See the possibilities

Tentative Version

User Manual

Sweep Series - Camera Link Interface

SW-8001M-MCL-M72
SW-8001TL-MCL-M72
SW-16001M-MCL-M72

High Performance 8K/16K Trilinear and Monochrome Line Scan Camera

Document Version: Tentative

Date: 2025-07-28

Thank you for purchasing this product.

⚠Be sure to read this documentation before use.

This documentation includes important safety precautions and instructions on how to operate the unit. Be sure to read this documentation to ensure proper operation.

The contents of this documentation are subject to change without notice for the purpose of improvement.

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Table of Contents

About Technical Note

Some additional technical information is provided on the JAI website as Technical Notes. In this manual, if a technical note is available for a particular topic, the above icon is shown. Please refer to the following URL for Technical notes.

https://www.jai.com/support-software/technical-notes

Notice/Warranty

Notice

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Warranty

For information about the warranty on the engineering samples, please contact your factory representative.

Certifications

CE Compliance

As defined by the Directive 2004/108/EC of the European Parliament and of the Council, EMC (Electromagnetic compatibility), JAI Ltd., Japan declares that the following model(s) comply with the following provisions applying to their standards.

Models	Comply with
SW-8001M-MCL-M72	EN 55032:2015 + A1 + A11 EN 55035:2017 + A11 EN IEC 61000-6-2:2019 EN IEC 61000-6-4:2019
SW-8001TL-MCL-M72	
SW-16001M-MCL-M72	

FCC

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.

- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Warning

Changes or modifications to this unit not expressly approved by the party responsible for FCC compliance could void the user's authority to operate the equipment.

KC

상 호:	JAI Ltd. Japan
기자재명칭:	Industrial Camera
모 델 명:	SW-8001M-MCL-M72
제조자 및 제조국가:	JAI Ltd., Japan / JAPAN

TBD

상 호:	JAI Ltd. Japan
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TBD

상 호:	JAI Ltd. Japan
기자재명칭:	Industrial Camera
모 델 명:	SW-16001M-MCL-M72
제조자 및 제조국가:	JAI Ltd., Japan / JAPAN

TBD

제조년월은 제품상자의 라벨을 참조하십시오.

China RoHS

The following statement is related to the regulation on “Measures for the Administration of the Control of Pollution by Electronic Information Products “, known as “China RoHS“. The table shows contained Hazardous Substances in this camera.

mark shows that the environment-friendly use period of contained Hazardous Substances is 15 years.

重 要 注 意 事 项

有毒有害物质或元素名称及含量表

根据中华人民共和国信息产业部『电器电子产品有害物质限制使用管理办法』， 本产品《有毒有害物质或元素名称及含量表》如下.

部件名称	有毒有害物质或元素					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr (VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
SW-8001M-MCL-M72	×	○	○	○	○	○
SW-8001TL-MCL-M72						
SW-16001M-MCL-M72						

○:表示该有毒有害物质在该部件所有均质材料中的含量均在 GB/T 26572-2011规定的限量要求以下。

×:表示该有毒有害物质至少在该部件的某一均质材料中的含量超出 GB/T 26572-2011规定的限量要求。

环保使用期限

电子信息产品中含有的有毒有害物质或元素在正常使用的条件下不会发生外 泄或突变、电子信息产品用户使用该电子信息产品不会对环境造成严重污染 或对其人身、财产造成严重损害的期限。

数字「15」为期限15年。

Usage Precautions

Notes on Cable Configurations

The presence of lighting equipment and television receivers nearby may result in video noise. In such cases, change the cable configurations or placement.

Notes on Attaching the Lens

Technical Notes How to Clean a Sensor

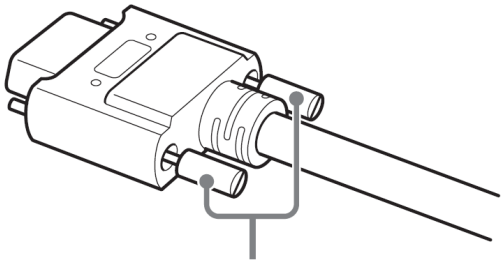
Avoiding Dust Particles

When attaching the lens to the camera, stray dust and other particles may adhere to the sensor surface and rear surface of the lens. Be careful of the following when attaching the lens.

- Work in a clean environment.
- Do not remove the caps from the camera and lens until immediately before you attach the lens.
- To prevent dust from adhering to surfaces, point the camera and lens downward and do not allow the lens surface to come into contact with your hands or other objects.
- Always use a blower brush to remove any dust that adheres.
- Never use your hands or cloth, blow with your mouth, or use other methods to remove dust.

Notes on Camera Link Cable Connections

Secure the locking screws on the connector manually, and do not use a driver. Do not secure the screws too tightly. Doing so may wear down the screw threads on the camera. (Tightening torque: 0.15 N·m or less)



> **Caution:** Secure manually. Do not secure too tightly.

Phenomena Specific to CMOS Image Sensors

The following phenomena are known to occur on cameras equipped with CMOS image sensors. These do not indicate malfunctions.

- **Aliasing**: When shooting straight lines, stripes, and similar patterns, vertical aliasing (zigzag distortion) may appear on the monitor.
- **Blooming**: When strong light enters the camera, some pixels on the CMOS image sensor may receive much more light than they are designed to hold, causing the accumulated signal charge to overflow into surrounding pixels. This “blooming” phenomenon can be seen in the image but does not affect the operation of the camera.
- **Fixed pattern noise**: When shooting dark objects in high-temperature conditions, fixed pattern noise may occur throughout the entire video monitor screen.
- **Defective pixels**: Defective pixels (white and black pixels) of the CMOS image sensor are minimized at the factory according to shipping standards. However, as this phenomenon can be affected by the ambient temperature, camera settings (e.g., high sensitivity and long exposure), and other factors, be sure to operate within the camera’s specified operating environment.

Notes on Exportation

When exporting this product, please follow the export regulations of your country or region.

Features

This camera is a high performance line scan camera that uses a tri-linear (RGB) or monochrome CMOS line sensor. The interface is CameraLink, and it is equipped with two Mini CameraLink connectors.

The table below shows the basic information of the cameras.

