

Matrics Touts Smallest RFID Chip

The company's next-generation UHF integrated circuit will be half the size of a grain of sand.

Jan. 9, 2003 - Matrics, a startup RFID company based in Columbia, Md., says it has designed the world's smallest UHF microchip, which will be embedded in its next generation of RFID inlays and smart labels. The chip, which is compliant with the Auto-ID Center's Electronic Product Code (EPC), will be about 550 microns square, or about half the size of a grain of sand.

Matrics CEO Piyush Sodha says the microchip is currently at the "tapeout" stage, the final stage before going into fabrication, and that it should be available by the middle of this year. The company didn't produce a prototype, according to Sodha, because the new integrated circuit is essentially the same chip as the Type 0 chip that Matrics will begin selling later this month (see Matrics To Sell New EPC Tag).

"All of the RF concepts and all of the fundamentals of the circuit design have been verified," Sodha says. "There really was no need to debug anything. It's just a quantum improvement in the size."

The chip that will be available later this month is about 900 microns square. It operates in the 902-928 MHz band and must be programmed at the factory. The new chip is not only smaller, but Sodha says it can either be programmed at the factory or by customers after they receive it.

The new chip will be less expensive to manufacture because the smaller size means more chips can be produced from each silicon wafer. It will also be made using a standard CMOS (Complementary Metal Oxide Semiconductor) process, which is the lowest-cost silicon fabrication process.

One issue with a smaller microchip is the ability of existing assembly machines to attach the RF antenna and turn out a finished inlay. Sodha says that the machines can handle chips as small as 500 microns square, but the process begins to break down if the chip gets any smaller.

"We chose this size because we initially want to carry on using a more mature manufacturing process," Sodha says. "We don't want all of the vendors to have to change their attachment lines to use our chips."

Microchips will need to get even smaller to get to the very low cost price point that many retailers are looking for. Since the current machinery is unable to handle anything much smaller than this latest design, Matrics is working with KSW Microtec and Mühlbauer of Germany on a high-speed, low-cost machine for attaching antennas to microchips.

"The new attachment technology will not only enhance the throughput speed," says Sodha, "it will also be able to handle smaller chips."

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