

Two interacting galaxies, M51 (Whirlpool Galaxy) & NGC 5195. Courtesy of Prof. Andrzej Pigulski, Wrocław University, Poland.



Features and Benefits

- Broad wavelength coverage**
 Now available with BR-DD (red/NIR), BEX2-DD (UV-NIR Broadband) and BU2 (UV/blue) sensor options
- TE cooling to -100°C**
 Critical for elimination of dark current detection limit
- Fringe Suppression Technology™**
 NIR etaloning greatly reduced (BR-DD and BEX2-DD sensor types)
- 4-speed readout up to 5 MHz**
 Slower readout for low noise, faster speeds for dynamic processes and 5 MHz for visualization mode
- Ultra low noise readout**
 Intelligent low-noise electronics offer the most 'silent' system noise performance available
- Large area 2048 x 2048 sensor**
 Large field of view and high resolution
- UltraVac™ *1**
 Critical for sustained vacuum integrity and to maintain unequalled cooling and QE performance, year after year
- Dual output**
 High Sensitivity output for low-light applications, or High Capacity output for maximum dynamic range
- Integrated shutter *2**
 F-mount (EF optional) with integrated programmable 45 mm shutter
- Fast Kinetics & Cropped Sensor modes**
 For fast temporal resolution down to sub-millisecond
- USB 2.0 connection**
 Simple Plug & Play connection
- Windows, Linux & Labview**
 Andor's user-friendly SDK supports both Windows and Linux OS. Labview VI package available

-100°C Deep-Cooled CCD for Large Area Imaging

Andor's iKon-L 936 is designed with scientific imaging in mind. The 2048 x 2048 array and 13.5 x 13.5 µm pixels combine to deliver a 27.6 x 27.6 mm active image area, TE cooled down to -100°C. The iKon-L offers outstanding resolution, field of view, sensitivity and dynamic range performance. Ultimate sensitivity performance is achieved through combination of > 90% QE (back-illuminated sensor), low noise readout electronics and exceptionally deep TE cooling.

iKon-L boasts a proprietary large area 5-stage TE cooler (4-stage optional), enabling cooling of this large area sensor down to an unprecedented -100°C without the aggravation of liquid nitrogen or compressed gas cooling, perfect for the longest of exposure times. Such performance renders this camera ideal for low-light applications such as astronomy, luminescence imaging and microtitre plate/biochip imaging, with ideal OEM adaptability and support. USB 2.0 connectivity and multi-MHz readout options provide for ease of integration and operation.

Specifications Summary^{*3}

| | |
|------------------------------|--|
| Active pixels | 2048 x 2048 |
| Sensor size | 27.6 x 27.6 mm |
| Pixel size (W x H) | 13.5 µm x 13.5 µm |
| Active area pixel well depth | 100,000 e ⁻ (150,000 e ⁻ for BR-DD model) |
| Maximum readout rate | 5 MHz |
| Read noise | 2.9 e ⁻ |
| Maximum cooling | -100°C |
| Frame rate | 0.95 fps (full frame) |

System Specifications^{*3}

| | | |
|---|--|------------------------|
| Sensor options | BV: Back Illuminated CCD, Vis optimized BU2: Back Illuminated CCD, UV-Enhanced, 250 nm optimized FI: Front Illuminated CCD BR-DD: Back Illuminated CCD, Deep Depletion with fringe suppression. Optimum sensor for Near IR applications. BEX2-DD: Back Illuminated CCD, Deep Depletion with fringe suppression, extended range dual AR coating | |
| Active pixels ^{*4} | 2048 x 2048 | |
| Pixel size | 13.5 x 13.5 μm | |
| Image area | 27.6 x 27.6 mm with 100% fill factor | |
| Minimum temperatures ^{*5} | 4-stage peltier cooler | 5-stage peltier cooler |
| Air cooled | -70°C | -80°C |
| Coolant recirculator | -75°C | -95°C |
| Coolant chiller, coolant @ 10°C, 0.75 l/min | -80°C | -100°C |
| Blemish specification | Grade 1 as per sensor manufacturer definition | |
| System window type | BV, BR-DD sensors: UV-grade fused silica, 'Broadband VIS-NIR', unwedged BU2, FI, BEX2-DD sensors: UV-grade fused silica, 'Broadband VUV-NIR', unwedged (other options available e.g. Bose-Einstein 780nm for Rb BEC experiments) | |

