OTI-64017

DirectX GUI Accelerator

OAK TECHNOLOGY®

FEATURES

♦ DirectDraw and Direct3D acceleration

♦ Integrated 170 MHz RAMDAC for high refresh rates

♦ 83 or 100 MHz MCLK

♦ Supports single-cycle EDO, SGRAM and SDRAM for up to 800 MB/sec bandwidth

♦ Hardware video window

♦ Bilinear (X/Y) interpolated video scaling

♦ 1MB - 4MB frame buffer

♦ Resolutions up to 1600x1200

♦ 3D DMA blit and DropZ/ ClearZ buffer commands accelerate D3D games by up to 200%

DESCRIPTION

Oak Technology's OTI-64017 Eon™ GUI accelerator is the new standard in PC graphics performance. Featuring a radically new drawing engine for Windows 95 and NT acceleration, the OTI-64017 provides fast graphics, enhanced video capabilities and support for the latest memory technologies.

The OTI-64017 utilizes Oak's new single-clocked, pipelined GrafixPump™ architecture, ensuring the maximum performance from display memory. The GrafixPump is a multiprocessing engine that simultaneously manipulates graphics, live video and host image data. When coupled with the pipelined architecture of the OTI-64017, the GrafixPump exploits the full capabilities of single-cycle EDO, Synchronous Graphics RAM, and SDRAM. Utilizing this high memory bandwidth allows the OTI-64017 to support enhanced video and accelerate host-based 3D graphics under Windows 95 and NT.

The OTI-64017 integrates a high-performance 170 MHz triple 8-bit RAMDAC with alpha blending and gamma correction. This RAMDAC/clock combination delivers screen resolutions up to 1600x1200, and 100 Hz refresh rates at 1024x768 resolutions.

The OTI-64017 supports memory configurations from 1MB to 4MB with a programmable 83/100 MHz memory clock and frame buffer interface. The OTI-64017 can use either EDO or high-performance SGRAM, offering system designers several price/performance options. A minimum DRAM interface requirement of two 256Kx16 DRAMs lowers system cost and reduces board space, while providing a cost-effective 1024x768x256 solution.

The OTI-64017 is designed to accelerate Microsoft's DirectX architecture, including DirectDraw, ActiveMovie and Direct3D standards. Transparent BitBLT, hardware windows, enhanced bus mastering and page-flipping (double buffering) features help accelerate MS Windows DirectDraw API. For ActiveMovie, the OTI-64017 utilizes Oak's PixelVu™ video scaling technology. Video playback functions are enhanced by arbitrary up-scaling with a bilinear interpolation scheme utilizing more coefficients for accuracy, a color space converter (YUV to RGB) and support of planar YUV data streams. For Direct3D, the OTI-64017 incorporates special hardware that takes advantage of today's fast Pentium processors and delivers 3D performance that rivals that of more expensive, dedicated hardware solutions.

OTI-64017
Technical Specifications

GUI Acceleration

♦ 64-bit internal/external memory data bus

♦ Single-clock GrafixPump pipelined architecture

♦ 256 ROPS (Raster Operations) for all 8-bit, 15/16-bit and 24/32-bit per pixel modes

♦ Accelerated line draw and polygon fills

♦ Built-in hardware cursor

PixelVu Video Scaling Hardware

♦ 8-tap and 4-tap Y bi-linear video interpolation and arbitrary scaling removes jagged edges from scaled image

♦ Uses additional coefficients for image accuracy while maintaining the sharpest, smoothest possible image

♦ Anti-tearing support via single-command page-flip mechanism

♦ Back-end color-space conversion (YUV-RGB)

♦ Arbitrary up-scaling

♦ YUV 4:2:2 Packed and YUV 4:2:0 Planar (MPEG) video display support

RAMDAC and Clock Design

♦ 170 MHz integrated triple 8-bit RAMDAC

♦ 16-level constant alpha blending of video and graphics

♦ Gamma correction

♦ Integrated dual clock synthesizer for MCLK speeds up to 83/100 MHz and PCLK speeds up to 170 MHz.

