Trident

TVG9470™ TV Accelerator

Features

Complete Hardware Compatibility
- PCI rev. 2.1 and VL Bus 2.0 and ISA compliant
- Supports VESA DDC and VAFC Standards
- 100% IBM VGA compatible on BIOS, register, and hardware levels
- 208-pin PQFP package

Flexible Display Memory Interface
- 1/2 MB, 1 MB, or 2 MB display memory configuration with memory densities of 256Kx4, 256Kx8, and 256Kx16
- Requires only one 256Kx16 DRAM for 1024x768 SVGA solutions
- 32-bit memory interface with programmable DRAM timing

Extended VGA Display Resolutions
- High resolution non-interlaced display through 1280x1024-256, 1024x768-256, 800x600-64K colors, or 640x480-16M colors
- Extended text modes (80 or 132 columns by 25, 30, 43, or 60 rows)

Integrated Features for TV Display
- NTSC/PAL resolution interlaced display for 640x480 (NTSC) or 800x600 (PAL)
- NTSC/PAL display for DOS games
- Flicker Removal for output to interlaced monitors
- Interpolated vertical scaling for NTSC or PAL resolutions
- Video Passthrough analog switch for selection of direct output of VGA or VCR Data to TV monitor
- Overscan/underscan to TV display
- Simultaneous display of VGA and TV (NTSC or PAL) monitors with external DAC
- Direct interface to external NTSC/PAL Encoder

Improved Manufacturability
- Pin scan testing
- Signature analysis

Highly Integrated Design
- Fully integrated 24-bit TrueColor DAC with color look-up table, 108 MHz programmable clock synthesizer, 100% IBM compatible VGA core, and GUI Accelerator
- 256x18 color look-up table with HiColor and TrueColor bypass mode support, dual loop memory, and video clock
- Two wire interface to EEPROM or VESA DDC

Advanced Multimedia Support
- VESA Advanced Feature Connector (VAFC)
- Port for high bandwidth video overlay on graphics
- Programmable Color Space Converter
- Palette snooping

Simple Bus Interface
- Flexible Bus Interface Unit supports 16-bit ISA Bus interface and 32-bit "glueless" connection to VESA Local Bus or PCI with no additional TTL
- Linear display memory addressing
- Zero wait state host write buffer and read cache
- PCI Burst mode support

"Deep Green PC" Power Management
- VESA Display Power Management Signaling (DPMS) compatible
- Simple RAMDAC power-down and clock idle register interface
- Maintain default video throughput at power-down.

Accelerated Graphics Functions
- Optimized graphic functions for BitBLTs, line drawing, short stroke vectors, polygon fills, and text transfer
- 256 Raster Operations (ROPs) for 8-bits per pixel (PseudoColor) and 15/16-bits per pixel (HiColor) graphic modes
- Accelerated color expansion modes
- Internal hardware cursor (64x64x2 or 32x32x2)
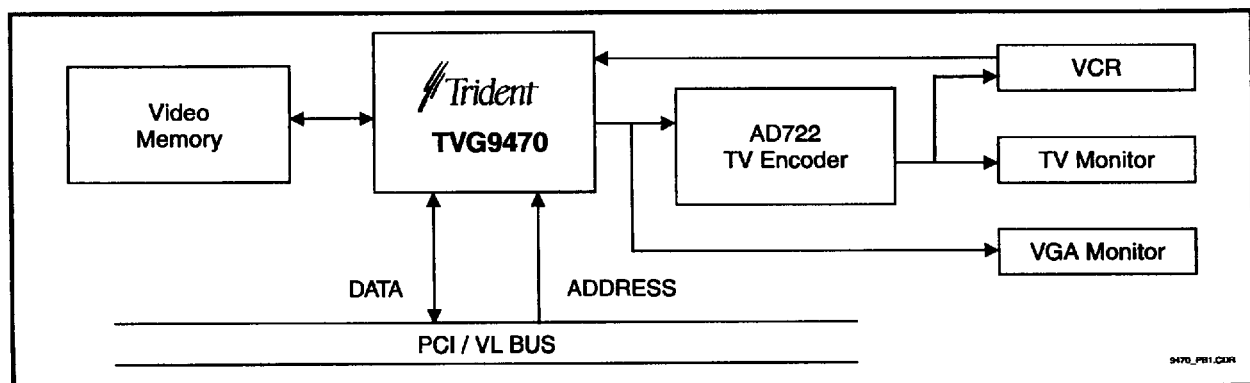
TVG9470 Application Diagram

