waveshare ESP32-S3-Touch-LCD-1.85C

Waveshare ESP32-S3 1.85-inch Round LCD Development Board User Manual

Model: ESP32-S3-Touch-LCD-1.85C

1. Introduction

This manual provides detailed instructions for the setup, operation, and maintenance of your Waveshare ESP32-S3 1.85-inch Round LCD Development Board. This high-performance board features a dual-core Xtensa LX7 processor, Wi-Fi, Bluetooth BLE 5, and a 360x360 capacitive touch display, making it suitable for various AI speech and smart speaker applications.

2. Package Content

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

- ESP32-S3-Touch-LCD-1.85C-BOX x1
- SH1.0 4PIN cable ~100mm x2

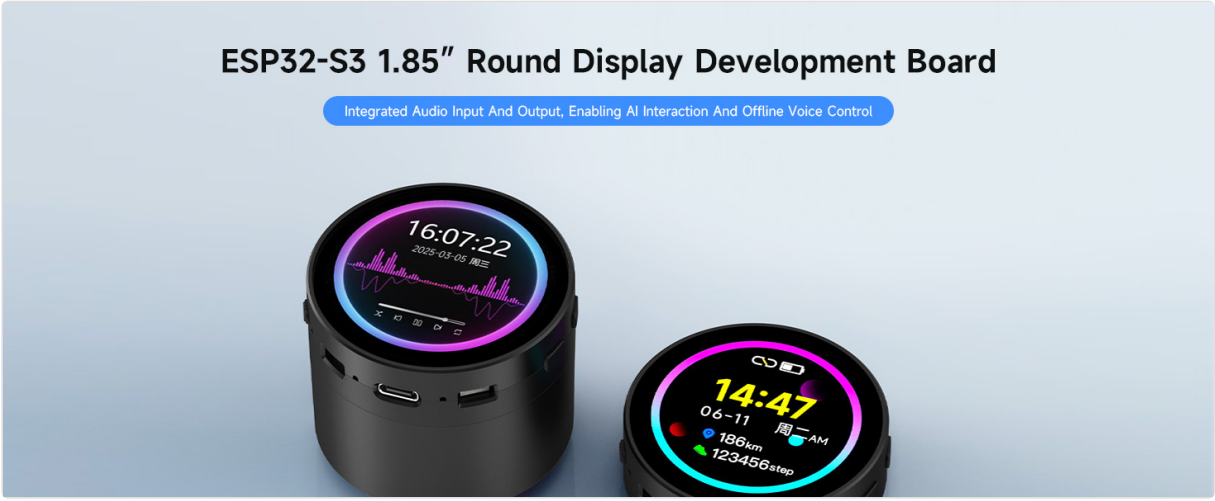

Figure 2.1: Package Contents of the ESP32-S3-Touch-LCD-1.85C-BOX.

3. Product Features

The Waveshare ESP32-S3-Touch-LCD-1.85C is a microcontroller development board designed for advanced applications. It integrates high-capacity Flash and PSRAM, along with a vibrant 1.85-inch LCD display. This board is ideal for rapid development of Human-Machine Interface (HMI) and other ESP32-S3 based projects.

- **High-Performance Processor:** Equipped with a dual-core Xtensa LX7 processor, operating up to 240MHz.
- **Wireless Connectivity:** Supports 2.4GHz Wi-Fi (802.11 b/g/n) and Bluetooth 5 (LE) with an onboard antenna.
- **Memory & Storage:** Features 512KB SRAM, 384KB ROM, 16MB Flash, and 8MB PSRAM.
- **Display & Touch:** 1.85-inch LCD with 360x360 resolution and 262K colors, offering smooth GUI program execution. Capacitive touch control is supported via I2C with interrupt support.
- **Rich Peripherals:** Includes an audio decoder, microphone, RTC sensor, TF card slot, and battery management capabilities.
- **Flexible Control:** Supports accurate control functions such as flexible clock and multiple power modes for low power consumption.

