SONY
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Digital Interface - GigE Interface

XCG-H280CR

PIL Product Information letter

Jan 2012

XCG-H280CR

Jan. 17, 2012

Product Code

Product No.	Model Name	Dest.	Product Code	EAN/JAN	UPC	Country of origin	China RoHS	Ex-factory
XCG-H280CR	Digital Video Camera Module	SYM	32333580	-	-	Japan	Yes	2012/Jan/E
XCG-H280CR//C	Digital Video Camera Module	SYM	32333581	-	-	China	Yes	2012/Feb/E

Production plant will be changed from Japan to China from Feb/E, 2012

Table of contents

1. Product Concept

Sony introduced XCG-H280E which incorporates a 2/3-type EXview HAD CCD II™ sensor providing great sensitivity in the visible and near-infrared wavelengths with GigE Vision®. This camera is suited to the demanding requirements of ITS (Intelligent Transportation Systems) and the traditional machine vision applications.

To expand the market share in both ITS and machine vision applications, the color version of this camera, XCG-H280CR will be introduced. Moreover, the specialized functions, Chunk data (meta data transferring) and Auto exposure, are added. These are very effective in ITS market .

From this model, new ZCL is applied and support OS expands to 64bit of Win XP, Vista and 7.

- − GigE Vision Interface
- − High Frame Rate Image Transfer
- − High Resolution Uncompressed Picture Output with Best Quality
- − High Sensitivity
- − Various Trigger Modes
- − Temporal Image Storage Capability
- − Robust and Small Form Factor
- − Low power consumption

Machine Vision   XCG-H280CR

2. GigE Vision standard

GigE Vision is an interface standard for machine vision cameras. It has been developed by a group of about 50 companies and the Automated Imaging Association (AIA) oversees the ongoing development and administration of the standard.

GigE Vision is based on the Gigabit Ethernet standard which used standard Ethernet category cabling(CAT5e or higher). The standard is trying to unify protocols currently used in machine vision industrial cameras and let 3rd party organizations develop compatible software and hardware.

Features of the GigE Vision standard:

- Fast data transfer rates – up to 1,000M bit/s based on 1000BASE-T
- Data transfer length up to 100m – The use of switches or repeaters increases the length.
- Base on established standard allowing with other Ethernet devices and computers.

GigE Vision has four main elements:

- GigE Vision Control Protocol (GVCP) runs on the UDP[1] protocol. The standard defines how to control and configure devices. Specifies stream channels and the mechanisms of sending image and configuration data between cameras and computers.
- GigE Vision Stream Protocol (GVSP) covers the definition of data types and the ways images can be transferred via GigE.
- GigE Device Discovery Mechanism. Provides mechanisms to obtain IP addresses.
- An XML description file base of the GenICam standard. A datasheet that allows access to camera controls and image stream.

[1] UDP (User Datagram Protocol):

GigE Vision standard does not use TCP but UDP as protocol of transportation layer (4th layer of OSI reference model and managing network communication). Although TCP (Transmission Control Protocol) has error correcting function such as retransmission of lost packet by checking packet sequence, UDP does not check packet service and therefore detection and handling of packet loss during communication and data error need to be done by application when required. Therefore, Resend Mechanism is specified for GigE Vision.
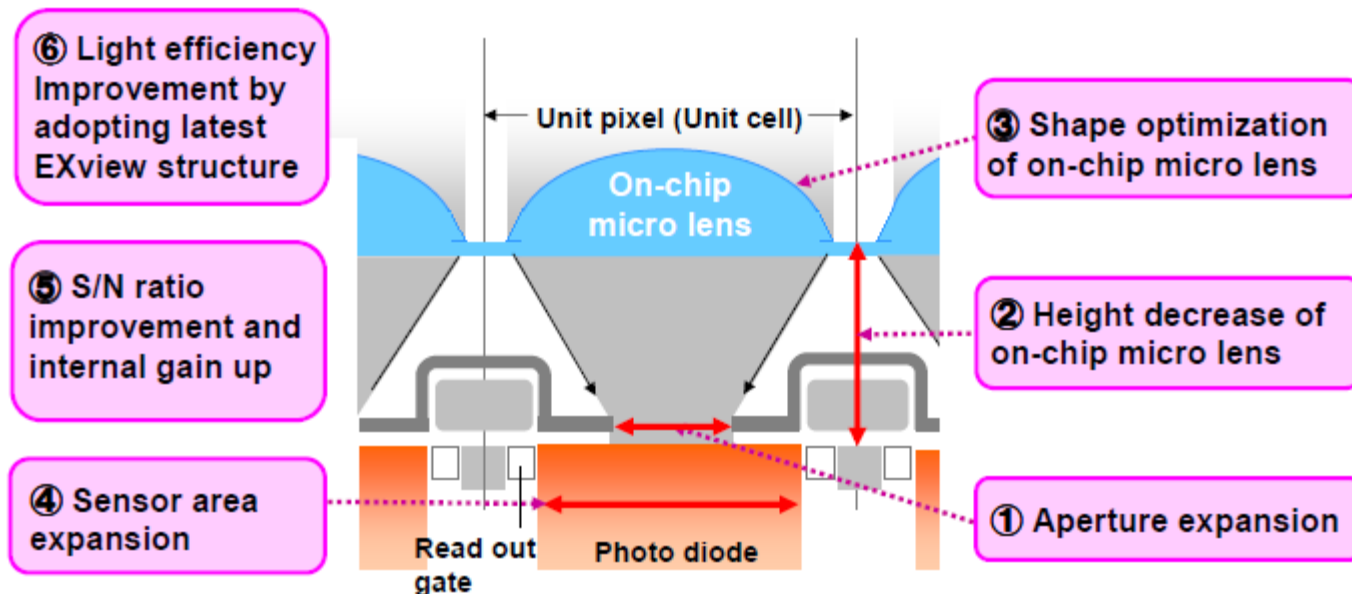
http://www.machinevisiononline.org/vision-standards-details.cfm?type=5

Latest version(As of Dec. 2011) : Version 1.2 released January 2010

3. Main Features

I. Image Sensor : *EXview* HAD CCD II

◆ Definition of ***EXview* HAD CCD II**

"EXview HAD CCD II" is a CCD image sensor that realizes sensitivity (typical) of 1000mV or more per 1 μm^2 (Color : F5.6 / BW : F8 in 1s accumulation equivalent) and improves light efficiency by including near infrared light region as a basic structure of Sony's "EXview HAD CCD".

⑥ Light efficiency Improvement by adopting latest EXview structure

⑤ S/N ratio improvement and internal gain up

④ Sensor area expansion

Unit pixel (Unit cell)

On-chip micro lens

③ Shape optimization of on-chip micro lens

② Height decrease of on-chip micro lens
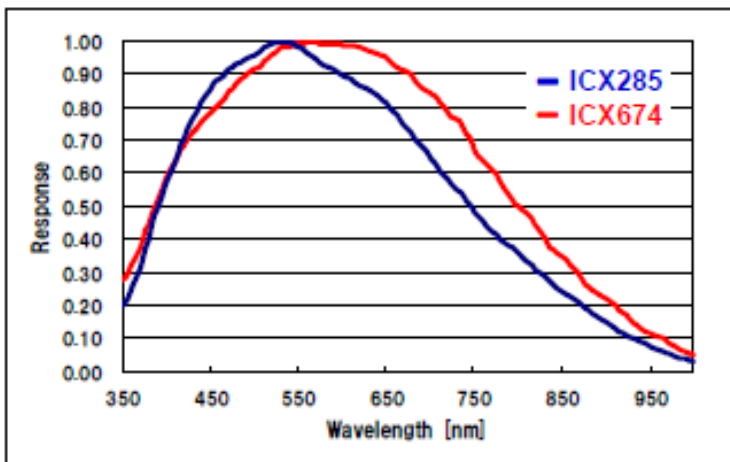
Read out gate   Photo diode

① Aperture expansion

3. Main Features
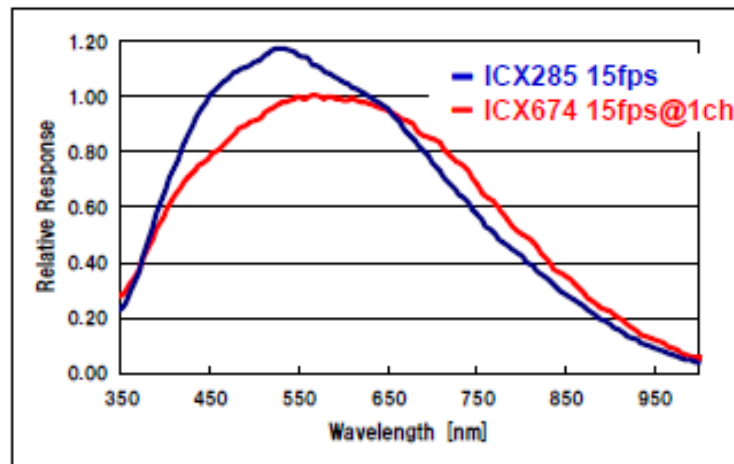
I. Image Sensor : *EXview* HAD CCD II

- ICX674 : Sensor used for the XCG-H280E, XCG-H280CR
- ICX285 : Sensor used for the XCG-SX97E and XCG-SX99E

■ **Spectral Sensitivity (Normalized)**   ■ **Spectral Sensitivity (Relative)**

High sensitivity including infrared region is realized by adopting latest EXview HAD CCD technology and *Super* HAD CCD Ⅱ technology
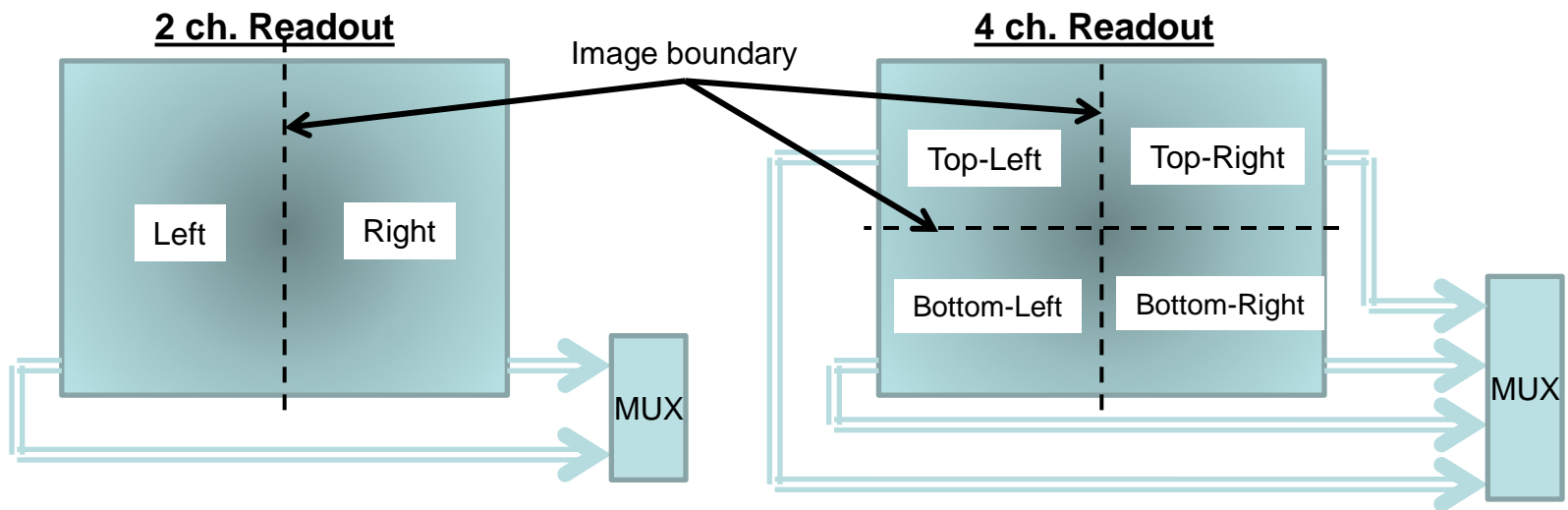
EXview **HAD CCD** Ⅱ is newly designed "EXview HAD CCD" which evolved by adopting the technology of *Super* **HAD CCD** Ⅱ

3. Main Features

I. Image Sensor

The sensor for the XCG-H280CR supports **dual(2) channel and quad(4) channel readout** for high speed acquisition and the camera combines the two/four output to one picture outside of the sensor as shown in the figure below.

