

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) 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 sensor type)
- **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

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 <sup>-</sup>
Maximum readout rate	5 MHz
Read noise	2.9 e <sup>-</sup>
Maximum cooling	-100°C
Frame rate	0.95 fps (full frame)

## System Specifications<sup>\*3</sup>

Sensor options	BV: Back Illuminated CCD, Vis optimized BU2: Back Illuminated CCD, UV-Enhanced, 250 nm optimized FI: Front Illuminated CCD <b>BR-DD: Back Illuminated CCD, Deep Depletion with fringe suppression. Optimum sensor for Near IR applications.</b>	
Active pixels <sup>*4</sup>	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 <sup>*5</sup>	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	Single UV-grade fused silica window; AR coated on both sides for BV & FI models. Custom coated windows can be ordered on request, e.g. 780 nm optimized for Rb BEC experiments	

## Advanced Performance Specifications<sup>\*3</sup>

Dark current, e <sup>-</sup> /pixel/sec <sup>*6</sup>		
@ -70°C	0.00040	
@ -80°C	0.00013	
@ -100°C (5-stage peltier cooler model only)	0.000059	
Pixel readout rates	5, 3, 1, 0.05 MHz	
Pixel well depth	100,000 e <sup>-</sup>	
Read noise (e <sup>-</sup> ) <sup>*7</sup>	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 <sup>*8</sup>	Better than 99%	
Digitization	16-bit	
Vertical clock speed	38 or 76 μs (software selectable)	

## Frame Rates<sup>\*9</sup>

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

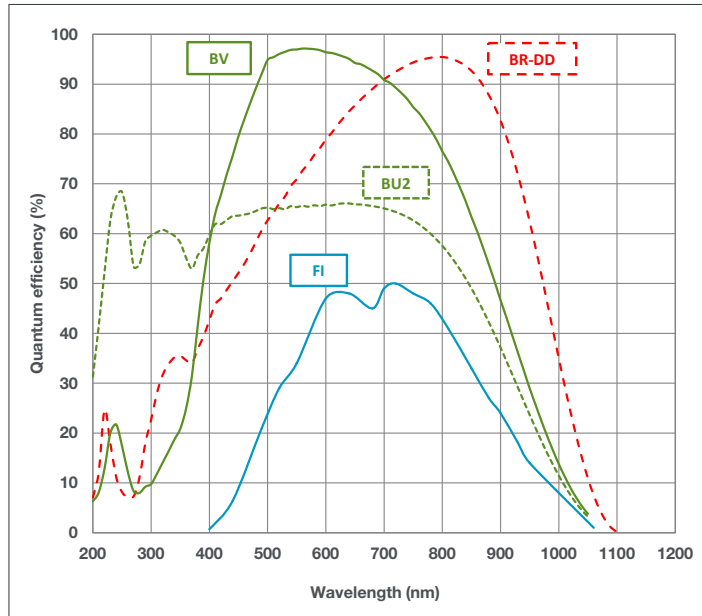
1 MHz			
Binning	Full Frame	1024 x 1024	512 x 512
1 x 1	0.433	0.835	3.1
2 x 2	0.993	1.67	4.733
4 x 4	1.947	2.951	6.424
8 x 8	3.266	4.571	7.822
16 x 16	4.71	6.204	8.777

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

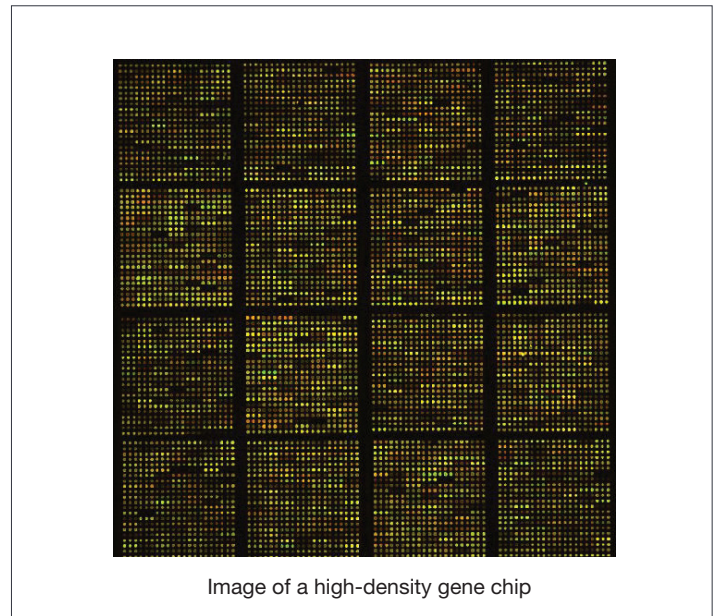
5 MHz (Visualization mode)			
Binning	Full Frame	1024 x 1024	512 x 512
1 x 1	0.953	1.771	3.1
2 x 2	1.655	2.922	4.733
4 x 4	2.619	4.329	6.424
8 x 8	3.697	5.7	7.822
16 x 16	4.654	6.776	8.777

## Quantum Efficiency Curves <sup>\*10</sup>

20°C



## 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 large field of view with faster frame rates?** Neo and Zyla sCMOS delivers up to 100 frames/sec (full frame) from a large 5.5 megapixel sensor.

