

# Grasshopper®

**POINT GREY**  
Innovation in Imaging

HIGH RESOLUTION + HIGH FPS + COMPACT

- **0.3M, 1.4M, 2.0M, or 5.0M pixels**
- **Progressive scan Sony® CCDs**
- **High speed 14-bit A/D converter**
- **Dual IEEE-1394b ports for daisy chaining**
- **Industry standard design, compact case**

The Grasshopper digital camera line from Point Grey Research is a complete, cost effective and reliable imaging solution. A variety of large format, high resolution image sensors, combined with an IEEE-1394b 800Mb/s interface, makes the Grasshopper an ideal choice for demanding imaging applications such as semiconductor inspection and high-speed assembly.



Available Now	GRAS-03K2C/M-C	0.3 MP	Kodak KAI0340 CCD, 1/3", Color/Mono, Global	640x480	200 FPS	7.4 µm
Available Now	GRAS-03S3M-C	0.3 MP	Sony ICX414 CCD, 1/2", Mono, Global	648x488	74 FPS	9.9 µm
Available Now	GRAS-14S3C/M-C	1.4 MP	Sony ICX267 CCD, 1/2", Color/Mono, Global	1384x1032	21 FPS	4.65 µm
Available Now	GRAS-14S5C/M-C	1.4 MP	Sony ICX285 CCD, 2/3", Color/Mono, Global	1384x1036	15 FPS	6.45 µm
Available Now	GRAS-20S4C/M-C	2.0 MP	Sony ICX274 CCD, 1/1.8", Color/Mono, Global	1624x1224	30 FPS	4.4 µm
Available Now	GRAS-50S5C/M-C	5.0 MP	Sony ICX625 CCD, 2/3", Color/Mono, Global	2448x2048	15 FPS	3.45 µm

A/D Converter	14-bit
Video Data Output	8, 12, 16 and 24-bit digital data
Image Data Formats	Y8, Y16 (all models), RGB, YUV411, YUV422, YUV 444, 8- bit and 16-bit raw Bayer data (color models)
Partial Image Modes	Pixel binning and region of interest (ROI) modes
Image Processing	Gamma, lookup table, white balance
Gain	0 dB to 24 dB, Automatic/Manual/One-Push Gain modes
Gamma	0.50 to 4.00
White Balance	Automatic/manual modes, programmable via software
Color Processing	On-camera in YUV or RGB format, or on-PC in Raw format
Digital Interface	Dual Bilingual 9-pin IEEE-1394b for camera control, video data transmission, and power
Transfer Rates	100, 200, 400, 800 Mb/s
GPIO	8-pin Hirose HR25 GPIO connector for power, trigger, strobe, PWM, and RS232
External Trigger Modes	IIDC Trigger Modes 0, 1, 3, 14, and 15
Synchronization	Via external trigger or software trigger
Shutter	Global Shutter 0.02 ms to >10 seconds (extended shutter mode) Automatic/Manual/One-Push/Extended Shutter modes
Memory	32 MB frame buffer; Flash Memory 512 KB
Memory Channels	2 memory channels for custom camera settings
Dimensions and Mass	58 mm x 44 mm x 29 mm (excluding lens holder and connectors), 104 g (without optics or tripod mounting bracket)
Power Consumption	8 to 30 V, 3.5 W at 12 V via GPIO or FireWire interface
Camera Specification	IIDC v1.31
Camera Control	via FlyCapture SDK, CSRs, or third party software
Camera Updates	In-field firmware updates
Lens Mount	C-mount
Temperature	Operating: 0° to 40°C; Storage: -30° to 60°C
Emissions Compliance	CE, FCC, RoHS
Operating System	Vista SP1, Windows7, Linux Ubuntu 8.04
Warranty	Two years

# Grasshopper<sup>®</sup> Specifications

## IEEE-1394b Benefits

The IEEE-1394b 800Mb/s bus provides reliable, deterministic communication with guaranteed bandwidth. This allows full color images to be transmitted at faster frame rates, and more cameras to be networked on the same 1394b bus. The Grasshopper camera family is also backward compatible with 1394a and can work seamlessly with legacy 1394a systems<sup>1</sup>.

## Daisy Chaining

Multiple Grasshopper cameras can be daisy chained together using the dual IEEE-1394b ports on the back, effectively minimizing cabling requirements and equipment costs and maximizing the reliability of the data pipeline.

