

Camera Physical Description



Aluminum case with C-/CS-mount lens holder (DX-xxx-CSBOX)



Bare-board with C-/CS-mount lens holder (DX-xxx-CS)

The *Dragonfly EXPRESS* camera is housed in an anodized aluminum case (DX-xxx-KIT and DX-xxx-CSBOX only). The dimensions of this case are 75mm x 65mm x 29mm, not including the optics or the rear GPIO connector. The lens mount can accommodate a standard C- or CS-mount lens.

The large mounting holes on the case are 1/4-20 tapped holes. The smaller mounting holes are M3 tapped holes. The lens set screw hole is 2mm and the set screw requires a 0.035-inch hex driver.

Status Indicator LED

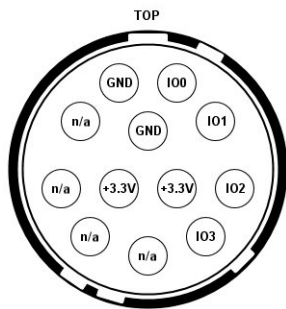
LED Status	Description
Steady on	Camera receiving power and successful initialization
Steady on and very bright	Camera acquiring / transmitting images
Flashing bright, then brighter	Camera registers being accessed (no image acquisition)
Steady flashing on and off	Indicates possible camera problem
Slow flashing on and off	Indicates possible camera problem

Camera Interface

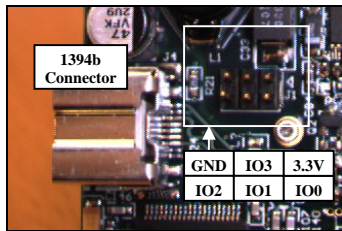
General Purpose IO (GPIO) Connector

The *Dragonfly EXPRESS* has a set of four (4) GPIO pins that can be accessed via the [Hirose](#) HR10 (12-pin) female circular connector on the back of the case.

Manufacturer Part Number:	HR10A-10R-12SB (female connector) HR10A-10P-12P (male counterpart)
Digikey Part Number:	HR361-ND (female) HR112-ND (male)



GPIO pin configuration (Hirose Connector)



GPIO pin configuration (bare board)

Pins 1 through 4 (GPIO 0 to GPIO3) can be configured as general purpose I/O (external triggering, general input/output, strobe output). Pins 7 and 8 (+3.3V) are capable of powering external circuitry up to a total of 50mA.

Pins 3 and 4 can also be used as an RS-232 serial port; however, a level converter must be used to convert the TTL digital logic levels to RS-232 voltage levels. [B&B Electronics](#) Part Number 232LPTTL can be used for this conversion.

Contacting Point Grey Research

General Information:

All general questions can be sent to:

info@ptgrey.com

Sales:

Please direct any sales related questions to:

sales@ptgrey.com

Knowledge Base:

We encourage all customers to search for answers to commonly asked questions in our knowledge base, which can be found at:

<http://www.ptgrey.com/support/kb>

Technical Support:

To contact technical support please go to our website:

<http://www.ptgrey.com/support/contact/>

Latest Manuals and Software:

Users can download the latest manuals, software and camera firmware from:

<http://www.ptgrey.com/support/downloads>

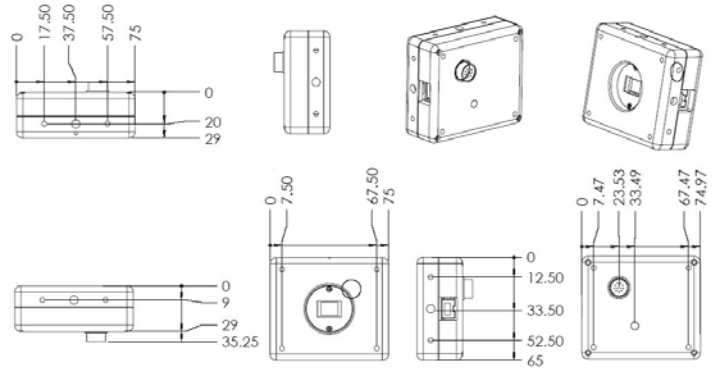
Other inquiries:

All other inquiries and correspondence can be directed to:

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Vancouver, BC, Canada
V6J 1Y6
Tel: 604-730-9937
Fax: 604-732-8231

Camera Measurements

The following diagrams illustrate the physical dimensions of the camera system.



