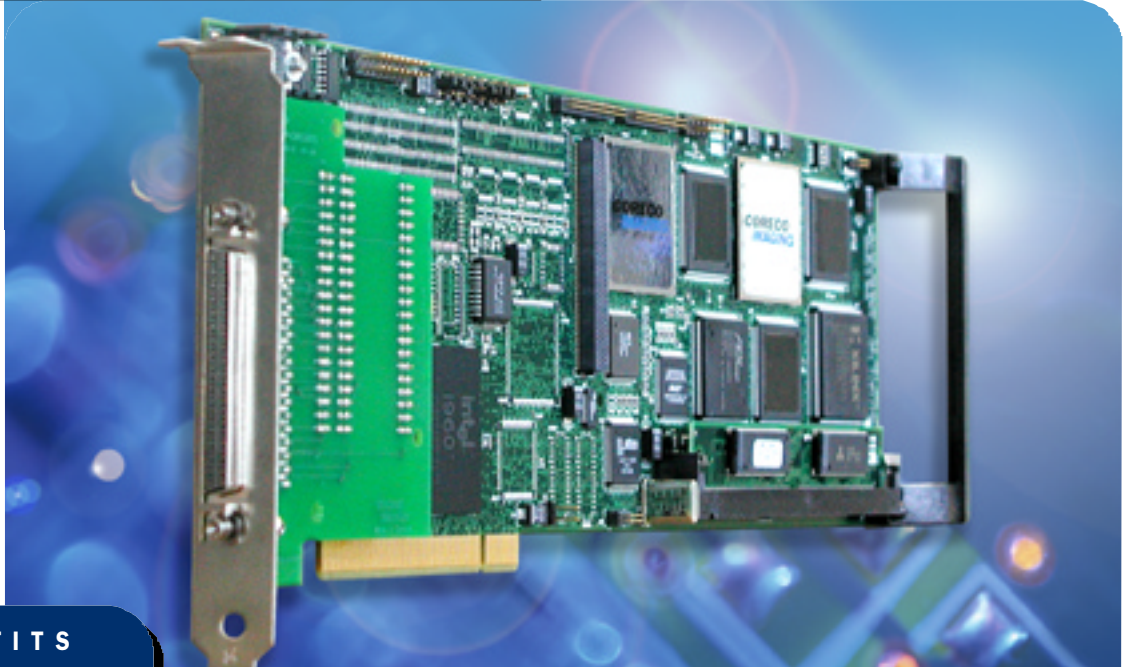


# Viper-Digital



## KEY BENEFITS

### **Acquisition Features**

- Interfaces to multi-tap area scan and line scan cameras
- Acquisition rates up to 200 Mbytes/sec
- Two 32-bit inputs permit acquisition from multiple cameras
- Eight 8-bit inputs permit acquisition from multiple cameras
- Multiple data formats (8, 16, 24 or 32-bit)
- Flat field correction for line and area scan cameras with Pixel Processor
- Real-time tap reversal
- Trigger input, digital I/O
- Data transfer direct to host or to the Mamba.