2 ch. Readout   Image boundary   **4 ch. Readout**

Left   Right

Top-Left   Top-Right

Bottom-Left   Bottom-Right

MUX

MUX

The XCG-H280CR is correcting the luminance difference (The sensor itself has an individual specificity) of left / right and top/bottom image automatically by full automatic correction(factory setting) or one-push correction.

3. Main Features

I. Image Sensor

Resolution	Frame rate*1	
	2ch*2 (default)	4ch*2
1,920 (H) x 1,080 (V) (16:9, default)	32fps	64fps*3
1,920 (H) x 1,440 (V) (4:3)	26fps	52fps*3

*1 Approx. value in free run mode
*2 Readout mode of image sensor
*3 Frame rate of image sensor. Some image data may not be transferred when the frame rate exceeds transmission capacity.

Actual value : 59.6[fps] @ 4ch, 1,920(H)x1,080(V)

Condition

- OS: WindowsXP 32bit
- CPU: Intel Xeon L5240 3GHz
- RAM: 2GByte
- NIC: Intel Gigabit CT Desktop Adapter

- SensorTaps: 4
- Width: 1920
- Height: 1080
- OffsetY: 180
- PixelFormat: Mono8
- ExposureTime: 15000
- GevSCPSPacketSize : 10596
- GevSCPD : 32

3. Main Features

I. ## Image Sensor

Resolution	Frame rate[1]	
	2ch[2] (default)	4ch[2]
1,920 (H) x 1,080 (V) (16:9, default)	32fps	64fps[3]
1,920 (H) x 1,440 (V) (4:3)	26fps	52fps[3]

Note:
Default exposure time limits
the frame rate to 32fps at 2ch readout.
If customer releases the limitation,
the frame rate goes up to 33.1fps.

[1] Approx. value in free run mode
[2] Readout mode of image sensor
[3] Frame rate of image sensor. Some image data may not be transferred when the frame rate exceeds transmission capacity.

Actual value : 59.6[fps] @ 4ch, 1,920(H)x1,080(V)

Condition

- OS: WindowsXP 32bit
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- Width: 1920
- Height: 1080
- PixelFormat: Mono8
- ExposureTime: 15000
- GevSCPSPacketSize：10596
- GevSCPD：32

3. Main Features

II. High Speed Acquisition (Partial Scan)

A customer can minimize image processing time by selecting needed frame rate and angle of view without decreasing the resolution. Partial scan function is useful in **reducing data amount of effective image and increasing frame rate** in all angle of view by scanning the only area that a customer needs.

Note:
1. Frame rate is increased **only by vertical partial scan**.
2. Since shutter speed setting has priority over the partial scan, shutter speed is not changed even if the partial scanning function is set. And also when the shutter speed is too long, the frame rate might not go up even if the smaller area is selected.

Vertical Partial Scan **(GENERAL)**

The time difference of T（A）－T（B）can be shorten

Standard readout   Vertical partial scan

T（A）：
Readout time
per frame

T（B）：
Readout time
per frame

Unnecessary parts of the frame
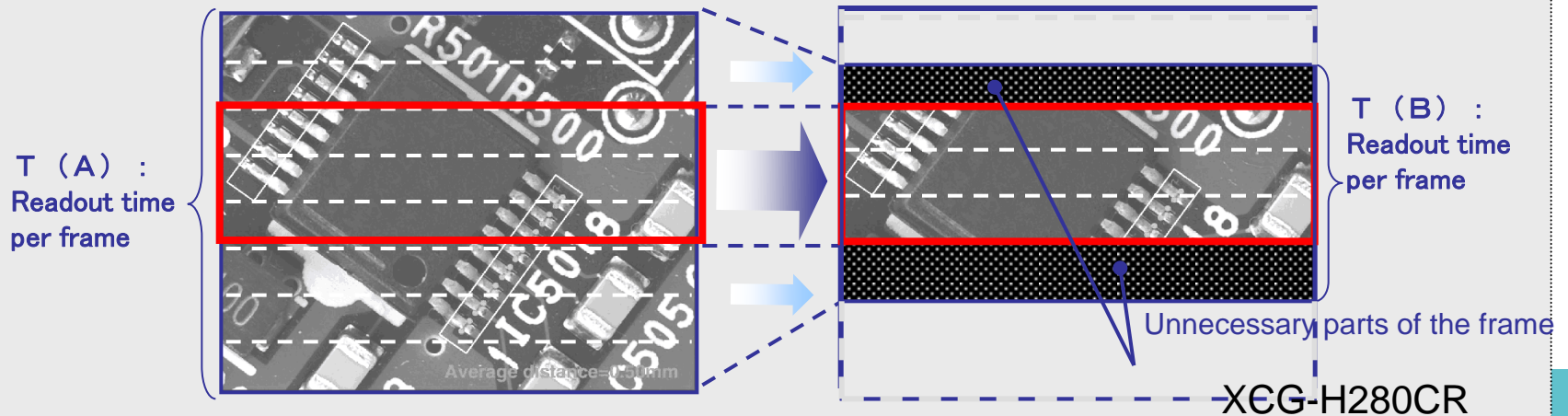
XCG-H280CR

3. Main Features

II. High Speed Acquisition (Partial Scan)

Partial scan function for the GigE Vision camera the XCG-H280CR is to partly clip specified position of angle and fixes number
of pixels and lines by setting four parameters (Offset X/Y and Width/Height).

Four parameters

Parameter: "Offset X"   Parameter: "Width"

Parameter: "Offset Y"

Parameter: "Height"
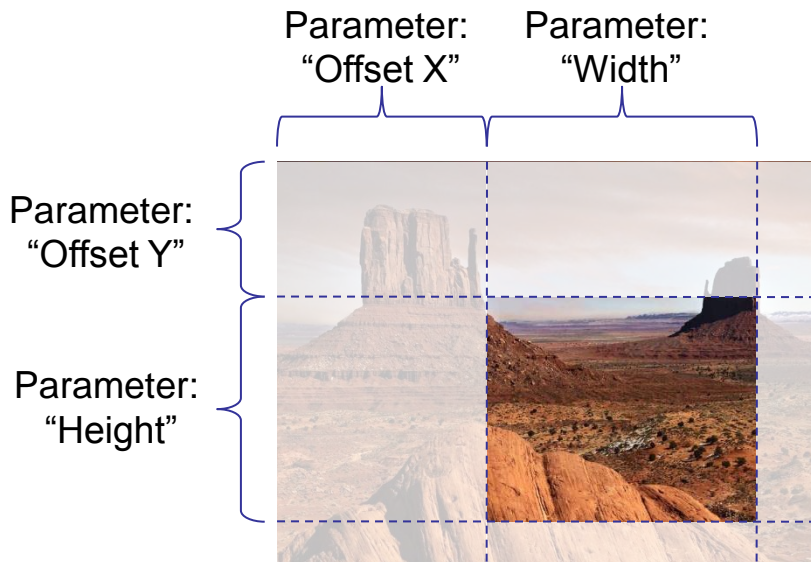
Adjustable range

	XCG-H280CR
	wo/Binning
Width (pixels)	640 to 1,920, 8-pixel step
Height (lines)	480 to 1,440, 2-line step
Offset X	0 to 1,280, 2-pixel step
Offset Y	0 to 720, 2-pixel step

3. Main Features

II. High Speed Acquisition (Partial Scan)

Frame rate on vertical partial scan (Theoretical)

| Number of lines	Frame rate	
	2ch	4ch
1,440	26.3255	52.1159
1,280	28.962	57.5772
1,080	33.1279	65.4108
1,024	34.4947	68.3153
800	41.4456	82.1828
720	44.6708	87.8117
480	58.1869	113.792

Note:

1. Since horizontal partial scan is done with the memory after retrieving from sensor, frame rate is not changed(quicken) by setting.

2. The frame rate of 2ch readout shows when OffsetY is o(zero).
   The frame rate is moved approx. 0.1fps due to OffsetY.

