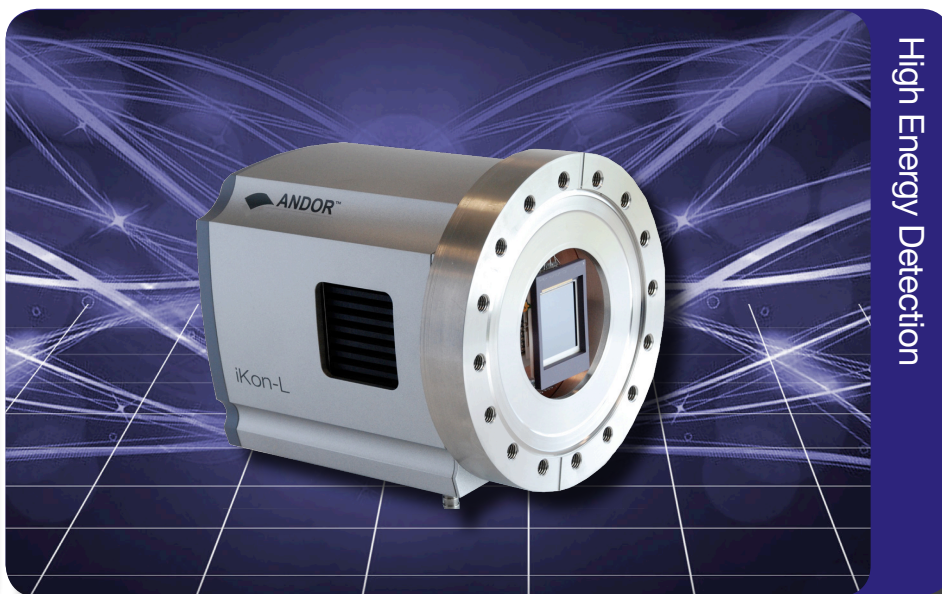


XRD Powder diffraction image
courtesy of NASA AMES, USA



High Energy Detection

Features and Benefits

- **Open front end** *1
6" CF152 flange and knife-edge sealing provided as standard for direct interfacing to vacuum chambers
- **Peak QE of 95%**
High detector sensitivity
- **13.5 x 13.5 µm pixel size**
Optimal balance of dynamic range and resolution
- **Large area 2048 x 2048 sensor**
Large field of view and high resolution
- **TE cooling to -100°C**
Minimization of dark current and pixel blemish
- **Up to 5 MHz pixel readout**
Slower readout for low noise, faster speeds for dynamic processes and 5 MHz for focusing mode
- **USB 2.0 connection**
USB plug and play – no controller box
- **Ultra-low noise readout**
Intelligent low-noise electronics offer the most 'silent' system noise available
- **Dual output**
High sensitivity output for low-light applications, or a High Capacity output for maximum dynamic range with extensive binning
- **Cropped sensor mode**
Specialized acquisition mode for continuous imaging with fast temporal resolution
- **Enhanced baseline clamp**
Essential for quantitative accuracy of dynamic measurements

Direct Detection High Energy Imaging

Andor's iKon-L SO 936 series is designed with direct High-Energy Imaging in mind with a convenient 16-point, knife-edge sealed 6" CF152 flange providing a robust and highly-effective seal to any compatible vacuum chamber interface. 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 SO 936 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 SO 936 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. USB 2.0 connectivity and multi-MHz readout options enable seamless 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 x 13.5 µm
Active area pixel well depth (typical)	100,000 e ⁻
Maximum readout rate	5 MHz
Read noise	2.9 e ⁻
Maximum cooling	-100°C
Frame rate	0.95 fps

System Specifications

Sensor options	<ul style="list-style-type: none"> • BN: Back Illuminated CCD • FI: Front Illuminated CCD 	<ul style="list-style-type: none"> • BR-DD: Back Illuminated, Deep Depletion, CCD
Active pixels *2	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 *3	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, 0.75l/min	-80°C	-100°C
Blemish specification	Grade 1 sensor	