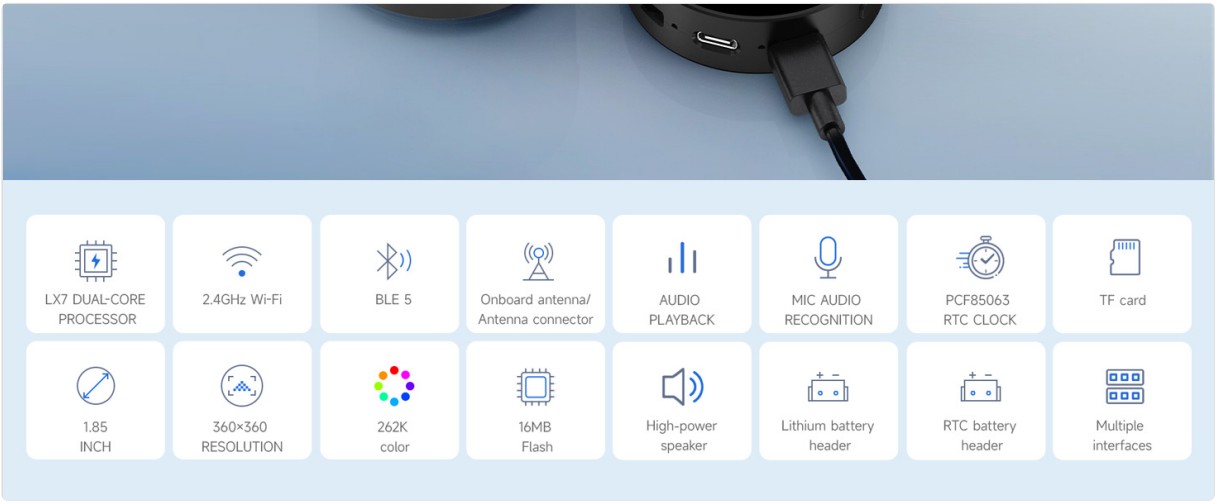

Figure 3.1: Overview of Product Features.

4. Interface Introduction

The board provides various interfaces for connectivity and expansion. Understanding these interfaces is crucial for proper integration and development.

Figure 4.1: Detailed view of board interfaces and components.

GPIO Pinout

The board supports expansion of multiple peripherals via UART, I2C, and GPIO interfaces. Refer to the pinout diagram for specific connections.

Figure 4.2: GPIO Pinout Diagram.

5. Setup: Battery Installation

This section details the process of installing the battery into your ESP32-S3-Touch-LCD-1.85C-BOX. Please follow these steps carefully.

1. **Open Speaker Cover:** Using a screwdriver, gently open the speaker cover located on the bottom of the product.
2. **Unscrew Top Screws:** Unscrew the three screws securing the speaker assembly.
3. **Remove Copper Posts:** Unscrew the three copper posts located inside the device.
4. **Insert Battery Cable:** Carefully insert the battery cable through the designated hole on the board.
5. **Connect Battery Cable:** Connect the battery cable to its corresponding port on the board.
6. **Re-screw Copper Posts:** Re-screw the copper posts back into their positions.
7. **Affix Battery:** The stereo comes with double-sided tape. Remove the sticker from the adhesive side

and stick the battery in the correct position, ensuring it is fixed securely. *Ensure the battery paste position and the copper post and hole position do not interfere with the subsequent installation of the speaker cover and screws.*

8. **Cable Placement:** Place the battery cable properly in the gap next to the battery to avoid blocking the shell when it is closed, which may affect the fit.
9. **Close Product:** Align the parts of the product with the holes of the copper pillars and close the product.
10. **Tighten Screws:** Tighten the screws that you unscrewed earlier.
11. **Replace Speaker Cover:** Finally, put the speaker cover back on.

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Video 5.1: Battery Installation Tutorial for ESP32-S3-Touch-LCD-1.85C-BOX. This video demonstrates the step-by-step process of installing the battery, including opening the device, connecting the battery, and reassembling the unit.

6. Operating Instructions

6.1. Display and Touch Control

The 1.85-inch round LCD provides excellent display performance with 262K colors and a 360x360 resolution, offering a wide viewing angle. The capacitive touch screen allows for intuitive interaction.