Model Name	Image Sensor	Effective Pixels	Pixel Size	Max Line Rate
SW-8001TL-MCL-M72	Trilinear (RGB)	3 x 8192	7 µm x 7 µm	33kHz
SW-8001M-MCL-M72	Monochrome	2 x 8192	7 µm x 7 µm	100kHz
SW-16001M-MCL-M72	Monochrome	2 x 16384	3.5 µm x 3.5 µm	50kHz

Features Overview

- The Camera Link interface can be used for trigger source and video output.
- Video output:
  - Trilinear model: RGB8, Mono8
  - Monochrome model: Mono8, Mono10, Mono10p, Mono12p
- Supports ROI, horizontal binning, and horizontal image flip
- Image calibration functions include FFC (flat field correction), black level adjustment
- Trilinear model: supports tilted view correction, white balance, color correction matrix
- Monochrome model: supports TDI (Time Delayed Integration)
- Supports ASCII commands
- Lens mount: M72

Package Contents

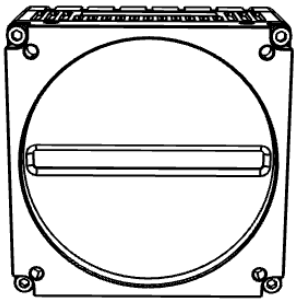
- Camera body (1)
- Dear Customer (sheet) (1)

Parts Identification

This section describes the lens mount, connectors, LEDs, and mounting holes of this camera.

Lens Mount (M72-Mount)

Mount an M72-mount lens here.

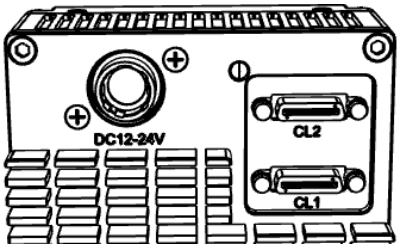


- Back flange distance: 12 mm
- Thread pitch: 0.75 mm

> **Note:** Before mounting a lens, be sure to refer to ① Lens and confirm the precautions for attaching a lens and the supported lens types.

Connectors

This section explains the connectors on this camera.



CL1 and CL2 Mini CameraLink Connectors

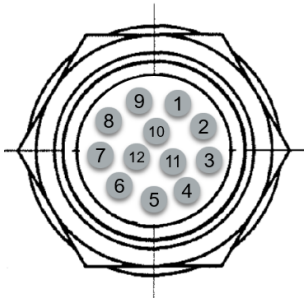
Connect Cable Link compatible cables here.

- Camera Side: HDR-EC26FYTG2-SL+
- Cable: SDR Connector Cable

> **Notes:**
> - The cable length at which communication will be possible will be limited when using a cable that is not compatible with Camera Link, a small diameter type cable, or a high flex type cable.
> - This camera does not support PoCL.

DC IN Connector (12-Pin Round)

Connect the cable for a power supply or for DC IN here.

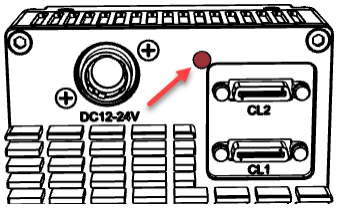


Camera Side: HR10A-10R-12PB (71)

Pin No.	Description
1	GND
2	DC In (DC 12V to 24V ± 10%)
3 ~ 12	Disabled

LED

Indicates the power and trigger status.



LED		Status
	Off	The camera is initializing There is a hardware/power supply error
	Lit red	The camera in operation
	Blinking green (fast)	During operation in trigger mode or free-run. **Note:** The blinking interval is not related to the actual input interval of the external trigger.
	Lit green	The camera is in idle state
	Alternating Red and Green	Firmware update in progress
	Alternating Red and Purple	The camera is in a fault state.

Mounting Holes

Use these holes when mounting the camera directly to a wall or other structural system.

Location	Description
Front	M4, Depth 6mm
Top	M4, Depth 6mm
Bottom	M4, Depth 6mm
Side	M4, Depth 6mm

> **Note:** Refer to "Dimensions" for the location of the mounting holes.

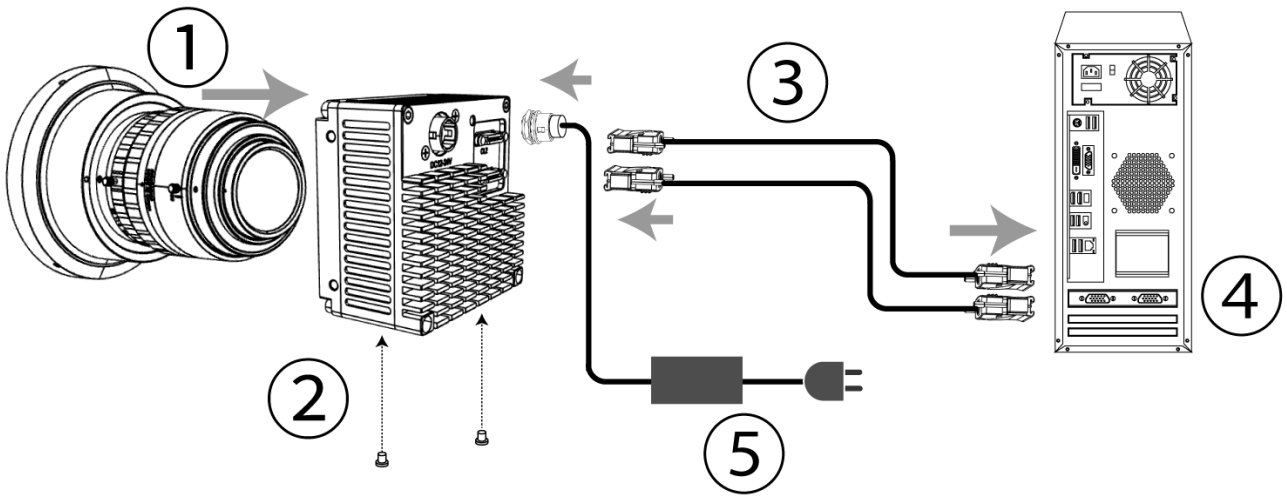
Preparation

Read this section to learn how the camera connects to devices and accessories. The preparation process is described below.

> **Note:** eBUS Player for SDK does not support this camera.

1	**Step 1: Connect Devices** Connect the lens, Camera Link cable, AC adapter, computer, and other devices.
2	**Step 2: Verify Camera Operation** Verify whether the camera is turned on and ready for use.
3	**Step 3: Verify the Connection Between the Camera and PC** Verify whether the camera is properly recognized.
4	**Step 4: Configure Trigger, Exposure, and Line Rate Settings** Configure the trigger, exposure, and line rate settings.
5	**Step 5: Adjust the Image Quality** Perform basic settings for image quality.
6	**Step 6: Save the Settings** Save the current setting configurations in user memory.

