# LilyGo T-Beam Setup Guide

⚠ **ANTENNA SAFETY - ALL DEVICES:** Always connect an antenna **before** powering on or transmitting with any LoRa device - this is good practice on every board. On the T-Beam's **SX1262**, the radio has improved antenna-mismatch tolerance, so a brief transmission without an antenna is less likely to cause instant damage than on older PA/front-end boards; nonetheless, transmitting without an antenna can still stress the radio, so make antenna-before-power a firm habit. (The "permanent damage from a brief TX" risk is most acute on PA/FEM-equipped boards.)

# LilyGo T-Beam - Setup Guide

The T-Beam is a compact ESP32-based node with built-in GPS and a holder for a standard 18650 lithium cell. It is important to verify the radio variant (SX1262 vs SX1276) before purchasing, as this affects firmware compatibility.

## Specifications

| Attribute | Value |
|---|---|
| MCU | ESP32 |
| Radio | SX1262 on the current T-Beam v1.1 / v1.2 (US/EU); some older revisions shipped the SX1276. Read the radio chip off your board and confirm against LILYGO's product page before flashing. (The T-Beam Supreme uses the SX1262; the SX1268 is the ~470 MHz China-band part.) |
| GPS | Built-in |
| Battery | 18650 holder (cell not included) |
| Power Management | AXP192 or AXP2101 chip |
| Price | $35 - 45 (volatile; confirm against a current LILYGO/Rokland listing, as of 2026-06-08) |
| Strengths | Compact with GPS, familiar form factor, replaceable 18650 |

⚠ **CRITICAL - Verify Radio Variant Before Purchasing:**
The T-Beam is sold with two different radio chips:

- **SX1262** - Current standard. Full firmware support for both MeshCore and Meshtastic. Preferred for new builds.
- **SX1276** - The legacy radio. Still supported in Meshtastic/MeshCore, but being phased out, so the SX1262 is preferred for new purchases.

Selecting the wrong firmware variant during flashing will result in a blank/non-functional screen. Confirm your hardware version before flashing.

# Driver Installation

- **Windows:** The required driver depends on your board's USB-to-UART chip. Recent T-Beams ship a **CH9102F** chip, which needs the **CH9102/CH34x driver**; older boards use a **CP2102**, which needs the **CP210x driver** from Silicon Labs. Check Device Manager (or the chip marking on the board) to confirm which one you have.
- **macOS & Linux:** Built-in - no driver needed.

# Entering Bootloader / DFU Mode

**Method 1 - From powered-off state:**

1. Hold the **BOOT** button (labeled "IO0" on some hardware versions).
2. Plug in the USB cable while holding BOOT.
3. Release BOOT after ~2 seconds.

**Method 2 - From powered-on state:**

1. Hold the **BOOT** button.
2. Briefly press and release the **RST** button.
3. Release the BOOT button.

# Firmware Flashing

1. Enter bootloader mode.
2. Open Chrome or Edge and navigate to:
   - **MeshCore:** flasher.meshcore.io (the canonical MeshCore web flasher)
   - **Meshtastic:** flasher.meshtastic.org
3. Select the T-Beam variant that matches your radio chip:
   - **T-Beam (SX1262)** for current hardware
   - **T-Beam (SX1276)** for older hardware
4. Click **Flash**. Do not disconnect during the process.

# Post-Flash Configuration

1. GPS initializes and begins acquiring satellites automatically.
2. Set **region to US** via the Bluetooth app.
3. The AXP192/AXP2101 power management chip handles battery charging automatically and provides charge/discharge protection.
4. **Use good-quality flat-top (unprotected) 18650 cells.** The T-Beam holder is sized for **unprotected flat-top** cells - protected cells are longer and generally will not fit, and may also trip on transmit current spikes. The board's AXP PMIC provides charge/discharge protection. Buy quality cells from a reputable brand, and in cold deployments never charge any lithium cell below 0 °C (32 °F).

# Known Quirks

- **SX1262 vs SX1276 variant selection is critical** - the wrong radio firmware leaves a blank/non-functional screen. (Distinct from a wrong-PMIC mismatch, where the board may appear to boot but the battery will not charge.)
- On some hardware versions the GPS antenna is located under the screen - avoid placing metal objects directly on the display area.
- The BOOT button may be labeled "IO0" on older PCB revisions.

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