LILYGO T-Embed ESP32-S3

LILYGO T-Embed ESP32-S3 IOT Embedded Panel Instruction Manual

Model: T-Embed ESP32-S3

Brand: LILYGO

1. Introduction

The LILYGO T-Embed is an Internet of Things (IOT) embedded panel designed for programmable development. It integrates an ESP32-S3 microcontroller, a 1.9-inch IPS color TFT LCD, and various peripherals to facilitate rapid prototyping and deployment of embedded applications. This manual provides essential information for setting up, operating, and maintaining your T-Embed device.

2. Product Overview

The T-Embed features a compact design with a 1.9-inch IPS color TFT LCD for clear visual feedback and a rotary encoder for intuitive user interaction. Its robust construction makes it suitable for various embedded projects.



Figure 2.1: Front and back view of the LILYGO T-Embed device, showcasing its compact design and internal components.

3. Components

The LILYGO T-Embed package includes the main board and several accessories to get you started:

- 1 x T-Embed board
- 1 x 1.9-inch IPS color TFT LCD with ST7789 model (integrated)
- 1 x ESP32-S3 MCU (integrated)
- 1 x Type-C USB TF card holder (integrated)
- 2 x Microphones (integrated)
- 1 x Rotary encoder (integrated)
- 7 x Ring RGB lights (integrated)
- 1 x 8 ohm speaker
- Battery charge and discharge protection circuit (integrated)
- Additional connectors and pins for expansion.

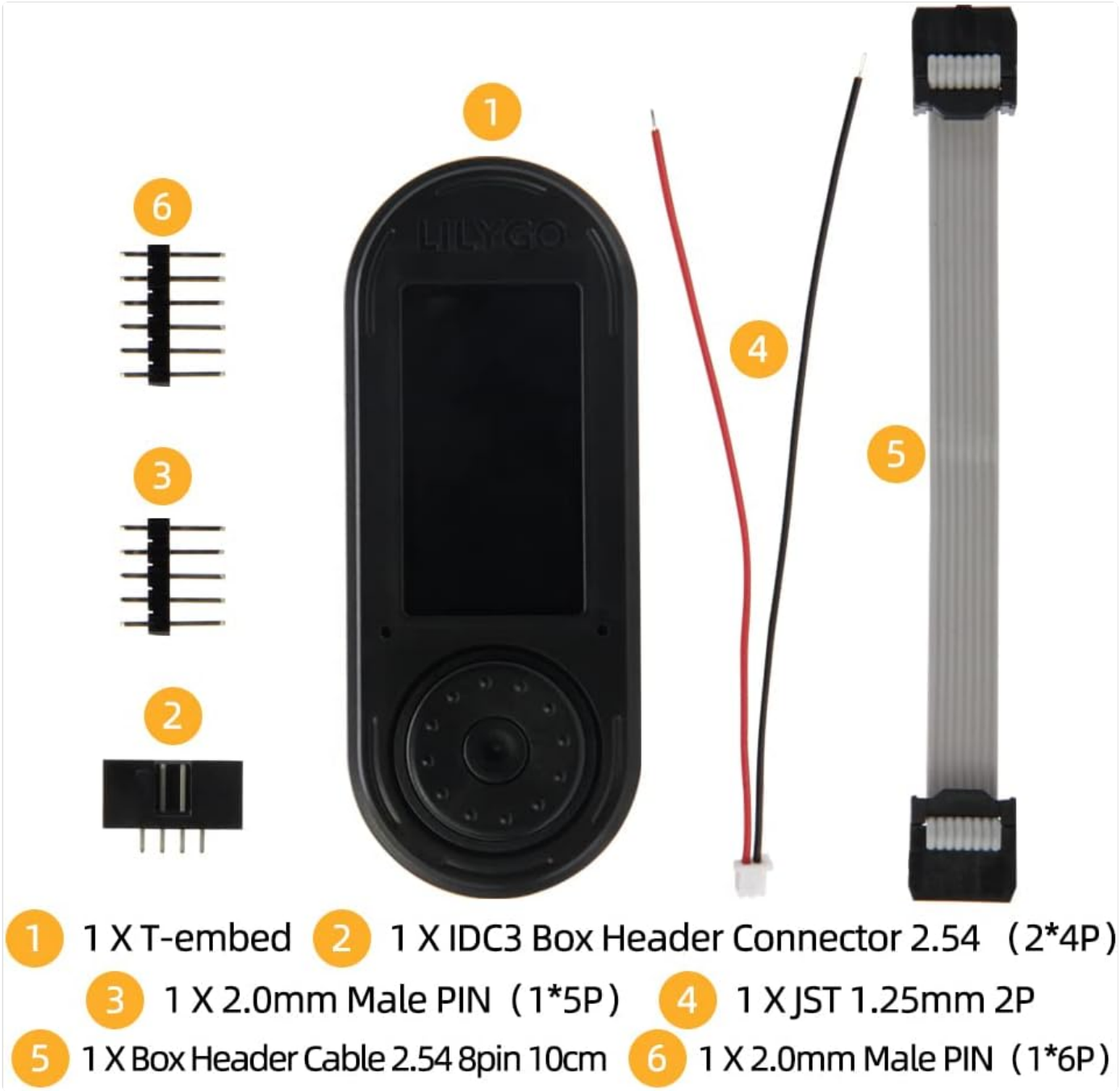


Figure 3.1: All components included with the LILYGO T-Embed, showing the main board and various accessories.



