

Wonrabai ESP32-S3-Touch-AMOLED-1.75

Wonrabai ESP32-S3 1.75-inch AMOLED Round Touch Display Development Board

MODEL: ESP32-S3-TOUCH-AMOLED-1.75

[Overview](#) [Setup](#) [Introduction](#) [Operation](#) [Features](#) [Maintenance](#) [Package Contents](#) [Troubleshooting](#) [Hardware](#) [Specifications](#) [Support](#)

1. Introduction

The Wonrabai ESP32-S3 1.75-inch AMOLED Round Touch Display Development Board is a versatile and powerful platform designed for various embedded projects, including wearables, IoT devices, and AI speech interaction applications. It integrates an ESP32-S3R8 Xtensa 32-bit LX7 dual-core processor, a high-resolution AMOLED capacitive touch display, and a comprehensive suite of peripherals for advanced development.

This manual provides essential information for setting up, operating, and maintaining your development board, ensuring you can effectively utilize its capabilities.

2. Key Features

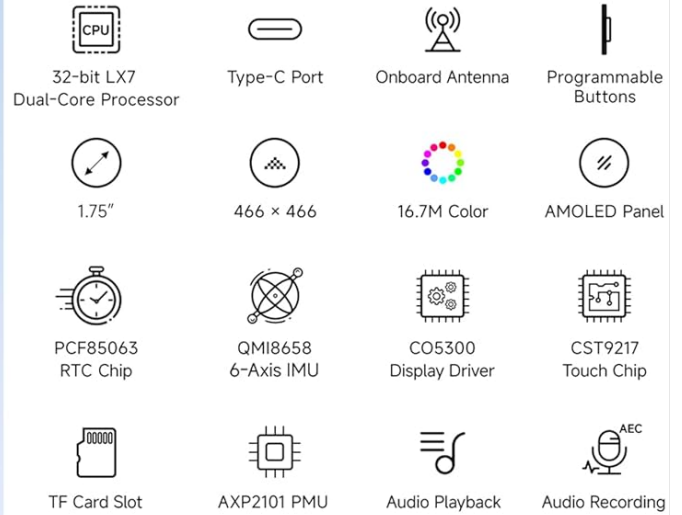
The ESP32-S3 Development Board offers a rich set of features:

- **Processor:** ESP32-S3R8 Xtensa 32-bit LX7 dual-core processor, up to 240MHz main frequency.
- **Connectivity:** Supports 2.4GHz Wi-Fi (802.11 b/g/n) and Bluetooth 5 (LE) with an onboard antenna.
- **Memory:** Built-in 512KB SRAM, 384KB ROM, onboard 8MB PSRAM, and external 16MB Flash memory.
- **Display:** 1.75-inch AMOLED capacitive touch display with 466 × 466 resolution, 16.7M colors, and 178° wide viewing angle.
- **Audio:** Onboard audio codec for high-quality audio processing, dual digital microphone array for noise reduction and echo cancellation, and support for AI speech interaction.
- **Sensors:** Onboard QMI8658 6-axis IMU (3-axis accelerometer and 3-axis gyroscope) for motion detection.
- **Power Management:** AXP2101 IC for efficient power management, supporting multiple voltage outputs, battery charging, and optimization.

- **RTC:** Onboard PCF85063 RTC chip for uninterrupted timekeeping.
- **Expansion:** TF card slot for extended storage, 8PIN 2.54mm header for GPIO and UART, and reserved pads for I2C and expanded IO interfaces.
- **Interface:** Type-C connector for power and data.

