XCD-SX910CR
XCD-X710CR

Progressive Scan | *1 1/2 Type CCD | *2 1/3 Type CCD | Square Pixels | C Lens Mount | *1 SXGA Output | *2 XGA Output

IEEE-1394 Digital Output | Normal Shutter | External Trigger Shutter | Long Exposure | Partial Scan | Lead-Free Solder | RAW Mode Output

*1 :XCD-SX910CR
*2 :XCD-X710CR

Connection Diagram P92

Outline

The XCD-SX910CR and XCD-X710CR are high-resolution digital color cameras equipped with a progressive scan CCD that employs a raw color RGB filter.
The XCD-SX910CR features a 1.45 million pixel (effective picture element) 1/2 type CCD, and the XCD-X710CR features an 800,000 pixel (effective picture element) 1/3 type CCD. Unlike the large number of other color cameras on the market, these cameras are able to output true image data, and are designed for users that perform color image capturing. The use of analog RGB signal is well-established in conventional color machine vision, but with its increased number of pixels, the XCD-CR series allows uncompressed image transfer at 400Mbps to an image capturing device via universal IEEE 1394 digital interface output.
These cameras are ideal not only in industries where there is a wealth of accumulated expertise in machine vision, such as in printing, food inspection, and board inspection, but also as input devices for new inspection applications in fields such as medicine, biotech, automotive, and packaging. To support a wide range of user applications, these cameras feature the same functions as the new XCD-SX910/X710 monochrome cameras, such as external trigger shutter control, increased frame rate, partial scan function, etc.

Features

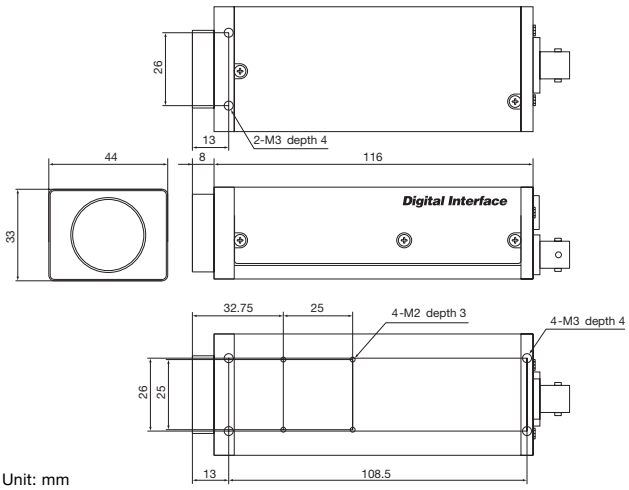
- High resolution color data output
  XCD-SX910CR: SXGA 1280 (H) x 960 (V)
  XCD-X710CR: XGA 1024 (H) x 768 (V)
- Frame rate
  XCD-SX910CR: 15/7.5/3.25/1.875 fps
  XCD-X710CR: 30/15/7.5/3.25/1.875 fps
- C-mount lens
- Digital camera protocol
  1394-based Digital Camera Specification (Ver. 1.30)
- Partial scan function (256 zones)
- Trigger shutter function
  Trigger pulse width control
- Lead-free solder

