Digital Camera Image Acquisition

NI PCI-1424, NI PCI-1422

NI PCI-1424
- RS422, LVDS, or TTL area- and line-scan camera compatibility
- Full 8-, 10-, 12-, 14-, 16-, 24-, and 32-bit resolution (grayscale or color)
- 50 MHz pixel clock rate with up to 200 MB/s acquisition
- 4 external TTL triggers (digital I/O lines)

NI PCI-1422
- RS422 or LVDS area- and line-scan camera compatibility
- Full 8-, 10-, 12-, 14-, and 16-bit resolution (grayscale or color)
- 40 MHz pixel clock rate with up to 80 MB/s acquisition
- 4 external TTL triggers (digital I/O lines)

Operating Systems
- Windows XP/2000/Me/9x/NT

Recommended Software
- LabVIEW
- Measurement Studio
- NI Vision Development Module
  - NI Vision Assistant

Other Compatible Software
- ANSI C/C++

Driver Software (included)
- NI Vision Acquisition Software



Overview and Applications

The NI PCI-1424 is a digital camera image acquisition board for acquiring color and grayscale images and controlling digital cameras. Designed for high-speed, large-image, high-resolution digital image capture, the board can capture into onboard memory up to 32 bits of data at a clock speed of 50 MHz, for a total acquisition rate of 200 MB/s. Onboard memory (16 to 80 MB) gives you the flexibility to buffer images on the board for large-image capture and sustained real-time throughput. You can choose from two versions of the board – one compatible with digital cameras that use RS422 and another compatible with digital cameras that use LVDS.

The NI PCI-1422 is designed to acquire images from a wide range of digital cameras. These boards perform high-speed, large-image, high-resolution digital image capture and can capture up to 16 bits of data at a clock speed of 40 MHz for a total acquisition rate of 80 MB/s. Onboard memory (16 MB) gives you the flexibility to buffer images on the board for large-image capture and sustained real-time throughput. There are two versions of the board – one compatible with digital cameras that use RS422 signals and another compatible with digital cameras that use LVDS. The PCI-1422 is ideal for both industrial and scientific applications.

Digital Cameras

Digital cameras have several advantages over analog cameras. During transmission, analog video is more susceptible to noise than digital video. Digitizing at the CCD camera, rather than at the image acquisition board, increases the signal-to-noise ratio, resulting in better accuracy. In addition, standard digital cameras now come with 10- to 12-bit gray levels of resolution. The higher resolution is often necessary in medical, machine vision, astronomy, and scientific imaging applications.

Easy Camera Configuration

Configure digital image acquisition from your digital camera with NI Measurement & Automation Explorer (MAX), which is delivered with NI Vision Acquisition Software. This configuration utility is an interactive tool for setting up region of interest and camera control. Plus, you can use MAX to control the serial interface for communicating with the camera. Both the PCI-1422 and PCI-1424 use a 100-pin SCSI-type connector that you can easily cable to your specific camera. In addition, MAX includes specific camera setup files, so you can quickly configure your camera for acquisition. For a list of applicable cameras, visit **ni.com/camera**.

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Digital Camera Image Acquisition

Digital Image Acquisition

The PCI-1424 can acquire four channels of 8-bit data; two channels of 10-, 12-, 14-, or 16-bit data; or one channel of 24- or 32-bit data. The PCI-1422 can acquire two channels of 8-bit data or one channel of 10-, 12-, 14-, or 16-bit data.

These boards have a serial interface and four TTL or differential digital control lines for camera control. You can also use the adjustable onboard region of interest (ROI) window to minimize the amount of data transferred to PC memory.

Digital Transfer Rates

The base memory configuration for the PCI-1424 is 16. You can use onboard memory to buffer large images before transferring them to PC memory, which increases the overall throughput. The PCI-1422 can acquire data into onboard memory at a rate of up to 80 MB/s and transfer data to PC memory at a rate of 100 MB/s. The PCI-1424 can acquire data at 200 MB/s into onboard memory.

Onboard Image Preparation

The PCI-1424 has four 8-bit or two 16-bit lookup tables (LUTs) for mapping the data from one value to another in real time. The PCI-1422 has two 8-bit or one 16-bit LUT(s) for mapping the data from one value to another in real time.

In addition, setting a rectangular ROI window reduces the overall data across the PCI bus because the pixels outside the ROI are not transferred. You can reduce the amount of data transferred across the PCI bus by scaling or decimating the data in hardware. You can scale the image by keeping every second, fourth, or eighth pixel.

