

Features and Benefits

- **'Standalone' Be filter** *1
250 μm Beryllium window with a back filled chamber as standard
- **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
- **Up to 5 MHz pixel readout** *9
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**
Specialised acquisition mode for continuous imaging with fast temporal resolution
- **Enhanced baseline clamp**
Essential for quantitative accuracy of dynamic measurements
- **Integrated in EPICS**
Platform is fully integrated into the EPICS control software

Large Area 'Standalone' High Energy Imaging

Andor's iKon-L SY 936 is designed to block unwanted visible light with its built in Beryllium foil window while allowing the lowest X-Ray photon energies to be imaged. 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.

The iKon-L SY 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), optimally selected fibre and low noise readout electronics.

TE cooled for stable performance 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 | -55°C |
| Frame rate | 0.95 fps |
| Beryllium foil thickness | 250 μm |

System Specifications

| | | |
|--|--|--|
| Sensor options | <ul style="list-style-type: none"> • BN: Back Illuminated CCD • FI: Front Illuminated CCD | • 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} | | |
| Air cooled | -35°C | |
| Coolant recirculator | -50°C | |
| Coolant chiller, coolant @ 10°C, 0.75l/min | -55°C | |
| Blemish specification | Grade 1 sensor from supplier. Camera blemishes as defined by Andor Grade A: https://andor.oxinst.com/learning/view/article/ccd-blemishes-and-non-uniformities | |

Advanced Performance Specifications^{*4}

| | | | | |
|---|-----------------------------------|----------------------|-------------------------|----------------------|
| Dark current, e ⁻ /pixel/sec ^{*5} | | | | |
| @ -55°C | 0.0175 | | 0.07 | |
| Pixel readout rates | 5, 3, 1, 0.05 MHz | | | |
| Pixel well depth | 100,000 e ⁻ | | 150,000 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 ^{*9} | 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) | | | |

