



Scientific Full-Frame CCD Cameras for UV, VIS, NIR Imaging and Spectroscopy EISEs/EISEi



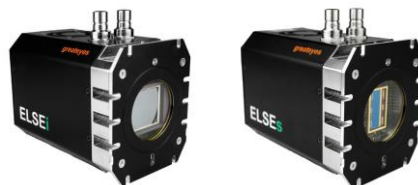
2023 V1

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info@simtrum.com

www.simtrum.com

Scientific Full-Frame CCD Cameras for UV, VIS, NIR Imaging and Spectroscopy

This scientific full-frame CCD cameras for UV, VIS, NIR imaging and spectroscopy is the ELSE series (including ELSEs and ELSEi). It is suitable for Wavelength Range 160 nm -1100 nm.



ELSE integrates cutting-edge low-noise electronics and ultra-deep cooling technology while keeping a compact camera design. Multiple readout speeds can be selected supporting pixel rates from 50 kHz up to 5 MHz. True 18-bit AD conversion allows to exploit the full dynamic range of the CCD sensor for highest performance and SNR. ELSE is ideally suited for detection of very weak signal intensities where a low-noise floor is paramount. ELSE offers unprecedented possibilities for your measurements of tomorrow.

Camera Feature

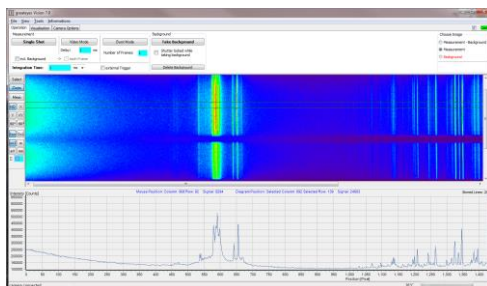
- Ultra deep TE cooling to -100 °C
Lowest dark current for better detection limit
- Hermetic vacuum seal
Low camera maintenance and sensor protection
- GigE & USB 3.0 data interface
Local or remote network operation – your choice
- Multiple sensor options
UV, VIS or NIR coatings for different sensor formats
- High QE up to 98%
Very sensitive sensors for low light applications
- User selectable gain
Balance your detector for best SNR and dynamic range
- Flexible software options
Camera software and SDKs available
- Fast readout speeds up to 5 MHz
Fast frame rates paired with low-noise electronics

Vision Software

Vision software suite provides access to all camera functionalities. It includes comprehensive visualization, analysis and storage options and supports important features such as wavelength and geometric calibration, crop and burst modes and various file formats. The software runs on 32/64-bit Windows systems. For integration into other systems, a software development kit and drivers are available.

Software Features

- Supports crop and burst readout modes for higher frame rates and precise time resolution
- Various file formats: JPG, BMP, TXT, TIFF (16-bit), DAT raw data
- Comprehensive visualization and image manipulation routines
- Supports flexible horizontal and vertical binning
- Many drivers available for integration into other systems
- Runs on 32/64-bit Windows systems
- Wavelength and geometric calibration
- Language support in English and German



Scientific Full-Frame CCD Cameras for UV, VIS, NIR for Spectroscopy-ELSEs Series

Application

- Raman Spectroscopy
- NIR Spectroscopy
- Fluorescence Spectroscopy
- Absorption, Transmission,
- Reflectance Spectroscopy



