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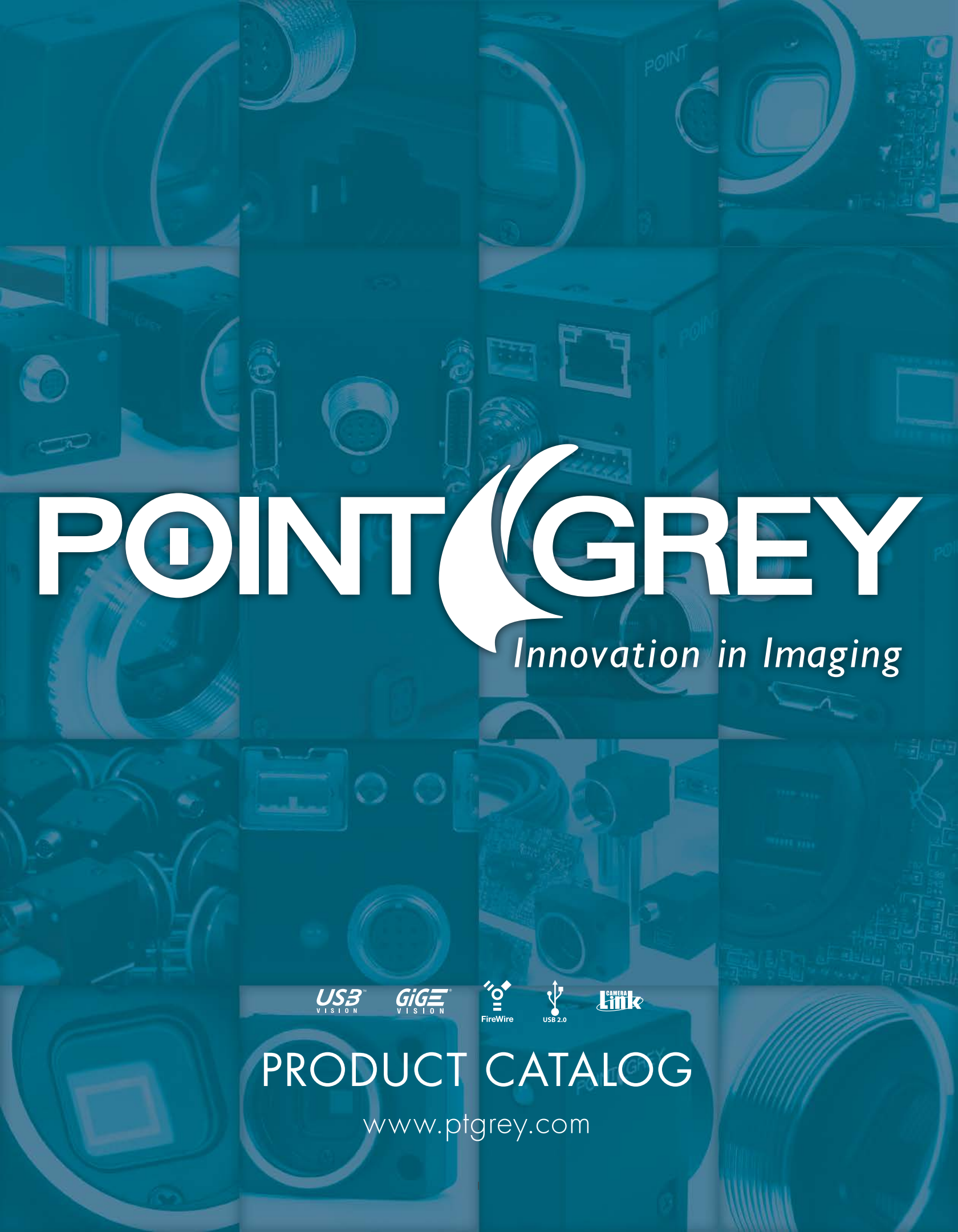
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Find the *FLIR Systems / Point Grey Research Grasshopper2 GS2-FW-14S5M* at our website: *Click HERE*



POINT GREY

Innovation in Imaging

USB VISION GiGE VISION FireWire USB 2.0 CAMERA Link

PRODUCT CATALOG

www.ptgrey.com



ABOUT POINT GREY

POINT GREY is a global leader in the research, design, and manufacturing of innovative, high-performance digital cameras for industrial, scientific, GIS, traffic, and security applications. We offer a unique and comprehensive portfolio of USB3 Vision, GigE Vision, FireWire, USB 2.0 and Camera Link products known for their outstanding quality, ease of use, and unbeatable price-performance.

QUICK FACTS

- Founded 1997
- ISO 9001:2008 registered company
- 200+ staff worldwide
- 150 K camera/year capacity
- Designed and manufactured in Canada
- Global offices & distribution network



INNOVATION

At Point Grey, "innovation" is more than a tagline; it's a way of life. The synergies of a broad range of hardware, software and mechanical engineering skills under one roof allows Point Grey to continually bring innovative and ground-breaking products to market. This drive for innovation has led to many industry firsts, including the world's first and smallest 1394b digital camera, the world's smallest GigE camera, and the world's first USB 3.0 camera.

PRODUCT EXCELLENCE

All design, prototyping, manufacturing, testing, and packaging is done out of a state-of-the-art facility in Richmond, BC, Canada. These facilities include dedicated



SMT lines, AOI and X-ray machines, industrial clean room, and automated test stations. The "Seal of Quality" label on each camera cannot be printed until the camera has been 100% inspected and tested. This rigorous quality testing, together with hassle-free product warranties, ensures that customers can rely on Point Grey cameras for their demanding applications.

CUSTOMER CARE

To ensure our customers achieve maximum value from their camera systems, Point Grey offers world-class support on installation, configuration, customization and trouble shooting. Our Customer Support program includes quick response email and phone support, online user



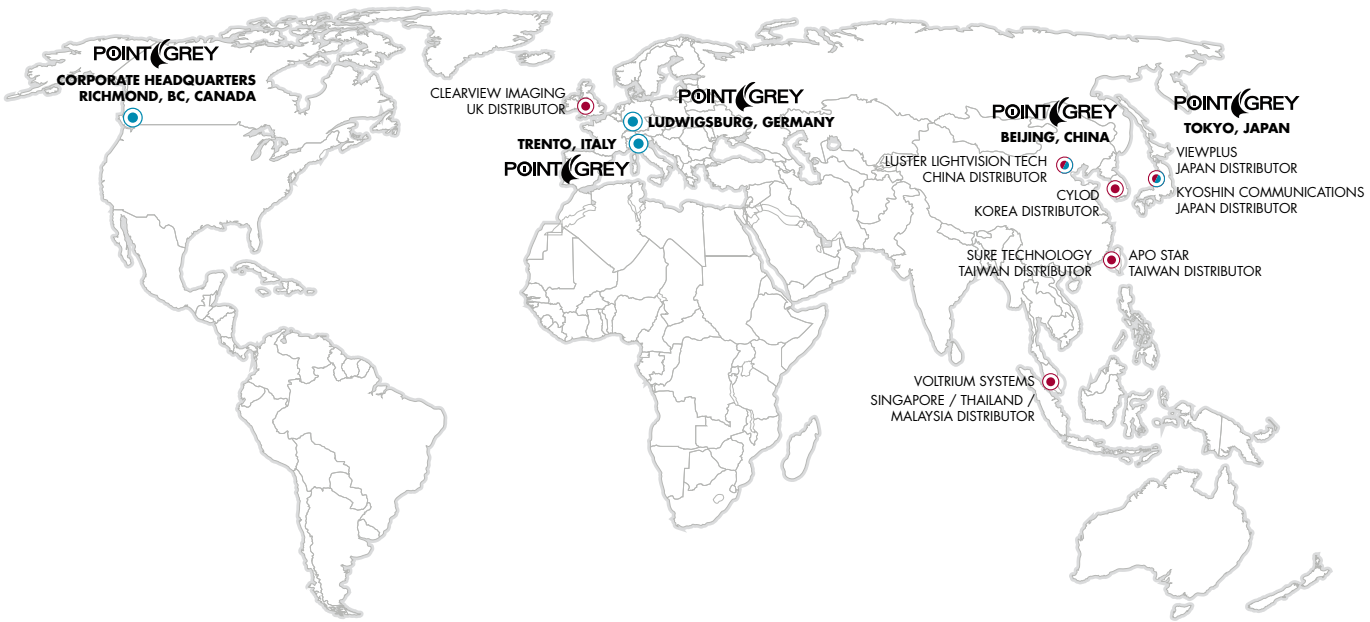
manuals, online knowledge base articles and regular firmware updates.

END-TO-END IMAGING

A critical component of any vision system is the speed and reliability of the imaging pipeline, from light hitting the image sensor to data reaching the host system. Point Grey has taken ownership of the entire pipeline, and over the last 16 years has created a diverse portfolio of digital cameras, peripheral components, and software.







2000
First IEEE 1394 stereo vision camera
Digiclops

2001
First IEEE 1394 imaging camera
Firefly

2002
First spherical vision camera
Ladybug

2003
First Flea camera

2004
First IEEE 1394b camera
Dragonfly Express

2005
Headquarters expansion

New products
Dragonfly2
Ladybug2

2006
Office opens in Germany

New products
Flea2
Firefly MV

2007
New products
Grasshopper
FirePRO

2008
Headquarters expansion

New product
USB 2.0 camera
Chameleon

New product
Ladybug3

2009
World's first
USB 3.0 Camera

2010
New products
Flea3

New product
GigE camera
Grasshopper2

2011
First
Camera Link camera
Gazelle

First USB 3.0 camera
Flea3

World's smallest
GigE camera
Flea3

New product
Grasshopper Express

2012
China office opens

New Product
IP camera
Zebra2

World's Smallest
PoE GigE Camera
Blackfly

2013
New USB3 products
Ladybug5
Grasshopper3

2014
New USB3 products
Blackfly USB 3.0
Chameleon 3

New GigE products
Grasshopper3 GigE

Point Grey USB 3.0 Camera Features:

- Largest selection of CCD and CMOS sensors
- FPGA and frame buffer-based architecture for optimal reliability
- Point Grey proprietary USB 3.0 link layer and driver stack
- Industry-standard C- and CS- mount
- Fully tested USB 3.0 accessories: interface cards, hubs, cables, and lenses

CHAMELEON®3

FLEXIBLE FORM FACTOR



Model#	Sensor Specifications				Shutter	Max Res	Max FPS
CM3-U3-13S2C/M-CS	1.3MP	Sony ICX445 CCD**	1/3"	3.75 µm	Global	1288 x 964	30 fps
CM3-U3-13Y3C/M-CS[1]	1.3MP	On Semi Python1300 CMOS	1/2"	4.8 µm	Global	1280 x 1024	150 fps
CM3-U3-28S4C/M-CS[1]	2.8MP	Sony ICX818 CCD**	1/1.8"	3.69 µm	Global	1928 x 1448	13 fps

[1] COMING SOON

**High sensitivity Sony EXview HAD CCD™

BLACKFLY®

CCD PERFORMANCE AND VALUE



Model#	Sensor Specifications				Shutter	Max Res	Max FPS
BFLY-U3-03S2C/M-CS	0.3MP	Sony ICX424 CCD	1/3"	7.4 µm	Global	648 x 488	84 fps
BFLY-U3-05S2C/M-CS	0.5MP	Sony ICX693 CCD	1/3"	6.0 µm	Global	808 x 608	50 fps
BFLY-U3-13S2C/M-CS	1.3MP	Sony ICX445 CCD**	1/3"	3.75 µm	Global	1288 x 964	30 fps
BFLY-U3-20S4C/M-CS	2.0MP	Sony ICX274 CCD**	1/1.8"	4.4 µm	Global	1624 x 1224	15 fps

**High sensitivity Sony EXview HAD CCD™

	CHAMELEON®3	BLACKFLY®
INTERFACE	USB 3.0 interface with screw locks for camera control, data, and power	USB 3.0 interface with screw locks for camera control, data, and power
GPIO	9-pin JST GPIO connector, 4 pins for trigger and strobe, 1 pin +3.3 V, 1 VEXT pin for external power 1 opto-isolated input, 1 opto-isolated output	6-pin Hirose HR10A-7R-6PB GPIO connector for trigger, strobe, and power. 1 opto-isolated input, 1 opto-isolated output
ADC	12-bit	12-bit
IMAGE DATA FORMATS	Y8, Y16, Mono8, Mono12, Mono16 (all models) RGB8, YUV411, YUV422, YUV444, Raw8, Raw12, Raw16 (color models)	Y8, Y16, Mono8, Mono12, Mono16 (all models) RGB8, YUV411, YUV422, YUV444, Raw8, Raw12, Raw16 (color models)
PARTIAL IMAGE MODES	Pixel binning and region of interest (ROI) modes	Pixel binning and region of interest (ROI) modes
GAIN RANGE	Automatic*/manual/one-push* (*Free running only) 0 dB to 24 dB	Automatic*/manual/one-push* (*Free running only) 0 dB to 24 dB
EXPOSURE RANGE	Automatic/manual/one-push* 0.046 ms to 32 seconds	Automatic/manual/one-push* 0.015 ms to 32 seconds
GAMMA	0.50 to 4.00, programmable lookup table	0.50 to 4.00, programmable lookup table
TRIGGER MODES	Standard, bulb, multi-shot	Standard, bulb, multi-shot
IMAGE BUFFER	16 MB frame buffer	16 MB frame buffer
USER SETS	2 memory channels for custom camera settings	2 memory channels for custom camera settings
SIZE (WxHxD)	44 x 35 x 19.5 mm excluding lens holder (metal case)	29 x 29 x 30 mm excluding lens holder (metal case)
MASS	55g (Without optics or tripod mounting bracket)	36g (Without optics or tripod mounting bracket)
POWER	5 V, <3 W, via GPIO or USB 3.0 interface	5 V, <3 W, via GPIO or USB 3.0 interface
LENS MOUNT	CS-mount	CS-mount
TEMPERATURE	-30° to 60°C (storage) • 0° to 45°C (operating)	-30° to 60°C (storage) • 0° to 45°C (operating)
WARRANTY	3 years	3 years







FLEA®3

ULTRA-COMPACT, ULTRA-FAST CMOS



Model#	Sensor Specifications			Shutter	Max Res	Max FPS
FL3-U3-13S2C/M-CS	1.3MP	Sony IMX035 CMOS*	1/3"	3.63µm Rolling	1328 x 1048	120 fps
FL3-U3-13Y3M-C	1.3MP	ON Semi VITA 1300 CMOS	1/2"	4.8 µm Global	1280 x 1024	150 fps
FL3-U3-13E4C/M-C	1.3MP	e2v EV76C560 CMOS	1/1.8"	5.3 µm Global	1280 x 1024	60 fps
FL3-U3-20E4C/M-C	2.0MP	e2v EV76C5706F CMOS	1/1.8"	4.5 µm Global	1600 x 1200	59 fps
FL3-U3-32S2C/M-CS	3.2MP	Sony IMX036 CMOS*	1/2.8"	2.5 µm Rolling	2080 x 1552	60 fps
FL3-U3-88S2C-C	8.8MP	Sony IMX121 CMOS**	1/2.5"	1.55µm Rolling	4096 x 2160	21 fps

**High performance Sony Exmor R CMOS™

GRASSHOPPER®3

HIGH PERFORMANCE CCD AND CMOS



Model#	Sensor Specifications			Shutter	Max Res	Max FPS
GS3-U3-14S5C/M-C	1.4MP	Sony ICX285 CCD	2/3"	6.45 µm Global	1384 x 1036	30 fps
GS3-U3-15S5C/M-C	1.4MP	Sony ICX825 CCD	2/3"	6.45 µm Global	1384 x 1036	45 fps
GS3-U3-23S6C/M-C	2.3MP	Sony IMX174 CMOS*	1/1.2"	5.86 µm Global	1920 x 1200	162 fps
GS3-U3-28S4C/M-C	2.8MP	Sony ICX687 CCD**	1/1.8"	3.69 µm Global	1928 x 1448	26 fps
GS3-U3-28S5C/M-C	2.8MP	Sony ICX674 CCD**	2/3"	4.54 µm Global	1920 x 1440	26 fps
GS3-U3-41S4C/M-C	4.1MP	Sony ICX808 CCD**	1/1.8"	3.1 µm Global	2016 x 2016	18 fps
GS3-U3-41C6NIR-C	4.1MP	CMOSIS CMV4000-3E12 CMOS	1"	5.5 µm Global	2048 x 2048	90 fps
GS3-U3-41C6C/M-C	4.1MP	CMOSIS CMV4000-3E5 CMOS	1"	5.5 µm Global	2048 x 2048	90 fps
GS3-U3-50S5C/M-C	5.0MP	Sony ICX625 CCD	2/3"	3.45 µm Global	2448 x 2048	15 fps
GS3-U3-60S6C/M-C	6.0MP	Sony ICX694 CCD**	1"	4.54 µm Global	2736 x 2192	13 fps
GS3-U3-60QS6C/M-C	6.0MP	Sony ICX694 CCD**	1"	4.54 µm Global	2736 x 2192	25 fps
GS3-U3-91S6C/M-C	9.1MP	Sony ICX814 CCD**	1"	3.69 µm Global	3376 x 2704	9 fps
GS3-U3-120S6C/M-C[1]	12 MP	Sony ICX834 CCD**	1"	3.1 µm Global	4242 x 2830	7 fps

[1] COMING SOON

*High performance Sony Pregius™ Global Shutter CMOS **High sensitivity Sony EXview HAD CCD II™

USB 3.0 interface with screw locks for camera control, data, and power	USB 3.0 interface with screw locks for camera control, data, and power	**INTERFACE**
8-pin Hirose HR25 GPIO connector for power, trigger, strobe, PWM, and serial I/O: 1 opto-isolated input, 1 opto-isolated output, 2 bi-directional I/O pins	8-pin Hirose HR25 GPIO connector for power, trigger, strobe, PWM, and serial I/O: 1 opto-isolated input, 1 opto-isolated output, 2 bi-directional I/O pins	**GPIO**
12-bit (FL3-U3-13S2, FL3-U3-32S2, FL3-U3-88S2) / 10-bit (FL3-U3-13Y3, FL3-U3-13E4, FL3-U3-20E4)	14-bit • 10/12-bit (GS3-U3-23S6) • 10-bit (GS3-U3-41C6)	**ADC**
Y8, Y16, Mono8, Mono12, Mono16 (all models) RGB8, YUV411, YUV422, YUV444, Raw8, Raw12, Raw16 (color models)	Mono8, Mono12, Mono16 (all models) RGB, YUV411, YUV422, YUV444, Raw8, Raw12, Raw16 (color models)	**IMAGE DATA FORMATS**
Pixel binning and region of interest (ROI) modes	Pixel binning and region of interest (ROI) modes	**PARTIAL IMAGE MODES**
Automatic*/manual/one-push* (*Free running only) 0 dB to 24 dB (FL3-U3-13S2, FL3-U3-32S2,FL3-U3-88S2) 0 db to 18 db (FL3-U3-13Y3, FL3-U3-13E4)	Automatic/manual/one-push modes 0 dB to 24 dB (GS3-U3-23S6, GS3-U3-28S4, GS3-U3-28S5, GS3-U3-41C6) -6.158 dB to 24 dB (GS3-U3-60S6); -9 dB to 24 dB (GS3-U3-91S6)	**GAIN RANGE**
Automatic*/Manual/One-Push*/Extended Shutter** modes (*Free running only) (**except FL3-U3-13Y3) 0.008 ms to 1 second (FL3-U3-13S2) / 0.006 ms to 1 second (FL3-U3-13Y3) / 0.016 ms to 1 second (FL3-U3-13E4) / 0.01 ms to 32 seconds (FL3-U3-20E4, FL3-U3-32S2) / 0.021 ms to 1 second (FL3-U3-88S2)	Automatic/manual/one-push/extended shutter modes Up to 32 seconds (GS3-U3-28S5, GS3-U3-41S4, GS3-U3-50S5, GS3-U3-60S6, GS3-U3-91S6) / up to 30 seconds (GS3-U3-28S4) / up to 4 seconds (GS3-U3-41C6) / up to 3.2 seconds (GS3-U3-23S6)	**EXPOSURE RANGE**
0.50 to 4.00, programmable lookup table	0.50 to 4.00, programmable lookup table	**GAMMA**
Standard, bulb, multi-shot	Standard, bulb, multi-shot, overlapped (excludes GS3-U3-23S6)	**TRIGGER MODES**
32 MB frame buffer	128 MB frame buffer	**IMAGE BUFFER**
2 memory channels for custom camera settings	2 memory channels for custom camera settings	**USER SETS**
29 x 29 x 30 mm excluding lens holder (metal case)	44 x 29 x 58 mm excluding lens holder (metal case)	**SIZE (WxHxD)**
35g - 41 g (Without optics or tripod mounting bracket)	90 g (Without optics or tripod mounting bracket)	**MASS**
5 V, <3 W, via GPIO or USB 3.0 interface	5-24 V via GPIO or 5 V via USB 3.0 interface, maximum 4.5 W	**POWER**
CS-mount (FL3-U3-13S2, FL3-U3-32S2), C-mount (FL3-U3-13Y3, FL3-U3-13E4, FL3-U3-20E4, FL3-U3-88S2)	C-mount	**LENS MOUNT**
-30° to 60°C (storage) • 0° to 45°C (operating)	-30° to 60°C (storage) • 0° to 50°C (operating)	**TEMPERATURE**
3 years	3 years	**WARRANTY**





