

# Sensors Unlimited: LE/LSE Series



## InGaAs linear photodiode arrays

Available in machine vision (MV) and spectroscopy formats, the high-resolution LE/LSE series linear InGaAs photodiode arrays are setting the standard for high performance.

## BENEFITS

- Easy-to-use analog design
- Wavelength ranges of 0.8 to 2.2 μm
- Pixel heights of 250 μm or 500 μm
- 25 μm or 50 μm pitch one inch array
- Two separate gains are selectable with a single input
- Maximum lps 1.25KHz analog output
- Anti-blooming to prevent charge overflow from saturated pixels
- Available with one- or two-stage thermoelectric cooler, or without a cooler for uncooled or externally cooled operation
- ESD resistant

Sensors UnlimIted's LE/LSE InGaAs arrays feature 512 and 1024 elements, in 25µm or 50µm pixel pitches with pixel heights of 250µm and 500µm. These arrays cover a standard wavelength range of 0.8 to 1.7 µm or an extended range of 1.1 to 2.2 µm.

Anti-blooming protection prevents charge flow from saturated pixels, allowing for increased intra-scenic dynamic range. These channels are >99% operable and have unmatched uniformity. The photodetector arrays are hybridized with CMOS readout integrated circuits (ROIC) of SUI's exclusive design to offer maximum noise immunity and sensitivity.

Operating circuit designs need only provide for one analog supply and two digital control lines for optimum ROIC performance. Two separate gains are selectable with a single input. Arrays are available with 1 or 2 stage thermoelectric coolers for temperature stabilization and monitoring.

Applications include industrial process control and inspection in agricultural sorting, biomedical analysis, thermal imaging and NIR Molecular Spectroscopy.

### **Applications**

- FTIR/NIR interferometry
- NIR molecular spectroscopy
- Biomedical analysis
- Plastic recycling
- Industrial process control and inspection
- Machine vision

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| Parameter/description                  | Unit | Min. | Typical             | Max. |
|--|------|------|---------------------|------|
| V <sub>DD</sub> /analog supply voltage | V    | 4.90 | 5.00                | 5.25 |
| Vss/analog supply ground               | V    |      | 0                   |      |
| Vclk/digital pixel clock               | V    |      | Hi: Vdd<br>Low: Vss |      |
| VLSYNC/digital exposure<br>control     | V    |      | Hi: Vdd<br>Low: Vss |      |
| Vcap/digital gain control              | V    |      | Hi: Vdd<br>Low: Vss |      |

#### Linear array comparison table (representative values)

| Material<br>type | Dark<br>current | 50% QE<br>cut-on<br>λ (μm) | 50% QE<br>cut-off<br>λ (μm) | Peak<br>λ (μm) |
|------------------|-----------------|----------------------------|-----------------------------|----------------|
| 1.45 μm          | 1.3 pA          | 0.91                       | 1.415                       | 1.17           |
| 1.7 µm           | 2.3 pA          | 0.91                       | 1.65                        | 1.36           |
| 2.2 µm           | 10 nA           | 1.3                        | 2.155                       | 1.67           |
| 2.6 µm           | 100 nA          | 1.64                       | 2.41                        | 1.84           |



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**Electrical inputs** 

| Parameter                                | Unit             | Min. | Typical                                       | Max. |
|--|------------------|------|---|------|
| Peak wavelength<br>sensitivity (λpk)     | μm               |      | 1.5   |      |
| Responsivity<br>(at λpk)²                | nV/<br>photon    | 10.5 |   |      |
| Photoresponse<br>nonuniformity<br>(PRNU) | +/- %            |      | 5   | 10   |
| Non-linearity<br>of response             | %                |      |   | 1    |
| Gain                                     | nV/<br>electron  |      | 4.00 <sup>1</sup> ,<br>15.4 <sup>2</sup>      |      |
| Saturation<br>charge                     | Me               |      | 5 <sup>1</sup> , 130 <sup>2</sup>             |      |
| Readout noise                            | Electrons<br>rms |      | 800 <sup>1</sup> ,<br>10,000 <sup>2</sup>     |      |
| Sensor dynamic<br>range                  | ratio            |      | 6250:1 <sup>1</sup> ,<br>13000:1 <sup>2</sup> |      |
| Readout rate<br>per port                 | MHz              | 0.01 |   | 2.5  |
| Inoperable pixels                        | %                |      |   | 1    |

1. High-sensitivity mode: High gain capacitor

2. High-dynamic range mode: Low gain capacitor

Specifications subject to change without notice.





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