

P R E L I M I N A R Y

**SENSORS
UNLIMITED**



Anterior eye image demonstrates 7.8 μm axial resolution and 16 mm deep imaging with 1.05 μm source, both courtesy of U of Washington

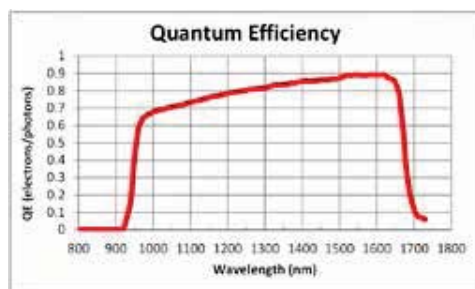
2048R InGaAs Linescan Camera

2048 Pixels with >147 klps

The new Sensors Unlimited 2048R boosts the speed of Spectral-Domain Optical Coherence Tomography imaging to >147 klps via the Medium Camera Link® interface. To optimize performance, three speed ranges cover line rates from 9.5 to 80 k, 73 to 126 k, and 114 to 147 klps, providing the flexibility lacking in swept-source systems. They deliver the high-resolution, stability and reliability needed for OCT of blood flow, or capturing large tissue volumes. Compact and slim, the camera features an InGaAs photodiode array of 2048 pixels on 10- μm pitch with an aperture height of 210 μm . High-spectral resolution and QE are provided over the short-wave infrared (SWIR) wavelengths from 0.98 to 1.65 μm , enabling deeper imaging. The simultaneous acquisition across all pixels delivers the superior, repeatability, and long operating life needed for vital bio-medical and for industrial.

APPLICATIONS

- Optical Coherence Tomography at: 1.04, 1.31, 1.55 μm
- High-resolution spectroscopy of transient spectra from .940 to 1680 nm
- SWIR Machine vision of ultra-fast moving objects



FEATURES

- 2048 x 1 pixel array with 10 μm pitch
- 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 9.5 k to >147 k-lps in 3 speed ranges
- >1590:1 dynamic range in low sensitivity
> 510:1 in high sensitivity
- External triggering of line and exposure via Camera Link CC1 line
- Enclosed body < 136 cm³ (< 8.3 in³)
- Low power < 4 W over 6-12 V
- Acquires and saves user non-uniformity corrections
- Medium 12-bit Camera Link® interfaces
- Meets FCC and CE requirements for radiated and conducted emissions, for immunity from such emissions and for ESD resistance
- The GL2048R is compliant with EU RoHS Directives



P R E L I M I N A R Y

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 (Abs. Maximum: 13.1 VDC)
Typical Power	< 4 W at 30 °C case temp ¹
In-rush Current	< 1.25 A @ 12 VDC

INTERFACES	
Control: & Data	Dual SDR 26-pin connectors
Power Connector	CUI Inc. PJ-056, 1.0mm X 3.8mm power jack
Trigger: Input	Via Camera Link CC1 line
Status LED:	Green: Power on
Tested Framegrabbers	Nat. Instruments PCIe-1429,-1433, Matrox eV-CL PCIe-X4

REGULATORY COMPLIANCE	
CE:	Meets class A for emission, immunity & ESD standards, RoHS
FCC:	Meets requirements for Part 15, Subpart B, Class A, 2006

MECHANICAL	
Width x Height x Depth:	8.3 cm x 10.2 cm x 1.6 cm (excludes I/O connectors, and lens adapter) 3.25 in x 4 in x 0.64 in (excludes I/O connectors, and lens adapter)
Weight:	< 240 g or 8.6 oz (no lens or adapter)
Threaded Lens Mount and optional lens mount adapters	M42x1-6H with ~6 mm to image plane. None, 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, 2 tapped 8-32 holes in-line with image axis, O-Ring light seal, 1.9 inch diameter, 1/16 th thickness
Camera Tripod Mount	2 tapped ¼-20 holes, one on bottom, one on side wall.

OPTO-ELECTRONIC PERFORMANCE								
Sensor format ¹	2048 pixels with 2048 readout ADCs							
Optical aperture (pixel height) ¹	210 µm							
Quantum efficiency ¹	> 60% 0.98 µm-1.65 µm; > 70% peak response @ 1.55 µm							
Gain setting	High		Medium High		Medium Low		Low	
	Typical	Specification	Typical	Specification	Typical	Specification	Typical	Specification
Temporal noise (rms counts) ^{1,2,4}	6.7	< 7.3	3.4	< 4.2	2.4	< 2.7	2	< 2.5
Dynamic range ^{1,2}	560:1	> 510:1	1140:1	> 920:1	> 1640:1	> 1460:1	1990:1	> 1590:1
Differential non-linearity ^{1,2}	+/- 1.1	< +/- 2.5%	+/- 1.5	< +/- 2.5%	+/- 1.5	< +/- 2.5%	+/- 1.5	< +/- 2.5%
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 ^{1,3}	4.5 µs to 0.1 ms, user programmed in pixel clock cycles or via the width of the ext. trigger							
Trigger modes ³	Free run, single line per trigger (ET set by camera), or variable exposure							
Self-Triggered Line Rates	Three ranges: 9.5 k to 80 k-lps, 73 k to 126 k-lps; and 114 to 147 k-lps							
External trigger ³	Via CC1 signal line in Camera Link cable							
External variable ET	User set by the duration of trigger input signal (minimum ET pulse: 4.5 µs)							
External trigger jitter	+/-3 clock cycle: nominally 62.5 ns							
Pixel rate	301 Mpix/s with 4 x 12-bit words transferred on each Camera Link strobe clock at 80 MHz							
Digital output format	12-bit Medium Camera Link®; recommend NI PCIe-1433 or frame grabber with throughput of >606 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 or user calibrated gain, offset, and bad pixel replace.							

¹Actual formats and performance governed by pixel size options (dark current may limit longest usable ET, especially at high gain);

²Camera readout noise limited for low & medium gain settings; dark shot noise limited for high gain settings at longer exposure times.

³User selectable by command over Camera Link® serial lines

⁴Noise and dynamic range values determined in high gain while using 98% of the maximum exposure period for the slowest line rates of each line-rate range

ORDERING INFORMATION						
Camera Model	Part number	Max. Line rate	Pitch	Pixels	FPA length	Aperture (height)
GL2048R-10A-ENC-STD-210	8000-0587	147,000 lps	10 µm	2048	20.48 mm	210 µm
GL 2048 Power Supply	8000-0636					

Included items in qty 1-4: Wall-mount power supply, lens cap, ESD foam-lined shipping box, USB media card with manual and free SUI Image Analysis software for National Instruments Camera Link frame grabbers.

Order lens adapters separately for additional charge:

Part Numbers: Adjustable F-mount adapter: 8000-0171. C-mount adapter: 3800-0002

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Model No: GL2048R Doc. No. 4110-0385 Rev. 4 Jan 2016

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