

FCC Regulations and EIRP Reference

Operating LoRa mesh equipment in the United States requires compliance with FCC Part 15 rules. This page summarizes the relevant regulations and explains how to calculate whether your installation is within limits.

“ **Disclaimer:** This page is a general reference for community operators. It is not legal advice. For installations with high-gain antennas or unusual configurations, consult the FCC rules directly ([47 CFR § 15.247, eCFR](#)) or a licensed RF engineer.

Rules summarized as of June 2026.

The 915 MHz ISM band

LoRa mesh in North America operates in the 902–928 MHz band, designated as an ISM (Industrial, Scientific, and Medical) band. This band is available for unlicensed operation under FCC Part 15, Subpart C (Intentional Radiators).

Key rule: FCC § 15.247 governs spread-spectrum and digitally modulated operation in the 902–928 MHz band.

Power limits

Limit type	Value	Notes
Conducted output power (the primary FCC limit)	1 W (30 dBm)	Maximum power at the antenna port, valid for antennas up to 6 dBi gain; above 6 dBi the conducted power must be reduced (see below)

Limit type	Value	Notes
EIRP (Effective Isotropic Radiated Power)	≈ 36 dBm (4 W) — a derived ceiling, not an independent limit	This is simply 30 dBm conducted + 6 dBi (the maximum gain allowed before power reduction kicks in). § 15.247 does not grant a standalone 4 W EIRP allowance; you cannot reach it by pairing higher gain with full power
Antenna gain above 6 dBi	Reduce conducted power dB-for-dB above 6 dBi	EIRP stays capped at ~36 dBm — § 15.247(b)(4)

There is no extra EIRP allowance at 902-928 MHz — not even for fixed point-to-point links. If your antenna gain exceeds 6 dBi (common with [directional antennas](#)), FCC rules require you to reduce conducted transmit power by the full amount the gain exceeds 6 dBi (47 CFR § 15.247(b)(4)), which keeps maximum EIRP at 36 dBm (4 W) in every configuration. Example: a 9 dBi Yagi limits you to 27 dBm conducted; a 12 dBi antenna to 24 dBm.

You may have read about point-to-point gain allowances in § 15.247 — those provisions (§ 15.247(c)(1)) apply **only to the 2.4 GHz and 5.8 GHz bands**, not to 902-928 MHz. At 2.4 GHz a fixed point-to-point link may reduce conducted power only 1 dB for every 3 dB of gain above 6 dBi (§ 15.247(c)(1)(i)); 5.8 GHz allows extra gain with no reduction (§ 15.247(c)(1)(ii)). **Neither relief exists at 902-928 MHz** — there the full dB-for-dB reduction of § 15.247(b)(4) always applies. Canada's RSS-247 works the same way: its point-to-point exception also excludes 902-928 MHz.

Conditions behind the 1 W figure

The 1 W ceiling applies to qualifying system types: digitally modulated systems with at least 500 kHz of 6 dB bandwidth (§ 15.247(a)(2)), or frequency-hopping systems with at least 50 hopping channels (§ 15.247(b)(2); systems with 25-49 channels — permitted only when the hopping channel's 20 dB bandwidth is 250 kHz or greater, § 15.247(a)(1)(i) — are limited to 0.25 W). Digitally modulated systems are additionally limited to 8 dBm of power spectral density in any 3 kHz band (§ 15.247(e)). Common LoRa mesh presets use 125-250 kHz bandwidth, so **your device's FCC certification grant — not the rule's 1 W ceiling — defines what it is authorized to transmit**. Operating a certified device in its stock configuration is the safe harbor.

EIRP calculation

$$\text{EIRP (dBm)} = \text{TX Power (dBm)} + \text{Antenna Gain (dBi)} - \text{Cable Loss (dB)}$$

Example 1: Stock node with a small upgrade antenna (within limits)

Parameter	Value
TX power	22 dBm (stock SX1262-class board)
Cable loss (3 m LMR-200)	1.0 dB
Antenna gain	+5 dBi
EIRP	$22 + 5 - 1.0 = 26.0$ dBm (below 36 dBm limit ✓)

Example 2: PA-equipped rooftop repeater (within limits)

Parameter	Value
TX power	27 dBm (500 mW — PA-equipped/base-station class)
Cable loss (3 m LMR-200)	1.0 dB
Antenna gain	+5 dBi
EIRP	$27 + 5 - 1.0 = 31.0$ dBm (below 36 dBm limit ✓)

Note: 3 m of LMR-200 loses about 1.0 dB at 900 MHz (Times Microwave datasheet: ~32.6 dB/100 m). Thinner cables lose more; budget for your actual cable type and length.

