



SWIR InGaAs Detectors



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Aligned with our **"ALWAYS A STEP AHEAD"** strategy, SCD was among the pioneers to recognize the advantages of multi-functionality within the SWIR spectral range. Since the initial development of SWIR infrared detectors, SCD has secured a substantial market share by implementing advanced solutions tailored to customer needs. These solutions are grounded in our expertise with leading InGaAs material and sophisticated ROIC design capabilities.

The SWIR spectral range offers distinctive benefits over other spectral bands, providing a competitive edge in both defense and commercial applications.

Main benefits include:

- 1 Reflective and intuitive imagery versus thermal imagery
- 2 Superior atmospheric transparency for long-range imaging
- 3 Effective smoke and haze penetration, including imaging through glass windows
- 4 Support for high F-number (F#) systems due to lower diffraction compared to MWIR and LWIR systems
- 5 Low Size, Weight, and Power (SWaP) with high reliability sensors (no cryogenic cooler required)
- 6 Improved low-light-level (LLL) imaging attributable to the "night glow" effect
- 7 Laser Detection and Guiding Systems: SWIR sensors detect laser designators or guide weapons
- 8 Asynchronous Laser Pulse Detection (ALPD): Ability to detect and characterize laser sources up to 50kHz

Our InGaAs detectors have been integrated into an array of defense and commercial systems across the globe. From high-definition (HD) payloads to compact, low Size, Weight, and Power (SWaP) ground platforms, as well as diverse commercial uses, our technology is pervasive.

We are proud to provide our customers with superior SWIR detection capabilities, granting them the tactical advantage of being the **FIRST TO SEE**, irrespective of whether their focus is on military operations or commercial endeavors.



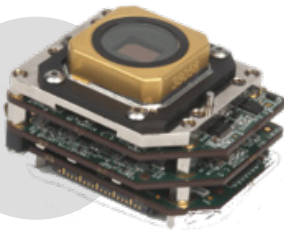
Cardinal 640

The Cardinal 640 stands as a well-established SWIR VGA 15µm detector, renowned for its exceptional performance. It offers high sensitivity and a high frame rate, while maintaining low power consumption and minimal floor noise, distinguishing it as one of the premier SWIR detectors available. Included with the detector is a Thermo Electric Cooler (TEC), which can be deployed to cool the Focal Plane Array (FPA) in low-light scenarios.

Equipped with Asynchronous Laser Pulse Detection (ALPD) and two-dimensional Laser Range Finder (TLRF) capabilities, the Cardinal 640 presents the optimal solution for advanced SWIR systems. With the Cardinal 640, SCD's customers are invariably equipped to be the first to detect and act.

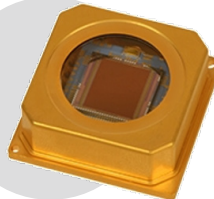
Main Features

- High frame rate with global shutter functionality
- Low-power camera link interface for efficient connectivity
- Low floor noise mode enabled by CTIA stage
- Special features include:
 - Two-dimensional Laser Range Finder (TLRF)
 - Asynchronous Laser Pulse Detection (ALPD)



Applications

- High quality daylight SWIR imaging
- Low light level imaging
- Active Imaging
- Hand Held goggles
- Airborne EVS
- Payloads
- Driving systems
- Non-Destructive testing





Format & pitch	640x512, 15µm	
Spectral range	0.6-1.7 (VIS-SWIR)	
Quantum efficiency	>80% at 1550nm	
Dark current	< 4.5 fA @ 283K	< 4.5 fA @ 283K
Operating modes and well capacity	High gain (for Low Light Level imaging) - 12Ke	High gain (for Low Light Level imaging) - 15Ke
	Medium gain (for high quality daylight imaging) - 0.6Me	Low gain (for high quality daylight imaging) - 0.3Me
	Low gain - 3Me	
	ALPD	Active imaging
Maximum FR at full window (low gain mode)	350 F/s @ 13 bit resolution Global Shutter	
Power dissipation (FPA)	~ 100mW @ 60 F/s	
Power dissipation (proxy)	< 1.7W @ 60Hz, 25c environment (without TEC)	
Size	30x23x30mm (elevated window w/o proxy) 30x20x30mm (w/o proxy)	51X45X61mm (with proxy)
Cooling capability	TEC	
Video output (proxy)	Camera Link interface	

