

USB2.0 / STC-MxA5MUSB3 Camera Software StCamSWare

User's Guide

OMRON SENTECH CO., LTD.

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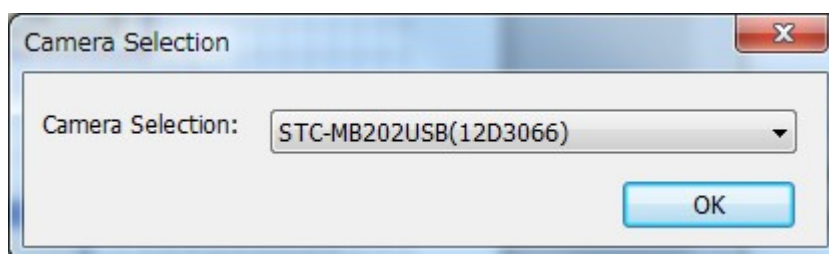
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1 Start method

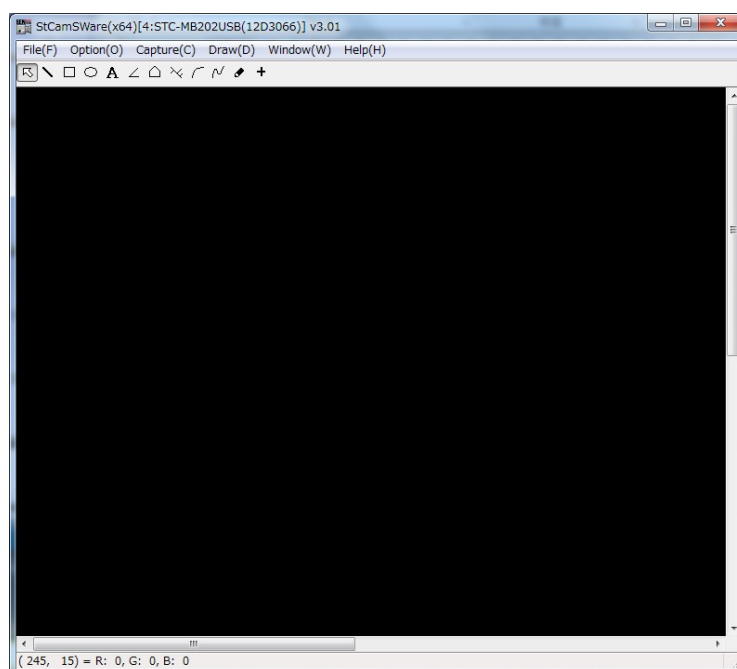
- 1) USB camera connecting to USB port of PC.
- 2) After a few seconds, double-click the “StCamSWare” on desktop and start “StCamSWare.” USB camera may not be recognized if starting StCamSWare software immediately after connecting USB camera.



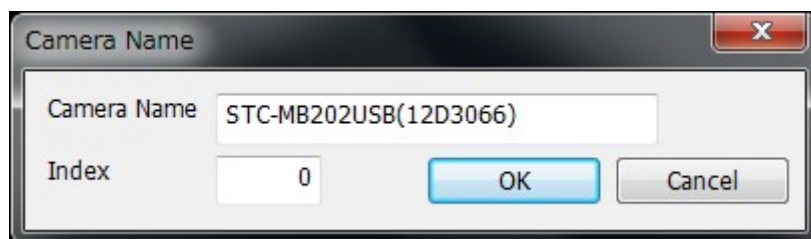
- 3) The message below will appear when several usable cameras are found. Select camera name (*1) to be used and click [OK] button. (*2)



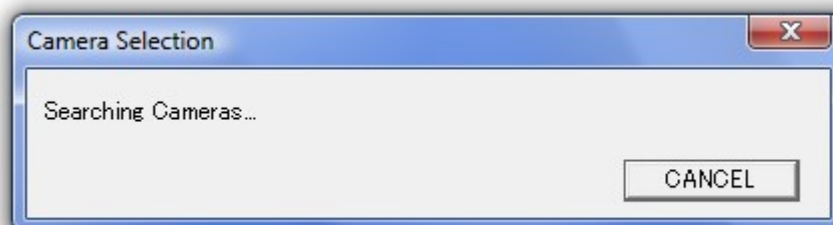
- 4) The preview window will open and preview will start. (*3)



- *1 The camera name to be displayed can be changed from [Rename Camera] under [Option] in menu.

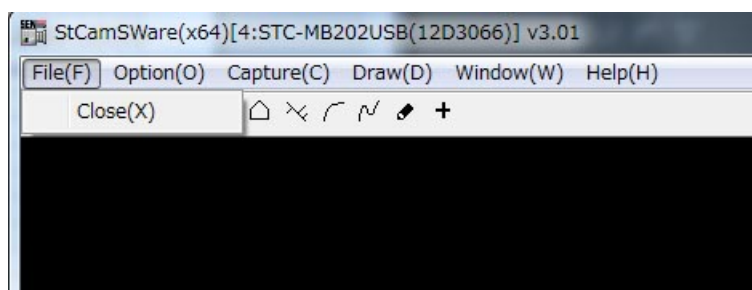


- *2 When the USB camera is not connected to PC or when starting up software immediately after connecting, "Searching Cameras..." message appears.
Either connect USB camera to PC or select [CANCEL] button to close software, and starts software after connecting USB camera.



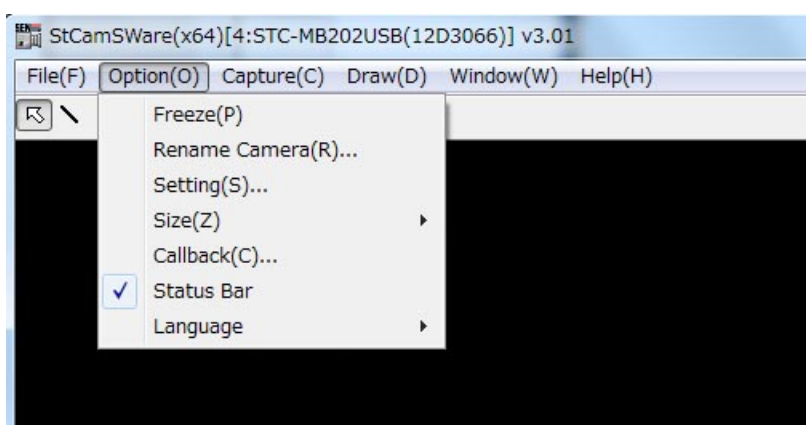
2 Operating method (general)

2.1 [File] menu



[Close] Closes the StCamSWare software.

2.2 [Option] menu



[Freeze] Preview stops and option becomes [LiveVideo]

[LiveVideo] Preview restarts and option becomes [Freeze].

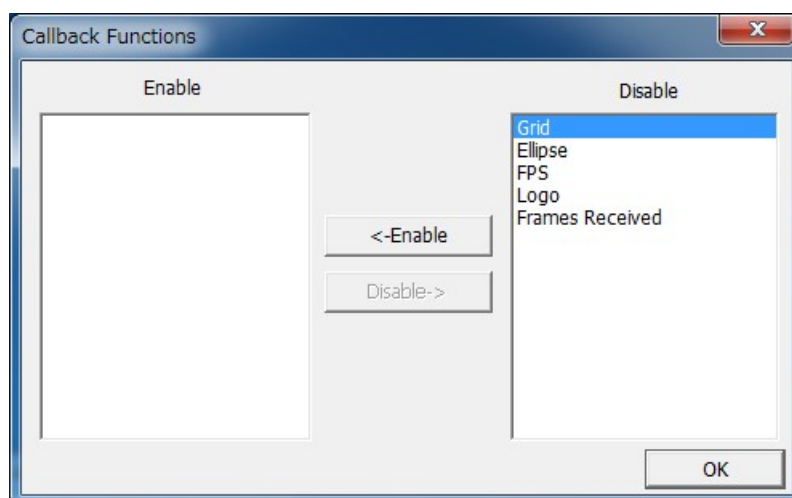
[Rename Camera] Sets camera name (camera identifier of software).

[Setting] Saves, reads in, and makes various changes to camera setting.
Please refer to "[3 How to use \(camera setting\)](#)" for details of camera setting screen.

[Size] Changes display image size.
Please select from normal display (original size), double, quadruple, octuplet, half, fourth or one-eighth.

[Callback] When making a software using the camera's SDK, characters, lines, and images can be displayed superimposed on a preview image (saved image will not change). This software includes functions that display "Grid" "Ellipse" "FPS" "Logo" and "Frames Received" as samples.

- 1) The screen below appears when selecting [Option] [Callback] from menu.

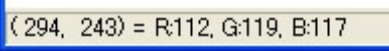


- 2) To enable Callback, select the Callback to be enabled from “Disable” list on right and click [<-Enable] button. (*1)

Display name	Description
Grid	Displays grids.
Ellipse	Displays concentric circles.
FPS	Displays FPS, FPS Callback received frame number, camera output frame number and date/time. FPS is calculated from the average time used to receive 100 frames.
Logo	Displays the company logo.
Frames Received	Displays received frame number and non-received frame number.

- 3) To disable Callback, select the Callback to be disabled from “Enable” list on left and click [Disable->] button.

[Status bar] Displays status bar in preview window. Position and pixel value are displayed on status bar when mouse is moved. (*2)



(294, 243) = R:112, G:119, B:117

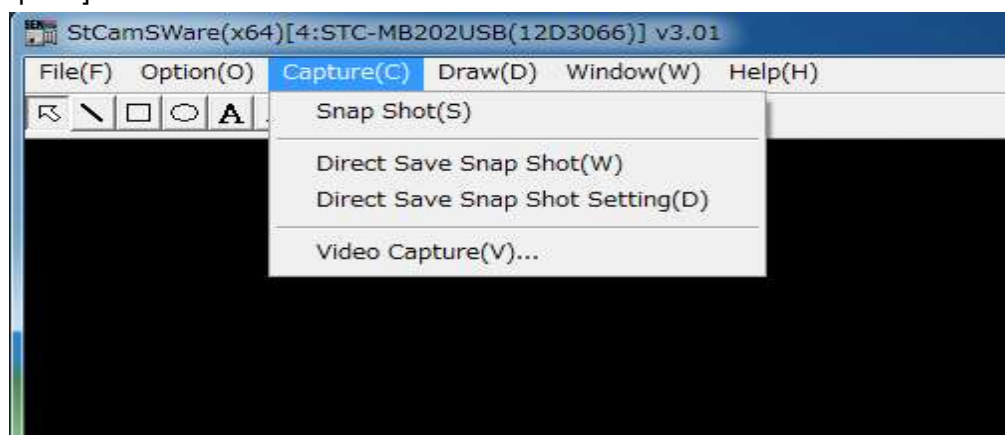
[Language] StCamSWare display can be changed to English, Japanese, German, Spanish, and Chinese.

*1 Frame rate may be reduced because processing is done of PC.

If settings are not required, use as “OFF (disable all).”

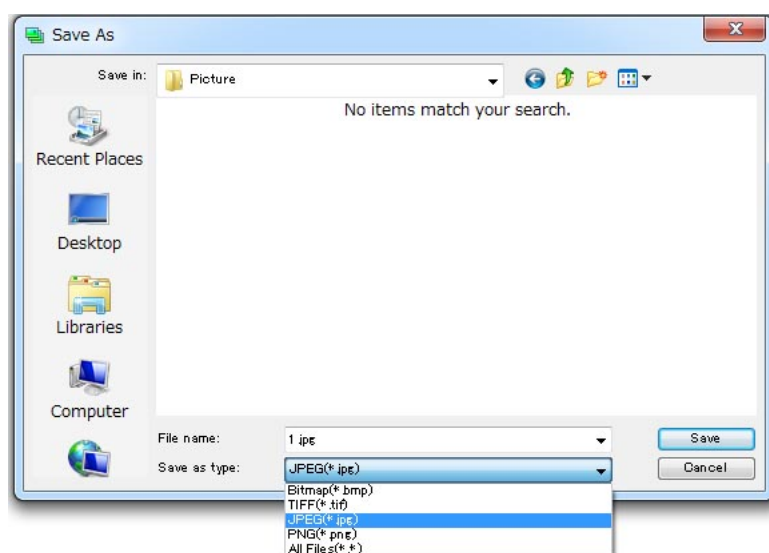
*2 Position and pixel value are revised when moving mouse and not when image is revised.

2.3 [Capture] menu



[Snap Shot] Acquires still images, specifies file name, file type, and destination to save, and save.

- 1) The still image will be acquired when selecting [Snap Shot] or pressing [S] key and will be displayed in another window.
- 2) To save the acquired still image, right-click on image to be saved and select [Save] of displayed menu.
- 3) Input file name, select file type, and save acquired image. (*1)

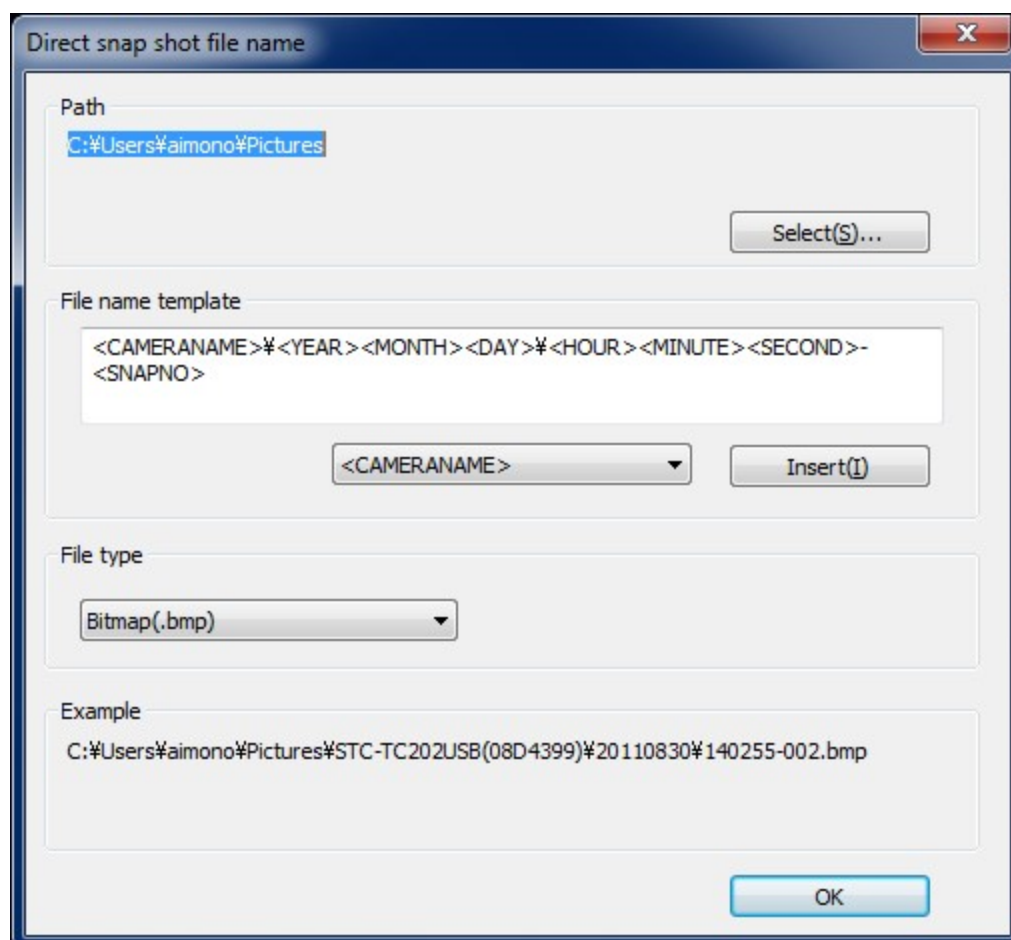


- 4) To display the acquired still image in another window, right-click image, and select (or double click) [Display] of displayed menu. (*1)
- 5) To delete the acquired still image without saving, right-click image and select (or press [DEL] key) [Delete] of displayed menu. (*1)

[Direct Save Snap Shot] Acquires a still image and immediately saves to a specified destination.

[Direct Save Snap Shot Setting] Specifies file name and destination.

