



Radiantum

WIRELESS PERFORMANCE MATTERS

Dryad Networks
#2227 – LORA sensor and gateways
Passive measurements and Tuning - Sensor
14/10/22, Updated 27/04/2023
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Summary

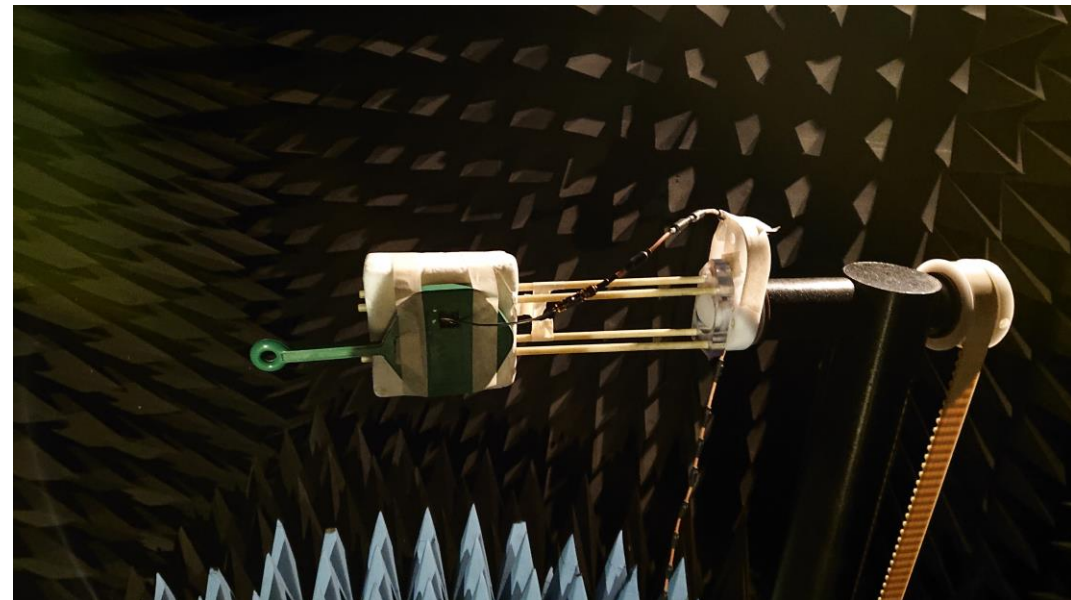
- Sensor prototype with new RF-layout has been measured, and the antenna has been matched.
 - New matching components are suggested.
 - The antenna matching and efficiency with the new layout is really good.
 - Clear improvement compared to the previous layout version can be seen in the total efficiency results.
- There have been problems with active testing
 - The CW-modes of the Sensors are not staying on and different output powers have been recorded from different Sensor prototypes.
 - It is not clear where the issue is: software or hardware.

Project target/specification

- Dryad Networks Sensor is set to operate in 868 MHz and 915 MHz LORA bands.
- High efficiency is required from the Sensor, since it will be placed on a tree, which will decrease its performance.

