PHOTONIC SCIENCE

SWIR Range

Cooled VGA SWIR InGaAs Cameras



High performance SWIR imaging

The compact, high-performance range of cooled SWIR and vis-SWIR cameras from Photonic Science, are ideal for a wide range of applications.

Short Wave Infrared (SWIR) is typically defined as being in the wavelength range 900 nm to 1700 nm; with some definitions going up to 2500 nm; and vis-SWIR covering an extended range from 600 nm to 1700 nm.

SWIR imaging is a widely used technique in many areas of scientific, medical, industrial inspection and surveillance applications. Imaging in the SWIR region has advantages in that it interacts with materials differently to visible wavelengths with reduced scattering eg. penetrating through smoke or haze, different spectral characteristics allowing differentiations of materials, particularly plastics for recycling applications. These features have found many applications where details can be “uncovered” imaging in the SWIR region compared to the visible.

Photonic Science SWIR cameras are widely used for biological and medical research applications requiring high resolution images of *in vivo* structures. This technique makes use of the improved penetration of NIR through soft tissue with reduced scattering (NIR-I and NIR-II windows) as well as the water transparency window (800 nm – 1400 nm).

Key Features

- High dynamic range
  14-bit digitization / 16-bit image processing
- Low read out noise
  <35 electrons
- High speed @ 174 fps full frame
  7,200 fps with region of interest ROI
- Excellent linearity response
- Air and water cooled options
- Long exposures - Ultra low dark noise
- Software option - SDK kit, PS Viewer

Applications

- Surveillance
- Spectroscopy
- Hyper spectral imaging
- Astronomy
- Solar cell inspection
- Airborne payload
- Crop inspection
- Semiconductor inspection
- Laser beam profiling
- Medical & biology research
- Photoluminescence
- Art conservation

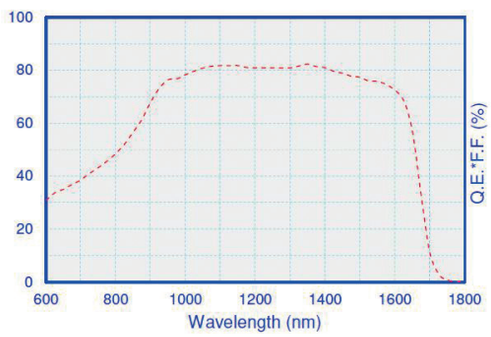
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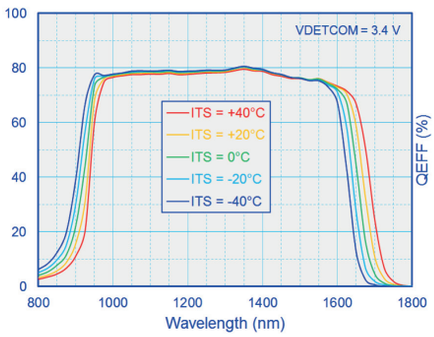
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Cooled VGA SWIR InGaAs Camera Range

Characteristics	Vis-SWIR	SWIR
Spectral Range	600 nm - 1700 nm	900 nm - 1700 nm
Resolution	640 x 512	640 x 512
Sensor Size	9.6 mm x 7.68 mm	9.6 mm x 7.68 mm
Frame Rate	174 fps at full VGA resolution 570 fps at ¼ VGA resolution 7,200 fps at 640x4 resolution (spectroscopy or line mode)	
Pixel Size	15 µm x 15 µm	15 µm x 15 µm
Full Well Capacity (typical)	24k electrons (high gain mode) 100k electrons (mid gain mode) 1.2M electrons (low gain mode)	
Read Out Noise (typical)	34 electrons (high gain mode) 64 electrons (mid gain mode) 600 electrons (low gain mode)	33 electrons (high gain mode) 64 electrons (mid gain mode) 600 electrons (low gain mode)
Reading Mode	Integrate then read, Integrate while read	
Dark Current (typical)	0.2 fA with air cooling 0.05 fA with water cooling	0.2 fA with air cooling 0.05 fA with water cooling
Sensor Temperature	-20°C with air cooling, -50°C with water cooling	
Corrections	Non uniformity, bright pixel, gain, offset, flatfield	
Bit Depth	14-bit with 16-bit digital processing	
Exposure Range	30 microseconds to > 1 minute	
QE	78% @ 1500 nm	80% @ 1500 nm



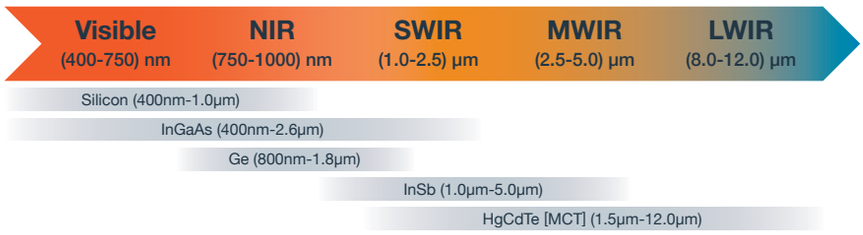
Quantum efficiency response of Cooled Vis-SWIR InGaAs camera



