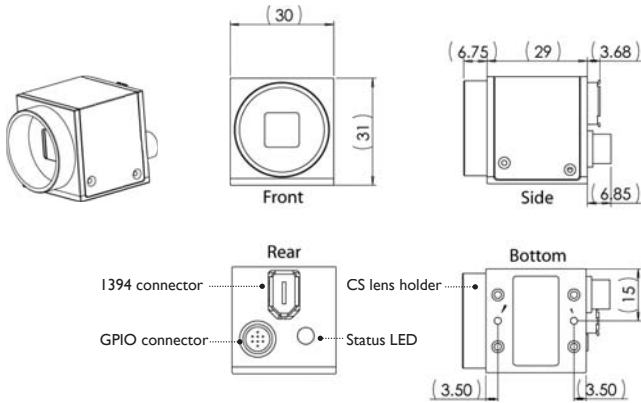# Development Accessory Kit

The following items are included in all *Flea*® development accessory kits:
- 4.5 meter, 6-pin to 6-pin, IEEE-1394 cable
- IEEE-1394 OHCI PCI Host Adapter 3-port 400Mb/s card
- Hirose HR25 male GPIO connector prewired for easy triggering
- *FlyCapture*® SDK (C/C++ API and device drivers) CD

Physical Dimensions


```
(30)
Front   (31)
Side   (6.75) (29) (3.68)  (6.85)

Rear                    Bottom
1394 connector     CS lens holder
GPIO connector     Status LED        (15)
(3.50)  (3.50)
```

Camera Specifications

Specification	Low-Res (640x480)	High-Res (1024x768)
Overview	Small format boxed camera housed in anodized aluminum case	
Imaging Sensor	Sony 1/3" progressive scan CCD	
	ICX424 (648x488 max pixels)	ICX204 (1024x768 max pixels)
A/D Converter	Analog Devices AD9849 12-bit analog-to-digital converter	
Video Data Output	8 and 16-bit digital data (see *Supported Data Formats* below)	
Standard Resolutions	640x480	1024x768
Frame Rates	60, 30, 15, 7.5, 3.75, 1.875 FPS	30, 15, 7.5, 3.75, 1.875 FPS
Partial Image Modes	Pixel binning and region of interest modes available via Format_7	
Interfaces	6-pin IEEE-1394 for camera control and video data transmission 4 general-purpose digital input/output (GPIO) pins.	
Voltage Requirements	8-32V	
Power Consumption	Less than 3W	
Gain	Automatic/Manual/One-Push Gain modes	
	-5.45 to 30.75dB	-6.8 to 29.4dB
Shutter	Automatic/Manual/One-Push Shutter modes	
	0.04ms to 66.63ms @15 FPS	0.03ms to 66.63ms @15 FPS
	Extended Shutter modes	
	0.04ms to 7900ms @ 15 FPS	0.04ms to 5200ms @ 15 FPS
Gamma	0.50 to 4.00	
Trigger Modes	DCAM v1.31 Trigger Modes 0, 1, 3 and 14	
Signal To Noise Ratio	Greater than 60dB	
Dimensions	30mm x 31mm x 29mm (w/o lens holder)	
Mass	46 grams (w/o lens)	
Camera Specification	IIDC 1394-based Digital Camera Specification v1.31	
Emissions Compliance	Complies with CE rules and Part 15 Class B of FCC Rules	
Operating Temperature	Commercial grade electronics rated from 0° to 45°C	
Storage Temperature	-30° to 60°C	

Spectral Response (QE)

FLEA-HICOL	FLEA-HIBW
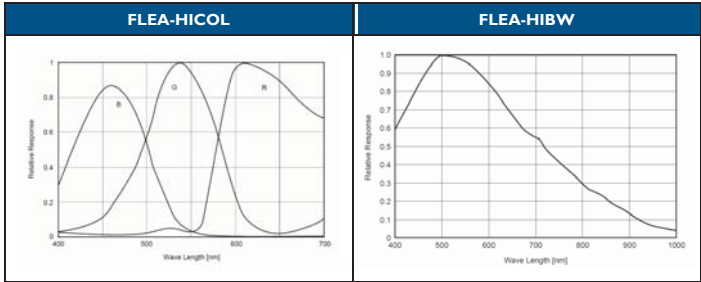
Physical Description

The bottom of the case has a pair of M2 threaded holes designed to accommodate the mounting bracket shipped with the camera. This bracket can be attached to the case using the screws provided, and has a ¼"-20 hole for mounting to a tripod. The rear of the case has a pair of connectors used for interfacing with the camera and a status LED. The connectors are fully described in the Camera Interface section.

