

## Manuals+

[Q & A](#) | [Deep Search](#) | [Upload](#)

manuals.plus /

- › [LILYGO](#) /
- › [LILYGO T-Embed ESP32-S3 Development Board Shell Kit User Manual](#)

## LILYGO T-Embed Shell Kit ESP32-S3

# LILYGO T-Embed ESP32-S3 Development Board Shell Kit User Manual

Model: T-Embed Shell Kit ESP32-S3

## 1. INTRODUCTION

The LILYGO T-Embed is an Internet of Things (IoT) embedded panel designed for programmable development. This kit provides a custom control panel featuring a macro knob and a 1.9-inch LCD display, built around the ESP32-S3 microcontroller. It is intended for users who wish to develop custom embedded applications and control interfaces.



Image 1.1: Front and back view of the LILYGO T-Embed Shell Kit.

## 2. WHAT'S IN THE BOX

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

- 1 x T-Embed ESP32-S3 Development Board
- 1 x IDC3 Box Header Connector 2.54 (2\*4P)
- 1 x 2.0mm Male PIN (1\*5P)
- 1 x JST 1.25mm 2P Cable
- 1 x Box Header Cable 2.54 8pin 10cm
- 1 x 2.0mm Male PIN (1\*6P)

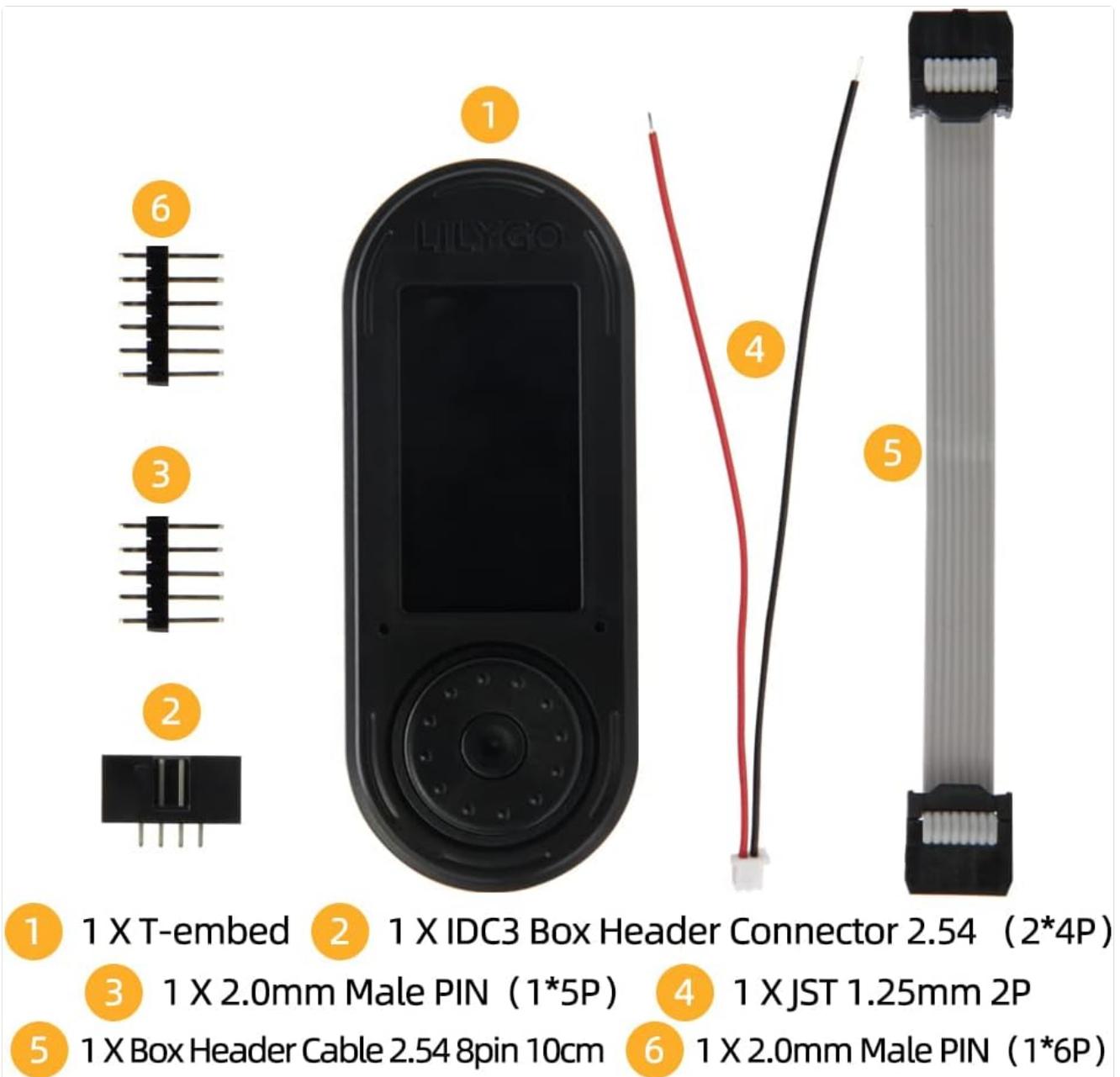


Image 2.1: Included components of the T-Embed Shell Kit.

### 3. PRODUCT OVERVIEW AND FEATURES

The T-Embed is designed for integration into custom projects, offering a compact and versatile control interface.