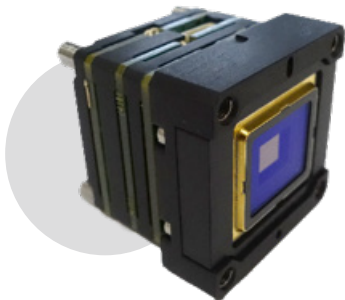


SWIFT 640

The SWIFT 640 is SCD's compact video module designed for low SWaP-C within the SWIR detector family. It is built on a 10 μ m VGA, a highly sensitive InGaAs detector, paired with a digital ROIC, all enclosed in a ceramic package with TEC. This module is also equipped with a proximity electronics board. The SWIFT 640 boasts specialized features that facilitate its integration into EO/IR systems for diverse applications, including high-quality long-range daylight SWIR imaging and low light level (LLL) imaging.

Main Features

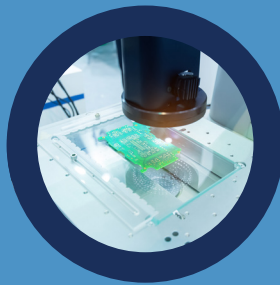
- Standard daylight imaging with dual gain levels.
- Enhanced performance in low light levels.
- Supports active imaging techniques.
- Features a low-power Base Camera Link interface for efficient data transfer.



Applications

- High quality long range daylight SWIR imaging
- Low light level imaging
- Active imaging
- Airborne EVS
- Airborne and ground payloads
- Driving Vision Enhancement (DVE)
- Non-Destructive Testing
- Covert surveillance with 24/7 day operation

Format & pitch	640x512, 10μm
Spectral range	0.6-1.7 (VIS-SWIR)
Quantum efficiency	> 80% at 1550nm
Dark current	~ 1fA @ 280K
NEP	< 0.5fW @ High Gain, 27msec integration time
Modes of operation (typical well field and electronic noise)	High gain - 10Ke, 40e with CDS Medium gain - 500Ke, 170e (ALPD) Low gain - 1Me, 350e
Frame rate	25, 50 F/s
Power dissipation	< 1.7W @ 50Hz, 25c environment temperature (without TEC)
Cooling capability	TEC
Video output	Camera link
Size	34x33x34 mm
Weight	~ 100 gr



SWIFT-EI

The SWIFT-EI is the world's first SWIR detector to feature a state-of-the-art read-out integrated circuit (ROIC), enabling low size, weight, power, and cost (SWaP-C). It supports VGA image format for SWIR imaging, multi-spot ALPD (asynchronous laser pulse detection), and a rapid imaging frame rate of up to 1,600 frames per second.

The revolutionary ROIC introduces an independent neuromorphic imaging stream for event detection, which greatly expands capabilities in target detection and classification.

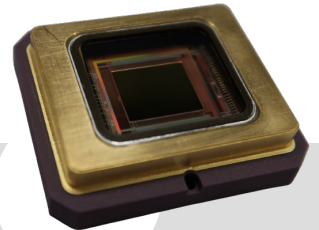
Ideal for cutting-edge, low SWaP-C applications, the SWIFT-EI can be integrated into a variety of air platforms, missiles, vehicles, and handheld devices, making it extraordinarily versatile. With SWIFT-EI, SCD's customers always have the advantage of being the FIRST TO SEE.

Main Features

- High frame rate standard imaging with a global shutter.
- High frame rate Low Light Level (LLL) imaging with a global shutter
- Dedicated channel for 3rd Generation Asynchronous Laser Pulse Detection (ALPD) up to 50KHz.
- Separate channel for Event Detection.
- Digital interface for streamlined connectivity.

