Hikrobot Co., Ltd.

CoaXPress-6 Frame Grabber

User Manual

HIKROBOT

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

Available Model

This manual is applicable to the CoaXPress-6 frame grabber.

Contact Information

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Contents

Chapter 1 Safety Instruction

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

1.1 Safety Claim

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

1.2 Safety Instruction

⚠**Caution**:

- Do not install the device if it is found that the device and accessories are damaged, rusted, water ingress, incorrect model, missing parts, etc. when unpacking.
- Avoid storing and transporting the device in places where have water splashing and rain, direct sunlight, strong electric fields, strong magnetic fields, strong vibrations, etc.
- Avoid dropping, smashing, or vigorously vibrating the device and components during handling.
- Do not touch the electronic components of the device with bare hands, which may cause damage to the device due to ESD.
- When installing the device, it needs to be installed by professionals under the condition of electrostatic protection. The PCB should not be exposed after the device is installed.
- It is forbidden to install the indoor device in an environment where it may be exposed to water or other liquids. If the device is damp, it may cause fire and electric shock hazard.
- Place the device in a place out of direct sunlight and ventilation, away from heat sources such as heaters and radiators.
- When the device is installed in a cabinet or terminal equipment, the cabinet or terminal equipment shall be provided with corresponding protective devices such as fireproof enclosures, electrical protective enclosures and mechanical protective enclosures, and

the protection level shall comply with IEC standards and local laws and regulations.
- In the use of the device, you must be in strict compliance with the electrical safety regulations of the nation and region.
- Make sure that the power consumption of ATX meets that of the device. For the specific power consumption of the device, please refer to the device's specifications.
- If the device emits smoke, odor or noise, please turn off the power and unplug the power cord immediately, and contact the dealer or service center in time.
- If the device is not working properly, contact the store or the nearest service center. Do not disassemble or modify the device in any way. (The company does not bear any liability for any problem arising from unauthorized modification or maintenance).
- Please dispose of the device in strict accordance with the relevant national or regional regulations and standards to avoid environmental pollution and property damage.

Note:

- Check whether the device's package is in good condition, whether there is damage, intrusion, moisture, deformation, etc. before unpacking.
- Check the surface of the device and accessories for damage, rust, bumps, etc. when unpacking.
- Check whether the quantity and information of the device and accessories are complete after unpacking.
- Store and transport the device according to the storage and transport conditions of the device, and the storage temperature and humidity should meet the requirements.
- It is strictly prohibited to transport the device in combination with items that may affect or damage the device.
- Please read the manual and safety instructions carefully before installing the device.
- The device must not be exposed to water droplets or splashes, and it is strictly prohibited to place anything containing liquids (such as vases) on the device.
- The device should not be placed with exposed flame sources, such as lighted candles.
- Do not touch sharp edges of the device.
- Quality requirements for installation and maintenance personnel:
  - Qualification certificate or working experience in weak current system installation and maintenance, and relevant working experience and qualifications. Besides, the personnel must possess the following knowledge and operation skills.
  - The basic knowledge and operation skills of low voltage wiring and low voltage electronic circuit connection.
  - The ability to comprehend the contents of this manual.

1.3 Electromagnetic Interference Prevention

- Make sure that the shielding layer of cables is intact and 360° connected to the metal connector when using shielded cables.
- Do not route the device together with other equipment (especially servo motors, high-power devices, etc.), and control the distance between cables to more than 10 cm. Make sure to shield the cables if unavoidable.

- The control cable of the device and the power cable of the industrial light source must be wired separately to avoid bundled wiring.
- The power cable, data cable, signal cable, etc. of the device must be wired separately. Make sure to ground them if the wiring groove is used to separate the wiring and the wiring groove is metal.
- During the wiring process, evaluate the wiring space reasonably, and do not pull the cables hard, so as not to damage the electrical performance of the cables.
- The unused cables of the device must be insulated.
- To avoid the accumulation of static electricity, ensure that other equipment (such as machines, internal components, etc.) and metal brackets on site are properly grounded.
- Make sure that the connector metal barrier of the device is well connected to the PC and other chassis, and if necessary, copper foil should be used to enhance the grounding effect.
- During the installation and use of the device, high voltage leakage must be avoided.
- Use a figure-eight bundle method if the device cable is too long.
- When connecting the device and metal accessories, they must be connected firmly to maintain good conductivity.

Chapter 2 Overview

2.1 Introduction

The CoaXPress-6 (or CXP-6 for short) frame grabber supports CXP-6 protocol. Its 1 to 8 DIN connectors can be connected to 1 to 8 camera(s), and each DIN connector can access to 6.25 Gbps data at most. The CXP-6 frame grabber can connect to the computer via the PCIe Gen2 × 8 bus or PCIe Gen3 × 8 bus and use bus-master DMA technology to transmit data, which hardly occupies CPU resources.

2.2 Key Feature

- Supports CXP-6 protocol and single channel can access to 6.25 Gbps data at most.
- Supports PoCXP and single channel can provide 13 W at most.
- Adopts bus indicator and stream indicator to display frame grabber status in real time.
- Adopts multiple I/O interfaces and integrates inputs and outputs.
- Provides SDK for secondary development.
- Comply with GenICam standard.

Note

Refer to the specification of the frame grabber for detailed parameters.

Chapter 3 Appearance, Connector, and Indicator

3.1 Appearance

Note

- The appearance of MV-GX1002 is essentially identical to that of MV-GX1004, differing only in the number of CoaXPress connector.
- The appearance of MV-GX1102 is essentially identical to that of MV-GX1104, differing only in the number of CoaXPress connector.
- Refer to the specification of the frame grabber for specific appearance and dimension.
- The appearance is subject to change, and the actual device you purchased shall prevail.
- The on-board indicator includes loading indicator and bus indicator.

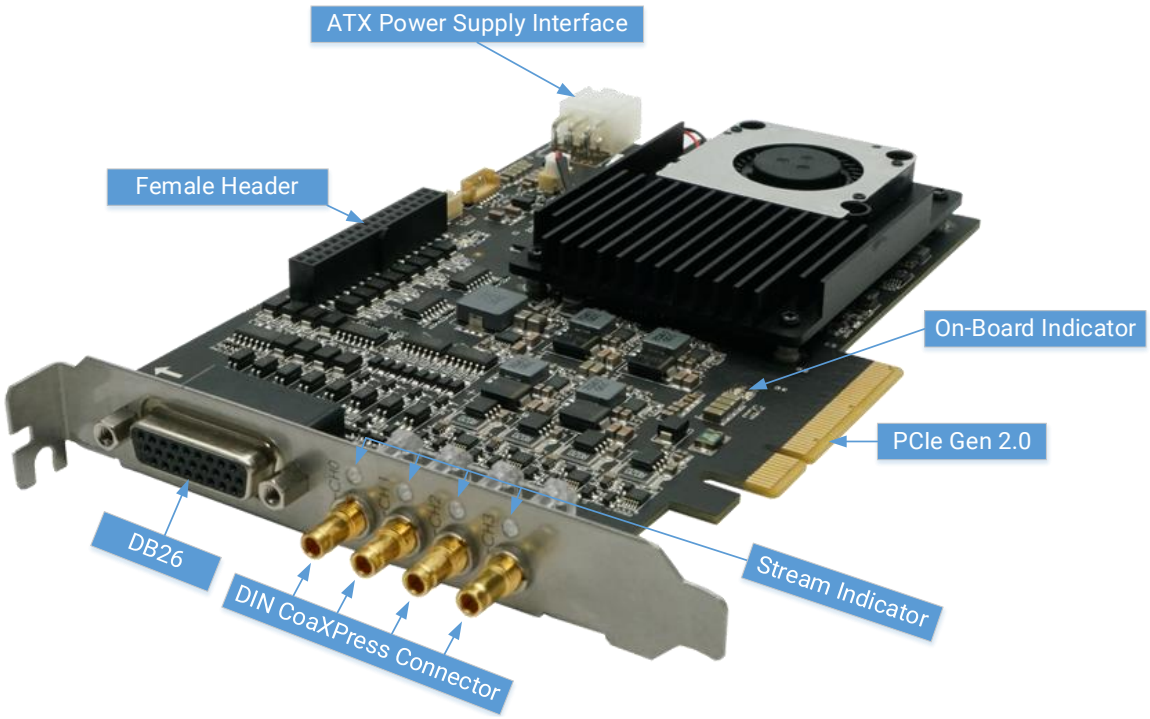

Figure 3-1 Appearance for MV-GX1004

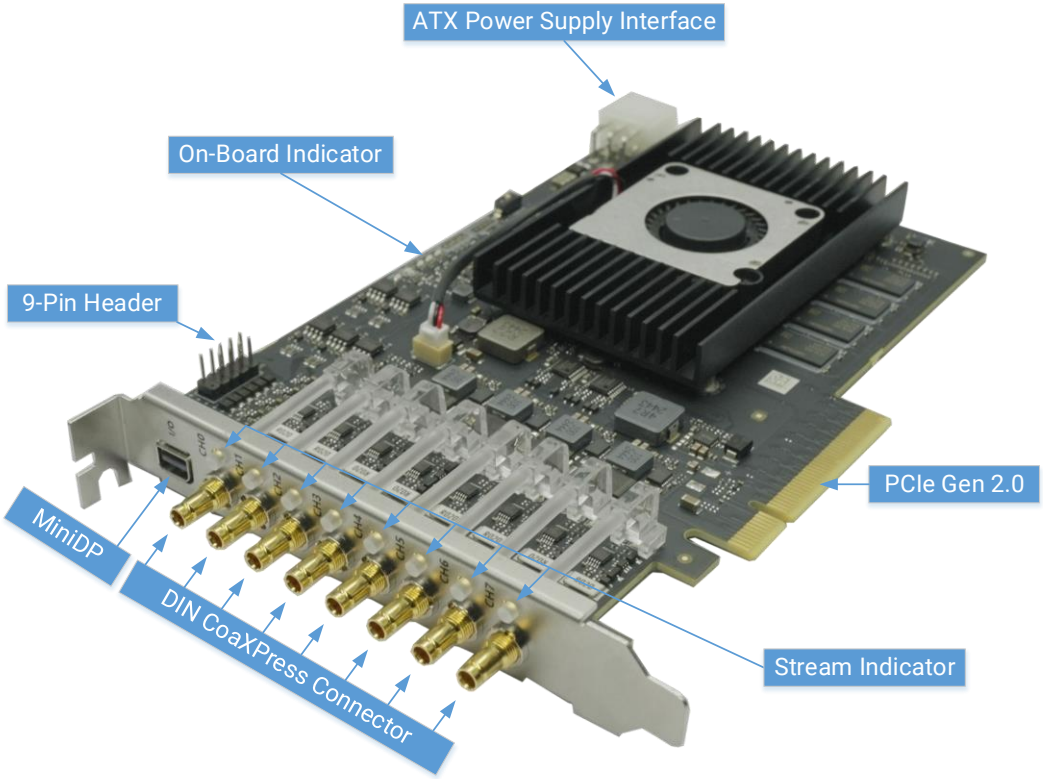

Figure 3-2 Appearance for MV-GX1008

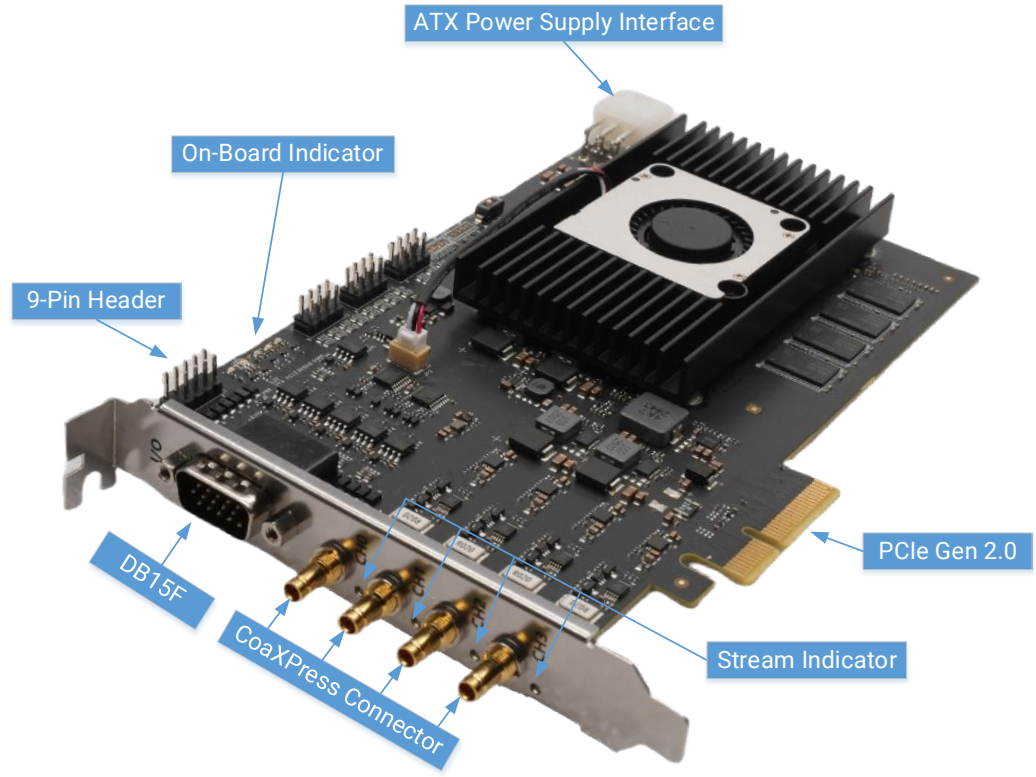

Figure 3-3 Appearance for MV-GX1104

3.2 ATX Power Supply Interface

The ATX power supply interface is used to power the PoCXP link. Make sure that the cable of 6-pin ATX 12V is inserted if the PoCXP function is used.

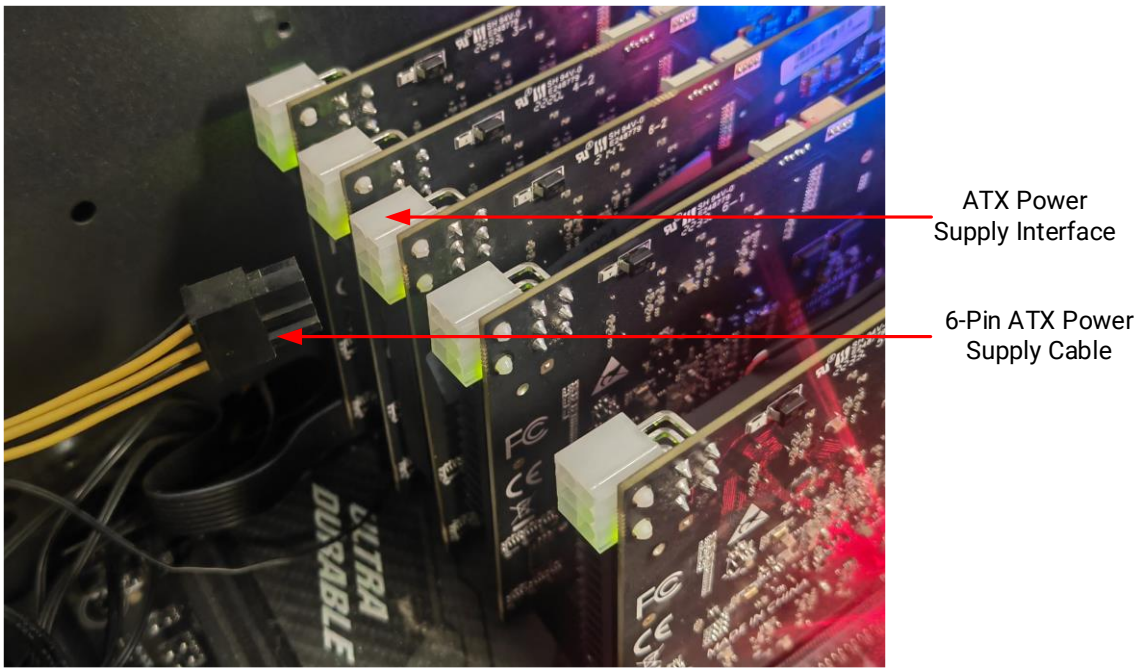

Figure 3-4 ATX Power Supply Interface

3.3 I/O Connector

The frame grabber has multiple I/O connectors that provide input and output signals, with the configuration of these connectors varying across different models.

3.3.1 MV-GX1002 and MV-GX1004

They adopt DB26 female socket and female header, and you can use I/O trigger cable 1 and I/O adapter cable to wire the device.

DB26 Female Socket

Refer to the figure and table below for the connector definition of the DB26 female socket.

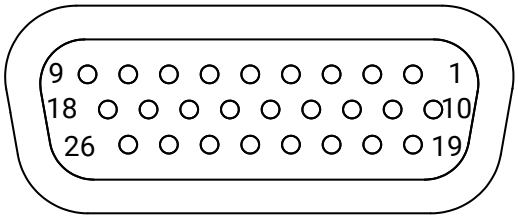

Figure 3-5 DB26 Female Socket

Note

The non-isolated I/O ground can be used as the signal ground of other signals apart from opto coupler input/output.

Table 3-1 Connector Definition of DB26 Female Socket

No.	Signal	Description	No.	Signal	Description
1	OPTO_IN0	Opto coupler input 0	14	TTL_OUTPUT0	TTL output 0
2	OPTO_IN1	Opto coupler input 1	15	TTL_OUTPUT1	TTL output 1
3	OPTO_IN2	Opto coupler input 2	16	TTL_OUTPUT2	TTL output 2
4	OPTO_IN3	Opto coupler input 3	17	TTL_OUTPUT3	TTL output 3
5	IN_COM	Opto coupler input ground	18	OUT_COM	Opto coupler output ground
6	OPTO_OUT0	Opto coupler output 0	19	GND	Non-isolated I/O ground
7	OPTO_OUT1	Opto coupler output 1	20	GND	Non-isolated I/O ground
8	OPTO_OUT2	Opto coupler output 2	21	TX422_0N	RS-422 output 0
9	OPTO_OUT3	Opto coupler output 3	22	TX422_0P	RS-422 output 0
10	TTL_INPUT0	TTL input 0	23	GND	Non-isolated I/O ground
11	TTL_INPUT1	TTL input 1	24	RX422_0N	RS-422 input 0
12	TTL_INPUT2	TTL input 2	25	RX422_0P	RS-422 input 0
13	TTL_INPUT3	TTL input 3	26	GND	Non-isolated I/O ground

I/O Trigger Cable 1

The two ends of the I/O trigger cable 1 are DB26 (male connector) and open to have 21 input and output signals. The DB26 (male connector) is connected to the DB26 female socket on

the frame grabber.

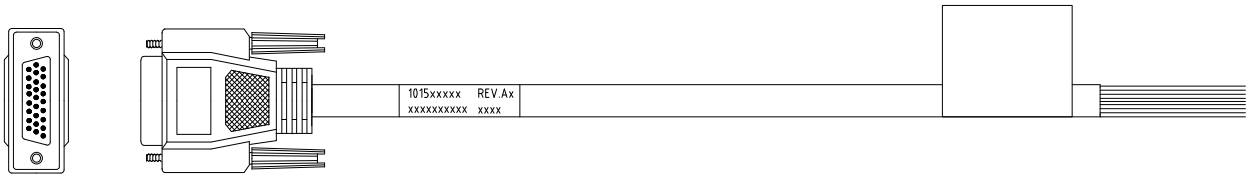

Figure 3-6 I/O Trigger Cable 1

Figure 3-7 Appearance of I/O Trigger Cable 1

Female Header

Refer to the figure and table below for the connector definition of the female header.

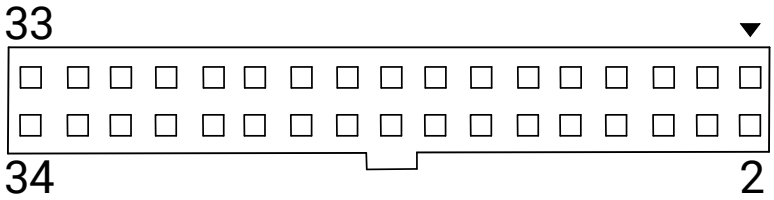

Figure 3-8 Female Header

Note

The non-isolated I/O ground can be used as the signal ground of other signals apart from opto coupler input/output.

Table 3-2 Connector Definition of Female Header

No.	Signal	Description	No.	Signal	Description
2	RX422_1P	RS-422 input 1	20	TX422_2P	RS-422 output 2
4	RX422_1N	RS-422 input 1	22	TX422_2N	RS-422 output 2
6	GND	Non-isolated I/O ground	24	GND	Non-isolated I/O ground
8	TX422_1P	RS-422 output 1	26	RX422_3P	RS-422 input 3

No.	Signal	Description	No.	Signal	Description
10	TX422_1N	RS-422 output 1	28	RX422_3N	RS-422 input 3
12	GND	Non-isolated I/O ground	30	GND	Non-isolated I/O ground
14	RX422_2P	RS-422 input 2	32	TX422_3P	RS-422 output 3
16	RX422_2N	RS-422 input 2	34	TX422_3N	RS-422 output 3
18	GND	Non-isolated I/O ground	/	/	/

I/O Adapter Cable

The I/O adapter cable connects the female header of the frame grabber at one end, and connects I/O trigger cable at the other to have 3 input and output signals.

Figure 3-9 I/O Adapter Cable

Figure 3-10 Appearance of I/O Adapter Cable

Table 3-3 Connector Definition of Female Header

DB26	Female Header	Signal	DB26	Female Header	Signal
1	2	RX422_1P	18	20	TX422_2P
2	4	RX422_1N	17	22	TX422_2N
3	6	GND	16	24	GND
4	8	TX422_1P	15	26	RX422_3P
5	10	TX422_1N	14	28	RX422_3N

DB26	Female Header	Signal	DB26	Female Header	Signal
6	12	GND	13	30	GND
7	14	RX422_2P	12	32	TX422_3P
8	16	RX422_2N	11	34	TX422_3N
9	18	GND	/	/	/

Note

I/O trigger cable 1 and I/O adapter cable are sold separately, and you should purchase them according to actual demands.

3.3.2 MV-GX1008

It adopts MiniDP and 9-pin header 1, and you can use I/O trigger cable 2 and I/O expansion bracket to wire the device.

MiniDP Connector

Refer to the figure and table below for the MiniDP connector definition.

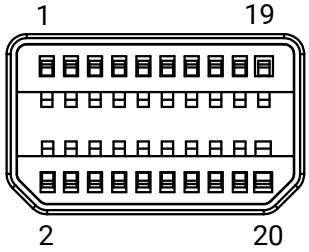

Figure 3-11 MiniDP Connector

Table 3-4 Pin Definition of MiniDP Connector

No.	Signal	Description	No.	Signal	Description
1	RS485_0P	Differential input/output IO0 positive	10	RS485_4P	Differential input/output IO4 positive
2	RS485_0N	Differential input/output IO0 negative.	12	RS485_4N	Differential input/output IO4 negative.
3	RS485_1P	Differential input/output IO1 positive	13	GND	Non-isolated I/O ground
5	RS485_1N	Differential input/output	14	GND	Non-isolated I/O ground

No.	Signal	Description	No.	Signal	Description
		IO1 negative.			
4	RS485_2P	Differential input/output IO2 positive	15	RS485_5P	Differential input/output IO5 positive
6	RS485_2N	Differential input/output IO2 negative.	17	RS485_5N	Differential input/output IO5 negative.
7	GND	Non-isolated I/O ground	16	RS485_6P	Differential input/output IO6 positive
8	GND	Non-isolated I/O ground	18	RS485_6N	Differential input/output IO6 negative.
9	RS485_3P	Differential input/output IO3 positive	19	RS485_7P	Differential input/output IO7 positive
11	RS485_3N	Differential input/output IO3 negative.	20	RS485_7N	Differential input/output IO7 negative.

I/O Trigger Cable 2

The two ends of the I/O trigger cable 2 are MiniDP and open to have 8 input and output signals. The MiniDP is connected to the MiniDP connector on the frame grabber.

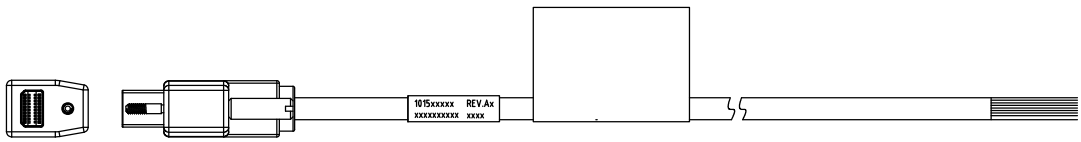

Figure 3-12 I/O Trigger Cable 2

Figure 3-13 Appearance of I/O Trigger Cable 2

9-Pin Header 1

Refer to the figure and table below for the definition of the 9-pin header 1.

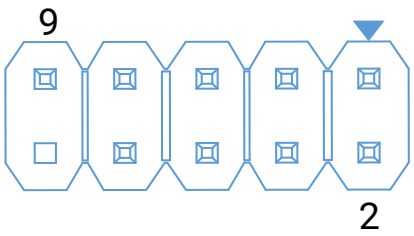

Figure 3-14 9-Pin Header 1

Table 3-5 Definition of 9-Pin Header 1

No.	Signal	Description	No.	Signal	Description
1	/	/	6	RS485_9P	Differential input/output IO9 positive
2	/	/	7	RS485_9N	Differential input/output IO9 negative.
3	RS485_8P	Differential input/output IO8 positive	8	RS485_10P	Differential input/output IO10 positive
4	RS485_8N	Differential input/output IO8 negative.	9	RS485_10N	Differential input/output IO10 negative.
5	GND	Non-isolated I/O ground	/	/	/

I/O Expansion Bracket

The I/O expansion bracket connects the 9-pin header of the frame grabber at one end, and it is secured to the PC and connects the I/O trigger cable 4, to have 3 input and output signals.

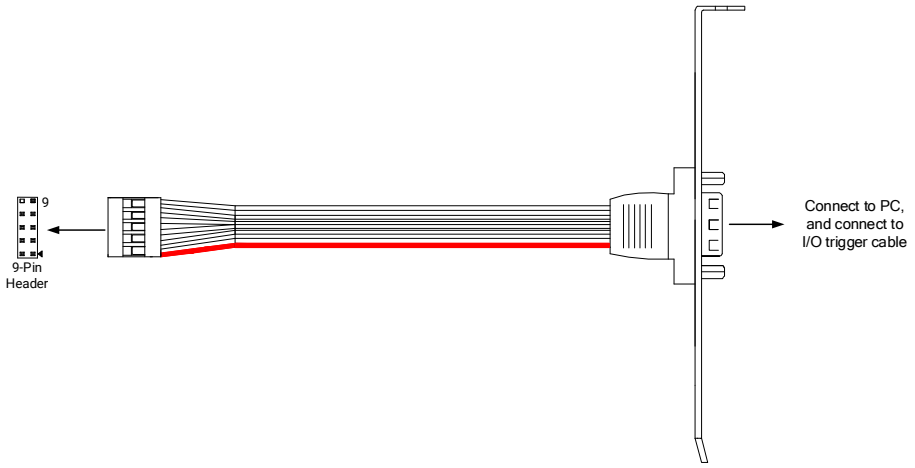

Figure 3-15 I/O Expansion Bracket

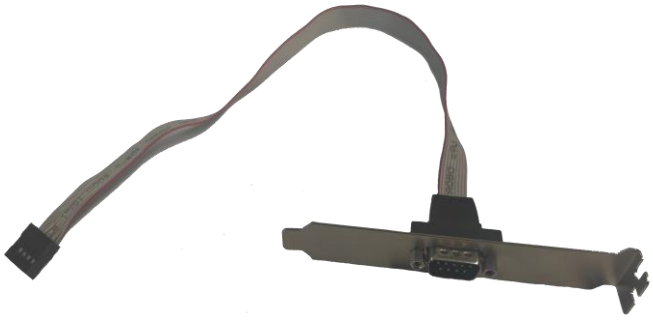

Figure 3-16 Appearance of I/O Expansion Bracket

I/O Trigger Cable 4

The two ends of the I/O trigger cable 4 are DB9F and open to have 3 input and output signals. The DB9F is connected to the I/O expansion bracket above.

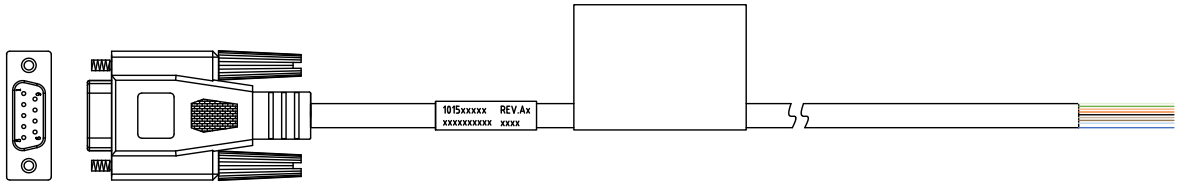

Figure 3-17 I/O Trigger Cable 4

Figure 3-18 Appearance of I/O Trigger Cable 4

Note

I/O trigger cables and I/O expansion bracket above are sold separately, and you should purchase them according to actual demands.

3.3.3 MV-GX1102 and MV-GX1104

They adopt DB15F and 9-pin header 2, and you can use I/O trigger cable 4 and I/O expansion bracket to wire the device.

DB15F Connector

Refer to the figure and table below for the connector definition of the DB15F connector.

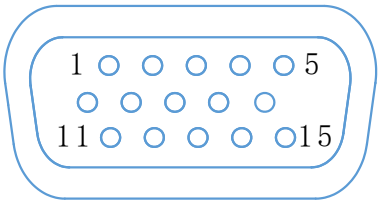

Figure 3-19 DB15F Connector

Table 3-6 Connector Definition of DB15F Connector

No.	Signal	Description	No.	Signal	Description
5	LINE_0P	Differential input/output IO0 positive	1	LINE_4P	Differential input/output IO4 positive
10	LINE_0P	Differential input/output IO0 positive	6	LINE_4N	Differential input/output IO4 negative
4	LINE_1P	Differential input/output IO1 positive	15	LINE_5P	Differential input/output IO5 positive
9	LINE_1N	Differential input/output IO1 negative	14	LINE_5N	Differential input/output IO5 negative
3	LINE_2P	Differential input/output IO0 positive	13	LINE_6P	Differential input/output IO6 positive
8	LINE_2N	Differential input/output IO2 negative	12	LINE_6N	Differential input/output IO6 negative
2	LINE_3P	Differential input/output IO3 positive	11	GND	Non-isolated I/O ground
7	LINE_3N	Differential input/output IO3 negative	/	/	/

I/O Trigger Cable 3

The two ends of the I/O trigger cable 3 are DB15M and open to have 7 input and output signals. The DB15M is connected to the DB15F on the frame grabber.

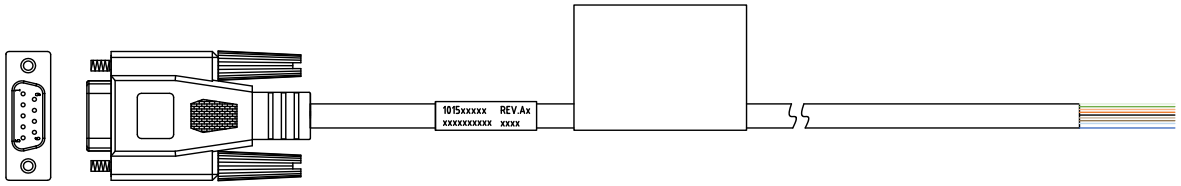

Figure 3-20 I/O Trigger Cable 3

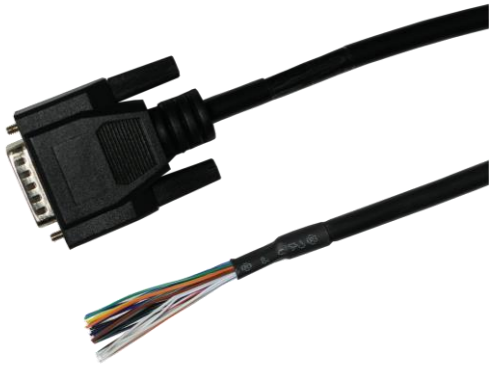

Figure 3-21 Appearance of I/O Trigger Cable 3

9-Pin Header 2

Refer to the figure and table below for the definition of the 9-pin header 2.

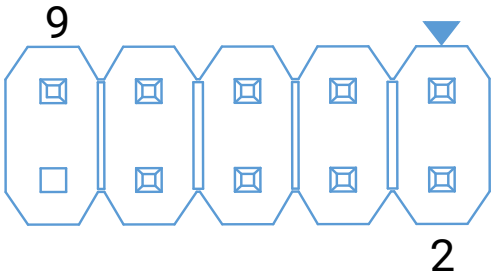

Figure 3-22 9-Pin Header 2

Table 3-7 Definition of 9-Pin Header 2

No.	Signal	Description	No.	Signal	Description
1	LINE_7P	Differential input/output IO7 positive	6	LINE_9P	Differential input/output IO9 positive
2	LINE_7N	Differential input/output IO7 negative.	7	LINE_9N	Differential input/output IO9 negative.
3	LINE_8P	Differential input/output IO8 positive	8	LINE_10P	Differential input/output IO10 positive
4	LINE_8N	Differential input/output IO8 negative.	9	LINE_10N	Differential input/output IO10 negative.
5	GND	Non-isolated I/O ground	/	/	/

I/O Expansion Bracket

The I/O expansion bracket connects the 9-pin header 2 of the frame grabber at one end, and it is secured to the PC and connects the I/O trigger cable 4 to have 4 input and output signals.

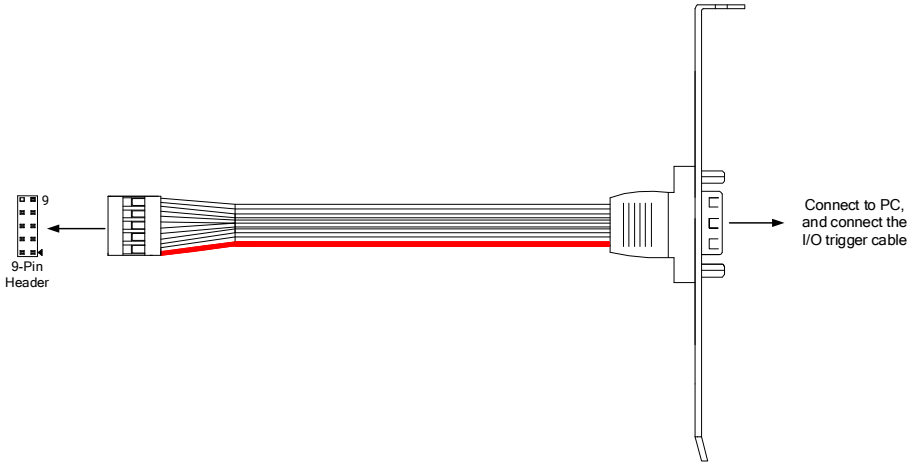

Figure 3-23 I/O Expansion Bracket

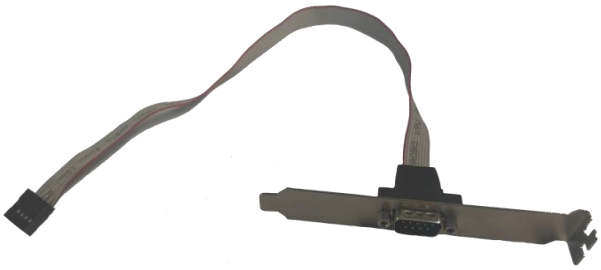

Figure 3-24 Appearance of I/O Expansion Bracket

I/O Trigger Cable 4

The two ends of the I/O trigger cable 4 are DB9F and open to have 4 input and output signals. The DB9F is connected to the I/O expansion bracket.