- 1) Select [Direct Save Snap Shot Setting] and open setting screen.



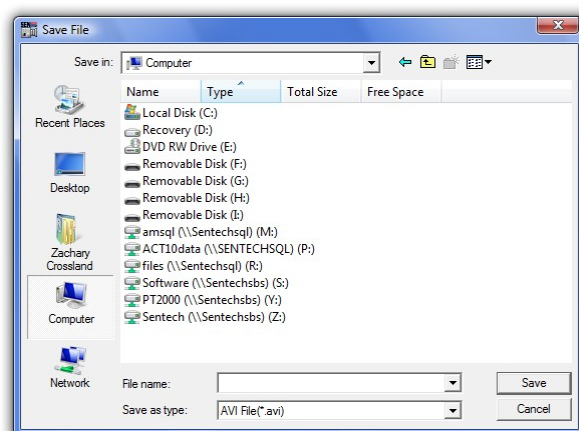
- 2) Pressing the [Select] button in “Path” frame will select Path to which files are saved.
- 3) Specify a file name template in “File name template” frame textbox.
A subfolder name can be specified by separating with ¥.
The character strings enclosed with <> below are replaced when saving. (*2)

<CAMERANAME>	Camera name
<YEAR>	4-digits one-byte numbers representing Calendar Year
<MONTH>	2-digits one-byte numbers representing Month
<DAY>	2-digits one-byte numbers representing Day
<HOUR>	2-digits one-byte numbers representing Hour
<MINUTE>	2-digits one-byte numbers representing Minute
<SECOND>	2-digits one-byte numbers representing Second
<FRAMENO>	Minimum 4-digits one-byte numbers representing Frame number (exposed image count value after turning on camera*)
<SNAPNO>	Minimum 3-digits one-byte numbers representing Snap number (snap shot count value acquired after starting StCamSWare)

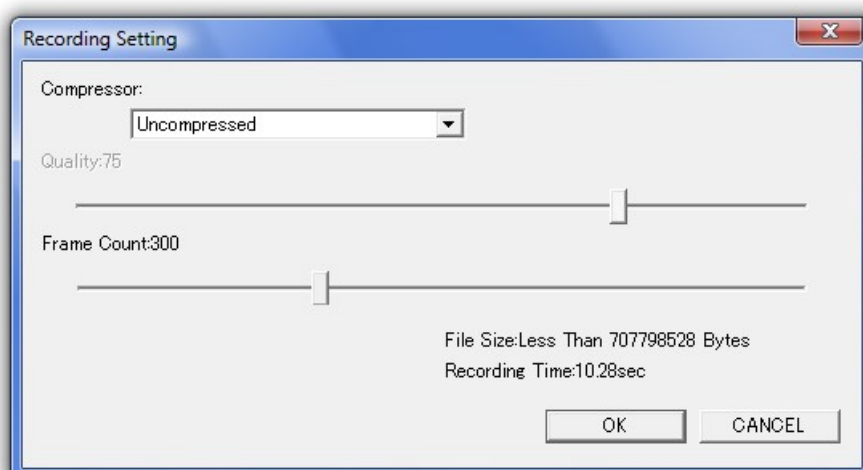
- 4) Select file format (BMP, TIFF, JPEG, PNG) of combo box in [Save as Type] frame.

[Save video] Saves video by specifying file name, compression technology, quality, and frame number.
 When saving images, burden on PC increase, and dropping frames are likely to occur.
 Dropping frames can be reduced by changing clock settings and decreasing frame rates.

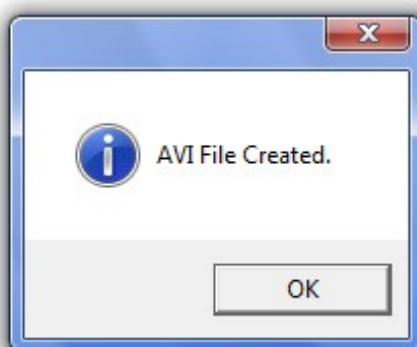
- 1) The dialogue box will open when selecting [Save Video], and input AVI file name to be saved.



- 2) Set the file format (*3) and frame number of video to be saved (quality as well when MotionJPEG) and click [OK] button.
 Quality range at MotionJPEG is from 1 through 100 (default is 75), and specifying 100 provides the highest quality.
 File size when selecting compression format is only a rough indication. File size may change significantly depending on filmed image.

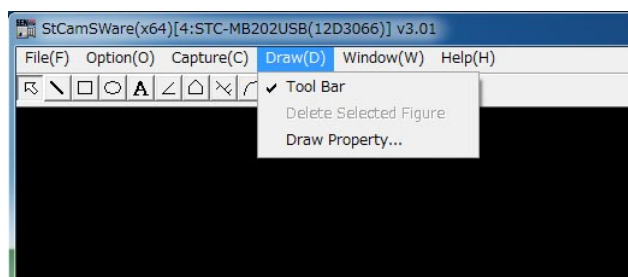


- 3) To cancel while saving, click [CANCEL] button.
- 4) The message below will appear when saving is completed.

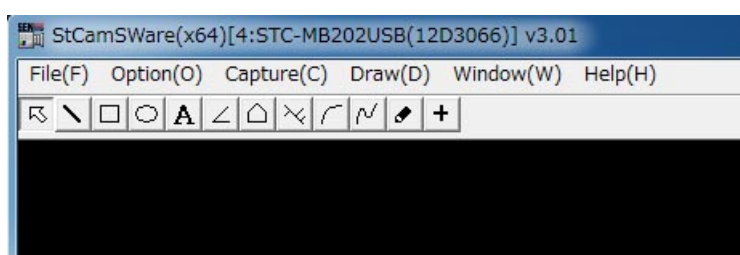


- *1 Multiple screens can be selected by left-clicking while holding down [Ctrl] key.
- *2 Each count value is 32 bits, so it will return to 0 when it exceeds 4294967295.
The above character to be replaced can be added to end of character string by selecting combo box and clicking [Insert] button.
- *3 MPG4C32.dll is required to save in compression format (MS-MPEG4v1/MS-MPEG4v2)
(not compatible with x64 environment).
Not compatible with OS after Windows Vista and x64 version OS.

2.4 [Draw] menu















[Tool Bar] The draw tool bar will appear at top of screen by selecting tool bar.



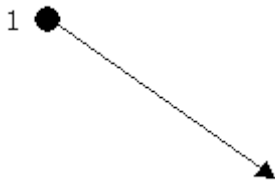
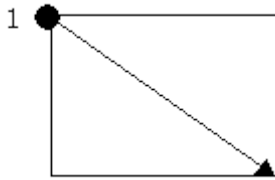
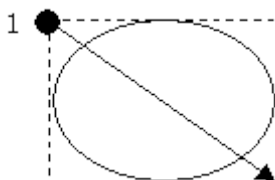

2.4.1 Add and edit figures

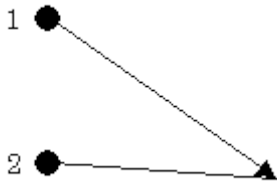
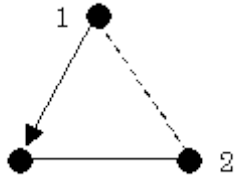
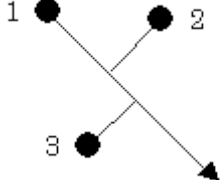
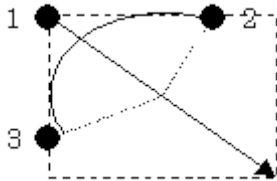
Instructions on adding and editing figures are given below.

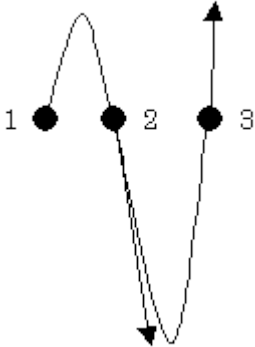

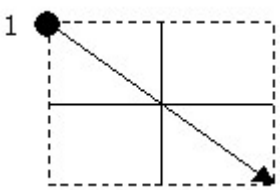
1) Select the figure to be drawn from tool bar.

-  Select the figure already drawn to edit
-  Draw a line
-  Draw a rectangle
-  Draw an oval
-  Draw a character string
-  Draw 2 lines to measures angles
-  Draw polygons
-  Draw perpendicular lines
-  Draw an arch
-  Draw a Bezier curve
-  Draw a freehanded curve
-  Draw a cross

2) Use to mouse to add and edit figures.

Line		Add	A line will be drawn from where left button of mouse is pressed and where it is released. Moving the mouse while holding down [SHIFT] key will change slope of line by a unit of 45 degrees.
		Edit	Pressing the left button of mouse on an area around start or end point will move it until left button is released. Moving the mouse while holding down [SHIFT] key will change slope of line by a unit of 45 degrees. When pressing the left button of mouse near line, it can be moved to where left button is released.
Rectangle		Add	A rectangle with vertexes at where left button of mouse is pressed and released will be drawn. A square will be drawn by moving mouse while pressing [SHIFT] key.
		Edit	Pressing the left button of mouse near vertex will move it to where left button is released. A square will be drawn by moving mouse while pressing [SHIFT] key. Pressing the left button of mouse in rectangle enables to move position of rectangle.
Oval		Add	An inscribed oval will be drawn in rectangle with vertexes at where left button of mouse is pressed and released. A circle will be drawn by moving mouse while pressing [SHIFT] key.
		Edit	When pressing the left button of mouse at vertex of outer rectangle, shape of oval will change so where left button is released will be vertex of outer rectangle. A circle will be drawn by moving mouse while pressing [SHIFT] key. Pressing the left button of mouse in outer rectangle will move position of oval.
Character string	Character string 	Add	Character strings will be drawn where left button of mouse is clicked. Character strings displayed will be change on Draw property screen.
		Edit	When pressing the left button of mouse around characters, character strings can be moved to where left button is released.


Angle		Add	Just as with a line, a line will be drawn from where left button of mouse is pressed and where it is released. The 2 nd line will be drawn to where left button of mouse is clicked, and angle between 2 lines is displayed.
		Edit	When pressing the left button of mouse around line's end point, end point can be moved to where left button is released. When pressing the left button of mouse near center of line, figure can be moved to where left button is released.
Polygons		Add	Just as with a line, a line will be drawn from where left button of mouse is pressed and where it is released. A vertex is added with every left-click. A right-click finishes drawing.
		Edit	When pressing the left button of mouse around vertex, vertex can be moved to where left button is released. When pressing the left button of mouse near center of line, polygon can be moved to where left button is released.
Perpendicular Line		Add	Just as with a line, a line will be drawn from where left button of mouse is pressed and where it is released. One perpendicular line is added with every left-click. A right-click finishes drawing.
		Edit	When pressing the left button of mouse around line's end point, end point can be moved to where left button is released. When pressing the left button of mouse near center of line, perpendicular line can be moved to where left button is released.
Arch		Add	Just as with an oval, an inscribed oval will be drawn in rectangle with vertexes at where left button of mouse is pressed and released. The 1 st left-click sets start position of arch and 2 nd end position.
		Edit	When pressing the left button of mouse near vertex of outer rectangle, shape of oval will change so where left button is released will be vertex of outer rectangle. A circle will be drawn by moving mouse while pressing [SHIFT] key. Pressing the left button of mouse in outer rectangle will move position of arch. When pressing the left button of mouse near line's end point from start position (or end position) of that stretches from center of the arch, start position (or end position) of arch can be moved to where left button is released.

Bezier curve		<div> Add <p>A Bezier curve that passes through the position of left click will be drawn. A right click will finish drawing. Dragging while holding down left button of mouse when adding the pass point will set slope of angle of curve (control point) at pass point. A control point can be set so curve will become continuous around pass point by moving mouse while pressing [SHIFT] key.</p> </div> <div> Edit <p>When pressing the left button of mouse near pass point, pass point can be moved to where left button is released. When pressing the left button of mouse near tip of control point stretching from pass point, control point can move to where left button is released. The control point can be moved so curve will become continuous around vertex by dragging control point while holding down [SHIFT] button. When pressing the left button of mouse near center of line stretching to control point from pass point, entire curve can be moved to where left button is released.</p> </div>
Freehand curve		<div> Add <p>A track of the mouse from left button of mouse was pressed to where it was released will be drawn.</p> </div> <div> Edit <p>Freehand curves are generated by multiple lines. When pressing the left button of mouse near end point of each line, end point can be moved to where left button is released. When pressing the left button of mouse near center of each line, entire curve can be moved to where left button is released.</p> </div>
Cross		<div> Edit <p>When pressing the left button of mouse near pass point, pass point can be moved to where left button is released. When pressing the left button of mouse near tip of control point stretching from pass point, control point can be moved to where left button is released. The control point can be moved so curve will become continuous around vertex by dragging control point while holding down [SHIFT] button. Pressing the left button of mouse near center of line stretching from pass point to control point, entire curve can be moved to where left is released.</p> </div>

- * Burden on the PC increases depending on number of figures and width of lines.
- * When multiple figures are selected, they can be moved only in entirety.
To change shapes of each figure, selected that figure separately.
- * The display of drawing can be updated only during preview.
Adding, editing, and deleting of figures while preview is stopped will not be reflected for display.

2.4.2 How to delete figures

Instructions on how to delete figures are given below.

- 1) Click the  button and set to selection mode.
- 2) Left-click the periphery of figure to be deleted and activate figure.
Left-clicking while holding down [SHIFT] button will enable multiple selections of figure.
Dragging while holding down the left button of mouse will enable selection of multiple figures included in area dragged.
- 3) Select the [Draw] [Delete selected figure] from menu to delete a figure.

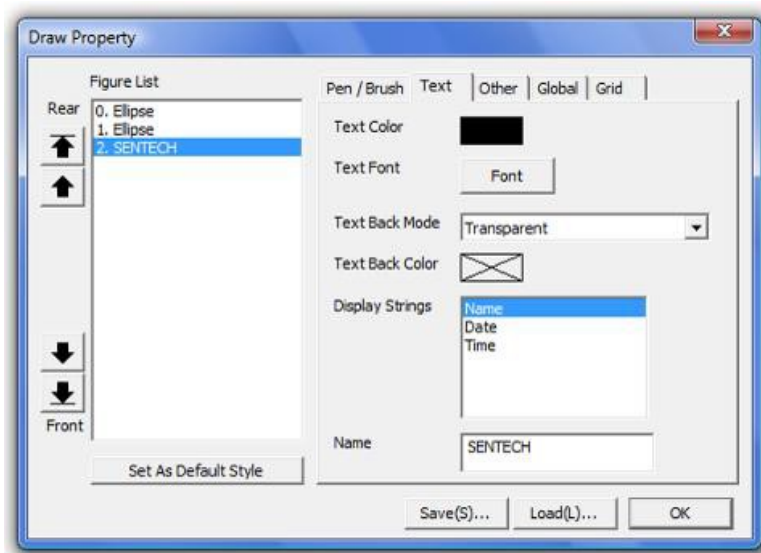
* The display of drawing can be updated only during preview.

Adding, editing, and deleting of figures while the preview is stopped will not be reflected for display.

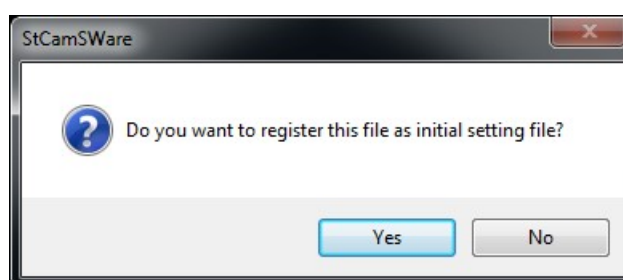
2.4.3 Saving and reading of draw data

Instructions now how to save and read draw data are given below.

- 1) The below draw property screen will appear when selecting [Draw Property] under [Draw] in menu.



- 2) Pressing the [Save] button will enable saving current draw data to file (*.drw).
When responding [Yes] to the message displayed as below, this file will be read automatically next start-up.