Step 1: Connect Devices



① Lens

② Mounting

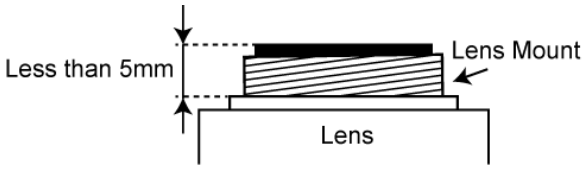
③ Camera Link Cable

④ Frame Grabber Board

⑤ DC IN Cable and AC Adapter

① Lens

M-72 mount lenses with lens mount protrusions of 5 mm or less can be attached.



Caution: The maximum performance of the camera may not be realized depending on the lens.

Note: The following formula can be used to estimate the focal length: **Focal length = WD / (1 + W/w)**

- WD: Working distance (distance between lens and object)
- W: Width of object
- w: Width of sensor (30.72mm)

② Mounting

When mounting the camera directly to a device, use screws that match the mounting holes on the camera. (Mounting Holes)

> **Caution:** For heavy lenses, be sure to support the lens itself. Do not use configurations in which its weight is supported by the camera.

③ Camera Link Cable

Connect the Mini CameraLink cables to the CL1 and CL2 connectors.

- Use Cable Link compatible cables.
- Refer to the specifications of the cable for details on its bend radius.

> **Notes:**
> - Refer to Notes on Camera Link Cable Connections when connecting the cables to the connectors.
> - This camera does not support PoCL.
> - The maximum length of a Camera Link cable is 7m when CLPixelClock is set to 85MHz. The maximum length of a CameraLink cable is 10m when CLPixelClock is set to a value other than 85MHz.
> - The CL1 connector is required for minimum system operation and is used for the Base Link configuration. The CL2 connector is used for the Full or EightBit (Decca) Link configuration and supports high-bandwidth data transfer.

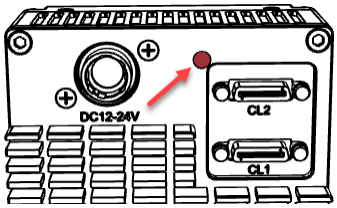
④ Frame Grabber Board

Refer to the operating instructions of the frame grabber board and configure settings on the computer as necessary. (Use a computer that meets the requirements of your frame grabber board).

⑤ DC IN Cable and AC Adapter

Provides power to the camera.

Step 2: Verify Camera Operation



Verify whether power is being supplied to the camera by checking the rear LED. When properly turned on, the power LED is lit green.

> **Note:** For details on how to read the LEDs, see LED.

Step 3: Verify the Connection Between the Camera and PC

Use the appropriate tool for the frame grabber board to be used to set up the camera and display captured images. Refer to the operation manual of the tool to be used for the operation method.

> **Note:** eBUS Player for JAI does not support this camera.

Step 4: Configure Trigger, Exposure, and Line Rate Settings

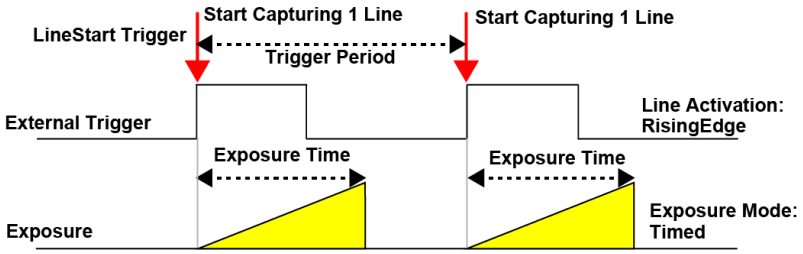
> **Related Setting Items:** AcquisitionControl

This section describes scenarios for controlling the trigger, exposure, and line rate.

> **Notes:**
> - This section is intended to explain the basic relationship between the trigger, exposure, and line rate.

Trigger Mode	Exposure Mode	Example
ON	Timed	Control via External Triggers with the Specified Exposure Time
	TriggerWidth	Control via External Triggers with Exposure Time Set to TriggerWidth
OFF	Timed	Control without External Triggers with the Specified Exposure Time

Control via External Triggers with the Specified Exposure Time

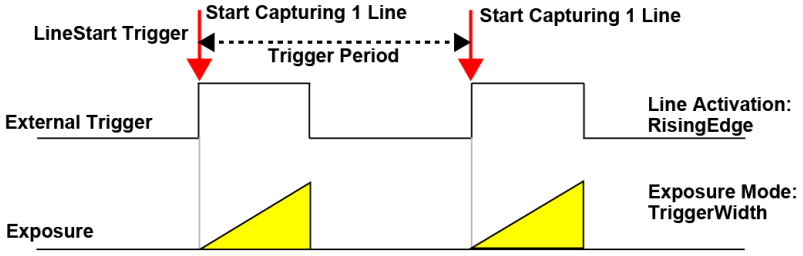


Notes:

- When using external triggers, the line rate is determined by the trigger period.
- The ExposureTime value cannot be longer than the trigger period.

Item	Setting Value / Selectable Range
Trigger Mode	On
Trigger Source	CC1, CC2, CC3, CC4
Trigger Activation	RisingEdge (rising edge of input signal) or FallingEdge (falling edge of input signal)
Exposure Mode	Timed (control via exposure time)
Exposure Time	Varies depending on settings.

Control via External Triggers with Exposure Time Set to TriggerWidth



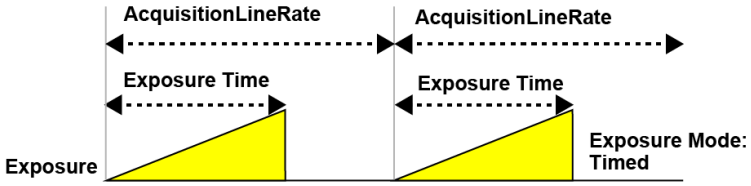
Notes:

- When using external triggers, the line rate is determined by the trigger period.

Item	Setting Value / Selectable Range
Trigger Mode	On
Trigger Source	CC1, CC2, CC3, CC4
Trigger Activation	LevelHigh (high-level duration) or LevelLow (low-level duration)
Exposure Mode	TriggerWidth (control via trigger width)

Control without External Triggers with the Specified Exposure Time

Configure the settings as follows.



