Sens’it antenna

Implementation rules & Integration guideline

1 Sens’it antenna overview

2 Antenna Performance overview on Sens’it device

3 Integration guidelines

4 Antenna tuning and matching parameters

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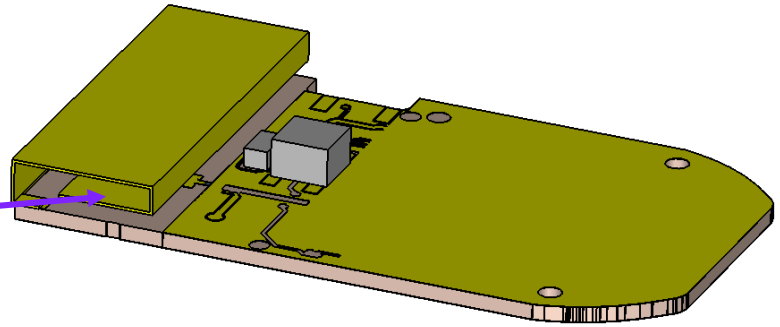
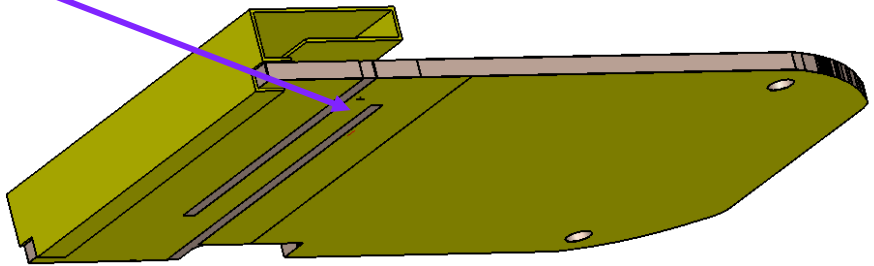
Sens’it antenna overview

The Sens’it antenna is made of two parts:

- A metal part
- A PCB printed part





This is a folded PIFA - like antenna.

It is possible to implement this antenna in other devices, however, some precaution must be taken

In most cases, only the printed part should be modified in order to implement this antenna in another device.

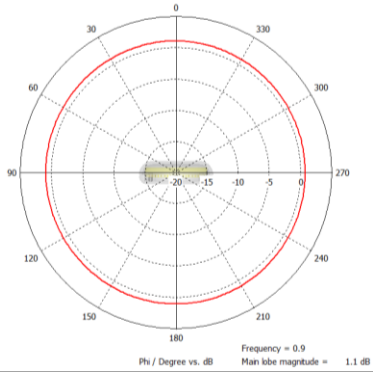
This document describes how to tune and match the sens’it antenna and provide recommendations on how to implement this antenna into another device.

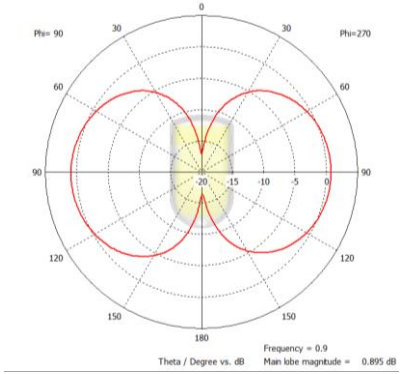
Sens’it radiation pattern

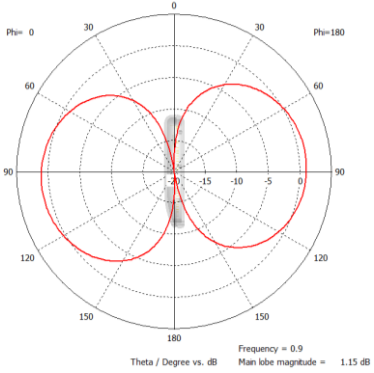
The Sens’it antenna provides an omnidirectional radiation pattern when implemented in the Sens’it device.