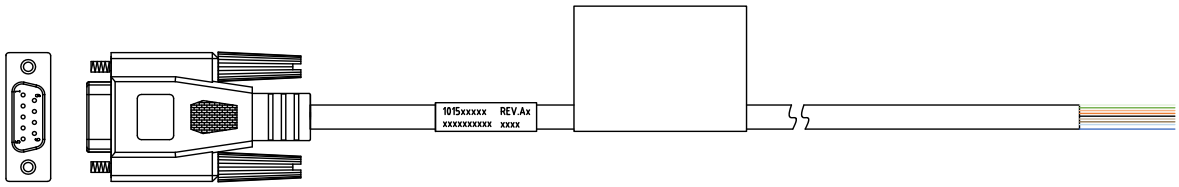

Figure 3-25 I/O Trigger Cable 4

Figure 3-26 Appearance of I/O Trigger Cable 4

Table 3-8 Pin Definition of Open End

No.	Cable Color	Signal	No.	Cable Color	Signal
1	White/Green	LINE_0P	6	White/Brown	LINE_2P
2	Green	LINE_0N	7	Brown	LINE_2N
3	White/Orange	LINE_1P	8	White/Blue	LINE_3P
4	Orange	LINE_1N	9	Blue	LINE_3N
5	Black	GND			

Note

I/O trigger cable and I/O expansion bracket are sold separately, and you should purchase them according to actual demands.

3.4 DIN CoaXPress Connector

The frame grabber has 2 to 8 DIN CoaXPress connectors (CH0 to CH7). Refer to the figure below for the four DIN CoaXPress connectors.
The connectors are used to connect 2 to 8 CoaXPress links. Take MV-GX1004 as an example, the CXP-6 connector near the PCIe slot is CH 3, and the CXP-6 connector far from the PCIe slot is CH 0. PoCXP is supported.

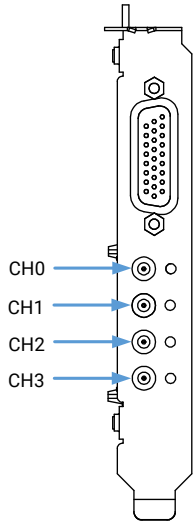

Figure 3-27 DIN CoaXPress Connector

3.5 PCIe Connector

The frame grabber has a PCIe2.0 or PCIe3.0 connector in x8 mode, which can be connected to the host. When in use, the PCIe2.0 or PCIe3.0 connector of the frame grabber can be inserted into the X8 or X16 slots of the host, as shown below.

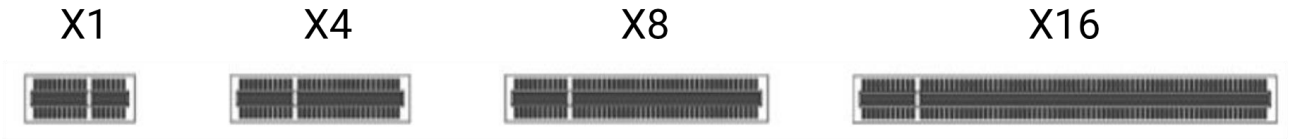

Figure 3-28 PCIe2.0 Connector

Note

Refer to the datasheet of the corresponding product for the supported PCIe connector.

3.6 Indicators

The frame grabber provides feedback on various information and status through indicators, and the indicators may vary depending on the model.

3.6.1 MV-GX1002 and MV-GX1004

The frame grabber has 2 types of indicators, including stream indictor and on-board indictor.

Note

- The indicator status may differ by device models, and actual devices you purchased shall prevail.
- When the indicator is flashing rapidly and flashing slowly, its unlit interval is 0.2 sec and 1 sec respectively.

Refer to the table below for indicator definition.

Table 3-9 Indicator Definition

Status	Description
Flashing Rapidly	The indicator turns on for 20 ms, and then turns off for 60 ms.
Flashing Slowly	The indicator turns on for 1 second, and then turns off for 1 second.
Slow Alternating Flash	The indicator turns on for 100 ms, and then turns off for 100 ms.
Slow Pulsing Flash	The indicator turns on for 200 ms, and then turns off for 800 ms.

Stream Indicator

There are 2 to 4 stream indicators used to indicate the status of 2 to 4 DIN CoaXPress connectors. Refer to the tables below for details.

Table 3-10 Stream Indicator Description

No.	Indicator Color	Status	Device Status Description
1	N/A	Unlit	The frame grabber is powered off.
2	Red	Slow Pulsing Flash	The frame grabber is powered on, but the device is not connected.
3	Green	Solid	The frame grabber and the device are connected, but there is no data for transmission.
4	Green	Flashing rapidly	The frame grabber and the device are connected, and there is data being transmitted.
5	Orange	Flashing rapidly	Device connection test is ongoing when the PoCXP is disabled.
6	Green and Orange	Rapid Alternating Flash	Device connection test is ongoing when the PoCXP is enabled.

No.	Indicator Color	Status	Device Status Description
7	Green and Orange	Slow Alternating Flash	The test data package is being sent.

On-Board Indicator

The on-board indicator includes loading indicator and bus indicator.

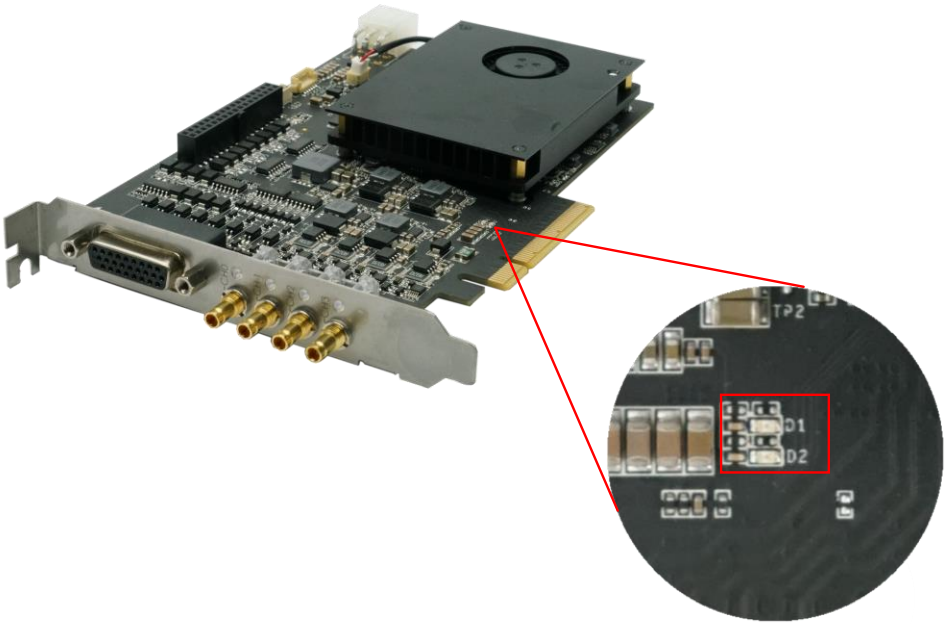

Figure 3-29 On-Board Indicator

- **Loading Indicator**

Loading indicator (D1) is used to indicate whether the frame grabber is loaded normally.

Table 3-11 Loading Indicator Description

Status	Description
Flashing Slowly and Alternately	The frame grabber is loaded.
Unlit	The frame grabber is not loaded.

- **Bus Indicator**

Bus indicator (D2) is used to indicate whether the host's PCIe identifies the frame grabber.

Table 3-12 Bus Indicator Description

Status	Description
Solid	The PCIe identifies the frame grabber.
Unlit	The PCIe does not identify the frame grabber.

3.6.2 MV-GX1008 Model and MV-GX1100 Series

The MV-GX1008, MV-GX1102, and MV-GX1104 frame grabbers have 2 types of indicators, including stream indictor and on-board indictor.

Note

- When the indicator is flashing rapidly and flashing slowly, its unlit interval is 0.2 sec and 1 sec respectively.

Refer to the table below for indicator definition.

Table 3-13 Indicator Definition

Status	Description
Flashing Rapidly	The indicator turns on for 20 ms, and then turns off for 60 ms.
Flashing Slowly	The indicator turns on for 1 second, and then turns off for 1 second.

Stream Indicator

There are multiple stream indicators used to indicate the status of corresponding DIN CoaXPress connectors. Refer to the tables below for details.

Table 3-14 Stream Indicator Description

No.	Indicator Color	Status	Device Status Description
1	N/A	Unlit	The frame grabber is powered off.
2	Red	Slow Flash	The frame grabber is powered on, but the device is not connected.
3	Green	Solid	The frame grabber and the device are connected, but there is no data for transmission.
4	Green	Flashing rapidly	The frame grabber and the device are connected, and there is data being transmitted.

On-Board Indicator

The on-board indicator includes loading indicator, power supply indicator, bus indicator, debug indicator, and status indicator.

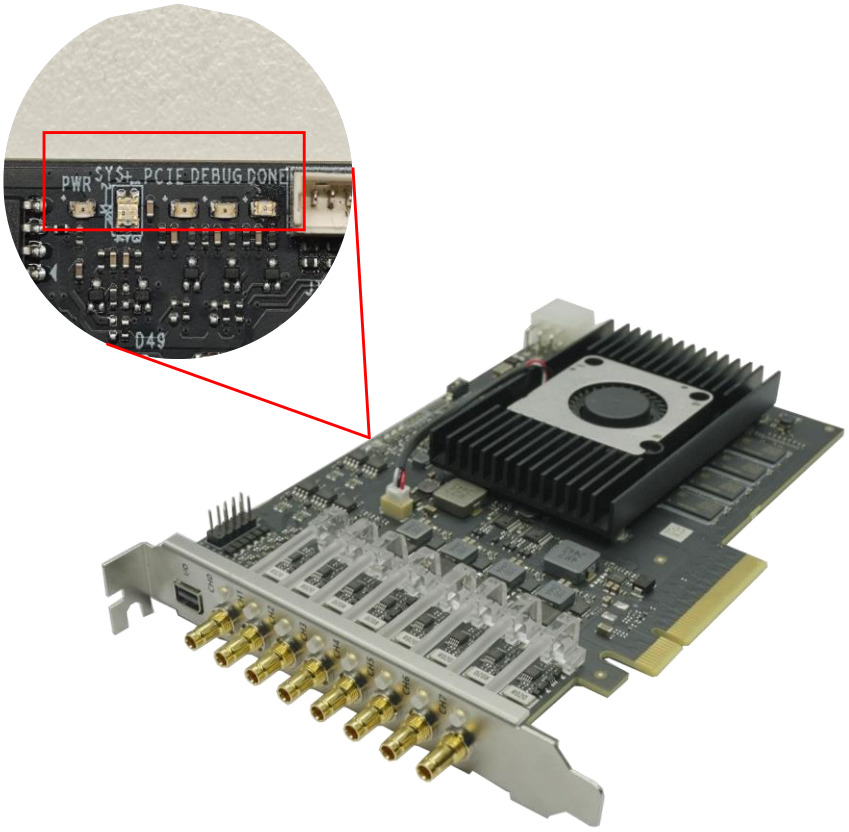

Figure 3-30 On-Board Indicator of MV-GX1008

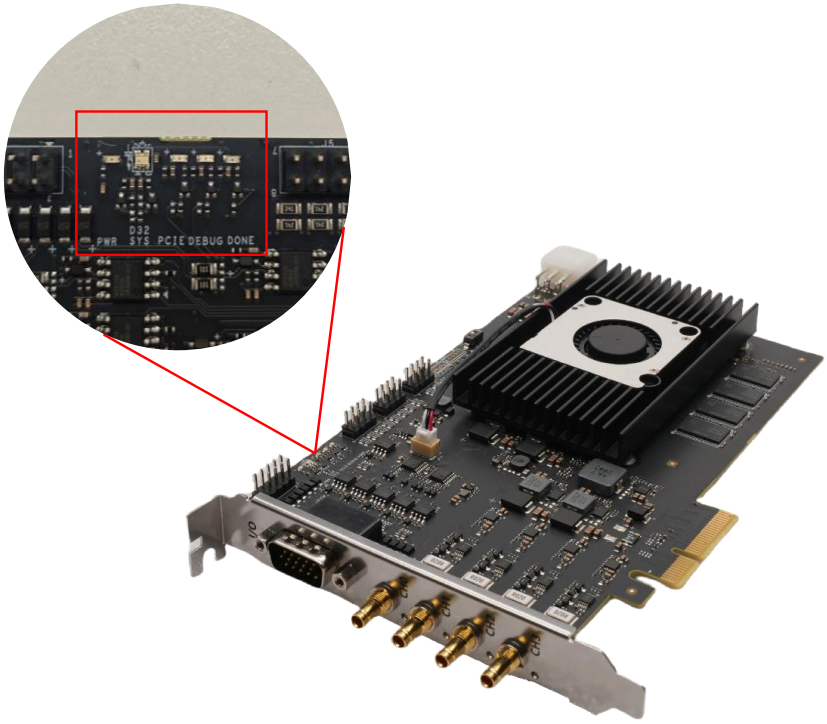

Figure 3-31 On-Board Indicator of MV-GX1104

- **Loading Indicator**

Loading indicator (DONE) is used to indicate whether the frame grabber is loaded normally.

Table 3-15 Loading Indicator Description

Status	Description
Solid Green	The frame grabber is loaded.
Unlit	The frame grabber is not loaded.

- **Power Supply Indicator**

Power supply indicator (PWR) is used to indicate whether the frame grabber is powered on properly.

Table 3-16 Power Supply Indicator Description

Status	Description
Solid Green	The frame grabber is powered on properly.
Unlit	The frame grabber is not powered on properly.

- **Bus Indicator**

Bus indicator (PCIE) is used to indicate whether the host's PCIe identifies the frame grabber.

Table 3-17 Bus Indicator Description

Status	Description
Solid Green	The PCIe identifies the frame grabber.
Unlit	The PCIe does not identify the frame grabber.

- **Debug Indicator**

Debug indicator (DEBUG) is used to indicate whether the frame grabber memory is initialized.

Table 3-18 Debug Indicator Description

Status	Description
Solid Green	The frame grabber memory is initialized.
Unlit	The frame grabber memory is not initialized.

- **Status Indicator**

Status indicator (SYS) is used to indicate whether the frame grabber is working normally. The indicator is solid green or flashing red, which means the frame grabber is working normally.

Chapter 4 Installation

4.1 Installation Preparation

Table 4-1 Installation Preparation

Category	Name	Description
Software	MVS Client Software	It is used to enumerate and set the frame grabber's parameters.
	MVS Tool Kit	It is used to provide tool kit for you to finish the frame grabber's function configuration.
Hardware	DIN CoaXPress Cable	It is used to connect the frame grabber and cameras.
	I/O Adapter Cable	It is used to connect the frame grabber via I/O connector to other external devices.
API Function Library	SDK	It is used for the secondary development.
Drive Package	MVFG_DRIVER_..._GX1002/4_... .zip	It is used to update the frame grabber's firmware to match the SDK. There are two versions. ● 2-stream version: It can connect to 1 camera and support up to 4 links with each DIN connector accessing up to 6.25 Gbps data transfer speed, and connect to 2 cameras with each camera supporting up to 2 links and each DIN connector accessing up to 6.25 Gbps data transfer speed. ● 4-stream version: It can connect to 4 cameras at most, with each camera supporting up to 1 link and accessing up to 6.25 Gbps data transfer speed.
	MVFG_DRIVER_..._GX1008_... .zip	It is used to update the frame grabber's firmware to match the SDK. There are two versions. ● 4-stream version: It can connect to 4 cameras at most, with each camera supporting up to 4 links and each DIN connector accessing up to 6.25 Gbps data transfer speed. ● 8-stream version: It can connect to 8 cameras at most, with each camera supporting up to 2 links and each DIN connector accessing up to 6.25 Gbps data transfer speed.

4.2 Install Frame Grabber

Before You Start

- Before installing the frame grabber, make sure that the computer is powered off.
- Before installing the frame grabber, please remove static electricity from your body via touching a grounded metal object.

Steps

1. Insert the frame grabber into the computer's PCIe2.0 × 8 slot or above.
2. Use screws to fix the frame grabber with the computer.
3. Use the cable of 6-pin ATX to connect the frame grabber’s ATX power supply interface to the computer if the PoCXP function is used.
4. Connect one or more cameras to the frame grabber according to actual demands.

Here we list some common wirings, and you can wire the camera and the frame grabber according to actual demands.

Note

The images below are for reference only.

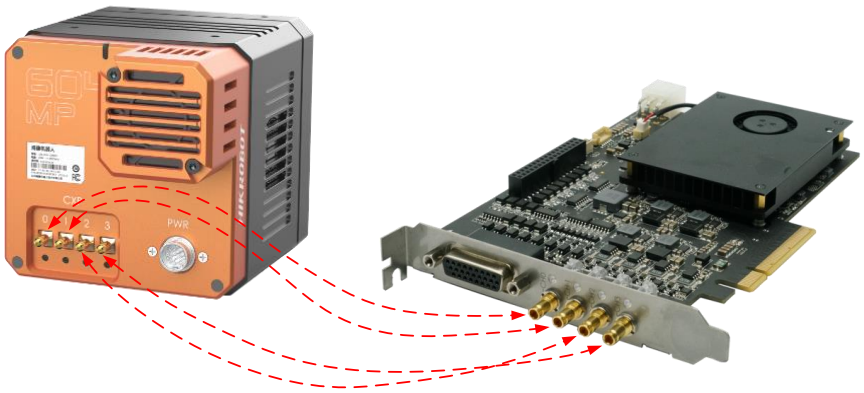

Figure 4-1 Wiring of One Camera

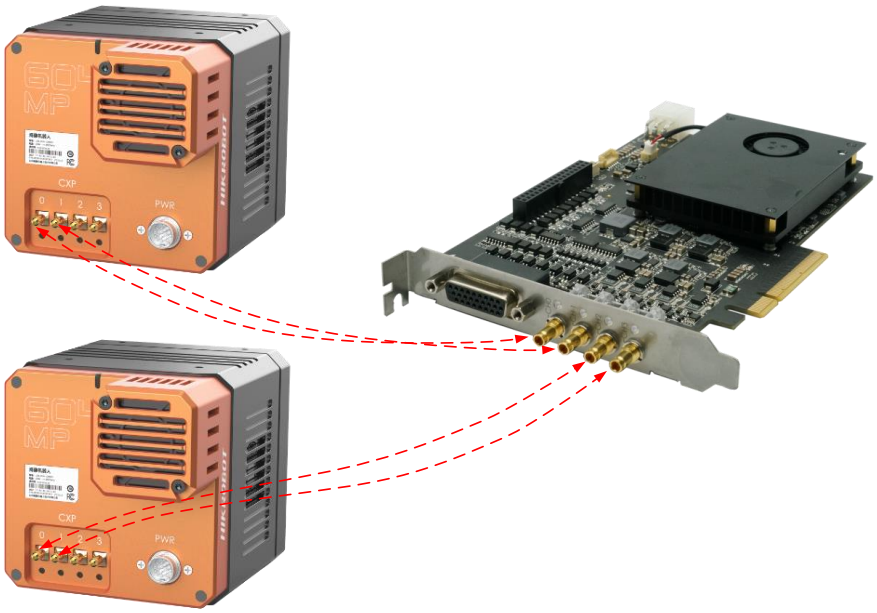

Figure 4-2 Wiring of Two Cameras

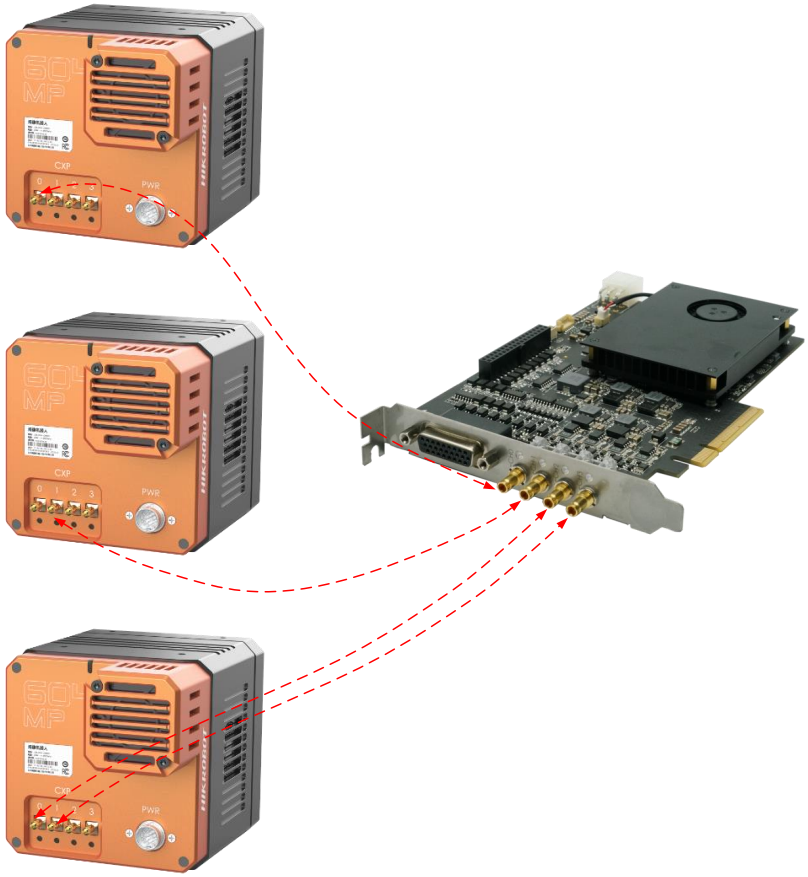

Figure 4-3 Wiring of Three Cameras

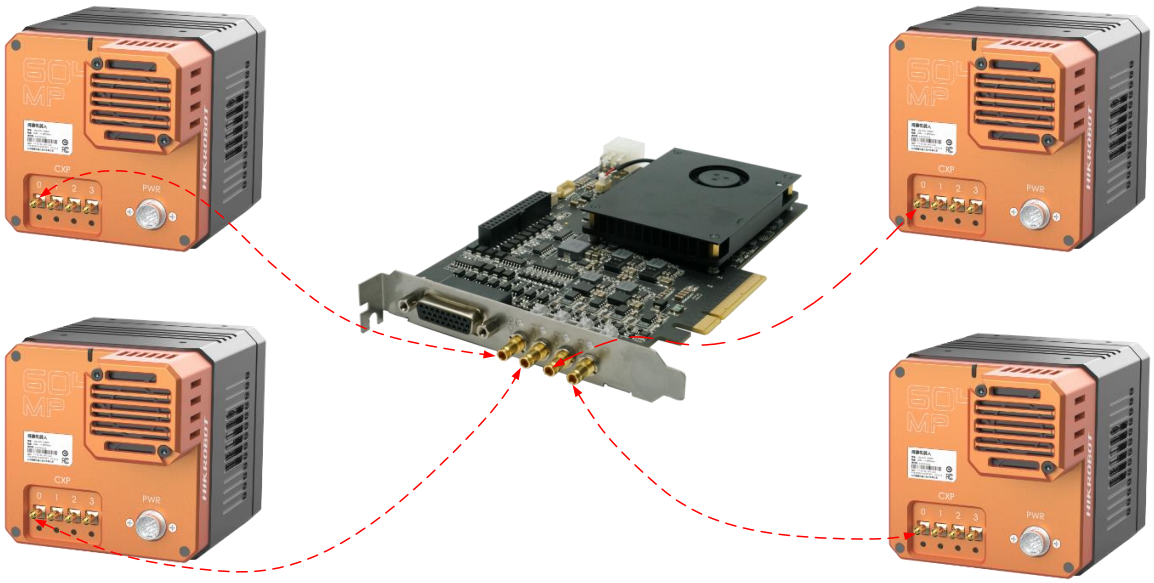

Figure 4-4 Wiring of Four Cameras

4.3 Install Client Software

MVS client software is used to connect and set frame grabber parameters, etc.

Steps

Note

- The MVS client software is compatible with 32/64-bit Windows 7/10, 64-bit Windows 11, and 64-bit Linux operating system. Here we take Windows as an example.
- Make sure that the MVS is closed before installing or updating it.
- The graphic user interface may differ by versions of the client software you use.
- You can download the client software and SDK from ***en.hikrobotics.com***.
- The client integrates the required drivers for the frame grabber, so there is no need to download and install other drivers.

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

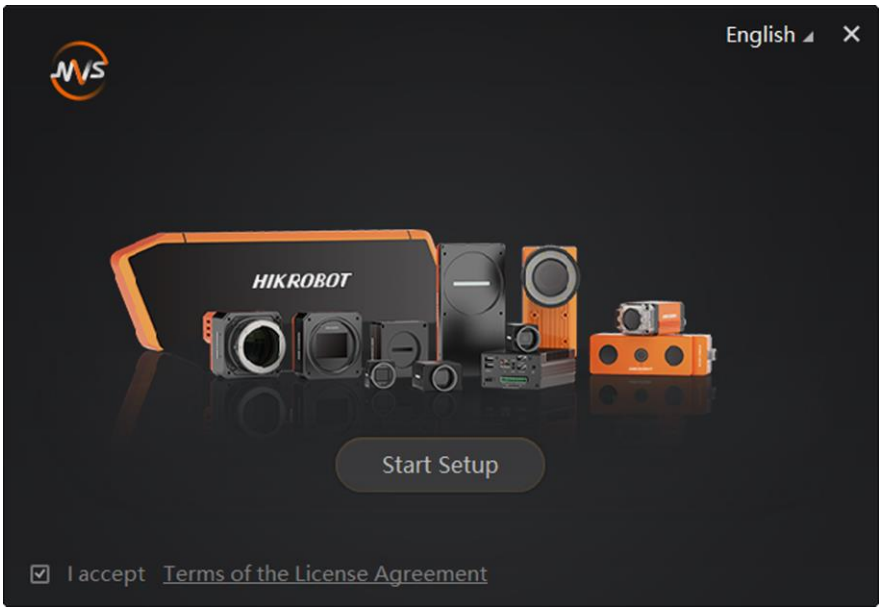

Figure 4-5 Installation Interface

4. Click **Start Setup**.

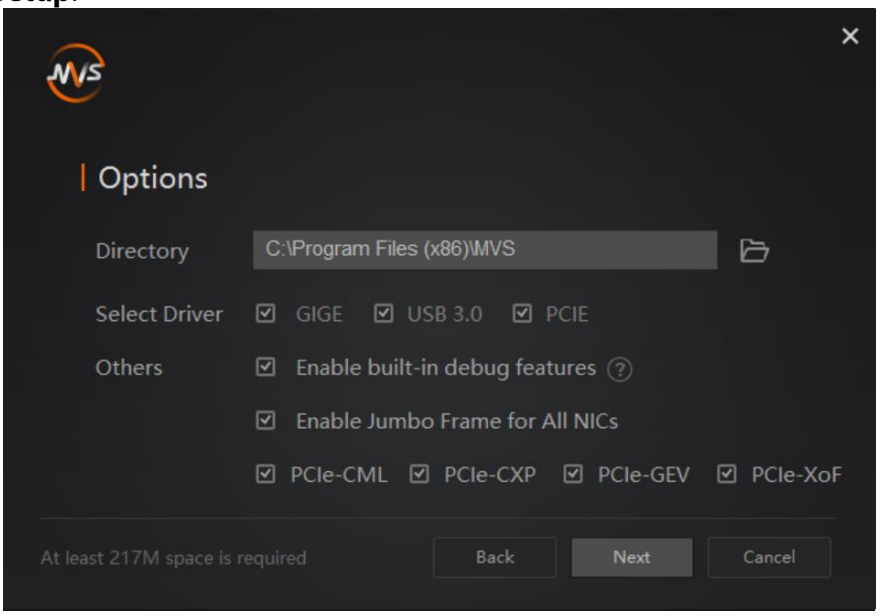

Figure 4-6 Default Settings

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

Chapter 5 Basic Operation of Client Software

5.1 Connect Frame Grabber to Client Software

Steps

Note

Refer to the user manual of the camera and client software for detailed camera operation.

1. Run the MVS software.
2. Click  in the PCIe, and the client software will enumerate the frame grabber automatically.
3. Click  in the specific frame grabber name to connect it.

Note

Refer to the camera's user manual and MVS's user manual for detailed camera operation.

5.2 Client Software Layout

The main window of the MVS client software is displayed after you connect a frame grabber to it.

Note

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

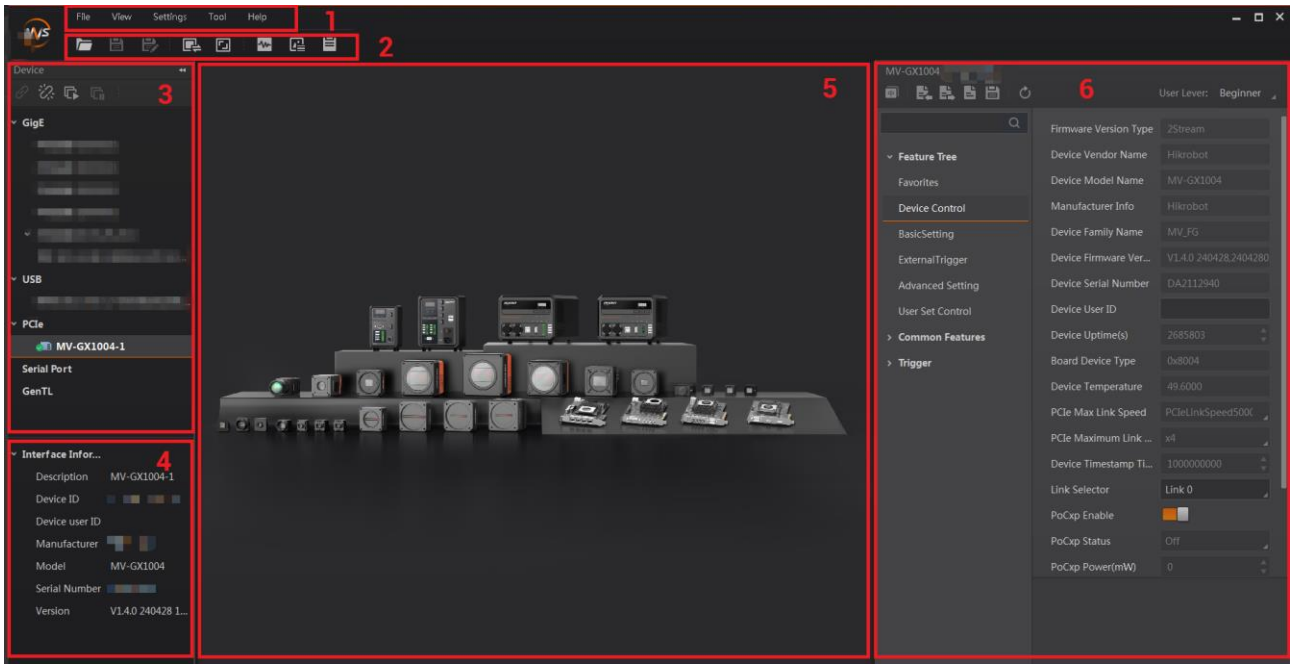

Figure 5-1 Main Window

Table 5-1 Main Window Description

No.	Area Name	Description
1	Menu Bar	The menu bar displays function modules, including **File**, **View**, **Settings**, **Tool**, and **Help**.
2	Control Toolbar	The control toolbar provides quick operations for the device.
3	Device List Panel	This panel displays device list, and you can connect or disconnect device, etc.
4	Device Information Panel	This panel displays the detailed device information.
5	Display Window	This area displays the acquisition images in real time. You can click different icons to capture and save image, record, etc.
6	Feature Panel	You can view and set features of the selected device.

Table 5-2 Parameter Description

Parameter Name	Description
Device Control	It displays the basic information about the frame grabber, and you can set the PoCXP function here.
Basic Setting	It allows you to set parameters of stream, trigger, camera, etc.
External Trigger	It allows you to set and manage external trigger signals.
Advanced Setting	It allows you to set the timer-related signal source and other

Parameter Name	Description
	parameters, and set and manage advanced I/O control.
User Set Control	It allows you to save and load the parameter group of the frame grabber, and set the default parameter group.

5.3 Install Drive Package

To ensure that the frame grabber's SDK matches the firmware version of the frame grabber, you can update the firmware by installing a drive package.

Note

Contact the technical support to get the drive package for CoaXPress-6 frame grabber. The drive package is named with "MVFG_DRIVER_***".

Before You Start

Close the MVS client software before installing the drive package.

Steps

1. Decompress the patch package, open the folder, and double-click the .exe file.
2. Click **Install** to continue.

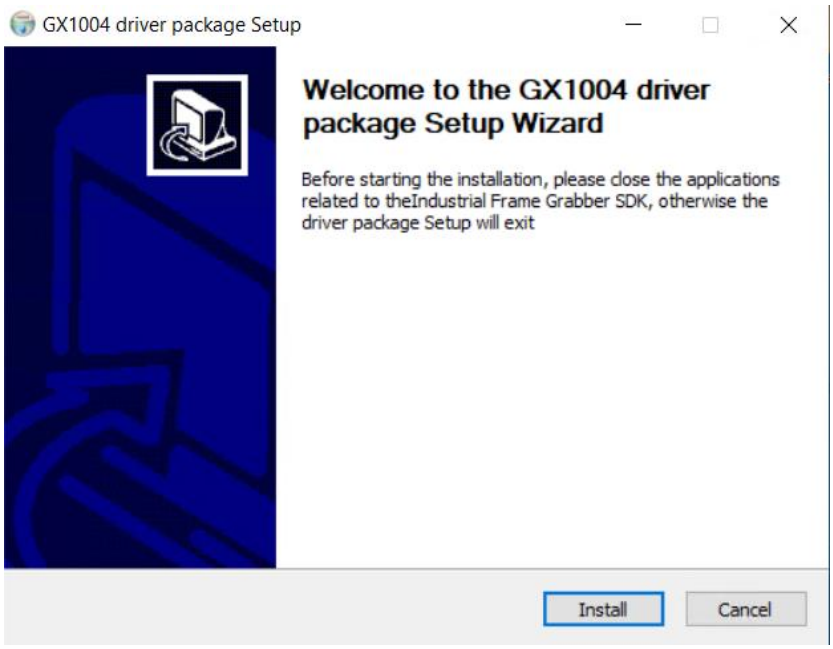

Figure 5-2 Install

3. Select **Open Firmware Updater** or **Open Release Note** according to your needs, and click **Finish** after selection.

Note

Refer to section ***Upgrade Firmware*** to see frame grabber upgrade via the firmware upgrade tool.

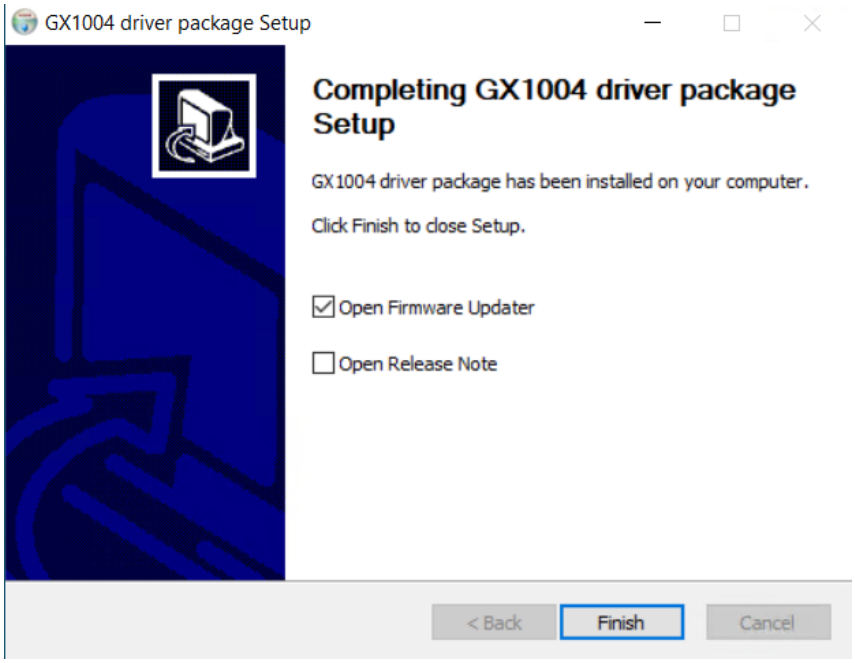

Figure 5-3 Finish Installation

5.4 Secondary Development

Users can perform secondary development of the frame grabber. The SDK secondary development data path is located: C:\Program Files (x86)\MVS\Development\MVFG, as shown below. Please refer to the following table for the specific contents of each folder.