Notes:

- The line rate can be set up to 1 line cycle to match the speed of the object or to lengthen the accumulation time to increase sensitivity.
- The ExposureTime value cannot be longer than the line period.

Item	Setting Value / Selectable Range
Trigger Mode	Off
Exposure Mode	Timed (control via exposure time)
Exposure Time	Varies depending on settings.
Acquisition Line Rate	Varies depending on the PixelFormat and Link speed.

Step 5: Adjust the Image Quality

To maximize the performance of the camera, configure its basic function in the following order.

1. Adjust the image grayscale to the desired actual brightness level.

   > **Related Topic:** "Exposure Mode", "Gain Controls", "Black Level Function", "Gamma Function", "LUT (Lookup Table)".

2. Configure the TDI-related settings (the monochrome models only).

   > **Related Topic:** 2-Step TDI Function

3. Perform FFC in the actual working environment.

   > **Related Topic:** Flat Field Correction (FFC)

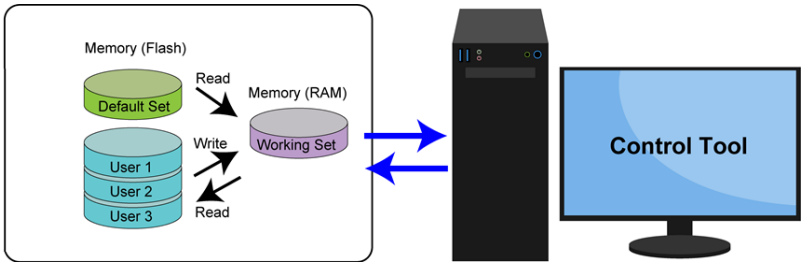
4. Adjust the White Balance (the trilinear model only).

   > **Related Topic:** White Balance Function

Step 6: Save the Settings

> **Related Setting Items:** UserSetControl

The configured setting values will be deleted when the camera is turned off. By saving current setting values to user memory, you can load and recall them whenever necessary. You can save up to three sets of user settings in the camera. (User Set1 to 3)



> **Note:** Settings will not be saved on the PC.

Save the User Settings

UserSetSave can save camera function configuration parameters, including module enable/disable settings and register data size. However, the LUT, FFC, Gamma, and other pixel-by-pixel algorithm settings cannot be saved.

1. Stop image acquisition.
2. Expand UserSetControl and select the save destination (UserSet1 to UserSet3) in UserSetSelector.

   > **Note:** The factory default setting values are stored in Factory and cannot be overwritten.

   > **Caution:** Settings can only be saved when image acquisition on the camera is stopped.

3. Click the **UserSetSave** button.
4. The current setting values are saved as user settings.

Load the User Settings

1. Stop image acquisition. User settings can only be loaded when image capture on the camera is stopped.
2. Select the settings to load (UserSet1 to UserSet3) in UserSetSelector.

   > **Note:** When selecting **Default** for UserSetSelector, the factory settings are loaded.

3. Click the **UserSetLoad** button.
4. The selected user settings are loaded.
5. Optionally, in select the UserSet (UserSet1 to UserSet3) using **UserSetDefaultSelector** to load and make active when the camera is power-cycled or **DeviceReset** is executed.

Main Functions

This chapter describes the camera's main functions.

ROI (Regional Scanning Function)

Related Setting Items: ImageFormatControl

The ROI (region of interest) function allows you to output images by specifying the area to scan.

ROI Settings

Specify the area to scan by specifying the Width and Horizontal Offset values (ImageFormatControl).

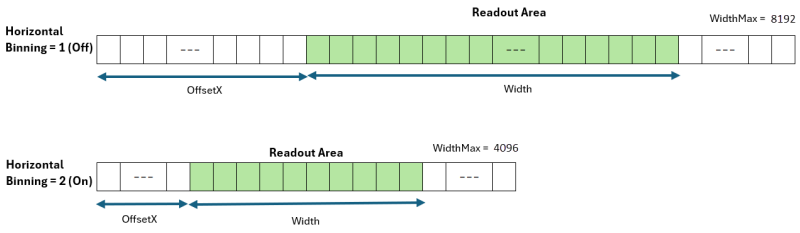
Notes:

- This camera does not support the vertical binning.
- On this camera, the line rate is not affected by the ROI settings.
- The DeviceTapGeometry setting [CameraLinkControl] does not affect the ROI settings.

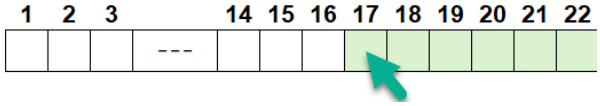
The setting ranges for the ROI function's readable area based on the Binning setting are as follows.

	BinningHoizontal	Width (Pixel)	Offset X (Pixel)
SW-8001	1 (Off)	16 ~ 8192, Step 16	0 ~ 8172, Step 16
	2 (On)	8 ~ 4096, Step 8	0 ~ 4088, Step 8
SW-16001	1 (Off)	16 ~ 16384, Step 16	0 ~ 16368, Step 16
	2 (On)	8 ~ 8192, Step 8	0 ~ 8184, Step 8

Example (SW-8001 Model)



For example, when **OffsetX** is set to 16, the first readout pixel is the 17th pixel.



Binning Function

Related Setting Items: ImageFormatControl

The Binning function combines signal values from clusters of adjacent pixels to create larger, virtual pixels. This process reduces the image's pixel resolution while offering two key benefits:

- **Sum mode**: Increases sensitivity by summing pixel values.
- **Average mode**: Reduces noise by averaging pixel values.

Binning = 1 (Off)	Binning = 2 (ON): Sum Mode
	

This camera supports Horizontal x2 digital binning on the FPGA.

Notes:

- On this camera, the line rate remains unaffected when binning is enabled.
- A similar effect can be achieved using the 2-Step TDI Function.
- Refer to JAI's blog "Using pixel binning to increase image quality under low light conditions" on how to use the Binning function.

