



CoaXPress Area Scan Camera

User Manual

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FCC Conditions

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference.
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upon the purchase of equivalent new equipment, or dispose of it at designated collection points. For more information see: <http://www.recyclethis.info>



2006/66/EC (battery directive): This product contains a battery that cannot be disposed of as unsorted municipal waste in the European Union. See the product documentation for specific battery information. The battery is marked with this symbol, which may include lettering to indicate cadmium (Cd), lead (Pb), or mercury (Hg). For proper recycling, return the battery to your supplier or to a designated collection point. For more information see: <http://www.recyclethis.info>

Warning: This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.




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Symbol	Description
 Danger	Indicates a hazardous situation which, if not avoided, will or could 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 CoaXPress area scan camera.

Safety Instruction

These 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.
- To ensure personal and device safety, when installing, operating, and maintaining the

device, follow the signs on the device and in the manual, and all safety instructions described in the manual.

- The note, warning 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.

Caution:

- 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. For the specific requirements of the power adapter, please refer to the device's specifications.
- To reduce the risk of fire or electric shock, do not expose the device to rain or moisture.
- Make sure that the device is firmly fixed when installing it in the use environment.
- 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).
- Avoid installing the device in a vibration or shock environment, and keep it away from electromagnetic interference sites (ignoring this may damage the device).
- Do not directly touch the heat dissipation parts of the device to avoid burns.
- Do not install the indoor device in an environment where it may be exposed to water or other liquids.
- Do not use the device in high temperature, low temperature or high humidity environment. For specific temperature and humidity requirements, please refer to the device's specifications.
- Avoid aiming the lens at strong light (such as lighting, sunlight, or laser beams, etc.), otherwise the image sensor will be damaged.
- Caution: If the device has battery, risk of explosion if battery is replaced by an incorrect type. Dispose of used batteries according to the instructions.
- Do not touch the image sensor directly. If cleaning is necessary, please slightly dampen a soft clean cloth with alcohol and gently wipe off the dust. When the device is not in use, please attach a dust cover to protect the image sensor.

Personnel Requirement

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

- The basic knowledge and operation skills of low voltage wiring and low voltage

electronic circuit connection.

- The ability to comprehend the contents of this manual.

Electromagnetic Interference Prevention

- 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.
- 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 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.
- 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.
- When connecting the device and metal accessories, they must be connected firmly to maintain good conductivity.
- Use a shielded network cable to connect to the device. If you use a self-made network cable, make sure that the shielding shell at the aviation head is well connected to the aluminum foil or metal braid of the shielding cable.
- 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.
- The unused cables of the device must be insulated.
- 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.
- 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.

Contact Information

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Chapter 1 Overview

1.1 Introduction

The CoaXPress (CXP) area scan camera uses CoaXPress interface to transmit non-compressed images in real time, and it acquires images and sets parameters via client software or SDK based on CoaXPress frame grabber.

1.2 Key Feature

- Provides high dynamic range, Signal Noise Ratio (SNR), and high-quality image.
- Supports auto and manual adjustment for gain, exposure time, Look-Up Table (LUT), Gamma correction, etc.
- Adopts CoaXPress interface to transmit data.
- Compatible with CoaXPress Protocol and GenICam Standard.

Note

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

Chapter 2 Appearance

Note

- TEC stands for Thermo-Electric Cooler that is able to keep the device’s sensor temperature around environment temperature to ensure the normal operation of the device.
- For specific appearance and dimension, refer to the device’s specification for details.
- The appearance is subject to change, and the actual device you purchased shall prevail.

Refer to the table and figures below for the information and appearance of different device models.

Table 2-1 Appearance Description

Figure	Lens Mount	Cooling Fan	TEC	CXP Type
Figure 2-1, Type I Device	F-Mount	Support	Not Supported	CXP-6
Figure 2-2, Type II Device	M58-Mount	Support	Not Supported	CXP-6
Figure 2-3, Type III Device	M72-Mount	Support	Not Supported	CXP-6
Figure 2-4, Type IV Device	M72-Mount	Support	Support	CXP-6
Figure 2-5, Type V Device	C-Mount	Support	Not Supported	CXP-12
Figure 2-6, Type VI Device	C-Mount	Not Supported	Not Supported	CXP-6
Figure 2-7, Type VII Device	M58-Mount	Support	Not Supported	CXP-12
Figure 2-8, Type VIII Device	M58-Mount	Not Supported	Not Supported	CXP-6 & CXP-12
Figure 2-9, Type IX Device	M58-Mount	Not Supported	Not Supported	CXP-6

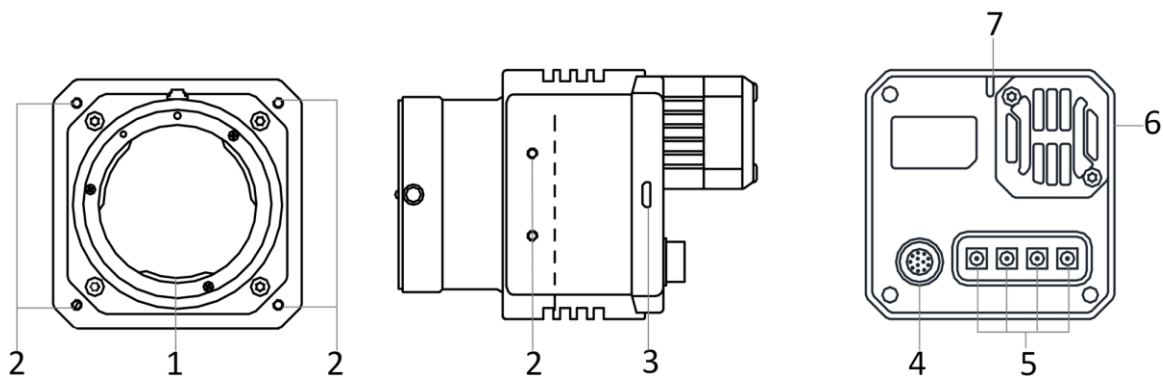


Figure 2-1 Appearance (Type I)

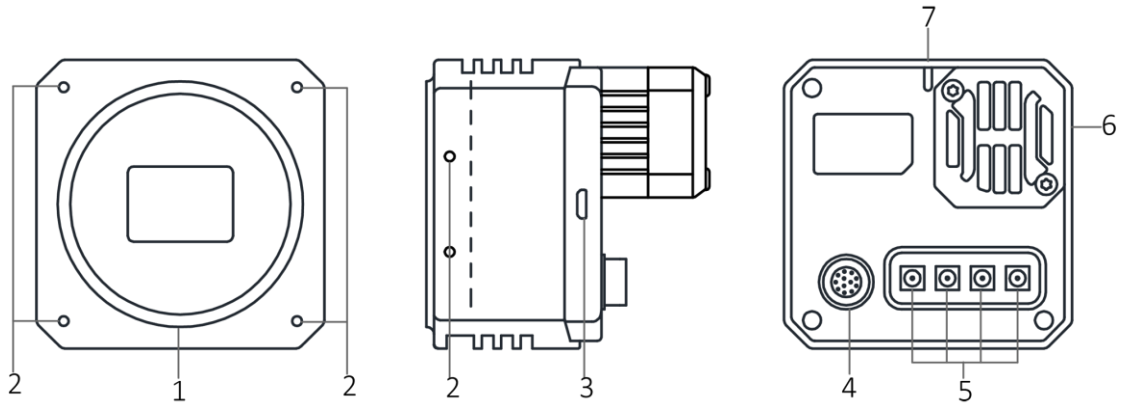


Figure 2-2 Appearance (Type II)

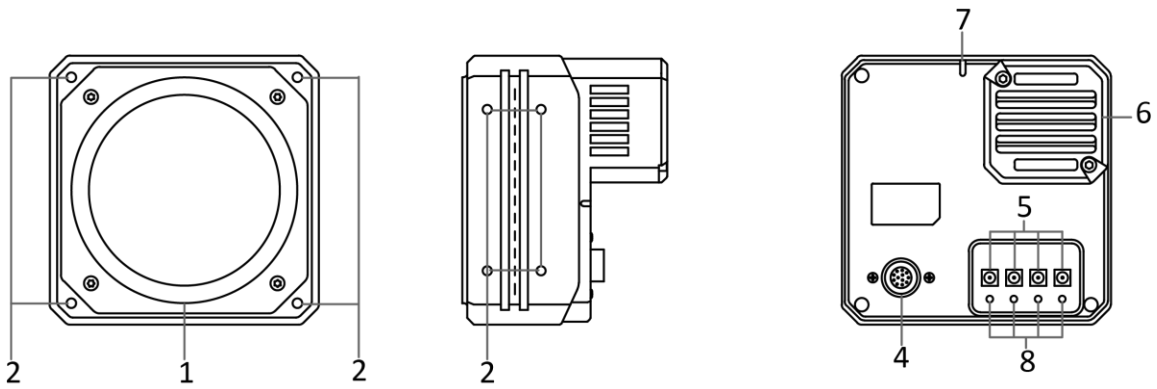


Figure 2-3 Appearance (Type III)

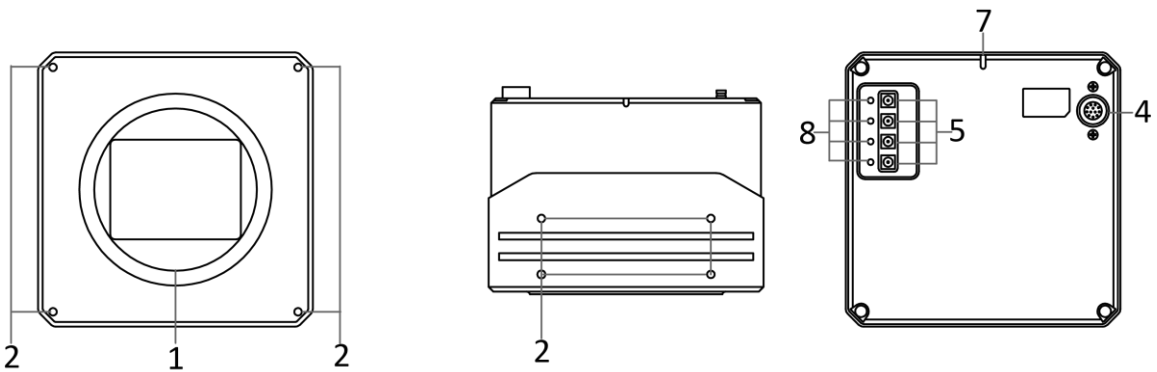


Figure 2-4 Appearance (Type IV)

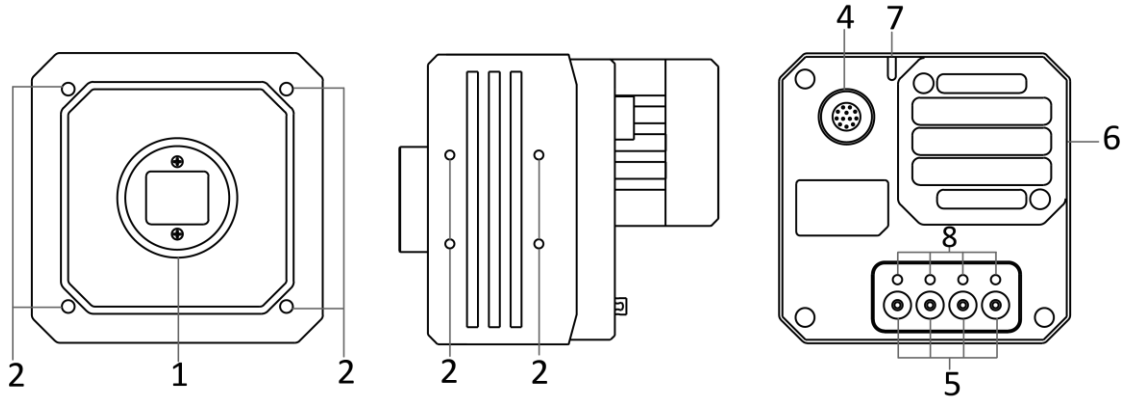


Figure 2-5 Appearance (Type V)

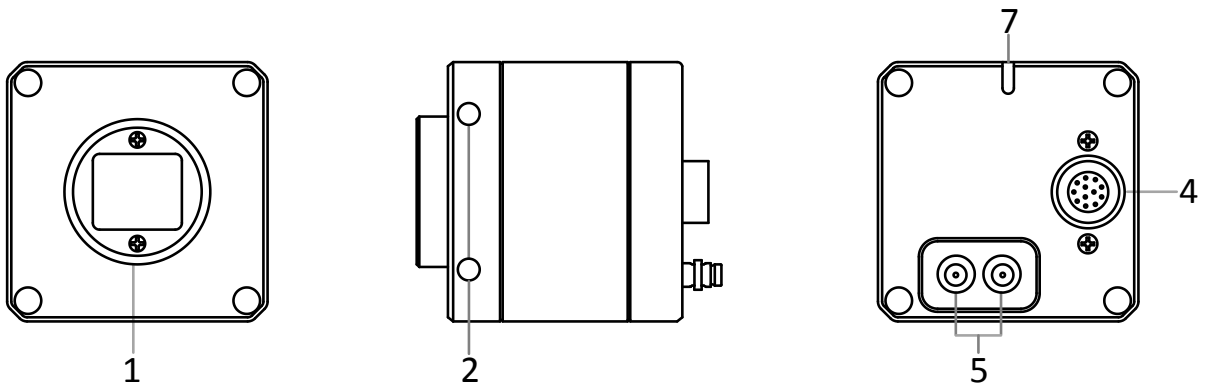


Figure 2-6 Appearance (Type VI)

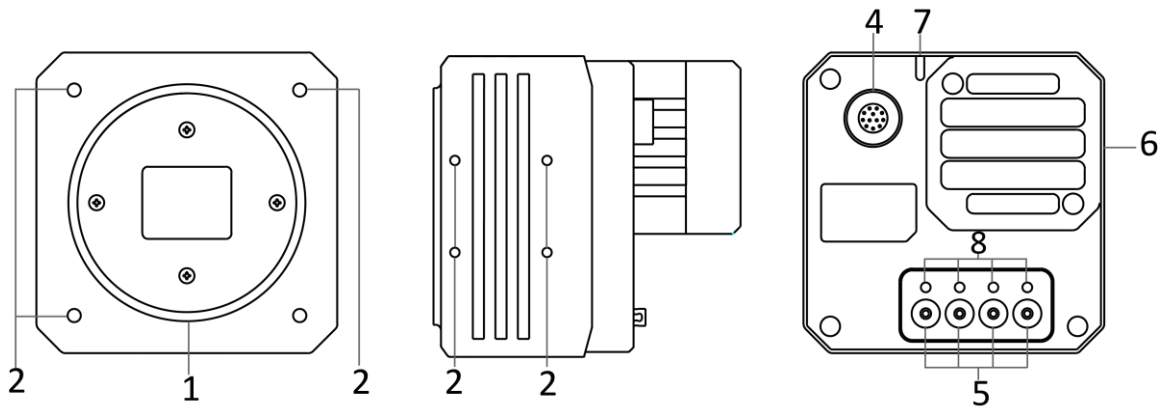


Figure 2-7 Appearance (Type VII)

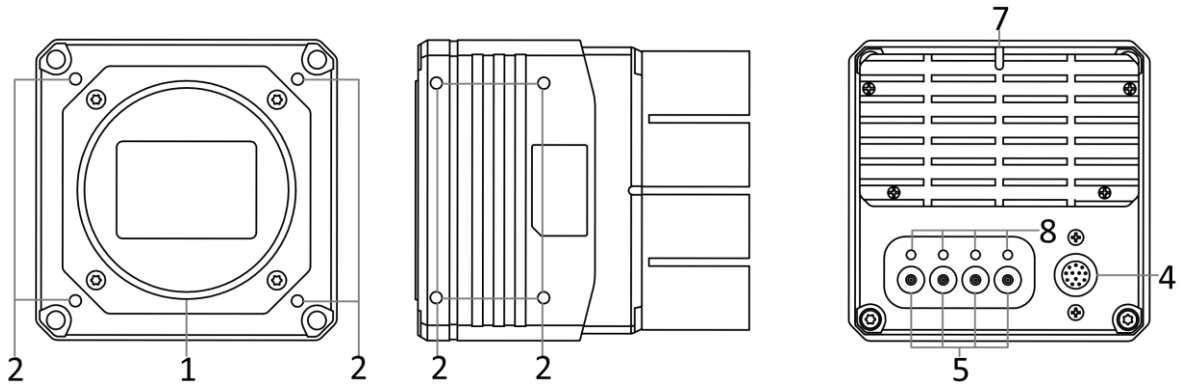


Figure 2-8 Appearance (Type VIII)

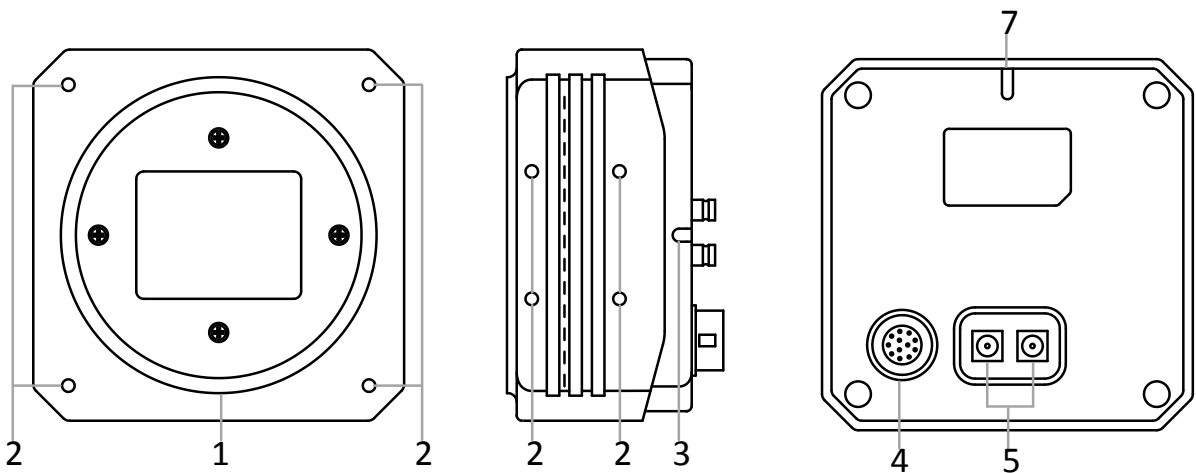


Figure 2-9 Appearance (Type IX)

Table 2-2 Component Description

No.	Interface	Description
1	Lens Mount	It is used to install lens. Refer to the device's specification for details.
2	Screw Hole	It is used to fix the device to the installation position. Refer to the device's specification for details.
3	USB Interface	It is used to update firmware.
4	I/O Connector (12-Pin Hirose Connector)	It refers to the 12-pin Hirose connector that provides power, input/output signal, etc.
5	CoaXPress Interface	It refers to the 4 CoaXPress interfaces for transmitting data.
6	Fan or TEC	It is used to cool the device to ensure its normal operation.

No.	Interface	Description
7	Device Indicator	It indicates the device's status. See section <i>Device Indicator Status</i> for details.
8	CoaXPress Linking Indicator	It indicates CoaXPress linking connection status via CoaXPress cable. See section <i>CoaXPress Linking Indicator Status</i> for details.

Chapter 3 Interface and Indicator

3.1 Interface Description

All CoaXPress area scan cameras have the same 12-pin Hirose connector, as shown below. However, the specific pin definitions are different by device models.