Advanced Performance Specifications**

Dark current, e⁻/pixel/sec *5	0.0004		0.0013	
@ -70°C	0.00013		0.000235	
@ -80°C	0.00059		0.000375	
@ -100°C (5-stage peltier cooler model only)				
Pixel readout rates	5, 3, 1, 0.05 MHz			
Output node capacity	250,000 e ⁻		1,000,000 e ⁻	
Read noise (e⁻) *6	High Sensitivity output	High Capacity output	High Sensitivity output	High Capacity output
0.05 MHz	2.9	8.7	4.3	9.5
1 MHz	7.0	22.2	6.8	21.8
3 MHz	11.7	40.2	11.7	36.3
5 MHz	31.5	70.3	34.1	69.4
Linearity *7	Better than 99%			
Digitization	16 bit			
Vertical clock speed	38 or 76 μs (software selectable)			
Maximum bakeout temperature	+55°C			
Vacuum compatibility	10 ⁻⁹ millibar			

Frame Rates*8

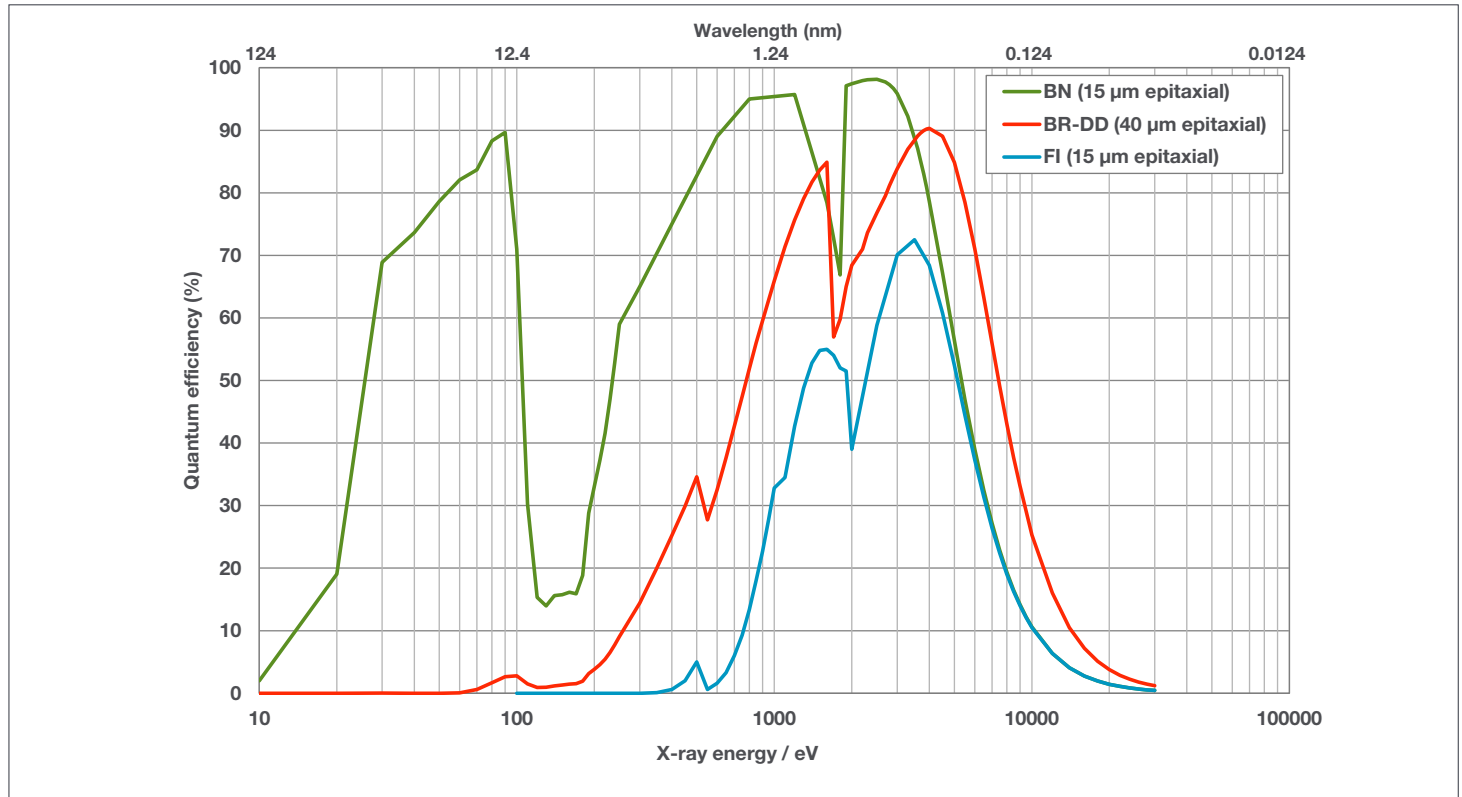
50 kHz Precision photometry mode			
Binning	Full Frame	1024 x 1024	512 x 512
1 x 1	0.011	0.023	0.046
2 x 2	0.04	0.059	0.102
4 x 4	0.155	0.138	0.213
8 x 8	0.482	0.293	0.42
16 x 16	1.166	0.572	0.78