Advanced Performance Specifications^{*3}

| | | |
|--|-----------------------------------|------------------------|
| Dark current, e⁻/pixel/sec ^{*6} | BV, BU2, FI sensors | BR-DD, BEX2-DD sensors |
| @ -70°C | 0.00040 | 0.020 |
| @ -80°C | 0.00013 | 0.006 |
| @ -100°C (5-stage peltier cooler model only) | 0.000059 | 0.0003 |
| Pixel readout rates | 5, 3, 1, 0.05 MHz | |
| Active area pixel well depth | 100,000 e ⁻ | 150,000 e ⁻ |
| Read noise (e⁻) ^{*7} | High Sensitivity output | High Capacity output |
| 0.05 MHz | 2.9 | 8.7 |
| 1 MHz | 7.0 | 22.2 |
| 3 MHz | 11.7 | 40.2 |
| 5 MHz | 31.5 | 70.3 |
| Linearity ^{*8} | Better than 99% | |
| Digitization | 16-bit | |
| Vertical clock speed | 38 or 76 μs (software selectable) | |

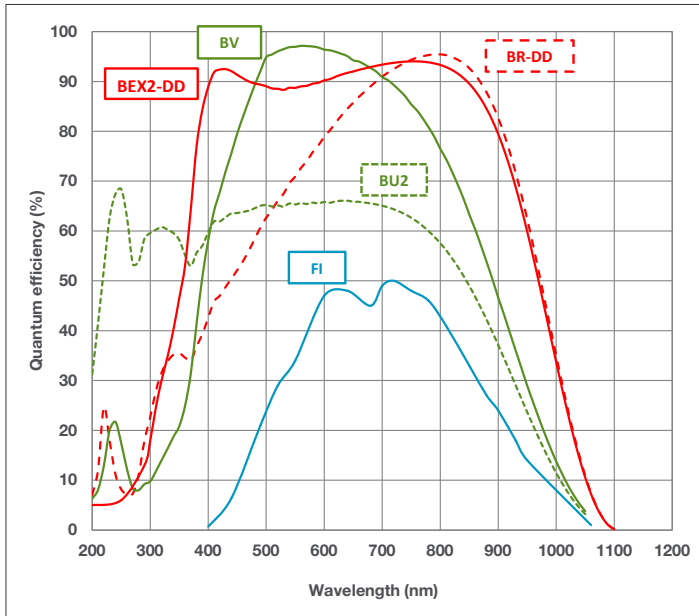
Frame Rates^{*9}

| 50 kHz | | | |
|---------|------------|-------------|-----------|
| Binning | Full Frame | 1024 x 1024 | 512 x 512 |
| 1 x 1 | 0.011 | 0.023 | 0.046 |
| 2 x 2 | 0.04 | 0.059 | 0.102 |
| 4 x 4 | 0.155 | 0.138 | 0.213 |
| 8 x 8 | 0.482 | 0.293 | 0.42 |
| 16 x 16 | 1.166 | 0.572 | 0.78 |