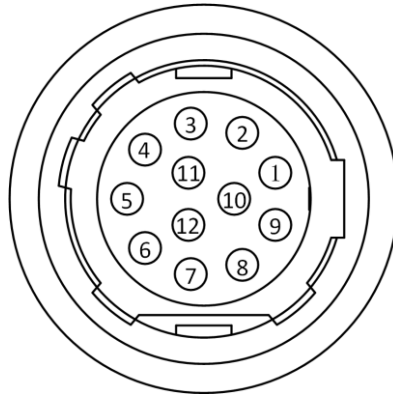


Figure 3-1 12-Pin Hirose Connector

3.1.1 First Type of Pin Definitions

Regarding the type I and type II devices, read the table below to get their pin definitions.

Note

You should refer to the table below and the label attached to the power and I/O cable to wire the device.

Table 3-1 First Type of Pin Definitions

No.	Signal	I/O Signal Source	Description
1	GND	Line 2-	Device power supply ground
2	DC_PWR	--	Device power supply
3	Reserved		
4	Reserved		
5	GND_IO	Line 0/1-	Opto-isolated signal ground
6	Reserved		
7	Reserved		
8	RS-232_RXD	--	RS-232 receives

No.	Signal	I/O Signal Source	Description
9	RS-232_TXD	--	RS-232 transmits
10	GPIO2	Line 2+	Input or output
11	OPTO_OUT0	Line 1+	Opto-isolated output
12	OPTO_IN0	Line 0+	Opto-isolated input

3.1.2 Second Type of Pin Definitions

For other types of devices, read the table below to get their pin definitions.

 **Note**

You should refer to the table below and the label attached to the power and I/O cable to wire the device.

Table 3-2 Second Type of Pin Definitions

No.	Signal	I/O Signal Source	Description
1	GND	Line 2-	Device power supply ground
2	DC_PWR	--	Device power supply
3	DC_PWR	--	Device power supply
4	OPT_IN-	Line 0-	Opto-isolated input signal ground
5	OPT_OUT-	Line 1-	Opto-isolated output signal ground
6	GND	--	Device power supply ground
7	GND	--	Device power supply ground
8	RS-232_RXD	--	RS-232 receives
9	RS-232_TXD	--	RS-232 transmits
10	GPIO2	Line 2+	Input or output
11	OPT_OUT+	Line 1+	Opto-isolated output
12	OPT_IN+	Line 0+	Opto-isolated input

3.2 Indicator Description

The device has different types of indicator with varied models, including device indicator and CoaXPress linking indicator. For type I, type II and type VIII devices, they have device indicator only. For other types of devices, they both have device indicator and CoaXPress linking indicator.

3.2.1 Device Indicator Status

The device indicator is used to display different device statuses.

 **Note**

When the indicator is flashing slowly, its unlit interval is about 1 s.

Table 3-3 Device Indicator

No.	Status	Description
1	Unlit	The device is powered off.
2	Solid blue	There is no data transmission, or data transmission exception occurs after device starts up.
3	Rapid flashing blue	The device is acquiring images in continuous mode.
4	Slow flashing blue	The device is acquiring images in trigger mode.
5	Slow flashing blue and red in alternative	The device firmware is updating.

3.2.2 CoaXPress Linking Indicator Status

The CoaXPress linking indicator is used to display CoaXPress linking connection status via CoaXPress cable. For devices with CXP-6 interface, refer to the Table 3-4 for the status of CoaXPress linking indicator.

 **Note**

When the indicator is flashing rapidly, flashing slowly, or flashing very slowly, its unlit interval is 0.08 s, 1 s, and 2 s respectively.


Table 3-4 CoaXPress Linking Indicator (Devices with CXP-6 Interface)

No.	Status	Description
1	Unlit	No CoaXPress linking connected, or connection error occurs.
2	Solid green	CoaXPress linking connected without data transmission,

No.	Status	Description
		or data transmission error occurs (e.g. CRC error).
3	Rapid flashing green	The device is acquiring images in continuous mode.
4	Slow flashing green	The device is acquiring images in trigger mode.

For devices with CXP-12 interface, refer to the Table 3-5 for the status of CoaXPress linking indicator.

Table 3-5 CoaXPress Linking Indicator (Devices with CXP-12 Interface)

No.	Status	Description
1	Unit	The device is not powered on, or incorrect CoaXPress wiring.
2	Slow flashing red	The device is powered on, but CoaXPress linking is not connected.  Note This status is not applicable to the device that supports PoCXP.
3	Solid orange	The device system is starting.
4	Slow flashing orange	The device is acquiring images in trigger mode.
5	Rapid flashing orange	The device is connected with the PC, and data is being transferred.
6	Solid green	The device is connected with the PC, but no data is being transferred.
7	Rapid flashing green	The device is acquiring images in continuous mode.

Chapter 4 Installation

4.1 Installation Preparation

You need to prepare following accessories before device installation.

Table 4-1 Accessories

No.	Name	Quantity	Description
1	Frame Grabber	1	It refers to the CoaXPress frame grabber that you need to purchase separately.
2	Power and I/O Cable	1	It refers to the 12-pin power and I/O cable that you need to purchase separately.
3	DC Power Supply	1	It refers to suitable power adapter that you need to purchase it separately.
4	CoaXPress Cable(s)	1/2/4	You can use 1/2/4 CoaXPress cable(s) to transmit data. You need to purchase separately in accordance with device's CoaXPress interface type and frame grabber model.
5	Lens	1	You need to purchase separately in accordance with device's lens mount.
6	Lens Adapter	1	If other lens are used, you need to purchase lens adapter separately.

Note

In order to ensure the normal operation of the device, you need to make sure that the output voltage of DC power supply meets with that of the device. For specific device voltage range, refer to the specification of the device.

4.2 Install Device and Connect Frame Grabber

Before You Start

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

Steps

Note

- The device has 4 CoaXPress interfaces, and it can transmit data via 1, 2 or 4 interface(s). If you need to use 1 interface, the corresponding interface number is CXP 1. If 2 interfaces are required, the corresponding interface number is CXP 1 and CXP 2. If 4 interfaces are required, the corresponding interface number is CXP 1, CXP 2, CXP 3 and CXP 4.
 - The specific CXP interface No. may differ by device models. For example, some devices may have CXP 0, CXP 1, CXP 2 and CXP 3.
 - It is recommended to install the CoaXPress frame grabber into a free PCIe x 16 slot of the PC.
-

1. Fix the device to the installation position.
2. Install the lens to the device body.
3. Connect the device to CoaXPress frame grabber via CoaXPress cable.
4. Connect the device to a suitable power adapter via 12-pin power and I/O cable.

Chapter 5 Device Connection

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

5.1 Install Frame Grabber Software

The CoaXPress frame grabber client software is used to view and set device parameters, and acquire images.

Obtain the frame grabber software installation package and driver package from frame grabber supplier, and install the frame grabber software and frame grabber driver accordingly. After installing, it is recommended to go to the PC's device manager to check if the installation is correct.

Note

- If the frame grabber driver is not installed correctly, the MVS client software cannot enumerate and find devices.
 - Refer to the user manual of the frame grabber you purchased for frame grabber installation and operation.
-

5.2 Install MVS Client Software

MVS client software is used to connect and set device parameters, and acquire images.

Note

- MVS client software of version 3.2.1 or above supports connecting CoaXPress devices.
 - The MVS client software is compatible with 32/64-bit Windows 7/10 operating systems, and you can download it from <https://en.hikrobotics.com/>.
 - The graphic user interface may differ by different versions of the client software you use.
-

Steps

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

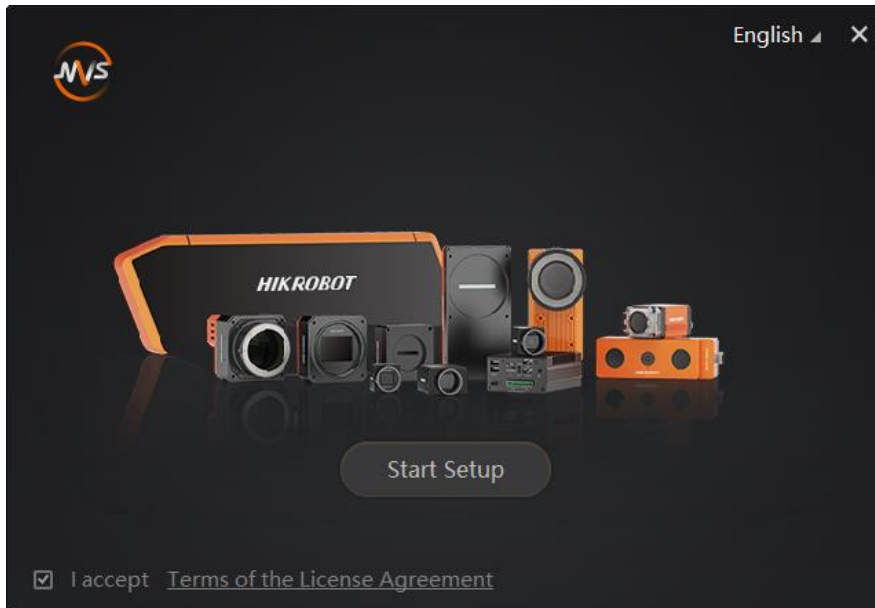


Figure 5-1 Installation Interface

4. Click **Start Setup**.

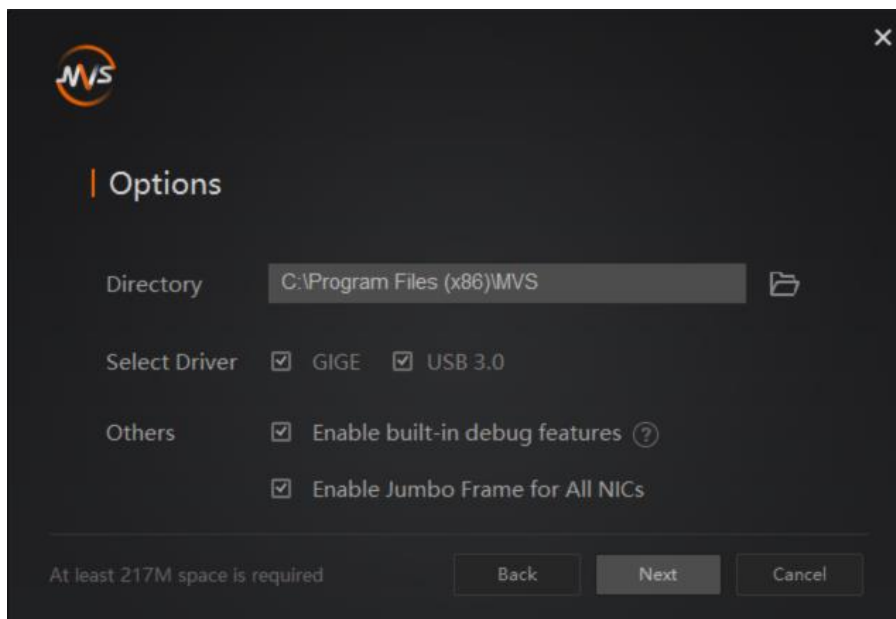



Figure 5-2 Default Settings

5. Keep default settings, and click **Next**.

6. Finish the installation according to the interface prompts.

5.3 Connect Device to MVS Client Software

Steps

1. Double click the MVS client software to run it.
2. Click  beside **GenTL** in the device list, and click **OK** in the popup window.

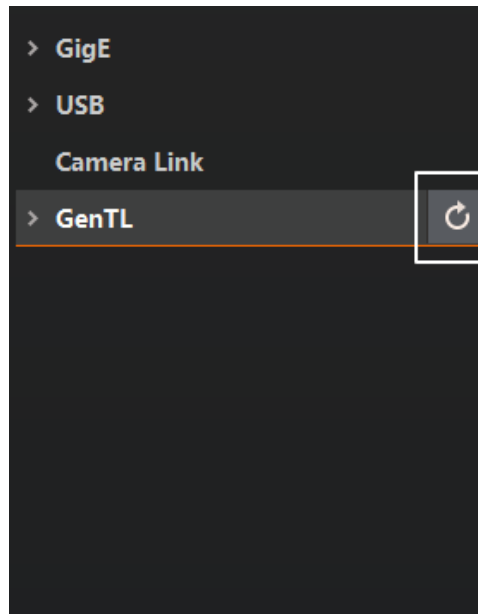


Figure 5-3 Refresh List

3. Open the cti file according to prompts, and the MVS client software will search devices.
4. Double click the device to connect it to the MVS client software.

Chapter 6 Client Software Layout

After connecting to the device, the client software can read the device attributes and display them.



Figure 6-1 Main Window


Note

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

Table 6-1 Description of Main Window

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, modify device IP address, etc.
4	Device Information Panel	This panel displays the detailed device information.
5	Display Window	This area displays the acquisition images in real-time.

No.	Name	Description
		You can click different icons to capture and save image, record, etc.
6	Feature Panel	You can view and set features of the selected device, and perform operations such as importing, exporting, and saving features.

Click  in the device's feature name of devices tab to unfold the specific device parameters, and set them according to actual demands.

 **Note**

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

Table 6-2 Description of Feature Tree

Feature Name	Description
Device Control	You can view device information, edit its name and reset it.
Image Format Control	You can view and set the device's resolution, 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 analog signal, including 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.
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.
Counter And Timer Control	You can set the function of Counter 0 as trigger source.
Digital IO Control	You can set the different input and output signals.
Transport Layer Control	You can set the parameters of transport layer of the device.
User Set Control	You can save or load the device's parameters. You can set the default parameter when running the frame grabber client software.
CoaXPress	You can set CoaXPress related parameters.

Chapter 7 Device Feature

7.1 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.

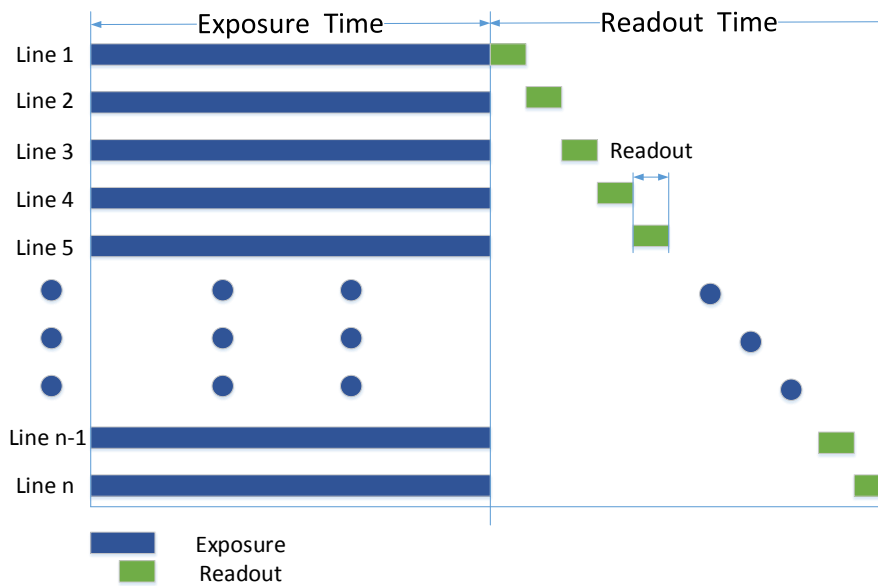


Figure 7-1 Global Shutter

7.2 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.

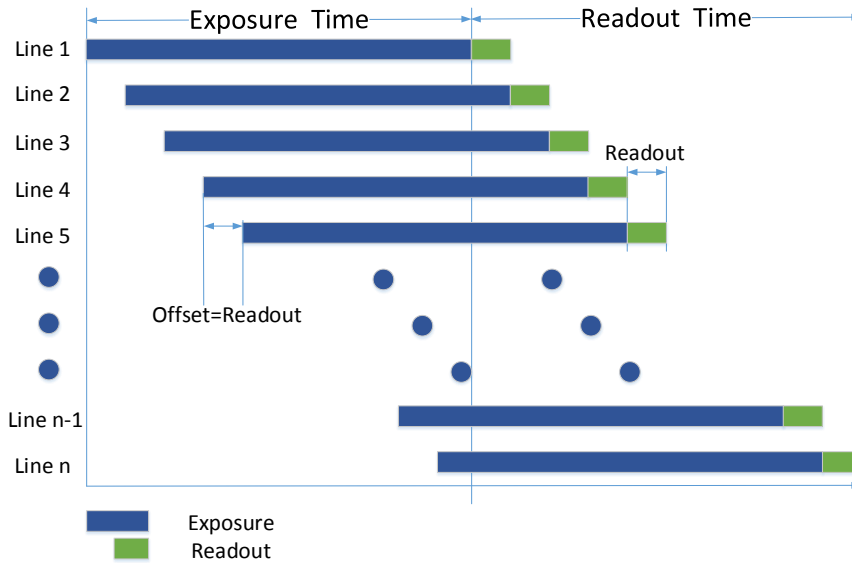


Figure 7-2 Rolling Shutter

7.3 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.

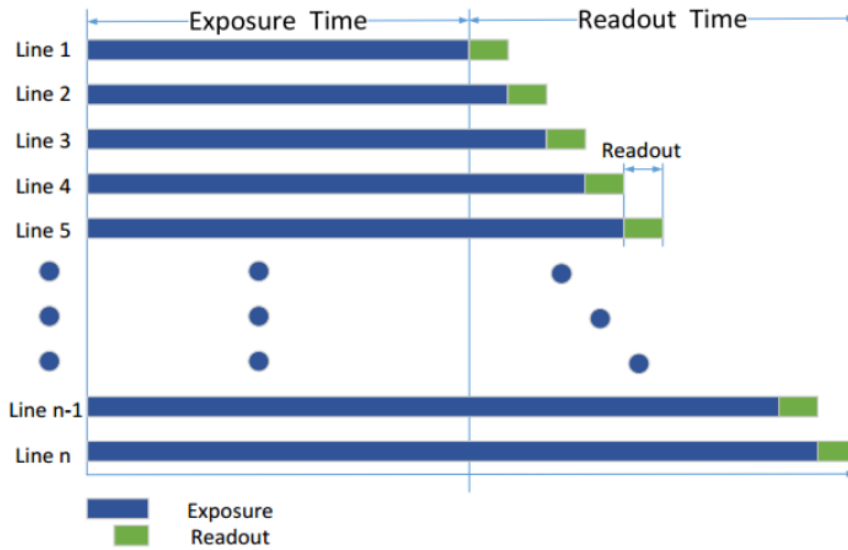


Figure 7-3 Global Reset

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.

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

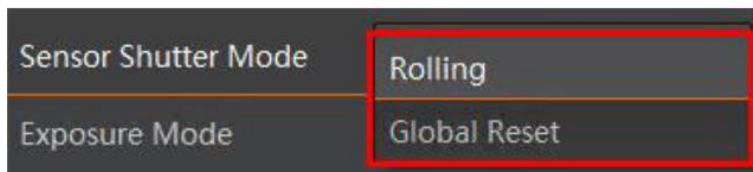


Figure 7-4 Sensor Shutter Mode

7.4 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.

