SCIENTIFIC IN-VACUUM CCD CAMERAS

for VUV, EUV, X-Ray Imaging and Spectroscopy

DATA SHEET:

GE-VAC 1024 1024 series

GE-VAC 1024 256 series

GE-VAC 2048 512 series

SPECTRAL RANGES:

Vacuum-Ultraviolet (VUV)

Extreme-Ultraviolet (EUV)

Soft X-ray

Hard X-ray

NIR, VIS, UV

GE-VAC 1024 1024 series	GE-VAC 1024 256 series	GE-VAC 2048 512 series
1024 × 1024 pixels	1024 × 256 pixels	2048 × 512 pixels
13.3 mm × 13.3 mm image area	26.6 mm × 6.7 mm image area	27.6 mm × 6.9 mm image area
13 µm × 13 µm pixel size	26 µm × 26 µm pixel size	13.5 µm × 13.5 µm pixel size
in-vacuum version	in-vacuum version	in-vacuum version

Based on a unique platform concept, greateyes offers a portfolio of scientific in-vacuum cameras for imaging and spectroscopy in the VUV, EUV, soft and hard X-ray range. They are fabricated in stainless steel or aluminium providing excellent vacuum compatibility. A single additional flange integrates electrical and water cooling feedthroughs. Incoming photons are directly detected by the CCD sensor. No external controller is required to operate the detectors.

All greateyes cameras combine scientific CCD sensors with ultra-low noise electronics for optimal detection of weak signals. Select among different spectral sensitivities and sensor technologies to find the best solution for your imaging or spectroscopic application.
Deep cooling of the sensor is achieved by means of multi-stage thermoelectric Peltier elements. The cameras are equipped with a rich set of functionalities including flexible binning operation, various trigger and synchronisation modes, software adjustable gain settings as well as temperature monitoring of the CCD sensor and heat dissipation system.

Key features

Compact size	16-bit digitization	Flexible binning and crop modes
Full well capacity up to 700 ke$^-$	Deep cooling down to -80°C	Software adjustable gain settings
Scientific low-noise CCD sensors	Single flange for feedthroughs	greateyes Vision software included
Optimised for UHV compatibility	Temperature monitoring	SDK for developers included
Quantum efficiency up to 98%	Ext. trigger, shutter, sync signals	EPICS, LabVIEW or Linux integration

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SPECIFICATIONS

Model specifications

	GE-VAC 1024 1024 series	GE-VAC 1024 256 series			GE-VAC 2048 512 series
Nominal pixel format	1024 × 1024	1024 × 256			2048 × 512
Image area	13.3 mm × 13.3 mm	26.6 mm × 6.7 mm			27.6 mm × 6.9 mm
Pixel size	13 µm × 13 µm	26 µm × 26 µm			13.5 µm × 13.5 µm
Full well capacity	100 ke⁻ / 120 ke⁻ (DD)	500 ke⁻ / 700 ke⁻ (DD)			100 ke⁻
Register well capacity	400 ke⁻	1 000 ke⁻ / 1 400 ke⁻ (DD)			400 ke⁻
Typ. read noise (e⁻) @ 500 kHz @ 1 MHz @ 3 MHz	FI / BI / DD 5.2 6.6 9.7	FI 7.5 10.7 17.3	BI 9.7 12.1 19.2	DD 9.0 11.6 18.0	FI / BI 5.7 6.9 10.3
Dark current @ -80°C	0.0003 e⁻/pixel/s 0.017 e⁻/pixel/s (DD)	0.0005 e⁻/pixel/s 0.08 e⁻/pixel/s (DD)			0.0003 e⁻/pixel/s
Gain	1 counts/e⁻ (high) 0.4 counts/e⁻ (low)	1 counts/e⁻ (high) 0.2 counts/e⁻ (low)			1 counts/e⁻ (high) 0.4 counts/e⁻ (low)
CCD sensor type	Front-illuminated (FI), back-illuminated (BI), deep depletion fringe suppression (DD), enhanced back-illuminated (UV1)				
Blemish specifications	Grade 0 or grade 1 (standard) as specified by sensor manufacturer				