### **Host Interface Features**

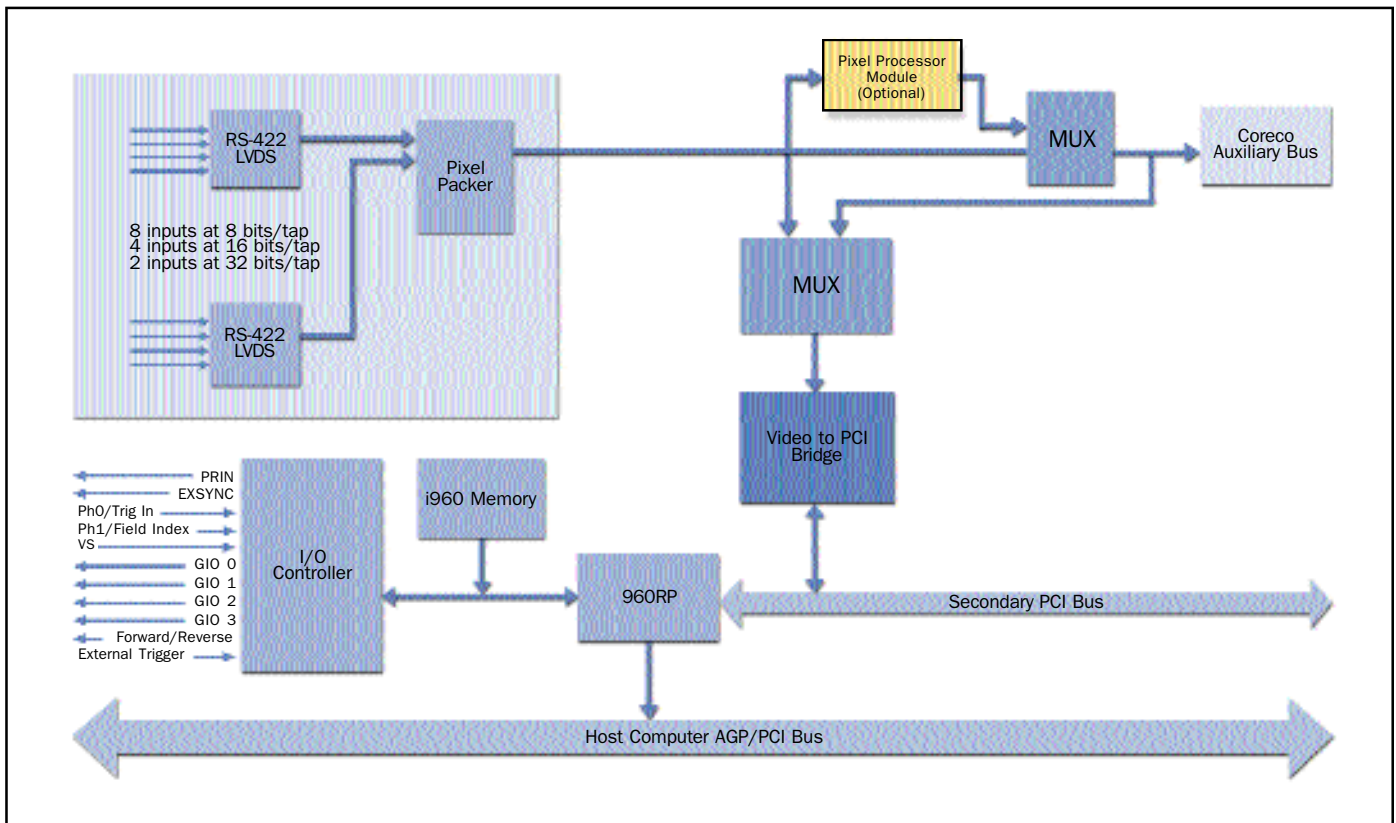
- i960 System Controller
- PCI Bus Master supports scatter/gather transfers
- Planar or Packed pixel transfer modes
- 100 Mbytes/sec PCI bandwidth

## OVERVIEW

### High Performance **PCI** Frame Grabber for **Multitap Digital** Cameras

The Viper-Digital is a single slot, high quality video acquisition and pre-processing board for the PCI bus that features high speed image acquisition (up to 200 Mbytes/sec).

The Viper-Digital can acquire, pre-process and transfer images in real-time to system memory or to the Mamba products, as well as handle a variety of data formats including 8, 16, 24 or 32 bits/pixel.



Viper-Digital Functional Block Diagram

## The i960:

### **PCI Interface and System Controller**

The Viper-Digital utilizes the Intel i960 as its PCI interface. This intelligent I/O controller supports PCI bus mastering and scatter/gather for maximum PCI performance. Additionally, part of the image can be buffered during busy cycles on the PCI bus, ensuring no image data is ever lost.