3. The frame rate of 4ch readout shows the fastest when OffsetY is (1,440 – Height) / 2.

4. The frame rate is changed approx. 0.05fps by TriggerShift.

3. Main Features

III. Black level control
– Internal block diagram (Sensor ~ FPGA)
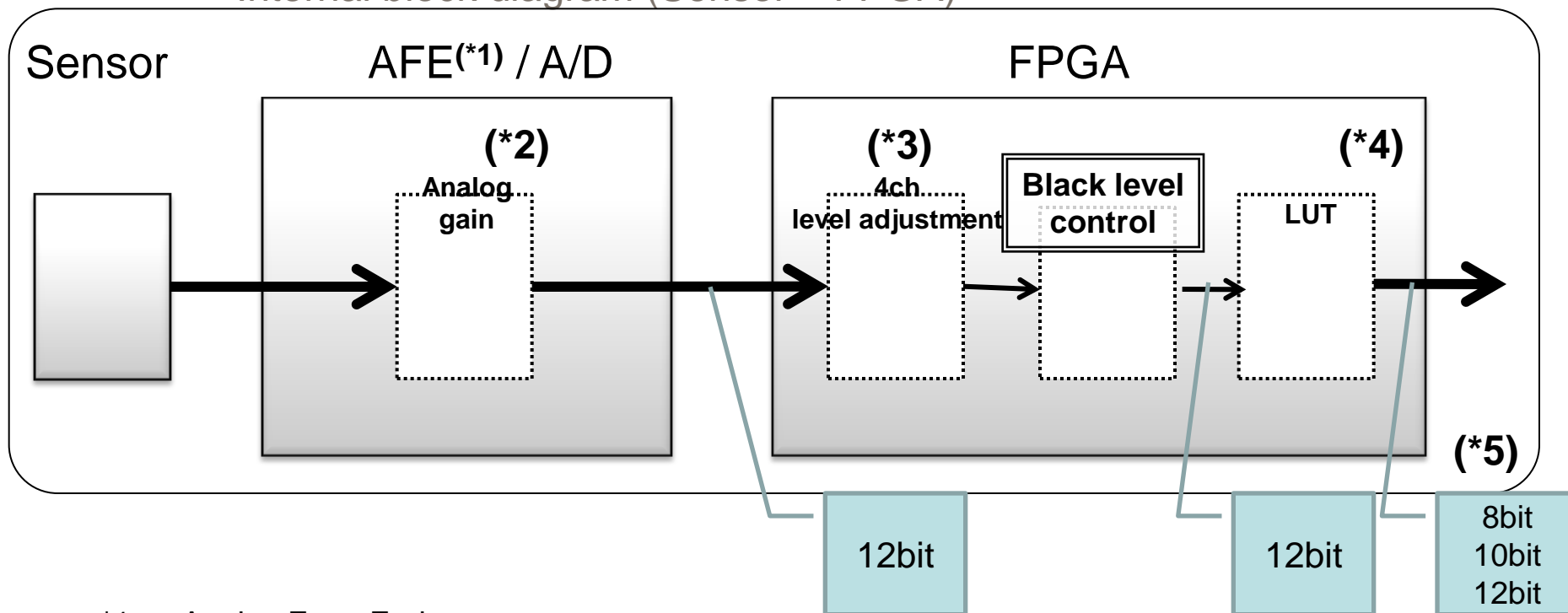
*1 : Analog Front End
*2 : Refer to IV. Gain Control
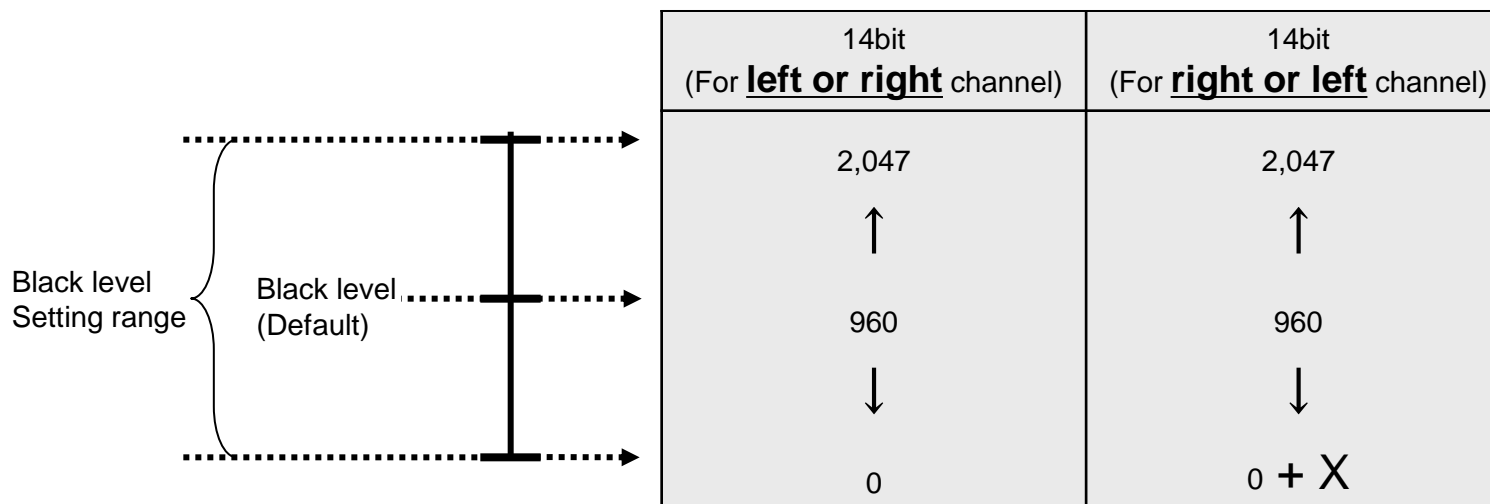*3 : Selectable from Off (Default), Once and Continuous
*4 : Refer to XII. Readout Features
*5 : Bit length(Video output resolution depth) is selected(Lower bits are cut).

3. Main Features

III. Black level control

Black level control is a function to change black level(base position of luminance value). In order to absorbing the luminance difference between each 4 channels, the default setting of black level is set to 960 and the setting range is from 0(+X) to 2,047 in 14-bit value as follows.

Black level
Setting range

Black level
(Default)

| 14bit (For **left or right** channel)	14bit (For **right or left** channel)
2,047	2,047
↑	↑
960	960
↓	↓
0	$0 + X$

Index (unit: step)
X : apporx. 50 step

3. Main Features

IV. Gain Control

The XCG-H280CR provides both manual and automatic gain control.

XCG-H280CR	*Manual Gain Control* **0 to +18dB, 0.0359dB unit**	*Auto Gain Control* **0 to +18dB**

Setting area of the manual gain is selectable from

All area/Tap1/Tap2/Tap3/Tap4 by command GainSelector.

Tap1	Tap2
Tap3	Tap4
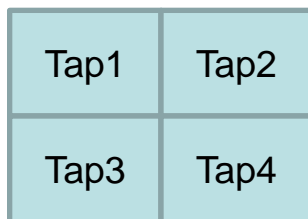
In case of AGC(Auto Gain Control), user can set user-specified detection frame and average sensitivity.

- Detection frame : is defined by offset X/Y and Width/Height(Relative to 100% width and height of the output frame).
- Average sensitivity : is selectable from 0 to 16383.

3. Main Features

IV. Gain Control

- Pixel Gain control

  The XCG-H280CR provides Pixel Gain control.

  It is possible to set the gain from 0 to 24dB for each R/G/B and Tap

  which are selected in GainSelector. To set for the all Tap, select

  DigialRedAll, DigitalGreenAll, and DegitalBlueAll.

V. White Balance

The XCG-H280CR provides One-push white balance which is possible to adjust white balance by controlling R level and B level corresponding to G level for a user-specified detection area once upon executing the command.

3. Main Features

VI. Synchronization (External Trigger Input)

3. Main Features

VI. Synchronization(External Trigger Input)

i. Hardware/Software Trigger
The XCG-H280CR can select trigger input from hardware trigger input from 7pin connector and software trigger that generates drive signal inside the camera by command via Ethernet.   Hardware trigger has a benefit in case user needs more accurate acquisition and Software trigger is useful to make the system simple (Software trigger starts after receiving command from host computer).

ii. Trigger Polarity
It is possible to input both high-active and low-active polarity trigger to the camera according to a customer's system by setting TriggerActivation command.

iii. Trigger inhibit
The XCG-H280CR can be set not to recognize trigger input by internal camera setting (Command : TriggerInhibit).
This enables arbitrary the camera to recognize only a needed trigger signal, and acquire image when customers use system in which common trigger signal line is connected to multiple units of cameras. Also the cameras can be protected from noise which added to trigger signal line by using Trigger Inhibit function.

3. Main Features

VI. Synchronization(External Trigger Input)

iv. Trigger Overlap

This trigger overlap function enables the XCG-H280CR to input trigger during previous picture is read out from the sensor on trigger mode in order to accept trigger at the fastest possible timing.
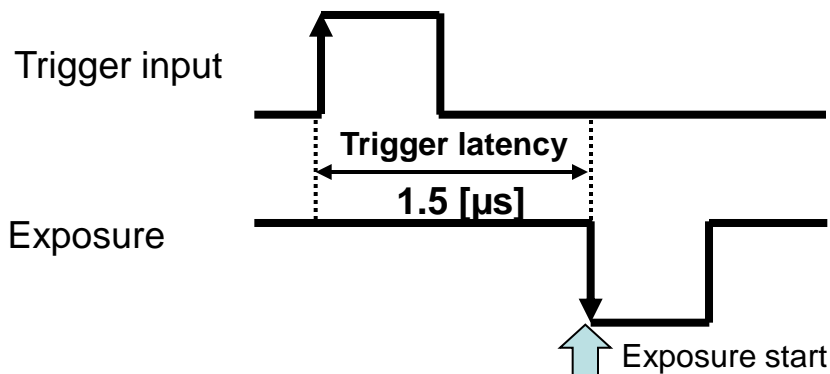
Trigger input
(Edge detection mode)

Overlap

Exposure

Readout
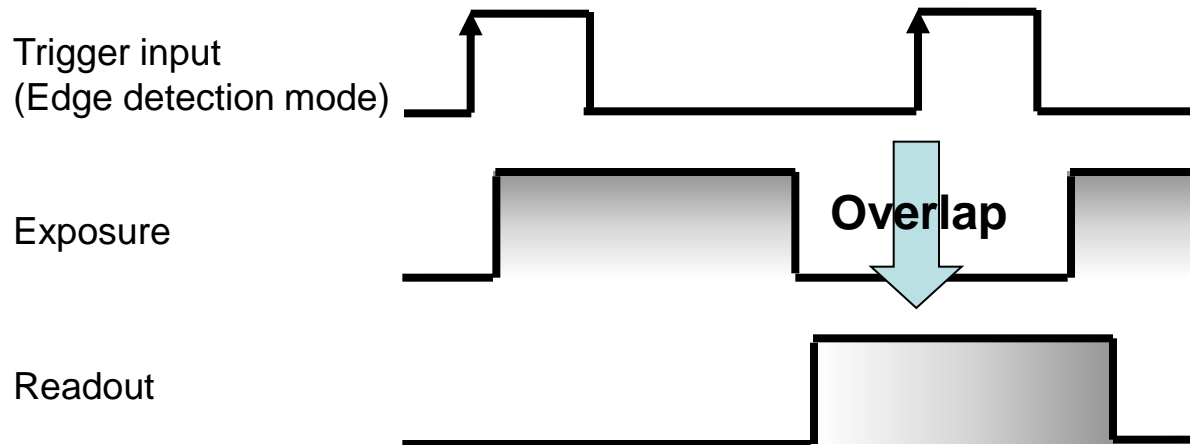
Note: When trigger is overlapped, exposure start to the trigger is fine adjusted and jitter occurs. Please refer to the "Trigger Latency", Overlap: Yes.

3. Main Features

VI. Synchronization(External Trigger Input)

v. Trigger Latency
The following charts show the latency from input trigger to exposure start.

Trigger input

Trigger latency

1.5 [μs]

Exposure

Exposure start

Note:
When trigger width shows the exposure time(T),
the trigger latency will be T + 1.5[μs].

3. Main Features

VI. Synchronization(External Trigger Input)

   vi. Delay Setting

The XCG-H280CR allows users to delay the timing of capturing image by slowing trigger signal. This can finely control trigger line which is received by the camera set on a factory line.

And also the camera allows customers to set the timing of strobe output so that customers can flexibly set the timing of lighting which is important when image acquisition.

Note: Delay setting can not be used in case of software trigger.

Delay setting	Range of setting	Unit
Trigger input	0 to 4 sec	1 µsec/step
Strobe output	0 to 4 msec	1 µsec/step

Also it is possible to set the polarity and width for the Strobe.

