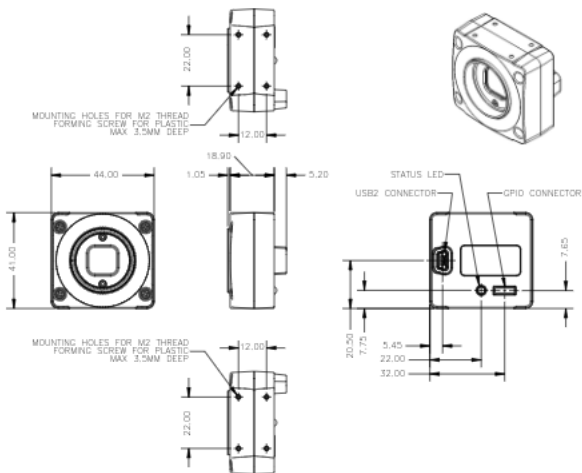# Development Kit Contents

- 2 meter USB 2.0 cable (Type A to Mini-B 5-pin)
- ACC-01-3002 GPIO wiring harness
- Chameleon Getting Started Manual
- FlyCapture SDK CD



# Camera Specifications

| Specification | CMLN-13S2M/C |
|---|---|
| Image Sensor Model | Sony progressive scan interline transfer ICX445 1/3" EXview HAD CCD™ |
| Maximum Resolution | 1296(H) x 964(V) |
| Pixel Size | 3.75µm x 3.75µm |
| A/D Converter | Analog Devices 12-bit ADC |
| Video Data Output | 8 and 16-bit digital data |
| Image Data Formats | Y8, Y16 (monochrome), 8-bit and 16-bit Bayer data (color models) |
| Digital Interface | 5-pin Mini-B USB 2.0 digital interface for camera control, video data transmission, and power |
| Data Transfer Rate | 480Mbits/s |
| Maximum Frame Rate | 1296x964 Y8 at 18FPS |
| Partial Image Modes | pixel binning and region of interest modes via Format_7 |
| General Purpose I/O | 7-pin JST GPIO connector, 4 pins for trigger and strobe, 1 pin +3.3 V, 1 $V_{EXT}$ pin for external power |
| Gain | automatic / manual / one-push gain modes, programmable via software, 0 dB to 24 dB in 0.04 dB increments |
| Shutter | automatic / manual / one-push modes, programmable via software, 0.01 ms to greater than 10 s (extended shutter mode) |
| Synchronization | via external trigger, |
| Trigger Modes | DCAM v1.31 Trigger Modes 0, 1 (bulb trigger), 3, and 14 (overlapped trigger and transfer) |
| Memory Storage | 3 memory channels for custom camera settings |
| Power Requirements | 4.745 to 5.25 V via the Mini B USB 2.0 interface or JST 7-pin GPIO connector |
| Power Consumption | 2 W (max) at 5 V |
| Dimensions (DxWxH) | 25.5 mm x 41 mm x 44 mm (excluding optics) |
| Mass | 37 grams (including tripod mounting bracket) |
| Lens Mount | CS-mount (5mm C-mount adapter included) |
| Emissions Compliance | Complies with CE rules and Part 15 Class B of FCC Rules |
| Temperature | 0° to 45°C(Operating), -30° to 60°C(Storage) |
| Warranty | 1 year |

# Spectral Response (QE)

## Monochrome Model
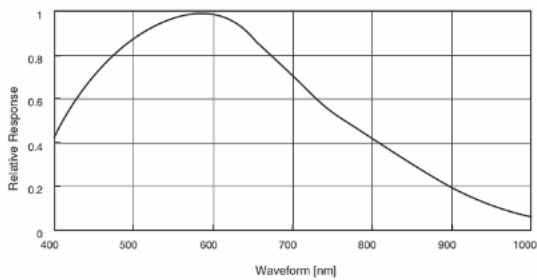


## Color Model
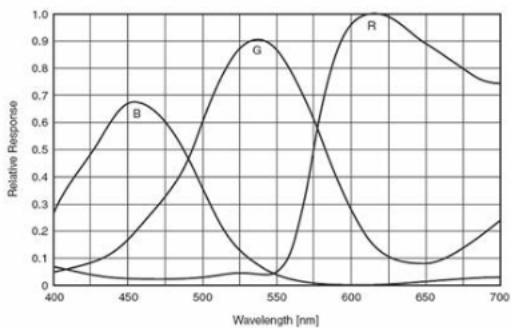


# Camera Features

## Image Acquisition

| Feature | Description |
|---|---|
| USB 2.0 Bandwidth | 480 Mb/s interface |
| Programmable Exposure | User-programmable shutter and gain settings via software |
| Fast Frame Rates | Faster standard frame rates, pixel binning and ROI support |
| Multiple Trigger Modes | Bulb-trigger mode |
| Trigger at Full Frame Rate | Overlapped trigger input, image acquisition and transfer |
| Embedded Image Info | Pixels contain frame-specific info |