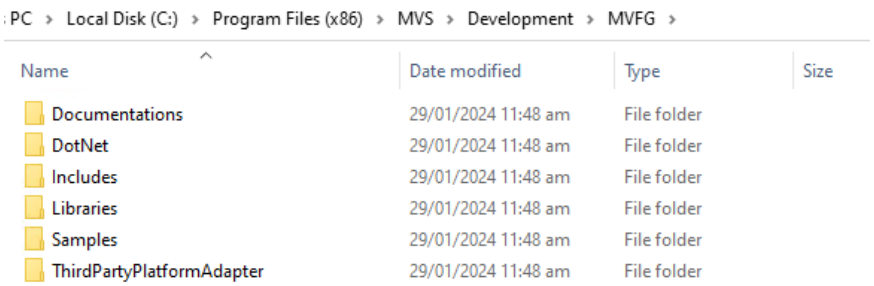

Figure 5-4 Secondary Development

Table 5-3 Folder Description

Folder Name	Content Description
Bin	It is the result of the compilation.
Documentations	It is secondary development documentation, including SDK developer guide and Demo instructions.
DotNet	.NET assembly.
Includes	Header files.
Libraries	Static library.
MVFG	The SDK content of frame grabber, including secondary development documentation, some dynamic libraries developed in C#, header files, static library, sample code, and third-party platform plug-ins.
Samples	Sample code for various programming languages.
ThirdPartyPlatformAdapter	Third-party platform plug-ins.

Chapter 6 Operating Principle

The onboard diagram of the frame grabber is shown below. The external I/O trigger signal sends the Link Trigger signal, transmits UpLink to the camera, and controls the camera to output the corresponding image.

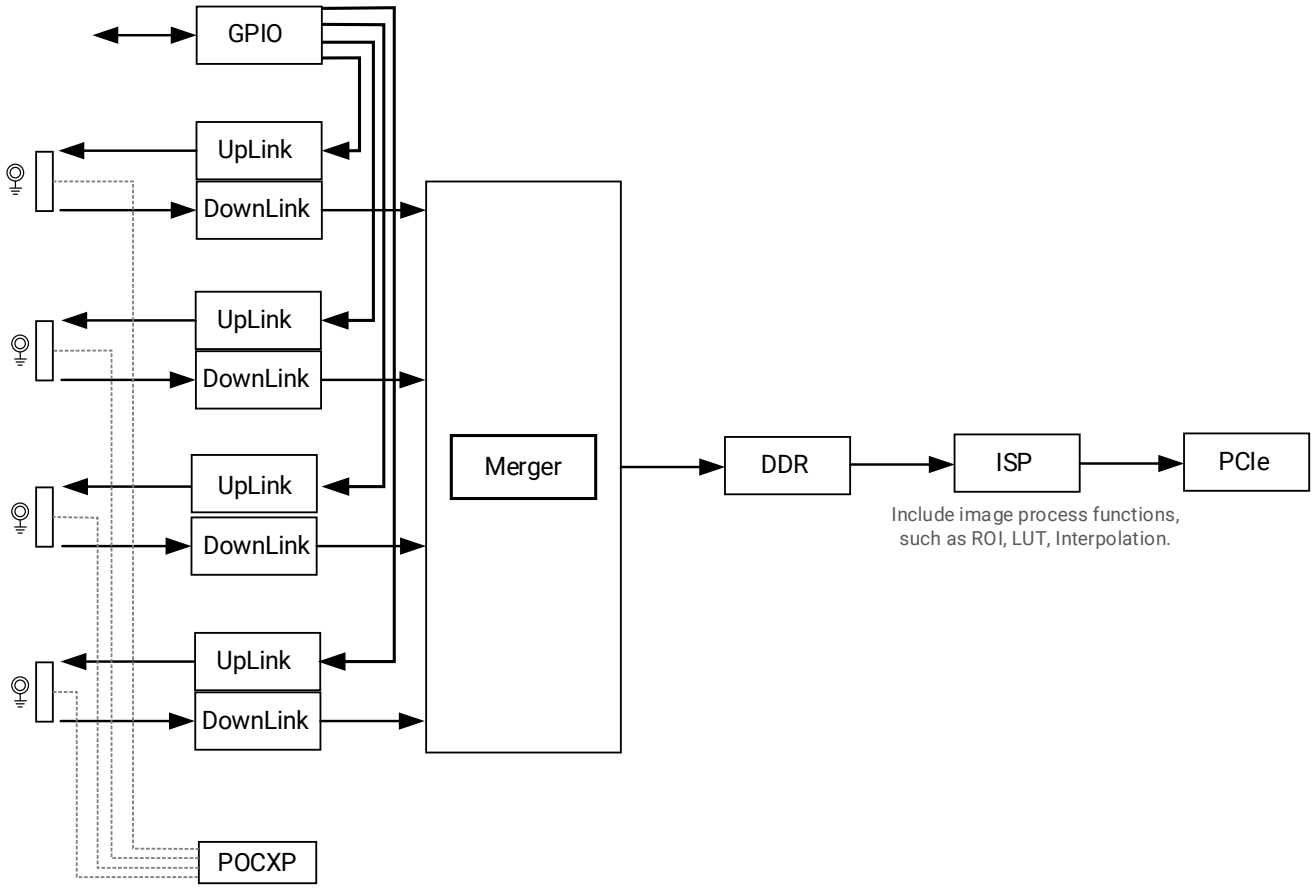

Figure 6-1 Operating Principle

Chapter 7 I/O Introduction

The frame grabber provides multiple I/O connectors, and the connector types vary among models.

7.1 MV-GX1002 and MV-GX1004

The MV-GX1002 or MV-GX1004 frame grabber has 24 I/O connectors that provide input and output signals, including opto-isolated input × 4 (OptoCoupled Input 0 to OptoCoupled Input 3), opto-isolated output × 4 (OptoCoupled Output 0 to OptoCoupled Output 3), RS-422 input × 4 (RS422diff Input 0 to RS422diff Input 3), RS-422 output × 4 (RS422diff Output 0 to RS422diff Output 3), TTL input × 4 (TTL Input 0 to TTL Input 3), and TTL output × 4 (TTL Output 0 to TTL Output 3).

7.1.1 I/O Electrical Feature

Opto Coupler Input

The frame grabber has 4 opto coupler-isolated input signals, and their internal circuit is shown below.

Note

The max. input current is 25 mA.

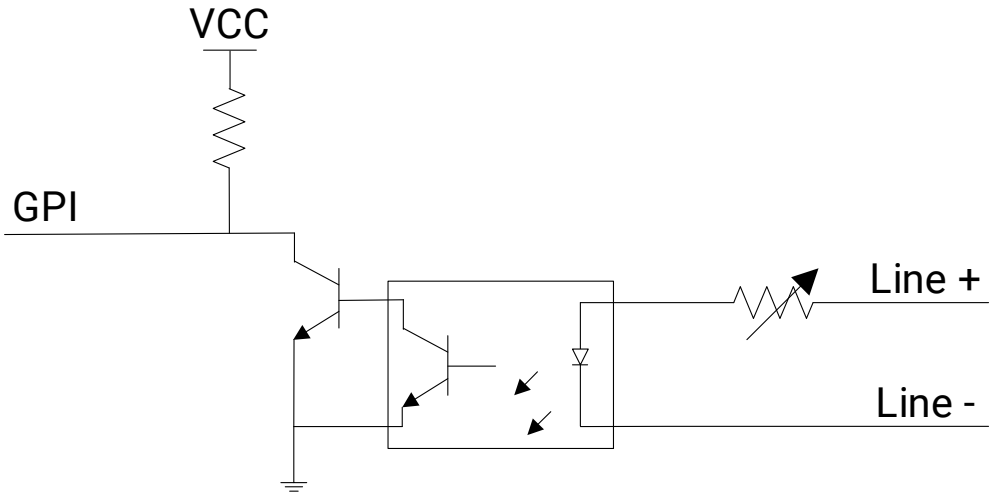

Figure 7-1 Internal Circuit of Opto Coupler Input

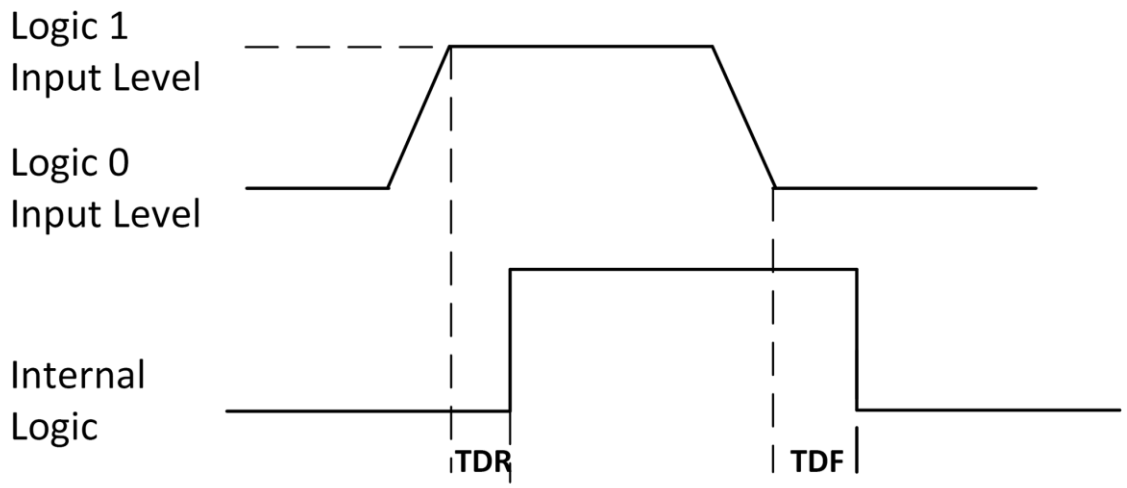

Figure 7-2 Input Logic Level

Note

- The electric circuit status is not stable when the input voltage is between 1 VDC and 1.5 VDC. Please avoid this voltage range.
- The breakdown voltage is 30 VDC and keep voltage stable.

Table 7-1 Opto Coupler Input Electrical Feature

Parameter Name	Parameter Symbol	Value
Input Logic Level Low	VIL	0 VDC to 1 VDC
Input Logic Level High	VIH	1.5 VDC to 24 VDC
Input Rising Delay	TDR	1.8 μs to 4.6 μs
Input Falling Delay	TDF	16.8 μs to 22 μs

Opto Coupler Output

The frame grabber has 4 opto coupler-isolated output signals, and their internal circuit is shown below.

Note

The max. output current is 25 mA.

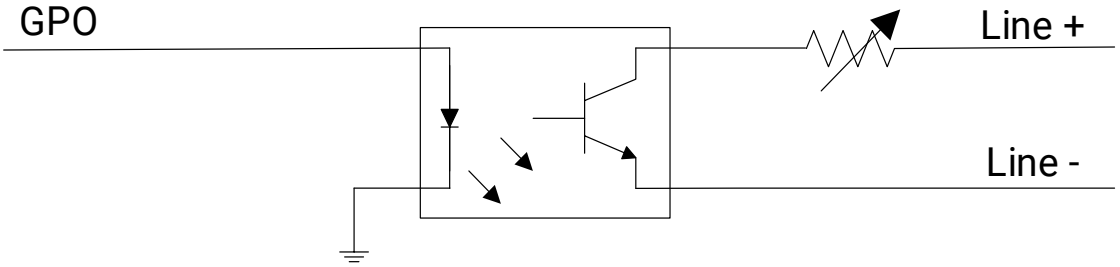

Figure 7-3 Internal Circuit of Opto Coupler Output

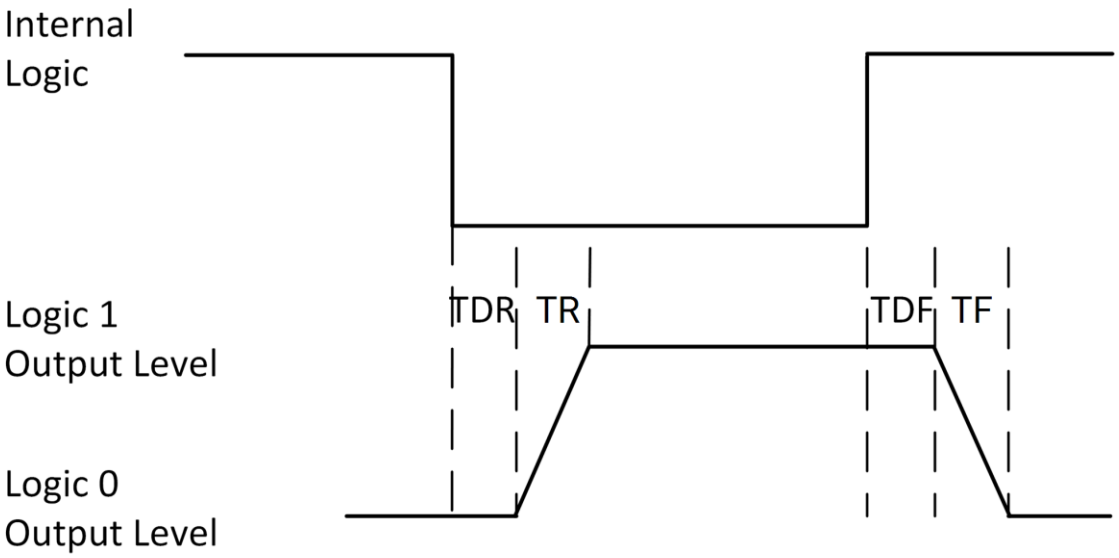

Figure 7-4 Output Logic Level

When the external voltage is 3.3 VDC and the external resistance is 1 KΩ, the electrical feature of opto coupler output is shown in below.

Table 7-2 Opto Coupler 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 μs
Output Falling Time	TF	1.9 μs
Output Rising Delay	TDR	15 μs to 60 μs
Output Falling Delay	TDF	3 μs to 6 μs

With different external voltages and resistances, the corresponding current and parameters of output logic level low are shown below.

Table 7-3 Parameter of Output Logic Level Low

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

TTL Input/Output

The frame grabber has 4 TTL input signals and 4 TTL output signals. Their internal circuit is shown below, and A stands for signal input and Y stands for signal output.

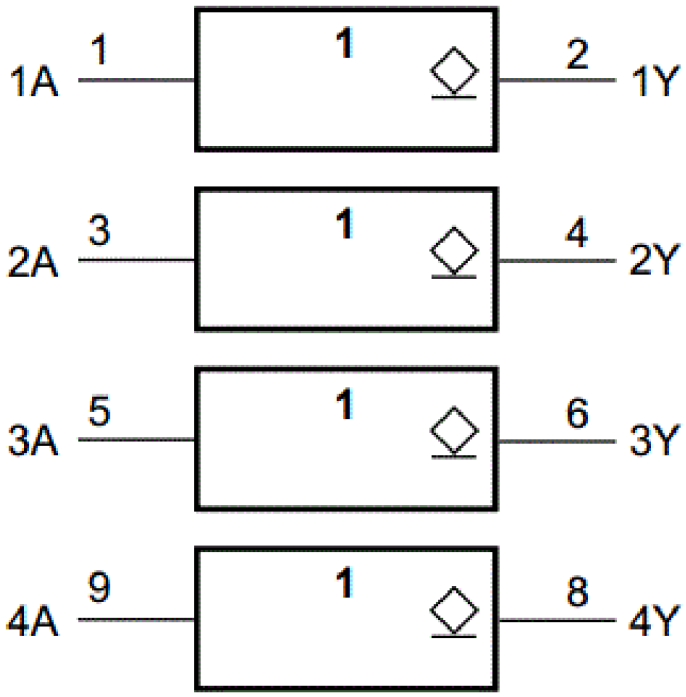

Figure 7-5 Internal Circuit of TTL Input/Output

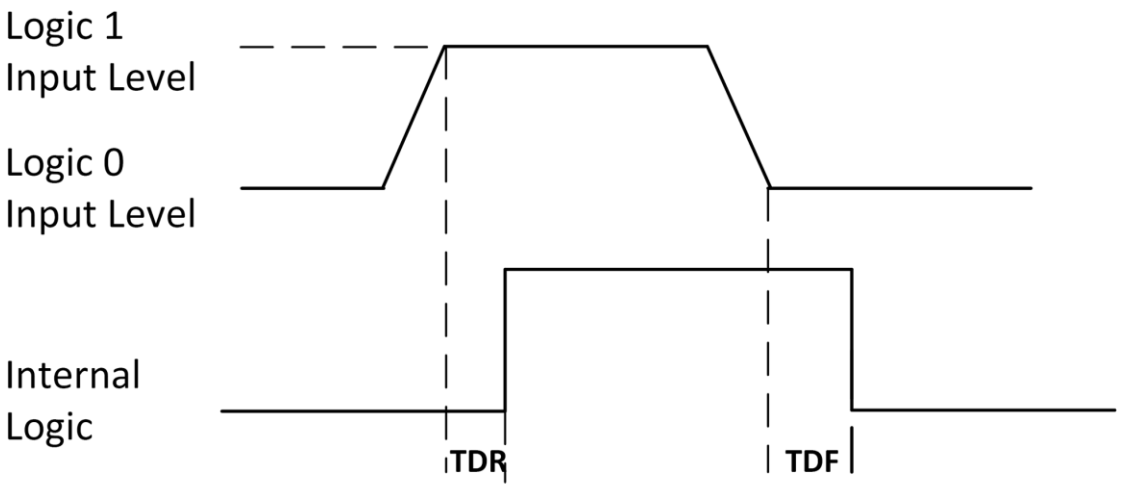

Figure 7-6 Logic Level of TTL Input/Output

The electrical feature of the TTL input/output is shown below.

Table 7-4 TTL Input Electrical Feature

Parameter Name	Parameter Symbol	Value
Input Logic Level Low	VIL	0 VDC to 0.8 VDC
Input Logic Level High	VIH	4.5 VDC
Input Rising Delay	TDR	< 10 ns
Input Falling Delay	TDF	< 10 ns

Table 7-5 TTL Output Electrical Feature

Parameter Name	Parameter Symbol	Value
Output Logic Level Low	VOL	0 VDC to 0.4 VDC
Output Logic Level High	VOH	2.4 VDC to 5 VDC
Output Rising Delay	TDR	< 10 ns
Output Falling Delay	TDF	< 10 ns

RS-422 Input/Output

The frame grabber has 4 pairs of RS-422 input signal and 4 pairs of RS-422 output signal. Among them, one pair of RS-422 input signal and one pair of RS-422 out signal are achieved via the DB26 female socket, and others achieved via the female header.
The internal circuit of RS-422 input/output is shown below. A and B stand for RS-422 differential input, and Y and Z stand for RS-422 differential output.

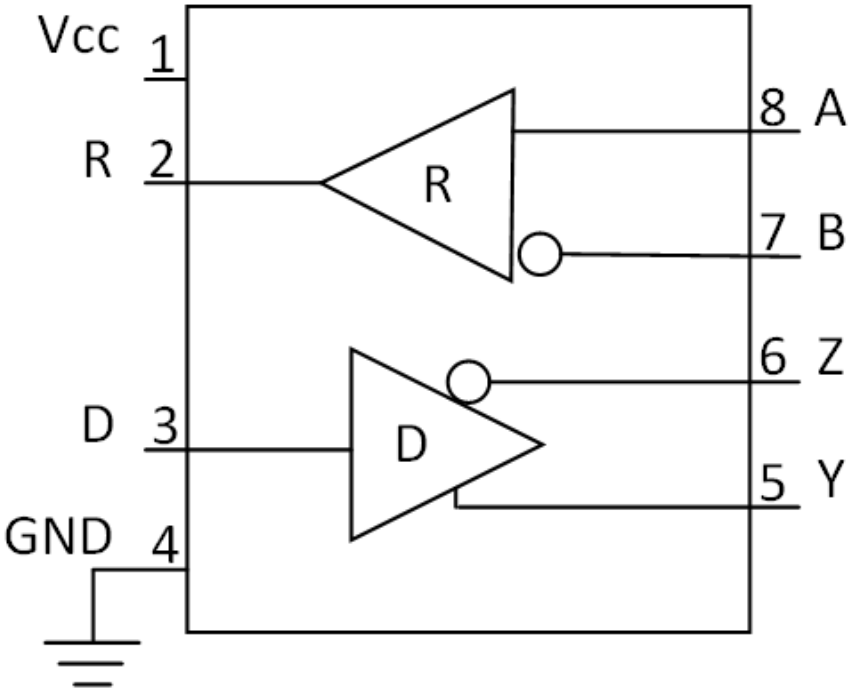

Figure 7-7 Internal Circuit of RS-422 Input/Output

The differential signal threshold is –0.2 V and +0.2 V. The electrical feature of RS-422 input/output is shown below.

Table 7-6 RS-422 Input Electrical Feature

Input (A-B)	Output (R)
Higher than +0.2 V	High
Lower than –0.2 V	Low

Table 7-7 RS-422 Output Electrical Feature

Input (D)	Output (Y)	Output (Z)
Low	Low	High
High	High	Low

7.1.2 I/O Wiring

Opto Coupler Input Wiring

Note

Wirings may differ by types of external devices providing input signals.

- **PNP Device**

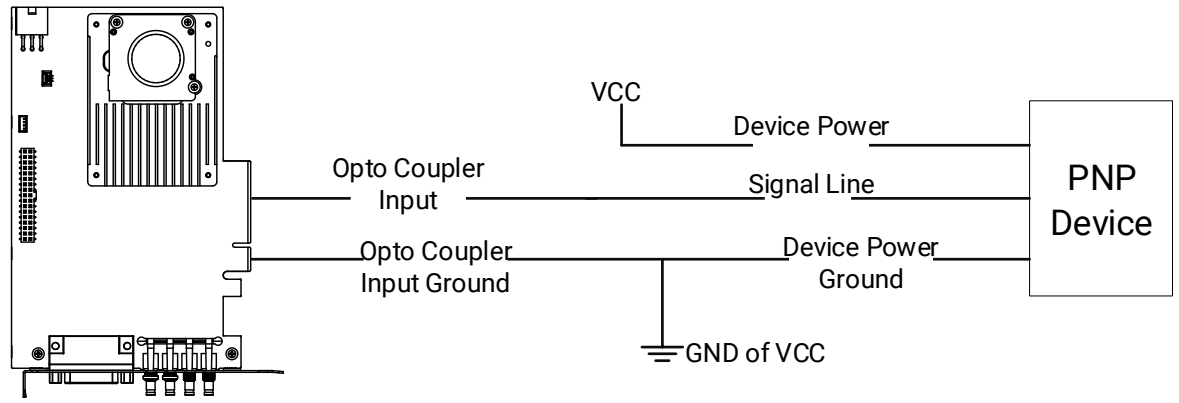

Figure 7-8 Opto Coupler Input Connects PNP Device

- **NPN Device**
  If the VCC of NPN device is 24 V, it is recommend to use 1 KΩ to 4.7 KΩ pull-up resistor.
  If the VCC of NPN device is 12 V, it is recommend to use 1 KΩ pull-up resistor.

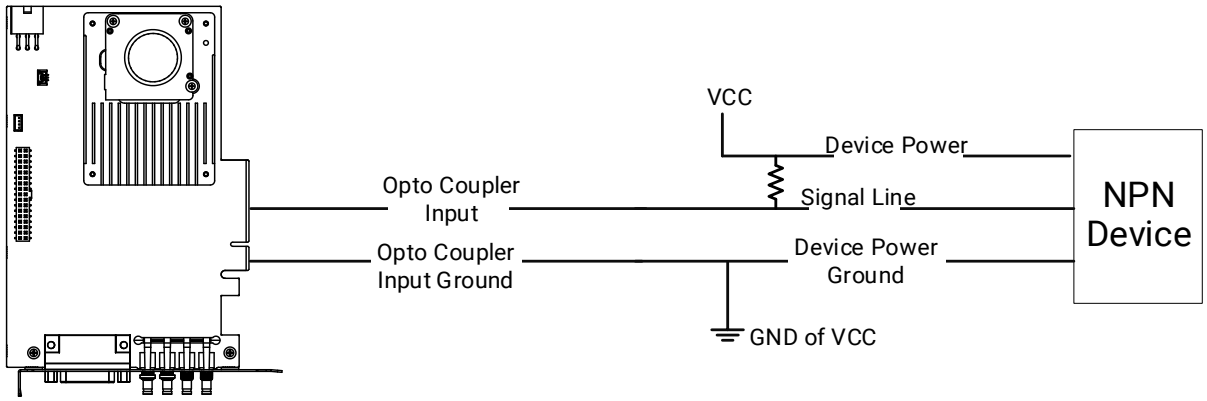

Figure 7-9 Opto Coupler Input Connects NPN Device

- **Switch**
  If the VCC of the switch is 24 V, it is recommended to use a series resistor of 1 KΩ to 4.7 KΩ to protect the circuit.

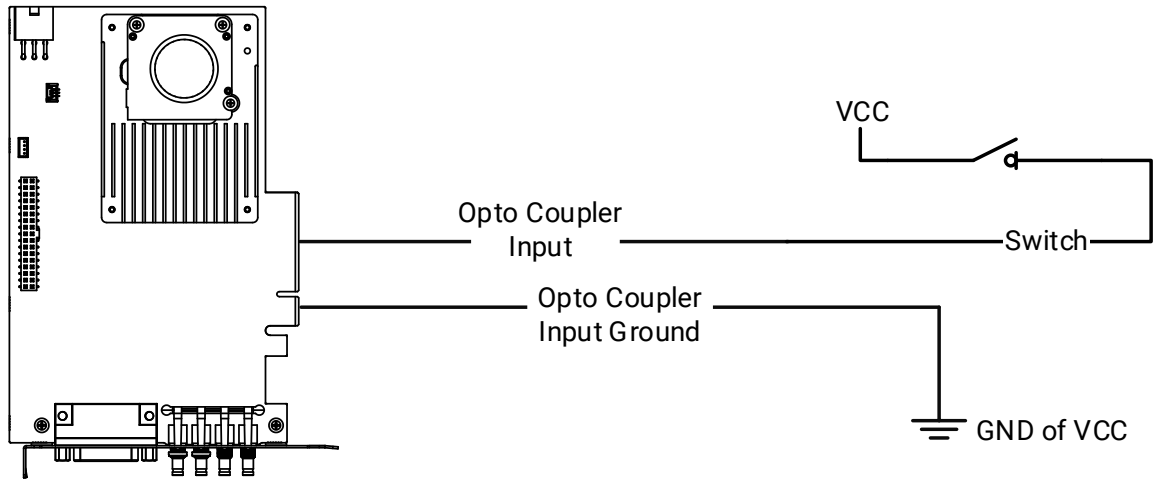

Figure 7-10 Opto Coupler Input Connects a Switch

Opto Coupler Output Wiring

Note

Wirings may differ by types of external devices providing output signals.

- **PNP Device**

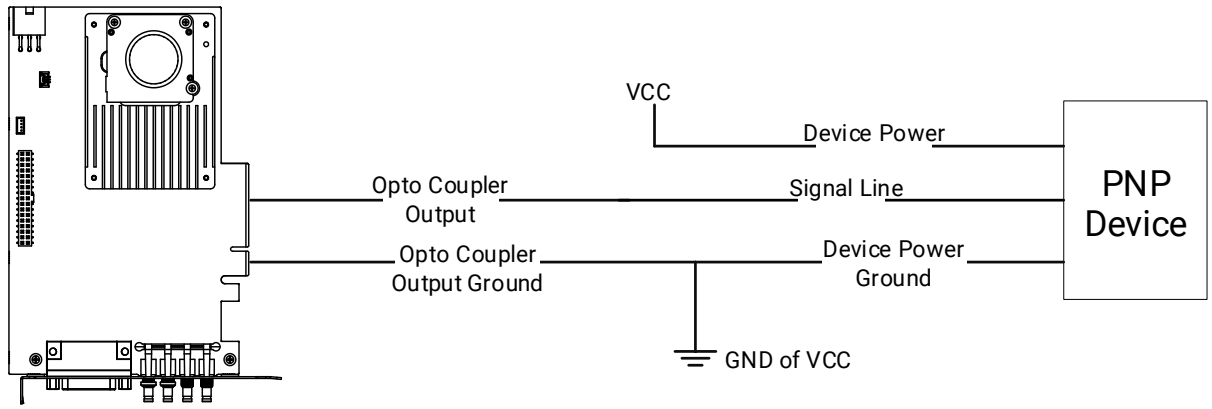

Figure 7-11 Opto Coupler Output Connects PNP Device

- **NPN Device**
  If the VCC of NPN device is 24 V, it is recommend to use 1 KΩ to 4.7 KΩ pull-up resistor.
  If the VCC of NPN device is 12 V, it is recommend to use 1 KΩ pull-up resistor.

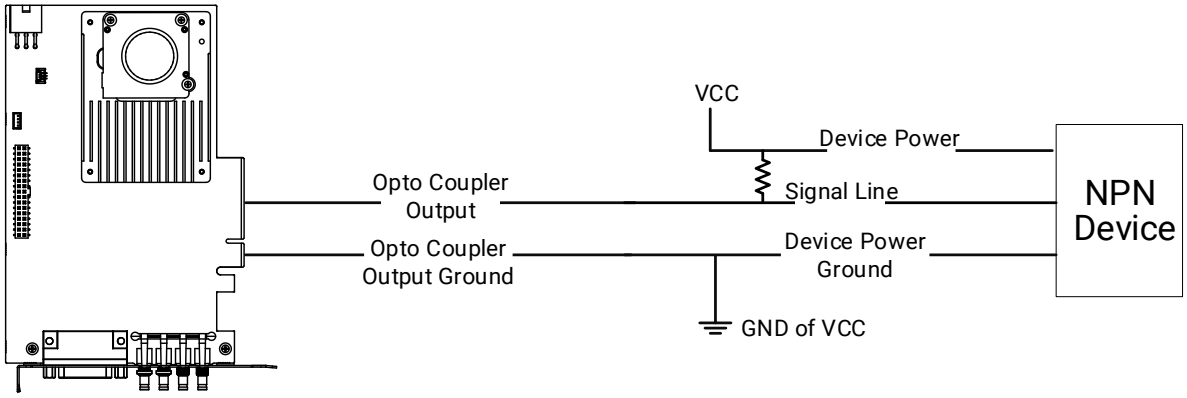

Figure 7-12 Opto Coupler Output Connects NPN Device

Wiring of TTL Input/Output

When the frame grabber receives the TTL input/output signal, you can direct connect the frame grabber's signal with the electrical level of external devices.

- **TTL Input Signal**

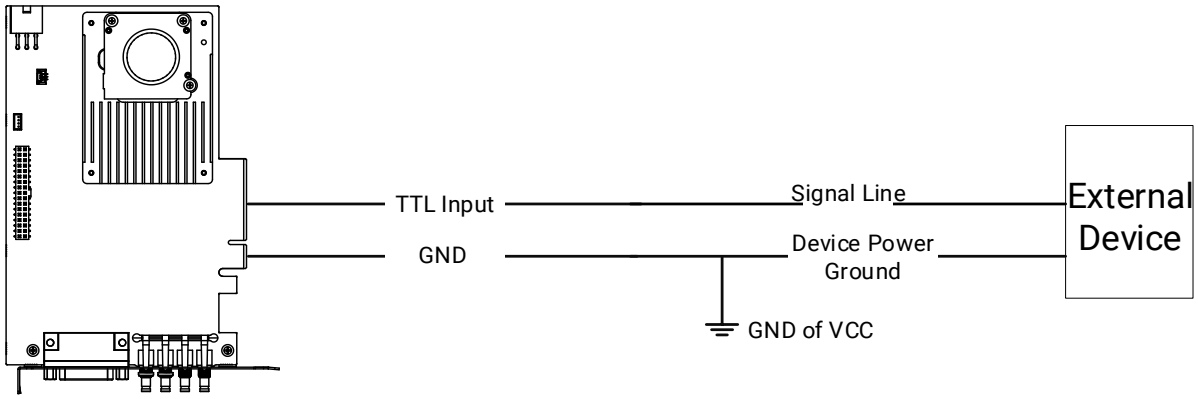

Figure 7-13 TTL Input Connects External Device

- **TTL Output Signal**

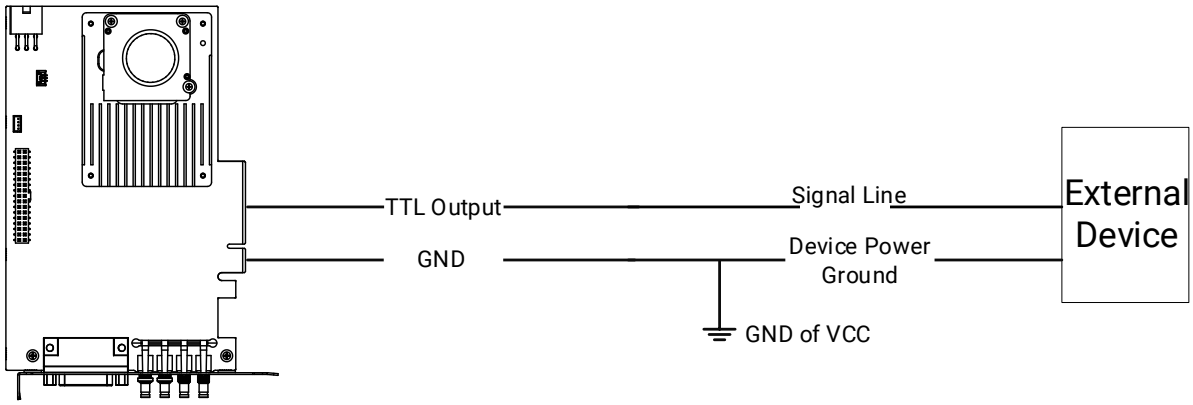

Figure 7-14 TTL Output Connects External Device

Wiring of RS-422 Input/Output

When the frame grabber receives the RS-422 input/output signal, you can direct connect the frame grabber's P/N/GND terminal with that of external devices.

- **RS-422 Input Signal**

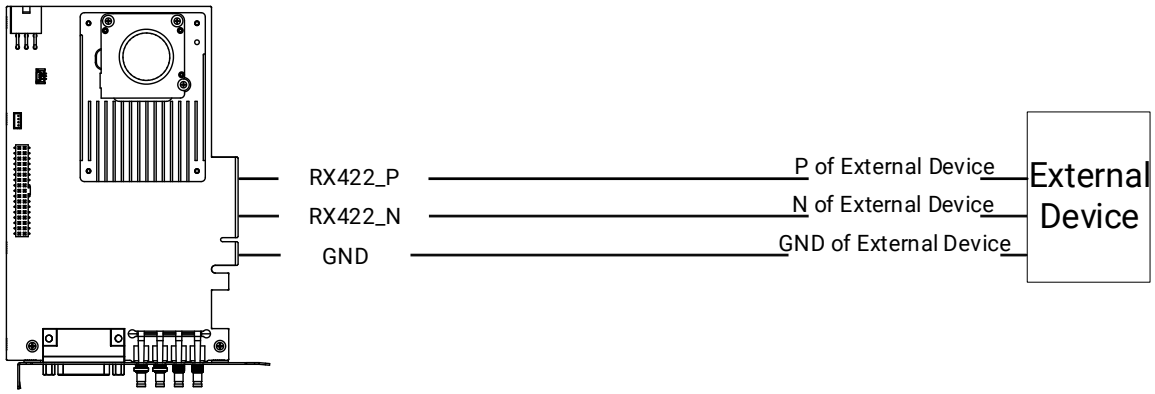

Figure 7-15 RS-422 Input Connects External Device

- **RS-422 Output Signal**

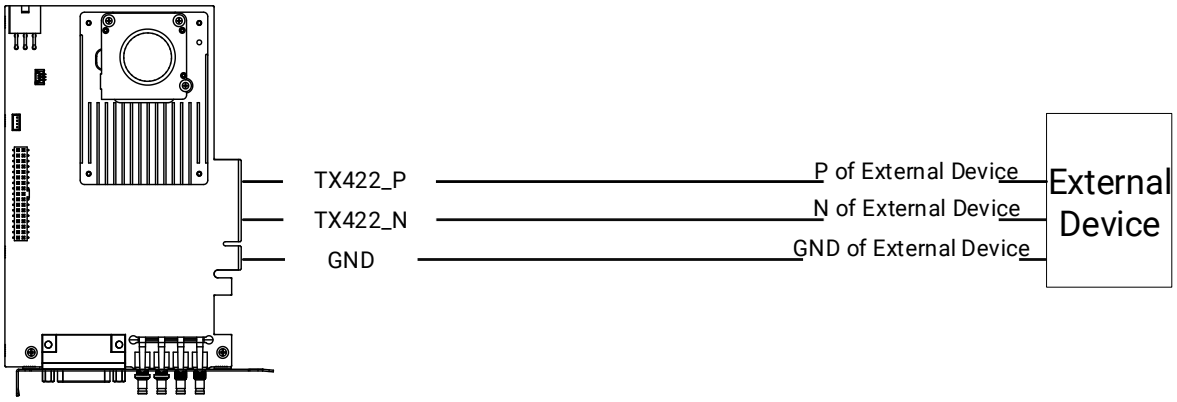

Figure 7-16 RS-422 Output Connects External Device

7.2 Other Models

The MV-GX1008, MV-GX1102, and MV-GX1104 frame grabbers have 11 I/O connectors (D485 InOut 0 to D485 InOut 10) that can be configured as differential input or differential output.