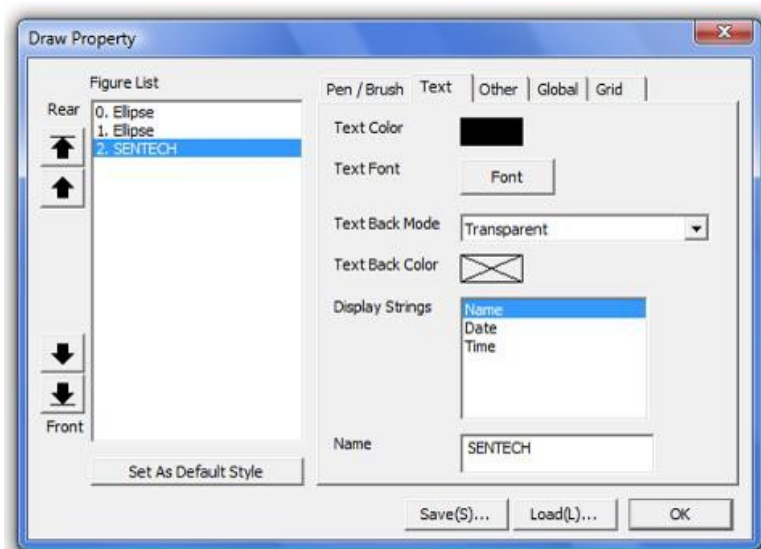
- 3) Pressing the [Load] button will enable to read draw data to file (*.drw).

2.4.4 Setting the sequence of draw data

Instructions on how to set the sequence of draw data are given below.

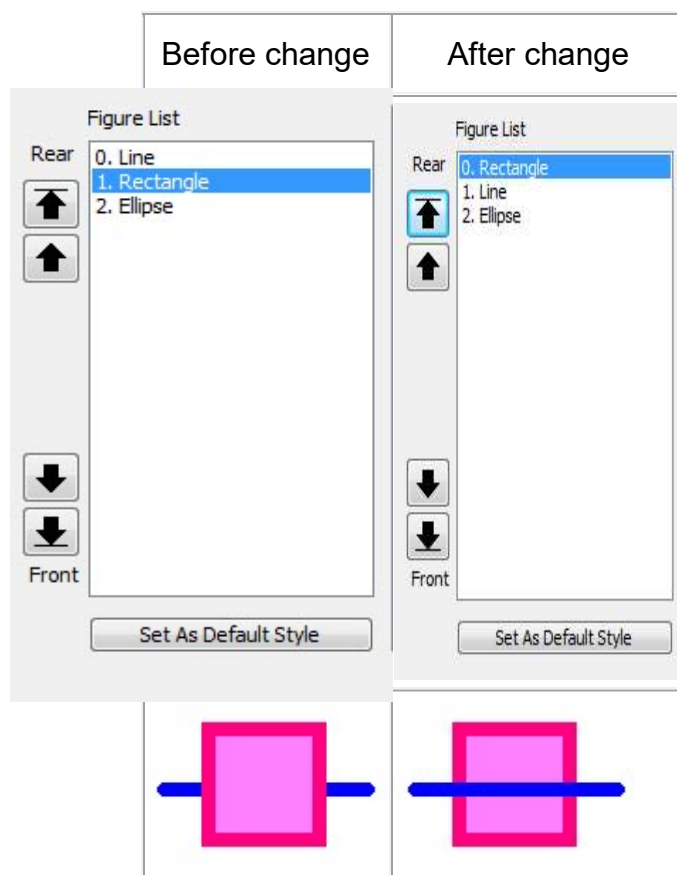
Moving the sequence to front will enable display of figures hidden under different figures or will make selection of figures in back of other figures easier.

- 1) The below draw property will appear by selecting [Draw Property] under [Draw] in menu.



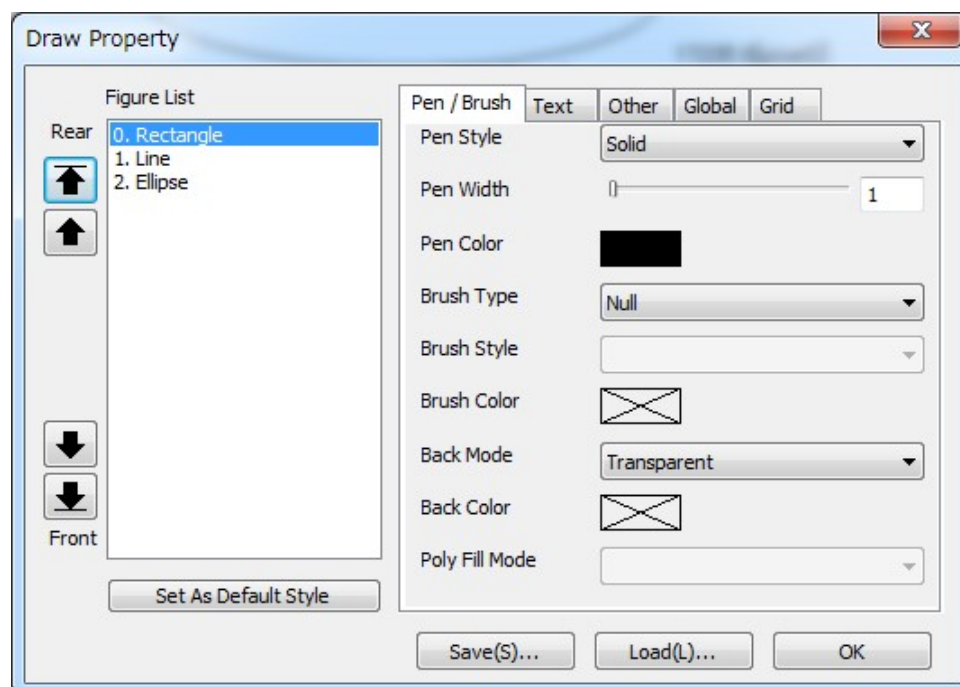
- 2) Select the figure to change sequence from figure list and click arrow button.

In the example below, [Line] hidden at back of [Rectangle] will appear in front by selecting [Rectangle] from figure list and clicking top button.







































2.4.5 Setting figure formats

- 1) The below draw property will appear by selecting [Draw Property] under [Draw] in menu.



- 2) Select the figure to change format from figure list.

3) Set the format by switching tabs.

Tab name	Item name	Description														
Pen/brush	Pen style	Sets pen style. When pen width is 2 or more, only [Solid] [No Line] can be selected (for a cross [Dashed Line] [Dotted Line] can be selected).														
		<table><tr><th>Pen style</th><th>Example</th></tr><tr><td>Solid</td><td></td></tr><tr><td>Dashed line</td><td></td></tr><tr><td>Dotted line</td><td></td></tr><tr><td>Chain line</td><td></td></tr><tr><td>Chain double-dashed line</td><td></td></tr><tr><td>No line</td><td></td></tr></table>	Pen style	Example	Solid		Dashed line		Dotted line		Chain line		Chain double-dashed line		No line	
		Pen style	Example													
		Solid														
		Dashed line														
		Dotted line														
		Chain line														
		Chain double-dashed line														
	No line															
	Pen width	Sets pen width.														
Pen color	Sets pen color.															
Brush type	Sets brush type.															
	<table><tr><td>Brush type</td></tr><tr><td>Empty brush</td></tr><tr><td>Pure color brush</td></tr><tr><td>Hash pattern brush</td></tr></table>	Brush type	Empty brush	Pure color brush	Hash pattern brush											
	Brush type															
	Empty brush															
Pure color brush																
Hash pattern brush																
Brush style	Sets brush style. Only valid when brush type is [Hash Pattern Brush].															
	<table><tr><th>Brush style</th><th>Example</th></tr><tr><td>45 degree downward sloping hatch</td><td></td></tr><tr><td>Horizontal and vertical cross hatch</td><td></td></tr><tr><td>45 degree cross hatch</td><td></td></tr><tr><td>45 degree upward sloping hatch</td><td></td></tr><tr><td>Horizontal hatch</td><td></td></tr><tr><td>Vertical hatch</td><td></td></tr></table>	Brush style	Example	45 degree downward sloping hatch		Horizontal and vertical cross hatch		45 degree cross hatch		45 degree upward sloping hatch		Horizontal hatch		Vertical hatch		
	Brush style	Example														
	45 degree downward sloping hatch															
	Horizontal and vertical cross hatch															
	45 degree cross hatch															
	45 degree upward sloping hatch															
	Horizontal hatch															
Vertical hatch																
Background mode	Sets background mode.															
	<table><tr><td>Background mode</td></tr><tr><td>Transparent</td></tr><tr><td>Fill</td></tr></table>	Background mode	Transparent	Fill												
	Background mode															
Transparent																
Fill																
Background color	Sets background color. Valid only when background mode is [Fill].															

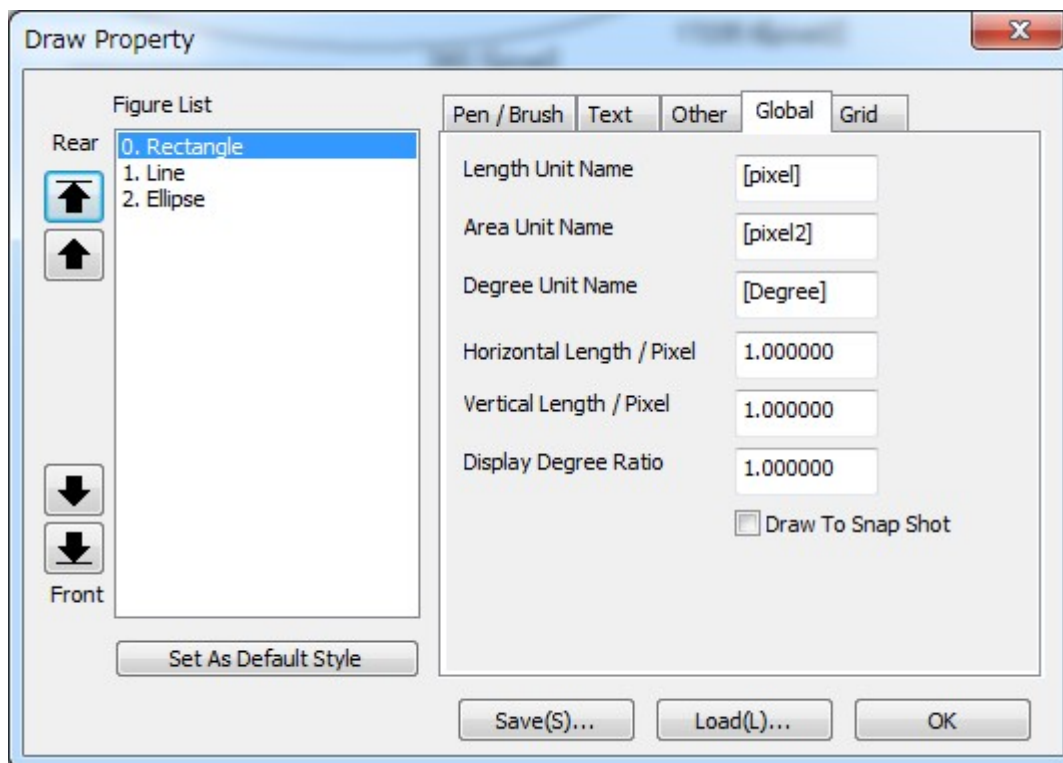
Tab name	Item name	Description
Pen/brush	Polygon fill mode	Sets polygon fill mode. Valid only for polygons. Effective for polygons whose sides cross as below.
		Polygon fill mode
		Alternate
		Entire region
Text	Character color	Sets character color.
	Font	Sets fonts. Letter colors may change during font setting. In that case, reset the letter color.
	Character string background mode	Sets character string background mode. Character string background mode
		Transparent
		Fill
	Character string background color	Sets character string background color. Valid only when character string background mode is [Fill].
	Display character string	Selects character string to be displayed. Character strings that can be displayed vary depending on selected figure.
		Displayed character string
		Description
		Name
		Display name of figure
		Width
		Displays width of figure
		Height
		Displays height of figure
		Length
		Displays length of line and circumference of figure. For arches, values are displayed only for precise circles.
		Area
		Displays area of figure
		Angle
		Displays angle
		Date
		Displays date
		Time
		Displays time
	Name	Sets name. Pressing [Enter] after inputting new name will change name.

Tab name	Item name	Description
Others	Lock	Sets to locked state. When locking, selecting and editing with a mouse on preview screen will be deactivated.
	Non-display	Sets display state. During non-display, the figure can be hidden without deleting it.

- 4) When clicking [Set as Default Style], the setting of pen, brush, background color, letter color, font, letter background color of figure that is currently selected will be registered as default value and reflected on newly added figure.
- * When pixel format is set to "GRAY8," draw data will be displayed as black-and-white.
To display draw data in color, set to "BGR24" or "BGR32."







2.4.6 Draw Global Setting

- 1) The below draw property will appear by selecting [Draw Property] under [Draw] in menu

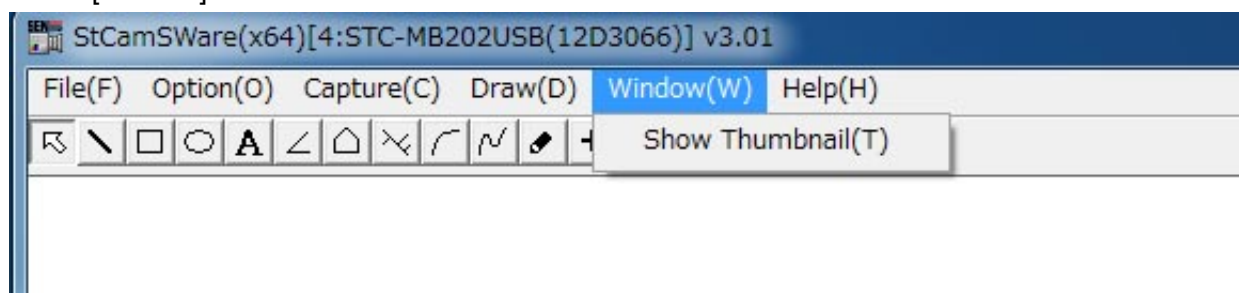


- 2) Switch the tab and set each item. Pressing [Enter] key after changing will fix input value.

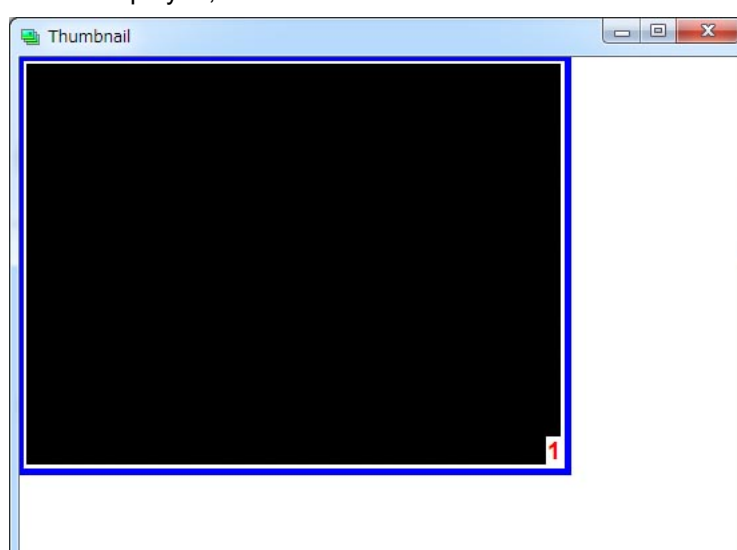
Tab name	Item name	Description
Global	Length unit name	Sets the length unit displayed with length value.
	Area unit name	Sets the area unit displayed with area value.
	Angle unit name	Sets the angle unit displayed with angle value.
	Lateral direction pixel size	Sets multiplier that corrects lateral direction length. When an 8cm horizontal line in real world is compatible with a 100 pixel horizontal line in image, value should be set to 0.08 and length unit name will be set to [cm].
	Longitudinal direction pixel size	Sets multiplier that corrects the longitudinal direction length. When an 8cm horizontal line in real world is compatible with a 100 pixel perpendicular line in image, value should be set to 0.08 and length unit name will be set to [cm].
	Display degree ratio	Sets multiplier that corrects the displayed degree value. Sets value against degree measure (360 degrees). To display the milli-radian value, this value will be set to 17.453293 and degree unit name will be set to [mrad].
	Draw to snap shot	Placing a checkmark will enable to draw figures on snap shops.