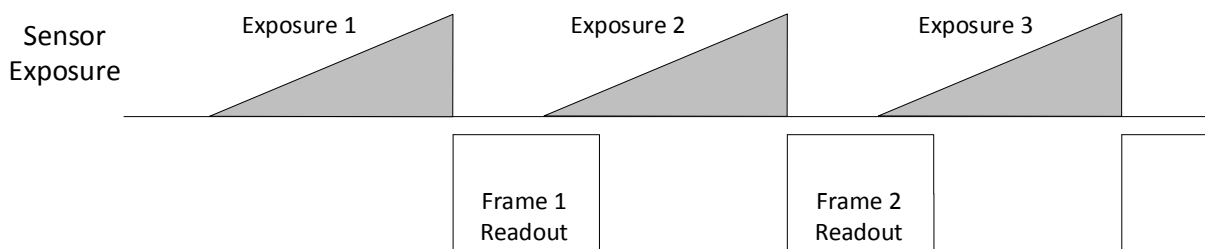


Figure 7-5 Internal Trigger Overlap Exposure

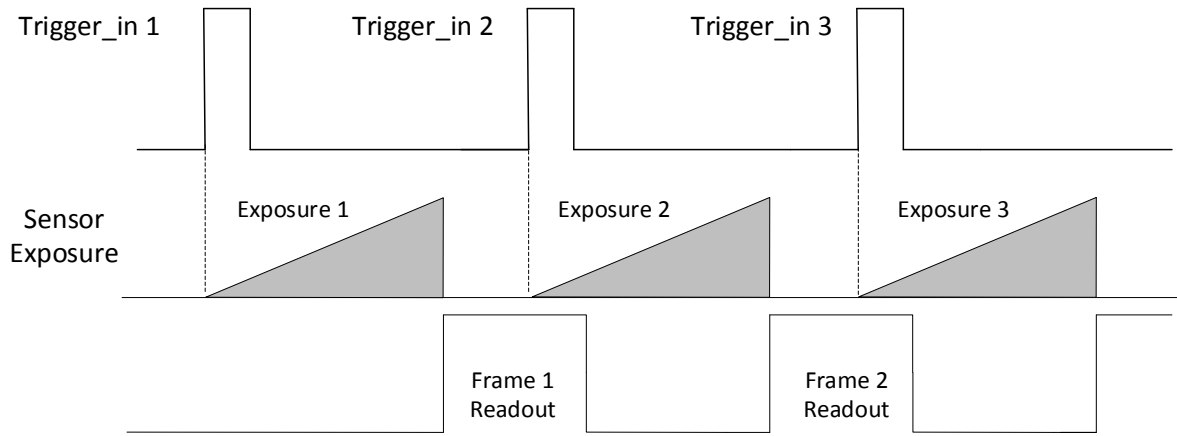


Figure 7-6 External Trigger Overlap Exposure

Chapter 8 Image Acquisition

8.1 Set Frame Rate

Note

The image compression function may differ by device models

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**.

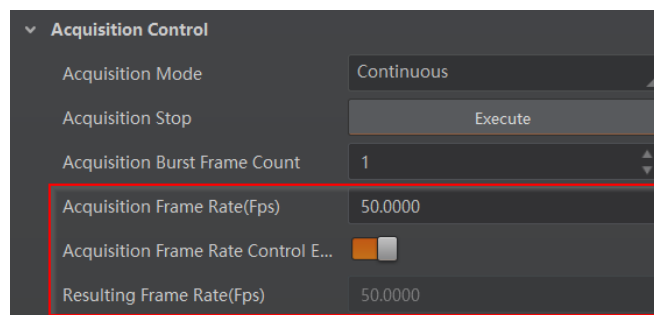


Figure 8-1 Set Frame Rate

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**.

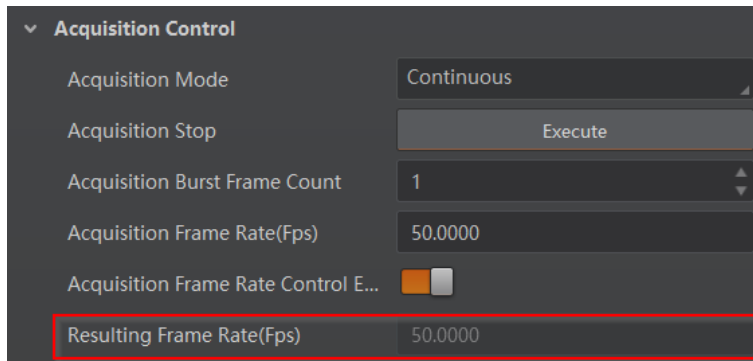


Figure 8-2 View Resulting Frame Rate

8.2 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.

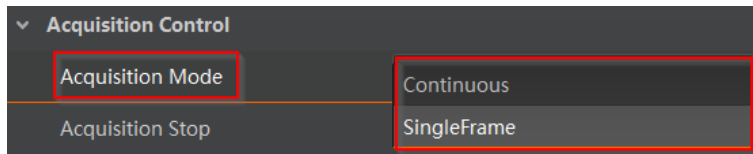


Figure 8-3 Set Acquisition Mode

8.3 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, link trigger, and free trigger.

8.3.1 Enable Internal Trigger Mode

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

Note

Off refers to the internal trigger mode.

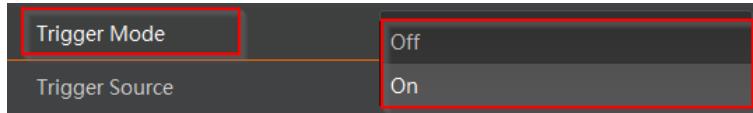


Figure 8-4 Enable Internal Trigger Mode

8.3.2 Enable External Trigger Mode

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

Note

On refers to the external trigger mode.

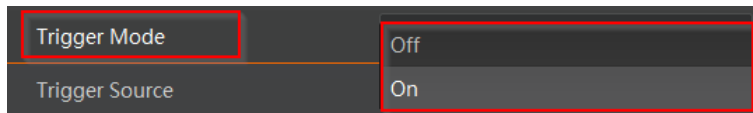


Figure 8-5 Enable External Trigger Mode

8.4 Set Trigger Source

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

Table 8-1 Trigger Source Description

Trigger Source	Parameter	Description
Software Trigger	Software	The software sends trigger signal to the device via CoaXPress interface to acquire images.
Hardware Trigger	Line 0, Line 2	External device connects device via 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.
Link Trigger	Link Trigger	The frame grabber sends trigger signal to the device

Trigger Source	Parameter	Description
	0	to acquire images.
Free Trigger	Anyway	The device can receive software trigger and hardware trigger to acquire images.

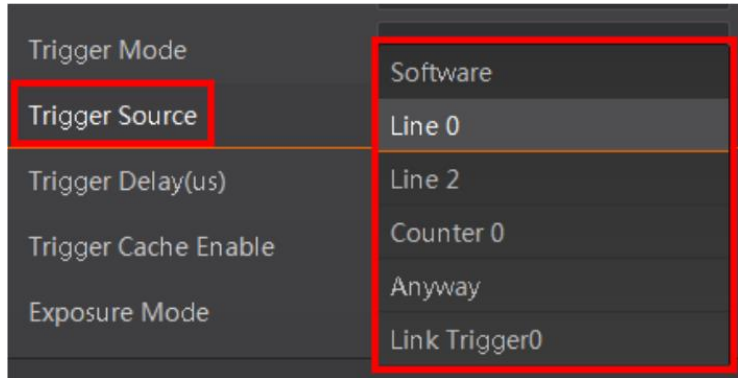


Figure 8-6 Set Trigger Source

Note

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

Set and Execute Software Trigger

In software trigger, the software sends trigger signal to the device via CoaXPress 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**.

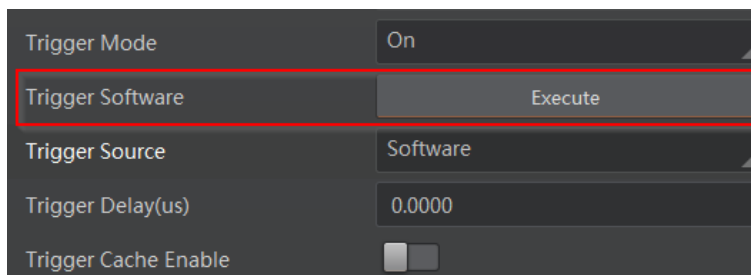


Figure 8-7 Set and Execute Software Trigger

Set and Execute Hardware Trigger

The device has one opto-isolated input (Line 0), and one bi-directional I/O (Line 2) that can be configured as input signal. The steps for configuring Line 2 as input signal as follows.

Steps

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

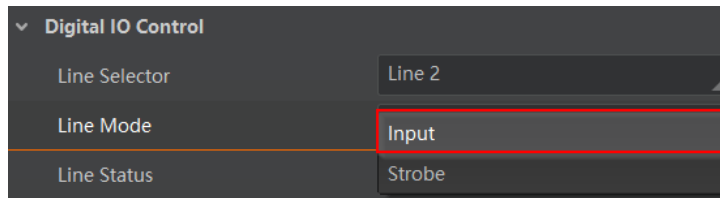


Figure 8-8 Set Line 2 as Input Signal

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.

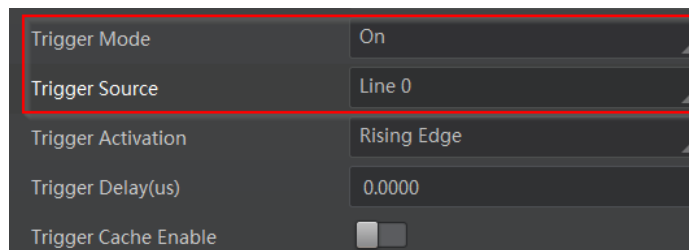


Figure 8-9 Set and Execute Hardware Trigger

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**.

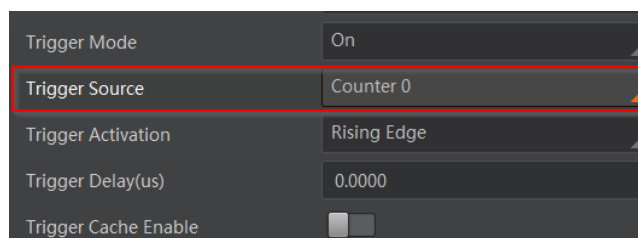


Figure 8-10 Set and Execute Counter Trigger

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

Table 8-2 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. Line 0, Line 2 or Link Trigger 0 is available. 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.
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.

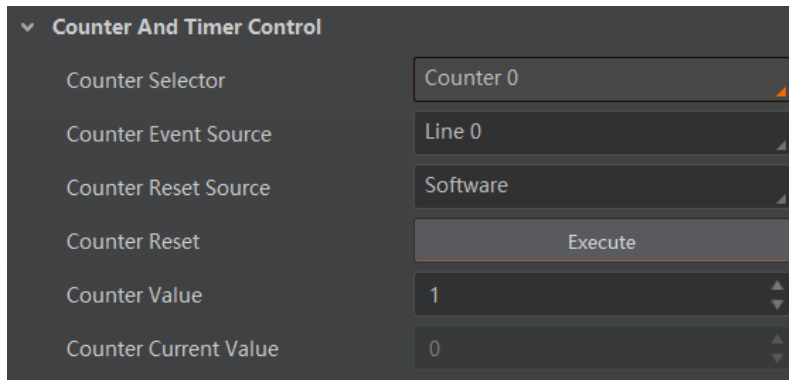


Figure 8-11 Counter and Timer Control

Set and Execute Link Trigger

The device supports triggering via CoaXPress frame grabber, and you can set related parameters as follows.

Steps

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

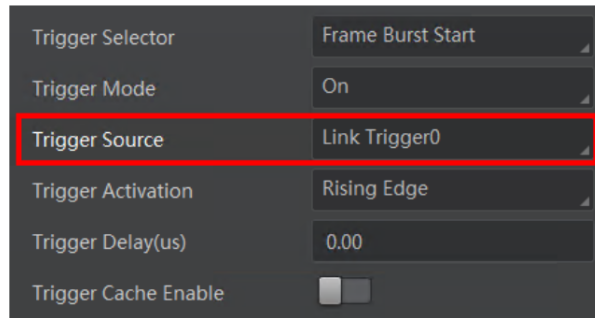


Figure 8-12 Set and Execute Action Command Trigger

Note

For more details about frame grabber trigger, please refer to the user manual of frame grabber you purchased.

Set and Execute Free Trigger

In free trigger, the device can receive software trigger, hardware trigger and link trigger signals to acquire images.

Steps

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

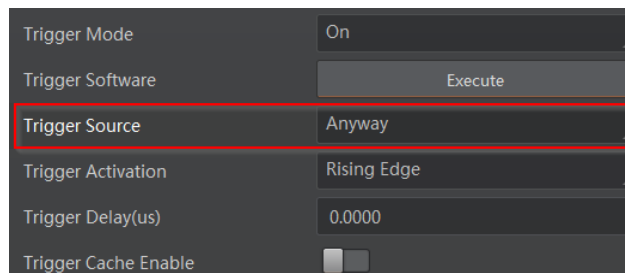


Figure 8-13 Set and Execute Free Trigger

8.5 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 8-3 Trigger Source and Trigger Related Parameters

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

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.

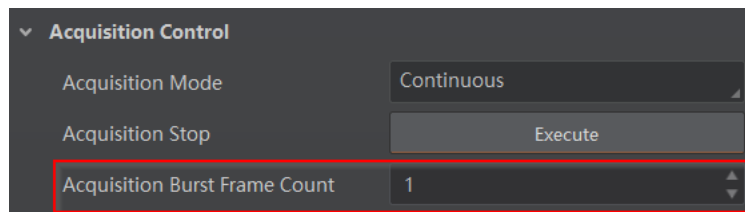


Figure 8-14 Set Acquisition Burst Frame Count

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.

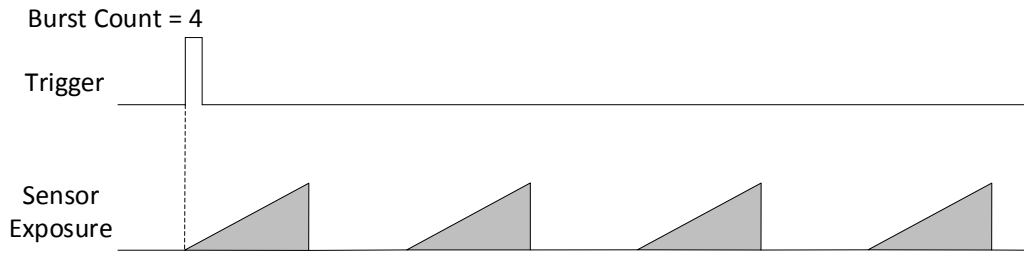


Figure 8-15 Sequence Diagram of Acquisition Burst Frame Count

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** or **Level Low** 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.
- **Any Edge:** It means that when the level signal sent by external device is in rising or 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.

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 .

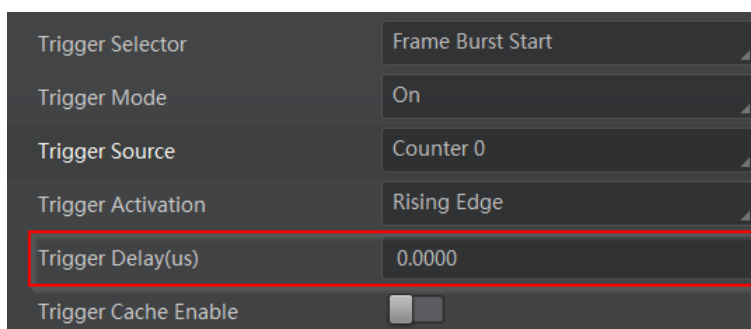


Figure 8-16 Set Trigger Delay

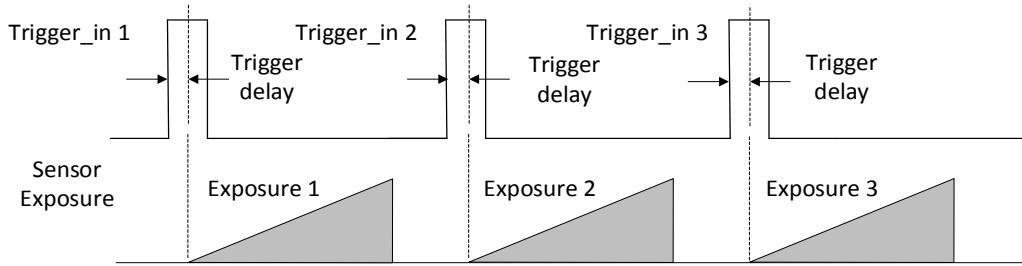


Figure 8-17 Sequence Diagram of Trigger Delay

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**.

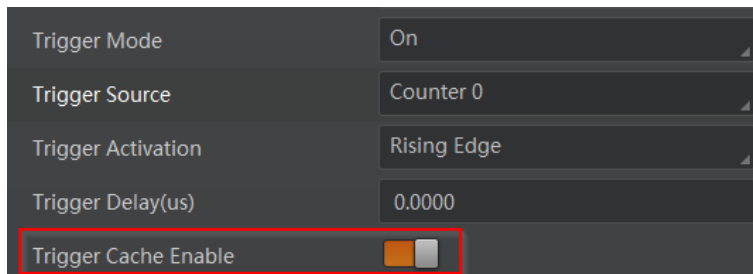


Figure 8-18 Set Trigger Cache

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.

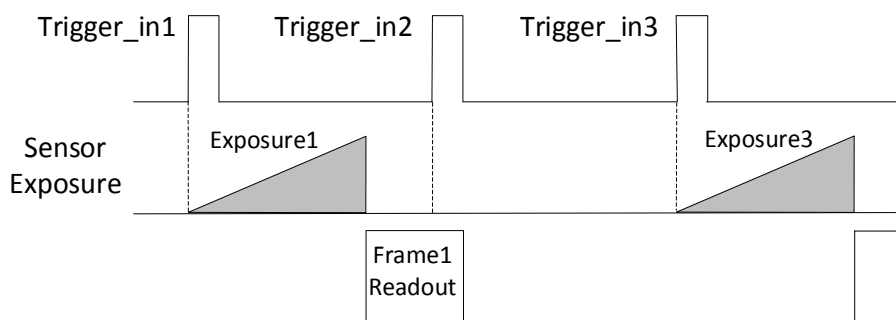


Figure 8-19 Second Frame Filtered

- 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.

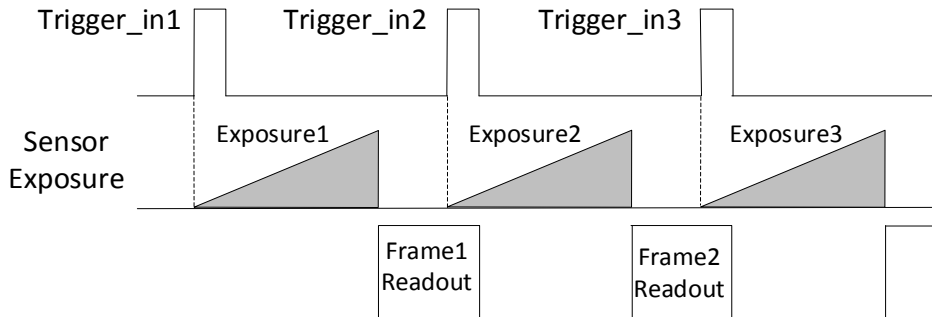


Figure 8-20 Second Frame Created Normally

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.

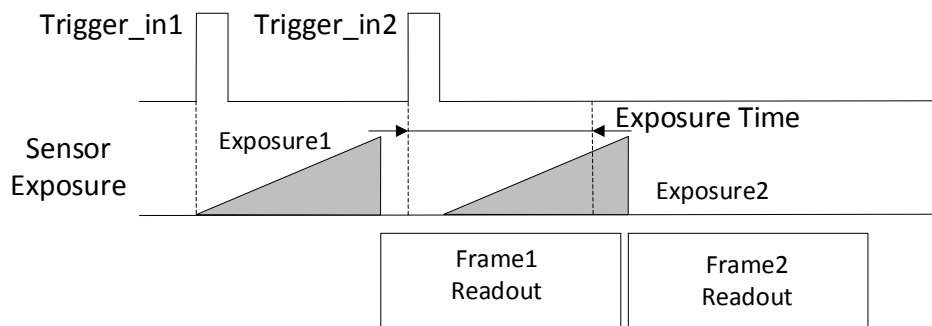


Figure 8-21 Sequence Diagram

Note

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

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.

