

Machine Vision Cameras for IEEE 1394

Basler Scout Series for IEEE 1394 **NEW!**

Camera Features

- Machine vision cameras by Basler Vision Technologies
- High-speed IEEE 1394b interfaces
- High-quality Sony CCD sensors
- Easy connection with NI Compact Vision Systems or NI IEEE 1394 interfaces
- Resolutions from VGA to 2 megapixels

Recommended NI Software

- Vision Acquisition software¹
- Vision Builder for Automated Inspection (AI)
- Vision Development Module for LabVIEW

Recommended Accessories

- C-mount lens
- NI CVS-1456 Compact Vision System
- IEEE 1394 interfaces with reconfigurable I/O
 - NI PCIe-8255R (IEEE 1394b)
 - NI PCI-8254R (IEEE 1394a)
- NI 8252 interfaces (IEEE 1394a)
- Trigger and I/O cables

Included Accessory

- Tripod mount



¹Not needed if camera is purchased with an NI frame grabber or a development seat of the NI Vision Development Module or NI Vision Builder AI.

Camera	Resolution	Max Frame Rate (at full resolution)	Monochrome/Color	Sensor Size (in.)	Sensor Type	Typical Power Consumption at 12 V (W)
scA640-70fm	659 x 490	70	Monochrome	1/3	Sony ICX424	2.5
scA640-70fc	659 x 490	70	Color	1/3	Sony ICX424	2.5
scA1390-17fm	1392 x 1040	17	Monochrome	1/2	Sony ICX424	2.5
scA1390-17fc	1392 x 1040	17	Color	1/2	Sony ICX424	2.5
scA1600-14fm	1628 x 1236	14	Monochrome	1	Sony ICX424	3

Table 1. IEEE 1394 Camera Model Comparison

Overview

National Instruments offers IEEE 1394 cameras from Basler Vision Technologies. These cameras incorporate the highest-quality Sony CCD sensors with resolutions from VGA to 2 megapixels. Using the higher-bandwidth IEEE 1394b interface, you can achieve full-frame speeds of up to 70 fps. Also, because power is supplied directly over the IEEE 1394 cable, you do not need an external power supply. With a small, rugged design, these cameras offer easy integration into your machine vision systems for industrial applications. Basler cameras are thoroughly checked for quality and calibrated for consistent performance and reliability. In addition, they are compatible with NI vision hardware and NI Vision Acquisition software.

Basler Hardware and NI Software

Basler scout cameras offered by National Instruments are tested with NI IEEE 1394 frame grabbers and NI Vision Acquisition software to ensure smooth integration. NI Vision Acquisition software includes all the functions for enumerating and setting up the camera's capabilities, such as programmable shutter speed. It also provides a single API to

support all IEEE 1394 and GigE Vision cameras. By using NI Vision Acquisition software functions, you can acquire and save images from IEEE 1394 or GigE Vision cameras without changing your program, therefore reducing your development time. You can easily integrate these IEEE 1394 cameras into systems using an NI Compact Vision System or an NI IEEE 1394 interface. With Basler cameras and NI Vision Acquisition software, National Instruments provides all the tools you need for your machine vision applications.

IEEE 1394 Benefits

The IEEE 1394 specification defines a high-performance serial bus that offers the high bandwidth required for machine vision cameras. Due to the bandwidth advantages of IEEE 1394, it is now a widespread standard for vision systems, providing data rates of 400 Mb/s for IEEE 1394a and 800 Mb/s for IEEE 1394b. This bus allows a camera to acquire 640 x 480 images at a frame rate of 200 fps. IEEE 1394 offers power over the cable, giving most cameras the ability to acquire images without the need for an external power source. IEEE 1394 cameras are also plug-and-play devices, making setup quick and easy.

Machine Vision Cameras for IEEE 1394

NI Vision Acquisition Software

You can easily control and configure IEEE 1394 cameras offered by National Instruments using the NI-IMAQdx driver, which is included with NI Vision Acquisition software. NI-IMAQdx is more than just a driver because it features all of the tools you need to acquire, save, and display images from thousands of cameras. The easy-to-use functions and example programs offer quick setup with NI Measurement & Automation Explorer and development of image acquisition applications in NI LabVIEW and LabWindows™/CVI, Visual Studio .NET, ANSI C, or Visual Basic.

