SONY

# XCG-CG Series

## Digital Video Camera Module

A new series of PoE compatible GigE Vision interface digital camera equipped with a Global Shutter CMOS Sensor.

Exmor Pregius GiGE VISION PoE

**New support functions**

### Cubic Size

- Dimensions : 29 (W) x 29 (H) x 42 (D) mm (Same dimensions as XCG-C series)

*excluding protrusions

### Feature-rich

- Area gain
- Defect correction
- Shading correction
- Look Up Table (LUT)
- Temperature readout
- 3 x 3 filter
- Multi ROI*
- Binning **

*Only XCG-CG160/CG160C

**Only XCG-CG160

### System Optimization

- PoE **specification support**
- IEEE1588
- Mounting position same as XCG-C Series analogue cameras

**XCG-CG160/160C**
1/2.9-type 1.6 MP 75 fps

**XCG-CG240/240C**
1/1.2-type 2.4MP 41fps

**XCG-CG510/510C**
2/3-type 5.1MP 23fps

Optimal replacement camera modules, inheriting equal size and high reliability, for CCD equipped digital and analogue cameras.

Responds to high speed and high sensitivity needs unique to Global Shutter CMOS, allowing use of various features.

## Features

## High Frame Rate

Select either "Frame rate priority" or "Full feature available" mode.

| Model name | Frame rate priority Mode 0 | | Full feature available Mode 1 | |
|---|---|---|---|---|
| XCG-CG510 XCG-CG510C | 8 bit | 23 fps | 8/10/12 bit | 15 fps |
| | | | YUV422 | 11 fps |
| | | | RGB24 | 7 fps |
| XCG-CG240 XCG-CG240C | 8 bit | 41 fps | 8/10/12 bit | 32 fps |
| | 10 bit | 33 fps | YUV422 | 25 fps |
| | | | RGB24 | 17 fps |
| XCG-CG160 XCG-CG160C | 8 bit | 70 fps | 8/10/12 bit | 45 fps |
| | 10 bit | 45 fps | YUV422 | 37 fps |
| | | | RGB24 | 25 fps |

## IEEE1588

IEEE1588 is a protocol that synchronizes the clock on the network. Exposure synchronization is possbile with several cameras via Ethernet cable.

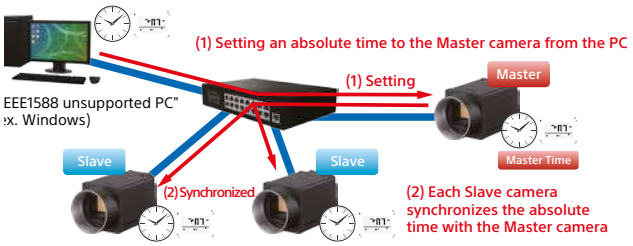
### IEEE1588 Characteristics

- Synchronization accuracy of sub µ seconds
- A synchronization system that isn't hardware dependent is constructible
- Composed of PTP master and slave (cameras, etc.)

Systemization simplified due to IEEE1588.

### Merits

- All camera time stamps are synchronized to the master time
- Exposure synchronization in error range sub µ seconds possible without having to connect trigger lines
- The accuracy for date and time information of time stamps enhanced.
- When time synchronization starts, shooting images will be synchronized in free run with the set interval
- **PTP Master Feature**
  When using the IEEE1588 feature, a grand master and slave composition is required.
  Operating 1 camera as a master in environments where a grand master cannot be prepared allows synchronization between cameras.
  An arbitrary time can be set via PC.



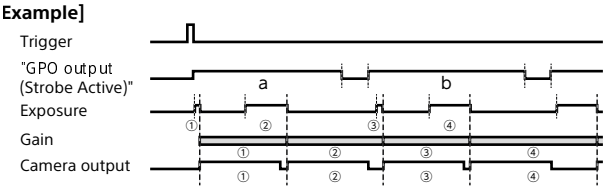

## Free Set Sequence

Perform exposure several times (max. 10 patterns) and GPO output with 1 trigger signal.
You can arbitrarily set the start time and length as well as the gain of the exposure and GPO output.
The set series of exposure and GPO output is counted as 1 cycle, and this cycle can be repeated.

