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Find the *National Instruments 183882A-02* at our website: ***Click HERE***

Four-Channel Monochrome Image Acquisition

NI PCI-1410

- Up to 4 standard or nonstandard video sources
- 8 or 10-bit digitization
- Compatible with double-speed 60 frames/s progressive scan cameras
- Interlaced/noninterlaced acquisition
- Analog area and line-scan capabilities
- Unlimited acquisition window size with 16 MB of onboard memory
- 4 external triggers/digital I/O lines

Operating Systems

- Windows 2000, NT, XP

Recommended Software

- LabVIEW
- Measurement Studio
- LabWindows/CVI
- Vision Development Module
- Vision Builder AI

Other Compatible Software

- C/C++
- Visual Basic

Measurement Services Software (included)

- NI-IMAQ



Overview and Applications

For acquiring high-resolution, measurement-quality images from standard and nonstandard analog cameras, the National Instruments PCI-1410 image acquisition board offers quick and easy configuration. NI PCI-1410 boards have high-resolution, 10-bit digitization for cameras that offer 60 dB dynamic range. In addition, you can easily configure the PCI-1410 to work with standard monochrome cameras (RS170 or CCIR), slow or variable-rate pixel-clock cameras, double-speed progressive-scan cameras, and analog line-scan cameras.

Measurement-Quality Image Acquisition with Calibration

The PCI-1410 is gain-calibrated and delivered with a calibration certificate. Calibration ensures repeatable, consistent image acquisition for your machine vision and scientific imaging applications.

Variable Scan and Nonstandard Video

With PCI-1410 boards, you can acquire images from nonstandard video, such as analog line-scan and variable-scan devices with pixel clocks that range from 2 to 40 MHz. The PCI-1410 device works with double-speed (60 frames/s) progressive-scan or noninterlaced monochrome cameras from vendors such as Sony and JAI PULNiX.

10-Bit Image Acquisition

Many high-resolution analog monochrome cameras have dynamic range greater than 48 dB, which means that the camera has resolution capabilities greater than 8 bits or 256 gray scales. For these high-resolution cameras, you should use an image acquisition board that offers comparable or greater resolution. The PCI-1410 works with the highest-quality monochrome cameras and delivers up to 60 dB of dynamic range, which corresponds to 10 bits or 1,024 gray scales. With the PCI-1410, you can acquire in 8-bit or 10-bit mode at very high rates, such as 60 frames/s with double-speed progressive-scan cameras.

Quick and Easy Camera Configuration

You can easily configure standard and nonstandard video capture with NI Measurement & Automation Explorer, delivered with NI-IMAQ. This utility is an interactive tool for setting the camera type (RS170, CCIR, NTSC, and PAL), programmable ROI, aspect ratio, and antichrominance filter. Use this interactive utility to set up acquisition from noninterlaced progressive-scan cameras and to create your own camera configurations for nonstandard video.

Image Acquisition Performance Gains with Partial Image Scanning

For improved throughput and processing bandwidth, the acquisition and ROI control circuitry monitors the incoming video signal and routes the active pixels to the FIFO. In addition to digitizing an entire frame, the PCI-1410 can perform pixel and line scaling (decimation) and ROI acquisition. With pixel and line scaling, you can transfer multiple (2, 4, or 8) pixels and/or lines to the PCI bus. Using ROI acquisition, you select an area in the acquisition window to transfer to the PCI bus.

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Hardware

Scatter-Gather DMA Controllers

The PCI-1410 has three independent onboard DMA controllers. The DMA controllers can transfer data between the host memory and the onboard FIFO via the PCI bus. Each of these controllers performs scatter-gather DMA, which means the DMA controller can reconfigure on the fly, and thus perform continuous image transfers to either contiguous or fragmented buffers.

Onboard Memory

The PCI-1410 has 16 MB of onboard memory used to temporarily store the image being transferred to the PCI bus. With 16 MB, you can buffer large images during image acquisition.

DAQ Synchronization

The RTSI bus provides a flexible synchronization scheme between any National Instruments IMAQ, DAQ, or motion device and your PCI-1410.

Trigger Control and Mapping Circuitry

The trigger control and mapping circuitry routes, monitors, and drives the external and RTSI trigger bus lines. You can configure each of these lines to start or stop acquisition on a rising or falling edge, or use each line as digital I/O. You also can map the lines to onboard status values (CSYNC, Acquisition in Progress, and Acquisition Complete).

Antichrominance and Lowpass Filter

The PCI-1410 has an antichrominance filter, which can remove chrominance information from a color video signal. There are two software selectable antichrominance filters – one for NTSC color-coded signals (a 3.58 MHz notch filter), and another for PAL color-coded signals (a 4.43 MHz notch filter). Use the lowpass filter at 9 MHz to remove unwanted noise.