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

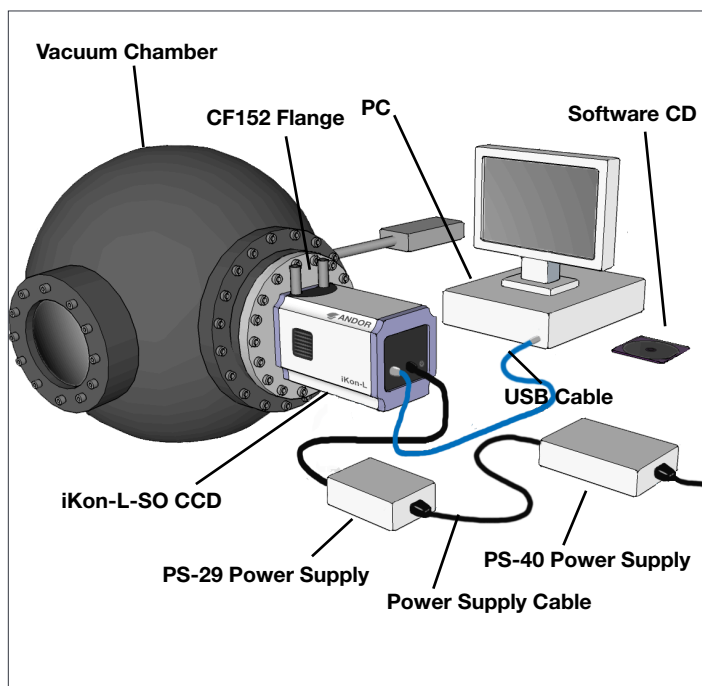
3 MHz			
Binning	Full Frame	1024 x 1024	512 x 512
1 x 1	0.607	1.157	2.115
2 x 2	1.294	2.175	3.588
4 x 4	2.305	3.545	5.326
8 x 8	3.463	5.017	6.953
16 x 16	4.496	6.27	8.18

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

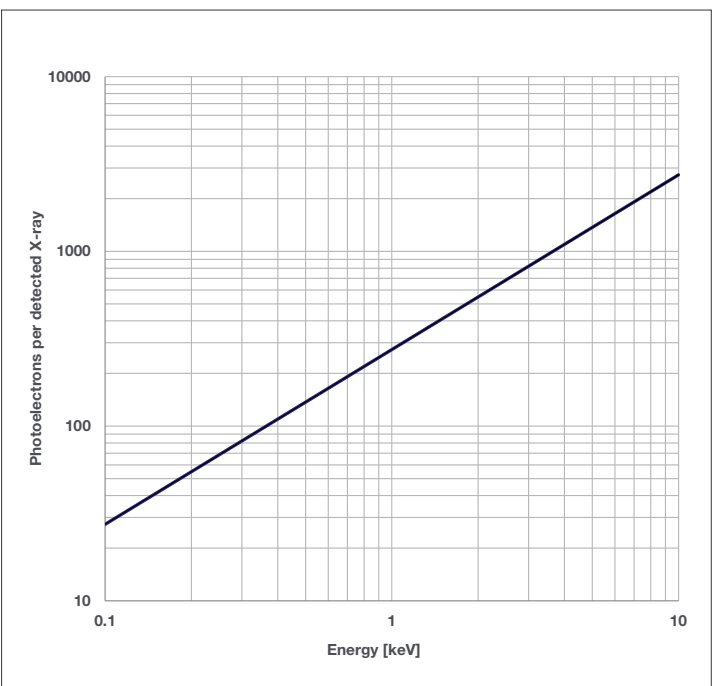
Quantum Efficiency Curves ^{**9}



Typical Setup



Photoelectrons v Incident X-rays ^{**10}



Creating The Optimum Product for You

How to customize the iKon-L SO:

Step 1.

