

## Small Hardware / Software Trigger USB2.0

### Color / Monochrome Cameras

|                       |         |
|-----------------------|---------|
| STC-MC33USB/MB33USB   | (VGA)   |
| STC-MC83USB/MB83USB   | (XGA)   |
| STC-MC133USB/MB133USB | (SXVGA) |
| STC-MC152USB/MB152USB | (SXGA)  |
| STC-MC202USB/MB202USB | (UXGA)  |

#### Users Guide

Sentech Co., Ltd.

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## 1. How to setup camera

Please make and configure the software with trigger SDK to use the trigger function of the camera.

The trigger function setting and check the trigger function with StCamSWare software.

Please use the latest StCamSWare to check the trigger function.

The advanced setting window, gain, mirror mode, gamma, sharpness (edge enhancement), white balance, scanning mode, clock speed, pixel format for saving image, color interpolation, rotation mode and other settings are adjustable. The adjustable settings are different for color and monochrome model. (Some settings are changeable in the simple setting window)

The operating mode (Free run / trigger), trigger mode (edge preset, pulse width or start / stop trigger), Input and output signal settings (signal type and delay) are selectable for the hardware trigger function.

The operating mode (Free run / trigger), trigger mode (edge preset or start/stop trigger) are selectable and trigger signal can generate for the software trigger function.

## 2. Camera Settings

The camera settings are adjustable for the system with the simple setting window or advanced setting window.

The simple setting window, gain, mirror mode, gamma, sharpness (edge enhancement), white balance, and hue and saturation settings are adjustable. The adjustable settings are different for color and monochrome model.

The advanced setting window, gain, mirror mode, gamma, sharpness (edge enhancement), white balance, scanning mode, clock speed, pixel format for saving image, color interpolation, rotation mode and other settings are adjustable. The adjustable settings are different for color and monochrome model.

## 3. Simple Camera Settings

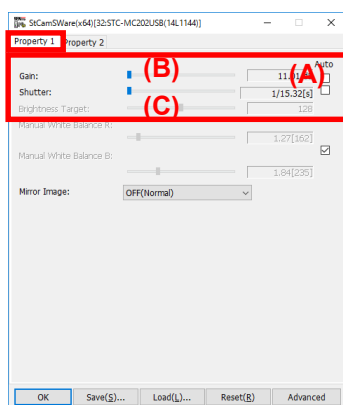
### 3.1 Gain settings

#### A. Descriptions

Set the gain mode (AGC or fixed gain).

#### B. How to set

Gain sets at "Property 1" window.



Gain mode is selectable from below two gain modes.

#### a. AGC (Auto Gain Control)

Check on check box (A) at right side of gain setting.

#### Target brightness for AGC (C)

Set target brightness for AGC from 0 to 255.

When setting small target brightness value, the image becomes dark with AGC.

When setting great target brightness value, the image becomes bright with AGC, but the noise becomes noticeable.

#### b. Fixed Gain

Uncheck on check box (A) at right side of gain setting.

#### Fixed Gain (B)

Set fixed Gain from 1.86 to 31.30 dB.

When setting great target brightness value, the image becomes bright, but the noise becomes noticeable.

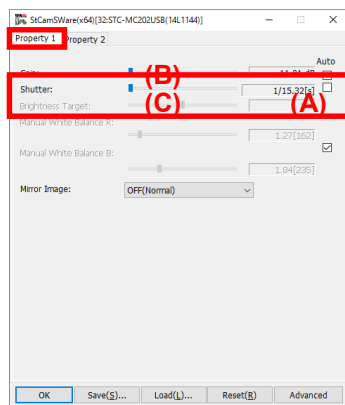
## 3.2 Shutter speed (Exposure time) settings

### A. Descriptions

Set shutter mode (Auto shutter or fixed shutter).

### B. How to set

Shutter speed (exposure time) sets at "Property 1" window.



Shutter mode is selectable from below two shutter modes.

#### a. Auto shutter

Check on check box (A) at right side of shutter setting.

Target brightness for auto shutter (C)

Sets target brightness for auto shutter from 0 to 255.

When setting small target brightness value, the image becomes dark with auto shutter function.

When setting great target brightness value, the image becomes bright with auto shutter function.

#### b. Fixed shutter

Uncheck on check box (A) at right side of shutter setting.

Fixed shutter (B)

Adjustable range for fixed shutter is different based on the camera type.

## 3.3 Mirror image mode settings

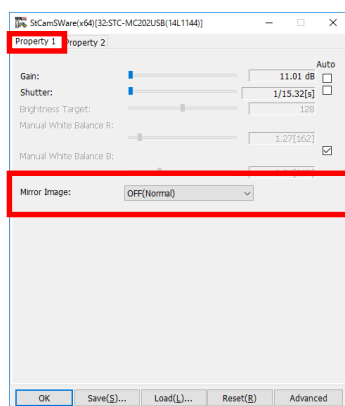
### A. Descriptions

Sets mirror image mode (Normal, horizontal mirror, vertical mirror, and horizontal and vertical mirror) for the displaying image.

**This function is processing on the PC. The frame rate may become slower when using mirror mode.**

### B. How to set

Mirror image mode sets at “Property 1” window.



Mirror mode is selectable from below four mirror modes.

**This function is processing on the PC. The frame rate may become slower when using mirror mode.**

#### a. OFF (Normal)

Normal image (original image) is displayed.

#### b. Horizontal

Horizontal mirror image from original image is displayed.

#### c. Vertical

Vertical mirror image from original image is displayed.

#### d. Horizontal / vertical

Horizontal and vertical mirror image from original image is displayed.

## 3.4 Gamma mode settings

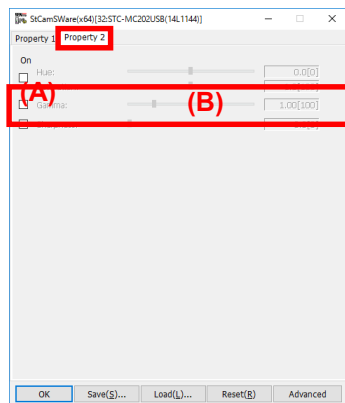
### A. Descriptions

Sets gamma mode, which is gamma conversion for the brightness of image.

**This function is processing on the PC. The frame rate may become slower when using gamma mode.**

### B. How to set

Gamma mode sets at "Property 2" window.



Gamma mode is selectable from below two gamma modes.

**This function is processing on the PC. The frame rate may become slower when using gamma mode.**

#### a. OFF

Uncheck on check box (A) at left side of gamma setting.

Gamma is 1.0.

#### b. ON

Check on check box (A) at left side of gamma setting.

#### Gamma (B)

Set the gamma.

Adjustable range for gamma is 0.01 to 5.00.



## 3.5 Sharpness (Edge enhancement) mode settings

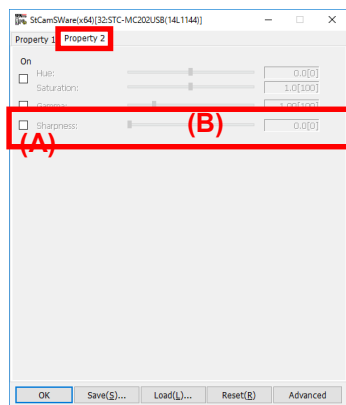
### A. Descriptions

Sets sharpness (edge enhancement) mode, which is edge enhancement for the image.

**This function is processing on the PC. The frame rate may become slower when using sharpness mode.**

### B. How to set

Sharpness mode sets at "Property 2" window.



Sharpness mode is selectable from below two sharpness modes.

**This function is processing on the PC. The frame rate may become slower when using sharpness mode.**

#### a. OFF

Uncheck on check box (A) at left side of sharpness setting.

Sharpness gain is not adjustable.

#### b. ON

Check on check box (A) at left side of sharpness setting.

#### Sharpness gain (B)

Set the sharpness gain.

Adjustable range for sharpness gain is 0 to 50.

When setting small sharpness gain value, the image sharpness becomes soft.

When setting great sharpness gain value, the image sharpness becomes strong.

## 3.6 White balance mode settings (only available for color model)

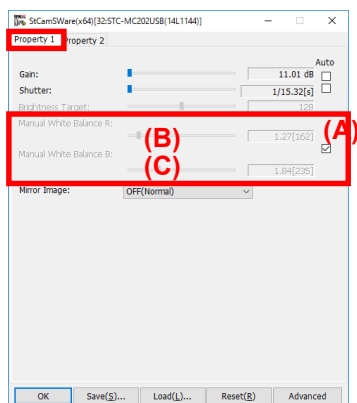
### A. Descriptions

Sets white balance mode, which is white balance process for the image.

**This function is processing on the PC. The frame rate may become slower when using white balance mode.**

### B. How to set

White balance mode sets at "Property 1" window.



White balance mode is selectable from below two white balance modes.

**This function is processing on the PC. The frame rate may become slower when using white balance mode.**

#### a. Auto white balance

Check on check box (A) at right side of white balance setting.

The white balance is adjusting automatically. It cannot adjust manually.

#### b. Manual white balance

Uncheck on check box (A) at right side of white balance setting.

#### Manual White Balance R (B)

Set Red gain of manual white balance.

Adjustable range for R gain of manual white balance is 1.0 to 5.0.

#### Manual White Balance B (C)

Set Blue gain of manual white balance.

Adjustable range for B gain of manual white balance is 1.0 to 5.0.

## 3.7 Hue and Saturation settings (only available for color model)

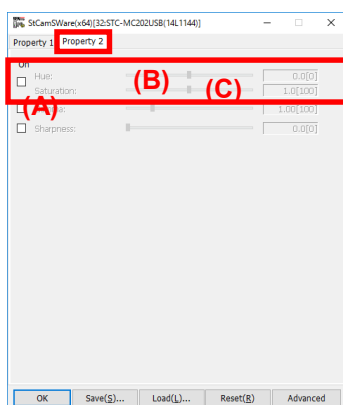
### A. Descriptions

Set hue and saturation setting for the image.

**This function is processing on the PC. The frame rate may become lower when using hue and saturation function.**

### B. How to set

Hue and saturation mode sets at "Property 2" window.



Hue and saturation mode is selectable from below two hue and saturation modes.

**This function is processing on the PC. The frame rate may become slower when using hue and saturation mode.**

#### a. OFF

Uncheck on check box (A) at left side of hue and saturation setting.

Hue and saturation are not adjustable.

#### b. ON

Check on check box (A) at left side of hue and saturation setting.

#### Hue (B)

Set the hue of the image.

Adjustable range for hue is -180 to 180.

#### Saturation (C)

Set the saturation of the image.

Adjustable range for saturation is 0 to 2.0.

## 4. Advanced Camera Settings

The advanced setting window, gain, mirror mode, gamma, sharpness (edge enhancement), white balance, scanning mode, clock speed, pixel format for saving image, color interpolation, rotation mode and other settings are adjustable. The adjustable settings are different for color and monochrome model.

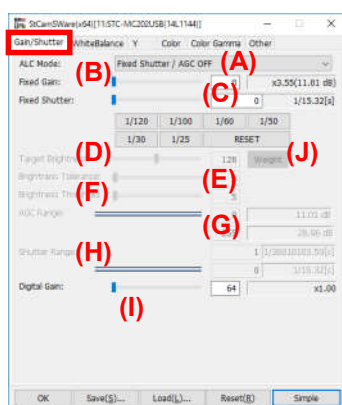
### 4.1 Gain / Shutter settings

#### A. Descriptions

Set the shutter speed (exposure time) and gain.

#### B. How to set

The shutter speed and gain settings set at “Gain/Shutter” window.



The shutter and gain mode is selectable from below seven shutter and gain modes.

#### a. Fixed shutter / Fixed gain

“Fixed shutter / AGC OFF” selects at ALC Mode. (A)

The camera operates with fixed shutter and fixed gain.

#### Fixed Gain (B)

Set the analog gain.

When setting great fixed gain value, the image becomes bright under the dark situation, but the noise becomes noticeable.

#### Fixed Shutter (C)

Set the fixed shutter speed.

Adjustable range for fixed shutter is different based on the camera type, clock speed and scanning mode.

Shutter speed can selectable by the shutter speed button.

#### Digital Gain (I)

Set the digital gain.

Please set the digital gain before set the analog gain.

When setting great fixed gain value, the image becomes bright under the low light condition, but the noise becomes noticeable.

The maximum gain setting of the camera is when setting maximum gain for digital gain and analog gain.

## b. Auto shutter / AGC

“Auto Shutter ON / AGC ON” selects at ALC Mode. (A)

The camera maintains the brightness of the image is matched to the target brightness.

### Target Brightness (D)

Set the target brightness of the image.

When setting small target brightness value, the image becomes dark image.

When setting great target brightness value, the image becomes bright image.

### Brightness Tolerance (E)

Set the brightness tolerance to stop brightness adjustment.

The camera stops the brightness adjustment when the difference between the target brightness and image brightness is smaller than this value.

### Brightness Threshold (F)

Set the brightness threshold to start brightness adjustment.

The camera starts the brightness adjustment when the difference between the target brightness and image brightness is greater than this value.

### AGC Range (G)

Set the range of AGC.

### Shutter Range (H)

Set the range of auto shutter.

### Digital Gain (I)

Set the digital gain.

Please set the digital gain before set the analog gain.

When setting great fixed gain value, the image becomes bright under the low light condition, but the noise becomes noticeable.

The maximum gain setting of the camera is when setting maximum gain for digital gain and analog gain.

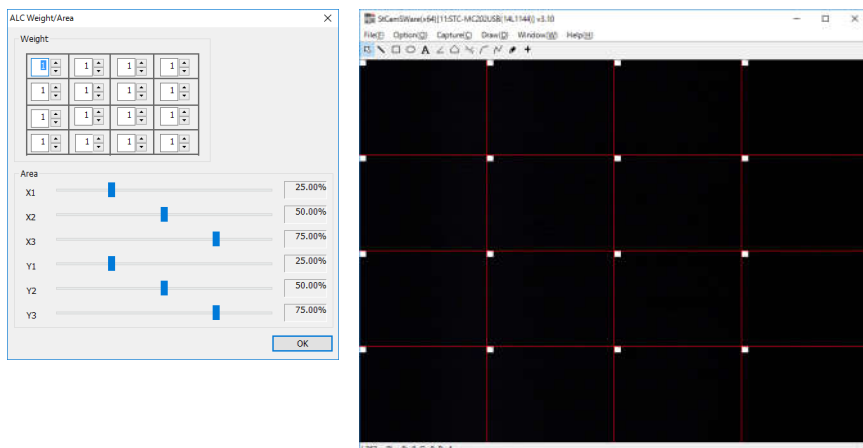
### Weight (J)

Set the weight area and weight for auto shutter and AGC.

When selecting the “Weight” button, “ALC Weight/Area” window is appeared and maximum 16 areas can be assignable with X1, X2 and X3 for horizontal separation and Y1, Y2 and Y3 for vertical separation.

The weight is settable from 0 to 255.

The weight area and weight value are displayed on the image while “ALC Weight/Area” window is displaying.



c. Auto shutter / AGC

“Auto Shutter ON / AGC OFF” selects at ALC Mode. (A)

The camera maintains the brightness of the image is matched to the target brightness.

The camera uses the fixed gain.

Fixed Gain (B)

Set the analog gain.

When setting great fixed gain value, the image becomes bright under the dark situation, but the noise becomes noticeable.

Target Brightness (D)

Set the target brightness of the image.

When setting small target brightness value, the image becomes dark image.

When setting great target brightness value, the image becomes bright image.

Brightness Tolerance (E)

Set the brightness tolerance to stop brightness adjustment.

The camera stops the brightness adjustment when the difference between the target brightness and image brightness is smaller than this value.

Brightness Threshold (F)

Set the brightness threshold to start brightness adjustment.

The camera starts the brightness adjustment when the difference between the target brightness and image brightness is greater than this value.

Shutter Range (H)

Set the range of auto shutter.

Digital Gain (I)

Set the digital gain.

Please set the digital gain before set the analog gain.

When setting great fixed gain value, the image becomes bright under the low light condition, but the noise becomes noticeable.

The maximum gain setting of the camera is when setting maximum gain for digital gain and analog gain.

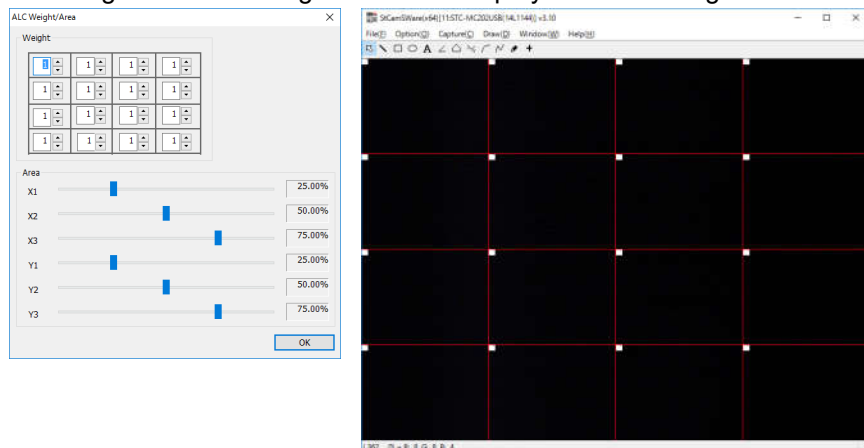
## Weight (J)

Set the weight area and weight for auto shutter and AGC.

