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Full-Configuration Camera Link Image Acquisition

NI PCIe-1429

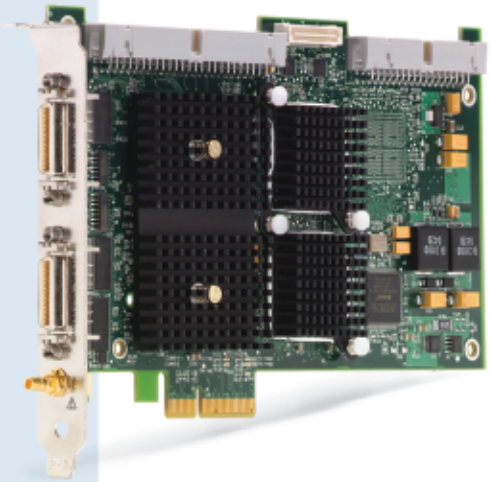
- Image acquisition for base, medium, and full-configuration Camera Link cameras
- Four-lane (x4) PCI Express interface
- Standard Camera Link cabling
- Acquires at the maximum Camera Link rate of 680 MB/s
- Optional digital I/O expansion card for extra triggering and isolation

Operating Systems
- Windows 2000/NT/XP

Recommended Software
- LabVIEW
- Vision Development Module, or Vision Builder for Automated Inspection

Driver Software (included)
- NI-IMAQ 3.1

NEW



Overview

The National Instruments PCIe-1429 is the industry's first PCI Express image acquisition board. With the NI PCIe-1429, you now can acquire images at the highest speeds, resolutions, and bit depths available for Camera Link cameras to perform demanding imaging applications such as synchronized data and image acquisition, fault analysis, and advanced motion tracking.

In the past, acquiring images at high data rates required devices with banks of expensive onboard memory that could acquire images only for short periods of time, or specialized buses such as the PCI 64/66 or PCI-X, for which standard PC chipsets are not available. With Intel's standardization on PCI Express and the NI PCIe-1429 board, you now can acquire at high data rates indefinitely through a standard PC bus.

Camera Link

Camera Link is an industrial high-speed serial data and cabling standard developed by National Instruments, camera vendors, and other image acquisition companies. Created for easy connectivity between the PC and the camera, Camera Link provides simple, flexible cabling for high-speed, high-resolution digital cameras. A Camera Link cable is a slender 26-pin cable with 24-bit data, clock, and enable as well as control signals. You can control camera functionality by asynchronous serial control or LVDS differential lines through a Camera Link cable.

Camera Link comes in three configurations – base, medium, and full. The base configuration uses three 8-bit taps, or input channels, to acquire up to 24 bits of data at a rate of 340 MB/s. The full configuration offers eight taps and can acquire images up to 680 MB/s.

Digital I/O

Each NI PCIe-1429 image acquisition board includes one trigger line and two Camera Link connectors to work with any base, medium or full-configuration Camera Link camera. Additional I/O lines for advanced triggering, pulse-train outputs and isolated DIO also are available with the IMAQ-1000 expansion board. With the four-lane PCI Express configuration of the NI PCIe-1429, engineers and scientists can acquire at the full Camera Link bandwidth of 680 MB/s. In addition, they can synchronize other data acquisition measurements with each acquired image to analyze activities frame by frame in data-intensive applications such as crash tests.

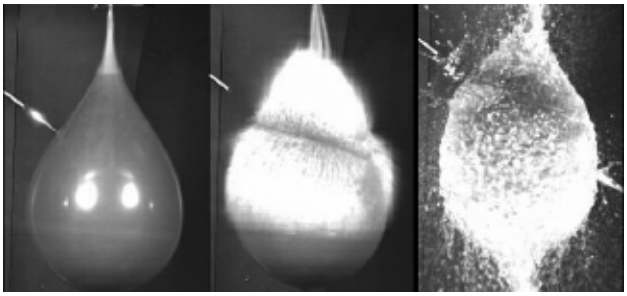


Figure 1. Images Acquired at 1,000 Frames/s with a Basler A504 High-Speed Camera.

