OMRON

GigE Vision

Monochrome / Color CMOS PoE Camera

STC-MBS881POE   (8.9M / Monochrome)
STC-MCS881POE   (8.9M / Color)

Product Specifications and User's Guide

OMRON SENTECH CO., LTD.

OMRON

Table of Contents

OMRON

OMRON

Precautions for safe use

Please read carefully this "Precautions for safe use" before use the camera. Then the camera uses correctly with agreeing with below notes.

In this "Precautions for safe use", notes divides into "Warning" and "Caution" to use the camera safety and prevent to harm and damage.

⚠ Warning	This shows, assumption for possibility of serious accident leading death or serious injury if ignore this note and camera uses incorrectly.
⚠ Caution	This shows, assumption for possibility of bear the damage or physical damage if ignore this note and camera uses incorrectly.

About Graphic symbols

🚫 This symbol shows general prohibition.

⬤ This symbol shows completion or instruction.

[Environment / condition]

⚠ Warning		
🚫	Do not use flammable or explosiveness atmospheres. This will cause of personal injury or fire.	🚫 Do not use for "safety for human body" related usage. This camera is designed for use "do not harm human body immediately" if by any chance the camera has malfunction.
⚠ Caution		
⬤	Use and store under specified environmental conditions (Vibration, shock, temperature, humidity) in the specifications for this camera. This will cause of fire or damage the camera.	

[Installation and cable wiring]

⚠ Warning		
⬤	Do not use with out of power voltage range that is specified in the specifications for this camera. This will cause of fire, electrification or malfunction.	⬤ Do not wrong wiring. This will cause of fire or malfunction.

OMRON

⚠ Caution

🚫	The camera housing and 0 V line of camera inside circuit are isolated. There is a risk of short circuit between camera inside ciurcuit and frame ground through other devices. This will cause of malfunction.	❗	It is necessary to wiring and mounting that is specified in the specifications for this camera. This will cause of fire or malfunction.
🔌	It is necessary to wiring with turn off the camera. This will cause of electrification or malfunction.	❗	It is necessary to mounting the camera without stress for the cable. This will case of electrification or fire.

[Usage instruction]

⚠ Warning

✋	Do not touch the terminal and PCB board While turn on the camera. This will cause of electrification or accident caused by malfunction.	🚫	Do not put combustibles near the camera. This will cause of fire.
❗	Do not use without usage that is specified in the specifications for this camera. This will cause of personal injury or malfunction.	🚫	Do not push metals including screw driver into radiation holes. This will cause of electrification or malfunction.
♨	Do not touch the camera housing while or afterusing the camera. There is a risk of get burned.		

⚠ Caution

❗	Do not push contamination into opening of the camera. This will cause of electrification or malfunction.	❗	Do not block the radiation holes. This will cause of fire due to increase the camera inside temperature.

[Maintenance]

⚠ Caution

🚫	Do not disassemble or repair the camera. This will cause of fire, electrification or malfunction.	🔌	It is turn off the camera when maintaining or inspecting the camera. This will cause of electrification.

[Disposal]

⚠ Caution

❗	It is necessary to dispose as industrial waste.	

OMRON

1 Product Precautions

- ➢ Do not give shock to the camera.
- ➢ Do not haul or damage the camera cable.
- ➢ Do not wrap the camera with any material while using the camera. This will cause the internal camera temperature to increase.
- ➢ When the camera moving or using the place that temperature difference is   extreme, countermeasure for dew condensation (heat removal / cold removal) is necessary.
- ➢ While the camera is not using, keep the lens cap on the camera to prevent dust or contamination from getting in the sensor or filter and scratching or damaging it.
  Do not keep the camera under the following conditions.
    - ・ In wet, moist, high humidity or dusty place
    - ・ Under direct sunlight
    - ・ In extreme high or low temperature place
    - ・ Near an object that releases a strong magnetic or electric filed
    - ・ Place with strong vibrations
- ➢ Apply the power that satisfies the specified in specifications for the camera.
- ➢ The defective pixels may appear due to the sensor characteristics.
- ➢ Use below recommend materials (or equivalent materials) to clean the surface of glass.
    - ・ Air dust: Non Freon air duster (NAKABAYASHI Co., LTD.)
    - ・ Alcohol: Propan-2-ol (SAN'EI KAKO Co., LTD.)
    - ・ Non-woven: nikowipe clean room (NKB)
- ➢ Use a soft cloth to clean the camera.

2 Warranty

■Warranty period

One year after delivery (However, the camera had malfunction with camera uses correctly)

In below case for a fee even within warranty period.
- ・The malfunction caused by incorrect usage, incorrect modify or repair.
- ・The malfunction caused by external shock including the camera dropping after delivery the camera.
- ・The malfunction caused by fire, earthquake, flood disaster, thunderbolt struck, other natural disaster or wrong voltage.

■Warranty coverage

Exchange or repair the malfunction camera if the malfunction is occurred by our responsibility.

"Warranty" mean is warranty for the delivered camera itself. Please accept the induction damage by the camera malfunction is not included.

OMRON

3 Software Licensing

3.1 LWIP TCP/IP Licensing

The software in this camera includes LWIP TCP/IP implementation.
The copyright information is

Copyright (c) 2001-2004 Swedish Institute of Computer Science.
All rights reserved.

Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

1. Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimer.

2. Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.

3. The name of the author may not be used to endorse or promote products derived from this software without specific prior written permission.

THIS SOFTWARE IS PROVIDED BY THE AUTHOR ``AS IS *AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE AUTHOR BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.*

OMRON

4   Overview

This document describes the specification of the following cameras:

STC-MBS881POE / STC-MCS881POE

4.1   Features
- GigE Interface
- Support PoE (Power over Ethernet)
- Small robust camera housing
- Maximum frame rate (Full resolution): 12.4 fps @ 8.9M 8bits
- CMOS (Global Shutter)
- Up to 2,048 Defective Pixel Correction (Default: ON)
- 8bits, 10bits, 12bits output

4.2   Product Number Naming Method

STC-MxS881POE

POE: PoE (Power over Ethernet (Gigabit Ethernet))

881: 1", 8.9M Sensor

Sensor Manufacture
S: SONY

B: Monochrome
C: Color

OMRON
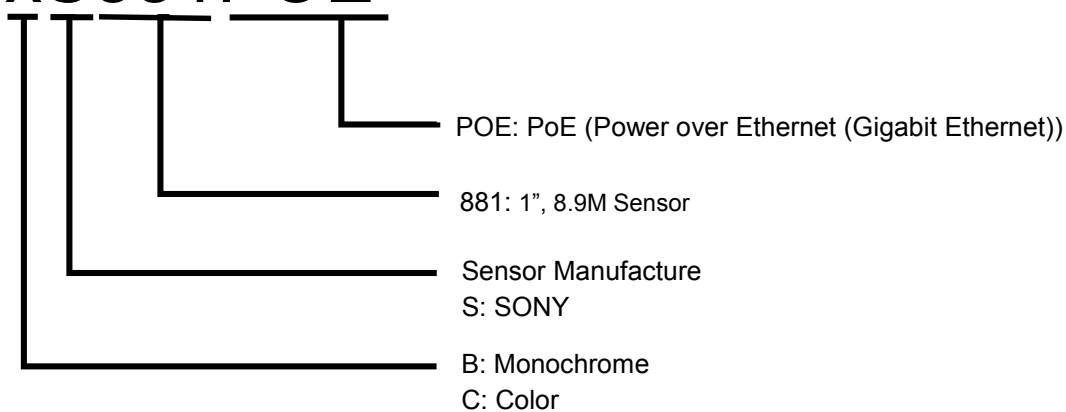
5 Specifications

5.1 Electronic Specifications

Product		STC-MBS881POE	STC-MCS881POE
Image Sensor		1" 8.9M Progressive Monochrome CMOS (SONY: IMX267)	1" 8.9M Progressive Color CMOS (SONY: IMX267)
Shutter Type		Global Shutter	
Active Picture Elements		4,096 (H) x 2,160 (V)	
Cell Size		3.45 (H) x 3.45 (V) µm	
Scanning Mode		**Full scanning (Full resolution)** / ROI	
Frame rate (at full scanning)		**8bits: 12.4 fps** / 10bits: 6.2 fps / 10bits Packed: 8.3 fps / 12bits: 6.2 fps / 12bits Packed: 8.3 fps / RGB8: 4.1 fps Maximum frame rate: : 757.8 fps @ 4 lines (8bits)	
ADC bit depth		12bits	
Image Output Format		**Mono8** / Mono10 / Mono10Packed / Mono12 / Mono12Packed	Mono8 / Mono10 / Mono10Packed / Mono12 / Mono12Packed / **BayerRG8** / BayerRG10 / BayerRG10Packed / BayerRG12 / BayerRG12Packed / RGB8
Noise Level	8bits output	Less than 3.0 digits (Gain 0 dB)	
	10bits / 10bits Packed output	Less than 12.0 digits (Gain 0 dB)	
	12bits / 12bits Packed output	Less than 48.0 digits (Gain 0 dB)	
Sensitivity (*1)		430 Lux	850 Lux
Exposure Time		1 µseconds to 16.777 seconds **(Default: 80,051 µseconds)**	
Gain	Analog Gain	0 to 20.8 dB **(Default: 0 dB)**	
	Digital Gain	x1 to x3 **(Default: x1)**	
ROI		Horizontal: 264 to 4,096 pixels, Vertical: 4 to 2,160 lines **(Default: 4,096 x 2,160)** Adjustable steps for size: 8 pixels in horizontal direction and 4 lines in vertical direction Adjustable steps for offset: 8 pixels in horizontal direction and 4 lines in vertical direction	
Gamma		Gamma 0.1 to 4.0 **(Default: 1.0)**	
Binning		N/A	
Decimation		Horizontal and Vertical decimation (2x2) / **Off**	
Image Flip		Horizontal / Vertical / Horizontal and Vertical / **Off**	
Defective Pixel Correction		Up to 2,048 points (**Default: On**)	
Auto Image Control	Auto Exposure	Support **(Default: Off)**	
	Auto Gain	Support **(Default: Off)**	
	Auto White Balance	N/A	Auto / **Manual** / Push to Set
Operational Mode		Edge preset trigger / Pulse width trigger / **Free run**	
Interface		PoE: IEEE802.3af CLASS2 (1000BASE-T)	
Protocol		GigE Vision 2.1 and GenICam SFNC 2.4, IEEE1588 (PTP)	
I/O		One opto-isolated input, one opto-isolated output and one open collector GPIO (Input or output)	
Power	Input Voltage (*2)	+10.8 to +26.4 Vdc External power (via 6 pin connector) / Power Over Ethernet (IEEE802.3af)	
	Consumption	+12 V / +24 V: 4.3 W, PoE: 4.6 W	

Default: **Bold**

OMRON

Precautions

(*1) The sensitivity is measuring the luminance when white level achieved 100 % in below conditions.

Camera Setting		Environment	
Parameter	Setting	Parameter	Setting
Gain Up	0 dB	Light Source	Light Box (White)
AGC	Off	Color temperature	5,100K
White Balance	Optimum	Lens	
Electrical Shutter	1/30 seconds	F on Lens	F5.6
Black Level	Optimum	Target Luminance	IM-600 (Topcon)
Gamma	Factory Setting		

(*2) The camera operates with external power when power suppling by external power supply and PoE to camera at same time.

OMRON

5.2   Spectral Sensitivity Characteristics

5.2.1   STC-MBS881POE
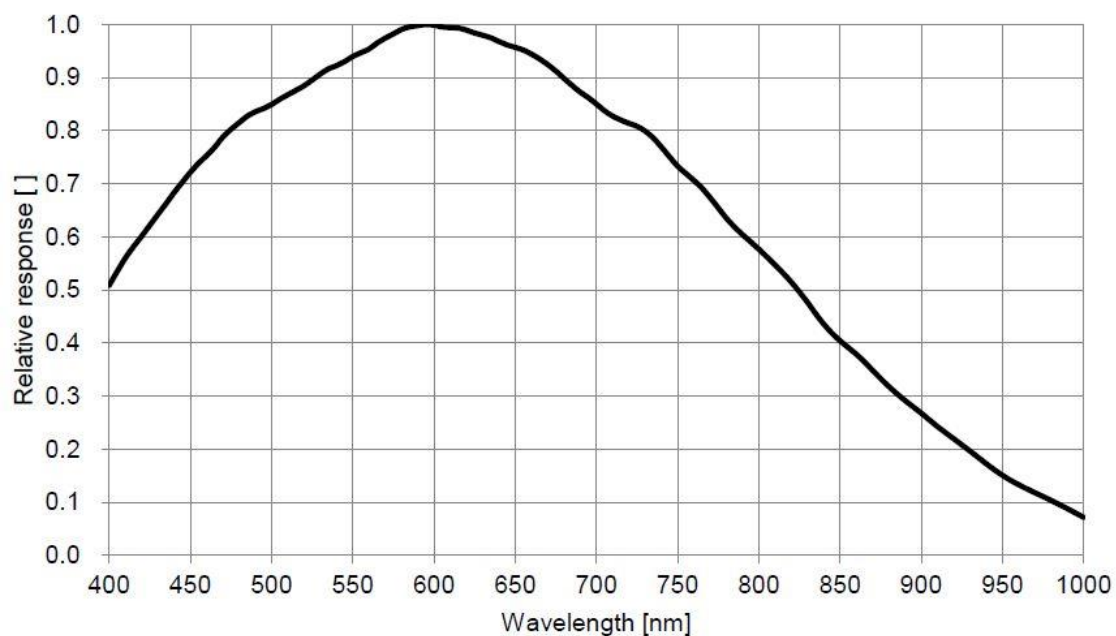
5.2.2   STC-MCS881POE (without IR Cut Filter)

OMRON
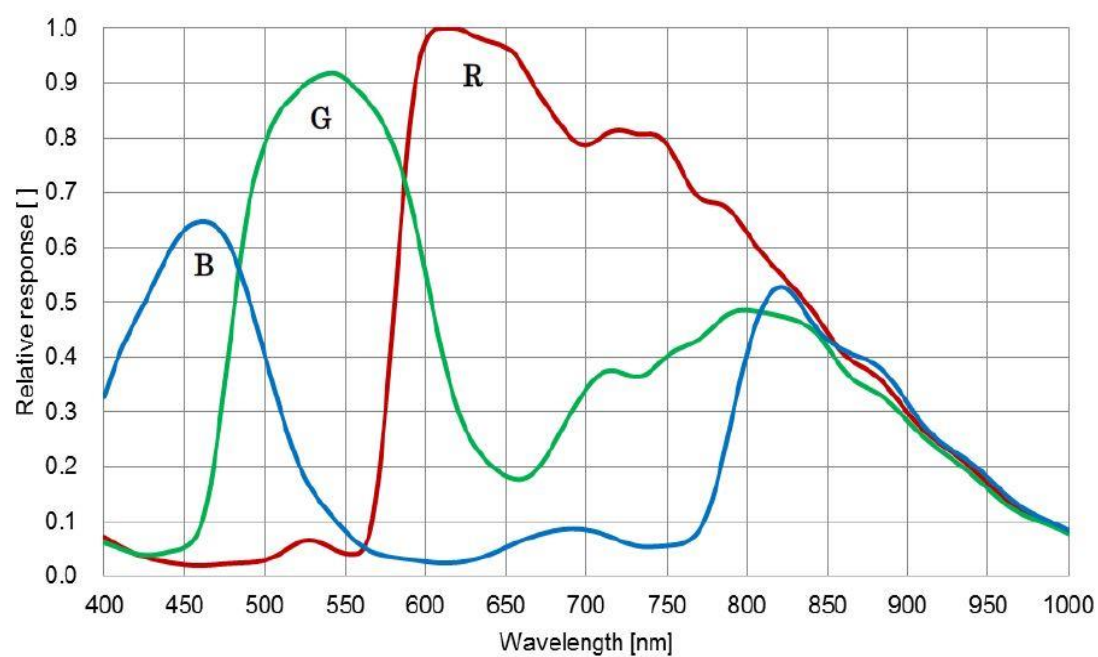
5.2.3 IR Cut Filter (STC-MCS881POE)
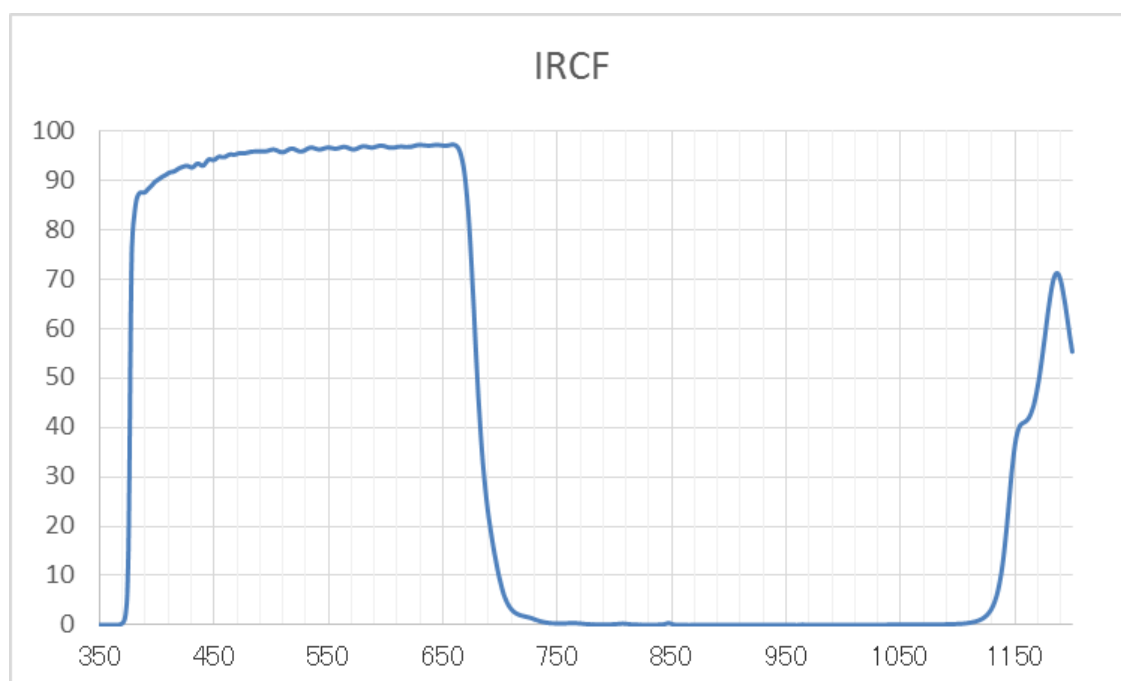
5.3 Mechanical Specifications

