LILYGO T-Zigbee

LILYGO T-Zigbee Dual MCU Development Board User Manual

Model: T-Zigbee

1. Product Overview

The LILYGO T-Zigbee is a versatile dual MCU development board designed for Internet of Things (IoT) applications. It integrates an ESP32-C3 (Rev3) chip for Wi-Fi and Bluetooth 5 (LE) connectivity, and a TLSR8258 ultra-low-power chip for Zigbee, BLE 5 Mesh, RF4CE, Thread, 6LoWPAN, HomeKit, and ANT 2.4GHz proprietary standard communication. This board is ideal for smart control modules requiring multiple wireless protocols.

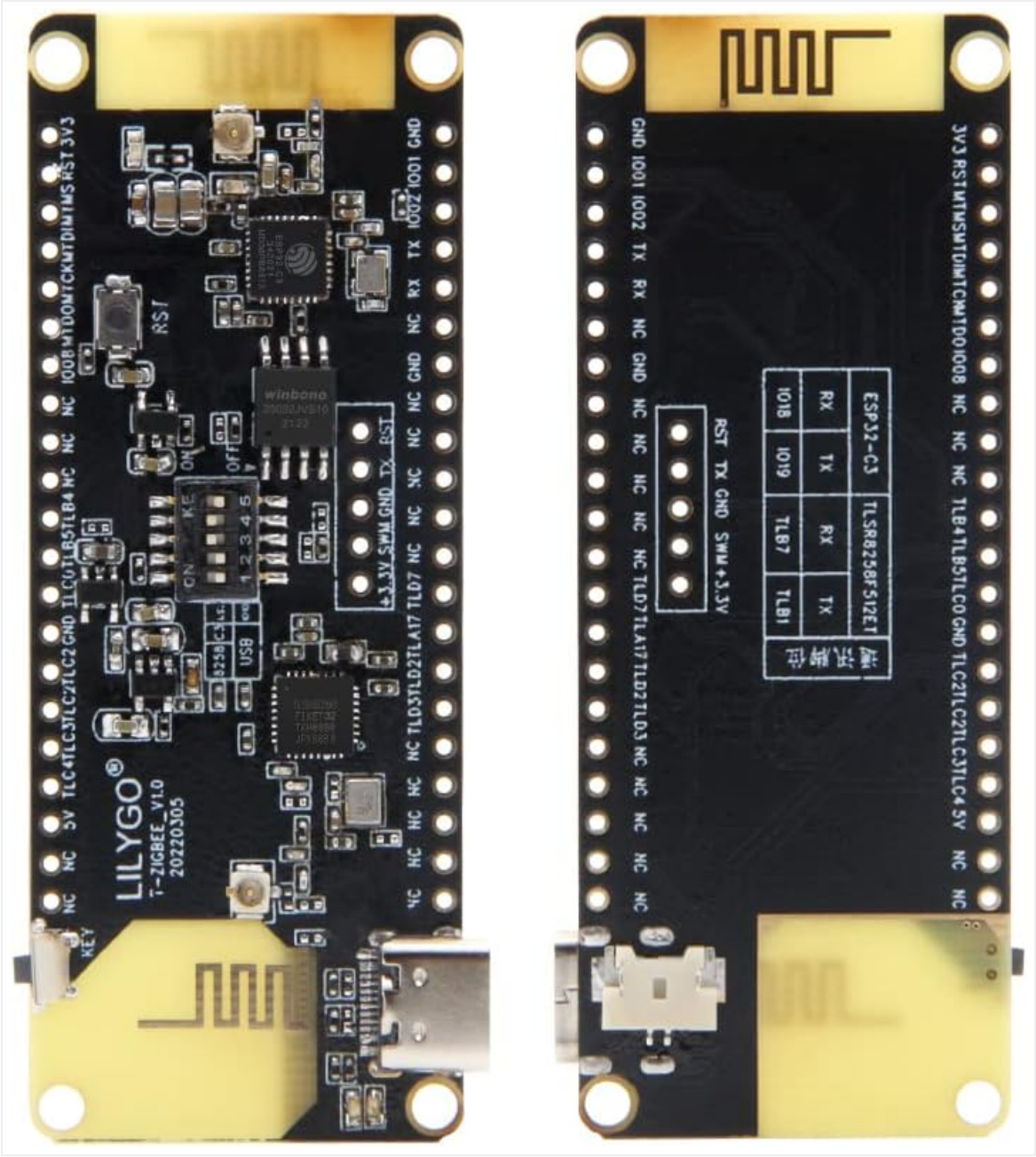

Figure 1: LILYGO T-Zigbee Development Board (front and back views).

Key Features:

- **Dual MCUs:** Features both ESP32-C3 (Rev3) and TLSR8258 ultra-low-power chips.
- **Wireless Connectivity:** Supports Wi-Fi, Bluetooth 5 (LE), Zigbee, BLE 5 Mesh, RF4CE, Thread, 6LoWPAN, HomeKit, and ANT 2.4GHz.
- **Processor:** ESP32-C3 with RISC-V processor SoC, 160 MHz main frequency, 400 KB SRAM, 384 KB ROM.
- **Programmable:** Includes programmable buttons (IO02, IO03 for ESP32-C3; PA00 for TLSR8258 Red LED, PD04 for Green LED).
- **Compact Design:** Rectangular shape with a PCB thickness of 1.0mm, matte black finish, and immersion gold.

2. Setup and Programming

To program the LILYGO T-Zigbee board, a dedicated T-U2T automatic downloader is required. This board cannot be programmed directly via its built-in USB-C port for firmware uploads. The T-U2T downloader is typically included in specific kits or sold separately.

