Features

Highly Integrated Design
- 64 bit GUI engine
- 64 bit EDO DRAM interface up to 4MB
- Built-in TrueVideo® processor
- Motion video capture
- Flicker free TV-Output support (Cyber9385 Only)
- Built-in RAMDAC & frequency synthesizer
- Flat panel display up to 1280x1024

Accelerated Graphics Functions
- 256 Raster Operations (ROPs) for up to 24 bit packed pixel true color graphic modes
- Optimized graphic engine for: BitBLTs, line drawing, short stroke vectors, rectangle fills, and text transfer.
- Linear display memory addressing up to 4GB memory space
- Four-color hardware cursor & popup icon up to 128x128x2

Versatile Frame Buffer Interface and UMA Support
- Supports 64/48/32 bit 256Kx16 DRAM up to 4MB
- Integrated DSTN frame buffer for dual scan panels
- Unified Memory Architecture (UMA) system memory sharing
- Dynamic frame buffer sharing for optional external Video Processor

Advanced Power Management
- Supports 0V and 3.3V/5V suspend
- Self-refresh and slow-refresh DRAM
- 8 GPIO, SMI, and activity detect-pin

Mixed Voltage Operation and I/O
- Independent power plane for internal logic, host, memory, panel, and CRT interfaces
- Programmable dual-drive output buffer

Simple Bus Interface Support
- PCI rev. 2.1 support with no additional TTL
- VESA DDC, DPMS, and VAFC

TrueVideo® Processor
- On-chip YUV-to-RGB color space conversion
- Hardware bilinear H/V interpolated scaling
- Supports DirectDraw™ acceleration for sprites, page flipping, double buffer, and color keying
- Proprietary edge recovery algorithm
- Multitap horizontal filtering

Motion Video Capture
- Glueless interface to MPEG 1, 2 & video decoders
- Supports Zoom Video (ZV port)
- 8/16 pin port for RGB or YUV4:2:2/4:1:1 video data
- Dual apertures for simultaneous graphics and video access to the display memory areas
- Mixed color depth overlay provides true color video overlaid on any color depth of graphics
- Dual video overlay for VAFC video source and PCI video stream

Flickering Free TV-Output to NTSC/PAL Encoder (Cyber 9385 Only)
- Internal line buffer for flicker reduction
- Provides RGB, composite sync and sub-carrier clock for an external NTSC/PAL encoder
- Simultaneous display (flat panel & TV or CRT)

Hi-Res and Hi-Ref Display Support
- 16/24 bit interface to color DSTNs up to 1024x768
- 9/12/18/24 bit/Analog for TFTs or (9+9)/(12+12)/(18+18) for double pixel/clk TFTs up to 1280x1024
- Supports 85 Hz refresh rate at 3.3V

Advanced Flat Panels Image Control
- Frame rate control and spatial dithering for increased color depth
- Auto expansion and centering

Cyber9385/2™ Application Diagram

Overview
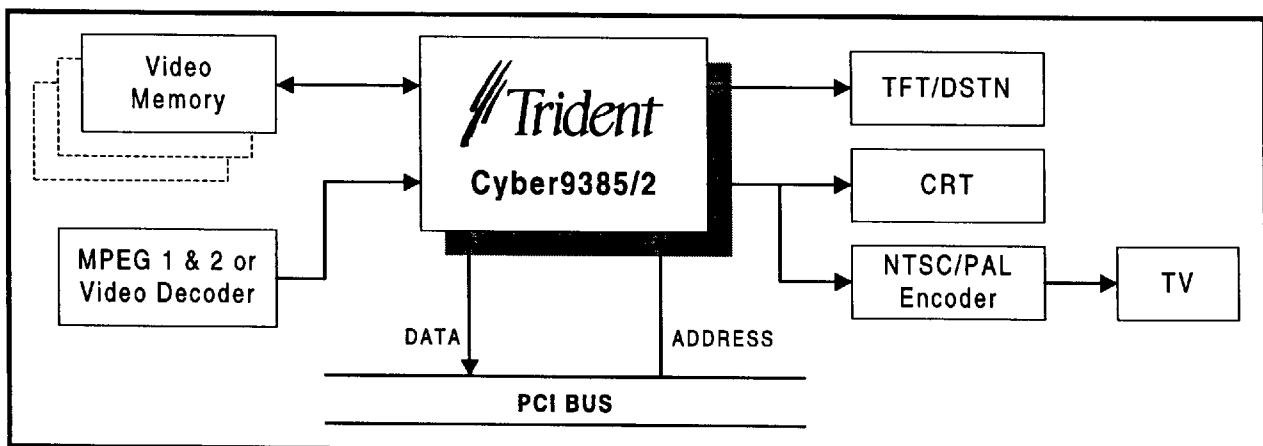
The Cyber9385/2 is a DRAM based, fully integrated LCD, CRT & TV 64 bit Multimedia Flat Panel Controller for PCI systems. It provides a flexible, high performance solution for various color depths and various resolutions. It supports these displays with options for 1, 1.5, 2 and 4 MB, and allows many memory configurations including unified or shared frame buffer architectures. With burst PCI, Extended-Data-Out (EDO)/FPM memory support, and the fastest video graphics engine, the Cyber9385/2 brings VisualReality™ to PCs.

