LILYGO T-ETH-Lite

LILYGO T-ETH-Lite ESP32 Development Board User Manual

Model: T-ETH-Lite ESP32

1. INTRODUCTION

The LILYGO T-ETH-Lite ESP32 is a compact development board designed for projects requiring both Wi-Fi and Ethernet connectivity. It integrates an ESP32-WOVER-E microcontroller, an RTL8201 Ethernet chip, and a TF card slot, making it suitable for various IoT applications, network devices, and embedded systems. This manual provides essential information for setting up, operating, and maintaining your T-ETH-Lite ESP32 board.

2. PRODUCT FEATURES

- **Microcontroller:** ESP32-WOVER-E
- **Memory:** 16MB Flash, 8MB PSRAM
- **Wireless Connectivity:** Wi-Fi 802.11 b/g/n, Bluetooth BR/EDR V4.2 + BLE
- **Wired Connectivity:** RTL8201 Ethernet
- **Onboard Peripherals:** TF Card Slot
- **Buttons:** Reset, Boot
- **Dimensions:** Approximately 2.32 x 1.1 x 0.43 inches (5.9 x 2.8 x 1.1 cm)
- **Expandability:** Supports POE Shield (sold separately)

3. PACKAGE CONTENTS

Verify that all items are present in your package. If any components are missing or damaged, please contact your vendor.

