Features

Complete Hardware Compatibility
- PCI bus 2.0 and VL bus 2.0 compliant
- Supports VESA DDC2B, DPMS and VAFC standards
- 100% IBM® VGA compatible on BIOS, register and hardware levels
- 208-pin PQFP package

Accelerated Graphics Functions
- Internal 64 bit memory data bus
- 256 Raster Operations (ROPs) for 8 bits per pixel (PseudoColor), 15/16 bits per pixel (HiColor), and 24 bits per pixel (True Color) graphic modes
- Optimized graphic engine for bitBLTs, line draws, short stroke vector draws, clipping, ROP4 assist, and text transfer
- Accelerated color expansion modes
- Internal hardware cursor (64x64x2 or 32x32x2)
- Built-in 64x32 pattern register

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

Simple Bus Interface Support
- Flexible bus interface unit for zero wait state, 32 bit glueless connection to VESA Local Bus (VLB) 2.0 or PCI bus 2.0 with no additional TTL
- PCI burst mode support
- Big-endian and little-endian format
- Memory-mapped I/O on PCI and VL buses
- Zero wait state host write buffer and read cache

Highly Integrated Design
- Fully integrated 24 bit True Color DAC with color look-up table, 135 MHz clock synthesizer, read cache, command FIFO, and GUI accelerator
- 256x18 color look-up table with HiColor and TrueColor bypass mode support
- Two wire interface to EEPROM or VESA DDC2B

Software CODEC Acceleration
- On-chip Color Space Conversion (CSC), horizontal/vertical scaling and overlay control for 30 FPS software video CODEC display
- 16 bit VAFC video stream can be merged for dual-video display
- DCI acceleration and dual mixed mode display

Flexible Display Memory Interface
- 1 MB to 4 MB display memory configurations with DRAM densities of 256Kx4, 256Kx8 and 256Kx16
- Only two 256Kx16 DRAMs for 1024x768-256
- Dynamic frame buffer sharing
- Fast Page Mode (FPM) or Extended Data Out (EDO) DRAM
- Support for WRAM

"Deep Green PC" Power Management
- VESA Display Power Management Signaling (DPMS) compatible
- RAMDAC and clock synthesizer power-down for greater energy savings
- Support for graphics system shutdown

Improved Manufacturability
- Pin scan testing
- Signature analysis
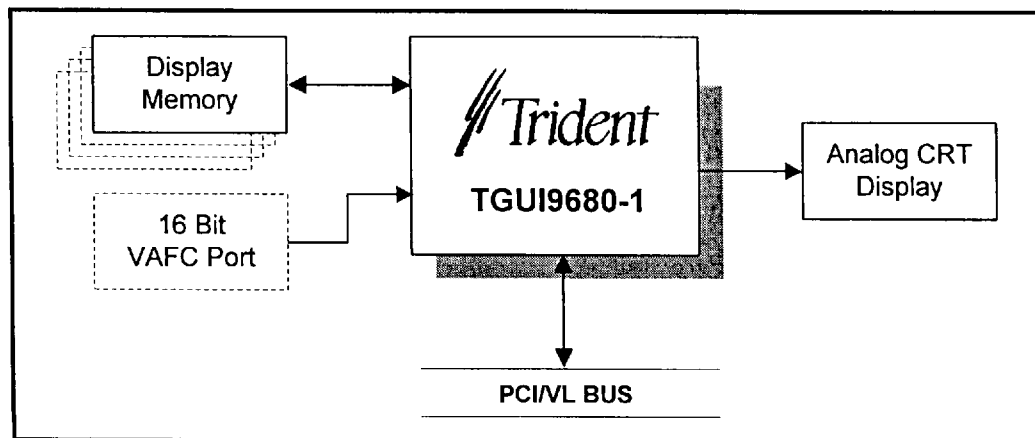
TGUI9680-1 Application Diagram

Overview

The TGUI9680-1 improves upon the 64 bit TGUI9680 GUI accelerator by consuming 20-30% less power and by enhancing the screen quality. The TGUI9680-1 includes all advanced graphical acceleration features of the original TGUI9660 and extends the feature set to the acceleration of software video CODEC standards such as Cinepak, Indeo and MPEG. Video acceleration features include on-chip hardware Color Space Conversion (CSC), horizontal/vertical scaling and overlay control.