When selecting the "Weight" button, "ALC Weight/Area" window is appeared and maximum 16 areas can be assignable with X1, X2 and X3 for horizontal separation and Y1, Y2 and Y3 for vertical separation.

The weight is settable from 0 to 255.

The weight area and weight value are displayed on the image while "ALC Weight/Area" window is displaying.



## d. Fixed shutter / AGC

“Fixed Shutter / AGC” selects at ALC Mode. (A)

The camera maintains the brightness of the image under the low light condition.

The camera uses the fixed shutter. Shutter speed can selectable by the shutter speed button.

## Fixed Shutter (C)

Set the fixed shutter speed.

Adjustable range for fixed shutter is different based on the camera type, clock speed and scanning mode.

Shutter speed can selectable by the shutter speed button.

## Target Brightness (D)

Set the target brightness of the image.

When setting small target brightness value, the image becomes dark image.

When setting great target brightness value, the image becomes bright image.

## Brightness Tolerance (E)

Set the brightness tolerance to stop brightness adjustment.

The camera stops the brightness adjustment when the difference between the target brightness and image brightness is smaller than this value.

## Brightness Threshold (F)

Set the brightness threshold to start brightness adjustment.

The camera starts the brightness adjustment when the difference between the target brightness and image brightness is greater than this value.

## AGC Range (G)

Set the range of AGC.

## Digital Gain (I)

Set the digital gain.

Please set the digital gain before set the analog gain.

When setting great fixed gain value, the image becomes bright under the low light condition, but the noise becomes noticeable.

The maximum gain setting of the camera is when setting maximum gain for digital gain and analog gain.



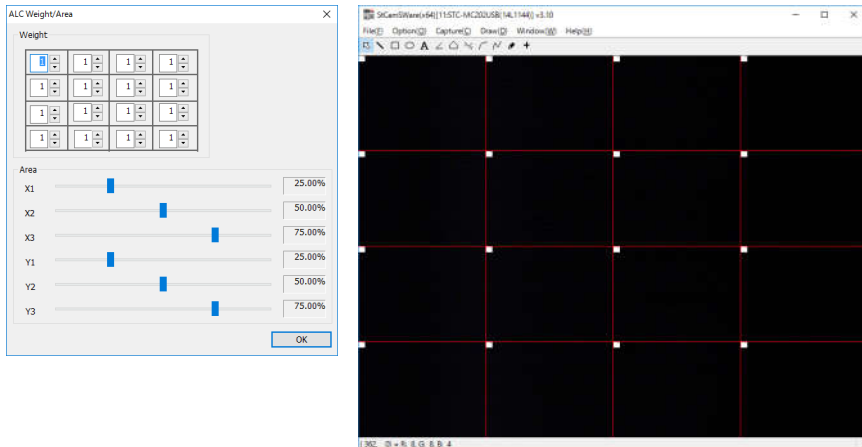
## Weight (J)

Set the weight area and weight for auto shutter and AGC.

When selecting the "Weight" button, "ALC Weight/Area" window is appeared and maximum 16 areas can be assignable with X1, X2 and X3 for horizontal separation and Y1, Y2 and Y3 for vertical separation.

The weight is settable from 0 to 255.

The weight area and weight value are displayed on the image while "ALC Weight/Area" window is displaying.



## e. Oneshot auto shutter / Oneshot AGC

“Auto Shutter / AGC OneShot” selects at ALC Mode. (A)

The camera maintains the brightness of the image is matched to the target brightness.

### Target Brightness (D)

Set the target brightness of the image.

When setting small target brightness value, the image becomes dark image.

When setting great target brightness value, the image becomes bright image.

### Brightness Tolerance (E)

Set the brightness tolerance to stop brightness adjustment.

The camera stops the brightness adjustment when the difference between the target brightness and image brightness is smaller than this value.

### Brightness Threshold (F)

Set the brightness threshold to start brightness adjustment.

The camera starts the brightness adjustment when the difference between the target brightness and image brightness is greater than this value.

### AGC Range (G)

Set the range of AGC.

### Shutter Range (H)

Set the range of auto shutter.

### Digital Gain (I)

Set the digital gain.

Please set the digital gain before set the analog gain.

When setting great fixed gain value, the image becomes bright under the low light condition, but the noise becomes noticeable.

The maximum gain setting of the camera is when setting maximum gain for digital gain and analog gain.

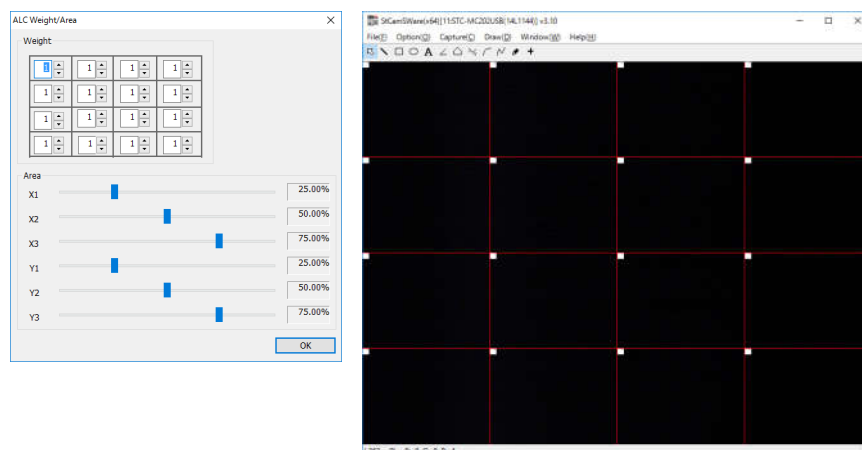
### Weight (J)

Set the weight area and weight for auto shutter and AGC.

When selecting the “Weight” button, “ALC Weight/Area” window is appeared and maximum 16 areas can be assignable with X1, X2 and X3 for horizontal separation and Y1, Y2 and Y3 for vertical separation.

The weight is settable from 0 to 255.

The weight area and weight value are displayed on the image while “ALC Weight/Area” window is displaying.



f. Onshot auto shutter / Fixed gain

“Auto Shutter OneShot / AGC OFF” selects at ALC Mode. (A)

The camera maintains the brightness of the image is under the low light condition.

The camera uses fixed shutter excluding under the low light condition.

Fixed Gain (B)

Set the analog gain.

When setting great fixed gain value, the image becomes bright under the dark situation, but the noise becomes noticeable.

Target Brightness (D)

Set the target brightness of the image.

When setting small target brightness value, the image becomes dark image.

When setting great target brightness value, the image becomes bright image.

Brightness Tolerance (E)

Set the brightness tolerance to stop brightness adjustment.

The camera stops the brightness adjustment when the difference between the target brightness and image brightness is smaller than this value.

Brightness Threshold (F)

Set the brightness threshold to start brightness adjustment.

The camera starts the brightness adjustment when the difference between the target brightness and image brightness is greater than this value.

Shutter Range (H)

Set the range of auto shutter.

Digital Gain (I)

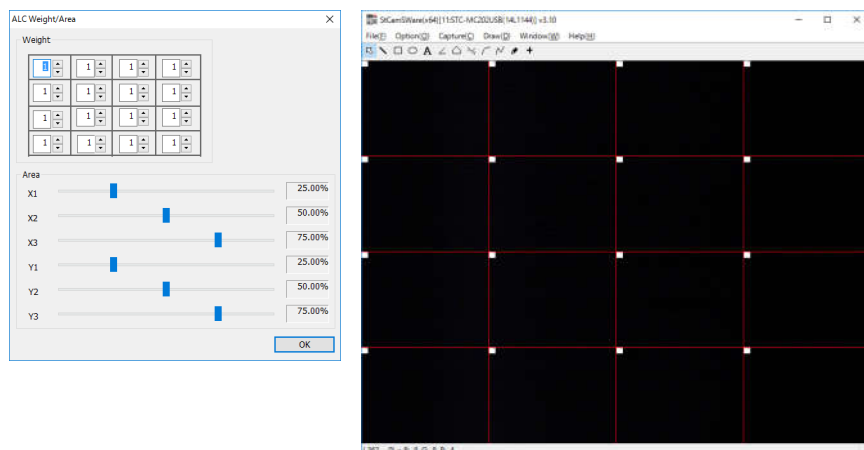
Set the digital gain.

Please set the digital gain before set the analog gain.

When setting great fixed gain value, the image becomes bright under the low light condition, but the noise becomes noticeable.

The maximum gain setting of the camera is when setting maximum gain for digital gain and analog gain.

The weight area and weight value are displayed on the image while “ALC Weight/Area” window is displaying.



g. Fixed shutter / OneShot AGC

“Fixed Shutter / AGC OneShot”selects at ALC Mode. (A)

The camera maintains the brightness of the image is under the low light condition.

The camera uses fixed shutter excluding under the low light condition.

Shutter speed can selectable by the shutter speed button.

Fixed Shutter (C)

Set the fixed shutter speed.

Adjustable range for fixed shutter is different based on the camera type, clock speed and scanning mode.

Shutter speed can selectable by the shutter speed button.

Target Brightness (D)

Set the target brightness of the image.

When setting small target brightness value, the image becomes dark image.

When setting great target brightness value, the image becomes bright image.

Brightness Tolerance (E)

Set the brightness tolerance to stop brightness adjustment.

The camera stops the brightness adjustment when the difference between the target brightness and image brightness is smaller than this value.

Brightness Threshold (F)

Set the brightness threshold to start brightness adjustment.

The camera starts the brightness adjustment when the difference between the target brightness and image brightness is greater than this value.

AGC Range (G)

Set the range of AGC.

Digital Gain (I)

Set the digital gain.

Please set the digital gain before set the analog gain.

When setting great fixed gain value, the image becomes bright under the dark situation, but the noise becomes noticeable.

The maximum gain setting of the camera is when setting maximum gain for digital gain and analog gain.

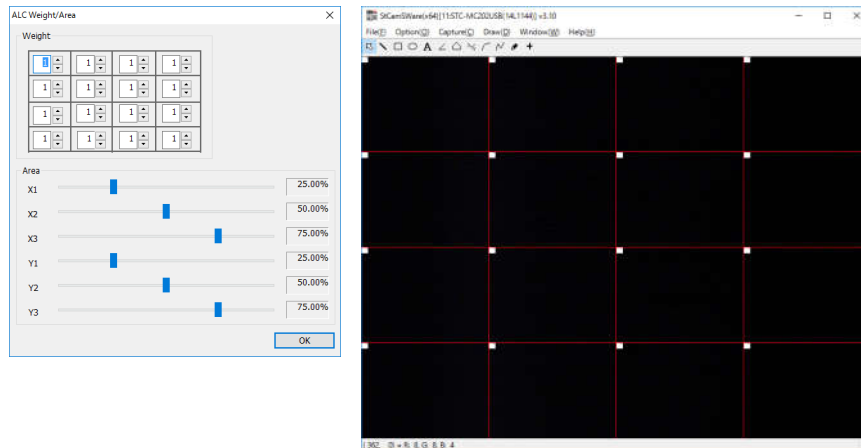
## Weight (J)

Set the weight area and weight for auto shutter and AGC.

When selecting the "Weight" button, "ALC Weight/Area" window is appeared and maximum 16 areas can be assignable with X1, X2 and X3 for horizontal separation and Y1, Y2 and Y3 for vertical separation.

The weight is settable from 0 to 255.

The weight area and weight value are displayed on the image while "ALC Weight/Area" window is displaying.



## 4.2 Gamma mode settings

### A. Descriptions

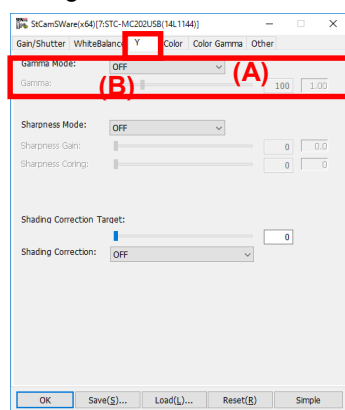
Sets gamma mode, which is gamma conversion for the brightness of image.

The color gamma for color model is changeable on "Color Gamma" window.

**This function is processing on the PC. The frame rate may slower when using gamma mode.**

### B. How to set

The gamma mode set at "Y" window.



Gamma mode is selectable from below two gamma modes.

**This function is processing on the PC. The frame rate may become slower when using gamma mode.**

#### a. OFF

"OFF" selects at Gamma Mode. (A)

Gamma is 1.0.

#### b. ON

"ON" selects at Gamma Mode. (A)

Gamma (B)

Set the gamma.

Adjustable range for gamma is 0.01 to 5.00.

#### c. Reverse

"Reverse" selects at Gamma Mode. (A)

When selecting "Reverse" gamma mode, the brightness of the image is inverted.

Gamma (B)

Set the gamma.

Adjustable range for gamma is 0.01 to 5.00.

## 4.3 Sharpness (Edge enhancement) mode settings

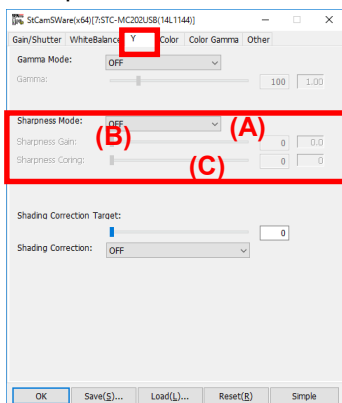
### A. Descriptions

Sets sharpness (edge enhancement) mode, which is edge enhancement for the image.

**This function is processing on the PC. The frame rate may become slower when using sharpness mode.**

### B. How to set

Sharpness mode sets at “Y” window.



Sharpness mode is selectable from below two sharpness modes.

**This function is processing on the PC. The frame rate may become slower when using sharpness mode.**

#### a. OFF

“OFF” selects at Sharpness Mode. (A)

Sharpness gain is not adjustable.

#### b. ON

“ON” selects at Sharpness Mode. (A)

#### Sharpness Gain (B)

Set the sharpness gain.

Adjustable range for sharpness gain is 0 to 50.

When setting small sharpness gain value, the image sharpness becomes soft.

When setting great target brightness value, the image sharpness becomes strong.

#### Sharpness Coring (C)

Set the sharpness coring.

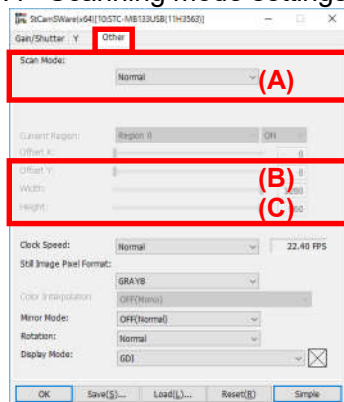
Adjustable range for sharpness coring is 0 to 255.

When setting small sharpness coring value, the sharpness process for small edge including the noise.

When setting great sharpness coring value, the less sharpness process even greater edge.



## 4.4 Scanning mode settings



Scanning mode is selectable from below ten scanning modes.  
(some scanning modes are only available for monochrome model)

### 4.4.1 Normal

### 4.4.2 1/1 partial scanning

### 4.4.3 1/2 partial scanning

### 4.4.4 1/4 partial scanning

### 4.4.5 Variable partial scanning

### 4.4.6 Binning (only available for monochrome model)

### 4.4.7 Binning 1/1 partial scanning (only available for monochrome model)

### 4.4.8 Binning 1/2 partial scanning (only available for monochrome model)

### 4.4.9 Binning 1/4 partial scanning (only available for monochrome model)

### 4.4.10 Binning variable partial scanning (only available for monochrome model)

Please refer from next page for the details for each scanning mode.

**The maximum frame rate information from next page is the maximum frame rate from the camera.**  
**The frame drop may occur or no get the maximum frame rate due to the performance of PC.**

## 4.4.1 Normal

### A. Descriptions

The full resolution of the image is out from the camera.

The frame rate is changed by selecting clock speed. (Normal, 1/2 or 1/4 clock speed)

#### a. Resolution

STC-MC33/MB33USB: 640 (H) x 480 (V)

STC-MC83/MB83USB: 1,024 (H) x 768 (V)

STC-MC133/MB133USB: 1,280 (H) x 960 (V)

STC-MC152/MB152USB: 1,360 (H) x 1,024 (V)

STC-MC202/MB202USB: 1,600 (H) x 1,200 (V)

#### b. Maximum frame rate

|                     | Normal   | 1/2      | 1/4      | clock |
|---------------------|----------|----------|----------|-------|
| STC-MC33/MB33USB:   | 59.94fps | 29.97fps | 14.99fps |       |
| STC-MC83/MB83USB:   | 29.18fps | 14.59fps | 7.30fps  |       |
| STC-MC133/MB133USB: | 22.40fps | 11.20fps | 5.60fps  |       |
| STC-MC152/MB152USB: | 19.26fps | 9.63fps  | 4.81fps  |       |
| STC-MC202/MB202USB: | 15.32fps | 7.66fps  | 3.83fps  |       |

### B. How to set

Scanning mode sets at "Other" window.