- 1 x LILYGO T-ETH-Lite ESP32 Development Board
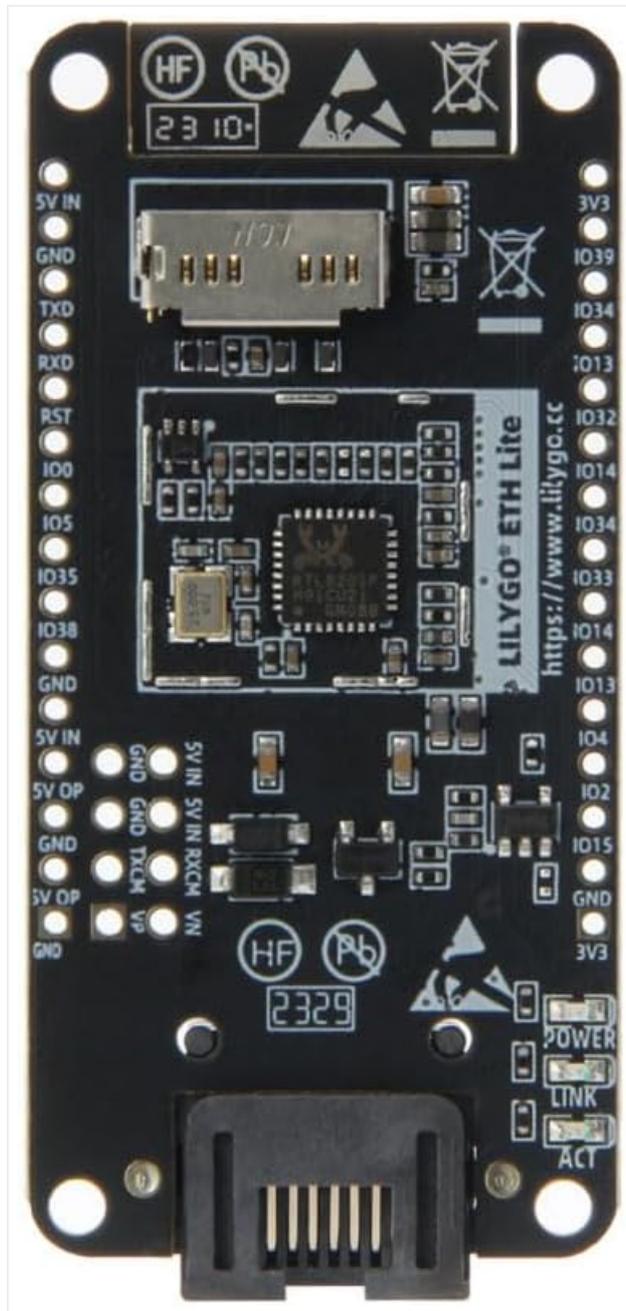- 2 x 15-pin Headers
- 1 x 2*4-pin Header
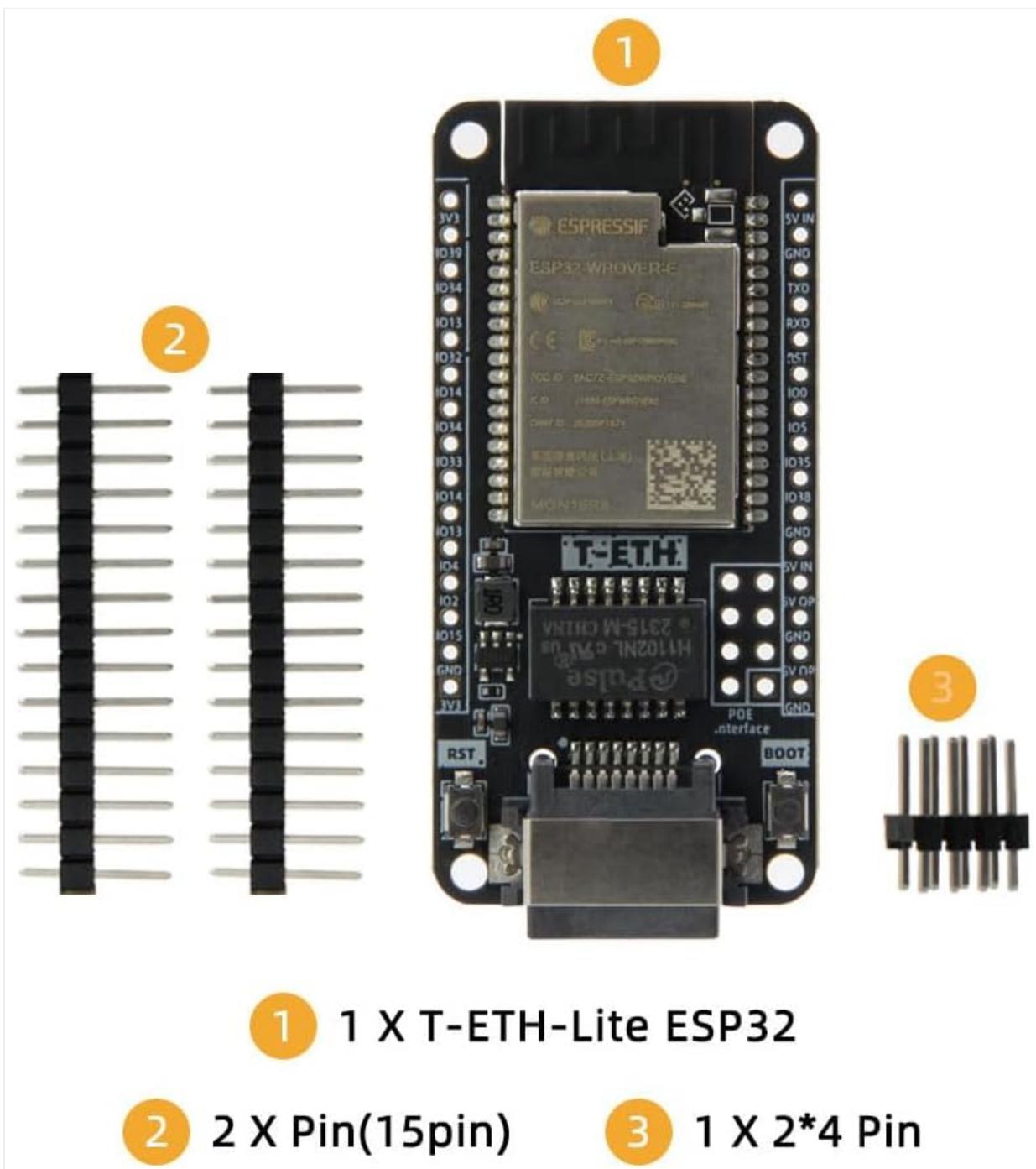
Figure 3.1: The image displays the LILYGO T-ETH-Lite ESP32 board along with two 15-pin headers and one 2x4-pin header, which are typically included in the package for connectivity.

4. HARDWARE OVERVIEW

The T-ETH-Lite ESP32 board features a compact design with essential components for network-enabled embedded projects. Below are diagrams illustrating the front, back, and pinout configurations of the board.

