COSMOS-8k LARGE AREA CMOS CAMERA

KEY FEATURES

- Large 8k x 8k pixel sensor
- >90% QE
- 10 μm pixel size
- < 1 e⁻ read noise
- 18 fps at full resolution
- Sensor temperature <-25°C
- Dark current < 0.05 e⁻/p/s
- 101 dB dynamic range
- Rolling and true global shutter
- Hardware, electronics, sensor and software developed by Teledyne

TYPICAL APPLICATIONS

- Ground-based astronomy
- Exoplanet characterization
- Orbital object tracking
- Near Earth Object characterization
- Time Domain Astronomy
- Solar Physics
- Adaptive optics
- Speckle/Lucky Imaging

RELIABILITY

- An all-metal, hermetically sealed vacuum enclosure designed for long-term reliability

Next-Generation, Large Sensor, High-Performance Camera for Astronomy

Teledyne Princeton Instruments COSMOS camera merges CCD and CMOS performance, resulting in a new generation of camera distinct from anything else currently on the market. The COSMOS camera excels in several key areas: resolution, pixel size, sensitivity, and speed. Notably, it is the only large format, high performance CMOS camera designed and manufactured entirely within a single source, at Teledyne.

Teledyne Imaging has a history of providing solutions for world-changing projects, including the Mars Rover missions, ground-based observatories, and the James Webb Space Telescope. The COSMOS camera, leveraging its large area CMOS technology, stands as the ultimate solution for astronomy and more.
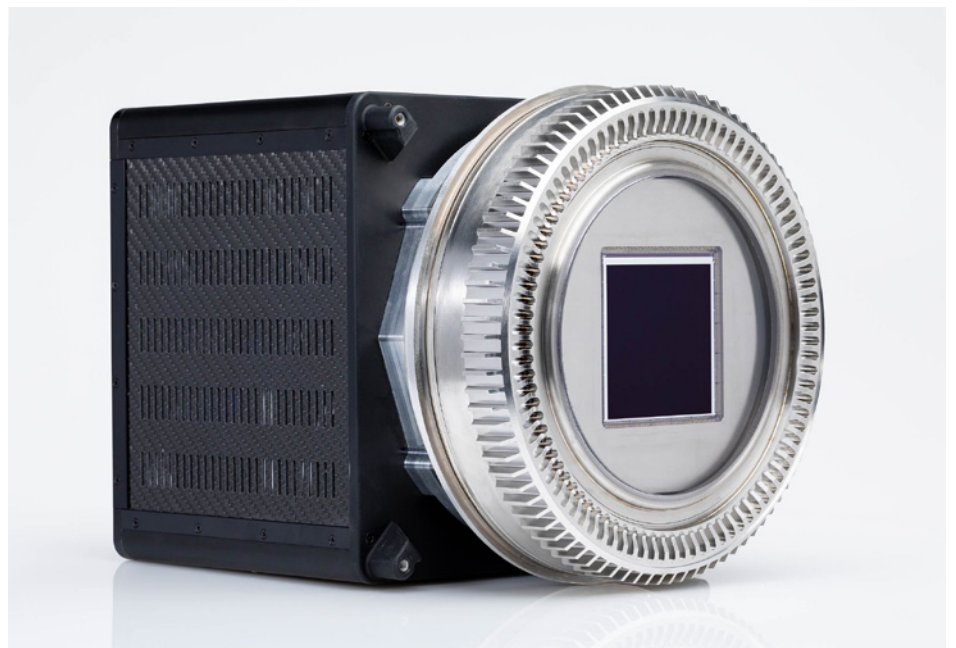
COSMOS-8k SPECIFICATIONS

