SONY

A-E7D-100-**11** (1)

Digital Video Camera Module

Technical Manual

XCG-H280E
XCG-H280CR

Table of Contents

Overview

Network

Functions

Control Operations

Specifications

Appendix

Overview

The XCG-H280E/H280CR is a digital video camera module that uses a 2/3-inch 2,830,000-pixel (effective) progressive scan CCD and supports 1000BASE-T interface.
Conforming to GigE Vision standards (Ver. 1.2), the unit is capable of transmitting uncompressed images via a LAN cable at high efficiency.
Furthermore, the“EXview HAD CCD II” that has sensitivity in near-infrared domains and supports Full HD is employed, permitting image acquisition at 32 fps and shooting of fast-moving objects.

Features

High-quality and high-speed image capturing

XCG-H280E: video camera module incorporated with 2/3-inch 2,830,000-pixel progressive scan CCD
XCG-H280CR: color video camera module incorporated with 2/3-inch 2,830,000-pixel progressive scan CCD

High-precision and high-speed image acquisition

32 fps (1,920×1,080 (with default setting))
26 fps (1,920×1,440 (with full resolution))

“EXview HAD CCD II” that has sensitivity in near-infrared domains

Readout modes

Normal/Binning functions (XCG-H280E)/Partial Scan

Trigger functions

Bulk Trigger/Sequential Trigger/Trigger Delay

Switching an Output Bit Length

You can select 8 bit output (default setting), 10 bit output, or 12 bit output.

Binarization

Outputs a binarized image. The threshold can be changed.

Frame rate control

You can change the frame rate while maintaining the shutter setting. This is useful when you want to reduce packet sizes per time by lowering the frame rate and reduce network traffic.

Image Buffer (Memory Shot) function

Images exposed from the sensor can be stored in built-in memory of the unit. and read using the host PC when required.

Notes on Operation

Power supply

Use a stable power source free from ripple or noise.

Locations for operation and storage

Avoid operation or storage in the following places.

- Extremely hot or cold locations. Recommended temperature range for operation is 0 °C to 40 °C (32 °F to 104 °F).
- Locations subject to strong vibration or shock.
- Near generators of strong electromagnetic radiation such as TV or radio transmitters.

Care

Use a blower to remove dust from the surface of the lens or optical filter. Clean the exterior with a soft, dry cloth. If the camera is very grimy, apply a cloth soaked in a mild detergent then wipe with a dry cloth. Do not apply organic solvents such as alcohol or benzine which may damage the finish.

Note on laser beams

Laser beams may damage a CCD. You are cautioned that the surface of a CCD should not be exposed to laser beam radiation in an environment where a laser beam device is used.

Typical CCD Phenomena

The following effects on the monitor screen are characteristic of CCD cameras.
They do not indicate any fault with the camera module.

Smear

This occurs when shooting a very bright object such as electric lighting, the sun, or a strong reflection.
This phenomenon is caused by an electric charge induced by infrared radiation deep in the photosensor. It appears as a vertical smear, since the CCD imaging element uses an interline transfer system.

Vertical aliasing

When you shoot vertical stripes or lines, they may appear jagged.

Blemishes

A CCD image sensor consists of an array of individual sensor elements (pixels). A malfunctioning sensor element will cause a single pixel blemish in the picture. (This is generally not a problem.)

White speckles

While CCD image pickup device is made by an accurate technique, imperceptible speckless may rarely come up on the screen due to cosmic rays and so on. This is connected to the principle of CCD image pickup device, not a malfunction. And the white speckless are easy to come up in the following conditions.

- Using the camera in high temperature
- When turning up the gain
- With slow-shutter settings

Blooming

This is a phenomenon in which the light from very bright objects appears to overflow into neighboring areas in an image.

Level differences between left and right as well as top and bottom

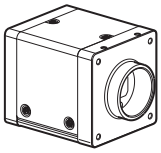
As the CCD used in the camera adopts a 4-channel output system, the image area is divided into quarters to be output individually. Sometimes level differences among these four sections may occur or border lines may be seen vertically or horizontally at the center of the screen, depending on the setting mode of the camera. This is not a malfunction.

Note

If strong light enters a wide area of the screen, the screen may become dark.
This is not a malfunction. If this occurs, avoid strong light or adjust the lens iris to reduce the light amount.

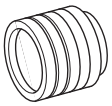
System Components

The Camera Module system comprises the following optional products.



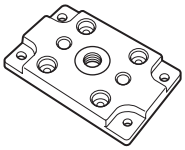
Camera Module

This is a small-size, high-resolution, video camera module using a progressive scan CCD image sensor.



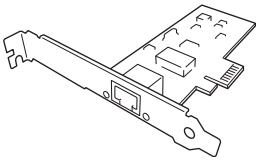
C-mount lens

Use a high-resolution lens.



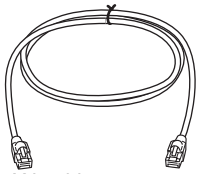
VCT-ST70I
tripod adaptor

This attaches to the bottom of the camera module to fix the camera module to a tripod.



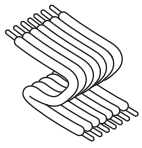
Network card
(commercially available)

Install the board in the expansion slot of the host device (ex: computer). Select a card that is appropriate for your system and that supports 1000BASE-T and jumbo packets.



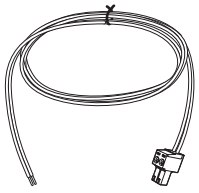
LAN cable
(commercially available)

This cable connects to the RJ45 connector on the rear panel of the camera module. Image/control signals are transmitted via this cable. Select a LAN cable that supports 1000BASE-T (CAT5e or higher cable standard).
Depending on the attributes of the LAN cable, images may become less clear and the camera module may become unstable. Be sure to use a LAN cable that has sufficient noise reduction.



Electric wires for signal inputs
(commercially available)

To be connected to the 7-pin GPIO



Power supply cable (The 2-pin connector is supplied as an accessory.)

Attach commercially available electric wires to the connector to be connected to the power receptacle.

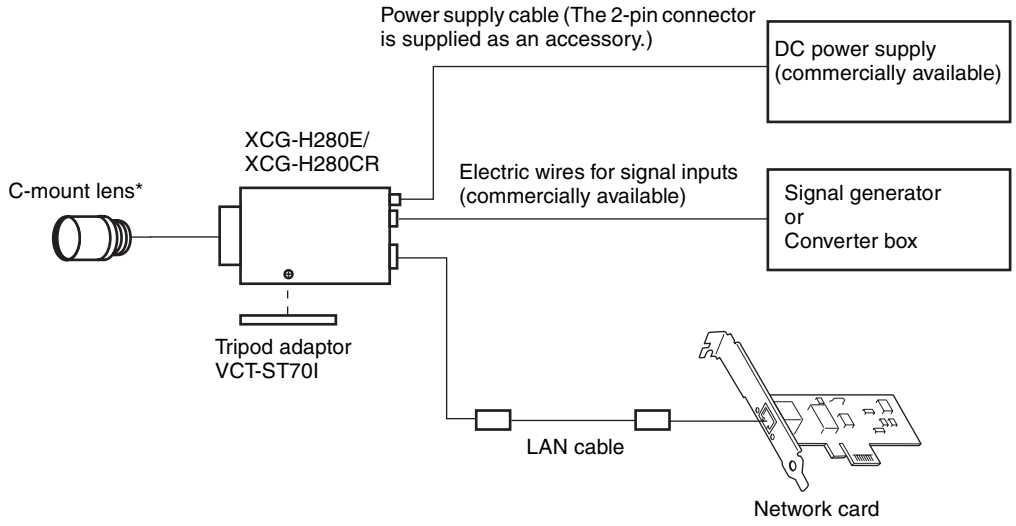
Note

Use electric wires allowed for DC 20 V or higher and 0.5 A or higher.

DC power supply
(commercially available)

Use a power supply allowed for DC 10.5 V to DC 15 V or higher and 1 A or higher.

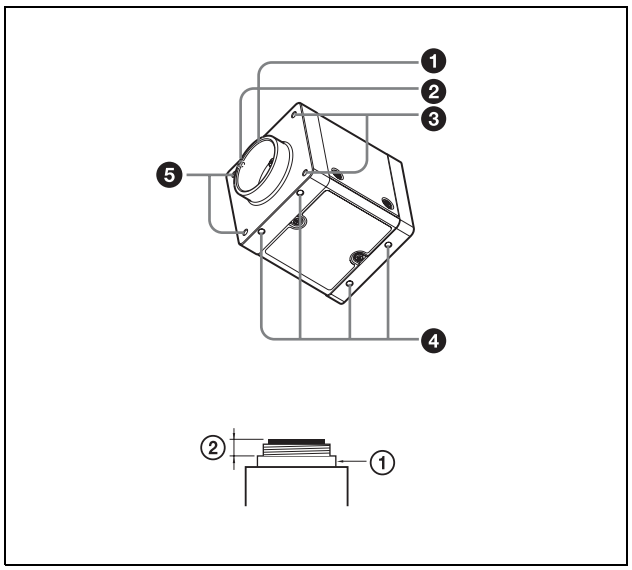
Connection



* Use a high-resolution lens.

Location and Function of Parts and Operation

Front/Top/Bottom



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

Note

The lens must not project more than 10 mm (13/32 inch) from the lens mount.
① Lens mount face ② 10 mm (13/32 inch) or less

2 Guide screw holes (Top)

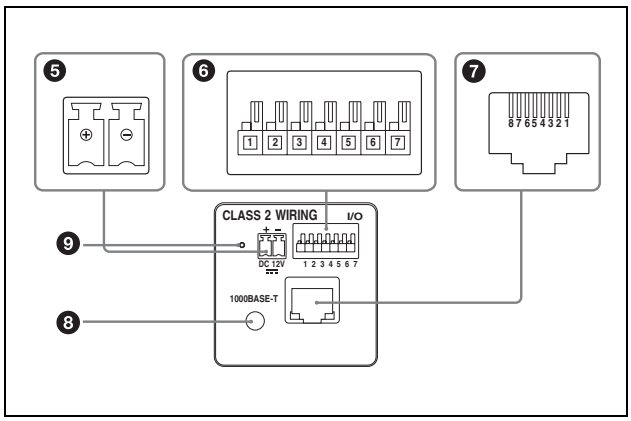
3 LED light screw holes
Use these screw holes to attach the LED light to the camera module.
Use an adapter appropriate for the LED light as required.

4 Guide screw holes/Tripod 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.
When using a tripod, use these four screw holes to attach a VCT-ST70I tripod adaptor.

Note

Use the screws (M3 × 8 (4)) supplied with the tripod adaptor when installing it on the camera module.

Rear



5 DC 12V (DC power input) connector
Connect the DC power cord to input the +12 V DC power supply.
The pin configuration of this connector is as follows.

Pin No.	Signal
+	+12V
–	GND

6 I/O (Input/Output) connector

Pin No.	Signal
1	GPO[1]
2	GPO[2]
3	TRIGGER IN[1]
4	TRIGGER IN[2]
5	GPI[1]
6	GPI[2]
7	GND

7 RJ45 connector
You can connect a LAN cable to this connector to control the camera module from a host device to output image to a host device.

Pin No.	Signal	Pin No.	Signal
1	TP1 +	5	TP3 –
2	TP1 –	6	TP2 –
3	TP2 +	7	TP4 +
4	TP3 +	8	TP4 –

CAUTION

For safety, do not connect the connector for peripheral device wiring that might have excessive voltage to this port. Follow the instructions for this port.

❽ Status LED (Green)
When power is on, this LED lights up.

❾ Reset switch
This reformats the network settings.

Using a Tripod

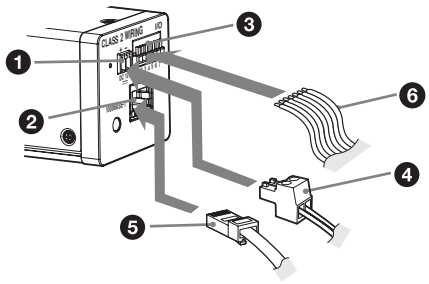
To use the tripod, install the tripod adaptor VCT-ST70I (not supplied) on the camera module.
Use a tripod screw with a protrusion (ℓ) extending from the installation surface, as follows, and tighten it, using a screwdriver.

4.5 mm to 5.5 mm
0.18 inches to 0.22 inches

Note

If you install a tripod adapter (not supplied), use the screws provided.

Connecting the Cables



Connect the DC power cord to the DC 12V connector and the LAN cable to the RJ45 connector respectively. Connect the I/O cable to the I/O connector.

❶ DC 12V connector

❷ RJ45 connector

❸ I/O connector

❹ DC power cord

❺ LAN cable

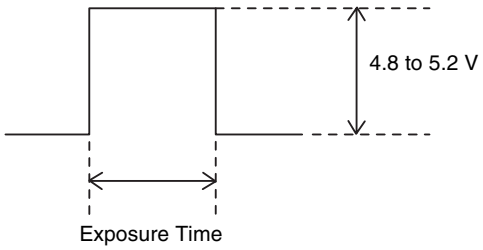
❻ I/O cable

Connect the DC power cord to the DC power supply source, and the LAN cable to the camera module interface board of the host device. Connect the I/O cable to the I/O device.

