RICOH

External Hardware Trigger Settings for RICOH Stereo Cameras

User's Guide

RICOH Industrial Solutions Inc.

RICOH

Contents

1. FUNCTIONAL OVERVIEW

This user's guide describes the imaging functions using external hardware triggering.

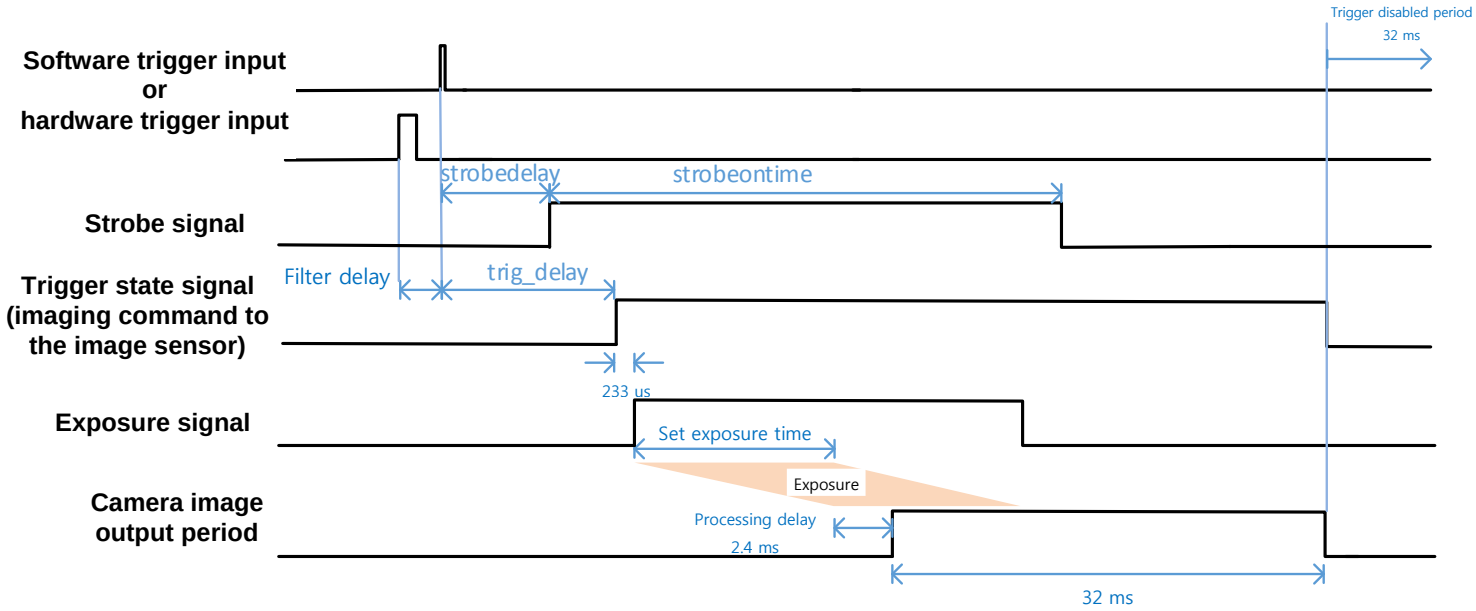
• Edge trigger function

Imaging is performed using the edge of the external hardware trigger as a trigger.
There is a trigger disabled period during which a new trigger signal is not accepted after the completion of the camera image output (approximately 32 ms).
A new trigger signal is not accepted during the period from the trigger input to the end of the trigger disabled period.
The time until the next trigger signal can be accepted varies depending on the setting.
Do not change the external hardware trigger settings during the period from the trigger input to the end of the camera image output period.

• Signal output function

An arbitrary output signal can be output from each output pin.

[Timing Diagram]



2. POWER CONNECTOR

[Connector Specifications]
Connector: HR10A-10R-12PB (Hirose) or an equivalent connector
The connector doubles as the power supply.
Prepare an IO power input and IO GND separately from the power input and power GND when connecting with an external device to, for example, input a trigger signal.
Use an HR10A-10P-12S (Hirose) or an equivalent connector on the cable side.
* For the output pins and input pins, it is recommended to configure the setting so the total Low period becomes shorter. The life of the Opt. Isolated device is consumed during the Low period.

