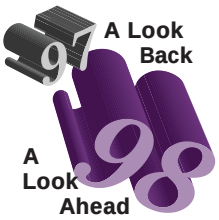
Media Processors Begin to Specialize

Chromatic Aims at PC Graphics, Others at Consumer DVD



by Peter Song

For media-processor vendors, 1997 was a rude awakening, as they were squeezed out of the PC graphics and DVD markets by hardwired accelerator chips offering better performance and lower cost. With commodity 3D performance doubling every six months, media processors have been shut out of the performance-driven PC graphics markets. In the cost-sensitive consumer DVD market, media processors must compete with dedicated DVD chips from C-Cube, LSI, and others. Demand for single-chip multimedia solutions has not yet materialized.

There are strong signs that 1998 will be a better year for some media processors. With interest in DVD increasing, Chromatic expects its Mpact chips to appear in some mainstream PCs this year. Its media processors may also find a home in sub-$1,000 PCs, which are growing in popularity. In these systems, the media processor could be a single-chip solution for a variety of multimedia features that the CPU is too underpowered to perform.

Other media-processor vendors have given up trying to break into the highly competitive PC market. After flirting with Microsoft's Talisman initiative, Philips is now pushing its TriMedia chip into consumer devices, mainly standalone DVD players. Samsung completely gave up on its ambitious MSP project, pulling the plug last spring (see MPR 6/2/97, p. 11). Other prospective media-processor vendors have yet to reveal their product plans.

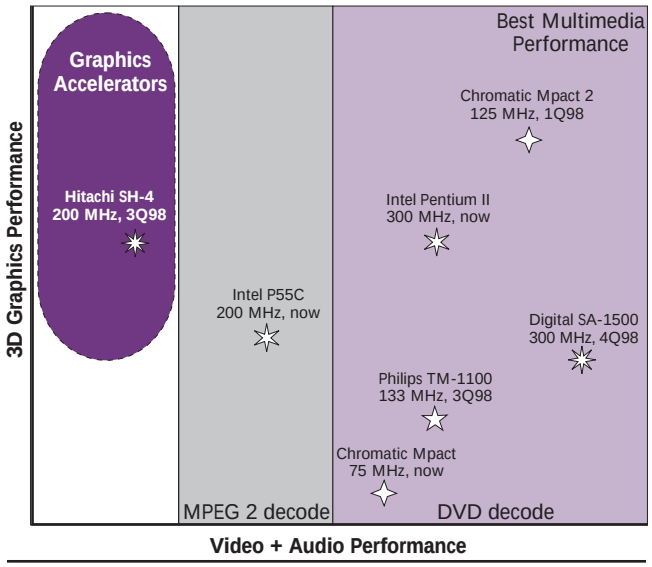


Figure 1. Chromatic's Mpact 2 is most successful in combining full DVD decoding with strong 3D performance. The dates indicate volume production.

Mpact Gains Design Wins, Mpact 2 Boosts 3D

Chromatic gained a number of DVD design wins for its Mpact/3600 media processors this year. Both Compaq and Gateway offer home-theater-quality DVD add-on cards using Mpact/3600 in their living room PC systems. Gateway and Micron also offer the DVD add-on cards as standard equipment in their 266- and 300-MHz Pentium II PCs. Although a 300-MHz Pentium II could deliver an adequate level of DVD performance, according to Intel, Mpact/3600 should deliver better-quality audio and video without taxing the host CPU in these high-end systems.

For its second-generation design, Mpact 2, Chromatic increased the clock speed from 75 MHz in Mpact/3600 to 125 MHz, doubled the cache to 8K, and added a second Rambus channel to deliver 1.3 Gbytes/s of peak memory bandwidth (see MPR 11/18/96, p. 1). More significant, it added floating-point capability and a 35-stage 3D-rendering unit to Mpact 2, raising the chip's 3D performance to a mainstream level.

All three of Chromatic's licensees—LG Semicon, SGS-Thomson, and Toshiba—are now offering samples of Mpact 2 chips at the target frequency. Toshiba expects to ramp Mpact 2 to full production March, and the other licensees expect to do so by June. Toshiba's Mpact 2 chip occupies 121 mm^2 in a 0.35-micron process and uses a 352-contact BGA package. According to the MDR Cost Model, the chips will have a manufacturing cost of $40, slightly higher than that of most graphics accelerators.

Chromatic expects Mpact 2 chips to deliver a score of 450–500 on 3D WinBench, near the top of the performance range of today's PC graphics systems (see MPR 12/29/97, p. 17). When Mpact 2 ships in systems in 2Q98, it could maintain its performance lead. It remains to be seen if the Mpact licensees can improve graphics performance in time for this Christmas season, however.

Using Mpact 2, Chromatic aims to deliver mainstream, but not high-end, graphics performance, adding full-feature DVD playback capability for free. A single add-in card for graphics and DVD should cost less than two cards delivering comparable performance and quality. For low-cost PCs, Mpact 2 chips could be integrated onto the motherboard, eliminating the add-on card and reducing cost. Chromatic has been touting these obvious benefits of multifunction media chips since its founding without much success, however. The emergence of the sub-$1,000 PC may make a difference.