Tab name	Item name	Description	
Grid	Lateral direction grid number	Sets number of grids of the lateral direction.	
	Longitudinal direction grid number	Sets number of grids of the longitudinal direction.	
	Grid pen style	Sets grid pen style. When pen width is over 2, only [Solid] [No Line] can be selected.	
		Pen style	Example
		Solid	
		Dashed line	
		Dotted line	
		Chain line	
Chain double-dashed line			
No line			
Grid pen width	Sets grid pen width.		
Grid pen color	Sets grid pen color.		
Grid background mode	Sets grid background mode.		
	Background mode		
	Transparent		
	Fill		
Grid background color	Sets grid background color. Valid only when background mode is [Fill].		

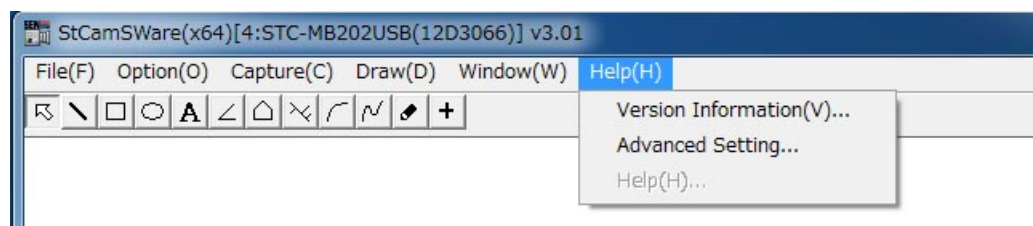
2.5 [Window] menu



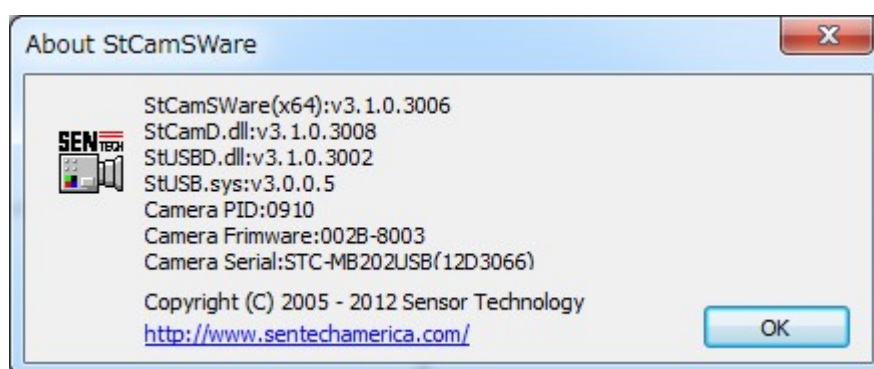
[Show Thumbnail] A thumbnail screen will appear when selecting thumbnail display, captured image can be displayed, saved and deleted.



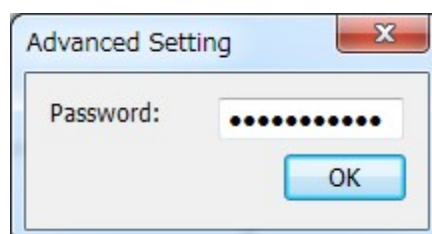
2.6 [Help] menu



[Version Information] When selecting version information, software version information and camera information can be acquired.



[Advanced Setting] The password input screen will appear when selecting detail setting.
To use the trigger function, enter password and activate trigger function screen.



Password: triggeruser

* The trigger function built in StCamSWare is for simple operation check.
To use the trigger function in real application, please refer to sample program StTrgDisplayXXX.exe included in TriggerSDK (XXX varies depending on development environment such as VB6 and VC6).

[Help] Help will appear when selecting help.

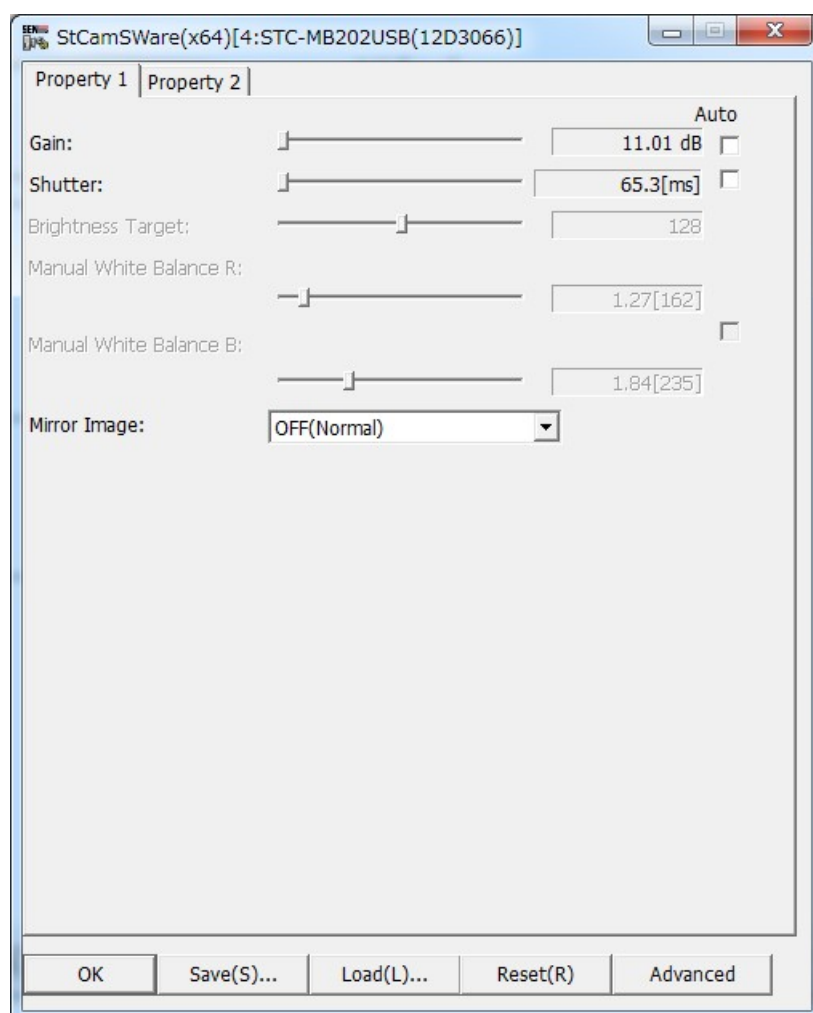
3 How to use (camera setting)

3.1 Saving and reading camera settings

Instructions on how to display the setting screen, how to save files to settings, how to read settings from file, and how to reset settings are given.

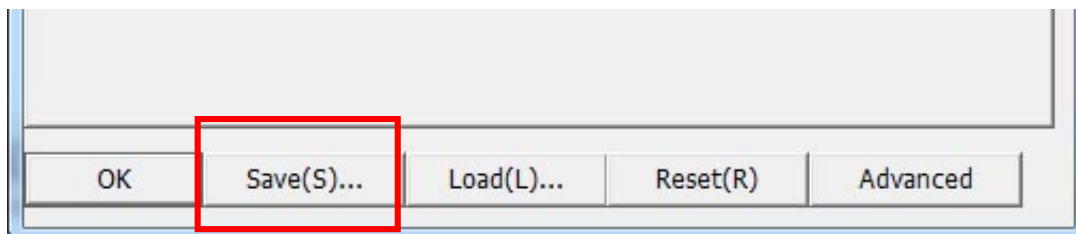
3.1.1 Display method of setting screen

- 1) Select [Setting] under [Option] in menu.
- 2) To display the detail setting screen, click [Advanced] button.
- 3) To return to the normal setting screen, click [Simple] button.

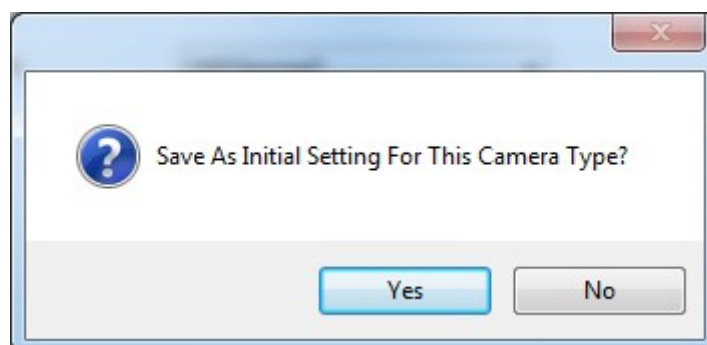


3.1.2 How to save settings to files

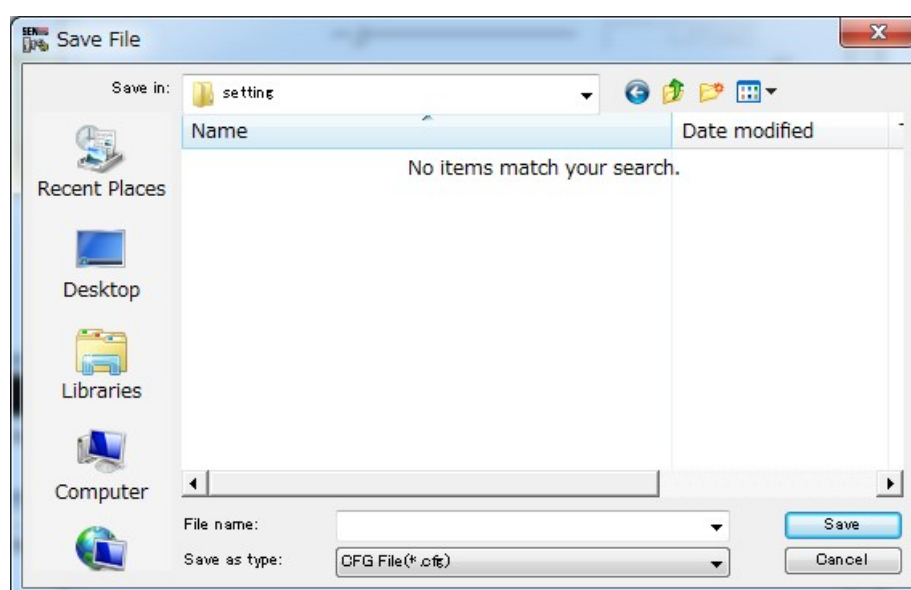
- 1) Click the [Save] button in lower part of screen.



- 2) When selecting [Yes] to the below message, setting "StCamSWare.cfg" will be created in same folder as "StCamSWare.exe" (*:¥ProgramData¥Sentech¥StCamSWare in post-Vista OS), and it will be automatically read from next start-up.
When selecting [No,] the next step is 3).



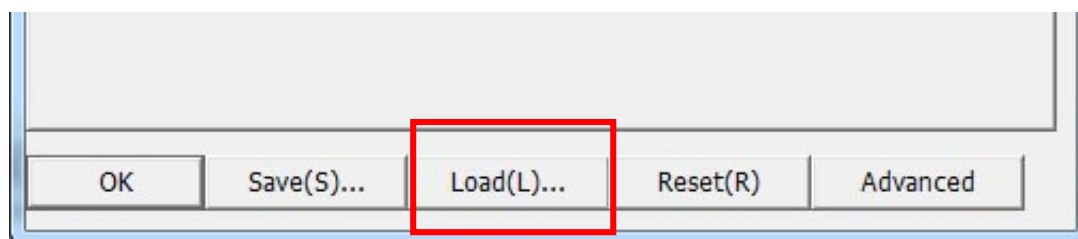
- 4) Enter the file name and click [Save] button.



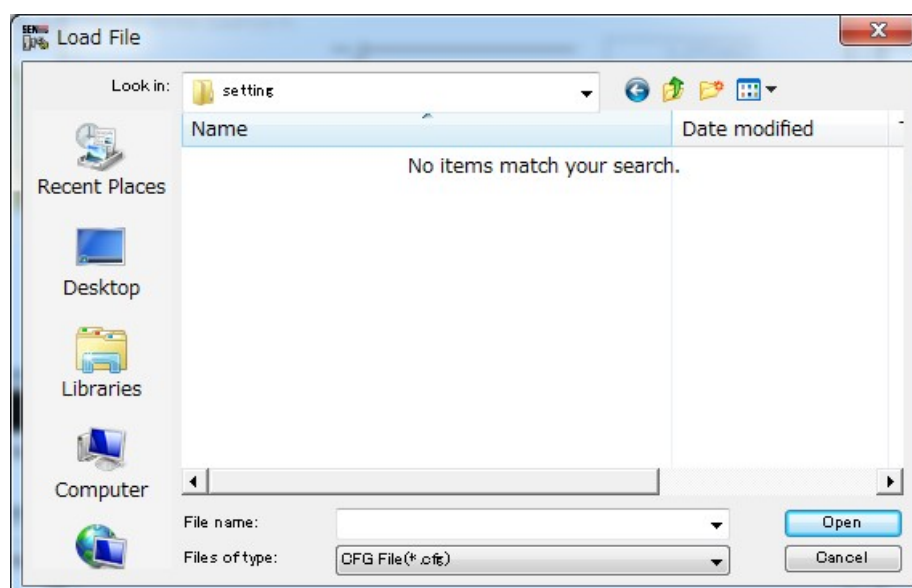
* "Trigger" and "IO" screen settings of detail setting screen cannot be saved.

3.1.3 How to read settings from files

- 1) Click the [Load] button at lower part of screen.

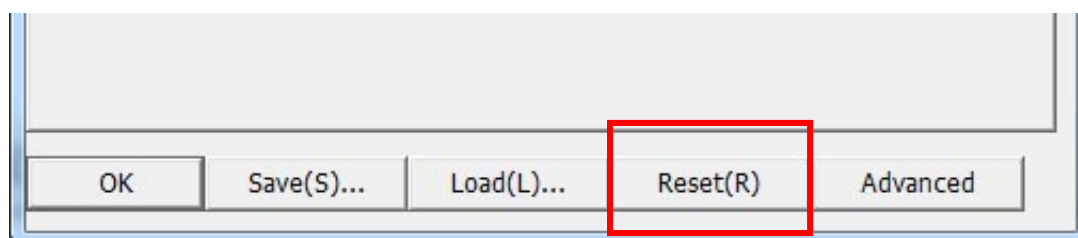


- 2) Select the file to be selected and click [Open] button.



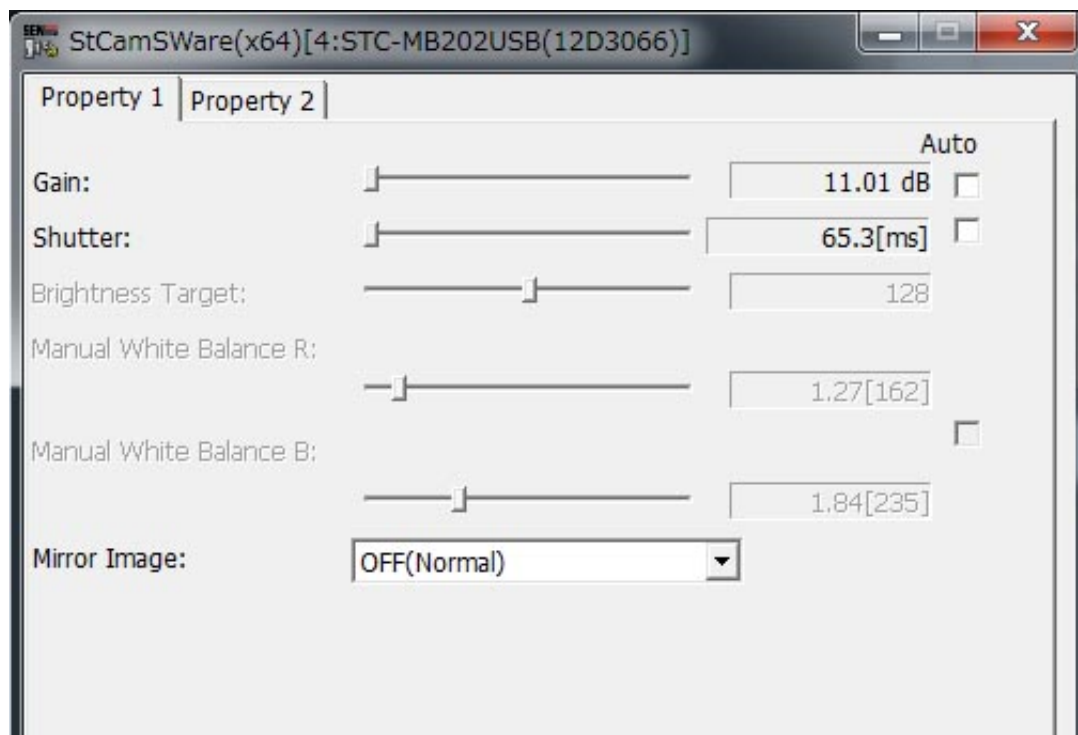
3.1.4 How to reset

- 1) Click the [Reset] button at lower part of screen.