System Bus Interface

♦ Zero wait-state, 32-bit glueless connection to PCI bus (33 MHz PCI 2.1 compliant)

♦ PCI burst and PCI bus mastering supported

Enhanced Memory Architecture

♦ Supports single-cycle EDO and Synchronous Graphics RAM and Synchronous DRAM (SGRAM/SDRAM)

♦ Up to 600 MB/sec frame buffer bandwidth using 75 MHz EDO memory

♦ Up to 800 MB/sec maximum frame buffer bandwidth using 100 MHz SGRAM memory

♦ Supports memory densities of 256Kx4, 256Kx8, 256Kx16, 256Kx32, 512Kx32, 128Kx32, and 128Kx16

♦ 1MB - 4MB dedicated frame buffer

♦ Programmable memory interface

Microsoft DirectX Technology Accelerator

The OTI-64017 supports the complete range of Microsoft's DirectDraw acceleration functions, including:

BLT Surface Support - transparent BLT, asynchronous BLT, shrink/stretch BLT, double buffering (page flipping)

Overlay Surface Support - colorspace conversion, source and destination color keying, arbitrary x-y scaling with bilinear filtering, constant alpha blend

Other Functions - readable vertical line counter, vertical blank interrupt, vertical blank toggle status

The OTI-64017 supports the complete range of Microsoft's ActiveMovie acceleration functions.

The OTI-64017 supports Microsoft Direct3D acceleration functions in hardware, including:

Interleaved z/pixel BLT, system-to-video BLT (ultra-fast DMA BLT from system memory to frame buffer), source clear during BLT, low resolution modes in 8 and 16 bpp.

Extended Refresh and Resolution Support

Maximum non-interlaced display resolutions:

1600 x 1200 x 64K	60 Hz	(4MB)
1280 x 1024 x 16.7M	75 Hz	(4MB)
1152 x 864 x 16.7M	90 Hz	(4MB)
1024 x 768 x 16.7M	100 Hz	(4MB)
800 x 600 x 16.7M	120 Hz	(2MB)
640 x 480 x 16.7M	150 Hz	(1MB)

Power Management

♦ VESA DPMS compliant

Monitor Support

♦ DDC2B compliant
♦ VESA DPMS

Process

♦ 0.5µ micron

Package

♦ 208 PQFP

On-Chip Diagnostic

♦ JTAG Boundary Scan
♦ Signature analysis

Software and Manufacturing Support

Oak Technology offers comprehensive software support packages for Oak multimedia devices. The OTI-64017 software package comes with VESA compliant BIOS and accelerated display drivers for popular operating systems such as Windows 95, 3.1 and NT. In addition, Oak supplies complete manufacturing reference designs for the OTI-64017.