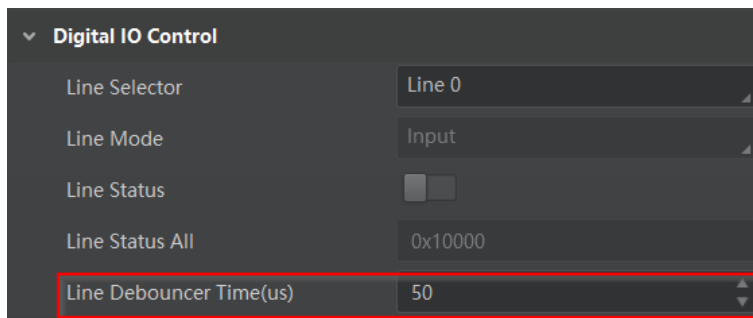


Figure 8-22 Set Trigger Debouncer

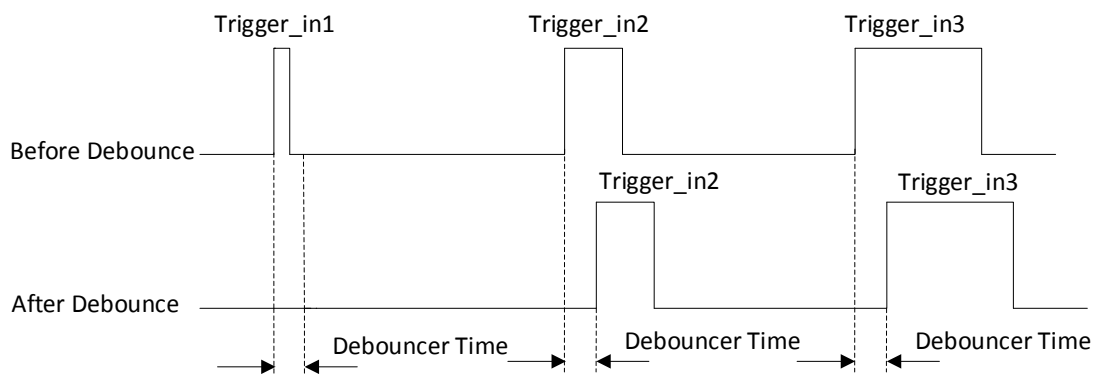


Figure 8-23 Sequence Diagram of Trigger Debouncer

Note

The sequence diagrams above use rising edge as trigger activation.

Chapter 9 Trigger Output

9.1 Select Output Signal

The device has one opto-isolated output (Line 1), and one bi-directional I/O (Line 2) that can be configured as output signal. The steps for configuring Line 2 as output signal as follows.

Steps

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

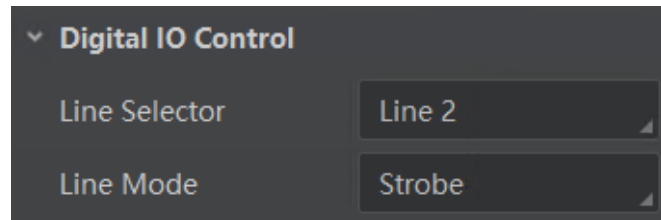


Figure 9-1 Set Line 2 as Output Signal

9.2 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.

9.2.1 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.

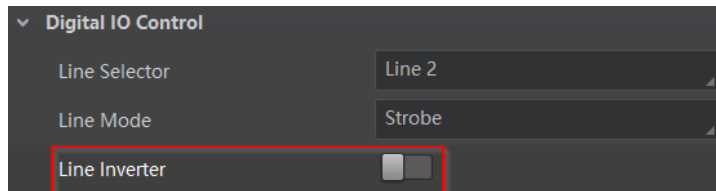


Figure 9-2 Enable Line Inverter

Note

The line inverter function is disabled by default.

9.2.2 Enable Strobe Signal

The strobe signal is used to directly output I/O signal to external devices when 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**.

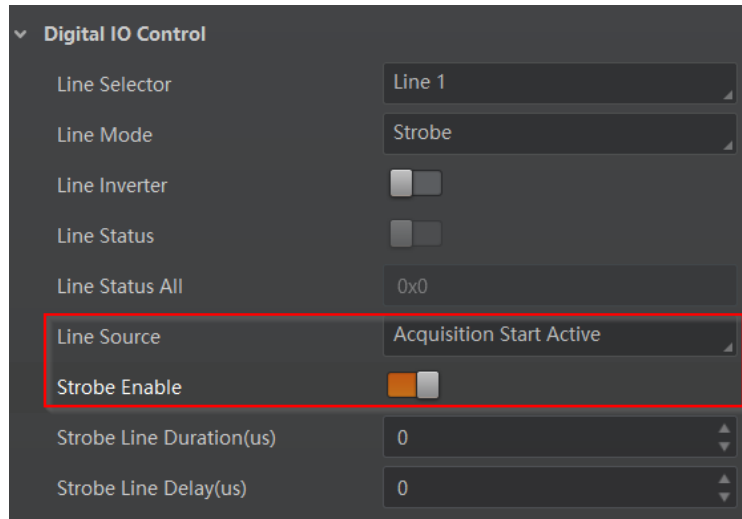


Figure 9-3 Enable Strobe Signal

The supported line sources are as follows:

Table 9-1 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**.

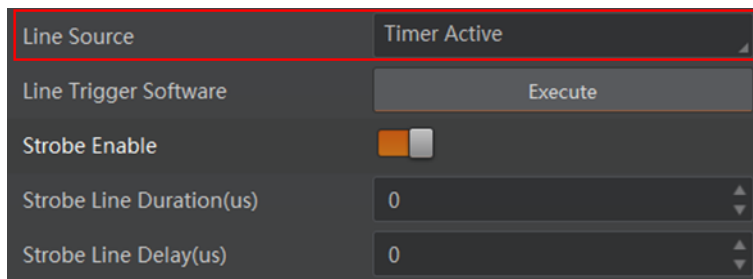


Figure 9-4 Timer Active Parameters

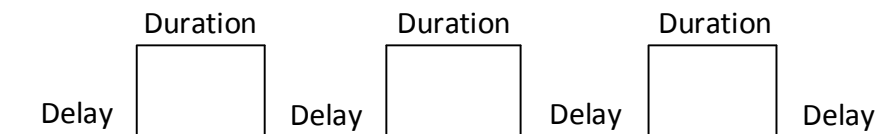


Figure 9-5 Sequence Diagram of Timer Active

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 9-6 Set Strobe Line Duration

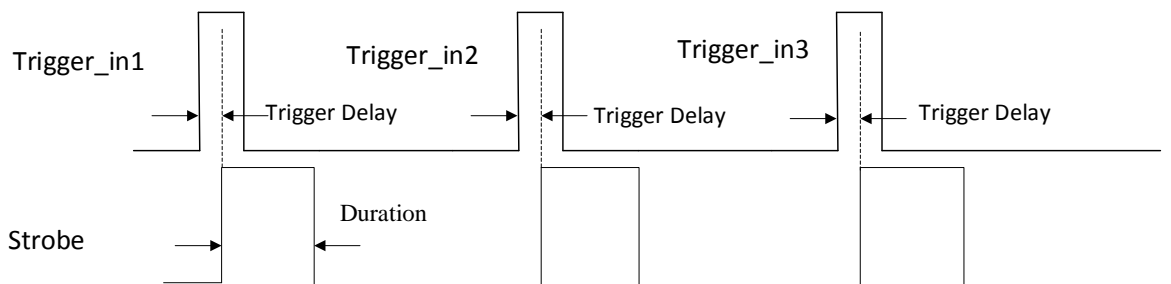


Figure 9-7 Sequence Diagram of Strobe Line Duration

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.

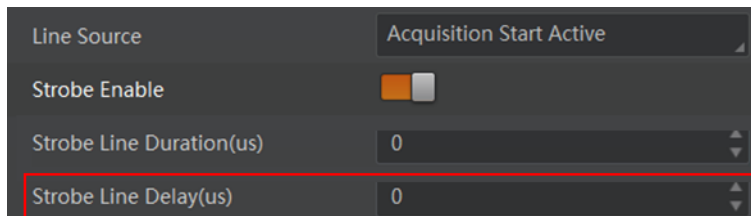


Figure 9-8 Set Strobe Line Delay

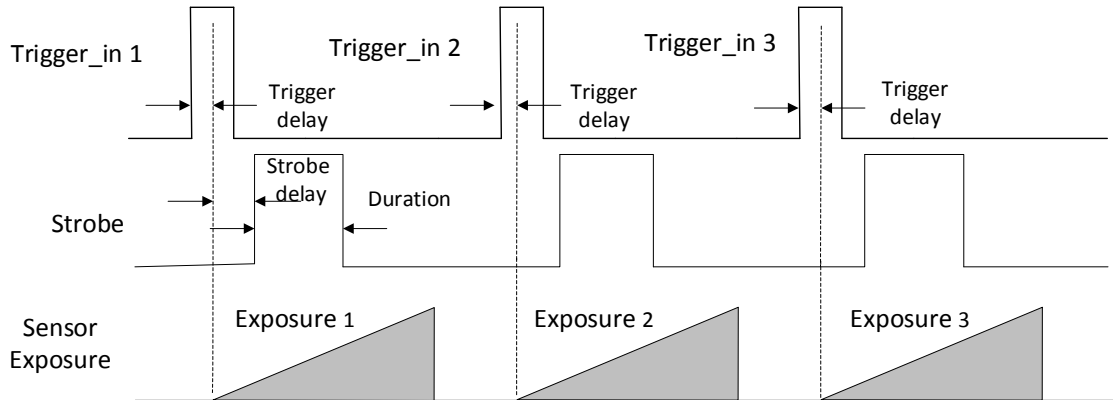


Figure 9-9 Sequence Diagram of Strobe Line Delay

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.

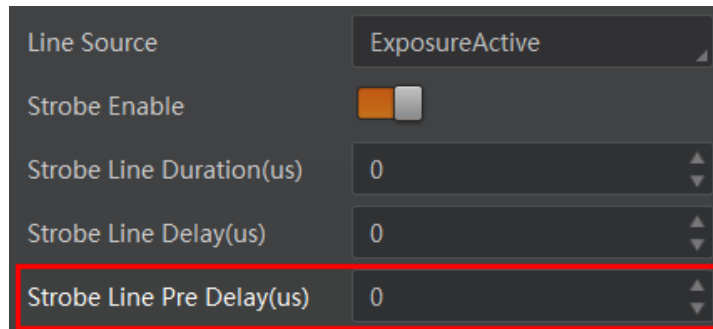


Figure 9-10 Set Strobe Pre Line Delay

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

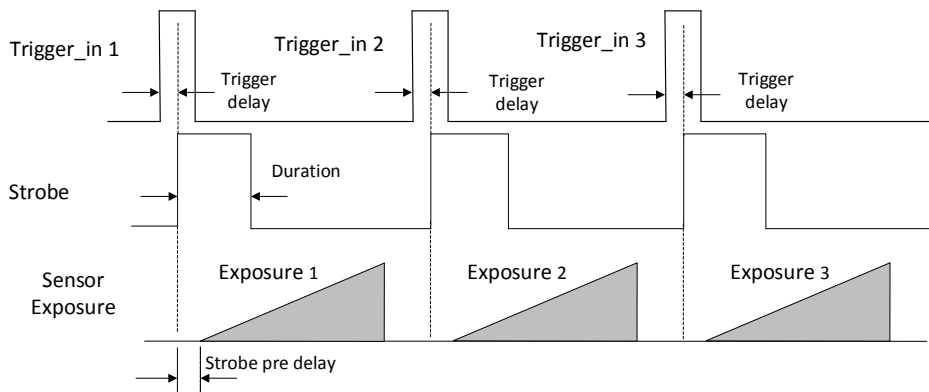


Figure 9-11 Sequence Diagram of Strobe Pre Line Delay

Chapter 10 I/O Electrical Features and Wiring

10.1 Input Signal

The device's Line 0 is opto-isolated input signal, and its internal circuit is as follows.

Note

- The maximum input current of Line 0 is 25 mA.
- Make sure that the input voltage is not from 1 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.

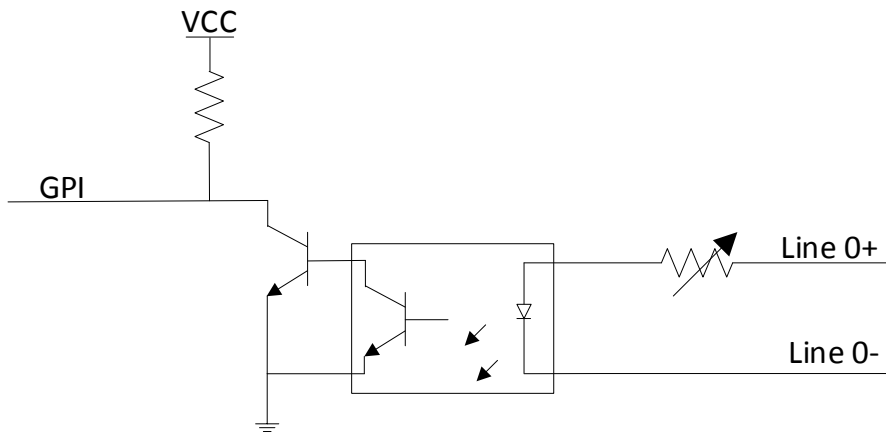


Figure 10-1 Internal Circuit of Input Signal

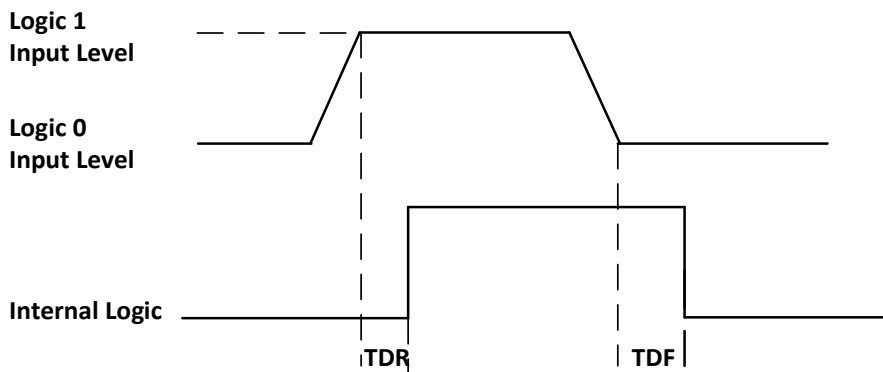


Figure 10-2 Input Logic Level

Table 10-1 Input Electrical Feature

Parameter Name	Parameter Symbol	Value
Input Logic Level Low	VL	0 VDC to 1 VDC
Input Logic Level High	VH	3.3 VDC to 24 VDC
Input Falling Delay	TDF	16.8 μ s to 22 μ s
Input Rising Delay	TDR	1.8 μ s to 4.6 μ s

10.2 Output Signal

The device's Line 1 is opto-isolated output signal, and its internal circuit is as follows.

Note

The maximum output current of Line 1 is 25 mA.

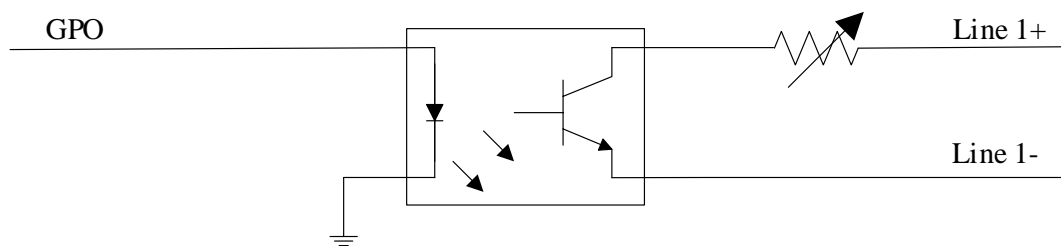


Figure 10-3 Internal Circuit of Output Signal

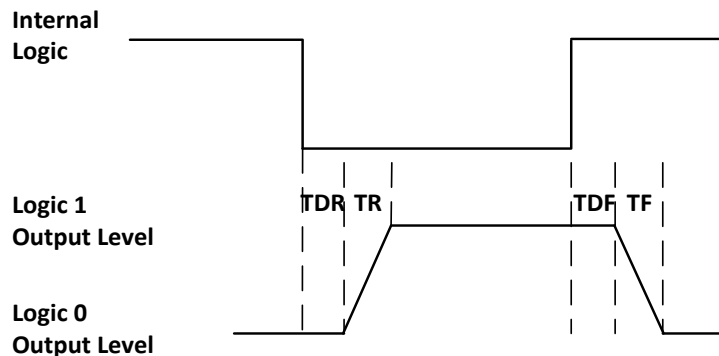


Figure 10-4 Output Logic Level

Opto-isolated output electric feature is shown below when the external voltage is 3.3 VDC and the external resistance is 1 K Ω .

Table 10-2 Output Electrical Feature

Parameter Name	Parameter Symbol	Value
Output Logic Level Low	VL	575 mV
Output Logic Level High	VH	3.3 VDC
Output Rising Time	TR	8.4 μ s
Output Falling Time	TF	1.9 μ s
Output Rising Delay	TDR	15 μ s to 60 μ s
Output Falling Delay	TDF	3 μ s to 6 μ s

With different external voltage and resistance, the corresponding current and the parameter of output logic level low are shown below.

Table 10-3 Parameters of Output Logic Level Low

External Voltage	External Resistance	VL	Output Current
3.3 VDC	1 K Ω	575 mV	2.7 mA
5 VDC	1 K Ω	840 mV	4.1 mA
12 VDC	2.4 K Ω	915 mV	4.6 mA
24 VDC	4.7 K Ω	975 mV	4.9 mA

10.3 Bi-Directional Signal

The device has one bi-directional non-isolated I/O signal (Line 2), and you can set it as input signal or output signal according to demands. Its internal circuit is as follows.

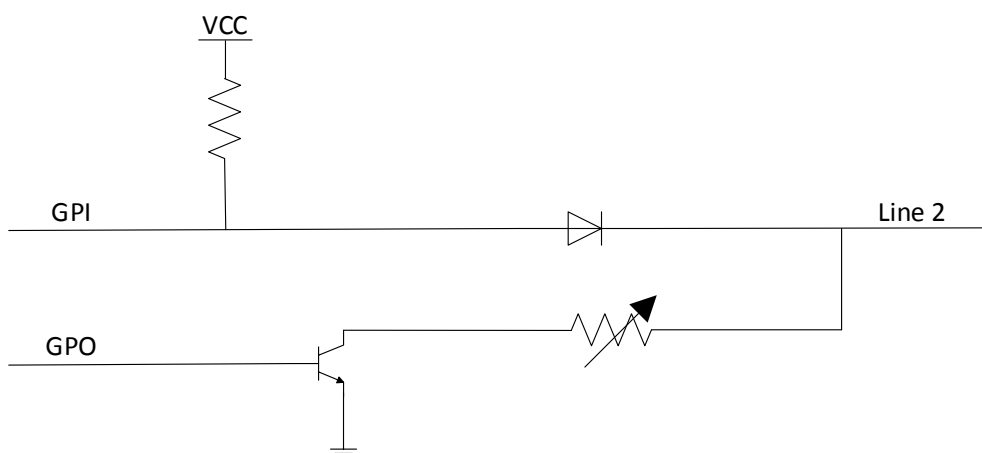


Figure 10-5 Internal Circuit of Bi-Directional Signal

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 Line 2.