- Included with all NI vision hardware, Vision Builder AI, and the Vision Development Module; also sold separately for IEEE 1394 and GigE Vision cameras
- Wide variety of functions for quick development in LabVIEW, LabWindows/CVI, Visual Studio .NET, ANSI C, or Visual Basic
- Detailed example programs
- Compatibility with scout IEEE 1394 and GigE Vision cameras
- NI-IMAQ, NI-IMAQdx, and NI-IMAQ I/O drivers included

Software – Configure or Program



Vision Development Module

This powerful machine vision application development software features hundreds of image processing and machine vision functions for LabVIEW, C/C++, Visual Basic, and .NET.

- 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 the included NI Vision Assistant
- Subpixel accuracy down to 1/10 of a pixel and 1/10 of a degree



Vision Builder for Automated Inspection (AI)

Vision Builder AI is a configurable machine vision development environment that requires no programming. With Vision Builder AI, you can:

- Build, benchmark, and deploy complete machine vision applications without programming
- Configure more than 40 powerful machine vision tools including pattern matching, OCR, and particle analysis
- Create custom user interfaces for display and control purposes
- Host user interfaces on a built-in Web server
- Communicate with industrial protocols over serial and Ethernet

Ordering Information

Basler Scout Cameras for IEEE 1394

scA640-70fc	780880-01
scA640-70fm	779982-01
scA1390-17fc	780881-01
scA1390-17fm	779980-01
scA1600-14fm	780883-01

Image Acquisition Hardware

NI PCI-8252	779024-01
NI PXI-8252	778926-01
NI PCI-8254R	779303-01
NI PCIe-8255R	779679-01
NI CVS-1454	778638-01
NI CVS-1456	778986-01

Accessories

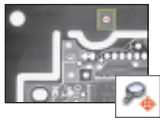
Basler trigger and I/O cable (IEEE 1394b)	779984-01
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BUY NOW!

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

Machine Vision Cameras for IEEE 1394

National Instruments vision software includes hundreds of image processing and analysis functions. A subset of the tools available in the Vision Development Module and Vision Builder AI are shown below.



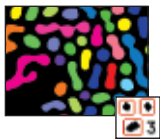
Pattern and Geometric Matching

Learn and locate objects and patterns in your images. The National Instruments patented matching algorithms locate patterns fast with very high accuracy.



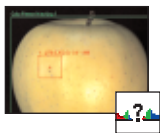
Optical Character Recognition/Verification

NI OCR functions use a trainable OCR algorithm specifically designed to identify and verify all types of fonts, characters, and symbols despite poor and inconsistent image quality.



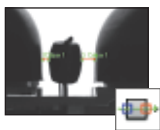
Particle Analysis

Use particle analysis to detect connected regions or groupings of pixels in an image and make selected measurements of those regions. Choose from more than 80 unique measurements that return data in both real-world and pixel values.



Color Inspection

Color matching quantifies which colors and how much of each color exist in a region of an image and uses this information to check if another image contains the same colors in the same ratio.



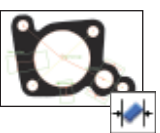
Edge Detection

Use the edge detection tools to identify and locate discontinuities in the pixel intensities of an image. Find edges to align, measure, or detect features in the image.



Object Classification

Classification is a tool for identifying an unknown object by comparing its significant features to a set of features that represent known samples.



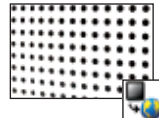
Gauging

Use dimensional measurement or gauging tools to obtain quantifiable, critical distance measurements such as distances, angles, areas, line fits, circular fits, and counts.



Bar Code Reader and Grader

Read 1D bar codes as well as 2D codes like Data Matrix and PDF 417. You can decipher codes applied through ink jets, thermal transfer, laser etching, or dot peen.



