

Space Imaging

A storied history of sensors in flight

Proven partnership.

Working with a sensor designer who understands the harsh environment and strict requirements of space imaging is critical to success. BAE Systems has a long history of providing commercial image sensors that have been space qualified and used in flight and orbital missions. Knowing what is required and how to deliver it through a flexible supply chain makes us your premier partner to ensure high performance and high quality.

Technology Readiness Level 9

For decades, our sCMOS and CCD sensors have been used in numerous space imaging applications and missions.

- **Applications:** Earth observation and living planet sciences, outer space telescopes, star trackers, planetary exploration, and defense and security such as SSA and ISR.
- **Missions:** Mars Rover Pathfinder, Asteria, ENMAP, Deep Impact, Cassini, Hubble Telescope, Argentina Earth Resource Satellite, Exoatmospheric Kill Vehicle, ISRO Earth Resource Satellite, Triana, and missile systems.

Custom designs and services

The key to the BAE Systems support approach is understanding the requirements, maintaining access to a continuous supply of qualified products, and conducting strict testing. Our quality assurance process can include up-screening COTS to characterization, custom testing, radiation hardened designs, bond pull tests, same batch processing, and other custom services.



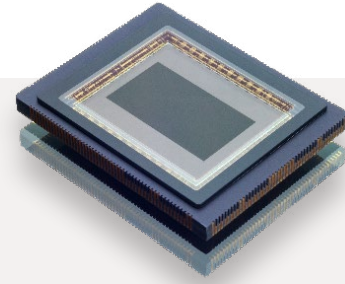
Features

- Options ranging from 5.5 MP - 12 MP sensors
- Radiation-hardened designs
- Custom up-screening
- User definable image operation modes
- Extremely low read noise performance down to 0.25e-
- Extremely low dark current
- Deep full well capacities up to 40,000e-

Benefits

- Wide range of options to meet specific needs
- Proven for the space imaging environment
- Continuous reliability for missions
- Sensor performance tuned to specific needs
- Photon counting capability
- Enables long exposure modes
- Capture bright object data over long exposures

Wide range of options to meet specific needs



Preliminary specifications

Sensor	4323	4123	4625	2521
Optical Format	4/3"	4/3"	APS-C	4/3"
Configurations	Color/Monochrome	Color/Monochrome	Color/Monochrome	Color/Monochrome
Resolution	10.5 MP	9.4 MP	12 MP	5.5 MP
Active Array	4432 x 2368	4100 x 2300	4608 x 2592	2560 x 2160
Active Area	20.3 mm x 10.9 mm	18.9 mm x 10.6 mm	25.3 mm x 14.3 mm	16.6 mm x 14.0 mm
Active Diagonal	23.1 mm	21.7 mm	29.1 mm	21.77 mm
Frame Rates	120 fps @ Full Frame 240 fps @ 1080p (ROI)	120 fps @ Full Frame 240 fps @ 1080p (ROI)	120 fps @ 12MP (GS) 240 fps @ 12MP (RS/GR)	100 fps (RS) 50 fps (GS)
ADC Resolution	12 bits @ 60 fps 11 bits @ 120 fps	12 bits @ LG/HG 11 bits @ 120 fps	22 bits (2x 11-bit)	22 bits (2x 11-bit)
Programmable Gain	LG: 1x HG: 8x, 16x, 32x	LG: 1x HG: 8x, 16x, 32x	LG: 1x HG: 15x, 30x	LG: 1x, 2x HG: 10x, 30x

Pixel

Pixel Size	4.6 x 4.6 μm	4.6 x 4.6 μm	5.5 x 5.5 μm	6.5 x 6.5 μm
Shutter Types	Rolling with Global Reset	Rolling with Global Reset	Rolling with Global Reset	Rolling with Global Reset
Read Noise	0.6 e- RMS @ 30 fps	0.25 – 0.5 e- RMS	<1.5 e- RMS at 240 fps (RS/GR) <5 e- RMS at 120 fps (GS)	<2 e- RMS (RS) <5 e- RMS (GS)
Dynamic Range	90dB	84 dB	>88 dB single frame (RS/GR) >77 dB single Frame (GS)	>83.5 dB
Dark Current in RS	2 e-/sec @ 30° C	2 e-/sec @ 30° C	<15 e-/pixel/sec @ 20° C	10e-/pixel/sec @ 20° C
Non-linearity	< 1%	< 1%	< 1%	< 1%
Full Well Capacity	>20,000 e-	>7,000 e-	>40,000 e-	>35,000 e-

Interface

Temperature Sensor	VPTAT Analog Output	VPTAT Analog Output	VPTAT Analog Output	VPTAT Analog Output
Output Data Interface	10 sub-LVDS @ 60 fps 20 sub-LVDS @ 120 fps	10 sub-LVDS @ 60 fps 20 sub-LVDS @ 120 fps	3.125 Gbps Serdes	Digital: 1.8V LVCMOS and 1.8V HSTL
Data Type	11 or 12 bit RAW 16 bit LG/HG merged	11 or 12 bit RAW 16 bit LG/HG merged	11 bit RAW 16 bit LG/HG merged	11 bit RAW 16 bit LG/HG merged
Control Interface	20 MHz SPI	20 MHz SPI	20 MHz SPI	25 MHz JTAG

Operating

Power	2.5W @ 120 fps	1.9W @ 120 fps	~6.4W @ 240 fps ~5.0W @ 60 fps	<2W @ 100 fps
Operating temperature	-30° to +70° C	-30° to +70° C	-40° to +55° C	-40° to +55° C
Power Supply	3.5V, 2.5V, 1.8V, 1.2V	2.5V, 1.8V, 1.2V	-0.4V, 1.2V, 1.8V, 3.0V, 3.3V	-0.4V, 1.8V, 3.0V, 3.3V

Packaging

Package	256 Pin CLGA	256 Pin CLGA	194 Pin CLCC	168 Pin CLCC
Coverglass	Double sided-AR coated	Double sided-AR coated	Double sided-AR coated	Double sided-AR coated

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