

SPRINGCARD CONTACTLESS READERS INDUCTIVE COUPLING

Integration guide

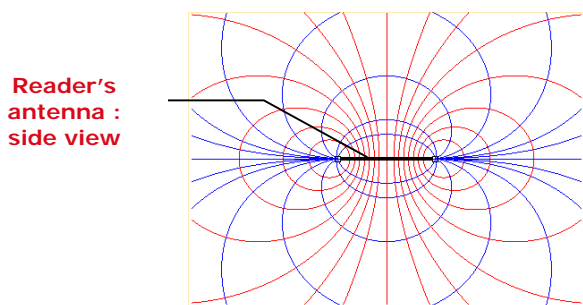
Thank you for choosing SpringCard !

This document gives an overview of:

- the magnetic field lines of the contactless readers
- how to interfere the least possible with these lines in order to optimize the capability of your readers.

This general guide applies to any contactless readers but especially to OEM modules which have to be integrated in an environment likely to disturb the generated magnetic field (e.g.: close metallic plate).

READER'S ANTENNA AND GENERATED MAGNETIC FIELD LINES



The reader's antenna generates a magnetic field that creates an inductive coupling with the card/tag's antenna present in the field. This **power transfer** is the basis of the HF communication between contactless readers and cards/tags. As a consequence, care should be taken in order to optimize this coupling.

There are 2 main parameters that interfere with power transfer :

- The presence of a metallic plate near the reader's antenna
- The card/tag position

CARD POSITIONING

In order to get the maximum power from the reader, the contactless card has to be positioned in a proper way regarding the reader antenna's position : they should be parallel as illustrated below.



Note: The typical operating distance L is about the shortest of the 2 antennas' radius

INSTALLATION SCHEMES AND THEIR EFFECTS

When a metallic plate is near the reader's antenna, the field is distorted and as a result, there may be no more (not enough) inductive coupling between reader and card/tag.

In the following examples, the operating areas for the card/tag are indicated.

Note that the ferrite and the antenna are not in contact. Actually, this would disturb the inductive coupling. That's why there is a layer of foam between the ferrite and the antenna in our products.

Note : you might need to adjust the variable capacity of the antenna. Please refer to the [Antenna designing guide](#) for more details.

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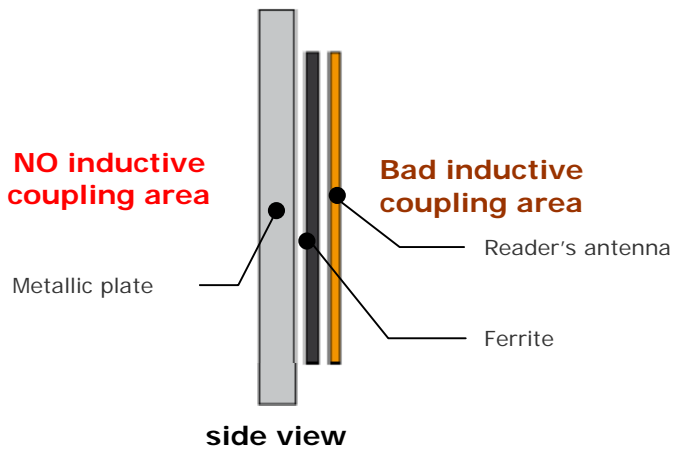
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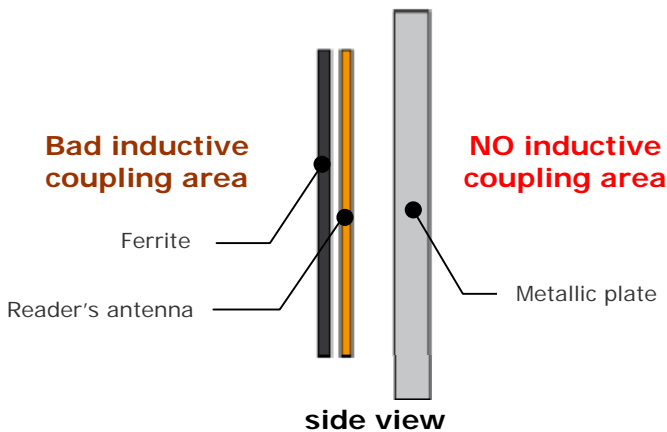
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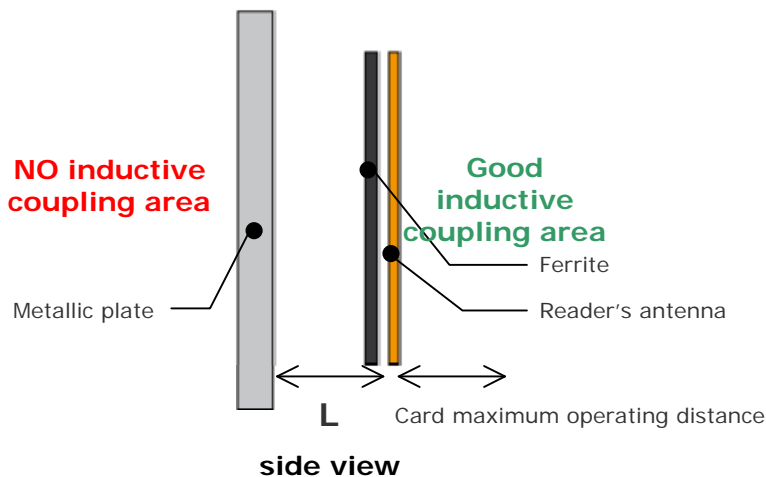
- **Example 1** : metallic plate is behind the ferrite and is too close to both ferrite & antenna. **NO!**