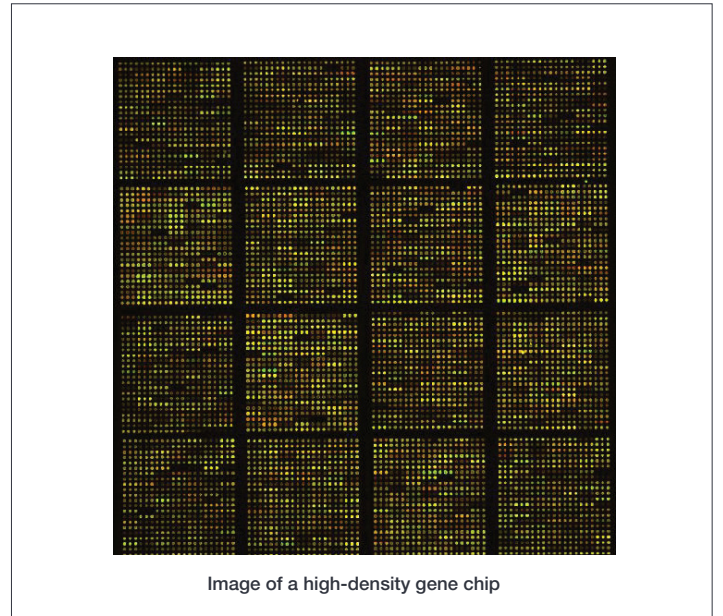
| 1 MHz | | | |
|---------|------------|-------------|-----------|
| Binning | Full Frame | 1024 x 1024 | 512 x 512 |
| 1 x 1 | 0.221 | 0.433 | 0.835 |
| 2 x 2 | 0.662 | 0.993 | 1.67 |
| 4 x 4 | 1.594 | 1.947 | 2.951 |
| 8 x 8 | 2.912 | 3.266 | 4.571 |
| 16 x 16 | 4.152 | 4.71 | 6.204 |

| 3 MHz | | | |
|---------|------------|-------------|-----------|
| Binning | Full Frame | 1024 x 1024 | 512 x 512 |
| 1 x 1 | 0.607 | 1.157 | 2.115 |
| 2 x 2 | 1.294 | 2.175 | 3.588 |
| 4 x 4 | 2.305 | 3.545 | 5.326 |
| 8 x 8 | 3.463 | 5.017 | 6.953 |
| 16 x 16 | 4.496 | 6.27 | 8.18 |

| 5 MHz (Visualization mode) | | | |
|----------------------------|------------|-------------|-----------|
| Binning | Full Frame | 1024 x 1024 | 512 x 512 |
| 1 x 1 | 0.953 | 1.771 | 3.1 |
| 2 x 2 | 1.655 | 2.922 | 4.733 |
| 4 x 4 | 2.619 | 4.329 | 6.424 |
| 8 x 8 | 3.697 | 5.7 | 7.822 |
| 16 x 16 | 4.654 | 6.776 | 8.777 |

Quantum Efficiency Curves ^{*10}

Application Images



Have you found what you are looking for?

Need the ultimate in sensitivity? The iXon back-illuminated EMCCD series offers > 90% QE and single photon sensitivity, combined with fast frame rate performance.

Need a large field of view with faster frame rates? The Neo and Zyla sCMOS are available in a large 5.5 megapixel sensor format that offers up to 100 frames/sec (full frame).

Need smaller pixels? Check out the Luca^{EM} EMCCDs, the Clara Interline CCD and the Neo and Zyla sCMOS.

Need a customised version? Please contact us to discuss our Customer Special Request options.

Check out Andor's New Neo and Zyla sCMOS. *Simultaneously* offering, ultra-sensitivity, high speed, high-resolution, large field of view & high dynamic range!

Creating The Optimum Product for You

How to customise the iKon-L:

Step 1.

The iKon-L has 2 options for peltier cooling. Please select the type of cooler required.

Step 2.

The iKon-L comes with 5 options for sensor types. Please select the sensor which best suits your needs.

Step 3.

Please indicate alternative window option if required.

Step 4.

Please indicate which software you require.

Step 5.

For compatibility, please indicate which accessories are required.

D **Z** 936N- **FI** example shown

Step 1.

Choose cooling option

W: 4-stage peltier cooling
Z: 5-stage peltier cooling

Step 2.

Choose sensor finish option

BV: Back Illuminated CCD
FI: Front Illuminated CCD
BU2: Back Illuminated CCD, AR coated for optimized performance in the 250 nm region
BR-DD: Back Illuminated CCD, Deep Depletion with fringe suppression. Optimum sensor for Near IR applications.
BEX2-DD: Back Illuminated CCD, Deep Depletion with fringe suppression, extended range dual AR coating

Step 3.

Select alternative camera window (optional)

The standard window has been selected to satisfy most applications. However, other options are available. The alternative camera window code must be specified at time of ordering.