GPO Output Specifications

When exposure output is selected, signal output is valid during image sensor exposure. When strobe control output is selected, output signal timing and pulse width can be precisely set to control external devices such as strobes connected to the camera. The sensor readout signal indicates that the imager is outputting images. If you select user output, the High/Low-fixed output is obtained according to the register set value. The polarity of the GPO output signal can be changed, using the line selector. When connecting the GPO output signal, terminate the connection with 10 kΩ or higher impedance.

The figure shows an example in which the polarity of GPO output is positive.

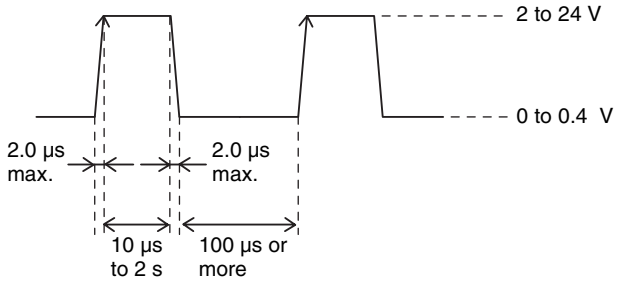


GPI Input Specifications

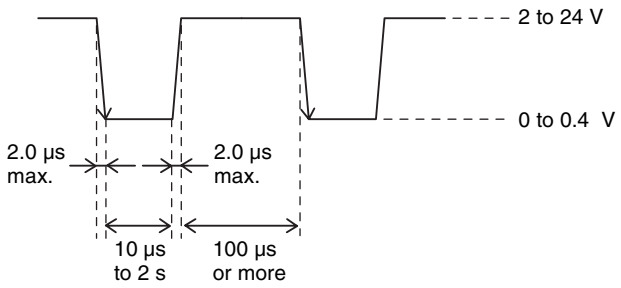
Be sure to use an external power supply between +5 and +24 V DC in combination with resistance.

Trigger Input Specifications

When trigger input polarity is positive



When trigger input polarity is negative



The voltage values described in the above diagram are the values when the terminating impedance is 10 kΩ or more.

Network Settings

For the camera to be connected to a network, the following address data must be properly specified:
- IP address
- Subnet mask
- Default gateway

The camera provides the following three methods for the address data setting:
- Using Persistent IP
- Using DHCP
- Using Link Local Address (LLA)

Using Persistent IP

Use this method when the IP address to be assigned to the camera has been specified in advance. When using the persistent IP, subnet mask and default gateway settings are also required.

Using DHCP

The camera is equipped with a function to automatically obtain an IP address by communicating with a DHCP server on a network. When using the DHCP method for IP address setting, the subnet mask and default gateway values automatically obtained from the DHCP server are also used.

Using LLA

If neither Persistent IP nor DHCP is used, or if an IP address cannot be obtained from the DHCP server, the IP address is determined by LLA. The IP address determined by LLA will be 169.254.XXX.YYY, with XXX and YYY automatically specified.

In addition, the following network settings can be changed.
- Packet size
- Packet delay

Packet Size

The amount of image data per packet can be set in bytes. To permit the camera to operate properly, set the packet size to a value less than the MTU of the network device connected to the camera.

Packet Delay

The delay amount to be inserted between packets can be set when sending them to a network. By increasing the packet delay, you can reduce the network bandwidth that the camera uses for sending packets. However, as the amount of data sent in a certain time is decreased with increased delay, the frame rate of output images of the camera may be consequently decreased.

Notes

- Any persistent IP address can be entered, but the camera may become unable to be detected, depending on the IP address setting. If this occurs, use a tool for issuing ForceIP and set a persistent IP address again.
- The packet size and payload size (amount of data per frame) settings that conform to the forbidden condition described below are invalid. If such invalid setting is made, an error occurs. In such a case, change the packet size or payload size to an appropriate value.
  Forbidden condition: The remainder is 4 or 8 when the payload size is divided by (packet size – 36).
  The payload size (in bytes) is calculated from the image size (Width × Height) and pixel format as follows:
  Mono8: Width × Height
  Mono10Packed/Mono12Packed: Width × Height × 1.5
- When setting the parameters (Width, Height, and PixelFormat) for calculating the payload size, stop camera image output beforehand.

Reset Functions

This camera has the following reset functions for returning operations to the initial conditions:
- Camera reset
- Camera setting reset

Camera Reset

Reset is executed by accessing the DeviceReset register. The camera is restarted. This is the same operation as that when you turn the power off then back on again.

Camera Setting Reset (Initializing)

This reset is executed by holding the reset button on the rear panel pressed for more than three seconds. Then the camera is restarted.
The following network settings are returned to their default values with this reset operation:
Packet size, packet delay, use/nonuse setting of the persistent IP address and the set values (IP address, subnet mask, default gateway), use/nonuse setting of DHCP

In addition, the camera settings are changed as follows:
"UserSetDefaultSelector" is set to "Default."

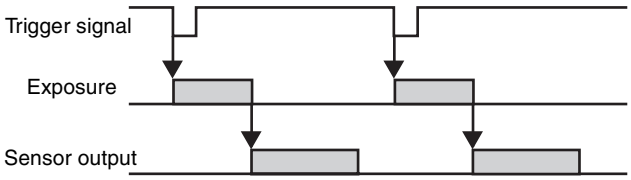
Triggering

Trigger Operations

The camera can shoot images according to trigger signals supplied from external devices. If no operation with a trigger signal is selected, the camera performs free-run image output according to the exposure time and frame rate settings. In Free-Run mode, the frame rate is automatically adjusted to the maximum value according to the exposure time setting. The frame rate can also be fixed when required. The sensor output shown in the figures below is a signal (SensorReadOut) which indicates that the imager output is valid. The signal can be fed out from the GPIO-OUT connector.

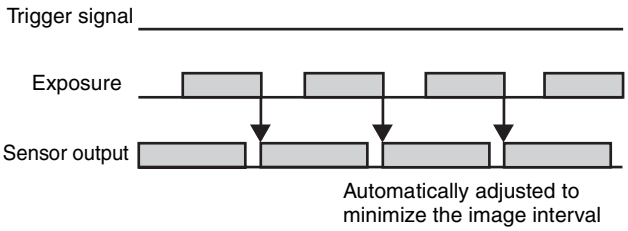
External trigger enabled

Setting parameter: TriggerMode = On



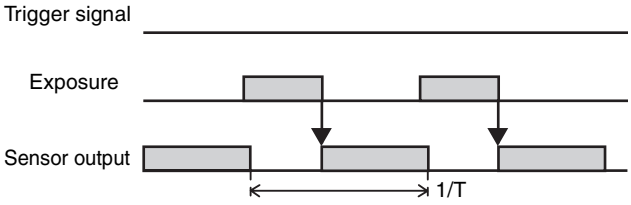
External Trigger disabled/Free Run mode (Frame Rate Auto adjustment)

Setting parameters: TriggerMode = Off
AcquisitionFrameRateAuto = On



External Trigger disabled/Free Run mode (Frame Rate fixed)

Setting parameters: TriggerMode = Off
AcquisitionFrameRateAuto = Off
AcquisitionFrameRate = T

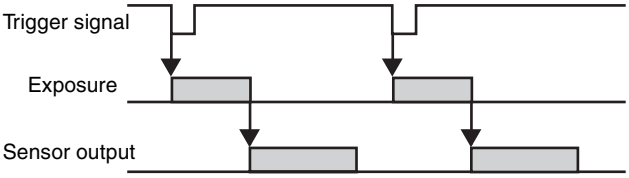


Trigger Edges and Width

When the camera is in Trigger Edge mode, it starts shooting by detecting the rising or falling edge of a trigger signal and performs shooting for the exposure time specified in advance.
In Trigger Width mode, shooting is performed by detecting the effective period of the trigger signal as the exposure time.

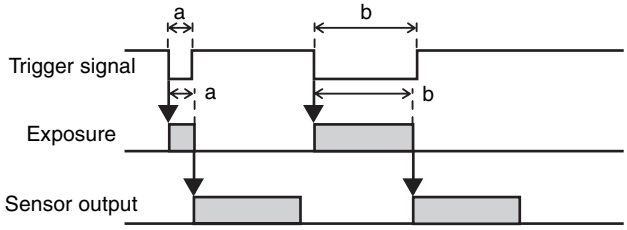
Trigger Edge

Setting parameters: ExposureMode = Timed
TriggerActivation = RisingEdge/FallingEdge ("FallingEdge" selected in the figure below)



Trigger Width

Setting parameter: ExposureMode = TriggerWidth

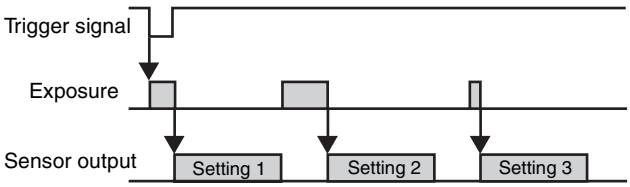


Special Trigger Modes

In a normal trigger operation, the settings, such as exposure time, gain and imaging region, must be changed in advance for each trigger input when shooting under different conditions. Such setting changes can be eliminated by activating a special trigger mode which makes shooting under different conditions easier. Up to 16 configurations of camera settings can be used. There are two types of special trigger modes: Bulk mode, in which shooting continues after being started by a trigger signal, and Sequential mode, in which shooting is performed each time a trigger signal is detected. The next exposure will start after the current image output is completed. Therefore, the second and subsequent trigger signal inputs in Sequential mode must be more than 3 msec. after the end of the preceding image output.

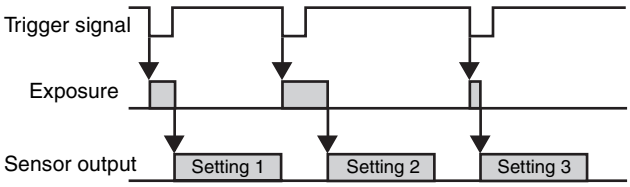
Bulk mode

Setting parameters: TriggerMode = Off
SpecialTriggerMode = Bulk
SpecialTriggerSource = Software/Line3_TRIG1/Line4_TRIG2/Line5_GPI1/Line6_GPI2/Line3orLine4/Line3andLine4
SpecialTriggerActivation = RisingEdge/FallingEdge ("FallingEdge" selected in the figure below)
NumberOfMemoryForSpecialTriggerMode = 1 to 16 ("3" selected in the figure below)



Sequential mode

Setting parameters: TriggerMode = Off
SpecialTriggerMode = Sequential
SpecialTriggerSource = Software/Line3_TRIG1/Line4_TRIG2/Line5_GPI1/Line6_GPI2/Line3orLine4/Line3andLine4
SpecialTriggerActivation = RisingEdge/FallingEdge ("FallingEdge" selected in the figure below)
NumberOfMemoryForSpecialTriggerMode = 1 to 16 ("3" selected in the figure below)



For Bulk and Sequential trigger modes, the following function settings are read from the User Set memory and reflected:

Image Format Control
- OffsetX
- OffsetY

Acquisition Control
- ExposureTime

Digital I/O Control
- LineInverter
- LineSource
- UserOutputValue
- StrobeActiveTime
- StrobeActiveDelay

Analog Control
- Gain
- BlackLevel
- BlackLevelAdjust

LUT Control
- LUTEnable
- LUTFormat
- BinarizationThreshold

UserSet Control
- UserMemoryValue

When using Bulk or Sequential trigger mode, note that the following settings are ignored and have no effect:

Image Format Control
- SensorTaps
- Width
- Height
- BinningHorizontal
- BinningVertical
- PixelFormat
- TestImageSelector
- GainAutoAreaHighlight
- BalanceWhiteAutoHighlight

Acquisition Control
- AcquisitionFrameRate
- AcquisitionFrameRateAuto
- TriggerMode
- TriggerSource
- TriggerInhibit
- TriggerActivation
- TriggerShift
- TriggerControl
- TriggerDelay
- ExposureMode
- ExposureAuto

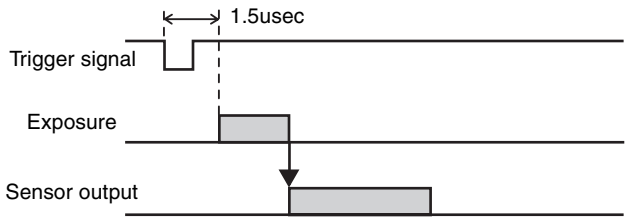
Analog Control
- GainAuto
- BlackLevelAutoBalance

External Trigger Signals and Timing of Shooting

In Trigger Edge mode, the time from when detecting a trigger signal to when starting exposure is 1.5 usec. Shooting is performed according to the “Exposure Time” specified in advance.
In Trigger Width mode, “Minimum Delay” operation or “Exact Exposure Time” operation can be selected. The relationship between the time till starting exposure and the exposure time are shown in the table below.

