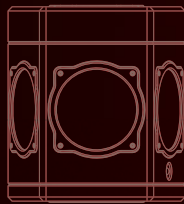


Product Catalog—Spherical



 **POINT GREY**

PRODUCT CATALOG – SPHERICAL



PRODUCT CATALOG – SPHERICAL

See 360° of possibilities.

Point Grey Research® has made spherical video a reality by providing an affordable hardware and software package that delivers high-resolution 360° visual coverage. Both the Ladybug®2 and Ladybug3 systems do all the image acquisition, processing, stitching and correction necessary to integrate multiple camera images into full-resolution digital spherical and panoramic videos in real time.

Point Grey Research spherical video systems offer:

- HIGH QUALITY IMAGING – SUPERIOR LENSES MATCHED WITH TIGHTLY PACKED CCD IMAGERS THAT MINIMIZE PARALLAX
- FULL FRAME RATE VIDEO – UP TO 30 FPS AND 80MB/S
- INDEPENDENT IMAGING CONTROL CCD SETTINGS CAN BE CONTROLLED INDIVIDUALLY OR IN UNISON
- PRE-CALIBRATION FOR EASE OF USE
- PLUG AND PLAY FUNCTIONALITY



Quick Reference Guide

	IMAGE SENSORS	MAX RESOLUTION	FRAME RATE (max resolution)
Ladybug2	 Sony 0.8 MP 1/3" ICX204	1024(H) x 768(V)	30 FPS JPEG compressed 15 FPS uncompressed
Ladybug3	 Sony 2.0 MP 1/1.8" ICX274	1600(H) x 1200(V)	15 FPS JPEG compressed 6.5 FPS uncompressed



360° SPHERICAL DIGITAL VIDEO CAMERA SYSTEMS

High Dynamic Range Mode

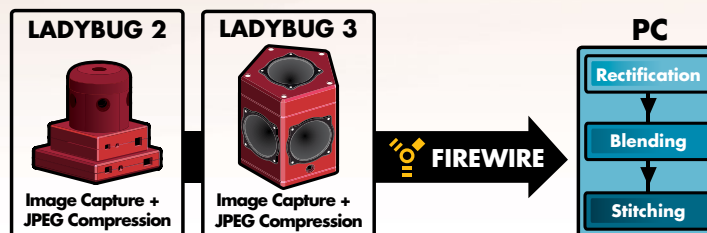
To meet the requirements of complex imaging scenes, the camera can be configured to operate in a special High Dynamic Range mode. This mode continuously cycles through a series of camera shutter and gain settings, sacrificing overall frame rate and acquisition time for the ability to capture the full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

Image Sensor Calibration

Both of these compact camera products feature six high quality Sony® 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.

Embedded JPEG Compression

Ladybug products use an embedded JPEG compression engine and fast 800Mbit/s IEEE-1394b (FireWire) interface to stream full 12 MP images at 15 FPS, or raw uncompressed images at just under 7 FPS, to the host system. The user can adjust the JPEG compression rate on-the-fly to balance image quality against frame rate. Camera parameters, such as gain, shutter, white balance and gamma, can also be adjusted through software to find the right match for the surrounding environment.