GiGE VISION

Point Grey GigE Camera Features:
- Unique selection of CCD and CMOS sensors
- Supports GigE Vision 1.2
- Industry's most compact sizes
- GigE image filter driver for reduced latency and maximized bandwidth
- Firmware versions updatable in the field
- On-board temperature, power sensors, and status LED

BLACKFLY®

WORLD'S SMALLEST POE CAMERA



Model#	Sensor	Specifications			Shutter	Max Res	Max FPS
BFLY-PGE-03S2C/M-CS	0.3MP	Sony ICX424 CCD	1/3"	7.4 µm	Global	648 x 488	84 fps
BFLY-PGE-03S3C/M-CS	0.3MP	Sony ICX414 CCD	1/2"	9.9 µm	Global	648 x 488	90 fps
BFLY-PGE-05S2C/M-CS	0.5MP	Sony ICX693 CCD	1/3"	6.0 µm	Global	808 x 608	50 fps
BFLY-PGE-09S2C/M-CS	0.9MP	Sony ICX692 CCD**	1/3"	4.08 µm	Global	1288 x 728	30 fps
BFLY-PGE-12A2C/M-CS	1.2MP	Aptina AR0134 CMOS	1/3"	3.75 µm	Global	1280 x 960	52 fps
BFLY-PGE-13S2C/M-CS	1.3MP	Sony ICX445 CCD*	1/3"	3.75 µm	Global	1288 x 964	22 fps
BFLY-PGE-13E4C/M-CS	1.3MP	e2v EV76C560 CMOS	1/1.8"	5.3 µm	Global	1280 x 1024	60 fps
BFLY-PGE-14S2C-CS	1.4MP	Sony IMX104 CMOS	1/3"	3.75 µm	Rolling	1296 x 1032	60 fps
BFLY-PGE-20E4C/M-CS	2.0MP	e2v EV76C570 CMOS	1/1.8"	4.5 µm	Global	1600 x 1200	47 fps
BFLY-PGE-23S2C-CS	2.3MP	Sony IMX136 CMOS	1/2.8"	2.8 µm	Rolling	1920 x 1200	27 fps
BFLY-PGE-23S6C/M-C	2.3MP	Sony IMX249 CMOS***	1/1.2"	5.86 µm	Global	1920 x 1200	30 fps
BFLY-PGE-50A2C/M-CS	5.0MP	Aptina MT9P006/031 CMOS	1/2.5"	2.2 µm	Rolling	2592 x 1944	13 fps
BFLY-PGE-50H5C/M-C	5.0MP	Sharp RJ32S4/S3AA0DT CCD	2/3"	3.45 µm	Global	2448 x 2048	7.5 fps

*High sensitivity Sony EXview HAD CCD™ **High sensitivity Sony EXview HAD CCD II™ ***High performance Sony Pregius™ Global Shutter CMOS

FLEA®3

WORLD'S SMALLEST GIGE CAMERA



Model#	Sensor	Specifications			Shutter	Max Res	Max FPS
FL3-GE-03S1C/M-C	0.3MP	Sony ICX618 CCD*	1/4"	5.6 µm	Global	648 x 488	120 fps
FL3-GE-03S2C/M-C	0.3MP	Sony ICX424 CCD	1/3"	7.4 µm	Global	648 x 488	82 fps
FL3-GE-08S2C/M-C	0.8MP	Sony ICX204 CCD	1/3"	4.65 µm	Global	1032 x 776	31 fps
FL3-GE-13S2C/M-C/CS	1.3MP	Sony ICX445 CCD*	1/3"	3.75 µm	Global	1288 x 964	31 fps
FL3-GE-14S3C/M-C	1.4MP	Sony ICX267 CCD	1/2"	4.65 µm	Global	1384 x 1032	18 fps
FL3-GE-20S4C/M-C	2.0MP	Sony ICX274 CCD	1/1.8"	4.4 µm	Global	1624 x 1224	15 fps
FL3-GE-28S4C/M-C	2.8MP	Sony ICX687 CCD**	1/1.8"	3.69 µm	Global	1928 x 1448	14 fps
FL3-GE-50S5C/M-C	5.0MP	Sony ICX655 CCD	2/3"	3.45 µm	Global	2448 x 2048	8 fps

*High sensitivity Sony EXview HAD CCD™ **High sensitivity Sony EXview HAD CCD II™

	BLACKFLY	FLEA3
INTERFACE	Gigabit Ethernet interface with screw locks for camera control and data; Power over Ethernet	Gigabit Ethernet interface with screw locks for camera control and data
GPIO	6-pin Hirose HR10A-7R-6PB GPIO connector for trigger, strobe, and power. 1 opto-isolated input, 1 opto-isolated output	8-pin Hirose HR25 GPIO connector for power, trigger, strobe, PWM, and serial I/O, 1 opto-isolated input, 1 opto-isolated output, 2 bi-directional I/O pins
ADC	10-bit (BFLY-PGE-13E4, BFLY-PGE-20E4) • 12-bit	12-bit
IMAGE DATA FORMATS	Mono8, Mono12, Mono16, Raw8, Raw12, Raw16 (all models) RGB, YUV411, YUV422, YUV 444 (color models)	Y8, Y16, Mono8, Mono12, Mono16 (all models) RGB, YUV411, YUV422, YUV 444, Raw8, Raw12, Raw16 (color models)
PARTIAL IMAGE MODES	Pixel binning and region of interest (ROI) modes	Pixel binning and region of interest (ROI) modes
GAIN RANGE	Automatic*/manual/one-push*/ 0 dB to 18 dB (*free running BFLY-PGE-13E4)	Automatic/manual/one-push/ 0 dB to 24 dB
EXPOSURE RANGE	Automatic/manual/one-push* (*free running BFLY-PGE-13E4) 0.015 ms to 32 seconds	Automatic/manual/one-push/extended shutter modes 0.03 ms to 2 sec (FL3-GE-03S2); 0.03 ms to 4 sec (FL3-GE-08S2, FL3-GE-13S2); 0.03 ms to 6 sec (FL3-GE-50S5); 0.03 ms to 32 sec (FL3-GE-03S1, FL3-GE-14S3, FL3-GE-20S4, FL3-GE-28S2)
GAMMA	0.50 to 4.00, programmable lookup table	0.50 to 4.00, programmable lookup table
TRIGGER MODES	Standard, overlapped, multi-shot	Standard, bulb, skip frames, overlapped, multiple exposure, multi-shot, low smear mode (FL3-GE-13S2, FL3-GE-28S4 models only)
IMAGE BUFFER	16 MB frame buffer	32 MB frame buffer
USER SETS	2 memory channels for custom camera settings	2 memory channels for custom camera settings
SIZE (WxHxD)	29x29x30 mm excluding lens holder, without optics (metal case)	29x29x30 mm excluding lens holder, without optics (metal case)
MASS	36 grams (without optics or tripod mounting bracket)	38 grams (without optics or tripod mounting bracket)
POWER	Standard voltage via Power over Ethernet (PoE) or 5 - 16 V via GPIO interface, < 2.5 W	12-24 V, <2.5 W, via GPIO
LENS MOUNT	CS-mount (5 mm C-mount adapter sold separately) / C-mount (BFLY-PGE-23S6)	C-mount (FL3-GE-13S2 also available with CS-mount)
TEMPERATURE	-30° to 60°C (storage) • 0° to 45°C (operating)	-30° to 60°C (storage) • 0° to 45°C (operating)
WARRANTY	3 years	3 years



GiGE VISION POE ENABLED



GiGE VISION



GRASSHOPPER®2

HIGH-RESOLUTION SONY CCDS



Model#	Sensor Specifications				Shutter	Max Res	Max FPS
GS2-GE-20S4C/M-C	2.0MP	Sony ICX274 CCD	1/1.8"	4.4 µm	Global	1624 x 1224	29 fps
GS2-GE-50S5C/M-C	5.0MP	Sony ICX625 CCD*	2/3"	3.45 µm	Global	2448 x 2048	15 fps

*High sensitivity Sony Super HAD CCD II™

GRASSHOPPER®3

POE, FAST, HIGH-RESOLUTION IMAGING



Model#	Sensor Specifications				Shutter	Max Res	Max FPS
GS3-PGE-23S6C/M-C	2.3MP	Sony IMX174 CMOS*	1/1.2"	5.86 µm	Global	1920 x 1200	45 fps
GS3-PGE-50S5C/M-C	5.0MP	Sony ICX625 CCD	2/3"	3.45 µm	Global	2448 x 2048	15 fps
GS3-PGE-60S6C/M-C	6.0MP	Sony ICX694 CCD**	1"	4.54 µm	Global	2736 x 2192	13 fps
GS3-PGE-91S6C/M-C	9.1MP	Sony ICX814 CCD**	1"	3.69 µm	Global	3376 x 2704	9 fps

*High performance Sony Exmor CMOS™ **High sensitivity Sony EXview HAD CCD II™

Gigabit Ethernet interface with screw locks for camera control and data	Gigabit Ethernet interface with screw locks for camera control and data; Power over Ethernet	**INTERFACE**
8-pin Hirose HR25 GPIO connector for power, trigger, strobe, PWM, and serial I/O 1 opto-isolated input,1 opto-isolated output, 2 bi-directional I/O pins	8-pin Hirose HR25 GPIO connector for power, trigger, strobe, PWM, and serial I/O 1 opto-isolated input,1 opto-isolated output, 2 bi-directional I/O pins	**GPIO**
14-bit	10/12-bit (GS3-PGE-23S6) • 14-bit	**ADC**
Y8, Y16, (all models) RGB, YUV411, YUV422, YUV444, Raw8, Raw16, (color models)	Mono8, Mono12, Mono16 (all models) RGB, YUV411, YUV422, YUV444, Raw8, Raw12, Raw16 (color models)	**IMAGE DATA FORMATS**
Pixel binning and region of interest (ROI) modes	Pixel binning and region of interest (ROI) modes	**PARTIAL IMAGE MODES**
Automatic/manual/one-push/ 3.6 dB to 24 dB	Automatic/manual/one-push/ 0 dB to 24 dB /-9dB to 24 dB (GS3-PGE-91S6)	**GAIN RANGE**
Automatic/manual/one-push/extended shutter modes 0.03 ms to >30 seconds (extended shutter mode)	Automatic/manual/one-push/extended shutter modes Up to 32 seconds (GS3-PGE-60S6, 50S5) / up to 3.2 seconds (GS3-PGE-23S6)	**EXPOSURE RANGE**
0.50 to 4.00, programmable lookup table	0.50 to 4.00, programmable lookup table	**GAMMA**
Standard, bulb, skip frames, overlapped, multi-shot	Standard, bulb, skip frames, overlapped, multi-shot	**TRIGGER MODES**
32 MB frame buffer	128 MB frame buffer	**IMAGE BUFFER**
2 memory channels for custom camera settings	2 memory channels for custom camera settings	**USER SETS**
44x29x58 mm excluding lens holder and connectors (metal case)	44x29x58 mm excluding lens holder and connectors (metal case)	**SIZE (WxHxD)**
86 grams (without optics or tripod mounting bracket)	86 grams (without optics or tripod mounting bracket)	**MASS**
8-30 V, <4.7 W, via GPIO or interface	8-30 V, <4.7 W, via GPIO or interface	**POWER**
C-mount	C-mount	**LENS MOUNT**
-30° to 60°C (storage) • 0° to 45°C (operating)	-30° to 60°C (storage) • 0° to 50°C (operating)	**TEMPERATURE**
3 years	3 years	**WARRANTY**





GiGE VISION

ZEBRA®2

HYBRID IP AND MACHINE VISION CAMERA

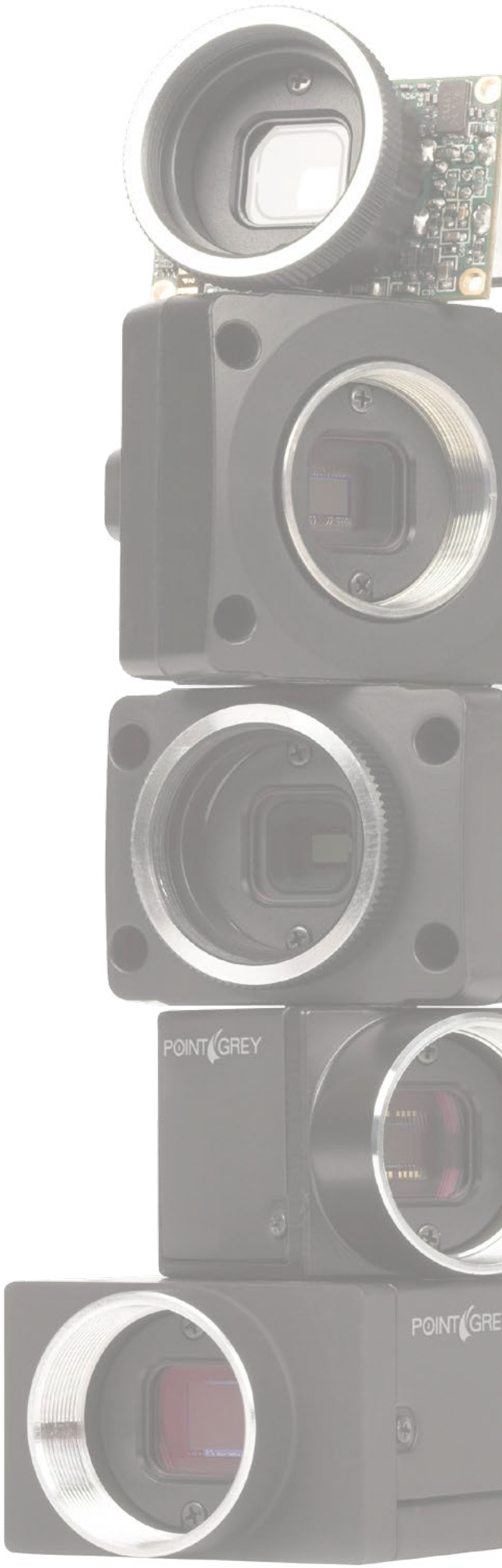


Model#	Sensor Specifications				Shutter	Max Res	Max FPS
ZBR2-PGEHD-20S4C-CS	2.0MP	Sony ICX274 CCD	1/1.8"	4.4µm	Global	1624 x 1224	30 fps (HD-SDI 25 FPS)
ZBR2-PGEHD-28S4C-CS	2.8MP	Sony ICX687 CCD*	1/1.8"	3.69µm	Global	1928 x 1448	26 fps (HD-SDI 25 FPS)
ZBR2-PGEHD-50S5C-CS	5.0MP	Sony ICX625 CCD	2/3"	3.45µm	Global	2448 x 2048	15 fps (HD-SDI 25 FPS)
ZBR2-PGEHD-51S5C-CS	5.0MP	Sony ICX655 CCD	2/3"	3.45µm	Global	2448 x 2048	10 fps (HD-SDI 25 FPS)

HD-SDI up to 2.97 Gbit/s for video. Gigabit Ethernet interface with screw locks for camera control and data; Power over Ethernet.	**INTERFACE**
6-pin GPIO connector for trigger, strobe, and serial I/O 1 opto-isolated input, 1 opto-isolated output, RS-485 interface	**GPIO**
12-bit (ZBR2-PGEHD-51S5) • 14-bit	**ADC**
Raw8, Raw12, Raw16, RGB, YUV411, YUV422, MJPEG Image Compression	**IMAGE DATA FORMATS**
HD-SDI supports standard SMPTE formats , RTSP/GVSP supports binned	**PARTIAL IMAGE MODES**
Automatic/manual/one-push/ 0 dB to 24 dB	**GAIN RANGE**
Automatic/manual/one-push/extended shutter modes 0.03 ms to 2 seconds (extended shutter mode)	**EXPOSURE RANGE**
0.50 to 4.00, programmable lookup table	**GAMMA**
Standard, bulb, skip frames, multi exposure preset, multi exposure pulse width, low smear, overlapped, and multi shot	**TRIGGER MODES**
32 MB frame buffer	**IMAGE BUFFER**
2 memory channels for custom camera settings	**USER SETS**
44x44x87.5 mm excluding lens holder and connectors (metal case)	**SIZE (WxHxD)**
150 grams (without optics or tripod mounting bracket)	**MASS**
8-30 V, <6 W, via 4-pin power connector or GigE interface	**POWER**
CS-mount with hand-adjustable back focal distance • DC auto iris	**LENS MOUNT**
-30° to 60°C (storage) • 0° to 45°C (operating)	**TEMPERATURE**
3 years	**WARRANTY**



GiGE VISION
POE ENABLED

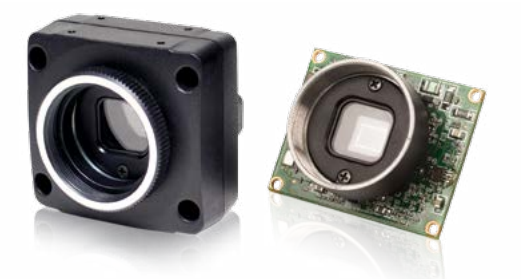


USB 2.0

Point Grey USB 2.0 Camera Features:
- Cost effective
- Industry-standard CS- mount
- Includes CS-C 5 mm adapter
- Firmware versions updatable in the field
- On-board temperature, power sensors, and status LED
- Board-level and custom options available for OEMs

CHAMELEON®

COMPACT, COST EFFECTIVE, CCD QUALITY



Model#	Sensor Specifications		Shutter	Max Res	Max FPS
CMLN-13S2C/M-CS	1.3MP	Sony ICX445 CCD* 1/3" 3.75 µm	Global	1296 x 964	18 fps

*High sensitivity Sony EXview HAD CCD™

FIREFLY® MV

SMALL, AFFORDABLE, VERSATILE CMOS



Model#	Sensor Specifications		Shutter	Max Res	Max FPS
FMVU-03MTC/M-CS	0.3MP	Micron MT9V022 CMOS 1/3" 6.0 µm	Global	752 x 480	60 fps
FMVU-13S2C-CS	1.3MP	Sony IMX035 CMOS* 1/3" 3.63 µm	Rolling	1328 x 1048	23 fps

*High speed Sony Exmor™ CMOS

CHAMELEON®	FIREFLY® MV	
Mini-B USB2.0 for camera control, video data, and power	Mini-B USB2.0 for camera control, video data, and power	**INTERFACE**
7-pin JST GPIO connector, 4 pins for trigger and strobe, 1 pin +3.3 V, 1 VEXT pin for external power	7-pin JST GPIO connector, 4 pins for trigger and strobe, 1 pin +3.3 V, 1 VEXT pin for external power	**GPIO**
12-bit	10-bit (FMVU-03MT) • 10/12-bit (FMVU-13S2)	**ADC**
Y8, Y16 (mono) 8-bit and 16-bit Raw Bayer data (color)	Y8, Y16 (mono) 8-bit and 16-bit raw Bayer data (color)	**IMAGE DATA FORMATS**
Pixel binning and region of interest (ROI) modes	Pixel binning and region of interest (ROI) modes	**PARTIAL IMAGE MODES**
Automatic/manual/one-push/ 0 dB to 24 dB	Automatic/manual/ 0 dB to 12 dB (03MT) / 0 dB to 24 dB (13S2)	**GAIN RANGE**
Automatic/manual/one-push/extended shutter modes 0.01 ms to >10 seconds (extended shutter mode)	Automatic/manual modes 0.12 ms to 512 ms (FMVU-03MT) / 0.03 ms to 8 seconds (FMVU-13S2)	**EXPOSURE RANGE**
0.50 to 4.00, programmable lookup table	0 to 1 (FMVU-03MT)/0.50 to 4.00 (FMVU-13S2)	**GAMMA**
Standard, bulb, skip frames, overlapped	Standard, skip frames	**TRIGGER MODES**
N/A	N/A	**IMAGE BUFFER**
2 memory channels for custom camera settings	2 memory channels for custom camera settings	**USER SETS**
39x31mm (board level) / 25.5x44x41 mm excluding lens holder, without optics (plastic case)	39x24 mm (board level) / 24.4x44x34 mm excluding lens holder, without optics (plastic case)	**SIZE (WxHxD)**
22 g (board level) / 37 g (plastic case) (without optics or tripod mounting bracket)	14 g (board level) / 37 g (plastic case) (without optics or tripod mounting bracket)	**MASS**
2 W, 4.745 to 5.25 V via USB 2.0 interface or JST 7-pin GPIO connector	8-30 V, 1 W at 12 V via 1394a interface	**POWER**
CS-mount (5 mm C-mount adapter included)	CS-mount	**LENS MOUNT**
-30° to 60°C (storage) • 0° to 45°C (operating)	-30° to 60°C (storage) • 0° to 45°C (operating)	**TEMPERATURE**
1 year	1 year	**WARRANTY**





FireWire

Point Grey IEEE 1394 Camera Features:
- Compact sizes including board level options
- Supports IIDC v1.32
- Industry-standard C- mount
- Firmware versions updatable in the field
- On-board temperature, power sensors, and status LED
- Automatic synchronization

FLEA®3

ULTRA-COMPACT, CCD FAMILY



Model#	Sensor Specifications				Shutter	Max Res	Max FPS
FL3-FW-03S1C/M-C	0.3MP	Sony ICX618 CCD*	1/4"	5.6 µm	Global	648 x 488	120 fps
FL3-FW-03S3C/M-C	0.3MP	Sony ICX414 CCD	1/2"	9.9 µm	Global	648 x 488	76 fps
FL3-FW-14S3C/M-C	1.4MP	Sony ICX267 CCD	1/2"	4.65 µm	Global	1384 x 1032	16 fps
FL3-FW-20S4C/M-C	2.0MP	Sony ICX274 CCD	1/1.8"	4.4 µm	Global	1624 x 1224	15 fps

