

FCLabo (Ver.2.0) Instruction Manual

Image Viewing and Analysis Software

- This manual provides instructions for using **FCLabo**, an image file viewer with image analysis functions.

TAKENAKA OPTONIC CO.,LTD.

FCLabo (Ver.2.0)

Instruction Manual (Rev. 3.0e)

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Notations Used in This Manual

Note: ... Explains points to be noted when using the software.

[Important] ... Highlights matters that require special attention.

[Explanation] ... Provides information necessary to understand the operation of this software.

[Tip] ... Offers tips for using this software more efficiently.

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Disclaimer and Terms of Use

About This Agreement

Before using the software "**FCLabo**" (hereinafter referred to as the "Software"), please carefully read the following disclaimer and terms of use. By installing or using the Software, **you are deemed to agree to these terms**. If you do not agree, please refrain from using the Software.

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 3. The Software does not guarantee compatibility with other software or hardware.
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Additional Notes

Please comply with these terms when using the Software. If a violation is detected, the company reserves the right to take legal action. For inquiries regarding these terms, please contact the company's support desk.

Introduction

FCLabo is designed to display still image files saved in **BMP** or **TIFF** format (excluding compressed image file formats) and to analyze the image data.

※Because this software is developed using standard Windows APIs, no installation of specific third-party SDKs is required.

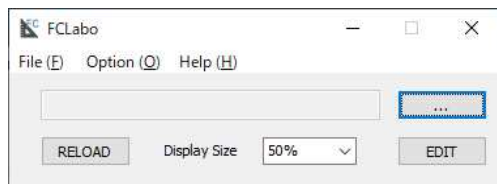
1. Features

By using this viewer software, you can display still image files saved in **BMP** or **TIFF** format and perform image viewing, data evaluation, and data analysis.

This software supports the display and analysis of general-purpose image file formats such as **BMP** and **TIFF** (excluding all compressed image file formats).

This image viewer can be used with image files acquired by the image viewer applications “**FCPLayer**” or “**eBUS Player**,” which are included with our GigE camera SDKs, as well as with image files generated by other application software.

Note: Image files saved in a compressed format cannot be opened, even if they are **BMP** or **TIFF** files.



Main Dialog

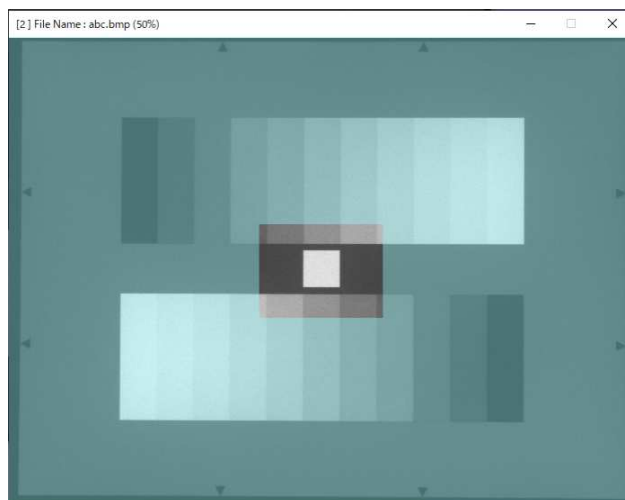
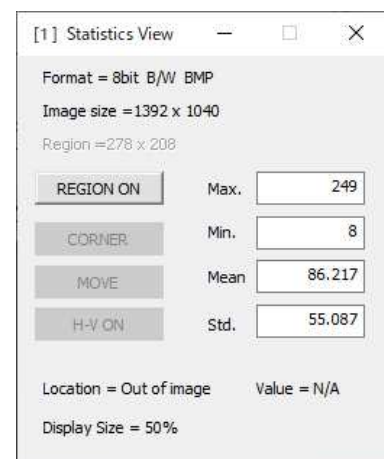


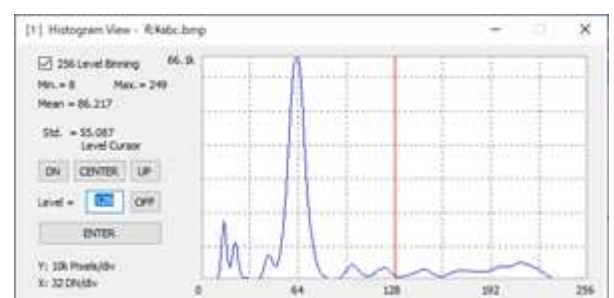
Image Display



Statistical Data Display



Profile Display



Histogram Display

[Main Functions]

- Image file viewer function that allows simultaneous display of up to eight images (supports uncompressed **BMP** and **TIFF** formats)
- Display of statistical summary values for image data within a user-specified region (**maximum**, **minimum**, **mean**, and **standard deviation**)
- Display of **horizontal** and **vertical profiles** at user-specified positions, with export to **CSV files**
- Display of **histograms** for user-specified regions, with export to **CSV files**

2. Operating Environment

[System Requirements]

OS: Microsoft **Windows 10** (64-bit) or **Windows 11** (Japanese or English)

PC: Intel® Core™ i3 CPU, 3.4 GHz or higher recommended

Main Memory: 4 GB or more recommended

Available HDD Space: 50 MB or more

3. Installation Procedure

(3-1) Notes and Disclaimer Before Using This Software

Before installing this software, be sure to review the “**Disclaimer and Terms of Use**” described at the beginning of this document.

If you do not review and agree to these terms, you may not install or use this software.

(3-2) Installation Procedure

In this manual, the installation procedure is explained using **Windows 11** as an example.

The same procedure applies to **Windows 10**.

To install the software, run the installer file (**FCLaboSetupXXXXX.msi**) obtained from our download site.*

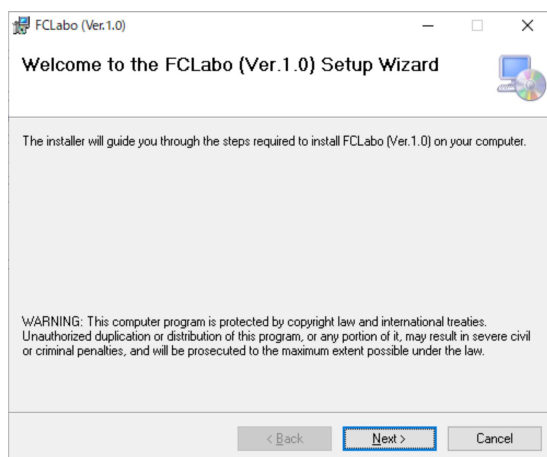
* “XXXXX” indicates the build identification number.

Example: **FCLaboSetup25904.msi**

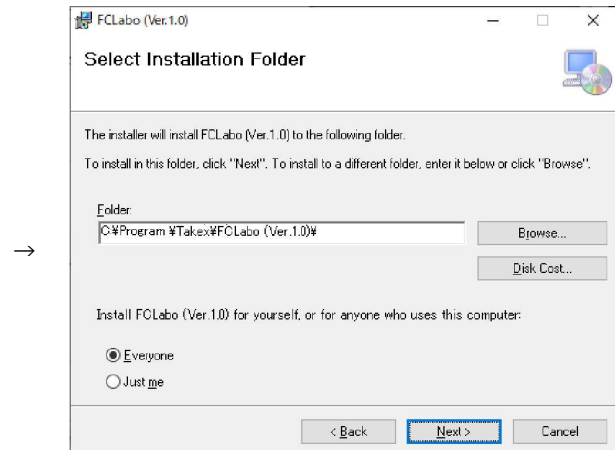
Note: If a previous version of FCLabo is already installed, installation cannot proceed. Please uninstall the existing version before installing this software.

Note: The version number shown below (e.g., Ver. 1.0) may differ depending on the version.

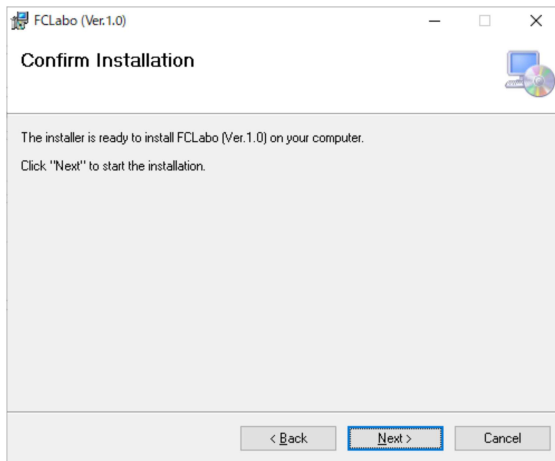
a. Double-click the installer file icon “**FCLaboSetupXXXXX.msi**” to start the installer.



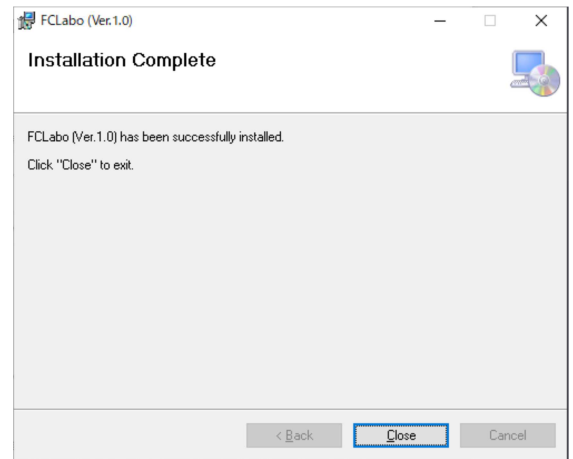
Click “**Next**” on the setup confirmation screen.



Select the installation folder and click “**Next**.”
(Use the default folder if no changes are required.)

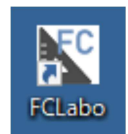


The installation confirmation screen is displayed again.



When “**Installation Complete**” is displayed, the installation is finished.

- b. When the installation is completed successfully, a shortcut icon for launching this program will appear on the desktop.
- c. The executable file (**FCLabo.exe**) is installed in the folder specified during installation. If the default settings are used, the installation folder is as follows:



C:\Program Files\Take\X\FCLabo (Ver.X.X) (“X.X” indicates the version number.)

Shortcut Icon

(3-3) Uninstallation Procedure

Uninstall the software using one of the following methods.

- **Method 1: Uninstall from the Windows Control Panel**

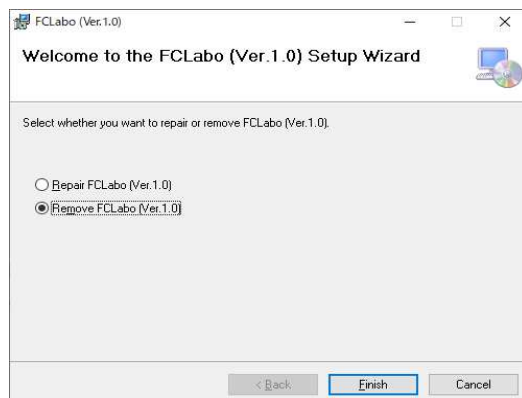
For **Windows 10**: Start menu → Settings (icon above the Power button) → Apps → Apps & features
→ Click the **FCLabo (Ver. X.X)** icon → Select **Uninstall** to remove the software.

For **Windows 11**: Start menu → All → Select **FCLabo (Ver. X.X)**
→ Right-click and select **Uninstall** to remove the software.

- **Method 2: Run the Installer File Used for Installation**

Run the installer file used for installation (Run the installer file used for installation (**FCLaboSetupXXXX.msi**)).

Double-click the installer file → Select **Remove FCLabo (Ver. X.X)** → Click **Finish** to uninstall the software.



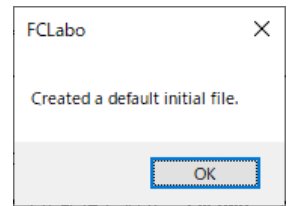
- ※ The folders and files created during installation (excluding user-created files) and the desktop shortcut will be automatically removed.

4. Operating Procedure

(4-1) Starting the Program

The program can be started using any of the following methods:

- Double-click the “**FCLabo**” shortcut icon placed on the desktop during installation.
- Select and click “**FCLabo**” from the **Windows Start menu** → **Program list**.
- Double-click the executable file (**FCLabo.exe**) in the installation folder.



