**Features and Benefits**

- **Rapid frame rates**
  100 fps full frame sustained

- **Fiber optic plate coupling**
  Direct bonding on sCMOS sensor for maximum throughput, EMA statistical structure for lowest channel crosstalk

- **5.5 megapixel sensor format with high resolution and 6.5 μm pixels**
  Large 16.6 x 14 mm field of view

- **1.2 e$^{-}$ read noise**
  Lower detection limit than any CCD

- **Compact and light**
  Ideal for integration into space restrictive set-ups

- **Rolling and Global shutter**
  Maximum flexibility across all application

- **Dual-Gain amplifiers**
  Extensive dynamic range of 25,000:1 @ 30 fps

- **ROI and pixel binning**
  User-defined ROI (1 pixel granularity) and hardware binning

- **Dynamic baseline clamp**
  Ensures quantitative stability

- **Hardware time stamp**
  FPGA generated time stamp with 25 ns accuracy

- **Modular input interface**
  Choice of high resolution / high throughput scintillators and Beryllium filters

- **Integrated in EPICS**
  Platform is fully integrated into the EPICS control software

**Zyla Fiber Optic sCMOS- X-Ray Imaging at 100 fps**

Andor’s Zyla 5.5 HF outstanding design delivers the highest transmission and spatial resolution performance associated with state-of-the-art single fiber optic plate bonding, while also taking advantage of the very fast frame rate, ultra-low noise performance and exceptional field of view of the Zyla 5.5.

Its compact format, multiple mounting points and modular input configuration for scintillators or Beryllium filter integration allow ease of integration into laboratory setup or integrator (OEM) systems.

This unique feature combination makes the Zyla 5.5 HF the perfect detector platform for applications including X-ray imaging & tomography, electron microscopy and picosecond/ nanosecond X-ray imaging when coupled to streak tubes or open MCPs.

**Specifications Summary**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active pixels (W x H)</td>
<td>2560 x 2160 (5.5 Megapixel)</td>
</tr>
<tr>
<td>Sensor size</td>
<td>16.6 x 14.0 mm (21.8 mm diagonal)</td>
</tr>
<tr>
<td>Pixel size (W x H)</td>
<td>6.5 μm</td>
</tr>
<tr>
<td>Pixel well depth (typical)</td>
<td>30,000 e$^{-}$</td>
</tr>
<tr>
<td>Readout speeds (MHz)</td>
<td>560, 200</td>
</tr>
<tr>
<td>Read noise</td>
<td>1.2 e$^{-}$</td>
</tr>
<tr>
<td>Sensor operating temperature</td>
<td>0°C</td>
</tr>
<tr>
<td>Maximum frame rate</td>
<td>100 fps @ full frame</td>
</tr>
</tbody>
</table>

**NEW! sCMOS for Indirect Detection**

High resolution phase-contrast enhanced X-ray image of mouse paw

Courtesy of 4DX Phy. Ltd., Melbourne, Australia.
1 sCMOS technology: high speed AND low noise AND large field of view

Scientific CMOS overcomes the limitation of traditional slow-scan CCDs or interline technologies by offering simultaneously a large 16.6 x 14 mm (5.5 Megapixel) field of view with high resolution 6.5 µm pixel, 100 frames per second and ultralow 1.2 e- read noise.

Learn more at: http://www.andor.com/learning-academy/scmos-technology-what-is-scmos

2 High resolution AND high throughput AND low crosstalk fiber-optic plate

- Single fiber direct bonding onto sensor
- EMA (Extra-Mural Absorption) statistical structure

Light-absorbing glass structures are inserted into the matrix as replacements for individual light-conducting fibers, absorbing stray photons not contained by the individual fibers and leading to the lowest fiber crosstalk.

3 High spatial resolution

1:1 image of a USAF resolving Power Test Target 1951 acquired with a Zyla 5.5 HF - features up to 50 lp/mm can be resolved
**Sensor Specifications**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensor type</td>
<td>Front Illuminated Scientific CMOS with FOP</td>
</tr>
<tr>
<td>Active pixels</td>
<td>2560 x 2160 (5.5 Megapixel)</td>
</tr>
<tr>
<td>Pixel size</td>
<td>6.5 x 6.5 µm</td>
</tr>
<tr>
<td>Image area</td>
<td>16.6 x 14.0 mm, 21.8 mm diagonal with 100% fill factor</td>
</tr>
<tr>
<td>Blemish specification</td>
<td>Grade 1 sensor as per manufacturer definition</td>
</tr>
<tr>
<td>Maximum quantum efficiency</td>
<td>60% @ 580 nm</td>
</tr>
</tbody>
</table>