3.2 Simple setting screen

3.2.1 Property 1 [Gain, Shutter, Mirror Image]



[Gain] Gain settings inside the camera will adjust brightness of image.
 “Fixed Gain Mode” and “AGC (Auto Gain Control) mode” can be selected.

■ Fixed gain mode

Setting to this mode fixes the gain to set value.

- 1) Remove the checkmark from automatic checkbox.
- 2) Set the gain value.

■ AGC mode

Setting to this mode will automatically adjust gain so brightness target will converge to “Brightness Target” value.

- 1) Place a checkmark in the automatic checkbox.
- 2) Set “Brightness Target” value as necessary.

[Shutter] Electric shutters adjust brightness of images and reduce flickers.
“Fixed Shutter Mode” and “Auto Shutter Control Mode” can be selected.

■ Fixed shutter mode

Setting to this mode will fix the shutter to set value.

- 1) Remove the checkmark from automatic checkbox.
- 2) Set the shutter value.

■ Auto shutter control mode

Setting to this mode will automatically adjust shutter so brightness target will converge to “Brightness Target” value.

- 1) Place a checkmark in the automatic checkbox.
- 2) Set “Brightness Target” value as necessary.

[White balance] The human eye adapts to light source, so white paper under a red light source is seen as white. However, image sensor cameras are affected by light source, and paper photographed under a red light source will be tinted as red. Making adjustments to a white object that is photographed so it will not be tinted is called white balance.
This camera has AWB mode which automatically made adjustments and Manual WB mode which fixes adjustment value.

■ AWB mode

Setting to this mode automatically corrects white balance.

- 1) Place a checkmark in the automatic checkbox next to “Manual White Balance R” (“Manual White Balance B”).

■ Manual WB mode

Setting to this mode fixes the adjusted value of white balance to a set value. Used when light source of photograph environment is fixed or when AWB mode is insufficient.

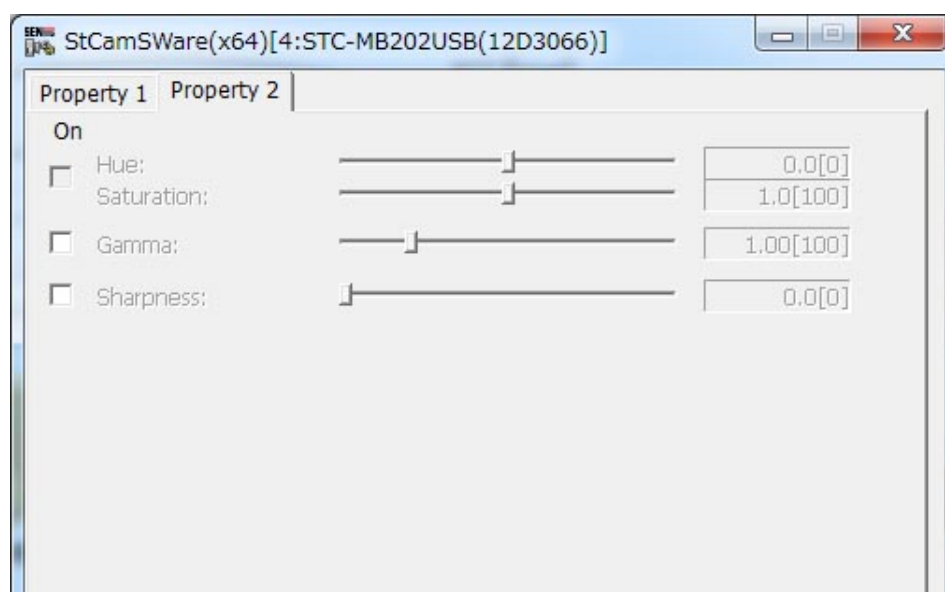
- 1) Remove the checkmark in automatic checkbox next to “Manual White Balance R” (“Manual White Balance B”).
- 2) Photograph the white object under actual light source to be used for photograph and set “Manual White Balance R” and “Manual White Balance B” so it will be displayed as white on image.

[Mirror image] Images can be displayed in reverse right-left and top-bottom.

The frame rate may be reduced when validated (excluding normal image) because processing is done by PC.

If unnecessary, please disable (normal image) for use.

3.2.2 Property 2 [Hue/Saturation, Gamma, Sharpness]



[Hue/Saturation] Adjusts hue/saturation of the displayed image.

- 1) Place a checkmark in the On checkbox.
- 2) Sets the hue/saturation value.

* The frame rate may be reduced when turning on this feature because processing is done by PC.
If this feature is not necessary, please turn off (remove checkmark).

[Gamma] Adjusts gamma of the displayed image.

- 1) Place checkmark in the On checkbox.
- 2) Sets the gamma value.

* The frame rate may be reduced when turning on this feature because processing is done by PC.
If this feature is not necessary, please turn off (remove checkmark).

[Sharpness] Adjusts the sharpness of displayed image.

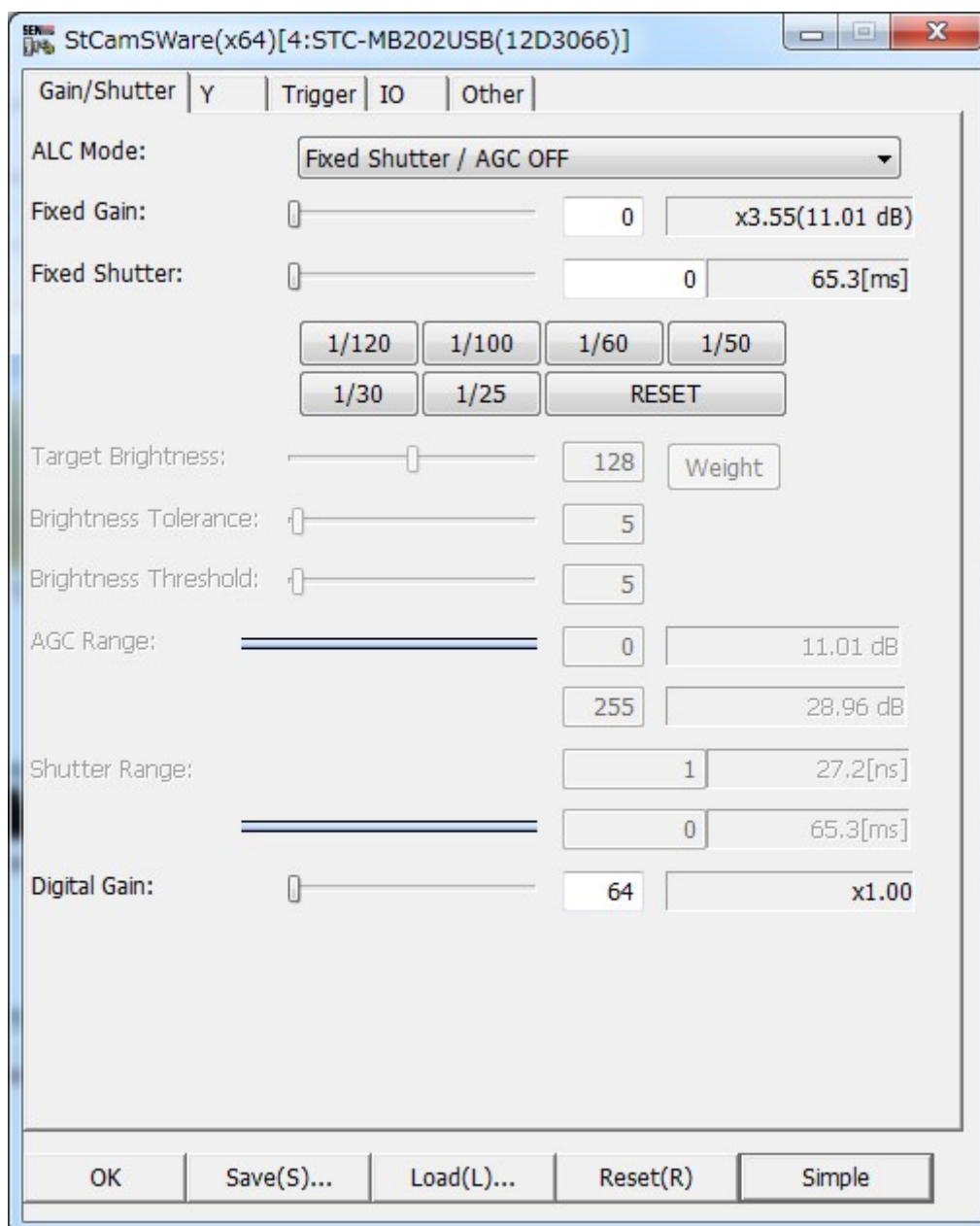
- 1) Place checkmark in the On checkbox.
- 2) Sets the sharpness value.

* The frame rate may be reduced when turning on this feature because processing is done by PC.
If this feature is not necessary, please turn off (remove checkmark).

3.3 Detail setting screen

3.3.1 Gain/Shutter

The outline and Instructions on how to set gain and shutter are given.



3.3.1.1 Gain

Setting of the gain inside camera will adjust brightness of image. Because the noise component will be amplified along with image signal, a gain set too large will create a rough image, so attention is required. Fixed gain mode which fixes gain and AGC (Auto Gain Control) mode which automatically adjusts gain can be selected from this camera.

■ Fixed mode

Setting to this mode fixes gain to the set value.

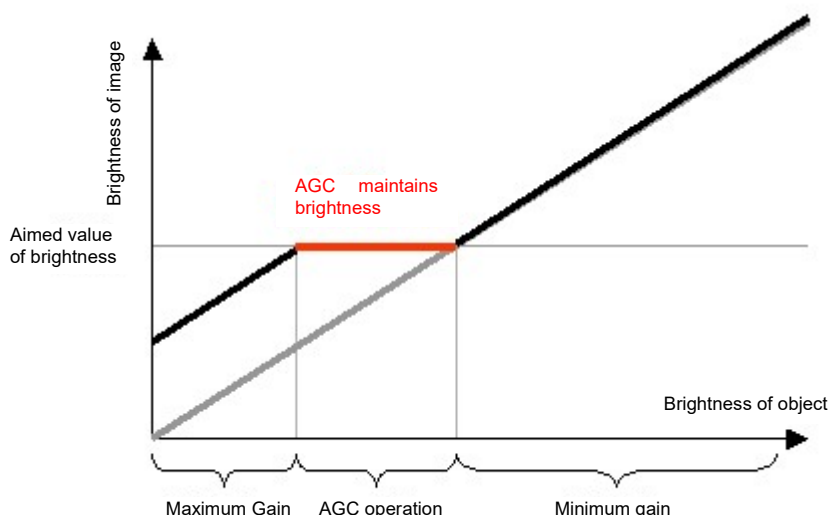
Instructions of switching to fixed mode and changing to gain when switching are given below.

- 1) Open the [Gain/Shutter] tab and select [Fix Gain] at "ALC Mode."
- 2) Use slider of the "Fixed Gain" to set gain.

■ AGC Mode

Setting to this mode will automatically control gain (Auto Gain Control) and maintain brightness aimed for by image brightness when object is dark relative to aimed brightness.

Below figure shows the brightness of object and a change of image when set to AGC mode.



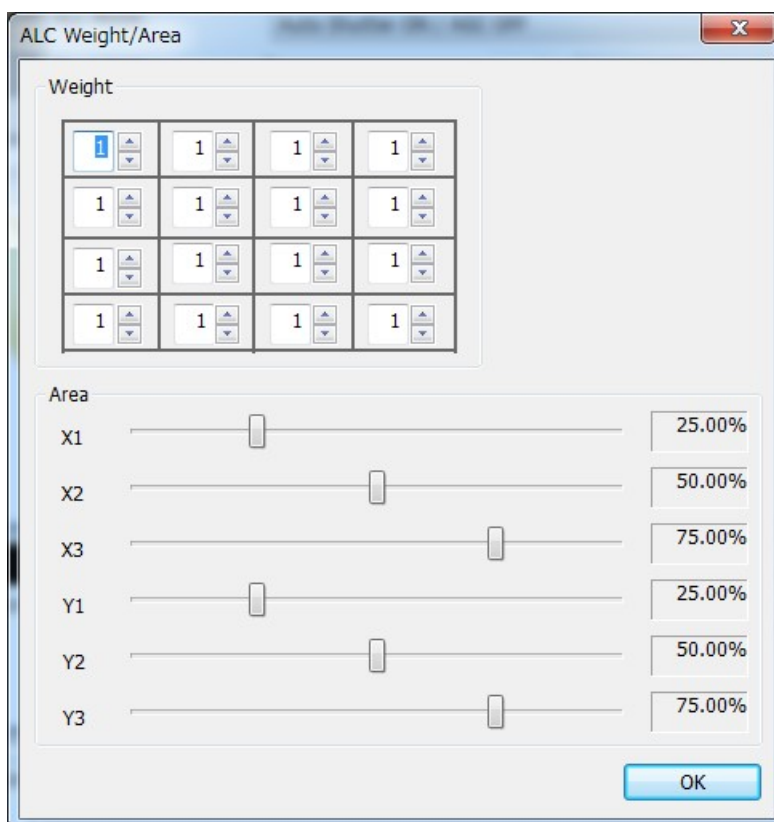
AGC functions perform in the red line area, and brightness is maintained to aimed brightness of image.

AGC mode settings and aimed value of brightness, and gain control range can be set according to the following steps. Setting aimed value is same as ALC.

(Some functions may not be displayed depending on whether camera has that certain function)

- 1) Open [Gain/Shutter] and select [AGC] at "ALC Mode."
When selecting [One Shot AGC], once converged to aimed brightness, it will switch to "fixed gain." (display will not change)
- 2) Use "Brightness Target" slider to set aimed value of brightness.
- 3) Use "Brightness Tolerance" slider to set tolerance of brightness. (*1)
- 4) Use "Brightness Threshold" slider to set control start point of brightness. (*2)

- 5) Pressing the [Weight] button will open a screen to enter weight and area positions for brightness data for each position on image.

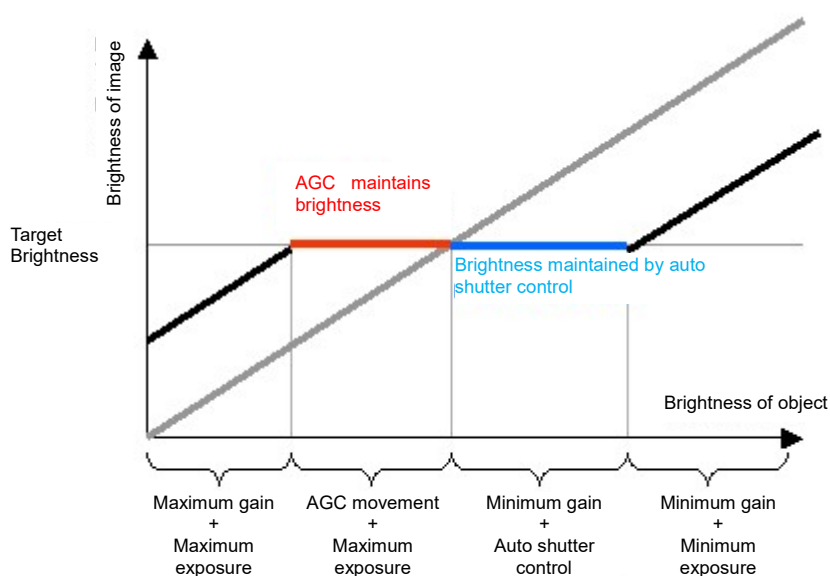


- 6) Use "AGC Range" slider to set the gain range at AGC control. (*3)

- *1 AGC control finishes when difference between "Brightness Target" value and current brightness becomes smaller than this value.
When this value is reduced, range of converged brightness becomes smaller, but gain becomes variable.
When this value is enlarged, range of converged brightness becomes larger, but gain becomes more stable.
- *2 AGC control starts when difference between current brightness and tolerance range of brightness exceeds this value.
- *3 Compatible with some cameras only.

