



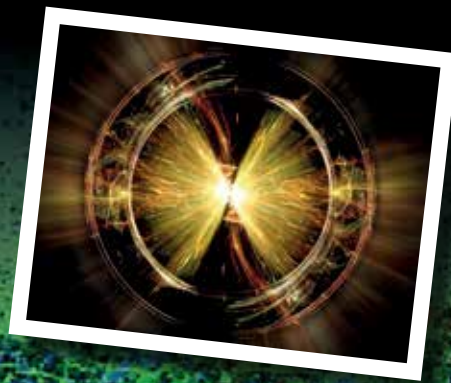
# Leaders in digital camera solutions

X-RAY



EMCCD


CCD

SWIR



SCIENTIFIC 2020

	SWIR	
	Owl 640	Ninox 640 Ultra
		
Sensor	InGaAs	InGaAs
Sensor Type	2/3" InGaAs	2/3" InGaAs
Sensor Size	0.32MP	0.32MP
Array Size (pixels)	640 x 512	640 x 512
Pixel Pitch (µm)	15 x 15	15 x 15
Active Area (mm)	9.6 x 7.68	9.6 x 7.68
Full Well Depth LG = Low Gain HG = High Gain	LG: 120ke- HG: 43ke-	LG: 1.4Me- HG: 43ke-
Digitization (bits)	14	16
Typical Readout Noise (RMS) LG = Low Gain HG = High Gain	HG: <30e-	LG: <390e- HG: <30e-
Max. Full Resolution Frame Rate (Hz)	300	100
Peak Quantum Efficiency	80% @ 1.5µm	80% @ 1.5µm
Spectral Response (nm)	900 - 1700	900 - 1700
TE Cooling	Active	-80°C
Typical Dark Current (e/p/s)	<60,000	<100
Dynamic Range (Typical Value) LG = Low Gain HG = High Gain	HG: 63dB	LG: 71dB HG: 63dB
Lens Mount	C mount	C mount
Dimensions (mm)	75 x 50 x 50	129 x 112 x 94
Weight (g)	250	<1.5k

	VIS-SWIR							
	Owl 320 High Speed	Owl 640 Mini	Owl 640	Night Owl 640	Ninox 640	Owl 1280	Ninox 1280	
								
Sensor	InGaAs	InGaAs	InGaAs	InGaAs	InGaAs	InGaAs	InGaAs	
Sensor Type	2/3" InGaAs	2/3" InGaAs	2/3" InGaAs	2/3" InGaAs	2/3" InGaAs	1" InGaAs	1" InGaAs	
Sensor Size	0.08MP	0.32MP	0.32MP	0.32MP	0.32MP	1.3MP	1.3MP	
Array Size (pixels)	320 x 256	640 x 512	640 x 512	640 x 512	640 x 512	1280 x 1024	1280 x 1024	
Pixel Pitch (µm)	30 x 30	15 x 15	15 x 15	15 x 15	15 x 15	10 x 10	10 x 10	
Active Area (mm)	9.6 x 7.68	9.6 x 7.68	9.6 x 7.68	9.6 x 7.68	9.6 x 7.68	12.8 x 10.24	12.8 x 10.24	
Full Well Depth LG = Low Gain HG = High Gain	HG: 170ke-	LG: 650ke- HG: 9ke-	LG: 650ke- HG: 10ke-	LG: 650ke- HG: 10ke-	LG: 650ke- HG: 10ke-	LG: 450ke- HG: 10ke-	LG: 450ke- HG: 10ke-	
Digitization (bits)	14	14	14	14	14	12	12	
Typical Readout Noise (RMS) LG = Low Gain HG = High Gain	HG: 202e-	LG: 174e- HG: 38e-	LG: 174e- HG: 36e-	LG: 150e- HG: 16e-	LG: 150e- HG: 16e-	LG: 160e- HG: 47e-	LG: 160e- HG: 47e-	
Max. Full Resolution Frame Rate (Hz)	349	120	120	120	120	60	60	
Peak Quantum Efficiency	>90% @ 1.3µm	>90% @ 1.3µm	>90% @ 1.3µm	>90% @ 1.3µm	>90% @ 1.3µm	>90% @ 1.3µm	>90% @ 1.3µm	
Spectral Response (nm)	400 - 1700	400 - 1700	400 - 1700	400 - 1700	400 - 1700	400 - 1700	400 - 1700	
TE Cooling	Active	None	Active	Active	Active	Active	Active	
Typical Dark Current (e/p/s)	<200,000	Unspecified	<28,000	<28,000	<1,500	<19,000	<2,000	
Dynamic Range (Typical Value) LG = Low Gain HG = High Gain	HG: 59dB	LG: 72dB HG: 49dB	LG: 71dB HG: 49dB	LG: 73dB HG: 56dB	LG: 73dB HG: 56dB	LG: 69dB HG: 47dB	LG: 69dB HG: 47dB	
Lens Mount	C mount	C mount	C mount	C mount	C mount	C mount	C mount	
Dimensions (mm)	75 x 50 x 50	62 x 42 x 42	91 x 50 x 50	91 x 50 x 50	87 x 79 x 79	68 x 50 x 50	87 x 79 x 79	
Weight (g)	250	170	282	250	550	247	550	

All specifications are typical and correct at time of print. More detailed specifications can be found in datasheets for each product on [www.raptorphotronics.com](http://www.raptorphotronics.com). All standard cameras are monochrome and use Camera Link digital output. For custom options please contact us directly.