#### Scan Mode (A)

"Normal" selects at Scan Mode.

## 4.4.2 1/1 partial scanning

### A. Descriptions

The full resolution of the image is out from the camera.

In this mode, the frame rate is slightly faster than normal due to fast transferring for the blanking period.

The frame rate is changed by selecting clock speed. (Normal, 1/2 or 1/4 clock speed)

#### a. Resolution

|                     |                       |
|---------------------|-----------------------|
| STC-MC33/MB33USB:   | 640 (H) x 480 (V)     |
| STC-MC83/MB83USB:   | 1,024 (H) x 768 (V)   |
| STC-MC133/MB133USB: | 1,280 (H) x 960 (V)   |
| STC-MC152/MB152USB: | 1,360 (H) x 1,024 (V) |
| STC-MC202/MB202USB: | 1,600 (H) x 1,200 (V) |

#### b. Maximum frame rate

|                     | Normal   | 1/2      | 1/4      | clock |
|---------------------|----------|----------|----------|-------|
| STC-MC33/MB33USB:   | 62.94fps | 31.47fps | 15.73fps |       |
| STC-MC83/MB83USB:   | 29.59fps | 14.80fps | 7.40fps  |       |
| STC-MC133/MB133USB: | 22.63fps | 11.32fps | 5.66fps  |       |
| STC-MC152/MB152USB: | 19.78fps | 9.89fps  | 4.94fps  |       |
| STC-MC202/MB202USB: | 15.72fps | 7.86fps  | 3.93fps  |       |

### B. How to set

Scanning mode sets at "Other" window.

#### Scan Mode (A)

"1/1 Partial" select at Scan Mode.

4.4.3 1/2 partial scanning

A. Descriptions

The horizontal full resolution and approximately vertical half resolution from original image height image is out from the camera.

In this mode, the frame rate is twice faster than normal.

The frame rate is changed by selecting clock speed. (Normal, 1/2 or 1/4 clock speed)

a. Resolution

|                     |                     |
|---------------------|---------------------|
| STC-MC33/MB33USB:   | 640 (H) x 224 (V)   |
| STC-MC83/MB83USB:   | 1,024 (H) x 344 (V) |
| STC-MC133/MB133USB: | 1,280 (H) x 440 (V) |
| STC-MC152/MB152USB: | 1,360 (H) x 472 (V) |
| STC-MC202/MB202USB: | 1,600 (H) x 544 (V) |

b. Maximum frame rate

|                     | Normal    | 1/2      | 1/4      | clock |
|---------------------|-----------|----------|----------|-------|
| STC-MC33/MB33USB:   | 120.11fps | 60.05fps | 30.03fps |       |
| STC-MC83/MB83USB:   | 60.02fps  | 30.01fps | 15.01fps |       |
| STC-MC133/MB133USB: | 44.81fps  | 22.40fps | 11.20fps |       |
| STC-MC152/MB152USB: | 38.52fps  | 19.26fps | 9.63fps  |       |
| STC-MC202/MB202USB: | 30.63fps  | 15.32fps | 7.66fps  |       |

B. How to set

Scanning mode sets at “Other” window.

Scan Mode (A)

“1/2 Partial” select at Scan Mode.

#### 4.4.4 1/4 partial scanning

##### A. Descriptions

The horizontal full resolution and approximately vertical 1/6 resolution from original image height image is out from the camera.

In this mode, the frame rate is four times faster than normal.

The frame rate is changed by selecting clock speed. (Normal, 1/2 or 1/4 clock speed)

##### a. Resolution

|                     |                     |
|---------------------|---------------------|
| STC-MB33/MB33USB:   | 640 (H) x 80 (V)    |
| STC-MC83/MB83USB:   | 1,024 (H) x 136 (V) |
| STC-MC133/MB133USB: | 1,280 (H) x 168 (V) |
| STC-MC152/MB152USB: | 1,360 (H) x 176 (V) |
| STC-MC202/MB202USB: | 1,600 (H) x 208 (V) |

##### b. Maximum frame rate

|                     | Normal    | 1/2       | 1/4      | clock |
|---------------------|-----------|-----------|----------|-------|
| STC-MC33/MB33USB:   | 240.22fps | 120.11fps | 60.05fps |       |
| STC-MC83/MB83USB:   | 120.35fps | 60.18fps  | 30.09fps |       |
| STC-MC133/MB133USB: | 89.80fps  | 44.90fps  | 22.45fps |       |
| STC-MC152/MB152USB: | 77.04fps  | 38.52fps  | 19.26fps |       |
| STC-MC202/MB202USB: | 61.27fps  | 30.63fps  | 15.32fps |       |

##### B. How to set

Scanning mode sets at "Other" window.

##### Scan Mode (A)

"1/4 Partial" select at Scan Mode.

## 4.4.5 Variable partial scanning

### A. Descriptions

The horizontal full resolution and variable vertical resolution from original image height, image is out from the camera. The variable vertical resolution can set by the software and minimum vertical resolution is 4 lines.

In this mode, the frame rate is change based on variable vertical resolution. The frame rate is faster when set small vertical resolution.

The frame rate is changed by selecting clock speed. (Normal, 1/2 or 1/4 clock speed)

### B. How to set

Scanning mode sets at "Other" window.

#### Scan Mode (A)

"Variable Partial" select at Scan Mode.

#### Variable partial scanning settings

##### Variable partial size (height)

Set the vertical lines for variable partial scanning at Height. (C)

##### Variable partial scanning start line

Set the start line for the variable partial scanning at Offset Y. (B)

Settable start line is changed based on the variable partial size. (C)

## 4.4.6 Binning (only available for monochrome model)

### A. Descriptions

The horizontal full resolution and approximately vertical half resolution from original image height, image is out from the camera.

In this mode, more sensitive image than normal is output because the brightness is adding.

The frame rate is changed by selecting clock speed. (Normal, 1/2 or 1/4 clock speed)

### a. Resolution

STC-MB33USB: 640 (H) x 240 (V)

STC-MB83USB: 1,024 (H) x 384 (V)

STC-MB133USB: 1,280 (H) x 440 (V)

STC-MB152USB: 1,360 (H) x 512 (V)

STC-MB202USB: 1,600 (H) x 600 (V)

### b. Maximum frame rate

|               | Normal    | 1/2      | 1/4      | clock |
|---------------|-----------|----------|----------|-------|
| STC-MB33USB:  | 120.11fps | 60.05fps | 30.02fps |       |
| STC-MB83USB:  | 56.93fps  | 28.47fps | 14.23fps |       |
| STC-MB133USB: | 44.81fps  | 22.40fps | 11.20fps |       |
| STC-MB152USB: | 38.52fps  | 19.26fps | 9.63fps  |       |
| STC-MB202USB: | 30.63fps  | 15.32fps | 7.66fps  |       |

### B. How to set

Scanning mode sets at "Other" window.

### Scan Mode (A)

"Binning" select at Scan Mode.

## 4.4.7 Binning 1/1 partial scanning (only available for monochrome model)

### A. Descriptions

The horizontal full resolution and approximately vertical half resolution from “1/1 partial scanning image height, image is out from the camera.

In this mode, more sensitive image than 1/1 partial scanning is output because the brightness is adding.

The frame rate is changed by selecting clock speed. (Normal, 1/2 or 1/4 clock speed)

### a. Resolution

STC-MB33USB: 640 (H) x 240 (V)

STC-MB83USB: 1,024 (H) x 384 (V)

STC-MB133USB: 1,280 (H) x 480 (V)

STC-MB152USB: 1,360 (H) x 512 (V)

STC-MB202USB: 1,600 (H) x 600 (V)

### b. Maximum frame rate

|               | Normal    | 1/2      | 1/4      | clock |
|---------------|-----------|----------|----------|-------|
| STC-MB33USB:  | 121.97fps | 60.99fps | 30.49fps |       |
| STC-MB83USB:  | 57.93fps  | 28.96fps | 14.48fps |       |
| STC-MB133USB: | 44.63fps  | 22.31fps | 11.16fps |       |
| STC-MB152USB: | 38.96fps  | 19.48fps | 9.74fps  |       |
| STC-MB202USB: | 30.93fps  | 15.47fps | 7.73fps  |       |

### B. How to set

Scanning mode sets at “Other” window.

### Scan Mode (A)

“Binning 1/1 Partial” select at Scan Mode.



## 4.4.8 Binning 1/2 partial scanning (only available for monochrome model)

### A. Descriptions

The horizontal full resolution and approximately vertical half resolution from “1/2 partial scanning image height, image is out from the camera.

In this mode, more sensitive image than 1/2 partial scanning is output because the brightness is adding.

The frame rate is changed by selecting clock speed. (Normal, 1/2 or 1/4 clock speed)

#### a. Resolution

STC-MB33USB: 640 (H) x 112 (V)

STC-MB83USB: 1,024 (H) x 172 (V)

STC-MB133USB: 1,280 (H) x 220 (V)

STC-MB152USB: 1,360 (H) x 236 (V)

STC-MB202USB: 1,600 (H) x 272 (V)

#### b. Maximum frame rate

|               | Normal    | 1/2       | 1/4      | clock |
|---------------|-----------|-----------|----------|-------|
| STC-MB33USB:  | 224.78fps | 112.39fps | 56.19fps |       |
| STC-MB83USB:  | 112.21fps | 56.11fps  | 28.05fps |       |
| STC-MB133USB: | 79.21fps  | 39.61fps  | 19.80fps |       |
| STC-MB152USB: | 69.02fps  | 34.51fps  | 17.26fps |       |
| STC-MB202USB: | 55.10fps  | 27.55fps  | 13.78fps |       |

### B. How to set

Scanning mode sets at “Other” window.

Scan Mode (A)

“Binning 1/2 Partial” select at Scan Mode.

## 4.4.9 Binning 1/4 partial scanning (only available for monochrome model)

### A. Descriptions

The horizontal full resolution and approximately vertical half resolution from “1/4 partial scanning image height, image is out from the camera.

In this mode, more sensitive image than 1/4 partial scanning is output because the brightness is adding.

The frame rate is changed by selecting clock speed. (Normal, 1/2 or 1/4 clock speed)

### a. Resolution

STC-MB33USB: 640 (H) x 40 (V)

STC-MB83USB: 1,024 (H) x 68 (V)

STC-MB133USB: 1,280 (H) x 84 (V)

STC-MB152USB: 1,360 (H) x 88 (V)

STC-MB202USB: 1,600 (H) x 104 (V)

### b. Maximum frame rate

|               | Normal    | 1/2       | 1/4      | clock |
|---------------|-----------|-----------|----------|-------|
| STC-MB33USB:  | 240.22fps | 120.11fps | 60.05fps |       |
| STC-MB83USB:  | 120.35fps | 30.18fps  | 30.09fps |       |
| STC-MB133USB: | 89.80fps  | 44.90fps  | 22.45fps |       |
| STC-MB152USB: | 77.04fps  | 38.52fps  | 19.26fps |       |
| STC-MB202USB: | 61.27fps  | 30.63fps  | 15.32fps |       |

### B. How to set

Scanning mode sets at “Other” window.

### Scan Mode (A)

“Binning 1/4 partial” select at Scan Mode.

#### 4.4.10 Binning variable partial scanning (only available for monochrome model)

##### A. Descriptions

The horizontal full resolution and variable vertical resolution from original image height, image is out from the camera. The variable vertical resolution can set by the software and minimum vertical resolution is 4 lines.

In this mode, more sensitive image than variable partial scanning is output because the brightness is adding.

In this mode, the frame rate is change based on variable vertical resolution. The frame rate is faster when set small vertical resolution.

The frame rate is changed by selecting clock speed. (Normal, 1/2 or 1/4 clock speed)

##### B. How to set

Scanning mode sets at "Other" window.

##### Scan Mode (A)

"Binning Variable Partial" select at Scan Mode.

##### Variable partial scanning settings

##### Variable partial size (height)

Set the vertical lines for variable partial scanning at Height. (C)

##### Variable partial scanning start line

Set the start line for the variable partial scanning at Offset Y. (B)

Settable start line is changed based on the variable partial size. (C)

## 4.5 Clock speed (pixel clock) settings

### A. Descriptions

Set the camera operating clock speed (pixel speed) mode.

When selecting “Normal” (fastest clock speed), the maximum frame rate is increased, but the sensitivity is reduced.

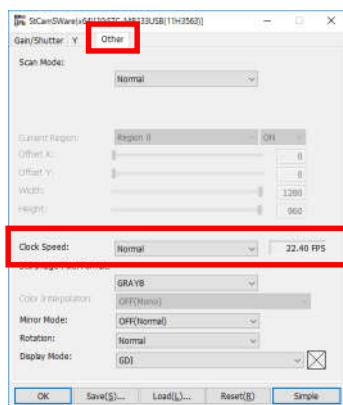
When selecting “1/4” (slowest clock speed), the maximum frame rate is reduced, but the sensitivity is increased. Also reduce the frame drop.

The maximum frame rate is determined by the combination of clock speed and scanning mode.

**It may require to adjust gain and shutter speed after change the clock speed due to change the brightness change by the clock speed changed.**

### B. How to set

Clock speed sets at “Other” window.



Clock speed (pixel clock speed) is selectable from below three clock speed modes.

#### a. Normal

The camera operates with normal clock speed. This is selectable fastest clock speed of the camera.

|                     | Pixel frequency |
|---------------------|-----------------|
| STC-MC33/MB33USB:   | 24.5454 MHz     |
| STC-MC83/MB83USB:   | 29.5000 MHz     |
| STC-MC133/MB133USB: | 36.8180 MHz     |
| STC-MC152/MB152USB: | 36.8180 MHz     |
| STC-MC202/MB202USB: | 36.8180 MHz     |

#### b. 1/2

The camera operates with 1/2 of normal clock speed.

|                     | Pixel frequency |
|---------------------|-----------------|
| STC-MC33/MB33USB:   | 12.7727 MHz     |
| STC-MC83/MB83USB:   | 14.7500 MHz     |
| STC-MC133/MB133USB: | 18.4090 MHz     |
| STC-MC152/MB152USB: | 18.4090 MHz     |
| STC-MC202/MB202USB: | 18.4090 MHz     |

c. 1/4

The camera operates with 1/4 of normal clock speed. This is selectable slowest clock speed of the camera.

|                     | Pixel frequency |
|---------------------|-----------------|
| STC-MC33/MB33USB:   | 6.3863 MHz      |
| STC-MC83/MB83USB:   | 7.3750 MHz      |
| STC-MC133/MB133USB: | 9.2040 MHz      |
| STC-MC152/MB152USB: | 9.2040 MHz      |
| STC-MC202/MB202USB: | 9.2040 MHz      |

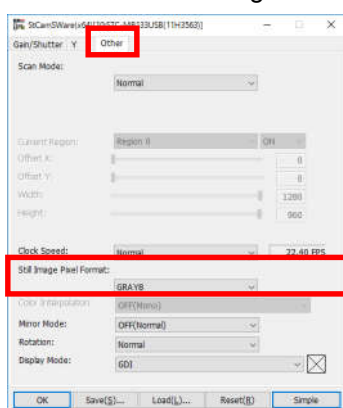
## 4.6 Pixel format settings for saving still image

### A. Descriptions

Set pixel format for saving still image with BMP and TIF format.

### B. How to set

Pixel format for saving still image sets at "Other" window.



Pixel format for saving still image is selectable from below three pixel formats. (for two pixel format for the color model)

a. GRAY8 (only available for monochrome model)

The saving image has 8bits data depths for one pixel.

b. BRG24

The saving image has 24bits data (8bits data depth for each R, G and B) for one pixel.

c. BRG32

The saving image has 32bits data (8bits data depth for each R, G and B. And 8bits dummy data) for one pixel.

## 4.7 Color interpolation settings (only available for color model)

### A. Descriptions

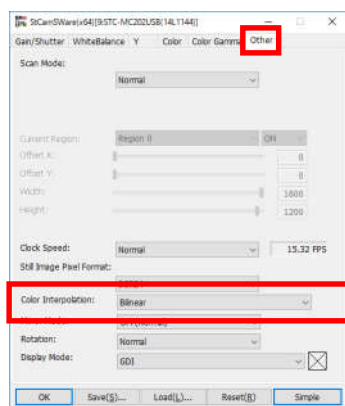
The each pixel has only R, G or B information before process the color interpolation.

It is necessary to process color interpolation to each pixel has all R, G and B information.

**This function is processing on the PC. The frame rate may become slower when using color interpolation.**

### B. How to set

Color interpolation sets at "Other" window.



Color interpolation method is selectable from below five color interpolation methods.

**This function is processing on the PC. The frame rate may become slower when using below c to d color interpolation.**

#### a. OFF (MONO)

No color interpolation process and monochrome raw image is out.

#### b. OFF (COLOR)

No color interpolation process and RGB Bayer image is out.

#### c. Nearest Neighbor

Nearest pixel information copied color interpolation image is out.

#### d. Bilinear

Surround four pixels information used color interpolation image is out.

#### e. BiCubic

Surround sixteen pixels information used color interpolation image is out.