*High sensitivity Sony EXview HAD CCD ™

GRASSHOPPER EXPRESS®

HIGH RESOLUTION AND SENSITIVITY



Model#	Sensor Specifications				Shutter	Max Res	Max FPS
GX-FW-10K3M-C	1.0MP	Kodac KAI-01050 CCD	1/2"	5.5 µm	Global	1024 x 1024	70 fps
GX-FW-28S5C/M-C	2.8MP	Sony ICX674 CCD*	2/3"	4.54 µm	Global	1932 x 1452	26 fps
GX-FW-60S6C/M-C	6.0MP	Sony ICX694 CCD*	1"	4.54 µm	Global	2736 x 2192	11 fps

*High sensitivity Sony EXview HAD CCD II ™

INTERFACE	IEEE 1394b interface with screw locks for camera control, data, and power	Two IEEE 1394b interface with screw locks for camera control, data, power, and daisy chaining
GPIO	8-pin Hirose HR25 GPIO connector for power, trigger, strobe, PWM, and serial I/O, 1 opto-isolated input, 1 opto-isolated output, 2 bi-directional I/O pins	8-pin Hirose HR25 GPIO connector for power, trigger, strobe, PWM, and serial I/O, 1 opto-isolated input, 1 opto-isolated output, 2 bi-directional I/O pins
ADC	12-bit	14-bit
IMAGE DATA FORMATS	Y8, Y16 (all models) RGB, YUV411, YUV422, Raw8, Raw16 (color models)	Y8, Y16, Mono8, Mono12, Mono16 (all models) RGB, YUV411, YUV422, YUV444, Raw8, Raw12, Raw16 (color models)
PARTIAL IMAGE MODES	Pixel binning and region of interest (ROI) modes	Pixel binning and region of interest (ROI) modes
GAIN RANGE	Automatic/manual/one-push/ 0 dB to 24 dB	Automatic/manual/one-push/ 0 dB to 24 dB
EXPOSURE RANGE	Automatic/manual/one-push/extended shutter modes 0.03 ms to >25 seconds (extended shutter mode)	Automatic/manual/one-push/extended shutter modes 0.04 ms to >30 seconds (extended shutter mode)
GAMMA	0.50 to 4.00, programmable lookup table	0.50 to 4.00, programmable lookup table
TRIGGER MODES	Standard, bulb, skip frames, overlapped, multiple exposure, multi-shot	Standard, bulb, skip frames, overlapped, multi-shot
IMAGE BUFFER	32 MB frame buffer	32 MB frame buffer
USER SETS	2 memory channels for custom camera settings	2 memory channels for custom camera settings
SIZE (WxHxD)	29x29x30 mm excluding lens holder, without optics (metal case)	44x29x58 mm excluding lens holder, without optics (metal case)
MASS	58 g (without optics or tripod mounting bracket)	86 grams (without optics or tripod mounting bracket)
POWER	8-30 V, <2.5 W via GPIO or 1394b interface	8-30 V, ~5 W, via GPIO or 1394b interface
LENS MOUNT	C-mount	C-mount
TEMPERATURE	-30° to 60°C (storage) • 0° to 45°C (operating)	-30° to 60°C (storage) • 0° to 45°C (operating)
WARRANTY	3 years	3 years



FireWire



FireWire



GRASSHOPPER®2

HIGH SENSITIVITY AND LOW NOISE



Model#	Sensor Specifications			Shutter	Max Res	Max FPS
GS2-FW-14S5C/M-C	1.4MP	Sony ICX285 CCD*	2/3"	6.45 µm	Global	1384 x 1036	30 fps

*High sensitivity Sony EXview HAD CCD ™

Two IEEE 1394b interface with screw locks for camera control, data, power, and daisy chaining	**INTERFACE**
8-pin Hirose HR25 GPIO connector 1 opto-isolated trigger pin, 1 opto-isolated strobe pin 2 bi-directional pins for trigger, strobe, pwm or serial port	**GPIO**
14-bit	**ADC**
Y8, Y16, (all models) RGB, YUV411, YUV422, YUV444, Raw8, Raw16, (color models)	**IMAGE DATA FORMATS**
Pixel binning and region of interest (ROI) modes	**PARTIAL IMAGE MODES**
Automatic/manual/one-push/ 0dB to 24dB	**GAIN RANGE**
Automatic/manual/one-push/extended shutter modes 0.03 ms to >330 seconds (extended shutter mode with amp glow disable option)	**EXPOSURE RANGE**
0.50 to 4.00, programmable lookup table	**GAMMA**
Standard, bulb, skip frames, overlapped, multi-shot	**TRIGGER MODES**
32 MB frame buffer	**IMAGE BUFFER**
2 memory channels for custom camera settings	**USER SETS**
44x29x58 mm excluding lens holder and connectors (metal case)	**SIZE (WxHxD)**
104 g (without optics or tripod mounting bracket)	**MASS**
8-30 V, <2.5 W, via GPIO or 1394b interface	**POWER**
C-mount	**LENS MOUNT**
-30° to 60°C (storage) • 0° to 45°C (operating)	**TEMPERATURE**
3 years	**WARRANTY**



FLEA®2

UP TO 5 MP, ULTRA-COMPACT, CCD



Model#	Sensor Specifications			Shutter	Max Res	Max FPS
FL2-03S2C/M-C	0.3MP	Sony ICX424 CCD	1/3"	7.4 µm	Global	648 x 488	80 fps
FL2-08S2C/M-C	0.8MP	Sony ICX204 CCD	1/3"	4.65 µm	Global	1032 x 776	30 fps
FL2G-13S2C/M-C	1.3MP	Sony ICX445 CCD*	1/3"	3.75 µm	Global	1288 x 964	30 fps
FL2-14S3C/M-C	1.4MP	Sony ICX267 CCD	1/2"	4.65 µm	Global	1392 x 1032	15 fps
FL2-20S4C/M-C	2.0MP	Sony ICX274 CCD	1/1.8"	4.4 µm	Global	1624 x 1224	15 fps
FL2G-50S5C/M-C	5.0MP	Sony ICX655 CCD	2/3"	3.45 µm	Global	2448 x 2048	7.5 fps

*High sensitivity Sony EXview HAD CCD™

IEEE 1394b interface with screw locks for camera control, data, and power	**INTERFACE**
8-pin Hirose HR25 GPIO connector opto-isolated pins for trigger and strobe (FL2G only), bi-directional pins for trigger, strobe or serial port	**GPIO**
12-bit	**ADC**
Y8, Y16 (all models) RGB, YUV411, YUV422, YUV444, Raw8, Raw16 (color models)	**IMAGE DATA FORMATS**
Pixel binning and region of interest (ROI) modes	**PARTIAL IMAGE MODES**
Automatic/manual/one-push/ 0 dB to 24 dB	**GAIN RANGE**
Automatic/manual/one-push/extended shutter modes 0.02 ms to > 10 s (extended shutter mode)	**EXPOSURE RANGE**
0.50 to 4.00, programmable lookup table	**GAMMA**
Standard, bulb, skip frames, overlapped, multiple exposure, multi-shot	**TRIGGER MODES**
32 MB frame buffer (FL2G only)	**IMAGE BUFFER**
2 memory channels for custom camera settings	**USER SETS**
29x29x30 mm excluding lens holder, without optics (metal case)	**SIZE (WxHxD)**
58 g (without optics or tripod mounting bracket)	**MASS**
8-30V, <2.5W, via GPIO or 1394b interface	**POWER**
C-mount	**LENS MOUNT**
-30° to 60°C (storage) • 0° to 45°C (operating)	**TEMPERATURE**
3 years	**WARRANTY**



FireWire



GRASSHOPPER®

HIGH PERFORMANCE, CCD FAMILY



Model#	Sensor Specifications				Shutter	Max Res	Max FPS
GRAS-03K2C/M-C	0.3MP	Kodak 0340D CCD	1/3"	7.4 µm	Global	648 x 480	200 fps
GRAS-03S3M-C	0.3MP	Sony ICX414 CCD	1/2"	9.9 µm	Global	648 x 488	74 fps
GRAS-14S3C/M-C	1.4MP	Sony ICX267 CCD	1/2"	4.65 µm	Global	1384 x 1032	21 fps
GRAS-14S5C/M-C	1.4MP	Sony ICX285 CCD*	2/3"	6.45 µm	Global	1384 x 1036	15 fps
GRAS-20S4C/M-C	2.0MP	Sony ICX274 CCD	1/1.8"	4.4 µm	Global	1624 x 1224	30 fps
GRAS-50S5C/M-C	5.0MP	Sony ICX625 CCD	2/3"	3.45 µm	Global	2448 x 2048	15 fps

*High sensitivity Sony EXview HAD CCD™

FIREFLY® MV

SMALL, AFFORDABLE, VERSATILE CMOS



Model#	Sensor Specifications				Shutter	Max Res	Max FPS
FFMV-03M2C/M-CS	0.3MP	Aptina MT9V022 CMOS	1/3"	6.0 µm	Global	752 x 480	60 fps

	GRASSHOPPER®	FIREFLY® MV
INTERFACE	Two IEEE 1394b interface with screw locks for camera control, data, power, and daisy chaining	IEEE-1394a interface for ccamera camera control, data, and power (mini connector option available)
GPIO	8-pin Hirose HR25 GPIO connector for power, trigger, strobe, PWM, and RS232	7-pin JST GPIO connector, 4 pins for trigger and strobe, 1 pin +3.3 V, 1 VEXT pin for external power
ADC	14-bit	10-bit
IMAGE DATA FORMATS	Y8, Y16 (all models) RGB, YUV411, YUV422, YUV 444, 8- bit and 16-bit raw Bayer data (color models)	Y8, Y16 (mono) 8-bit and 16-bit raw Bayer data (color)
PARTIAL IMAGE MODES	Pixel binning and region of interest (ROI) modes	Pixel binning and region of interest (ROI) modes
GAIN RANGE	Automatic/manual/one-push/ 0 dB to 24 dB	Automatic/manual/ 0 dB to 12 dB
EXPOSURE RANGE	Automatic/manual/one-push/extended shutter modes 0.08 ms to >10 seconds (extended shutter mode)	Automatic/manual/extended shutter modes 0.03 ms to 512 ms (extended shutter mode)
GAMMA	0.50 to 4.00, programmable lookup table	0 to 1
TRIGGER MODES	Standard, bulb, skip frames, overlapped, multi-shot	Standard, skip frames
IMAGE BUFFER	32 MB frame buffer	N/A
USER SETS	2 memory channels for custom camera settings	2 memory channels for custom camera settings
SIZE (WxHxD)	44x29x58 mm excluding lens holder, without optics (metal case)	39x24 (board level) / 44x34x24.4 mm (plastic case) excluding lens holder, without optics
MASS	104 g (without optics or tripod mounting bracket)	15 g (board level) / 37 g (plastic case) (without optics or tripod mounting bracket)
POWER	8-30 V, <2.5 W via GPIO or 1394b interface	8-30 V, 1 W at 12 V via 1394a interface
LENS MOUNT	C-mount	CS-mount or M12 microlens mount
TEMPERATURE	-30° to 60°C (storage) • 0° to 40°C (operating)	-30° to 60°C (storage) • 0° to 40°C (operating)
WARRANTY	3 years	1 year







DRAGONFLY®2

FLEXIBLE AND FULL-FEATURED



Model#	Sensor Specifications				Shutter	Max Res	Max FPS
DR2-COL/BW-C	0.3MP	Sony ICX424 CCD	1/3"	7.4 µm	Global	648 x 488	60 fps
DR2-HICOL/BW-C	0.8MP	Sony ICX204 CCD	1/3"	4.65 µm	Global	1032 x 776	30 fps
DR2-13S2C/M-C	1.3MP	Sony ICX445 CCD*	1/3"	3.75 µm	Global	1296 x 964	20 fps

*High sensitivity Sony EXview HAD CCD™

IEEE-1394a interface for camera camera control, data, and power	
8-pin Phoenix connector for power, trigger, strobe, PWM, and I/O	
12-bit	ADC
Y8, Y16, Mono8, Mono12, Mono16, Raw8, Raw12, Raw16 (all models) RGB, YUV411, YUV422, YUV 444 (color models)	IMAGE DATA FORMATS
Pixel binning and region of interest (ROI) modes	PARTIAL IMAGE MODES
Automatic/manual/one-push/ 0 dB to 24 dB	GAIN RANGE
Automatic/manual/one-push/extended shutter modes 0.031 ms to 66.63 ms at 15 FPS, >5 seconds in extended shutter mode	EXPOSURE RANGE
0.50 to 4.00, programmable lookup table	GAMMA
Standard, bulb, overlapped, multiple exposure, multi-shot	TRIGGER MODES
N/A	IMAGE BUFFER
2 memory channels for custom camera settings	USER SETS
64x51 mm (board level) / 44x34x24.4 mm (metal case)	SIZE (WxHxD)
37 g (board level) / 187 g (metal case) (without optics or tripod mounting bracket)	MASS
8-30 V, 2.5 W at 12 V via 1394a or GPIO connector	POWER
C-mount / M12 microlens (DR2-03S2 & DR2-08S2)	LENS MOUNT
-30° to 60°C (storage) • 0° to 45°C (operating)	TEMPERATURE
1 year	WARRANTY



FireWire

CAMERA Link

Point Grey Camera Link Camera Features:
- 2 SDR connectors with screw locks
- Industry-standard C- mount
- 8- and 10- bit image modes
- Firmware versions updatable in the field
- On-board temperature, power sensors, and status LED

GAZELLE®

HIGH RESOLUTION, FAST FRAME RATES



Model#	Sensor Specifications				Shutter	Max Res	Max FPS
GZL-CL-22C5M-C	2.2MP	CMOSIS CMV2000 CMOS	2/3"	5.5 µm	Global	2048 x 1088	280 fps
GZL-CL-41C6M-C	4.1MP	CMOSIS CMV4000-2E5 CMOS	1"	5.5 µm	Global	2048 x 2048	150 fps

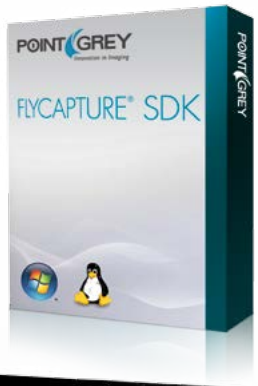
Camera Link LVDS for camera control and video data transmission. Base (2-tap) and Full (8-tap) configurations	INTERFACE
8-pin Hirose HR25 GPIO connector; opto-isolated pins for trigger and strobe	GPIO
10-bit	ADC
Mono8, Mono10	IMAGE DATA FORMATS
Single or multiple region of interest modes	PARTIAL IMAGE MODES
Analog and digital programmable via software. Range: 32 - 64 (analog), 1 - 63 (digital)	GAIN RANGE
Full 8-tap mode 0.07 ms to 54 seconds	EXPOSURE RANGE
N/A	GAMMA
Single-shot, bulb, software trigger	TRIGGER MODES
N/A	IMAGE BUFFER
2 memory channels for custom camera settings	USER SETS
44x29x59.5 mm excluding lens holder, without optics (metal case)	SIZE (WxHxD)
90 g (without optics or tripod mounting bracket)	MASS
12 V, 6 W at 12 V	POWER
C-mount	LENS MOUNT
-30° to 60°C (storage) • -10° to 50°C (operating)	TEMPERATURE
3 years	WARRANTY



CAMERA Link

FLYCAPTURE SDK

THE FLYCAPTURE SOFTWARE DEVELOPMENT KIT (SDK) THAT comes free with every Point Grey camera provides a common software interface to control and acquire images from Point Grey USB 3.0, GigE, FireWire, and USB 2.0 cameras using the same API under 32- or 64-bit Windows or Linux. FlyCapture supports ActiveX and DirectShow interfaces, and includes the FirePRO low-level 1394b interface driver, enhanced USB 3.0 interface driver, and the GigE image filter driver. A complete software API library, ready-to-use demo programs, and comprehensive source code examples enable users to easily build custom imaging applications.



KEY FEATURES

- Proprietary USB 3.0 and FireWire driver stacks for robust diagnostics and, with complete end-to-end control, faster issue resolution
- GigE image filter driver for reduced latency and dropped frames, and maximized bandwidth
- Support for IIDC 1.32 features such as frame buffering and lookup table functionality
- OpenGL and Direct 2D support for better display performance and CPU usage
- Managed interface to decrease development time
- Simple (API) - only 3 function calls required to grab an image
- Example programs and source code

MULTIPLE PLATFORM

- **WINDOWS®** 32/64-bit XP, 7, 8
- **LINUX®** Ubuntu® 32/64-bit ARMv7

MULTIPLE INTERFACES

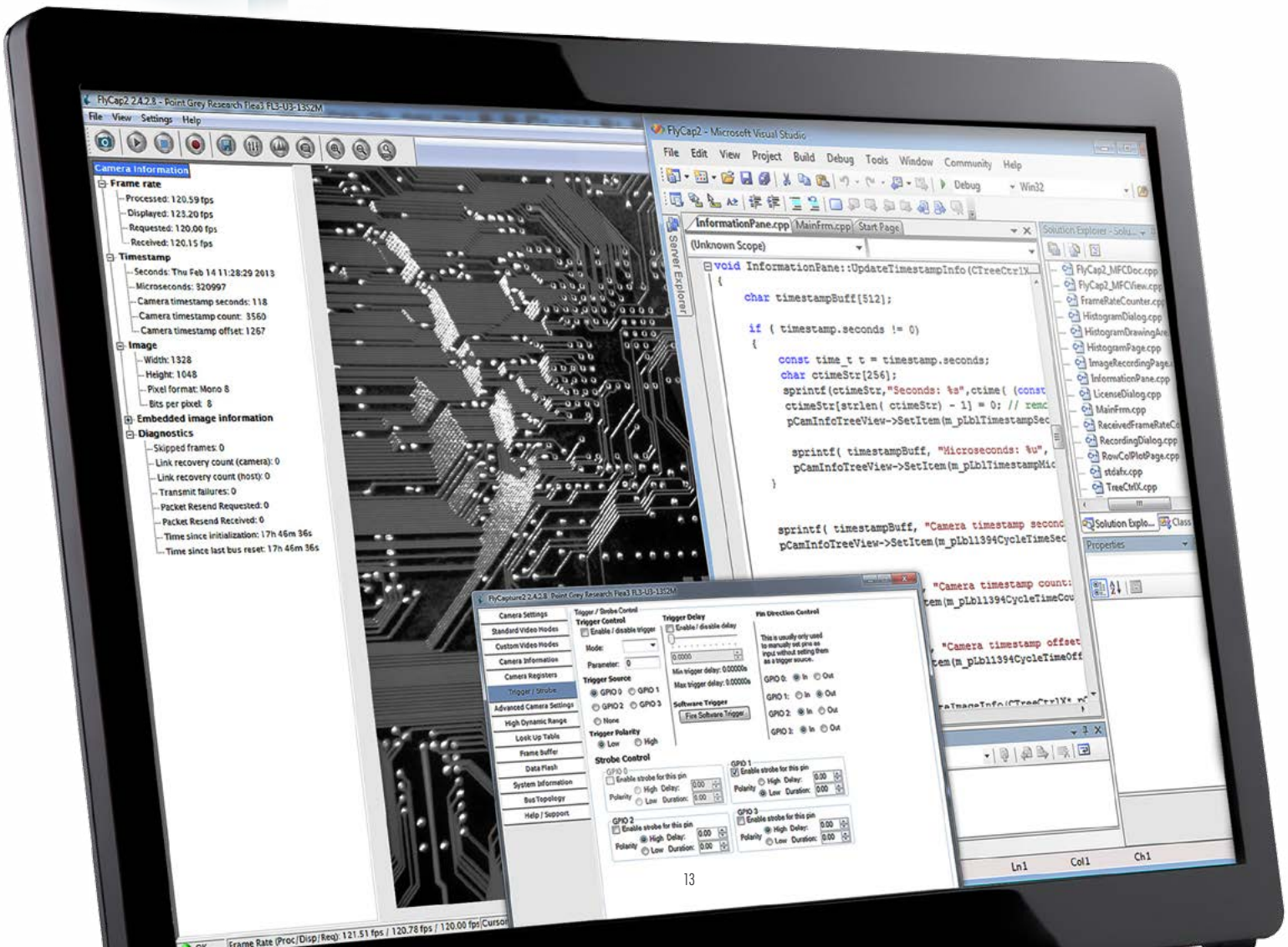
The SDK provides the same programming interface across USB 3.0*, USB 2.0, GigE and FireWire products.

FireWire

USB 2.0

MULTIPLE LANGUAGES

- C, C++, C#
- Visual Basic .NET
- ActiveX
- DirectShow



The compact, cost-effective Cricket IP camera uses high resolution Sony CMOS Exmor sensors for exceptional sensitivity and excellent dynamic range. Cricket offers a 720p model featuring a 1.3 MP sensor at 60 fps, and two 1080p models featuring a 2.0 MP sensor at 60 fps running over PoE. Designed and manufactured in Canada.

