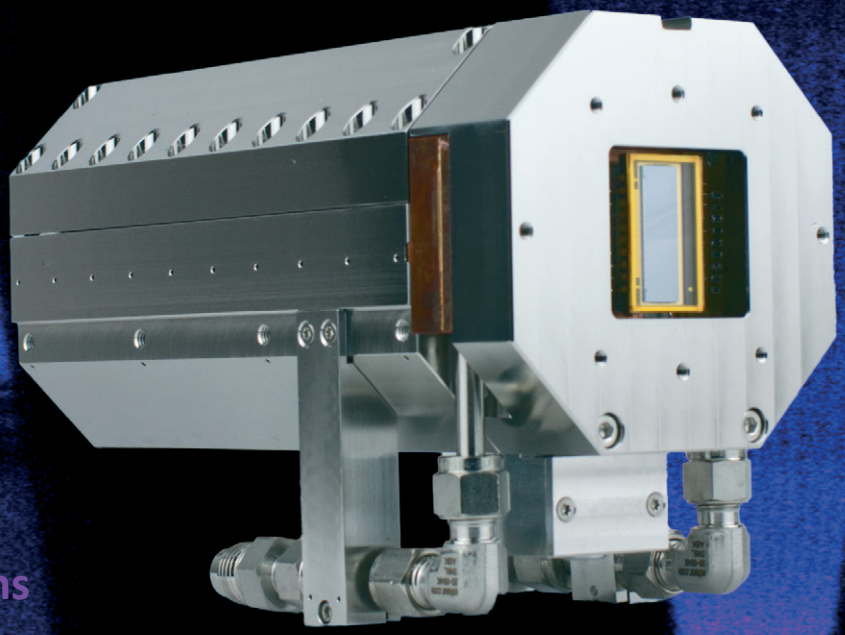
LOTTE-s

greateyes

DISCOVER WHAT
THE EYE CAN'T SEE

Full-Frame Deep Cooling In-vacuum Scientific CCD Camera for Spectroscopic Applications



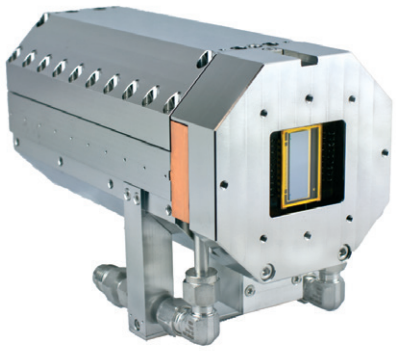
Typical Applications

Soft X-Ray Spectroscopy
Plasma Emission Spectroscopy
High Harmonic Generation Spectroscopy
NEXAFS Spectroscopy
Resonant Inelastic X-Ray Scattering

Key Specifications

UHV Compatibility through Encapsulated Design
High Quantum Efficiency
Ultra Deep Cooling up down -100 °C
18-bit Dynamic Range
Multi-MHz Readout
Compact Design

LOTTE-s



LOWEST OUTGASSING RATE & DEEPEST COOLING

LOTTE in-vacuum CCD camera is the latest innovation from greateyes. **LOTTE** can be submerged, operated and positioned freely inside a vacuum chamber. Utilising scientific-grade back-illuminated CCD sensors for the detection of EUV, VUV and X-ray signals, **LOTTE** is equipped with a novel and advanced cooling concept enabling detector temperatures as low as -100 °C. It is furthermore driven by the most powerful and versatile true 18-bit electronic platform available for in-vacuum use. This guarantees ultra low noise performance. One key feature that differentiates **LOTTE** from its nearest rivals is an innovative encapsulated stainless-steel housing, assuring extremely low outgassing at all times. The special design and unprecedented performance make the **LOTTE** a unique companion for demanding low-light scientific research applications. Additional handy features are further improving the user experience and adding true value.

