

3DPRO™ /2MP CHIPSET

3DPro/2mp Highlights

Performance

- ▲ Up to 2 million polygons per second with 24-bit Z buffering, Gouraud shading, filtered MIP-mapped texture, transparency, fog and overlay
- ▲ 60 million bilinear MIP-mapped pixels per second
- ▲ Up to 8.3 Gpixels per second screen clear
- ▲ 32-bit double buffered color up to 1280x1024

3DPro/2mp Rendering Processor

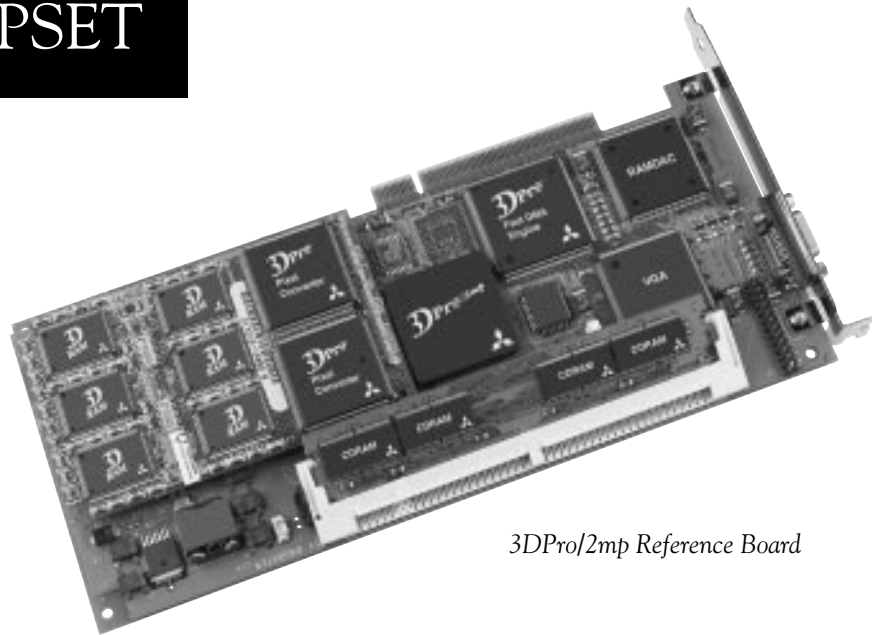
- ▲ Based on REALimage, the flagship 3D technology from Evans & Sutherland, and the result of E&S's 30 years of expertise in image generation, simulation and 3D acceleration
- ▲ Developed and optimized for Mitsubishi's 3D-RAM memory architecture
- ▲ Integrated setup, 2D and 3D acceleration
- ▲ Integrated texture engine
- ▲ Full OpenGL 1.1 hardware acceleration
- ▲ Seamless 2D and 3D integration
- ▲ Precision textured image
- ▲ Trilinear & bilinear filtered texture, perspective corrected
- ▲ Anti-aliased points, lines and pre-sorted triangles
- ▲ 32-bit RGBA color
- ▲ Transparency, overlay, depth cueing, fog, stenciling

3DPro/2mp Frame Buffer

- ▲ Based on Mitsubishi's award-winning 3D-RAM memory architecture
- ▲ Simplifies the memory control interface and scales performance with greater ease
- ▲ Optimized for high-end graphics
- ▲ On-chip ALU, ROP/Blend and compare units for pixel processing
- ▲ Replaces read-modify-write operations with write only
- ▲ Dual ported, multi-banked with cache

3DPro/2mp Texture Memory

- ▲ Based on Mitsubishi's CDRAM memory
- ▲ On-chip cache minimizes latency in texel reads



3DPro/2mp Reference Board

The Power of True OpenGL Acceleration

The 3DPro/2mp chipset delivers exceptional 3D graphics acceleration performance, superb fill-rate rendering speed, precision textured image quality, and high-resolution display to professional NT desktop systems. Empowered by Mitsubishi's revolutionary 3D-RAM frame buffer technology and Evans & Sutherland's REALimage technology, 3DPro/2mp delivers performance traditionally found only in high-end workstations.

3DPro/2mp was designed specifically for Mitsubishi's award-winning 3D-RAM memory technology. In contrast to other currently available chip technologies which share 3D processing functions between the CPU and the graphics accelerator, 3DPro/2mp offloads four key functions from the 3D graphics pipeline to 3D-RAM: anti-aliasing, blending, Z-buffer compare and raster operations. This unique design eliminates bottlenecks in the 3D pipeline to achieve unprecedented levels of graphics performance.

The 3DPro/2mp rendering processor integrates the key 3D pipeline processes of setup, scanning, shading and hardware texturing in a single chip; this is in contrast to architectures requiring separate setup geometry or texture engines. The result: a PCI graphics board with a single 3DPro/2mp chipset is capable of processing up to 2 million polygons/second, while concurrently achieving a rendering speed of up to 60 million pixels/second.