LED Status	Description
Steady on	Camera receiving power and initialized
Steady on and very bright	Camera acquiring and transmitting images
Flashing bright, then brighter	Camera registers being accessed
Steady or slow flashing on and off	Firmware updated, or possible camera problem (power cycle)

Camera Features

Image Acquisition

Feature	Description
Automatic Synchronization	Multiple Flea's on the same 1394 bus automatically sync
Fast Frame Rates	Faster standard frame rates up to 60 FPS
Partial Image Modes	Format_7 modes for fast frame rates and higher sensitivity
Multiple Trigger Modes	Bulb-trigger mode, overlapped trigger at full frame rate
Gain and Brightness	Adjust gain and black clamp via a 12-bit A/D converter

Image Processing

Feature	Description
Image Processing	On-camera control of gamma and lookup table
Embedded Image Info	Pixels contain frame-specific info (e.g. shutter, 1394 cycle time)

Camera and Device Control

Feature	Description
Broadcast Properties	Camera responds to broadcast register writes on the same bus
White Balance	Manual control of white balance for color balancing
Frame Rate Control	Fine-tune frame rates for video conversion (e.g. PAL @ 24 FPS)
Improved Strobe Output	Configurable strobe pattern output, pulse width modulation
RS-232 Serial Port	Provides serial communication via GPIO TTL digital logic levels
Camera Upgrades	Firmware upgradeable in field via IEEE-1394 interface.

Image Formats

Flea® 640x480

Standard Modes	Frames Per Second					
	1.875	3.75	7.5	15	30	60
640x480 Y8 (8bpp)	•	•	•	•	•	•
640x480 Y16 (16bpp)	•	•	•	•	•	

(Format_7 Partial Image Modes)

Mode	Pixel Format	Size	FPS	Description
0	Mono8 (8bpp)	320x240	100	Region of interest (ROI)
0	Mono8 (8bpp)	160x120	120	Region of interest (ROI)
1	Mono8 (8bpp)	320x240	100	2x2 pixel binning
2	Mono8 (8bpp)	640x240	100	1x2 pixel binning

Flea 1024x768

Standard Modes	Frames Per Second					
	1.875	3.75	7.5	15	30	60
800x600 Y16 (16bpp)					•	
1024x768 Y8 (8bpp)	•	•	•	•	•	
1024x768 Y16 (16bpp)	•	•	•	•		

(Format_7 Partial Image Modes)

Mode	Pixel Format	Size	FPS	Description
0	Mono8 (8bpp)	640x480	45	Region of interest (ROI)
0	Mono8 (8bpp)	320x240	65	Region of interest (ROI)
1	Mono8 (8bpp)	512x384	50	2x2 pixel binning
2	Mono8 (8bpp)	1024x384	50	1x2 pixel binning

Camera Interface

IEEE-1394 Connector
The *Flea*® has a standard 6-pin IEEE-1394 connector that is used for data transmission, camera control and powering the camera.

Cables
The maximum 1394 cable length between any 1394 node (e.g. camera to PCI card, card to hub, etc.) is 4.5m, as specified by the IEEE-1394 standard. Use standard, shielded twisted pair copper cables.

General Purpose I/O Connector
The *Flea* has an 8-pin General Purpose Input/Output (GPIO) connector on the back of the case. The connector is a Hirose HR25 8 pin connector (Mfg P/N: HR25-7TR-8SA). KIT contents include a pre-wired male connector; refer to the diagram below for wire color-coding. Additional male connectors (Mfg P/N: HR25-7TP-8P) can be purchased from Digikey (P/N: HR702-ND).

Diagram	Pin	Function	Description
	1	IO0	Input / Output (default Trigger_Src)
	2	IO1	Input / Output
	3	IO2	Input / Output / RS232 Transmit (TX)
	4	IO3	Input / Output / RS232 Receive (RX)
	5, 6	GND	
	7	Vext	Allows the camera to be powered externally. Voltage limit: 8 to 30V, Current limit: 1A
	8	+3.3V	Power external circuitry up to a total of 50mA
	To configure the GPIO pins, consult the "General Purpose Input / Output" section of the *PGR IEEE-1394 Digital Camera Register Reference*.		

The GPIO pins are TTL 3.3V pins protected by two diodes to +3.3V and GND in parallel. There is also a 10K resistor in series to limit current. **Inputs** can be configured to accept external trigger signals. **Outputs** can be configured to send an output signal, strobe, or PWM signal; however, the pins have almost no drive strength (they are high impedance) and need to be buffered with a transistor or driver.

To use the **RS232** functionality, a level converter must be used to convert the TTL digital logic levels to RS232 voltage levels. See B&B Electronics (http://www.bb-elec.com/) P/N: 232LPTTL for an example.

