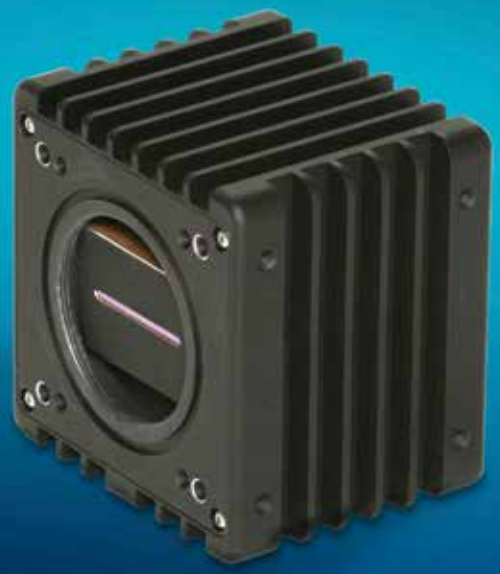
SENSORS UNLIMITED



1024-LDM Linescan Camera

Compact InGaAs Linescan Camera for Machine Vision

The model 1024-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.

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

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)

UTC Aerospace Systems

Model No: 1024-LDM

MECHANICAL

Length x Width x Height:	6.1 cm x 7.37 cm x 7.62 cm 2.4 in x 2.9 in x 3.00 in Length excludes I/O connectors, and lens adapter
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 4 tapped M4x0.7-6H holes spaced 5 cm x 4 cm (h x w) O-Ring light seal, 1.9 inch diameter, 1/16th thickness
Camera Tripod mount	2 tapped ¼-20 holes alternating on ¾" (19 .05 mm) spacing with 2 tapped M6-6H holes
Side wall mounts	4 tapped M4x0.7-6H holes, 5 x 4.5 cm spacing (h x d)

REGULATORY COMPLIANCE

CE:	Meets class A level for emission, immunity and ESD standards
FCC:	Meets requirements for Part 15, Subpart B, Class A, 2006

INTERFACES

Control:	SDR 26-pin connector (Base Camera Link®)
Image Data:	SDR 26-pin connector (Base Camera Link®)
Power	Hirose HR10-7R-6PA receptacle Mates with HR10-7P-6S or SN4-8-6(P)
Sync Output:	SMA: 5 V, 50 W series terminated, active high: integration active
Trigger: Input	SMA, Low < 0.5, 3 V > high < 5 V
Status LED:	Green: TEC locked at setpoint Red: TEC unlocked Blinking: Timing or triggering error

ENVIRONMENTAL AND POWER

Operating temperature:	-10°C to +50°C case temperature
Storage temperature:	-20°C to 70°C
Humidity:	Non-condensing
Power requirements: **AC adapter supplied** **DC (voltage/power)** **In-rush current**	100-240 VAC, 47-63 Hz, < 1.0 A 7-16 V, < 6 W at 25°C, <9 W at 50°C < 1.5 A peak

ELECTRO-OPTICAL PERFORMANCE

Sensor format [1]	1024 pixels on 25 µm pitch with 8 readout ADCs					
Optical aperture (pixel height) [1]	25 µm square pixel sharply defined by mask on the detector surface or 500 µm photodiode					
Peak quantum efficiency [1]	> 70%					
Gain capacitor setting	0.1pF		1.0pF		10.0pf	
	Typical	Specification	Typical	Specification	Typical	Specification
Net full well capacity (Me-) [2]	1.6	>1.1	15.9	>9.2	150	>110
Gain (e-/cnt) [1 3]	107		1000		9600	
Temporal noise (rms counts) [1 2]	8	< 10	3.5	<4.5	2.5	<3.5
Dynamic range [1 2 4]	1900:1	> 1350:1	2600:1	> 2100:1	3100:1	> 2600:1
Differential non-linearity [1 2]	+/- 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 Number of bad pixels limited to a maximum of 1% of array total; no bad neighbors within 5 pixels					
Exposure time [1 3]	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 [3]	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 [3]	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					

[1] Actual formats and performance governed by user-selected SUI linear array purchased with camera (dark current may limit longest usable ET)
[2] Camera readout noise limited for low & medium gain settings; dark shot noise limited for high gain settings
[3] User selectable by command over Camera Link® serial lines
[4] Dynamic range limited to lowest values listed when camera operated at exposure times shorter than 28 µs due to reduced full well capacity

ORDERING INFORMATION

Camera Model [1]	Part number	Max. Line rate [1]	Pitch	Pixels	FPA length	Aperture (height)	Classification
SU1024-LDM-1.7RT-0025/LC	8000-0555	45,956 lps	25 µm	1024	25.6 mm	25 µm	EAR99
SU1024-LDM-1.7RT-0500/LC	8000-0661	45,956 lps	25 µm	1024	25.6 mm	500 µm	6A003.b.4.a

[1] Cameras include the photodiode array, whose characteristics dominate camera performance; see the array datasheet for more information

Accessory Kits: Include power supply, carrying case, SMA-BNC trigger in and sync out cables, o-ring, carrying case, mini-CD with manual and free SUI Image. Analysis software for National Instruments Camera Link frame grabbers.

Part Numbers: Kit with F-mount adapter: 8000-0528. Kit with C-mount: 8000-0530. Kit without lens adapter: 8000-0529

For additional information:
Sensors Unlimited, Inc.
330 Carter Road, Suite 100
Princeton, New Jersey 08540 USA
Ph: +1.609.333.8200
sui_sales@utas.utc.com
www.sensorsinc.com

UTC Aerospace Systems

Model No: 1024-LDM Doc No: 4110-0261 Rev: D March 2017