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Find the *National Instruments PCIe-8255R* at our website: *Click HERE*

IEEE 1394 Image Acquisition with Digital I/O

NI PCI-8254R, NI PCIe-8255R *NEW!*

- 2 IEEE 1394a camera inputs
- 400 Mb/s image data transfer
- 29 TTL and isolated DIO lines
  - 15 input, 14 output
- Reconfigurable DIO with LabVIEW FPGA

Operating Systems

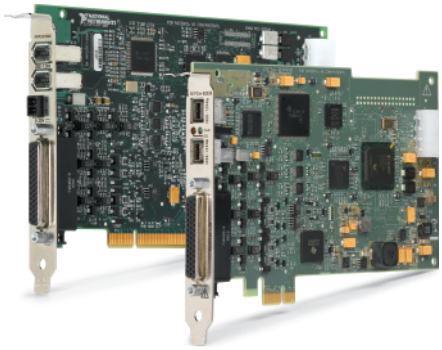
- Windows XP/2000

Recommended Software

- LabVIEW and the NI Vision Development Module
- Vision Builder AI

Driver Software

- NI Vision Acquisition software (included)



Overview

With the National Instruments 825xR image acquisition boards, you can build machine vision systems that trigger and synchronize two or more IEEE 1394 cameras without requiring additional digital I/O boards or custom circuitry. The NI PCI-8254R has 400 Mb/s of bandwidth and two direct-connect IEEE 1394a ports that share that bandwidth. The NI PCIe-8255R has 800 Mb/s of bandwidth shared between two direct-connect IEEE 1394b ports (IEEE 1394a cameras are compatible with a converter cable). Both of these boards feature NI reconfigurable I/O (RIO) technology and include all the digital I/O you need for industrial control and communication.

About IEEE 1394

IEEE 1394 is a PC bus standard ideally suited for machine vision. Any IEEE 1394 camera that complies with the DCAM (or IIDC) standard works with the National Instruments Vision Acquisition driver. With digital image quality, simple cabling, standard software, and a lower cost, IEEE 1394 cameras are quickly replacing analog cameras in machine vision applications. Today, there are more than 300 industrial IEEE 1394 cameras available from nearly every major vision company.

Vision Acquisition Software

NI Vision Acquisition software offers a mobile, easy-to-use solution for acquiring images from IEEE 1394 cameras. The driver software integrates with NI Measurement & Automation Explorer, so you can easily configure your camera. You also can quickly set up your system by connecting an IEEE 1394 camera to your computer and immediately begin acquiring images. With a set of easy-to-use functions, you can quickly create applications in National Instruments LabVIEW, C/C++, or Visual Basic. Vision Acquisition software is compatible with IIDC-compliant cameras. You can connect a maximum of 16 cameras to your board and acquire from each one. Advanced functionality includes the ability to query the camera for onboard parameters and to change programmatic parameters programmatically. Vision Acquisition is also compatible with Camera Link, analog, GigE, and parallel digital cameras (through compatible NI hardware), so you can use programs written for NI 825xR boards with a wide range of cameras without major changes to your code.

Onboard Digital I/O

The NI 825xR series has 15 digital input lines – 13 isolated 24 V lines and two dedicated TTL lines. There are also 14 digital output lines – four isolated 24 V and 10 dedicated TTL. You can access all 29 digital lines for synchronizing vision components such as cameras, triggers, and lights. You also can use quadrature encoder inputs, product selection lines, and general-purpose digital I/O for communicating with actuators, PLCs, and NI programmable automation controllers (PACs).

Reconfigurable I/O

As with the Compact Vision System, you can extend the NI 825xR functionality with NI RIO technology. Using the NI LabVIEW FPGA Module, you can customize all 29 digital I/O lines to perform a wider variety of packaging inspection, assembly verification, and robot control applications.

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Multicamera Inspection

NI 825xR boards provide a low-cost way to inspect from several angles. With two IEEE 1394 ports, you can directly connect two cameras to a board with ease. You can connect up to 16 IEEE 1394 cameras to each board with the addition of an IEEE 1394 hub.

IEEE 1394 is a standard bus, which means you have a wide variety of cameras that can connect to NI 825xR boards. From the more than 300 cameras available to complete your application, your choices range from a low-cost, low-resolution sensor to a high-performance sensor. There are also specialty cameras such as infrared and linescan. To find a complete list of cameras, visit the NI Camera Advisor at **ni.com/camera**. In addition, as new, improved industrial IEEE 1394 cameras enter the marketplace, you can upgrade your system with the latest cameras without changing the image acquisition board or your software.