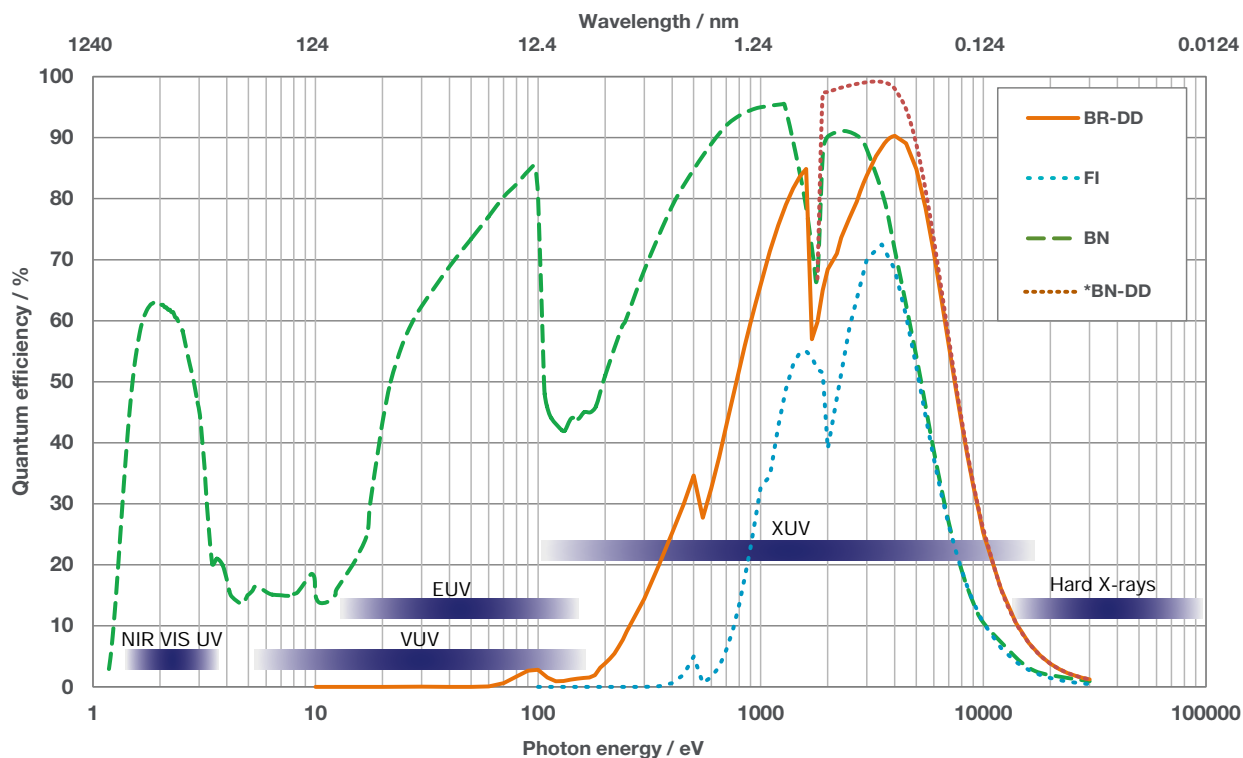
Frame Rates^{*8}

| 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 | 0.040 | 0.059 | 0.102 |
| 4 x 4 | 0.155 | 0.138 | 0.213 |
| 8 x 8 | 0.482 | 0.293 | 0.420 |
| 16 x 16 | 1.166 | 0.572 | 0.780 |

| 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 | 1.670 |
| 4 x 4 | 1.594 | 1.947 | 2.951 |
| 8 x 8 | 2.912 | 3.266 | 4.571 |
| 16 x 16 | 4.152 | 4.710 | 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 | 6.270 | 8.180 |

| 5 MHz Visualization mode ^{*9} | | | |
|--|------------|-------------|-----------|
| Binning | Full Frame | 1024 x 1024 | 512 x 512 |
| 1 x 1 | 0.953 | 1.771 | 3.100 |
| 2 x 2 | 1.655 | 2.922 | 4.733 |
| 4 x 4 | 2.619 | 4.329 | 6.424 |
| 8 x 8 | 3.697 | 5.700 | 7.822 |
| 16 x 16 | 4.654 | 6.776 | 8.777 |

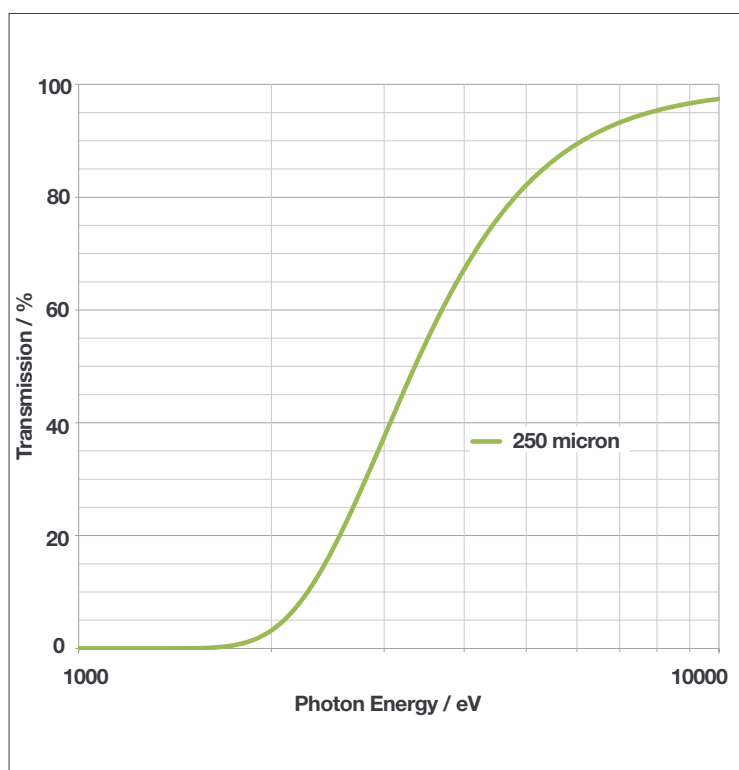
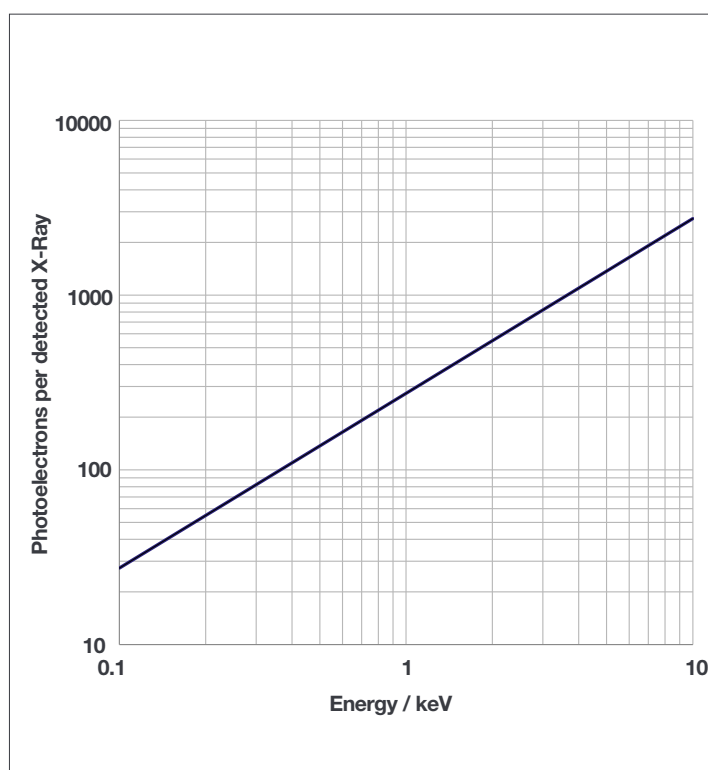
Quantum Efficiency Curves ^{**10}

