AMD's K6 Family on the Move

By Kevin Krewell {5/1/00-05}

The latest, and probably last, incarnation of AMD's K6 family was officially announced on April 18. The 0.18-micron K6-2+ and K6-III+ feature on-chip caches, a power management mode called PowerNow, and the five new MMX DSP instructions that are in Athlon.

These new versions of the K6 will be manufactured in AMD's Fab25 in Austin, Texas, on a 0.18-micron aluminum process. It appears that AMD will use the same die for both the K6-2+ and K6-III+, thus following Intel's manufacturing model of using one die for both value and performance products, but de-featuring the die for the value product. In this regard, AMD has not gone quite as far as Intel: AMD has only reduced the L2 cache size for the value K6-2+ from 256K to 128K. Intel's new Celeron, based on the Coppermine die, not only has the L2 cache size cut in half but seems also to have access latency increased. Intel apparently believes that cutting the L2 cache size and speed still isn't enough to hobble Celeron—it also disables SpeedStep.

AMD was prepared to announce these products a month earlier, but it delayed the introduction until OEM shipments commenced. The delay could have been to avoid any distractions of the gigahertz processor race last quarter, but it appears to be mostly because AMD didn't need to announce the product before key OEMs were ready.

AMD plans to market the K6-III+ in the mobile-performance segment, where a notebook design could include a level-3 (L3) cache on the planar board and where the end user will pay more for the performance benefit of the larger on-chip cache. The K6-2+ is targeted at the value segment, where lower system costs will preclude the use of external cache chips, and 128K of on-chip L2 cache will have to suffice. Even though the performance of the K6-2+ without an L3 cache would be considerably lower than a K6-III+ with an L3 cache, the value market tends to buy on the basis

of processor megahertz rather than performance. The K6-2+ could still be designed into a notebook with an L3 cache, but AMD offers benchmark results that show the K6–III+ would perform more than 4% faster (than the K6–2+) on the Ziff-Davis Business Winstone test and a whopping 18.5% faster on ZD CPUmark99.

AMD has taken a very different tack than Intel for enhanced power management. Both the performance and value products offer the PowerNow technology, whereas Intel reserves its SpeedStep technology for the premium Pentium III products. AMD's technology provides additional flexibility over Intel's SpeedStep. AMD's PowerNow offers 0.1V voltage steps from 1.4V to 2.0V and up to seven frequency steps, compared with Intel's Speedstep which only offers only two states. PowerNow can be implemented without modifying the operating system and is transparent to ACPI. The processor goes into a stop-grant state when the core voltage and clock multipliers are changes. A timer is required to restart the processor after the switching power supply settles to the new voltage, which is typically less than 100μs. Control of the voltage setting, the clock multiplier setting control, and the restart timer are all integrated into the K6-2+ and K6-III+. Intel's Speedstep requires an external ASIC to provide some of that control and timing.

Unfortunately, the initial OEM configurations of the AMD products do not support PowerNow. It appears that design-cycle constraints did not allow OEMs sufficient time to add the core voltage controls to the motherboard and the additional support in the BIOS. AMD expects OEMs will

begin shipping notebooks with PowerNow support near the end of Q2.

AMD's K6-2+ and K6-III+ are offered in 450-, 475-, and 500MHz versions. The 1,000-piece prices for the K6-2+ are $85 (450MHz), $98 (475MHz), and $112 (500MHz); for the K6-III+ they are $140 (450MHz), $162 (475MHz), and $184 (500MHz.) These mobile processors are available with a maximum case temperature of 85°C and a nominal 2.0V core voltage. The first OEM product announced was the HP Pavilion N3215, which is available immediately with a K6-2+ running at 475MHz. AMD's Web site can be accessed at www.amd.com. ◈