### Merits

- Set different lighting, exposure, and gain for each different detected subject as well as perform inspection of each detected subject

**Example]**




## Burst Trigger

This is a feature capable of continuous shooting at the trigger timing and specifying the number of exposures, exposure interval, and exposure time.
Select from the mode that repeats one exposure time or the mode that switches between 2 exposure times repeatedly.
Furthermore, there is another mode that repeats only while the trigger signal is on.

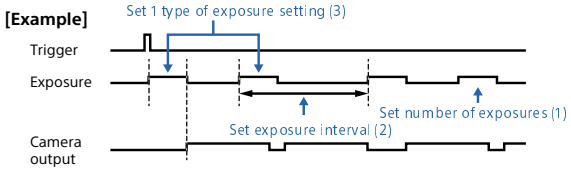
### Merits

- Optimal for capturing synchronized images with several cameras
- Optimal when 2 exposures are necessary due to the difference in brightness of the subject

### (A) When 1 pattern of exposure time is set

Set the number of exposures (1), exposure interval (2), and exposure time (3)
Continuous shooting at the trigger timing

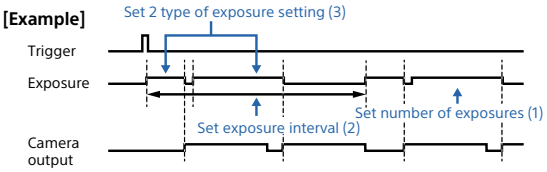
**[Example]**




### (B) When 2 patterns of exposure times are set

Set the number of exposures (1), exposure interval (2), and exposure time (3)
Continuous shooting at the trigger timing

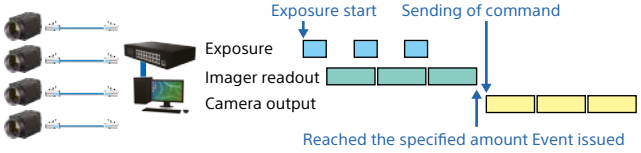
**[Example]**




## Bandwidth Control Feature

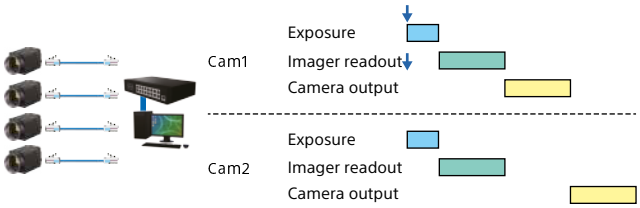
### (1) Memory shot (when shooting continuously)

This feature allows you to save a specified amount of camera images to the camera and perform image output at your desired timing.
Optimal when requiring simultaneous exposure, but there are several cameras connected to the same network and the configuration makes the bandwidth exceed 1Gbps when operated simultaneously.
Optimal when shooting several shots.




### (2) Output timing control (when shooting 1 shot with 1 trigger)

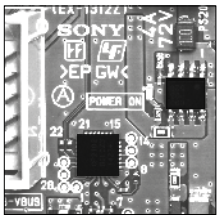
Normally, images are sequentially output when exposure ends, but the image output start timing can be delayed.
Optimal when requiring simultaneous exposure, but there are several cameras connected to the same network and the configuration makes the bandwidth exceed 1Gbps when operated simultaneously.
Optimal when shooting 1 shot with single frame or trigger.



## Area Gain

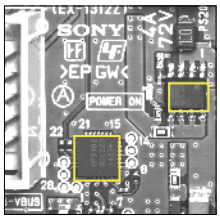
Individually set digital gain (0 to 32 times) to any of the 16 rectangular areas.
If several rectangular areas overlap, the gain value of the rectangular area with a smaller area number is prioritized.
Optimization of images for parts is available during parts inspection, etc.