CRICKET® IP CAMERA

HD WDR, 60 FPS, IP SECURITY CAMERA*



Model#	Sensor Specifications			Shutter	Max Res	Max FPS
CR-POE-13S2C-CS	1.3MP	Sony IMX139 CMOS	1/3"	Rolling	1280 x 1024	60 fps
CR-POE-20S2C-CS	2.0MP	Sony IMX140 CMOS	1/2.8"	Rolling	1920 x 1080	60 fps
CR-POE-20S3C-CS	2.0MP	Sony IMX185 CMOS	1/2"	Rolling	1920 x 1080	60 fps

INTERFACE	RJ45 100Base-TX for data and power (PoE), 4-pin DC auto-iris connector
LIGHT SENSITIVITY/ MINIMUM ILLUMINATION	0.1 lux, F1.2 at 30 FPS, 1/30 second shutter
DYNAMIC RANGE	120 dB (CR-POE-13S2), 90 dB (CR-POE-20S2) in 4 image WDR mode
GAIN RANGE	0 dB to 24 dB
EXPOSURE RANGE	1/10,000 second to 1 second
LENS TYPE	CS-mount, DC Auto Iris (optional)
COMPRESSION FORMAT	MJPEG; H.264 Base/Main/High Profile
STREAM RESOLUTIONS	CR-POE-13S2: ranging from 1280 x 1024 to 160 x 120, including SXGA, 720p, XGA, VGA CR-POE-20S2: ranging from 1920 x 1080 to 160 x 120, including 1080p, SXGA, 720p, XGA, VGA CR-POE-20S3: ranging from 1920 x 1080 to 160 x 120, including 1080p, SXGA, 720p, XGA, VGA
MULTI-STREAMING	2 streams, individually configurable frame rate, resolution and compression (H.264 or MJPEG)
PAN/TILT/ZOOM	Digital
IMAGE SETTINGS	Auto exposure, auto white balance, gain, shutter, contrast, sharpness, gamma
IMAGE ENHANCEMENTS	WDR, 2D noise reduction, 3D noise reduction, image flip
SECURITY	Password protection, HTTPS encryption
SUPPORTED PROTOCOLS	ONVIF Profile S, RTSP, RTP, IPv4, TCP, UDP, HTTP, HTTPS, DHCP, NTP
MULTICASTING	Yes
CASING	Plastic and aluminum, white or black, integrated tripod mount (1/4-20 thread)
POWER CONSUMPTION	~4 W, via PoE 802.3af, at full frame rate and resolution with a single stream
TEMPERATURE	0°-45°C, 20-80% relative humidity (operating) • -30° to 60°C, 20-95% relative humidity (storage)
APPROVALS	CE, FCC, RoHS, TUV
SIZE (WxHxD)	88.1 mm x 44 mm x 32 mm
MASS	~75 grams (without lens)
WARRANTY	1 year



Wide Dynamic Range for challenging lighting conditions



Excellent sensitivity with Sony Exmor CMOS sensors



Ultra-compact and lightweight



Available in a black enclosure



*Note: Cricket is recommended for customers familiar with the use of standard security IP cameras. Key differences between the Cricket IP security camera and other Point Grey cameras include:

- Cricket produces compressed images only;
- Cricket requires a 3rd party Video Management Software (VMS) and does not support FlyCapture SDK;
- Cricket does not support external triggering or strobe capabilities.

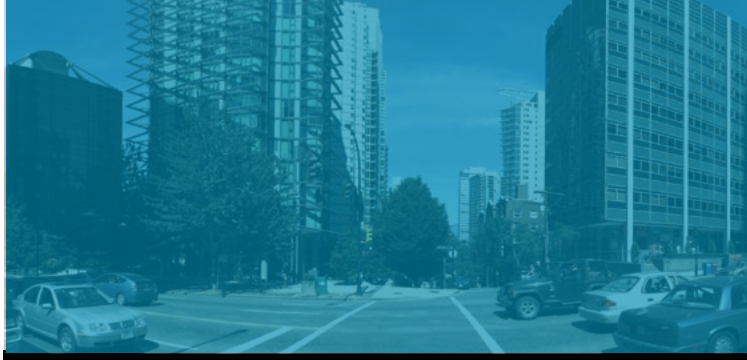
360° SPHERICAL IMAGING CAMERAS

POINT GREY MAKES SPHERICAL video a reality by providing affordable hardware and software packages that deliver high-resolution 360° visual coverage. All three Ladybug systems perform the image acquisition, processing, stitching and correction necessary to integrate multiple camera images into full-resolution digital spherical and panoramic videos in real time.The quality and flexibility of spherical video data make the medium ideal for applications requiring synchronization of video images. This revolutionary technology is now used for a wide variety of applications and solutions. Examples include large scale GIS for street-level viewing, geographical mapping and other location-based visualizations (NMEA GPS and EXIF output compatible); high end security and surveillance applications; city planning applications; simulation and measurement analysis; and entertainment solutions for lighting models, full dome projection content, and other immersive experiences.

LADYBUG FAMILY KEY FEATURES

- 360° degree video streaming
- Covers 90% of visual sphere; 6 sensors each camera
- Independent imaging control CCD settings controlled individually or in unison
- Pre-calibrated for ease of use
- High dynamic range mode continuously cycles through a series of camera shutter and gain settings
- Image stabilization for smoother sequences
- Dynamic Stitching
- Complete Development Accessory Kit with each model
  (Ladybug5 Dev Kit shown below)





LADYBUG® 5

30 MP AND 12-BIT CAMERA RAW



Model#	Sensor Specifications		Shutter	Max Res Per Sensor	Max FPS
LD5-U3-51S5C-44	30MP	Sony ICX655 CCD 2/3" 3.45 µm	Global	2048 x 2448	10 FPS Compressed, 5 FPS Uncompressed

INTERFACE	USB 3.0 interface with screw locks for camera control and data
GPIO	12-pin GPIO connector for external trigger input, strobe output, and camera power
OPTICS	Six high quality 4.4 mm focal length lenses
SPHERICAL DISTANCE	Calibrated from 2 m to infinity
FOCUS DISTANCE	~200 cm. Objects have an acceptable sharpness from ~60 cm to infinity
ADC	12-bit
IMAGE DATA FORMATS	Raw8, Raw12, Raw16 in uncompressed and JPEG
IMAGE DATA OUTPUT	8-, 12-, or 16-bit, Raw or JPEG compressed
PARTIAL IMAGE MODES	Pixel binning and region of interest (ROI) modes
GAIN RANGE	Automatic/manual/one-push/ 0dB to 18dB
GAMMA	0.50 to 4.00
TRIGGER MODES	Standard, bulb, skip frames, overlapped, multi-shot
HIGH DYNAMIC RANGE	Cycle 4 gain and exposure presets
EXPOSURE RANGE	Global shutter; Automatic/manual/one-push/extended shutter modes 0.02 ms to 2 seconds (extended shutter)
IMAGE PROCESSING	Shutter, gain, white balance, gamma & JPEG compression, programmable via software
CASE TYPE	Single unit, water resistant
CASE MATERIAL	Machined aluminum housing, anodized red or black
ENVIRONMENTAL SENSORS	Temperature, Barometer, Humidity, Accelerometer, Compass
SIZE (WXHXD)	197 mm diameter, 160 mm height (with lens hoods)
MASS	3000 g
POWER	12-24 V, 13 W via GPIO
TEMPERATURE	-30° to 60°C (storage) • 0° to 45°C (operating)
WARRANTY	2 years

LADYBUG SDK

Every Ladybug system includes feature-rich software to manage image acquisition, spherical and panoramic image production, and camera settings. The Ladybug SDK includes the LadybugCapPro program, source code for a quick start in the C/C++ programming environment, a camera device driver, and Application Programming Interface (API) software library.



Spherical View Styles:
a. Panoramic *b.* Spherical *c.* Dome *d.* Multi-camera view

LADYBUG API FUNCTIONALITY

- Acquire and process images using a variety of different color processing algorithms
- Stream images off the camera for viewing
- Control JPEG compression level
- Access stored image stream files
- Store and link data from NMEA GPS devices
- Image stabilization for smoother sequences
- Dynamic Stitching - Stitch to variable distances
- Independent Exposure and HDR Imaging
- Anti-aliasing
- Environment Mapping - Uses OpenGL's cube map texture to create reflections from far away scenes.
- Control other settings including:
  - Auto exposure, gain, shutter, white balance, color correction, falloff correction, frame rate, independent sensor control
- Unique post processing workflow
  - ***Exclusive only to the Ladybug5***. Edit 12-bit Camera RAW files for maximum flexibility and dynamic range



LADYBUG®3

HIGH RESOLUTION, WATER RESISTANT



Model#	Sensor Specifications	Shutter	Max Res Per Sensor	Max FPS
LD3-20S4C-33	12MP Sony ICX274 CCD 1/1.8" 4.4 µm	Global	1600 x 1200	16 FPS Compressed, 6.5 FPS Uncompressed

IEEE 1394b interface with screw locks for camera control, data, and power	INTERFACE
8-pin GPIO connector for external trigger, strobe, serial port, or external power	GPIO
Six high quality 3.3 mm focal length lenses	OPTICS
Calibrated at 20 m	SPHERICAL DISTANCE
~200 cm. Objects have an acceptable sharpness from ~60 cm to infinity	FOCUS DISTANCE
12-bit	ADC
Raw8, Mono8	IMAGE DATA FORMATS
8-bit raw Bayer (color) digital data	IMAGE DATA OUTPUT
Pixel binning and region of interest (ROI) modes	PARTIAL IMAGE MODES
Automatic/manual/one-push/ 0dB to 24dB	GAIN RANGE
0.50 to 4.00	GAMMA
Standard, bulb, skip frames, overlapped, multi-shot	TRIGGER MODES
Cycle 4 gain and exposure presets	HIGH DYNAMIC RANGE
Global shutter; Automatic/manual/one-push/extended shutter modes 0.01 ms to 4.2 s (extended shutter mode)	EXPOSURE RANGE
Shutter, gain, white balance, gamma & JPEG compression, programmable via software	IMAGE PROCESSING
Single unit, water resistant	CASE TYPE
Machined aluminum housing, anodized red or black	CASE MATERIAL
N/A	ENVIRONMENTAL SENSORS
122 x 141 x 133 mm	SIZE (WxHxD)
2414 g	MASS
8-30 V, 7.2 W at 12 V via IEEE 1394b	POWER
-30° to 60°C (storage) • 0° to 45°C (operating)	TEMPERATURE
1 year	WARRANTY

LADYBUG®2

30 FPS SPHERICAL VIDEO



Model#	Sensor Specifications	Shutter	Max Res Per Sensor	Max FPS
LD2-HICOL-KIT	4.8MP Sony ICX204 CCD 1/3" 4.65 µm	Global	1024 x 768	30 FPS Compressed, 15 FPS Uncompressed

IEEE 1394b interface with screw locks for camera control, data, and power fiber optic link between head and compressor	INTERFACE
N/A	GPIO
Six high quality 2.5 mm focal length lenses	OPTICS
Calibrated at 20 m	SPHERICAL DISTANCE
~200 cm. Objects have an acceptable sharpness from ~60 cm to infinity	FOCUS DISTANCE
12-bit	ADC
Raw8, Mono8	IMAGE DATA FORMATS
8-bit raw Bayer (color) digital data	IMAGE DATA OUTPUT
Pixel binning and region of interest (ROI) modes	PARTIAL IMAGE MODES
Automatic/manual/one-push/ 0dB to 26dB	GAIN RANGE
0.50 to 4.00	GAMMA
Software only	TRIGGER MODES
N/A	HIGH DYNAMIC RANGE
Global shutter; Automatic/manual/one-push/extended shutter modes 0.01 ms to 4.2 s (extended shutter mode)	EXPOSURE RANGE
Shutter, gain, white balance, gamma & JPEG compression, programmable via software	IMAGE PROCESSING
Two units (head and compressor)	CASE TYPE
Machined aluminum housing, anodized red	CASE MATERIAL
N/A	ENVIRONMENTAL SENSORS
110 x 100 x 141 mm	SIZE (WxHxD)
1190 g	MASS
8-30 V, 11.2 W at 12 V via IEEE 1394b	POWER
-30° to 60°C (storage) • 0° to 45°C (operating)	TEMPERATURE
1 year	WARRANTY



STEREO VISION CAMERAS

POINT GREY MAKES STEREO VISION PRACTICAL

for a variety of research areas by providing hardware and software packages that include complete stereo processing support – from image correction and alignment to dense correlation-based stereo mapping. Stereo vision works in a similar way to 3D sensing in human vision. It begins with identifying image pixels that correspond to the same point in a physical scene observed by multiple cameras. The 3D position of a point can then be established by triangulation using a ray from each camera. The more corresponding pixels identified, the more 3D points that can be determined with a single set of images. Correlation stereo methods attempt to obtain correspondences for every pixel in the stereo image, resulting in tens of thousands of 3D values generated with every stereo image.

BUMBLEBEE CAMERA FAMILY KEY FEATURES

- Full field-of-view depth measurements from a single image set
- Real time transformation of images to 3D data. Cameras can easily generate one million 3D points per second
- Easy integration with other machine vision techniques. The images and 3D data are perfectly registered
- Passive 3D sensing – no lasers or projectors required
- Pre-calibration for lens distortion and camera misalignments. Epipolar lines are aligned to within 0.05* pixels RMS error
- No manual adjustments or in-field calibration required
- High quality Sony CCD sensors
- Flexible software environment that provides access to all levels of the stereo processing pipeline

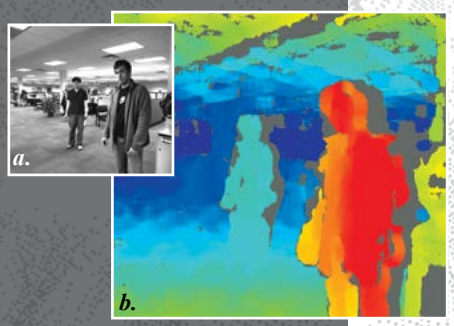
* This figure is based on a stereo resolution of 320x240 and is valid for all camera models. Calibration accuracy will vary from camera to camera.

TRICLOPS™ STEREO SDK

The Triclops SDK provides flexible access to all image stages in the stereo processing pipeline, making it ideal for custom stereo processing approaches. For example, users can track features in the distorted images, rectify feature locations only, use rectified locations to perform epipolar validation on the features, and then determine their locations in 3D. Or users can rectify images and implement a user-supplied stereo algorithm, or perform correlation stereo only in regions of interest in the image, to speed up stereo processing. This flexibility enables innovation in a wide range of stereo vision research and application.

TRICLOPS SDK FEATURES INCLUDE:

- Distance Measurement for every pixel in view
- Over 1,000,000 measurements per second
- Removes lens distortions and misalignments
- Extensive example programs and source code



a. Original Image *b.* Depth Image

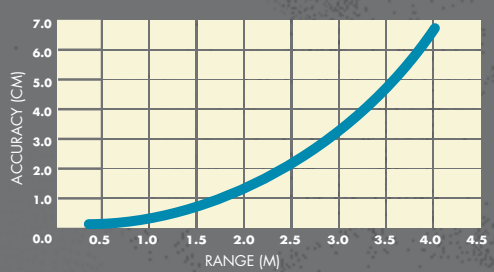
IMAGE RECTIFICATION



Raw Image Rectified Image

RANGE VS ACCURACY

This chart shows the accuracy of 3D point calculations versus the range to the point. Results are dependent on image resolution, lens focal length and calibration accuracy.



This chart was generated for a 3.8 mm Bumblebee2 camera with a stereo resolution of 512x384 and typical calibration accuracy.



a. Original Image *b.* Depth Image

BUMBLEBEE® XB3

3-SENSOR AND MULTI-BASELINE



Model#	Sensor Specifications				Shutter	Max Res	Max FPS	Focal Length
BBX3-13S2C/M-38	1.3MP	Sony ICX445 CCD	1/3″	3.75 µm	Global	1280 x 960	16 fps	3.8 mm
BBX3-13S2C/M-60	1.3MP	Sony ICX445 CCD	1/3″	3.75 µm	Global	1280 x 960	16 fps	6 mm

Two IEEE-1394b interfaces for camera camera control, data, and power	INTERFACE
4 general-purpose digital input/output pins	GPIO
12-bit	ADC
YUV411, YUV422, and RGB formats	IMAGE DATA FORMATS
8, 12, 16 and 24-bit digital data	IMAGE DATA OUTPUT
Automatic/Manual/One-Push Gain modes, 0 dB to 24 dB	GAIN
12 cm and 24 cm	BASELINE
3.8 mm with 66° HFOV, 6 mm with 43° HFOV	FIELD OF VIEW
f/2.0 (2.5 mm and 3.8 mm focal length), f/2.5 (6.0 mm focal length)	APERTURE
54 dB	SIGNAL TO NOISE RATIO
Standard, bulb, skip frames, overlapped	TRIGGER MODES
Automatic/Manual 0.03 ms to 66.63 ms at 15 FPS	EXPOSURE RANGE
277 x 37 x 41.8 mm	SIZE (WXHXD)
505 g	MASS
4 W at 12 V via IEEE-1394 interface or GPIO connector	POWER
3 x M12 microlens mount	LENS MOUNT
-30° to 60°C (storage) • 0° to 45°C (operating)	TEMPERATURE
2 years	WARRANTY



FireWire

BUMBLEBEE® 2

COMPACT SIZE AND QUALITY



Model#	Sensor Specifications				Shutter	Max Res	Max FPS	Focal Length
BB2-03S2C/M-25	0.3MP	Sony ICX424 CCD	1/3″	7.4 µm	Global	648 x 488	48 fps	2.5 mm
BB2-03S2C/M-38	0.3MP	Sony ICX424 CCD	1/3″	7.4 µm	Global	648 x 488	48 fps	3.8 mm
BB2-03S2C/M-60	0.3MP	Sony ICX424 CCD	1/3″	7.4 µm	Global	648 x 488	48 fps	6 mm
BB2-08S2C/M-25	0.8MP	Sony ICX204 CCD	1/3″	4.65 µm	Global	1032 x 776	20 fps	2.5 mm
BB2-08S2C/M-38	0.8MP	Sony ICX204 CCD	1/3″	4.65 µm	Global	1032 x 776	20 fps	3.8 mm
BB2-08S2C/M-60	0.8MP	Sony ICX204 CCD	1/3″	4.65 µm	Global	1032 x 776	20 fps	6 mm

IEEE-1394a interfaces for camera camera control, data, and power	INTERFACE
4 general-purpose digital input/output pins	GPIO
12-bit	ADC
YUV411, YUV422, and RGB formats	IMAGE DATA FORMATS
8, 12, 16 and 24-bit digital data	IMAGE DATA OUTPUT
Automatic/Manual/One-Push Gain modes, 0 dB to 24 dB	GAIN
12 cm	BASELINE
2.5 mm with 97° HFOV, 3.8 mm with 66° HFOV, 6 mm with 43° HFOV	FIELD OF VIEW
f/2.0 (2.5 mm and 3.8 mm focal length), f/2.5 (6.0 mm focal length)	APERTURE
60 dB	SIGNAL TO NOISE RATIO
Standard, bulb, skip frames, overlapped	TRIGGER MODES
Automatic/Manual 0.03 ms to 66.63 ms at 15 FPS	EXPOSURE RANGE
157 x 36 x 47.4 mm	SIZE (WXHXD)
342 g	MASS
2.5 W at 12 V via IEEE-1394 interface or GPIO connector	POWER
2 x M12 microlens mount	LENS MOUNT
-30° to 60°C (storage) • 0° to 45°C (operating)	TEMPERATURE
2 years	WARRANTY