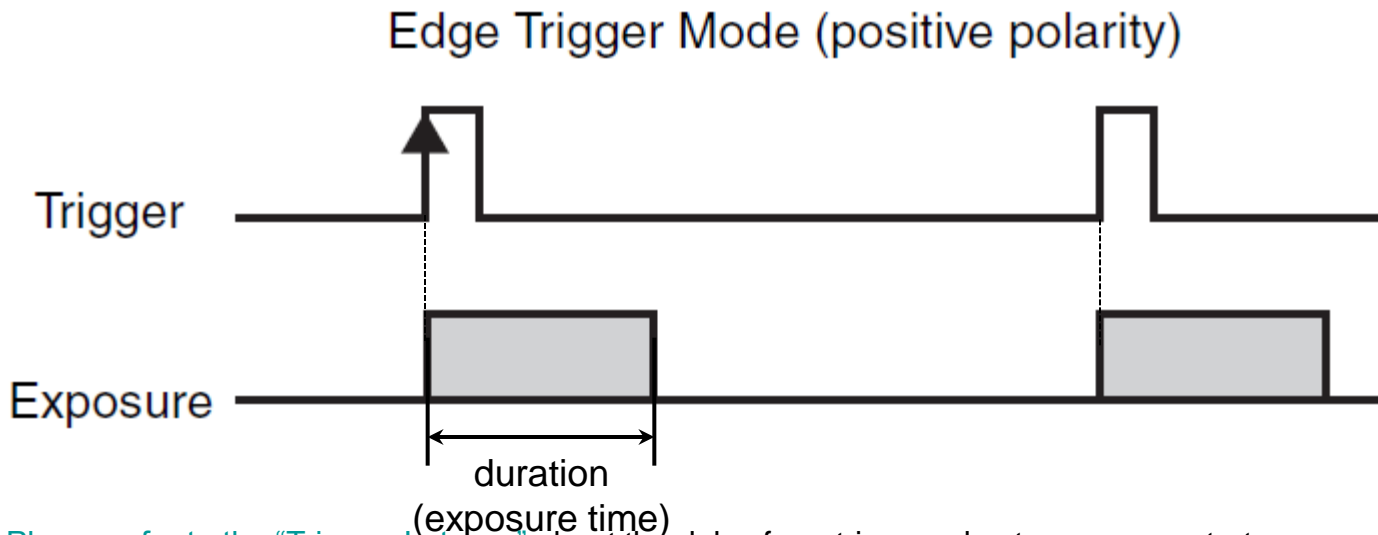| Width setting	Range of setting	Unit
Strobe output	0 to 4 msec	1 µsec/step

3. Main Features

VI.   Synchronization(External Trigger Input)

    vii.   Trigger Mode

TheXCG-H280CR has normal mode which outputs pictures continuously and trigger mode which outputs one-shot or multiple shot pictures by entered hardware or software trigger.

    1.   **Edge detection mode**(Edge trigger mode, Trigger start)

Exposure starts at the rising edge of an input trigger with duration based on the register setting of shutter in case trigger polarity is set to positive.

Edge Trigger Mode (positive polarity)

Trigger

Exposure

duration
(exposure time)

* Please refer to the "Trigger Latency" about the delay from trigger edge to exposure start
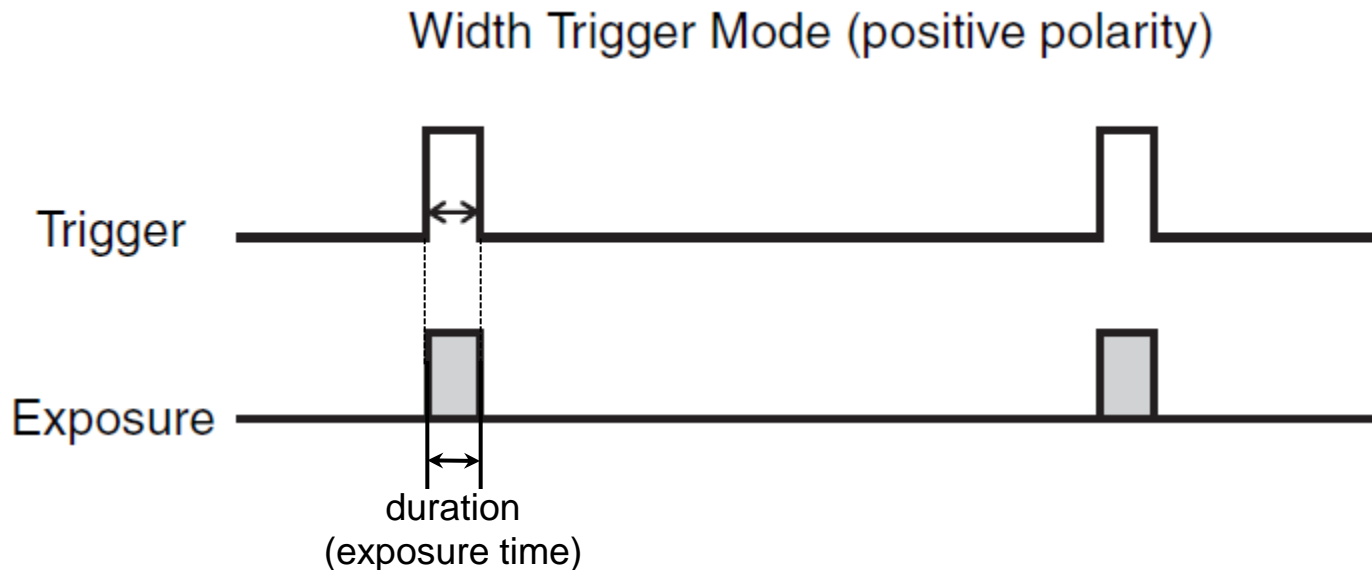
3. Main Features

VI. Synchronization(External Trigger Input)
  vii. Trigger Mode
    2. **Width detection mode**(Width trigger mode, Trigger start and duration)

       Exposure starts at the rising edge of an input trigger and the duration is the same as the

       trigger pulse width.

Width Trigger Mode (positive polarity)

Trigger

Exposure

duration
(exposure time)

3. Main Features

VI.   Synchronization(External Trigger Input)

   vii.   Trigger Mode

The XCG-H280CR has special trigger mode, "Bulk trigger mode" and "Sequential trigger mode" other than Edge and Width detection mode.

3.   **Bulk trigger mode**

This is the mode to retrieve continues multiple images of different setting by using one-shot hardware or software trigger entered externally(Antonym of Bulk trigger mode is Single trigger mode). The XCG-H280CR enables to capture picture set in maximum 16 ways by one-shot trigger.

(Please refer to Memory Channel(UserSet))

4.   **Sequential trigger mode**

Sequential trigger mode is to switch the setting in maximum 16 ways set by Memory Channel in every time the trigger is input (Number of Input trigger is different from Bulk trigger mode).

3. Main Features

VI.   Synchronization(External Trigger Input)

    viii.   Hardware Trigger Input Option

Customer can select hardware trigger source from TRIGGER IN[1]/[2] and GPI[1]/[2].

7-pin I/O connector Pin No.	Signal
3 (Line3)	TRIGGER IN[1]
4 (Line4)	TRIGGER IN[2]
5 (Line5)	GPI[1]
6 (Line6)	GPI[2]

In addition,

Line3 and Line4 can be set to logical add "OR" or logical multiplication "AND".

Therefore, in case customer selects TriggerSource = 3, one Line can be a condition ready to input trigger to another Line

for instance.

3. Main Features

VII. Acquisition Mode

The XCG-H280CR has three image acquisition modes independently of Trigger mode and these acquisition modes are in accordance with GigE Vision standard. This enables not to carelessly pressure network bandwidth connected with XCG.

- One shot acquisition: Output only one frame from XCG
- Specified number of frame acquisition: Output 2 to 255 frames
- Continuous acquisition: Output all continuous frames

Note: When the XCG-H280CR is acquiring images on each mode, the settings related to Payload size such as Width and Height cannot be changed.

3. Main Features

VIII. Image Buffer (Memory Shot)

The XCG-H280CR has function to store images up to 16 frames in any resolution in internal frame memory and read them when required.

This function is useful for example when multiple cameras are connected to the host computer via a single hub, and simultaneous image outputs are disabled because of the band width restriction of 1 Gbps.

It is possible to send one image or specified number of images stored in the frame memory to the host PC.

Note: Image(s) is not stored in frame memory and is discarded if the frame memory already stores 16 images.

3. Main Features

IX. Memory Channel (UserSet)

16 Memory Channels are provided for storing user's camera settings to the XCG-H280CR. It is useful when user needs to switch the camera setting for particular situations. Furthermore, it is useful in case user want to get different pictures of different camera settings for every
frame up to 16 with using Bulk trigger mode or Sequential trigger mode.
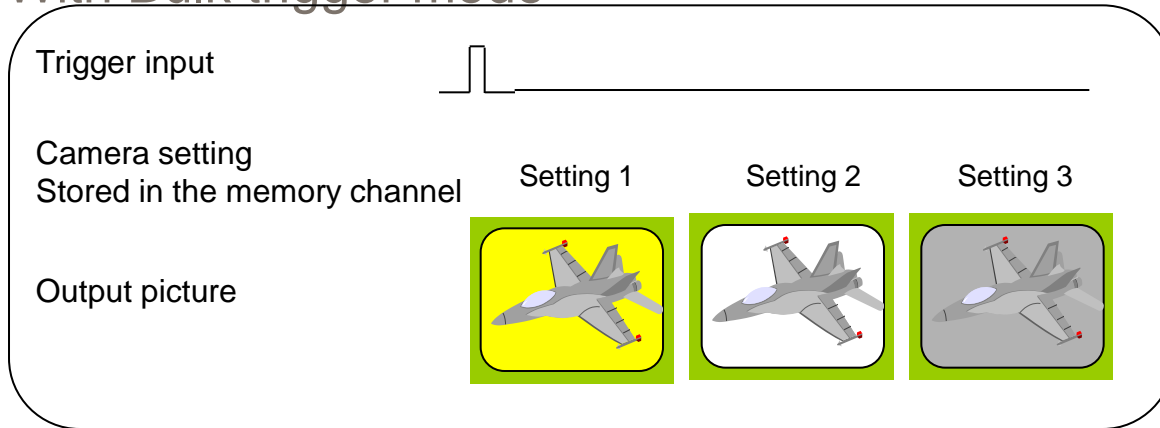
X. User Free Memory

The XCG-H280CR has user free non-volatile read-write storage of 64Bytes in each Memory Channel(1,024Bytes in total).
Stored data is preserved even when the power is turned off. It is useful for users to manage multiple cameras by such as allocating ID to each camera.
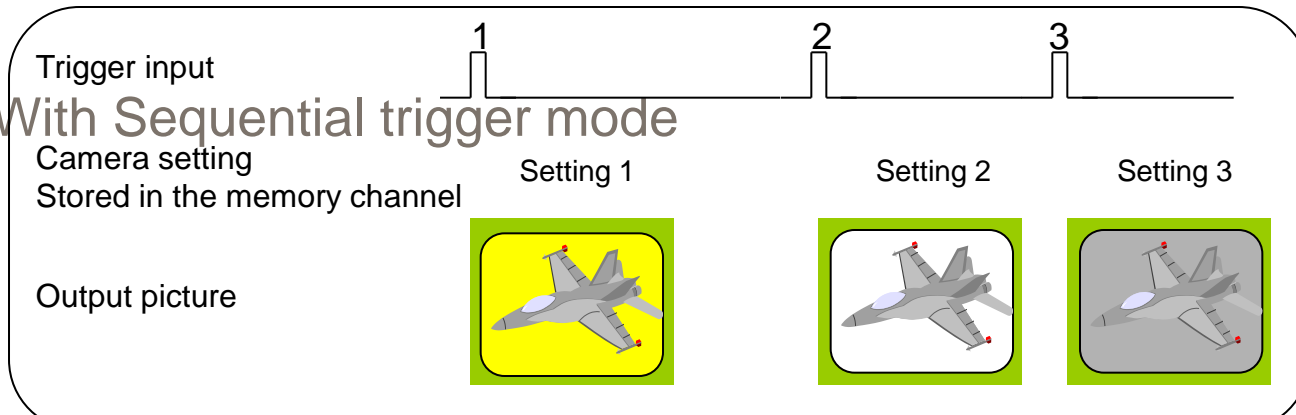
3. Main Features

IX. Memory Channel

I. With Bulk trigger mode

Trigger input

Camera setting
Stored in the memory channel

Setting 1   Setting 2   Setting 3

Output picture

II. With Sequential trigger mode

1   2   3

Trigger input

Camera setting
Stored in the memory channel

Setting 1   Setting 2   Setting 3

Output picture

3. Main Features

XI. Frame Rate Control

The following two modes are supported for the XCG-H280CR.

