Stand-alone vision systems

Matrox **4Sight X**

Complete embedded system for image capture, processing, display and I/O.

Shown with Matrox Nexis option.

Key features

- embedded Intel® Celeron® M or Core™ 2 Duo CPU
- small footprint and rugged construction
- accommodates Matrox Nexis integrated camera system
- native GigE Vision™ and IEEE-1394 IIDC support
- acquire from analog and digital video sources such as NTSC, PAL and Camera Link®
- connect external equipment using Ethernet, IEEE 1394, RS-232/485, USB or general purpose digital I/Os
- archive video with integrated mass storage
- monitor system integrity with a watchdog timer[1]
- available pre-installed with Microsoft® Windows® XP Embedded (XPe)
- includes components to create custom XPe images
- develop applications using standard Microsoft® development tools and Matrox Imaging Library (MIL)

Industrial imaging platform

Matrox 4Sight X is an industrial imaging platform featuring Intel® single/multi-core CPU. Carefully selected embedded components ensure long term availability, making it ideal for OEMs looking to maximize their return on investment. The combination of Matrox 4Sight X hardware with Matrox Imaging Library (MIL) software ensures interoperability and time to market.

Strong imaging performance

Featuring an Intel® Celeron® M or Intel® Core™ 2 Duo processor, the Matrox 4Sight X provides enough power to handle mainstream imaging applications. Capable of supplying vast amounts of image data to the system for processing, the x4 PCIe™ connectivity of PCI/104-Express™ provides the bandwidth required to keep pace with today's high resolution and frame rate cameras.

