LILYGO LoRa32

LILYGO LoRa32 915Mhz ESP32 Development Board

USER MANUAL

1. Introduction

This manual provides essential information for the setup, operation, and maintenance of your LILYGO LoRa32 915Mhz ESP32 Development Board. This versatile module integrates an ESP32 microcontroller with LoRa, OLED display, SD card support, Bluetooth Low Energy (BLE), and WiFi capabilities, making it suitable for a wide range of IoT and communication projects.

2. Key Features

- Integrated ESP32 MCU for powerful processing.
- LoRa communication module (915Mhz) for long-range, low-power wireless data transmission.
- 0.96 inch OLED display for real-time data visualization.
- SD card slot for local data storage.
- Built-in Bluetooth Low Energy (BLE) and WiFi connectivity.
- SMA antenna connector for enhanced signal transmission.
- TP4054 for battery charging management.
- Optimized power switch interaction mode.
- Supports Paxcounter applications for mobile device metering.
- Flexible data transmission options: local SD-card, LoRaWAN, MQTT over TCP/IP, or serial (SPI).

3. What's in the Box

- 1 x LILYGO T3 LoRa Development Board
- 1 x SMA Antenna
- 2 x Pin Headers
- 1 x Battery Cable

Figure 3.1: Included components with the LILYGO LoRa32 Development Board.