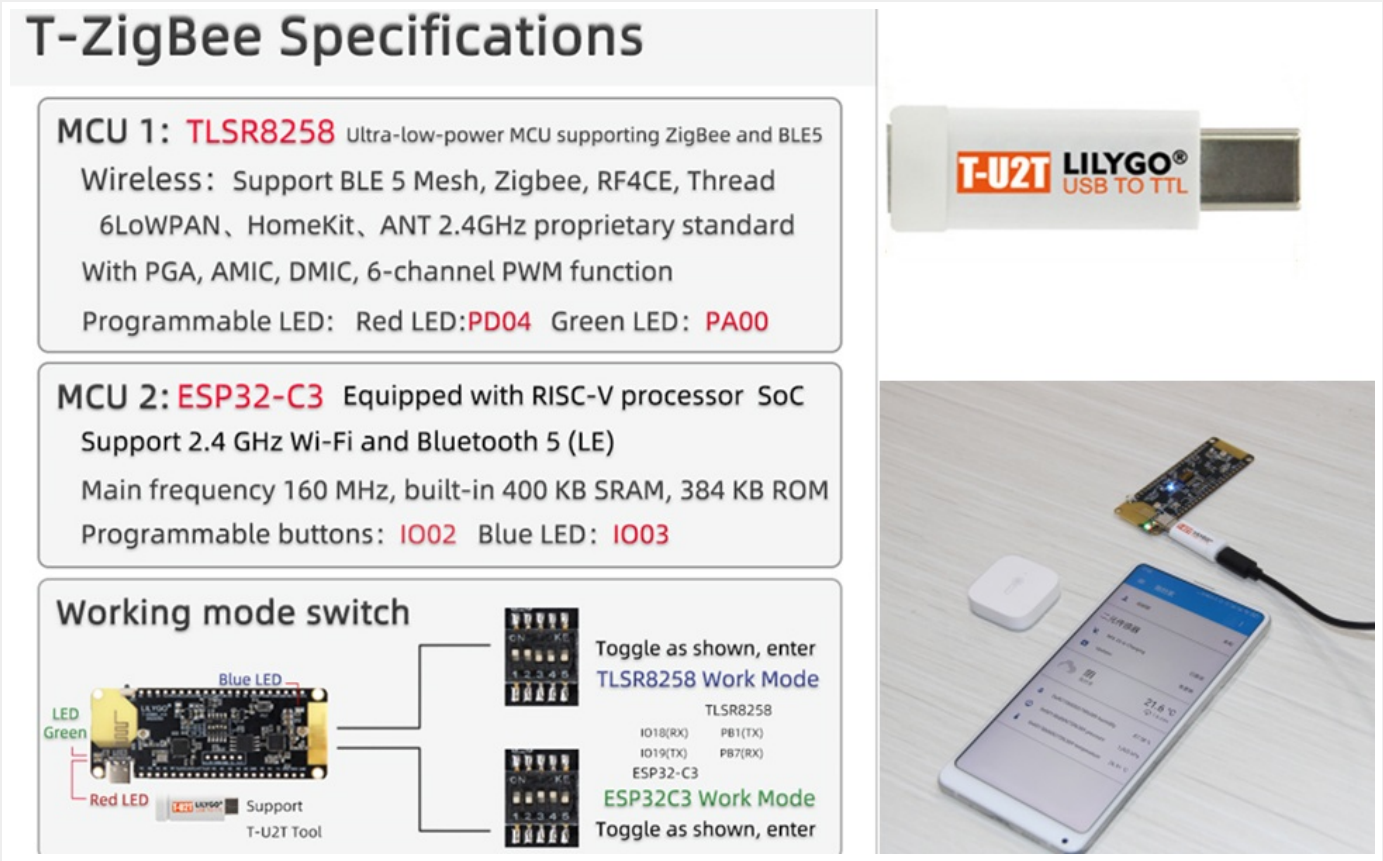

Figure 2: LILYGO T-Zigbee board with T-U2T downloader and other components.

2.1 Required Tools

- LILYGO T-Zigbee Development Board
- LILYGO T-U2T Automatic Downloader
- USB-A to USB-C cable (ensure compatibility, some USB-C to USB-C cables may not work for programming)
- Computer with appropriate development environment (e.g., Arduino IDE, PlatformIO)

2.2 Programming Steps

1. **Connect the T-U2T Downloader:** Plug the T-U2T automatic downloader into your computer's USB-A port.
2. **Connect the T-Zigbee Board:** Connect the T-Zigbee board to the T-U2T downloader using a compatible cable.
3. **Install Drivers:** Ensure all necessary drivers for the T-U2T downloader and ESP32-C3/TLSR8258 are installed on your computer.
4. **Prepare Development Environment:** Set up your chosen IDE (e.g., Arduino IDE) with the correct board definitions for ESP32-C3.
5. **Upload Firmware:** Follow the specific burning guide provided by LILYGO for detailed instructions on uploading your program. A general guide can be found at: zbhci.readthedocs.io/en/latest/user-guide/burning.html

Important Note: Some users have reported issues when using USB-C to USB-C cables for power or data transfer. It is recommended to use a USB-A to USB-C cable for reliable operation and programming.

3. Operating the T-Zigbee Board

The LILYGO T-Zigbee board offers flexible operation due to its dual MCU architecture. You can configure the board to operate primarily with either the ESP32-C3 or the TLSR8258 chip, depending on your application's requirements.

3.1 Working Mode Switch

The board features a DIP switch for selecting the working mode. Refer to the pin map for the exact location and configuration of this switch.

