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Cyrix Challenges 486DX with Cx486DLC

386DX-Pin-Compatible Chip Offered with Separate FPU

By Michael Slater

Cyrix has introduced its second microprocessor, the 486DLC, which is a 32-bit bus version of its original 486SLC (see μ PR 4/15/92, p. 1). While the 486SLC is pin-compatible with the 386SX, the 486DLC is pin-compatible with the 386DX. (Note that despite some erroneous reports in the trade press, Cyrix does not yet have a processor that is pin-compatible with Intel's 486DX.)

The 486DLC also will be sold by Texas Instruments, as well as by Cyrix. TI is serving as one of Cyrix's foundries (along with SGS-Thomson), and it also has marketing rights to current and future Cyrix processors.

In an attempt to pit the 486DLC against Intel's 486DX, Cyrix is offering it bundled with its Cx87DLC math coprocessor—a faster, pin-compatible alternative to Intel's 387. In response to Intel's recent price cuts that bring its 486SX down to \$119 for the 25-MHz version, Cyrix is matching that price for the 486DLC/87DLC pair at 25 MHz, offering "floating-point for free." Cyrix is capitalizing on the high price of the 487SX math coprocessor (which typically sells for about \$500), and the huge gap between the 486SX (at \$119) and the 486DX (at \$406).

Cyrix's chip is about 10% slower than Intel's 486 at the same clock rate, however, primarily because of its lack of a dedicated address adder in the CPU core and its smaller (1K vs. 8K) cache. Unlike the 486SX, however, the incremental cost to add a math coprocessor to the 486DLC is small. When bundled with the 486DLC processor, as shown in Table 1 (see p. 6), Cyrix is charging only \$20 more (at 25 MHz) than the price of the processor alone for the processor and coprocessor together.

Cyrix is quoting identical prices for its 486DLC and 486SLC, despite the fact that the 486DLC is in a more expensive package and therefore has a significantly higher production cost. This is a sign of Cyrix's need to

have especially aggressive pricing on the 486DLC to compete with Intel's new 486SX pricing. The 486SLC price appears to be in need of a major downward adjustment.

While Cyrix is not currently marketing the chip to end users, the 486DLC can be used to upgrade existing 386DX systems. For maximum performance, the on-chip cache requires a small hardware modification to provide A20M and FLUSH signals for the processor. It can be installed in existing systems with no hardware modifications, however, with a slight loss in performance, by using the chip's software configuration options. The processor can be configured (by a small program executed in `autoexec.bat`) to flush the cache whenever HOLD is asserted, and the need for A20M can be eliminated by setting a configuration bit that inhibits caching for the first 64K of each 1-Mbyte segment.

As with the 486SLC, the initial version of the

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Cyrix 486DLC

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486DLC has a power-down capability but not a system-management mode. Versions of both chips that include an SMM are promised for late in the third quarter. This is more important for the SLC, which is aimed at portable systems, than for the DLC, which is likely to be used primarily in desktop systems.

As Figure 1 shows, the 25-MHz Cx486DLC with the math coprocessor is somewhat slower than Intel's 486SX at the same clock rate on all benchmarks except for Excel and Whetstone, both of which use floating-point. At 33 MHz, the Cx486DLC/87DLC pair consistently out-performs Intel's 486SX at 25 MHz, but it is \$40 more expensive. (Without the math coprocessor, the 33-MHz 486DLC matches Intel's 25-MHz 486SX price.) For top performance, the 40-MHz Cyrix chip pair performs comparably to a 33-MHz 486DX, according to Cyrix's benchmarks, while costing about half as much. There may be some system logic, board design, and DRAM cost penalties, however, from the higher clock rate required by the Cyrix chip to achieve the same performance level.

Note that Figure 1 includes some of the first published "SYSmark92" results from the new BAPCo suite. This metric is based on a weighted average of performance on 12 real applications in 5 categories (see *µPR* 5/27/92 p. 5), and it should provide a realistic estimate of the performance typical users will realize.