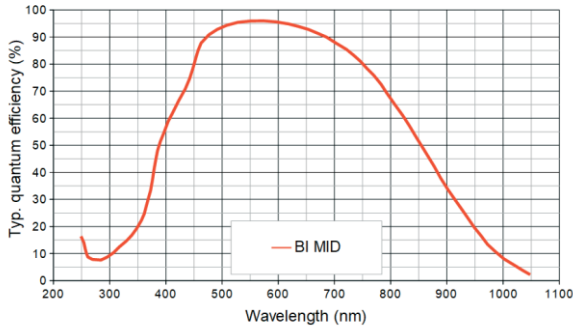
Choose your camera model

ELSE-sseries	ELSE-s 1k128	ELSE-s 1k256	ELSE-s 2k256	ELSE-s 2k512
Enhanced UV sensitivity		OE UV BI UV2, BI UV3		FI UV BI UV2, BI UV3
Enhanced VIS sensitivity	BI MID	FI BI MID	FI	FI BI MID
Enhanced NIR sensitivity	DD NIR	FI DD DD NIR DD MU2	DD NIR	
Usable pixels (columns x rows)	1024 x 127	1024 x 255	2048 x 264	2048 x 515
Active image area	26.6 mm x 3.3 mm	26.6 mm x 6.7 mm	30.7 mm x 3.9 mm	27.6 mm x 6.9 mm
Pixel size	26 μm x 26 μm		15 μm x 15 μm	13.5 μm x 13.5 μm
Full well capacity	300 ke ⁻ (OE UV) / 500 ke ⁻ / 700 ke ⁻ (DD)		75 ke ⁻	100 ke ⁻
Register well capacity	1 000 ke ⁻ / 1 400 ke ⁻ (DD)		650 ke ⁻	400 ke ⁻
Dark current @ -100°C	0.0004 e ⁻ /pixel/s 0.005 e ⁻ /pixel/s (DD)		0.0006 e ⁻ /pixel/s	0.00025 e ⁻ /pixel/s
Typ. read noise (e ⁻)	@ 50 kHz			
	5.5	FI:4.2, BI:6.0, DD:5.4	3.7	3.5
	@ 1 MHz			
	12.5	FI:12.0, BI:13.1, DD:12.3	7	6.8
Gain	Standard mode			
	0.4 counts/e ⁻		1.5 counts/e ⁻	1 counts/e ⁻
CCD sensor type	High capacity mode			
	/			0.34 counts/e ⁻
Anti-reflective coating	UV (UV2, UV3), midband (MID), multiband (MU2), near-infrared (NIR)			

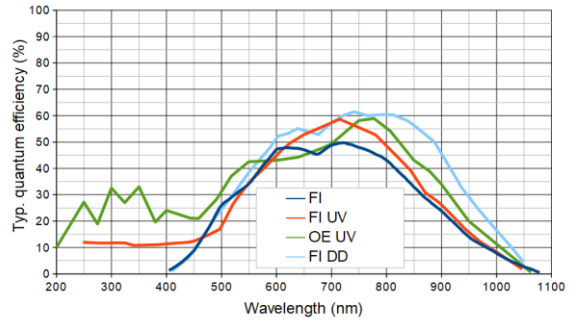
Choose your accessories and software(optional)

Order code	Description
A) Accessories for imaging purposes	
GE-M4202	M42 lens adapter (integrated fi lter holder optional)
GE-FM02	F-mount lens adapter (integrated filter holder optional)
GE-SR35	35mm shutter, including shutter driver module
B) Accessories for enhanced cooling performance	
GE-CR01	Compact liquid cooling, circulating the coolant at room temperature for deep camera cooling
GE-CR02	Recirculating water chiller, PID control with temp. from -5°C to 30°C for ultra-deep camera cooling
C) Software development kit (SDK) and drivers	
GE-LX01	SDK for Linux (C/C++ based)
GE-PYT01	Python driver
GE-LAB01	LabVIEW driver
GE-EP	EPICS driver
GE-TAN	Tango driver

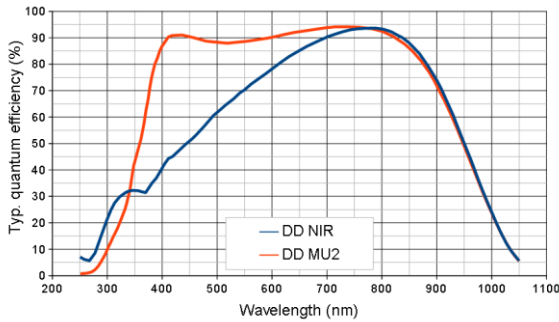
Quantum efficiency curves



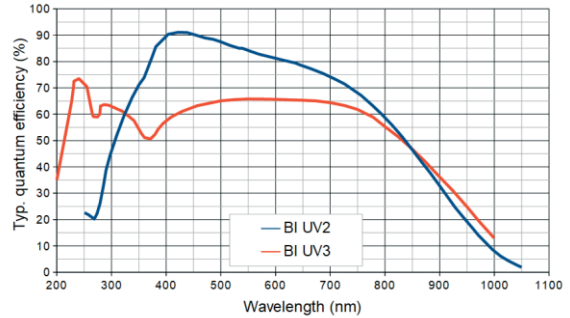
Back-illuminated CCD sensors for VIS range



Basic front-illuminated CCD sensors



Deep-depletion, NIMO CCD sensors for NIR range



Enhanced back-illuminated CCD sensors for UV range

Model Common specifications

Pixel readout frequency	50 kHz, 100 kHz, 250kHz, 500 kHz, 1 MHz, 3 MHz (5 MHz for visualization mode)
AD converter resolution	18-bit
Linearity	Better than 99%
Window material	MgF2 or UVFS for UV sensitive models, otherwise BK7
Distance flange - focal plane	10.0 mm
CCD sensor cooling	Min. -100°C to 20°C, forced air or liquid cooling
Temperature monitoring	Two thermistors at CCD sensor and thermoelectric cooler (hot side)
Data link	Gigabit Ethernet, USB 3.0
Software	Vision software for Windows 7/10
SDK and drivers	DLL for Windows; LabVIEW, EPICS, Linux, Python, Tango driver (optional)
TTL interface signals	Exposure out, shutter out, 2 external trigger in
Operating conditions	Temperature: 0°C to 35°C ambient, relative humidity <80% (non-condensing)
Power supply	80 - 240 VAC, 47 Hz - 63 Hz max. 1.1 A (230 VAC), 1.9 A (115 VAC)
Certification	CE
Dimensions	8.3 cm (3.27") × 10.0 cm (3.94") × 13.1 cm (5.16") (W × H × L)
Weight	2.2 kg

