

Hangzhou Hikrobot Technology Co.,Ltd.

USB3.0 Board Level Camera

User Manual

HIKROBOT

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Symbol Conventions

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

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

Available Model

This manual is applicable to the USB3.0 board level camera.

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Contents

Chapter 1 Safety Instruction	1
1.1 Safety Claim	1
1.2 Safety Instruction	1
1.3 Electromagnetic Interference Prevention.....	3
Chapter 2 Cleaning Instruction	4
2.1 Device and Lens Cleaning	4
2.1.1 Rubber Dust Air Blower	4
2.1.2 Mirror Brush Cleaning	5
2.1.3 Contact Cleaning.....	5
2.1.4 Lens Cleaning Paper	6
2.2 Device Housing Cleaning	7
Chapter 3 Overview	8
3.1 Introduction	8
3.2 Key Feature.....	8
Chapter 4 Appearance	9
Chapter 5 I/O Connector and Indicator	11
5.1 I/O Connector	11
5.1.1 6-Pin I/O Connector.....	11
5.1.2 4-Pin I/O Connector.....	12
5.2 Indicator.....	12
Chapter 6 Installation	14
6.1 Installation Preparation.....	14
6.2 Install Device	14
Chapter 7 Device Connection	15
7.1 Install MVS Client Software	15
7.2 Check Driver	16
7.3 Connect Device to MVS Client Software	16

Chapter 8 Client Software Layout	17
Chapter 9 Device Feature	19
9.1 Global Shutter	19
9.2 Rolling Shutter	19
9.3 Sensor Shutter Mode	20
9.4 Non-Overlap Exposure and Overlap Exposure	21
9.4.1 Non-Overlap Exposure	21
9.4.2 Overlap Exposure	23
Chapter 10 Image Acquisition.....	24
10.1 Set Frame Rate.....	24
10.2 Set Overlap Mode	25
10.3 Set Acquisition Mode	25
10.4 Set Trigger Mode	26
10.4.1 Enable Internal Trigger Mode	26
10.4.2 Enable External Trigger Mode	26
10.5 Set Trigger Source	27
10.5.1 Set and Execute Software Trigger	28
10.5.2 Set and Execute Hardware Trigger.....	28
10.5.3 Set and Execute Counter Trigger	29
10.5.4 Set and Execute Free Trigger.....	30
10.6 Set Trigger Related Parameters	31
10.6.1 Set Acquisition Burst Frame Count	31
10.6.2 Set Trigger Activation.....	32
10.6.3 Set Trigger Delay	33
10.6.4 Set Trigger Cache	34
10.6.5 Set Trigger Debouncer	35
Chapter 11 Trigger Output.....	37
11.1 Select Output Signal.....	37
11.2 Set Output Signal.....	37
11.2.1 Enable Line Inverter	37
11.2.2 Enable Strobe Signal	38

Chapter 12 I/O Electrical Features and Wiring	42
12.1 I/O Electrical Features	42
12.1.1 Configured as Input Signal	42
12.1.2 Configured as Output Signal	43
12.2 I/O Wiring	44
12.2.1 Input Signal Wiring	44
12.2.2 Output Signal Wiring	46
Chapter 13 Image Parameter	48
13.1 View Resolution	48
13.2 Set ROI	48
13.3 Set Image Reverse	49
13.4 Set Pixel Format	50
13.5 Set Super Bayer	52
13.6 Set Test Pattern	52
13.7 Set Binning	55
13.8 Set Decimation	56
13.9 Set Exposure Time Mode	57
13.10 Set Exposure Auto	57
13.11 Set Sequencer Control and HDR	58
13.11.1 Set Sequencer	58
13.11.2 Set HDR	60
13.12 Set Gain	61
13.12.1 Set Analog Gain	61
13.12.2 Set Digital Gain	62
13.13 Set Brightness	63
13.14 Set Black Level	63
13.15 Set White Balance	64
13.16 Set Gamma Correction	65
13.17 Set Sharpness	67
13.18 Set Contrast Ratio	67
13.19 Set AOI	68
13.20 Set Color Transformation Control	69

13.21 Set Hue	70
13.22 Set Saturation	71
13.23 Set Super Palette Control	72
13.24 Set LUT	72
13.25 Set Shading Correction	73
Chapter 14 Other Functions.....	75
14.1 Device Control	75
14.2 Embed Information into Image.....	77
14.3 Event Control	79
14.4 Transport Layer Control	81
14.5 U3V Protocol Control	82
14.6 User Set Customization	82
14.6.1 Save User Set	83
14.6.2 Load User Set	84
14.6.3 Set User Default	85
14.7 Update Firmware.....	85
Chapter 15 FAQ (Frequently Asked Question).....	87
15.1 Why the client software cannot list devices?	87
15.2 Why device connection fails after the device is listed in the client software?....	87
15.3 Why the live view is back?	87
15.4 Why the device cannot be triggered although the live view is normal?	88
15.5 Why images required by algorithm cannot get although the live view and trigger signal are normal?	88
Appendix A Device Parameter Index.....	89
Appendix B Revision History.....	96

Chapter 1 Safety Instruction

The safety instructions are intended to ensure that the user can use the device correctly to avoid danger or property loss. Read and follow these safety instructions before installing, operating and maintaining the device.

1.1 Safety Claim

- To ensure personal and device safety, when installing, operating, and maintaining the device, follow the signs on the device and all safety instructions described in the manual.
- The note, caution and danger items in the manual do not represent all the safety instructions that should be observed, but only serve as a supplement to all the safety instructions.
- The device should be used in an environment that meets the design specifications, otherwise it may cause malfunctions, and malfunctions or component damage caused by non-compliance with relevant regulations are not within the scope of the device's quality assurance.
- Our company will not bear any legal responsibility for personal safety accidents and property losses caused by abnormal operation of the device.

1.2 Safety Instruction

Caution:

- Do not install the device if it is found that the device and accessories are damaged, rusted, water ingress, model mismatch, missing parts, etc., when unpacking.
- Avoid storage and transportation in places such as water splashing and rain, direct sunlight, strong electric fields, strong magnetic fields, and strong vibrations.
- Avoid dropping, smashing or vigorously vibrating the device and its components.
- It is forbidden to install the indoor device in an environment where it may be exposed to water or other liquids. If the device is damp, it may cause fire and electric shock hazard.
- Place the device in a place out of direct sunlight and ventilation, away from heat sources such as heaters and radiators.
- In the use of the device, you must be in strict compliance with the electrical safety regulations of the nation and region.
- Use the power adapter provided by the official manufacturer. The power adapter must meet the Limited Power Source (LPS) requirements. For specific requirements, please refer to the device's technical specifications.
- If the device emits smoke, odor or noise, please turn off the power and unplug the power cord immediately, and contact the dealer or service center in time.

- It is strictly forbidden to touch any terminal of the device when operating it. Otherwise there is a danger of electric shock.
- It is strictly forbidden for non-professional technicians to detect signals during device operation, otherwise it may cause personal injury or device damage.
- It is strictly forbidden to maintain the device is powered on, otherwise there is a danger of electric shock.
- Avoid aiming the lens at strong light (such as lighting, sunlight, or laser beams, etc.), otherwise the image sensor will be damaged.
- If it is necessary to clean the device, use a damp paper towel or a soft clean cloth to moisten a little pure water, gently wipe off the dust, and do not use alcohol-based corrosive solutions. Make sure to power off the device and unplug the power socket when cleaning.
- Keep clean of the device's image acquisition window. It is recommended to use cleaning water to wipe off the dust.
- If the device does not work properly, please contact your dealer or the nearest service center. Never attempt to disassemble the device yourself (we shall not assume any responsibility for problems caused by unauthorized repair or maintenance).
- Please dispose of the device in strict accordance with the relevant national or regional regulations and standards to avoid environmental pollution and property damage.

Note:

- Check whether the device's package is in good condition, whether there is damage, intrusion, moisture, deformation, etc. before unpacking.
- Check the surface of the device and accessories for damage, rust, bumps, etc. when unpacking.
- Check whether the quantity and information of the device and accessories are complete after unpacking.
- Store and transport the device according to the storage and transport conditions of the device, and the storage temperature and humidity should meet the requirements.
- It is strictly prohibited to transport the device in combination with items that may affect or damage the device.
- 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.
- Please read the manual and safety instructions carefully before installing the device.
- Please install the device strictly according to the installation method in this manual.
- The case of the device may be overheated, and it needs to be powered off for half an hour before it can be touched.
- The device should not be placed with exposed flame sources, such as lighted candles.

1.3 Electromagnetic Interference Prevention

- Make sure that the shielding layer of cables is intact and 360° connected to the metal connector when using shielded cables.
- Do not route the device together with other equipment (especially servo motors, high-power devices, etc.), and control the distance between cables to more than 10 cm. Make sure to shield the cables if unavoidable.
- The control cable of the device and the power cable of the industrial light source must be wired separately to avoid bundled wiring.
- The power cable, data cable, signal cable, etc. of the device must be wired separately. Make sure to ground them if the wiring groove is used to separate the wiring and the wiring groove is metal.
- During the wiring process, evaluate the wiring space reasonably, and do not pull the cables hard, so as not to damage the electrical performance of the cables.
- If the device is powered on and off frequently, it is necessary to strengthen the voltage isolation, and consider adding a DC/DC isolation power supply module between the device and the adapter.
- Use the power adapter to supply power to the device separately. If centralized power supply is necessary, make sure to use a DC filter to filter the power supply of the device separately before use.
- The unused cables of the device must be insulated.
- When installing the device, if you cannot ensure that the device itself and all equipment connected to the device are well grounded, you should isolate the device with an insulating bracket.
- To avoid the accumulation of static electricity, ensure that other equipment (such as machines, internal components, etc.) and metal brackets on site are properly grounded.
- Make sure that the connector metal barrier of the device is well connected to the PC and other chassis, and if necessary, copper foil should be used to enhance the grounding effect.
- During the installation and use of the device, high voltage leakage must be avoided.
- Use a figure-eight bundle method if the device cable is too long.
- When connecting the device and metal accessories, they must be connected firmly to maintain good conductivity.

Chapter 2 Cleaning Instruction

2.1 Device and Lens Cleaning

Four ways are available to clean the device and lens when they have dust or stains.

Table 2-1 Device and Clean Method

Equipment Clean Method	Camera	Lens
Rubber Dust Air Blower	Support	Support
Mirror Brush Cleaning	Not Support	Support
Contact Cleaning	Support	Support
Lens Cleaning Paper	Not Support	Support

2.1.1 Rubber Dust Air Blower

You can use a rubber dusk air blower to clean the dust on the surface of the device filter and lens. The specific operation steps are as follows:

Steps

1. Blow the rubber dusk air blower downward several times to blow out the dust inside.
2. Hold the device or lens and tilt it down so that the air blower port and the device lens are at an angle of 45 °.
3. Blow to clean the dust on the surface of the device filter and lens.



Figure 2-1 Cleaning by Rubber Dust Air Blower

Note

- Do not go too far into the device's lens mount and avoid direct contact with the dust glass when cleaning.
 - It is strictly forbidden to blow the lens directly from the mouth, and avoid spattering saliva particles onto the glass surface, causing serious secondary pollution.
-

2.1.2 Mirror Brush Cleaning

If the dust on the surface of the lens cannot be cleaned by rubber dusk air blower, use a mirror brush to gently remove the dust on the surface of the lens.

Note

Do not touch the bristles directly with your hands.

2.1.3 Contact Cleaning

For the stubborn stains on device filter or lens surface, such as finger marks, liquid stains, etc., it is recommended to use a fat-free cotton swab or dust-free cloth, with high purity alcohol wipe clean. Take the fat-free cotton swab as an example, the specific operation steps are as follows:

Steps

1. Take a clean fat-free cotton swab, dip in proper amount of alcohol or cleaning liquid.
-

Note

Do not touch the head of the cotton swab by fingers.

2. Tilt the fat-free cotton swab about 60 degrees, resist the device filter or lens surface, clean from left to right, turn cotton swab over one side, and clean again from right to left.
3. Take another fat-free cotton swab that is not stained with alcohol or cleaning liquid and swipe the device filter or lens to absorb the remaining alcohol or cleaning liquid.

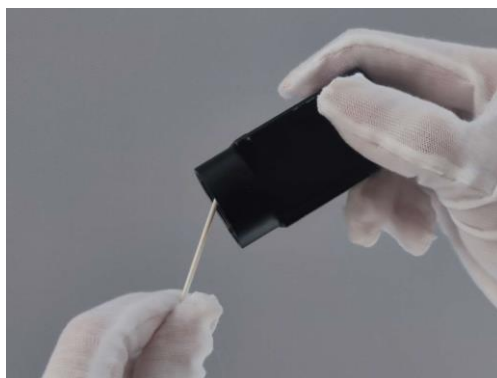


Figure 2-2 Contact Cleaning

4. Check whether there is still a stain. If the stain changes position, repeat steps above, until the stain is cleaned.

Note

If the stains on the lens cannot be wiped or clean, please clean by using lens cleaning paper. For specific operation steps, please refer to the next section.

2.1.4 Lens Cleaning Paper

For lens stains that cannot be cleaned by a fat-free cotton swab or dust-free cloth, use lens cleaning paper to clean them.

Before You Start

- Use lens paper purchased from a regular, professional photography store.
- Use freshly opened lens cleaning paper in a wet state.
- Make sure there is no hard dust on the lens.

Tear off the outer package of the lens cleaning paper, fold the pre-moistened paper to a suitable wiping state, and slowly spiral wipe it in the same direction from the center of the lens outward.



Figure 2-3 Cleaning by Lens Cleaning Paper

Note

- Do not use hard paper, paper towels or napkins to clean the lens. These products contain scratching wood pulp, which will seriously damage delicate coating on the lens.
 - Do not press the lens surface hard when cleaning it the lens cleaning paper. Otherwise, the fragile coating on the lens surface will be wiped off.
-

2.2 Device Housing Cleaning

When cleaning the device, try to clean it in a closed room to avoid a large amount of dust in the environment. The specific operation steps are as follows:

Steps

1. Disconnect the device's power supply.
2. Take a soft lint-free cloth that will not cause static electricity during cleaning and soak it with a neutral detergent.
3. Wipe the device's housing with a soaked, lint-free cloth as appropriate.
4. Wait for the residual moisture to evaporate after wiping. When the moisture has completely evaporated, you can reconnect the device to the power supply.

Note

Do not use compressed air to accelerate evaporation.

Chapter 3 Overview

3.1 Introduction

The USB3.0 board level camera uses USB3.0 interface to transmit non-compressed images in real time, and it supports acquiring images and setting parameters via the client software or SDK.

3.2 Key Feature

- Compact design for flexible installation.
- Supports auto or manual adjustment of gain, exposure time, and white balance, and manual adjustment of Gamma correction, LUT, etc.
- Supports HDR function with different exposure time and gain.
- Supports hardware trigger, software trigger, free run, etc.
- Compatible with USB3 Vision Protocol, GenICam Standard, and third-party software based on these protocol and standard.

 **Note**

- The specific functions may differ by device models.
 - Refer to the device's specifications for specific parameters.
-

Chapter 4 Appearance

Note

- The device's appearance may differ by device models. The image below is for reference only. For specific appearance and dimension, please refer to the device's specification for details.
- The appearance is subject to change, and the actual device you purchased shall prevail.

The device has three kinds of appearance as shown below. Type I is the single board structure, type II is the C-mount structure, and type III is the M12-mount structure.

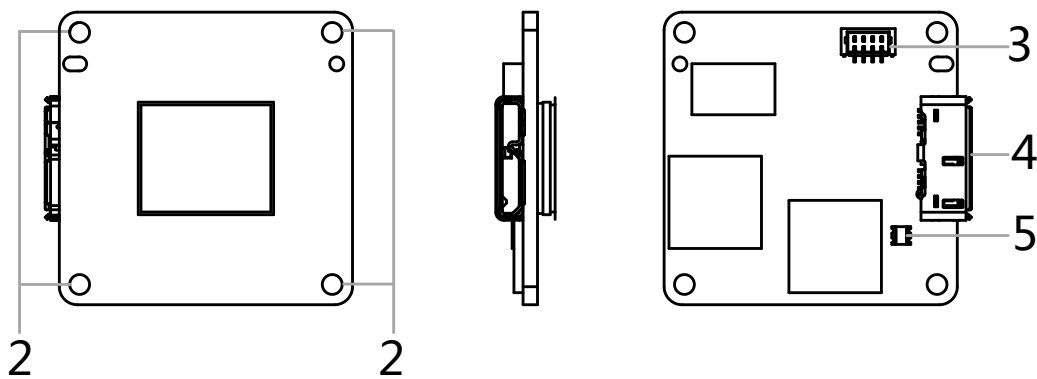


Figure 4-1 Appearance (Type I)

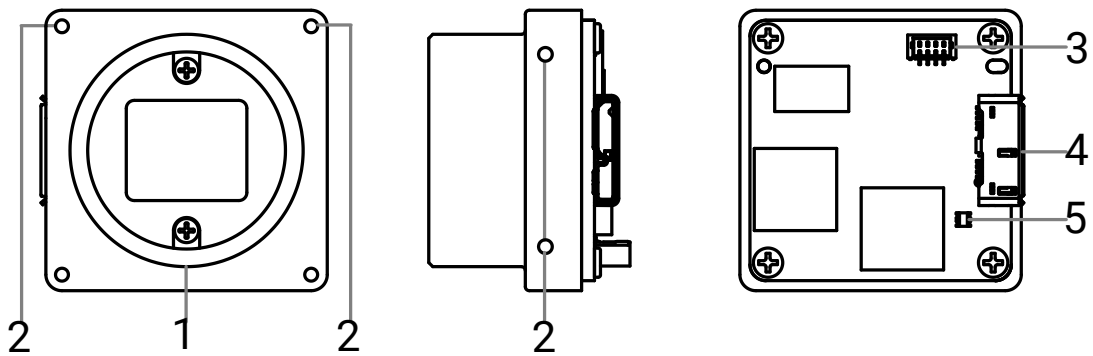


Figure 4-2 Appearance (Type II)

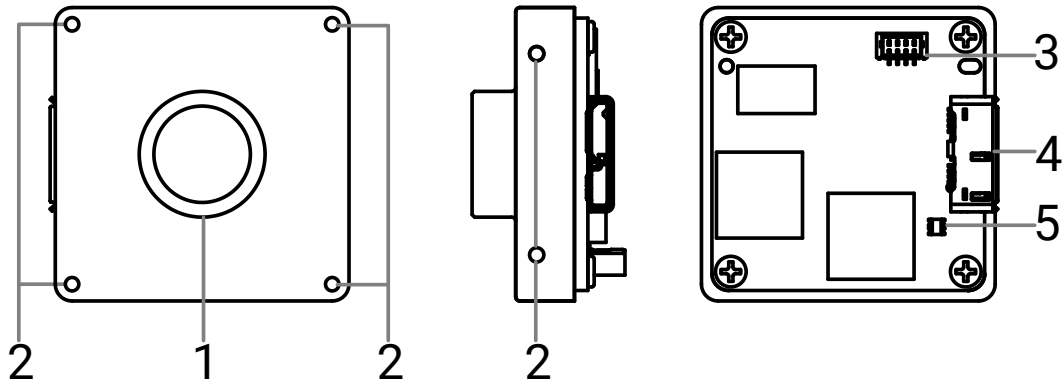


Figure 4-3 Appearance (Type III)

Table 4-1 Component Description

No.	Component	Description
1	Lens Mount	It is used to install the lens. Refer to the device's specification for specific lens mount information. Note The back focal length of the C-mount lens is 17.45 mm ± 0.15 mm.
2	Screw Hole	It is used to fix the device to the installation position. Refer to the device's specification for specific screw information.
3	I/O Connector	It provides input and output signals.
4	USB3.0 Interface	It provides power supply and transmits data.
5	Indicator	It indicates the device's operation status.

Chapter 5 I/O Connector and Indicator

5.1 I/O Connector

The device has two kinds of I/O connectors, including 6-pin and 4-pin.

5.1.1 6-Pin I/O Connector

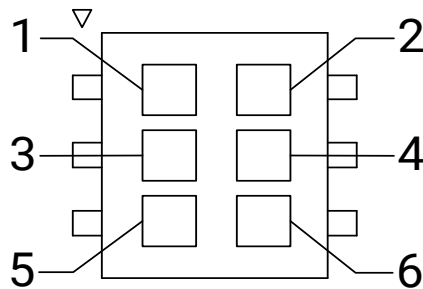


Figure 5-1 6-Pin I/O Connector

Note

Refer to the table below and the label attached to the cable to wire the device.

Table 5-1 Pin Definitions of 6-Pin I/O Connector

No.	Signal	I/O Signal Source	Description
1	GPI02	Line 2 Signal Line	It can be configured to input or output.
2	Reserved		
3	GPI01	Line 1 Signal Line	It can be configured to input or output.
4	GND	Signal Ground of Line 1 and Line 2	It is signal ground.
5	Reserved		
6	Reserved		

5.1.2 4-Pin I/O Connector

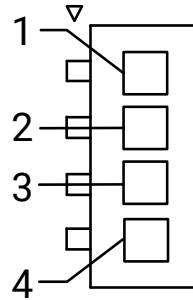


Figure 5-2 4-Pin I/O Connector

Note

Refer to the table below and the label attached to the cable to wire the device.

Table 5-2 Pin Definitions of 4-Pin I/O Connector

No.	Signal	I/O Signal Source	Description
1	Reserved		
2	GND	Signal Ground of Line 1 and Line 2 or Line 2 and Line 5	It is signal ground.
3	GPI01	Line 1 or Line 2 Signal Line	It can be configured to input or output.
4	GPI02	Line 2 or Line 5 Signal Line	It can be configured to input or output.

5.2 Indicator

The device’s indicator indicates its operation status.

Note

When the indicator is lit up, flashing rapidly, flashing slowly, or flashing very rapidly, its unlit interval is 5 sec, 0.2 sec, 1 sec, and 2 sec respectively.

