LILYGO LoRa32 V2.1_1.6.1

LILYGO ESP32 LoRa32 V2.1_1.6.1 915Mhz Wireless Module User Manual

1. Introduction

The LILYGO ESP32 LoRa32 V2.1_1.6.1 915Mhz Wireless Module is a versatile development board designed for wireless communication projects, particularly those requiring long-range, low-power capabilities. It integrates an ESP32 microcontroller with a LoRa radio module, an OLED display, and a battery management circuit (TP4054), making it suitable for various IoT and disaster communication applications. This manual provides essential information for setting up, operating, and maintaining your module.

2. Key Features

- Integrated ESP32 microcontroller for Wi-Fi and Bluetooth connectivity.
- LoRa radio module (915Mhz) for long-range, low-power wireless communication.
- Onboard SMA antenna connector for enhanced signal transmission.
- TP4054 battery charging and protection circuit.
- Compact design suitable for embedded projects.
- Open-source hardware and software support.

3. Package Contents

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

- LILYGO ESP32 LoRa32 V2.1_1.6.1 Wireless Module
- External LoRa Antenna
- Pin Headers (2x 18-pin strips)
- Power Connection Wires (Red and Black)

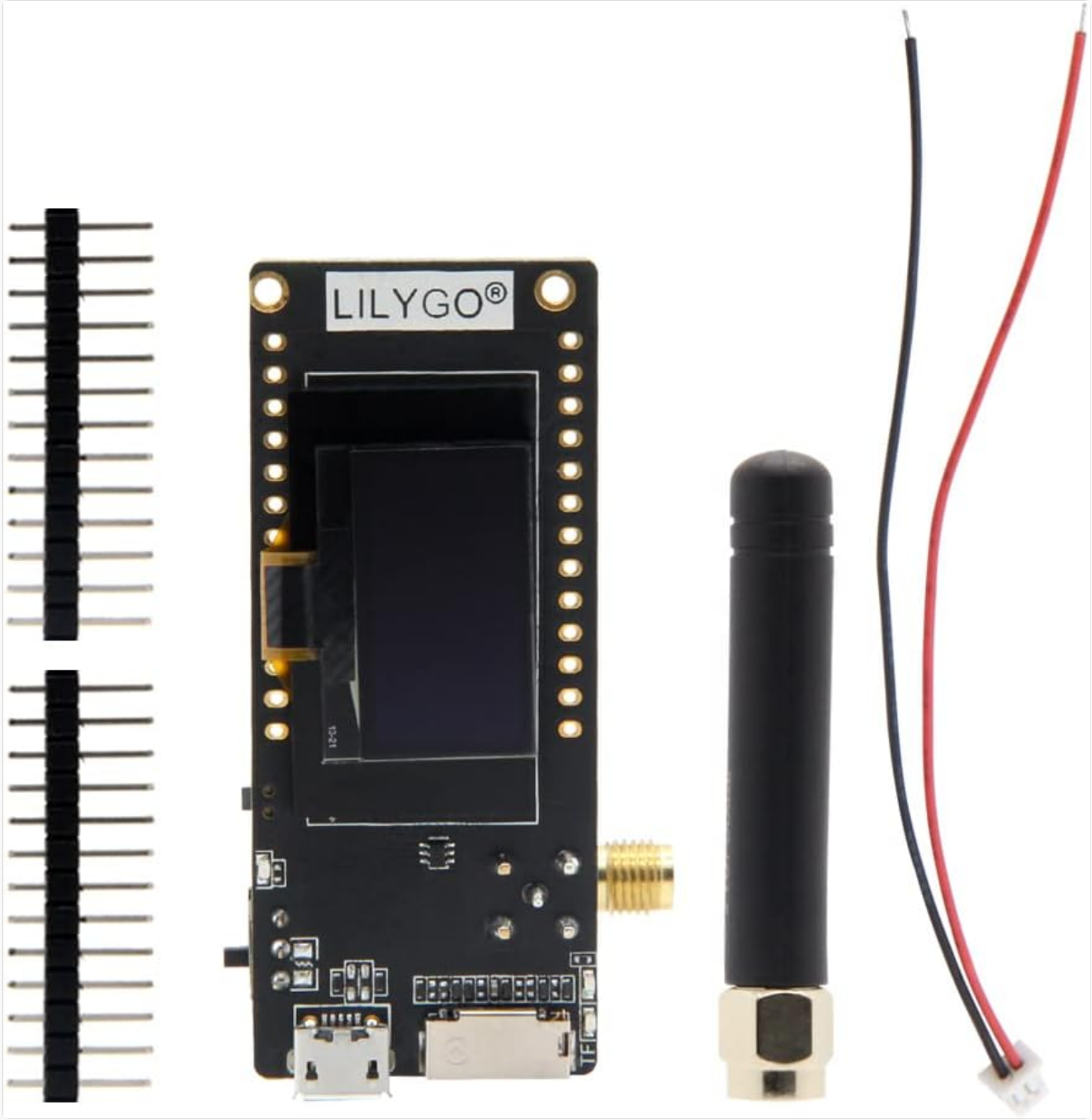

Figure 3.1: This image shows the LILYGO ESP32 LoRa32 V2.1_1.6.1 module alongside its included accessories: two strips of pin headers, the external LoRa antenna, and two power connection wires (red and black).

4. Product Overview

Familiarize yourself with the physical layout and dimensions of the module.

Figure 4.1: This image displays the LILYGO ESP32 LoRa32 V2.1_1.6.1 wireless module with its antenna connected, showing its approximate dimensions: width 2.7cm and height 6.4cm. The module features an integrated OLED display and various pin headers.