FireWire

		MODEL NUMBER	INTERFACE	SENSOR TYPE	OPTICAL FORMAT	PIXEL SIZE	MAX RES	MAX FPS
USB3 VISION	**CHAMELEON3** Page 3	CM3-U3-13S2C/M-CS	USB 3.0	Sony ICX445 CCD	1/3″	3.75µm	1288 x 964	30 fps
		CM3-U3-13Y3C/M-CS	USB 3.0	On Semi Python 1300 CMOS	1/3″	4.8µm	1280 x 1024	150 fps
		CM3-U3-28S4C/M-CS	USB 3.0	Sony ICX818 CCD	1/1.8″	3.69µm	1928 x 1448	13 fps
	BLACKFLY Page 3	BFLY-U3-03S2C/M-CS	USB 3.0	Sony ICX424 CCD	1/3″	7.4µm	648 x 488	84 fps
		BFLY-U3-05S2C/M-CS	USB 3.0	Sony ICX693 CCD	1/3″	6.0µm	808 x 608	50 fps
		BFLY-U3-13S2C/M-CS	USB 3.0	Sony ICX445 CCD	1/3″	3.75µm	1288 x 964	30 fps
		BFLY-U3-20S4C/M-CS	USB 3.0	Sony ICX274 CCD	1/1.8″	4.4 µm	1624 x 1224	15 fps
	FLEA3 Page 4	FL3-U3-13S2C/M-CS	USB 3.0	Sony IMX035 CMOS	1/3″	3.63µm	1328 x 1048	120 fps
		FL3-U3-13Y3M-C	USB 3.0	ON Semi VITA1300 CMOS	1/2″	4.8µm	1280 x 1024	150 fps
		FL3-U3-13E4C/M-C	USB 3.0	e2v EV76C560 CMOS	1/1.8″	5.3µm	1280 x 1024	60 fps
		FL3-U3-20E4C/M-C	USB 3.0	e2v EV76C5706F CMOS	1/1.8″	4.5µm	1600 x 1200	59 fps
		FL3-U3-32S2C/M-CS	USB 3.0	Sony IMX036 CMOS	1/2.8″	2.5µm	2080 x 1552	60 fps
		FL3-U3-88S2C-C	USB 3.0	Sony IMX121 CMOS	1/2.5″	1.55µm	4096 x 2160	21 fps
	GRASSHOPPER3 Page 4	GS3-U3-14S5C/M-C	USB 3.0	Sony ICX285 CCD	2/3″	6.45µm	1384 x 1036	30 fps
		GS3-U3-15S5C/M-C	USB 3.0	Sony ICX825 CCD	2/3″	6.45µm	1384 x 1032	45 fps
		GS3-U3-23S6C/M-C	USB 3.0	Sony IMX174 CMOS	1/1.2″	5.86µm	1920 x 1200	162 fps
		GS3-U3-28S4C/M-C	USB 3.0	Sony ICX687 CCD	1/1.8″	3.69µm	1928 x 1448	26 fps
		GS3-U3-28S5C/M-C	USB 3.0	Sony ICX674 CCD	2/3″	4.54µm	1920 x 1440	26 fps
		GS3-U3-41S4C/M-C	USB 3.0	Sony ICX808 CCD	1/1.8″	3.1µm	2016 x 2016	18 fps
		GS3-U3-41C6NIR-C	USB 3.0	CMOSIS CMV4000-3E12 CMOS	1″	5.5µm	2048 x 2048	90 fps
		GS3-U3-41C6C/M-C	USB 3.0	CMOSIS CMV4000-3E5 CMOS	1″	5.5µm	2048 x 2048	90 fps
		GS3-U3-50S5C/M-C	USB 3.0	Sony ICX625 CCD	2/3″	3.45µm	2448 x 2048	15 fps
		GS3-U3-60S6C/M-C	USB 3.0	Sony ICX694 CCD	1″	4.54µm	2736 x 2192	13 fps
		GS3-U3-60QS6C/M-C	USB 3.0	Sony ICX694 CCD	1″	4.54µm	2736 x 2192	25 fps
		GS3-U3-91S6C/M-C	USB 3.0	Sony ICX814 CCD	1″	3.69µm	3376 x 2704	9 fps
		GS3-U3-120S6C/M-C	USB 3.0	Sony ICX834 CCD	1″	3.1µm	4242 x 2830	7 fps
GiGE VISION	**BLACKFLY** Page 5	BFLY-PGE-03S2C/M-CS	GigE PoE	Sony ICX424 CCD	1/3″	7.4µm	648 x 488	84 fps
		BFLY-PGE-03S3C/M-CS	GigE PoE	Sony ICX414 CCD	1/2″	9.9µm	648 x 488	90 fps
		BFLY-PGE-05S2C/M-CS	GigE PoE	Sony ICX693 CCD	1/3″	6.0µm	808 x 608	50 fps
		BFLY-PGE-09S2C/M-CS	GigE PoE	Sony ICX692 CCD	1/3″	4.08µm	1288 x 728	30 fps
		BFLY-PGE-12A2C/M-CS	GigE PoE	Aptina AR0134 CMOS	1/3″	3.75µm	1280 x 960	52 fps
		BFLY-PGE-13S2C/M-CS	GigE PoE	Sony ICX445 CCD	1/3″	3.75µm	1288 x 964	22 fps
		BFLY-PGE-13E4C/M-CS	GigE PoE	e2v EV76C560 CMOS	1/1.8″	5.3µm	1280 x 1024	60 fps
		BFLY-PGE-14S2C-CS	GigE PoE	Sony IMX104 CMOS	1/3″	3.75µm	1296 x 1032	60 fps
		BFLY-PGE-20E4C/M-CS	GigE PoE	e2v EV76C570 CMOS	1/1.8″	4.5µm	1600 x 1200	47 fps
		BFLY-PGE-23S2C-CS	GigE PoE	Sony IMX136 CMOS	1/2.8″	2.8µm	1920 x 1200	27 fps
		BFLY-PGE-23S6C/M-C	GigE PoE	Sony IMX249 CMOS	1/1.2″	5.86µm	1920 x 1200	30 fps
		BFLY-PGE-50A2C/M-CS	GigE PoE	Aptina MT9P006/031 CMOS	1/2.5″	2.2µm	2592 x 1944	13 fps
		BFLY-PGE-50H5C/M-CS	GigE PoE	Sharp RJ32S4/S3AA0DT CCD	2/3″	3.45µm	2448 x 2048	7.5 fps
	FLEA3 Page 5	FL3-GE-03S1C/M-C	GigE	Sony ICX618 CCD	1/4″	5.6µm	648 x 488	120 fps
		FL3-GE-03S2C/M-C	GigE	Sony ICX424 CCD	1/3″	7.4µm	648 x 488	82 fps
		FL3-GE-08S2C/M-C	GigE	Sony ICX204 CCD	1/3″	4.65µm	1032 x 776	31 fps
		FL3-GE-13S2C/M-C/CS	GigE	Sony ICX445 CCD	1/3″	3.75µm	1288 x 964	31 fps
		FL3-GE-14S3C/M-C	GigE	Sony ICX267 CCD	1/2″	4.65µm	1384 x 1032	18 fps
		FL3-GE-20S4C/M-C	GigE	Sony ICX274 CCD	1/1.8″	4.4µm	1624 x 1224	15 fps
		FL3-GE-28S4C/M-C	GigE	Sony ICX687 CCD	1/1.8″	3.69µm	1928 x 1448	15 fps
		FL3-GE-50S5C/M-C	GigE	Sony ICX655 CCD	2/3″	3.45µm	2448 x 2048	8 fps
	GRASSHOPPER3 Page 6	GS3-PGE-23S6C/M-C	GigE-PoE	Sony IMX174 CMOS	1/1.2″	5.86µm	1920 x 1200	45 fps
		GS3-PGE-50S5C/M-C	GigE-PoE	Sony ICX625 CCD	2/3″	3.45 µm	2448 x 2048	15 fps
		GS3-PGE-60S6C/M-C	GigE-PoE	Sony ICX694 CCD	1″	4.54µm	2736 x 2192	13 fps
		GS3-PGE-91S6C/M-C	GigE-PoE	Sony ICX814 CCD	1″	3.69µm	3376 x 2704	9 fps
	GRASSHOPPER2 Page 6	GS2-GE-20S4C/M-C	GigE	Sony ICX274 CCD	1/1.8″	4.4µm	1624 x 1224	29 fps
		GS2-GE-50S5C/M-C	GigE	Sony ICX625 CCD	2/3″	3.45µm	2448 x 2048	15 fps
	ZEBRA2 Page 7	ZBR2-PGEHD-20S4C-CS	GigE-PoE / HD-SDI	Sony ICX274 CCD	1/1.8″	4.4µm	1624x1224	30 fps (HD-SDI 25 FPS)
		ZBR2-PGEHD-28S4C-CS	GigE-PoE / HD-SDI	Sony ICX687 CCD	1/1.8″	3.69µm	1928x1448	26 fps (HD-SDI 25 FPS)
		ZBR2-PGEHD-50S5C-CS	GigE-PoE / HD-SDI	Sony ICX625 CCD	2/3″	3.45µm	2448x2048	15 fps (HD-SDI 25 FPS)
		ZBR2-PGEHD-51S5C-CS	GigE-PoE / HD-SDI	Sony ICX655 CCD	2/3″	3.45µm	2448x2048	10 fps (HD-SDI 25 FPS)
FireWire	**FLEA2** Page 10	FL2-03S2C/M-C	IEEE 1394b	Sony ICX424 CCD	1/3″	7.4µm	648x488	80 fps
		FL2-08S2C/M-C	IEEE 1394b	Sony ICX204 CCD	1/3″	4.65µm	1032x776	30 fps
		FL2G-13S2C/M-C	IEEE 1394b	Sony ICX445 CCD	1/3″	3.75µm	1288x964	30 fps
		FL2-14S3C/M-C	IEEE 1394b	Sony ICX267 CCD	1/2″	4.65µm	1392x1032	15 fps
		FL2-20S4C/M-C	IEEE 1394b	Sony ICX274 CCD	1/1.8″	4.4µm	1624x1224	15 fps
		FL2G-50S5C/M-C	IEEE 1394b	Sony ICX655 CCD	2/3″	3.45µm	2448x2048	7.5 fps
	FLEA3 Page 9	FL3-FW-03S1C/M-C	IEEE 1394b	Sony ICX618 CCD	1/4″	5.6µm	648x488	120 fps
		FL3-FW-03S3C/M-C	IEEE 1394b	Sony ICX414 CCD	1/2″	9.9µm	648x488	76 fps
		FL3-FW-14S3C/M-C	IEEE 1394b	Sony ICX267 CCD	1/2″	4.65µm	1384x1032	16 fps
		FL3-FW-20S4C/M-C	IEEE 1394b	Sony ICX274 CCD	1/1.8″	4.4µm	1624x1224	15 fps
	GRASSHOPPER EXPRESS Page 9	GX-FW-10K3M-C	IEEE 1394b	Kodak KAI-01050 CCD	1/2″	5.5µm	1024x1024	70 fps
		GX-FW-28S5C/M-C	IEEE 1394b	Sony ICX674 CCD	2/3″	4.54µm	1932x1452	26 fps
		GX-FW-60S6C/M-C	IEEE 1394b	Sony ICX694 CCD	1″	4.54µm	2736x2192	11 fps
	GRASSHOPPER Page 11	GRAS-03K2C/M-C	IEEE 1394b	Kodak KAI-0340D CCD	1/3″	7.4µm	648x480	200 fps
		GRAS-03S3M-C	IEEE 1394b	Sony ICX414 CCD	1/2″	9.9µm	648x488	74 fps
		GRAS-14S3C/M-C	IEEE 1394b	Sony ICX267 CCD	1/2″	4.65µm	1384x1032	21 fps
		GRAS-14S5C/M-C	IEEE 1394b	Sony ICX285 CCD	2/3″	6.45µm	1384x1036	15 fps
		GRAS-20S4C/M-C	IEEE 1394b	Sony ICX274 CCD	1/1.8″	4.4µm	1624x1224	30 fps
		GRAS-50S5C/M-C	IEEE 1394b	Sony ICX625 CCD	2/3″	3.45µm	2448x2048	15 fps
	GRASSHOPPER2 Page 10	GS2-FW-14S5C/M-C	IEEE 1394b	Sony ICX285 CCD	2/3″	6.45µm	1384x1036	30 fps

SHUTTER	LENS MOUNT	A/D CONVERTER	IMAGE DATA OUTPUT	ON-BOARD MEMORY	SIZE	OPERATING TEMP	WARRANTY
Global	CS	12-bit ADC	8, 12, 16, 24-bit	16 MB frame buffer	44 x 35 x 19.5 mm	0° to 45° C	3 years
Global	CS	12-bit ADC		1 MB flash memory			
Global	CS	12-bit ADC					
Global	CS	12-bit ADC	8, 12, 16, 24-bit	16 MB frame buffer	29 x 29 x 30 mm	0° to 45° C	3 years
Global	CS	12-bit ADC		1 MB flash memory			
Global	CS	12-bit ADC					
Global	CS	12-bit ADC					
Rolling	CS	12-bit ADC	8, 12, 16, 24-bit	32 MB frame buffer	29 x 29 x 30 mm	0° to 45° C	3 years
Global	C	10-bit ADC		1 MB flash memory			
Global	C	10-bit ADC					
Global	C	10-bit ADC					
Rolling/Global Reset	CS	12-bit ADC					
Rolling/Global Reset	C	12-bit ADC					
Global	C	14-bit ADC	8, 12, 16, 24-bit	128 MB frame buffer	44 x 29 x 58 mm	0° to 50° C	3 years
Global	C	14-bit ADC		2 MB flash memory			
Global	C	10/12-bit ADC					
Global	C	14-bit ADC					
Global	C	14-bit ADC					
Global	C	14-bit ADC					
Global	C	10-bit ADC					
Global	C	10-bit ADC					
Global	C	14-bit ADC					
Global	C	14-bit ADC					
Global	C	14-bit ADC					
Global	C	14-bit ADC					
Global	CS	12-bit ADC	8, 12, 16, 24-bit	16 MB frame buffer	29 x 29 x 30 mm	0° to 45° C	3 years
Global	CS	12-bit ADC		512 KB flash memory			
Global	CS	12-bit ADC					
Global	CS	12-bit ADC					
Global	CS	12-bit ADC					
Global	CS	12-bit ADC					
Global	CS	10-bit ADC					
Rolling	CS	12-bit ADC					
Global	CS	10-bit ADC					
Rolling	CS	12-bit ADC					
Global	C	10/12-bit ADC					
Rolling	CS	12-bit ADC					
Global	C	12-bit ADC					
Global	C	12-bit ADC	8, 12, 16, 24-bit	32 MB frame buffer	29 x 29 x 30 mm	0° to 45° C	3 years
Global	C			1 MB flash memory			
Global	C						
Global	C / CS						
Global	C						
Global	C						
Global	C						
Global	C						
Global	C	10/12-bit ADC	8, 12, 16, 24-bit	128 MB frame buffer	44 x 29 x 58 mm	0° to 50° C	3 years
Global	C	14-bit ADC		2 MB flash memory			
Global	C	14-bit ADC					
Global	C	14-bit ADC	8, 12, 16, 24-bit	32 MB frame buffer	44 x 29 x 58 mm	0° to 45° C	3 years
Global	C			512 KB flash memory			
Global	CS	14-bit ADC	8, 12, 16, 24-bit	32 MB frame buffer	44 x 44 x 87.5 mm	0° to 45° C	3 years
Global	CS			1 MB flash memory			
Global	CS						
Global	CS						
Global	C	12-bit ADC	8, 12, 16, 24-bit	32 MB frame buffer	29 x 29 x 30 mm	0° to 45° C	3 years
Global	C			512 KB flash memory			
Global	C						
Global	C						
Global	C						
Global	C						
Global	C	12-bit ADC	8, 12, 16, 24-bit	32 MB frame buffer	29 x 29 x 30 mm	0° to 45° C	3 years
Global	C			1 MB flash memory			
Global	C						
Global	C						
Global	C	14-bit ADC	8, 12, 16, 24-bit	32 MB frame buffer	44 x 29 x 58 mm	0° to 45° C	3 years
Global	C			1 MB flash memory			
Global	C						
Global	C	14-bit ADC	8, 12, 16, 24-bit	32 MB frame buffer	44 x 29 x 58 mm	0° to 40° C	3 years
Global	C			512 KB flash memory			
Global	C						
Global	C						
Global	C						
Global	C						
Global	C	14-bit ADC	8, 12, 16, 24-bit	32 MB frame buffer	44 x 29 x 58 mm	0° to 45° C	3 years
				512 KB flash memory			

	MODEL NUMBER	INTERFACE	SENSOR TYPE	OPTICAL FORMAT	PIXEL SIZE	MAX RES	MAX FPS
Page 11 **FIREFLY MV**	FFMV-03M2C/M-CS	IEEE 1394a	Aptina MT9V022 CMOS	1/3″	6.0µm	752x480	60 fps
DRAGONFLY2 Page 12	DR2-COL/BW-CS	IEEE 1394a	Sony ICX424 CCD	1/3″	7.4µm	648x488	60 fps
	DR2-HICOL/BW-CS	IEEE 1394a	Sony ICX204 CCD	1/3″	4.65µm	1032x776	30 fps
	DR2-13S2C/M-CS	IEEE 1394a	Sony ICX445 CCD	1/3″	3.75µm	1296x964	20 fps
Page 8 **CHAMELEON**	CMLN-13S2C/M-CS	USB 2.0	Sony ICX445 CCD	1/3″	3.75µm	1296x964	18 fps
FIREFLY MV Page 8	FMVU-03MTC/M-CS	USB 2.0	Micron MT9V022 CMOS	1/3″	6.0µm	752x480	60 fps
	FMVU-13S2C-CS	USB 2.0	Sony IMX035 CMOS	1/3″	3.63µm	1328x1048	23 fps
GAZELLE Page 12	GZL-CL-22C5-C	Camera Link Base/Full	CMOSIS CMV2000 CMOS	2/3″	5.5µm	2048x1088	280 fps
	GZL-CL-41C6-C	Camera Link Base/Full	CMOSIS CMV4000-2E5 CMOS	1″	5.5µm	2048x2048	150 fps
CRICKET IP CAMERA Page 14	CR-POE-13S2C-CS	100Mbit PoE	Sony IMX139 CMOS	1/3″	3.75µm	1280x1024	60 fps
	CR-POE-20S2C-CS	100Mbit PoE	Sony IMX140 CMOS	1/2.8″	2.8µm	1920x1080	60 fps
	CR-POE-20S3C-CS	100Mbit PoE	Sony IMX185CMOS	1/2″	3.75µm	1920x1080	60 fps
BUMBLEBEE2 & XB3 Page 18	BB2-03S2C/M (25/38/60)	IEEE 1394a	Sony ICX424 CCD	1/3″	7.4µm	648x488	48 fps
	BB2-08S2C/M (25/38/60)	IEEE 1394a	Sony ICX204 CCD	1/3″	4.65µm	1032x776	20 fps
	BBX3-13S2C/M (38/60)	IEEE 1394b	Sony ICX445 CCD	1/3″	3.75µm	1280x960	16 fps
LADYBUG2	LD2-HICOL-KIT	IEEE 1394b	Sony ICX204 CCD	1/3″	4.65µm	1024x768 (x6)	30 fps
LADYBUG3	LD3-20S4C-33	IEEE 1394b	Sony ICX274 CCD	1/1.8″	4.4µm	1600x1200 (x6)	16 fps
Page 15 & 16 **LADYBUG5**	LD5-U3-51S5C-44	USB 3.0	Sony ICX655 CCD	2/3″	3.45µm	2048x2448 (x6)	10 fps



Sony EXview HAD CCD II

Increased Camera Sensitivity for Sony's Global Shutter CCDs

Sony EXview HAD CCD technology increases sensitivity compared to other CCD's, including into the near infrared. Sony engineers achieve this by optimizing the photodiode's surface area and depth on the sensor as well as placing their proprietary micro lenses on each diode to better capture and focus the light.



Sony Exmor

Increased Imaging Performance for Sony's CMOS Sensors

Exmor CMOS technology features very low temporal dark noise (read noise) and excellent high saturation capacity (well depth). The results are excellent imaging performance at the high frame rates of CMOS. Sony engineers achieve this by replacing aluminum transistors with copper transistors to reduce wiring thickness and its interference to incoming light. In addition, Sony engineers increased heat shielding and improved silicon purity.

SHUTTER	LENS MOUNT	A/D CONVERTER	IMAGE DATA OUTPUT	ON-BOARD MEMORY	SIZE	OPERATING TEMP	WARRANTY
Global	CS	10-bit ADC	8, 16-bit	N/A	44 x 34 x 24.4mm	0° to 45° C	1 year
Global Global Global	CS CS CS	12-bit ADC	8, 12, 16, 24-bit	512 KB flash memory	75 x 65 x 25.5 mm	0° to 45° C	1 year
Global	CS	12-bit ADC	8, 16-bit	256 KB flash memory	44 x 41 x 25.5 mm	0° to 45° C	1 year
Global Rolling	CS CS	10-bit ADC 12-bit ADC	8, 16-bit	N/A	44 x 34 x 24.4 mm	0° to 45° C	1 year
Global Global	C C	10-bit ADC	8, 10-bit	4 MB flash memory	44 x 29 x 59.5 mm	-10° to 50° C	3 years
Rolling Rolling Rolling	CS CS CS	N/A	N/A	N/A	88.1 x 44 x 32 mm	0° to 45° C	1 year
Global Global Global	2 x M12 2 x M12 3 x M12	12-bit ADC	8, 16-bit	N/A	157x 36 x 47.4 mm 157 x 36 x 47.4 mm 277 x 37 x 41.8 mm	0° to 45° C	2 years
Global Global Global	N/A N/A N/A	12-bit ADC	8-bit 8-bit 8, 12, 16-bit	N/A	110 x 100 x 141 mm 122 x 141 mm 139.5 x 160 mm	0° to 45° C	1 year 1 year 2 years



Sony Exmor R

Back Illuminated Technology for High Sensitivity and Lower Noise

Sony Exmor R back-illuminated CMOS architecture increases quantum efficiency and reduces read noise for small sensors with high resolutions. Sony engineers flipped the wiring layer with the photo-diode so the photodiode is completely free from any wiring obstruction, allowing more light to be collected within the smaller photo diode. This gives the sensors high imaging performance even though the pixels sizes are small.



Sony Pregius Global Shutter CMOS

High-Speed CMOS Sensor with Global Shutter Technology

Sony's Pregius Global Shutter CMOS technology truly fulfills the promise of global shutter CMOS: crisp, clear, distortion-free images at high speeds. Sony engineers designed a special "analog memory" that perfectly stores the light collected in the photodiode. This memory is shielded from all sources of noise and allows for a clean conversion during the analog to digital process. This technology results in very high QE and dynamic range with ultra low read noise.