Overview

The TVG9470 TV Accelerator is a highly integrated DRAM-based graphics accelerator and CRT controller with integrated features for flicker-free output to TV monitors and recording devices. It provides a flexible, low-cost, high-performance solution for a diverse range of color depth, CRT resolution, and display memory configurations for 32-bit VL Bus, PCI Bus, and ISA Bus interfaces. The TVG9470's highly innovative system design and full acceleration graphics engine dramatically improves GUI functions and significantly enhances overall system operation. The "flicker removal" and "scaling" functions removes the artifacts when a VGA display is viewed on a TV monitor or data is sent to a recording device such as a VCR. Also advanced system features such as VAFC DAC interface, Display Power Management Signaling (DPMS), 24-bit TrueColor DAC, dual clock synthesizer, minimal DRAM configuration, and extended color text modes allow operation at peak performance levels. The TVG9470 also supports standard BIOS for VESA modes, VESA palette snooping, and programmable DRAM timing. The TVG9470's enhanced feature set and flexible system configuration can be tailored for a wide range of design applications, making it the ideal solution for mid-range PCs running Microsoft® Windows™, Windows NT™, IBM® OS/2™ and similar operating systems. In addition, the integrated flicker removal and functionality scaling of the TVG9470 is ideal for the expanding MPEG playback and games market by providing high quality video output to large screen TV monitors and VCRs.

Accelerated Functions

The TVG9470's graphics engine significantly boosts graphics performance through specialized hardware that accelerates the most frequently used GUI operations. Functions directly supported in hardware include: BitBLT, image and text transfer, line draw, short stroke vector draw, and polygon fills. Graphics functions are optimized further by faster hardware cursor operations, which offloads the CPU. The graphics engine also supports 256 Raster Operations (ROPs) for 8 and 16-bit per pixel (HiColor) graphic modes. These advanced functions combine to allow performance increases up to five times greater than the Super VGA designs, providing outstanding acceleration in graphic intensive environments such as Microsoft Windows.

Highly Integrated Design

The TVG9470's highly integrated design offers a "no-TTL" solution for simple, efficient, cost-effective, high-performance graphics subsystem design for the IBM PC and compatible systems. The integrated 24-bit TrueColor DAC, 108 MHz programmable clock synthesizer, read cache, and command FIFO reduces system cost while optimizing memory bandwidth for maximum graphics performance. When combined with the integrated bus transceivers, the integrated clock synthesizer and DAC provide a complete graphic subsystem solution simply by adding DRAM. The TVG9470 also includes a fully integrated GUI accelerator, 256x18 color look-up table with HiColor and TrueColor bypass mode support, dual-loop memory, and video clock. No TTL support is needed for system bus or display memory interface, and a single line EEPROM interface allows easy graphic system configuration.

Integrated Video to TV Support

The TVG9470 incorporates "flicker removal" and "vertical scaling" logic for better video quality when displayed on an interlaced TV monitor. VGA data as well as PC games are often unusable on a TV monitor due to the flicker effect that is caused by the interlaced monitor. The TVG9470 eliminates this by smoothing adjacent lines and eliminating single horizontal lines that cause flicker. The vertical scaling is also used to provide better video quality when outputting the video to a TV or VCR. Since the TV screen does not display as many vertical lines as a VGA monitor, scaling is implemented to avoid losing information when lines are dropped. The data from the lines that are eliminated during scaling is incorporated into adjacent lines, therefore avoiding loss of data. With the addition of a low cost external DAC, simultaneous display on a VGA monitor and a TV monitor is possible.

Analog Video Output Switch Control

The TVG9470 has a complex analog video switch that is used to select different video input and output devices. This control allows the user to select video input from VGA or an external device (such as a VCR) before it is sent to the TV display. The switch also controls the selection of output devices for TV, VCR, or VGA monitors. The TVG9470 provides the switch control information to external devices for controlling audio input and output selection. Default switch settings are maintained during "power-off" mode for VCR output to TV.

