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# VLSI Solution Video Processor Product Brief

Revision 1.1

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Revision history:

Rev. 1.0	August 11, 1998	First release
Rev. 1.1	February 18, 1999	Editorial changes

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# 1 Product Overview

- Working silicon environment
- Mathematically correct and advanced 3D functions including bump mapping technology, licensed by Microsoft
- 250 MHz DAC supports resolutions up to 1600x1200x32bpp@75Hz
- All the frames are shareable: unified memory architecture makes simultaneous 2D and 3D mixed with video capture and TV-output possible
- Highly optimized Windows drivers with FULL DirectX 6 support and fast 2D/3D acceleration
- Superior TV output quality: PAL/NTSC with variable threshold patented flicker filter.
  - Operation modes for standard and 100/120 Hz televisions.
- Multimedia features include video capture block utilizing ITU-R 65-3 video stream standard
- 100/200MHz internal geometry processor will increase 3D Winbench performance (currently 340) by reducing CPU load significantly
  - Initializes 550 000/1M full featured triangles per second
- Complete hardware design environment
  - Full product test vector base available
  - VHDL simulation environment for all blocks
  - Fast test vector generation environment written in C-language for all the major blocks
  - Application test board environment, including real time 3D and software tests
  - Test vectors can be obtained directly from Windows drivers
- IBM compatible VGA/VESA 3.0 sub-block, optimized for 8-bit gaming performance

## 2 3D Processing features

- Geometry setup engine
  - 550/1100k triangles per second with full triangle data.
  - Dot product in 1 cycle with 3 cycle latency
  - Pipelined processing can be used for any purpose
  - Hardware division unit
  - Integrated 3x128-word data memory
  - Internal 512-word instruction cache
  - Pipelined execution
  - Speculative branches
  - Synchronization through cache, stream or user
  - AGP Ready
    - \* Burst reads supported by stream-interface
  - Full custom layout database
  - High level VHDL simulator
  - Assembler with source codes
  - High level C-simulator
- Rasterizer
  - Supports rectangles, triangles and lines
  - Mathematically correct for OpenGL implementations
  - Full custom database optimized for small size and performance
  - Patented perspective correction unit
- Pixel processor
  - Programmable pixel pipeline with logic operations
  - Bump-mapping, bilinear filtering and YUV-conversion
  - Indexed texture formats, internal 256-color 32-bit TRGB palette
  - 24/16-bit Z-buffer with fast clear and stencil
  - Enhanced picture quality through 16-bit to 32-bit color dithering

### 3 2D acceleration and multimedia features

- PCI Interface
  - Revision 2.1 with bus mastering
  - FAST DEVSEL generation
  - no wait state generation (under normal conditions)
  - Operates with both 33 and 66MHz clock frequencies
  - Can be used in both PCI and AGP slots.
- Block Transfer Unit
  - Area fill and copy
  - Bit expansion modes provide accelerated text output functions
  - 2D Benchmark results (WinBench98, 1024x768, PII/300):
    - \* 16 bpp: 135
    - \* 8 bpp: 115
    - \* 32 bpp: 103
- Video Capture Unit
  - Receives standard ITU-R BT.656-3 video stream
  - Input in PAL, NTSC, SECAM, PAL-60, NTSC 4.43 supported
  - Independent functional block
  - YUV 4:2:2 format data can be used as a texture source
- TV Output Unit
  - Both NTSC/PAL outputs are supported
  - Adjustable flicker filter threshold
  - Patented flicker filter
  - Special operation mode for 100/120 Hz televisions provides better picture sharpness with high-end IDTV sets.
  - TV output supported in Windows drivers as well as in VGA and VESA BIOS
- VGA
  - Seamless PCI/DAC interface implementation
  - Optimized for 8-bit games
  - includes IBM compatible VGA BIOS with VESA 2.0 and 3.0 and TV output

## 4 Windows Drivers

- 2D Benchmark results (WinBench98, 1024x768, PII/300):
  - 16 bpp: 135
  - 8 bpp: 115
  - 32 bpp: 103
- Accelerated features in 2D include:
  - Mouse cursor
  - Text output, with font cache
  - BitBlts with all 256 Windows ROPs supported in hardware
  - Bitmap caching in video memory
- 3D benchmark result (3D WinBench98, PII/300): 340
- Full DirectX 6 support
  - Bump mapping and multitextures
- High quality driver design includes portable code base for both 2D and 3D
  - Win95 and WinNT drivers share the same low-level acceleration code
  - The same code can be used for developing drivers for other platforms
- The acceleration code is fully 32-bit
  - Better portability
  - Nicer environment for writing code
- Straightforward and simple object-oriented design

## 5 Hardware Development Environment

- VHDL-simulation possible in all the levels and blocks
- Full documentation of all the VHDL blocks
- End user and software documentation included
  - VS25203 Hardware reference manual
  - Windows Driver's documentation
  - VGA Functional description
  - VGA BIOS Documentation
- Test vector generation environment includes
  - Geometry processor simulator and assembler
  - Rasterizer simulator and test vectors
  - Full VGA test vector database and emulation and test environment, running under Windows 95 and DOS
- Real life test vectors can be obtained directly from Windows drivers
- Application test board environment includes
  - Direct PCI and register programming tools
  - Real time 3D testing software
  - Test vector generation interface
  - VGA debugging tools and software
  - VGA BIOS tools and software including flash ROM programming utility
- Full support for development

## 6 Patents

- Division unit
- Blend
- Vector processing
- Flicker filter