The iKon-L SO flange has three mounting flange options. Please select the type of fitting for your installation.

Step 2.

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

Step 3.

The iKon-L SO CCD comes with three options for sensor types. Please select the sensor that best suits your needs.

Step 4.

Please indicate which software you require.

Step 5.

For compatibility, please indicate which accessories are required.

DO936N-**M**0**Z**-**#FI**
example shown

Step 1.

Choose flange hole type
I: Imperial thread (5/16 UNC)
O: No thread (ø 8 mm through hole)
M: Metric thread (M8)

Step 2.

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

Step 3.

Choose sensor type
#BN: Back Illuminated CCD, with no AR coating
BRD: Back illuminated CCD, with NIR coating
#FI: Front Illuminated CCD

Step 4.

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

Solis Imaging A 32-bit and fully 64-bit enabled application for Windows (XP, Vista, 7 and 8) 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++.

Step 5.

The following accessories are available:

XW-RECR Re-circulator for enhanced cooling performance

ACC-XW-CHIL-160 Oasis 160 Ultra compact chiller unit

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

XF-FILTER HOLDER Optional filter holder for camera

Have you found what you are looking for?

Need a faster frame rate? Andor's iKon-M SO 934 boasts a 1k x 1k active image area.

Need to get even closer to the action? Andor's range of SX/HX cameras are designed for use inside vacuum chambers.

Need to detect harder X-rays? Andor offers a range of Indirect Detection cameras (HH/HF range) that are compatible with industry-standard scintillators.

Need a standalone camera for X-ray? A custom built Beryllium window is fitted as standard to our SY/HY range of cameras to block visible light.

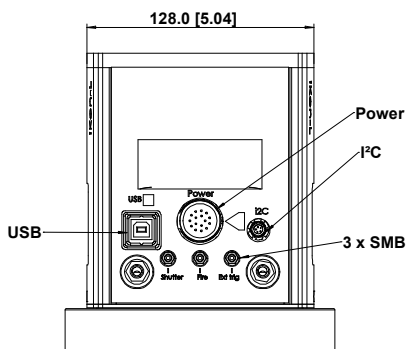
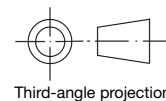
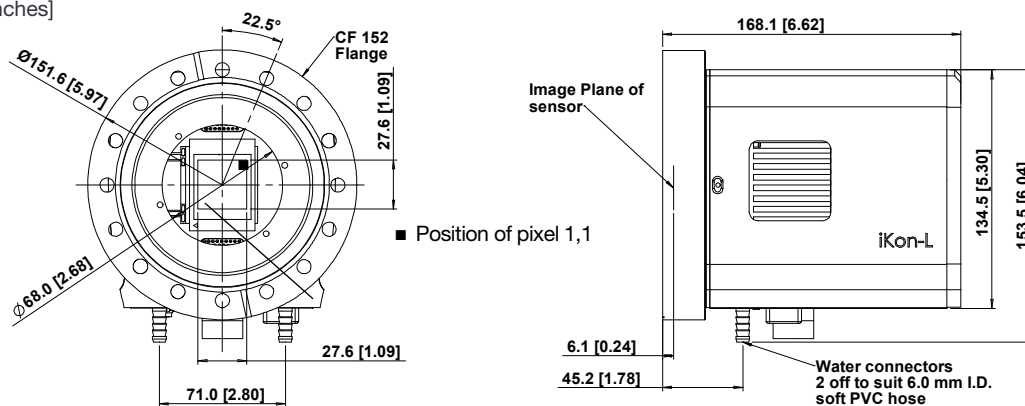
Need a specific mounting? Contact our experienced design team so we can make the perfect fit.

