

Sydor Fast CCD

The Sydor Fast CCD is a revolutionary high speed, ultra-high QE, low noise camera used to detect soft x-rays. Direct detection eliminates the risk of signal loss, often encountered when converting x-ray into signals detectable by visible cameras. Sydor's Fast CCD offers these benefits, along with ~100x faster image acquisition than competitive direct detection camera systems. Imaging at these rates allows data collection BEFORE samples experience x-ray damage. The high frame rates are coupled to a fiber optic output with low noise and fast transmission speeds.

The depletion contact is extremely thin to enable high QE from < 100 eV to 1000 eV. The sensor can be fully depleted, preventing residual charge carriers from corrupting the streaming data, and resulting in a high collection efficiency. The proprietary depletion contact demonstrates > 75% QE @ 100 eV and over 98% for photons above 600 eV. Users can employ a burst mode for faster output, which may be needed for certain types of laser and semiconductor research. This increased speed and QE allows more data to be collected in less time, maximizing the value of often scarce beam time.

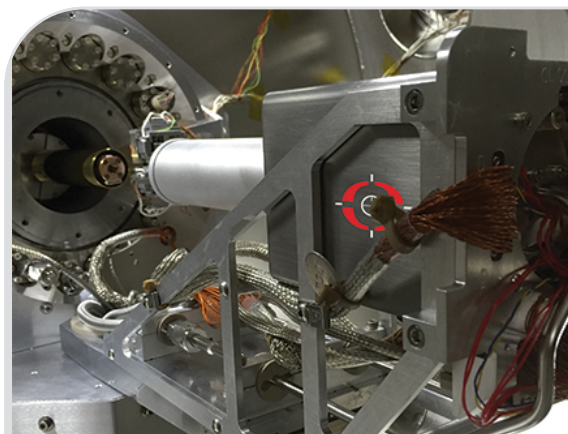
The camera system can be designed to operate in one of two available modes--Full-Frame Mode or 1K Mode. In Full-Frame Mode, the complete 960 x 1920 sensor is utilized and acquires at 60 fps. In 1K mode, the active imaging area is 960 x 960 pixels and acquires at 120 fps.

The combination of soft x-ray sensitivity, image acquisition speed, and low-noise performance make this an ideal detector for diffraction, scattering, and spectroscopy experiments.

The Sydor Fast CCD camera head can be flange-mounted or operated in-vacuum. This is useful for scanned or rastered samples. Our technical experts custom-engineer designs to fit into the user's vacuum chambers, accounting for translation, rotation, and electrical/cooling bulkhead requirements.

A Sydor Fast CCD package includes:

- Fast CCD detector (flange or in-vacuum)
- Optional rotation mounting/bulkhead engineering for detector
- Mounts and cables
- Power supply
- Readout system
- On-site installation and training



Features:

- ⊕ Ultra-fast imaging allows data collection prior to samples being damaged from x-ray exposure
- ⊕ High QE performance, which is critical for experiments within the soft x-ray regime
- ⊕ Low noise performance allows for collection of single-photon events
- ⊕ Full depletion via ultra thin depletion contact, maintaining collection efficiency of $\geq 99\%$ x-rays

Applications:

- ⊕ Coherent Diffraction Imaging, Ptychography - 100x speed reduces experiment time by orders of magnitude
- ⊕ Pump-Probe Experiments
- ⊕ X-Ray Tomography
- ⊕ EUV and other applications requiring extreme QE direct measurements.



Product Specifications

Detector Specifications

- ⊕ **Chip Type:** 200 μm thick silicon, back illuminated with 10 nm thick depletion contact
- ⊕ **Chip Size:** 1,920 x 960 (max), 30 μm pixels, fully depleted
- ⊕ **Read Noise:** < 30 e-/pixel RMS
- ⊕ **Dark Current @ 50 °C:** < 1 e-/pixel/sec RMS
- ⊕ **Electron Well Depth:** 100k e/pixel (~600 650 eV photons)
- ⊕ **Operating Temperature:** -60 °C
- ⊕ **Dynamic Range:** 11.7 bits actual. 16 bit device
- ⊕ **Frame Rate:** 60 fps in Full Frame Mode, 120 fps in 1K Mode
- ⊕ **Efficiency:** 75% @ 200 eV, > 90% above 600 eV

Mechanical

- ⊕ **Vacuum Compatibility:** Flange mount or high vacuum designs
- ⊕ **Cooling:** External Chiller
- ⊕ **Weight:** < 1.5 kg
- ⊕ **Camera Head Dimensions:** 120 mm (L) x 80 mm (W) x 80 mm (H)

Readout

- ⊕ **Software:** Embedded EPICS IOC or stand-alone user interface
- ⊕ **Electrical Vacuum Feedthrough:** UHV compatible
- ⊕ **Triggering:** Software & external

