DIYmalls ESP32 LoRa 32 V3

DIYmalls ESP32 LoRa 32 V3 915MHz LoRa Antenna User Manual

Model: ESP32 LoRa 32 V3

1. Introduction

This manual provides detailed instructions for the setup, operation, and maintenance of the DIYmalls ESP32 LoRa 32 V3 development board, which includes an integrated 915MHz LoRa antenna. This board is designed for Internet of Things (IoT) applications, offering Wi-Fi, Bluetooth, and LoRa wireless communication capabilities, making it suitable for various projects requiring long-range, low-power data transmission.

2. Product Overview

The ESP32 LoRa 32 V3 board integrates an ESP32-S3FN8 chip, a LoRa SX1262 transceiver, and a 0.96-inch OLED display. It features a Type-C USB port for power and programming, a 2-pin 1.25mm battery connector for portable applications, and an IPEX port for connecting the external LoRa antenna.

Image 2.1: Labeled components of the ESP32 LoRa 32 V3 board. Key components include the LoRa antenna IPEX port, 0.96" OLED I2C display, power indicator, signal indicator, reset button, 2p 1.25mm battery connector, WiFi antenna, ESP32 chip, Type-C port, programming/user button, CP2102 USB to serial chip, and the V3 version marking.

Key Components:

- **ESP32-S3FN8 Chip:** The main microcontroller providing Wi-Fi and Bluetooth connectivity.
- **LoRa SX1262 Chip:** Enables long-range, low-power LoRa communication.
- **0.96" OLED I2C Display:** For displaying information such as network scans, sensor data, or status messages.
- **Type-C Port:** Used for power supply, data communication, and programming.
- **2p 1.25mm Battery Connector:** Allows connection of a 3.7V Lithium battery for portable use.
- **LoRa Antenna IPEX Port:** Connects the external 915MHz LoRa antenna.
- **WiFi Antenna:** Integrated antenna for Wi-Fi and Bluetooth communication.
- **CP2102 USB to Serial Chip:** Facilitates communication between the ESP32 and a computer via the USB-C

port for programming and debugging.

- **Reset Button:** Resets the ESP32 microcontroller.
- **Programming/User Button:** Can be used for entering bootloader mode or as a general-purpose user input.

3. Specifications

The following table details the technical specifications of the ESP32 LoRa 32 V3 board:

Image 3.1: Detailed specifications for the WiFi LoRa 32 V3 board, including resource parameters, electrical features, and power consumption.

ESP32 LoRa 32 V3 Technical Specifications

Feature	Parameter
Master Chip	ESP32-S3FN8 (X tensa 32-bit LX7 dual-core processor)
LoRa Chip	SX1262
Max. TX Power	20dB - 22dBm
Max. RX Sensitivity	-139dBm
Hardware Resource	7*ADC1+2*ADC2, 7*Touch, 3*UART, 2*I2C, 2*SPI etc
Memory	384KB ROM, 512KB SRAM, 16KB RTC SRAM, 8MB Flash
Interface	Type-C USB, 2*1.25 Lithium battery port, LoRa ANT(IPEX1.0), 2*2.54mm Header Pin*18
USB to Serial Chip	CP2102x 2102
Battery (Not included)	3.7V Lithium (1.25mm X 2 socket) battery power supply and charging
Display Size	0.96 inch OLED

Electrical Features and Power Consumption:

Condition	Min	Typical	Max
Power Supply			
Type-C USB powered (≥500mA)	4.7V	5V	6V
Lithium powered (≥250mA)	3.3V	3.7V	4.2V
3.3V(pin) powered (≥150mA)	2.7V	3.3V	3.5V
5V(pin) powered (≥500mA)	4.7V	5V	6V
Power Consumption (mA)			
WiFi Scan (USB powered)			115mA
WiFi AP (USB powered)			150mA

Condition	Min	Typical	Max
BT (USB powered)			150mA
Sleep (USB powered)			2mA
Sleep (VBAT/battery powered)			15uA
Sleep (3.3V header powered)			10uA
Output			
3.3V pin output			500mA
5V pin output (USB powered only)			500mA
Vext Pin			350mA

4. Setup

Follow these steps to set up your ESP32 LoRa 32 V3 board:

1. **Connect the LoRa Antenna:** Carefully connect the provided 915MHz LoRa antenna to the IPEX port on the board. Ensure a secure connection to maximize LoRa performance.
2. **Power Supply:**
    - **USB Power:** Connect the board to your computer or a 5V USB power adapter using a Type-C USB cable. The power indicator LED should illuminate.
    - **Battery Power (Optional):** If using a 3.7V Lithium battery, connect it to the 2-pin 1.25mm battery connector. Ensure correct polarity. The board includes battery charging circuitry when powered via USB.
3. **Driver Installation:** If connecting to a computer for the first time, you may need to install the CP2102 USB to Serial driver. These drivers are typically available from Silicon Labs' official website.
4. **Development Environment Setup:** Install the Arduino IDE or PlatformIO. Add the ESP32 board support package to your chosen IDE. Refer to the official ESP32 documentation for detailed instructions on setting up the development environment.
5. **Upload Firmware:** Connect the board to your computer via the Type-C USB cable. Select the correct board and COM port in your IDE. Upload your desired firmware or example sketches to begin using the board.

5. Operating

Once the board is powered and programmed, you can begin operating it for your specific application. The 0.96-inch OLED display provides visual feedback and can be programmed to show various data.

Image 5.1: The 0.96-inch OLED display showing a list of scanned Wi-Fi networks and their signal strengths, demonstrating the board's network scanning capability.

Basic Operation:

- **Power On:** Connect the USB-C cable or a charged battery. The power indicator LED will light up.
- **OLED Display:** The integrated OLED display will show information as programmed. This could include

network status, sensor readings, or LoRa communication logs.

- **LoRa Communication:** With appropriate firmware, the board can send and receive data over long distances using the LoRa protocol. Ensure the 915MHz antenna is properly connected for optimal range.
- **Wi-Fi and Bluetooth:** The ESP32 chip supports Wi-Fi and Bluetooth for local network connectivity or short-range communication with other devices.
- **User Button:** The programming/user button can be configured in your firmware to trigger specific actions or modes.

6. Dimensions

Understanding the physical dimensions of the board is important for enclosure design and integration into projects.