Table 5-3 Indicator Description

No.	Indicator Color	Status	Device Status Description
1	Red	Flashing very slowly	The device connection exception occurs. The data cable is disconnected.
2	Blue	Solid	The device is in idle status. The data cable is connected, and the device is ready.

USB3.0 Board Level Camera User Manual

No.	Indicator Color	Status	Device Status Description
3	Blue	Flashing rapidly	The data cable is connected, and the device is acquiring images in internal trigger mode. Data transmission speed reaches the rated speed of USB3.0.
4	Blue	Flashing slowly	The data cable is connected, and the device is acquiring images in internal trigger mode. Data transmission speed reaches the rated speed of USB2.0.
5	Blue	Flashing very slowly	The data cable is connected, and the device is acquiring images in external trigger mode.
6	Red and blue	Flash alternatively	The device is updating firmware.
7	Red	Solid	Updating firmware failed, reading configuration file failed, or other errors occur.
8	Red	Light up	When executing Find Me function via the client software, the indicator is lit up for 8 sec with red color.

Chapter 6 Installation

6.1 Installation Preparation

You need to prepare following accessories before device installation.

Table 6-1 Accessories

No.	Name	Quantity	Description
1	Lens	1	It refers to the lens that is suitable for the device. You need to purchase separately.
2	USB3.0 Cable	1	It refers to the Micro USB3.0 (type B) cable. You need to purchase separately.

6.2 Install Device

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.

Steps

1. Fix the device to the installation position.
2. Install the lens to the device.
3. Use the Micro USB3.0 (type B) cable to connect the device to the PC or other devices.

Note

- Make sure that the data cable is USB3.0 cable.
 - The device's USB3.0 interface provides power supply.
-

Chapter 7 Device Connection

Device connection to the client software is required for device's configurations and remote operations. This section introduces how to install the client software, connect the device to the client software, etc.

7.1 Install MVS Client Software

MVS client software is used to set the device's parameters, update its firmware, etc.

Note

- The MVS client software is compatible with 32/64-bit Windows XP/7/10 operating systems.
 - The graphic user interface may differ by different versions of the client software you use.
 - You can download the client software from en.hikrobotics.com.
-

Steps

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

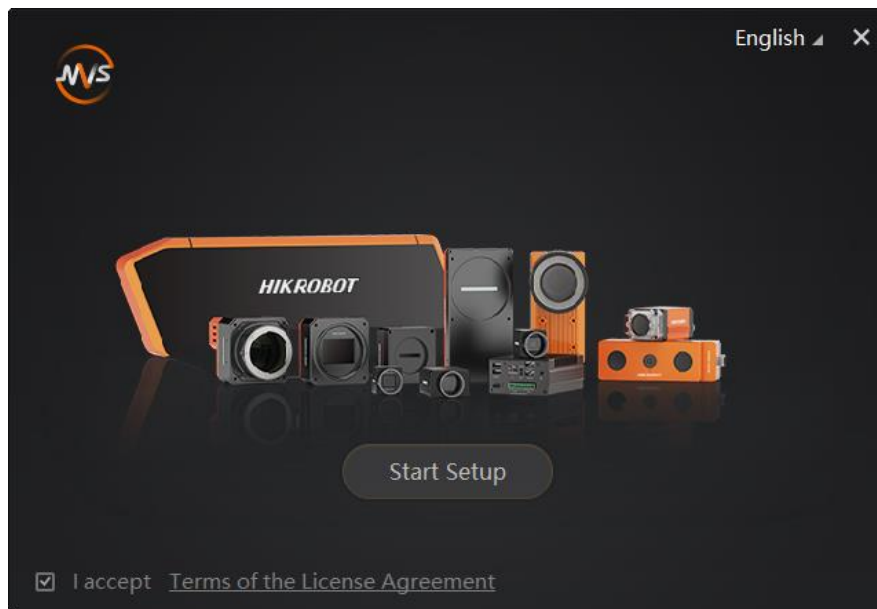


Figure 7-1 Installation Interface

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

7.2 Check Driver

Note

Before using the device, you need to make sure that the PC has installed the USB driver correctly. Otherwise, the client software cannot find the device.

After connecting the device, the PC will automatically check and install the USB driver. After installation, you can view the added driver in the device manager of the PC, and right click **Properties** to view its status.

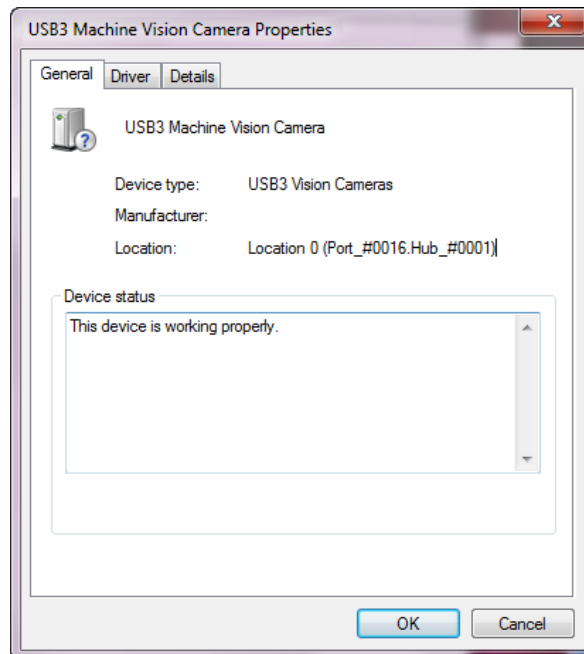



Figure 7-2 Driver Properties

Note

- If the installation of the driver fails, you can install it manually. By default, the driver is located in C:\Program Files (x86)\Common Files\MVS\Drivers\Usb3.0.
 - The specific path of driver location may differ by Windows version and the client software version you installed.
-

7.3 Connect Device to MVS Client Software

Steps

1. Double click the MVS client software to run it.
2. Double click the device in the device list, or click  to connect it to the MVS client software.

Chapter 8 Client Software Layout

The client software displays the device's information after connecting, as shown below.

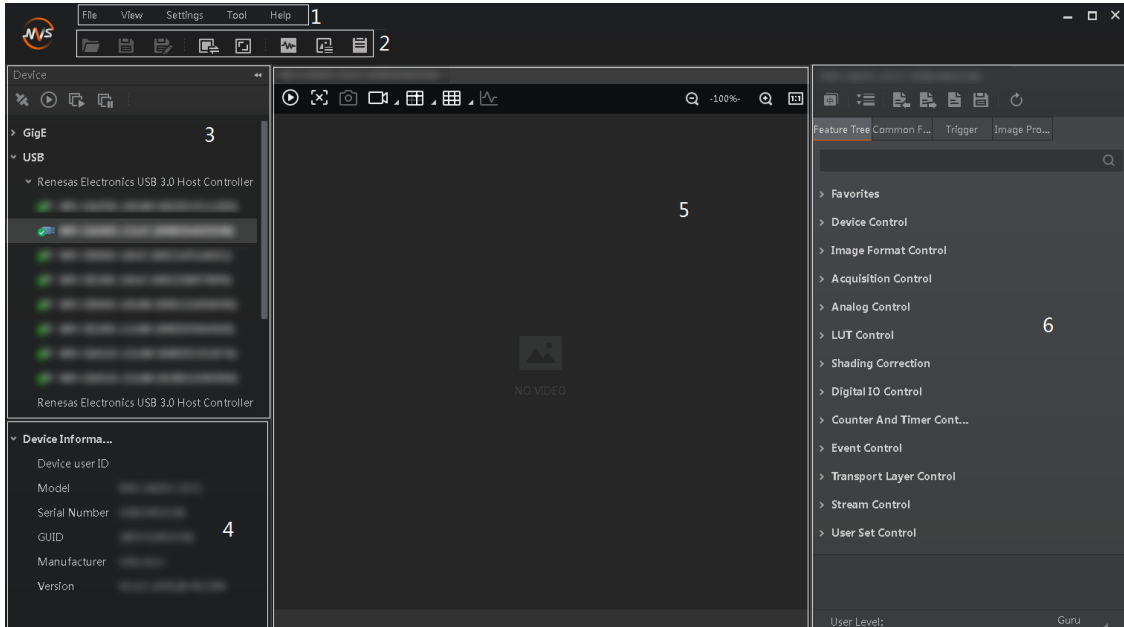



Figure 8-1 Main Window

Note

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

Table 8-1 Main Window Description

No.	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.
4	Device Information Panel	This panel displays the detailed information of connected device.
5	Display Window	This area displays the acquired images in real-time.
6	Feature Panel	This panel displays the device's parameters, and you can configure them according to actual demands.

Click  in the device's feature panel to unfold parameters, and configure them according to actual demands.

 **Note**

The device's feature panel and parameters may differ by device models.

Table 8-2 Feature Tree Description

Feature Name	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 like hue and saturation.
Super Palette Control	You can select different color areas in the image to set customized hue and saturation values.
LUT Control	You can view the Look-Up Table (LUT), and set its index and value.
Shading Correction	You can set shading correction to correct shade.
Digital IO Control	You can set the different input and output signals.
Counter and Timer Control	You can view and set event sources of counter and timer, and the device outputs the corresponding external signals.
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 computer.
Transport Layer Control	You can view and set the parameters of the device's transport layer.
Stream Control	You can view the size of payload, data head, and data end.
User Set Control	You can save or load the device's parameters.
Sequencer Control	You can configure multiple groups of parameters such as exposure time and gain.

Chapter 9 Device Feature

9.1 Global Shutter

For device 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.

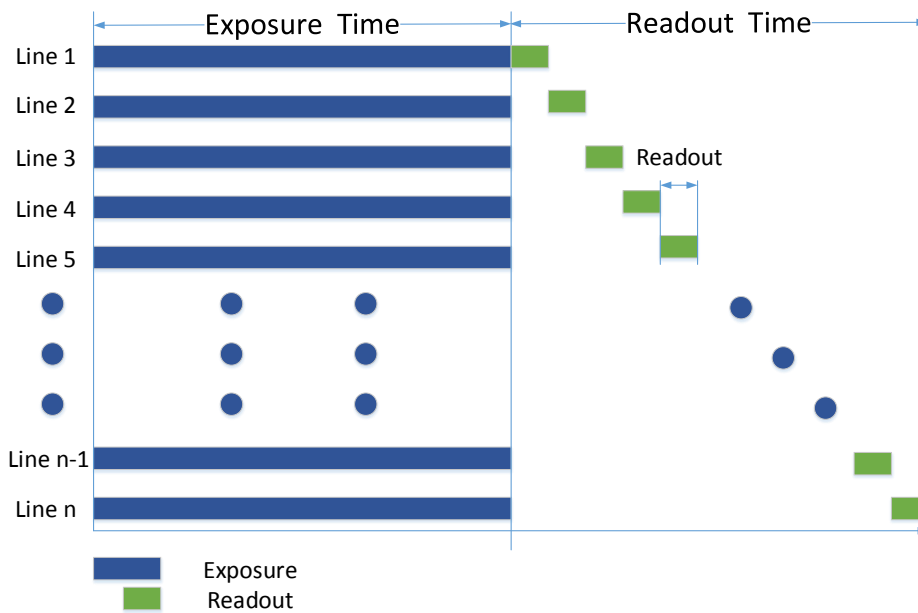


Figure 9-1 Global Shutter

9.2 Rolling Shutter

For device that supports rolling shutter, as soon as the exposure ends, 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.

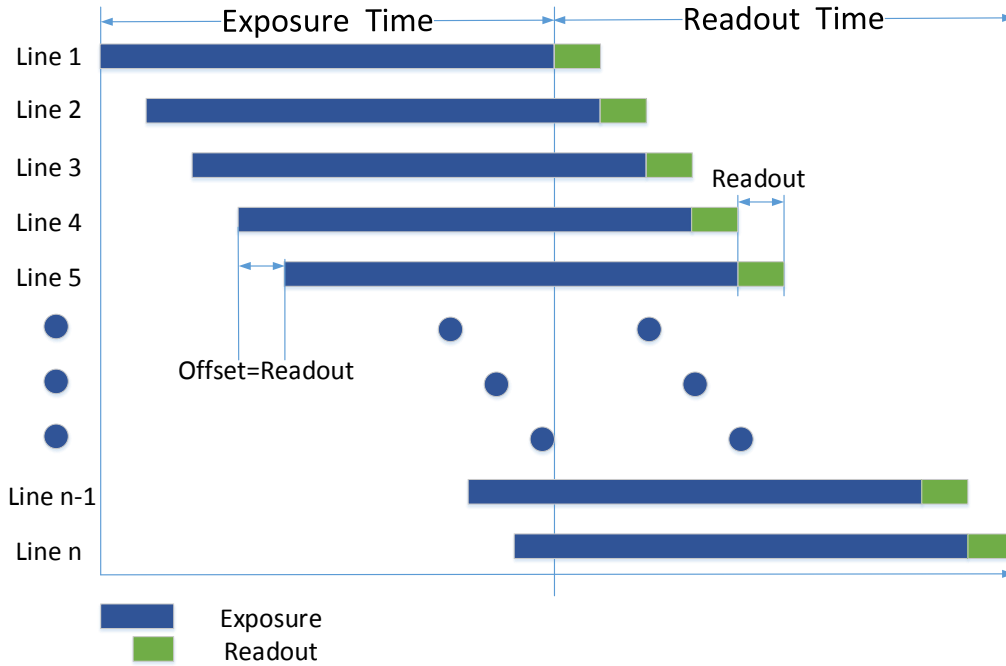


Figure 9-2 Rolling Shutter

9.3 Sensor Shutter Mode

Note

- Only some models of devices with rolling shutter and corresponding firmware support the sensor shutter mode. The actual product you purchased should prevail.
- Stopping the real-time acquisition is required before setting the sensor shutter mode.
- For some device models, only when **Trigger Mode** is **On**, you can set **Sensor Shutter Mode**.

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

In general, there are 3 sensor shutter modes, including **Global Reset**, **Rolling** and **Trigger Rolling**. Global reset means that all of the sensor’s pixels start exposing at the same time, but stop exposing at different time.

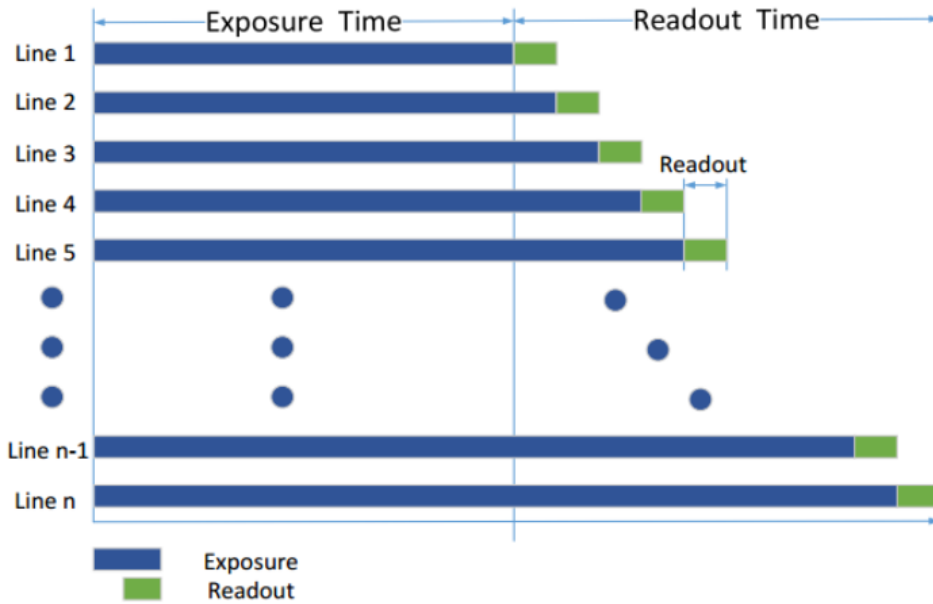


Figure 9-3 Global Reset

Rolling means that the device exposes the pixel rows one after the other, and it supports sensor's pixels exposure and pixel data readout proceeding at the same time. While trigger rolling does not support that sensor's pixels exposure and pixel data readout proceed at the same time.

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

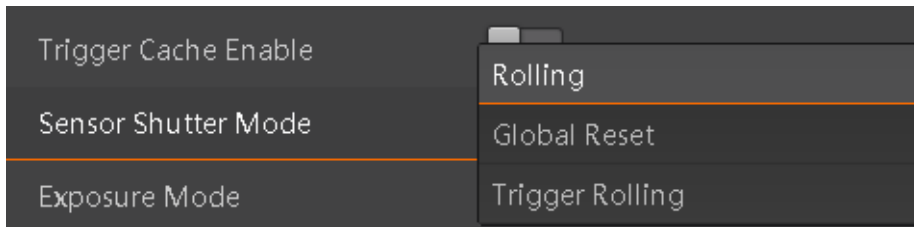


Figure 9-4 Sensor Shutter Mode

9.4 Non-Overlap Exposure and Overlap Exposure

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

9.4.1 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.

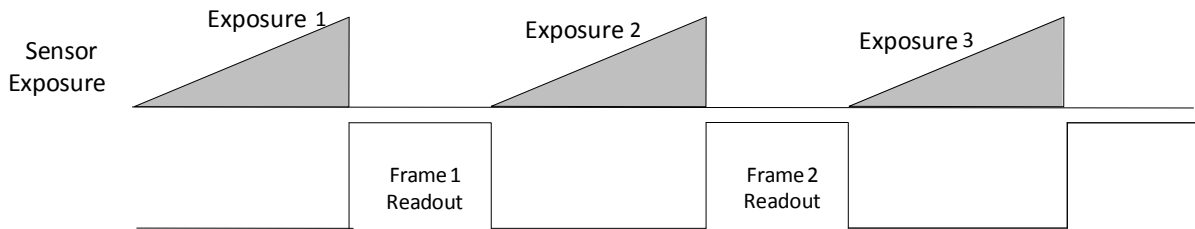


Figure 9-5 Internal Trigger Non-Overlap Exposure

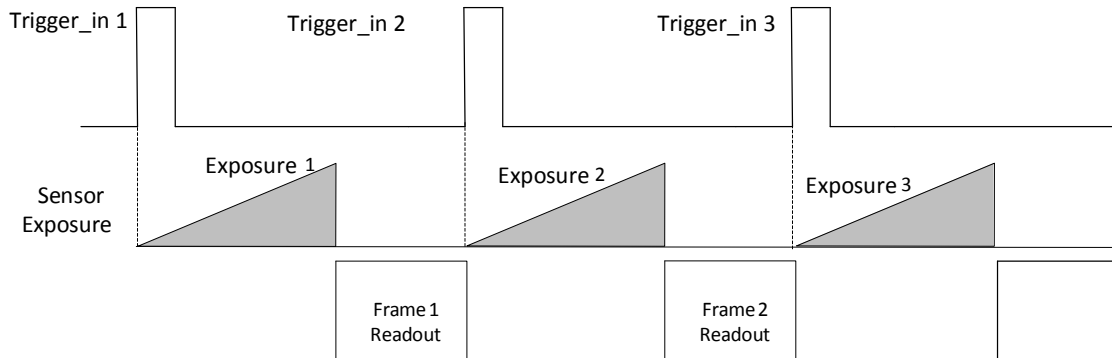


Figure 9-6 External Trigger Non-Overlap Exposure

Note

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

9.4.2 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.

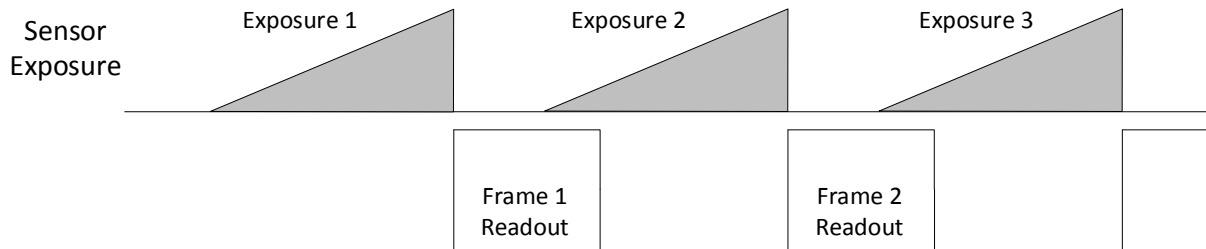


Figure 9-7 Internal Trigger Overlap Exposure

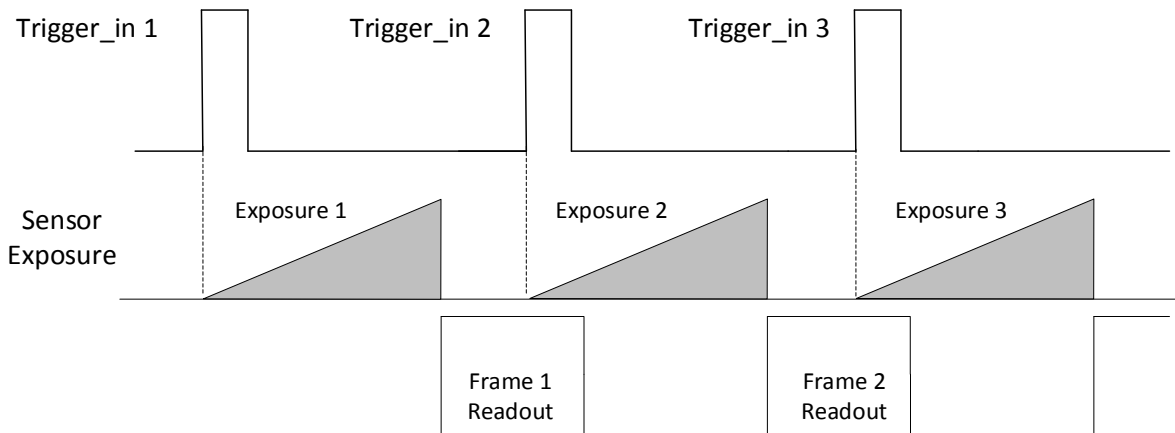


Figure 9-8 External Trigger Overlap Exposure

Chapter 10 Image Acquisition

10.1 Set Frame Rate

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

- Frame readout time: The frame readout time is related with device'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 device 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.