7.2.1 I/O Electrical Feature

Differential Input Circuit

The differential input signals in I/O signals also support single-ended inputs, and the internal circuit is shown below.

- The external differential signals (EXTERNAL SIGNAL) are converted to single-ended input signals through a RS-485 transceiver and sent to the FPGA for functions such as trigger counting.
- After being compared with the internal threshold level of the frame grabber, the external single-ended signals are converted to single-ended signals through a RS-485 transceiver and sent to the FPGA for functions such as trigger counting.

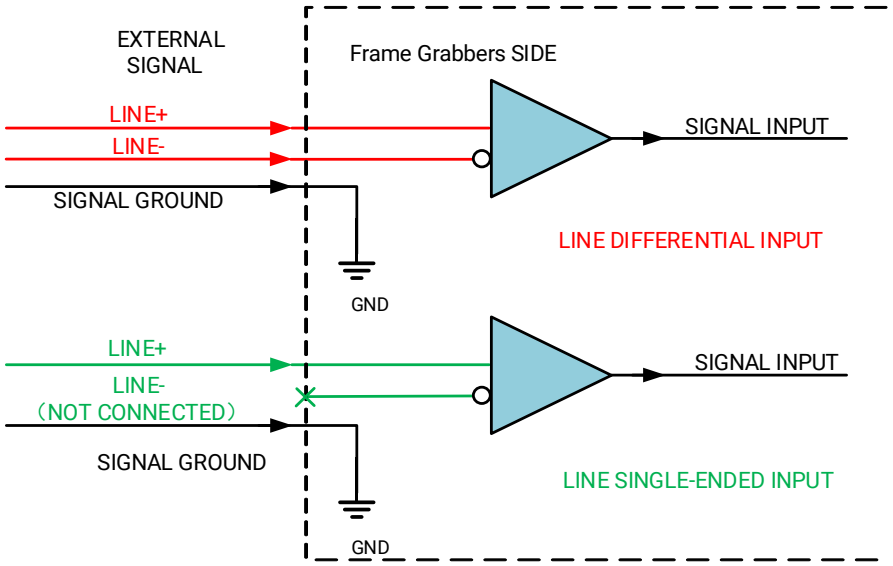

Figure 7-17 Internal Circuit of Differential Input

Differential input can receives RS-422, TTL, and LVTTL standard input signals.

- Using RS-422 standard input

If the differential input uses RS-422 standard signals, to ensure the normal operation of the device input circuit, the device ground signal should be connected to the external ground signals.

- Using TTL and LVTTL standard input

If the differential input uses TTL or LVTTL standard signals, see the table below for the electrical feature requirements.

Table 7-8 Electrical Feature Requirements of TTL and LVTTL Input

Voltage Range	Description
0 VDC to 1 VDC	Low level.
1 VDC to 3 VDC	Unstable voltage, and it is not recommended.
3.3 VDC to 24 VDC	Line 0 to Line 10 high level.

Differential Output Circuit

The internal circuit of differential output signals is shown below.

The FPGA internal single-ended signals are converted to differential output signals through

a RS-485 transceiver.

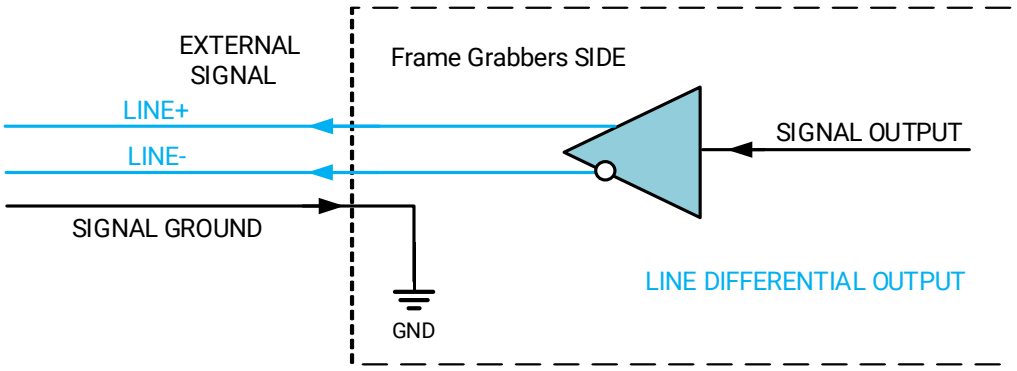

Figure 7-18 Internal Circuit of Differential Output

Differential output uses RS-422 standard signals.
To ensure the normal operation of the device output circuit, the device ground signal should be connected to the external ground signals. This connector can be configured as a main transmitter to connect the RS-422 bus.

7.2.2 I/O Wiring

Input Wiring

MV-GX1008, MV-GX1102, and MV-GX1104 frame grabbers can directly receive differential signals or single-ended signals to trigger image capture through hardware triggering.

Note

Before using, make sure to set the hardware trigger signal source to input signal.

Refer to the figure below for the wiring when the trigger signal is provided by differential signal source.

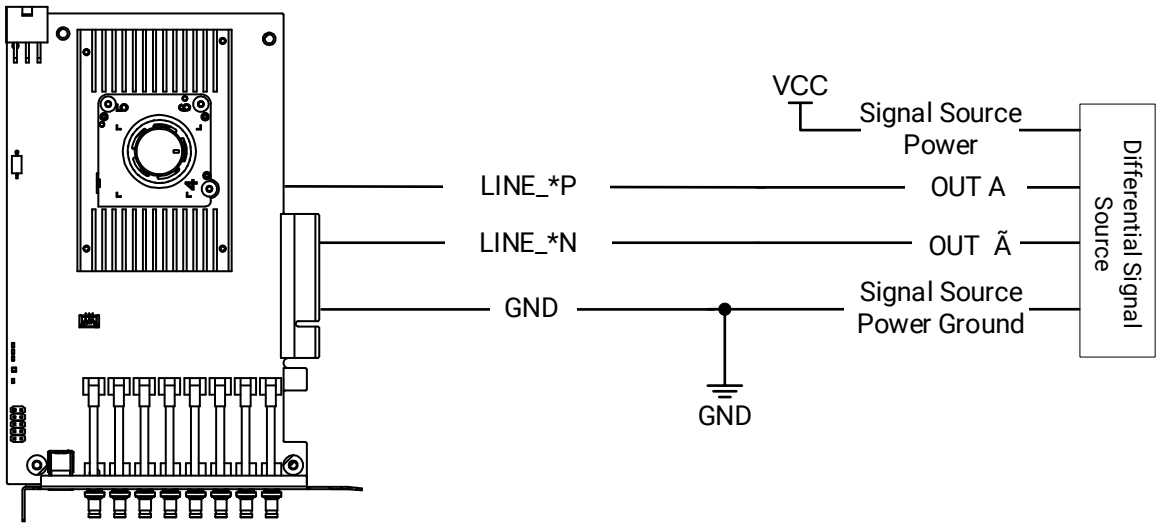

Figure 7-19 Differential Input Wiring

Refer to the two figures below for the wiring methods when the trigger signal is provided by PNP single-ended signal source.

Note

The range of pull-down resistor is 1 KΩ to 4.7 KΩ.

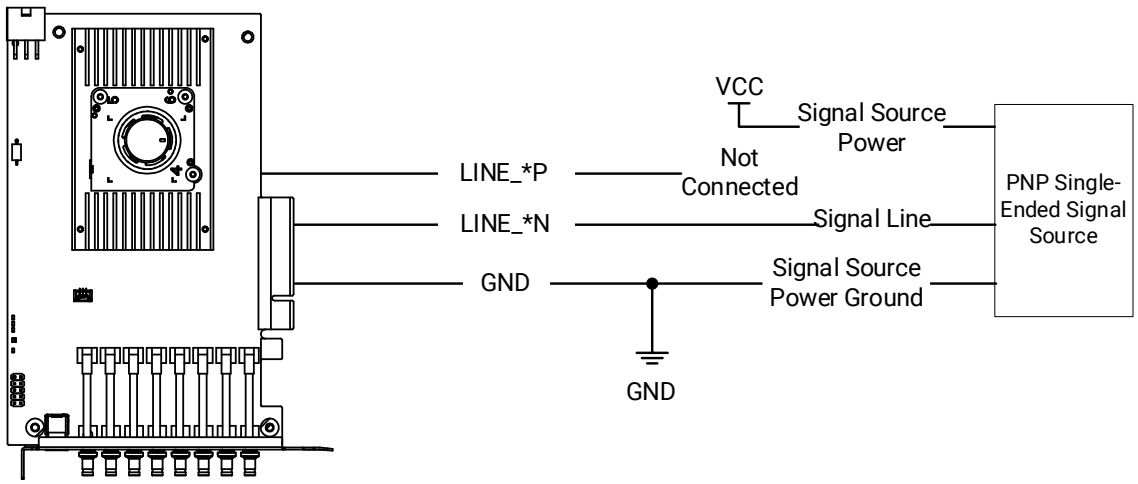

Figure 7-20 PNP Single-Ended Input Wiring (Without Pull-Down Resistor)

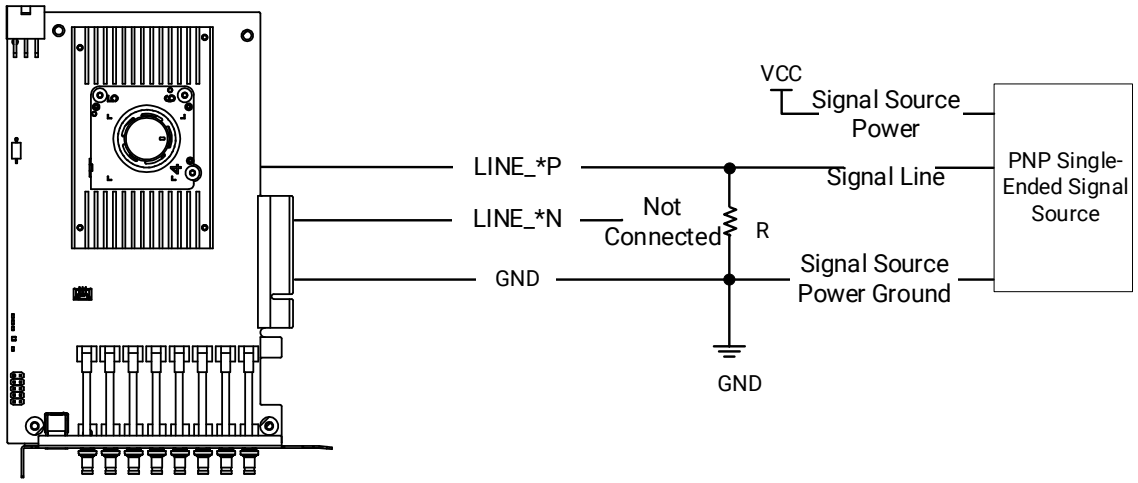

Figure 7-21 PNP Single-Ended Input Wiring (with Pull-Down Resistor)

Refer to the two figures below for the wiring methods when the trigger signal is provided by NPN single-ended signal source.

Note

The range of pull-up resistor is 1 KΩ to 10 KΩ.

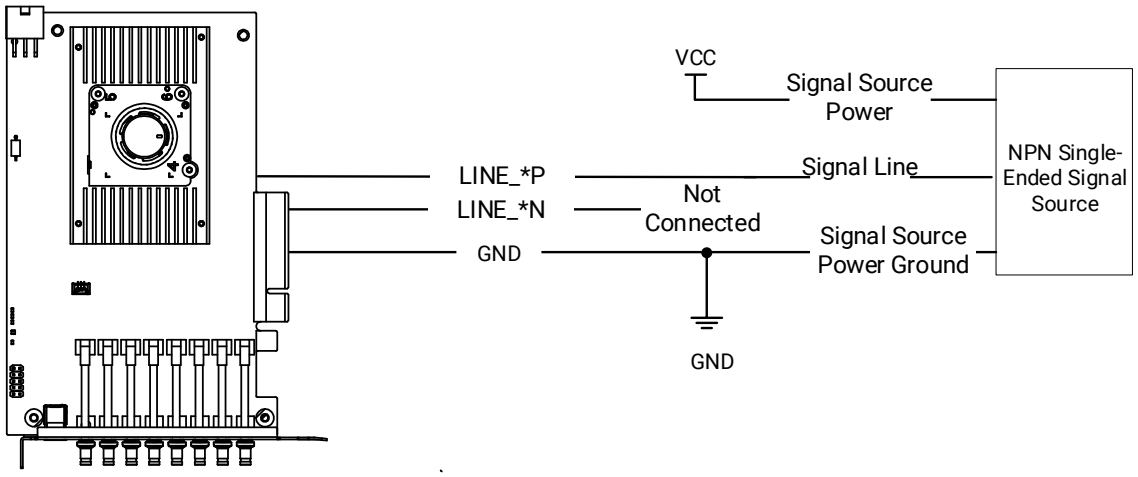

Figure 7-22 NPN Single-Ended Input Wiring (Without Pull-UP Resistor)

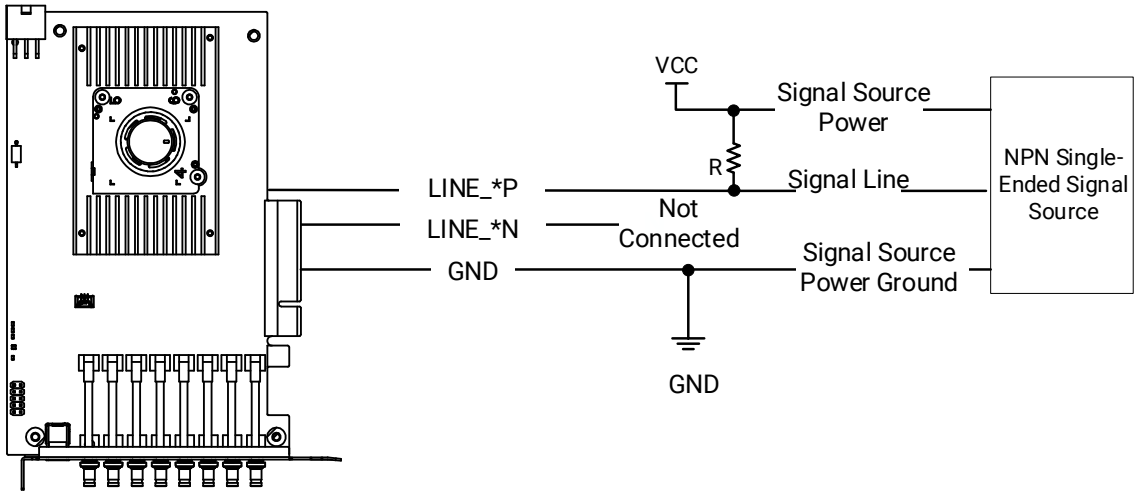

Figure 7-23 NPN Single-Ended Input Wiring (with Pull-UP Resistor)

Output Wiring

The 11 differential signals of MV-GX1008, MV-GX1102, and MV-GX1104 frame grabbers can all be set as outputs to trigger other devices. When the I/O signals are used as differential outputs and single-ended outputs, the wiring methods are different.

- As differential outputs, the wiring method is shown below.

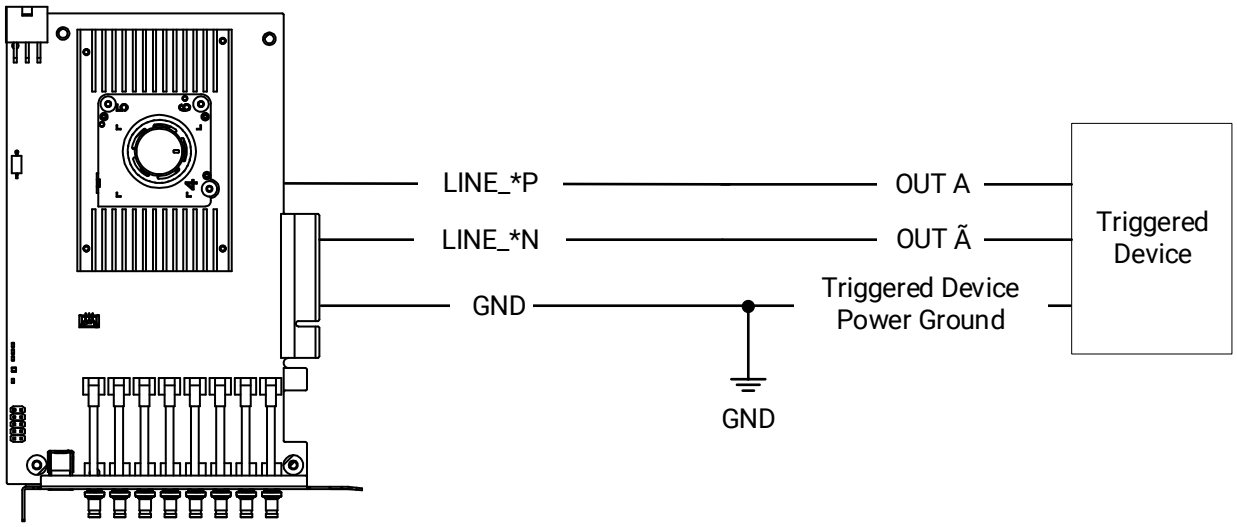

Figure 7-24 Differential Output Wiring

- When Line 0 to Line 7 are used as single-ended outputs, a pull-up resistor is required, with a resistance range of 1 kΩ to 10 kΩ. The resistance R varies depending on the input voltage VCC of the single-ended signal.

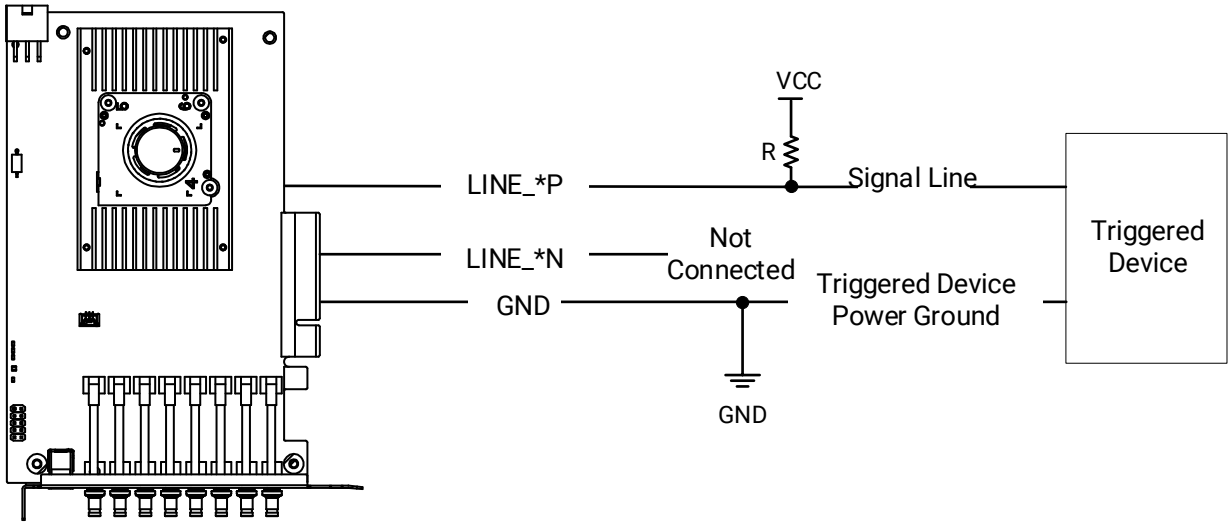

Figure 7-25 Single-Ended Output Wiring (with Pull-UP Resistor)

Table 7-9 Correspondence Between Voltage VCC and Resistance R

VCC	R
5 VDC	1 K
12 VDC	2 K to 4.7 K
24 VDC	4.7 K to 10 K

- When Line 8 to Line 10 are used as single-ended outputs, with the output voltage of 3.3V.

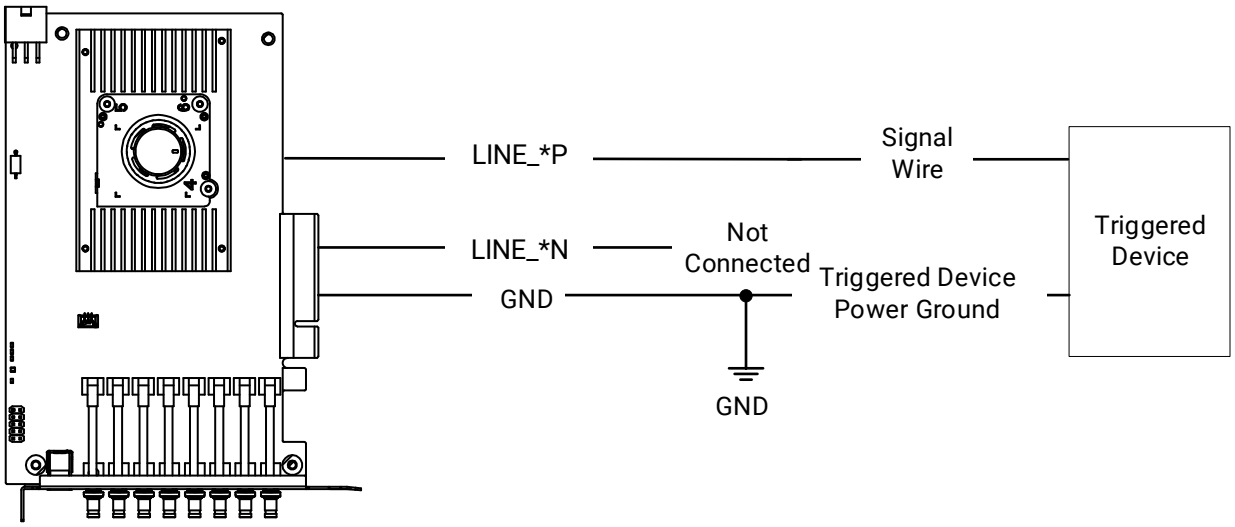

Figure 7-26 Single-Ended Output Wiring (Without Pull-UP Resistor)

Chapter 8 Input and Output Signals

The frame grabber has multiple input/output signals, but different models feature varying interface types, resulting in different input/out signals.

- MV-GX1002 and MV-GX1004 frame grabbers have 24 input/output signals, including opto-isolated input × 4, opto-isolated output × 4, RS-422 input × 4, RS-422 output × 4, TTL input × 4, and TTL output × 4.
- MV-GX1008, MV-GX1102, and MV-GX1104 frame grabbers have 11 configurable differential input/output signals (D485 InOut 0 to D485 InOut 10).

You can go to **External Trigger** of the MVS client software to configure the signals according to actual demands. This section takes MV-GX1002 and MV-GX1004 as examples to introduce the settings of input/output signals.

8.1 Input Signal

The frame grabber can receive multiple input signals that can be used as the signal source of output signal, encoder, timer and Link Trigger.

Steps

1. Go to **External Trigger**, and select **OptoCoupled Input ***, **RS422diff Input ***, or **TTL Input *** in the **Line Selector** according to actual demands.

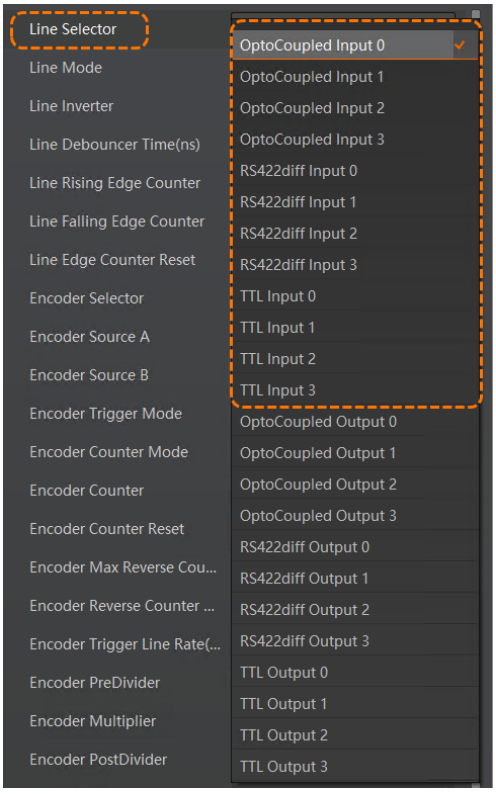

Figure 8-1 Line Selector

Note

For MV-GX1008, MV-GX1102, and MV-GX1104, select D485 InOut *.

2. Select **Input** as **Line Mode**.
3. Set the type of input signals via **Line Input Polarity**.

Note

- This parameter is only available for MV-GX1008, MV-GX1102, and MV-GX1104.
- **SingleEnded**: Receive single-ended input signals.
- **Differential**: Receive TTL and LVTTL standard input signals.

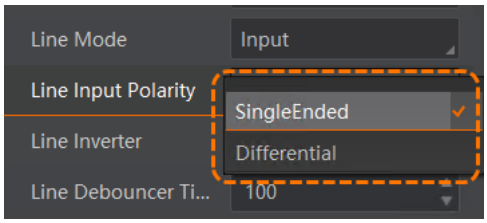

Figure 8-2 Input Signal Type

Caution

Select the signal type according to the type of the actual connected device. If the types mismatch, there is a risk of damaging the I/O.

4. Set the level threshold for input signals via **Line Level**.

Note

- This parameter is only available for MV-GX1008, MV-GX1102, and MV-GX1104.
- This parameter can only be set when D485 InOut 2 to 5 is selected in the **Line Selector**.
- Level thresholds should be set for corresponding external trigger levels.

5. (Optional) Enable **Line Inverter** if you want to invert the electrical level of selected lines.

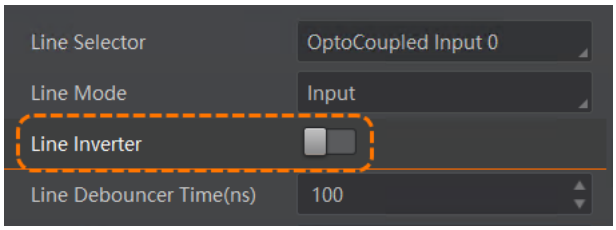

Figure 8-3 Enable Line Inverter

Note

- The line inverter is disabled by default.
- OptoCoupled Input *, RS422diff Input *, and TTL Input * you selected in **Line Selector** are in high levels by default.

6. Set **Line Debouncer Time** if the trigger signal sent by external devices to the frame grabber has signal bounce that may cause false trigger. Thus, it is necessary to debounce the trigger signal.

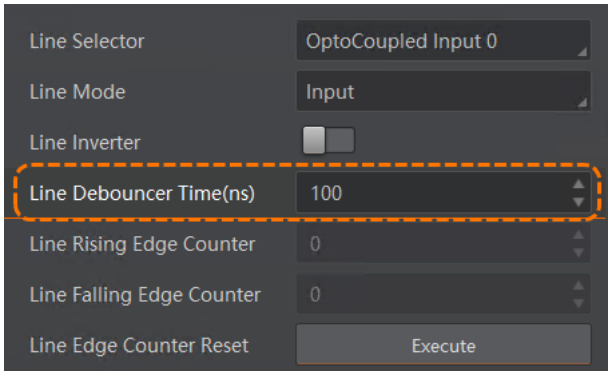

Figure 8-4 Set Line Debouncer Time

Note

The trigger signal will be ignored if the configured line debouncer time is larger than that of the trigger signal.

The sequence diagram is shown below.

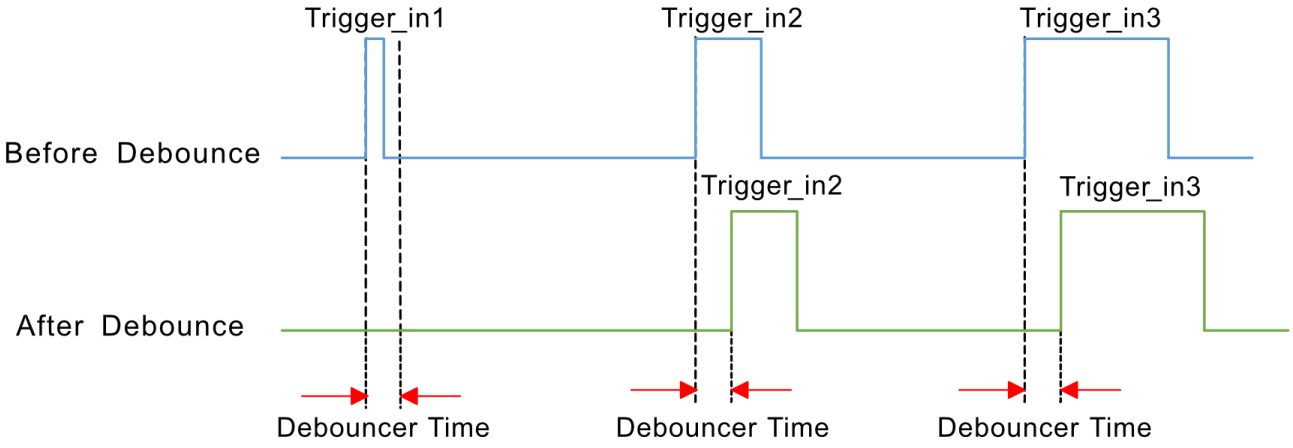

Figure 8-5 Sequence Diagram

Taking **OptoCoupled Input 0** as **Line Selector** as an example, the principle of trigger

debouncer and line inverter is shown below.

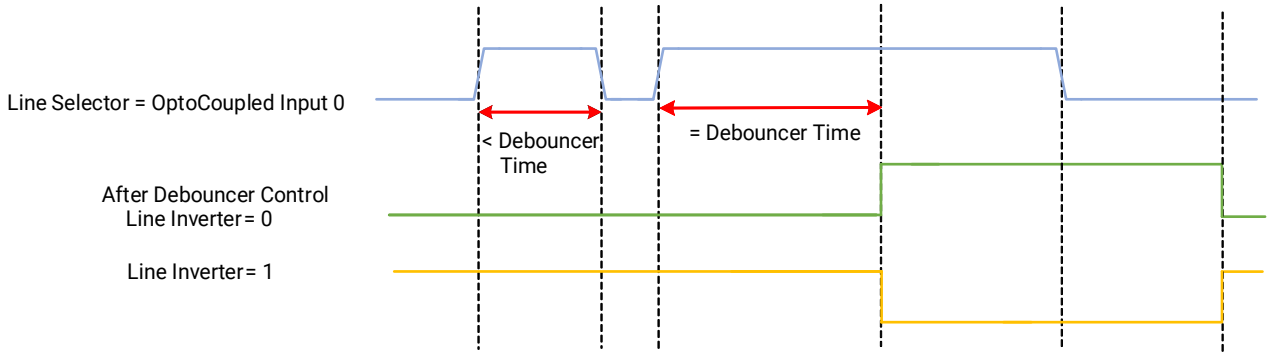

Figure 8-6 Principle

8.2 Encoder Control

The encoder control is used to select encoder sources and set trigger signal mode sent by signal source A and B. It can also count the output signal quantity.

Steps

1. Select **Encoder 0** or **Encoder 1** as **Encoder Selector**.
2. Select corresponding signal sources or **Off** as **Encoder Source A** and **Encoder Source B**.

Note

The supported input signal source may differ by different models of frame grabbers you use.

3. Set **Encoder Trigger Mode**.

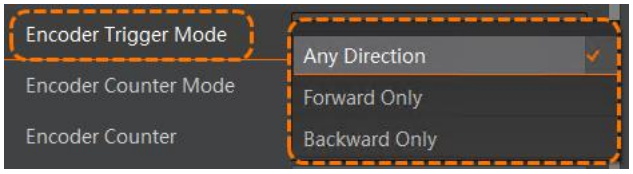

Figure 8-7 Select Encoder Trigger Mode

- **Any Direction** means that the frame grabber will output forward and backward signals.
- **Forward Only** means that the frame grabber will output forward signal only.
- **Backward Only** means that the frame grabber will output backward signal only.

The forward and backward signals of the encoder are judged according to the signals of

Encoder A and Encoder B, and the principle is shown below.

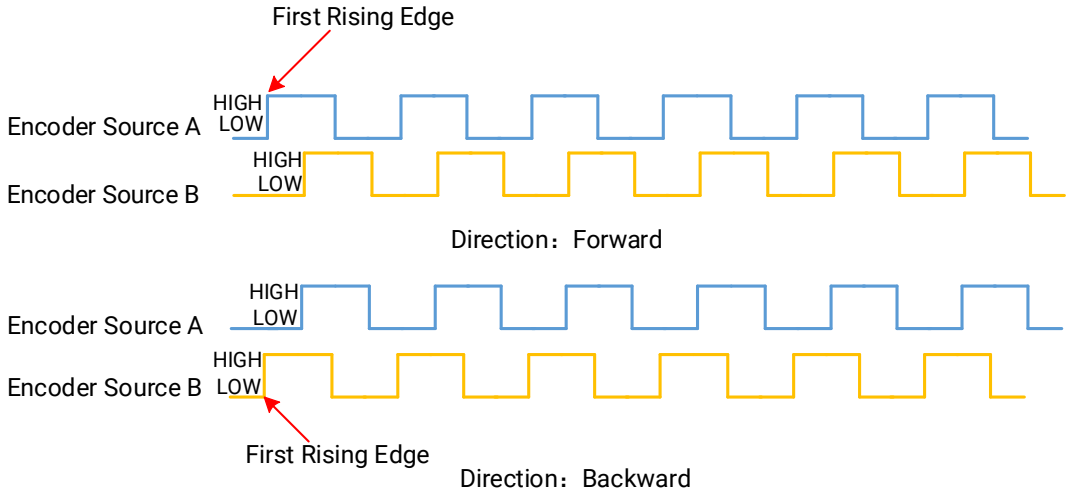

Figure 8-8 Principle

The output signal of the encoder is different if various trigger modes are selected, and the principle is shown below.

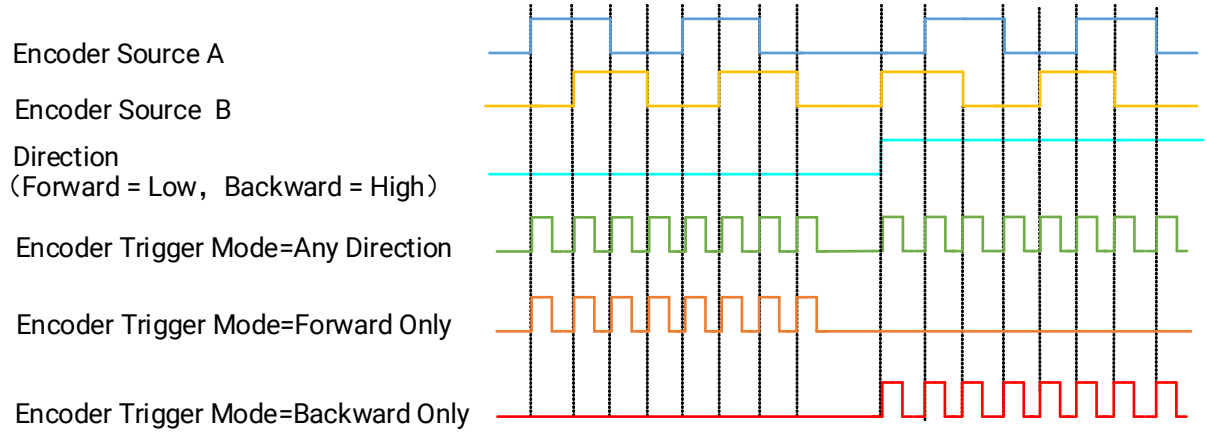

Figure 8-9 Encoder Trigger Signal Mode Principle

4. Set **Encoder Counter Mode**.

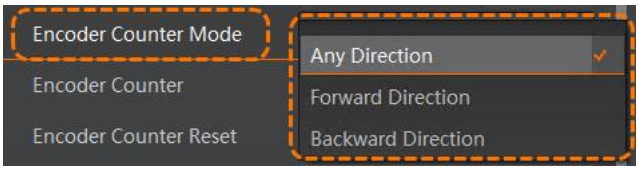

Figure 8-10 Set Encoder Counter Mode

- **Any Direction** means that both forward and backward signals will count.
- **Forward Direction** means that only the forward signal will count.
- **Backward Direction** means that only the backward signal will count.