Key:

VUV: Vacuum Ultraviolet, **EUV:** Extreme Ultraviolet, **XUV:** Extreme Ultraviolet (X-Ray)

For more information about Andor solutions for 'indirect' detection please go to www.andor.com/scientific-cameras/high-energy-detection

Beryllium Foil Transmission

Photoelectrons v Incident X-Rays ^{**11}

Creating The Optimum Product for You



DY936N-

#FI

example shown

Step 1. Choose the sensor type option

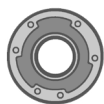


CCD

Sensor
Type

| Description | Code |
|--|-------|
| Back Illuminated CCD, with no AR coating | #BN |
| Back illuminated CCD, with NIR coating | BR-DD |
| Front Illuminated CCD | #FI |

Step 2. Select the required accessories and adapters

Accessories &
Adapters

| Description | Order Code |
|---|--|
| Re-circulator for enhanced cooling performance | XW-RECR |
| Oasis 160 Ultra compact chiller unit (tubing to be ordered separately) | ACC-XW-CHIL-160 |
| 6 mm tubing options for ACC-XW-CHIL-160 (2x2.5 m or 2x5 m lengths) | ACC-6MM-TUBING-2X2.5/ ACC-6MM-TUBING-2X5M |
| USB Extender: Icron USB 2.0 Ranger 2201 (supports up to 100 m) - EU/UK/US | ACC-USBX-EU ACC-USBX-UK ACC-USBX-US |
| 30 m Ethernet cable (for use with the above ACC-USBX-** USB extenders) | ACC-ELC-13295 |

Step 3. Select the required software



Software

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

Solis Imaging A 32-bit and fully 64-bit enabled application for Windows (8, 8.1 and 10) 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 32/64-bit libraries for Windows (8, 8.1 and 10), compatible with C/C++, C#, Delphi, VB.NET, LabVIEW and Matlab. Linux SDK compatible with C/C++.

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 detect harder X-Rays? Andor offers a range of Indirect Detection cameras (HH/HF range) which 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.