Need a camera for VUV/ X-ray spectroscopy? Andor's specialist spectrographic cameras (SO 920 or SO 940) are ideally suited for vacuum spectrographs.

Need a customized version? Please contact us to discuss our options.

Product Drawings

Dimensions in mm [inches]



Connector panel

Weight: 5.5 kg [12 lb 2 oz]

Best Practice Guidelines

Condensation	It is strongly advised that the camera should not be used in a condensing atmosphere. If used in a condensing atmosphere the sensor MUST be protected and the use of a cold finger is strongly recommended
Contamination & Damage	<ul style="list-style-type: none"> When not in use the sensor chamber should be covered and sealed. Due to the exposed nature of the sensor extreme care should be taken with the camera, as damage can easily occur through mishandling or by contamination. If the sensor becomes contaminated, due to accident or misuse, please contact Andor immediately for advice on cleaning.
Vacuum Operations	Ensure that the vacuum environment to which the camera is fitted is free of water vapour and other contaminants. Care should also be taken to control pressure change, as sudden pressure changes can potentially cause damage to the sensor assembly

Connecting to the iKon-L SO

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

Applications Guide

X-ray Laser Development

Lithography EUV

X-ray Plasma Diagnostics

Soft X-ray Imaging

X-ray Diffraction (XRD)

X-ray Fluorescence (XRF)

Crystallography

Phase Contrast Imaging

High Harmonic Generation

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 regional sales offices, please see: www.andor.com/contact

Our regional headquarters are:

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Japan

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Fax +81 (3) 3518 6489

North America

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

China

Beijing
Phone +86 (10) 5129 4977
Fax +86 (10) 6445 5401



Items shipped with your camera:

- 1 x 2 m BNC - SMB connection cable
- 1 x 3 m USB 2.0 cable Type A - Type B
- 2 x Power supplies (PS-29 & PS-40) with associated cables
- 1 x CD containing Andor user guides
- 1 x Individual system performance booklet
- 1 x Protective cover plate
- 4 x Fixing screws for cover plate **1

Footnotes:

Specifications are subject to change without notice

1. IMPORTANT - Due to the sensor being exposed to environments outside of Andor's control there is no warranty on the sensor. For full details of Andor's Warranty Policy please refer to our webpage at http://www.andor.com/contact_us/support_request/. For key information on handling precautions for SO/HO open front end systems, please refer to the best practice guidelines on page 5. Note permanent damage can easily occur due to misuse.
2. Edge pixels may exhibit a partial response.
3. Stabilized cooling temperatures are given for slowest readout speed. Use of faster readout speeds (in order to achieve faster frame rates) may require a higher cooling temperature to be selected. Specified minimum air cooled temperature assumes ambient temperature of 25°C. Specified minimum temperature with coolant assumes coolant temperature of 10°C. All cooling performance can be compromised by the environment to which the sensor is exposed.
4. Figures are typical unless otherwise stated.
5. Dark current measurement is averaged over the CCD area excluding any regions of blemishes.
6. Readout noise is for the entire system and is taken as a mean over the sensor area excluding any regions of blemishes. It is a combination of sensor readout noise and A/D noise.
7. Linearity is measured from a plot of counts vs exposure time under constant photon flux up to the saturation point of the system.
8. Typical binning or array size combinations. All measurements are made with 38.55 µs vertical shift speed. It also assumes internal trigger mode of operation and minimum exposure time. Note: 5 MHz = Visualization mode only.
9. Quantum efficiency as supplied by the sensor manufacturer.
10. The graph shows photoelectrons generated as a function of photon energy of incident X-ray.
11. Fixing screws for mounting the flange to a vacuum chamber are not included.

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 40 MB/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
- Maximum Bakeout: Temperature +55°C

Power Requirements

- 110 - 240 VAC, 50 - 60 Hz



Windows is a registered trademark of Microsoft Corporation.
Labview is a registered trademark of National Instruments.
Matlab is a registered trademark of The MathWorks Inc.

XiKonLSOSS 0514 R1