AMD's Mobile Assault Continues With K6 IIIP

Accelerating its bid for the mobile processor market, AMD has announced what it claims is the highest-performance mobile x86 CPU available. The new part, called the K6 IIIP, uses the same ploy used by the company for its current K6-2P mobile processor (see MPR 3/29/99, p. 4), i.e., the K6 IIIP is really just a K6 III that is restricted to operate 15% below the K6 III's top speed of 450 MHz. This marketing approach to mobile processing is based on the company's observation that many notebooks can easily cool processors that operate well above the Intel-imposed 10-W thermal envelope, and that battery life is only marginally diminished by higher current draw from the CPU.

At its top speed of 380 MHz, the 2.2-V K6 IIIP dissipates 16 W maximum and 12 W while running typical applications. On the Ziff-Davis Battery Mark, this translates to only about 20 minutes less battery life, out of almost three hours, compared with similarly configured K6-2P/333, Mobile Celeron-300, or Mobile Pentium II-366 systems.

In return for the 10% shorter battery life, the K6 IIIP delivers higher performance at lower cost. According to AMD's testing, the K6 IIIP-380 outperforms the Mobile Pentium II-366 by 34% on Ziff-Davis's CPUmark 99 and by 5% on Winstone 99 for Windows 98. It also beats the P II-366 by a whopping 63% on Future Mark's 3DMark 99 CPU benchmark for Windows 98. (For all these tests, the systems were configured the same, except the Intel processors used a BX chip set, while the AMD processors used an Ali V chip set and 1M of L3 cache.) Although the tests have not been completed, AMD expects the K6 IIIP-380 will also outperform the new 400-MHz Mobile Pentium II (see next item) on these tests.

AMD attributes much of the K6 IIIP's performance to its trilevel cache architecture: the K6 IIIP has 64K of L1 cache and 256K of on-chip L2 cache, and it can have up to 1M of L3 cache on its 100-MHz Socket 7 bus. The K6 IIIP's outstanding performance on 3Dmark is due to its 3DNow SIMD floating point, which the Intel mobile parts lack.

AMD is obviously positioning the K6 IIIP against Intel's Mobile Pentium II line as opposed to the Mobile Celeron line, as the K6 IIIP-380, at $349, is priced 30% less than the Mobile Pentium II-400 but 87% more than the Mobile Celeron-400. The K6 IIIP, which is delivered in a Socket 7 CPGA package, also comes in -366 and -350 versions at $316 and $249, respectively (in 1,000-unit quantities).

According to the *PC Data Hardware Report*, in April AMD surpassed Intel as the market share leader in the U.S. retail market for portables, and the new K6 IIIP parts should further boost AMD's presence in that market. Next on the agenda for AMD's mobile line is its 0.18-micron version of the 0.25-micron K6 IIIP. Due late this year, that part will substantially reduce power and improve performance. AMD must get this part out quickly if it is to keep pace with Intel, which is already shipping its 0.18-micron version of Mobile Pentium II (Dixon) and which will soon begin shipping its 0.18-micron Mobile Pentium III (Coppermine). —*K.D.*

Intel Rolls Out 0.18-Micron Dixon

Intel has announced availability of a new 400-MHz version of its Mobile Pentium II. The new part is a quick shrink of the current Dixon die (see MPR 1/25/99, p. 20), from its 0.25-micron P865.5 process to Intel's latest-and-greatest 0.18-micron P858 process (see MPR 1/25/99, p. 22). Not only is the new Dixon the first processor Intel will produce in 0.18-micron technology, it is also the first 0.18-micron microprocessor from any company to enter production.

Intended as a minimum-effort project, the Dixon quick shrink does not take full advantage of the new process. While an optimized P858 implementation might have reduced the die size by 50%, Dixon's new die remains the same size: 180 mm^2. This is reminiscent of the P55CQS quick shrink (see MPR 3/27/95, p. 10), which Intel undertook to gain advantage from a new process without requiring a new package.

Even though the die size remains the same, the shrink gives the new Dixon a smaller effective die area, which should improve yield. Manufacturing costs, however, are likely to remain about the same, due to P858's higher wafer cost. The real benefit of the shrink will be to increase the yield of higher-frequency parts at a lower voltage. At 400 MHz, the new 1.5-V Dixon will consume 7.5 W (TDP), well within the 10-W thermal envelope of notebooks, and about 25% less than the current 1.6-V Dixon at the same speed.

While adding the new 0.18-micron Mobile Pentium II, Intel is also boosting the 0.25-micron Mobile P II and Mobile Celeron to 400 MHz. The 0.25-micron Mobile P II is offered in a conventional minicartridge package—for OEMs that want the higher speed grade but aren't ready to switch to BGA—while the 0.18-micron Mobile P II comes only in a 615-contact BGA. To make room for these new 400-MHz parts, Intel slashed the prices of its older mobile speed grades

by up to 40%, as the table below shows, and pushed the 266-MHz Mobile Celeron off the price list.