Applications

- Multi spot detection (support of PRF decoding)
- Hostile Fire Indication (HFI)
- Fast sorting & screening
- Hyperspectral applications
- Robotics & machine vision
- Simultaneous Location and Mapping (SLAM)
- Situational awareness
- Platform stabilization



Format & pitch	640x512, 10µm @ SIM 320x256 with binning @ LNIM, ALPD, Event
Spectral range	0.6-1.7 (VIS-SWIR)
Quantum efficiency	> 80% at 1550nm
Dark current	~ 1fA @ 280K
Operation modes & maximum FR at full window	SIM only: 800 F/s @ 13 bit resolution 1600 F/s @ 11 bit resolution SIM with Detection: 200 F/s @ 13 bit resolution LNIM: 2000 F/s @ 11 bit resolution ALPD: 50KHz Event: 25KHz
Size	25x22x6.1 mm
FPA power dissipation	200mW-500mW operation mode dependent
Video output	4 lane JESD204B

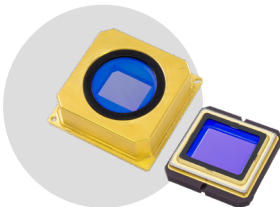


Cardinal 1280

The Cardinal 1280 is a high-definition SWIR InGaAs detector featuring a 10µm pixel pitch. This detector offers high resolution and sensitivity, enabling EO/IR systems to capitalize on the SWIR spectrum for low-light imaging and extremely long-range daytime surveillance, even in challenging weather conditions like smoke, dust, fog, or rain. It incorporates SCD's advanced Asynchronous Laser Pulse Detection (ALPD) technology. A Thermo Electric Cooler (TEC) is included for optimal performance of the Focal Plane Array (FPA) in low light level scenarios. SCD is committed to standing alongside our customers, ensuring they receive the finest solutions available.

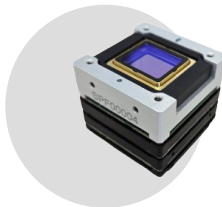
Main Features

- Standard daylight imaging with 2 gain levels
- Low light level with CTIA stage
- ALPD with 2x2 binning
- Active imaging
- Proximity electronics available



Applications

- High quality long range daylight SWIR imaging
- Low light level imaging
- Active imaging
- Laser "see-spot"
- Airborne EVS
- Airborne and ground payloads
- Driving Vision Enhancement (DVE)
- Non-destructive testing
- Covert surveillance with 24/7 day operation



	High-end solution metallic packaging	Wide distribution ceramic packaging
Format & pitch	1280x1024, 10µm	1280x1024, 10µm
Spectral range	0.6-1.7µm (VIS-SWIR)	0.6-1.7µm (VIS-SWIR)
Quantum efficiency	>80% at 1550nm	>80% at 1550nm
Dark current	~ 1fA @ 283K	~ 1fA @ 283K
Operating modes and well capacity	High gain - 10Ke Medium gain - 0.5Me Low Gain - 1Me ALPD - 2nd gen up to 1KHZ	High gain - 10Ke Medium gain - 0.5Me Low Gain - 1Me ALPD - 2nd gen up to 1KHz
Maximum FR at full window (low gain mode)	150 F/s @ 13 bit resolution global shutter	151 F/s @ 13 bit resolution global shutter
Size	43x45x43 mm (with proxy) 34x25x34 mm (w/o proxy) 34x22x34 mm (Low Window w/o proxy)	37x34x37 mm (with proxy) 25x11x26 mm (w/o proxy)
Cooling capability	Down to -10C @ 30C environment	Down to 0C @ 30C environment
Power dissipation (FPA)	~ 150mW @ 60 F/s	~ 150mW @ 60 F/s
Power dissipation (proxy)	2W (TEC disabled)	2W (TEC disabled)





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