10-Bit A/D and Look-Up Table (LUT)

An A/D converter performs the image digitization, the result of which passes to a 1,024 by 10 RAM LUT. You can configure the LUT to implement simple imaging operations, such as gamma manipulation, contrast enhancement, data inversion, or any nonlinear transfer function.

Programmable Gain and Offset

The PCI-1410 has programmable gain and offset circuitry for optimizing the input signal range.

Digital I/O

The PCI-1410 includes four general-purpose digital input/output lines for general-purpose triggering and pulse generation. In addition, each PCI-1410 includes four digital output lines for lighting, shutter, camera control, and pulse generation.

BNC Connector

The BNC connector supplies an immediate connection to the VIDEO0 input of the PCI-1410. Use the 2 m BNC cable shipped with an PCI-1410 to connect a camera to VIDEO0. You can configure the BNC connector only for RSE mode.

Cable Accessories

The IMAQ-A6822 cable provides 22 BNC connectors to all video signals (VIDEO0, VIDEO1, VIDEO2, and VIDEO3), the external digital I/O lines and triggers, and external signals. The IMAQ-A6804 provides four bus connectors to three video signals and one trigger line. The IMAQ SCB-68 provides access to all of the signals on an PCI-1410 device 68-pin connector.

Warranty and Support Services

As a complement to your image acquisition product, consider FREE technical support through worldwide applications engineers,Web resources, and Premier Support at **ni.com/support**.

Ordering Information

NI PCI-1410 779209-01
Includes hardware, NI-IMAQ software, and a 2 m NI-BNC cable

Cables

IMAQ-A6822 (1 m) 778135-01
IMAQ-A6804 187805-01
IMAQ-BNC-1 (2 m) 183882-02
IMAQ SCB-68 778410-01

RTSI Bus Cables

2 boards.....776249-02
3 boards.....776249-03
4 boards.....776249-04
5 boards.....776249-05

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Four-Channel Monochrome Image Acquisition

Specifications

Typical for 25 °C unless otherwise stated

Available Formats

RS170/NTSC	30 frames/s interlaced
CCIR-601/PAL	25 frames/s interlaced
Progressive scan	60 frames/s noninterlaced maximum
Variable scan	2 to 40 MHz pixel clock

Video Input

Quantity	4 monochrome
Video 0	Single-ended (BNC)
Video (0:3)	Single-ended or differential (D-Sub)
Input impedance	75 Ω ± 1%
Bandwidth	Typical 30 MHz (-3 dB)
Input range (black and white)	700 MV (calibrated) or 50 mV to 1.4V (variable gain)
Antichrominance filter	Programmable 3.58 MHz notch filter (<-25 dB) 4.43 MHz notch filter (<-25 dB)

A/D Conversion

Gray levels	256 (8 bits) or 1,024 (10 bits)
DNL	±1 LSB maximum
RMS noise	< 0.5 LSB rms
SNR	Typical 56 dB
Sampling rate	2 to 40 MHz

External Synchronization and Trigger Signals

Trigger lines	4
Trigger sense	TTL
Trigger polarity	Programmable (rising or falling)
PCLKIN sense	Selectable (TTL or RS422)
PCLKIN polarity	Programmable (direct or invert)
HSYNCIN sense	Selectable (TTL or RS422)
HSYNCIN polarity	Programmable (rising or falling)
VSYNCIN sense	Selectable (TTL or RS422)
VSYNCIN polarity	Programmable (rising or falling)
CSYNCIN sense	Selectable (TTL or RS422)
CSYNCIN level	Programmable (rising or falling)
Pulse width	20 ns minimum detectable
VIH (TTL)	2 V
VIL (TTL)	0.8 V

Pixel Clock

Internally generated	
Frequency range	2 to 40 MHz
Adjustable pixel aspect ratio	
RS-170/NTSC	±5%
CCIR/PAL	±5%
Pixel jitter	<5 ns
Lock time	<1 frame
External PCLK frequency range	2 to 40 MHz

Power Requirements

+5 VDC (±5%)	1.25 A
+12 VDC (±5%)	<100 mA
–12 VDC (±5%)	<100 mA

Physical

Dimensions	
PCI	10.7 by 17.5 cm (4.2 by 6.9 in.)
PXI	10 by 16 cm (3.9 by 6.3 in.)

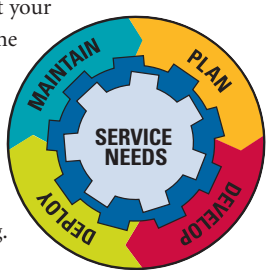
Environment

Operating temperature	0 to 55 °C
Storage temperature	-20 to 70 °C
Relative humidity	5 to 90%, noncondensing

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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.

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