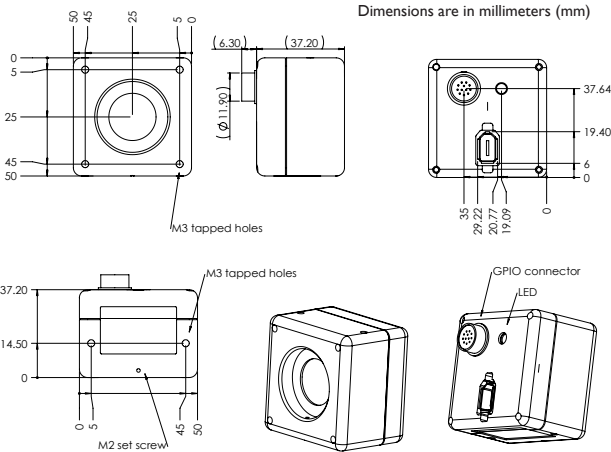


Development Kit Contents

- 4 meter, 6-pin to 6-pin, IEEE-1394 cable
- IEEE-1394 OHCI PCI Host Adapter 3-port 400Mb/s card
- Male GPIO connector pre-wired for quick and easy access
- Tripod mounting adapter
- FlyCapture® SDK (C/C++ API and device drivers) CD

Physical Dimensions



Mounting

Top and Bottom Mounts

The *Scorpion™* is equipped with two M3 mounting holes on each of the top and bottom faces of the case (4 holes total). These holes can be used to attach the camera directly to a custom mount or to the Scorpion tripod mounting bracket.

Front Mount

The *Scorpion* is equipped with four M3 mounting holes on the front (sensor) face that can be used to attach the camera directly to a custom fixture.

Lens Setup and Compatibility

The *Scorpion* is compatible with both C- and CS-mount lenses (not included). To differentiate between C- and CS-mount lenses, consult www.ptgrey.com/support/kb/index.asp?a=4&q=98.

Adjusting Lens Focus

A lens M2 set screw is located on the underside of the *Scorpion* camera body, toward the side closest to the lens. The set screw is used to hold the adjustable *C/CS* lens holder ring in place once the lens is focused.

The *Scorpion* comes pre-focused to the standard CS-mount lens focal length (12.52mm). Should you need to adjust the back focal length, loosen the set screw with the 0.035" (inch) hex driver provided with the camera before adjusting the focal length. For more information on lens focusing, consult the following knowledge base article: www.ptgrey.com/support/kb/index.asp?a=4&q=122.

Camera Specifications

Specification	03SO	14SO	20SO
Imaging Sensor	Sony progressive scan CCD with global (frame) shutter		
	1/2"	1/2"	1/1.8"
	ICX414 (658x494)	ICX267 (1392x1040)	ICX274 (1600x1200)
Pixel Size	9.9µm x 9.9µm	4.65µm x 4.65µm	4.4µm x 4.4µm
A/D Converter	Analog Devices AD9849 12-bit analog-to-digital converter		
Video Data Output	8 and 16-bit digital data (see <i>Image Formats</i> below)		
Resolution and FPS	See <i>Image Formats</i> section below		
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 2.6W	Less than 3.5W	Less than 3.5W
Gain	Automatic/Manual/One-Push Gain with absolute value support -10dB to 26dB		
Shutter	Automatic/Manual/One-Push Shutter with absolute value support		
	0.02ms to 533ms	0.02ms to 533ms	0.03ms to 533ms
	Extended Shutter mode		
	Up to 7s	Up to 30s	Up to 23s
Gamma	0.50 to 4.00		
Trigger Modes	DCAM v1.31 Trigger Modes 0, 1, 3, and 14		
Signal To Noise Ratio	Greater than 55dB		
Dimensions	50mm x 50mm x 40mm (without optics)		
Mass	125 grams (without 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		
Operating Temperature	Commercial grade electronics rated from 0° to 45°C		
Storage Temperature	-30° to 60°C		

