

# **Multi Channel Detector Head and Driver Circuit for Image Sensor Control Software DCam-USB**

## **Instruction Manual**

- Be sure to read the operation manual carefully before the product is used.
- If operated differently from the standard procedure in the manual, a serious accident may occur.
- Keep this manual for future reference.

Document Number : K46-B60009  
Document Revision : 2.03 29.Jul.2014

**HAMAMATSU**

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# Overview

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"DCam-USB" is an application software that is provided with Hamamatsu Photonics's Multi Channel Detector Head and Driver Circuit for Image Sensor.

This software can carry out various operations such as following functions, and can be made compliant to various applications.

- Hardware setting
- Data acquisition
- Graphic display
- Data analyses



**Application software "DCam-USB" is the application software for our products of USB interface. Although the support for all the functions to operate the whole hardware of our company is given in this application, in case of the functions which are not valid for this hardware, a message to indicate that this operation is not possible or error message after the operation failure will be displayed. Also, explanation of supported functions is published in this handling description manual. Therefore please take care while usage, as the functionalities which can not be used by the our products are also present.**

## 2.1 Program file

The following files are used to boot up this program.

Related application software

- 1) DCam-USB.exe
- 2) DCamUSBDrv.dll
- 3) DCamUSBCmd.dll

Related USB interface driver

- 1) UsbCamIF.sys ( Windows 7® )
- 2) UsbCamIF.inf

## 2.2 Operating environment

### ■ Supported OS

Microsoft® Windows 7® (Service Pack 1 or later)

### ■ CPU

To conform the environment of OS recommended.

### ■ Memory

To conform the environment of OS recommended.

## 3.1 Installing DCam-USB

Installation of DCam-USB requires the following installer.

To install, follow these steps.

1. Run "Setup.exe".
2. When the program starts, click "Next".
3. In the following window, select the installation location. Since the location is usually the same, just click "Next" to start the installation.
4. When the installation is completed, a dialog will appear. Click "Finish" in the dialog. When DCam-USB is installed, its shortcut icon appears on the PC's desktop.

## 3.2 Uninstalling DCam-USB

DCam-USB is uninstalled from "Add / Remove Programs" in the control panel.

To uninstall, follow these steps.

1. In the start menu point to "Settings" and select "Control Panel".
2. Select "Add / Remove Programs" from the control panel.
3. Select "DCam-USB" from the list and then click "Remove". A confirmation dialog box appears. Click "Yes" to confirm that the program is to be removed.
4. When uninstallation is completed, a dialog will appear. Click "Finish" in this dialog.

# 4

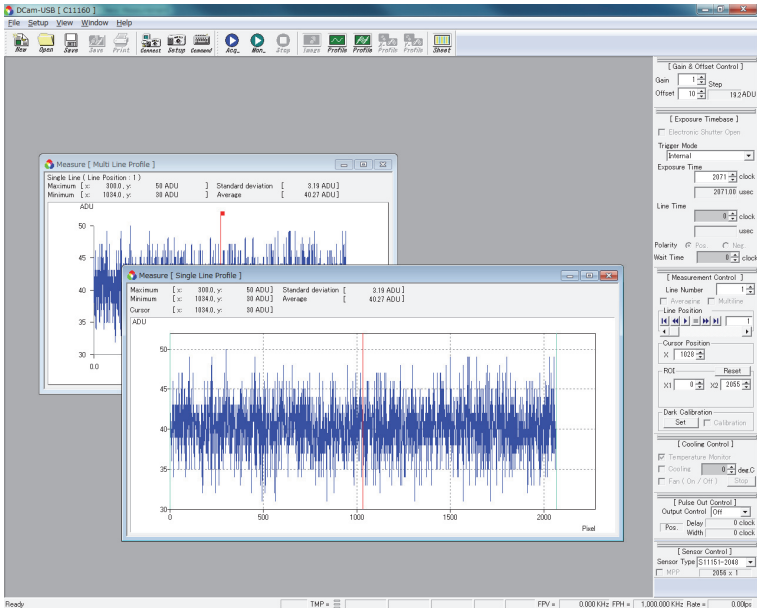
## Overview of setup window

### 4.1 Main window

The main window of DCam-USB is shown below.

The operations can be carried out from the menu and tool bar and the settings can be made from the dialog, dialog bar and popup menu.

The measurement parameters are also displayed on the status bar.





## 4.2 Menu

Following are the menus available in DCam-USB.

"Image", "Profile", "Sheet" will be displayed only when the specific window is active.

Menu	Name	Description
File	New	Deletes the current data and creates a new file
	Open	Reads the data
	Close	Deletes the current data
	Save Meas Data	Saves the data
	Print	Prints the data on the active window
	Print Preview	Displays a preview of the active window
	Print Setup	Printer settings
	Recent File	Opens the most recently used file
Setup	Exit	Quits the application
	Connection	Connects to the hardware (Displays the dialog)
	Scanning Mode	Settings of measurement mode (Linear Scanning Mode / Area Scanning Mode)
	Monitor Mode	Settings of monitor mode (Data Skipping Mode/Continuous Data Mode)
	Camera Setup	Displays the dialog for setting the hardware (Setup)
		Reading the parameter (Load Camera Parameter)
		Writing the parameter (Save Camera Parameter)
Measure	Acquire	Starts data acquisition
	Monitor	Starts data monitoring
	Stop	Stops data acquisition/monitoring
	Image	Displays the image window
	Single Line Profile	Displays the single line profile window
	Multi Line Profile	Displays the multi line profile window
	Multi X Line Profile	Displays the multi X line profile window
	Multi Y Line Profile	Displays the multi Y line profile window
	Spread Sheet	Displays the spreadsheet window

Menu	Name	Description
Image * 1	Binning	Binning settings (LPB/AB/AE)
	LUT	Displays the color for the image (B&W/RGB)
	Zoom	Magnifies/minimizes the image (25%, 400%, Auto)
	Rotate	Rotates the image (None, 90, 180, 270)
	Flip	Changes the axis of the image (None, Y, X)
	Cursor Center	The cursor is moved to center of the image
	Save Image	Saves the displayed analysis result image
	Copy Image	The displayed analysis result image is copied to the clipboard.
	Profile ON	Shows/hides the X and Y section profile
	Property	Shows the details of the image settings
Profile(Single) * 1	X/Y Adjust	Auto scales X/Y axis
	X Auto Scale	Auto scale mode of X axis ON/OFF
	Y Auto Scale	Auto scale mode of Y axis ON/OFF
	Save Profile Image	Saves the displayed profile image
	Copy Profile Image	The displayed profile image is copied to the clipboard.
	Property	Details of the profile settings
Profile(Multi) * 1	X/Y Adjust	Auto scales X/Y axis
	X Auto Scale	Auto scale mode of X axis ON/OFF
	Y Auto Scale	Auto scale mode of Y axis ON/OFF
	Save Profile Image	Saves the displayed profile image
	Copy Profile Image	The displayed profile image is copied to the clipboard.
	Property	Details of the profile settings
Profile(Multi X) * 1	X/Z Adjust	Auto scales X/Z axis
	X Auto Scale	Auto scale mode of X axis ON/OFF
	Z Auto Scale	Auto scale mode of Z axis ON/OFF
	Graph ROI Portion	The area specified by the ROI cursor are displayed. ON/OFF
	Save Profile Image	Saves the displayed profile image
	Copy Profile Image	The displayed profile image is copied to the clipboard.
	Property	Details of the profile settings
Profile(Multi Y) * 1	Y/Z Adjust	Auto scales Y/Z axis
	Y Auto Scale	Auto scale mode of Y axis ON/OFF
	Z Auto Scale	Auto scale mode of Z axis ON/OFF
	Graph ROI Portion	The area specified by the ROI cursor are displayed. ON/OFF
	Save Profile Image	Saves the displayed profile image
	Copy Profile Image	The displayed profile image is copied to the clipboard.
	Property	Details of the profile settings

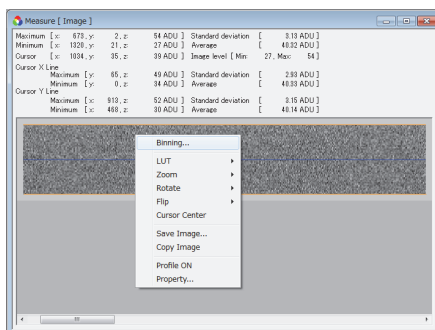
Menu	Name	Description
Sheet * 1	Copy	Copies the selected data to the clip board
	Select All	Selects the entire data
	Dec mode	Decimal mode
	Hex Mode	Hexadecimal mode
	Image Data	Displays the image data
	X Profile Data	Displays the X profile data
	Y Profile Data	Displays the Y profile data
View	Measurement Control	Shows/hides Measurement Control
	Gain & Offset Control	Shows/hides Gain & Offset Control
	Exposure Timebase	Shows/hides Exposure Timebase
	Cooling Control	Shows/hides Cooling Control
	Pulse Out Control	Shows/hides Pulse Out Control
	Sensor Control	Shows/hides Sensor Control
	Camera Command	Shows/hides Camera Command
	Tool Bar (Standard)	Shows/hides the tool bar
	Tool Bar (Measure)	Shows/hides the tool bar
	Status Bar	Shows/hides the status bar
Window	Cascade	Arranges the windows to overlap each other
	Tile	Arranges the windows as non-overlapping tiles
	Arrange Icons	Arranges the icons
Help	About	Displays the version information regarding DCam-USB and the hardware
	Online Help	Displays the help file

\*1 : The indication screens are different by a chosen menu.

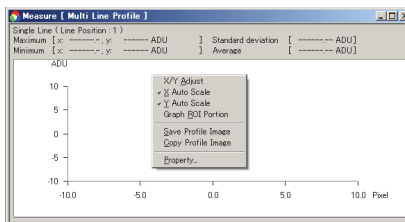
## 4.3 Popup menu

Right click on the Image, Single Line Profile, Multi Line Profile, Multi X Line Profile, Multi Y Line Profile, and Spread Sheet window to display the popup menu. For details, refer to 3.2 Menu.

### (1) Image



### (2) Profile (Single, Multi, Multi X, Multi Y)



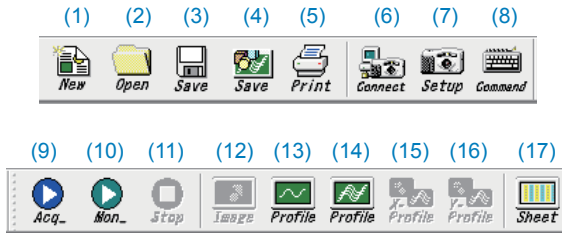
### (3) Spread Sheet

The screenshot shows the 'Spread Sheet' window. It contains a table with columns: AVE, SD, P-P, MAX, MIN, and several numbered columns (1-8). A right-click context menu is open over the table, listing options: Copy (Ctrl+C), Select All (Ctrl+A), Dec Mode, Hex Mode, Image Data, X Profile Data, and Y Profile Data. The 'Image Data' option is highlighted.