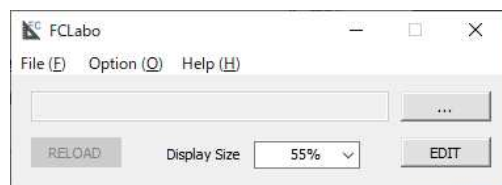
First startup only

When the program is launched for the first time after installation, a message like the one shown on the right will be displayed. This indicates that a definition file for saving settings has been newly created.

After that, a startup screen as shown below will be displayed for a few seconds, and then the main dialog will appear. Confirm that the main dialog is displayed.



Startup screen (a few seconds)



Main Dialog

(4-2) Windows Display Scaling and Text Size Settings

When using Windows system settings for display scaling and text size, please note the following points.

If these settings are not appropriate, dialogs in this program may not be displayed correctly and operation may become impossible.

[Display Scaling]

The supported display scaling settings for this software are **100% (recommended)**, 125%, 150%, and 175%. Set the Windows display scaling to one of these values: **100% (recommended)**, 125%, 150%, or 175%.

If there are no specific issues, the **100%** setting is recommended.

Custom scaling settings are not supported.

- How to Check and Change **Display Scaling**

Windows 11 / Windows 10: Start → Settings () → System → Display → Scale and layout


[Text Size Settings]

Set **Text Size** between **100% (recommended)** and **150%**.

If this range is exceeded, the main dialog may not be displayed correctly.

- How to Check and Change **Text Size**

For Windows 11: Start → Settings () → Accessibility → Text size (slider)

For Windows 10: Start → Settings () → Ease of Access → Make text bigger (slider)

Note: The procedure for opening the settings screens may differ depending on the version of Windows you are using.

(4-3) Supported Image File Formats for Import

This software can load, display, and analyze **BMP** and **TIFF** image files saved by our GigE camera viewer software “**FCPlayer**” and USB3 camera viewer software “**FCDisplay**,” as well as **BMP** and **TIFF** image files generated by other image capture boards or application software, provided that they are in uncompressed format.

The following image file formats can be imported. All image files must be in uncompressed format.

•BMP Format Images (Uncompressed)

8-bit format image files (Grayscale / 256 levels)

8-bit format image files (Grayscale / 256 levels, Color R/G/B each 256 levels)

•TIFF Format Images (Uncompressed)

8-bit format image files (Grayscale / 256 levels, Color R/G/B each 256 levels)

12-bit format image files (Grayscale / 4,096 levels, Color R/G/B each 4,096 levels)

16-bit format image files (Grayscale / 65,536 levels, Color R/G/B each 65,536 levels)

Note: **RAW** format files (.bin files), **JPEG**, **PNG**, and compressed **BMP** or **TIFF** files cannot be imported.

Note: **TIFF** files defined with bit depths other than those listed above (e.g., 10-bit or 14-bit) cannot be imported.

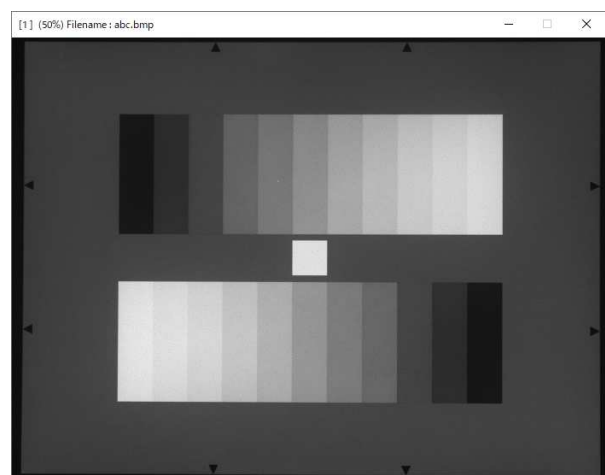
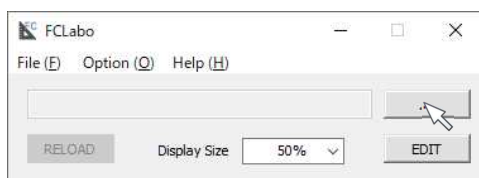
However, uncompressed image files in 16-bit format that contain **14-bit**, **12-bit**, **10-bit**, or **8-bit** data stored in the upper bits can be imported.

(4-4) Displaying Image Files (Import)

Click the Browser button (“...”) on the right side of the main dialog to open the browser window, and select an image file you want to open (see **Note:** below).

Image files can be imported one file at a time, and up to eight (8) images can be displayed simultaneously.

Note: There are other methods available for opening (importing) image files. For details, please refer to the subsequent sections of this manual.



(4-5) Exiting the Program

Exit the program by following the steps below.

1. Close all displayed image views (view planes) by performing one of the following actions:

Click the “**X**” button in the upper-right corner of each view plane, or Right-click on the displayed image in each view plane and select Close from the context menu, or Select **Main Menu** → **File** → **Close All Files** to close all open view planes at once.

2. Exit the program by performing one of the following actions:

Click the “**X**” button in the upper-right corner of the main dialog, or
Select **Main Menu** → **File** → **Exit**.

Note: You may also exit the program directly using **step 2** without performing **step 1**.

5. View Planes (Image Display Dialogs)

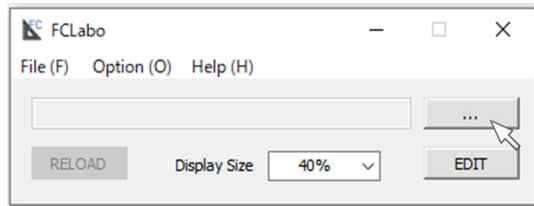
Images loaded (imported) from files can be displayed simultaneously, up to a maximum of **eight images**. In this software, each image display area is referred to as a **View Plane**.

(5-1) Importing Image Files

(5-1-1) Import Methods

<Importing from the File Browser>

Click the browser button ("...") on the right side of the main dialog to open the file browser, and then select the image file you want to open.



← Open the file browser and select an image.

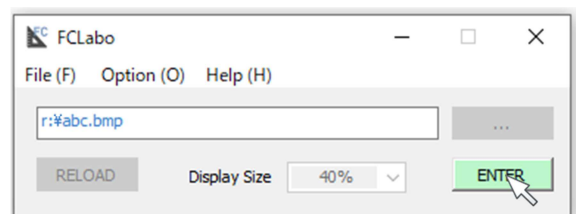
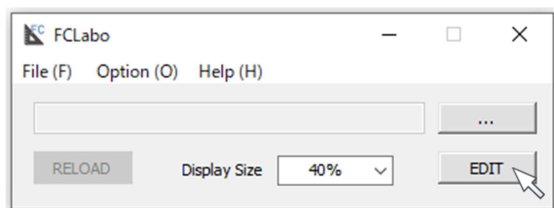
<Importing by Drag and Drop>

In Windows File Explorer, select the icon of the image file you want to open (one file only), and drag and drop it onto the **FCLabo** main dialog to open the image.

Note: Only one file can be dragged and dropped at a time.

<Importing by Directly Entering the File Name>

Click the **EDIT** button, directly enter the image file name (including the full path) into the file name field, and press **ENTER**.

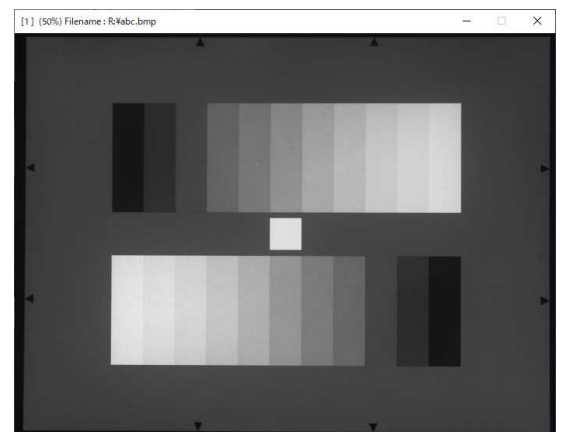
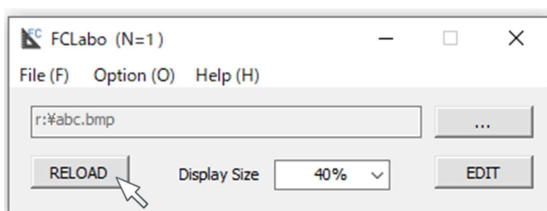


Using any of the above methods, the specified View Plane (image dialog) is displayed at the size (display magnification) specified in **Display Size**.

<Reloading an Image File>

To reload the same file as the one most recently opened (the image file currently shown in the file name field), click the **RELOAD** button.

If the previously opened file is still displayed, the same image will be additionally displayed at the magnification specified by **Display Size**.

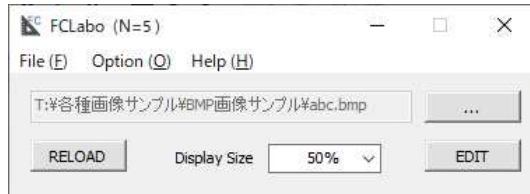


View Plane (Image Display Dialog)

The image currently displayed in the file name field is imported again and displayed.

(5-1-2) Opening Multiple Image Files

This software allows up to eight image files to be opened simultaneously, displayed in view planes, and analyzed.
The number of currently imported images can be confirmed from the title bar of the main dialog.



← Displays the number of imported images (**N = number**).

(5-1-3) Closing Image Files (View Planes)

A View Plane can be closed using any of the following methods:

<Using the “X” Button>

Click the “X” button at the upper-right corner of the View Plane dialog.

< From the Context Menu >

Place the mouse pointer over the View Plane, right-click to open the context menu, and select **Close**.

<By Double-Clicking the Title Bar>

Place the mouse pointer on the upper-left area of the title bar of the View Plane dialog (the [**plane number**] area) and double-click.

※All open View Planes can be closed at once using the following menu command:

Main Menu → File → Close All Files

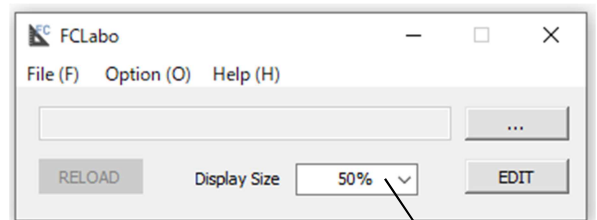
(5-2) Image Display Magnification Settings at Load Time

When opening an image, the initial display magnification is set according to the value specified in the “**Display Size**” field in the main dialog.

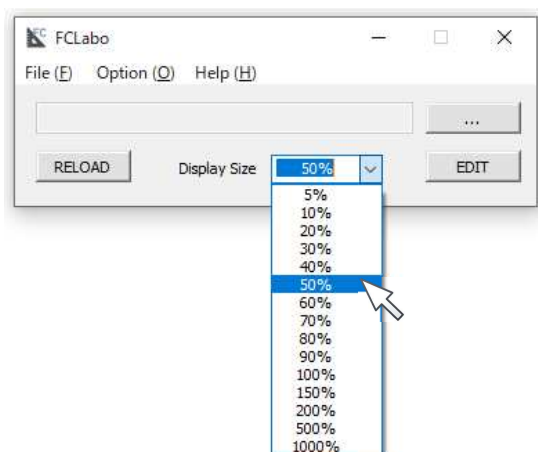
The selectable range is **1% to 10,000%** (in **0.1%** increments).

The display magnification can be set using either of the following methods:

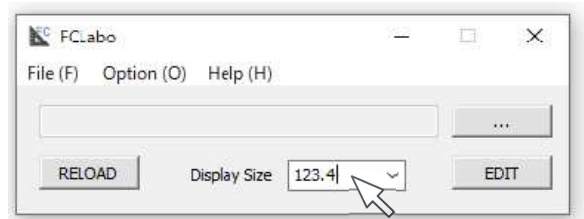
- **Selecting the Display Magnification from the Drop-down List**
- **Entering the Display Magnification Directly**



Display Size field



Select from drop-down list



Enter value directly (**0.1%** increments)

•Selecting the Display Magnification from the Drop-down List

As shown in the lower-left figure on the previous page, click the down arrow next to the **Display Size** field to select a display magnification from the list.

