

The logo for HIKROBOT, featuring the brand name in a bold, italicized, white sans-serif font. The text is set against a red background that consists of a horizontal bar with a diagonal white stripe on the left side, creating a dynamic, slanted effect.

HIKROBOT

GigE Board Level Camera

User Manual

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2. This device must accept any interference received, including interference that may cause undesired operation.

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The symbols that may be found in this document are defined as follows.

Symbol	Description
 NOTE	Provides additional information to emphasize or supplement important points of the main text.
 WARNING	Indicates a potentially hazardous situation, which if not avoided, could result in equipment damage, data loss, performance degradation, or unexpected results.
 DANGER	Indicates a hazard with a high level of risk, which if not avoided, will result in death or serious injury.

Available Model

This manual is applicable to the GigE Board Level Camera.

Safety Instructions

These instructions are intended to ensure that the user can use the device correctly to avoid danger or property loss.

Laws and Regulations

The device should be used in compliance with local laws, electrical safety regulations, and fire prevention regulations.

Power Supply

- When wiring or dismounting, make sure that the device power is cut off, and do not operate under electrification.
- Avoid contact with exposed circuit. When the device is powered on, avoid contact with exposed junctions and parts.
- Use the power adapter provided by the regular manufacturer.
- Do not connect multiple devices to one power adapter, to avoid over-heating or fire hazards caused by overload.
- Make sure the plug is properly connected to the power socket.
- Caution: If the device has battery, risk of explosion if battery is replaced by an incorrect type. Dispose of used batteries according to the instructions.

Transportation

- The device contains precision optical components and electronic components. During transportation, storage and installation, incorrect operations like heavy pressure and violent vibration should be avoided. Otherwise, the device may be damaged.
- Avoid sudden collision, and pack the device with the accompanied carton and cushioning material or similar package.

Using Environment

- In order to reduce the risk of fire or electric shock, do not let the device get wet or damp.
- Do not drop objects onto the device and avoid vigorous vibration.
- Keep the device away from magnetic interference.
- Do not use the device in extremely heat, extremely cold, dusty environment, corrosive environment or high humidity environment.
- Do not aim the device lens at objects of strong light, such as the sun and incandescent lamp. Otherwise, the lens may be damaged.
- The device should be stored in dry environment without corrosive gas. Avoid placing the device in direct sunlight and poorly ventilated locations, or near heat sources such as heater or heating (ignoring this warning may lead to fire hazards).
- Do not operate in explosive environment.
- Keep the surrounding area well ventilated to avoid heat accumulation. Do not contact the radiator directly to avoid scald.

Electrostatic Protection

- Remove all conductive objects (such as jewelry, watch, etc.) on the device body before touching the device, and touch the grounding metal bracket by hand to release the static electricity.

- It is suggested to wear anti-static suit to prevent damage to the equipment caused by static electricity.
- When installing or maintaining the device, wear anti-static wristband or anti-static gloves. Make sure that the wristband is tightly attached to the skin and is reliably grounded.
- It is forbidden to touch exposed circuit boards with bare hands. Static electricity generated by human body may damage electrostatic sensitive components on circuit boards.
- When touching electrostatic sensitive components or devices, proper grounding measures must be taken.
- Put electrostatic sensitive components into anti-static bags for protection.
- It is suggested to place humidifier in dry environment to maintain suitable humidity and reduce static electricity generation.

Maintenance

- If the device is not working properly, contact the store or the nearest service center. Do not disassemble or modify the device in any way. (The company does not bear any liability for any problem arising from unauthorized modification or maintenance).
- Properly preserve all the original packaging materials of the device so that when problems arise, the device can be packed with packaging materials and sent to the agent or returned to the manufacturer for processing. The company does not bear any liability for accidental damage during transportation caused by non-original packaging.
- This device is a precision electronic device, no components can be maintained by user, do not disassemble the device arbitrarily.

Cleaning

Do not touch the image sensor directly. If the sensor needs to be cleaned, use a clean rag and wet it with alcohol, then gently wipe off the dirt; if the device is not in use, cover the image sensor with dust cover for protection.

Installation

Do not install the device on vibrating surface or places that are vulnerable to impact.

Personnel Requirement

Quality requirements for installation and maintenance personnel: qualification certificate or working experience in weak current system installation and maintenance, and relevant working experience and qualifications. Besides, the personnel must possess the following knowledge and operation skills:

- The basic knowledge and operation skills of low voltage wiring and low voltage electronic circuit connection.
- The ability to comprehend the contents of this manual.

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Chapter 1 Overview

1.1 Introduction

The GigE board level camera uses the GigE interface to transmit images in real time, and the camera can acquire images and be set parameters via the client software or SDK. The camera is applicable to the electronic semiconductor, factory automation, logistics, bottle detection, medicine packing, etc.

1.2 Key Feature

- Supports auto or manual adjustment for gain and exposure time, and manual adjustment for Look-Up Table (LUT), Gamma correction, etc.
- Supports image compression mode and noise reduction functions.
- Compact design with mounting holes on panels for flexible mounting.
- Adopts GigE interface and max. transmission distance of 100 meters without relay.
- Compatible with GigE Vision V2.0 Protocol, GenICam Standard, and third-party software based on the protocol and standard.



NOTE

- The key feature may differ by camera models.
- For specific camera functions, refer to the camera's user manual.

Chapter 2 Appearance

 **NOTE**

Appearances here are for reference only. Refer to the camera's specification for detailed dimension information.

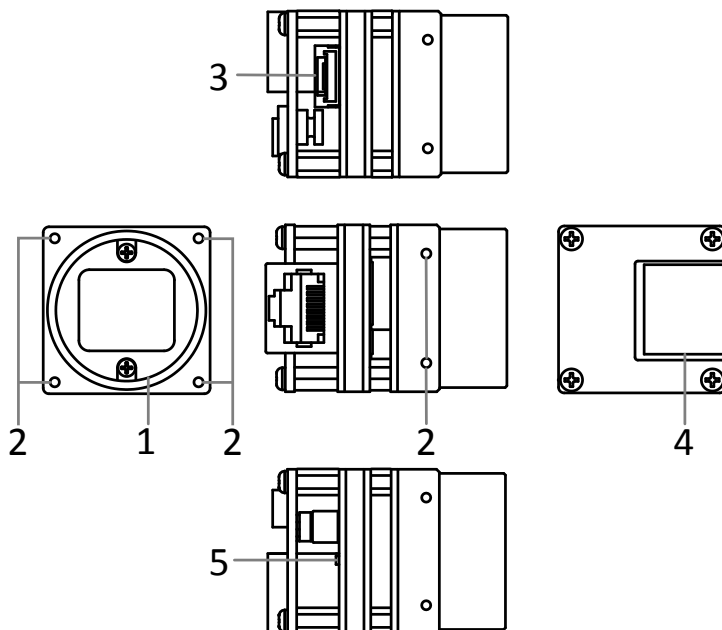


Figure 2-1 Appearance (Type I: C-Mount Camera)

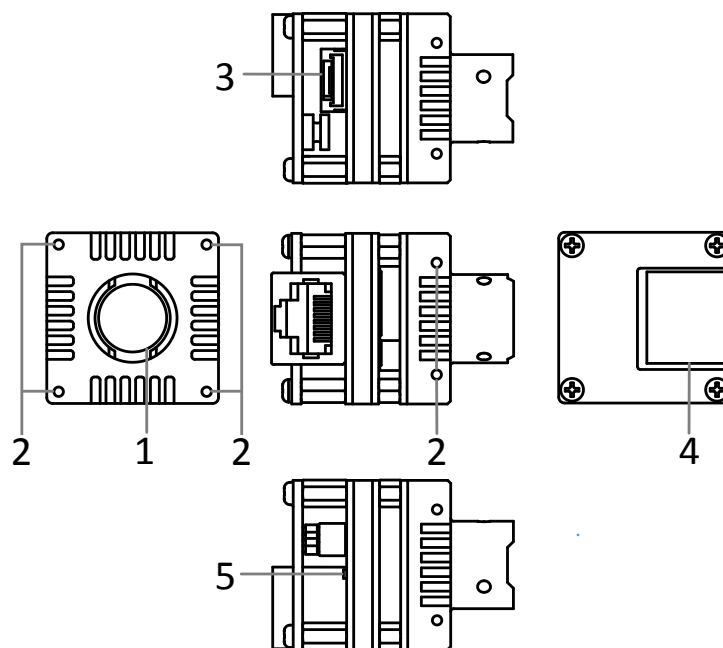


Figure 2-2 Appearance (Type II: M12-Mount Camera)

Table 2-1 Component Description

No.	Name	Description
1	Lens Mount	It is used to install the lens. Type I camera is C-mount, and type II camera is M12-mount.
2	Screw Hole	It is used to fix the camera to the installation position. You should use M2 screws.
3	Power and I/O Interface	It provides power, input and output signals. Refer to section Interface and Indicator for details.
4	Gigabit Ethernet Interface	It is used to transmit data.
5	Indicator	It indicates the camera's status. Refer to section Interface and Indicator for details.

 **NOTE**

The C-mount camera connects to a C-mount lens. Its back focal length is $17.45 \text{ mm} \pm 0.15 \text{ mm}$.

Chapter 3 Interface and Indicator

3.1 Power and I/O Interface

The camera has a 6-pin power and I/O interface that provides power, input and output signals. Read the followings to get its pin definitions.

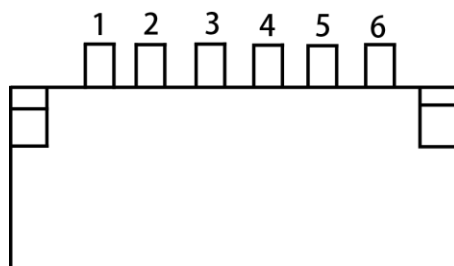


Figure 3-1 6-Pin Power and I/O Interface

Table 3-1 Pin Definitions

No.	Signal	I/O Signal Source	Description
1	GPO	Line 1+	Non-isolated output
2	GND_IO	Line 0/1/2-	Signal ground
3	GPI	Line 0+	Non-isolated input
4	GPIO	Line 2+	Non-isolated input or output
5	GND	--	Camera power supply ground
6	PWR	--	Camera power supply

NOTE

Refer to the pin definitions and labels attached to the power and I/O cable to wire the camera.

3.2 Indicator

The indicator is used to indicate the camera's status. Refer to the table below for details.

Table 3-2 Indicator Description

Indicator Color	Indicator Status	Camera Description
Red	Flashing very slowly	The cable is disconnected.
Red	Solid	Major exception occurs.
Blue	Flashing slowly	The camera is acquiring images in the trigger mode.
Blue	Flashing rapidly	The camera is acquiring images in the normal status.
Blue	Solid	The camera is in an idle status.
Red and blue	Flashing alternatively	The function of finding me is executed, or the camera is updating firmware.

 **NOTE**

When the indicator is flashing rapidly, flashing slowly, or flashing very slowly, its unlit interval is 0.2 s, 1 s, 2 s respectively.

Chapter 4 Camera Installation

4.1 Installation Preparation

You need to prepare following accessories before camera installation.

Table 4-1 Accessories

No.	Name	Quantity	Description
1	Power and I/O Cable	1	It refers to the 6-pin power and I/O cable. You need to purchase separately.
2	Power Adapter or Switch Power Supply	1	You should select suitable power adapter or switch power supply according to the camera's power supply and consumption. You need to purchase separately.
3	Network Cable	1	You should use the CAT-5e or CAT-6 network cable with RJ45 connector. You need to purchase separately.
4	Lens	1	You should select suitable lens according to the camera's lens mount. You need to purchase separately.

4.2 Install Camera

Before you start

- Make sure that the device in package is in good condition and all assembly parts are included.
- Make sure that all related devices are powered off during the installation process.

Steps:

1. Fix the camera to the installation position, and install the lens to the camera.
2. Use a network cable to connect the camera to a GigE switch or a GigE network interface card.
3. Use the power and I/O cable to connect the camera to a suitable power adapter.

NOTE

For the camera that supports PoE, you can use a network cable to connect the camera to a switch or a network interface card that supports PoE function.

Chapter 5 Camera Connection

Camera connection to the client software is required for camera's configuration and remote operations. This section introduces how to install the client software, connect the camera to the client software, etc.

5.1 Install MVS Client

MVS client software is used to connect the camera, set its parameters, etc.

 **NOTE**

- The MVS client software is compatible with 32/64-bit Windows XP/7/10, 32/64-bit Linux, and 64-bit MacOS operating systems. Here we take Windows as an example.
- The graphic user interface may differ by different versions of the client software you use.
- You can download the MVS client software from <https://en.hikrobotics.com/>.

Steps:

1. Double click the MVS installation package.
2. Select the language.
3. Read and check **Terms of the License Agreement**.

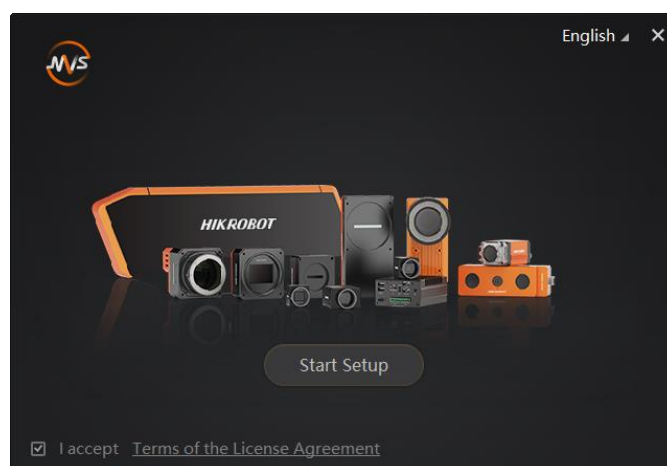


Figure 5-1 Installation Interface

4. Click **Start Setup**.

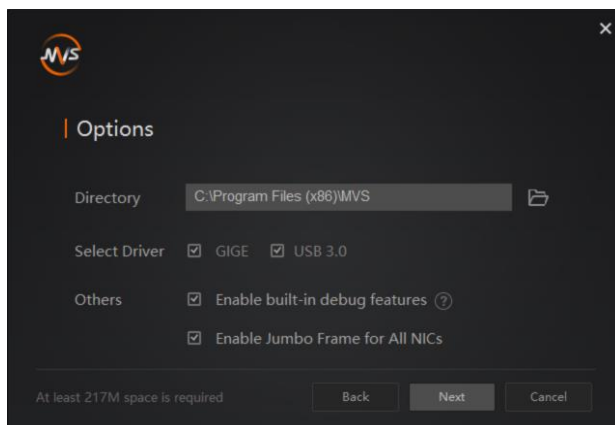


Figure 5-2 Default Settings

5. Keep default settings, and click **Next**.
6. Finish the installation according to the interface prompts.

5.2 Turn off Firewall

To ensure stable client running and image transmission, you are recommended turning off Windows firewall before using the client software.

NOTE

For different Windows versions, the path name or interface may differ.

Steps:

1. Go to Windows Firewall.
 - Windows XP system: Click **Start > Control Panel > Security Center > Windows Firewall**.
 - Windows 7 system: Click **Start > Control Panel > Windows Firewall**.
 - Windows 10 system: Click **Start > Control Panel > System and Security > Windows Defender Firewall**.
2. Click **Turn Windows Defender Firewall on or off** on the left.
3. Select **Turn off Windows Defender Firewall (not recommended)**.

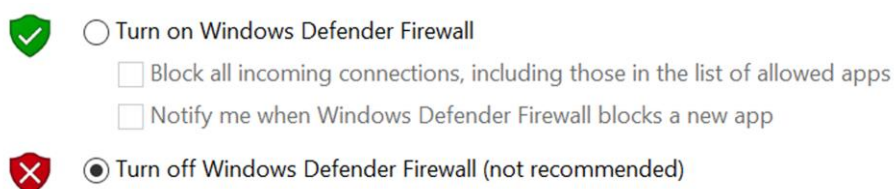


Figure 5-3 Windows Defender Firewall

4. Click **OK**.

5.3 Set PC Network

To ensure stable image transmission and normal communication between the PC and the camera via client software, you need to set the PC network before using the client software.



NOTE

For different Windows versions, the path name or interface may differ.

Steps:

1. Go to PC network settings page: **Start > Control Panel > Network and Internet > Network and Sharing Center > Change adapter settings.**
2. Select NIC and set the IP obtainment mode.
 - Select **Obtain an IP address automatically** to get an IP address of the PC automatically.
 - Select **Use the following IP address** to set an IP address for the PC manually.
3. Set NIC property via the PC.
 - 1) Go to NIC settings page: **Control Panel > Hardware and Sound > Device Manager > Network Adapter.**
 - 2) Select corresponding network interface card, and click **Advanced.**
 - 3) Set **Jumbo Packet** value to 9014 Bytes, **Transmit Buffers** and **Receive Buffers** to 2048, **Interrupt Moderation Rate** to Extremum.
4. (Optional) Set NIC property via the MVS.
 - 1) Right click the Ethernet, and click **NIC Settings.**

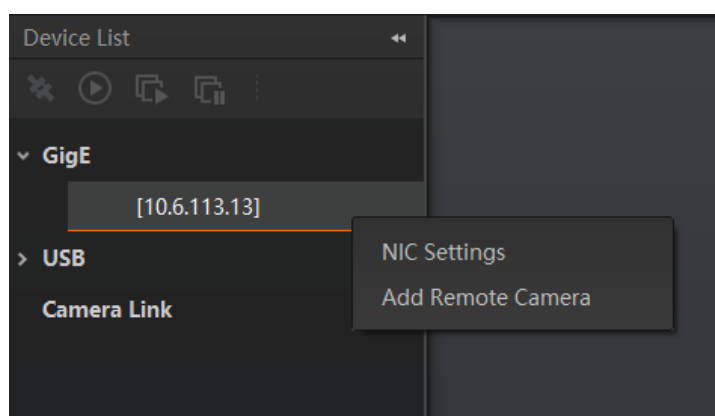


Figure 5-4 NIC Settings

- 2) Enable **Jumbo Frame**, and set **Receive Buffers** and **Transmit Buffers** to 2048.

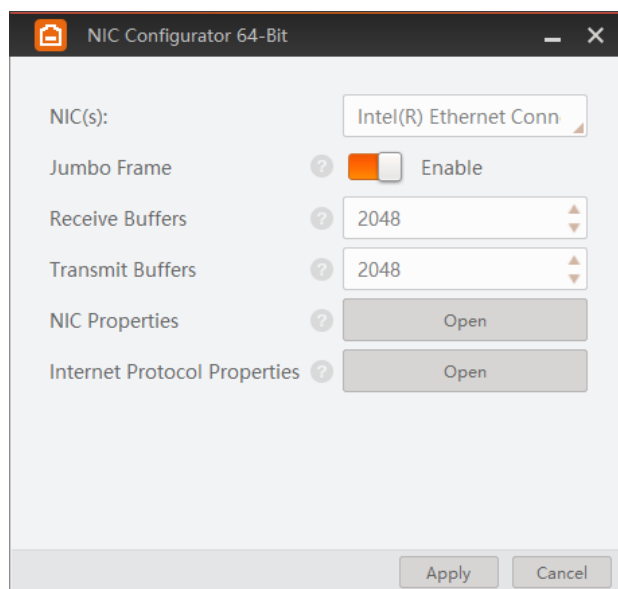


Figure 5-5 NIC Configurator




NOTE

The max. value of receive buffers and transmit buffers may differ by network interface cards.

5.4 Set Camera Network

You can set and operate the camera in the client software only when the camera is in the same network segment with the PC where the client software is installed.

Steps:

1. Double click the client software to run it.
2. Click  in device list to search the device.
3. Select a device to be connected.
4. Right click the device, and click **Modify IP**.
5. Set the IP address of the device in the same network segment with the PC
6. Click **OK**.

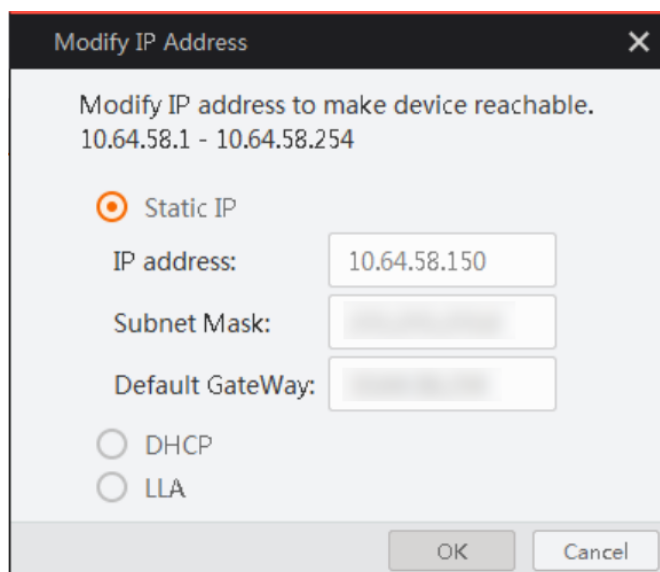



Figure 5-6 Modify Device IP Address

5.5 Connect Camera to Client Software

Make sure that your camera's IP address is in the same network segment with the PC where you installed the client software before connecting the camera to it.

Double click the camera name in device list, or click  to connect the camera to the client.

Chapter 6 Client Software Layout

After connecting to the camera, the client software can read camera's attributes and display them.

