

Station G2 Setup Guide

⚠ **ANTENNA SAFETY - ALL DEVICES:** Always connect a properly matched antenna **before** powering on any LoRa device. Never transmit without a properly matched antenna connected. On a high-power PA board like the Station G2, an antenna mismatch during transmission can cause **permanent damage** to the RF amplifier, so this precaution matters even more here than on a bare SX1262 board.

⚠ FCC COMPLIANCE WARNING - READ BEFORE OPERATING

The Station G2's maximum **36.5 dBm (4.46 W)** output **EXCEEDS the FCC Part 15 conducted limit of 1 W (30 dBm)** for unlicensed 902-928 MHz operation by roughly 6.5 dB - about 4.5× the legal limit. You may **NOT** operate it above 30 dBm conducted on unlicensed 915 MHz.

Compliance is governed by the **conducted** (radio) output limit FIRST, before antenna gain or EIRP. A low-gain antenna does **NOT** make full power legal. For unlicensed Part 15 use you must set conducted TX power to **no more than 30 dBm (1 W)**, and reduce it further dB-for-dB for any antenna with gain above 6 dBi (36 dBm EIRP is the derived ceiling).

Higher power is only lawful under an amateur (**Part 97**) license - and Part 97 **prohibits encryption** (so Meshtastic/MeshCore default AES must be disabled) and **requires station ID by callsign**. See 47 CFR 15.247.

Station G2 - Setup Guide

The Station G2 is a purpose-built fixed base station with a very high TX power capability for a LoRa node (36.5 dBm / 4.46 W conducted) and an integrated LNA for excellent receive sensitivity. **This output level is for licensed (Part 97) or other-region use only - it is NOT a legal unlicensed selling point in the US, where conducted output must be capped at 30 dBm (see the FCC compliance warning above).** It is designed for hilltop, tower, and infrastructure deployments - not personal portable use.

⚠ **RF EXPOSURE (MPE, FCC §1.1310):** At up to 4.46 W into a gain antenna, this station can produce RF-exposure levels exceeding human-safety limits close to the antenna. Perform an

RF-exposure evaluation, mount the antenna where people cannot approach within the computed compliance distance while transmitting, and keep workers out of the main beam during installation and service.

Specifications

Attribute	Value
MCU	ESP32-S3
Radio	SX1262 + power amplifier (PA) + LNA
Max TX Power (conducted)	36.5 dBm (4.46 W, US915 per uniteng spec) - exceeds the US Part 15 limit; cap at 30 dBm for unlicensed use
Price	\$109 (as of 2026-06-08; confirm current price at shop.uniteng.com / official Tindie store)
Strengths	High TX power for licensed/other-region use, integrated LNA, purpose-built for fixed infrastructure
Weaknesses	Expensive; requires high-voltage power; overkill for personal use; full power is illegal for unlicensed US operation

⚡ CRITICAL POWER REQUIREMENT:

The Station G2 **requires 15V USB-C Power Delivery (PD) or 9 - 19V external DC** (5.5×2.1 mm barrel jack, center-positive) for full RF power. The high-power amplifier needs this higher voltage to reach full TX power.

Standard 5V USB powers the ESP32 (enough to flash and configure the device) but will NOT enable the high-power amplifier. For full TX power, use 15V USB-C PD or 9 - 19V external DC.

Use one of:

- A USB-C charger that supports Power Delivery (PD) and can negotiate 15V - verify PD capability and that it offers the 15V profile before purchasing
- A 9 - 19V DC supply via the 5.5×2.1 mm barrel jack (12V is a common choice; observe center-positive polarity)

Connecting only 5V will let the device power on and enumerate for flashing/config, but the RF amplifier will not reach full output.

Driver Installation

- **Windows:** The ESP32-S3 can present native USB. If a USB-serial bridge driver is needed for your unit, install the matching driver (CP210x from Silicon Labs, or CH34x/CH9102, depending on the onboard USB chip) only if the device is not detected. Confirm the chip on your board before installing a driver.
- **macOS & Linux:** Built-in - no driver needed.

Entering Bootloader / DFU Mode

Method 1 - From powered-off state:

1. Disconnect power.
2. Hold the **BOOT** button.
3. Connect USB while holding BOOT.
4. Release BOOT after ~2 seconds.

Method 2 - From powered-on state:

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

Firmware Flashing

1. Enter bootloader mode.
2. Open Chrome or Edge and navigate to:
 - **MeshCore:** flasher.meshcore.io
 - **Meshtastic:** flasher.meshtastic.org
3. Select **Station G2** from the device list.
4. Click **Flash**. Do not disconnect during flashing.

Post-Flash Configuration

MeshCore:

1. Configure via Bluetooth or serial connection.
2. Set **region to US**. Selecting the US region caps firmware TX power to the legal 30 dBm. Do NOT override the region power cap or enable any high-power/boost mode that pushes conducted output above 30 dBm on unlicensed 915 MHz.
3. **The Station G2 can output up to 4.46 W, which is illegal under Part 15.** Set conducted TX power to no more than 30 dBm (1 W) for unlicensed use, AND reduce it further dB-for-dB for any antenna gain above 6 dBi. Conducted power is a separate, hard limit from EIRP - a low-gain antenna does NOT make full power legal.

4. For most infrastructure deployments: use an external directional or high-gain antenna (and remember high-gain antennas require additional conducted-power reduction).

Meshtastic:

1. Set **role to Router** in the app for infrastructure deployment.
2. Configure power settings and region. Selecting US region caps TX power to the legal 30 dBm - do not override it for unlicensed operation.
3. Independent of antenna gain, the conducted (radio) output must not exceed 30 dBm / 1 W for unlicensed Part 15 use. The Station G2 must be turned **DOWN** to 30 dBm or less - reducing TX power is mandatory, not optional, for legal unlicensed operation.

Known Quirks & Deployment Notes

- Power supply verification is essential - confirm PD output voltage before connecting.
- At full TX power (up to 4.46 W, per the uniteng Station G2 US915 spec), antenna quality and coax loss matter significantly. Use low-loss coax and quality connectors. Remember that for unlicensed US use you must operate at 30 dBm or below.
- Conducted power is the first, hard limit: cap conducted output at 30 dBm / 1 W for unlicensed Part 15 use. The derived EIRP ceiling is ~36 dBm (47 CFR 15.247) - for any antenna with gain above 6 dBi you must reduce conducted TX power dB-for-dB. Example: with a 9 dBi antenna (3 dB over the 6 dBi reference), set conducted power no higher than 27 dBm so EIRP stays at the 36 dBm ceiling.
- **Tower, water-tower, and rooftop installation is elevated, high-voltage-adjacent work** - use fall protection / working-at-height precautions, maintain the full fall-radius clearance from overhead power lines, ground and surge-protect the antenna feedline, and bond the antenna ground rod to the building grounding electrode system (NEC 810.21/250). See *Mounting Outdoor Nodes*.
- Ideal placement: hilltop, water tower, or rooftop with clear line-of-sight horizon (keeping people clear of the RF-exposure compliance distance while transmitting).

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