## 4.8 Mirror image mode settings

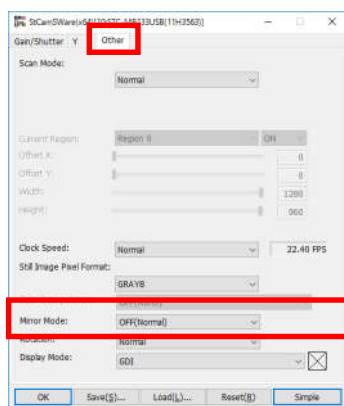
### A. Descriptions

Sets mirror image mode (Normal, horizontal mirror, vertical mirror, and horizontal and vertical mirror) for the displaying image.

**This function is processing on the PC. The frame rate may become slower when using mirror mode.**

### B. How to set

Mirror image mode sets at “Other” window.



Mirror mode is selectable from below four mirror modes.

**This function is processing on the PC. The frame rate may become slower when using mirror mode.**

#### a. OFF (Normal)

Normal image (original image) is displayed.

#### b. Horizontal

Horizontal mirror image from original image is displayed.

#### c. Vertical

Vertical mirror image from original image is displayed.

#### d. Horizontal / vertical

Horizontal and vertical mirror image from original image is displayed.

## 4.9 Rotation image mode settings

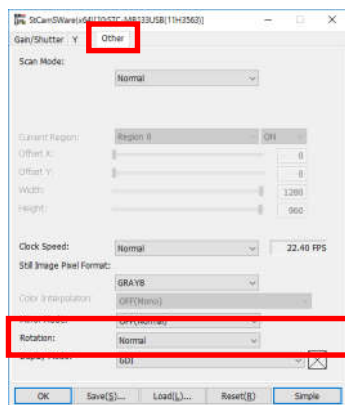
### A. Descriptions

Set rotation image mode (Normal, clockwise 90 deg. and counter clockwise 90 deg.) for the displaying image.

**This function is processing on the PC. The frame rate may become slower when using rotation mode.**

### B. How to set

Rotation image mode sets at “Other” window.



Rotation mode is selectable from below three rotation modes.

**This function is processing on the PC. The frame rate may become slower when using b and c rotation mode.**

#### a. Normal

Normal image (original image) is displayed.

#### b. Clockwise\_90

Clockwise 90 deg. rotated image from original image is displayed.

#### c. CounterClockwise\_90

Counter clockwise 90 deg. rotated image from the original image is displayed.



## 4.10 Display mode settings

### A. Descriptions

Set the display mode with DirectDraw.

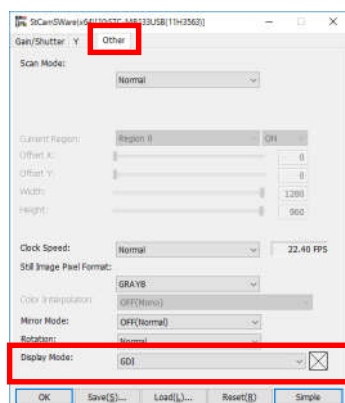
This process is valid when using the SDK.

It may improve the CPU usage when digital zooming and image quality by selected display mode.

It may become slower or the camera does not work correctly with some environment.

### B. How to set

Display mode sets at "Other" window.



Display mode is selectable from below five display modes.

#### a. GDI

This is standard display method.

#### b. DirectDraw Offscreen

The drawings with SDK and image are composed by video board.

The image data is 16bits.

#### c. DirectDraw Overlay

The drawings and image are displayed on the chroma key.

The image data is 16bits. The screen shot cannot take by the print screen function.

#### d. DirectDraw Offscreen HQ

The drawings with SDK and image are composed by video board.

The image data is 24bits.

#### e. DirectDraw Overlay HQ

The drawings and image are displayed on the chroma key.

The image data is 24bits. The screen shot cannot take by the print screen function.

#### f. DirectX

The drawings and image are displayed by DirectX.

#### g. DirectX [V sync ON]

The drawings and image are displayed by DirectX.

The tearing could be reduced by the video board.

h. DirectX [V sync ON2]

The drawings and image are displayed by DirectX.

The tearing could be reduced by the video board.

Please use this display mode when the tearing does not reduce by DirectX [V sync ON] display mode.

## 4.11 White balance settings (only available for color model)

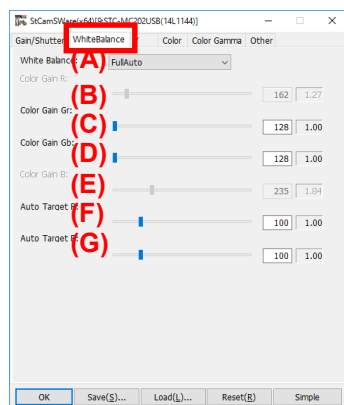
### A. Descriptions

Sets white balance mode, which is white balance process for the image.

**This function is processing on the PC. The frame rate may become slower when using white balance mode.**

### B. How to set

White balance mode sets at "WhiteBalance" window.



White balance mode is selectable from below four white balance modes.

**This function is processing on the PC. The frame rate may become slower when using b to d white balance mode.**

#### a. OFF

"OFF" selects at White Balance. (A)

No white balance process.

#### b. Manual white balance

"Manual" selects at White Balance. (A)

It is necessary to Gain R, Gain Gr, Gain Gb and Gain B under the target light source.

#### Color Gain R (B)

Set Red gain of manual white balance.

Adjustable range for R gain of manual white balance is 1.0 to 5.0.

#### Color Gain Gr (C)

Set Green (next red) gain of manual white balance.

Adjustable range for Gr gain of manual white balance is 1.0 to 5.0.

#### Color Gain Gb (D)

Set Green (next blue) gain of manual white balance.

Adjustable range for Gb gain of manual white balance is 1.0 to 5.0.

#### Color Gain B (E)

Set Blue gain of manual white balance.

Adjustable range for B gain of manual white balance is 1.0 to 5.0.

c. Auto white balance

“FullAuto” selects at White Balance. **(A)**

The white balance is adjusting automatically.

Color Gain Gr **(C)**

Set Green (next red) gain of auto white balance.

Adjustable range for Gr gain of auto white balance is 1.0 to 5.0.

Color Gain Gb **(D)**

Set Green (next blue) gain of auto white balance.

Adjustable range for Gb gain of auto white balance is 1.0 to 5.0.

Auto Target R **(F)**

Set Red target level of auto white balance.

Adjustable range for R target level of auto white balance is 1.0 to 5.0.

Auto Target B **(G)**

Set Blue target level of auto white balance.

Adjustable range for B target level of auto white balance is 1.0 to 5.0.

d. Push to set white balance

“OneShot” selects at White Balance. **(A)**

The white balance is adjusting automatically once then switch to fixed (manual).

Color Gain Gr **(C)**

Set Green (next red) gain of auto white balance.

Adjustable range for Gr gain of auto white balance is 1.0 to 5.0.

Color Gain Gb **(D)**

Set Green (next blue) gain of auto white balance.

Adjustable range for Gb gain of auto white balance is 1.0 to 5.0.

Auto Target R **(F)**

Set Red target level of auto white balance.

Adjustable range for R target level of auto white balance is 1.0 to 5.0.

Auto Target B **(G)**

Set Blue target level of auto white balance.

Adjustable range for B target level of auto white balance is 1.0 to 5.0.

## 4.12 Hue and saturation settings (only available for color model)

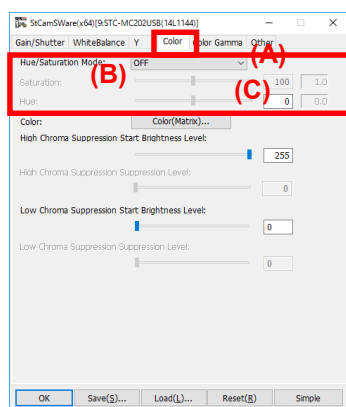
### A. Descriptions

Set hue and saturation setting for the image.

**This function is processing on the PC. The frame rate may become lower when using hue and saturation function.**

### B. How to set

Hue and saturation mode sets at "Color" window.



Hue and saturation mode is selectable from below two hue and saturation modes.

**This function is processing on the PC. The frame rate may become slower when using hue and saturation mode.**

#### a. OFF

"OFF" selects at Hue/Saturation Mode. (A)

Hue and saturation are not adjustable.

#### b. ON

"ON" selects at Hue/Saturation Mode. (A)

#### Hue (B)

Set the hue of the image.

Adjustable range for hue is -180 to 180.

#### Saturation (C)

Set the saturation of the image.

Adjustable range for saturation is 0 to 2.0.

## 4.13 Color matrix settings (only available for color model)

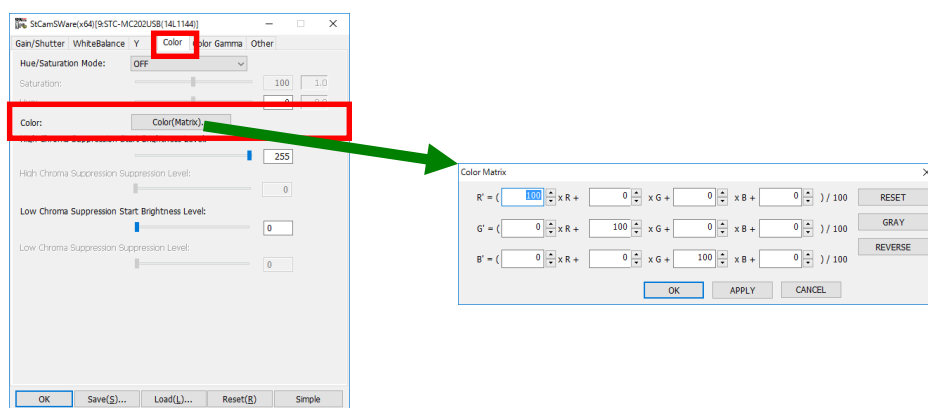
### A. Descriptions

Set color matrix setting for the image.

**This function is processing on the PC. The frame rate may become lower when using color matrix setting.**

### B. How to set

Color matrix sets at “Color” window.



Selects “Color (Matrix)” button to open the color matrix adjust window.

It is possible to obtain the original color of the image with color matrix adjustment.

When “GRAY” button selecting, the monochrome (Gray) image can obtain.

When “REVERSE” button selecting, the negative / positive reverse image can obtain.

**This function is processing on the PC. The frame rate may become lower when using monochrome (Gray) or reverse color matrix setting.**

## 4.14 Color gamma settings (only available for color model)

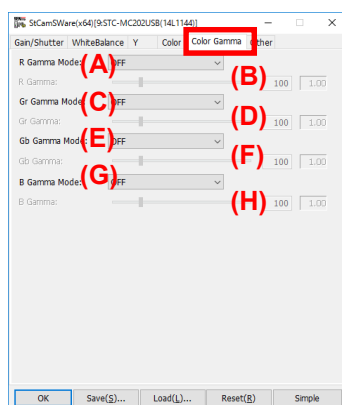
### A. Descriptions

Sets color gamma mode, which is gamma conversion for each R, G and B of image.

**This function is processing on the PC. The frame rate may become slower when using gamma mode.**

### B. How to set

Color gamma mode sets at "Color Gamma" window.



Color gamma mode is selectable from below three gamma modes for each R, Gr, Gb and B.

**This function is processing on the PC. The frame rate may become slower when using color gamma mode.**

### 4.14.1 Color gamma for R

#### a. OFF

"OFF" selects at R Gamma Mode. (A)

Color gamma for R is 1.0.

#### b. ON

"ON" selects at R Gamma Mode. (A)

#### R Gamma (B)

Set the color gamma for R.

Adjustable range for color gamma R is 0.01 to 5.00.

#### c. Reverse

"Reverse" selects at R Gamma Mode. (A)

Brightness of R is reversed.

#### R Gamma (B)

Adjustable range for reverse color gamma for R is 0.01 to 5.00.

## 4.14.2 Color gamma for Gr

### a. OFF

“OFF” selects at Gr Gamma Mode. **(C)**

Color gamma for Gr is 1.0.

### b. ON

“ON” selects at Gr Gamma Mode. **(C)**

### Gr Gamma **(D)**

Set the color gamma for Gr.

Adjustable range for color gamma Gr is 0.01 to 5.00.

### c. Reverse

“Reverse” selects at Gr Gamma Mode. **(C)**

Brightness of Gr is reversed.

### Gr Gamma **(D)**

Adjustable range for reverse color gamma for R is 0.01 to 5.00.

## 4.14.3 Color gamma for Gb

### a. OFF

“OFF” selects at Gb Gamma Mode. **(E)**

Color gamma for Gb is 1.0.

### b. ON

“ON” selects at Gb Gamma Mode. **(E)**

### Gb Gamma **(F)**

Set the color gamma for Gb.

Adjustable range for color gamma Gb is 0.01 to 5.00.

### c. Reverse

“Reverse” selects at Gb Gamma Mode. **(E)**

Brightness of Gb is reversed.

### Gb Gamma **(F)**

Adjustable range for reverse color gamma for Gb is 0.01 to 5.00.



#### 4.14.4 Color gamma for B

a. OFF

“OFF” selects at B Gamma Mode. (G)

Color gamma for B is 1.0.

b. ON

“ON” selects at B Gamma Mode. (G)

B Gamma (H)

Set the color gamma for B.

Adjustable range for color gamma B is 0.01 to 5.00.

c. Reverse

“Reverse” selects at B Gamma Mode. (G)

Brightness of B is reversed.

B Gamma (H)

Adjustable range for reverse color gamma for B is 0.01 to 5.00.

## 5 Trigger function settings

The exposure start timing and image output timing is controllable by the trigger signal and readout signal with the software or the hardware.

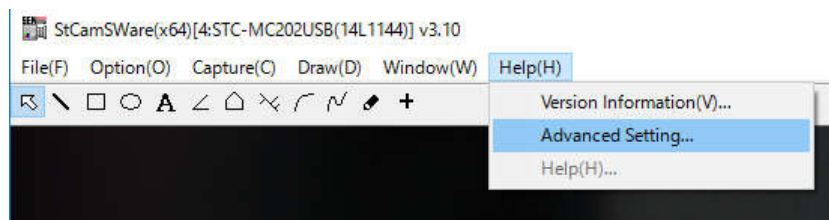
When selecting “Free run (continuous)” operating mode, the image is output continuously.

### 5.1 Setup for the trigger function

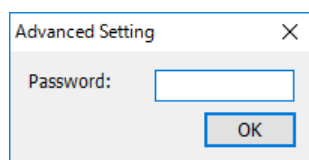
#### 5.1.1 Software settings

It is necessary to activate “Trigger function adjust window” by enter the password.

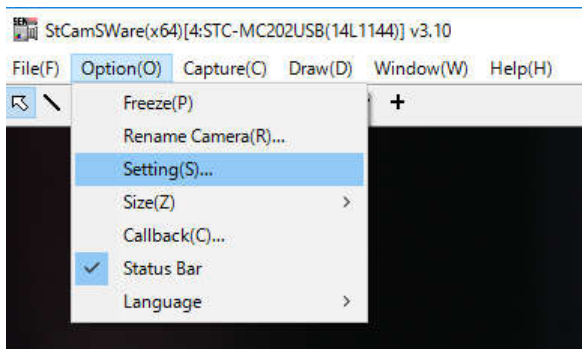
Select “Advanced Setting” under “Help” in the menu.



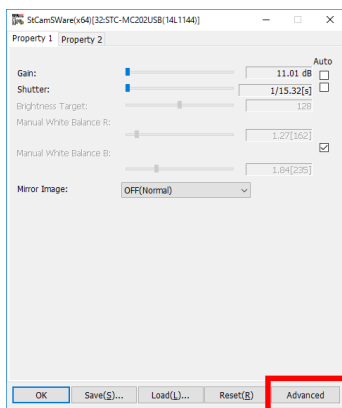
Please enter “sentechcamera” in “Advanced Setting” window.



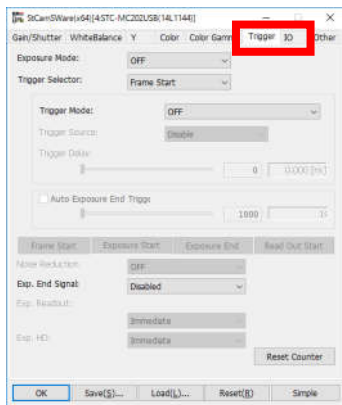
Please select "Setting" under "Option" in the menu to display camera setting window.



Please select "Advanced" button at right bottom of simple setting window, for switch to advanced setting window.

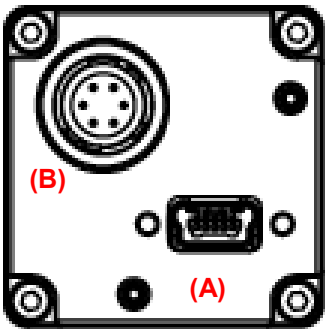


"Trigger" and "IO" windows are appeared in the advanced setting window.



**It is necessary to switch to the simple setting window once if the advanced setting window is displayed after select "Setting" under "Option" in the menu.**

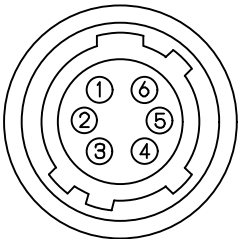
5.1.2 Hardware setting (cable connecting)



A. USB connector: Mini-B USB type  
Please connect the USB cable.  
It is possible to connect the USB cable with lock screw.