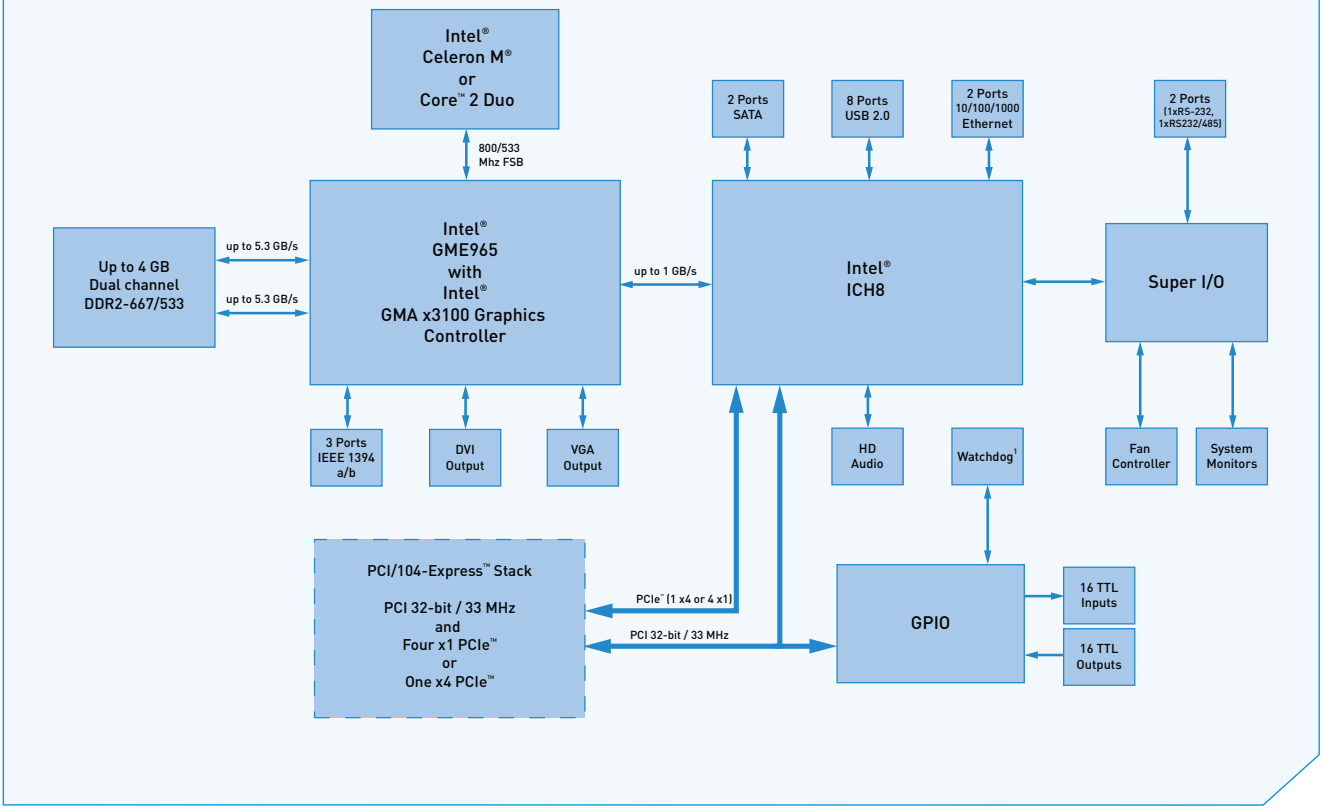
Designed for embedded imaging

The small size of the Matrox 4Sight X makes it easy for OEMs to incorporate it into their systems. System health monitors including temperature, voltage and fan speed, in combination with a watchdog timer[1], allow the Matrox 4Sight X to detect, report and recover from errors and failures, and quickly return the system to operational status.

Pre-loaded with Microsoft® Windows® XP Embedded (XPe), the Matrox 4Sight X provides a more stable and secure software operating environment than Windows® XP Professional. The ability to remove unnecessary operating system components allows XPe to occupy a smaller memory footprint and protects it against malicious code. The enhanced write filter (EWF) available with XPe makes the Matrox 4Sight X more resilient by preventing data from being written to the hard disk thereby preserving the validated known good configuration. Furthermore, EWF enables the use of optional flash disks, removing the need for rotating media.

MATROX IMAGING

Matrox 4Sight X



Designed for embedded imaging (cont.)

Matrox Imaging not only carefully selected each component in the Matrox 4Sight X to ensure product availability in excess of five years, but also exercises strict change control to provide consistent supply. Longevity of stable supply lets OEMs achieve maximum return on the original investment without incurring the additional costs associated with the repeated validation of the constantly-changing mainstream commercial platforms.

Industrial strength

Modern manufacturing demands equipment that moves faster and works harder, but this subjects the equipment to more shock and vibration. Matrox 4Sight X is designed to ensure reliability and up-time in the most demanding environments. Shock and vibration can corrupt data coming through the connectors of mainstream commercial platforms, but Matrox 4Sight X protects the system's integrity with features such as memory with latching connectors, soldered CPU, embedded PCI/104-Express™ expansion slots and latching/screw-down I/O connectors.

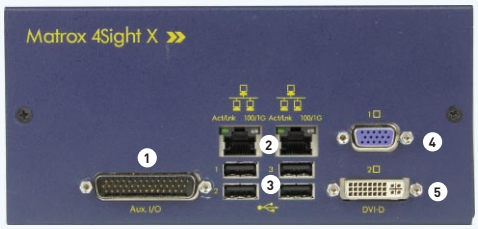
The Matrox 4Sight housing is made of 1.2mm thick, cold rolled steel, which can withstand routine abuse. The chassis design and fan ensure adequate cooling by channeling airflow throughout the Matrox 4Sight X, allowing the highest levels of computing performance throughout the entire standard temperature range. Moreover, adaptive fan control minimizes power requirements and noise. Optional flash disks further enhance the Matrox 4Sight X for use in continuous vibration or high-shock environments.

Extensive connectivity

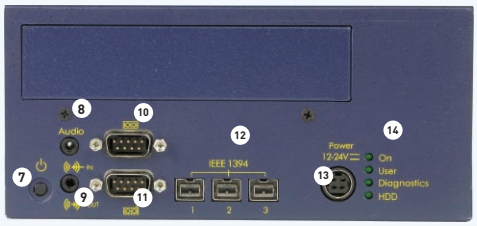
Communicating results outside the box is an integral part of any imaging system, so connecting to modern and legacy equipment in the field requires the right interfaces. With Gigabit Ethernet, IEEE 1394a/b, RS-232/485, USB 2.0 and digital I/Os, the Matrox 4Sight X can directly interact with critical process automation devices. With the ability to host up to three PCI-104 or PCI/104-Express™ expansion modules, the Matrox 4Sight X lets OEMs create systems flexible enough to meet their evolving needs. Dual head display capability on the Matrox 4Sight X allows the creation of a rich human-machine interfaces (HMIs) whereby the finest details are clearly communicated to the operator.

