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## VigmaVision - PCI

### Image Capture Real-Time Processing and Display

#### Special Features

- Single-slot PCI module combines video acquisition, real-time processing, and display
- State-of-the-art reconfigurable computing architecture (FPGA-based) offers greater than 25 times the performance typical of traditional DSP solutions for image processing, depending on the application
- Scalable processing options: VigmaVision® PCI can be configured to meet a wide range of real-time image processing requirements
- Image acquisition includes a variety of video sources - color/ monochrome, analog/digital, and frame scan/line scan up to 40 MHz sampling rate
- True color image display with non-destructive graphics overlay
- Graphics display resolutions up to 1600 x 1200 with flicker free refresh up to 85 Hz
- Eliminates need for separate display board
- VigmaVision Toolbox™ API provides developers and system integrators seamless integration of VigmaVision's hardware features into their applications
- Imaging functions/operations optimized for real-time image processing
- Support for Solaris™ and Windows 95/NT/98™
- Available in two configurations: VigmaVision PRO with real-time image processing, VigmaVision STD as a versatile frame grabber with graphics overlay and display driver

Titan Systems Corporation's VisiCom Products Division develops real-time image processing solutions integrating acquisition, processing, and display capabilities. Our product solutions have incorporated state-of-the-art image processing technology, ranging from general purpose digital signal processors to the most current implementation of reconfigurable computing technology, Field Programmable Gate Arrays (FPGAs). Our solutions have evolved from VME designs to the PCI architecture to serve the needs of vision system developers and system integrators who need the performance and versatility inherent in our designs.

#### VigmaVision-PCI

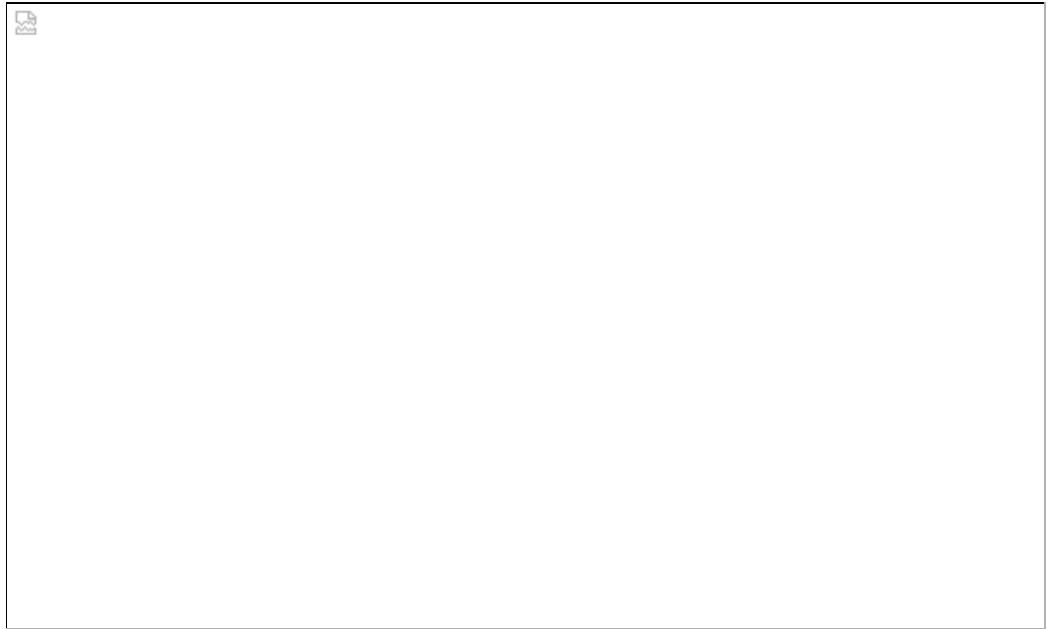
VisiCom's VigmaVision PRO product combines the real-time performance of our FPGA Imaging Extensions with off-the-shelf components for acquisition and display, as well as a comprehensive, easy-to-use API. Our approach to product development includes continuing development of more sophisticated image processing functions, and providing support for the latest developments in camera/video technologies. VisiCom is committed to providing the best that technology offers in terms of performance and flexibility at a price and total cost of ownership lower than our competition.