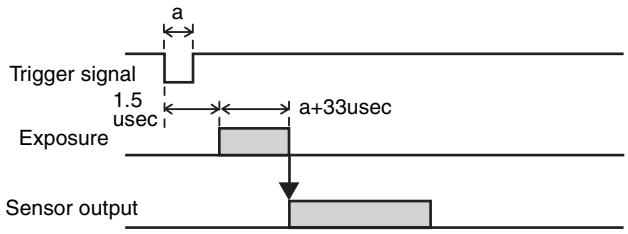
Trigger mode	Trigger Control	Time till starting exposure	Duration of exposure
Trigger Edge	Minimum Delay	1.5 usec	Exposure Time
Trigger Width	Minimum Delay	1.5 usec	Valid period of Trigger Width+33 usec
	Exact Exposure Time	35 usec	Valid period of Trigger Width

Trigger Edge



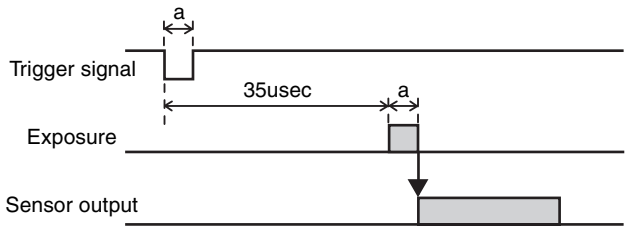
Trigger Width/Minimum Delay mode

Setting parameter: TriggerControl = MinimumDelay



Trigger Width/Exact Exposure Time mode

Setting parameter:TriggerControl =ExactExposureTime



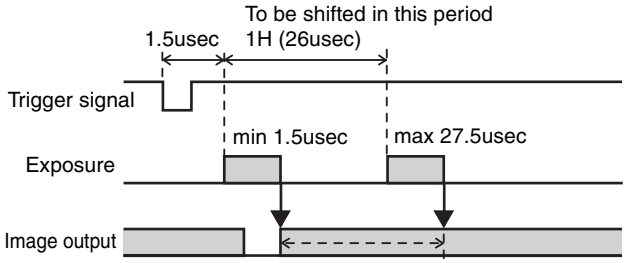
Note

When Trigger Shift is active, Trigger Width/Exact Time Exposure mode cannot be selected.

Trigger Shift

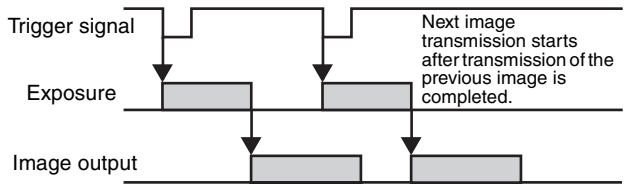
The camera can perform exposure by the next trigger even during image transmission (except in Special Trigger mode). In such case, as the trigger signal can be a noise source, use the camera with Trigger Shift activated. When Trigger Shift is active, the time between trigger input and start of exposure is automatically adjusted to avoid noise generation, causing a delay of one line at maximum in starting exposure. When Trigger Shift is deactivated, the delay adjustment is not made and exposure always starts with the same timing, but noise may be mixed into images. Even if Trigger Shift is active, triggering may be disabled, or exposure may be defective while an image transmission is in progress and the next transmission cannot be started. Select a sufficient trigger interval (see "Trigger Input Specifications" (page 8)).
Setting parameter: TriggerShift = On

Trigger Shift operation (The figure below shows Trigger Edge mode.)



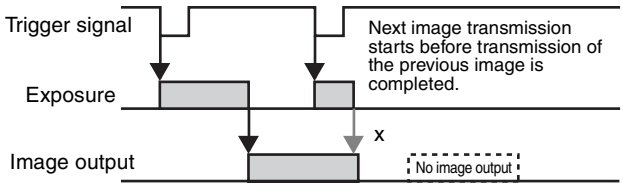
Example of next image transmission enabled

Transmission of the next image can be started as the previous image transmission is already completed when the exposure ends.



Example of next image transmission disabled

As image transmission is not completed when the exposure ends, transmission of the next image cannot be started. The trigger becomes invalid.

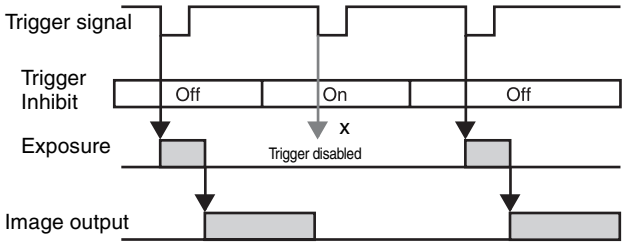


Note

Trigger Shift cannot be enabled in Trigger Width/Exact Time Exposure mode.

Trigger Inhibit

This function disables the camera's trigger input. When multiple cameras are connected, use this to disable triggering for only specified cameras or to eliminate malfunction due to noise mixed in the trigger signal line from the setup environment.
Setting parameter: TriggerInhibit = On



Vertical Binning (XCG-H280E)

Vertical Binning increases sensitivity and doubles frame rate by adding vertically adjacent pixel data.
When Vertical Binning is activated, the maximum vertical image size is halved.
Setting parameter: BinningVertical = 1 (Vertical Binning Off) / 2 (Vertical Binning On)

Horizontal Binning (XCG-H280E)

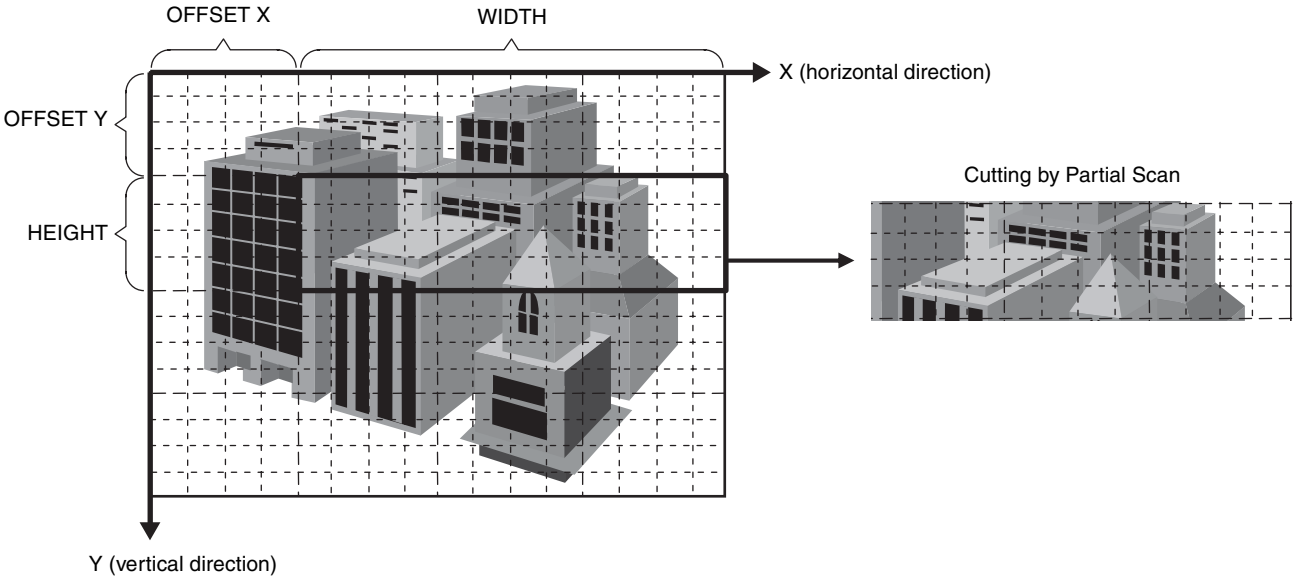
Horizontal Binning increases sensitivity by adding horizontally adjacent pixel data.
When Horizontal Binning mode is activated, the maximum horizontal image size is halved.
Setting parameter: BinningHorizontal= 1 (Horizontal Binning Off) / 2 (Horizontal Binning On)

Note

Frame rate is not doubled by activating Horizontal Binning mode.

Partial Scan

Partial Scan is a function for outputting a user-defined region 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) as well as 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 rectangle. T- and L-shaped regions are invalid. When Vertical Binning or/and Horizontal Binning are active, the pixels defined by Width, Height, OffsetX, and OffsetY are those after pixel binning.



Setting parameters:

Width =	640 to 1920,	by 8 pixels (Horizontal Binning Off)
	320 to 960,	by 4 pixels (Horizontal Binning On)
OffsetX =	0 to 1280,	by 2 pixels (Horizontal Binning Off)
	0 to 640,	by 1 pixel (Horizontal Binning On)
Height =	480 to 1440,	by 2 pixels (Vertical Binning Off)
	240 to 720,	by 1 pixel (Vertical Binning On)
OffsetY =	0 to 720,	by 2 pixels (Vertical Binning Off)
	0 to 480,	by 1 pixel (Vertical Binning On)

Notes

- When setting Partial Scan mode, observe the following conditions.
  Width + OffsetX $\leqq$ MaxWidth (1920 with Horizontal Binning Off, 960 with it On)
  Height + OffsetY $\leqq$ MaxHeight (1440 with Vertical Binning Off, 720 with it On)
- Be aware that the frame rate increases for vertical cut-outs, while the frame rate remains unchanged for horizontal cut-outs.
- In 4-channel sensor reading, the closer to the center the reading position, the more the frame rate will be improved. While keeping Height unchanged, OffsetY that provides the maximum frame rate can be obtained with the formula below:
  OffsetY = (MaxHeight – Height)/2
  Be sure that MaxHeight is 1440 with Vertical Binning Off and 720 with it On.

Gain

The camera provides both manual and automatic gain-control capabilities.

Manual gain control

For the Tap selected with "GainSelector," gain can be set from 0 to 18 dB in increments of 0.0359 dB.
When setting gain for all Taps, select "AnalogAll."
Setting parameters: GainSelector =AnalogAll/
AnalogTap1/AnalogTap2/
AnalogTap3/ AnalogTap4
Gain[GainSelector] = 0 to 18(dB)

Auto gain control

The camera provides the auto gain control function to automatically control image brightness according to a user-specified detection frame and image average level (variable from 0 to 16383 by 14 bits). The upper and lower limits of the variable range are adjustable.
If auto gain control is set to "Once," it automatically changes to "Off" when the gain reaches the image average level or the upper or lower limit of the variable range. With the "Continuous" setting, auto gain control constantly operates.
Also, the auto gain control detection frame which shows each area's image average level can be displayed and adjusted. The detection frame is defined by Offset X and Y, Width and Height percentage values (relative to the [100%] width and height of the output video image).

Setting parameters: GainAuto = Off/Once/Continuous
GainAutoLevel = 0 to 16383
GainAutoSpeed = 1 to 256
GainAutoLowerLimit = 0 to 18(dB)
GainAutoUpperLimit = 0 to 18(dB)

The detection frame is specified using the following parameters.
Setting parameters: GainAutoAreaHighlight = On/Off
GainAutoAreaWidth = 1 to 100 (%)
GainAutoAreaHeight = 1 to 100 (%)
GainAutoAreaOffsetX = 0 to 99 (%)
GainAutoAreaOffsetY = 0 to 99 (%)

Note

When specifying the detection frame, be sure to observe the following requirements.
GainAutoAreaWidth + GainAutoAreaOffsetX $\leqq$ 100
GainAutoAreaHeight + GainAutoAreaOffsetY $\leqq$ 100

White Balance/Pixel Gain (XCG-H280CR)

The camera provides the pixel gain control function and one push white balance function using the pixel gain control.

Pixel gain control

For the R/G/B Tap selected with "GainSelector," gain can be set from 0 to 24 dB.
When setting gain for all Taps, select "DigitalRedAll," "DigitalGreenAll," or "DigitalBlueAll."

Setting parameters: GainSelector = DigitalRedAll/
DigitalRedTap1/
DigitalRedTap2/
DigitalRedTap3/
DigitalRedTap4/
DigitalGreenAll/
DigitalGreenTap1/
DigitalGreenTap2/
DigitalGreenTap3/
DigitalGreenTap4/
DigitalBlueAll/
DigitalBlueTap1/
DigitalBlueTap2/
DigitalBlueTap3/
DigitalBlueTap4
Gain[GainSelector] = 0 to 24 (dB)

One push white balance

For the G level of the user-specified detection frame, the camera adjusts R level and B level with executing one command. The white balance detection frame which detects G level can be displayed and adjusted. The detection frame is defined by Offset X and Y, Width and Height percentage values (relative to the [100%] width and height of the output video image).

Setting parameters: BalanceWhiteAuto = Once

The detection frame is specified using the following parameters.
Setting parameters: BalanceWhiteAuto AreaHighlight = On/Off
BalanceWhiteAutoAreaWidth = 1 to 100 (%)
BalanceWhiteAutoAreaHeight = 1 to 100 (%)
BalanceWhiteAutoAreaOffsetX = 0 to 99 (%)
BalanceWhiteAutoAreaOffsetY = 0 to 99 (%)

Even if the above one push white balance is used, the level may not be specified optimally when color temperature is low. Use the one push white balance after the G level is specified using the following.

Setting parameters: GainSelector = DigitalGreenAll
Gain[DigitalGreenAll] = 3 (dB)
BalanceWhiteAuto = Once

Notes

- When using pixel gain, the output level interval may not be continuous. This phenomenon occurs when there is not video output signal that corresponds to the output step. This is not a malfunction.
- If pixel gain is set to high, noise may be apparent. This is not a malfunction.
- When specifying the upper or lower limit of the exposure time, be sure to observe the following requirements.
  BalanceWhiteAutoAreaWidth + BalanceWhiteAutoAreaOffsetX $\leqq$ 100
  BalanceWhiteAutoAreaHeight + BalanceWhiteAutoAreaOffsetY $\leqq$ 100

Exposure Time

The camera provides both manual and automatic exposure control capabilities.