If the encoder selects different counter modes, and its principle is shown below.

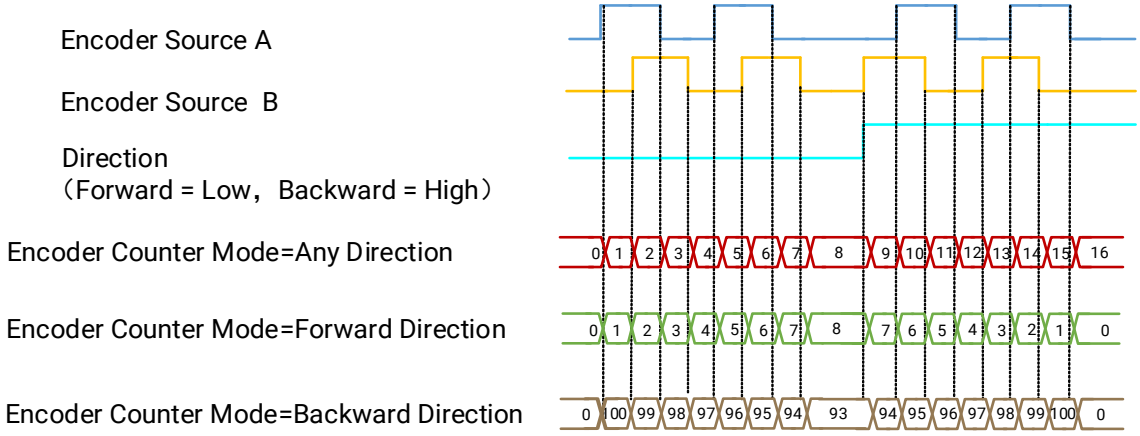

Figure 8-11 Encoder Counter Mode Principle

5. View counter value in **Encoder Counter**.
6. (Optional) Click **Execute** in **Encoder Counter Reset** to reset the counter.
7. (Optional) Set **Encoder Max Reverse Counter** to avoid outputting images if the object moves backward accidently, and click **Execute** in **Encoder Reverse Counter Reset** to let the camera output images again.

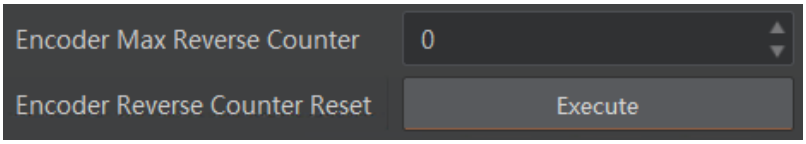

Figure 8-12 Set Encoder Max Reverse Counter

The maximum value for handling encoder reverse can be determined by setting the **Encoder Max Reverse Counter**. By default, the reverse is not handled that is **Encoder Max Reverse Counter = 0**. Taking the **Encoder Max Reverse Counter = 4** as an example, the output of the encoder under different trigger signal modes is introduced.

- If **Encoder Trigger Mode** selects **Forward Only**, the principle is shown below.

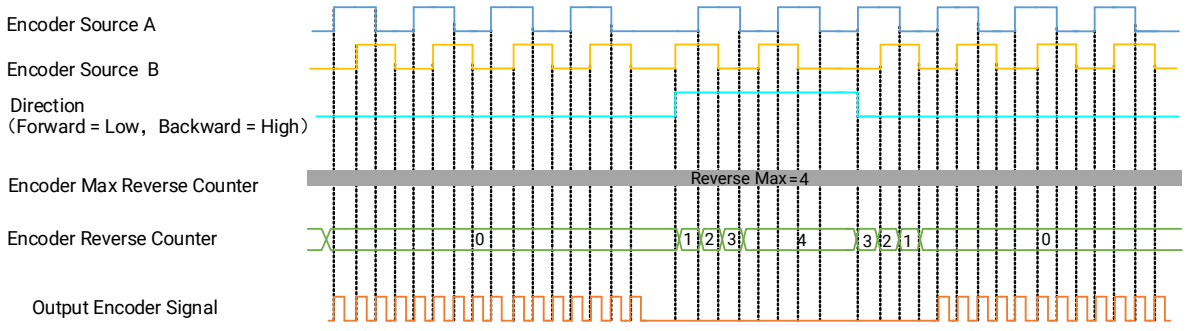

Figure 8-13 Forward Principle

- If **Encoder Trigger Mode** selects **Backward Only**, the principle is shown below.

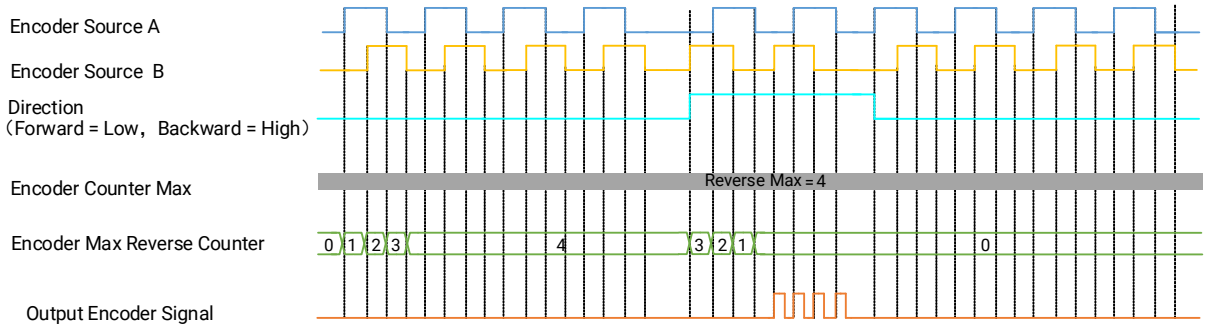

Figure 8-14 Backward Principle

- If **Encoder Trigger Mode** selects **Any Direction**, the principle is shown below.

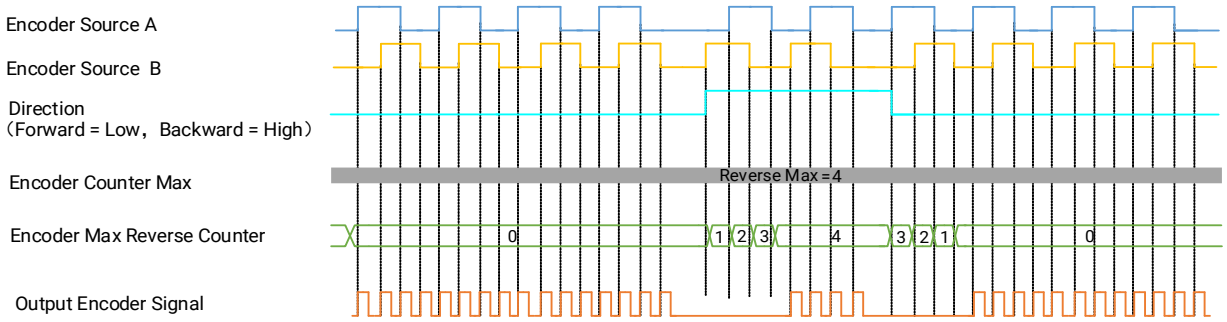

Figure 8-15 Any Direction Principle

8. Set **Encoder Trigger Line Rate (Hz)** to display the line rate of the encoder.
9. Set **Resulting Trigger Line Rate (Hz)** to display the actual line rate.
10. The encoder can count the amount of edge trigger received in real time, as shown below.

- **Encoder Rising Edge Counter** returns the rising edge counter value of selected encoder.
- **Encoder Edge Counter Reset**: Click **Execute** to reset edge counter of selected encoder.

Figure 8-16 Encoder Edge Counter

8.3 Encoder Frequency Converter Control

The encoder frequency converter can convert the encoder's signal frequency into the frame trigger signal frequency that the camera needs through the frame grabber's frequency conversion module, thus triggering the camera. The frequency conversion module includes

PreDivider, Multiplier and PostDivider.

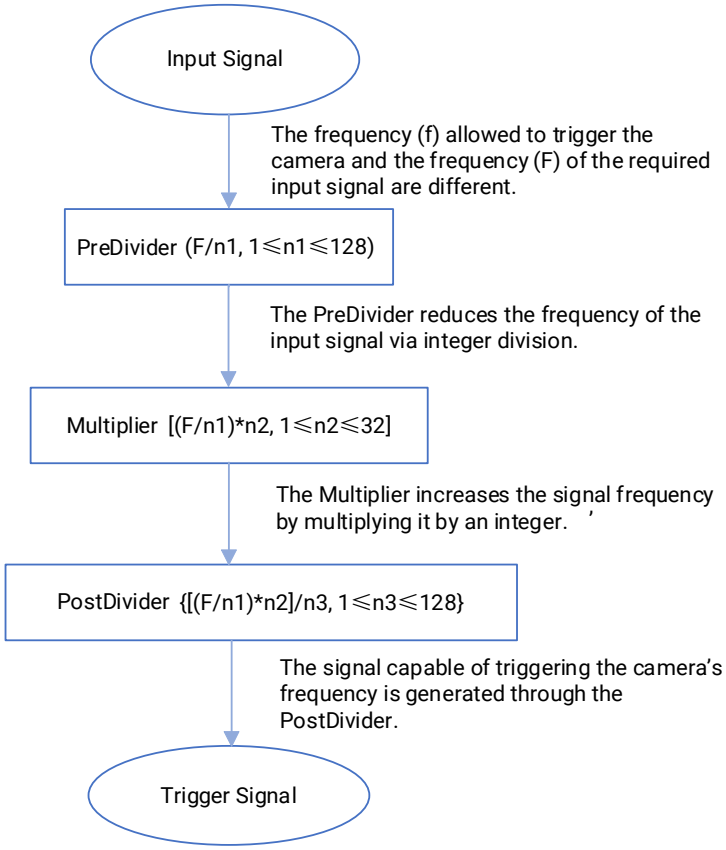

Figure 8-17 Encoder Frequency Converter Control

PreDivider

The input signal first enters the PreDivider module, which reduces source signal frequency via integer division, and then the signal is sent to the Multiplier module.
The PreDivider module reduces periodic jitter on the input signal, and signals above 100 kHz must go through the PreDivider module to reduce the frequency for the Multiplier can only receive signals in the range of 10 Hz to 100 kHz frequency range. The periodic jitter of shaft encoder signal is accepted.

Multiplier

After the signal is processed by the PreDivider, it is sent to the Multiplier. The Multiplier multiplies the signal by an integer to increase its signal frequency, and then the signal is sent to the PostDivider.

PostDivider

PostDivider reduces signal frequency via an integer factor, and uses the newly generated

frequency signal as the device's trigger signal.
The principle of encoder frequency converter is shown below.

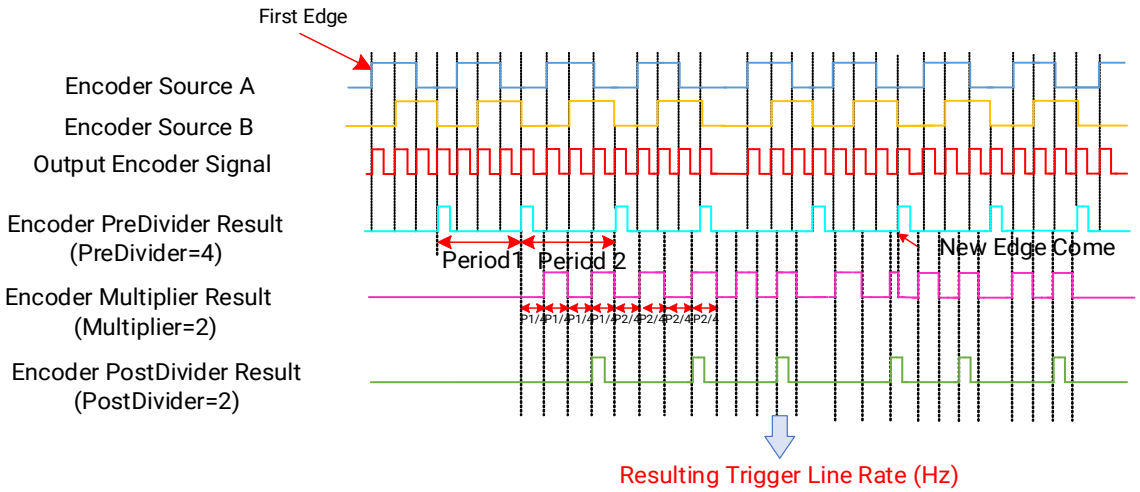

Figure 8-18 Principle of Encoder Frequency Converter

Steps

1. Go to **External Trigger**, and find encoder frequency converter related parameters.
2. Enter **Encoder PreDivider**, **Encoder Multiplier**, and **Encoder PostDivider** according to actual demands.

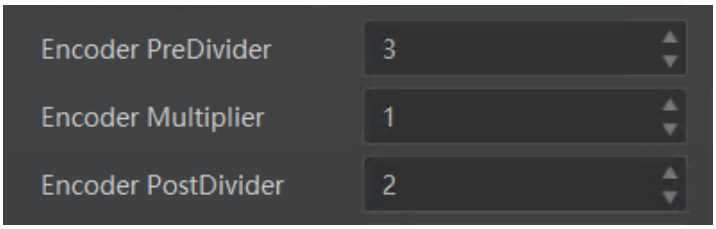

Figure 8-19 Encoder Frequency Converter Control

8.4 Timer Control

The timer control can output the corresponding signal by setting the high level and low level duration of the timer signal under the condition of setting corresponding trigger source and trigger activation.

Steps

1. Go to **Advanced Setting**, and select one timer from **Timer 0** to **Timer 3** as **Timer Selector**.
2. Set **Timer Duration(μs)** and **Timer Delay(μs)** according to actual demands. The principle of timer output is shown below.

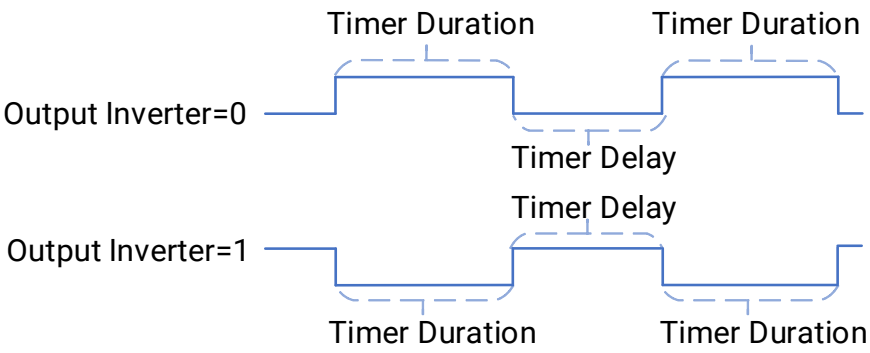

Figure 8-20 Principle of Timer Output

Note

The output signal of the timer is related to the settings of level inversion. Please set according to the demands.

3. Set **Timer Frequency(HZ)** according to actual demands. The timer signal will be outputted in cycles according to the frequency.
4. Select trigger source from **Timer Trigger Source**.

Note

- The supported timer trigger source may differ by different models of frame grabbers you use.
- If **Continuous** is selected as **Timer Trigger Source**, the frame grabber will output signal continuously according to configured duration. The trigger activation will not impact this process.

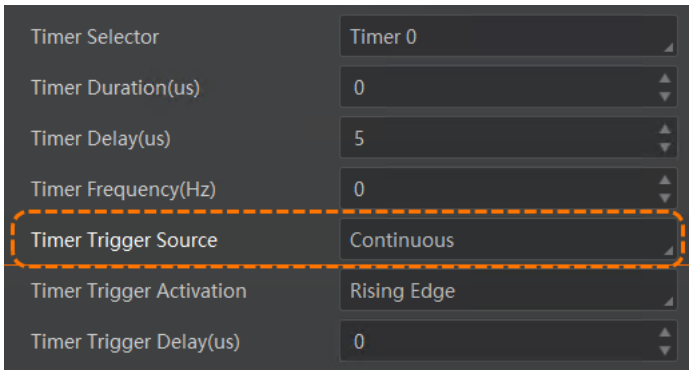

Figure 8-21 Continuous

- If **QuickSoftwareTrigger0/1/2/3** is selected as **Timer Trigger Source**, the frame grabber will receive the trigger signal after you click **Execute**.

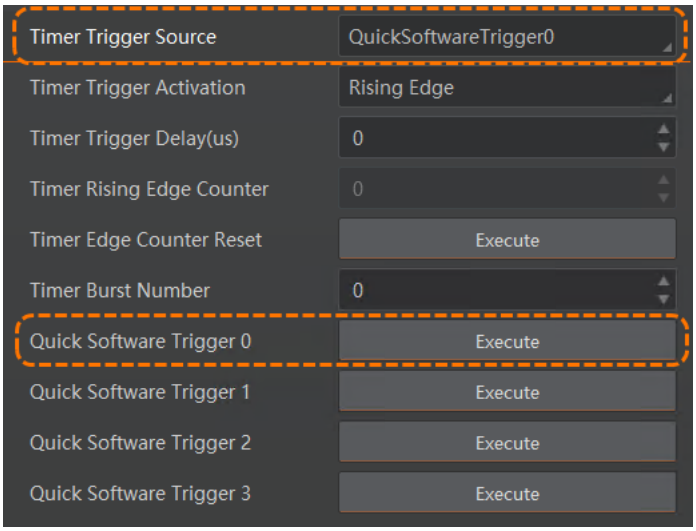

Figure 8-22 Quick Software Trigger

- If other trigger sources are selected as **Timer Trigger Source**, the frame grabber will output signal when receiving the trigger signal.

5. Set **Timer Trigger Activation** according to actual demands.

Table 8-1 Timer Trigger Activation Parameter

Timer Trigger Activation	Description
Rising Edge	When the electrical level signal given by external devices is in rising edge, the frame grabber receives the trigger source and starts to output configured timer signal.
Falling Edge	When the electrical level signal given by external devices is in falling edge, the frame grabber receives the trigger source and starts to output configured timer signal.
Any Edge	When the electrical level signal given by external devices is in rising or falling edge, the frame grabber receives the trigger source and starts to output configured timer signal.
High Level	When the electrical level signal given by external devices is in high level, the frame grabber receives the trigger source and starts to output configured timer signal.
Low Level	When the electrical level signal given by external devices is in low level, the frame grabber receives the trigger source and starts to output configured timer signal.

6. (Optional) Set **Timer Trigger Delay(us)** if you want to have a delay time of selected timer.

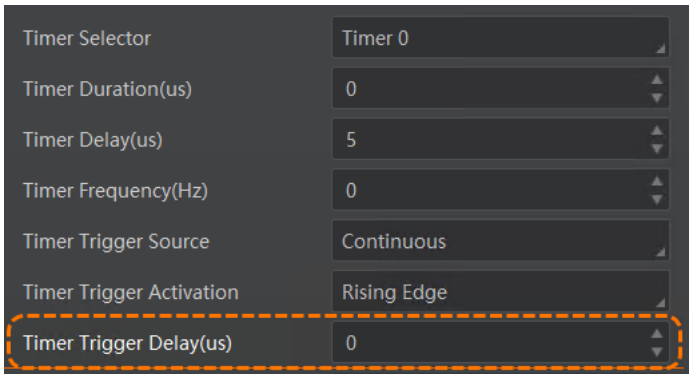

Figure 8-23 Timer Trigger Delay

7 The timer can count the amount of edge trigger received in real time, as shown below.

- **Timer Rising Edge Counter** returns the rising edge counter value of selected timer.
- **Timer Edge Counter Reset**: Click **Execute** to reset edge counter of selected timer.

Figure 8-24 Timer Edge Counter

8. (Optional) If it is necessary to set the period of the output timer signal (one rising edge and one falling edge are one period), the number of timer periods can be set via the **Timer Burst Number**, and the **Timer** of n periods can be continuously output once triggered.

8.5 Signal Countering

The signal counting function is to count the edge of selected lines (input or output signals).

Steps

1. View the number of rising edges and falling edges in real time via **Line Rising Edge Counter** and **Line Falling Edge Counter**.

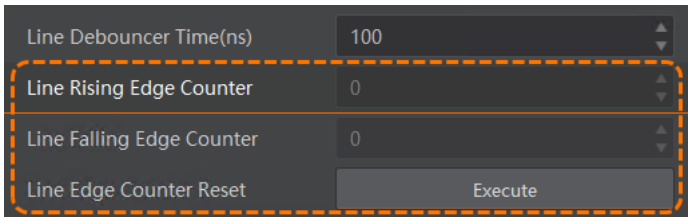

Figure 8-25 View Signal Amount

2. (Optional) Click **Execute** in **Line Edge Counter Reset** to reset counting.

8.6 Output Signal

The frame grabber supports setting multiple output signals that can be sent to external

devices via the frame grabber.

Steps

1. Go to **External Trigger**, and select **OptoCoupled Output ***, **RS422diff Output ***, or **TTL Output** in the **Line Selector** according to actual demands.

Note

For MV-GX1008, MV-GX1102, and MV-GX1104, select D485 InOut *.

2. Select **Output** as **Line Mode**.

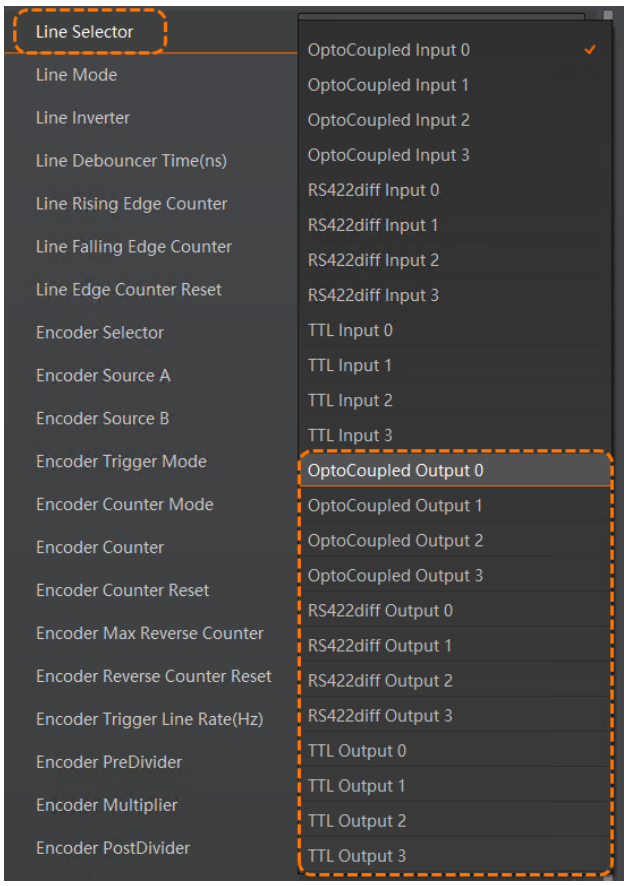

Figure 8-26 Set Output Signal

3. (Optional) Enable **Line Inverter** to invert the electrical level of selected lines.

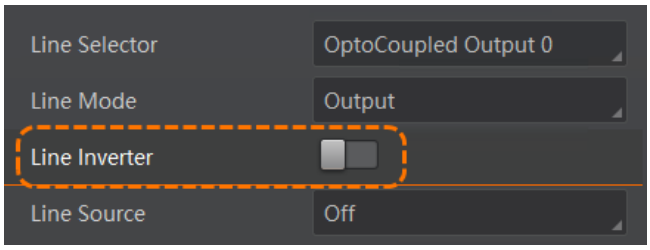

Figure 8-27 Enable Line Inverter

Note

- The line inverter is disabled by default.
- OptoCoupled Output *, RS422diff Output *, and TTL Output you selected in **Line Selector** are in high levels by default.

Take **OptpCoupled Input 0** as **Line Source** as an example and the principle of line inverter is shown below.

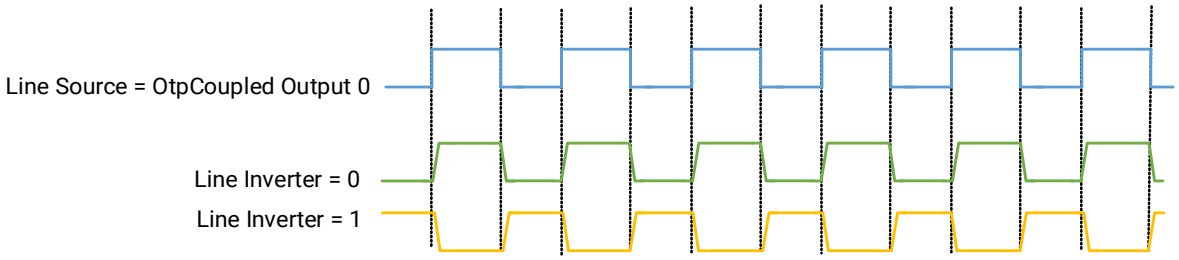

Figure 8-28 Principle

4. The frame grabber can select multiple output signal sources sent by external devices.

Note

The supported output signal source may differ by different models of frame grabbers you use.

8.7 Advanced I/O

The advanced I/O control function provides more flexible I/O logic operations based on timer control. It can control multiple advanced IO signals by logical operations such as AND or NOT of different signal sources, and output the operation result. Advanced I/O control can provide free and flexible I/O configuration for frame grabbers by configuring the A and B signal sources of I/O signals, perform AND or NOT operations on them, and output corresponding I/O control signals according to operation logic.

Steps

1. Go to **Advanced Setting** > **Advanced IO Control**.
2. Select **Advanced IO Selector** according to actual demands.

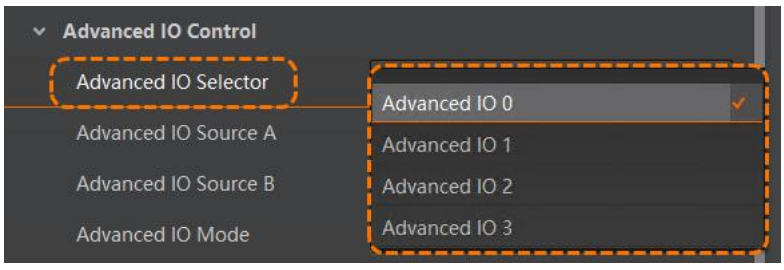

Figure 8-29 Advanced IO Selector

3. Set **Advanced IO Source A** and **Advanced IO Source B** according to actual demands.

Note

The supported signal source may differ by different models of frame grabbers you use.

4. Set **Advanced IO Mode** according to actual demands.

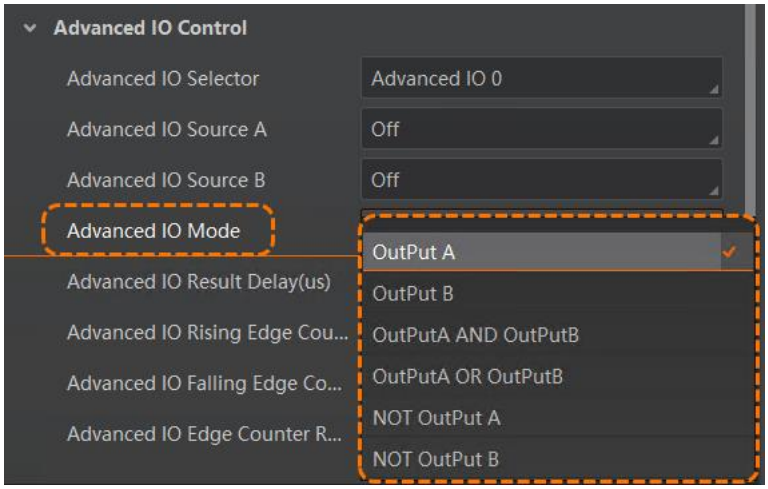

Figure 8-30 Advanced IO Mode

Table 8-2 Advanced IO Mode

Parameter Value	Description
OutPut A	Direct output of signals from **Advanced IO Source A**.
OutPut B	Direct output of signals from **Advanced IO Source B**.
OutPutA AND OutPutB	The signal source selected by **Advanced IO Source A** and **Advanced IO Source B** to perform AND operation, and then output the signal. For example, if both A and B are at high level, the output is high level.
OutPutA OR OutPutB	The signal source selected by **Advanced IO Source A** and **Advanced IO Source B** to perform OR operation, and then output the signal. For example, if one of A and B is at high level, the output is high level.
NOT OutPut A	The signal selected by **Advanced IO Source A** is output after being inverted.
NOT OutPut B	The signal selected by **Advanced IO Source B** is output after being inverted.

The principle of advanced IO mode is shown below.

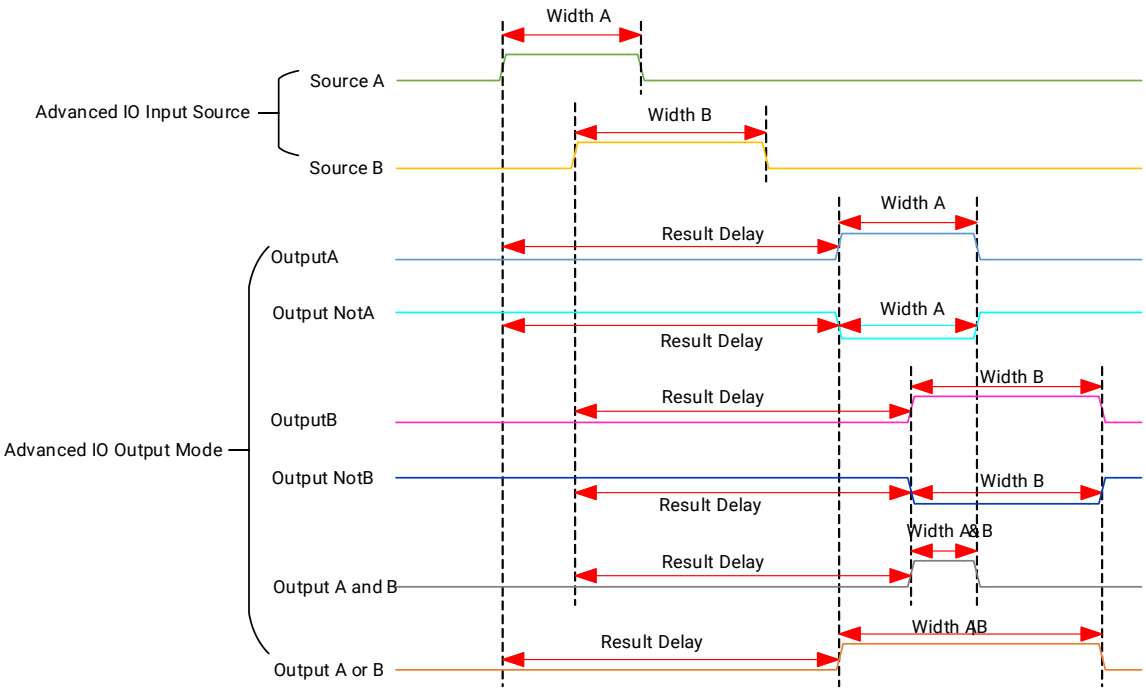

Figure 8-31 Principle of Advanced IO Mode

5. (Optional) Set **Advanced IO Result Delay(us)** if you want to delay for some time.

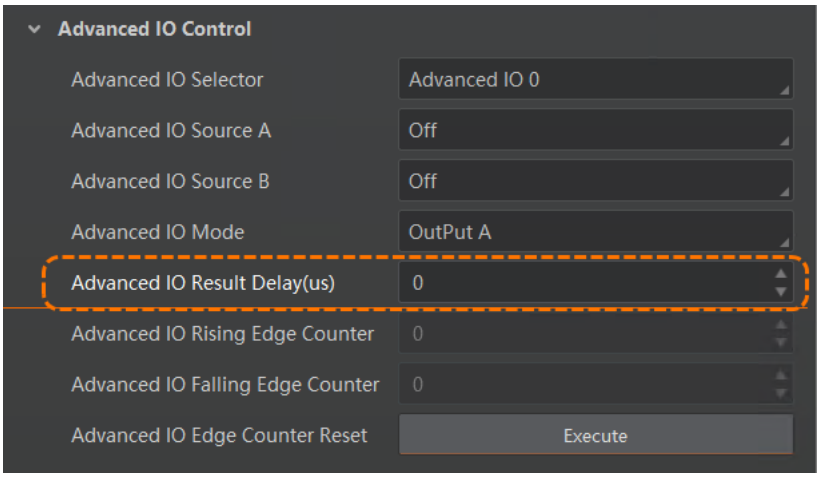

Figure 8-32 Set Advanced IO Result Delay

6. View the signal amount of rising edge and falling edge in real time via **Advanced IO Rising**

Edge Counter and **Advanced IO Falling Edge Counter**.

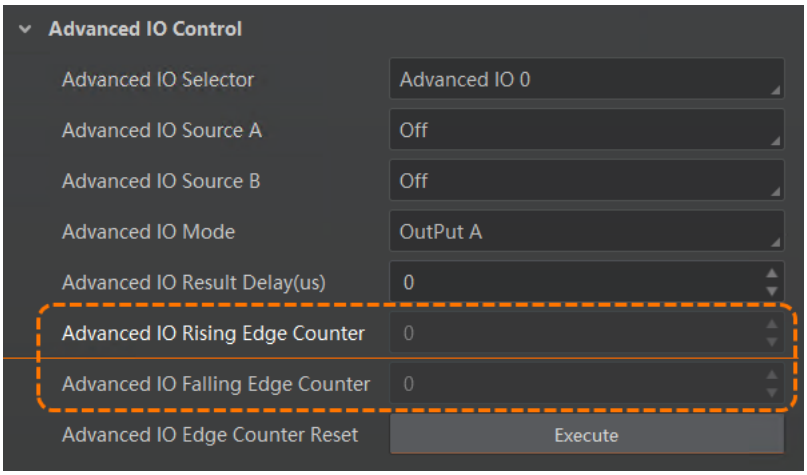

Figure 8-33 View Signal Amount

7. (Optional) Click **Execute** in **Advanced IO Edge Counter Reset** to reset counting.

Chapter 9 Link Trigger

The frame grabber uses the link trigger function to let the camera acquire images. The frame grabber has 4 DIN CoaXPress connectors, and you can select and set the corresponding connectors according to actual demands.
Take **Timer 0** as **Link Trigger** as an example and the principle of the Link Trigger is shown below.