	AVE	SD	P-P	MAX	MIN	1	2	3	4	5	8
0	40.17	3.87	10	44	34	43	44	39	34	43	38
1	39.33	4.76	14	47	33	37	42	38	47	33	39
2	38.50	2.95	6	42	36	38	36	36	42	39	40
3	40.17	1.72	5	43	38	39	40	40	38	41	43
4	40.67	4.23	11	48	37	43	37	37	40	48	39
5	39.50	3.89	11	44	33	33	36	36	36	36	39
6	39.67	3.44	10	44	34	44	40	40	40	40	40
7	39.17	3.31	9	44	35	42	44	44	44	44	41
8	39.67	3.01	7	42	35	35	44	44	44	44	35
9	40.17	3.43	9	44	35	44	44	44	44	44	37
10	39.33	1.96	4	41	37	41	41	41	41	41	42
11	39.00	3.29	9	42	33	38	44	44	44	44	42
12	41.83	2.23	8	44	39	44	44	44	44	44	45
13	40.67	2.73	9	45	37	42	44	44	44	44	39
14	40.83	4.79	13	48	35	40	44	44	44	44	39
15	40.50	3.73	9	46	37	44	48	37	40	37	39
16	40.00	4.71	10	49	30	41	50	50	45	40	50

## 4.4 Tool bar

The following buttons are available on the tool bar.

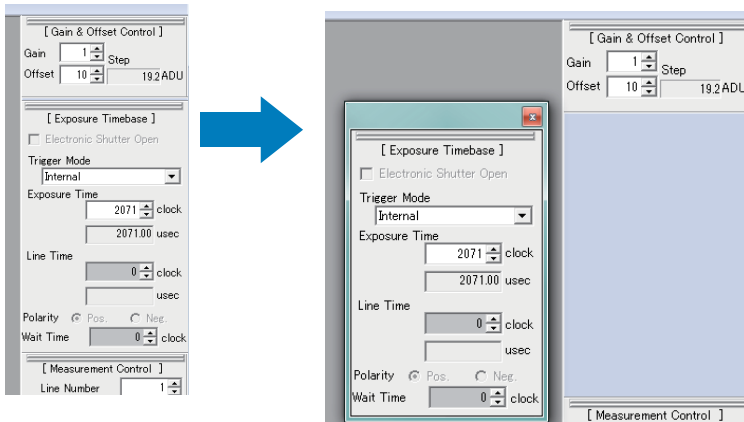


- |      |                      |   |
|------|----------------------|---|
| (1)  | New                  | : Deletes the current data and creates a new file |
| (2)  | Open                 | : Reads the data                                  |
| (3)  | Save Meas Data       | : Saves the data                                  |
| (4)  | Save Image           | : Saves the displayed analysis result image       |
|      | Save Profile image   | : Saves the profile image                         |
| (5)  | Print                | : Prints the data on active window                |
| (6)  | Connection           | : Connects to the hardware                        |
| (7)  | Camera Setup         | : Settings of the hardware                        |
| (8)  | Camera Command       | : Sends a manual command to the hardware          |
| (9)  | Acquire              | : Starts data acquisition                         |
| (10) | Monitor              | : Starts data monitoring                          |
| (11) | Stop                 | : Stops data acquisition/monitoring               |
| (12) | Image                | : Displays the image window                       |
| (13) | Single Line Profile  | : Displays the single line profile window         |
| (14) | Multi Line Profile   | : Displays the multi line profile window          |
| (15) | Multi X Line Profile | : Displays the multi X line profile window        |
| (16) | Multi Y Line Profile | : Displays the multi Y line profile window        |
| (17) | Spread Sheet         | : Displays the spreadsheet window                 |

\* Whether the buttons can be used depends upon the specified window.

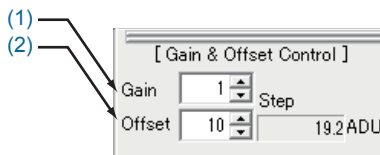
## 4.5 Dialog bar

The measurement conditions that can be set in the four dialog bars are shown below.  
The parameters are also displayed in a single dialog bar.  
The dialog bar can also be removed from the main window.



### 4.5.1 Gain & Offset Control

Sets the gain and offset of the hardware. For details on the functions, refer to the "Instruction manual" of each hardware.



**(1) Gain**

Sets the hardware gain.

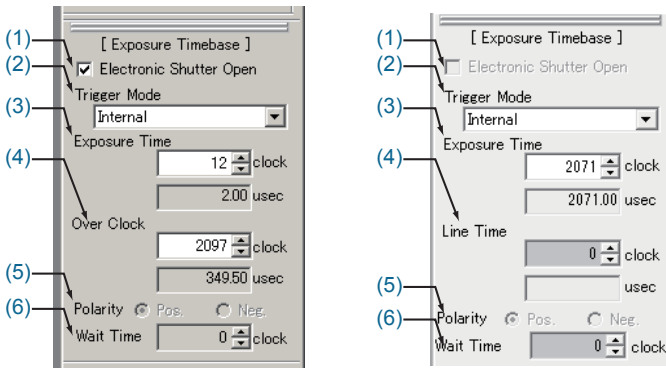
**(2) Offset**

Sets the hardware offset.

### 4.5.2 Exposure Timebase

Sets the operating mode when acquiring the data using the hardware. For details on the functions, refer to the "Instruction manual" of each hardware.

Dialogs at storage time are two types of Dialog bar.



#### (1) Electronic shutter mode

Sets the electronic shutter mode.

#### (2) Trigger Mode

The trigger mode can be selected. However, the trigger modes that can be selected when the hardware is connected are restricted or subject to changed. Following are examples of frequently used mode.

Internal	: Internal mode
External Edge	: External edge mode
External Level	: External level mode
External Gated	: External gate mode

#### (3) Exposure Time

Sets the exposure time.

#### (4) Over Clock/Line Time

Sets the over clock or line time.

#### (5) Polarity

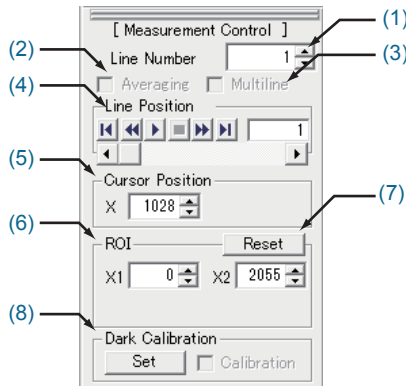
Select either "Positive" or "Negative".

#### (6) Wait Time

Sets the wait time.

### 4.5.3 Measurement Control (Line Scanning Mode)

The display of the dialog bar differs according to the measurement mode. In case of Line Scanning Mode, the dialog bar is as follows.



**(1) Line Number**

Specify the total number of lines to be obtained.

**(2) Averaging**

In case of multiple lines, select the Averaging check box before measuring. The average of the entire data is calculated and displayed as a single datum.

**(3) Multi Line**

Select the this check box before measuring. The measurement data is temporarily stored in hardware's RAM and transferred without deficit.

**(4) Line Position**

When data of multiple lines are acquired in "Acquire" mode or only when the data has been acquired in "Monitor" mode (after data acquisition is stopped), specify the data of any one line.

The line number that is displayed in the above window starts from 1.

Moreover, animated display operations are also possible with the replay/stop button. (Only in case of multiple data)

**(5) Cursor Position**

Sets the cursor position.



**(6) ROI**

Set the ROI (Regions of Interest) cursor to specify the region of data analysis. When the data is obtained, this region is specified with the maximum range.

**(7) Reset**

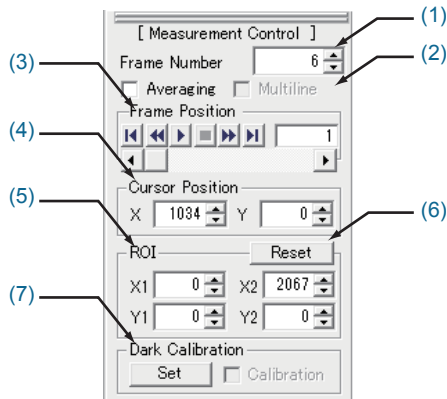
Set the ROI (Region Of Interest) cursor to the maximum range.

**(8) Dark Calibration**

Set the data of the displayed line as a dark value with the "Set" button. When the "Dark Calibration" check box is ON, the image, reduced by the dark set value, is displayed.

**4.5.4 Measurement Control (Area Scanning Mode)**

In case of Area Scanning Mode, the display of the dialog bar is as follows.

**(1) Frame Number**

Specify the total number of frames to be obtained.

**(2) Multi Line**

Select the this check box before measuring. The measurement data is temporarily stored in hardware's RAM and transferred without deficit.

**(3) Frame Position**

When multiple images are acquired in the "Acquire" mode or only when the data is acquired in the "Monitor" mode (after data acquisition is stopped), any one-image data that is displayed on the window can be specified. Moreover, continuous display operations are also possible with the replay/stop button. (In case of multiple data)

**(4) Cursor Position**

Set the cursor position.

**(5) ROI**

Set the ROI (Regions of Interest) cursor to specify the region of data analysis. When the data is obtained, this region is specified with the maximum range.

**(6) Reset**

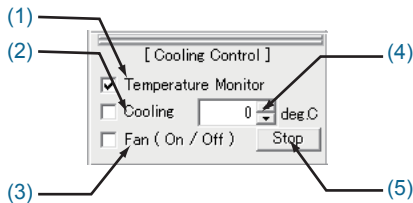
Sets the ROI (Region Of Interest) cursor to the maximum range.

**(7) Dark Calibration**

Set the image data that is currently displayed as a dark value with the "Set" button. When the "Dark Calibration" check box is ON, the image, reduced by the dark set value, is displayed.

#### 4.5.5 Cooling Control

Sets the parameters of the temperature controller. For details on the functions, refer to the "Instruction manual" of each hardware.

**(1) Temperature Monitor**

To enable temperature monitoring, select the check box.

**(2) Cooling**

To enable cooling, select the check box.

**(3) Fan**

To switch ON the fan, select the check box.

**(4) Cooling temperature (deg.C)**

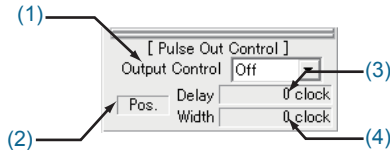
Sets the cooling temperature.

**(5) Stop**

Stops the cooling and fan controls.

#### 4.5.6 Pulse Out Control

Displays the settings of " PULSE OUT " symbol.



**(1) Output Control**

It performs the Operation Setup of output control.

Choose "On" or "Auto" for sending "PULSE OUT" signal. When "Auto" is selected, timing is adjusted automatically by using exposure time width, instead of using delay time and pulse width.