Manual exposure control

Exposure for the specified time is achieved by internal continuous driving or Trigger Edge operation.
Setting parameter: ExposureTime = 10 to 2,000,000 (us)

Auto exposure control

The camera provides the auto exposure control function to automatically control exposure time according to a common user-specified detection frame and image average level sharing with auto gain control function. The upper and lower limits of the variable range are adjustable.
If the auto exposure control is set to “Once,” it automatically changes to “Off” when the exposure time reaches the image average level or the upper or lower limit of the variable range. With the “Continuous” setting, auto exposure control constantly operates.
When both auto exposure control and auto gain control are activated, gain is lowered and exposure time is extended within the variable range.
Setting parameters: ExposureAuto = Off/Once/Continuous
ExposureAutoSpeed = 1 to 256
ExposureAutoLowerLimit = 10 to 2,000,000 (us)
ExposureAutoUpperLimit = 10 to 2,000,000 (us)

Note

Neither the upper nor lower limits of the exposure time variable range affect the configurable range of exposure time setting by manual exposure control.
When specifying the upper or lower limit of the exposure time, be sure to observe the following requirements.
ExposureAutoLowerLimit < ExposureAutoUpperLimit

Frame Rate Control

The camera provides the following two methods for frame rate control during internal continuous drive operation.

Auto Frame Rate setting

The fastest frame rate is configured automatically based on the current Exposure Time and Partial Scan settings. This is the default frame rate control setting for the camera.
To increase the frame rate, activate Partial Scan mode. Depending on whether the exposure time is longer than the frame period, the frame rate will be reduced proportionally. Therefore shorten the exposure time as necessary.
Setting parameter: AcquisitionFrameRateAuto = On

Frame Rate setting

The frame rate can be set manually. However, you cannot increase the frame rate beyond the fastest setting. In addition, if the exposure time is longer than the configured frame period, the frame rate will be reduced in proportion to the exposure time.
When you want to reduce network traffic, use this setting to lower the frame rate while maintaining the same Exposure Time setting.
Setting parameters: AcquisitionFrameRateAuto = Off
AcquisitionFrameRate = 0.0625 to180 (fps)

Frame rate indication

The camera has a frame rate display function for verifying the frame rate obtained using the above settings. By using this function, you can confirm that an anticipated frame rate has been obtained.
Observation parameter: AcquisitionFrameRateActual

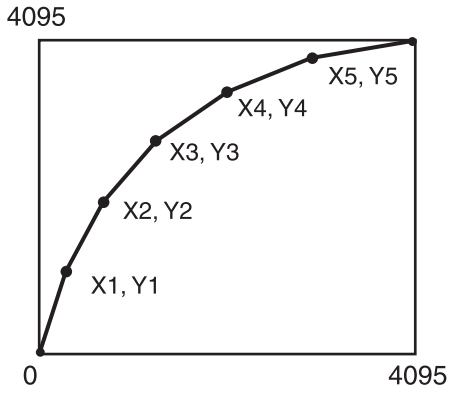
Look-Up Table (LUT)

The look-up table of the camera consists of 4,096 values, with 12-bit input and 12-bit output. The look-up table allows setting an arbitrary gamma curve or binarization.

Selectable from 0: Linear 1: Reverse 2: Binarization 3: 5-Point Linear Interpolated LUT 4: User Setting.

5-Point Linear Interpolated LUT

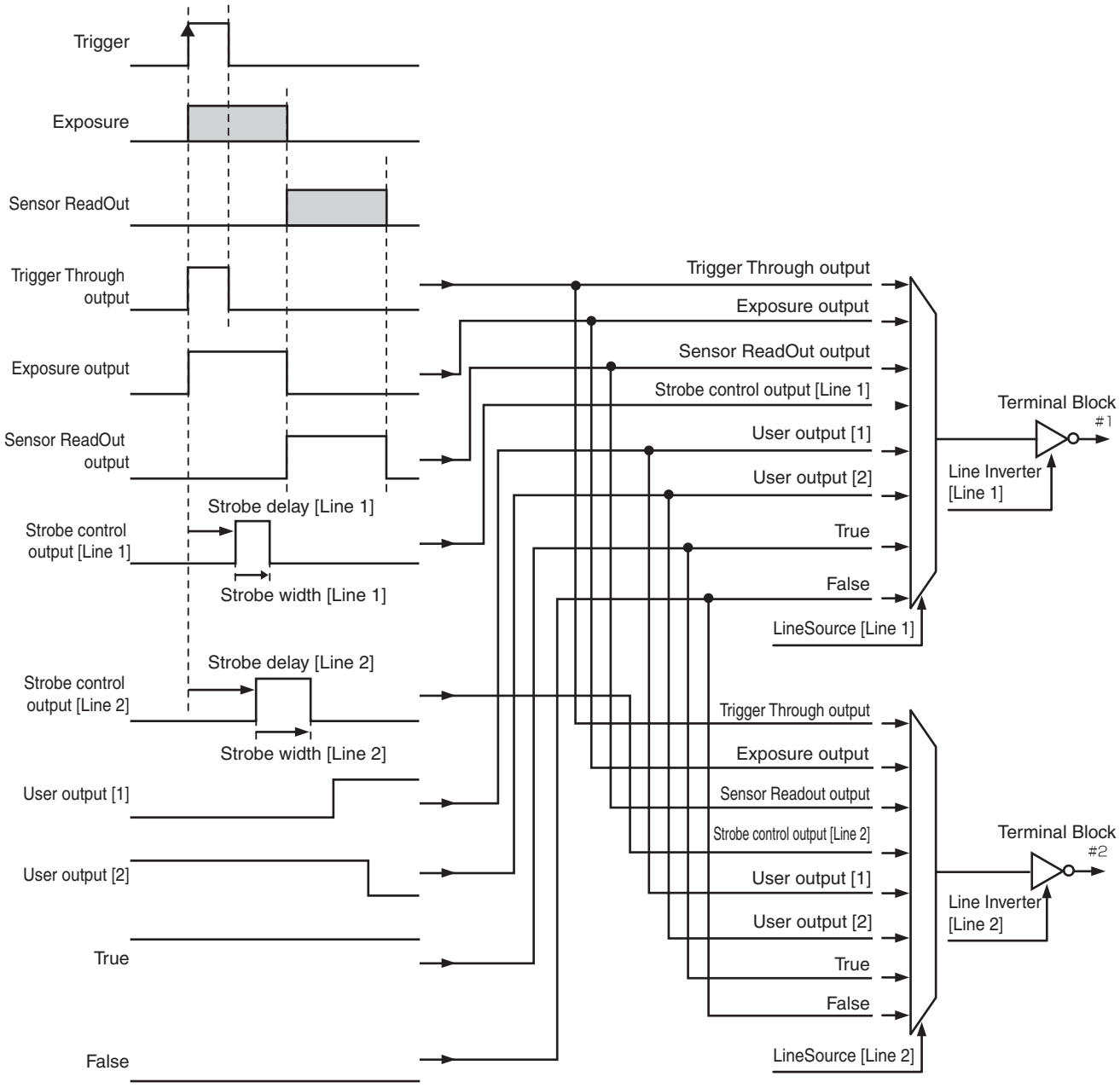
By specifying the input (X) and output (Y) each for 5 points as desired, you can create an LUT through linear interpolation between the specified points.



The specified points are sorted by inputs (X), then an LUT is created by linearly interpolating between (0,0) and (X1,Y1), ..., then (X5,Y5) and (4095,4095).
Setting parameters: LinearInterpolationIndex = 1
LinearInterpolationInValue = X1
LinearInterpolationOutValue = Y1
:
LinearInterpolationIndex = 5
LinearInterpolationInValue = X5
LinearInterpolationOutValue = Y5
LinearInterpolationBuild = Execute

GPIO

The camera has two GPO ports for outputting various signals, as well as two GPI ports for observing signal levels. For setting the output signal and polarity for GPO or checking via GPI, first select the port using the Line Selector.
Setting parameter: LineSelector = Line1/Line2/Line5/Line6



Line Inverter

You can inverse the signal to be output to GPO.
Setting parameter: LineInverter[LineSelector] = True/False

Line Sources

The signals mentioned below can be selected for the output from the GPO ports.
If the line inverter is set to "False," all signals are High Active.

Trigger Through output

The signal supplied to the trigger input connector selected with "TriggerSource" is output as-is.
Setting parameter: LineSource[LineSelector] = TriggerSignalThroughOut

Exposure output

For outputting the exposure time of the image sensor.
Setting parameter: LineSource[LineSelector] = ExposureActive

Sensor ReadOut output

For outputting the status of reading from the image sensor.
Setting parameter: LineSource[LineSelector] = SensorReadOutActive

Strobe control outputs

For fine adjustment of strobe control for external devices connected to the camera by controlling the timing and width of signal generation.
The strobe delay and width can be set each for the GPO1 and GPO2 ports.
Setting parameters: LineSource[LineSelector] = StrobeActive
StrobeActiveTime[LineSelector] = 1 to 4000 (us)
StrobeActiveDelay[LineSelector]= 0 to 4000 (us)

Note

When using strobe control output, if the strobe delay or strobe width exceeds the exposure interval, proper strobe signals cannot be output. Set the strobe control output so that the delay and width are within the exposure time.

User outputs

For outputting the user-specified True/False setting.
The camera provides two user output settings (User Output 1 and User Output 2) which can be selected each for GPO1 and GPO2 port.
Setting parameters: LineSource[LineSelector] = UserOutput1/UserOutput2
UserOutputSelector = UserOutput1/UserOutput2
UserOutputValue[UserOutputSelector] = True/False

True/False

For outputting the True/False setting.
Settting parameter: LineSource = True/False

Line Status

"True" is returned if the input to the selected GPI port is High, and "False" is returned if it is Low.
Observation parameter: LineStatus[LineSelector] = True/False

Memory Shot

The camera has the Memory Shot function to store images in internal frame memory and read them when required.
When multiple cameras are connected to the host computer via a single hub, the Memory Shot function may be useful in cases where simultaneous image outputs are disabled because of the band restriction of 1 Gbps.
Up to 16 frames can be stored in memory.
Memory Shot mode can be used regardless of the trigger mode and special trigger mode settings.

Activating Memory Shot mode

Memory Shot mode can be activated.
Captured images are stored in frame memory until a ReadOut command is issued.

Setting parameter: MemoryShotMode = On

Confirming the number of images stored in frame memory

You can confirm how many images have been stored.

Observation parameter: MemoryShotNumberOfImages InMemory

Reading an image

You can send an image stored in the frame memory to the host PC.

Setting parameter: MemoryShotSingleRead = Execute

Reading multiple images

You can send the specified number of images stored in frame memory to the host PC.

Setting parameters: MemoryShotNumberOfImages ToRead= 1 to 16
MemoryShotMultiFrameRead = Execute

Note

Frame memory can store 16 images at maximum, regardless of image size.
Any image captured under the condition that there are already 16 images in frame memory will be discarded, and not stored in frame memory.

User Set/User Memories

User Set

The camera has the User Set function for storing the camera settings and loading them when required to change the camera status accordingly. Up to 16 configurations of settings can be stored. This function also enables shooting frame by frame with different configurations of the camera settings by loading the User Set data in sequence in Bulk Trigger or Sequential Trigger mode.

When storing data in a User Set, first specify the destination User Set then execute storage.
Setting parameters: UserSetSelector = UserSet0 to UserSet15
UserSetSave = Execute

When loading data from a User Set, first specify the source User Set then execute loading.
Setting parameters: UserSetSelector = UserSet0 to UserSet15 / Default
UserSetSave = Execute

When you select “Default” for the source, the following items will return to the factory-set conditions, in addition to the items stored in the User Set:
- TestImageSelector
- GainAutoAreaWidth
- GainAutoAreaHeight
- GainAutoAreaOffsetX
- GainAutoAreaOffsetY
- AcquisitionMode
- SpecialTriggerMode
- NumberOfMemoryForSpecialTriggerMode
- SpecialTriggerSource
- SpecialTriggerActivation

User Memories

Each User Set provides 64 bytes of nonvolatile read-write storage for users to store data freely. Stored data are retained even when the power is turned off.

Chunk Data

The camera supports the chunk data format transferring images and various types of information on shot images. The following items are transferred as chunk data:

Essential item

- Image
- OffsetX
- OffsetY
- Width
- Height
- PixelFormat

Optional item

- TriggerCounter
- Temperature
- LineStatusAll
- ExposureTime
- GainAnalog
- UserMemory
- LineOutputStatus

Setting parameters: ChunkModeActive = True/False
ChunkSelector = TriggerCounter/
Temperature/
LineStatusAll/
ExposureTime/
GainAnalog/
UserMemory/
LineOutputStatus
ChunkEnable[ChunkSelector] =
True/False

Note

When the chunk mode is activated, the format of transferred packets differs from normal image transfer. This will prevent applications that do not support the chunk data format from obtaining images.

Camera Control Registers

There is a diagonal line in the Address column of registers for which there is a definition for XML only and there is no address definition.