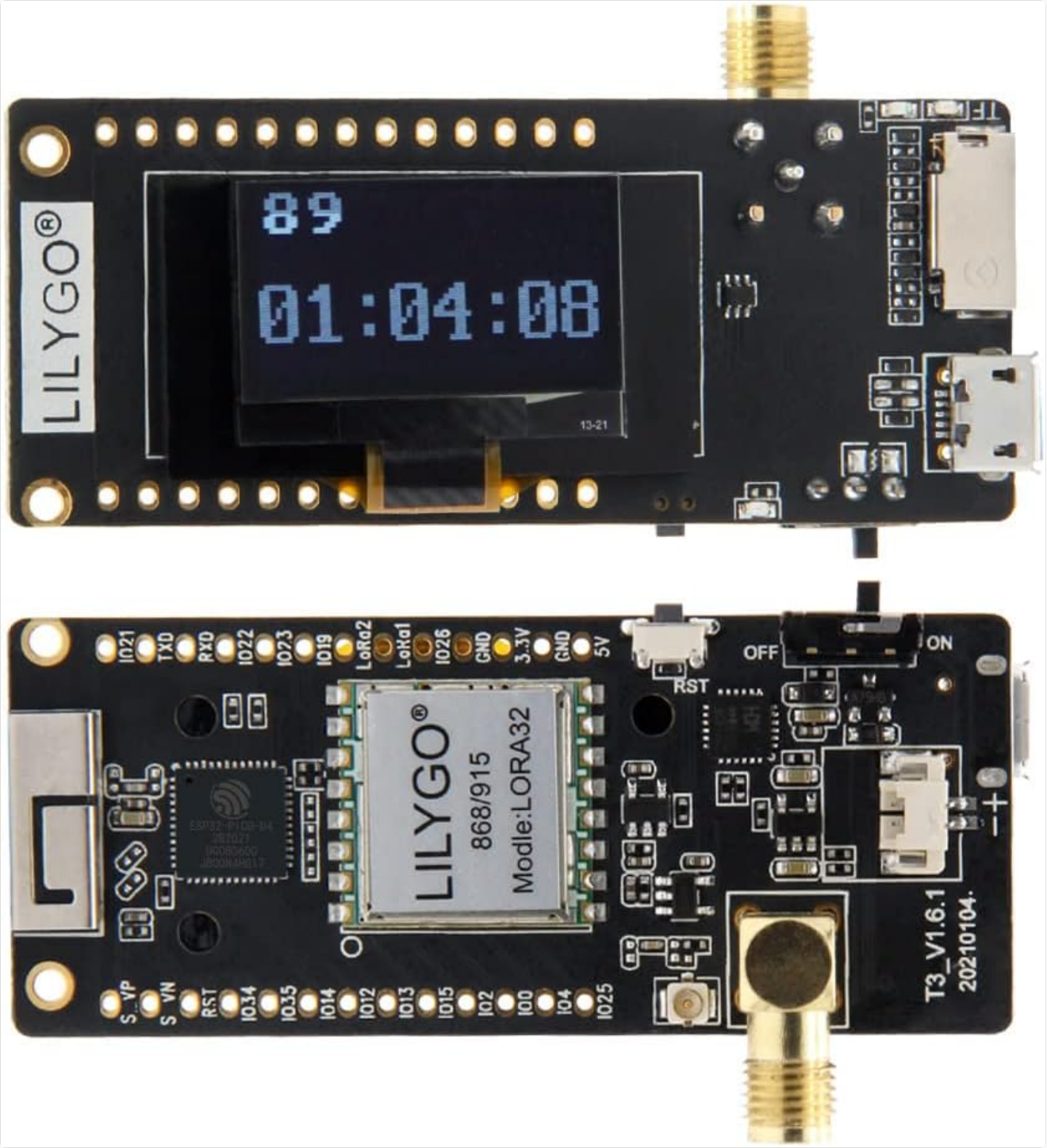

Figure 4.2: This image provides a dual view of the LILYGO ESP32 LoRa32 V2.1_1.6.1 module. The top panel shows the integrated OLED display, while the bottom panel reveals the ESP32 chip, LoRa module, and various components, including the antenna connector and power switch.

4.1 Pinout Diagram

Understanding the pinout is crucial for connecting external components and programming the module.