B. I/O connector: HR10A-7R-6PB (Hirose) or equivalent

| No. | Signal type | I/O direction | Spec.                     | Default signal |
|-----|-------------|---------------|---------------------------|----------------|
| 1   | IO GND      |               | IO GND                    |                |
| 2   | OUT2        | OUT           | Opt. Isolated             | Disable        |
| 3   | OUT1        | OUT           | Opt. Isolated             | Disable        |
| 4   | IN2         | IN            | Opt. Isolated             | Disable        |
| 5   | IN1         | IN            | Opt. Isolated             | Disable        |
| 6   | IO VCC IN   |               | IO VCC<br>DC +3 to +26.4V |                |



Input and output signals are isolated.  
Please assign the signal type and polarity for input and output ports with the software.

Connector on the rear

## 5.2 Operating mode settings

The operating mode is selectable from below operating modes.

### 5.2.1 Free run (continuous)

### 5.2.2 Software trigger

#### 5.2.2.1 Edge preset trigger

#### 5.2.2.2 Start stop trigger

#### 5.2.2.3 Start stop trigger (auto)

### 5.2.3 Hardware trigger

#### 5.2.3.1 Edge preset trigger

#### 5.2.3.2 Pulse width trigger

#### 5.2.3.3 Start stop trigger

Please refer about the details for each operating mode from next page.

It is necessary to setup I/O port in advance when using the hardware triggers or output signal.

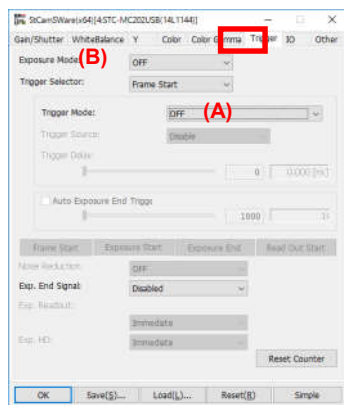
## 5.2.1 Free run (continuous)

### A. Descriptions

The image is out from the camera continuously.

### B. How to set

The operating mode selects at “Trigger” window.



#### a. Trigger Mode setting (A)

“OFF” selects at Trigger Mode.

#### b. Exposure Mode (B)

Please select the exposure mode from four exposure modes.

Please select “Timed” to configure the exposure time with software (on “Gain/Shutter” window).

#### c. I/O settings

Please setup the output port if the output signal uses.

### C. How to use

The image is out continuously when select “OFF” at Trigger Mode. (A)

### 5.2.2 Software trigger

The exposure start timing is control by the software trigger signal.

The edge preset software trigger, which is the exposure time is preset fixed shutter on the software and the exposure start timing is control by software trigger signal.

The start / stop software trigger, which is the exposure time is period of time between the software trigger signal and exposure end signal, and the exposure start timing is control by the software trigger signal.

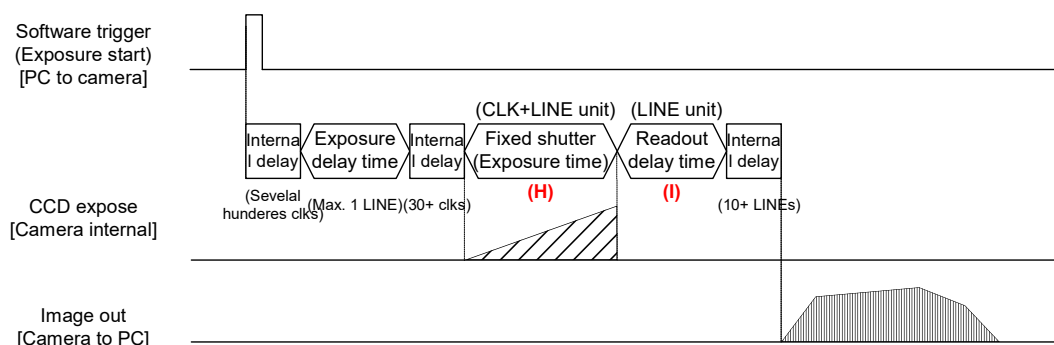
The start / auto stop software trigger, which is exposure time is period of time between the software trigger and “Auto Exposure End Trigger” signal that sets on the software and the exposure stat timing is control by software trigger signal.

It is necessary to set “Fixed Shutter / AGC OFF” at ALC Mode on Gain/Shutter window.

## 5.2.2.1 Software trigger (Edge preset)

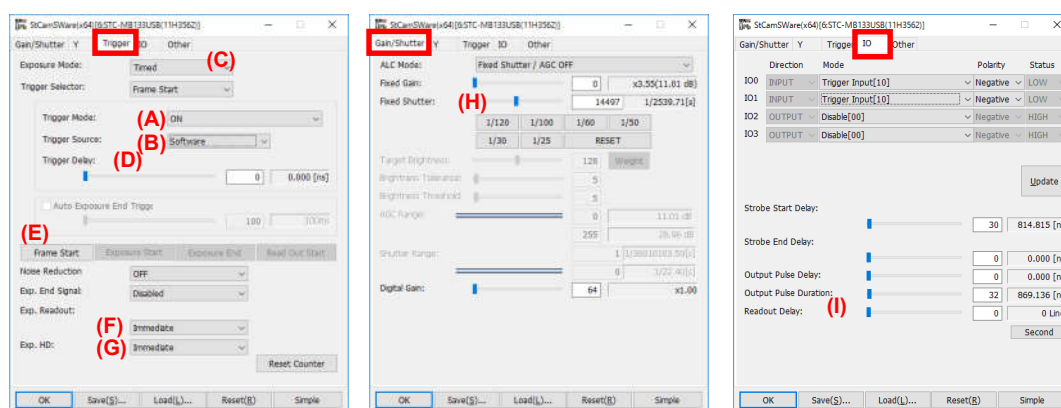
### A. Descriptions

The exposure starts with the software trigger signal and the exposure time is preset fixed shutter speed by the software. The image is out after expose is finished.



### B. How to set

The edge preset software trigger sets up at “Trigger”, “Gain/Shutter” and “IO” windows.



### a. Mode settings

#### Trigger Mode

“ON” selects at Trigger Mode (A) at Trigger window.

#### Trigger Source

“Software” selects at Trigger Source (B) at Trigger window.

#### Exposure Mode

“Timed” selects at Exposure Mode (C) at Trigger window.

### b. Exposure time setting

The exposure time is preset fixed shutter (H) at Gain/Shutter window.



c. Exposure start settings

The exposure start is selectable below two exposure start settings.

i) Exposure starts immediately

The exposure starts immediate after trigger signal input.

The actual exposure start the “trigger delay + camera internal delay” after trigger signal input.

It is necessary to set below three settings

Set the exposure start delay time after trigger signal input at Trigger Delay. (D)

Set “Immediate” at Exp. Readout (F) to image is output immediate after exposure is finished.

Set “Immediate” at Exp. HD (G) to exposure starts immediate after trigger signal is input.

ii) Exposure starts 1HD after

The exposure starts 1 HD after trigger signal input.

The actual exposure start the “trigger delay + camera internal delay + maximum 1H” after trigger signal input.

It is necessary to set below three settings

Set the exposure start delay time after trigger signal input at Trigger Delay. (D)

Set “Immediate” at Exp. Readout (F) to image is output immediate after exposure is finished.

Set “Wait HD” at Exp. HD (G) to exposure starts 1HD after trigger signal is input.

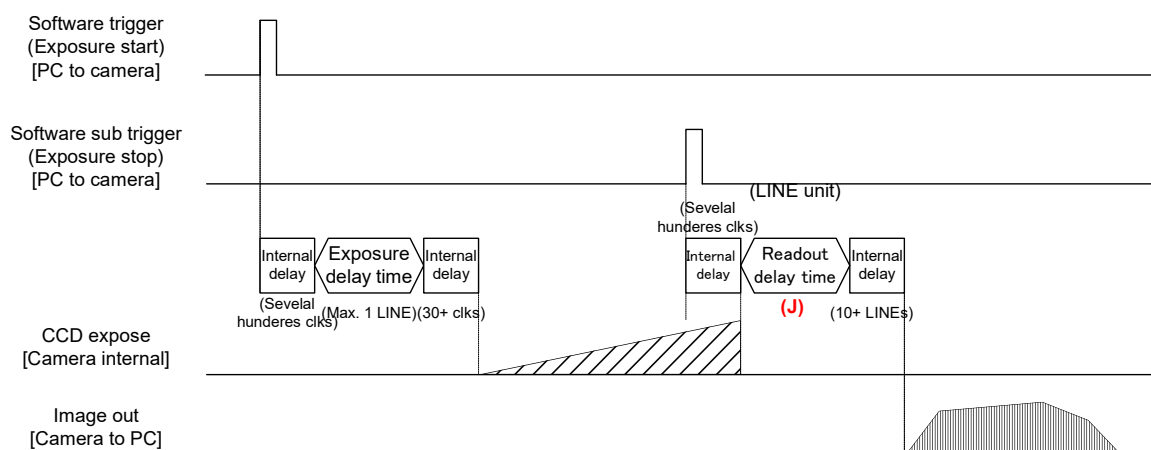
C. How to use

When “Frame Start” (F) button is selected, the software trigger signal sends to the camera then expose and image is out.

## 5.2.2.2 Software trigger (Start / stop)

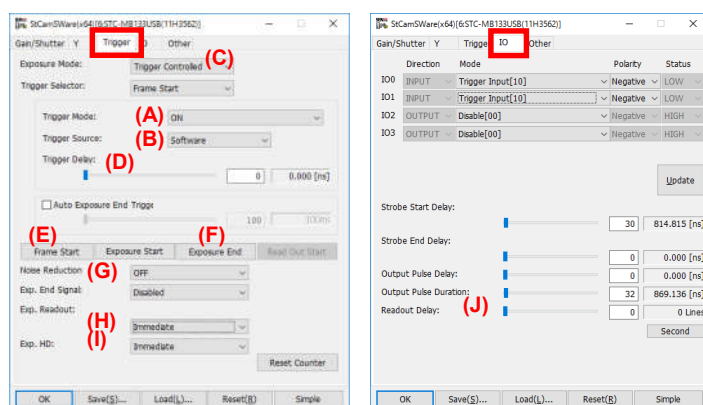
### A. Descriptions

The exposure starts with the software trigger signal and exposure stops and image is out with the sub trigger signal. The exposure time is defined by the period of time between the software trigger input and sub trigger signal input.



### B. How to set

The start / stop software trigger sets up at “Trigger” and “IO” windows.



#### a. Mode settings

##### Trigger Mode

“ON” selects at Trigger Mode (A) at Trigger window.

##### Trigger Source

“Software” selects at Trigger Source (B) at Trigger window.

##### Exposure Mode

“Trigger Controlled” selects at Exposure Mode (C) at Trigger window.

#### b. Exposure time setting

The exposure time is defined by the period of time between the software trigger input and sub trigger signal input.

## c. Exposure start settings

The exposure start is selectable below two exposure start settings.

### i) Exposure starts immediately

The exposure starts immediately after trigger signal input.

The actual exposure start is the “trigger delay + camera internal delay” after trigger signal input.

It is necessary to set below three settings

Set the exposure start delay time after trigger signal input at Trigger Delay. (D)

Set “Immediate” at Exp. Readout (H) to image is output immediately after exposure is finished.

Set “Immediate” at Exp. HD (I) to exposure starts immediately after trigger signal is input.

### ii) Exposure starts 1HD after

The exposure starts 1 HD after trigger signal input.

The actual exposure start is the “trigger delay + camera internal delay + maximum 1H” after trigger signal input.

It is necessary to set below three settings

Set the exposure start delay time after trigger signal input at Trigger Delay. (D)

Set “Immediate” at Exp. Readout (H) to image is output immediately after exposure is finished.

Set “Wait HD” at Exp. HD (I) to exposure starts 1HD after trigger signal is input.

### iii) Noise reduction setting

The noise reduction is selectable from below three noise reduction settings. (G)

OFF: No noise reduction.

Easy: Noise reduction with obtained image.

Complex: Noise reduction with shading image. It is necessary to obtain the image in advance.

## C. How to use

When “Frame Start” (E) button is selected, the software trigger signal sends to the camera then exposure is started.

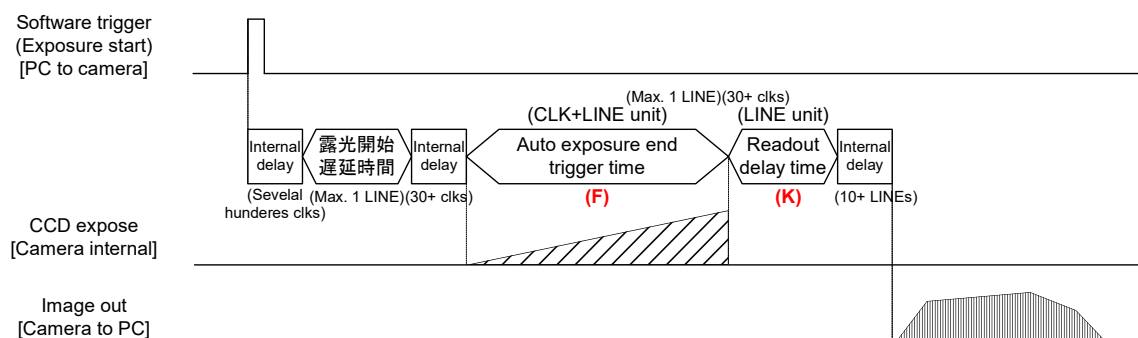
When “Exposure End” (F) button is selected, the software sub trigger signal sends to the camera then exposure is finished and image is out.

## 5.2.2.3 Software trigger (Start / auto stop)

### A. Descriptions

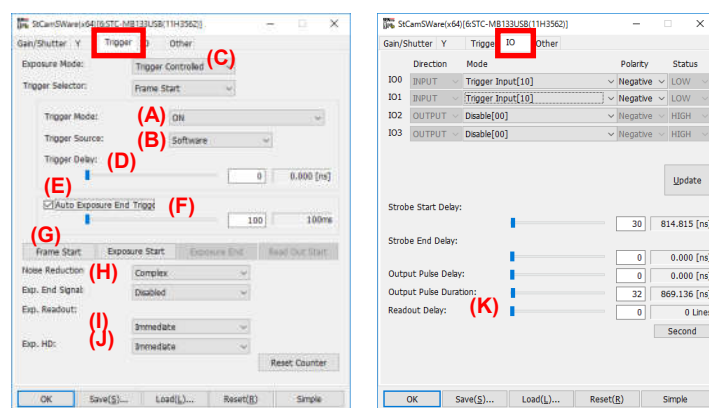
The exposure starts with the software trigger signal and exposure stops and image is out after the auto exposure end trigger period of time is passed.

The exposure time is defined by the auto exposure End trigger setting.



### B. How to set

The start / auto stop software trigger sets up at “Trigger” and “IO” windows.



#### a. Mode settings

##### Trigger Mode

“ON” selects at Trigger Mode (A) at Trigger window.

##### Trigger Source

“Software” selects at Trigger Source (B) at Trigger window.

##### Exposure Mode

“Trigger Controlled” selects at Exposure Mode (C) at Trigger window.

##### Auto Exposure End Trigger

Select “Auto Expire End Trigger (E) at Trigger window.

#### b. Exposure time setting

The exposure time is defined by the auto exposure End trigger setting. (F)

## c. Exposure start settings

The exposure start is selectable below two exposure start settings.

### i) Exposure starts immediately

The exposure starts immediately after trigger signal input.

The actual exposure start is the "trigger delay + camera internal delay" after trigger signal input.

It is necessary to set below three settings

Set the exposure start delay time after trigger signal input at Trigger Delay. (D)

Set "Immediate" at Exp. Readout (I) to image is output immediately after exposure is finished.

Set "Immediate" at Exp. HD (J) to exposure starts immediately after trigger signal is input.

### ii) Exposure starts 1HD after

The exposure starts 1 HD after trigger signal input.

The actual exposure start is the "trigger delay + camera internal delay + maximum 1H" after trigger signal input.

It is necessary to set below three settings

Set the exposure start delay time after trigger signal input at Trigger Delay. (D)

Set "Immediate" at Exp. Readout (I) to image is output immediately after exposure is finished.

Set "Wait HD" at Exp. HD (J) to exposure starts 1HD after trigger signal is input.

## d. Noise reduction setting

The noise reduction is selectable from below three noise reduction settings. (H)

OFF: No noise reduction.

Easy: Noise reduction with obtained image.

Complex: Noise reduction with shading image. It is necessary to obtain the image in advance.

## C. How to use

When "Frame Start" (G) button is selected, the software trigger signal sends to the camera then exposure is started.

The exposure is finished and image is out after auto exposure end trigger period of time is passed.

### 5.2.3 Hardware trigger

The exposure start timing is control by the external hardware trigger signal.

The edge preset hardware trigger, which is the exposure time, is preset fixed shutter on the software and the exposure start timing is control by hardware trigger signal.

