

**Micron PCM and 2800ISP  
Case Study**

Micron Technology, Inc.  
8000 S. Federal Way  
Boise, ID 83707

Phone: 208-368-4000  
Fax: 208-368-4435  
Micron.com

Industry: Electronics - Semiconductor

Number of employees: 20,000  
worldwide

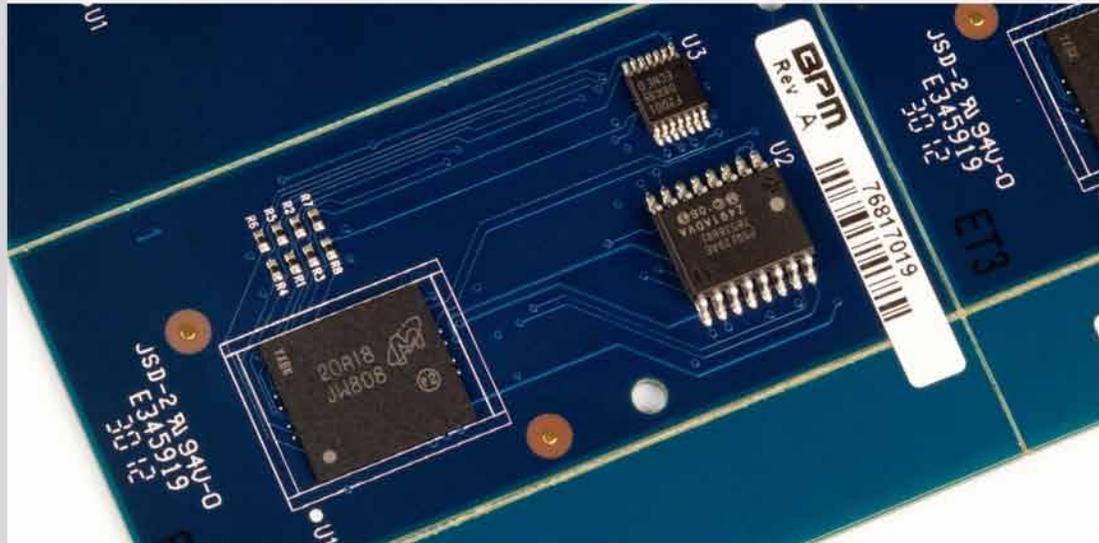
Annual revenue \$8.7 billion (2011)

**Introduction**

The key advantage of in-system programming is that it allows design engineers and production manufacturers to integrate semiconductor device programming and testing into a single step, eliminating the need to program a device before board placement. Flash memory is often preprogrammed in order to maintain high throughput as traditional in-system programming solutions do not have sufficient speed for typical high-density flash memories. Micron's new, revolutionary Phase Change Memory (PCM) is a non-volatile memory technology that features increased system-level reliability, byte-alterability and higher programming rates than any other flash device. By using BPM Microsystems' high-speed 2800ISP in-system parallel programming system, customers can apply code or firmware just in time in a production environment, while maintaining a high manufacturing beat rate.

**Typical Application**

Embedded systems typically contain a microcontroller as its processing core, a flash memory chip for firmware, and a managed NAND device for data storage. For this application, BPM Microsystems used a panel of eight PCBs, each containing one 8Kbit microprocessor, one Micron NP5Q128A13ESFC0E 128Mbit PCM for application firmware, and one Micron MTFC4GLVEA-0M WT 32Gbit eMMC device for data storage.



**About Micron Technology, Inc.**

Since its establishment in 1978, Micron Technology, Inc. has become a world leader in semiconductor manufacturing. Its foundation is in providing DRAM, NAND and NOR flash memory technology along with developing other innovative semiconductor solutions.

**Problem**

Because of the attributes of PCM technology, any preprogrammed data to the device would be lost after reflow, therefore requiring in-system programming equipment such as in-circuit test systems, JTAG or memory interfaces. Most of these in-system programming solutions currently on the market do not have the ability to match the high programming speeds PCM is capable of achieving, thus creating a manufacturing bottleneck.