ESP32-S3-Touch-AMOLED-1.75

Embedded with CO5300 Display Driver and CST9217 Capacitive Touch Chip



AMOLED Parameters

DISPLAY PANEL	AMOLED	DISPLAY SIZE	1.75 inch
RESOLUTION	466 × 466 pixels	DISPLAY COLORS	16.7M
BRIGHTNESS	700 cd/m ²	CONTRAST RATIO	100000:1
COMMUNICATION INTERFACE	QSPI	DRIVER IC	CO5300
TOUCH	Supported	TOUCH IC	CST9217

Figure 2.1: Overview of ESP32-S3 Development Board Features

Version Options

Features

All Versions Come With Touch Function



ESP32-S3-Touch-AMOLED-1.75

Standard version



ESP32-S3-Touch-AMOLED-1.75-B

Standard version with protective case



ESP32-S3-Touch-AMOLED-1.75-G

GPS version, with built-in LC76G module,
comes with a GNSS ceramic antenna

The **ESP32-S3-Touch-AMOLED-1.75** is a high-performance, highly integrated MCU board designed by Waveshare. It is compact in size, onboard 1.75inch AMOLED capacitive touch display, power management IC, 6-axis sensor (3-axis accelerometer and 3-axis gyroscope), RTC chip, low power audio codec, echo cancellation circuit, and so on, which makes it easy for you to develop and integrate into the products quickly.

- Equipped with ESP32-S3R8 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 of SRAM and 384KB ROM, with onboard 8MB PSRAM and an external 16MB Flash memory
- Type-C connector, improving device compatibility, easier to use
- Onboard 1.75inch AMOLED capacitive touch display for clear color picture display, 466 × 466 resolution, 16.7M color
- Built-in CO5300 display driver and CST9217 capacitive touch chip, using QSPI and I2C communication respectively, effectively saving the IO resources
- Equipped with dual microphones array for audio algorithms such as noise reduction and echo cancellation, suitable for accurate speech recognition and near-field / far-field voice wake-up applications
- Onboard QMI8658 6-axis IMU (3-axis accelerometer and 3-axis gyroscope) for detecting motion gesture, counting steps, etc.
- Onboard PCF85063 RTC chip, powered by Lithium battery through AXP2101 chip for uninterrupted power supply
- Onboard PWR and BOOT programmable buttons for easy custom function development
- Onboard 3.7V MX1.25 Lithium battery recharge/discharge header
- Onboard 8PIN 2.54mm header adapting 3 × GPIO and 1 × UART, and reserved pads of I2C and 3 × expanded IO interfaces, for connecting peripherals and debugging
- Onboard TF card slot for extended storage and fast data transfer, suitable for applications such as data recording and media playback, simplifying circuit design
- Adopts AXP2101 IC for efficient power management, supports multiple voltage outputs, battery charging, battery management, and battery life optimization, etc.
- Adopts AMOLED screen, featuring advantages of high contrast, wide viewing angle, rich colors, fast response, thinner design, and low power consumption, etc.

Figure 2.2: ESP32-S3-Touch-AMOLED-1.75 Version Options and Feature List

Small Size, Touch More Possibilities

Suitable For Various Smart Device Development, And Can Realize Human-Computer Interaction Function. Supports Connecting To A Battery For Independent Operation



Adopts AMOLED Screen

The Next-Generation Display Technology, Compared To Traditional LCD Displays, The AMOLED Screen Features Precise Light-Control Capability, Representing More Delicate Colors, More Picture Details, And More Vivid Videos And Images



178° Wide Viewing Angle

Excellent Display Performance, 16.7M Color, Wide Viewing Angle



Figure 2.3: AMOLED Screen Benefits and Wide Viewing Angle

Onboard Audio Codec

Supports High-Quality Audio Processing, Providing Clear And High-Quality Audio Input And Output

