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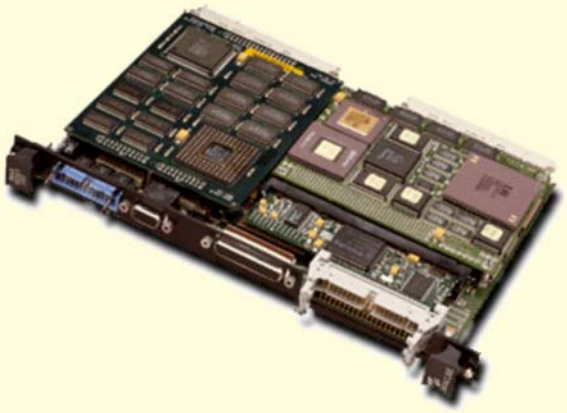
Find the *Datacube MaxVideo MV200* at our website: ***Click HERE***

VME Image Processing Sub-systems

MaxVideo 250
MaxVideo 200
Acquisition Modules
- **AS (Analog Scanner)**
- **AD (Acquire Digital)**
- **AC (Acquire Color)**

MaxModules
- **MiniWarper**
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MaxVideo 250



Datacube's MaxVideo 250 provides image acquisition, storage, processing, and display functions on a single, one-slot VME card that is more powerful and versatile than any other VME product available. With 7,000 MIPS of processing power, it supports multiple, simultaneous pipelines, switchable by software at frame rates. It derives its power from pipeline processing -- a method of specialized parallel processing uniquely suited to the demands of image manipulation. Fast VMEbus transfer is available for applications where access to image data by the host CPU is useful.

The MaxVideo 250 includes ports to the VMEbus and MAXbus. It comes with 28 MB of VSIM memory and includes high-speed image access. The MaxVideo 250 accepts analog or digital input from a wide variety of sensors at various speeds and resolutions. It can also receive data from line-scan, TDI, multi-tap, or multi-spectral cameras.

Each board has six VSIMs (Virtual Surface Image Memories) that provide a total of 28 MB of memory. In addition to being surface stores, VSIMs have a crosspoint switch, statistical processor, LUT, and ALU, allowing them to perform specific processing functions at 40 MHz.

The MaxVideo 250's massive crosspoint switch provides 640 MB/second of internal bandwidth. Linear, non-linear, convolution, histogram, and statistical processing operations can be performed simultaneously at frame rates by connecting the processing elements under the control of ImageFlow software.

High Speed Image Access (HSIA) enhances the transfer of frame-rate image data over the VMEbus. In some applications, HSIA allows utilization of the host CPU to augment image processing functionality.

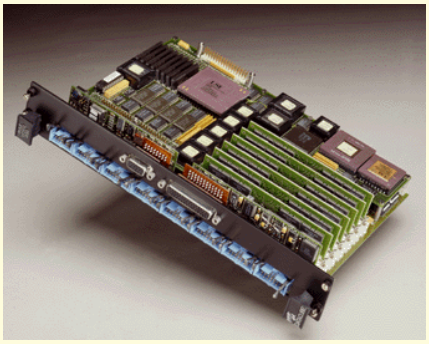
The MAXbus ports allow image data interchange with no perfomance penalty between the MaxVideo 250 and other boards such as Datacube's XI Display Controller and MD1 Digital Image Recorder. It also allows cascading of multiple MaxVideo 250s for enhanced processing horsepower.

Applications development on the MaxVideo 250 is significantly simplified by Datacube's ImageFlow. This library of C-callable functions synchronizes multiple data transfers at frame-rates, hiding the complexities of the hardware from the programmer. It is also flexible, with the ability to work with a variety of CPUs and operating systems.

The Advanced Processor daughtercard enhances the convolution, statistical analysis, LUT processing and binary morphology capabilities of the MaxVideo 250. The built-in Analog Generator provides a display and graphics overlay that facilitates a wide variety of gray-scale, pseudo-color and color outputs.

