

# Cyrix Delivers Revamped M6 Processors

## 486DX-Class “M7” is Up and Running—Slated for July Shipments

By Linley Gwennap

Stealing the “S” from Intel’s still-awaited “S-Series,” Cyrix announced its Cx486S family, previously known as the M6. The new parts include a 33-MHz processor and two 40-MHz (internal) versions, with and without clock-doubling. The clock-doubled 486S2/50 was actually announced last November but never reached production; it has been redesigned to match the other family members. The 486SV, operating at 3.3V, is available at 25 and 33 MHz. All 486S chips include power-management features such as system-management mode (SMM), suspend mode, and static design.

The 486S includes the same 486-compatible CPU as Cyrix’s 486SLC/DLC (see [060501.PDF](#)). It expands the write-back cache to 2K and uses a 486SX pinout. Since this cache has lower performance than Intel’s 8K write-through cache and the Cyrix CPU core is slightly slower than Intel’s 486, the Cyrix parts must run at a higher frequency to achieve the same overall performance. For example, the Cx486S/40 scores about the same as an i486DX-33 on the PC benchmarks listed in Table 1. The Cyrix part is significantly faster on programs that fit into its 2K cache, such as Landmark.

Cyrix ran the benchmarks in Table 1 with a standard PC chip set that forces the on-chip cache to operate in write-through mode. With the popularity of the Cyrix parts and the forthcoming P24T from Intel, many chip-set vendors are adding write-back support to their designs; OPTi, Acer, VLSI Technology, and others plan to ship such products this summer. With these chip sets, the Cyrix parts will perform slightly better.

The Cyrix cache also includes a “No-Lock” feature that the company claims will improve protected mode performance by up to 5%. This feature, not supported on Intel 486 processors, allows the contents of protected-mode segment registers to be cached, speeding accesses to cache descriptors. A minor BIOS change is required to enable No-Lock.

Benchmark	Cx486S 40 MHz	i486DX 33 MHz	Cyrix Gain
BAPCo SYSmark92	139	134	+3.7%
PC Magazine 7.0 CPU Harmonic	9543	9319	+2.4%
Byte Magazine 2.2 Desktop Index	1.74	1.38	+26.1%
Power Meter MIPS 1.7	15.6	14.7	+6.1%
Landmark V2.0	131.35	110.44	+18.9%
Norton SI 6.0	68.0	71.4	-4.8%

Table 1. The 40-MHz Cyrix 486S achieves similar performance as Intel’s 33-MHz 486DX when tested in the same motherboard and the same system. (Source: Cyrix)

The 486S includes several features to reduce power, all of which were first developed for the SLC/DLC products. The new chips use a static design, allowing the clock to be slowed (reducing power to about 50 mA) or completely stopped (0.05 mA). Even the clock-doubled 486S2 chips allow the clock to be slowed or stopped. The 3.3V versions reduce power usage even further. All of the 486S chips also incorporate SMM.

### Inexpensive Floating-Point Upgrade

The new products continue Cyrix’s strategy of providing an inexpensive math coprocessor as a separate chip. The Cx487S uses a small 80-pin PQFP and costs just \$20 when purchased with a Cx486S CPU. This pricing allows the 486S/487S set to significantly undercut Intel’s 486DX prices, as shown in Table 2. Cyrix’s FP performance suffers, however, from coprocessor communication overhead and is lower than a 486DX. Like the 486S, the 487S has a static design, includes a suspend mode, and is available in a 3.3V version. It also automatically reduces power when not in use.

For integer-only work, the Cyrix prices don’t stack up as well against Intel’s 486SX pricing in plastic packages. Intel has been aggressively pricing the SX to compete against 386-class chips from Cyrix and AMD, and these low prices work well against the new Cyrix parts. Intel’s current parts, however, don’t include power-management features; the Cyrix family is more attractive for notebook and “green PC” applications.

Intel’s current solution for this market is the 486SL. If one adds the cost of a \$25 system-logic chip (such as Etec’s ET9000) to the 486SV/33 with 487S coprocessor,

Cyrix Processor	Shipments	Cyrix Price	Competitive CPU	
			Price	Part Number
Cx486S/33	now	\$139	\$89	i486SX-25p
Cx486S/40	now	\$179	\$168	i486SX-33p
Cx486S2/40	June	\$179	\$168	i486SX-33p
Cx486S2/50	June	\$199	n/a	n/a
Cx486SV/25	now	\$139	n/a	n/a
Cx486SV/33	June	\$159	n/a	n/a
Cx486S/33 + 487S	June	\$159	\$306	i486DX-25
Cx486S/40 + 487S	June	\$199	\$306	i486DX-33
Cx486S2/40 + 487S	June	\$199	\$306	i486DX-33
Cx486S2/50 + 487S	June	\$229	\$306	Am486DX-40
Cx486SV/25 + 487S	June	\$159	\$204*	i486SL-20*
Cx486SV/33 + 487S	June	\$179	\$204*	i486SL-25*

Table 2. Cyrix 486S processors compared to other processors with equivalent features and performance, using published 2Q93 prices in 1000-unit quantities. \*The 486SL integrates system functions that the Cyrix parts do not.

the price is identical to that of the 486SL-25 for similar integer performance and features. With the Cyrix family, system makers can reduce cost by going to a lower clock rate or leaving out the math chip and still outperform systems using the 386SL.

### Cyrix Ready M7 Processor

Cyrix recently began testing the first silicon of its "M7" chip, which enhances the 486S CPU core, expands the write-back cache to 8K, and integrates the math coprocessor on-chip. The resulting design should match the 486DX in most respects, and the write-back cache will perform better than the 486DX's write-through cache. Cyrix expects to begin production of this chip in July, but no official announcement of price or availability has been made.

### New Price/Performance Points

In head-to-head matchups against Intel's chips, the Cx486S merely meets the competition in price and performance; this is not enough for a second-tier vendor to gain market share. The Cyrix parts are most attractive in offering new capabilities not found in the Intel product line. For example, the 486SV chips provide an intermediate price/performance point between the 386SL and 486SL. The inexpensive math upgrade also gives Cyrix a price advantage over Intel's 486DX.

Both Cyrix and AMD have recently announced 486 processors with 40-MHz system interfaces, a frequency

that Intel has so far neglected. PC makers are more comfortable with this speed after designing 40-MHz 386 systems. It also provides better graphics performance than a DX2 chip with a 25- or 33-MHz local bus.

The Cx486S parts are aimed at the same low-power markets as Intel's forthcoming S-Series processors, which will include similar power-management features. Intel will eventually bombard the market with a broad range of processor choices, forcing Cyrix to price its chips more aggressively or look for new niches. The fast-growing notebook and low-power PC markets should provide enough room for both companies—at least for the short term. Eventually, Cyrix's larger die sizes and its dependence on outside foundries could spell trouble against Intel's S-Series. ♦

### Price & Availability

The price and availability of the Cx486S parts are shown in Table 2. All parts that are not currently shipping are sampling. The 487S math coprocessor is currently sampling with production expected in June. The 487S/33 and 487SV/25 cost \$39 while the 487S/40 and 487SV/33 cost \$49, all in quantities of 1000.

The 486S uses a 196-pin PQFP or 168-pin PGA. The 487S is packaged in an 80-pin PQFP. Contact Cyrix at 2703 North Central Expwy, Richardson, TX 75080; 800/848-2979, fax 214/6699-9857.