

## DATA SHEET:

GE 4096 4096 series

## SPECTRAL RANGES:

Vacuum-ultraviolet (VUV)

Extreme-ultraviolet (EUV)

Soft X-ray

Hard X-ray

Near-infrared (NIR)

Visible (VIS)

Ultra-violet (UV)

### GE 4096 4096 series

4096 × 4096 active pixels, 61.4 mm × 61.7 mm image area, 15 μm × 15 μm pixel size, Gigabit ethernet

Vacuum flange interface CF DN160 with attached pumping port CF DN25

greateyes wafer-scale CCD cameras with back-illuminated 16.8 Megapixel sensors provide exceptional high performance for most demanding applications in research and industry. Due to the large pixel size of 15 μm, a maximum full well capacity of 350,000 e<sup>-</sup> and a very low readout noise, the detectors provide an extremely high dynamic range. Flexible readout schemes using 1, 2 or all 4 output amplifiers as well as flexible binning settings are fully supported. A gigabit ethernet interface with full TCP/IP supports flexible integration in large-scale scientific facilities.

The sensor is placed in front of the flange maximising the possible angle of detection. A separate pumping port can serve the evacuation of the detector in case it is used together with a window flange in air environment. With integrated multistage Peltier elements thermoelectrically to cool the sensor, there is no need for cryo-coolers or liquid nitrogen. The cameras provide precise temperature monitoring of the sensor and the camera head, ideally suited for controlled bakeout to achieve UHV vacuum conditions.

### Key features

Scientific low-noise CCD sensors	18-bit digitization	Flexible 4-port readout & binning
Full well capacity up to 350 ke <sup>-</sup>	Deep cooling down to -90°C	Software adjustable gain setting
Sensor read noise down to 2 e <sup>-</sup>	Liquid and forced air cooling	greateyes Vision software included
Gigabit ethernet & USB 3.0 interface	Temperature monitoring	SDK for developers included
Quantum efficiency up to 98%	Ext. trigger, shutter, sync signals	EPICS, LabVIEW or Linux integration

