

DUELING STANDARDS

TEXAS INSTRUMENTS TMS340 FAMILY	IBM's 8514/A
• General-purpose programmable microprocessor • Fast floating-point coprocessor available • Especially good at driving X window applications • Single source of supply • Second-generation chip in volume production • Top candidate for high-end PC and workstation applications	• Hardwired for graphics functions • Delivers resolution of 1,024 by 768 pixels • Good for bitblts, line drawing, area fills • Several vendors developing chips • Slow in coming to market • Top contender for low- and midrange PC applications

IBM AND TI SQUARE OFF IN POST-VGA GRAPHICS

CHIPS IMPLEMENTING BIG BLUE'S 8514/A STANDARD ARE FINALLY ARRIVING TO COMPETE WITH THE TMS340 FAMILY **BY LAWRENCE CURRAN**

WITH THE ADVENT OF high-performance graphics chips, personal computers are evolving into graphics workstations, driven by add-in cards that execute graphics functions much faster than the host processor can. Now PC users with applications ranging from desktop publishing to computer-aided design and medical imaging want ever higher resolution, prompting chip, board, and monitor makers to push beyond the 640-by-480-pixel standard embodied in IBM Corp.'s Video Graphics Array.

Less than a year ago, developers of graphics boards were contemplating as many as four approaches to achieve resolutions greater than VGA's [*Electronics*, July 1989, p. 66]. Since then, the industry has done some sorting out and appears to be settling on two primary performance niches. Those niches will be filled

by hardwired chips and boards implementing IBM's 8514/A hardware standard or by Texas Instruments Inc.'s TMS340 family of programmable graphics microprocessors.

The niche for the 8514/A **GRAPHICS** standard is characterized by displays having 1,024-by-768-pixel resolution and needing fast execution of bit-boundary block transfers (bitblts), line drawing, and area-fill commands. But there's no need for heavy computation. Those requirements make 8514/A especially suitable for executing CAD programs such as Autodesk Inc.'s popular AutoCAD.

The TMS340 family and its related architecture, on the other hand, are resolution-independent. TI's solution appears to be winning favor to drive high-performance displays used in CAD and imaging, applications that usually call for res-

olutions at least as great as 8514/A. Some, such as combined graphics and imaging, also require extensive computation, for which a general-purpose microprocessor is well suited. TIGA—for Texas Instruments Graphics Architecture—is described by TI as an interface that manages communications between the PC and the 340 processor. An interprocessor communications protocol links an application program or software-environment driver to a library of standard TIGA or custom-graphics functions that run on the 340.

TI is winning sockets because of the availability and performance of its TMS34010, TMS34020, and TMS34082 chips. The 40-to-60-MHz TMS34010, introduced in 1986, has gained substantial software support and market momentum. Its very availability has established TI in PC and workstation graph-

ics. Two months ago, TI unleashed the 32-MHz 34020, and the company cut prices for both processors, further enhancing their appeal.

At least one close observer, however, isn't convinced there's yet a substantial market for beyond-VGA resolution, simply because prices for graphics boards and monitors still haven't provided enough incentive for PC users to go beyond 640 by 480 pixels. Michael Slater, editor of the *Microprocessor Report* in Palo Alto, Calif., says that both 8514/A and TMS34020 backers "are concerned about how to get people to move out of VGA into either of those. I see a reluctance to go beyond VGA, because prices need to come down." Slater points out that PC users pay

about \$1,000 for a VGA board and monitor today versus \$1,000 for an 8514/A monitor and \$500 for a board.

The latest graphics boards using the TMS340 family sell for almost \$4,000, but those are for high-performance, high-resolution (1,280-by-1,024-pixel) applications that combine graphics with real-time imaging. TI is promising pricing that will result in 34010-based boards selling this year for less than \$600 and 34020-based boards for less than \$1,000.

Meanwhile, only one company—Western Digital Corp.—is known to be delivering chip sets that implement 8514/A, even though it's been almost three years since IBM advanced the standard. The need to address the 8514/A standard through a set of on-chip registers has hampered chip development, because IBM hasn't provided public definitions of the registers it uses in its own 8514/A devices.

Further, rumors that IBM will cripple 8514/A advocates by coming out with a standard that goes beyond it have contributed to delays in both chip and board development. The 8514/A camp, however, appears convinced that IBM isn't ready to curtail the market with a beyond-8514/A announcement this

year. In fact, they say, IBM showed substantial support for the standard in its exhibits both at last fall's Comdex show and at the National Computer Graphics Association show in March. "IBM dedicated about 25 feet of counter space to 8514/A at Fall Comdex," says Jim Anderson, director of graphics product marketing at Headland Technology Inc. "Everything I see suggests that IBM hasn't done anything to modify its 8514/A support."

H EADLAND IS ONE OF several firms developing chips that implement 8514/A. Rumors have circulated since Comdex that the Fremont, Calif., company had dropped its 8514/A effort, but Anderson says otherwise. He's not happy that Headland's chips won't be ready until late this year, but insists "we're going ahead with the project. A lack of focus had caused some delays, but we're now going forward."

