

# MMC2001 Launches M•Core Odyssey

## Motorola's Newest Architecture Takes Aim at Auto, Industrial Controllers

by Jim Turley

Motorola has revealed the first in its new line of M•Core microprocessors, a chip aimed at low-end control-oriented applications. Suitable for portable or light industrial use, the new MMC2001 competes with similar chips from Hitachi and NEC, and with 16-bit chips from a number of vendors.

The first chip is a fairly standard integrated processor, with no application-specific features. The MMC2001 contains 256K of mask-programmed ROM, 32K of SRAM, two UARTs, a pulse-width modulation (PWM) output, a SPI (serial-peripheral interface), and 24 programmable I/O lines, as Figure 1 shows. The device is housed in a 144-lead thin plastic flat package, with enough pins for the 16-bit data bus and all the I/O to be accessible without multiplexing.

### Large ROM Comes With Debug Code

The part ships with Motorola's own debug monitor programmed into the masked ROM, so customers get a low-level debugger for free. The monitor doesn't come close to filling up the 256K of ROM, so customers can add their own code while keeping the debug monitor intact. Because the ROM is mask-programmed at the factory, however, only volume customers will have this option. All others must use external ROMs or RAMs for code storage.

With no cache, access to that external memory can take longer than an internal ROM access. At 16 MHz and slower, the MMC2001 can execute from external memory with no speed degradation; above 16 MHz, the chip needs a wait state, so performance takes a hit. That means customers will certainly want to have Motorola mask-program their application code before they enter production. It also means debugging code in real time is impossible above 16 MHz.

The MMC2001 (a part number sure to give Roman dyslexics fits) can tolerate supply voltages ranging from 1.8 V to 3.6 V. Top speed is 33 MHz, regardless of voltage. The broad voltage range is also a natural side-effect of the 0.35-micron process in which Motorola builds the MMC2001, so

the chip's broad tolerance comes, in effect, for free. For battery-powered, portable, and some industrial systems, the ability to run on a wide voltage range is vital. For automotive applications, the low voltages are less important.

### First Chip Matches Japanese Competitors

There are a fair number of \$13 chips available in the 32-bit market, most of them (naturally) at the low end of the performance spectrum. IBM's 50-MHz PowerPC 401GF is the exception, and an exceptional value for processor-intensive tasks. The PowerPC chip has next to no I/O though, so it's a poor fit for control systems.

A better comparison could be made with Hitachi's low-end SuperH parts, such as the SH7042, '43, '44, and '45 (see MPR 3/30/98, p. 9). Like the MMC2001, these chips are I/O-rich and have on-chip RAM and ROM. Clock speeds are comparable and even the code density is similar between these two architectures. The M•Core part, however, is half the price.

NEC's V830 and V850 chips also compete in this space and have already shipped in huge volumes. The V831 has similar features and price but years of support behind it.

Hitachi and NEC have the clearer roadmap and established development tools. Motorola has its enviable reputation, but M•Core will still have to prove itself. Until the product line broadens a bit, it's too early to say whether the latest CPU from Motorola will be as popular as the others. □

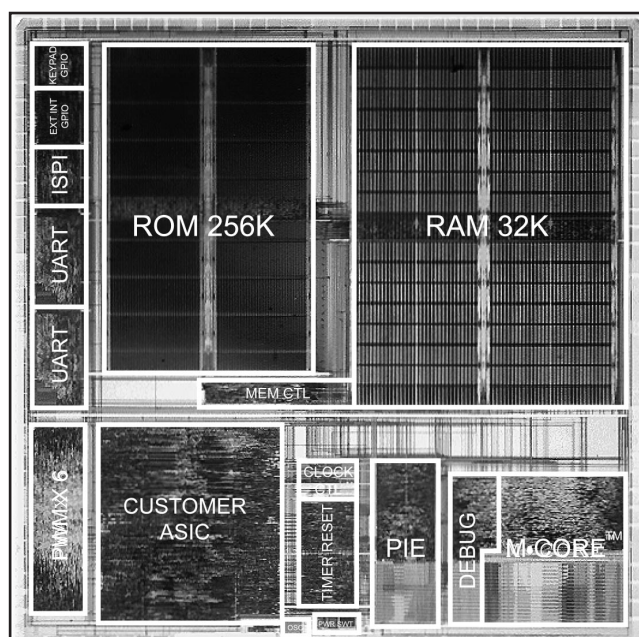


Figure 1. Die photo of the MMC2001 M•Core chip reveals the large amount of ROM and RAM on the 54-mm<sup>2</sup> device.

### Price & Availability

Motorola's M•Core-based MMC2001 will begin sampling in June at 33 MHz, with production scheduled for 3Q98. In 10,000-unit quantities, the 2001 is priced at \$13 in a TQFP-144 package. For more information, contact Motorola (Austin, Texas) at 512.895.2392 or visit [www.mot.com/mcore](http://www.mot.com/mcore).