Model Number	STC-MBS881POE	STC-MCS881POE
Dimensions	40 (W) x 30 (H) x 54.5 (D) mm (*1)	
Optical Filter	No Optical Filter	IR Cut Filter
Optical Center Accuracy	Positional accuracy in Horizontal and Vertical directions: +/- 0.5 mm Rotational accuracy of Horizontal and Vertical: +/- 1.5 deg.	
Material	Aluminum Alloy (AC)	
Lens Mount	C mount	
Interface Connectors	Ethernet connector: RJ45 connector Power- I/O connector: HR10A-7R-6PB (Hirose) or equivalent	
Camera Mounting	Eight M4 screw holes (Four on top and bottom plates)	
Weight	Approximately 100 g	

(*1) Excluding the connectors

OMRON

5.4 Environmental Specifications

Model Number		STC-MBS881POE	STC-MCS881POE
Operational Temperature / Humidity	Minimum	Environmental Temperature: 0 deg. C, Environmental Humidity: 0 to 85 %RH (No condensation)	
	Maximum	Environmental Temperature: +40 deg. C or Camera housing temperature (top plate) shall not exceed +63 deg. C (*1) Environmental Humidity: 0 to 85 %RH (No condensation)	
Storage Temperature / Humidity		Environmental Temperature: -20 to +70 deg. C, Environmental Humidity: 0 to 85 %RH (No condensation)	
Vibration		20 Hz to 200 Hz to 20 Hz (5 min. / cycle), acceleration 10 G, XYZ 3 directions, 30 min. each	
Shock		Acceleration 38 G, half amplitude 6 ms, XYZ 3 directions, 3 times each	
Standard Compliancy		EMS: EN61000-6-2, EMI: EN55011	
RoHS		RoHS Compliance	

(*1) Please insure the camera is installed with the appropriate heat dissipation. If camera has a mounted lens and a tripod with an aluminum plate, this could decrease the camera housing temperature for heat dissipation. When the internal temperature sensor on the camera shows less than 75 deg. C, the camera housing temperature (top plate) will be less than 63 deg. C.

Taking these steps will maintain the heat rating of the electronic components of the camera.

Upper side of camera

Measuring point

OMRON
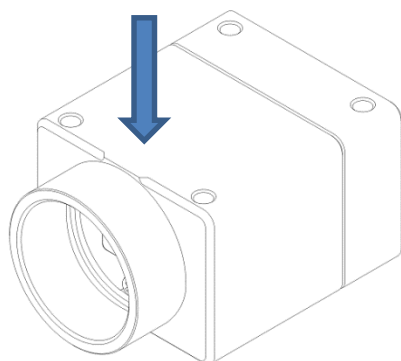
6   Connector Specifications

Power-I/O Connector →
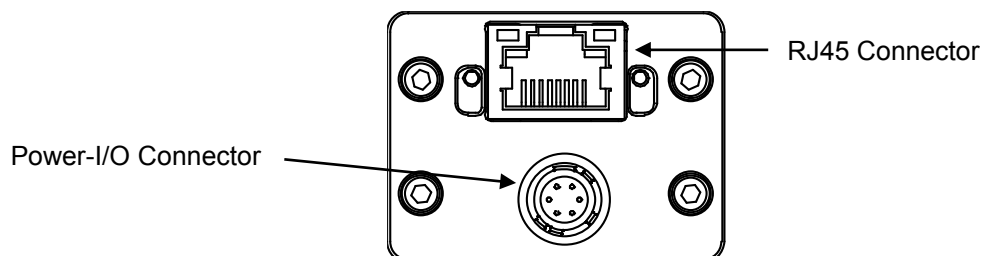
RJ45 Connector

6.1   RJ45 Connector

This product is PoE compliant.
Please supply power (+10.8 to +26.4 Vdc) through the power-I/O connector when using non-PoE-compliant NIC.

Pin Assignment

LED

Pin No.	Signal Name
1	TA+
2	TA-
3	TB+
4	TC+
5	TC-
6	TB-
7	TD+
8	TD-

Green LED	Yellow LED	Status
Green Light ON	Yellow Light OFF	Power ON (1GB NIC)
Green Light OFF	Yellow Light OFF	Power ON (100MB NIC)
Green Light ON	Yellow Light Blinking	1 GB Transferring
Green Light OFF	Yellow Light Blinking	100 MB Transferring

Yellow LED   Green LED
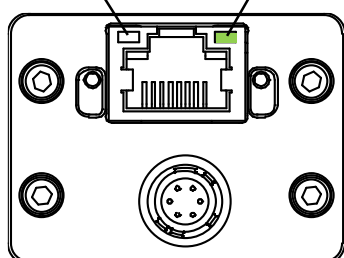
Camera is powered-on
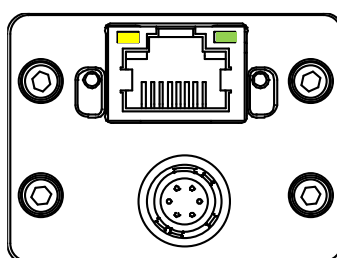
Green light: ON
Yellow light: Blinking
1 GB Transferring
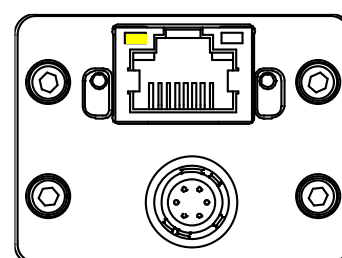
Green light: OFF
Yellow light: Blinking
100 MB Transferring

Please use a 1GB supported NIC, Network Switcher and Ethernet cable.
Check the setting of NIC and Network Switcher being used is "1GB transferring".

OMRON

6.2 Power and Control Signal Connector

HR10A-7R-6PB (Hirose) or equivalent
This connector is for the power supply and input / output signals.
The power from this connector is priority power for camera when power supplies through this connector and PoE at same time.
Please use HR10A-7P-6S (Hirose) or equivalent for cable.

Pin assignment

Pin No.	Signal Name	IN / OUT	Voltage
1	POWER IN	IN	+10.8 to +26.4 Vdc
2	Opto-isolated in (Line0)	IN	Low: Smaller than +1.0 V High: +3.0 to +26.4 V * Potential difference between TRG_in and Opt. Isolated Common
3	Open Collector GPIO (Line2)	IN / OUT	+3.0 to +26.4 V / Open Collector
4	Opto-isolated out (Line1)	OUT	Open Collector
5	Opto-isolated Common	IN	
6	GND	IN	0 V
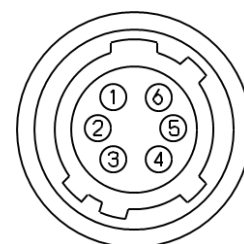
Configuration of Line2 (Pin No.3) and Line1 (Pin No.4)
Output signal can be assign by GenICam command.

.

GenICam
1) Frame Trigger Wait (Default for all output)
2) Frame Trigger Internal
3) Exposure Active
4) Acquisition Trigger Wait
5) Acquisition Trigger Internal
6) Sensor Read Out
7) Debounced Line 0
8) Debounced Line 2
9) User Output 1
10) User Output 2
11) Timer 0 Active
12) Software Signal 0
13) Software Signal 1
14) Logic Block 0
15) Pulse Per Second

OMRON

1) Frame Trigger Wait

The condition of camera operation with trigger signal can be check.

"LOW" state of signal is out between "start exposing" to "image out".

2) Frame Trigger Internal

The input trigger signal with the trigger delay (camera internal process delay).

3) Exposure Active

While camera exposing, "HIGH" state of signal is out. The signal state will be "LOW" after finish exposing.

4) Acquisition Trigger Wait

While image transferring from camera to PC, "Low" state of signal is out. The signal state will be "High" after finish image transferring.

5) Acquisition Trigger Internal

The image transferring starts signal is out.

6) Sensor Read Out

FVAL (Frame valid, HIGH state) signal is out.

7) Debounced Line0

Debounced Line0 signal is out.

8) Debounced Line2

Debounced Line2 signal is out.

9) User Output 1 (User Output signal through Line 1)

Selected "HIGH" or "LOW" state of signal is out.

10) User Output 2 (User Output signal through Line 2)

Selected "HIGH" or "LOW" state of signal is out.

11) Timer 0 Active

Selected signal at "Timer Counter" is out.

When signal synchronizing with "Exposure Active" signal, signal can use for strobe control.

12) Software Signal 0

Selected signal for "Software Signal 0" at "Software Signal Control" is out.

13) Software Signal 1

Selected signal for "Software Signal 1" at "Software Signal Control" is out.

14) Logic Block 0

"Logic Block 0" signal is out.

15) Pulse Per Second

"Pulse / second" signal (50% Duty, 1 Hz interval) is out.

OMRON

6.2.1 Opto-isolated input

The camera has current limiting circuit on camera. The current limiting resistor does not necessary.
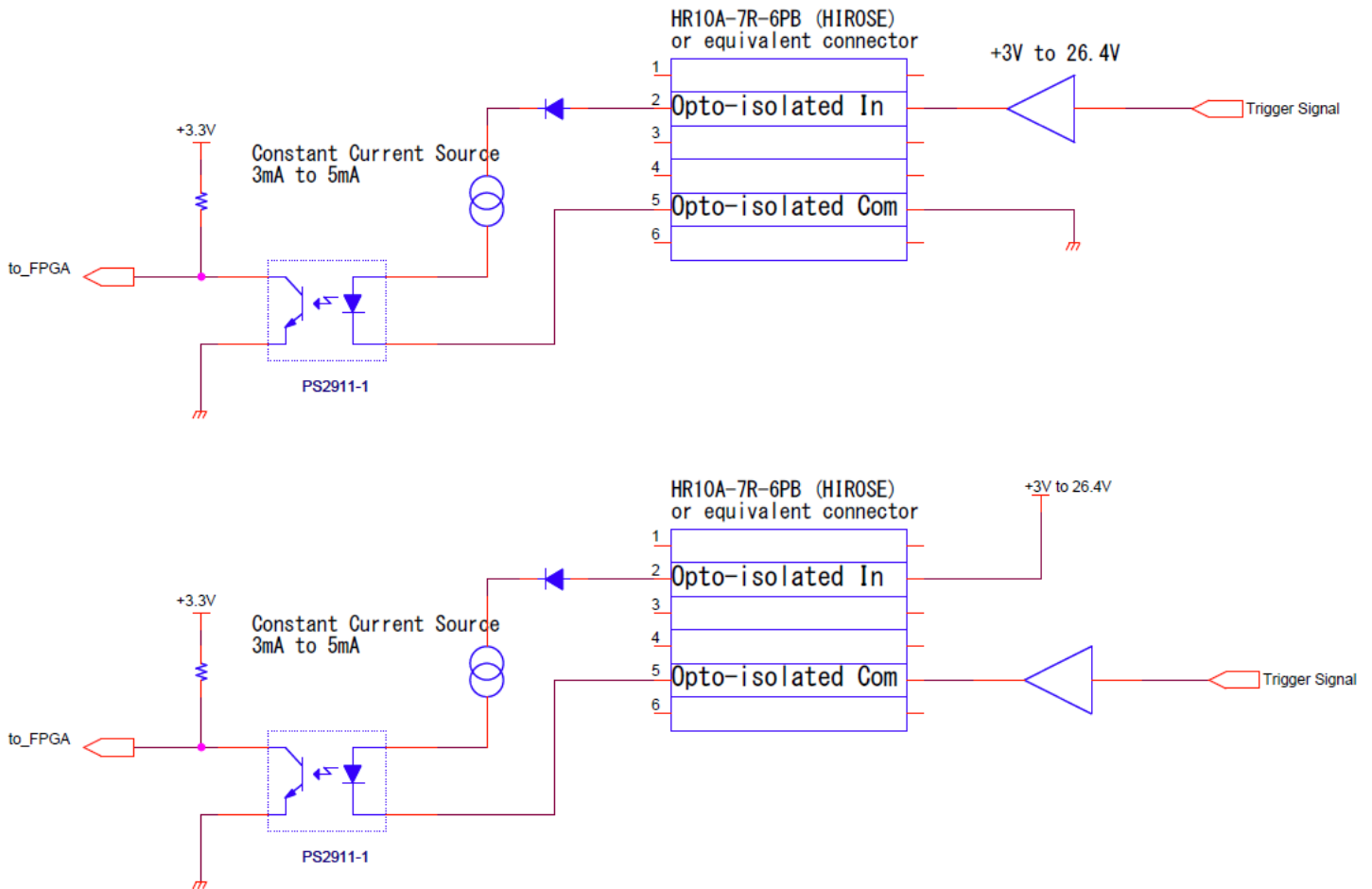
6.2.2 Opto-isolated output

It is necessary to have current limiting resistor at outside of camera, to keep less than 50 mA.

OMRON
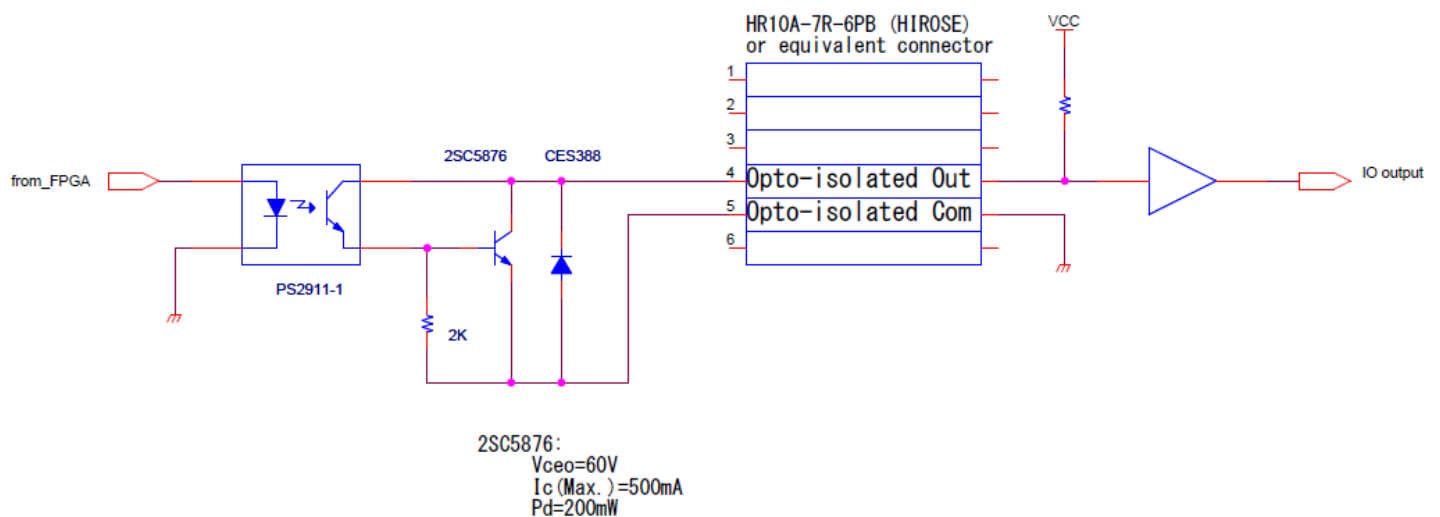
6.2.3 Open Collector GPIO

This GPIO can be used for input or output.

When using as output, it is necessary to have current limiting resistor at outside of camera, to keep current less than 50 mA.