Choice of Sensor

By using IEEE 1394 image acquisition, the NI 825xR boards help you use the sensor that is right for your application. You can choose from more than 300 cameras to complete your application, from a low-cost, low-resolution sensor to a high-performance sensor. There are also IEEE 1394 specialty cameras such as infrared and linescan. To find a complete list of cameras, visit the NI Camera Advisor at **ni.com/camera**. In addition, as new, improved industrial IEEE 1394 cameras enter the marketplace, you can upgrade your system with the latest cameras without changing the image acquisition board or your software.

Ordering Information

NI PCIe-8255R 779679-01
NI PCI-8254R 779303-01
Includes Vision Acquisition software.

Cables

IEEE 1394b to 1394b, 4 m 196283-04
IEEE 1394a to 1394a, 4 m 196284-04

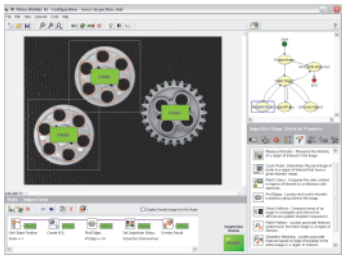
BUY NOW!

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

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Software – Configure or Program

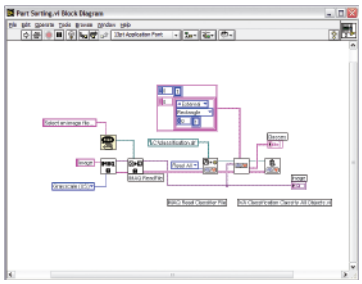
Vision Builder for Automated Inspection



National Instruments Vision Builder for Automated Inspection (AI) is a configurable machine vision development environment that requires no programming. With the NI Vision Builder AI, you can:

- Build, benchmark, and deploy complete machine vision applications without programming
- Configure more than 40 powerful machine vision tools including geometric matching, OCR, and particle analysis
- Acquire and process images with any NI frame grabber, more than 300 IEEE 1394 cameras, or the NI Compact Vision System
- Communicate triggering and inspection results directly to NI M Series DAQ devices or to industrial devices over serial and Ethernet protocols

LabVIEW Real-Time Vision Development Kit



The National Instruments LabVIEW Real-Time Vision Development Kit includes all the software you need to program a real-time machine vision application with LabVIEW. You must purchase LabVIEW separately. The kit includes:

- LabVIEW Real-Time Module
- LabVIEW Application Builder
- NI Vision Development Module

The NI Vision Development Module is a library of image processing and machine vision functions. The NI Vision Development Module includes Vision Assistant, an interactive prototyping environment that generates ready-to-run code.

The NI Vision Development Module delivers:

- Hundreds of image processing functions including pattern and geometric matching, OCR, bar code readers, object classification, and particle analysis
- Tools to enhance images, check for presence, locate features, identify objects, and gauge parts
- Fast application prototyping and code generation with Vision Assistant
- Subpixel accuracy down to 1/10 of a pixel and 1/10 of a degree

Cameras and Camera Accessories

NI vision accessories are compatible with any DCAM-compliant IEEE 1394 camera. To find an IEEE 1394 that fits your application, visit the Camera Advisor at **ni.com/camera**. To simplify purchases, National Instruments provides a few IEEE 1394 cameras that address many applications.



High-Speed Camera



Basler A601F, IEEE 1394, 640x480,
60 FPS 778785-01
Trigger cable for Basler
600 series cameras 190264-01

Additional Camera Cables

IEEE 1394 cable, 2.0 m 185797-02
IEEE 1394 cable with jackscrews 778796-01
Trigger cable for Prosilica cameras 763422-01

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Digital I/O Accessories

SMB Trigger Cable (CVS only) 763422-01
Cable with female SMB connectors at both ends that you can use to trigger certain Prosilica cameras.

SMB to BNC Trigger Cable (CVS only) 763422-01
Cable with female SMB connector at one end and a BNC at the other that you can use to trigger certain Sony cameras.



Terminal Block and Prototyping Accessory 779166-01
Terminal block you can use to prototype and troubleshoot digital I/O for the Compact Vision System and the NI 825xR image acquisition boards. A demo mode can simulate triggers, encoder inputs, and product selection lines. Outputs are displayed with LEDs.

Terminal Block – Vertical 778791-01

Terminal Block – Horizontal 778790-01

Compact Vision System Mounting

Panel and DIN-Rail Mount Kit 189154-01

Power Supply

NI 1450 Power Supply, 24 V, 50 W 778794-01
Includes Compact Vision System power connector that you can use to power the isolated input of the NI 825xR boards.