Steps

1. Go to **Acquisition Control** → **Acquisition Frame Rate**, and enter **Acquisition Frame Rate**.
2. Enable **Acquisition Frame Rate Control Enable**.

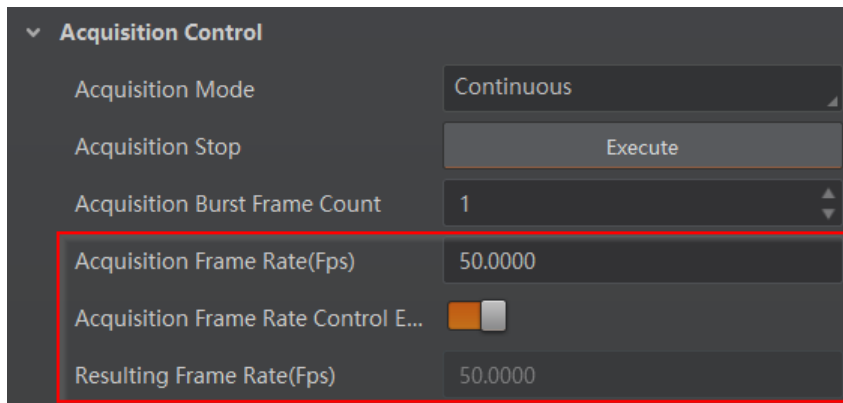


Figure 10-1 Set Frame Rate

Note

- If the real-time frame rate is smaller than the value you set, the device acquires images by the real-time frame rate.
- If the real-time frame rate is larger than the value you set, the device acquires images by the value you set.

3. View the device's final frame rate in **Resulting Frame Rate**.

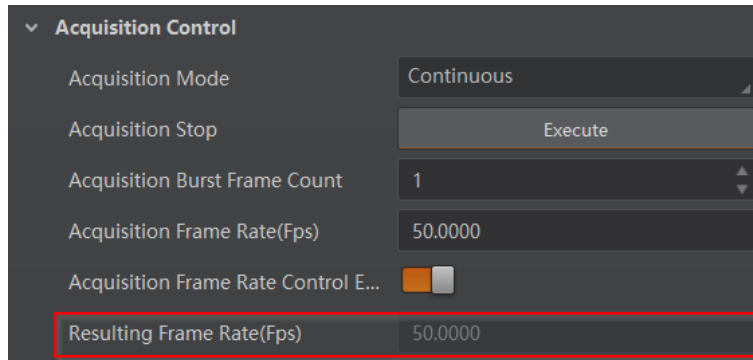


Figure 10-2 View Resulting Frame Rate

10.2 Set Overlap Mode

Note

The overlap mode may differ by device models. Refer to section **Non-Overlap Exposure and Overlap Exposure** for detailed introduction.

The device's overlap function is controlled by the overlap mode. Go to **Acquisition Control** → **Overlap Mode**, select **On** as **Overlap Mode** to have overlap exposure, and select **Off** as **Overlap Mode** to have non-overlap exposure.

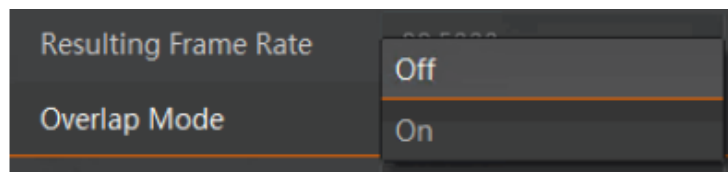


Figure 10-3 Set Overlap Mode

10.3 Set Acquisition Mode

The device supports two types of acquisition modes, including **SingleFrame** mode and **Continuous** mode. Go to **Acquisition Control** → **Acquisition Mode**, and select **Continuous** or **SingleFrame** as **Acquisition Mode** according to actual demands.

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

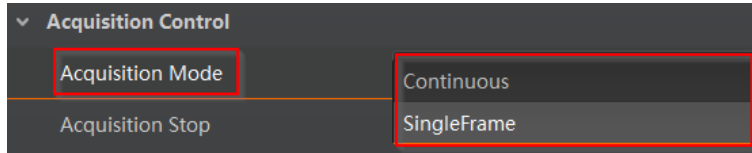


Figure 10-4 Set Acquisition Mode

10.4 Set Trigger Mode

The device supports two types of trigger modes, including internal trigger mode and external trigger mode. Go to **Scan Control** → **Trigger Control** → **Trigger Mode** and set it.

- **Internal Trigger Mode:** In this mode, the device acquires images via its internal signals.
- **External Trigger Mode:** In this mode, the device acquires images via external signals like software signal and hardware signal. The trigger source of external trigger mode includes software trigger, hardware trigger, counter trigger, and free trigger.

10.4.1 Enable Internal Trigger Mode

Go to **Acquisition Control** → **Trigger Mode**, and select **Off** as **Trigger Mode**.

Note

Off refers to the internal trigger mode.

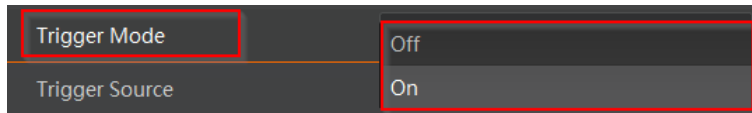


Figure 10-5 Enable Internal Trigger Mode

10.4.2 Enable External Trigger Mode

Go to **Acquisition Control** → **Trigger Mode**, and select **On** as **Trigger Mode**.

Note

On refers to the external trigger mode.

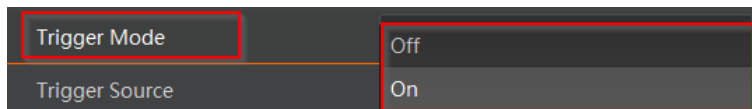


Figure 10-6 Enable External Trigger Mode

10.5 Set Trigger Source

The device's trigger source includes software trigger, hardware trigger, counter trigger, and free trigger. Go to **Acquisition Control** → **Trigger Source**, and select **Trigger Source** according to actual demands.

Table 10-1 Trigger Source Description

Trigger Source	Parameter	Description
Software Trigger	Software	The software sends trigger signal to the device via USB interface to acquire images.
Hardware Trigger	Line 1/Line 2, or Line 2/Line 5	External device connects device via device I/O interface. External device sends trigger signal to device to acquire images.
Counter Trigger	Counter 0	The counter sends trigger signal to the device to acquire images.
Free Trigger	Anyway	The device uses software, hardware, or counter to trigger the device and acquire images.

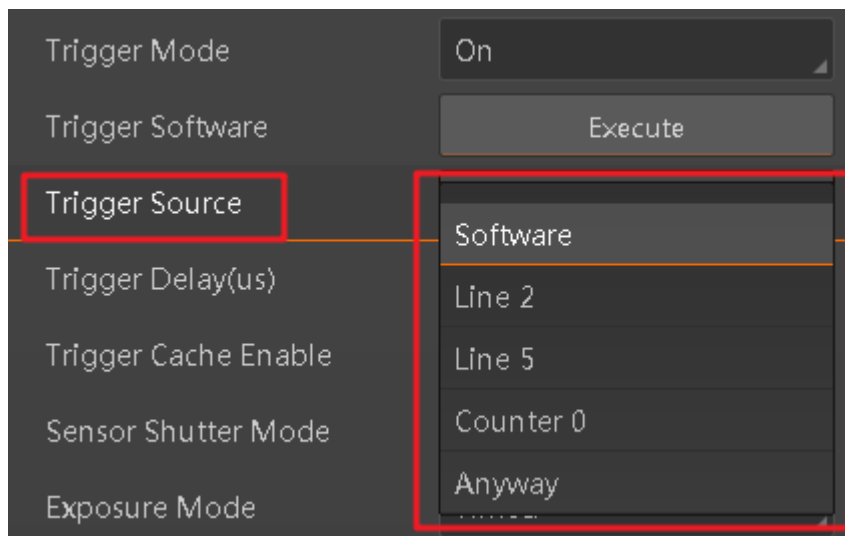


Figure 10-7 Set Trigger Source

Note

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

10.5.1 Set and Execute Software Trigger

In software trigger, the software sends trigger signal to the device via USB interface to acquire images.

Steps

1. Go to **Acquisition Control** → **Trigger Mode**, and select **On** as **Trigger Mode**.
2. Select **Software** as **Trigger Source**.
3. Click **Execute** in **Trigger Software**.

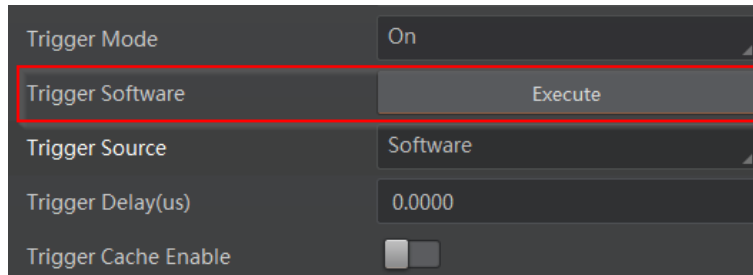


Figure 10-8 Set and Execute Software Trigger

10.5.2 Set and Execute Hardware Trigger

The device has two bi-directional I/O that can be configured as input signal.

Note

Here we take Line 2 as an example.

Steps

1. Go to **Digital IO Control** and select specific line as **Line Selector**.
2. Select **Input** as **Line Mode**.

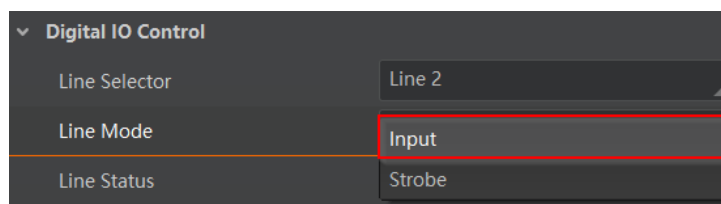


Figure 10-9 Set Line 2 as Input Signal

In hardware trigger, external device sends trigger signal to the device to acquire images via I/O connector.

Steps

1. Go to **Acquisition Control** → **Trigger Mode**, and select **On** as **Trigger Mode**.
2. Select **Line 0** or **Line 2** as **Trigger Source** according to actual demands.

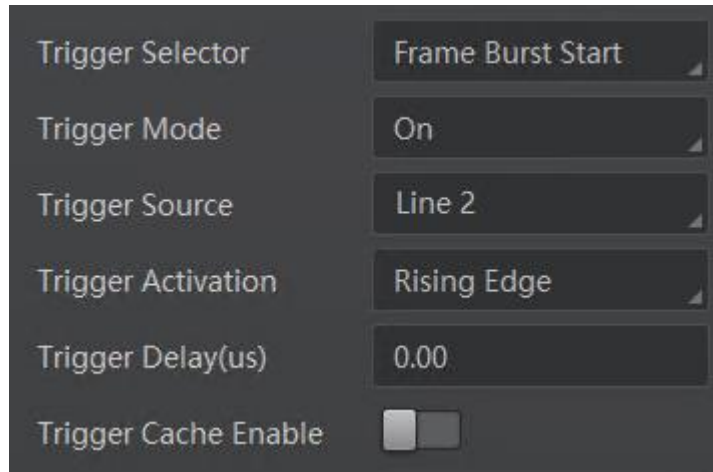


Figure 10-10 Set and Execute Hardware Trigger

10.5.3 Set and Execute Counter Trigger

In counter trigger, the counter sends trigger signal to the device to acquire images.

Steps

1. Go to **Acquisition Control** → **Trigger Mode**, and select **On** as **Trigger Mode**.
2. Select **Counter 0** as **Trigger Source**.

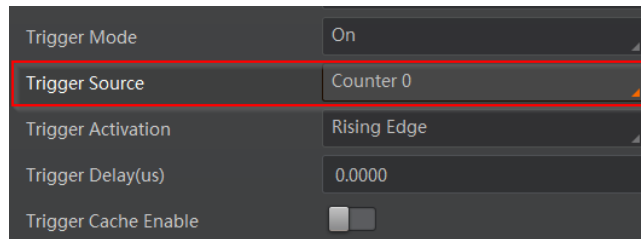


Figure 10-11 Set and Execute Counter Trigger

When using counter trigger, you need to set parameters of **Counter and Timer Control** as shown below.

Table 10-2 Parameters 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. This parameter is disabled by default.
Counter Reset Source	Read and write	It selects the signal source of resetting counter. Software is available only. This parameter is disabled by default.

Parameter	Read/Write	Description
Counter Reset	Write is available under certain condition	It resets counter and it can be executed only 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.

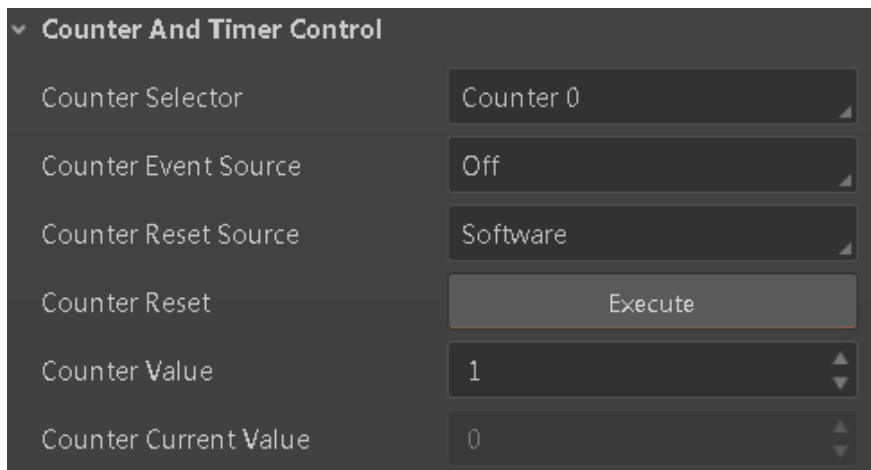


Figure 10-12 Counter and Timer Control

10.5.4 Set and Execute Free Trigger

In free trigger, the device uses software, hardware, or counter to trigger the device and acquire images.

Steps

1. Go to **Acquisition Control** → **Trigger Mode**, and select **On** as **Trigger Mode**.
2. Select **Anyway** as **Trigger Source**.

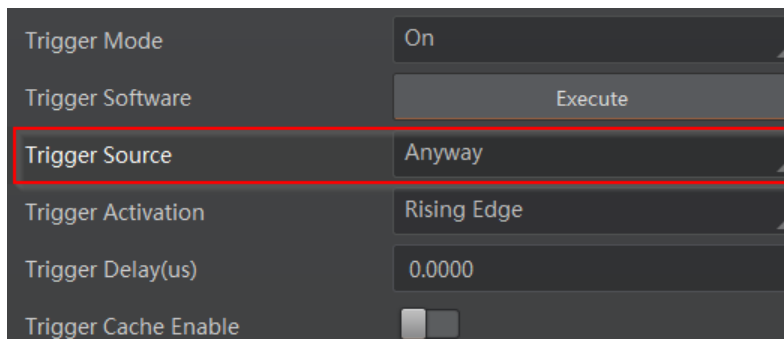


Figure 10-13 Set and Execute Free Trigger

10.6 Set Trigger Related Parameters

In external trigger mode, you can set five related parameters, including acquisition burst frame count, trigger activation, trigger delay, trigger cache, and trigger debouncer.

Note

- Different trigger sources can set various parameters in external trigger mode.
- √ is supported, and × is not supported.

Table 10-3 Trigger Source and Trigger Related Parameters

Trigger Source Trigger Parameters	Software Trigger	Hardware Trigger	Counter Trigger	Free Trigger
Acquisition Burst Frame Count	√	√	√	√
Trigger Activation	×	√	×	√
Trigger Delay	√	√	√	√
Trigger Cache	√	√	√	√
Trigger Debouncer	×	√	×	√

10.6.1 Set Acquisition Burst Frame Count

In external trigger mode, you can set acquisition burst frame count. Go to **Acquisition Control** → **Acquisition Burst Frame Count**, and enter **Acquisition Burst Frame Count** according to actual demands.

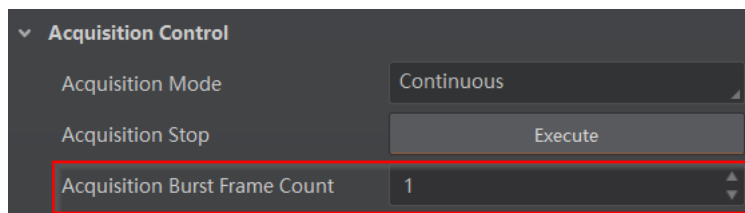


Figure 10-14 Set Acquisition Burst Frame Count

Note

- The range of **Acquisition Burst Frame Count** is from 1 to 1023.
- If **Acquisition Burst Frame Count** is 1, the device is in single frame trigger mode. If

Acquisition Burst Frame Count is larger than 1, the device is in multi-frame trigger mode.

- If **Acquisition Burst Frame Count** is n, when input 1 trigger signal to the device, the device stops acquiring images after exposing n times and outputting n frame images.
-

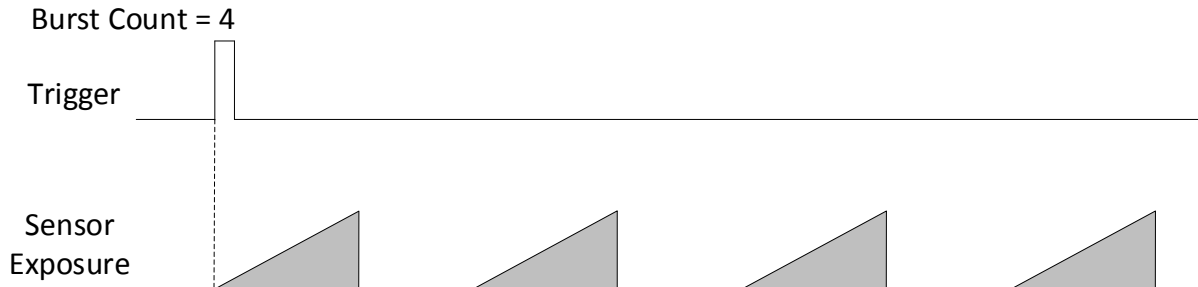


Figure 10-15 Sequence Diagram of Acquisition Burst Frame Count

10.6.2 Set Trigger Activation

The device supports triggering image acquisition in the rising edge, falling edge, level high, level low or any edge of the external signal. Go to **Acquisition Control** → **Trigger Activation**, and select **Rising Edge**, **Falling Edge**, **Level High**, **Level Low** or **Any Edge** as **Trigger Activation**.

- **Rising Edge**: It means that when the level signal sent by external device is in rising edge, the device receives trigger signal and starts to acquire images.
- **Falling Edge**: It means that when the level signal sent by external device is in falling edge, the device receives trigger signal and starts to acquire images.
- **Level High**: The level high of the trigger signal is valid. As long as the trigger signal is in level high, the device is in image acquisition status.
- **Level Low**: The level low of the trigger signal is valid. As long as the trigger signal is in level low, the device is in image acquisition status.
- **Any Edge**: It means that when the level signal sent by external device is in rising edge, falling edge, level high or level low, the device receives trigger signal and starts to acquire images.

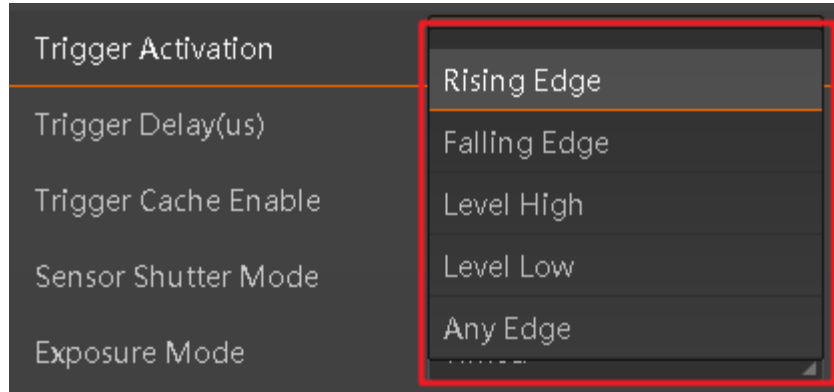


Figure 10-16 Set Trigger Activation

10.6.3 Set Trigger Delay

The trigger delay function allows the device to add a delay between the receipt of trigger signal and the moment the trigger becomes active. Go to **Acquisition Control** → **Trigger Delay**, and enter **Trigger Delay**, and the unit is μs .

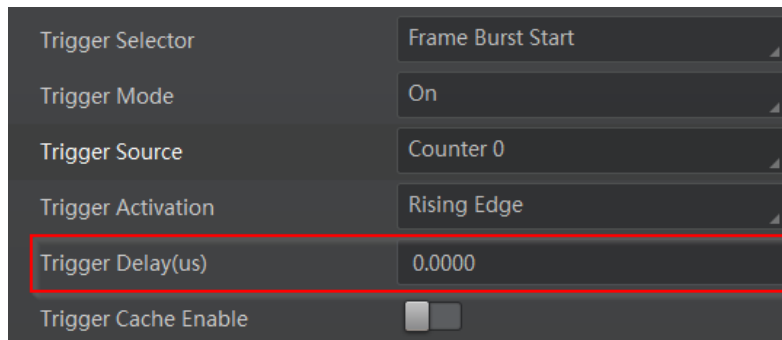


Figure 10-17 Set Trigger Delay

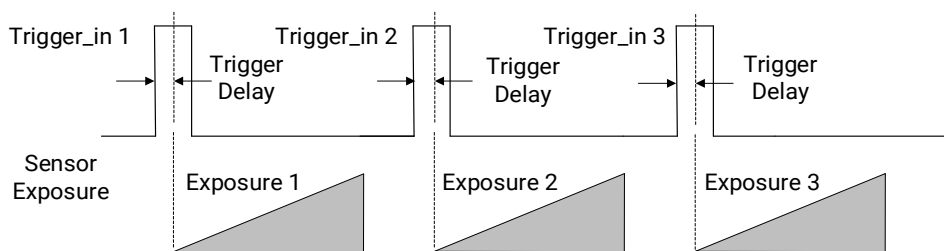


Figure 10-18 Sequence Diagram of Trigger Delay

10.6.4 Set Trigger Cache

The trigger cache function allows the device to save and process new signal during trigger stage, and the device can save and process three trigger signals at most. Go to **Acquisition Control** → **Trigger Cache Enable**, and enable **Trigger Cache Enable**.