**(2) Polarity**

Displays either "Pos" (Positive) or "Neg" (Negative).

**(3) Delay Time**

Displays the delay time in standard time units.

**(4) Pulse Width**

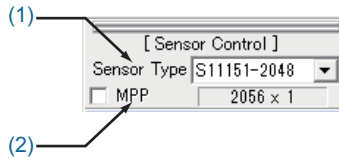
Displays the pulse width in standard time units.

#### 4.5.7 Sensor Control

It performs setting of Sensor.

Sensor, which can be selected, changes depending on the hardware.

Moreover, in some cases it is not required to perform the setup.



**(1) Sensor Type**

Sensor to be used is selected.

**(2) MPP(Multi-Pinned Phase)**

Sets the MPP mode for CCD image sensor.

When MPP Mode is changed, the "Exposure Time" and "Line Time" are updated automatically.

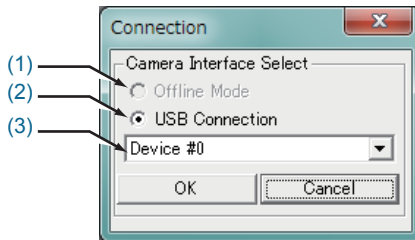
## 4.6 Dialog

The settings for Each interface and the hardware can be selected in the following dialog. For details on each feature, refer to the "Instruction manual" of the individual hardware.

### 4.6.1 Connection

Select the method for connecting with the camera.

Select menu "Setup Connection" to display the following dialog.



**(1) Offline Mode**

The hardware is not connected. Used for analyzing the saved data.

**(2) USB Connection**

Select when the hardware is to be controlled from the PC USB port.

**(3) USB number**

Select the device.

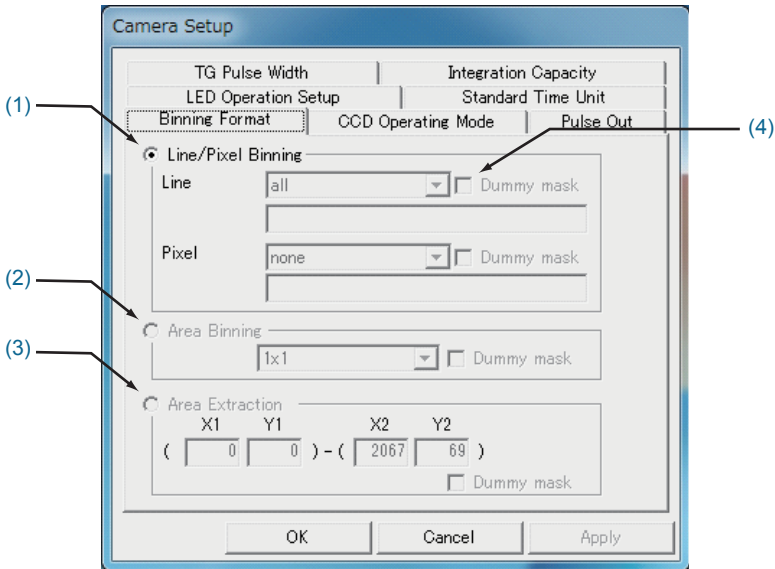
## 4.6.2 Camera Setup

Sets the parameters for hardware.

Either select from menu, "Setup" -> "Camera Setup" or click the "Setup" button on the tool bar.

### 4.6.2.1 Camera Setup: Binning Format

Sets the binning format.



#### (1) Line/Pixel Binning

Select a binning format from the following seven formats, to separate line and pixel.

- "manual" : Sets the binning manually
- "none" : No line/pixel binning
- "2", "4", "8", "16" : Binning for every 2N (N=1 to 4)
- "all" : Bins all

#### (2) Area Binning

Select a binning format from the following five formats.

"1x1", "2x2", "4x4", "8x8", "16x16" : Binning for every 2Nx2N (N=1 to 4)

However, area binning cannot be used in Linear Scanning Mode.

**(3) Area Extraction**

Extracts a particular area. In such a case, the extracted area is not binned.  
Validates only the area enclosed by (X1,Y1) (X2,Y2).  
However, area extraction cannot be used in Linear Scanning Mode.

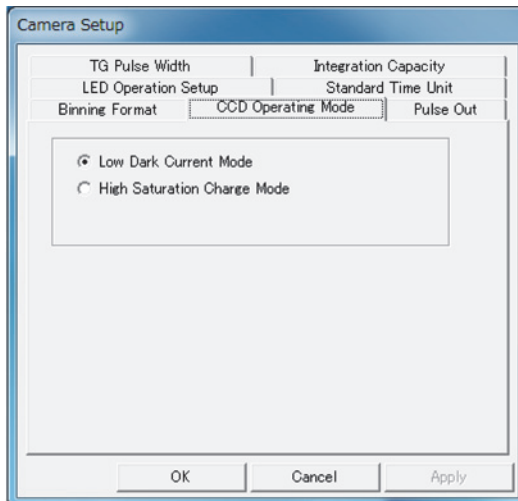
**(4) Dummy mask**

Select to validate/invalidate the dummy pixel data.

On : Valid, Off : Invalid

**4.6.2.2 Camera Setup: CCD Operation Mode**

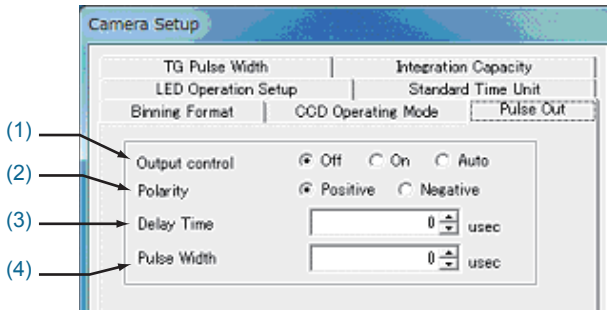
Controls the CCD image sensor operating mode.



Select either "Low Dark Current Mode" or "High Saturation Charge Mode".

#### 4.6.2.3 Camera Setup: Pulse Out

Controls the external output signal that is sent via the BNC connector. This signal is synchronized with the Sensor exposure time.



##### (1) Output Control

Select either "Off", "On" or "Auto".

- "Off" : Does not output the "PULSE OUT" signal.
- "On" : Outputs the "PULSE OUT" signal. (Delay time, pulse width)
- "Auto" : Outputs the "PULSE OUT" signal. (Exposure time width)

When "Auto" is selected, timing is adjusted automatically by using exposure time width, instead of using delay time and pulse width.

##### (2) Polarity

Select either "Positive" or "Negative".

##### (3) Delay Time

Specify the delay time from the exposure start time.

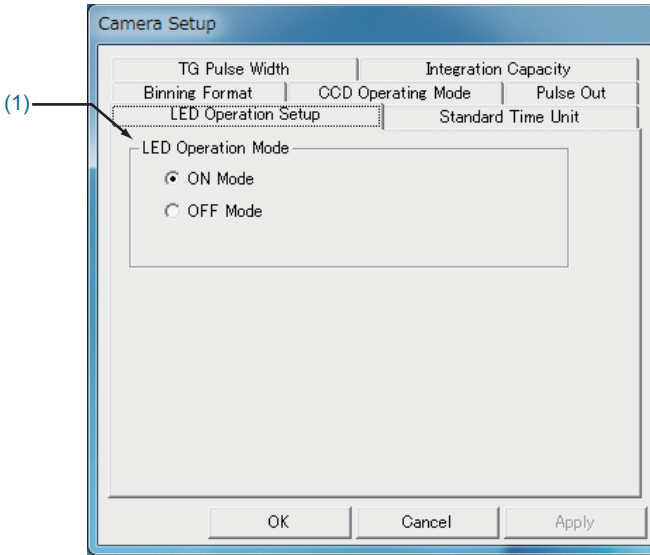
##### (4) Pulse Width

Sets the pulse width.



#### 4.6.2.4 Camera Setup: LED Operation Setup

This dialog performs LED operation setup.



##### (1) LED Operation Mode

This performs LED operation mode setup.

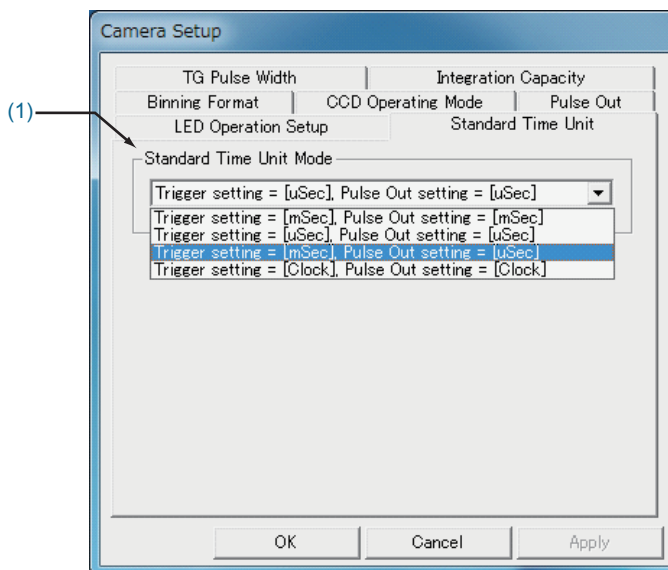
Select either "ON Mode" Radio button or "OFF Mode" Radio button to select the respective LED Operation Mode.

"ON Mode" : In this mode, LED lights when it is in progress.

"OFF Mode" : In this mode, LED remains in always turned off state.

#### 4.6.2.5 Camera Setup : Standard Time Unit Setup

This dialog performs Standard Time Unit setup.



##### (1) Standard Time Unit Mode

Select a standard time unit mode from the following three types.

"Trigger setting = [mSec], Pulse Out setting = [mSec]" :

- Sets millisecond to time unit of Trigger setting.
- Sets millisecond to time unit of Pulse Out setting.

"Trigger setting = [uSec], Pulse Out setting = [uSec]" :

- Sets microsecond to time unit of Trigger setting.
- Sets microsecond to time unit of Pulse Out setting.

"Trigger setting = [mSec], Pulse Out setting = [uSec]" :

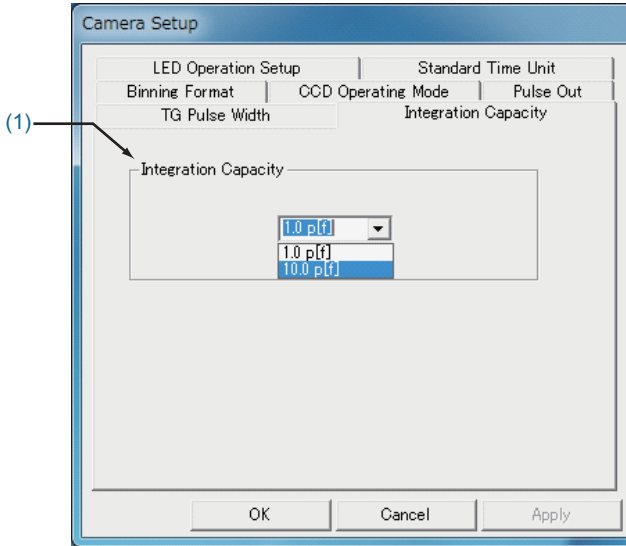
- Sets millisecond to time unit of Trigger setting.
- Sets microsecond to time unit of Pulse Out setting.