Matrox 4Sight X front and back

Front



Back



1. Auxiliary I/Os
2. 10/100/1000 Mbit Ethernet
3. USB 2.0 ports
4. Analog VGA output
5. Digital VGA (DVI-D) output
7. Power switch
8. Audio Input
9. Audio Output
10. Serial Port 1
11. Serial Port 2
12. IEEE 1394b Ports
13. Power Input
14. Status LEDs

All encompassing video capture and more

There have never been so many ways of transmitting video: analog, Gigabit Ethernet, IEEE 1394 and USB. The Matrox 4Sight X supports them all, either directly or through add-on Matrox frame grabber modules. Simplifying integration even further, the Matrox 4Sight X with Matrox Nexis camera controller and remote cameras heads provides a more complete solution from a single vendor. The Matrox 4Sight X provides the broad camera support needed to handle the majority of applications.

Matrox Nexis camera system

An integrated camera system for the Matrox 4SightX, the optional Matrox Nexis features a variety of remote camera heads offering sub to megapixel resolutions, different maximum frame rates, and monochrome or color images as well as a dual camera control unit (CCU) expansion module. With Matrox Nexis, the Matrox 4Sight X is transformed into a complete, highly-integrated capture, processing and display platform. See the Matrox Nexis datasheet for more information.

Camera Link® acquisition

Taking full advantage of the PCI/104-Express™ capability, the optional Matrox Solios eM-CL expansion module provides connectivity to the highest-performance multi-megapixel area and line scan Camera Link® cameras on the market. The module is available in either dual independent Base configuration (Matrox Solios eM-CLB) featuring power over Camera Link® (PoCL with SafePower) or single Medium/Full configuration supporting up to 10-taps (Matrox Solios eM-CLF).

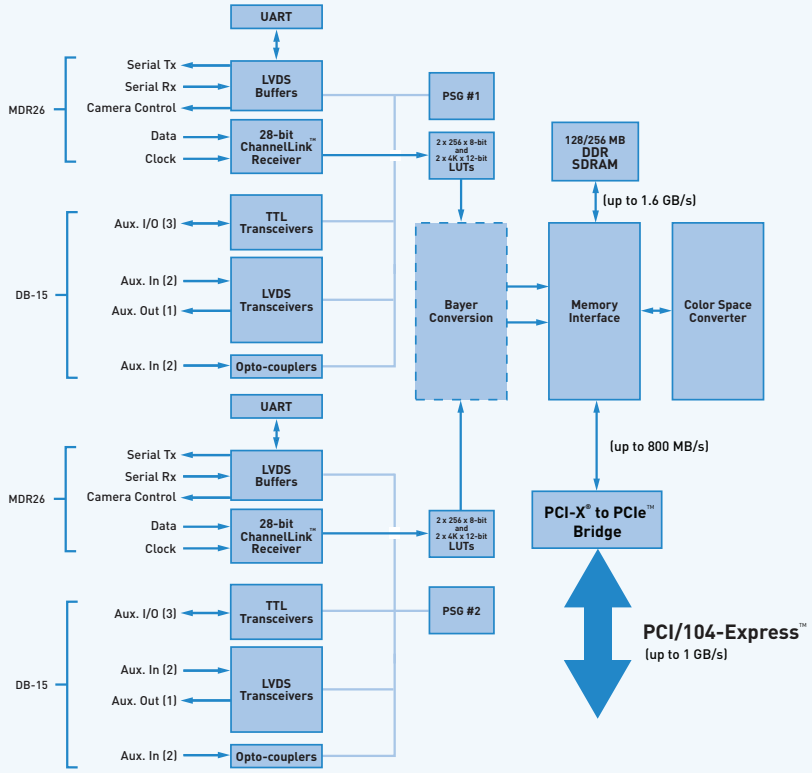
An extensive set of general purpose inputs and outputs (GPIOs) on the module lets Matrox 4Sight X synchronize image acquisition with external events (i.e., triggers and strobes) and communicate with process automation devices. Onboard image reconstruction, look-up tables (LUTs) and optional Bayer conversion offload laborious pre-processing tasks, and allow the embedded host processor to handle more valuable tasks.

