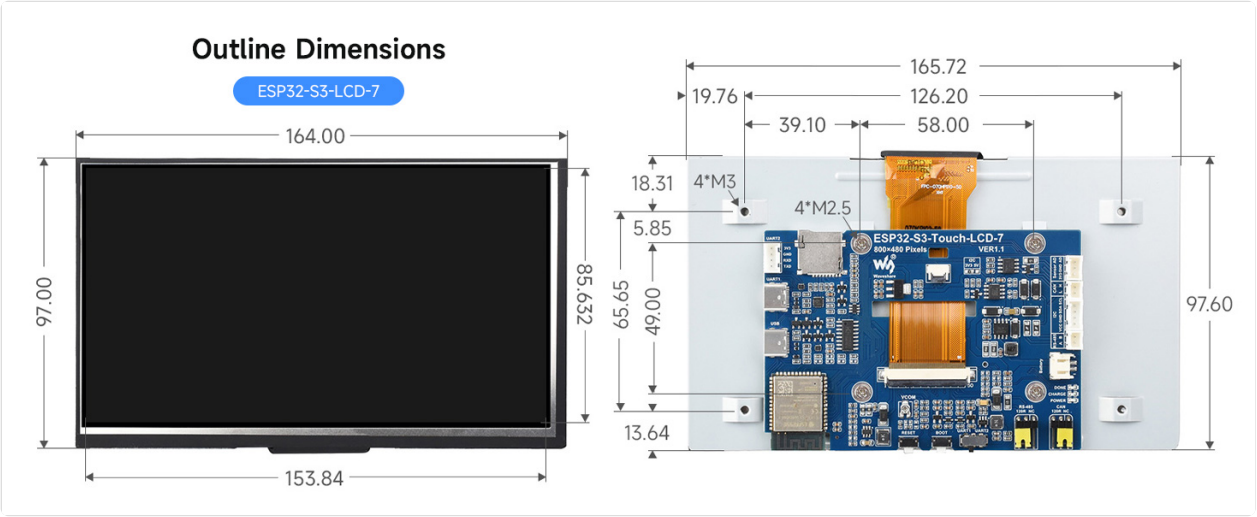



Figure 4.1: Outline Dimensions of the Display.

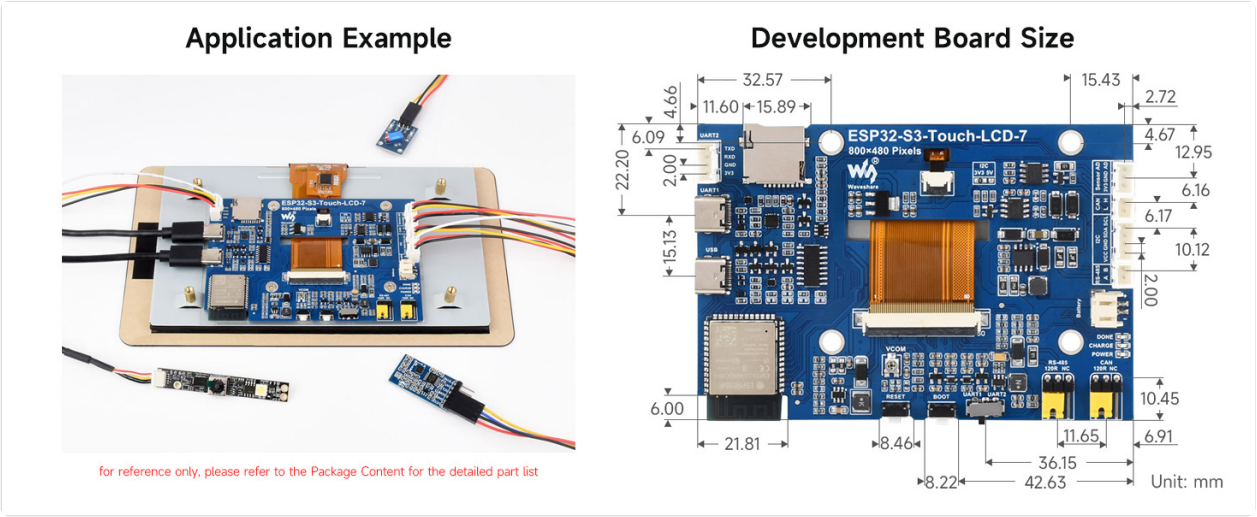



Figure 4.2: Outline Dimensions of the Development Board.