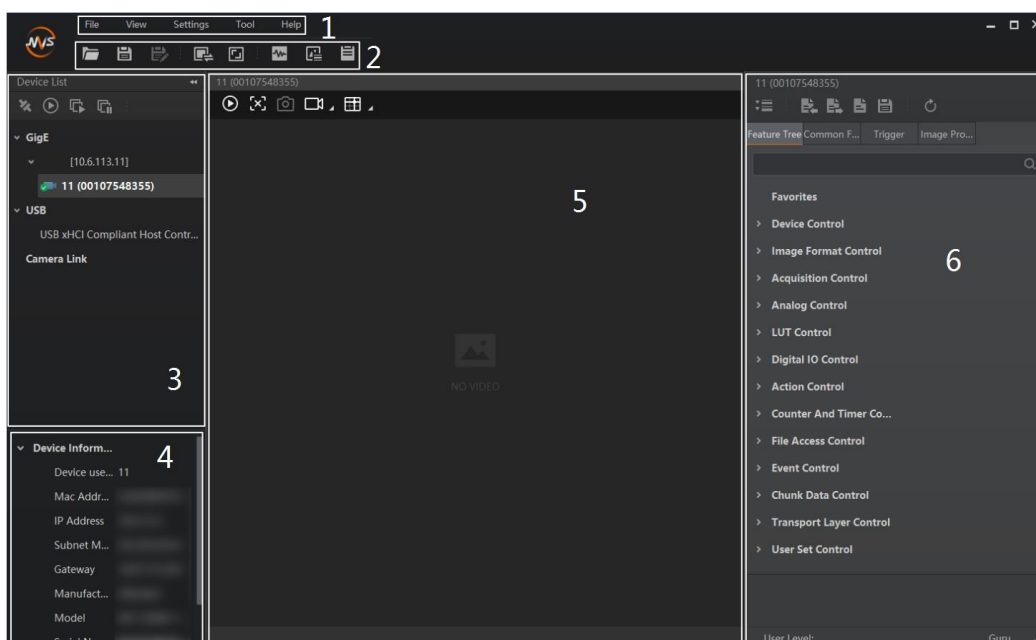


Figure 6-1 Main Window


NOTE

For specific main window of the client software, please refer to the actual one you got.

Table 6-1 Main Window Description

No.	Area Name	Description
1	Menu Bar	The menu bar displays function modules, including File, View, Settings, Tool, and Help.
2	Control Toolbar	The control toolbar provides quick operations for the device.
3	Device List Panel	This panel displays device list, and you can connect or disconnect device, modify device IP address, etc.
4	Device Information Panel	This panel displays the detailed device information.

No.	Area Name	Description
5	Display Window	This area displays the acquisition images in real-time. You can click different icons to capture and save image, record, etc.
6	Feature Panel	You can view and set features of the selected camera, and perform operations such as importing, exporting, and saving features.

Click  in the camera's feature panel to unfold the specific camera parameters.



NOTE

The camera's feature tree and parameters may differ by camera models.

Table 6-2 Feature Tree Description

Attribute	Description
Device Control	You can view the device information, edit its name, reset the device, etc.
Image Format Control	You can view and set the device's resolution, image reverse function, pixel format, region of interest, test pattern, etc.
Acquisition Control	You can view and set the device's acquisition mode, frame rate, trigger mode, exposure time, etc.
Analog Control	You can view and set the device's gain, black level, Gamma correction, sharpness, etc.
Color Transformation Control	You can view and set the device's color transformation related parameters.
LUT Control	You can view the Look-Up Table (LUT), and set its index and value.
Digital IO Control	You can set the different input and output signals.
Action Control	You can view and set the device's action control related parameters.
Counter and Timer Control	You can view and set the counter related parameters.
File Access Control	You can view and set the device's file access control related parameters.

Attribute	Description
Event Control	You can view and set the device's event control related parameters to let the device generate an event and transmit a related event message to the PC.
Chunk Data Control	You can view and set the device's chunk data control related parameters to generate supplementary image data and append that data to every image that you acquire.
Transport Layer Control	You can view and set the parameters of the device's transport layer.
Transfer Control	You can view the device's transfer sources, transfer mode, etc.
User Set Control	You can save or load the device's parameters.

Chapter 7 Camera Features

7.1 Global Shutter

For camera that supports global shutter, its exposure starts and ends in each line simultaneously. After the exposure, data readout starts line by line. All pixels expose at the same time, then readout at different time, as shown below.

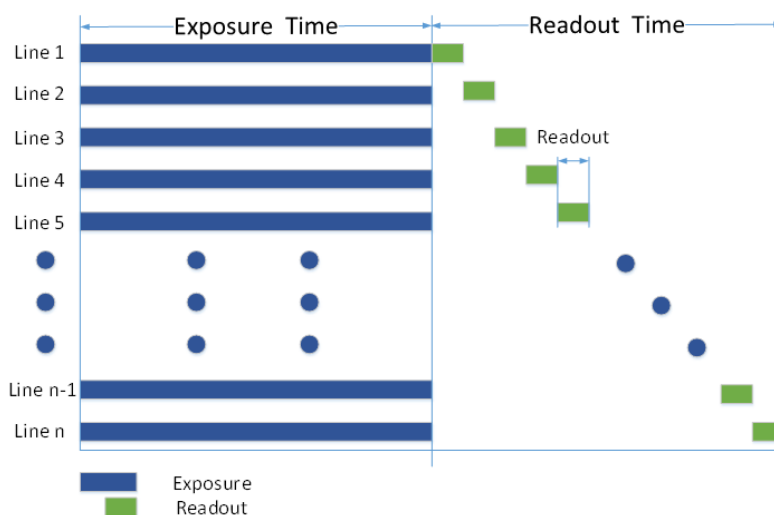


Figure 7-1 Global Shutter

7.2 Rolling Shutter

For cameras that support rolling shutter: as soon as the exposure ends, and the data readout starts simultaneously. After the whole action, the rest of rows start to expose and read out one by one. All pixels expose at the same time, then readout at different time, as shown below.

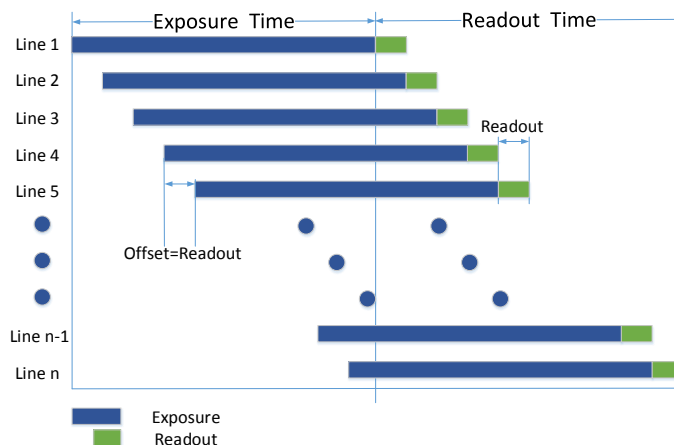


Figure 7-2 Rolling Shutter

7.3 Sensor Shutter Mode

NOTE

- Only some models of cameras with rolling shutter and corresponding firmware support the sensor shutter mode. The actual product you purchased should prevail.
- Stopping the real-time acquisition and setting **Trigger Mode** as **On** are required before setting the sensor shutter mode.

The sensor shutter mode allows you to set the operating mode of the camera's electronic shutter. The shutter mode refers to the way in which the image data is captured and processed.

Global reset means that all of the sensor's pixels start exposing at the same time, but stop exposing at different time.

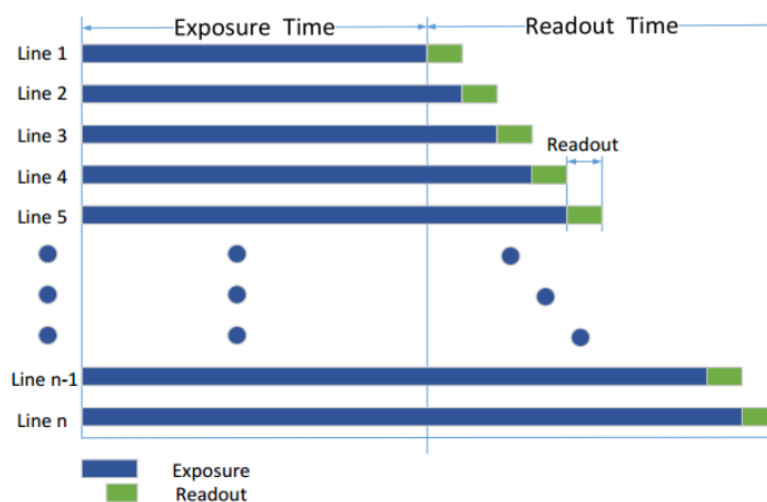


Figure 7-3 Global Reset

Trigger rolling is applied to cameras with rolling shutter, and this function is used to improve the max. frame rate in the trigger mode.

You can go to **Acquisition Control > Sensor Shutter Mode**, and select **Sensor Shutter Mode** according to actual demands.

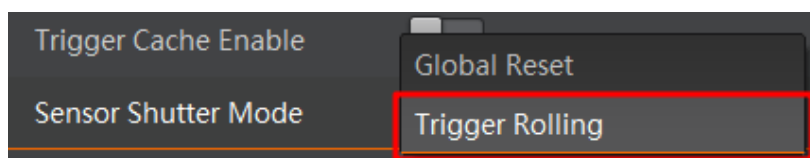


Figure 7-4 Sensor Shutter Mode

NOTE

The trigger rolling does not support the overlap exposure.

7.4 Non-Overlap Exposure and Overlap Exposure

The process that camera captures one frame of image includes two stages, exposure and readout. According to the overlap relation between the exposure time and the readout time, cameras with different sensors can be divided into overlap exposure and non-overlap exposure.

7.4.1 Non-Overlap Exposure

After completing the current frame's exposure and readout, the next frame starts to expose and read out. This process is called non-overlap exposure. The non-overlap exposure's frame period is larger than the sum of the exposure time and the readout time, as shown below.

- **Non-overlap Exposure under Internal Trigger Mode**

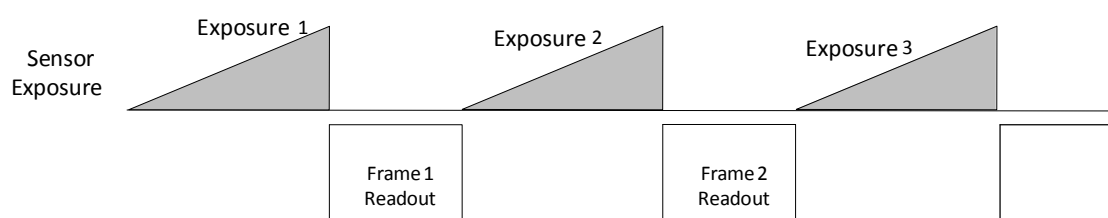


Figure 7-5 Internal Trigger Non-Overlap Exposure

- **Non-overlap Exposure under External Trigger Mode**

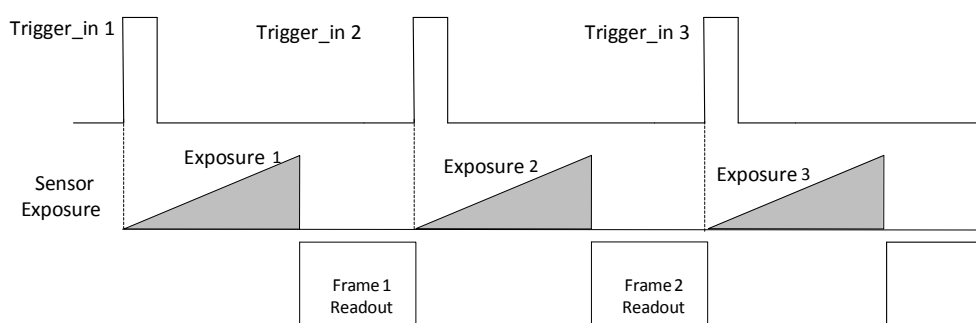


Figure 7-6 External Trigger Non-Overlap Exposure

 **NOTE**

The camera will ignore the external signal in the readout section under this mode.

7.4.2 Overlap Exposure

Overlap exposure refers to the overlap between the current frame exposure and the previous frame readout. In other words, when the previous frame starts to read out, the current frame starts to expose simultaneously, as shown below.

- **Overlap Exposure under Internal Trigger Mode**

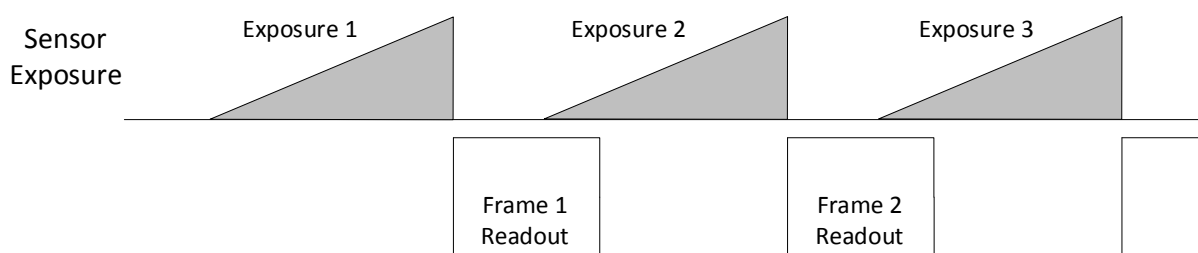


Figure 7-7 Internal Trigger Overlap Exposure

- **Overlap Exposure under External Trigger Mode**

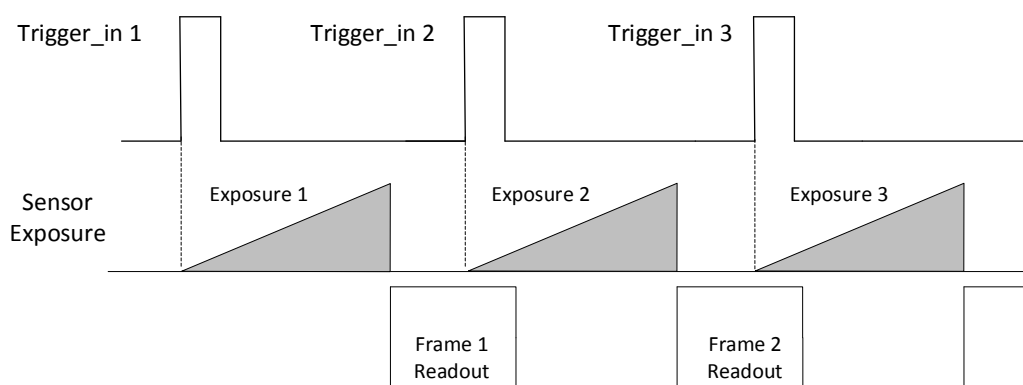


Figure 7-8 External Trigger Overlap Exposure

 **NOTE**

The camera will ignore the external signal in the readout section under this mode.

Chapter 8 Image Acquisition

8.1 Set Frame Rate

Frame rate refers to the image number that is acquired by the camera per second. The higher frame rate, and shorter time used for image acquisition will be. The following 5 factors determine the camera's frame rate in real-time.

- **Frame readout time:** The frame readout time is related with camera's sensor performance and image height. The lower the image height and less the frame readout time, and the higher the frame rate will be.
- **Exposure time:** If the reciprocal of max. frame rate that the camera supports is t , and when the configured exposure time is larger than t , the less the exposure time, the higher the frame rate will be. When the configured exposure time is less than or equal to t , exposure time will not influence the frame rate.
- **Bandwidth:** The larger the bandwidth, the higher the frame rate will be.
- **Pixel format:** The more bytes pixel format occupy, the lower the frame rate will be.
- **Image compression mode:** This function is used to compress data before transmitting to the PC, and increase the frame rate to some extent.

Click **Acquisition Control > Acquisition Frame Rate**, enter **Acquisition Frame Rate** according to actual demands, and enable **Acquisition Frame Rate Control Enable**.

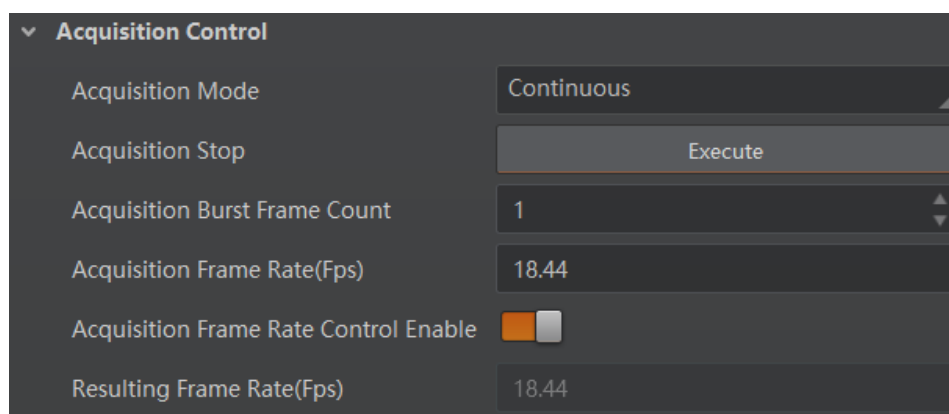


Figure 8-1 Set Frame Rate

When you enable the image compression mode (refer to section **Set Image Compression Mode** for details), you can view the **Reference Frame Rate** that is a reference rate calculated according to bandwidth and the compression ratio.

You can refer to **Resulting Frame Rate** to view the camera's resulting frame rate.

 NOTE

- If the current real-time frame rate is smaller than configured frame rate, the camera acquires images according to the real-time frame rate.
- If the current real-time frame rate is larger than configured frame rate, the camera acquires images according to the configured frame rate.

8.2 Set Acquisition Mode

The camera has 2 types of acquisition modes, including **SingleFrame** mode and **Continuous** mode.

- SingleFrame mode: When camera starts image acquisition, it acquires one image only, and then stops.
- Continuous mode: When camera starts image acquisition, it acquires images continuously. Real-time frame rate decides the acquisition frame number per second. You can stop camera image acquisition manually.

Click **Acquisition Control** > **Acquisition Mode**, and select **Continuous** or **SingleFrame** according to actual demands.

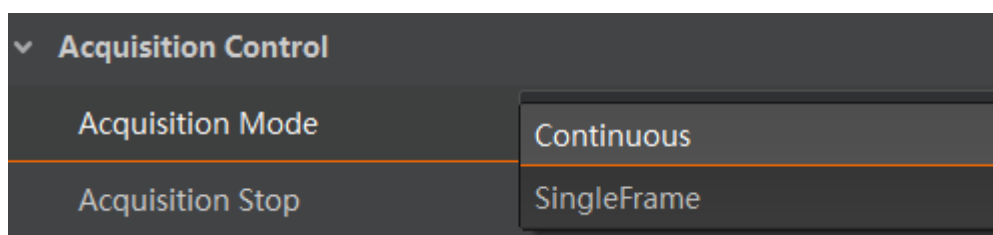


Figure 8-2 Set Acquisition Mode

 NOTE

The acquisition mode is **Continuous** by default.

8.3 Set Trigger Mode

The camera has 2 types of trigger mode, including internal trigger mode and external trigger mode.

- Internal trigger mode: The camera acquires images via its internal signals.
- External trigger mode: The camera acquires images via external signals. These signals can be software signal and hardware signal, including software trigger, hardware trigger, counter trigger, etc..

Click **Acquisition Control** > **Trigger Mode**, and select **Off** or **On** as **Trigger Mode** according to actual demands.

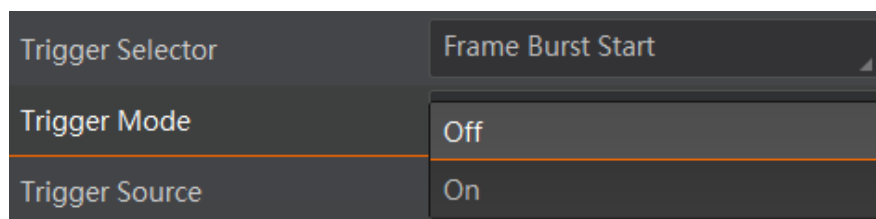


Figure 8-3 Set Trigger Mode



Off refers to the internal trigger mode, and **On** refers to the external trigger mode.

8.4 External Trigger Mode

8.4.1 Set External Trigger Source

There are 5 types of external trigger sources, including software trigger, hardware trigger, counter trigger, action command trigger, and free trigger. Their principle and parameter setting are shown below.

Table 8-1 Principle and Parameter of External Trigger Mode

External Trigger Source	Parameter	Parameter Value	Principle
Software trigger	Acquisition Control > Trigger Source	Software	The software sends trigger signal to the camera via GigE interface to acquire images.
Hardware trigger	Acquisition Control > Trigger Source	Line 0, Line 2	External device connects camera via camera I/O interface. External device sends trigger signal to camera to acquire images.
Counter trigger	Acquisition Control > Trigger Source	Counter 0	The counter sends trigger signal to the camera to acquire images.
Action command trigger	Acquisition Control > Trigger Source	Action 1	The action command sends trigger signal to the camera to acquire images.
Free trigger	Acquisition Control > Trigger	Anyway	Use software trigger, hardware trigger, counter or action command to send

External Trigger Source	Parameter	Parameter Value	Principle
	Source		trigger signal to the camera to acquire images.

Click **Acquisition Control > Trigger Source**, and select **Trigger Source** according to actual demands.

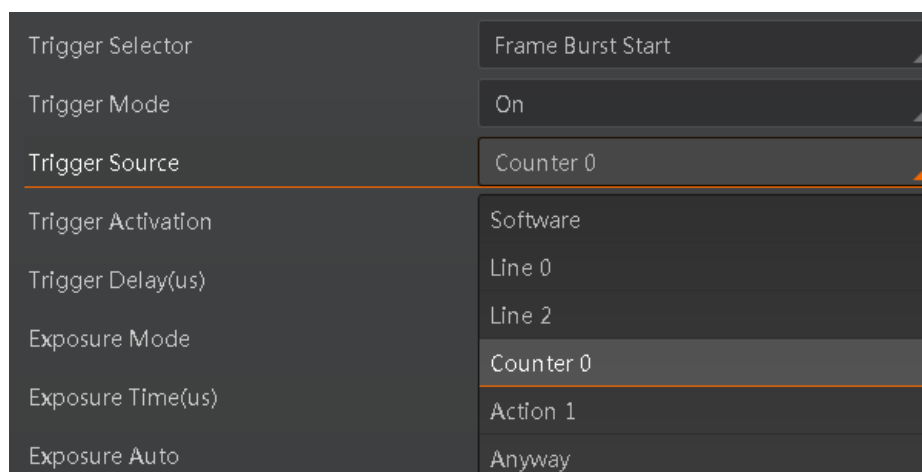


Figure 8-4 Set Trigger Source

NOTE

These 5 external trigger sources are valid only when the **Trigger Mode** is **On**.

8.4.2 Set Software Trigger

Steps:

1. Click **Acquisition Control > Trigger Mode**, and select **On** as **Trigger Mode**.
2. Select **Software** as **Trigger Source**, and click **Execute** in **Trigger Software** to send trigger commands.