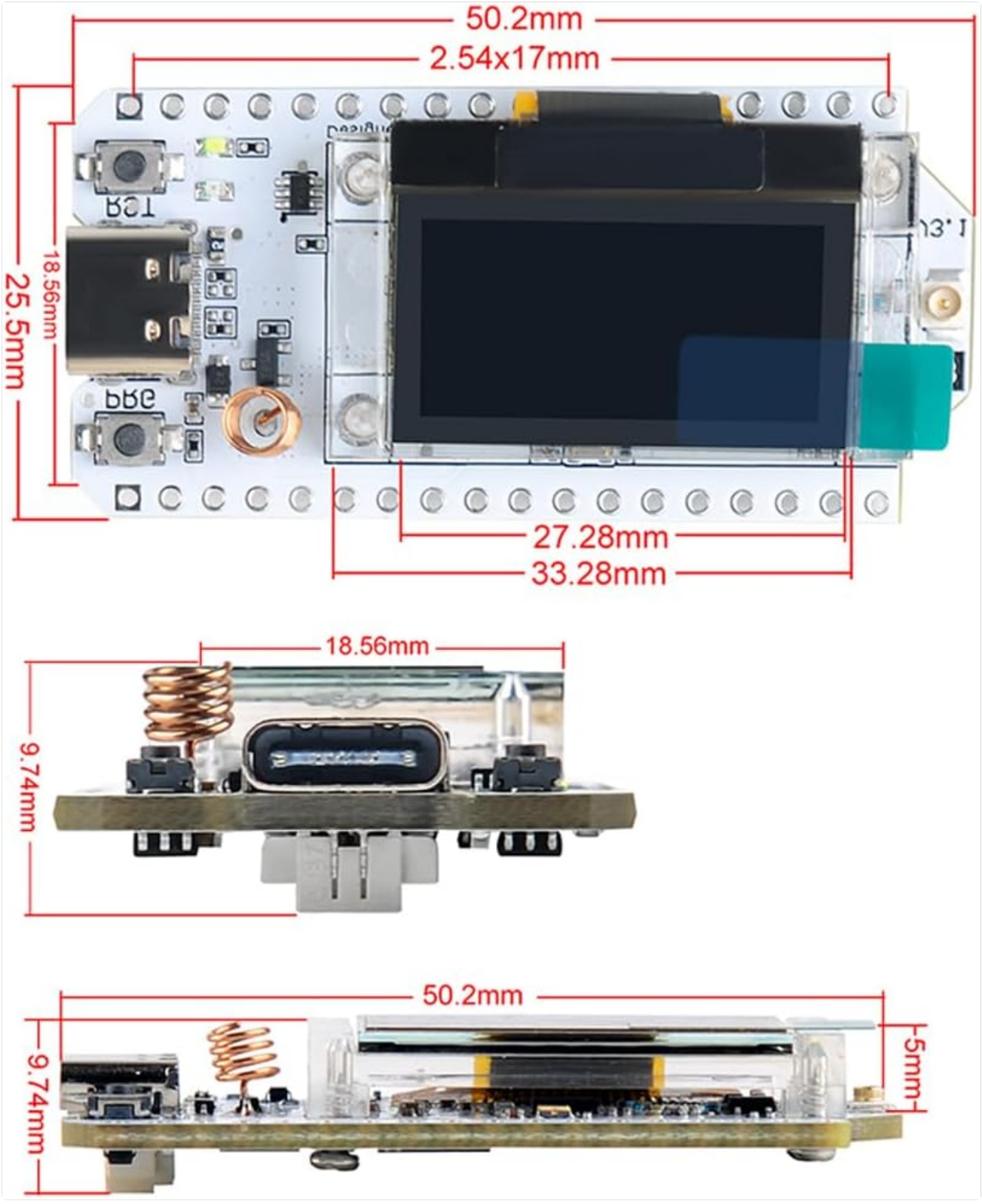


Image 6.1: Detailed dimensional drawing of the ESP32 LoRa 32 V3 board, showing measurements in millimeters for length, width, and component placement.

- **Overall Length:** Approximately 50.2mm
- **Overall Width:** Approximately 25.5mm
- **OLED Display Dimensions:** Approximately 33.28mm x 18.56mm (active area 27.28mm x 17mm)
- **Height (excluding pins):** Approximately 5mm

7. Performance Data

The ESP32 LoRa 32 V3 board undergoes testing to ensure optimal performance, particularly for its LoRa

capabilities. The following images illustrate typical test results for antenna performance.