"Trigger setting = [Clock], Pulse Out setting = [Clock]" :

- Sets clock count to time unit to Trigger setting.
- Sets clock count to time unit to Pulse Out setting.

#### 4.6.2.6 Camera Setup : Integration Capacity

Sets the Integration Capacity.



##### (1) Integration Capacity

Select a integration capacity from following value.

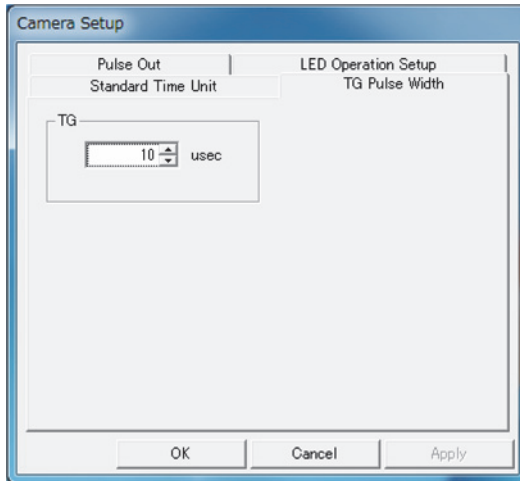
- "0.05 [pF]"
- "0.1 [pF]"
- "0.2 [pF]"
- "0.5 [pF]"
- "1.0 [pF]"
- "2.0 [pF]"
- "5.0 [pF]"
- "10.0 [pF]"
- "20.0 [pF]"



The available value are different depending on the model.

#### 4.6.2.7 Camera Setup : TG Pulse Width

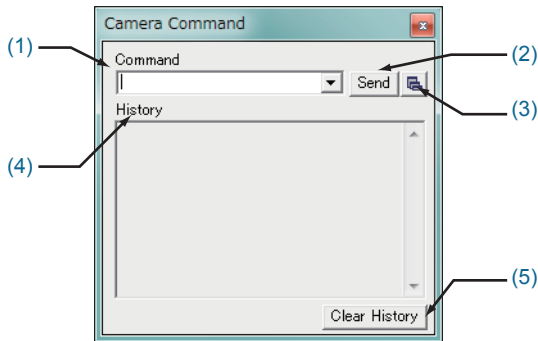
Sets the TG pulse width.



### 4.6.3 Camera Command

Used when sending the connection command for the camera.

Either select menu "Setup" → "Camera Command" or click the "Command" button from the tool bar, to display the following dialog.



**(1) Command**

Enter the command to be sent. The entered command will be displayed in the list box.

**(2) Send**

After specifying the command or the data file to be sent, press the Send button.

**(3) Mode Change**

The history display in the dialog can be changed in the order of Multiple line Display Single line display No display. Moreover, in case of single line display, docking of the tool bar is possible.

**(4) History**

Displays the command that is received or sent.

**(5) Clear History**

Clears the display.

## 4.7 Status bar

The following parameters are displayed on the status bar.

(1)	(2)	(3)	(4)	(5)	(6)	(7)
TMP =	C.+28.67deg.C	H.+27.92deg.C	A.+28.15deg.C	FPV = 175.000 KHz	FPH = 14.000.000 KHz	Rate = 0000.00fps

### (1) Sensor temperature status<sup>\*1</sup>

Displays the status of the sensor temperature.

The DCam-USB is ON when temperature control is carried out.

- Red : The sensor temperature is higher than the setting temperature.
- Green : The sensor temperature is within the setting temperature.
- Cyan : The sensor temperature is lower than the setting temperature.

### (2) Cooling temperature<sup>\*1</sup>

### (3) Heat sink temperature<sup>\*1</sup>

### (4) Outside temperature<sup>\*1</sup>

### (5) Vertical frequency

### (6) Horizontal frequency

### (7) Transfer rate

- <sup>\*1</sup> : When installed the temperature monitor function, the temperature display is refreshed periodically.  
However, there are unshown parameters when the camera does not have the temperature control feature.

## 5.1 Overview of measurement mode

The selection of the measurement mode depends on the type of hardware. Correspondingly, the method for incorporating the data is automatically set. From menu "Setup" → "Measurement Mode" select either "Line Scanning Mode" or "Area Scanning Mode".

- |                    |   |
|--------------------|---|
| Line Scanning Mode | : Mode for acquiring/displaying one dimensional data from the linear image sensor |
| Area Scanning Mode | : Mode for acquiring/displaying two dimensional data from the area image sensor   |

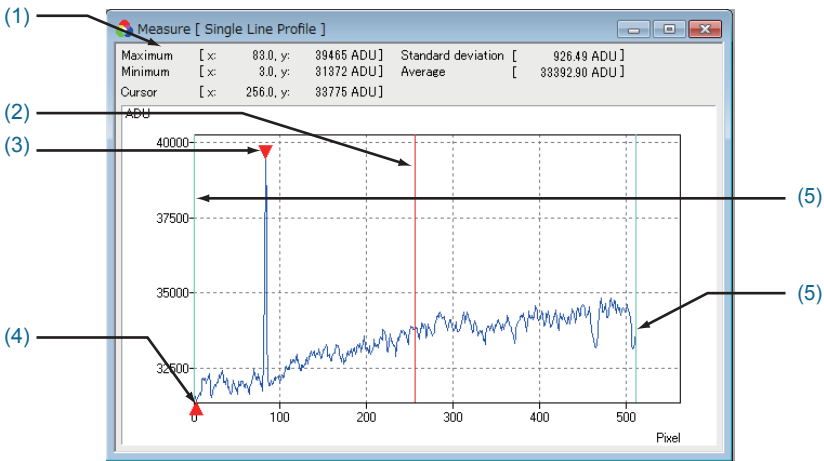
The measurement mode is set with the parameters that are saved in the hardware when the software is started for the first time. Thereafter, whenever the application is started, it uses the parameter values that were saved the last time the application was closed. Moreover, the window to be displayed will differ according to the measurement mode. The display format of each mode is as follows.

- |                    |   |
|--------------------|---|
| Line Scanning Mode | : Single Line Profile, Multi Line Profile, Spread Sheet           |
| Area Scanning Mode | : Image, Multi X Line Profile, Multi Y Line Profile, Spread Sheet |

## 5.2 Line Scanning Mode

### 5.2.1 Single Line Profile

Displays any one of the line data specified in the Line Position of the "Measure Control" dialog bar in a profile.



#### (1) Analysis data display

The data value present at the Data Display cursor position and the analysis data value of the area specified by the ROI cursor are displayed.

The values displayed are maximum/minimum/standard/deviation/average/cursor.

#### (2) Data Display Cursor

The data display cursor is displayed in the position that is set by the Cursor Position of the "Measurement Control" dialog bar.

The cursor can be moved by dragging or by using the arrow keys.

The cursor data is also updated simultaneously.

#### (3) Maximum Mark

The maximum value is indicated by "▼" on the profile window.

#### (4) Minimum Mark

The minimum value is indicated by "▲" on the profile window.



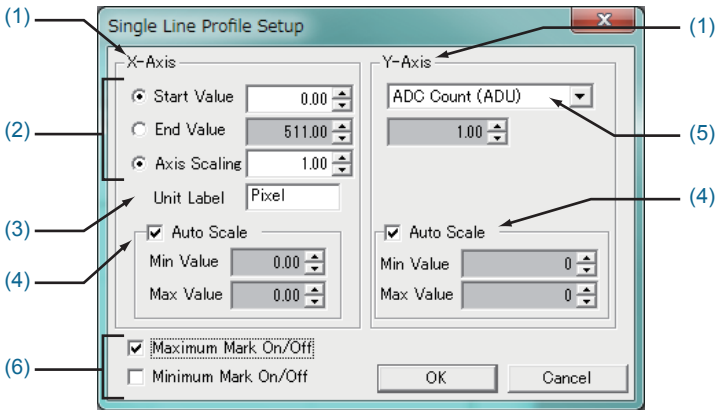
**(5) ROI cursor**

The ROI cursor is displayed in the position that is set by the ROI of the "Measurement Control" dialog bar.

Each cursor can be moved by dragging or by pressing Shift key with the arrow keys. The entire analysis data is updated simultaneously.

## ■ Setup

To display the "Single Line Profile Setup" dialog, either select "Profile" from the Main Menu or right click in the profile window and select "Property" from the menu that is displayed.



### (1) X-Axis / Y-Axis

Sets the X-Axis/Y-Axis.

### (2) X-Axis scale settings

Set the scale for the X-Axis by selecting any two from the following three parameters.

- "Start Value" : Sets the starting point of the X-Axis.
- "End Value" : Sets the end point of the X-Axis.
- "Axis Scaling" : Sets the scaling of the X-Axis.

### (3) Unit Label

Sets the unit name of the X-Axis.

### (4) Auto Scale

Enables auto scaling

When the check box is disabled, scaling can be set manually.

**(5) Y-Axis unit**

Select from the following three units.

Moreover, if "Voltage (mV)" and "Electron Numbers (e-)" are selected, enter the conversion coefficient for 1ADU.

" ADC Count(ADU) "	:	Digital count number of AD converter
"Voltage(mV)"	:	Voltage
"Electron Numbers(e-)"	:	Electron Number

**(6) Maximum value/Minimum value mark**

Select to show/hide the maximum value/minimum value mark on the profile window.

**■ Window operations****1. Movement of the cursor for data display**

Change the cursor position by dragging the cursor in the profile window.

When the mouse is over the cursor, a left/right mouse pointer is displayed.

Change the position of the left cursor with the `←` keys and that of the right cursor with the `→` keys.

**2. Movement of the ROI cursor**

Change the data area to be analyzed by dragging the cursor in the profile window.

When the mouse is over the cursor, a left/right mouse pointer is displayed.

Change the position of the left cursor by pressing the CTRL key and `←` keys and that of the right cursor by pressing the CTRL key and `→` keys.

