



# SMALLEST THERMAL POLARIMETER



## About The Pyxis Family

Polaris' state-of-the-art optical systems vastly improve visualization for situational awareness, offering a far superior solution than any available in today's marketplace. The Pyxis imager is the industry's first to combine the power of polarization with standard thermal imaging at a mere fraction of the size, weight, power, and cost of existing polarization imagers. Long-Wave InfraRed (LWIR) thermal imagers are used in a variety of commercial and military applications, but often fall short in situations involving high clutter and low thermal contrast. This is when Pyxis prevails, improving detection, recognition, and identification.

## The Power of Polarization

Polarization adds range, increases contrast, improves specificity and provides details not delivered by standard thermal imaging alone. Polarization-based cameras outperform current systems by detecting contrast even when there is no thermal contrast. The addition of polarization to standard thermal exploits geometry and material composition to improve contrast and detail.

## Real-Time Data Collection and Analysis for Critical Awareness



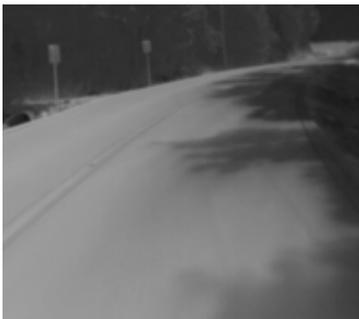
**Thermal**



**Polarization**

### Facial Recognition

Polarization enhanced thermal imaging analyzes facial features by sensing subtle changes in shape for a higher degree of identification accuracy. Works equally well in day and night conditions and does not require ambient or controlled lighting.



**Thermal**



**Polarization**

### Autonomous Vehicle Navigation

With polarization, it is easy to distinguish the roadway, obstacles, and other vehicles at a distance, even when thermal has low contrast or is misleading due to shadows. Daylight detail is revealed in low light and dark scenarios to aid in pathfinding and obstacle avoidance.



**Thermal**



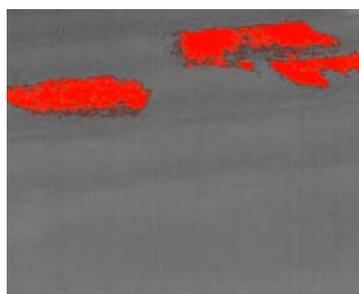
**Polarization**

### Target Detection

Polarization coupled with specialized software provides the detection of military vehicles and other threats that are hardly seen in thermal imagery while eliminating background clutter. Pyxis increases IR contrast for hard-to-detect objects including camouflaged and concealed threats.



**Thermal**



**eTherm**

### Oil on Water

Polarization provides the needed sensitivity for oil on water detection. Thermal plus polarization with a color overlay provides accurate discrimination and detection. The Pyxis is up to 400% more effective at detecting oil and other petrochemicals on water than the competing technology.

## Pyxis Greatly Improves Situational Awareness

The majority of security and surveillance activities must take place during both day and night. In the absence of ambient light, thermal imagers are most often the chosen solution. However, if all objects in the scene are approximately the same temperature, the thermal picture is essentially useless because the temperature of the target matches the surrounding dirt and scrub-brush. Man made objects virtually disappear in thermal. Pyxis, featuring Polarization, is especially effective when thermal contrast is low.



**Thermal**



**Polarization**

## Thermal + Polarization = Enhanced Thermal or eTherm®

Polaris uses eTherm to show the breadth of information available with polarimetric imaging. The gray scale conveys the underlying IR scene - IR is collected at the same time as polarization. The color in the eTherm image denotes the varying geometry that contributes to the polarization signature, while the saturation of the color indicates the magnitude of polarization. Hue, saturation, and value are all unique aspects of the data not available with the false color image that you're used to seeing from a regular IR camera.