IEEE 1394, USB and GigE Vision™ interfaces

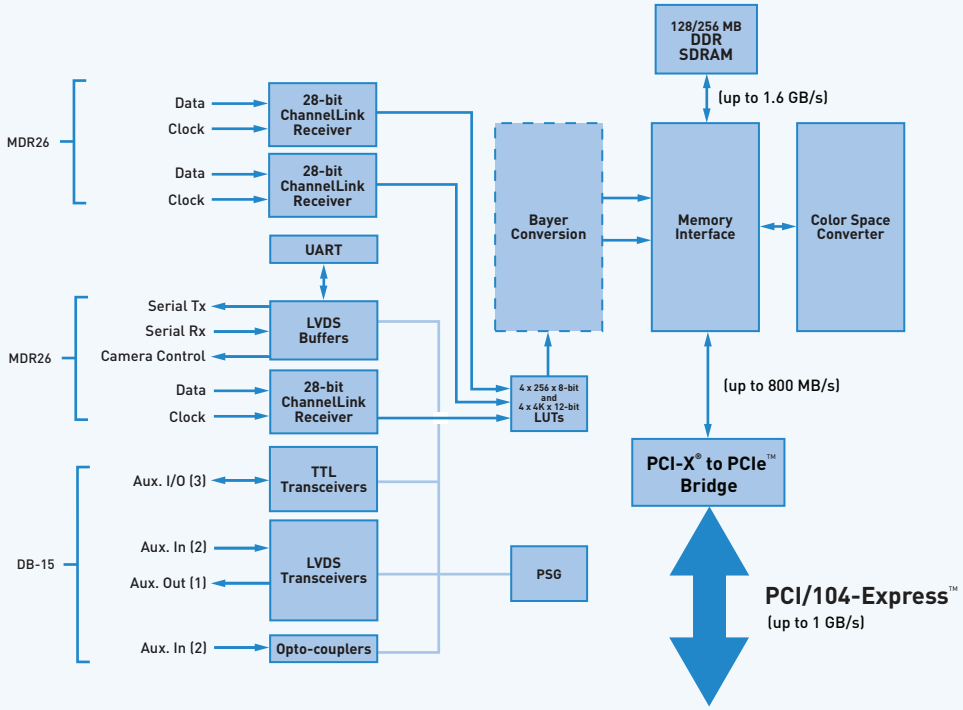
IEEE 1394a/b, hi-speed USB and GigE Vision™ have made a major impact on the imaging industry. Matrox 4Sight X embraces these technologies by providing integral support for these interfaces with every system. Software applications acquire images over these interfaces using the IEEE 1394 IIDC and GigE Vision™ support provided in the Matrox Imaging Library (MIL) or through third-party application programming interfaces (APIs), which comfortably coexist with the rest of MIL.

The Matrox 4Sight X is also available with a supplemental Matrox IEEE1394b embedded adapter, a cost effective solution for adding extra IEEE 1394 ports. The adapter also provides galvanic isolation and opto-coupled inputs, shielding the system from hostile electrical environments. With its ability to cycle the power on the IEEE1394b bus through software control, the adapter is able to reset cameras as needed without requiring human intervention. An extensive set of general purpose inputs and outputs (GPIOs) on the adapter lets Matrox 4Sight X synchronize image acquisition with external events (i.e., triggers and strobes) and communicate with process automation devices.

Matrox Solios eM-CLB



Matrox Solios eM-CLF



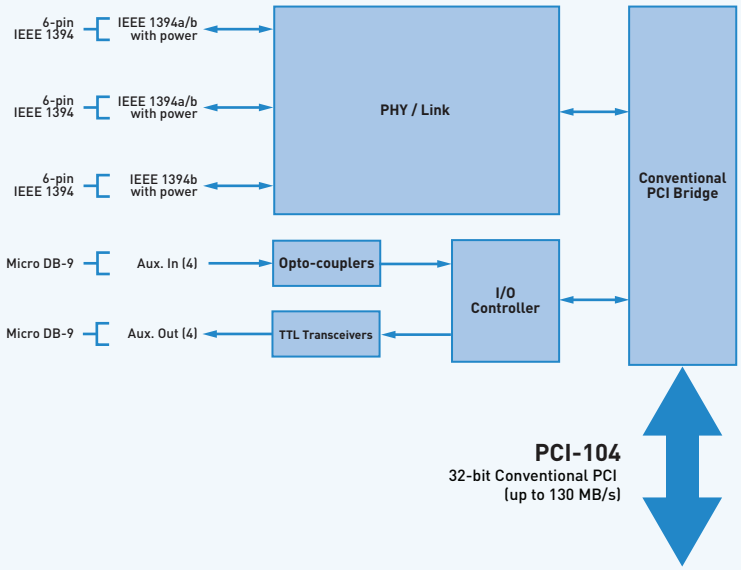
Analog capture

The Matrox 4Sight X offers optional expansion modules for both standard (NTSC/PAL) and non-standard analog video. With two independent standard video decoders working in tandem, the Matrox Morphis Dual expansion module can rapidly switch between up to 16 standard video sources. See the Matrox Morphis datasheet for more information.