Common specifications

Pixel readout frequency	500 kHz, 1 MHz, 3 MHz
AD converter resolution	16-bit, 18-bit (optional)
Linearity	Better than 99%
CCD epitaxial thickness	15 µm standard, 40 µm for deep depletion models
Feedthrough flange	CF DN63 with integrated electrical feedthroughs sub-D 15pin and sub-D 9pin (male/male) plus feedthrough tubes for water cooling with VCR 1/4″ female connectors on vacuum side
Vacuum compatibility	from 1 x 10^{-3} mbar to 1 x 10^{-8} mbar
Bakeout temperature	Max. +80°C
Distance flange - focal plane	10.0 mm
CCD sensor cooling	min. -80°C to 20°C, liquid cooling
Temperature monitoring	CCD sensor and heat dissipation system
Data link	USB 2.0
Software	greateyes Vision software for Windows 7 / 10
SDK and drivers	DLL for Windows 7 / 10; LabVIEW, EPICS, Linux driver (optional)
TTL interface signals	Sync out, shutter out, external trigger in
Power supply	110-240 VAC, 50-60 Hz, max. 1 A
Certification	CE
Dimensions	6.2 cm (2.44″) x 10.0 cm (3.94″) x 13.2 cm (5.20″) (W x H x L)
Weight	2 300 g

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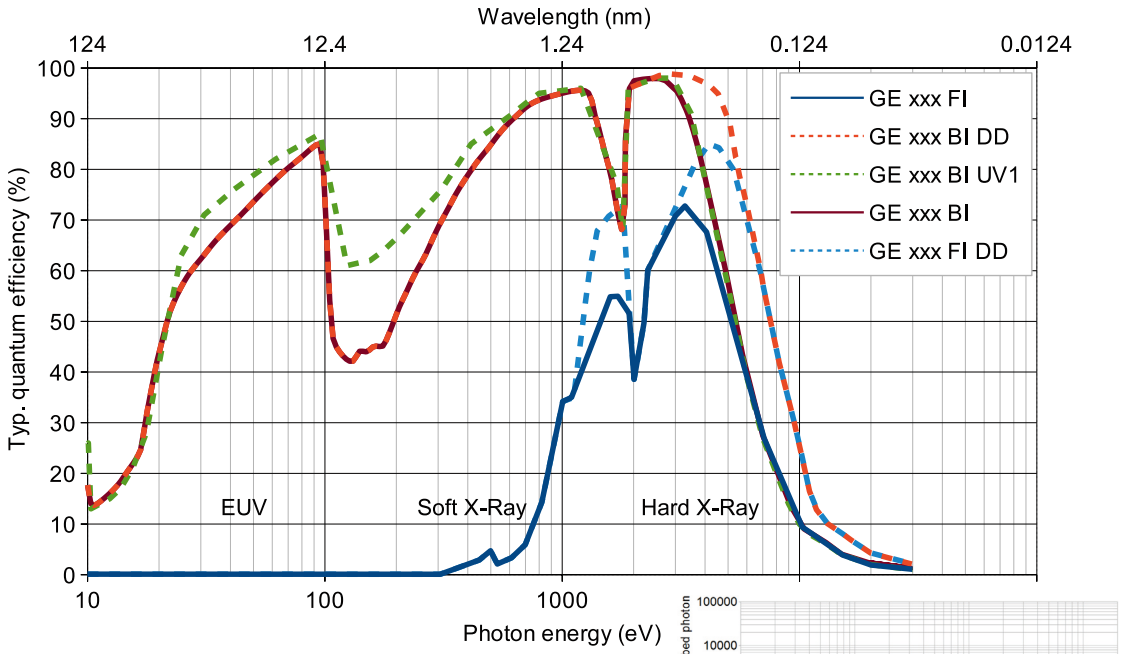
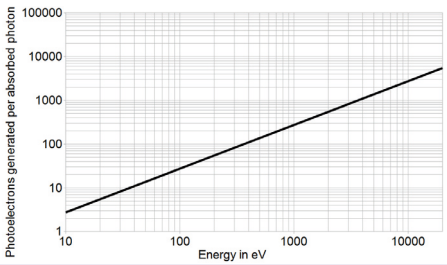
STEP 1: Choose camera model by order code

	GE-VAC 1024 1024 series	GE-VAC 1024 256 series	GE-VAC 2048 512 series
High sensitivity in the VUV, EUV, soft and hard X-ray range	GE-VAC 1024 1024 FI GE-VAC 1024 1024 BI GE-VAC 1024 1024 BI UV1 GE-VAC 1024 1024 BI DD	GE-VAC 1024 256 FI GE-VAC 1024 256 FI DD GE-VAC 1024 256 BI UV1 GE-VAC 1024 256 BI DD	GE-VAC 2048 512 FI GE-VAC 2048 512 BI GE-VAC 2048 512 BI UV1