Address	Register
0x00000000	Base Address
0x00000000 - 0x00009FFC	GigE Vision Bootstrap
0xA0000000	Camera Base Address
0xA0000000 - 0xA00020BC	Camera Control
0xA00020C0 - 0xA00020FC	User Memory
0xA0003000 - 0xA00030FC	Camera Control
0xA0007000 - 0xA00070FC	Camera Control Inq
0xA0010000 - 0xA0013FFC	LUT Control

DeviceControl

Address	Name	Type	Data	Description
0x00000068	DeviceVendorName	R/O	1)	Displays the vendor name.
0x00000088	DeviceModelName	R/O	1)	Displays the model name.
0x000000A8	DeviceVersion	R/O	1)	Displays the version.
0x000000D8	DeviceManufacturerInfo	R/O	1)	Displays the manufacturer information.
0x000000D8	DeviceID	R/O	1)	Displays the serial number.
0x000000E8	DeviceUserID	R/W	1)	Sets the user ID.
	DeviceScanType	R/O	–	Displays the scan type.
0xA0000010	DeviceReset	W/O	1	Executes a device reset.
0xA0000014	DeviceTemperature	R/O		Displays the device temperature (°C).

1) This value is unique to the model.

ImageFormatControl

Address	Name	Type	Data	Description
0xA0000124	SensorTaps	R/W	2,4	Sets the number of Taps to be read from the image sensor.
0xA0000100	Width	R/W	1)	Sets the number of horizontal pixels (H).
0xA0000104	Height	R/W	1)	Sets the number of vertical lines (V).
0xA0000108	OffsetX	R/W	1)	Sets the offset of the number of horizontal pixels (H).
0xA000010C	OffsetY	R/W	1)	Sets the offset of the number of vertical lines (V).
0xA0000118	BinningHorizontal2)	R/W	1,2	Sets Horizontal Binning.
0xA0000114	BinningVertical2)	R/W	1,2	Sets Vertical Binning.

Address	Name	Type	Data	Description
0xA0000110	PixelFormat	R/W	0x01080001	Sets to 8-bit black and white (Mono8).[2]
			0x010C0004	Sets to 10-bit black and white (Mono10 Packed).[2]
			0x010C0006	Sets to 12-bit black and white (Mono12 Packed).[2]
			0x01080009	Sets to bayer 8-bit (BayerRG8).[3]
			0x010C0027	Sets to bayer 10-bit (BayerRG10Packed).[3]
			0x010C002B	Sets to bayer 12-bit (BayerRG12Packed).[3]
	PixelSize	R/O	8	Configures with 8-bit pixels (Bpp8).
			10	Configures with 10-bit pixels (Bpp10).
			12	Configures with 12-bit pixels (Bpp12).
	PixelColorFilter	R/O	0	Displays the color filter (no).
			1	Displays the color filter (RG).
0xA0000130	TestImageSelector	R/W	0	Sets the test image to OFF.
			1	Sets the test image to gray scale chart.[2]
			2	Sets the test image to color chart.[3]
0xA0000134	GainAutoAreaHighlight	R/W	0	Sets the auto gain detection frame to OFF.
			1	Sets the auto gain detection frame to ON.
0xA0000138	GainAutoAreaWidth	R/W	1 - 100	Sets the auto gain detection frame (H).
0xA000013C	GainAutoAreaHeight	R/W	1 - 100	Sets the auto gain detection frame (V).
0xA0000140	GainAutoAreaOffsetX	R/W	0 - 99	Sets the offset of the auto gain detection frame (H).
0xA0000144	GainAutoAreaOffsetY	R/W	0 - 99	Sets the offset of the auto gain detection frame (V).
0xA0000154	BalanceWhiteAutoAreaHighlight[3]	R/W	0	Sets the white balance detection frame to OFF.
			1	Sets the white balance detection frame to ON.
0xA0000158	BalanceWhiteAutoAreaWidth[3]	R/W	0 - 100	Sets the white balance detection frame (H).
0xA000015C	BalanceWhiteAutoAreaHeight[3]	R/W	0 - 100	Sets the white balance detection frame (V).
0xA0000160	BalanceWhiteAutoAreaOffsetX[3]	R/W	0 - 100	Sets the offset of the white balance detection frame (H).
0xA0000164	BalanceWhiteAutoAreaOffsetY[3]	R/W	0 - 100	Sets the offset of the white balance detection frame (V).

1)This value is unique to the model.
2)XCG-H280E only
3)XCG-H280CR only

AcquisitionControl

Address	Name	Type	Data	Description
0xA0000200	AcquisitionMode	R/W	1	Sets free run (Continuous).
			2	Sets multi frames (MultiFrame).
			3	Sets a single frame (SingleFrame).
0xA0000210	AcquisitionStart	W/O	1	Executes start of image transfer.
0xA0000214	AcquisitionStop	W/O	0	Executes stop of image transfer.
0xA0000204	AcquisitionFrameCount	R/W	2 - 255	Sets the frame count of multi frames.
0xA0000220	AcquisitionFrameRate	R/W	62500 - 180000000	Sets the frame rate. [fps][1]

Address	Name	Type	Data	Description
0xA0000224	AcquisitionFrameRateAuto	R/W	0	Sets the auto frame rate to OFF.
			1	Sets the auto frame rate to ON.
0xA0000228	AcquisitionFrameRateActual	R/O	–	Displays the frame rate. [fps][1)]
0xA0000300	SpecialTriggerMode[2)]	R/W	0	Sets the special trigger to OFF.
			1	Sets the special trigger to bulk trigger mode.
			2	Sets the special trigger to sequential trigger mode.
0xA0000304	NumberOfMemoryForSpecialTriggerMode	R/W	1 - 16	Sets the frame count of the special trigger.
0xA00002F0	SpecialTriggerSource	R/W	0	Sets the trigger source for special trigger to Line3.
			1	Sets the trigger source for special trigger to Line4.
			2	Sets the trigger source for special trigger to Line3 or Line4.
			3	Sets the trigger sources for special trigger to Line3 and Line4.
			4	Sets the trigger source for special trigger to the software.
			5	Sets the trigger source for special trigger to Line5.
			6	Sets the trigger source for special trigger to Line6.
0xA00002F4	SpecialTriggerActivation	R/W	0	Sets the trigger of the special trigger to the edge of negative polarity.
			1	Sets the trigger of the special trigger to the edge of positive polarity.
	TriggerSelector	R/O	–	Displays the trigger type.
0xA0002044	TriggerMode	R/W	0	Sets the trigger to OFF.
			1	Sets the trigger to ON.
0xA00002F8	TriggerSoftware	W/O	1	Executes the software trigger.
0xA0002098	TriggerSource	R/W	0	Sets the trigger source to Line3.
			1	Sets the trigger source to Line4.
			2	Sets the trigger source to Line3 or Line4.
			3	Sets the trigger sources to Line3 and Line4.
			4	Sets the trigger source to the software.
			5	Sets the trigger source to Line5.
			6	Sets the trigger source to Line6.
0xA0002050	TriggerInhibit	R/W	0	Sets trigger inhibit to OFF.
			1	Sets trigger inhibit to ON.
0xA0002048	TriggerActivation	R/W	6	Sets the trigger to the edge of positive polarity.
			4	Sets the trigger to the edge of negative polarity.
			7	Sets the trigger to the level of positive polarity.
			5	Sets the trigger to the level of negative polarity.
0xA00020BC	TriggerActivation	R/W	0	Sets the trigger to negative polarity.
			1	Sets the trigger to positive polarity.
	TriggerOverlap	R/O	0	Indicates that trigger overlap is not allowed.
			1	Indicates that trigger overlap is allowed during sensor reading.
0xA0002054	TriggerShift	R/W	0	Sets trigger shift to OFF.
			1	Sets trigger shift to ON.

Address	Name	Type	Data	Description
0xA00020B4	TriggerControl	R/W	0	Sets trigger width mode to “Exact Exposure Time” operation.
			1	Sets trigger width mode to “Minimum Delay” operation.
0xA0002058	TriggerDelay	R/W	0 - 4000000	Sets the trigger delay. [us]
0xA00020B8	ExposureMode	R/W	0	Sets the exposure time by ExposureTime.
			1	Sets the exposure time by the trigger signal width.
0xA0002040	ExposureTime	R/W	10 - 2000000	Sets the exposure time. [us]
0xA0002140	ExposureAuto	R/W	0	Sets the auto exposure to OFF.
			1	Sets the auto exposure to Once.
			2	Sets the auto exposure to Continuous.
0xA0002144	ExposureAutoSpeed	R/W	1 - 256	Sets the response speed of the auto exposure.
0xA0002148	ExposureAutoLowerLimit	R/W	10 - 2000000	Sets the lower limit of the exposure time controlled by the auto exposure. [us]
0xA000214C	ExposureAutoUpperLimit	R/W	10 - 2000000	Sets the upper limit of the exposure time controlled by the auto exposure. [us]

1) For reading/writing data from/to the register, use integers of 1,000,000 times the fps value. When fps is 32, use 32,000,000.
2) The settings of SpecialTriggerMode are deleted and unsaved when the power is turned OFF.

AnalogControl

Address	Name	Type	Data	Description
0xA00030B0	GainSelector[1)]	R/W	16	Sets the gain selector to AnalogAll.
			17	Sets the gain selector to AnalogTap1.
			18	Sets the gain selector to AnalogTap2.
			19	Sets the gain selector to AnalogTap3.
			20	Sets the gain selector to AnalogTap4.
			48	Sets the gain selector to DigitalRedAll.
			49	Sets the gain selector to DigitalRedTap1.
			50	Sets the gain selector to DigitalRedTap2.
			51	Sets the gain selector to DigitalRedTap3.
			52	Sets the gain selector to DigitalRedTap4.
			64	Sets the gain selector to DigitalGreenAll.[2)]
			65	Sets the gain selector to DigitalGreenTap1.[2)]
			66	Sets the gain selector to DigitalGreenTap2.[2)]
			67	Sets the gain selector to DigitalGreenTap3.[2)]
			68	Sets the gain selector to DigitalGreenTap4.[2)]
			96	Sets the gain selector to DigitalRedAll.[2)]
			97	Sets the gain selector to DigitalBlueTap1.[2)]
			98	Sets the gain selector to DigitalBlueTap2.[2)]
			99	Sets the gain selector to DigitalBlueTap3.[2)]
			100	Sets the gain selector to DigitalBlueTap4.[2)]
0xA00030A0	Gain[AnalogAll]	R/W	0 - 502	Sets the gain (AnalogAll).[3)]
0xA0002010	Gain[AnalogTap1]	R/W	0 - 502	Sets the gain (AnalogTap1).[3)]
0xA0002014	Gain[AnalogTap2]	R/W	0 - 502	Sets the gain (AnalogTap2).[3)]

Address	Name	Type	Data	Description
0xA0003088	Gain[AnalogTap3]	R/W	0 - 502	Sets the gain (AnalogTap3).[3]
0xA000308C	Gain[AnalogTap4]	R/W	0 - 502	Sets the gain (AnalogTap4).[3]
0xA0003000	Gain[DigitalRedAll]	R/W	128 - 2047	Sets the gain (DigitalRedAll).[2) 4]
0xA0003040	Gain[DigitalRedTap1]	R/W	128 - 2047	Sets the gain (DigitalRedTap1).[2) 4]
0xA0003004	Gain[DigitalRedTap2]	R/W	128 - 2047	Sets the gain (DigitalRedTap2).[2) 4]
0xA0003048	Gain[DigitalRedTap3]	R/W	128 - 2047	Sets the gain (DigitalRedTap3).[2) 4]
0xA000304C	Gain[DigitalRedTap4]	R/W	128 - 2047	Sets the gain (DigitalRedTap4).[2) 4]
0xA0003008	Gain[DigitalGreenAll]	R/W	128 - 2047	Sets the gain (DigitalGreenAll).[2) 4]
0xA0003050	Gain[DigitalGreenTap1]	R/W	128 - 2047	Sets the gain (DigitalGreenTap1).[2) 4]
0xA000300C	Gain[DigitalGreenTap2]	R/W	128 - 2047	Sets the gain (DigitalGreenTap2).[2) 4]
0xA0003058	Gain[DigitalGreenTap3]	R/W	128 - 2047	Sets the gain (DigitalGreenTap3).[2) 4]
0xA000305C	Gain[DigitalGreenTap4]	R/W	128 - 2047	Sets the gain (DigitalGreenTap4).[2) 4]
0xA0003018	Gain[DigitalBlueAll]	R/W	128 - 2047	Sets the gain (DigitalBlueAll).[2) 4]
0xA0003070	Gain[DigitalBlueTap1]	R/W	128 - 2047	Sets the gain (DigitalBlueTap1).[2) 4]
0xA000301C	Gain[DigitalBlueTap2]	R/W	128 - 2047	Sets the gain (DigitalBlueTap2).[2) 4]
0xA0003078	Gain[DigitalBlueTap3]	R/W	128 - 2047	Sets the gain (DigitalBlueTap3).[2) 4]
0xA000307C	Gain[DigitalBlueTap4]	R/W	128 - 2047	Sets the gain (DigitalBlueTap4).[2) 4]
0xA000201C	GainAuto	R/W	0	Sets the auto gain to OFF.
			1	Sets the auto gain to Once.
			2	Sets the auto gain to Continuous.
0xA0002020	GainAutoLevel	R/W	0 - 16383	Sets the auto gain level.
0xA0002154	GainAutoSpeed	R/W	1 - 256	Sets the response speed of auto gain.
0xA0002158	GainAutoLowerLimit	R/W	0 - 502	Sets the lower limit of gain controlled by auto gain.
0xA000215C	GainAutoUpperLimit	R/W	0 - 502	Sets the upper limit of gain controlled by auto gain.
0xA0002038	BlackLevel	R/W	0 - 2047	Sets the pedestal level.
0xA0002018	BlackLevelAutoBalance	R/W	0	Set the automatic black level adjustment between Taps to OFF.
			1	Set the automatic black level adjustment between Taps to Once.
			2	Set the automatic black level adjustment between Taps to Continuous.
0xA00030B4	BlackLevelAdjustSelector	R/W	1 - 4	Selects the Tap for black level adjustment.
0xA0003090	BlackLevelAdjust[Tap1]	R/W	-255 - 255	Sets the black level adjustment to Tap1.
0xA0003094	BlackLevelAdjust[Tap2]	R/W	-255 - 255	Sets the black level adjustment to Tap2.
0xA0003098	BlackLevelAdjust[Tap3]	R/W	-255 - 255	Sets the black level adjustment to Tap3.
0xA000309C	BlackLevelAdjust[Tap4]	R/W	-255 - 255	Sets the black level adjustment to Tap4.