## SWIR Technology Overview

The infrared (IR) part of the spectrum is defined as electromagnetic radiation with wavelengths longer than visible light but shorter than radio waves. Short Wave Infrared Radiation can only be detected by dedicated sensors, such as InGaAs. Although light in the shortwave infrared region is not visible to the eye, this light interacts with objects in a similar manner as visible wavelengths. Therefore, images from an InGaAs camera are comparable to visible images in resolution and detail.

### Features and Benefits

Raptor leads the way in SWIR camera design offering a range of sensors, cooling options and firmware enhancements making our cameras some of the most sensitive on the market for surveillance, scientific and industrial applications. Our cameras are compact, rugged and very reliable. As well as "off the shelf" cameras, we offer OEM solutions as well.

## Applications

- Telecommunications
- Space applications, environment
- Transportation
- Medical – imaging through tissues / rare earth nanoparticles
- Industrial process monitoring
- Non destructive testing
- Instrumentation

## VIS-SWIR Technology Overview

Using a back thinned InGaAs sensor enables both the visible and short-wave infra-red spectrum to be viewed simultaneously from 400nm-1700nm, essentially replacing the need for two cameras. Raptor offers a range of VIS-SWIR sensors with different resolutions, pixel pitches and cooling options.

### Features and Benefits

Raptor leads the way in VIS-SWIR camera design offering a range of sensors, cooling options and firmware enhancements making our cameras some of the most sensitive on the market for surveillance, scientific and industrial applications. Our cameras are compact, rugged and very reliable. As well as "off the shelf" cameras, we offer OEM solutions as well.

## Applications

- Telecommunications
- Space applications, environment
- Transportation
- Medical – imaging through tissues / rare earth nanoparticles
- Industrial process monitoring
- Non destructive testing
- Instrumentation

	UV, VIS, NIR				
	Falcon III	Kestrel	Hawk 252	Eagle 42-40	Eagle 47-10
					
Sensor	CCD-351	CCD-60	CCD-252	CCD42-40	CCD47-40
Sensor Type	1/2" EMCCD	1/2" EMCCD	1/2" EMCCD	Front and Back illuminated	
Sensor size	1MP	0.16MP	1.3MP	4MP	1MP
Array Size (pixels)	1024 x 1024	128 x 128	1280 x 1024	2048 x 2048	1024 x 1024
Pixel Pitch (µm)	10 x 10	24 x 24	8 x 8	13.5 x 13.5	13 x 13
Active Area (mm)	10.2 x 10.2	3.1 x 3.1	10.24 x 8.19	27.65 x 27.65	13.3 x 13.3
Full Well Capacity	35ke-	160ke-	20ke-	100ke-	100ke-
Shift Register Well Depth	200ke-	800ke-	120ke-	150ke-	150ke-
Digitization (bit)	16	16	12	16	16
Typical Readout Noise (RMS)	EM Gain ON: <1e- EM Gain OFF: <50e-	EM Gain ON: <1e- EM Gain OFF: <60e-	EM Gain ON: <0.01e- EM Gain OFF: <60e-	2.3e- @ 75kHz 9.0e- @ 2MHz	2.3e- @ 75kHz 9.0e- @ 2MHz
Max. Full Resolution Frame Rate (Hz)	31	500	25 / 30	0.42	1.45
Peak Quantum Efficiency	95% @ 575nm	95% @ 600nm	95% @ 600nm	>90% @ 550nm	>90% @ 550nm
Spectral Response (nm)	300 - 1100	300 - 1100	300 - 1100	300 - 1100	
TE Cooling	-70°C	-20°C	15°C	-90°C	-90°C
Typical Dark Current (e/p/s)	0.001	0.001	TBC	<0.0001	<0.0001
Typical Dynamic Range (dB)	91	>90	>90	93	93
Lens Mount	C mount	C mount	C mount	F mount	F mount
Dimensions (mm)	121 x 140 x 113	129 x 112 x 94	73 x 62 x 62	155 x 141 x 110	155 x 141 x 110
Weight	<1.5kg	<1.5kg	350g	3.0kg	3.0kg

## UV-VIS-NIR Technology Overview

An EMCCD is an Electron Multiplying Charge Coupled Device. (Also referred to as an L3CCD or an Impactron CCD). In an ordinary CCD device light incident on the device is converted to electrons through photonic processes. EMCCDs employ a unique architecture that enables the device to greatly multiply (>1000 times) the number of resulting electrons produced by the incident light. This feature gives the EMCCD a far superior advantage over existing CCD technology in low light conditions.