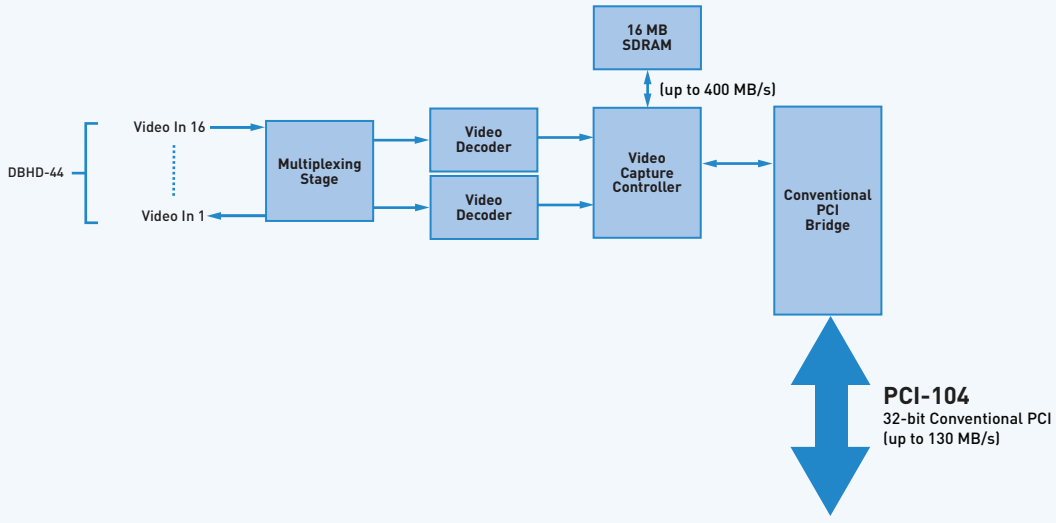
The Matrox 4Sight X is also available with the optional Matrox Meteor-II/Multi-Channel expansion module for capturing from standard or variable analog monochrome or component RGB frame scan sources.

The Matrox Meteor-II/Multi-channel specifically supports acquisition from interlaced or progressive scan component RGB cameras and single or dual-channel progressive scan monochrome cameras. An extensive set of general purpose inputs and outputs (GPIOs) on the module lets Matrox 4Sight X synchronize image acquisition with external events (i.e., triggers and strobes) and communicate with process automation devices.

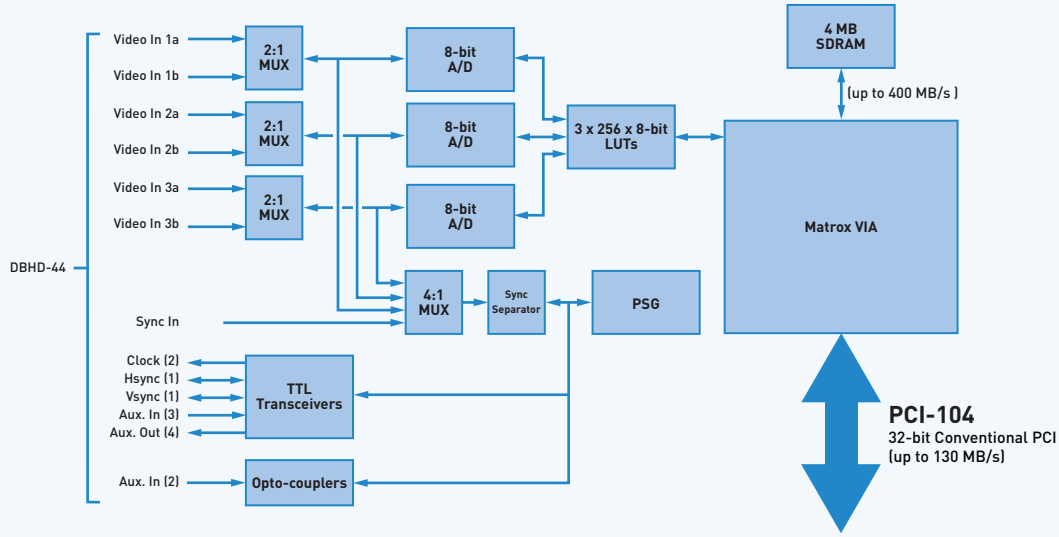
Matrox IEEE1394b PCI-104 adapter



Matrox Morphis Dual



Matrox Meteor-II/Multi-Channel



Software Environment

Microsoft® Windows® XP Embedded

Matrox 4Sight X can come pre-loaded with Windows® XP Embedded (XPe), which provides the same user interface, reliability, performance, security, networking and remote management capabilities as Windows® XP Professional but with a lower licensing cost and longer term availability and support. Programming under XPe is done using the standard Windows® API and consists of a cross-platform environment (i.e., PC linked to Matrox 4Sight X through Ethernet). Matrox 4Sight X can also run Windows® XP Professional and Windows® Vista (32-bit and 64-bit).

