**Metolius™ P-I-N Photodiodes**

High-quantum efficiency P-I-N photodiode increases probability of detection and reduces false alarm rate.

**Features**

- Low-capacitance, high-sensitivity, back-side-illuminated design
- 950–1700 nm response
- Low operating bias, <5 V
- Custom devices available upon request

**Applications**

- Freespace optical communications
- Laser range finding
- Optical time domain reflectometry
- Optical coherence tomography
- Fluorescence measurements, spectroscopy, chromatography and electrophoresis
- Telecommunications
- LADAR/LIDAR

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**PX2-1000 Series InGaAs P-I-N Photodiodes**

The Metolius PX2-1000 series high-quantum efficiency P-I-N (HQE-PIN) InGaAs photodiodes can provide high-sensitivity NIR light detection with a large-diameter active area, minimal bias (< 5 V), and low dark currents.

This backside-illuminated photodetector provides both higher sensitivity and lower capacitance than competing frontside-illuminated photodiodes. While detector capacitance is minimized at a bias of 3 to 5 Volts, the device can operate with at least 90% of its specified responsivity with a fraction of the dark current at a bias of only 0.7 V.

For ease of integration, the HQE-PIN die is provided on a ceramic submount with or without a co-mounted temperature sensor. Packaging of these diodes is available in either a windowed TO-46 header or with a three-stage thermoelectric cooler (TEC) in a six-pin windowed TO-8 header.
## Specifications—PX2-1000 Series

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Min</th>
<th>Typical</th>
<th>Max</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spectral Range, λ</td>
<td>950</td>
<td>1000–1600</td>
<td>1750</td>
<td>nm</td>
</tr>
<tr>
<td>Quantum Efficiency</td>
<td>0.82</td>
<td>0.85</td>
<td>0.98</td>
<td>1064 nm</td>
</tr>
<tr>
<td></td>
<td>0.96</td>
<td></td>
<td></td>
<td>1550 nm</td>
</tr>
<tr>
<td>Absolute Operating Temp.</td>
<td>-73</td>
<td>-40 – 30</td>
<td>75</td>
<td>℃</td>
</tr>
<tr>
<td></td>
<td>200</td>
<td>233 – 303</td>
<td>348</td>
<td>K</td>
</tr>
<tr>
<td>Temperature Sensing Diode Voltage and ΔV/K(^1)</td>
<td>0.48</td>
<td>0.50</td>
<td>0.51</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-2.18 mV/K</td>
<td></td>
<td></td>
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</table>

\(^1\) Sourcing 10 µA and 298 K

<table>
<thead>
<tr>
<th>Active Diameter (Model)</th>
<th>1150-µm (PX21-SBXA)</th>
<th>650-µm (PX21-RBXA)</th>
<th>300-µm (PX21-QBXA)</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Min</td>
<td>Typical</td>
<td>Max</td>
<td>Min</td>
</tr>
<tr>
<td>Noise Spectral Density</td>
<td>27</td>
<td></td>
<td></td>
<td>20</td>
</tr>
<tr>
<td>Dark Current(^2)</td>
<td>1.7</td>
<td>2.2</td>
<td>2.6</td>
<td>0.9</td>
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<tr>
<td>Dark Current Dependence on Temperature(^3)</td>
<td>0.30</td>
<td></td>
<td></td>
<td>0.30</td>
</tr>
<tr>
<td>Total Capacitance(^4)</td>
<td>38</td>
<td></td>
<td></td>
<td>12</td>
</tr>
<tr>
<td>Max. Instantaneous Optical Input</td>
<td>500 est.</td>
<td></td>
<td></td>
<td>100 est.</td>
</tr>
</tbody>
</table>

\(^2\) \(V_{bias} = 2 V, T=298 K\)
\(^3\) \(240 K – 300 K\)
\(^4\) \(V_{bias} = 5 V\)
Performance—PX2-1000 Series

Quantum Efficiency Uniformity

Quantum Efficiency vs. Wavelength (2V)

Ordering Information

<table>
<thead>
<tr>
<th>P</th>
<th>X</th>
<th>2</th>
<th>1</th>
<th>-</th>
<th>-</th>
<th>-</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device Type</td>
<td>Detector Format</td>
<td>Diameter</td>
<td>Package</td>
<td>Window</td>
<td>Revision</td>
<td></td>
<td></td>
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<tr>
<td>non-APD photo-diode</td>
<td>P-I-N</td>
<td>HQE-PIN</td>
<td>Single Element</td>
<td>Ceramic Submount</td>
<td>TO-46</td>
<td>3-stage TEC</td>
<td>Flat</td>
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</tbody>
</table>

Other packaging options for the HQE-PIN photodiodes are available by request. Please contact Voxtel for specific ordering information and parts availability. Upon request, Voxtel will gladly assist customers in implementing the proper controls to ensure safe and reliable operation of detectors in their system.

Voxtel, Inc., 15985 NW Schendel Avenue, #200, Beaverton, OR 97006
www.voxtel-inc.com, T 971.223.5646, F 503.296.2862
**Mechanical Information—Submounted Dies**

The submount for the PX2-1000 series InGaAs P-I-N photodetector is 250-μm-thick aluminum-nitrate. The photodiodes are 350-μm thick.

### 1150-micron Submounted Die

![Diagram of 1150-micron Submounted Die]

### 650-micron Submounted Die

![Diagram of 650-micron Submounted Die]

### 300-micron Submounted Die

![Diagram of 300-micron Submounted Die]
**Mechanical Information — Hermetically Packaged Photodiodes**

**TO-8 Packages with 3-stage TEC**

Pinout
1) TEC -
4) TEC +
9) Temp Sense -
10) Temp Sense +
11) PIN Anode (p)
12) PIN Cathode (n)

**TO-46 Packages**

Pinout
1) PIN Cathode
2) PIN Anode
3) Ground, T Sense -
4) T Sense +
**Typical Impulse Response—1150-micron device at 2.3 V Reverse Bias**

**Capacitance vs. Voltage—1150-micron device**