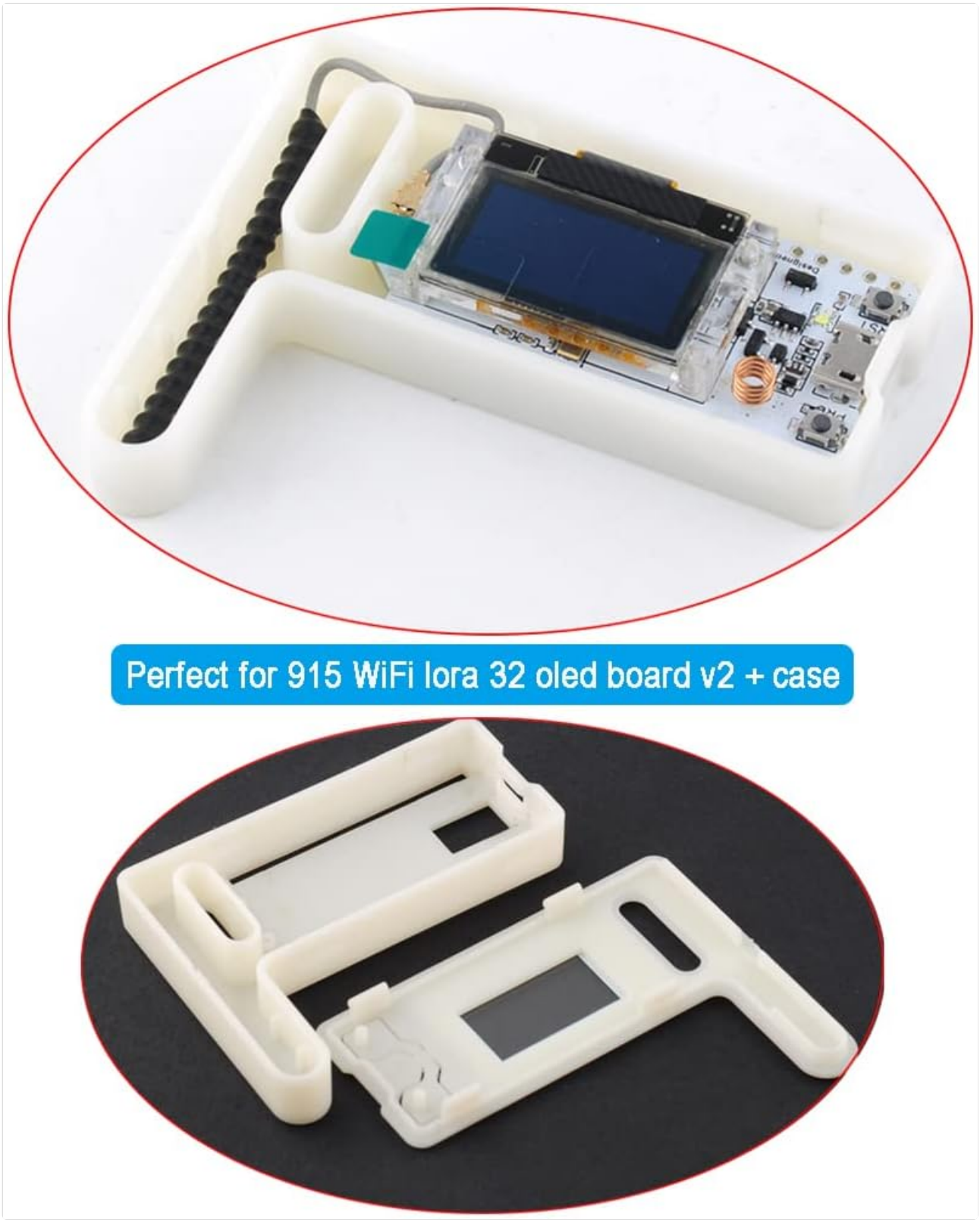


Image 7.1: A laboratory setup showing the ESP32 LoRa 32 V3 board connected to test equipment for antenna performance evaluation. The antenna is positioned for measurement.



