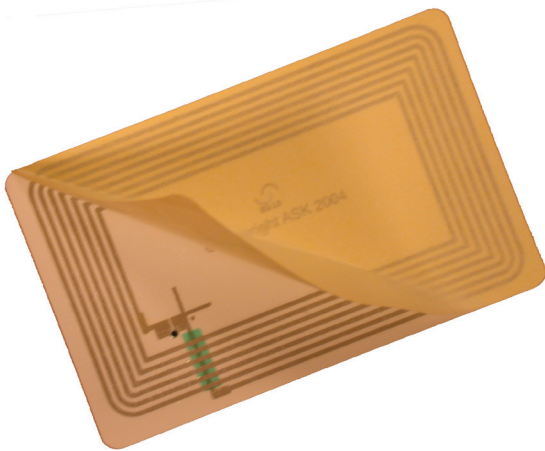


DuPont Microcircuit Materials

APPLICATION PROFILE

5033 Screen-Printable Conductive Ink for RFID Antennas



In the recent past, plastic cards with magnetic strips were used as reusable cards in the public transportation industry and other applications. Among the new technologies that would better address the evolving transportation needs, contactless cards were quickly recognized as the best solution. This technology proved to be reliable, providing low cost, durable tickets capable of withstanding harsh environments. In addition, they also offered value-added services to both the operator and the end user, in particular for their compatibility with Automatic Fare Collection (AFC) systems.

Challenge **Quicker, More Cost-Effective Smart Card Transactions**

Traditional antennas in contactless cards are made by embedding copper wire on a plastic substrate, or by using copper etching techniques. Although acceptable for medium volume production, both of these methods are costly, and do not represent the best environmentally friendly alternative.

To better address the requirements of contactless tickets in this evolving market, the company ASK, a leading manufacturer of contactless, microprocessor smart cards, has developed a technology based on screen printing antenna tracks using conductive silver ink. This technique reduces traditional manufacturing costs and significantly boosts reliability.

The antenna is the component which allows the chip in the Smart Card to achieve contactless operation. In a simplified overview, the reader (or transceiver) transmits a radio frequency signal, which the antenna receives. It energizes the IC chip allowing the data to be processed and communicated back to the reader via the antenna. Depending on the operating frequency, the printed tags (antenna + IC module) fall into 2 groups. Those operating in the High Frequency (HF) 13.56 MHz band use a printed coil antenna and have read distances of less than 10 cm. Typical applications include ticketing, security and financial/banking. In the Ultra High Frequency (UHF) band, operation is around 900 MHz, and these require a dipole antenna design. Tags can be read beyond 4 m and are primarily used in luggage tagging and labeling.



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Solution

DuPont Thick Film Pastes Provide Durability and Security

In response to an effort to drive down costs of producing smart tags and labels, DuPont Microcircuit Materials has introduced 5033, a conductive ink specifically designed for clean, cost-effective production of antennas for RFID cards and labels. Featuring lower silver content, 5033 ink brings higher performance, greater coverage, and allows the production of lower-cost RFID labels based on almost any substrate, for virtually any application.

ASK has developed this new technology, based on DuPont's conductive silver ink pastes, which allows the antenna to be screen printed onto paper. This forms the inlay for each contactless card to which the die is subsequently attached. The paper inlay is very flexible and resilient to bending and twisting, reducing the risk of electronic failure. The screen printing process is an additive process, as opposed to the previously used subtractive process of etching into a copper layer. Because this additive process uses few raw materials, waste products are limited, making the process more cost effective and environmentally friendly.

In addition, screen printed cards using DuPont thick film pastes can offer added security. Attempts to tamper with a smart card utilizing a screen printed antenna and a flip chip unit will break the RFID system, making it nearly impossible to retrieve personal information that may have been added during the final stages of card production. These screen printed cards are ideal for personalized electronic documents containing biometric information, such as e-passports, e-visas, and e-driver's licenses.

ASK and DuPont Microcircuit Materials continue to work closely together to advance Smart Card technology. Conductive inks developed by DuPont are suitable for a wide range of applications in the transportation industry. Founded in 1997 and based at Sophia Antipolis in the South of France with 125 employees, ASK is a leading manufacturer of contactless microprocessor smart cards, contactless paper tickets and RFID smart paper labels and inlays with over 50 million products in circulation worldwide. As a result of this unique technology of silver ink printed antenna on paper in a reel-to-reel manufacturing process, ASK's applications include mass transit, access control, secure documents and banking.

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