Digital I/O

Four general-purpose, bidirectional TTL digital I/O lines are available for triggering image acquisition.

PCI-1424 Signaling

The RS422/TTL version of the PCI-1424 can drive and receive either TTL or RS422 level signals. The driver software can access these signal levels independently for data, control, and enable lines on the 100-pin connector. The LVDS (also known as EIA-644) version can drive and receive LVDS and TTL signals. The benefits of LVDS include less power consumption, longer cable lengths, less noise, and higher clock rates.

NI PCI-1422 Signaling

One version of the PCI-1422 can receive RS422 data signals. It can also drive and receive RS422 or TTL control and enable signals. NI Vision Acquisition Software can access these signal levels independently for data, control, and enable lines on the 100-pin connector. Another version of the PCI-1422 is capable of receiving data from LVDS cameras. LVDS, also known as EIA-644, is a low-voltage differential signal protocol similar to RS422 but with lower voltage levels.

Multiple-Channel Data Formatter

The multiple-channel data formatting circuitry is fully programmable, so you can simultaneously acquire from multiple channels to build up to the complete image.

Advanced Clock Generation

The PCI-1424 has two clock outputs for generating a frequency from 500 kHz up to 50 MHz for digital cameras that require an external clock. The PCI-1422 has two clock outputs for generating a frequency from 500 kHz up to 40 MHz.

RS232 Serial Interface

RS232 serial lines are available on the 100-pin connector to control digital cameras that have a serial interface.

Camera Cables

National Instruments offers 2 m cables for digital cameras, including models by Basler, DALSA, Hamamatsu, Roper Scientific, and Pulnix. Extension cables are also available (see the cable section). Contact National Instruments for additional cabling options or visit **ni.com/camera**.

Advanced Triggering to Work with DAQ and Motion

NI vision products are designed to work with National Instruments data acquisition (DAQ) and motion products. The RTSI bus on the PCI-1422 and PCI-1424 routes timing and triggering signals between boards. The buses can synchronize video acquisition between several image acquisition devices or between image acquisition, data acquisition, and motion control devices.

I/O Connector Signals

The 100-pin SCSI connector connects to all digital video data inputs, digital enable inputs, camera control outputs, RS232 serial interfaces, and the external trigger signals.

Digital Trigger Accessory

The NI D2504-1, which has four BNC connectors for digital trigger lines, is for use with National Instruments digital camera cables.

Ordering Information

NI PCI-1424

PCI-1424 RS422/TTL 777662-01

PCI-1424 LVDS/TTL 777662-02

Includes PCI-1424 board and NI Vision Acquisition Software for Windows XP/2000/Me/9x/NT.

Digital Trigger Accessory

NI D2504-1 (1 m) 185298-01

Accessories

100-pin to 100-pin extension cable

2 m 184743-02

4 m 184743-04

Memory Upgrades

32 MB 920130-32

64 MB 920130-64

BUY NOW

For complete product specifications, pricing, and accessory information, call 800 813 3693 (U.S.) or go to **ni.com/info** and enter **pci1424**.

Ordering Information

NI PCI-1422

PCI-1422 RS422/TTL 777662-01

PCI-1422 LVDS/TTL 777662-02

Includes PCI-1422 board and NI Vision Acquisition Software for Windows XP/2000/Me/9x/NT.

Digital Trigger Accessory

NI D2504-1 (1 m) 185298-01

Accessories

100-pin to 100-pin extension cable

2 m 184743-02

4 m 184743-04

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Specifications

Specifications subject to change without notice.

NI PCI-1424

External Connections

Trigger sense	TTL
Trigger level	Programmable (rising or falling)
Pixel clock sense	LVDS or RS422 selectable (TTL or differential)
Pixel clock level	Programmable (rising or falling)
Enable sense	LVDS or RS422 selectable (TTL or differential)
Enable level	Programmable (rising or falling)
Master clock drive	LVDS or RS422 selectable (TTL or differential)
Master clock level	Rising edge
Control signal drive	LVDS or RS422 selectable (TTL or differential)
Control signal level	Programmable (rising or falling)
Video data sense	LVDS or RS422 selectable (TTL or differential)

Clocks

Master clock frequency range	500 kHz to 50 MHz
Pixel clock frequency range	500 kHz to 50 MHz

PCI Master Performance

Ideal	133 MB/s
Sustained	100 MB/s

Power Requirements

+5 VDC (±5%)	2.135 A
+12 VDC (±5%)	25 mA
-12 VDC (±5%)	20 mA

Physical

Dimensions	
PCI	11.4 by 33.6 cm (4.5 by 13.2 in.)

