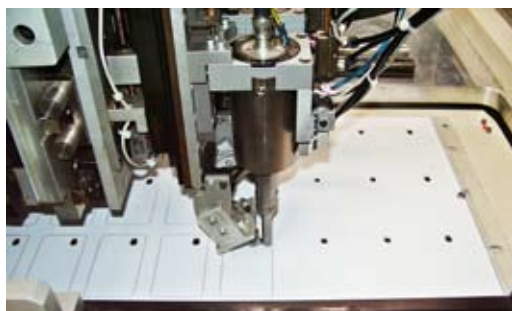


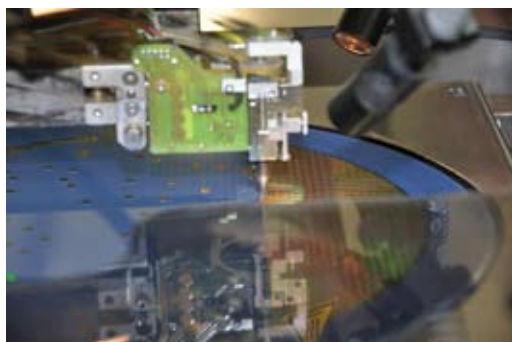
Wire bonding for module production



Antenna Production



Customers in public transport can store their electronic ticket in a contactless card or mobile phone.



Wafer processing for module production

## CARDAG

Deutschland GmbH

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### Company Profile

Cardag Deutschland GmbH is specialized in the development, design, manufacturing and sales of high quality and long-lasting contactless and contact smart cards. The cards can be as diverse as the ideas of our customers.

Our highly automated in-house production process starts with our own module manufacturing via antenna and card production with 100% electrically tested units. Card personalization and encoding complete our services.

Due to our active influence on every manufacturing step, we realize customer-specific requirements while offering high flexibility and reliability in production process and lead time.

Cards and related products made by Cardag are used in markets such as public transportation, secure access and identification, vending, ticketing and industrial environments. Contactless cards from Cardag hold several certifications, e. g. from Arsenal or ITSO.

## UHF Transponders - The Way from Low Cost Labels to ISO Cards

Cardag has expanded its proven product range based on specifically-designed wired antennas and our own contactless module with the

platform UHF card, using our two decades of experience in design and production of contactless cards.

Labels in the UHF frequency range have matured, especially in the field of product coding as an alternative, sometimes also complementing barcodes.

Cards working in this UHF band are often based on smart labels, fulfilling the ISO specifications for contactless cards only with limitations. Labels made with printed or etched antennas are always connected to un housed semiconductors and, in most cases, are simply glued to the card body.

The market requirements are becoming more and more specific. In order to follow such demands for type variety, longer life cycle, temperature stability and so on, we searched for efficient ways to offer a variety of UHF cards, similar to our broad spectrum of HF cards, using our proven technology.

Other options were the possibility to combine UHF and HF transponders and the ability to embed a contact chip module to assist a system change from contact and/or HF systems to UHF or to complement existing systems with long range applications.

Application notes and specifications published in the 'UHF Golden Tag Antenna Design Guide' by Philips / NXP Semiconductors in 2006 were the basis for our development.

The proven high performance antenna technology used over many years in multiple identity card projects and the production of our own contactless module have allowed us to make relatively chip-independent oscillation circuits using an UHF loop module.

When designing UHF systems, you have to take care of specific features, contrary to HF systems, such as sensitivity to the surrounding medium. However, such requirements are relatively easy to adjust for because of the possibility to optimize the embedded antenna and UHF loop unit in many variations.

Generally speaking, we offer passive UHF cards based on this technology. These rightly carry the title 'contactless card' because they pass all relevant ISO specifications.

Every day brings new applications for UHF cards followed by the increasing requirements on the features of UHF chips, e.g. more memory or cryptographic properties. Strictly following the ISO requirements as base of the development of our platform UHF Card makes it possible to process such advanced, sometimes larger sized chips with more functions without the need to change our technology.

Our offer to the market includes contactless cards with solitary UHF chips as U-Code™ or Monza™, combinations with HF chips, ex. with the complete Mifare™ family, or other semiconductors following the ISO14443A standard. The platform is completed by hybrid cards – combinations of UHF with contact chips or UHF/HF with contact chips. All those cards and combinations can be produced with hardly any limitations in the choice of the card material used, such as premium PVC, ABS, polycarbonate or blends of them.

### Core competencies

- 1 Design and production of contactless cards in 125 kHz (LF), 13.56 MHz (HF) and 800MHz (UHF) frequency ranges and combinations of these frequencies
- 2 e-datapage inlays
- 3 Dual-interface DIP and hybrid cards
- 4 Own development of manufacturing and testing equipment
- 5 Technical consulting services