1) The settings of GainSelector and BlackLevelSelector, are deleted and unsaved when the power is turned OFF.
2) XCG-H280CR only
3) The value of 0.0359×data will be set for the gain (dB).
4) 20×log10 (Data/256) will be set for the gain (dB).

DigitalIOControl

Address	Name	Type	Data	Description
0xA0000354	LineSelector[1)]	R/W	0	Selects GPO1 (Line1).
			1	Selects GPO2 (Line2).
			2	Selects GPI1 (Line5).
			3	Selects GPI2 (Line6).
	LineMode	R/O	–	Displays the input/output of GPI and GPO.
0xA00020A8	LineInverter[Line1]	R/W	0	Sets GPO1 inversion to OFF.
			1	Sets GPO1 inversion to ON.
0xA00020AC	LineInverter[Line2]	R/W	0	Sets GPO2 inversion to OFF.
			1	Sets GPO2 inversion to ON.
0xA0000400 bit0	LineStatus[Line5]	R/O	–	Displays the GPI1 signal.
0xA0000400 bit1	LineStatus[Line6]	R/O	–	Displays the GPI2 signal.
0xA000206C	LineSource[Line1]	R/W	0	Selects the Exposure signal.
			1	Selects the Strobe1 signal.
			2	Selects UserOutput[1].
			3	Selects UserOutput[2].
			4	Selects the SensorReadOut signal.
			5	Selects the TriggerSignal.
			6	Selects True.
			7	Selects False.
0xA0002080	LineSource[Line2]	R/W	0	Selects the Exposure signal.
			1	Selects the Strobe2 signal.
			2	Selects UserOutput[1].
			3	Selects UserOutput[2].
			4	Selects the SensorReadOut signal.
			5	Selects the TriggerSignal.
			6	Selects True.
			7	Selects False.
	LineFormat	R/O	–	Displays the signal format of GPI and GPO.
0xA0000358	UserOutputSelector [1)]	R/W	0	Selects UserOutput0.
			1	Selects UserOutput1.
0xA0002090 bit0	UserOutputValue[1]	R/W	0 - 1	Specifies the User Output[1] signal.
0xA0002090 bit1	UserOutputValue[2]	R/W	0 - 1	Specifies the User Output[2] signal.
0xA0002078	StrobeActiveTime[Line1]	R/W	1 - 4000	Specifies the pulse width of the Strobe1 signal. [us]
0xA000208C	StrobeActiveTime[Line2]	R/W	1 - 4000	Specifies the pulse width of the Strobe2 signal. [us]
0xA0002074	StrobeActiveDelay[Line1]	R/W	0 - 4000	Specifies the delay of the Strobe1 signal. [us]
0xA0002088	StrobeActiveDelay[Line2]	R/W	0 - 4000	Specifies the delay of the Strobe2 signal. [us]

1) The settings of LineSelector, and UserOutputSelector are deleted and unsaved when the power is turned OFF.

LUTControl

Address	Name	Type	Data	Description
	LUTSelector	R/O	–	Displays the LUT control.
0xA0002060	LUTEnable	R/W	0	Disables LUT.
			1	Enables LUT.
0xA000205C	LUTFormat	R/W	0	Sets linear.
			1	Sets reverse.
			2	Sets binarization.
			3	Sets the 5-point linear interpolation LUT.
			4	Sets the user setting[1].
0xA0002064	BinarizationThreshold	R/W	0 - 4095	Sets the threshold value for binalization.
0xA0000340	LinearInterpolationIndex	R/W	1 - 5	Selects the point for setting the linear interpolation LUT.
0xA0000344	LinearInterpolationInValue	R/W	0 - 4095	Sets the input value of the linear interpolation LUT.
0xA0000348	LinearInterpolationOutValue	R/W	0 - 4095	Sets the output value of the linear interpolation LUT.
0xA000034C	LinearInterpolationBuild	R/W	1	Builds the table of the linear interpolation LUT.
0xA0000350	LUTIndex	R/W	0 - 4095	Sets Index of LUT.
0xA0010000 – 0xA0013FFC	LUTValue	R/W	0 - 4095	Sets Value of LUT.
0xA0010000 – 0xA0013FFC	LUTValueAll	R/W	0 - 4095	Sets LUT with Streaming.

1) Set the user setting value with LUTIndex, LUTValue, and LUTValueAll.
2) The setting of LUTIndex is deleted and unsaved when the power is turned OFF.

UserSetControl

Address	Name	Type	Data	Description
0xA0001000	UserSetSelector	R/W	16	Sets UserSet to the default value.
			0 – 15	Sets UserSet0[1]. – Sets UserSet15[1].
0xA0001008	UserSetLoad	R/W	3	Loads the setting value of UserSet[2].
0xA0001004	UserSetSave	R/W	3	Saves the setting value of UserSet[2].
0xA000100C	UserSetDefaultSelector	R/W	0 - 16	Selects UserSet to be applied upon startup.
0xA0000350	UserMemoryIndex[3]	R/W	0 - 15	Sets Index of UserMemory.
0xA00020C0 – 0xA00020FC	UserMemoryValue	R/W	–	Sets Value of UserMemory.

1) UserSet0 - 15 can be directly set with a specific address. For details, see “User Set Registers” (page 33).
2) UserSet that was selected with UserSetSelector is applicable.
3) UserMemoryIndex is deleted and unsaved when the power is turned OFF.

MemoryShotControl

Address	Name	Type	Data	Description
0xA0002200	MemoryShotMode	R/W	0	Sets Memory Shot mode to OFF.
			1	Sets Memory Shot mode to ON.
0xA0002208	MemoryShotNumberOfMemory	R/O	16	Displays the number of memory channels used for Memory Shot.
0xA0002204	MemoryShotNumberOfImagesInMemory	R/O	–	Displays the number of images stored in memory at present.
0xA000220C	MemoryShotNumberOfImagesToRead	R/W	1 - 16	Specifies the number of images for multiple-image reading.
0xA0002210	MemoryShotMultiFrameRead	W/O	1	Executes multiple-image reading.
0xA0002214	MemoryShotSingleRead	W/O	1	Executes single-image reading.

TransportLayerControl

The registers 0x00000000 to 0x00009FFF conform to the Bootstrap register of GigE Vision.

Address	Name	Type	Data	Description
0x0000A000	PayloadSize	R/O	–	Displays the payload size.
0x0000A020	GevIPConfigurationStatus	R/O	0	IPConfiguration is configured with None.
			1	IPConfiguration is configured with PersistentIP.
			2	IPConfiguration is configured with DHCP.
			3	IPConfiguration is configured with LLA.
			4	IPConfiguration is configured with ForceIP.
0x0000A030	GevTimestampResetSignalSelector	R/W	0	Disables selection of the time stamp reset signal.
			1	Resets the time stamp at the falling edge of GPI1.
			2	Resets the time stamp at the falling edge of GPI2.
			5	Resets the time stamp at the rising edge of GPI1.
			10	Resets the time stamp at the rising edge of GPI2.

ChunkDataControl

Address	Name	Type	Data	Description
0x0000A100	ChunkModeActive	R/W	0	Sets Chunk mode to OFF.
			1	Sets Chunk mode to ON.
0x0000A104	ChunkSelector	R/W		Selects items to be added to the chunk data..
0x0000A108 bit0	ChunkTriggerCounterEnable	R/W	0 - 1	Sets to add the trigger counter to the chunk data.
0x0000A108 bit1	ChunkTemperatureEnable	R/W	0 - 1	Sets to add the temperature [°C] to the chunk data.
0x0000A108 bit2	ChunkLineStatusAllEnable	R/W	0 - 1	Sets to add GPI signal to the chunk data.
0x0000A108 bit3	ChunkExposureTimeEnable	R/W	0 - 1	Sets to add the exposure time to the chunk data.
0x0000A108 bit4	ChunkGainAnalogEnable	R/W	0 - 1	Sets to add the gain to the chunk data.
0x0000A108 bit5	ChunkUserMemoryEnable	R/W	0 - 1	Sets to add the user memory to the chunk data.
0x0000A108 bit6	ChunkLineOutputStatusEnable	R/W	0 - 1	Sets to add GPO signal to the chunk data.
0x0000A108 bit31	ChunkImageEnable	R/O	1	Indicates to add images to the chunk data.

Address	Name	Type	Data	Description
0x0000A108 bit30	ChunkOffsetXEnable	R/O	1	Indicates to add the number of holizontal pixels to the chunk data.
0x0000A108 bit29	ChunkOffsetYEnable	R/O	1	Indicates to add the number of vertical lines to the chunk data.
0x0000A108 bit28	ChunkWidthEnable	R/O	1	Indicates to add the offset of the number of holizontal pixels to the chunk data.
0x0000A108 bit27	ChunkHeightEnable	R/O	1	Indicates to add the offset of the number of vertical lines to the chunk data.
0x0000A108 bit26	ChunkPixelFormatEnable	R/O	1	Indicates to add the pixel format to the chunk data.

User Set Registers

User Set registers enable storing and confirming of settings by directing at UserSet0 to UserSet15.

The addresses of the User Set registers are configured as follows:
0xA000XYZZ
X: Indicates the category.
Y: Indicates the User Set number.
Y=0 means User Set 0, Y=1 means User Set 1, Y=A means User Set 10, and Y=F means User Set 15.
ZZ: Indicates the setting item.

ImageFormatControl (UserSet0 to UserSet15)

Address	Name	Type	Data	Description
0xA0005Y24	SensorTaps	R/W	2,4	Sets the number of Taps to be read from the image sensor.
0xA0005Y00	Width	R/W	WidthMin - WidthMax[1)]	Sets the number of horizontal pixels (H).
0xA0005Y04	Height	R/W	HeightMin - HeightMax[2)]	Sets the number of vertical lines (V).
0xA0005Y08	OffsetX	R/W	0 - WidthMax[1)]	Sets the offset of the number of horizontal pixels (H).
0xA0005Y0C	OffsetY	R/W	0 - HeightMax[2)]	Sets the offset of the number of vertical lines (V).
0xA0005Y18	BinningHorizontal	R/W	1,2	Sets Horizontal Binning.
0xA0005Y14	BinningVertical	R/W	1,2	Sets Vertical Binning.
0xA0005Y10	PixelFormat	R/W	0x01080001 0x010C0004 0x010C0006 0x01080009 0x010C0027 0x010C002B	Sets the pixel format.

1) Observe the following condition when setting:
Width + OffsetX $\leqq$ WidthMax
2) Observe the following condition when setting:
Height + OffsetY $\leqq$ HeightMax

AcquisitionControl (UserSet0 to UserSet15)

Address	Name	Type	Data	Description
0xA0006Y00	AcquisitionFrameRate	R/W	62500 - 180000000	Sets the frame rate. [fps]
0xA0006Y04	AcquisitionFrameRateAuto	R/W	0, 1	Sets the auto frame rate.
0xA0008Y44	TriggerMode	R/W	0, 1	Sets the trigger.
0xA0008Y98	TriggerSource	R/W	0, 1	Sets the trigger source.
0xA0008Y50	TriggerInhibit	R/W	0, 1	Sets the trigger inhibit.
0xA0008YBC	TriggerActivation	R/W	0, 1	Sets the trigger polarity.
0xA0008Y54	TriggerShift	R/W	0, 1	Sets the trigger shift.
0xA0008Y58	TriggerDelay	R/W	0 - 4000000	Sets the trigger delay. [us]
0xA0008YB8	ExposureMode	R/W	0,1	Sets Exposure mode.
0xA0008Y40	ExposureTime	R/W	10 - 2000000	Sets the exposure time. [us]
0xA0009YB0	ExposureAuto	R/W	0, 1, 2	Sets the auto exposure.