Features & Benefits

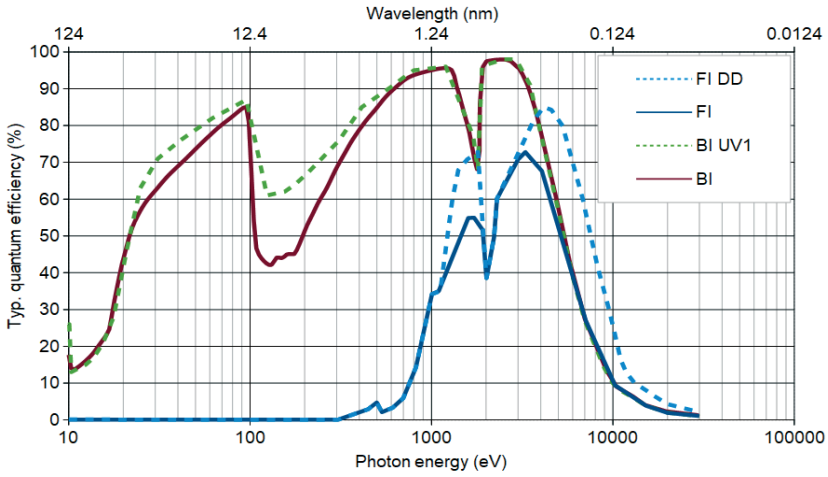
- **Ultra deep TE cooling down to -100 °C**
  lowest dark current for better detection limit
- **GigE data interface**
  local or remote network operation – your choice!
- **Fast readout speeds up to 5 MHz**
  fast frame rates paired with low-noise electronics
- **UHV Compatibility**
  encapsulated design delivers the lowest outgassing rate
- **High QE up to 98%**
  very sensitive sensors for low light applications
- **Flexible software options**
  camera software and SDKs available

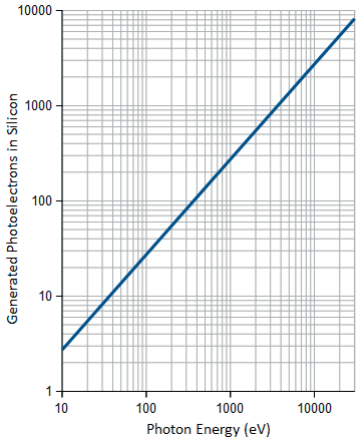
Common specifications

Pixel readout frequency	50/100/250/500 kHz, 1 MHz, 3 MHz (5 MHz visualization mode; up to 20 MHz by multi-output)
AD converter resolution	18-bit
Linearity	Better than 99%
CCD epitaxial thickness	15 µm standard, 40 µm for deep depletion (DD) models
Feedthrough Flange	CF DN100 flange with D-sub electrical feedthrough connectors and 6 mm liquid feedthrough tubes (airside: G 1/4 fitting female, vacuum side: VCR 1/4 fitting female)
Vacuum compatibility	10^{-9} mbar (UHV capability)
Bakeout temperature	Max. +80 °C
Flange - focal plane	6 mm (can be customised)
CCD sensor cooling	-100 ° C to 20 °C (liquid cooling only)
Temperature monitoring	Two thermistors at CCD sensor and thermoelectric cooler (hot side)
Data link	Gigabit Ethernet
Software	greateyes Vision software for Windows 7 / 10
SDK and drivers	DLL for Windows; LabVIEW, EPICS, Linux, Python, Tango driver (optional)
TTL interface signals	1 Exposure out, 1 Trigger in
Power supply	80-264 VAC (typ. 115/230), 47-63 Hz (typ. 50/60), max. 1.1 A (230 V) / 1.9 A (115 V)
Certification	CE
Dimensions, W × H × L	rc version: 98 mm × 90 mm × 235 mm | sc version: 90 mm × 127 mm × 189 mm
Weight	rc version: 4.9 kg | sc version: 5.0 kg

LOTTE-s

In the late 17th century queen Sophia Charlotte - nicknamed LOTTE- layed the foundation stone of Berlin's most famous palace "Schloss Charlottenburg".



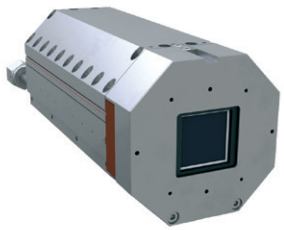


The mean energy of a photon to generate an electron-hole pair in silicon is 3.66 eV.

