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Matrox Morphis QxT

Installation and Hardware Reference

Manual no. 11002-101-0100

March 27, 2007

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Chapter 1

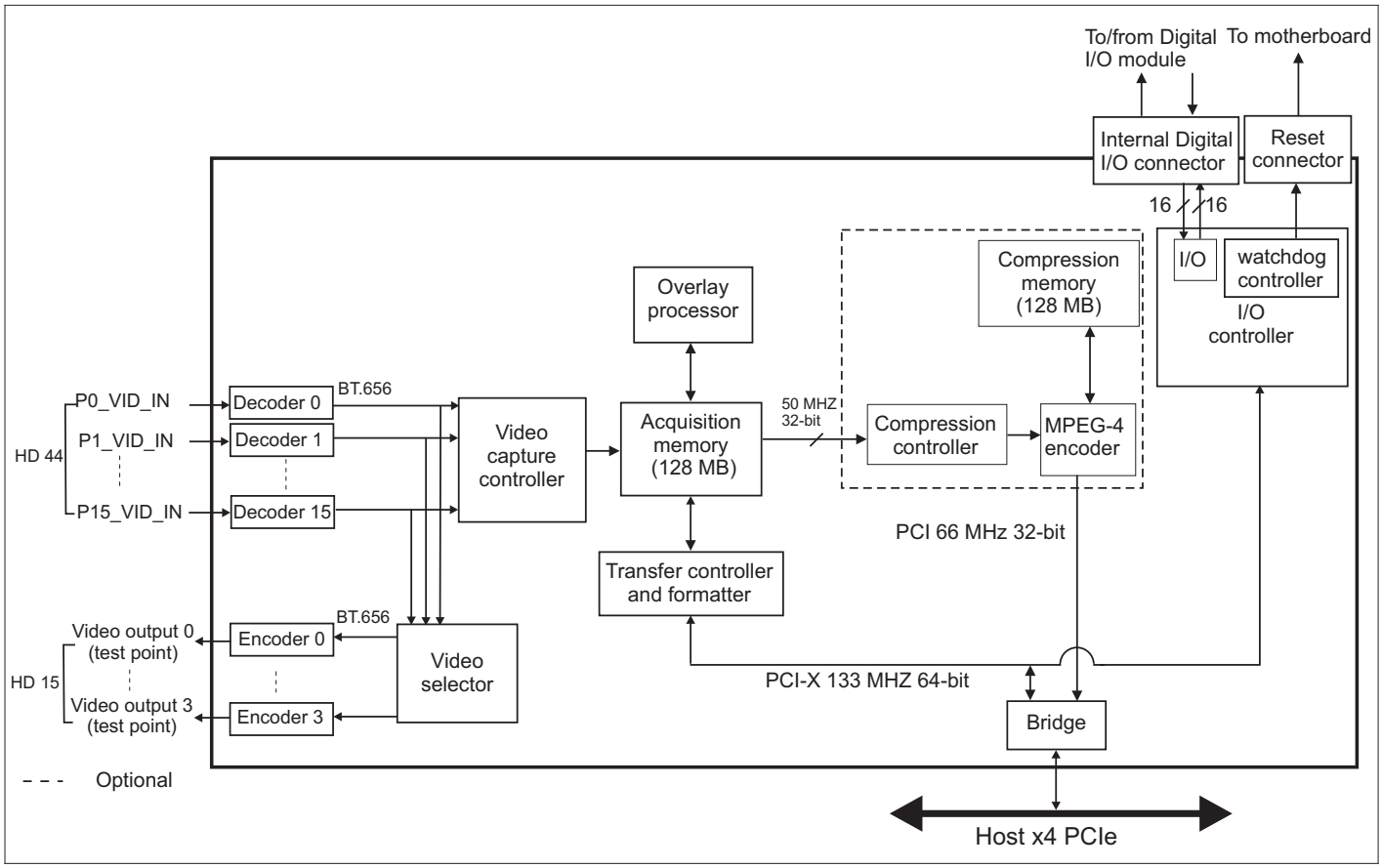
Introduction

This chapter outlines the key features of the Matrox Morphis QxT board.

Matrox Morphis QxT

Matrox Morphis QxT is a cost-effective, PCIe-compatible imaging board, capable of acquiring standard, monochrome/color, analog video. Matrox Morphis QxT supports simultaneous acquisition from up to 16 different video sources, and optionally supports live MPEG-4 compression of all video streams. Video images can be formatted in real-time during capture, including adding an overlay, before being sent to the Host. An overlay can be added before images are sent for compression.

The following diagram illustrates the data flow of the Matrox Morphis QxT board.



General acquisition features

Matrox Morphis QxT supports input from up to 16 synchronous or asynchronous composite or monochrome video sources simultaneously. The Matrox Morphis QxT video decoders can accept composite video (CVBS) in NTSC/PAL format, and monochrome video in RS-170/CCIR format. Composite video is digitized into YUV16 format.

Matrox Morphis QxT has 128 Mbytes of on-board acquisition memory.

Formatting features

As Matrox Morphis QxT grabs images, it can vertically or horizontally flip them. In addition, Matrox Morphis QxT can overlay information onto grabbed images. The overlay operation can be done before images are sent to the Host, or before they are sent to the MPEG-4 compression section.

When grabbed images are being sent to the Host, Matrox Morphis QxT supports other formatting features. These include cropping (ROI capture), arbitrary downscaling to 1/16th of a field or frame, and vertical/horizontal flipping. Grabbed images can be converted into the following formats with square pixels: RGB planar, BGR32 packed, YCrCb, YUV16 packed (stored in YUYV format), and 8-bit monochrome.

Compression

Matrox Morphis QxT supports an optional real-time multi-channel MPEG-4 encoder. Matrox Morphis QxT can support 16 CIF video streams (352 x 240 NTSC / 352 x 288 PAL) or 4 D1 (720 x 480 NTSC/ 720 x 576 PAL) video streams simultaneously. Video can be compressed in real-time during video capture. The MPEG-4 encoder has a 32-bit 66 MHz PCI bus master to reduce CPU usage.

Additional functionality

To simplify overall system integration, Matrox Morphis QxT also offers a variety of additional features. These features include:

- Hardware facilities for implementing custom software-based motion detection.
- Integrated Watchdog capability for automatically recovering from application or Host system failure.

- 16 TTL user-defined input and 16 TTL user-defined output signals to control or synchronize with other devices. These signals can be internally accessed, or accessed externally using the Matrox Morphis QxT Digital I/O module.

- Video input testing. Up to four video signals can be routed to display devices (for example, a TV monitor, computer monitor that allows composite input, or VCR) for test purposes. The selected video signals are sent straight to a video encoder; they cannot be altered.

Data transfer

Matrox Morphis QxT allows the transfer of live video to Host memory, off-board display memory, or PCIe devices. Matrox Morphis QxT features an on-board 64-bit 133 MHz PCI-X bus master to reduce CPU usage. The data is then transformed to PCIe before being transferred to the Host over the Host PCIe bus.

Important

Note that transfer of image data to a display board or other PCIe devices might require intervention from the Host CPU, depending on your computer's architecture[1].

Documentation conventions

When the term Host is used in this manual, it refers to the host computer.

❖ Note that unless otherwise stated, the information in this manual reflects the most recent version of the board available at the time that this manual was written. *Appendix C: Major revisions of Matrox Morphis QxT* lists the major changes that have been made to the board since it was first introduced.

Software

To operate Matrox Morphis QxT, you can purchase one or more Matrox Imaging software products that support the Matrox Morphis QxT board. These are the Matrox Imaging Library (MIL) and its derivatives (MIL-Lite, ActiveMIL, ActiveMIL-Lite, and Matrox Inspector). All Matrox software is supported under Windows; consult your software manual for supported Windows environments.

1. Direct copies are possible if the display memory is physically accessible from the Matrox Morphis QxT.

MIL

MIL is a high-level programming library with an extensive set of optimized functions for image capture, processing, analysis, transfer, compression, display, and archiving. Image processing operations include point-to-point, statistical, spatial filtering, morphological, geometric transformation, and FFT operations. Analysis operations support calibration, are performed with sub-pixel accuracy, and include pattern recognition (normalized grayscale correlation and Geometric Model Finder), blob analysis, edge extraction and analysis, measurement, metrology, character recognition (template-based and feature-based), and code recognition (1D, 2D, and composite code types).

MIL applications are easily ported to new hardware platforms and can be designed to take advantage of multi-processing and multi-threading environments.

MIL-Lite

MIL-Lite is a subset of MIL. It includes all the MIL functions for image acquisition, transfer, display control, and archiving.

ActiveMIL

ActiveMIL is a set of ActiveX controls that are based on MIL. ActiveMIL was designed for rapid application development (RAD) tools, such as Microsoft's Visual Basic.Net. ActiveMIL is included with MIL (ActiveMIL-Lite is included with MIL-Lite).

Matrox Inspector

Matrox Inspector is an interactive Windows application for image capture, processing, analysis, and archiving. MIL application developers can use Matrox Inspector as a prototyping tool to quickly build proof-of-concept demonstrations for their video surveillance, machine vision, image analysis, and medical imaging system. End users can use Matrox Inspector to perform and automate image enhancement and measurement tasks.

Matrox Intellicam

Matrox Intellicam is an interactive Windows program that allows for fast camera interfacing and provides interactive access to all the acquisition features of your Matrox board. With Matrox Intellicam, you can change the size and position of the active region by creating a custom digitizer configuration format (DCF) file. Matrox Intellicam is included with all Matrox Imaging software products.

Essentials to get started

To use Matrox Morphis QxT, you must have a computer with at least the following:

- An available x4 or x8 PCIe slot. You also require a free bracket location at the back of the computer chassis for a Matrox Morphis QxT Digital I/O module, if needed. This location need not be adjacent to the Matrox Morphis QxT base board.
- Processor with an Intel 32-bit architecture (IA32) or equivalent.

Other useful considerations

- A computer with a relatively up-to-date PCIe chipset. An up-to-date chipset is recommended because it generally offers better performance in terms of data transfer rates. To learn more about the most appropriate chipset, refer to the Matrox Imaging website or consult with your local Matrox Imaging representative, local Matrox Imaging sales office, or the Matrox Imaging Customer Support Group at headquarters.
- MIL or one of its derivatives. This software should be installed after you install your board.
- Microsoft Windows (consult the software package for specific supported environments and computer memory/storage requirements).
- A CD drive, and a hard disk or network drive on which to install the Matrox Morphis QxT software.

Inspecting the Matrox Morphis QxT package

When you unpack your Matrox Morphis QxT package, you should check its contents. Note that optional parts might or might not be included, depending on what you ordered. If something is missing or damaged, contact your Matrox representative.

Standard package

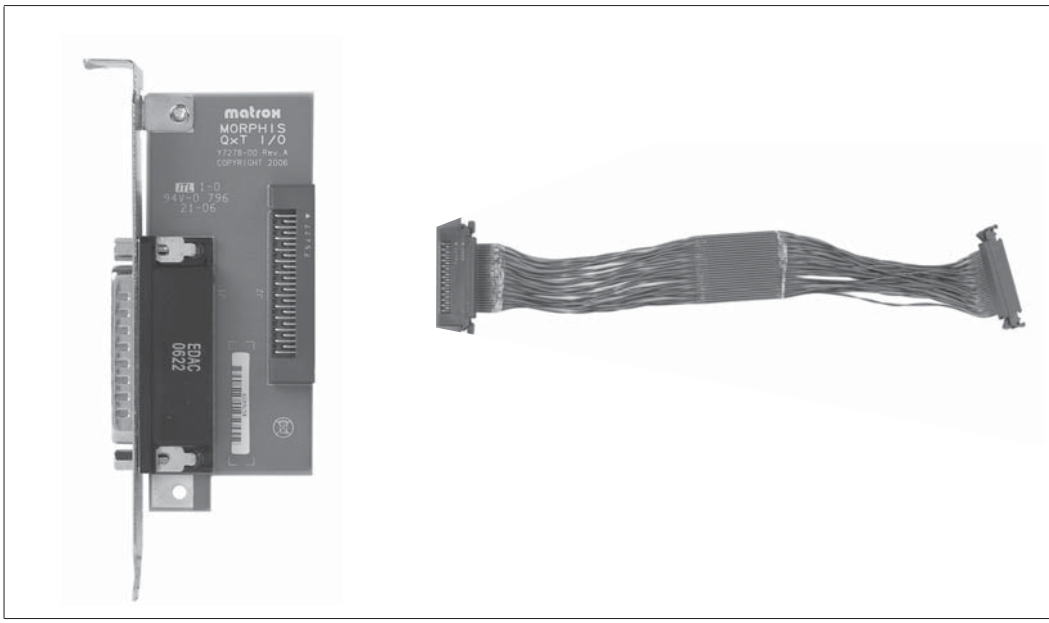
If you ordered Matrox Morphis QxT, you should receive the following items:

- The Matrox Morphis QxT base board.
- The *Matrox Morphis QxT Installation and Hardware Reference* manual (this document).