PixelSize, Resolution

Model	Binning Off (1)	Binning On (2)
		
SW-8001M-MCL-M72 SW-8001TL-MCL-M72	PixelSize: 7 µm x 7 µm	PixelSize: 14 µm x 7 µm
	WidthMax: 8192	WidthMax: 4096
SW-16001M-MCL-M72	PixelSize: 3.5 µm x 3.5 µm	PixelSize: 7 µm x 3.5 µm
	WidthMax: 16384	WidthMax: 8192

Pixel Format

Related Setting Items: ImageFormatControl

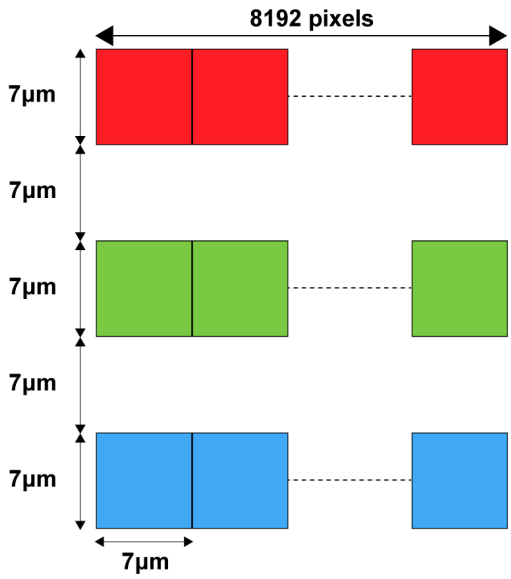
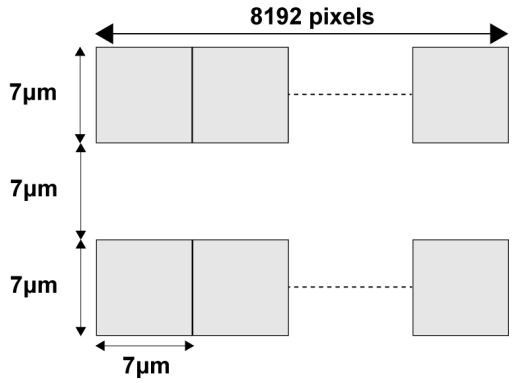
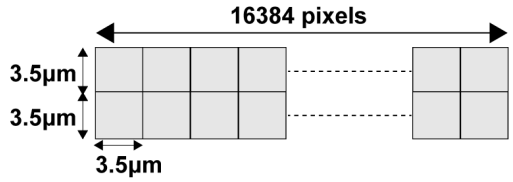
The selectable PixelFormat depends on the CIConfiguration (CameraLinkControl) setting (see below).

CIConfiguration	SW-8001M	SW-8001TL	SW-16001M
Base	Mono8, Mono10, Mono10p, Mono12p,	RGB8, Mono8	Mono8, Mono10, Mono10p, Mono12p,
Full	Mono8	NA	NA
EightyBit (Deca)	Mono8	RGB8, Mono8	Mono8

Note: The CIConfiguration and PixelFormat settings on the camera side and the frame grabber board side must match. For details on frame grabber board settings, refer to the instruction manual of the board.

Pixel Alignment of the Sensor

The following is the pixel alignment of the sensor that is used on the camera.

Trilinear Model	Monochrome Model
SW-8001TL-MCL-M72 	SW-8001M-MCL-M72  SW-16001M-MCL-M72 

ReverseX

> **Related Setting Items:** ImageFormatControl

The ReverseX function allows you to flip an image horizontally.

ReverseX = Off	ReverseX = On
	

> **Note:** The **Width** and **OffsetX** settings are not affected by this function because the image is flipped after the image acquisition.

Exposure Mode

> **Related Setting Items:** AcquisitionControl

This function allows exposure at a preset accumulation time regardless of the line rate. The setting range is 3.0µs ~ 15.149ms.

This camera supports the following exposure modes:

Exposure Mode	Description	Setting Example
Timed	Mode in which control is performed using ExposureTime. Acquire images using an exposure time configured beforehand on an external trigger.	Control via External Triggers with the Specified Exposure Time
		Control without External Triggers with the Specified Exposure Time
TriggerWidth	Mode in which control of the exposure time is performed using the pulse width of the trigger input signal. The exposure time will be the same as the pulse width of the trigger input signal.	Control via External Triggers with Exposure Time Set to TriggerWidth

How to Configure Exposure Time via the ASCII Command

> **Note:** On this manual, parameters exclusive to ASCII command control are labeled with the prefix "raw" (e.g., ExposureTime in the Control Tool vs. rawExposureTime in ASCII commands).

When configuring the Exposure Time using ASCII commands, you must specify the value based on the internal clock cycle, calculated as: T / 12.5 ns

Below are the formulas for converting Exposure Time in microseconds (µs) to the corresponding ASCII setting value based on the internal clock:

```
rawExposureTime[ASCII Setting Value] = ExposureTime[µs] /12.5ns
                                     = (100 x 10^-6) / (12.5 x 10^-9)
                                     = 80 x ExposureTime[µs]
```

For example, To set the Exposure Time to **50 µs**, enter **4000**:

```
rawExposureTime[ASCII Setting Value] = 80 x 50µs = 4000
```

Converting from Clock Cycles to Exposure Time (µs)

The values of rawMeasuredExposureTime, rawExposureTimeMIN, and rawExposureTimeMAX are also represented based on the internal clock (T / 12.5 ns). Use the following formulas to convert these values back into microseconds:

```
ExposureTime[µs] = rawExposureTime[ASCII Setting Value] x 12.5ns
                 = rawExposureTime[ASCII Setting Value] x 0.0125
```

For example, If rawMeasuredExposureTime displays **4000**, the actual Exposure Time is **50µs**:

```
4000 x 0.0125 = 50µs
```

Change the Line Rate

> **Related Setting Items:** AcquisitionControl

When **TriggerMode** is set to **Off**, you can set the line rate using **InternalLineRate**. This function can be used to match the scanning speed of the camera to the feeding speed of the object or to lengthen the accumulation time to increase sensitivity.

Supported Operation Mode

TriggerMode	ExposureMode	Example
Off	Timed	Control without External Triggers with the Specified Exposure Time

> **Notes:**
> - You can also save the setting, and have it applied whenever the power is subsequently turned on, but this requires addition operations. (Step 6: Save the Settings)
> - The black level will change depending on the line rate, so be sure to read the black level after changing the line rate or trigger period.
> - On this camera, the line rate is not affected by Binning Function or ROI (Regional Scanning Function).

How to Configure Line Rate via the ASCII Command

> **Note:** On this manual, parameters exclusive to ASCII command control are labeled with the prefix "raw" (e.g., InternalLineRate in the Control Tool vs. rawInternalLineRate in ASCII commands).