When area gain is OFF



*Sample image

When area gain is ON

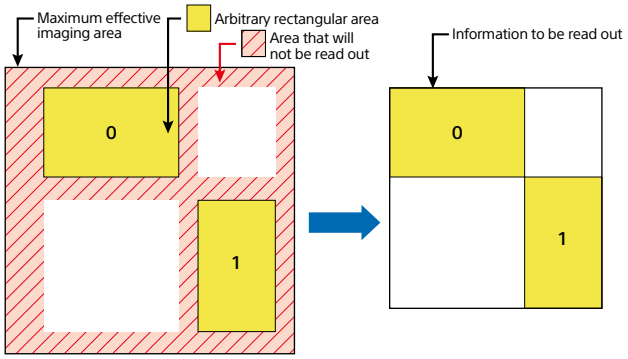


*Sample image

In case setting Gain=2 at Area 0 and Area 1

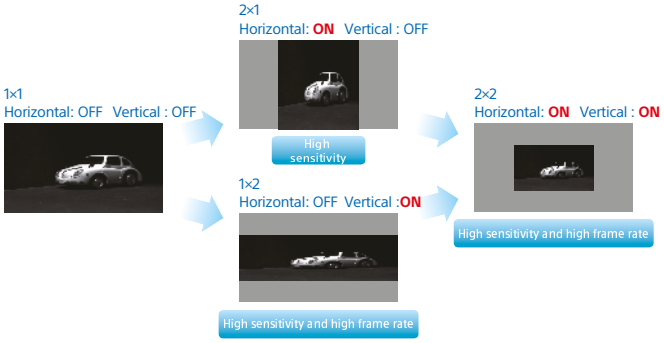
## Multi ROI *Only XCG-CG160/CG160C

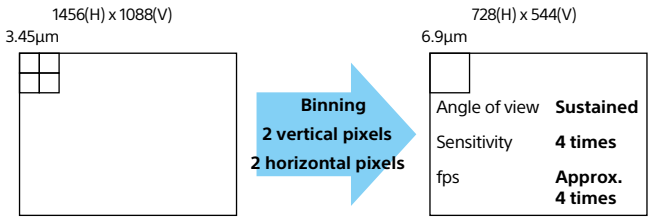
Arbitrarily read out images including any 2 (max.) rectangular area from the maximum effective imaging area.
Due to this, you will be capable of limiting read out information, thus accelerating the frame rate.




## Binning *only XCG-CG160

Supports binning in vertical and horizontal 2 pixel units and increases frame rate without changing the angle of view as well as enhances the sensitivity.




**Pregius** Pregius is a trademark of Sony Corporation. The Pregius is global shutter pixel technology for active pixel-type CMOS image sensors that use Sony's low-noise CCD structure, and realizes high picture quality.

## Trigger Range Limitation

You can choose to receive only the signal of the set trigger width as a trigger signal.
It functions as a noise filter that eliminates chattering and disturbance noise of the trigger signal line.
Furthermore, exposure start can be delayed following the set value of the trigger range if a trigger signal is input.

## Defect Correction

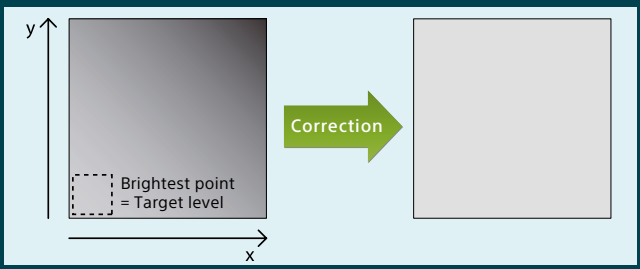
Corrects white defect points and black defect points of the image sensor.
Corrections start from the periphery of the pixel coordinates where defects were detected.
Select between factory default settings and user settings.

## 3 x 3 Filter

Apply various processing to the image through matrix operating in 3 x 3 pixels.
Perform processing including noise reduction, edge emphasizing, and contour extraction with 9 filter factor patterns.

## Shading Correction

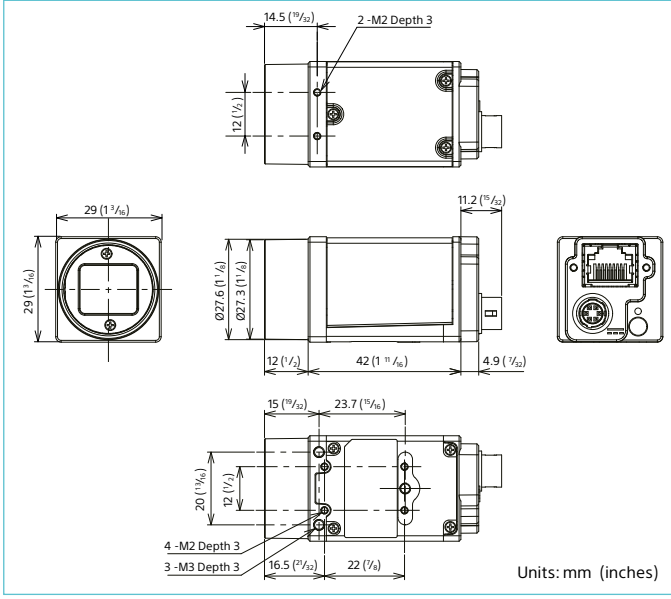
Corrects shading that occurs due to peripheral light falloff, light source irregularity, etc. that are characteristics of the lens.
A number of user data can be saved as user settings.
XCG-CG510/CG510C : 9 patterns
XCG-CG240/CG240C : 20 patterns
XCG-CG160/CG160C : 35 patterns