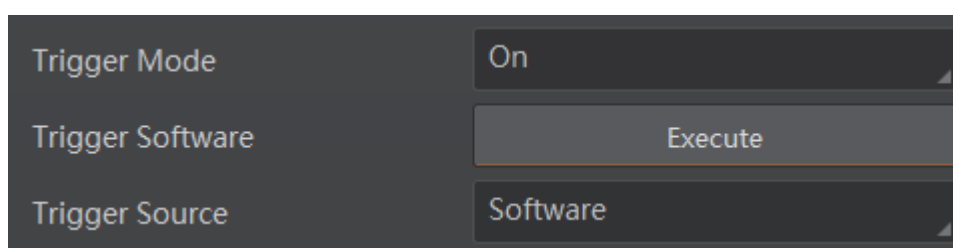


Figure 8-5 Set Software Trigger

8.4.3 Set Hardware Trigger

The camera has 1 non-isolated input (Line 0), and 1 bi-directional I/O (Line 2) that can be configured as input signal, as shown below.

NOTE

Here we take Line 2 as an example to introduce the hardware trigger settings. You select other bi-directional I/O as trigger source to set hardware trigger according to actual demands.

Steps:

1. Click **Digital IO Control**.
2. Select **Line 2** as **Line Selector**, and **Input** as **Line Mode** to set line 2 as input signal.

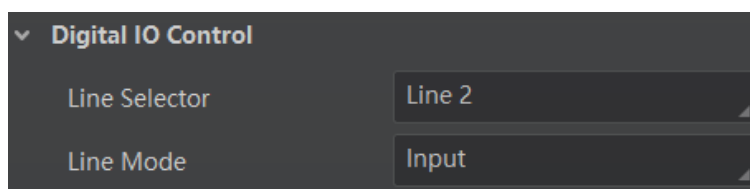


Figure 8-6 Set Line2 as Input Signal

3. Select **Line 2** as **Trigger Source**.

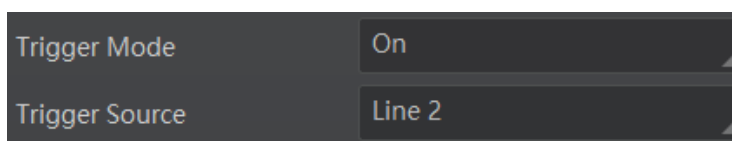


Figure 8-7 Set Hardware Trigger

8.4.4 Set Counter Trigger

The counter trigger provides frequency division to the external trigger signal. You can set counter trigger as shown below.

Steps:

1. Click **Acquisition Control > Trigger Mode**, and select **On** as **Trigger Mode**.
2. Select **Counter 0** as **Trigger Source**.

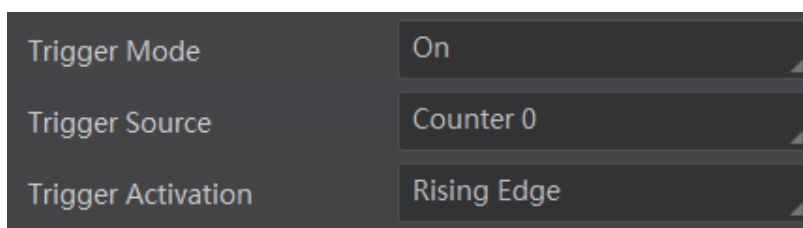


Figure 8-8 Set Counter Trigger

When using counter as trigger source, you need to set relevant parameters under **Counter And Timer Control**. For specific parameter function and setting, please refer to the following table.

Table 8-2 Description of Counter And Timer Control

Parameter	Read/Write	Description
Counter Selector	Read and write	It selects counter source. Counter 0 is available only at present.
Counter Event Source	Read and write	It selects the signal source of counter trigger. Line 0 and Line 2 are available. It is disabled by default.
Counter Reset Source	Read and write	It selects the signal source of resetting counter. Software is available only. It is disabled by default.
Counter Reset	Write is available under certain condition	It resets counter and it can be executed when selecting Software as Counter Reset Source .
Counter Value	Read and write	It is the counter value with the range of 1 to 1023.
Counter Current Value	Read only	It displays the number of executed external trigger.

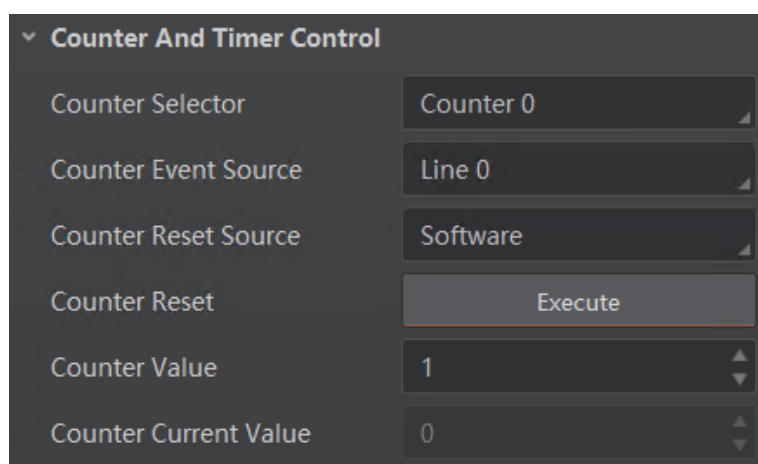


Figure 8-9 Counter Trigger Parameters

8.4.5 Set Action Command Trigger

When you need to use the function of action commands, you should set action command trigger first.

Steps:

1. Click **Acquisition Control > Trigger Mode**, and select **On** as **Trigger Mode**.
2. Select **Action 1** as **Trigger Source**.

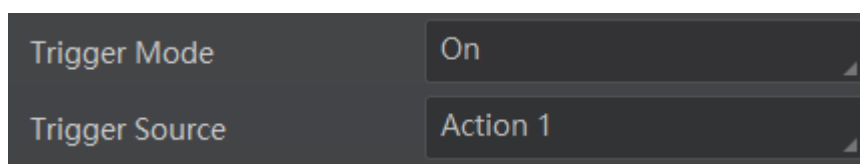


Figure 8-10 Set Action Command Trigger

 **NOTE**

For specific function of action commands, please refer to the section **Set Action Command** for details.

8.4.6 Set Free Trigger

In the free trigger mode, the camera can receive signals from software trigger, hardware trigger, action command trigger, and counter trigger.

Steps:

1. Click **Acquisition Control > Trigger Mode**, and select **On** as **Trigger Mode**.
2. Select **Anyway** as **Trigger Source**.

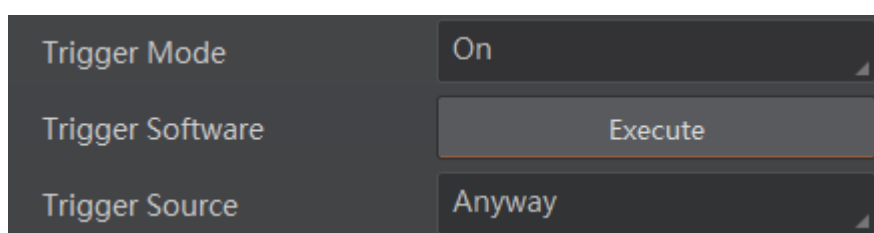


Figure 8-11 Set Free Trigger

8.5 Trigger Related Parameters

Under external trigger mode, you can set burst frame count, trigger delay, trigger cache enable, trigger activation and trigger debouncer. Different trigger sources can set various trigger parameters, and their relation is shown below.

Table 8-3 Trigger Source and Trigger Parameter

Trigger Source / Trigger Parameter	Software Trigger	Hardware Trigger	Counter Trigger	Action Command Trigger	Any Trigger
Burst Frame Count	√	√	√	√	√
Trigger Delay	√	√	√	√	√
Trigger Cache Enable	√	√	√	√	√
Trigger Activation	×	√	√	×	√
Trigger Debouncer	×	√	√	×	√

 **NOTE**

× means that specific trigger parameters are not supported, and √ means that specific trigger parameters are supported.

8.5.1 Set Burst Frame Count

Under external trigger mode, you can set burst frame count as shown below.

Click **Acquisition Control > Acquisition Burst Frame Count**, and enter **Acquisition Burst Frame Count** according to actual demands. Its range is from 1 to 1023.

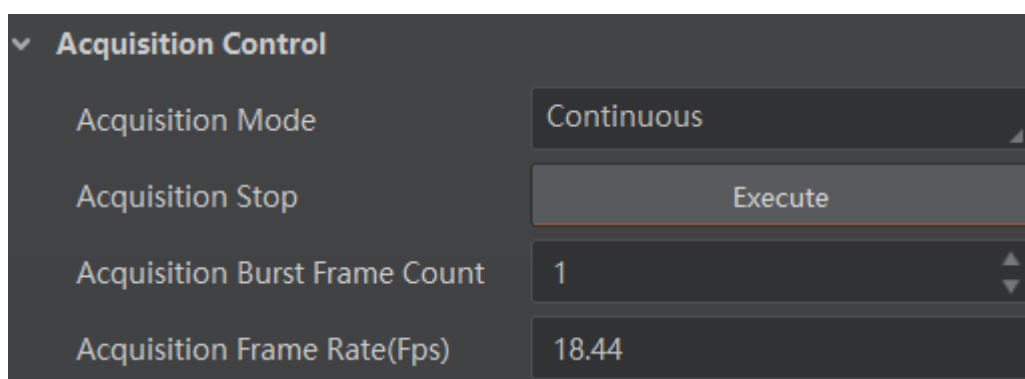


Figure 8-12 Set Burst Frame Count

When **Acquisition Burst Frame Count** is 1, it is in single frame trigger mode. When **Acquisition Burst Frame Count** is larger than 1, it is in multi-frame trigger mode. If **Acquisition Burst Frame Count** is n and when inputting 1 trigger signal, the camera stops acquiring images after exposing n times and outputs n frame images. The sequence diagram of burst frame count is shown below.

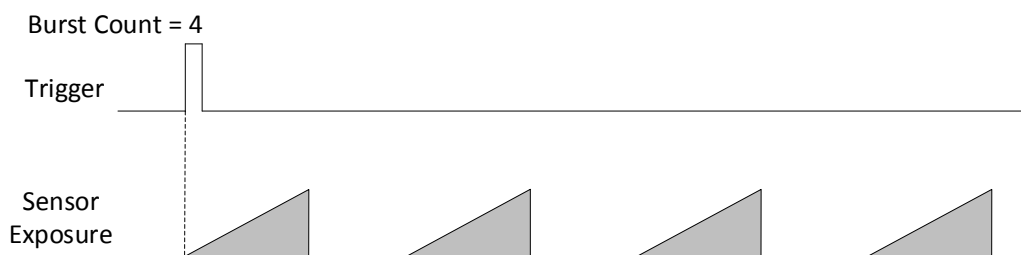


Figure 8-13 Sequence Diagram of Burst Frame Count

NOTE

The figure above uses rising edge as trigger activation.

8.5.2 Set Trigger Delay

From camera receiving signal and responding, this period is trigger delay. Its sequence diagram is shown below.

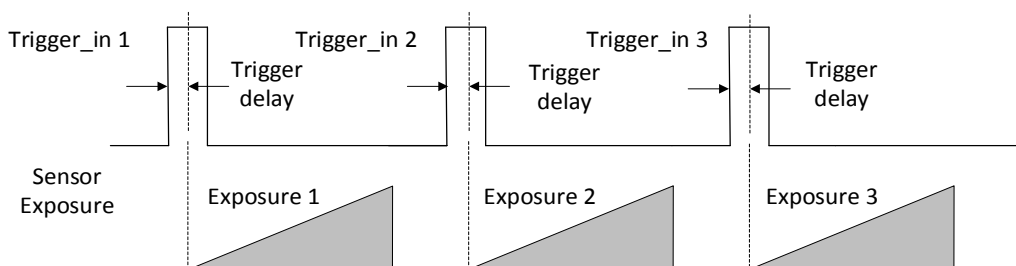


Figure 8-14 Signal Delay Sequence Diagram

You can set **Trigger Delay** according to actual demands.

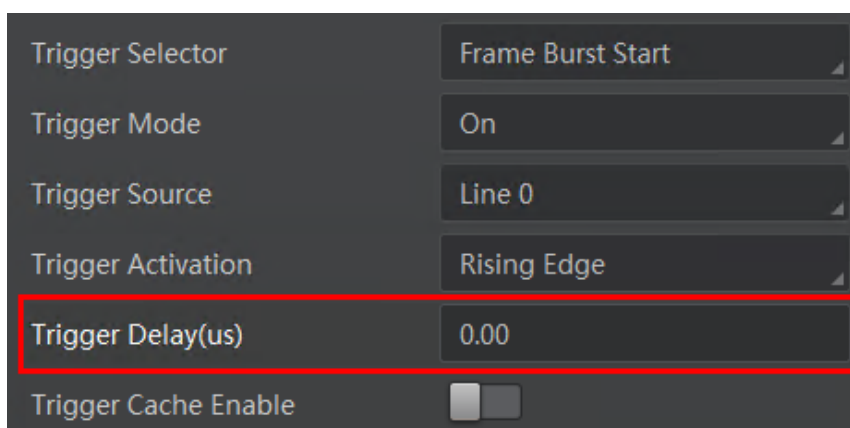


Figure 8-15 Set Trigger Delay

8.5.3 Set Trigger Cache Enable

The camera has the function of Trigger Cache Enable. During the triggering process, if the camera receives new trigger signal, it will save and process the signal if you enable this function. Trigger cache enable can save up to 3 trigger signals.

Click **Acquisition Control > Trigger Cache Enable**, and enable **Trigger Cache Enable**.

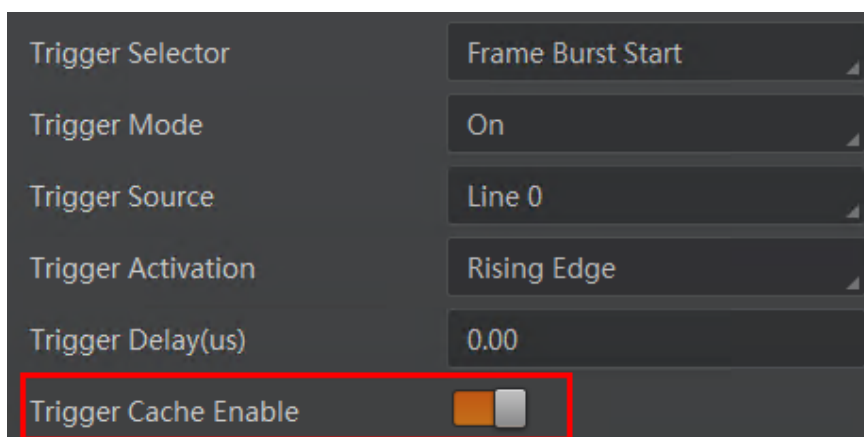


Figure 8-16 Enable Trigger Cache Enable

If the camera receives the 1st trigger signal first, and the camera receives the 2nd trigger signal during processing the 1st trigger signal.

- Disable Trigger Cache Enable: the 2nd trigger signal will be filtered without processing.

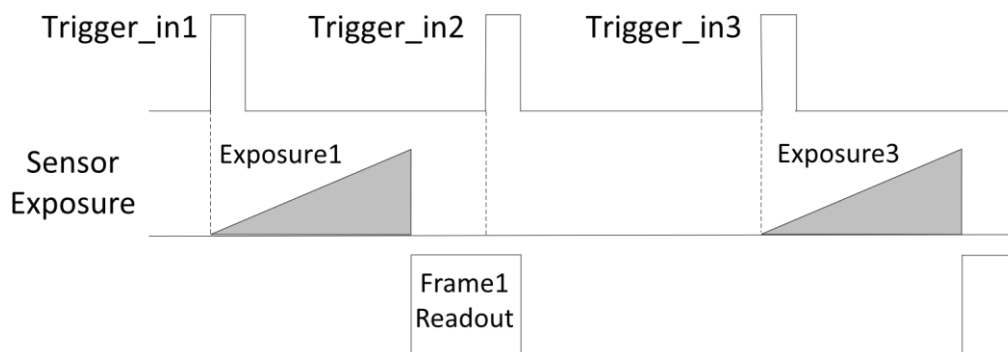


Figure 8-17 Second Triger Signal Filtered

- Enable Trigger Cache Enable: the 2nd trigger signal will be saved.

If the 1st frame image's exposure time of the 2nd trigger signal is not earlier than the camera's last frame creation time of the 1st trigger signal, and then the 2nd trigger signal's 1st frame image is created normally.

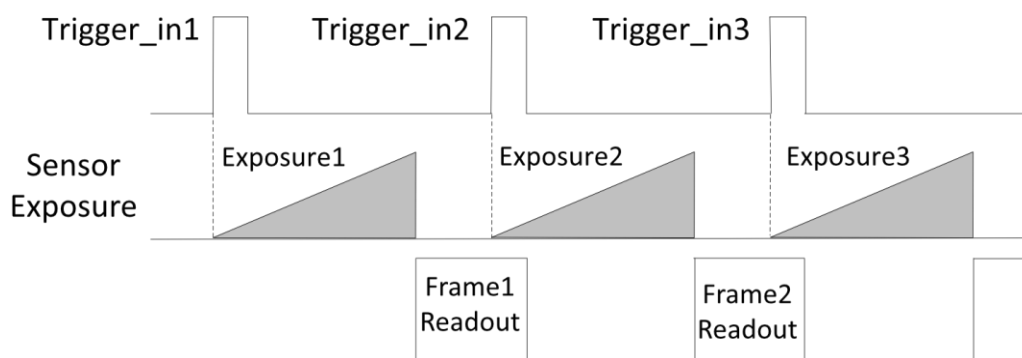


Figure 8-18 Normal Process of Second Trigger Signal

If the 1st frame image's exposure time of the 2nd trigger signal is earlier than the camera's last frame creation time of the 1st trigger signal, and then the camera will delay this exposure time. Thus making sure this exposure time is not earlier than the camera's last frame creation time of the 1st trigger signal.

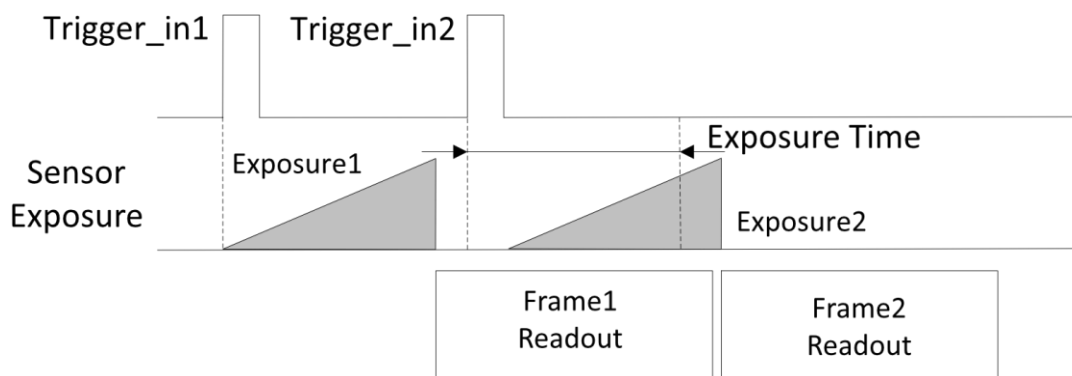


Figure 8-19 Second Trigger Signal Delayed

 **NOTE**

The three sequence diagrams above uses rising edge as trigger activation.

8.5.4 Set Trigger Activation

The camera supports trigger acquisition in the rising edge, falling edge, level high, or level low of the external signal. The principle and parameter of trigger activation are shown below.

Table 8-4 Trigger Activation Principle and Parameter

Trigger Activation	Parameter	Parameter Value	Principle
Rising Edge	Acquisition Control > Trigger Activation	Rising Edge	Rising Edge refers to the rising edge of the trigger signal is valid, that is camera exposure and acquisition at

Trigger Activation	Parameter	Parameter Value	Principle
			the beginning of the rising edge of the trigger signal.
Falling Edge	Acquisition Control > Trigger Activation	Falling Edge	Falling Edge refers to the falling edge of the trigger signal is valid, that is camera exposure and acquisition at the beginning of the falling edge of the trigger signal.
Level High	Acquisition Control > Trigger Activation	Level High	Level High refers to the level high of the trigger signal is valid. As long as trigger signal is in level high, the camera keeps exposure and acquisition status.
Level Low	Acquisition Control > Trigger Activation	Level Low	Level Low refers to the level low of the trigger signal is valid. As long as trigger signal is in level low, the camera keeps exposure and acquisition status.

Click **Acquisition Control > Trigger Activation**, and select **Rising Edge, Falling Edge, Level High** or **Level Low** as **Trigger Activation** according to actual demands.

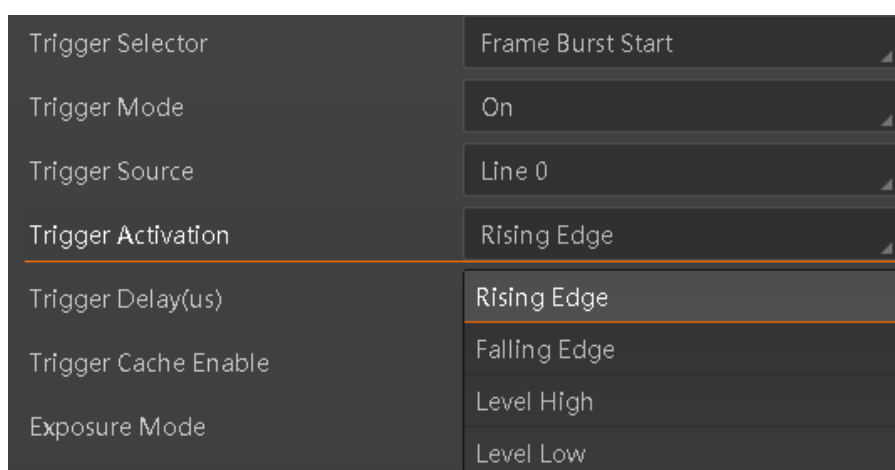


Figure 8-20 Set Trigger Activation

8.5.5 Set Trigger Debouncer

The external trigger input signal of the camera may have signal bounce that may cause false trigger. Thus, it is necessary to debounce the external trigger signal, and its sequence diagram is shown below.

