

DIGITAL CAMERA MODULE

Camera Link

Equipped with a Global Shutter CMOS Sensor

Introducing a series of PoCL compatible Camera Link interface digital cameras equipped with a Global Shutter CMOS Sensor.

This lineup of 8 models ranges from the 12.4 MP and 5.1 MP high resolution, high frame rate models to the 1.6 MP standard models. Each is equipped with a wide array of Sony's original features, offering just the right model to fit your needs. With its high reliability, the product is capable of fulfilling high speed and high sensitivity needs that are required for image capture and processing in machine vision and other applications.

Camera Link® XCL-SG Series

12.4 MP

5.1 MP

High
Resolution

High
Functionality



1.1-type 12.4 MP 20 fps

XCL-SG1240 (B/W)

XCL-SG1240C (RAW color)

- Camera Link Base Configuration (1/2/3 tap selectable)
- Area gain ■ Defect correction
- Shading correction
- Base Clock 45/65/85 MHz selectable

Pregius

Exmor



2/3-type 5.1 MP 154 fps

XCL-SG510 (B/W)

XCL-SG510C (RAW color)

- Camera Link Configuration (80 bit / Full / Medium / Base selectable)
- Frame accumulation
- Wide dynamic range
- Multi ROI ■ Defect correction
- Shading correction
- Base Clock 45/65/85 MHz selectable

Camera Link® XCL-CG Series

5.1 MP

1.6 MP

Compact Size



2/3-type 5.1 MP 35 fps

XCL-CG510 (B/W)

XCL-CG510C (Color)

- Compact size: 29(W) x 29(H) x 30(D) mm
- Area gain
- Defect correction
- Shading correction
- Multi ROI*1
- Base Clock 45/75 MHz selectable
- High compatibility with the XCL-C series
 - Identical command specifications/ mounting hole positions
- Identical sensor size as XCL-C500*2

Pregius

Exmor



1/2.9-type 1.6 MP 127 fps

XCL-CG160 (B/W)

XCL-CG160C (Color)

*1 Only XCL-CG160/CG160C

*2 Only XCL-CG510/CG510C

Key Features

High Frame Rate

XCL-SG1240	XCL-SG1240C
XCL-SG510	XCL-SG510C
XCL-CG510	XCL-CG510C
XCL-CG160	XCL-CG160C

• XCL-SG1240/SG1240C

Supports Base Configuration 3tap.

CameraLink tap (Pixel clock frequency: when 85 MHz)		1	2	3
Bit length	8	6 fps	13 fps	20 fps
	10	6 fps	13 fps	
	12	6 fps	13 fps	

• XCL-SG510/SG510C

Selects a max. frame rate of 154 fps due to the combination of "Bit length" and "CameraLink tap".

CameraLink tap (Pixel clock frequency: when 85 MHz)		1	2	3	4	8	10
Bit length	8	16 fps	32 fps	48 fps	64 fps	124 fps	154 fps
	10	16 fps	32 fps		64 fps		
	12	16 fps	32 fps		64 fps		
	16	16 fps*					

*Only when Wide-D

• XCL-CG510/CG510C

Supports Base Configuration 3tap.

CameraLink tap (Pixel clock frequency: when 75 MHz)		1	2	3
Bit length	8	14 fps	28 fps	35 fps
	10	14 fps	28 fps	
	12	14 fps	28 fps	

• XCL-CG160/CG160C

Supports Base Configuration 3tap.

CameraLink tap (Pixel clock frequency: when 75 MHz)		1	2	3
Bit length	8	44 fps	90 fps	127 fps
	10	44 fps	90 fps	
	12	44 fps	90 fps	

Shading Correction

XCL-SG1240	XCL-SG1240C
XCL-SG510	XCL-SG510C
XCL-CG510	XCL-CG510C
XCL-CG160	XCL-CG160C

Corrects shading that occurs due to peripheral light falloff, light source irregularity, etc. that are characteristics of the lens.

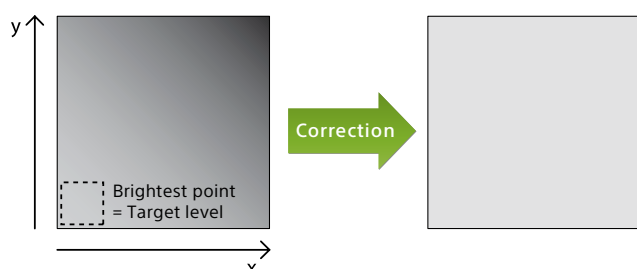
A number of user data can be saved as user settings.