#### Key Features:

- **Microcontroller:** ESP32-S3 Dual-core LX7 microprocessor
- **Wireless Connectivity:** Wi-Fi 802.11 b/g/n, BLE 5
- **Programming Platform Support:** Arduino-IDE, ESP-IDF
- **Memory:** 16MB PSRAM, 8MB Flash
- **Display:** 1.9-inch ST7789 IPS TFT LCD, 170(H)RGB x 320(V) resolution
- **Input:** Macro Knob (Encoder), Reset Button, Boot Button
- **Power Supply:** USB Type-C, Li-Po Battery (dual power supply support)
- **Additional Features:** Microphone, Speaker Slot, RGB LEDs (7 x APA102 RGB), TF Card Slot, GPIO Pinout

**MCU:** ESP32-S3 Dual-core LX7 microprocessor  
**Wireless Connectivity:** Wi-Fi 802.11 b/g/n, BLE 5  
**Programming Platform:** Arduino-ide, ESP-IDF  
**Flash:** 16MB **PSRAM:** 8MB **Bat voltage detection:** IO04  
**Onboard functions:** Reset + Boot Button

**1.9 inch ST7789V IPS TFT LCD:**

**Interface:** SPI **Type:** TFT LCD **Drive Chip:** ST7789  
**Resolution:** 170(H)RGB x 320(V)  
 1.9" diagonal, Full color TFT Display

**Support USB/Li-Po Battery Dual Power Supply**

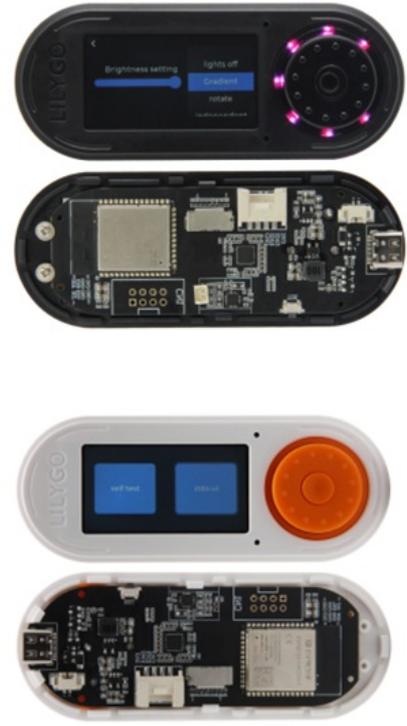
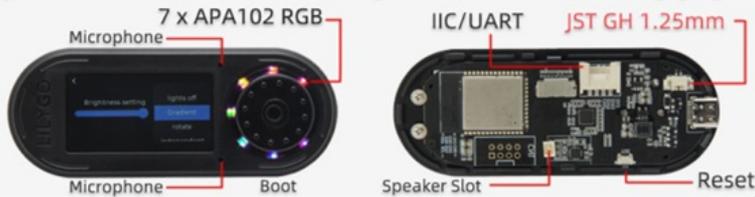


Image 3.1: Top view of the T-Embed board highlighting key features and components.

