Inlay Companies Testing EM Micro’s Dual NFC and EPC Chip

Global semiconductor manufacturer EM Microelectronic has released its new EM4423 silicon chip featuring two types of passive RFID interfaces—EPC Gen2v2 and Near Field Communication (NFC)—on a single IC. The chip would enable companies to create tags that can transmit the same unique ID

number and data stored in its memory via ultrahigh-frequency (UHF) EPC or high-frequency (HF) NFC readers. The EM4423 is currently being tested by nearly every major RFID inlay manufacturer, according to Mark Jakusovszky, EM Microelectronic's U.S. sales and marketing manager. Following that testing period, he says, the company expects inlay makers and systems integrators to begin designing technology and solutions leveraging the IC's dual functionality. EM Microelectronic intends to begin mass-producing the chips by the end of this year.

The technology was initially designed to meet the needs of EM Microelectronic's parent company, Swatch Group. Some of the watch company's subsidiaries use EPC UHF RFID tags on the packaging of their products in order to track inventory en route to stores. The company liked the idea of enabling customers to use their NFC-enabled smartphones or tablets to access more information about the watches—or to share their own data—at the point of purchase, via that same tag. In that way, Swatch and its watch-making subsidiaries would be able to interface with their end customers.

Mark Jakusovszky

Once the technology was developed, says Hugues Blangy, EM Microelectronic's business unit manager of RFID circuits, his company drew interest for such technology on a broader scale, so that even as some Swatch subsidiaries are testing EM4423-based tags on some of their own products, consumer goods manufacturers and systems integrators are showing an interest in using EM4423-based tags in similar ways.

There are dual NFC and UHF tags currently on the market, but they come with two independent systems—one chip and antenna dedicated to NFC HF transmission and data storage, and another chip and antenna for UHF. With the EM4423, the single chip, connected to an HF and UHF antenna, can communicate with either an HF NFC reader or a UHF EPC Gen 2 or Gen2v2 reader. The chip's memory for data storage (more than 2 kilobits) is accessible by both types of readers (HF or UHF). Once interrogated, Blangy explains, the chip responds on the corresponding frequency band.

The EM4423 also features an NFC field powering option for increased UHF performance and reading range. Thus, if the IC receives both HF and UHF reader transmissions simultaneously, it can use the NFC signal to boost the power of its UHF response. This function is inherent in the chip's design, so it need not be special-ordered.

Typically, the tag could be used as an inventory tool to manage the movements of products from the point of manufacture to the storefront. In this way, EPC UHF readers could track the goods as they pass through distribution centers and are moved to a store's back room or onto the sales-floor shelves, where customers could then select them for purchase. The shoppers would benefit from reading the tags via their NFC-enabled phones, such as most Android-based smartphones that come with built-in NFC readers. (The Apple iPhone 6 also has a built-in NFC reader, but that functionality is currently only useable for Apple Pay transactions.)

The EM4423 chip's NFC functionality could offer a variety of purposes if product manufacturers or retailers so choose, such as directing an NFC-enabled phone to the product brand's website, or to media or content about that product. It could enable customers to sign up for loyalty programs, or to register their new product after buying it. The chip's NFC function could also enable a brand or retailer to count the

number of times that an item's tag was interrogated, enabling it to better understand how much interest the product is receiving at the store. The NFC tag could also be used with a phone to authenticate the product, thereby proving that it is not a counterfeit. (Blangy, however, does not specify how Swatch's subsidiary companies might employ the new chip.)

In addition, the system makes data privacy possible, by enabling retailers to use Gen2v2's untraceable or kill command for UHF reading. The kill command renders a UHF function inoperable forever, while an untraceable command would require a password to be used for any subsequent read via UHF. The untraceable command also allows users to change the tag's UHF read range to within a few inches. "Data privacy is very important to consumers, especially in Europe," Blangy states. However, he says, even when the EM4423's UHF function is rendered untraceable or even permanently disabled by the kill command, the chip's NFC operation would remain unchanged, so that the product could be returned to a store, for instance, and its tag could still be interrogated by an NFC reader, but only at close range, thereby protecting the privacy of the tag's data.

It took EM Microelectronic approximately one year to develop the chip, Blangy reports. During that time, he says, the company's efforts failed to generate much interest from the RFID industry, and EM Microelectronic intended to provide the new technology solely to its own parent company. Now, however, it finds that there is considerably more interest from RFID integrators and tag manufacturers, now that the chip has been developed and they can see its value.

Blangy speculates that small retailers may benefit from the dual-frequency RFID labels, since many of them may not use UHF RFID readers and would now be able to utilize the tags already on products that arrive at the store, by scanning each tag's ID number via their NFC phones. Inlay manufacturers, he adds, will also be able to reduce costs, by using the EM4423 to make

a dual-frequency tag as opposed to using two separate ICs to produce such a tag.