Dragonfly EXPRESS physical dimensions

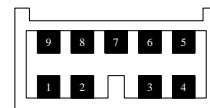
GPIO Electrical Characteristics

The *Dragonfly EXPRESS* 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. When configured as input, the pins can be directly driven from a 3.3V or 5V logic output. For output, each GPIO pin has almost no drive strength (they are high impedance) and needs to be buffered with a transistor or driver to lower its impedance. The pins are protected from both over and under voltage. However, it is recommended that they only be connected to 5V or 3.3V digital logic signals.

WARNING: Users should take every precaution to insure the correct wiring of the GPIO pins. Incorrect wiring could result in camera damage.

IEEE-1394b Connector

The *Dragonfly EXPRESS* has a standard 9-pin IEEE-1394b connector that is used for data transmission, camera control and powering the camera. The pin configuration for the socket is illustrated below.



Pin	Function
1	TPB- (Pair B -)
2	TPB+ (Pair B +)
3	TPA- (Pair A -)
4	TPA+ (Pair A +)
5	TPA(R) (Pair A Ground Ref.)
6	VG (Power Ground)
7	SC (Status Contact - Reserved NC)
8	VP (Power Input +8-32V DC)
9	TPB(R) (Pair B Ground Ref.)

IEEE-1394b pin configuration



Dragonfly EXPRESS

IEEE-1394b Digital Camera System

Getting Started Manual



Users can download the latest firmware and documents for their camera at:
<http://www.ptgrey.com/support/downloads>.

Included with this package

The following items should be included with your camera kit:

- *Dragonfly EXPRESS* IEEE-1394b digital camera unit
- 4.5 meter, 9-pin to 9-pin, IEEE-1394b cable
- IEEE-1394b OHCI PCI Host Adapter 3 port-800Mbps card
- 5mm spacer for use with C-mount lenses
- Anodized aluminum camera enclosure with C/CS-mount lens holder
- Hirose 12-pin male connector
- PGR FlyCapture SDK (C/C++ API and device drivers) CD

PLEASE NOTE: This list is only applicable to users who have purchased a camera kit (DX-xxx-KIT). Users who have purchased OEM versions of the camera system may or may not receive all of the items included in the list.

Camera specific information

Camera Specifications

Specification	Low Resolution	
Style	OEM board-level camera (anodized aluminum case available)	
Sensor (view datasheet)	Kodak 1/3" progressive scan interline CCD (dual-output) KAI-0340DM	
Resolution	640x480 (Y8 and Y16 Mono)	
A/D Converters	Analog Devices AD9849 A/D (x2)	
Video Output Signal	8 bits per pixel / 12 bits per pixel digital data	
Interfaces	9-pin IEEE-1394b for camera control and data transmission 4 general purpose digital input/output pins	
Voltage Requirements	8-32V	
Power consumption	Less than 4W	
Standard Frame Rates	1.875, 3.75, 7.5, 15, 30, 60, 120fps (200fps custom image mode)	
Custom Image Modes	Format 7, Modes 0 to 3 (region of interest modes)	
Gain	Automatic/Manual modes at 0.035dB resolution -6 to 30dB	
Shutter	Automatic/Manual modes 20us to 16.66ms @ 60Hz	Extended shutter mode up to 63s
Signal To Noise Ratio	Greater than 60dB	
Trigger Modes	DCAM v1.31 Trigger Modes 0, 1 and 3	
Dimensions	63.5mm x 50.8mm x 13.15mm (without lens holder)	
Mass	25 grams (without optics)	
Lens Adapter	M12 microlens (standard) or C- or CS-mount lens (KIT)	
Camera Specification	IIDC 1394-based Digital Camera Specification v1.31	
Emissions Compliance	Complies with CE rules and Part 15 Class B of FCC Rules (in aluminum case only). Operation is subject to the following two conditions: (1) this device may not cause harmful interference; and (2) this device must accept any interference received, including interference that may cause undesired operation.	
Operating Temp	Commercial grade electronics rated from 0° - 45°C	
Storage Temperature	Room temperature	
Camera Upgrades	Firmware upgradeable in field via IEEE-1394b interface.	

Precautions and Camera Care

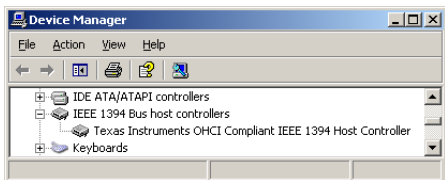
Your PGR IEEE 1394 digital camera module is a precisely manufactured device and should be handled with care. Here are some tips on how to care for the device.