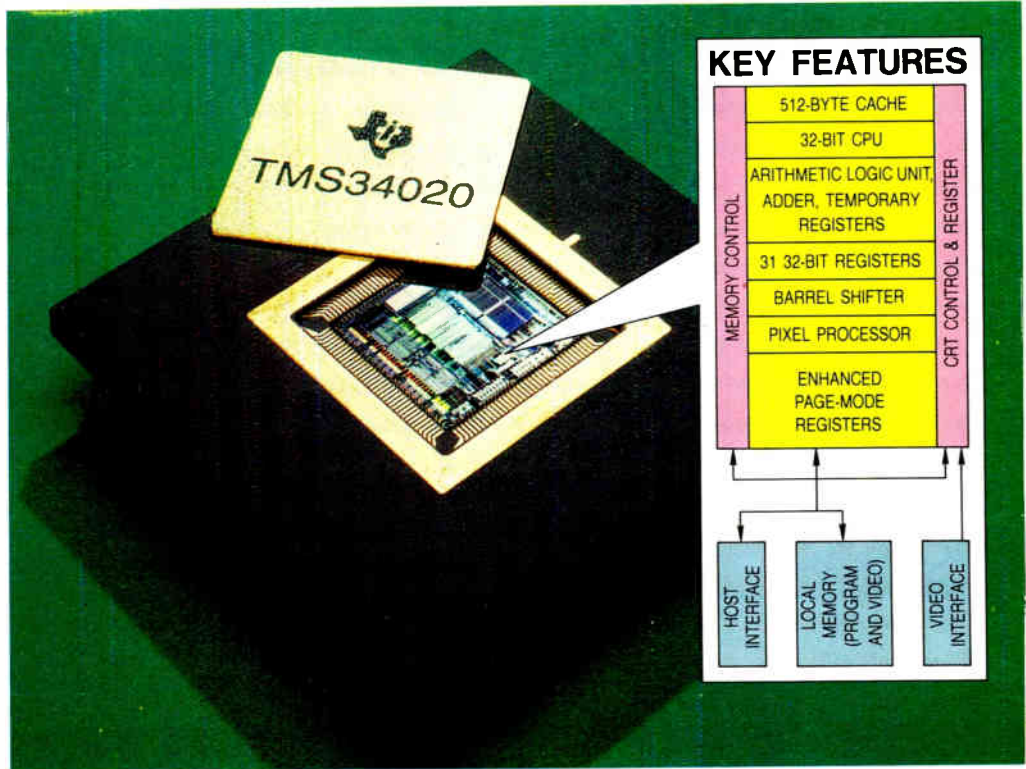
As the only chip vendor delivering 8514/A silicon in production quantities, Western Digital is offering a chip set based on the company's PWGA1 graphics controller chips. Western Digital expects this to be the year 8414/A takes hold in the market, says William

Chu, vice president of engineering at the company's Mountain View, Calif., facility—assuming IBM doesn't throw a monkey wrench in the works.

The remaining silicon vendors known to be developing 8514/A chips sets are ATI in Toronto, Canada; Chips & Technologies in San Jose, Calif.; Integrated Information Technologies in Santa Clara, Calif.; and Trident Microsystems in Sunnyvale, Calif.

The next 8514/A chip expected to reach volume production will come from Chips & Technologies Inc. Roger Reak, director of graphics marketing, says the company will have silicon out this month and should be in volume production soon after that. The single-chip design is the 82C480 graphics controller. Reak points out that because of the number of players coming into the chip segment, the competition will result in 8514/A boards priced in the \$500 ballpark. "There's a sizable market window for an add-in board at that price," he says.

Having chips available from multiple sources should help to fill the 8514/A pipeline this year. Dataquest Inc., the San Jose, Calif., market research organization, estimates that some 930,000 chip sets for beyond-VGA applications will be



WINNING SOCKETS

TI has a leg up on IBM because its TMS340 family has been out longer than 8514/A implementations; the second generation is the just introduced TMS34020.

sold this year. Of that total, some 400,000 are expected to be 8514/A chips, with most of the remainder from the TMS340 family. However, Dataquest projects a shift by 1993, with 3.1 million 8514/A chips shipping against 1.7 million TMS devices. The estimate "is based on our expectations that the 1,024-by-768 market is ready to start growing," says Sohail Malik, Dataquest's graphics specialist. "The supply of chips has been limited until now."