Spatial Calibration

Using spatial calibration functions, you can calibrate your image to take accurate, real-world measurements from images, regardless of camera perspective or lens distortion.

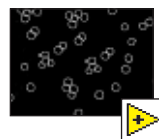
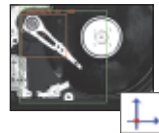


Image Arithmetic and Logic Functions

Operators perform basic arithmetic and logical operations on images. Use operators to add, subtract, multiply, and divide an image with other images or constants.



Coordinate Systems

Set up coordinate systems to ensure that all your measurements move with the object within the field of view.

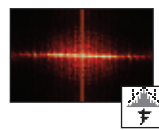


Image Filters and Frequency Analysis

Frequency filters, such as the fast Fourier transform (FFT), alter pixel values with respect to the periodicity and spatial distribution of the variations in light intensity in the image.



Image Segmentation

NI vision software comes with several options to segment and partition images into related components. Segmentation is an important part of many imaging applications that need to extract certain features or objects in order to process them further.



Golden Template Comparison

Find defects in an image by comparing a perfect (golden) sample to all subsequent samples. Golden template comparison detects surface defects, label misprints, and overall quality issues.

Machine Vision Cameras for IEEE 1394

Specifications

Mono/Color	Yes/Yes
Video Output Type (Interface)	IEEE 1394b (screw lock possible)
Video Output Format	Mono 8: 8 bits/pixel Mono 16: 12 bits/pixel YUV 4:2:2: 16 bits/pixel average YUV 2:2:2: (YUYV): 16 bits/pixel average Raw 8: 8 bits/pixel (R, G, or B) Raw 16: 12 bits/pixel (R, G, or B)
Synchronization	Via external trigger, via the IEEE 1394 bus, or free run
Exposure Control	Programmable via the 1394 bus
Power Requirements	8 to 36 VDC; provided via the IEEE 1394 cable; <1% ripple
Lens Mount	C-mount
Housing Size (L by W by H)	73.7 by 44 by 29 mm
Conformity	CE, FCC, DCAM, RoHS, IP 30
I/O Ports	2 optoisolated input ports, 4 optoisolated output ports
GenICam Compatible	Yes
Weight (typical)	150 g

Hardware

779679-01	NI PCIe-8255R IEEE 1394b interface with reconfigurable I/O
779303-01	NI PCI-8254R IEEE 1394a interface with reconfigurable I/O
778926-01	NI PXI-8252 IEEE 1394a interface
779024-01	NI PCI-8252 IEEE 1394a interface
778638-01	NI CVS-1454 compact vision system
778986-01	NI CVS-1456 compact vision system

Accessories

779984-01	Basler trigger and I/O cable for IEEE 1394b cameras
780024-01	Lens, 8 mm, F1.4, megapixel, Computar
780025-01	Lens, 12 mm, F1.4, megapixel, Computar
780026-01	Lens, 16 mm, F1.4, megapixel, Computar
780027-01	Lens, 25 mm, F1.4, megapixel, Computar
196283-04	IEEE 1394b to 1394b cable, 4 m
196284-04	IEEE 1394a to 1394b cable, 4 m
778796-01	Cable assy, 1394 jackscrews to standard 1394, 4.5 m
185797-02	IEEE 1394, 400 Mb/s, nonlatching, cable, 2 m
185797-04	IEEE 1394, 400 Mb/s, nonlatching, cable, 4.5 m

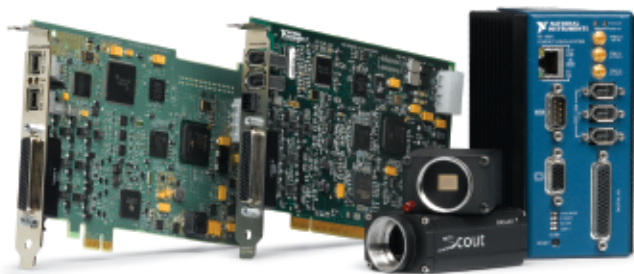


Figure 1. NI PCIe-8255R and PCI-8254R Image Acquisition Boards with the NI CVS-1456 Compact Vision System