### **High Speed Multi-Tap Acquisition**

The Viper-Digital acquires digital data at rates up to 200 Mbytes/sec from multiple tap cameras. The board features two, 32-bit wide input channels. Each channel can be configured to acquire data at 8, 16, 24 or 32 bits/pixel. The maximum acquisition rate on any single input is 50 MHz.

### **Variable Acquisition Resolution**

Resolutions from 32 x 32 to 32K x infinity allow windowed or full frame acquisition from either standard or high resolution large array CCD cameras. Variable frame rate capability allows data to be captured from high or slow frame rate cameras, capturing image data for later analysis and viewing. The Viper-Digital is programmable, allowing a range of pixel clocks, vertical refresh rates, horizontal line rates and scan types to be acquired by the card.

### **Tap Reversal**

The Mamba-100's eight optically isolated inputs and four outputs can be used for external event/process monitoring and synchronization. These TTL level signals can also be used to control external devices.

### **Flat Field Correction**

The Viper-Digital is able to perform flat field correction on line scan data. This feature is useful to compensate for lighting variations and/or sensor variations across the field of view. Flat field correction occurs during acquisition with the Pixel Processor installed.

### **The Pixel Processor Module**

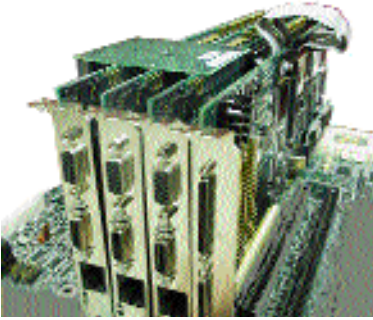
The Pixel Processor is an optional processing module designed for the Viper series of products and the Cobra/C6. The Pixel Processor performs point-to-point and neighborhood operations on live images up to 200 Mbytes/sec. Reference images can be acquired and stored in the Pixel Processors' on-board frame buffer for further operations.

The Pixel Processor features a re-programmable processing unit, plus frame buffer memory which is used to buffer reference images incoming images and intermediate results. The Pixel Processor operates on pixels at rates up to 200 Mbytes/sec.

## Embedded Pentium Processing

The Viper-Digital can transfer acquired images to the host PCI bus for host based processing, or across the Coreco Auxiliary Bus (CAB) at 200 Mbytes/sec to the Mamba products.

### **Mamba-100**



The Mamba-100 is a highly integrated, Pentium III based embedded vision processor designed to off-load time-critical and compute intensive tasks from the host. The advanced technology offered by Intel's Pentium III employs enhanced MMX

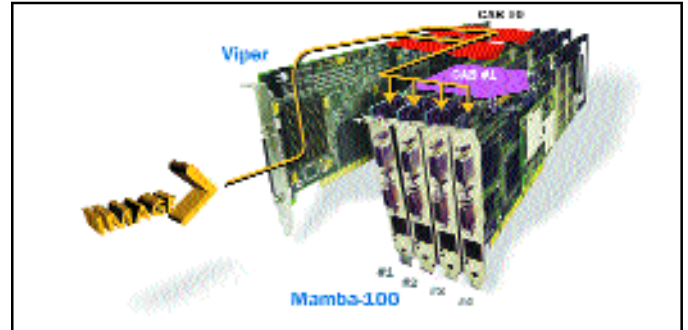
instructions along with a newly introduced Streaming SIMD Extensions (SSE), memory and cache management instructions to speed up data processing. A central feature of the Mamba-100 is the Coreco Auxiliary Bus (CAB), a dedicated high-speed board-to-board communication bus (200 Mbytes/sec.) that facilitates fast data transfers.