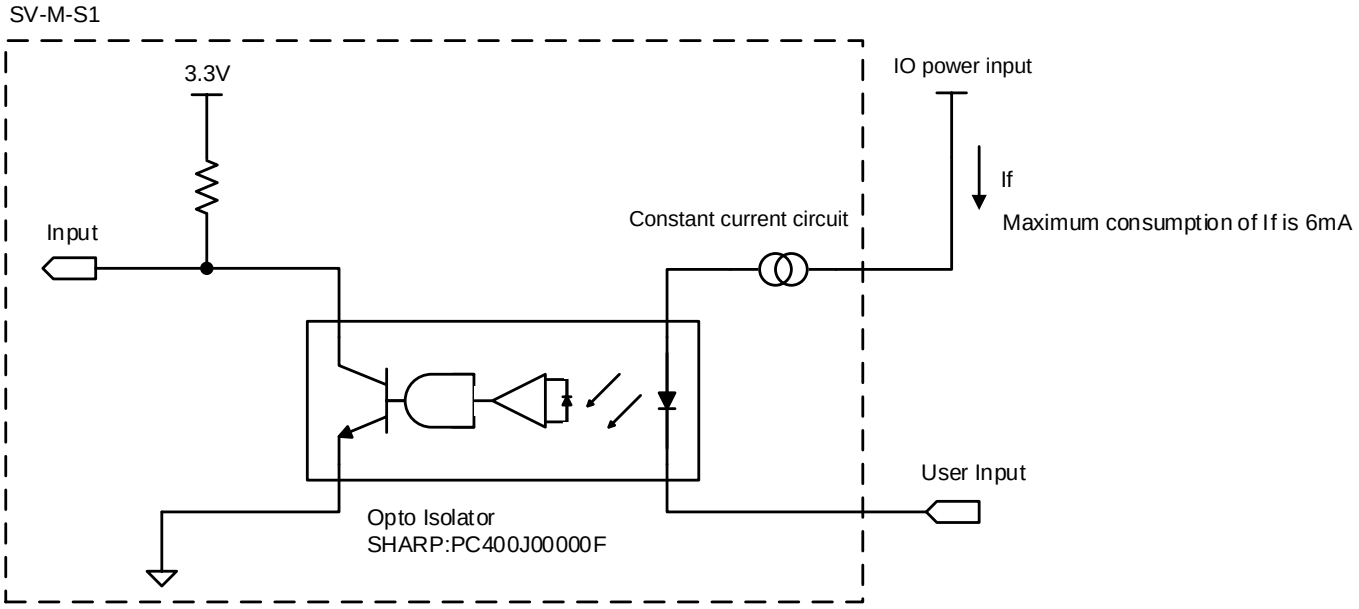
Pin Assignment

Pin No.	Signal Name	Specification	Default Setting		
			Mode	Polarity	Debounce
1	Power GND	GND	-		
2	Power input	12, 24 V ±10%	-		
3	Output 1	Opt. Isolated	User	Active Low	-
4	Output 2	Opt. Isolated	User	Active Low	-
5	Output 3	Opt. Isolated	User	Active Low	-
6	Output 4	Opt. Isolated	User	Active Low	-
7	Output 5	Opt. Isolated	User	Active Low	-
8	Input 1	Opt. Isolated	None	Active Low	None
9	Input 2	Opt. Isolated, System reset, Active Low, Minimum pulse width: 8 us	-		
10	Input 3	Opt. Isolated	None	Active Low	None
11	IO power input	3.3, 5.0, 12, 24 V ±10%	-		
12	IO GND	IO GND	-		

12-pin connector

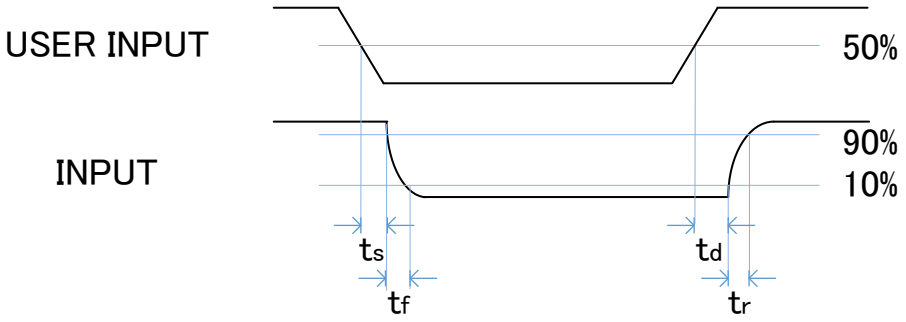
[I/O Signal Terminal Circuit Diagrams]