4.1 Board Layout

Figure 4.1: Front view of the LILYGO T-ETH-Lite ESP32 development board, showing the ESP32-WOVER-E module, Ethernet chip, and various pin headers.
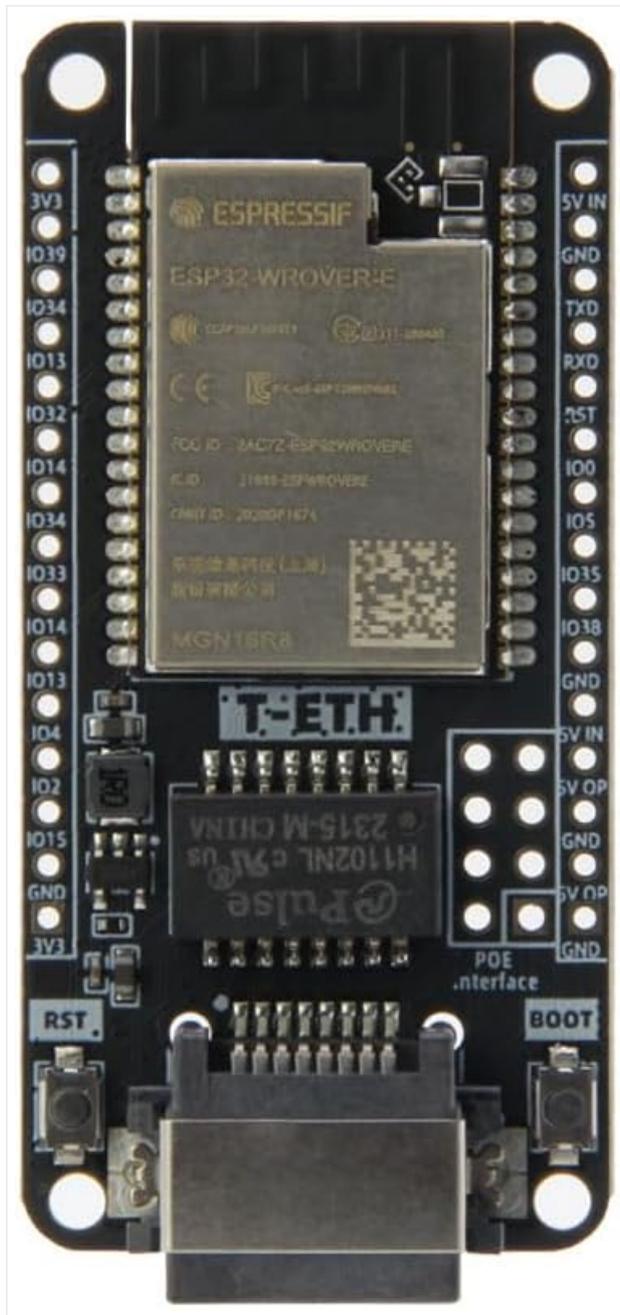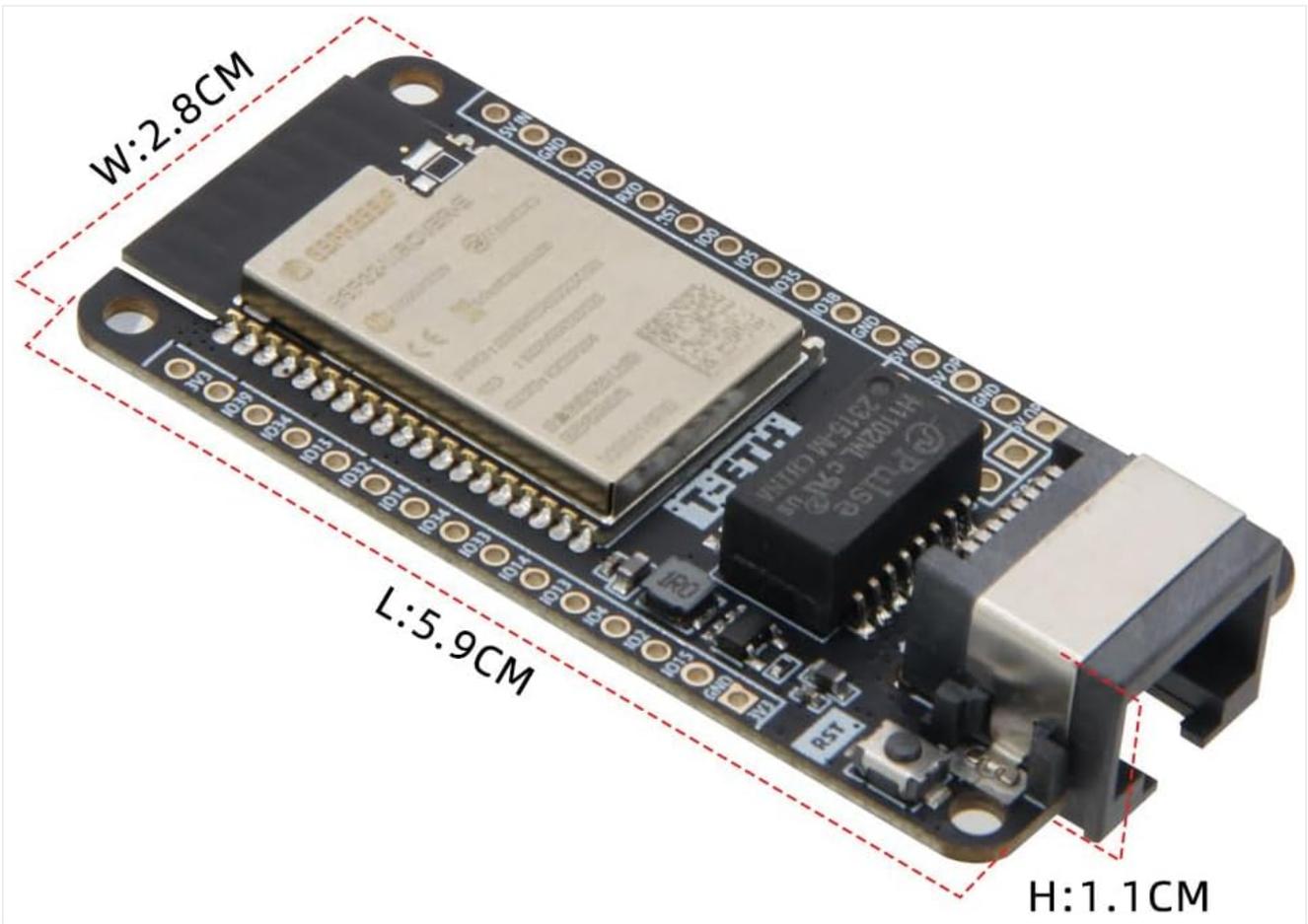