When using as input, current limiting resistor does not necessary. However, camera does not have current limiting circuit on camera. The camera inside circuit may get damage if accidentally uses as output without current limiting resistor. For safety, please add current limiting resistor even use as input.

a) Open Collector GPIO uses as output

b) Open Collector GIPO uses as input

OMRON
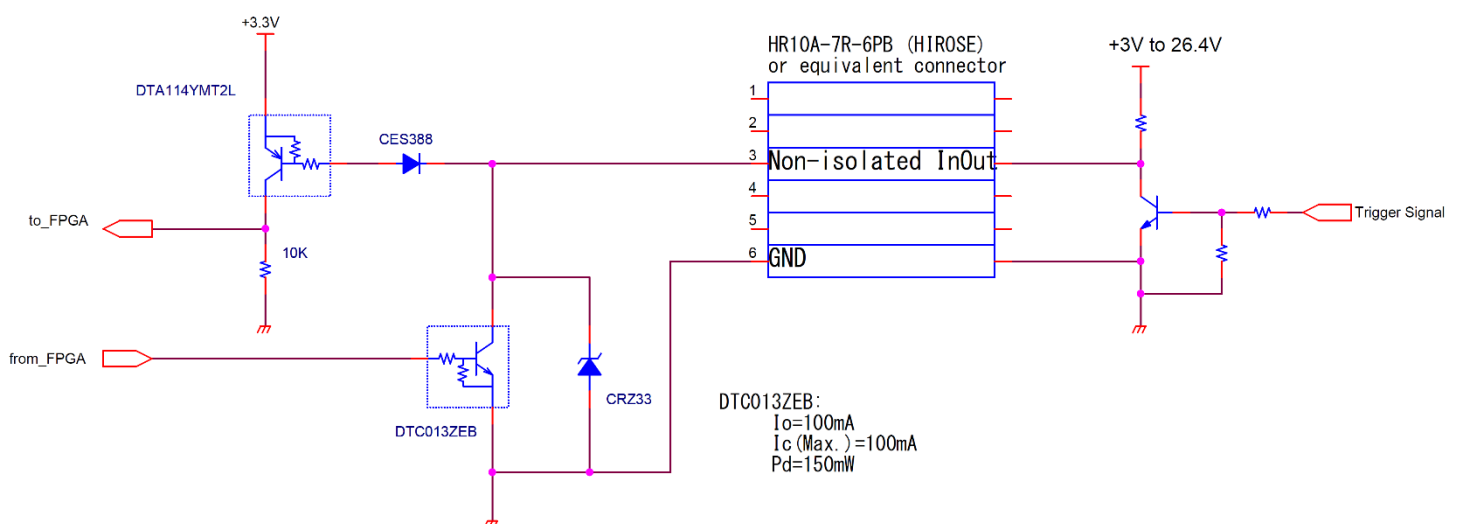
6.2.4 Input and Output Signal Timing (Hardware Trigger)
Case of "External Hardware Trigger", "Timed Exposure Mode" and "Positive Edge Trigger"
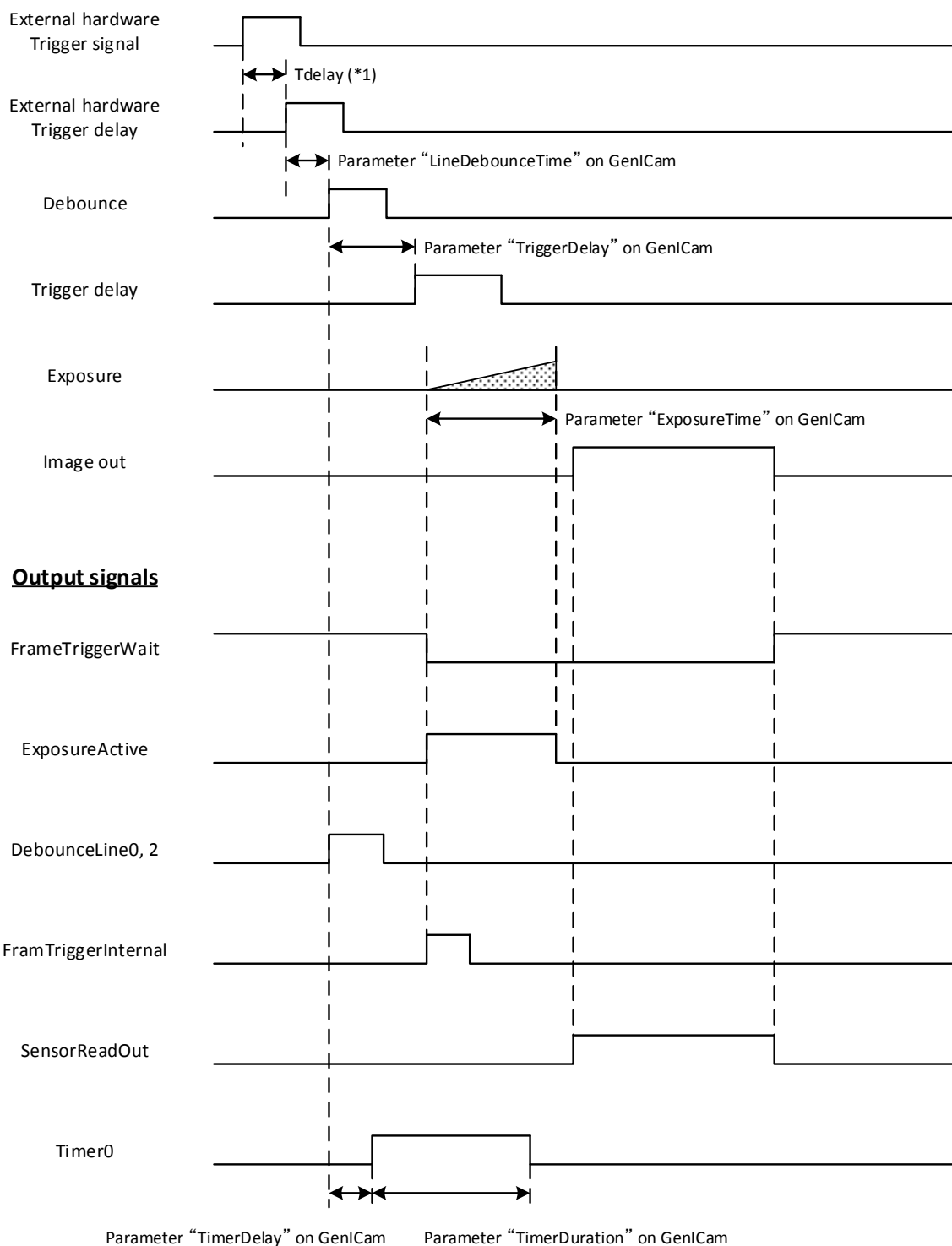
Camera internal processing

Output signals

External hardware Trigger signal

Tdelay (*1)

External hardware Trigger delay

Parameter "LineDebounceTime" on GenICam

Debounce

Parameter "TriggerDelay" on GenICam

Trigger delay

Exposure

Parameter "ExposureTime" on GenICam

Image out

FrameTriggerWait

ExposureActive

DebounceLine0, 2

FramTriggerInternal

SensorReadOut

Timer0

Parameter "TimerDelay" on GenICam   Parameter "TimerDuration" on GenICam

(*1) Please refers "5.2.6 External Hardware Trigger Input Delay" for more details about "External hardware trigger delay"

OMRON

6.2.5 Input and Output Signal Timing (Software Trigger)
Case of "Software Trigger", "Timed Exposure Mode" and "Positive Edge Trigger"

Camera internal processing

Software trigger

Trigger delay — Parameter "TriggerDelay" on GenICam

Exposure

Image out — Parameter "ExposureTime" on GenICam

Output signals

FrameTriggerWait

ExposureActive

FramTriggerInternal

SensorReadOut

Timer0

Parameter "TimerDelay" on GenICam   Parameter "TimerDuration" on GenICam

OMRON

6.2.6   External Hardware Trigger Input Delay
The input trigger signal has some delay inside camera by photo coupler or transistor.
Please refers example measurement of delay in below.

6.2.6.1 External Trigger Signal Delay (Positive polarity trigger signal)

External Trigger Signal

External Trigger Signal
with camera internal delay
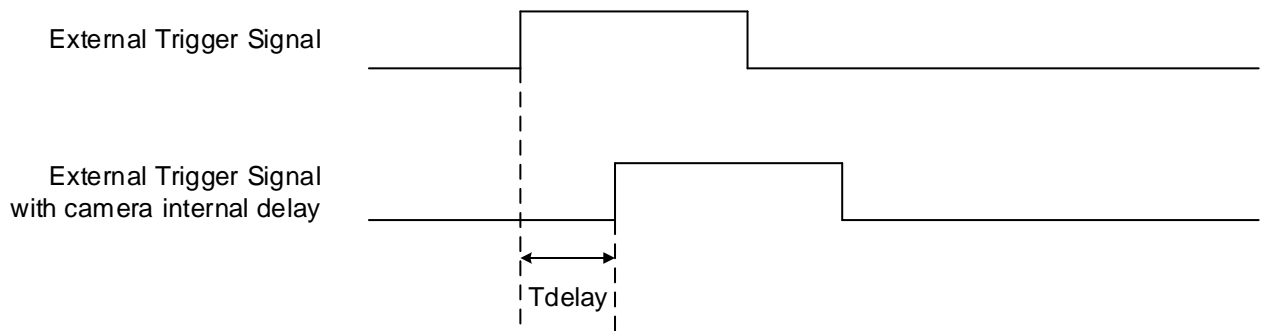
Tdelay

6.2.6.2 External Trigger Signal Delay (Negative polarity trigger signal)

External Trigger Signal

External Trigger Signal
with camera internal delay
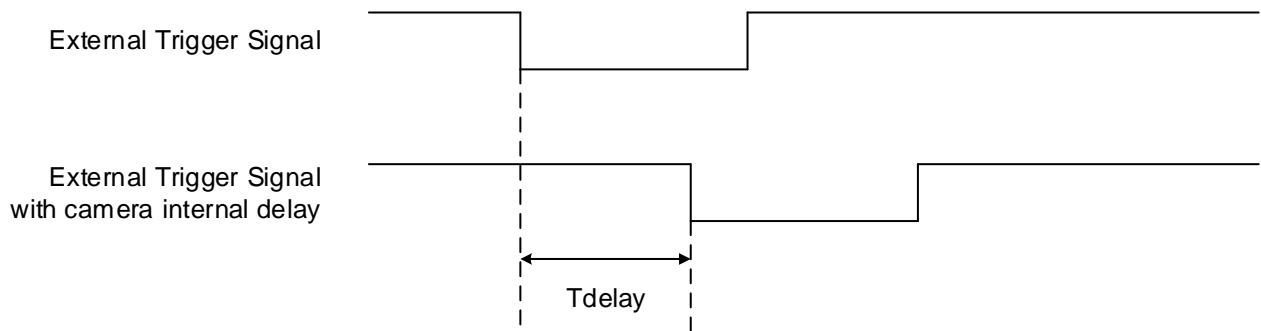
Tdelay

6.2.6.3 Measured External Trigger Signal Delay through Opt-Isolated Port (Line 0)

Measurement circuit

Positive polarity trigger signal

Pull-up voltage	Tdelay	Minimum active pulse duration
+3.3 V	8.2 μseconds	6 μseconds
+12 V	4.6 μseconds	3 μseconds
+24 V	4.4 μseconds	2 μseconds

Negative polarity trigger signal

Pull-up voltage	Tdelay	Minimum active pulse duration
+3.3 V	47 μseconds	6 μseconds
+12 V	53.2 μseconds	3 μseconds
+24 V	53.2 μseconds	2 μseconds

Note. Please use this measured delay as reference. The delay time may fluctuate depending on photo coupler variation, pull-up voltage and pull-up resister.

6.2.6.4 Measured External Trigger Signal Delay through Open Collector GPIO Port (Line 2)

Measurement circuit

Positive polarity trigger signal

Pull-up voltage	Tdelay	Minimum active pulse duration
+3.3 V	3.9 μseconds	6 μseconds
+12 V	3.8 μseconds	3 μseconds
+24 V	2.2 μseconds	2 μseconds

Negative polarity trigger signal

Pull-up voltage	Tdelay	Minimum active pulse duration
+3.3 V	0.6 μseconds	6 μseconds
+12 V	0.8 μseconds	3 μseconds
+24 V	0.8 μseconds	2 μseconds

Note. Please use this measured delay as reference. The delay time may fluctuate depending on transistor variation, pull-up voltage and pull-up resister.

OMRON

7   Dimensions

7.1   STC-MBS881POE
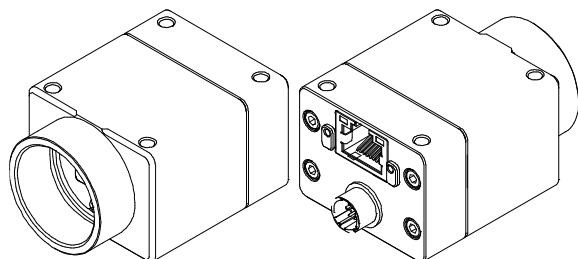
Top and bottom plates are same design
Right and left plates are same design

4-M4 depth4

30

14.5

50.5

40

30

54.5

1"-32UNF (C mount)

φ 29

43.5

Unit: mm

OMRON
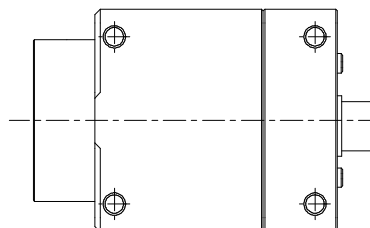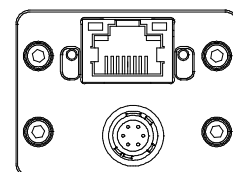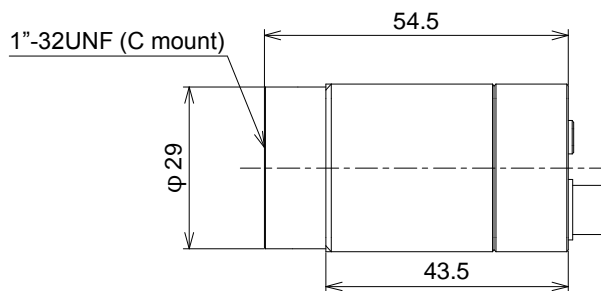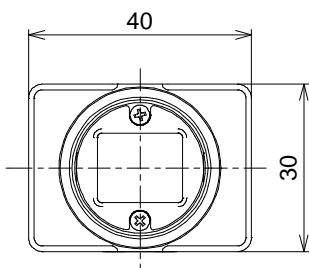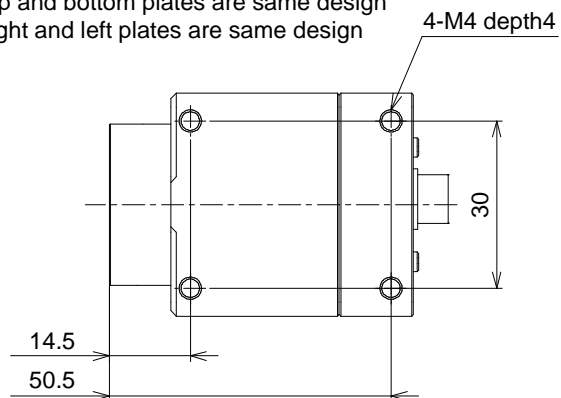
7.2   STC-MCS881POE

Top and bottom plates are same design
Right and left plates are same design

4-M4 depth4

30

14.5

50.5

40

30

1"-32UNF (C mount)

54.5

φ29

43.5

Unit: mm

OMRON
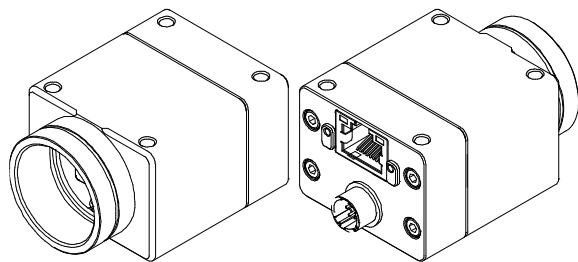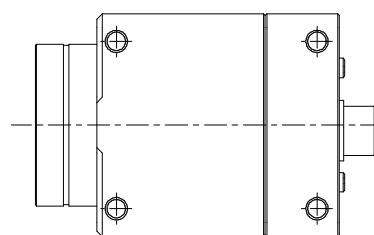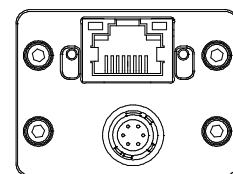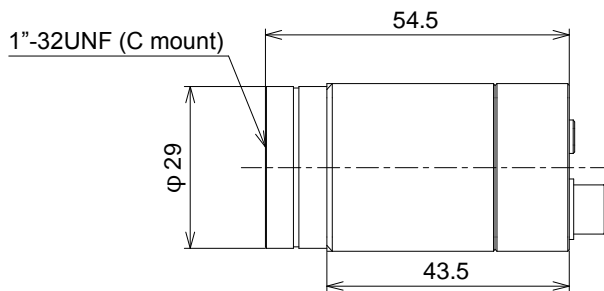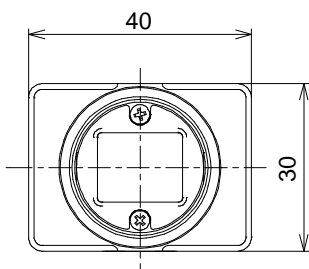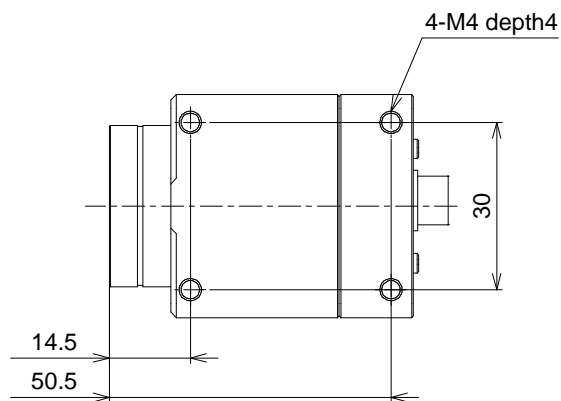
8 Sensor Information