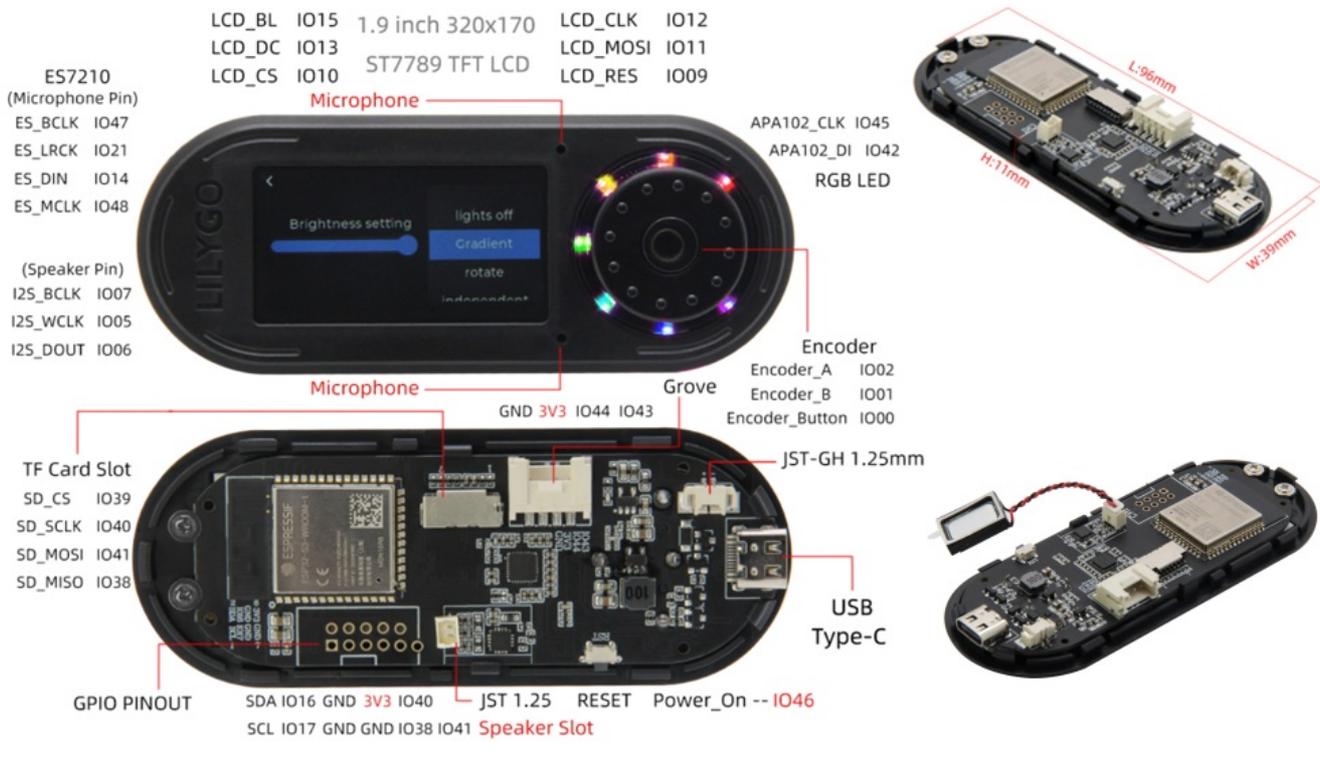


Image 3.2: Bottom view of the T-Embed board showing pinout and additional components.

## 4. SETUP

### 4.1 Assembly

The T-Embed comes as a shell kit, requiring assembly of the circuit board within the provided enclosure. Carefully align the circuit board with the mounting points inside the shell. Ensure all connectors and the display are properly

seated before securing the enclosure. Refer to the official GitHub repository for detailed assembly instructions and shell files if needed.

## 4.2 Initial Power-Up

The T-Embed supports dual power supply options:

- **USB Type-C:** Connect a standard USB Type-C cable to the port on the device and to a 5V power source (e.g., computer USB port, USB wall adapter).
- **Li-Po Battery:** Connect a compatible Li-Po battery to the JST 1.25mm connector. Ensure correct polarity. The device includes battery voltage detection on IO04.

Upon successful power-up, the 1.9-inch LCD display should illuminate, and the device will begin its boot sequence.

## 4.3 Software Setup and Programming Environment

To develop applications for the T-Embed, you will need to set up a programming environment. The device supports both Arduino-IDE and ESP-IDF.