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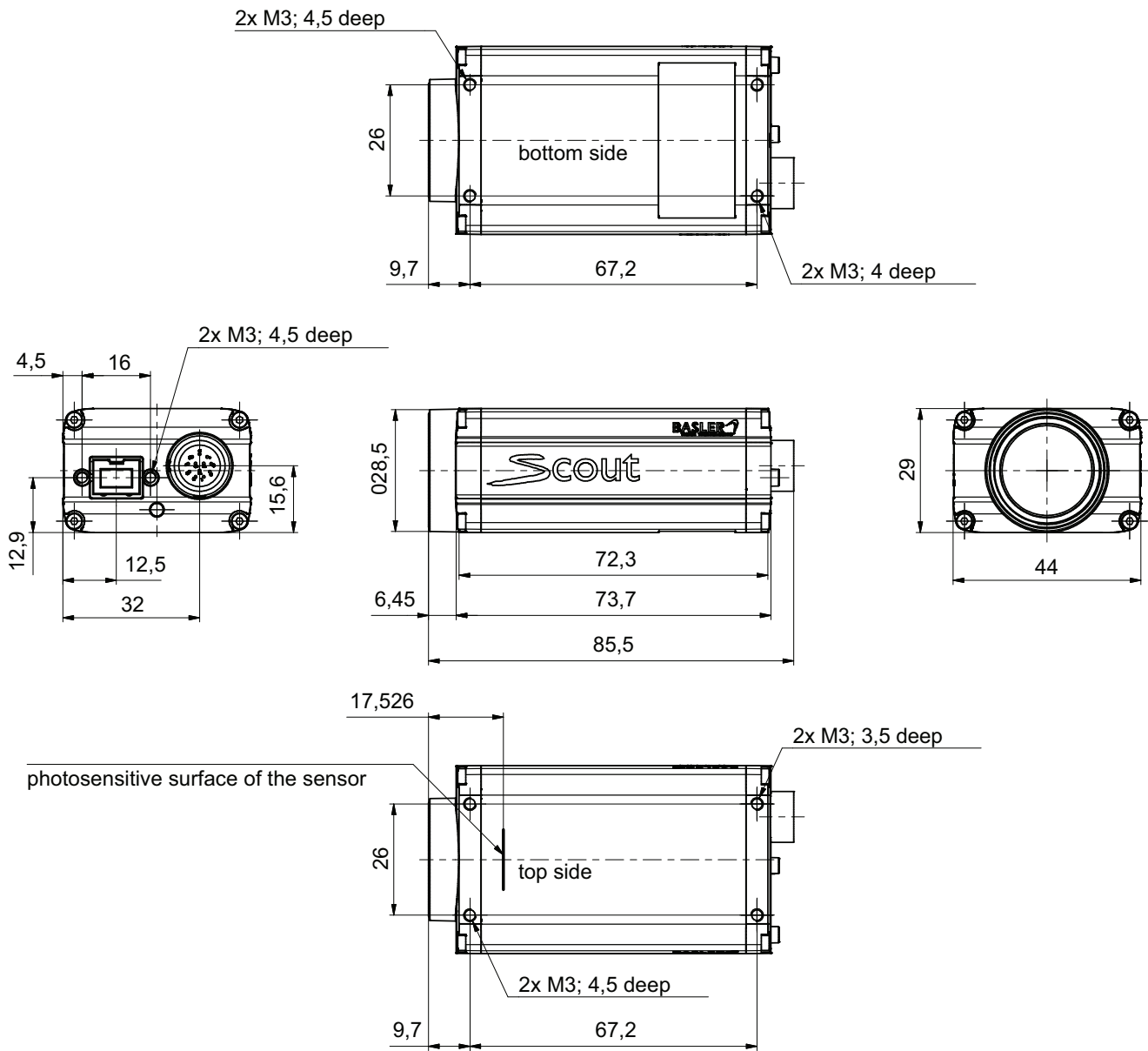


Figure 2. IEEE 1394 Camera Dimensional Drawings

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