The shared TGUI9660/80/80-1 feature set consists of a DRAM-based 64 bit GUI accelerator with a 24 bit True Color DAC and 135 Mhz clock synthesizers integrated on-chip. The device includes glueless VL and PCI bus interfaces. Graphic acceleration functions include line draw, color expansion, 256 ROPBLT's and clipping for high performance Windows operation. "Green PC" support includes VESA compliant Display Power Management Signaling (DPMS) and extended features such as RAMDAC shutdown. BIOS support includes DDC2B and full VESA BIOS Extensions (VBE).

The 208-pin package and integration of RAMDAC, clock synthesizers and graphics/video acceleration make the TGUI9680-1 an ideal solution for add-in and planar board graphic designs.

Complete Hardware Compatibility

The TGUI9680-1 is the second of Trident's 64 bit product family. It is fully compliant with the PCI Rev. 2.0 and the VL bus 2.0 specifications, and it also supports VESA DDC2B and VAFC standards. The TGUI9680-1 is 100% IBM VGA and TGUI9660/80 compatible on the BIOS, register and hardware level, allowing full compatibility with virtually any VGA application software. Additionally, the TGUI9680-1 features a 208-pin PQFP package with optimized pin assignment for efficient PCB layout.

Accelerated Graphics Functions

The TGUI9680-1 64 bit graphics engine significantly boosts graphics performance through specialized hardware that accelerates the most frequently used GUI operations. The 64 bit memory data bus provides a higher memory bandwidth, which allows greater and faster data transfer rates for improved system throughput. Functions directly supported in hardware include: bitBLT, image and text transfer, line draw, short stroke vector draw and clipping.

Graphic functions are optimized further by a 64 bit internal data bus and a hardware cursor operation (64x64x2 or 32x32x2 pixel image) which offloads the CPU. The graphics engine also supports 256 Raster Operations (ROPs) for 8 bpp (PseudoColor), 15 and 16 bpp (HiColor), and 24 bpp (True Color) graphic modes. Additionally, memory-mapped I/O registers on the graphics engine provide faster access time. These advanced functions combine to allow significant performance increases over standard Super VGA designs, providing outstanding graphics acceleration on GUI's such as Microsoft Windows and similar applications.

Extended Display Resolution

Support of non-interlaced 1024x768-256, 1024x768-64K or 800x600-16M colors provides "full spectrum" color. Extended text modes of 80 or 132 columns by 25, 30, 43 or 60 rows allow an extended text area frequently used in many spreadsheet and database applications. 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 TGUI9680-1 software application drivers support 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™	

The TGUI9680-1 also supports other VGA compatible applications using their own respective software drivers.

Simple Bus Interface Support

A flexible Bus Interface Unit (BIU) provides a low-cost, single-chip solution for IBM PC or compatibles on 32 bit VESA Local Bus (VLB) or PCI bus interfaces. Combined with "glueless" connections, the BIU allows an efficient design path for quick and easy integration to future generation PC's. The TGUI9680-1 supports VL bus speeds up to 50 MHz and PCI bus speeds up to 33 MHz. Also, linear display memory addressing, zero-wait state host write buffer and read cache 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.

