Andor CB1

High Speed Global Shutter sCMOS Camera

Key Specifications

- ✓ 0.5, 1.7 or 7.1 MegaPixel variants
- ✓ Very low noise: 1.38 e- read noise
- ✓ 4.5 or 9 µm pixel pitch
- ✓ Global Shutter
- ✓ Up to 1594 fps (8 bits) | 941 fps (12 bits)
- ✓ High Dynamic Range (14 bits)
- ✓ High speed interface options

Key Applications

- ✓ Adaptive Optics
- ✓ LGS wavefront sensing
- ✓ Space debris tracking/de-orbitation
- ✓ Fluorescence microscopy
- ✓ Super-resolution microscopy
- ✓ Cell motility studies
- ✓ Ground-based space situational awareness

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Introducing CB1

Andor CB1 is a ultra-high performance scientific CMOS camera specifically designed for demanding imaging applications in the visible range (400 nm – 1000 nm). Andor CB1 was born from the need of scientists to have a flexible high speed, low noise, global shutter "snapshot" camera for high-end low-light visible applications. Integrating the new generation of Sony CMOS Pregius™ sensors, the camera achieves high framerate and high sensitivity without any compromise.

The architecture of the camera has been designed to integrate one of three different new generation Sony CMOS Pregius™ sensors: thanks to this flexible design, Andor CB1 is able to cover the largest scope of applications. The camera can be tailored to be the best pixel size, resolution, and frame rate compromise for your application:

✓ Andor CB1 0.5 MP: 812×612 px, 9 μm, 1594 fps
✓ Andor CB1 1.7 MP: 1608×1104 px, 9 μm, 662 fps
✓ Andor CB1 7.1 MP: 3208×2200 px, 4.5 μm, 207 fps

In addition, all Andor CB1 cameras offer a very low readout noise enabling imaging in ultra-low light conditions, simultaneously with a global shutter architecture. The camera uses CXP 2.0 or GigE interface to transfer the large amount of data generated each second and to ensure the lowest latency and highest real time capability. Andor CB1 is GigE Vision compliant.

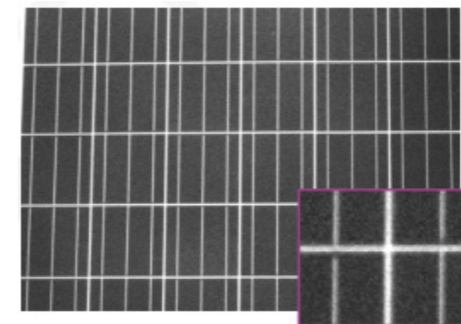| Andor CB1 Common Features	
Monochrome global shutter CMOS	The three sensors that can be integrated in CB1 are silicon-based CMOS monochrome sensors with global shutter architecture.
Data interface	CB1 has two high-throughput interfaces compatible with long reach cables: 10 GigE and CoaXPress. 10 GigE enables data transfer using the GigE Vision protocol and Ethernet cables. CoaXPress is optimized for real time operation. Two synchronization connectors enable peripheral device control.
Temperature management	CB1 is the only camera offering high-end thermalization of the Sony Pregius™ sensors. This guarantees optimal noise performances and a stable position of the sensor. The integrated fan provides an air-cooled stabilization down to 0°C which can be completed by a cooling plate to further increase the temperature differential.
Camera body	The dimensions of the camera (154.3 mm x 76.2 mm x 64.1 mm and 1.1 kg) enable an easy integration into imaging and detection systems.
Lens mount	The camera has a CS-mount native interface and is provided with a C-mount adaptor.
ADC readout options	To optimize either bit depth or speed, both 8 bits and 12 bits modes are available.
Gain tuning	Capacitor gain can be switched between High gain and Low gain modes. In addition, 24 dB analog gain can be added, and up to 48 dB using digital gain.
Multi-windowing and Region of Interest (ROI)	Windowing mode allows to achieve faster image rate. A multiple region mode, illustrated below, further enhances the possible applications.