SPECIFICATIONS	Camera Performance
Sensor	Back illuminated, grade 1, 100% fill factor
Active Array Size	8120 x 8120 (66 megapixels)
Pixel Area	10 x 10 µm (100 µm^2)
Sensor Area	81.2 x 81.2 mm (114.8 mm diagonal)
Peak QE%	> 90% peak QE
Spectral Response	200 – 1100 nm
Full Well Capacity	~ 14ke$^-$ (typical, high gain), > 100,000 e$^-$ (typical low gain)
Read Noise	< 1.5 e$^-$ RMS (typical, high gain mode) < 1 e$^-$ RMS (typical, CMS mode)
Dark Current	< 0.05 e$^-$/p/s (typical)
Cooling Method	Thermoelectric with liquid circulation (requires external chiller)
Cooling Temperature	< -25 °C (guaranteed)
Data Interfaces	CoaXPress® (Teledyne PCIe frame grabber card included)
Bit depth	14-, 16-, and 18-bit
Readout Modes	Rolling and true global shutter
Max Exposure Time	> 1 hour
Window Material	JGS1 UV grade quartz glass; different AR coating options
Operating Temperature Range	-30°C to 30°C; relative humidity: ≤ 90% (non-condensing); altitude: 0-4500 meters
Camera Weight	21.4 kg
Camera Dimensions	26.2 x 26.2 x 32.8 cm (W x H x L)
Nonlinearity	< 1%
Binning	2 x 2 and 4 x 4 (on FPGA)
I/O signals	Three MCX connectors: 2x software configurable outputs, 1x trigger input
Certification	CE

COSMOS-8k QE CURVE
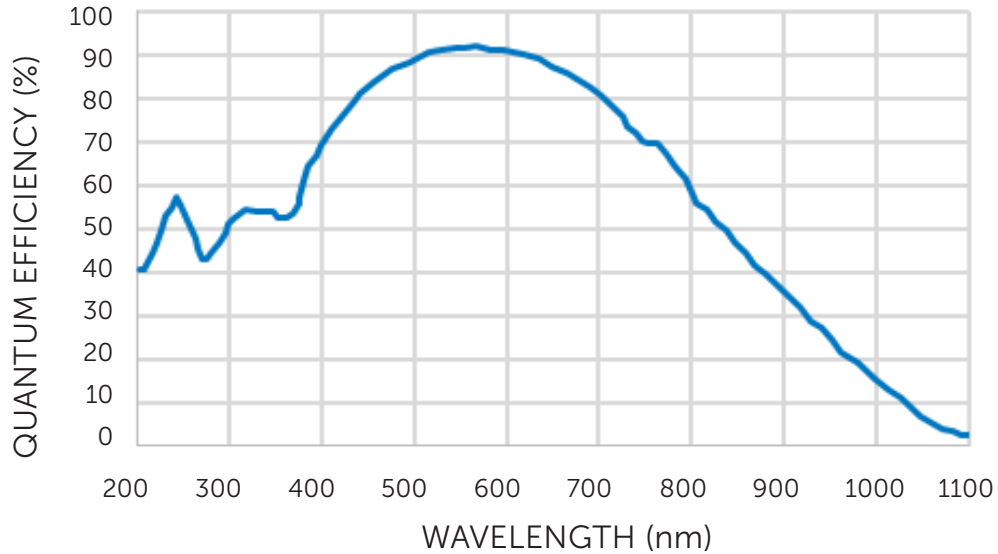
COSMOS-8k READOUT MODES AND PROPERTIES