Field-proven application development software

Matrox 4Sight X is supported by the Matrox Imaging Library (MIL), a comprehensive collection of software tools for developing industrial imaging applications. MIL features interactive software and programming functions for image capture, processing, analysis, annotation, display and archiving. These tools are designed to enhance productivity, thereby reducing the time and effort required to bring your solution to market. Refer to the MIL datasheet for more information.

Specifications

Motherboard

- EBX form factor (8" x 5¾" or 20.32 cm x 14.61 cm)
- Intel® GME 965 chipset
- Intel® x3100 GPU
  - up to 256 MB of shared memory
- two (2) 200-pin DDR2-667/533 SO-DIMM slot (dual channel)
- dual-head graphics support
  - one (1) DVI display output
    DVI-D 1.0 compliant
    Up to 1600 x 1200 @ 60 Hz
  - one (1) RGB (VGA) display output
    Up to 2048 x 1536 @ 60 Hz
- three (3) bilingual (9/4-pin) IEEE-1394b ports
- two (2) Gigabit Ethernet ports (10/100/1000)
- eight (8) USB 2.0 ports
  - four (4) external
  - four (4) internal
- two (2) SATA 2.0 ports
- two (2) serial ports
  - one (1) RS-232
  - one (1) RS-232/RS-485
- one (1) 20-bit stereo audio input and 24-bit output
- thirty-two (32) auxiliary I/O's
  - TTL compatible
  - sixteen (16) inputs
    up to 9 V tolerant
  - sixteen (16) outputs (open collector)
    100mA max. @ 5 to 24VDC
    compatible with OPTO 22 Snap I/O and G4 series
- one (1) watchdog timer[1]
- PCI/104-Express™ expansion
  - one (1) x4 or four (4) x1 PCIe™
  - one (1) Conventional PCI 32-bit, 33 MHz bus

Specifications (cont.)

CPU options
- Intel® Celeron® 550
  - 2.0 GHz
  - 533 MHz front side bus
  - 1 MB L2 cache
- Intel® Core® 2 Duo (T7500)
  - 2.2 GHz
  - 800 MHz front side bus
  - 4 MB L2 cache

Memory options
- 512 MB Dual-channel DDR2-667[2] or DDR2-533[3]
- 1 GB Dual-channel DDR2-667[2] or DDR2-533[3]
- 2 GB Dual-channel DDR2-667[2] or DDR2-533[3]
- 4 GB Dual-channel DDR2-667[2] or DDR2-533[3]

Hard disk options
- 40 GB SATA disk drive
  - 40 GB capacity
  - SATA 2.0
  - 5400 RPM
  - 8 MB cache

Chassis
- material
  - 1.2 mm (0.048") cold rolled steel
- cooling
  - integrated 42 CFM fan
- dimensions
  - length: 20.828 cm (8.200")
  - width: 18.415 cm (7.250")
  - height: 8.387 cm (3.302")
- mounting
  - four (4) x #6-32 UNC x 0.125" (3.2 mm) deep
- expansion
  - up to three (3) PCI-104™, PCIe/104™ or PCI/104-Express™ modules
  - one (1) removable expansion I/O bracket

Power
- latching power connector
- 12 to 24 V_{DC} input
- 65- 120 Watts

Power supply
- latching connection
- 100-240 V_{AC} input
- 12 V_{DC} @ 8.3A (100W) (for Core™ 2 Duo Models)
- 12 V_{DC} @ 6A (72W) (for Celeron™ M models)

Matrox 4Sight X environmental information
- 10° C (50° F) to 50° C (122° F) operating temperature
- -40° C (-40° F) to 85° C (185° F) storage temperature
- up to 90% (non-condensing) relative humidity

Certifications
- UL/CUL TUV
- FCC part 15 class A
- CE class A
- RoHS-compliant
- EN55022:1995 class B
- EN61000-3-2:1995 class D
- EN61000-3-3:1995
- EN61000-4-2:1995 operating class A
- EN6100-4-3:1995 operating class A
- ENV50204:1995 operating class A
- EN6100-4-4:1995 operating class A
- EN6100-4-5:1995 operating class A
- EN6100-4-6:1996 operating class A
- EN6100-4-11:1994 operating class A/B
- EN60721 3M5 operating (industrial vibration)

Operating system
- optionally pre-loaded with Microsoft® Windows® XP Embedded
- supports Microsoft® Windows® XP Professional