Highly Integrated Design

The highly integrated design of the Cyber9385/2 offers a "no TTL" solution for cost-effective, high performance multimedia subsystem designs for the IBM® PC and compatible notebooks. The 64 bit memory data bus, supporting EDO DRAM memory, provides faster data transfer rates for improved system throughput. The Cyber9385/2 features a built-in TrueVideo® Processor, flicker free TV-Output support, built-in RAMDAC composed of 256x18 color lookup table, and dual loop memory and video clock. The integrated 24 bit true color DAC programmable clock synthesizer, which runs at 135 MHz using 5V and 108 MHz using 3.3V, provides a complete graphic subsystem with the addition of only two DRAMs. Video processor features include on-chip hardware Color Space Conversion (CSC) for faster data conversion on the fly, Horizontal/Vertical (H/V) scaling with interpolation, edge recovery algorithm, and overlay control with different color depths from graphics. The Cyber9385/2 also includes a fully integrated GUI accelerator, read cache, and command FIFO that optimizes memory bandwidth and maximizes graphics performance.

Accelerated Graphics Functions

The Cyber9385/2 64 bit graphics engine significantly boosts graphics performance through specialized hardware that accelerates the most frequently used GUI operations. Functions directly supported in hardware include: BitBLTs, image and text transfer, line draw, short stroke vector draw, rectangle fills, and clipping. The graphics engine supports 256 Raster Operations (ROPs) for up to 24 bit packed pixel graphic modes. Additionally, the graphic engine features linear display memory addressing (up to 4GB memory space), accelerated color expansion modes for graphics text procession, and memory-mapped I/O registers on the graphics engine for faster access time. In addition, graphic functions are optimized by a 64 bit internal data bus and a four-color hardware cursor/pop-up icon operation up to 128x128x2 pixel image, which offloads the CPU. The hardware cursor mechanism can also be used to display patterns stored in the system memory. This pop-up icon is very useful in displaying user friendly information through simple hot key operations. These advanced functions combine to allow significant performance increases over standard Super VGA designs, providing outstanding graphics acceleration on GUIs such as Microsoft® Windows™.

Versatile Frame Buffer Interface and UMA Support

The Cyber9385/2 features display memory configurations for 1MB to 4MB using 256Kx16 DRAMs. A 32, 48, or 64 bit memory bus interface, dynamic frame buffer sharing, and programmable DRAM timing provide flexibility that maximizes performance. The Cyber9385/2 supports Unified Memory Architecture (UMA) which reduces the memory cost by sharing the frame buffer with the system memory. The display queue has been increased to reduce the frequency of the memory bus requests, optimizing the memory bus efficiency for the graphic controller. Additionally, a minimal DRAM interface requirement of two 256Kx16 DRAM for 1024x768-256 color SVGA minimizes chip count, system cost, and board space for a cost-effective design solution. The display memory interface supports symmetrical or asymmetrical, Dual CAS or Dual WE (Write Enable) DRAM configurations. Extended-Data-Out (EDO) DRAM is also supported to further enhance interface capabilities.

TrueVideo® Processor

The Cyber9385/2, with an integrated Video Display and a Capture Engine, supports the dual aperture on the PCI bus which enables independent graphic and video data to be transported simultaneously without any software involvement. The video image is stored in off-screen memory and is retrieved by the Video Display Processing block for TrueVideo® processing. Using DirectDraw™ acceleration for sprites, page flipping, double buffering, and color keying, TrueVideo® processing is performed utilizing our proprietary edge recovery algorithm for sharper line visibility, de-interlacing, anti-tearing, multitap horizontal filtering, dithering, and scaling operations with bilinear interpolation in both horizontal and vertical directions. In addition, the on-chip hardware Color Space Conversion (CSC) accelerates conversion for 16 bit YUV pixels into linear true color 24 bit RGB pixels on the fly. The additional X and Y minifiers are capable of shrinking the video images to any linear fractions, which saves bus bandwidths and memory space.