Audio Playback

Audio Input



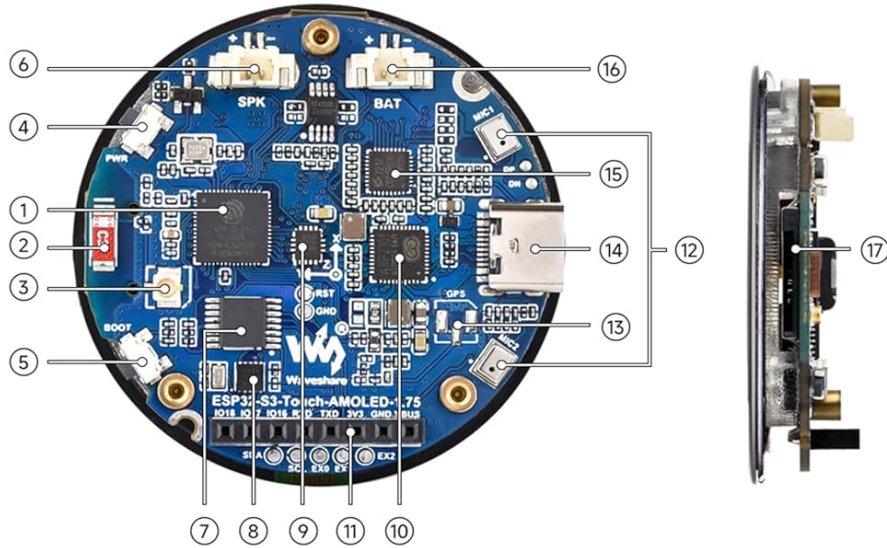
Supports AI Speech Interaction

Allows Access To Online Large Model Platforms Such As DeepSeek, Doubao, Etc.



Figure 2.4: Onboard Audio Codec and AI Speech Interaction

What's On Board



1. SP32-S3R8

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

2. Onboard antenna

Supports 2.4 GHz Wi-Fi (802.11 b/g/n) and Bluetooth 5 (LE)

3. IPEX1 connector

Switching to use the external antenna via resoldering an onboard resistor

4. PWM button

for system power supply ON/OFF, supports custom function

5. BOOT button

for device startup and function debugging

6. MX1.25 2P speaker header

7. TCA9554

GPIO expander chip

8. PCF85063

RTC chip

9. QMI8658

6-axis IMU includes a 3-axis gyroscope and a 3-axis accelerometer

10. AXP2101

Highly integrated power management IC

11. 2.54mm 8PIN header

for debugging and connecting peripherals

12. Dual microphones

with onboard echo cancellation circuit, enabling higher-quality audio capture

13. IPEX 1 GPS connector

for connecting GPS antenna (for the GPS version only, with built-in LC76G module)

14. Type-C port

ESP32-S3 USB interface, for program burning and log printing

15. ES7210

Echo cancellation algorithm chip, for reducing echo and enhancing audio capture accuracy

16. MX1.25 Lithium battery header

MX1.25 2P connector, for 3.7V Lithium battery, supports charging and discharging

Figure 2.5: Development Environment and Wireless Support

3. Package Contents

Verify that all items are present in your package:

- ESP32-S3-Touch-AMOLED-1.75 with case x1
- 8Ω 2W speaker x1

Package Content



1. ESP32-S3-Touch-AMOLED-1.75 with case x1



2. 8Ω 2W speaker ×1

Figure 3.1: Package Contents

4. Hardware Overview

Familiarize yourself with the components and interfaces of the ESP32-S3 Development Board:

Supports ESP-IDF, Arduino

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



ESP-IDF

With free open source development tools, supports IDEs such as VSCode and Eclipse easier for developers to use.



Arduino IDE

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

Wi-Fi And BLE 5 Support

ESP32-S3 Integrates 2.4 GHz Wi-Fi (802.11 Ax/B/G/N) With 40 MHz Of Bandwidth Support, Its Bluetooth Low Energy Subsystem Supports Bluetooth 5 (LE) And Bluetooth Mesh