Address	Name	Type	Data	Description
0xA0009YB4	ExposureAutoSpeed	R/W	1 - 256	Sets the response speed of auto exposure.
0xA0009YB8	ExposureAutoLowerLimit	R/W	10 - 2000000	Sets the lower limit of the exposure time controlled by auto exposure. [us]
0xA0009YBC	ExposureAutoUpperLimit	R/W	10 - 2000000	Sets the upper limit of the exposure time controlled by auto exposure. [us]

AnalogControl (UserSet0 to UserSet15)

Address	Name	Type	Data	Description
0xA0008Y10	Gain[AnalogTap1]	R/W	0 - 502	Sets the gain (AnalogTap1).
0xA0008Y14	Gain[AnalogTap2]	R/W	0 - 502	Sets the gain (AnalogTap2).
0xA0009Y88	Gain[AnalogTap3]	R/W	0 - 502	Sets the gain (AnalogTap3).
0xA0009Y8C	Gain[AnalogTap4]	R/W	0 - 502	Sets the gain (AnalogTap4).
0xA0009Y00	Gain[DigitalRedTap1]	R/W	128 - 2047	Sets the gain (DigitalRedTap1).
0xA0009Y04	Gain[DigitalRedTap2]	R/W	128 - 2047	Sets the gain (DigitalRedTap2).
0xA0009Y40	Gain[DigitalRedTap3]	R/W	128 - 2047	Sets the gain (DigitalRedTap3).
0xA0009Y44	Gain[DigitalRedTap4]	R/W	128 - 2047	Sets the gain (DigitalRedTap4).
0xA0009Y08	Gain[DigitalGreenTap1]	R/W	128 - 2047	Sets the gain (DigitalGreenTap1).
0xA0009Y0C	Gain[DigitalGreenTap2]	R/W	128 - 2047	Sets the gain (DigitalGreenTap2).
0xA0009Y48	Gain[DigitalGreenTap3]	R/W	128 - 2047	Sets the gain (DigitalGreenTap3).
0xA0009Y4C	Gain[DigitalGreenTap4]	R/W	128 - 2047	Sets the gain (DigitalGreenTap4).
0xA0009Y18	Gain[DigitalBlueTap1]	R/W	128 - 2047	Sets the gain (DigitalBlueTap1).
0xA0009Y1C	Gain[DigitalBlueTap2]	R/W	128 - 2047	Sets the gain (DigitalBlueTap2).
0xA0009Y58	Gain[DigitalBlueTap3]	R/W	128 - 2047	Sets the gain (DigitalBlueTap3).
0xA0009Y5C	Gain[DigitalBlueTap4]	R/W	128 - 2047	Sets the gain (DigitalBlueTap4).
0xA0008Y1C	GainAuto	R/W	0, 1, 2	Sets automatic gain.
0xA0008Y20	GainAutoLevel	R/W	0 - 16383	Sets the automatic gain level.
0xA0009YA4	GainAutoSpeed	R/W	1 - 256	Sets the response speed of auto gain.
0xA0009YA8	GainAutoLowerLimit	R/W	0 - 502	Sets the lower limit of gain controlled by auto gain.
0xA0009YAC	GainAutoUpperLimit	R/W	0 - 502	Sets the upper limit of gain controlled by auto gain.
0xA0008Y18	BlackLevelAutoBalance	R/W	0, 1, 2	Sets automatic balance of the black level.
0xA0008Y38	BlackLevel[DigitalAll]	R/W	0 - 2047	Sets the pedestal level.
0xA0009Y90	BlackLevelAdjust[Tap1]	R/W	-255 - 255	Sets the black level adjustment to Tap1.
0xA0009Y94	BlackLevelAdjust[Tap2]	R/W	-255 - 255	Sets the black level adjustment to Tap2.
0xA0009Y98	BlackLevelAdjust[Tap3]	R/W	-255 - 255	Sets the black level adjustment to Tap3.
0xA0009Y9C	BlackLevelAdjust[Tap4]	R/W	-255 - 255	Sets the black level adjustment to Tap4.

DigitalIOControl (UserSet0 ~ UserSet15)

Address	Name	Type	Data	Description
0xA0008YA8	LineInverter[Line1]	R/W	0, 1	Sets GPO1 inversion.
0xA0008YAC	LineInverter[Line2]	R/W	0, 1	Sets GPO2 inversion.
0xA0008Y6C	LineSource[Line1]	R/W	0,1,2,3,4,5, 6,7	Selects GPO1signal.
0xA0008Y80	LineSource[Line2]	R/W	0,1,2,3,4,5, 6,7	Selects GPO2 signal.
0xA0008Y90 bit0	UserOutputValue[1]	R/W	0, 1	Specifies the UserOutput[1] signal.
0xA0008Y90 bit1	UserOutputValue[2]	R/W	0, 1	Specifies the UserOutput[2] signal.
0xA0008Y78	StrobeActiveTime[Line1]	R/W	1 - 4000	Specifies the pulse width of the Strobe1 signal. [us]
0xA0008Y8C	StrobeActiveTime[Line2]	R/W	1 - 4000	Specifies the pulse width of the Strobe2 signal. [us]
0xA0008Y74	StrobeActiveDelay[Line1]	R/W	0 - 4000	Specifies the delay of the Strobe1 signal. [us]
0xA0008Y88	StrobeActiveDelay[Line2]	R/W	0 - 4000	Specifies the delay of the Strobe2 signal. [us]

LUTControl (UserSet0 to UserSet15)

Address	Name	Type	Data	Description
0xA0008Y60	LUTEnable	R/W	0, 1	Enables/disables the LUT.
0xA0008Y5C	LUTFormat	R/W	0 - 4	Sets LUTFormat.
0xA0008Y64	BinarizationThreshold	R/W	0 - 4095	Sets the threshold value for binalization.

UserSetControl (UserSet0 to UserSet15)

Address	Name	Type	Data	Description
0xA0008YC0 – 0xA0008YFC	UserMemoryValue	R/W	–	Sets Value of UserMemory.

Default Value List

ImageFormatControl - Default Value

Address	Name	Type	UserSet Default Value	
			XCG-H280E	XCG-H280CR
0xA0000124	SensorTaps	R/W	2	
0xA0000100	Width	R/W	1920	
0xA0000104	Height	R/W	1080	
0xA0000108	OffsetX	R/W	0	
0xA000010C	OffsetY	R/W	180	
0xA0000110	PixelFormat	R/W	0x01080001	0x01080009
0xA0000118	BinningHorizontal	R/W	1	
0xA0000114	BinningVertical	R/W	1	
	PixelSize	R/O	8	
	PixelColorFilter	R/O	none	BayerRG
0xA0000130	TestImageSelector	R/W	0	
0xA0000134	GainAutoAreaHighlight	R/W	0	
0xA0000138	GainAutoAreaWidth	R/W	50	
0xA000013C	GainAutoAreaHeight	R/W	50	
0xA0000140	GainAutoAreaOffsetX	R/W	25	
0xA0000144	GainAutoAreaOffsetY	R/W	25	
0xA0000154	BalanceWhiteAutoHighlight	R/W	0	
0xA0000158	BalanceWhiteAutoAreaWidth	R/W	50	
0xA000015C	BalanceWhiteAutoAreaHeight	R/W	50	
0xA0000160	BalanceWhiteAutoAreaOffsetX	R/W	25	
0xA0000164	BalanceWhiteAutoAreaOffsetY	R/W	25	

AcquisitionControl - Default Value

Address	Name	Type	UserSet Default Value	
			XCG-H280E	XCG-H280CR
0xA0000200	AcquisitionMode	R/W	1	
0xA0000210	AcquisitionStart	W/O		
0xA0000214	AcquisitionStop	W/O		
0xA0000204	AcquisitionFrameCount	R/W	2	
0xA0000220	AcquisitionFrameRate	R/W	32	
0xA0000224	AcquisitionFrameRateAuto	R/W	1	
0xA0000228	AcquisitionFrameRateActual	R/O	32	
0xA0000300	SpecialTriggerMode	R/W	0	
0xA0000304	NumberOfMemoryForSpecialTriggerMode	R/W	1	
0xA00002F0	SpecialTriggerSource	R/W	0	
0xA00002F4	SpecialTriggerActivation	R/W	0	

Address	Name	Type	UserSet Default Value	
			XCG-H280E	XCG-H280CR
	TriggerSelector	R/O	FrameStart	
0xA0002044	TriggerMode	R/W	0	
0xA00002F8	TriggerSoftware	W/O		
0xA0002098	TriggerSource	R/W	0	
0xA0002050	TriggerInhibit	R/W	0	
0xA0002048	TriggerActivation	R/W	4	
0xA00020BC	TriggerActivation	R/W	0	
0xA00020B0	TriggerActivationBackwardCompatibleMode	R/W	0	
	TriggerOverlap	R/O	ReadOut	
0xA0002054	TriggerShift	R/W	0	
0xA00020B4	TriggerControl	R/W	1	
0xA0002058	TriggerDelay	R/W	0	
0xA00020B8	ExposureMode	R/W	0	
0xA0002040	ExposureTime	R/W	31146	
0xA0002140	ExposureAuto	R/W	0	
0xA0002144	ExposureAutoSpeed	R/W	192	
0xA0002148	ExposureAutoLowerLimit	R/W	10	
0xA000214C	ExposureAutoUpperLimit	R/W	31146	

AnalogControl - Default Value

Address	Name	Type	UserSet Default Value	
			XCG-H280E	XCG-H280CR
0xA0003080	GainSelector	R/W	16	
0xA00030A0	Gain[AnalogAll]	R/W	0	
0xA0002010	Gain[AnalogTap1]	R/W	0	
0xA0002014	Gain[AnalogTap2]	R/W	0	
0xA0003088	Gain[AnalogTap3]	R/W	0	
0xA000308C	Gain[AnalogTap4]	R/W	0	
0xA0003040	Gain[DigitalRedTap1]	R/W	1)	
0xA0003004	Gain[DigitalRedTap2]	R/W	1)	
0xA0003048	Gain[DigitalRedTap3]	R/W	1)	
0xA000304C	Gain[DigitalRedTap4]	R/W	1)	
0xA0003050	Gain[DigitalGreenTap1]	R/W	128	
0xA000300C	Gain[DigitalGreenTap2]	R/W	128	
0xA0003058	Gain[DigitalGreenTap3]	R/W	128	
0xA000305C	Gain[DigitalGreenTap4]	R/W	128	
0xA0003070	Gain[DigitalBlueTap1]	R/W	1)	
0xA000301C	Gain[DigitalBlueTap2]	R/W	1)	
0xA0003078	Gain[DigitalBlueTap3]	R/W	1)	
0xA000307C	Gain[DigitalBlueTap4]	R/W	1)	

Address	Name	Type	UserSet Default Value	
			XCG-H280E	XCG-H280CR
0xA000201C	GainAuto	R/W	0	
0xA0002020	GainAutoLevel	R/W	11264	
0xA0002154	GainAutoSpeed	R/W	192	
0xA0002158	GainAutoLowerLimit	R/W	0	
0xA000215C	GainAutoUpperLimit	R/W	502	
0xA0002038	BlackLevel	R/W	960	
0xA0002018	BlackLevelAutoBalance	R/W	0	
0xA00030B4	BlackLevelAdjustSelector	R/W	1	
0xA0003090	BlackLevelAdjust[Tap1]	R/W	0	
0xA0003094	BlackLevelAdjust[Tap2]	R/W	0	
0xA0003098	BlackLevelAdjust[Tap3]	R/W	0	
0xA000309C	BlackLevelAdjust[Tap4]	R/W	0	

1) This value is unique to the model.

DigitalIOControl - Default Value

Address	Name	Type	UserSet Default Value	
			XCG-H280E	XCG-H280CR
0xA0000354	LineSelector	R/W	1	
	LineMode	R/O	output	
0xA00020A8	LineInverter[Line1]	R/W	1	
0xA00020AC	LineInverter[Line2]	R/W	1	
0xA0000400 bit0	LineStatus[Line5]	R/O	–	
0xA0000400 bit1	LineStatus[Line6]	R/O	–	
0xA000206C	LineSource[Line1]	R/W	1	
0xA0002080	LineSource[Line2]	R/W	1	
	LineFormat	R/O	TTL	
0xA0000358	UserOutputSelector	R/W	0	
0xA0002090 bit0	UserOutputValue[1]	R/W	0	
0xA0002090 bit1	UserOutputValue[2]	R/W	0	
0xA0002078	StrobeActiveTime[Line1]	R/W	256	
0xA000208C	StrobeActiveTime[Line2]	R/W	256	
0xA0002074	StrobeActiveDelay[Line1]	R/W	100	
0xA0002088	StrobeActiveDelay[Line2]	R/W	100	

LUTControl - Default Value

Address	Name	Type	UserSet Default Value	
			XCG-H280E	XCG-H280CR
	LUTSelector	R/O	Luminance	
0xA0002060	LUTEnable	R/W	0	
0xA000205C	LUTFormat	R/W	0	
0xA0002064	BinarizationThreshold	R/W	2047	
0xA0000350	LUTIndex	R/W	0	
0xA0010000 – 0xA0013FFC	LUTValue	R/W	0	
0xA0010000 – 0xA0013FFC	LUTValueAll	R/W	0	

ChunkDataControl - Default Value

Address	Name	Type	UserSet Default Value	
			XCG-H280E	XCG-H280CR
0x0000A100	ChunkModeActive	R/W	0	
0x0000A104	ChunkSelector	R/W	0	
0x0000A108	ChunkEnable	R/W	0xFC00007F	

Max/Min Value List

ImageFormatControlInq

Address	Name	Type	UserSet Default Value	
			XCG-H280E	XCG-H280CR
0xA00070D0	SensorWidth	R/O	1920	
0xA00070D8	SensorHeight	R/O	1440	
0xA0007000	WidthMax	R/O	1920, 960 [1)]	1920
0xA0007004	WidthMin	R/O	640, 320 [1)]	640
0xA0007008	HeightMax	R/O	1440, 720 [2)]	1440
0xA000700C	HeightMin	R/O	480, 240 [2)]	480
0xA0007090	UserMemorySize	R/O	64	

1) With BinningHorizontal set to 1, 1920 is selected for WidthMax and 640 is selected for WidthMin.
With BinningHorizontal set to 2, 960 is selected for WidthMax and 320 is selected for WidthMin.
2) With BinningVertical set to 1, 1440 is selected for HeightMax and 480 is selected for HeightMin.
With BinningVertical set to 2, 720 is selected for HeightMax and 240 is selected for HeightMin.