## 5. Onboard Components and Interfaces

The board is designed with various components and interfaces to facilitate development. Refer to the diagram below for component identification:

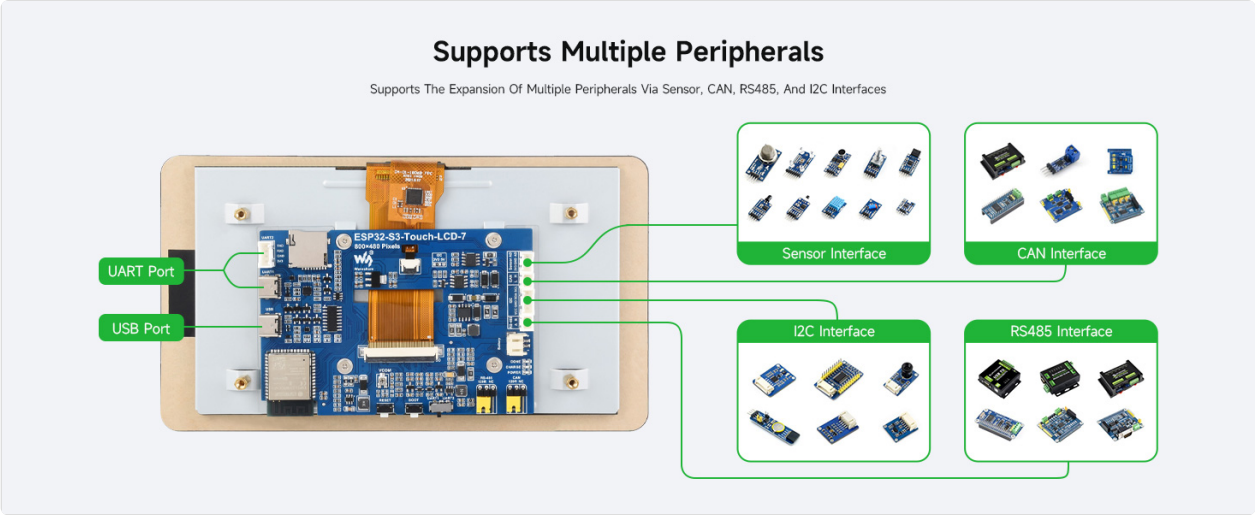



Figure 5.1: Onboard Components and Interfaces.

1. **ESP32-S3N8R8:** The System-on-Chip (SoC) with Wi-Fi and Bluetooth, up to 240MHz operating frequency, integrated 8MB PSRAM and Flash.
2. **7-inch display panel connector:** Connects to the main display.
3. **Touch panel connector:** Connects to the touch overlay of the display.
4. **TF card slot:** For external storage via a MicroSD card.
5. **USB Type-C port:** For power supply and data communication.
6. **UART1 Port:** Universal Asynchronous Receiver/Transmitter port 1.
7. **UART2 connector:** Universal Asynchronous Receiver/Transmitter port 2. UART1 and UART2 share the same UART, selected by a switch.
8. **Sensor header:** For connecting various sensors.
9. **CAN header:** Controller Area Network interface.
10. **I2C header:** Inter-Integrated Circuit interface.
11. **RS485 header:** Recommended Standard 485 interface.
12. **3.7V single lithium battery PH2.0 header:** For connecting a 3.7V lithium battery.
13. **CAN terminal resistor selection:** Jumper for enabling/disabling CAN bus termination resistor.
14. **RS485 terminal resistor selection:** Jumper for enabling/disabling RS485 bus termination resistor.
15. **UART selection:** Switch to select between UART1 or UART2.
16. **BOOT button:** Press and hold while powering on for program burning.
17. **RESET button:** Resets the ESP32-S3 module.
18. **I2C level selection:** Jumper for selecting 3.3V / 5V I2C logic levels.
19. **DONE:** Lithium battery charging completed indicator.
20. **CHG:** Lithium battery charging indicator.
21. **PWR:** Power supply indicator.

## 6. Initial Setup

To begin using your Waveshare ESP32-S3 7-inch Capacitive Touch LCD Development Board, follow these general steps:

1. **Connect the Display:** Ensure the 7-inch display panel and touch panel connectors are securely attached to their respective headers on the main board.
2. **Power Supply:** Connect the board to a power source using the USB Type-C port. Alternatively, a 3.7V

lithium battery can be connected to the PH2.0 header.