• Input signal terminal circuit diagram



IO power input: I/O terminal power supply for inputting from a power signal connector (11-pin)

• Response timing

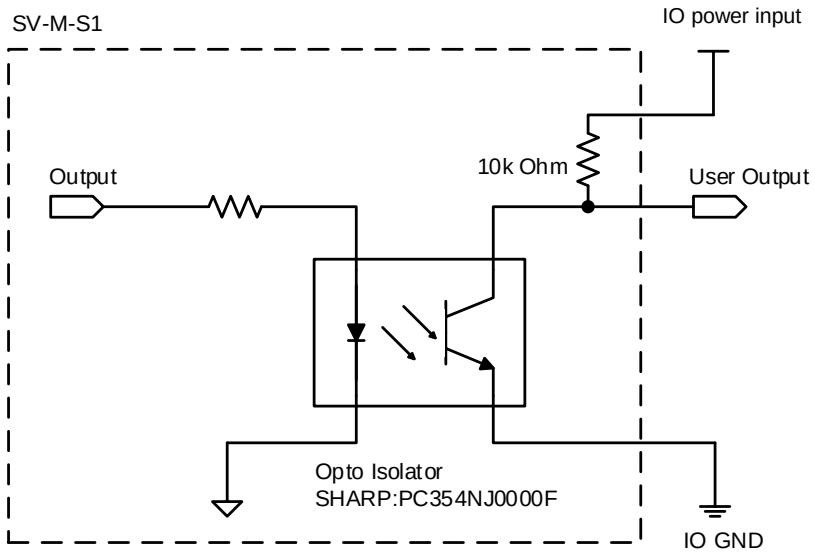


Response time

	IO power input voltage			
	3.3 [V]	5.0 [V]	12 [V]	24 [V]
Td [us]	37.2	52.8	121	226
Tr [ns]	115	116	115	120
Ts [ns]	492	478	440	434
Tf [ns]	13.1	13.1	12.7	13.3

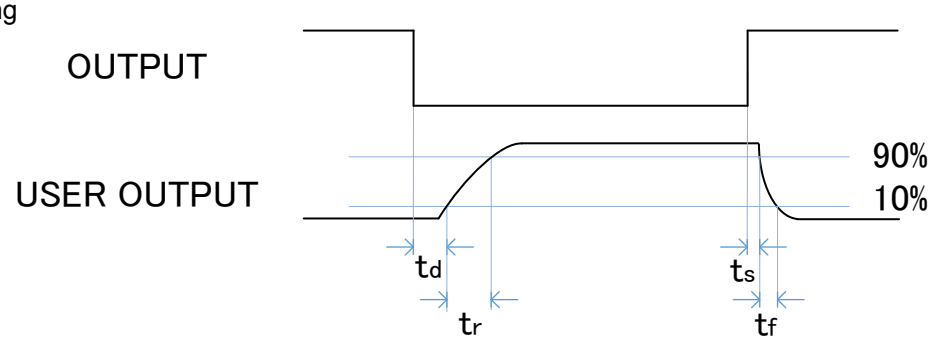
The response time values are reference values and do not guarantee the performance.

• Output signal terminal circuit diagram



IO power input: I/O terminal power supply for inputting from a power signal connector (11-pin)

• Response timing



Response time

	IO power input voltage			
	3.3 [V]	5.0 [V]	12 [V]	24 [V]
Td [us]	32.0	34.0	33.4	11.4
Tr [us]	195	160	100	71.3
Ts [us]	2.8	3.0	4.0	4.6
Tf [us]	8.6	11.4	22.4	52.5

The response time values are reference values and do not guarantee the performance.

3. INPUT SIGNAL DETAILS

[Input Signal]

