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No Thanks for the Memory

By [Nicole Ridgway](#) Published: July 13, 2006

SOMETIMES BEING THE first to market with a near-revolutionary new technology warrants hero status. But perhaps status is all it warrants.

Freescale Semiconductor ([FSL](#)) can attest to that. The Austin, Texas, chip maker wowed industry peers this week when it announced that it had started volume production of what has been dubbed "the holy grail" of next-generation memory chip technology known as MRAM. Freescale, which was spun off from **Motorola** ([MOT](#)) two years ago, beat competitors like **Sony** ([SNE](#)), **Honeywell** ([HON](#)) and a joint venture between **IBM** ([IBM](#)) and **Infineon Technologies** ([IFX](#)) in an almost decade-long race to harness this "universal memory" and bring MRAM to market. (**Cypress Semiconductor** ([CY](#)) abandoned its MRAM efforts last year due to the level of investment MRAM required and the difficulty the company would have bringing the technology to market.)

MRAM, which stands for magnetoresistive random access memory, stores bits of data using magnetic charges. Typical memory like the DRAM found in most PCs depends on electrical charges. By employing magnetic charges MRAM chips are expected to enable greater amounts of data while using less battery power. Like flash memory, which is used in portable devices such as iPods and cellphones, MRAM is "nonvolatile" so data doesn't disappear or get moved to a separate drive when the device is turned off. Much like its DRAM and SRAM brethren, MRAM can be written on and erased infinitely without deterioration or eventual data loss — a problem that plagues flash memory. In theory, these attributes make MRAM great for mobile devices because it's faster, rewritable and requires little power, explains Bob Merritt, an analyst at Semico Research, a semiconductor industry marketing and consulting firm.

In the mobile-device market in particular, the growing number of bells and whistles like color screens and email and a plethora of new ones to come (Mobile TV anyone?) means the need for memory is growing by leaps and bounds. According to the World Semiconductor Trade Statistics, or WSTS, a nonprofit industry group, the memory market alone is expected to expand 14% (for the second year in a row) to \$62.9 billion in 2007.

Those looking to invest in Freescale to get a chunk of the potential MRAM market though should realize that they'll have to be very patient investors. And even those who are still stand to be disappointed. Freescale may be making its MRAM devices in "volume production," but it will be years before its bottom line sees a boost from MRAM sales. The company's MRAM product has a measly four megabits of data capacity. At a price of \$25 a pop, that means buying a four gigabit iPod Nano with Freescale's MRAM technology in it would cost you tens of thousands of dollars. Just for further comparison sake, the spot price for SRAM, the high-end memory used in computer caches, is at just over two dollars, and includes much higher densities than four megabits, says Doug Freedman, a senior analyst at American Technology Research.

As with most new chip technologies, prices will go down as demand increases. But as Freedman points out, MRAM will not only have to get cheaper to gain traction, but it will have to get better, too (with a lot more density than just four megabits). In essence, it's a chicken and egg scenario. "There needs to be five to seven years of real-world experience before anybody is going to make a large-scale investment in deploying a new technology that doesn't offer them a huge cost savings," he says.

For now, Freescale will sell MRAM to niche markets like the auto industry, which will use it for simple dashboard-type applications like controlling heating and cooling systems or for use in "smart" airbags, explains Semico's Merritt. MRAM will also be useful to the Department of Defense since it isn't susceptible to the radiation problems in deep space that other types of chips experience, he says.

Even though Freescale has patented the heck out of this thing — 100 patents so far — it won't necessarily stop the competition from entering the MRAM market. French MRAM start-up company Crocus Technology, which just received \$17 million in first-round funding, recently announced it'll launch its first commercial MRAM products next year. And don't think IBM, Infineon and Sony will rest on their laurels after investing a considerable amount of time and cash into their MRAM ventures.

There are other competitive technologies — some of which have already gained traction — that could easily supplant MRAM as well. John Rydning, a research manager at International Data Corp., recently published a report with some of his colleagues that discusses 15 such technologies, including holographic storage, which uses laser beams to store data. InPhase Technologies, which was founded by **Lucent Technologies** ([LU](#)) and spun out of the infamous Bell Labs, is working on holographic storage that could potentially store up to a terabyte (approximately 1,000 gigabytes) of data some day. The one problem with this technology is it's not rewritable so once the data is there you can't erase it and write over it.

Another memory technology that could unseat MRAM is FRAM, or ferroelectric RAM, which is similar to MRAM in that it's rewritable and, like flash memory, is nonvolatile. FRAM, which uses a special crystalline material, has seniority. It's been on the market since the early 1990s and is used in a number of devices. There are still some kinks to work out and the chips need greater density if they are ever to become more widespread. The main provider of FRAM products is **Ramtron International** ([RMTR](#)), which counts **Texas Instruments** ([TXN](#)) and Japan's Fujitsu as partners.

One thing is for sure, getting MRAM to market first is an extra vote of confidence in Freescale's R&D team. But bragging rights could be all the company gets out of this invention for now.