XCL-SG1240 (B/W)
XCL-SG1240C (RAW Color)

| CL Output | Progressive Scan | 1.1 Type GS CMOS | Square Pixels | C Lens Mount | 12.4 MP Output | Area Gain | Image Flip |

| Long Exposure | Normal Shutter | External Trigger Shutter *1 | Auto Shutter *1 | Burst Trigger | Trigger range *2 | Partial Scan *1 | Shading Correction *2 |

| Temperature Readout | Defect Correction | One-Push White Balance *1 | Manual White Balance *1 | LUT | B/W | RAW Color *1 | Near-IR Sensitivity *2 |

*1 : XCL-SG1240C   *2 : XCL-SG1240

Camera setting **P46**

Connection Diagram **P62**

Pregius   Exmor

Link   PoCL

Outline

Introducing a new series of 12.4 MP and high frame rate XCL-SG1240/SG1240C PoCL compatible Camera Link interface digital cameras equipped with a Global Shutter CMOS Sensor.

Features

■ High frame rate
Supports Base Configuration 3tap.

		Camera Link tap (Pixel clock frequency : 85 MHz)		
		1	2	3
Bit length	8	6 fps	13 fps	20 fps
	12	6 fps	13 fps	
	12	6 fps	13 fps	

■ Shading Correction ➜ See page 15
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.
XCL-SG1240/SG1240C : 3 patterns

Correction

Brightest area = target level
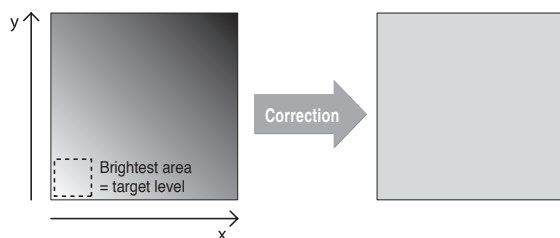
■ Image Flip
You can flip the image vertically or horizontally, or rotate it 180 degrees.

		ReverseX	
		0	1
ReverseY	0	Normal	Flip horizontally
	1	Flip vertically	Rotate 180 degrees

■ Defect Correction ➜ See page 15
A function optimal for uses that require high resolution. Corrects white defect and black defect points that occur during image sensor manufacturing.
Furthermore, corrects secondary white and black points that occur after operations due to effects including cosmic rays. Corrections are applied from the surrounding areas of the coordinate pixel where the defect was detected. Factory default settings and user settings are selectable.
* Factory setting : ON

	XCL-SG1240 XCL-SG1240C
Number of corrections (upper limit)	8184

Defects stand out when the gain or temperature is high. Numerous corrections are necessary to perform these corrections.
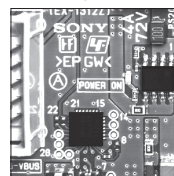The XCL series is supplied with sufficient numbers of corrections for defect corrections.

■ Area Gain ➜ See page 14
Individually set digital gain (0 to 32 times) to any of the 16 rectangular areas.
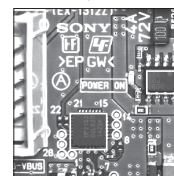If several rectangular areas overlap, the gain value of the rectangular area with a smaller area number is prioritized. Optimization of images for parts is available during parts inspection, etc.

When area gain is OFF   When area gain is ON

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

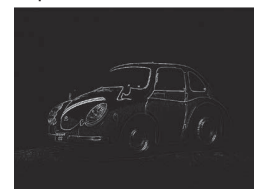* image   * image

■ 3 x 3 filter ➜ See page 16
Utilizing the 3 x 3 filter, you can obtain images in various processing conditions.
Depending on the patterns of parameters, you can reduce noise, apply edge enhancement and extract the contour.