Accessories

- Tripod adaptor
  ●VCT-ST70I

Dimensions

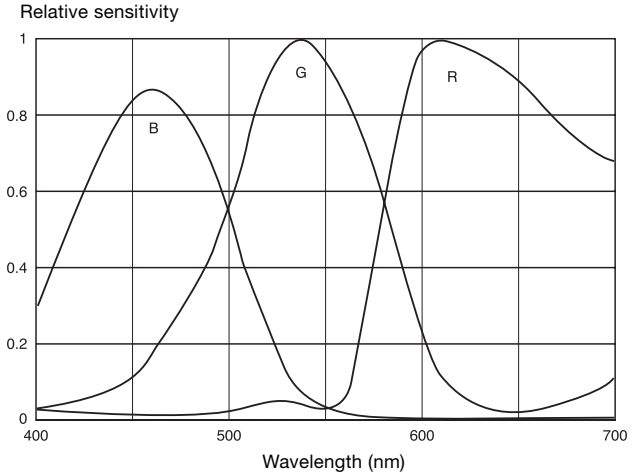
Camera body of all models



Unit: mm

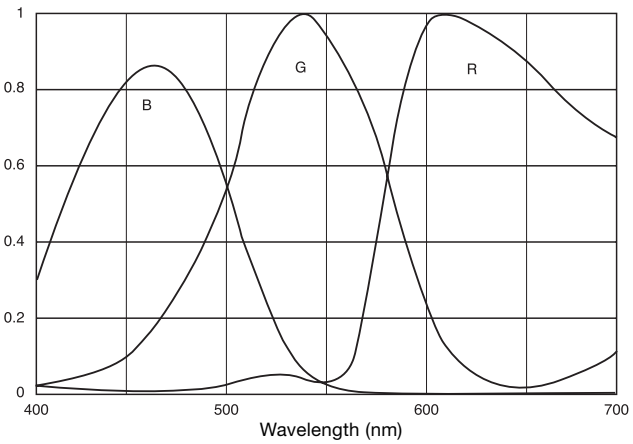
Spectral Sensitivity Characteristics

●XCD-SX910CR



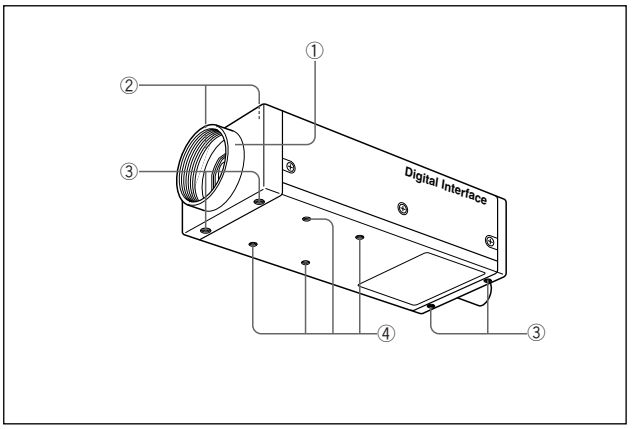
(Lens characteristics included, and light source characteristics excluded.)

●XCD-X710CR



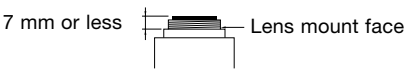
(Lens characteristics included, and light source characteristics excluded.)

Location and Function of Parts and Controls



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

Note
The lens must not project more than 7 mm from the lens mount.



② Reference holes (Top)

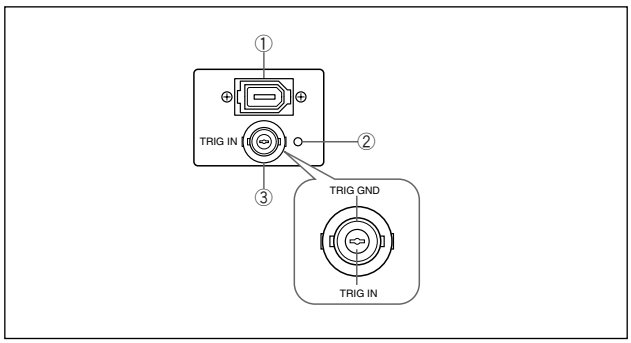
③ Reference holes (Bottom)
These precision screw holes are for locking the camera module. Locking the camera module into these holes secures the optical axis alignment.

④ Tripod adaptor screw holes
Screw the tripod adaptor VCT-ST70I into the four screw holes when you use a tripod.

Specifications

	XCD-SX910CR	XCD-X710CR
Image device	1/2 type progressive scan IT CCD	1/3 type progressive scan IT CCD
Effective picture elements	1,392 (H) x 1,040 (V); 1,450,000 pixels	1,034 (H) x 779 (V); 800,000 pixels
Effective lines/Output image size	1,280 (H) x 960 (V)/SXGA	1,034 (H) x 768 (V)/XGA
Unit Cell size	4.65 µm (H) x 4.65 µm (V)	
Lens mount	C mount	
Minimum illumination	20 lx (F0.95, Gain+18 db, 1/30 s, G output)	
Digital interface	IEEE 1394-1995	
Protocol	IIDC 1394-based Digital Camera Specification Version1.30	
Transfer rate	400 Mbps/200 Mbps/100 Mbps	
Frame rate	15/7.5/3.75/1.875 fps	30/15/7.5/3.75/1.875 fps
Gain control	Auto/Manual (0 to 18 dB)	
Gamma	γ=1 (Fix.)	
Shutter speed	1/100,000 to 17.5 s (Absolute value control possible)	
External trigger shutter	Available (Trigger mode 0,1)	
Partial scan function	256 zones (16 x 16)	
Power requirements	DC 8 to 30 V	
Power consumption	3.5 W (12 V)	
Dimensions	44 (W) x 33 (H) x 116 (D) mm	
Mass	250 g	
Operating temperature	-5 to 45 ˚C	
Storage temperature	-30 to 60 ˚C	
Performance guarantee temperature	0 to 40 ˚C	
Vibration resistance	10 G (20 to 200 Hz, 20 minutes for each direction-X, Y, Z)	
Shock resistance	70 G	
MTBF	59,549 hrs. (approx. 6.8 years)	
Regulation	UL60950, FCC Class B Personal computers and peripherals, ICES-003 Class B Digital Device. CE (EN61326/97+A1/98), Australia EMC (AS4251.1 + AS4252.1)	
Supplied accessories	Lens mount cap (1), Operation instructions (1), Cable (1), Clamp filter (2)	

Rear Panel

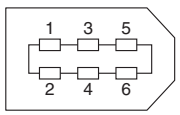


① CAMERA connector
Connect the IEEE1394 camera cable (supplied) to this connector.

