Aries 6504 Pro BSI sCMOS Camera, 0.43 e^- RMS Read Noise, 297 fps

Model Aries 6504 Pro · waveqvanta.com/products/aries-6504-pro-scmos-camera

A sub-electron-noise sCMOS camera for quantitative low-light imaging at high frame rates.



The Aries 6504 Pro is built on the back-illuminated GSENSE6504BSI sensor (2048 × 2048, 6.5 µm pixels) and offers three readout modes. In Sensitive mode it reaches 0.43 e^- RMS read noise at 99 fps, low enough to resolve individual photoelectron peaks, while Speed mode delivers 297 fps at the full 4.2 MP with 0.8 e^- RMS. Dark current of 0.01 e^-/pixel/s or less at −20 °C also supports long, quantitative exposures.

Key features

- Sensitive mode: 0.43 e^- RMS read noise (0.36 e^- median) at 99 fps and 4.2 MP, with photon-number peaks clearly separated at about 2 e^-/pixel
- Speed mode: 297 fps at full 4.2 MP resolution with 0.8 e^- RMS read noise
- Dynamic (HDR) mode: 170 fps at 4.2 MP with 16-bit output and 15 ke^- full well
- 95% peak QE at 450 nm across a 200–1100 nm spectral range
- Dark current ≤ 0.01 e^-/pixel/s at −20 °C with liquid cooling; air cooling to −10 °C
- USB 3.2 Gen 2×2 and dual CXP-12 interfaces at the same frame rates, four SMA trigger connectors and timestamps

Specifications

Sensor Type	BSI sCMOS
Sensor	GSENSE6504BSI
Color / Mono	Mono
Peak QE	95% @ 450 nm
Spectral Range	200–1100 nm
Resolution	2048 × 2048
Pixel Size	6.5 µm × 6.5 µm
Effective Area	13.3 mm × 13.3 mm
Array Diagonal	18.8 mm
Full-Well Capacity	15 ke^- (Dynamic mode)
Readout Noise	0.43 e^- RMS (Sensitive mode); 0.8 e^- RMS (Speed mode)
Dynamic Range	91 dB (Sensitive mode)
Frame Rate	99 fps (Sensitive); 170 fps (Dynamic); 297 fps (Speed), all at 4.2 MP
Shutter Type	Rolling, global reset
Binning	2 × 2, 4 × 4
ROI	Supported
Cooling Method	Liquid, air
Cooling Temperature	Liquid: −20 °C @ 20 °C coolant; air: −10 °C @ 25 °C ambient
Dark Current	≤ 0.01 e^-/pixel/s @ −20 °C

DSNU / PRNU	0.1 e^- (Dynamic mode) / 0.3%
Bit Depth	12 bit, 16 bit
Data Interface	USB 3.2 Gen 2×2, CXP-12 × 2
Trigger	Hardware, software; 4 × SMA; timestamp supported
Trigger Output	Readout End, Global Exposure, Exposure Start, Trigger Ready, First Row, Any Row, High, Low
Optical Interface	C-mount
Power Supply	DC 12 V
Power Consumption	60 W
Dimensions	80 mm × 80 mm × 108 mm (camera body only)
Weight	950 g
Operating Environment	Working 0–40 °C, 20–80% RH, 0–3000 m; storage −20 to 60 °C, 20–80% RH
Software / SDK Support	Acquisition and analysis software; C / C++ SDK; Windows 10 / 11, Ubuntu 22.04

Typical applications

- Super-resolution microscopy, including SIM
- Light-sheet microscopy
- Calcium and voltage imaging
- High-content imaging
- Bioluminescence imaging
- Quantum physics and astronomy research