ACCESSORY LIST

MAXIMIZE THE EFFECTIVENESS OF YOUR IMAGING PIPELINE

For the most up to date list, please visit ptgrey.com/products/accessories

Model#	TRIPOD MOUNT / ENCLOSURES	BFLY-PGE	BFLY-U3	BB2	BBX3	CMLN	CM3-U3	DR2	FL3-FW	FL3-GE	FL3-U3	FL2	FFMV	FMVU	GRAS	GS2-GE	GS3-PGE	GS2-FW	GS3-U3	GX-FW	GZL-CL	LD2	LD3	LD5	ZBR2
ACC-01-0003	Tripod Mount Adapter-3	■	■			■	■		■	■	■	■	■	■											
ACC-01-0005	Tripod Mount Adapter-5												■												
ACC-01-0011	Tripod Mount Adapter-11														■	■	■	■	■	■	■				
ACC-01-0010	Metal Camera Enclosure for CS-Mount FFMV only												■												
ACC-01-0012	Ladybug3 Desktop Mount																						■	■	
ACC-01-0013	Ladybug3 Tripod Mount Adapter and Plugs																						■		
ACC-01-0014	Zebra2 Tripod Mount Adapter																								■
ACC-01-0015	Ladybug5 Tripod Mount Adapter																							■	

Model#	HOST ADAPTER CARDS	BFLY-PGE	BFLY-U3	BB2	BBX3	CMLN	CM3-U3	DR2	FL3-FW	FL3-GE	FL3-U3	FL2	FFMV	FMVU	GRAS	GS2-GE	GS3-PGE	GS2-FW	GS3-U3	GX-FW	GZL-CL	LD2	LD3	LD5	ZBR2
ACC-01-1000	IEEE 1394a OHCI PCI Host Adapter 3 Port			■				■					■												
ACC-01-1001	IEEE 1394b OHCI PCI Host Adapter 2 Port			■	■			■	■			■	■		■			■		■		■	■		
ACC-01-1100	Intel PRO 1000 CT Gigabit Ethernet PCIe	■								■						■	■								■
GIGE-PCIE2-2P02	Gigabit Ethernet PCIe PoE, 2 Port, Intel	■								■						■	■								■
ACC-01-1201	Generic USB 3.0 PCIe 2.0 x1 2 Port Card		■			■	■				■			■					■					■	
ACC-01-1202	Generic USB 3.0 PCIe 2.0 x1 4 Port Card		■			■	■				■			■					■					■	
U3-PCIE2-2P01X	PGR USB 3.0 PCIe 2.0 x1 Card, Fresco, 2-port		■			■	■				■			■					■					■	

Model#	CABLES	BFLY-PGE	BFLY-U3	BB2	BBX3	CMLN	CM3-U3	DR2	FL3-FW	FL3-GE	FL3-U3	FL2	FFMV	FMVU	GRAS	GS2-GE	GS3-PGE	GS2-FW	GS3-U3	GX-FW	GZL-CL	LD2	LD3	LD5	ZBR2
ACC-01-2000	4.5 m, 6-pin to 6-pin, 1394a			■				■					■												
ACC-01-2004	0.3-m, 6-pin to 6-pin, Ultra Thin 1394a (10moq)			■				■					■												
ACC-01-2003	1.0 m, 6-pin to 6-pin, Ultra Thin 1394a (10moq)			■				■					■												
ACC-01-2002	2.0 m, 6-pin to 6-pin, Ultra Thin 1394a (10moq)			■				■					■												
ACC-01-2013	4.5 m, 4-pin to 9-pin, 1394a to 1394b				■				■			■			■			■		■		■	■		
ACC-01-2007	4.5 m, 6-pin to 9-pin, Locking 1394a to 1394b			■	■				■			■			■			■		■		■	■		
ACC-01-2016	0.3 m, 9-pin to 9-pin, Locking 1394b								■			■			■			■		■		■	■		
ACC-01-2015	1.0 m, 9-pin to 9-pin, Locking 1394b								■			■			■			■		■		■	■		
ACC-01-2005	4.5 m, 9-pin to 9-pin, 1394b				■																	■	■		
ACC-01-2006	4.5 m, 9-pin to 9-pin, Locking 1394b				■				■			■			■			■		■		■	■		
ACC-01-2012	4.5 m, 9-pin to 9-pin, Locking 1394b High Flex OKI				■				■			■			■			■		■		■	■		
ACC-01-2017	FirePRO 10-m 9-pin to 9-pin, Locking 1394b				■				■			■			■			■		■		■	■		
ACC-01-2008	10 m Ladybug2 Data																					■			
ACC-01-2010	10 m Ladybug2 Power																					■			
ACC-01-2011	50 m Ladybug2 Power																					■			
ACC-01-2100	5 m CAT 5e Ethernet Locking Cable, High Flex	■								■						■	■								■
ACC-01-2101	4.5 meter CAT 5e Ethernet Cable	■								■						■	■								■
ACC-01-2200	3 m 85 MHz Camera Link, 1x MDR , 1x SDR mini																				■				
ACC-01-2300	3 m USB 3.0 Cable, Type-A to Micro-B (Locking)		■				■				■								■					■	
ACC-01-2301	5 m USB 3.0 Cable, Type-A to Micro-B (Locking)		■				■				■								■					■	
ACC-01-2302	5 m USB 3.0 Cable, Type-A to Micro-B (Locking) Industrial, 80°C		■				■				■								■					■	

Model#	GPIO CONNECTORS	BFLY-PGE	BFLY-U3	BB2	BBX3	CMLN	CM3-U3	DR2	FL3-FW	FL3-GE	FL3-U3	FL2	FFMV	FMVU	GRAS	GS2-GE	GS3-PGE	GS2-FW	GS3-U3	GX-FW	GZL-CL	LD2	LD3	LD5	ZBR2
ACC-01-3000	1.0 m, Circular 8-pin Prewired GPIO Hirose Conn.								■	■	■	■			■	■	■	■	■	■			■		
ACC-01-3005	4.5 m, Circular 8-pin Prewired GPIO Hirose Conn.								■	■	■	■			■	■	■	■	■	■			■		
ACC-01-3001	Circular 12PIN Prewired GPIO Hirose Connector			■																					
ACC-01-3002	7-pin Prewired GPIO JST Connector					■							■	■											
ACC-01-3013	9-pin Prewired GPIO JST Connector						■																		
ACC-01-3004	8-pin Phoenix Contact GPIO Connector							■																	
ACC-01-3006	8-pin Circular Hirose HR25 GPIO Connector								■	■	■	■			■	■	■	■	■	■			■		
ACC-01-3007	4-pin Phoenix Contact Power Connector																								■
ACC-01-3008	6-pin Phoenix Contact GPIO Connector																								■
ACC-01-3009	1.0m, Circular 6-pin Prewired GPIO Hirose Conn.	■	■																						
ACC-01-3010	4.5m, Circular 6-pin Prewired GPIO Hirose Conn.	■	■																						
ACC-01-3011	6-pin Circular Hirose HR10 GPIO Connector	■	■																						
ACC-01-3012	12-pin Circular Hirose GPIO Cable with Power Jack																							■	

Model#	GENERIC OPTICS	BFLY-PGE	BFLY-U3	BB2	BBX3	CMLN	CM3-U3	DR2	FL3-FW	FL3-GE	FL3-U3	FL2	FFMV	FMVU	GRAS	GS2-GE	GS3-PGE	GS2-FW	GS3-U3	GX-FW	GZL-CL	LD2	LD3	LD5	ZBR2
ACC-01-4000	M12 Microlens 4MM						■						■												
ACC-01-4001	M12 Microlens 6MM						■						■												
ACC-01-4002	M12 Microlens 8MM						■						■												
ACC-01-4003	Auto Iris CS-Mount Lens 1/3" 3.5~8MM							■																	

Model#	OPTIC MOUNTS	BFLY-PGE	BFLY-U3	BB2	BBX3	CMLN	CM3-U3	DR2	FL3-FW	FL3-GE	FL3-U3	FL2	FFMV	FMVU	GRAS	GS2-GE	GS3-PGE	GS2-FW	GS3-U3	GX-FW	GZL-CL	LD2	LD3	LD5	ZBR2
ACC-01-5004	C- to CS-Mount Mount 5mm Spacer Adapter	■	■			■	■	■		■	■		■	■											■
ACC-01-5005	CS- to M12 Microlens Adapter					■	■	■		■	■		■	■											■
ACC-01-5006	Cast Metal M12 Microlens Holder					■	■																		
ACC-01-5007	Cast Metal M12 Microlens Holder with IR Filter					■	■																		

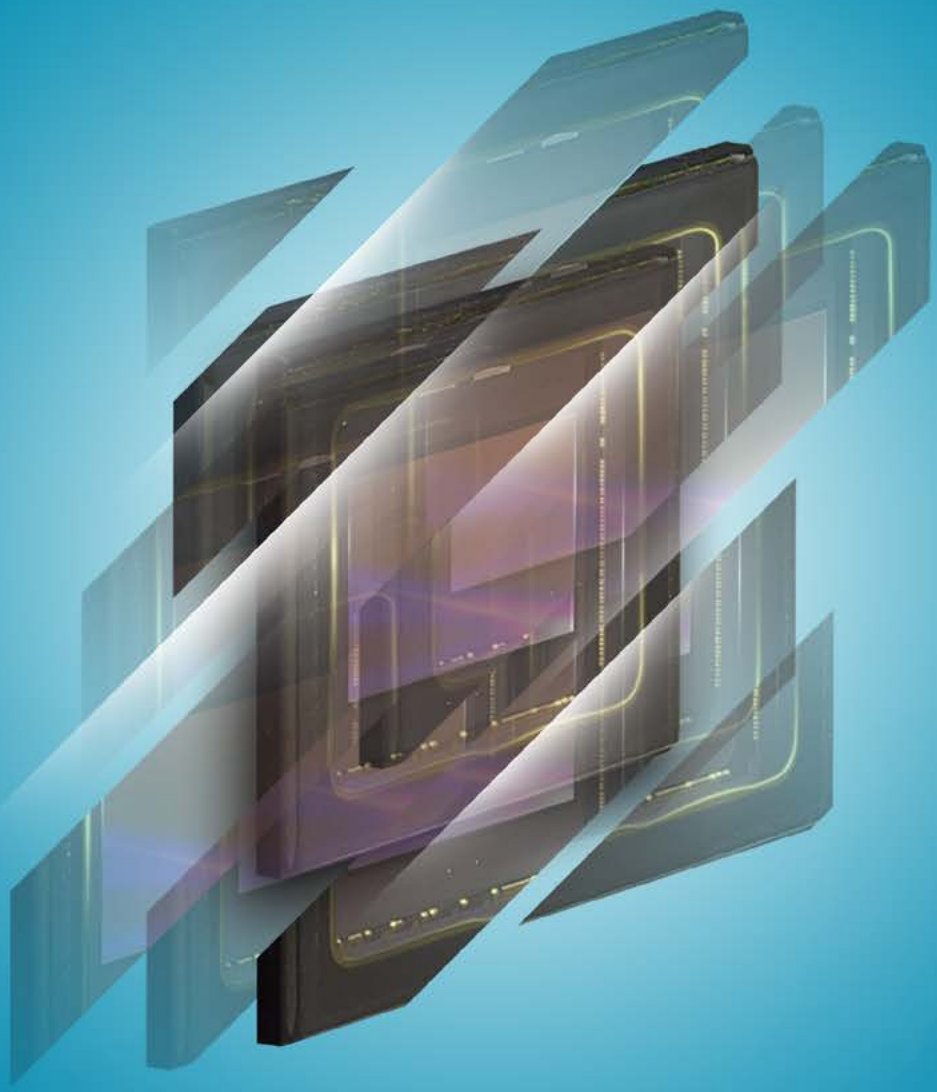
Model#	HUBS	BFLY-PGE	BFLY-U3	BB2	BBX3	CMLN	CM3-U3	DR2	FL3-FW	FL3-GE	FL3-U3	FL2	FFMV	FMVU	GRAS	GS2-GE	GS3-PGE	GS2-FW	GS3-U3	GX-FW	GZL-CL	LD2	LD3	LD5	ZBR2
ACC-01-6000	4-Port USB 3.0 Hub, Screw Locks, Ext Power Adap.		■				■				■								■						
FWB-HUB-2PORT	FirePRO 1394b 2-Port Repeater							■	■			■	■		■			■		■		■	■		
FWB-HUB-3PORT	FirePRO 1394b 3-Port Hub							■	■			■	■		■			■		■		■	■		
FWB-HUB-5PORT	FirePRO 1394b 5-Port Repeater							■	■			■	■		■			■		■		■	■		
FWB-LDR-CAT5	FirePRO LDR IEEE 1394b 100 m Cat5e repeater							■	■			■	■		■			■		■		■	■		

Model#	POWER SUPPLY (PS) / MISC	BFLY-PGE	BFLY-U3	BB2	BBX3	CMLN	CM3-U3	DR2	FL3-FW	FL3-GE	FL3-U3	FL2	FFMV	FMVU	GRAS	GS2-GE	GS3-PGE	GS2-FW	GS3-U3	GX-FW	GZL-CL	LD2	LD3	LD5	ZBR2
ACC-01-9001	24V 2.5A 60W PS, Standard DC Barrel Connector																					■		■	
ACC-01-9007	20V 2A 40W PS, Standard DC Barrel Connector																								
ACC-01-9008	12V 1.5A (18W) Wall Mount PS, 4-Pin Phoenix Contact																								■
ACC-01-9009	12V 1.5A Wall-Mount PS, Plug Adapters, HR25 GPIO Harness									■						■	■		■	■	■				
ACC-01-9010	12V 2.0A Wall Mount PS for FWB-EC2PORT																								
ACC-01-9011	12V 1.5A Wall-Mount PS, Plug Adapters, HR10 GPIO Harness	■																							
ACC-01-9012	19.6W Single Port PoE Injector with NA power cord	■															■								■

Model#	REGULAR LENS
LENS-V130F3C	Fujinon 3.8-13mm Varifocal C-mount lens, for 1/2" sensors (DV3.4x3.8SA-1)
LENS-V130F3C-DC	Fujinon 3.8-13mm Varifocal C-mount lens, for 1/2" sensors, DC Iris (DV3.4x3.8SA-SA1)
LENS-15F5-125C	Fujinon fixed focal length 12.5mm C-mount lens for 2/3" sensors (HF12.5HA-1B)
LENS-15F5-250C	Fujinon fixed focal length 25mm C-mount lens for 2/3" sensors (HF25HA-1B)
LENS-15F3-60C	Fujinon fixed focal length 6mm C-mount lens for 1/2" sensors (DF6HA-1B)
LENS-30F2-V80C	Fujinon vari-focal 2.8-8mm CS-mount lens, for 1/3" sensors (YV2.8×2.8SA-2)
LENS-V500F2CS	Fujinon vari-focal 15-50mm CS-mount lens, for 1/3" sensors (YV3.3x15SA-2)
LENS-V80F2CS-DC	Fujinon vari-focal 2.8-8mm CS-mount DC iris lens, for 1/3" sensors (YV2.8x2.8SA-SA2)
LENS-V500F2CS-DC	Fujinon vari-focal 15-50mm CS-mount DC iris lens, for 1/3" sensors (YV3.3x15SA-SA2)

Model#	HIGH RESOLUTION LENS
LENS-50F5-125C	Fujinon fixed focal length 12.5mm C-mount lens for 2/3" sensors (HF12.5SA-1)
LENS-30S6-250C	Spacecom fixed focal length 25mm C-mount lens for 1" sensors (VF25095M)
LENS-160T5C	Tamron fixed focal length 16mm C-mount lens for 2/3" sensors (23FM16SP)
LENS-250T5C	Tamron fixed focal length 25mm C-mount lens for 2/3" sensors (23FM25SP)
LENS-80T4C	Tamron fixed focal length 8mm C-mount lens for 1/1.8" sensors (MF118FM08)
LENS-160T4C	Tamron fixed focal length 16mm C-mount lens for 1/1.8" sensors (MF118FM16)

MONO CAMERA SENSOR REVIEW
Q1 2015



POINT GREY
Innovation in Imaging

1288 EMVA Standard Compliant

Measurements are taken based on guidelines in the EMVA 1288 standard; the full definition can be found at EMVA.org. Camera settings are at maximum exposure time and bit depth unless otherwise noted. The pixel format is Mono 16 for mono cameras and Raw 16 for color cameras. Results are captured at room temperature (20°C).

RELEASE NOTES:

Q1 2015
ADDED:
- GRASSHOPPER3 GS3-U3-15S5M-C (SONY ICX825)

Q4 2014
ADDED:
- BLACKFLY GIGE BFLY-PGE-23S6M-C (SONY IMX249)
- BLACKFLY GIGE BFLY-PGE-50H5M-C (SHARP RJ32S4AA0DT)

Q3 2014
REMOVED:
- FIREWIRE CAMERAS
- CHAMELEON USB 2.0, FLEA3-GE-03S3M-C (ICX424)
- COST PER MB/S OF THROUGHPUT CHART

ADDED:
- FLEA3 USB3 FL3-U3-20E4M-C (E2V EV76C570)
- GRASSHOPPER3 USB3 GS3-U3-60QS6M-C-C (SONY ICX964 CMOS) *QUAD TAP
- BLACKFLY GIGE BFLY-PGE-03S3M-C (SONY ICX414 CCD)
- ABSOLUTE SENSITIVITY THRESHOLD CHART

Q2 2014
ADDED:
- GRASSHOPPER3 USB3 GS3-U3-41S4M-C (SONY ICX808 CCD)
- GRASSHOPPER3 GIGE GS3-PGE-23S6M-C (SONY IMX174 CMOS)
- GRASSHOPPER3 GIGE GS3-PGE-60S6M-C (SONY ICX694 CCD)
- GRASSHOPPER3 USB3 GS3-U3-14S5M-C (SONY ICX285 CCD)
- BLACKFLY USB3 BFLY-U3-13S2M-CS (SONY ICX445 CCD)
- UPDATED COST PER MB/S TO REFLECT NEW GS3-U3 PRICING

Q1 2014
ADDED:
- GRASSHOPPER3 GS3-U3-50S5M-C (SONY ICX625 CCD)
- GRASSHOPPER3 GS3-U3-41C6NIR-C (CMOSIS CMV4000 NIR CMOS)
- BLACKFLY BFLY-PGE-03S2M-CS (SONY ICX424 CCD)

CONTENT

i • OVERVIEW / HOW TO READ OUR MODEL NUMBERS

1-2 • MONO CAMERA CHART WITH EMVA 1288 DATA

3 • QUANTUM EFFICIENCY AT 525 NM

3 • DYNAMIC RANGE

4 • TEMPORAL DARK NOISE (READ NOISE)

4 • SATURATION CAPACITY (WELL DEPTH)

5 • NEAR IR QE

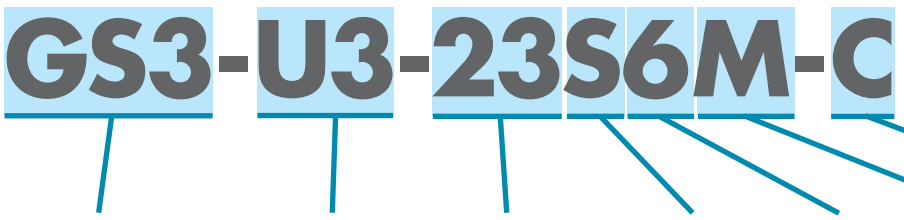
6 • ABSOLUTE SENSITIVITY THRESHOLD

7 • MAX RESOLUTION TO MAX FRAME RATE

8 • MAX THROUGHPUT (MB/S) / % OF INTERFACE BANDWIDTH

Our Model Numbers Mean Something!

Here is one example of our model numbers and what each section means. Understanding this will give you a quick explanation of the model's specifications and help you when comparing models.



Camera Family	**Interface**	**Megapixels**	**Sensor Brand**	**Sensor Size**	**Color/Mono**	**Lens Mount**
GS3=Grasshopper3	U3=USB 3.0	23=2.3 MP	S=Sony	6=1"	M=Mono	C=C-Mount
BFLY=Blackfly	FW=FireWire	03=0.3 MP	A=Aptina	0=Unassigned	C=Color	CS=CS-Mount
FL3=Flea3	GE=GigE	08=0.8 MP	M=Micron	1=1/4"		
FFMV=FireflyMV FireWire	PGE=PoE GigE	13=1.3 MP	K=Kodak	2=1/3", 1/2.8", 1/2.5"		
GS2=Grasshopper2		20=2.0 MP	C=CMOSIS	3=1/2"		
GX=Grasshopper Express		50=5.0 MP	Y=Cypress	4=1/1.8"		
		etc	E=E2V	5=2/3"		
			H=Sharp			

Please note that all measurements are taken based on guidelines in the EMVA 1288 standard. Camera settings are at maximum exposure time and bit depth unless otherwise noted. The pixel format is Mono 16 for mono cameras except for the last two Bandwidth and Throughput graphs which are done at Mono 8. Results are captured at room temperature (20°C). For more information on the EMVA 1288 standard please visit EMVA.org. Thanks for considering Point Grey and please enjoy our mono camera sensor review.

