

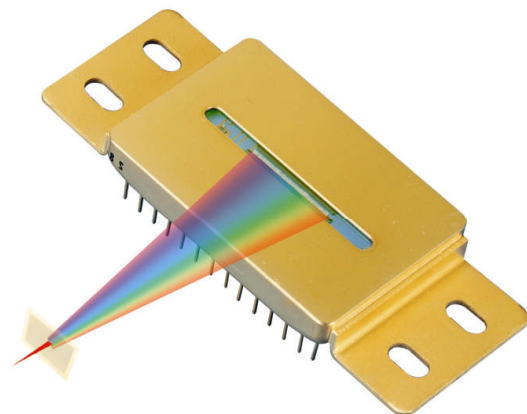
InGaAs Linear Photodiode Arrays for SWIR (0.9 to 2.2 μm)



Extended InGaAs wavelength sensitivity to 2.2 μm makes this line scan sensor ideal for thermal machine vision applications or for spectroscopy requiring sensitivity at the 1.95 μm water band. Other applications include agricultural sorting, remote sensing, geological imaging, biomedical analysis, thermal imaging, and industrial process control.

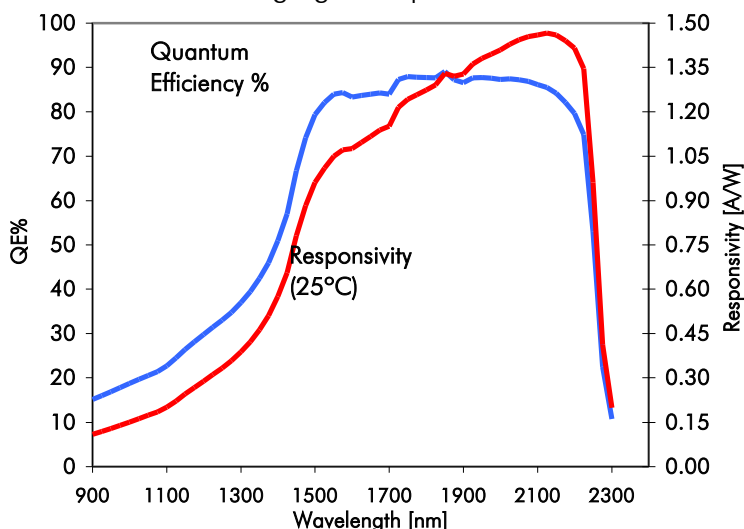
APPLICATIONS

- Near infrared spectroscopy
- Radiation thermography
- Machine vision for:
 - Moisture content
 - Chemical properties
 - Temperature uniformity
 - Molten metal fill level/slag detection
- Hyperspectral airborne imaging
- Thermal imaging of objects $>100^\circ\text{C}$



FEATURES

- Operating wavelength range 0.9 μm – 2.2 μm
- Array lengths of 128, 256, 512 or 1024 pixels
- Pixel heights of 50 or 250 μm (or custom)
- Pixel pitch of 25 or 50 μm
- Selectable gain of 400 or 15.4 nV/e^-
- Full-well capacity up to 130×10^6 electrons
- Thermo-electric cooling for stabilization (-T1) or cooling to 70°C below ambient (-T3)
- ESD resistant
- Self-clocked and easy to use
- Clock frequency up to 5 MHz
- Multi-tap options for 19 kHz line readout rates



Sensors Unlimited offers extended wavelength InGaAs PIN photodiode array products with a variety of options to serve many different applications. These include array lengths of 128, 256, 512, or 1024 pixels, line rates to over 19K lines per second, and pixel sizes optimized for machine vision or spectroscopy. System designers need only provide one analog supply and two digital control lines to operate these self-clocked arrays. Users may select high sensitivity mode for best detectivity or high capacity mode for resolution of weak absorbance peaks. These arrays are hermetically sealed with an internal 1 or 3-stage solid state cooler, which prevents condensation while cooling the detector to as much as 70°C below ambient temperatures.

Sensors *knows* IR™

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PERFORMANCE CHARACTERISTICS

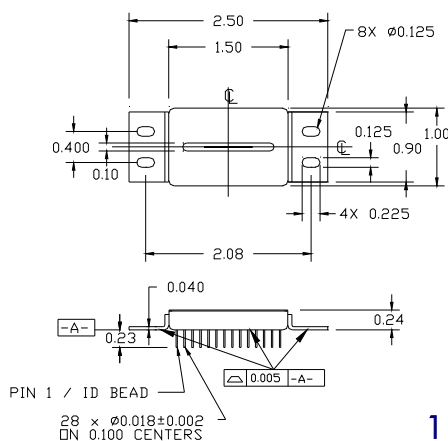
Parameter	Min.	Typ.	Max.	Unit
Peak wavelength sensitivity (λ_{pk})		2		μm
Responsivity (at λ_{pk})	9 ^{II}			nV/photon
Quantum efficiency (QE)	60			%
Photoresponse non-uniformity (PRNU)		5	10	%
Non-Linearity			1	%
Gain		400 ^I 15.4 ^{II}		nV/electron
Linear saturation charge		5 ^I 130 ^{II}		Me^-
Readout noise		800 ^I 10,000 ^{II}		electrons RMS
Sensor dynamic range		6250:1 ^I 13000:1 ^{II}		ratio
Dark rate			$3.6 \times 10^{10 \text{ III}}$ $18 \times 10^{10 \text{ IV}}$	e/s
Readout rate	0.01		5	MHz
Inoperable pixels			2	%

^I High-sensitivity mode: high gain capacitor^{III} 50 μm pixel height^{II} High dynamic range mode: low gain capacitor^{IV} 250 μm pixel height

ABSOLUTE MAXIMUM RATINGS

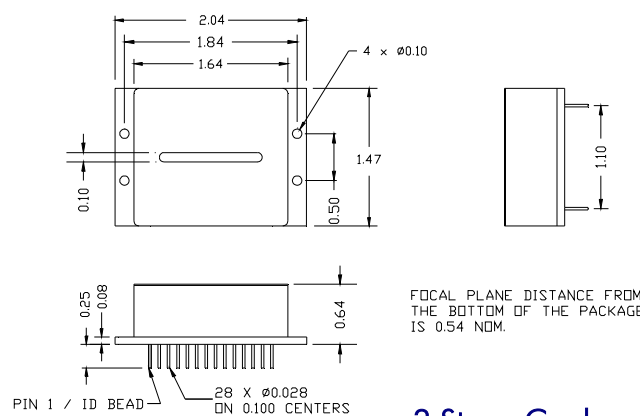
Parameter	Unit	Min.	Typ.	Max.
V_{DD} / Analog supply voltage	V	4.90	5.00	5.25
Power consumption (FPA) ($V_{DD} = 5.00 \text{ V}$)	mW			256LX: 150 512LX: 300 1024LE: 500
Operating temperature range	$^{\circ}\text{C}$	-20		+70
Storage temperature range	$^{\circ}\text{C}$	-40		+85

MECHANICAL DRAWINGS



1 Stage Cooler

FOCAL PLANE
DISTANCE FROM THE
BOTTOM OF THE
PACKAGE IS 0.16 NDM.



3 Stage Cooler

FOCAL PLANE DISTANCE FROM
THE BOTTOM OF THE PACKAGE
IS 0.54 NDM.