## Secure and Powered

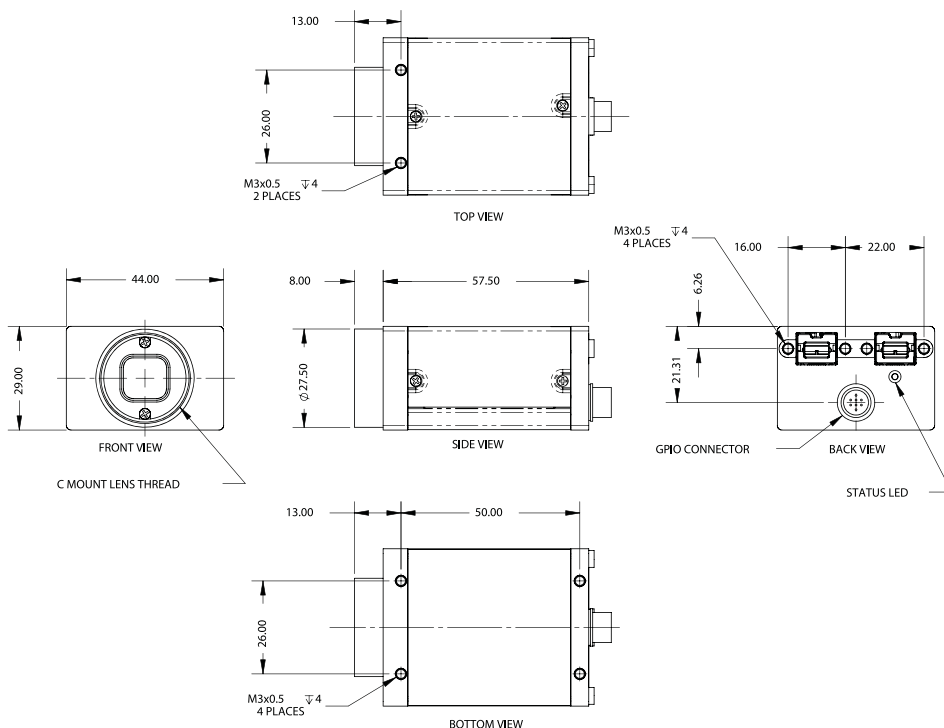
Screw holes located on either side of the Grasshopper camera's IEEE-1394b connectors enable the locking 1394b cable (included in the Development Accessory Kit) to be securely connected to the camera. This not only guarantees a reliable connection, but also reduces stress on internal electronics that can be caused by cable movement. The cable also carries both data and power, minimizing the need for additional cables or external power sources.

## Industry Standard Design

Every mechanical component of the Grasshopper camera is designed to maximize usability, including the compact aluminum case, C-mount lens holder and ASA/ISO-compliant tripod mounting bracket, status LED and removable glass/IR filter system.

## Dimensional Drawings (in mm)

CAD models available at [www.ptgrey.com/support/downloads](http://www.ptgrey.com/support/downloads).



## Frame Buffer/Image Retransmit

The camera is equipped with a 32MB frame buffer that can be used to store multiple images for transmission, or retransmission, at a later time. This is useful in situations where the available 1394b bandwidth must be maximized between multiple cameras, or where an image must be sent again.

## Updatable FPGA

The field-programmable gate array chip controls all camera functionality, including on-camera color processing, pixel binning, automatic inter-camera synchronization, user memory channels and more. It can also be updated with new functionality in the field.

## Software

The FlyCapture<sup>®</sup> SDK is compatible with Microsoft<sup>®</sup> Windows<sup>®</sup> and includes the PGRCAMTM device driver, full software API library, demo programs and C/C++ example source code. It also includes the FirePROTM driver, which provides enhanced debugging and diagnostics and allows 1394b devices to run at 800Mb/s.

## Development Accessory Kit (DEVKIT-01-0001 & DEVKIT-01-0002)

This kit has all the hardware and software you need for rapid design and prototyping, including:

- 4.5 meter, 9-pin to 9-pin, 1394b locking cable
- 4.5 meter, 6-pin to 9-pin, 1394a to 1394b locking cable
- IEEE-1394b OHCI PCI Host Adapter 3-port 800Mb/s card (DEVKIT-01-0001)
- FirePRO low profile single bus IEEE-1394b PCI Express card (DEVKIT-01-0002)
- Male GPIO connector prewired for quick and easy access
- FlyCapture<sup>®</sup> SDK (C/C++ API and device drivers) CD