1. **Install Arduino IDE or ESP-IDF:** Download and install your preferred development environment.
2. **Install ESP32-S3 Board Support:** Follow the instructions for adding ESP32-S3 board support to your chosen IDE.
3. **Obtain T-Embed Libraries and Examples:** Access the official LILYGO T-Embed GitHub repository for necessary libraries, example code, and detailed programming guides.

**Official GitHub Repository:** [github.com/Xinyuan-LilyGO/T-Embed](https://github.com/Xinyuan-LilyGO/T-Embed)

**Shell Files:** [github.com/Xinyuan-LilyGO/T-Embed/tree/main/Shell\\_file](https://github.com/Xinyuan-LilyGO/T-Embed/tree/main/Shell_file)

# 5. OPERATION

## 5.1 Display and Navigation

The 1.9-inch LCD display serves as the primary visual interface. Navigation and interaction are typically managed through the integrated macro knob (encoder) and associated buttons (Reset, Boot). The specific functionality of the display and controls will depend on the firmware loaded onto the T-Embed.

## 5.2 Programming and Customization

The T-Embed is a development board, meaning its core functionality is defined by the code you upload. It can be programmed to perform a wide range of tasks, such as:

- Custom control panel for smart home devices
- Macro keyboard or shortcut device
- IoT sensor data display
- Audio processing (using the microphone and speaker slot)
- Network monitoring tool

Refer to the LILYGO GitHub repository for example projects and detailed documentation on how to program the ESP32-S3 and utilize the T-Embed's peripherals.

# 6. SPECIFICATIONS

Feature	Detail
---------	--------

Feature	Detail
Processor	ESP32-S3 Dual-core LX7 microprocessor
Flash Memory	16MB
PSRAM	8MB
Wireless Connectivity	Wi-Fi 802.11 b/g/n, BLE 5
Display	1.9-inch ST7789 IPS TFT LCD
Display Resolution	170(H)RGB x 320(V)
Power Supply	USB Type-C, Li-Po Battery
Onboard Functions	Reset + Boot Button, Macro Knob (Encoder), Microphone, Speaker Slot, RGB LEDs, TF Card Slot
Operating System	FreeRTOS (supported)
Connectivity Technology	I2C (via GPIO)

## 7. MAINTENANCE

---

To ensure the longevity and proper functioning of your LILYGO T-Embed:

- **Cleaning:** Use a soft, dry cloth to clean the exterior. Avoid using liquid cleaners or solvents, which can damage the display or electronic components.
- **Storage:** Store the device in a cool, dry environment away from direct sunlight, extreme temperatures, and high humidity.
- **Handling:** Handle the device with care to prevent physical damage. Avoid dropping or subjecting it to strong impacts.
- **Firmware Updates:** Regularly check the official LILYGO GitHub repository for firmware updates to ensure optimal performance and access to new features.

## 8. TROUBLESHOOTING

---

If you encounter issues with your T-Embed, consider the following:

- **Device Not Powering On:**
  - Ensure the USB Type-C cable is securely connected to a functional power source.
  - If using a Li-Po battery, verify it is charged and correctly connected with proper polarity.
- **Display Not Working:**
  - Check power supply.
  - Ensure the display ribbon cable is properly seated if you assembled the kit.
  - Verify that the loaded firmware initializes the display correctly.
- **Programming Errors:**
  - Confirm that the correct board (ESP32-S3) is selected in your IDE.
  - Ensure all necessary libraries are installed and up to date.

- Check your code for syntax errors or logical issues.
- Refer to the LILYGO GitHub repository for common issues and solutions related to specific firmware or hardware interactions.
- **Connectivity Issues (Wi-Fi/BLE):**
  - Verify your Wi-Fi credentials or BLE pairing process in your code.
  - Ensure the device is within range of the network or other BLE devices.

For more in-depth troubleshooting and community support, visit the official LILYGO T-Embed GitHub page.

## 9. SUPPORT AND RESOURCES

---

For the latest documentation, code examples, and community support, please refer to the official LILYGO resources:

- **LILYGO T-Embed GitHub Repository:** [github.com/Xinyuan-LilyGO/T-Embed](https://github.com/Xinyuan-LilyGO/T-Embed)
- **LILYGO T-Embed Shell Files:** [github.com/Xinyuan-LilyGO/T-Embed/tree/main/Shell\\_file](https://github.com/Xinyuan-LilyGO/T-Embed/tree/main/Shell_file)

For general inquiries or further assistance, please contact LILYGO customer support through their official channels.