Astronomy

Initially, the Andor CB1 camera was developed for Laser Guide Star (LGS) wavefront sensing astronomy: debris tracking, adaptive optics assisted satellite tracking, ground based space situational awareness, space debris de-orbitation, etc.

Detection of stars on a moonless night. Camera: Andor CB1 1.7 MP. Objective lens: 35 mm f/1.4.

High-end industry

Designed for industrial use the Andor CB1 sensor performances are optimized by their integration in a scientific camera. This unique combination enhances the possible application of the camera to high-end industries, such as semiconductor inspection, monitoring optical components quality, failure analysis, solar panel inspection, etc.

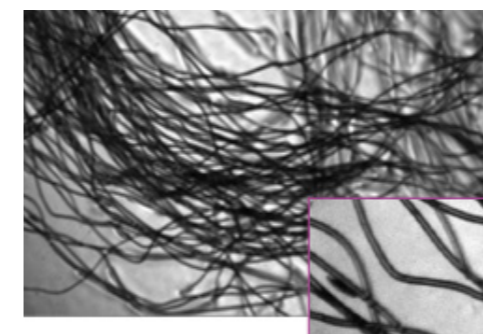*Imaging of solar panel cells. Camera Andor CB1 1.7 MP. Objective lens: 35 mm f/1.4*

Life Science

Fluorescence and bioluminescence imaging including super-resolution localization microscopy require high sensitivity cameras to detect the low emission of fluorophores.

Andor CB1 can also be used for widefield microscopy, for example for high content and high throughput screening, DNA and forensic analysis, biometrics etc.
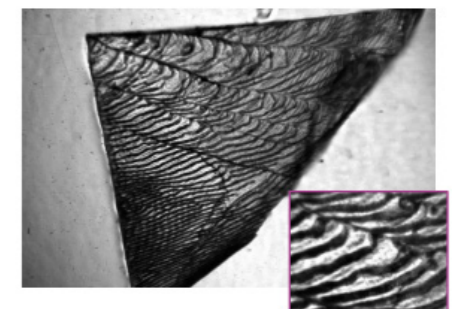
Microscopy image of a fish skin sample. Camera CB1 1.7 MP. Custom 10x microscope.

Research & Development

Multiple research applications can benefit from the performances of Andor CB1. Dynamical studies such as motion analysis, particle image velocimetry, etc. will take advantage of the high resolution and high speed without any motion artefacts thanks to the global shutter architecture.

Microscopy image of a wool fiber sample. Camera CB1 1.7 MP. Custom 10x microscope

Technical Specifications

Model Specific Specifications

Sensor Specifications	CB1 0.5 MP	CB1 1.7 MP	CB1 7.1 MP
Sensor type	Back illuminated stacked sensor		
Active pixels (W x H)	816 x 624 pixels	1608 x 1104 pixels	3216 x 2208 pixels
Sensor size (W x H)	816 x 656	1608 x 1136	3216 x 2232
Pixel pitch	9 µm		4.5 µm
Sensor format	1/1.7" Monochrome CMOS	1.1" Monochrome CMOS	1.1" Monochrome CMOS
Sensor diagonal	9.2 mm	17.6 mm	
Shutter architecture	Global shutter		
Maximum Quantum Efficiency	> 70%		
Interface options	CoaXPress 2.0 (CXP-12) | High speed SFP+ 10 GigE interface with Ethernet or Fiber		
Optical interface	C-Mount / CS-Mount		

Camera Specifications	CB1 0.5 MP	CB1 1.7 MP	CB1 7.1 MP
Image Full well capacity (Low gain, 0 dB)	94 ke-		23 ke-
Readout Noise (in 12 bits, High gain, 24 dB,at 50µs)	2.35 e- typ	2.33 e- typ	1.38 e- typ.
Dark Current at 10°C sensor temperature	1.39 e-/p/s	0.96 e-/p/s	0.24 e-/p/s
Analog gain	0 to 24 dB		
Quantization A/D	8, 12 bits		
Quantization with HDR (High Dynamic Range)	14 bits		