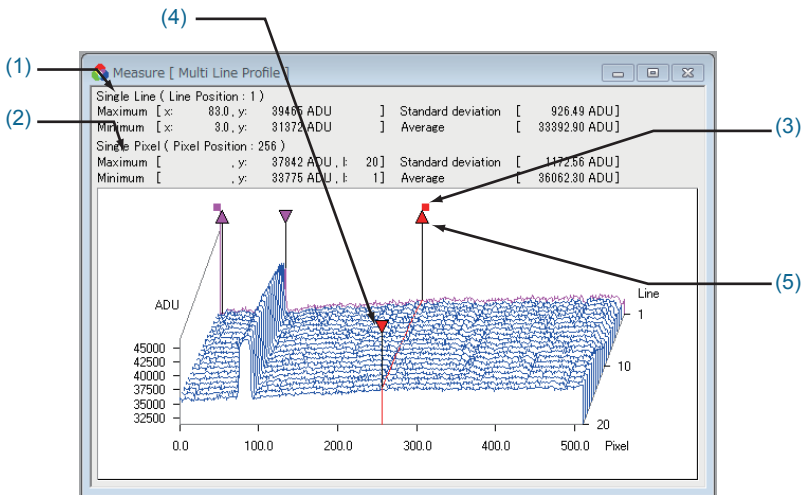
**3. Expansion of profile (Optional)**

The profile may be expanded, by specifying the range with the mouse on the profile window.

Press the Esc or Home key to return to the initial display.

### 5.2.2 Multi Line Profile

Displays the data of the lines specified in Line Number of the "Measurement Control" dialog bar.



#### (1) "Single Line" analysis data display

The analysis data value of the Line Position of the "Measurement Control" dialog bar and that of the area specified by the ROI cursor are displayed. The values displayed are maximum/minimum/standard deviation/average. The selected line position is indicated in pink.

#### (2) "Single Pixel" analysis data display

The analysis data value of the total lines for the pixel selected in Cursor Position of the "Measurement Control" dialog bar is displayed. The values displayed are maximum/minimum/standard deviation/average. The selected pixel position is indicated in red.

#### (3) Data position display

The position of the data that is being analyzed is indicated by "■". The position of the line data that is being analyzed in the "Single Line" data display mode is indicated in pink and the position of the pixel that is being analyzed in the "Single Pixel" data display mode is indicated in red.

**(4) Maximum Mark**

The maximum value is indicated by "▼" on the profile window.

The "Maximum" position of the "Single Line" data display is indicated in pink and the "Maximum" position of the "Single Pixel" data display is indicated in red.

**(5) Minimum Mark**

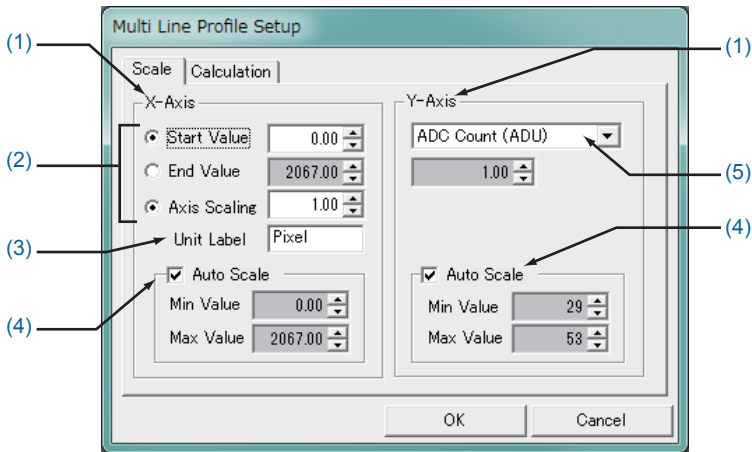
The minimum value is indicated by "▲" on the profile window.

The "Minimum" position of the "Single Line" data display is indicated in pink and the "Minimum" position of the "Single Pixel" data display is indicated in red.

## ■ Setup

To carry out the following setting, either select "Profile" from the main menu or right click in the profile window and select "Property" from the displayed menu.

### 1. Scale



#### (1) X-Axis / Y-Axis

Sets the X-Axis/Y-Axis.

#### (2) X-Axis scale settings (Start Value / End Value / Scale Ratio)

Set the scale for the X-Axis by selecting any two from the following three parameters.

- "Start Value" : Sets the starting point of the X-Axis.
- "End Value" : Sets the end point of the X-Axis.
- "Axis Scaling" : Sets the scaling of the X-Axis.

#### (3) Unit Label

Sets the unit name of the X-Axis.

#### (4) Auto Scale

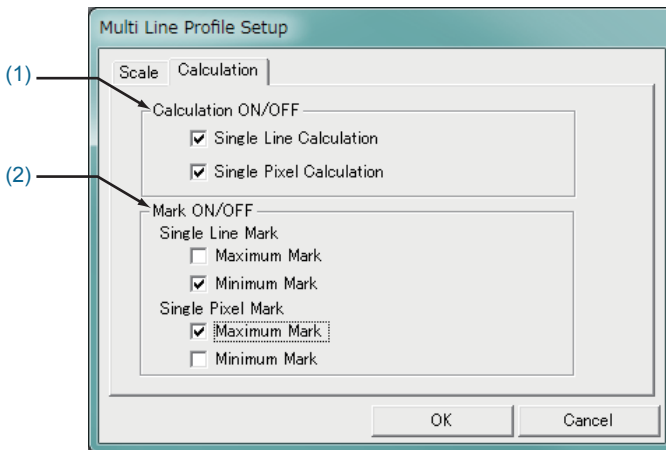
Enables auto scaling

When the check box is disabled, scaling can be set manually.

**(5) Y-Axis unit**

Select from the following three units. Moreover, if "Voltage (mV)" and "Electron Numbers (e-)" are selected, enter the conversion coefficient for 1ADU.

" ADC Count(ADU) " : Digital count number of AD converter  
 "Voltage(mV)" : Voltage  
 "Electron Numbers (e-)" : Electron Number

**2. Calculation****(1) Calculation ON/OFF**

Check "Single Line Calculation" or "Single Pixel Calculation" or check both.

"Single Line Calculation" : Sets the show/hide option for "Single Line" of analysis data display.

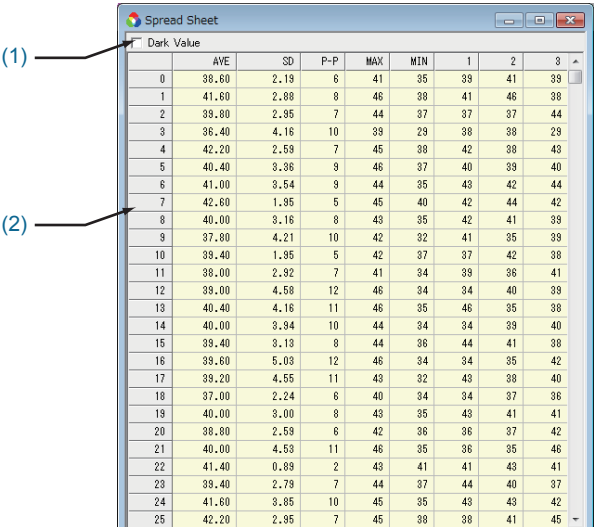
"Single Pixel Calculation" : Sets the show/hide option for "Single Pixel" of analysis data display.

**(2) Maximum/Minimum Mark**

Select to show/hide the maximum value/minimum value mark on the profile window.

### 5.2.3 Spread Sheet

Displays the data of the lines specified in Line Number of the "Measurement Control" dialog bar in the spreadsheet.



(1) Dark Value

(2)

	AVE	SD	P-P	MAX	MIN	1	2	3
0	38.60	2.19	6	41	35	39	41	39
1	41.60	2.88	8	46	38	41	46	38
2	39.80	2.95	7	44	37	37	37	44
3	36.40	4.16	10	39	29	38	38	29
4	42.20	2.59	7	45	38	42	38	43
5	40.40	3.38	9	46	37	40	39	40
6	41.00	3.54	9	44	35	43	42	44
7	42.60	1.85	5	45	40	42	44	42
8	40.00	3.16	8	43	35	42	41	39
9	37.80	4.21	10	42	32	41	35	39
10	39.40	1.95	5	42	37	37	42	38
11	38.00	2.92	7	41	34	39	36	41
12	39.00	4.58	12	46	34	34	40	39
13	40.40	4.16	11	46	35	46	35	38
14	40.00	3.94	10	44	34	34	39	40
15	39.40	3.13	8	44	36	44	41	38
16	39.60	5.03	12	46	34	34	35	42
17	39.20	4.55	11	43	32	43	38	40
18	37.00	2.24	6	40	34	34	37	36
19	40.00	3.00	8	43	35	43	41	41
20	38.80	2.59	6	42	36	36	37	42
21	40.00	4.53	11	46	35	36	35	46
22	41.40	0.89	2	43	41	41	43	41
23	39.40	2.79	7	44	37	44	40	37
24	41.60	3.85	10	45	35	43	43	42
25	42.20	2.85	7	45	38	38	41	45

#### (1) Dark Value

Select this check box to display/edit the dark data. In such cases, the dark data in "Dark Calibration" of the dialog bar must be acquired beforehand.

#### (2) Data display

Click the cell to edit the data.

### ■ Setup/Operations

Either select "Sheet" from the main menu or right click in the sheet window. A menu will be displayed. Carry out the following settings and operations from this menu.

#### (1) Copy

Transfers the selected cell data to the clipboard.

#### (2) Select All

All the cells are selected.

#### (3) Dec Mode / Hex Mode display

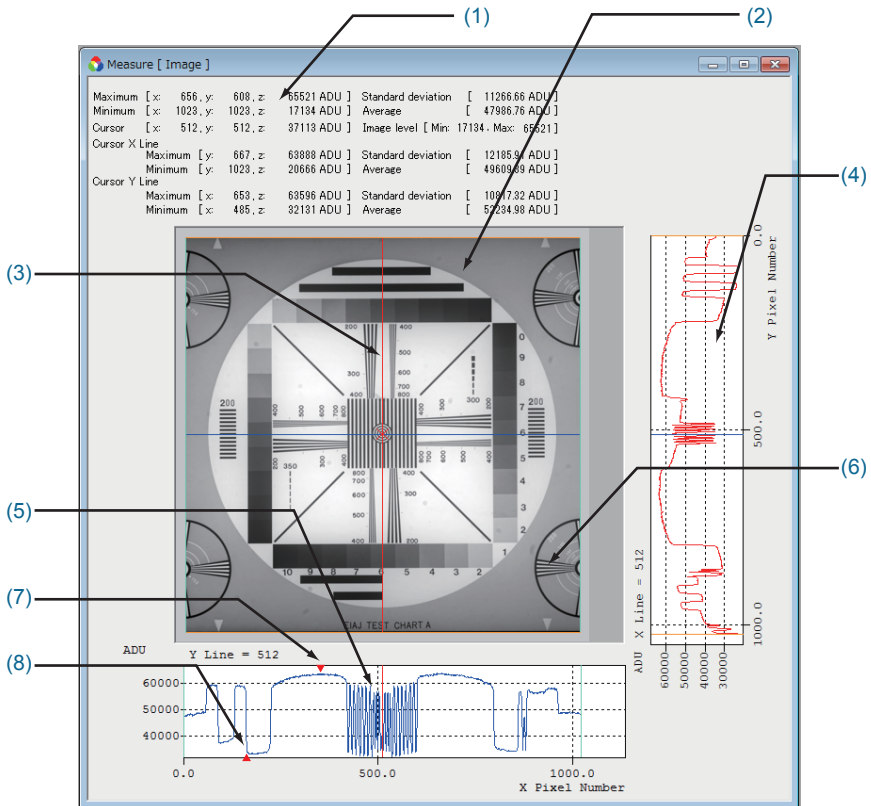
Select Dec mode display / Hex mode display.



