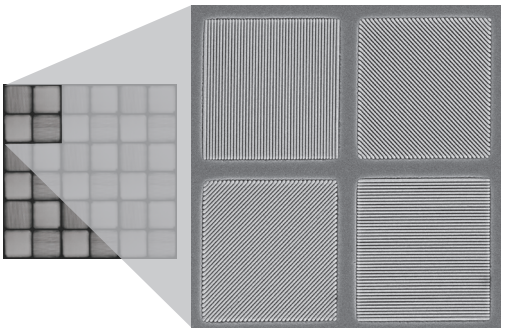
Pixelated Polarizers

PIX Series Datasheet



Four State Pixelated Polarizer Array

Applications

- Polarimetry and 3D Cameras
- Biometric Facial Recognition
- Polarized Fiber-Optic Probes
- Machine Vision
- Interferometry
- Environmental Detection

Standard Product Options

Product Name	Pixel Pitch	Pixel Size
PIX055C	5.5µm	4.5µm
PIX058C	5.86µm	4.86µm
PIX065C	6.5µm	5.5µm
PIX074C	7.4µm	6.4µm
PIX080C	8.0µm	7.0µm
PIX088C	8.8µm	7.8µm
PIX090C	9.0µm	8.0µm
PIX098C	9.8µm	8.8µm
PIX100C	10.0µm	9.0µm
PIX156C	15.6µm	14.6µm
PIX300C	30.0µm	29.0µm

See page 2 for dimension details.

Standard products are four-state pixelated polarizers with a visible AR coating.

New sizes in development:
• 2x2 µm to 30x30 µm pixel pitch

UV polarizers in development:
• 2 µm to 30 µm pixel pitch
• UV wavelengths

See OPT-DATA-1011 for size and mounting options. Visit moxtek.com for more information.

Pixelated polarizers are designed to incorporate different polarization angles into a single array, which can be aligned with CCD/CMOS camera arrays, enabling real-time polarimetry. Traditional polarimetry requires multiple images be taken with different polarizations and multiple cameras precisely aligned to each other. The resulting image data must then be carefully overlaid and aligned which requires added time, equipment, and precision. Pixelated polarizers enable real-time imaging when speed and resolution is critical. Recently, Moxtek has further developed a NanoImprint Lithography (NIL) fabrication process, rendering improved performance and uniformity across pixels while allowing potential wafer level imprint with alignment.

Features	Benefits
Nanowire® Technology	Superior Transmission and Contrast
	±20˚ AOI Without Depolarization
	Wavelength and AOI Independent
	Visible and IR Wavelengths
	Broadband Visible and IR Wavelengths
NIL Pixelation	User Defined Pixel Geometries and Layouts
	Uniform Cross-Pixel Performance
	Potential Wafer-Level Imprint with Alignment
Inorganic	High Heat Resistance

General Specifications

	Visible Options (Standard)	IR Options (Custom)
Wavelength Range:	400-700nm (400-2500nm upon request)	3-5µm, 8-12µm
Substrate Type:	Display Grade Glass	Silicon
Thickness:	0.7 ± 0.07mm	0.675 ± 0.095mm
Index of Refraction:	1.5198 (435.8nm) 1.5078 (643.8nm)	3.421 (10.33µm) 3.427 (4.132µm)
Thermal Expansion:	31.7 x 10^{-7}/˚C (0-300˚C)	2.6 x 10^{-6}/˚C
AOI (Angle of Incidence):	0˚± 20˚	0˚± 20˚
AR Coating:	Depending on operation wavelength	Depending on operation wavelength
Maximum Temperature:	200˚C, >5,000 hours	200˚C, >5,000 hours
Transmission Axis (TA):	Referenced to long side	Referenced to long side
TA Tolerance:	± 1˚	± 1˚
RoHS:	Compliant	Compliant
Transmission:	>80% @ 632nm at pixel center	Contact Moxtek for information
Contrast Ratio:	>200:1 @ 632nm at pixel center	Contact Moxtek for information

Do not touch or clean the wire-grid polarizer surface otherwise the polarizer will be damaged.

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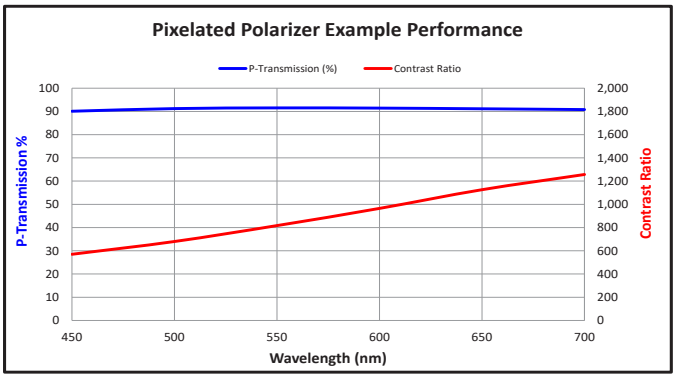
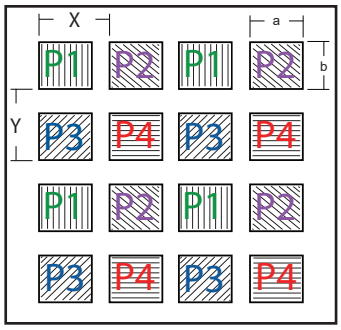
Standard Dimensional Specifications