CoaXPress Camera Specifications			
Maximum speed Full Frame	1594 fps (8 bit) 941 fps (12 bit) 509 fps (14 bit HDR)	662 fps (8 bit) 481 fps (12 bit) 256 fps (14 bit HDR)	207 fps (8 bit) 134 fps (12 bit) 68 fps (14 bit HDR)
Maximum speed in 2x2 binning full frame	NA	NA	418 fps (8 bit) 261 fps (12 bit) 134 fps (14 bit HDR)
Minimum integration time	5.80 µs (8 bit) 6.42 µs (12 bit) 6.42 µs (14 bit HDR)	6.15 µs 6.64 µs 6.64 µs	7.07 µs (8 bit) 8.22 µs (12 bit) 8.22 µs (14 bit HDR)

GigE VISION Camera Specifications			
Maximum speed Full Frame	1594 fps (8 bit) 941 fps (12 bit) 509 fps (14 bit HDR)	662 fps (8 bit) 343 fps (12 bit) | 458 fps (12 bit packed) 256 fps (14 bit HDR)	169 fps (8 bit) 85 fps (12 bit) | 114 fps (12 bit packed) 68 fps (14 bit HDR)
Maximum speed in 2x2 binning full frame	NA		To be measured
Minimum integration time	5.80 µs (8 bit) 6.42 µs (12 bit & 12 bit packed) 6.42 µs (14 bit HDR)	6.15 µs (8 bit) 7.30 µs (12 bit) | 6.72 µs (12 bit packed) 6.64 µs (14 bit HDR)	7.52 µs (8 bit) 10.06 µs (12 bit) | 8.79 µs (12 bit packed) 8.22 µs (14 bit HDR)

Features	All models
Operating temperature	-10°C to 50°C Stabilization with ΔT° of 25°C between case and sensor (typ. 0°C for 25°C environment) Optional liquid cooling plate
Software	Graphical User Interface: First Light Vision Software Development Kit: (C, C++, C#, Python, MatLab) / LabVIEW / µManager
Synchronisation	Internal | External
Power Requirement (typical)	< 15 W

Frame Rate Table CoaXPress Interface

Lines	CB1 0.5MP			CB1 1.7MP			CB1 7.1MP		
	Mono 8	Mono 12	Mono 14	Mono 8	Mono 12	Mono 14	Mono 8	Mono 12	Mono 14
16	7366	5150	4377	3997	3457	3 043	3545	2864	2416
32	6725	4608	3648	3721	3169	2 623	3171	2494	1933
64	5729	3806	2736	3270	2716	2 056	2620	1983	1381
128	4416	2824	1824	2632	2113	1 435	1944	1406	878
256	3033	1862	1094	1893	1462	895	1282	889	508
512	1863	1108	608	1212	905	510	762	512	276
624	1594	941	509	1047	776	429	648	432	230
1104	-	-	-	662	481	256	393	258	134
2208	-	-	-	-	-	-	207	134	68

Cropping granularity: 16 lines & 8 columns (The number of columns does not affect acquisition speed)

Frame Rate Table GigE VISION Interface

Lines	CB1 0.5MP				CB1 1.7MP				CB1 7.1MP			
	Mono 8	Mono 12	Mono 12 packed	Mono 14	Mono 8	Mono 12	Mono 12 packed	Mono 14	Mono 8	Mono 12	Mono 12 packed	Mono 14
16	7366	5150	5150	4377	3997	3457	3457	3043	3545	2864	2864	2416
64	5729	3806	3806	2736	3270	2716	2716	2056	2 620	1983	1983	1381
256	3033	1862	1862	1094	1893	1462	1462	895	1282	720	889	508
624	1594	941	941	509	1047	607	776	429	576	300	400	230
1104	-	-	-	-	662	343	458	256	333	171	227	134
2208	-	-	-	-	-	-	-	-	169	85	114	68

Cropping granularity: 16 lines & 8 columns (The number of columns does not affect acquisition speed)