The pulse width hardware trigger, which is the exposure time, is active duration of trigger signal and the exposure start timing is control by hardware trigger signal.

The start / stop software trigger, which is the exposure time is period of time between the hardware trigger signal and hardware exposure end signal, and the exposure start timing is control by the hardware trigger signal.

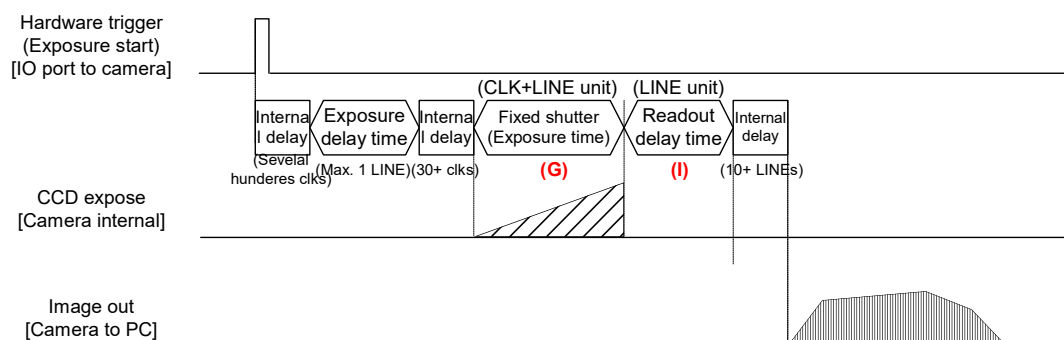
It is necessary to set "Fixed Shutter / AGC OFF" at ALC Mode on Gain/Shutter window.

It is necessary to set Input port for the trigger signal on IO window.

## 5.2.3.1 Hardware trigger (Edge preset)

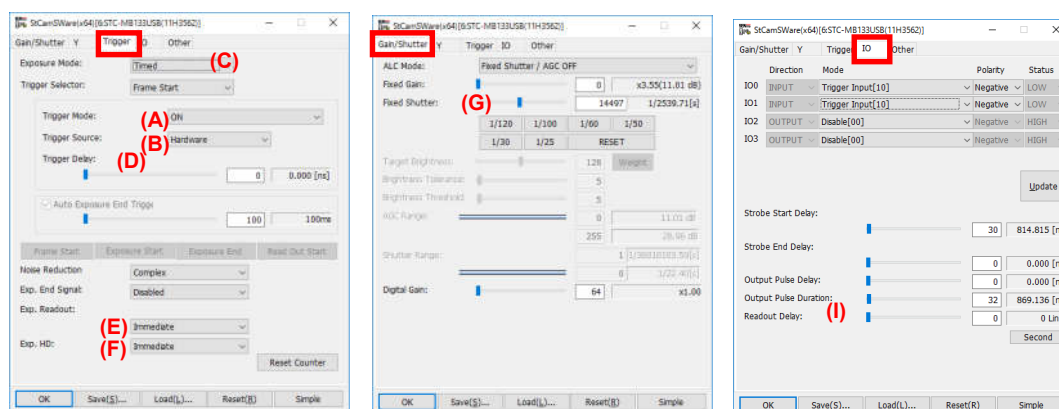
### A. Descriptions

The exposure starts with the hardware trigger signal and the exposure time is preset fixed shutter speed by the software. The image is out after expose is finished.



### B. How to set

The edge preset hardware trigger sets up at “Trigger”, “Gain/Shutter” and “IO” windows.



### a. Mode settings

#### Trigger Mode

“ON” selects at Trigger Mode (A) at Trigger window.

#### Trigger Source

“Hardware” selects at Trigger Source (B) at Trigger window.

#### Exposure Mode

“Timed” selects at Exposure Mode (C) at Trigger window.

### b. Exposure time setting

The exposure time is preset fixed shutter (G) at Gain/Shutter window.

## c. Exposure start settings

The exposure start is selectable below two exposure start settings.

### i) Exposure starts immediately

The exposure starts immediate after trigger signal input.

The actual exposure start the “trigger delay + camera internal delay” after trigger signal input.

It is necessary to set below three settings

Set the exposure start delay time after trigger signal input at Trigger Delay. (D)

Set “Immediate” at Exp. Readout (E) to image is output immediate after exposure is finished.

Set “Immediate” at Exp. HD (F) to exposure starts immediate after trigger signal is input.

### ii) Exposure starts 1HD after

The exposure starts 1 HD after trigger signal input.

The actual exposure start the “trigger delay + camera internal delay + maximum 1H” after trigger signal input.

It is necessary to set below three settings

Set the exposure start delay time after trigger signal input at Trigger Delay. (D)

Set “Immediate” at Exp. Readout (E) to image is output immediate after exposure is finished.

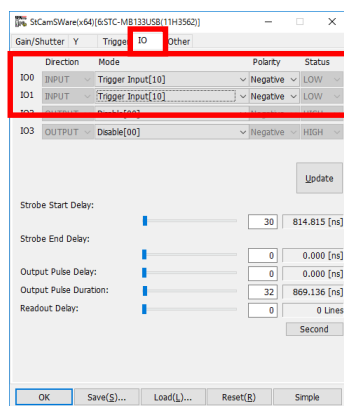
Set “Wait HD” at Exp. HD (F) to exposure starts 1HD after trigger signal is input.

## d. Input / Output signal settings

“Trigger Input” selects at trigger input port.

It is necessary to set the output signal if the trigger signal, strobe signal or other signal is out.

Please refer “Input / Output signal setting” for more details.



## C. How to use

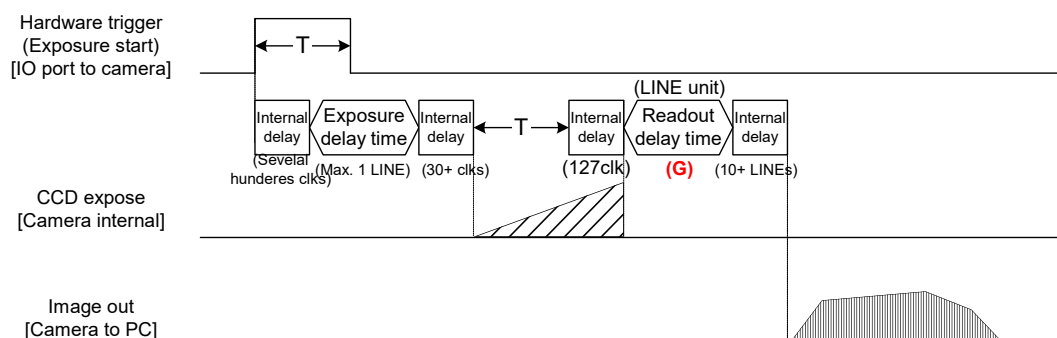
When the hardware trigger signal is input via 6pin connector, the camera starts exposing then image is out.



## 5.2.3.2 Hardware trigger (Pulse width)

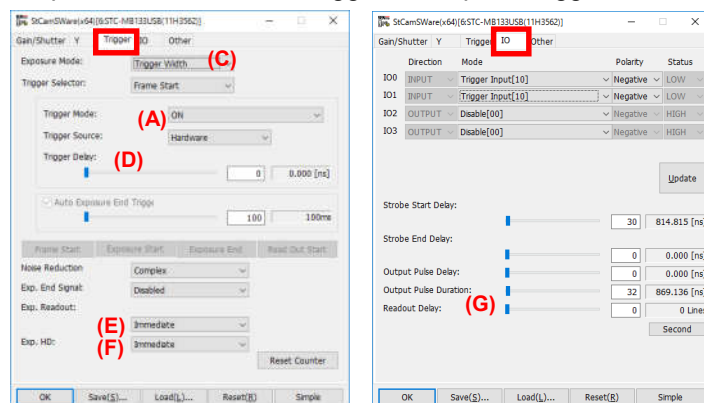
### A. Descriptions

The exposure starts with the hardware trigger signal and the exposure time is defined by the active duration of trigger signal. The image is out after expose is finished.



### B. How to set

The pulse width hardware trigger sets up at “Trigger” and “IO” windows.



#### a. Mode settings

##### Trigger Mode

“ON” selects at Trigger Mode (A) at Trigger window.

##### Trigger Source

“Hardware” selects at Trigger Source (B) at Trigger window.

##### Exposure Mode

“Trigger Width” selects at Exposure Mode (C) at Trigger window.

#### b. Exposure time setting

The exposure time is defined by the active dilation of hardware trigger signal.

## c. Exposure start settings

The exposure start is selectable below two exposure start settings.

### i) Exposure starts immediately

The exposure starts immediate after trigger signal input.

The actual exposure start the “trigger delay + camera internal delay” after trigger signal input.

It is necessary to set below three settings

Set the exposure start delay time after trigger signal input at Trigger Delay. (D)

Set “Immediate” at Exp. Readout (I) to image is output immediate after exposure is finished.

Set “Immediate” at Exp. HD (J) to exposure starts immediate after trigger signal is input.

### ii) Exposure starts 1HD after

The exposure starts 1 HD after trigger signal input.

The actual exposure start the “trigger delay + camera internal delay + maximum 1H” after trigger signal input.

It is necessary to set below three settings

Set the exposure start delay time after trigger signal input at Trigger Delay. (D)

Set “Immediate” at Exp. Readout (I) to image is output immediate after exposure is finished.

Set “Wait HD” at Exp. HD (J) to exposure starts 1HD after trigger signal is input.

## d. Noise reduction setting

The noise reduction is selectable from below three noise reduction settings. (H)

OFF: No noise reduction.

Easy: Noise reduction with obtained image.

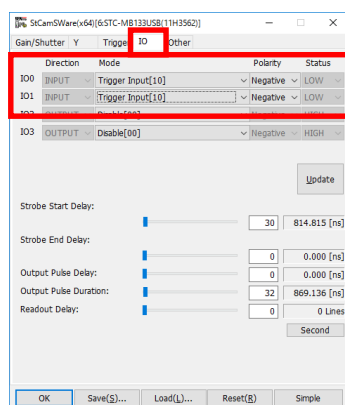
Complex: Noise reduction with shading image. It is necessary to obtain the image in advance.

## e. Input / Output signal settings

“Trigger Input” selects at trigger input port.

It is necessary to set the output signal if the trigger signal, strobe signal or other signal is out.

Please refer “Input / Output signal setting” for more details.



## C. How to use

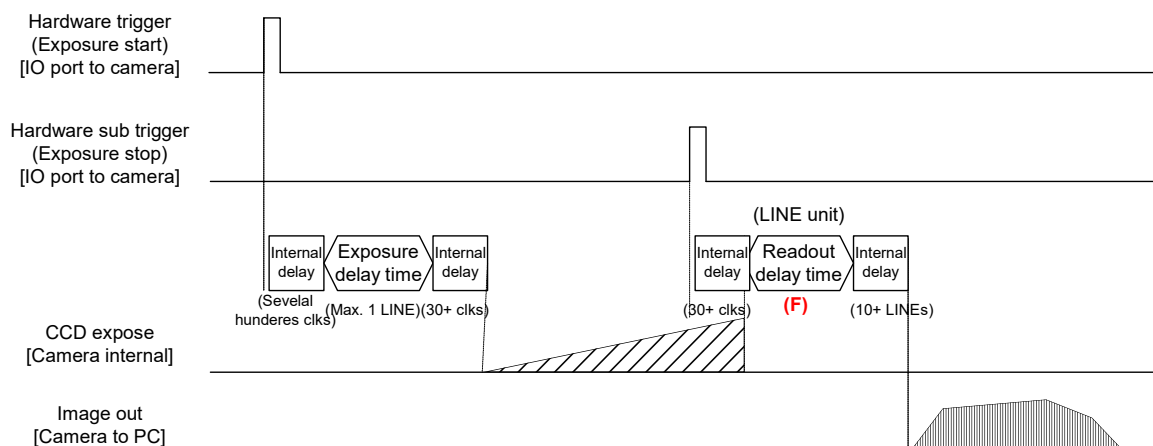
When the hardware trigger signal is input via 6pin connector, the camera starts exposing then image is out.

## 5.2.3.3 Hardware trigger (Start / stop)

### A. Descriptions

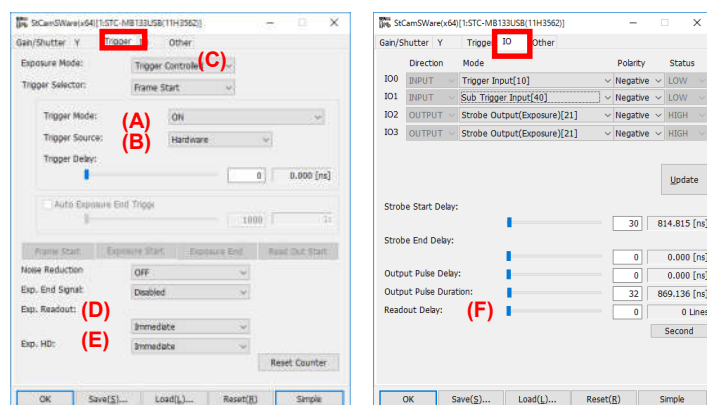
The exposure starts with the hardware trigger signal and exposure stops and image is out with the hardware sub trigger signal.

The exposure time is defined by the period of time between the hardware trigger input and hardware sub trigger signal input.



### B. How to set

The start / stop hardware trigger sets up at "Trigger" and "IO" windows.



### a. Mode settings

#### Trigger Mode

"ON" selects at Trigger Mode (A) at Trigger window.

#### Trigger Source

"Hardware" selects at Trigger Source (B) at Trigger window.

#### Exposure Mode

"Trigger Controlled" selects at Exposure Mode (C) at Trigger window.

### b. Exposure time setting

The exposure time is defined by the period of time between the hardware trigger input and hardware sub trigger signal input.

## c. Exposure start settings

The exposure start is selectable below two exposure start settings.

### i) Exposure starts immediately

The exposure starts immediate after trigger signal input.

The actual exposure start the “trigger delay + camera internal delay” after trigger signal input.

It is necessary to set below three settings

Set the exposure start delay time after trigger signal input at Trigger Delay. (D)

Set “Immediate” at Exp. Readout (I) to image is output immediate after exposure is finished.

Set “Immediate” at Exp. HD (J) to exposure starts immediate after trigger signal is input.

### ii) Exposure starts 1HD after

The exposure starts 1 HD after trigger signal input.

The actual exposure start the “trigger delay + camera internal delay + maximum 1H” after trigger signal input.

It is necessary to set below three settings

Set the exposure start delay time after trigger signal input at Trigger Delay. (D)

Set “Immediate” at Exp. Readout (I) to image is output immediate after exposure is finished.

Set “Wait HD” at Exp. HD (J) to exposure starts 1HD after trigger signal is input.

## d. Noise reduction setting

The noise reduction is selectable from below three noise reduction settings. (H)

OFF: No noise reduction.

Easy: Noise reduction with obtained image.

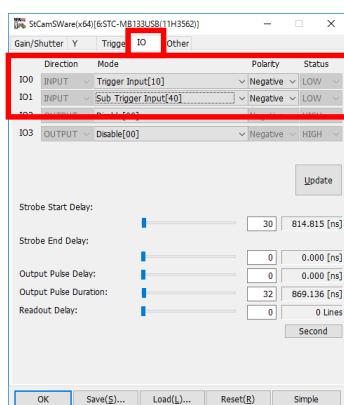
Complex: Noise reduction with shading image. It is necessary to obtain the image in advance.

## e. Input / Output signal settings

“Trigger Input” and “Sub Trigger Input” select at trigger input port.

It is necessary to set the output signal if the trigger signal, strobe signal or other signal is out.

Please refer “Input / Output signal setting” for more details.



## C. How to use

When the hardware trigger signal is input via 6pin connector, the camera starts exposing.

When the hardware sub trigger signal is input via 6pin connector, the camera stops exposing and image is out.

## **6 Input / output signal settings**

The camera has two input signal ports and two output signal ports.  
The input / output signal ports are Configurable.

### 6.1 Input signal settings for IO0 and IO1

- 6.1.1 Disable
- 6.1.2 General Input
- 6.1.3 Trigger Input
- 6.1.4 Readout Input
- 6.1.5 Sub Trigger Input

### 6.2 Output signal settings for IO2 and IO3

- 6.2.1 Disable
- 6.2.2 General Output
- 6.2.3 Trigger Output (Programmable)
- 6.2.4 Exposure End
- 6.2.5 CCD Read End Output
- 6.2.6 Strobe Output (Programmable)
- 6.2.7 Strobe Output (Exposure)

## 6.1 Input signal settings for IO0 and IO1

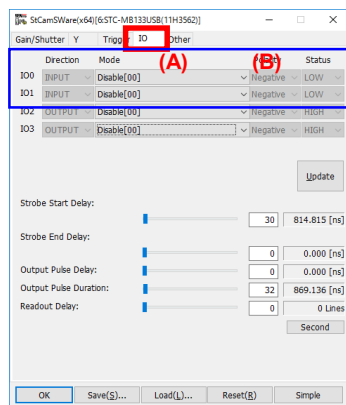
### 6.1.1 Disable

#### A. Descriptions

Selected input port is disabled when selecting “Disable”.

#### B. How to set

Disabled input signal setup at “IO” window.