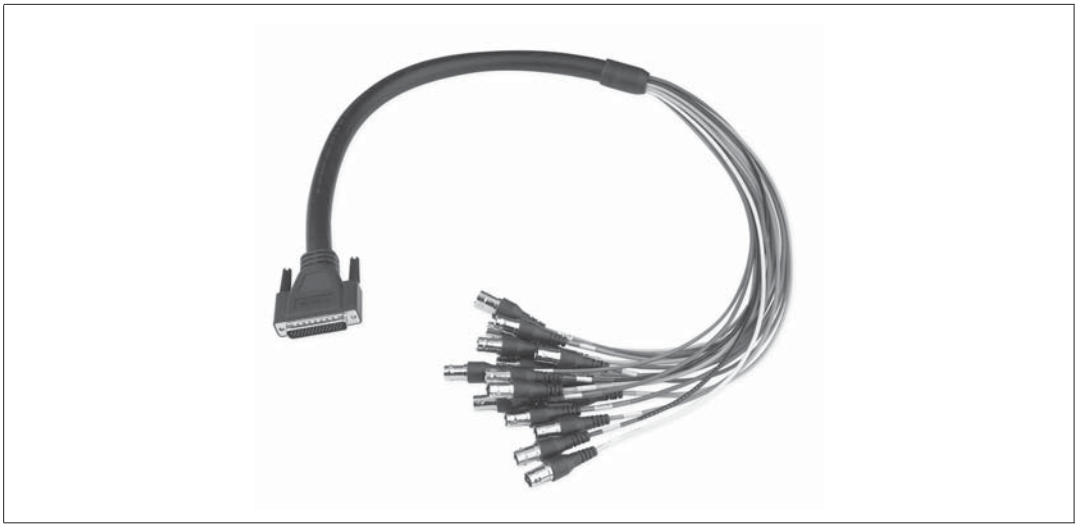
Optional items

You might have also ordered one or more of the following:

- MIL, which includes ActiveMIL; MIL-Lite, which includes ActiveMIL-Lite; or Matrox Inspector. Matrox Intellicam is included with each of the aforementioned software packages.
- A Matrox Morphis QxT Digital I/O module, and an I/O cable with 2 50-pin female connectors to connect the module to the base board.



- An HD-44M-18BNC input cable, a 3-foot cable with a 44-pin male connector at one end and eighteen BNC female type connectors at the other end. This cable is used for analog input.



Handling components

The electronic circuits in your computer and the circuits on Matrox Morphis QxT are sensitive to static electricity and surges. Improper handling can seriously damage the circuits. Be sure to follow these precautions:

- Drain static electricity from your body by touching a metal fixture (or ground) before you touch any electronic component.

- Avoid letting your clothing come in contact with the circuit boards or components.

Caution

Before you add or remove devices from your computer, always **turn off** the power to your computer and all peripherals.

Installation overview

The installation procedure consists of the following steps:

1. Complete the hardware installation as described in Chapter 2.

2. Complete the software installation procedure as described in the documentation accompanying your software package.

More information

For information on using multiple Matrox Morphis QxT boards, refer to Chapter 3, and for in-depth hardware information, refer to Chapter 4.

If you want technical information about Matrox Morphis QxT, including specifications and connector pinouts and descriptions, refer to *Appendix B: Technical information*.

Conventions

When the term *Host* is used in this manual, it refers to your computer.

This manual occasionally makes reference to a MIL-Lite function. However, anything that can be accomplished with MIL-Lite can also be accomplished with MIL, ActiveMIL, ActiveMIL-Lite, or Matrox Inspector.[1]

Need help?

If you experience problems during installation or while using this product, refer to the support page on the Matrox Imaging web site: www.matrox.com/imaging/support. This page provides answers to frequently asked questions, as well as offers registered customers additional ways of obtaining support.

If your question is not addressed and you are registered, you can contact technical support. To do so, you should first complete and submit the online Technical Support Request Form, accessible from the above-mentioned page. Once the information is submitted, a Matrox support agent will contact you shortly thereafter by email or phone, depending on the problem.

In the unlikely event of a failure, you will find the warranty and a *Product Assistance Request Form*, that outlines return conditions and procedures, at the back of this manual.

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1. Most operations can be accomplished with Matrox Inspector.

Chapter

2

Hardware installation

This chapter explains how to install the Matrox Morphis QxT hardware.

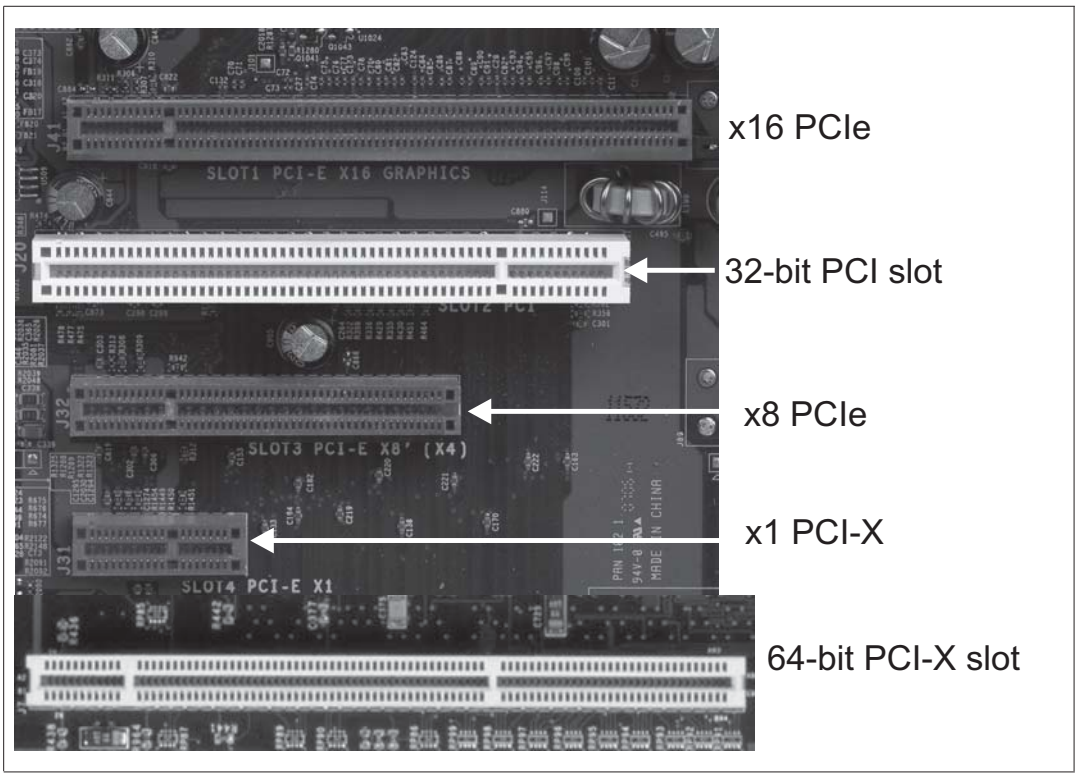
Installing Matrox Morphis QxT

Before you install your Matrox Morphis QxT board(s), some precautionary measures must be taken. Turn off the power to your computer and its peripherals, and drain static electricity from your body (by touching a metal part of the computer chassis).

Use the following steps to install your Matrox Morphis QxT board(s). Note that your board(s) should be installed before you install your software.

1. Remove the cover from your computer using the instructions from your computer manual.

2. Check that you have an x4 or x8 empty PCIe slot to accommodate the Matrox Morphis QxT base board. Illustrated below are some slots.



If you are also installing a Matrox Morphis QxT Digital I/O module, you also need a free bracket location at the back of the computer chassis. This bracket location need not be adjacent to the base board. In addition, the slot associated with the bracket location can be of any type.

If necessary, remove boards from your computer to make room for your Matrox Morphis QxT board(s).

3. If present, remove the blank metal plate located at the back of the selected slots. Keep the removed screws; you will need them to fasten the Matrox Morphis QxT board and, if required, Matrox Morphis QxT Digital I/O module.

4. If Watchdog functionality is required, install the appropriate cables as described in *Installing the cables for Watchdog functionality* section, later in this chapter.

5. Carefully position the Matrox Morphis QxT base board in the selected empty PCIe slot. Once perfectly aligned with the slot's connector, press the board firmly but carefully into the connector. Anchor the board by replacing the screw that you removed.

6. f required, install your Matrox Morphis QxT Digital I/O module as described in the *Installing the Matrox Morphis QxT Digital I/O module* section later in this chapter.

7. Attach your video sources as described in the *Connecting devices to Matrox Morphis QxT* section later in this chapter.

8. Turn on your computer.

❖ Under Windows 2000/XP, when you boot your computer, Windows' Plug-and-Play system will detect a new Multimedia Video Device and you will be asked to assign it a driver. At this point, you should click on **Cancel** because the driver will be installed during the installation of Matrox Morphis QxT software.

Installing the cables for Watchdog functionality

Watchdog functionality is available on the Matrox Morphis QxT board. If Watchdog functionality is required:

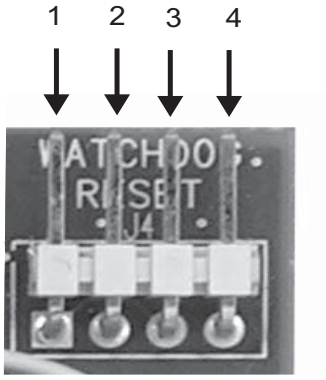
1. Create a custom cable (Cable A) with a standard, 0.1" spacing, 2-pin female connector at one end, and at the other end, a connector that fits into the Reset button connector of the chassis (see the subsection *Video test connector* of section *Base board input and output connectors* in *Appendix B: Technical information*).

2. Create a second custom cable (Cable B) with a standard, 0.1" spacing, 2-pin female connector at one end, and at the other end, a connector that fits into the motherboard reset connector (see the above-mentioned subsection).

3. Disconnect the end of the reset button cable currently attached to the reset button connector of the chassis, and attach Cable A to this connector instead.

4. Disconnect the end of the Reset button cable currently attached to your motherboard reset connector, and attach Cable B to this connector instead.

5. Connect Cable A to pins 3 and 4 of connector J4 of Matrox Morphis QxT.



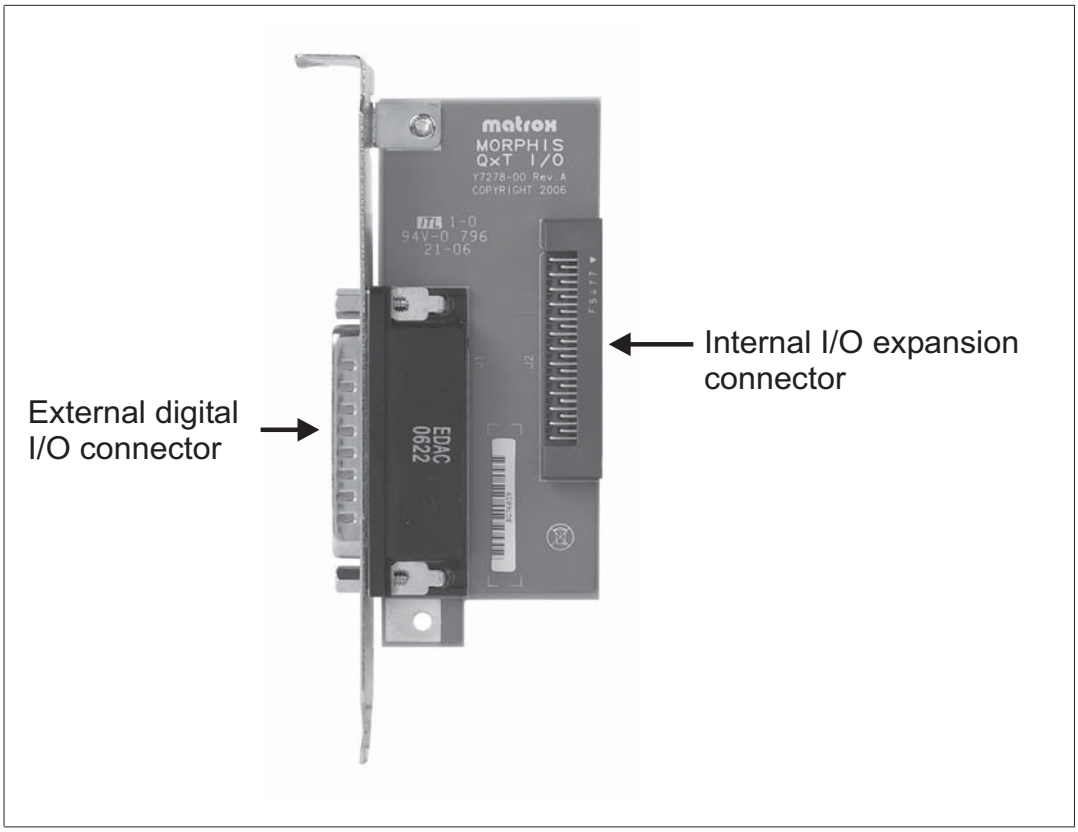
6. Connect Cable B to pins 1 and 2 of connector J4 of Matrox Morphis QxT.