Optional expansion modules
Matrox Nexis
- see Matrox Nexis datasheet for details

Matrox Solios eM-CLB/eM-CLF
Hardware
- PC/104-Express™ form factor
  - x4 PCIe™ host interface
- 128/256/512 MB of DDR SDRAM
- two (2) independent Base Camera Link® ports (eM-CLB)
  - PoCL (Power over Camera Link®) with SafePower support
- one (1) Medium/Full Camera Link® port (eM-CLF)
  - 10-tap support
- 20 MHz to 85 MHz clock
- serial port(s) mapped as PC COM port(s)
- supports frame and line scan sources
- on-board image reconstruction
- on-board color space conversion
- support for optional on-board Bayer conversion
- two (2) 256 x 8-bit look-up tables (LUTs) per port
- two (2) 4K x 12-bit look-up tables (LUTs) per port
- three (3) TTL configurable auxiliary I/Os per port
- two (2) LVDS auxiliary inputs per port
- one (1) LVDS auxiliary output per port
- two (2) opto-isolated auxiliary inputs per port
- support for one (1) quadrature rotary encoder per port

Specifications (cont.)

Optional expansion modules (cont.)

Matrox Morphis Dual

Hardware

- PCI-104 form factor
- conventional PCI 32-bit, 33 MHz host bus interface
- 16 MB of DDR SDRAM
- sixteen (16) CVBS or eight (8) Y/C standard video channels
  - NTSC/PAL/RS-170/CCIR
- dual (2) video decoder architecture
  - supports ultra-fast channel switching
  - simultaneous capture from two (2) independent video sources
- square pixel digitization
- controllable AGC (automatic gain control)

Environmental information

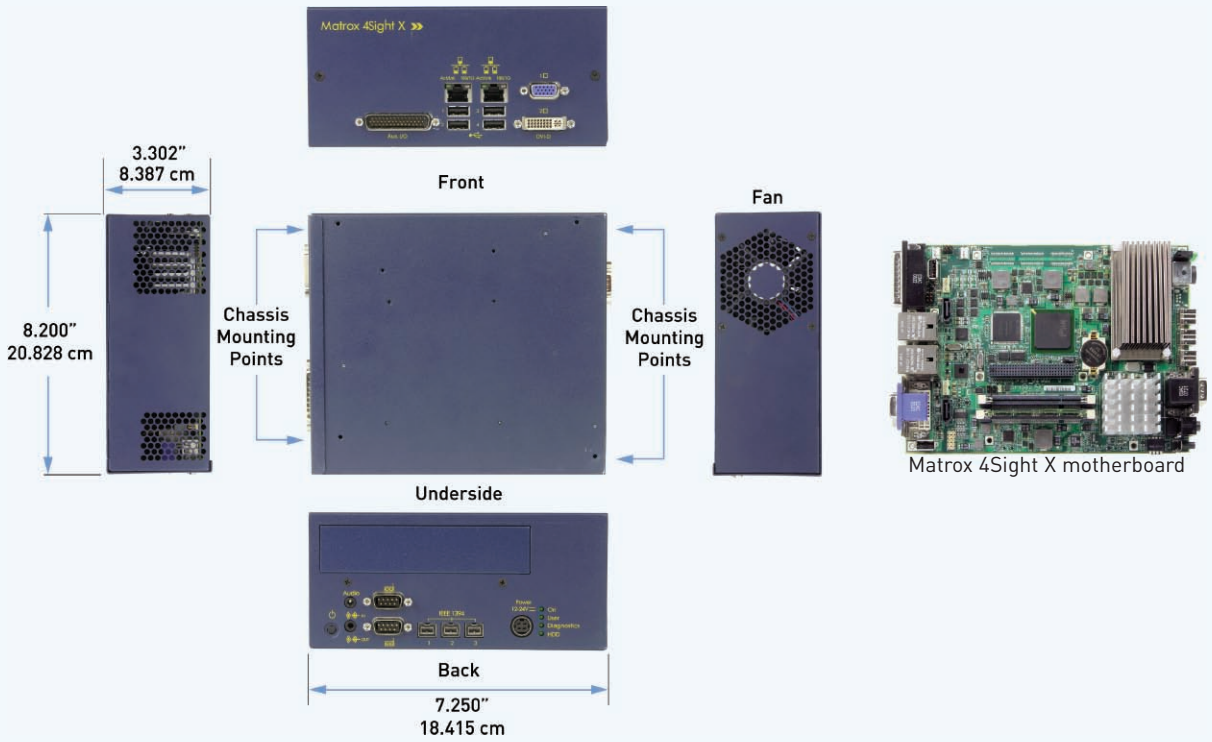
- power consumption
  - 3.3V @ 1.08 A (3.564 W)
  - 5V @ 210 mA (1.05W)
  - 12V @ 80mA (0.96)