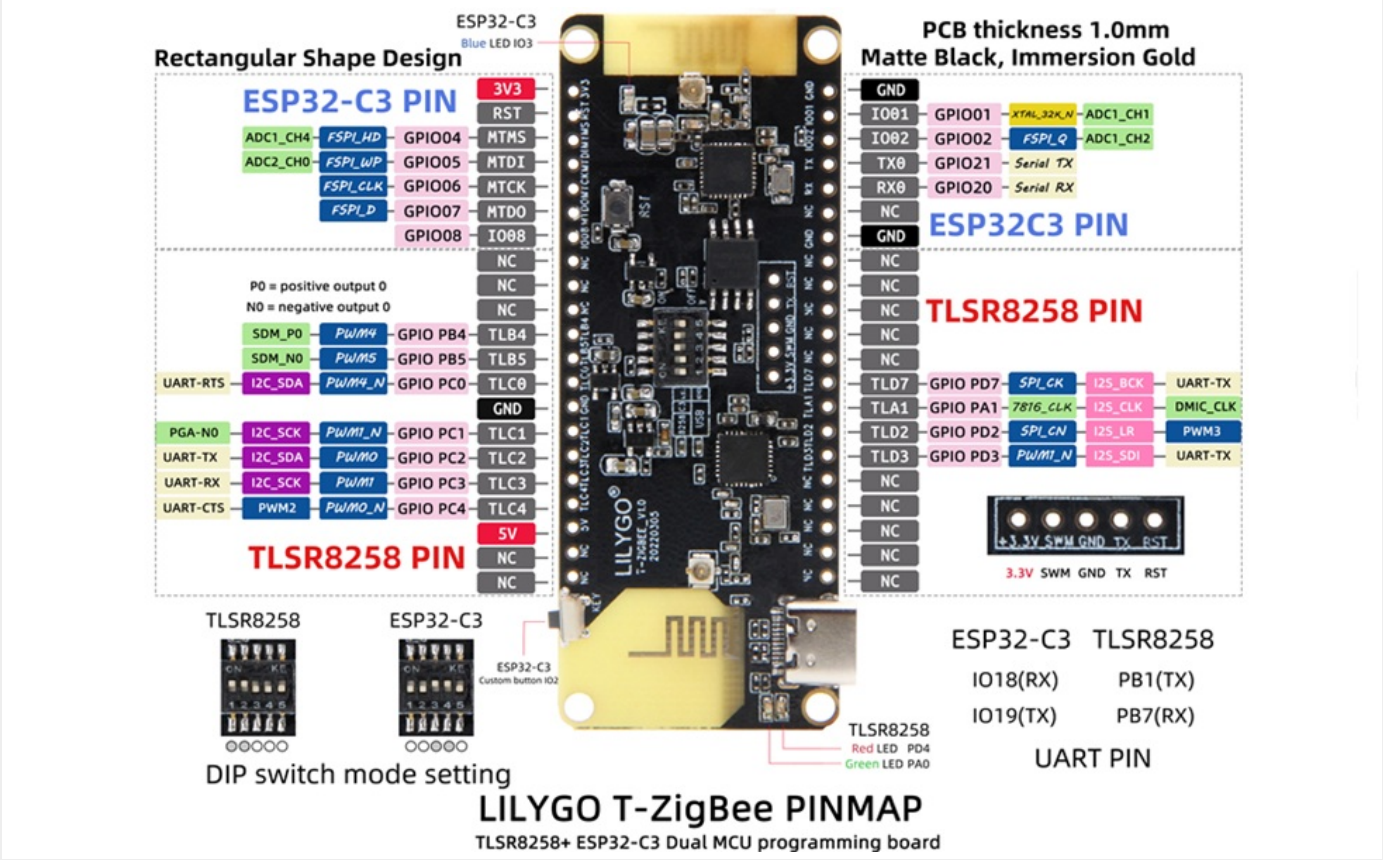

Figure 3: LILYGO T-Zigbee Pin Map and DIP switch mode settings.

- **TLSR8258 Work Mode:** Toggle the DIP switch as shown in the pin map to enable the TLSR8258 for Zigbee, BLE Mesh, etc.
- **ESP32-C3 Work Mode:** Toggle the DIP switch as shown in the pin map to enable the ESP32-C3 for Wi-Fi and Bluetooth LE.

3.2 Pinout Information

Understanding the pinout is crucial for connecting peripherals and integrating the board into your projects. The board provides clear labels for both ESP32-C3 and TLSR8258 pins.

