Features and Benefits

- **‘Standalone’ Beryllium window**
  200 µm thick Beryllium foil window as standard
- **TE cooling down to -100°C**
  Critical for elimination of dark current
- **UltraVac™**
  Critical for sustained vacuum integrity and to maintain unequalled cooling, year after year
- **Peak QE of 95%**
  High detector sensitivity
- **13 x 13 µm pixel size**
  Optimal balance of dynamic range and resolution
- **Ultra-low noise readout**
  Intelligent low-noise electronics offer the most ‘silent’ system noise performance available
- **Multi-Megahertz pixel readout**
  High frame rates achievable (5 MHz in visualization mode, 50 kHz for the highest sensitivity and signal-to-noise ratio)
- **Enhanced baseline clamp**
  Quantitative accuracy of dynamic measurements
- **Cropped sensor mode**
  Specialized acquisition mode for continuous imaging with fast temporal resolution
- **USB 2.0 connection**
  USB plug and play – no controller box
- **Integrated in EPICS**
  Platform is fully integrated into the EPICS control software

‘Standalone’ Soft X-ray Imaging @ -100°C

Andor’s standalone USB 2.0 iKon-M SY 934 series feature a high-QE, back-illuminated, soft X-ray optimized sensor for direct X-ray detection and is ideal for low flux, low photon energy research. A convenient Beryllium foil window blocks visible wavelengths with minimal ‘Beam Hardening’ of lower energy X-rays.

This 1024 x 1024 sensor array with 13 x 13 µm pixels offers high dynamic range and high spatial resolution. Seamless software selection of a range of kHz and Multi-MHz readout speeds provide exceptionally low readout noise and faster frame rates respectively.

Specifications Summary

<table>
<thead>
<tr>
<th>Feature</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active pixels</td>
<td>1024 x 1024</td>
</tr>
<tr>
<td>Sensor size</td>
<td>13.3 x 13.3 mm</td>
</tr>
<tr>
<td>Pixel size (W x H)</td>
<td>13 x 13 µm</td>
</tr>
<tr>
<td>Active area pixel well depth (typical)</td>
<td>100,000 e⁻</td>
</tr>
<tr>
<td>Maximum readout rate</td>
<td>5 MHz</td>
</tr>
<tr>
<td>Read noise</td>
<td>2.9 e⁻</td>
</tr>
<tr>
<td>Maximum cooling</td>
<td>-100°C</td>
</tr>
<tr>
<td>Frame rate</td>
<td>4.4 fps (full frame)</td>
</tr>
<tr>
<td>Beryllium foil thickness</td>
<td>200 µm</td>
</tr>
</tbody>
</table>
### Key Specifications

<table>
<thead>
<tr>
<th>Model number</th>
<th>DY934P</th>
<th>DY934P-BR-DD</th>
</tr>
</thead>
</table>
| Sensor options | • BN: Back illuminated sensor - no AR coating  
• FI: Front illuminated sensor | • BR-DD: Back illuminated, Deep Depletion CCD with fringe suppression |
| Active pixels | 1024 x 1024 |
| Pixel size | 13 x 13 μm |
| Image area | 13.3 x 13.3 mm with 100% fill factor |
| Minimum temperatures | -80°C  
-95°C  
-100°C |

### Advanced Specifications

| Dark current, e/pixel/sec @ -100°C | 0.00012 | 0.00047 |
| Pixel readout rates | 5, 3, 1, 0.05 MHz |
| Output node capacity | 250,000 e⁻ |
| Pixel well depth | 100,000 e⁻  
130,000 e⁻ |
| Read noise (e⁻) | 2.9  
6.6  
11.6  
18.0  
3.7  
6.6  
10.0  
15.0 |
| Linearity | Better than 99% |
| Digitization | 16-bit |
| Vertical clock speed | 11.3 to 67.3 µs (software selectable)  
4.25 to 64.25 µs (software selectable) |