Matrox Meteor-II/Multi-Channel

Hardware

- PCI-104 form factor
- conventional PCI 32-bit, 33 MHz host bus interface
- 4 MB of SDRAM
- three (3) channel non-standard analog acquisition
- connect and switch between up to two (2) RGB or up to 6 monochrome sources
- 5 MHz to 30 MHz sampling rate
- 8-bit ADC
- 47 dB SNR
- Pixel jitter of +/- 1.5ns
- Variable gain amplifier
- 10 MHz input low pass filter
- adjustable ADC references
- three (3) 256 x 8-bit look up tables (LUTs)

Matrox 4Sight X chassis and motherboard



Matrox 4Sight X motherboard

Specifications (cont.)

Optional expansion modules (cont.)

Matrox Meteor-II/Multi-Channel (cont.)

Hardware

- two (2) TTL clock outputs
- one (1) TTL Hsync I/O
- one (1) TTL Vsync I/O
- three (3) TTL auxiliary inputs
- four (4) TTL auxiliary outputs
- two (2) Opto-isolated auxiliary inputs

Environmental information

- power consumption
  - 3.3V @ 1.03 A (3.4 W)
  - 5V @ 0.24 A (1.2 W)

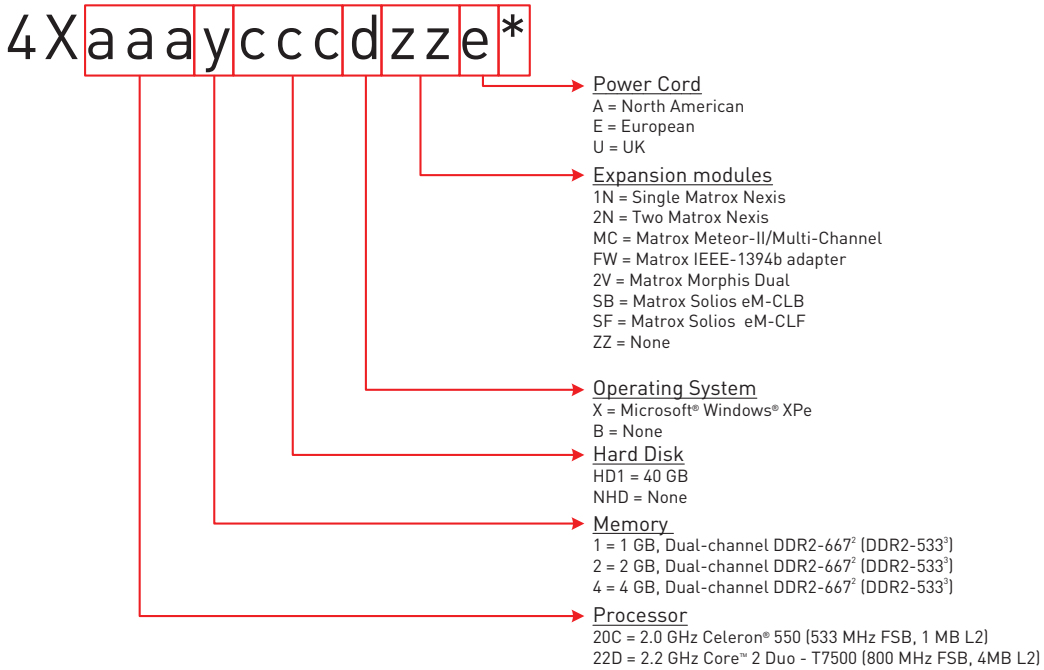
Matrox IEEE-1394b PCI-104 Adapter

Hardware

- PCI-104 form factor
- conventional PCI 32-bit, 33 MHz host bus interface
- two (2) 6-pin IEEE-1394 a/b bilingual ports
- one (1) 6-pin IEEE-1394b port
  - AC coupled for galvanic isolation
- four (4) TTL auxiliary outputs
- four (4) opto-isolated auxiliary inputs

Ordering Information

Hardware



Software

Refer to MIL datasheet.

Contact Matrox Imaging or your local representative for more information.

Notes:
1. Contact Matrox Imaging or your local sales representative for availability.
2. Available for Intel® Core™ 2 Duo processor options.
3. Available for Intel® Celeron® processor options

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