XCL-SG1240/SG1240C: 3 patterns

XCL-SG510/SG510C: 9 patterns

XCL-CG510/CG510C: 9 patterns

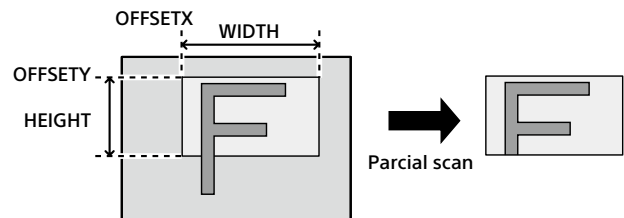
XCL-CG160/CG160C: 31 patterns



Partial Scan

XCL-SG1240	XCL-SG1240C
XCL-SG510	XCL-SG510C
XCL-CG510	XCL-CG510C
XCL-CG160	XCL-CG160C

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.



Partial Scan (Multi ROI)

XCL-SG1240	XCL-SG1240C
XCL-SG510	XCL-SG510C
XCL-CG510	XCL-CG510C
XCL-CG160	XCL-CG160C

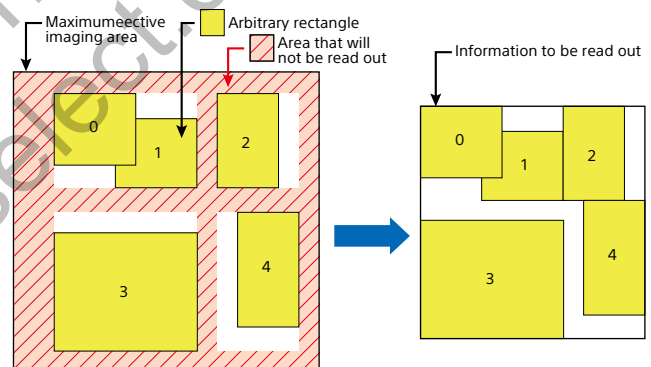
Arbitrarily read out images including arbitrary multiple rectangular areas from the maximum effective imaging area.

With this function you will be capable of limiting read out information, thus accelerating the frame.

XCL-SG510/SG510C 8 areas (max.)

XCL-CG160/CG160C 2 areas (max.)

*When 5 rectangles are selected



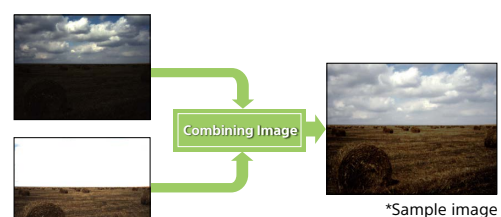
Wide Dynamic Range (Wide-D)

XCL-SG1240	XCL-SG1240C
XCL-SG510	XCL-SG510C
XCL-CG510	XCL-CG510C
XCL-CG160	XCL-CG160C

Restore the gradation for bright and dark areas that have lost the gradation in scenes with strong contrast.

Acquires images with 2 different exposure times and combines images of 16-bit length. When using in 8, 10, 12-bit length, adjusts the gradation using around 17 point LUT. Due to optimization through exposure time, there is no S/N deterioration of the image.

*You may not be able to correctly capture moving subjects since 2 images will be combined.



[Sample of application]

- The application case is when the picture is taken with two type of lighting illumination, which is because only one lighting causes overexposure or too dark to recognize.

Area Gain

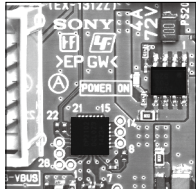
XCL-SG1240	XCL-SG1240C
XCL-SG510	XCL-SG510C
XCL-CG510	XCL-CG510C
XCL-CG160	XCL-CG160C

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.

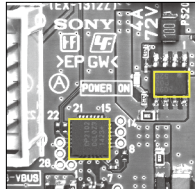
Optimization of images for parts inspection is available during parts inspection, etc.

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

Area Exposure

XCL-SG1240	XCL-SG1240C
XCL-SG510	XCL-SG510C
XCL-CG510	XCL-CG510C
XCL-CG160	XCL-CG160C

Set 2 types of exposure times for valid pixel areas and 16 arbitrarily selected rectangular areas.

Optimization of images for subjects such as parts inspection, etc. is possible.

Due to optimization through exposure time, there is no S/N deterioration of the image.