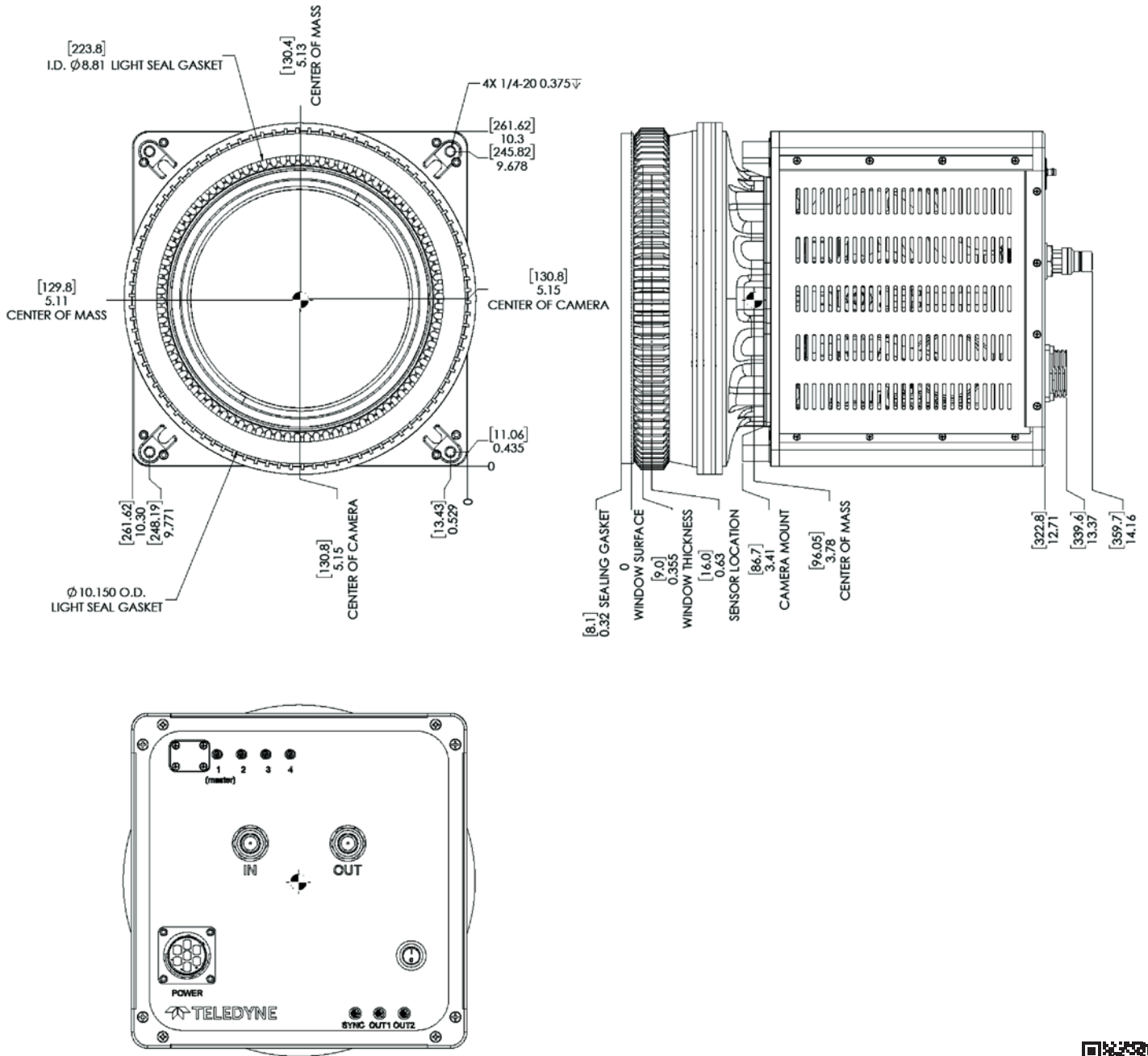HDR: High Dynamic Range Mode; CMS: Correlated Multisampling

Data	Gain Setting	Shutter Mode	Read Noise (e-)	Frame Rate (fps)
14 bit	High – CMS 16x	Rolling	< 1	1.1
14 bit	High	Rolling	1.4	18.3
14 bit	High	Global	2	18.3
16 bit	Low	Rolling	6	7.4
16 bit	Low	Global	15	6.9
18 bit	HDR	Rolling	1.5	2.9

COSMOS-8k SPEED TABLE

Frame Rates (frames per second)

Region of interest size (pixels)	14 bit (rolling and global shutter	16 bit (rolling shutter)	16 bit (global shutter)	18 bit (HDR)
8120 x 8120	18.3	7.4	6.2	2.9
4096 x 4096	36	15	12	6
2048 x 2048	73	29	25	11
1600 x 1600	93	38	31	15
1024 x 1024	144	59	49	23
512 x 512	288	115	96	45
256 x 256	572	224	189	88

DIMENSIONAL OUTLINES (Unit: mm)

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