Installing the Matrox Morphis QxT Digital I/O module

To install the Matrox Morphis QxT Digital I/O module, proceed with the following steps:

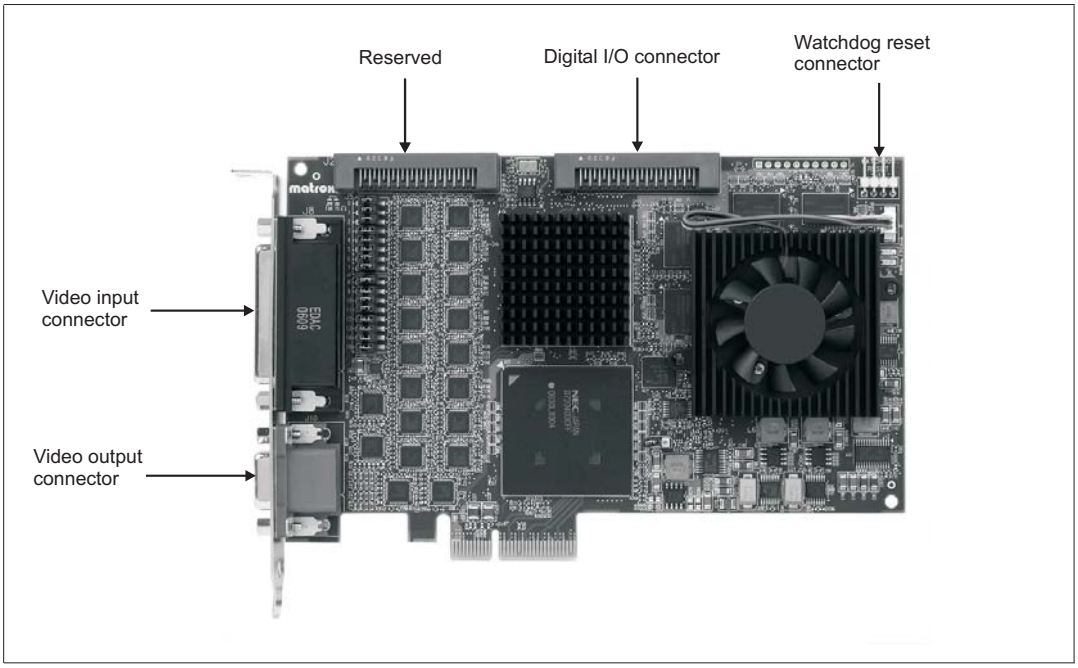
1. Make sure that your Matrox Morphis QxT base board is fastened to the computer chassis.

2. Attach your Matrox Morphis QxT Digital I/O module to the computer chassis. Anchor the module's bracket to the chassis using the screw that you removed in the first section.

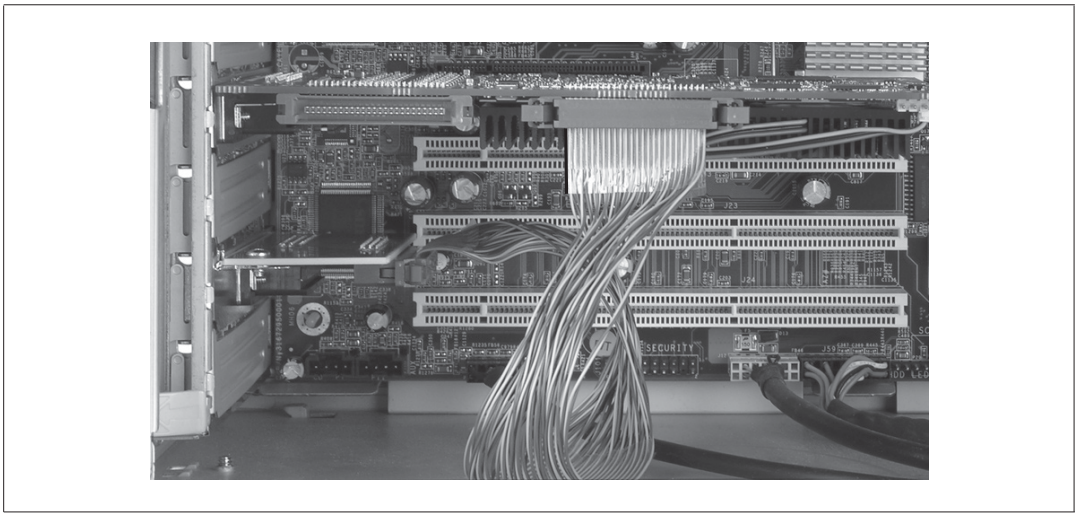


3. Connect the Matrox flat ribbon cable, shipped with the module, to the internal I/O expansion connector of the module. You can connect either end of the cable to the module; the selected cable connector will latch properly only when the red wire of the cable is on the top side of the connector.

4. Connect the other end of the Matrox flat ribbon cable to the digital I/O connector on the base board, shown below.

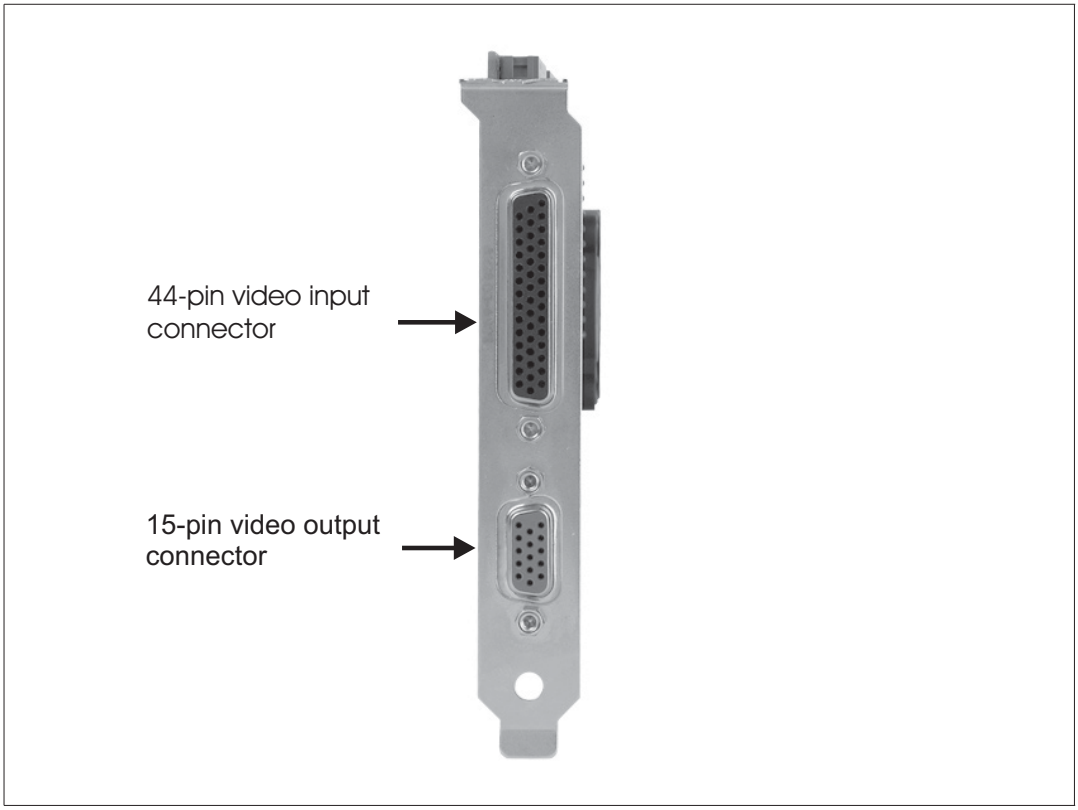


The cable connector will latch properly only when the red wire of the cable is closest to the board's bracket.



Connecting devices to Matrox Morphis QxT

The Matrox Morphis QxT has two connectors on its bracket:



- A high-density DB-44 female connector for video input.
- A high density 15-pin female connector for video output.

Connecting video sources

To connect a video source to your Matrox Morphis QxT, plug the HD-44M-18BNC cable into the DB-44 video input connector. Connect your video sources to the BNCs at the other end of the cable.

The BNC connectors of the HD-44M-18BNC cable correspond to the following signals.

BNC label	Signal	Video device to connect
CH-0	P0_VID_IN	Analog video input for acquisition path 0.
CH-1	P1_VID_IN	Analog video input for acquisition path 1.

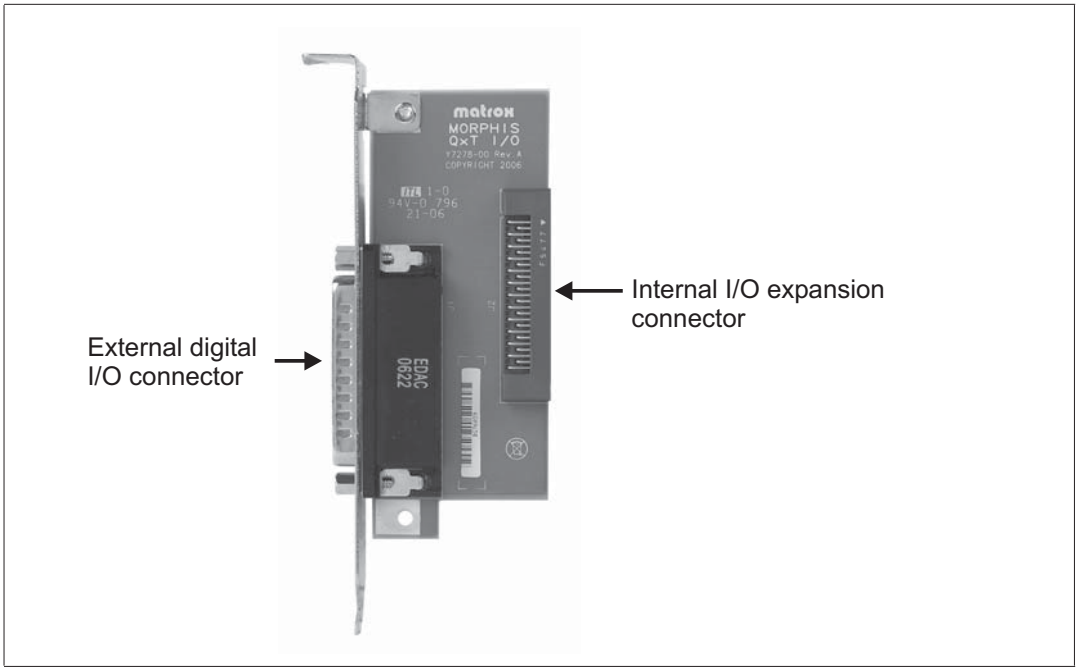
BNC label	Signal	Video device to connect
CH-2	P2_VID_IN	Analog video input for acquisition path 2.
CH-3	P3_VID_IN	Analog video input for acquisition path 3.
CH-4	P4_VID_IN	Analog video input for acquisition path 4.
CH-5	P5_VID_IN	Analog video input for acquisition path 5.
CH-6	P6_VID_IN	Analog video input for acquisition path 6.
CH-7	P7_VID_IN	Analog video input for acquisition path 7.
CH-8	P8_VID_IN	Analog video input for acquisition path 8.
CH-9	P9_VID_IN	Analog video input for acquisition path 9.
CH-10	P10_VID_IN	Analog video input for path acquisition 10.
CH-11	P11_VID_IN	Analog video input for path acquisition 11.
CH-12	P12_VID_IN	Analog video input for path acquisition 12.
CH-13	P13_VID_IN	Analog video input for path acquisition 13.
CH-14	P14_VID_IN	Analog video input for path acquisition 14.
CH-15	P15_VID_IN	Analog video input for path acquisition 15.
TRIG-0	Reserved	Reserved.
TRIG-1	Reserved	Reserved.

Connecting output devices

To connect an output device to the video output connector, use a standard HD 15-pin VGA to 5BNC monitor cable (available at your local electronic store).

Connecting to the Digital I/O module

The Matrox Morphis QxT Digital I/O module has one 44-pin male I/O connector on its bracket:



To connect an input/output device to the Matrox Morphis QxT Digital I/O module, attach a custom-built cable. For more information, see *Appendix B: External digital I/O connector*.

Chapter

3

Using multiple Matrox Morphis QxT boards

This chapter explains how to use multiple Matrox Morphis QxT boards.

