



# ELSEi

## KEY SPECIFICATIONS

- High Quantum Efficiency
- Ultra Deep Cooling to  $-100^{\circ}\text{C}$
- 18-bit Dynamic Range
- Multi-MHz Readout
- Compact Design

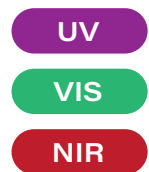
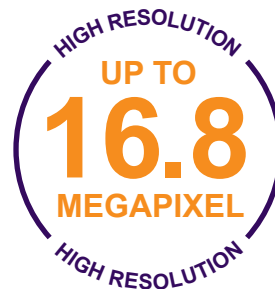
## Full-Frame Deep Cooling Scientific CCD Camera for Imaging Applications

Straight out of Berlin comes **ELSE**, greateyes' new platform for your spectroscopy and imaging applications in the UV - VIS - NIR range.

**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. Choose from a wide range of sensors to find the best match with your requirements. **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.



## TYPICAL APPLICATIONS

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

# ELSEi



## The golden child of low noise CCD cameras

The golden statue of Victoria upon the Berlin Victory Column has been given the nickname 'ELSE' by Berliners.

### FEATURES & BENEFITS

#### Ultra deep TE cooling down 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

#### Fast readout speeds up to 5 MHz

fast frame rates paired with low-noise electronics

#### Flexible software options

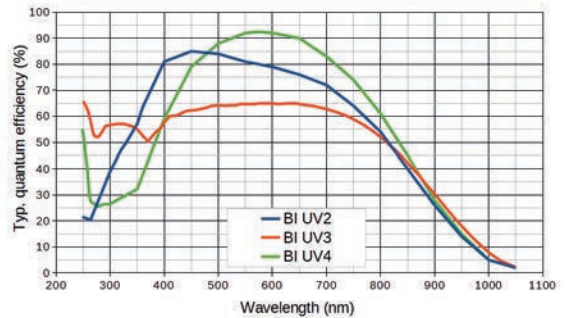
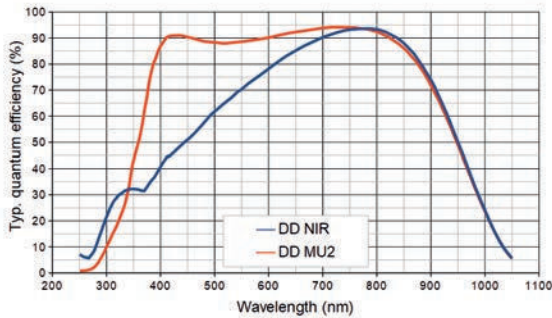
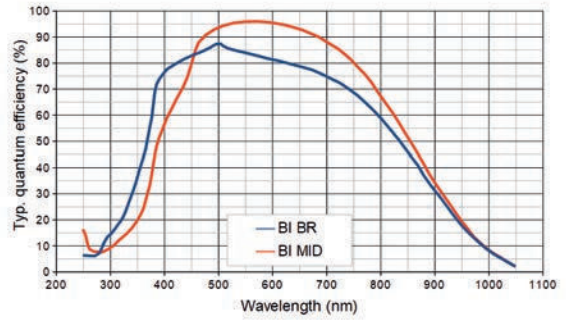
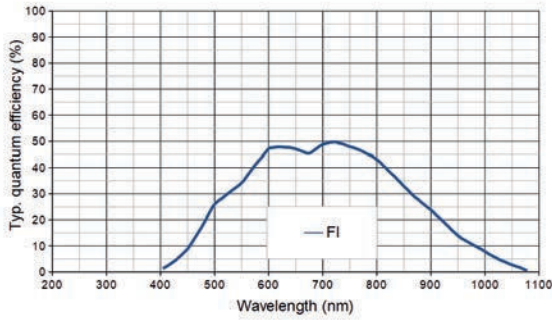
camera software and SDKs available

### COMMON SPECIFICATIONS





Pixel readout frequency	50 kHz, 250 kHz, 1 MHz, 3 MHz (5 MHz for visualisation 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	MgF <sub>2</sub> or UVFS for UV sensitive models, otherwise BK7
Flange - focal plane	10.0 mm (1k1k, 2k2k plus & 4k4k cameras); 9mm (2k2k camera)
Temperature monitoring	Two thermistors at CCD sensor and thermoelectric cooler (hot side)
Data link	Gigabit Ethernet, USB 3.0
Software	greateyes 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	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 (W x H x L)	1k1k & 2k2k Camera body: 8.3 cm x 10.0 cm x 13.1 cm (3.27" x 3.94" x 5.16") 2k2k plus & 4k4k Camera body: 13.7 cm x 13.7 cm x 17.1 cm (5.39" x 5.39" x 6.71")
Weight	2.2 kg (1k1k & 2k2k); 5.4kg (1k1k & 4k4k)

### Included with your camera

GE-VI01	greateyes Vision software suite for Windows		
GE-SDK01	SDK for Windows (C/C++ based)	GE-StoB2m	2m SMB to BNC connection cable x2
GE-USB3m3	3m USB 3.0 cable type A to type C	GE-POW01	Camera power supply with cabling
GE-GigE10m	10m Ethernet cable	GE-ManCam	Camera instruction manual