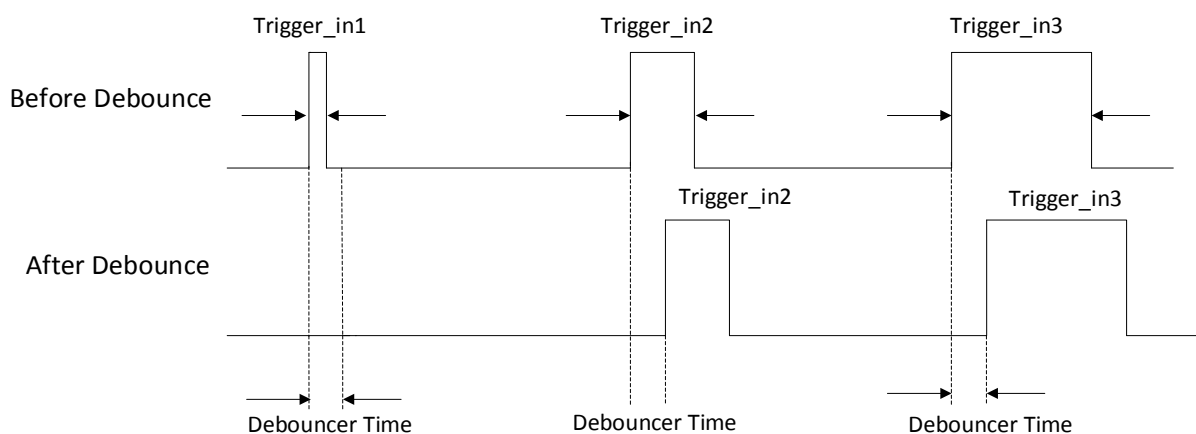


Figure 8-21 Trigger Debouncer Sequence Diagram

Click **Digital IO Control > Line Debouncer Time**, enter **Line Debouncer Time**, and its range is from 1 μs to 1000000 μs .

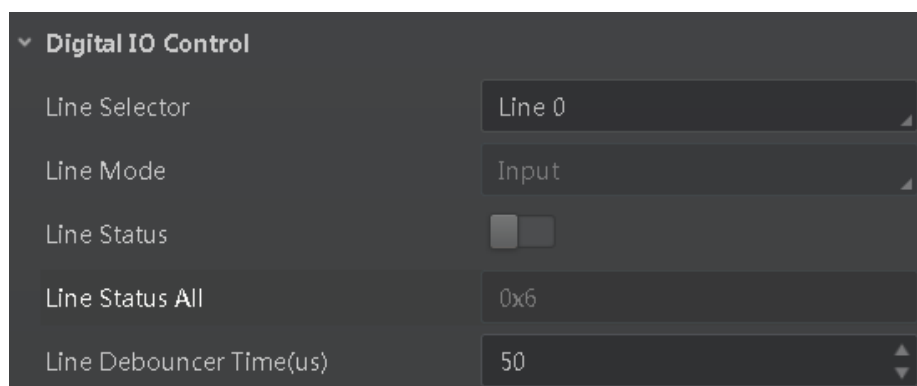


Figure 8-22 Set Trigger Debouncer

8.6 Set Event Control

NOTE

The event control function may differ by camera models.

The event control function allows you to enable event messages and camera events like Acquisition Start, Acquisition End, etc.

When the **Event Notification** is set to **Notification On**, the camera can generate an event and transmit a related event message to the computer whenever a specific situation occurs.

Steps:

1. Click **Event Control**, and select specific event in **Event Selector** according to actual demands.
2. Set **Notification On** as **Event Notification**.

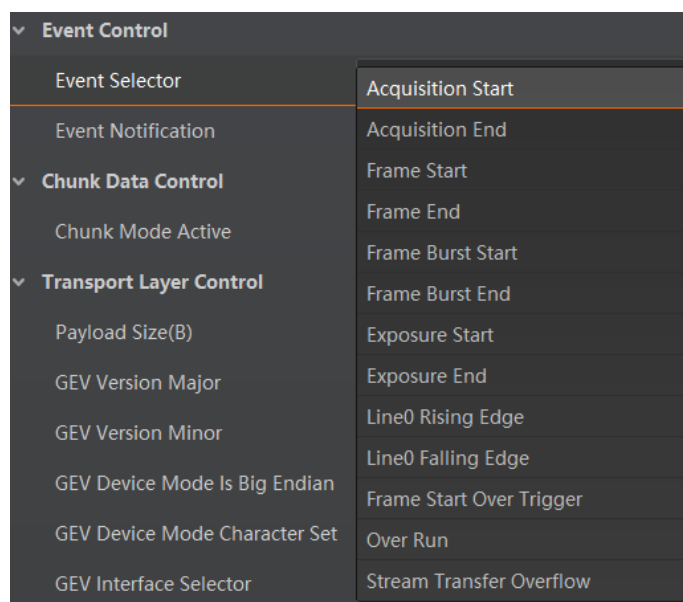


Figure 8-23 Select Event

3. Right click the connected camera, and click **Event Monitor**.

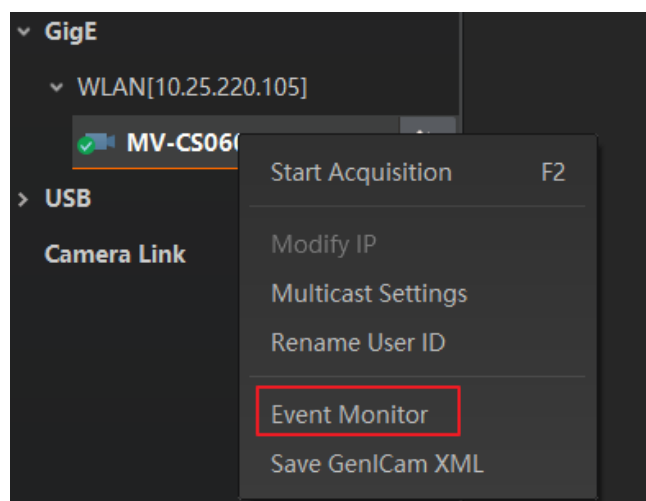


Figure 8-24 Click Event Monitor

4. View the specific event information in the event monitor interface.

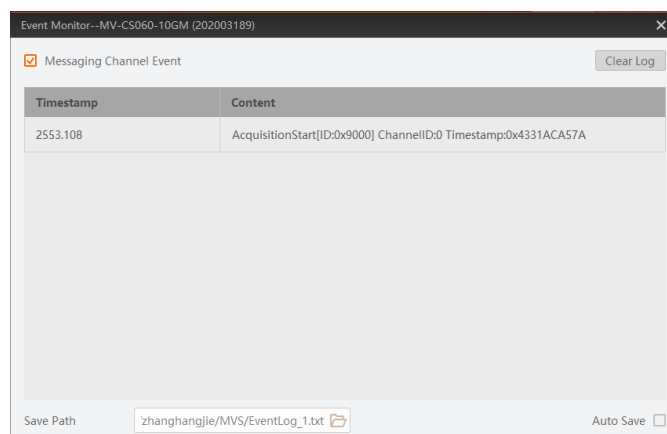


Figure 8-25 Event Monitor Interface

8.7 Set Action Command

NOTE

The action command function may differ by camera models.

The action command allows you to execute actions on multiple cameras at roughly the same time by using a single broadcast protocol message.

NOTE

- The action command function is available only with client software version of V3.1.0 and higher.
- If you want to send action commands that are executed in multiple cameras at exactly the same time, it is recommended to enable **Gev IEEE 1588** first by clicking **Transport Layer Control > Gev IEEE 1588**.

Steps:

1. Click **Tool > GigE Vision Action Command**.
2. Select **Network Interfaces** to set the subnet that the command to be sent to.
3. Enter the **Device Key**, **Group Key**, and **Group Mask**.

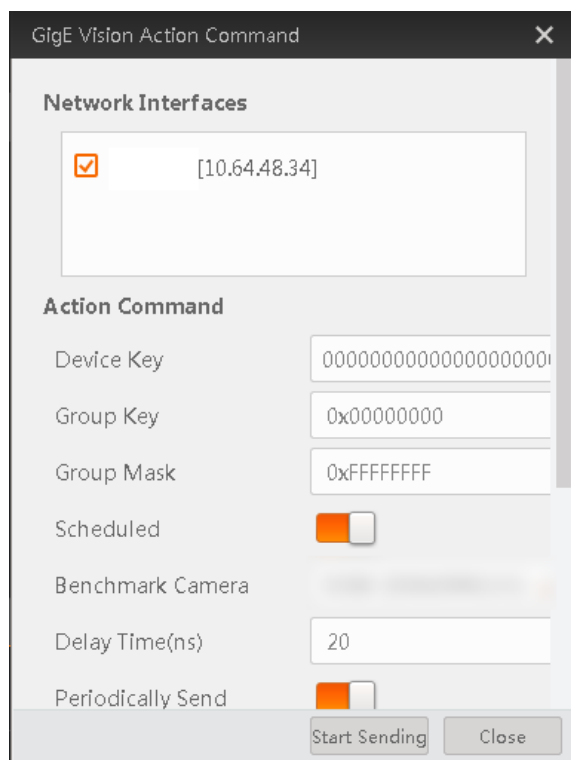



Figure 8-26 Set Action Command

 **NOTE**

The specific contents entered in **Device Key** and **Group Key** should be the same with those in **Action Device Key** and **Action Group Key** of the **Action Control** feature. The bitwise AND operation of the **Group Mask** against the **Action Group Mask** feature should results in non-zero.

4. Enable **Scheduled**.
5. Click  in **Benchmark Camera** to select one camera as benchmark camera. Once benchmark camera is selected, other cameras keep time synchronization with it.
6. (Optional) Enter **Delay Time** according to actual demands.

 **NOTE**

- The delay time should NOT be shorter than the maximum time required to transmit the command across the network.
 - When the benchmark camera receives the command, all the cameras will trigger certain actions simultaneously after the specified delay time.
7. (Optional) Enable **Periodically Send** to enable the client to send commands periodically, and enter **Sending Interval** according to actual demands.

 **NOTE**

The default value of sending interval is 1000 ms, and its range is from 1 ms to 3600000 ms.

8. (Optional) Enable **Request Acknowledgement** to display the acknowledgement messages.



NOTE

Up to 50 messages can be displayed. Once the message quantity exceeds 50, the earliest message will be automatically deleted.

9. Click **Start Sending**.

Chapter 9 I/O Output

9.1 Select Output Signal

The camera has 1 non-isolated output (Line 1), and 1 bi-directional I/O (Line 2) that can be configured as output signal. Here we take **Line 2** as an example.

Click **Digital IO Control**, select **Line 2** as **Line Selector**, and select **Strobe** as **Line Mode** to set line 2 as output signal.

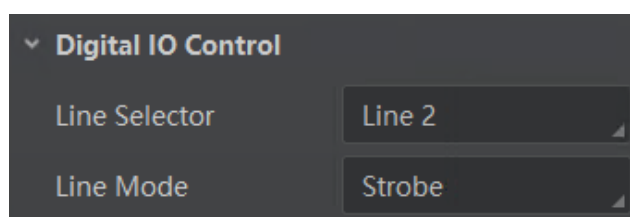


Figure 9-1 Set Line 2 as Output Signal

9.2 Set Output Signal

The output signal of the camera is switch signal that can be used to control external devices such as light source, PLC, etc.

9.2.1 Enable Level Inverter

The line inverter function allows the camera to invert the electrical signal level of an I/O line, and meets requirements of different devices for high or low electrical signal level. All high signals are converted to low signals and vice versa.

Click **Digital IO Control** > **Line Selector**, select line for **Line Selector**, and enable **Line Inverter**.

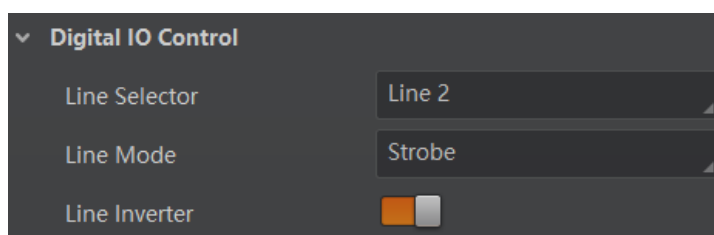


Figure 9-2 Enable Line Inverter

NOTE

The **Line Inverter** parameter is disabled by default.

9.2.2 Enable Strobe Signal

The strobe signal is used to directly output I/O signal to external devices when camera's event source occurs.

Click **Digital IO Control**, select different output events as **Line Source**, and enable **Strobe Enable**.



NOTE

The specific line source may differ by camera models.

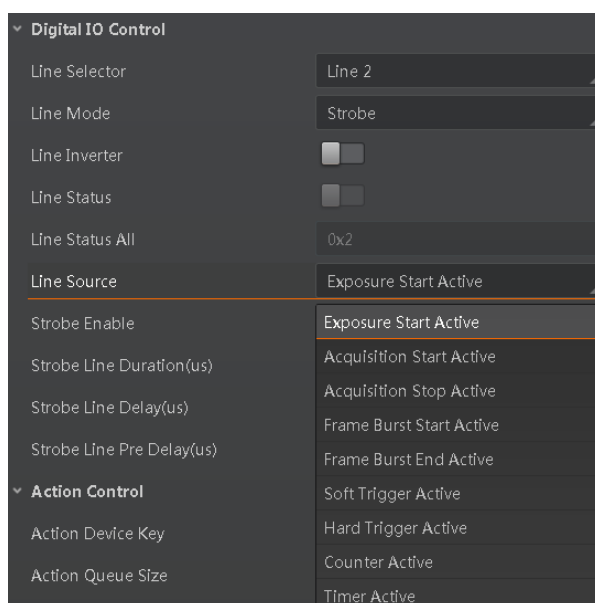


Figure 9-3 Set Line Source

For specific **Line Source**, please refer to following table for details.

Table 9-1 Line Source

No.	Name	Description
1	Exposure Start Active	It refers to output one I/O edge signal when starting exposure.
2	Acquisition Start Active	It refers to output one I/O edge signal when starting acquisition.
3	Acquisition Stop Active	It refers to output one I/O edge signal when stopping acquisition.
4	Frame Burst Start Active	It refers to output one I/O edge signal when starting triggering and acquiring images under Burst mode.

No.	Name	Description
5	Frame Burst End Active	It refers to output one I/O edge signal when stopping triggering and acquiring images under Burst mode.
6	Soft Trigger Out	It refers to output one I/O edge signal when software trigger acquisition.
7	Hard Trigger Active	It refers to output one I/O edge signal when hardware trigger acquisition.
8	Count Active	It refers to output one I/O edge signal when counter output is enabled.
9	Timer Active	It refers to output one I/O edge signal when timer output is enabled.
10	Frame Trigger Wait	The camera is currently waiting for a frame start trigger.

If **Timer Active** is selected as **Line Source**, and click **Execute** in **Line Trigger Software**. The camera will output the signal whose duration is equal to the value you set in **Strobe Line Duration** after **Strobe Line Delay**.

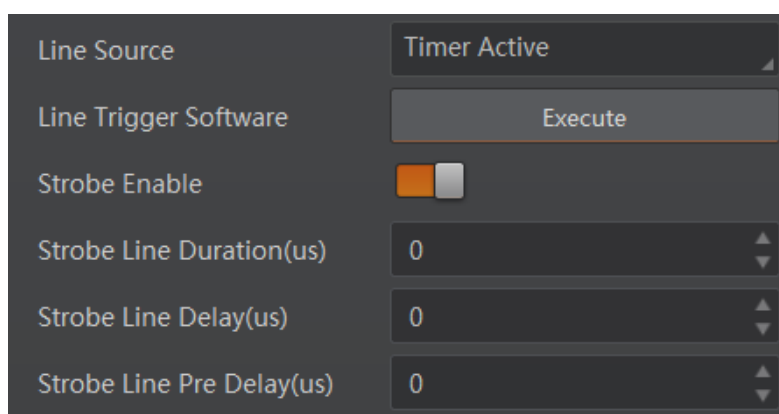


Figure 9-4 Set Timer Active

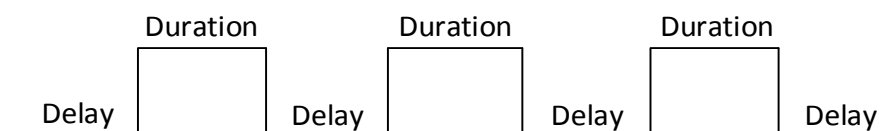


Figure 9-5 Sequence Diagram of Timer Active

Regarding strobe signal, you can also set its duration, delay and pre delay.

- **Set Strobe Line Duration**

After enabling strobe signal, you can set its duration. Click **Digital IO Control > Strobe Line Duration**, and enter **Strobe Line Duration**.

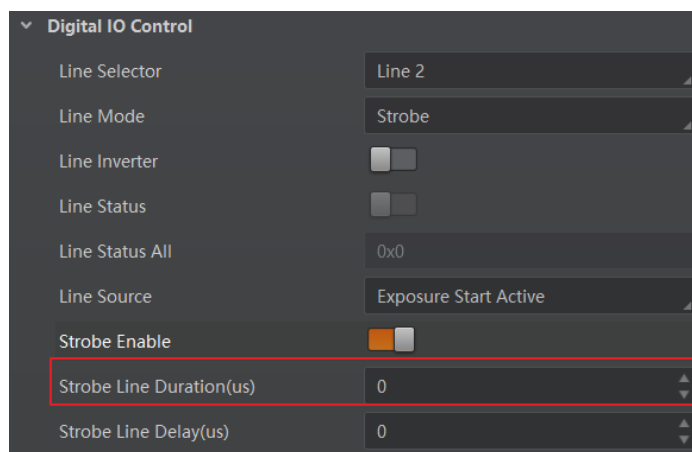


Figure 9-6 Set Strobe Line Duration

 **NOTE**

When the **Strobe Line Duration** value is 0, the strobe duration is equal to the exposure time. When the **Strobe Line Duration** value is not 0, the strobe duration is equal to **Strobe Line Duration** value.

- **Set Strobe Line Delay**

The camera supports setting strobe line delay to meet actual demands. When exposure starts, the strobe output doesn't take effect immediately. Instead, the strobe output will delay according to the strobe line delay setting.

Click **Digital IO Control > Strobe Line Delay**, and enter **Strobe Line Delay** according to actual demands.

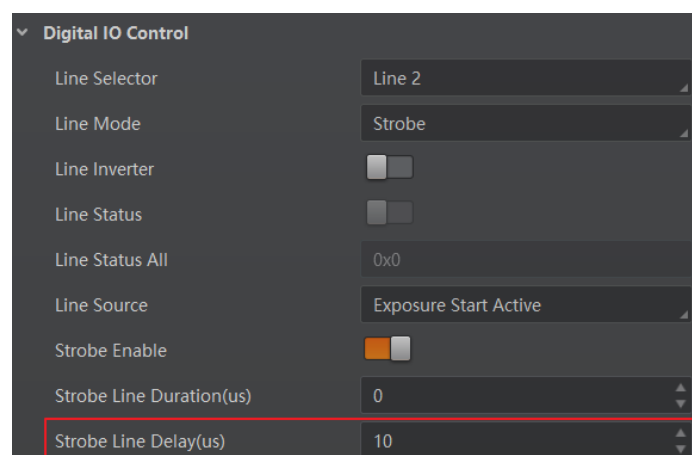


Figure 9-7 Set Strobe Line Delay

The sequence diagram of strobe line delay is shown below.

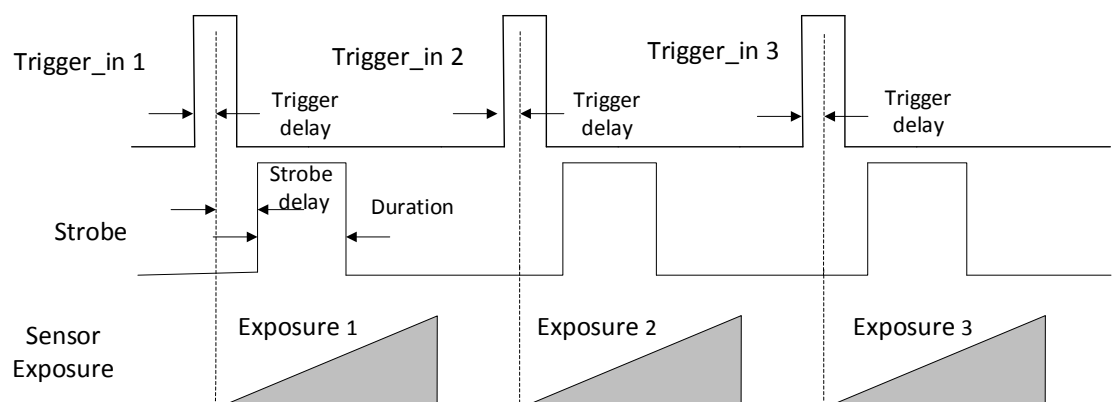


Figure 9-8 Sequence Diagram of Strobe Line Delay

● Set Strobe Line Pre Delay

The camera also supports the function of strobe line pre delay, which means that the strobe signal takes effect early than exposure. This function is applied to the external devices that have slow response speed.

Click **Digital IO Control** > **Strobe Line Pre Delay**, and enter **Strobe Line Pre Delay** according to actual demands.

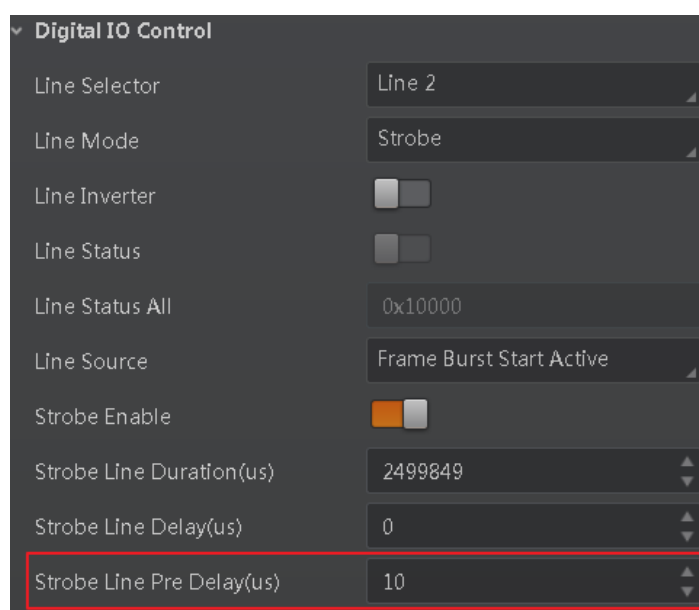


Figure 9-9 Set Strobe Line Pre Delay

The sequence diagram of strobe line pre delay is shown below.