Figure 3.2: Detailed view of the LILYGO T-Embed's internal circuit board and integrated components.

4. Setup and Getting Started

To begin using your LILYGO T-Embed, ensure it is fully charged via the Type-C USB port. For initial setup, connect the device to a power source. The device is designed to be integrated into custom enclosures, such as 3D-printed cases, for a seamless fit.



Figure 4.1: The LILYGO T-Embed being integrated into a custom 3D printed enclosure, demonstrating its intended use in embedded projects.

5. Operating Instructions

The LILYGO T-Embed features a user-friendly interface navigated primarily through its rotary encoder and integrated buttons. The 1.9-inch IPS display provides clear visuals for various functions and settings.



Figure 5.1: A user interacting with the LILYGO T-Embed's interface, demonstrating navigation using the rotary encoder and viewing display settings.

Key functionalities include adjusting screen brightness, selecting different light modes for the RGB rings (e.g., Gradient, Rotate, Independent, White, Orange), and accessing various demo applications such as music playback and microphone FFT analysis. The device also supports Wi-Fi and Bluetooth connectivity for broader application possibilities.



Figure 5.2: The LILYGO T-Embed displaying red RGB lights, indicating a specific light mode or status.



Figure 5.3: The LILYGO T-Embed displaying purple RGB lights, showcasing another customizable lighting option.

6. Programming and Development

The LILYGO T-Embed is built around the powerful ESP32-S3 MCU, offering extensive capabilities for custom programming. It supports Wi-Fi 802.11 b/g/n and BLE 5 for wireless communication. Developers can utilize various platforms for programming, including Arduino IDE, ESP-IDF, and MicroPython.
Official documentation and source code are available on the LILYGO GitHub repositories:

- **T-Embed GitHub:** github.com/Xinyuan-LilyGO/T-Embed
- **T-Embed Shell Files:** github.com/Xinyuan-LilyGO/T-Embed/tree/main/Shell_file

The following video provides a comprehensive introduction to the T-Embed, including shell installation, function demonstrations, and guidance on setting up development environments like PlatformIO, Arduino, MicroPython, and ESP-IDF for burning firmware.

Video 6.1: Product Introduction of T-Embed. This video covers detailed steps for shell installation, function demonstrations, and setting up various programming environments (PlatformIO, Arduino, MicroPython, ESP-IDF) for firmware burning.

7. Maintenance and Care

To ensure the longevity and optimal performance of your LILYGO T-Embed, follow these maintenance guidelines:

- Keep the device dry and away from moisture.
- Avoid exposing the device to extreme temperatures (both high and low).
- Handle the device with care to prevent physical damage to the screen or internal components.
- Regularly check for firmware updates on the official GitHub repository to ensure you have the latest features and bug fixes.
- Clean the device with a soft, dry cloth. Avoid using harsh chemicals or abrasive materials.

8. Troubleshooting

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

- **Device not powering on:** Ensure the device is fully charged. Check the Type-C USB cable and power source.
- **Display issues:** Verify that the display cable is securely connected. If the screen remains blank or shows artifacts, try reflashing the firmware.
- **Connectivity problems (Wi-Fi/Bluetooth):** Ensure correct network credentials are entered. Check for interference from other devices.
- **Firmware upload failures:** Verify that the correct drivers are installed for your operating system. Ensure the device is in bootloader mode if required by your chosen programming environment.
- **Unexpected behavior:** Try resetting the device by pressing the reset button. If the issue persists, consider reflashing the latest stable firmware.

For more detailed troubleshooting guides and community support, refer to the official LILYGO GitHub repositories and forums.

