## DRAGONFLY®2 SPECIFICATIONS

| SPECIFICATION | BW/COL/03S2 | HIBW/HICOL/08S2 | I3S2 |
|---|---|---|---|
| Image Sensor Type | Sony® 1/3" progressive scan CCDs | | |
| Image Sensor Model | ICX424 | ICX204 | ICX445 |
| Sensor Pixel Size | 7.4µm square pixels | 4.65µm square pixels | 3.75µm square pixels |
| Maximum Resolution | 648x488 | 1032x776 | 1296x964 |
| Maximum Frame Rate | 648x488 at 60 FPS | 1032x776 at 30 FPS | 1296x964 at 20 FPS |
| Lens Mount | C/CS-mount, M12 microlens | | C/CS-mount |
| A/D Converter | Analog Devices 12-bit analog-to-digital converter | | |
| Video Data Output | 8, 16 and 24-bit digital data | | |
| Partial Image Modes | Pixel binning and region of interest modes via Format_7 | | |
| Interfaces | 6-pin IEEE-1394a , 8-pin GPIO connector | | |
| Power Requirements | 8-30V, max 2W at 12V | | max 2.2W at 12V |
| Gain | Automatic/Manual/One-Push Gain modes, 0dB to 24dB | | |
| Shutter | Automatic/Manual/One-Push/Extended Shutter modes<br>0.01ms to 66.63ms at 15 FPS, greater than 5s in extended mode | | |
| Gamma | 0.50 to 4.00 | | |
| Trigger Modes | DCAM v1.31 Modes 0, 1, 3, 4, 5 and 14 | | Modes 0, 1, 3, 14 |
| Signal To Noise Ratio | Greater than 60dB at 0dB gain | | |
| Dimensions | 64mm x 51mm (bare board w/o case or lens holder) | | |
| Mass | 25 grams (bare board w/o case or optics) | | |
| Camera Specification | IIDC 1394-based Digital Camera Specification v1.31 | | |
| Emissions Compliance | Complies with CE rules and Part 15 Class A of FCC Rules | | |
| Temperature | -30° to 60°C (storage) • 0° to 45°C (operating) | | |
| Remote Head Option | Available with 6-inch shielded ribbon cable | | Not available |
| Case Enclosed Option | Available (except with remote head option) | | Not available |

## IMAGE ACQUISITION

| | |
|---|---|
| Automatic Synchronization | Multiple Dragonfly®2's on the same 1394 bus automatically sync |
| Multiple Trigger Modes | Bulb-trigger mode, multiple triggered exposures before readout |
| Trigger at Full Frame Rate | Overlapped trigger input, image acquisition and transfer |
| Pixel Binning and ROI | Pixel binning for higher sensitivity and faster frame rates |

## IMAGE PROCESSING

| | |
|---|---|
| Color Conversion | On-camera conversion to YUV411, YUV422 and RGB formats |
| Image Processing | On-camera control of sharpness, hue, saturation, gamma, LUT |
| Image Flipping | Horizontal image flipping (mirror image) |
| Embedded Image Info | Pixels contain frame-specific info (e.g. shutter, 1394 cycle time) |

## CAMERA AND DEVICE CONTROL

| | |
|---|---|
| Broadcast Properties | Apply settings (e.g. shutter, gain) to all cameras on the same bus |
| Auto Iris | On-board DC output for use by an auto iris lens |
| Auto White Balance | Auto and one-push white balance for easy color balancing |
| Temperature Sensor | Reports the temperature near the imaging sensor |
| Voltage Sensor | Monitors sensor voltages to ensure optimal image quality |
| Frame Rate Control | Fine-tune frame rates for video conversion (e.g. PAL @ 24 FPS) |
| Improved Strobe Output | Increased drive strength, configurable strobe pattern output |
| RS-232 Serial Port | Provides serial communication via GPIO TTL digital logic levels |
| Data Storage | Non-volatile storage of camera default settings and user data |
| Camera Upgrades | Firmware upgradeable in field via IEEE-1394 interface. |

## STATUS LED

| | |
|---|---|
| Steady on | Receiving power and successful camera initialization |
| Steady on and very bright | Acquiring / transmitting images |
| Flashing bright, then brighter | Camera registers being accessed (no image acquisition) |
| Steady or slow flashing on and off | Camera firmware updated (requires power cycle),<br>or possible camera problem |

## CAMERA INTERFACE

**IEEE-1394 Connector**

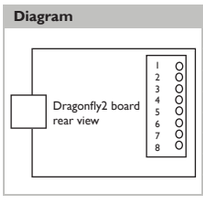
The Dragonfly®2 has a standard 6-pin IEEE-1394 connector that is used for data transmission, camera control and powering the camera. See the Dragonfly2 Technical Reference for pin configuration schematics.