1. Auto Frame Rate Setting (Default)

   The fastest frame rate is set automatically based on the exposure time and scanning area.

   In order to increase the frame rate more, it is helpful to activate Partial Scan mode and select smaller scanning area and select shorter exposure time.

2. Frame Rate Setting

   The frame rate is set manually.

   In order to minimize network traffic, use this setting to lower the frame rate while maintaining the same exposure time.

3. Main Features

XII. Readout Features

i.   LUT(Look-Up Table)

LUT is a table to transfer luminance value of each pixels and Gamma curve is one of LUT function.

Input → [luminance transfer table] → Output
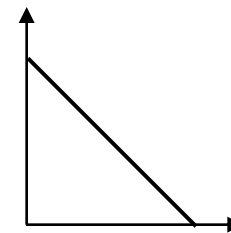
LUT of the XCG-H280CR consists of 4,096 tables

(Input : 12bit * Output : 12bit) and the setting can be selected from the following 5 options:

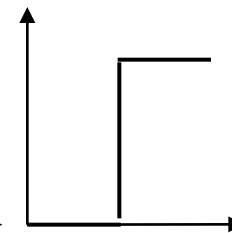1.   Linear (Default setting)
2.   Reverse
3.   Binarization
4.   Linear Interpolation (5-point)
5.   User setting

Output luminance value

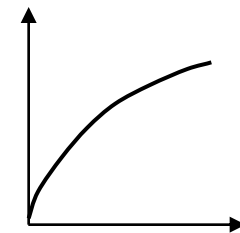Input luminance value
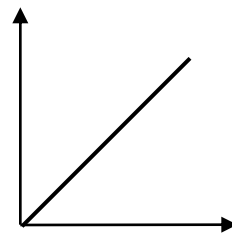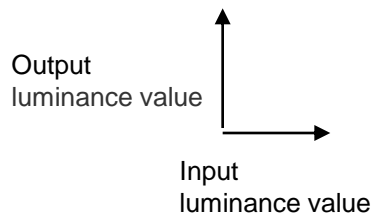
Linear   Reverse   Binarization   Linear Interpolation
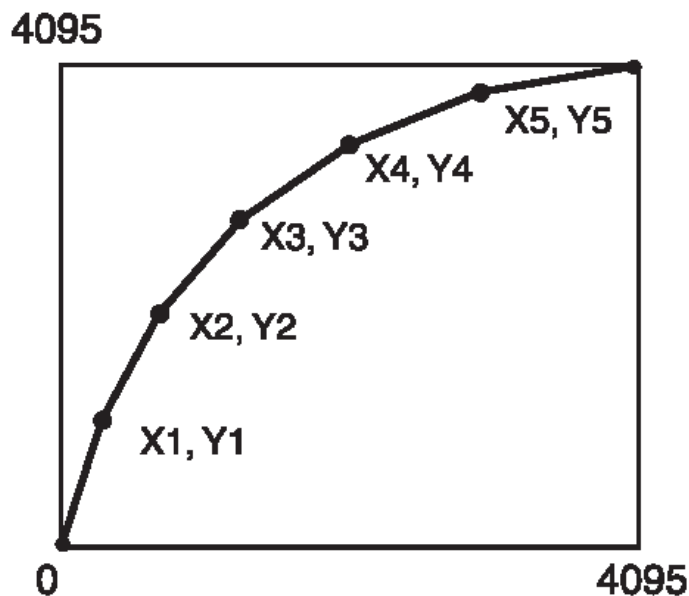
3. Main Features

XII. Readout Features

    i.   LUT(Look-Up Table)

        4.   Linear Interpolation (5-point)

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

3. Main Features

XII. Readout Features

ii. Test Chart(Built-in Test Pattern)

The XCG-H280CR outputs test chart which is generated in the camera instead of the captured image of the sensor. It is useful for customers and system integrators when they build the system and confirm the conditions of the camera.

TestImageSelector = <ColorBar>

Red value		4,095	4,095	0	0	4,095	4,095	0
Green value		4,095	4,095	4,095	4,095	0	0	0
Blue value		4,095	0	4,095	0	4,095	0	4,095
[step]								
XCG-5005CR	pixel number	1 to 354 353[pixels]	355 to 702 348[pixels]	703 to 1,050 348[pixels]	1,051 to 1,398 348[pixels]	1,399 to 1,746 348[pixels]	1,747 to 2,094 348[pixels]	2,095 to 2,448 355[pixels]
XCG-U100CR		1 to 230 230[pixels]	231 to 458 228[pixels]	459 to 686 228[pixels]	687 to 914 228[pixels]	915 to 1,142 228[pixels]	1,143 to 1,370 228[pixels]	1,371 to 1,600 230[pixels]
XCG-H280CR		1 to 274 274[pixels]	275 to 548 274[pixels]	549 to 822 274[pixels]	823 to 1098 276[pixels]	1099 to 1372 274[pixels]	1373 to 1646 274[pixels]	1647 to 1920 274[pixels]

3. Main Features

XIII. SDRAM Data Flow for Packet Resending

The XCG-H280CR has SDRAM of 128Mbit (16MByte) to play a role of FIFO. Resend request from host PC when packet lost can be answered while data exists in this SDRAM. The right table shows amount of data that each camera can store in SDRAM (as a reference value).
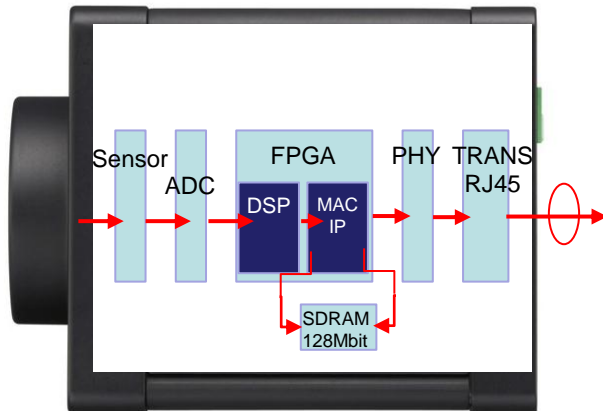
Amount of storing data (1920x1080)
(Reference value)

	8bit	10bit	12bit
XCG-H280CR	8 frames	6 frames	5 frames

3. Main Features

XIV. Camera Reboot and Reset

i. Camera Reboot

The XCG-H280CR has a register to reboot the camera by software command. This is the same operation as that when the camera is powered off and on.
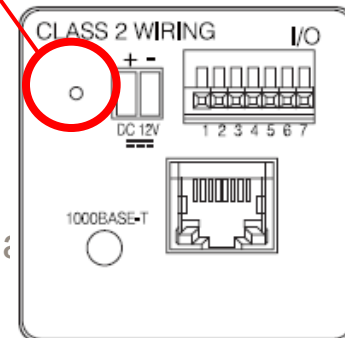
Address	Name	Type	Data
0xA0000010	DeviceReset	W/O	1

ii. Camera Reset

The following network settings are initialized when the reset switch on the rear panel is pressed for more than 3 sec:

- Packet size
- Packet delay
- Persistent IP (Off)
- The values of persistent IP (IP address/subnet mask/default ga
- DHCP (On)
- SpecialTriggerMode
- UserSetDefaultSelector

Reset switch

3. Main Features

XV. Chunk Data

The XCG-H280CR can transfer Chunk data (meta data) to PC.

The following items are transferred.

I. Items which should be transferred

- Image
- OffsetX, Y
- Width, Height
- PixelFormat

II. Items which are settable to transfer

- TriggerCounter, Temperature, LineStatusAll
- Exposure Time, GainAnalog, UserMemory, LineOutputStatus