4. Product Overview
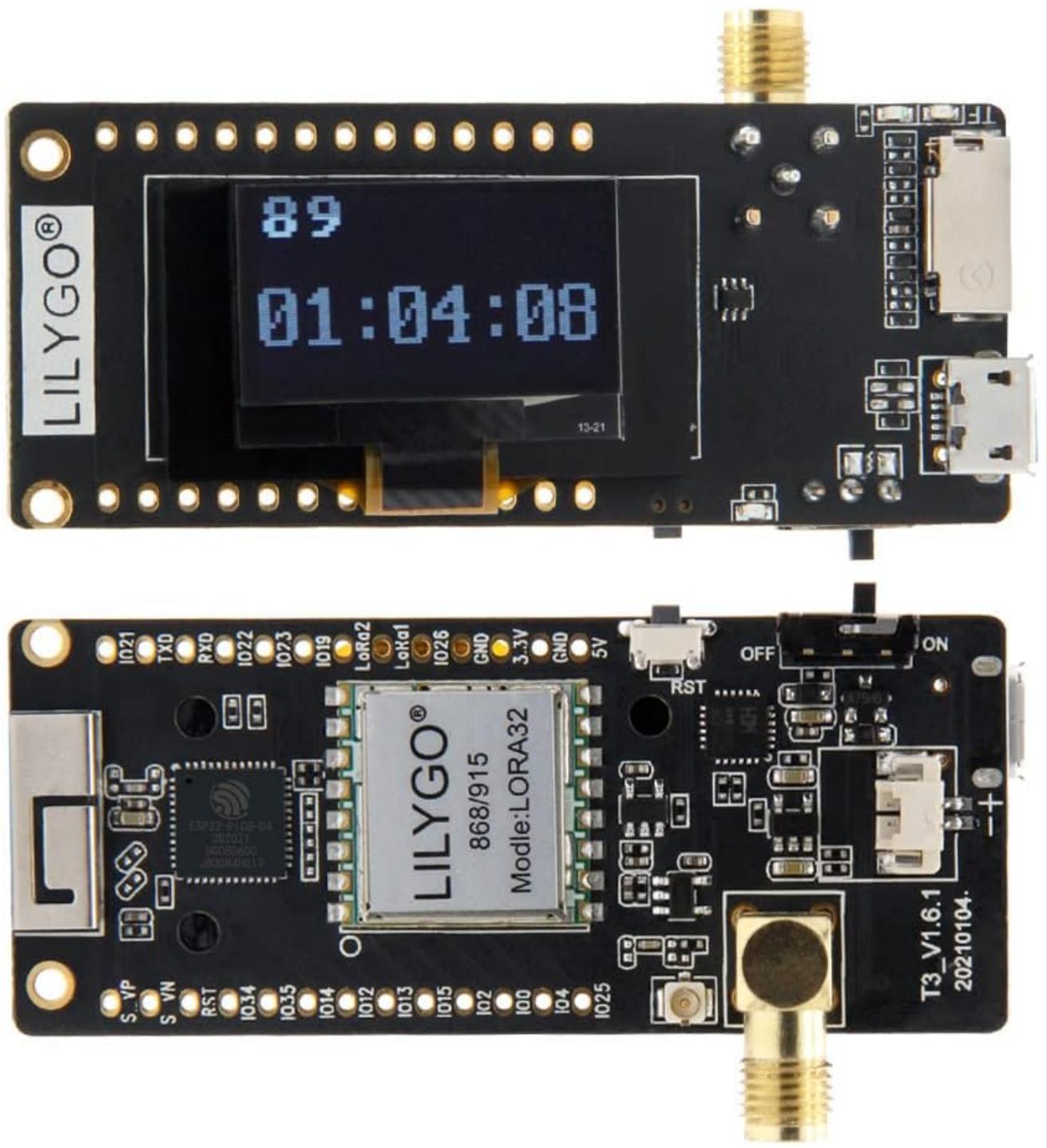
Figure 4.1: Top and bottom view of the LILYGO LoRa32 Development Board.
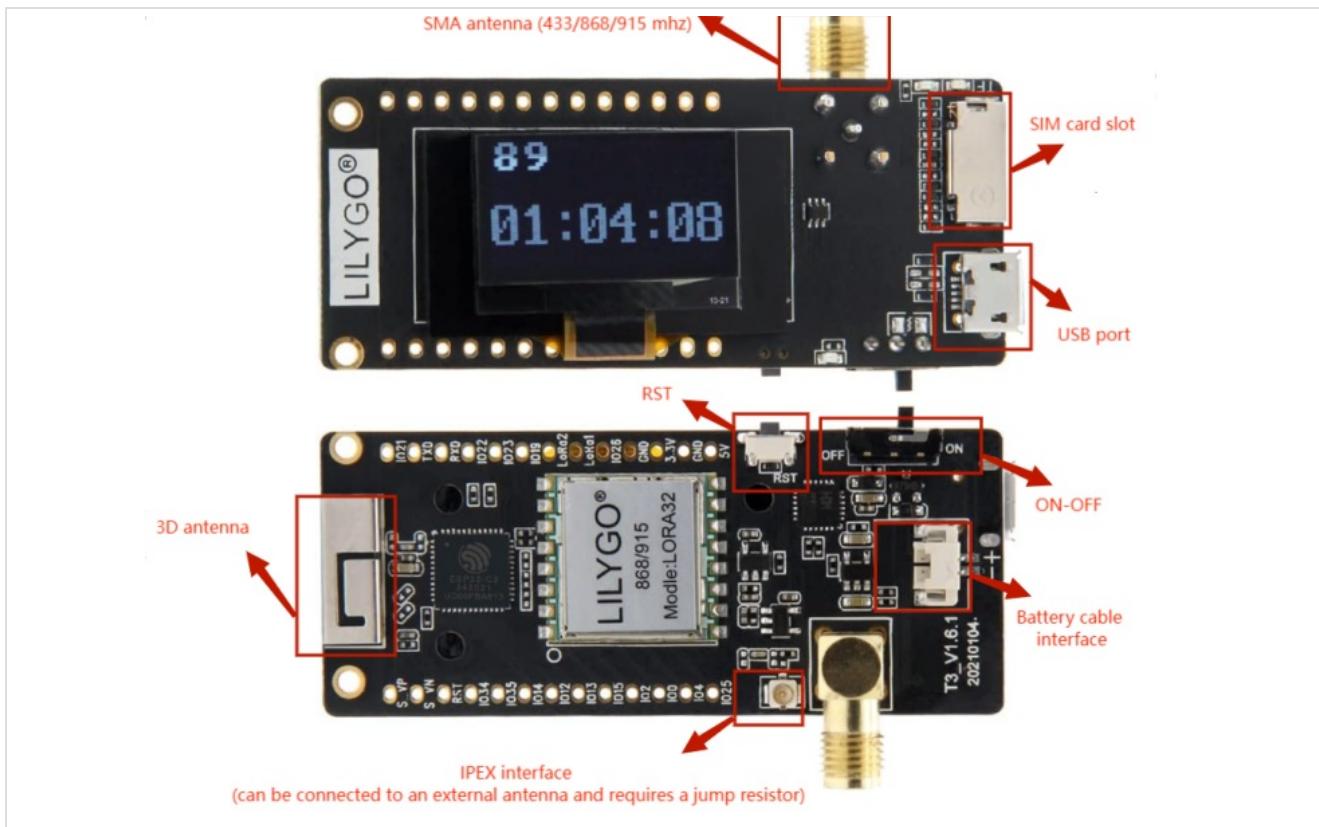
Figure 4.2: Component identification on the LILYGO LoRa32 board.
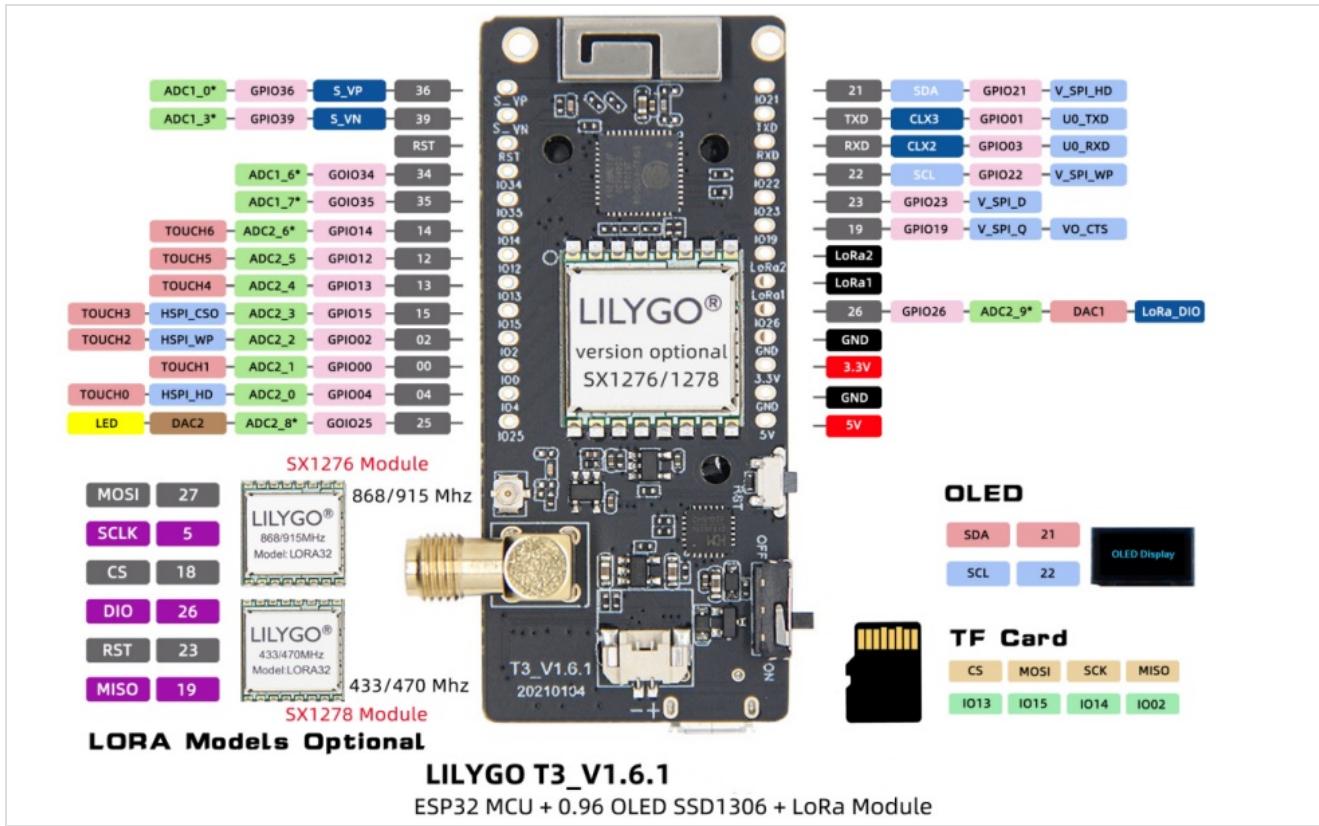
Figure 4.3: Pinout diagram of the LILYGO LoRa32 T3 V1.6.1 board.

