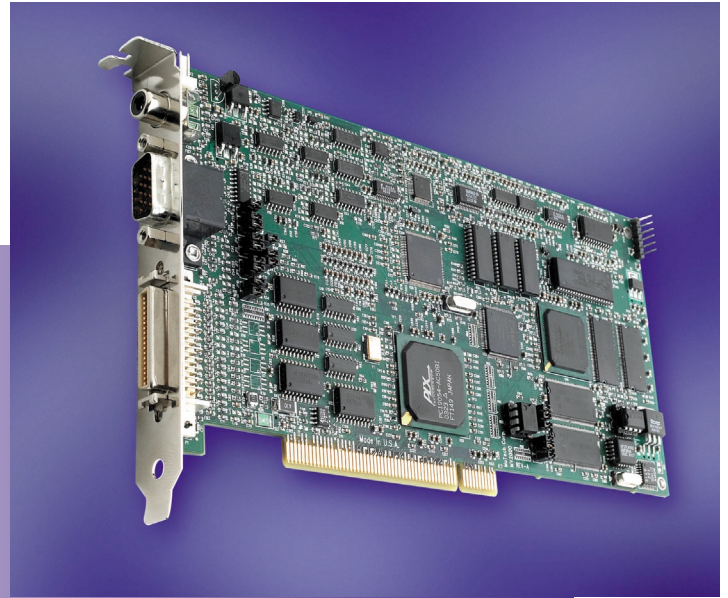


## M-Vision 2000 Series Video Digitizer

### Features

- 6 (monochrome) or 2 (RGB) Video Inputs
- RS-170/CCIR or Non-standard Video
- Monochrome and RGB on the Same Board
- Supports Dual Video Output Cameras
- 10 Bit A/D (monochrome)
- AC or DC Video Coupling
- Up to 95MHz Sampling Rate
- Multi-bank Input LUTs for MONO & RGB
- Programmable Grab Window Control
- Max. Size of Grab Window (64K x 64K)
- H/V Scaling 1:1 to 8:1
- H/V Mirroring on Captured Image
- 32/128 MB of On Board Memory Buffer
- Up to 130 MB/S DMA to System Memory
- External Sync Inputs and HD + VD Output
- Multiple Groups of Event/Trigger Inputs
- Multiple Strobe Outputs
- Supports Multiple Boards in a System
- PCI V2.2 Compliant I/F Chip
- Windows 9X/NT/2K/XP Support
- Software Development Kit Available
- RS-232 Signals for Camera Control



### Applications

- Machine Vision
- Industrial Inspection/Gauging
- Medical/Biomedical Imaging
- Video Sequence Capture
- Scientific Image Processing

### Description / Summary

The M-Vision 2000(MV-2000) is a high quality high performance color/monochrome Video Digitizer Board, capable of selecting video sources, conditioning the video signal, digitizing, capturing and storing the image(s) to the on board SDRAM memory. The captured video data may be DMAed to the system memory simultaneously or afterwards. The MV-2000 also has the capability to capture a high speed video sequence to either on board memory or system memory in real time. There are optimally up to 128MB of buffer memory on the MV-2000 board, which can store from a few lines of video to a frame or many frames of video under the users' control. The MV-2000 supports RGB or monochrome (both standard and non-standard) video sources. The MV-2000 uses a PCI 2.2 compliant 32 bit, 33 MHz Master Interface, which is capable of transferring the video data at up to 130 MB/S. Other than video inputs, the MV-2000 also provides connections for external sync signal, event input, strobe output, trigger input as well as sync and timing outputs to drive the camera.

### Video Inputs

Video from up to 6 cameras (monochrome) or up to 2 RGB cameras may be selected for digitizing. The user can mix the connections with up to 3 monochrome and 1 RGB video sources. A Video Cable (VC-MDR 36-16) is available from MuTech, which has 16 connections and supports a subset of the input/outputs of the board (4 video inputs; external sync and clock; events; strobes and triggers). For complete information on the connections, please contact MuTech Support Group.

The selected video signal passes the Video Input Conditioning Circuit. This unit includes a selectable low-pass filter with programmable bandwidth; a video gain/clamping controller and software selectable AC/DC coupling. The video is then sent to a 10 bit A/D converter for digitizing. For RGB video, three 8 bit A/D converters are used. The digitizing voltage ranges of the converters are also programmable.

### Digital Video Data Processing

The digital data passes an on board LUT which has multiple banks for fast switching. The LUT supports 8 to 8 mapping for color

video or 10 to 8/10 to 10 mapping for B/W video. The pixels are then packed into DWORDs and stored into the on-board video buffer. Before being put in the memory the image may be sub-sampled and/or mirrored. The storage of the image(s) in the video buffer is programmable by software and very flexible. They may be stored as a group of lines, fields, frames or in a sequence of many frames. This architecture provides the maximum flexibility to the user.

### Host Interface & DMA Controller

The host interface of the MV-2000 is fully PCI 2.2 compliant and transfers data at up to 130 MB/S. It supports scatter/gather capability for paged memory architecture. The main DMA controller uses a control linked list to specify the sources and destinations for the transfers. Multiple user-specified AOIs on a captured frame may be transferred to separate individual memory locations in the system, for highly efficient processing.

The utilization of a ping-pong architecture on the SDRAM interface makes possible that the transfer of the frames (currently being captured)

# M-Vision 2000 Series Video Digitizer

can start as soon as a few lines have been captured (no need to wait until the end of the current frame). This is advantageous in time critical machine vision applications. Interrupts may be generated at various times relative to the video timing or to the transfer, so the user application is notified for action.