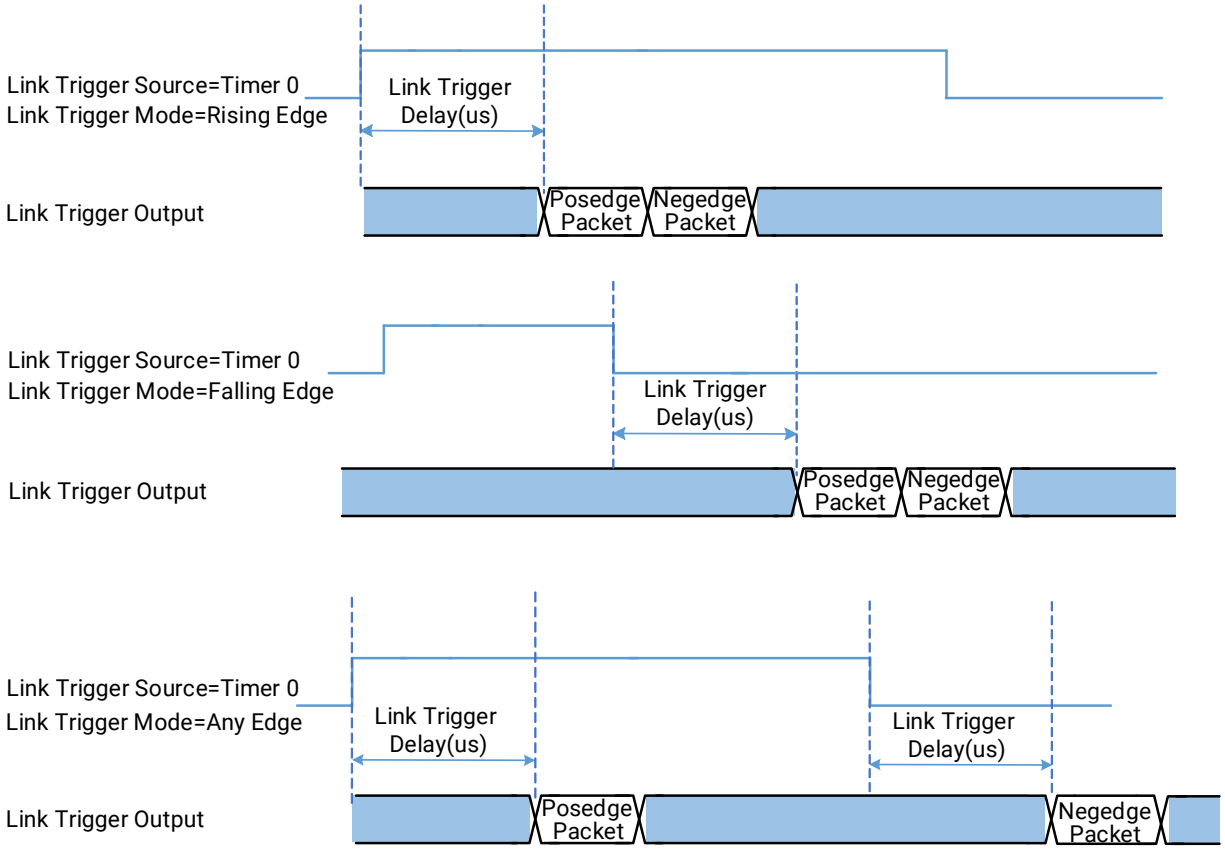

Figure 9-1 Principle of Link Trigger

Note

- For the camera with DIN CoaXPress connector, you should select **Link Trigger 0** as **Trigger Source** and enable the trigger source. Refer to the *CoaXPress Area Scan Camera User Manual* for details.
- As the edge signal of frame grabber input source, Link Trigger sends the edge signal data packet to the camera. Only the main Link (CXP-1 connector) of the camera can receive the Link Trigger.

9.1 Select Link

Steps

1. Go to **Advanced Setting** and select **Link Selector** according to actual demands.

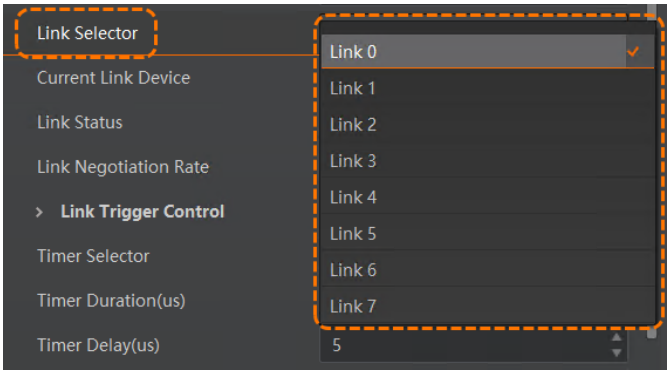

Figure 9-2 Link Selector

Note

Link 0 to **Link 7** correspond to CH0 to CH7 connectors respectively.

2. View **Current Link Device** that displays the connected camera via **Link Selector** you selected.
3. View link status and negotiation rate via **Link Status** and **Link Negotiation Rate**.

The code below shows the process of link selecting.

```
MV_INTERFACE_INFO_LIST stInterfaceList = {0};

MV_CC_EnumInterfaces(MV_CXP_INTERFACE, &stInterfaceList);

unsigned int nInterfaceIndex = 0;

void* hInterface = NULL;

MV_CC_CreateInterface(&hInterface, stInterfaceList.pInterfaceInfos[nInterfaceIndex]);

MV_CC_OpenInterface(hInterface, NULL);


MV_CC_SetEnumValueByString(hInterface,"LinkSelector","Link0");


MV_CC_CloseInterface(hInterface);

MV_CC_DestroyInterface(hInterface);
```

9.2 Select Link Trigger

Steps

1. Go to **Advanced Setting** > **Link Trigger Control**.
2. Select **Link Trigger Selector** according to actual demands.

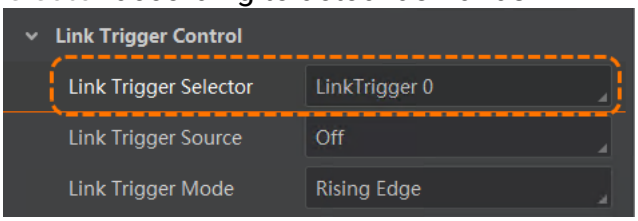

Figure 9-3 Link Trigger Selector

Note

The **LinkTrigger 0** can be selected. One DIN CoaXPress connector can be configured with one link trigger.

The code below shows the process of link trigger.

```
MV_INTERFACE_INFO_LIST stInterfaceList = {0};

MV_CC_EnumInterfaces(MV_CXP_INTERFACE, &stInterfaceList);

unsigned int nInterfaceIndex = 0;

void* hInterface = NULL;

MV_CC_CreateInterface(&hInterface, stInterfaceList.pInterfaceInfos[nInterfaceIndex]);

MV_CC_OpenInterface(hInterface, NULL);


MV_CC_SetEnumValueByString(hInterface,"LinkTriggerSelector","LinkTrigger0");


MV_CC_CloseInterface(hInterface);

MV_CC_DestroyInterface(hInterface);
```

9.3 Trigger Source

The trigger source includes software trigger, quick software trigger, hardware trigger, encoder trigger, timer trigger, and advanced I/O control.

Steps

1. Go to **Advanced Setting** > **Link Trigger Control**.
2. Select **Link Trigger Source** according to actual demands.

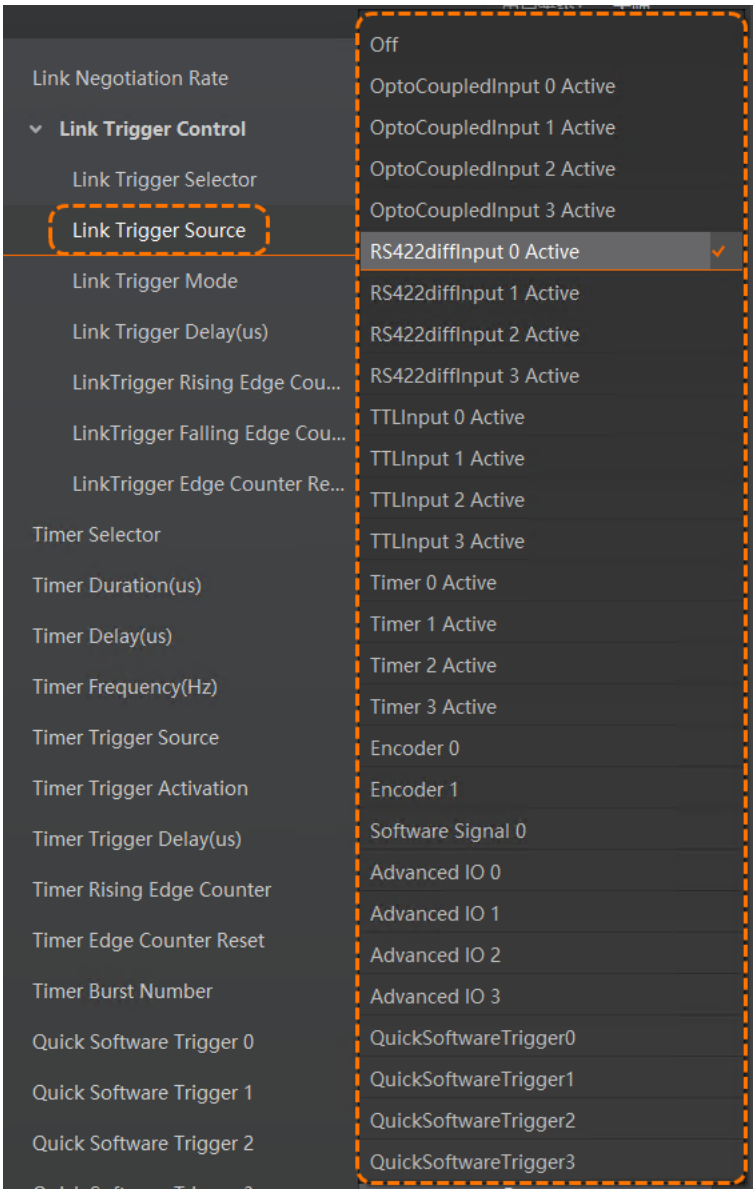

Figure 9-4 Link Trigger Source

Table 9-1 Link Trigger Source Description

Trigger Source	Parameter Value	Principle
Software Trigger	Software Signal 0	The frame grabber sends data packet to the camera to acquire images by manual executing.
Quick Software Trigger	QuickSoftwareTrigger0/1/2/3	
Hardware Trigger	• MV-GX1002 and MV-GX1004: - OptoCoupled Input 0/1/2/3 Active - RS422diff Input 0/1/2/3 Active - TTL Input 0/1/2/3 Active	The trigger source created by the frame grabber sends data packet to camera to acquire images.

Trigger Source	Parameter Value	Principle
	• MV-GX1008, MV-GX1102, and MV-GX1104: D485 Input 0 to D485 Input 10	
Encoder Trigger	Encoder 0/1	The frame grabber sends data packet to camera via the encoder to acquire images.
Timer Trigger	Timer 0/1/2/3 Active	The frame grabber sends data packet to camera via the timer to acquire images.
Advanced I/O Control	Advanced IO 0/1/2/3	The frame grabber sends data packet to camera or external I/O via the advanced I/O control to acquire images.
None	Off	Close the frame grabber's external trigger.

Note

You can refer to section ***Trigger Related Parameters*** to set trigger activation and trigger delay after you select the link trigger.

9.3.1 Software Trigger

1. Go to **Link Trigger Control**.
2. Select **Software Signal 0** as **Link Trigger Source**, and click **Execute** in **Link Trigger Software** to send trigger commands.

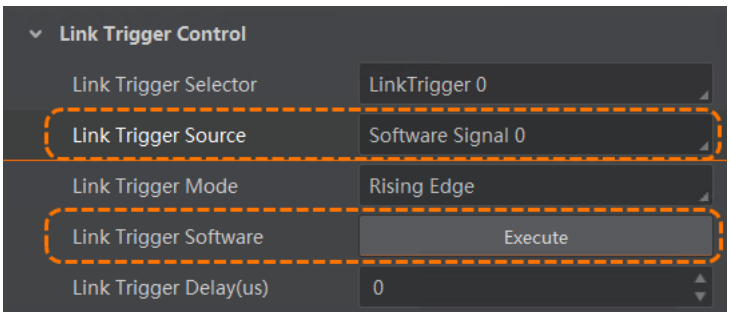

Figure 9-5 Software Trigger

The code below shows the process of setting software trigger as link trigger source.

```
MV_INTERFACE_INFO_LIST stInterfaceList = {0};

MV_CC_EnumInterfaces(MV_CXP_INTERFACE, &stInterfaceList);

unsigned int nInterfaceIndex = 0;
```

```
void* hInterface = NULL;

MV_CC_CreateInterface(&hInterface, stInterfaceList.pInterfaceInfos[nInterfaceIndex]);

MV_CC_OpenInterface(hInterface, NULL);


MV_CC_SetEnumValueByString(hInterface,"LinkTriggerSource","SoftwareSignal0");

MV_CC_SetCommandValue(hInterface,"LinkTriggerSoftware");


MV_CC_CloseInterface(hInterface);

MV_CC_DestroyInterface(hInterface);
```

9.3.2 Quick Software Trigger

1. Go to **Link Trigger Control**.
2. Select **QuickSoftwareTrigger0/1/2/3** as **Link Trigger Source**, and click **Execute** in the correspond parameter to send trigger commands.

Note

Compared with the software trigger, the quick software trigger has a faster trigger speed.

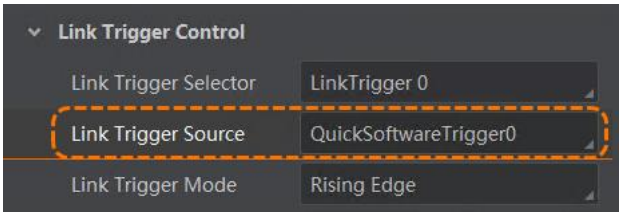

Figure 9-6 Quick Software Trigger

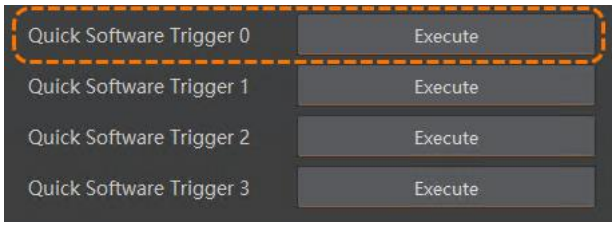

Figure 9-7 Execute Quick Software Trigger

The code below shows the process of setting quick software trigger as link trigger source.

```
MV_INTERFACE_INFO_LIST stInterfaceList = {0};

MV_CC_EnumInterfaces(MV_CXP_INTERFACE, &stInterfaceList);

unsigned int nInterfaceIndex = 0;

void* hInterface = NULL;
```

```
MV_CC_CreateInterface(&hInterface, stInterfaceList.pInterfaceInfos[nInterfaceIndex]);

MV_CC_OpenInterface(hInterface, NULL);


MV_CC_SetEnumValueByString(hInterface,"LinkTriggerSource","QuickSoftwareTrigger0");

MV_CC_SetCommandValue(hInterface,"QuickSoftwareTrigger0");


MV_CC_CloseInterface(hInterface);

MV_CC_DestroyInterface(hInterface);
```

9.3.3 Hardware Trigger

Hardware trigger signal sources are different for frame grabbers of different models.

- MV-GX1002 and MV-GX1004: You can configure 4 opto-isolated input signals, 4 RS-422 input signals, and 4 TTL input signals as the trigger signal source.
- MV-GX1008, MV-GX1102, and MV-GX1104: You can configure 11 differential input/output signals as the trigger signal source.

Steps

Note

Here we take **OptoCoupled Input 1 Active** as the trigger source for MV-GX1004 as an example to set hardware trigger.

1. Go to **Link Trigger Control**.
2. Select **OptoCoupled Input 1 Active** as **Link Trigger Source**.

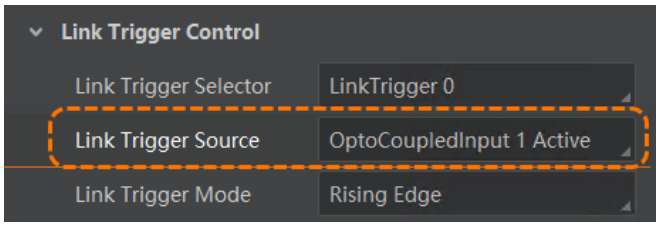

Figure 9-8 Hardware Trigger

The code below shows the process of setting hardware trigger as link trigger source.

```
MV_INTERFACE_INFO_LIST stInterfaceList = {0};

MV_CC_EnumInterfaces(MV_CXP_INTERFACE, &stInterfaceList);

unsigned int nInterfaceIndex = 0;

void* hInterface = NULL;

MV_CC_CreateInterface(&hInterface, stInterfaceList.pInterfaceInfos[nInterfaceIndex]);

MV_CC_OpenInterface(hInterface, NULL);
```

```
MV_CC_SetEnumValueByString(hInterface,"LinkTriggerSource","OptoCoupledInput0");


MV_CC_CloseInterface(hInterface);
MV_CC_DestroyInterface(hInterface);
```

9.3.4 Encoder Trigger

When the frame grabber uses encoder trigger, the external device sends trigger signal to the frame grabber, and the frame grabber sends the signal to the camera after processing according to the configuration of the encoder. Finally, the camera receives trigger commands to acquire images.

Steps

1. Go to **Link Trigger Control**.
2. Select **Encoder 0/1** as **Link Trigger Source**.

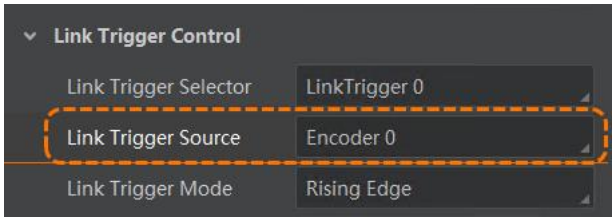

Figure 9-9 Encoder Trigger

The code below shows the process of setting encoder trigger as link trigger source.

```
MV_INTERFACE_INFO_LIST stInterfaceList = {0};
MV_CC_EnumInterfaces(MV_CXP_INTERFACE, &stInterfaceList);
unsigned int nInterfaceIndex = 0;
void* hInterface = NULL;
MV_CC_CreateInterface(&hInterface, stInterfaceList.pInterfaceInfos[nInterfaceIndex]);
MV_CC_OpenInterface(hInterface, NULL);


MV_CC_SetEnumValueByString(hInterface,"LinkTriggerSource","Encoder0");


MV_CC_CloseInterface(hInterface);
MV_CC_DestroyInterface(hInterface);
```

9.3.5 Timer Trigger

When the frame grabber uses timer trigger, the frame grabber sends the signal to the camera after processing according to the configuration of the timer. Finally, the camera receives trigger commands to acquire images.

Steps

1. Go to **Link Trigger Control**.
2. Select **Timer 0/1/2/3 Active** as **Link Trigger Source**.

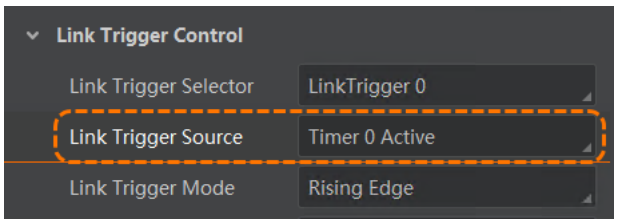

Figure 9-10 Timer Trigger

The code below shows the process of setting timer trigger as link trigger source.

```
MV_INTERFACE_INFO_LIST stInterfaceList = {0};

MV_CC_EnumInterfaces(MV_CXP_INTERFACE, &stInterfaceList);

unsigned int nInterfaceIndex = 0;

void* hInterface = NULL;

MV_CC_CreateInterface(&hInterface, stInterfaceList.pInterfaceInfos[nInterfaceIndex]);

MV_CC_OpenInterface(hInterface, NULL);


MV_CC_SetEnumValueByString(hInterface,"LinkTriggerSource","Timer0Active");


MV_CC_CloseInterface(hInterface);

MV_CC_DestroyInterface(hInterface);
```

9.3.6 Advanced I/O Control

When the frame grabber uses advanced I/O control, the frame grabber sends the signal to the camera after processing according to the configuration of the advanced I/O. Finally, the camera receives trigger commands to acquire images.

Steps

1. Go to **Link Trigger Control**.
2. Select **Advanced IO 0/1/2/3** as **Link Trigger Source**.

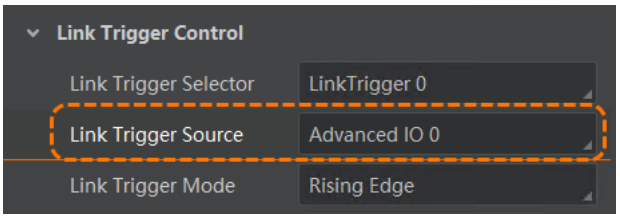

Figure 9-11 Advanced I/O Control

The code below shows the process of setting advanced I/O as link trigger source.

```
MV_INTERFACE_INFO_LIST stInterfaceList = {0};

MV_CC_EnumInterfaces(MV_CXP_INTERFACE, &stInterfaceList);

unsigned int nInterfaceIndex = 0;

void* hInterface = NULL;

MV_CC_CreateInterface(&hInterface, stInterfaceList.pInterfaceInfos[nInterfaceIndex]);

MV_CC_OpenInterface(hInterface, NULL);


MV_CC_SetEnumValueByString(hInterface,"LinkTriggerSource","AdvancedIO0");


MV_CC_CloseInterface(hInterface);

MV_CC_DestroyInterface(hInterface);
```

9.4 Trigger Related Parameters

You can set trigger activation and trigger delay after enabling and selecting specific link trigger source. All trigger sources support setting trigger delay and trigger activation.

9.4.1 Trigger Activation

The frame grabber supports setting the trigger activation of the trigger source. When the electrical level signal given by external devices is in selected edge, the frame grabber sends the corresponding edge trigger packet to camera to acquire images.

Steps

1. Go to **Link Trigger Control**.
2. Select **Link Trigger Mode** according to actual demands.

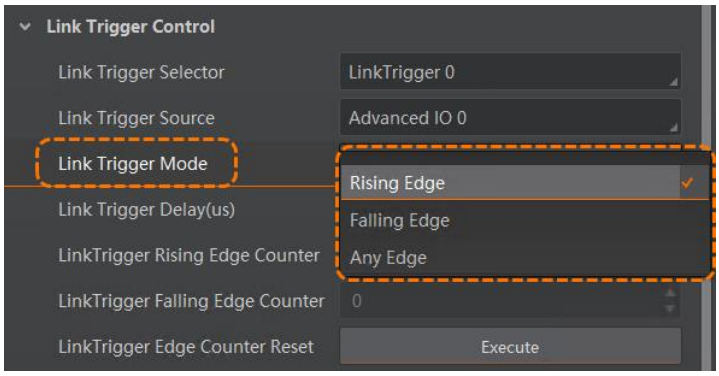

Figure 9-12 Trigger Activation

Table 9-2 Trigger Activation Parameter

Trigger Activation	Description
Rising Edge	When the electrical level signal given by external devices is in rising edge, the frame grabber sends rising edge trigger packet to camera to acquire images.
Falling Edge	When the electrical level signal given by external devices is in falling edge, the frame grabber sends falling edge trigger packet to camera to acquire images.
Any Edge	When the electrical level signal given by external devices is in rising or falling edge, the frame grabber sends rising or falling edge trigger packet to camera to acquire images.

Note

Software trigger and quick software trigger support rising edge and falling edge only, and other trigger sources support these three trigger activation types.

3. (Optional) The frame grabber can execute edge counter of the selected link.
   - **LinkTrigger Rising Edge Counter** returns the rising edge counter value of the selected link.
   - **LinkTrigger Falling Edge Counter** returns falling edge counter value of the selected link.
   - **LinkTrigger Edge Counter Reset**: Click **Execute** to reset edge counter of selected link.

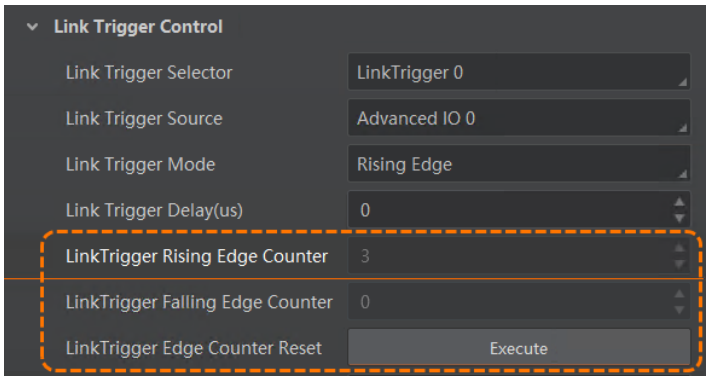

Figure 9-13 Link Trigger Edge Counter

The code below shows the process of setting trigger activation.

```
MV_INTERFACE_INFO_LIST stInterfaceList = {0};

MV_CC_EnumInterfaces(MV_CXP_INTERFACE, &stInterfaceList);

unsigned int nInterfaceIndex = 0;

void* hInterface = NULL;

MV_CC_CreateInterface(&hInterface, stInterfaceList.pInterfaceInfos[nInterfaceIndex]);

MV_CC_OpenInterface(hInterface, NULL);


MV_CC_SetEnumValueByString(hInterface,"LinkTriggerMode","RisingEdge");


MV_CC_CloseInterface(hInterface);

MV_CC_DestroyInterface(hInterface);
```

9.4.2 Trigger Delay

Trigger delay means that the frame grabber receives the trigger source, and then sends the trigger signal to the camera after configured trigger delay time.

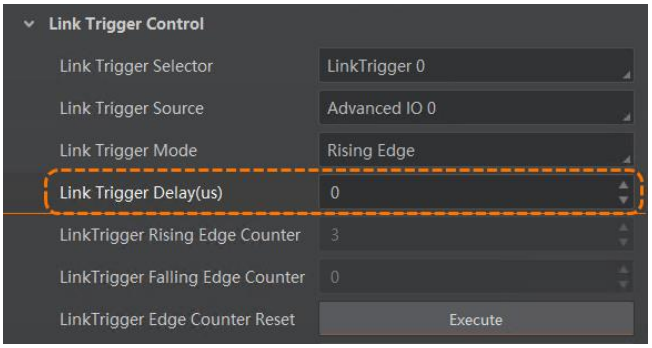

Figure 9-14 Trigger Delay

The code below shows the process of setting trigger delay.

```
MV_INTERFACE_INFO_LIST stInterfaceList = {0};
MV_CC_EnumInterfaces(MV_CXP_INTERFACE, &stInterfaceList);
unsigned int nInterfaceIndex = 0;
void* hInterface = NULL;
MV_CC_CreateInterface(&hInterface, stInterfaceList.pInterfaceInfos[nInterfaceIndex]);
MV_CC_OpenInterface(hInterface, NULL);


MV_CC_SetIntValueEx(hInterface,"LinkTriggerDelay",100);


MV_CC_CloseInterface(hInterface);
MV_CC_DestroyInterface(hInterface);
```

Chapter 10 Frame Grabber Trigger

10.1 Stream

The frame grabber can send a trigger command to the camera for acquiring images. It is necessary to configure the relevant parameters of the frame grabber's trigger function.

Steps

1. Go to **BasicSetting** > **Stream Selector**, and select the corresponding stream.

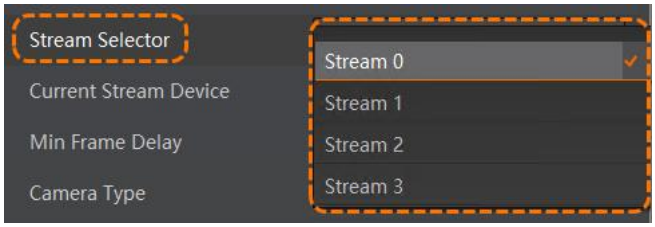

Figure 10-1 Stream Selector

Note

- **Stream 0 to Stream 7** correspond to cameras that are displayed in **Current Stream Device**.
- The supported stream quantity may differ by different models of frame grabbers you use.

2. (Optional) Enable or disable **Min. Frame Delay** according to actual demands.
- If **Min. Frame Delay** is enabled, the client software will always cache the new image data in the image space to be sent, and discard the unsent image data directly.
- If **Min. Frame Delay** is disabled, and the latest image data will be cached in the unsent buffer space. If the cached data in the buffer space reaches the upper limit, the old unsent images will be discarded and new images will be cached.

3. Select **Frame Scan** or **Line Scan** in the **Camera Type** according to actual demands.

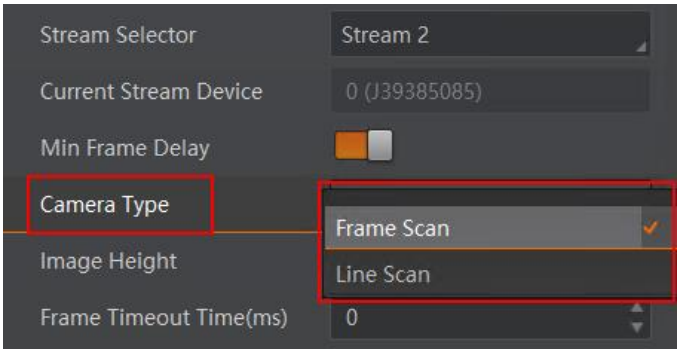

Figure 10-2 Set Camera Type

- **Frame Scan**: The frame grabber acquires images according to the valid frame signal sent by the camera. This function is suitable for industrial area cameras, and industrial line

cameras with Frame Scan.

- **Line Scan**: The frame grabber acquires images according to the valid line signal sent by the camera. This function is suitable for industrial line cameras with Line Scan.

Note

Regarding the line camera, you can set its scan mode to acquire images. Some models of line cameras support frame scan only.

4. (Optional) If you select **Line Scan** as **Camera Type**, set **Image Height** to configure the height of output images.

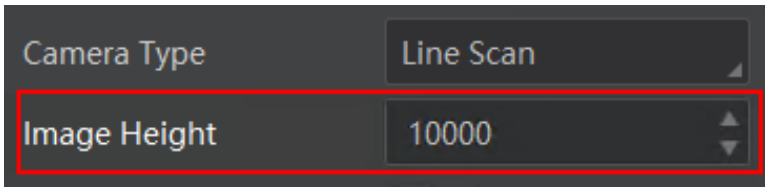

Figure 10-3 Set Image Height

5. Enter **Frame Timeout Time(ms)** according to actual demands. If the camera's image height is received fully within the configured **Frame Timeout Time**, the frame is output normally. Otherwise, the actual frame received will be output.

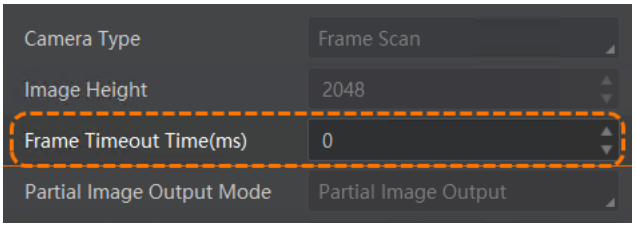

Figure 10-4 Frame Timeout Time

6. (Optional) Set **Frame Cache Number Max** to configure frame cache number according to actual demands, and you can view the actual effect in **Actual Cache Frame Number**.

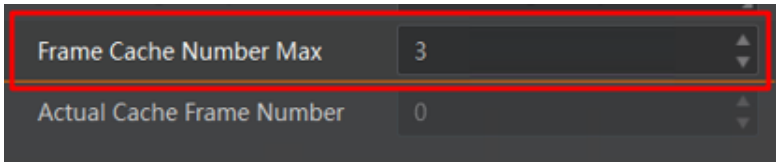

Figure 10-5 Frame Cache Number Max and Actual Cache Frame Number

Note

The default value of **Frame Cache Number Max** is 3.

7. Set **Partial Image Output Mode** according to actual demands.

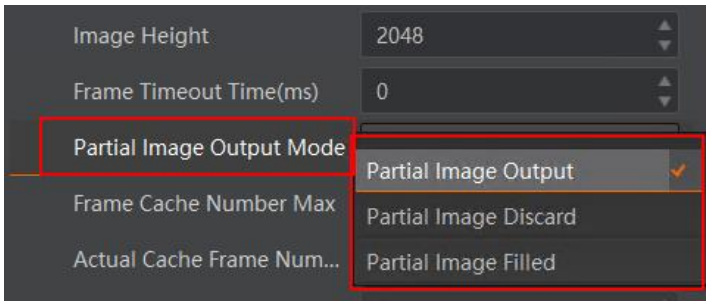

Figure 10-6 Partial Image Output Mode

Table 10-1 Partial Image Output Mode Description

Parameter	Description
Partial Image Output	● If the number of lines output by the device reaches the configured image height (height parameter) within the frame timeout period, one frame of image will be output. ● If the number of lines output by the device does not reach the configured image height (height parameter) within the frame timeout period, the SDK will output the image according to the actual height.
Partial Image Discard	● If the number of lines output by the device reaches the configured image height (height parameter) within the frame timeout period, one frame of image will be output. ● If the number of lines output by the device does not reach the configured image height (height parameter) within the frame timeout period, the SDK discards the image.
Partial Image Filled	● If the number of lines output by the device reaches the configured image height (height parameter) within the frame timeout period, one frame of image will be output. ● If the number of lines output by the device does not reach the configured image height (height parameter) within the frame timeout period, the SDK will output the image after filling the black according to the height parameter for the remaining part.

10.2 Set Stream Trigger

Go to **Advanced Setting** > **Stream Trigger Selector**, and select the stream (**Stream 0** to **Stream 3**) to be configured.

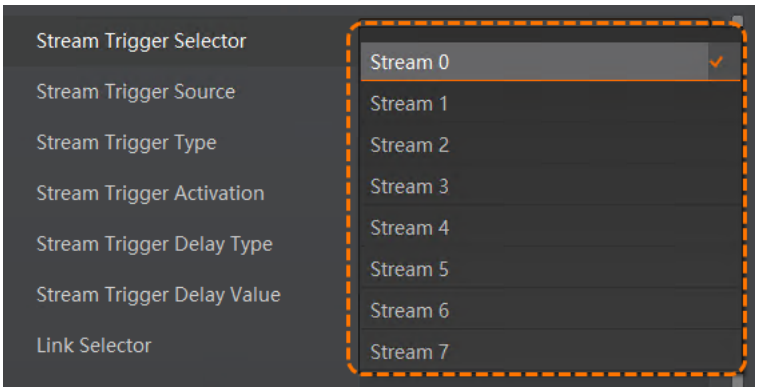

Figure 10-7 Stream Trigger Selector

10.3 Set Trigger Source

The trigger source includes software trigger, quick software trigger, hardware trigger, encoder trigger, timer trigger, and advanced I/O control.

Steps

1. Go to **Advanced Setting** > **Stream Trigger Source**.
2. Select **Stream Trigger Source** according to actual demands.

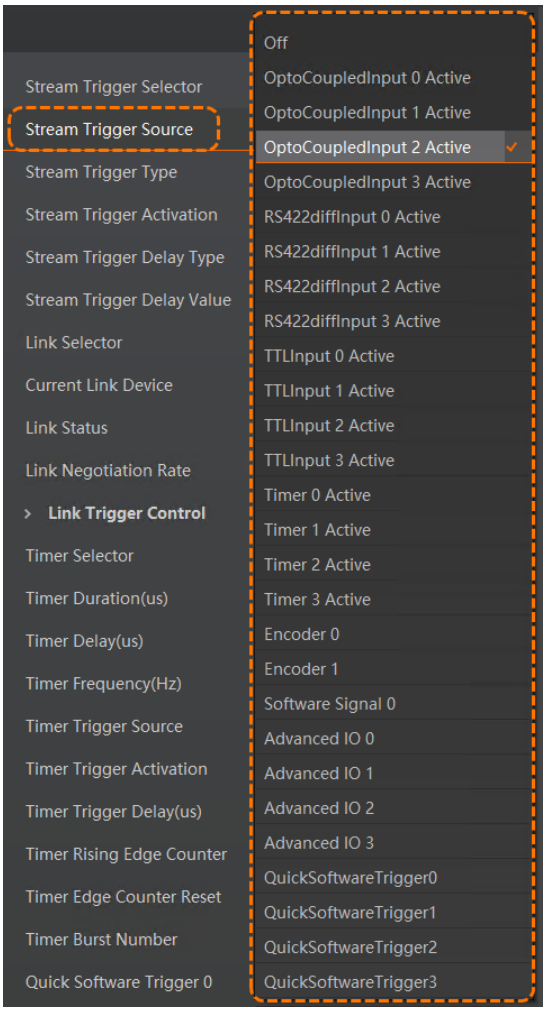

Figure 10-8 Stream Trigger Source

Table 10-2 Stream Trigger Source Description

Trigger Source	Parameter Value	Principle
Software Trigger	Software Signal 0	The frame grabber sends data packet to the camera to acquire images by manual executing.
Quick Software Trigger	QuickSoftwareTrigger0/1/2/3	
Hardware Trigger	• MV-GX1002 and MV-GX1004: - OptoCoupled Input 0/1/2/3 Active - RS422diff Input 0/1/2/3 Active - TTL Input 0/1/2/3 Active • MV-GX1008, MV-GX1102, and MV-GX1104: D485 Input 0 to D485 Input 10	The trigger source created by the frame grabber sends data packet to the camera to acquire images.
Encoder Trigger	Encoder 0/1	The frame grabber sends data

Trigger Source	Parameter Value	Principle
		packet to the camera via the encoder to acquire images.
Timer Trigger	Timer 0/1/2/3 Active	The frame grabber sends data packet to the camera via the timer to acquire images.
Advanced I/O Control	Advanced IO 0/1/2/3	The frame grabber sends data packet to the camera or external I/O via advanced I/O control to acquire images.
None	Off	Close the frame grabber's external trigger.