Motion Video Capture/Overlay Support

The Cyber9385/2 features advanced Video Capture Port with a direct glueless decoder interface to MPEG 1 & 2, TV tuner and other video decoder chips, allowing 8/16-pin port for RGB or YUV 4:2:2/4:1:1 video data to accelerate the software playback and video capture functions. In addition, it supports Zoom Video (ZV port).

The Cyber9385/2 features Dual Video Overlay for VESA Advanced Feature Connector (VAFC) video source and PCI video stream. The video inputs can come from either the PCI bus or the Video Capture Port, which shares the same pins with the Feature Connector (FC) or VAFC port. Video image is overlaid with different color depths of graphic data according to the color key, this eases the graphic on top of the video as in pull-down menu or icon situations. Port interfaces with the Cyber9385/2's 16 bit DAC to support high-speed and high-bandwidth video overlay on graphics or graphics output to

video. This feature reduces the footprint for video subsystem design and provides a very economical solution for combining video and graphics in the same system. The Cyber9385/2 also supports palette snooping, which is important for multimedia system compatibility.

Hi-Res and Hi-Ref Display Support

The Cyber9385/2 features versatile display support in the following areas: flat panels, CRTs, TVs and application display software drivers.

Flat Panel

The Cyber9385/2 supports TFT and Dual-Scan STN (DSTN) panels without external glue logic. No extra frame buffers are required for DSTN LCDs. The Cyber9385/2 features wide flat panel support for 16/24 bit color DSTNs up to 1024x768x16M color, 9/12/18/24 bit/analog TFTs, or (9+9)/(12+12)/(18+18) double pixel/clk TFT panels up to 1280x1024x64K color. The Cyber9385/2 also supports expansion of VGA data for all supported types and resolutions.

CRT

The Cyber9385/2 display enhancements dramatically improve CRT resolution, providing sharp images. These enhancements include support of non-interlaced 1280x1024x64K, 1024x768x16M, 800x600x16M, and 640x480x16M colors for "full spectrum" color. Extended text modes of 80 or 132 columns by 25, 30, 43, or 60 rows provide an extended graphics area frequently used in many spreadsheet and database applications. In addition, extended graphics and text modes are supported by software drivers that provide a "ready-to-go" solution, minimizing the need for additional driver development.

Flicker Free TV-Output To NTSC/PAL Encoder (Cyber9385 Only)

The Cyber9385 provides an internal buffer for flicker reduction and the RGB signals driven from the Cyber9385 LUT/DAC can directly interface with a standard off-the-shelf NTSC/PAL encoder. Composite synchronization signals also produced support the encoder for standard home TV connection.

Application Software Display Drivers

The Cyber9385/2 software drivers support the following applications:

Microsoft® Windows 3.11™	OS/2 Warp™
Microsoft® Windows NT™	SCO X-Windows™
Windows 95™	AutoCAD™

The Cyber9385/2 also supports other VGA compatible applications using their software application drivers.

Simultaneous Display

The Cyber9385/2 simultaneous display in 24 bit color with mixed video/graphics on flat panel and CRT or flat panel and TV. This feature provides an optimal solution for users requiring data on both displays.

Advanced Flat Panels Image Control

Through advanced Frame Rate Control (FRC) and Spatial Dithering algorithm, color depths as high as 16M, 64K, or 256K are achievable for color flat panels. To enhance the image on high resolution displays, texts and graphics are expanded to fill the whole panel. In addition, the auto-centering function relocates the display image to the center of the screen for the same purpose.

Advanced Power Management

The Cyber9385/2 provides flexible and extensive power management capabilities. The Cyber9385/2 supports 3.3V and 5V mixed voltage operation with independent power planes for Core and Analog, Host, Memory, CRT and Panel interface. The on-chip LUT/DAC, video clock (VCLK) and memory clock (MCLK), and extend crystal input can be powered down through register controls or pins. Power down states includes ready, standby, suspend (both 0V and 3.3V/5V) and hibernation. Each power state can be activated by hardware pins, hardware timers, or software control bits. The Dual-Drive output buffers increase driving capabilities through register control on selected outputs. Self-refresh DRAM. and slow-refresh DRAM are also supported in this design.