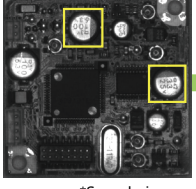
*You may not be able to correctly capture moving subjects since 2 images will be combined.

Exposure time: Long



*Sample image

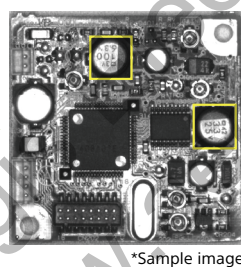
Exposure time: short



*Sample image

Combining Image

When area exposure is ON



*Sample image

The yellow framed "Exposure time: short" areas are optimized when images are combined.



The difference between "Area Gain" and "Area Exposure"

	Valid cases
Area Gain	(1) When capturing moving subjects (Processing for single frame) (2) When you want to make minor adjustments of the brightness for each area (Area gain can be individually set for 16 areas)
Area Exposure	(1) When overexposure occurs with one shot and you want to suppress the exposure amount of that area (2) When securing S/N by adjusting the exposure

Since overexposure, etc. may occur in one shot, several shots may be necessary. By using the "Area gain" and "Area exposure" features, you can adjust areas necessary for inspection to optimal levels.

[Merits]: Reduction of processing speed

Cost reduction

By performing optimizing adjustments on the camera, the processing time on the PC is reduced, the tact time is improved, and high performance PCs are not necessary, contributing to cost reduction.

Burst Trigger

XCL-SG1240	XCL-SG1240C
XCL-SG510	XCL-SG510C
XCL-CG510	XCL-CG510C
XCL-CG160	XCL-CG160C

Capable of continuous shooting at the trigger timing and specifying the number of exposures, exposure interval, and exposure time. You can 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.

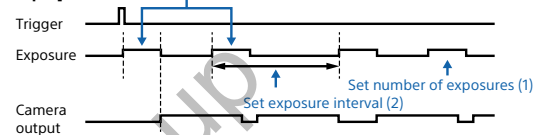
[Merits]

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

(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

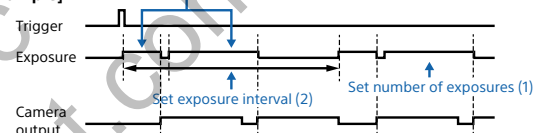
[Example] Set 1 type of exposure setting (3)



(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] Set 2 types of exposure settings (3)



Frame Accumulation

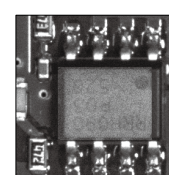
XCL-SG1240	XCL-SG1240C
XCL-SG510	XCL-SG510C
XCL-CG510	XCL-CG510C
XCL-CG160	XCL-CG160C

Performs exposure in the specified amount of times and with the averaging process within the camera, outputs 1 image. Optimal for S/N improvement under high gain, canceling of the flicker status during high speed exposure, etc.

Select from 2, 4, 8, or 16 images for the averaging process.

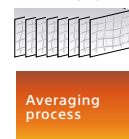
*You may not be able to correctly capture moving subjects since several images will be combined.

Before correction



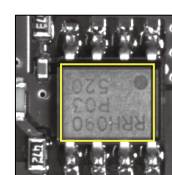
*Sample image

2 4 8 16



Averaging process

After correction S/N improvement



*Sample image

Defect Correction

XCL-SG1240	XCL-SG1240C
XCL-SG510	XCL-SG510C
XCL-CG510	XCL-CG510C
XCL-CG160	XCL-CG160C

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.

*During factory default: ON

	XCL-SG1240 XCL-SG1240C	XCL-SG510 XCL-SG510C	XCL-CG510 XCL-CG510C XCL-CG160 XCL-CG160C
Number of corrections (upper limit)	8184	2040	2047

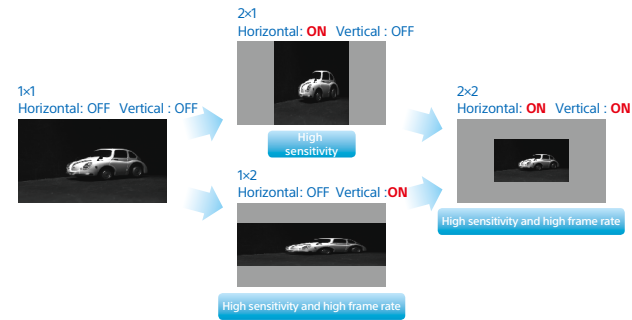
Defects stand out when the gain or temperature is high. Numerous corrections are necessary to perform these corrections.