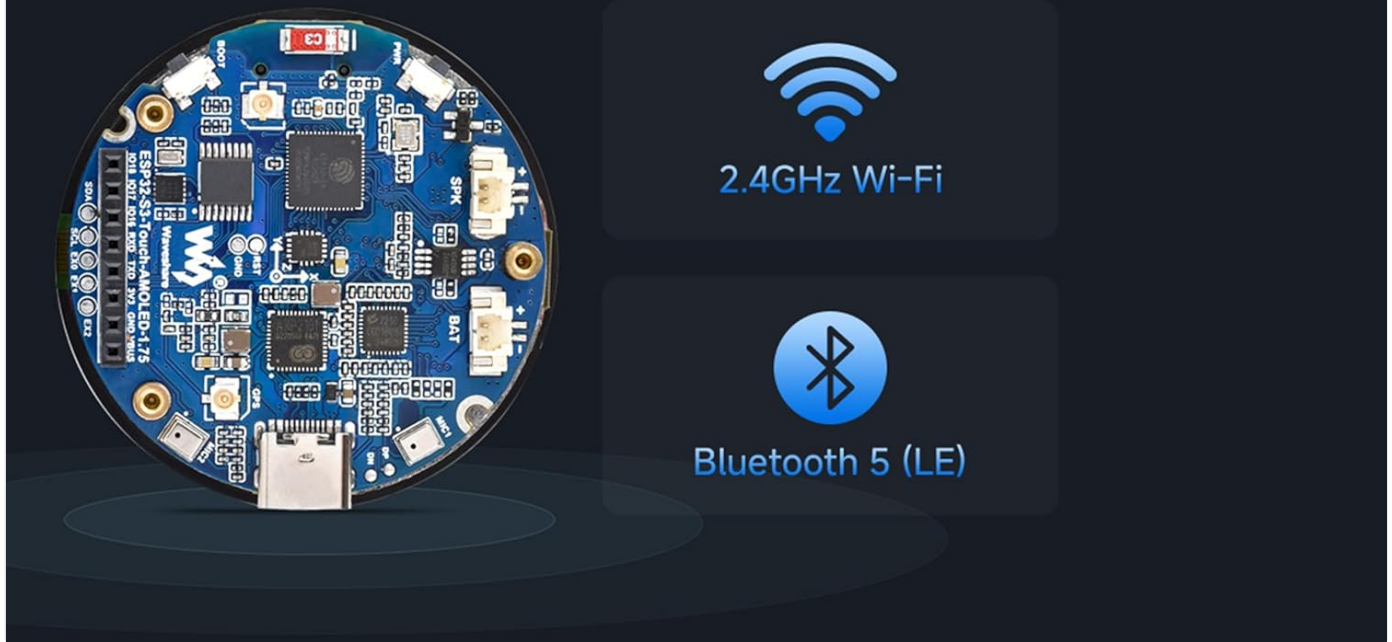


Figure 4.1: ESP32-S3 Development Board Component Layout

No.	Component	Description
1	ESP32-S3R8	The SoC with Wi-Fi and Bluetooth, up to 240MHz operating frequency, with onboard 8MB PSRAM.
2	Onboard antenna	For 2.4 GHz Wi-Fi (802.11 b/g/n) and Bluetooth 5 (LE) connectivity.
3	IPEX1 connector	Switching to use an external antenna via resoldering an onboard resistor.
4	PWR button	For system power ON/OFF, supports custom function development.
5	BOOT button	For device startup and function debugging.
6	MX1.25 2P speaker header	Connects to the included 8Ω 2W speaker.
7	TCPA9554	GPIO expander chip.
8	PCF85063	Real-Time Clock (RTC) chip.
9	QMI8658	6-axis IMU (3-axis accelerometer and 3-axis gyroscope).
10	AXP2101	Highly integrated power management IC.

No.	Component	Description
11	2.54mm 8PIN header	For debugging and connecting peripherals (3 × GPIO and 1 × UART).
12	Dual microphones	With onboard echo cancellation circuit, enabling higher-quality audio capture.
13	IPEX 1 GPS connector	For connecting GPS antenna (for the GPS version only, with built-in LC76G module).
14	Type-C port	ESP32-S3 USB interface, for program burning and log printing.
15	ES7210	Echo cancellation algorithm chip, for reducing echo and enhancing audio capture accuracy.
16	MX1.25 Lithium battery header	MX1.25 2P connector, for 3.7V Lithium battery, supports charging and discharging.

5. Setup Instructions

Follow these steps for initial setup:

- Connect Speaker:** If using the included speaker, connect its MX1.25 connector to the corresponding header (No. 6 in Figure 4.1) on the development board.
- Power Connection:** Connect the development board to a power source using a Type-C USB cable. The Type-C port (No. 14 in Figure 4.1) also serves as the data interface for programming and debugging.
- Battery (Optional):** For portable applications, connect a 3.7V Lithium battery to the MX1.25 battery header (No. 16 in Figure 4.1). The board's power management IC will handle charging and discharging.
- Initial Power On:** Press the PWR button (No. 4 in Figure 4.1) to power on the device. The AMOLED display should illuminate.
- Development Environment:** For programming, refer to the online tutorial for setting up your preferred development environment (e.g., ESP-IDF, Arduino IDE).