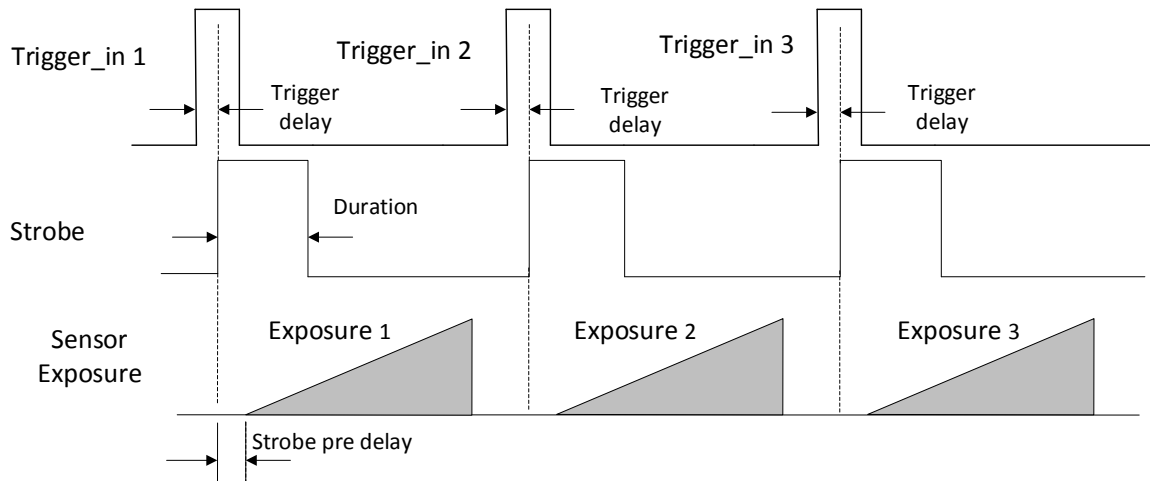


Figure 9-10 Sequence Diagram of Strobe Line Pre Delay

Chapter 10 I/O Electrical Feature and Wiring

10.1 I/O Electrical Feature

10.1.1 Line 0 Input Circuit

The Line 0 non-isolated input circuit is shown below.

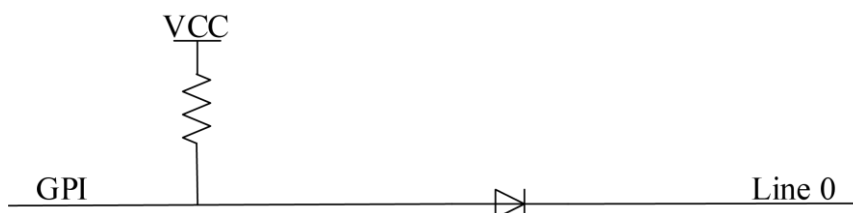


Figure 10-1 Line 0 Internal Circuit

When the voltage is 5 VDC and the external resistance is 100 Ω , the input logic level and electric feature of Line 0 are shown below.

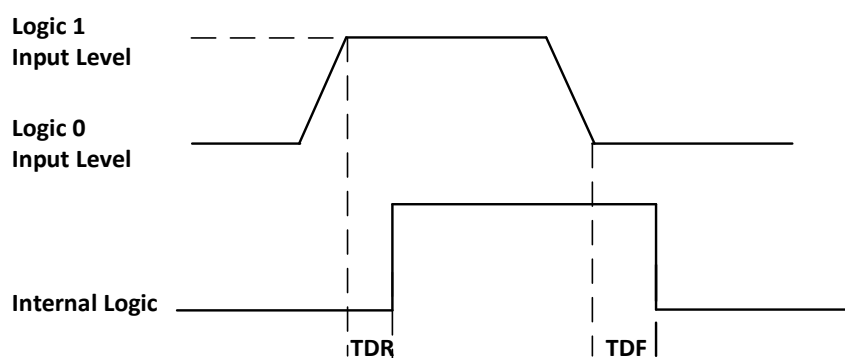


Figure 10-2 Input Logic Level

Table 10-1 Input Electrical Feature

Parameter Name	Parameter Symbol	Value
Input Logic Level Low	VL	0 VDC to 0.5 VDC
Input Logic Level High	VH	1.5 VDC to 24 VDC
Input Rising Delay	TDR	< 1 μ s

Parameter Name	Parameter Symbol	Value
Input Falling Delay	TDF	< 1 μ s

 **NOTE**

- Make sure that the input voltage is not from 0.5 VDC to 1.5 VDC as the electric status between these two values are not stable.
- The breakdown voltage is 30 VDC, and keep voltage stable.

10.1.2 Line 1 Output Circuit

The Line 1 non-isolated output circuit is shown below.



Figure 10-3 Line 1 Internal Circuit

The relation of external voltage, resistance and output level low is shown below.

Table 10-2 Parameter of Output Logic Level Low

External Voltage	External Resistance	VL (GPO1)
3.3 VDC	1 K Ω	160 mV
5 VDC	1 K Ω	220 mV
12 VDC	1 K Ω	460 mV
24 VDC	1 K Ω	860 mV
30 VDC	1 K Ω	970 mV

When the voltage of external resistance (1 K Ω) is pulled up to 5 VDC, the logic level and electrical feature of Line 1 are shown below.

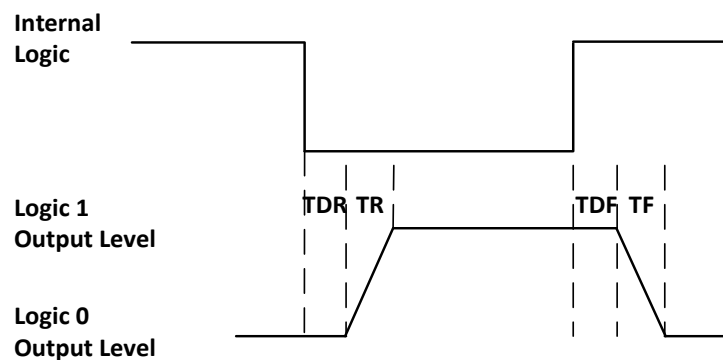


Figure 10-4 Output Logic Level

Table 10-3 Output Electric Feature

Parameter Name	Parameter Symbol	Value
Output Logic Level Low	VL	220 mV
Output Logic Level High	VH	4.75 V
Output Rising Time	TR	0.06 μ s
Output Falling Time	TF	0.016 μ s
Output Rising Delay	TDR	0 μ s 4 μ s
Output Falling Delay	TDF	< 1 μ s

10.1.3 Line 2 Bi-Directional I/O Circuit

The Line 2 bi-direction I/O circuit is shown below. The Line 2 can be configured as input signal or as output signal.

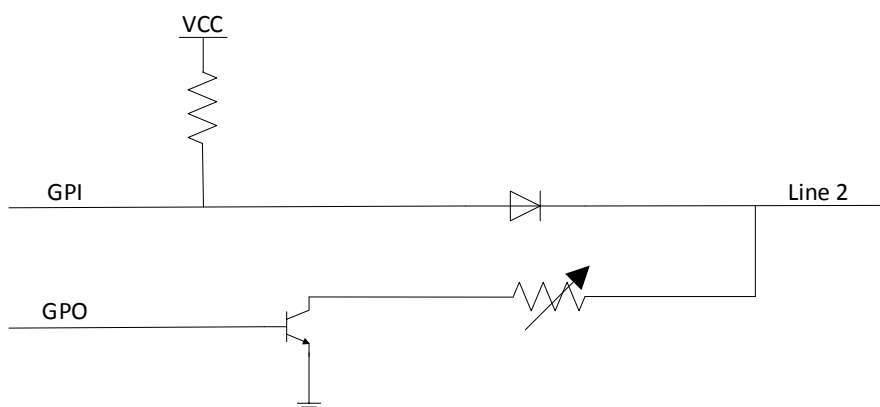


Figure 10-5 Line 2 Internal Circuit

Line 2 Configured as Input

With the condition of 100 Ω and 5 VDC, the logic level and electrical feature of configuring Line 2 as input are shown below.

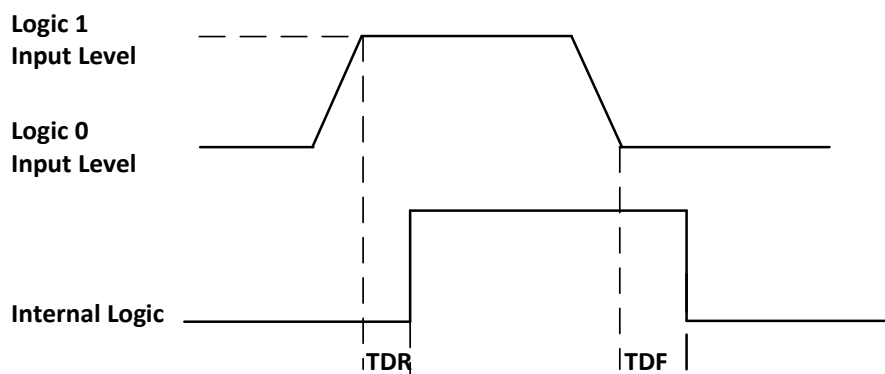


Figure 10-6 Input Logic Level

Table 10-4 Electrical Feature of Line 2 Input

Parameter Name	Parameter Symbol	Value
Input Logic Level Low	VL	0 VDC to 0.5 VDC
Input Logic Level High	VH	1.5 VDC to 24 VDC
Input Rising Time	TDR	< 1 μ s
Input Falling Time	TDF	< 1 μ s

NOTE

- Make sure that the input voltage is not from 0.5 VDC to 1.5 VDC as the electric status between these two values are not stable.
- The breakdown voltage is 30 VDC, and keep voltage stable.
- To prevent damage to the GPIO pin, please connect GND first and then input voltage in Line 2.

Line 2 Configured as Output

The relation of external voltage, resistance and output level low is shown below.

Table 10-5 Parameter of Output Logic Level Low

External Voltage	External Resistance	VL (GPIO2)
3.3 V	1 KΩ	160 mV
5 V	1 KΩ	220 mV
12 V	1 KΩ	460 mV
24 V	1 KΩ	860 mV
30 V	1 KΩ	970 mV

NOTE

The maximum current is 25 mA and the output impedance is 40 Ω.

When the voltage of external resistance (1 KΩ) is pulled up to 5 VDC, the logic level and electrical feature of configuring Line 2 as output are shown below.

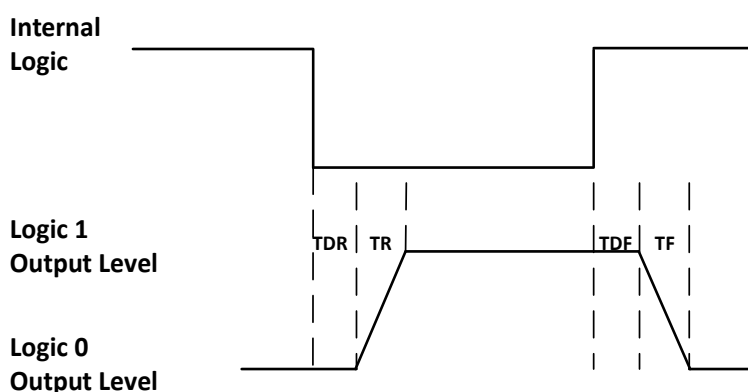


Figure 10-7 Output Logic Level

Table 10-6 Electrical Feature of Line 2 Output

Parameter Name	Parameter Symbol	Value
Output Logic Level Low	VL	220 mV
Output Logic Level High	VH	4.75 VDC
Output Rising Time	TR	0.06 μ s
Output Falling Time	TF	0.016 μ s
Output Rising Delay	TDR	0 μ s to 4 μ s
Output Falling Delay	TDF	< 1 μ s

10.2 I/O Wiring

10.2.1 Input Wiring

The camera has 1 non-isolated input (Line 0) and 1 bi-directional I/O (Line 2) that can be configured as input signal. Here we take type I camera and Line 0 as an example to introduce input wiring.

NOTE

The input wiring may differ by external device types.

- PNP Device

It is recommended to use 330 Ω pull-down resistor.

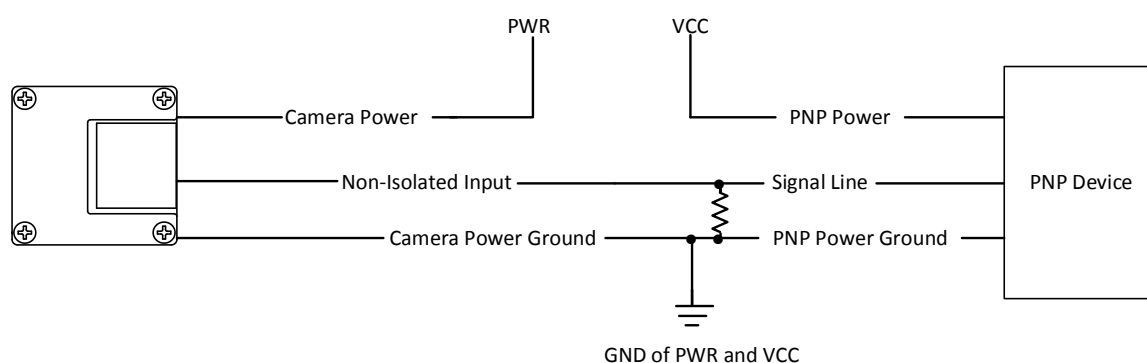


Figure 10-8 Line 0 Connects to PNP Device

- NPN Device

If the VCC of NPN device is 24 VDC, and it is recommended to use 4.7 KΩ pull-up resistor.

If the VCC of NPN device is 12 VDC, and it is recommended to use 1 KΩ pull-up resistor.

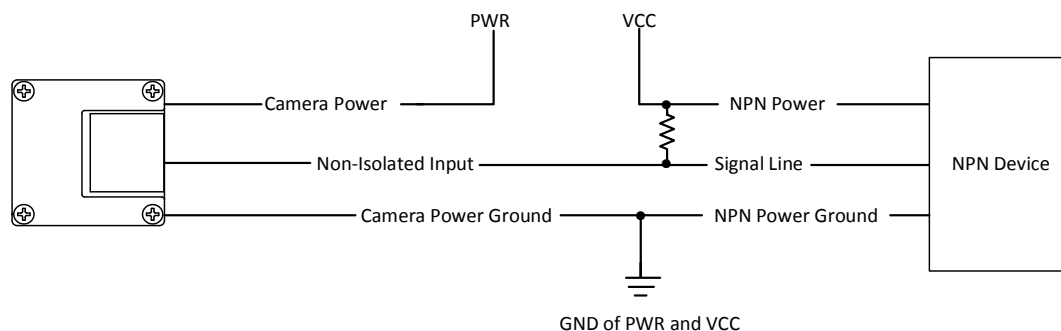


Figure 10-9 Line 0 Connects to NPN Device

- Switch

The switch value can provide low electrical level to trigger Line 0.

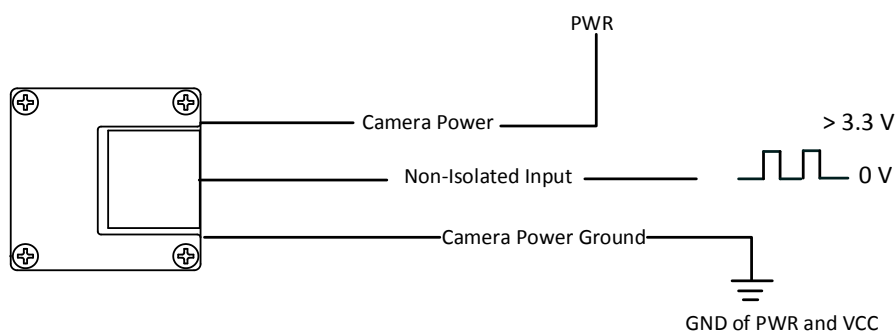


Figure 10-10 Line 0 Connects to a Switch

NOTE

If the camera uses Line 2 that is a bi-directional I/O as the hardware input trigger source, and non-isolated input in figures above should be replaced with bi-directional I/O.

10.2.2 Output Wiring

The camera has 1 non-isolated output (Line 1) and 1 bi-directional I/O (Line 2) that can be configured as output signal. Here we take type I camera and Line 1 as an example to introduce output wiring.

NOTE

The output wiring may differ by external device types.

● PNP Device

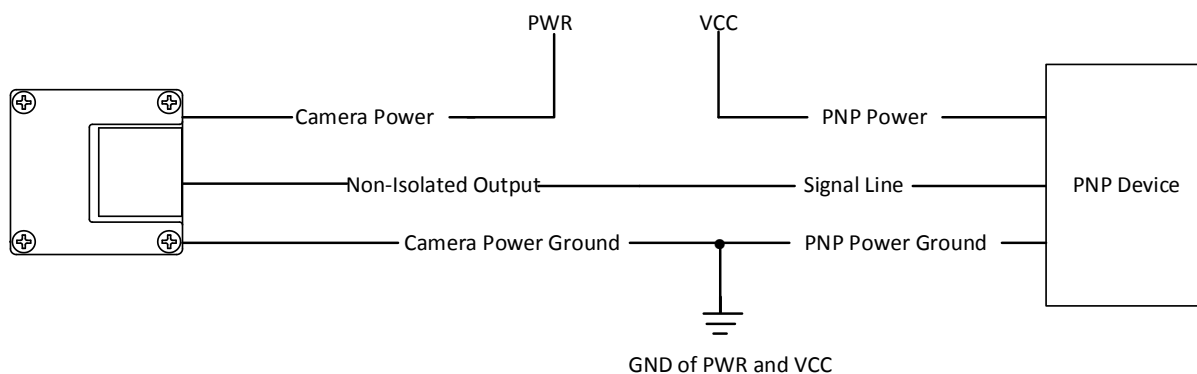


Figure 10-11 Line 1 Connects to PNP Device

● NPN Device

If the VCC of NPN device is 24 VDC, and it is recommended to use 4.7 K Ω pull-up resistor.
 If the VCC of NPN device is 12 VDC, and it is recommended to use 1 K Ω pull-up resistor.

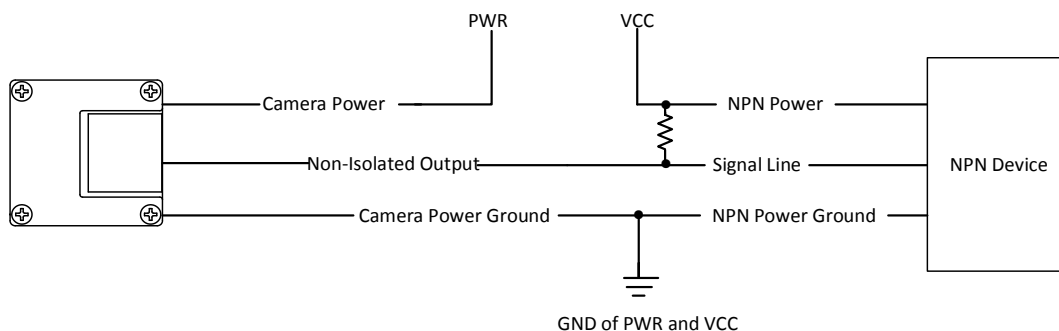


Figure 10-12 Line 1 Connects to NPN Device

 **NOTE**

If the camera uses Line 2 that is a bi-directional I/O as output signal, and non-isolated output in figures above should be replaced with bi-directional I/O.

Chapter 11 Image Parameter

11.1 View Resolution

Click **Image Format Control**, and view **Width Max** and **Height Max**. **Width Max** stands for the max. pixels per inch in width direction and **Height Max** stands for the max. pixels per inch in height direction.

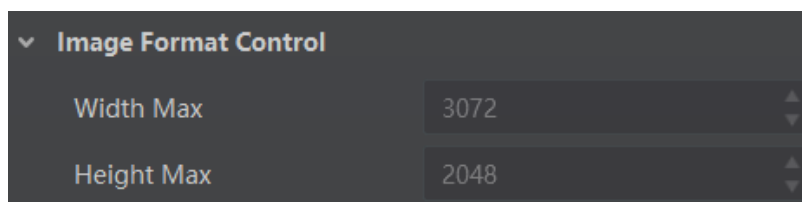


Figure 11-1 View Resolution

NOTE

The camera displays the image with max. resolution by default.

11.2 Set ROI

If you are only interested in a certain region of the image, you can set a Region of Interest (ROI) for the camera. Setting Region of Interest can reduce the bandwidth of the image being transmitted. Thus increasing the frame rate to some extent.

NOTE

- The camera currently supports 1 ROI only, that is, there is **Region 0** for **Region Selector** parameter only.
- Region of interest can be set only when you stop real-time acquisition.

Click **Image Format Control > Region Selector**, and enter **Width**, **Height**, **Offset X**, and **Offset Y**.

- Width: it stands for horizontal resolution in ROI area.
- Height: it stands for vertical resolution in ROI area.
- Offset X: it refers to the horizontal coordinate of the upper left corner of the ROI.
- Offset Y: it refers to the vertical coordinate of the upper left corner of the ROI.

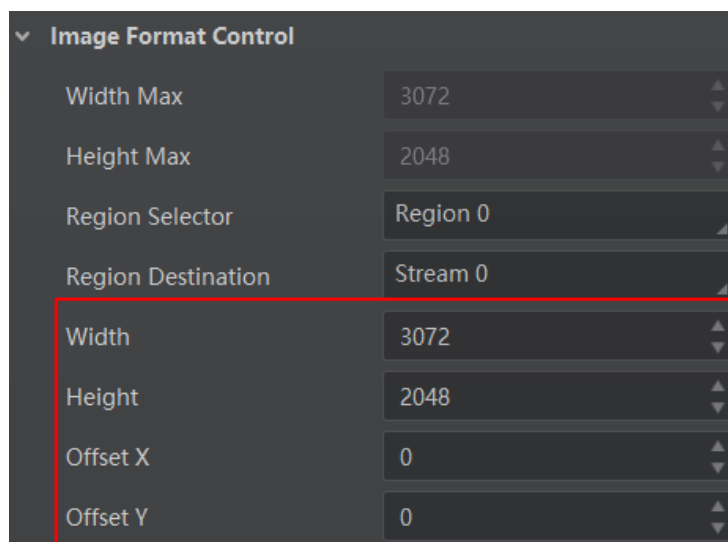


Figure 11-2 Set ROI

 NOTE

- The **Width** value plus **Offset X** value should not be larger than **Width Max** parameter value, **Height** value plus **Offset Y** value should not be larger than **Height Max** parameter value
- The ROI function may differ by camera models.