8.1 Pixel Transferring Image

STC-MBS881POE (Monochrome)

Pixel1 of Data	Pixel2 of Data
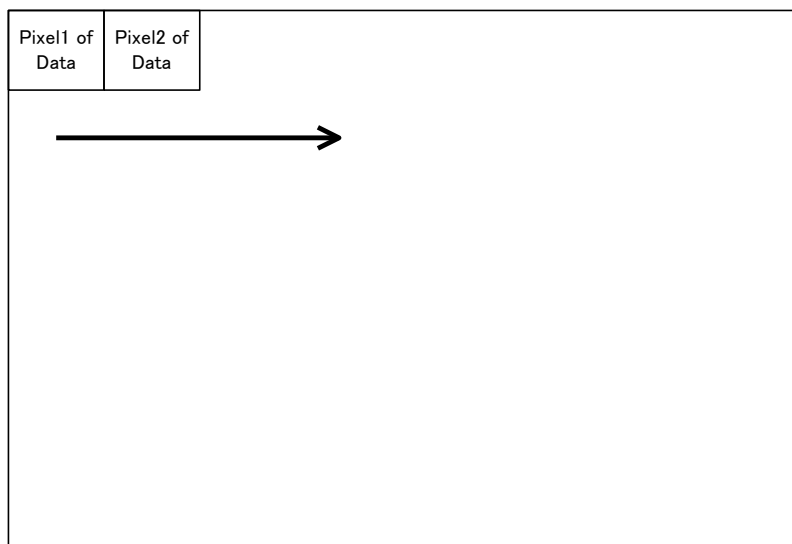
Pixel (m) of Data: mth pixel being transferred

STC-MCS881POE (Color)

Pixel 11 of Data	Pixel 21 of Data
Pixel 12 of Data	Pixel 22 of Data
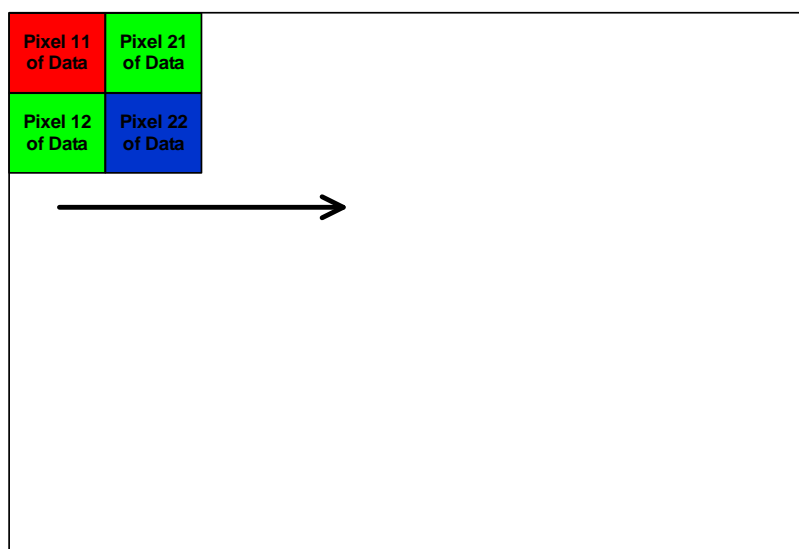
Pixel (m, n) of Data: mth pixel of nth line being transferred

OMRON

9   Camera Operational Modes

9.1   Normal Mode

Exposure
Time

Expose

Image out
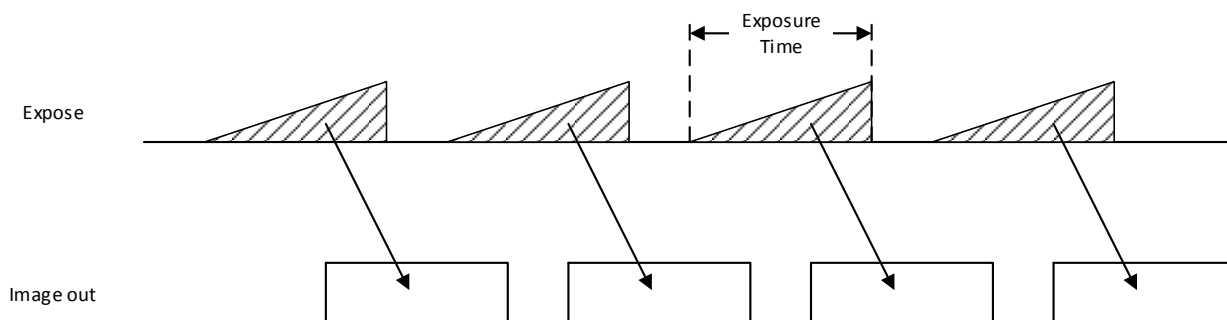
* The exposure time for each line is same.

OMRON

9.2　Pulse width trigger mode

In this trigger mode with positive polarity, the expose starts at rising edge of trigger signal and stops at falling edge of trigger signal. The expose period is high states of trigger signal.
In this trigger mode with negative polarity, the expose starts at falling edge of trigger signal and stops at rising edge of trigger signal. The expose period is low states of trigger signal.

9.2.1　Timing
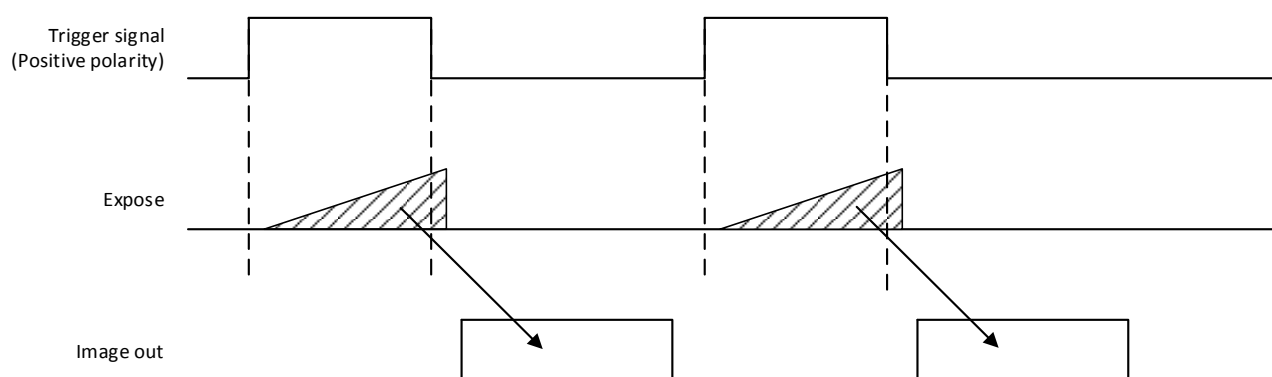
Note: The exposure time is active pulse duration of trigger signal.
　　　Please refers "Exposure Timing" for more details.

OMRON

9.2.2 Exposure Timing with Positive Polarity Trigger Signal

Pixel Format = RGB8: 1H = 28.678 μseconds
Pixel Format = Other: 1H = 57.374 μseconds

Note 1: The trigger signal will be removed by filtering if active pulse width of input trigger signal is less than "Line Debounce Time" setting time. Please input trigger signal has more than "Line Debounce Time" time active pulse width trigger signal.
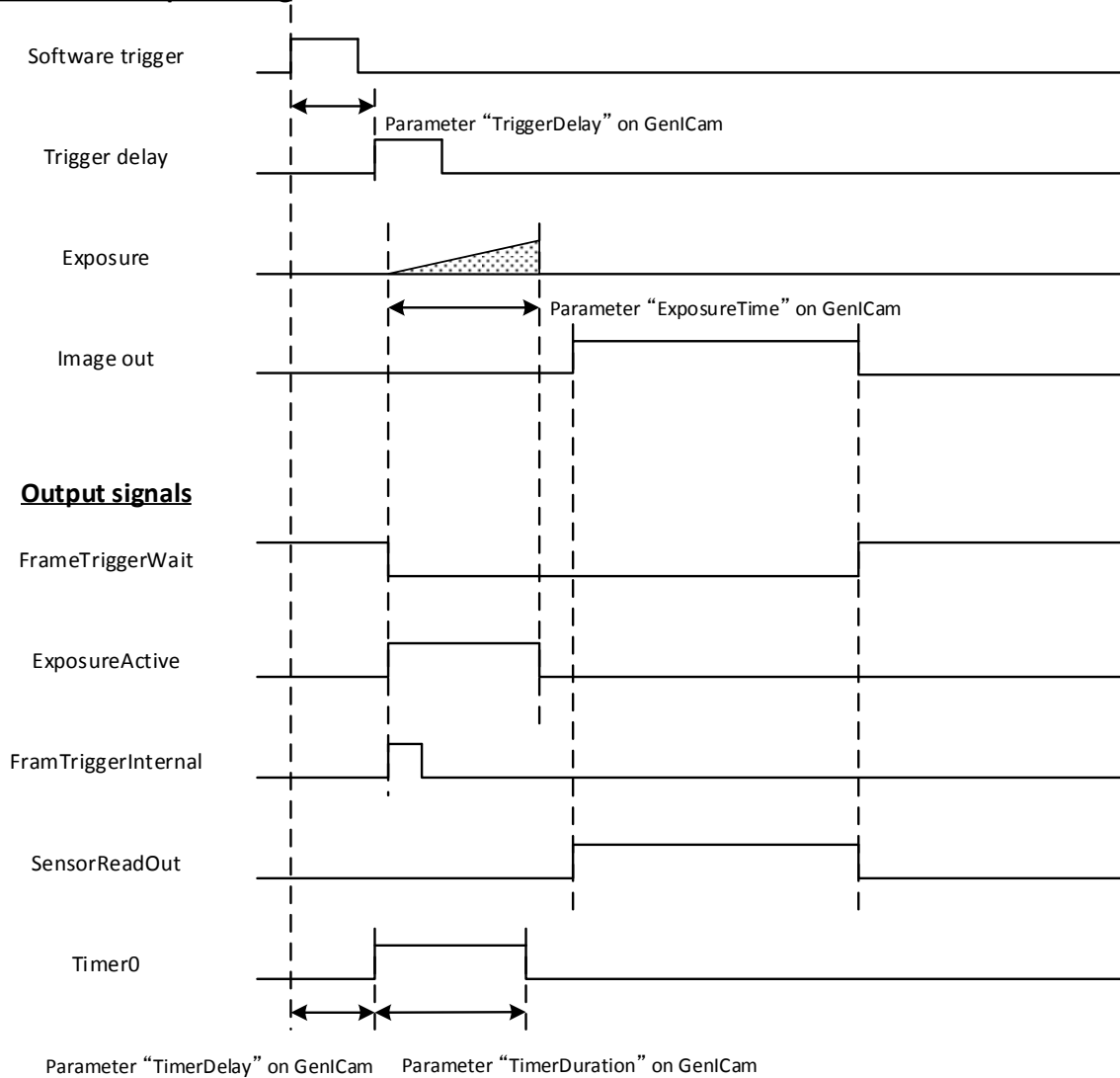
Note 2: Please refers "5.2.6 External Hardware Trigger Input Delay" for more details about "External hardware trigger delay".

Note 3: Please refers "5.2.6 External Hardware Trigger Input Delay" for shortest active pulse duration of trigger signal.

OMRON

9.2.3 Exposure Timing with Negative Polarity Trigger Signal

Pixel Format = RGB8: 1H = 28.678 µseconds
Pixel Format = Other: 1H = 57.374 µseconds

Note 1: The trigger signal will be removed by filtering if active pulse width of input trigger signal is less than "Line Debounce Time" setting time. Please input trigger signal has more than "Line Debounce Time" time active pulse width trigger signal.

Note 2: Please refers "5.2.6 External Hardware Trigger Input Delay" for more details about "External hardware trigger delay".

Note 3: Please refers "5.2.6 External Hardware Trigger Input Delay" for shortest active pulse duration of trigger signal.

OMRON

9.3 Edge Preset Trigger Mode

In this trigger mode with positive polarity, the expose starts at rising edge of trigger signal. The exposure duration time is based on preset exposure setting stored by camera setting communication.
In this trigger mode with negative polarity, the expose starts at falling edge of trigger signal. The exposure duration time is based on preset exposure setting stored by camera setting communication.

9.3.1 Timing
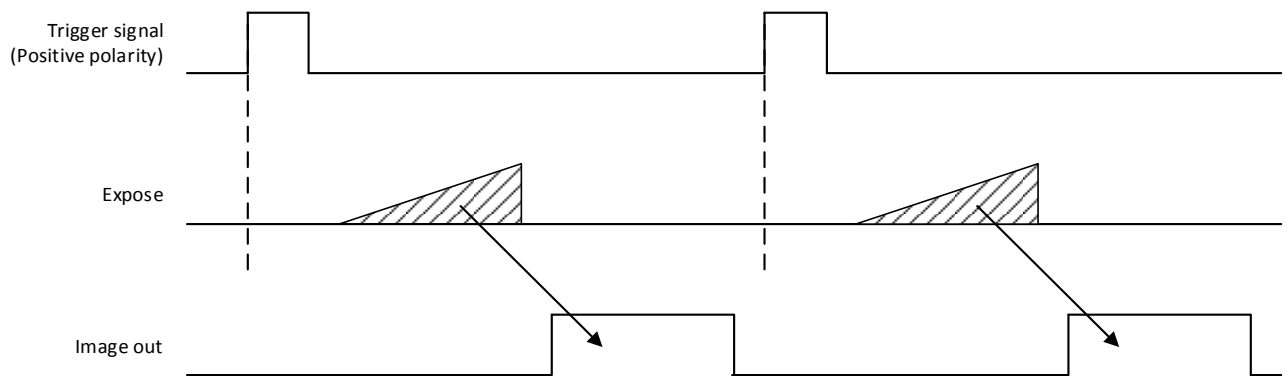
Note: The exposure time is "Exposure Time" on GenICam setting.

9.3.2 Exposure Timing with Positive Polarity Trigger Signal

Pixel Format = RGB8: 1H = 28.678 µseconds
Pixel Format = Other: 1H = 57.374 µseconds
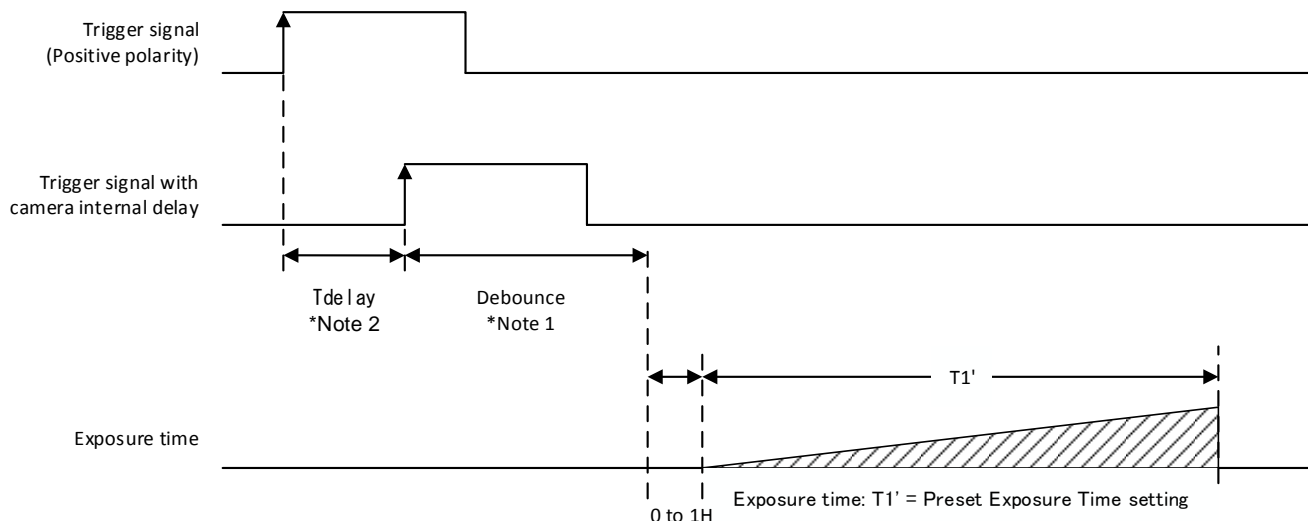
Note 1: The trigger signal will be removed by filtering if active pulse width of input trigger signal is less than "Line Debounce Time" setting time. Please input trigger signal has more than "Line Debounce Time" time active pulse width trigger signal.

Note 2: Please refers "5.2.6 External Hardware Trigger Input Delay" for more details about "External hardware trigger delay".