Highly Integrated Design

The TGUI9680-1's highly integrated design offers a "no TTL" solution for cost-effective, high performance graphic subsystem designs for the IBM PC and compatible systems. The integrated 24 bit True Color DAC and 135 MHz programmable clock synthesizers provide a complete graphic subsystem with the addition of only one WRAM or two DRAM. The TGUI9680-1 also includes a fully integrated GUI accelerator, read cache, and command FIFO that optimize memory bandwidth and maximize graphics performance. No TTL support is needed for the system bus or display memory interface and a two-wire communications interface allows direct support of either an external EEPROM or VESA DDC2B monitor interface.

Software CODEC Acceleration

Software CODECs such as Indeo, Cinepak and MPEG can be accelerated with the TGUI9680-1's hardware video acceleration features. The TGUI9680-1 places video data in off-screen graphics display memory and accelerates software CODEC operation by providing Color Space Conversion (CSC), hardware horizontal/vertical scaling and overlay control. The hardware video acceleration features allow up to 30 FPS motion video from CD-ROM without the need for expensive hardware options. Color format support includes YUV 4:2:2 and 8 bit RGB. The TGUI9680-1 includes Windows™ 95 compliant DCI drivers for maximum video compatibility.
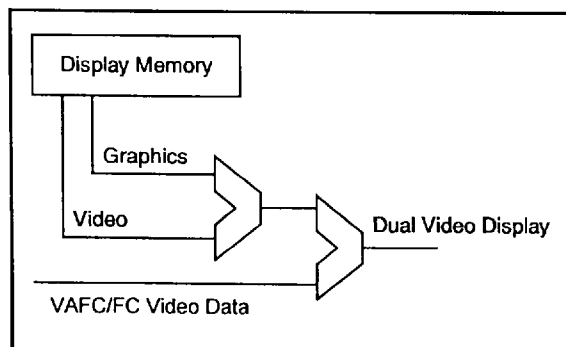
The TGUI9680-1 supports the VESA Advanced Feature Connector (VAFC) or the standard IBM Feature Connector (FC). Its 16 bit VAFC port is baseline compatible with the VESA video standard.

The video stream from the VAFC/FC port is merged with the combined video and graphics image coming from the display memory to allow dual live-video displays, as depicted in the previous figure.

Flexible Display Memory Interface

The TGUI9680-1 features display memory configurations from 1 MB to 4 MB and supports a wide range of DRAM configurations (256Kx4, 256Kx8, and 256Kx16). A 32 bit or 64 bit memory bus interface, dynamic frame buffer sharing for video data and programmable DRAM timing provide a flexible interface that maximizes timing for increased performance, offering system designers a choice of power/performance options. A minimum DRAM interface requirement of two 256Kx16 DRAMs for 1024x768-256 color SVGA lowers chip count, system cost, and board space for cost-effective design solutions. The display memory interface supports a symmetrical or asymmetrical configuration as well as dual CAS or dual WE (Write Enable) DRAM configurations. Support for Fast Page Mode (FPM) and Extended Data Out (EDO) DRAM improves CPU performance by offering CPU access to the display memory at maximum bus bandwidth. A minimum one DRAM interface is achieved by using high bandwidth WRAM for increased system throughput and superior graphics operation.

The TGUI9680-1 is designed to take advantage of both Extended Data Out (EDO) DRAM and Window RAM (WRAM) using up to an 80 MHz MCLK for 25ns fast-page-cycle timing. Both of these memory types offer higher performance than conventional DRAM because of their high bandwidth architectures. EDO is configured using standard DRAM control signals. WRAM is a dual-ported VRAM "like" architecture with a 256Kx32 high-speed data port and 16 bit serial out port. The TGUI9680-1 can support up to two WRAM devices. The two WRAM devices are interleaved on their 32 bit data ports while the 32 bits of combined serial-data are brought into the remaining 32 bits of the TGUI9680-1's data lines.

"Deep Green PC" Power Management

The TGUI9680-1 supports VESA Display Power Management Signaling (DPMS), which decreases monitor power consumption after a predetermined timeout period. "Deep Green PC" goes beyond the conventional VESA DPMS specification. VESA DPMS power-down states (ready, standby, suspend, and off) specify HSYNC and VSYNC signals to control the monitor power-down state. All power

■ 9002182 0000379 300 ■

management functions are regulated using MCLK, VCLK and RAMDAC control registers.

