2048L InGaAs Linescan Camera
2048 Pixels for OCT or Machine Vision

The high-resolution linescan Sensors Unlimited 2048L offers square pixels (10 x 10 μm) for machine vision or tall pixels (10 x 210 μm) for ease of alignment with spectrometers. The cameras deliver line rates from 100 to >76,000 per second via Base Camera Link® interfaces providing flexibility. The 2048’s deliver the high-resolution, stability and reliability needed for Optical Coherence Tomography (OCT) or industrial machine vision. High uniformed sensitivity is provided over the short-wave infrared (SWIR) wavelengths from 0.98 to 1.65 μm. The simultaneous acquisition across all pixels delivers the superior repeatability, and long operating life needed for vital medical and industrial machine vision.

FEATURES
- 2048 x 1 pixel array with 10 μm pitch
- Square (10x10 μm) or tall (10x210 μm) pixel options
- High QE from 0.98 μm to 1.65 μm
- Solid-state FPA with snapshot exposure
- User controlled exposure and line period
- Line rates from 0.1 k to 76 k lines per second
- >1200 : 1 dynamic range in high gain
- 4 sensitivity choices
- External triggering of line and exposure via Camera Link CC1 line
- Enclosed body < 136 cm³ (< 8.3 in³)
- Low power < 3.6 W over 6-12 V
- Acquires and saves user non-uniformity corrections
- Base12-bit Camera Link® interfaces
- Meets FCC and CE requirements for radiated and conducted emissions, for immunity from such emissions and for ESD resistance
- The GL2048 cameras are compliant with EU RoHS and Directives

APPLICATIONS
- Optical Coherence Tomography at: 1.04, 1.31, 1.55 μm
- High-resolution spectroscopy of transient spectra in the 0.94 to 1.68 μm wavelength range
- Silicon wafer or integrated circuit microscopy
- SWIR machine vision (MV) of moving objects
- Thermal MV imaging > 150 °C through glass windows

Model No: 2048L
**ENVIRONMENTAL & POWER**

- **Operating Case Temperature**: +10 °C to +35 °C
- **Storage Temperature**: -10 °C to 60 °C
- **Humidity**: Up to 95% and non-condensing
- **Power Requirements**:
  - **AC Adapter Supplied**: 100–240 VAC, 47–63 Hz
  - **DC Voltage**: +6 to 12 VDC (Maximum: 13.1 VDC)
  - **Typical Power**: 3.6 W at 30 °C case temp
  - **In-rush Current**: 1.25 A @ 12 VDC

**MECHANICAL**

- **Width x Height x Depth**: 8.3 cm x 10.2 cm x 1.6 cm (excludes I/O connectors, and lens adapter)
- **Weight**: < 240 g or 8.6 oz (no lens or adapter)
- **Threaded Lens Mount**: M42x1-6H (focus point ~6 mm from camera surface)
- **Optional Lens Mount Adapters**:
  - C-Mount adapter or adjustable distance F-Mount adapter (see ordering info)
- **Spectrometer Mount**:
  - 4 tapped 8-32 holes in 2 inch square pattern,
  - 2 tapped 8-32 holes in-line with image axis,
  - O-Ring light seal, 1.9 inch diameter, 1/16" thickness
- **Camera Tripod Mount**: 2 tapped ¼-20 holes, one on bottom, one on side wall.

**OPTO-ELECTRONIC PERFORMANCE**

- **Sensor format**: 2048 pixels with 2048 readout ADCs on 10 µm pitch
- **Optical aperture (pixel height)**: 210 µm or 10 µm
- **Quantum efficiency**: > 60% over 0.98 µm-1.65 µm; > 70% peak response @ 1.55 µm

<table>
<thead>
<tr>
<th>Gain setting</th>
<th>High</th>
<th>Medium High</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Temporal noise (rms counts)</strong></td>
<td>3.1</td>
<td>&lt; 3.4</td>
<td>2.2</td>
</tr>
<tr>
<td><strong>Dynamic range</strong></td>
<td>&gt; 1200:1</td>
<td>&gt; 1450:1</td>
<td>&gt; 1750:1</td>
</tr>
<tr>
<td><strong>Differential non-linearity</strong></td>
<td>+/- 1.1</td>
<td>+/- 2.5%</td>
<td>+/- 1.5</td>
</tr>
</tbody>
</table>

- **Bad pixel specification**: White, dark, noisy or pixels exceeding +/- 20% of the mean value when illuminated at 50% of full well. Number of bad pixels limited to a maximum of 1% of array total; on-board pixel replacement function
- **Exposure time**: 5.5 µs to 10 ms, user programmed in pixel clock cycles or via the width of the ext. trigger
- **Trigger modes**: Free run, single line per trigger (exposure set by camera), or variable exposure
- **External trigger**: Via CC1 signal line in Camera Link cable
- **External variable ET**: User set by the duration of trigger input signal (minimum exposure time pulse: 5.5 µs)
- **External trigger jitter**: +/-2.5 clock cycles; nominally 63 ns variation
- **Pixel rate**: 2048L:157 Mpix/s with 2 x 12-bit words transferred on each Camera Link strobe clock at 80 MHz
- **Digital output format**: 12-bit base Camera Link®; recommend NI PCIe-1433 or frame grabber with throughput of > 313 Mbytes/s to PC motherboard (minimum of 4 bi-directional PCIe express lanes in PC)
- **Readout mode**: Integrate-While-Read, differential double sampling
- **Corrections (preset OPR)**: Factory calibrated gain, offset, and bad pixel replace.

1. Actual formats and performance governed by pixel size options (dark current may limit longest usable ET, especially at high gain);
2. Camera readout noise limited for low & medium gain settings; dark shot noise limited for high gain settings at longer exposure times
3. Modes are user selectable by command over Camera Link® serial lines

**ORDERING INFORMATION**

- **Camera Model**
  - GL2048L-10A-ENC-STD-210: 8000-0596: 76,263 lps, 10 µm
  - GL2048L-10A-ENC-STD-010: 8000-0597: 76,263 lps, 10 µm

<table>
<thead>
<tr>
<th>Part number</th>
<th>Max. Line rate</th>
<th>Pitch</th>
<th>Pixels</th>
<th>FPA length</th>
<th>Aperture (height)</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>8000-0596</td>
<td>76,263 lps</td>
<td>10 µm</td>
<td>2048</td>
<td>20.48 mm</td>
<td>210 µm</td>
<td>EAR99</td>
</tr>
<tr>
<td>8000-0597</td>
<td>76,263 lps</td>
<td>10 µm</td>
<td>2048</td>
<td>20.48 mm</td>
<td>10 µm</td>
<td>6A003.b.4.a</td>
</tr>
</tbody>
</table>

**Included items in qty 1-4**: Power supply, lens cap, ESD foam-lined shipping box, mini-CD with manual and SUI Image Analysis software for National Instruments IMAQ environment.

Order lens adapters separately for additional charge:
- Part Numbers: Adjustable F-mount adapter: 8000-0171, C-mount adapter: 3800-0002

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