Simple Bus Interface Support

A simple Bus Interface Unit (BIU) provides a low cost, single chip solution for IBM® PC or compatibles on PCI 2.1 Bus systems speeds up to 33 MHz. The glueless logic for both the system bus and display memory interface, and a two wire communications interface allows direct support of VESA DDC, DPMS, VAFC standards for up to 8 GPIO for DDC, I²C, and EEPROM memory. Additionally, zero-wait state host write buffer, read cache, and memory mapped I/O increase operating speeds and contribute to peak performance levels. Graphics system throughput is further enhanced by a command FIFO, allowing maximum bus transfer speed for applications such as Windows™ or AutoCAD™ that directly access video memory.

Complete Hardware Compatibility

The Cyber9385/2 is fully compliant with the PCI 2.1 Bus specifications and also supports VESA DDC and VAFC standards. The Cyber9385/2 is 100% IBM® VGA compatible on the BIOS and Drivers, allowing full compatibility with virtually any VGA application software. Additionally, the Cyber9385/2 features a 256 pin PQFP/TQFP package with optimized pin assignment for efficient PCB layout.

Cyber9385/2 Block Diagram
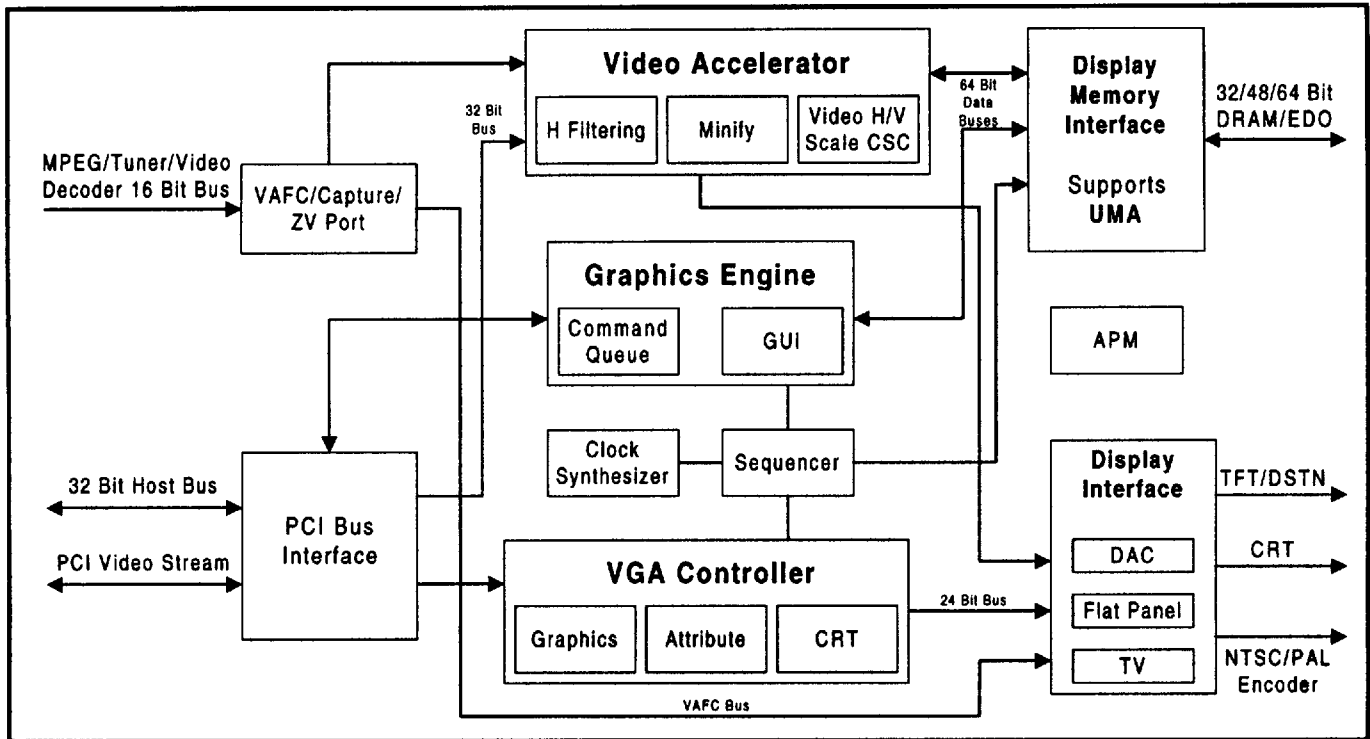
Contact your local Trident representative for:

- Technical Reference Manuals
- Software Programmer's Guides
- Evaluation Kits (Includes documentation plus evaluation board and software)

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