The XCL series is supplied with sufficient numbers of corrections for defect corrections.

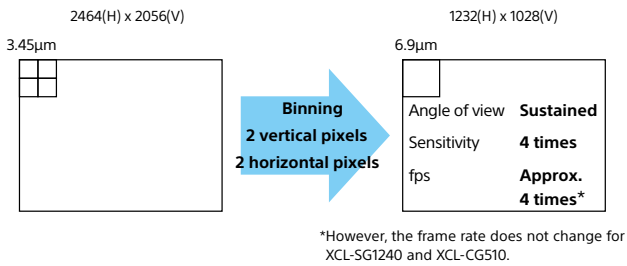
Binning

XCL-SG1240	XCL-SG1240C
XCL-SG510	XCL-SG510C
XCL-CG510	XCL-CG510C
XCL-CG160	XCL-CG160C

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.



For XCL-SG510



Trigger Range Limitation

XCL-SG1240	XCL-SG1240C
XCL-SG510	XCL-SG510C
XCL-CG510	XCL-CG510C
XCL-CG160	XCL-CG160C

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.

3 x 3 Filter

XCL-SG1240	XCL-SG1240C
XCL-SG510	XCL-SG510C
XCL-CG510	XCL-CG510C
XCL-CG160	XCL-CG160C

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.

3 x 3 filter: OFF



Laplacian filter



Image Flip

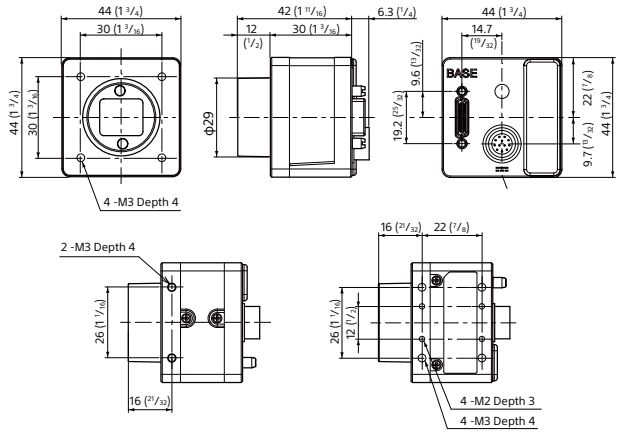
XCL-SG1240	XCL-SG1240C
XCL-SG510	XCL-SG510C
XCL-CG510	XCL-CG510C
XCL-CG160	XCL-CG160C

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

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

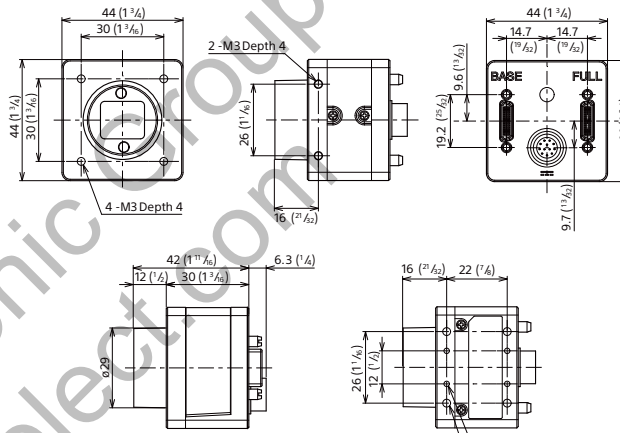
Dimensions

XCL-SG1240/SG1240C



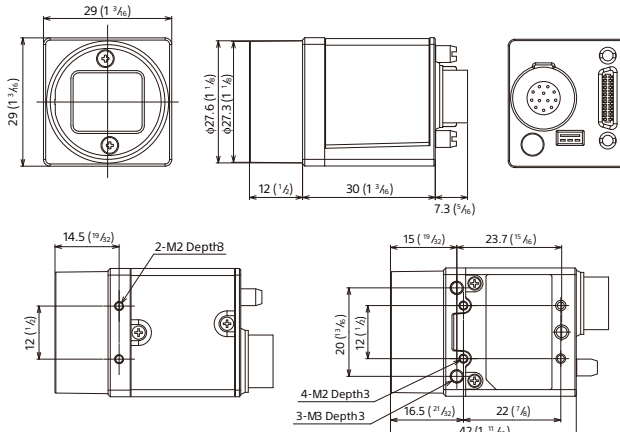
Units: mm (inches)