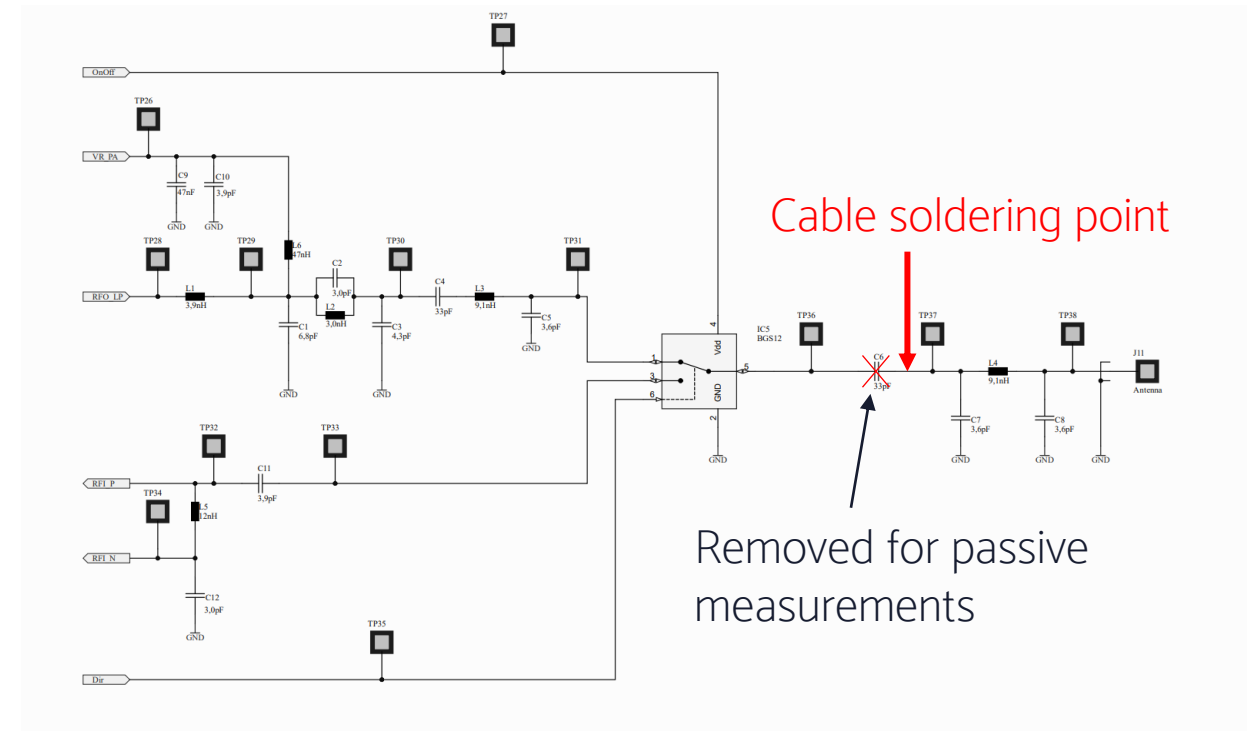
Passive Measurement Setup

- Passive (efficiency & gain) measurements are done at anechoic antenna chamber at Radiantum premises in Tampere.
- Chamber size is 3x3x5m



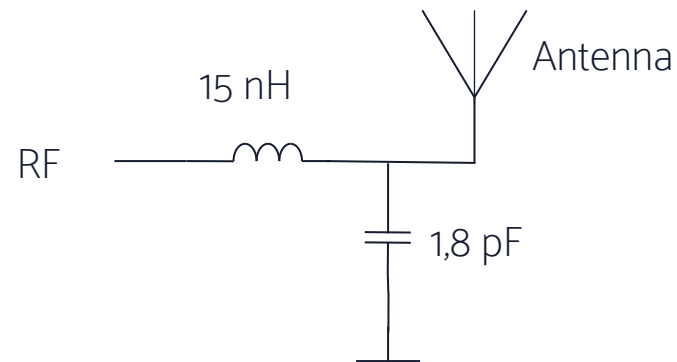
S11 Measurement Setup

- Antenna tuning (S11) was measured with VNA
- Measurements were done at free space