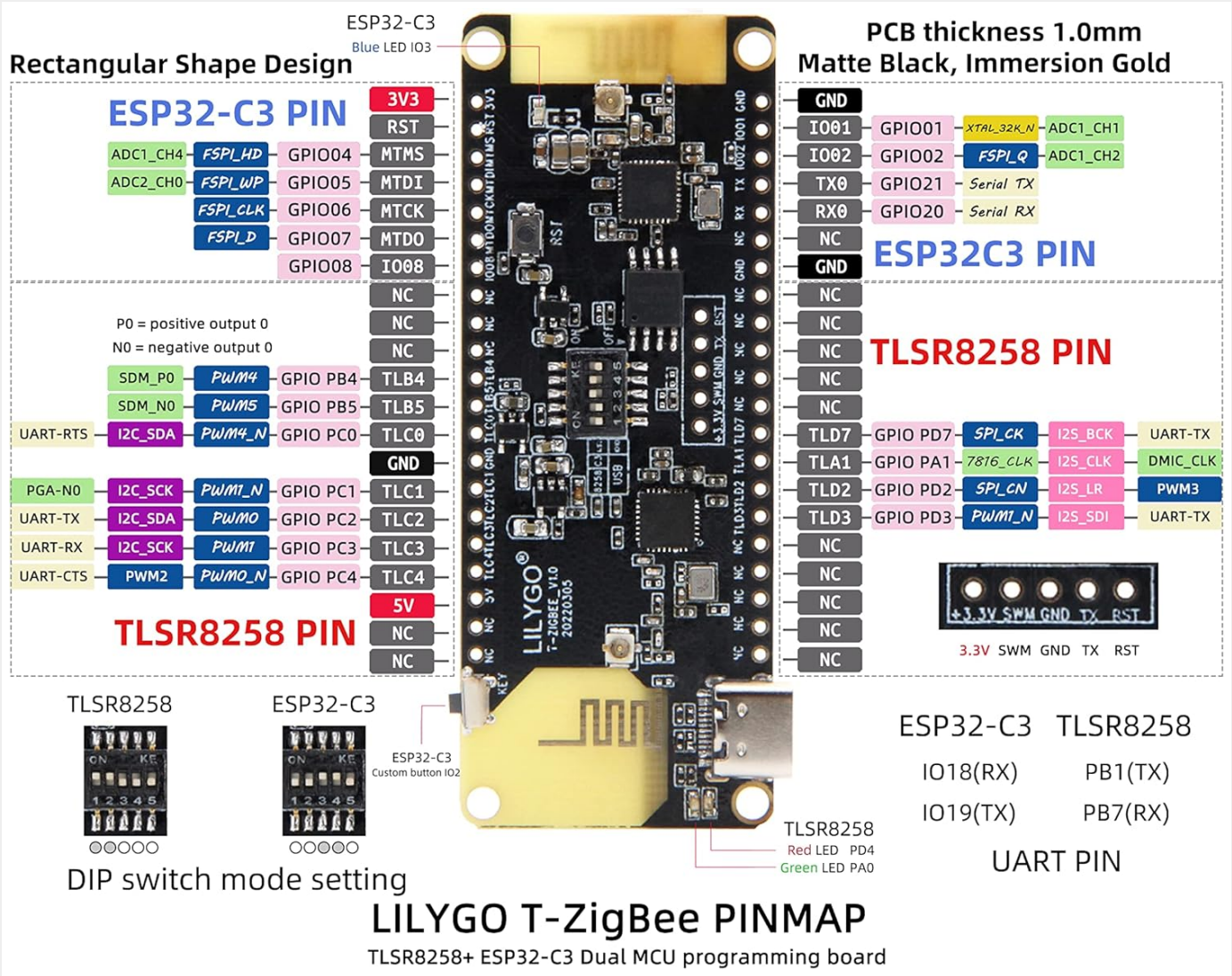

Figure 4: Detailed Pin Map for LILYGO T-Zigbee.