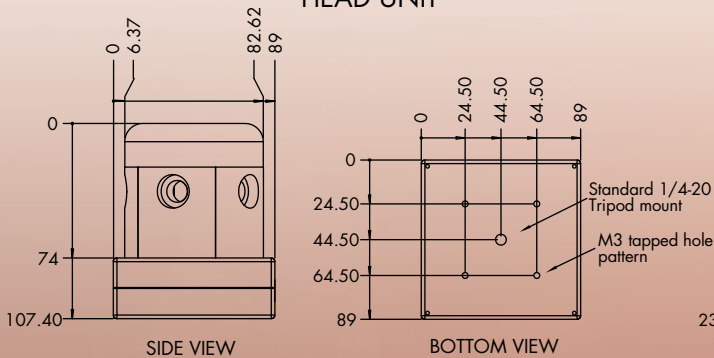


Ladybug[®] 2

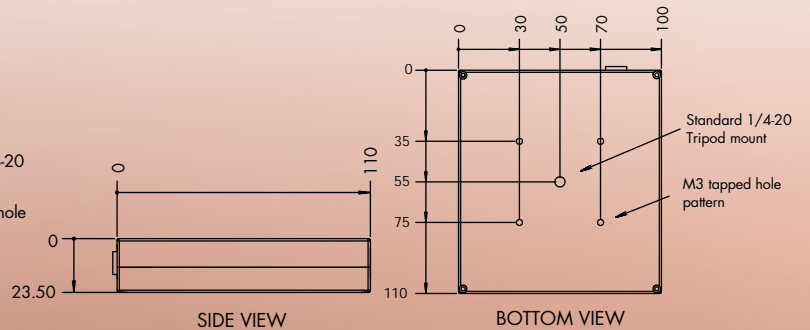
The highly affordable Ladybug2 spherical digital video camera system has six 0.8 MP cameras that enable the system to collect video from more than 80% of the full sphere, and an IEEE-1394b interface that allows streaming to disk at 30fps. The Ladybug2 is an excellent choice where smaller size, lower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

- **SMALLER SIZE**
- **LOWER COST**
- **OPERATIONAL OVER LONG DISTANCES VIA OPTICAL CABLE**
- **4.7 MEGAPIXELS USING SIX 1024x768 CCDs**
- **CONTROL SETTINGS FOR INDIVIDUAL SENSORS**

HEAD UNIT



COMPRESSOR



0.8MP	Sony 0.8 MP 1/3" ICX204 (six Sony CCDs)	1024(H) x 768(V) (each sensor)
Shutter Type	global shutter	
Analog-to-Digital Converter	Analog Devices 12-bit ADC	
Video Data Output	8-bit raw Bayer (color) digital data	
Digital Interface	9-pin 1394b (FireWire) 800Mb/s interface for camera control, power and video data fiber optic link between Head and Compressor	
Frame Rates (max resolution)	30 FPS JPEG compressed, 15 FPS uncompressed	
Partial Image Modes	region of interest modes via Format_7, programmable via software	
Optics	six (6) high-quality 2.5 mm focal length microlenses	
Camera Settings Control	shutter, gain, white balance, gamma & JPEG compression, programmable via software	
Voltage Requirements	8-30 V, via external power supply (recommended) or IEEE-1394b interface	
Power Consumption	11.2 W at 12 V†	
Case Material	machined aluminum housing, anodized red	
Triggering	Software only	
Case Type	two units (Head and Compressor)	
Mass	1190 g†	
Camera Status	status LED to indicate power and device connection	
Camera Control Specification	IIDC 1394-based Digital Camera Specification v1.31	
Emissions Compliance	complies with CE rules and Part 15 Class A of FCC Rules	
Operating Temperature	0° to 45°C (-30° to 60°C storage)	
Warranty	1 year	

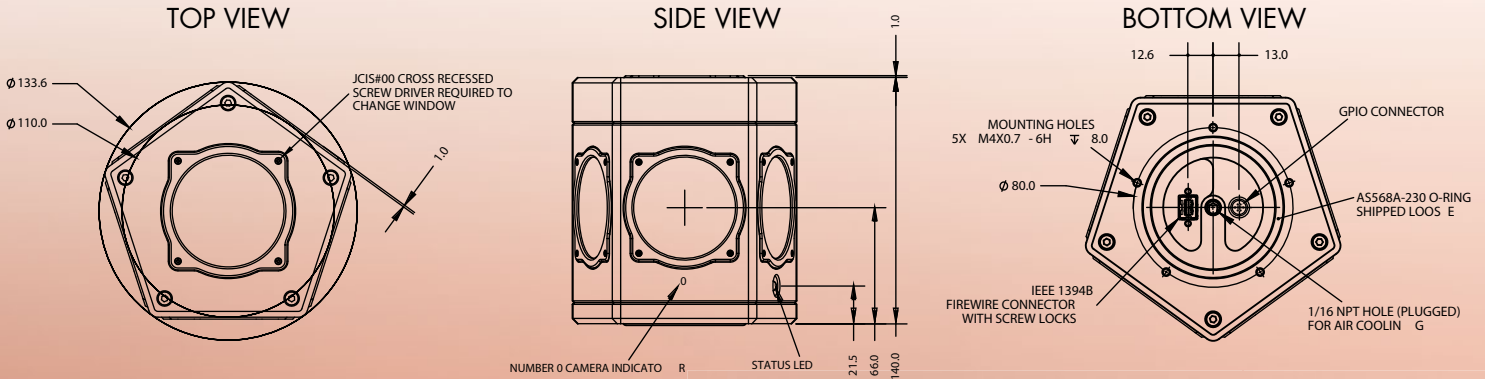
† Includes both Ladybug2 Head and Compressor units



Ladybug[®] 3

The high resolution Ladybug3 spherical digital video camera system has six 2 MP cameras that enable the system to collect video from more than 80% of the full sphere, and an IEEE-1394b (FireWire) interface with locking screw connection that allows JPEG-compressed 12MP resolution images to be streamed to disk at 15fps. The Ladybug3 is an ideal solution for applications that require very high resolution, a weather-resistant case, direct FireWire connection, and the ability to synchronize to external devices such as an external trigger or light source.