•Entering the Display Magnification Directly

As shown in the lower-right figure, you can set the display magnification by entering a numeric value directly into the **Display Size** field in **0.1% increments**.

The input method is as follows:

Example 1: "**123.5%**"

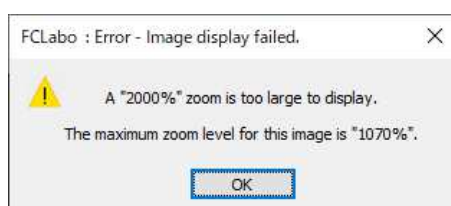
Enter "**123.5%**" or simply "**123.5**" using half-width alphanumeric characters, then press the **Enter key**.

Example 2: "**540%**"

Enter "**540%**" or simply "**540**" using half-width alphanumeric characters, then press the **Enter key**.

※ The allowable range for the display magnification is **1% to 10,000%** (in **0.1%** increments).

Note: If a high initial display magnification is specified in **Display Size**, some image files with a large number of pixels may not be displayed at the specified size due to program memory limitations. In such cases, an error message like the one shown below will appear.



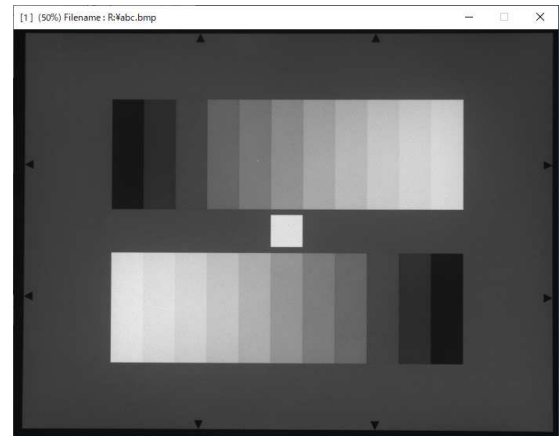
For example, if the following error message is displayed when attempting to show a View Plane, change the **Display Size** setting to a value equal to or less than the maximum size shown in the error dialog (**1070%** in the example above), and then reload the image.

(5-3) View Plane Title Display

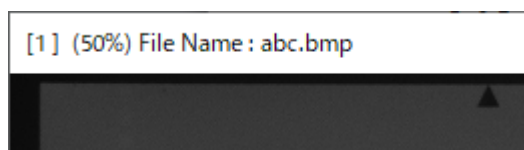
The initial display magnification of an image shown in a View Plane is the value specified in the **Display Size** field of the main dialog.

This magnification can be set from **1% (0.01×)** to **10,000% (100×)** in **0.1%** increments.

The file name of the image displayed in the View Plane is shown in the title bar at the upper-left, as shown below.



View Plane (image display window)



← View Plane (image display window) title bar

In the title bar of an imported and displayed View Plane (image display dialog), the plane number, display size (magnification), and file name are shown, as illustrated in the example above.

[Plane Number] (Display Size %) File Name: File Name

↑
①

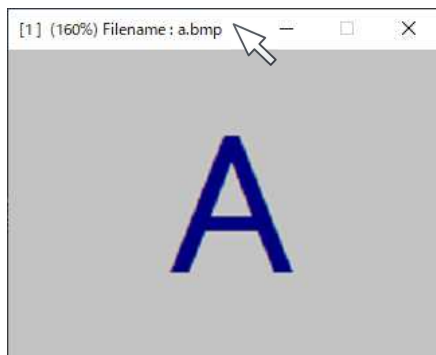
↑
②

↑
③

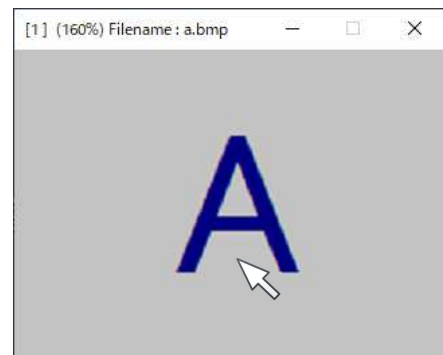
- ① **Plane Number** is automatically assigned to each imported image. Numbers from **[1]** to **[8]** are assigned, corresponding to the maximum of eight images that can be imported.
- ② **Display Size** (magnification) is shown in the range from **1%** to **10,000% (0.01× to 100×)** in **0.1%** increments.
- ※ When the magnification is set to 100%, one pixel on the PC monitor corresponds to one pixel of the displayed image.
- ③ The image file name is displayed.
- ※ If **Full Path** is selected under **Main Menu** → **Option** → **Viewer Style** → **Caption Style**, the full path of the file is displayed.

(5-4) Moving the View Plane Display Position

The display position of a View Plane on the monitor screen can be changed using one of the following methods.



Drag the title bar with the left mouse button.

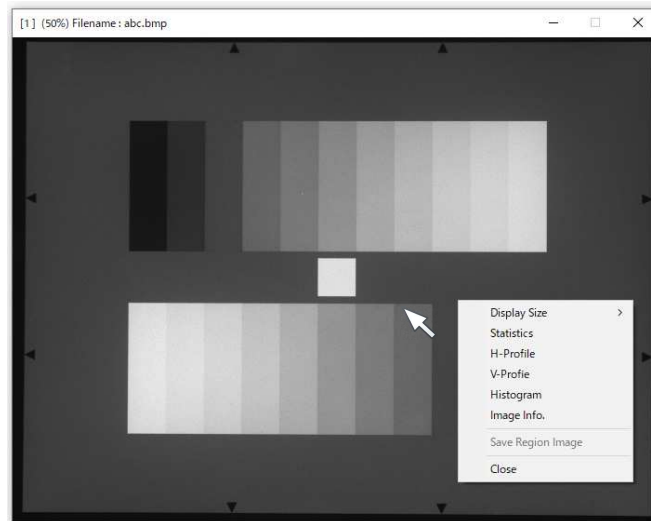


Click and drag the image using the mouse wheel

(5-5) View Plane Operations

In a **View Plane**, you can not only display and view images, but also obtain various types of information about the displayed image using the operations described below.

When you right-click the mouse while the mouse pointer is positioned over any area of the image displayed in the **View Plane**, a context menu appears, as shown in the figure below.



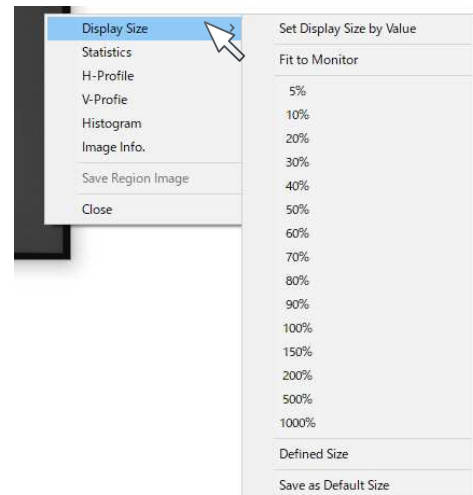
Right-click on the **View Plane**.

(5-5-1) Display Size (Image Magnification)

You can set the display magnification of the image shown in a **View Plane**.

From **Display Size** in the context menu, the display magnification can be changed using any of the following options:

- **Set Display Size by Value**
- **Fit Monitor**
- **Select from the 5% to 1000% drop-down menu**
- **Defined Size**
- **Save as Default Size**



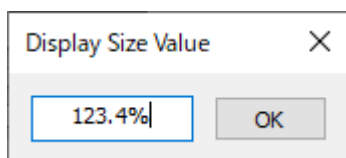
Select Display Size from the context menu.

a. Set Display Size by Value

(Right-click in the **View Plane**) → **Display Size** → **Set Display Size by Value**

Enter the desired magnification value directly in the **Display Size Value** dialog that appears.

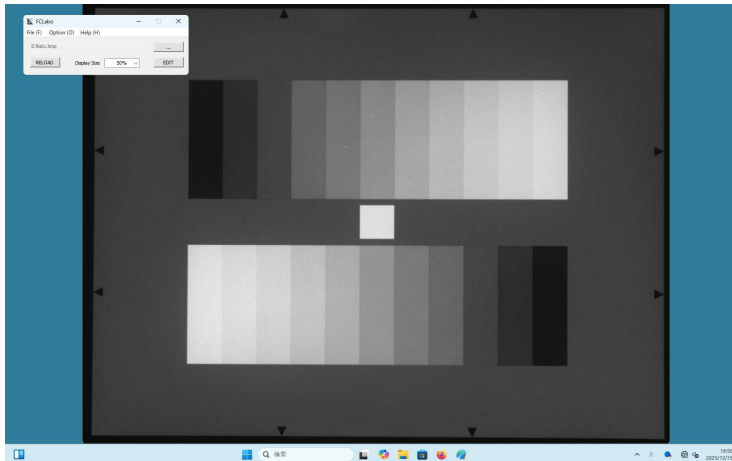
The value can be specified in the range from 1% to 10,000%, in **0.1%** increments (1%: 0.01× to 10,000%: 100×).



← Enter a value from **1%** to **10,000%** (**0.1%** increments), then click **OK** or press **Enter Key** (% optional).

b. Fit to Monitor

Right click on the **View Plane** → **Display Size** → **Fit to Monitor**



← Displayed using **Fit to monitor**

With the above operation, the image is displayed centered on the monitor at full-screen size.

In this case, the display magnification is automatically set to a value that maximizes either the vertical or horizontal display area of the image.

- ※ When an image is displayed using **Fit Monitor**, the display magnification can be checked either by clicking the mouse wheel button and dragging downward by the height of the title bar on any area of the image to show the magnification in the title area at the top of the dialog, or by checking **Display Size** in the **Image Info.** dialog that appears when you right-click on any area of the image.

c. Select from the 5% to 1000% List

When Display Size is selected from the context menu, you can specify the display magnification by selecting a value from the displayed list (**5%** to **1000%**).

d. Defined Size

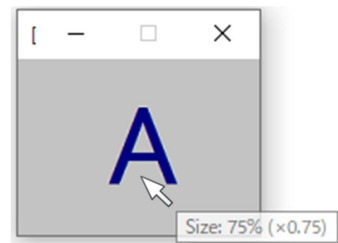
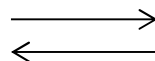
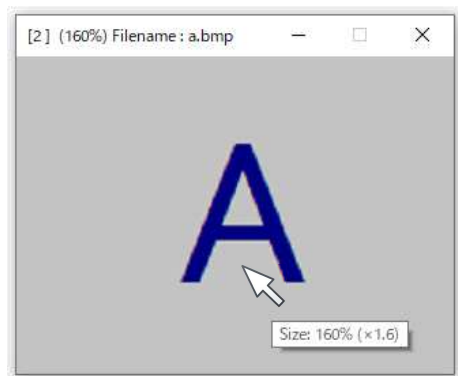
The image is displayed using the display magnification currently set in the **Display Size** field of the main dialog.

e. Save as Default Size

Saves the display magnification currently set for this **View Plane** as the default size (the **Display Size** value in the main dialog).

(5-5-2) Zooming In and Out Using the Mouse Scroll Wheel

Place the mouse pointer over the image display area of the **View Plane**, and rotate the mouse scroll wheel forward or backward to zoom in or out of the image.



The zoom level is shown below the mouse pointer.

- ※ When zooming in or out using the mouse wheel, the image is scaled with the tip of the mouse pointer as the center of magnification.

6. Image Analysis Functions

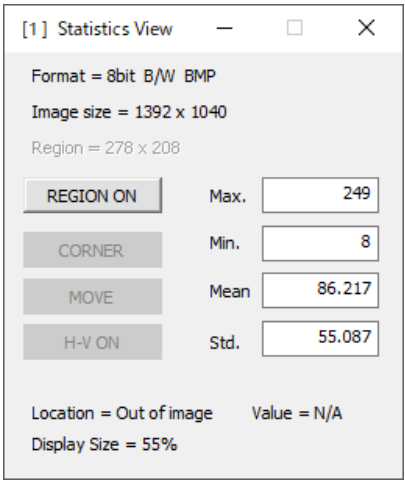
By right-clicking on a displayed View Plane, you can open various viewers for image analysis.
Even when multiple View Planes are displayed, an analysis viewer corresponding to each **View Plane** can be opened individually.

