

LOTTEs

KEY SPECIFICATIONS

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

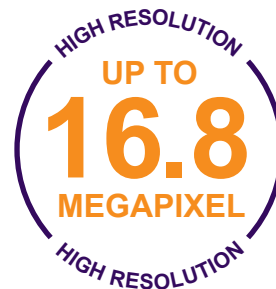
Full-Frame Deep Cooling In-vacuum CCD Camera for Spectroscopy Applications

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.



VUV

EUV

SXR

HXR

TYPICAL APPLICATIONS

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



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LOTTEs



Wearing the crown for lowest outgassing rate

Queen Sophia Charlotte - nicknamed 'LOTTE' - laid the foundation stone of Berlin's most famous place 'Schloss Charlottenburg'

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

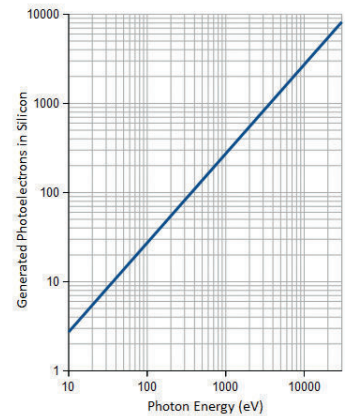
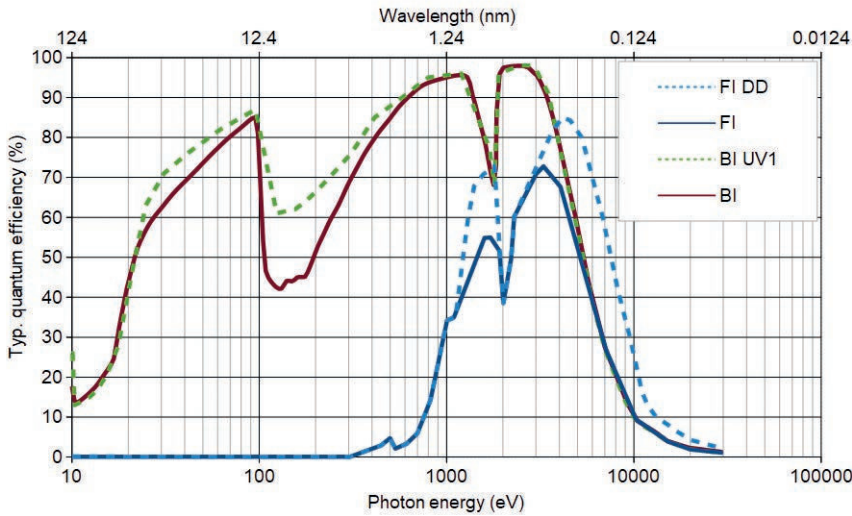
Pixel readout frequency	50/100/250/500 kHz, 1 MHz, 3 MHz (5 MHz for visualisation mode; up to 20 MHz by multi-output)
AD converter resolution	18-bit
Linearity	Better than 99%
CCD epitaxial thickness	15 µm standard, 40 µm for deep depletion (DD) models
Feedthrough flange	CF DN100 flange with D-sub electrical 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 place	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	Exposure out, shutter out, 2 external 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 x H x L)	rc version: 98 mm x 90 mm x 235 mm; sc version: 90 mm x 127 mm x 189mm
Weight	rc version: 4.4 kg; sc version: 4.6 kg

Included with your camera

GE-InFI02	CF DN100 flange with electrical and liquid feedthroughs		
GE-VacP01	2x in-vacuum hoses for cooling	GE-GigE10m	10m Ethernet cable
GE-VacCab	2x in-vacuum PTFE D-sub cables	GE-StoB2m	2m SMB to BNC connection cable x2
GE-VI01	greateyes Vision software suite for Windows	GE-POW01	Camera power supply with cabling
GE-SDK01	SDK for Windows (C/C++ based)	GE-ManCam	Camera instruction manual

LOTTEs

HIGH PERFORMANCE SPECTROSCOPY CAMERAS



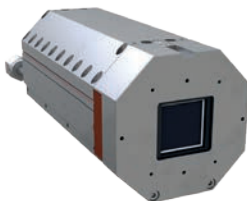
The mean energy of a photon to generate an electron-hole pair in silicon is 3.66 eV.

