RM-EXP

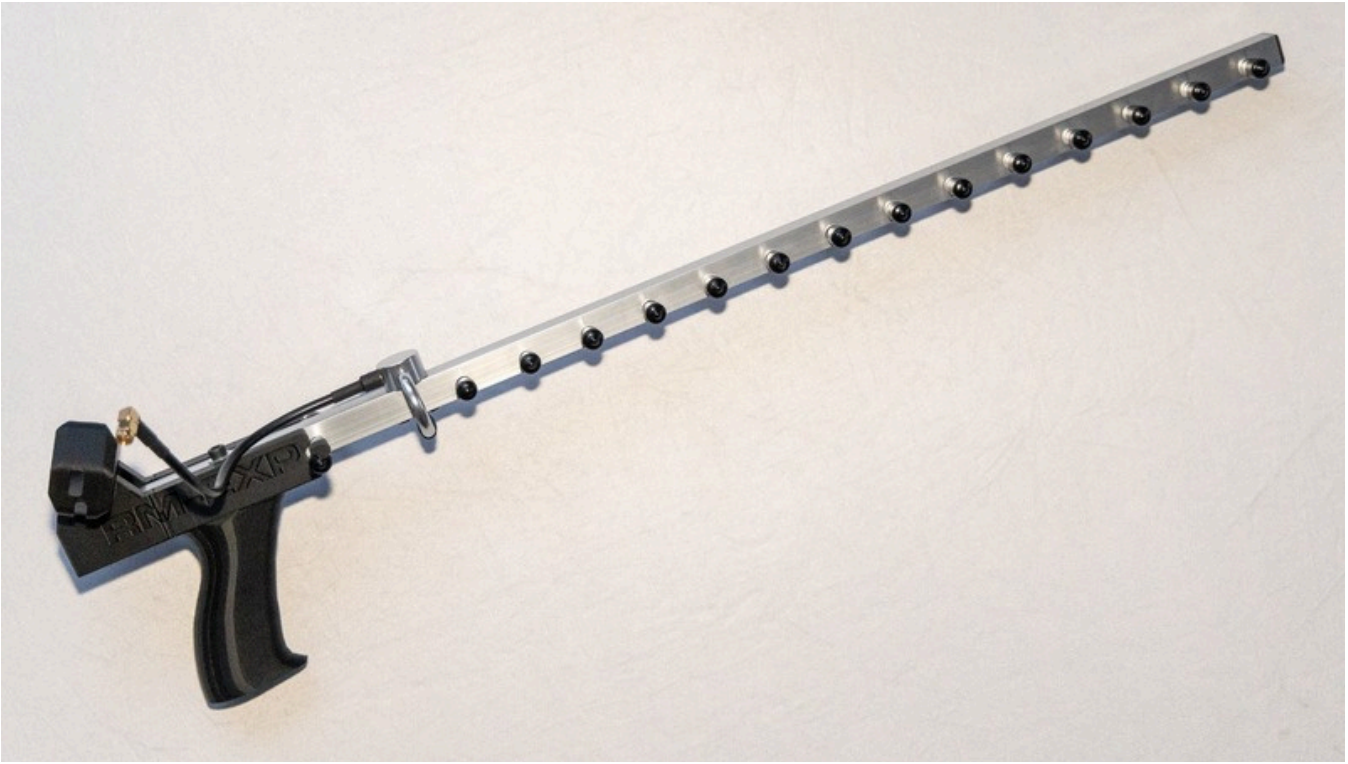
2.4 GHz 65 cm Yagi antenna with a Flipper mount

Technical Brief / Datasheet

Revision: 2.0
Date: 2026-10-11

Abstract

This datasheet gives the measured electrical performance, the mechanical build and the handling notes for a handheld 2.4 GHz Yagi-Uda antenna with a Flipper Zero mount. Every radio-frequency figure comes from one sample, measured outside RM-EXP in an anechoic chamber on 9 July 2025. The figures are not independently verified, and weak values are published alongside strong ones.