3 x 3 filter: OFF   Laplacian filter

Polarization Camera

Digital Video Camera (GS CMOS)

XCL XCG XCU

Digital Video Camera (CCD)

XCL

Accessories

FCB-4K Color Camera Block FCB-HD

■ Partial Scan

The partial scan function outputs a user-defined region (Area Of Interest) within the overall image area. The cut-out region for partial scan is defined by Offset X and Offset Y (which indicate the start point for cutting), and Width and Height (which indicate the area). Contiguous blocks of minimum areas can be selected to define regions. However, the defined region must be a square or right rectangle. T- and L-shaped regions are invalid.
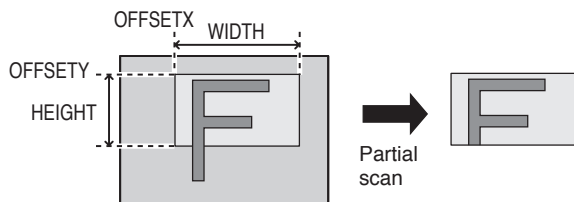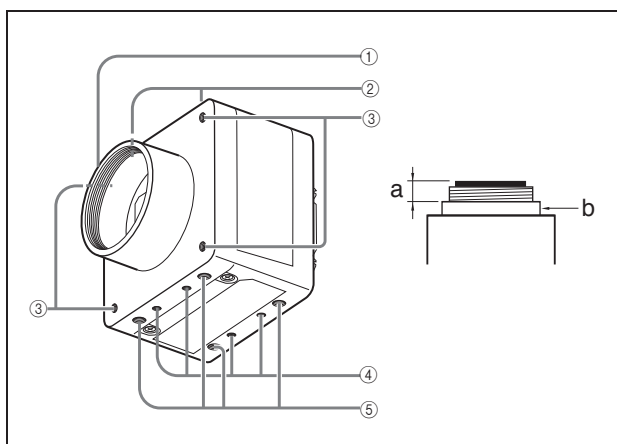

Note

Be aware that the frame rate increases for vertical cut-outs, while the frame rate remains unchanged for horizontal cut-outs.

Accessories

■ Compact camera adaptor
DC-700/700CE

■ Tripod adaptor
VCT-333I

Location and Function of Parts and Controls

① **Lens mount (C-mount)**
Attach any C-mount lens or other optical equipment.

Note
Use a C-mount lens with a protruction (a) extending from the lens mount face (b) of 10mm or less.

② **Guide screw holes (Top)**

③ **LED light guide screw holes (Front)**
Screw hole to guide LED light.
Prepare appropriate adopter according to the LED light to guide.

④ **Guide screw holes / Tripod screw holes (Bottom)**
When using a tripod, use these four screw holes to attach a VCT-333I tripod adaptor.

⑤ **Reference screw holes (Bottom)**
These precision screw holes are for locking the camera module. Locking the camera module into these holes secures the optical axis alignment.

■ Temperature Readout
■ LUT (Look up Table)
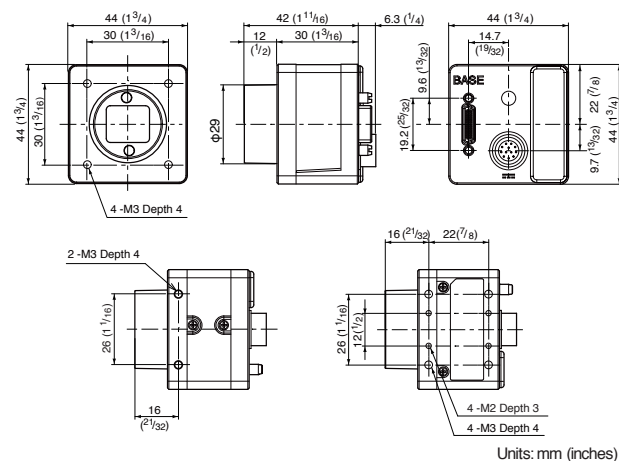■ Trigger Range Limit
■ Burst trigger
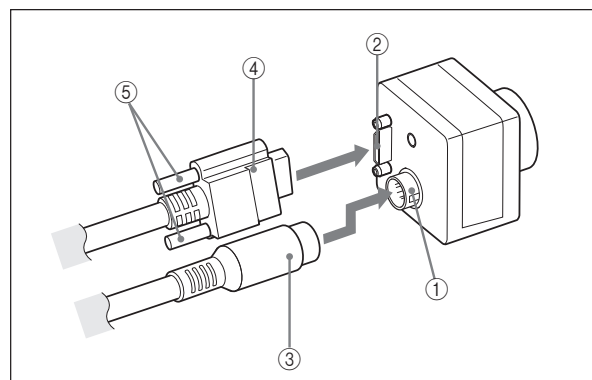■ Camera Link (PoCL*)
  *PoCL: Power over Camera Link
■ Dimensions 44 (W) x 44 (H) x 30 (D) mm
  (excluding protrusions)
■ Mass: 96 g