SORTED BY SENSOR TYPE (CCD/CMOS) AND RESOLUTION

MODEL ID	SENSOR	SENSOR SIZE	INTERFACE	SENSOR TYPE	SHUTTER	MAX RESOLUTION	MAX FRAME RATE	PIXEL SIZE
BFLY-PGE-03S2M-CS	**Sony ICX424**	1/3"	PoE GigE	CCD	Global	648 x 488	84	7.4 µm
BFLY-U3-03S2M-CS	**Sony ICX424**	1/3"	USB 3.0	CCD	Global	648 x 488	84	7.4 µm
BFLY-PGE-03S3M-CS	**Sony ICX414**	1/2"	PoE GigE	CCD	Global	648 x 488	90	9.9 µm
FL3-GE-03S1M-C	**Sony ICX618**	1/4"	GigE	CCD	Global	648 x 488	120	5.6 µm
BFLY-PGE-05S2M-CS	**Sony ICX693**	1/3"	PoE GigE	CCD	Global	808 x 608	50	6.0 µm
FL3-GE-08S2M-C	**Sony ICX204**	1/3"	GigE	CCD	Global	1032 x 776	31	4.65 µm
BFLY-PGE-09S2M-CS	**Sony ICX692**	1/3"	PoE GigE	CCD	Global	1288 x 728	30	4.08 µm
BFLY-U3-13S2M-CS	**Sony ICX445**	1/3"	USB 3.0	CCD	Global	1288 x 964	30	3.75 µm
BFLY-PGE-13S2M-CS	**Sony ICX445**	1/3"	PoE GigE	CCD	Global	1288 x 964	22	3.75 µm
FL3-GE-13S2M-C	**Sony ICX445**	1/3"	PoE GigE	CCD	Global	1288 x 964	31	3.75 µm
FL3-GE-14S3M-C	**Sony ICX267**	1/2"	GigE	CCD	Global	1384 x 1032	18	4.65 µm
GS3-U3-15S5M-C	**Sony ICX825**	2/3″	USB 3.0	CCD	Global	1384 x 1032	45	6.45 µm
GS3-U3-14S5M-C	**Sony ICX285**	2/3"	USB 3.0	CCD	Global	1384 x 1036	30	6.45 µm
FL3-GE-20S4M-C	**Sony ICX274**	1/1.8"	GigE	CCD	Global	1624 x 1224	15	4.4 µm
GS3-U3-28S5M-C	**Sony ICX674**	2/3"	USB 3.0	CCD	Global	1920 x 1440	26	4.54 µm
FL3-GE-28S4M-C	**Sony ICX687**	1/1.8"	GigE	CCD	Global	1928 x 1448	15	3.69 µm
GS3-U3-28S4M-C	**Sony ICX687**	1/1.8"	USB 3.0	CCD	Global	1928 x 1448	26	3.69 µm
GS3-U3-41S4M-C	**Sony ICX808**	1/1.8"	USB 3.0	CCD	Global	2024 x 2024	18	3.1 µm
FL3-GE-50S5M-C	**Sony ICX655**	2/3"	GigE	CCD	Global	2448 x 2048	8	3.45 µm
GS3-U3-50S5M-C	**Sony ICX625**	2/3″	USB 3.0	CCD	Global	2448 x 2048	15	3.45 µm
GS3-PGE-50S5M-C	**Sony ICX625**	2/3″	PoE GigE	CCD	Global	2448 x 2048	15	3.45 µm
BFLY-PGE-50H5M-C	**Sharp RJ32S4AA0DT**	2/3″	PoE GigE	CCD	Global	2448 x 2048	7.5	3.45 µm
GS3-U3-60S6M-C	**Sony ICX694**	1"	USB 3.0	CCD	Global	2736 x 2192	13	4.54 µm
GS3-U3-60QS6M-C	**Sony ICX694**	1"	USB 3.0	CCD	Global	2736 x 2192	25	4.54 µm
GS3-PGE-60S6M-C	**Sony ICX694**	1"	PoE GigE	CCD	Global	2736 x 2192	13	4.54 µm
GS3-U3-91S6M-C	**Sony ICX814**	1"	USB 3.0	CCD	Global	3376 x 2704	9	3.69 µm
FFMV-03M2M-CS	**Micron MT9V022177ATC**	1/3"	FireWire	CMOS	Global	752 x 480	60	6.0 µm
BFLY-PGE-12A2M-CS	**Aptina AR0134**	1/3"	PoE GigE	CMOS	Global	1280 x 960	52	3.75 µm
FL3-U3-13E4M-C	**e2v EV76C560**	1/1.8"	USB 3.0	CMOS	Global	1280 x 1024	60	5.3 µm
BFLY-PGE-13E4M-CS	**e2v EV76C560**	1/1.8"	PoE GigE	CMOS	Global	1280 x 1024	60	5.3 µm
FL3-U3-13Y3M-C	**On Semi VITA1300**	1/2"	USB 3.0	CMOS	Global	1280 x 1024	150	4.8 µm
FL3-U3-13S2M-CS	**Sony IMX035**	1/3"	USB 3.0	CMOS	Rolling	1328 x 1048	120	3.63 µm
BFLY-PGE-20E4M-CS	**e2v EV76C570**	1/1.8"	PoE GigE	CMOS	Global	1600 x 1200	47	4.5 µm
FL3-U3-20E4M-C	**e2v EV76C570**	1/1.8"	USB 3.0	CMOS	Global	1600 x 1200	60	4.5 µm
GS3-U3-23S6M-C	**Sony IMX174**	1/1.2"	USB 3.0	CMOS	Global	1920 x 1200	162	5.86 µm
GS3-PGE-23S6M-C	**Sony IMX174**	1/1.2"	PoE GigE	CMOS	Global	1920 x 1200	46	5.86 µm
BFLY-PGE-23S6M-C	**Sony IMX249**	1/1.2"	PoE GigE	CMOS	Global	1920 x 1200	41	5.86 µm
FL3-U3-32S2M-CS	**Sony IMX036**	1/2.8"	USB 3.0	CMOS	Rolling	2080 x 1552	60	2.5 µm
GS3-U3-41C6M-C	**CMOSIS CMV4000**	1"	USB 3.0	CMOS	Global	2048 x 2048	90	5.5 µm
GS3-U3-41C6NIR-C	**CMOSIS CMV4000 NIR**	1″	USB 3.0	CMOS	Global	2048 x 2048	90	5.5 µm
BFLY-PGE-50A2M-CS	**Aptina MT9P031**	1/2.5"	PoE GigE	CMOS	Rolling	2592 x 1944	13	2.2 µm

CCD

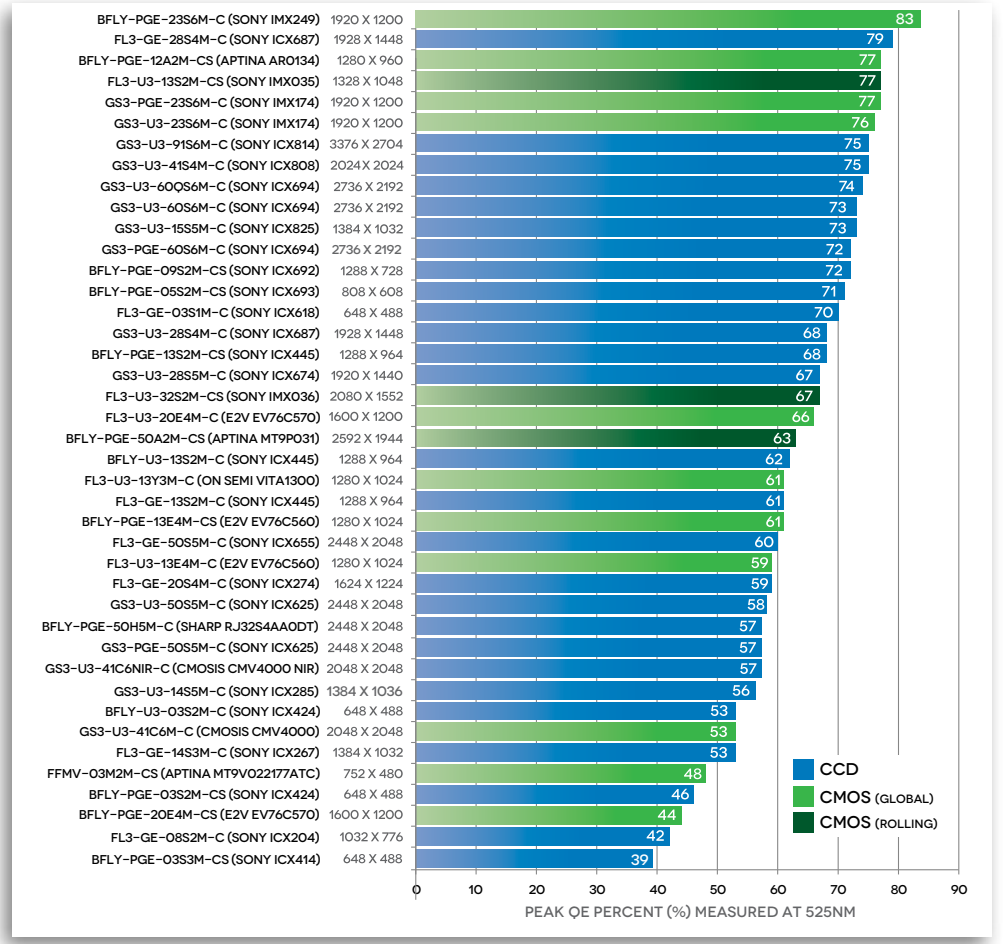
CMOS

QE 525nm %	QE NEAR IR 850nm / 950nm %	TEMPORAL DARK NOISE (READ NOISE) e–	S/N RATIO MAX dB	S/N RATIO MAX Bits	ABSOLUTE SENSITIVITY THRESHOLD γ	SATURATION CAPACITY (WELL DEPTH) e–	DYNAMIC RANGE dB	DYNAMIC RANGE Bits	GAIN e-/ADU
46	7/2	12.86	41.44	6.88	29.74	13932	60.37	10.03	0.22
53	8 / 3	12.03	41.37	6.87	24.76	13701	60.78	10.10	0.22
39	7/2	19.43	44.14	7.33	51.72	25949	62.29	10.35	0.41
70	21 / 8	11.73	41.62	6.91	17.57	14508	61.49	10.21	0.22
71	14 / 4	11.22	43.02	7.14	16.97	20024	64.66	10.74	0.36
42	6 / 2	12.13	40.77	6.77	30.70	11944	59.51	9.89	0.19
72	15 / 5	8.56	40.63	6.75	12.76	11551	62.11	10.32	0.24
62	16 / 5	10.30	39.86	6.62	17.78	9686	59.06	9.81	0.15
68	16 / 5	9.27	39.60	6.58	14.72	9126	59.67	9.91	0.15
61	15 / 4	7.61	38.66	6.42	13.63	7347	59.14	9.82	0.12
53	7 / 2	11.48	40.16	6.67	23.63	10366	58.75	9.76	0.18
73	22 / 7	8.31	43.59	7.24	12.15	22856	68.28	11.34	0.37
56	9 / 3	11.9	42.15	7.00	23.19	16408	62.43	10.37	0.28
59	7 / 2	8.35	39.01	6.48	15.77	7969	59.09	9.82	0.13
67	17 / 5	9.39	41.67	6.92	14.86	14693	63.43	10.54	0.24
79	17 / 6	9.68	40.64	6.78	13.13	11586	61.12	10.15	0.19
68	15 / 5	10.17	39.56	6.57	15.78	9039	58.56	9.73	0.15
75	14/4	9.29	38.10	6.33	13.32	6459	56.39	9.37	0.10
60	9 / 4	9.43	37.68	6.26	17.23	5856	55.42	9.20	0.09
58	9 / 3	8.73	37.90	6.30	16.30	6168	56.50	9.38	0.10
57	8 / 3	8.18	37.71	6.26	15.69	5903	56.66	9.41	0.10
57	8 / 2	5.48	39.08	6.49	10.67	8086	62.61	10.4	0.13
73	16 / 5	10.54	41.60	6.91	15.22	14446	62.34	10.35	0.23
74	16 / 5	10.88	41.53	6.90	15.43	14227	61.94	10.29	0.23
72	16 / 5	10.87	41.56	6.93	13.87	14959	63.40	10.53	0.24
75	16 / 4	9.43	40.00	6.64	13.53	9996	60.06	9.98	0.16
48	37 / 15	40.45	41.83	6.75	85.67	15239	51.41	8.53	0.27
77	21 / 7	6.58	37.44	6.22	9.30	5542	57.87	9.61	0.10
59	22 / 4	25.14	39.24	6.52	43.18	8384	50.29	8.35	0.16
61	22 / 8	25.32	38.76	6.44	43.00	7506	49.27	8.18	0.16
61	21 / 8	26.26	40.10	6.66	44.13	10226	51.64	8.58	0.21
77	12 / 4	6.00	41.90	6.96	8.72	15491	67.55	11.22	0.27
44	15 / 6	20.47	38.55	6.40	47.44	7167	50.68	8.42	0.13
66	22 / 9	24.17	38.92	6.46	37.84	7788	49.99	8.30	0.13
76	13 / 4	6.83*	45.12	7.49	9.77*	32513	72.94	12.11	0.52
77	14 / 4	6.83*	45.14	7.50	9.75*	32691	72.99	12.12	0.51
83	15 / 5	14.72	45.21	7.51	18.92	33173	66.77	11.09	0.53
67	13 / 4	6.71	40.03	6.65	10.99	10066	62.90	10.45	0.19
53	18 / 7	16.81	38.82	6.45	33.38	7620	52.87	8.78	0.15
57	32 / 13	17.99	39.59	6.58	31.01	9094	53.84	8.94	0.15
63	14 / 5	7.64	38.26	6.35	13.00	6693	58.30	9.68	0.11

*Mode 7 (Low Noise Imaging Mode)

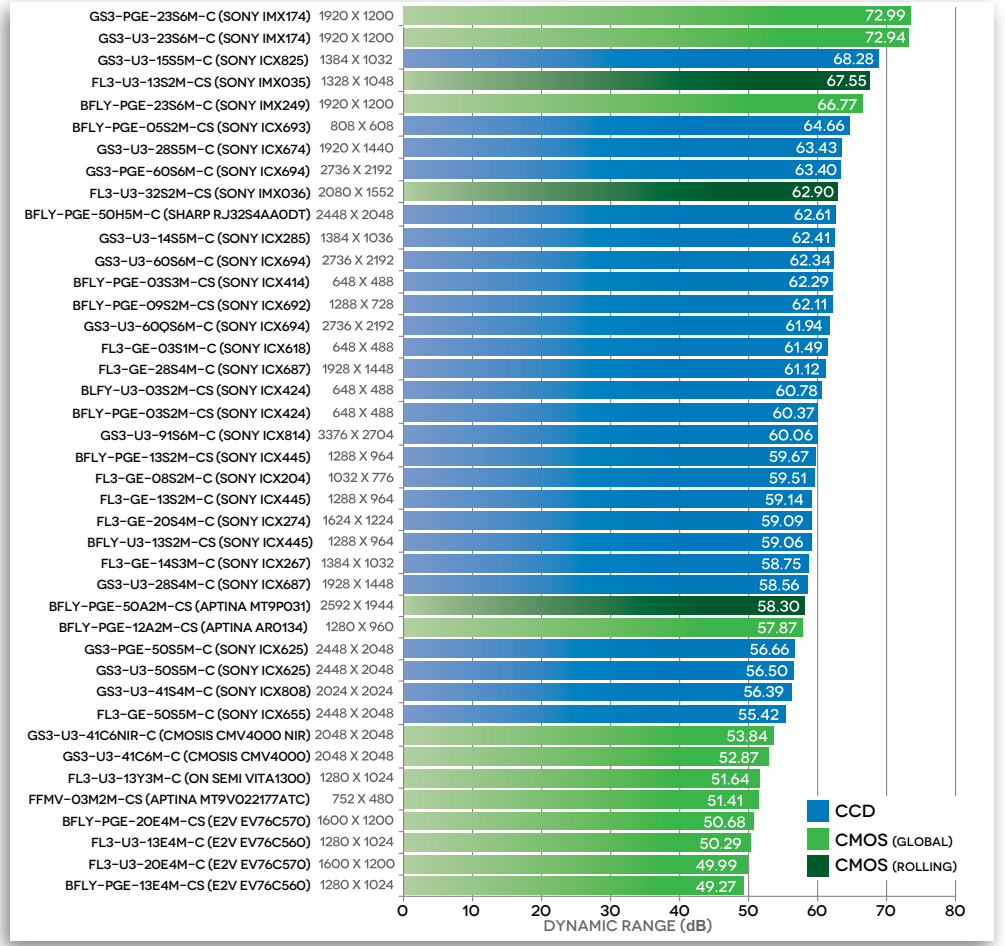
MONO SINGLE LENS CAMERAS

QUANTUM EFFICIENCY (%) AT 525 NM (HIGHER IS BETTER)



Quantum efficiency (QE) is the ability of the sensor to turn photons into electrons, or in other words, turn incoming light into an electrical signal for imaging. A higher QE % means greater sensitivity for detecting light. A sensor with a measurement of 79% means that for every 100 photons that hit the sensor an average of 79 will be detected.

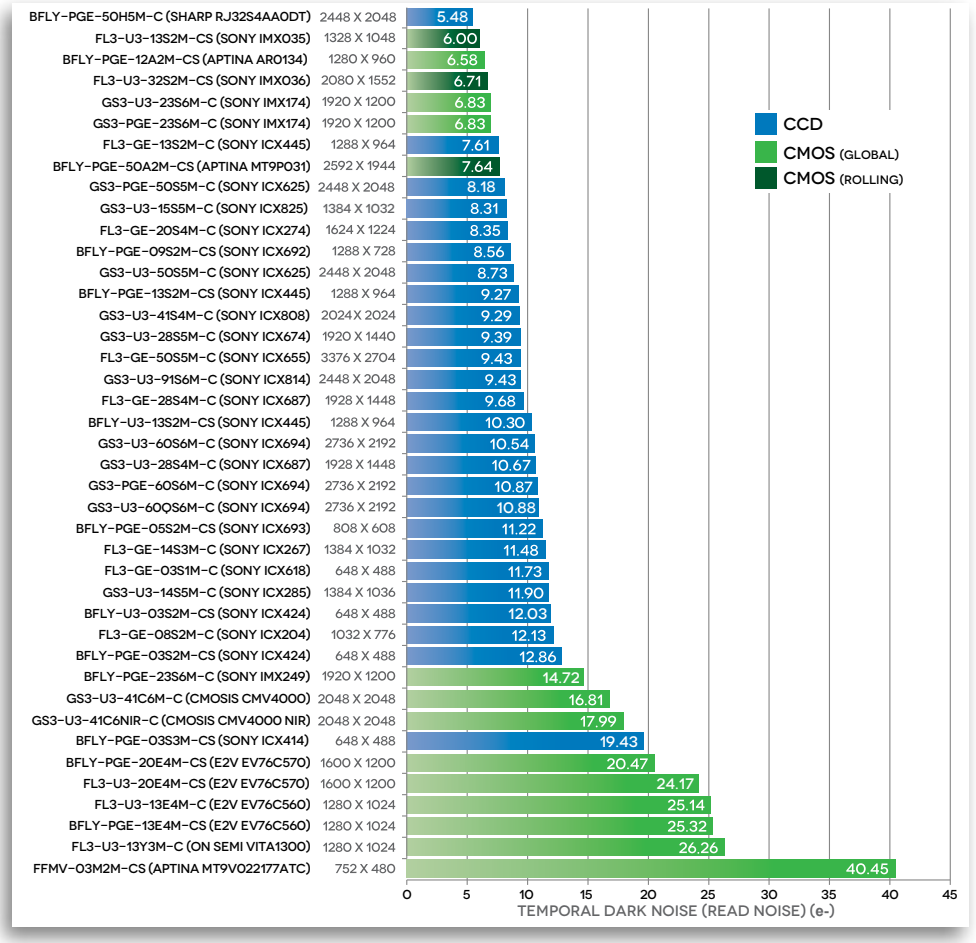
DYNAMIC RANGE dB (HIGHER IS BETTER)



Dynamic range describes the camera model's ability to detect the maximum and minimum of light intensities (shadows and highlights). Models with higher dynamic range can detect more detail in the darks and lights.

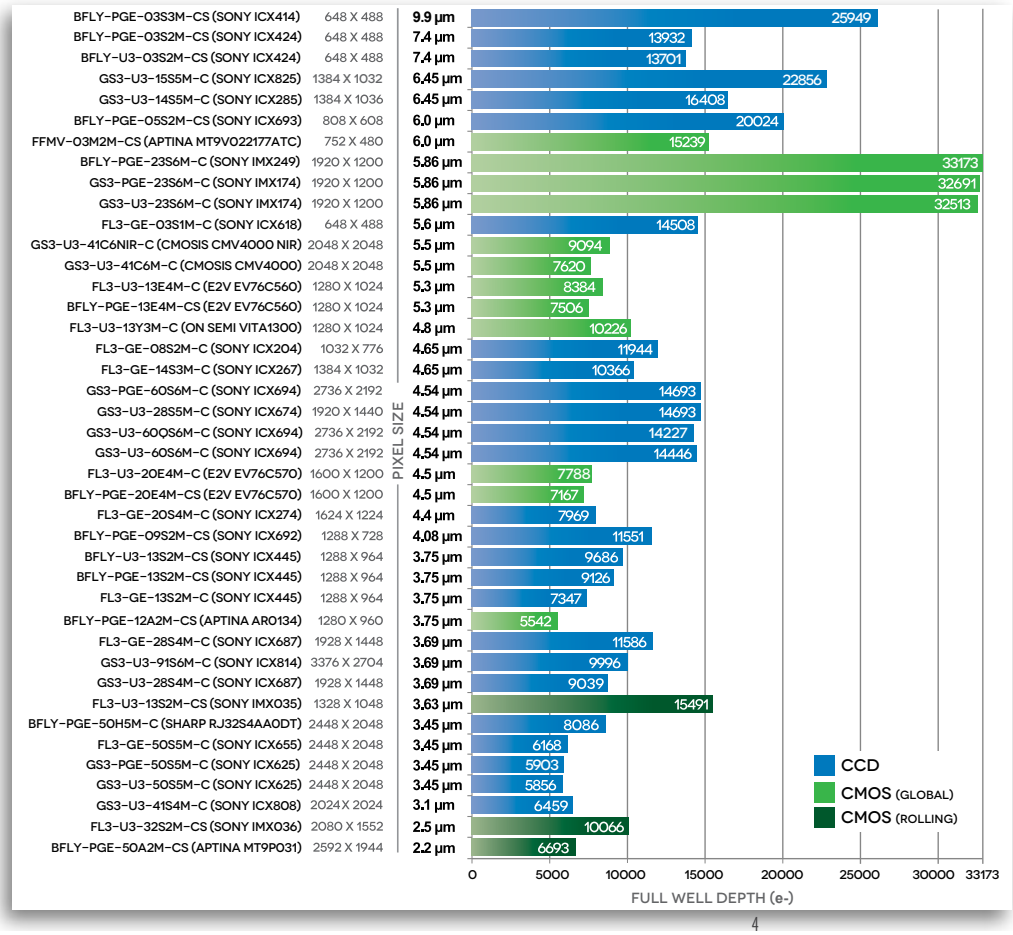
MONO SINGLE LENS CAMERAS

TEMPORAL DARK NOISE / READ NOISE e– (LOWER IS BETTER)



Temporal dark noise (also known as read noise) comes from energy within the sensor and the surrounding sensor electronics. Over time, random electrons are created that fall into the sensor wells and are detected and turned into signal. Models with lower read noise measurements produces cleaner images.