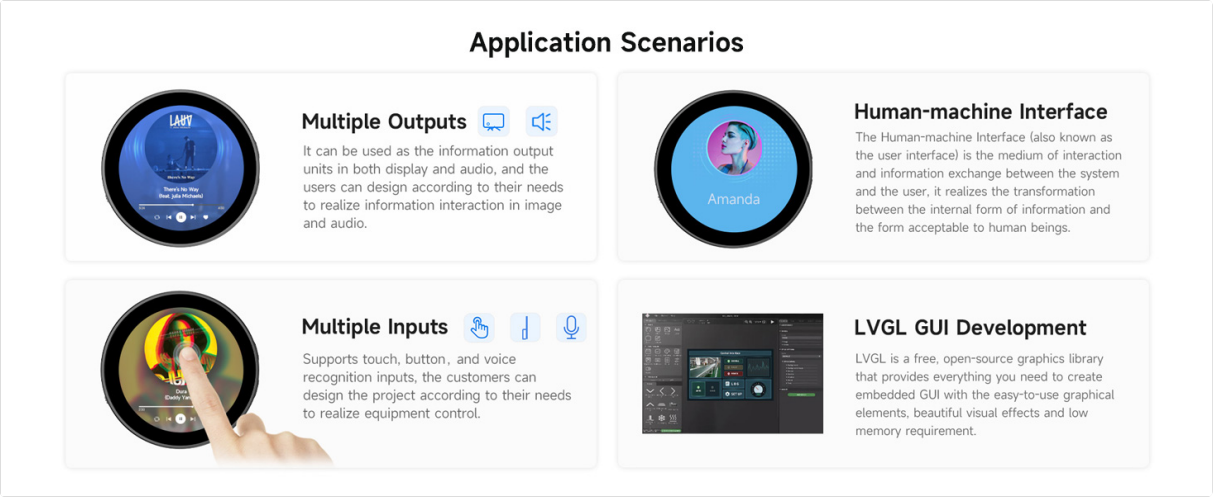

Figure 6.1: Display Performance and Capacitive Touch.

6.2. Onboard Audio Input/Output

The device supports high-quality audio processing, providing clear input and output. It is equipped with an offline voice model to enable device control via customizable shortcut commands.

- **Audio Input:** Utilize the integrated microphone for voice commands and recording.
- **Audio Playback:** The high-power speaker allows for clear audio output.
- **Voice Commands:** Examples include "Turn on the backlight", "Turn off the backlight", "Backlight is brightest", and "Backlight is darkest".

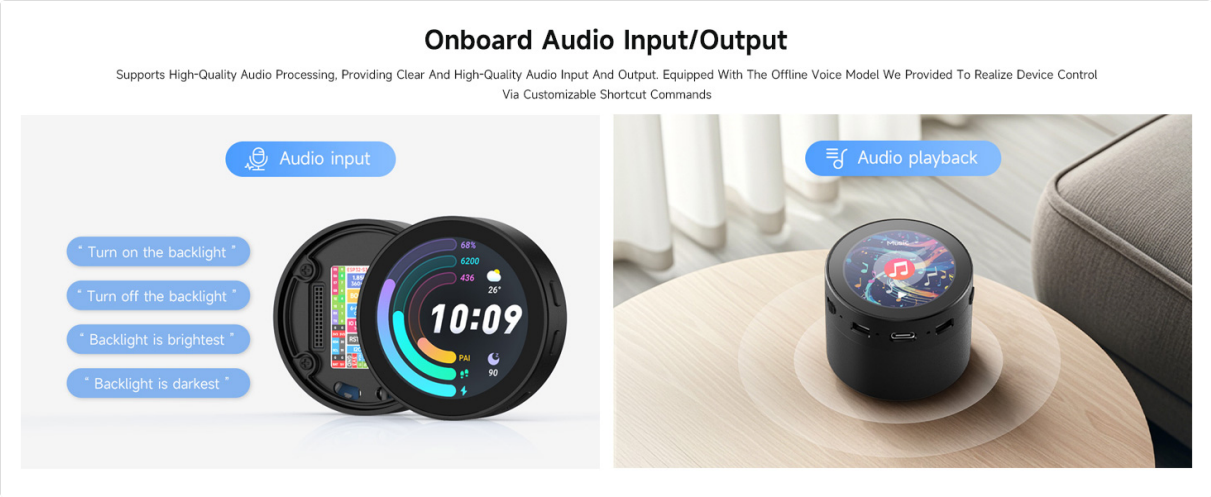

Figure 6.2: Audio Input and Output Functionality.

6.3. AI Speech Interaction

The ESP32-S3 board allows access to online large model platforms such as GPT, DeepSeek, and Doubao for advanced AI speech interaction. This enables conversational interfaces and intelligent responses.

Figure 6.3: AI Speech Interaction Capabilities.