- **VERY HIGH RESOLUTION**
- **WEATHER-RESISTANT CASE**
- **DIRECT FIREWIRE CONNECTION**
- **SYNCHRONIZE TO EXTERNAL TRIGGER OR LIGHT SOURCE**
- **12 MEGAPIXELS USING SIX 1600x1200 CCDs**



2.0MP

Sony 2.0 MP 1/1.8" ICX274
(six Sony CCDs)

1600(H) x 1200(V)
(each sensor)

Shutter Type	global shutter
Analog-to-Digital Converter	Analog Devices 12-bit ADC
Video Data Output	8-bit raw Bayer (color) digital data
Digital Interface	9-pin 1394b (FireWire) 800Mb/s interface for camera control, power and video data locking screws guarantee secure connection
Frame Rates (max resolution)	15 FPS JPEG compressed, 6.5 FPS uncompressed
Partial Image Modes	region of interest modes via Format_7, programmable via software
Optics	six (6) high quality 3.3 mm focal length microlenses
Camera Settings Control	shutter, gain, white balance, gamma & JPEG compression, programmable via software
Voltage Requirements	8-30 V, via the IEEE-1394b interface
Power Consumption	7.2 W at 12 V
Case Material	machined aluminum housing, anodized red
Triggering	GPIO and software
Case Type	single unit, water resistant
Mass	2416 g
Camera Status	status LED to indicate power and device connection
Camera Control Specification	IIDC 1394-based Digital Camera Specification v1.31
Emissions Compliance	complies with CE rules and Part 15 Class A of FCC Rules
Operating Temperature	0° to 45°C (-30° to 60°C storage)
Warranty	1 year



Applications

The quality and flexibility of spherical video data make the medium ideal for applications requiring synchronization of video images. This revolutionary technology is now used for a wide variety of applications and solutions. Examples include large scale GIS for street-level viewing, geographical mapping and other location-based visualizations; high end security and surveillance applications; city planning applications; simulation and measurement analysis; and entertainment solutions 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.

- **GIS Visualization**
- **Security and Surveillance**
- **Navigation Systems**
- **Real Estate Management**
- **City Planning**
- **Entertainment Industry**



Mobile Applications

Using your laptop you can capture, monitor and view the isochronous transmission of images as they are captured from an external mounted Ladybug.



Image from Schoolwave 2008 Festival, Athens, Greece, courtesy of ASR SA www.iam-360.com

Entertainment Applications

Get creative with the Ladybug. The Ladybug's ease-of-use allows you to quickly capture and store unique spherical video.



GIS Applications

LadybugCapPro can integrate and store data from recommended NMEA GPS devices via the host serial port. Precise synchronization of GPS data can be done using GPIO. Support for EXIF output allows for integration with geo applications.



Development Kit

DEVELOPMENT ACCESSORY KIT

The Ladybug2 and Ladybug3 spherical digital video systems are designed to make getting started with spherical video as simple as possible. Each system comes complete with camera and development accessory kit. First-time users receive all the hardware and software needed to get the camera running.

