

# Ladybug<sup>®</sup> 2

COMPACT SIZE + 1394B + 30FPS VIDEO

- **Smaller Size**
- **Lower Cost**
- **Operational Over Long Distances via Optical Cable**
- **4.7 Megapixels Using Six 1024x768 CCDs**
- **Full Frame Rate Video – Up To 30 FPS and 80MB/s**

The highly affordable Ladybug2 spherical digital video camera system has six 0.8 MP cameras that enable the system to collect video from more than 80% of the full sphere, and an IEEE-1394b interface that allows streaming to disk at 30fps. The Ladybug2 is an excellent choice where smaller size, lower cost, or the ability to have the camera run over long distances via optical cable is required.

**POINT GREY**  
Innovation in Imaging



MODEL	VERSION	MP	IMAGING SENSOR
LD2-HICOL-KIT	Red	0.8 MP	<ul style="list-style-type: none"> <li>■ Sony ICX204 CCD x6, 1/3", 4.65 μm</li> <li>■ Global Shutter</li> <li>■ 1024 x 768 at 30 FPS JPEG compressed; 15 FPS uncompressed</li> </ul>
<b>A/D Converter</b>	12-bit		
<b>Video Data Output</b>	8-bit Raw Bayer digital data		
<b>Image Data Formats</b>	Raw8, Mono8		
<b>Partial Image Modes</b>	Pixel binning and region of interest (ROI) modes		
<b>Image Processing</b>	Shutter, gain, white balance, gamma and JPEG compression, are programmable via software		
<b>Gain</b>	Automatic/Manual/One-Push Gain modes		
	0 - 24 dB		
<b>High Dynamic Range</b>	Not applicable		
<b>Digital Interface</b>	9-pin 1394b 800 MB/s interface for camera control, power, and video data; fiber optic link between head and compressor		
<b>Transfer Rates</b>	100, 200, 400, 800 Mbit/s		
<b>GPIO</b>	Not applicable		
<b>External Trigger Modes</b>	Software only		
<b>Shutter</b>	Global Shutter Automatic/Manual/One-Push/Extended Shutter modes 0.01 ms to 4.2 s (extended shutter mode)		
<b>Memory Channels</b>	2 memory channels for custom camera settings		
<b>Case</b>	Machined aluminum housing, anodized red; two units (head and compressor)		
<b>Dimensions</b>	110 mm x 100 mm x 141 mm		
<b>Mass</b>	1190 g (both units)		
<b>Power Consumption</b>	11.2 W at 12 V via FireWire interface		
<b>Camera Specification</b>	IIDC v1.31		
<b>Camera Control</b>	via Ladybug SDK, CSRs, or third party software		
<b>Camera Updates</b>	In-field firmware updates		
<b>Optics</b>	Six high quality 2.5 mm focal length lenses		
<b>Field of View</b>	>75% of full sphere		
<b>Spherical Distance</b>	Calibrated at 20 m		
<b>Temperature</b>	Operating: 0° to 45°C; Storage: -30° to 60°C		
<b>Humidity</b>	Operating: 20 to 80% (no condensation) ; Storage: 20 to 95% (no condensation)		
<b>Emissions Compliance</b>	CE, FCC, RoHS		
<b>Operating System</b>	Windows XP, Windows 7		
<b>Warranty</b>	One Year		

# Ladybug<sup>®</sup> 2 Specifications

## GIS mapping, surveillance, security, and more

The quality and flexibility of spherical video data makes the medium ideal for applications requiring synchronization of video images. This revolutionary technology is now used by a wide variety of industries, including: large scale GIS systems for location-based visualizations, such as street-level viewing, and geographical mapping; high end security and surveillance applications; city planners for inventory and traffic scene analysis; and the entertainment industry for lighting models, full dome projection content, and other immersive experiences. The Ladybug3 camera's water resistant housing also allows it to operate in most outdoor environments.