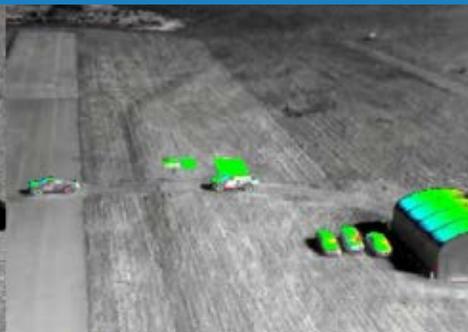
**Visible**



**Thermal**



**Polarization**



**eTherm**



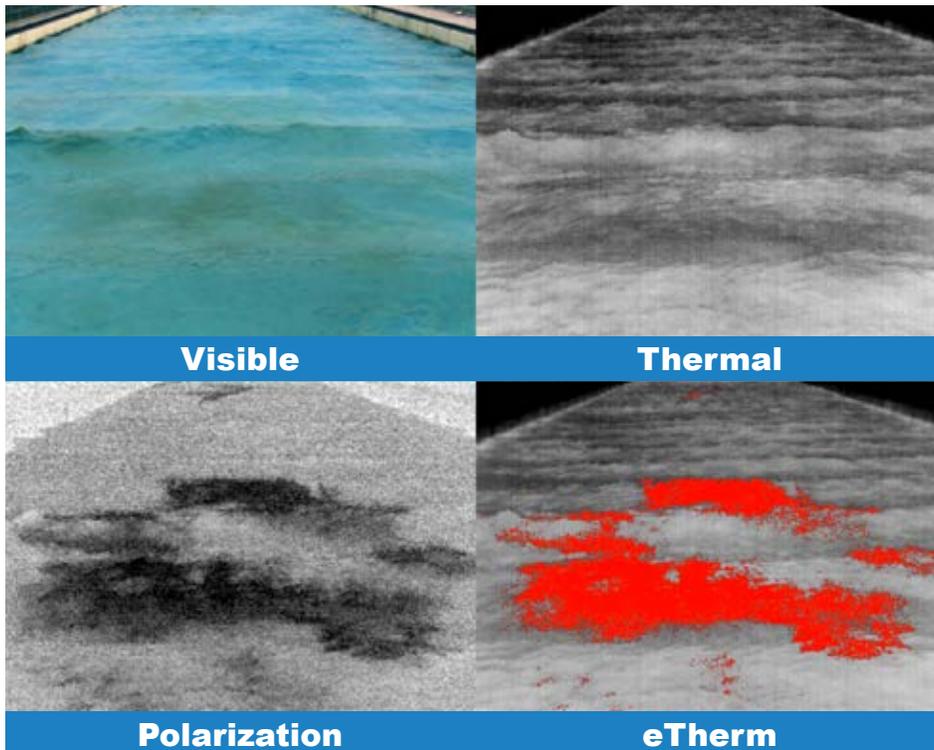
# OIL ON WATER DETECTION



## Pyxis LWIR 640

- Industry's smallest polarization enhanced thermal imager
- Up to 400% greater detail and contrast than standard thermal
- Real-time data display and analysis

## 400% GREATER DETECTION THAN THERMAL



Pyxis detects contaminants on water, outperforming conventional thermal 24/7, even in rough conditions. Detected contaminants to date include crude oil and diesel. Using the Pyxis Vision Science Software included, the oil appears red, which can be configured to set off automatic alarms when detected.

## REAL-TIME Seep and Leak Detection

- Up to 400% better identification of oil on water than thermal alone with no false alarms
- Distinguishes oil from seaweed and other debris
- Works both day and night
- Suitable for automated continuous monitoring, detection, and alarm
- Mitigates specularly reflected light (glint)

## Pyxis® Vision Science Software

- Real-time display of thermal polarization products and standard thermal video
- Data recording
- Region of interest calculations and plots
- Histogram, auto-scale, and color palette adjustments
- Image processing algorithms selection and adjustments
- File playback and data analysis
- Video and snapshot exporting
- System Requirements: Windows 7 or higher and 4GB memory.



Pyxis Vision Science software provides a colorful overlay by blending infrared and polarization images. A ruggedized version of the imager is also available for demanding environments with hand-held, tripod, drone, and gimbal mounting options.



**MOUNTING OPTIONS**  
oil rig • hand-held • drone

# Pyxis LWIR<sup>®</sup>



## Pyxis Models

Pyxis LWIR 640-A

Pyxis LWIR 640-GR

Pyxis LWIR 640-G

Detector	Uncooled VOx Microbolometer		
Operating Temperature	0°C-45°C		
Waveband	7.5µm-13.5µm		
Pixel Pitch	17µm		
Resolution (HxV)	640 x 512 pixels		
Standard Lens	20mm f/0.85 (others available)		
Field of View (Standard Lens)	30° x 25°		
Camera Frame Rate	30Hz or 7.5Hz		
Full Frame Pixel Operability	>99.9%		
NEDT @ f/0.85	<70mK		
NEDOLP @ f/0.85	<0.5%		
Input Voltage	5VDC		5VDC or ethernet (POE)
Size with Standard Lens (LxWxH)	2.65" x 1.75" x 1.79"	6.5" x 2.25" x 2.25"	3.46" x 1.83" x 1.83"
Weight with Standard Lens	4.9oz	12oz	6.5oz
Data Interface	NTSC/14-bit Camera Link	GigE	GigE and NTSC
Environmental	N/A	Designed to IP66	N/A
Steady State Power @ 70°F	4W	2.5W	4W with 5VDC, 6W with POE
Peak Power @ 70°F	5.3W	3.5W	5W with 5VDC, 7W with POE
Highlights	<ul style="list-style-type: none"> <li>- On-board FPGA</li> <li>- On-board user interface</li> <li>- Polarization data products over NTSC</li> </ul>	<ul style="list-style-type: none"> <li>- On-board GigE frame grabber</li> <li>- Ruggedized housing</li> </ul>	<ul style="list-style-type: none"> <li>- On-board GigE frame grabber</li> <li>- Polarization filter unprocessed over NTSC</li> </ul>
PATENTS PENDING			



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### **About Polaris Sensor Technologies, Inc.**

Polaris Sensor Technologies, Inc. is a dynamic commercial and prime government supplier providing innovative designs, unique products, and state-of-the-art analyses of optical systems. We have a team of optical experts with extensive experience in designing high-performance systems. Our portfolio includes polarization-based imaging systems, sensors, seekers, light scattering modeling, and measurement services.

Located in Huntsville, Alabama, our engineering facility features an extensive laboratory. Holding many national and international patents, Polaris creates custom hardware and unique software solutions providing our customers with the ability to meet mission objectives. How can we serve you?

## **See More. Know More.®**