9.3.3 Exposure Timing with the Negative Polarity Trigger signal

Pixel Format = RGB8: 1H = 28.678 µseconds
Pixel Format = Other: 1H = 57.374 µseconds

Note 1: The trigger signal will be removed by filtering if active pulse width of input trigger signal is less than "Line Debounce Time" setting time. Please input trigger signal has more than "Line Debounce Time" time active pulse width trigger signal.

Note 2: Please refers "5.2.6 External Hardware Trigger Input Delay" for more details about "External hardware trigger delay".

OMRON

9.4 Edge Preset Trigger Mode (Trigger input while image is out)

In this trigger mode with positive polarity, the expose starts at rising edge of trigger signal. The exposure duration time is based on the preset exposure setting stored by camera setting communication.
In this trigger mode with negative polarity, the expose starts at falling edge of trigger signal. The exposure duration time is based on the preset exposure setting stored by camera setting communication.
However, if the trigger signal input while exposing with previous trigger signal or output image, trigger signal is disregard.

9.4.1 Timing

Note: The exposure time is "Exposure Time" on GenICam setting.

OMRON
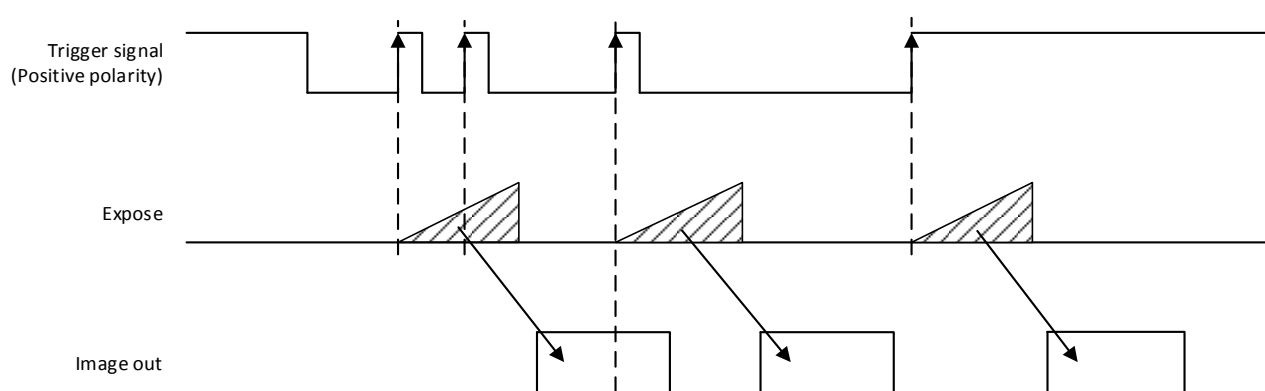
10 Camera Functions

10.1　Save and load the camera settings

The camera has the camera setting save function, and camera setting including factory default loads function.
The camera has below two type of camera settings.

Default: The factory default settings (This setting cannot change)
UserSet X: Over writeable camera settings (X: 0 to 7)

These camera settings load from ROM to register in RAM on camera, and camera settings at register in RAM on camera save to ROM.
The camera settings saving and loading are controllable with Parameters ("UserSetSelector", "UserSetDefault"), and commands ("UserSetLoad", "UserSetSave") in "UserSetControl" category of GenICam.

The details of the parameters and the functions are in the table below:

GenICam Parameters

UserSetSelector	IEnumeration Type	Select "Default" or "UserSet X" "UserSetLoad" or "User Set Save" process for selected settings.
UserSetLoad	ICommand Type	The camera settings load from ROM to register in RAM.
UserSetSave	ICommand Type	The camera settings at register in RAM save to ROM.
UserSetDefault	IEnumeration Type	Select which settings ("Default" or "UserSet X") load automatically when camera power is on. This selection saves automatically.

10.1.1 Saving Camera Settings
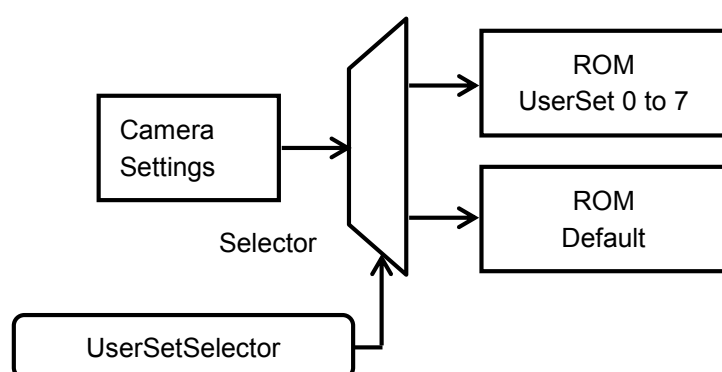
When executing "UserSetSave",
camera settings at the register in RAM are saved to the ROM that is selected at "UserSetSelector".
Caution:
"UserSetSave" CANNOT execute when "Default" was selected at "UserSetSelector"

Setting Procedure
1. Selects "UserSet X" at "UserSetSelector"
2. Execute "UserSetSave"

OMRON

10.1.2 Loading Camera Settings
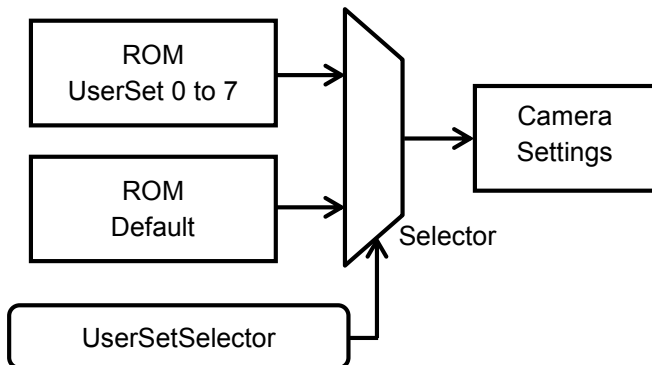
When executing "UserSetLoad",
camera settings load from selected ROM
that was selected at "UserSetSelector" to
register at RAM.

Setting Procedure
1.   Select "UserSet X" (or Default) at "UserSetSelector"
2.   Execute "UserSetLoad"

10.1.3 Loading Camera Settings when Camera Power is on
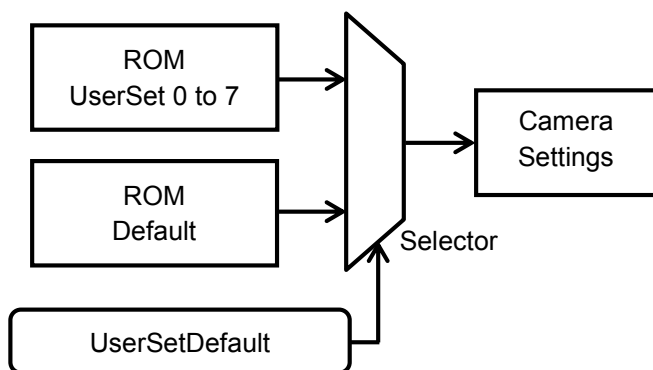
When the camera power is on,
camera settings load from selected ROM
that was selected at "UserSetDefault" to
register at RAM.

Setting Procedure
1.   Set "UserSet X" or "Default" at "UserSetDefault"

10.1.4 Camera Settings Initialization
Please follow the procedure in below for camera settings put back to factory default settings.

Setting Procedure
1.   Selects "Default" at "UserSetSelector".
2.   Executes "UserSetLoad".
3.   Select "UserSet X" at "UserSetSelector".
4.   Executes "UserSetSave".

OMRON

10.2 Frame rate

This parameter sets the frame rare (fps) of output image from camera.

GenICam Parameters

AcquisitionFrameRate	IFloat Type	Sets frame rate in Hz unit (*1)
		Range is changed with exposure time setting
		Default: 12.4407755

(*1) The approximate value of set value, sets to camera and display it.

10.3 Gain

The gain has Analog Gain, Digital Gain.

10.3.1 Analog Gain
This parameter sets analog gain.
Selects "AnalogAll" at "GainSelector", sets gain at "Gain".

GenICam Parameters

GainSelector	IEnumeration Type	Selects control gain
		AnalogAll: Analog Gain
Gain	IFloat Type	Analog Gain
		Range: 0 to 208
		Default: 0

Analog Gain Formula
Gain (dB) = "Gain" / 10

10.3.2 Digital Gain
This parameter sets digital gain.
Selects "DigitaAll" at "GainSelector", sets gain at "Gain".

GenICam Parameters

GainSelector	IEnumeration Type	Selects control gain
		DigitalAll: Digital Gain
DigitalGain	IFloat Type	Digital Gain
		Range: 0 to 255
		Default: 0

Digital Gain Formula
Gain (x times) = 1 + ("Digital Gain" / 128)

10.4 Exposure Time

This parameter sets variable exposure time.
The control method is selectable from
    Manual exposure control, which uses preset exposure time.
    Auto exposure control, which is maintain exposure time with brightness of target.

GenICam Parameters

ExposureMode	IEnumeration Type	Exposure control selection
		Selection: "Off" and "Timed"
		Off: Exposure time is "1 / Frame rate"
		Timed: Exposure time is "ExposureTime"
ExposureTime [ExposureTime Selector]	IFloat Type	Exposure time (in μsecond) (*1)
		Range: 1.000000 to 16,777,215.000000
		Default: 80,051.000000
ExposureAuto	IEnumeration Type	Auto exposure ON / OFF selection (*2)

(*1) The approximate value of set value, sets to camera and display it.
(*2) Please sets range of auto exposure control with "ExposureAutoLimitMin" and "ExposureAutoLimitMax" when using auto exposure control.

10.5 Black Level

This parameter sets the black level (clamp level for black signal).
Sets the black level at "Black Level".
The lower limit of signal is clamped at this setting level. The signal does not lower than this.

GenICam Parameters

BlackLevel	IFloat Type	Black Level
		Range:
		12bits output: 0 to 240
		10bits output: 0 to 60
		8bits output: 0 to 15
		Default: 0

OMRON

10.6 ALC (Auto Light Control)

ALC function has two control methods, which is AGC (Auto Gain Control) and auto shutter. The AGC and auto shutter can be set individually.

The camera parameters are adjusted to brightness of image is maintained with target brightness automatically with ALC function.

AGC or auto shutter have to set "On" to activate ALC function.

GenICam Parameters (for AGC and auto shutter)

AutoLuminanceTarget	IInteger Type	Target brightness Range: 0 to 255 Default: 128
AutoLuminanceRegion Selector	IEnumeration Type	ALC weight region to set area, position and weight Selection: Region 0 to Region 8
AutoLuminanceWidth	IInteger Type	Width for selected ALC weight region Range: 4 to 4,096 Default: 1,344 for all regions
AutoLuminanceHeight	IInteger Type	Height for selected ALC weight region Range: 2 to 2,160 Default: 696 for all regions
AutoLuminance OffsetX	IInteger Type	Horizontal offset for selected ALC weight region Range: 0 to 4,092 Default: 32 (Region 0, 3 and 6), 1,376 (Region 1, 4 and 7), 2,720 (Region 2, 5 and 8)
AutoLuminance OffsetY	IInteger Type	Vertical offset for selected ALC weight region Range: 0 to 2,158 Default: 36 (Region 0 to 2), 732 (Region 3 to 5), 1,428 (Region 6 to 8)
AutoLuminanceWeight	IInteger Type	Weight Range: 0 to 15 Default: 1 * Sets 10 on Region 4 only Sets the weight for each weight area.
AutoLuminancePeak	IInteger Type	Importance ratio for the brightness peak at ALC control. Range: 0 to 255 Default: 0

Target Brightness Formula (AutoLuminanceTarget)
12bits output: Target Brightness (Gradient) = "AutoLuminanceTarget" × 16
10bits output: Target Brightness (Gradient) = "AutoLuminanceTarget" × 4
 8bits output: Target Brightness (Gradient) = "AutoLuminanceTarget"

About the importance ratio for brightness peak at ALC control (AutoLuminancePeak)
When setting 0, Average: 100 %, Peak: 0 %. The ALC control with brightness average.
When setting 255, Average: 0 %, Peak: 100 %. The ALC control with brightness peak.
When setting 128, Average: 50 %, Peak: 50 %.

10.6.1   ALC control method
The ALC control with weight region 0 to 8.
The weight area setting parameters are in below:
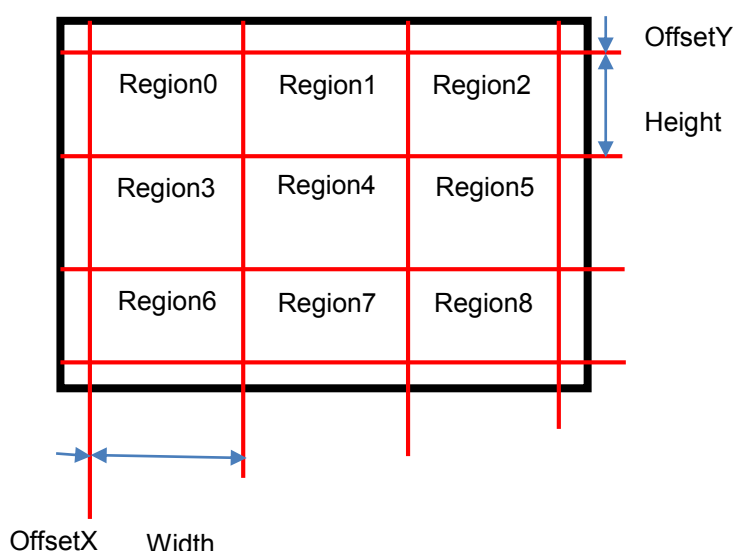
The brightness average and peak calculate for each weight area.
The target brightness comparison value calculates with "AutoLuminancePeak", the brightness average and peak then compare with target brightness to define necessary brightness control (to dark or to bright).
The brightness of image maintains to "AutoLuminanceTarget" with AGC and auto shutter functions.

If AGC and auto shutter are ON for ALC control, auto shutter function maintains brightness first. The AGC function maintains brightness if brightness cannot maintain to "AutoLuminanceTarget" with auto shutter.

OMRON

10.6.2 AGC (Auto Gain Contorl)

The brightness of image maintains to keep target brightness with gain automatically.

If the brightness of image is darker than target brightness, gain increases up to "GainAutoLimitMax".

If the brightness of image is brighter than target brightness, gain decreases.

GenICam Parameters

GainSelector	IEnumeration Type	Adjustable gain selection Selected gain can be adjusting by Gain[GainSelector]. Please select "AnalogAll" when AGC is turned on. Selection: "AnalogAll" (analog gain) and "DigitalAll" (digital gain) Default: "AnalogAll"
Gain[GainSelector]	IFloat Type	Gain Selected gain at "Gain Selector" is adjusting Analog gain: 　Range: 0 to 208 　Default: 0 Digital gain: 　Range: 0 to 255 　Default: 0 Analog gain cannot adjustable when AGC is turned on.
GainAuto [GainSelector]	IEnumeration Type	AGC ON / OFF selection Selection: "ON" (Continuous) and "OFF" (Off) Default: OFF
GainAutoLimitMin [GainSelector]	IFloat Type	Minimum gain for AGC Range: 0 to 208 Default: 0 This cannot be set greater than "GainAutoLimitMax"
GainAutoLimitMax [GainSelector]	IFloat Type	Maximum gain for AGC Range: 0 to 208 Default: 208 This cannot be set smaller than "GainAutoLimitMin"

10.6.3 Auto shutter

The brightness of image maintains to keep target brightness with shutter automatically.

If the brightness of image is darker than target brightness, exposure time extends up to "ExposureAutoLimitMax".

If the brightness of image is brighter than target brightness, exposure time becomes shorter up to "ExposureAutoLimitMin".

GenICam Parameters

ExposureAuto	IEnumeration Type	Auto shutter ON / OFF selection
		Selection: "ON" (Continuous), "OFF" (Off)
		Default: "OFF"
ExposureAutoLimitMin	IFloat Type	Minimum exposure time (in μsecond) for auto shutter
		Range: 1 to 16,777,215
		Default: 17
ExposureAutoLimitMax	IFloat Type	Maximum exposure time (in μsecond) for auto shutter
		Range: 1 to 16,777,215
		Default: 80,051

10.6.4 ALC settings procedure

ALC Settings Procedure
1. Sets "AutoLuminanceWidth", "AutoLuminanceHeight", "AutoLuminanceOffsetX", "AutoLuminanceOffsetY" and "AutoLuminanceWeight" for "AutoLuminanceRegion 0 to 8".
2. Sets "Continuous" for "GainAuto" when using AGC function.
3. Sets "GainAutoLimitMin" and "GainAutoLimitMax" when using AGC function.
4. Sets "Continuous" for "ExposureAuto" when using auto shutter function.
5. Sets "ExposureAutoLimitMin" and "ExposureAutoLimitMax" when using auto shutter function.
6. Sets "AutoLuminanceTarget".

