

# Technical Application Note TAN2006005

*Transitioning from the Flea<sup>®</sup> to the Flea<sup>®</sup>2: A How-To Guide*

*Revised May 30, 2006*

## 1.1. Subject

Technical Application Note (TAN2006001): Transitioning from the Flea to the Flea2: A How-To Guide.

## 1.2. Applicable Product(s)

- **Flea** (all models) with firmware v1.0 Release Candidate 7 or later
- **Flea2** (all models)

Consult [Knowledge Base Article 94](#) for information on how to determine camera firmware versions. The most recent firmware versions can be downloaded at [www.ptgrey.com/support/downloads/](http://www.ptgrey.com/support/downloads/).

## 1.3. Application Note Description

The *Flea2* was developed as the next generation replacement for the popular *Flea* camera. It supports all of the features of the *Flea*, yet also offers a significant number of additional features such as an IEEE-1394b interface for greater 1394 bus bandwidth, on-board color processing and an even smaller form factor. While the most significant change is, perhaps, the new 1394b interface, PGR has designed the *Flea2* to be backward-compatible with the IEEE-1394a standard used by the *Flea*.

The purpose of this Technical Application Note is to:

1. Outline the primary similarities and differences between the two cameras; and
2. Offer suggestions and pointers to end users for migrating their custom applications from the *Flea* to the *Flea2*.

**NOTE:** PGR strongly encourages users to put the *Flea2* through a full requalification process before deciding to fully migrate from the *Flea*. The [Point Grey Research Evaluation Program](#) offers qualified customers an excellent opportunity to evaluate the *Flea2*.

Given the significant number of mechanical, hardware and firmware feature enhancements included in the *Flea2*, this document will limit its discussion to similarities and differences that could directly impact current *Flea* users interested in transitioning to the *Flea2*, such as:

- **Mechanics:** dimensions, lens systems, case and brackets, physical and I/O connectors
- **Hardware:** 1394 interface, I/O electrical characteristics, imaging sensors
- **Firmware:** IIDC 1394-based Digital Camera compliance, camera properties

### 1.3.1. General Considerations

#### 1.3.1.1. Other Reference Documentation

Other useful sources of information regarding specific features of the Applicable Product(s) include:

- [PGR IEEE-1394 Digital Camera Register Reference](#)
- [Flea Getting Started Manual](#)
- [Flea2 Getting Started Manual](#)
- [PGR Imaging Products Comparison Chart](#)

#### 1.3.1.2. Testing Tools

To configure and test the information presented in this TAN:

1. **Connect the camera's GPIO pins to an oscilloscope or external trigger source.** By connecting the appropriate GPIO pins to an external trigger source or oscilloscope, you can observe the differences in general purpose input/output capability of the Applicable Product(s). Consult your camera's *Technical Reference* or *Getting Started* manual for:
  - a. GPIO connector pin layouts; and
  - b. GPIO electrical characteristics
2. **Download the FlyCapture SDK.** The SDK includes numerous example programs that demonstrate various camera features. Specific examples that relate to this TAN include *AsyncTriggerEx* and *ExtendedShutterEx*.
3. **Access the camera's register space.** The easiest way to try this is using the FlyCap demo software included with the *PGR FlyCapture SDK*. For register definitions and individual bit descriptions, please refer to the *PGR IEEE-1394 Digital Camera Register Reference*.

#### 1.3.1.3. Camera Orientation

For the purposes of this document, the “*left side*” of the camera is from the point of view of looking out of the camera through the CCD.

#### 1.3.1.4. Acronyms

- A/D converter: analog-to-digital converter
- DCAM: IIDC 1394-based Digital Camera specification
- GPIO: general purpose input / output
- SDK: software development kit