**Need smaller pixels?** Check out the Luca<sup>EM</sup> EMCCDs, the Clara Interline CCD and the Neo and Zyla sCMOS.

**Need sensitive performance in the red/NIR with zero fringing (etaloning)?** The iKon-M 934 BEX2-DD is a deep depletion CCD with superb red/NIR quantum efficiency, also incorporating fringe suppression technology. The single photon sensitive iXon EMCCD cameras also offers excellent sensitivity across the red/NIR wavelength region with zero fringing.

**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 4 options for sensor types. Please select the sensor which best suits your needs.

### Step 3.

Please indicate which software you require.

### Step 4.

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 optimised performance in the 250 nm region  
**BR-DD:** Back Illuminated CCD, Deep Depletion with fringe suppression. Optimum sensor for Near IR applications.

### Step 3.

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

**Solis for Imaging** A 32-bit application compatible with 32 and 64-bit 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

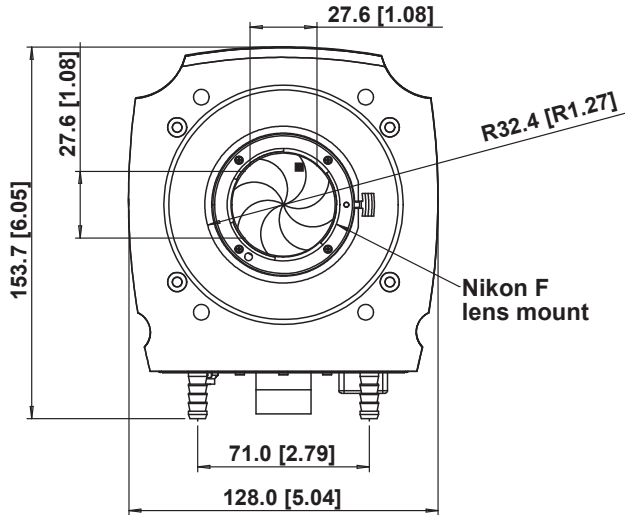
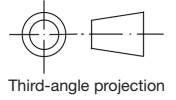
**OA-ECMT** Auto ext. tubes (set of 3) for C-mount

**OA-ENAF** Auto ext. tubes (set of 3) for Nikon AF

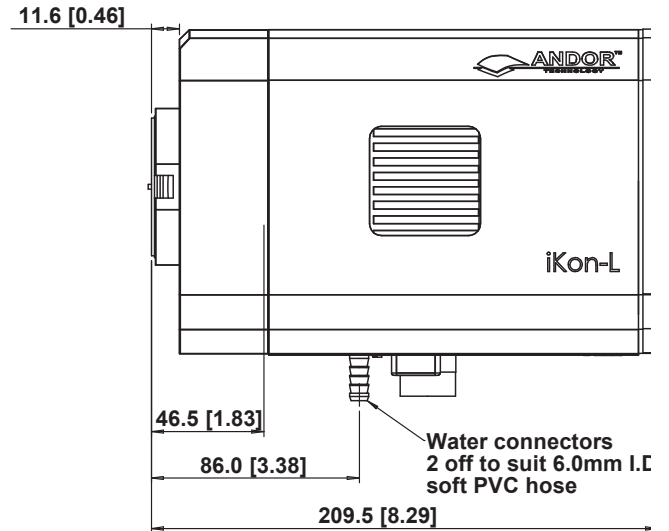
**XU-RECR/TRANS** USB 2.0 - Transmitter and Receiver, including 2 power supplies

## 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

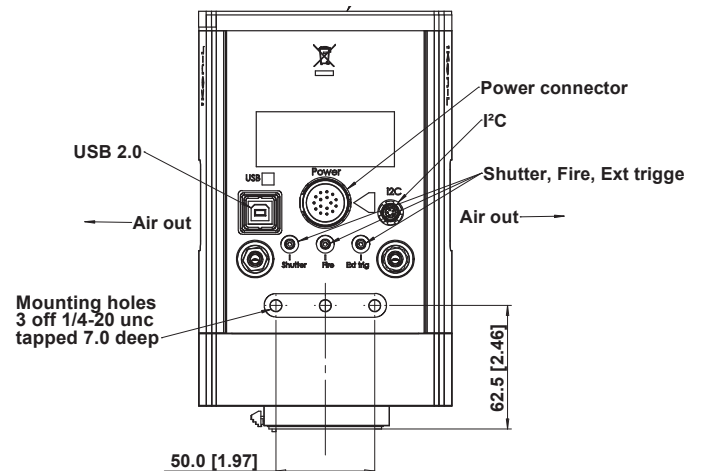
### TTL / Logic

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

### I<sup>2</sup>C connector

Compatible with Fischer SC102A054-130  
Shutter (TTL), I<sup>2</sup>C Clock, I<sup>2</sup>C Data, +5 Vdc, Ground

**Minimum cable clearance required at bottom of camera**  
90 mm



Mounting hole & connector locations

## 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



## Order Today

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Fax +1 (860) 290 9566

#### China

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Phone +86 (10) 5129 4977  
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 20°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.  
Matlab is a registered trademark of The MathWorks Inc.

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