■ Combined use with auto shutter control mode

Below figure shows the change between brightness of object and of image when auto shutter control mode and AGC mode are used in combination.



AGC functions are triggered when object is dark (red line area) and auto shutter control functions are triggered when object is bright (blue line area), and brightness is maintained to aimed brightness of image.

■ Digital gain (TC, TB series only)

Sets 10 bit of AD output and 8bits output from camera.

When 64 (x1.00), the top 8bits out of AD output 10bits are compatible with 8bits of output.

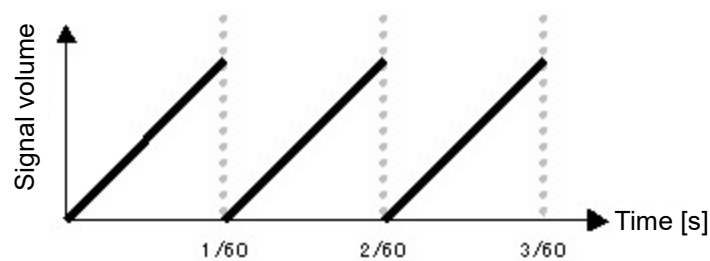
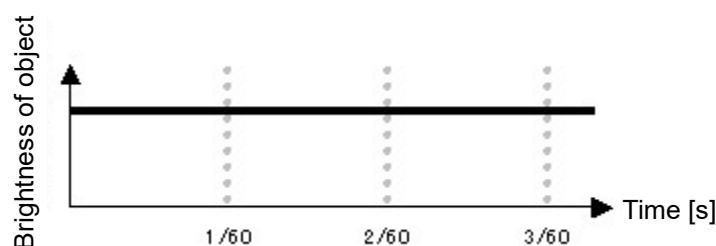
When 256 (x2.00), the lower 8bits out of AD output 10bits are compatible with 8bits of output.

3.3.1.2

Shutter

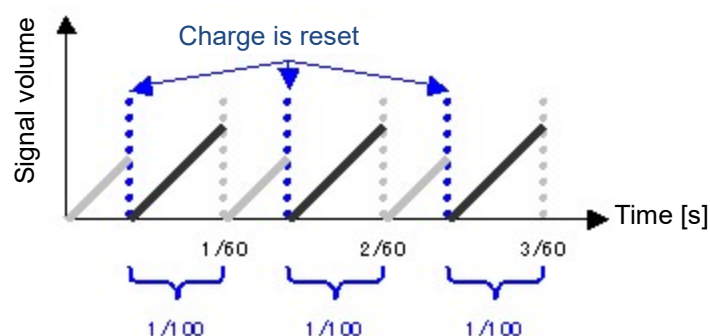
The charge amount of signal generated by image sensor is determined by brightness of object (intensity of incident light) and shutter speed (exposure time).

When NTSC, normal shutter speed is $1/60$ [s], and image is output every $1/60$ [s], change in signal amount when photographing an object with a constant brightness as in below figures.



Shutter speed can be increased (shorten exposure time) by resetting accumulated charge before outputting it as an image.

Below figure shows the change of charge volume when shutter speed is $1/100$ [s].



In comparison above figures, it is obvious that signal volume output every $1/60$ [s] changes even though objects are same. Based on this, shutter speed can be used to adjust brightness of images. In addition, shutter speed for moving objects can be set to high-speed to photograph less blurry images.

Fixed mode which fixes shutter speed and auto shutter control mode which automatically controls shutter speed depending on brightness of image can be selected from camera.

■ Fixed mode

Setting to this mode fixes shutter speed to set value.

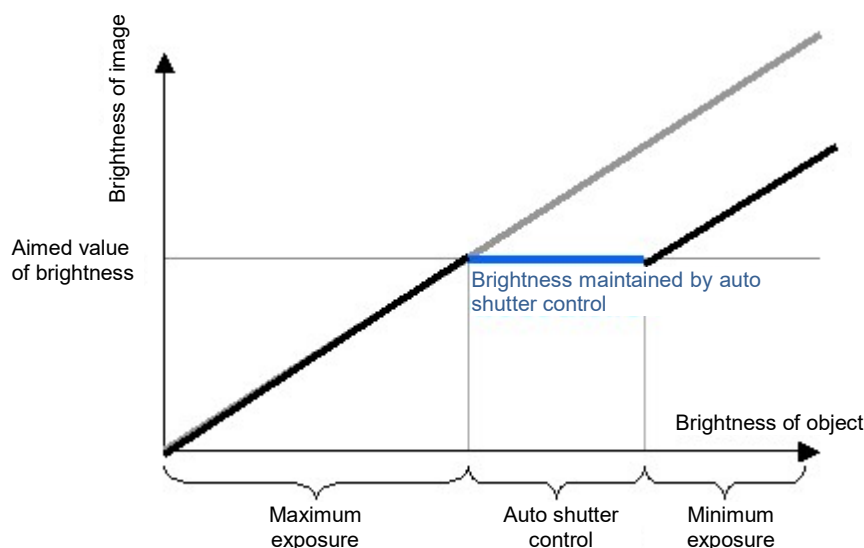
Setting shutter speed to 1/100 in 50Hz power supply regions will reduce flickers which are mentioned later.

- 1) Open [Gain/Shutter] tab and select [Fixed Shutter] at "ALC Mode."
- 2) Use "Fixed Shutter" slider to set shutter speed.
Press buttons to set shutter speed to "1/120," "1/100," "1/60," and "1/50."

■ Auto shutter control mode

Setting to this mode will automatically control shutter speed and maintain brightness to aimed brightness of image when object is bright relative to aimed brightness.

Below figure shows the change between brightness of object and of image when setting to auto shutter control mode.



Auto shutter control functions will become triggers in blue area, and brightness will be maintained at aimed brightness of image.

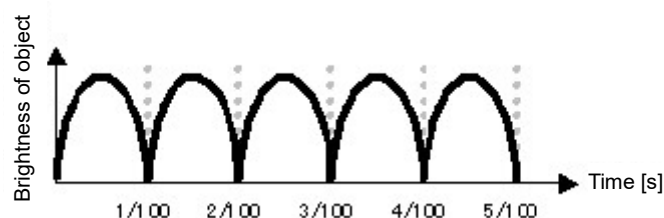
Auto shutter control mode settings and aimed value of brightness can be set according to following procedures.

- 1) Open the "Gain/Shutter" tab and select "auto shutter control (AE ON)" from "ALC Mode."
When selecting "one shot auto shutter control," once converged to aimed brightness, it will switch to "Fixed Shutter" (display will not change).
- 2) Use "Brightness Target" slider to set aimed value of brightness.
- 3) Use "Brightness Tolerance" slider to set tolerance of brightness. (*1)
- 4) Use "Brightness Threshold" slider to set control start point of brightness. (*2)
- 5) Pressing the "Weight" button will open a screen to enter weight and area positions for brightness data for each position on image.
- 6) Set the shutter range of auto shutter control from "Shutter Range." (*3)

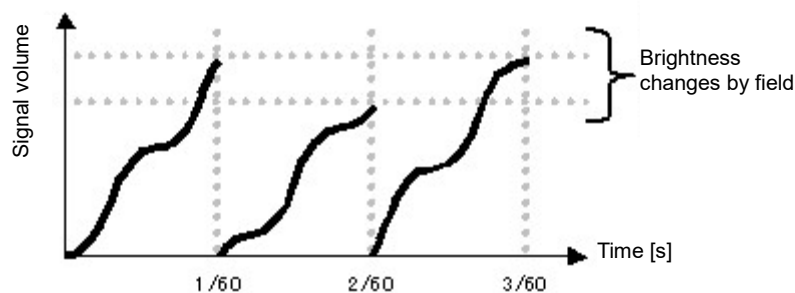
- *1 Auto shutter control finishes when difference between “Brightness Target” and current brightness becomes smaller than this value.
When this value is reduced, range of converged brightness becomes smaller, but shutter speed becomes variable.
When this value is enlarged, range of converged brightness becomes larger, but shutter speed becomes more stable.
- *2 Auto shutter control starts when difference between current brightness and tolerance range of brightness exceeds this value.
- *3 Only compatible with some cameras.

■ Flickers

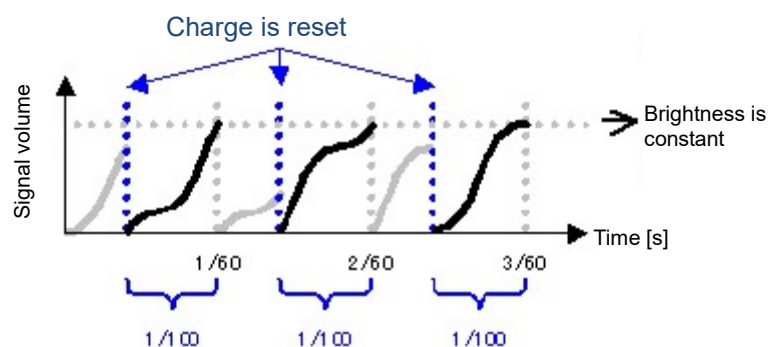
Fluorescent lights blink regularly at 1/100 [s] in 50Hz power supply region, so brightness of object under fluorescent light changes as in below figure.



When photographing such an object at shutter speed 1/60[s], signal volume changes by field as in below figure, and image may blink.
This phenomenon is called flicker.



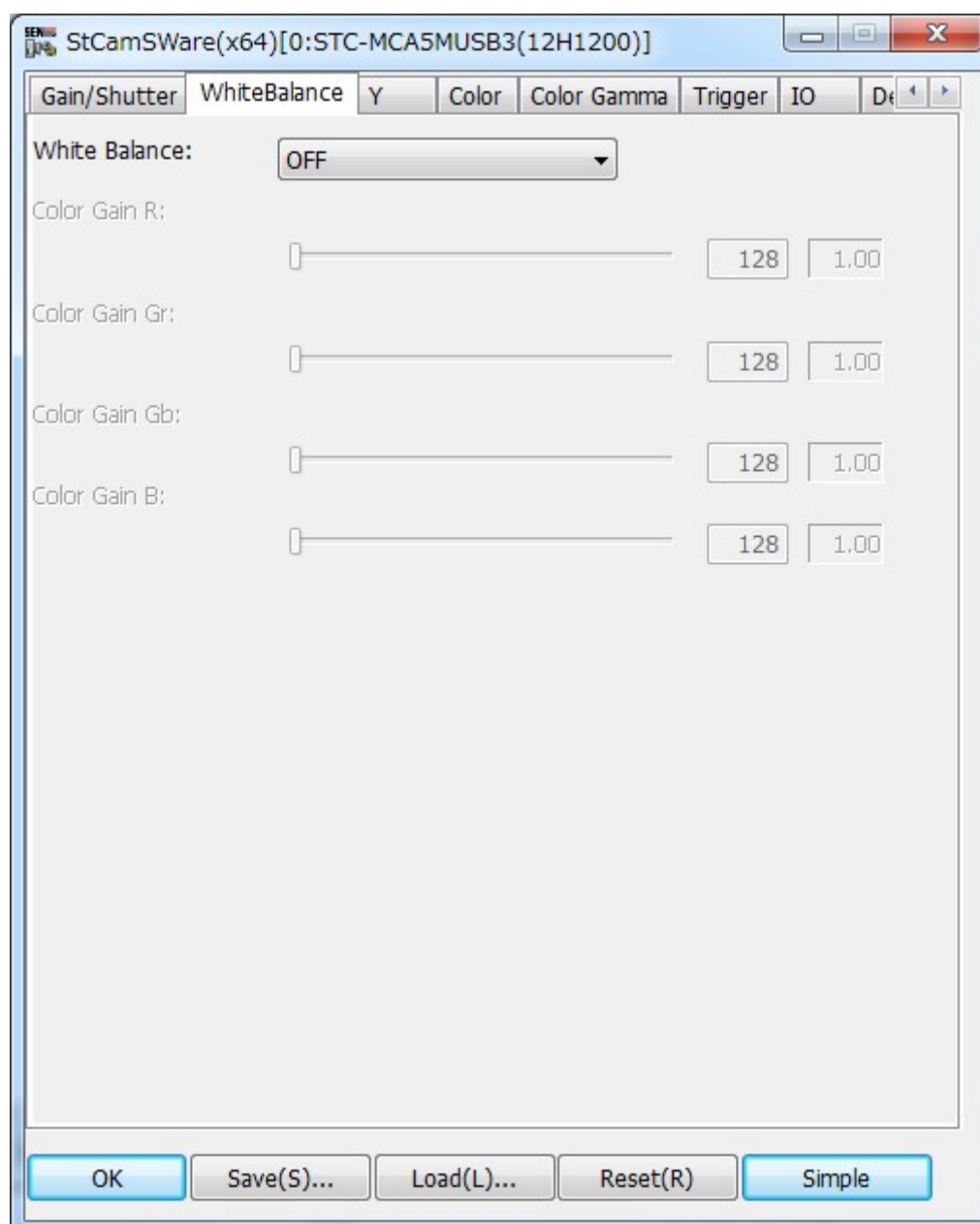
In this case, fixating shutter speed to 1/100 [s] will reduce flicker.
Below figure shows the change of signal volume when shutter speed is set to 1/100 [s].



3.3.2 White Balance

The human eye adapts to light source, so white paper under a red light source is seen as white. However, image sensor cameras are affected by light source, and paper photographed under a red light source will be tinted as red. Making adjustments to a white object that is photographed so it will not be tinted is called white balance.

This camera has AWB mode which automatically made adjustments and Manual WB mode which fixes adjustment value.



■ AWB mode

Setting to this mode allows the PC to automatically correct white balance.

AWB mode can be set according to following procedures.

- 1) Open the [White Balance] tab and select [AWB] mode of "FullAuto."
When selecting [One Shot AWB] mode, once converged, it will switch to [Manual] mode (display will not change).
- 2) Set "Color Gain Gr" and "Color Gain Gb" as necessary.
- 3) When setting the white balance convergence point to colors other than achromatic colors, set "Auto Target R" and "Auto Target B".(*)

■ Manual WB mode

Setting to this mode fixes the adjusted value of white balance to a set value.

Used when the light source of photograph environment is fixed or when AWB mode is insufficient.

