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WhisperMagic — Heltec V4 Bring-Up & Test Guide

Board under test: Andy's Heltec WiFi LoRa 32 V4 (high-power / GC1109 front-end variant) **Date:** 2026-08-28 **Purpose:** Wire up, power on safely, flash, and sequentially test the board before it's used as an interim WhisperMagic development/interoperability node.

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1. Board Identification

Photo review confirms this is a **Heltec WiFi LoRa 32 V4** (OLED SKU, not the V4 TFT variant) — a fully assembled development board, not a bare component kit. Key specs:

Item	Spec
MCU	ESP32-S3 (dual-core), native USB — matches WhisperMagic's confirmed MCU choice
LoRa radio	Semtech SX1262 — matches WhisperMagic's confirmed radio choice
RF front-end	GC1109 power amplifier / LNA — **up to 28 dBm (~630 mW) TX output** on this high-power variant
Display	0.96" OLED, 128×64
USB	USB-C (native USB-CDC, no separate USB-serial driver chip)
Buttons	PRG (boot) and RST (reset)
Flash / PSRAM	16 MB flash, 2 MB PSRAM
GNSS	Optional add-on module via an 8-pin connector — **not populated on this board**; no GPS fix should be expected

Because it shares the exact MCU and radio silicon already confirmed for WhisperMagic, this board is a strong stand-in for early bring-up and interoperability testing ahead of the custom PCB.

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2. What You Need — Connectors on This Board

This is a fully assembled board. There is no point-to-point wiring between chips to do — all of that is already done on the PCB. "Wiring it up" means correctly using the connectors that are already present, **in the right order**:

Connector	Type	Purpose	Needed for first test?
LoRa antenna	IPEX / U.FL (small clip-on socket)	The radio antenna. One is included in the box.	**Yes — required before any power**
USB-C	USB 2.0 Type-C	Power, flashing, and serial console	Yes
Battery	2-pin JST-SH, 1.25 mm pitch, 3.3–4.4 V single-cell Li-ion/LiPo	Battery power for untethered testing	No — skip for the first bring-up, USB power is enough

Connector	Type	Purpose	Needed for first test?
Solar	2-pin, 1.25 mm pitch, 4.7–6 V input	Solar charge input	No — later-phase testing only
GNSS	8-pin connector	Optional GPS module	Not applicable unless Andy has the GNSS add-on

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3. WARNING — Never Power the Board Without the Antenna Connected

Connect the antenna first, every time, before any USB cable or battery is attached. Never apply power to this board with no antenna in place.

Why this matters here specifically: this is the **high-power** Heltec V4 variant, with a GC1109 amplifier stage capable of pushing the SX1262's output up to **28 dBm (~630 mW)**. If the radio transmits into an open connector (no antenna = no load = the RF energy has nowhere to go), that power reflects straight back into the amplifier output stage. Even a single transmission under those conditions can overheat and permanently damage the front-end amplifier or the radio itself.

This isn't a hypothetical risk to guard against "just in case" — Meshtastic firmware transmits automatically within seconds of boot (node announcements, position/telemetry broadcasts), so there is no safe window to power the board up "just to look at it" before the antenna is on.

Practical rule: antenna on before power on; power off before antenna off. Treat it exactly like you would any other radio transmitter.

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4. Internal Radio/Display Pin Map (Reference Only)

This is already fixed on the PCB — nothing here needs to be wired by hand. It's included for reference, since it's useful when reading firmware logs or diagnosing a fault.

Function	Signal	ESP32-S3 GPIO
LoRa SPI	SCK / MISO / MOSI / CS	9 / 11 / 10 / 8
LoRa control	RESET / DIO1 (IRQ) / BUSY	12 / 14 / 13
RF front-end (GC1109)	VFEM enable / chip enable (CSD) / PA mode (CPS)	7 / 2 / 46
OLED (I2C)	SDA / SCL / RESET	17 / 18 / 21
PRG button	BOOT/user button	0
Battery sense	ADC input / ADC enable	1 / 37
VEXT (peripheral power)	Enables OLED + antenna boost, active low	36

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5. Get the Meshtastic App (Apple App Store)

1. On the iPhone, open the **App Store** app.
2. Tap **Search** and type **Meshtastic**.
3. Look for **"Meshtastic App"**, published by **Meshtastic LLC** — it's free. Direct link: https://apps.apple.com/us/app/meshtastic/id1586432531
4. Tap **Get** to install.
5. Requires iOS 17.5 or later (also available for iPad and Apple Silicon Mac).