Dimensions

Units: mm (inches)

Connecting the Cables

Connect the camera cable to the DC IN connector and the Camera Link cable to the DIGITAL IF connector respectively.
If you use a camera module interface board with support for PoCL, you can operate the camera even if you do not connect the camera cable to the DC IN connector.
When you connect the Camera Link cable, turn the two fastening screws on the connector to secure the cable tightly.
Connect the other end of the camera cable to the DC-700/700CE and the other end of the Camera Link cable to the camera module interface board.
When using the Camera link configuration in Base mode, connect the Camera Link cable to BASE of the DIGITAL IF connector.
Connect cables to the BASE and FULL terminals when you use the camera link configuration in Medium, Full, or 80 bit.
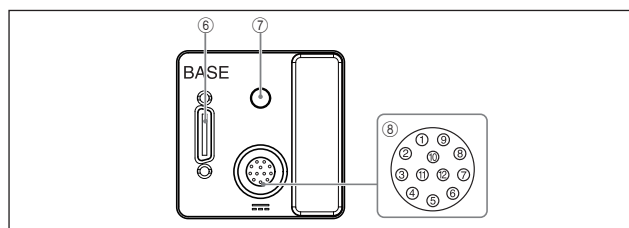
① DC IN connector
② DIGITAL IF connector
③ Camera cable
④ Camera Link cable
⑤ Fastening screws

Rear Panel/Pin Assignments

⑥ **DIGITAL IF (Interface) connector (26-pin)**
You can connect a Camera Link cable to this connector to control a camera module from a host device utilizing the serial communication protocol while outputting a video signal from the camera module.
If you use a camera module interface board with support for PoCL, you can also supply power from this connecter.
The camera module can also be actuated in external trigger mode by an inputting external trigger signal from this DIGITAL IF terminal.

⑦ **Status LED (Green)**
This button turns off when power is being supplied to the camera. It can be lit all the time or based on the output specifications set to the GPOX terminal.

⑧ **DC IN (DC power input) connector (12-pin)**
You can connect a CCXC-12P05N camera cable to input the +12 V DC power supply.
If you use a camera module interface board with support for PoCL, you can operate the camera without using this connector. The pin configuration of this connector is as follows.

Pin No.	Signal	Pin No.	Signal
1	Ground	7	GPI3 /GPO3
2	DC+12V	8	GPI4 (ISO -)
3	GPO4 (ISO -)	9	GPO4 (ISO +)
4	GPI1 / GPO1	10	GPI4 (ISO +)
5	GPO2 (ISO -)	11	GPI2
6	GPO2 (ISO +)	12	GPO4 (ISO -)

Power input
Pin 1 (Ground) and pin 2 (DC +12V) are used.

Signal input
Pins 4, 7, 10 and 11 (GPO1/3/4/2) are used for GPI input or trigger input.
When using 1 system for GPI (ISO):
– GPI4 (ISO+) (pin 10) and GPI4 (ISO–) (pin 8) are used.
When using 2 systems for GPI:
– GPI1 (pin 4*) and Ground (pin 1) are used.
– GPI3 (pin 7*) and Ground (pin 1) are used.

Signal output
Pins 4, 6, 7 and 9 (GPI1/2/3/4) allow you to select GPO from the exposure signal, strobe control signal, Hi/Low fixed value, etc.
When using 2 systems for GPO (ISO):
– GPO4 (ISO+) (pin 9) and GPO4 (ISO–) (pins 3 and 12) are used.
– GPO2 (ISO+) (pin 6) and GPO2 (ISO–) (pin 5) are used.
When using 2 systems for GPO:
– GPO1 (pin 4*) and Ground (pin 1) are used.
– GPO3 (pin 7*) and Ground (pin 1) are used.