**Advanced Performance Specifications**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensor Operating Temperature</td>
<td>0°C (up to 30°C ambient)</td>
</tr>
<tr>
<td>Dark current, e-/pixel/sec @ min temp</td>
<td>0.14</td>
</tr>
<tr>
<td>Pixel well depth</td>
<td>30,000 e⁻</td>
</tr>
<tr>
<td>Read noise (e-) Median [rms]</td>
<td>Rolling Shutter @ 200 MHz: 1.2 [1.7], 1.45 [1.8], Global Shutter (snapshot): 2.4 [2.7], 2.6 [2.9]</td>
</tr>
<tr>
<td>Linearity</td>
<td>Better than 99%</td>
</tr>
<tr>
<td>Data range</td>
<td>12-bit and 16-bit</td>
</tr>
<tr>
<td>Maximum dynamic range</td>
<td>25,000:1</td>
</tr>
<tr>
<td>Pixel binning</td>
<td>Hardware Binning: 2 x 2, 3 x 3, 4 x 4, 8 x 8</td>
</tr>
<tr>
<td>Trigger modes</td>
<td>Internal, External, External Start, External Exposure, Software Trigger</td>
</tr>
<tr>
<td>Software Exposure Events</td>
<td>Start exposure - End exposure (row 1), Start exposure - End exposure (row n)</td>
</tr>
<tr>
<td>Hardware timestamp accuracy</td>
<td>25 ns</td>
</tr>
<tr>
<td>Anti-blooming factor</td>
<td>x 10,000</td>
</tr>
</tbody>
</table>

**Fiber Optic Input**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMA Design</td>
<td>Statistical</td>
</tr>
<tr>
<td>Fiber Diameter</td>
<td>3 µm</td>
</tr>
<tr>
<td>Core : Cladding ratio</td>
<td>80 : 20</td>
</tr>
<tr>
<td>Resolution</td>
<td>128 lp/mm</td>
</tr>
<tr>
<td>Image Distortion</td>
<td>Shear: sub 6.5 µm pixel</td>
</tr>
<tr>
<td></td>
<td>Gross: sub 6.5 µm pixel</td>
</tr>
</tbody>
</table>

**Optional Scintillator Specifications**

<table>
<thead>
<tr>
<th>Part Code</th>
<th>Description</th>
<th>Wavelength/Energy Range</th>
<th>Outer dimension (mm)</th>
<th>Effective area (mm)</th>
<th>Substrate thickness (mm)</th>
<th>Csl Scintillator thickness (µm)</th>
<th>Relative light output (%)</th>
<th>Contrast Transfer Function @ 10 lp/mm (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACC-OPT-01471</td>
<td>High Throughput: Csl (Tl)</td>
<td>10 keV to 100 keV</td>
<td>50 x 50</td>
<td>47 x 47</td>
<td>3</td>
<td>150</td>
<td>70</td>
<td>18</td>
</tr>
<tr>
<td>ACC-OPT-01472</td>
<td>High Resolution: Csl (Tl)</td>
<td>10 keV to 100 keV</td>
<td>50 x 50</td>
<td>47 x 47</td>
<td>3</td>
<td>150</td>
<td>40</td>
<td>33</td>
</tr>
</tbody>
</table>
Have you found what you are looking for?

**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 spectographs.

**Need a customised version?** Please contact us to discuss our Customer Special Request options.
Creating The Optimum Product for You

How to customize the Zyla 5.5 HF:

Step 1.
The Zyla 5.5 HF sCMOS comes with a single sensor type.

Step 2.
Select the connection option, 10-tap Camera Link

Step 3.
Please indicate which scintillator option you require. Select from no scintillator, high resolution or high throughput options.

Step 4.
Please indicate which software you require.

Step 5.
For compatibility, please indicate which accessories are required.

The Zyla 5.5-HF requires at least one of the following software options:

**Solis for Imaging** A 32-bit and fully 64-bit enabled application for Windows (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 iQ** A comprehensive multi-dimensional imaging software package. Offers tight synchronization of the camera with a comprehensive range of microscopy hardware, along with comprehensive rendering and analysis functionality. Modular architecture for best price/performance package on the market.

**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 (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 Zyla range can be operated through a large variety of third party imaging packages. See Andor web site for detail: http://www.andor.com/software/

The following accessories are available:

**FILTER & SCINTILLATOR HOLDER**- ACC-MEC-08444 holder accessory for use with Beryllium and Scintillator filters (see page 4)

**BERYLLIUM FILTER**- ACC-OPT-07875, Beryllium foil (Ø 56 mm, 200 microns thick)

**SCINTILLATOR**- ACC-OPT-01471 (High Throughput) or ACC-OPT-01472 (High Resolution). See page 3 for further details.

**5 METER CAMERA LINK CONNECTOR CABLE**. ACC-ASE-02992 Note, 2 required for Zyla 5.5 Camera Link 10-tap model.

**10 METER ACTIVE CAMERA LINK CONNECTOR CABLE**, includes power supply. ACC-ASE-06962

**WKST-1 WIN** PC Workstation for up to 100 fps continuous spooling to hard drives, acquiring up to 120,000 12-bit full resolution images: Dell T7610, 2.3 GHz Six Core, 8 GB RAM, 4 x 250GB SSD hard drive configured in RAID 0.