## Image Flip

Images can be flipped vertically, horizontally, or 180°.

| | | ReverseX | |
|---|---|---|---|
| | | 0 | 1 |
| ReverseY | 0 | Normal | Horizontal flip |
| | 1 | Vertical flip | 180° rotation |




Units: mm (inches)

# XCG-CG Series - Specifications

| | | 5.1M GigE Vision® | | 2.4M GigE Vision® | | 1.6M GigE Vision® | |
|---|---|---|---|---|---|---|---|
| **Basic Specifications** | | **XCG-CG510** | **XCG-CG510C** | **XCG-CG240** | **XCG-CG240C** | **XCG-CG160** | **XCG-CG160C** |
| B/W / Colour | | B/W | Colour | B/W | Colour | B/W | Colour |
| Image Size | | 5.1 Mega | | 2.4 Mega | | 1.6Mega | |
| Image Sensor | | 2/3-type CMOS Image sensors with a global shutter function (Pregius) | | 1/1.2-type CMOS Image sensors with a global shutter function (Pregius) | | 1/2.9-type CMOS Image sensors with a global shutter function (Pregius) | |
| Number of Effective Pixels (H x V) | | 2,464 × 2,056 | | 1,936 × 1,216 | | 1,456 x 1,088 | |
| Cell Size (H x V) | | 3.45 µm × 3.45 µm | | 5.86 µm × 5.86 µm | | 3.45 µm×3.45 µm | |
| Standard Output Pixels (H x V) | | 2,448 × 2,048 | | 1,920 × 1,200 | | 1,440 × 1,080 | |
| Colour Filter | | – | RGB colour mosaic filter | – | RGB colour mosaic filter | – | RGB colour mosaic filter |
| Frame Rate | | 23 fps (8 bit, Mono/Raw) | | 41 fps (8 bit, Mono/Raw)<br>33 fps (10 bit, Mono/Raw) | | 75 fps (8 bit, Mono/Raw)<br>45 fps (10 bit, Mono/Raw) | |
| Minimum Illumination | | 0.5 lx<br>(Iris: F1.4, Gain: +18 dB, Shutter: 1/23 s) | 10 lx<br>(Iris: F1.4, Gain: +18 dB, Shutter: 1/23 s) | 0.5 lx<br>(Iris: F1.4, Gain: +18 dB, Shutter: 1/30 s) | 10 lx<br>(Iris: F1.4, Gain: +18 dB, Shutter: 1/30 s) | 0.5 lx<br>(Iris: F1.4, Gain: +18 dB, Shutter: 1/30 s) | 12 lx<br>(Iris: F1.4, Gain: +18 dB, Shutter: 1/30 s) |
| Sensitivity | | F8<br>(400 lx, Gain: 0 dB, Shutter: 1/23 s) | F8<br>(2000 lx, Gain: 0 dB, Shutter: 1/23 s) | F5.6<br>(400 lx, Gain: 0 dB, Shutter: 1/30 s) | F5.6<br>(2000 lx, Gain: 0 dB, Shutter: 1/30 s) | F5.6<br>(400 lx, Gain: 0 dB, Shutter: 1/30 s) | F5.6<br>(2000 lx, Gain: 0 dB, Shutter: 1/30 s) |
| SNR | | More than 50 dB (Lens close, Gain: 0 dB, 8 bit) | | | | | |
| Gain | | Auto, Manual : 0 dB to 18 dB | | | | | |
| Shutter Speed | | Auto, Manual : 60 to 1/100,000 s | | Auto, Manual : 60 to 1/40,000 s | | Auto, Manual : 60 to 1/100,000 s | |
| White Balance | | – | Manual, One push, Auto | – | Manual, One push, Auto | – | Manual, One push, Auto |
| **Camera features** | | | | | | | |
| Readout Modes | | Normal, Partial scan | | | | Normal, Binning (1x2, 2x1, 2x2), Partial scan (Multi ROI) | Normal, Partial scan (Multi ROI) |
| Readout Features | | LUT (Binarization, Gamma (Arbitrary value settable)), Test pattern | | | | | |
| Synchronization | | Hardware trigger, Software trigger, PTP (IEEE1588) | | | | | |