Figure 4.2: Back view of the LILYGO T-ETH-Lite ESP32 development board, highlighting the TF card slot and additional components.
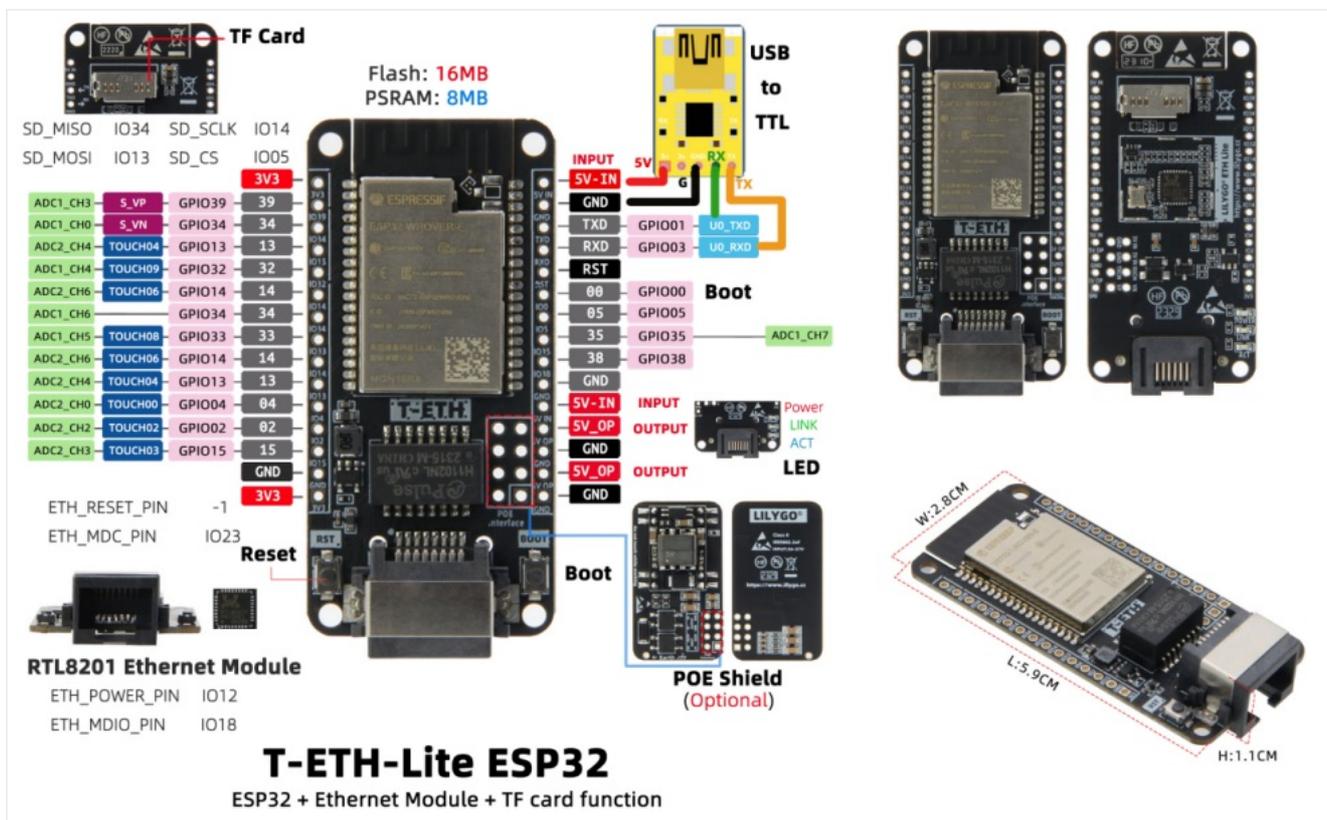
4.2 Dimensions