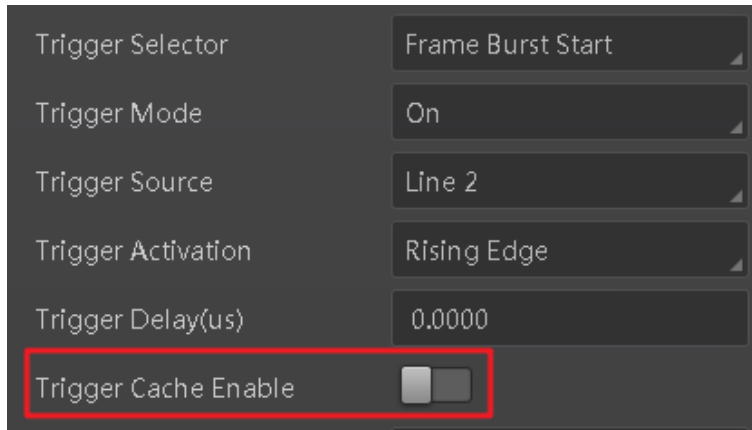


Figure 10-19 Set Trigger Cache

For example, if the device receives the 2nd trigger signal when it is processing the 1st trigger signal, and the result will be different depending on whether **Trigger Cache Enable** is enabled or not.

- The 2nd trigger signal will be filtered without processing if **Trigger Cache Enable** is disabled.

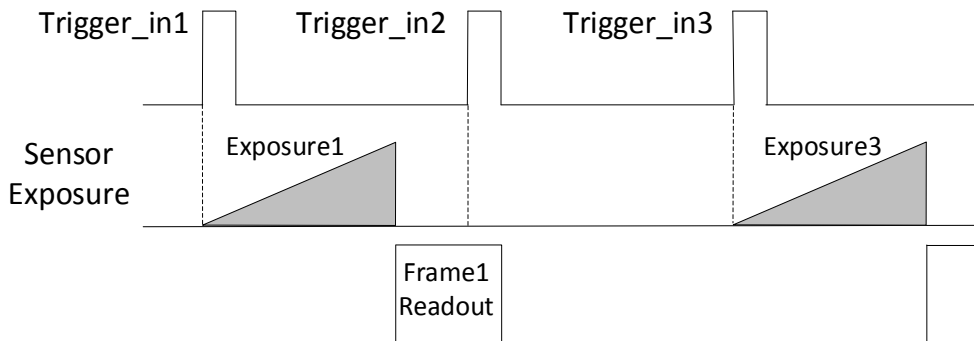


Figure 10-20 Second Frame Filtered

- The 2nd trigger signal will be saved if **Trigger Cache Enable** is enabled.

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

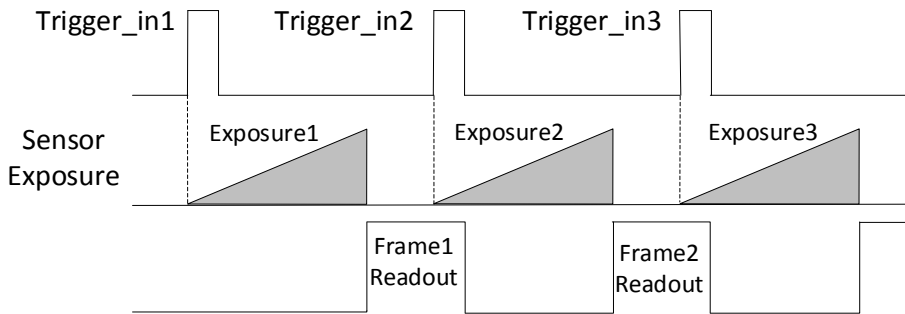


Figure 10-21 Second Frame Created Normally

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

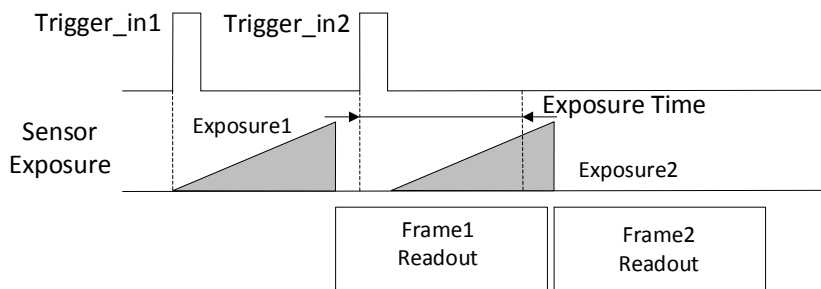


Figure 10-22 Sequence Diagram

Note

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

10.6.5 Set Trigger Debouncer

The trigger debouncer function allows the device to filter out unwanted short external trigger signal that is input to the device.

Go to **Digital IO Control** → **Line Debouncer Time**, and enter **Line Debouncer Time** according to actual demands. The range of **Line Debouncer Time** is from 0 μ s to 1000000 μ s.

Note

If the **Line Debouncer Time** you set is greater than the time of trigger signal, this trigger signal will be ignored.

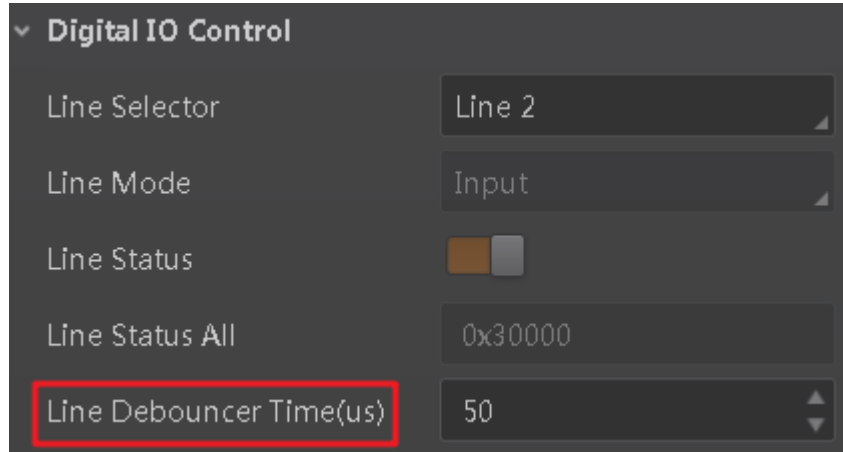


Figure 10-23 Set Trigger Debouncer

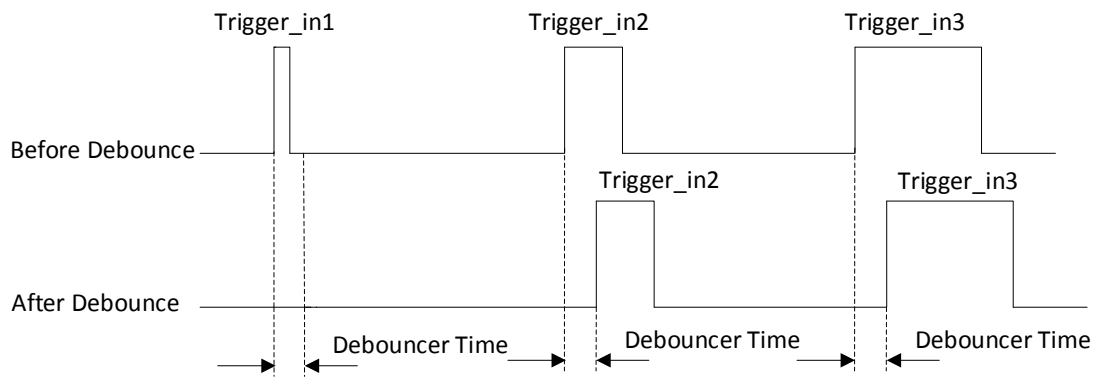


Figure 10-24 Sequence Diagram of Trigger Debouncer

Note

The sequence diagrams above use rising edge as trigger activation.

Chapter 11 Trigger Output

11.1 Select Output Signal

The device has two bi-directional I/O that can be configured as output signal.

Steps

1. Go to **Digital IO Control** and select specific line as **Line Selector**.
2. Select **Strobe** as **Line Mode**.

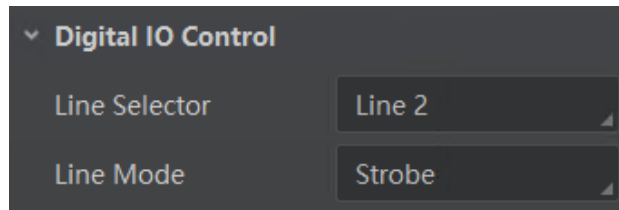


Figure 11-1 Set Output Signal

11.2 Set Output Signal

The output signal of the device is switch signal that can be used to control external devices such as light source, PLC, etc. There are two ways to set output signal, including line inverter and strobe signal.

11.2.1 Enable Line Inverter

The line inverter function allows the device to invert the electrical signal level of an I/O line. Go to **Digital IO Control** → **Line Inverter**, and enable it.

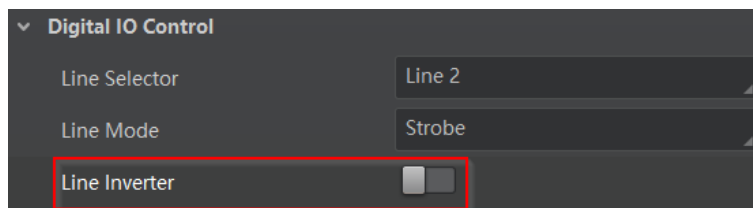


Figure 11-2 Enable Line Inverter

Note

The line inverter function is disabled by default.

11.2.2 Enable Strobe Signal

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

Steps

1. Go to **Digital IO Control** → **Line Source**, and select **Line Source** according to actual demands.
2. Enable **Strobe Enable**.

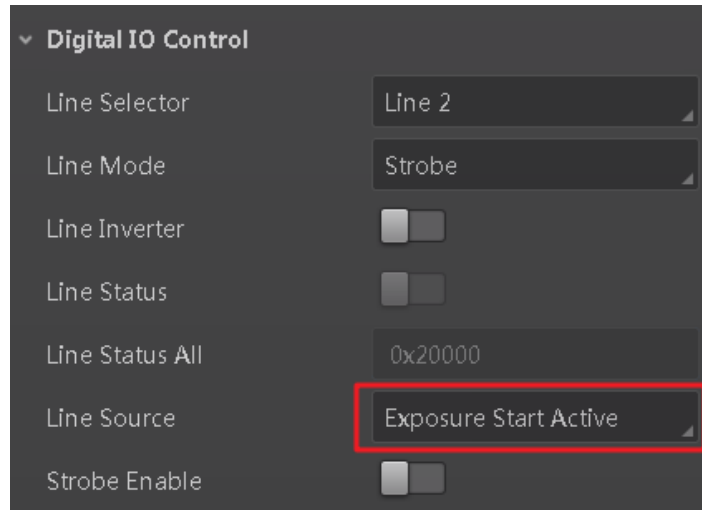


Figure 11-3 Enable Strobe Signal

The supported line sources are as follows:

Table 11-1 Line Source Description

Line Source	Description
Exposure Start Active	The device outputs signals to external devices when it starts exposure.
Exposure End Active	The device outputs signals to external devices when it stops exposure.
Acquisition Start Active	The device outputs signals to external devices when it starts acquiring images.
Acquisition Stop Active	The device outputs signals to external devices when it stops acquiring images.
Frame Burst Start Active	The device outputs signals to external devices when the device's frame burst starts.
Frame Burst End Active	The device outputs signals to external devices when the device's frame burst stops.
Frame Trigger Wait	The device is currently waiting for a frame start trigger.

Line Source	Description
Frame Start Active	The device outputs signals to external devices when it starts doing the capture of a frame.
Frame End Active	The device outputs signals to external devices when it stops doing the capture of a frame.
Soft Trigger Active	The device outputs signals to external devices when it has a software trigger.
Hard Trigger Active	The device outputs signals to external devices when it has a hardware trigger.
Counter Active	The device outputs signals to external devices when it has a counter trigger.
Timer Active	The device outputs signals to external devices when it has a timer trigger.

Note

The specific line sources may differ by device models.

If **Timer Active** is selected as **Line Source**, you can click **Execute** in **Line Trigger Software**, and enter **Strobe Line Delay** according to actual demands. The device will output signals whose duration is configured in **Strobe Line Duration**.

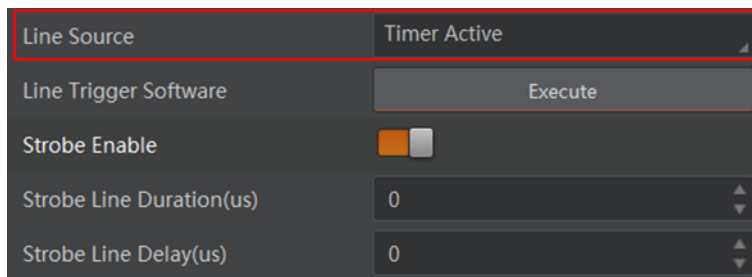


Figure 11-4 Timer Active Parameters

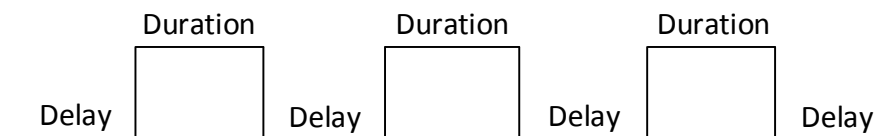


Figure 11-5 Sequence Diagram of Timer Active

Set Strobe Line Duration

After enabling strobe signal, you can set its duration. Go to **Digital IO Control** → **Strobe Line Duration**, and enter it according to actual demands.

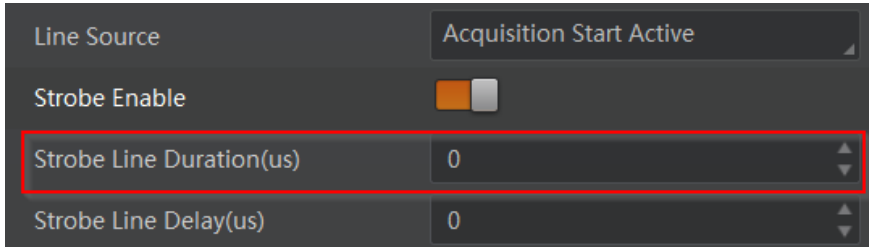


Figure 11-6 Set Strobe Line Duration

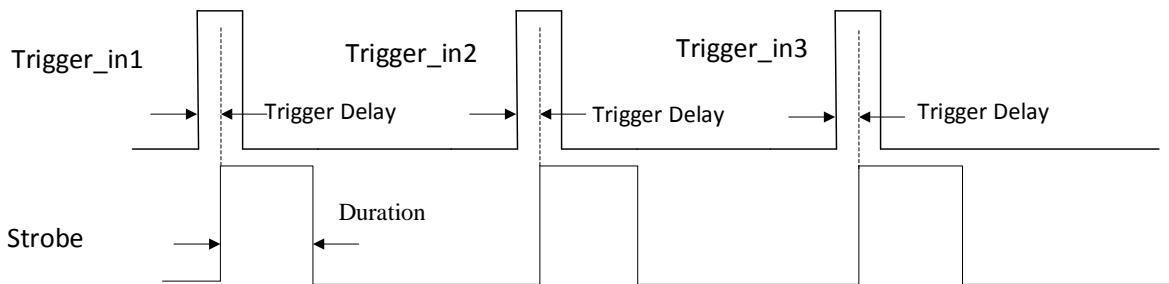


Figure 11-7 Sequence Diagram of Strobe Line Duration

 **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 the configured value you set.

Set Strobe Line Delay

The strobe line delay function allows the device to output signal in a delay time. Go to **Digital IO Control** → **Strobe Line Delay**, and enter it according to actual demands. The range of **Strobe Line Delay** is from 0 μ s to 10000 μ s.

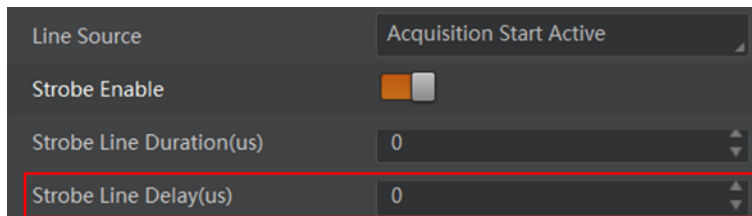


Figure 11-8 Set Strobe Line Delay

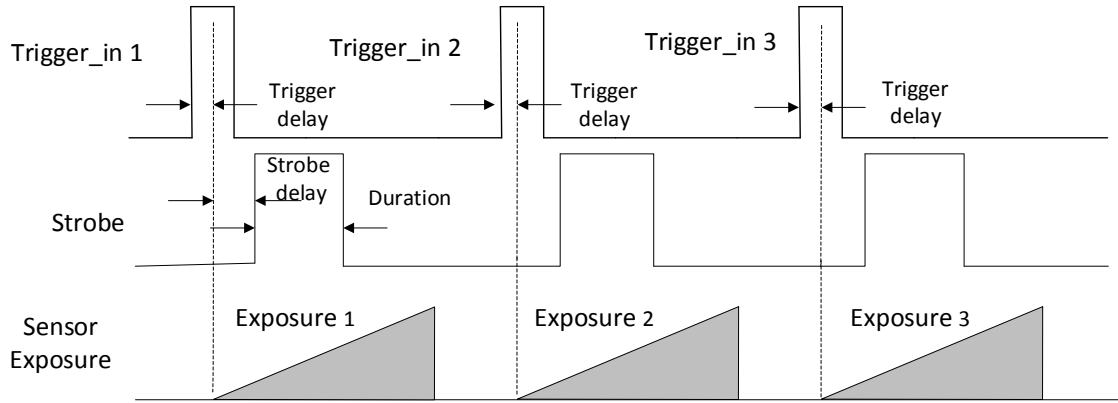


Figure 11-9 Sequence Diagram of Strobe Line Delay

Set Strobe Line Pre Delay

The device 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.

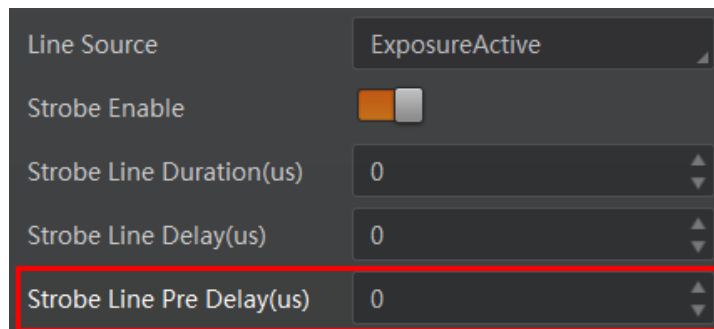


Figure 11-10 Set Strobe Pre Line Delay

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

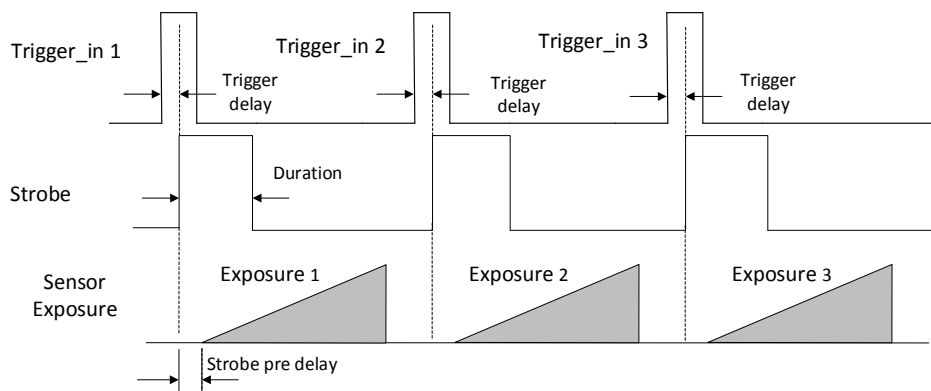


Figure 11-11 Sequence Diagram of Strobe Pre Line Delay

Chapter 12 I/O Electrical Features and Wiring

12.1 I/O Electrical Features

The device has two bi-directional I/O that can be configured as input or output signal. Its internal circuit is as follows.

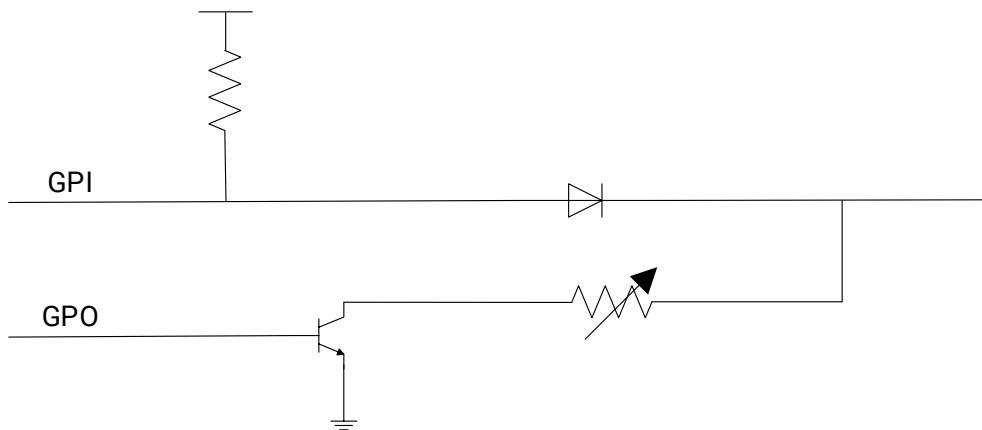


Figure 12-1 Internal Circuit of Bi-Directional Signal

12.1.1 Configured as Input Signal

Note

- Make sure that the input voltage is not from 0.3 VDC to 3.3 VDC as the electric status between these two values are not stable.
 - The breakdown voltage is 30 VDC. Keep voltage stable.
 - To prevent damage to the GPIO pin, please connect GND first and then input voltage in I/O pins.
-

With the condition of 100 Ω resistance and 5 VDC voltage, the logic level and electrical feature of configuring bi-directional I/O as input signal are shown below.