Proposed matching circuit

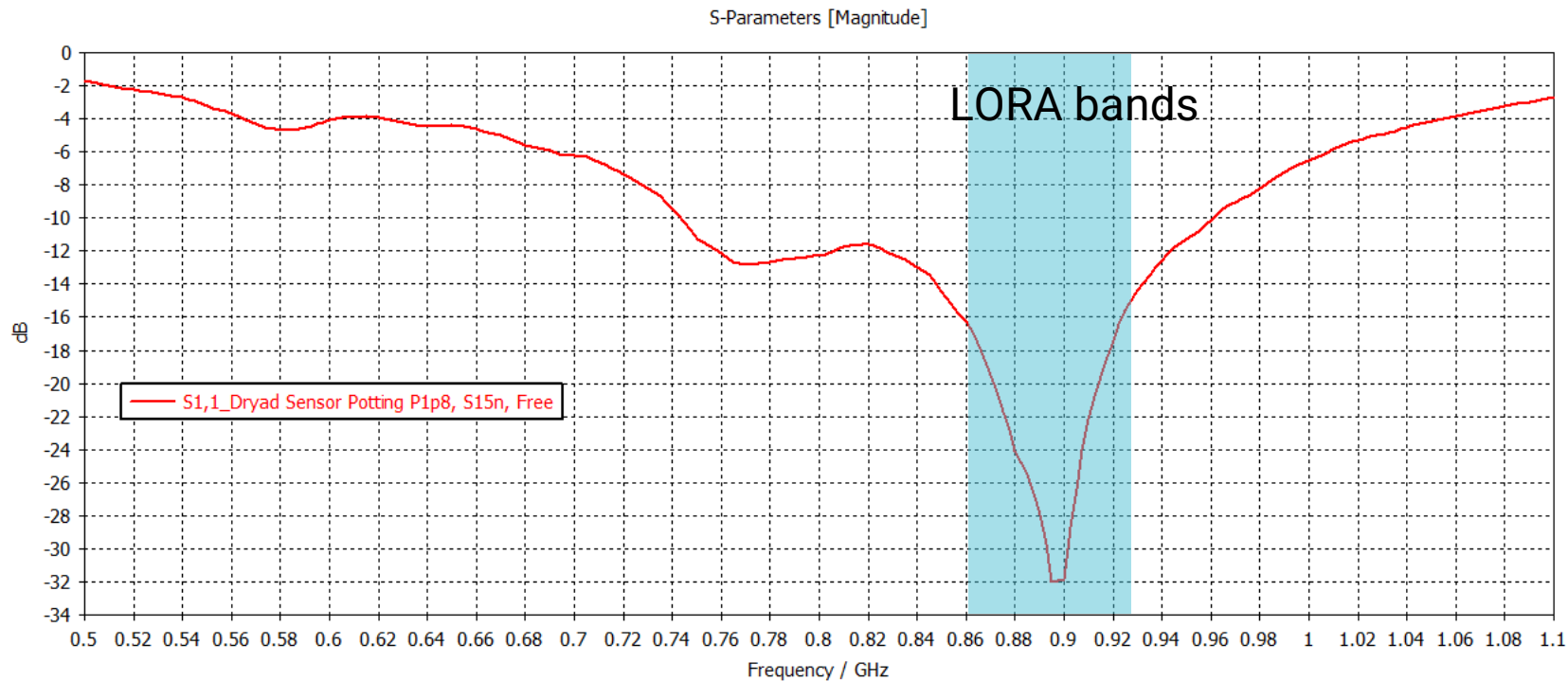
Measured matching circuit



Suggested component series:

- Capacitors: Murata GJM15
- Inductors: Murata LQW15AN_00
- 1,8 pF: Murata GJM1555C1H1R8CB01
- 15 nH: Murata LQW15AN15NJ00