Aside from price/performance, Intel's 486 has the apparent advantage of offering the OverDrive clock-doubler upgrade path. Cyrix has an answer here, too: by using one of several system-logic chip sets that support both 386 and 486 processors, a system can be built that

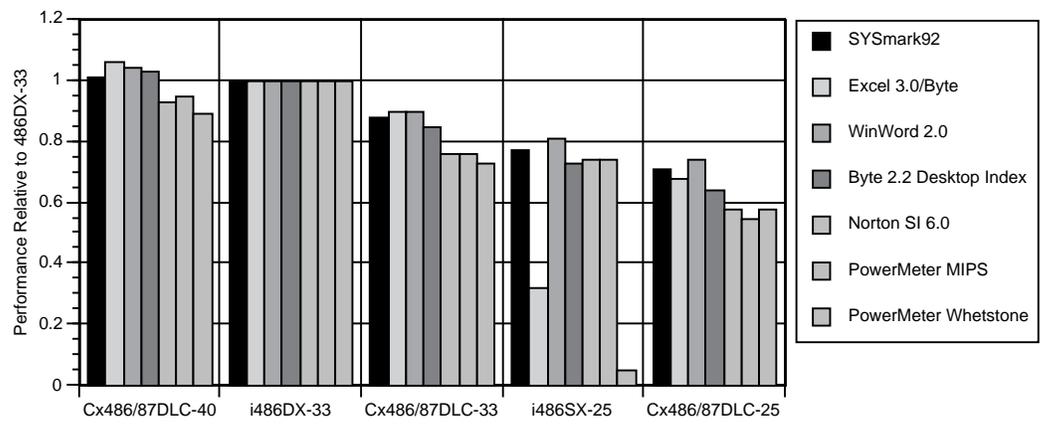


Figure 1. Performance of Cyrix Cx486DLC with Cx87DLC coprocessor, compared with Intel 486. The SYSmark92 rating is from the BAPCo suite; the Excel benchmark is from Byte. All chips were tested on the same system, a Northgate computer with a CPU module. (Data source: Cyrix.)

uses the Cyrix 486DLC/87DLC pair and also includes an OverDrive socket. Given this, Cyrix's 40-MHz 486DLC/87DLC pair could be a more cost-effective alternative to Intel's 486DX-33.

Intel isn't standing still, of course. Intel's 486DX prices are sure to drop in the third quarter, both in response to Cyrix's announcement and in preparation for AMD's entry into the 486 market. In addition, Intel is likely to introduce a 33-MHz version of the 486SX. Intel will also try to shift the market from the 33-MHz 486DX to the 25/50-MHz 486DX2, which should significantly out-perform the 40-MHz Cyrix part. The DX2 chips are likely to emerge as a key weapon against the 486 competitors; Intel is likely to drop the DX2 pricing to a point where it essentially obsoletes the standard 486DX, since the production cost of the two chips is essentially the same.

AMD has prospered in the 386 market by filling holes in Intel's product line: the lack of static and high-clock-rate versions. While Intel has been proliferating its 486 line in hopes of filling any gaps, Cyrix has plugged the one hole still remaining: the cavernous gap between 486SX and 486DX prices. This gap is likely to narrow dramatically by the end of the year, taking away Intel's highest-margin sales. Just in time, however, the P5 should begin shipping, and the cycle will begin again. ♦

	Cyrix		Intel	
	486DLC	486DLC & 87DLC	486SX	486DX
20 MHz	—	—	\$99	—
25 MHz	\$99	\$119	\$119	\$406
33 MHz	\$119	\$159	—	\$406
40 MHz	\$159	\$199	—	\$570 (50 MHz)

Table 1. Cyrix Cx486DLC pricing compared with Intel's 486 pricing. All prices are for 1000-piece lots in Q3, except Intel 486DX prices which are for Q2 (as of press time, Intel has not released Q3 prices for the 486DX).

Price & Availability

See Table 1 for pricing. The 25- and 33-MHz versions are in production now. Samples of the 40-MHz version are available now, with production in the third quarter.

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