### 1.3.2. Mechanics

| Description                               | Same? | Flea  | Flea2   |
|---|-------|---|---|
| <i>IR cut filter properties</i>           | Y     | The infrared cut-off filter used with color versions of the cameras is the same and has the same transmittance properties.  |   |
| <i>GPIO connector</i>                     | Y     | <b>NOTE:</b> While the type of connector is the same, the GPIO connector position on the back of the camera has changed.  |   |
| <i>CCD sensor placement on PCB</i>        | Y     | The chip and lens holder mounting holes are centered relative to the four corner mounting holes.  |   |
| <i>Overall dimensions</i>                 | N     | 30mm x 31mm x 29mm  | 29mm x 29mm x 30mm  |
|   |       | <b>NOTE:</b> Dimensions do not include lens holder or 1394/GPIO connector   |   |
| <i>Lens holder</i>                        | N     | CS-mount  | C-mount   |
|   |       |   |   |
| <i>Case description</i>                   | N     | Black aluminum with logo and web address on the sides   | Black zinc (casted) with black aluminum top, no logos   |
| <i>Mass</i>                               | N     | 48g   | 58g   |
|   |       | <b>NOTE:</b> Not including lens or C-mount lens adapter (Flea)  |   |
| <i>Tripod mounting bracket</i>            | N     | <ul style="list-style-type: none"> <li>• Secured by two (2) M2 screws</li> </ul>  | <ul style="list-style-type: none"> <li>• Secured by four (4) M2x2mm screws</li> <li>• Meets ISO and ASA standards</li> </ul>  |
| <i>Mounting holes</i>                     | N     | None, other than the tripod mounting bracket holes  | <ul style="list-style-type: none"> <li>• Three (3) M3x2.5mm holes on the bottom face</li> <li>• Four (4) M2x2mm holes on the bottom face (for mounting bracket)</li> <li>• Two (2) M2 holes on the top face</li> </ul>                          |
| <i>Removable glass / IR filter system</i> | N     | <ul style="list-style-type: none"> <li>• BW models: no glass between sensor and optics</li> <li>• COL models: IR filter glued into place between sensor and optics</li> </ul> | <ul style="list-style-type: none"> <li>• BW models: protective dust glass between sensor and optics</li> <li>• COL models: IR filter between sensor and optics</li> <li>• Glass / IR filter screwed into place to allow easy removal</li> </ul> |

### 1.3.3. Hardware and Electronics

| Description                     | Same? | Flea  | Flea2   |
|---------------------------------|-------|---|---|
| CCD imaging sensors             | Y     | 640x480 Black and White: <a href="#">Sony ICX424AL</a><br>640x480 Color: <a href="#">Sony ICX424AQ</a><br>1024x768 Black and White: <a href="#">Sony ICX204AL</a><br>1024x768 Color: <a href="#">Sony ICX204AK</a>  |   |
| RoHS compliant                  | Y     | <i>Flea2</i> has always been RoHS compliant. See <a href="#">Knowledge Base Article 232</a> for more details on upcoming <i>Flea</i> RoHS compliance.   |   |
| GPIO pin mapping                | Y     | GPIO pins 1 to 8 map to the same functions.   |   |
| IEEE-1394 interface             | N     | <ul style="list-style-type: none"> <li>• 6-pin IEEE-1394a (400Mb/s)</li> <li>• Connector protrudes from case</li> </ul>   | <ul style="list-style-type: none"> <li>• 9-pin IEEE-1394b (800Mb/s)</li> <li>• Connector flush with case</li> <li>• Secure jack screw connector</li> </ul>  |
|                                 |       | <b>Recommendation:</b> The <i>Flea2</i> is backward compatible with standard 1394a OHCI host adapters. To connect the <i>Flea2</i> to a 1394a card, such as those provided with <i>Flea</i> camera kits, use a 6-pin to 9-pin 1394 cable. However, bus speed will be limited to S400. |   |
| Power consumption               | N     | Less than 3W  | Less than 2W  |
| GPIO electrical characteristics | N     | <ul style="list-style-type: none"> <li>• Pin 1 (+3.3V) is capable of powering external circuitry up to a total of 50mA.</li> <li>• When configured as outputs each of the four I/O lines have almost no drive strength.</li> </ul>  | <ul style="list-style-type: none"> <li>• Pin 1 (+3.3V) is capable of powering external circuitry up to a total of 150mA.</li> <li>• When configured as outputs, each of the four I/O lines can sink 10mA of current.</li> </ul> |
| A/D converter                   | N     | Analog Devices AD9849<br>Resolution: 12-bit   | Analog Devices AD9949A<br>Resolution: 12-bit  |

### 1.3.4. Firmware and Software

This section does not address the significant number of features that have been added in the *Flea2*, but focuses on functional differences between the two cameras that could affect integration of the *Flea2* in existing *Flea*-based applications. Users are encouraged to download the documents listed in Section 1.3.1.1: Other Reference Documentation for assistance with terms, camera specifications, and register definitions.