5. Specifications
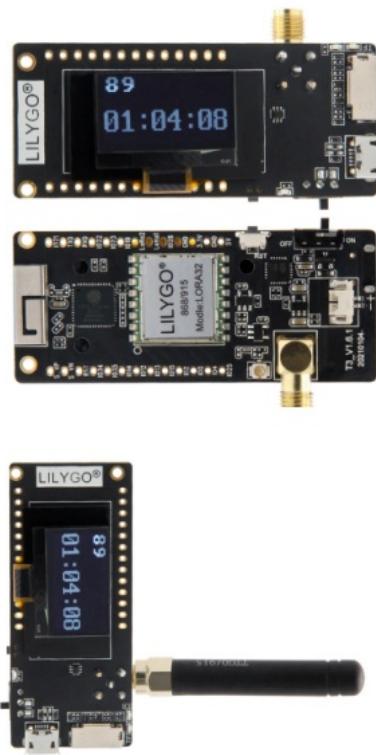
Figure 5.1: Detailed technical specifications.

General Specifications

Feature	Detail
Brand	LILYGO
Model Name	LoRa32
Item Model Number	LoRa32
Processor	ESP32 (915 MHz)
RAM	LPDDR
Screen Display Size	0.96 Inches
Screen Resolution	OLED (128x64)
Wireless Type	Bluetooth, Wi-Fi
Item Weight	1.13 ounces
Product Dimensions	1.97 x 3.15 x 1.57 inches
Operating System	Mac OS (compatible, typically programmed via Arduino IDE/PlatformIO)

6. Setup

Initial setup of the LILYGO LoRa32 board typically involves installing necessary drivers and development environments on your computer. The board is commonly programmed using the Arduino IDE or PlatformIO with ESP32 board support.