3. **Driver Installation:** Depending on your operating system, you may need to install a USB-to-UART driver for the serial communication chip (e.g., CH340/CP210x). Refer to the Waveshare product wiki for specific driver information.
4. **Development Environment Setup:** Install your preferred Integrated Development Environment (IDE), such as Arduino IDE or Visual Studio Code with the ESP-IDF extension.
5. **Obtain Sample Code:** Download the official Waveshare demo code and libraries from their product wiki. These resources provide a starting point for understanding the board's functionalities.
6. **Upload Firmware:** Connect the board to your computer via the USB Type-C cable. Follow the instructions provided in the Waveshare documentation or your chosen IDE to compile and upload firmware to the ESP32-S3 module.

## 7. Operating Instructions

The ESP32-S3-Touch-LCD-7 board is designed for various applications, particularly those requiring a graphical user interface. Here are general operating guidelines:

### 7.1 Human-Machine Interface (HMI) Development

This board is ideal for creating interactive HMI applications. The 7-inch capacitive touch screen allows for intuitive user interaction. Developers can design custom interfaces using graphical libraries like LVGL.

### 7.2 LVGL GUI Development

LVGL (Light and Versatile Graphics Library) is a popular open-source graphics library compatible with this board. It provides tools and widgets for creating rich graphical user interfaces with low memory requirements. Refer to the LVGL documentation and Waveshare's examples for implementation details.

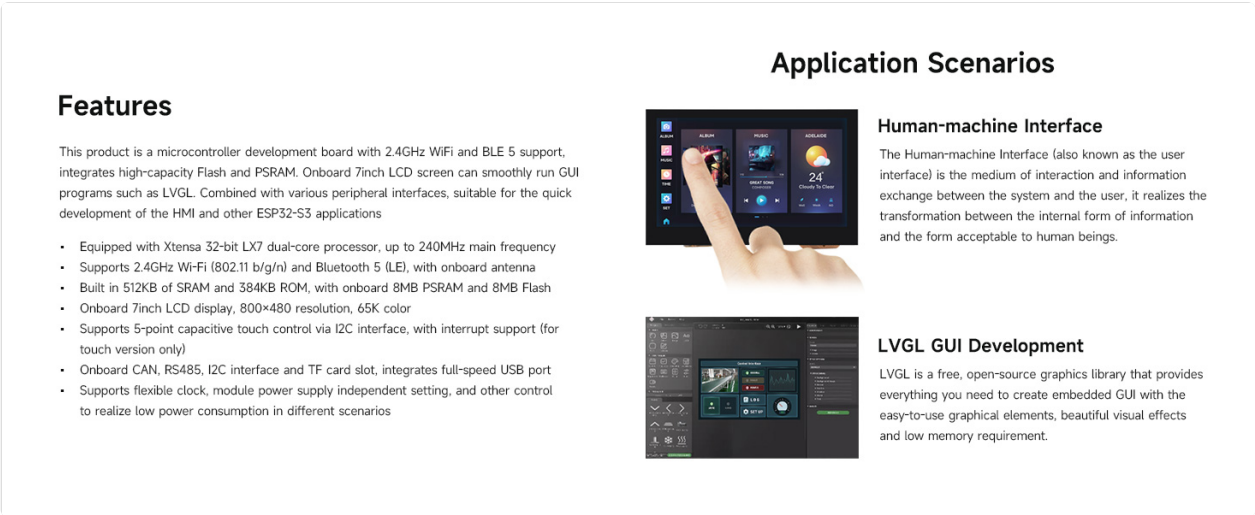



Figure 7.1: Application Scenarios.

### 7.3 Peripheral Expansion

Utilize the onboard headers (CAN, RS485, I2C, Sensor) to connect external modules and expand the board's functionality. Ensure proper wiring and power supply for connected peripherals.