## Camera and Device Control

| Feature | Description |
|---|---|
| Frame Rate Control | Fine-tune frame rates for video conversion (e.g. PAL @ 24 FPS) |
| Memory Channels | Non-volatile storage of camera default power-up settings |
| Camera Upgrades | Firmware upgradeable in field via USB 2.0 interface. |

## Mechanics and Form Factor

| Feature | Description |
|---|---|
| Ultra-Compact Design | Small (25.5mm x 41mm x 44mm) and light (37g) |
| Industry Standard Design | ASA/ISO-compliant mounting bracket and CS-mount lens holder |

## Status LED

| LED Status | Description |
|---|---|
| Off | Not receiving power |
| 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 flashing on and off | Indicates possible camera problem |
| Slow flashing on and off | Indicates possible camera problem |

# Standard Image Formats

| Mode | Frames Per Second | | | | |
|---|---|---|---|---|---|
| | 1.875 | 3.75 | 7.5 | 15 | 30 |
| 640x480 Y8 | ●● | ●● | ●● | ●● | ●● |
| 640x480 Y16 | ●● | ●● | ●● | ●● | ●● |
| 1280x960 Y8 | ●● | ●● | ●● | ●● | |
| 1280x960 Y16 | ●● | ●● | ●● | | |

● 13S2C   ● 13S2M

# Camera Interface

## USB 2.0 Connector
The Chameleon has a USB 2.0 Mini-B vertical connector (pin configuration shown below) that is used for data transmission, camera control and powering the camera. For more detailed information, consult the USB 2.0 specification available from http://www.usb.org/developers/docs/.

## Cables
The maximum cable length between any USB mode (e.g. camer to USB, USB to hub, etc.) is 5.0m, as specified by the USB specification. Standard, shielded twisted pair copper cables must be used.

## General Purpose Input/Output (GPIO)
The Chameleon has a 7-pin GPIO connector on the back of the case. The connector is made by JST (Mfg P/N: BM07B-SRSS-TB). The Development Kit contents include a pre-wired female connector; refer to the diagram below for wire color-coding. Additional female connectors (Mfg P/N: SHR-07V-S-B) can be purchased from Digikey (P/N: 455-1382-ND).

| Diagram | Pin | GPIO | Function |
|---|---|---|---|
| | 1 | VEXT | Power camera externally. Voltage limit: 4.75 to 5.25V |
| 7 6 5 4 3 2 1 | 2 | +3.3V | Power external circuitry up to a total of 150mA |
| black green green green green red white | 3 | IO0 | Input / Output (default Trigger_Src) |
| | 4 | IO1 | Input / Output |
| Pre-wired GPIO cable | 5 | IO2 | Input / Output |
| | 6 | IO3 | Input / Output |
| | 7 | GND | Input / Output |

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

## 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
- USB 2.0 port
- 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 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 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.

### 4. Installing the Tripod Adapter (optional)

- The ASA and ISO-compliant tripod adapter for the Chameleon attaches to the camera using the included M2x3.5 screws.

### 5. Connect the Camera to the USB 2.0 port

- Plug the 2-meter USB 2.0 cable (Type A to Mini-B 5-pin) into the host machine's USB 2.0 port and the Chameleon connector.
- If the Microsoft Windows "Found New Hardware Wizard" appears, proceed to Step 6. Otherwise, proceed to Step 7.

## 3 Installation

### 6. Install the PGRUSBCam 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.

### 7. Confirm Successful Installation

- Check the Device Manager to confirm that installation was successful (PGRUSBCam driver install only). Go to the Start menu, select Run and enter "devmgmt.msc".
- 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 145: Image discontinuities or horizontal tearing of images when displayed on monitor
- 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 197: Extending the distance between a PGR camera and the controlling host system.

## 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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**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/.

# POINT GREY
### RESEARCH

# Chameleon™

USB 2.0 Digital Camera



Getting Started
Manual