

Antenna examples

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1.Introduction

This chapter will contains a summary of antenna builds and tested performances.

This starts with simple antenna, going toward advanded antenna then explore combinations of antennas.

2.Simple pre-made antenna



04RI001 – Pre-made 433Mhz

The kit contains basic quarter wavelength antennas. Those are included for demonstration purpose.

Those **are not high performance** antenna. As such, they are not suited for your the launch of your CanSat project. However, they are pretty good for initial radio module testing.

Max distance: 300 – 500m (depending on condition)

3.Single pole antenna (home-made)

The first antenna strongly advised to build.



04RI002 – Single pole antenna

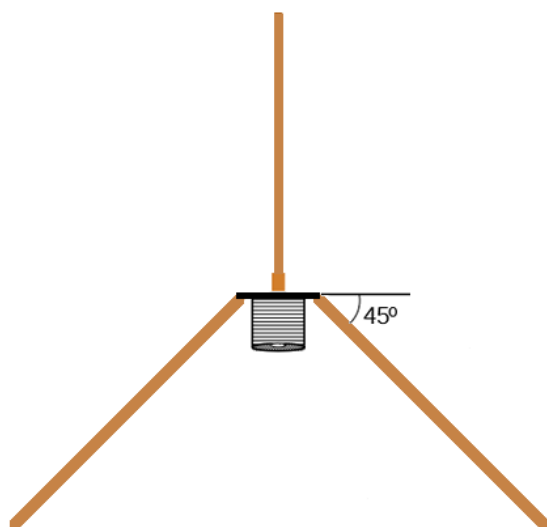
Introduced in chapter 5, this antenna is quite simple to assemble. It can be made with a single core copper wire or a straight brass segment.

Tuning it with the VNA will offers an essential skill used for every antenna built.

Max distance: 300 – 500m (depending on condition)

4. Ground plane antenna (home-made)

Flying object (like a CanSat) must also brings a ground plane together with the antenna. This is essential to ensure long distance communication.



04RI003 – Ground plane antenna

Introduced in chapter 5, this antenna is an advanced version of the single pole antenna used in combination with a Yagi Antenna.

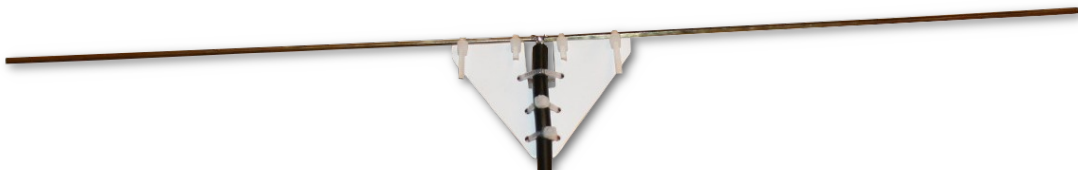
Max distance: not tested (ground plane + ground-plane)

5. Dipole antenna (home-made)

The dipole antenna is the base of the Yagi antenna.

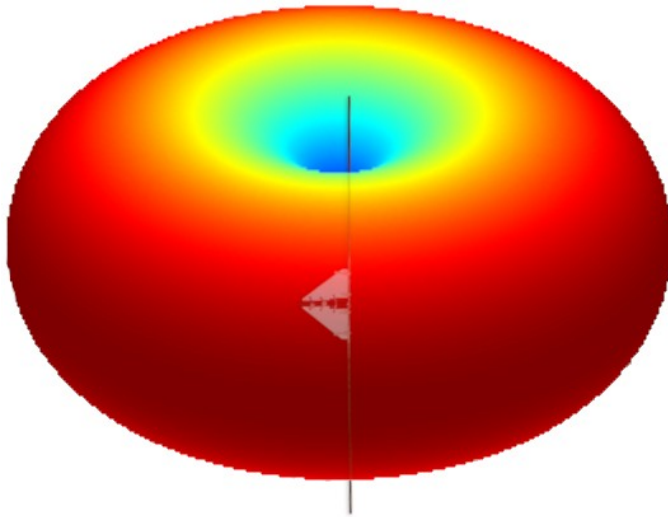
An faulty or improperly tuned dipole antenna cannot create a great Yagi Antenna.

Chapter 6 introduce a 433Mhz dipole. **The antenna must be manufactured with great attention to details.** Higher frequency is incredibly more sensitive to small errors.



04RI004 – Dipole antenna

The dipole antenna are used vertically because of their radiation patterns.



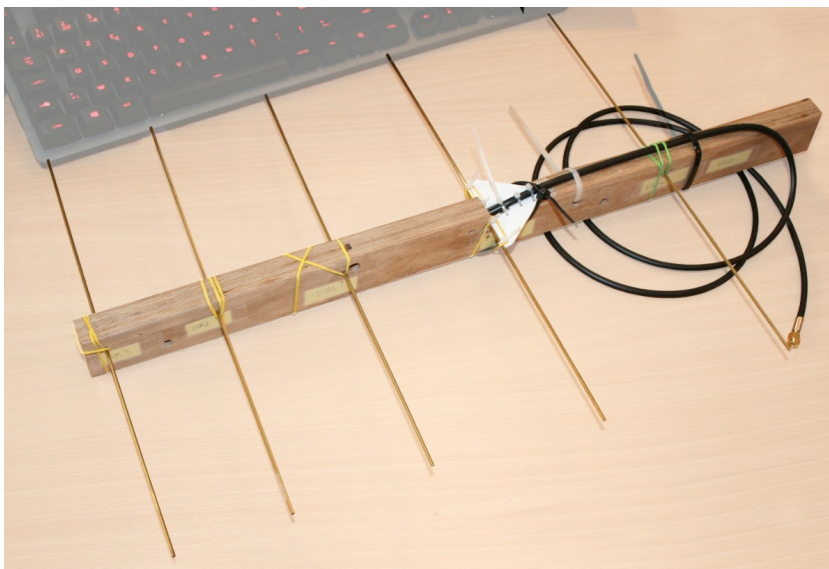
04RI005 – Dipole Antenna Radiation pattern

Max distance: not tested (Dipole + Dipole)

6.Yagi antenna (home-made)

The Yagi antenna, introduced in chapter 6, is based on the Dipole antenna.

As the dipole antenna, the Yagi antenna must be assembled with great care otherwise the directional gain will be lost!



04RI006 – Yagi antenna

Due to legal restriction, Yagi antenna cannot be used with emitter.
Yagi antenna is only with receiver.

Max distance: see tests of Yagi + other antenna

7.Yagi (5 elements) + Ground plane

This is the ideal setup for Cansat Contest.

The Yagi Antenna can be oriented toward the flying can (think twice to the polarisation). The ground plane above the flying can is suited for longer transmission.



04RI007 – Combination Yagi + Ground Plane

The two test sessions have been conducted in the wild and reported in the following articles:

- Cansat : RFM69HCW et communication longue distance
<https://arduino103.blogspot.com/2025/08/cansat-rfm69hcw-et-communication-longue.html>
- Cansat : RFM69HCW et communication longue distance (test session 2)
<https://arduino103.blogspot.com/2025/08/cansat-rfm69hcw-et-communication-longue.html>

Current distance: 4 Km with line of sight.

Max distance: Additional tests required.