## 5.3 Area Scanning Mode

### 5.3.1 Image

The data of the frames specified in Frame Number of the "Measurement Control" dialog bar is displayed in the image.



**(1) Analysis data value**

The data at the intersection point of the X/Y cursor, the analysis data at the intersection line of the cursor and the analysis data value of the area specified by the ROI cursor are displayed.

The values displayed are maximum/minimum/standard/deviation/average/cursor/image level.

**(2) Analysis data display window**

At the time of startup, the size of the frame data are adjusted so that they can all be displayed on the window. (Auto scale display) Press the Home key to restore the size of the frame data. The display of the scroll bar depends on the size of the frame data.

**(3) X/Y cursor for data display**

The X cursor and Y cursor are displayed in the positions set by Cursor Position of the "Measurement Control" dialog bar.

The X/Y cursor can be moved by dragging.

The data at the intersection point of the X/Y cursor is updated simultaneously.

**(4) X section profile display**

Displays the data of the X cursor (Section of the X direction) in the profile.

**(5) Y section profile display**

Displays the data of the Y cursor (Section of the Y direction) in the profile.

**(6) ROI cursor**

The ROI cursor is displayed in the position set by ROI of the "Measurement Control" dialog bar.

The ROI cursor that is set by "X1", "X2" is indicated in light blue and the ROI cursor that is set by "Y1", "Y2" is indicated in yellow.

The cursor can be moved by dragging.

The entire analysis data is updated simultaneously.

**(7) Maximum Mark**

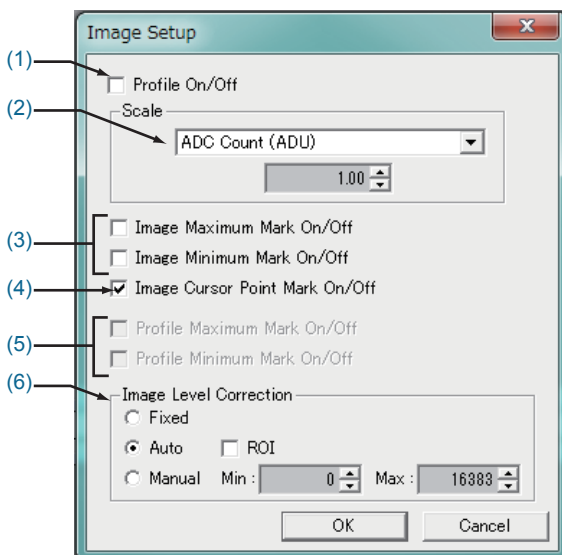
The maximum value is indicated by "▼" in the image and both the profiles.

**(8) Minimum Mark**

The minimum value is indicated by "▲" in the image and both the profiles.

## ■ Setup

To display the following "Image Setup" dialog, either select "Image" from the main menu or right click in the sheet window and select "Property" from the displayed menu.



### (1) Profile On/Off

Select to display the additional X and Y section profile on the image window.

### (2) Scale

Select from the following three units. Moreover, if "Voltage (mV)" and "Electron Numbers (e-)" are selected, enter the conversion coefficient for 1ADU.

" ADC Count (ADU) " : Digital count number of AD converter

### (3) Image Maximum / Minimum Mark

Select to show/hide the maximum value/minimum value mark on the image window.

### (4) Image Cursor Point Mark

Select to display the mark on the intersection point of the X/Y cursor on the image window.

**(5) Profile Maximum/Minimum Mark**

Select to display the maximum value/minimum value mark on the Y section profile and X section profile.

**(6) Image Level Correction**

Set the level correction of the displayed image.  
The default type is Fixed.

**Fixed**

Displays the obtained data in 8 bits scale.  
Depending on the range of the data the image may not be clearly visible.

**Auto**

Automatically detects the obtained data and converts it into a display that can clearly visible to the naked eye.  
Also if the ROI check box is selected, the data value of the area specified in ROI is automatically detected and displayed as an image.

**Manual**

The level correction can also be performed manually.

**■ Window operations****1. Movement of the X/Y cursor for data display**

Change the position of the data that is to be displayed in the Y and X section profile by dragging the cursor in the image window.  
When the mouse is over the cursor, a left/right or up/down mouse pointer is displayed.  
Change the position of the Y cursor with the **↑** **↓** keys.

**2. Movement of the ROI cursor**

Change the data area to be analyzed by dragging the cursor in the image window.  
When the mouse is over the cursor, a left/right mouse pointer is displayed.  
Change the position of the left cursor by pressing the CTRL key and **←** **→** keys and that of the right cursor by pressing the CTRL key and **←** **→** keys.

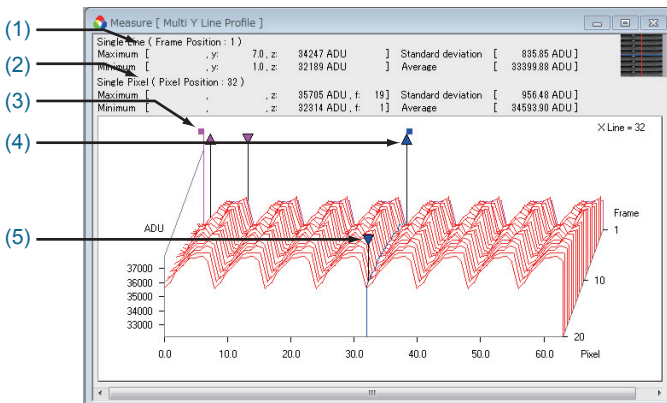
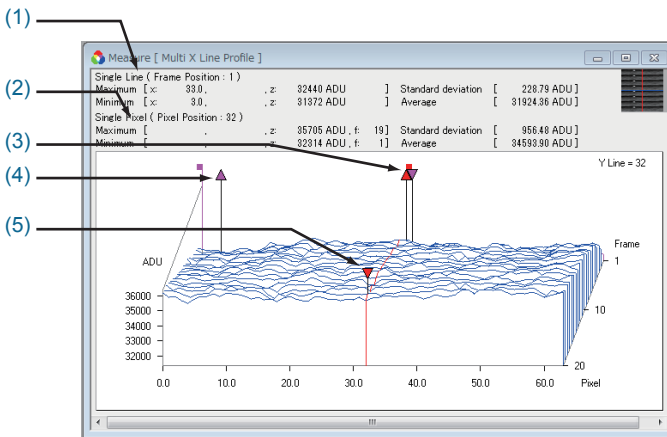
**3. Expansion of image (Optional)**

The image may be expanded, by specifying the range with the mouse on the image window.  
Press the Esc or Home key to return to the initial display.

### 5.3.2 Multi Line Profile (X, Y)

Displays the Y section data and X section data of the frames specified in Frame Number of the "Measurement Control" dialog bar in a profile.

Refer to "5.2.2. Multi Line Profile" since the features and settings of both the profiles are same as that of Multi line profile.



**(1) "Single Line" analysis data display**

The analysis data value of the Frame Position of the "Measurement Control" dialog bar and that of the area specified by ROI are displayed.

The values displayed are maximum/minimum/standard deviation/average.

The selected frame position is indicated in pink.

**(2) "Single Pixel" analysis data display**

The analysis data value of the total frames for the pixel selected in Cursor Position of the "Measurement Control" dialog bar is displayed.

The values displayed are maximum/minimum/standard deviation/average.

The selected pixel position is indicated in red in Multi X Line Profile. In Multi Y Line Profile, the pixel position is indicated in light blue.

**(3) Data position display**

The position of the data that is being analyzed is indicated by "■".

The position of the frame data that is being analyzed in the "Single Line" data display mode is indicated in pink. The position of the pixel that is being analyzed in the "Single Pixel" data display mode is indicated in red in Multi X Line Profile and in light blue in Multi Y Line Profile.

**(4) Maximum Mark**

The maximum value is indicated by "▼" on the profile window.

The "Maximum" position of the "Single Line" data display is indicated in pink and the "Maximum" of the "Single Pixel" data display is indicated in red in Multi X Line Profile and in light blue in Multi Y Line Profile.

**(5) Minimum Mark**

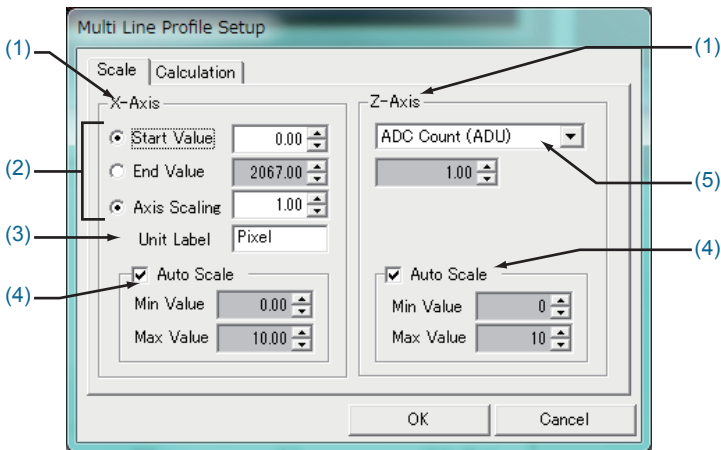
The minimum value is indicated by "▲" on the profile window.

The "Minimum" position of the "Single Line" data display is indicated in pink and the "Minimum" of the "Single Pixel" data display is indicated in red in Multi X Line Profile and in light blue in Multi Y Line Profile.

## ■ Setup

Either select "Profile" from the main menu or right click in the profile window. A menu will be displayed. Select "Property" from this menu and carry out the following settings.

### 1. Scale



#### (1) X-Axis(Y-Axis) / Z-Axis

Sets the X-Axis/Z-Axis or Y-Axis/Z-Axis.

#### (2) X-Axis ( Y-Axis ) scale settings (Start Value / End Value / Scale Ratio)

Set the scale for the X-Axis ( Y-Axis ) by selecting any two from the following three parameters.

- "Start Value" : Sets the starting point of the X-Axis ( Y-Axis ).
- "End Value" : Sets the end point of the X-Axis ( Y-Axis ).
- "Axis Scaling" : Sets the scaling of the X-Axis ( Y-Axis ).

#### (3) Unit Label

Sets the unit name of the X-Axis ( Y-Axis ).

