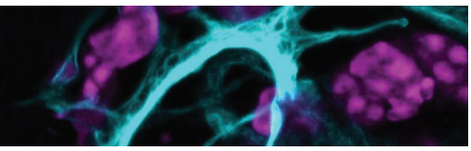
TELEDYNE

Teledyne Judson Technologies

SCION SWIR CAMERAS



KEY FEATURES

- Built with long-life vacuum chamber and high-reliability thermoelectric cooling for worry-free and consistent operation, year after year
- Built-in F/1.4 cold shield cuts down on background signal
- Teledyne provided custom cold shield and filters options available
- Choice of full camera or OEM model with sensor and proximity boards
- Multiple regions of interest can be read out, allowing you to focus on the data that matters
- Offering "Sample-Up-The-Ramp" (SUPR) for low noise at low signal conditions

TYPICAL APPLICATIONS

- Hyperspectral imaging
- Chemical sensing
- Scientific research
- Medical imaging
- Silicon inspection

The Latest SWIR Camera from Teledyne

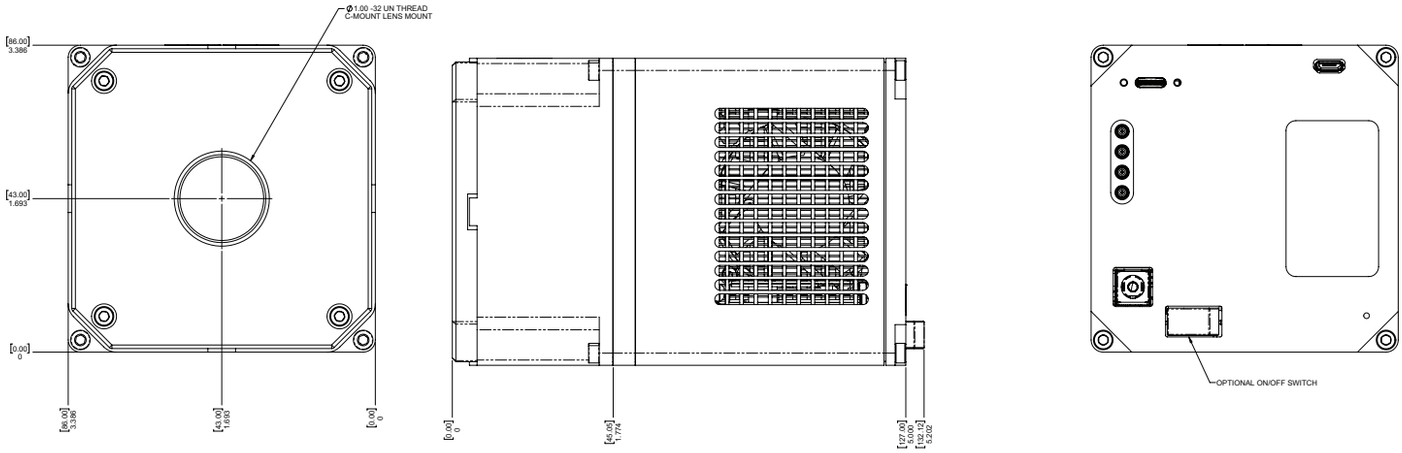
From The World's Leading Manufacturer of Sensors, Camera Modules, Data Software, and Optics

The SCION SWIR camera from Teledyne delivers exceptional performance from 0.4 to 1.7 µm visible and short-wavelength infrared imaging. Featuring an advanced VISGaAs sensor and thermoelectric cooling this camera offers reduced noise and improved temperature stability, ensuring higher quality and more reliable imaging. Teledyne LightField® software provides complete control enabling easy capture, analysis, and processing of high-quality images and spectra.