Example 3: High-gain antenna requiring power reduction

Parameter	Value
TX power (attempted)	30 dBm (1 W)
Antenna gain	+9 dBi
Required reduction	Antenna gain exceeds 6 dBi by 3 dB → reduce conducted power by 3 dB
Maximum legal TX power	27 dBm (47 CFR § 15.247(b)(4))
Resulting EIRP	$27 + 9 - 0.5$ (cable) = 35.5 dBm (within 36 dBm ✓)

The reduction is computed from antenna gain alone — cable loss does **not** offset it. In Meshtastic, set `LoRa config → Transmit Power` to 27 (integer dBm; always round **down**).

Standard device compliance

Many mainstream LoRa boards (LILYGO T-Beam — FCC ID 2ASYE-T-BEAM, RAK4631 — see [RAK's certification page](#), Heltec, etc.) carry FCC certification covering their shipped configuration. **Check that your specific board has an FCC ID — uncertified clones are common.** If you use a certified device as shipped with the included antenna, or with a replacement antenna **of the same type and equal or lower gain** (47 CFR § 15.204(c)(4)), you are within the certification. A different antenna type or higher gain — even a "comparable" one — is not covered, and compliance responsibility shifts to you.

Custom installations — especially with high-gain external antennas or increased TX power settings — require you to verify EIRP compliance independently.

What happens if you exceed the limits?

Exceeding the limits is a violation of federal rules regardless of how likely enforcement is. The operator (or, for professionally installed equipment, the installer) is responsible for ensuring the system stays in compliance. The FCC can and does act on interference complaints, issuing warnings and monetary forfeitures, and any Part 15 operator must stop transmitting if notified that they are causing harmful interference (47 CFR § 15.5). The rules also exist for good reason: excessive EIRP interferes with other users of the band, including industrial IoT systems, 900 MHz ISM devices, and licensed services.

More practically: running higher power than necessary increases interference with nearby mesh nodes and doesn't improve range as much as better antenna placement would. For most installations, stock TX power with a 3–6 dBi antenna at a better location is the right operating point.

Beyond power limits, fixed transmitters must also comply with the FCC's RF human-exposure (MPE) limits under 47 CFR § 1.1310 (evaluated per § 15.247(i)/OET Bulletin 65). At 915 MHz the general-population power-density limit is roughly 0.6 mW/cm². High-gain or co-located antennas near occupied areas may require an exposure evaluation and a minimum separation distance — keep antennas out of arm's reach of people while transmitting.

Canada (ISED) rules

Innovation, Science and Economic Development Canada (ISED, formerly Industry Canada) rules for 902–928 MHz operation are similar to FCC § 15.247. The relevant standard is [RSS-247](#) (with RSS-Gen general requirements). The conducted power limit is also 1 W, but ISED's antenna-gain and e.i.r.p. provisions are written separately and are not guaranteed identical to FCC § 15.247 — verify against RSS-247 directly rather than assuming they align. RSS-247's point-to-point exception likewise does not cover 902–928 MHz. Certified devices sold in both markets carry both FCC and IC certification numbers.

Frequency coordination

The 902–928 MHz band is shared with many other services and devices, including:

- **Federal radiolocation systems (primary users)** — high-EIRP government radars; you must accept their interference
- **Part 18 ISM equipment** — Part 15 devices are secondary to it
- **Amateur radio (33 cm band)** — licensed hams may also run mesh hardware at higher power under Part 97 (47 CFR § 97.313(j))
- Other LoRa/LoRaWAN deployments
- 900 MHz Wi-Fi (802.11ah/HaLow)
- Legacy 900 MHz consumer devices (older 900 MHz analog/digital cordless phones — now largely obsolete; note that DECT 6.0 cordless phones operate at 1.9 GHz, not 900 MHz — and some baby monitors)

Part 15 operation is unprotected: you must accept interference from these services and must not cause harmful interference to them (47 CFR § 15.5).

Meshtastic and MeshCore each transmit on a single configurable channel frequency — they do **not** automatically frequency-hop. As used in mesh, these are digitally modulated (non-hopping) systems under § 15.247(a)(2), not frequency-hopping systems. If you experience interference, manually select a different frequency slot (Meshtastic: `LoRa config → Frequency Slot`; MeshCore: `set freq` via the serial CLI on repeaters/room servers, or the app's radio settings on client nodes). Coordinate with other operators in your area to avoid overlapping on the same exact frequency.

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