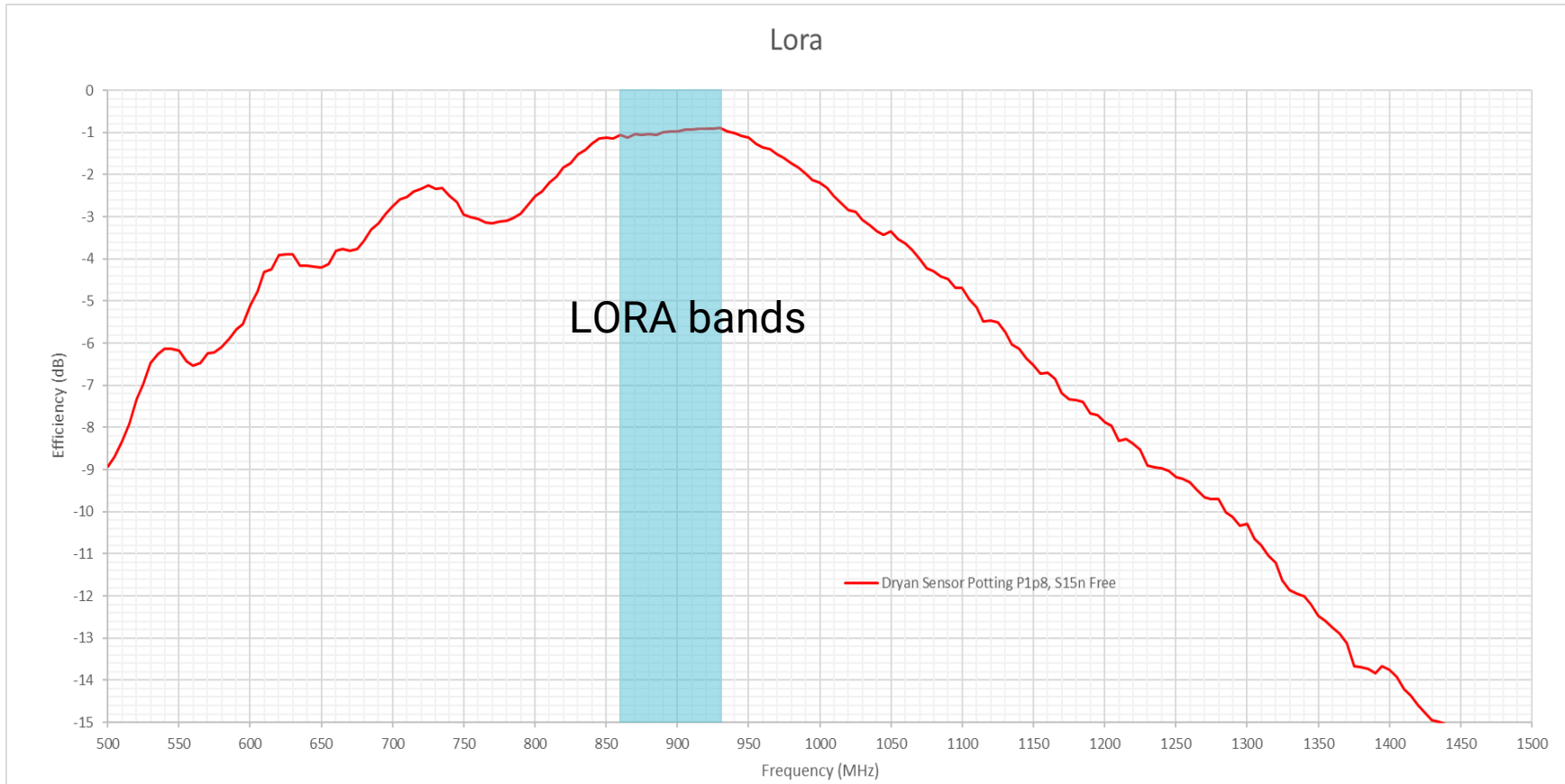
Dryad Sensor Matching - Potted



The proposed matching network provides extremely good matching for the required LORA bands.

The measurements have been done, when the Sensor is potted.