BIOS extensions can automatically turn off the RAMDAC and VCLK and reduce MCLK when DPMS power-down states are activated, since the display no longer needs analog RGB signals. In addition, all registers in the TGUI9680-1 offer read/write access allowing a complete shutdown of the graphics subsystem.

Improved Manufacturability

The TGUI9680-1 is designed for high-volume PC markets requiring the lowest possible manufacturing costs. To help achieve this, the TGUI9680-1 includes pin-scan testing for detecting opens and shorts on a manufacturing floor bed-of-nails. Also, an Internal Signature Analysis Circuit with built-in accumulator and timing circuit provides for easy testing of both integrity of the frame buffer and a large part of the TGUI9680-1 functional circuit. No external circuitry is required to support either of these features, except a bed-of-nails PC board tester.

Advanced Multimedia Support

A built-in VAFC or FC port interfaces with the TGUI9680-1's DAC to support high speed and high band-width 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 TGUI9680-1 also supports palette snooping, which is ideal for multimedia applications.

AIX, Solaris Support

Both little and big endian pixel swap modes are included in the TGUI9680-1, for both the Intel 80X86 and PowerPC architectures. Big endian swap modes include full, half and word swap as well as pass-through for various operating systems including AIX, Solaris and others.
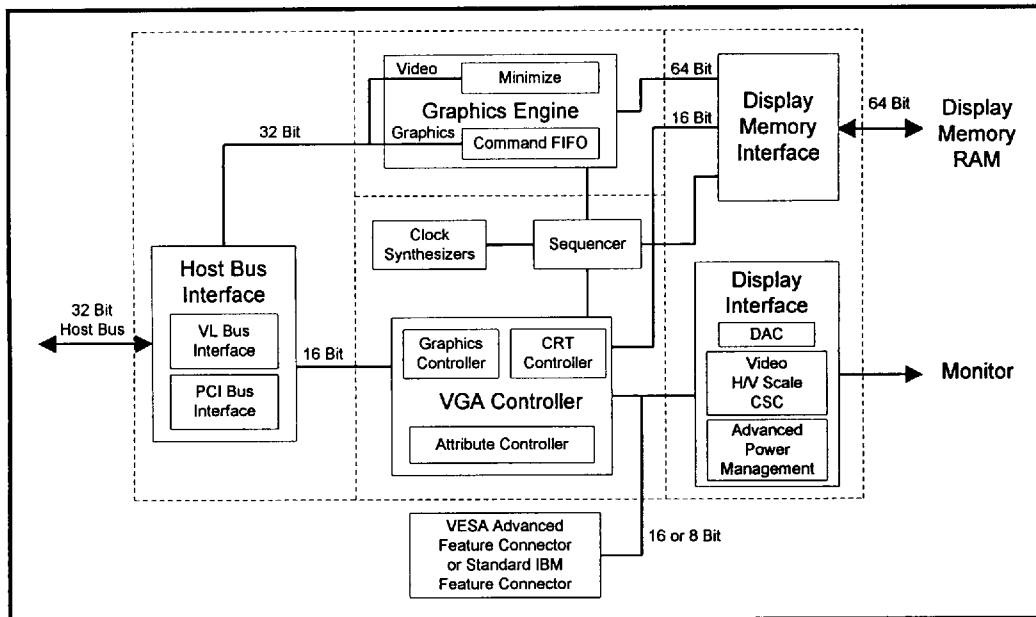
TGUI9680-1 Block Diagram

Contact your local Trident representative for:
* Technical Reference Manuals, Software Programmer's Guides, and Evaluation Kits

Specifications subject to change without notice.
Document Revision B. Printed in USA 9/96

■ 9002182 0000380 022 ■