Figure 4.3: This image illustrates the physical dimensions of the LILYGO T-ETH-Lite ESP32 board, with length (L) approximately 5.9 cm, width (W) 2.8 cm, and height (H) 1.1 cm.

4.3 Pinout Diagram

Understanding the pinout is crucial for connecting external components and programming the board. The diagram below details the GPIOs, power pins, and other interfaces.

Figure 4.4: Detailed pinout diagram for the LILYGO T-ETH-Lite ESP32, showing GPIO assignments, power rails (3V3, 5V), ground (GND), TF card connections (SD_MISO, SD_MOSI, SD_SCLK, SD_CS), ADC channels, Touch pins, and serial communication pins (TXD, RXD). It also indicates the RTL8201 Ethernet module connections and suggests using a USB to TTL adapter for programming.

5. SETUP INSTRUCTIONS

Follow these steps to prepare your LILYGO T-ETH-Lite ESP32 for development.

5.1 Hardware Connection

1. **Attach Pin Headers:** Solder the provided pin headers to the board if not already attached. This allows for easy connection to a breadboard or custom circuitry.

2. **Power Supply:** Connect a 5V power supply to the 5V IN pin and GND. Alternatively, if using a POE Shield (sold separately), power can be supplied via Ethernet.

3. **USB-to-TTL Adapter:** The T-ETH-Lite ESP32 does not have an onboard USB-to-serial converter. You will need an external USB-to-TTL adapter for programming. Connect the adapter's TXD to the board's RXD, RXD to TXD, and GND to GND. Ensure the adapter's voltage level matches the ESP32 (3.3V).

4. **Ethernet Cable:** Connect a standard Ethernet cable to the RJ45 port for wired network access.

5. **TF Card (Optional):** Insert a formatted TF card into the slot if your application requires data storage.

5.2 Software Environment Setup

1. **Install Arduino IDE or ESP-IDF:** Download and install the Arduino IDE or Espressif IoT Development Framework (ESP-IDF) based on your development preference.

2. **Install ESP32 Board Support:** For Arduino IDE, add the ESP32 board manager URL in preferences and install the ESP32 boards package. For ESP-IDF, follow the official installation guide.

3. **Install Drivers:** Ensure drivers for your USB-to-TTL adapter are installed on your computer.