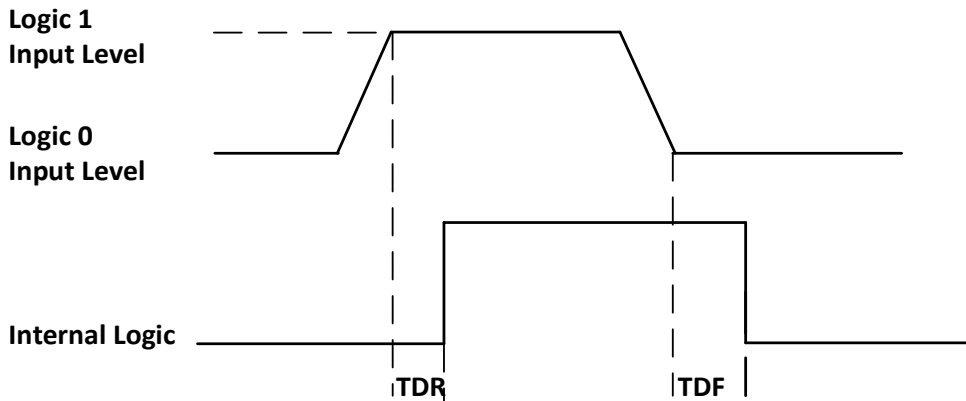


Figure 12-2 Input Logic Level

Table 12-1 Input Electrical Feature

Parameter Name	Parameter Symbol	Value
Input Logic Level Low	VL	0 VDC to 0.3 VDC
Input Logic Level High	VH	3.3 VDC to 24 VDC
Input Falling Delay	TDF	< 0.66 μs
Input Rising Delay	TDR	< 0.05 μs

12.1.2 Configured as Output Signal

Note

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

The relation among external voltage, resistance and the output level low is shown below when the environmental temperature is 25 °C (77 °F).

Table 12-2 Parameters of Output Logic Level Low

External Voltage	External Resistance	VL
3.3 VDC	1 KΩ	160 mV
5 VDC	1 KΩ	220 mV
12 VDC	1 KΩ	460 mV
24 VDC	1 KΩ	860 mV
30 VDC	1 KΩ	970 mV

When the voltage of external resistance (1 K Ω) is pulled up to 5 VDC, the logic level and electrical feature of configuring bi-directional I/O as output are shown below.

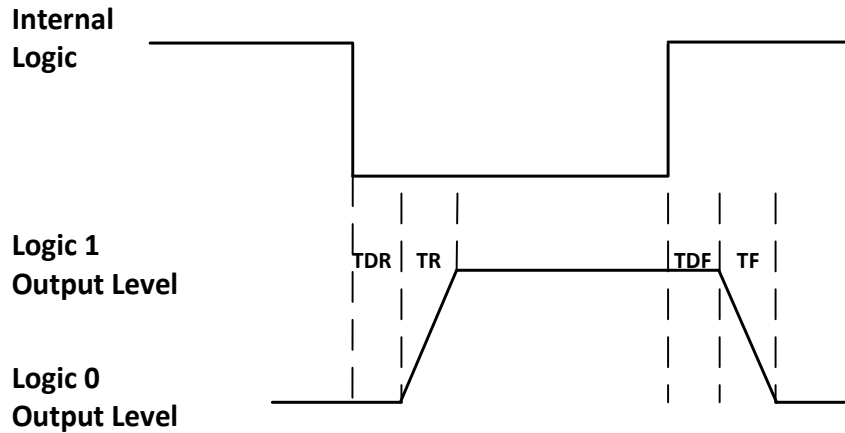


Figure 12-3 Output Logic Level

Table 12-3 Output Electrical Feature

Parameter Name	Parameter Symbol	Value
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

12.2 I/O Wiring

The device has two bi-directional I/O that can be configured as input or output signal. Follow the section below to wire the I/O.

12.2.1 Input Signal Wiring

The input signal wiring is shown below when the device's bi-directional I/O is configured as input signal.

Note

- Input signal wiring may differ by the external device type.
- The device appearance here is for reference only, and please refer to the actual one you got.

PNP Device

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

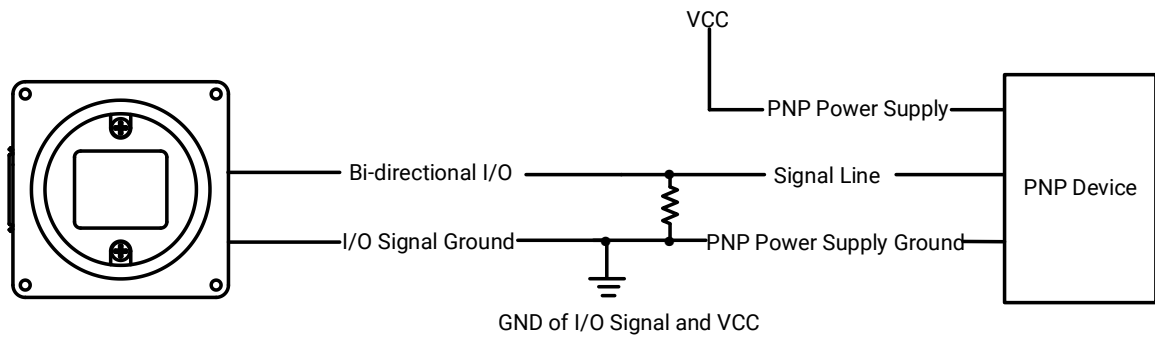


Figure 12-4 Input Signal Connects to PNP Device

NPN Device

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

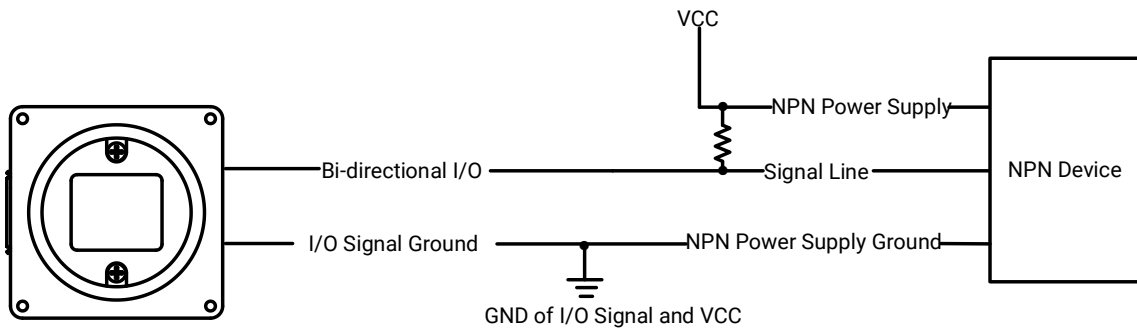


Figure 12-5 Input Signal Connects to NPN Device

Switch

The switch value can provide low electrical level to trigger bi-directional I/O.

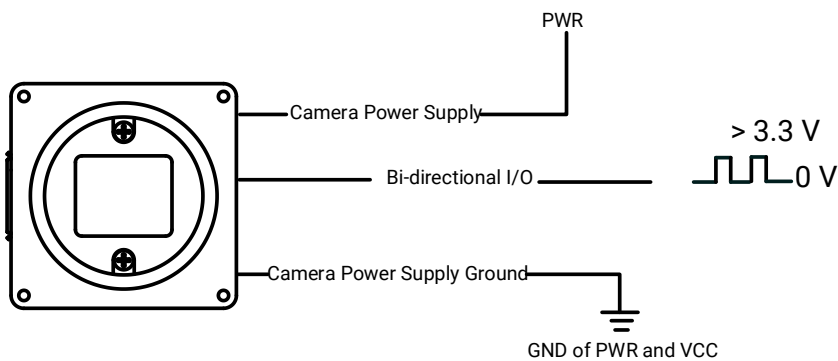


Figure 12-6 Input Signal Connects to Switch

12.2.2 Output Signal Wiring

The output signal wiring is shown below when the device's bi-directional I/O is configured as output signal.

Note

- Output signal wiring may differ by the external device type.
- The device appearance here is for reference only, and please refer to the actual one you got.

PNP Device

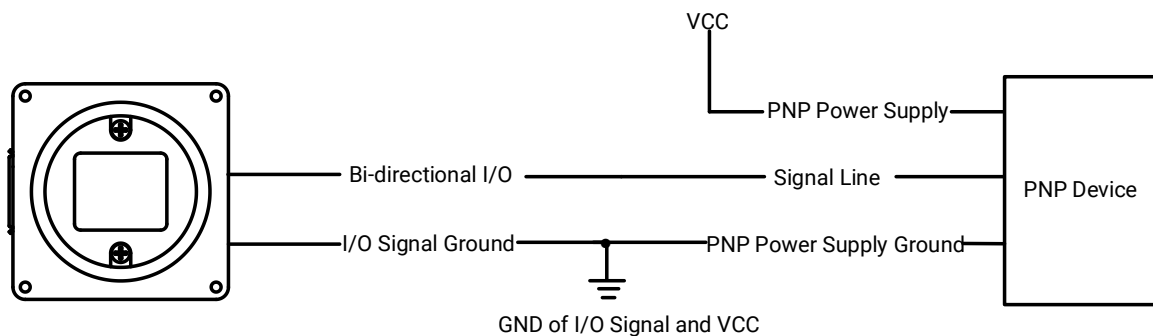


Figure 12-7 Output Signal Connects to PNP Device

NPN Device

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

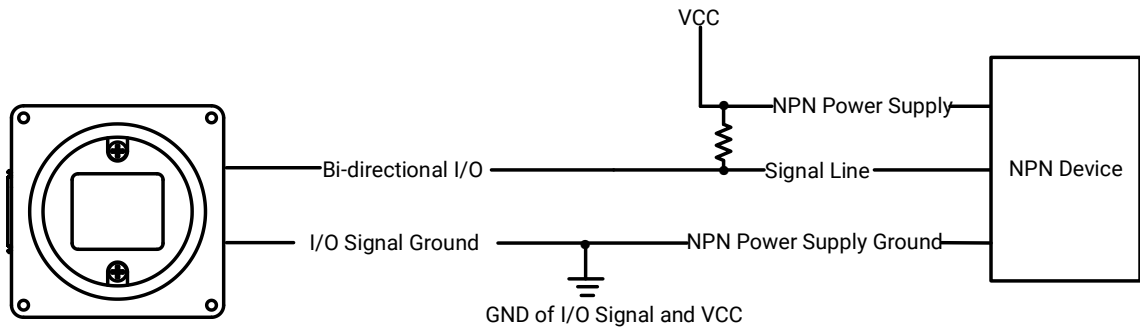


Figure 12-8 Output Signal Connects to NPN Device

Chapter 13 Image Parameter

13.1 View Resolution

Note

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

Go to **Image Format Control**, and you can view resolution by reading **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.

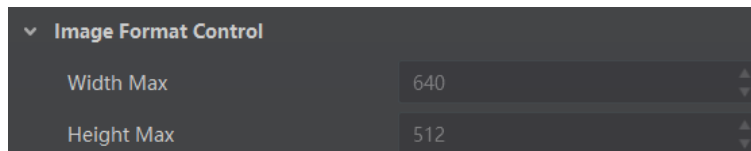


Figure 13-1 View Resolution

13.2 Set ROI

If you are only interested in a certain region of the image, you can set a Region of Interest (ROI) for the device.

Note

- The device currently supports one ROI only, and you can select **Region 0** as **Region Selector**.
 - Region of interest can be set only when you stop real-time acquisition.
-

Go to **Image Format Control** → **Region Selector**, and enter **Width**, **Height**, **Offset X**, and **Offset Y**.

Note

The **Width** plus **Offset X** should not be larger than **Width Max**, and **Height** plus **Offset Y** should not be larger than **Height Max**.

- **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.

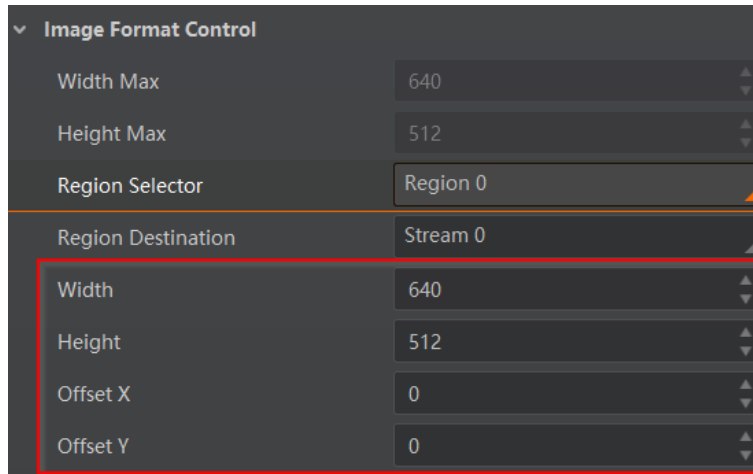


Figure 13-2 Set ROI

13.3 Set Image Reverse

 **Note**

- For different models of device, the image reverse function may be different, please refer to the actual one you got.
- Only when the device stops streaming, you can enable **Reverse Y**.

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 13-3 Set Image Reverse

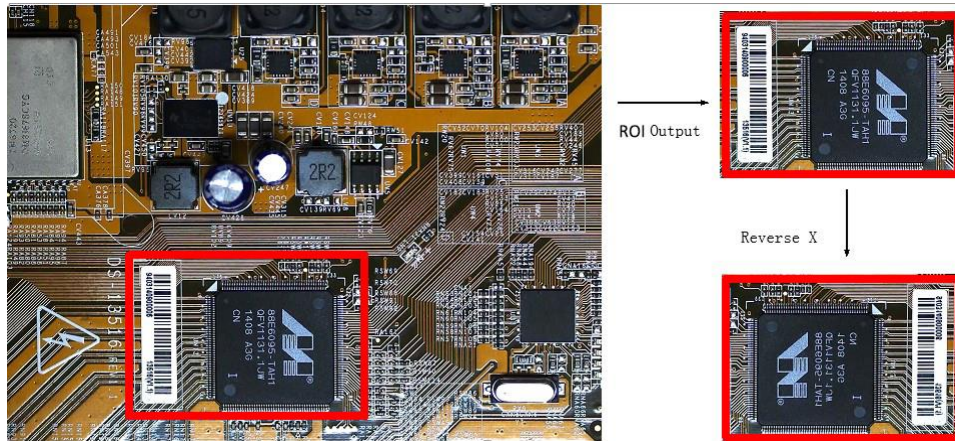


Figure 13-4 Image Reverse Comparison

13.4 Set Pixel Format

This function allows you to set the pixel format of the image data transmitted by the device. Go to **Image Format Control** → **Pixel Format**, and set **Pixel Format** according to actual demands.

Note

- The specific pixel formats may differ by device models.
- With different ADC bit depth, the pixel format and pixel size may differ.

Table 13-1 Pixel Format and Pixel Size

ADC Bit Depth	Pixel Format	Pixel Size (Bits/Pixel)
8	Mono 8, Bayer 8	8
12	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

Offset Y	Mono 8
Reverse X	Mono 10
Reverse Y	Mono 12
Pixel Format	RGB 8
	BGR 8
Pixel Size	YUV 422 (UYVY) Packed
Test Pattern Generator Selector	YUV 422 Packed
Test Pattern	Bayer RG 8
Binning Selector	Bayer RG 10
Binning Horizontal	Bayer RG 10 Packed
Binning Vertical	Bayer RG 12
	Bayer RG 12 Packed

Figure 13-5 Set Pixel Format

With different ADC bit depths and pixel formats, the device’s max. frame rate may differ. The larger the device’s ADC bit depth value, the better the device’s image quality, the lower the device’s frame rate will be.

Note

The ADC bit depth function may differ by device models.

The default output data format of mono device is Mono 8. The default output data format of color device is Bayer 8, and it can be converted into RGB format via pixel interpolation algorithm. Bayer GR, Bayer GB, Bayer BG, Bayer RG and Bayer RBGG patterns are shown below.

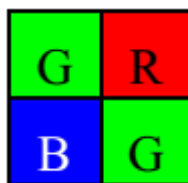


Figure 13-6 Bayer GR Pixel Pattern

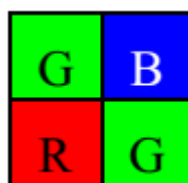


Figure 13-7 Bayer GB Pixel Pattern

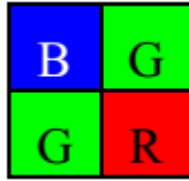


Figure 13-8 Bayer BG Pixel Pattern

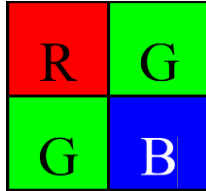


Figure 13-9 Bayer RG Pixel Pattern

13.5 Set Super Bayer

Note

For different models of device, the super Bayer function may be different, please refer to the actual one you got.

In Bayer pixel format, the device supports Gamma function, LUT, contrast ratio, super palette control, sharpness, and color correction function after you enable **Super Bayer Enable**. Go to **Image Format Control** → **Super Bayer Enable**, and enable it according to actual demands.

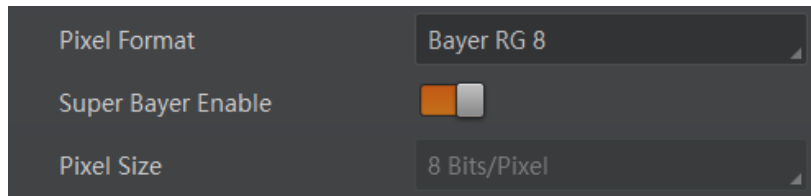


Figure 13-10 Set Super Bayer

13.6 Set Test Pattern

Note

The test pattern may differ by device models.

The device 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 device is

real-time image. If this function is enabled, the outputted image by the device is test image.

Go to **Image Format Control** → **Test Pattern Generator Selector** → **Test Pattern**, and set **Test Pattern** according to actual demands.

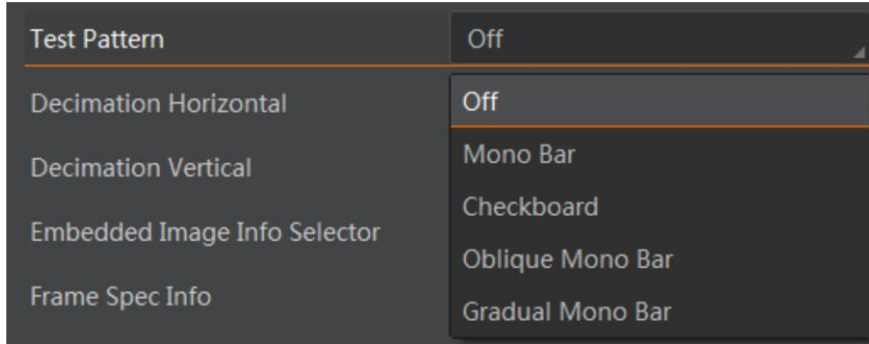


Figure 13-11 Set Test Pattern

The mono device offers 5 test patterns, including **Mono Bar**, **Checkboard**, **Oblique Mono Bar**, **Gradual Mono Bar**, and **Test Image 1**.

The color device offers 7 test patterns, including **Mono Bar**, **Checkboard**, **Oblique Mono Bar**, **Gradual Mono Bar**, **Vertical Color Bar**, **Horizontal Color Bar**, and **Test Image 1**.

