

Fairchild Imaging

HWK4123

4/3" 9MP BSI sCMOS 3.0 ultra low-light sensor

The HWK4123 sCMOS 3.0 Backside Illuminated (BSI) sensor defines the next horizon in professional imaging.

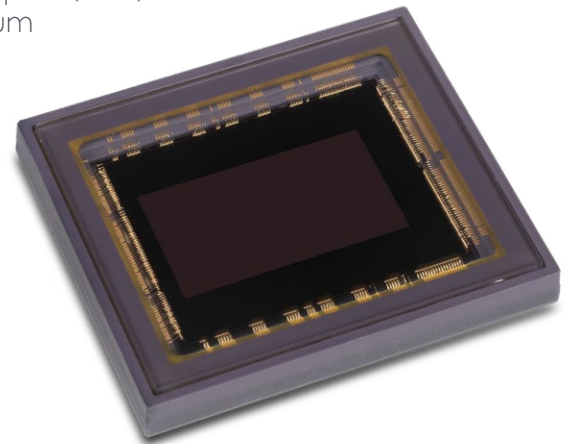
The HWK4123 incorporates new sCMOS 3.0 BSI technology, resulting in an ultra low-light capable 4k sensor with market leading 0.5e- Root Mean Square (RMS) read noise. Combining the exceptionally low read noise with high quantum efficiency BSI processing enables <0.001 Lux (starlight) imaging capability. The HWK4123 delivers the performance demanded by night vision and high-end surveillance applications.

The ultra low-light capable HWK4123 is available in monochrome and color versions, and employs new BSI sCMOS 3.0 pixel engineering to realize extremely low noise, boost Quantum Efficiency (QE), and reduce dark current. An innovative BSI process enhancement delivers a broad spectrum Near-Infrared Quantum Efficiency (NIR QE) out to 1100nm to sense nightglow for improved night vision. Low-dark current enables lower dark signal noise and maintains high image quality under high temperature conditions.

Our proven dual gain amplifier architecture results in 16 bits per pixel to encompass the full dynamic range. Low-gain and high-gain signal paths provide analog to digital conversions at multiple gain factors on a pixel by pixel basis. The process optimizes both dynamic range and low-light noise. The result is a high native dynamic range that can be further extended utilizing the sensor's multiple-exposure HDR operating modes.

Key features and benefits

- 9.4MP (4096 x 2300) enables the highest resolution in low-light imaging
- 4/3" optical format is compatible with standard lenses
- 0.5e-Root Mean Square (RMS) read noise enables imaging in darker scenarios
- 83dB dynamic range shows more detail in high contrast scenes
- Enhanced NIR QE process leverages the existing night-glow for improved low-light imaging
- Extremely low-dark current enables longer exposure times
- 120fps frame rate allows for no motion blur

**Applications**

- Surveillance
- Night vision
- Critical infrastructure security
- Unmanned vehicles

Ideal for imaging in extreme low-light conditions

Specifications

Sensor

Optical format	4/3"
Configurations	Monochrome or bayer RGB
Active array	4096 x 2300 (9.4MP)
Active area	18.9 mm x 10.6 mm
Active diagonal	21.6 mm
Frame rates	120 fps @ full frame 240 fps @ 1080p (ROI)
ADC resolution	12 bits @ ≤ 60 fps 11 bits @ 120 fps
Programmable gain	LG: 1x HG: 8x, 16x, 32x

Pixel

Pixel size	4.6µm x 4.6µm
Shutter types	Rolling shutter and global reset
Quantum efficiency (mono)	>85%
Read noise	0.5 e- RMS @ 120 fps
Dynamic range	83 dB
Dark current	2 e-/sec @ 30°C
Non-linearity	<1%

Interface

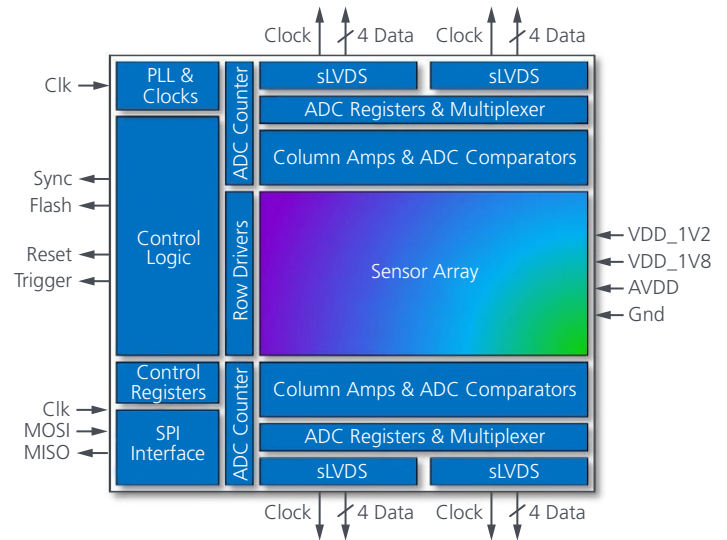
Temperature sensor	Analog and digital outputs
Output data interface	10 sub-LVDS @ 60 fps 20 sub-LVDS @ 120 fps
Data type	11 or 12 bit RAW 16 bit LG/HG-merged
Control interface	SPI 20 MHz

Operating

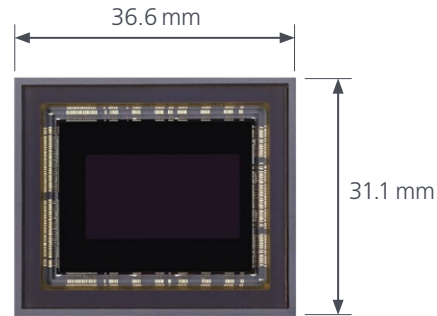
Power	1.8W @ 120 fps
Operating temp	-30°C to + 70°C
Power supply	3.3V, 2.5V, 1.8V, 1.2V

Packaging

Package	256 pin CLGA
Coverglass	Double-sided-AR coated



Block diagram



Standard CLGA package

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