3. Main Features
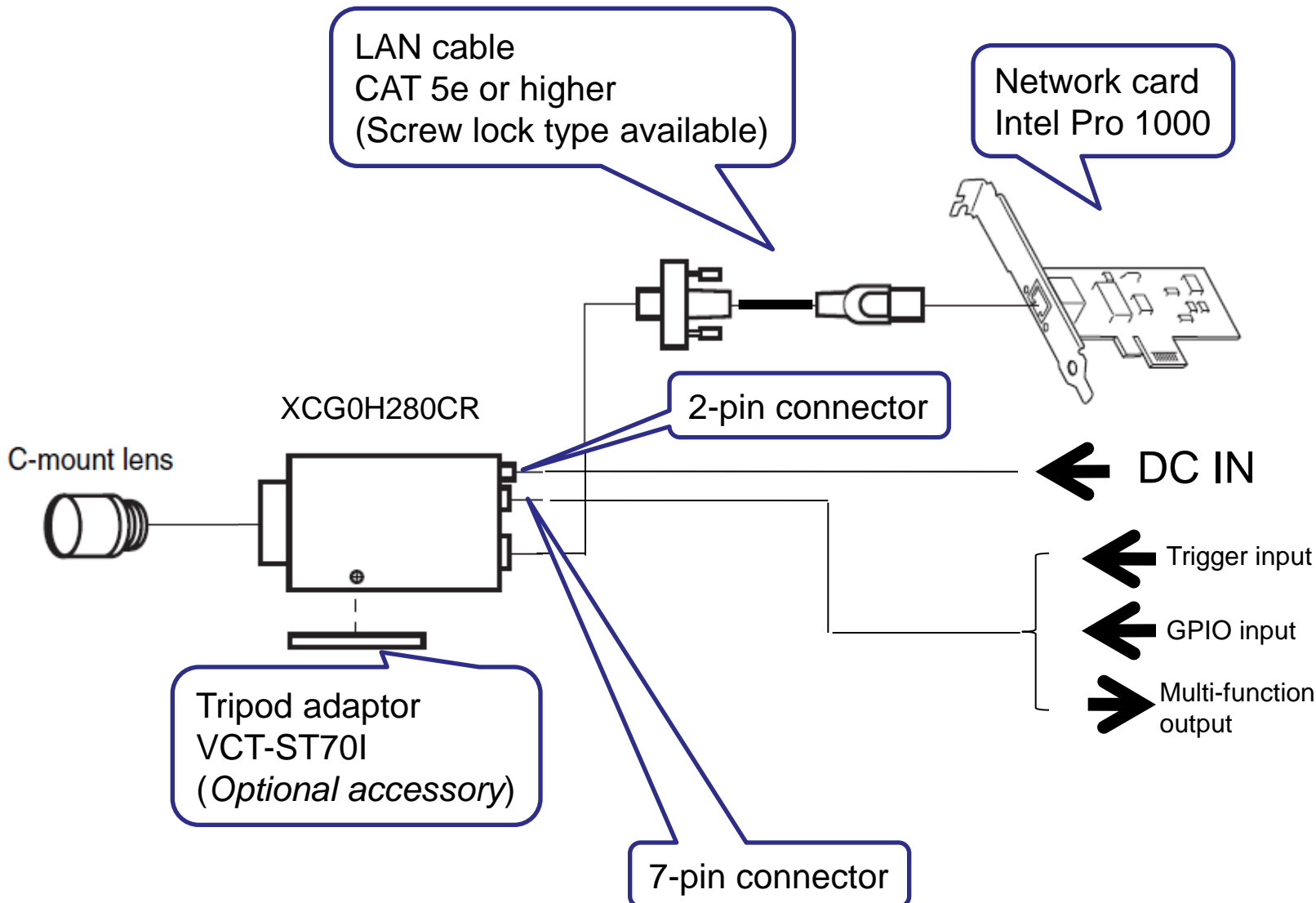
XVI. Auto Exposure

The XCG-H280CR can control the exposure time automatically to the image average level specified as the specified same detection domain as an automatic gain control.

- Once

  When Auto Exposure Control reach to the image average level or upper limitation or lower limitation of the exposure time, this function will be set to Off.

- Continuous

  This function continues.

4. System Configurations

LAN cable
CAT 5e or higher
(Screw lock type available)

Network card
Intel Pro 1000

XCG0H280CR

2-pin connector

DC IN

C-mount lens

Trigger input

GPIO input

Multi-function output

Tripod adaptor
VCT-ST70I
(*Optional accessory*)

7-pin connector

5. Specifications

I. Specifications (1/3)

	XCG-H280CR
Camera	
Image sensor	2/3-type progressive scan IT CCD
Image sensor (Number of effective pixels)	1,940 x 1,460
Sensor technology	EXview HAD CCD II
Cell size (H x V)	4.54 x 4.54 µm
Standard output pixels (H x V)	1,920 x 1,080
Standard frame rate	32fps (@ 1920(H) x 1080(V), 2ch)
Maximum output pixels (H x V)	1,920 x 1,440
Color Filter	Elementary color mosaic
Sensitivity	F8 (2000 lx, Gain : 0 dB, 100% video level)
Minimum illumination (50% video level)	6 lx F1.4, +18dB, Shutter: off, Gamma: off
Minimum illumination (50% video level) (*1)	5.2 lx F1.4, +18dB, Shutter: off, Gamma: off
Signal to noise ratio	1 step (lens close, Gain : 0 dB)
Signal to noise ratio (*1)	0.5 step (equivalent of 54.2dB, lens close, Gain : 0 dB)
Gain	Auto, Manual (0 dB to +18 dB)
Gain (*2)	Approx. -2dB to +30dB
Shutter speed	2 s to 1/100,000 s

5. Specifications

I. Specifications (2/3)

|	XCG-H280CR
Camera Features	
Video output resolution depth	8 bits/pixel (Default) 10 bits/pixel 12 bits/pixel, Raw
White balance	One push white balance, Manual
Readout modes	Normal, Partial scan
Readout features	LUT(Look-Up Table, Variable Gamma), Built-in test pattern (Grey scale)
Synchronization	Hardware/Software trigger, Trigger start /Trigger start and exposure duration/Bulk/Sequential trigger mode, Trigger inhibit setting, Trigger delay setting/Strobe control
Memory channel	16 channels
User memory	64 Byte x 16channels
Interfaces	
Video output	Gigabit Ethernet (1000Base-T)
Protocol	GVCP, GVSP(GigE Vision Ver. 1.2), UDP/IPv4, DHCP, LLA
Digital I/Os	TTL IN(2x), TTL OUT(2x)

5. Specifications
I. Specifications (3/3)

	XCG-H280E
General	
Lens mount	C mount
Power requirements	DC +12V (+10.5 V to +15.0V)
Power consumption	5.8 W (Max.)
Operating temperature	-10℃ to 50℃ (14℉ to 122℉)
Performance guarantee temp.	0℃ to 40℃ (32℉ to 104℉)
Storage temperature	-30℃ to 60℃ (-22℉ to 140℉)
Operating humidity	20% to 80% (no condensation)
Storage humidity	20% to 95% (no condensation)
Shock resistance	70 G
Dimensions (W x H x D)	50 x 50 x 57.5 mm (2 x 2 x 2 3/8 inches, Excluding protrusions)
Mass	200 g (7.1 oz)
MTBF	Approx. 8.8 [yr]

5. Specifications
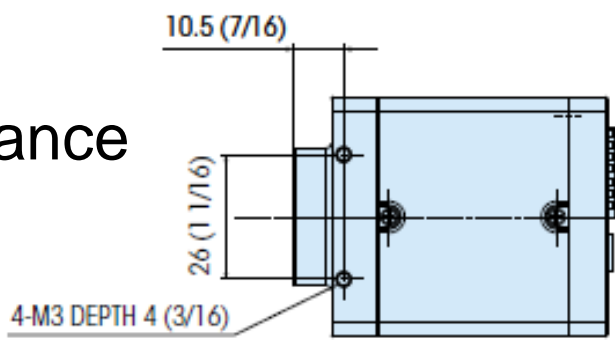
II. External Appearance

Unit: mm (inches)
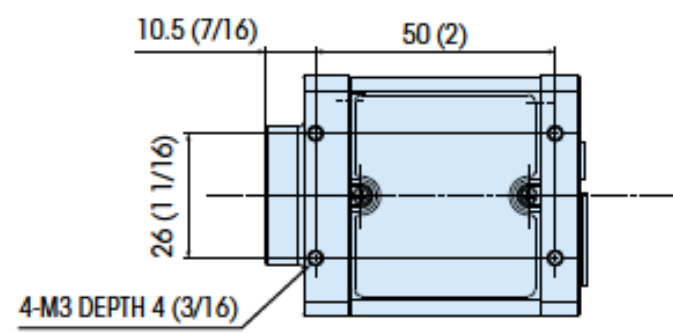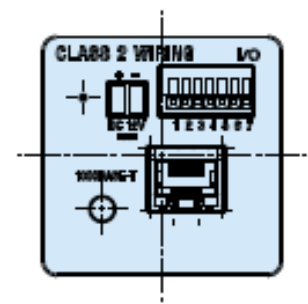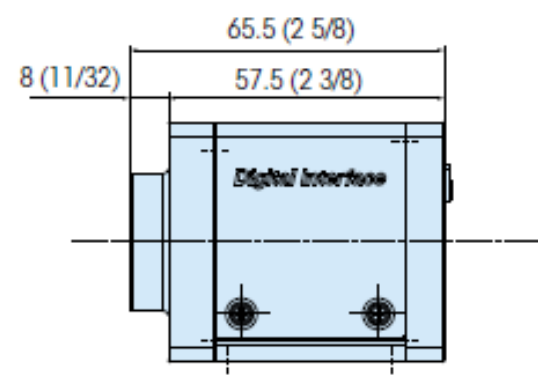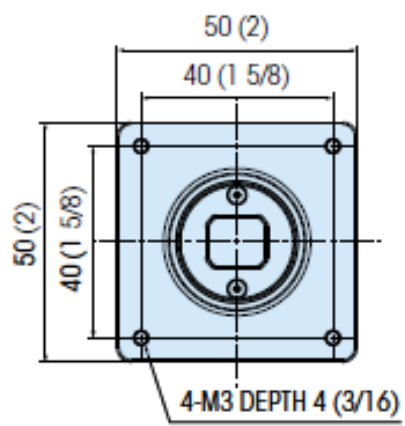
5. Specifications

II.   External Appearance(Power ON LED, Reset switch)

Reset switch

1000BASE-T
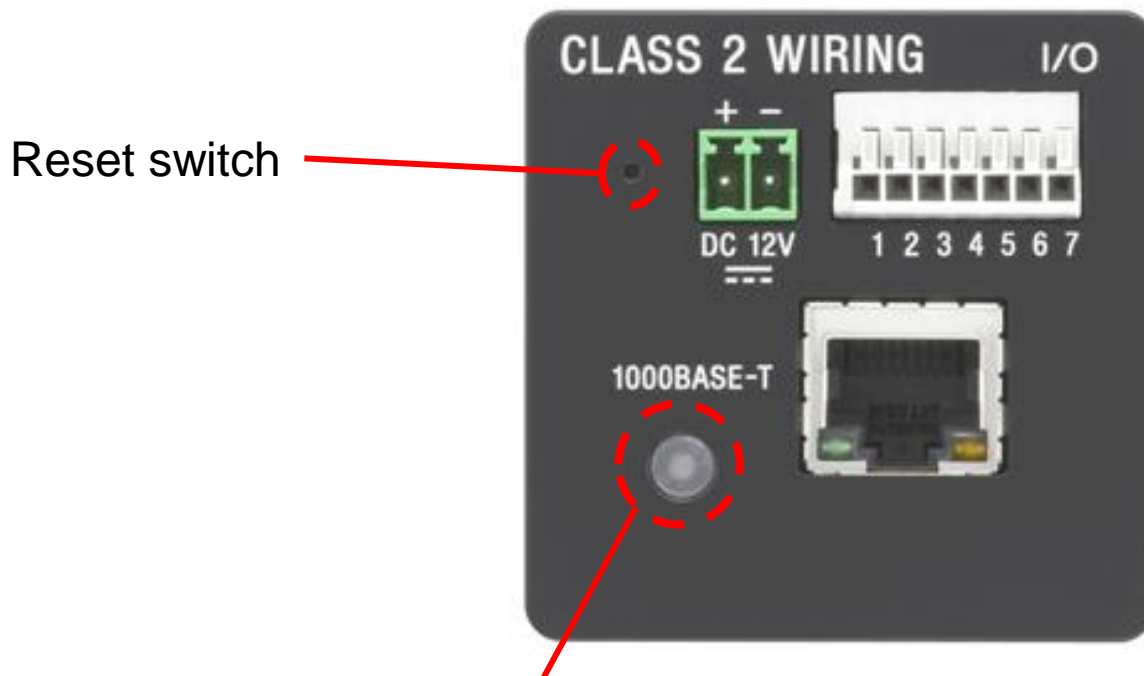
After turning on the power,
It flashes or lights based on the internal
Status of the camera.
            Flashing : Obtaining IP address.
            Lighting : IP address obtained