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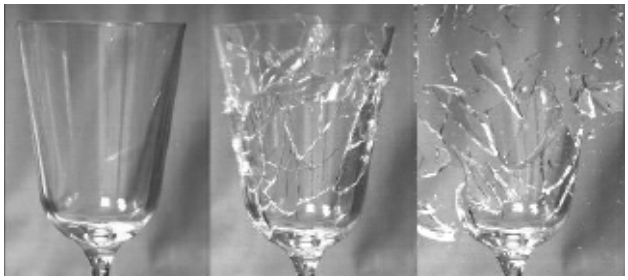
Full-Configuration Camera Link Image Acquisition

Applications

The NI PCIe-1429 is ideal for many industrial, life science, and biomedical imaging applications. For instance, engineers and scientists can use the board to perform fault analysis by setting up a stop trigger to record images before and after an event on the factory floor. They can also use high-speed imaging to perform particle image velocimetry, track the movement intricacies in gait analysis or measure the stimulus responses in heart valves or eye corneas.



About PCI Express

PCI Express is a high-performance, point-to-point serial interconnect that improves PCI by providing scalable bus bandwidth. PCI Express features a layered model that offers backward compatibility with existing PCI applications at the OS level. The NI PCIe-1429 board will be available in January 2005.

Ordering Information

NI PCIe-1429 779191-01

BUY ONLINE!

Specifications

These specifications are not final. These specifications are typical at 25 °C, unless otherwise stated.

External Connections

Number of external trigger I/O lines 1

Additional Digital I/O available with the IMAQ-1000 expansion board.

Trigger input:

Voltage range ..... 0 to 5 V (TTL)
- Input high voltage ..... 2.0 V
- Input low voltage ..... 0.8 V

Polarity ..... Programmable, active-high or active-low

Trigger output:

Voltage range ..... 0 to 5 V (TTL)
- Output high voltage ..... 2.4 V at 15 mA source
- Output low voltage ..... 0.55 V at 10 mA sink

Polarity ..... Programmable, active-high or active-low

Power-on state ..... Input (high-impedance) 22.1 kΩ pull-down

Camera Interface ..... Camera Link 1.1

Clocks

Pixel clock frequency range ..... 20 to 85 MHz

Note The Camera Link specification requires cameras to transmit at a minimum of 20 MHz.[1]

[1] This value corresponds to the post-serialization Camera Link cable transmission rate of 140 to 350 MHz.

PCI Express Interface

PCI Express lanes 4

Serial Interface

Baud rates accepted ..... 300, 600, 1200, 1800, 2000, 2400, 3600, 4800, 7200, or 9600 b/s; 19.2, 38.4, or 56 kb/s

Power Requirements

Voltage ..... +12 V (1.25 A)

Physical

Dimensions ..... 10.7 by 17.5 cm (4.2 by 6.9 in.)

Environment

For indoor use only.
- Operating temperature ..... 0 to 40 °C
- Storage temperature ..... –20 to 70 °C

Safety

The NI PCIe-1429 is proposed to meet the requirements of the following standards for safety and electrical equipment for measurement, control, and laboratory use:
- EN 61010-1, IEC 61010-1
- UL 3111-1
- CAN/CSA C22.2 No. 1010.1

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

CE, C-Tick, and FCC Part 15 (Class A) Compliant

Emissions .....EN 55011 Class A at 10 m; FCC Part 15A above 1 GHz

Immunity ..... EN 61326: 1997/ A2:2001, Table 1

Note: For EMC compliance, operate this device with shielded cabling. In addition, all covers and filler panels must be installed. 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.

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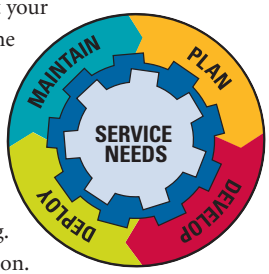

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