Quantum efficiency response of Cooled SWIR InGaAs camera

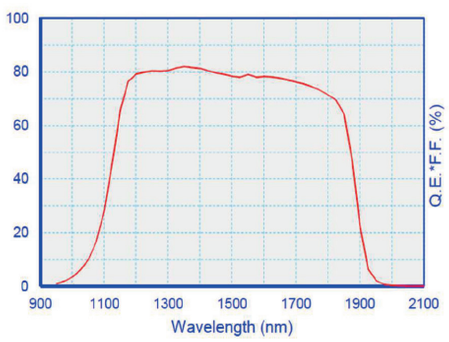
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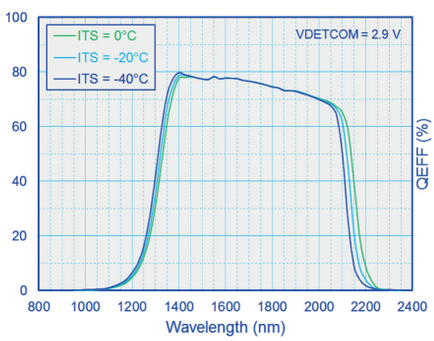




Characteristics	SWIR XT	SWIR XT+
Spectral Range	1000 nm - 1900 nm	1100 nm - 2200 nm
Resolution	640 x 512	640 x 512
Sensor Size	9.6 mm x 7.68 mm	9.6 mm x 7.68 mm
Frame Rate	174 fps at full VGA resolution 570 fps at ¼ VGA resolution 7,200 fps at 640x4 resolution (spectroscopy or line mode)	
Pixel Size	15 µm x 15 µm	15 µm x 15 µm
Full Well Capacity (typical)	20k electrons (high gain mode) 80k electrons (mid gain mode) 1.0M electrons (low gain mode)	
Read Out Noise (typical)	40 electrons (high gain mode) 70 electrons (mid gain mode) 500 electrons (low gain mode)	40 electrons (high gain mode) 70 electrons (mid gain mode) 500 electrons (low gain mode)
Reading Mode	Integrate then read, Integrate while read	
Dark Current (typical)	1 fA with air cooling 0.3 fA with water cooling	70 fA with air cooling 30 fA with water cooling
Sensor Temperature	-30°C with air cooling, -50°C with water cooling	
Corrections	Non uniformity, bright pixel, gain, offset, flatfield	
Bit Depth	14-bit with 16-bit digital processing	
Exposure Range	30 microseconds to > 100 msec	
QE	80% @ 1500 nm	80% @ 1400 nm, 70% @ 2050 nm



Quantum efficiency response of Cooled SWIR XT InGaAs camera



Quantum efficiency response of Cooled SWIR XT+ InGaAs camera

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Custom Design

Photonic Science has over 35 years experience in designing innovative high sensitivity low noise imaging solutions for OEMs. Our technology is based around cooled CCD, Intensified CCD/CMOS cameras and more recently InGaAs & sCMOS cameras.

The Photonic Science 1,000 square metre facility at St Leonards, East Sussex site contains manufacturing, production, clean room, environmental / X-ray testing and research facilities.

We deliver cost effective, innovative camera solutions with selected components from concept, prototyping to volume manufacturing for OEMs including complete turnkey solutions involving cameras / illumination source / optics / environmental housing and software.

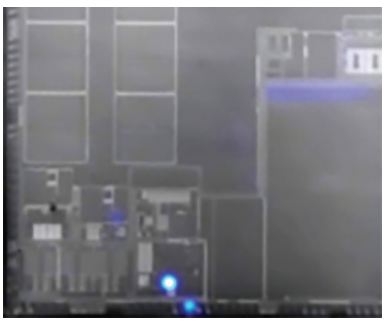
The engineering team at PSEL have many years' experience in customising standard camera designs to suit the specific requirements of individual customers and OEMs. **Contact us to find out more about our custom design and OEM services.**

Quality Assurance

Quality and continuous improvement is at the heart of everything we do at Photonic Science, to ensure we deliver on-spec systems every time.

Photonic Science is an ISO9001:2015 qualified company and as standard we provide a 12 month warranty on all our products, with warranty extensions available on request.

Photonic Science also provide after sales support for the lifetime of our products; including beyond warranty maintenance and repairs service, and advice on upgrades to newer R&D solutions from our experts.



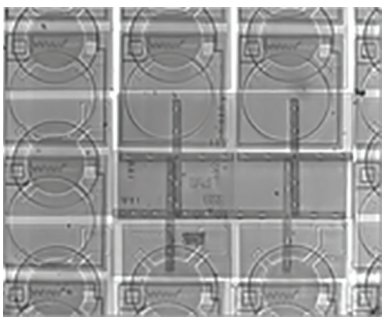
Photoemission microscopy



SWIR camera image



Visible camera image



Transmission infrared microscopy



SWIR camera image



Visible camera image

Please Note: All specifications in this document are typical and subject to change without notice.

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Product selection, configuration & integration support

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