STEP 1: Choose your camera model

LOTTEs Series	LOTTEs 1k128	LOTTEs 1k256	LOTTEs 2k512
Sensor code	FI	FI DD BI UV1	FI BI BI UV1
Usable pixels (columns x rows)	1024 x 127	1024 x 255	2048 x 515
Active image area	26.6 mm x 3.3 mm	26.6 mm x 6.7 mm	27.6 mm x 6.9 mm
Pixel size	26 μm x 26 μm	26 μm x 26 μm	13.5 μm x 13.5 μm
Full well capacity	500 ke ⁻	500 ke ⁻ / 700 ke ⁻ (DD)	100 ke ⁻
Register well capacity	1 000 ke ⁻	1 000 ke ⁻ / 1 400 ke ⁻ (DD)	400 ke ⁻
Typical read noise (e ⁻)		FI BI DD	
@ 50 kHz	4.4	4.2 6.0 5.4	3.5
@ 1 MHz	11.0	12.0 13.1 12.3	6.8
@ 3 MHz	25.0	25.0 26.0 25.0	10.7
Typical Dark Current @ -100°C	0.0004 e ⁻ /pixels/s	0.0004 / 0.005 e ⁻ /pixels/s (DD)	0.00025 e ⁻ /pixels/s
Gain:			
Standard Mode	0.4 counts/e ⁻	0.4 counts/e ⁻	1 counts/e ⁻
High Capacity Mode	-	-	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: www.greateyes.de/en/glossar.html		

STEP 2: Choose your camera design

'rc' version



Compact in diameter, camera body fits into a 6 inch tube
Electrical and water connectors on the rear side

Order Code:
LOTTE-s 2k512 BI UV1 - rc

'sc' version



Camera length only 189 mm
Electrical and water connectors on the bottom side

Order Code:
LOTTE-s 1k256 FI DD - sc

STEP 3: Choose your accessories and software

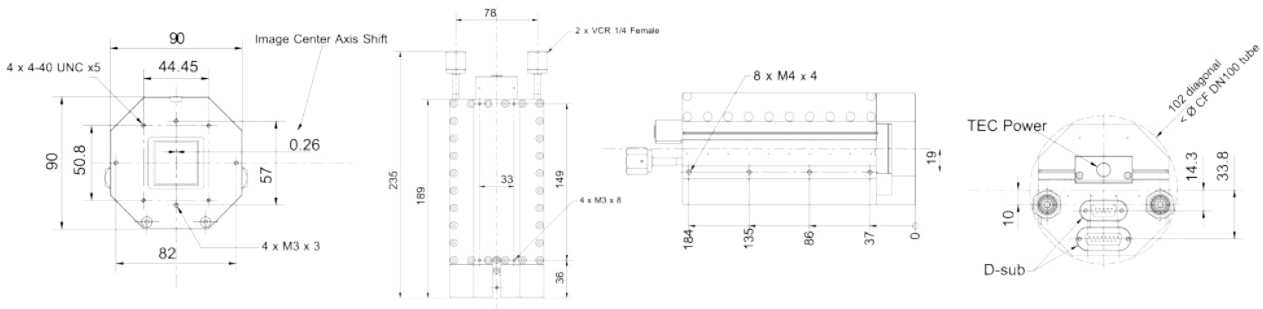
Order Code	Description
Accessories for Imaging Purposes	
GE-SR35	35mm in-vacuum shutter, including shutter driver module
Accessories for Cooling Performance (LOTTE series can only be cooled by liquid cooling)	
GE-CR01	Compact liquid cooling, circulating the coolant at room temperature for deep camera cooling
GE-CR02	Recirculating water chiller, PID control with temp. from -5°C to 30°C for ultra-deep camera cooling
GE-VacP01	2x in-vacuum hoses, formed bellow 1/4", VCR male/female, 305 mm (standard accessory)
GE-VacP02	2x in-vacuum hoses, formed bellow 1/4", VCR male/female, 1200 mm (upon request)
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 LOTTEs 2k2k cameras. For other drawings, please send us an enquiry.



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