Multiple board installation

This section describes how to use multiple Matrox Morphis QxT boards.

Install each additional Matrox Morphis QxT board as you installed the first board (refer to chapter 2, *Installing Matrox Morphis QxT*).

Installing multiple PCIe boards

When installing Matrox Morphis QxT, you can theoretically have as many as 16 boards installed in your computer at one time. This number is, however, limited by the number of empty slots in your computer and, for simultaneous image capture, by the available bandwidth of your computer (discussed later in this chapter).

Using MIL-Lite, you have to allocate a MIL system for each board and allocate the resources of each MIL system.

Simultaneous image capture from different boards

You can simultaneously capture images from video sources attached to Matrox Morphis QxT; however, the number of video sources from which you can simultaneously capture images is determined by the available bandwidth of your PCIe interface (segment). If there is not enough bandwidth, your board will drop frames.

Matrox Morphis QxT might have a problem with dropped frames if there are not at least 4 active lanes on the PCIe connector to the Host (for example, if the board is connected to a x4 PCIe connector that has only one active lane). Customers have to verify with the motherboard manufacturer to find out whether the particular motherboard works efficiently with a x4 PCIe board, such as Matrox Morphis QxT.

The use of a high-performance PCIe core-logic chipset is necessary to sustain PCIe transfers to Host memory. If a high performance chipset is used, you should not have a problem with dropped frames. The list of platforms that are known to be compatible with Matrox Morphis QxT are available on the Matrox web site, under the board's compatibility list.

You should not have any PCIe bandwidth problems capturing up to 16 full-sized color images simultaneously from multiple Matrox Morphis QxT boards, assuming you are using a high-performance chipset.

Chapter

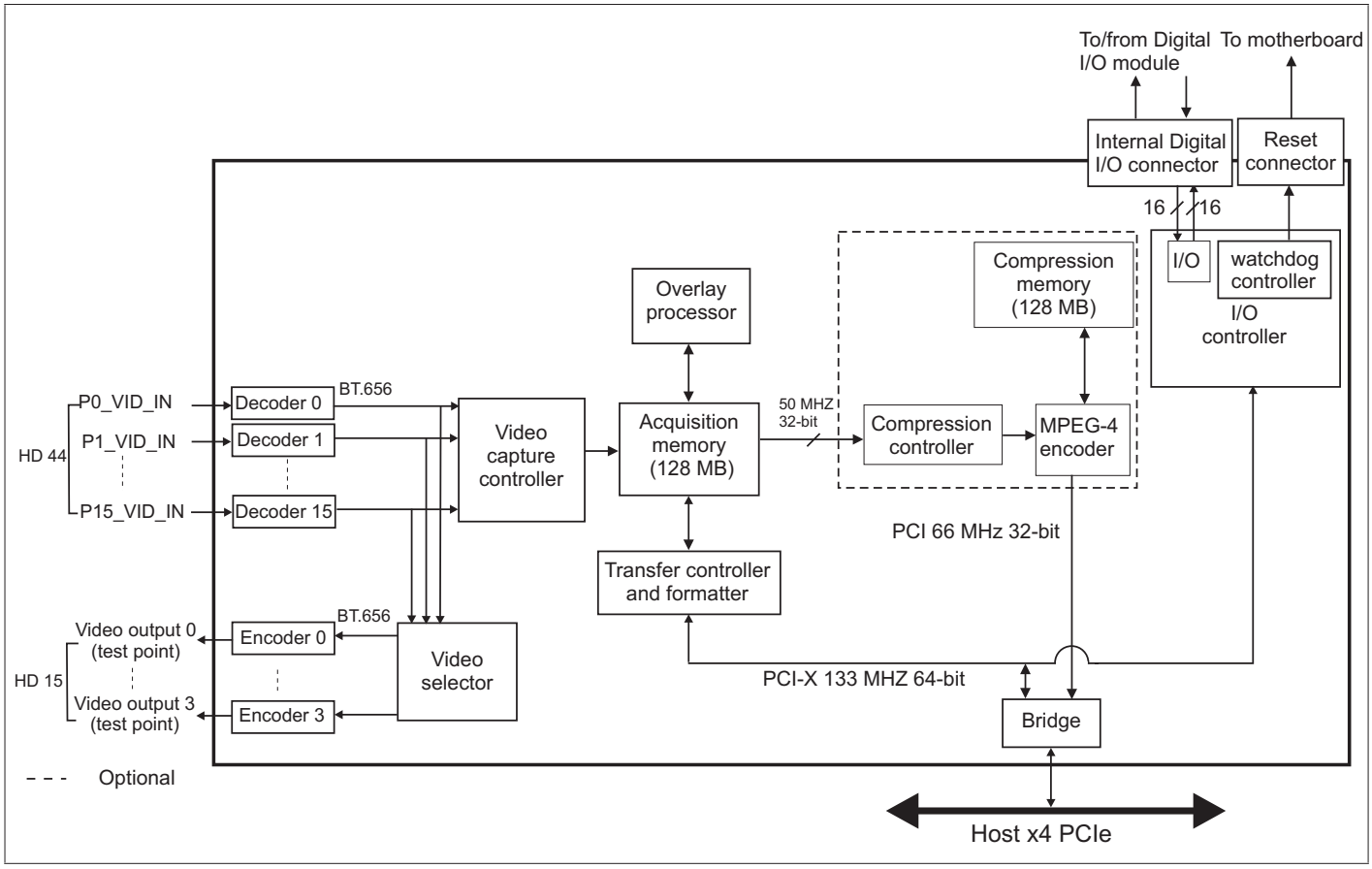
4

Hardware reference

This chapter explains the architecture of the Matrox Morphis QxT hardware, as well as the available features and modes.

Matrox Morphis QxT hardware reference

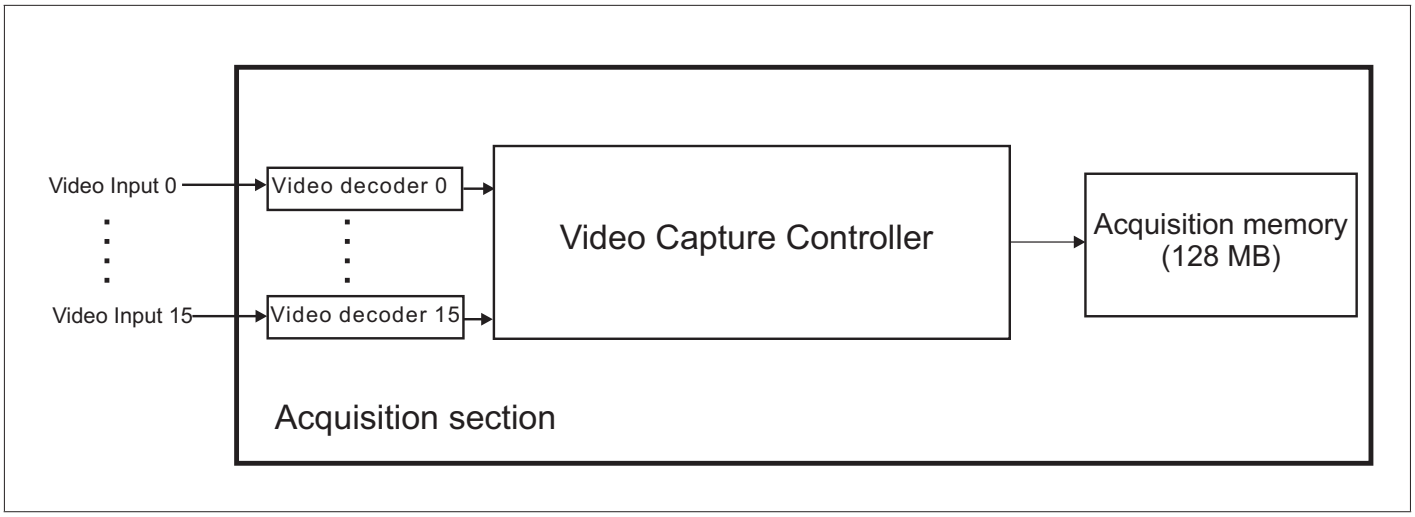
This chapter provides information on the architecture, operating modes, and supported features of Matrox Morphis QxT. For a summary of the information given in this chapter and detailed specifications of connectors and pinouts, refer to *Appendix B: Technical information* of this manual.



Acquisition section

The acquisition section of Matrox Morphis QxT can capture RS-170/CCIR monochrome video and composite (CVBS) video in NTSC /PAL format. The acquisition section of Matrox Morphis QxT has 16 independent acquisition paths. These independent acquisition paths allow Matrox Morphis QxT to simultaneously capture from any 16 connected, supported, synchronous or asynchronous video sources.

The following diagram illustrates the main components of the acquisition section of Matrox Morphis QxT.



To grab from a video source, allocate a MIL digitizer with a DCF that matches the video source's data type, using the MIL-Lite **MdigAlloc**() function; a MIL digitizer represents the acquisition path(s) with which to grab from one input source of the specified type. Then, using the returned MIL digitizer identifier, call **MdigGrab**().

To grab video data from multiple video sources simultaneously, allocate the appropriate number of digitizers with **MdigAlloc**() and specify a different device number for each. Then, using the returned MIL digitizer identifiers, call **MdigGrab**().

Video decoders

The acquisition section has 16 standard video decoders. In addition to digitizing video, these decoders feature internal filtering and automatic gain control.

Gain

The automatic gain control (AGC) allows the video signal input range to be optimized before being digitized. You can, however, disable the AGC and set the gain manually, using the **MdigControl**() function, with M_GRAB_AUTOMATIC_INPUT_GAIN set to M_DISABLE and M_GRAB_INPUT_GAIN set to any integer value from 0 to 255.

Digitizing component

The multi-standard video decoders can convert analog composite (CVBS) video in NTSC/PAL format, to digitized video in YUV16 (4:2:2).

Each decoder supports the following video timing settings:

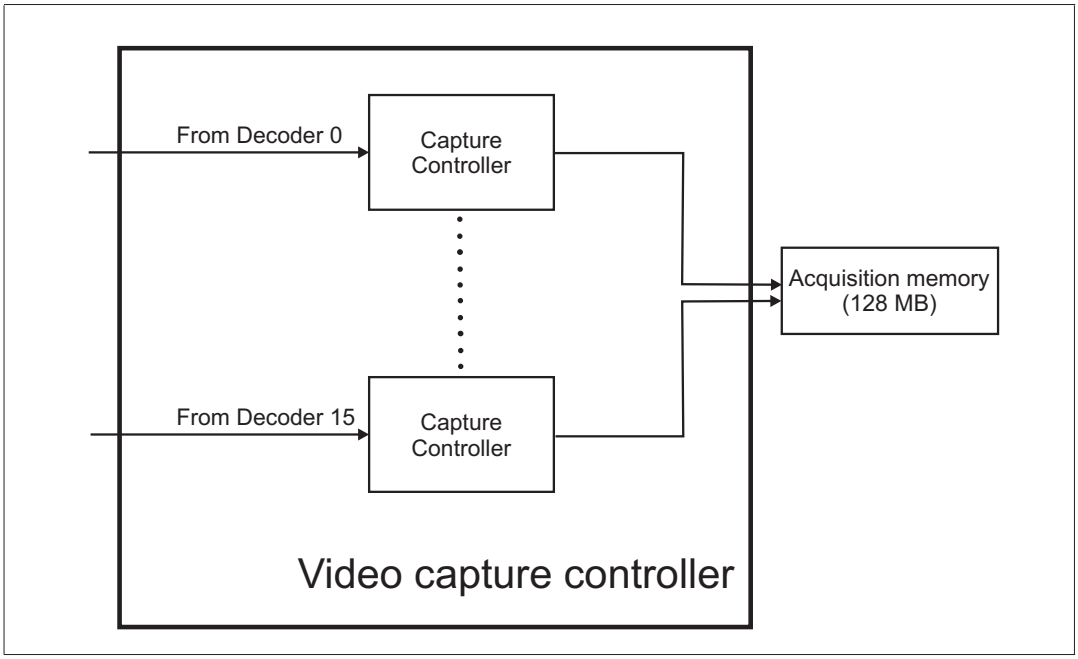
	Square pixel video formats	
	NTSC	**PAL**
Pixel sampling rate (MHz)	12.27	14.75
Y component sampling rate (MHz)	12.27	14.75
U and V components (MHz)	6.14 each	7.38 each
Digitizing component sampling rate (MHz)	24.54	29.5
Field rate (Hz)	60	50
Pixel/line (pixels)	780	944
Active pixel/line (pixels)	640	768
Active lines/frame (lines)	480	576
Line rate (KHz)	15.734	15.625

Video capture controller

Once the analog video has been converted to digitized video, it enters a component called the *video capture controller*.