#### Applications

VisiCom's principal customers are OEMs and System Integrators providing vision systems that meet the demands of the Machine Vision, Medical Imaging, and Surveillance market segments and related industries. Some of the specific applications include:

- **Semiconductor Manufacturing:** Wafer Inspection and Alignment, Semiconductor Packaging, Electronics Assembly and Test
- **Industrial Inspection:** Web Inspection
- **Medical/Image-Guided Surgery:** Laser Surgery, Endoscopy, Microscopy, SEM and Fluoroscopy
- **Security:** Cargo and Luggage Automated Inspection
- **Surveillance:** Unmanned Aerial Vehicles, Automated Traffic Monitoring
- **Scientific:** Electron Microscopy

In addition to the VigmaVision product line, VisiCom provides custom solutions designed to meet user-specific configuration and performance requirements. Working with VisiCom allows customers to add value with real-time image processing in their products while avoiding the risks involved in developing that technology. VisiCom's extensive experience is available to rapidly produce real-time image processing solutions for integration into higher-level products.



### VigmaVision-PC PRO Architecture Integrates Image Capture, Real-Time Processing and Display On A Single PCI Board

#### **Real-Time Image Processing**

Real-time image processing consists of the acquisition, processing and display of image and graphics data at the video frame rate. Traditional approaches to image processing have utilized separate boards for acquisition, processing and display, depending on the system bus for transfer of up to 30 MB/sec of data between the three functions. The VigmaVision architecture integrates all three functions on a single board that does not depend on scarce system resources to achieve real-time capability. Since this architecture provides the ability to drive a wide variety of display devices, the expense of a separate video board is not required. The re-configurability of FPGA technology allows the characteristics of VigmaVision-PCI to change dynamically, providing a significant benefit and cost-savings for OEMs. The flexibility of FPGA technology allows rapid implementation of customer-specific, real-time image processing functions.

#### **Real-Time Functions**

Examples of Real-time functions accessible through the VigmaVision Toolbox API include:

**Spatial Filtering - Laplacian Edge Enhancement:** Omni-directional operation that highlights all edges in an image, regardless of orientation. This 3x3 convolution operates on the luminance component of standard video.

**Frame Averaging (IIR filter) w/ 3x3 Convolution:** An operation designed to reduce or eliminate random noise patterns in an image. The numbers of frames averaged is a user-defined parameter. Both luminance and chrominance components are averaged. Convolution is performed on the luminance component only.

**Motion Detection/Isolation:** An image differencing operation used to discern movement of objects between multiple images of the same scene or that were acquired at different times. This implementation results in the replacement of non-moving objects in one color, and the display of moving objects in a chosen color.

**Affine Transform Re-Sampling with Bilinear Interpolation:** This operation allows the original image to be rotated/translated/skewed/scaled/reflected based upon parameters provided by the user. Bilinear interpolation produces smoother imagery than nearest-neighbor resampling.

**Custom Solutions:** In addition to the types of real-time image processing functions listed above, the VigmaVision architecture allows custom solutions to be developed to meet special needs for additional image processing power and performance, such as radar scan conversion algorithms, convolutions of varying kernel size, color-space conversion, gamma correction, contrast stretch, motion stabilization, and video-mixing/synchronization.

#### **Scalability**

For additional performance, the VigaVision-PCI can optionally be configured with components from several families of Xilinx FPGAs, enabling very intensive real-time image processing requirements to be satisfied.