XCL-SG510/SG510C



Units: mm (inches)

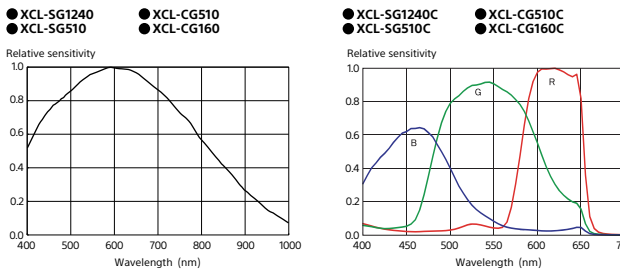
XCL-CG510/CG510C/CG160/CG160C



Units: mm (inches)

Spectral Sensitivity Characteristics

*Lens characteristics and light source characteristics excluded.



Specifications

	XCL-SG1240	XCL-SG1240C	XCL-SG510	XCL-SG510C
Basic Specifications				
B/W / Color	B/W		RAW color	
Image Size	12.4 Mega		5.1 Mega	
Image Sensor	IMX304: 1.1-type Global Shutter CMOS sensors (Pregius)		IMX250: 2/3-type Global Shutter CMOS sensors (Pregius)	
Number of Effective Pixels (H x V)	4,112 x 3,008		2,464 x 2,056	
Cell Size (H x V)	3.45 μm×3.45 μm			
Standard Output Pixels (H x V)	4,096 x 3,000		2,448 x 2,048	
Color Filter	-	RGB color mosaic filter	-	RGB color mosaic 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) *At the time of shipment		16 fps (Base, 8 bit, 1 tap, Mono/Raw) 32 fps (Base, 8 bit, 2 tap, Mono/Raw)* 48 fps (Base, 8 bit, 3 tap, Mono/Raw) 64 fps (Medium, 8 bit, 4 tap, Mono/Raw) 124 fps (Full, 8 bit, 8 tap, Mono/Raw) 154 fps (80 bit(DECA), 8 bit, 10 tap, Mono/Raw) *At the time of shipment	
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)	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)	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		Manual, One push
Camera Features				
Readout Modes	Normal, Binning (1x2, 2x1, 2x2)*1, Partial Scan	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			
Trigger Modes	OFF (Free run), ON (Edge detection, Trigger width detection), Burst trigger		OFF (Free run), ON (Edge detection, Trigger width detection), Special trigger (Burst trigger/Bulk trigger/Sequential trigger)	
Userset	16			
User Memory	32 kbytes + 64 bytes x 16ch			
Partial Scan	W (Pixel)	16 to 4,112	16 to 2,464	
	H (Line)	4 to 3,008	4 to 2,056	
GPO	EXPOSURE/Strobe/LVAL/FVAL/Sensor lead out/Trigger through/Pulse generation signal/User defined 1, 2, 3, 4 (Output switching)			
Other Features	Area gain, Defect correction, Shading correction, Temperature readout, LUT, 3 x 3 filter		Wide dynamic range, Frame accumulation, Area exposure, Area gain, Defect correction, Shading correction, Temperature readout, LUT, 3 x 3 filter	
Interface				
Video Data Output	digital Mono 8, 10, 12 bit (at the time of shipping 8bit)	digital Raw 8, 10, 12 bit (at the time of shipping 8 bit)	digital Mono 8, 10, 12, 16*2 bit (at the time of shipping 8 bit)	digital Raw 8, 10, 12, 16*2 bit (at the time of shipping 8 bit)
Base Clock (No. of Taps)	45/65/85 MHz switchable			
Camera Link Tap	1/2/3 switchable		1/2/3/4/8/10 switchable	
Digital Interface	LVDS			
Camera Specification	Camera Link* Version2.0			
Output Data Clock	45MHz (1, 2, 3tap) 65MHz (1, 2, 3tap) 85MHz (1, 2, 3tap)		45 MHz (1, 2, 3, 4, 8, 10 tap) 65 MHz (1, 2, 3, 4, 8, 10 tap) 85 MHz (1, 2, 3, 4, 8, 10 tap)	
Digital I/O	ISO IN (x1), ISO OUT (x2), TTL IN (x1), TTL IN/OUT (x2, selectable)			
General				
Lens Mount	C mount			
Flange Back	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)		5.0 W max. (DC +12V)*3	
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 x H x D)	44 x 44 x 30 mm (excluding protrusions) 1 3/4 x 1 3/4 x 1 3/16 inches (excluding protrusion)			
Mass	Approx. 96 g (Approx. 3.4 oz)			
MTBF	64,461 hours (Approx. 7.4 years)		70,523 hours (Approx. 8.1 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, CU-TR EAC			
Supplied Accessories	Lens mount cap (1), Safety Regulations*4 (1)			

*1 The frame rate does not change.