The video capture controller accepts all data signals provided by the decoders and transfers them to acquisition memory. It is also capable of performing vertical and horizontal flipping of the image during capture.

The following diagram illustrates the video capture controller found on Matrox Morphis QxT.



The video capture controller contains 16 capture controllers.

Capture controllers

Each capture controller performs the following:

- Each sets the conditions under which to start and end a grab. Examples of grabbing conditions are whether to grab one or two fields per frame, or whether to start the grab on an odd or even field. Set the capture controller conditions using the MIL-Lite **MdigControl**() function.

- Each can generate interrupts, based on various grabbing events. You can hook a function to these events using the MIL-Lite **MdigHookFunction**() function. The various events that can cause an interrupt are listed in the following table:

Hook Type	Description
M_GRAB_START	Hook to the start of each grab.
M_GRAB_END	Hook to the end of each grab.
M_GRAB_FIELD_END_ODD	Hook to the end of grabbed odd fields.
M_GRAB_FIELD_END_EVEN	Hook to the end of grabbed even fields.

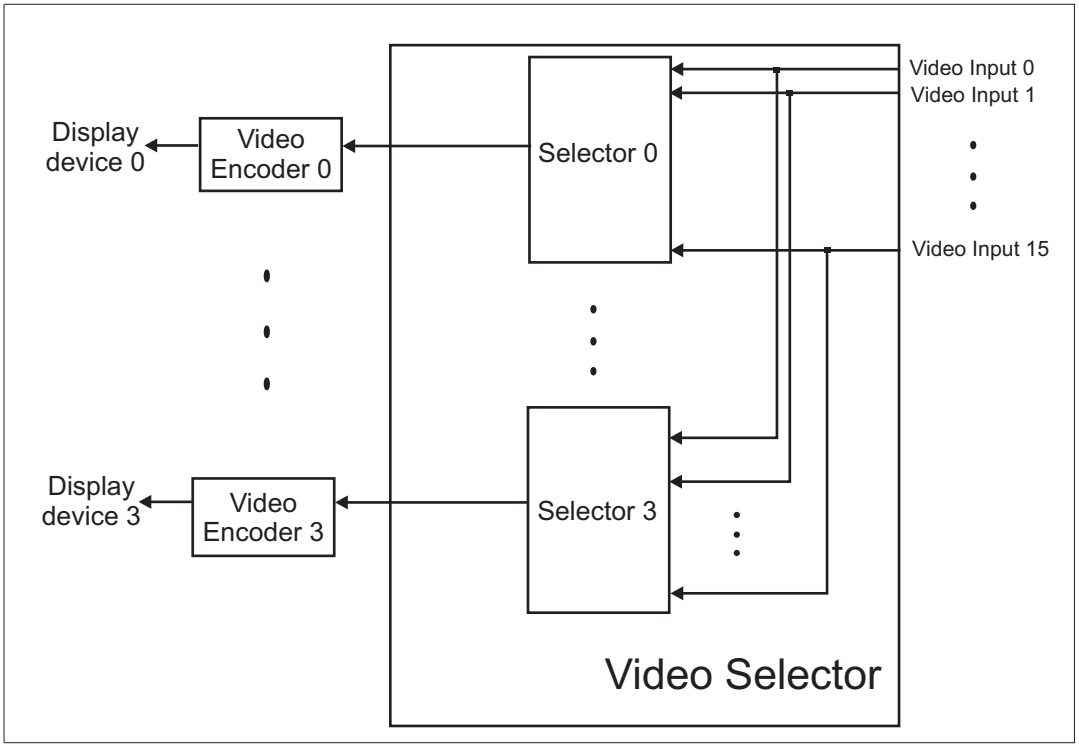
Hook Type	Description
M_GRAB_FIELD_END	Hook to the end of grabbed fields.
M_FRAME_START[1]	Hook to the start of the incoming signal's frames.
M_FIELD_START_ODD[1]	Hook to the start of the incoming signal's odd fields.
M_FIELD_START_EVEN[1]	Hook to the start of the incoming signal's even fields.
M_FIELD_START[1]	Hook to the start of the incoming signal's field.
M_GRAB_FRAME_END	Hook to the end of grabbed frames.
M_GRAB_FRAME_START	Hook to the start of grabbed frames.

1. These events occur even when a video source is connected but the board is not grabbing.

- The video data is sent to the 128 Mbytes of on-board acquisition memory. After storing the video, an interrupt is generated notifying the Host of the acquired data. The Host is then responsible to request a data transfer to the optional MPEG-4 encoder, Host memory, off-board display memory, or other PCIe devices across the PCIe bus. Upon receiving the request, acquisition memory sends the data to the appropriate device.

Video test display

If you want to test the video input, Morphis QxT can send the video inputs through the *video selector* to a display device (for example, TV monitor, computer monitor that allows composite input, or VCR). You can send any of the up to 16 video inputs to any of four outputs. Data is sent straight to a video encoder; it cannot be altered.



The video selector can select which of the 16 video inputs to send to the appropriate encoder. The video selector routes the data from the selected decoder to the selected encoder. It is possible to send the same video input to each of the video encoders.

I/O controller

The I/O controller is responsible for routing user-defined signals.

Using the I/O controller, Matrox Morphis QxT supports 16 TTL-compatible (5 V) user-defined input signals and 16 TTL-compatible (5 V) user-defined output signals. These signals can be used to synchronize with or control other devices, such as a strobe light. All user-defined input signals can also generate an interrupt.

The user-defined signals can be accessed inside the chassis from the I/O connector of the base board, or accessed externally from the bracket of the Matrox Morphis QxT Digital I/O module.

These user-defined signals are programmed using the MIL-Lite **MsysControl**() function with M_USER_BIT_... .

For information on the electrical specification of user-defined signals, see the section *Electrical specifications* in *Appendix B: Technical information*.

Watchdog circuitry

Matrox Morphis QxT integrates Watchdog circuitry to automatically recover from application or system failure. The Watchdog circuitry automatically reboots your computer when, for some reason, your computer hangs for longer than a pre-set amount of time.

The Watchdog circuitry works based on several integrated timers. When the Watchdog circuitry is enabled, it must receive a reset signal from the user application within the time specified by a timer. Every time the signal is received, the Watchdog circuitry resets this timer. If, however, the Watchdog circuitry does not receive a reset signal for a period longer than the time allotted by this timer, it will either send a warning interrupt signal or a hardware signal to reboot the computer, depending on the timer.

There are three main timers that make up the Watchdog circuitry:

- **Warning timer.** If, during the course of regular operations, the Host computer does not reset the warning timer before the specified interval expires, it is assumed to have hung. The Watchdog's warning timer will then generate a warning interrupt.

- **Timeout timer.** If, during the course of regular operation, the Host computer does not reset the timeout timer before the specified interval expires, it is assumed to have hung. The Watchdog's timeout timer will then force the Host computer to reboot.

- **Reboot timer.** If, during a reboot, the Host computer does not start regular operations before the specified interval expires, the Host computer is assumed to have hung. The Watchdog's reboot timer will then force the Host computer to reboot again.

  You can enable the Watchdog circuitry and set and reset the Watchdog timers using the MIL-Lite **MsysControl**() function. You can hook an event handler function to the warning interrupt using **MsysHookFunction**().

Overlay

The overlay processor can overlay information onto grabbed images. The overlay operation can be done before the image is sent to the MPEG-4 encoder, or before the image is sent to the Host. The overlay processor can block part of the source image, or blend information with the image (with a programmable alpha factor), using the MIL-Lite **MbufTransfer**() function.

Transfer controller and formatter

The transfer controller and formatter is capable of formatting and performing high-speed transfers of data to Host memory, off-board display memory, or other PCIe devices across the PCIe bus. The transfer controller and formatter also allows data to be transferred from the Host to acquisition memory.

Image formatter

Before transferring data off-board, the transfer controller and formatter can format the data with its image formatter. The image formatter can perform several operations on data transferred off-board:

- **Image resizing.** Captured data can be cropped (ROI capture) or it can be arbitrarily downscaled to 1/16th of a field or frame. This can be useful to implement custom software-based motion detection because at a reduced scale, image comparison is faster.

- **Vertical/horizontal flipping.** Captured data can be flipped vertically or horizontally, or both.

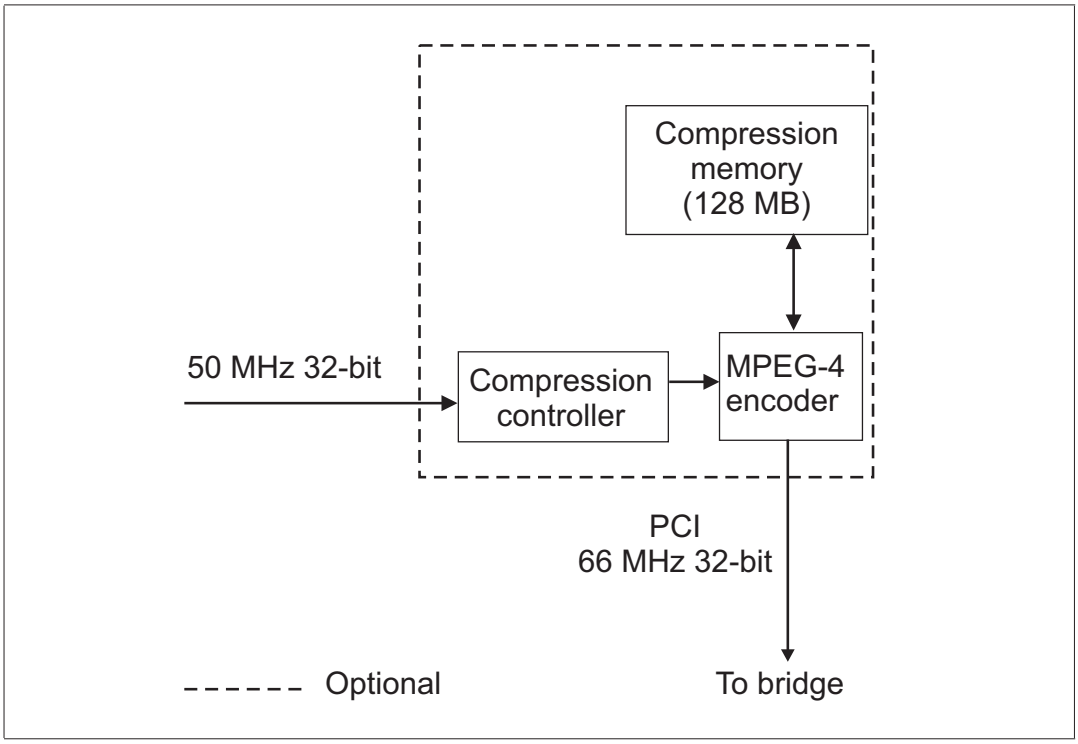
- **Color space conversion.** Captured data can be converted into the following formats with square pixels: RGB planar, BGR32 packed, YCbCr, and 8-bit monochrome. Alternatively, YUV16 packed (stored in YUYV format) can be passed through. The image formatter can also perform *color kill*, which converts the data to grayscale and then converts it to the appropriate destination format.

  The equations for the conversions are as follows:

Color space conversion	Equations
YUV-to-Y	• Y = Y
YUV-to-RGB	• R = ((Y x 65536) + (91862 V))/65536 • G = ((Y x 65536) - (22525 x U) - 46806 V)/65536 • B = ((Y x 65536) + (116143 U))/65536
YUV-to-YCrCb	• Y = Y x 220/256 + 16 • Cb =((U x 57796) + 1023547)/65536 • Cr = ((V x 57796) + 1023547)/65536

MPEG-4 compression section

Matrox Morphis QxT optionally includes an MPEG-4 compression section. The compression section includes a compression controller, a real-time, multi-channel MPEG-4 encoder, and compression memory.



The compression controller scales images transferred to the compression section so that they have an appropriate resolution for the selected operating mode of the MPEG-4 encoder.

Video source from which data was grabbed	Resolution	
	CIF	D1
NTSC or RS-170	352 x 240	720 x 480
PAL or CCIR	352 x 288	720 x 576

The MPEG-4 encoder can encode monochrome or color video and can encode up to 16 CIF video streams or up to 4 D1 video streams simultaneously, depending on how the encoder is set. The MPEG-4 encoder uses the 128 Mbytes of compression memory while encoding the image data.

The MPEG-4 encoder can control the bit rate, with a range from 192 Kbps to 4 Mbps. The MPEG-4 encoder can set the bit rate to be a constant value, to be variable with a maximum rate, or to be variable with a minimum quality factor. The MPEG-4 encoder supports up to 4 variable slices per frame, allowing the encoder to switch the video streaming bit rate.

The MPEG-4 encoder can encode images of the incoming video stream into groups (GOP) of up to 100 images. You can modify the length of the GOP.

The MPEG-4 encoder does not allow for manipulation of the data once it has been compressed. After the data is encoded, the compressed stream is then passed to the PCI-to-PCIe bridge.