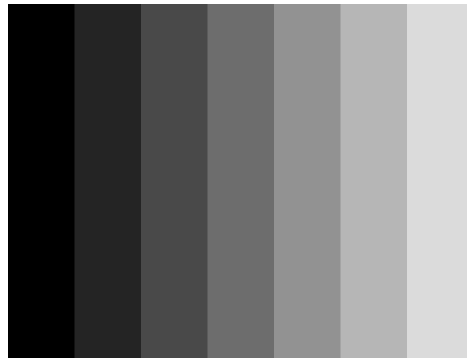


Figure 13-12 Mono Bar Test Pattern

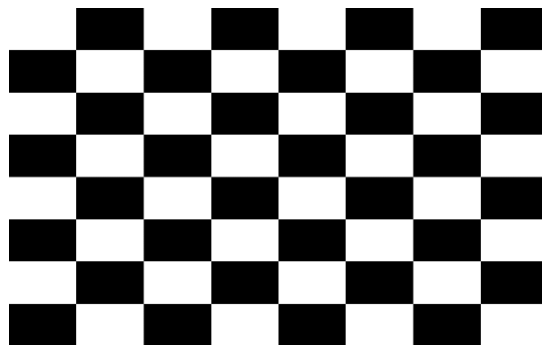


Figure 13-13 Checkboard Test Pattern

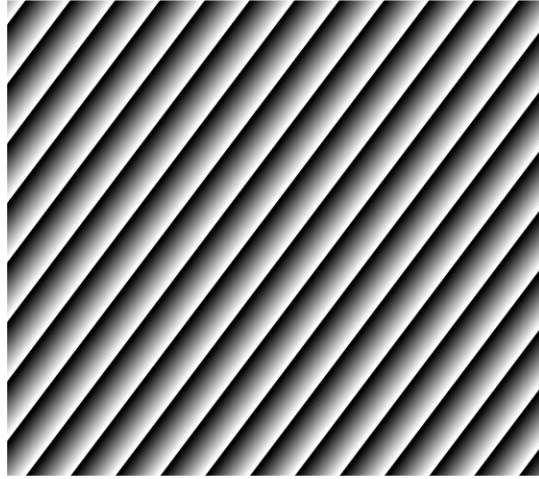


Figure 13-14 Oblique Mono Bar Test Pattern



Figure 13-15 Gradual Mono Bar Test Pattern

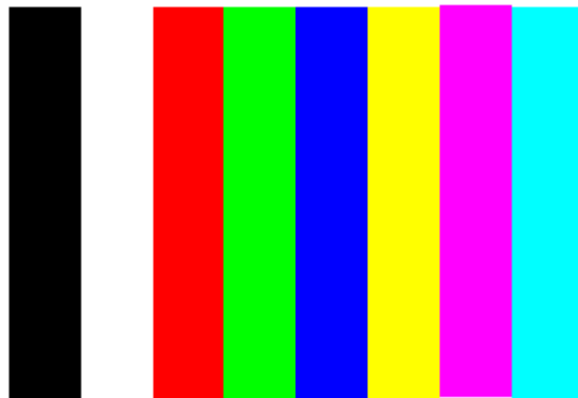


Figure 13-16 Vertical Color Bar Test Pattern

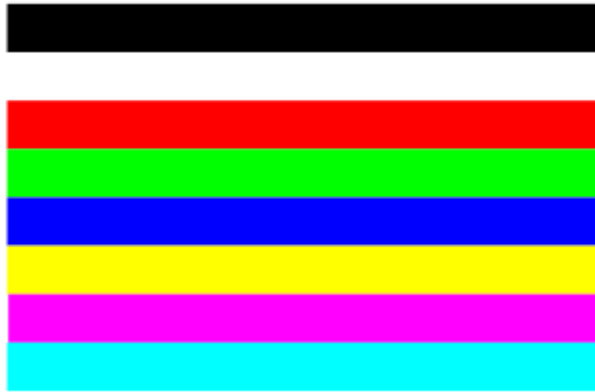


Figure 13-17 Horizontal Color Bar Test Pattern



Figure 13-18 Test Image 1

 **Note**

The pattern of the test image 1 may differ by device models.

13.7 Set Binning

 **Note**

- **Binning Horizontal** is the image's width, and **Binning Vertical** is the image's height.
 - The binning functions may differ by device models.
-

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 **Binning Selector**, and set **Binning Horizontal** and **Binning Vertical** according to actual demands.

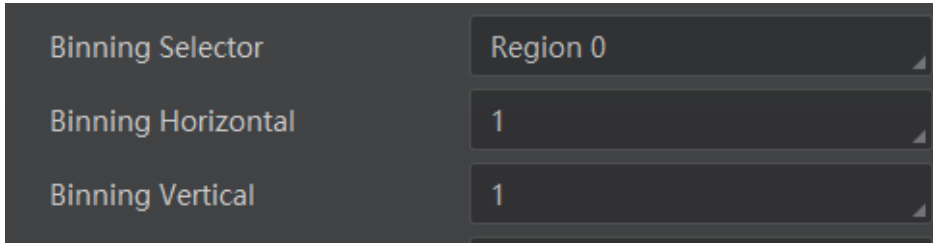


Figure 13-19 Set Binning

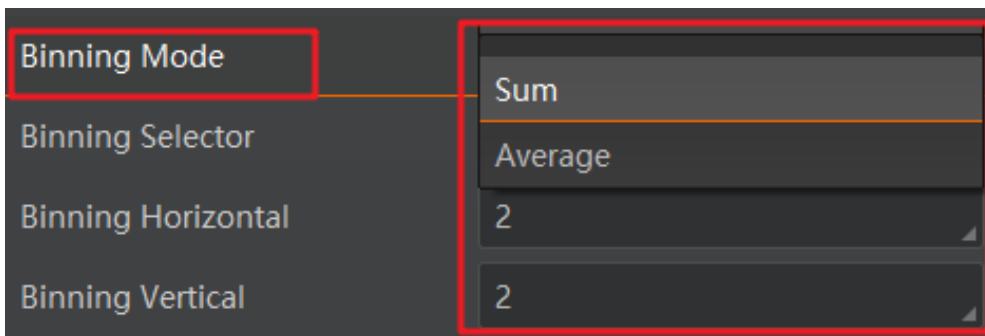


Figure 13-20 Set Binning Mode

13.8 Set Decimation

Note

- **Decimation Horizontal** is the image's width, and **Decimation Vertical** is the image's height.
 - The decimation functions may differ by device models.
-

The decimation feature allows you to reduce the number of sensor pixel columns or rows that are transmitted by the device. This procedure is also known as subsampling. It reduces the amount of data to be transferred and may increase the device's frame rate. Click **Image Format Control**, and set **Decimation Horizontal** and **Decimation Vertical** according to actual demands.

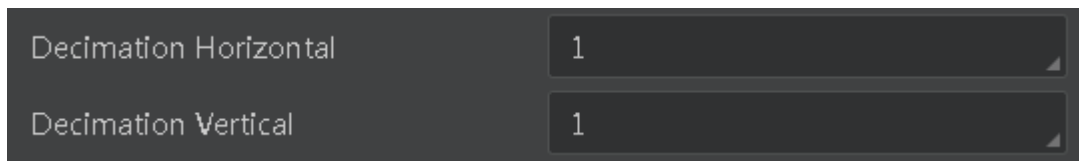


Figure 13-21 Set Decimation

13.9 Set Exposure Time Mode

Note

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

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

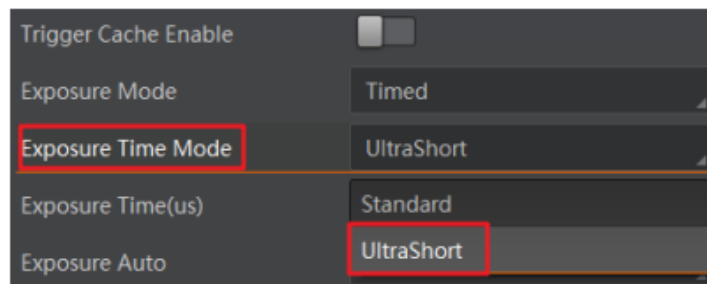


Figure 13-22 Set Exposure Time Mode

13.10 Set Exposure Auto

The device supports 3 types of exposure mode, including **Off**, **Once** and **Continuous**. Click **Acquisition Control** → **Exposure Auto**, and select **Exposure Auto** according to actual demands.

- **Off**: The device exposures according to the value set in **Exposure Time (μs)**.
- **Once**: The device adjusts the exposure time automatically according to the image brightness. After adjusting, it will switch to **Off** mode.
- **Continuous**: The device adjusts the exposure time continuously according to the image brightness.

When the exposure mode is set as **Once** or **Continuous**, the exposure time should be within the range of **Auto Exposure Time Lower Limit (μs)** and **Auto Exposure Time Upper Limit (μs)**.

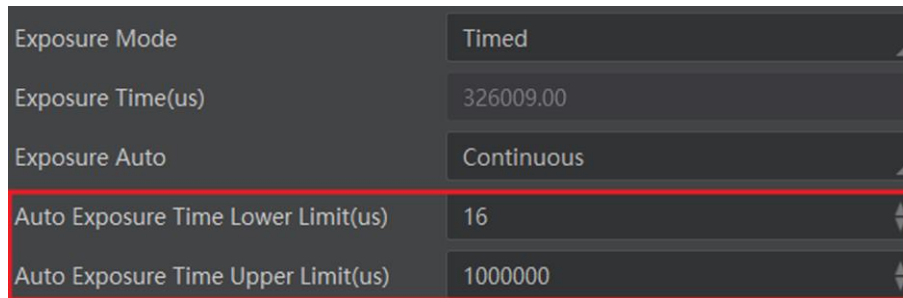


Figure 13-23 Set Exposure Time under Once or Continuous Mode

Note

- If the device is under **Continuous** exposure mode, once external trigger mode is enabled, the device will automatically switch to **Off** exposure mode.
 - Some models of the device do not support **Once** or **Continuous** exposure mode. You can enter **Exposure Time (μs)** directly.
-

13.11 Set Sequencer Control and HDR

The device supports sequencer or HDR functions, which allow you to configure multiple groups of parameters to acquire images.

Note

- The device cannot support sequencer and HDR functions at the same time.
 - The sequencer or HDR function may differ by device models.
-

13.11.1 Set Sequencer

If the device supports sequencer, you can configure multiple groups of parameters like exposure time, gain, etc.

Note

You cannot configure parameters like trigger width, exposure time mode during sequencer.

Steps

1. Go to **Sequencer Control**, select **Off** as **Sequencer Mode**, and **On** as **Sequencer Configuration Mode**.

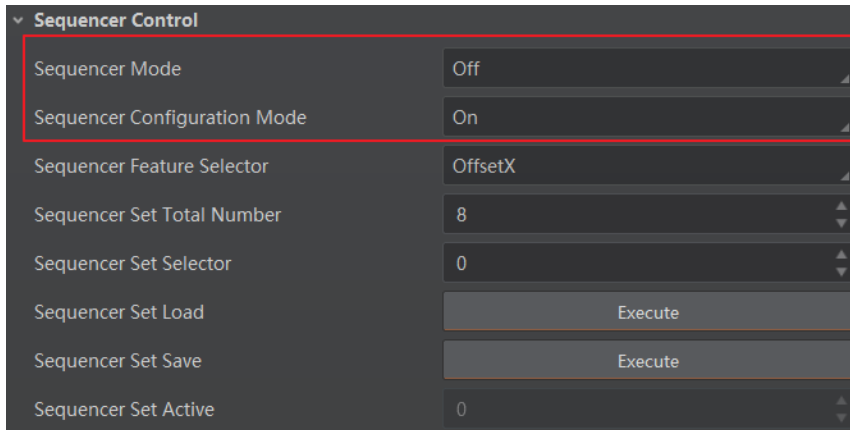


Figure 13-24 Set Sequencer Control

2. Set **Sequencer Set Total Number** to configure how many groups to join sequencer according to actual demands.

Note

Up to 8 groups of parameters can be configured.

3. Set **Sequencer Set Selector** to select one group of parameters, and set **Sequencer Feature Selector** to configure specific parameters.

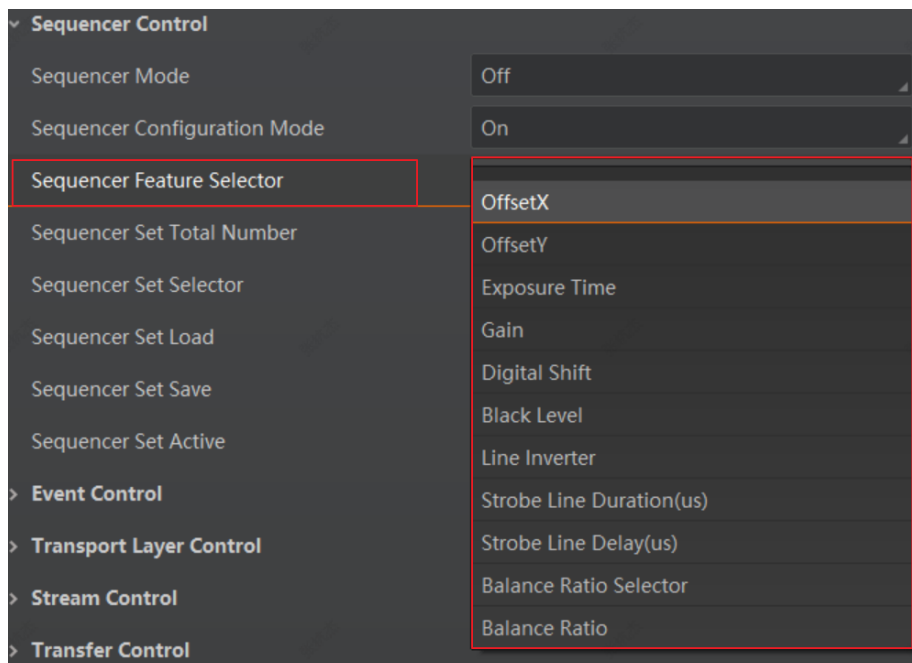


Figure 13-25 Sequencer Feature Selector

Note

You should go to the corresponding parameters to set their detailed parameters.

- (Optional) Click **Execute** in **Sequencer Set Load** to load selected parameters in **Sequencer Set Selector**.
 - (Optional) Click **Execute** in **Sequencer Set Save** to save the selected group of parameters.
 - Repeat step 3 to step 5 to configure other group of parameters.
 - Select **On** as **Sequencer Mode** to start sequencer after configuration.
-

Note

You cannot configure detailed parameters of group of parameters once sequencer is started.

- (Optional) Click **Execute** in **Sequencer Restart** to let the sequencer start from the beginning group.

13.11.2 Set HDR

Note

- The HDR function may differ by device models.
 - The device supports HDR (High Dynamic Range) function that the device acquires images based on customized settings, and each with its own exposure time and gain.
 - With the same HDR parameter settings, the frame rate when **Sensor Shutter Mode** is **Global Reset** or **Trigger Rolling** is reduced to half compared with the frame rate when **Sensor Shutter Mode** is **Rolling**.
-

Steps

- Go to **Acquisition Control** → **HDR Enable**, and enable **HDR Enable**.
 - Select **0, 1, 2** or **3** as **HDR Selector** according to actual demands.
 - Set corresponding **HDR Shutter** and **HDR Gain**.
-

Note

Up to 4 HDR groups can be configured.

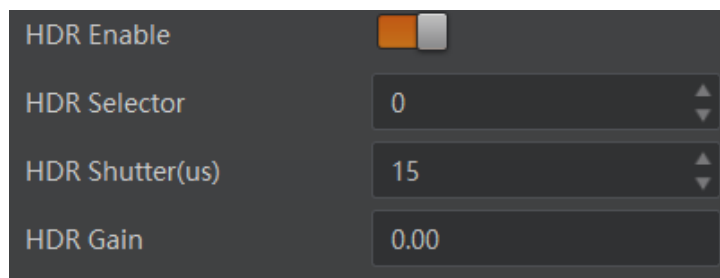


Figure 13-26 Set HDR

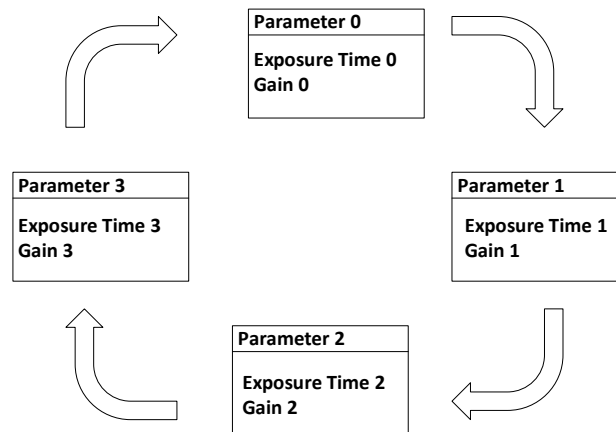


Figure 13-27 HDR Polling Demonstration

13.12 Set Gain

Note

The gain function may differ by device models.

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

13.12.1 Set Analog Gain

The device supports 3 types of gain mode, including **Off**, **Once** and **Continuous**. Click **Analog Control** → **Gain Auto**, and select **Gain Auto** according to actual demands.

- **Off**: The device **adjusts** gain according to the value configured by user in **Gain**.
- **Once**: The device adjusts the gain automatically according to the image brightness. After adjusting, it will switch to **Off** mode.
- **Continuous**: The device **adjusts** the gain continuously according to the image brightness.

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

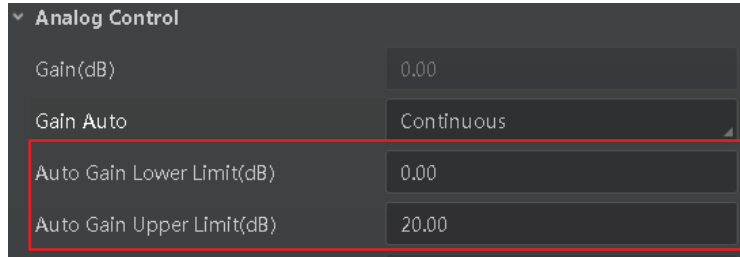


Figure 13-28 Set Gain under Once or Continuous Mode

Note

- 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 device's exposure time first. If the exposure time reaches its upper limit, and at this point, you can increase gain.
- Some models of the device do not support **Once** or **Continuous** gain mode. You can enter **Gain (dB)** directly.

13.12.2 Set Digital Gain

Apart from analog gain, the device 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.

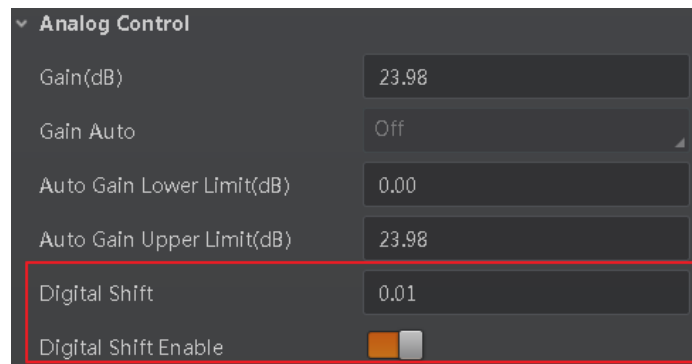


Figure 13-29 Set Digital Gain

Note

When increasing the digital gain, the image noise will greatly increase too, which will severely influence image quality. It is recommended to use analog gain first, and then to adjust digital gain if the analog gain cannot meet demands.

13.13 Set Brightness

The device brightness refers to the brightness when the device adjusts image under **Once** or **Continuous** exposure mode, or **Once** or **Continuous** gain mode.

Note

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

Go to **Analog Control** → **Brightness**, and enter **Brightness** according to actual demand.



Figure 13-30 Set Brightness

13.14 Set Black Level

Note

The black level may differ by device models.

The device 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.

Go to **Analog Control** → **Black Level Enable**, enable **Black Level Enable**, and enter **Black Level** according to actual demands.

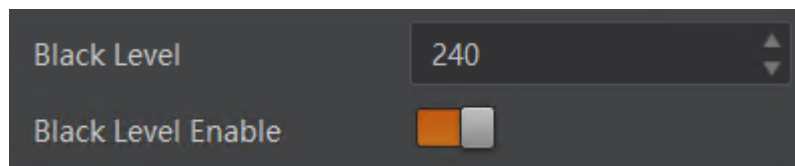


Figure 13-31 Set Black Level

13.15 Set White Balance

Note

White balance is only available for color devices.

The white balance refers to the device color adjustment depending on different light sources. Adjust the R/G/B ratio to ensure that the white regions are white under different color temperatures. Ideally, the proportion of R/G/B in the white region is 1:1:1.

The device supports 3 types of white balance mode, including **Off**, **Once** and **Continuous**. Click **Analog Control** → **White Balance Auto**, and select **White Balance Auto** according to actual demands.

- **Off**: You need to set the R, G, B ratio manually via **Balance Ratio Selector** and **Balance Ratio**. The range is from 1 to 16376, and 1024 means ratio is 1.0.
- **Once**: Adjust the white balance for a certain amount of time then stop.
- **Continuous**: Adjust the white balance continuously.

It is recommended to correct white balance when there is great difference between the device'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 device's field of view, and make sure the paper covers the entire field of view.
2. Set exposure and gain.

Note

It is recommended to set image brightness value between 120 and 160.

3. Select **Wide** as **AWB Color Temperature Mode** to let the device adjust white balance again if the image's color effect is not good under the default condition of **Balance White Auto** is **Continuous** and **AWB Color Temperature Mode** is **Narrow**.

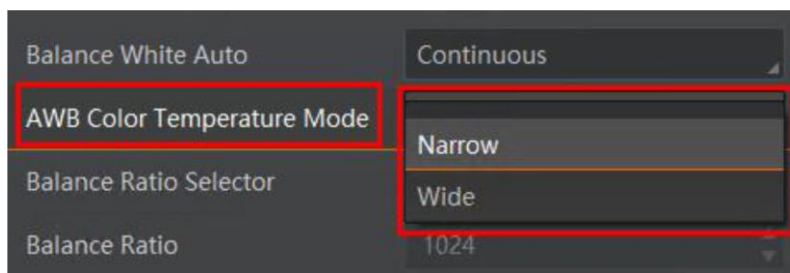


Figure 13-32 Set Parameters

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

Steps

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 device, 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.
-

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 device'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.

13.16 Set Gamma Correction

Note

- The Gamma correction function may differ by device models.
 - Regarding the color device in Bayer pixel format, you need to enable **Super Bayer Enable** first before using Gamma correction function.
-

The device supports Gamma correction function. Generally, the output of the device'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 0.5 and 1: image brightness increases, dark area becomes brighter.
- Gamma value between 1 and 4: image brightness decreases, dark area becomes darker.

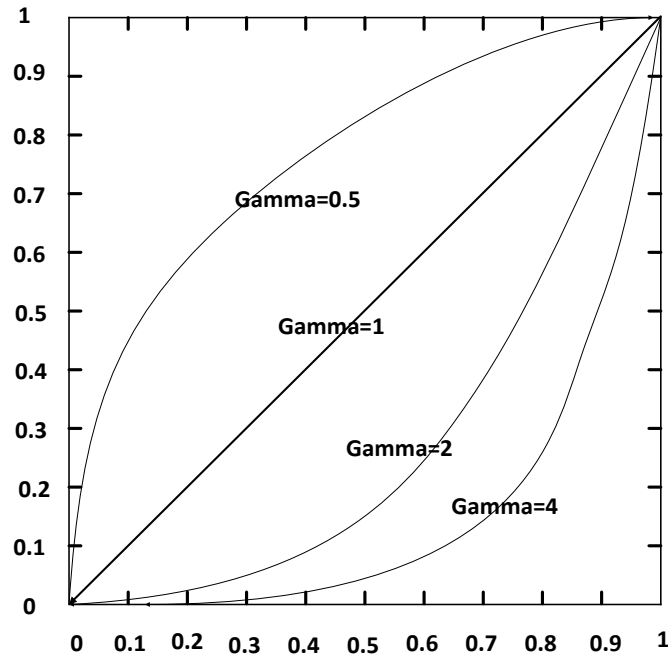


Figure 13-33 Set Gamma Correction

There are 2 types of Gamma correction, including **User** mode and **sRGB** mode.

