



Space and Astronomy Camera Solutions

Raptor Photonics is a leader in innovative, ultra-compact and performance driven camera solutions.

SPACE AND ASTRONOMY 2019

Overview

Raptor is a leading player in the design and development of cameras for space, optical astronomy and adaptive optics applications. With access to some of the most sensitive sensors in the world we have developed a range of standard “off the shelf” and custom designs offering different features and benefits in terms of resolution, speed, sensitivity, cooling, wavelength optimisation, exposure and triggering all packaged into our small and ruggedly designed cameras.

Raptor has cameras on ground-based stations, low orbit satellites and even in deep space that are being used in imaging, spectroscopy, hyperspectral and x-rap applications.

Deep Sky and Exoplanets

Transit Exoplanet Detection, Wide Field Spectroscopic Surveys, Radial Velocimetry & other techniques for exoplanet discovery.

Image of Messier 42



Courtesy of Michel Boër and Alain Klotz



Camera	Sensor Format	Wavelength (nm)	Peak QE	Resolution (Pixels)
Eagle	CCD	180-1100	90%	2048 x 2048
Falcon III	EMCCD	180-1100	95%	1024 x 1024
Ninox 640	InGaAs VIS-SwWIR	400-1700	85%	640 x 512
Ninox 1280	InGaAs VIS-SwWIR	400-1700	85%	1280 x 1024
Ninox Ultra	InGaAs SWIR	900-1700	>77%	640 x 512
Night Owl	InGaAs VIS-SWIR	400-1700	85%	640 x 512

For further details visit raptorphotonics.com

The Eagle CCD is a deep cooled back-illuminated 4MP sensor and is being used on a number of ground based stations. It provides one of the best combinations of low noise and dark current enabling long exposures.

Images of Orion Nebula

VIS



VIS SWIR



SWIR ONLY



Courtesy of Alain Klotz

Courtesy of Lyu Abe



The Owl 640 was used to image nebula in VIS, VIS-SWIR and SWIR only. It is particularly useful for H-Band (1.625um) and J-Band (1.22um) imaging.

Low Earth Orbit Satellites - CubeSats

With the growth of CubeSats, both for Free Space Optical Communication and Low Earth Orbit Observation and Imaging applications, Raptor can offer core camera modules for both visible and SWIR bands. In fact, Raptor is already proven, having been involved in several missions to date, using custom SWIR and VIS-SWIR modules, designed for SWaP and built to MilSpec standards.



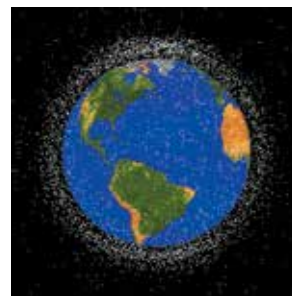
Raptor develops cores based on InGaAs sensors with custom variants.

Products

Resolution (lines)	Pixel Size (µm)	Frame Rate (Hz)	Cooling (°C)	Read Noise (e-)	Dark Current (e/p/s)
48	13.5x13.5	0.42	-90	2.3	0.0001
24	10x10	34	-90	<1	0.0002
2	15x15	120	-15	<37	<1,500
24	10x10	60	-15	47	<1,500
2	15x15	100	-85	30	<100
2	15x15	120	Stabilised	18	<28,000

Space Debris Tracking and Near-Earth Objects (NEO) – All Sky

With the abundance of space waste from the mass of defunct, artificially created objects in space, especially Earth orbit, projects are being designed to identify and capture waste. High dynamic range imaging suitable for tracking fast occurring events such as falling asteroids or space debris require fast and sensitive cameras. Only EMCCDs are capable of achieving fast frame rates while maintaining good sensitivity levels thanks to the embedded on-chip Electron Multiplication (EM gain) which eliminates the readout noise.

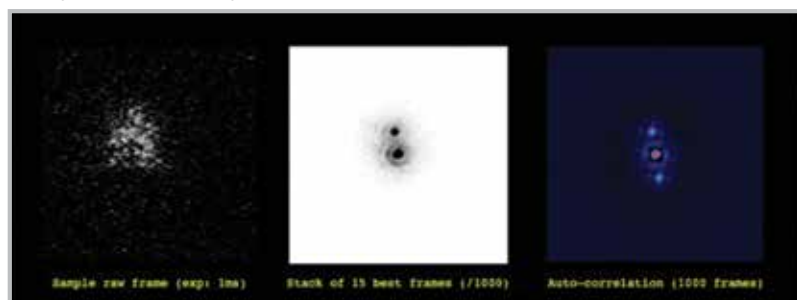


The Falcon III EMCCD offers single photon sensitivity couple with speed and resolution.

Adaptive Optics

High speed, low latency solutions for wavefront detection, Double Stars, Occultations and Interferometry.

Washington Double Star Catalog



Courtesy of Jocelyn Sérot

The OWL 320 High Speed offering SWIR coverage from 900-1700nm at 347 fps.

OEM Accreditations

Raptor's core business is targeted at the OEM market. Since our inception in 2006 we have focused on building our credentials / capabilities to meet our OEM customer needs. These include:

- Operating a quality management system, the company fully complies with the requirements of BS EN ISO 9001:2015
- Accustomed to designing to MilSpec standards including MIL-STD-810F and MIL-STD-704F
- RMAs of less than 2% – we deliver quality products
- Workmanship to class IPCa610
- ESD Compliant
- RoHS Compliant

We have also introduced our Raptor Certified Supply Chain to ensure that our suppliers conform to best practice guidelines e.g. Counterfeit goods inspections.

OEM and Custom Options

Raptor offers a range of custom options for OEMs and customers with high-end projects. This includes optical, electronic, mechanical layout and interface. Contact us to discuss your requirements in more detail.



A custom SWIR based core



OEM Spectroscopy CCD



OEM Board level CCD design

Customer Support

Understanding your instrumentation solutions, your product roadmap and your business model will enable us to offer you the best camera solution. We would be delighted to hear from you.

For further information, datasheets or to schedule a demo of any of our cameras please refer to our website, contact your local distributor or reach out to us directly:

Raptor Key Facts

- **Established 2006.**
- **Made in the UK.**
- **Onshore US sales and technical support.**
- **Complete Turnkey manufacturing.**
- **Strong Financial Performance - Year on Year Growth.**
- **Operating in four key markets; Surveillance, Scientific, Industrial and Space.**
- **Compatible with XCAP software, Micromanager & Labview.**



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