In addition to the new processors, Intel is adding a package and two chip sets to its mobile line. The new Micro PGA package, which will be available for both Mobile Pentium II and Mobile Celeron, measures 32 × 37 mm and is only 6 mm thick, plus 1.25-mm pins. The socketability of this package offers significant inventory advantages to OEMs manufacturing build-to-order notebooks.

The new Mobile 440ZX and 440MX chip sets, designed for Mobile Celeron systems, are Intel's first mobile chip sets to include AGP support for better graphics. The MX is a single-chip version of the ZX, and it also includes soft-audio and soft-modem features. The MX is priced at $22.35 and the ZX at $26 (in 10,000-unit quantities).

Although the new Mobile Pentium II-400 may not have quite the performance of AMD's K6 IIIP-380 with an L3 cache (see previous item), it will be close even without an L3, and it has much lower power, making it far more appealing for the increasingly popular thin-and-light notebooks. The new Celeron-400 will almost certainly outperform AMD's Mobile K6-2/333 on most tasks and, since it also costs 35% less, could force AMD to radically lower its price. AMD's parts still have the advantage of 3DNow, but this advantage will begin to evaporate when Intel ships Mobile Coppermine with SSE (see MPR 3/8/99, p. 1) later this year. —*K.D.*

Performance Desktop	5/16/99	6/6/99	Change
Pentium II-400	$193	$173	-10%
Low-End Desktop	**4/11/99**	**6/6/99**	
Celeron-466	$169	$147	-13%
Celeron-433	$143	$113	-21%
Celeron-400	$103	$93	-10%
Celeron-366	$73	$69	-5%
Celeron-333	$67	$67	0%
Mobile	**5/16/99**	**6/13/99**	
Pentium II-400 (BGA)	–	$530	New
Pentium II-400 (MC)	–	$495	New
Pentium II-366	$530	$316	-40%
Pentium II-333	$316	$187	-41%
Celeron-400	–	$187	New
Celeron-366	$170	$144	-15%
Celeron-333	$159	$106	-33%
Celeron-300	$106	$65	-39%

Desktop Celeron Prices Continue to Plunge

On June 6th, Intel tightened the thumbscrews another turn on its competitors, reducing prices of desktop Celerons by up to 21%, as the table below shows. The only Celeron not affected by this pricing action was the 333-MHz part, which has bottomed out at $67. Failure to reduce the price of this part bolsters our view that Intel isn't planning to sweep Celerons into the sub-$50 sewer, leaving some room for IDT and Rise to eke out an existence. The Celeron pricing move will go especially hard on AMD, however, as it tries to compete head-on against the ever-cheaper Celerons.

At the same time it announced the Celeron cuts, Intel dropped the price of the Pentium II-400 by 10%, from $193 to $173, essentially obsoleting the 350-MHz part. Even the 400-MHz part is nearing the end of its life, and we do not expect further price cuts before it disappears. —*K.D.*

Intel Commits to 300-mm Wafers

Intel has become the first major semiconductor manufacturer to officially commit to a schedule for 300-mm (12") wafer production. Intel's 120,000-ft^2 D1C fab—now under construction in Hillsboro, Oregon—will ramp into production on the company's 0.13-micron copper P1260 process in 2002, just one year after the similar P860 process begins production on 200-mm (8") wafers in fab D1B.

While 300-mm wafers deliver 2.4 times as many potential die per wafer, they also cost only about 65% more per wafer to process than 200-mm wafers. Thus, Intel says, 300-mm wafers will reduce its manufacturing costs by 30% across the board. In addition, the combination of 300-mm wafers and 0.13-micron processing will result in a tremendous increase in Intel's fab capacity when P1260 enters production.

Now that Intel has broken through the ice with its 300-mm commitment—thus virtually ensuring the availability of 300-mm manufacturing equipment—we expect other major manufacturers to quickly follow suit. —*K.D.*

ZDBOp Zaps Benchmark Bugs

The Ziff-Davis Benchmark Operation (ZDBOp) has released a new version of its 3D WinBench 99 benchmark that permits more meaningful comparisons of CPU performance.

ZDBOp (*www.zdbop.com*) reexamined the 3D WinBench code and identified certain elements of the benchmark's design that were not representative of real-world applications. The benchmark was performing certain unnecessary operations, and some 3D objects were not structured for efficient rendering.

ZDBOp says the changes in the new Version 1.2 release will usually increase scores. The greatest impact is seen on CPU-only tests such as the 3D Processing test. These tests do not produce a display, so they are not influenced by the graphics adapter in the system. Scores affected by the display adapter's performance, such as the overall 3D WinMark score, will increase the most when a less-powerful processor is paired with a fast graphics adapter, since the CPU is the primary bottleneck in this configuration.

AMD's K6-2 saw the greatest improvement from the changes, but scores for Intel's processors also increased. The Pentium III retained its substantial edge over the K6-2 in overall performance, but, as before, the K6-2 has a significant price/performance advantage. —*P.N.G.*