*2 A feature valid when the wide dynamic range feature is ON.

*3 When supplying power (PoCL) with 1 camera cable, wide dynamic range, frame accumulation, and area exposure features are not available for use.

*4 Notes related to safety. Conventional instruction manual content will be included in the "Technical Manual".

	XCL-CG510		XCL-CG510C		XCL-CG160		XCL-CG160C		
Basic Specifications									
B/W / Color	B/W			Color		B/W		Color	
Image Size	5.1 Mega				1.6 Mega				
Image Sensor	IMX264: 2/3-type Global Shutter CMOS sensors (Pregius)				IMX273: 1/2.9-type Global Shutter CMOS sensors (Pregius)				
Number of Effective Pixels (H x V)	2,464 × 2,056				1,456 × 1,088				
Cell Size (H x V)	3.45 μm × 3.45 μm								
Standard Output Pixels (H x V)	2,448 × 2,048				1,440 × 1,080				
Color Filter	-		RGB color mosaic filter		-		RGB color mosaic filter		
Frame Rate	14 fps (Base, 8 bit, 1 tap, Mono/Raw) 28 fps (Base, 8 bit, 2 tap, Mono/Raw)* 35 fps (Base, 8 bit, 3 tap, Mono/Raw) *At the time of shipment				44 fps (Base 8bit 1tap, Mono/Raw) 90 fps (Base 8bit 2tap, Mono/Raw)* 127 fps (Base 8bit 3tap, Mono/Raw) *At the time of shipment				
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)		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)		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		-		Manual, One push		
Camera Features									
Readout Modes	Normal, Binning (1x2, 2x1, 2x2)*1, Partial scan		Normal, Partial Scan		Normal, Binning (1x2, 2x1, 2x2), Decimation, Partial scan (Multi ROI)		Normal, Decimation, Partial scan (Multi ROI)		
Readout Features	LUT (Binarization, Gamma (Arbitrary value settable)), Test pattern								
Synchronization	Hardware trigger, Software trigger								
Trigger Modes	OFF (Free run), ON (Edge detection, Trigger width detection), Special trigger (Burst trigger/Bulk trigger*/Sequential trigger*) *Except XCL-CG160/CG160C								
Userset	16								
User Memory	32 kbytes + 64 bytes x 16ch								
Partial Scan	W (Pixel)	16 to 2,464			16 to 1,456				
	H (Line)	4 to 2,056			8 to 1,088				
GPO	EXPOSURE/Strobe/LVAL/FVAL/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 8, 10, 12 bit (at the time of shipping 8bit)		digital Raw 8, 10, 12 bit (at the time of shipping 8 bit) digital RGB 24 bit		digital Mono 8, 10, 12 bit (at the time of shipping Mono 8 bit)		digital Raw 8, 10, 12 bit (at the time of shipping Raw 8 bit) digital RGB 24 bit		
Base Clock (No. of Taps)	45/75 MHz switchable								
Camera Link Tap	1/2/3 switchable								
Digital Interface	LVDS								
Camera Specification	Camera Link* Version2.0								
Output Data Clock	45 MHz (1,2,3 tap) 75 MHz (1,2,3 tap)								
Digital I/O	TTL IN (x3), TTL OUT (x3)								
General									
Lens Mount	C mount								
Flange Back	17.526 mm								
Power Requirements	DC +12 V (10.5 V to 15.0 V), PoCL (10 V to 13.0 V)								
Power Consumption	2.7 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 x H x D)	29 × 29 × 30 mm (excluding protrusions) 1 3/16 × 1 3/16 × 1 3/16 inches (excluding protrusions)								
Mass	Approx. 53 g (Approx. 1.9 oz)								
MTBF	81,562 hours (Approx. 9.3 years)				76,315 hours (Approx. 8.7 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, CU-TR EAC								
Supplied Accessories	Lens mount cap (1), Safety Regulations*2 (1)								

*1 The frame rate does not change.

*2 Notes related to safety. Conventional instruction manual content will be included in the "Technical Manual".

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