* The initial value of pins 4 and 7 is GPI. Switch to GPO output by external command.

Controlling the Camera From the Host Device

Control functions	Description	
Operating mode	Free run/Trigger	
Shutter speed	Free run	1/100,000 s to 60 s
	Trigger edge detection	1/100,000 s to 60 s
	Trigger pulse width detection	Setting by trigger pulse width
Gain	0 dB to 18 dB	
Partial Scan	Variable, 4-line increments	
LUT (Look Up Table)	OFF/ON (Mode: 5 types)	
External trigger input	DIGITAL IF connector/DC IN connector	
Video output switch	Monochrome model: Mono 8/10/12-bit Color model: Raw 8/10/12-bit	
Binning (Monochrome camera only)	2 × 1, 1 × 2, 2 × 2	
Defect correction	OFF/ON	
Shading correction	OFF/ON	
Image flip	OFF/ON	
Area gain	OFF/ON	

Trigger Signal Input

Trigger signals can be input via the 4th/7th/10th/11th pins of the DC IN connector, the CC1, CC2, CC3, CC4 pins of the Digital IF connector, or the software command. Switchover of the trigger signal can be changed via the TRG-SRC command.

command	param	Trigger signal assigned pin
TRG-SRC	4	DC IN connector 4th pin*
	7	DC IN connector 7th pin*
	10	DC IN connector 10th pin
	11	DC IN connector 11th pin
	101	Digital IF connector 22nd [+]/9th [-] (CC1)
	102	Digital IF connector 10th [+]/23th [-] (CC2)
	103	Digital IF connector 24th [+]/11th [-] (CC3)
	104	Digital IF connector 12nd [+]/25th [-] (CC4)
	0	Software command (TRG-SOFT)
	20	OR of DC IN connector 4th/7th/10th/11th pin

* DC IN connector 4th pin and 7th pin are available only when the GPIO input/output setting is switched to input.

GPIO

GPI
The value can be checked by detecting the signals input to the DC IN connector 4th, 7th, 10th, and 11th using the GPI command. Since all pins are pulled up, 1 (Hi level) is returned if they are opened.

GPO
GPO1, GPO2, GPO3 and GPO4 outputs can be transmitted from the DC IN connector 4th, 6th, 7th, and 9th pins, respectively. After selecting a signal, the output polarity should be determined by GPO-INVERTER. The strobe control signal can be set separately for GPO1, GPO2, GPO3, and GPO4.

Polarization Camera

Digital Video Camera (GS CMOS)

XCL

XCG

XCU

Digital Video Camera (CCD)

XCL

Accessories

FCB-4K

Color Camera Block

FCB-HD

Spectral Sensitivity Characteristics

B/W model

● **XCL-SG1240**
(Lens characteristics and light source characteristics excluded.)
Relative sensitivity

Wavelength (nm)
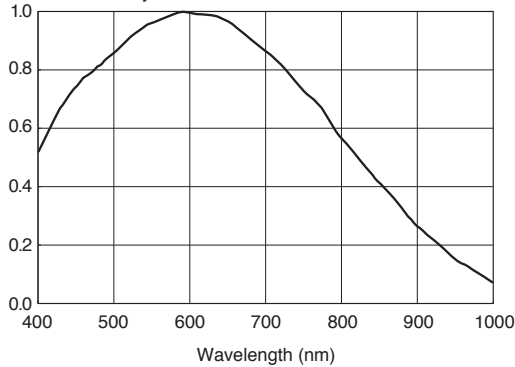
Color model

● **XCL-SG1240C**
(Lens characteristics and light source characteristics excluded.)
Relative sensitivity