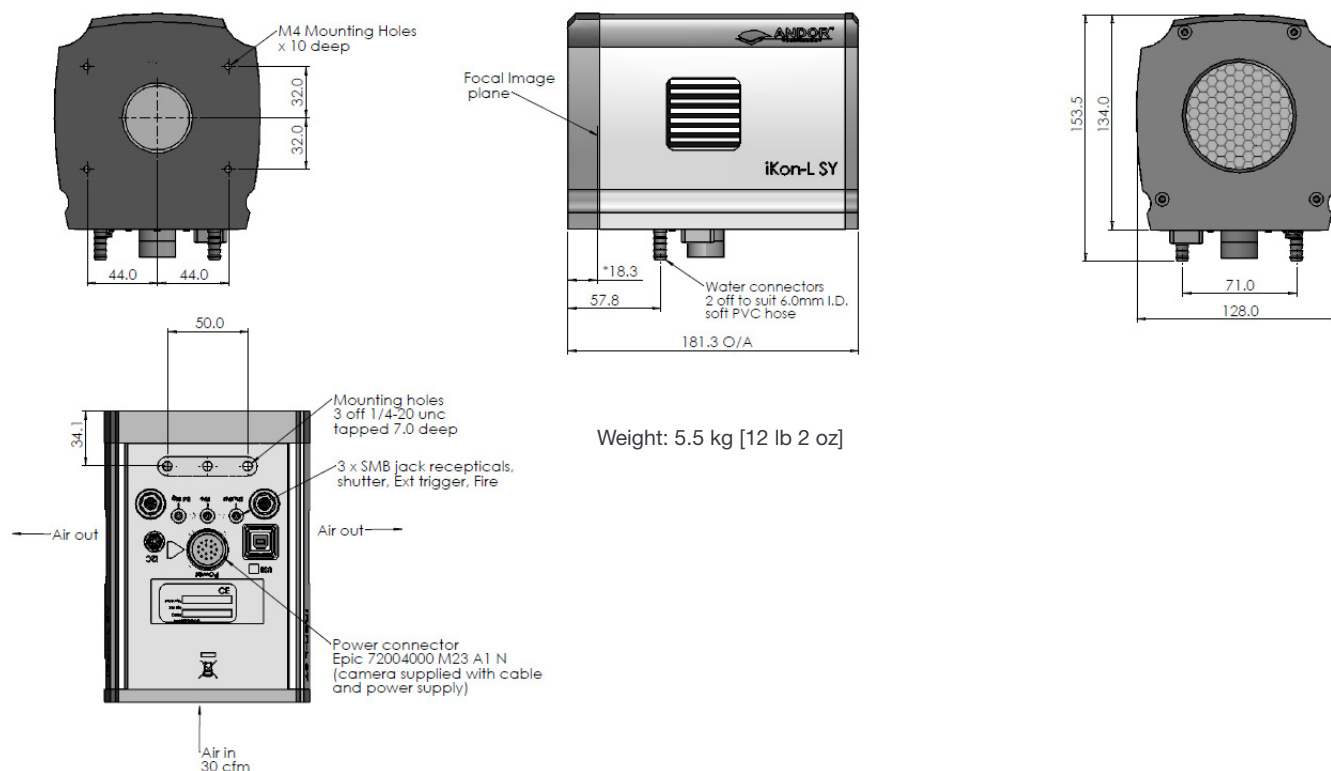
Need a specific mounting? Contact our experienced design team so we can make the perfect fit.

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]



Best Practice Guidelines

- ✓ When not in use the window should be covered and protected.
- ✗ Not suitable for mounting to vacuum chamber.
- ✓ Handle the camera with care - due to the exposed nature of the window, damage can easily occur through mishandling or by contamination.
- ✓ If due to accident or misuse the window becomes contaminated, please contact Andor immediately for advice on cleaning.
- ✗ Avoid shock damage as the Beryllium foil window is very brittle. If the foil is broken there is a health risk. Please contact Andor for further information if required.

Connecting to the iKon-L SY

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 Source Development
- ✓ X-Ray Absorption, Phase Contrast Imaging and Tomography
- ✓ X-Ray Plasma Diagnostics
- ✓ X-Ray Diffraction (XRD)
- ✓ X-Ray Fluorescence (XRF)

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:

Europe

Belfast, Northern Ireland
Phone +44 (28) 9023 7126
Fax +44 (28) 9031 0792

Japan

Tokyo
Phone +81 (3) 6732 8968
Fax +81 (3) 6732 8939

North America

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

China

Beijing
Phone +86 (10) 5884 7900
Fax +86 (10) 5884 7901

Items shipped with your camera:

- 1 x 2 m BNC - SMB connection cable
- 1 x 3 m USB 2.0 cable Type A to 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

Footnotes: Specifications are subject to change without notice

1. IMPORTANT - Due to the Be window there is a limited warranty on the sensor. For full details of Andor's Warranty Policy please refer to our webpage at www.andor.com/contact_us/support_request/. For key information on handling precautions for SY/HY 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.
9. 5 MHz is for focusing/visualization mode only.
10. Quantum efficiency as supplied by the sensor manufacturer.
11. The graph shows photoelectrons generated as a function of photon energy of incident X-Ray.
12. 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 (8, 8.1 and 10) 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

- 100 - 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.