1. **Install USB Drivers:** Connect the board to your computer via a micro USB cable. Depending on your

operating system, you may need to install CP210x USB to UART Bridge VCP Drivers.

2. **Prepare Development Environment:** Install the Arduino IDE or PlatformIO. Add ESP32 board support to your chosen IDE.

3. **Install Libraries:** Install necessary libraries for LoRa, OLED display (e.g., U8g2 library), and SD card functionality.

4. **Connect Antenna:** Securely attach the provided SMA antenna to the SMA connector on the board. Ensure it is finger-tight to prevent signal loss.

5. **Power Supply:** The board can be powered via the micro USB port or a 3.7V LiPo battery connected to the battery cable interface. Use the ON-OFF switch to control power when using a battery.

For detailed programming guides and example code, refer to the official LILYGO GitHub repository: github.com/Xinyuan-LilyGO/LilyGo-LoRa-Series.

7. Operating

Once programmed, the LILYGO LoRa32 board can perform various functions based on the uploaded firmware. Common applications include:

- **LoRa Communication:** Send and receive data over long distances using the LoRa module. Ensure your LoRa frequency matches local regulations (e.g., 915Mhz for North America).

- **OLED Display:** Information can be displayed on the 0.96 inch OLED screen, such as sensor readings, status messages, or time.

- **SD Card Usage:** Log data to a micro SD card inserted into the slot. This is useful for data logging applications where continuous connectivity is not required.

- **WiFi and BLE:** Utilize the ESP32's built-in WiFi for internet connectivity or local network communication, and BLE for short-range device pairing.

- **Paxcounter Functionality:** The board can be configured as a Paxcounter to detect and count mobile devices in its vicinity, providing an estimation of people density. Data can be transmitted to a cloud service or stored locally.

Your browser does not support the video tag.

Video 7.1: Demonstration of the LILYGO TTGO LoRa32 V2.1_1.6 Version 915Mhz ESP32 LoRa Module in operation, showcasing its display and general functionality.

Figure 7.2: Paxcounter application examples and data visualization.

8. Maintenance

To ensure the longevity and optimal performance of your LILYGO LoRa32 Development Board, follow these maintenance guidelines:

- **Handle with Care:** The board contains sensitive electronic components. Avoid dropping it or subjecting it to physical shock.
- **Keep Dry:** Protect the board from moisture and humidity. Do not operate it in wet environments.
- **Clean Gently:** If cleaning is necessary, use a soft, dry cloth. Avoid using liquids or abrasive cleaners.
- **Proper Storage:** When not in use, store the board in an anti-static bag or a protective enclosure to prevent dust accumulation and electrostatic discharge.
- **Antenna Care:** Ensure the antenna connection is secure but do not overtighten. Avoid bending or damaging the antenna.

9. Troubleshooting

If you encounter issues with your LILYGO LoRa32 Development Board, consider the following troubleshooting steps:

- **Board Not Powering On:**
  - Check USB cable connection and power source.
  - If using a battery, ensure it is charged and correctly connected, and the ON-OFF switch is in the 'ON' position.

- **Upload Errors:**
  - Verify that the correct board (e.g., ESP32 Dev Module) and COM port are selected in your IDE.
  - Ensure USB drivers are correctly installed.

- Try holding down the 'BOOT' button while uploading, then releasing it after the upload starts.

- **OLED Display Not Working:**

  - Check your code for correct OLED initialization and I2C address.
  - Ensure the OLED library is correctly installed and configured.

- **LoRa Communication Issues:**

  - Verify the antenna is securely attached.
  - Check LoRa frequency settings in your code to match your region.
  - Ensure LoRa library is correctly implemented.

- **SD Card Not Detected:**

  - Ensure the SD card is properly inserted.
  - Check your code for correct SD card initialization and SPI pin assignments.
  - Try a different SD card to rule out card issues.

For more specific issues or advanced troubleshooting, consult the LILYGO community forums or the GitHub repository for known issues and solutions.

10. Warranty and Support

For warranty information and technical support regarding your LILYGO LoRa32 Development Board, please refer to the official LILYGO store or contact their customer service directly. The LILYGO brand is committed to providing quality products and support for their development boards.
Visit the LILYGO Store: LILYGO Store on Amazon