To view and select other window options please refer to the '**Camera Windows Supplementary Specification Sheet**' which gives the transmission characteristics, product codes and procedure for entering the order. Further detailed information on the windows can be found in the Technical note – '**Camera Windows: Optimizing for Different Spectral Regions**'.

Step 3.

The iKon-L requires at least one of the following software options:

Solis for Imaging A 32-bit and fully 64-bit enabled application for Windows (XP, Vista, 7 and 8) Linux and Labview, offering rich functionality for data acquisition and processing. AndorBasic provides macro language control of data acquisition, processing, display and export.

Andor SDK A software development kit that allows you to control the Andor range of cameras from your own application. Available as 32 and 64-bit libraries for Windows (XP, Vista, 7 and 8), compatible with C/C++, C#, Delphi, VB6, VB.NET, LabVIEW and Matlab. Linux SDK compatible with C/C++.

Third party software compatibility

Drivers are available so that the iKon-L range can be operated through a large variety of third party imaging packages. See Andor web site for detail: <http://www.andor.com/software/>

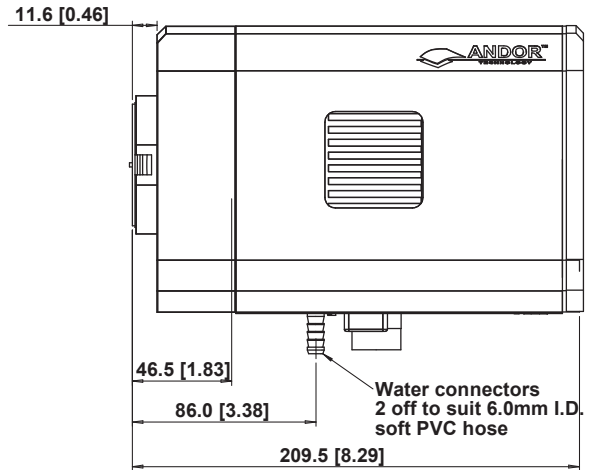
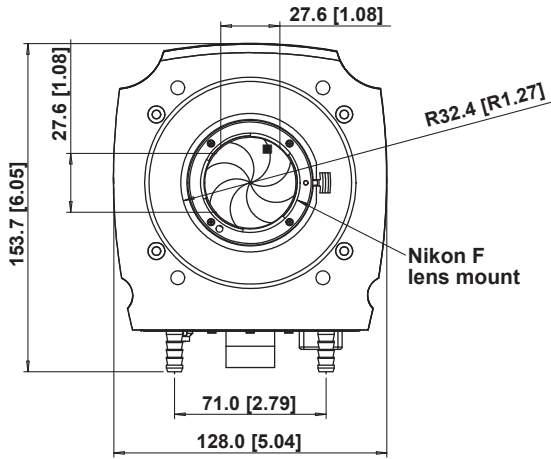
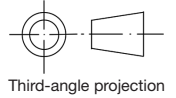
Step 4.

The following accessories are available:

XW-RECR Re-circulator for enhanced cooling performance
ACC-XW-CHIL-160 Oasis 160 Ultra compact chiller unit
OA-CCFM C-mount to Canon F-mount adapter
OA-CNAF C-mount to Nikon F-mount adapter
OA-COFM C-mount to Olympus F-mount adapter
OA-CTOT C-mount to T-mount adapter
OA-ECAF Auto ext. tubes (set of 3) for Canon AF
OA-ECMT Auto ext. tubes (set of 3) for C-mount
OA-ENAF Auto ext. tubes (set of 3) for Nikon AF
XU-RECR/TRANS USB 2.0 - Transmitter and Receiver, including 2 power supplies

Product Drawings

Dimensions in mm [inches]



■ = position of pixel 1,1

Weight: 4.6 kg [10.2 lb]