5. Specifications

III. 2pin connector(DC power input connector)

Pin No.	Signal
+ (Left side)	+12Vdc IN
-- (Right side)	Ground

5. Specifications

III. 7pin connector(I/O connector)

Pin No.	Signal
1 (Line1)	GPO[1]
2 (Line2)	GPO[2]
3 (Line3)	TRIGGER IN[1]
4 (Line4)	TRIGGER IN[2]
5 (Line5)	GPI[1]
6 (Line6)	GPI[2]
7 (Line7)	GND

Multi-function output (TTL)

Selectable from
1. Trigger through output
2. Exposure   (Active period shows the exposure time)
3. Sensor readout
4. Strobe control   (Width and delay can be set to Exposure)
5. GPIO output   (Output of register value)
6. True(High) / False(Low)

Output specification

4.8 to 5.2 V

Exposure Time
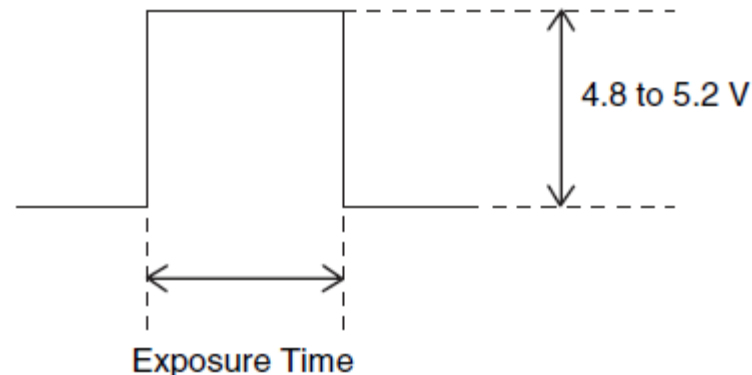
* The termination impedance of the TTL output shall be 10 [kΩ] or higher.

5. Specifications

III. 7pin connector(I/O connector)

Termination : 10kΩ or higher

Pin No.	Signal
1 (Line1)	GPO[1]
2 (Line2)	GPO[2]
3 (Line3)	TRIGGER IN[1]
4 (Line4)	TRIGGER IN[2]
5 (Line5)	GPI[1]
6 (Line6)	GPI[2]
7 (Line7)	GND

TRIGGER IN[1]/[2]

Input specifications

Polarity : positive

2～24 V
0～0.4 V
2.0 μs 以下
2.0 μs 以下
10 μs～2 s   100 μs 以上
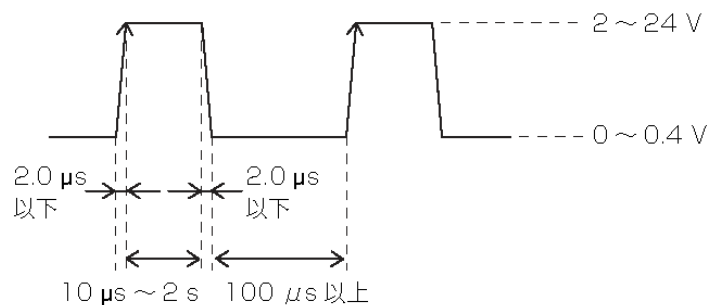
Polarity : negative
(Default)
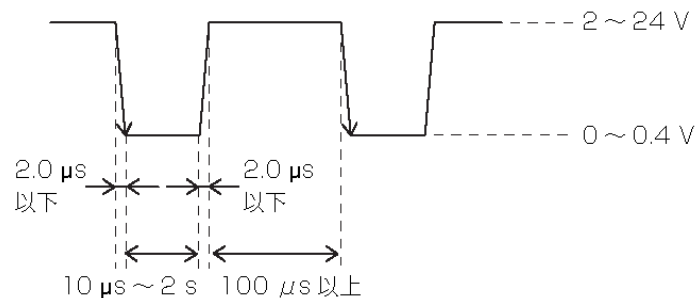
2～24 V
0～0.4 V
2.0 μs 以下
2.0 μs 以下
10 μs～2 s   100 μs 以上

5. Specifications

III. 7pin connector(I/O connector)

Pin No.	Signal
1 (Line1)	GPO[1]
2 (Line2)	GPO[2]
3 (Line3)	TRIGGER IN[1]
4 (Line4)	TRIGGER IN[2]
5 (Line5)	GPI[1]
6 (Line6)	GPI[2]
7 (Line7)	GND

High : Between +5 Vdc and +24 Vdc

6. Software

I. ZCL-SDK (IEEE1394/GigE Unified Driver)

- ➤ Available via IS Products Information Website

- ➤ Components
  - ➤ Windows Filter Driver for XCG series
    - ➤ OS : Windows XP 32bit
      Windows Vista 32bit/64bit
      Window7 32bit/64bit
    - Operation checked adapter: Intel Pro/1000 PT
      Intel Pro/1000 PT Quad Port
      Intel Pro/1000 CT (needs driver's update from Intel's web site)
  - ➤ SDK
    - ➤ Language : English / Japanese
    - ➤ Application sample source code (Refer to the Tutorial file)
      - ➤ Opening library, interface and device,
      - ➤ Accessing device registers,
      - ➤ Creating data stream,
      - ➤ Start and stop acquisition,
      - ➤ Grabbing images, etc.
  - ➤ Viewer/Camera control application "Sample Viewer"
  - ➤ PDF Help files and Tutorials

SONY
make.believe

7. Accessories

I. Supplied Accessories

➤ Lens mount cap (1x)

➤ Terminal block (1x)

  ➤ Manufacture :   DINKLE

  ➤ Product code :   EC350V-02P

➤ Operating instructions (1x)

  ● Japanese

  ● English

  ● Korean

Reference picture
(DINKLE, EC series)

7. Accessories

II.   Optional Accessories

> Tripod adaptor

VCT-ST70I

10.5 (7/16)   50 (2)

26 (1 1/16)

4-M3 DEPTH 4 (3/16)

Screws : M3 x 4 (4)
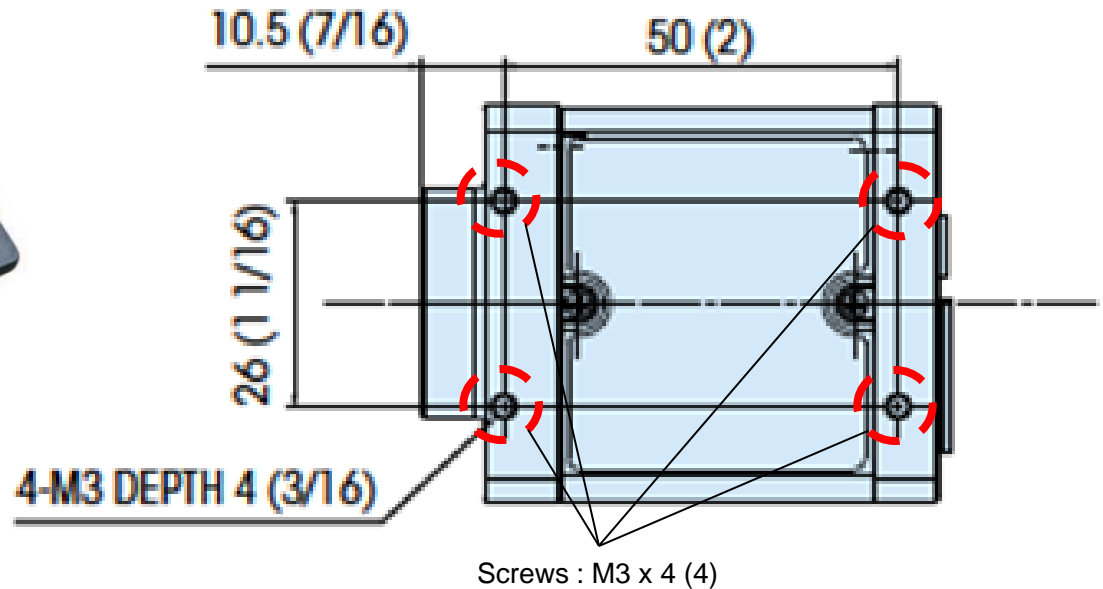
To use the tripod, install the tripod adaptor VCT-ST70I (not supplied) on the camera module.
Use a tripod screw with a protrusion (ℓ) extending from the installation surface, as follows, and tighten it, using a screwdriver.

4.5 mm to 5.5 mm
0.18 inches to 0.22 inches

8. Safety Approval and Regulation

Safety Approval	UL(US) + cUL(Canada)	UL2044
E M C	VCCI(Japan)	Class A information processing device
	FCC(US) / IC(Canada)	Class A Digital Device
	$\mathrm{C\,E}$ (Europe)	EN55022 Class A,
	AS/NZ	EN55022
	Korean KC	KN22/KN24 Class A

9. Comparison Chart

	SONY XCG-H280CR	AVT GX1920C
Camera		
Image sensor	**ICX674, Sony (2/3", Exview HAD CCD II)**	**ICX674, Sony (2/3", Exview HAD CCD II)**
Resolution (H x V)	1,940 x 1,460	1,936 x 1,456
Frame rate	**59.6fps @ 1,920 x 1,080, 4ch**	49.6fps @1,936 x 1,080
Camera Features		
Readout modes	Normal, Partial Scan	Normal, Binnning (8 x 8), AOI
Synchronization	Hardware trigger, Software trigger	Hardware trigger, Software trigger
Trigger modes	**Edge, Width, Bulk, Sequential**	Edge, Width
Image buffer	16 frames	**128MByte (45 frames)**
Auto exposure	Yes	Yes
Others	Chunk data (Trigger counter), Time stamp, Internal temp. sensor	Chunk data, Frame counter, Trigger input counter, time stamp
Interfaces		
Video data output	8, 10, 12-bit digital	8, 12, 14-bit digital
Digital interface	Gigabit Ethernet (1000BASE-T) x 1	Gigabit Ethernet (1000BASE-T) x 2 LAG configuration
Camera specification	GigE Vision® Verision 1.2	GigE Vision® Verision 1.0
Digital I/Os	TTL IN(2x), TTL OUT(2x)	ISO IN(2x), ISO OUT(4x)
General		
Lens mount	C mount	C mount
Power requirements	DC +12 V (+10.5 V to +15.0 V)	DC +5 V to +24V
Power consumption	5.2 W (typ.) 5.8W(max)	5.3W (typ.)
Operating temperature	-10℃ to +50℃	0℃ to +50℃
Dimensions (W x H x D)	50 x 50 x 57.5 mm	53.3 x 33 x 108.1 mm
Mass	200 g	269 g