3. Select **Stream Trigger Type** according to actual demands.

- **Fixed Line**: If the frame grabber receives an edge trigger signal, it outputs image data according to the configured line height (Image Height parameter). The stream trigger activation supports **Low Level**, **High Level**, **Rising Edge**, and **Falling Edge**.
- **Variable Line**: If the frame grabber receives a level trigger, it outputs image data according to the actual number of lines of the level signal. The stream trigger activation supports **Low Level**, **High Level**, **Rising Edge**, and **Falling Edge**.

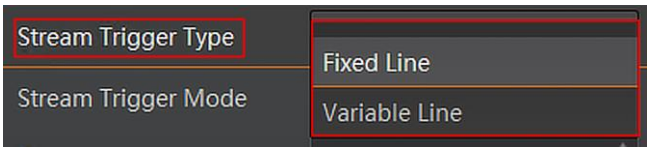

Figure 10-9 Set Stream Trigger Type

Note

You can refer to section ***Set Trigger Related Parameters*** to set trigger activation and trigger delay after you select the trigger source.

When the **Fixed Line** is selected as the **Stream Trigger Type**, the **Rising Edge** as the **Stream Trigger Activation**, and the **Partial Image Output** as the **Partial Image Output Mode**, the

diagram of image output principle is shown below.

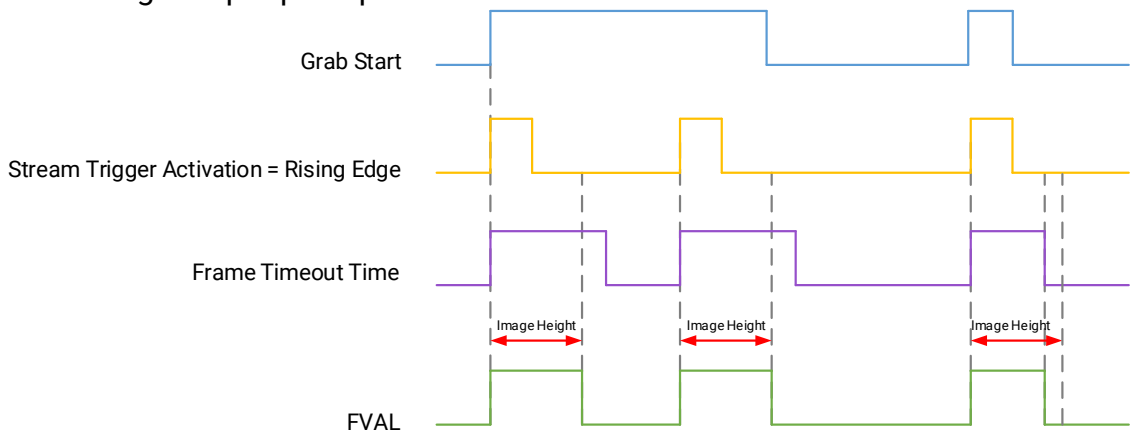

Figure 10-10 Image Output Principle

10.3.1 Set Software Trigger

Steps

1. Go to **Advanced Setting** > **Stream Trigger Source**.
2. Select **Software Signal 0** as **Stream Trigger Source**, and click **Execute** in **Stream Software Trigger** to send trigger commands.

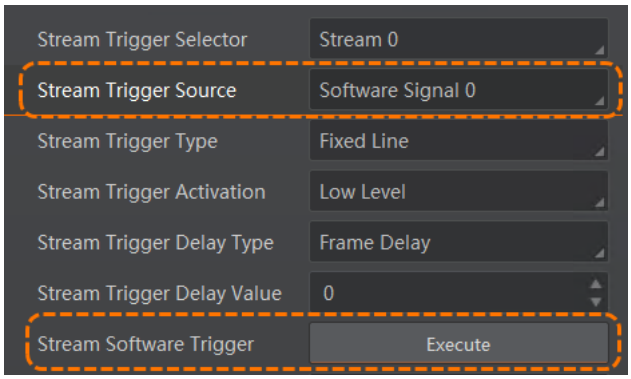

Figure 10-11 Software Trigger

The code below shows the process of selecting software as trigger source.

```
MV_INTERFACE_INFO_LIST stInterfaceList = {0};

MV_CC_EnumInterfaces(MV_CXP_INTERFACE, &stInterfaceList);

unsigned int nInterfaceIndex = 0;

void* hInterface = NULL;

MV_CC_CreateInterface(&hInterface, stInterfaceList.pInterfaceInfos[nInterfaceIndex]);

MV_CC_OpenInterface(hInterface, NULL);
```

```
MV_CC_SetEnumValueByString(hInterface,"StreamTriggerSource","SoftwareSignal0");

MV_CC_SetCommandValue(hInterface,"StreamSoftwareTrigger");



MV_CC_CloseInterface(hInterface);

MV_CC_DestroyInterface(hInterface);
```

10.3.2 Set Quick Software Trigger

Steps

1. Go to **Advanced Setting** > **Stream Trigger Source**.
2. Select **QuickSoftwareTrigger0/1/2/3** as **Stream Trigger Source**, and click **Execute** in the correspond parameter to send trigger commands.

Note

Compared with the software trigger, the quick software trigger has a faster trigger speed.

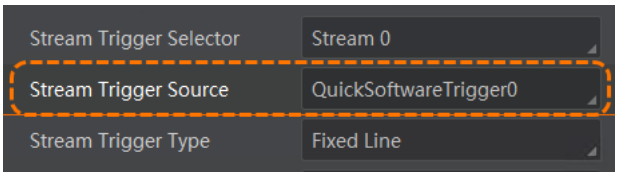

Figure 10-12 Quick Software Trigger

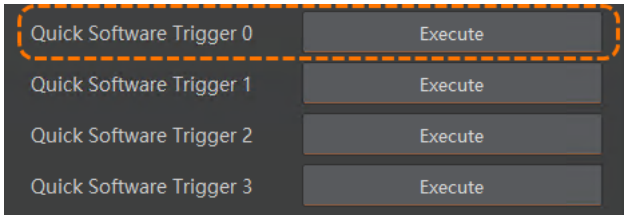

Figure 10-13 Execute Quick Software Trigger

The code below shows the process of setting quick software as trigger source.

```
MV_INTERFACE_INFO_LIST stInterfaceList = {0};

MV_CC_EnumInterfaces(MV_CXP_INTERFACE, &stInterfaceList);

unsigned int nInterfaceIndex = 0;

void* hInterface = NULL;

MV_CC_CreateInterface(&hInterface, stInterfaceList.pInterfaceInfos[nInterfaceIndex]);

MV_CC_OpenInterface(hInterface, NULL);



MV_CC_SetEnumValueByString(hInterface,"StreamTriggerSource","QuickSoftwareTrigger0");
```

```
MV_CC_SetCommandValue(hInterface,"QuickSoftwareTrigger0");


MV_CC_CloseInterface(hInterface);
MV_CC_DestroyInterface(hInterface);
```

10.3.3 Set Hardware Trigger

Hardware trigger signal sources are different for frame grabbers of different models.

- MV-GX1002 and MV-GX1004: You can configure 4 opto-isolated input signals, 4 RS-422 input signals, and 4 TTL input signals as the trigger signal source.
- MV-GX1008, MV-GX1102, and MV-GX1104: You can configure 11 differential input/output signals as the trigger signal source.

Steps

Note

Here we take **OptoCoupled Input 1 Active** as the trigger source for MV-GX1004 as an example to set hardware trigger.

1. Go to **Advanced Setting** > **Stream Trigger Source**.
2. Select **OptoCoupled Input 1 Active** as **Stream Trigger Source**.

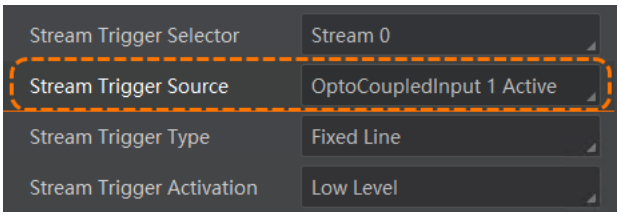

Figure 10-14 Hardware Trigger

The code below shows the process of selecting hardware as trigger source.

```
MV_INTERFACE_INFO_LIST stInterfaceList = {0};
MV_CC_EnumInterfaces(MV_CXP_INTERFACE, &stInterfaceList);
unsigned int nInterfaceIndex = 0;
void* hInterface = NULL;
MV_CC_CreateInterface(&hInterface, stInterfaceList.pInterfaceInfos[nInterfaceIndex]);
MV_CC_OpenInterface(hInterface, NULL);


MV_CC_SetEnumValueByString(hInterface,"StreamTriggerSource","OptoCoupledInput0");


MV_CC_CloseInterface(hInterface);
```

```
MV_CC_DestroyInterface(hInterface);
```

10.3.4 Set Encoder Trigger

When the frame grabber uses encoder trigger, the external device sends trigger signal to the frame grabber, and the frame grabber sends the signal to the camera after processing according to the configuration of the encoder. Finally, the camera receives trigger commands to acquire images.

Steps

1. Go to **Advanced Setting** > **Stream Trigger Source**.
2. Select **Encoder 0/1** as **Stream Trigger Source**.

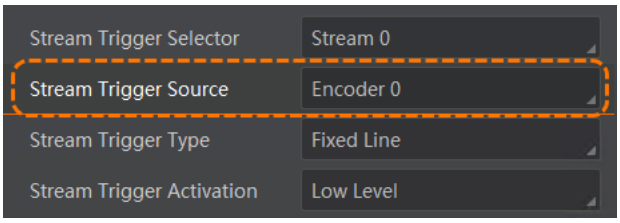

Figure 10-15 Encoder Trigger

The code below shows the process of selecting encoder as trigger source.

```
MV_INTERFACE_INFO_LIST stInterfaceList = {0};

MV_CC_EnumInterfaces(MV_CXP_INTERFACE, &stInterfaceList);

unsigned int nInterfaceIndex = 0;

void* hInterface = NULL;

MV_CC_CreateInterface(&hInterface, stInterfaceList.pInterfaceInfos[nInterfaceIndex]);

MV_CC_OpenInterface(hInterface, NULL);


MV_CC_SetEnumValueByString(hInterface,"StreamTriggerSource","Encoder0");


MV_CC_CloseInterface(hInterface);

MV_CC_DestroyInterface(hInterface);
```

10.3.5 Set Timer Trigger

When the frame grabber uses timer trigger, the frame grabber sends the signal to the camera after processing according to the configuration of the timer. Finally, the camera receives trigger commands to acquire images.

Steps

1. Go to **Advanced Setting** > **Stream Trigger Source**.
2. Select **Timer 0/1/2/3 Active** as **Stream Trigger Source**.

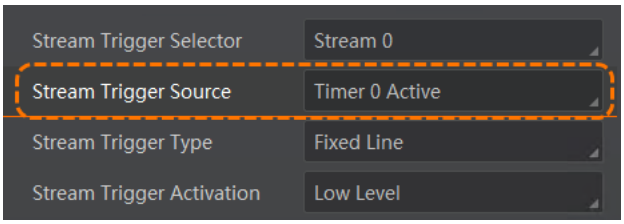

Figure 10-16 Timer Trigger

The code below shows the process of selecting timer as trigger source.

```
MV_INTERFACE_INFO_LIST stInterfaceList = {0};

MV_CC_EnumInterfaces(MV_CXP_INTERFACE, &stInterfaceList);

unsigned int nInterfaceIndex = 0;

void* hInterface = NULL;

MV_CC_CreateInterface(&hInterface, stInterfaceList.pInterfaceInfos[nInterfaceIndex]);

MV_CC_OpenInterface(hInterface, NULL);


MV_CC_SetEnumValueByString(hInterface,"StreamTriggerSource","Timer0Active");


MV_CC_CloseInterface(hInterface);

MV_CC_DestroyInterface(hInterface);
```

10.3.6 Set Advanced I/O Control

When the frame grabber uses advanced I/O control, the frame grabber sends the signal to the camera after processing according to the configuration of the advanced I/O. Finally, the camera receives trigger commands to acquire images.

Steps

1. Go to **Advanced Setting** > **Stream Trigger Source**.
2. Select **Advanced IO 0/1/2/3** as **Stream Trigger Source**.

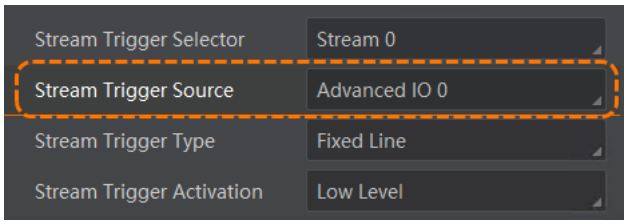

Figure 10-17 Advanced I/O Control

The code below shows the process of setting advanced I/O as link trigger source.

```
MV_INTERFACE_INFO_LIST stInterfaceList = {0};

MV_CC_EnumInterfaces(MV_CXP_INTERFACE, &stInterfaceList);

unsigned int nInterfaceIndex = 0;

void* hInterface = NULL;

MV_CC_CreateInterface(&hInterface, stInterfaceList.pInterfaceInfos[nInterfaceIndex]);

MV_CC_OpenInterface(hInterface, NULL);


MV_CC_SetEnumValueByString(hInterface,"StreamTriggerSource","AdvancedIO0");


MV_CC_CloseInterface(hInterface);

MV_CC_DestroyInterface(hInterface);
```

10.4 Set Trigger Related Parameters

You can set trigger activation and trigger delay after enabling selecting specific stream trigger source. All trigger sources support setting trigger delay and trigger activation.

10.4.1 Set Trigger Activation

The frame grabber supports setting the trigger activation of the trigger source. When the electrical level signal given by external devices is triggered in selected trigger activation, the frame grabber sends the corresponding trigger packet to the camera to acquire images.

Steps

1. Go to **Advanced Setting** > **Stream Trigger Activation**.
2. Select **Stream Trigger Activation** according to actual demands.

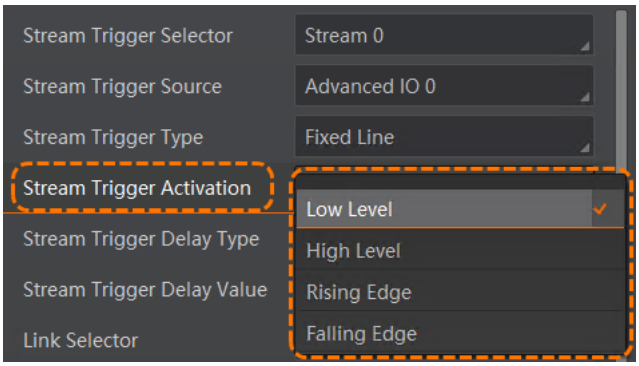

Figure 10-18 Trigger Activation

Table 10-3 Trigger Activation Parameter

Trigger Activation	Description
Rising Edge	When the electrical level signal given by external devices is in rising edge, the frame grabber receives the trigger source and starts to output configured counter signal.
Falling Edge	When the electrical level signal given by external devices is in falling edge, the frame grabber receives the trigger source and starts to output configured counter signal.
High Level	When the electrical level signal given by external devices is in high level, the frame grabber receives the trigger source and starts to output configured counter signal.
Low Level	When the electrical level signal given by external devices is in low level, the frame grabber receives the trigger source and starts to output configured counter signal.

The code below shows the process of setting trigger activation.

```
MV_INTERFACE_INFO_LIST stInterfaceList = {0};
MV_CC_EnumInterfaces(MV_CXP_INTERFACE, &stInterfaceList);
unsigned int nInterfaceIndex = 0;
void* hInterface = NULL;
MV_CC_CreateInterface(&hInterface, stInterfaceList.pInterfaceInfos[nInterfaceIndex]);
MV_CC_OpenInterface(hInterface, NULL);


MV_CC_SetEnumValueByString(hInterface,"StreamTriggerActivation","RisingEdge");


MV_CC_CloseInterface(hInterface);
MV_CC_DestroyInterface(hInterface);
```

When **Rising Edge** and **Falling Edge** are selected as the **Stream Trigger Activation**, you can set **Stream Trigger Frame Burst** of the frame grabber. The code below shows the process of setting stream trigger frame burst.

```
MV_INTERFACE_INFO_LIST stInterfaceList = {0};

MV_CC_EnumInterfaces(MV_CXP_INTERFACE, &stInterfaceList);

unsigned int nInterfaceIndex = 0;

void* hInterface = NULL;

MV_CC_CreateInterface(&hInterface, stInterfaceList.pInterfaceInfos[nInterfaceIndex]);

MV_CC_OpenInterface(hInterface, NULL);


MV_CC_SetIntValueEx(hInterface,"StreamTriggerFrameBurst",100);


MV_CC_CloseInterface(hInterface);

MV_CC_DestroyInterface(hInterface);
```

10.4.2 Set Trigger Delay

Trigger delay means that the frame grabber receives the trigger source, and then sends the trigger signal to the camera after configured trigger delay time.

Steps

1. Go to **Advanced Setting** > **Stream Trigger Delay Type**.
2. Select **Stream Trigger Delay Type** according to actual demands.

- **Frame Delay**: The frame trigger signal is delayed by the configured number. That is, when the **Stream Trigger Delay Value** is set to n, the n+1 frame trigger signal can be received.

Note

Only when the **Camera Type** is **Frame Scan**, you can select **Frame Delay** as **Stream Trigger Delay Type**.

- **Line Delay**: The line trigger signal is delayed by the configured number. That is, when the **Stream Trigger Delay Value** is set to n, the n+1 line trigger signal can be received.

Note

Only when the **Camera Type** is **Line Scan**, you can select **Line Delay** as **Stream Trigger Delay Type**.

- **Time Delay (μs)**: The trigger signal is delay in the unit of μs.

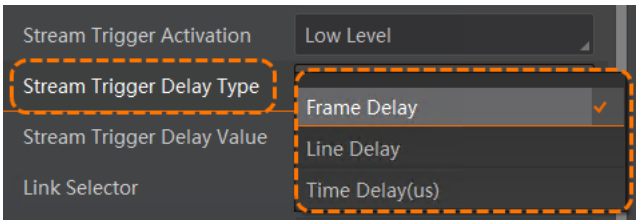

Figure 10-19 Stream Trigger Delay Type

3. Set **Stream Trigger Delay Value** according to actual demands.

Figure 10-20 Set Stream Trigger Delay Value

The code below shows the process of setting trigger delay.

```
MV_INTERFACE_INFO_LIST stInterfaceList = {0};
MV_CC_EnumInterfaces(MV_CXP_INTERFACE, &stInterfaceList);
unsigned int nInterfaceIndex = 0;
void* hInterface = NULL;
MV_CC_CreateInterface(&hInterface, stInterfaceList.pInterfaceInfos[nInterfaceIndex]);
MV_CC_OpenInterface(hInterface, NULL);


MV_CC_SetEnumValueByString(hInterface,"StreamTriggerDelayType","LineDelay");
MV_CC_SetIntValueEx(hInterface,"StreamTriggerDelayValue",100);


MV_CC_CloseInterface(hInterface);
MV_CC_DestroyInterface(hInterface);
```

Chapter 11 Other Functions

11.1 Image Parameter

The frame grabber supports ISP functions, such as Bayer interpolation and Gamma correction. You can go to **ISP Control** page to set the related parameters.

- **Bayer CFA Enable**: After the parameter is enabled, the RGB image can be output if the pixel formats of the camera are Bayer GR8/RG8/GB8/BG8, and the transmission bandwidth of the PCIe interface is three times the actual bandwidth transmitted from the camera to the frame grabber (not exceeds the bandwidth limit of the PCIe 2.0 X8).

Note

Frame loss may occur after you enable the **Bayer CFA Enable**.

- **Gamma Enable**: You can enable the parameter, and enter the Gamma value. The value should be between 0 and 4.

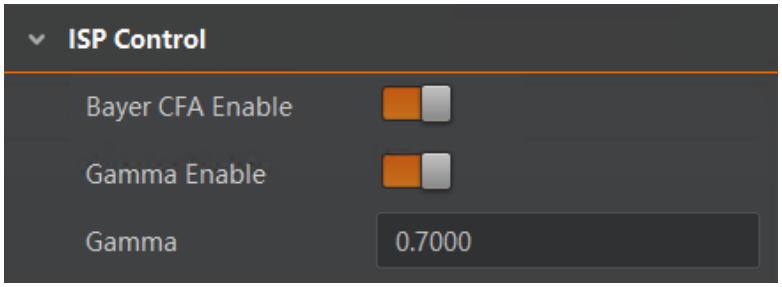

Figure 11-1 Image Parameter

Note

Some models and some firmware versions do not support Bayer interpolation and Gamma correction, and the actual device you purchased shall prevail.

11.2 Test Mode

The test mode detects whether cameras connected to the frame grabber can send data packet or not, and displays the number of error, received and transmitted data packets.

Steps

1. Go to **Device Control** > **Test Control**, and select **Mode 1** as **Test Mode** to start test mode.
   - **Test Error Count**: It displays the number of error data packets sent by the camera.
   - **Test Packet Count Tx**: It displays the number of data packets sent by the frame grabber.
   - **Test Packet Count Rx**: It displays the number of data packets sent by the camera.

2. Click **Execute** in **Test Error Count Reset**, **Test Packet Count Tx Reset**, or **Test Packet Count Rx Reset** to reset the count.

Note

Make sure to select **Off** as **Test Mode** first when change the connector to test.

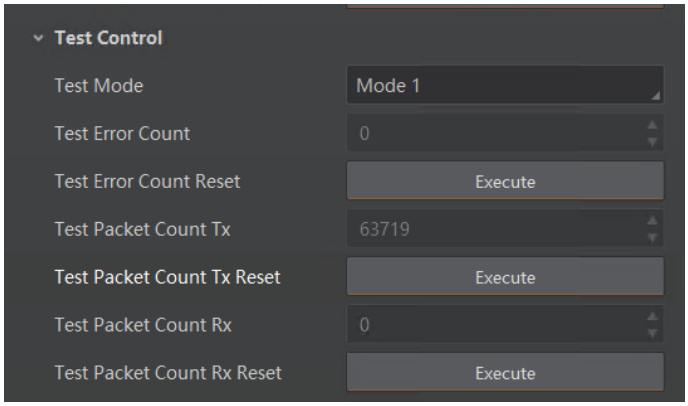

Figure 11-2 Test Mode

11.3 PoCXP

The PoCXP can control the power supply of cameras connected to the frame grabber, and display power consumption of connected cameras in real time.

Before You Start

Note

Make sure that the cable of 6-pin ATX 12V is connected to the frame grabber's ATX power supply interface with the computer before using the PoCXP function.

Steps

1. Go to **Device Control** > **Link Selector** to select a connector according to actual demands.

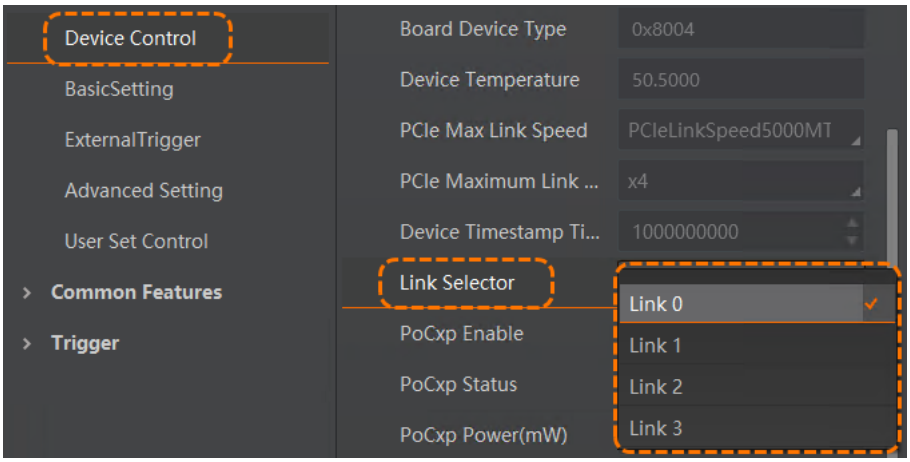

Figure 11-3 Select Link

Note

The supported connector quantity may differ by different models of frame grabbers you use.

2. Enable **PoCxp Enable**. It is enabled by default.
3. Check whether the camera has normal power supply via **PoCxp Status**.
   - **On** means that the camera is powered via PoCXP.
   - **Off** means that the PoCXP function is not used.
4. View the power consumption, voltage, and current via **PoCxp Power**, **PoCxp Voltage**, and **PoCxp Current** respectively.

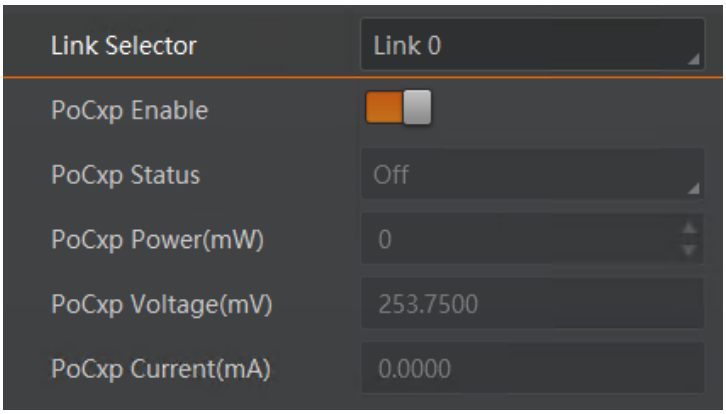

Figure 11-4 PoCXP

11.4 Device Control

In **Device Control**, you can view device information.

Table 11-1 Device Control Parameter Description

Parameter	Read/Write	Description
Firmware Version Type	Read Only	It is the type of firmware version.
Device Vendor Name	Read Only	It is the name of device manufacturer.
Device Model Name	Read Only	It is the device model.
Manufacture Info	Read Only	It is the manufacturer information.
Device Family Name	Read Only	It is the device name.
Device Firmware Version	Read Only	It is the device firmware version.
Device Serial Number	Read Only	It is the device serial No.
Device User ID	Read & Write	The device name is empty by default. You can set according to your preference. ● 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 Uptime (s)	Read Only	It is the period of time when device is powered up.
Board Device Type	Read Only	It is the device type.
Device Temperature	Read Only	It displays the real-time temperature of the device
Max Bandwidth Per Stream	Read Only	It is the max. bandwidth of a single stream.
PCIe Max Link Speed	Read Only	It is the max. link speed that PCIe supports.
PCIe Maximum Link Width	Read Only	It is the max. link width that PCIe supports.
Device Timestamp Tick Frequency (Hz)	Read Only	It is the device's timestamp tick frequency.
Device Log Storage	Read & Write	It is used to enable device log storage. If it is set as On, you can export the device logs via ***File Access***.

11.5 Update Firmware

You can use the MVS Tool Kit to update the frame grabber's firmware.

Note

The MVS Tool Kit is installed by default when you install the MVS client software.

Steps

1. Select **FrameGrabber** type after running MVS Tool Kit.

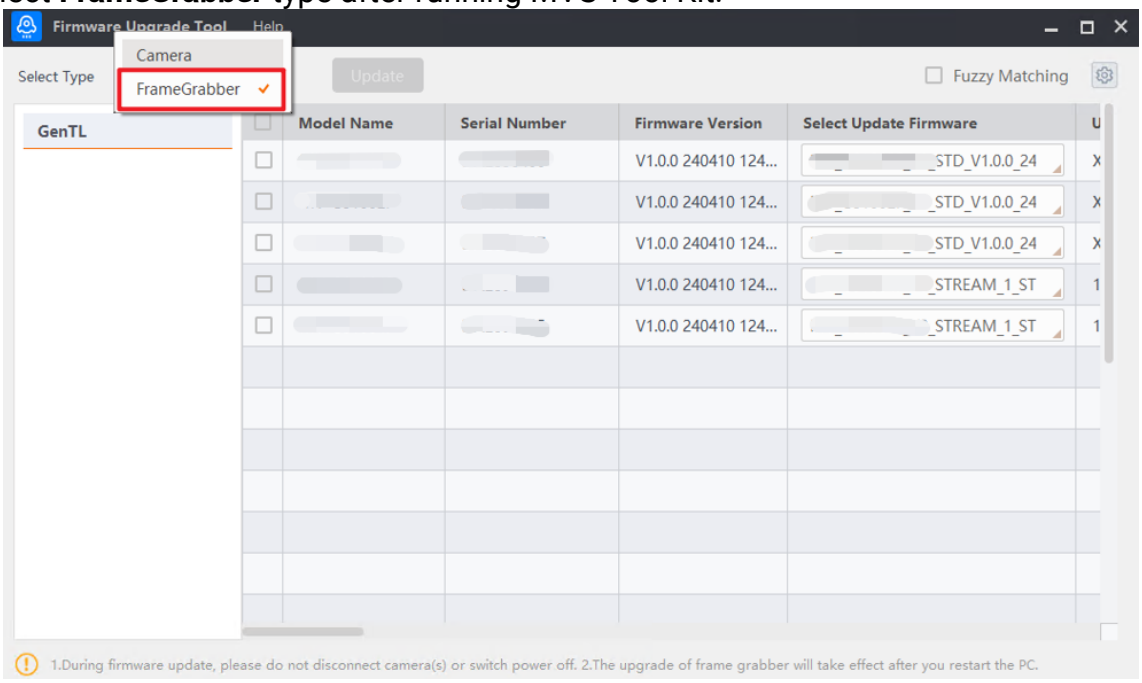

Figure 11-5 Select Frame Grabber

2. After you import the CTI file manually or the file is loaded automatically, the client software will enumerate the frame grabbers automatically.
3. Select the available frame grabber to update, and select the firmware version in the **Select Update Firmware**.

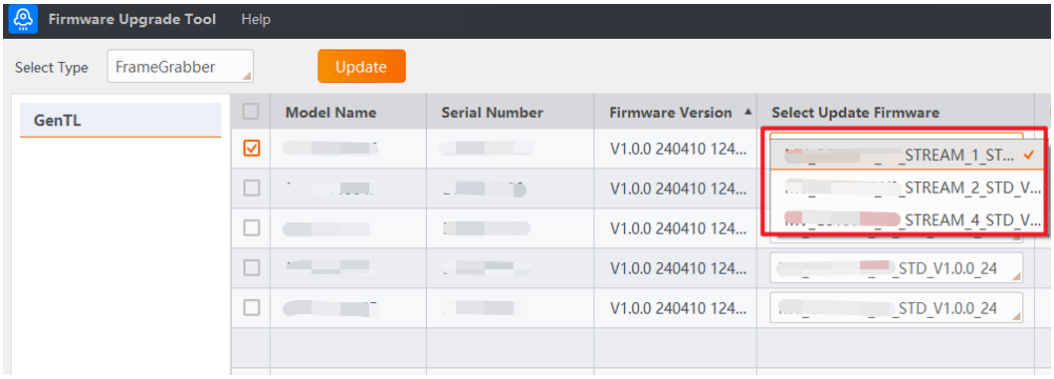

Figure 11-6 Update Firmware

4. Click **Update** to start updating.

Note

- Before updating, install the firmware drive package according to the frame grabber's model.
- Do not power off the frame grabber during updating.
- Restart the computer to check the frame grabber's function after updating.

11.6 User Set Control

This function allows loading or saving default or user-defined settings. The frame grabber supports four sets of parameters, including one default set and three user sets, and the relation among four sets of parameters is shown below.

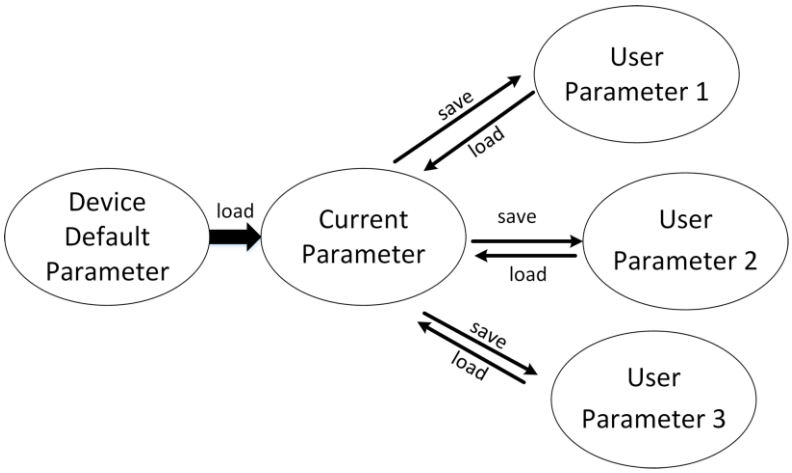

Figure 11-7 Parameter Relation

11.6.1 Save User Set

Steps

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

Note

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

2. Click **Execute** in **User Set Save** to save parameter.
3. View **User Set Save Status**:

- Saving: User parameters are being saved.
- Ready: User parameters have been saved.

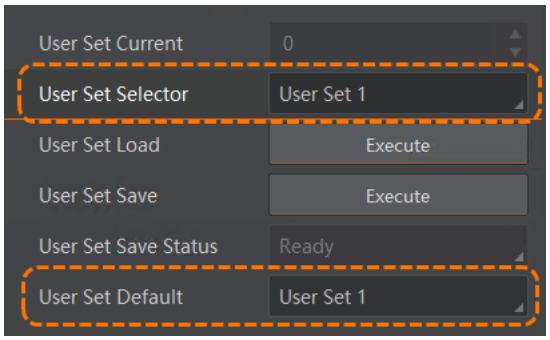

Figure 11-8 Save User Set

11.6.2 Load User Set

Note

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

Steps

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

Note

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

2. Click **Execute** in **User Set Load** to load parameter.

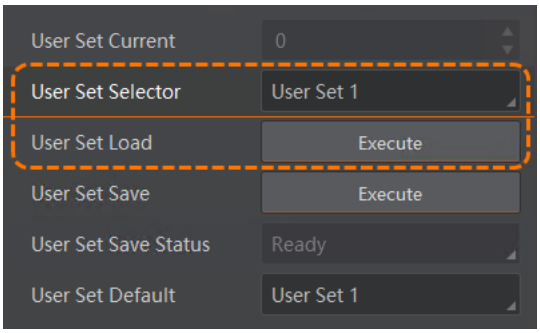

Figure 11-9 Load User Set

11.6.3 Set User Default

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

Note

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

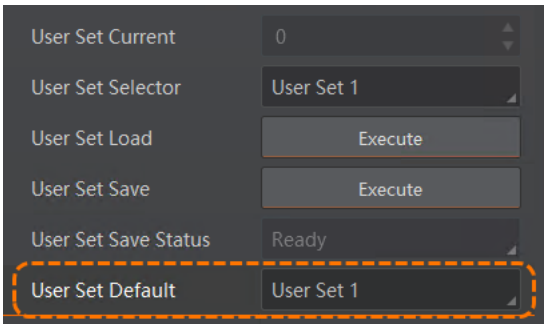

Figure 11-10 Set User Default

The code below shows the process of setting user parameters.

```
MV_INTERFACE_INFO_LIST stInterfaceList = {0};
MV_CC_EnumInterfaces(MV_CXP_INTERFACE, &stInterfaceList);
unsigned int nInterfaceIndex = 0;
void* hInterface = NULL;
MV_CC_CreateInterface(&hInterface, stInterfaceList.pInterfaceInfos[nInterfaceIndex]);
MV_CC_OpenInterface(hInterface, NULL);


//Save User Set
MV_CC_SetEnumValueByString(hInterface,"UserSetSelector","UserSet1");
MV_CC_SetCommandValue(hInterface,"UserSetSave");


//Load User Set
MV_CC_SetCommandValue(hInterface,"UserSetLoad");
MV_CC_SetEnumValueByString(hInterface,"UserSetDefault","UserSet1");


MV_CC_CloseInterface(hInterface);
MV_CC_DestroyInterface(hInterface);
```

11.7 File Access Control

The file access function can import or export the frame grabber's feature files and save them in mfa format. Currently, only **User Set 1/2/3**, **License Notice**, and **Log File** are supported.

Note

Exporting **License Notice** and **Log File** is supported only.