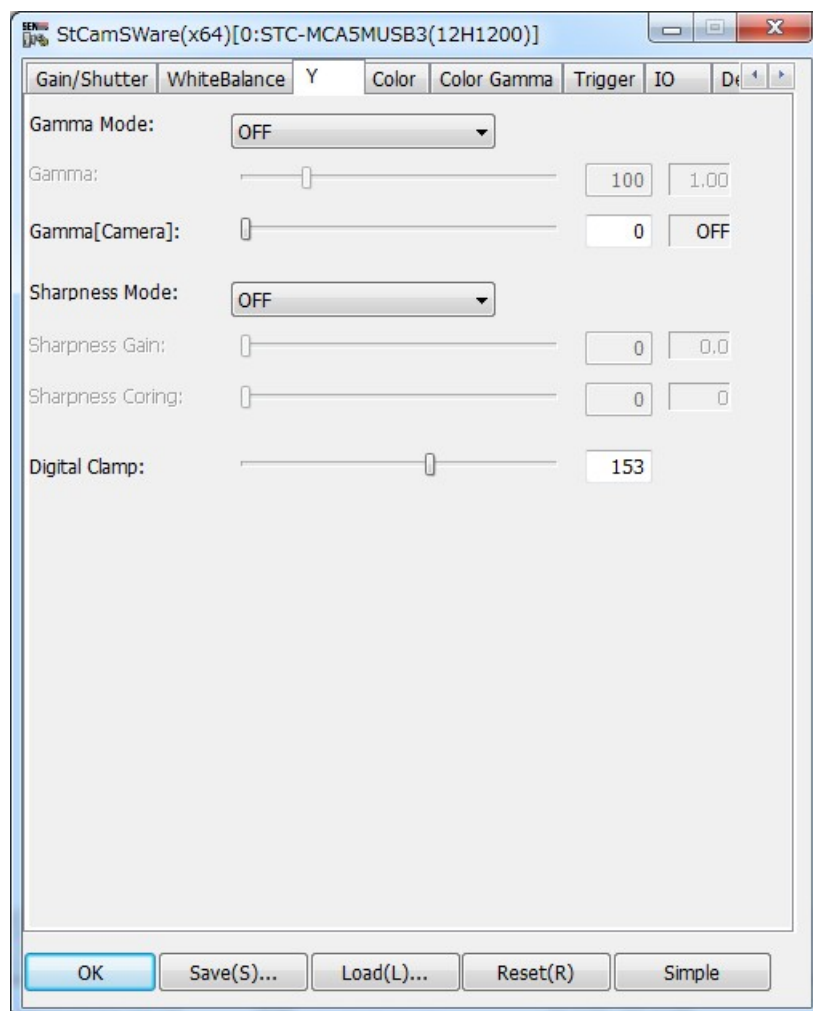
Manual WB mode can be set according to following procedures.

- 1) Open the [White Balance] tab and select [Manual] mode of "White Balance."
- 2) By photographing the white object under light source actually used, set "Color Gain R", "Color Gain Gr", "Color Gain Gb", and "Color Gain B", so it will appear white in image.

* Compatible with some cameras only.

3.3.3 Y (gamma, sharpness)

Instructions on how to set gamma and sharpness are given.



■ Gamma

Gamma conversion against the accuracy of object can be performed according to following procedures. (*1)

- 1) Open the [Y] tab and set "Gamma Mode" to [ON.]
Accuracy is reversed when "Reverse" is selected.
- 2) Change the "Gamma" slider to set gamma value.

■ Sharpness

Edge reinforcement against the accuracy of object can be performed according to following procedures. (*2)

- 1) Open the [Y] tab and set "Sharpness Mode" to [ON.]
- 2) Use the "Sharpness Gain" slider to set level of reinforcement.
- 3) Use the "Sharpness Coring" slider to control reinforcement against small edges.

*1 Frame rate may be reduced because processing is done on PC.

If this feature is not necessary, please turn off.

A setting item called "Gamma (camera side)" will appear on cameras which support gamma correction on camera side.

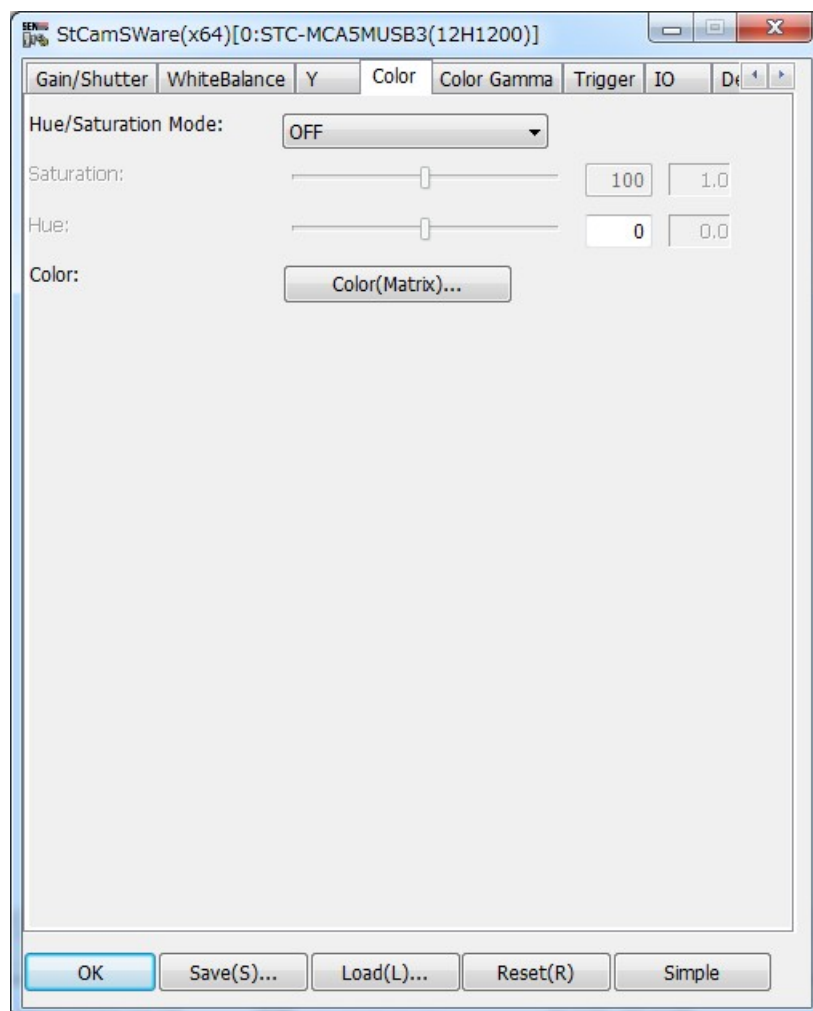
Performing gamma correction will not load PC even when activated.

*2 Frame rate may be reduced because processing is done on PC.

If this feature is not necessary, please turn off.

3.3.4 Color (Hue/saturation, color correction matrix)

Instructions on how to set hue/saturation and color correction matrix are given.



■ Hue/saturation

Hue/saturation can be set according to following procedures. (*)

- 1) Open the "Color" tab and set "Hue/Saturation Mode" to "ON."
- 2) Change the "Saturation" slider to set saturation.
- 3) Change the "Hue" slider to set hue.

■ Color correction matrix

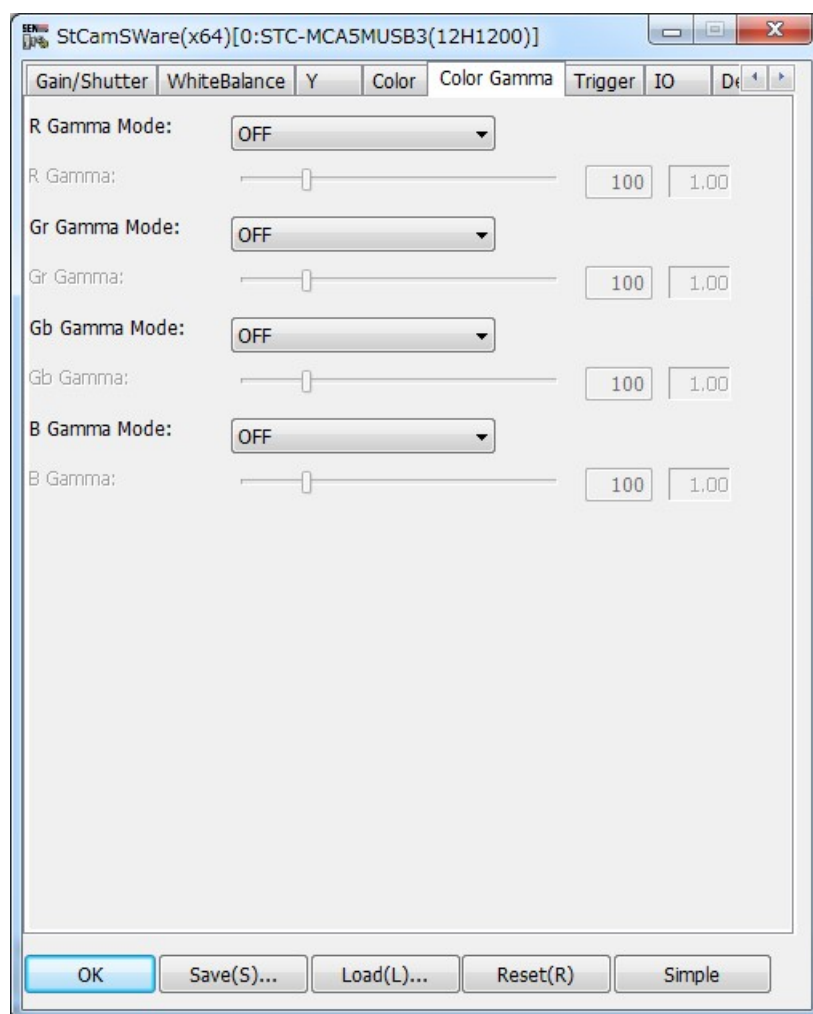
Color correction matrix can be set according to following procedures. (*)

- 1) Open the "Color" tab and click "Color (Matrix)" button.
- 2) Enter an appropriate value in Edit box.
A default value (not corrected) will be set when clicking "REST" button.
Clicking the [GRAY] button will set value for black-and-white.
Clicking the [REVERSE] button will set a value that reverses each RGB.
- 3) Click the "APPLY" button.

* Frame rate may be reduced because processing is done on PC.

If these features are not necessary, please turn "OFF (reset state)".

3.3.5 Color gamma



Gamma conversion against each color component can be performed according following procedures. (*)

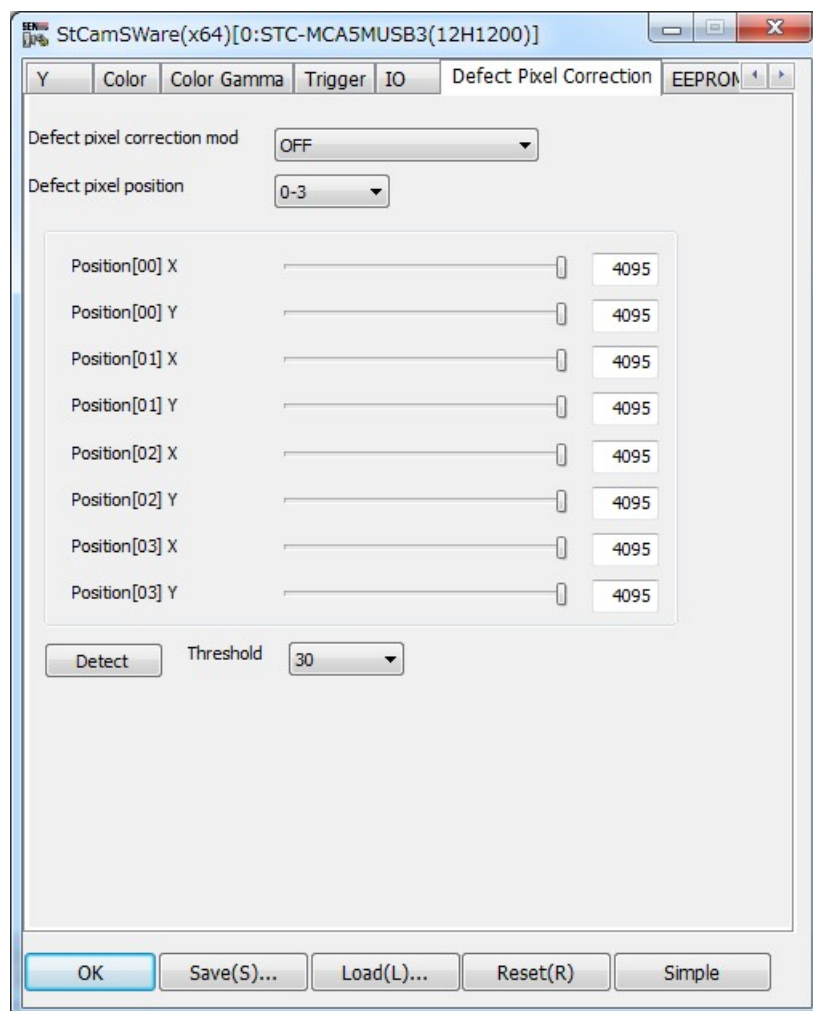
- 1) Open the [Color Gamma] tab and set "R (Gr/Gb/B) Gamma Mode" to [ON.]
Accuracy is reversed when "Reverse" is selected.
- 2) Change the "R (Gr/Gb/B) Gamma" slider to set gamma value.

* Frame rate may be reduced because processing is done on PC.

If these features are not necessary, please turn "OFF (reset state)".

3.3.6 Defect pixel correction (compatible only with USB.3.0 cameras)

Instructions how to set the sensor's defect pixel correction are given below.



Defect pixel correction can be set according to following procedures.

This function is compatible to some models only.

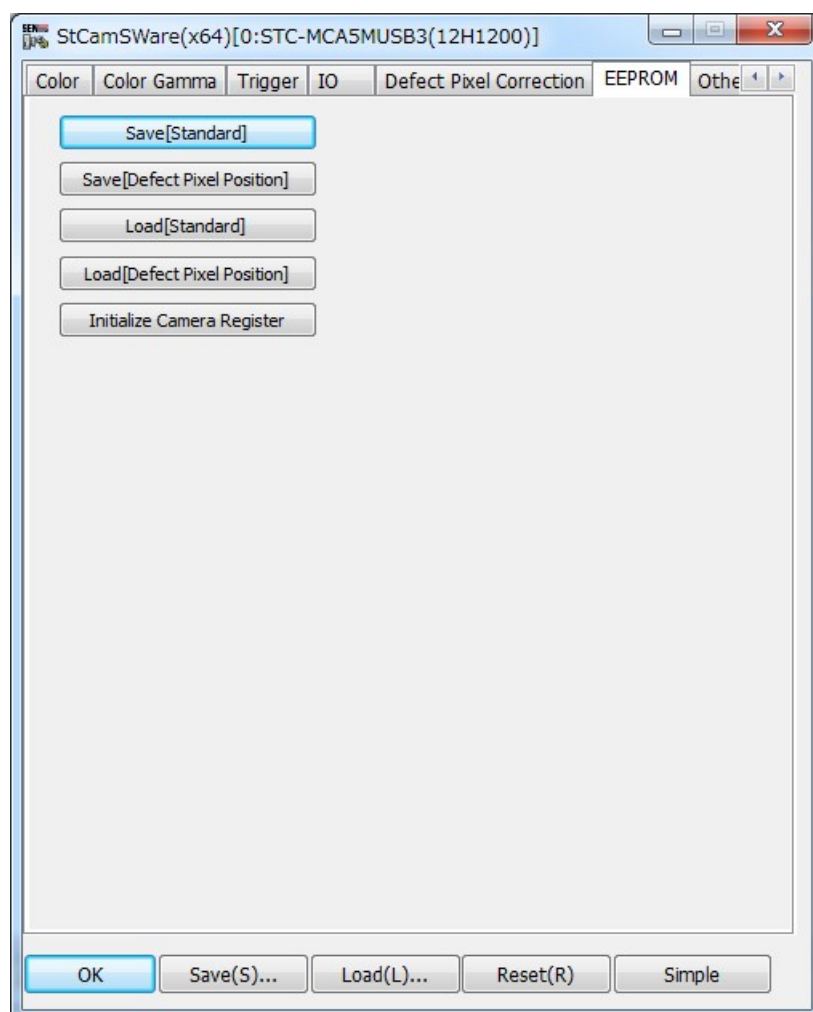
- 1) Open the [Defect Pixel Correction] tab.
- 2) Set the threshold and click [Detect] button to detect defect pixel correction.
When a message appears, click OK button in a backlit state.
A pixel with a larger value than specified threshold will be detected as a defect pixel.
- 3) To manually specify the defect pixel, input X and Y positions after switching "Defect pixel correction mod" as necessary.
- 4) When turning "Defect pixel correction mod" to ON, pixel of specified position will be corrected.

3.3.7 EEPROM (compatible with USB.3.0 cameras only)

Camera settings in some cameras can be saved in EEPROM inside camera.

Settings saved in EEPROM will read when power is turned on or at specified timing and can be reflected to camera.