(6-1) Statistics Display (Statistics View)

The following statistics of the displayed image data are shown:
Maximum (**Max.**), Minimum (**Min.**), Mean, Standard Deviation (**Std.**), etc.

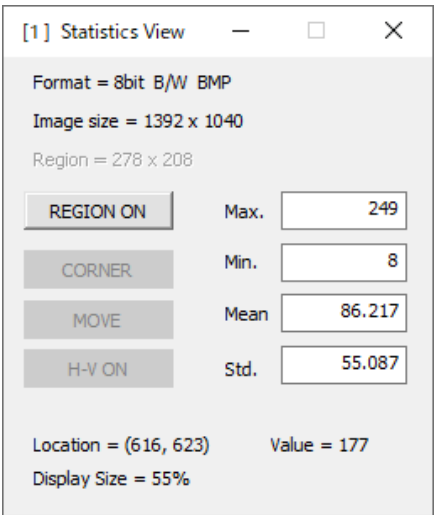
(6-1-1) How to Display

With a View Plane displayed, right-click on the View Plane and select Statistics from the context menu.
A dialog like the one shown on the right will appear.

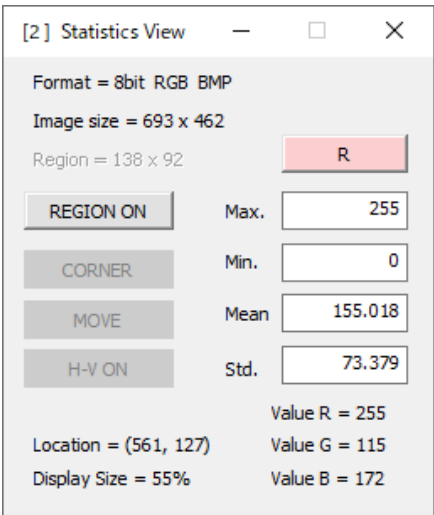


(6-1-2) Displayed Items

- Format** ... Indicates the format information of the image file.
- Image Size** ... Shows the image resolution as horizontal (H) × vertical (V) pixels.
- Region** ... Shows the horizontal and vertical pixel counts of the specified region ((H) × vertical (V) pixels).
- Max.** ... Displays the maximum value of the displayed image data.
- Min.** ... Displays the minimum value of the displayed image data.
- Mean.** ... Displays the mean value of the displayed image data.
- Std.** ... Displays the standard deviation of the displayed image data.
- Location** ... When the mouse pointer is positioned over the displayed image, this shows the pixel coordinates at the pointer position.
The pixel coordinate of the upper-left pixel is (1, 1),
and the coordinate of the lower-right pixel is (maximum horizontal pixels, maximum vertical pixels).
- Value** ... Displays the pixel data value at the mouse pointer position (the coordinates shown in Location).
- Region ON, CORNER, MOVE, H-V ON** ... Buttons used to specify and control the region selection.



Statistics View for a grayscale (B/W) image



Statistics View for a color (RGB) image

(6-1-3) Switching the Region Display ON/OFF

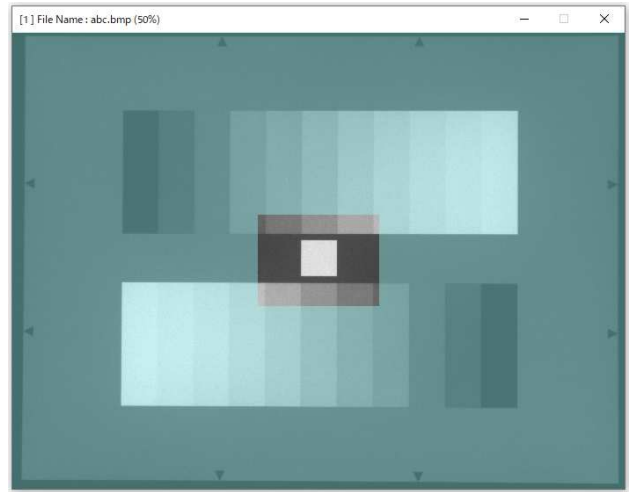
REGION ON ... Click this button to switch the statistics display to show only a specified rectangular region of the entire image.

Click this button again to turn the region display OFF.



Region display OFF

→
ON
←
OFF



Region display ON (inside the rectangle)

(6-1-4) Region Selection

When the region display is OFF, statistics, profile, and histogram information are shown for the entire displayed image. When the region display is ON, these values are shown only for the specified rectangular region.

There are three methods for specifying a region. These methods can be selected using the three buttons located on the left side of the **Statistics View** dialog.

CORNER ... Specify the four corner positions of the region using the mouse pointer.

MOVE ... Move the region by dragging a corner or the center while keeping its size.

H-V ON ... Specifies the coordinates of the upper-left and lower-right corners of the rectangular region by numerical input.

CORNER, **MOVE**, **H-V ON** (H-V coordinates) buttons are enabled only when the region display is set to ON.

a. Specification Using **CORNER** ... With the region display set to ON, click the CORNER button.

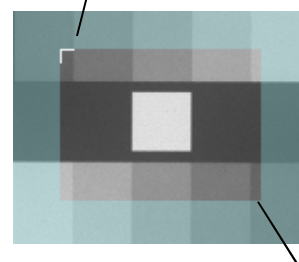
As shown in the figure below, a marker (selection indicator) appears at one of the corners of the region.

The position of this marker can be changed by selecting any one of the four corners and moving the mouse pointer near that corner, then right-clicking.



A marker appears at a region corner

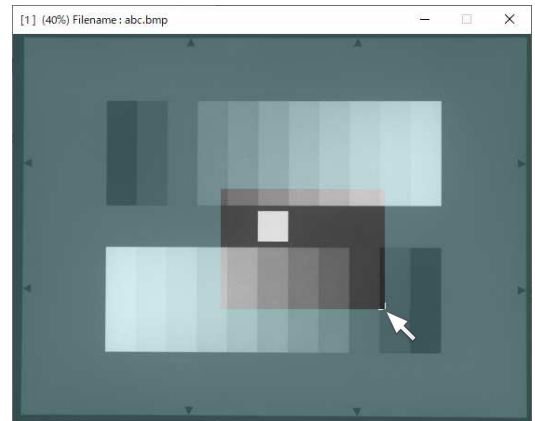
(Enlarged)



Right-click near here to select this corner



Right-click to select one of the corners to change.



Left-click at the desired position.

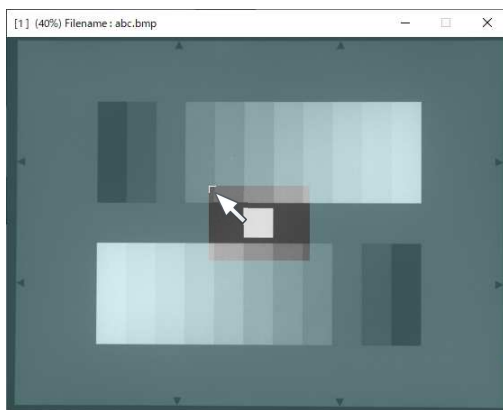
- ※ To finish region selection using **CORNER**, click the **CORNER** button again, or press and hold the right mouse button (about 2 seconds) to open the context menu, then select Context Menu → **Exit Region Change**.

b. Selection using **MOVE ...** With region display set to **ON**, click the **MOVE** button.

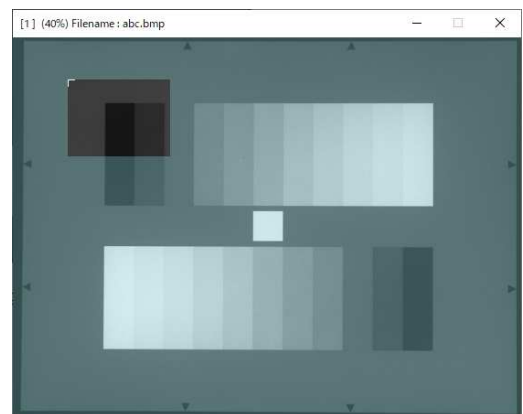
Using this method, the shape and size of the rectangular region remain unchanged, and the region can be moved to any desired position on the image.

As shown in the figure below, a marker (selection indicator) appears at either the center or one of the corners of the region.

By selecting one of these markers (corners or center), you can choose the reference point for moving the region. For example, after selecting the upper-left corner marker by right-clicking, move the mouse pointer to the desired new upper-left corner position and left-click to move the region.



Right-click to select one of the corners or the center.



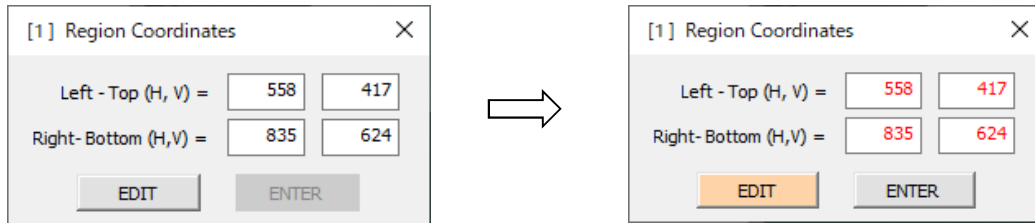
Move to the desired position and left-click.

- ※ To finish region selection using **MOVE**, click the **MOVE** button again, or press and hold the right mouse button (about 2 seconds) to open the context menu, then select **Context Menu** → **Exit Region Change**.

- c. Specification by **H-V Coordinate** ... With region display set to **ON**, click the **H-V ON** button to open the **Region Coordinates** dialog.

In this mode, specify the region by entering the **(H, V)** coordinate values of the upper-left and lower-right points within the effective horizontal and vertical pixel ranges.

When the **EDIT** button is clicked, the button turns orange and the coordinate values are shown in red. Coordinate values can be entered in units of one pixel.



Click **EDIT** to enable editing (button turns orange and coordinates turn red).

In this state, directly enter the pixel coordinate values into the four fields, **Left Top (H, V)** and **Right Bottom (H, V)**, and then click the **ENTER** button. After finishing the coordinate editing, click the **H-V OFF** button to return the button color to gray and exit the edit mode.

Note: Coordinate values must be non-negative integers for both horizontal and vertical directions.

The maximum values are (effective horizontal pixels – 1) and (effective vertical pixels – 1) respectively.

The coordinate of the upper-left pixel in the effective image area is (0, 0).

Example: For an image with a resolution of 1628 (H) × 1236 (V) pixels,
the upper-left pixel coordinate is (0, 0), and the lower-right pixel coordinate is (1627, 1235)

※ To exit the **H-V coordinate** mode, click the **H-V OFF** button, or click the **X** at the upper-right corner of the **Region Coordinates** dialog to close it.

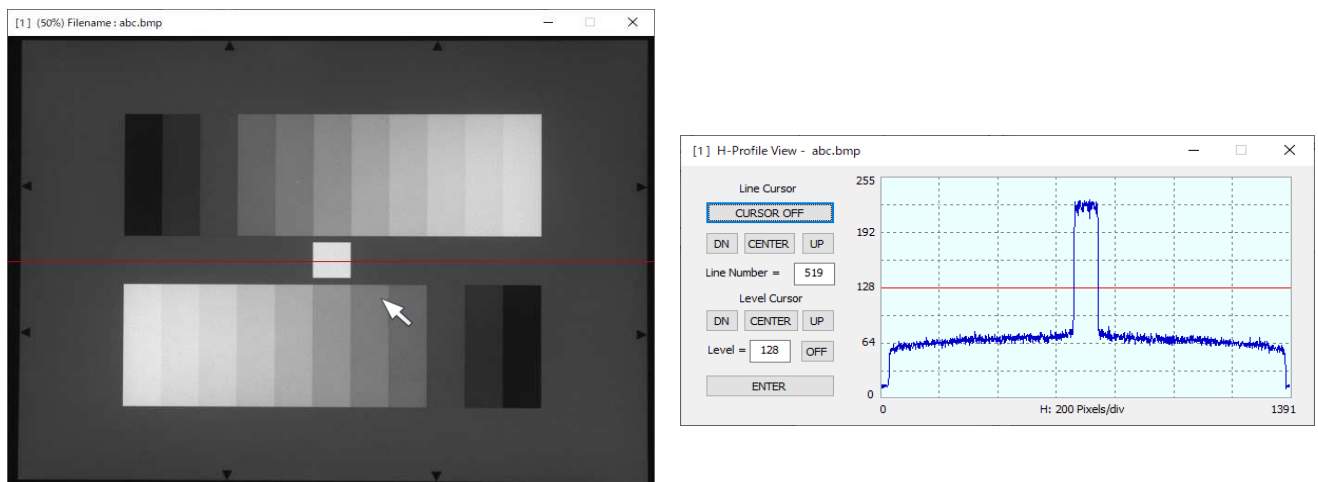
Note: To switch to another region specification method, click the corresponding button labeled **CORNER** or **MOVE**. If the **Region Coordinates** dialog is no longer needed, close it by clicking the **X** at the upper-right corner.