OMRON

10.7 White balance (Only available for color camera)

The color compensates with gain adjustment each color.
The gain for each color has to adjust each color has same brightness when taking flat white target.
The white balance control methods are listed in below:
OFF
Auto white balance
Push to set white balance
Preset 0 to 2

10.7.1 White balance control methods

GenICam Parameters

BalanceRatioSelector	IEnumeration Type	White balance control target color selection
		Selection: "Red", "Green" and "Blue"
BalanceRatio	IFloat Type	Color gain setting for color selects at "BalanceRatioSelector"
		Range: 0 to 255
BalanceWhiteAuto	IEnumeration Type	White balance control method selection.
		Selection: "Off", "Once", "Continuous", "Preset 0", "Preset 1" and "Preset 2"
		Default: "Off"

10.7.2 White balance control method selection

OFF
The white balance with "BalanceRatio" setting for Red, Green and Blue.
If the white balance process is not necessary, please sets 0 for "BalanceRatio" for all colors.

White balance "OFF" setting procedure
1. Sets "Off" at "BalanceWhiteAuto".

Auto white balance
The optimized white balance gain calculates each frame for auto white balance.

Auto white balance setting procedure
1. Sets "Continuous" at "BalanceWhiteAuto".

Push to set white balance
The white balance gain adjusts once after select this white balance then set to "BalanceRatio" for all colors.
Sets "OFF" at "BalanceWhiteAuto" automatically after sets "BalanceRatio" for all colors.

Push to set white balance setting procedure
1. Sets the flat white target then acquires image.
2. Sets "Once" at "BalanceWhiteAuto".

OMRON

Preset white balance 0 to 2
  The camera has three preset manual white balances.

  Preset white balance setting procedure
  1. Selects "Preset0" to "Preset2" at "BalanceWhiteAuto".
  2. Selects adjusting color from Red, Green or Blue at "BalanceRatioSelector".
  3. Sets gain for selected adjusting color at "BalanceRatio".

  The settings can be save into camera with "UserSetControl" function.

OMRON

10.7.3 White balance calculate region setting

The size and position for white balance gain calculation region are changeable.

GenICam Parameters

BalanceWhiteAuto RegionSelector	IEnumeration Type	White balance gain calculation region selection Selection: Region 0
BalanceWhiteAuto Width	IInteger Type	Width (horizontal size, in pixel) for white balance gain calculation region Range: 1 to 4,096 Default: 4,096
BalanceWhiteAuto Height	IInteger Type	Height (vertical size, in line) for white balance gain calculation region Range: 1 to 2,160 Default: 2,160
BalanceWhiteAuto OffsetX	IInteger Type	Horizontal offset (in pixel) for region 0 Range: 0 to 4,095 Default: 0
BalanceWhiteAuto OffsetY	IInteger Type	Vertical offset (in line) for region 0 Range: 0 to 2,159 Default: 0

The white balance calculation region settings are like below:

OMRON
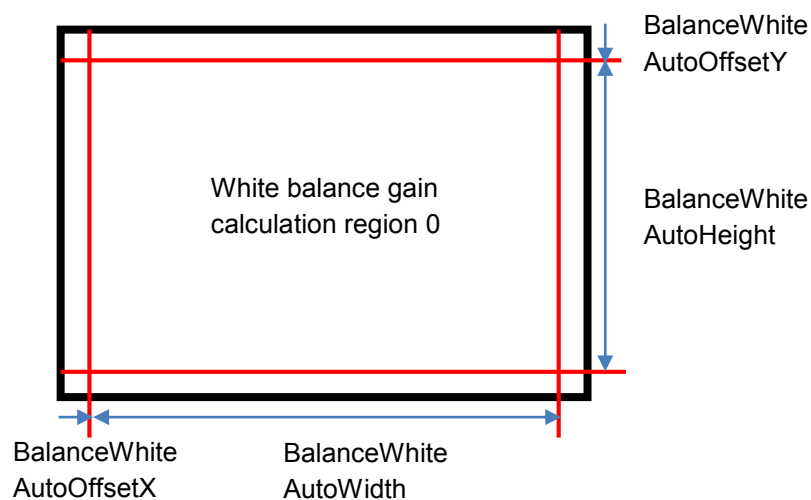
10.8 Gamma correction

The gamma correction is changeable.

GenICam Parameters

Gamma	IFloat Type	Gamma correction
		Range: 0 to 4.0
		Default: 1.0

10.9 ROI (Region of Interest)

The specified region of image can be output from camera with ROI function.

GenICam Paramters

Width	IInteger Type	Width (horizontal size) of output image (in pixel)
		Range: 264 to 4,096
		Default: 4,096
		Adjustable steps: 8
		("Width" + "OffsetX") should not exceeded maximum width.
Height	IInteger Type	Height (vertical size) of output image (in line)
		Range: 4 to 2,160
		Default: 2,160
		Adjustable steps: 4
		("Height" + "OffsetY") should not exceeded maximum height.
OffsetX	IInteger Type	Horizontal offset for output image (in pixel)
		Range: 0 to 3,832
		Default: 0
		Adjustable steps: 8
OffsetY	IInteger Type	Vertical offset for output image (in line)
		Range: 0 to 2,156
		Default: 0
		Adjustable steps: 4

The ROI region settings are below:

OMRON
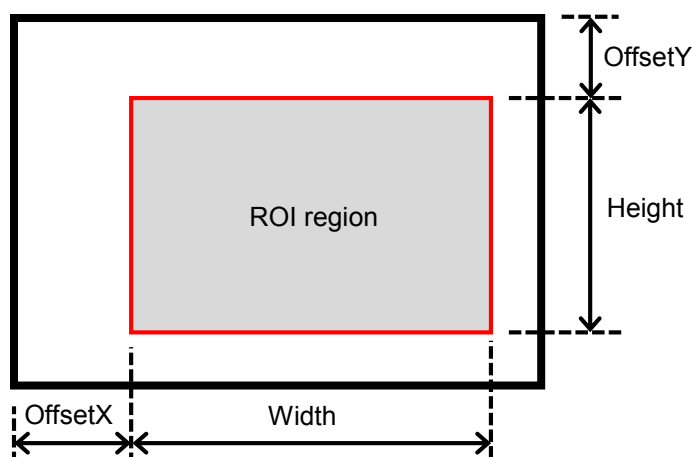
10.10 Pixel Format

The image format from camera can be set on PixelFormat.

GenICam Parameters

PixelFormat	IEnumeration Type	Pixel Format

The following chart shows the available Pixel Formats on camera:

Output Bits	Pixel Format		
	Monochrome Camera STC-MBS881POE	Color Camera STC-MCS881POE	
8bits	Mono8	Mono8	BayerRG8
10bits	Mono10	Mono10	BayerRG10
10bits Packed	Mono10Packed	Mono10Packed	BayerRG10Packed
12bits	Mono12	Mono12	BayerRG12
12bits Packed	Mono12Packed	Mono12Packed	BayerRG12Packed
8bits x 3	N/A	RGB8	

Each format specified on GenICam PFNC (Pixel Format Naming Convention).

10.11 Decimation

When using Decimation mode, the decimated image can be output.
The images below show decimated pixels (red squares) where they are output.

＜STC-MBS881POE＞   ＜STC-MCS881POE＞
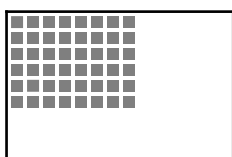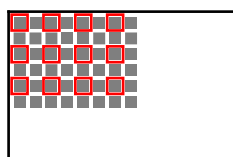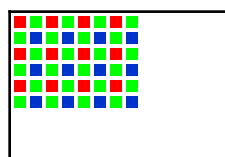
Decimation X（OFF）, Y（OFF）   Decimation X（ON）, Y（ON）   Decimation X（OFF）, Y（OFF）   Decimation X（ON）, Y（ON）
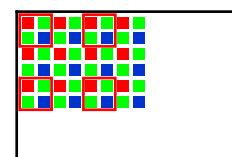
GenICam Parameter

DecimationHorizontal	IInteger Type	Sets decimation on horizontal direction
		Selection: 1: Disable Decimation, 2: Decimate one of two pixels
		Default: Disable Decimation
DecimationVertical	IInteger Type	Sets decimation on vertical direction
		Selection: 1: Disable Decimation, 2: Decimate one of two pixels
		Default: Disable Decimation

(*1) Decimation cannot change horizontal only or vertical only. Selection applies for horizontal and vertical.
(*2) It is necessary to change exposure time (to shorten exposure time), to increase frame rate when using Decimation.

OMRON

10.12　Trigger

The trigger type (trigger source) is selectable at "TriggerSource" under "AcquisitionControl".
The trigger type (trigger source) is listed in below table.

Software	Software trigger generates by "TriggerSoftware"
SoftwareSignal0	Software trigger generates by "SoftwareSignalControl"
SoftwareSignal1	Software trigger generates by "SoftwareSignalControl"
Action0	Action command trigger
Line0	Hardware trigger through "Line0"
Line2	Hardware trigger through "Line2"
LogicBlock0	Trigger generates by "LogicBlockControl"
	Please refers "Trigger signal processing procedure" for more details

10.12.1　Trigger signal processing procedure

The camera internal process for external hardware trigger signal or software trigger signal input is below:
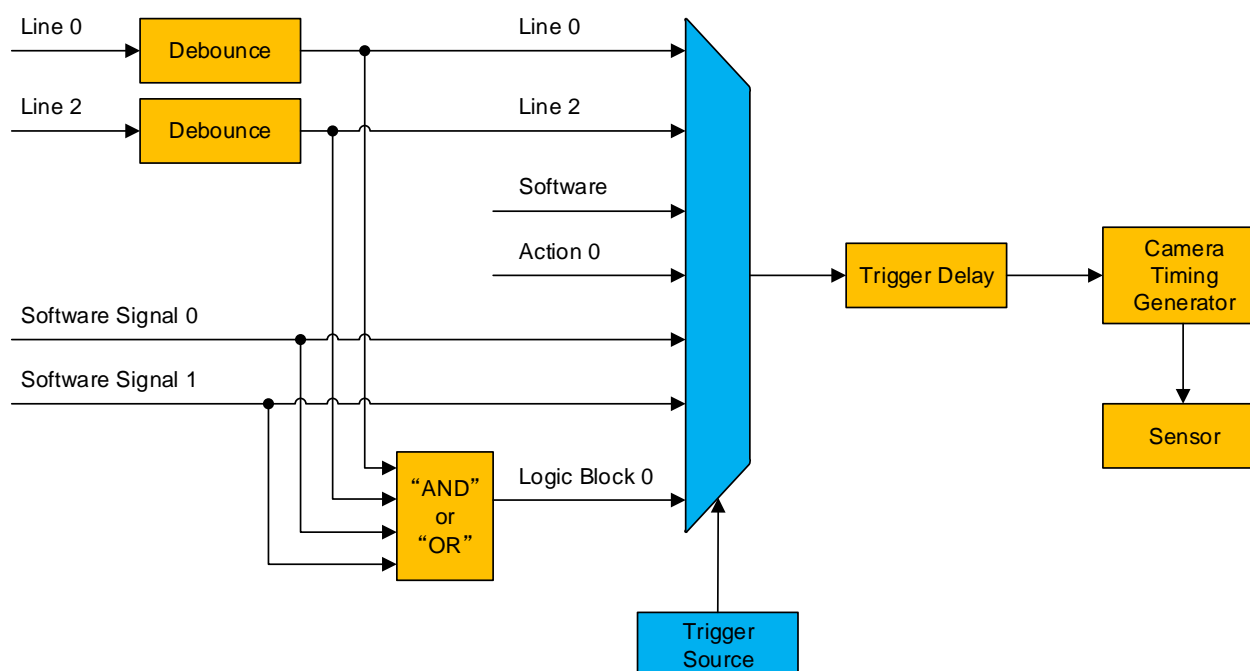
The trigger signal is selectable by GenICam commands.

TriggerSource: select trigger type

10.13 Image Flip

The horizontal flip image can be selected by "ReverseX".
The vertical flip image can be selected by "ReverseY".

GenICam Parameters

ReverseX	IBoolean Type	Horizontal flip image ON / OFF selection
		Selection: "False" (Horizontal flip is Off), "True" (Horizontal flip is On)
		Default: "False" (Horizontal flip is Off)
ReverseY	IBoolean Type	Vertical flip image ON / OFF selection
		Selection: "False" (Vertical flip is Off), "True" (Vertical flip is On)
		Default: "False" (Vertical flip is Off)

10.14 LUT Control

The output signal assigned table for input signal.

GenICam Parameters

LUTSelector	IEnumeration Type	Control LUT selection (Luminance is only selectable)
		Default: Luminance
LUTEnabled	IBoolean Type	LUT ON / OFF selection
LUTIndex	IInteger Type	Index for LUT
		Range: 0 to 4,095
LUTValue	IInteger Type	The output value for input value that specifies by index
		Range: 0 to 4,095
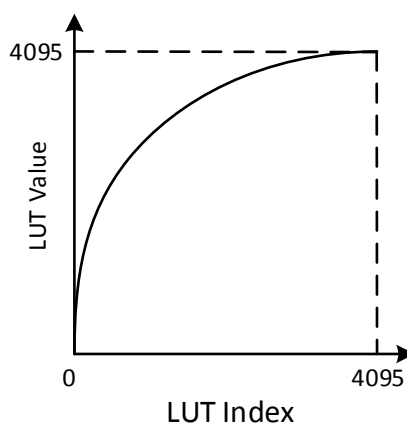
e.g. LUT usage (low brightness level enhancement)

OMRON

10.15 Flat Field Correction Function

Flat Flied Correction (FFC) function is correcting shading on image that caused by characteristics of lens (amount of through light difference at center and edge of lens) and characteristics of light (uneven brightness level).
This function is supported by StViewer in SentechSDK (v1.1.1 or later).
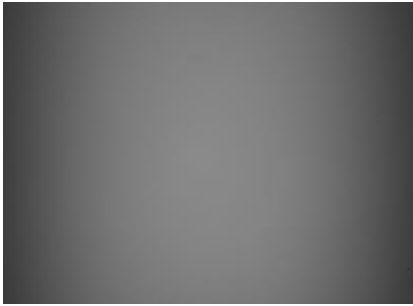
The shading on image is correcting by using FFC correcting value for each pixel of image.
FFC correcting value for FFC function is calculate by following methods.
・FFC correcting value calculates automatically by StViwer in SentechSDK (v1.1.1 or later)
・FFC correcting value calculates from image data of multiple images.

Please refers below procedure for FFC function used by StViewer in SentechSDK (v1.1.1)

GenICam Parameters

FFCEnable	IBoolean Type	FFC function ON / OFF selection Selection: "True" (On), "False" (Off) Default: False True: FFC applied image is acquired. False: None FFC applied image is acquired.
FFCIndex	IInteger Type	The index of area for FFC function Range: 0 to 8,900 0 128 8,772 8,900
FFCValue	IInteger Type	The FFC value for selected index area. Range: 0 to 1,023

OMRON

10.15.1　FFC function procedure

FFC function procedure
1. Selects "Start calculating FFC correction values" under "File" on menu at "StViewer".
2. The FFC correction values calculate automatically. The image stops while FFC correction values are calculating.
3. When FFC correcting values are calculated, sets "True" at "FFCEnable" automatically and FFC function applied image are acquired.
4. It is necessary to save FFC settings to memory on camera used by "UserSet Control". Please refers 10.1 Save and load the camera settings
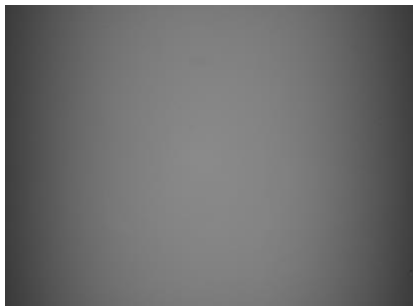
Image before FFC function

Image after apply FFC function

　* Note1: Please sets "OFF" for "Trigger mode" as free-run operation when using FFC function.
　* Note2: Please adjusts "Exposure Time" to acquiring "50%" brightness level of image when using FFC function.
　* Note3: Please uses FFC function again when changing lens or light source

OMRON

10.16 Defective pixel correction

The selected position of defective pixel is correcting with adjacent pixel information.
The selected position of defective pixel of color camera is correcting with adjacent same color of pixel information.

GenICam Parameters

PixelCorrectionAll	IBoolean Type	Defective pixel correction ON / OFF selection
		Selection: "True" (On), "False" (Off)
		Default: "True"
PixelCorrection Enabled	IBoolean Type	Defective pixel correction ON / OFF selection for selected index
		Selection: "True" (On), "False" (Off)
		Default: "False" (Off)
PixelCorrection Index	IInteger Type	Index for process defective pixel correction
		Range: 0 to 2,047
		Default: 0
PixelCorrectionX	IInteger Type	Horizontal position for selected index for process defective pixel correction
		Range: 0 to 4.095
		Default: 0
PixelCorrectionY	IInteger Type	Vertical position for selected index for process defective pixel correction
		Range: 0 to 2,159
		Default: 0

10.17   Counter And Timer Control

Controls "Timer" and "Counter".

A)   Timer Control

GenICam Parameters

TimerSelector	IEnumeration Type	Fixed as "Timer 0"
TimerDelay	IFloat Type	Delay for "Timer 0 active" signal (in μsecond) Range: 0 to 16,777,215 Default: 0
TimerDuration	IFloat Type	Duration of "Timer 0 active" signal (in μsecond) Range: 1 to 16,777,215 Default: 1
TimerTrigger Source	IEnumeration Type	Reference signal selection to generate "Timer 0 active" signal Default: "Off"
TimerTrigger Activation	IEnumeration Type	Polarity of reference signal to generate "Timer 0 active" signal Default: "RisingEdge"
TimerValue	IFloat Type	Returns value for "Timer 0 active" signal

When the timing of "Timer 0 active" signal is adjusting to active signal of Exposure, "Timer 0" can be used as strobe control signal.