Machine Vision   XCG-H280CR

10. Appendix

I. Spectral Sensitivity Characteristic (Relative response)
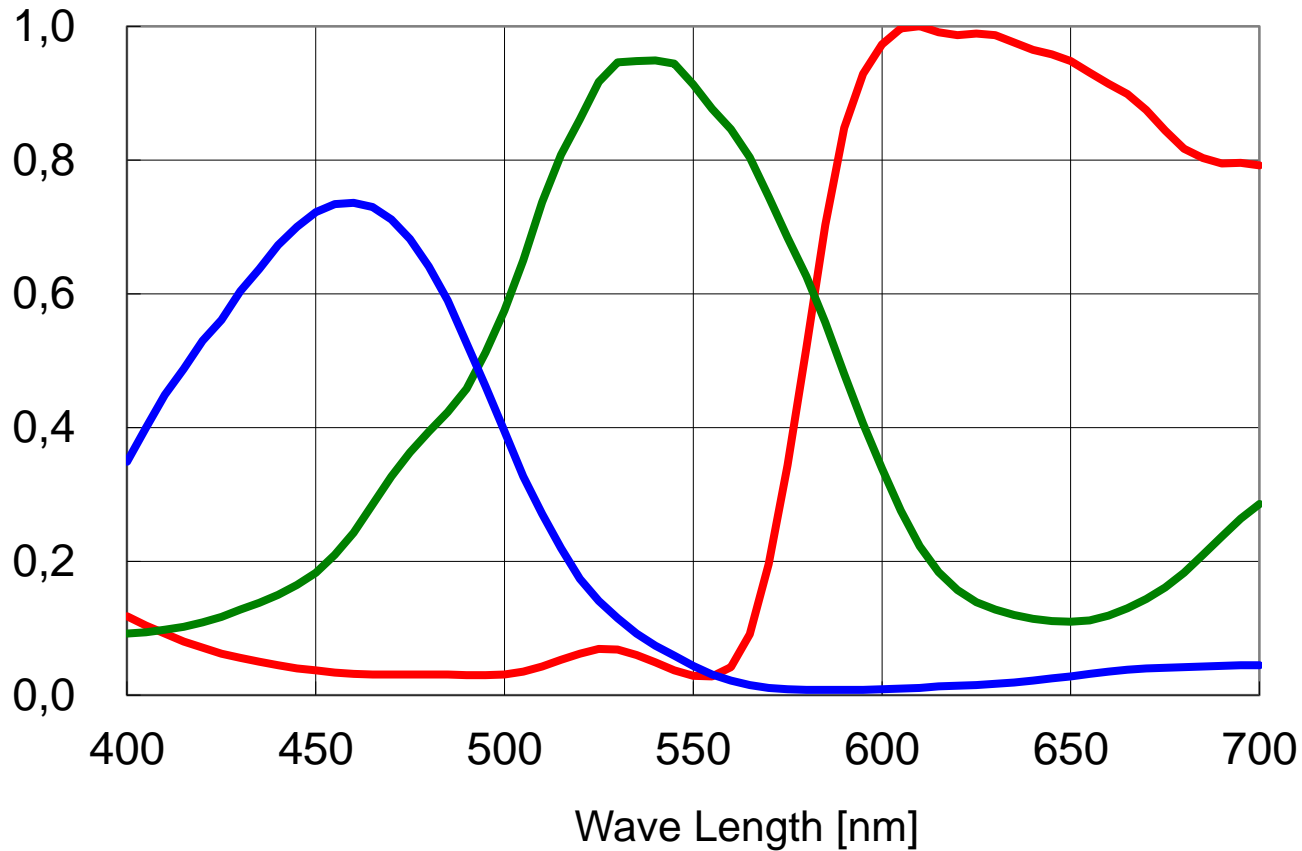
(Without lens and light source parameters.)

10. Appendix

II. Supported Network Functions

Function	Value	Description
Payload Size	BayerRG8: (Pixels) * (Lines) [byte] BayerRG10/12 Packed: (Pixels) * (Lines) * 1.5 [byte]	Shows data size of image It is fixed by number of pixels and lines of image
Packet Size	1,440 / 2,960 / 4,480 / 6,000 / 7,520 / 9,040 / 10,560 and≦NetworkMTU[byte]	Sets packet size of image data and header(36byte)
Inter Packet Delay	32 to 65,535 [Timestamp] [Timestamp] = 83.333333 [MHz]	Amount of delay to insert into each packet Effective when application receives packet late from camera
DHCP Enable	Enable / Disable	Sets whether to acquire IP address from DHCP server.
Persistent(Static) IP	Enable / Disable	Sets whether to use Static IP
Persistent(Static) IP Address	0.0.0.0 < A < 255.255.255.255 0.0.0.0 < B < 255.255.255.255 A / B: different from Host's	IP Address appropriate according to system requirements
Persistent(Static) IP Subnet	255.255.255.0 or Same as Host's	Subnet mask in case of using Static IP
Heartbeat Mode	Enable / Disable / Streaming Only	Heartbeat setting Disable: Heartbeat is not available Enable: Image will be stopped and network will be initialized when Heartbeat is disconnected. Streaming Only: Image will be stopped when Heartbeat is disconnected.
Heartbeat Timeout	500 to 10,000 [ms]	Setting of permissible time that Heartbeat reaches from Host PC
Timestamp Tick Frequency	83,333,333 [pcs] (fixed)	Number of Timestamp per one second (Accuracy of time information in Header is unit of 83.333333[MHz])
Access Mode	0 / 1 / 2	Camera control setting 0: Uncontrollable 1: Controlled by one application and other application can not reference register 2: Controlled by one application and other application can only reference register

10. Appendix

II. Supported Network Functions

- Glossaries of Network Funcitons

Payload	Data body of communication packet without header to transfer
MTU (Maximum Transmission Unit)	Unit: [byte] Maximum value of data that can be sent by one transfer on Communication network Although sending side can set value for each connection, sending side devices data and send it in accordance with MTU of receiving side, when MTU of sending side is larger than receiving side.
DHCP (Dynamic Host Configuration Protocol)	Protocol to automatically allocate necessary information such as I P addresss to a computer temporarily connected with Internet.
Persistent(Static) IP	Global address Address to distinguish all computers on the Internet
Subnet mask	Numeric value to distinguish network address and host address of IP address 32bit when IPv4
Heartbeat	Signals to be sent to notify outside that computer and network device themselves are working normally on network. Disconnect when Heartbeat is not sent even after communication status continues for a certain period of time

10. Appendix

III. Sony's Digital Interface Camera Specification

− **Minimum illumination**

The minimum illumination "lx" is measured by illumination meter

* Condition for a Digital Camera

  − Object : Gray scale chart (reflectance : 89.9%)

      The white part of the Gray scale chart : 50% of the digital video output

  − Lens : Open (typically F1.4)

  − GAIN : Maximum dB of the camera specification

− **Sensitivity**

The F number of the lens describes the "Sensitivity

* Condition for a <u>Monochrome</u> Digital Camera

  − Object : Gray scale chart (reflectance : 89.9%)

      The white of the Gray scale chart : 100% of the digital video output

  − Lighting : Halogen, 2000lx , 3,200±50K

  − GAIN : 0dB

10. Appendix

III. Sony's Digital Interface Camera Specification

– Signal to Noise Ratio

"SNR" of Sony's digital camera is described by a unit of "step".

* Condition
  - Lens : Close
  - GAIN : 0 dB
  - Measurement data area : 1/4 of the normal resolution

* Calculation formula ("standard deviation")

$$noise = \sqrt{\frac{\sum(x-a)^2}{n}}$$

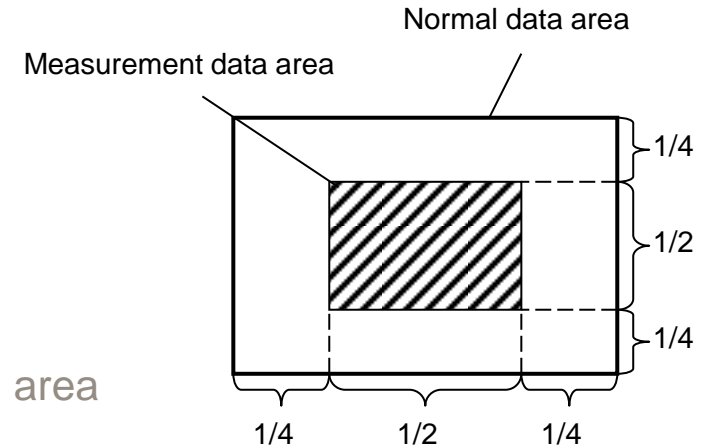n : pixel number

x : pixel value

a : average value of the area

$$noise = \sqrt{\frac{X2}{n} - \left(\frac{X}{n}\right)^2} \; [step]$$

X2 : Sum of squares ($\sum\{p(x)\}$)

X : Sum ($\sum\{p(x)\}$)

p(x) : pixel value

n : pixel number

Normal data area

Measurement data area
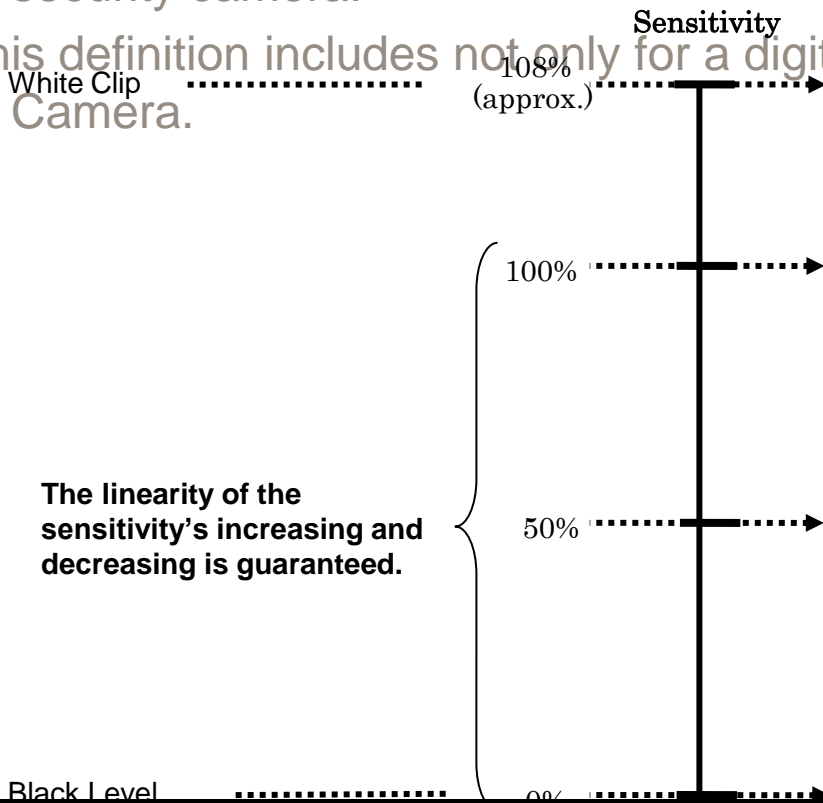
1/4

1/2

1/4

1/4　　1/2　　1/4

10. Appendix

III. Sony's Digital Interface Camera Specification

– "Step" definition

This definition is based on/refer to the guide line of JEITA for a network security camera.

This definition includes not only for a digital ~~Camera.~~

Index (unit: step)

	8bit	10bit	12bit	14bit
White Clip — 108% (approx.)	255	1,023	4,095	16,383
100%	235	940	3,760	15,040
50%	125	500	2,000	8,000
Black Level — 0%	15	60	240	960

The linearity of the sensitivity's increasing and decreasing is guaranteed.

Sensitivity

XCG-H280CR