PCIe interface

Matrox Morphis QxT allows the transfer of live video to Host memory, off-board display memory[1], or other PCIe devices across the PCIe bus. Compressed data can be sent to Host memory.

Matrox Morphis QxT features an on-board 64-bit 133 MHz PCI-X bus master to reduce CPU usage. There is also an on-board 32-bit 66 MHz PCI bus master for the optional MPEG-4 encoder. Matrox Morphis QxT has a x4 PCIe bus interface.

1. Direct copies are possible if the display memory is physically accessible from Matrox Morphis QxT.

Appendix A: Glossary

This appendix defines some of the specialized terms used in this Matrox Morphis document.

Glossary

- **Band**

  One of the surfaces of a buffer. A grayscale image requires just one band. A color image requires three bands, one for each color component.

- **Bandwidth**

  A term describing the capacity to transfer data. Greater bandwidth is needed to sustain a higher transfer rate. Greater bandwidth can be achieved, for example, by using a wider bus.

- **Bus**

  A pathway along which signals are sent, generally in two directions, for communication of data.

- **CIF**

  Common Intermediate Format. A set of video formats used to standardize the horizontal and vertical resolutions in pixels of YCbCr sequences in video signals.

- **Color component**

  One of the components that make up a color space. Typically, each component of a color image is stored in a separate band of a multi-band buffer.

- **Color space**

  A color space is a way of representing and describing the complete range of perceived colors. A number of color spaces have been developed. Common color spaces are RGB and HSL. Both describe the same range of perceivable colors.

- **D1**

  A digital video standard, used for storing uncompressed digitized component video, digital audio, and a time code. D1 video resolution is 720 x 480 for NTSC systems and 720 x 576 for PAL systems.

- **DCF**

  Digitizer Configuration Format. A DCF defines the input data format and among other things, how to accept or generate video timing signals such as horizontal sync, vertical sync, and pixel clock.

- **Deinterlacing**

  This is the process of converting interlaced video (like that used for a CRT) into a non-interlaced form (such as digital video).

- **Field**

  One of the two halves that make up an image. One half consists of the image's odd lines (known as the *odd field*); the other half consists of the image's even lines (known as the *even field*).

- **Frame**

  A single image grabbed from a video camera.

- **GOP**

  Group of Picture. A group of pictures is a group of successive pictures within an MPEG-coded video stream. The GOP consists of a reference picture (I-frame) followed by up to a specified number of P-frames, which reference the I_frame. The following I_frame marks the start of the next GOP.

- **Grab**

  To acquire or capture an image from a camera.

- **Horizontal synchronization signal**

  The part of a video signal that indicates the end of a line and the start of a new one.

  See also *vertical synchronization signal*.

  In general, Host refers to the principal CPU in one's computer.

- **Interlaced scanning**

  Describes a transfer of data in which the odd-numbered lines of the source are written to the destination buffer first and then the even-numbered lines (or vice-versa).

  See also *progressive scanning*.

- **MPEG**

  A universal standard established for the compression of digital video and audio data.

- **PCI**

  Peripheral Component Interconnect. Present day standard expansion bus.

- **Progressive scanning**

  Describes a transfer of data in which the lines of the source input device are written sequentially into the destination buffer.

  Also known as *non-interlaced.* See also *interlaced scanning*.

- **RGB**

  A color space that represents color using the primary colors (red, green and blue) as components.**Vertical synchronization signal**

  The part of a video signal that indicates the end of a frame and the start of a new one.

  See also *horizontal synchronization signal*.

Appendix B: Technical information

This appendix contains information that might be useful when installing the Matrox Morphis QxT board.

Technical information

This appendix contains information that might be useful when installing your Matrox Morphis QxT.

Global information

- Operating system: See your software manual for supported versions of Microsoft Windows.

- System requirements: A computer with a x4 or x8 PCIe bus and an Intel Pentium processor (or equivalent) or better.

  We recommend a relatively up-to-date PCIe chipset. An up-to-date chipset is recommended because it generally offers better performance in terms of data transfer rates. The list of platforms that are known to be compatible with Matrox Morphis QxT are available on the Matrox website, under the board's PC compatibility list.

Acquisition features

- Can simultaneously capture from up to 16 independent video sources.

- Accepts composite (CVBS) video in NTSC/PAL format, or monochrome video in RS-170/CCIR format.

- Captured data can be converted into the following formats with square pixels: RGB planar, BGR32 packed, YCrCb, YUV16 packed (stored in YUYV format), and 8-bit monochrome.

- Has 128 Mbytes of 166 MHz DDR SDRAM used as acquisition memory.

- Supports cropping (ROI capture), arbitrary downscaling to 1/16th of a field or frame, and vertical/horizontal flipping.

MPEG-4 features

- Supports real-time MPEG-4 encoding of all video streams.

- Supports interlaced encoding of video streams when using D1 mode.

- Supports up to 4 variable slices per frame.

- Supports bit rate control from 192 Kbps to 4Mbps.
  - Constant bit rate.
  - Variable with maximum rate.
  - Variable with minimum quality factor.
- Supports a group of pictures (GOP) size of up to 100 frames.
- Has 128 Mbytes of 166 MHz DDR SDRAM used as compression memory.

Additional features

- Has hardware facilities for implementing custom software-based motion detection.
- Has integrated Watchdog capabilities for automatically recovering from application or system failure.
- Supports 16 TTL user-defined input signals and 16 TTL user-defined output signals (5 V) to control or synchronize with other devices. These signals can be internally accessed, or accessed externally using the Matrox Morphis QxT Digital I/O module.
- Supports video input testing. Up to four video signals can be routed to display devices (for example, a TV monitor, computer monitor that allows composite input, or VCR) for test purposes. The selected video signals are sent straight to a video encoder; they cannot be altered.
- Has an overlay processor to overlay information onto grabbed images, or images sent to the MPEG-4 encoder.

Data transfer features

- Supports the transfer of live video to Host memory, off-board display memory[1], or other PCIe devices across a PCIe bus.
- Supports transfer of an MPEG-4 stream to Host memory.
- Features an on-board 32-bit 66 MHz PCI bus master for the MPEG-4 encoder to reduce CPU usage.
- Features an on-board 64-bit 133 MHz PCI-X bus master to reduce CPU usage.
- Can generate interrupts for the start and end of a field, frame, and sequence capture.

1. Direct copies are possible if the display memory is physically accessible from the Matrox Morphis QxT.

Electrical specifications

The following tables list the electrical specifications of the Matrox Morphis QxT board under different conditions.

Important

When determining the power requirements for your computer, do not forget to include the power requirements for other peripheral devices. In addition, if using multiple boards, do not forget to add their total power requirements together.

Typical operating voltage and current for Matrox Morphis QxT, no compression option, and no module (applies to PCB 7250-00 rev. A).		
Voltage	**Current**	**Power**
3.3 V ± 9%	800 mA	2.64 W
12 V ± 8%	1200 mA	14.40 W
Total		17.04 W

Typical operating voltage and current for Matrox Morphis QxT, compression option, and no module (applies to PCB 7250-00 rev. A).		
Voltage	**Current**	**Power**
3.3 V ± 9%	850 mA	2.8 W
12 V ± 8%	2400 mA	28.8 W
Total		31.6 W

The following table lists the electrical signal specifications of Matrox Morphis QxT.

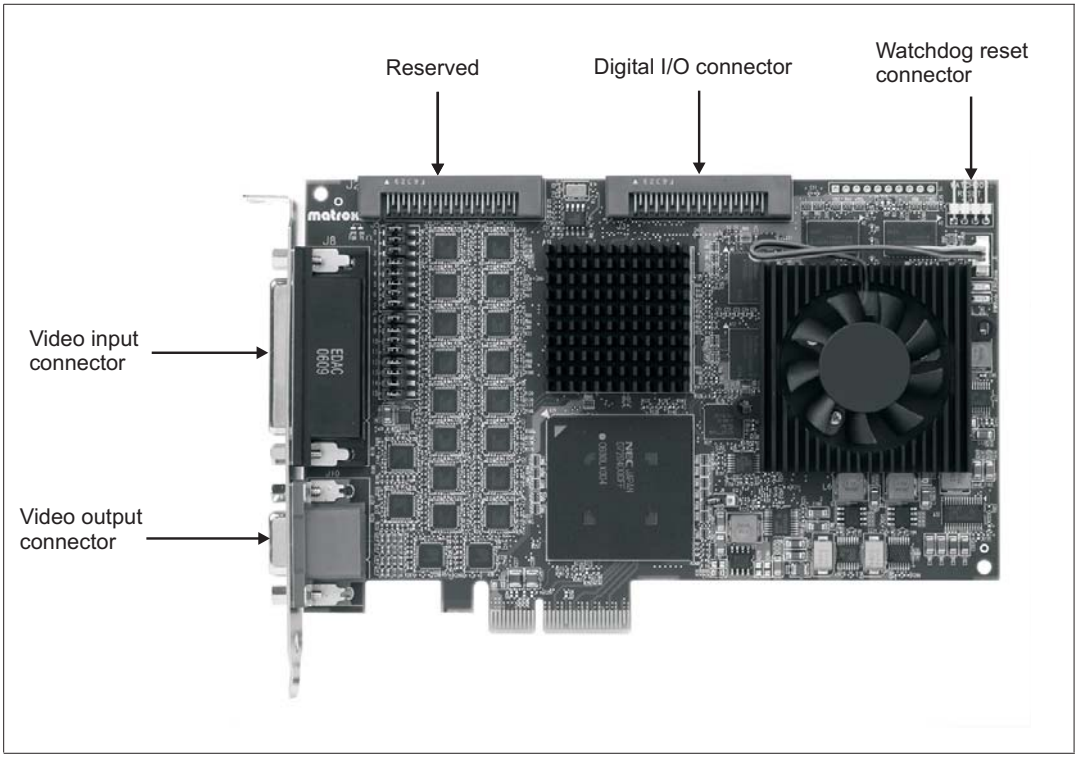
Signals	Specifications
Video input signals	Termination: 75 Ω with jumper installed, >100 KΩ without jumper.
Video output signals	75 Ω termination required.
User input signals	No termination. Input current: ± 1 µA max. Input voltage: • Low: 0.0 V min; 0.8 V max. • High: 2.0 V min; 5.0 V max.
User output signals	No termination. Maximum output current: 24 mA. Output voltage: • Low: 0.55 V max. • High: 2.4 V min; 5.0 V max.

Dimensions and environmental specifications

- Dimensions:
  - 16.7 L x 11.1 H cm (6.6" x 4.4") from bottom edge of goldfinger to top edge of board.
  - Matrox Morphis QxT I/O module: 3.8 L x 9.5 H cm (1.5" x 3.8").
- Minimum/maximum ambient operating temperature: 0°C to 55°C.
- Minimum/maximum storage temperature: -25°C to 85°C.
- Operating humidity: 10% - 90% (non-condensing).
- Storage humidity: 10% - 90% (non-condensing).
- Maximum altitude for operation: 3000 meters.
- Maximum altitude for transport: 12000 meters.
- Ventilation requirements: 50 LFM (linear feet per minute) over board(s).

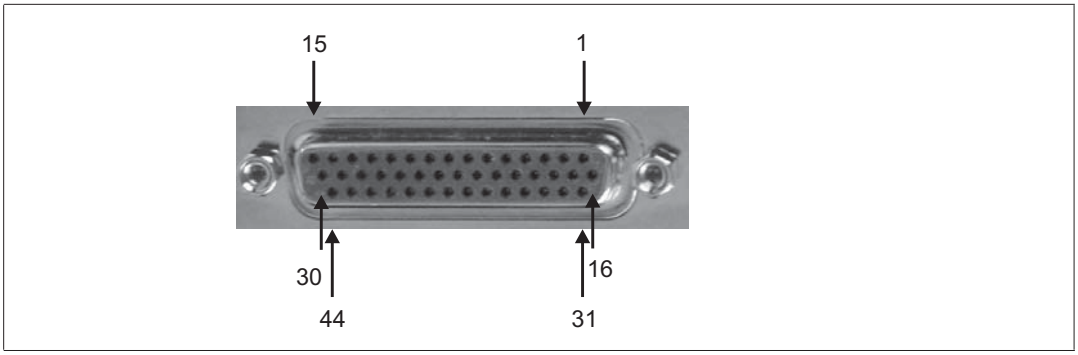
Base board input and output connectors

The Matrox Morphis QxT board has several interface connectors. On its bracket, it has an HD-44 connector for video input and an HD-15 connector for video output. On the top edge of the board, there is a 50-pin digital I/O connector for I/O from the Matrox Morphis QxT digital I/O module. In addition, there is one system reset connector.