**Cables**

The maximum 1394a 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 Input/Output (GPIO)**

The Dragonfly2 has an 8-pin GPIO connector. CSBOX models use a Phoenix Contact connector (Mfg P/N: 1881613). The male counterpart (Mfg P/N: 1881383) can be purchased from Digi-Key (P/N: 277-1436-ND). CS models use JST P/N: B8B-EH-A. The male counterpart (P/N: EHR-8) can be purchased from Digi-Key (P/N: 455-1006-ND), and requires crimping pins (Digi-Key P/N: 455-1042-1-ND).




| Pin | GPIO | Function |
|---|---|---|
| 1 | +3.3V | Provides +3.3V, current limited to 150mA |
| 2 | GND | |
| 3 | IO0 | Input / Output (default Trigger_Src) |
| 4 | IO1 | Input / Output |
| 5 | IO2 | Input / Output / RS232 Transmit (Output) TD or TX or TXD |
| 6 | IO3 | Input / Output / RS232 Receive (Input) RD or RX or RXD |
| 7 | GND | |
| 8 | $V_{EXT}$ | Power camera externally |

**Inputs** can be configured to accept external trigger signals. Outputs can be configured to send an output signal or strobe pulse. Refer to the Dragonfly2 Technical Reference for GPIO electrical characteristics.

## STANDARD IMAGE FORMATS

DR2-03S2C ● DR2-03S2M ● DR2-08S2C ● DR2-08S2M ● DR2-13S2C ● DR2-13S2M

| Mode Description | Frames Per Second | | | | | |
|---|---|---|---|---|---|---|
| | 1.875 | 3.75 | 7.5 | 15 | 30 | 60 |
| 160x120 YUV444 (24bpp) | | | ● ● | ● ● | ● ● | ● |
| 320x240 YUV422 (16bpp) | ● ● | ● ● | ● ● | ● ● | ● ● | ● |
| 640x480 YUV411 (12bpp) | ● ● | ● ● | ● ● | ● ● | ● ● | ● |
| 640x480 YUV422 (16bpp) | ● ● | ● ● | ● ● | ● ● | ● ● | |
| 640x480 RGB (24bpp) | ● ● | ● ● | ● ● | ● ● | ● ● | |
| 640x480 Y8 (8bpp) | ● ● ● ● ● ● | ● ● ● ● ● ● | ● ● ● ● ● ● | ● ● ● ● ● ● | ● ● ● ● ● ● | ● ○ |
| 640x480 Y16 (16bpp) | ● ● ● ● ● ● | ● ● ● ● ● ● | ● ● ● ● ● ● | ● ● ● ● ● ● | ● ● ● ● ● ● | |
| 800x600 YUV422 (16bpp) | | ● | ● | ● | ● | |
| 800x600 RGB (24bpp) | | | ● | ● | | |
| 800x600 Y16 (16bpp) | | ● ● | ● ● | ● ● | ● ● | |
| 800x600 Y8 (8bpp) | | | ● ● | ● ● | ● ● | |
| 1024x768 YUV422 (16bpp) | ● | ● | ● | ● | | |
| 1024x768 RGB (24bpp) | ● | ● | ● | | | |
| 1024x768 Y16 (16bpp) | ● ● | ● ● | ● ● | ● ● | | |
| 1024x768 Y8 (8bpp) | ● ● | ● ● | ● ● | ● ● | ● ● | |
| 1280x960 YUV422 (16bpp) | ● | ● | ● | | | |
| 1280x960 RGB (24bpp) | ● | ● | ● | | | |
| 1280x960 Y16 (16bpp) | ● ● | ● ● | ● ● | | | |
| 1280x960 Y8 (8bpp) | ● ● | ● ● | ● ● | ● ● | | |

# Getting Started

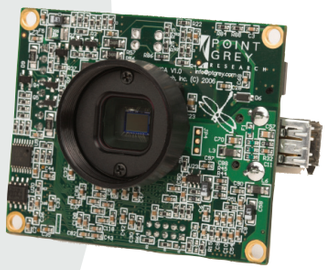
## DRAGONFLY®2 IEEE-1394a Digital Camera

The following items are included with your Dragonfly2 Development Accessory Kit

All Development Kits
- 4.5 meter, 6-pin to 6-pin, IEEE-1394 cable w/ferrites
- IEEE-1394 OHCI PCI Host Adapter 400Mb/s card
- 5mm spacer for use with C-mount lens
- FlyCapture SDK (C/C++ API and device drivers) CD

DR2-DEVKIT
- Male GPIO connector for easy external wiring
- CS-mount lens with variable focus and auto-iris

DR2-OEM-DEVKIT
- 6mm microlens and lens holder†
- Male GPIO connector pre-wired for easy triggering
- Anodized aluminum tripod mounting bracket



## DRAGONFLY2 MODELS

DR2-13S2M/C-CS

DR2-HIBW/HICOL-CS
DR2-BW/COL-CS

DR2-HIBW/HICOL-CSBOX
DR2-BW/COL-CSBOX

DR2-03S2M/C-CS
DR2-08S2M/C-CS

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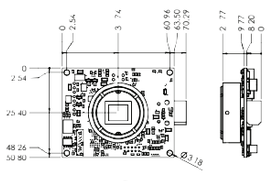
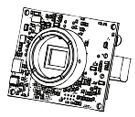
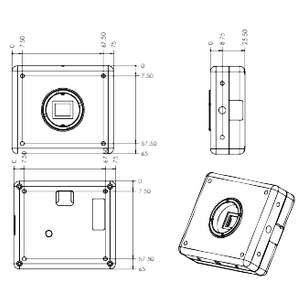
## TECHNICAL DRAWINGS