Scientific Full-Frame CCD Cameras for UV, VIS, NIR for Imaging Applications - ELESi Series

Applications

- In-vivo Fluorescence Bioimaging
- Astronomy
- LIBS Spectroscopy
- Neutron Tomography
- EL / PL Imaging
- Ultracold Quantum Studies

Images of ELESi series



ELSE-i 1k1k/ELSE-i 2k2k



ELSE-i 2k2k plus



ELSE-i 4k4k

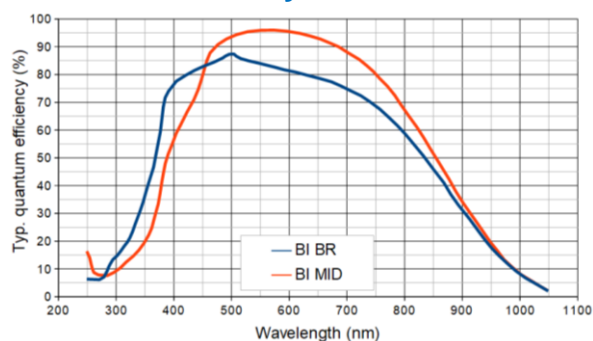
Choose your camera model

ELSE-i Series	ELSE-i 1k1k		ELSE-i 2k2k		ELSE-i 2k2k plus		ELSE-i 4k4k		
Enhanced UV sensitivity	BI UV3	/	/	BI UV3	/	/	BI UV2	BI UV4	
Enhanced VIS sensitivity	FI BI BR BI MID	/	FI BI MID	/	BI MID	/	FI BI BR BI MID	/	
Enhanced NIR sensitivity	/	DD NIR DD MU2	/	DD NIR DD MU2	/	/	/	DD MU2	
Usable pixels (columns × rows)	1024 × 1024 (FI) 1056 × 1027 (others)		2048 × 2052		2048 × 2064		4096 × 4112		
Active image area	13.3 mm × 13.3 mm		27.6 mm × 27.6 mm		30.7 mm × 30.7 mm		61.4 mm × 61.4 mm		
Pixel size	13 μm × 13 μm		13.5 μm × 13.5 μm		15 μm × 15 μm		15 μm × 15 μm		
CCD sensor cooling	-100 °C to 20 °C		-90°C to 20 °C		-90°C to 20 °C		-90°C to 20 °C		
Full well capacity	100 ke ⁻	120 ke ⁻	100 ke ⁻	150 ke ⁻	150 ke ⁻		150 ke ⁻	350 ke ⁻	
Register well	400 ke ⁻		400 ke ⁻	600 ke ⁻	850 ke ⁻		/	/	
Output node	/		/	/	900 ke ⁻		900 ke ⁻	600 ke ⁻	
Typ. read noise (e ⁻)	@ 50 kHz								
	2.8		3.4		4.6		4.6	2.8	
	@ 1 MHz								
	6.4		7		8.5		8.5	5.8	
Dark current (e ⁻ /pixel/s)	@ -100 °C								
	10.9		13.6		17		17	10.4	
Gain (counts/e ⁻)	@ -90 °C								
	0.00015		0.0005	0.0001	0.001	0.00008		0.00008	0.0006
	Standard mode								
CCD sensor type	1		1		0.6		0.6	1	
	High capacity mode								
Anti-reflective coating	/		0.34		0.2		0.2	0.34	

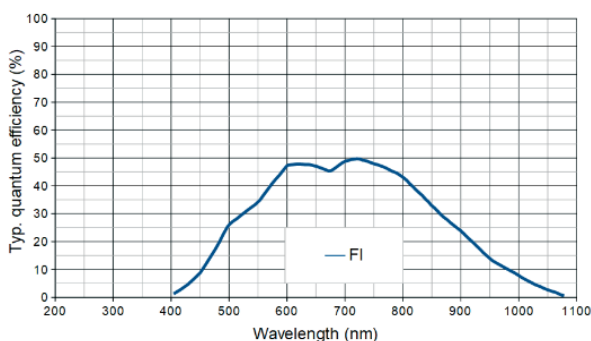
Choose your accessories and software(optional)

