Ross Finally Ships HyperSPARC

New MBus Modules Match SuperSPARC Performance at Lower Cost

by Linley Gwennap

After nearly 18 months as vaporware, Ross Technology's hyperSPARC processor has finally emerged as a shipping product. It is available only as MBus modules that can be used as end-user upgrades to SPARC systems or in OEM products. The 55- and 66-MHz hyperSPARC modules deliver about the same performance as 40- and 50-MHz SuperSPARC processors, respectively. Ross promises that a faster version, which will match the performance of the high-end 60-MHz SuperSPARC+, will ship soon.

When Ross' chip set was first announced *(see **060701.PDF**)*, the company—then part of Cypress—said it would ship 66-MHz modules in 4Q92. Even then, it appeared that the announcement had been hastily cobbled together to try to match Sun's concurrent announcement of SuperSPARC. Ross hoped that Sun and its foundry partner, TI, would have problems getting their chip to perform at the 50-MHz clock rate needed to match Ross' announcement, and indeed this came to pass; TI did not ship even 40-MHz parts in volume until 1Q93.

Unfortunately, Ross found itself in deeper trouble than its competitors. About the time that the company had originally planned to make shipments, it had silicon on all three hyperSPARC chips, but the set did not yield at its frequency goal, nor was it fully functional. The

CPU went through ten turns (all metal-layer changes) before all the bugs were worked out and yields improved. In the meantime, TI began to have more success with SuperSPARC's clock rate, and announced first 50-MHz and then 60-MHz versions *(see **0709MSB.PDF**)*. Sun, which had evaluated hyperSPARC for its workstations, rapidly lost interest in the Ross product.

SPARCstation Upgrade Board

Now that the chip set is finally functional, the company—now owned by Fujitsu—is marketing it directly to Sun's customers rather than working through Sun. The first such end-user product is an upgrade board containing two 55-MHz hyperSPARC processors. It can be used in Sun 600MP systems as well as SPARCstation 10 (SS10) boxes. Even a single hyperSPARC processor offers more than twice the performance of the 601-based CPUs shipped with the 600MP systems, but the dual-processor configuration is needed to offer a significant performance boost to the SuperSPARC-based SS10s.

As shown in Figure 1, the chip set uses TAB packaging *(see **071304.PDF**)* to jam two full processors, each with 256K of cache, onto a single standard MBus board. Sun initially planned a similar dual-processor Super-SPARC module but has been unable to get that CPU to work in a TAB package. Thus, Sun's current dual-CPU modules use PGA packages, requiring a double-width board. These modules are so large that they cover an adjacent SBus slot; thus, with four processors, an SS10 is reduced to two SBus slots instead of four. The smaller hyperSPARC module eliminates this constraint.

Ross rates a single 55-MHz hyper-SPARC processor at 56 SPECint92 and 72 SPECfp92 with 256K of external cache. As shown in Table 1, this is slightly better than a 40-MHz Super-SPARC with 1M of external cache. The dual-processor module costs $5,950 in unit quantities. This price includes all necessary firmware and software patches as well as on-site installation. By comparison, Sun's single-processor, 40-MHz SuperSPARC upgrade costs $8,000 to end users.

Ross is eying the worldwide installed base of about 13,000 Sun 600 systems and 100,000 SS10s. Its strategy is
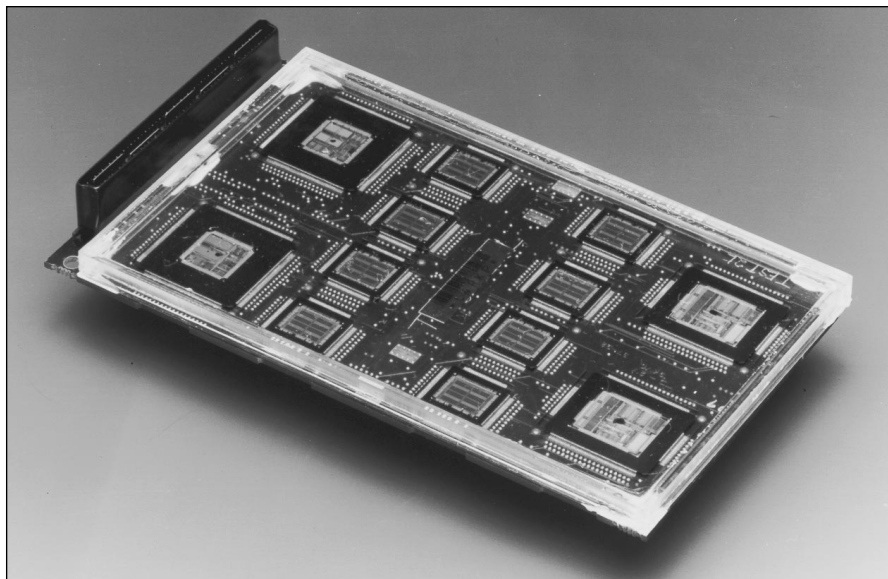

Figure 1. The dual-processor hyperSPARC module contains two bus interface chips (upper left), eight custom SRAMs, and two processor chips (lower right), all in TAB packages. The board measures 14.7 × 8.4 cm and connects directly to Sun's MBus.

similar to that of Weitek's SPARC Power upgrade chip for SPARCstation 2 and IPX systems *(see 070902.PDF)*. Both vendors have been locked out of Sun's CPU purchases but have found it more profitable selling to Sun's customers than bidding for the meager volumes of other SPARC vendors. Like Weitek, Ross is offering Solaris 1.1 compatibility for those customers who are not ready to migrate to Solaris 2.