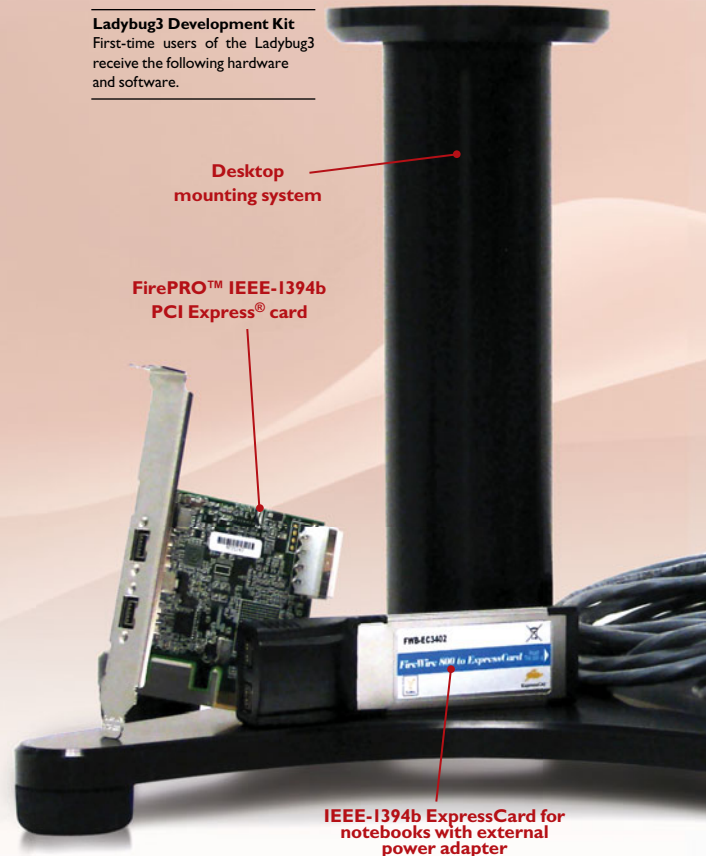
The Ladybug3 accessory kit includes:

- FirePRO™ IEEE-1394b PCI Express® card
- IEEE-1394b ExpressCard for notebooks
- 10 meter 1394b cable with locking screws
- Desktop mounting system
- 4.5 meter GPIO Trigger Cable
- Ladybug SDK software DVD
- Tripod adapter

The Ladybug2 accessory kit includes:

- IEEE-1394b OHCI PCI Host Adapter 3-port
- 4.5m, 9-pin to 9-pin, IEEE-1394b cable
- 4.5m, 6-pin to 9-pin, IEEE-1394a to IEEE-1394b cable
- 4.5m, 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
- Ladybug SDK software DVD

Ladybug3 Development Kit
First-time users of the Ladybug3 receive the following hardware and software.



Desktop
mounting system

FirePRO™ IEEE-1394b
PCI Express® card

IEEE-1394b ExpressCard for
notebooks with external
power adapter

Who We Are

Point Grey Research, Inc. is a worldwide leader in the development of advanced digital camera technology products for machine vision, industrial imaging, and computer vision applications. Based in Richmond, BC, Canada, Point Grey designs, manufactures and distributes IEEE-1394 (FireWire) and USB 2.0 cameras that are known for their excellent quality, performance, and ease of use.

A broad range of hardware, software, and mechanical engineering skills has allowed Point Grey

to successfully bring innovative and ground-breaking products to market. This drive for innovation has led to many industry firsts, including both the first and the world's smallest 1394b digital camera.

Since its founding in January of 1997, the company's approach to product pricing, quality control, and customer service has attracted thousands of customers worldwide, and its organic growth through product sales has enabled the company to expand significantly without any outside investment. Point Grey currently employs more than 70 people worldwide, and has a German subsidiary that provides

sales and support services to customers in Europe, Africa and Israel. The company has also established a strong network of distributors in Japan, Korea, China, Singapore, and Taiwan.

All Point Grey cameras and FirePRO products are built using state-of-the-art manufacturing facilities, located in the company's 41,000 square-foot (3,800 sq m) corporate headquarters. These facilities include a dedicated SMT line, AOI and X-ray machines, industrial clean room, and automated test stations.

The "Seal of Quality" label that is applied to each Point Grey camera cannot be printed until the camera

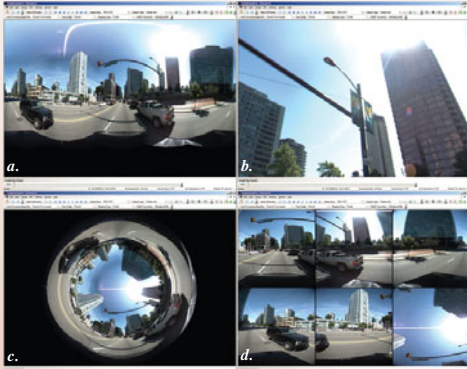
has been 100% inspected and tested. This rigorous quality testing, together with hassle-free product warranties, ensures that customers can rely on Point Grey cameras for their demanding vision applications.

Point Grey is also proud to offer world-class support on installation, configuration, customization and troubleshooting, so that all customers derive significant value from their camera systems. Quick response e-mail and phone support, online user manuals and knowledge base articles, and regular software and firmware updates are designed to deliver a superior ownership experience.