*Many default startup (power-up) parameters, such as resolution, frame rate, gain, and shutter, have changed in the Flea2. However, PGR has implemented memory channels on the Flea2 that can be used for creating new default settings.*



*PGR cannot predict if or how all of the following differences may affect user applications. This section provides recommendations on how to address some of the most obvious differences in functionality.*

| Description                              | Flea   | Flea2   |
|--|--|---|
| <i>Color processing</i>                  | Color models output raw Bayer information when run in standard (Format_0 or Format_1) Y8/Y16 modes. This raw data is then color processed in software by the PC.   | Color models output greyscale information when run in standard (Format_0 or Format_1) Y8/Y16 modes. The conversion from raw Bayer information to greyscale is done on-board the camera. |
|  | <p><b>Recommendation:</b> To access raw data from the <i>Flea2</i> for color processing in software by the PC, users should configure the camera to acquire images using one of the Format_7 video modes that support Raw8 or Raw16 pixel encoding e.g. using flycaptureStartCustomImage(). Users can then apply any of the standard FlyCapture color processing algorithms to the image data.</p> <p><b>Recommendation:</b> Use the <i>Flea2</i> memory channel feature to change the default video mode to Format_7, as described above.</p> |   |
| <i>Lookup table</i>                      | <ul style="list-style-type: none"> <li>• 11-bit to 8-bit mapping</li> <li>• One (1) LUT for raw Bayer data</li> </ul>  | <ul style="list-style-type: none"> <li>• 11-bit to 9-bit mapping</li> <li>• Three (3) LUT's for RGB</li> </ul>  |
| <i>White balance setting</i>             | <ul style="list-style-type: none"> <li>• Red / Blue range: 0 to 127</li> </ul>   | <ul style="list-style-type: none"> <li>• Red / Blue range: 1 to 1023</li> <li>• Auto white balance (default on)</li> </ul>  |
| <i>Maximum resolution using Format_7</i> | <ul style="list-style-type: none"> <li>• 640x480 (FLEA-xx)</li> <li>• 1024x768 (FLEA-HIxx)</li> </ul>  | <ul style="list-style-type: none"> <li>• 648x488 (FL2-xx)</li> <li>• 1032x776 (FL2-HIxx)</li> </ul>   |

## 1.4. Additional Downloads and Support

Access more PGR Technical Application Notes on the web at:

[www.ptgrey.com/support/downloads](http://www.ptgrey.com/support/downloads)

Point Grey Research Inc. endeavors to provide the highest level of technical support possible to our customers. Most support resources can be accessed through the Product Support section of our website: [www.ptgrey.com/support](http://www.ptgrey.com/support).

## **Creating a Customer Login Account**

The first step in accessing our technical support resources is to obtain a Customer Login Account. This requires a valid name, e-mail address, and camera serial number. To apply for a Customer Login Account go to [www.ptgrey.com/support/downloads/](http://www.ptgrey.com/support/downloads/).

## **Knowledge Base**

Our on-line knowledge base at [www.ptgrey.com/support/kb/](http://www.ptgrey.com/support/kb/) contains answers to some of the most common support questions. It is constantly updated, expanded, and refined to ensure that our customers have access to the latest information.

## **Product Downloads**

Customers with a Customer Login Account can access the latest software and firmware for their cameras from our downloads site at [www.ptgrey.com/support/downloads](http://www.ptgrey.com/support/downloads). We encourage our customers to keep their software and firmware up-to-date by downloading and installing the latest versions.

## **Contacting Technical Support**

Before contacting Technical Support, have you:

1. *Read the product documentation and user manual?*
2. *Searched the Knowledge Base?*
3. *Downloaded and installed the latest version of software and/or firmware?*

If you have done all the above and still can't find an answer to your question, contact our Technical Support team at [www.ptgrey.com/support/contact/](http://www.ptgrey.com/support/contact/).