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

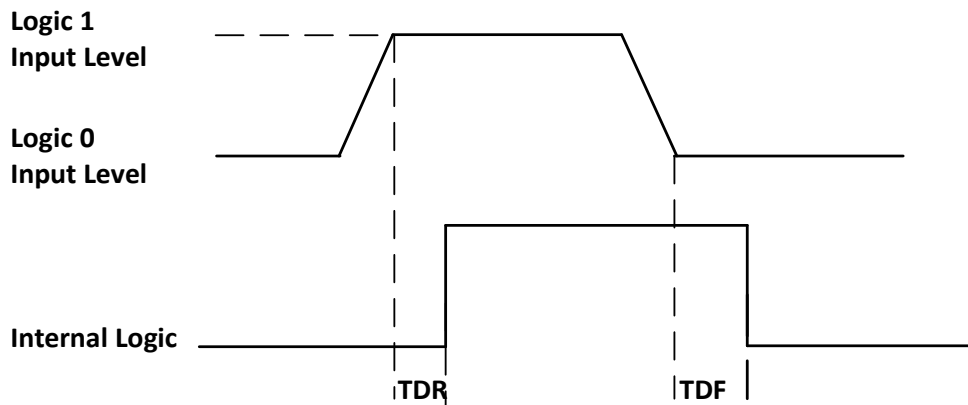


Figure 10-6 Input Logic Level

Table 10-4 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	< 1 μ s
Input Rising Delay	TDR	< 1 μ s

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.

Table 10-5 Parameters of Output Logic Level Low

External Voltage	External Resistance	VL (GPIO2)
3.3 VDC	1 K Ω	160 mV
5 VDC	1 K Ω	220 mV
12 VDC	1 K Ω	460 mV
24 VDC	1 K Ω	860 mV
30 VDC	1 K Ω	970 mV

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

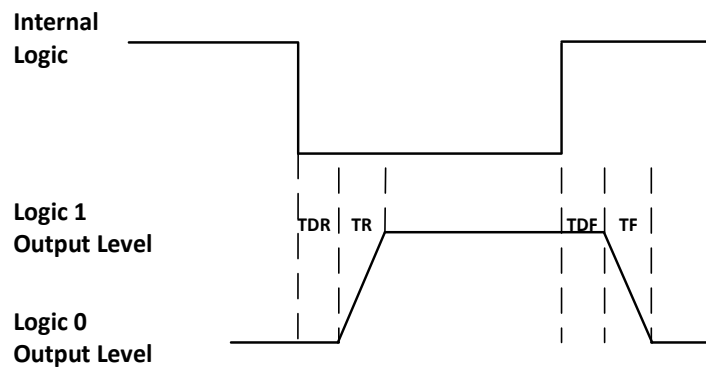


Figure 10-7 Output Logic Level

Table 10-6 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

10.4 Input Signal Wiring

The input signal wiring is shown below when the device uses Line 0 as trigger source in external trigger mode.

Note

- Input signal wiring may differ by the external device type.
- Here we take type I device as an example to introduce I/O wiring, the appearance here is for reference only, and the actual device you purchased shall prevail.

PNP Device

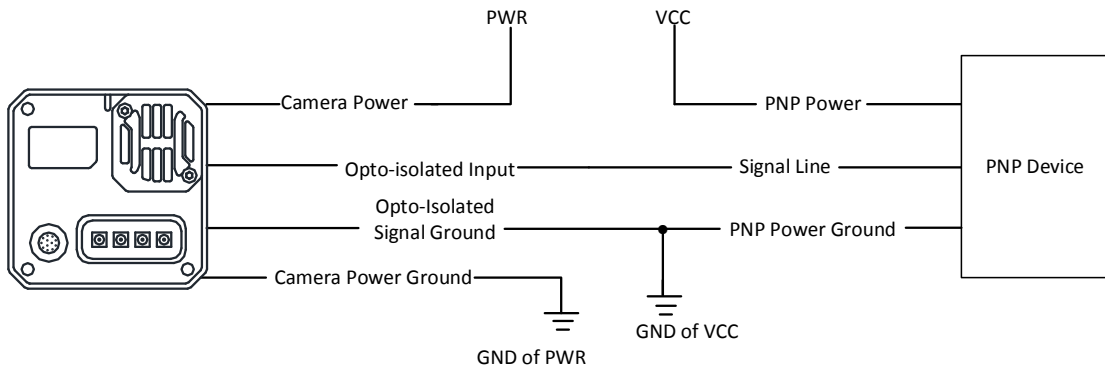


Figure 10-8 Input Signal Connects to PNP Device

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.

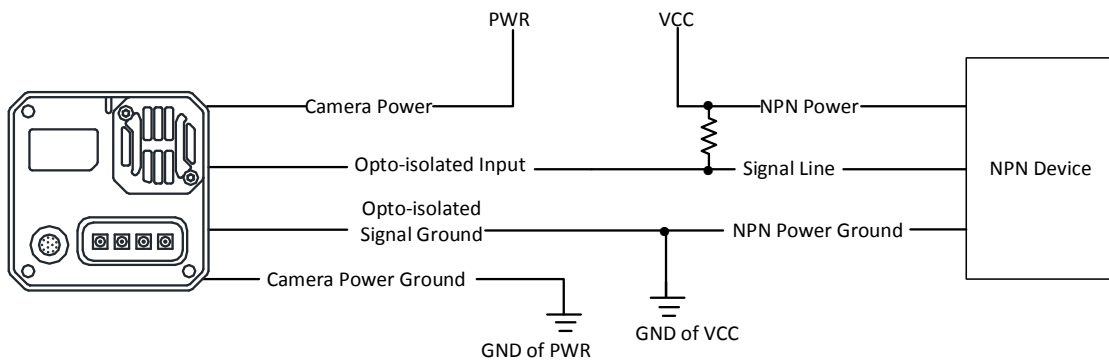


Figure 10-9 Input Signal Connects to NPN Device

Switch

If the VCC of switch is 24 VDC, it is recommended to use 4.7 K Ω resistor to protect circuit.

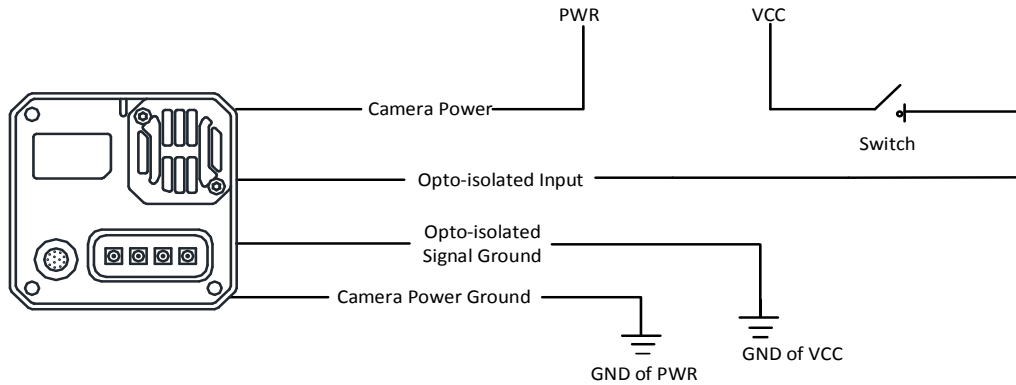


Figure 10-10 Input Signal Connects to Switch

10.5 Output Signal Wiring

The output signal wiring is shown below when the device uses Line 1 as output signal.

Note

- Output signal wiring may differ by the external device type.
- Here we take type I device as an example to introduce I/O wiring, the appearance here is for reference only, and the actual device you purchased shall prevail.

PNP Device

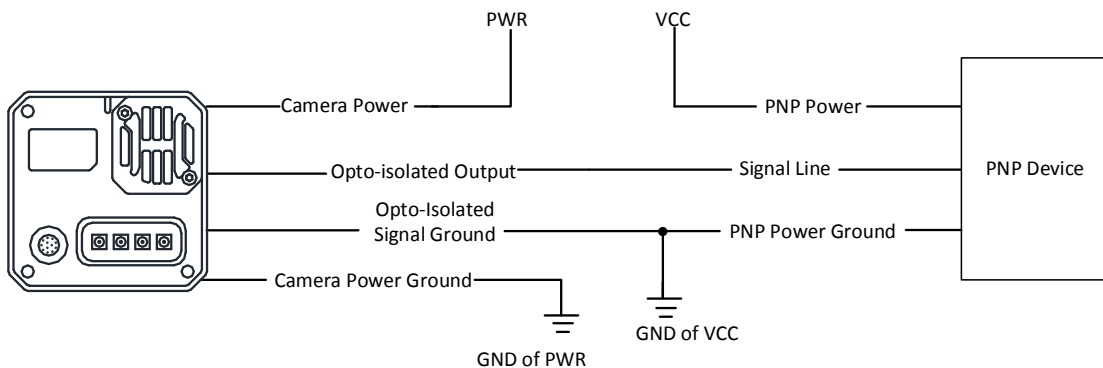


Figure 10-11 Output Signal Connects to PNP Device

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.

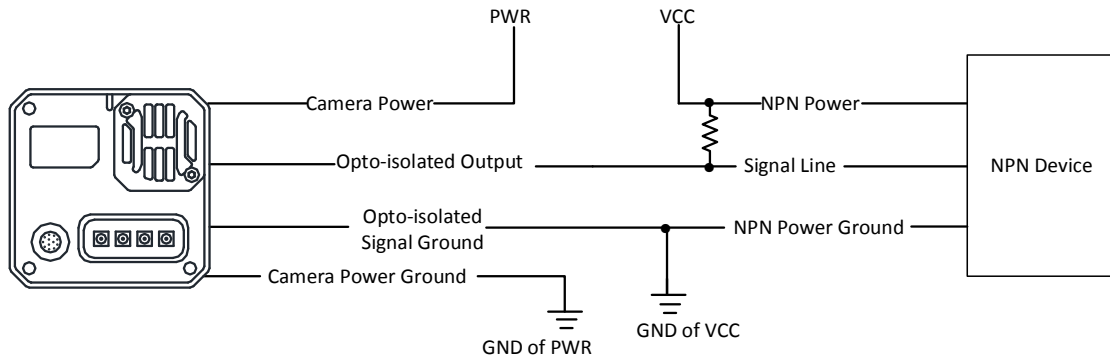


Figure 10-12 Output Signal Connects to NPN Device

10.6 Bi-Directional Signal Wiring

The device's Line 2 can be used as input signal and output signal.

Configured as Input Signal

The input signal wiring is shown below when the device's Line 2 is configured as input signal.

Note

- Input signal wiring may differ by the external device type.
- Here we take type I device as an example to introduce I/O wiring, the appearance here is for reference only, and the actual device you purchased shall prevail.

PNP Device

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

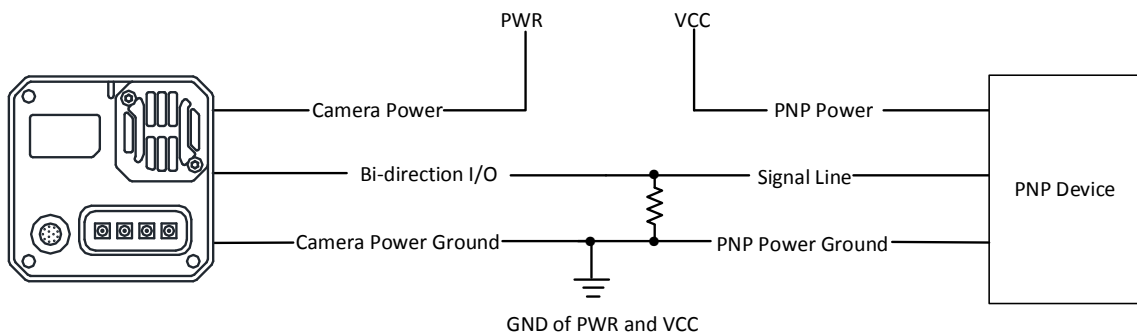


Figure 10-13 Input Signal Connects to PNP Device

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.

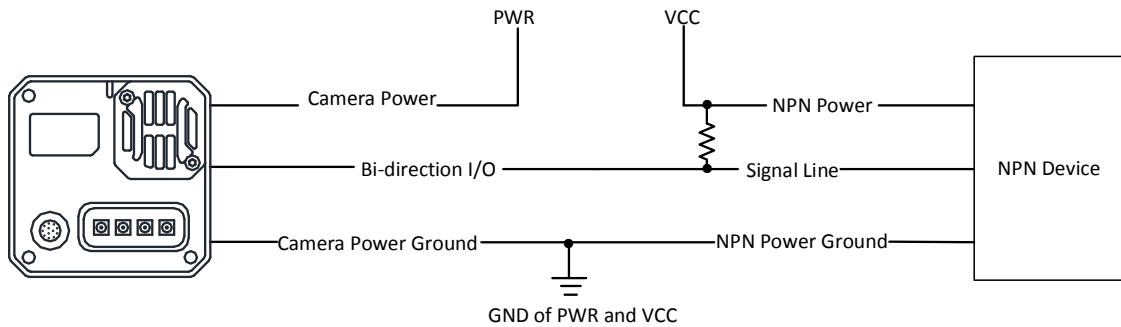


Figure 10-14 Input Signal Connects to NPN Device

Switch

The switch value can provide low electrical level to trigger line 2.

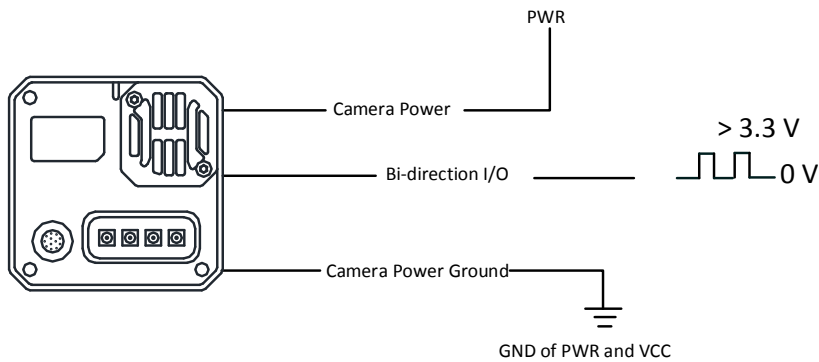


Figure 10-15 Input Signal Connects to Switch

Configured as Output Signal

The output signal wiring is shown below when the device's Line 2 is configured as output signal.

Note

- Output signal wiring may differ by the external device type.
 - Here we take type I device as an example to introduce I/O wiring, the appearance here is for reference only, and the actual device you purchased shall prevail.
-

PNP Device

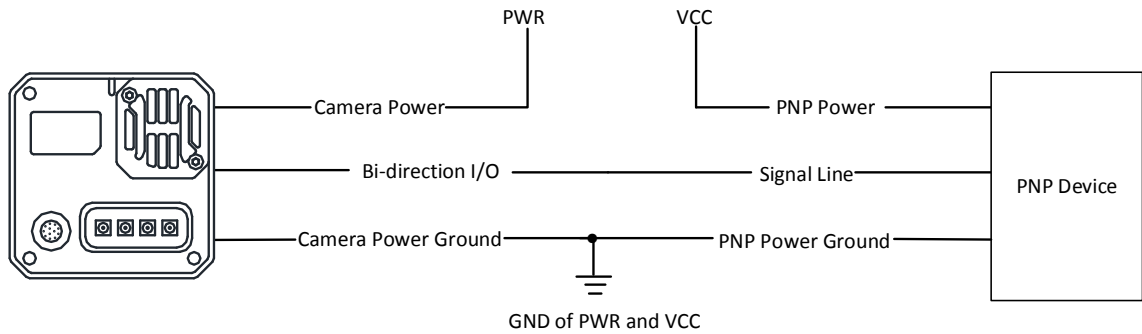


Figure 10-16 Output Signal Connects to PNP Device

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.

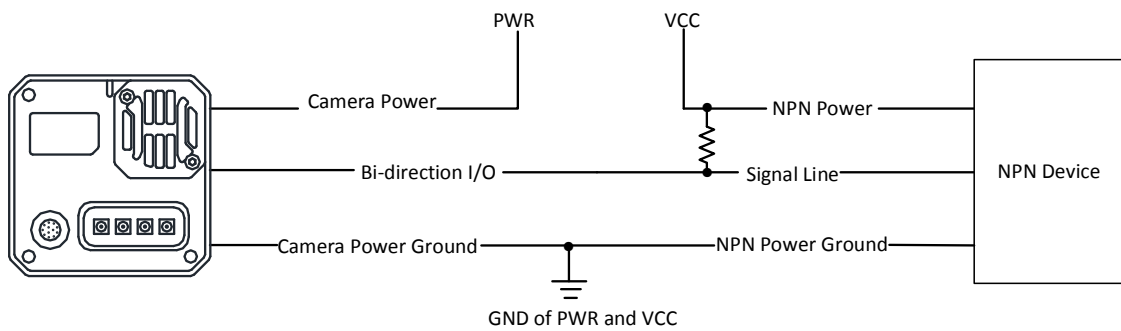


Figure 10-17 Output Signal Connects to NPN Device

Chapter 11 Image Parameter

11.1 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.

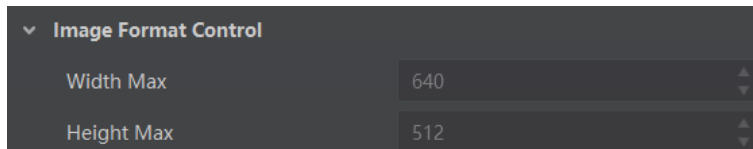


Figure 11-1 View Resolution

11.2 Set ROI

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

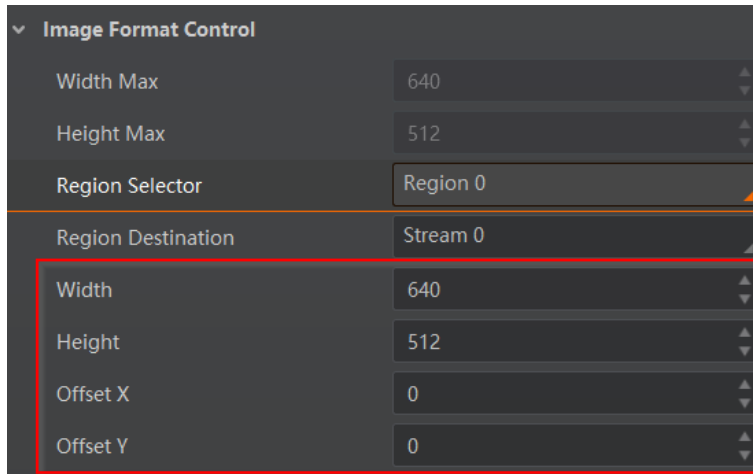


Figure 11-2 Set ROI

11.3 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 11-3 Set Image Reverse

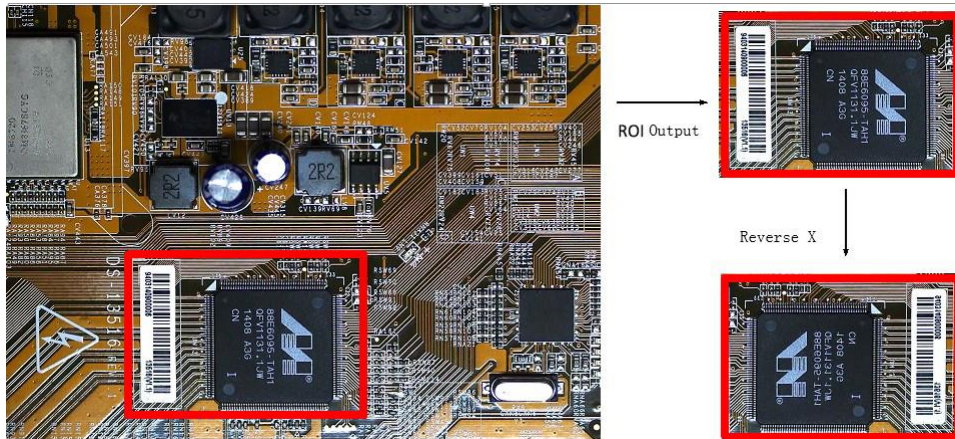


Figure 11-4 Image Reverse Comparison

11.4 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 11-1 Pixel Format and Pixel Size

ADC Bit Depth	Pixel Format	Pixel Size (Bits/Pixel)
8	Mono 8	8
12	Mono 8, Bayer 8	8
	Mono 10, Bayer 10	10
	Mono 12, Bayer 12	12
	RGB 8	24
16	Mono 8, Bayer 8	8
	Mono 10, Bayer 10	10
	Mono 12, Bayer 12	12
	Mono 16, Bayer 16	16
	RGB 8	24

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.