- Avoid electrostatic charging. Please consult the following knowledge base article for more details:
<http://www.ptgrev.com/support/kb/details.asp?id=42>
- Users who have purchased a bare board camera should be sure to take the following additional protective measures:
 - 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. Fingerprints will affect the quality of the image produced by the device.
- 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.ptgrev.com/support/kb/details.asp?id=66>.
- Our cameras are designed for an office environment or laboratory use. 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 any kind of mishandling of the device.

Installing Your Camera System

NOTE: The driver and SDK must be installed before connecting the camera to your computer; otherwise your computer may not use the correct driver. If this happens, you must manually install the driver. For further instructions, please consult the knowledge base at <http://www.ptgrev.com/support/kb/>.

1. **Install the PCI card into an available PCI slot.**
Installing the 1394b PCI OHCI (Open Host Controller Interface) card is very similar to installing other PCI devices. Upon successful installation, the Windows Device Manager will list an *IEEE 1394 Bus host controller*.



2. **Install the PGR FlyCapture driver and SDK.**
Software installation can be achieved by either inserting the accompanying CD into your PC or downloading the latest software from <http://www.ptgrev.com/support/downloads>.

Further instructions on installing the FlyCapture software are available in the User Manual contained on the CD.

3. **Connect the camera to your computer.**
With the computer powered on, insert one end of the IEEE-1394 cable (included with the kit) into the camera and the other into the 1394 PCI card.

Camera Features

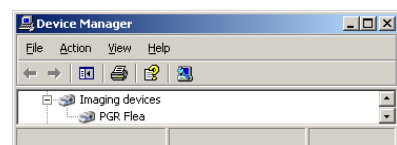
- **Automatic Synchronization:** Cameras operating on the same bus and running at the same frame rate will automatically synchronize to one another.
- **Upgradeable Firmware:** The camera employs a design that allows the firmware to be upgraded in field via the IEEE-1394b interface.
- **Gain and Brightness:** The camera employs a pair of 12-bit A/D converters that allows the user to modify the gain and brightness (black clamp) levels. The gain can be adjusted from -6 to 30dB.
- **Adjustable and Extended Integration Time:** The user has the ability to adjust the sensor's integration time via the IEEE-1394b interface. In addition to supporting the integration times outlined under *Camera Specifications*, extended shutter times upwards of several seconds are also supported.
- **High Frame Rate:** The *Dragonfly EXPRESS* is capable of transmitting full frames without compression across the IEEE-1394b bus at up to 120fps using standard video modes. In custom image mode, the camera can acquire and transmit images at 200fps (640x480 resolution).
- **General Purpose Input/Output:** The camera has 4 pins that can be used for general-purpose input and output. These GPIO pins can also be configured to behave as an RS-232 serial port.
- **Trigger Modes:** The camera supports a variety of standard external and internal DCAM compliant trigger modes including Trigger Mode_0, Trigger Mode_1 and Trigger Mode_3.
- **Strobe Output:** It is possible to configure the camera to output a triggering signal to an external device that is synchronized and offset with either the start of integration or an external trigger signal.
- **Regions of Interest:** The camera supports DCAM Format 7. This format allows the user to extract partial images at faster frame rates than those possible in full frame modes.

NOTE: The camera relies on the 9-pin IEEE 1394b cable to provide power. If an interface card other than that provided is to be used, ensure that adequate power is provided. The camera has been designed to conform to the IEEE-1394 standard for power – 8 to 32V DC – and requires less than 4W.

Windows 2000 will automatically recognize the device and prompt you to install the driver - this is usually done automatically. In Windows XP, the *Add Hardware Wizard* will appear. To properly install the device driver:

- Click *Install from a list or specific location* and click *Next*.
- Select *Don't search. I will choose the driver to install* and click *Next*.
- Click *Have Disk* and then *Browse* to the driver folder of your installed software (for example, *C:\Program Files\Point Grey Research\PGR FlyCapture\driver*), then click *Open*, then *OK*.
- Select the camera model (e.g. PGR *Dragonfly EXPRESS*) then click *Next*.

The driver installation process will proceed and you will be asked "if you want to install the unsigned driver" - click *Continue Anyway* then *Finish* to complete installation. Check Device Manager to verify correct installation:



4. **Test the system.**
Test the camera using the PGR FlyCap software. For more details see the PGR FlyCapture manual located at *Program Files > Point Grey Research > PGR FlyCapture > Documentation*.