1 Installation

1. Recommended System Configuration

- Windows XP Service Pack 1
- 512MB of RAM
- Intel Pentium 4 2.0GHz or compatible processor
- AGP video card with 128MB video memory
- 32-bit standard PCI slot for the IEEE-1394 PCI card
- Microsoft Visual C++ 6.0 (to compile and run example code)

2. Electrostatic Precautions and Camera Care

- Users who have purchased a bare board camera should:
    - Either handle bare handed or use non-chargeable gloves, clothes or material. Also use conductive shoes.
    - Install a conductive mat on the floor or working table to prevent the generation of static electricity.
- When handling the camera unit, avoid touching the lenses. To clean the lenses, use a standard camera lens cleaning kit or a clean dry cotton cloth. Do not apply excessive force.
- To clean the imaging surface of your CCD, follow the steps outlined in http://www.ptgrey.com/support/kb/index.asp?a=4&q=66.
- Extended exposure to bright sunlight, rain, dusty environments, etc. may cause problems with the electronics and the optics of the system.
- Avoid excessive shaking, dropping or mishandling of the device.

2 Installation

3. Install the IEEE-1394 PCI card

- Place the IEEE-1394 PCI card in an open PCI slot.
- Connect the 4-pin connector on the card to the PC power supply.
- Turn the computer back on and log into Windows.
- In most cases, the Windows IEEE-1394 drivers will be automatically installed for the card, with no user input required. However, in some cases the *Found New Hardware Wizard* will appear. Follow the prompts given by the Wizard to install the card.
- Open Windows Device Manager by going to the Control Panel > *System* > *Hardware* tab > *Device Manager*. Ensure that the PCI card is properly installed as an *IEEE 1394 Bus host controller*.

4. Install the FlyCapture® Software and Drivers

- Insert the software CD-ROM. If the Installation Wizard does not automatically run, browse to your CD-ROM directory and run *setup.exe*.
- Follow the installation instructions to install the software.
- A dialog will appear asking if you want to downgrade your Windows XP drivers. If you have installed Service Pack 2, we encourage users to do this. See this Knowledge Base article for further information: http://www.ptgrey.com/support/kb/index.asp?a=4&q=171

3 Installation

5. Installing the Tripod Mounting Bracket (optional)

- The mounting bracket for the *Flea®* attaches to the camera using the included M2 screws.

6. Connect the 1394 PCI Card and Cable to the Camera

- Plug the 4.5 meter, 6-pin to 6-pin, IEEE-1394 cable into the 1394 PCI card and the *Flea* 1394 Connector.
  NOTE: The camera relies on the 6-pin 1394 cable to provide power. If using an interface card other than that provided, ensure that adequate power is provided.
- If the Microsoft Windows *"Found New Hardware Wizard"* appears, proceed to Step 7. Otherwise, proceed to Step 8.

7. Install the PGRCAM Driver

- Click *"Install from a list or specific location"* and click *"Next"*.
- Select *"Don't search. I will choose the driver to install"* and *"Next"*.
- Click *"Have Disk"* and browse to *C:\Program Files\Point Grey Research\PGR FlyCapture\driver*, click *"Open"*, then *"OK"*.
- Select the camera model and click *"Next"*.
- You will be prompted to continue installation - click *"Continue Anyway"* then *"Finish"* to complete installation.

4 Installation

8. Confirm Successful Installation

- Check the Device Manager to confirm that installation was successful. Go to the *Start* menu, select *Run* and enter "devmgmt.msc". Verify the camera is listed under "Point Grey Research Devices".
- To test the camera's image acquisition capabilities, run the FlyCap demo program. From the *Start* menu, select *All Programs > Point Grey Research > PGR FlyCapture > FlyCap.exe*.

5 Troubleshooting

The FlyCapture® User Guide and other technical references can be found in the *Programs > Point Grey Research > PGR FlyCapture > Documentation* directory. Our on-line Knowledge Base (http://www.ptgrey.com/support/kb/) also addresses the following problems:

- Article 21: Troublesome hardware configurations
- Article 88: Vertical bleeding or smearing from a saturated portion of an image
- Article 91: PGR camera not recognized by system and not listed in Device Manager
- Article 93: My laptop's IEEE-1394 port or PCMCIA card doesn't supply power to my camera
- Article 145: Image discontinuities or horizontal tearing of images when displayed on monitor
- Article 171: Performance of 1394 devices may decrease after installing Windows XP SP2
- Article 188: Image data acquired by my camera is corrupt and displayed images are broken
- Article 189: Image capture freezes after a period of successful image capture.

Contacting Point Grey Research

Email: For all general questions about Point Grey Research please contact us at info@ptgrey.com.

For technical support (existing customers only) contact us at http://www.ptgrey.com/support/contact/.

Main Office:

Mailing Address:
Point Grey Research, Inc.
12051 Riverside Way
Richmond B.C. Canada
V6W 1K7

Tel: +1 (604) 242-9937
Toll Free (N. America only):
+1 (866) 765-0827
Fax: +1 (604) 242-9938
Email: sales@ptgrey.com

Knowledge Base: Find answers to commonly asked questions in our knowledge base at http://www.ptgrey.com/support/kb/.

Downloads: Users can download the latest manuals and software from http://www.ptgrey.com/support/downloads/.

POINT GREY

R E S E A R C H

Flea®

IEEE-1394 Digital Camera System

Getting Started Manual