Environment

Operating temperature	0 to 50 °C
Storage temperature	-25 to 70 °C
Relative humidity	10 to 40% noncondensing

NI PCI-1422

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Trigger sense	TTL
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Safety Compliance

- IEC 61010-1, EN 61010-1
- UL 61010-01, CSA 61010-1

Electromagnetic Compatibility

- EN 61326 (IEC 61326): Class A emissions; Basic immunity
- EN 55011 (CISPR 11): Group 1, Class A emissions
- AS/NZS CISPR 11: Group 1, Class A emissions
- FCC 47 CFR Part 15B: Class A emissions
- ICES-001: Class A emissions

CE Compliance

This product meets the essential requirements of applicable European Directives, as amended for CE marking, as follows:

- 2006/95/EC; Low-Voltage Directive (safety)
- 2004/108/EC; Electromagnetic Compatibility Directive (EMC)

Refer to the Declaration of Conformity (DoC) for this product for any additional regulatory compliance information. To obtain the DoC for this product, visit **ni.com/certification**, search by model number or product line, and click the appropriate link in the Certification column.

Waste Electrical and Electronic Equipment (WEEE)

EU Customers: At the end of their life cycle, all products must be sent to a WEEE recycling center. For more information about WEEE recycling centers and National Instruments WEEE initiatives, visit **ni.com/environment/weee.htm**.

NI Services and Support



NI has the services and support to meet your needs around the globe and through the application life cycle – from planning and development through deployment and ongoing maintenance. We offer services and service levels to meet customer requirements in research, design, validation, and manufacturing.
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Training and Certification

NI training is the fastest, most certain route to productivity with our products. NI training can shorten your learning curve, save development time, and reduce maintenance costs over the application life cycle. We schedule instructor-led courses in cities worldwide, or we can hold a course at your facility. We also offer a professional certification program that identifies individuals who have high levels of skill and knowledge on using NI products.
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Professional Services

Our NI Professional Services team is composed of NI applications and systems engineers and a worldwide National Instruments Alliance Partner program of more than 600 independent consultants and integrators. Services range from start-up assistance to turnkey system integration. Visit **ni.com/alliance**.

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OEM Support

We offer design-in consulting and product integration assistance if you want to use our products for OEM applications. For information about special pricing and services for OEM customers, visit **ni.com/oem**.

Local Sales and Technical Support

In offices worldwide, our staff is local to the country, giving you access to engineers who speak your language. NI delivers industry-leading technical support through online knowledge bases, our applications engineers, and access to 14,000 measurement and automation professionals within NI Developer Exchange forums. Find immediate answers to your questions at **ni.com/support**.

We also offer service programs that provide automatic upgrades to your application development environment and higher levels of technical support. Visit **ni.com/ssp**.

Hardware Services

System Assurance Programs

NI system assurance programs are designed to make it even easier for you to own an NI system. These programs include configuration and deployment services for your NI PXI, CompactRIO, or Compact FieldPoint system. The NI Basic System Assurance Program provides a simple integration test and ensures that your system is delivered completely assembled in one box. When you configure your system with the NI Standard System Assurance Program, you can select from available NI system driver sets and application development environments to create customized, reorderable software configurations. Your system arrives fully assembled and tested in one box with your software preinstalled. When you order your system with the standard program, you also receive system-specific documentation including a bill of materials, an integration test report, a recommended maintenance plan, and frequently asked question documents. Finally, the standard program reduces the total cost of owning an NI system by providing three years of warranty coverage and calibration service. Use the online product advisors at **ni.com/advisor** to find a system assurance program to meet your needs.

Calibration Services

NI recognizes the need to maintain properly calibrated devices for high-accuracy measurements. We provide manual calibration procedures, services to recalibrate your products, and automated calibration software specifically designed for use by metrology laboratories. Visit **ni.com/calibration**.

Repair and Extended Warranty

NI provides complete repair services for our products. Express repair and advance replacement services are also available. We offer extended warranties to help you meet project life-cycle requirements. Visit **ni.com/services**.

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