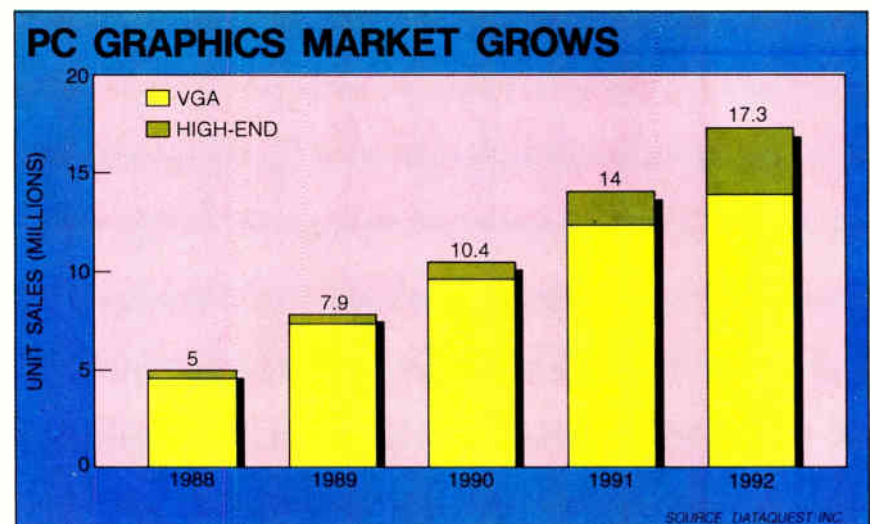
Meanwhile, TI's top-dog position with the 34010 has generated important early acceptance for the faster 34020. At least three firms have announced high-performance boards that use the 34020 and TMS34082 floating-point coprocessor. For example, Matrox Electronic Systems Ltd., Dorval, Canada, has built its Image series—which combines high-performance graphics with real-time imaging—around the 34020/34082 [*Electronics*, October 1989, p. 102].

OTHER COMPANIES THAT have committed to the 34020/34082 are Imagraph Corp. of Chelmsford, Mass., and Univision Technologies Inc. of Burlington, Mass. Imagraph's approach is to offer its 34020-based ITX-1210 board and an optional daughterboard housing the 34082 for high-performance combined graphics and imaging applications.

Univision is also addressing dual graphics-imaging needs, but has put both processors on the same board to get 1,280-by-1,024-by-32-bit resolution. Univision's price of \$3,895 is \$100 less than Imagraph's, but both are in a price region that's well above the mass market for PC graphics.

So while 1990 should be the year that 8514/A chips begin to flow to board users in substantial numbers, TI has already moved into its second-generation graphics microprocessor. Nor does it appear that TI will be content to focus primarily on the high-performance, high-resolution graphics applications that begin where 8514/A ends. The company has an aggressive strategy intended to make the TMS340 family and the TIGA architecture the next PC graphics standard.

The TMS340 family is designed into more than 200 products to date, says Karl Gutttag, graphics strategy manager for TI's Microprocessor Division in Stafford, Texas. Industry sources estimate that TI has already shipped well over



500,000 TMS340-family chips this year, with a growing number of them being 34020s. TI's TIGA products directory includes a partial list of more than 40 software applications for which universal TIGA software drivers are or soon will be available.

Importantly, that TIGA directory also numbers more than 260 applications that run via the Microsoft Windows environment. That market "is a whole new animal," says TI's Gutttag. "There may be 100,000 of them shipped this year, and we're designed into every X Window terminal we know of." That list includes terminals from Digital Equipment, Hewlett-Packard, Tektronix, and—significantly—IBM itself, with the IBM Xstation 120 X server terminal. This unit is part of IBM's new RISC System/6000 [*Electronics*, April 1990, p. 32]. Gutttag says that 8514/A isn't easily compatible with X Window applications because the chips "don't accelerate pixels properly. Even IBM didn't use 8514/A in its X terminal."

Some in the industry see appropriate niches for each kind of chip. Western Digital's Chu, for example, sees 8514/A

becoming the beyond-VGA PC standard and the TMS340 more appropriate for high-performance workstation graphics. "At 1,024-by-768 resolution, users are happy with a 14- or 16-in. screen, which is more a PC product," says Chu. "Going to 1,280 by 1,024 dictates a 19-in. screen. That's the workstation market, and TIGA will play very well there."

Slater of *Microprocessor Report* believes that 8514/A vendors "have a chance to get some of the business-graphics market as it moves up from VGA, though that's happening slowly. But 8514/A won't be the high-resolution standard. The 340 series will be far more important than 8514/A in the high-performance high-resolution market."

Indeed, says Dataquest's Malik, the lower- and midrange machines constitute the mass market, "where buyer behavior favors the 8514/A." But he sees TI competing for more business there than some 8514/A backers do. The three issues that influence the mass market are price, performance, and standards-compatibility.

"No matter what anyone tells you, pricing for TI and 8514/A will be a wash," Malik says. "There's a [price] comfort level that TI is already meeting." As for performance, "the issue is bandied about a lot, but 8514/A chips will perform well, too, so performance will be a wash, as well." An intangible is IBM's clout in setting a standard, which Malik believes will sway buyers to 8514/A. "Multisynch monitors will drive the retail part of the mass market, and users will ask what kind of graphics board goes with those monitors. And there will be five shrink-wrapped 8514/A packages for each TI package." ■

POST-VGA GRAPHICS

To get higher resolution than VGA's 640 by 480 pixels, the industry is turning in two directions.

IBM's 8514/A standard handles 1,024-by-768-pixel resolution but can't do heavy computation. TI's TMS340 processors can provide higher resolution plus extensive computation, suiting them for combined graphics and imaging.