AcquisitionControlInq

Address	Name	Type	UserSet Default Value	
			XCG-H280E	XCG-H280CR
0xA0007010	AcquisitionFrameRateMax	R/O	180000000[1)]	
0xA0007014	AcquisitionFrameRateMin	R/O	62500[1)]	
0xA0007060	TriggerDelayMax	R/O	4000000	
0xA0007064	TriggerDelayMin	R/O	0	
0xA0007058	ExposureTimeMax	R/O	2000000	
0xA000705C	ExposureTimeMin	R/O	10	

1) For reading data from the register, use integers of 1,000,000 times the fps value.
The maximum frame rate is 180 fps. The minimum frame rate is 0.0625 fps.

AnalogControlInq

Address	Name	Type	UserSet Default Value	
			XCG-H280E	XCG-H280CR
0xA0007020	GainRawMax	R/O	502	
0xA0007024	GainRawMin	R/O	0	
0xA00070C0	GainPixelMax	R/O	2047	
0xA00070CC	GainPixelMin	R/O	128	
0xA0007030	GainAutoLevelMax	R/O	16383	
0xA0007034	GainAutoLevelMin	R/O	0	
0xA0007048	PedestalLevelMax	R/O	2047	
0xA000704C	PedestalLevelMin	R/O	0	

DigitalIOControlInq

Address	Name	Type	UserSet Default Value	
			XCG-H280E	XCG-H280CR
0xA0007080	StrobeActiveTimeMax	R/O	4000	
0xA0007084	StrobeActiveTimeMin	R/O	1	
0xA0007078	StrobeActiveDelayMax	R/O	4000	
0xA000707C	StrobeActiveDelayMin	R/O	0	

LUTControlInq

Address	Name	Type	UserSet Default Value	
			XCG-H280E	XCG-H280CR
0xA0007070	BinarizationThresholdMax	R/O	4095	
0xA0007074	BinarizationThresholdMin	R/O	0	
0xA0007088	LUTMax	R/O	4095	
0xA000708C	LUTMin	R/O	0	

Specifications

		XCG-H280E	XCG-H280CR
Camera	Image Sensor	2/3-type progressive scan IT CCD	2/3-type progressive scan IT CCD
	Image Sensor (Number of Effective Pixels, H × V)	1,940 × 1,460	1,940 × 1,460
	Cell Size (H × V)	4.54 µm × 4.54 µm	4.54 µm × 4.54 µm
	Output Pixels (H × V)	1,920 × 1,080	1,920 × 1,080
	Output Pixels (H × V, Full Resolution)	1,920 × 1,440	1,920 × 1,440
	Color Filter		Elementary color mosaic
	Frame Rate	32 fps @ 1,920 (H) × 1,080 (V), 2ch	32 fps @ 1,920 (H) × 1,080 (V), 2ch
	Minimum Illumination (50%)	0.5 lx (Iris: F1.4, Gain: +18 dB, Shutter: 1/32 s)	6 lx (Iris: F1.4, Gain: +18 dB, Shutter: 1/32 s)
	Sensitivity	F8 (400 lx, Gain: 0 dB)	F8 (2000 lx, Gain: 0 dB)
	S/N Ratio	1 step (Lens close, Gain: 0 dB, 8 bits)	1 step (Lens close, Gain: 0 dB, 8 bits)
	Gain	Auto, Manual : 0 dB to +18 dB	Auto, Manual : 0 dB to +18 dB
	Shutter Speed	2 s to 1/100,000 s, Auto	2 s to 1/100,000 s, Auto
	White Balance		One push WB, Manual
Camera Features	Readout Modes	Normal, Binning (2 × 2, 1 × 2, 2 × 1), Partial scan	Normal, Partial scan
	Readout Features	Gamma (variable), Built-in test pattern	Gamma (variable), Built-in test pattern
	Synchronization	Hardware trigger, Software trigger	Hardware trigger, Software trigger
	Trigger Modes	Edge detection, Pulse width detection, Bulk trigger, Sequential trigger	Edge detection, Pulse width detection, Bulk trigger, Sequential trigger
	Memory Channel (Usersets)	16 channels	16 channels
	User Memory	64 bytes × 16 channels	64 bytes × 16 channels
	Image Buffer	16 frames	16 frames
	Other Features	Internal temperature sensor	Internal temperature sensor
Interface	Video Data Output	8, 10, 12-bit, digital	8, 10, 12-bit RAW, digital
	Digital Interface	Gigabit Ethernet (1000BASE-T)	Gigabit Ethernet (1000BASE-T)
	Camera Specification	GigE Vision®* Version 1.2	GigE Vision®* Version 1.2
	Digital Input/Output	TTL IN (×2), TTL OUT (×2)	TTL IN (×2), TTL OUT (×2)

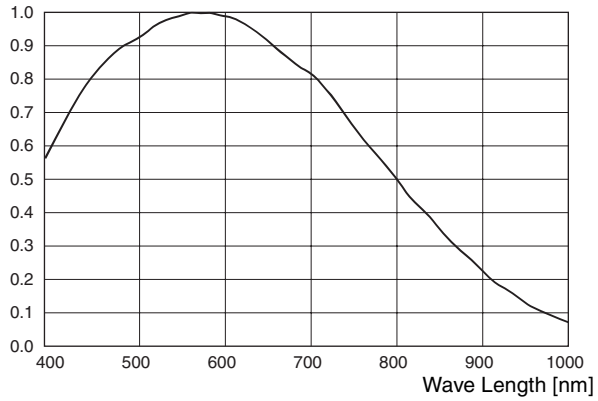
		XCG-H280E	XCG-H280CR
General	Lens Mount	C mount	C mount
	Power Requirements	DC +12 V (+10.5 V to +15.0 V)	DC +12 V (+10.5 V to +15.0 V)
	Power Consumption	5.8 W (max.)	5.8 W (max.)
	Operating Temperature	–10°C to +50°C	–10°C to +50°C
		14°F to + 122°F	14°F to + 122°F
	Performance Quarantee Temperature	0°C to 40°C	0°C to 40°C
		32°F to 104°F	32°F to 104°F
	Storage Temperature	–30°C to +60°C	–30°C to +60°C
		–22°F to +140°F	–22°F to +140°F
	Operating Humidity	20% to 80% (no condensation)	20% to 80% (no condensation)
	Storage Humidity	20% to 95% (no condensation)	20% to 95% (no condensation)
	Vibration Resistance		
	Shock Resistance	70 G	70 G
	Dimensions (W × H × D)[[F_YS0001]]	50 × 50 × 57.5 mm (excluding protrusions)	50 × 50 × 57.5 mm (excluding protrusions)
		2 × 2 × 2 3/8 inches (excluding protrusions)	2 × 2 × 2 3/8 inches (excluding protrusions)
	Mass	200 g	200 g
		7.1 oz	7.1 oz
	Regulations	UL2044, FCC Class A, CE: EN55022, AS/NZ: EN55022, VCCI Class A, KC: KN22/KN24 Class A	UL2044, FCC Class A, CE: EN55022, AS/NZ: EN55022, VCCI Class A, KC: KN22/KN24 Class A
	Supplied Accessories	Lens mount cap (1)	Lens mount cap (1)
		Connecter plug 2P (1)	Connecter plug 2P (1)
		Operating instructions (1)	Operating instructions (1)

* “GigE Vision” is a registered trademark of the Automated Imaging Association (AIA).

Spectral Sensitivity (Relative Response) Parameters

XCG-H280E

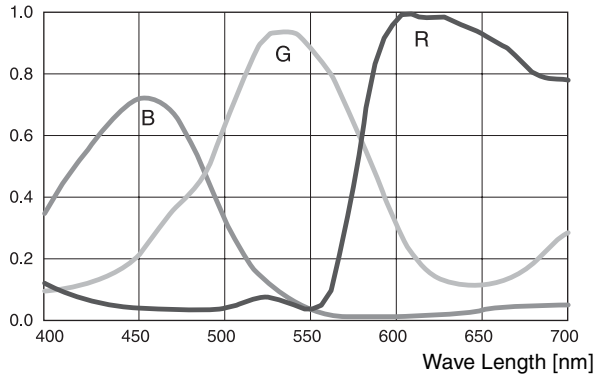
Camera Relative Response



(Without lens and light source parameters.)

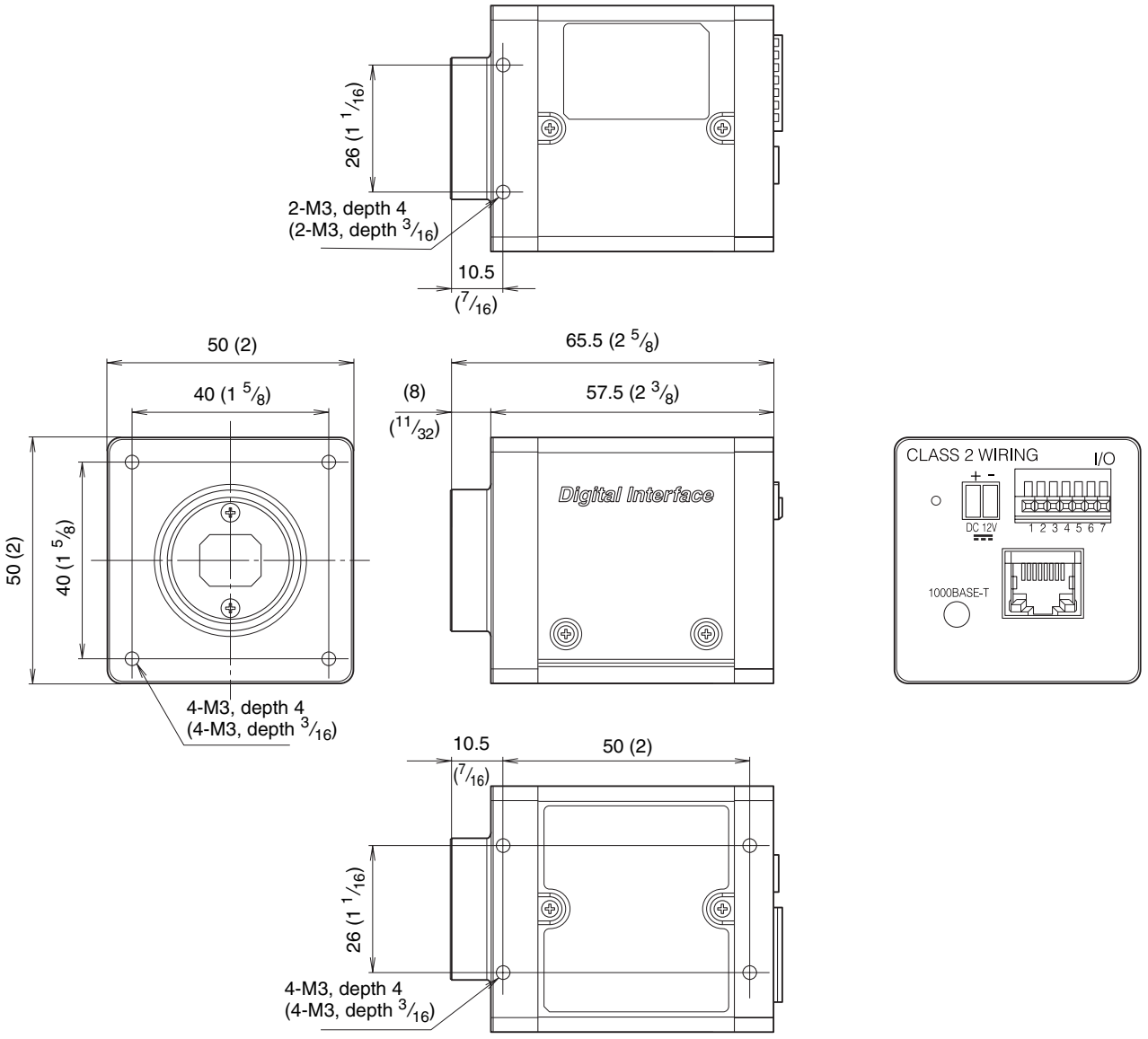
XCG-H280CR

Camera Relative Response



(Without lens and light source parameters.)

Dimensions



Unit: mm (inches)