#### (4) Auto Scale

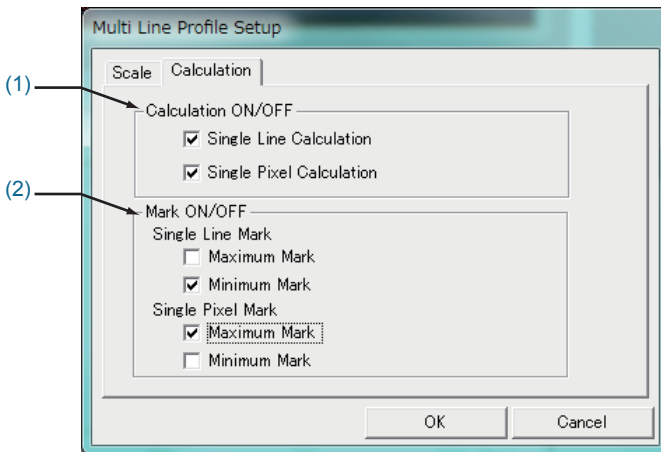
Enables auto scaling When the check box is disabled, scaling can be set manually.

**(5) Z-Axis unit**

Select from the following three units.

Moreover, if "Voltage (mV)" and "Electron Numbers (e-)" are selected, enter the conversion coefficient for 1ADU.

- " ADC Count(ADU) " : Digital count number of AD converter
- "Voltage(mV)" : Voltage
- "Electron Numbers (e-)" : Electron Number

**2. Calculation****(1) Calculation ON/OFF**

Check "Single Line Calculation" or "Single Pixel Calculation" or check both.

"Single Line Calculation" : Sets the show/hide option for "Single Line" of analysis data display.

"Single Pixel Calculation" : Sets the show/hide option for "Single Pixel" of analysis data display.

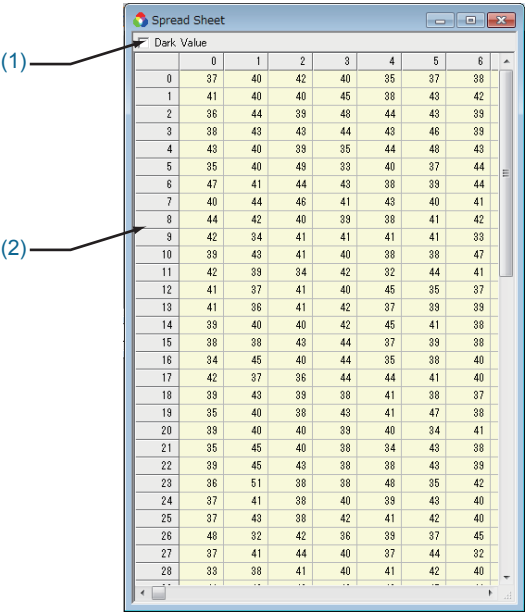
**(2) Maximum/Minimum Mark**

Select to display the maximum/minimum mark on Multi Line Profile (X,Y).



### 5.3.3 Spread Sheet

Displays the data of the frames specified in Frame Number of the "Measurement Control" dialog bar in the spreadsheet.



**(1) Dark Value**

Select this check box to display/edit the dark data. In such cases, the dark data in "Dark Calibration" of the dialog bar must be acquired beforehand.

**(2) Data display**

Click the cell to edit the data.

## ■ Setup/Operations

Either select "Sheet" from the main menu or right click in the sheet window.  
A menu will be displayed. Carry out the following settings and operations from this menu.

### (1) Copy

Transfers the selected cell data to the clipboard.

### (2) Select All

All the cells are selected.

### (3) Dec Mode / Hex Mode display

Select Dec mode display/ Hex mode display.

### (4) Change of data display(Image Data, Multi X Profile Data, Multi Y Profile Data)

Displays the specified window.

## 6.1 Flow of basic operations

The basic operation of DCam-USB is as follows.

**1. Starting DCam-USB**



**2. Connecting with the hardware**



**3. Parameter settings**



**4. Acquiring data**



**5. Display and data analysis**



**6. Saving the data**



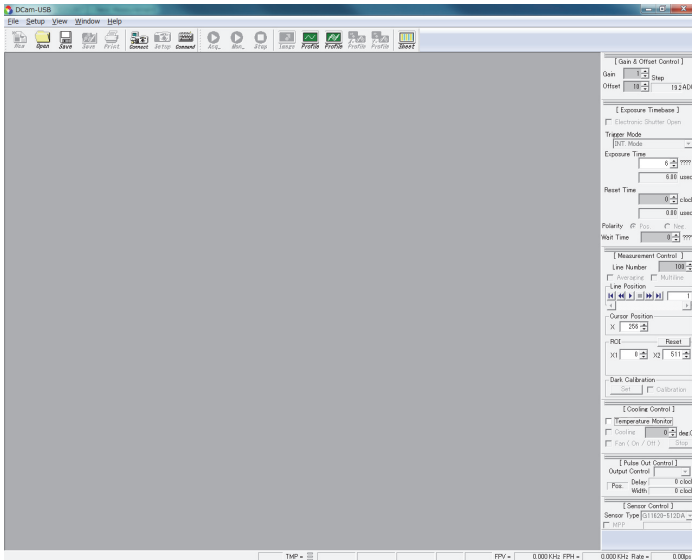
**7. Quitting DCam-USB**

## 6.2 Operation process

### 6.2.1 Startup

Start this program by clicking the shortcut on the desktop.

At the time of startup, the tool bar, docking bar will be inactive (Offline Mode) as shown below.



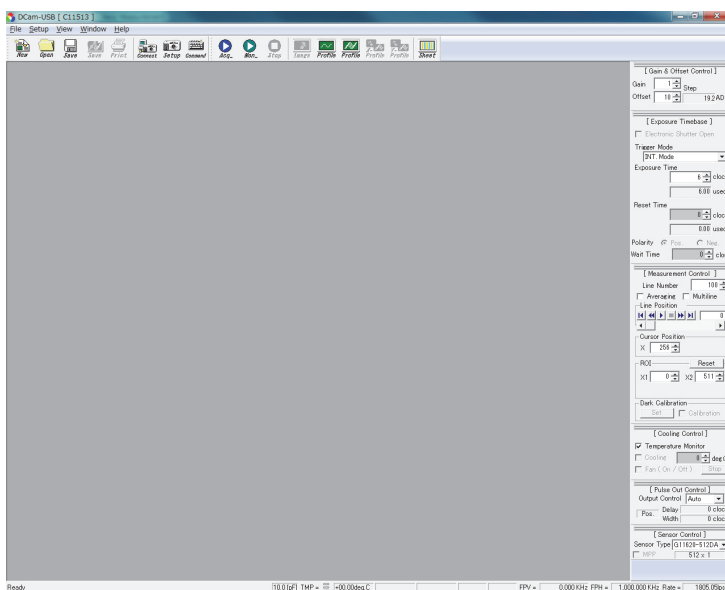
## 6.2.2 Establishing connection

Establish connection with the hardware.

Either select the "Connect" button from the tool bar or "Connection" from the "Setup" menu to display the "Connection" dialog ( Refer to 4.6 Dialog).

After selecting the connection method, click "OK".

Select any mode other than Offline Mode to activate the tool bar and dialog bar when connecting with the camera.



---

### 6.2.3 Setup

---

Carry out the settings for the measurement mode.

Refer to 4. Overview of setup window and 5. Overview of the measurement window.

### 6.2.4 Measurement

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Carry out the measurement.

Acquire the data in accordance with the settings.

There are two types of acquisition methods (modes). One is the Acquire mode where the set frame number and line number is acquired and the other is the Monitor mode where the data is acquired continuously.

However, since in the Monitor mode, the image and the graphics are updated every time, only the last acquired data can be saved.

Press the "STOP" button to exit from this mode.

#### 1) Acquire mode (Data acquisition)

Either click the "Acq." button of the tool bar or select "Acquire" from the "Measure" menu to acquire the data.

The acquisition process stops automatically once the data of the specified frame number and line number is obtained and the data gets displayed.

Moreover, the acquisition can also be stopped before completion.

#### 2) Monitor mode (Acquiring data continuously)

Either click the "Mon." button of the tool bar or select "Monitor" from the "Measure" menu to acquire the data continuously.

Press the stop button to discontinue the data acquisition process in the Monitor mode.

There are two types of Monitor mode.

Select either "Data Skipping Mode" or "Continuous Data Mode" from "Monitor Mode" in the "Setup" menu.

In some cases since the data acquisition process cannot match the hardware's transfer speed that results in a loss of data during acquisition, the mode gets selected depending on the situation.

Data Skipping Mode : Does not obtain the data continuously.

Continuous Data Mode : Obtains the data continuously.

The analysis method of the acquired data is identical for "Acquire" and "Monitor".

Moreover, during Monitor mode, the information changes in real time.

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### 6.2.5 Other functions

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#### ■ File input/output functions

The data obtained from the hardware can be saved as a file. Moreover, the saved data can be read by this application (DCam-USB).

The files formats available are text, binary, BMP and TIFF. In the binary and text formats the header is embedded in the file.

However, the image data file in BMP and TIFF format cannot be read. These formats are used only to output the image and the profile.

#### 1. File formats

Following are the types of files available in the Save dialog.

##### (1) Bitmap Files (\*.bmp)

Saves data in the 8bit BMP format.

##### (2) Tiff Files (\*.tif)

Saves data in the 8bit TIFF format.

##### (3) Binary Data Files (\*.bin)

Saves data in the binary format.

##### (4) Text Data Files (\*.txt)

Saves data in the text format.

##### (5) Text Raw Data Files (\*.txt)

Saves only the data without embedding the header.

In case of multiple frames, saves all the data in one frame.

##### (6) Text Split Raw Data Files 1

Saves only the data without embedding the header.

Creates a folder and saves one file in the text format for every one frame within the folder.

##### (7) Text Split Raw Data Files 2

Saves only the data without embedding the header.

Creates a folder and saves in a file for every 256 pixels in the folder.

For example, when the data size is 1024 pixels, four files will be created.

