# Alpha Challenges Xeon With Slot B

*New Motherboards Support 750-MHz 21264 in Workstations, Servers*

*by Linley Gwennap*

Following Intel's lead, Alpha Processor (API) has created a standard module and slot architecture for server processors. API, a subsidiary of Samsung, has defined Slot B and is shipping both processor modules and motherboards to support the new architecture. The modules contain a 21264 processor and up to 8M of one-third-speed L2 cache, as Figure 1 shows. They are similar in size to Intel's Slot 2 Xeon processors but take advantage of the much greater bandwidth of the 21264 bus.

Astute readers will recall that AMD's forthcoming K7 uses the same bus as the 21264. It would be straightforward for AMD to build a Slot B version of K7 for servers, and we expect the company to deploy such a product late this year. The initial K7 processors will ship on Slot A modules, which are similar in size to Intel's Slot 1 modules but are too small for the 21264 and, in particular, its required heat sink.

Although Samsung continues to own the vast majority of API, the spinoff is operating independently in Concord, Mass., with its own R&D and sales staffs totaling about 60 people. The company gets most of its annual revenue (well over $100 million) from Compaq.

The first motherboard designed by API is the UP2000, which supports up to two Slot B processors, using the chip set from Compaq's DS20 system. This powerful chip set runs the processor bus at 333 MHz, delivering a peak bandwidth of 2.66 GB/s. With its extended ATX form factor, the UP2000 fits into standard cases and supports standard I/O interfaces such as SCSI, PCI, and USB. The board, available in July, carries a 100-piece list price of about $2,200.

By September, API plans to deliver a lower-cost single-processor board, the UP1000, that uses the same AMD "Iron Gate" chip set as will initial K7 systems. The company did not announce pricing for this board, which also supports standard PC interfaces such as AGP, PCI, and USB.

API is developing its own chip sets to reduce costs. For example, the company is working on a low-cost dual-processor chip set that would replace the Compaq chip set. For high performance, this chip set will support a 128-bit-wide DDR SDRAM memory system and two 333-MHz-bus processors, all with a single chip comprising about 1,000 pins. API expects to sample this device late this year. This chip set could sell in the $150 range. A second chip set aimed at four-to-eight-way servers is due to sample late next year.

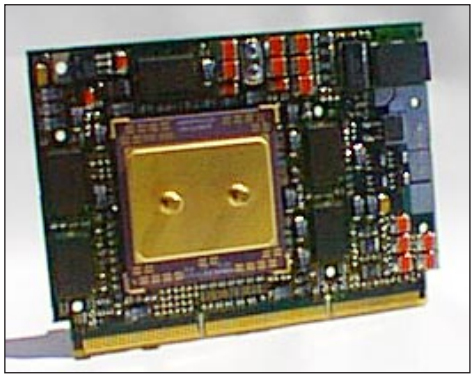

**Figure 1.** The Slot B module contains a 21264 processor, up to 8M of SRAM, and a voltage regulator, all on a small PC board that measures 110 × 152 mm (4.3" × 6.0"). With the heat sink, the height is 115 mm (4.5").

## 21264 Hits 1 GHz Without Supercooling

The company also announced plans to ship the 21264 at 750 MHz in July, at 833 MHz by the end of the year, and at more than 1 GHz by mid-2000. These speeds should be achieved easily as Samsung moves the chip to 0.25-micron and 0.18-micron production. At this week's PC Expo, API and Samsung demonstrated a 1-GHz Alpha processor running in a normal system without any of the cryogenic equipment used in earlier 1-GHz demos by Intel and AMD.

Through API, Samsung supplies most of Compaq's Alpha processors (Intel builds the rest) and those for all the rest of the market. Unfortunately, the rest of the market consists of several small companies that together consume far fewer Alpha processors than Compaq. API is dedicated to growing both the Compaq and the non-Compaq markets, and the standardized design of the new motherboards and Slot B processors should make Alpha more attractive. It is less clear who, if anyone, would want a system that supports both K7 and Alpha, but at least the commonality enables the companies to share chip-set development costs.

A big drawback to Alpha remains its high price, however. A 750-MHz 21264 module with 8M of cache has a list price of $4,368, or $6,611 with the UP2000 board. Even a 667-MHz module with only 2M of cache costs $2,296 in 100-unit quantities. These prices won't get Alpha into a high-end PC, or even a high-volume workstation.

Compared with a Xeon-500/2M at $3,692, the 21264 provides better integer and much better floating-point performance, based on SPEC95. In the UP2000 board, the 21264 also has more than three times the peak bandwidth of any Xeon system. API claims its processors will deliver 50% better performance than Intel's at the same price, even as Intel deploys IA-64 processors such as Merced and McKinley.

How Alpha and IA-64 match up in performance remains to be seen. With numerous major vendors backing IA-64 and only Compaq behind Alpha, sales revenue will clearly favor Intel. API hopes the new Slot B strategy will help Alpha gain new customers while Merced is still just a dot on Intel's roadmap. M