6. Operating Instructions

Basic operation of the ESP32-S3 Development Board:

- Power On/Off:** Use the PWR button (No. 4) to turn the device on or off.
- Display Interaction:** The 1.75-inch AMOLED display is capacitive touch-enabled. Interact with on-screen elements by tapping or swiping as programmed.
- AI Speech Interaction:** Utilize the dual digital microphones (No. 12) for voice input. The onboard audio codec and echo cancellation chip enhance audio quality for speech recognition. Access to online large model platforms (e.g., DeepSeek, Doubao, GPT) can be integrated through custom firmware.
- Programmable Buttons:** The PWR and BOOT buttons can be configured for custom functions within your application.
- Data Storage:** Insert a TF card into the TF card slot for extended storage and data transfer, suitable for logging or media playback.
- Motion Sensing:** The QMI8658 6-axis IMU (No. 9) can detect motion gestures, count steps, and provide orientation data for various applications.

7. Maintenance

To ensure the longevity and optimal performance of your development board:

- **Cleaning:** Use a soft, dry cloth to clean the display and case. Avoid abrasive cleaners or solvents.
- **Storage:** Store the board in a cool, dry environment, away from direct sunlight and extreme temperatures.
- **Handling:** Handle the board with care to avoid physical damage. Avoid static discharge by working on an anti-static mat if possible.
- **Firmware Updates:** Regularly check the official resources for firmware updates to benefit from performance improvements and new features.

8. Troubleshooting

If you encounter issues, refer to the following common problems and solutions:

- **Device does not power on:**
 - Ensure the Type-C cable is securely connected to a working power source.
 - If using a battery, ensure it is charged and properly connected.
 - Press the PWR button firmly.
- **Display is blank or unresponsive:**
 - Verify the device is powered on.
 - Check your firmware for display initialization errors.
 - Ensure the display driver (CO5300) and touch chip (CST9217) are correctly configured in your code.
- **Wi-Fi or Bluetooth connectivity issues:**
 - Confirm that the onboard antenna is not obstructed.
 - Check your code for correct Wi-Fi/Bluetooth initialization and credentials.
 - Ensure the device is within range of the access point or Bluetooth device.
- **Microphone or speaker not working:**
 - Ensure the speaker is correctly connected to the MX1.25 header.
 - Verify audio codec and microphone drivers are correctly implemented in your firmware.
 - Check volume settings in your application.

For more detailed troubleshooting and development resources, please refer to the online tutorial and community forums.

9. Specifications

Feature	Detail
Product Dimensions	0.06 x 1.57 x 1.57 inches
Item Weight	1.06 ounces
Item Model Number	ESP32-S3-Touch-AMOLED-1.75-B
Standing Screen Display Size	1.75 inches
Aspect Ratio	1:1

Feature	Detail
Screen Type	AMOLED, Capacitive Touch
Response Time	5 Milliseconds
Color Screen	Yes
Processor	ESP32-S3R8 Xtensa 32-bit LX7 dual-core
Main Frequency	Up to 240MHz
Wi-Fi	2.4GHz (802.11 b/g/n)
Bluetooth	Bluetooth 5 (LE)
SRAM	512KB
ROM	384KB
PSRAM	8MB (onboard)
Flash Memory	16MB (external)
Display Resolution	466 × 466 pixels
Display Colors	16.7M
Viewing Angle	178°
IMU	QMI8658 6-axis (3-axis accelerometer, 3-axis gyroscope)
RTC Chip	PCF85063
Power Management	AXP2101 IC
Expansion	TF card slot, 8PIN 2.54mm header (GPIO, UART)
Connector	Type-C