6. Open the app once installed. It will ask for **Bluetooth permission** the first time — allow it; the phone pairs with the node over BLE, not Wi-Fi.

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6. Sequential Test Plan

Work through these in order — each phase assumes the previous one passed.

Phase 0 — Pre-flight (before any power)

1. Visually inspect the board: USB-C port undamaged, OLED glass intact, no bent header pins.
2. Locate the small antenna pigtail (included in the box) and the IPEX/U.FL socket on the board.
3. **Connect the antenna to the board first.** Confirm it clicks/seats firmly.
4. Leave the battery disconnected for this first round — USB power only.

Phase 1 — Basic power-up

5. Connect a USB-C **data** cable (not charge-only) from the board to the Mac.
6. Confirm the OLED lights up / shows a boot screen.
7. On the Mac, confirm the board enumerates as a serial device — open Terminal and run `ls /dev/tty.usb*`; you should see something like `/dev/tty.usbmodemXXXX`.

Phase 2 — Flash stock Meshtastic firmware

8. In Chrome (Web Serial required — Safari won't work), go to **flasher.meshtastic.org**.
9. Click **Connect** and select the board's port when prompted.
10. If it isn't detected automatically, force bootloader mode: **hold PRG, tap RST once, then release PRG.**
11. Select **Heltec V4** (the OLED variant — not "V4 TFT") from the board list.
12. Choose the latest stable firmware release and click **Flash**. Don't disconnect the cable during the flash.
13. When it finishes, the board reboots on its own and the OLED should show the Meshtastic boot screen.

Phase 3 — Serial/console check

14. Open the web flasher's console tab (or a terminal: `screen /dev/tty.usbmodemXXXX 115200`) and watch the boot log.
15. Confirm the log shows the SX1262 radio detected successfully — look for a radio init success line, not a "radio init failed" error.
16. Confirm the board isn't stuck in a reboot loop.

Phase 4 — Set the LoRa region (required before it will transmit)

17. The radio stays silent until a region is set. Do this either from the OLED's on-device menu (PRG/RST to navigate), the Meshtastic web client at **client.meshtastic.org** connected over USB, or the Meshtastic CLI (`meshtastic --set lora.region US`).
18. Confirm the region took effect (re-check via the web client or `meshtastic --info`).

Phase 5 — Pair the phone app over Bluetooth

19. Install the Meshtastic app per Section 5 if not already done.
20. Turn on Bluetooth on the phone, open the app, tap **Connect to a device / Scan**, and select the node (named something like `Meshtastic_XXXX`).
21. Confirm the app's node screen shows: hardware model "Heltec V4," current firmware version, and the region you just set.

Phase 6 — Single-node functional checks

22. From the app, send a test message on the default channel — this exercises the BLE link only, no RF involved yet, and confirms the phone-to-node connection works.
23. Check the GPS/position tile — expect "no fix" since this board has no GNSS module attached. That's expected, not a fault.
24. Note uptime and battery/USB status on the node info screen as a baseline.

Phase 7 — Over-the-air mesh test (needs a second node)

25. Power up a second Meshtastic node (e.g., the ThinkNode M2), antenna attached, same region and same primary channel/PSK as the Heltec.
26. Send a message from one device to the other via the app; confirm delivery (checkmark/ACK) and note the RSSI/SNR values shown.
27. Walk the two nodes apart to get an informal first read on real-world range.

Phase 8 — Wrap-up

28. Record the firmware version, hardware model, and node ID for the test log.
29. To stop testing, just unplug USB — no special shutdown sequence is needed. **Always disconnect power before disconnecting the antenna, never the other way around.**

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7. Quick Troubleshooting

Symptom	Likely cause / next step
Port doesn't appear in Chrome/Terminal	Try a different USB-C cable (must be data-capable, not charge-only)
Flasher can't connect	Force bootloader manually: hold PRG, tap RST, release PRG
"Radio init failed" in boot log	Check the antenna is fully seated on the IPEX connector
No BLE device found in the app	Confirm Bluetooth is on; restart the app; confirm firmware flash completed
Radio never transmits	Confirm the LoRa region was actually set (Phase 4)
No GPS fix	Expected — this board has no GNSS module attached

Sources

- Heltec WiFi LoRa 32 (V4.3.1) — official product page
- Heltec WiFi LoRa 32 V4 — CNX Software overview
- Meshtastic App — Apple App Store
- WhisperMagic firmware fork, `variants/esp32s3/heltec_v4/` (this project's repo)