## SPECIFICATIONS

### Model specifications

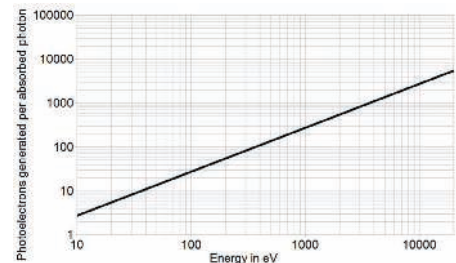
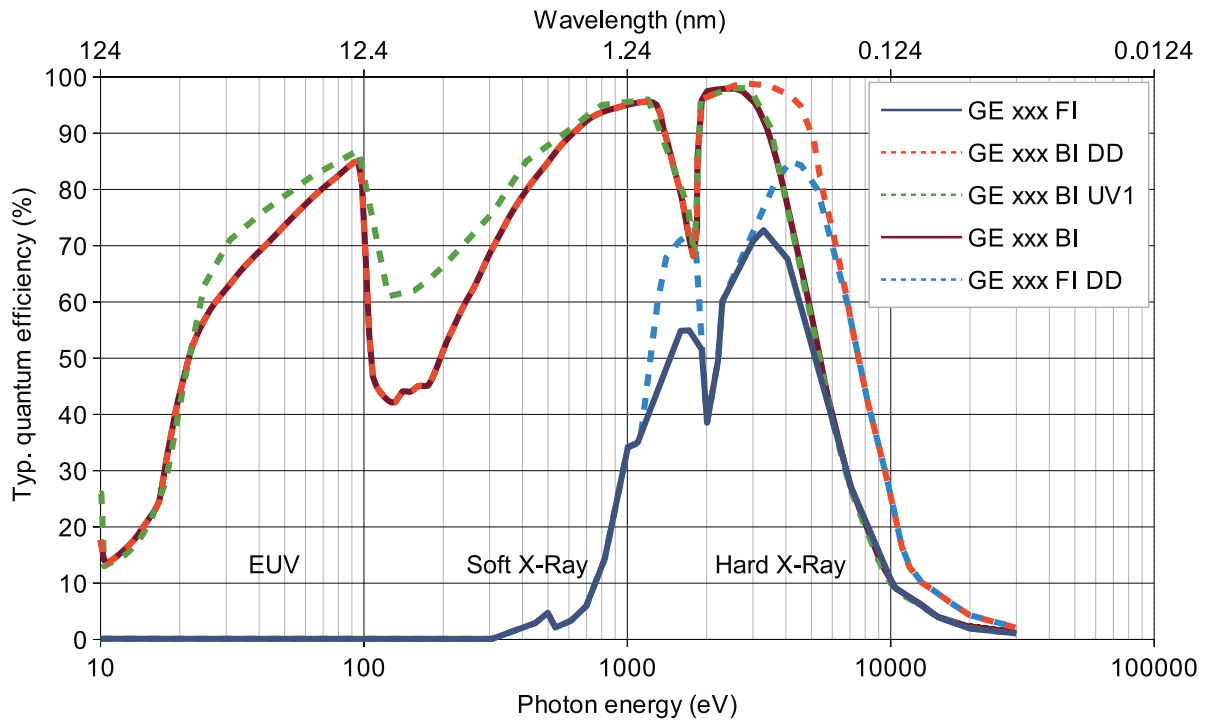
	GE 4096 4096 BI	GE 4096 4096 BI UV1
Nominal pixel format	4096 × 4096	4096 × 4096
Image area	61.4 mm × 61.7 mm	61.4 mm × 61.7 mm
Pixel size	15 μm × 15 μm	15 μm × 15 μm
Full well capacity	150 ke <sup>-</sup> (typical)	350 ke <sup>-</sup> (typical)
Output node capacity	900 ke <sup>-</sup> (typical)	600 ke <sup>-</sup> (typical)
Sensor read noise (e <sup>-</sup> )		
@ 50 kHz	4.4 (typical)	2.0 (typical)
@ 1 MHz	8.5 (typical)	4.8 (typical)
@ 3 MHz	14.0 (typical)	8.0 (typical)
@ 5 MHz	18.0 (typical)	-
Typ. dark signal @ -90°C	0.00008 e <sup>-</sup> /pixel/s	0.006 e <sup>-</sup> /pixel/s
Camera gain	switchable, max. 1 count/e <sup>-</sup>	switchable, max. 1 count/e <sup>-</sup>
CCD sensor type	Back-illuminated (BI), IMO Device	Enhanced back-illuminated (UV1), NIMO Device
Blemish specifications	Grade 0 or grade 1 (standard) as specified by sensor manufacturer	

### Common specifications

Pixel readout frequency	50 kHz, 1 MHz, 3 MHz
AD converter resolution	16-bit, 18-bit (optional)
Readout Modes	1, 2 or all 4 output nodes
Linearity	Better than 99%
Flange types	Knife-edge sealed CF DN160, integrated separate pumping port (optional)
Vacuum compatibility	<10 <sup>-9</sup> mbar (UHV capability)
Bakeout temperature	Max. +80°C
Distance flange - CCD focal plane	20.5 mm +/- 0.1 mm
CCD sensor cooling	Min. -90°C to 20°C, forced air or liquid cooling
Temperature monitoring	CCD sensor and heat radiation system
Data link	Gigabit ethernet, USB 3.0
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, 2 x 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. 3 A
Certification	CE
Dimensions	15.0 cm (5.90") × 13.5 cm (5.31") × 28.5 cm (11.22") (W × H × L) camera body
Weight	9 500 g

**STEP 1: Choose camera model by order code**

Order code	Description
GE 4096 4096 BI	Uncoated back-illuminated CCD sensor
GE 4096 4096 BI UV1	Uncoated enhanced back-illuminated CCD sensor