7. Application Scenarios

The versatility of the ESP32-S3-Touch-LCD-1.85C allows for a wide range of applications:

- **Multiple Outputs:** Can be used as an information output unit in both display and audio, allowing users to design projects requiring information interaction in image and audio formats.
- **Multiple Inputs:** Supports touch, button, and voice recognition inputs, enabling users to control equipment through various methods.
- **Human-Machine Interface (HMI):** Serves as a medium for information and interaction exchange between the system and the user, facilitating intuitive control and feedback.
- **LVGL GUI Development:** Ideal for developing embedded GUIs using LVGL, a free, open-source graphics library that provides easy-to-use graphical elements with beautiful visual effects and low memory requirements.

Figure 7.1: Potential Application Scenarios.

8. Specifications

Feature	Detail
Processor	Dual-core Xtensa LX7, up to 240 MHz
Wireless Connectivity	2.4GHz Wi-Fi (802.11 b/g/n), Bluetooth 5 (LE)
Memory	512KB SRAM, 384KB ROM, 16MB Flash, 8MB PSRAM
Display	1.85-inch LCD, 360x360 resolution, 262K color, Capacitive Touch (I2C)
Audio	Audio decoder, Microphone, High-power speaker
Other Peripherals	RTC sensor, TF card slot, Battery management
Item Weight	4.9 ounces
Package Dimensions	4.49 x 3.7 x 2.76 inches
Model Name	ESP32-S3-Touch-LCD-1.85C-BOX-EN

9. Outline Dimensions

Refer to the diagrams below for the physical dimensions of the ESP32-S3-Touch-LCD-1.85C, both in its standard version and with the speaker box.

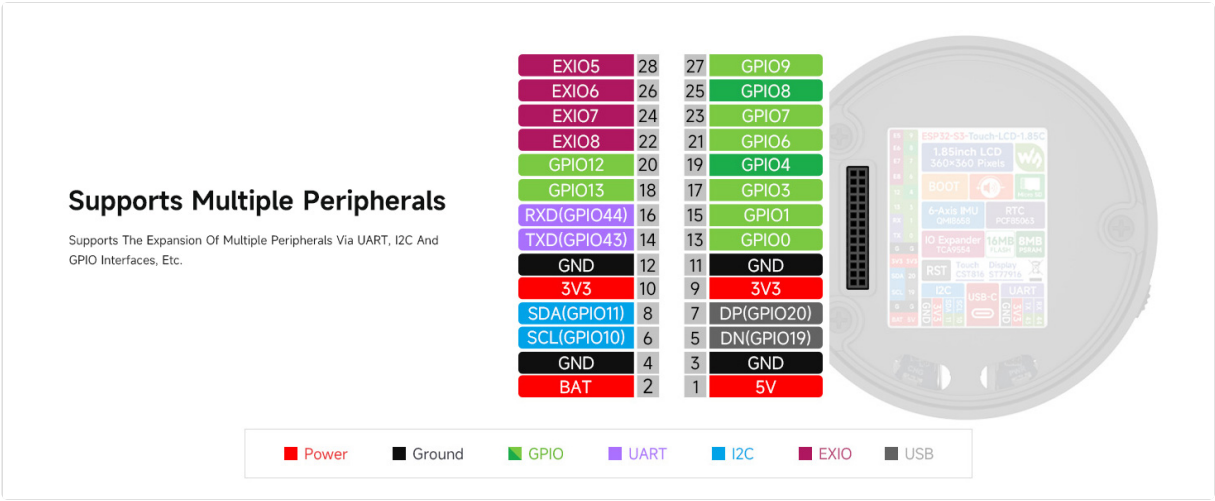

Figure 9.1: Standard Version Dimensions.

