SCIENTIFIC FULL-FRAME CCD CAMERAS
for VUV, EUV, X-Ray Imaging and Spectroscopy

DATA SHEET:

GE 1024 1024 series

GE 1024 256 series

GE 2048 512 series

SPECTRAL RANGES:

Vacuum-Ultraviolet (VUV)

Extreme-Ultraviolet (EUV)

Soft X-ray

Hard X-ray

NIR, VIS, UV

GE 1024 1024 series	GE 1024 256 series	GE 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
Vacuum flange interface	Vacuum flange interface	Vacuum flange interface

Based on a unique platform concept, greateyes offers a portfolio of scientific cameras with vacuum interface for imaging and spectroscopy in the VUV, EUV, soft and hard X-ray range. Incoming photons are directly detected by the CCD sensor. Besides precise measurement of high energy radiation, the detectors exhibit high sensitivity in the ranges NIR, VIS and UV as well.

All greateyes cameras combine scientific CCD sensors with ultra-low noise electronics for optimal detection of weak signals. Select among different spectral sensitivities and flange types to find the best solution for your imaging or spectroscopic application. Deep cooling of the sensor is achieved by means of multi-stage thermoelectric coolers. The cameras provide 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 sensor and heat radiation system.

Key features

Compact size	16-bit digitization	Flexible binning and crop modes
Full well capacity up to 700 ke⁻	Deep cooling down to -100°C	Software adjustable gain setting
Scientific low-noise CCD sensors	Liquid and forced air cooling	greateyes Vision software included
USB 2.0 or Gigabit Ethernet interface	Temperature monitoring	SDK for developers included
Quantum efficiency up to 98%	Ext. trigger, shutter, sync signals	EPICS, LabVIEW or Linux integration

DISCOVER WHAT
THE EYE CAN'T SEE

Phone: 400-888-5556 WeChat: Auniontech Website: www.auniontech.com E-mail: info@auniontech.com

SPECIFICATIONS

Model specifications

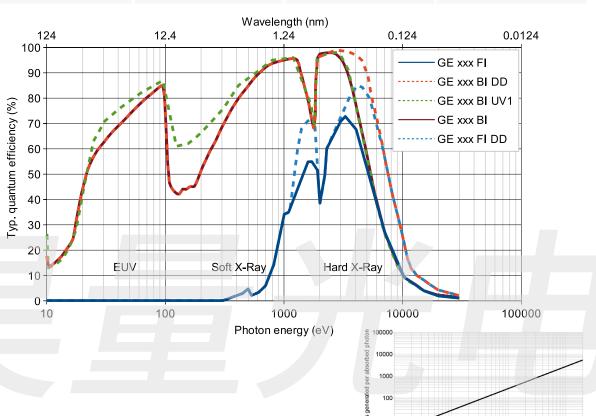|	GE 1024 1024 series	GE 1024 256 series			GE 2048 512 series
Nominal pixel format	1024 × 1024	1024 × 256			2048 × 512
Image area	13.3 mm × 13.3 mm	26.6 mm × 6.7 mm			27.6 mm × 6.9 mm
Pixel size	13 µm × 13 µm	26 µm × 26 µm			13.5 µm × 13.5 µm
Full well capacity	100 ke$^-$ / 120 ke$^-$ (DD)	500 ke$^-$ / 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 signal @ -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 (BI UV1)				
Blemish	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 (DD) models
Flange types	ISO-F DN63, knife-edge sealed CF DN63, CF DN100, CF DN160
Vacuum compatibility	With CF flange: <10^{-10} mbar (UHV capability)
Bakeout temperature	Max. +80°C
Distance flange - focal plane	19.6 mm for CF DN 63
CCD sensor cooling	Min. -100°C to 20°C, forced air or liquid cooling
Temperature monitoring	CCD sensor and thermoelectric cooler (hot side)
Data link	USB 2.0, Gigabit Ethernet (optional)
Software	greateyes Vision software for Windows XP / Vista / 7 / 10
SDK and drivers	DLL for Windows XP / Vista / 7 / 10; LabVIEW, EPICS, Linux driver
TTL interface signals	Sync out, shutter out, external trigger in
Operating conditions	Temperature: 0°C to 35°C ambient, relative humidity <80% (non condensing)
Power supply	110-240 VAC, 50 Hz-60 Hz, max. 1 A
Certification	CE
Dimensions	6.2 cm (2.44″) × 8.7 cm (3.43″) × 12.3 cm (4.84″) (W × H × L) camera body
Weight	2 300 g (camera with CF DN63 flange)

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STEP 1: Choose camera model by order code

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

STEP 2: Select interface vacuum flange

Order code	Description
camera order code + IS1	Quick release flange ISO-F DN63 with through holes
camera order code + CF4 / CF5	Knife-edge sealed CF DN63 / CF DN100 flange with threaded / through holes
camera order code + CF6	Knife-edge sealed CF DN160 flange. An integrated pumping pipe with CF DN40 flange allows differential separate pumping of sensor area for UHV designs.

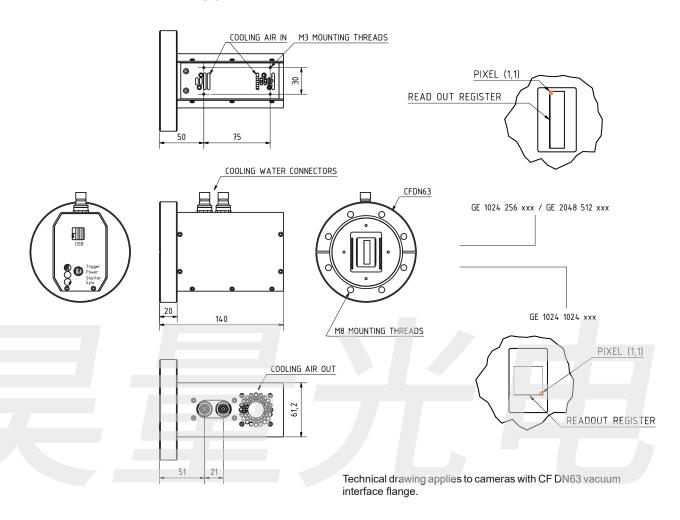## STEP 3: Choose accessories and software

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) Software development kit (SDK) and drivers	
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 (based on C/C++)
GE-LAB01	LabVIEW driver
GE-EP	EPICS driver
GE-LX01	Linux driver

STEP 4: For customisation of the camera detector, please let us know your requirements.

TECHNICAL DRAWINGS

COOLING AIR IN   M3 MOUNTING THREADS

30

50   75

PIXEL (1,1)

READ OUT REGISTER

COOLING WATER CONNECTORS

USB

Trigger
Power
Shutter
Sync

CFDN63

20   140

M8 MOUNTING THREADS

COOLING AIR OUT

61,2

51   21

GE 1024 256 xxx / GE 2048 512 xxx

GE 1024 1024 xxx

PIXEL (1,1)

READOUT REGISTER

Technical drawing applies to cameras with CF DN63 vacuum interface flange.

Items delivered together with each camera

GE-VI01	greateyes Vision software suite for Windows
GE-StoB2m	2m SMB to BNC connection cable
GE-USB5m	5m USB 2.0 cable type A to type B
GE-POW01	Camera power supply with cabling
GE-ManCam	Camera instruction manual on storage device

CONTACT INFORMATION

Aunion Tech Co.,Ltd
Floor 3, F Building, No. 86 Caobao road, Shanghai 200235 P.R. China
Tel: +86-21-51083793   Fax:+86-21-34241962
E-Mail: info@auniontech.com   Website: www.auniontech.com