Each MaxVideo 250 can be equipped with a module to acquire analog or digital images. It interfaces with a wide variety of sensors with a range of speeds and resolutions. The MaxVideo 250 can also be customized with one of a choice of MaxModules -- optional daughterboard modules that enhance specific image processing functions.

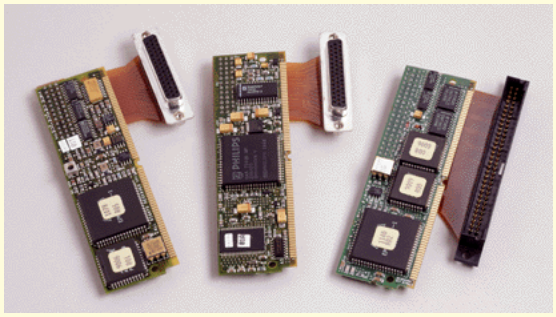
MaxVideo 200



The MaxVideo 200 is an earlier, two VME-slot version of the MaxVideo 250. Like the MaxVideo 250, it can accommodate one Acquisition Module and one MaxModule. It is ideal for applications where more memory flexibility and capacity are required, because:

- It allows more flexible memory configuration with six independent VSIM slots
- Up to 96 MB of VSIM memory can reside on each board by using 16 MB VSIMs.

Acquisition Modules



Each MaxVideo 250 and MaxVideo 200 board-level image processor comes with your choice of one of three acquisition modules. These modules provide support for analog, digital, and color inputs from a wide variety of acquisition devices. Each of these acquisition modules are fully supported by ImageFlow, Datacube's software library of programmable functions.

Analog Scanner (AS)

The Analog Scanner (AS) is an 8-bit digitization module for the MaxVideo 250 and 200. It interfaces to most analog 1-D or 2-D cameras and sensors. Digitization rates from DC to 26 MHz are supported. It provides complete conditioning of the selected analog source signals, including programmable gain, offset, filter selection, and sync processing operations. The timing section of the AS is fully programmable and it can generate and/or slave to horizontal sync, vertical sync, composite sync, and pixel clock signals.

Acquire Digital (AD)

The Acquire Digital (AD) is a 24-bit digital input module for the MaxVideo 250 and 200. It interfaces to most digital 1-D or 2-D cameras and sensors. It supports data rates from DC to 20 MHz. The AD receives digital signals with up to 24 bits of resolution. A First In First Out (FIFO) is used to match input rates with the video pipeline. Data is output to the MaxVideo 250 or MaxVideo 200 through up to three 8-bit module ports. The AD timing section is fully programmable and can generate and/or slave to horizontal sync, vertical sync, composite sync, and pixel clock signals. It accepts 24-bit single-ended or 12-bit differential digital data inputs.

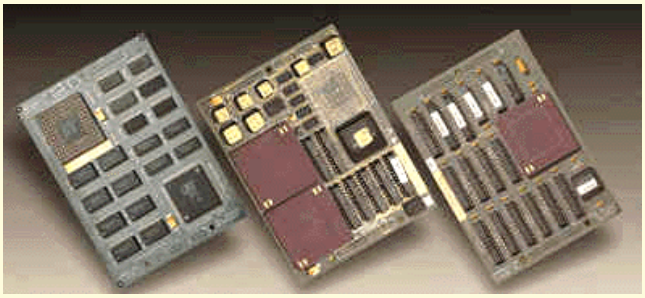
Acquire Color (AC)

The Acquire Color (AC) is the color acquisition module for use with the MaxVideo 250 and 200. It supports standard, analog color input formats and outputs either 24-bit RGB data or 16-bit YU/YV interleaved data to the motherboard. Features include two analog input ports that support separate 8-bit luminance and 8-bit chrominance inputs, or composite inputs. Also included is an Input Video Selector for camera selection between two input ports, color space conversion to RGB, monochrome, or YUV, and selectable resolution. The AC supports three filter characteristics -- a low-boost filter, a nominal filter, and a high-boost filter -- for both composite video and S-Video.

