Hardware design

The 82786 combines on a single chip much of the hardware required for a graphics subsystem. A complete DRAM controller is built in so no logic is needed between the 82786 and the DRAMs that form the graphics/display memory. The DRAM controller can take advantage of static-column or fast-page-mode DRAMs and of interleaved configurations to provide up to 40M-bytes-per-second memory bandwidth. Dual-ported (video) DRAMs can also be used to further increase the bandwidth available to the graphics processor or CPU for faster drawing.

The video logic is integrated so that no external logic is required to implement scrolling, panning, windowing, or displaying bitmaps with different numbers of bits per pixel. Two status bits per window allow a palette RAM to be easily utilized.

The system bus logic has a synchronous mode to optimize it for an 80286 or 80386 microprocessor and an asynchronous mode for any 8-, 16-, or 32-bit microprocessor.

Three different system configurations are common. A simple, low-cost system could use the 82786 not only as a graphics controller, but also as the DRAM controller for the single memory. A higher performance system could eliminate memory contention by using separate memory for the CPU and have the dedicated graphics controlled by the 82786.

Finally, a very high resolution graphics system could use several 82786 chips working in tandem.

Summary

The 82786 has integrated on a single chip a high-performance graphics processor along with an advanced windowing display processor. The chip also includes most of the required system interface logic. Thus three major needs in graphics were met:

- Speed—The 82786 has a fast graphics processor to create bitmap images as well as a display processor to perform video generation and windowing functions in hardware.
- Flexibility—The host CPU has direct access to the graphics memory, allowing special and infrequent operations to be performed.
- Component count—Along with the graphics and display processors, the 82786 also contains a complete DRAM/VRAM controller, CPU interface, and much of the video interface, substantially reducing the number of support chips required.

The 82786 reduces the cost and complexity of interactive graphics while maintaining very flexible, high-performance drawing and windowing functions.

References


Glen Shires worked at Intel Corporation as an application engineer for the 82786, designing the hardware configurations around the chip and working on its feature definition. He also worked on the 80386 32-bit CPU in a similar capacity and has worked as a design engineer in Intel's IBM-PC add-on board division. He is now an independent consultant, primarily involved in designing similar graphics and microprocessor boards. He received his BS and MS in electrical engineering at the University of Wisconsin-Madison.

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