Video input connector

The video input connector is a high-density 44-pin female connector, used to access video input signals. The connector's pin assignment is as follows:



Pin number	Signal	Description	Pin number	Signal	Description
1	P15_VID_IN	Analog video input for acquisition path 15.	23	P6_VID_IN	Analog video input for acquisition path 6.
2	P7_VID_IN	Analog video input for acquisition path 7.	24	RESERVED	Reserved. Do not connect.
3	GND	Ground.	25	GND	Ground
4	GND	Ground.	26	GND	Ground
5	GND	Ground.	27	GND	Ground
6	RESERVED	Reserved. Do not connect.	28	NC	Not connected.
7	P14_VID_IN	Analog video input for acquisition path 14.	29	GND	Ground
8	GND	Ground.	30	GND	Ground
9	P5_VID_IN	Analog video input for acquisition path 5.	31	NC	Not connected.
10	GND	Ground.	32	GND	Ground
11	P13_VID_IN	Analog video input for acquisition path 13.	33	P8_VID_IN	Analog video input for acquisition path 8.
12	NC	Not connected.	34	GND	Ground.
13	P4_VID_IN	Analog video input for acquisition path 4.	35	P9_VID_IN	Analog video input for acquisition path 9.
14	GND	Ground.	36	NC	Not connected.
15	P12_VID_IN	Analog video input for acquisition path 12.	37	NC	Not connected.
16	GND	Ground.	38	NC	Not connected.
17	GND	Ground.	39	NC	Not connected.
18	GND	Ground.	40	P2_VID_IN	Analog video input for acquisition path 2.
19	P0_VID_IN	Analog video input for acquisition path 0.	41	P3_VID_IN	Analog video input for acquisition path 3.
20	P1_VID_IN	Analog video input for acquisition path 1.	42	GND	Ground.
21	GND	Ground.	43	P10_VID_IN	Analog video input for acquisition path 10.
22	GND	Ground.	44	P11_VID_IN	Analog video input for acquisition path 11.

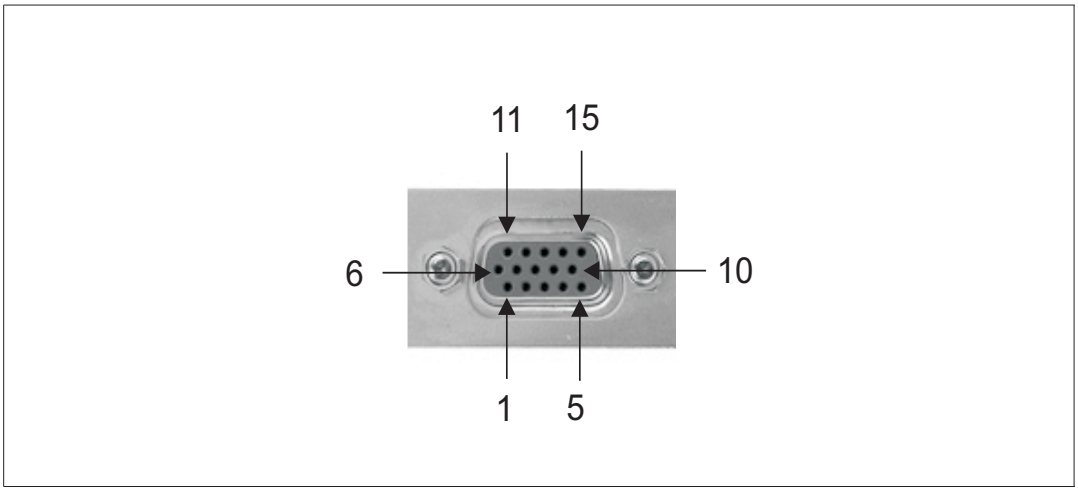
You can use the optional Matrox cable HD-44M-18BNC to interface with this connector. The cable has a high density D-Subminiature 44-pin male connector at one end, and 18 BNC female connectors at the other end.

To build your own cable to interface with this connector, you can purchase the following parts:

Manufacturer:	Norcomp, Inc.
Connector:	180-044-102-031
Backshell:	970-025-010-011

Video test connector

The video test connector is a high density 15-pin female connector that allows you to test incoming signals by sending them to a display device (for example, TV monitor, computer monitor that allows composite input, or VCR). The connector's pin assignment is as follows:



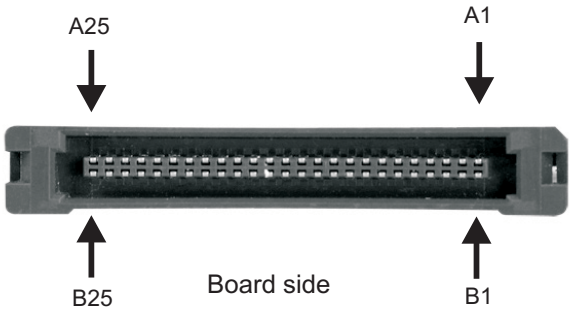
Pin number	Signal	Description
1	VID_OUT0	Analog video output 0.
2	VID_OUT1	Analog video output 1.
3	VID_OUT2	Analog video output 2.
4	NC	Not connected.
5	NC	Not connected.
6	GND	Ground.
7	GND	Ground.
8	GND	Ground.
9	NC	Not connected.
10	GND	Ground.
11	NC	Not connected.

Pin number	Signal	Description
12	NC	Not connected.
13	VID_OUT3	Analog video output 3.
14	NC	Not connected.
15	NC	Not connected.

You can use a standard HD 15-pin VGA to 5BNC monitor cable (available at your local electronic store) to interface with this connector.

Internal digital I/O expansion connector

The internal digital I/O expansion connector is a high-density, 50-pin female connector that is used for user input and output signals. The connector's pin assignment is as follows:



Pin number	Signal	Description
A1	TTL_USER_IN0	TTL user input 0.
A2	TTL_USER_IN2	TTL user input 2.
A3	TTL_USER_IN4	TTL user input 4.
A4	TTL_USER_IN5	TTL user input 5.
A5	TTL_USER_IN7	TTL user input 7.
A6	TTL_USER_IN9	TTL user input 9.
A7	TTL_USER_IN10	TTL user input 10.
A8	TTL_USER_IN12	TTL user input 12.
A9	TTL_USER_OUT0	TTL user output 0.
A10	TTL_USER_OUT1	TTL user output 1.
A11	TTL_USER_OUT2	TTL user output 2.

Pin number	Signal	Description
A12	TTL_USER_OUT3	TTL user output 3.
A13	TTL_USER_OUT4	TTL user output 4.
A14	TTL_USER_OUT5	TTL user output 5.
A15	TTL_USER_OUT6	TTL user output 6.
A16	TTL_USER_OUT7	TTL user output 7.
A17	TTL_USER_OUT8	TTL user output 8.
A18	RESERVED	Reserved. Do not connect.
A19	TTL_USER_OUT9	TTL user output 9.
A20	TTL_USER_OUT10	TTL user output 10.
A21	TTL_USER_OUT11	TTL user output 11.
A22	TTL_USER_OUT12	TTL user output 12.
A23	TTL_USER_OUT13	TTL user output 13.
A24	TTL_USER_OUT14	TTL user output 14.
A25	TTL_USER_OUT15	TTL user output 15.
B1	TTL_USER_IN1	TTL user input 1.
B2	TTL_USER_IN3	TTL user input 3.
B3	GND	Ground.
B4	TTL_USER_IN6	TTL user input 6.
B5	TTL_USER_IN8	TTL user input 8.
B6	GND	Ground.
B7	TTL_USER_IN11	TTL user input 11.
B8	TTL_USER_IN13	TTL user input 13.
B9	GND	Ground.
B10	TTL_USER_IN14	TTL user input 14.
B11	TTL_USER_IN15	TTL user input 15.
B12	GND	Ground.

Pin number	Signal	Description
B13	GND	Ground.
B14	GND	Ground.
B15	GND	Ground.
B16	GND	Ground.
B17	GND	Ground.
B18	RESERVED	Reserved. Do not connect.
B19	GND	Ground.
B20	GND	Ground.
B21	GND	Ground.
B22	GND	Ground.
B23	GND	Ground.
B24	GND	Ground.
B25	GND	Ground.

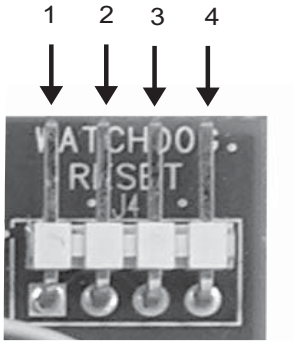
To build your own cable for the internal digital I/O expansion connector, parts can be purchased from:

Part	Manufacturer	Part number
Receptacle (cable crimp style)	KEL	8925E-050-179-F
Flat cable	Amphenol	425-3006-050

System reset connector

The system reset connector is a standard, right angle, 0.1" spacing, male connector. This connector is used to reset the motherboard if the reset button is pressed or the Watchdog circuitry of Matrox Morphis QxT detects abnormal Host inactivity.

The connector's pin assignment is as follows:



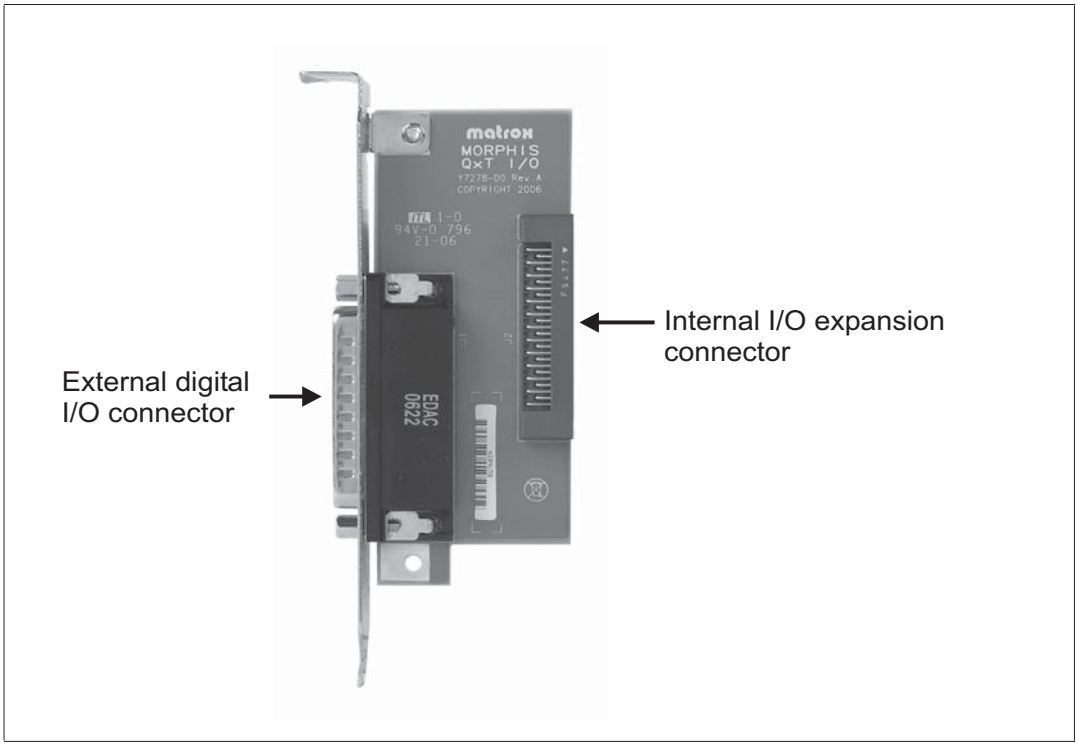
Connector	Pin	Signal	Description
J4	1	RESET_MB	Reset signal output (usually to motherboard).
J4	2	GND_MB	Motherboard active reset level (usually ground).
J4	3	RESET_BUTTON	Reset signal input (usually from Reset button).
J4	4	GND_MB	Motherboard active reset level (usually ground).