(6-2) Horizontal Profile Display (H-Profile View)

Displays a horizontal profile (level distribution) of the image currently shown in the **View Plane** as a graph. The vertical position from which profile data is acquired can be set in units of one pixel.

(6-2-1) How to Display

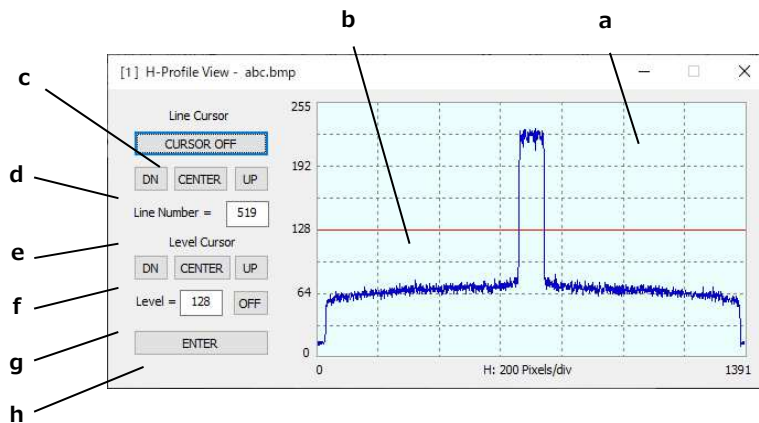
With a **View Plane** displayed, right-click on the View Plane and select **H-Profile**. A horizontal cursor line appears on the image display area, and the profile graph is shown in the **H-Profile View** dialog.



Right-click on the **View Plane** → **H-Profile** to display the profile cursor line and the **H-Profile View** dialog

(6-2-2) Displayed Items

Here, the contents displayed in the **H-Profile View** dialog are explained.



H-Profile View dialog (grayscale image)

a. Graph display field ... A graph showing the profile data is displayed on the right side of the dialog.

Horizontal axis – Indicates the horizontal pixel position.

The left end corresponds to the left edge of the image, and the right end corresponds to the right edge.
One division of the dashed grid corresponds to the pixel value shown below the graph.
In the example above, one division (1 div) represents 200 pixels.

Vertical axis – Indicates the pixel value (intensity level) corresponding to each horizontal position.

For 8-bit data, the range is from 0 (minimum) to 255 (maximum).

b. Level cursor ... This cursor line is used to read the level values on the graph.

The cursor can be moved by left-clicking at any position within this display field.

It can also be moved using one of the following methods:

- Enter a value in the Level field (**g.**) and press the **Enter key**, or click the **ENTER** button (**h**).
- While the **H-Profile dialog** is active, press the keyboard \uparrow (up) or \downarrow (down) keys.

c. Cursor OFF button ... Click this button to hide the line cursor displayed on the **View Plane**.

When the line cursor is hidden, this button changes to **Cursor ON**. Clicking it again will display the line cursor.

d. DN / CENTER / UP buttons ... These buttons are used to change the position of the line cursor.

DN button – Moves the line cursor down by one pixel.

CENTER button – Moves the line cursor to the vertical center.

UP button – Moves the line cursor up by one pixel

e. Line Number ... The current line cursor position (vertical image coordinate) is shown in the field on the right.

You can also move the line cursor to a specified position by entering a value directly in this field and pressing the Enter key, or by clicking the **ENTER** button (**h**).

f. DN/CENTER/UP buttons ... These buttons are used to change the position of the level cursor.

DN button ... Moves the level cursor down by one unit.

CENTER button ... Moves the level cursor to the center position.

UP button ... Moves the level cursor up by one unit.

g. Level ... The current value of the level cursor is displayed in the field on the right.

You can also change the level cursor value by entering a value directly in this field and pressing the **Enter key**, or by clicking the **ENTER** button (**h**).

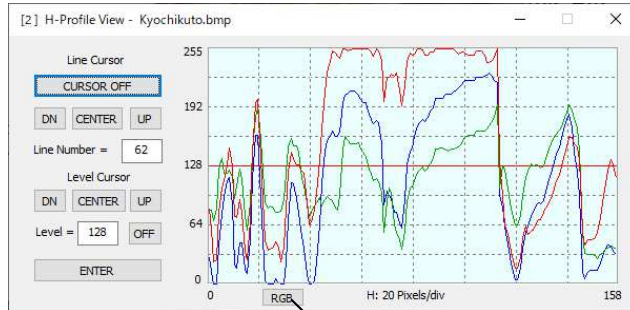
h. ENTER button ... After entering a desired value in **Line Number** or **Level**, click this button to apply the value.

You can also perform the same operation by pressing the **Enter key** on the keyboard instead of clicking this button.

(6-2-3) Horizontal Profile View Dialog (Color Image)

For color images, the H-Profile View dialog is displayed as shown in the figure below.

The display is basically the same as for grayscale images, but **R/G/B/RGB** toggle buttons are provided so that the graph can be switched for each color component.



H-Profile View dialog (Color Image)

i. R/G/B/RGB toggle buttons ... These buttons allow you to switch the graph display between all channels combined (**RGB**) and each individual color channel (**R/G/B**).

Each time this button is clicked, the display cycles as follows:

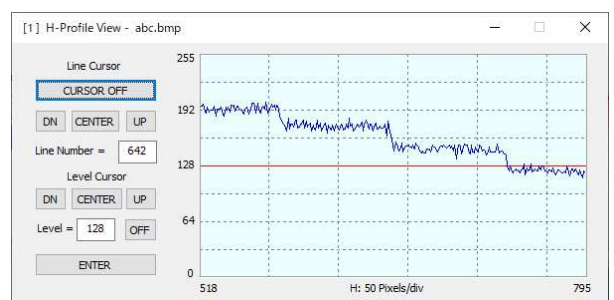
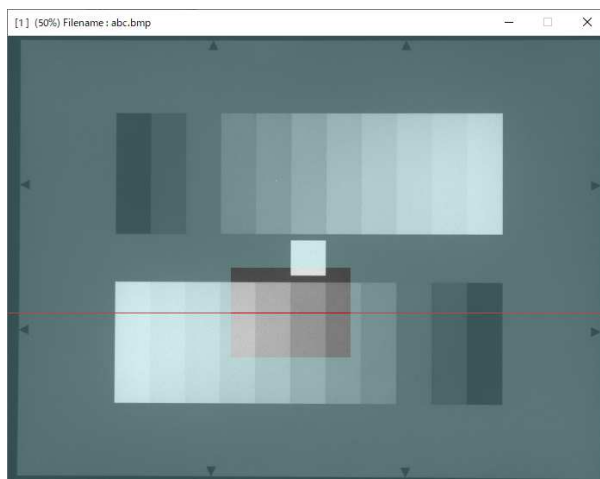
RGB → R → G → B → RGB → ...

(6-2-4) Using Profile Display with Region Selection

The profile display can be limited to a specified region.

The display region is specified in the **Statistics View** window.

See (6-1-4) [Region Selection](#) for details.



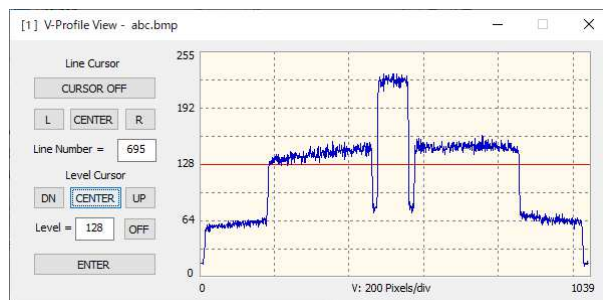
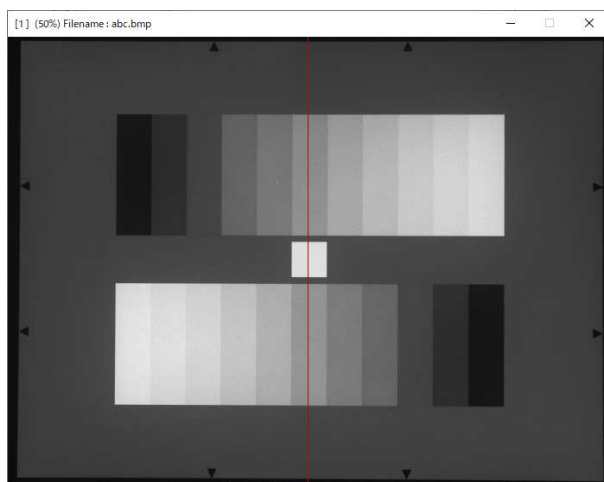
The profile of the selected region is displayed

(6-3) Vertical Profile Display (V-Profile View)

Displays a vertical profile (level distribution) of the image currently shown in the **View Plane** as a graph. The horizontal position from which profile data is acquired can be set in units of one pixel.

(6-3-1) How to Display

With a **View Plane** displayed, right-click on the View Plane and select **V-Profile**. A vertical cursor line appears on the image display area, and the profile graph is shown in the **V-Profile View** dialog.



Right-click on the **View Plane** → **V-Profile** to display the profile cursor line and the **V-Profile View** dialog

(6-3-2) Displayed Items

→ Refer to (6-2-2) [Displayed Items](#) in **Horizontal Profile Display**.

(6-3-3) Vertical Profile View Dialog (Color Image)

→ Refer to (6-2-3) [Horizontal Profile View Dialog \(Color Image\)](#) in **Horizontal Profile Display**.

(6-3-4) Using Profile Display with Region Selection

→ Refer to (6-2-4) [Using Profile Display with Region Selection](#) in **Horizontal Profile Display**.

(6 - 4) Histogram View

Displays a histogram (frequency distribution for each intensity level) of the image currently shown in the **View Plane** as a graph.

Two display modes can be selected in the settings:

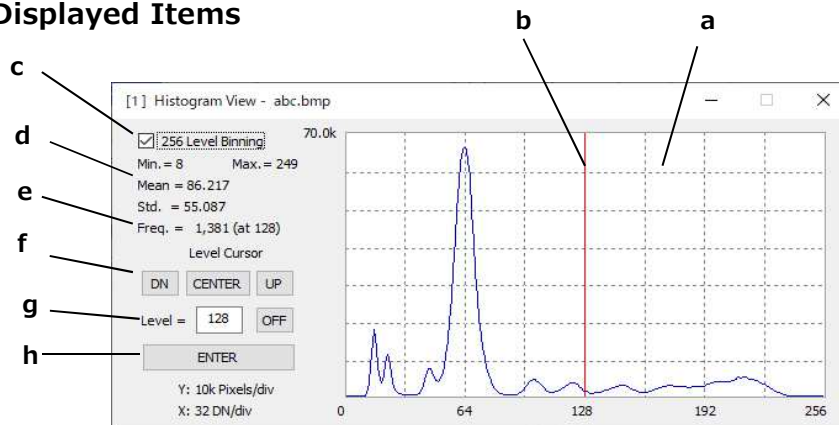
No Binning, which shows the frequency for each individual intensity level across the full bit depth, and **256 Levels**, which divides the entire intensity range into 256 bins.

(6 - 4 - 1) How to Display

With a View Plane displayed, right-click on the View Plane and select **Histogram**.

The **Histogram View** dialog is displayed, and the histogram (frequency distribution graph) of the image data appears in the right area of the dialog.