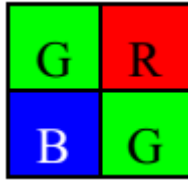


Figure 11-5 Bayer GR Pixel Pattern

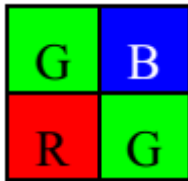


Figure 11-6 Bayer GB Pixel Pattern

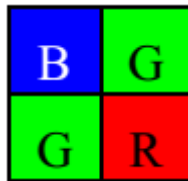


Figure 11-7 Bayer BG Pixel Pattern

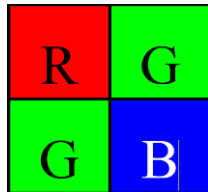


Figure 11-8 Bayer RG Pixel Pattern

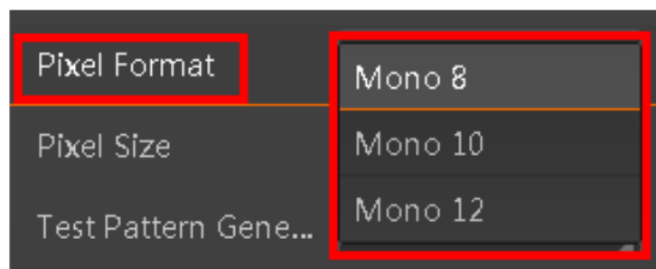


Figure 11-9 Set Pixel Format

11.5 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.

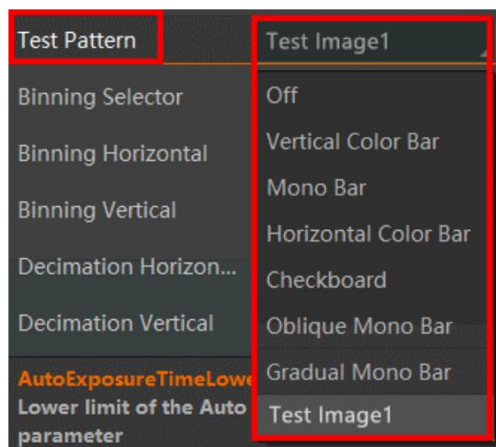


Figure 11-10 Set Test Pattern

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**.

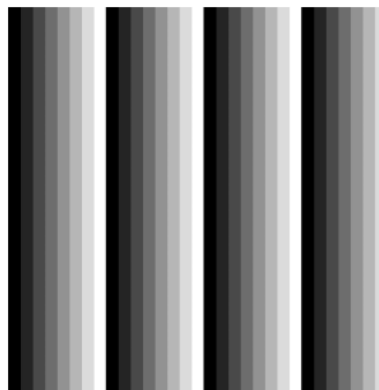


Figure 11-11 Mono Bar Test Pattern

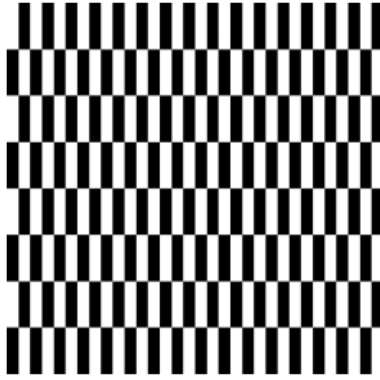


Figure 11-12 Checkboard Test Pattern

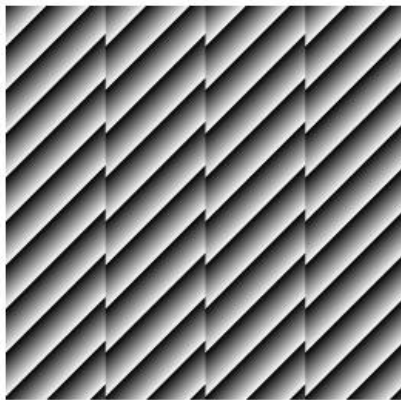


Figure 11-13 Oblique Mono Bar Test Pattern

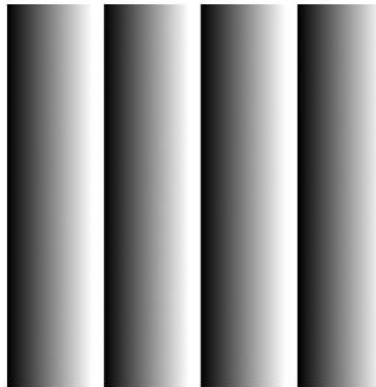


Figure 11-14 Gradual Mono Bar Test Pattern

actual demands.

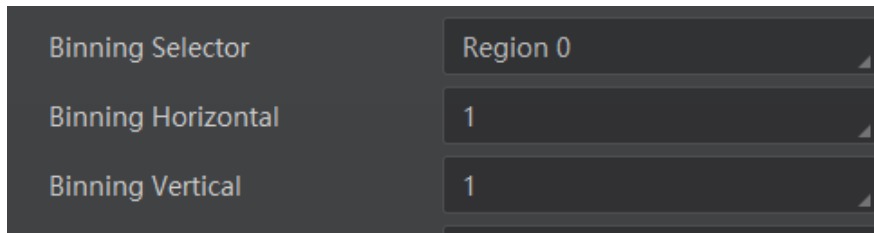


Figure 11-18 Set Binning

Note

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

11.7 Set Decimation

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.

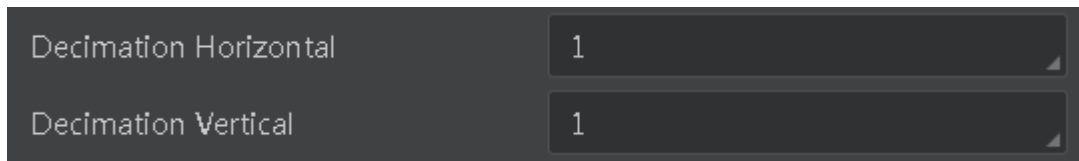


Figure 11-19 Set Decimation

Note

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

11.8 Set Exposure Mode

Note

The exposure mode may differ by device models.

The device supports 2 types of exposure modes, including **Timed** and **Trigger Width**.

- If the **Exposure Mode** is **Timed**, the device's exposure time is controlled by **Exposure**
-

Auto and Exposure Time.

- When the device's **Trigger Mode** is **On**, **Trigger Source** is **Line 0** or **Line 2**, and **Trigger Activation** is **Level High** or **Level Low**, **Trigger Width** can be selected as **Exposure Mode** and the device's exposure time is controlled by the signal duration.

11.9 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.

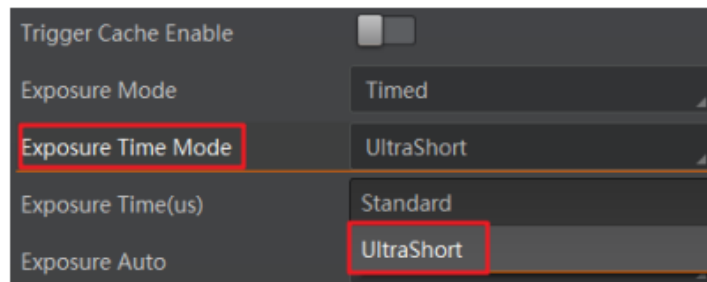


Figure 11-20 Set Exposure Time Mode

11.10 Set Exposure Auto

In standard exposure time mode, 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)**.

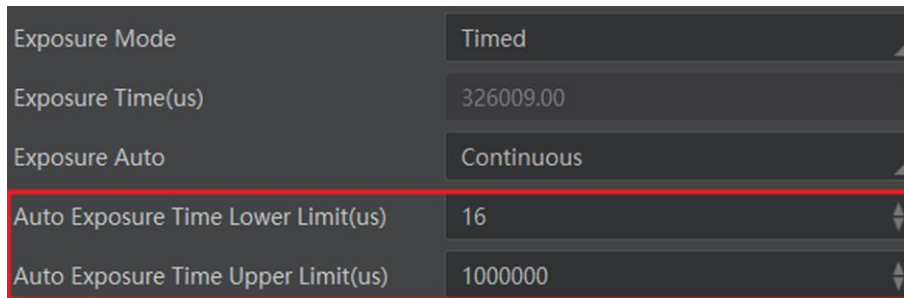


Figure 11-21 Set Exposure Time under Once or Continuous Mode

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.
-

11.11 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, gain and white balance.
-

Steps

1. Go to **Acquisition Control** → **HDR Enable**, and enable **HDR Enable**.
 2. Set **HDR Number** to determine how many groups to join HDR according to actual demands.
-

Note

Up to 8 HDR groups can be configured.

3. Set **HDR Selector**, and set corresponding **HDR Shutter**, **HDR Gain** and **HDR Balance R/G/B**.
-

Note

Only some color device models support **HDR Balance Ratio R/G/B**.

4. (Optional) Click **Execute** in **HDR Reset** to reset HDR parameters.

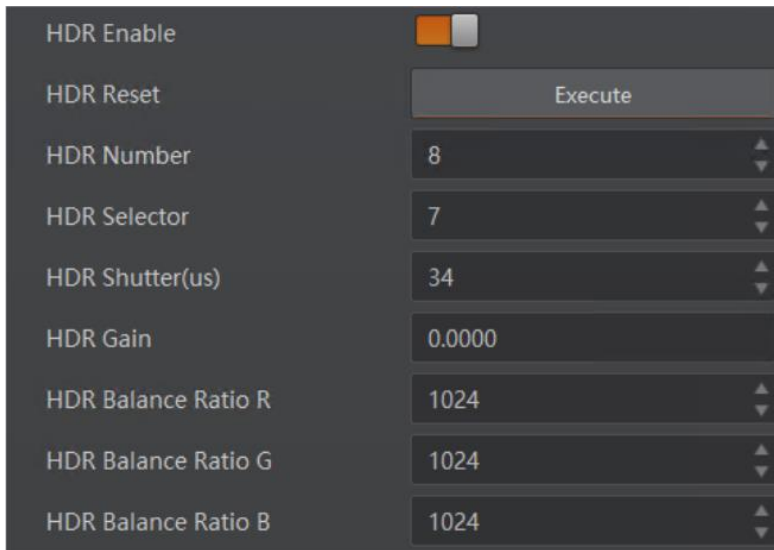


Figure 11-22 Set HDR

11.12 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.

11.12.1 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)**.

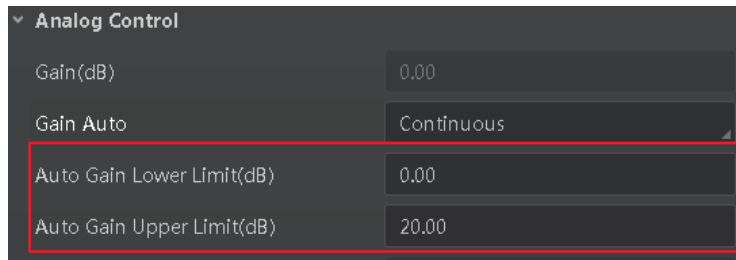


Figure 11-23 Set Gain under Once or Continuous Mode

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.
-

11.12.2 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.

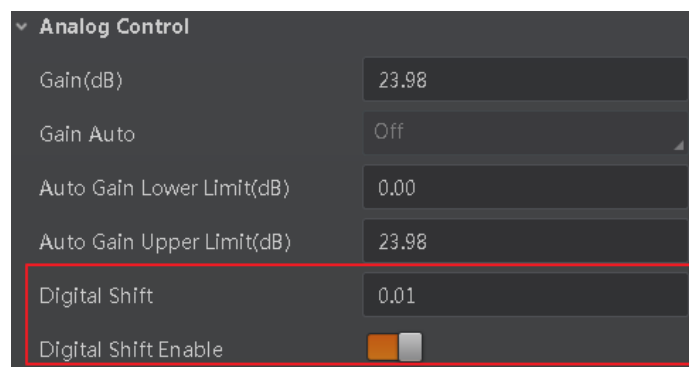


Figure 11-24 Set Digital Gain

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.

11.13 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.

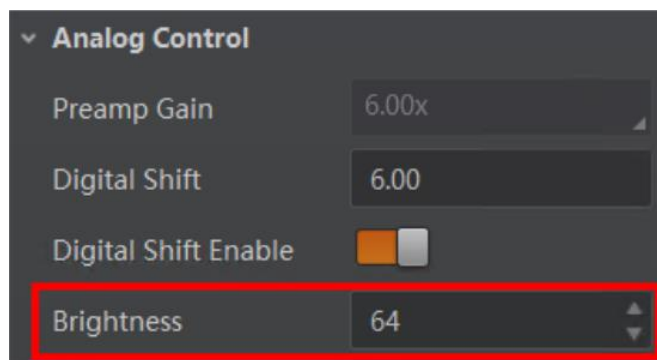


Figure 11-25 Set Brightness

11.14 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.

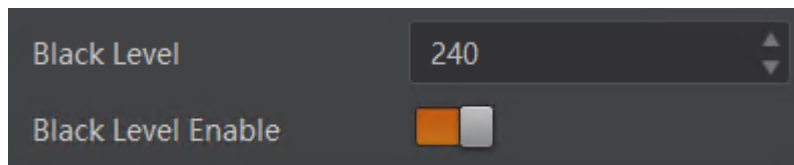


Figure 11-26 Set Black Level

11.15 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**.

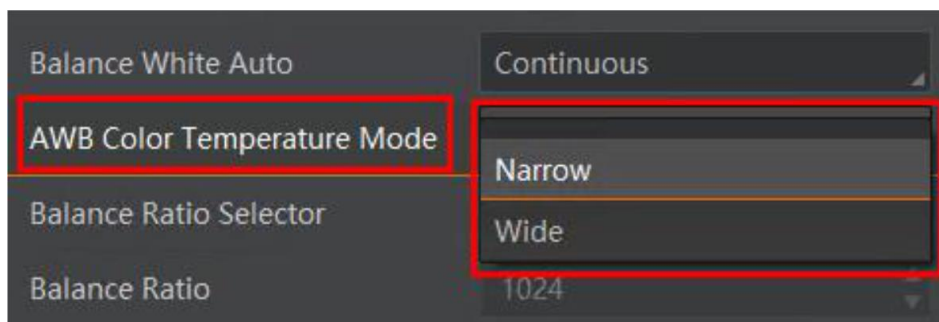


Figure 11-27 Set Parameters

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.

11.16 Set Gamma Correction

Note

- The Gamma correction function may differ by device models.
- The color device in Bayer pixel format does not support 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.

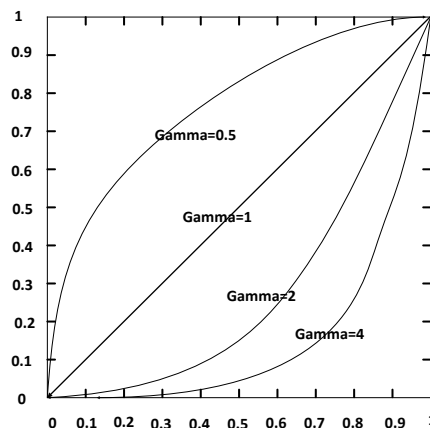


Figure 11-28 Set Gamma Correction

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.

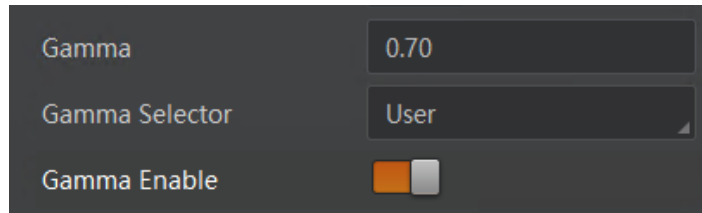


Figure 11-29 Set User Mode

sRGB Mode

Steps

1. Go to **Analog Control** → **Gamma Selector**.
2. Select **sRGB** as **Gamma Selector**.
3. Enable **Gamma Enable** to enable it.

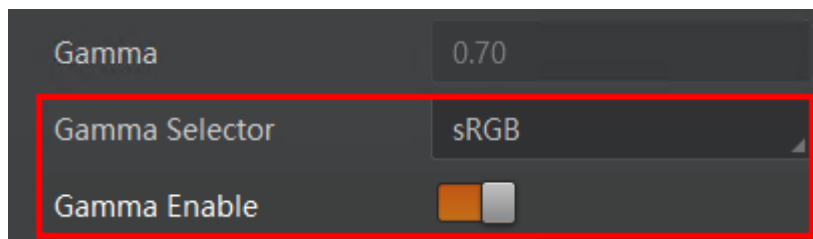


Figure 11-30 Set sRGB Mode

11.17 Set Sharpness

Note

- The sharpness function may differ by device models.
 - The device supports sharpness function only in Mono or YUV pixel format.
-

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.

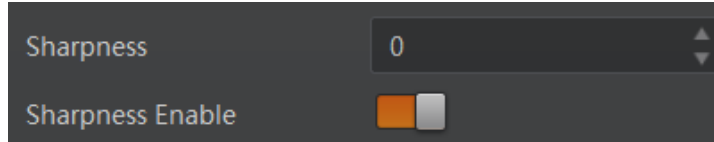


Figure 11-31 Set Sharpness

11.18 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**.

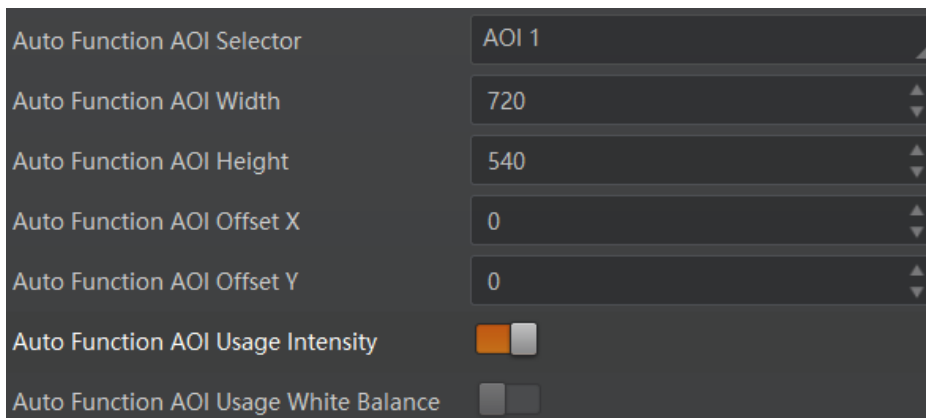


Figure 11-32 Set AOI

11.19 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.
-

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

Steps

1. Go to **Color Transformation Control**.
2. Select **Color Transformation Value Selector**, and set **Color Transformation Value**.
3. Enable **Color Transformation Enable**.