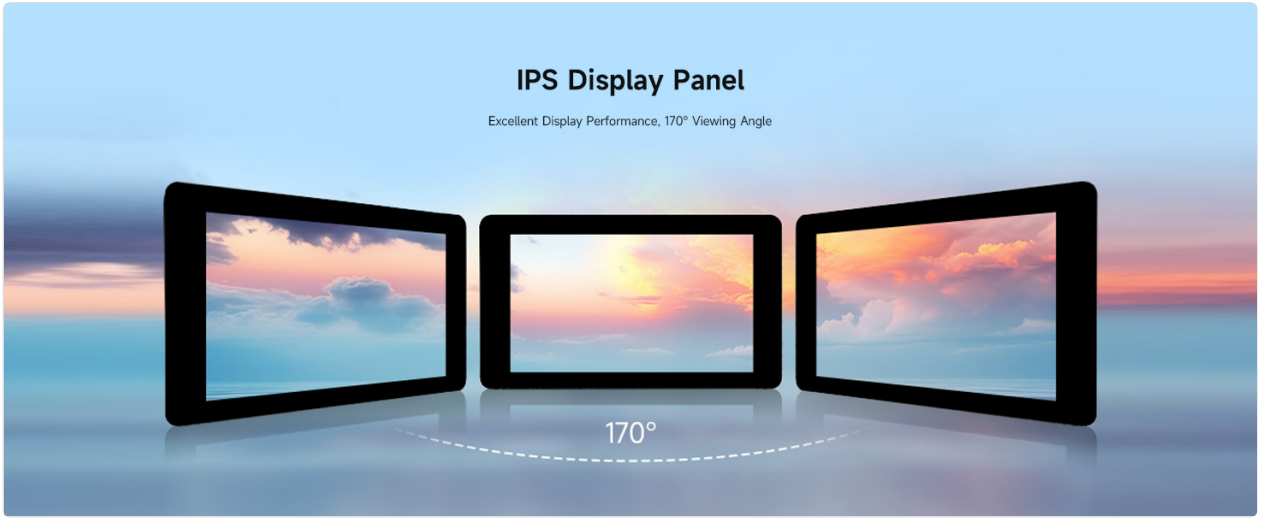



Figure 7.2: Multiple Peripheral Support.

## 8. Maintenance

To ensure the longevity and optimal performance of your development board, observe the following maintenance guidelines:

- **Handling:** Handle the board with care, avoiding static discharge. Use anti-static precautions when working with electronic components.
- **Cleaning:** Keep the board and display clean. Use a soft, dry cloth to wipe dust. For the screen, use a screen-specific cleaner if necessary, applied to the cloth, not directly to the screen.
- **Storage:** Store the board in a dry, cool environment, away from direct sunlight, extreme temperatures, and humidity.
- **Power:** Always use a stable and appropriate power supply. Avoid over-voltage or reverse polarity connections.
- **Connections:** Ensure all cable connections are secure but do not apply excessive force when connecting or disconnecting.

## 9. Troubleshooting

If you encounter issues with your ESP32-S3-Touch-LCD-7 board, consider the following troubleshooting steps:

- **Board Not Powering On:**
  - Verify the USB Type-C cable is correctly connected to a functional power source.
  - If using a battery, ensure it is charged and properly connected to the PH2.0 header.
  - Check the PWR indicator LED on the board.
- **Display Not Working:**
  - Ensure the display panel connector is firmly seated.
  - Confirm that the firmware uploaded includes display initialization code.
- **Touch Screen Unresponsive:**
  - Check the touch panel connector.
  - Verify that the I2C interface for the touch controller is correctly configured in your code.

- Ensure the I2C level selection jumper is set appropriately (3.3V/5V).

- **Unable to Upload Firmware:**
  - Install the correct USB-to-UART drivers for your operating system.
  - Ensure the USB Type-C cable is a data-capable cable, not just a charging cable.
  - Try pressing and holding the BOOT button while connecting the USB cable or initiating the upload process, then release.
  - Verify correct COM port selection in your IDE.

- **Wi-Fi/Bluetooth Connectivity Issues:**
  - Check your code for correct Wi-Fi/Bluetooth initialization and credentials.
  - Ensure the onboard antenna is not obstructed.

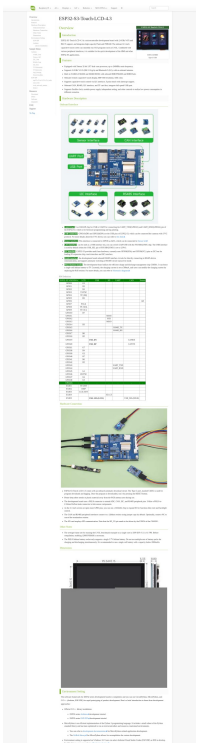
For more detailed troubleshooting and specific error codes, refer to the official Waveshare product wiki and community forums.