(6 - 4 - 2) Displayed Items



Example of Histogram View dialog (B/W image)

a. Graph Display Field ... The frequency distribution graph is displayed in the right area of the dialog.

Horizontal axis – Indicates the image data level values from 0 to the maximum value of the bit depth (e.g., 8-bit: 255, 10-bit: 1023, 12-bit: 4095, etc.).

Each division of the auxiliary grid corresponds to (e.g., 8-bit: 32, 10-bit: 128, 12-bit: 512, etc.).

Vertical axis – Indicates the frequency corresponding to each level on the horizontal axis.

b. Level Cursor ... A cursor line used to read values from the histogram graph.

The cursor position can be moved by left-clicking at any position in the graph display field.

It can also be moved using one of the following methods:

- Enter a value in the Level field (**g**) and press the **Enter key**, or click the **ENTER** button (**h**).
- Select the **Histogram View** dialog and press the \uparrow (up) or \downarrow (down) keys on the keyboard.

c. 256 Level Binning ... Check this box to perform binning into 256 levels when generating the histogram plot. Uncheck this box to generate the plot without binning.

d. Statistical Data Display Area ... Displays the minimum (**Min.**), maximum (**Max.**), mean (**Mean**), and standard deviation (**Std.**) of the image region.

e. Freq. ... Displays the frequency at the current level cursor position.

f. DN/CENTER/UP Buttons ... These buttons move the level cursor position.

- | | | |
|---------------|--------|--|
| DN | Button | ... Moves the level cursor one step to the left. |
| CENTER | Button | ... Moves the level cursor to the median position. |
| UP | Button | ... Moves the level cursor one step to the right. |

g. Level ... Displays the current value of the level cursor.

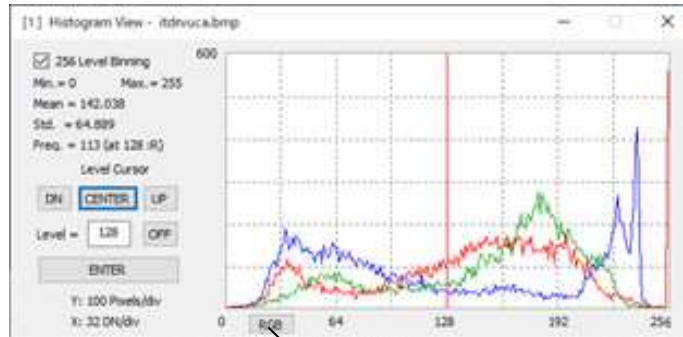
You can also directly enter a value in this field and press the **Enter key**, or click the **ENTER** button (**h**), to set the level cursor to the specified value.

h. ENTER Button ... Click this button after directly entering a desired value in the **Level** field to apply the value. The same operation can also be performed by pressing the **Enter key** on the keyboard.

(6-4-3) Displayed Items (Color Image)

For a color image, the **Histogram View** dialog is displayed as shown in the figure below.

The basic display is the same as for a grayscale image, but **R/G/B/RGB** selection buttons are provided to allow switching the graph display for each color component.



Histogram View dialog (Color image)

- i. **R/G/B/RGB** selection button ... This button allows you to switch between displaying all color components together (**RGB**) or displaying each color separately (**R/G/B**).

Each time the button is clicked, the display switches in the following order:

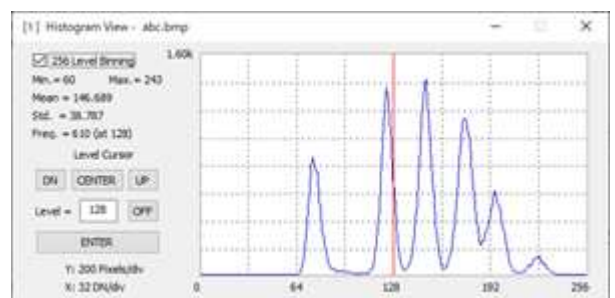
RGB → R → G → B → RGB → ...

(6-4-4) Using Histogram Display with Region Selection

The histogram can be displayed for a specified region only.

The display region is specified in the **Statistics View** window.

→ See [\(6-1-4\) Region Selection](#) for details.



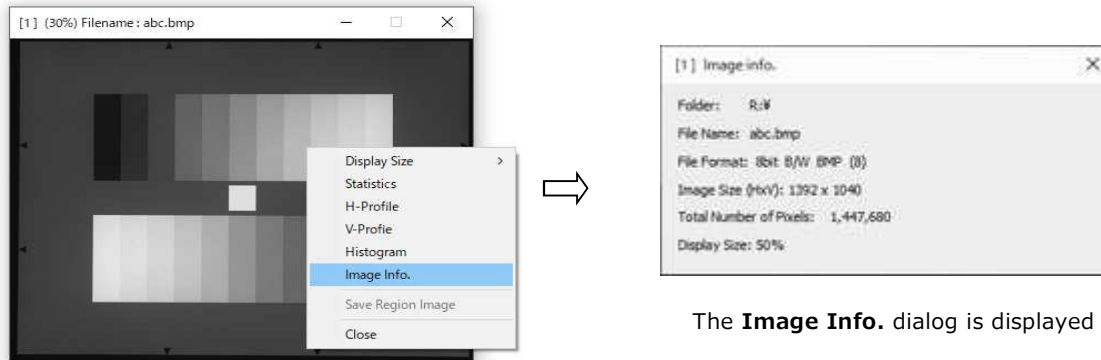
Histogram of the selected region is displayed

(6-5) Image Information (Image Info.)

Displays information about the image file and its current display status in the View Plane.

(6-5-1) How to Display

With a View Plane open, right-click anywhere on the View Plane and select: **Right-click → Image Info.**
The Image Information dialog will be displayed.



The **Image Info.** dialog is displayed

(6-5-2) Displayed Items

- **Folder** ... Displays the path of the folder where the image is stored.
- **File Name** ... Displays the image file name.
- **File Format** ... Displays the format of the image file.
- **Image Size (HxV)** ... Displays the horizontal and vertical pixel size of the image.
- **Total Number of Pixels** ... Displays the total number of pixels in the image.
- **Display Size** ... Displays the current image zoom ratio.

If region selection is set to **ON** in the **Statistics View** dialog, the following two items are also displayed:

- **Region (HxV)** ... Displays the horizontal and vertical pixel size of the selected region.
- **Region (Total)** ... Displays the total number of pixels in the selected region.

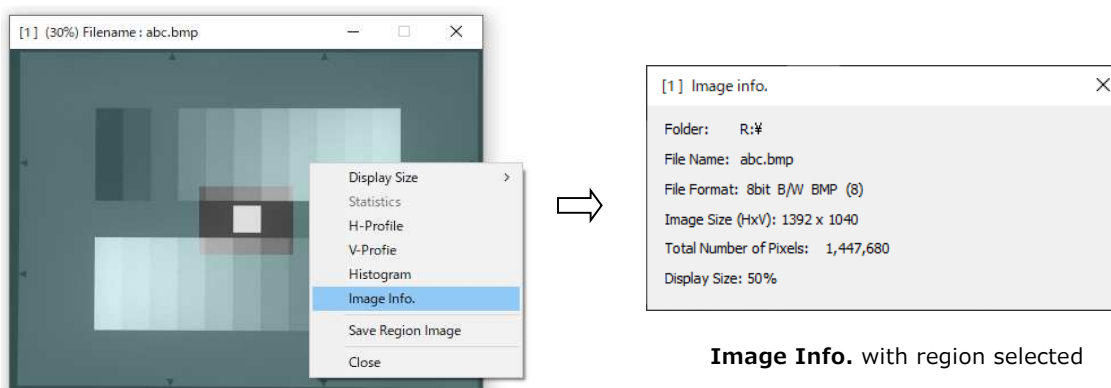
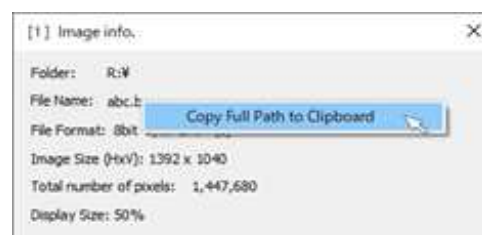


Image Info. with region selected

[Tip] In the Image Info. dialog, right-click on the value displayed after Filename: to open a context menu. → **Left-click** to copy the full file path (including the file name) to the clipboard.



Copy the full file path to the clipboard

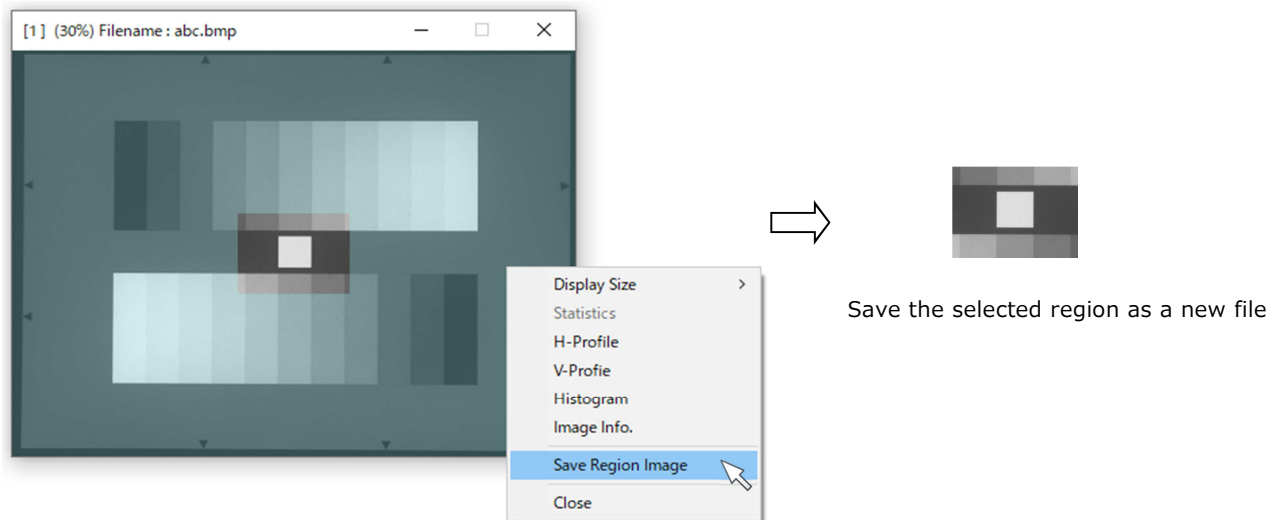
(6 -6) Save Region Image

When region selection is set to **ON** in the dialog, you can save the selected region as a separate image file with a specified file name.

(6 -6-1) How to Save an Image

Specify the region to be saved in the Statistics View window. → [See \(6-1-4\) Region Selection](#).

With the region displayed, right-click anywhere in the View Plane and select **Context Menu → Save Region Image**. The file browser will appear. Enter an appropriate file name and save the image.



※ When the file browser is displayed during the save operation, the file name is automatically generated by default according to the following rule:

OriginalFileName_TopLeftX.TopLeftY_BottomRightX.BottomRightY.Extension

Example: If the original file name is **abc.bmp**, the top-left coordinate is **(558, 417)**, and the bottom-right coordinate is **(835, 624)**, the generated file name will be: **abc_558.417_835.624.bmp**

(6 -7) Closing a View Plane (Close)

You can close the currently open **View Plane** by selecting: **Context menu → Close**

The View Plane can also be closed using any of the following methods:

<Using the "X" button>

Click the **"X"** button at the upper-right corner of the View Plane dialog.