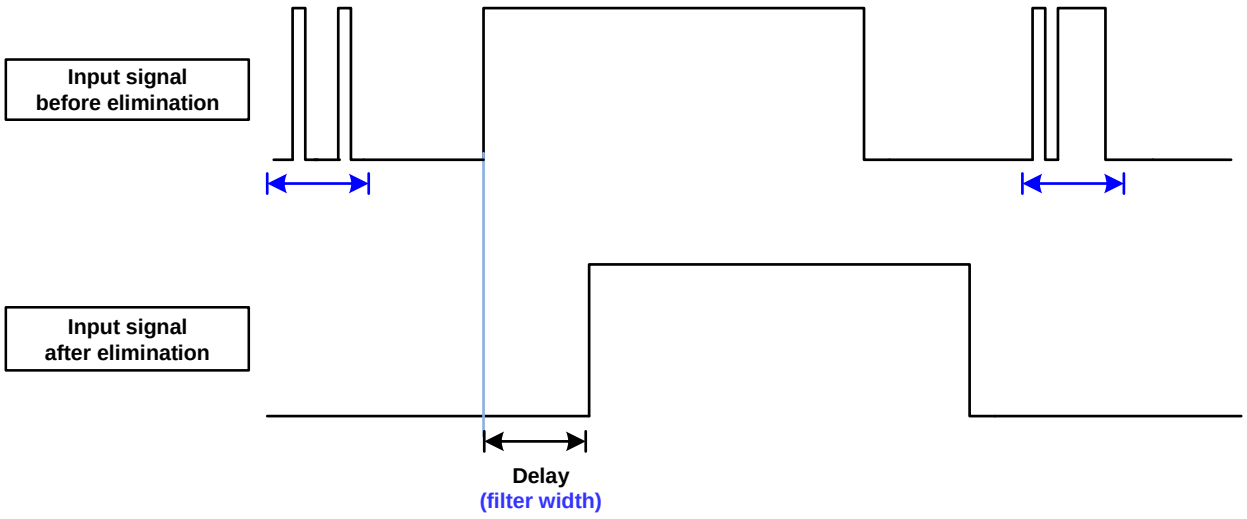
For input trigger signals, the following settings need to be configured from either R-Stereo-GigE-Player or -SDK.
A new trigger signal is not accepted during the period from the trigger input to the end of the trigger disabled period.
When both input pins 1 and 3 are set to HardTrigger mode,the logical OR of both signals functions as the trigger signal.

Setting Item	Setting Name	Description	Remark
Input Pin * Mode	None	Input signal disabled	-
	HardTrigger	Trigger signal input	-
Input Pin * Polarity	Active Low	Negative logic	-
	Active High	Positive logic	-
Input Pin * Debounce	None	Chattering elimination function OFF	-
	MicroSec20	Eliminate signals of 20 us or less	-
	MicroSec100	Eliminate signals of 100 us or less	-
	MicroSec200	Eliminate signals of 200 us or less	-
	MicroSec300	Eliminate signals of 300 us or less	-

* “*” represents an input pin number (1 or 3).

Filter Width (Input Pin * Debounce)

Set the filter width for eliminating the chattering that occurs when a signal is input from the input pin.
A delay equivalent to the set filter width is generated.



4. OUTPUT SIGNAL DETAILS

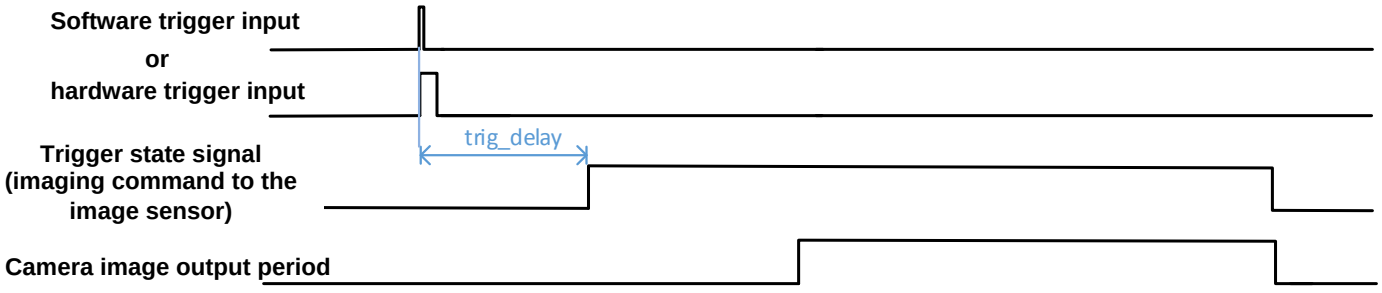
[Output Signal]
For output signals, the following settings need to be configured from either R-Stereo-GigE-Player or -SDK.