Order code	Description
A) Accessories for imaging purposes	
GE-CM02	C-mount lens adapter for 1k1k camera
GE-M4202	M42 lens adapter for 1k1k, 2k2k, and 2k2k plus cameras (integrated filter holder optional)
GE-FM02	F-mount lens adapter for 1k1k, 2k2k, and 2k2k plus cameras (integrated filter holder optional)
GE-SR35	25mm shutter for 1k1k camera, including shutter driver module
GE-SR45	45mm shutter for 2k2k and 2k2k plus camera, including shutter driver module
B) Accessories for enhanced cooling performance	
GE-CR01	Compact liquid cooling, circulating the coolant at room temperature for deep camera cooling
GE-CR02	Recirculating water chiller, PID control with temp. from -5°C to 30°C for ultra-deep camera cooling
C) Software development kit (SDK) and drivers	
GE-LX01	SDK for Linux (C/C++ based)
GE-PYT01	Python driver
GE-LAB01	LabVIEW driver
GE-EP	EPICS driver
GE-TAN	Tango driver

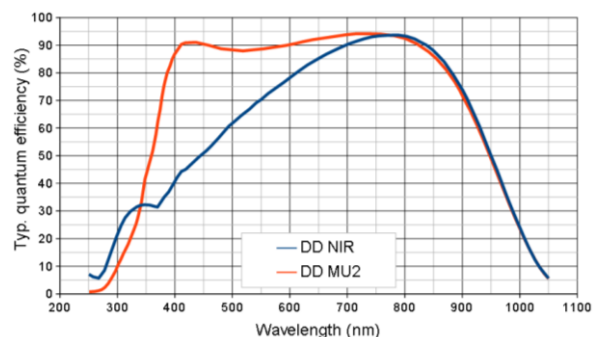
Quantum efficiency curves



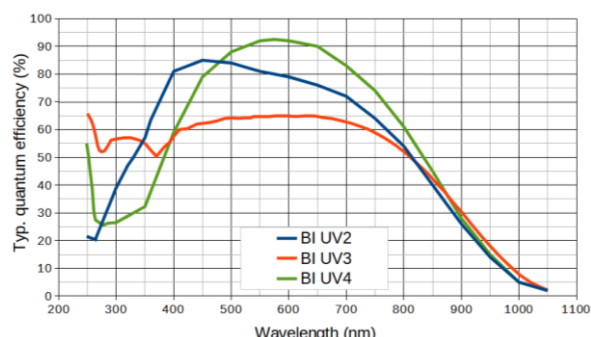
Back-illuminated CCD sensors for VIS range



Basic front-illuminated CCD sensors



Deep-depletion, NIMO CCD sensors for NIR range



Enhanced back-illuminated CCD sensors for UV range

Model common specifications

Pixel readout frequency	50 kHz, 250 kHz, 1 MHz, 3 MHz (5 MHz for visualization mode; up to 20 MHz with multi-output)
Readout modes	2 output nodes for 1k1k & 2k2k cameras, 4 output nodes for 2k2k plus & 4k4k cameras
AD converter resolution	18-bit
Linearity	Better than 99%
Window material	MgF2 or UVFS for UV sensitive models, otherwise BK7
Distance fl ange - focal plane	10.0 mm (1k1k, 2k2k plus & 4k4k cameras); 9mm (2k2k camera)
CCD sensor cooling	-100 °C to 20 °C (1k1k cameras); -90°C to 20 °C (2k2k, 2k2k plus & 4k4k camera)
Temperature monitoring	Two thermistors at CCD sensor and thermoelectric cooler (hot side)
Data link	Gigabit Ethernet, USB 3.0
Software	Vision software for Windows 7 / 10
SDK and drivers	DLL for Windows; LabVIEW, EPICS, Linux, Python and Tango driver (optional)
TTL interface signals	Exposure out, shutter out, 2 external trigger in
Operating conditions	Temperature: 0°C to 35°C ambient, relative humidity <80% (non-condensing)
Power supply	1k1k & 2k2k: 80-264 VAC (typ. 115/230), 47-63 Hz (typ. 50/60) max. 1.1 A (230 V) / 1.9 A (115 V) 2k2k plus & 4k4k: 85-264 VAC (typ. 115/230), 47-63 Hz (typ. 50/60) max. 1.9 A (230 V) / 3.8 A (115 V)
Certification	CE
Dimensions	8.3 cm (3.27") × 10.0 cm (3.94") × 13.1 cm (5.16") (W × H × L, 1k1k & 2k2k camera body) 13.7 cm (5.39") × 13.7 cm (5.39") × 17.1 cm (6.71") (W × H × L, 2k2k plus & 4k4k camera body)
Weight	2.2 kg (1k1k & 2k2k) 5.4 kg (2k2k plus & 4k4k)