## 10. Warranty and Support

For information regarding product warranty, technical support, and additional resources, please visit the official Waveshare website. The product wiki for the ESP32-S3-Touch-LCD-7 board often contains detailed documentation, schematics, sample code, and FAQs that can assist with development and issue resolution.
**Manufacturer:** Waveshare
**Website:** www.waveshare.com



**Related Documents - ESP32-S3-Touch-LCD-7**



[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.

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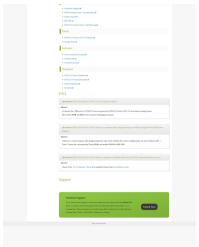
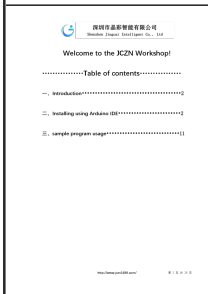
|  | |
|  | [ESP32-S3-Touch-LCD-4.3B: Development Board Overview and Setup Guide]<br>Explore the ESP32-S3-Touch-LCD-4.3B, a powerful microcontroller development board from Waveshare. This guide covers its features, hardware description, interface details, and provides instructions for setting up the development environment using ESP-IDF and VSCode. |
|  | [ESP32-S3 DevKits Documentation]<br>Comprehensive documentation for Espressif's ESP32-S3 series development boards, including the ESP32-S3-DevKitC-1, ESP32-S3-DevKitM-1, ESP32-S3-USB-OTG, and ESP32-S3-LCD-EV-Board. This guide provides getting started instructions, hardware references, revision details, and related resources for developers. |
|  | [ESP32-S3 Development Boards Documentation \| Espressif Systems]<br>Comprehensive documentation for Espressif Systems' ESP32-S3 development boards, including DevKitC-1, DevKitM-1, USB-OTG, LCD-EV-Board, and USB-Bridge. Guides cover setup, hardware, and application development. |
|  | [JCZN ESP32-S3 Display Module: Arduino IDE Setup and Usage Guide]<br>A comprehensive guide for JCZN ESP32-S3 display modules, detailing Arduino IDE setup, ESP32 board installation, library management (Arduino_GFX, LVGL), and sample program implementation. |

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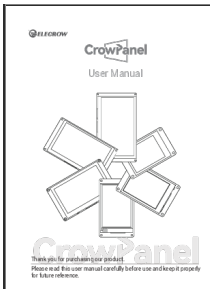
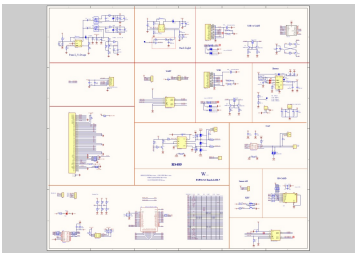
|  | [Elecrow CrowPanel ESP32 Display User Manual]<br>User manual for the Elecrow CrowPanel ESP32 HMI displays, detailing package contents, interface layouts, technical specifications, and safety instructions. |

Documents - Waveshare – ESP32-S3-Touch-LCD-7

[Waveshare ESP32-S3 Touch-LCD-7 Datasheet: 7-inch Display, IoT, HMI Development Board]
Datasheet for the Waveshare ESP32-S3 Touch-LCD-7, a 7-inch capacitive touch display development board featuring an ESP32-S3 processor, Wi-Fi, Bluetooth 5, 800x480 resolution, and extensive interfaces for IoT, HMI, and educational projects.
lang:en score:41 filesize: 2.65 M page_count: 7 document date: 2025-06-28



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lang:i-klingon score:28 filesize: 1.93 M page_count: 2 document date: 2024-04-12


PANTALLA TÁCTIL CAPACITIVA
800X480 CON ESP32-S3 7 PULGADAS
SKU27078
Descripción
Pantalla táctil capacitiva de 7 pulgadas con una resolución de 800x480, cuenta con un ESP32-S3 integrado, wifi de 2.5 GHz y BLE 5. Es adecuada para diversas aplicaciones, como interfaces interactivas, proyectos de IoT y sistemas embebidos.
Características
- Equipado con procesador de doble núcleo Xtensa LX7 de 32 bits, frecuencia principal de hasta 240 MHz.
- Compatible con wifi de 2.4 GHz (802.11 b/g/n) y bluetooth 5 (LE), con antena integrada.
- 512 KB de SRAM y 384 KB de ROM integrados, con 8 MB de PSRAM y 8 MB de flash integrados.
- Pantalla táctil capacitiva de 7 pulgadas integrada, resolución de 800×480, 65000 colores.
- Compatible con control táctil capacitivo a través de interfaz I2C, toque de 5 puntos con soporte de interrupción.
- Interfaz CAN, RS485, I2C y ranura para tarjeta TF integradas, integra puerto USB de alta velocidad.
- Compatible con reloj flexible, configuración independiente de la fuente de alimentación del módulo y otros controles para lograr un bajo consumo de energía en diferentes escenarios.