User Mode

Steps

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

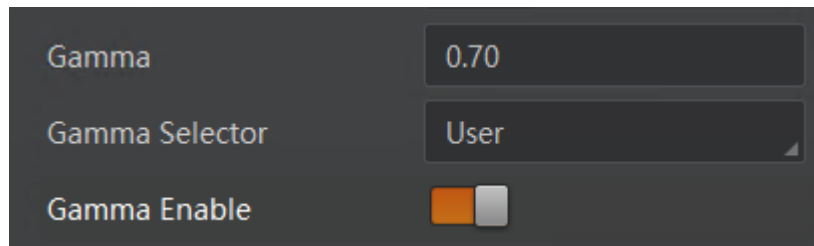


Figure 13-34 Set User Mode

sRGB Mode

Steps

1. Go to **Analog Control** → **Gamma Selector**.
2. Select **sRGB** as **Gamma Selector**.

3. Enable **Gamma Enable** to enable it.

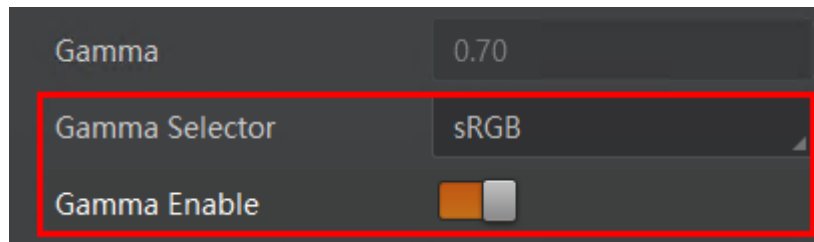


Figure 13-35 Set sRGB Mode

13.17 Set Sharpness

Note

- The sharpness function may differ by device models.
- Regarding the color device in Bayer pixel format, you need to enable **Super Bayer Enable** first before using sharpness function.

The device supports sharpness function that can adjust the sharpness level of the image edge, You can set sharpness as shown below.

Go to **Analog Control** → **Sharpness Enable**, enable **Sharpness Enable**, and enter **Sharpness** according to actual demands.

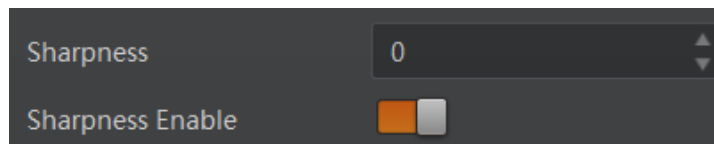


Figure13-36 Set Sharpness

13.18 Set Contrast Ratio

Note

- The contrast ratio function may differ by device models.
- Make sure that the live view is enabled, and Gamma correction and LUT function is disabled before using the contrast ratio function.
- Regarding the color device in Bayer pixel format, you need to enable **Super Bayer Enable** first before using contrast ratio function.
- The range of **Contrast Ratio** is from 0 to 100.

The device supports the contrast ratio function that adjusts the intensity of light and darkness and color. The larger the contrast ratio, and more clear the image is. Go to **Analog Control**, enable **Contrast Ratio Enable**, and set **Contrast Ratio** according to actual demands.

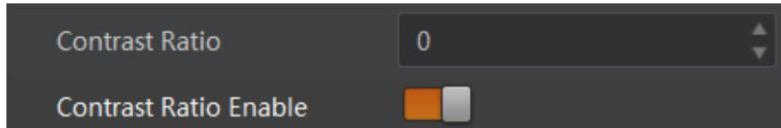


Figure 13-37 Set Contrast Ratio

13.19 Set AOI

Note

- The AOI function may differ by device models.
 - AOI 1 is used when the device is in once or continuous exposure mode, and AOI 2 is used when the device is in once or continuous white balance mode.
-

The device 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**.

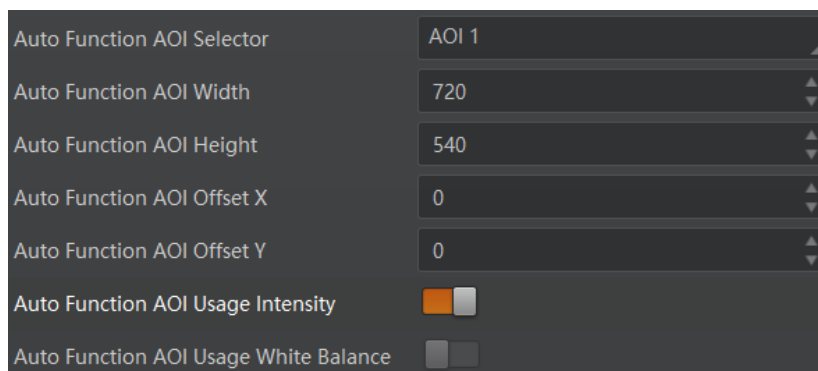


Figure 13-38 Set AOI

13.20 Set Color Transformation Control

Note

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

After the image is processed by the white balance, the overall image will be dark, and at the same time, various colors may deviate from their standard values to varying degrees. At this time, it is necessary to multiply the color of the image by the correction matrix to correct each color to its standard value, so that the overall color of the image is more vivid. The color correction function is implemented by multiplying each RGB component by a correction matrix. The currently supported color conversion module is RGB to RGB.

Two methods are available to set color transformation control.

- Method 1:

Steps

1. Go to **Color Transformation Control**, and enable **CCM Enable**.
2. Select **Color Transformation Value Selector**, and set **Color Transformation Value** according to actual demand.

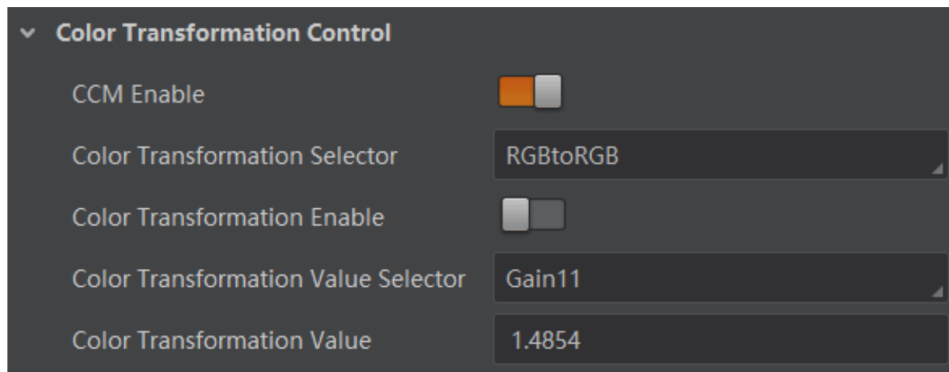


Figure 13-39 Method 1

Note

- **CCM Enable** is used to enable color correction function. If the device you purchased does not have **CCM Enable**, then the color correction function is enabled by default.
- Color correction is achieved by adjusting the values of the parameters in **Color Transformation Value Selector**, where Gain00, Gain10, and Gain20 adjust the R component of the red pixel, Gain01, Gain11, and Gain21 adjust the G component of the green pixel, and Gain02, Gain12, and Gain22 adjust the B component of the blue pixel.
- Method 2: Go to **Color Transformation Control**, enable **Color Transformation Enable**, set **Hue** and **Saturation** to adjust **Color Transformation Value**.

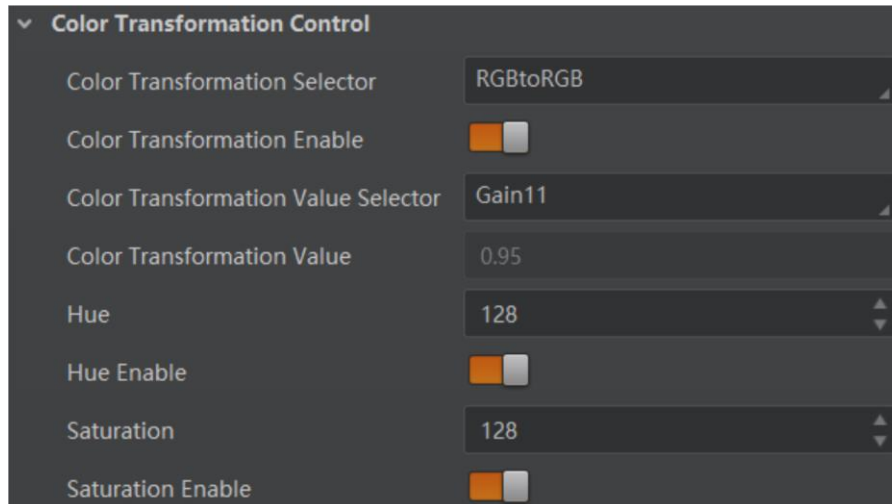


Figure 13-40 Method 2

13.21 Set Hue

Note

- The hue function is only available for color devices.
- In Mono pixel format, hue function is not supported.
- The color device in Bayer pixel format does not support hue function.
- The range of hue is between 0 and 255.

Adjusting the hue shifts the colors of the image. After hue is set, the device will perform color correction based on the hue value to bring the image tone to the target value. For example, when hue is set to 128, the red in the image appears as real red. When hue is 0, the hue is reversed 128 degrees counterclockwise, and red becomes blue. When hue is 255, the hue rotates 128 degrees clockwise, and red becomes green.

Steps

1. Go to **Color Transformation Control**.
2. Enable **Color Transformation Enable**, and enable **Hue Enable**.
3. Enter **Hue** according to actual demands.

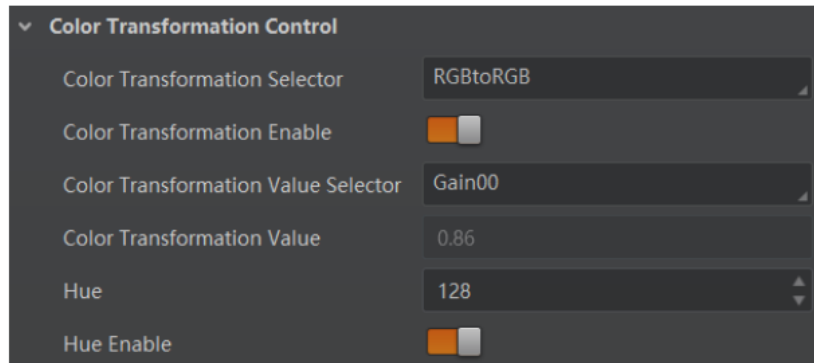


Figure 13-41 Set Hue

13.22 Set Saturation

Note

- The saturation function is only available for color devices.
- In Mono pixel format, hue function is not supported.
- The color device in Bayer pixel format does not support saturation function.
- The range of saturation is between 0 and 255.

Adjusting the saturation changes the colorfulness of the colors. A higher saturation, for example, makes colors easier to distinguish.

Steps

1. Go to **Color Transformation Control**.
2. Enable **Color Transformation Enable**, and enable **Saturation Enable**.
3. Enter **Saturation** according to actual demands.

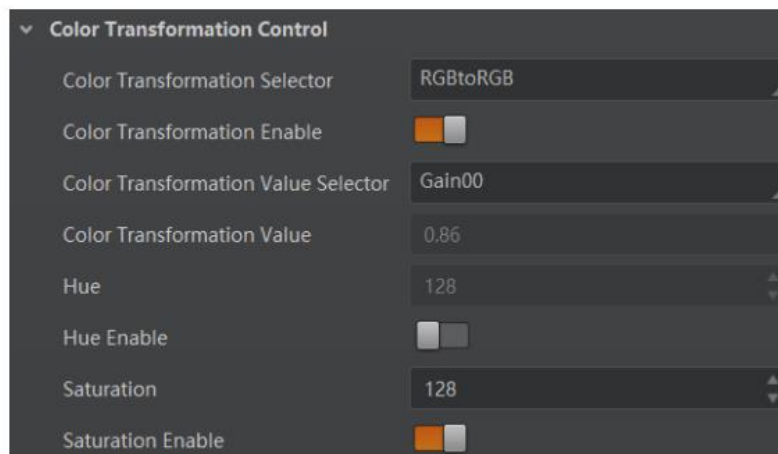


Figure 13-42 Set Saturation

13.23 Set Super Palette Control

Note

- The function of super palette control may differ by device models.
- Regarding the color device in Bayer pixel format, you need to enable **Super Bayer Enable** first before using super palette control function.

The super palette control function allows you to select different color areas in the image to set customized hue and saturation values.

Steps

1. Go to **Super Palette Control**, and enable **Super Palette Enable**.
2. Select **Super Palette Selector**.

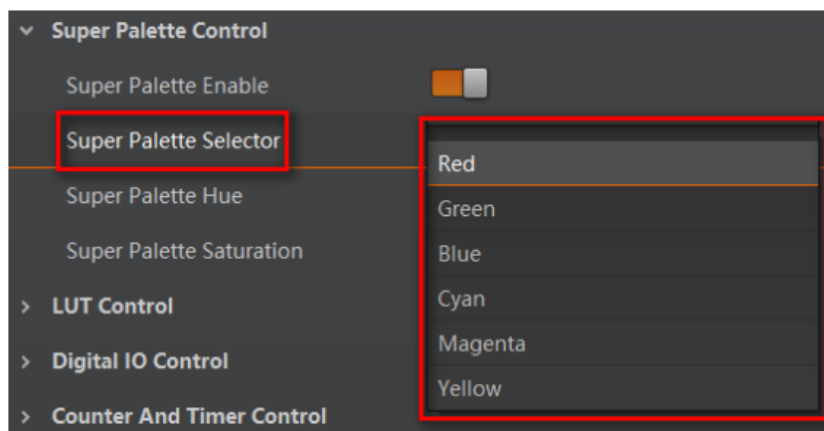


Figure 13-43 Super Palette Selector

3. Set corresponding **Super Palette Hue** and **Super Palette Saturation** according to actual demands.

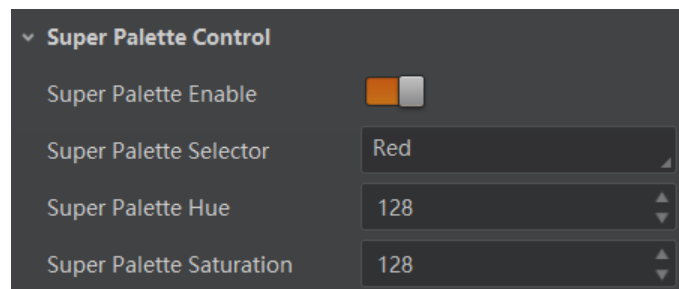


Figure 13-44 Set Super Palette Control

13.24 Set LUT

A Look-Up Table (LUT) is a customizable grayscale-mapping table. You can stretch, amplify the grayscale range that interests you. The mapping can be linear or customized

curve.

Note

- You cannot use Gamma correction function and LUT function at the same time.
 - The parameter of **LUT Save** may differ by device models. If the device has no **LUT Save**, the settings you configured will be saved in the device in real time.
 - For different models of device, the **LUT Index** and **LUT Value** range may differ, please refer to the actual one you got.
 - Regarding the color device in Bayer pixel format, you need to enable **Super Bayer Enable** first before using LUT function.
-

Steps:

1. Click **LUT Control**, and enable **LUT Enable**.
2. Enter **LUT Index** and **LUT Value** according to actual demands.
3. Click **Execute** in **LUT Save** to save it.

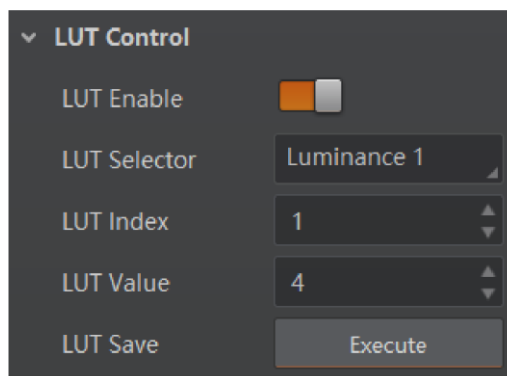


Figure 13-45 Set LUT

13.25 Set Shading Correction

Note

The specific shading correction types that devices support and configuration methods may differ by device models.

The device supports NUC and PRNUC correction. Go to **Shading Correction**, and enable **NUC Enable**.

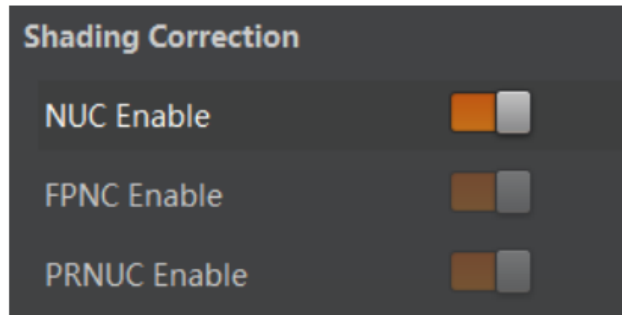


Figure 13-46 Shading Correction

Chapter 14 Other Functions

14.1 Device Control

 **Note**

The specific device control parameters may differ by device models.

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

Table 14-1 Parameters of Device Control

Parameter	Read/Write	Description
Device Scan Type	Read Only	It is the scan type of the device's sensor.
Device Vendor Name	Read Only	It is the name of the manufacturer of the device.
Device Model Name	Read Only	It is the model of the device.
Manufacturer Info.	Read Only	It is the manufacturer information about the device.
Device Firmware Version	Read Only	It is the device firmware version and FPGA version.
Device Serial Number	Read Only	It is device's serial number.
Device User ID	Read & Write	Device name and it is empty by default. You can set according to your preference. <ul style="list-style-type: none"> • If User ID is empty, the client software displays the device model (device serial number). • If you set it, the client software displays the User ID you set (device serial number).
Maximum Device Response Time	Read Only	It is the device max. response time. If it has no response after this time, the device is disconnected.
Device Manifest Table Address	Read Only	It is the ID of GenICam XML that the device selects.
Device SBRM Address	Read Only	It is the base address register.

USB3.0 Board Level Camera User Manual

Parameter	Read/Write	Description
Device Timestamp	Read Only	It is the device timestamp.
Device Timestamp Latch	Read & Write	Click Execute to get the device timestamp.
Device Timestamp Increment	Read Only	It is the max. value of the device timestamp.
Device Protocol Endianness	Read Only	It is the device protocol endianness.
Device Implementation Endianness	Read Only	It is the device operating endianness.
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.
USB Speed Mode	Read Only	It is the speed mode of USB interface, including High Speed (USB2.0) and Super Speed (USB3.0).
Device Link Current Throughput	Read Only	It is the current transmission bandwidth.
Device Sensor Throughput Limit	Read & Write	It controls device flow, and can be set according to actual bandwidth to avoid image lose.
Device Command Timeout	Read Only	If the device has no response after this time, the device is disconnected or command timeout.
Device Stream Channel Count	Read Only	It is the quantity of device stream channel.
Device Reset	Read & Write	Click Execute to reset the device.
Find Me	Read & Write	Click Execute to let red indicator flash once, and find device.
Device Max Throughput (bps)	Read Only	It is the maximum flow of device operation.
Device PJ Number	Read Only	It is the device's project number.

14.2 Embed Information into Image

The device supports embedding information into image data. The information will be embedded into the image according to the enabling condition of each type of information in the order of the image embedding information listed in the table below.

 **Note**

The white balance is only available for the color device.

Table 14-2 Image Embedding Information

Image Embedding Info.	Byte	Data Format
Timestamp	4	Refer to figure 12-1.
Gain	4	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.
Exposure	4	4 bytes are combined to show the exposure time, and the unit is μ s.
Brightness Info	4	Ranges from 0 to 4095.
White Balance	8	R/G/B occupies 2 bytes each. Value Range: 0 to 4095.
Frame Counter	4	Ranges from 0 to $2^{32}-1$.
Ext Trigger Count	4	Ranges from 0 to $2^{32}-1$.
Line Input Output	4	The 1 st byte is input, and each bit corresponds to 1 input. The 2 nd byte is output, 3 rd and 4 th bytes are reserved.
ROI Position	8	The starting coordinates occupy two bytes each with the column coordinates at the front and the row coordinates at the back. The length and width coordinates each occupy two bytes.

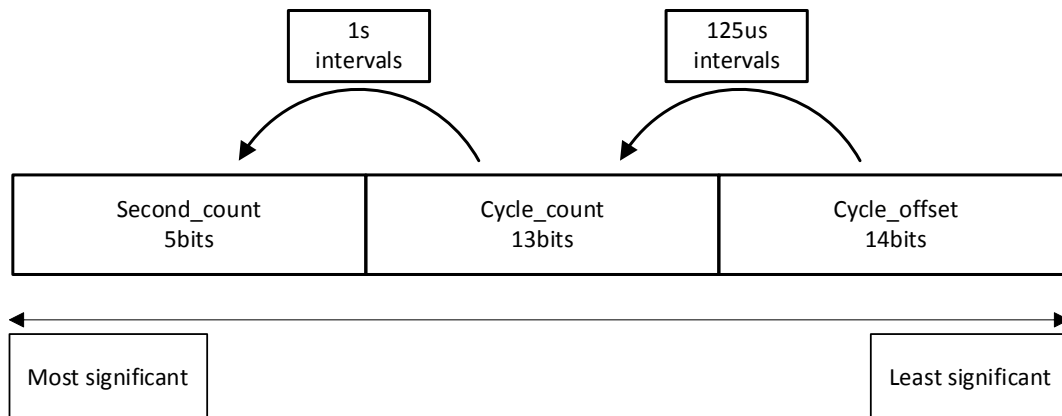


Figure 14-1 Data Format of Timestamp

Steps

1. Go to **Image Format Control** → **Embedded Image Info Selector**, and select **Embedded Image Info Selector** according to actual demands.