Driver List

♦ Microsoft Windows 95, Windows NT, Windows 3.1
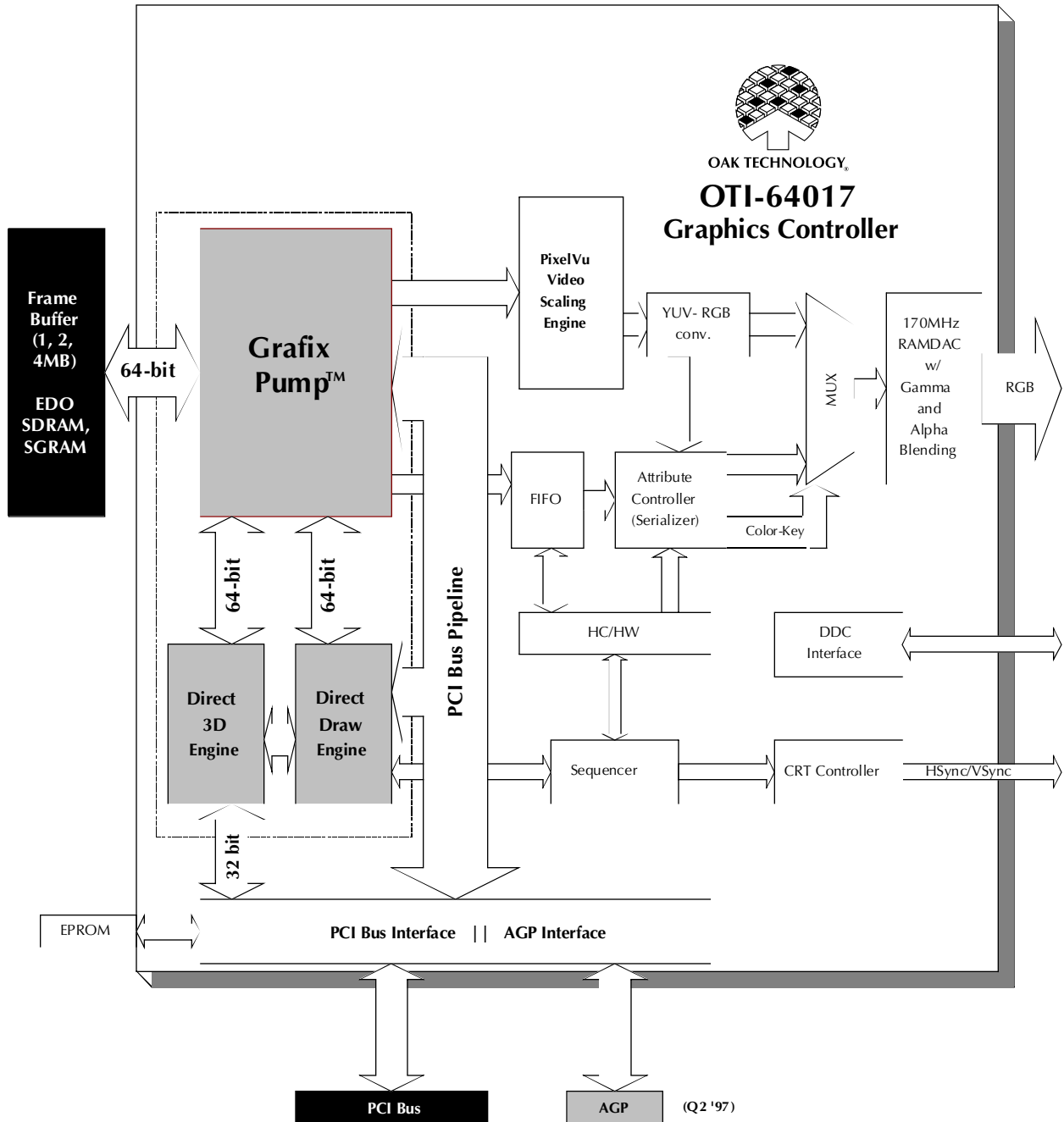♦ OS/2 Warp
♦ SCO Unix
♦ NextStep
♦ Sun Solaris

Other Software

♦ Software Development Kit available
♦ Debug
♦ Manufacturing test
♦ Gerber files and schematics
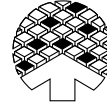
OAK TECHNOLOGY®

OTI-64017
Graphics Controller

Frame Buffer (1, 2, 4MB)

EDO SDRAM, SGRAM

64-bit

Grafix Pump™

64-bit

64-bit

PixelVu Video Scaling Engine

YUV- RGB conv.

MUX

170MHz RAMDAC w/ Gamma and Alpha Blending

RGB

PCI Bus Pipeline

FIFO

Attribute Controller (Serializer)

Color-Key

Direct 3D Engine

Direct Draw Engine

HC/HW

DDC Interface

32 bit

Sequencer

CRT Controller

HSync/VSync

EPROM

PCI Bus Interface || AGP Interface

PCI Bus

AGP

(Q2 '97)

OTI-64017 Block Diagram