11.3 Set Image Reverse

 NOTE

The image reverse function may differ by camera models.

Reverse X refers to the image reverses in a horizontal way, and **Reverse Y** refers to the image reverses in a vertical way.

You can click **Image Format Control**, and enable **Reverse X** or **Reverse Y** according to actual demands.



Figure 11-3 Set Image Reverse

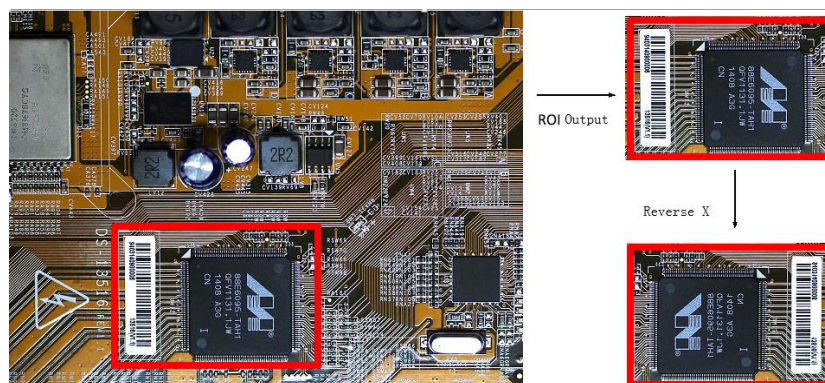


Figure 11-4 Image Reverse Comparison

11.4 Set Image Compression Mode

NOTE

The function of the image compression is related with camera models, firmware and pixel format, and the actual product you purchased should prevail.

Without affecting image quality, this function allows the camera to compress data before transmitting to the PC, and increase the frame rate to some extent.

Click **Image Format Control > Image Compression Mode**, and select **HB** as **Image Compression Mode**.

You can select **Compression** or **Burst** as **High Bandwidth Mode** according to actual demands. **Compression** only compresses the image data, while **Burst** compresses the image data and increases the frame rate.

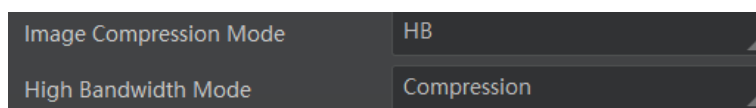


Figure 11-5 Set Image Compression Mode

You can view the mode's related parameters like **HB Abnormal Monitor** and **HB Version** in the device control attribute.

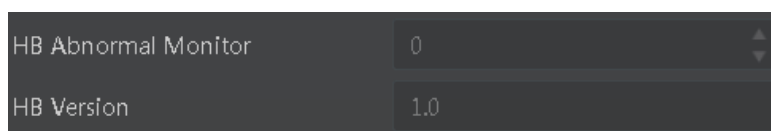


Figure 11-6 HB Abnormal Monitor and Version

- HB abnormal monitor is used to monitor image stream condition. If the size of compressed image is larger than that of raw image under HB function, this parameter will increase. When this parameter increases rapidly, it is recommended to disable the image compression mode.

- HB version refers to the version of this function.

11.5 Set Pixel Format



NOTE

The pixel format may differ by camera models.

Table 11-1 Pixel Format and Pixel Size

Pixel Format	Pixel Size (Bits/Pixel)
Mono 8, Bayer 8	8
Mono 10 Packed, Mono 12 Packed, Bayer 10 Packed, Bayer 12 Packed	12
Mono 10/12, Bayer 10/12, YUV422Packed, YUV 422 (YUYV) Packed	16
RGB 8, BGR 8	24

Click **Image Format Control** > **Pixel Format**, and set **Pixel Format** according to actual demands.

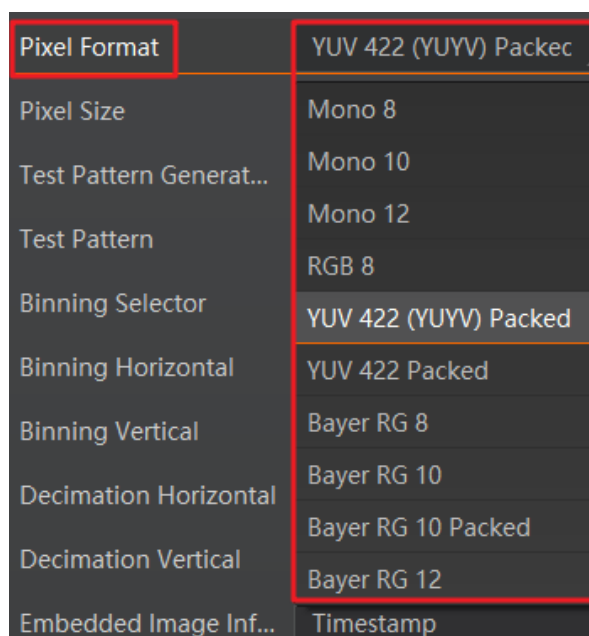


Figure 11-7 Set Pixel Format

11.6 Set Test Pattern



NOTE

The test pattern may differ by camera models.

The camera supports test pattern function. When there is exception in real-time image, you can check whether image of test mode have similar problem to determine the reason. This function is disabled by default, and at this point, the outputted image by the camera is real-time image. If this function is enabled, the outputted image by the camera is test image.

Click **Image Format Control > Test Pattern**, and set **Test Pattern** according to actual demands

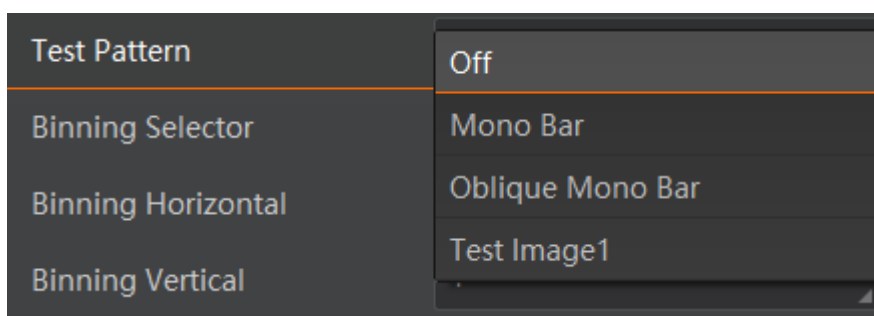


Figure 11-8 Set Test Pattern

The camera offers 4 test patterns, including **Mono Bar**, **Oblique Mono Bar**, **Vertical Color Bar**, and **Test Image 1**.

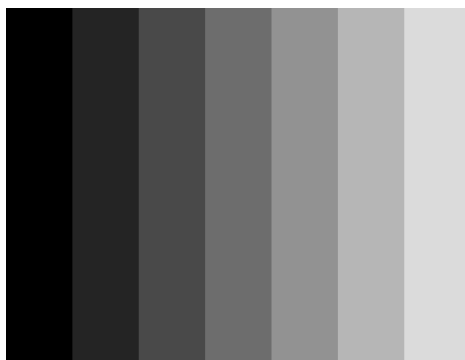


Figure 11-9 Mono Bar

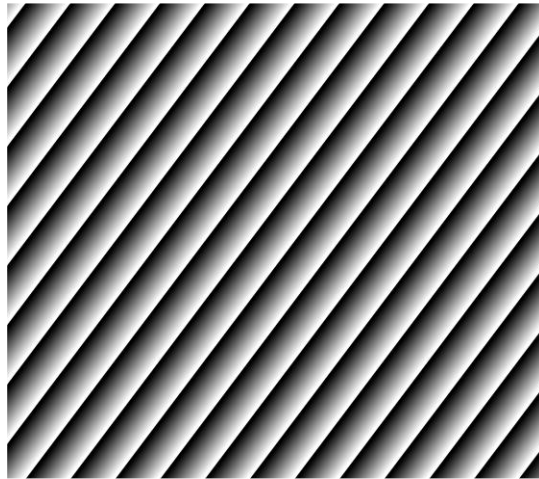


Figure 11-10 Oblique Mono Bar

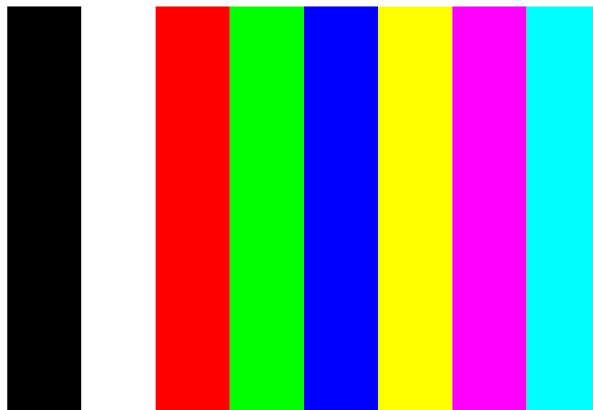


Figure 11-11 Vertical Color Bar

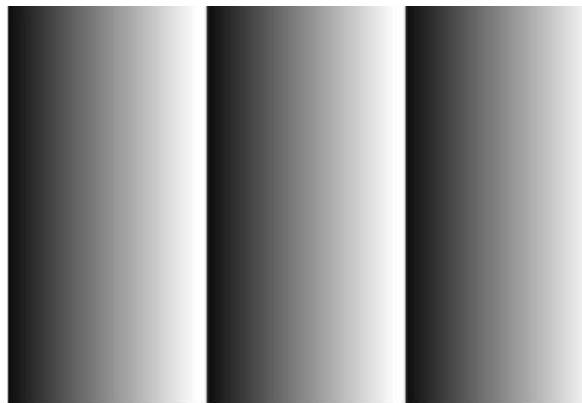


Figure 11-12 Test Image 1

 **NOTE**

- The mono camera does not support the vertical color bar.
- The pattern of the test image 1 may differ by camera models.

11.7 Set Binning

The purpose of setting binning is to enhance sensibility. With binning, multiple sensor pixels are combined as a single pixel to reduce resolution and improve image brightness.

Click **Image Format Control**, and set **Binning Horizontal** and **Binning Vertical** according to actual demands.

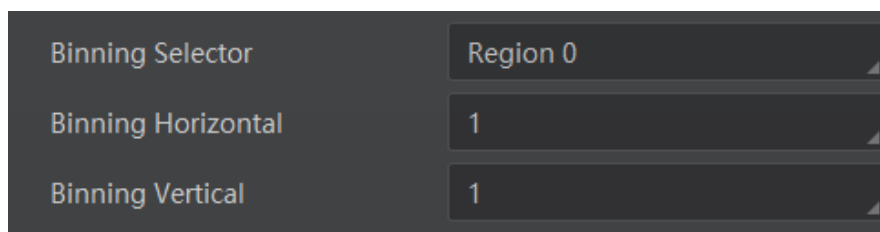


Figure 11-13 Set Binning

NOTE

- **Binning Horizontal** refers to the image's width, and **Binning Vertical** refers to the image's height.
- The binning function may differ by camera models.

11.8 Set Decimation

The decimation feature allows you to reduce the number of sensor pixel columns or rows that are transmitted by the camera. This procedure is also known as "subsampling". It reduces the amount of data to be transferred and may increase the camera's frame rate.

Click **Image Format Control**, and set **Decimation Horizontal** and **Decimation Vertical** according to actual demands.

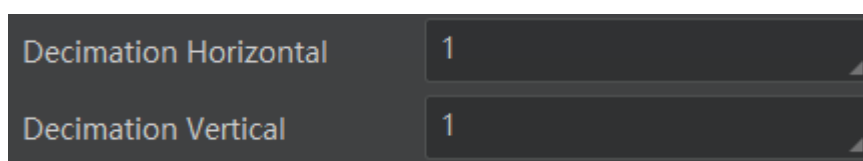


Figure 11-14 Set Decimation

NOTE

- **Decimation Horizontal** refers to the image's width, and **Decimation Vertical** refers to the image's height.
- The decimation function may differ by camera models.

11.9 Set Exposure Time Mode



NOTE

The exposure time mode may differ by camera models.

The camera offers 2 types of exposure time modes, including **Ultrashort** mode and **Standard** mode. Click **Acquisition Control > Exposure Time Mode**, and set **Exposure Time Mode** according to actual demands.

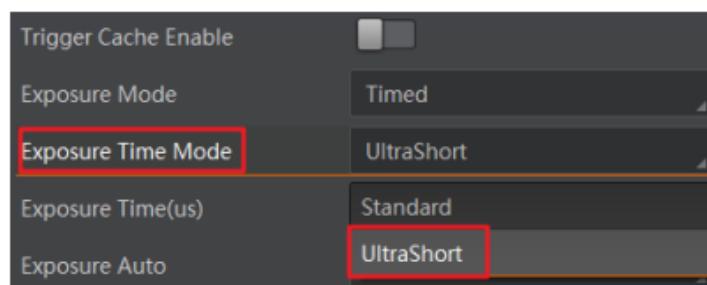


Figure 11-15 Set Exposure Time Mode



NOTE

If the camera you got does not support **Ultrashort** exposure time mode, and then there is no **Exposure Time Mode** parameter, and your camera supports **Standard** exposure time mode only by default.

11.10 Set Exposure Auto

Under the ultrashort exposure time mode, the camera exposes within an ultrashort time. The camera supports **Off** exposure mode only, you can adjust **Exposure Time** manually only.

Under the standard exposure time mode, the camera supports 3 types of exposure methods: **Off**, **Once** and **Continuous**. Click **Acquisition Control > Exposure Auto**, and select **Exposure Auto** according to actual demands. The exposure method and principle are shown below.

Table 11-2 Exposure Method and Principle

Exposure Method	Principle
Off	The camera exposes according to the value configured by user in Exposure Time .
Once	Adjust the exposure time automatically according to the image brightness. After adjusting, it will switch to

Exposure Method	Principle
	Off Mode.
Continuous	Adjust the exposure time continuously according to the image brightness.

When the **Exposure Auto** is set as **Off**, you can enter **Exposure Time** manually. When the **Exposure Auto** is set as **Once** or **Continuous**, the exposure time should be within the range of **Auto Exposure Time Lower Limit** and **Auto Exposure Time Upper Limit**.

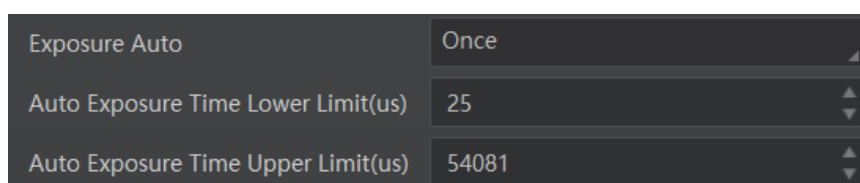


Figure 11-16 Set Exposure Time under Once or Continuous Mode

NOTE

If the camera is under **Continuous** exposure method, once external trigger mode is enabled, the camera will automatically switch to **Off** exposure mode.

11.11 Set HDR

NOTE

The HDR function may differ by camera models.

The camera supports HDR (High Dynamic Range) function that the camera acquires images based on 4 sets of settings, and each with its own exposure time and gain.

Click **Acquisition Control**, enable **HDR Enable**, select **0, 1, 2** or **3** as **HDR Selector**, and set **HDR Shutter** and **HDR Gain**.

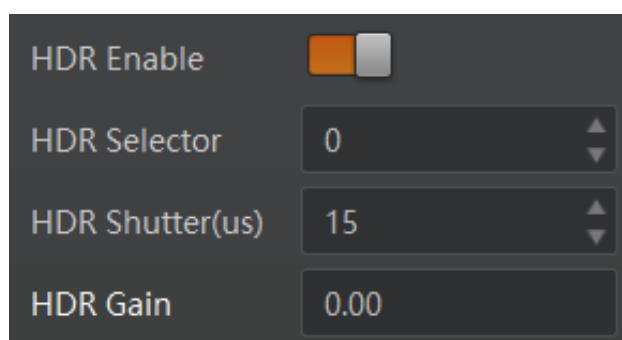


Figure 11-17 Set HDR

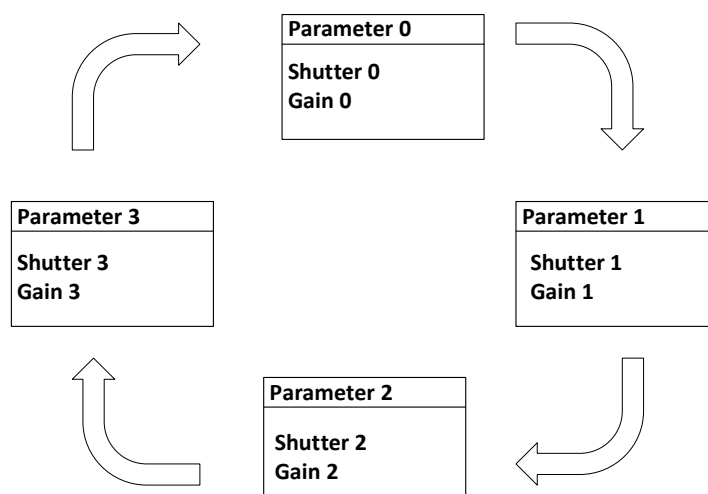


Figure 11-18 HDR Polling

11.12 Set Gain

NOTE

The gain function may differ by camera models.

The camera has 2 types of gain, including the analog gain and digital gain. The analog gain is applied before the signal from the camera sensor is converted into digital values, while digital gain is applied after the conversion.

When increasing gain, the image noise will increase too, which will influence image quality. If you want to increase image brightness, it is recommended to increase the camera's exposure time. If the exposure time reaches its upper limit, it is recommended to increase analog gain. If the image is still dark after increasing exposure time and analog gain, at this time, you can increase digital gain.

11.12.1 Set Analog Gain

The camera supports 3 types of analog gain modes: **Off**, **Once** and **Continuous**. Click **Analog Control**, and select **Gain Auto** according to actual demands. The analog gain mode and principle are shown below.

Table 11-3 Analog Gain Mode and Principle

Gain Mode	Principle
Off	The camera adjusts gain according to the value configured by user in Gain .
Once	Adjust the gain automatically according to the image

Gain Mode	Principle
	brightness. After adjusting, it will switch to Off Mode .
Continuous	Adjust the gain continuously according to the image brightness.

When the analog gain is set as **Once** or **Continuous**, the gain should be within the range of **Auto Gain Lower Limit** and **Auto Gain Upper Limit**.

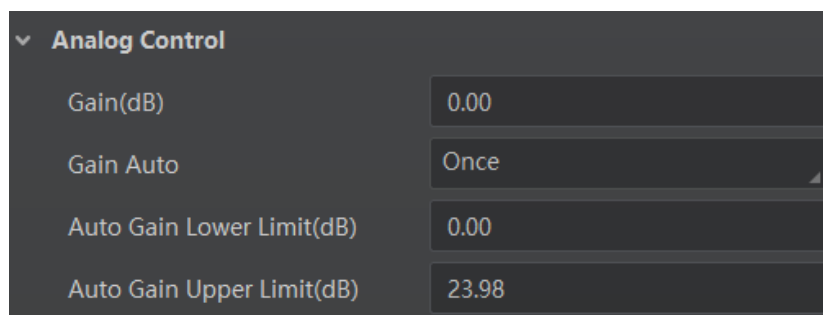


Figure 11-19 Set Gain under Once or Continuous Mode

11.12.2 Set Digital Gain

Apart from analog gain, the camera supports digital gain function. When analog gain reaching its upper limit and the image is still too dark, it is recommended to improve image brightness via digital gain.

Click **Analog Control**, enable **Digital Shift Enable**, and enter **Digital Shift** according to actual demands. The range of **Digital Shift** is from -6 to 6.

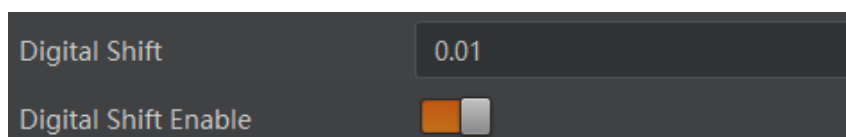


Figure 11-20 Set Digital Gain

11.13 Set Brightness

The camera brightness refers to the brightness when the camera adjusts image under **Once** or **Continuous** exposure mode, or **Once** or **Continuous** gain mode. You can set brightness as shown below.

NOTE

You should enable **Once** or **Continuous** exposure mode, or **Once** or **Continuous** gain mode first before setting brightness.

Click **Analog Control > Brightness**, and set **Brightness** according to actual demand, and its range is from 0 to 255.



Figure 11-21 Set Brightness

NOTE

After setting brightness, the camera will automatically adjust exposure time to let image brightness reach target one. Under **Once** or **Continuous** exposure mode, or **Once** or **Continuous** gain, the higher the brightness value, the brighter the image will be.

11.14 Set Black Level

The camera supports black level function that allows you to change the overall brightness of an image by changing the gray values of the pixels by a specified amount.

Click **Analog Control > Black Level Enable**, enable **Black Level Enable**, and enter **Black Level** according to actual demands. The range of black level is from 0 to 4095.

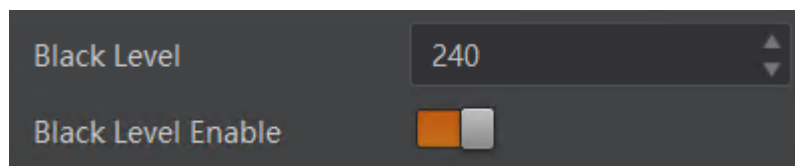


Figure 11-22 Set Black Level

11.15 Set White Balance

NOTE

White balance is only available for color cameras.

The white balance refers to the camera color adjustment depending on different light sources. Adjust the Gain Value of the image's R channel and B channel to keep white regions white under different color temperatures. Ideally, the proportion of R channel, G channel and B channel in the white region is 1:1:1.

Click **Analog Control > Balance White Auto**, and select **Balance White Auto** according to actual demands.

Table 11-4 White Balance Status Description

White Balance Mode	Description
Off	You need to set the R, G, B value manually, between 1 and 4095. 1024 means ratio is 1.0
Once	Automatic white balance once. Adjust the white balance for a certain amount of time then stop. It implements an algorithm that finds possible gray areas in the Bayer data.
Continuous	Continuous automatic white balance. It implements an algorithm that finds possible gray areas in the Bayer data.

It is recommended to correct white balance when there is great difference between the camera's color effect and actual effect. You can correct white balance as shown below.