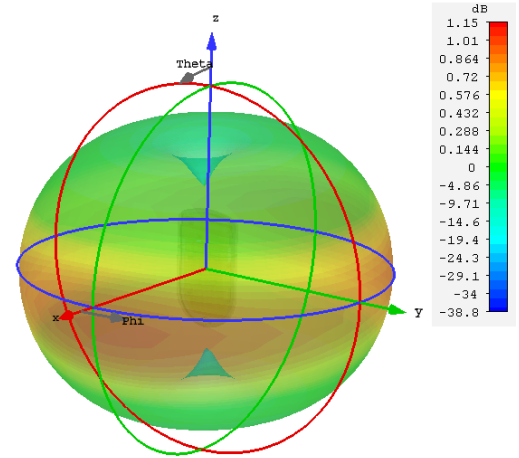
The radiation pattern is mainly driven by the size and form factor of the PCB as well as the antenna location.

Changing one of those three parameter can impact the radiation pattern.









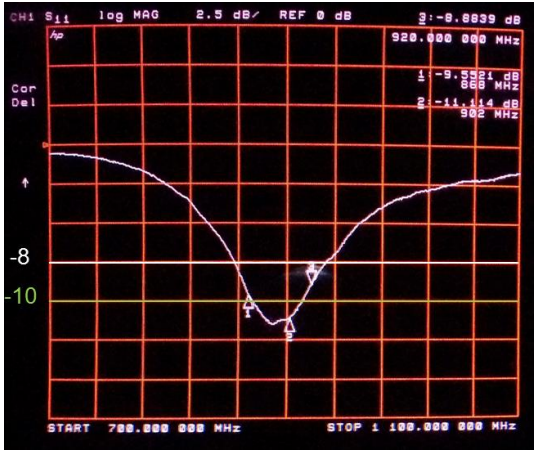
Type	Farfield
Approximation	enabled (kR >> 1)
Monitor	farfield (f=0.9) [14dBmW at Port1,Mode1]
Component	Abs
Output	Realized Gain
Frequency	0.9
Rad. effic.	-0.5930 dB
Tot. effic.	-0.9052 dB
TRP [dBmW]	13.09
rlzd.Gain	1.152 dB

- Antenna gain : +1dBi
- Antenna efficiency : -1dB
- ERP = 13dBm (for 14dBm input power)
- EIRP = 23dBm (for 22dBm input power)

Sens’it antenna Impedance

The sens’it antenna has enough bandwidth to cover the whole Sigfox frequency range.

- Return loss below -8dB over whole Sigfox frequency range.
- Reference impedance 50Ohms



Measured Return Loss plot

Smith Chart

Sensit antenna

Parameter impact on antenna

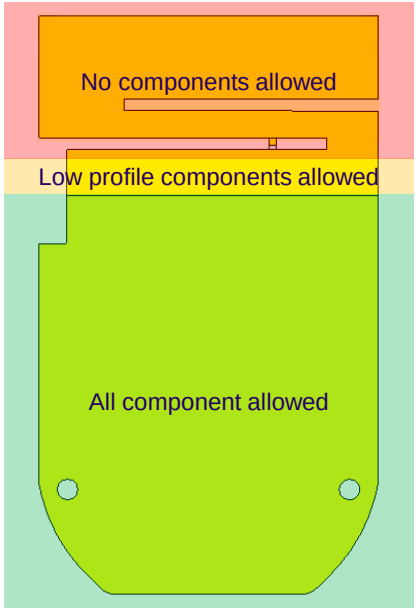
Parameters	Impact	Comment
Casing	++	• A casing change will impact the frequency tuning • It is better to keep ABS PC type casing
PCB length	++	• PCB length will impact the frequency tuning as well as the antenna Bandwidth
PCB width	+++	• PCB width will impact the frequency tuning as well as the antenna Bandwidth • It will require a retuning and matching of the antenna
Component location	+	• Changing the electronic is not critical though it may require • Avoid placing big components next to the antenna
Battery location	++	• The battery can be changed but an antenna tuning may be necessary • Try to keep the battery as far as possible from the antenna and avoid long wire to connect it to the PCB