Wavelength (nm)
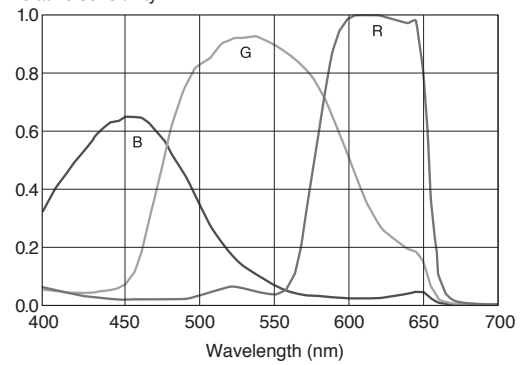
Specifications

		XCL-SG1240	XCL-SG1240C
Basic specifications			
	Image type	B/W	RAW Color
	Image size	12.4 MP	
	Image sensor	IMX304: 1.1-type Global Shutter CMOS Sensor (Pregius)	
	Number of effective pixels (H × V)	4,112×3,008	
	Cell size (H × V)	3.45 μm×3.45 μm	
	Standard output pixels (H × V)	4,096×3,000	
	Color filter	—	RGB color moxaic filter
	Frame rate	6 fps (Base, 8 bit, 1 tap, Mono/Raw), 13 fps (Base, 8 bit, 2 tap, Mono/Raw), 20 fps (Base, 8 bit, 3 tap, Mono/Raw), * default setting	
	Minimum illumination	0.5 lx (Iris: F1.4, Gain: +18 dB, Shutter: 1/30 s)	12 lx (Iris: F1.4, Gain: +18 dB, Shutter: 1/30 s)
	Sensitivity	F5.6 (400 lx, Gain: 0 dB, Shutter: 1/30 s)	F5.6 (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 to 18 dB	
	Shutter speed	Auto, Manual : 60 to 1/100,000 s	
	White balance	—	Manual, One push
Camera Features			
	Readout modes	Normal, Binning (2x1, 1x2, 2x2), Partial scan	Normal, Partial scan
	eadout features	LUT (Binarization, Gamma (arbitrary setting), Test pattern	
	eadout features	Hardware trigger, Software trigger	
	Trigger modes	OFF (Free run), ON (Trigger edge detection, Trigger width detection), Burst trigger	
	User Set/Memory Channel	16	
	User memory	32 kbytes + 64 bytes x 16ch	
	Partial scan	W (Pixel)	16 to 4,112	
		H (Line)	4 to 3,008	
	GPO	EXPOSURE/Strobe/LVAL/FVAL/Sensor readout/Trigger through/Pulse generation signal/User definition 1, 2, 3, 4 (Selectable)	
	Interface	Area gain, Shading correction, Defect correction, Temperature readout, LUT, 3 x 3 filter	
Interface			
	Video data output	digital Mono 8, 10, 12 bit (default setting Mono 8 bit)	digital Raw 8, 10, 12 bit (default setting Raw 8 bit)
	Base Clock	85/65/45 MHz switchable	
	Camera Link Tap	1/2/3 switchable	
	Digital interface	LVDS	
	Camera specification	Camera Link® Version2.0 (Connector sahpe : SDR)	
	Output data clock	85MHz (1, 2, 3 tap), 65MHz (1, 2, 3 tap), 45MHz (1, 2, 3 tap)	
	Digital I/O	ISO IN (x1), ISO OUT (x2), TTL IN (x1), TTL IN/OUT (x2, selectable)	
General			
	Lens mount	C-mount	
	Flange focal length	17.526 mm	
	Power requirements	DC +12 V (10.5 V to 15.0 V), PoCL (10 V to 13.0 V)	
	Power consumption	3.8 W max. (DC +12V)	
	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 80% (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 × H × D)	44 × 44 × 30 mm (1 3/4 × 1 3/4 × 1 3/16 inches) (excluding protrusions)	
	Mass	Approx. 96 g (3 oz)	
	MTBF	64,461 hours (Approx. 7.4 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	
	Supplied accessories	Lens mount cap (1), Safety Regulations*2 (1)	

*1 The frame rate does not change.
*2 Safety Regulations : It describes the Safety precaution. Those contents which had described in Operation Manual are aggregated in the Technical Manual.