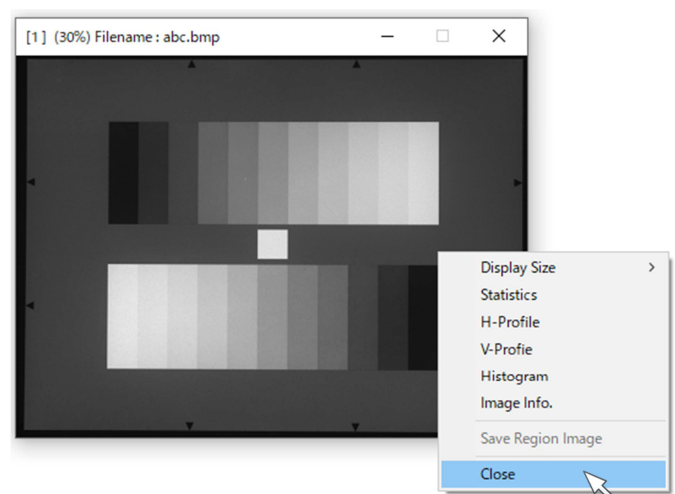
<By double-clicking the title bar>

Move the mouse pointer to the upper-left area of the title bar (the **[Plane Number]** area) and double-click.

<Closing all open View Planes>

You can close all currently open View Planes at once using the following menu:

Main menu → File → Close All Files



Close the View Plane from the context menu

7. Main Menu Description

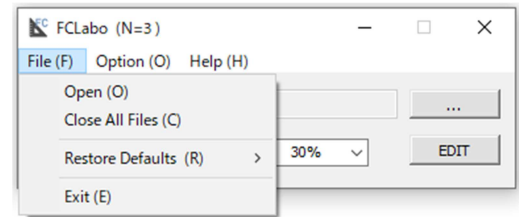
This section explains each item in the main menu bar of the main dialog.

(7-1) File

The following operations are available:

- **Open**
- **Close All Files**
- **Restore Defaults**
- **Exit**

Each item is explained below.



Items in the **File** menu

(7-1-1) Open

Main menu → File → Open

Loads an image file using the file browser.

The same operation can also be performed by clicking the browser button ("...") on the right side of the main dialog to open the file browser.

(7-1-2) Close All Files

Main menu → File → Close All Files

Closes all view planes of the currently loaded image files.

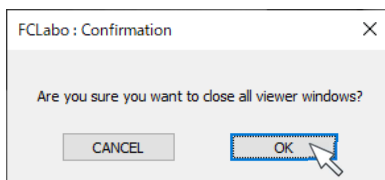
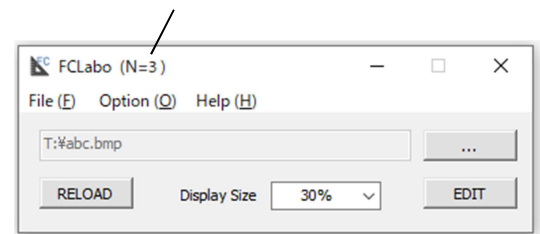
This item is enabled only when at least one view plane is open.

※The number of currently opened planes can be checked at the upper left of the main dialog as (**N = number of planes**).

When Close All Files is selected, a confirmation dialog like the one shown below appears.

Click **OK** to proceed.

Number of open **View Planes**

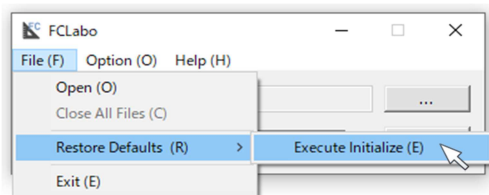


← Click OK to proceed

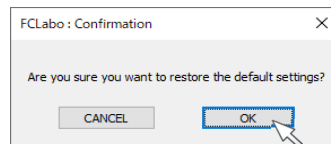
(7-1-3) Restore Defaults (Reset All)

Main menu → File → Restore Defaults → Execute Initialize

Use this operation to restore all settings to their initial state (default settings) as they were immediately after installation.



Click **Restore Defaults → Execute Initialize**



Click **OK** in the confirmation

(7-1-4) Exit

Main menu → File → Exit

Exits the program.

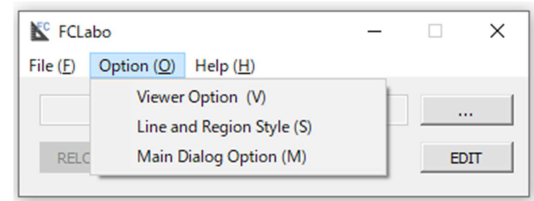
※ You can also exit the program by clicking the "X" button at the upper right of the main dialog.

(7-2) Option

The following options can be viewed and configured:

- **Viewer Option**
- **Line and Region Style**
- **Main Dialog Option**

Each item is explained below.



Items in the **Option** menu

(7-2-1) Viewer Option

Main menu → Option → Viewer Option

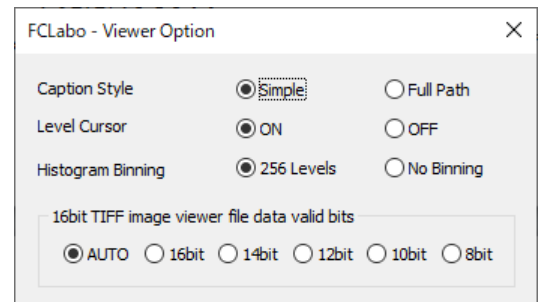
• Caption Style

Sets how the file name is displayed in the title bar of the **View Plane**.

Note: The underlined option is the default setting.

Simple ... Displays only the file name, without showing the folder path.

Full Path ... Displays the file name together with the full folder path.



Items in the **Viewer Option** dialog

• Level Cursor

Sets whether the level cursor is shown or hidden by default in the graphs of the **Profile View** and **Histogram View**.

ON ... Shows the level cursor by default.

OFF ... Hides the level cursor by default.

※ The level cursor can be individually turned **ON** or **OFF** in each graph dialog using the Level **ON/OFF** button.

• Histogram Binning

Sets whether **histogram binning** is applied by default in the **Histogram View** graph.

256 Levels ... By default, the horizontal axis (intensity) is divided into **256 bins** and the histogram is displayed.

No Binning ... By default, **no binning** is applied to the horizontal axis (intensity values).

※ Binning can also be turned **ON** or **OFF** in the **Histogram View** dialog using the “**256 Level Binning**” checkbox.

Note: Binning is performed by dividing the intensity range into 256 bins. Therefore, for 8-bit images that already have 256 intensity levels, enabling or disabling binning does not affect the appearance of the graph.

[Explanation]

In 256-level binning, the entire intensity range is divided into 256 bins when plotting the histogram.

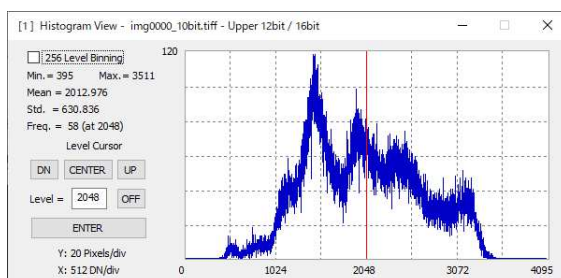
For example, in **12-bit** data, one bin corresponds to $4096 / 256 = 16$ intensity levels.

The full intensity range is divided as follows: **0–15, 16–31, 32–47, ..., 4064–4079, 4080–4095**.

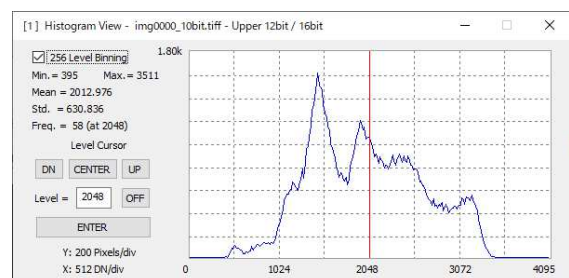
The frequencies within each bin are accumulated and plotted.

The two histogram displays below show the same **12-bit** image.

By displaying the histogram with **256-level binning** (as shown on the right), fine fluctuations at each single intensity level are averaged, making it easier to grasp the overall brightness distribution of the image.



No Binning



256-level binning (256 Levels)

• 16bit TIFF image viewer file data valid bits

Specifies the number of valid bits in 16-bit TIFF image data.

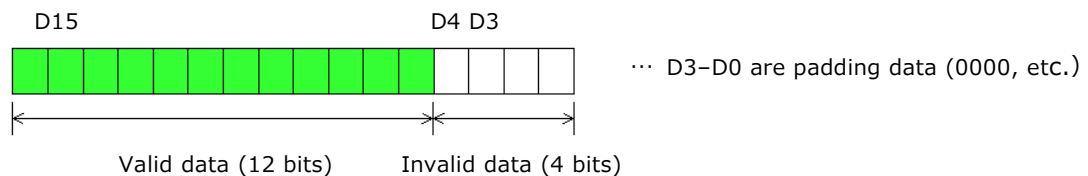
When set to **AUTO**, the actual valid bits in the 16-bit data are automatically detected, and the image is displayed using only those valid bits.

- AUTO** ... Automatically detects and imports only the valid image data bits from a 16-bit TIFF image
- 16bit** ... Imports all bits of a 16-bit TIFF image as valid image data.
- 14bit** ... Imports the upper 14 bits of a 16-bit TIFF image as valid image data.
- 12bit** ... Imports the upper 12 bits of a 16-bit TIFF image as valid image data.
- 10bit** ... Imports the upper 10 bits of a 16-bit TIFF image as valid image data.
- 8bit** ... Imports the upper 8 bits of a 16-bit TIFF image as valid image data.

[Explanation]

To simplify the implementation of TIFF file generation, image data whose actual valid bit depth is less than 16 bits (e.g., 12-bit data) is sometimes stored as 16-bit data by padding the remaining lower bits (e.g., 4 bits for 12-bit data) with meaningless values such as all zeros or all ones.

The figure below shows an example of one pixel in a 16-bit TIFF image where 12-bit valid image data is embedded in the upper bits.



Example of 12-bit valid data in 16-bit TIFF data

In this viewer, the valid bit depth can be specified using this option, and the image data is loaded after being converted to the actual valid bit depth (only the specified number of upper bits is extracted).

If image data with a smaller bit depth is embedded in 16-bit TIFF data, the valid bit depth is displayed in the title bar of the view plane as shown in the following example:

File Name: *filename* **(Upper 12bit/16bit)** ... Indicates that the upper 12 bits out of 16 bits are valid image data.

Note: If a TIFF file originally formatted as 12-bit is loaded, it is displayed as: **File Name:** *file Name* **(12bit)**

(7-2-2) Line and Region Style

Main menu → Option → Line and Region Style

• Cursor Line Color

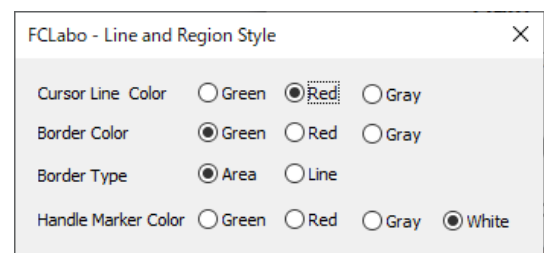
Sets the display color of the H/V line cursors shown in the view plane dialog.

The specified color is applied to both H and V line cursors.

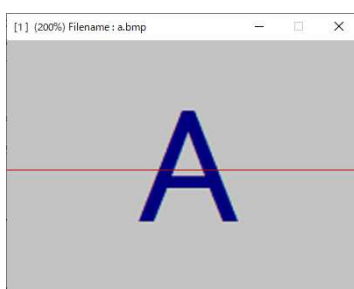
Green ... Displays the line cursor in green.

Red ... Displays the line cursor in red.

Gray ... Displays the line cursor in gray.



Line and Region Style settings dialog



← Set the line cursor color with **Cursor Line Color**

- **Border Color**

Sets the color used to indicate the region boundary in the **View Plane** dialog.

Green ... Displays the region boundary in green.

Red ... Displays the region boundary in red.

Gray ... Displays the region boundary in gray.

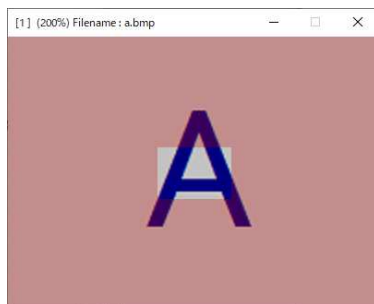
- **Border Type**

Sets how the region boundary is displayed in the view plane dialog.