Creating The Optimum Product for You

Step 1.	Select the camera type

Description	Code
CB1 0.5MP: 816 x 624 Monochrome CMOS camera, 1594 FPS, <2.35 e- RON typ., CoaXPress/GigE Vision 10GB Eth or Fiber interface	PAC-CB1-V05
CB1 1.7MP: 1608 x 1104 Monochrome CMOS camera, 662 FPS, <2.33 e- RON typ., CoaXPress/ GigE Vision 10GB Eth or Fiber interface	PAC-CB1-V17
CB1 7.1MP: 3216 x 2208 Monochrome CMOS camera, 207 FPS, <1.38 e- RON typ., CoaXPress/ GigE Vision 10GB Eth or Fiber interface	PAC-CB1-V71

Camera Type

Step 2.	Select an accessory
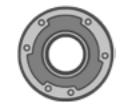
| Description	Order Code
Grabber kit 10 GB Ethernet	ACC-GRA-10G-ETH
Grabber kit 10 GB Fiber	ACC-GRA-10G-FIB
Quick coupling set	ACC-QCS-CAM-001
Power supply	ACC-PSU-CRE-001
Cooling pack	PAC-COO-200-000
Hydraulic cooling plate	ACC-HYD-CB1-000
Synchro cables 1 m	ACC-CAB-SYN-000
Synchro cables 3 m	ACC-CAB-SYN-001
Coax cables 10 m	ACC-CAB-CXP-000
Matrox Grabber CXP	ACC-GRA-CXP-000

Accessories

Step 3.	Software

Your product is provided with the following software options:

Graphical User Interface: First Light Vision

Software Development Kit: (C, C++, C#, Python, MatLab) / LabVIEW / µManager

Software

Product Drawings

Dimensions in mm (inches)
Weight 1.1 kg
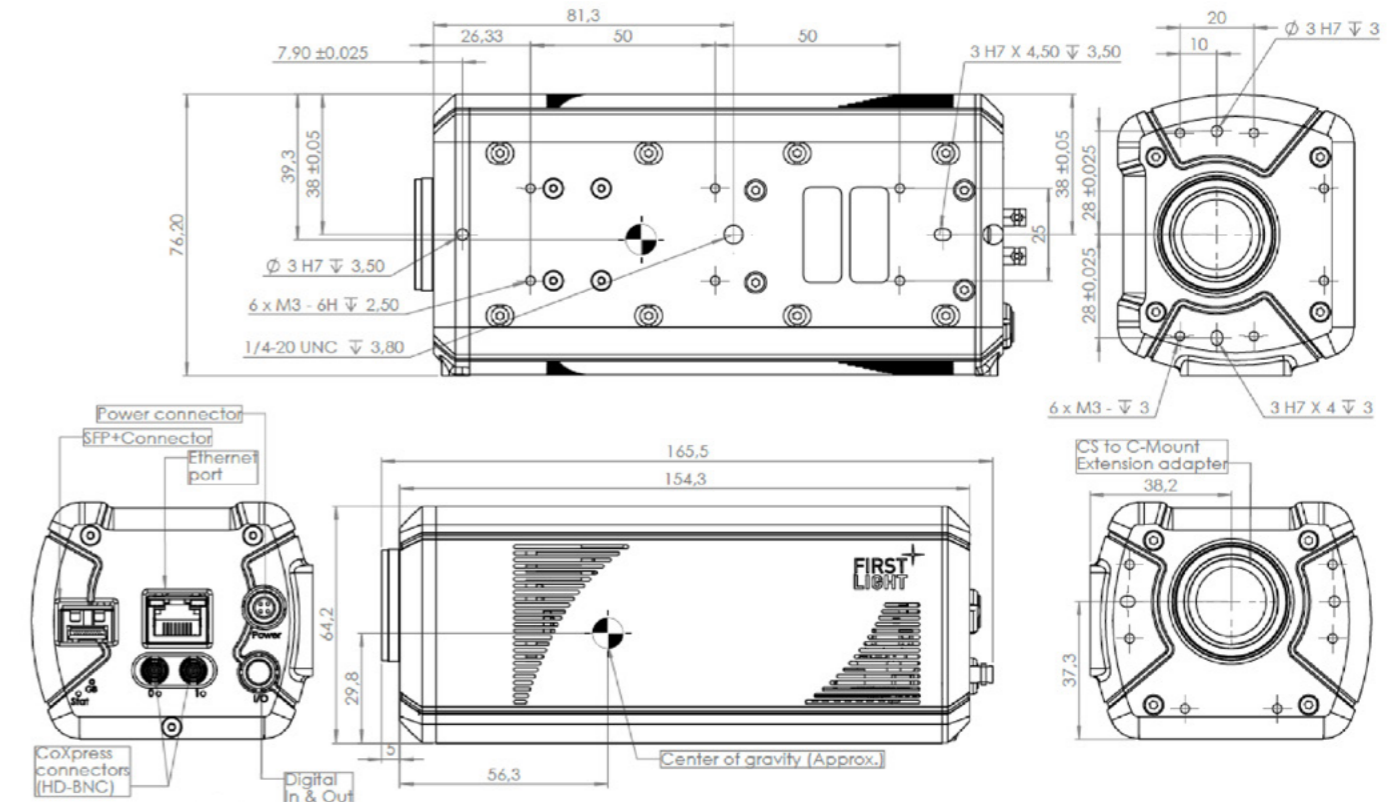
Quantum Efficiency (QE) Curve
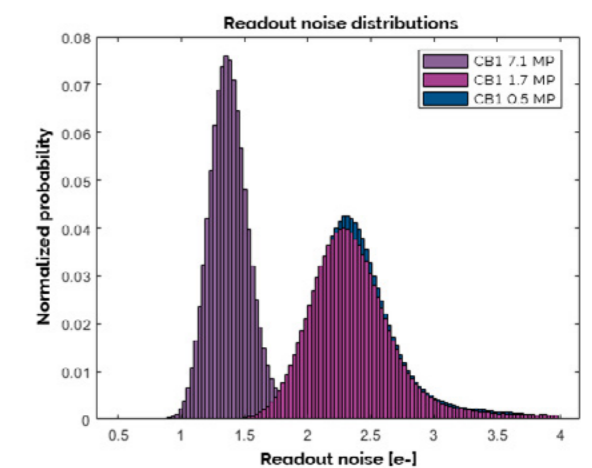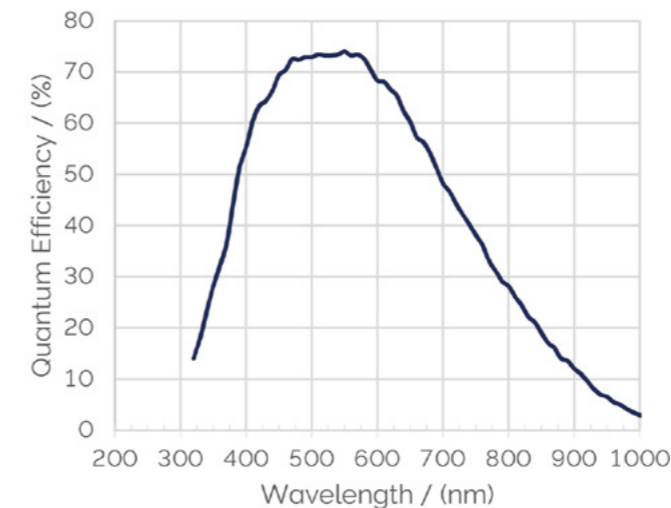
Order Today

Need more information? At Andor we are committed to finding the correct solution for you. With a dedicated team of technical advisors, we are able to offer you one-to-one guidance and technical support on all Andor products. For a full listing of our local sales offices, please see: **andor.oxinst.com/contact**

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Items shipped with your camera:
1x Camera (model as ordered)
1x Power supply
1x Power supply cable
1x C-Mount adaptor
1x Quick start guide

Footnotes: Specifications are subject to change without notice

Minimum Computer Requirements:
RAM: 8 GB minimum
Processor: Intel® Core™ i5 or higher
Screen resolution: at least 1920 x 1080
See system requirements for more information.

Operating and Storage Conditions
- Operating Temperature: -10°C to 50°C
- Relative Humidity: (non-condensing)
- Storage Temperature: -10°C to 70°C

Power Requirements
- 100 - 240 VAC 50 - 60 Hz
- Max. power consumption: 60 W