To build your own cable for the system reset connector, parts can be purchased from:

Manufacturer	Crimp-to-wire receptacle	Housing
FCI	76357-301 (discrete contact; wire size: 22-30 AWG)	65039-035 (2 positions) 65039-033 (4 positions)

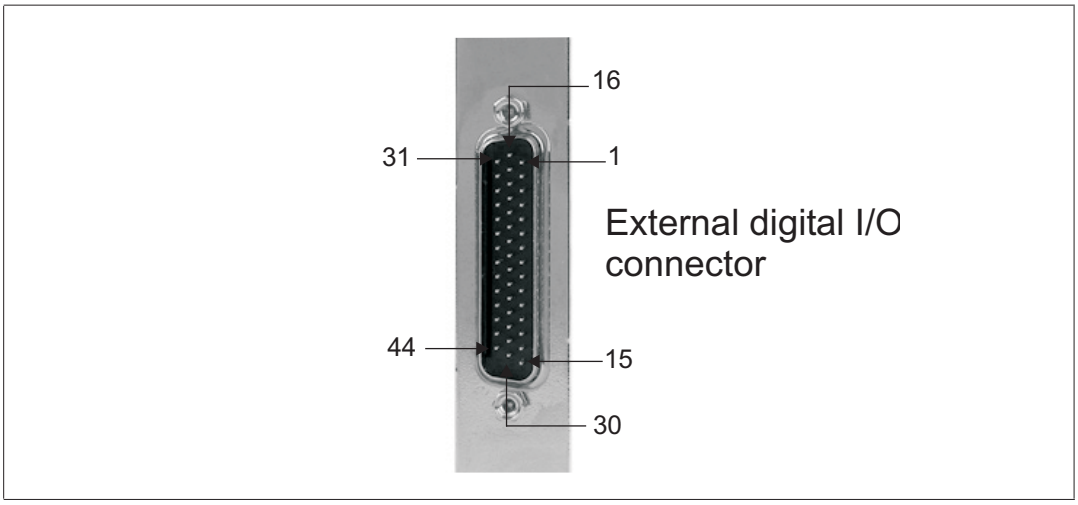
Connectors of the Matrox Morphis QxT Digital I/O module

The Matrox Morphis QxT Digital I/O module has one connector on its bracket: the external digital I/O connector (HD-44). The module also has one internal connector, an I/O expansion connector, which interfaces with the internal digital I/O expansion connector on the base board.



External digital I/O connector

External digital I/O connector is a high-density Dsub 44-pin male connector, used to receive and transmit user-defined signals. The connector's pin assignment is as follows:



Pin	Signal	Description
1	TTL_USER_IN1	TTL user input 1.
2	TTL_USER_IN3	TTL user input 3.
3	TTL_USER_IN5	TTL user input 5.
4	TTL_USER_IN7	TTL user input 7.
5	TTL_USER_IN9	TTL user input 9.
6	TTL_USER_IN11	TTL user input 11.
7	TTL_USER_IN13	TTL user input 13.
8	TTL_USER_IN15	TTL user input 15.
9	TTL_USER_OUT1	TTL user output 1.
10	TTL_USER_OUT3	TTL user output 3.
11	TTL_USER_OUT7	TTL user output 7.
12	TTL_USER_OUT9	TTL user output 9.
13	TTL_USER_OUT11	TTL user output 11.
14	TTL_USER_OUT13	TTL user output 13.
15	TTL_USER_OUT15	TTL user output 15.
16	GND	Ground.
17	GND	Ground.
18	GND	Ground.

Pin	Signal	Description
19	GND	Ground.
20	NC	Not connected.
21	GND	Ground.
22	GND	Ground.
23	GND	Ground.
24	TTL_USER_OUT0	TTL user output 0.
25	GND	Ground.
26	TTL_USER_OUT5	TTL user output 5.
27	GND	Ground.
28	TTL_USER_OUT10	TTL user output 10.
29	GND	Ground.
30	NC	Not connected.
31	TTL_USER_IN0	TTL user input 0.
32	TTL_USER_IN2	TTL user input 2
33	TTL_USER_IN4	TTL user input 4.
34	TTL_USER_IN6	TTL user input 6.
35	TTL_USER_IN8	TTL user input 8.
36	TTL_USER_IN10	TTL user input 10.
37	TTL_USER_IN12	TTL user input 12.
38	TTL_USER_IN14	TTL user input 14.
39	TTL_USER_OUT2	TTL user output 2.
40	TTL_USER_OUT4	TTL user output 4.
41	TTL_USER_OUT6	TTL user output 6.
42	TTL_USER_OUT8	TTL user output 8.
43	TTL_USER_OUT12	TTL user output 12.
44	TTL_USER_OUT14	TTL user output 14.

To build your own cable, you can purchase the following part:

Manufacturer	Connector	Backshell
NorComp, Inc.	180-044-273 L000	970-025-010R011

This part can be purchased from third parties such as Digi-Key Corporation (www.digikey.com).

Appendix C: Listing of Matrox Morphis QxT boards

This appendix lists specific versions and revisions of the Matrox Morphis QxT board.

Major revisions of Matrox Morphis QxT

Board	PCB#/ VER.	*Description*
Matrox Morphis QxT board	Y7250-00 rev. A	• Original version.
Matrox Morphis QxT Digital I/O module	Y7278-00 rev. A	• Original version.

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Regulatory compliance for Matrox Morphis QxT

FCC Compliance Statement

Remark for the Matrox hardware products supported by this guide

These devices have been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment causes harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures: • Reorient or relocate the receiving antenna • Increase the separation between the equipment and receiver • Connect the equipment into an outlet on a circuit different from that to which the receiver is connected • Consult the dealer or an experienced radio/TV technician for help.

WARNING

Changes or modifications to this unit not expressly approved by the party responsible for the compliance could void the user's authority to operate this equipment. The use of shielded cables for connection of the monitor to the card is required to meet FCC requirements.

Declaration of conformity of a Class B digital device according to the FCC rules

We, the Responsible Party

Matrox International Corporation, 625 State Route 3, Unit B, Plattsburg, NY 12901-6530
Telephone: (514) 822-6000 (x2026) • Attention: Conformity Group

Declaration

The Matrox hardware products supported by this guide comply with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) these devices may not cause harmful interference, and (2) these devices must accept any interference received, including interference that may cause undesired operation. Any question regarding this declaration should be forwarded to the above coordinates.

(English) Industry Canada Compliance Statement

Remark for the Matrox hardware products supported by this guide

These digital devices do not exceed the Class B limits for radio noise emission from digital apparatus devices set out in the Radio Interference Regulation of Industry Canada.

(Français) Conformité avec les exigences du ministère de l'Industrie Canada

Remarque sur les produits matériels Matrox couverts par ce guide

Ces appareils numériques n'émettent aucun bruit radioélectrique dépassant les limites applicables aux appareils numériques de Classe B prescrites dans le Règlement sur le brouillage radioélectrique édicté par Industrie Canada.

(English) European user's information – Declaration of Conformity

Remark for the Matrox hardware products supported by this guide

These devices comply with EC Directive 89/336/EEC for a Class B digital device. They have been tested and found to comply with EN55022/CISPR22 and EN55024/CISPR24. In a domestic environment these products may cause radio interference in which case the user may be required to take adequate measures.To meet EC requirements, shielded cables must be used to connect the monitor and other peripherals to the card. These products have been tested in a typical class B compliant host system. It is assumed that these products will also achieve compliance in any class B compliant system.

(Français) Informations aux utilisateurs Européens – Déclaration de conformité

Remarque sur les produits matériels Matrox couverts par ce guide

Ces unités sont conformes à la directive communautaire 89/336/EEC pour les unités numériques de classe B. Les tests effectués ont prouvé qu'elles sont conformes aux normes EN55022/CISPR22 et EN55024/CISPR24. Le fonctionnement de ces produits dans un environnement résidentiel peut causer des interférences radio, dans ce cas l'utilisateur peut être amené à prendre les mesures appropriées. Pour respecter les impératifs communautaires, les câbles de connexion entre le moniteur ou autres périphériques et la carte doivent être blindés. Ces produits ont été testés dans un système hôte typique compatible classe B. On suppose qu'ils présenteront la même compatibilité dans tout système compatible classe B.

(Deutsch) Information für europäische Anwender – Konformitätserklärung

Anmerkung für die Matrox Hardware-Produktunterstützung durch dieses Handbuch

Diese Geräte entsprechen EC Direktive 89/336/EEC für ein digitales Gerät Klasse B. Sie wurden getestet und entsprechen demnach EN55022/CISPR22 und EN55024/CISPR24. In einer Wohnumgebung können diese Produkte Funkinterferenzen erzeugen, und der Benutzer kann genötigt sein, entsprechende Maßnahmen zu ergreifen. Um EG-Anforderungen zu entsprechen, müssen zum Anschließen des Monitors und anderer Peripheriegeräte an die Karte abgeschirmte Kabel verwendet werden. Diese Produkt wurden in einem typischen, der Klasse B entsprechenden, Host-System getestet. Es wird davon ausgegangen, daß diese Produkte auch in jedem Klasse B entsprechenden System entsprechend funktionieren.

(Italiano) Informazioni per gli utenti europei – Dichiarazione di conformità

Nota per i prodotti hardware Matrox supportati da questa guida

Questi dispositivi sono conformi alla direttiva CEE 89/336/EEC relativamente ai dispositivi digitali di Classe B. Sono stati provati e sono risultati conformi alle norme EN55022/CISPR22 e EN55024/CISPR24. In un ambiente domestico, questi prodotti possono causare radiointerferenze, nel qual caso all'utente potrebbe venire richiesto di prendere le misure adeguate. Per soddisfare i requisiti CEE, il monitor e le altre periferiche vanno collegati alla scheda grafica con cavi schermati. Questi prodotti sono stati provati in un tipico sistema host conforme alla classe B. Inoltre, si dà per scontato che questi prodotti acquisiranno la conformità in qualsiasi sistema conforme alla classe B.

(Español) Información para usuarios europeos – Declaración de conformidad

Observación referente a los productos de hardware de Matrox apoyados por este manual

Estos dispositivos cumplen con la directiva de la CE 89/336/EEC para dispositivos digitales de Clase B. Dichos dispositivos han sido sometidos a prueba y se ha comprobado que cumplen con las normas EN55022/CISPR22 y EN55024/CISPR24. En entornos residenciales, estos productos pueden causar interferencias en las comunicaciones por radio; en tal caso el usuario deberá adoptar las medidas adecuadas. Para satisfacer las disposiciones de la CE, deberán utilizarse cables apantallados para conectar el monitor y demás periféricos a la tarjeta. Estos productos han sido sometidos a prueba en un típico sistema anfitrión que responde a los requisitos de la clase B. Se supone que estos productos cumplirán también con las normas en cualquier sistema que responda a los requisitos de la clase B.

Directive on Waste Electrical and Electronic Equipment (WEEE)

Europe



(English) European user's information – Directive on Waste Electrical and Electronic Equipment (WEEE)

Please refer to the Matrox Web site (**www.matrox.com/environment/weee**) for recycling information.

(Français) Informations aux utilisateurs Européens – Règlementation des déchets d'équipements électriques et électroniques (DEEE)

Se référer au site Web de Matrox (**www.matrox.com/environment/weee**) pour l'information concernant le recyclage.

(Deutsch) Information für europäische Anwender – Europäische Regelungen zu Elektro- und Elektronikaltgeräten (WEEE)

Bitte wenden Sie sich an dem Matrox-Website (**www.matrox.com/environment/weee**) für Recycling Informationen.

(Italiano) Informazioni per gli utenti europei – Direttiva sui rifiuti di apparecchiature elettriche ed elettroniche (RAEE)

Si prega di riferirsi al sito Web Matrox (**www.matrox.com/environment/weee**) per le informazioni di riciclaggio.

Product support

Limited Warranty

Matrox warrants this product against defects in materials and workmanship for a period of ***one year*** *from the date of delivery. Matrox and its suppliers expressly disclaim any and all other warranties, express or implied.*

Your sole remedy shall be, repair or replacement of the product provided that the defective product be returned to the authorized dealer within a year from the date of delivery.

If you wish to return your board, contact the Matrox authorized dealer where you purchased the board for service. ***Do not return a product to Matrox without authorization****.*

In the event you must return the board directly to Matrox, follow these steps:

1. Contact Customer Support (The *Customer support contacts* information sheet included in your package has the phone numbers for Matrox's offices).

   Customer Support will ask you to describe the problem and will issue a Return Merchandise Authorization (RMA).

2. Leave the configuration as it was when you were using the board.

3. Pack the board in its original box and return it with a completed "Product Assistance Request" form (provided in the following page).

Return address

U.S. customers must return their products to our U.S. address:

- Matrox International Corp.
  625 State Route 3, Unit 1
  Plattsburgh, N.Y.
  12901

Canadian and other international customers can return their products directly to our Canadian facility:

- Matrox Electronic Systems Ltd.
  1055 St. Regis Blvd.
  Dorval, Quebec
  H9P 2T4

Product Assistance Request Form

Name:	
Company:	
Address:	
Phone:	Fax:
E-mail:	
Hardware Specific Information	
Computer:	CPU:
System memory:	PCI Chipset:
System BIOS rev:	
Video card used:	Resolution:
Network Card:	Network Software:
Other cards in system:	
Software Specific Information	
Operating system:	Rev:
Matrox SW used:	Rev:
Compiler:	Rev:
Fill out only if you are returning a board	
RMA #:	
Who were you talking to in customer support?	
Date board was received:	Date of failure:
MOD #:	These numbers are on the label at the back of the board.
SER #:	
REV #:	
PMB #:	
PNS #:	
Can you reproduce the problem? Yes ❒ No ❒	
Is an error code displayed? Yes ❒ No ❒	If so, what code?
	... Continued on reverse

Describe the problem:

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