② Pilot lamp
This lamp indicates the camera module operation states:
OFF: Camera power OFF
Green: Camera power ON / Video signal output OFF
Orange: Camera power ON / Video signal output ON

④ TRIG IN/Exposure OUT connector
Connect the trigger signal generator (trigger output connector) to this connector.
When trigger is OFF, or software trigger is ON, a signal that indicates the exposure time is output from the BNC connector of the camera.

Connector Pin Assignments



1: Power
2: Power (GND)
3: TPB-
4: TPB+
5: TPA-
6: TPA+

Shutter

This camera allows both Manual and Auto Shutter setting.
The variable range extends from 10 microseconds to 17.5 seconds; relative control values are indicated by a 12-bit integer, and absolute control values are indicated using a 32-bit floating point value.
The shutter settings for the XCD-SX910CR/SX910UV/SX910 and XCD-X710CR/X710 are the same, but these settings differ from some of those for the XCD-SX900 or XCD-X700.
The relationship between the parameter and the exposure time is given by the following formulas.
Where

P = Parameter (003h to 424h)
E = Exposure time (s)
$P \geqq 3 \sim P \leqq 1000$

$$E = \frac{P^2}{1000000} \quad \text{①}$$

$P > 1000 \sim P \leqq 1150$

$$E = (P - 1000) * 0.1 + 1 \quad \text{②}$$

Setting examples

3 (003h) :	9 µs (1/100000)
32 (020h) :	1 ms (1/1000)
100 (064h) :	10 ms (1/100)
1000 (3E8h) :	1 s
1010 (3F2h) :	2 s
1150 (47Eh) :	16 s

When Auto Shutter is selected, the exposure time is adjusted automatically, based on the brightness of the subject. At this time, the reference level (target point) is set in the AutoExposure register.

Gain

Both Manual and Auto Gain setting are available with this camera.
The variable range extends from 0 to 18 dB(XCD-SX910CR/XCD-X710CR) 0 to 24 dB (XCD-SX910UV*/SX910*/X710), and the unit is designed so that the gain can be subdivided and set to any of 640 steps.
At the factory default setting, the gain is set to 0 dB.
When Auto gain is selected, the gain is adjusted automatically, based on the brightness of the subject. At this time, the reference level (target point) is set in the AutoExposure register.
The XCD-SX910CR/SX910UV/SX910 and XCD-X710CR/X710 are not compatible with the XCD-SX900 and XCD-X700 in Gain settings.

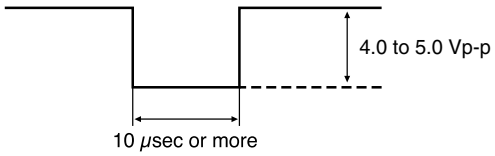
*: If you set the gain to +18 dB or higher, the S/N ratio will be severely degraded. Note this characteristic when you use the XCD-SX910UV/SX910/X710.

Trigger Shutter

Trigger shutter is useful for capturing images in response to a trigger that starts the exposure to match a preset timing. It can also be used to capture an image using multiple cameras with the same timing. When a trigger shutter is used, the required trigger is input via the BNC connector on the rear panel. The input signal is a 5-volt negative pulse. The falling edge of the signal is detected as the trigger, and the unit is equipped with an exposure time consisting of the shutter parameter set as trigger mode 0, and trigger mode 1 that controls the exposure timing using the width of the trigger signal pulse. When trigger mode 0 is used, the minimum width of the trigger is 10 microseconds. When trigger mode 1 is used, there is no limit to the exposure time.

This unit can also be used with a software trigger that issues the trigger signal via a software command. Both trigger mode 0 and trigger mode 1 can be used with software triggers.

Trigger shutter

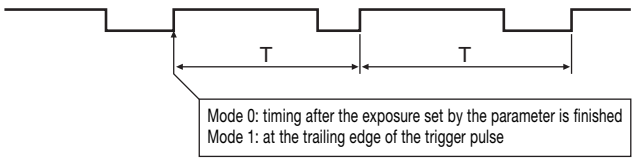


• Input impedance: 10 kΩ

■ When using Trigger mode

When this camera is set to accept a trigger at the fastest possible timing, it can accept overlap of the next trigger signal in the midst of video transmission.
For this reason, a tigger inhibition period is not available. Thus, if a trigger signal is input before the CCD can change to the state where it can accept exposures, multiple exposures can occur, and it cannot capture the correct image. Make sure that the following conditioons are met when the trigger is activated.

(However, partial activation can be used if the following conditions are exceeded.)



XCD-SX910CR : T≧1/15 sec
XCD-X710CR : T≧1/30 sec

White Balance

You can adjust the R and B gain with respect to G. Shoot a white object and adjust the two gains to standardize the signal levels of R, G, and B.

Hue

You can adjust the G gain. Use this feature when you cannot obtain the correct white balance using the R and B gain.

Optical Filter

You can change the Bayer patterns by moving the starting position from which to output pixel data by one position up, down, right, or left.

Patterns of Bayer arrangement are as follows:

Pattern 0

G	B
R	G

Pattern 1

B	G
G	R

Pattern 2

R	G
G	B

Pattern 3

G	R
B	G