### STEP 1: Choose your camera model

ELSEi Series	 ELSEi 1k1k	 ELSEi 2k2k	 ELSEi 2k2k plus	 ELSEi 4k4k
Enhanced UV sensitivity	BI UV3	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 NIR DD MU2	DD MU2
Usable pixels (columns x rows)	1024 x 1024 (FI) 1056 x 1027 (others)	2048 x 2052	2048 x 2064	4096 x 4112
Active image area	13.3 mm x 13.3 mm	27.6 mm x 27.6 mm	30.7 mm x 30.7 mm	61.4 mm x 61.4 mm
Pixel size	13 μm x 13 μm	13.5 μm x 13.5 μm	15 μm x 15 μm	15 μm x 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 <sup>-</sup> 120 ke <sup>-</sup>	100 ke <sup>-</sup> 150 ke <sup>-</sup>	150 ke <sup>-</sup>	150 ke <sup>-</sup> 350 ke <sup>-</sup>
Register well / Output node	400 ke <sup>-</sup> / -	400 ke <sup>-</sup> / -	600 ke <sup>-</sup> / -	850 ke <sup>-</sup> / 900 ke <sup>-</sup> 900 ke <sup>-</sup> / 600 ke <sup>-</sup>
Typical read noise (e <sup>-</sup> )				
@ 50 kHz	2.8	3.4	4.6	4.6    2.8
@ 1 MHz	6.4	7.0	8.5	8.5    5.8
@ 3 MHz	10.9	13.6	17.0	17.0    10.4
Dark Current (e <sup>-</sup> /pixels/s)	@ -100°C 0.00015    0.0005	@ -90°C 0.0001    0.001	@ -90°C 0.00008	@ -90°C 0.00008    0.0006
Gain (counts/e <sup>-</sup> ): Standard Mode High Capacity Mode	1 -	1 0.34	0.6 0.2	0.6    1 0.2    0.34
CCD sensor type	Front-illuminated (FI), Back-illuminated (BI), Deep depletion fringe suppression (DD)			
Antireflective coating	UV (UV3), broadband (BR), midband (MID), near-infrared (NIR), multiband (MU2), astro broadband (UV2), astro midband (UV4)			
Blemish specifications	Grade 0 or Grade 1 (standard) as specified by sensor manufacturer. For more information please see: <a href="http://www.greateyes.de/en/glossar.html">www.greateyes.de/en/glossar.html</a>			

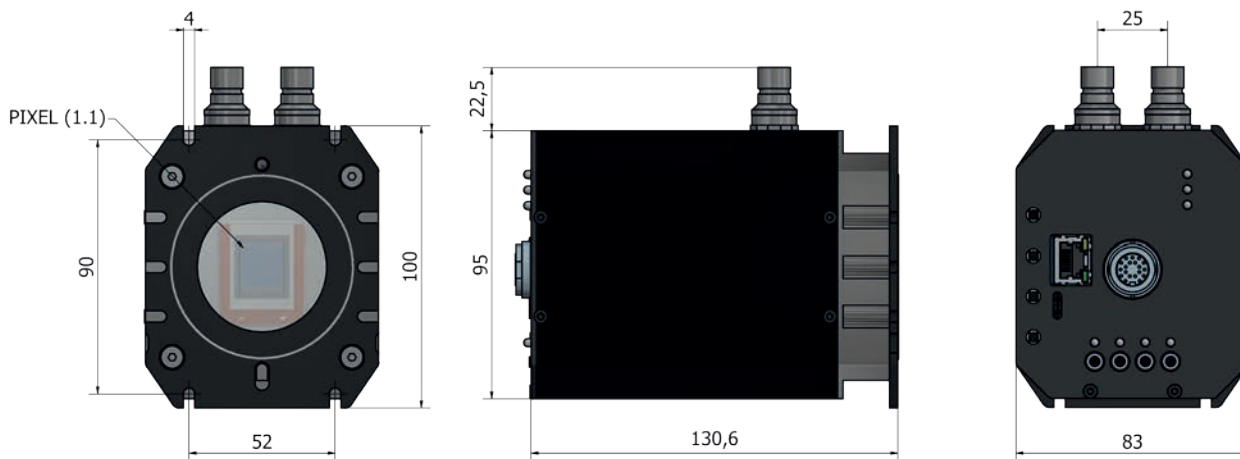
## STEP 2: Choose your accessories and software

Order Code	Description
<b>Accessories for Imaging Purposes</b>	
GE-CM02	C-mount lens adaptor for 1k1k camera
GE-M4202	M42 lens adaptor for 1k1k, 2k2k, and 2k2k plus cameras (integrated filter holder optional)
GE-FM02	F-mount lens adaptor for 1k1k, 2k2k, and 2k2k plus cameras (integrated filter holder optional)
GE-SR25	25mm shutter for 1k1k camera, including shutter driver module
GE-SR45	45mm shutter for 2k2k & 2k2k plus cameras, including shutter driver module
<b>Accessories for Enhanced Cooling Performance</b>	
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
<b>Software Development Kit (SDK) and Drivers</b>	
GE-LX01	SDK for Linux (C/C++ based)
GE-PYT01	Python driver
GE-LAB01	LabVIEW driver
GE-EP	EPICS driver
GE-TAN	Tango driver

## STEP 3: Flexible customisation service

With direct and fast response, we provide various customisations and OEM services. For example, the alteration of sensor position/tilt, the modification of camera housing or cooling system, etc. Let us know what **ELSEi** you require.

## TECHNICAL DRAWINGS



Find a distributor or representative



Follow us on LinkedIn



Subscribe to our newsletter



Pembroke Instruments, LLC  
 San Francisco, California  
[sales@pembrokeinstruments.com](mailto:sales@pembrokeinstruments.com)  
<https://pembrokeinstruments.com>  
 Tel. 650-550-8618