+	Limited impact
++	Moderate impact
+++	High Impact

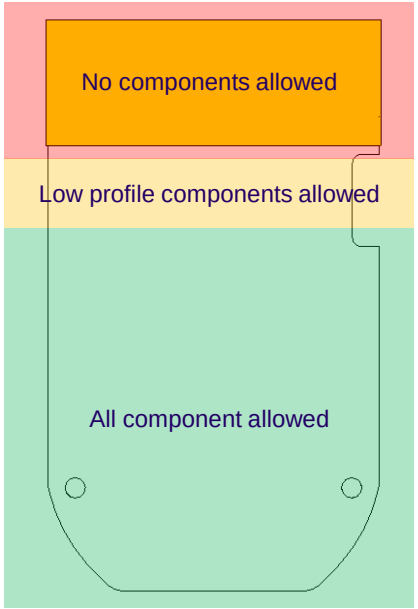
Sens’it area

To avoid antenna retuning and matching, respect the different component areas.

Back side



Front side



Low profile component include CMS chicken food components (eg. capacitors, coils, resistor)

Antenna tuning and matching parameters

As any antenna, the sens'it antenna uses the PCB to operate and is impacted by its surrounding (e.g. casing…)

Therefore, implementing the sens'it antenna in your device can require some tuning and matching in order to optimize the antenna performance.

This optimization can be done by adjusting two parameters of the PCB printed part of the antenna.

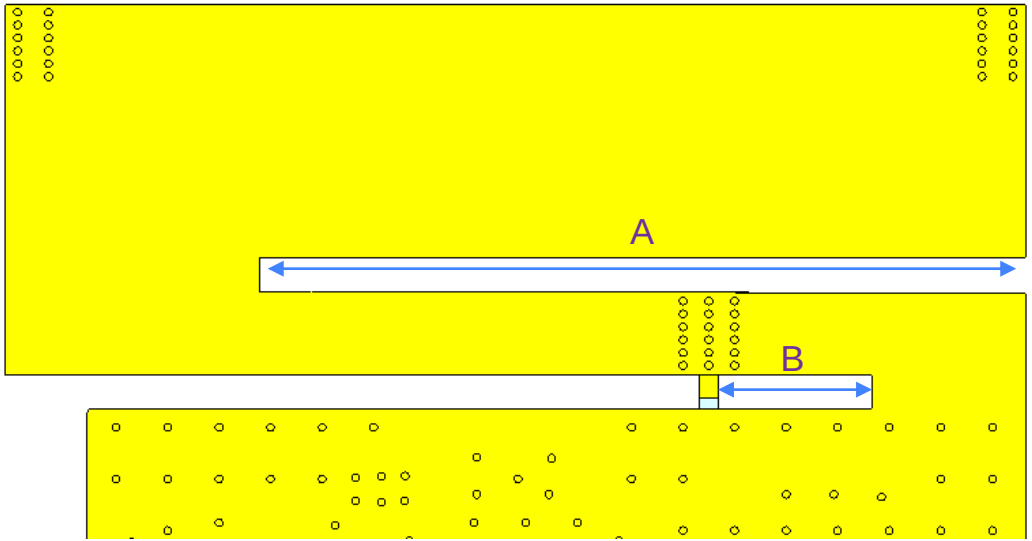
Frequency tuning

The size of slot A can be modified to tune the resonance frequency of the antenna

- Slot A length increase ➔ Fc move down
- Slot A length decrease ➔ Fc move up

Antenna Matching

Adjusting the dimension B will impact the antenna matching (impedance of the antenna)



Thank you!

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