Steps:

1. Put a white paper in the range of the camera's field of view, and make sure the paper covers the entire field of view.
2. Set exposure and gain. It is recommended to set image brightness value between 120 and 160.
3. Select **Once** as **Balance White Auto**, and the camera will automatically adjust white balance for once.

If there is still great difference between correction effect and actual color, it is recommended to correct white balance according to following steps.

Steps:

1. Select **Off** as **Balance White Auto**. At this time, **Balance Ratio** is **1024**.
2. Find corresponding R/G/B channel in **Balance Ratio Selector**. Here we take **Green** as an example.
3. Find camera's R/G/B value.
4. Take **Green** as correction standard, and manually adjust other two channels (R channel and B channel) to let these three channels have same value.

**NOTE**

- Here we take **Green** as an example. For specific **Balance Ratio Selector** value, please refer to the actual condition.
- In order to avoid repeated correction after rebooting the camera, it is recommended to save white balance parameter to **User Set** after white balance correction. You can refer to the Section **Save and Load User Set** for details.

- If the light source and color temperature in environment change, you need to correct white balance again.

11.16 Set Gamma Correction

NOTE

- The Gamma correction function may differ by camera models.
- Bayer pixel format of color cameras does not support Gamma correction.

The camera supports Gamma correction function. Generally, the output of the camera's sensor is linear with the photons that are illuminated on the photosensitive surface of the sensor. Gamma correction provides a non-linear mapping mechanism as shown below.

- Gamma value between 0 and 1: image brightness increases, dark area becomes brighter.
- Gamma value between 1 and 4: image brightness decreases, dark area becomes darker.

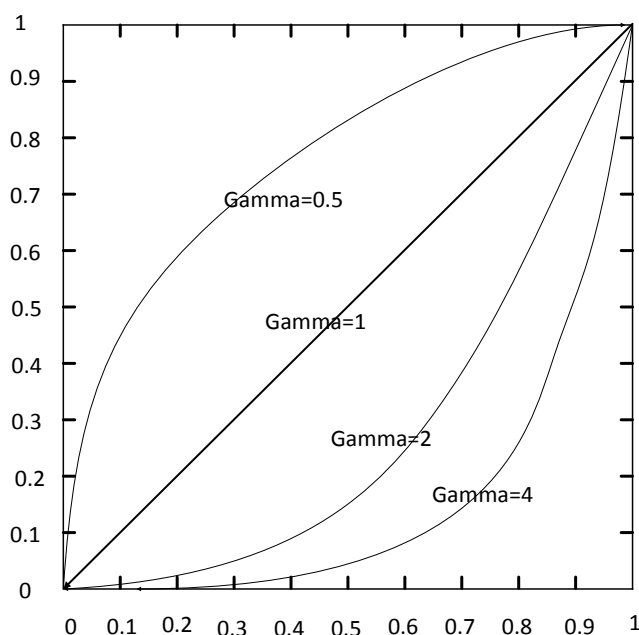


Figure 11-23 Gamma Curve

There are 2 types of Gamma correction, including **User** mode and **sRGB** mode. You can set User mode as shown below.

Steps:

1. Click **Analog Control > Gamma Selector**.
2. Select **User** as **Gamma Selector**.
3. Enable **Gamma Enable**.
4. Enter **Gamma** according to actual demands, and its range is from 0 to 4.

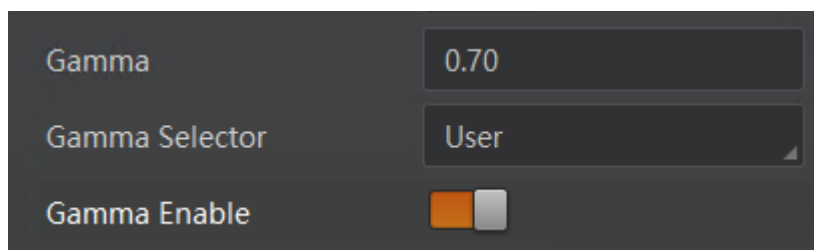


Figure 11-24 Set User Mode

You can set sRGB mode as shown below.

Steps:

1. Click **Analog Control > Gamma Selector**.
2. Select **sRGB** as **Gamma Selector**.
3. Enable **Gamma Enable**.

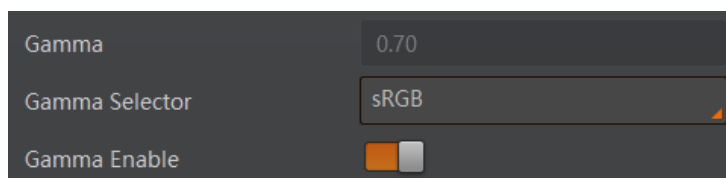


Figure 11-25 Set sRGB Mode

11.17 Set Sharpness



NOTE

The sharpness function is available when the camera is in Mono and YUV pixel formats.

The camera supports sharpness function that can adjust the sharpness level of the image edge, and this function is disabled by default.

Click **Analog Control > Sharpness Enable**, enable **Sharpness Enable**, and enter **Sharpness** according to actual demands. The range of the brightness is from 0 to 100.

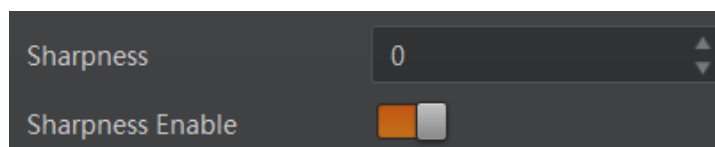


Figure 11-26 Set Sharpness

11.18 Set Digital Noise Reduction



NOTE

This function may differ by camera models.

The function of digital noise reduction can increase the image's SNR and improve its quality.

Click **Analog Control > Digital Noise Reduction Mode**, select **Expert** as **Digital Noise Reduction Mode**, and enter **Denoise Strength** and **Noise Correct** according to actual demands.

Denoise Strength refers to the intensity of the digital noise reduction, you can increase it to have a better effect. **Noise Correct** refers to the noise horizontal correction value, and it is used to adjust the noise curve.

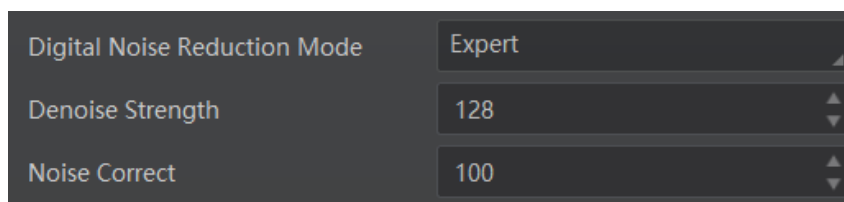


Figure 11-27 Set Digital Noise Reduction

11.19 Set AOI

NOTE

The AOI function may differ by camera models.

The camera supports AOI function that can adjust the brightness and white balance of the entire image based on the area you selected.

Steps:

1. Click **Analog Control > Auto Function AOI Selector**, and select **AOI 1** or **AOI 2 Auto Function AOI Selector**.
2. Enter **Auto Function AOI Width**, **Auto Function AOI Height**, **Auto Function AOI Offset X**, and **Auto Function AOI Offset Y** according to actual demands.
3. Enable **Auto Function AOI Usage Intensity** if **AOI 1** is selected as **Auto Function AOI Selector**. Or enable **Auto Function AOI Usage White Balance** if **AOI 2** is selected as **Auto Function AOI Selector**.

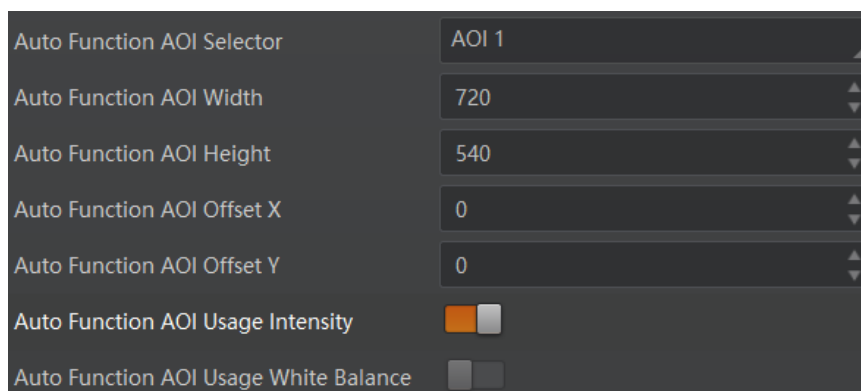


Figure 11-28 Set AOI

11.20 Set Color Transformation Control

NOTE

- The function of color transformation control is only available for color cameras.
- Currently, **RGB to RGB** is available for **Color Transformation Selector** only.

The color transformation control is used to restore color and eliminate the overlap in the color channels.

Click **Color Transformation Control**, select **Color Transformation Value Selector**, and set **Color Transformation Value** according to actual demand.

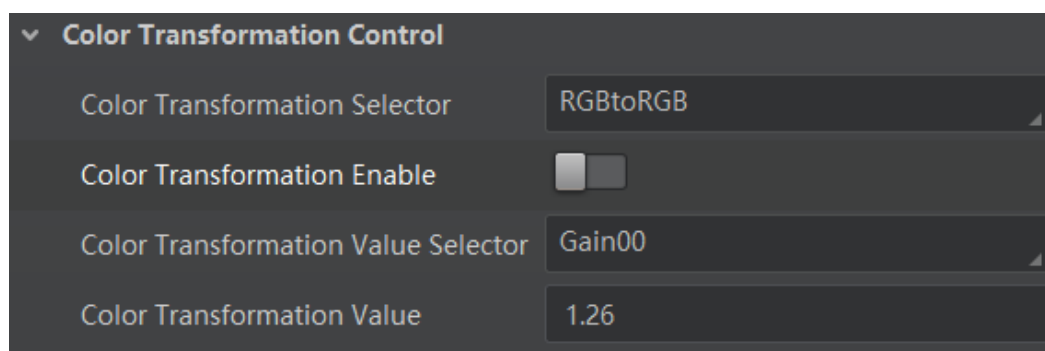


Figure 11-29 Set Color Transformation Control

11.21 Set LUT

A Look-Up Table (LUT) is a customized grayscale-mapping table. The LUT allows you to replace the pixel values in your images by values defined by you.

Steps:

1. Click **LUT Control**, and enable **LUT Enable**.
2. Enter **LUT Index** according to actual demands, and its range is from 0 to 1023.

3. Enter **LUT Value** according to actual demands, and its range is from 0 to 4095.
4. Click **Execute** in **LUT Save**.

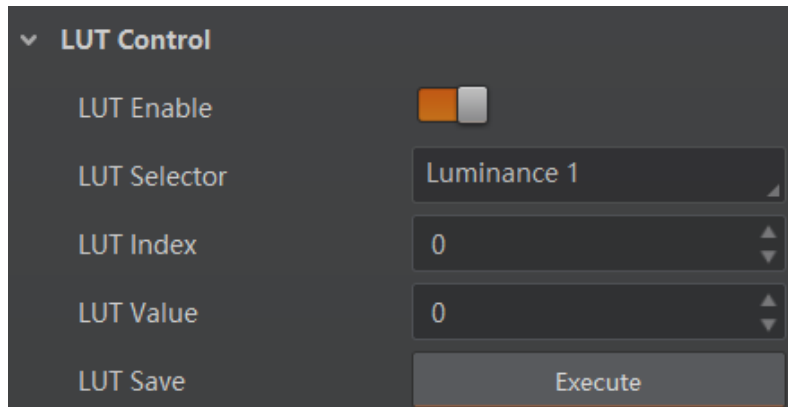


Figure 11-30 Set LUT

 **NOTE**

- You cannot use Gamma correction function and LUT function at the same time.
- LUT function is not supported when the color camera is in Bayer pixel format.

Chapter 12 Other Functions

12.1 Device Control



NOTE

The specific device control parameters may differ by camera models.

In the **Device Control** attribute, you can view device information, edit device name, reset device, etc. The specific parameters in **Device Control** attribute are shown below.

Table 12-1 Device Control Parameter Description

Parameter	Read/Write	Description
Device Type	Read only	It is the device type.
Device Scan Type	Read only	It is the scan type of the sensor.
Device Vendor Name	Read only	It is the name of device manufacturer.
Device Model Name	Read only	It is the device model.
Device Manufacture Info	Read only	It is the manufacturer information.
Device Version	Read only	It is the device version.
Device Firmware Version	Read only	It is the device firmware version.
Device Serial Number	Read only	It is the device serial number.
Device ID	Read only	It is the device ID.
Device User ID	Read and write	<p>Device name and it is empty by default. You can set according to your preference.</p> <ul style="list-style-type: none"> ● If User ID is empty, the client software displays the device model + serial number. ● If you set it, the client software displays the User ID you set + serial number.

Parameter	Read/Write	Description
Device Uptime(s)	Read only	It is the period of time when device is powered up.
Board Device Type	Read only	It is the device type.
Device Connection Selector	Read and write	It is the ID of GenICam XML.
Device Connection Speed (Mbps)	Read only	It is the device connection speed.
Device Link Selector	Read and write	It selects device link.
Device Link Speed(Mbps)	Read only	It is the link speed.
Device Link Connection Count	Read only	It is the link connection quantity.
Device Link Heartbeat Mode	Read and write	It enables heartbeat mode or not.
Device Stream Channel Count	Read only	It counts data packet quantity.
Device Stream Channel Selector	Read and write	It is the character set used in register.
Device Stream Channel Type	Read only	It is the stream channel type.
Device Stream Channel Link	Read only	It is the stream channel link quantity.
Device Stream Channel Endianness	Read only	It is the image data endianness.
Device Stream Channel Packet Size(B)	Read and write	It is the data packet size.

Parameter	Read/Write	Description
Device Event Channel Count	Read only	It is the channel quantity that the device supports.
Device Character Set	Read only	It is the character set used in register.
Device Reset	Read and write	Click Execute to reset the device.
Find Me	Read and write	Click Execute to let red indicator flash once, and find device.
Device Max Throughput(Kbps)	Read only	It is the maximum flow of device operation.
Device PJ Number	Read only	It is the device's project number.
HB Abnormal Monitor	Read only	It monitors image stream condition (HB is selected as Image Compression Mode).
HB Version	Read only	It is the version of the image compression mode (HB is selected as Image Compression Mode).

12.2 Embedded Information in Image

NOTE

- The embedded information function and chunk data function may differ by camera models.
- Embedded information types, including width, height, offset X, offset Y and pixel format, are for cameras that support the chunk data function only.
- The camera embeds category that you select into the image data. The ROI area does not influence collection information embedding. If the ROI area is small and there is not enough space in first line image, and then the collection information will be embedded into the second line image.

The camera supports adding and embedding the collection information to the image data. You can set in the client software and define which information to be embedded in the image data.

Embedded information includes following categories: **Timestamp, Gain, Exposure, Brightness Info, Frame Counter, Ext Triggering Count, Line Input Output, Width, Height, Offset X, Offset Y, Pixel Format**, and **ROI Position**. Each category of embedded information has its unique data format.

Table 12-2 Embedded Information Data Format

No.	Information Type	Byte	Data Format Description
1	Timestamp	4 Bytes	4 bytes are used to transfer the timestamp information.
2	Gain	4 Bytes	4 bytes are used to transfer the gain information. Each low 8 bits of the 4 valid data are combined to transfer the gain information. Value Range: 0 to 1023. Note: High bits will be complemented with 0 automatically.
3	Exposure	4 Bytes	4 bytes are combined to show the exposure time, and the unit is μs .
4	Brightness Info	4 Bytes	4 bytes are used to transfer the brightness information. Value Range: 0 to 4095. Note: High bits will be complemented with 0 automatically.
5	Frame Counter	4 Bytes	Value Range: 0 to $2^{32}-1$.
6	Ext Trigger Count	4 Bytes	Value Range: 0 to $2^{32}-1$.
7	Line Input Output	4 Bytes	4 bytes are used to transfer the line input and output information.
8	Width	4 Bytes	Value Range: 0 to $2^{32}-1$.
9	Height	4 Bytes	Value Range: 0 to $2^{32}-1$.
10	Offset X	4 Bytes	Value Range: 0 to $2^{32}-1$.
11	Offset Y	4 Bytes	Value Range: 0 to $2^{32}-1$.

No.	Information Type	Byte	Data Format Description
12	Pixel Format	4 Bytes	Value Range: 0 to $2^{32}-1$.
13	ROI Position	8 Bytes	The column coordinate occupies 2 bytes, and the row coordinate occupies 2 bytes. The column coordinate information comes first. The length and width occupy 2 bytes respectively, and the length information comes first.

Click **Image Format Control > Embedded Image Info Selector**, select specific parameters as **Embedded Image Info Selector**, and enable **Frame Spec Info**.

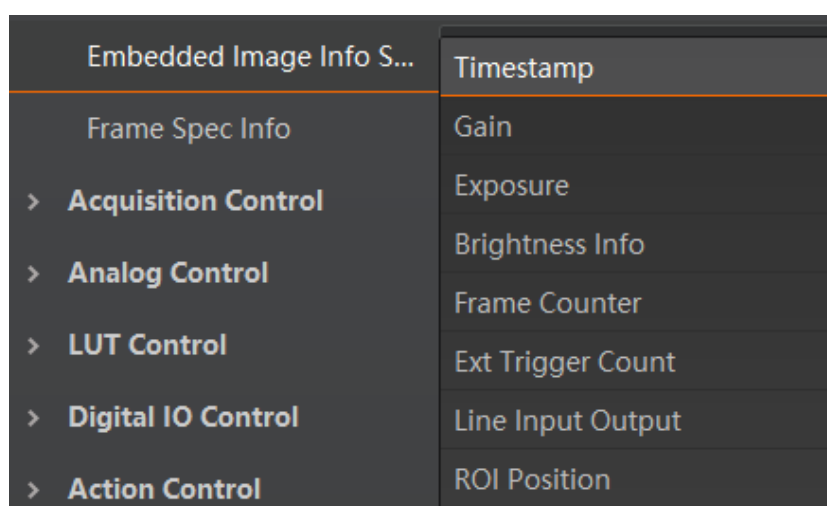


Figure 12-1 Set Embedded Information

You can also use the chunk data function to add the embedded information in images. The chunk data function allows you to generate supplementary image data and append that data to every image that you acquire.

 **NOTE**

- The chunk data function may differ by camera models.
- The chunk data function is not supported if the camera enables the image compression mode.
- The camera uses the chunk data function to realize embedded information in image in priority if you enable chunk data function and embedded information function both.

Steps:

1. Click **Chunk Data Control**, and enable **Chunk Mode Active**.
2. Select specific parameters in **Chunk Selector** according to actual demands.

3. Enable **Chunk Enable**.

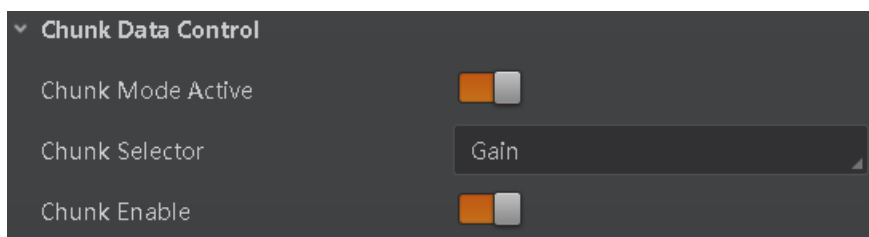


Figure 12-2 Set Chunk Data Control

12.3 Set Multicast

NOTE

The multicast function may differ by camera models.



The multicast function allows you to access the same camera via multiple PCs, and it has 3 modes as follows.

Controller and Data Receiver: This mode allows you to read and edit the camera's parameters, and get its image data.

Controller: This mode allows you to read and edit the camera's parameters, but you cannot get its image data.

Data Receiver: This mode allows you read the camera's parameters and get its image data, but you cannot edit the camera's parameters.

NOTE

- The same camera can be connected to only one MVS client software via the controller and data receiver or the controller mode at the same time, while in the data receiver mode, the same camera can be connected to multiple client software.
- When the multicast function is enabled, the camera icon on the client software of other PCs will become , and you can connect the camera via the data receiver mode.
- When you connect the camera via the data receiver mode, the camera icon on the client software of your PC will become , and at this time, you can read its parameters only.
- You can set multicast function for both the available camera and connected camera, but the specific settings are different.

For the available camera, you can set multicast function as follows.

Steps:

1. Right click the available camera, and click **Multicast Settings**.

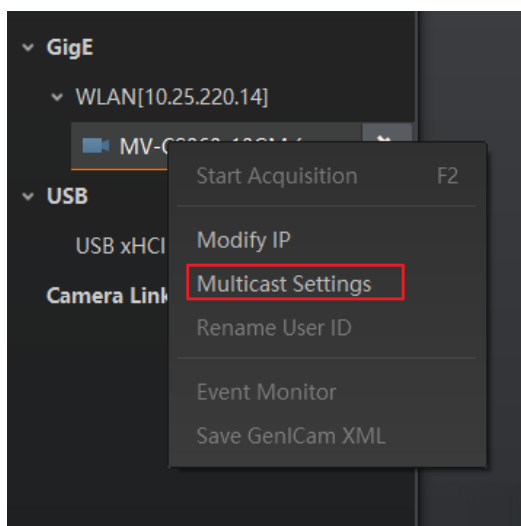


Figure 12-3 Click Multicast Settings

2. Select **Role**, and enter the **IP Address** and **Port**.
3. Click **OK**.

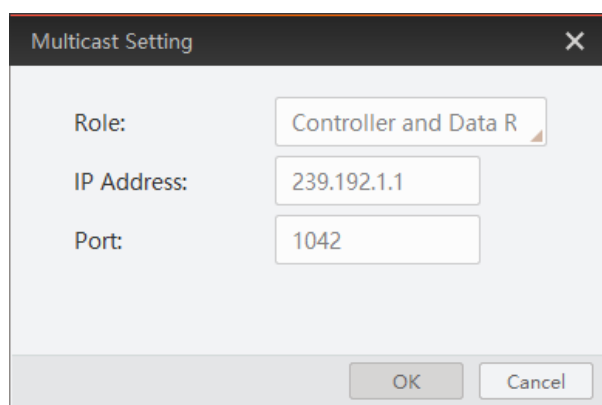


Figure 12-4 Set Multicast for Available Camera

For the connected camera, you can set multicast function as follows.

 **NOTE**

For the connected camera, only the **Controller and Data Receiver** is available.