B)   Counter Control

GenICam Parameters

CounterSelector	IEnumeration Type	Counter selection Default: "Counter 0"
CounterEvent Source	IEnumeration Type	Counter event source selection
CounterReset Source	IEnumeration Type	Reference signal selection to reset counter
CounterReset Activation	IEnumeration Type	Polarity of reference signal to reset counter
CounterReset	ICommand Type	Rest switch "Activate as switch when selecting "Software" at "CounterResetSource"
CounterValue	IInteger Type	Returns number of counter

OMRON

10.18 Event Control

The camera internal signal can be output as specified event information, like "exposure end", to PC used by GVCP (GigE Vision Control Protocol).

e.g. Event control
Notified "Exposure End"
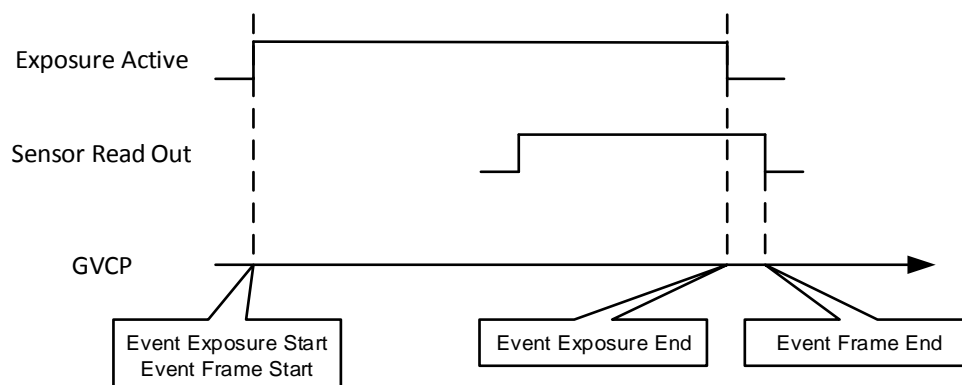
GenICam Parameters

Event Selector	IEnumeration Type	Event notification selection
		Selection: "Action Late", "Frame Trigger", "Exposure Start", "Exposure End",
		"Frame Start", "Frame End", "Block Discard",
		"Line 0 Input Rising Edge", "Line 0 Input Falling Edge",
		"Line 2 Input Rising Edge" and "Line 2 Input Falling Edge"
Event Notification	IEnumeration Type	Event notification ON / OFF selection
		On: Enable event notification
		Off: Disable event notification

OMRON

10.19   Chunk Control

This function is attached additional image information to image data.

For example, the exposure time and gain information do not include in image data itself. However, Chunk data transfers these parameters when image was acquiring.

GenICam Parameters

ChunkModeActive	IBoolean Type	Chunk control ON / OFF selection Default: "False" (Off)

ChunkSelector	IEnumeration Type	Transfer Chunk data selection
		Selection: "Image", "Offset X", "Offset Y", "Width", "Height", "Pixel Format",
		        "Gain", "Exposure Time", "Black Level", "Line Status All",
		        "Device Temperature", "Timer Value" and "Counter Value"

ChunkEnable	IBoolean Type	Enable Chunk data that was selected at "Chunk Selector" Selection: "True" (Enable Chunk data) and "False" (Disable Chunk data)

10.20   Action Control

The multiple cameras control by one action signal.

GenICam Parameters

ActionQueueSize	IInteger Type	Size of scheduled action command queue
ActionDeviceKey	IInteger Type	Control identifier of camera
ActionSelector	IInteger Type	Action command application selection Fixed as "0"
ActionGroupKey	IInteger Type	Action command applies camera * The camera executes action command when group key of action command and group key of camera is matched.
ActionGroupMask	IInteger Type	Select camera to apply action command Logical AND of Group Mask of camera and Group Mask of action command is 1 for any bit of 32bits, camera executes action command.

10.21 IEEE1588

Precision Time Protocol (PTP) is implemented on camera, is synchronized to "Master Clock" in same network automatically.
The camera supports IEEE 1588-2008 of PTP Version 2. The accuracy of time (Timestamp) synchronized is different based on network system configuration.

1) BMC (Best Master Clock) function
BMC function is implemented on camera. The most accurate clock in same network is defined as "Master Clock" then time (Timestamp) synchronizes. If there are more than two devices has most accurate clock in same network, clock of smallest MAC address device is defined as "Master Clock".

2) E2E (End-to-End) Transparent Clock
The camera supports E2E method. Time difference is correcting by blow algorithm
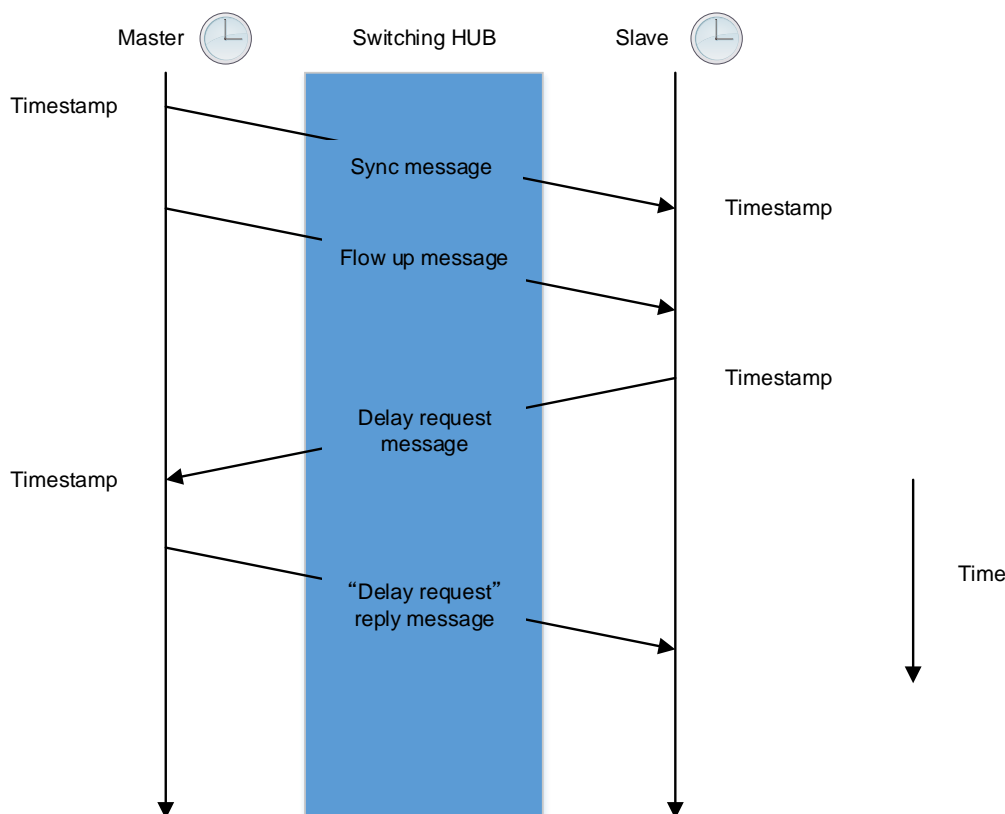
The master device and slave device exchange message included Timestamp.
Defined delay between master device and slave device by comparing these messages.
If time difference between master device and slave device is occurred, adjust internal clock of slave device to synchronize to master device.
Synchronize clock regularly to correcting time drift.

OMRON

3) How to use PTP
   Selects "True" at GevIEEE1588 then synchronize camera time to "Master Clock" (synchronize time is different depending on system). The camera is ready for action command after synchronize to "Master Clock".

4) Synchronized exposure for trigger mode
   When action command generating, action command is broadcasting to each camera and camera starts exposing.
   Synchronized exposure does not secure if action command does NOT include Timestamp. If action command includes Timestamp, action command will be scheduled automatically and each camera start exposing at same time.
   ActionControl setting is required when action command generating.
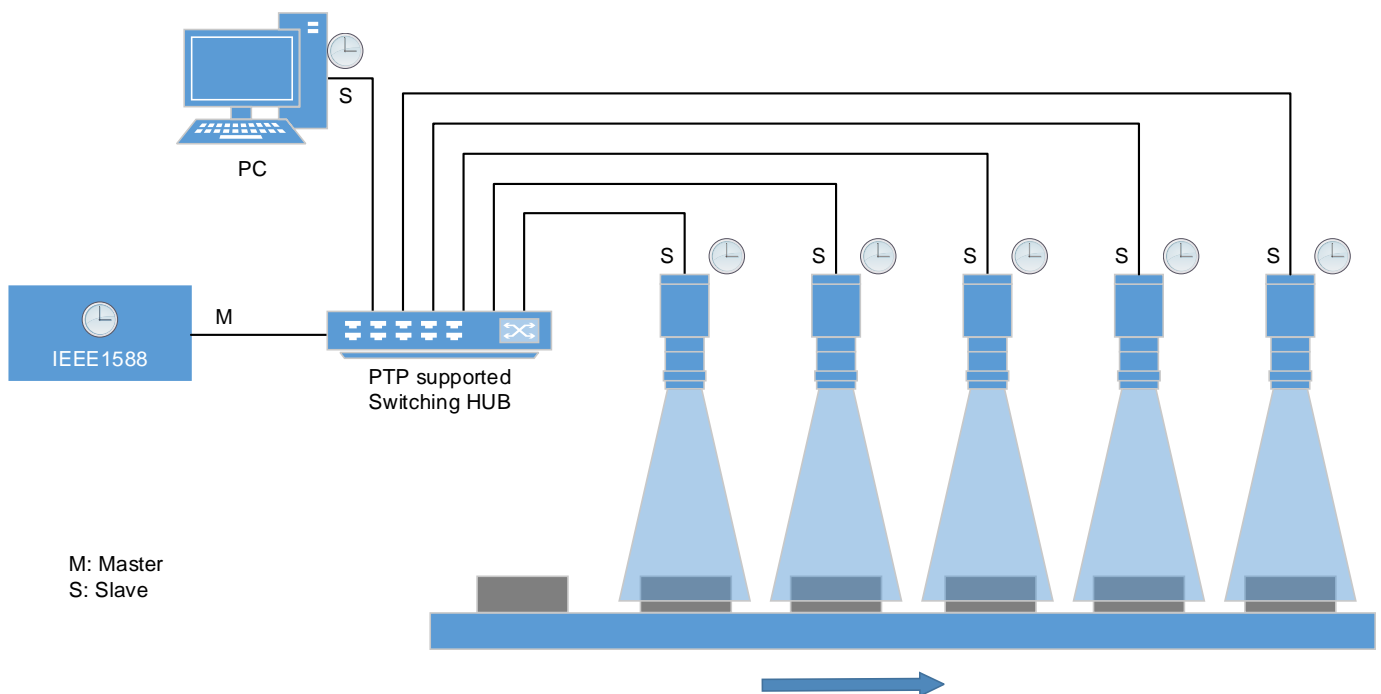
e.g. PTP configuration

11 GenICam command

11.1 DeviceControl

Name	Description
DeviceType	Returns the device type.
DeviceScanType	Scan type of the sensor of the device.
DeviceVendorName	Name of the manufacturer of the device.
DeviceModelName	Model of the device.
DeviceFamilyName	Identifier of the product family of the device.
DeviceManufacturerInfo	Manufacturer information about the device.
DeviceVersion	Version of the device.
DeviceHardwareVersion	Version of the hardware in the device.
DeviceFirmwareVersion	Version of the firmware in the device.
DeviceSerialNumber	Device's serial number.
DeviceUserID	User-programmable device identifier.
DeviceSFNCVersionMajor	Major version of the Standard Features Naming Convention that was used to create the device's GenICam XML.
DeviceSFNCVersionMinor	Minor version of the Standard Features Naming Convention that was used to create the device's GenICam XML.
DeviceSFNCVersionSubMinor	Sub minor version of Standard Features Naming Convention that was used to create the device's GenICam XML.
DeviceManifestEntrySelector	Selects the manifest entry to reference.
DeviceManifestXMLMajorVersion	Indicates the major version number of the GenICam XML file of the selected manifest entry.
DeviceManifestXMLMinorVersion	Indicates the minor version number of the GenICam XML file of the selected manifest entry.
DeviceManifestXMLSubMinorVersion	Indicates the sub minor version number of the GenICam XML file of the selected manifest entry.
DeviceManifestSchemaMajorVersion	Indicates the major version number of the schema file of the selected manifest entry.
DeviceManifestSchemaMinorVersion	Indicates the minor version number of the schema file of the selected manifest entry.
DeviceTLType	Transport Layer type of the device.
DeviceTLVersionMajor	Major version of the Transport Layer of the device.
DeviceTLVersionMinor	Minor version of the Transport Layer of the device.
DeviceTLVersionSubMinor	Sub minor version of the Transport Layer of the device.
DeviceMaxThroughput	Maximum bandwidth of the data that can be streamed out of the device.
DeviceLinkSelector	Selects which Link of the device to control.

OMRON

Name	Description
DeviceLinkSpeed [DeviceLinkSelector]	Indicates the speed of transmission negotiated on the specified Link.
DeviceLinkHeartbeatTimeout [DeviceLinkSelector]	Controls the current heartbeat timeout of the specific Link.
DeviceLinkCommandTimeout [DeviceLinkSelector]	Indicates the command timeout of the specified Link.
DeviceStreamChannelCount	Indicates the number of streaming channels supported by the device.
DeviceStreamChannelSelector	Selects the stream channel to control.
DeviceStreamChannelType [DeviceStreamChannelSelector]	Reports the type of the stream channel.
DeviceStreamChannelEndianness [DeviceStreamChannelSelector]	Endianness of multi-byte pixel data for this stream.
DeviceEventChannelCount	Indicates the number of event channels supported by the device.
DeviceCharacterSet	Character set used by the strings of the device's bootstrap registers.
DeviceReset	Resets the device to its power up state.
DeviceRegistersStreamingStart	Prepare the device for registers streaming without checking for consistency.
DeviceRegistersStreamingEnd	Announce the end of registers streaming.
DeviceRegistersEndianness	Endianness of the registers of the device.
DeviceTemperatureSelector	Selects the location within the device, where the temperature will be measured.
DeviceTemperature [DeviceTemperatureSelector]	Device temperature in degrees Celsius (C).
TimestampReset	Resets the current value of the device timestamp counter.
TimestampLatch	Latches the current timestamp counter into Timestamp Latch Value.
TimestampLatchValue	Returns the latched value of the timestamp counter.
DeviceUserMemory	Read / Write the user data from / to the non-volatile memory.

11.2   ImageFormatControl

Name	Description
SensorWidth	Effective width of the sensor in pixels.
SensorHeight	Effective height of the sensor in pixels.
SensorShutterMode	Sets the shutter mode of the device.
WidthMax	Maximum width of the image (in pixels).
HeightMax	Maximum height of the image (in pixels).
DecimationHorizontal	Horizontal sub-sampling of the image.
DecimationVertical	Vertical sub-sampling of the image.
RegionSelector	Selects the Region of interest to control.
RegionMode [RegionSelector]	Controls if the selected Region of interest is active and streaming.
Width [RegionSelector]	Width of the image provided by the device (in pixels).
Height [RegionSelector]	Height of the image provided by the device (in pixels).
OffsetX [RegionSelector]	Horizontal offset from the origin to the region of interest (in pixels).
OffsetY [RegionSelector]	Vertical offset from the origin to the region of interest (in pixels).
PixelFormat	Format of the pixels provided by the device.
PixelSize	Total size in bits of a pixel of the image.
PixelColorFilter	Type of color filter that is applied to the image.
ReverseX	Flip horizontally the image sent by the device.
ReverseY	Flip vertically the image sent by the device.
TestPatternGeneratorSelector	Selects which test pattern generator is controlled by the Test Pattern feature.
TestPattern [TestPatternGeneratorSelector]	Selects the type of test pattern that is generated by the device as image source.
TestPatternInputValue [TestPatternGeneratorSelector]	Test Pattern Input Value

OMRON

11.3   AcquisitionControl

Name	Description
AcquisitionMode	Sets the acquisition mode of the device.
AcquisitionStart	Starts the Acquisition of the device.
AcquisitionStop	Stops the Acquisition of the device at the end of the current Frame.
AcquisitionFrameCount	Number of frames to acquire in Multi Frame Acquisition mode.
AcquisitionFrameRate	Controls the acquisition rate (in Hertz) at which the frames are captured.
TriggerSelector	Selects the type of trigger to configure.
TriggerMode [TriggerSelector]	Controls if the selected trigger is active.
TriggerSoftware [TriggerSelector]	Generates an internal trigger.
TriggerSource [TriggerSelector]	Specifies the internal signal or physical input Line to use as the trigger source.
TriggerActivation [TriggerSelector]	Specifies the activation mode of the trigger.
TriggerDelay [TriggerSelector]	Specifies the delay in microseconds (us) to apply after the trigger reception before activating it.
ExposureMode	Sets the operation mode of the Exposure.
ExposureTimeSelector	Selects which exposure time is controlled by the Exposure Time feature.
ExposureTime [ExposureTimeSelector]	Sets the Exposure time when Exposure Mode is Timed and Exposure Auto is Off.
ExposureAuto	Sets the automatic exposure mode when Exposure Mode is Timed.
ExposureAutoLimitMin	Determine the lower limit of exposure time when Exposure Auto is set to Continuous.
ExposureAutoLimitMax	Determine the upper limit of exposure time when Exposure Auto is set to Continuous.