**Micron PCM and 2800ISP  
Case Study**

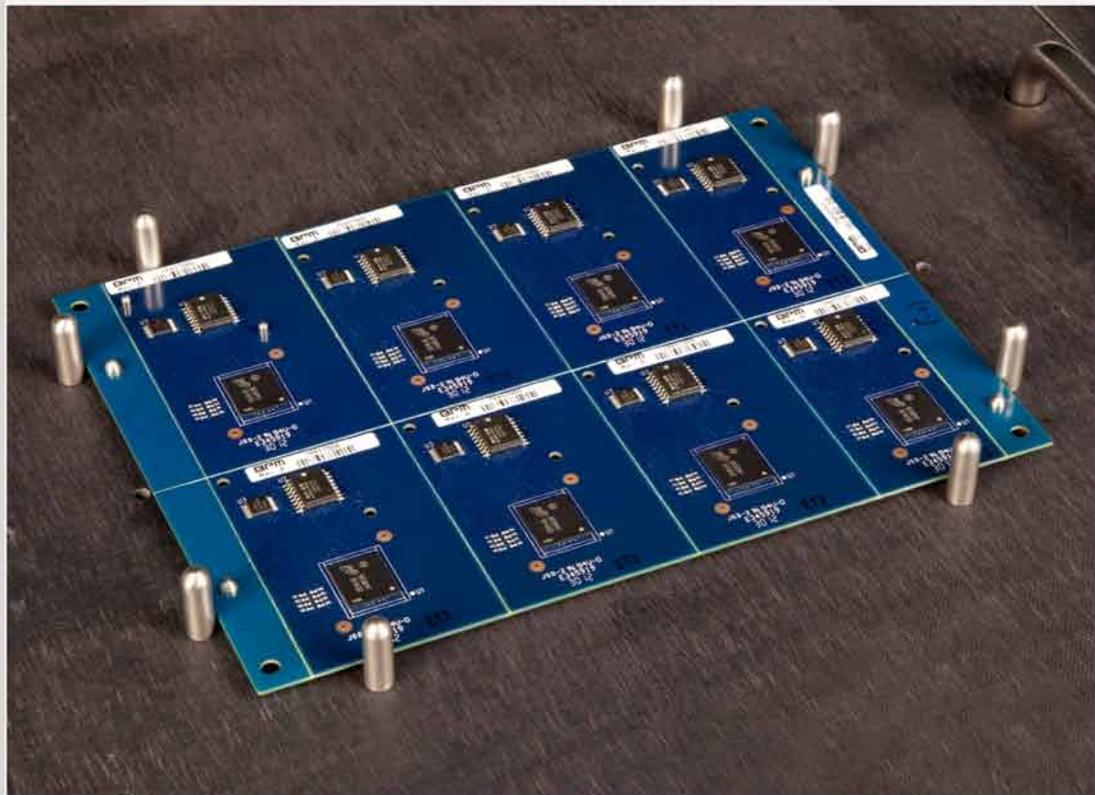
*BPM Microsystems  
5373 W. Sam Houston Pkwy. N.  
Ste. 250  
Houston, TX 77041*

*Phone: 713-688-4600  
Fax: 713-688-0920  
bpmmicro.com*

*Natalie Hunter  
Marketing Communications  
Manager  
Natalie\_hunter@bpmmicro.com*

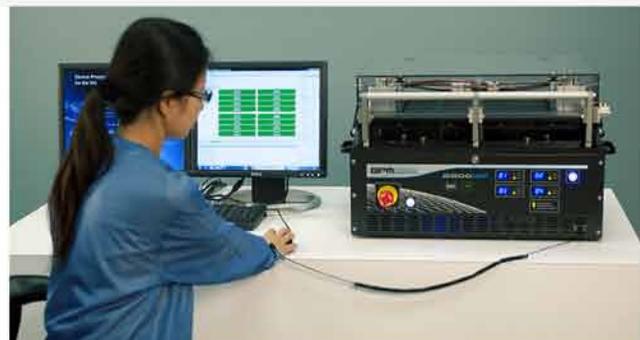
**Solution**

BPM Microsystems' semi-automated 2800ISP in-system parallel programming solution has the proven ability to program flash memory devices at the highest reachable speeds using its proprietary Vector Engine Co-Processor® with BitBlast technology. The Vector Engine Co-Processor accelerates waveforms during the programming cycle. The faster speeds are achieved through synchronous operations that eliminate the dead times so the device under test no longer waits for the programmer. The result is programming near the theoretical limits of the silicon design — the faster the device, the faster the device is programmed.



With Vector Engine technology, high-density flash memory devices are able to achieve read/write speeds up to 140Mbits per second. By programming in both serial and parallel mode the 2800ISP solution is significantly faster than traditional serial in-system programming solutions.