Connecting to the iKon-L

Camera Control

Connector type: USB 2.0

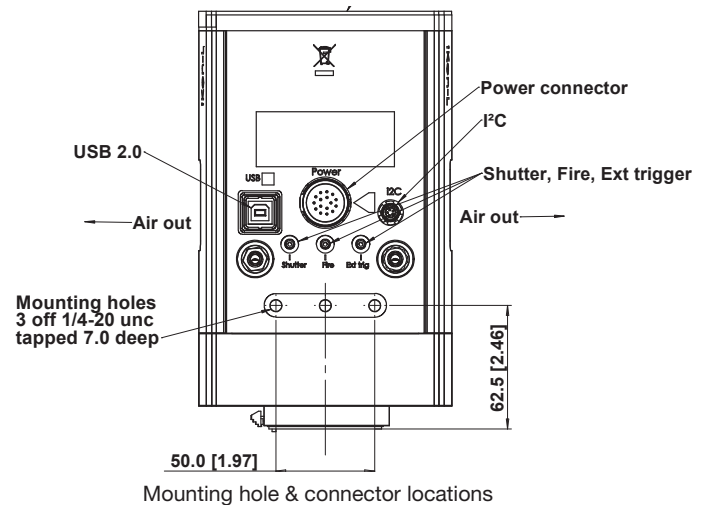
TTL / Logic

Connector type: SMB, provided with SMB - BNC cable
Fire (Output), External Trigger (Input), Shutter (Output)

I²C connector

Compatible with Fischer SC102A054-130
Shutter (TTL), I²C Clock, I²C Data, +5 Vdc, Ground

Minimum cable clearance required at bottom of camera
90 mm



Typical Applications

Astronomy

Biochip Reading

Bioluminescence/Chemiluminescence

Bose-Einstein Condensation (BEC)

Fluorescence Microscopy

High Throughput Screening

Hyper-Spectral imaging

In-Vivo Luminescence

Laser Induced Fluorescence (LIF)

Neutron Radiography

Semiconductor analysis



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North America

Connecticut, USA
Phone +1 (860) 290 9211
Fax +1 (860) 290 9566

China

Beijing
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Fax +86 (10) 6445 5401

Items shipped with your camera

- 1x 2 m BNC - SMB connection cable
- 1x 3 m USB 2.0 cable Type A to Type B
- 1x PS-40 power supply
- 1x PS-40 to camera cable
- 1x PS-29 power supply with mains cable
- 1x Quick launch guide
- 1x CD containing Andor user guides
- 1x Individual system performance booklet

Footnotes:

- Specifications are subject to change without notice
1. Assembled in a state-of-the-art cleanroom facility, Andor's UltraVac™ vacuum process combines a permanent hermetic vacuum seal (no o-rings), with a stringent protocol to minimize outgassing, including use of proprietary material.
 2. This integrated shutter can be removed on request, and the camera configured to trigger an external shutter via TTL output.
 3. Figures are typical unless otherwise stated.
 4. Edge pixels may exhibit a partial response.
 5. Specified minimum air cooled temperature assumes ambient temperature of 25°C. Specified minimum temperature with coolant assumes coolant temperature of 10°C.
 6. Dark current measurement is taken as a median over the sensor area excluding any regions of blemishes.
 7. Readout noise is for the entire system. It is a combination of sensor readout noise and A/D noise. Measurement is for Single Pixel readout with the sensor at a temperature of -80°C and minimum exposure time under dark conditions.
 8. Linearity is measured from a plot of counts vs exposure time under constant photon flux up to the saturation point of the system.
 9. The frame rates shown are for a range of binning or array size combinations. All measurements are made with 38 μs vertical shift speed. It also assumes internal trigger mode of operation and minimum exposure time. Note: 5 MHz = Visualization mode only.
 10. Quantum efficiency of the sensor at 25°C as supplied by the sensor manufacturer.

Minimum Computer Requirements:

- 3.0 GHz single core or 2.4 GHz multi core processor
- 2 GB RAM
- 100 MB free hard disc to install software (at least 1GB recommended for data spooling)
- USB 2.0 High Speed Host Controller capable of sustained rate of 40MB/s
- Windows (XP, Vista, 7 and 8) or Linux

Operating & Storage Conditions

- Operating Temperature: 0°C to 30°C ambient
- Relative Humidity: < 70% (non-condensing)
- Storage Temperature: -25°C to 50°C

Power Requirements

- 100 - 240 VAC, 50 - 60 Hz



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LabVIEW is a registered trademark of National Instruments.
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