Coreco's Viper frame grabbers use the CAB to transfer image data to the Mamba-100. Other features include, a flexible software development environment and the ability to configure multi-board architectures. The CAB transfers image data from the Coreco Viper series of intelligent frame grabbers, which includes the Viper-RGB for color applications, the Viper-Digital for integrating cameras with multiple digital inputs, the Viper-CamLink a camera link-based frame grabber and the Viper-Quad for simultaneous acquisition from up to four cameras. The Viper-Quad is ideally suited for semiconductor, reticle inspection, and multi-stage inspection applications requiring acquisition of multiple views of an object.

## CAB System Topologies

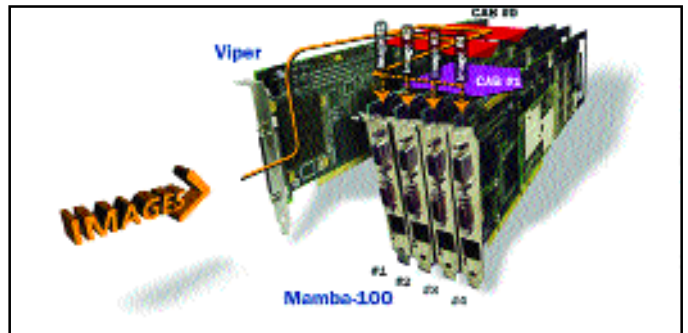
The CAB system on the Mamba-100 is designed to operate in three different configurations. These topologies allow developers to adapt their image processing algorithms to leverage multiple parallel processors or pipeline processing techniques to gain and increase processing performance in several folds.

### **Multicast Mode**



The CAB's Multicast mode allows images to be sent for concurrent processing on two or more Mamba-100s. Multicast mode can also be used to perform pipeline processing.

### **Round-Robin Mode**



The CAB's Round-Robin mode allows successive images to be sent to different Mamba-100s in the system for concurrent processing. For example, the Viper-Digital, while grabbing continuously, can transfer the first image to the first Mamba-100, the second image to the second Mamba-100, and so on, for processing.

## Software Development Tools



The Viper Series are supported by Coreco Imaging's Sapera, Smart Series and WiT software packages. Sapera is a library of C/C++ imaging functions built on a communications structure for embedded processing. The Smart Series is a library of advanced algorithms developed specifically for machine vision OEMs and include functions for pattern recognition (SmartSearch), OCR (SmartOCR), and 2D Matrix/Bar Code decoding (SmartMatrix). WiT is a performance proven development package that relies of a unique iconic user interface that allows the rapid development and testing of imaging algorithms. Version 7.1 of WiT requires no knowledge of C programming.

## Applications

- Real-time imaging
- Multi-tap camera interface
- High resolution image processing
- Color image processing
- Front-end pre-processor for the Mamba boards

## Specifications\*

Camera scan type	Area scan, Line scan
Camera interface type	Digital
Custom formats	Yes
Color acquisition	Yes
N° of inputs	1
Pixel depth (bits/pixel)	Mono: 8, 10, 12, 16, 32; RGB: 8:8:8; 10:10:10
Digitization rate (Max Mbytes/sec)	200 Mbytes/sec
Input lookup tables	No
Pixel jitter	+/- 2ns
<b>Display section</b>	
On-board VGA	No
Interlaced output	N/A
Resolution Max	N/A
Refresh Rate	N/A
Expansion capable	Yes
High speed auxiliary bus (CAB)	200 Mbytes/sec
On-board processor	Dedicated i960
Pixel Processor	Yes
<b>Control Signals</b>	
General I/O	4 out, RS-422, 4-out, TTL
Trigger	1 - RS-422
Strobe	N/A
Time/Counter	No
Pixel clock in	Yes
Pixel clock out	Yes
Shaft encoder	Quadrature
Frame reset	Yes
<b>Software</b>	
O/S	Win NT 4.0, Win 2000
Sapera SDK	Yes
WiT	Yes
Smart Series	Yes
Power output	+12V@amp
Camera connector type	Camera dependant

\* Last updated January 2002

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