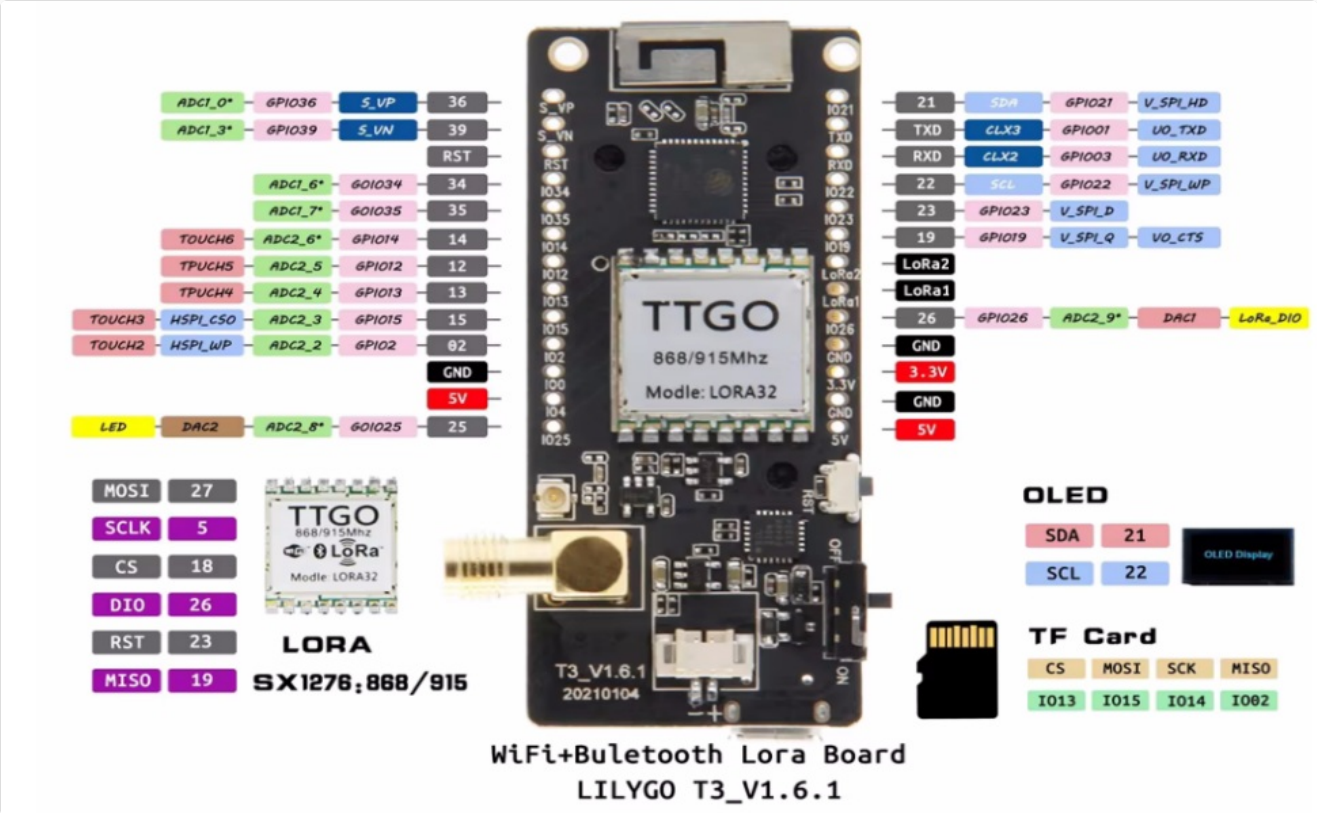

Figure 4.3: This diagram illustrates the pinout configuration for the LILYGO ESP32 LoRa32 V2.1_1.6.1 module (TTGO T3_V1.6.1). It labels various GPIO pins, power pins (3.3V, 5V, GND), LoRa connections (SX1276/88/915), OLED display pins (SDA, SCL), and TF Card interface pins (CS, MOSI, SCK, MISO, IO02).