When configuring the Internal Line Rate using ASCII commands, you must specify the value based on the internal clock cycle, calculated as: (1/f)/12.5ns

Below are the formulas for converting Internal Line Rate in Hz to the corresponding ASCII setting value based on the internal clock:

```
rawInternalLineRate [ASCII Setting Value]
                = 1 / (12.5ns x InternalLineRate[Hz])
                = 1 / (12.5 x 10^-9 x InternalLineRate[Hz])
                = 80,000,000 / Linerate[Hz]
```

For example, to set the line rate to **10,000Hz**, enter **8000**.

```
rawInternalLineRate [ASCII Setting Value] = 80000000 / 10000 = 8000
```

Converting from Clock Cycles to InternalLineRate (Hz)

The values of rawMeasuredLineRate, rawLineRateMIN, and rawLineRateMAX are also represented based on the internal clock. Use the following formulas to convert these values back into Hz:

```
InternalLineRate[Hz]
              = 1,000,000,000/(rawInternalLineRate [ASCII Setting Value] * 12.5)
             = 80,000,000 / rawInternalLineRate
```

For example, when the rawMeasuredLineRate displays 8000, the actual line rate is 10,000Hz.

```
InternalLineRate[Hz] = 80,000,000 / 8000 = 10,000
```

Counter Functions

> **Related Setting Items:** AcquisitionControl

The camera supports the following counters for monitoring trigger and signal events:

Counter	
ExtTriggerDropped	Displays the number of times external trigger signals were ignored or not processed (i.e., dropped). Triggers may be dropped if received during an ongoing exposure or if the interval between triggers is too short. When 0 is displayed, it indicates that all external trigger signals were processed successfully. To reset this counter, execute **ExtTriggerDroppedClear**.
ExtTriggerCount	Displays the total number of external trigger signals received by the sensor. This counter reflects the total number of lines read, including those where triggers were dropped. To reset this counter, execute **ExtTriggerCountClear**.
Input Ext Trigger Count	Displays the number of external trigger signals received and processed by the FPGA. Only trigger signals that result in processed and output lines are counted. If an image acquired by the sensor is not processed by the FPGA, it is not included in this count. To reset this counter, execute **InputExtTriggerCount**.
SOLCount	Counts the number of times a Start of Line (SOL) signal is generated. Indicates how many times the camera initiated the readout of a new image line.
EOLCount	Counts the number of times an End of Line (EOL) signal is generated. Indicates how many image lines were successfully completed and read out.
axidgtvalidCount	Counts the number of AXI DGT VALID signals generated during operation. > **Note:** SW-8001M Only
Camera tvalid Count	Counts the number of transfer cycles for which valid pixel data was output from the camera.

Trigger Control

Related Setting Items: LineTriggerControl

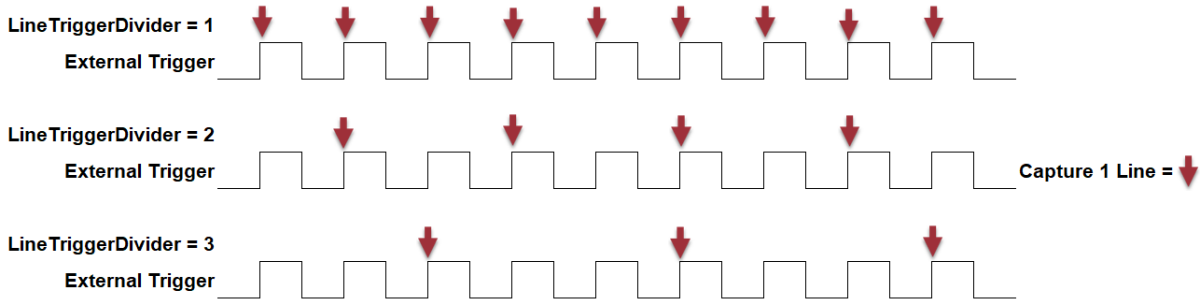
The camera supports Line Start trigger control via external trigger signals. This function allows the camera's exposure to be precisely controlled by each incoming trigger.

Supported Operation Mode

TriggerMode	ExposureMode	Example
On	Timed	Control via External Triggers with the Specified Exposure Time
On	TriggerWidth	Control via External Triggers with Exposure Time Set to TriggerWidth

LineTriggerDivider

The LineTriggerDivider setting determines how often the camera responds to external trigger signals. It enables the camera to acquire an image once every N trigger events, where N is the user-defined divider value.



The key benefits are:

- Ideal when the trigger input frequency is higher than the desired image acquisition rate.
- Helps reduce the number of captured images.
- Decreases processing load.
- Optimizes data bandwidth and improves overall system efficiency.

Black Level Function

> **Related Setting Items:** AnalogControl

The black level defines the reference signal level for "black" in an image. Proper black level adjustment is essential for maintaining image contrast, dynamic range, and noise suppression. The camera provides two black level modes (Normal and DeBackGround) to support different imaging environments:

1. Select the desired mode using **BlackLevelMode**:

    - **Normal**: Applies a uniform offset (BlackLevel) across the entire image. No pixel-level or noise-adaptive correction is performed. This mode is recommended for applications that prioritize processing speed or operate under stable lighting conditions where simple brightness adjustment is sufficient.

      Use this mode when you want to adjust the overall brightness of the image with a fixed offset.

    - **DeBackGround**: Automatically subtracts background offset only from pixels whose values are below the specified **BlackLevel** threshold. Pixels brighter than this threshold remain unchanged. This mode is ideal for applications where you want to suppress low-level background noise or baseline offsets—such as sensor dark current or uneven lighting—while preserving the brightness of target areas.

      Recommended for use in scenes where the background should be reduced to zero without affecting key image details.

2. Specify the black level adjustment value using **BlackLevel**. The setting range varies depending on the Black Level Mode (Normal: -4095 - +4095; DeBackGround: 0 - 4095). A negative value darkens the image, while a positive value brightens it.

Gain Controls

> **Related Setting Items:** AnalogControl

The camera provides two types of digital gain controls to adjust image brightness according to the application environment. Each gain method has different characteristics in terms of speed, precision, and noise impact.

DigitalGain

Applied after digitization, digital gain multiplies the image signal numerically to fine-tune brightness (0.1 ~ 15.99; step: 0.01). It allows for precise control in small increments and is useful for applications requiring detailed brightness calibration.

> **Note:** This setting item uses a different setting values when using the ASCII command to configure the setting. For more information see **rawDigitalGain** in AnalogControl.