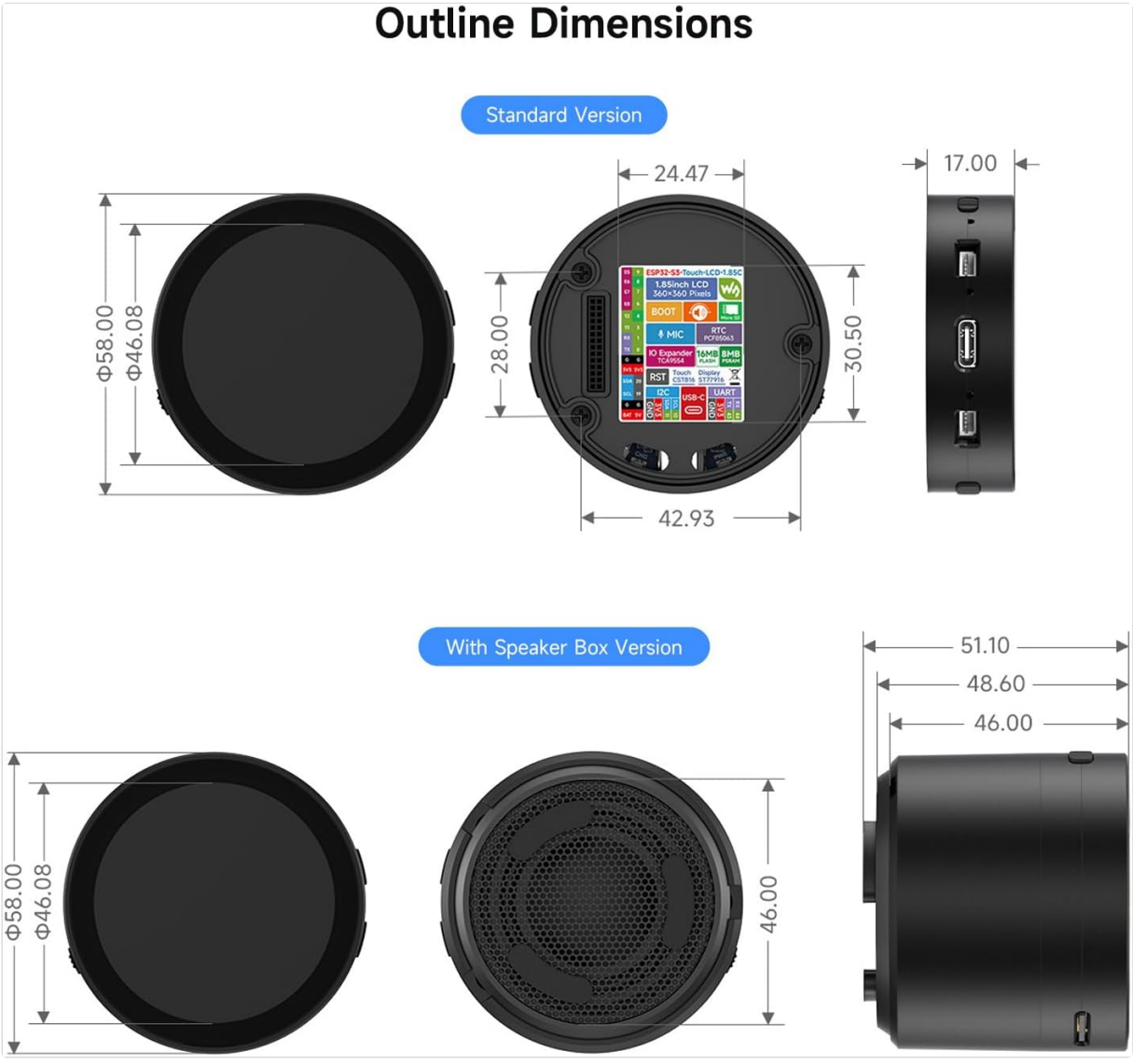

Figure 9.2: Dimensions with Speaker Box Version.

10. Troubleshooting

If you encounter issues with your Waveshare ESP32-S3 Development Board, consider the following general troubleshooting steps:

- **Power Issues:** Ensure the battery is correctly installed and charged, or that the device is properly connected to a power source via the USB Type-C port.

- **Display Not Working:** Check all connections to the LCD. If the display shows garbage, verify your software configuration and ensure the correct drivers are installed.
- **Connectivity Problems (Wi-Fi/Bluetooth):** Confirm that the onboard antenna is not obstructed and that your code correctly initializes and uses the wireless modules.
- **Audio Malfunctions:** Verify microphone and speaker connections. Ensure audio drivers and configurations in your software are correct.
- **Software/Firmware:** Refer to the official Waveshare Wiki for the latest documentation, example code, and firmware updates. Ensure you are using compatible ESP-IDF versions if developing with Espressif tools.
- **Physical Damage:** Inspect the board for any visible damage or loose connections.

For more specific issues, consult the Waveshare Wiki resources or contact technical support.

11. Warranty and Support

Waveshare products are designed for reliability and performance. For detailed warranty information, please refer to the official Waveshare website or the documentation included with your purchase.
For technical support, resources, and community forums, visit the official Waveshare Wiki:

Waveshare Official Wiki

You can also contact Waveshare customer service for assistance with product inquiries or issues.