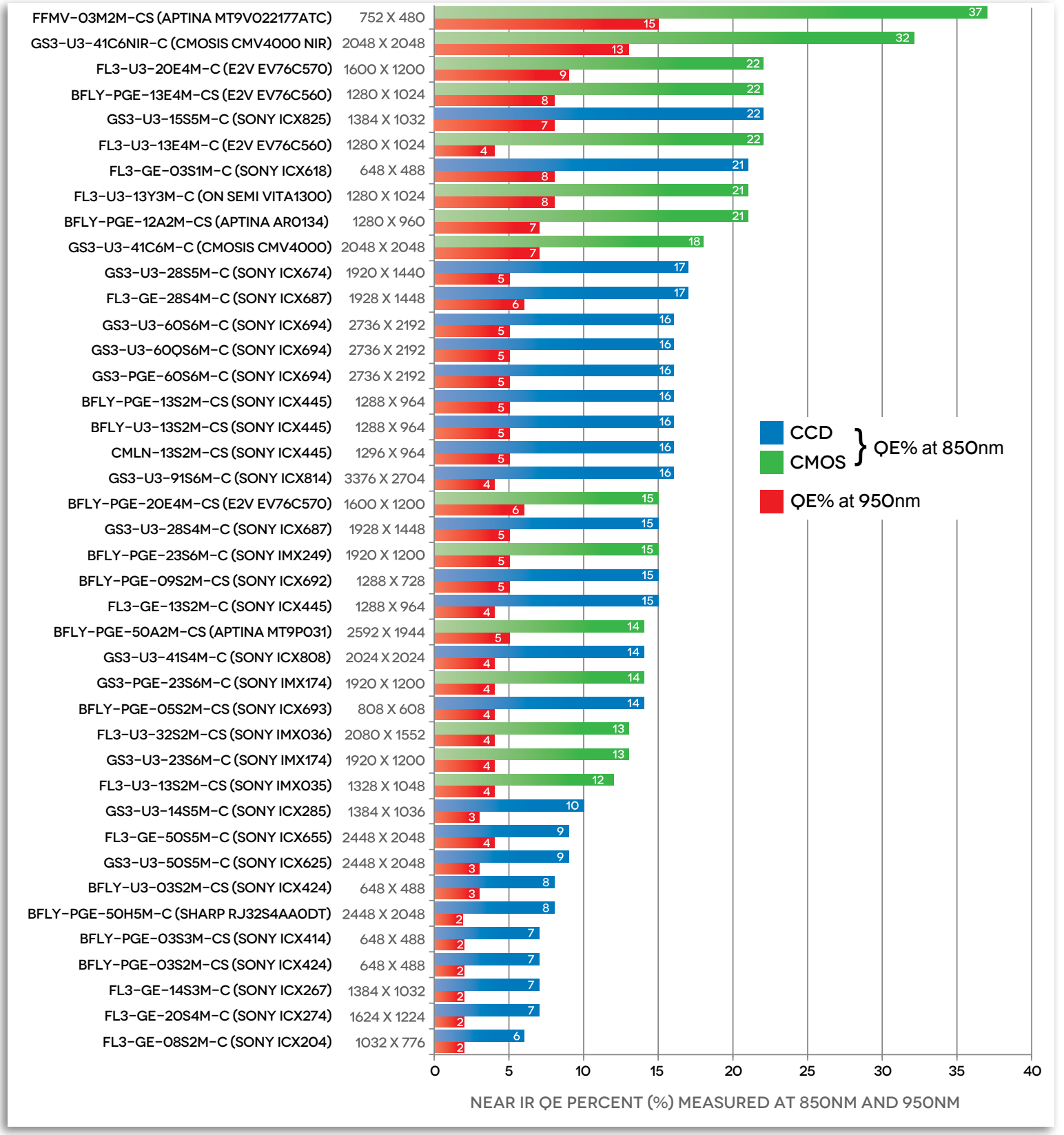
SATURATION CAPACITY (WELL DEPTH) e– (HIGHER IS BETTER, SORTED BY PIXEL SIZE)



The saturation capacity (well depth) is the largest charge a pixel can hold before over-saturation occurs and signal degradation begins. Saturation must be avoided because it diminishes the quantitative ability of the sensor and in the case of CCDs produces image smearing due to a phenomenon known as blooming.

MONO SINGLE LENS CAMERAS

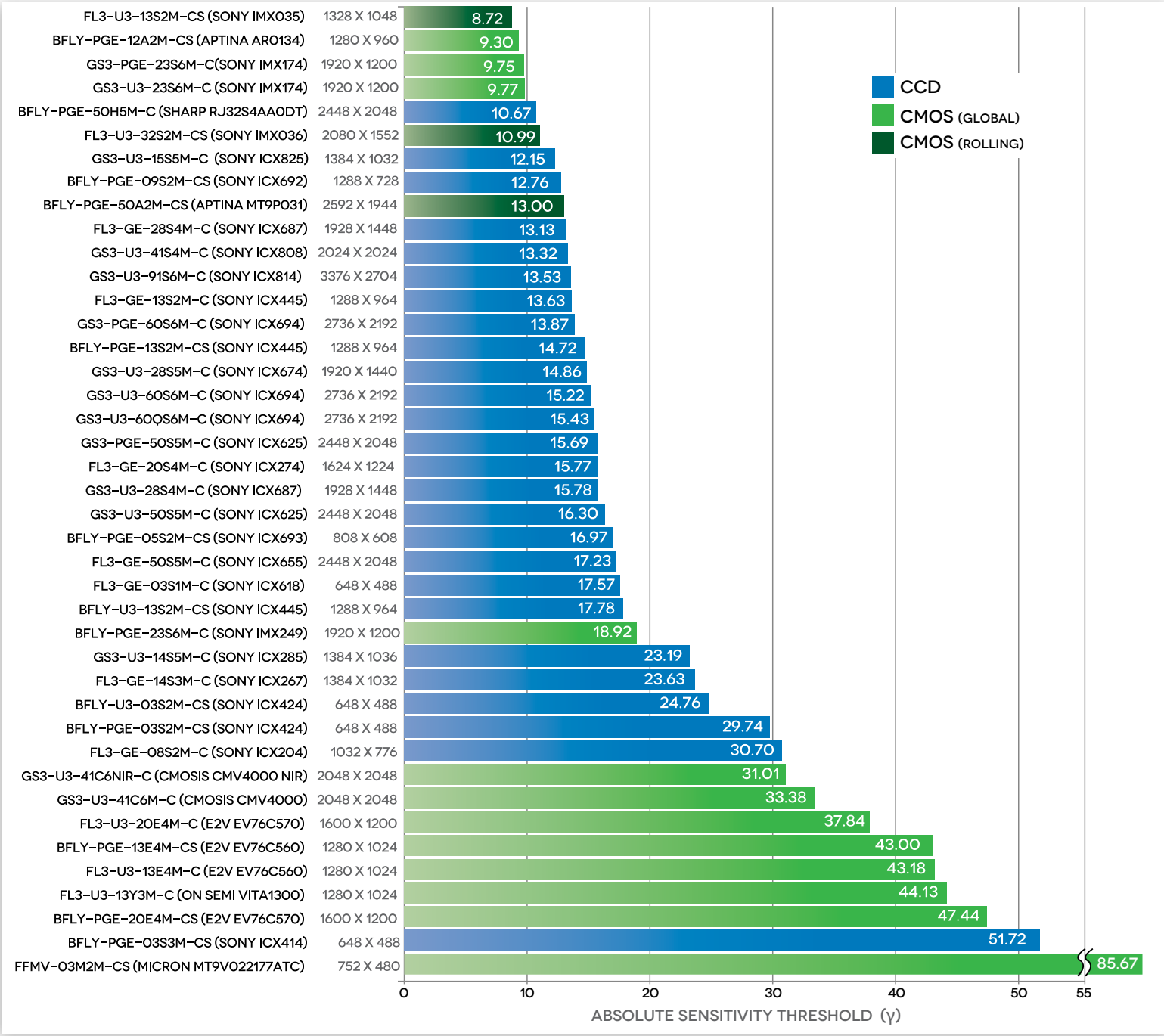
NEAR IR QE (%) (HIGHER IS BETTER)



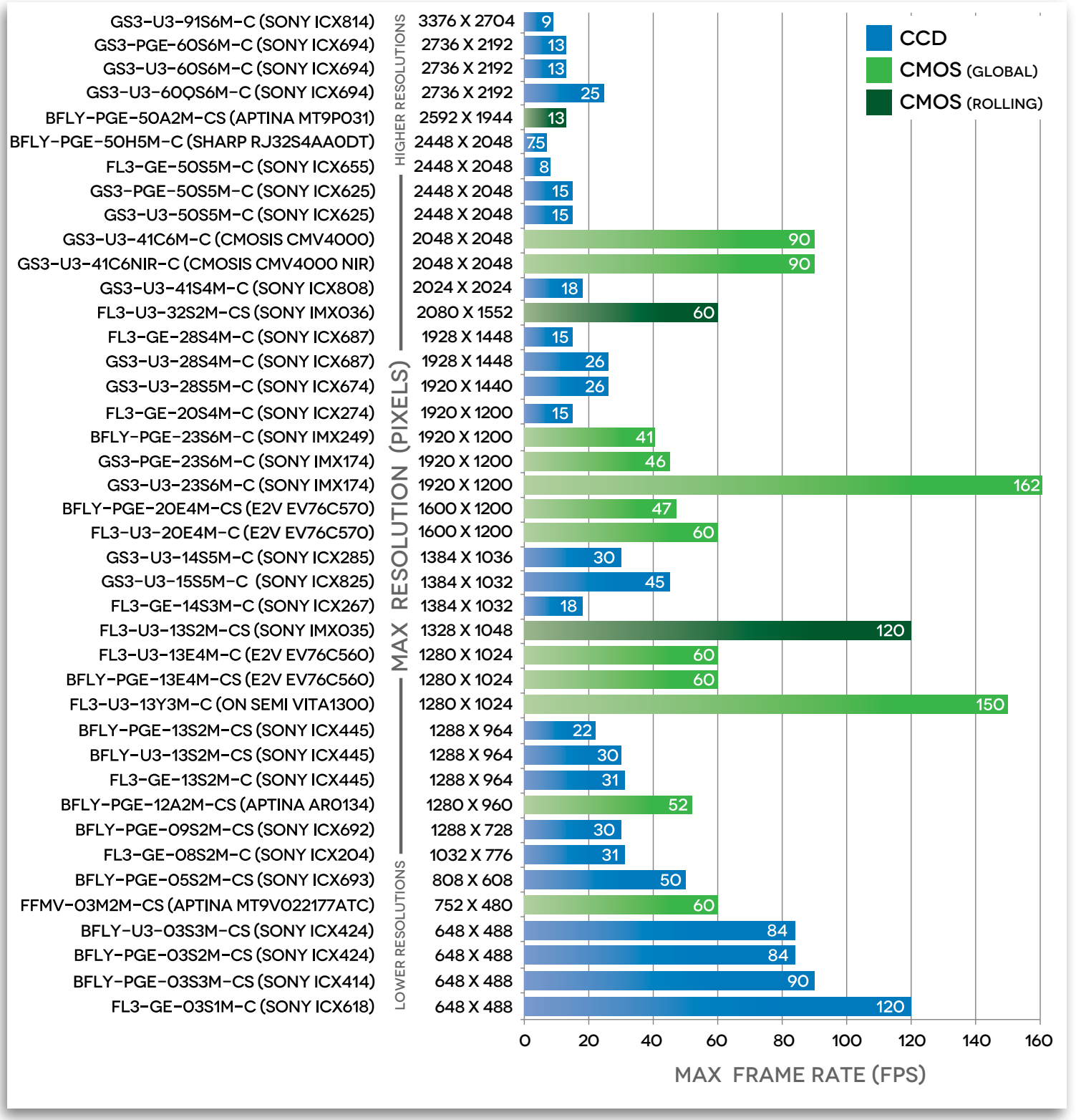
MONO SINGLE LENS CAMERAS

ABSOLUTE SENSITIVITY THRESHOLD (γ) (LESS IS BETTER)

Absolute sensitivity threshold is the minimum number of photons needed to equal the noise level. The lower the number the less light is needed to detect useful imaging data.

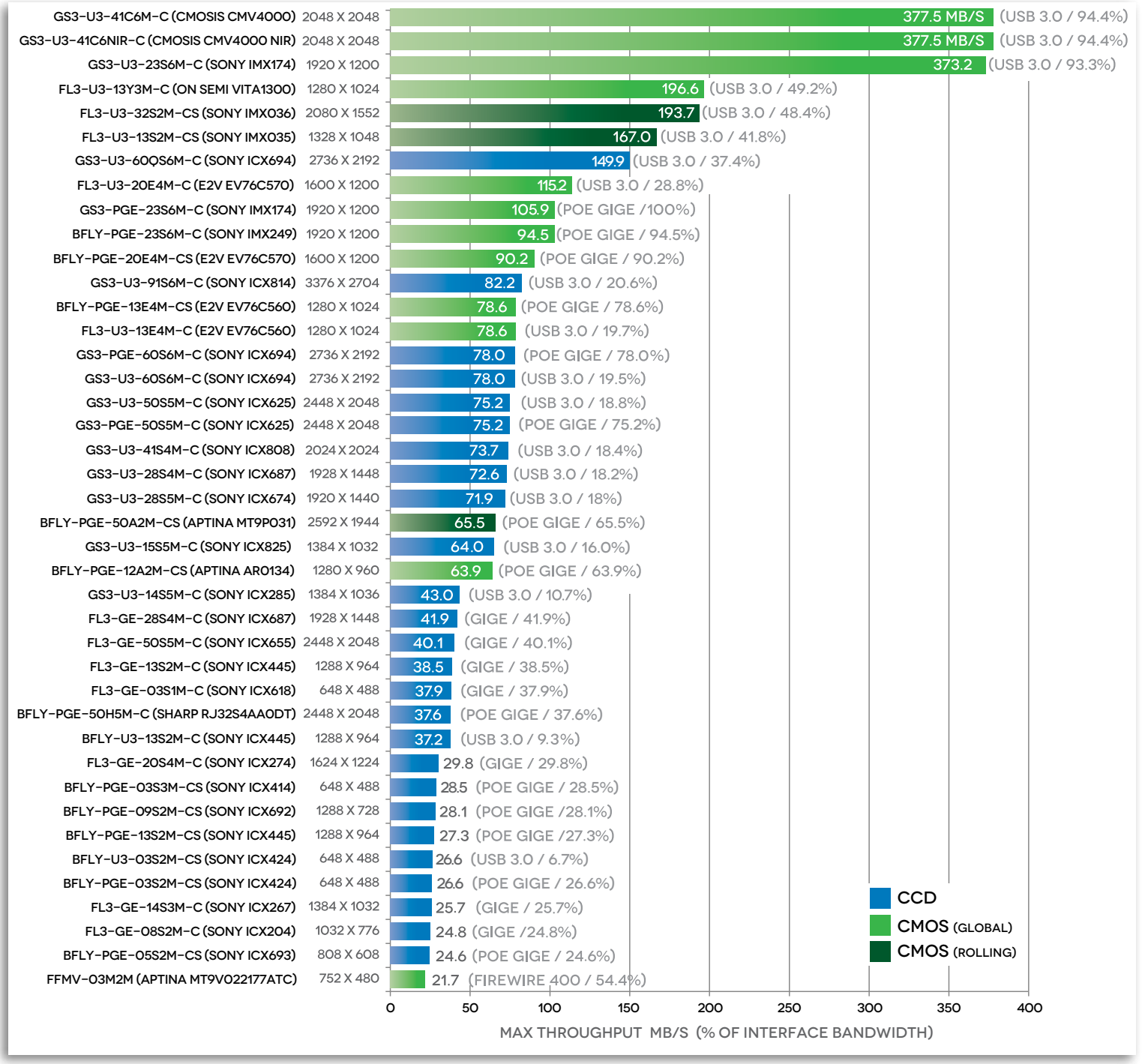


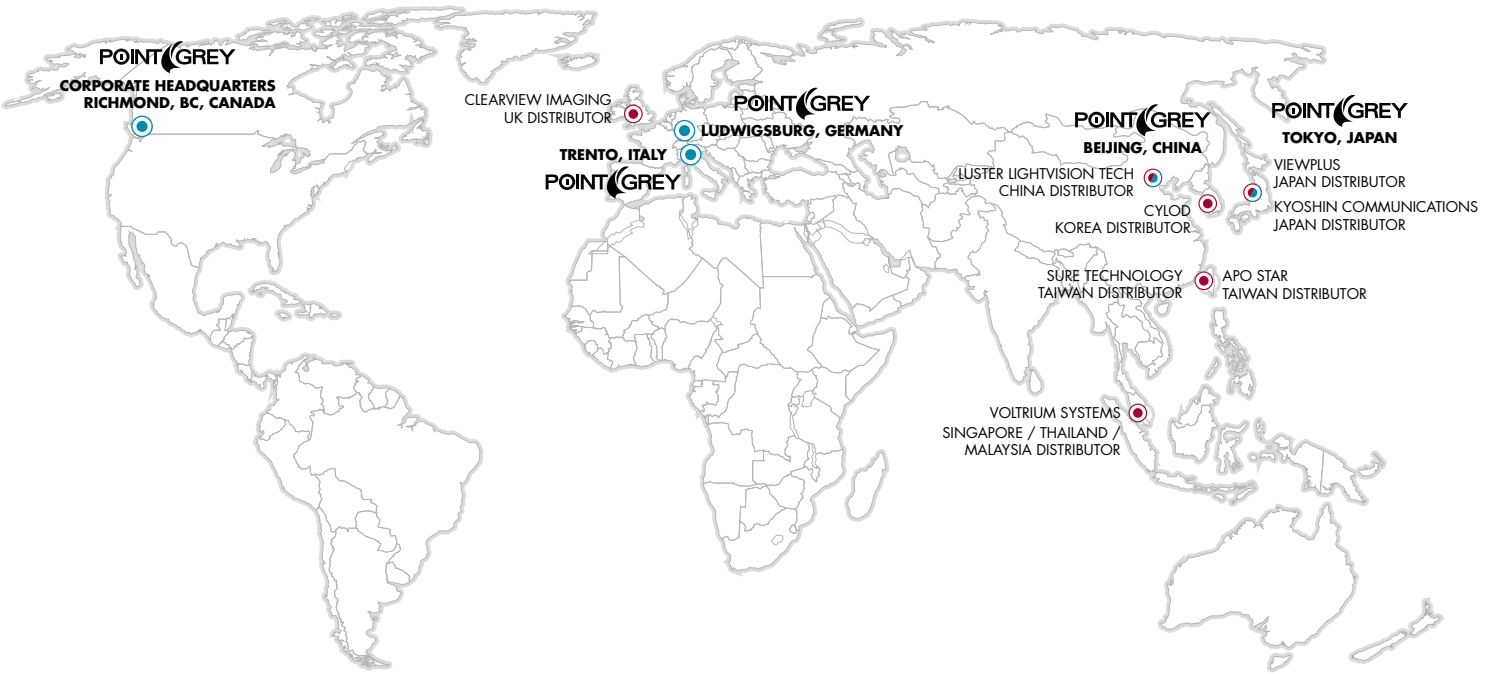
MAX RESOLUTION TO MAX FRAME RATE



CAMERA THROUGHPUT (MB/S) AND % OF INTERFACE BANDWIDTH

When considering multi-camera setups bandwidth considerations are a must. We calculated the maximum throughput (MB/s) by multiplying the maximum resolution by the maximum frame rate (note: to simplify these calculations an image data format of Mono8 was used). In addition we added the percentage of interface bandwidth which the camera model pumped out. For those calculations we used 400 MB/s for USB 3.0, 100 MB/s for GigE, 80 MB/s for FireWire 800, and 40 MB/s for both FireWire 400 and USB 2.0.





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