Step 1: Choose your camera model

LOTTE-s Series	LOTTE-s 1k256	LOTTE-s 2k512
Sensor code	**FI** **FI DD** **BI UV1**	**FI** **BI** **BI UV1**
Usable pixels (columns × rows)	1024 × 255	2048 × 515
Active image area	26.6 mm × 6.7 mm	27.6 mm × 6.9 mm
Pixel size	26 µm × 26 µm	13.5 µm × 13.5 µm
Full well capacity	500 ke⁻ / 700 ke⁻ (DD)	100 ke⁻
Register well capacity	1 000 ke⁻ / 1 400 ke⁻ (DD)	400 ke⁻
Typ. read noise (e⁻) @ 50 kHz @ 1 MHz @ 3 MHz	FI / BI / DD 4.2 / 6.0 / 5.4 12.0 / 13.1 / 12.3 25.0 / 26.0 / 25.0	 3.5 6.8 10.7
Typ. dark current (e⁻/pixel/s)	@ -100 °C 0.0004 / 0.005 (DD)	@ -100 °C 0.00025
Gain (counts/e⁻): Standard mode High capacity mode	 0.4 counts/e⁻ -	 1 counts/e⁻ 0.34 counts/e⁻
CCD sensor type	Front-illuminated (FI), back-illuminated (BI), deep depletion fringe suppression (DD), enhanced back-illuminated (BI UV1)	
Blemish specifications	Grade 0 or grade 1 (standard) as specified by sensor manufacturer. For more information, please see: https://www.greateyes.de/en/glossar.html	

Step 2: Choose your camera design

"rc" Version	"sc" Version
	
• Compact in diameter, camera body fits into 6 inch tube • Electrical and water connectors on the rear side	• Camera length only 189 mm • Electrical and water connectors on the bottom side
Order code: LOTTE-s 2k512 BI UV1 rc	Order code: LOTTE-s 1k256 FI DD sc

LOTTE-s

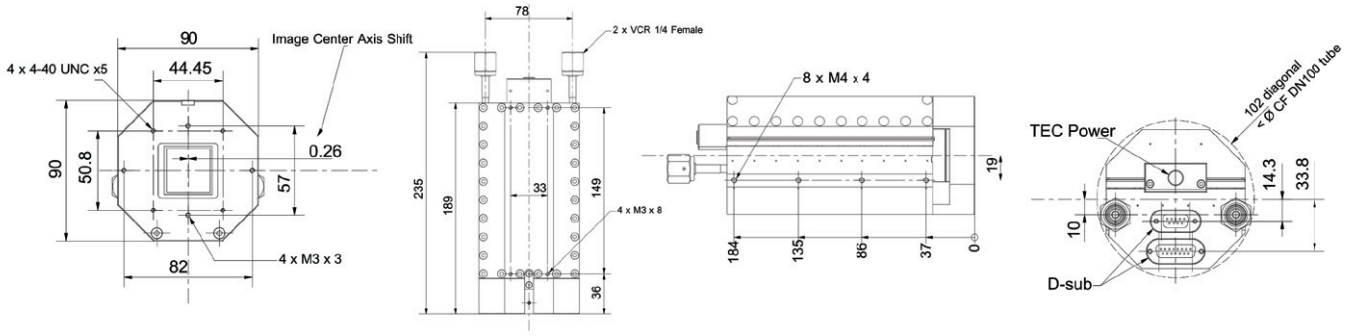
Step 3: Choose your accessories and software

Order code	Description
A) Accessories for imaging purposes	
GE-SR35	35mm in-vacuum shutter, including shutter driver module
B) Accessories for cooling performance (LOTTE series can only be cooled by liquid cooling)	
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
GE-VacP01	2 × in-vacuum hoses, formed bellow 1/4“, VCR male/female, 305 mm (standard accessory)
GE-VacP02	2 × in-vacuum hoses, formed bellow 1/4“, VCR male/female, 1200 mm (upon request)
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

Step 4: Flexible customisation service

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

TECHNICAL DRAWINGS*



***Only valid for LOTTE-i 2k2k cameras. For other drawings, please send us an equiry.**

Items included with your camera

GE-InFl02	CF DN100 flange with electrical & liquid feedthroughs
GE-VacP01	2 × in-vacuum hoses for cooling
GE-VacCab	2 × in-vacuum PTFE D-sub cables
GE-VI01	greateyes Vision software (Windows)
GE-SDK01	SDK for Windows (C/C++ based)
GE-GigE10m	10m Ethernet cable
GE-StoB2m	2m SMB to BNC connection cable × 2
GE-POW01	Camera power supply with cabling
GE-ManCam	Camera instruction manual

Subscribe to newsletter

Follow us on LinkedIn

greateyes GmbH
Justus-von-Liebig-Str. 2
12489 Berlin
Germany

Phone: +49 30 912075 250
Fax: +49 30 912075 251

Web: www.greateyes.de
E-mail: info@greateyes.de
For a list of representatives and distributors, please visit our website.