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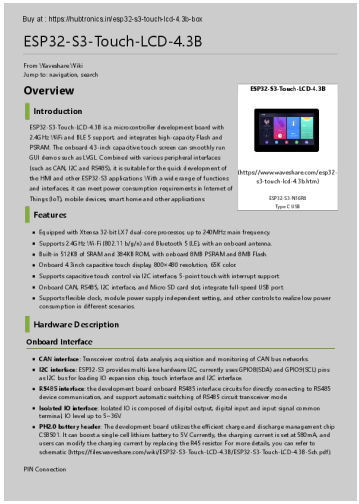
PANTALLA TÁCTIL CAPACITIVA 800X480 CON ESP32 S3 7 Aug 5 2024 · Pantalla táctil capacitiva de pulgadas con una resolución 800x480 cuenta un integrado wifi 2 GHz y BLE SKU27078 agelectronica lat s textos S |||

PANTALLA TCTIL CAPACITIVA 800X480 CON ESP32-S3 7 PULGADAS SKU27078 Descripcin Pantalla tctil capacit ... de energa Dimensiones y agujeros para montaje Enlace externo: informacin tcnica y recursos extra ESP32-S3-Touch-LCD-7 - Waveshare Wiki. s. f. . https://www.waveshare.com/wiki/ESP32-S3-Touch-...

lang:es score:22 filesize: 876.21 K page_count: 5 document date: 2024-08-06


Buy at : https://hutronics.in/esp32-s3-touch-lcd-4.3b-box
ESP32-S3-Touch-LCD-4.3B
From \Waveshare\Wiki
Jump to: navigation, search
Overview
Introduction
ESP32-S3-Touch-LCD-4.3B is a microcontroller development board with 2.4GHz \Wi-Fi and BLE 5 support, and integrates high-capacity Flash and PSRAM. The onboard 4.3-inch capacitive touch screen can smoothly run GUI demos such as LVGL. Combined with various peripheral interfaces (such as CAN, I2C and RS485), it is suitable for the quick development of the HMI and other ESP32-S3 applications. With a wide range of functions and interfaces, it can meet power consumption requirements in Internet of Things (IoT), mobile devices, smart home and other applications.
ESP32-S3-Touch-LCD-4.3B
(https://www.waveshare.com/esp32-s3-touch-lcd-4.3b.htm)
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 an onboard antenna
- Built-in 512KB of SRAM and 384KB ROM, with onboard 8MB PSRAM and 8MB Flash
- 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 CAN, RS485, I2C interface, and Micro SD 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
- CAN interface: Transceiver control data analysis, acquisition and monitoring of CAN bus networks.
- I2C interface: ESP32-S3 provides multi-lane hardware I2C, currently uses GPIO8(SDA) and GPIO9(SCL) pins as I2C bus for loading IO expansion chip, touch interface and I2C interface.
- RS485 interface: the development board onboard RS485 interface circuits for directly connecting to RS485 device communication, and support automatic switching of RS485 circuit transceiver mode.
- Isolated IO interface: Isolated IO is composed of digital output, digital input and input signal common terminal IO level up to 5~36V.
- PH2.0 battery header: The development board utilizes the efficient charge and discharge management chip CSB501. It can boost a single-cell lithium battery to 5V. Currently, the charging current is set at 580mA, and users can modify the charging current by replacing the RM5 resistor. For more details, you can refer to schematic (https://files.waveshare.com/wiki/ESP32-S3-Touch-LCD-4.3B/ESP32-S3-Touch-LCD-4.3B-Sch.pdf).
PIN Connection

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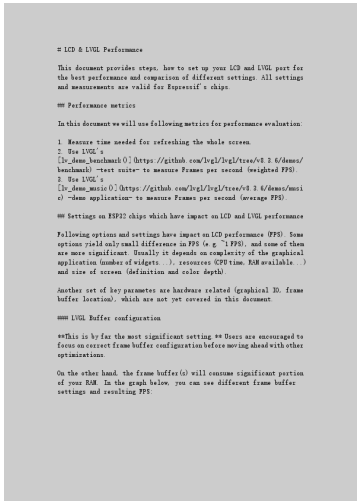
lang:en score:22 filesize: 3.46 M page_count: 54 document date: 2024-08-09