Refer to the pin map image for specific GPIO assignments, power pins (3V3, 5V, GND), and UART pins for both MCUs.

4. Specifications

Below are the technical specifications for the LILYGO T-Zigbee Development Board:

Feature	Detail
Brand	LILYGO
Model	T-Zigbee
MCU 1	TLSR8258 Ultra Low Power chip
MCU 2	ESP32-C3 (Rev3) RISC-V Processor SoC
ESP32-C3 Frequency	160 MHz
ESP32-C3 Memory	400 KB SRAM, 384 KB ROM
Wireless Standards	Wi-Fi, Bluetooth 5 (LE), Zigbee, BLE 5 Mesh, RF4CE, Thread, 6LoWPAN, HomeKit, ANT 2.4GHz

Feature	Detail
Connectivity Technology	I2C, Wi-Fi, Bluetooth
Processor Count	2 (Dual MCU)
Total USB Ports	1 (USB-C for power/data, requires T-U2T for programming)
PCB Thickness	1.0mm
Dimensions	Approximately 7.5cm x 3.1cm (Refer to Figure 5 for detailed dimensions)

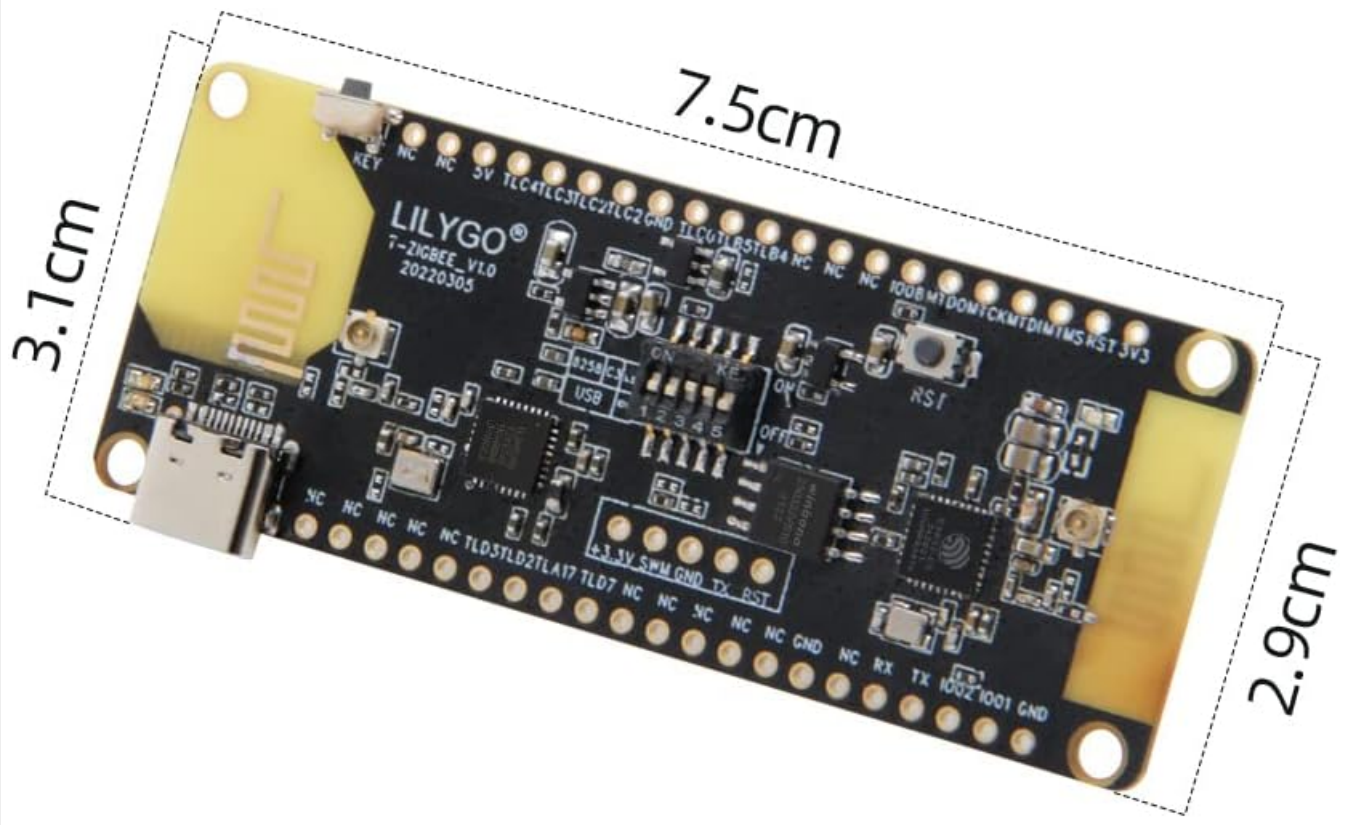

Figure 5: LILYGO T-Zigbee Development Board with approximate dimensions.

5. Maintenance and Care

To ensure the longevity and proper functioning of your LILYGO T-Zigbee board, follow these maintenance guidelines:

- **Handle with Care:** Avoid dropping the board or subjecting it to physical shock.
- **Static Electricity:** Always handle the board in an anti-static environment to prevent damage to sensitive electronic components.
- **Storage:** Store the board in a dry, cool place, away from direct sunlight and extreme temperatures.
- **Cleaning:** If necessary, gently clean the board with a soft, dry brush or compressed air. Avoid using liquids or harsh chemicals.
- **Power Supply:** Use a stable and appropriate power supply (5V via USB-C or 3.3V/5V via pin headers) to prevent damage.

6. Troubleshooting

This section addresses common issues you might encounter with your LILYGO T-Zigbee board.

6.1 Board Not Powering On / Not Detected

- **Check USB Cable:** Ensure you are using a functional USB-A to USB-C cable. Some USB-C to USB-C cables may not provide sufficient power or data connectivity for this board.