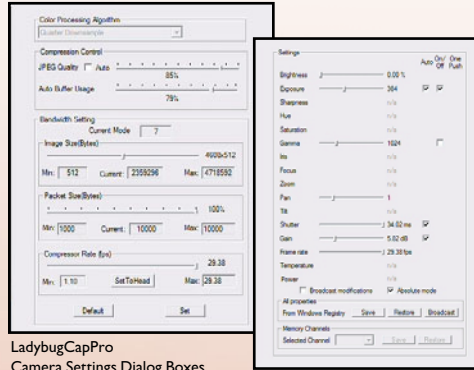
LADYBUG SDK

Every Ladybug system includes feature-rich software to manage image acquisition, spherical and panoramic image production, and camera settings. The Ladybug SDK includes the LadybugCapPro program, source code for a quick start in the C/C++ programming environment, a camera device driver, and Application Programming Interface (API) software library.

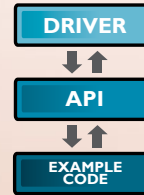
The LadybugCapPro program eliminates the need to create an application to access and control the camera system, and allows users to view real-time fully stitched panoramic and spherical images, store streaming data to the hard drive for processing, access and convert data to standard video formats and control camera shutter, gain, and JPEG compression. LadybugCapPro can also integrate and store data from recommended NMEA GPS devices via the host serial port.



a. Panoramic view b. Spherical view c. Dome view d. Multi-camera view



LadybugCapPro Camera Settings Dialog Boxes



Ladybug API Functionality

- Acquire and process images using a variety of different color processing algorithms
- Stream images off of the camera for viewing
- Control JPEG compression level
- Access image stream files stored on the host computer
- Display fully stitched panoramic and spherical images
- Image stabilization for smoother sequences
- Control other settings including:
 - Auto exposure
 - Gain
 - Shutter
 - White balance
 - Color correction
 - Falloff correction
 - Frame rate
 - Independent sensor control

Plug and Play Functionality

Perform many useful functions with your images and stream quickly and easily. View live video from the camera in either spherical, panoramic, dome or multi-camera projection. Enjoy real time stitching and blending on the GPU. Record live panoramic streams with a click of a button and do offline processing without a high end graphics card. Convert a stream to an AVI or Flash Video (FLV) and publish to the web with the Flash viewer. Crop a subset of images into smaller stream files, or save video frames in either BMP or JPEG format.

Full Camera Control

The Camera Control Dialog allows full control over the Ladybug's sensors. Customize JPEG compression and frame rates; adjust brightness, exposure, white balance, shutter speed, gain and more; virtually adjust camera orientation; correct vertical tilt.

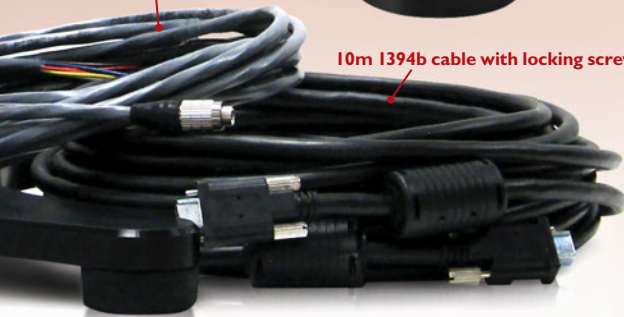
Ladybug API

This versatile API allows the building of custom applications to utilize the Ladybug's features quickly and efficiently. Gain direct access to camera parameters, interface controls, video and image properties, GPS data and more. The software SDK includes example programs and source code for a quick start in the C/C++ programming environment.

Tripod Adapter



4.5m GPIO Trigger Cable



10m 1394b cable with locking screws



Ladybug SDK DVD

- DVD includes:**
- LadybugCapPro
 - Ladybug API
 - Camera Driver
 - Standard C/C++
 - Users Guide PDF
 - Example Source Code
 - Printed Getting Started Manual

1997	1998	2000	2001	2002	2004	2005	2006	2007	2008	2009
Company Incorporation	First analog stereo vision camera Triclops	First IEEE 1394 stereo vision camera Digiclops	First IEEE 1394 imaging camera Firefly	First spherical vision camera Ladybug	First IEEE 1394b camera Dragonfly Express	Headquarters expansion New products Dragonfly2 Ladybug2	Office opens in Germany New products Flea2 Firefly MV	New products Grasshopper FirePRO	Headquarters expansion First USB 2.0 camera Chameleon	World's first USB 3.0 Camera New product Ladybug3



PRODUCT CATALOG – SPHERICAL

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