**About BPM Microsystems**  
*Founded in 1985, BPM Microsystems is a leading global supplier of engineering, manual concurrent production and automated device programming systems. Together with BPWin software, its customers receive the most innovative, flexible and value-focused programming technology in the industry.*



"At Micron, we have a profound interest in new, innovative products that have the potential to make a real impact for our customers," said Jeff Bader, vice president of marketing for Micron's embedded solutions group. "With high-speed, in-system programming support on BPM Microsystems' new 2800ISP, customers can program high-density firmware and data after the nonvolatile device has been placed on the PCB."

**Result**

Using BPM Microsystems' 2800ISP, Micron's serial PCM was programmed in 24.29 seconds, or at a rate of 5.27Mbits per second. It was verified in 3.33 seconds, or at a rate of 38.44Mbits per second. The signal integrity and speed is demonstrated by the waveforms captured during the in-system programming process (see **Figure 1.1**). With these high-speed program and verify times, over half a million boards can be programmed per year with a single 2800ISP (see **Table 1.1**). This solves the bottleneck typically seen with traditional test equipment, making the 2800ISP an efficient in-system programming solution for PCM devices.

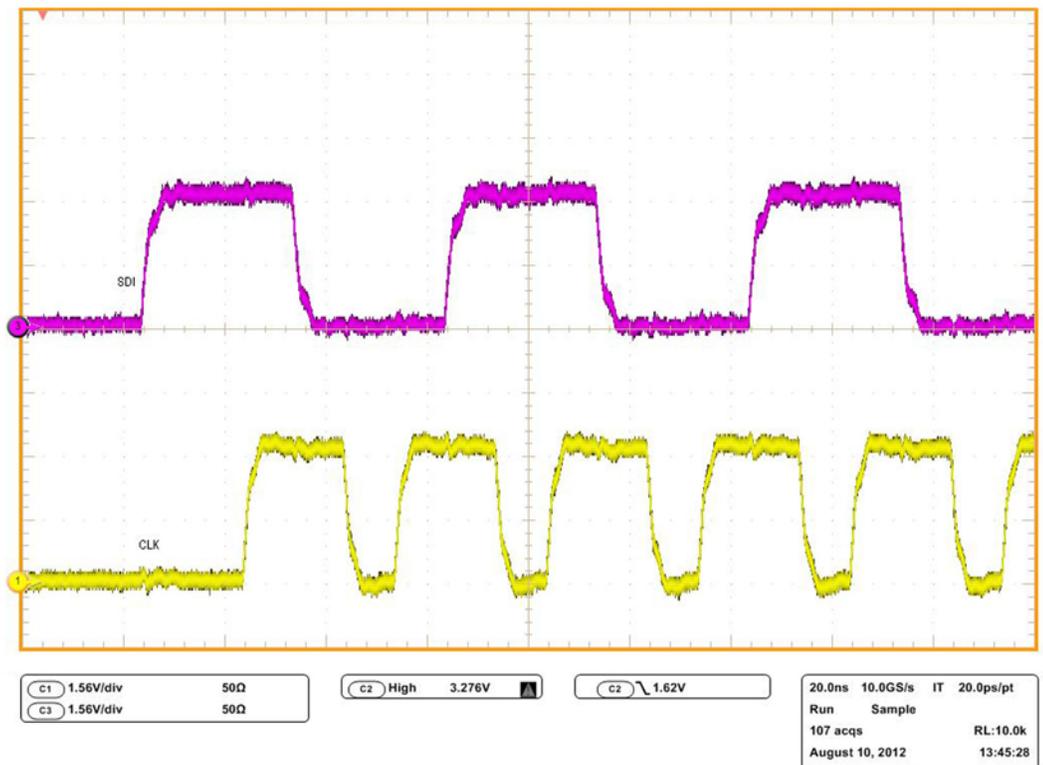


Figure 1.1

"Our customers who are implementing solutions using Micron NOR, NAND, eMMC or PCM memories see the benefit of having the capability and flexibility that in-system programming tools offer. We are pleased to see that an industry leader like BPM Microsystems can provide a high-quality programming tool and valuable support to our customers."

Device Manufacturer	Device Type	Program Rate	Verify Rate	Example File Size	Program+Verify Time
Micron	PCM	5.27Mbits/s	38.44Mbits/s	128Mbits	27.62s
Micron	eMMC	103.69Mbits/s	229Mbits/s	16Gbits	229.54s

Table 1.1

For more information about **BPM Microsystems** or the **2800ISP** in-system parallel programming solution, please visit [www.bpmmicro.com](http://www.bpmmicro.com).