1. Overview

This is a 651 mm Yagi-Uda antenna for the 2.4 GHz ISM band, made to be aimed by hand. Sixteen elements on an aluminium alloy boom give a beam about 30° wide. A counterbalanced PETG grip and a Flipper Zero mount make it a one-hand tool for range tests, site surveys and finding a transmitter.

Passive antenna: a 20 cm SMA male pigtail connects it to any board with an SMA female port. The Flipper Zero is a mount and counterweight only.

2. Key Specifications

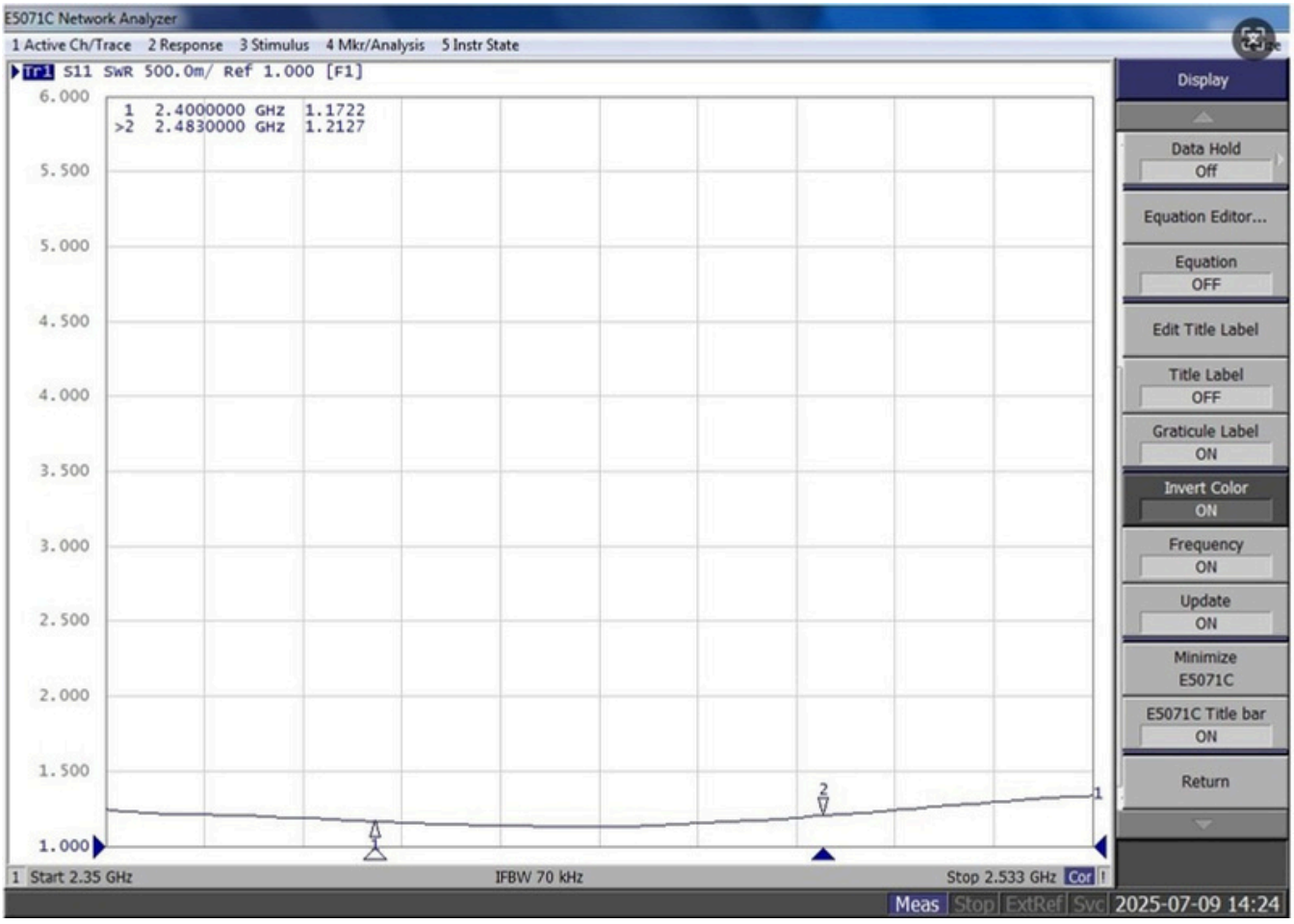
Parameter	Value
Frequency band	2400–2500 MHz (ISM band 2400–2483.5 MHz)
Antenna type	Yagi-Uda, directional, handheld
Gain	10.30 dBi @ 2400 MHz; 10.30–10.88 dBi in band (1)
Gain type	Gain, not directivity (1)
Radiation efficiency	−1.00 to −1.10 dB, 78–79% (1)
Half-power beamwidth	27.6–30.2° horizontal cut; 30.5–34.2° vertical cut (1)(4)
Front-to-back ratio	10.16–12.69 dB at four frequencies (1)(2)
Cross-polar discrimination	20.4–23.3 dB (1)
First sidelobe	7.1–7.6 dB below peak, ~39° off axis, one cut (1)(4)
VSWR	1.172 @ 2400 MHz; 1.213 @ 2483 MHz (1)
Return loss	22.0 dB @ 2400 MHz; 20.3 dB @ 2483 MHz (3)
Impedance	50 Ω (nominal)
Polarisation	Linear (H/V by orientation)
Connector	SMA male, 90°, 20 cm pigtail
Boom	651 mm, aluminium alloy
Elements	16: reflector, driven element, 14 directors
Grip and mount	PETG; grip in 2 parts; M5 threaded inserts
Mass	238 g (without Flipper)