## 2. Text format/Binary format analysis information header

Key	Type	Item Name	Note & Value
[GENERAL]			General information
VersionNo	char[4]	Version information fixed key	Fixed character "DCAM"
	int	Version number	Major [Value : 1]
	int		File format No. [Value : 0]
	int		Customization No. [Value : 1]
CameraType	int	Type of measurement hardware	1: Line scanner camera 2: Area scanner camera
DataInfo	int	Size X	
	int	Size Y	
	int	Data set	
	int	Data byte	
MeasureMode	int	Measurement mode	1:Line Scanning Mode, 2:Area Scanning Mode
SheetData	int	Sheet display data type	0: Image data 1: X Multi line profile data 2: Y Multi line profile data
Profile	int	Image window Profile Show/Hide setting	0: Hide, 1: Show
ImageWin	int	Type of scale unit	0:ADC Count (ADU) 1:Voltage (mV) 2:Electron Numbers (e-)
	double	Scale unit ratio value	
	char[20]	Scale unit characters	"ADU", "mV", "e"
	int	Show/hide the maximum mark of image	0: Hide, 1: Show
	int	Show/Hide the minimum mark of the image	0:Hide, 1: Show
	int	Cursor point mark	0:Hide, 1: Show
	int	Show/Hide the maximum mark of the profile	0:Hide, 1: Show
	int	Show/Hide the minimum mark of the profile	0:Hide, 1: Show



Key	Type	Item Name	Note & Value
SingleLineWin	int	Pixel scale calculation type	0: Calculated from end value and ratio value 1: Calculated from starting value and ratio value 2: Calculated from starting value and end value
	double	Pixel scale starting value	The result calculated from the pixel scale calculation type
	double	Pixel scale end value	
	double	Pixel scale ratio value	
	char[20]	Pixel scale unit characters	Characters present after the 20th character are ignored.
	int	Type of scale unit	0:ADC Count (ADU) 1:Voltage (mV) 2:Electron Numbers (e-)
	double	Scale unit ratio value	
	char[20]	Scale unit characters	"ADU", "mV", "-e"
	int	Show/Hide maximum mark	0:Hide, 1: Show
MultiLineWin	int	Show/Hide minimum mark	0:Hide, 1: Show
	int	Pixel scale calculation type	0: Calculated from end value and ratio value 1: Calculated from starting value and ratio value 2: Calculated from starting value and end value
	double	Pixel scale starting value	The result calculated from the pixel scale calculation type
	double	Pixel scale end value	
	double	Pixel scale ratio value	
	char[20]	Pixel scale unit characters	Characters present after the 20th character are ignored.
	int	Type of scale unit	0:ADC Count (ADU) 1:Voltage (mV) 2:Electron Numbers (e-)
	double	Scale unit ratio value	
	char[20]	Scale unit characters	"ADU", "mV", "-e"
	int	Show/Hide Max/Min calculation of pixel	0:Hide, 1: Show
	int	Show/Hide Max/min calculation of line	0:Hide, 1: Show
	int	Show/Hide maximum mark of pixel	0:Hide, 1: Show
	int	Show/Hide minimum mark of pixel	0:Hide, 1: Show
	int	Show/Hide maximum mark of line	0:Hide, 1: Show
	int	Show/Hide minimum mark of line	0:Hide, 1: Show

Key	Type	Item Name	Note & Value
MultiXLineWin	int	Pixel scale calculation type	0: Calculated from end value and ratio value 1: Calculated from starting value and ratio value 2: Calculated from starting value and end value
	double	Pixel scale starting value	The result calculated from the pixel scale calculation type
	double	Pixel scale end value	
	double	Pixel scale ratio value	
	char[20]	Pixel scale unit characters	Characters present after the 20th character are ignored.
	int	Type of scale unit	0:ADC Count (ADU) 1:Voltage (mV) 2:Electron Numbers (e-)
	double	Scale unit ratio value	
	char[20]	Scale unit character	"ADU", "mV", "-e"
	int	Show/Hide Max/Min calculation of pixel	0:Hide, 1: Show
	int	Show/Hide Max/Min calculation of frame	0:Hide, 1: Show
	int	Show/Hide maximum mark of pixel	0:Hide, 1: Show
	int	Show/Hide minimum mark of pixel	0:Hide, 1: Show
	int	Show/Hide maximum mark of frame	0:Hide, 1: Show
	int	Show/Hide minimum mark of frame	0:Hide, 1: Show

Key	Type	Item Name	Note & Value
MultiYLineWin	int	Pixel scale calculation type	0:Calculated from end value and ratio value 1:Calculated from starting value and ratio value 2:Calculated from starting value- and end value
	double	Pixel scale starting value	The result calculated from the pixel scale calculation type
	double	Pixel scale end value	
	double	Pixel scale ratio value	
	char[20]	Pixel scale unit characters	Characters present after the 20th character are ignored.
	int	Type of scale unit	0:ADC Count (ADU) 1:Voltage (mV) 2:Electron Numbers (e-)
	double	Scale unit ratio value	
	char[20]	Scale unit character	"ADU", "mV", "-e"
	int	Show/Hide Max/Min calculation of pixel	0:Hide, 1: Show
	int	Show/Hide Max/Min calculation of frame	0:Hide, 1: Show
	int	Show/Hide maximum mark of pixel	0:Hide, 1: Show
	int	Show/Hide minimum mark of pixel	0:Hide, 1: Show
	int	Show/Hide maximum mark of frame	0:Hide, 1: Show
	int	Show/Hide minimum mark of frame	0:Hide, 1: Show
NumberBase	int	Number base of data	10: Decimal, 16: Hexadecimal
[MEAS_INFO]			Measurement data information
Average	int	Average of measurement data	0: Normal process 1: Averaging process
MeasData	int	Measurement data number	Line Scanning Mode = Line number Area Scanning Mode = Frame number
MeasArea	int	Measurement area Top	
	int	Measurement area Left	
	int	Measurement area Bottom	
	int	Measurement area Right	
CursorPos	int	X axis cursor position	
	int	Y axis cursor position	
ROI	int	ROI area Top	
	int	ROI area Left	
	int	ROI area Bottom	
	int	ROI area Right	
RotationType	int	Rotation type	0:None, 1:90, 2:180, 3:270

Key	Type	Item Name	Note & Value
ReversType	int	Reverse type	0:None, 1:Vertical, 2:Horizontal
[DARK_INFO]			Dark data information
DarkData	int	Existence/non-existence of dark data	1: Exists, 0: Does not exists
DarkCalib	int	Existence/non-existence of dark process	1: Exists, 0: Does not exists
[MEAS_DATA_XX]			XX: Line/Frame number (0001 onwards) The data is the Line/Frame count.
	Byte count of one data unit X Saved data size	Measurement value data	The data is the Line/Frame count. The size and format changes according to the output format of the file and the measurement mode. *1
[DARK_DATA]			Present only when the dark data exists.
	Byte count of one data unit X Saved data size	Dark data	Present only when the dark data exists. The size and format changes according to the output format of the file and the measurement mode. *1

\*1 : When saving in the text format, primarily the immediate information is displayed in the spreadsheet.

Sheet data is saved in decimal and hexadecimal format for decimal and hexadecimal display formats respectively.

1) If AVE, SD, P-P, MAX, MIN exist in the sheet, then those values are also saved.

2) In the Line Scanning Mode, the data of each line can be displayed vertically (column -wise) . The header information before the data is also saved.

\* Since the size differs according to each case, confirm the size of MEASURE\_DATA

1) The application uses Key for input/output operations in text format.

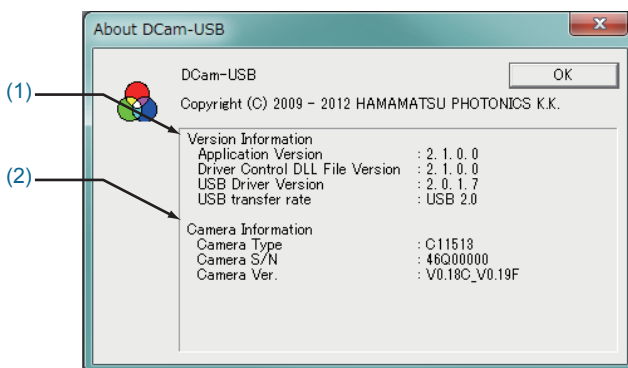
2) The application uses Type for input/output operations in binary format.

## ■ Data printing function

Print/Preview the active window of the Image/Single Line Profile/Multi Line Profile/Spread Sheet. In case of Image/Profile, the window will be printed as it is. Since the volume of spreadsheets for printing is huge, separate the table and take printouts in multiple sheets.

## ■ Version information

Displays the version information about DCam-USB and the hardware. The items displayed will differ according to the connection method.



### (1) Version Information

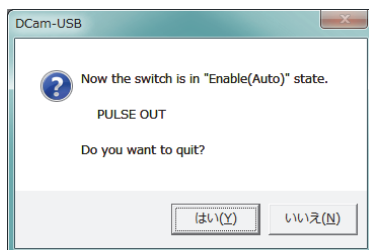
Application Version	: Application Version
Driver Control DLL File Version	: DLL version
USB Driver Version	: Driver Version
USB transfer rate	: USB transfer rate type

### (2) Hardware Information

Camera Type	: Type of hardware
Camera S/N	: Hardware serial number
Camera Ver.	: Hardware firmware version

### 6.2.6 Quitting

If exit the application when cooling, fan, PULSE OUT is ON or Enable, the following message will be displayed. In the following example, the cooling, fan has been set to ON and the PULSE OUT has been set as Enable. Select "Yes" to quit the application in its current state or "No" to return to the previous screen.



# Explanation of terminology

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Following is an explanation of the terms used in this manual.

**1. Single Line Profile**

It is the profile that is displayed when the data of one line is acquired in the line scanner camera.

**2. Multi Line Profile**

It is the profile that is displayed when the data of multiple lines is acquired in the line scanner camera.

**3. Multi X Profile**

It is the X section profile that is displayed when the data of multiple lines is acquired in the area scanner camera.

**4. Multi Y Profile**

It is the Y section profile that is displayed when the data of multiple lines is acquired in the area scanner camera.

**5. Line data**

It is the numeric value data obtained in the area scanner camera.

**6. Frame data**

It is the numeric value data obtained in the area scanner camera.

## Document History

Date	Document Revision	Contents
01.Jun.2009	1.00	First Edition
23.Jul.2009	1.10	Added the description of the "Standard Time Unit" tab of the "Camera Setup" dialogue.
08.Sep.2009	1.20	Added the descriptions of "Driver Circuit for C11512 Area Image Sensor".
02.Dec.2009	1.30	Added the descriptions of "Driver Circuit for C11160/C11165 Linear Image Sensor".
03.Dec.2010	1.40	Deleted the enrolled items about PCI interface. and Added the descriptions of "C11513 Driver Circuit for Linear Image Sensor".
12.Jul.2011	1.50	Added the descriptions of "Driver Circuit C11165-01 for Linear Image Sensor.
15.Nov.2011	1.51	Added the Electronic shutter mode.
28.Jun.2012	2.00	<ul style="list-style-type: none"> <li>Delete the description of Wndows2000AAand added the description of Windows7.</li> <li>Change the screen image to Windows7.</li> <li>Edited the misspelling.</li> </ul>
24.Sep.2013	2.01	Add list of offices on the back cover.
18.Feb.2014	2.02	Add the "TG Pulse Width" page in "Camera setup"
29.Jul.2014	2.03	Edited by the end of support of WindowsXP.



# Multi Channel Detector Head and Driver Circuit for Image Sensor Control Software DCam-USB Instruction Manual

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Document Number :	K46-B60009
Document Revision 2.03	29.Jul.2014

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