DigitalShift

This setting quickly increases brightness by shifting the digital signal by powers of two (×1, ×2, ×4, ×8, ×16). It is especially useful in low-light scenarios where fast gain adjustments are needed. Compared to digital gain, it offers coarser steps but minimal processing overhead.

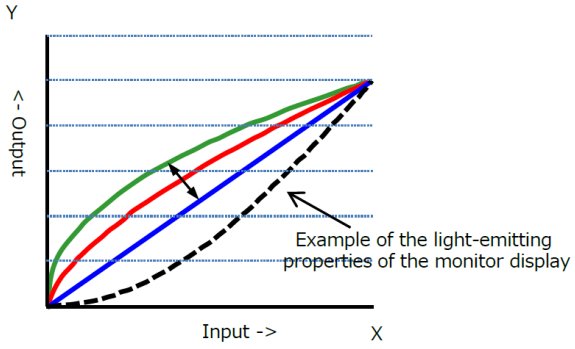
- **×1**: No change in brightness
- **×2 to ×16**: Doubles, quadruples, etc., the brightness

Gamma Function

> **Related Setting Items:** AnalogControl

The Gamma function corrects the output signals from the camera beforehand (reverse correction), taking into consideration the light-emitting properties of the monitor display. As the light-emitting properties of the monitor are not linear, the entire image may be darker or the gradation in the dark areas may be less noticeable when camera outputs are displayed without processing.

The Gamma function can be used to correct the camera signals with an opposite-direction curve and produce a display that is close to linear.



> **Note:** You can use the LUT function to configure a curve with more detailed points. For details, see LUT (LUT (Lookup Table)).

To Use the Gamma Function

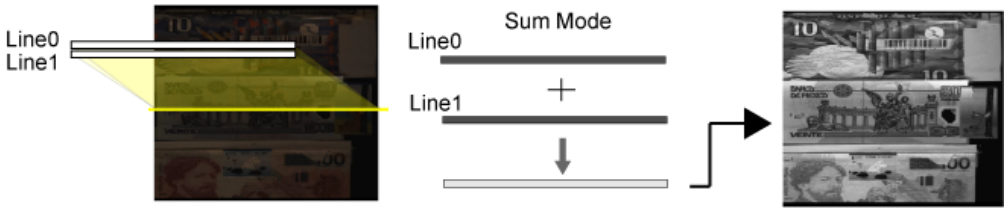
1. Select **GammaEnable** to **On**.
2. Set the Gamma value in **Gamma**. The setting range is from 0.1 to 7.0 (step: 0.1).

   > **Note:** This setting item uses a different setting values when using the ASCII command to configure the setting. For more information, see rawGamma [AnalogControl].

2-Step TDI Function

> **Related Setting Items:** TDIControl

This camera supports the 2-step TDI (Time-Delayed Integration) function. TDI is a motion-synchronized charge readout technique that significantly improves sensitivity and enables blur-free imaging of moving objects by accumulating charges in coordination with the object's movement across the image sensor.



2-step TDI is a variation of conventional TDI. While traditional TDI continuously transfers charge in one direction across 2 lines, 2-step TDI introduces a second phase:

- In Step 1, charges accumulate across 2 sensor lines in sync with the object's motion.
- In Step 2, the accumulated output is re-integrated, further enhancing signal strength and optimizing both signal-to-noise ratio (SNR).

> **Note:** This function is supported only on the monochrome models.

How to Configure

1. Select **TDIStage** to **2-Stage** to enable 2-step TDI.
    - **1-Stage**: Only Line 0 is used. The camera performs single-line TDI, which behaves similarly to standard line-scan imaging.
    - **2-Stage**: Both Line 0 and Line 1 are used. Charge collected in one line is transferred to the other line in synchronization with the object's motion. This mode offers higher sensitivity, better SNR, and superior motion tracking - ideal for fast-moving objects in low-light environments.

    When **2-Stage** is selected, move to step 2 to configure the rest of 2-step TDI settings.
2. Select **TDIMode** (**Sum** or **Average**).
    - **Sum**: Increases sensitivity by adding charge values across lines. Recommended for dark scenes or low-signal conditions.
    - **Average**: Reduces image noise by averaging accumulated charges. Useful in bright environments to preserve tonal detail.

3. Configure the **TDIParameter** setting (0 ~ 10 lines). This is a spatial correction setting item, and it defines the number of sensor lines separating two adjacent readout lines on the sensor—that is, the vertical pixel offset between them. For example, setting **TDIParameter** to **1** corrects the image by one line in the vertical direction.

   The TDIParameter setting depends on the relative speed between the camera's line frequency and the object's movement:

Recommended Value*	When to Use
< 2	When the camera line frequency is lower than that of the object (to prevent vertical compression)
= 2	When the camera and object line frequencies match (ideal square rendering).
> 2	When the camera line frequency is higher than that of the object (to prevent vertical stretching).

4. > **Note:** *This setting item uses a different setting format values when using the ASCII command to configure the setting. Fore more information, see **rawTDIParameter** (TDIControl).

5. Determines the direction of charge transfer between Line 0 and Line 1 in **TDIRowDirection**:

   - **Reverse**: Use when the object is moving from Line 0 to Line 1 on the sensor.
   - **Forward**: Use when the object is moving from Line 1 to Line 0 on the sensor.

   > **Note:** Correct synchronization is critical. An incorrect direction may cause image blur.

Setting Examples

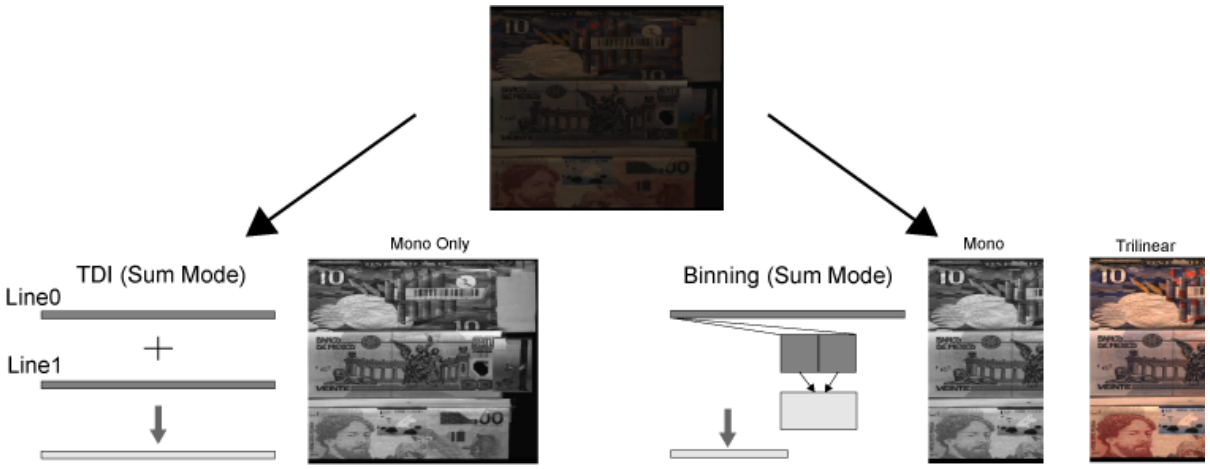
The below table shows the setting examples of the TDI function.