#### a. Mode settings

##### Mode (A)

Select “Disable” for the input port.

“IO0” is 5pin and “IO1” is 4pin of 6pin connector.

##### Polarity (B)

Select “Negative” or “Positive” signal polarity for the disabled input port.

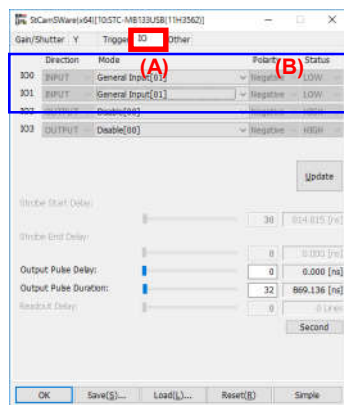
## 6.1.2 General signal input

### A. Descriptions

Selected input port can be received high or low status signal when selecting “General Input”.

### B. How to set

General signal input setup at “IO” window.



#### a. Mode settings

##### Mode (A)

Select “General Input” for the general input port.

“IO0” is 5pin and “IO1” is 4pin of 6pin connector.

##### Polarity (B)

Select “Negative” or “Positive” signal polarity for the general input port.

#### b. General input characteristics

Please input below characteristics of general signal.

##### i) Positive polarity general signal

3.0 to 5.0Vp-p

0V to 0.3Vp-p

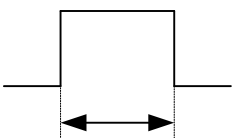
Signal level:

High: 3.0V to 5.0Vp-p

Low: 0.0V to 0.3Vp-p

Input impedance: 10 kOhm

Pulse duration: Specified by the input general signal



##### ii) Negative polarity general signal

3.0 to 5.0Vp-p

0V to 0.3Vp-p

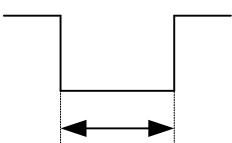
Signal level:

High: 3.0V to 5.0Vp-p

Low: 0.0V to 0.3Vp-p

Input impedance: 10 kOhm

Pulse duration: Specified by the input general signal



## 6.1.3 Trigger signal input

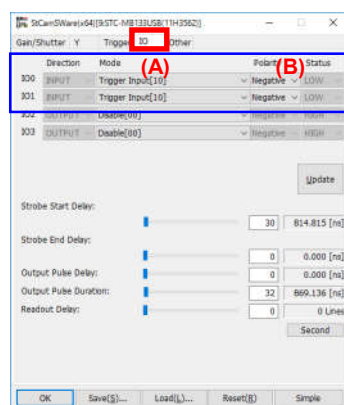
### A. Descriptions

Trigger signal can input through selected input port when selecting “Trigger Input”.

Please refer the operating mode for more details about how to use the trigger signal.

### B. How to set

Trigger signal input is setup at “IO” window.



#### a. Mode settings

##### Mode (A)

Select “Trigger Input” for the trigger input port.

“IO0” is 5pin and “IO1” is 4pin of 6pin connector.

##### Polarity (B)

Select “Negative” or “Positive” signal polarity for the trigger input port.

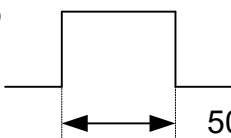
#### b. Trigger signal characteristics

Please input below characteristics of trigger signal.

##### i) Positive polarity trigger signal

3.0 to 5.0Vp-p

0V to 0.3Vp-p



50 clocks to 0.5 seconds

Signal level:

High: 3.0V to 5.0Vp-p

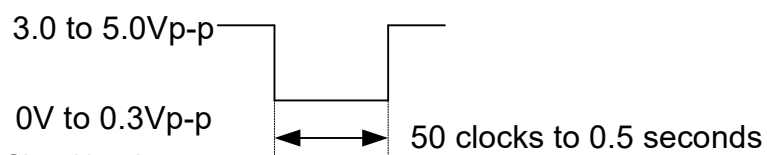
Low: 0.0V to 0.3Vp-p

Input impedance: 10 kohm

Pulse duration: 50 clocks to 0.5 seconds



## ii) Negative polarity trigger signal



Signal level:

High: 3.0V to 5.0Vp-p

Low: 0.0V to 0.3Vp-p

Input impedance: 10 kohm

Pulse duration: 50 clocks to 0.5 seconds

## 6.1.4 Readout signal input

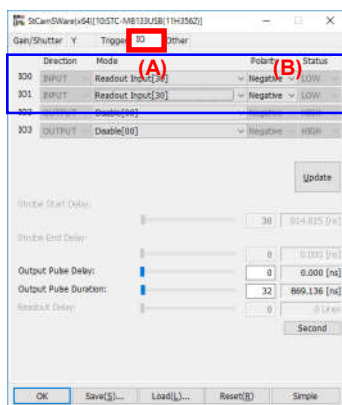
### A. Descriptions

Readout signal can input through selected input port when selecting “Readout Input”.

Please refer the operating mode for more details about how to use the readout signal.

### B. How to set

Readout signal input setup at “IO” window.



#### a. Mode settings

##### Mode (A)

Select “Readout Input” for the readout input port.

“IO0” is 5pin and “IO1” is 4pin of 6pin connector.

##### Polarity (B)

Select “Negative” or “Positive” signal polarity for the readout input port.

#### b. Readout signal characteristics

Please input below characteristics of readout signal.

##### i) Positive polarity readout signal

3.0 to 5.0Vp-p

0V to 0.3Vp-p

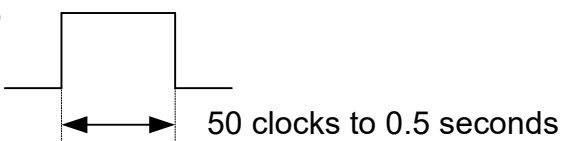
Signal level :

High: 3.0V to 5.0Vp-p

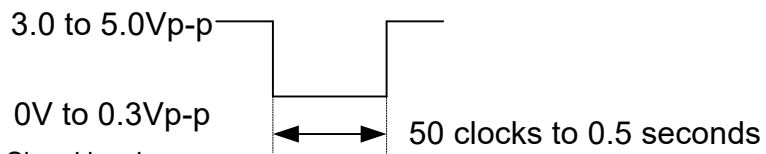
Low: 0.0V to 0.3Vp-p

Input impedance: 10 kohm

Pulse duration: 50 clocks to 0.5 seconds



## ii) Negative polarity sub trigger signal



Signal level :

High: 3.0V to 5.0Vp-p

Low: 0.0V to 0.3Vp-p

Input impedance: 10 kohm

Pulse duration: 50 clocks to 0.5 seconds

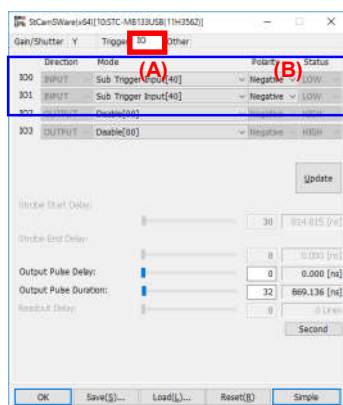
## 6.1.5 Sub trigger signal input

### A. Descriptions

Sub trigger signal can input through selected input port when selecting “Sub Trigger Input”. Please refer the operating mode for more details about how to use the sub trigger signal.

### B. How to set

Sub trigger signal input setup at “IO” window.



#### a. Mode settings

##### Mode (A)

Select “Sub Trigger Input” for the sub trigger input port.

“IO0” is 5pin and “IO1” is 4pin of 6pin connector.

##### Polarity (B)

Select “Negative” or “Positive” signal polarity for the sub trigger input port.

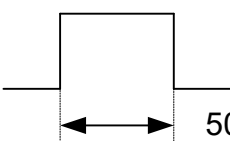
#### b. Sub trigger signal characteristics

Please input below characteristics of sub trigger signal.

##### i) Positive polarity sub trigger signal

3.0 to 5.0Vp-p

0V to 0.3Vp-p



50 clocks to 0.5 seconds

Signal level :

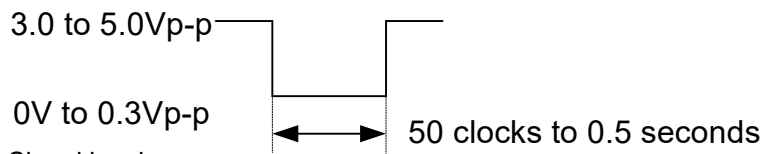
High: 3.0V to 5.0Vp-p

Low: 0.0V to 0.3Vp-p

Input impedance: 10 kohm

Pulse duration: 50 clocks to 0.5 seconds

## ii) Negative polarity sub trigger signal



Signal level:

High: 3.0V to 5.0Vp-p

Low: 0.0V to 0.3Vp-p

Input impedance: 10 kohm

Pulse duration: 50 clocks to 0.5 seconds

## 6.2 Output signal settings for IO2 and IO3

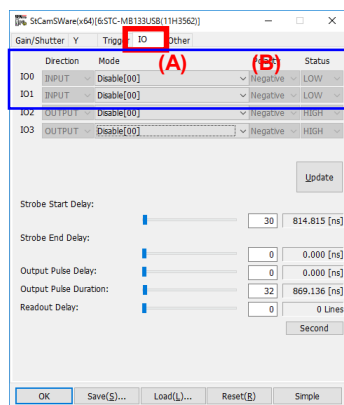
### 6.2.1 Disable

#### A. Descriptions

Selected output port is disabled when selecting “Disable”.

#### B. How to set

Disabled input signal setup at “IO” window.



#### a. Mode settings

##### Mode (A)

Select “Disable” for the output port.

“IO2” is 3pin and “IO3” is 2pin of 6pin connector.

##### Polarity (B)

Select “Negative” or “Positive” signal polarity for the disabled input port.

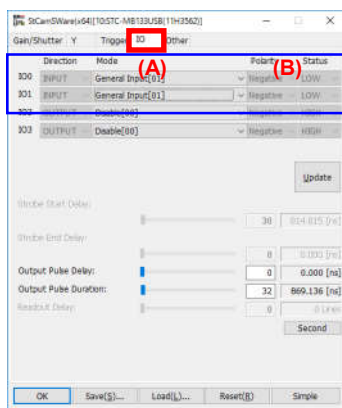
## 6.2.2 General Output

### A. Descriptions

Selected output port can be send high or low status signal when selecting “General Input”.

### B. How to set

General signal input setup at “IO” window.



#### a. Mode settings

##### Mode (A)

Select “General Output” for the general output port.

“IO2” is 3pin and “IO3” is 2pin of 6pin connector.

##### Polarity (B)

Select “Negative” or “Positive” signal polarity for the general output port.

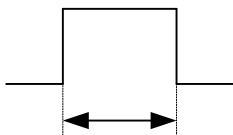
#### b. General input characteristics

Below characteristics of general signal is out.

##### i) Positive polarity general signal

3.3Vp-p

0V



Signal level:

High: 3.3Vp-p

Low: 0.0Vp-p

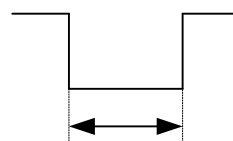
Output impedance: High impedance

Pulse duration: Specified by the input general signal

##### ii) Negative polarity general signal

3.3Vp-p

0V



Signal level:

High: 3.3Vp-p

Low: 0.0Vp-p

Output impedance: High impedance

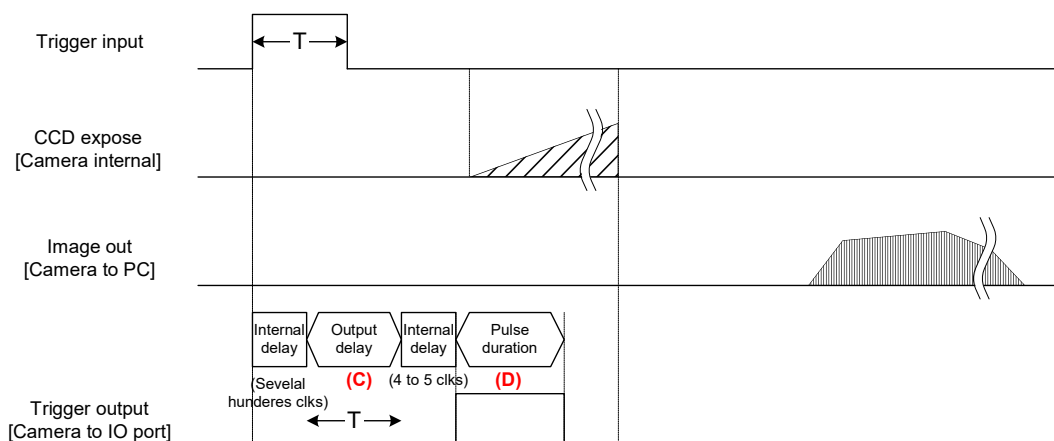
Pulse duration: Specified by the input general signal

## 6.2.3 Trigger Output (Programmable)

### A. Descriptions

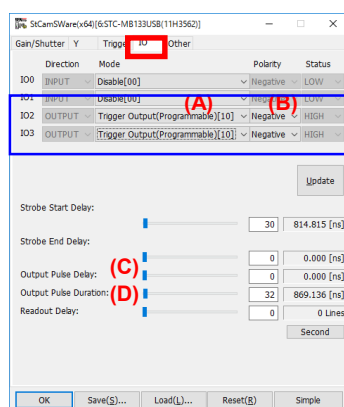
Trigger signal can output through selected output port when selecting “Trigger Output”.

Output timing of trigger signal is adjustable with Output Pulse Delay (C) and active trigger pulse duration is adjustable with Output Pulse Duration (D).



### B. How to set

Trigger output (Programmable) setup at “IO” window.



#### a. Mode settings

##### Mode (A)

Select “Trigger Output” for the trigger output port.

“IO2” is 3pin and “IO3” is 2pin of 6pin connector.

##### Polarity (B)

Select “Negative” or “Positive” signal polarity for the trigger output port.

#### b. Trigger signal output delay setting

Set the delay time from the trigger signal input to trigger signal output at Output Pulse Delay. (C)

The actual trigger signal is output “Output Pulse Delay + camera internal delay” after the trigger signal input.

#### c. Trigger signal duration setting

Set the active pulse duration for the output trigger signal at Output Pulse Duration. (D)

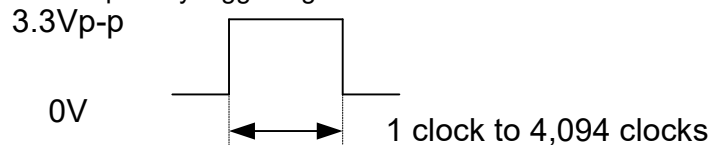


## d. Trigger signal characteristics

Below characteristics of trigger signal is out.

Output timing of trigger signal is adjustable with Output Pulse Delay (C) and active trigger pulse duration is adjustable with Output Pulse Duration (D).

### i) Positive polarity trigger signal



Signal level:

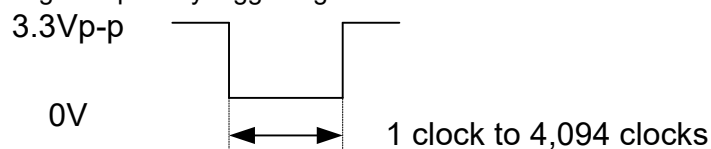
High: 3.3Vp-p

Low: 0.0Vp-p

Output impedance: High impedance

Pulse duration: 1 clock to 4,094 clocks (set as the trigger signal duration)

### ii) Negative polarity trigger signal



Signal level:

High: 3.3Vp-p

Low: 0.0Vp-p

Output impedance: High impedance

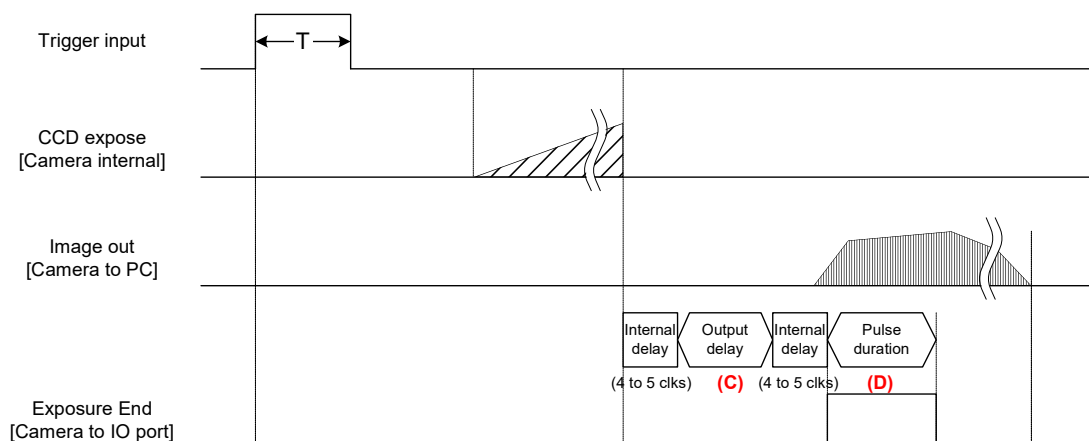
Pulse duration: 1 clock to 4,094 clocks (set as the trigger signal duration)

## 6.2.4 Exposure End

### A. Descriptions

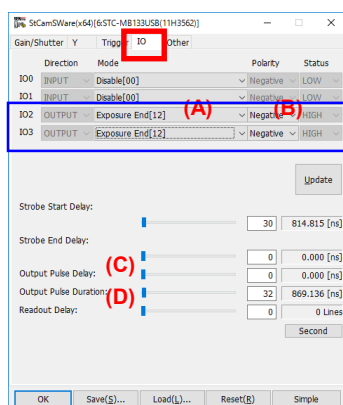
Exposure end signal can output through selected output port when selecting “Exposure End”.