Another integrated element of the 3DPro/2mp rendering processor is 2D windows acceleration. This combined with intelligent context switching between 2D and 3D windows brings another inherent workstation feature to the professional NT desktop. Desktop users are now able to achieve enhanced uniform flow between windows, in the same way as workstation users.

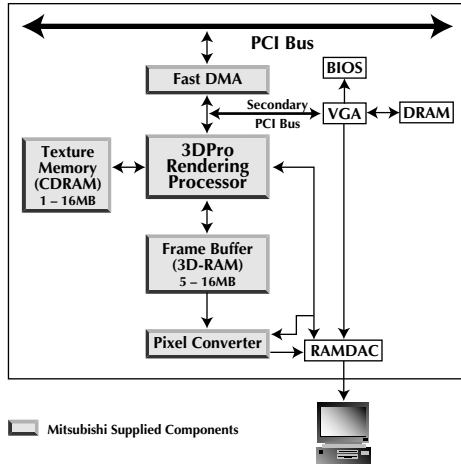
PCI 3D graphics boards based on 3DPro/2mp enable optimum solutions for popular OpenGL applications such as Pro/ENGINEER™ and Softimage™ 3D, to name just a few. Heidi applications, such as 3DStudio Max, and Direct3D applications are also supported.

3DPro/2mp provides all the processing power required for today's power-hungry professional graphics applications.



3DPro™/2mp Technical Characteristics

3DPro Reference Implementation



Performance

- ▲ 1.3M anti-aliased, Z-buffered, 32bit color lines
- ▲ 710K Gouraud shaded, Z-buffered, lit, 32bit color, 50 pixel triangles
- ▲ 570K textured, Gouraud shaded, Lit, Z-buffered, 32bit color, 50 pixel triangles
- ▲ 60M pixels per second, bilinear perspective corrected textured mapped, alpha blended

2D & 3D Acceleration

- ▲ 3D primitive level interface: points, lines and triangles (triangles with pre-sorted data)
- ▲ Multi-colored light sources
- ▲ Per pixel accurate Depth Cue
- ▲ Per vertex accurate Fog
- ▲ Anti-aliasing

Texture Mapping

- ▲ Trilinear & Bilinear filtering
- ▲ Perspective corrected
- ▲ Up to 16MB local texture memory with on-chip cache
- ▲ Real-time video textures supports texture depth:
 - 32bit RGBA texture
 - 16bit RGB and RGBA texture with 32bit calculation accuracy
 - 8 bit gray scale
- ▲ Texture size:
 - 1K x 1K at 32 bit
 - 2K x 1K or 1K x 2K at 16 bit
 - 2K x 2K at 8 bit
- ▲ Full OpenGL 1.1 compliant texture mapping with border

Frame Buffer Architecture

- ▲ Up to 15 MB of 3D-RAM
 - 1280 x 1024
 - 32bit double buffered
 - 24bit Z
 - 4bit Window ID
 - 4bit stencil/overlay
- ▲ Intelligent
- ▲ Cached
- ▲ Synchronous
- ▲ Dual-ported
- ▲ Supports six concurrent operations
- ▲ On-chip ALU
- ▲ Bit masking and block fill
- ▲ 16- and 32-bit RGBA color
- ▲ Blending and ROP performed concurrently with Z compare and stencil test

Display Features

- ▲ 640x480 to 1280x1024 screen resolution
- ▲ Overlay support
- ▲ 85MHz (up to 1280x1024)

Pixel Format

- ▲ Flexible 96 bits of data depth
 - 32-bit color double buffered
 - 24-bits of Z
 - Overlay: 8bit DB, 2bit DB or 4bit SB
 - Stencil: 4bit SB (combined with 8bit overlay DB or alone)
 - Window ID: 4

Memory Configurations

- ▲ Up to 15MB of 3D-RAM for frame buffer
- ▲ Up to 16MB of CDRAM texture memory

Software Support

- ▲ OS support: Windows™ NT 4.0, Windows 95
- ▲ API support: OpenGL 1.1, Heidi™ and Direct3D™

PCI Interface

- ▲ 33MHz PCI clock
- ▲ PCI 2.1 compliant, 32-bit
- ▲ DMA mastering
- ▲ Byte swapping capability

Package Specification

- ▲ Rendering Processor:
 - 384 pin Flip TAB-BGA
 - 3.3V supply voltage
- ▲ Frame buffer - 3D-RAM:
 - 128 pin QFP
 - 3.3V supply
- ▲ Texture memory - CDRAM:
 - 70 pin TSOP
 - 3.3V supply
- ▲ Fast DMA:
 - 240 pin Quad Flat
 - 5V PCI interface
 - 3.3V supply
- ▲ Pixel converter:
 - 208 pin PQFP
 - 3.3V supply

Projected system performance figures are based on 200MHz Pentium™ Pro, PCI @ 56MB sustain rate.

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