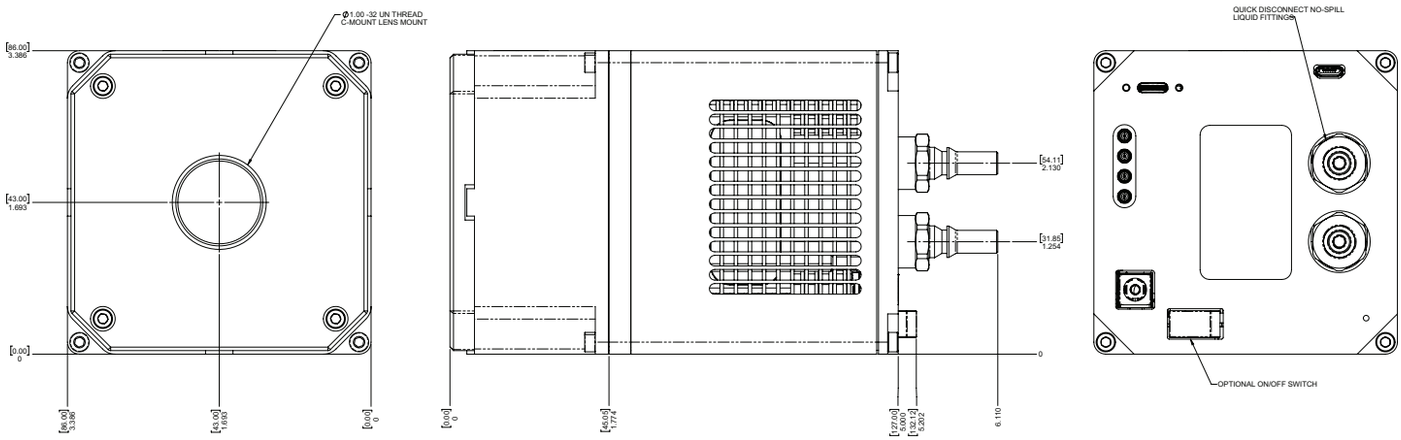
Specifications	Performance
Format	640 x 512 or 1280 x 1024
Pixel Size	10 µm
Sensor Material	VISGaAs
Wavelength Range	0.4 - 1.7
Qe_peak	85%
Frame rate, maximum full frame	700 Hz (175 Hz for 1280 x 1024)
Cooling	-55°C air, -65°C water
Cooling Method	Thermoelectric cooling
Read Noise (e^-, high gain)	< 30
Full Well (e^-, low gain)	1 M
Dark current (e^-/p/sec), Air Cooling	Target < 60
Shutter	Global, Rolling
Sample Modes	ITR, IWR, Sample-Up-The-Ramp (SUPR)
Cold Shield	f/1.4, optional cold filter
Data Interface	CameraLink, USB3
NUC	Yes
Camera Dimensions (maximum)	Camera: 86 x 86 x 127 mm (H x W x D)
Aquisition Software	LightField®, SDK and API for Windows and Linux

SCION DIMENSIONAL OUTLINES (Unit: mm)

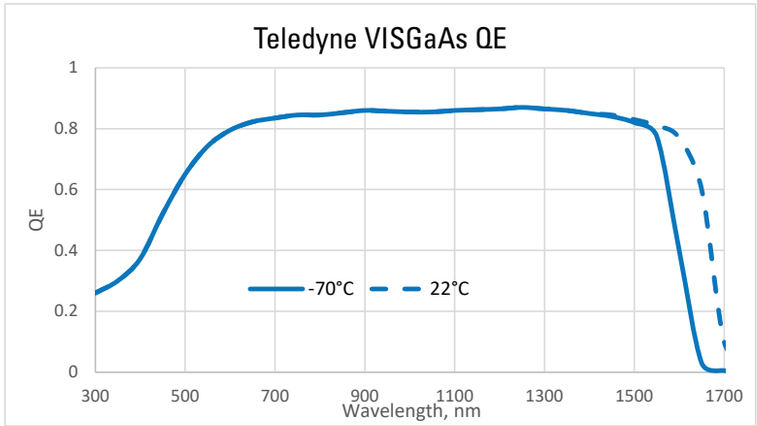
Air cooled Camera



Water cooled Camera



SCION QE CURVE

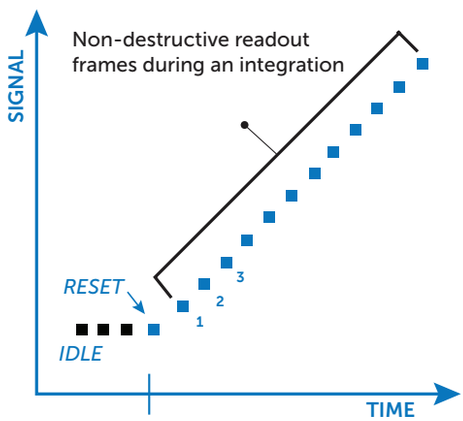


"Sample-Up-The-Ramp" (SUPR) and Non-Destructive Readout (NDR)

