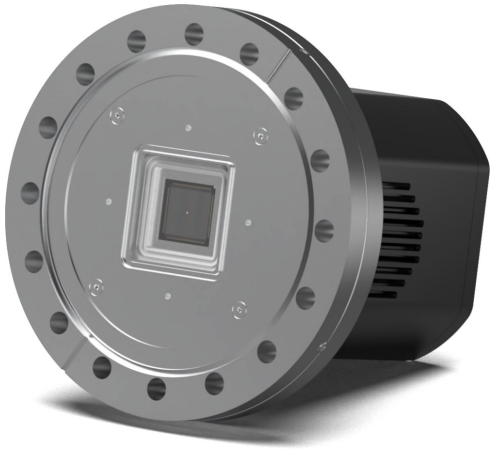
Dhyana XF Series Open-Front Soft X-ray sCMOS Camera, ~100% QE, 2K to 6K

Model Dhyana XF · waveqvanta.com/products/dhyana-xf-scmos-camera

Open-front BSI sCMOS cameras on standard CF flanges for direct detection of soft X-ray and EUV photons.



The Dhyana XF series are cooled, high-speed sCMOS cameras that mount on a vacuum chamber through a standard CF flange, exposing a back-illuminated sensor without anti-reflection coating directly to the beam. A high-vacuum seal and vacuum-compatible materials allow use down to 10^{-7} Pa, and the sensors reach a QE close to 100% between 80 and 1000 eV for soft X-ray, EUV and VUV detection. The series shares one hardware platform across 2K, 4K and 6K sensor formats.

Key features

- Four sensor variants: XF95 (2048 × 2048, 11 µm), XF400BSI (2048 × 2048, 6.5 µm), XF4040BSI (4096 × 4096, 9 µm) and 6060BSI (6144 × 6144, 10 µm)
- BSI sensors without anti-reflection coating: ~100% QE from 80 to 1000 eV, response from 200 to 1100 nm, and resistance to radiation damage in soft X-ray use
- Rotatable flange aligns the sensor x-axis with the image or spectral axis; pixel (0,0) is marked on the housing; flange and sensor position can be customized
- DN100CF (XF95, XF400BSI) or DN160CF (XF4040BSI) flange; vacuum compatible to 10^{-7} Pa
- Frame rates up to 100 fps (XF400BSI, CameraLink), 48 fps (XF95) and 16.5 fps (XF4040BSI); the 6060BSI uses CoaXPress 2.0
- Air or liquid cooling; dark current down to 0.02 e^-/pixel/s at -40°C chip temperature (XF4040BSI)
- Hardware and software triggering via SMA; support for LabVIEW, MATLAB and EPICS

Specifications

Sensor Type	BSI sCMOS without anti-reflection coating (open-front)
Sensor	XF95: GSENSE400BSI-PS
Peak QE	~100% (80–1000 eV)
Spectral Range	80–1000 eV; 200–1100 nm
Resolution	XF95, XF400BSI: 2048 × 2048; XF4040BSI: 4096 × 4096; 6060BSI: 6144 × 6144
Pixel Size	XF95: 11 µm; XF400BSI: 6.5 µm; XF4040BSI: 9 µm; 6060BSI: 10 µm
Effective Area	XF95: 22.5 × 22.5 mm; XF400BSI: 13.3 × 13.3 mm; XF4040BSI: 36.9 × 36.9 mm
Array Diagonal	XF95: 31.9 mm; XF400BSI: 18.8 mm; XF4040BSI: 52.1 mm
Full-Well Capacity	XF95: 85 ke^-; XF400BSI: 45 ke^-; XF4040BSI: 37 ke^- (typical)
Readout Noise	XF95: 1.6 e^-; XF400BSI: 1.1 e^- (CMS); XF4040BSI: 2.8 e^- (typical, median)
Dynamic Range	XF95: 90 dB; XF400BSI: 90 dB; XF4040BSI: 80 dB
Frame Rate (XF95)	48 fps (STD); 24 fps (HDR)
Frame Rate (XF400BSI)	100 fps @ CameraLink; 40 fps @ USB 3.0

Frame Rate (XF4040BSI)	16.5 fps @ CameraLink; 9.7 fps @ USB 3.0
Shutter Type	Rolling (XF400BSI: rolling, global reset)
Exposure Time	XF95: 21 µs–300 s; XF400BSI: 6.6 µs–300 s; XF4040BSI: 10 µs–3600 s
Binning	2 × 2, 4 × 4
ROI	Supported
Cooling Method	Air cooling, liquid cooling
Cooling Temperature	XF95: -30°C @ 25°C ambient, -50°C @ 20°C water; others: 60°C below ambient
Dark Current	XF95: 0.3; XF400BSI: 0.5; XF4040BSI: 0.02 e^-/pixel/s (all @ -40°C chip)
DSNU / PRNU	XF95, XF400BSI: 0.2 e^- / 0.3%; XF4040BSI: 0.5 e^- / 0.2%
Bit Depth	12 bit, 16 bit (XF400BSI also 11 bit)
Data Interface	CameraLink, USB 3.0 (XF95: USB 3.0 over fiber); 6060BSI: CoaXPress 2.0
Trigger	Hardware, software (SMA)
Vacuum Compatibility	Up to 10^{-7} Pa
Flange Size	DN100CF (XF95, XF400BSI), DN160CF (XF4040BSI); customization available
Power Supply	12 V / 8 A
Power Consumption	XF95: < 65 W; XF4040BSI: ≤ 95 W
Dimensions	XF95: 152.4 × 152.4 × 140.7 mm (H × W × L)
Weight	XF95: ~3700 g; XF4040BSI: ~4300 g
Software / SDK	Acquisition and analysis software, LabVIEW, MATLAB, EPICS; C/C++/C# SDK

Typical applications

- Fourier transform holography (FTH)
- Soft X-ray ptychography
- Small-angle X-ray scattering (SAXS)
- High-harmonic generation (HHG) EUV detection
- Soft X-ray scattering and spectroscopy
- EUV spectroscopy