9002182 0000322 420
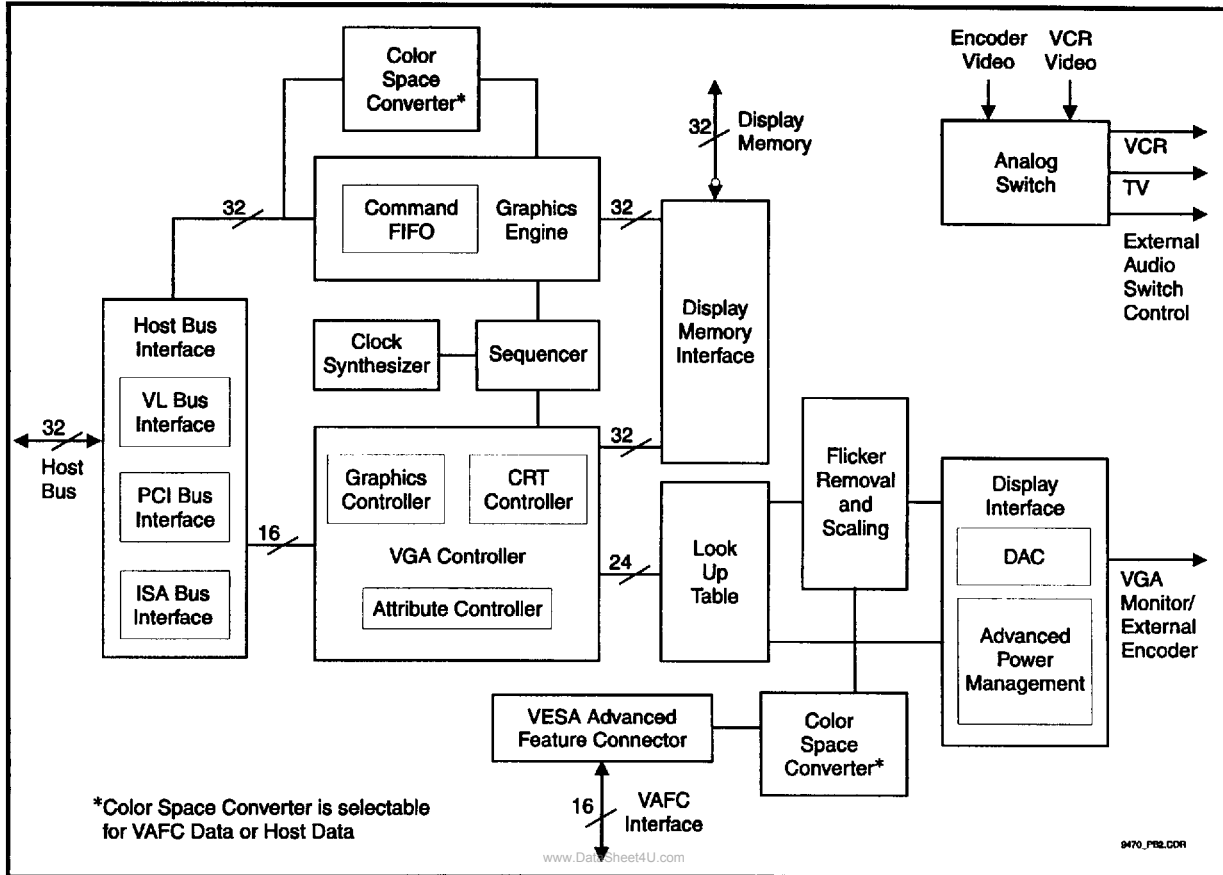
TVG9470 Block Diagram

Enhanced Display Capability

Display enhancements dramatically improve CRT resolution, providing sharp high-color images. These enhancements include support of 1280x1024-256, 1024x768-256, 1024x768-64K, or 800x600-16M color. Extended text modes of 80/132 columns by 25/30/43/60 rows provide an extended graphics area frequently used in many spreadsheet and database applications. VESA™ Display Data Channels (DDC) support allows selection of higher refresh rate to improve display quality. The chip also allows panning and zooming to support virtual desktop. In addition, extended graphics and text modes are supported by software application drivers that provide a "ready-to-go" solution minimizing the need for additional driver development. The TVG9470 supports the following applications:

Microsoft Windows™	Ventura Publisher™
Wordstar™	Microsoft NT™
Autoshade™	CADKEY™
OS/2™	Lotus 1-2-3™
FrameMaker™	AutoCAD™
P-CAD™	Quattro-Pro™
Microsoft Word™	VersaCAD™
Symphony™	WordPerfect™
SCO X-Windows™	

Optimized System Features

Compared with other similar devices, the TVG9470 offers many advanced features that optimize overall system operation. Linear display memory addressing, zero-wait state host write buffer, and read cache increase operation speed and contribute to peak performance levels.

While maintaining the high graphics performance, the flicker removal allows for high quality video output to TVs and VCRs with a simple low-cost external encoder. Also, pin scan testing and signature analysis perform system level test operations upon start-up to verify interface connections which ensures correct system functionality. Graphics system throughput is further enhanced by a command FIFO, allowing a maximum bus transfer speed for applications such as Windows, AutoCAD or multimedia applications that directly access graphics memory.

Advanced Multimedia Support with VAFC DAC

The built-in VESA Advanced Feature Connector (VAFC) Port interfaces with a 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 integrated Color Space Converter can be programmed to accept data over the VAFC or data being transferred over the system bus allowing conversion of YUV (4:2:2 or 4:1:1) to RGB (5:5:5, 5:6:5, or 8:8:8) from hardware video decoders or software CODECs for Indeo, Cinepak or MPEG. The TVG9470 also supports palette snooping, ideal for multimedia applications.

Complete System Bus Support

The flexible Bus Interface Unit (BIU) provides a low-cost, single-chip solution for IBM PC™ or compatibles on VL Bus, PCI Bus and ISA Bus systems. The TVG9470's BIU supports 16-bit ISA Bus interface and 32-bit VESA Local Bus (VL Bus) or PCI Bus interfaces. Combined with "glueless" connections, the BIU allows an efficient design path for quick and easy integration to future PCs. The TVG9470 supports VL 2.0 Bus speeds up to 50 MHz, PCI 2.1 bus speeds up to 33 MHz, and ISA Bus speeds up to 12 MHz.

"Green PC" Power Management

The TVG9470 supports VESA Display Power Management Signaling (DPMS), which decreases energy consumption when the device is in a temporary idle state. VESA DPMS power-down states, ready, standby, suspend, and off, specify HSYNC, VSYNC, clock and DAC operation through DPMS utility software supplied by Trident Microsystems, Inc. Furthermore, the TVG9470 maintains the video path to the TV active in "power-off" state.

Flexible Memory Interface

The TVG9470 offers a display memory configuration from 1/2 MB to 2 MB and supports a range of DRAM configurations from 256Kx4 to 256Kx16. A 32-bit memory bus interface and programmable DRAM timing provides a flexible interface that maximizes timing for increased performance. Additionally, a nominal DRAM interface requirement of one 256Kx16 DRAM for 1024x768-16 color SVGA minimizes chip count, system cost, and board space for cost-effective design solutions. The display memory interface also supports symmetrical or asymmetrical configuration and Dual CAS/Dual WE DRAM configuration. In addition, a conventional "Fast Page Mode" or "Fast Page Mode with Extended Data Out" DRAM feature improves system performance by offering CPU access to the display memory at maximum bus bandwidth.

Compatibility

The TVG9470 is fully compliant with the PCI rev. 2 and VL Bus 2.0 specifications and also supports VESA DDC, VAFC, and simplified DRAM interface interconnection. The TVG9470 is 100% IBM® VGA compatible on BIOS, register, and hardware level, allowing full compatibility with virtually any VGA application software. Additionally, the TVG9470 features a 208-pin package with optimized pin assignment for efficient PCB layout.

Contact your local Trident representative for:

- Technical Reference Manuals
- Evaluation Kits: Includes documentation plus evaluation board and software
- Reference Design Kits: Includes full documentation and software license for drivers to immediately enter production