Polarizer Pixel Pitch (X, Y): See page 1 for Standard Product Options

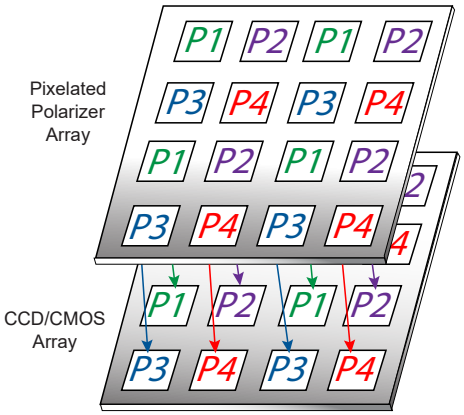
Polarizer Pixel Size (a, b): See page 1 for Standard Product Options



Performance assuming no cross talk between pixels. Performance data was taken from sample evaluations. Some part-to-part variation is expected.



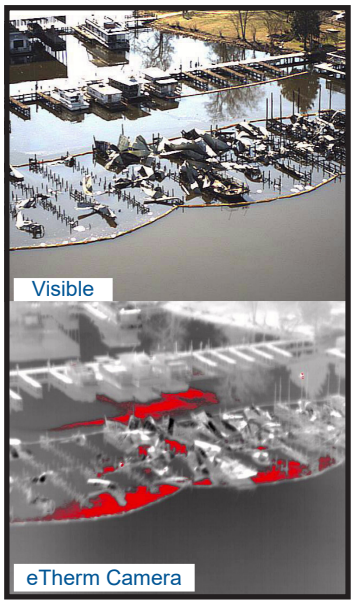
Typical layout of a 4-state pixelated polarizer array.



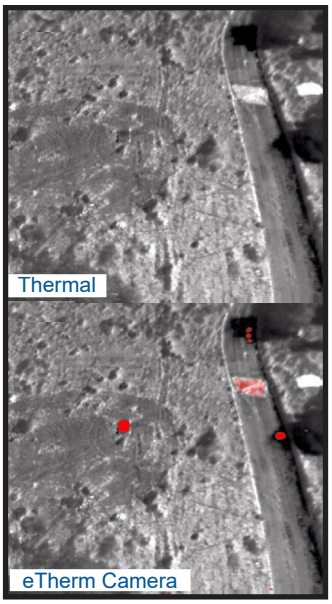
Pixelated polarizer aligned to camera array.

Application Examples of Quantitative Thermal Polarization Imaging

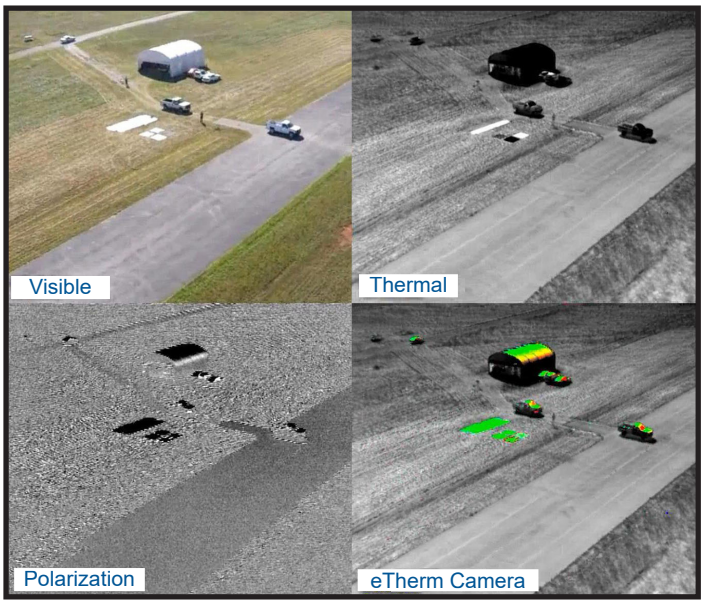
Pixelated polarizers are designed to align with CCD/CMOS camera arrays to create imaging polarimeters, which map a scene of interest using the polarization state of light instead of color as in traditional cameras. Polarization provides high contrast information about surface features such as shape, shading, and roughness. Traditional methods require combining and precisely aligning data from two separate images which requiring added time, equipment, and space. The pixelated polarizer, when attached to an image sensor, enables a number of different types of images to be obtained simultaneously as illustrated in the figures below. Photos courtesy of Polaris Sensor Technologies and taken with Pyxis LWIR camera (PolarisSensor.com).



Visible and eTherm (Thermal + Polarization) images identifying oil spill after a marina fire near Huntsville, AL.



Thermal and eTherm images for target identification.



Visible, Thermal, Polarization and processed eTherm images showing different data products in a target identification application.

Photos courtesy of Polaris Sensor Technologies and taken with Pyxis LWIR camera (PolarisSensor.com).

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Performance data was taken from sample evaluations. Some part-to-part variation is expected.
For warranty and ordering information, please visit moxtek.com.