- **Example 2** : metallic plate is in front of the antenna and too close to both ferrite & antenna. **NO!**

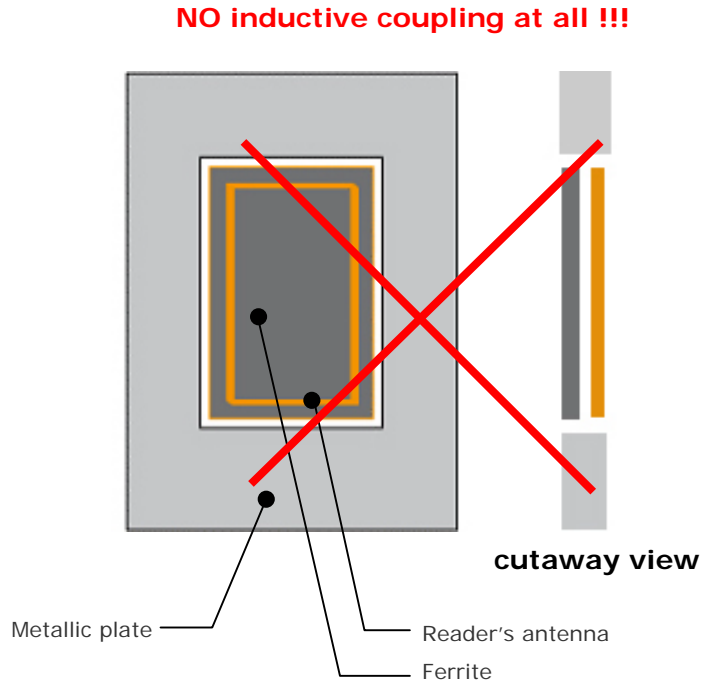


- **Example 3** : metallic plate is behind the ferrite and is distant enough (L) from both ferrite and antenna. **YES!**

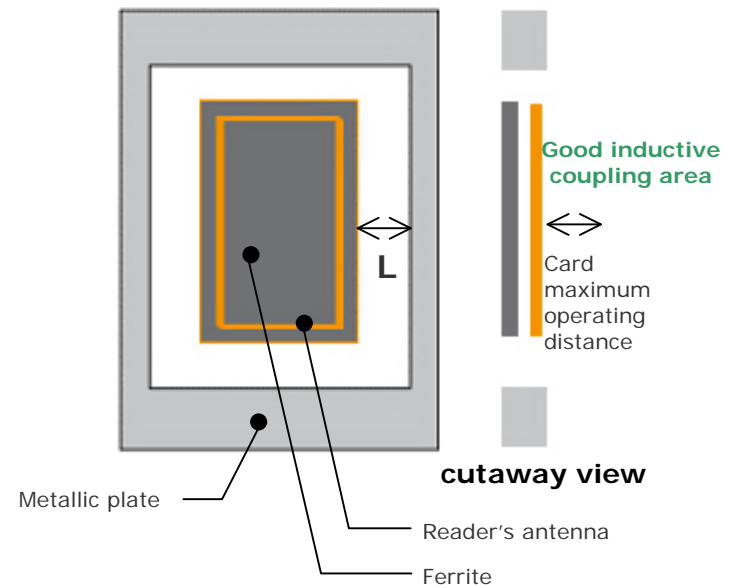


Note: The maximum operating distance between the reader's antenna and the card will be typically equal to the distance L.

- **Example 4** : Both ferrite and antenna are positioned inside a rectangular hole of the metallic plate. **NO!**



- **Example 5** : Both ferrite and antenna are positioned inside a rectangular hole of the metallic plate which is wide and high enough to not interfere with the magnetic field lines of the antenna. **YES!**



Note: The maximum operating distance between the reader's antenna and the card will be typically equal to the distance L.