Fraunhofer IMS

Next Generation of Industrial RFID

Increasing the Performance of RFID Systems by Using SHF Bands Offers Methods for Better Carrier Suppression and Signal Evaluation

Conventional RFID systems can't solve some challenges in the industrial and logistics sector and the use of RFID technology in metallic environments is particularly challenging. Two possible scenarios are relevant here:

1. The transponder (tag) is located in a metallic environment, e.g., in a container.
2. The tag is attached directly on a metallic substrate.

In the first case, it is difficult to read out the tags due to the formation of standing waves. In the second case, the performance of the tag on a metallic background is particularly problematic. The tag must be applied to small areas without affecting its performance and usability. Especially in case of tracking of tools or sterile goods, the visibility of the tags remains imperative.

Reader

In the last years, Fraunhofer IMS has developed a baseband board that performs signal processing in the baseband according to the ISO 18000-6 EPC Gen2 standard. Based on this standard, a UHF or SHF frontend can be used to modulate the baseband signals to a carrier frequency. The output power and the carrier frequency are adjustable. For interested parties, it is possible to set up exact requirements from the intended use and to select the suitable RFID technology (UHF/SHF). Fraunhofer IMS offers to develop a reader according to the specifications given.

Additional technologies such as carrier suppression against crosstalk of the transmitted signal on the receive path or the mode vortex patented by Fraunhofer IMS for optimal illumination of the target area by the transmitted signal are also possible. This can also be combined with our RFID on metal technology.

Transponder

The developed system operates in the SHF band at 5.8 GHz and the communication protocol was implemented following the ISO 18000-6 EPC Gen 2 standard. The chip has an Electronic Product Code (EPC) up to 448-bit and a 96-bit Tag Identifier. The overall size of the transponder depends largely on the performance and the exact installation situation. A current version, with the dimensions 9.4 mm x 5 mm x 1.5 mm, shows good properties in a variety of applications. The communication link to the tag is very robust against cross interference from nearby metal parts. This transponder can be recessed flush in the metal. The extension with additional functions such as temperature measurement is currently being investigated.

Customized transponder integration in meta

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We Bring Our RFID Solution on Your Metallic Surfaces

Fraunhofer IMS is developing new RFID technologies that are suitable for use on or inlaid in a metallic surface (RFID on metal). The SHF (Super High Frequency) band is used to increase the performance of RFID tags on or in metal. The use of the SHF band offers many advantages over conventional and well-known RFID solutions in terms of the size of the RFID tag and, above all, its possible use in a metallic environment. So far, no RFID solution in the SHF band is available on the market. Fraunhofer IMS is therefore also actively working on the communication protocols for this range to be established as a standard. Find out about our services below and get in touch with us about our solutions.

Features

- RFID on metal
- Multiple tag reading
- Optionally flush mounting or surface mounting on metallic instruments

Services

- Customized reader antenna (linear, cross, circular polarization)
- Reader antenna with beam forming
- Customized tag antenna on metal
- Integration and assembling technologies
- Simulation

Smart Factory Applications

- Implementing condition-based maintenance
- Real-time monitoring of production flow
- In-depth maintenance insights
- Reduce in-process inventory
- Autonomous material handling

Contact

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