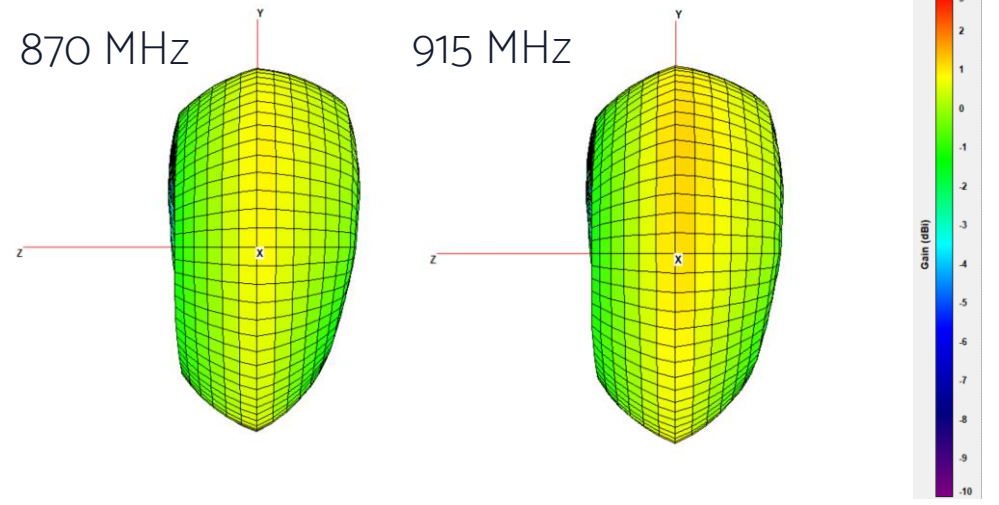
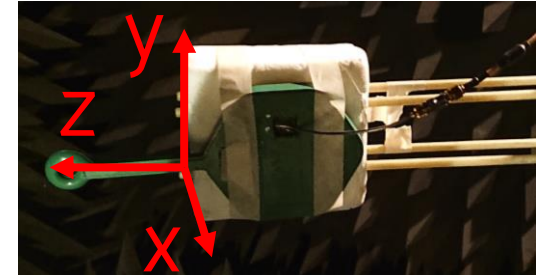
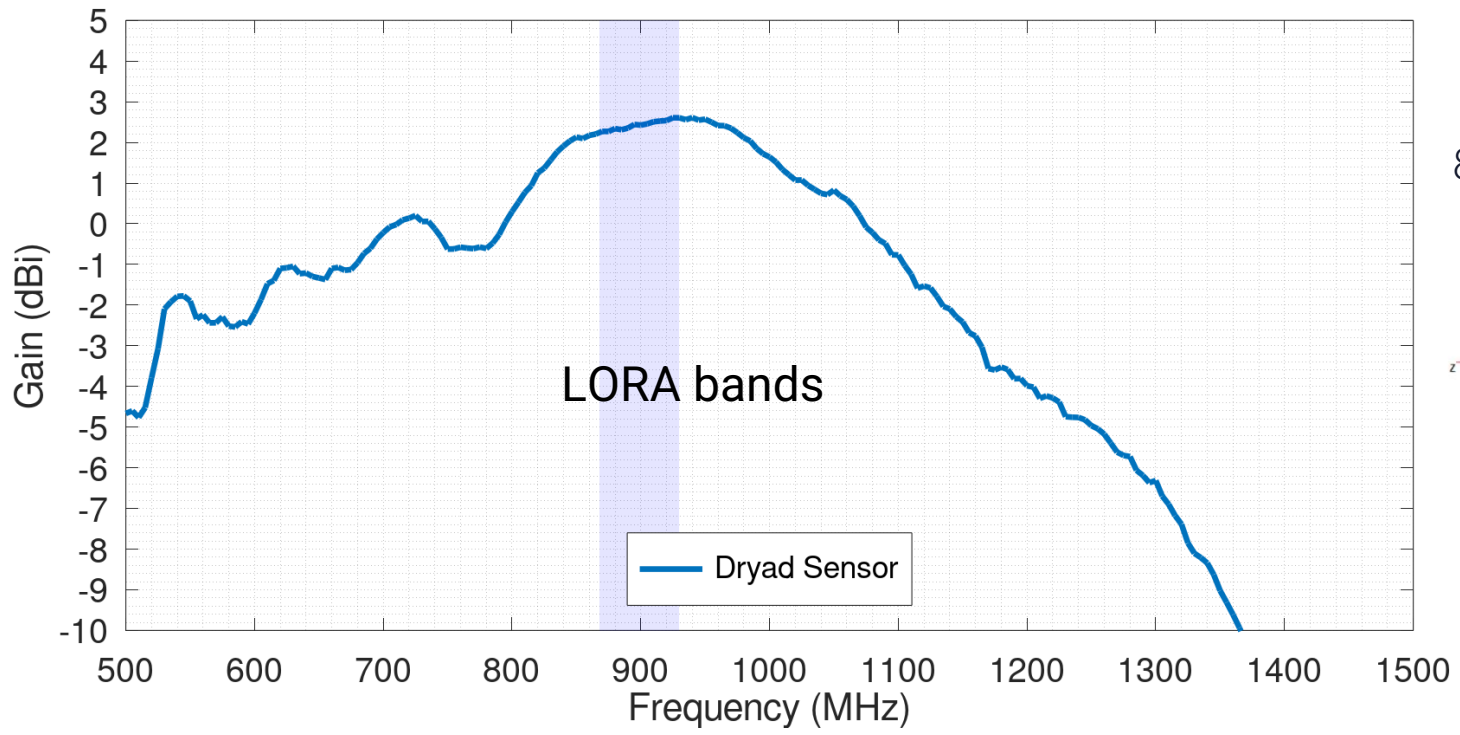
Dryad Sensor Tot. Efficiency - Potted



The measured total efficiency of the Sensor antenna is extremely high and reflects the matching result. There is clear improvement of around 1 dB from the previous Sensor-version.

The measurements have been done in free space (no wood behind the Sensor in anechoic chamber), when the Sensor is potted.

Dryad Sensor Gain - Potted



Measured gain results are in-line with the efficiency results, and the antenna realized gain is above 2dBi in the LoRa-bands. The radiation pattern is typical dipole pattern.