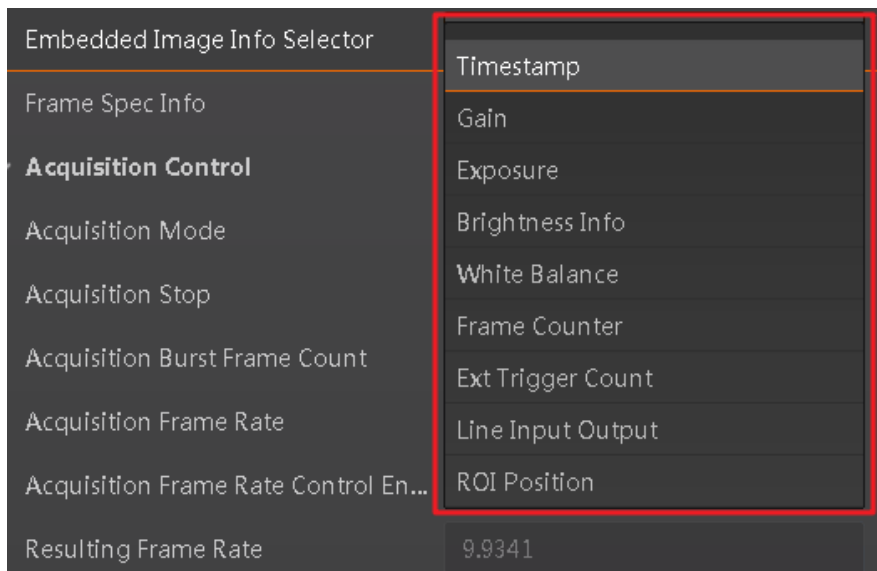


Figure 14-2 Select Embedded Image Info Selector

2. Enable **Frame Spec Info** to add watermark into images.

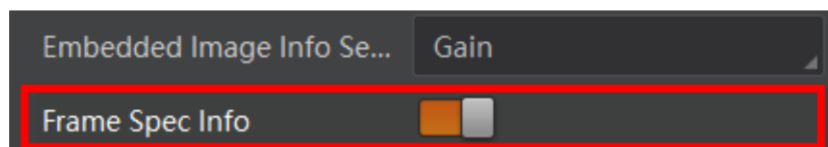



Figure 14-3 Enable Frame Spec Info

3. (Optional) Repeat steps above to add multiple watermarks.
4. Click  on the control toolbar of the client software to view specific watermark information.

 **Note**

The watermark is embedded into the starting position of the first line of image data. If the ROI is small and the first line of image data is insufficient to embed information, the information will be embedded into the second line of image data.

14.3 Event Control

 **Note**

The event control function may differ by device model.

The event control can record events happen to the device and allow you to view them.

Steps

1. Go to **Event Control** → **Event Selector**, and select **Event Selector**.

 **Note**

The specific events may differ by device models.

Table 14-3 Event Selector Description

Event Selector	Description
Acquisition Start	The acquisition starts.
Acquisition End	The acquisition ends.
Frame Start	The frame starts.
Frame End	The frame ends.
Frame Burst Start	The frame burst starts.
Frame Burst End	The frame burst ends.
Exposure Start	The exposure starts.
Exposure End	The exposure ends.
Frame Start Over Trigger	The frame starting is over triggered.
Line* Rising Edge	The rising edge of Line*.
Line* Falling Edge	The falling edge of Line*.
Stream Transfer Overflow	The device' images in cache is overwritten.
Over Run	Overrun.
Frame Trigger Wait	The device is currently waiting for a frame start trigger.
Software Active	The software trigger starts.

Event Selector	Description
EMC	The USB transmission is unstable.

2. Select **Notification On** as **Event Notification** to output event.

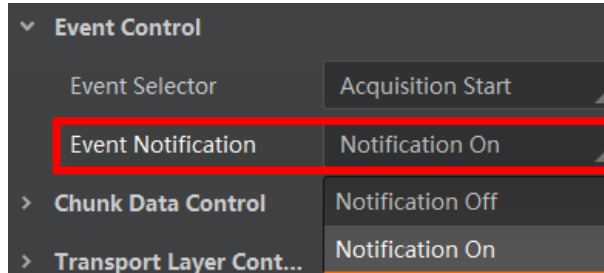


Figure 14-4 Set Event Control

3. Right click the connected device and click **Event Monitor**.

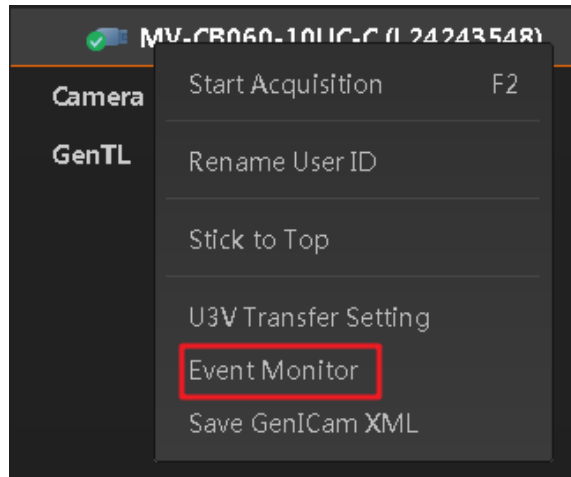


Figure 14-5 Event Monitor

4. Check **Messaging Channel Event**, and view specific event after the device starts live view.



Figure 14-6 Event Monitor Window

14.4 Transport Layer Control

You can go to **Transport Layer Control** to view the device’s payload size, GenCP version, etc.

 **Note**

The specific parameters of transport layer control may differ by device models.

Table 14-4 Parameters of Transport Layer Control

Parameter	Read/Write	Description
Payload Size	Read Only	It is the device’s load size.
GenCP Version Major	Read Only	It is the major version in GenCP version.
GenCP Version Minor	Read Only	It is the minor version in GenCP version.
U3V Version Major	Read Only	It is the major version in U3V version.
U3V Version Minor	Read Only	It is the minor version in U3V version.
U3VCP SIRM Available	Read Only	It sets whether the device supports one flow interface at least.
U3VCP EIRM Available	Read Only	It sets whether the device supports one event interface at least.
U3VCP IIDC2 Available	Read Only	It sets whether the device supports IIDC2 register mapping.

Parameter	Read/Write	Description
U3V Max Command Transfer Length	Read Only	It is the device max. command transmission length.
U3V Max Acknowledge Transfer Length	Read Only	It is the device max. data transmission length.
U3V Number Of Stream Channels	Read Only	It is the quantity of stream channel.
U3V SIRM Address	Read Only	It is the mapping address of SIRM.
U3V SIRM Length	Read Only	It is the length of each SIRM.
U3V EIRM Address	Read Only	It is the mapping address of EIRM.
U3V EIRM Length	Read Only	It is the length of each EIRM.
U3V Current Speed	Read Only	It is the current USB linking speed.

14.5 U3V Protocol Control

You can go to **Stream Control** to view USB transfer size, transfer times, final 1 value and final 2 value.

Note

The specific parameters of stream control may differ by device models.

Table 14-5 Parameters of Stream Control

Parameter	Read/Write	Description
U3V SI Payload Transfer Size	Read Only	It is the batch transmission size of stream data.
U3V SI Payload Transfer Count	Read Only	It is the batch transmission times of stream data.
U3V SI Payload FinalTransfer1 Size	Read Only	It is the Final 1 size of stream data.
U3V SI Payload FinalTransfer2 Size	Read Only	It is the Final 2 size of stream data.

14.6 User Set Customization

This function allows you to save or load device settings. The device supports four sets of

parameters, including one default set and three user sets, and the relation among four sets of parameters is shown below.

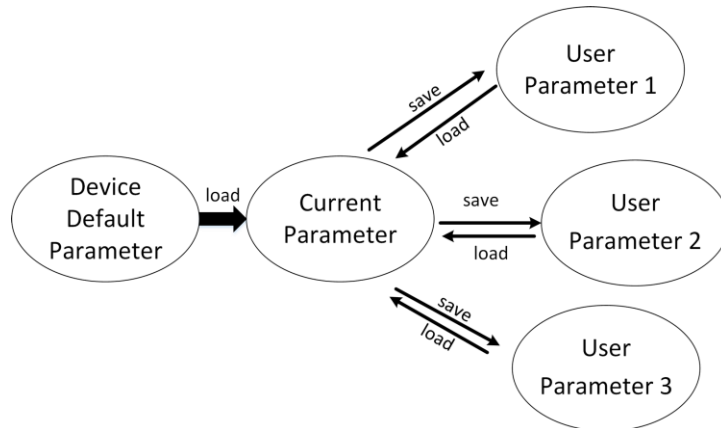


Figure 14-7 Parameter Relation

Note

After setting user parameters, it is recommended to save user parameters and select them as the default parameters.

14.6.1 Save User Set

Steps

1. Go to **User Set Control**, and select a user set in **User Set Selector**.
-

Note

Here we take selecting **User Set 1** as an example.

2. Click **Execute** in **User Set Save** to save parameter.
 3. View **User Set Save Status**:
 - Saving: User parameters are being saved.
 - Ready: User parameters have been saved.
-

Note

The **User Set Save Status** is supported by some models. Please refer to the specific parameters of the device.

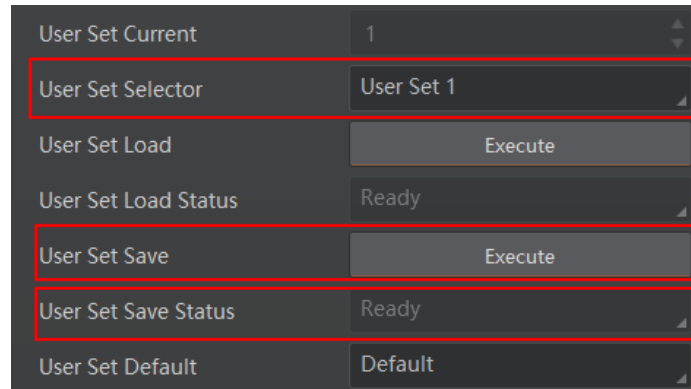


Figure 14-8 Save User Set

14.6.2 Load User Set

Note

Loading user set is available only when the device is connected but without live view.

Steps

1. Go to **User Set Control**, and select a user set in **User Set Selector**.
-

Note

Here we take selecting **User Set 1** as an example.

2. Click **Execute** in **User Set Load** to load parameter.
3. View **User Set Load Status**:

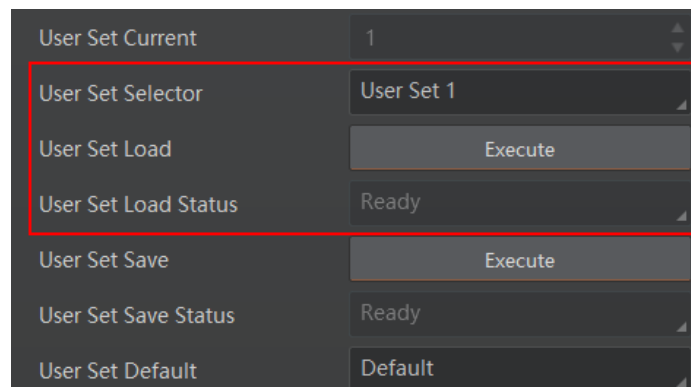


Figure 14-9 Load User Set

14.6.3 Set User Default

You can also set default parameter by going to **User Set Control**, and select a user set in **User Set Default**.

Note

Here we take selecting **User Set 1** as an example.

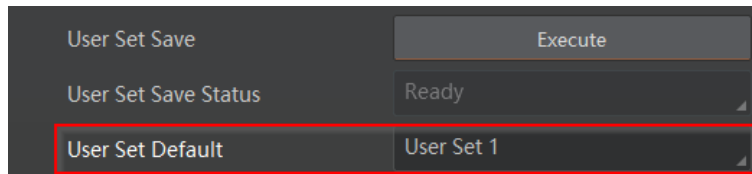


Figure 14-10 Set User Default

14.7 Update Firmware

The device supports updating firmware via the MVS client software.

Note

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

Steps

1. Go to **Tool > Firmware Updater** to open the update window.
2. Select corresponding device type like GigE, USB, or Camera Link.
3. Check to select the device you want to update.
4. Click to select update files (.dav files) in the local PC.
5. Click **Update** to start updating.

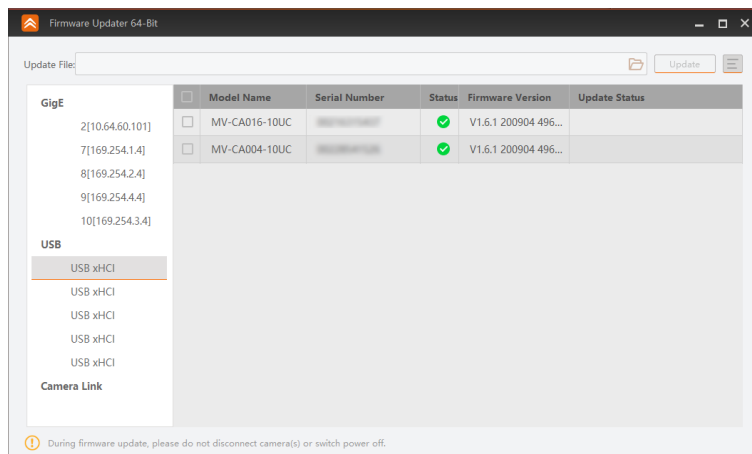


Figure 14-11 Update Firmware

Note

- The device 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 device or switch power off.
-

Chapter 15 FAQ (Frequently Asked Question)

15.1 Why the client software cannot list devices?

Reason

- The device is not powered on normally.
- Incorrect USB cable connection.

Solution

- Check the device's power supply by observing the device's indicator.
- Check USB cable connection.

15.2 Why device connection fails after the device is listed in the client software?

Reason

- Incorrect installation of the MVS client software.
- The USB3.0 driver is not installed successfully.

Solution

Install the MVS client software or the USB3.0 driver again.

15.3 Why the live view is back?

Reason

The device's lens aperture is not removed.

Solution

Remove the device's lens aperture.

15.4 Why the device cannot be triggered although the live view is normal?

Reason

- Incorrect trigger wiring.
- The trigger mode is not enabled correctly.

Solution

- Check wirings of different trigger modes.
- Enable the trigger mode and make sure that the selected trigger source matches with the corresponding trigger signal.

15.5 Why images required by algorithm cannot get although the live view and trigger signal are normal?

Reason

The image's output format is not matched with the algorithm.

Solution

Check the image format required by the algorithm, and configure the device's image output format in the client software.

Appendix A Device Parameter Index

Table A-1 Device Parameter Index

Attribute	Parameters	Section
Device Control	Device Scan Type	
	Device Vendor Name	
	Device Model Name	
	Manufacturer Info.	
	Device Firmware Version	
	Device Serial Number	
	Device User ID	
	Maximum Device Response Time	
	Device Manifest Table Address	
	Device SBRM Address	
	Device Timestamp	
	Device Timestamp Latch	
	Device Timestamp Increment	
	Device Protocol Endianness	
	Device Implementation Endianness	
	Device Uptime (s)	
	Board Device Type	
	USB Speed Mode	
	Device Link Current Throughput	
	Device Sensor Throughput Limit	
	Device Command Timeout	
	Device Stream Channel Count	
	Device Reset	
	Find Me	
Device Max Throughput (bps)		
Device PJ Number		

Attribute	Parameters	Section
Image Format Control	Width Max	Section View Resolution
	Height Max	
	Region Selector	Section Set ROI
	Width	
	Height	
	Offset X	
	Offset Y	
	Reverse X	Section Set Image Reverse
	Reverse Y	
	Pixel Format	Section Set Pixel Format
	Pixel Size	
	ADC Bit Depth	
	Super Bayer Enable	Set Super Bayer
	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 Embed Information into Image	
Frame Spec Info		
Acquisition Control	Acquisition Mode	Section Set Acquisition Mode
	Acquisition Start	
	Acquisition Stop	
	Acquisition Burst Frame Count	Section Set Trigger Related Parameters
	Acquisition Frame Rate	Section Set Frame Rate
	Acquisition Frame Rate Control Enable	
	Resulting Frame Rate	

Attribute	Parameters	Section
	Overlap Mode	Section Set Overlap Mode
	Trigger Selector	Section Set Trigger Source
	Trigger Mode	
	Trigger Software	
	Trigger Source	
	Trigger Activation	
	Trigger Delay (μ s)	
	Trigger Cache Enable	
	Sensor Shutter Mode	Section Sensor Shutter Mode
	Exposure Time Mode	Section Exposure Time Mode
	Exposure Mode	Section Set Exposure Auto
	Exposure Time (μ s)	
	Exposure Auto	
	Auto Exposure Time Lower Limit (μ s)	
	Auto Exposure Time Upper Limit (μ s)	
	HDR Enable	Section Set HDR
	HDR Selector	
	HDR Shutter (μ s)	
	HDR Gain	
Analog Control	Gain	Section Set Analog Gain
	Gain Auto	
	Auto Gain Lower Limit	
	Auto Gain Upper Limit	
	Digital Shift	Section Set Digital Gain
	Digital Shift Enable	
	Brightness	Section Set Brightness
	Black Level	Section Set Black Level
	Black Level Enable	

Attribute	Parameters	Section
	Balance White Auto	Section Set White Balance
	AWB Color Temperature Mode	
	Balance Ratio Selector	
	Balance Ratio	
	Gamma	Section Set Gamma Correction
	Gamma Selector	
	Gamma Enable	
	Sharpness	Section Set Sharpness
	Sharpness Enable	
	Contrast Ratio	Section Set Contrast Ratio
	Contrast Ratio Enable	
	Auto Function AOI Selector	Section Set AOI
	Auto Function AOI Width	
	Auto Function AOI Height	
	Auto Function AOI Offset X	
	Auto Function AOI Offset Y	
Auto Function AOI Usage Intensity		
Auto Function AOI Usage White Balance		
Color Transformation Control	CCM Enable	Section Set Color Transformation Control
	Color Transformation Selector	
	Color Transformation Enable	
	Color Transformation Value Selector	
	Color Transformation Value	Section Set Hue
	Hue	
	Hue Enable	
	Saturation	Section Set Saturation
	Saturation Enable	
Sequencer Control	Sequencer Mode	Section Set Sequencer Control and HDR
	Sequencer Configuration Mode	

Attribute	Parameters	Section
	Sequencer Feature Selector	
	Sequencer Feature Enable	
	Sequencer Restart	
	Sequencer Set Total Number	
	Sequencer Set Selector	
	Sequencer Set Active	
	Sequencer Set Load	
	Sequencer Set Save	
Super Palette Control	Super Palette Enable	Section Set Super Palette Control
	Super Palette Selector	
	Super Palette Hue	
	Super Palette Saturation	
LUT Control	LUT Selector	Section Set LUT
	LUT Enable	
	LUT Index	
	LUT Value	
	LUT Save	
Shading Correction	NUC Enable	Section Set Shading Correction
	FPNC Enable	
	PRNUC Enable	
Digital IO Control	Line Selector	Section Trigger Output
	Line Mode	
	Line Inverter	
	Line Status	
	Line Status All	
	Line Debouncer Time (μ s)	
	Line Source	
	Strobe Enable	
	Strobe Line Duration (μ s)	
	Strobe Line Delay (μ s)	

Attribute	Parameters	Section
	Strobe Line Pre Delay (μ s)	
Counter and Timer Control	Counter Selector	Section Set and Execute Counter Trigger
	Counter Event Source	
	Counter Reset Source	
	Counter Reset	
	Counter Value	
	Counter Current Value	
Event Control	Event Selector	Section Event Control
	Event Notification	
Transport Layer Control	Payload Size	Section Transport Layer Control
	GenCP Version Major	
	GenCP Version Minor	
	U3V Version Major	
	U3V Version Minor	
	U3VCP SIRM Available	
	U3VCP EIRM Available	
	U3VCP IIDC2 Available	
	U3V Max Command Transfer Length	
	U3V Max Acknowledge Transfer Length	
	U3V Number of Stream Channels	
	U3V SIRM Address	
	U3V SIRM Length	
	U3V EIRM Address	
	U3V EIRM Length	
U3V Current Speed		
Stream Control	U3V SI Payload Transfer Size	Section U3V Protocol Control
	U3V SI Payload Transfer Count	
	U3V SI Payload FinalTransfer1 Size	
	U3V SI Payload FinalTransfer2 Size	

Attribute	Parameters	Section
User Set Control	User Set Current	Section User Set Customization
	User Set Selector	
	User Set Load	
	User Set Save	
	User Set Save Status	
	User Set Default	

Appendix B Revision History

Table B-1 Revision History

Version	Document No.	Revision Date	Revision Details
V2.1.1	UD36827B	Mar. 12, 2024	<ul style="list-style-type: none"> ● Modify section Pixel Format. ● Modify section Set Sequencer Control and HDR. ● Modify section Save User Set. ● Add section Set Exposure Time Mode. ● Add section Cleaning Instruction.
V2.1.0	UD32279B	Feb. 28, 2023	<ul style="list-style-type: none"> ● Modify section Client Software Layout. ● Modify section Set Trigger Source. ● Modify section Set and Execute Free Trigger. ● Modify section Set Trigger Related Parameters. ● Modify section Enable Strobe Signal. ● Add section Set Super Bayer. ● Add section Set Contrast Ratio. ● Add section Set Color Transformation Control. ● Add section Set Hue. ● Add section Set Saturation. ● Add section Set Super Palette Control. ● Modify section Device Control. ● Add section Event Control.
V2.0.0	UD26615B	Dec. 14, 2021	<ul style="list-style-type: none"> ● Add section Overview. ● Modify section Appearance. ● Modify section I/O Interface and Indicator. ● Add section Camera Features. ● Modify section Set Hardware Trigger. ● Modify section I/O Electrical Feature and Wiring. ● Modify the structure of the user manual.
V1.0.0	UD13314B	Jan. 10, 2019	Original version.



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