4. **Clone GitHub Repository:** For example code and libraries specific to the T-ETH-Lite series, clone the official

LILYGO GitHub repository: .

5.3 Uploading Firmware

1. **Select Board:** In your IDE, select the appropriate ESP32 board (e.g., "ESP32 Dev Module").

2. **Select Port:** Choose the serial port corresponding to your USB-to-TTL adapter.

3. **Enter Bootloader Mode:** To upload code, press and hold the **Boot** button on the T-ETH-Lite board, then press the **Reset** button. Release **Reset**, then release **Boot**. The board is now in bootloader mode.

4. **Upload Code:** Compile and upload your sketch or program.

6. OPERATING INSTRUCTIONS

Once the firmware is uploaded, the T-ETH-Lite ESP32 will execute the programmed logic. For network applications, ensure your code initializes the Ethernet and/or Wi-Fi interfaces correctly.

- **Ethernet Operation:** Your code should initialize the RTL8201 Ethernet controller and obtain an IP address via DHCP or static assignment.
- **Wi-Fi Operation:** Configure your ESP32 code to connect to your desired Wi-Fi network (SSID and password).
- **TF Card Access:** Use the appropriate libraries (e.g., SD.h in Arduino) to read from and write to the TF card.
- **GPIO Control:** Program the GPIO pins as inputs or outputs to interface with sensors, actuators, or other external circuits. Refer to the pinout diagram (Figure 4.4) for available GPIOs.

7. MAINTENANCE

Proper care ensures the longevity and reliable operation of your development board.

- **Handle with Care:** Avoid dropping the board or subjecting it to physical stress.
- **Static Discharge:** Always handle the board in a static-safe environment to prevent damage to sensitive electronic components.
- **Power Supply:** Use a stable 5V power supply. Incorrect voltage can damage the board.
- **Environmental Conditions:** Operate the board within typical indoor temperature and humidity ranges. Avoid extreme temperatures, moisture, and dust.
- **Cleaning:** If necessary, gently clean the board with a soft, dry brush or compressed air. Avoid liquids.

8. TROUBLESHOOTING

If you encounter issues, refer to the following common troubleshooting steps.

1. **Board Not Powering On:**
   - Verify the 5V power supply is connected correctly and providing sufficient current.
   - Check for any short circuits on the board.

2. **Failed Firmware Upload:**
   - Ensure the USB-to-TTL adapter is correctly connected (TX to RX, RX to TX, GND to GND).
   - Confirm the correct serial port is selected in your IDE.
   - Make sure the board is in bootloader mode (hold Boot, press Reset, release Reset, release Boot).
   - Check that the USB-to-TTL adapter drivers are installed.

3. **Ethernet Not Connecting:**
   - Verify the Ethernet cable is securely connected to both the board and the network device.
   - Check your code for correct Ethernet initialization and configuration (e.g., DHCP client).

- Ensure your network infrastructure (router, switch) is functioning correctly.

4. **Wi-Fi Connection Issues:**
   - Double-check the Wi-Fi SSID and password in your code.
   - Ensure the Wi-Fi network is within range and operating on a 2.4GHz band.
   - Verify that your ESP32 code correctly initializes the Wi-Fi module.

5. **TF Card Not Detected:**
   - Ensure the TF card is inserted correctly and fully seated.
   - Verify the TF card is formatted to a compatible file system (e.g., FAT32).
   - Check your code for correct TF card initialization and pin assignments.

9. SPECIFICATIONS

Feature	Detail
MCU	ESP32-WOVER-E
Flash Memory	16 MB
PSRAM	8 MB
Wireless Connectivity	Wi-Fi 802.11 b/g/n, Bluetooth BR/EDR V4.2 + BLE
Ethernet Controller	RTL8201
Onboard Peripherals	TF Card Slot
Buttons	Reset, Boot
Product Dimensions (LxWxH)	5.9 x 2.8 x 1.1 cm (2.32 x 1.1 x 0.43 inches)
Operating Voltage	5V (via VIN pin)

10. SUPPORT AND RESOURCES

For further technical support, code examples, and community discussions, please refer to the official LILYGO GitHub repository and community forums.

- **Official GitHub Repository:** github.com/Xinyuan-LilyGO/LilyGO-T-ETH-Series
- **LILYGO Official Website:** www.lilygo.cc