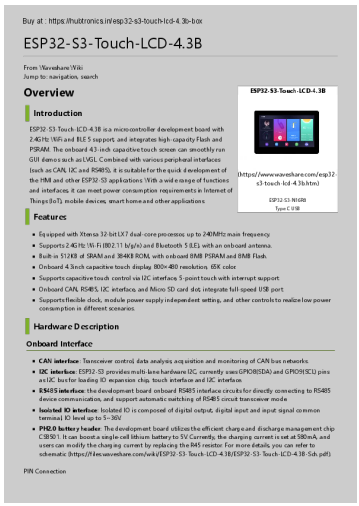

# LCD & LVGL Performance
This document provides steps, how to set up your LCD and LVGL port for the best performance and comparison of different settings. All settings and measurements are valid for Espressif's chips.
## Performance metrics
In this document we will use following metrics for performance evaluation:
1. Measure time needed for refreshing the whole screen.
2. Use LVGL's
[lv_demo_benchmark()](https://github.com/lvgl/lvgl/tree/v8.3.6/demos/benchmark) "test suite" to measure Frames per second (weighted FPS).
3. Use LVGL's
[lv_demo_music()](https://github.com/lvgl/lvgl/tree/v8.3.6/demos/music) "demo application" to measure Frames per second (average FPS).
## Settings on ESP32 chips which have impact on LCD and LVGL performance
Following options and settings have impact on LCD performance (FPS). Some options yield only small difference in FPS (e.g. ~1 FPS), and some of them are more significant. Usually it depends on complexity of the graphical application (number of widgets...), resources (CPU time, RAM available...) and size of screen (definition and color depth).
Another set of key parameters are hardware related (graphical IO, frame buffer location), which are not yet covered in this document.
### LVGL Buffer configuration
**This is by far the most significant setting.** Users are encouraged to focus on correct frame buffer configuration before moving ahead with other optimizations.
On the other hand, the frame buffer(s) will consume significant portion of your RAM. In the graph below, you can see different frame buffer settings and resulting FPS.

[pdf]

515611085 Performance files waveshare wiki ESP32 S3 Touch LCD 7 |||

# LCD LVGL Performance This document provides steps, how to set up your LCD and LVGL port for the best performance and comparison of different settings. All settings and measurements are valid for Espressif s chips. ## Performance metrics In this document we will use following metrics for performa...

lang:en score:21 filesize: 163.85 K page_count: 7 document date: 2024-04-11


Buy at : https://hubtronics.in/esp32-s3-touch-lcd-4.3b-box

ESP32-S3-Touch-LCD-4.3B

From Waveshare Wiki
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Overview

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ESP32-S3-Touch-LCD-4.3B

(https://www.waveshare.com/esp32-s3-touch-lcd-4.3b.htm)

ESP32-S3-N16R8
Type-C USB

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 an onboard antenna
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PIN Connection

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ESP32 S3 Touch LCD 4 3B Waveshare Wiki hubtronicsESP32 is a microcontroller development board with 2 4GHz WiFi and BLE 5 support integrates high capacity Flash and28141hubtronics in docs 28141 srsltid AfmBOopsvn31ZZhkcQePii9mtMiGRiMEdVGGdSocmbAle T1ErFKoQft andESP32 andhubtronics T1ErFKoQfthubtronics AfmBOor4pXCfYHNmUwI3ivJQsof1yNFjNaxY5Y 2EVbkyAo2zsqU1Ahu ||| ||| Buy at : https://hubtronics.in/esp32-s3-touch-lcd-4.3b-box ESP32-S3-Touch-LCD-4.3B From Waveshare Wiki Jump to: navigation, search Overview ESP32-S3-Touch-LCD-4.3B Introduction ESP32-S3-Touch-LCD-4.3B is a microcontroller development board

Buy at : https://hubtronics.in/esp32-s3-touch-lcd-4.3b-box ESP32-S3-Touch-LCD-4.3B From Waveshare W ... s about LCD and LVGL performance, you can refer to this document https://files.waveshare.c om/wiki/ESP32-S3-Touch-LCD-7/Performance.pdf . The PH2.0 lithium battery socket only supports single-cell 3...

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