Steps

1. Go to the feature tree, and click to open the file access dialogue box.

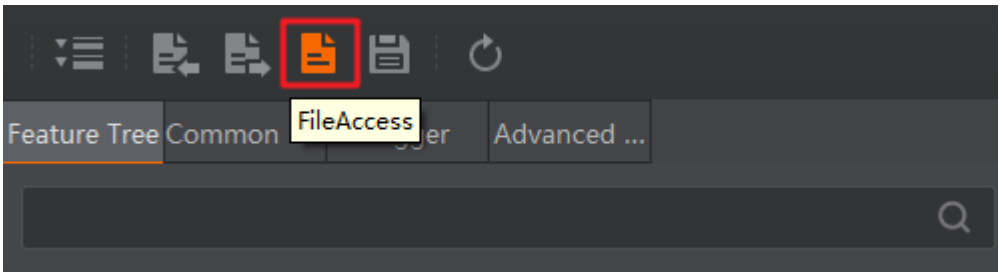

Figure 11-11 File Access

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

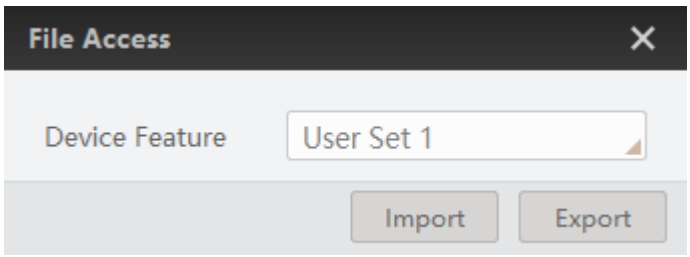

Figure 11-12 Import or Export

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. Refer to section ***User Set Control*** for details.
- Importing and exporting the device feature among the same model of the frame grabbers are supported.

11.8 Event Control

You can view and set the frame grabber's event control related parameters to let the device generate an event and transmit a related event message to the computer.

Note

- The event control function may differ by device model.
- The MVS Tool Kit is installed by default when you install the MVS client software.
- For abnormal events, you should view the device's SDK file.
- The specific event category and event selector may differ by device model.

Steps

1. Use the Event Configuration Tool of MVS Tool Kit to view and set frame grabber's events.

Note

Refer to the user manual of event configuration tool for detailed operation.

2. Right click the connected frame grabber and click **Event Monitor**.

Figure 11-13 Select Event Monitor

3. Check **Messaging Channel Event**, and view specific events after the device operates.
4. (Optional) You can set save path, enable auto save, or clear log in monitor window.

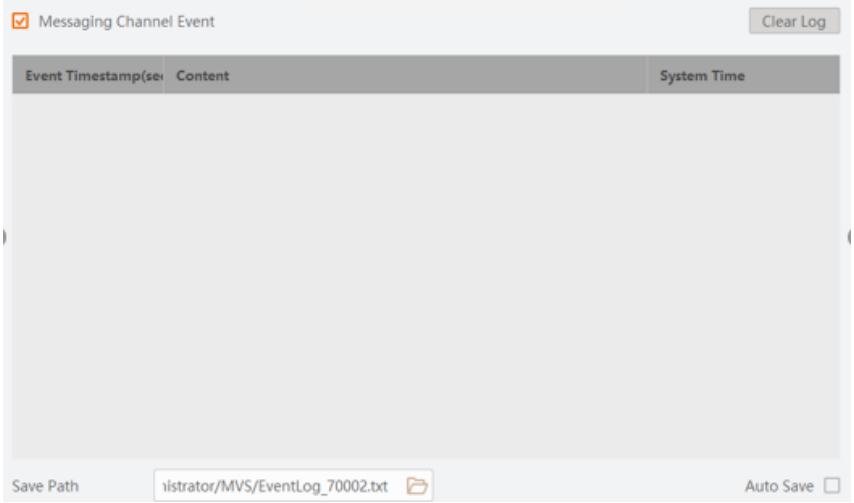

Figure 11-14 Event Monitor

The code below shows the process of event information recorded by the frame grabber.

```
void __stdcall EventCallBack(MV_EVENT_OUT_INFO * pEventInfo, void* pUser);


MV_CC_EnumInterfaces(MV_CXP_INTERFACE, &stInterfaceList);

unsigned int nInterfaceIndex = 0;

void* hInterface = NULL;

MV_CC_CreateInterface(&hInterface, stInterfaceList.pInterfaceInfos[nInterfaceIndex]);

MV_CC_OpenInterface(hInterface, NULL);


MV_CC_RegisterEventCallBackEx(hInterface, "TimerRisingEdge0", EventCallBack, NULL);

MV_CC_EventNotificationOn(hInterface, " TimerRisingEdge0");
```

```
MV_CC_CloseInterface(hInterface);
MV_CC_DestroyInterface(hInterface);
```

Chapter 12 FAQ (Frequently Asked Questions)

12.1 Why the frame grabber cannot be enumerated?

Table 12-1 Question 1

Possible Cause	Solution
Improper installation of the driver.	Install the driver again. After installation, check the frame grabber via device manager.
The MVS client software or other software is using the frame grabber.	Close the MVS client software or other software that is using the frame grabber.
Insufficient power supply of the mainboard.	Power the frame grabber independently.

12.2 Why the camera connected to the frame grabber cannot be enumerated?

Table 12-2 Question 2

Possible Cause	Solution
The camera is not working normally.	Check whether the camera is working normally.
Improper wiring of the data cable.	Check the wiring of the data cable.

12.3 Why the camera's frame rate is not stable?

Table 12-3 Question 3

Possible Cause	Solution
Insufficient PCIe bandwidth.	Replace PCIe slot.
Low CPU performance.	Use high performance CPU.

Chapter 13 Revision History

Table 13-1 Revision History

Version	Document No.	Date	Revision Details
V2.1.1	UD43003B	May. 29, 2025	● Add appearance, I/O connector, indicator of MV-GX1100 series to Chapter 3 Appearance, Connector, and Indicator. ● Edit Section 3.2.2 MV-GX1108. ● Edit Appendix A Frame Grabber Accessories.
V2.1.0	UD42240B	Mar. 26, 2025	● Add appearance, I/O connector, wiring methods, indicators of MV-GX1008 to Chapter 3 Appearance, Connector, and Indicator. ● Edit Section 3.5 PCIe Connector. ● Edit Section 4.1 Installation Preparation. ● Edit Chapter 8 Input and Output Signals. ● Edit Appendix A Frame Grabber Accessories. ● Edit Appendix B Other Fields.
V2.0.1	UD40789B	Nov. 28, 2024	● Edit Section 4.1 Installation Preparation ● Edit Section 5.1 Connect Frame Grabber to Client Software ● Edit Section 9.3 Set Trigger Source. ● Add Section 10.1 Image Parameter. ● Edit Appendix B Frame Grabber Fields.
V2.0.0	UD39189B	Aug. 23, 2024	● Edit the structure and the content of the whole user manual. ● Edit Chapter 3 Appearance, Connector, and Indicator. ● Add Section 5.3 Install Drive Package. ● Add Section 5.4 Secondary Development. ● Add Chapter 6 Operating Principle. ● Edit Chapter 7 I/O Introduction. ● Edit Chapter 8 Link Trigger. ● Edit Chapter 9 Frame Grabber Trigger. ● Edit Chapter 10 Other Functions. ● Add Appendix A Frame Grabber Accessories. ● Add Appendix B Frame Grabber Fields.
V1.1.0	UD30587B	Oct. 18, 2022	● Edit Section Safety Instruction. ● Add Section Install MVS Client Software. ● Add Section Basic Operation of MVS Client Software. ● Edit Section Encoder Control.

Version	Document No.	Date	Revision Details
			● Edit Section Encoder Frequency Converter Control. ● Edit Section Timer Control. ● Add Section Signal Counting. ● Edit Section Stream. ● Edit Section Select Link. ● Edit Section Trigger Related Parameters. ● Add Section Event Control. ● Add Section File Access Control. ● Add Section Update Firmware.
V1.0.0	UD25462B	Sep. 27, 2021	Original version.

Appendix A Frame Grabber Accessories

When using the frame grabber, you need to prepare these cables: DIN CoaXPress cable, I/O trigger cable, and I/O adapter cable. The appearance and pin definitions of accessories are shown below.

Note

You can contact the technical support to get the models of accessories.

DIN CoaXPress Cable

The DIN CoaXPress cable is used to establish the data transmission between the frame grabber and the camera. It can provide three lengths of 3 m, 5 m, and 10 m, which can be selected as required.

Figure A-1 DIN CoaXPress Cable

Note

Refer to the datasheet of the corresponding product for the specific size and parameter of the DIN CoaXPress cable.

I/O Trigger Cable 1

The I/O trigger cable 1 (DB26 male connector to open) is used for I/O trigger signal wiring of DB26 female socket of MV-GX1002 and MV-GX1004 frame grabbers, as shown below. Refer to the following table for pin definition. The cable has shielding protection, providing four lengths of 3 m and 5 m which can be selected as required.

Figure A-2 I/O Trigger Cable 1

Note

Refer to the datasheet of the corresponding product for the specific size and parameter of the I/O trigger cable 1.

Table A-1 Cable Color of Open End

Pin No.	Cable Color	Pin No.	Cable Color
1	Brown	14	White/Blue
2	Orange	15	White/Black
3	Yellow	16	White/Purple
4	Green	17	White/Brown
5	Blue	18	Black/Red
6	Purple	19	Black/Orange
7	Gray	20	Black/Yellow
8	White	21	Black/Green
9	Black	22	Black/Brown
10	Red	23	Black/Blue
11	White/Red	24	Blue/Orange
12	White/Orange	25	Blue/Red
13	White/Green	26	Blue/Yellow

Note

This section only provides the cable colors for the Open end. For specific pin definitions, refer to the actual connector pin definitions.

I/O Trigger Cable 2

The I/O trigger cable 2 (MiniDP to Open) is used for the I/O trigger signal wiring of the MiniDP connector of MV-GX1008 frame grabber. The pin definitions are detailed in the table below. The cable is shielded and is available in six lengths: 3 m, 5 m, 7 m, 10 m, 15 m, 20 m.

Figure A-3 I/O Trigger Cable 2

Table A-2 Pin Definition of Open End

Pin No.	Cable Color	Signal	Pin No.	Cable Color	Signal
1	White/Green	RS485_0P	15	White/Yellow	RS485_5P
2	Green	RS485_0N	17	Yellow	RS485_5N
3	White/Orange	RS485_1P	16	White/Purple	RS485_6P
5	Orange	RS485_1N	18	Purple	RS485_6N
4	White/Brown	RS485_2P	19	White/Gray	RS485_7P
6	Brown	RS485_2N	20	Gray	RS485_7N
9	White/Blue	RS485_3P	7	Black	GND
11	Blue	RS485_3N	8	White	GND
10	White/Red	RS485_4P	13	Pink	GND
12	Red	RS485_4N	14	Light green	GND

I/O Trigger Cable 3

The I/O trigger cable 3 (DB15M to Open) is used for the I/O trigger signal wiring of the DB15F connector of MV-GX1100 series frame grabbers. The pin definitions are detailed in the table below. The cable is shielded and is available in three lengths: 3 m, 5 m, 7 m, and 10 m.

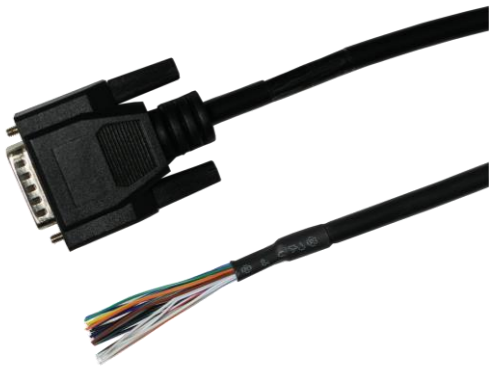

Figure A-4 I/O Trigger Cable 3

Table A-3 Pin Definition of Open End

Pin No.	Cable Color	Signal	Pin No.	Cable Color	Signal
5	White/Green	LINE_0P	1	White/Red	LINE_4P
10	Green	LINE_0N	6	Red	LINE_4N
4	White/Orange	LINE_1P	15	White/Yellow	LINE_5P
9	Orange	LINE_1N	14	Yellow	LINE_5N
3	Black	LINE_2P	13	White/Purple	LINE_6P
8	Brown	LINE_2N	12	Purple	LINE_6N
2	White/Blue	LINE_3P	11	Black	GND
7	Blue	LINE_3N	/	/	/

I/O Adapter Cable

The I/O adapter cable is used for the I/O trigger signal wiring of the female header of MV-GX1002 and MV-GX1004 frame grabbers, as shown below.

Figure A-5 I/O Adapter Cable

I/O Expansion Bracket

I/O expansion bracket is used for the I/O trigger signal wiring of the 9-pin header.

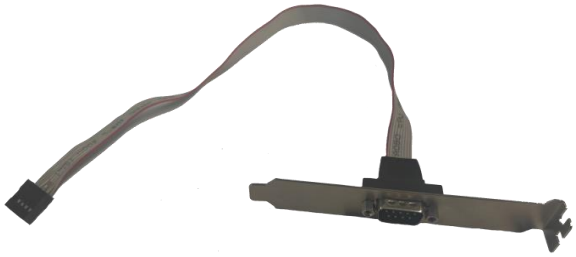

Figure A-6 I/O Expansion Bracket

I/O Trigger Cable 4

The I/O trigger cable 4 (DB9F to Open) is used for the I/O trigger signal wiring of 9-pin header of MV-GX1100 series frame grabber. The pin definitions are detailed in the table below. The cable is shielded and is available in four lengths: 3 m, 5 m, and 7 m.

Figure A-7 I/O Trigger Cable 4

Table A-4 Pin Definition of Open End

Pin No.	Cable Color	Signal	Pin No.	Cable Color	Signal
1	White/Green	LINE_7P	6	White/Brown	LINE_9P
2	Green	LINE_7N	7	Brown	LINE_9N
3	White/Orange	LINE_8P	8	White/Blue	LINE_10P
4	Orange	LINE_8N	9	Blue	LINE_10N
5	Black	GND			

Appendix B Frame Grabber Fields

Table B-1 Event Fields

Field Name	Field Type	Enumerated Value	Value Name	Description
EventCategory	Enum	1	SoftEvent	Soft event
		2	LinkEvent	Link event
		3	StreamEvent	Stream event
		4	PCIEEvent	PCIE event
		5	IOEvent	I/O event
EventIOType	Enum	0	Timer	I/O type
		1	Opto	
		2	RS422	
		3	TTL	
		4	Encoder	
		6	AdvancedIO	
ChannelSelector	Integer	0 to 10	/	Select channel
EventSelector	Enum	/	/	Select event
EventNotification	Enum	0	Off	Enable event
		1	On	

Table B-2 Event Source Fields

Event Type	Enumerated Value	Value Name
Soft Event	140	CardPacketReceived0
	141	CardPacketReadDone0
	142	CardAckPacketReceived0
	143	CardAckPacketReadDone0
Link Event	100	Trigger0RisingEdge0

Event Type	Enumerated Value	Value Name
Link Event	101	Trigger0RisingEdge1
	102	Trigger0RisingEdge2
	103	Trigger0RisingEdge3
	296	Trigger0RisingEdge4
	297	Trigger0RisingEdge5
	298	Trigger0RisingEdge6
	299	Trigger0RisingEdge7
	104	Trigger0FallingEdge0
	105	Trigger0FallingEdge1
	106	Trigger0FallingEdge2
	107	Trigger0FallingEdge3
	300	Trigger0FallingEdge4
	301	Trigger0FallingEdge5
	302	Trigger0FallingEdge6
	303	Trigger0FallingEdge7
	108	LockedEvent0
	109	LockedEvent1
	110	LockedEvent2
	111	LockedEvent3
	264	LockedEvent4
	265	LockedEvent5
	266	LockedEvent6
	267	LockedEvent7
	112	UnlockedEvent0
	113	UnlockedEvent1
	114	UnlockedEvent2
Link Event	115	UnlockedEvent3

Event Type	Enumerated Value	Value Name
	268	UnlockedEvent4
	269	UnlockedEvent5
	270	UnlockedEvent6
	271	UnlockedEvent7
	116	ControlAckPacketReceived0
	117	ControlAckPacketReceived1
	118	ControlAckPacketReceived2
	119	ControlAckPacketReceived3
	272	ControlAckPacketReceived4
	273	ControlAckPacketReceived5
	274	ControlAckPacketReceived6
	275	ControlAckPacketReceived7
	120	ControlAckPacketTransmitted0
	121	ControlAckPacketTransmitted1
	122	ControlAckPacketTransmitted2
	123	ControlAckPacketTransmitted3
	276	ControlAckPacketTransmitted4
	277	ControlAckPacketTransmitted5
	278	ControlAckPacketTransmitted6
	279	ControlAckPacketTransmitted7
	124	ControlPacketReceived0
	125	ControlPacketReceived1
	126	ControlPacketReceived2
	127	ControlPacketReceived3
	280	ControlPacketReceived4
Link Event	281	ControlPacketReceived5
	282	ControlPacketReceived6

Event Type	Enumerated Value	Value Name
	283	ControlPacketReceived7
	128	ControlPacketTransmitted0
	129	ControlPacketTransmitted1
	130	ControlPacketTransmitted2
	131	ControlPacketTransmitted3
	284	ControlPacketTransmitted4
	285	ControlPacketTransmitted5
	286	ControlPacketTransmitted6
	287	ControlPacketTransmitted7
	132	LinkTriggerPacketTransmitted0
	133	LinkTriggerPacketTransmitted1
	134	LinkTriggerPacketTransmitted2
	135	LinkTriggerPacketTransmitted3
	288	LinkTriggerPacketTransmitted4
	289	LinkTriggerPacketTransmitted5
	290	LinkTriggerPacketTransmitted6
	291	LinkTriggerPacketTransmitted7
	136	LinkTriggerAckPacketReceived0
	137	LinkTriggerAckPacketReceived1
	138	LinkTriggerAckPacketReceived2
	139	LinkTriggerAckPacketReceived3
	292	LinkTriggerAckPacketReceived4
	293	LinkTriggerAckPacketReceived5
	294	LinkTriggerAckPacketReceived6
	295	LinkTriggerAckPacketReceived7
Stream Event	84	ReceiveImageFrameStart0

Event Type	Enumerated Value	Value Name
	85	ReceiveImageFrameStart1
	86	ReceiveImageFrameStart2
	87	ReceiveImageFrameStart3
	304	ReceiveImageFrameStart4
	305	ReceiveImageFrameStart5
	306	ReceiveImageFrameStart6
	307	ReceiveImageFrameStart7
	88	ReceiveImageFrameEnd0
	89	ReceiveImageFrameEnd1
	90	ReceiveImageFrameEnd2
	91	ReceiveImageFrameEnd3
	308	ReceiveImageFrameEnd4
	309	ReceiveImageFrameEnd5
	310	ReceiveImageFrameEnd6
	311	ReceiveImageFrameEnd7
	92	TransmitImageBlockStart0
	93	TransmitImageBlockStart1
	94	TransmitImageBlockStart2
	95	TransmitImageBlockStart3
	312	TransmitImageBlockStart4
	313	TransmitImageBlockStart5
	314	TransmitImageBlockStart6
	315	TransmitImageBlockStart7
	96	TransmitImageBlockEnd0

Event Type	Enumerated Value	Value Name
Stream Event	97	TransmitImageBlockEnd1
	98	TransmitImageBlockEnd2
	99	TransmitImageBlockEnd3
	316	TransmitImageBlockEnd4
	317	TransmitImageBlockEnd5
	318	TransmitImageBlockEnd6
	319	TransmitImageBlockEnd7
	200	TheFirstLineInFrame0
	201	TheFirstLineInFrame1
	202	TheFirstLineInFrame2
	203	TheFirstLineInFrame3
	320	TheFirstLineInFrame4
	321	TheFirstLineInFrame5
	322	TheFirstLineInFrame6
	323	TheFirstLineInFrame7
	204	TheLastLineInFrame0
	205	TheLastLineInFrame1
	206	TheLastLineInFrame2
	207	TheLastLineInFrame3
	324	TheLastLineInFrame4
	325	TheLastLineInFrame5
	326	TheLastLineInFrame6
	327	TheLastLineInFrame7
PCIE Event	76	PCIEDMAStart0
	77	PCIEDMAStart1
	78	PCIEDMAStart2
	79	PCIEDMAStart3

Event Type	Enumerated Value	Value Name
	328	PCIEDMAStart4
PCIE Event	329	PCIEDMAStart5
	330	PCIEDMAStart6
	331	PCIEDMAStart7
	80	PCIEDMAEnd0
	81	PCIEDMAEnd1
	82	PCIEDMAEnd2
	83	PCIEDMAEnd3
	332	PCIEDMAEnd4
	333	PCIEDMAEnd5
	334	PCIEDMAEnd6
	335	PCIEDMAEnd7
IO Event	0	TimerRisingEdge0
	1	TimerRisingEdge1
	2	TimerRisingEdge2
	3	TimerRisingEdge3
	4	TimerFallingEdge0
	5	TimerFallingEdge1
	6	TimerFallingEdge2
	7	TimerFallingEdge3
	8	EncoderRisingEdge0
	9	EncoderRisingEdge1
	10	EncoderFallingEdge0
	11	EncoderFallingEdge1
	12	OptoCoupledInputRisingEdge0

Event Type	Enumerated Value	Value Name
IO Event	13	OptoCoupledInputRisingEdge1
	14	OptoCoupledInputRisingEdge2
	15	OptoCoupledInputRisingEdge3
	16	OptoCoupledInputFallingEdge0
	17	OptoCoupledInputFallingEdge1
	18	OptoCoupledInputFallingEdge2
	19	OptoCoupledInputFallingEdge3
	20	OptoCoupledOutputRisingEdge0
	21	OptoCoupledOutputRisingEdge1
	22	OptoCoupledOutputRisingEdge2
	23	OptoCoupledOutputRisingEdge3
	24	OptoCoupledOutputFallingEdge0
	25	OptoCoupledOutputFallingEdge1
	26	OptoCoupledOutputFallingEdge2
	27	OptoCoupledOutputFallingEdge3
	28	RS422diffInputRisingEdge0
	29	RS422diffInputRisingEdge1
	30	RS422diffInputRisingEdge2
	31	RS422diffInputRisingEdge3
	32	RS422diffInputFallingEdge0
	33	RS422diffInputFallingEdge1
	34	RS422diffInputFallingEdge2
	35	RS422diffInputFallingEdge3
	36	RS422diffOutputRisingEdge0
	37	RS422diffOutputRisingEdge1
	38	RS422diffOutputRisingEdge2

Event Type	Enumerated Value	Value Name
IO Event	39	RS422diffOutputRisingEdge3
	40	RS422diffOutputFallingEdge0
	41	RS422diffOutputFallingEdge1
	42	RS422diffOutputFallingEdge2
	43	RS422diffOutputFallingEdge3
	44	TTLInputRisingEdge0
	45	TTLInputRisingEdge1
	46	TTLInputRisingEdge2
	47	TTLInputRisingEdge3
	48	TTLInputFallingEdge0
	49	TTLInputFallingEdge1
	50	TTLInputFallingEdge2
	51	TTLInputFallingEdge3
	52	TTLOutputRisingEdge0
	53	TTLOutputRisingEdge1
	54	TTLOutputRisingEdge2
	55	TTLOutputRisingEdge3
	56	TTLOutputFallingEdge0
	57	TTLOutputFallingEdge1
	58	TTLOutputFallingEdge2
	59	TTLOutputFallingEdge3
	60	D485InRisingEdge0
	61	D485InRisingEdge1
	62	D485InRisingEdge2
	63	D485InRisingEdge3
	64	D485InRisingEdge4

Event Type	Enumerated Value	Value Name
IO Event	65	D485InRisingEdge5
	66	D485InRisingEdge6
	67	D485InRisingEdge7
	252	D485InRisingEdge8
	253	D485InRisingEdge9
	254	D485InRisingEdge10
	68	D485InFallingEdge0
	69	D485InFallingEdge1
	70	D485InFallingEdge2
	71	D485InFallingEdge3
	72	D485InFallingEdge4
	73	D485InFallingEdge5
	74	D485InFallingEdge6
	75	D485InFallingEdge7
	255	D485InFallingEdge8
	256	D485InFallingEdge9
	257	D485InFallingEdge10
	144	D485OutRisingEdge0
	145	D485OutRisingEdge1
	146	D485OutRisingEdge2
	147	D485OutRisingEdge3
	148	D485OutRisingEdge4
	149	D485OutRisingEdge5
	150	D485OutRisingEdge6
	151	D485OutRisingEdge7
	258	D485OutRisingEdge8

Event Type	Enumerated Value	Value Name
IO Event	259	D485OutRisingEdge9
	260	D485OutRisingEdge10
	152	D485OutFallingEdge0
	153	D485OutFallingEdge1
	154	D485OutFallingEdge2
	155	D485OutFallingEdge3
	156	D485OutFallingEdge4
	157	D485OutFallingEdge5
	158	D485OutFallingEdge6
	159	D485OutFallingEdge7
	261	D485OutFallingEdge8
	262	D485OutFallingEdge9
	263	D485OutFallingEdge10
	244	AdvancedIORisingEdge0
	245	AdvancedIORisingEdge1
	246	AdvancedIORisingEdge2
	247	AdvancedIORisingEdge3
	248	AdvancedIOFallingEdge0
	249	AdvancedIOFallingEdge1
	250	AdvancedIOFallingEdge2
	251	AdvancedIOFallingEdge3

Table B-3 Other Fields

Field Name	Field Type	Enumerated Value	Value Name	Description
Frame grabber trigger				
StreamSelector	Enum	0	Stream0	Stream selector
		1	Stream1	
		2	Stream2	
		3	Stream3	
		4	Stream4	
		5	Stream5	
		6	Stream6	
		7	Stream7	
CurrentStreamDevice	String	/	/	Current stream device
MinFrameDelay	Boolean	/	/	Minimum frame delay
CameraType	Enum	0	FrameScan	Scanning type
		1	LineScan	
ImageHeight	Integer	/	/	Image height; range: 1 to 4294967295
FrameTimeoutTime	Integer	/	/	Frame timeout; unit: ms; range: 0 to 120000
PartialImageOutputMode	Enum	1	PartialImageOutput	Partial image output
		2	PartialImageDiscard	
		3	PartialImageFilled	
StreamTriggerSource	Enum	255	Off	Trigger source
		0	OptoCoupledInput0	
		1	OptoCoupledInput1	
		2	OptoCoupledInput2	
		3	OptoCoupledInput3	
		16	RS422diffInput0	
		17	RS422diffInput1	
		18	RS422diffInput2	
		19	RS422diffInput3	
		32	TTLInput0	
		33	TTLInput1	
		34	TTLInput2	
		35	TTLInput3	
		48	Timer0Active	
		49	Timer1Active	

		50	Timer2Active	
		51	Timer3Active	
		64	Encoder0	
		65	Encoder1	
		80	SoftwareSignal0	
		96	D485Input0	
		97	D485Input1	
		98	D485Input2	
		99	D485Input3	
		100	D485Input4	
		101	D485Input5	
		102	D485Input6	
		103	D485Input7	
		104	D485Input8	
		105	D485Input9	
		106	D485Input10	
		112	AdvancedIO0	
		113	AdvancedIO1	
		114	AdvancedIO2	
		115	AdvancedIO3	
		128	QuickSoftwareTrigger0	
		129	QuickSoftwareTrigger1	
		130	QuickSoftwareTrigger2	
		131	QuickSoftwareTrigger3	
StreamTriggerType	Enum	0	FixedLine	Triger type
		1	VariableLine	
StreamTriggerActivation	Enum	0	LowLevel	Trigger activation
		1	HighLevel	
		2	RisingEdge	
		3	FallingEdge	
StreamTriggerDelayType	Enum	0	FrameDelay	Trigger delay type
		1	LineDelay	
		2	TimeDelay	
StreamTriggerDelayValue	Integer	/	/	Trigger delay value, range: 0 to 10000
Encoder control				
EncoderSelector	Enum	0	Encoder0	Select encoder
		1	Encoder1	

EncoderSourceA	Enum	0	OptoCoupledInput0	Select encoder input source (PHASE_A)
		1	OptoCoupledInput1	
		2	OptoCoupledInput2	
		3	OptoCoupledInput3	
		16	RS422diffInput0	
		17	RS422diffInput1	
		18	RS422diffInput2	
		19	RS422diffInput3	
		32	TTLInput0	
		33	TTLInput1	
		34	TTLInput2	
		35	TTLInput3	
		48	D485Input0	
		49	D485Input1	
		50	D485Input2	
		51	D485Input3	
		52	D485Input4	
		53	D485Input5	
		54	D485Input6	
		55	D485Input7	
		56	D485Input8	
		57	D485Input9	
		58	D485Input10	
		127	Off	
EncoderSourceB	Enum	0	OptoCoupledInput0	Select encoder input source (PHASE_B)
		1	OptoCoupledInput1	
		2	OptoCoupledInput2	
		3	OptoCoupledInput3	
		16	RS422diffInput0	
		17	RS422diffInput1	
		18	RS422diffInput2	
		19	RS422diffInput3	
		32	TTLInput0	
		33	TTLInput1	
		34	TTLInput2	
		35	TTLInput3	
		48	D485Input0	
		49	D485Input1	
		50	D485Input2	
		51	D485Input3	
		52	D485Input4	
		53	D485Input5	
		54	D485Input6	

		55	D485Input7	
		56	D485Input8	
		57	D485Input9	
		58	D485Input10	
		127	Off	
EncoderTriggerMode	Enum	0	AnyDirection	Encoder trigger mode
		1	ForwardOnly	
		2	BackwardOnly	
EncoderCounterMode	Enum	0	AnyDirection	Encoder counter mode
		1	ForwardDirection	
		2	BackwardDirection	
EncoderCounter	Integer	/	/	Encoder counter; range: 0 to 4294967295
EncoderCounterReset	Command	/	/	Encoder counter reset
EncoderMaxReverseCounter	Integer	/	/	Encoder reverse counter; range: 0 to 65535
EncoderReverseCounterReset	Command	/	/	Encoder reverse counter reset
EncoderTriggerLineRate	Integer	/	/	Encoder trigger line rate; unit: Hz; range: 0 to 4294967295
EncoderPreDivider	Integer	/	/	Encoder pre divider; range: 0 to 128
EncoderMultiplier	Integer	/	/	Encoder multiplier; range: 1 to 32
EncoderPostDivider	Integer	/	/	Encoder post divider; range: 1 to 128
ResultingTriggerLineRate	Integer	/	/	Resulting trigger line rate; unit: Hz; range: 0 to 4294967295
Input/output signal				
LineSelector	Enum	0	OptoCoupledInput0	Select line
		1	OptoCoupledInput1	
		2	OptoCoupledInput2	

		3	OptoCoupledInput3	
		4	RS422diffInput0	
		5	RS422diffInput1	
		6	RS422diffInput2	
		7	RS422diffInput3	
		8	TTLInput0	
		9	TTLInput1	
		10	TTLInput2	
		11	TTLInput3	
		12	OptoCoupledOutput0	
		13	OptoCoupledOutput1	
		14	OptoCoupledOutput2	
		15	OptoCoupledOutput3	
		16	RS422diffOutput0	
		17	RS422diffOutput1	
		18	RS422diffOutput2	
		19	RS422diffOutput3	
		20	TTLOutput0	
		21	TTLOutput1	
		22	TTLOutput2	
		23	TTLOutput3	
		24	D485Input0	
		25	D485Input1	
		26	D485Input2	
		27	D485Input3	
		28	D485Input4	
		29	D485Input5	
		30	D485Input6	
		31	D485Input7	
		32	D485Input8	
		33	D485Input9	
		34	D485Input10	
LineMode	Enum	0	Input	Line mode
		1	Output	
LineInverter	Boolean	/	/	Line inverter
LineDebouncerTimeNs	Integer	/	/	Line debouncer time; unit: ns; range: 0 to 400000000

LineSource	Enum	255	Off	Line source
		0	OptoCoupledInput0	
		1	OptoCoupledInput1	
		2	OptoCoupledInput2	
		3	OptoCoupledInput3	
		16	RS422diffInput0	
		17	RS422diffInput1	
		18	RS422diffInput2	
		19	RS422diffInput3	
		32	TTLInput0	
		33	TTLInput1	
		34	TTLInput2	
		35	TTLInput3	
		48	Timer0Active	
		49	Timer1Active	
		50	Timer2Active	
		51	Timer3Active	
		64	HighLevel	
		65	LowLevel	
		80	D485Input0	
		81	D485Input1	
		82	D485Input2	
		83	D485Input3	
		84	D485Input4	
		85	D485Input5	
		86	D485Input6	
		87	D485Input7	
		88	D485Input8	
		89	D485Input9	
		90	D485Input10	
		96	AdvancedIO0	
		97	AdvancedIO1	
		98	AdvancedIO2	
		99	AdvancedIO3	
		112	Fval_0	
		113	Fval_1	
		114	Fval_2	
		115	Fval_3	
		116	Fval_4	
		117	Fval_5	
		118	Fval_6	
		119	Fval_7	
Timer control				

Timer Selector	Enum	0	Timer0	Select timer
		1	Timer1	
		2	Timer2	
		3	Timer3	
TimerDuration	Integer	/	/	Timer duration; range: 0 to 34000000
TimerDelay	Integer	/	/	Timer delay; range: 0 to 34000000
TimerFrequency	Integer	/	/	Timer frequency; range: 0 to 1000000
TimerTriggerSource	Enum	255	Off	Timer trigger source
		0	OptoCoupledInput0	
		1	OptoCoupledInput1	
		2	OptoCoupledInput2	
		3	OptoCoupledInput3	
		16	RS422diffInput0	
		17	RS422diffInput1	
		18	RS422diffInput2	
		19	RS422diffInput3	
		32	TTLInput0	
		33	TTLInput1	
		34	TTLInput2	
		35	TTLInput3	
		48	Timer0Active	
		49	Timer1Active	
		50	Timer2Active	
		51	Timer3Active	
		64	Encoder0	
		65	Encoder1	
		80	SoftwareSignal0	
		81	Continuous	
		96	D485Input0	
		97	D485Input1	
		98	D485Input2	
		99	D485Input3	
		100	D485Input4	
		101	D485Input5	
		102	D485Input6	
		103	D485Input7	

		104	D485Input8	
		105	D485Input9	
		106	D485Input10	
		112	AdvancedIO0	
		113	AdvancedIO1	
		114	AdvancedIO2	
		115	AdvancedIO3	
		128	ReceiveImageFrame Start0	
		129	ReceiveImageFrame Start1	
		130	ReceiveImageFrame Start2	
		131	ReceiveImageFrame Start3	
		132	ReceiveImageFrame Start4	
		133	ReceiveImageFrame Start5	
		134	ReceiveImageFrame Start6	
		135	ReceiveImageFrame Start7	
		144	ReceiveImageFrame End0	
		145	ReceiveImageFrame End1	
		146	ReceiveImageFrame End2	
		147	ReceiveImageFrame End3	
		148	ReceiveImageFrame End4	
		149	ReceiveImageFrame End5	
		150	ReceiveImageFrame End6	
		151	ReceiveImageFrame End7	
		160	Fval_0	
		161	Fval_1	
		162	Fval_2	
		163	Fval_3	
		164	Fval_4	

		165	Fval_5	
		166	Fval_6	
		167	Fval_7	
		192	QuickSoftwareTrigger0	
		193	QuickSoftwareTrigger1	
		194	QuickSoftwareTrigger2	
		195	QuickSoftwareTrigger3	
Timer Trigger Activation	Enum	0	RisingEdge	Timer trigger activation
		1	FallingEdge	
		2	AnyEdge	
		3	LevelHigh	
		4	LevelLow	
TimerTriggerDelay	Integer	/	/	Timer trigger delay; range: 0 to 34000000
User set control				
UserSetCurrent	Integer	/	/	Current user set; range: 0 to 4294967295
UserSetSelector	Enum	0	Default	Select user set
		1	UserSet1	
		2	UserSet2	
		3	UserSet3	
UserSetLoad	Command	/	/	Load user set
UserSetSave	Command	/	/	Save user set
UserSetDefault	Enum	0	Default	Default user set
		1	UserSet1	
		2	UserSet2	
		3	UserSet3	

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