Camera Features

Image Acquisition

Feature	Description
Automatic Synchronization	Multiple Scorpion's on the same 1394 bus automatically sync
Fast Frame Rates	Stream VGA images at 60 FPS (03SO)
Large 1/2" and 1/1.8" CCDs	High 1392x1040 (14SO) and 1600x1200 (20SO) resolution
High Sensitivity	Large 9.9µm x 9.9µm square pixel size (03SO)
Partial Image Modes	ROI and pixel binning for faster frame rates and better sensitivity
Multiple Trigger Modes	Standard, bulb-trigger, and overlapped trigger at full frame rate
Shutter and Exposure	Manual, auto or one-push programmable adjustment of shutter
Gain and Brightness	Adjust gain and black clamp via a pair of 12-bit A/D converters

Image Processing

Feature	Description
Gamma and LUT	On-camera control of 11-bit to 8-bit 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	Apply settings (e.g. shutter, gain) to all cameras on the same bus
Auto White Balance	Auto white balance for easy color balancing
Frame Rate Control	Fine-tune frame rates for video conversion (e.g. PAL @ 24 FPS)
Strobe Output	PWM pulse and configurable strobe pattern output
RS-232 Serial Port	Provides serial communication via standard RS232 voltage levels
Camera Upgrades	Firmware upgradeable in field via IEEE-1394 interface.

Standard Image Formats

■ = SCOR-03SO ■ = SCOR-14SO ■ = SCOR-20SO

Standard Modes	Frames Per Second					
	1.875	3.75	7.5	15	30	60
640x480 Y16 (16bpp)	■ ■	■ ■	■ ■	■ ■	■ ■	
640x480 Y8 (8bpp)	■ ■	■ ■	■ ■	■ ■	■ ■	■
800x600 Y16 (16bpp)		■	■	■	■	
800x600 Y8 (8bpp)			■	■	■	
1280x960 Y16 (16bpp)	■ ■	■ ■	■ ■			
1280x960 Y8 (8bpp)	■ ■	■ ■	■ ■	■ ■		
1600x1200 Y16 (16bpp)	■	■	■			
1600x1200 Y8 (8bpp)	■	■	■	■		

Partial Image Formats (Format_7)

Mode_0: Region of interest Mode_1: 2x2 pixel binning Mode_2: 1x2 pixel binning

Model	Mode	Pixel Format	Size	FPS
SCOR-03SO	0	Mono8 (8bpp)	320x240	82
SCOR-03SO	0	Mono8 (8bpp)	160x120	100
SCOR-14SO	0	Mono8 (8bpp)	1024x768	21
SCOR-14SO	0	Mono8 (8bpp)	640x480	25
SCOR-20SO	0	Mono8 (8bpp)	1280x1024	16
SCOR-20SO	0	Mono8 (8bpp)	1024x768	18
SCOR-20SO	0	Mono8 (8bpp)	640x480	21

Camera Interface

IEEE-1394 Connector

The *Scorpion™* has a standard 6-pin IEEE-1394 connector that is used for data transmission, camera control and powering the camera. See the *Scorpion Technical Reference* for detailed 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 I/O Connector

The *Scorpion* has a 12-pin Hirose HR10 (Mfg P/N: HR10A-10R-12SB) female circular connector on the back of the case. Camera KIT contents include a pre-wired male connector; refer to the diagram below for wire color-coding. Additional male counterparts (Mfg P/N: HR10A-10P-12P) can be purchased from Digi-Key (P/N: HR112-ND).

Diagram	Pin	Function	Description
Model A	1	IO0	Input / Output (default Trigger_Src)
	2	IO1	Input / Output
	3	IO2	Input / Output
	4	IO3	Input / Output
	5	RTS	RS-232 Request to Send
	6	CTS	RS-232 Clear to Send
	7	TX	RS-232 Transmit (Output)
	8	RX	RS-232 Receive (Input)
	9, 10	GND	Power external circuitry up to a total of 150mA
	11, 12	+3.3V	
Model B			To configure the GPIO pins, consult the "General Purpose Input / Output" section of the PGR IEEE-1394 Digital Camera Register Reference.

*Due to stock fluxuation the GPIO cable you receive is either Model A or B

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.

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 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 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 mounting bracket included with the KIT attaches to the camera case using the included M3 screws.
- For full instructions, consult the *Scorpion Technical Reference Manual*.

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 camera's 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 PGR CAM 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. 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 PGR 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](#) 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

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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

Scorpion™

IEEE-1394 Digital Camera System



Getting Started Manual

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