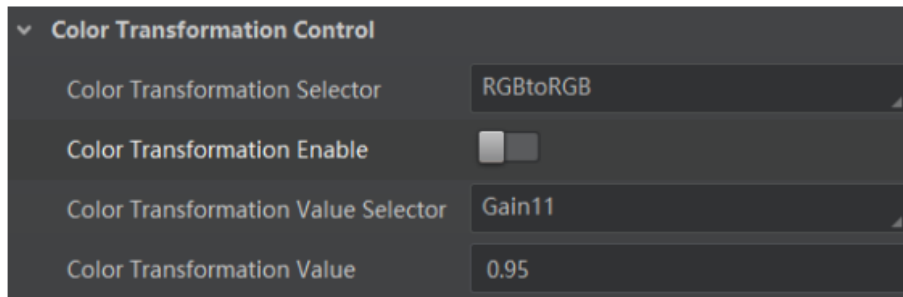


Figure 11-33 Set Color Transformation Control

11.20 Set Hue

Note

- The hue function is only available for color devices.
 - In Mono pixel format, hue function is not supported.
 - 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.

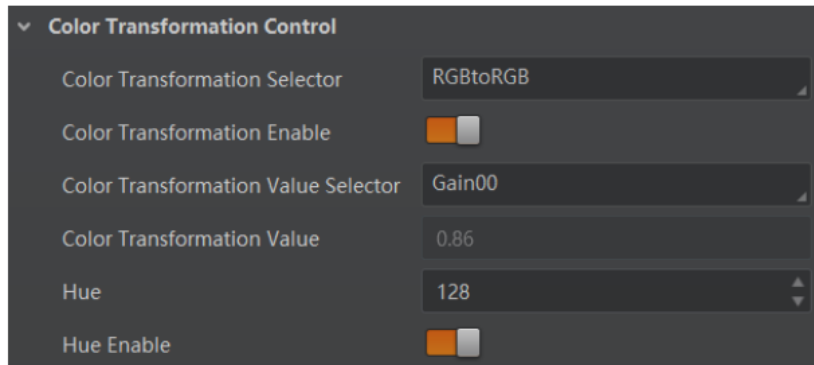


Figure 11-34 Set Hue

11.21 Set Saturation

Note

- The saturation function is only available for color devices.
- In Mono pixel format, hue function is not supported.
- 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.

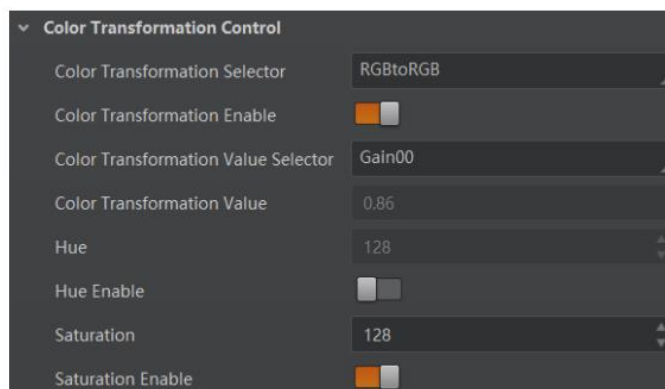


Figure 11-35 Set Saturation

11.22 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.
 - In Bayer pixel format, the color device does not support 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.

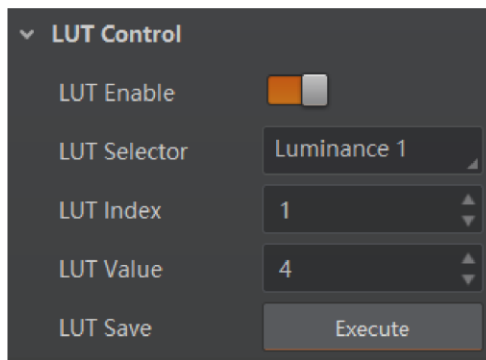


Figure 11-36 Set LUT

11.23 Set Shading Correction

The device supports shading correction function that improves the image uniformity when you acquire a non-uniformity image due to external conditions. The shading correction type includes LSC correction, FFC correction, FPNC correction, user PRNUC correction, and other corrections.

Note

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

11.23.1 LSC Correction

LSC correction stands for Lens Shading Correction that eliminates non-uniform illumination brought by lens. The LSC correction supports two correction methods, including auto image correction or correcting image via setting parameters.

Note

The specific LSC correction method that devices support may differ by device models.

Auto Image Correction

Steps:

1. Click **Shading Correction**, select **LSC Correction** as **Shading Selector**.
2. Click **Execute** in **Activate Shading**.
3. Enable **LSC Enable**.

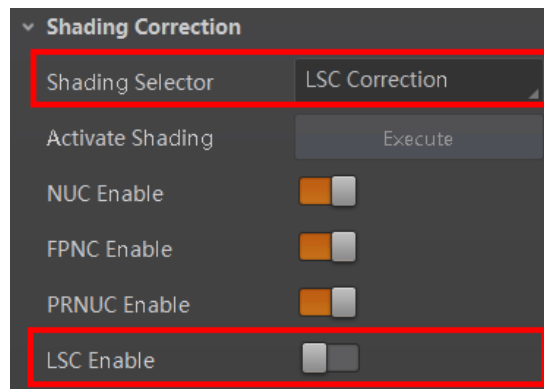


Figure 11-37 Auto Image Correction

Correcting Image via Setting Parameters

Some device models support correcting image via setting parameters to adjust the image brightness according to different scenarios.

Steps:

1. Click **Shading Correction**, select **LSC Correction** as **Shading Selector**.
2. Select tables from **LSC Table Selector** ranging from **Table 0** to **Table 7** according to actual demands.
3. Enable **LSC Target Enable** and set **LSC Target R/G/B** according to actual demands.

Note

- The larger value configured in **LSC Target R/G/B**, and brighter the image is.
 - The function of **LSC Target Enable** and **LSC Target** is only valid before executing **Activate Shading**.
-

4. Click **Execute** in **Activate Shading**, and enable **LSC Enable**.

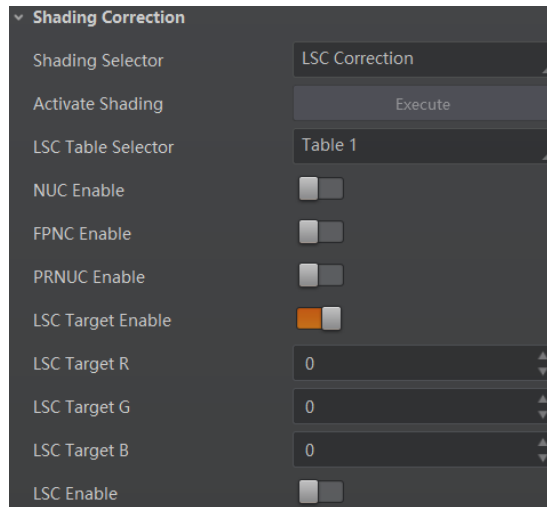


Figure 11-38 Correcting Image via Setting Parameters

Note

The LSC correction can be done only when the device is in full resolution. If you are only interested in certain details in the image, you can use the ROI function.

11.23.2 LSC Sequencer

Without stopping device's image streams, LSC sequencer function can periodically take pictures of collected images via setting multiple groups of brightness parameter tables according to the default sequencer parameter group or manually setting sequencer parameter group. Therefore, the device can process images of inconsistent uniformity due to different light sources.

Note

The LSC sequencer function may differ by device models.

Steps:

1. Click **Shading Correction**, and select **LSC Correction** as **Shading Selector**.
 2. Select tables from **LSC Table Selector** ranging from **Table 0** to **Table 7** according to actual demands.
-

Note

When using eight LSC tables, the default sequencer order is from Table 0 to Table 7 in turn.

3. Enable **LSC Target Enable** and set **LSC Target**.

 **Note**

- The larger value configured in **LSC Target R/G/B**, and brighter the image is.
 - The function of **LSC Target Enable** and **LSC Target** is only valid before executing **Activate Shading**.
-

4. Click **Execute** in **Activate Shading**, and enable **LSC Sequencer Enable**.

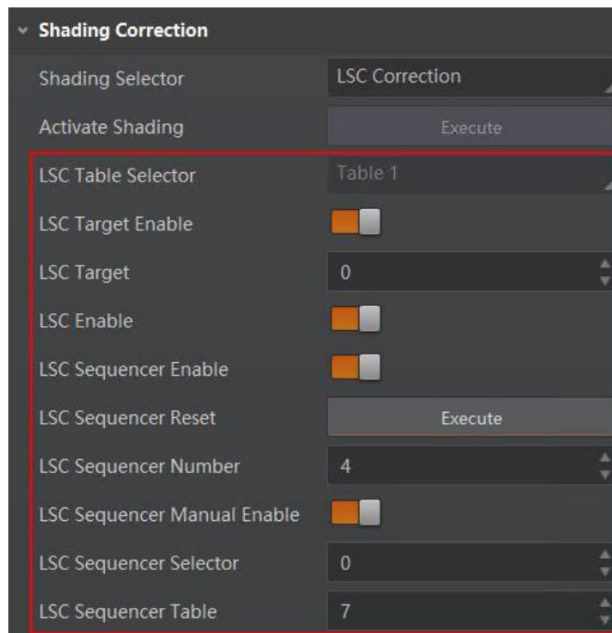


Figure 11-39 LSC Sequencer

5. Set **LSC Sequencer Number** to configure how many tables to participate the sequencer.
6. (Optional) Click **Execute** in **LSC Sequencer Reset** to reset the sequencer.
7. (Optional) Enable **LSC Sequencer Manual Enable** if you need to set the sequencer order manually, and set **LSC Sequencer Selector** and **LSC Sequencer Table** according to actual demands.

11.23.3 FFC Correction

The flat field correction (FFC) is used to improve the image uniformity that may be impacted by the sensor, light sources, external conditions, etc. The FFC correction supports two correction methods, including auto image correction or correcting image via setting parameters.

 **Note**

The FFC correction can be done only when the device is in full resolution.

Steps:

1. Click **Shading Correction**, and select **FFC Correction** as **Shading Selector**.
2. Click **Execute** in **Activate Shading**, and enable **FFC Enable**.

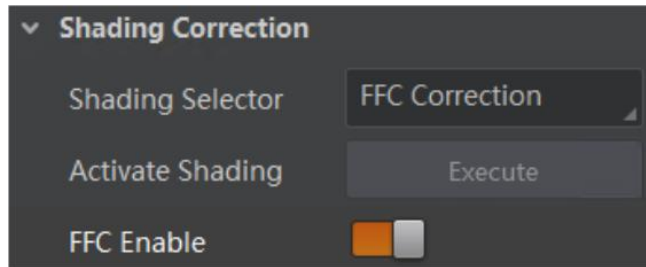


Figure 11-40 FFC Correction

11.23.4 User PRNUC Correction

The device currently supports user PRNUC (Photo-response Non-Uniformity Correction) function that eliminates vertical line on the images.

Steps:

1. Click **Shading Correction**, and click **Execute** in **Activate Shading**.
2. Enable **NUC Enable**, and **PRNUC Enable** will be enabled automatically.

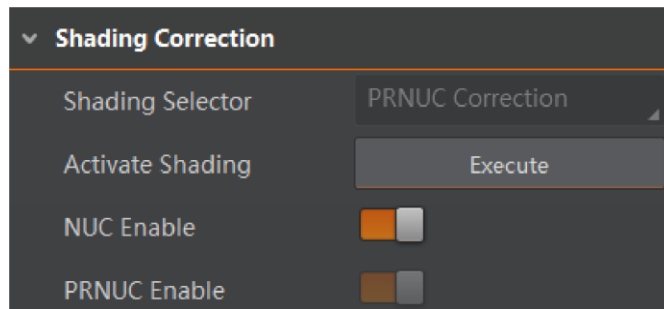


Figure 11-41 User PRNUC Correction

11.23.5 Other Corrections

Other corrections include FPNC and PRNUC. Click **Shading Correction**, and enable **NUC Enable**. The **FPNC Enable** and **PRNUC Enable** will be automatically enabled or disabled according to the device's condition.

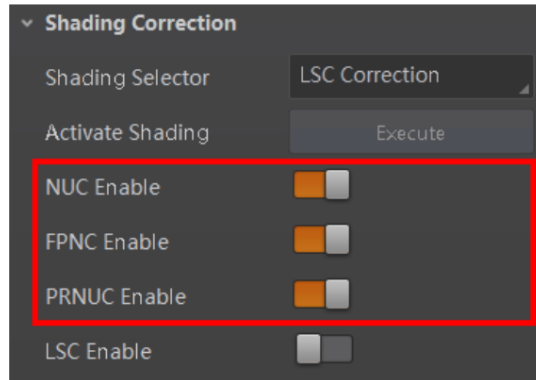


Figure 11-42 Other Corrections

11.24 Set FTO Mode

Note

The FTO mode function may differ by device models.

FTO (Four to One) mode enables the device to combine four acquired images to one image of 604 MP, as shown below.

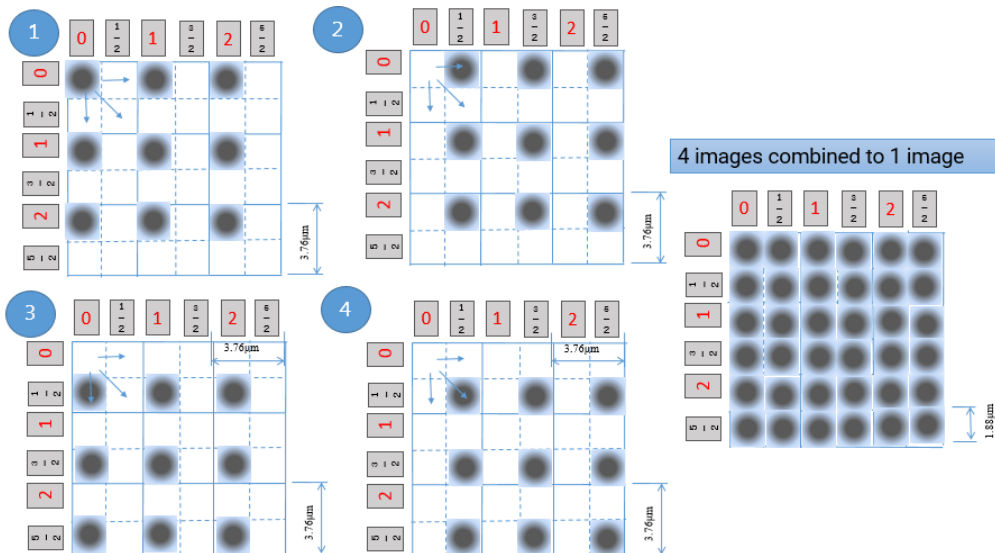


Figure 11-43 FTO Mode

Go to **Image Format Control**, and enable **FTO Mode** according to actual demands.

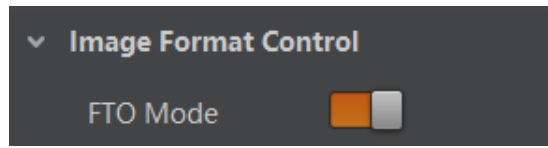


Figure 11-44 Enable FTO Mode

After enabling FTO mode, the device has pixel shifting function. This function shifts the image sensor to X and Y direction precisely using the 2D-Stage. The resulting image can be combined of 4 individual images captured by shifting the image sensor to X and Y direction. Thus, the output image offers improved resolution (4 Shot Result Image) in comparison with standard output image (1 Shot Result Image).

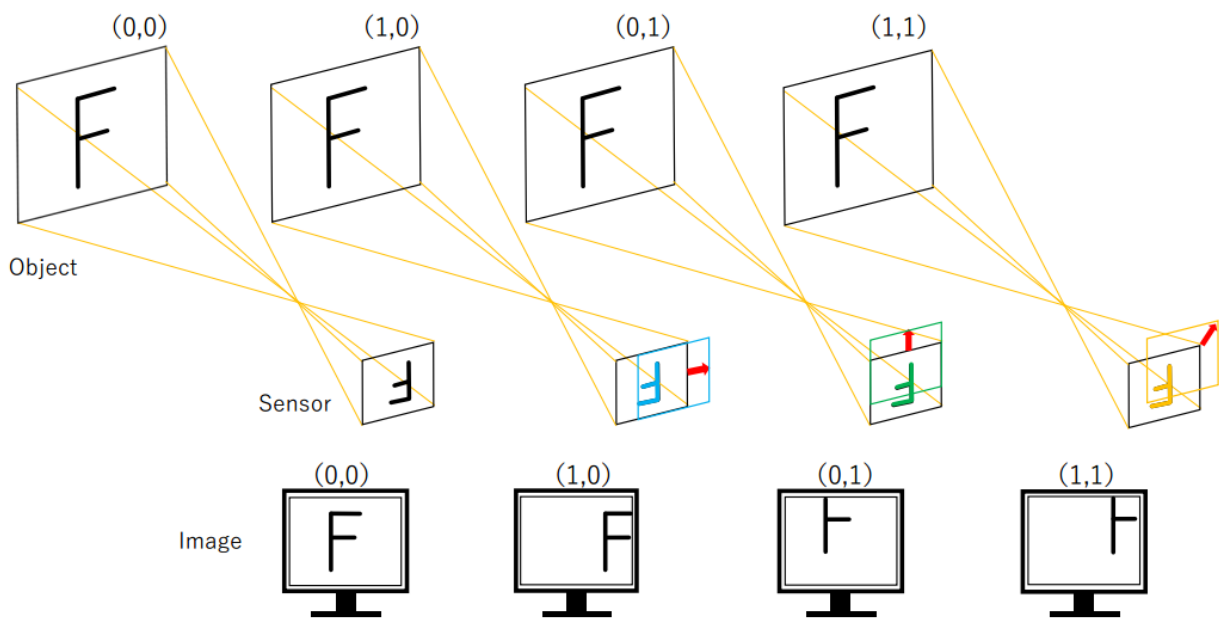


Figure 11-45 Pixel Shifting

Chapter 12 Other Functions

12.1 Device Control

Note

The specific device control parameters may differ by device models.

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

Table 12-1 Parameter Description

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 Version	Read only	It is the version of the device.
Device Firmware Version	Read only	It is the firmware version of the device.
Device Serial Number	Read only	It is device's serial number.
Device User ID	Read and 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. • If you set it, the client software displays the User ID you set.
Device Revision	Read only	It is CoaXPress protocol version.
Device Manifest Size	Read only	It is the quantity of GenICam XML in the device.
Device Manifest Selector	Read and write	It is the current ID of GenICam XML.
Device XML Version	Read only	It is the version of GenICam XML.
Device Schema Version	Read only	It is the structure version of GenICam.
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.

