# AMD Seeking Leadership Role

## *AMD-3D Extensions, "Slot A" Raise the Bar for Success*

AMD's recent moves in the x86 business reveal a bold plan to take a leadership role rather than to simply follow Intel. This approach gives AMD new opportunity, but it also raises the bar for success.

Although AMD was a licensed alternate source for the 8086 and 80286, the company has had to chart its own path since then. AMD produced 386 and 486 microprocessors that were close derivatives of Intel's designs, even though Intel didn't cooperate. Seeing that this strategy wasn't going to work in the long run, however, AMD finally broke free of dependence on Intel's designs and set about creating its own processor designs that implement Intel's instruction set.

AMD's first independent design, the K5, was behind schedule and lagged in performance. AMD's difficulties with the K5 prompted the company to acquire NexGen, and the K6 is the result. AMD still lags Intel's performance by two speed grades, and the K6's FP and MMX performance are lackluster, but it is better positioned than ever before.

AMD's biggest handicap today is its inability to ramp up production volume as rapidly as it expected; after falling short of its 3Q97 goal, the company now acknowledges that it will also fall short of its 4Q97 goal of two million units, and this isn't helping its credibility. Chips built in the 0.25-micron process aren't yet in volume production, and I suspect prospective customers among the top-tier PC makers are waiting for AMD to deliver consistent volume from this process before committing to the product. Assuming AMD gets beyond its production problems, it should be able to make significant market-share gains in 1998.

With the K6, AMD has an independent design that is Intel pin-compatible and software-compatible. AMD's disclosures at Microprocessor Forum show that the company is not content just to follow Intel's standards, however. With its AMD 3D extensions, AMD is advancing the instruction set without waiting for Intel to set the standard. This is a bold move that looks like it will pay off. AMD has convinced both Cyrix and IDT to make their chips compatible with AMD's extensions, providing a single target for software support (see MPR 12/8/97, p. 4). Microsoft will support the extensions in DirectX 6.0, and AMD has already announced commitments by two game makers—DreamWorks Interactive and Digital Anvil—to use the extensions directly.

Systems based on AMD's K6 3D processor have a shot at being the hot game boxes for Christmas 1998—potentially faster and cheaper than anything Intel will have to offer, at least for certain games. To make this happen, AMD has had to do a lot more to develop the market; it is not just a matter of selling chips into systems designed for Intel processors.

AMD also is moving beyond the Intel standards in hardware. Its first steps—a 100-MHz version of the Socket 7 bus, and a processor with an integrated L2 cache—don't require much special infrastructure support. The 100-MHz chip sets will be derivatives of today's chip sets, and AMD, Cyrix, and IDT will all have common needs.

In 1999, however, AMD will blaze its own path with the K7's "Slot A" interface: the physical connector and module size of Intel's Slot 1 module but with the bus protocols from Digital's 21264 Alpha processor. This bus is radically different from Intel's, and it will thus require entirely new chip-set designs. For the first time, AMD will need chip sets different from those used by Intel, Cyrix, or IDT. Alpha systems will be able to use the same chip sets, but it is unlikely that their volume will be large enough to matter much.

AMD was pushed onto this path by a condition of its legal settlement with Intel. The renewal of their patent cross-license agreement has one significant exclusion: AMD is not allowed to build chips that "socket steal" beyond Socket 7. In essence, AMD traded away its ability to build Slot 1 processors for freedom from patent litigation. IBM's and National's licenses have no such exclusion, so Cyrix may well choose to go with Slot 1.

The K7 will require more of its own infrastructure than any prior AMD product. Like NexGen's ill-fated 586, it will require custom chip sets and motherboards. These problems were crippling for NexGen, but AMD has far greater resources to bring to bear. If all goes well, the benefit will be high performance: Slot A will be faster than Slot 1, and if AMD can come up with a CPU core to match, it could achieve performance leadership in x86 processors.

AMD appears to be following a "go for broke" strategy. CEO Jerry Sanders has set a goal of 30% market share in 2001, and the company is charging down a path that assumes a large market share; a nonstandard bus architecture is probably unsupportable with AMD's current market share. AMD also is building a second large fab, due to come on line in 1999, that will give the company the capacity to serve 30% of the market. Since Intel is very unlikely to allow its competitors to gain a total share of much more than 30%, AMD is essentially betting that Cyrix will fail—or at least not be a player above the entry level. Ⓜ

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