Outline Dimensions

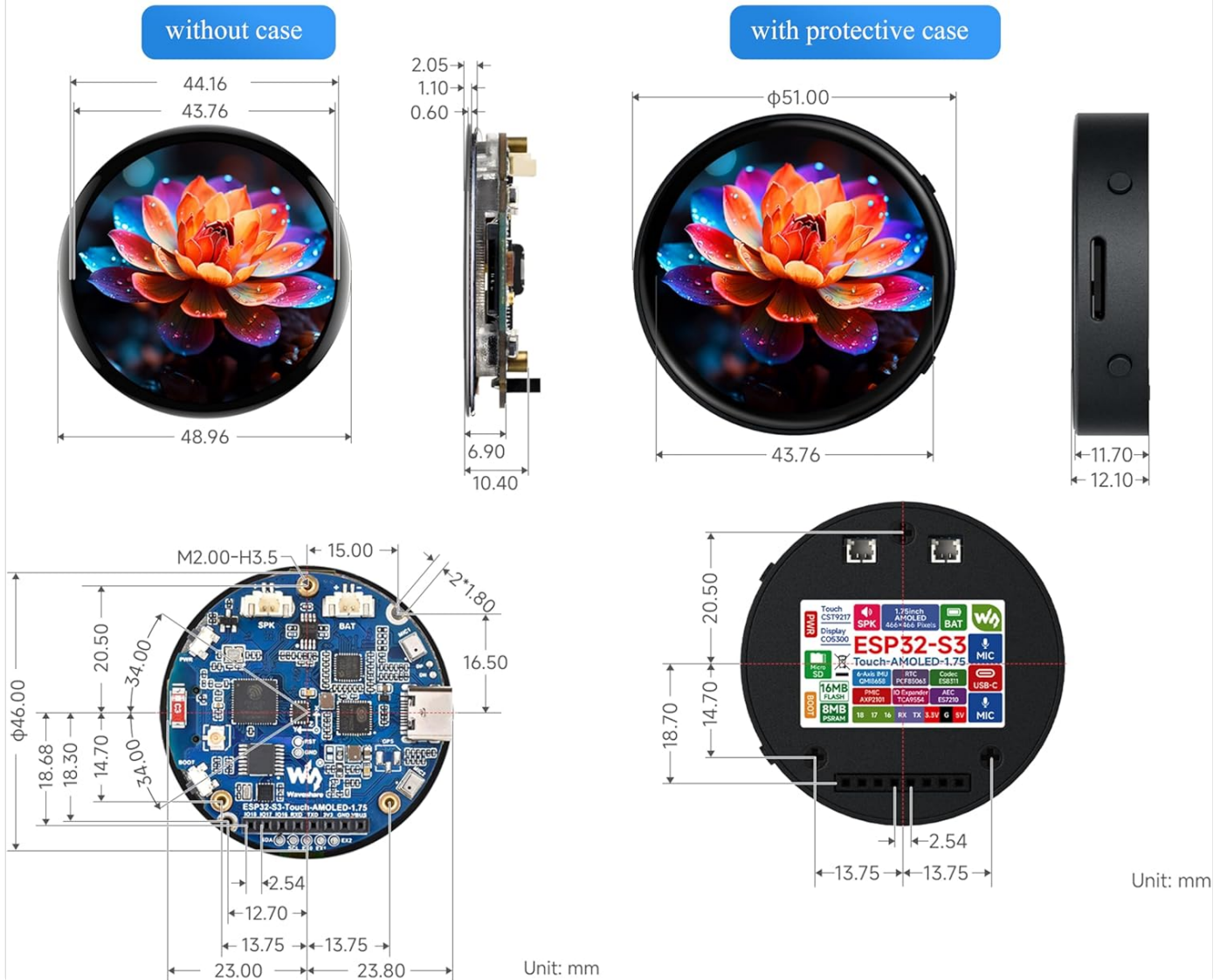


Figure 9.1: Outline Dimensions

10. Warranty and Support

For comprehensive online tutorials, usage guides, development resources, and support, please visit the official resource page:

<https://n9.cl/rr145>

This link provides access to detailed documentation, example code, and community support to assist you in your development projects.