### **VigaVision-PCI PRO - Integrated Acquisition, Processing and Display**

#### **Acquisition - Cameras and Other Image Sources**

VigaVision-PCI PRO easily interfaces to a variety of standard and non-standard video cameras and other image sources to meet the demands of the Machine Vision, Medical Imaging, and Surveillance market applications. Devices and cameras from manufacturers such as Kodak, Dalsa, Cohu, Pulnix, Hitachi, Panasonic, and Sony are supported. Image sources include high-resolution cameras, line scan cameras, medical scanners, slow-scan cameras (such as scanning electron microscopes), frame reset cameras, single or multi-tap cameras, Xray detectors, and infrared detectors. Flexibility for interfacing to a wide variety of devices includes:

- NTSC/PAL, CCIR/RS-170 and S-Video cameras
- Digital acquisition - 16-bit channel - acquisition at up to 40 MB/sec with optional RS-422 and LVDS Digital Interfaces
- External trigger to initiate image capture
- Exposure (timer) output
- Programmable gain and offset

#### **Real-Time Image Processing**

In order to meet the demands of very intensive image processing applications, the VigaVision-PCI PRO provides:

- Dynamic Reconfiguration of the FPGA
- Up to 64 MB DRAM buffer memory (16 MB standard)
- FPGA reconfiguration from host computer

#### **Graphics and Video Display**

- S3 VIRGE/GX-2 accelerated graphics
- 4 MB SGRAM frame buffer memory (video and overlay)
- Non-destructive overlay (8 - 24-bit)
- Pan/Scroll/Zoom image buffer independent of overlay buffer
- Up to 1600 x 1200 x 16-bit graphics (overlay) resolution
- Video resolutions from 640 x 480 up to 1280 x 1024
- Video color depth from 8 bits per pixel to 24 bits per pixel (16 bits at 1280 x 1024)
- Refresh rates ranging from 60 Hz to 85 Hz
- Simultaneous NTSC/S-Video and RGB outputs - does not require a separate video board
- Multi-monitor capability under Windows 98 and Solaris, enables multiple displays per CPU

#### **VigaVision-PCI STD Frame Grabber**

VigaVision-PCI is also available without the FPGA and buffer memory to serve as a versatile frame grabber. The input and output architecture is identical to the VigaVision-PCI PRO: The image acquisition and analog camera interface flexibility is included as are the video outputs with graphic overlay capabilities. This implementation provides the image acquisition interface, the frame buffer, non-destructive graphics overlay, and the capability to drive NTSC/S-Video and RGB displays, all in a single PCI form factor.

#### **Software**

The VigaVision Toolbox™ (VTB) is a C-language image acquisition and processing library providing the API for OEM developers and system integrators to access the functionality of the VigaVision-PCI hardware.

#### **Key Features**

- Hardware initialization and register control
- Display control
- Image acquisition, camera control and configuration functions
- Image processing functions
- Frame buffer access
- Color space conversion

#### **Software Environments**

- VTB is compatible with Microsoft C/C++ and callable from Visual Basic 5.0
- Accessible to application software which has been linked with the VTB or accessed via

- Windows as a DLL
- VTB is supported in the following operating system environments:
  - Solaris
  - Windows 95
  - Windows NT
  - Windows 98
- (Inquire about support for other operating systems)

### **Mechanical and Environmental**

- Size: Single PCI module
- Host Interface: PCI Local Bus, 32-bit
- Power consumption: +5 volts @ 2.5 amps maximum
- Operating Temperature: 0 to 50o C
- Storage Temperature: -20 to 85o C
- Relative Humidity: 0 to 90% (non-condensing)
- MTBF: 40,000 hours (calculated)

### **Ordering Information**

Contact VisiCom Products Sales for part numbers and prices.

- VignaVision-PCI PRO
- VignaVision-PCI STD
- VignaVision-PCI STD with RS-422 Digital Interface
- VignaVision-PCI STD with LVDS Digital Interface

*Note: Information herein is subject to change without notice. Capabilities may vary slightly with host platform and operating system.*

### **For More Information**

For additional information on this product, or any other VisiCom product or service, contact VisiCom's sales department via email at [sales@visicom.com](mailto:sales@visicom.com), by telephone at 800-621-8474 or 858-457-2111, or by fax at 858-597-7094.

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