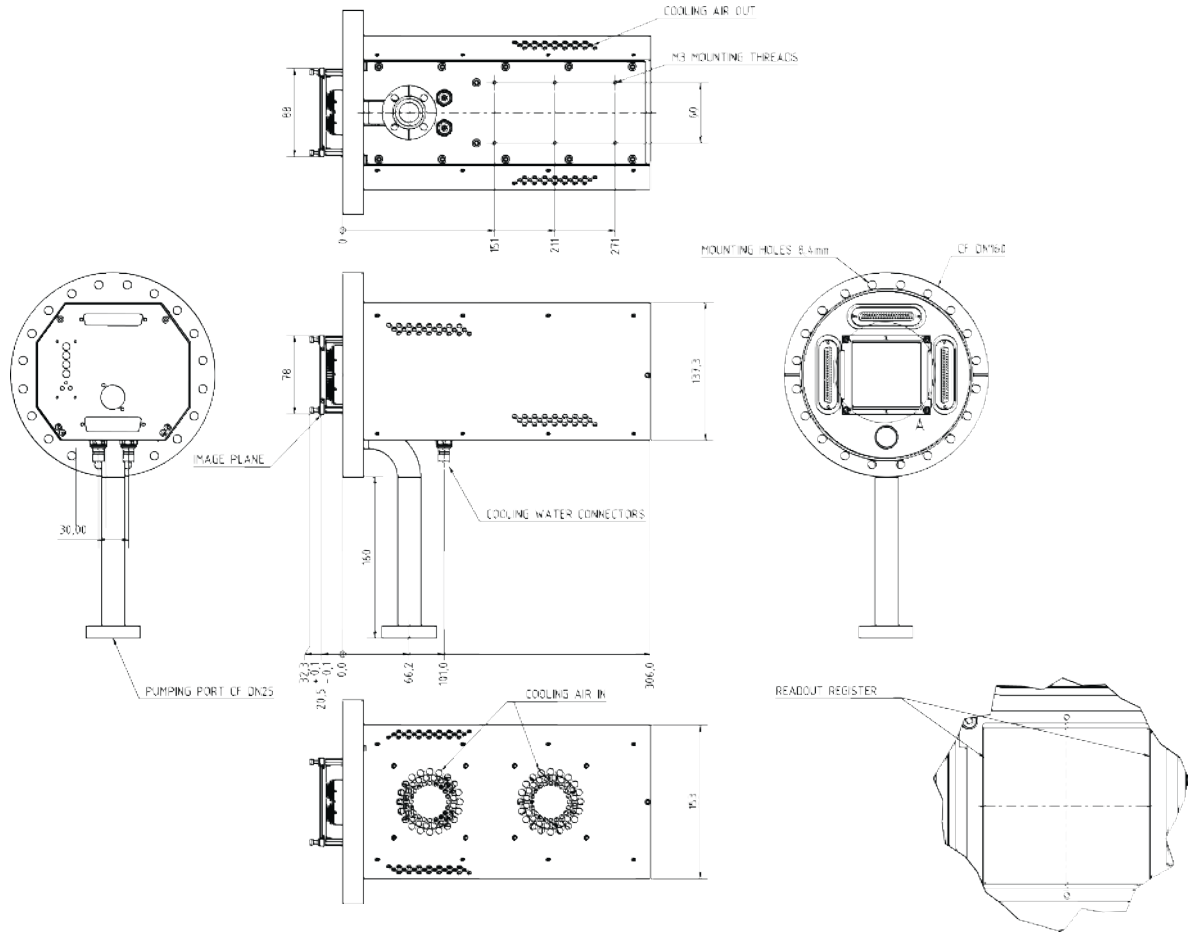


**STEP 2: Choose accessories and software**

Order code	Description
<b>A) Subpixel resolution enhancement</b>	
<b>New</b> GE-S xxx xxx series	Increased spatial resolution (See scientific superresolution camera data sheet for details)
<b>B) Accessories for enhanced cooling performance</b>	
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
<b>C) Software development kit (SDK) and drivers</b>	
GE-SDK01	SDK for Windows (based on C/C++)
GE-LAB01	LabVIEW driver
GE-EP	EPICS driver
GE-LX01	Linux driver

**STEP 3: For customisation of the camera detector, please let us know your requirements.**

## TECHNICAL DRAWINGS



### Items delivered together with each camera

GE-VI01	greateyes Vision software suite for Windows
GE-SDK01	SDK for Windows (based on C/C++)
GE-ETH5m	5m Ethernet cable
GE-POW05	Camera power supply with cabling 3m
GE-ManCam	Camera instruction manual on storage device

### CONTACT INFORMATION

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