**WKST-2 WIN** PC Workstation for up to 30 fps continuous spooling to RAM, acquiring up to 60,000 12-bit full resolution images: Dell T36010, 3.6 GHz Quad Core, 8 GB RAM, 2 x 250 GB SSD hard drives configured in RAID 0.

**WKST-3 WIN** PC Workstation for up to 100 fps continuous spooling to RAM, acquiring up to 6,000 12-bit full resolution images: Dell T3610, 3.6 GHz Quad Core, 64 GB RAM.
Product Drawings
Dimensions in mm [inches]

Connecting to the Zyla 5.5 HF

Camera Control
Connector type: 3 meter Camera Link 10-tap connectors
(longer cable lengths available as accessories)

TTL / Logic
Connector type: 15 way D Type with TTL I/Os for External Trigger,
Frame Readout and Fire Pulse

Best Practice Guidelines

• Camera is susceptible to shock damage. Protective plate should always be fitted when camera is not in use.
• The FOP should always be protected when mounting to another surface, both surfaces must be free of contamination to avoid damage.
• When mounting a scintillator, do not apply a force exceeding 30 N onto the fiber optic surface.
• Dust or contamination can be removed by drop and drag optical cleaning technique. For cleaning, use lens tissue with a suitable solvent e.g. spectroscopic grade solvent.
• Do not use abrasives, corrosive solvents, avoid impact or point contact.
• The Beryllium foil is very brittle in nature therefore extreme care should be taken to avoid shock damage. If the foil is broken there is a health risk. Please contact Andor for further information if required.

Applications Guide

✓ X-ray Tomography
✓ Gamma Tomography
✓ Neutron Tomography
✓ Computed (CT) Tomography
✓ X-ray Plasma Diagnostics
✓ X-ray Imaging
✓ X-ray Diffraction (XRD)
✓ Crystallography
✓ Phase Contrast Imaging
✓ Electron Microscopy

Notes
• Protective cap MEC-08309 not shown
• Scintillator/Be Filter Holder is attached by M4 x 16 caphead screws (4 off).

Weight: 1.25 kg [2 lb 12 oz]
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](http://www.andor.com/contact)

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- Fax +44 (28) 9031 0792

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- Fax +1 (860) 290 9566

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- Fax +81 (3) 6732 8939

**China**
- Beijing
- Phone +86 (10) 8271 9066
- Fax +86 (10) 8271 9055

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**Items shipped with your camera:**
1. Camera Link card and 3 meter connector cables.
2. Power supply with mains cable
3. 7-way Multi I/O timing cable, offering Fire, External Trigger and Arm (3 meter)
4. Quick Start Guide
5. CD containing Andor user guides
6. Individual system performance sheet
7. Protective cap (MEC-08309)

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**Footnotes:** Specifications are subject to change without notice

1. IMPORTANT—Due to the sensor/ fiber optic 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 [http://www.andor.com/support](http://www.andor.com/support). Please refer to the best practice guidelines on page 6.
2. Figures are typical unless otherwise stated.
3. Edge pixels may exhibit a partial response.
4. Quantum efficiency of the sensor at 20°C as supplied by the sensor manufacturer.
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 set photon flux up to the saturation point of the system.
8. Software Exposure Events provide rapid software notification (SDK only) of the start and end of acquisition, useful for tight synchronization to moving peripheral devices e.g. stages.
9. Data as supplied by the fiber optic plate manufacturer.
10. Data as supplied by the scintillator manufacturer. Scintillator peak emission at 550 nm. Please contact your local Andor representative to inquire about other scintillator options.
11. Relative values, with 100 % being equal to the light output from conventional phosphor screen (Lanex-R), Light output was measured by CCD with lens coupling to source- conditions as below.
12. Source data: X-ray tube voltage 60 kV p, Aluminum filter 1 mm thick

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**Minimum Computer Requirements:**
- 2.4 GHz Quad Core
- 4GB RAM (increase RAM if to be used for continuous data spoiling)
- Hard Drive:
- Minimum 850 MB/s continuous write speed
- PCI Express x8 or greater
- Windows (Vista, 7 or 8) or Linux
* See technical note entitled: ‘PC Recommendations for sCMOS’
** Note, Andor supply PC workstations for Zyla, see page 5.

**Operating & Storage Conditions**
- Operating Temperature: 0°C to 30°C ambient
- Relative Humidity: < 70% (non-condensing)
- Storage Temperature: -10°C to 50°C

**Power Requirements**
- Power: +12 VDC ± 5% @ 5A
- Ripple: 200 mV peak-peak 0 - 20 MHz
- 100 - 240 VAC 50/60 Hz external power supply

**External Power Supply Compliance**
- UL-certified for Canada and USA
- Japanese PSE Mark

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**External Power Supply Compliance**

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.