- **Power Source:** Verify that your USB power source (computer port, wall adapter) is providing adequate power.
- **Connections:** Ensure all connections are secure.

6.2 Programming Errors

- **T-U2T Downloader Required:** Remember that the T-Zigbee board requires the LILYGO T-U2T automatic downloader for programming. Direct programming via the onboard USB-C port is not supported.
- **Driver Installation:** Confirm that the correct drivers for the T-U2T downloader and the ESP32-C3/TLSR8258 chips are installed on your computer.
- **IDE Configuration:** Double-check your development environment (e.g., Arduino IDE) settings, including board selection and port configuration.
- **Burning Guide:** Consult the official burning guide for detailed programming instructions: zbhci.readthedocs.io/en/latest/user-guide/burning.html

6.3 Wireless Connectivity Issues

- **Antenna:** Ensure the onboard antenna is not obstructed or damaged.
- **Mode Selection:** Verify that the DIP switch is set to the correct working mode (ESP32-C3 for Wi-Fi/Bluetooth, TLSR8258 for Zigbee/BLE Mesh).
- **Firmware:** Confirm that the uploaded firmware includes the necessary code for the desired wireless functionality.

7. Warranty and Support

7.1 Warranty Information

The LILYGO T-Zigbee Development Board comes with a **1-year warranty** from the date of purchase. This warranty covers manufacturing defects under normal use. It does not cover damage caused by misuse, accidents, unauthorized modifications, or improper handling.

7.2 Technical Support and Resources

For further technical assistance, detailed documentation, and community support, please refer to the following resources:

- **Official GitHub Repository:** github.com/Xinyuan-LilyGO/T-ZigBee
- **Burning Guide:** zbhci.readthedocs.io/en/latest/user-guide/burning.html
- **Manufacturer Website:** Visit the LILYGO official website for product updates and additional information.

When seeking support, please provide your product model (T-Zigbee) and a detailed description of the issue you are experiencing.