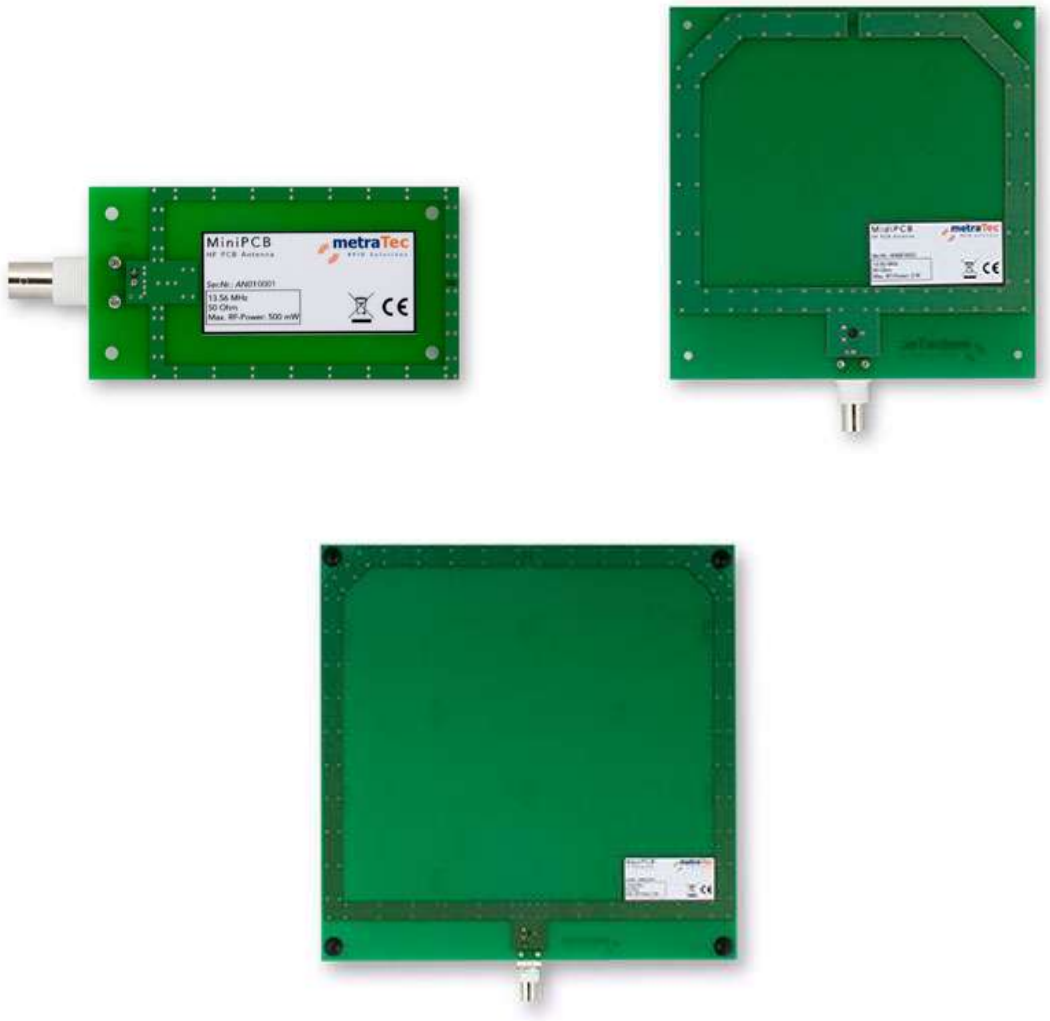
Antenna Integration Guide

for metraTec HF RFID Antennas



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1. General Notes / Introduction

HF Antennas for the 13.56MHz RFID band are resonant loop antennas which are pre-tuned for optimum performance by metraTec prior to delivery. For optimum performance of your RFID system it is important to preserve this tuning.

By integrating our antennas into your own device / application you might de-tune the antennas, leading to reduced performance (shorter read range, increased read errors, etc.). To make sure that you get optimum performance of our product, please read this integration guide carefully and follow the hints given in this document.

2. Material surrounding the antenna

The coupling to the RFID transponder is done using the magnetic field of the loop. The antenna may interact with its environment if the environment disturbs the magnetic field of the antenna.

Good conductors and ferromagnetic materials have the strongest influence on the magnetic field of an HF antenna. You should therefore:

- Keep the antenna away from any metallic or ferromagnetic parts of substantial size (> 20 mm).
- The distance should be at least the 1.5 x the largest antenna dimension.
- Replace any metallic parts by dielectric Materials such as Teflon, PEEK, PE or PVC as these do not influence HF antennas noticeably.
- Check furniture and desks for metallic parts before selecting a mounting position for the antenna.
- Avoid coupling of the antenna to other metallic loops like desk frames, machine frames and the like.

If in doubt, please contact metraTec before designing devices intended for housing RFID components.

3. Operating multiple readers in short distance

The magnetic field of HF RFID readers is not radiated and exists in the vicinity of the antenna only. However, HF RFID readers are not suitable to work in dense mode. If several antennas are to be used in your design you must avoid possible interaction and disturbance of the antennas.

- If only one antenna is provided with the HF signal by the reader at a time (in a multiplexed system) keep the antennas 1.5 x the largest antenna dimension apart.
- If more than one reader transmits its HF signal at a time keep the antennas 15 x the largest antenna dimension apart.

Avoid aligning long antenna edges parallel and close to each other. A shield consisting of metallic material and/or ferrite materials must be used if the above conditions cannot be met otherwise. Please contact metraTec for the design of such custom solutions.

4. Other Sources of Disturbance

RFID readers must be able to detect very weak signals transmitted by passive transponders. RFID technology is therefore somewhat sensitive to noisy environments. Devices known to interfere with RFID communication are e.g. motors, frequency inverters, neon tubes and poor switching power supplies.

- Keep all RFID components as far away as possible from power electronics, motors and their cables.
- Use high quality cables for connecting motors.
- Use shielded cables only.
- Do not install RFID antenna cables parallel to other cabling.
- Make sure all devices are properly grounded.
- Use high quality power supplies.
- Use separate supplies for RFID components and devices possibly conducting noise.
- Add ferrites to all connections of devices found to interfere with the reader.
- Install a metallic shield within the cabinet to separate it into sections if a RFID reader and switching power electronics are located in the same cabinet.

5. Antenna Cables

Use metraTec antenna cables only. Cables of unsuitable impedance or length can seriously degrade system performance.

The antenna cable shield must be connected to ground when the reader is installed as part of an automation system or machine. Antenna grounding is carried out at the Reader Multiplexer side only. Do not ground on both antenna cable ends. Carefully remove the outer isolation without damaging the actual woven or foil type metallic shield. Connect the shield to a low impedance ground clamp at entry in the cabinet.

Unsuitable grounding may lead to permanent damage of the reader or multiplexer.

Desktop installations using short cables may be operated floating on a DC power supply.

6. Conclusion

These are all rules of thumb to give the user the possibility to integrate an RFID system without extensive knowledge about RF systems. With some experience and measurement equipment it is possible to design stable RFID systems violating some of the above rules. This should however only be done after consultation with metraTec.

7. Further technical information

EN 300 330-1, -2: Electromagnetic compatibility and Radio spectrum Matters

ISO 15693: Identification cards – Contactless integrated circuit cards – Vicinity cards

ISO 14443 - Identification cards -- Contactless integrated circuit cards – Proximity cards

8. Version History

Version	*Change*	*by*	*Date*
1.0	created	KD	22.07.2010
1.1	review and update, section 5 added	TM	18.03.2015

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