(1) Measured outside RM-EXP on one sample (bare antenna, without grip or mount), 9 July 2025, in an anechoic chamber. Not independently verified; no uncertainty given. See section 3.2.
(2) Lowest value in the rear sector, not only at 180°. Example at 2500 MHz: 12.69 dB at 201°, 16.08 dB at 180°.
(3) Calculated from the measured VSWR.
(4) Cuts as measured; which cut is the E-plane was not stated.

3. Electrical Performance

3.1 Impedance match (VSWR)

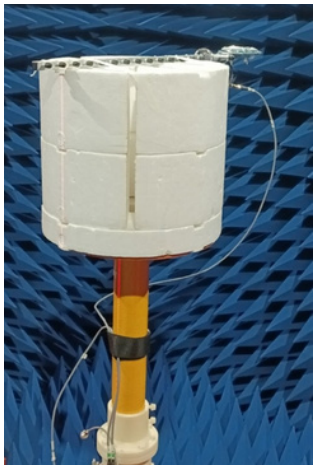
VSWR is 1.172 at 2400 MHz and 1.213 at 2483 MHz, near the top of the 2.4 GHz ISM band. That reflects about 1% of the power, so mismatch costs less than 0.05 dB (return loss 22.0 dB and 20.3 dB).



VSWR sweep 2350–2533 MHz, Agilent E5071C. Markers: 1.172 @ 2400 MHz, 1.213 @ 2483 MHz.