### Frame Rates

#### 50 kHz Precision photometry mode

<table>
<thead>
<tr>
<th>Binning</th>
<th>Full Frame</th>
<th>512 x 512</th>
<th>256 x 256</th>
<th>128 x 128</th>
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<tbody>
<tr>
<td>1 x 1</td>
<td>0.04</td>
<td>0.1</td>
<td>0.2</td>
<td>0.4</td>
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<tr>
<td>2 x 2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.4</td>
<td>0.8</td>
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<tr>
<td>4 x 4</td>
<td>0.6</td>
<td>0.6</td>
<td>0.9</td>
<td>1.5</td>
</tr>
<tr>
<td>8 x 8</td>
<td>2</td>
<td>1.2</td>
<td>0.9</td>
<td>1.7</td>
</tr>
<tr>
<td>16 x 16</td>
<td>5.1</td>
<td>2.3</td>
<td>3.2</td>
<td>5</td>
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#### 1 MHz

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<th>128 x 128</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 x 1</td>
<td>0.9</td>
<td>1.8</td>
<td>3.5</td>
<td>6.9</td>
</tr>
<tr>
<td>2 x 2</td>
<td>2.9</td>
<td>4.3</td>
<td>7.5</td>
<td>13.5</td>
</tr>
<tr>
<td>4 x 4</td>
<td>7.9</td>
<td>9.4</td>
<td>14.8</td>
<td>24.6</td>
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<tr>
<td>8 x 8</td>
<td>16</td>
<td>18.2</td>
<td>26.6</td>
<td>40.7</td>
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<tr>
<td>16 x 16</td>
<td>33.4</td>
<td>31.6</td>
<td>43</td>
<td>59.8</td>
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#### 3 MHz

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<th>128 x 128</th>
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<tbody>
<tr>
<td>1 x 1</td>
<td>2.6</td>
<td>5.2</td>
<td>10</td>
<td>18.6</td>
</tr>
<tr>
<td>2 x 2</td>
<td>6.3</td>
<td>10.9</td>
<td>19.3</td>
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<tr>
<td>4 x 4</td>
<td>13.4</td>
<td>20.9</td>
<td>34.2</td>
<td>53.5</td>
</tr>
<tr>
<td>8 x 8</td>
<td>25.1</td>
<td>36.3</td>
<td>54.4</td>
<td>76.5</td>
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<tr>
<td>16 x 16</td>
<td>41.5</td>
<td>56.1</td>
<td>76.5</td>
<td>97.1</td>
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</table>

#### 5 MHz Visualization mode

<table>
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<th>256 x 256</th>
<th>128 x 128</th>
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</thead>
<tbody>
<tr>
<td>1 x 1</td>
<td>4.4</td>
<td>8.5</td>
<td>16</td>
<td>28.8</td>
</tr>
<tr>
<td>2 x 2</td>
<td>8.4</td>
<td>15.9</td>
<td>28.5</td>
<td>47.6</td>
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<tr>
<td>4 x 4</td>
<td>15.6</td>
<td>28.1</td>
<td>47</td>
<td>70.8</td>
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<tr>
<td>8 x 8</td>
<td>27.3</td>
<td>45.6</td>
<td>69.4</td>
<td>93.5</td>
</tr>
<tr>
<td>16 x 16</td>
<td>43.6</td>
<td>66.9</td>
<td>91.2</td>
<td>111.5</td>
</tr>
</tbody>
</table>
Quantum Efficiency Curves

200 µm Beryllium Foil Transmission

Photoelectrons v Incident X-rays

Andor gives 8% higher transmission @ 3 keV
Have you found what you are looking for?

**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 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 Customer Special Request options.
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-M 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)

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

Minimum cable clearance required at rear of camera 90 mm

### Applications Guide

- X-ray Laser Development
- X-ray Plasma Diagnostics
- Soft X-ray Imaging
- X-ray Diffraction (XRD)
- X-ray Fluorescence (XRF)
- X-ray Spectroscopy
- Phase Contrast Imaging
Order Today

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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

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**Items shipped with your camera:**
- 1 x 2 m SMB-BNC connection cable
- 1 x 3 m USB 2.0 cable Type A to Type B
- 1 x PS-25 power supply with mains cable
- 1 x CD containing Andor user guides
- 1 x Individual system performance booklet

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**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/](http://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. 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.

3. Edge pixels may exhibit a partial response.

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. The frame rates shown are for the BR-DD model, for a range of binning or array size combinations. All measurements are made with 4.25 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 provided by the sensor manufacturer.

11. The graph shows photoelectrons generated as a function of photon energy of incident X-ray.

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**Minimum Computer Requirements:**
- 3.0 GHz single core or 2.4 GHz dual or quad 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

**Power Requirements:**
- 100 - 240 VAC, 50 - 60 Hz
- Power consumption: 48W max.

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

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