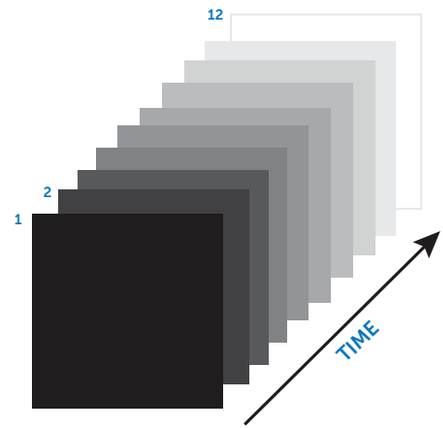
In SUTR mode, each pixel is read multiple times during a single integration without resetting the accumulated charge. This non-destructive readout preserves the signal while providing several key advantages for high-precision imaging:

- **Extended Dynamic Range:** Multiple reads capture signal before saturation, allowing accurate measurements even for bright sources.
- **Cosmic Ray and Noise Mitigation:** Intermediate reads help identify and correct artifacts such as cosmic ray hits and Random Telegraph Noise (RTN).
- **Lower Effective Read Noise:** Fitting a slope to multiple samples reduces noise by approximately the square root of the number of reads.
- **Rich Data for Analysis:** Each read is stored as a slice in a 3D datacube, enabling advanced processing techniques like slope fitting and artifact correction.

Integration timeline and datacube structure

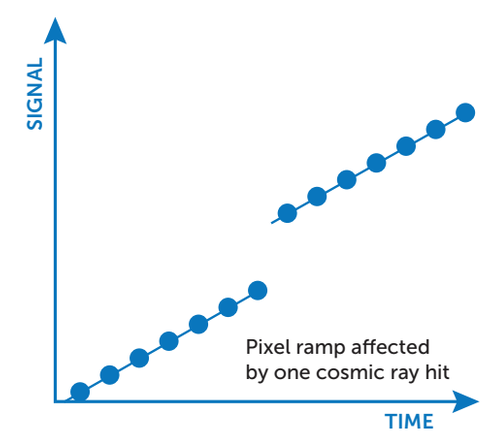


Non-destructive readouts during a single integration are shown as incremental signal measurements over time, starting from reset and idle states.

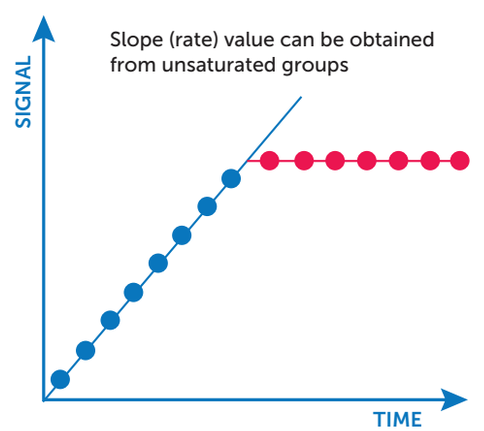


Each read is stored as a slice in a 3D datacube, enabling time sequenced data analysis for slope fitting and artifact correction.

Pixel ramp behaviors during integration



A cosmic ray hit introduces a sudden signal increase, dividing the ramp into two segments.



A pixel ramp reaching saturation; only unsaturated points (blue) are used to estimate the signal accumulation rate, while saturated points (red) are excluded. Each point represents a readout group.

SWIR Sensors and Cameras for Highly Challenging Applications

Teledyne has a rich heritage in providing SWIR sensors and cameras for challenging applications. The SWIR region of the infrared spectrum offers higher resolution and stronger contrast, enhancing detection capabilities across various industries. Photovoltaic and semiconductor inspection benefit from SWIR imagers, which can see through silicon. In life sciences SWIR technology has proven value observing *invivo* biological processes and improving diagnostic applications by reducing background noise.

Semiconductor & Photovoltaic

SWIR imaging enables wafer inspection and defect detection with exceptional clarity. It also supports through-silicon imaging for advanced packaging and quality control in high-volume semiconductor and photovoltaic manufacturing.

Life Sciences

SWIR technology improves imaging of tissue and blood flow, providing deeper penetration and reduced scattering. It also enhances fluorescence imaging with lower tissue background, supporting advanced molecular studies and non-invasive diagnostics.

Industrial

SWIR cameras deliver reliable process monitoring in harsh environments and ensure quality control for glass, plastics, and composite materials. They are ideal for high-temperature inspection where visible cameras fall short.

Defense & Security

SWIR sensors enable covert imaging and surveillance in low-light or obscured conditions. They improve target identification and situational awareness through smoke, haze, and camouflage without relying on active illumination.

Agriculture & Food

SWIR imaging detects moisture content and monitors crop health with precision. It also supports food quality inspection by revealing characteristics invisible to visible light, ensuring better yield prediction and product integrity.

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