There may also be an opportunity in notebook PCs, although Chromatic has not developed products for this market. A chip integrating the Mpact 2 core and GUI functions would significantly reduce board space and power consumption. Such a chip that also integrated 4–8 Mbytes of DRAM would be even more valuable, but it would require a 0.25-micron or better process. Among the licensees, Toshiba would be in the best position to deliver such embedded DRAM chips; SGS-Thomson, lacking DRAM capability, could not.

TriMedia Focuses on Video, Suspends Talisman

Philips's TriMedia chip was originally chosen as the media processor for Microsoft's Talisman architecture, but less than a year after the much-publicized design win, Philips suspended its Talisman effort. Instead, it has focused on consumer video applications, where its processors are better matched. Its narrowed focus comes just in time, as the conversion to digital broadcast begins this year in the United States.

The TM-1000, a 0.35-micron shrink of its TM-1 design (see MPR 11/13/95, p. 22), began volume production at the end of 1997, shipping a total of just 15,000 units for the year. Even after the shrink, the chip measures 135 mm^2 and operates at only 100 MHz, the same frequency targeted for the 0.5-micron TM-1 chips.

The TriMedia group is most proud of its design win in Polycom's ViewStation video-conferencing system, which uses two TM-1000 chips. Two chips are needed to run H.320, echo cancellation, voice-tracking camera-control, Web server, and GUI programs, although a single TM-1000 chip could run all of the H.320 functions. The TM-1000 is also used in the TriCodec add-on card from Philips's own components division, which markets the card as a video encode/decode and editing system for PCs. TriCodec lacks a few features, including authentication and descrambling, and delivers inadequate performance to be a DVD add-on card.

By the end of 1Q98, Philips will offer samples of the TM-1100, a pin- and software-compatible upgrade to the TM-1000. The newer chip, built in an improved 0.35-micron process, measures 100 mm^2 and operates at 133 MHz. It is expected to be in volume production by 3Q98. The faster chips will be able to run more demanding algorithms, delivering improved audio and video to existing designs and enabling new designs. An upgraded TriCodec using the TM-1100 could be sold as a DVD add-on card, offering full-feature DVD playback capability. Philips is developing another TM-1 derivative aimed at low-cost video-conferencing systems, which it projects to be a $3 billion market in 2000.

Philips is continuing its work on the TM-2 design, scheduled to be in production for Christmas 1999 products. It is not ready to reveal the plans or the product details of the TM-2, but the design is aimed at digital TVs, which require much more processing power and integration than available in the current chips. Philips is currently offering a DTV reference design, which uses the TM-1100, enabling software development for digital TVs.

Although the company isn't saying so, it seems poised to abandon Talisman eventually. Even the best of its current offerings delivers meager floating-point performance, and the company currently has no plans to add more floating-point capability in the TM-2. That chip would have to deliver about five times the floating-point performance of the TM-1100 to meet Talisman's processing demands. Apple's plan to use TriMedia for QuickTime acceleration is also on hold, according to the TriMedia group.

Embedded CPUs Reach DVD, 3D Performance

Digital created a new media processor, the SA-1500, by combining a programmable media engine with its existing StrongArm CPU core (see MPR 12/8/97, p. 12). The 300-MHz chip is capable of full DVD decoding using less than half of its compute power. It uses the StrongArm CPU for control and serial-data processing and the media engine for parallel data processing. That processor has 64 registers, each with 36 bits, and 72-bit data paths, supporting 8-, 9-, 16-, 18-, 32-, and 36-bit data types.

Using a 0.28-micron design, the SA-1500 occupies a 60-mm^2 die, roughly comparable with the TM-1100 if it were in a similar process. Samples of SA-1500 are expected sometime in 1H98, about six months sooner than those of the TM-2.

Both the SA-1500 and TM-2 will face stiff challenges from designs that are more focused on DVD decoding, including Mitsubishi's D30V (see MPR 12/9/96, p. 1) and Fujitsu's MMA (see MPR 11/18/96, p. 11). These chips provide just enough horsepower to do the job, saving die area and cost. But for emerging consumer video products that demand more than just DVD decoding, the SA-1500 and TM-2 allow system vendors to support a range of functions simply by adding more software.

New Year May See New Entrants

Despite the limited success of the current crop of media processors, other vendors are working on similar chips. BOPS (formerly Hot Chips & Salsas) disclosed plans for its ManArray core, an array of parallel DSPs with a peak performance of 52 billion 8-bit operations per second (see MPR 10/27/97, p. 4). This core could be used in custom products by the end of this year. Startups Equator (see MPR 6/2/97, p. 11) and EVSX (see MPR 12/29/97, p. 4) also appear to be developing media processors but haven't disclosed any plans.

These new entrants may blaze their own trails, but they are more likely to follow one of the two established paths. Like Philips TriMedia, they could focus on consumer devices, combining a simple CPU with a DVD-capable media engine. Alternatively, they could emulate Chromatic in attacking the PC market. This path requires matching the performance of commodity 3D accelerators while providing additional video capabilities with little incremental cost. In another year, we should see which of these strategies fares best against a slew of hardwired competitors. M