



Improving Radio Frequency Identification systems

RFID Reference Design Center





The RDC improves the performance and reliability of existing RFID systems by thoroughly testing applications under actual conditions for various industries such as pharmaceutical, manufacturing and retail.

Working in collaboration with key industry bodies such as EPCglobal and the International Organization for Standardization (ISO), the facility will help NXP and its partners to deliver RFID solutions with optimum read ranges and system configuration.

The RDC develops new RFID solutions with a frequency agnostic approach, as wireless frequency ranges are assessed and recommended based on the exact needs of the individual application.

The RDC thoroughly evaluates applications under real-life conditions



UHF Label Antenna Design

Antenna Design plays a key role in success of RFID applications. It is very important to understand what parameters the IC must have to fit best for most applications and to design appropriate label for it. To satisfy the label requirements for different types of applications - retail, ILT, fashion, pharma etc.

- the RDC has a dedicated and experienced team focused on the complex task of UHF antenna design.

To reduce time to market and verify IC performance, the RDC can provide a single point of contact for the entire antenna design cycle: From designing the label with professional simulation tools, etching the antenna on PET foil to the assembly of small quantities of labels.

With its in house antenna design capability, NXP's RDC provides the capability to quickly validate the expected performance of different label form factors in specific applications. Issues such as reading labels from multiple and varied directions, reading so called "stacked" labels, as well as the ability to read labels on multiple types of materials are successfully solved by RDC generic label antenna designs.

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UHF Label Performance Tests

Within the controlled RF environment (anechoic chamber) in the RDC it is possible to carry out a wide range of tests such as read and write range tests, backscatter strength measurements, write timing (protocol analysis), tag proximity tests and the minimal operation power of the labels (Pmin). All measurements are done in far field according to EPCglobal and ISO test procedures over the frequency band from 840 – 990 MHz. Labels and tags are also measured on different reference materials with defined permittivity values 2.1 to 12.5 to investigate potential changes of their performance parameter.



Label Tester

The RDC's Label Tester reference design enables reel-to-reel label performance testing, focused on the selection of labels to meet the application requirements in the far field. As the performance of labels in near field is not comparable to far field behaviour, NXP's RDC Label Tester proves to be a very efficient and useful solution for label manufacturers.

The Label Tester is designed to test any of the myriad of UHF label form factors. It is used for quality inspection (marking bad labels automatically online) and automatic yield calculation of UHF labels based on desired read range.

NXP's Label Tester is extremely useful in controlling the process of label assembly by label manufacturers as well as allowing end users to use only those labels that meet their requirements.



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Product Scanner

NXP's Product Scanner is simply the fastest and most accurate way to find the most optimum placement for UHF labels on products. The analysis can be done independent from a specific label and is based on pure physical parameters.

With higher frequencies, the dielectric properties of materials affect the parameters of the label antenna and thus affect the overall performance of the RFID system.

The Product Scanner measures quickly and accurately the dielectric constant along the surface of the product. The measured dielectric constant of the product correlated with the measured sensitivity of the RFID tag/label provides critical design information, which allows the optimal choice of label placement on the product. Accompanied with user friendly SW, the optimum placement for any desired label in different regions (EU/US/Asia) can be found quickly and easily.



Field Strength Recorder

With very compact size (115 x 40 x 4 mm) and wireless command/data transfer through RF interface, the Field Strength Recorder (FSR) is a stand-alone device for field analysis in any RFID application.

It's small size and neutrality with regards to the material it is attached to allow the FSR to be placed inside a palette measuring the field strength at the label position. With this data it can be confirmed whether there is enough energy to power up the UHF label at specific location inside the palette.

With on board rechargeable battery and 64 Mbit integrated memory the FSR can be operated independently and cablefree for several hours of measurements. Because of its features the FSR enables a simple and fast method of portal evaluation.





RFID UHF Portal for Logistics EU/US

The UHF RFID Portal is one of our exclusive reference designs which is widely appreciated and accepted. In simple terms this device is a gate antenna housed in compact cabinets equipped with integrated industry standard components. It features event based directionality recognition derived by reader embedded software together with sensors fitted inside the cabinet.

Key Features:

- ▶ Optimized read performance
- ▶ Cost effective manufacturing
- ▶ Easy installation
- ▶ Low operating costs
- ▶ Independent component sourcing
- ▶ Directionality feature

***NXP's RDC is
perfectly suited
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SCM applications***

Real Life conditions

System integrators are primarily focused on performance of RFID components in real world manufacturing environments. In order to accelerate system development and improve customer confidence in RFID, the RDC actively supports RFID system development.

The RDC can optimize systems and components for system integrators in a realistic working environment prior to their delivery to the customer. Housed in a large building with 800 sqm of space with all the necessary infrastructure including labs, testing equipment and pallet moving equipment, NXP's RDC is perfectly suited for recreating the conditions faced by real-life SCM applications. The RDC's activities have clear benefits for everyone involved in RFID – from our partners in the industry to end-users who deploy the technology in their supply chains and the people who use it in their daily working life.



Point-of-Sale (POS) currently represents one of the most challenging applications for UHF RFID technology



Point of Sale

Point-of-Sale (POS) currently represents one of the most challenging applications for UHF RFID technology. It is essential to read only those tags that are placed above the point of sale antenna. Based on these strict requirements and a need to read all kinds of products at the POS (for example those with high water or metal content) a short range UHF antenna has been developed and built by NXP's RDC.

This antenna creates a strong uniform magnetic field and significant improvement in magnetic coupling along the axis of the antenna. POS consists of reader and the short range antenna embedded together in one housing which has only two inputs, power and LAN cable. Together with the hardware comes visualization SW such that this POS application is plug & play for demonstration purposes.

Key Features

- ▶ High accuracy read volume
- ▶ Short and defined read range
- ▶ Designed for individual item scanning
- ▶ Compact design
- ▶ Integrated reader and antenna



UHF ILT Tunnel Reader

The NXP Reference Design Center tunnel antenna is designed for premium performance on all applications, where items are transported in boxes or totes on a conveyor up to 55 cm wide. The tunnel is based on four integrated antennas, able to be connected to typical 4-port fixed UHF readers used in portal applications.

The special antenna characteristics enables high performance reads within the tunnel while simultaneously providing best in class separation against unwanted reads of items outside the tunnel whether on an adjacent conveyor or on the same belt.

The flexible design enables easy adoption to the conveyor system that is used, allowing it to be integrated in a family of new conveyor elements as well as upgrading existing installations.

Portable Label Measurement Device

To solve the need of having a small portable unit able to measure minimal activation power of labels accurately and efficiently, the RDC has developed a portable label measurement device.

This unit consists of UHF reader and a near field antenna inside a box (150 x 80 x 50 mm), supports the wide power range from +5dBm to +30dBm and the whole UHF RFID frequency range (840MHz to 960MHz).

It offers the possibility to connect an external antenna to the unit which enables very accurate measurements using the provided calibration files. Accompanied by evaluation software, the unit is a simple to use plug & play device which could be used for quick on-site measurements or connected to an external antenna for precise and accurate laboratory measurements.



For more information visit www.nxp.com/support
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