Setting Item	Setting Name	Description	Remark
Output Pin * Mode	TrigState	Trigger state	Imaging command signal to the image sensor
	Exposure	Exposure signal	Exposure state of the image sensor
	Strobe	Strobe signal	Signal equivalent to the set OnTime and Delay values
	In-To-OutPin	External input signal	Input signal
	User	Fixed signal	-
Output Pin * Polarity	Active Low	Negative logic	-
	Active High	Positive logic	-

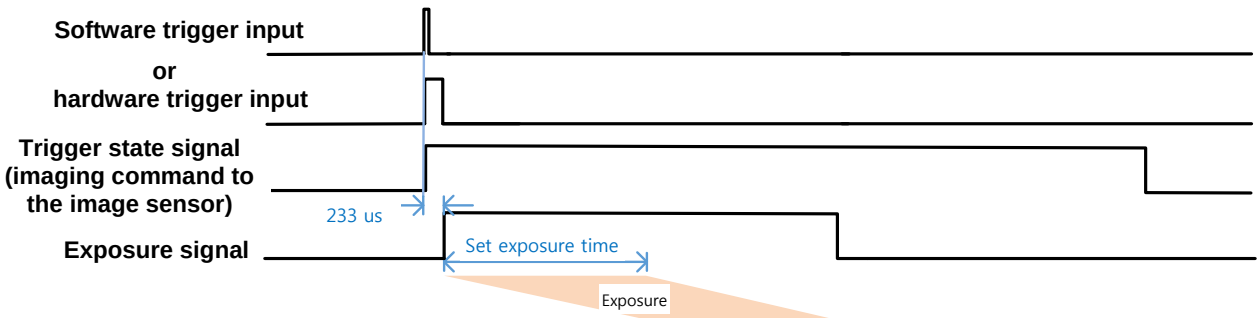
* "*" represents an output pin number (1 to 5).

Trigger State Signal (TrigState)
Imaging command signal to the image sensor.
The signal is asserted by a hardware or software trigger and negated by the completion of the image output from the camera.
The delay value from the hardware or software trigger to the assertion start can be set by setting the trigger delay (trig_delay) value.

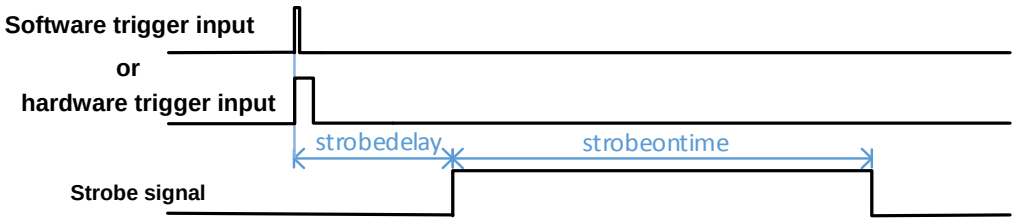
Setting Item	Setting Range	Description
Sensor Trigger Delay [nano sec]	0 to 2,000,000,000 ns	Delay value from the trigger input to the start of the imaging command to the image sensor



Exposure Signal (Exposure)
The exposure signal is asserted approximately 233 us after the rise of the trigger state signal. It is negated after the end of the exposure.
It is asserted or negated according to the trigger state signal in free run mode.
The set exposure time and the assertion period of the exposure signal are different because the image sensor uses a rolling shutter.



Strobe Signal (Strobe)
Signal for controlling external devices (such as lighting).
Inputting a trigger signal (hardware or software) outputs the signal equivalent to the set delay value and assertion period.
A new trigger signal is not accepted during the period from the trigger input to the end of the trigger disabled period and during the period until the completion of the strobe output.



Setting Item	Setting Range	Description	Remark
Strobe Delay [nano sec]	0 to 2,000,000,000 ns	Strobe signal delay value	Delay value setting from the trigger input to the strobe signal assertion
Strobe On-Time [nano sec]	0 to 2,000,000,000 ns	Strobe signal assertion period	Strobe signal assertion period setting

External Input Signal (In-To-OutPin)
Outputs the signal that is input from the input pin (after eliminating the chattering).
Either input 1 or input 3 must be selected for the pin used.

Setting Item	Setting Name	Description
In-To-OutPin (Through Pin)	Input Pin 1	Outputs the signal that is input to input pin 1.
	Input Pin 3	Outputs the signal that is input to input pin 3.

Fixed Signal (User)
High Fixed or Low Fixed can be set in Polarity Setting.

Polarity Setting	Output
Active High	Low Fixed
Active Low	High Fixed

5. HOW TO SET THE SOFTWARE

For an overview of R-Stereo-GigE-Player and -SDK, refer to the R-Stereo-GigE-Player User's Guide and the -SDK documentation.

Revision History

Rev	Date	Changes	Note
1.00	January 26, 2016	● Newly issued	