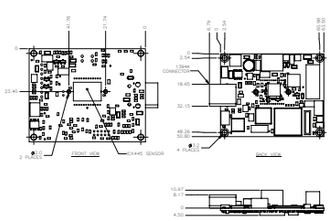




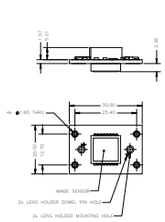
DR2-HIBW/HICOL-CS
DR2-BW/COL-CS



DR2-HIBW/HICOL-CSBOX
DR2-BW/COL-CSBOX



DR2-13S2M/C-CS



DR2-xx-EX-CS
(remote head part only)

## 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 www.ptgrey.com/support/contact/.

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**Fax:** +1 (604) 242-9938
**Email:** sales@ptgrey.com

**Knowledge Base:**

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

**Downloads:**

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

# 1 Installation

### 1. Recommended System Configuration

| OS | CPU | RAM | VIDEO | PORTS |
|---|---|---|---|---|
| Windows XP SP1 | 2.0GHz or equivalent | 512mb | AGP 128mb | IEEE-1394a |

- 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
- IEEE-1394a PCI card (available in dev kit)
- 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:

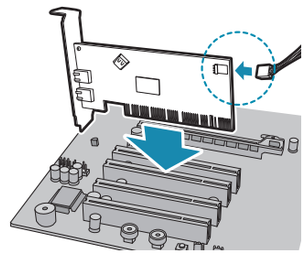
- This product is not intended for use in residential environments.
- Either handle bare handed or use non-chargeable gloves, clothes or material. Also use conductive shoes.
- Install a conductive mat on the floor or working table to prevent the generation of static electricity.

- 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.
- This device complies with Part 15 of the FCC Rules. 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 undesirable operation. This Class A digital apparatus complies with Canadian ICES-003. Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

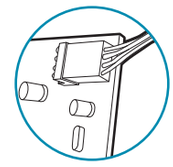
- To clean the imaging surface of your CCD, follow the steps outlined in www.ptgrey.com/support/kb/index.asp?a=4&q=66.
- Extended exposure to bright sunlight, rain, dusty environments, etc. may cause problems with the electronics and the optics of the system.
- Avoid excessive shaking, dropping or mishandling of the device.

# 2 Installation

### 3. Install the IEEE-1394 PCI card

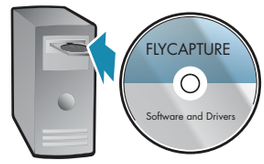


- Turn computer off and place the IEEE-1394 PCI card in an open PCI slot.
- Connect the 4-pin connector on the card to the PC power supply.



- 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 the PCI card is properly installed as an ***IEEE 1394 Bus host controller***.

### 4. Install the FlyCapture® Software and Drivers

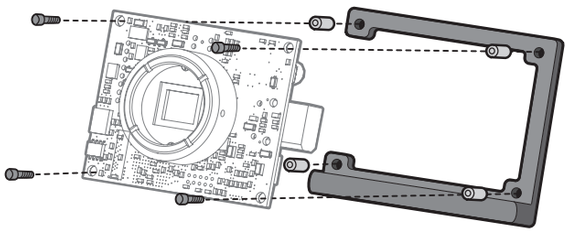



- Insert the FlyCapture software CD-ROM. If the Installation Wizard does not automatically run, browse to your CD-ROM directory and run the ***setup.exe*** file.
- Follow the installation instructions to install the software.
- A dialog will appear asking if you want to downgrade your Windows XP drivers.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

# 3 Installation

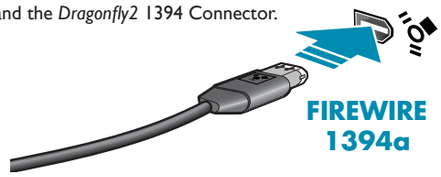
### 5. Installing the Tripod Mounting Bracket (optional)

- The bracket included with the DR2-OEM-DEVKIT attaches to the bare board camera using the included M3x14 screws and nylon spacers.
- For full instructions, consult the *Dragonfly®2 Technical Reference Manual*.



### 6. Connect the 1394 PCI Card and Cable to the *Dragonfly2*

- Plug the 4.5 meter, 6-pin to 6-pin, IEEE-1394 cable into the 1394 PCI card and the *Dragonfly2* 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\signed\<your platform>***, click *"**Open**"*, then *"**OK**"*.
- Select the camera model (e.g. PGR Dragonfly2 DR2-COL). Click *"**Next**"*.
- You will be prompted to continue installation - click *"**Continue Anyway**"* then *"**Finish**"* to complete 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*.

# 4 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 (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
- Article 297: Mounting a heavy lens on a Dragonfly2 may cause damage