9. Technical Specifications

Feature	Specification
Model	T-Embed ESP32-S3
Processor	ESP32-S3 (Atom, ARM Processor Brand)
Display	1.9-inch IPS Color TFT LCD (ST7789 model)
Wireless Connectivity	Wi-Fi 802.11 b/g/n, BLE 5 (Bluetooth)
Memory Storage Capacity	16 MB
Operating System	FreeRTOS
Connectivity Technology	Type-C USB, GPIO
Item Weight	2.39 ounces
Product Dimensions (LxWxH)	3.78 x 1.54 x 0.43 inches

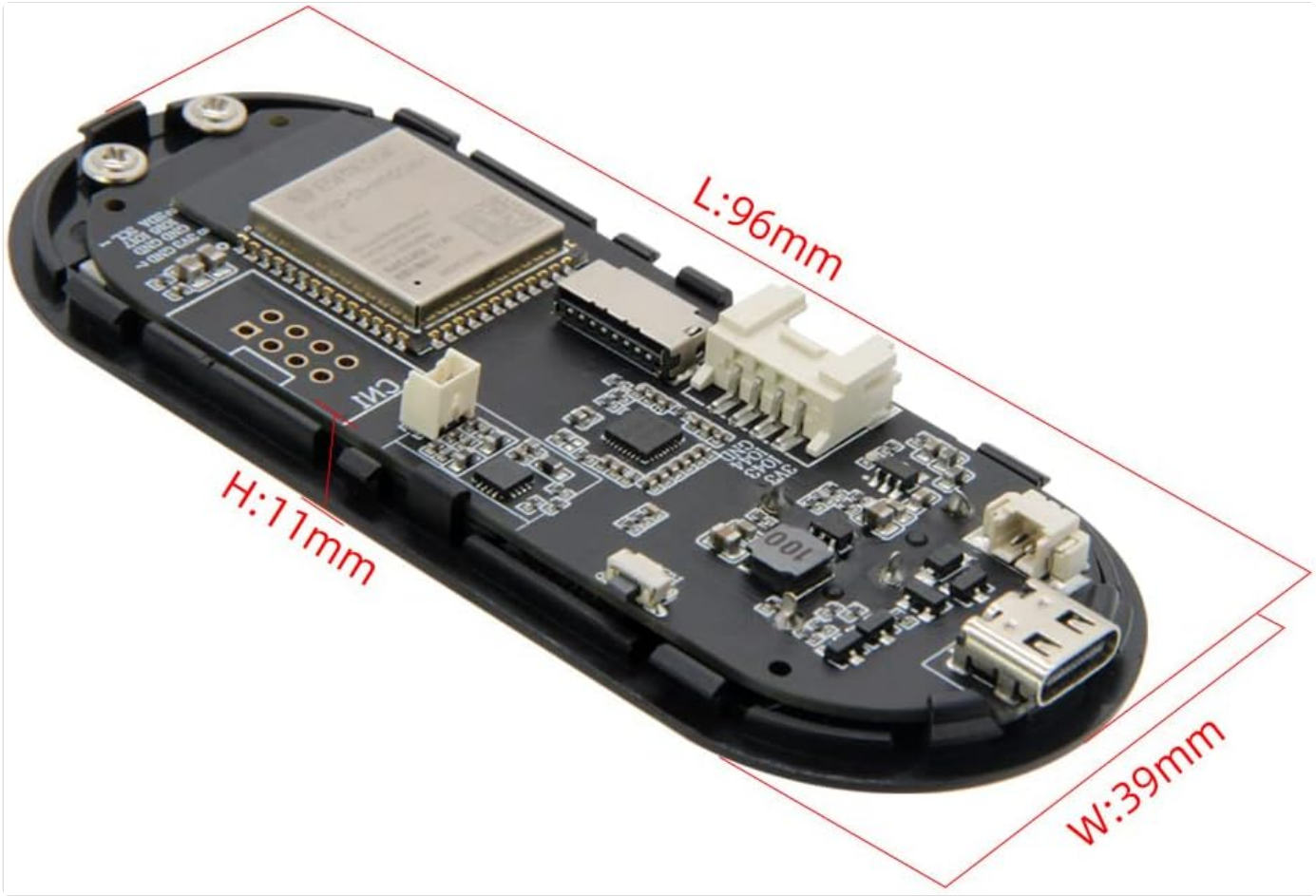


Figure 9.1: Detailed dimensions of the LILYGO T-Embed device.

10. Warranty and Support

LILYGO products are manufactured with high-quality standards. For warranty information and support, please refer to the official LILYGO website or contact their customer service. Technical support and resources, including firmware updates and community forums, are primarily available through the LILYGO GitHub repositories.
For further assistance, please visit the LILYGO Store on Amazon or the official GitHub pages linked in this manual.

Ask a question about this manual

Ask about setup, troubleshooting, compatibility, parts, safety, or missing instructions. Manuals+ will review the question and use this page's manual context to help answer it.

Name

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After a successful submission, we securely hash the supplied account or form email before sending it to Microsoft Advertising for conversion attribution. Privacy details.

Question

Example: How do I reset this device or fix this error?

Details

Model number, symptoms, what you tried, or the section of the manual you are using.

Submit question