OEM Products Available

Ross is also marketing its hyperSPARC modules through OEM channels. The company offers modules with either one or two processors at clock rates up to 66 MHz, as shown in Table 1. At the higher speed, the company has measured performance of 65 SPECint92 and 86 SPECfp92 *(see 071501.PDF)*, comparable to a 50-MHz SuperSPARC processor. Based on these results, the company expects a future 80-MHz version to compare to the 60-MHz TI chip, which TI has announced but Sun has not yet begun shipping in its systems.

Ross quotes $895 for the 55-MHz module and $1,595 for the 66-MHz module in 1K quantities. The dual-processor modules cost 2.5× more, as shown in the table; the extra 50% premium reflects the value of the more compact design. While these prices are much lower than for the upgrade, they are for OEM quantities and do not include software and on-site installation.

The table shows that TI's SuperSPARC modules are significantly more expensive. OEMs that wish to design SuperSPARC into their products can save a bit on cost. For example, one could combine the price of a 50-MHz SuperSPARC chip ($679) with the separate cache controller ($399) and 1M of synchronous, 20-ns SRAM (about $300). It costs an additional $150 or so for the PC board, other components, assembly, and testing required to build the board. Thus, a 50-MHz SuperSPARC processor could cost $1,630 to build, still slightly more than the price of the competitive hyperSPARC module.

The MPR Cost Model *(see 071004.PDF)* estimates that the two processor chips in the hyperSPARC set cost $160 to manufacture, much less than the estimated $210 for the 40-MHz SuperSPARC or $290 for the faster versions of the TI part. The cost difference is due to much smaller die sizes and the lower cost of the TAB packaging. The Ross processor requires four custom Cypress 512-Kbit cache RAMs, but SuperSPARC requires the separate cache-control chip plus eight 1-Mbit synchronous SRAMs to achieve the same performance.

Several Design Wins

HyperSPARC has gained several design wins. The biggest is with the British system vendor ICL, another subsidiary of Fujitsu. The Japanese vendor sees Ross as part of its global SPARC strategy, which includes ICL, Amdahl, and HaL *(see 0715MSB.PDF)* along with its own

Price and Availability

The 55-MHz dual-processor hyperSPARC module is available to end users at $5,950 for one unit and $9,950 for two. Both prices include upgrade software, documentation, and on-site installation. Ross also offers single- and dual-processor boards to OEMs, with pricing as shown in Table 1. All these products are currently shipping in volume. HyperSPARC is not available as a standalone chip set. Contact Ross Technology at 512.892.7802, fax 512.892.3036.

embedded SPARClite product line and its new micro-SPARC-2 processor *(see 071501.PDF)*. The Ross processor is also being used by Themis Computer, which embeds a hyperSPARC module into a VME-based single-board computer, as well as by Axil (Hyundai) and Aries Research, two workstation makers. Fujitsu is also using hyperSPARC in its own line of servers.

Now that Ross finally has a product worth shipping, it hopes to catch additional design wins. The biggest fish in this pond, of course, is Sun; while Ross continues to be optimistic that Sun eventually will use its processor, the part does not appear to offer enough of a performance advantage to cause the workstation leader to make the switch. The smaller physical size of the hyperSPARC processor could prove attractive, however, and the lower manufacturing cost could give Ross an edge in any price competition with TI.

Just as Sun plans future upgrades to SuperSPARC *(see 070404.PDF)*, Ross has plans for its processor. The first step is a 10% shrink to get the chip set up to 80 MHz by the end of the year. The next step, planned for 1H94, is to move the design into Fujitsu's 0.5-micron process, also used for microSPARC-2, which should boost the clock rate near 100 MHz. Ross has also discussed repackaging the chip set into a multichip module to further increase the clock speed. Ultimately, the company is working on a hyperSPARC-2 design to achieve a much larger performance increase.

The SPARC market doesn't seem big enough for a processor without a Sun design win, but Ross has made progress and now has Fujitsu's backing. The company hopes to find favor with Sun before burning a hole in Fujitsu's deep pockets. ♦

	SPECint92	SPECfp92	1K Pricing
55-MHz hyperSPARC	56.0	72.4	$895
40-MHz SuperSPARC	53.2	67.8	$1,599
66-MHz hyperSPARC	64.6	85.5	$1,595
50-MHz SuperSPARC	65.2	83.0	$1,829
55-MHz dual hyperSPARC	2500*	3000*	$2,240
66-MHz dual hyperSPARC	3000*	3600*	$3,990

Table 1. Ross' hyperSPARC modules offer similar performance to TI's SuperSPARC modules at a lower price. *SPECrate (est.)