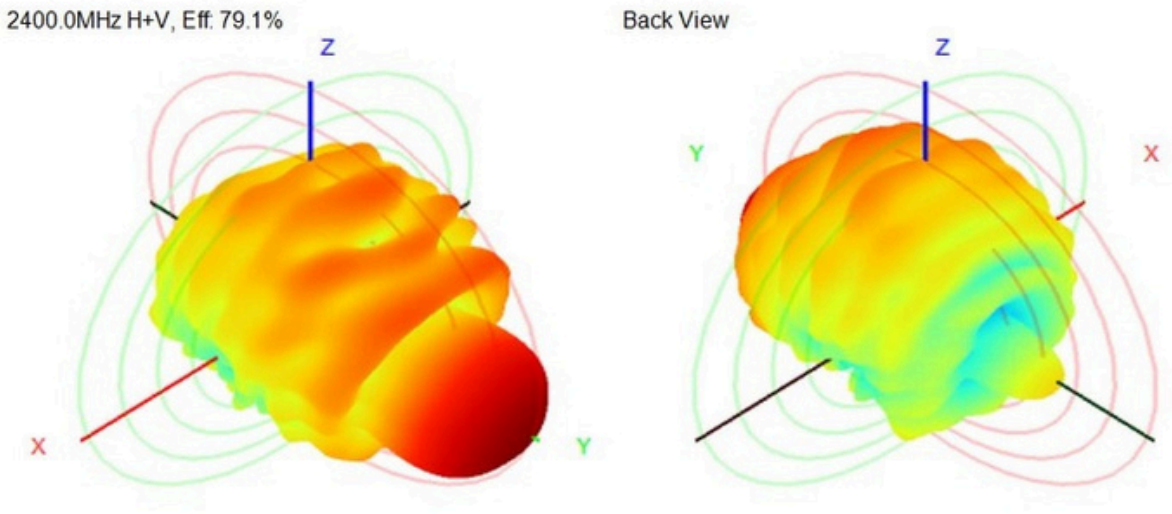
3.2 Measurement record

- One sample, 9 July 2025, anechoic chamber
- Measured outside RM-EXP, bare (no grip or mount)
- VSWR: Agilent E5071C, 2350–2533 MHz sweep
- Gain: four frequencies; instrument not stated
- Pattern: 360° cuts in 1° steps, co- and cross-pol
- Not independently verified; no uncertainty given

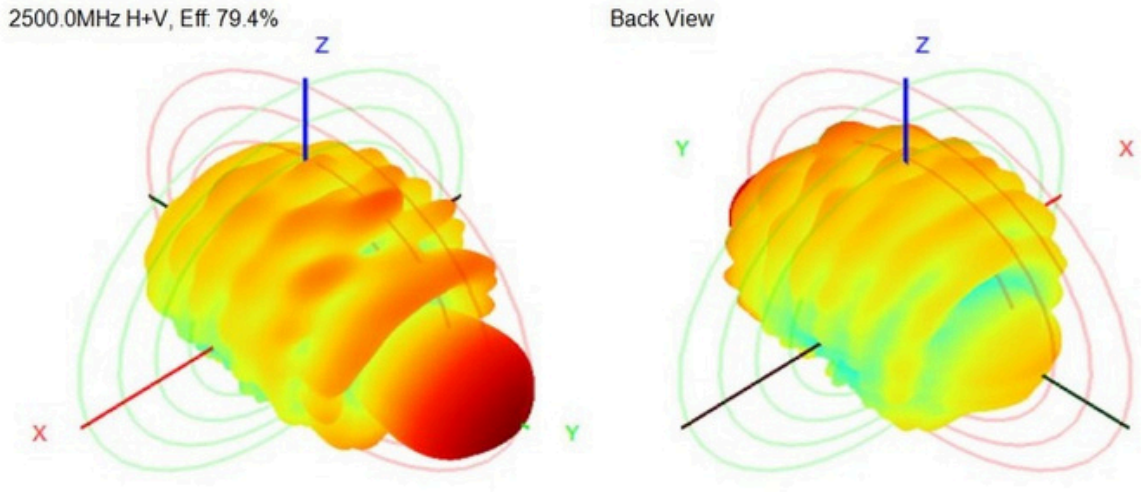


3.3 Radiation pattern

Half-power beamwidth: 27.6–30.2° horizontal cut, 30.5–34.2° vertical cut. Cross-polar discrimination is 20.4–23.3 dB. Below: measured 3D patterns.