| Trigger Modes | | OFF (Free run), ON (Edge detection, Trigger width detection), Special trigger (Burst trigger, Bulk trigger, Sequential trigger, Free set sequence) | | | | | |
| Userset | | 16 | | | | | |
| User Memory | | 64 bytes × 16 ch | | | | | |
| Partial Scan | W (Pixel) | 16 to 2,464 | | 16 to 1,936 | | 16 to 1,456 | |
| | H (Line) | 16 to 2,056 | | 16 to 1,216 | | 16 to 1,088 | |
| GPO | | EXPOSURE/Strobe/Sensor lead out/Trigger through/Pulse generation signal/User defined 1, 2, 3 (Output switching) | | | | | |
| Other Features | | Area gain, Defect correction, Shading correction, Temperature readout, LUT, 3 x 3 filter | | | | | |
| **Interface** | | | | | | | |
| Video Data Output | | digital Mono<br>8, 10, 12 bit<br>(at the time of shipment 8 bit) | digital Raw<br>8, 10, 12 bit<br>(at the time of shipment Raw 8 bit)<br>RGB, YUV422, YUV444 | digital Mono<br>8, 10, 12 bit<br>(at the time of shipment 8 bit) | digital Raw<br>8, 10, 12 bit<br>(at the time of shipment Raw 8 bit)<br>RGB, YUV422, YUV444 | digital Mono<br>8, 10, 12 bit<br>(at the time of shipment 8 bit) | digital Raw<br>8, 10, 12 bit<br>(at the time of shipment Raw 8 bit)<br>RGB, YUV422, YUV444 |
| Digital Interface | | Gigabit Ethernet (1000BASE-T/100BASE-TX) | | | | | |
| Camera Specification | | GigE Vision® Version 2.0/1.2 | | | | | |
| Digital I/O | | ISO IN (x1), TTL IN/OUT (x2, selectable) | | | | ISO IN (x1), ISO OUT (x1), TTL IN/OUT (x1, selectable) | |
| **General** | | | | | | | |
| Lens Mount | | C mount | | | | | |
| Flange Back | | 17.526 mm | | | | | |
| Power Requirements | | DC +12 V (10.5 V to 15.0 V), IEEE802.3af (37 V to 57 V) | | | | | |
| Power Consumption | | DC+12V 3.0 W (max.) | | DC+12V 3.0 W (max.) | | DC+12V 3.3 W (max.) | |
| | | IEEE802.3af 3.7 W (max.) | | IEEE802.3af 3.6 W (max.) | | IEEE802.3af 4.0 W (max.) | |
| Operating Temperature | | -5°C to +45°C (23°F to 113°F) | | | | | |
| Performance Guarantee Temperature | | 0°C to 40°C (32°F to 104°F) | | | | | |
| Storage Temperature | | -30°C to +60°C (-22°F to +140°F) | | | | | |
| Operating Humidity | | 20% to 80% (no condensation) | | | | | |
| Storage Humidity | | 20% to 95% (no condensation) | | | | | |
| Vibration Resistance | | 10 G (20 Hz to 200 Hz 20 minutes for each direction -x, y, z) | | | | | |
| Shock Resistance | | 70 G | | | | | |
| Dimensions (W x H x D) | | 29 × 29 × 42 mm (excluding protrusions) 1 3/16 × 1 3/16 × 1 11/16 inches (excluding protrusion) | | | | | |
| Mass | | Approx. 65 g (Approx. 2.3 oz) | | | | | |
| MTBF | | 62,042 hours (Approx. 7.1 years) | | 63,172 hours (Approx. 7.2 years) | | 58,525 hours (Approx. 6.7 years) | |
| Regulations | | UL60950-1, FCC Class A, CSA C22.2-No.60950-1, IC Class A Digital Device, CE : EN61326 (Class A), AS EMC: EN61326-1, VCCI Class A, KCC, CISPR22/24+IEC61000-3-2/-3 | | | | | |
| Supplied Accessories | | Lens mount cap (1), Operating instructions (1) | | | | | |

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