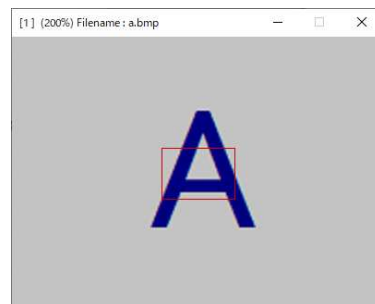
Area ... Colors the area outside the region using the color specified by **Border Color**.

Line ... Draws the region boundary line using the color specified by **Border Color**.

[Example]



Border Color = RED
(at **Border Type = Area**)



Border Color = RED
(at **Border Type = Line**)

- **Handle Marker Color**

Sets the line color of the handle markers that appear when specifying the position of the region boundary in the view plane dialog.

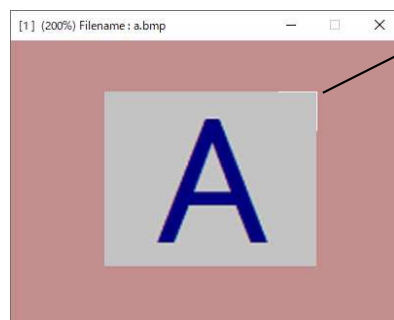
Green ... Sets the marker line color to green.

Red ... Sets the marker line color to red.

Gray ... Sets the marker line color to gray.

White ... Sets the marker line color to white.

[Example]



Handle Marker

Handle Marker Color = White

(7-2-3) Main Dialog Option

Main menu → Option → Main Dialog Option

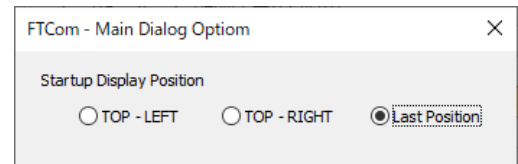
- **Startup Display Position**

Specifies where on the monitor the main dialog is displayed when the program starts.

Top-Left ... Displays the main dialog at the top-left of the monitor at startup.

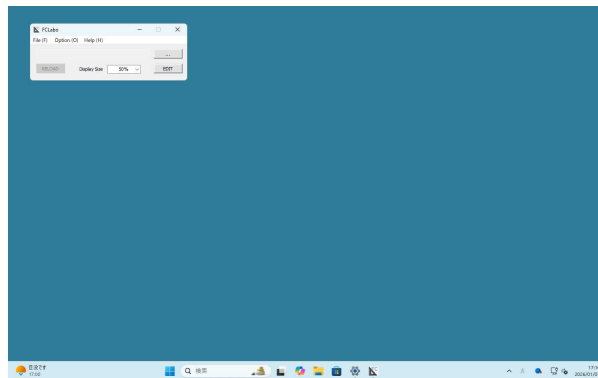
Top-Right ... Displays the main dialog at the top-right of the monitor at startup.

Last Position ... Displays the main dialog at the position where it was last closed.

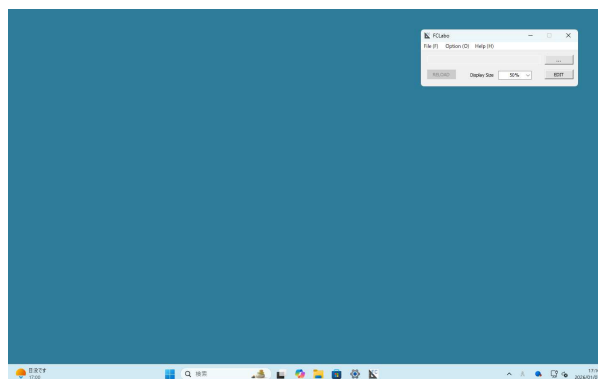


Main Dialog Option dialog

[Example]



Startup Display Position = Top-Left



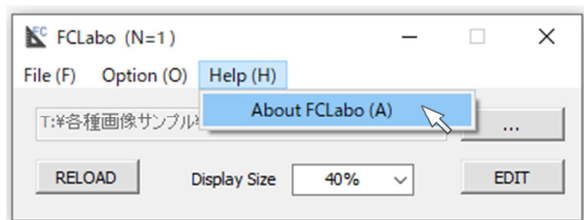
Startup Display Position = Top-Right

(7-3) Help

(7-3-1) About FCLabo (Version Information)

Main menu → Help → LAbout FCLabo

Displays the version information of this software.



How to check the version information



The version information dialog is displayed

※ If the PC is connected to the Internet, clicking the URL in the dialog (blue underlined text) will open our company's website (**Takenaka Optonic Co., Ltd.**) in a web browser.

8. CSV File Export

This software can generate **CSV** (Comma-Separated Values) files for the horizontal and vertical profile data at specified positions, as well as histogram data for a specified region, and output them to a designated folder. Using this function, the exported data can be analyzed or graphed with spreadsheet software or similar tools.

(8-1) Exporting Profile CSV Data

The data currently displayed in the **H** or **V** Profile dialog can be saved (exported) as a **CSV** file.

< Procedure for Exporting a CSV File >

- Right-click anywhere on the profile dialog from which you want to export the **CSV** file.
- When the **Export to CSV file** button appears, left-click it to save the file.

<Save Folder and File Name>

The save folder and file Name of the generated file are as follows.

Save Folder

Select the destination folder in the displayed file browser (**Save As** dialog).

Save File Name

The file name is automatically generated based on the original image file name, horizontal (H) or vertical (V) profile, line number (with "00000" representing the topmost or leftmost line), and, for RGB images, the color component (R/G/B).

Example for a B/W image

abc_ = Original image file name (**abc.bmp** or **abc.tif**)

H = Horizontal profile

00519 = Line number **519** (520th line from the top)

→ Save File Name: **abc_H00519.csv**

Example for an RGB image (R channel)

def_ = Original image file name (**def.bmp** or **def.tif**)

H = Horizontal profile

00519 = Line number **519** (520th line from the top)

(R) = R channel of the RGB image

→ Save File Name: **def_H00519(R).csv**

Example for an RGB image (RGB combined)

def_ = Original image file name (**def.bmp** or **def.tif**)

H = Horizontal profile

00519 = Line number **519** (520th line from the top)

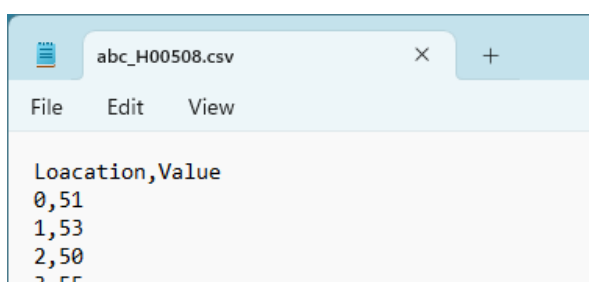
(RGB) = Combined R/G/B channels

→ Save File Name: **def_H519(RGB).csv**

※ The file name can also be freely edited by entering any desired name in the File name field of the file browser instead of using the automatically generated name. Example displayed in Windows Notepad

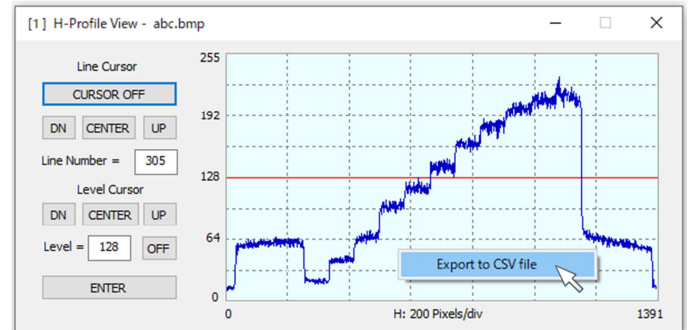
<Save Content>

As shown below, two data items—pixel position (**Location**) and intensity value (**Value**)—are stored as 1-byte text strings, separated by commas (,), carriage return (CR), and line feed (LF).



← Example shown in **Windows Notepad**

The left column shows the pixel position (**Location**), and the value on the right, separated by a comma, is the intensity (**Value**).



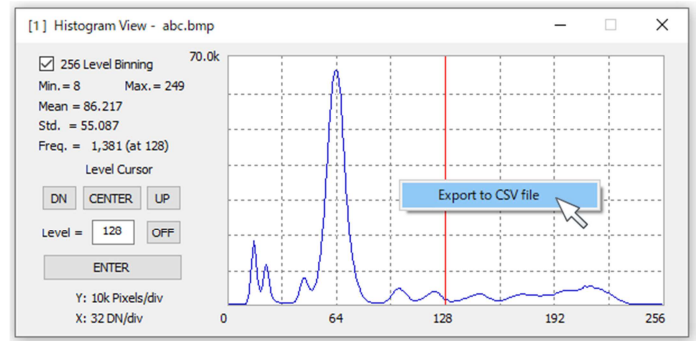
Export profile data to a **CSV** file

(8-2) Exporting Histogram CSV Data

The histogram data of the currently displayed image can be saved (exported) as a **CSV** (Comma-Separated Values) file.

< Procedure for Exporting a CSV File >

- Right-click anywhere in the histogram dialog for which you want to export the **CSV** file.
- **Click Export to CSV file** to save the file.



<Save Folder and File Name>

Export histogram data to a **CSV** file

The save folder and file name of the generated file are as follows.

Save Folder

Select the destination folder in the displayed file browser (**Save As** dialog).

Save File Name

The file name is generated based on the original image file name and, for RGB images, the selected color component (R/G/B/RGB).

Example for a B/W image

→ Save File Name: **abc_HIS.csv**

abc_ = Original image file name (**abc.bmp** or **abc.tif**)

HIS = histogram

Example when saving the “**R**” component of an RGB image

→ Save File Name: **def_HIS(R).csv**

def_ = Original image file name (**def.bmp** or **abc.tif**)

HIS = histogram

(R) = R channel of RGB

Example when saving the “**RGB**” of an RGB image

→ Save File Name: **def_HIS(RGB).csv**

def_ = Original image file name (**def.bmp** or **abc.tif**)

HIS = histogram

(RGB) = R/G/B channels

※ You can also manually specify any file name by typing it in the **File name** field of the file browser instead of using the automatically generated name.

Saved Content

As shown below, the data consists of two fields: **Value** and **Freq.**, recorded as single-byte text, separated by a comma (.), carriage return (**CR**), and line feed (**LF**).

```
Value,Freq.
0,0
1,0
2,0
3,0
4,0
5,0
6,0
```

← Example shown in **Windows Notepad**

The left column shows the intensity value (**Value**), and the right column shows the frequency (**Freq.**), separated by commas.

※ **CSV files** can be directly opened in spreadsheet software such as **Microsoft Excel**.

※ When **Region** display is **ON**, data corresponding to the specified region is exported.

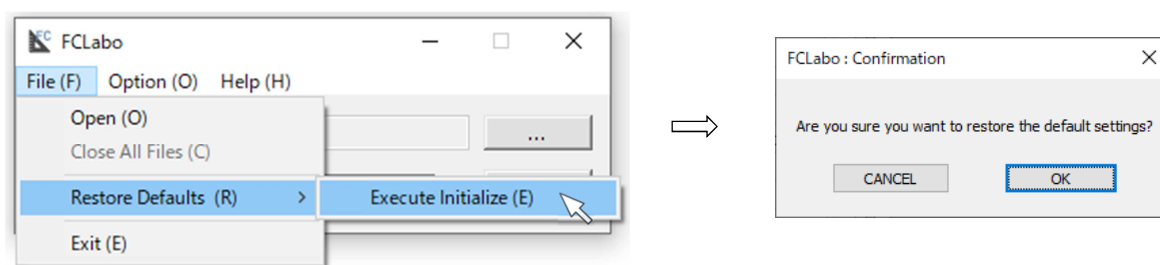
※ For **RGB** data, frequencies are counted separately for each color: **Freq(R)**, **Freq(G)**, and **Freq(B)**.

9. Resetting Settings and Uninstalling the Software

(9-1) How to Reset Settings

To restore all user settings of this software to the initial default state (**full reset**) as they were immediately after installation, follow the procedure below:

Main Menu → File → Restore Defaults → Execute Initialize (left-click)



Click **OK** in the confirmation dialog

(9-2) How to Uninstall the Software

Refer to [\(3-3\) Uninstalling Procedure](#) in this manual.

End of Document