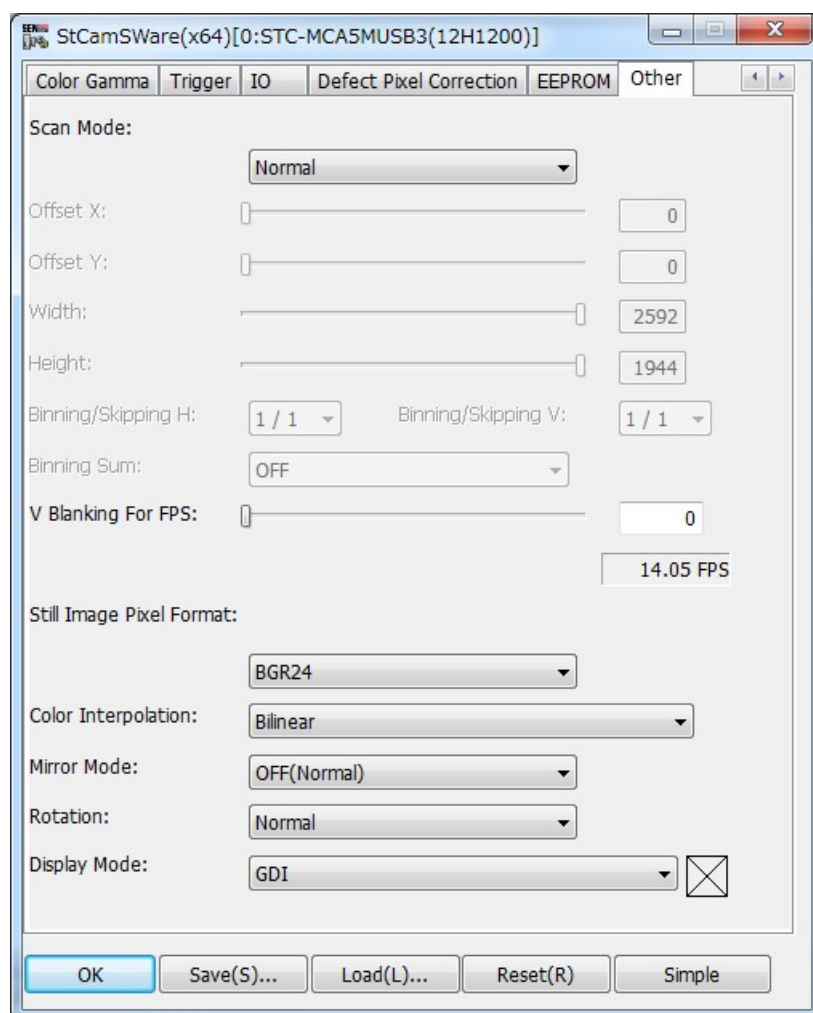
Please be aware that settings saved are camera settings only and that PC image processing settings will not be saved.



Save [Standard]	Information excluding defect pixel position will be saved to camera's EEPROM.
Save [Defect Pixel Position]	Information on the defect pixel position will be saved to camera's EEPROM.
Load [Standard]	Information excluding defect pixel position will read from EEPROM and will be reflected to camera.
Load [Defect Pixel Position]	Information on the defect pixel position will read from EEPROM and will be reflected to camera.
Initialize Camera Register	The default value will be reflected to camera.

3.3.8 Other

Instructions on how to set scan mode, clock, pixel format, color interpolation method, mirror image, rotation, and display mode are given.



3.3.8.1 Scan mode

Scan mode can be set according to following procedures.

Changing the scan mode will enable high-speed scan of center of screen.

- 1) Open the [Other] tab and set [Scan Mode.]

Mode	Compatible machines
Normal	Compatible with all models
1/1 Partial	Cameras compatible with TC, TB series and USB3.0
1/2 Partial	Compatible with all models
1/4 Partial	Compatible with all models
Arbitrarily Partial	Cameras compatible with TC, TB series and USB3.0
Binning	Cameras compatible with TB series and USB3.0
Binning1/1 Partial	Cameras compatible with TB series and USB3.0
Binning1/2 Partial	Cameras compatible with TB series and USB3.0
Binning1/4 Partial	Cameras compatible with TB series and USB3.0
Binning arbitrarily partial	Cameras compatible with TB series and USB3.0
AOI	Cameras compatible with USB3.0

* When scan mode is changing, brightness may change, and gain or shutter may need to be reset.

* Some cameras may allow detailed skipping and binning settings at time of AOI settings on some cameras.

When skipping value is increased, a small-sized image can be acquired without changing angle of view.

Reducing the binning value will increase frame rate, and increasing binning value will reduce frame rate but will increase sensitivity.

When activating the pixel addition at time of binning, accumulated value of added pixel value will be calculated, not average value.

3.3.8.2 Clock

Clock will be set according to following procedures.

Reducing the clock (reducing camera's output frame rate) will decrease load on PC.

Lengthening exposure time will improve sensitivity.

- 1) Open the [Other] tab and set [Clock.]

Normal	Normal
1/2	1/2 Clock
1/4	1/4 Clock

* When changing the clock, brightness may change, and gain or shutter may need to be reset.

* Some models are not compatible with clock settings.

3.3.8.3 V Blanking for FPS

V Blanking is set according to following procedures.

Increasing V Blanking (reducing camera's output frame rate) will decrease load on PC.

- 1) Open the [Other] tab and set [V Blanking For FPS.]
Increasing the value will expand interval of output of each image.

* Compatible with some models only.

■ Relation between scan mode/clock and maximum frame rate

[Camera compatible with USB2.0]

Model	Scan mode	Image size	Maximum frame rate (fps)		
			Normal clock	1/2 clock	1/4 clock
STC-C33USB STC-B33USB	Normal	640 × 480	59.94	29.97	14.99
	1/2 Partial	640 × 224	120.11	60.05	30.03
	1/4 Partial	640 × 80	240.22	120.11	60.05
STC-C83USB STC-B83USB	Normal	1,024 × 768	29.18	14.59	7.30
	1/2 Partial	1,024 × 344	60.02	30.01	15.01
	1/4 Partial	1,024 × 136	120.35	60.18	30.09

Model	Scan mode	Image size	Maximum frame rate (fps)		
			Normal clock	1/2 clock	1/4 clock
STC-TC33USB STC-TB33USB	Normal	640 × 480	59.94	29.97	14.99
	1/1 Partial	640 × 480	62.94	31.47	15.73
	1/2 Partial	640 × 224	120.11	60.05	30.03
	1/4 Partial	640 × 80	240.22	120.11	60.05
	Binning	640 × 240	120.11	60.05	30.02
	1/1 Binning partial	640 × 240	121.97	60.99	30.49
	1/2 Binning partial	640 × 112	224.78	112.39	56.19
	1/4 Binning partial	640 × 40	449.55 / 240.22	224.78 / 120.11	112.39 / 60.05
STC-TC83USB STC-TB83USB	Normal	1,024 × 768	29.18	14.59	7.30
	1/1 Partial	1,024 × 768	29.59	14.80	7.40
	1/2 Partial	1,024 × 344	60.02	30.01	15.01
	1/4 Partial	1,024 × 136	120.35	60.18	30.09
	Binning	1,024 × 384	56.93	28.47	14.23
	1/1 Binning partial	1,024 × 384	57.93	28.96	14.48
	1/2 Binning partial	1,024 × 172	112.21	56.11	28.05
	1/4 Binning partial	1,024 × 68	198.53 / 120.35	99.27 / 60.18	49.63 / 30.09
STC-TC133USB STC-TB133USB	Normal	1,280 × 960	22.40	11.20	5.60
	1/1 Partial	1,280 × 960	22.63	11.32	5.66
	1/2 Partial	1,280 × 440	44.81	22.40	11.20
	1/4 Partial	1,280 × 168	89.80	44.90	22.45
	Binning	1,280 × 480	44.81	22.40	11.20
	1/1 Binning partial	1,280 × 480	44.63	22.31	11.16
	1/2 Binning partial	1,280 × 220	79.21	39.61	19.80
	1/4 Binning partial	1,280 × 84	89.80	44.90	22.45
STC-TC152USB STC-TB152USB	Normal	1,360 × 1,024	19.26	9.63	4.81
	1/1 Partial	1,360 × 1,024	19.78	9.89	4.94
	1/2 Partial	1,360 × 472	38.52	19.26	9.63
	1/4 Partial	1,360 × 176	77.04	38.52	19.26
	Binning	1,360 × 512	38.52	19.26	9.63
	1/1 Binning partial	1,360 × 512	38.96	19.48	9.74
	1/2 Binning partial	1,360 × 236	69.02	34.51	17.26
	1/4 Binning partial	1,360 × 88	77.04	38.52	19.26

Model	Scan mode	Image size	Maximum frame rate (fps)		
			Normal clock	1/2 clock	1/4 clock
STC-TC202USB STC-TB202USB	Normal	1,600 × 1,200	15.32	7.66	3.83
	1/1 Partial	1,600 × 1,200	15.72	7.86	3.93
	1/2 Partial	1,600 × 5,44	30.63	15.32	7.66
	1/4 Partial	1,600 × 208	61.27	30.63	15.32
	Binning	1,600 × 600	30.63	15.32	7.66
	1/1 Binning partial	1,600 × 600	30.93	15.46	7.73
	1/2 Binning partial	1,600 × 272	55.10	27.55	13.78
	1/4 Binning partial	1,600 × 104	93.54 / 61.27	46.77 / 30.63	23.39 / 15.32

[Camera compatible with USB3.0]

Model	Scan mode	Image size	Maximum frame rate (fps)	
			VBlank=0	VBlank=2,035
STC-MCA5MUSB3 STC-MBA5MUSB3	Normal	2,592 × 1,944	14.1	6.9
	AOI (Skipping/Binning:OFF)	2,048 × 1,536	21.0	9.1
	AOI (Skipping/Binning:OFF)	1,600 × 1,200	31.6	11.8
	AOI (Skipping/Binning:OFF)	1,280 × 1,024	42.4	14.3
	AOI (Skipping/Binning:OFF)	1,024 × 768	63.7	17.7
	AOI (Skipping/Binning:OFF)	800 × 600	91.8	21.3
	AOI (Skipping/Binning:OFF)	640 × 680	126.0	24.7

3.3.8.4 Pixel format

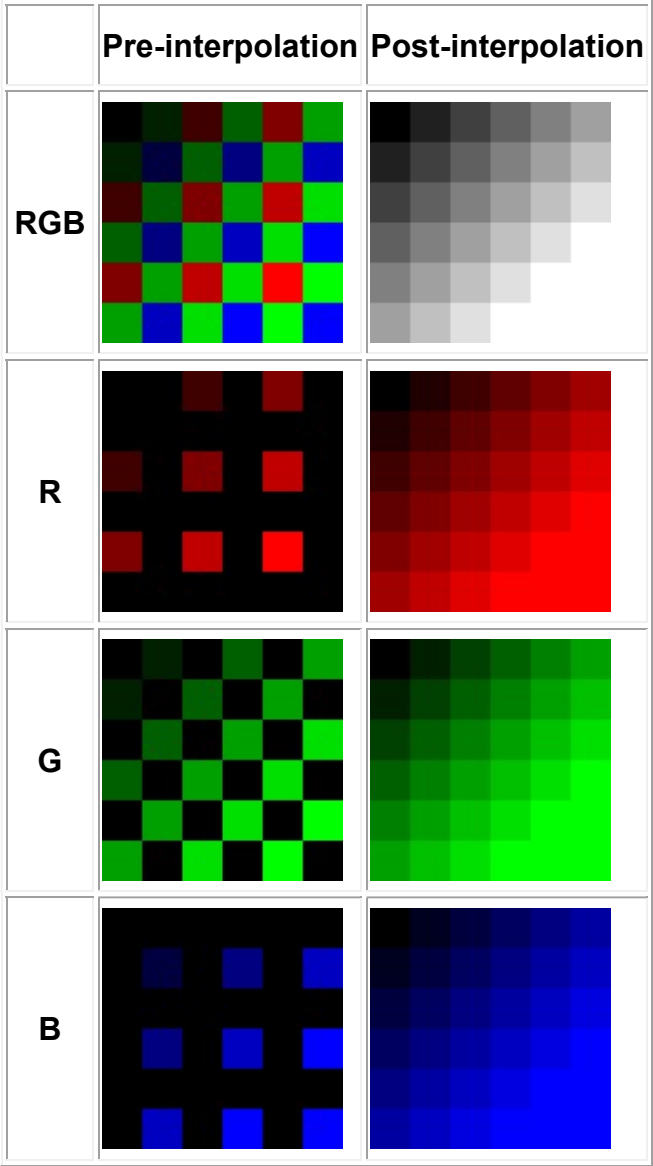
Pixel format will be set according to the following procedures.

Changing the pixel format will change file format when still images are saved.

- 1) Open the [Other] tab and set [Still Image Pixel format.]

3.3.8.5 Color interpolation method

In each pixel of the image (pre-interpolated image) output from camera, information on either R, G or B exists. Interpolation processing is preformed to acquire information on all RGB for each pixel.



Color interpolation is set according to following procedures.

- ① Open the [Other] tab and set [Color Interpolation.]

OFF (MONO)	Color interpolation not performed. Image sensor output value is displayed in black and white.
OFF (COLOR)	Color interpolation not performed. Image sensor output value is displayed in colors.
Nearest Neighbor	Color interpolation is performed by coping nearest neighbor's pixel value.
Bilinear	Color interpolation is performed by using 4 pixels surrounding it.
BiCubic	Color interpolation is performed by using 16 pixels surrounding it.
Bilinear false color reduction	Color interpolation is performed by using 4 pixels surrounding it. Compared to the "Bilinear," false color of edge area will be reduced, but load on PC increases.

3.3.8.6 Mirror image

Mirror image will be set according to following procedures.

- ① Open the [Other] tab and set [Mirror Mode.]

Normal
Flip horizontal
Flip vertical
Flip horizontal and vertical
Flip horizontal [Camera side]
Flip vertical [Camera side]
Flip horizontal and vertical [Camera side]

* When flip processing is done on camera side, there is no load increasing on PC, but flip processing on camera side is compatible with some models only.

Frame rate may be reduced when processing is done of PC.

If this feature is not necessary, use on "Normal."

3.3.8.7 Rotation

Mirror image is set according to following procedures.

- ① Open the [Other] tab and set [Rotation.]

Normal
CLOCKWISE_90
COUNTERCLOCKWISE_90

3.3.8.8 Display Mode

Display Mode is set according to the following procedures.

Display Mode using DirectDraw is for SDK users, and there is no performance difference among all modes, when limiting use of this software.

- 1) Open the "Other" tab and set Display Mode.

Display Mode	Description
GDI	Standard display mode. Stable performance without dependence on PC and video cards.
GDI [HALFTONE]	Interpolation processing is done by CPU at time of expansion. Stable performance without dependence on PC and video cards, but load on CPU increases.
DirectDraw Offscreen / DirectDraw Offscreen HQ	Data of figures and characters drawn by SDK and image data are superimposed by video cards and is displayed. HQ consumes a lot of memory as it maintains image data in 24 bits.
DirectDraw Overlay / DirectDraw Overlay HQ	Image is displayed on chromatic key. When using SDK, figures and characters can be drawn on chromatic key. Chromatic keys may be seen when moving preview window and resizing, but this is not a defect. Screen shots inclusive of images taken from print screens cannot be acquired on this mode. HQ consumes a lot of memory as it maintains image data in 24 bits.
DirectX	A drawing using DirectX.
DirectX[V Sync ON] / DirectX[V Sync ON2]	A drawing using DirectX. Tearing may be reduced depending on video card used. Use [V Sync ON2] when tearing cannot be improved by using [V Sync ON].

* When using DirectDraw or DirectX, load on CPU and image quality may be improved at time of display expansion depending on environment (video cards or video card drivers).

On the other hand, environment (video cards or video card drivers, other applications and OS) may cause a significant decrease in speed or a malfunction in performance.

4 Revision History

Rev.	Revised date	Revisions	Remarks
00	2012/08/31	● Newly issued	
01	2012/10/22	● Revised Compatible with StCamSWare v3.02	
02	2013/01/22	● Revised Replaced the screen shot of Windows XP with Windows7.	
03	2013/05/08	● Revised Compatible with StCamSWare v3.03	
07	2017/07/25	● Revised Company name Removed StCamSWare Revision history to StCamSWare's help information. and software version information	

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