## Features and Benefits

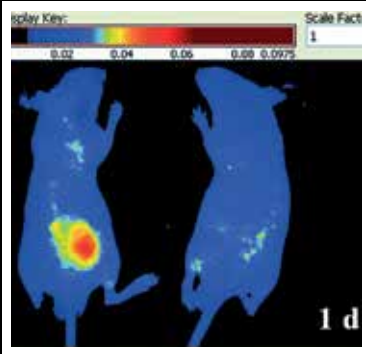
Raptor Photonics offers a range of cameras for the detection of photons and high energy particles. Using high performance CCD and EMCCD sensors, photon (or particle) energies from 1.2eV up to 20keV can be detected directly within the silicon. Higher energies are detected indirectly, by coupling a phosphor or scintillator screen onto the CCD sensor.

## Applications

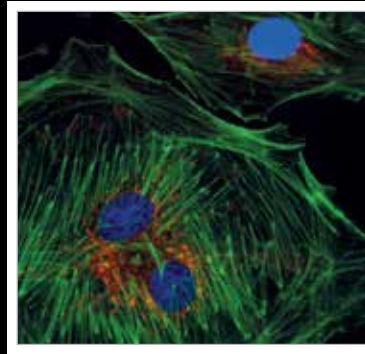
- Adaptive Optics and Astronomy
- Calcium signaling
- Fluorescence imaging / spectroscopy
- Flow cytometry
- FRET / FRAP / TIRF
- Genome sequencing
- High content screening
- High resolution fluorescence imaging
- Hyperspectral imaging
- Live Cell Imaging
- Single molecule detection
- Solar Cell Inspection
- X-ray tomography

Please consult with our X-ray & High-Energy brochure to see our full range of open-front and in-vacuum cameras and detectors.

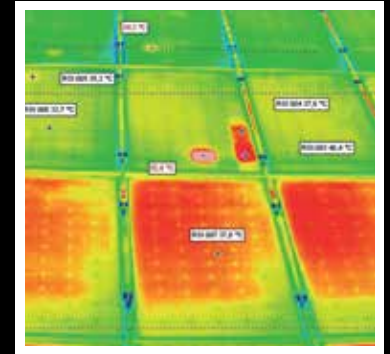
# Applications



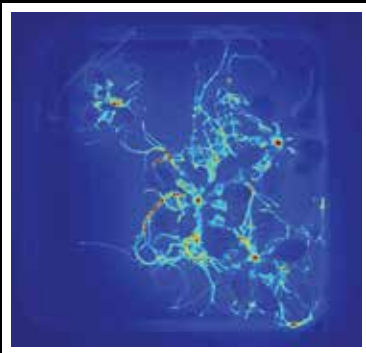
In-Vivo Fluorescence Imaging



Live Cell Imaging



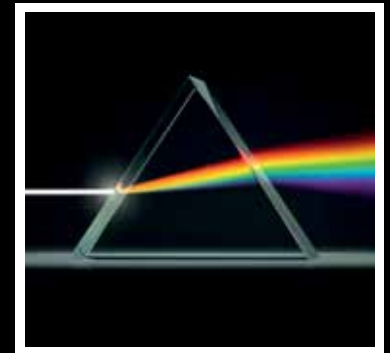
Solar Cell Inspection



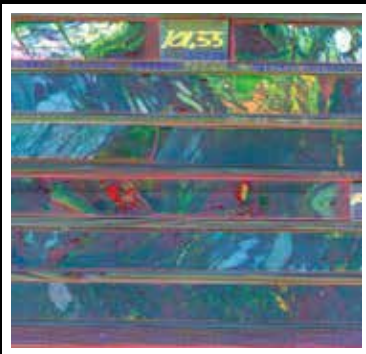
Chemiluminescence



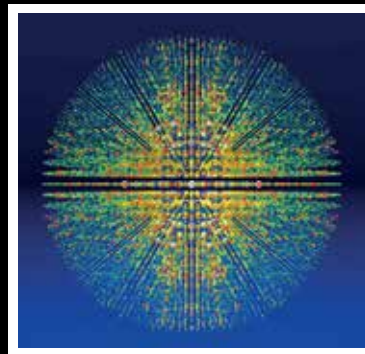
Astronomy



Spectroscopy



Hyperspectral Imaging



X-Ray Diffraction



Earth Observation (CubeSat)

# Software

Raptor designs and builds cameras, but we understand that we also need to deliver solutions that integrate with relevant software for the capture and analysis of images. We have developed drivers to enable users to control the camera for the following software platforms:



- **EPIX XCAP / XCLIB** – This is the software provided by Epix Inc., a US based manufacturer of CameraLink cards. <http://www.epixinc.com/>



- **MicroManger** – a complete image acquisition and microscope control package that runs as a plugin to ImageJ. It is an open-source platform (<https://micro-manager.org/>)



- **Labview / C++** - Raptor provides a range of .ICD files to enable customers to write their own software

For any questions on software or for any support issues, please contact [sales@raptrophotonics.com](mailto:sales@raptrophotonics.com)

## 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.

## 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 three key markets; Surveillance, Scientific and Aerospace.**
- **Compatible with XCAP software, Micromanager & Labview.**

## 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 selection of custom Raptor X-Ray cameras both Open Front and In-vacuum*

*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:



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