11.4 AnalogControl

Name	Description
GainSelector	Selects which Gain is controlled by the various Gain features.
Gain [GainSelector]	Controls the selected gain as an absolute physical value.
GainAuto [GainSelector]	Sets the automatic gain control (AGC) mode.
GainAutoLimitMin [GainSelector]	Determine the lower limit of gain when Gain Auto is set to Continuous.
GainAutoLimitMax [GainSelector]	Determine the upper limit of gain when Gain Auto is set to Continuous.
AutoLuminanceTarget	Target brightness for auto luminance control.
AutoLuminanceRegionSelector	Select the area for auto luminance control.
AutoLuminanceWidth [AutoLuminanceRegionSelector]	Determine width of targeted region for auto luminance control.
AutoLuminanceHeight [AutoLuminanceRegionSelector]	Determine height of targeted region for auto luminance control.
AutoLuminanceOffsetX [AutoLuminanceRegionSelector]	Determine X offset of targeted region for auto luminance control.
AutoLuminanceOffsetY [AutoLuminanceRegionSelector]	Determine Y offset of targeted region for auto luminance control.
AutoLuminanceWeight [AutoLuminanceRegionSelector]	Weight of the area determined by Auto Luminance Region Selector for auto luminance control.
AutoLuminancePeak	Ratio of peak and average for auto luminance control.
BlackLevelSelector	Selects which Black Level is controlled by the various Black Level features.
BlackLevel [BlackLevelSelector]	Controls the analog black level as an absolute physical value.
DigitalGainOffsetMode	Digital Gain Offset Mode is enabled.
BalanceRatioSelector	Selects which Balance ratio to control. (STC-MCS881POE)
BalanceRatio [BalanceRatioSelector]	Controls ratio of the selected color component to a reference color component. (STC-MCS881POE)
BalanceWhiteAuto	Controls the mode for automatic white balancing between the color channels. (STC-MCS881POE)
BalanceWhiteAutoRegionSelector	Select the area for auto white balance. (STC-MCS881POE)
BalanceWhiteAutoWidth [BalanceWhiteAutoRegionSelector]	Determine width of targeted region for auto white balance. (STC-MCS881POE)
BalanceWhiteAutoHeight [BalanceWhiteAutoRegionSelector]	Determine height of targeted region for auto white balance. (STC-MCS881POE)
BalanceWhiteAutoOffsetX [BalanceWhiteAutoRegionSelector]	Determine X offset of targeted region for auto white balance. (STC-MCS881POE)
BalanceWhiteAutoOffsetY [BalanceWhiteAutoRegionSelector]	Determine Y offset of targeted region for auto white balance. (STC-MCS881POE)
Gamma	Controls the gamma correction of pixel intensity.

OMRON

11.5   LUTControl

Name	Description
LUTSelector	Selects which LUT to control.
LUTEnable [LUTSelector]	Activates the selected LUT.
LUTIndex [LUTSelector]	Control the index (offset) of the coefficient to access in the selected LUT.
LUTValue [LUTSelector] [LUTIndex]	Returns the Value at entry LUT Index of the LUT selected by LUT Selector.
LUTValueAll [LUTSelector]	Accesses all the LUT coefficients in a single access without using individual LUT Index.
PixelCorrectionAllEnabled	Enable pixel correction for all pixels.
PixelCorrectionIndex	Determine index of targeted pixel for pixel correction.
PixelCorrectionEnabled [PixelCorrectionIndex]	Determine if targeted pixel is enabled for pixel correction.
PixelCorrectionX [PixelCorrectionIndex]	Determine x-coordinate of targeted pixel for pixel correction.
PixelCorrectionY [PixelCorrectionIndex]	Determine y-coordinate of targeted pixel for pixel correction.

11.6   Flat Field Correction Control

Name	Description
FFCSelector	Selects which Correction is controlled by the FFC features.
FFCType [FFCSelector]	Returns the FFC type.
FFCMeshWidth [FFCSelector]	Returns the Width of every mesh area for FFC table.
FFCMeshHeight [FFCSelector]	Returns the Height of every mesh area for FFC table.
FFCEnable [FFCSelector]	Activates the selected FFC.
FFCIndex [FFCSelector]	Control the index of the Value to access in the FFC table.
FFCValue [FFCSelector] [FFCIndex]	Returns the Value at entry FFC Index of the FFC table.
FFCValueAll [FFCSelector]	Accesses all the FFC table coefficients in a signal access without using individual FFC Index. This feature can only be accessed programmatically.

11.7　DigitalIOControl

Name	Description
LineSelector	Selects the physical line (or pin) of the external device connector or the virtual line of the Transport Layer to configure.
LineMode [LineSelector]	Controls if the physical Line is used to Input or Output a signal.
LineFormat [LineSelector]	Controls the current electrical format of the selected physical input or output Line.
LineSource [LineSelector]	Selects which internal acquisition or I/O source signal to output on the selected Line.
LineInverter [LineSelector]	Controls the inversion of the signal of the selected input or output Line.
LineDebounceTime [LineSelector]	Sets the value of the input line debouncer time.
LineStatus [LineSelector]	Returns the current status of the selected input or output Line.
LineStatusAll	Returns the current status of all available Line signals at time of polling in a single bitfield.
UseOutputSelector	Selects which bit of the User Output register will be set by User Output Value.
UseOutputValue [UseOutputSelector]	Sets the value of the bit selected by User Output Selector.

11.8　LogicBlockControl

Name	Description
LogicBlockSelector	Specifies the Logic Block to configure.
LogicBlockFunction [LogicBlockSelector]	Selects the combinational logic Function of the Logic Block to configure.
LogicBlockInputNumber [LogicBlockSelector]	Specifies the number of active signal inputs of the Logic Block.
LogicBlockInputSelector [LogicBlockSelector]	Selects the Logic Block's input to configure.
LogicBlockInputSource [LogicBlockSelector] [LogicBlockInputSelector]	Selects the source signal for the input into the Logic Block.
LogicBlockInputInverter [LogicBlockSelector] [LogicBlockInputSelector]	Selects if the selected Logic Block Input source signal is inverted.

11.9　SoftwareSignalControl

Name	Description
SoftwareSignalSelector	Selects which Software Signal features to control.
SoftwareSignalPulse [SoftwareSignalSelector]	Generates a pulse signal that can be used as a software trigger.

OMRON

11.10   CounterAndTimerControl

Name	Description
CounterSelector	Selects which Counter to configure.
CounterEventSource [CounterSelector]	Select the events that will be the source to increment the Counter.
CounterResetSource [CounterSelector]	Selects the signals that will be the source to reset the Counter.
CounterResetActivation [CounterSelector]	Selects the Activation mode of the Counter Reset Source signal.
CounterReset [CounterSelector]	Does a software reset of the selected Counter and starts it.
CounterValue [CounterSelector]	Reads or writes the current value of the selected Counter.
TimerSelector	Selects which Timer to configure.
TimerDuration [TimerSelector]	Sets the duration (in microseconds) of the Timer pulse.
TimerDelay [TimerSelector]	Sets the duration (in microseconds) of the delay to apply at the reception of a trigger before starting the Timer.
TimerTriggerSource [TimerSelector]	Selects the source of the trigger to start the Timer.
TimerTriggerActivation [TimerSelector]	Selects the activation mode of the trigger to start the Timer.
TimerValue [TimerSelector]	Reads or writes the current value (in microseconds) of the selected Timer.

OMRON

11.11　EventControl

Name	Description
EventSelector	Selects which Event to signal to the host application.
EventNotification [EventSelector]	Activate or deactivate the notification to the host application of the occurrence of the selected Event.
EventTestData	Category that contains all the data features related to the Event Test generated using the Test Event Generate command.
EventExposureStartData	Category that contains all the data features related to the Exposure Start Event.
EventExposure EndData	Category that contains all the data features related to the Exposure End Event.
EventFrameTriggerData	Category that contains all the data features related to the Frame Trigger Event.
EventFrameStartData	Category that contains all the data features related to the Frame Start Event.
EventFrameEndData	Category that contains all the data features related to the Frame End Event.
EventLine0RisingEdgeData	Category that contains all the data features related to the Line0 Rising Edge Event.
EventLine0FallingEdgeData	Category that contains all the data features related to the Line0 Falling Edge Event.
EventLine2RisingEdgeData	Category that contains all the data features related to the Line2 Rising Edge Event.
EventLine2FallingEdgeData	Category that contains all the data features related to the Line2 Falling Edge Event.
EventBlockDiscardData	Category that contains all the data features related to the Block Discard Event.
EventActionLateData	Category that contains all the data features related to the Action Late Event.

11.12　UserSetControl

Name	Description
UserSetSelector	Selects the feature User Set to load, save or configure.
UserSetLoad [UserSetSelector]	Loads the User Set specified by User Set Selector to the device and makes it active.
UseSetSave [UserSetSelector]	Save the User Set specified by User Set Selector to the non-volatile memory of the device.
UserSetDefault	Selects the feature User Set to load and make active by default when the device is reset.

OMRON

11.13 ChunkDataControl

Name	Description
ChunkModeActive	Activates the inclusion of Chunk data in the payload of the image.
ChunkSelector	Selects which Chunk to enable or control.
ChunkEnable [ChunkSelector]	Enables the inclusion of the selected Chunk data in the payload of the image.
ChunkCounterSelector	Selects which counter to retrieve data from.
ChunkCounterValue [ChunkCounterSelector]	Returns the value of the selected Chunk counter.
ChunkGainSelector	Selects which Gain to return.
ChunkGain [ChunkGainSelector]	Returns the gain used to capture the image.
ChunkBlackLevelSelector	Selects which Black Level to return.
ChunkBlackLevel [ChunkBlackLevelSelector]	Returns the black level used to capture the image included in the payload.
ChunkExposureTimeSelector	Selects which Exposure Time to return.
ChunkExposureTime [ChunExposureTimeSelector]	Returns the exposure time used to capture the image.
ChunkLineStatusAll	Returns the status of all the I/O lines at the time of the Frame Start internal event.
ChunkTimerSelector	Selects which timer to retrieve data from.
ChunkTimerValue [ChunkTimerSelector]	Returns the value of the selected Timer.
ChunkDeviceTemperature	Indicates the value of the temperature when the image was acquired.

11.14 ActionControl

Name	Description
ActionDeviceKey	Provides the device key that allows the device to check the validity of action commands.
ActionQueueSize	Indicates the size of the scheduled action commands queue.
ActionSelector	Selects to which Action Signal further Action settings apply.
ActionGroupMask [ActionSelector]	Provides the mask that the device will use to validate the action on reception of the action protocol message.
ActionGroupKey [ActionSelector]	Provides the key that the device will use to validate the action on reception of the action protocol message.

11.15 FileAccessControl

Name	Description
FileSelector	Selects the target file in the device.
FileOperationSelector [FileSelector]	Selects the target operation for the selected file in the device.
FileOperationExecute [FileSelector] [FileOperationSelector]	Executes the operation selected by File Operation Selector on the selected file.
FileOpenMode [FileSelector]	Selects the access mode in which a file is opened in the device.
FileAccessBuffer	Defines the intermediate access buffer that allows the exchange of data between the device file storage and the application.
FileAccessOffset [FileSelector] [FileOperationSelector]	Controls the Offset of the mapping between the device file storage and the File Access Buffer.
FileAccessLength [FileSelector] [FileOperationSelector]	Controls the Length of the mapping between the device file storage and the File Access Buffer
FileOperationStatus [FileSelector] [FileOperationSelector]	Represents the file operation execution status.
FileOperationResult [FileSelector] [FileOperationSelector]	Represents the file operation result.
FileSize [FileSelector]	Represents the size of the selected file in bytes.

11.16 TestControl

Name	Description
TestPendingAck	Tests the device's pending acknowledge feature.
TestEventGenerate	Generates a Test Event.

OMRON

11.17　TransportLayerControl

Name	Description
PayloadSize	Provides the number of bytes transferred for each image or chunk on the stream channel.
PtpEnable	Enable the Precision Time Protocol (PTP).
PtpClockAccuracy	Indicate the expected accuracy of the device PTP clock when it is the grandmaster, or in the event it becomes the grandmaster.
PtpDataSetLatch	Latches the current values from the device's PTP clock data set.
PtpStatus	Returns the latched state of the PTP clock.
PtpOffsetFromMaster	The latched offset from the PTP master clock in nanoseconds.
PtpClockID	The latched clock ID of the PTP device. PTP Parent Clock ID.
PtpParentClockID	The latched parent clock ID of the PTP device. The parent clock ID is the clock ID of the current master clock.
PtpGrandmasterClockID	The latched grandmaster clock ID of the PTP device. The grandmaster clock ID is the clock ID of the current grandmaster clock.
GevSupportedOptionSelector	Selects the GEV option to interrogate for existing support.
GevSupportedOption [GevSupportedOptionSelector]	Returns if the selected GEV option is supported.
GevInterfaceSelector	Selects which logical link to control.
GevMACAddress [GevInterfaceSelector]	MAC address of the logical link.
GevCurrentIPConfigurationLLA [GevInterfaceSelector]	Controls whether the Link Local Address IP configuration scheme is activated on the given logical link.
GevCurrentIPConfigurationDHCP [GevInterfaceSelector]	Controls whether the DHCP IP configuration scheme is activated on the given logical link.
GevCurrentIPConfigurationPersistentIP [GevInterfaceSelector]	Controls whether the Persistent IP configuration scheme is activated on the given logical link.
GevCurrentIPAddress [GevInterfaceSelector]	Reports the IP address for the given logical link.
GevCurrentSubnetMask [GevInterfaceSelector]	Reports the subnet mask of the given logical link.
GevCurrentDefaultGateway [GevInterfaceSelector]	Reports the default gateway IP address to be used on the given logical link.
GevIPConfigurationStatus [GevInterfaceSelector]	Reports the current IP configuration status.
GevPersistentIPAddress [GevInterfaceSelector]	Controls the Persistent IP address for this logical link.
GevPersistentSubnetMask [GevInterfaceSelector]	Controls the Persistent subnet mask associated with the Persistent IP address on this logical link.
GevPersistentDefaultGateway [GevInterfaceSelector]	Controls the persistent default gateway for this logical link.
GevGVCPExtendedStatusCodesSelector	Selects the GigE Vision version to control extended status codes for.

OMRON

Name	Description
GevGVCPExtendedStatusCodes [GevGVCPExtendedStatusCodesSelector]	Enables the generation of extended status codes.
GevGVCPPendingAck	Enables the generation of PENDING_ACK.
GevPrimaryApplicationSwitchoverKey	Controls the key to use to authenticate primary application switchover requests.
GevGVCPExpendedIDMode	Enables the extended IDs mode.
GevCCP	Controls the device access privilege of an application.
GevPrimaryApplicationSocket	Returns the UDP source port of the primary application.
GevPrimaryApplicationIPAddress	Returns the address of the primary application.
GevMCPHostPort	Controls the port to which the device must send messages.
GevMCDA	Controls the destination IP address for the message channel.
GevMCTT	Provides the transmission timeout value in milliseconds.
GevMCRC	Controls the number of retransmissions allowed when a message channel message times out.
GevMCSP	This feature indicates the source port for the message channel.
GevStreamChannelSelector	Selects the stream channel to control.
GevSCPInterfaceIndex [GevStreamChannelSelector]	Index of the logical link to use.
GevSCPHostPort [GevStreamChannelSelector]	Controls the port of the selected channel to which a GVSP transmitter must send data stream or the port from which a GVSP receiver may receive data stream.
GevSCPSFireTestPacket [GevStreamChannelSelector]	Sends a test packet.
GevSCPSDoNotFragment [GevStreamChannelSelector]	The state of this feature is copied into the "do not fragment" bit of IP header of each stream packet.
GevSCPSPacketSize [GevStreamChannelSelector]	This GigE Vision specific feature corresponds to DeviceStreamChannelPacketSize and should be kept in sync with it.
GevSCFTD [GevStreamChannelSelector]	Controls the delay (in GEV timestamp counter unit) to insert between each packet for this stream channel.
GevSCPD [GevStreamChannelSelector]	Controls the delay (in GEV timestamp counter unit) to insert between each frame for this stream channel.
GevSCDA [GevStreamChannelSelector]	Controls the destination IP address of the selected stream channel to which a GVSP transmitter must send data stream or the destination IP address from which a GVSP receiver may receive data stream.
GevSCSP [GevStreamChannelSelector]	Indicates the source port of the stream channel.

OMRON

12 Revision History

Rev	Date	Changes	Note
00	2019/09/25	● New Document	

Note: Product specifications would be changed without notification.

GigE Vision is trademark of AIA.

GenICam is trademark of EMVA.

Other company names and product names in this document are trademarks of their respective owners.

OMRON

STC-MBS881POE / STC-MCS881POE
Product Specifications and User's Guide