Capabilities include analog, color acquisition on one of two input channels and software-selectable input format. Supported formats are composite (PAL or NTSC), gray-scale (CCIR or RS-170), and YC (S-Video). The AC also works very well with low quality or irregular signals such as those produced by VCRs. It can be used instead of an AS for standard RS-170 and CCIR video sources of poor quality. The AC supports 24-bit RGB video or 16-bit interleaved

YU/YV output to the MaxVideo 250 and 200. It outputs full resolution of 640x484 (NTSC) and 768x576 (PAL) or scaled resolutions of 512x484 (NTSC) and 512x576 (PAL).

MaxModules



Each MaxVideo 250 and MaxVideo 200 board-level image processor can be customized with one of three MaxModules to enhance a specific image processing function. All of these daughterboards are fully supported by Datacube's ImageFlow software.

MiniWarper

A high-speed image warping module, the MiniWarper performs first and second order polynomial spatial rendering at 20 MHz. A single MiniWarper is capable of pipelined warping at 10 MPels/sec. Greater throughput can be acheived with multiple MiniWarpers (e.g., two for 20 MPel/second, four for 40 MPel/second). The MiniWarper provides resampling and sub-pixel interpolation operations for distortion or sensor correction, scan conversion, image translation, rotation, aspect ratio transformation, and zoom. ImageFlow includes software objects to make efficient use of the MiniWarper's capabilities.

The MiniWarper creates a warped (target) image that faithfully represents the transformed source image, eliminating distortion and unwanted artifacts with sophisticated interpolation techniques. Target pixels are created by interpolating between several pixels near the source. The interpolation algorithms are performed with sub-pixel precision.

Performance of the MiniWarper can be significantly faster than software solutions on CPU platforms. It is also flexible, with variable settings for data precision, interpolation, filter aperture, and coefficient precision. 8-bit data is warped in one pass, while multiple pass techniques are employed to warp 12-bit data. A 20 MHz render rate makes multiple pass techniques on the MiniWarper a practical alternative to costly hardware solutions. Its first-order image translation, rotation, and scale capabilities significantly improve the performance of applications such as imaging workstation window manipulation. Second-order warping applications, including sensor non-linearity correction, aspect angle distortion adjustment, and earth curvature compensation, are also greatly accelerated.

For machine vision applications, MiniWarper provides low-cost solutions for problems such as template matching on randomly positioned parts by warping the image to correct for differences in perspective or rotation.

NMAC

The NMAC (Neighborhood Multiply and Accumulate) MaxModule is a high-performance, cost-effective add-on convolution and neighborhood processor that enhances the MaxVideo 250 and MaxVideo 200's convolution capabilities. It is available in three configurations:

- ***NMAC1:*** A base-model 8-bit convolver with a single FIR chip used for 8-bit convolutions.
- ***NMAC2:*** This dual 8-bit convolver with two FIR chips can perform one or two independent 8x8 convolutions on the same input data. When used with an external 8x8 convolver such as the MaxVideo 250 or 200's AP device, it can perform 12-bit convolutions.
- ***NMAC3:*** The most powerful NMAC configuration, this dual 8-bit convolver has two FIR chips and one Pythagorean coordinate transform IC. It performs one or two independent 8x8 convolutions on the same input data, and complex rectangular-to-polar data conversion on video output data. It can also perform 12-bit convolutions when used with the MaxVideo 250's (or 200's) AP device.

RVF

The RVF (Rank Value Filter) MaxModule is a programmable 64-tap filter that provides enhanced rank value, median,

maximum, and minimum filtering on 8- or 12-bit data at 20 MHz. It handles images with an infinite vertical dimension and line lengths to 5048.

The RVF computes a given rank of the input values in a moving window and outputs the rank value. Values can be masked from the computation, allowing control over the window of the filter so that the size and shape of the window can be varied by application. It is most commonly used for median filtering, an effective technique for removing spike or impulse-like noise while preserving monotonic changes in the input data. Maximum and minimum filtering are used to suppress noise in a non-linear manner.

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