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Specifications

These specifications are typical at 25 °C, unless otherwise stated.

Power Requirements

IEEE 1394 bus power[1] ..... 18 W, maximum (shared by both ports)
Isolated supply[2] ..... 5 to 30 VDC
Camera interface
PCI-8254R..... IEEE 1394a
NI PCIe-8255R.....IEEE 1394b

[1]The bus power specification assumes that power is provided to the NI 825xR boards from the host computer power supply via the ATX power connector. If power is not supplied through this connector, camera power is supplied by the PCI bus and should be limited to 5 W, shared by both ports.

[2] Do not draw more than 500 mA combined from the Viso pins on the 44-pin D-Sub connector. Do not draw more than 100 mA from 30 V isolated outputs. Do not draw more than 50 mA from 5 V isolated outputs.

TTL Inputs and Outputs

Digital logic levels ..... Refer to Table

Level	Minimum	Maximum
Input low voltage (VIL)	0 V	0.5 V
Input high voltage (VIH)	2.2 V	5 V
Output low voltage (VOL), at 5 mA	–	0.4 V
Output high voltage (VOH), at 5 mA	2.4 V	–

Table 1. Digital Logic Levels

Optically Isolated Inputs and Outputs

Isolated (Current Sinking) Inputs

Number of channels..... 13
Input voltage range..... 0 to 30 V
Input ON voltage..... 3.5 to 30 V
Input OFF voltage ..... 0 to 2 V
Turn-on current..... 7.1 mA, typical; 14 mA, maximum
Maximum pulse rate..... 100 kHz
Minimum pulse detected..... 10 µs
Reverse polarity protection..... Yes, -30 V

Isolated (Current Sourcing) Outputs

Number of channels..... 4
On-state voltage range ..... 5 to 30 V, maximum
Maximum on-state voltage drop from V..... 1.2 V at 100 mA

Output Current

5 V isopower ..... 50 mA, maximum
24 V isopower ..... 100 mA, maximum
30 V isopower ..... 100 mA, maximum
Maximum pulse rate..... 10 kHz (maximum load resistance 100 kW)
Minimum pulse generated..... 100 µs
Reverse polarity protection..... Yes

IEEE 1394

Number of ports..... 2
Speed ..... 100, 200, or 400 Mb/s

Physical Characteristics

Dimensions..... 10.7 by 17.5 cm (4.2 by 6.9 in.)
Weight..... 114 g (4.0 oz)

Environment

The NI 825xR boards are intended for indoor use only.
Operating temperature ..... 0 to 55 °C
Storage temperature..... -20 to 70 °C
Relative humidity ..... 5 to 90%, noncondensing
Pollution degree..... 2

Caution *Do not use NI 825xR boards for connection to signals within Measurement Categories II, III, or IV.*

Measurement Category I
Approved at altitudes up to 2,000 m.

Safety

NI 825xR boards are designed to meet the requirements of the following standards of safety for electrical equipment for measurement, control, and laboratory use:

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

Note *For UL and other safety considerations, refer to the product label, or visit* **ni.com/certification**, *search by model number or product line, and click the appropriate link in the Certification column.*

Electromagnetic Compatibility

Emissions ..... EN 55011 Class A at 10 m
FCC Part 15A above 1 GHz
Immunity..... EN 61326:1997 + A2:2001, Table 1 CE, C-Tick, and FCC Part 15 (Class A) Compliant

Note *For EMC compliance, operate this device with shielded cabling.*

CE Compliance CE

This product meets the essential requirements of applicable European Directives, as amended for CE marking, as follows:
Low-Voltage Directive (safety) 73/23/EEC

Electromagnetic Compatibility

Directive (EMC) 89/336/EEC

Note *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.*

Note *NI 825xR boards may experience temporary data interruption if exposed to electrostatic discharge (ESD).*

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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. Visit **ni.com/services**.

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. Visit **ni.com/training**.

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Our Professional Services Team is composed of NI applications engineers, NI Consulting Services, 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

NI Factory Installation Services

NI Factory Installation Services (FIS) is the fastest and easiest way to use your PXI or PXI/SCXI combination systems right out of the box. Trained NI technicians install the software and hardware and configure the system to your specifications. NI extends the standard warranty by one year on hardware components (controllers, chassis, modules) purchased with FIS. To use FIS, simply configure your system online with **ni.com/pxiadvisor**.

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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351477A-01 2006-7305-221-101-D

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