Steps:

1. Right click the connected camera, and click **Multicast Settings**.

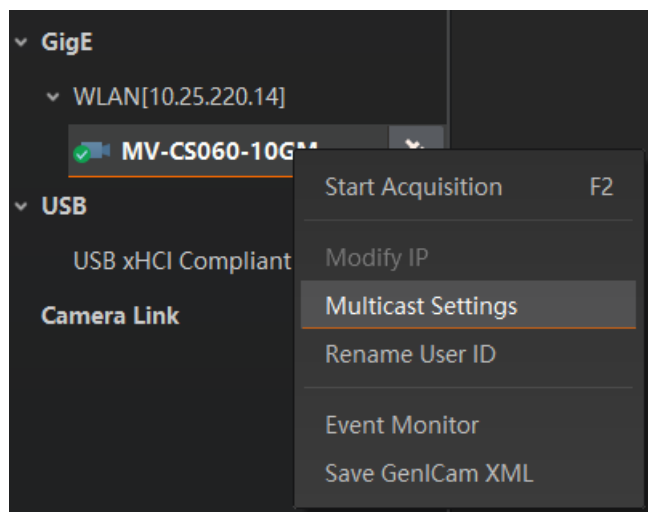


Figure 12-5 Click Multicast Settings

2. Enable the multicast function, and edit the **IP Address** and **Port**.
3. Click **OK**.

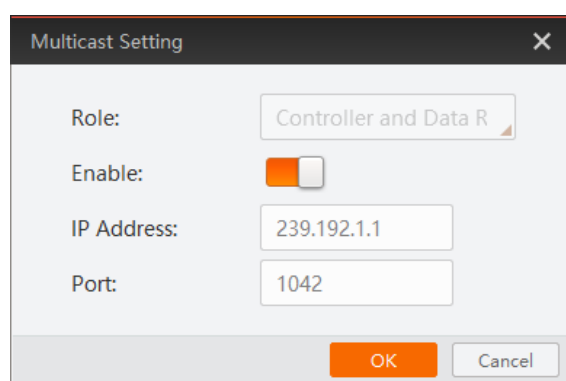


Figure 12-6 Set Multicast for Connected Camera

12.4 File Access Control

NOTE

The file access control function may differ by camera models.


The file access control allows you to export or import the camera's feature or DPC data, including User Set 1, User Set 2, and User Set 3, to or from the local PC as the mfa format.

NOTE

- The file access control function and specific device features that can be imported and exported may differ by camera models.
- Importing and exporting the camera's feature configuration among the same model cameras are supported.

- Make sure that you have stopped acquisition before using this function.
- Make sure that the firmware is same when exporting or importing files between two cameras.

Steps:

1. Select a camera in the device list.
2. Click  to open the **File Access** interface.

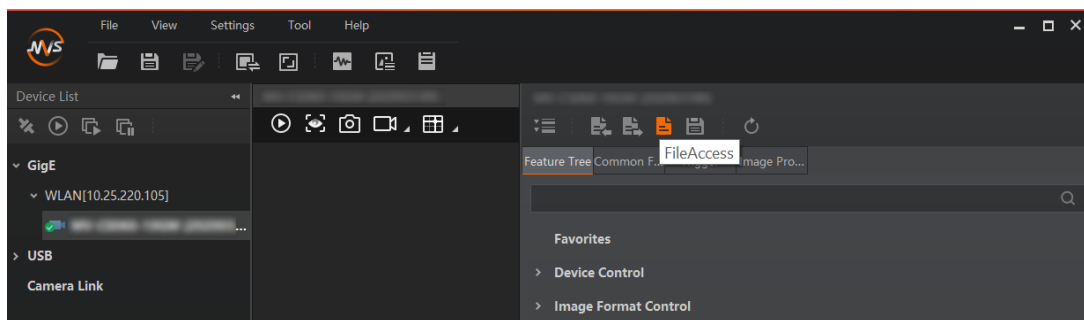


Figure 12-7 File Access

3. Select device feature from the drop-down list.

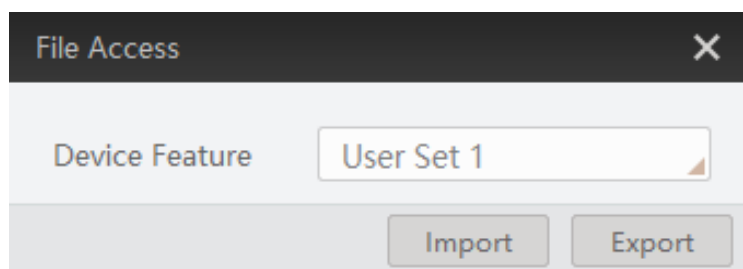


Figure 12-8 File Access Interface

4. Click **Import** or **Export** to import or export data according to actual demands.

12.5 Transport Layer Control

 **NOTE**

The specific transport layer control parameters may differ by camera models.

You can go to **Transport Layer Control** attribute to view the camera's load size, GEV version, etc.

Table 12-3 Transport Layer Control Description

Parameter	Read/Write	Description
Payload Size (B)	Read only	It is the camera's load size.

Parameter	Read/Write	Description
GEV Version Major	Read only	It is the major version in GEV version.
GEV Version Minor	Read only	It is the minor version in GEV version.
GEV Device Mode Is Big Endian	Read only	It is the endianness in device's register.
GEV Device Mode Character Set	Read only	It is the character set in device's register.
GEV Interface Selector	Read only	It sets which physical network interface to be controlled.
GEV MAC Address	Read only	It is the MAC address of the network interface.
GEV Supported Option Selector	Read and write	It selects the GEV option to interrogate for existing support.
GEV Supported Option	Read only	It indicates whether the selected GEV option is supported or not.
GEV Current IP Configuration LLA	Read only	It indicates whether the Link Local Address IP configuration scheme is activated on the given network interface.
GEV Current IP Configuration DHCP	Read and write	It indicates whether the DHCP IP configuration scheme is activated on the given network interface.
GEV Current IP Configuration Persistent IP	Read and write	It indicates whether persistent IP configuration scheme is activated on the given network interface.
DEV PAUSE Frame Reception	Read and write	It controls whether incoming pause frames are handled on the given logical link.
GEV Current IP Address	Read only	It is the current IP address for the given network interface.

Parameter	Read/Write	Description
GEV Current Subnet Mask	Read only	It is the current subnet mask of the given interface.
GEV Current Default Gateway	Read only	It is the default gateway IP address to be used on the given network interface.
GEV First URL	Read only	It is the first choice of URL for the XML device description file.
GEV Second URL	Read only	It is the second choice of URL to the XML device description file.
GEV Number Of Interfaces	Read only	It indicates the number of physical network interfaces supported by this device.
GEV Persistent IP Address	Read and write	It indicates the persistent IP address for this network interface. It is only used when the device boots with the persistent IP configuration scheme.
GEV Persistent Subnet Mask	Read and write	It indicates the persistent subnet mask associated with the persistent IP address on this network interface. It is only used when the device boots with the persistent IP configuration scheme.
GEV Persistent Default Gateway	Read and write	It indicates the persistent default gateway for this network interface. It is only used when the device boots with the persistent IP configuration scheme.
GEV Link Speed	Read only	It indicates the speed of transmission negotiated by the given network interface in Mbps.
GEV Message Channel Count	Read only	It indicates the number of message channels supported by this device.
GEV Stream Channel Count	Read only	It indicates the number of stream channels supported by this device.

Parameter	Read/Write	Description
GEV Heartbeat Timeout(ms)	Read and write	It indicates the current heartbeat timeout in milliseconds.
GEV Heartbeat Disable	Read and write	It disables the GEV Heartbeat.
GEV Timestamp Tick Frequency(Hz)	Read only	It indicates the number of timestamp ticks in 1 second (frequency in Hz).
Timestamp Control Latch	Read and write	It latches the current timestamp value of the device.
Timestamp Control Reset	Read and write	It resets the timestamp value for the device.
Timestamp Control Latch Reset	Read and write	It resets the timestamp control latch.
Timestamp Value	Read only	It is a read only element. It indicates the latched value of the timestamp.
GEV CCP	Read and write	It controls the device access privilege of an application.
GEV Stream Channel Selector	Read only	It selects the stream channel to control.
GEV SCP Interface Index	Read only	It is the Index of network interface to be used.
GEV SCP Host Port	Read and write	It is the host port of the channel
GEV SCP Direction	Read only	It transmits or receives the channel.
GEV SCPS Fire Test Packet	Read only	It sends a test packet.
GEV SCPS Do Not Fragment	Read and write	The state of this feature is copied into the "do not fragment" bit of the IP header of each stream packet.
GEV SCPS Big Endian	Read only	It is the Endianness of multi-byte pixel data for this stream.

Parameter	Read/Write	Description
GEV SCPS Packet Size(B)	Read and write	It specifies the stream packet size (in bytes) to send on this channel.
GEV SCPD	Read and write	It indicates the delay (in timestamp counter units) to insert between each packet for this stream channel.
GEV SCDA	Read and write	It indicates the destination IP address for this stream channel.
GEV SCSP	Read only	It indicates the source UDP port address for this stream channel.
GEV MCP Host Port	Read and write	It controls the port to which the device must send messages. Setting this value to 0 closes the message channel.
GEV MCDA	Read and write	It controls the destination IP address for the message channel.
GEV MCTT (ms)	Read and write	It provides the transmission timeout value in milliseconds.
GEV MCRC	Read and write	It controls the number of retransmissions allowed when a message channel message times out.
GEV MCSP	Read only	It indicates the source port for the message channel.
Gev IEEE 1588	Read and write	It enables the IEEE 1588 Precision Time Protocol to control the timestamp register.
Gev GVSP Extended ID Mode	Read and write	It enables the extended ID mode.

12.6 Transfer Control



NOTE

The transfer control may differ by camera models.

You can go to the **Transfer Control** attribute to view the camera's transfer sources, transfer mode, queue information, etc.

Table 12-4 Transfer Control Description

Parameter	Read/Write	Description
Transfer Selector	Read and write	It selects the transfer source.
Transfer Control Selector	Read and write	It selects the transfer mode.
Transfer Queue Max Block Count	Read only	It displays the max. image quantity that the camera memory can save before the compression.
Transfer Queue Current Block Count	Read only	It displays the current saved image quantity. When the quantity is smaller than 1 GB, it displays 0 or 1.
Transfer Queue Over Flow Count	Read only	It is the image quantity discarded by FPGA.
Transfer Queue Mode	Read only	It is the operating mode of memory queue.

12.7 Save and Load User Set

The camera supports 4 sets of parameters, including 1 default set and 3 user sets. The relation among 4 sets of parameters is shown below.

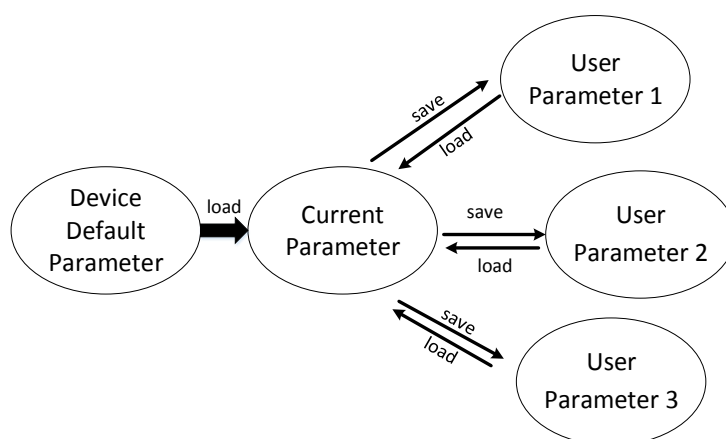


Figure 12-9 Parameter Relation

You can save parameters, load parameters and set user default as shown below.

- **Save Parameters**

Steps:

1. Click **User Set Control**, and select a user set in **User Set Selector**. Here we take selecting **User Set 1** as an example.
2. Click **Execute** in **User Set Save** to save parameters.

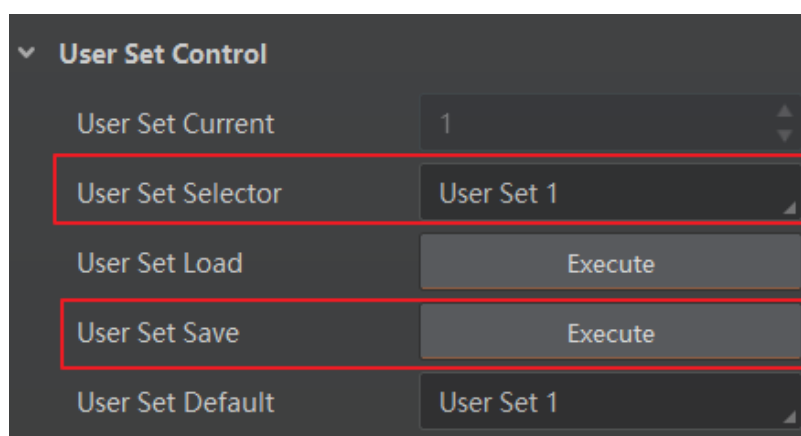


Figure 12-10 Save User Set

- **Load Parameters**

Steps:

1. Click **User Set Control**, and select a user set in **User Set Selector**. Here we take selecting **User Set 1** as an example.
2. Click **Execute** in **User Set Load** to load parameters to the camera, as shown below.

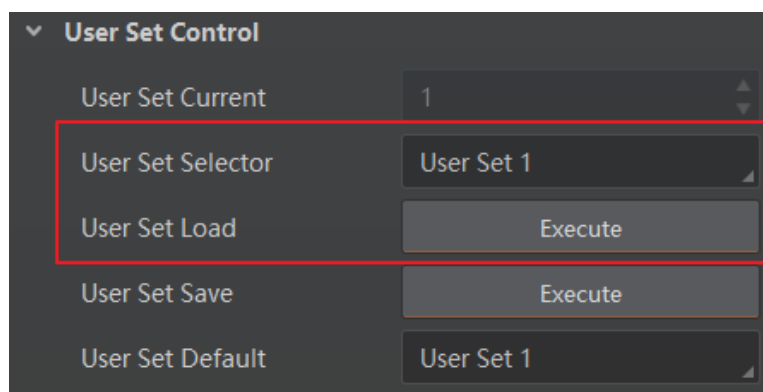


Figure 12-11 Load User Set

 **NOTE**

Loading parameters is available when connecting with camera, but without acquisition.

- **Set User Default**

You can also set default parameter by selecting parameter from drop-down list of **User Set Default**, as shown below.

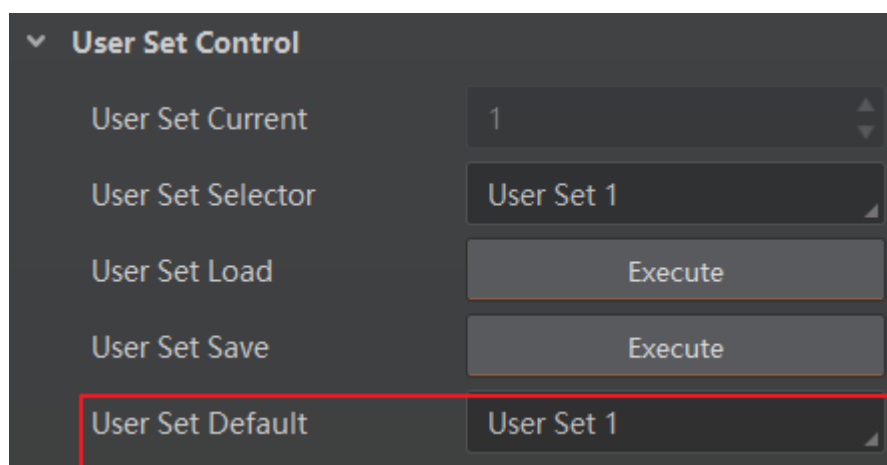


Figure 12-12 Set User Default



12.8 Update Firmware

The camera supports updating firmware via the MVS client software.

 **NOTE**

- Make sure that power cable and others are properly connected before updating.
- Use the firmware package of the corresponding camera model for updating.

Steps:

1. Click **Tool > Firmware Updater** to open the update interface.
2. Select corresponding device type like GigE, USB, or Camera Link.
3. Click  to select the camera you want to update.
4. Click  to select the update file in the local computer.
5. Click **Update** to start updating.

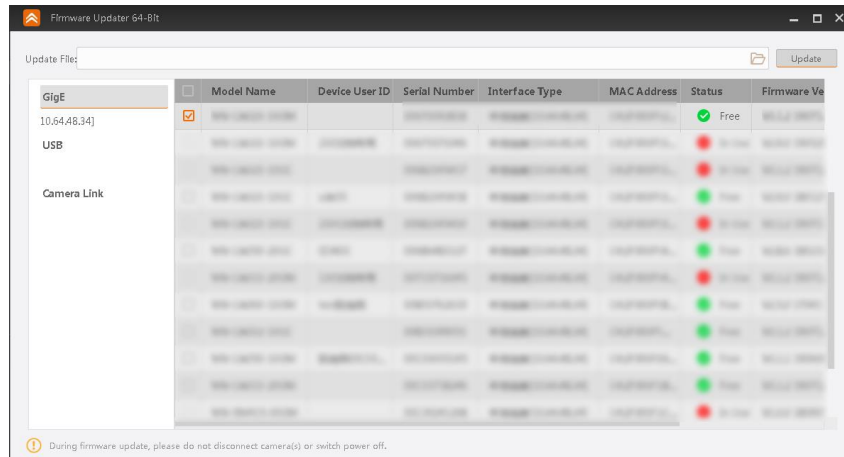


Figure 12-13 Update Firmware

 **NOTE**

- The camera will reboot automatically after updating the firmware.
- The firmware updating process may take a few minutes, please wait patiently.
- During firmware updating, do not disconnect the camera or switch power off.

Chapter 13 Trouble Shooting

Table 13-1 Trouble Shooting

No.	Trouble	Possible Reason	Solution
1	No camera found when running the MVS client software.	Camera is not started up normally, or network cable connection error.	Check camera power wiring (observe the indicator), and check network connection.
2	Camera connection error.	Camera and client software are not in the same network segment.	Use MVS IP Configurator tool to find the camera and edit its IP address.
3	Live view is black.	Aperture is closed, or the camera exception occurs.	Open the aperture or reboot the camera.
4	Live view is normal, but the camera cannot be triggered.	Incorrect wiring or the trigger mode is not enabled.	Check whether the camera trigger mode and related trigger signal input are normal in the current environment.
			Check whether the wiring is correct under corresponding triggering mode.
5	The Gigabit Ethernet becomes the Fast Ethernet.	The network cable is damaged.	Check whether the network cable is damaged.

Chapter 14 Revision History

Table 14-1 Revision History

Version No.	Document No.	Date	Revision Details
V3.4.24	UD26687B	Dec. 21, 2021	<ul style="list-style-type: none">● Modify section Appearance.● Modify section I/O Electrical Feature and Wiring.● Modify section Test Pattern.● Add section Color Transformation Control.
V3.4.20	UD21961B	Nov. 11, 2020	Original version.

Appendix A Camera Parameter Index

Table Appendix A-1 Camera Parameter Index

Attribute	Parameter	Section
Device Control	Device Type	Section Device Control
	Device Scan Type	
	Device Vendor Name	
	Device Model Name	
	Device Manufacturer Info	
	Device Version	
	Device Firmware Version	
	Device Serial Number	
	Device ID	
	Device User ID	
	Device Uptime (s)	
	Board Device Type	
	Device Connection Selector	
	Device Connection Speed (Mbps)	
	Device Link Selector	
	Device Link Speed (Mbps)	
	Device Link Connection Count	
	Device Link Heartbeat Mode	
	Device Stream Channel Count	
	Device Stream Channel Selector	
Device Stream Channel Type		
Device Stream Channel Link		
Device Stream Channel Endianness		
Device Stream Channel Packet Size (B)		

	Device Event Channel Count	
	Device Character Set	
	Device Reset	
	Find Me	
	Device Max Throughput (Kbps)	
	Device PJ Number	
	HB Abnormal Monitor	
	HB Version	
Image Format Control	Width Max	Section View Resolution & Set ROI
	Height Max	
	Region Selector	
	Region Destination	
	Width	
	Height	
	Offset X	
	Offset Y	
	Reverse X	Section Set Image Reverse
	Reverse Y	
	Image Compression Mode	Section Image Compression Mode
	High Bandwidth Mode	
	Pixel Format	Section Set Pixel Format
	Pixel Size	
	Test Pattern Generator Selector	Section Set Test Pattern
	Test Pattern	
	Binning Selector	Section Set Binning
	Binning Horizontal	
	Binning Vertical	
	Decimation Horizontal	Section Set Decimation

	Decimation Vertical	
	Embedded Image Info Selector	Section Embedded Information in Image
	Frame Spec Info	
Acquisition Control	Acquisition Mode	Section Set Frame Rate
	Acquisition Start	
	Acquisition Stop	
	Acquisition Burst Frame Count	
	Acquisition Frame Rate (Fps)	
	Acquisition Frame Rate Control Enable	
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	Exposure Time Mode	
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	HDR Gain	
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	Digital Shift Enable	
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	Black Level Enable	
	Balance White Auto	Section Set White Balance
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Auto Function AOI Usage Intensity		

	Auto Function AOI Usage White Balance	
Color Transformation Control	Color Transformation Selector	Section Set Color Transformation Control
	Color Transformation Enable	
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	Color Transformation Value	
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	Line Inverter	
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	Strobe Enable	
	Strobe Line Duration (μ s)	
	Strobe Line Delay (μ s)	
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	Action Group Key	
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	GEV Current IP Configuration Persistent IP	
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	GEV Heartbeat Timeout (ms)	
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	GEV CCP	
	GEV MCP Host Port	
	GEV MCDA	
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	GEV Stream Channel Selector GEV SCP Interface Index GEV SCP Host Port GEV SCP Direction GEV SCPS Fire Test Packet GEV SCPS Do Not Fragment GEV SCPS Big Endian GEV SCPS Packet Size (B) GEV SCPD GEV SCDA GEV SCSP Gev IEEE 1588 Gev GVSP Extended ID Mode	
Transfer Control	Transfer Selector Transfer Control Selector Transfer Queue Max Block Count Transfer Queue Current Block Count Transfer Queue Over Flow Count Transfer Queue Mode	Section Transfer Control
User Set Control	User Set Current User Set Selector User Set Load User Set Save User Set Default	Section Save and Load User Set



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