5. Setup Instructions

Follow these steps for initial setup of your LILYGO ESP32 LoRa32 module:

1. **Attach Antenna:** Carefully screw the provided LoRa antenna onto the SMA connector on the module. Ensure it is finger-tight to avoid damage.
2. **Connect Power:** The module can be powered via the micro-USB port or through the battery connector. If using a battery, connect it to the JST connector. The TP4054 circuit will manage charging.
3. **Install Pin Headers (Optional):** If you plan to use the module on a breadboard or with custom wiring, solder the included pin headers to the designated holes on the board.
4. **Connect to Computer:** Use a micro-USB cable to connect the module to your computer for programming and serial communication.
5. **Install Drivers:** Depending on your operating system, you may need to install CP2104 or CH9102X USB-to-Serial drivers. Refer to the official ESP32 documentation for driver installation.
6. **Prepare Development Environment:** Set up your preferred ESP32 development environment (e.g., Arduino IDE with ESP32 board support, PlatformIO, ESP-IDF).

6. Operating Instructions

The LILYGO ESP32 LoRa32 module operates based on the firmware loaded onto its ESP32 microcontroller. The following outlines general operational guidelines:

1. **Power On:** Slide the power switch to the 'ON' position. The integrated OLED display should illuminate, indicating power.
2. **Firmware Upload:** Use your development environment to compile and upload your desired firmware to the

module via the micro-USB connection. Ensure the correct board and COM port are selected.

3. **LoRa Communication:** Implement LoRa communication protocols within your firmware to send and receive data wirelessly. The 915Mhz frequency band is used for this module.
4. **OLED Display Usage:** Utilize the OLED display to show status information, sensor readings, or messages as programmed in your firmware.
5. **Battery Management:** If a battery is connected, the TP4054 circuit will manage charging when the module is powered via USB. Monitor battery levels through your firmware if desired.

For detailed programming examples and community support, refer to the official LILYGO GitHub repository: github.com/Xinyuan-LilyGo/TTGO-LoRa-Series.

7. Maintenance

Proper care and maintenance will ensure the longevity and reliable operation of your module:

- **Keep Dry:** Avoid exposing the module to moisture or liquids.
- **Handle with Care:** Electronic components are sensitive. Avoid dropping the module or applying excessive force.
- **Clean Gently:** If cleaning is necessary, use a soft, dry cloth. Do not use harsh chemicals or abrasive materials.
- **Store Properly:** When not in use, store the module in an anti-static bag or its original protective casing to prevent static discharge and physical damage.
- **Antenna Connection:** Ensure the antenna is securely connected during operation to prevent damage to the LoRa radio.

8. Troubleshooting

If you encounter issues with your module, consider the following troubleshooting steps:

- **Module Not Powering On:**
  - Check if the power switch is in the 'ON' position.
  - Ensure the USB cable is properly connected and providing power, or that the battery is charged and correctly connected.
- **Unable to Upload Firmware:**
  - Verify that the correct board (e.g., ESP32 Dev Module) and COM port are selected in your IDE.
  - Ensure USB-to-Serial drivers are installed correctly.
  - Try pressing the 'BOOT' button (if available) while uploading, then the 'RST' button after upload starts.
- **No LoRa Communication:**
  - Confirm the antenna is securely attached.
  - Check your firmware for correct LoRa library usage and frequency settings (915Mhz).
  - Ensure both transmitting and receiving modules are within range and configured correctly.
- **OLED Display Not Working:**
  - Verify that the OLED is enabled and initialized correctly in your firmware.
  - Check for any physical damage to the display or its connection.

If issues persist, consult the LILYGO community forums or the GitHub repository for further assistance.

9. Technical Specifications

Feature	Specification
Brand	LILYGO
Model Name	LoRa32 V2.1
CPU Manufacturer	Espressif
Operating System	FreeRTOS
Connectivity Technology	LoRaWAN, RF, Wi-Fi, Bluetooth
Wireless Type	Radio Frequency
RAM	LPDDR4 (ESP32 internal)
Number of Processors	1 (Dual-core ESP32)
Date First Available	November 18, 2024

10. Warranty and Support

For warranty information and technical support, please refer to the official LILYGO website or contact the seller directly. If you have any questions or suggestions about the product, please feel free to contact us. We will answer your question as soon as possible.