Output timing of exposure end signal is adjustable with Output Pulse Delay (C) and active exposure end pulse duration is adjustable with Output Pulse Duration (D).



### B. How to set

Exposure End setup at “IO” window.



#### a. Mode settings

Mode (A)

Select “Exposure End” for the exposure end output port.

“IO2” is 3pin and “IO3” is 2pin of 6pin connector.

Polarity (B)

Select “Negative” or “Positive” signal polarity for the exposure end output port.

#### b. Exposure end signal output delay setting

Set the delay time from the exposure is finished to exposure end signal output at Output Pulse Delay. (C)

The actual exposure end signal is output “Output Pulse Delay + camera internal delay” after exposure is finished.

#### c. Exposure end signal duration setting

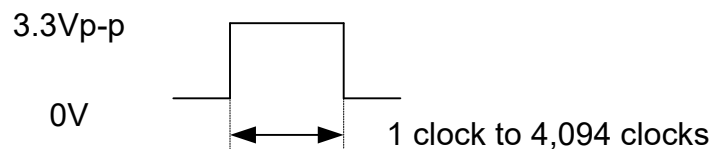
Set the active pulse duration for the output exposure end signal at Output Pulse Duration. (D)

## d. Exposure end signal characteristics

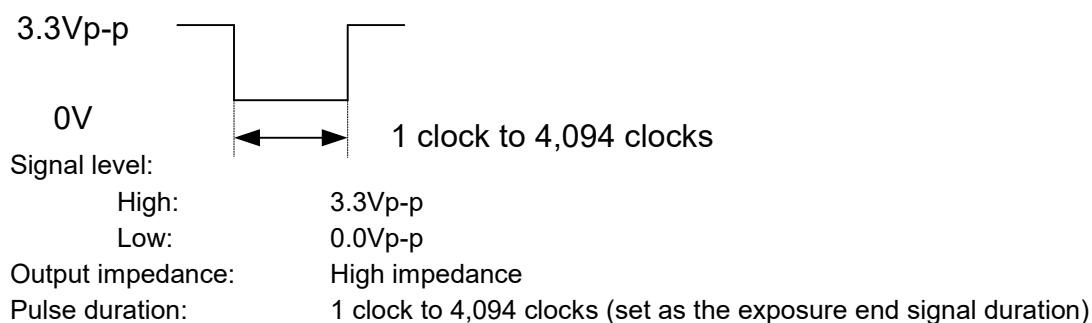
Below characteristics of exposure end signal is out.

Output timing of exposure end signal is adjustable with Output Pulse Delay (C) and active exposure end pulse duration is adjustable with Output Pulse Duration (D).

### i) Positive polarity exposure end signal



### ii) Negative polarity exposure end signal

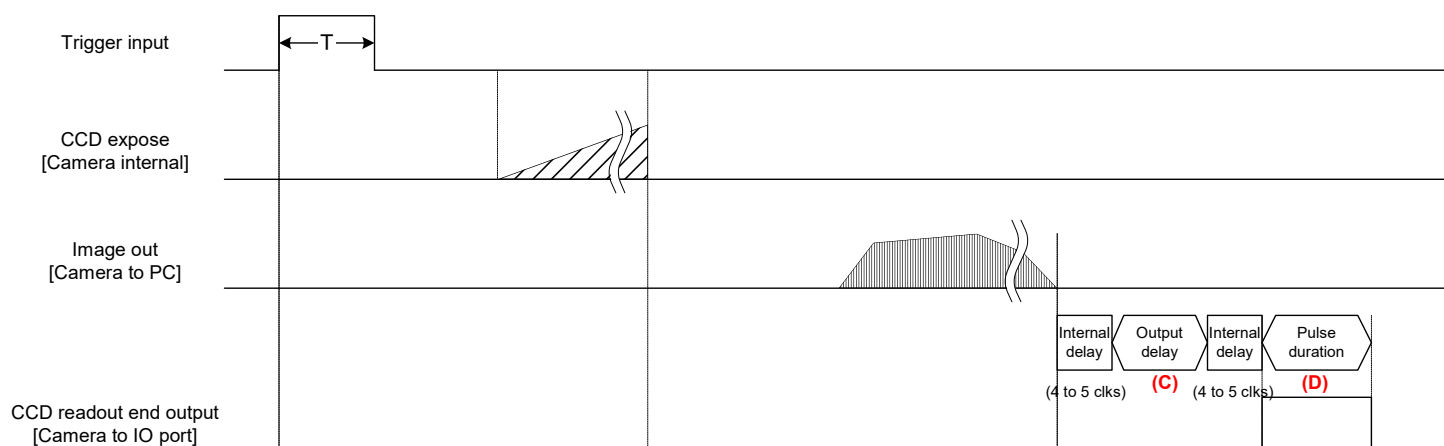


## 6.2.5 CCD Readout End Output

### A. Descriptions

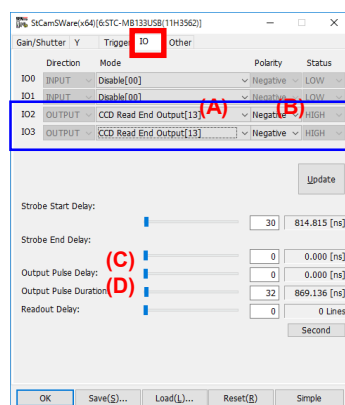
CCD Readout end signal can output through selected output port when selecting “CCD Readout End Output”.

Output timing of CCD Readout end signal is adjustable with Output Pulse Delay (C) and active CCD Readout end pulse duration is adjustable with Output Pulse Duration (D).



### B. How to set

CCD Readout End Output setup at “IO” window.



#### a. Mode settings

##### Mode (A)

Select “CCD Readout End Output” for the CCD readout end output port.

“IO2” is 3pin and “IO3” is 2pin of 6pin connector.

##### Polarity (B)

Select “Negative” or “Positive” signal polarity for the CCD readout end output port.

#### b. CCD readout end signal output delay setting

Set the delay time from the CCD readout is finished to CCD readout end signal output at Output Pulse Delay. (C)

The actual CCD readout end signal is output “Output Pulse Delay + camera internal delay” after CCD readout is finished.

#### c. CCD readout end signal duration setting

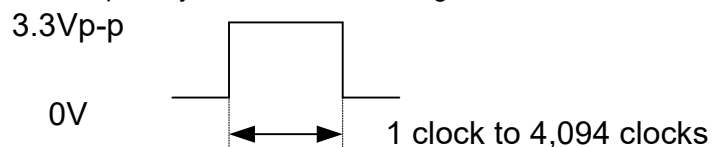
Set the active pulse duration for the output CCD readout end signal at Output Pulse Duration. (D)

## d. CCD Readout end signal characteristics

Below characteristics of CCD readout end signal is out.

Output timing of CCD Readout end signal is adjustable with Output Pulse Delay (C) and active CCD Readout end pulse duration is adjustable with Output Pulse Duration (D).

### i) Positive polarity CCD readout end signal



Signal level:

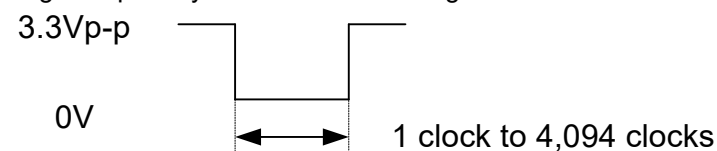
High: 3.3Vp-p

Low: 0.0Vp-p

Output impedance: High impedance

Pulse duration: 1 clock to 4,094 clocks (set as the CCD readout end signal duration)

### ii) Negative polarity CCD readout end signal



Signal level:

High: 3.3Vp-p

Low: 0.0Vp-p

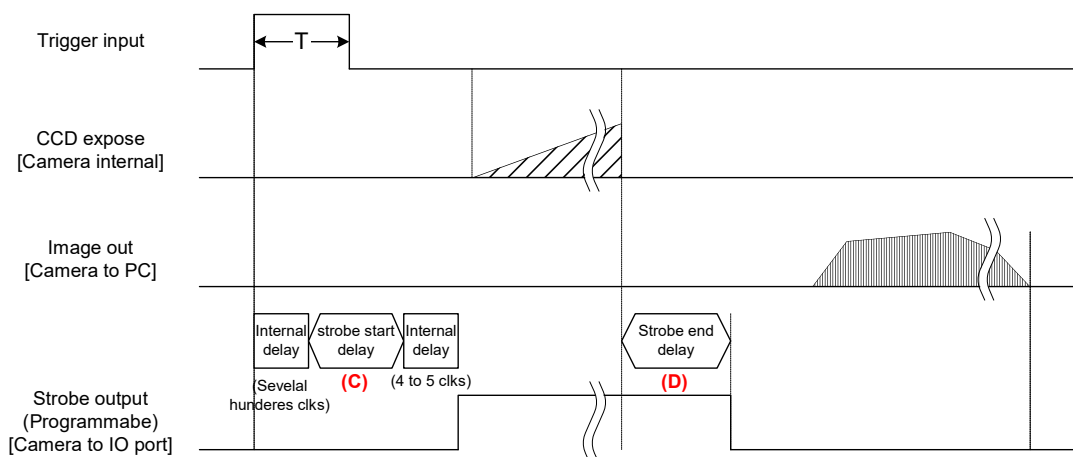
Output impedance: High impedance

Pulse duration: 1 clock to 4,094 clocks (set as the CCD readout end signal duration)

## 6.2.6 Strobe Output (Programmable)

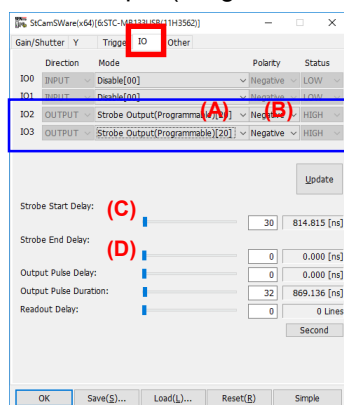
### A. Descriptions

Programmable strobe signal can output through selected output port when selecting “Strobe Output (Programmable)”. Output timing of strobe output (programmable) signal is adjustable with Output Pulse Delay (C) and active strobe output (programmable) pulse duration is adjustable with Output Pulse Duration (D).



### B. How to set

Strobe Output (Programmable) setup at “IO” window.



#### a. Mode settings

##### Mode (A)

Select “Strobe Output (Programmable)” for the strobe output (programmable) port.

“IO2” is 3pin and “IO3” is 2pin of 6pin connector.

##### Polarity (B)

Select “Negative” or “Positive” signal polarity for the strobe output (programmable) output port.

#### b. Strobe output (programmable) signal output delay setting

Set the delay time from the trigger signal input to strobe output (programmable) signal output at Output Pulse Delay. (C) The actual strobe output (programmable) signal is output “Output Pulse Delay + camera internal delay” after trigger signal input.

#### c. Strobe output (programmable) signal duration setting

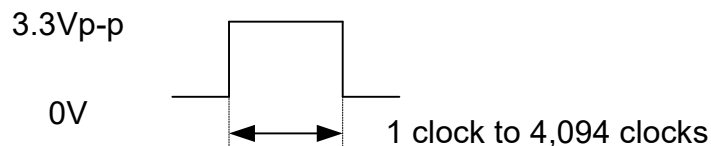
Set the active pulse duration for the strobe output (programmable) signal at Output Pulse Duration. (D)

## d. Strobe output (programmable) signal characteristics

Below characteristics of strobe output (programmable) signal is out.

Output timing of strobe output (programmable) signal is adjustable with Output Pulse Delay (C) and active strobe output (programmable) pulse duration is adjustable with Output Pulse Duration (D).

### i) Positive polarity strobe output (programmable) signal



Signal level:

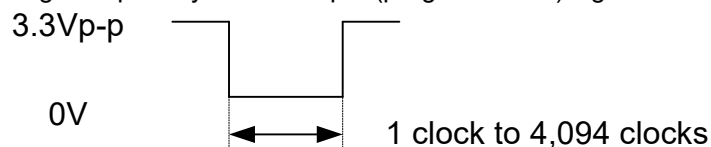
High: 3.3Vp-p

Low: 0.0Vp-p

Output impedance: High impedance

Pulse duration: 1 clock to 4,094 clocks (set as the strobe output (programmable) signal duration)

### ii) Negative polarity strobe output (programmable) signal



Signal level:

High: 3.3Vp-p

Low: 0.0Vp-p

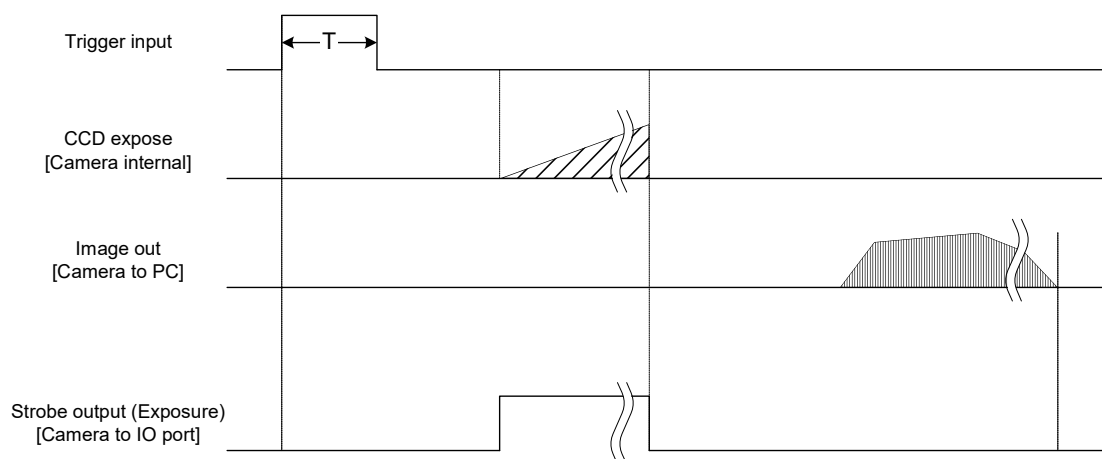
Output impedance: High impedance

Pulse duration: 1 clock to 4,094 clocks (set as the strobe output (programmable) signal duration)

## 6.2.7 Strobe Output (Exposure)

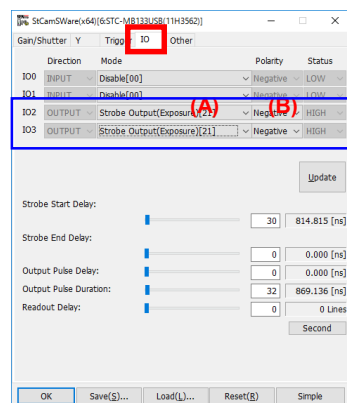
### A. Descriptions

Strobe signal, which is actual exposure time can output through selected output port when selecting “Strobe Output (Exposure)”.



### B. How to set

Strobe Output (Exposure) setup at “IO” window.



#### a. Mode settings

##### Mode (A)

Select “Strobe Output (Programmable)” for the strobe output (programmable) port.

“IO2” is 3pin and “IO3” is 2pin of 6pin connector.

##### Polarity (B)

Select “Negative” or “Positive” signal polarity for the strobe output (programmable) output port.

#### b. Strobe output (programmable) signal output delay setting

Set the delay time from the trigger signal input to strobe output (programmable) signal output at Output Pulse Delay. (C)  
The actual strobe output (programmable) signal is output “Output Pulse Delay + camera internal delay” after trigger signal input.

#### c. Strobe output (programmable) signal duration setting

Set the active pulse duration for the strobe output (programmable) signal at Output Pulse Duration. (D)



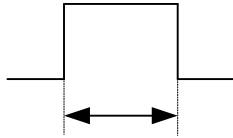
## d. Strobe output (exposure) signal characteristics

Below characteristics of strobe output (exposure) signal is out.

### i) Positive polarity strobe output (exposure) signal

3.3Vp-p

0V



Signal level:

High: 3.3Vp-p

Low: 0.0Vp-p

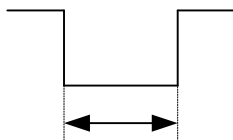
Output impedance: High impedance

Pulse duration: Same as the exposure time

### ii) Negative polarity strobe output (exposure) signal

3.3Vp-p

0V



Signal level:

High: 3.3Vp-p

Low: 0.0Vp-p

Output impedance: High impedance

Pulse duration: Same as the exposure time

Revisions

| Rev  | Date       | Changes      | Note |
|------|------------|--------------|------|
| 1.00 | 2017/01/13 | New document |      |
|      |            |              |      |

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