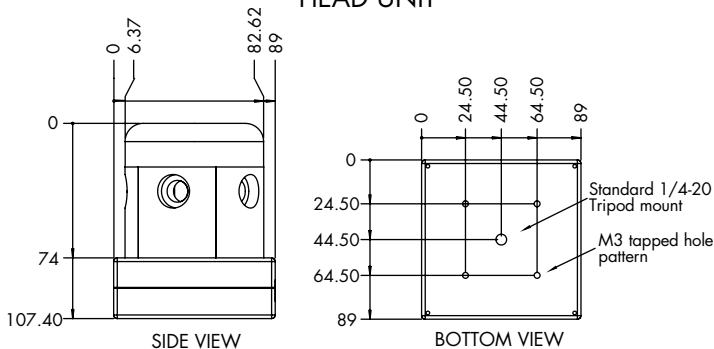
## Image quality and speed

The Ladybug2 Camera Head Unit consists of six 1024x768 color CCDs, with five CCDs positioned in a horizontal ring and one positioned vertically. The Head Unit produces color images at up to 30 FPS. The camera system is designed to minimize the effects of parallax by tightly packaging the CCDs and lenses. The Ladybug2 covers approximately 80% of a full sphere, with 4.7M effective pixels and 3.3M final image pixels. Approximately 3,800 pixels cover the horizontal circumference of the spherical image.

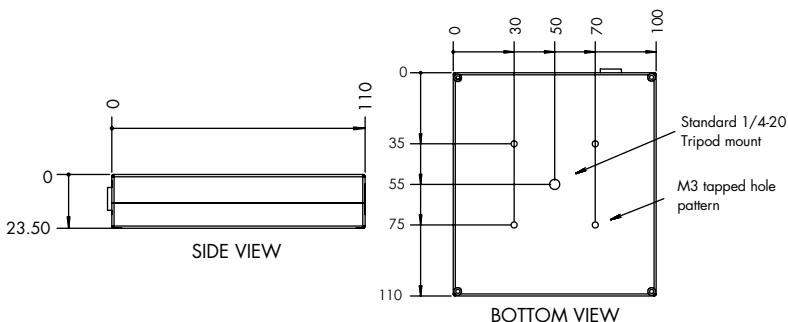
## Dimensional Drawings (in mm)

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

### HEAD UNIT



### COMPRESSOR



## High Dynamic Range Mode

To meet the requirements of complex imaging scenes, the camera can be configured to operate in a special High Dynamic Range mode. This mode continuously cycles through a series of camera shutter and gain settings, sacrificing overall frame rate and acquisition time for the ability to capture the full range of intensities in demanding scenes.

## Image Sensor Calibration

Both of these compact camera products feature six high quality Sony<sup>®</sup> CCD image sensors, with five CCDs positioned in a horizontal ring and one positioned vertically. They are pre-calibrated to enable high-quality spherical image stitching. Lens settings, such as focus and iris, are fixed to ensure the camera stays calibrated.

## Software

The Ladybug2 system includes feature-rich software to manage image acquisition, spherical and panoramic image production, and camera settings. It includes the LadybugCapPro program, source code for a quick start in the C/C++ programming environment, a camera device driver, full software library and Application Programming Interface (API). The LadybugCapPro program eliminates the need to create an application to access and control the camera system, and allows users to:

- View real-time fully stitched panoramic and spherical images
- Store streaming data to the hard drive for post processing
- Access and convert stored data to standard video formats
- Control camera shutter, gain, and JPEG compression

LadybugCapPro can also handle integrating and storing data from recommended NMEA GPS devices via the host serial port.

## Development Accessory Kit

The Ladybug2 spherical digital video system is designed to make getting started with spherical video as simple as possible. Each system comes complete with a Ladybug2 camera, JPEG Compressor Unit, and a license of the Ladybug software development kit (SDK). First-time users will receive all the hardware needed to get the camera running, including:

- IEEE-1394b OHCI PCI Host Adapter 3-port 800Mb/s card
- 4.5 meter, 9-pin to 9-pin, IEEE-1394b cable
- 4.5 meter, 6-pin to 9-pin, IEEE-1394a to IEEE-1394b cable
- 4.5 meter, 4-pin to 9-pin, IEEE-1394a to IEEE-1394b cable
- 10 meter 62.5/125um fiber optic link cable
- 10 meter, 3-pin power link cable
- 24V 2.5A power supply with standard connector and wall wart
- Ladybug SDK, including C/C++ API and device drivers
- Getting Started manual and LadybugCap demo software

## Recommended System Configuration

- Intel<sup>®</sup> Pentium 4 2.0GHZ
- Windows<sup>®</sup> XP Service Pack 1
- 128MB video card with OpenGL support
- 64-bit PCI or PCI-X slot for IEEE-1394b card
- Microsoft<sup>®</sup> Visual C++ 6.0 for sample code
- Multiple disk array to store full rate uncompressed streaming image data