Parameter	Read/Write	Description
TEC Enable	Read and write	Enable it to enable TEC function.
TEC Temperature	Read and write	It sets the max. temperature of sensor. <ul style="list-style-type: none"> ● If actual sensor's temperature is lower than this parameter, and TEC function is not enabled. ● If actual sensor's temperature is higher than this parameter and TEC enable is enabled, and then TEC function is enabled.
Device Temperature Selector	Read and write	It selects device temperature, including sensor and mainboard.
Device Temperature	Read only	It displays the real-time temperature of the device's motherboard you selected in Device Temperature Selector .
Sensor Board Temperature	Read only	It displays the real-time temperature of the device's sensor you selected in Device Temperature Selector .
Fan Control Mode	Read and write	It sets the fan mode. <ul style="list-style-type: none"> ● In auto mode, it includes three-level fan speed: 70, 85 and 100. According to the difference between the configured sensor temperature (TEC Temperature parameter) and the actual temperature, adjustment is made every 30 seconds. If actual temperature - configured temperature > 2 degrees, fan speed will increase. Otherwise, fan speed will decrease. ● In manual mode, the fan speed is decided by value set in Fan Speed.
Fan Speed	Read and write	It sets the fan speed, and its range is from 40 to 100.
Device Command Timeout	Read only	It counts the timeout of command.
Device Reset	Write only	Click Execute to reset the device.
Find Me	Read and write	Click Execute to let red indicator flash several times, and find device.
Device PJ Number	Read only	It is the device's project number.

12.2 File Access Control

Note

The file access control function may differ by device model.

The file access control allows you to export or import the device's parameters, DPC data, LUT, MPRNUC and HPRNUC, and save them in mfa format. Currently, the device supports User Set 1/2/3, DPC, LUT Luminance 1/2/3, MPRNUC, HPRNUC, and NUFFC.

Steps

1. Select a device in the device list, and click  to open the file access dialogue box.

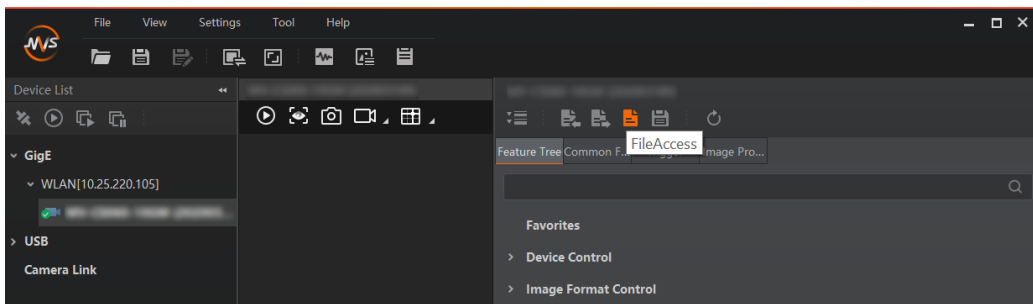


Figure 12-1 File Access

2. Select **Device Feature** and click **Import** or **Export**.

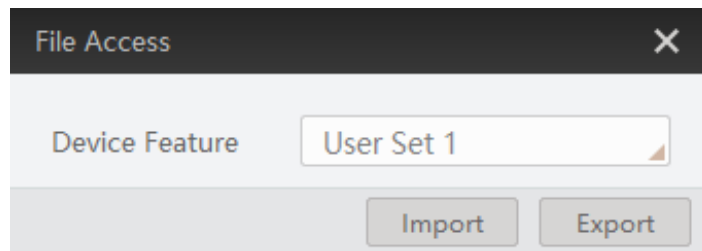


Figure 12-2 Import or Export

3. Select a mfa file from local PC to import or select a saving path and enter file name to save and export.

Note

- If User Set 1/2/3 is selected as device feature, you need to load the corresponding user set you selected to take effect.
- If LUT Luminance 1/2/3 is selected as device feature, and they will take effect only when you select the same parameters in LUT Selector.
- If DPC, MPRNUC, HPRNUC or NUFFC is selected as device feature, and it will take effect immediately after importing.
- Importing and exporting the device feature among the same model of devices are supported.

12.3 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.

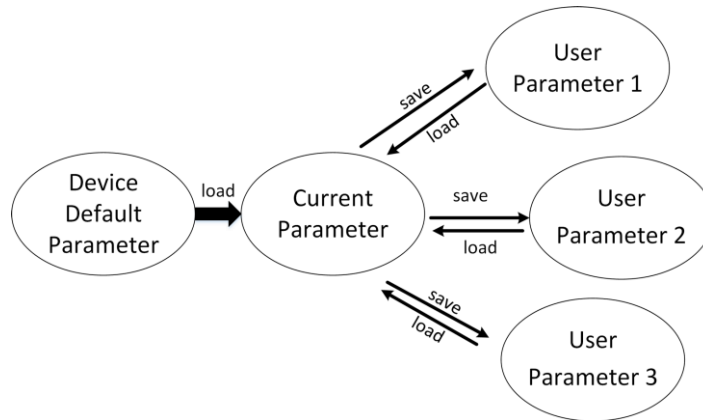


Figure 12-3 Parameter Relation

Note

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

12.3.1 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.

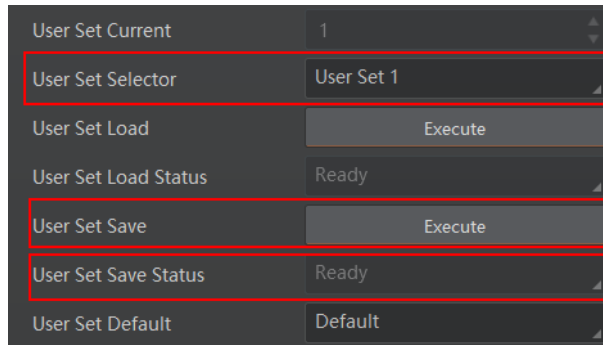


Figure 12-4 Save User Set

12.3.2 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**:
 - Saving: User parameters are being loaded.
 - Ready: User parameters have been loaded.

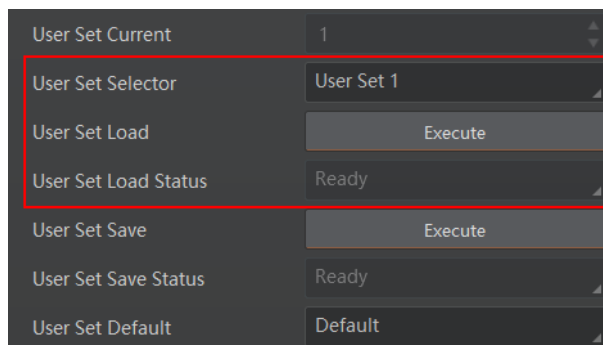


Figure 12-5 Load User Set

12.3.3 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.

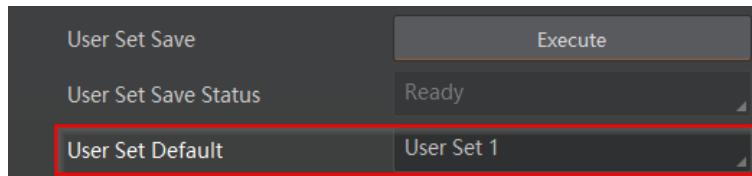


Figure 12-6 Set User Default

12.4 Transfer Layer Control

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

Note

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

Table 12-2 Parameters of Transfer Layer Control

Parameter	Read/Write	Description
Paylode Size	Read only	It is the device’s load size.
Device Tap Geometry	Read and write	It is the tap configuration mode.
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.
Image1StreamID	Read only	It is the ID of image 1.
Image2StreamID	Read only	It is the ID of image 2.

12.5 CoaXPress Parameters

You can go to **CoaXPress** to set CoaXPress related parameters.

Table 12-3 Parameters of Transfer Layer Control

Parameter	Read/Write	Description
Device Connection ID	Read only	It is the ID of the device's major link.
Main Host Connection ID	Read, and write is available when the device does not acquire image	It is the device's communication tag.
Control Packet Max Size	Read only	It is the max. value of single control data package.
Device Steam Max Size	Read, and write is available when the device does not acquire image	It is the max. value of single image stream data package.
Link Configuration	Read, and write is available when the device does not acquire image	It sets link configuration mode, link quantity and transmission bandwidth of each link.
Link Configuration Preferred	Read only	It is recommended link configuration mode.
Connection Test Mode	Read and write	It is communication test mode that can check test data sent by the device and frame grabber. It is disabled by default.
Test Error Count Selector	Read and write	It selects link to view its test result.
Test Error Count	Read only	It is error count of current link.
Test Packet Count Tx	Read only	It is the quantity of test data sent by current link.
Test Packet Count Rx	Read only	It is the quantity of test data received by current link.

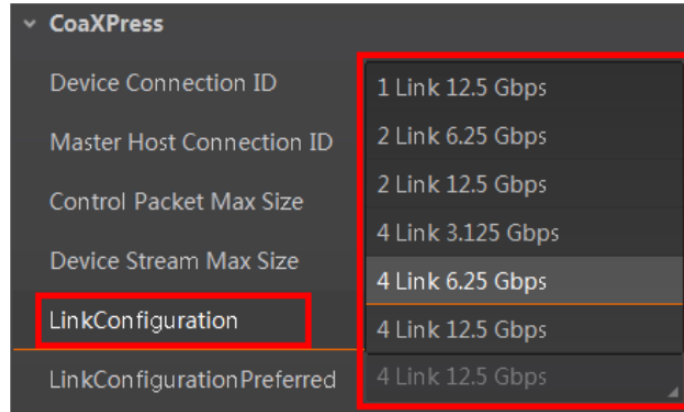


Figure 12-7 Set Link Configuration

Note

The specific link configuration values may differ by device models.

12.6 Update Firmware

The device supports updating firmware via the MVS client software or the USB interface.

Note

The USB interface may differ by device models.

Update Firmware via MVS

Steps

1. Right click the device in the device list, and click **Firmware Update**.

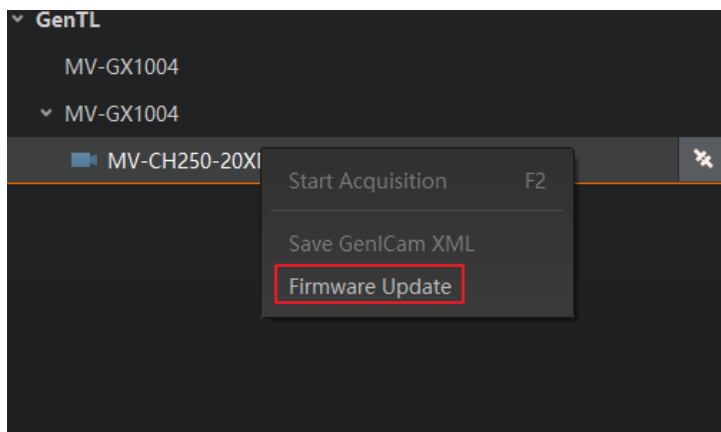



Figure 12-8 Click Firmware Update

2. Click  to select update files (.dav files) in the local PC.
 3. Click Update to start updating.
-

Note

The device will reboot after updating.

Update Firmware via USB Interface

Steps

1. Power on the device, and connect the device to the PC via USB data cable.
2. Copy the dav file of the device into the added disk.

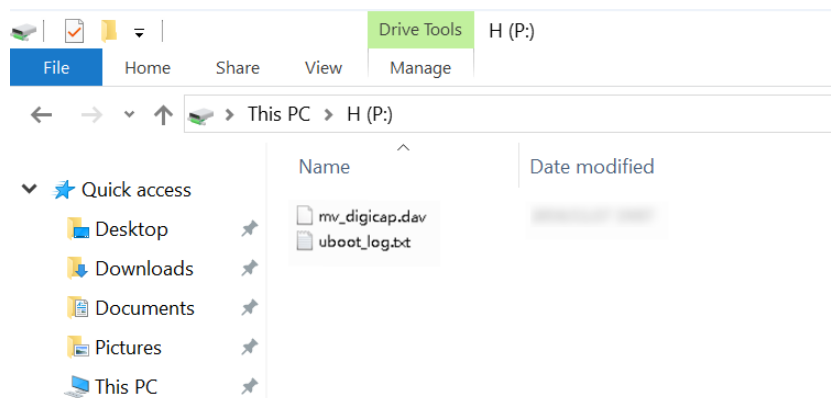


Figure 12-9 Copy Files

3. Reboot the device to update firmware.
-

Note

- The USB data cable you use should have data transmission function. If the USB data cable cannot transmit data, the PC will not find the disk.
 - Do not power off the device during firmware updating. If the device is powered off, format disk manually first and then update firmware again.
-

Chapter 13 FAQ (Frequently Asked Question)

13.1 Why the client software is stuck when listing devices?

Reason

- The device is not connected correctly.
- The frame grabber is not installed firmly.

Solution

- Check the wiring between the device and the frame grabber.
- Reinstall the frame grabber.

13.2 Why the client software turns to the blue screen?

Reason

Close frame grabber client software with force during image acquisition.

Solution

Stop image acquisition first, and then close frame grabber client software.

13.3 Why the client software cannot list devices?

Reason

- After powering on the device, searching the device via frame grabber client software too early.
- When creating new project in frame grabber client software, virtual frame grabber is selected.

Solution

- After the blue indicator lights on the device, searching the device via frame grabber client software.
- When creating new project in frame grabber client software, select physical frame grabber rather than virtual one. If there is no frame grabber model, check PCIe card slot.

13.4 Why the client software does not update frame rate information during live view?

Reason

When the change value of frame rate in frame grabber client software is smaller than 0.5, the frame rate does not update.

Solution

When the change value of frame rate is larger than 0.5, the frame rate will update.

13.5 Why the live view image in the client software is abnormal?

Reason

The device or frame grabber exception occurs.

Solution

Go to **Frame Grabber** → **Statistics and Tests** → **CRC Error Counter** to check CRC Error Counter.

- If CRC Error Counter is 0, frame grabber exception occurs, please contact frame grabber manufacturer.
- If CRC Error Counter is not 0, device exception occurs, please contact our technical support personnel.

Appendix A Device Parameter Index

Table Appendix A-1 Device Parameter Index

Attribute	Parameters	Section
Device Control	Device Scan Type	Section Device Control
	Device Vendor Name	
	Device Model Name	
	Manufacturer Info.	
	Device Version	
	Device Firmware Version	
	Device Serial Number	
	Device User ID	
	Device Revision	
	Device Manifest Size	
	Device Manifest Selector	
	Device Xml Version	
	Device Schema Version	
	Device Uptime (s)	
	Board Device Type	
	TEC Enable	
	TEC Temperature	
	Device Temperature Selector	
	Device Temperature	
	Fan Control Mode	
Fan Speed		
Device Command Timeout		
Device Reset		
Find Me		
Device PJ Number		
Image Format Control	FTO Mode	Section Set FTO Mode

Attribute	Parameters	Section
	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	
	ADC Bit Depth	Section Set Pixel Format
	Pixel Format	
	Pixel Size	
	Test Pattern Generator Selector	Section Set Test Pattern
	Test Pattern	
	Binning Selector	Section Set Binning
	Binning Horizontal	
	Binning Vertical	
	Decimation Horizontal	Section Set Decimation
Decimation Vertical		
Acquisition Control	Acquisition Mode	Section Set Acquisition Mode
	Acquisition Start	
	Acquisition Stop	
	Acquisition Burst Frame Count	Section Set Frame Rate
	Acquisition Frame Rate (Fps)	
	Acquisition Frame Rate Control Enable	
	Resulting Frame Rate (Fps)	
	Reference Frame Rate	
	Trigger Selector	Section Set Trigger Source
	Trigger Mode	
	Trigger Software	

Attribute	Parameters	Section
	Trigger Source	
	Trigger Activation	
	Trigger Delay (μ s)	
	Trigger Cache Enable	
	Sensor Shutter Mode	Section Sensor Shutter Mode
	Exposure Time Mode	Section Set 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 Reset	
	HDR Number	
	HDR Selector	
	HDR Shutter (μ s)	
	HDR Gain	
	HDR Balance Ratio R	
	HDR Balance Ratio G	
HDR Balance Ratio B		
Analog Control	Preamp Gain	Section Set Analog Gain
	Gain	
	Gain Auto	
	Auto Gain Lower Limit	
	Auto Gain Upper Limit	
	Digital Shift	Section Set Digital Gain
	Digital Shift Enable	
	Brightness	Section Set Brightness

Attribute	Parameters	Section
	Black Level	Section Set Black Level
	Black Level Enable	
	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	
	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	Color Transformation Selector	Section Set Color Transformation Control
	Color Transformation Enable	
	Color Transformation Value Selector	
	Color Transformation Value	
	Hue	Section Set Hue
	Hue Enable	
	Saturation	Section Set Saturation
	Saturation Enable	
LUT Control	LUT Selector	Section Set LUT
	LUT Enable	
	LUT Index	
	LUT Value	

Attribute	Parameters	Section
	LUT Save	
Shading Correction	Shading Selector	Section Set Shading Correction
	Activate Shading	
	FFC Enable	
	PRNUC Enable	
	NUC Enable	
	FPNC Enable	
	LSC Enable	
	LSC Table Selector	
	LSC Target Enable	
	LSC Target R	
	LSC Target G	
	LSC Target B	
	LSC Sequencer Enable	
	LSC Sequencer Reset	
	LSC Sequencer Number	
	LSC Sequencer Manual Enable	
LSC Sequencer Selector		
LSC Sequencer Table		
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)	
	Strobe Line Pre Delay (μ s)	

Attribute	Parameters	Section
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	
File Access Control	File Selector	Section File Access Control
	File Operation Selector	
	File Operation Execute	
	File Open Mode	
	File Operation Status	
	File Operation Result	
	File Size(B)	
Transport Layer Control	Payload Size	Section Transport Layer Control
	Device Tap Geometry	
	GenCP Version Major	
	GenCP Version Minor	
	Image1StreamID	
	Image2StreamID	
User Set Control	User Set Current	Section User Set Customization
	User Set Selector	
	User Set Load	
	User Set Save	
	User Set Default	
CoaXPress	Device Connection ID	Section CoaXPress Parameters
	Main Host Connection ID	
	Control Packet Max Size	
	Device Steam Max Size	
	LinkConfiguration	
	LinkConfigurationPreferred	

Attribute	Parameters	Section
	ConnectionTestMode	
	TestErrorCountSelector	
	TestErrorCount	
	TestPacketCountTx	
	TestPacketCountRx	

Appendix B Revision History

Table Appendix B-1 Revision History

Version	Document No.	Revision Date	Revision Details
V2.2.0	UD32244B	Feb. 17, 2023	<ul style="list-style-type: none"> ● Modify Appearance. ● Add Section Set FTO Mode.
V2.1.0	UD29923B	Aug. 25, 2022	<ul style="list-style-type: none"> ● Modify Safety Instructions. ● Modify Appearance. ● Modify Indicator Description.
V2.0.9	UD26060B	Nov. 1, 2021	<ul style="list-style-type: none"> ● Modify Section Set HDR. ● Modify Section LSC Correction.
V2.0.8	UD24053B	Aug. 10, 2021	<ul style="list-style-type: none"> ● Modify Section Appearance. ● Modify Section Interface and Indicator. ● Modify Section Install MVS Client Software. ● Add Section Connect Device to MVS Client Software. ● Add Section Sensor Shutter Mode. ● Modify Section Set Shading Correction. ● Modify Section Device Control. ● Add Section File Access Control. ● Modify Update Firmware.
V2.0.3	UD22073B	Nov. 20, 2020	<ul style="list-style-type: none"> ● Modify Section Appearance. ● Modify Section Interface and Indicator. ● Modify Section Installation Preparation. ● Modify Section Set External Trigger Source. ● Add Section Set Free Trigger. ● Modify Section Set Trigger Activation. ● Modify Section Enable Strobe Signal. ● Modify Section Set Pixel Format. ● Modify Section Set Test Pattern.
V1.1.1	UD17793B	Dec. 17, 2019	Original version.



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