## Displaying Video

The MV-2000 is an input only device, which does not have a VGA controller on board. Captured video may be displayed on the VGA screen with DirectDraw support. MuTech provides many functions to simplify the use of the DirectDraw Interface. See *MV-2XXX Software Development Guide* for details.

## Sync and Timing

The MV-2000 has the capability to handle standard/non-standard sync. Other than stripping the sync from the C. Video signal, it can accept external sync in the form of composite sync or separate H+V.

Based on the H. Sync, the MV-2000 uses a very high precision PLL (Phase-Locked Loop) to generate its pixel clock. The jitter of this clock is less than 1 ns and highly stable. This leads to very accurate video digitizing and high quality images.

## Other Input/Output Signals

The MV-2000 accepts up to 4 Event and 4 Trigger signals. It provides 4 Strobe Outputs. The I/O interface may be selected as TTL, LVDS or Optical-isolated.

The Events are used to accept a notice from the outside world. They may be configured to generate an IRQ to the system or fire a Strobe to control the camera.

The Strobe is programmable to a user defined width. The width may be defined in terms of video lines, fields, or frames. It can also be defined by software as a certain length of time. It may be delayed (or not delayed) after the Event. This signal is often used to control the camera

exposure/integration time or to fire a strobe light.

The Trigger is generally used to indicate a field/frame is ready from the camera and to start the triggered capture of that field/frame.

## Software

The MV-2000 boards come with the *M-Vision 2XXX DEMO/Utility*, which provides the control/configuration to most features of the boards. The DEMO/Utility works under Windows NT/2K/XP. Other Operating System support may be added in the future. Several sample camera configuration files for standard and non-standard cameras are included with the Utility.

MV-2XXX Software Development Kit (SDK) for the Windows platforms is available, which allows full control of all the capabilities of the MV-2000 Boards. OEM's and System Integrators may develop more specific applications using the SDKs.

## MV-2000 Series Technical Specifications

### Video Input

- RS-170/CCIR Standard Video
- Interlaced/Progressive Scan Video
- 6 Monochrome/2 RGB Video Inputs
- Line Scan/Area Scan Cameras
- MDR-36 Connector/RCA Connector
- 0.5 to 1.5 Vp-p into 75 Ohms
- 8/10 Bit A/D Converter (Monochrome)
- 3 x 8 Bit A/D Converter (RGB)

### Video Input Conditioning Circuit

- Programmable Gain of 2 X
- DC Offset (Clamping), Programmable
- Programmable Top/Bottom Voltages @ A/D
- AC/DC Coupling on Video Input
- Selectable Low-pass Filtering @ 5, 7, 10, 15, 20 MHz or No Filtering

### Video Data Processing

- Multiple Banks of LUT for 10/10 or 10/8 bit Mapping (Monochrome Video)
- Multiple Banks of LUT on Each Color for 8/8 bit Mapping (RGB Video)
- Programmable Grab Window on Video Screen
- H/V Sub-Sampling (1:1 to 1:8)
- Horizontal/Vertical Mirroring
- Pixel Formats Supported –
  - 8 Bit MONO
  - 10/12 Bit MONO (16 bit/pixel)
  - 16 Bit MONO (YUV format)
  - 24 Bit RGB
  - 32 Bit RGB (XRGB format)

### Sync & Timing

- Sync Stripper for Standard C. Video
- Composite or Separate Hs, Vs

- Up to 4 Programmable Sync Inputs (TTL/LVDS)
- PLL Generated P. Clock (5 – 90 MHz)
- < 1ns Jitter of P. Clock
- Master/Slave Modes for Sync & P. Clock
- P. Clock, Hd, Vd Outputs (TTL/LVDS)

### Capture Controls

- Continuous/Single Capture
- Frame/Field Capturing on Interlaced Video
- Odd/Even/All Fields
- Starting the DMA Before the Complete Frame/Field is Captured in Buffer
- Multiple AOI Supported on a Single Captured Frame
- Triggered Capturing
- Start/Stop by Trigger
- Level Trigger to Control the Duration of Capturing
- User Defined Frames/Fields Captured Real Time in Video Sequence

### Video Buffer and DMA Controller

- 32 MB of SDRAM (128 MB optional)
- Memory Bandwidth – up to 400 MB/S
- Flexible DMA Controller for Transferring Lines/Fields/Frames/Sequence
- Byte Masking During Capture and/or DMA
- Data De-interlacing During DMA
- Ping-Pong Architecture for simultaneous Capturing and Transferring

### External Signals & Camera Controls

- 4 Event and 4 Trigger Inputs
- 4 Strobe Outputs
- Programmable Strobe Control for Delayed/Non-Delayed Signal
- Flexible Camera Exposure Control

- Supports Camera Integration for Long Time Exposure
- RS-232 Signal Interface for Camera Configuration

### Host Interface

- PCI 2.2 Compliant
- Up to 130 MB/S Transfer Speed
- Scatter/gather DMA
- DMA Control Lists Support Multiple AOI and Multiple Destinations
- Directly DMA to VGA Buffer for Display

### Miscellaneous and Software

- 2/3 Sized PCI Boards
- Power Output – +12V (500 MA)
- CE Compliant
- OS Supported: Windows 9X/NT/2K/XP
- Software Included –
  - Windows Device Driver
  - MV-2XXX DEMO Software
  - Sample Camera Configuration Files
  - MV-2000 Camera Configuration Utility
- Software Available –
  - MV-2XXX Software Development Kit



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