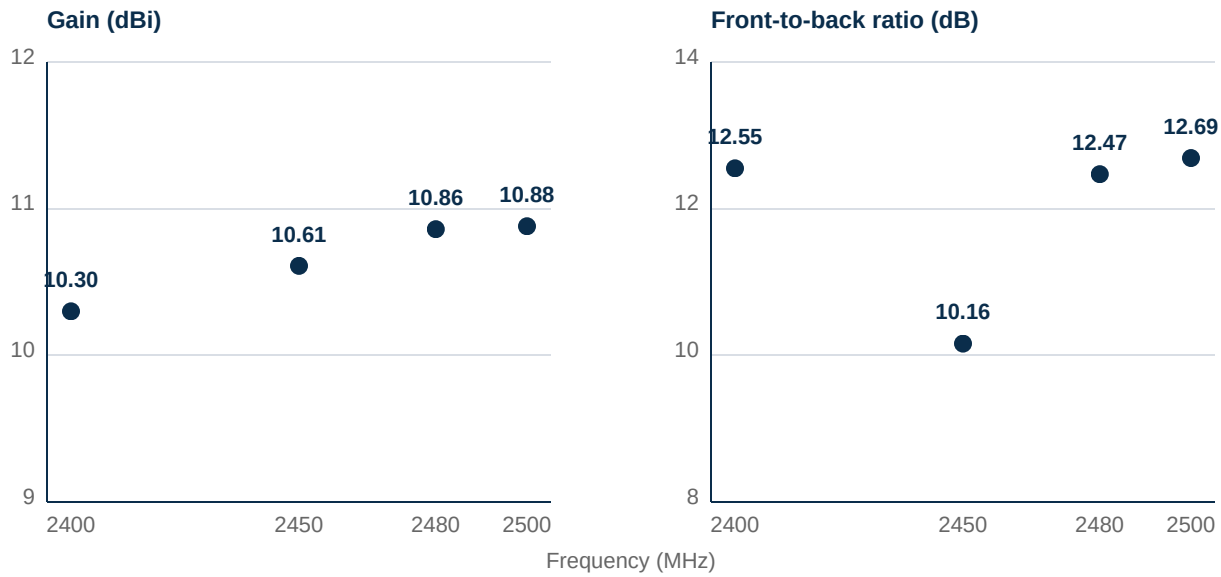
Measured 3D radiation pattern @ 2400 MHz



Measured 3D radiation pattern @ 2500 MHz

3.4 Gain and front-to-back across the band

Gain rises from 10.30 dBi at 2400 MHz to 10.88 dBi at 2500 MHz. Front-to-back is the lowest value in the rear sector, stricter than the reading at 180°; it dips to 10.16 dB at 2450 MHz. A later test sheet received on 22 September 2026 shows higher gain but states no test date, setup, sample count or gain definition, so it is not used.



Measured gain and front-to-back at four frequencies (9 July 2025, one sample)

Measured values at each frequency

Frequency (MHz)	Gain (dBi)	Front-to-back (dB)	Beamwidth, horiz. (°)	Beamwidth, vert. (°)	Cross-pol. discr. (dB)	Efficiency (dB)
2400	10.30	12.55	30.2	34.2	20.4	−1.02
2450	10.61	10.16	28.7	33.0	21.8	not reported
2480	10.86	12.47	28.1	31.9	22.9	−1.10
2500	10.88	12.69	27.6	30.5	23.3	−1.00

All values (1): one sample, 9 July 2025, measured outside RM-EXP, not independently verified. Efficiency was not reported at 2450 MHz.

4. Mechanical design and use

4.1 Build

The boom is 651 mm of aluminium alloy carrying a reflector, a driven element and 14 directors. The grip and the Flipper Zero mount are printed in PETG and joined with M5 threaded inserts, so the assembly can be taken apart and serviced. The grip counterbalances the boom; the whole assembly weighs 238 g without a Flipper.