Test Result

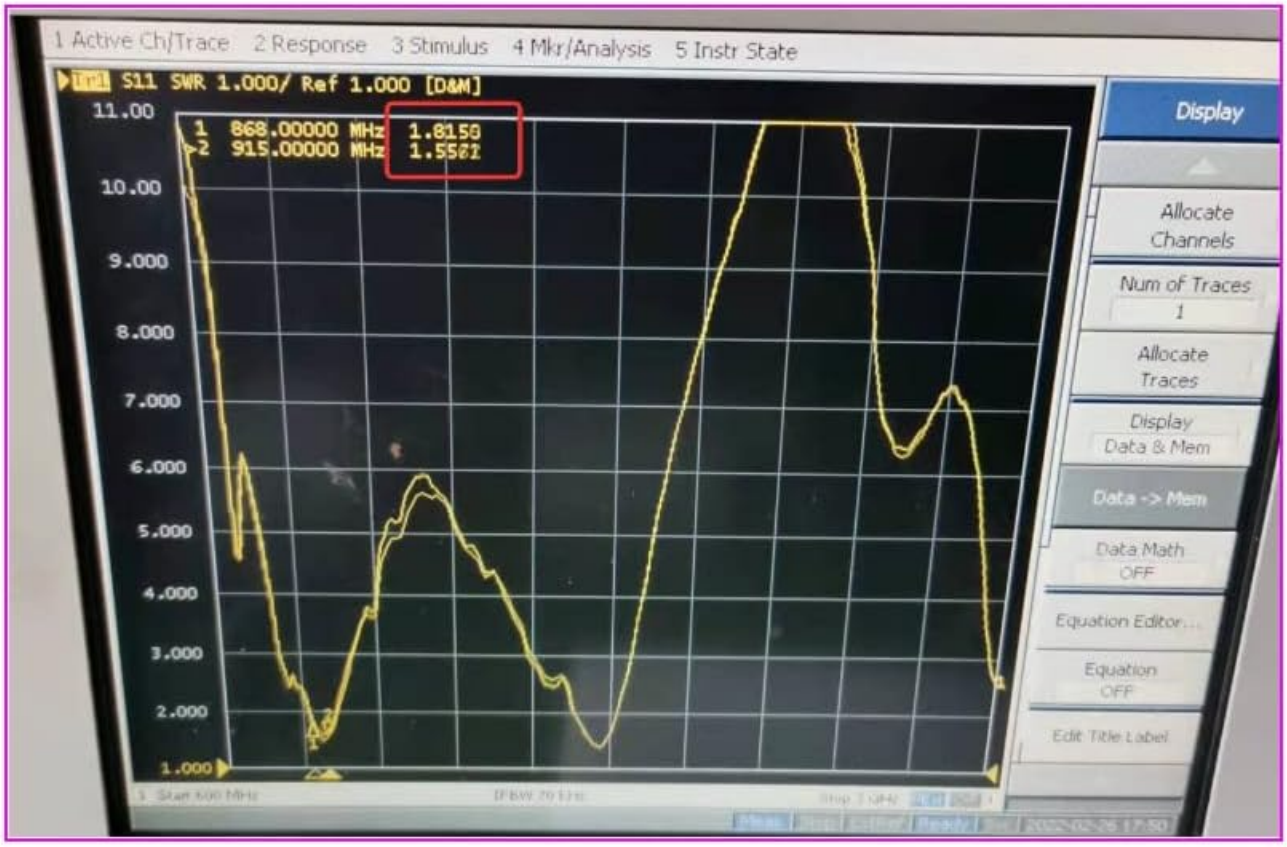


Image 7.2: A graph displaying the SWR (Standing Wave Ratio) test results for the 915MHz LoRa antenna. The graph indicates an SWR of 1.0150 at 868.0000 MHz and 1.0587 at 915.0000 MHz, demonstrating good impedance matching at the operating frequencies.

8. Maintenance

Proper care and maintenance will extend the lifespan of your ESP32 LoRa 32 V3 board:

- **Handle with Care:** Electronic components are sensitive. Avoid dropping the board or subjecting it to physical shock.
- **Static Discharge:** Always handle the board in a static-safe environment, especially when connecting or disconnecting components. Use an anti-static wrist strap if available.

- **Keep Dry:** Protect the board from moisture and liquids, which can cause short circuits and damage.
- **Cleanliness:** Keep the board free from dust and debris. Use a soft, dry brush or compressed air for cleaning. Avoid using liquid cleaners.
- **Temperature:** Operate and store the board within its specified temperature range to prevent damage.
- **Antenna Connection:** Ensure the LoRa antenna is securely connected to the IPEX port. Repeatedly connecting and disconnecting the antenna can wear out the connector.

9. Troubleshooting

If you encounter issues with your ESP32 LoRa 32 V3 board, consider the following troubleshooting steps:

- **Board Not Powering On:**
  - Check USB-C cable connection and power source.
  - If using battery, ensure it is charged and correctly connected.
- **No Display Output:**
  - Verify that the OLED display is correctly initialized in your firmware.
  - Check for any physical damage to the display or its connection.
- **Upload Errors:**
  - Ensure the correct board type and COM port are selected in your IDE.
  - Install or update the CP2102 USB to Serial driver.
  - Try pressing and holding the programming/user button while pressing the reset button, then releasing the reset button, then the programming button to enter bootloader mode before uploading.
- **Poor LoRa Range:**
  - Ensure the 915MHz LoRa antenna is securely connected to the IPEX port.
  - Verify that the antenna is the correct frequency (915MHz) for your region and application.
  - Check for obstructions between LoRa devices.
- **Wi-Fi/Bluetooth Connectivity Issues:**
  - Confirm Wi-Fi/Bluetooth functionality is enabled and correctly configured in your firmware.
  - Check for interference from other 2.4GHz devices.

10. Warranty and Support

For warranty information and technical support, please refer to the DIYmalls official website or contact their customer service directly. Keep your purchase receipt as proof of purchase.
DIYmalls Support: Visit the DIYmalls Store on Amazon

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Question

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

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