STEP 2: Choose accessories and software

Order code	Description
A) Subpixel resolution enhancement	
New GE-S xxx xxx series	Increased spatial resolution (See scientific superresolution camera data sheet for details)
B) Accessories for cooling	
GE-CR01	Compact recirculator operating at room temperature for deep camera cooling
GE-CR02	Recirculating water chiller, temperature range -5°C to 30°C for ultra-deep camera cooling
C) Software development kit (SDK) and drivers	
GE-SDK01	SDK for Windows compatible (based on C/C++)
GE-LAB01	LabVIEW driver
GE-EP	EPICS driver
GE-LX01	Linux driver

Items delivered together with each in-vacuum camera

GE-InFl	CF DN63 flange with feedthroughs sub-D 15pin (male/male) + sub-D 9pin (male/male) and feedthrough tubes for water cooling with VCR female 1/4″ on vacuum side
GE-VacP or GE-VacP2	2 x in-vacuum hoses, formed bellow 1/4″, VCR male/female, 305 mm or 1200 mm length
GE-VacCab	2 x in-vacuum PTFE cables Sub-D 15pin and Sub-D 9pin, each male/female, length adapted to in-vacuum hoses
GE-POW01	Camera power supply
GE-CabSp	Air side cable from Sub-D 9pin female to USB and BNC trigger-in + sync output Air side cable from Sub-D 15pin female to Sub-D 15pin male for power supply box
GE-ManCam	Camera instruction manual on storage device

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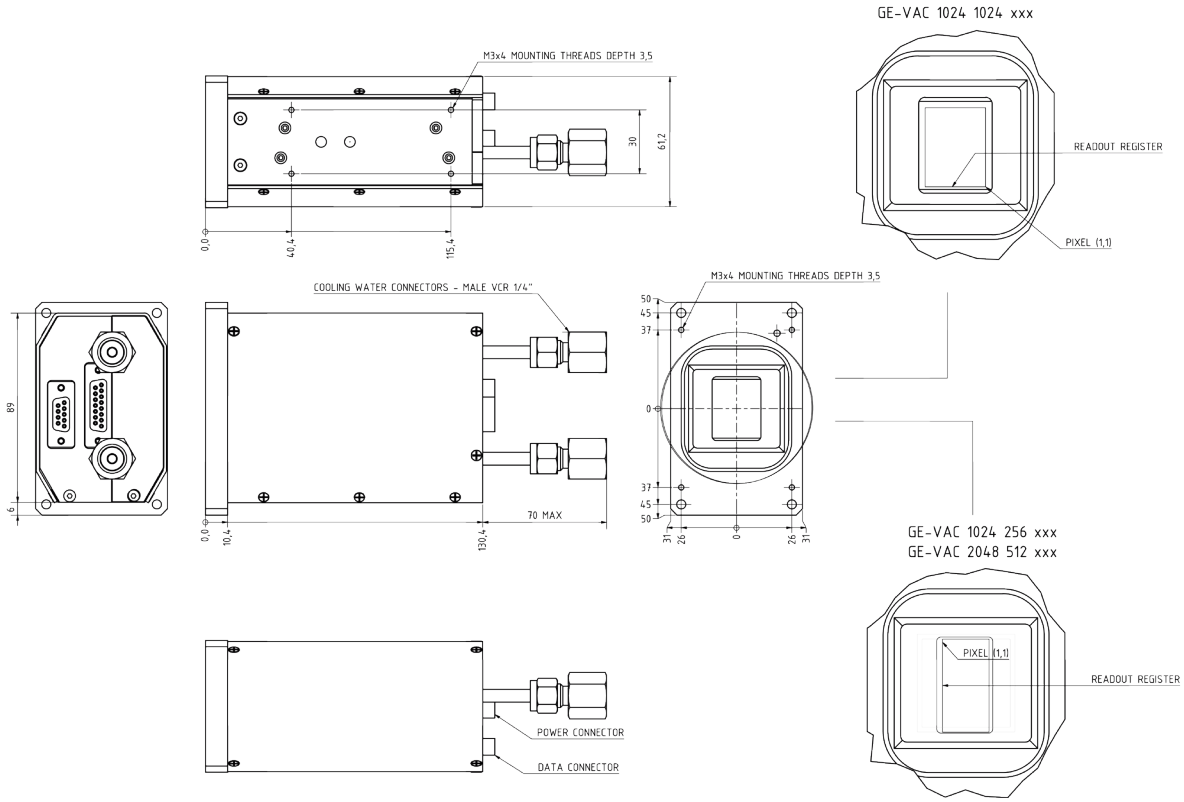
TECHNICAL DRAWINGS



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