4.2 In the box

1. Yagi assembly
2. PETG grip, in 2 parts
3. Flipper Zero mount
4. 2 × M5 fasteners and a washer
5. 4 mm hex key

Not included: the Flipper Zero and the add-on board.

4.3 Compatibility

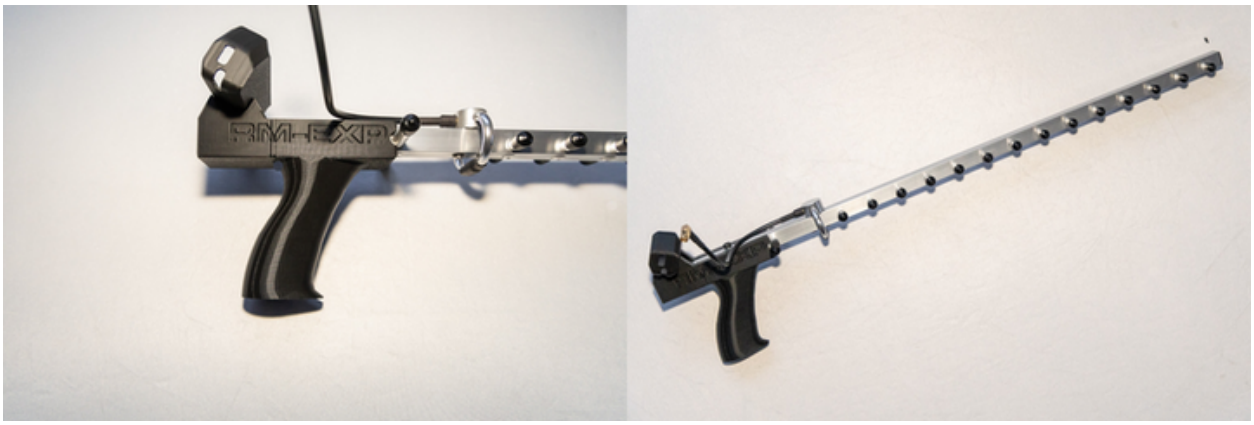
The 20 cm pigtail ends in a 90° SMA male plug. It fits any board with an SMA female port, for example HackRF One with PortaPack, ADALM-Pluto, USRP, bladeRF, LimeSDR Mini, tinySA Ultra, and ESP32 or nRF24 add-on boards with an SMA port. Boards with an RP-SMA port, common on Wi-Fi gear, need an adapter. The Flipper Zero is a mount and counterweight only; it has no RF connection to the antenna.

4.4 Handling and aiming

Hold the elements in the same orientation as the antenna you are aiming at: horizontal for horizontal, vertical for vertical. Sweep slowly and stop where the signal peaks. The beam is about 30° wide, so take a bearing from one spot and check it from a second. The antenna is passive: it adds no power and only concentrates what your board transmits.

5. Responsible use

This is a passive antenna for licensed and licence-exempt 2.4 GHz work: testing your own equipment, site surveys, range measurement and amateur radio. Transmit power and duty cycle are set by the board you attach. You are responsible for following the radio regulations where you use it. In the EU, 2.4 GHz wideband equipment such as Wi-Fi is limited to 100 mW (20 dBm) EIRP, and other uses can have lower limits; with about 10 dBi of antenna gain, keep the board's output at or below 9 dBm to stay within 20 dBm. RM-EXP is not affiliated with, endorsed by or connected to Flipper Devices.



6. Revision history

2.0 (2026-10-11): Rebuilt. All pattern figures now come from one dataset. Beamwidth is given per cut, and front-to-back is defined as the lowest value behind the antenna. Added efficiency, cross-polar discrimination, sidelobe level, return loss and the measurement record. VSWR sweep range corrected.
1.2 (2026-10-11): Gain corrected to 10.3 dBi at 2400 MHz; sample count corrected to one.
1.1 (2026-09-25): Interim issue, replaced by 1.2.
1.0: First issue. Stated a higher gain and three tested units; neither was supported by the measurement data.