SU1024-LDM Linescan Camera
Compact InGaAs Linescan Camera for Machine Vision

The model SU1024-LDM camera is a high-speed 1024-pixel linescan InGaAs camera for use in high-resolution imaging through silicon wafers, blocks or ingots. It finds problems such as mis-alignment, occlusions, inclusions or cracks; before the expense of further processing of ICs or solar cells. High-speed imaging of free-falling molten glass gobs, agricultural raw materials, or pharmaceutical mixes also benefit from the camera’s flexible line rates of up to 45,956 lps. Only 2.4 inches in depth, the mechanical design gives system integrators the flexibility to fit the camera inside their inspection machines. The LDM provides 14-bit digital capture into base-format Camera Link® interface cards, while providing dynamic ranges up to 4500:1. A photoetch mask sharply defines the array’s 25-µm aperture, ensuring high time and spatial resolution; the alternate 500-µm pixel height trades time resolution for increased sensitivity in photoluminescence imaging.

FEATURES
- High quantum efficiency and dynamic range
- Integrate-while-read snapshot acquisition
- Predefined line rates from 80 to 45,956 lps user programmable
- Wavelength response over 0.8 µm to 1.7 µm
- 1024 x 25-µm pixel pitch with the aperture heights of 25 or 500 µm
- 14-bit base Camera Link® compatible
- Operating temperature range of -10 to +50°C
- Light-tight mount for spectrometers
- Mounts easily to optics benches or MV systems with tripod, front or side fastener hole patterns
- Optional adapters for F-mount or C-mount, lenses (C-mount lenses may not fully illuminate the full width of the 25.6 mm wide arrays)

APPLICATIONS
- Inspection through polished silicon wafers or blocks
- Machine vision for ultra-high speed inspection, materials classification, sorting and/or monitoring of continuous processes, for example for food or agricultural product sorting
- Fast absorption or emission spectroscopy for combustion research, moisture, lipids, proteins or other molecular vibration bands in the 0.8 µm-1.7 µm range
**MECHANICAL**

<table>
<thead>
<tr>
<th>Length x Width x Height</th>
<th>6.1 cm x 7.37 cm x 7.62 cm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2.4 in x 2.9 in x 3.00 in</td>
</tr>
<tr>
<td>Length excludes I/O connectors, and lens adapter</td>
<td></td>
</tr>
</tbody>
</table>

**Weight:**

< 450 g or 1 lbs (no lens or adapter)

**Threaded Lens Mount and optional lens mount adapters**

M42x1-6H with 5.7 mm to image plane one, fixed distance C-Mount adapter or adjustable distance F-Mount adapter (see ordering info)

**Spectrometer mount**

4 tapped 8-32 holes in 2 inch square pattern

**Camera Tripod mount**

2 tapped ¼-20 holes alternating on ¼” (19.05 mm) spacing with 2 tapped M6-6H holes

**Side wall mounts**

4 tapped M4x0.7-6H holes, 5 x 4.5 mm spacing (h x d)

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**REGULATORY COMPLIANCE**

**CE:** Meets class A level for emission, immunity and ESD standards

**FCC:** Meets requirements for Part 15, Subpart B, Class A, 2006

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**ELECTRO-OPTICAL PERFORMANCE**

**Sensor format**

1024 pixels on 25 µm pitch with 8 readout ADCs

**Optical aperture (pixel height)**

25 µm square pixel sharply defined by mask on the detector surface or 500 µm photodiode

**Peak quantum efficiency**

> 70%

**Gain capacitor setting**

<table>
<thead>
<tr>
<th>0.1pF</th>
<th>1.0pF</th>
<th>10.0pf</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typical</td>
<td>Specification</td>
<td>Typical</td>
</tr>
<tr>
<td>1.6</td>
<td>&gt;1.1</td>
<td>15.9</td>
</tr>
</tbody>
</table>

**Net full well capacity (Me-)**

<table>
<thead>
<tr>
<th>25 µm square pixel sharply defined by mask on the detector surface or 500 µm photodiode</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.6</td>
</tr>
</tbody>
</table>

**Gain (e-/cnt)**

107 |

**Temporal noise (rms counts)**

8 | < 10 | 3.5 | <4.5 | 2.5 | <3.5 |

**Dynamic range**

1900:1 | > 1350:1 | 2600:1 | > 2100:1 | 3100:1 | > 2600:1 |

**Differential non-linearity**

+/- 0.8% | < +/- 1.2% | +/ 0.8% | < +/- 1.2% | +/- 0.8% | < +/- 1.5% |

**Bad pixel specification**

White, dark, noisy or pixels exceeding +/- 10 of the mean value when illuminated at 50% of full well

**Exposure time**

0.018 ms to 12.8 ms in 20 preset steps or to > 1 s with user programmed or via the width of the ext. trigger

**Trigger modes**

Free run, single line per trigger, external variable exposure, or gated burst

**Sync output**

SMA coaxial connector: digital output signal, high during integration

**External trigger input**

Via frame grabber CC1 signal or SMA coaxial connector on rear panel with selectable polarity

**External variable ET**

User set by the duration of trigger input signal (minimum ET pulse: 10 µs)

**External trigger jitter**

+/-1 clock cycle: nominally 80 ns with internal ET

**Pixel rate**

50 Mpix/s max with 14-bit words transferred on each Camera Link strobe clock cycle

**Digital output format**

14-bit base Camera Link®, recommend NI PCIe-1427 or equivalent frame grabber

**Readout mode**

Integrate-while-read, correlated differential double sampling

**Corrections (58 preset OPRs)**

Factory calibrated gain, offset, and bad pixel replace, applicable to the center 90% of the array

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**ORDERING INFORMATION**

<table>
<thead>
<tr>
<th>Camera Model</th>
<th>Part number</th>
<th>Max. Line rate</th>
<th>Pitch</th>
<th>Pixels</th>
<th>FPA length</th>
<th>Aperture (height)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SU1024-LDM-1.7RT-0025/LC</td>
<td>8000-0555</td>
<td>45,956 lps</td>
<td>25 µm</td>
<td>1024</td>
<td>25.6 mm</td>
<td>25 µm</td>
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<tr>
<td>SU1024-LDM-1.7RT-0050/LC</td>
<td>8000-0661</td>
<td>45,956 lps</td>
<td>25 µm</td>
<td>1024</td>
<td>25.6 mm</td>
<td>500 µm</td>
</tr>
</tbody>
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1 Cameras include the photodiode array, whose characteristics dominate camera performance; see the array datasheet for more information.


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