Setting Items	Example 1	Example 2
Scenario	Object moving very fast in low light	Object moving slowly in bright light
TDIStage	2-Stage	2-Stage
TDIMode	Sum	Average
TDIParameter	Depends on the relative speed between the camera's line frequency and the object's movement	
TDIRowDirection	Based on motion direction	

TDI vs Binning

Both TDI and Binning enhance signal quality but are optimized for different use cases.

- **TDI**: Enables higher sensitivity while maintaining resolution by synchronizing with object motion. Monochrome models only.
- **Binning**: Improves sensitivity but reduces resolution. It is also supported on color models.



	TDI	Binning
How it Works	Signal from 2 sensor rows is accumulated sequentially, synchronized with the motion of the target across the sensor.	Combines the signal from adjacent pixels into one output pixel.
Resolution impact	Maintains resolution along the scan axis	Reduces vertical resolution (2× binning halves resolution)
Light sensitivity	2× signal gain with better SNR due to synchronized charge accumulation	2× signal gain, but with less SNR improvement than TDI.
Color support	Not available (monochrome only)	Available on color and mono models

> **Note:** You can also combine binning with TDI.

Flat Field Correction (FFC)

> **Related Setting Items:** FlatFieldCorrection

Flat Field Correction (FFC) is a key image calibration process used in industrial line scan cameras to ensure high image uniformity and accuracy. This correction compensates for optical non-uniformities that may affect image quality.

The FFC process for this camera includes two main components:

- Fixed Pattern Noise (FPN) Correction: Applied to black (dark) pixels to eliminate consistent, sensor-related noise patterns that occur even in the absence of light.
- Photo-Response Non-Uniformity (PRNU) Correction: Compensates for pixel-to-pixel sensitivity differences when the sensor is exposed to a uniform light source.

Together, these corrections help produce cleaner, more uniform images, enabling reliable inspection and analysis in industrial imaging applications.

How to Configure

First configure the FFC settings, and then execute the corrections.

1. Set the number of sample frames in **FFCSampleFrames**.
    - **1024**: Select this option when real-time performance and/or processing speed are important.
    - **2048**: Select this option when high accuracy is required. This method takes time but reduces noise by averaging it.
2. Use **FFCUserSetSelector** to choose where to save the FFC correction data (UserSet1 - 3).

    > **Note:** Correction data cannot be saved to the Default user set.

3. Use the following parameters to specify the region where FFC should be applied:
    - **FFCCalAreaStartX**: Starting X-coordinate for the calibration area.
    - **FFCCalAreaWidth**: Width of the calibration area.

    > **Note:** The area specified by the FFCCalAOLStartX and FFCCalAOLWidth cannot exceed the WidthMax value.

4. Use **FFCCalAlgorithm** to select the amount of filtering (smoothing) to apply during FFC.
    - **1×3, 1×5, 1×7, 1×9**: Larger filters increase smoothing but reduce image detail (e.g., edge sharpness).
    - **Off**: No filtering is applied.

5. Set the mode using **FFCCalTargetMode**.
    - **Max**: Uses the maximum brightness level among sample frames for correction. Ideal for removing highlights.
    - **Average**: Uses the average brightness level. Recommended for unstable lighting environments or scenes with a wide brightness range.
    - **Target**: Uses a user-defined target brightness value (**FFCTargetValue**). Suitable for flat lighting conditions or have a clear target level.
        - **FFCCalTargetValue**: Specify the desired target brightness. If the scene is overly saturated, lower the value. If the scene is too dark, making correction difficult, increase the value.

            > **Note: FFCCalTargetValue** is enabled only when **FFCCalTargetMode** is set to **Target**.

6. Set **FFCEnable** to **On** to enable the correction.
7. Execute **FFCCalFPN** to perform the FPN (Fixed Pattern Noise) correction.

    > **Note:** Ensure the sensor is completely shielded from light during execution.

8. Execute **FFCCalPRNU** to PRNU (Photo-Reseponse Non-Uniformity), which arises from pixel-level response differences under bright conditions.

    > **Notes:**
    > - PRNU correction is performed under the condition that the image is flat with or without a lens attached. However, if there is shading due to a lens, light sources, etc., correction is performed to flatten the image including the effects of such shading.
    > - The subject should be a white, flat surface (such as a sheet of white paper).

9. Validate the correction visually after execution.
10. To apply previously saved correction data, select the desired user set from **FFCUserSetSelector**.
11. To load the Default user set (=factory default), execute **FFCUserSetDefault**.

White Balance Function

Related Setting Items: WhiteBalance

Note: This function is supported only on the SW-8001TL-MCL-M72 model.

White balance ensures accurate color reproduction by compensating for variations in lighting conditions. In a line scan camera, this process adjusts the red and blue gain levels so that neutral (gray or white) targets appear color-balanced in the final image.

The camera supports multiple white balance calibration modes and offers flexible control over both the region used for calibration and the gain values applied.

Automatic White Balance Adjustment (Once or Continue)

1. Place a white sheet of paper or similar object under the same lighting conditions as the intended subject, and zoom in to capture the white. White objects near the subject, such as a white cloth or wall, can also be used. Be sure to prevent the high-intensity spot lights from entering the screen.
2. If necessary, use **WBCalibAOIStartX** and **WBCalibAOIWidth** to configure the white balance adjustment area.
3. Select **Once** from **WBCalibMode**. Once performs one-time automatic calibration.
4. The camera will automatically calculate and apply **WBRedGain**, **WBBlueGain** and **WBGreenGain** based on the AOI.

   Note: These setting items use different setting values when using the ASCII command to configure the setting. For more information, see **rawWBRedGain**, **rawWBBlueGain** and **rawWBGreenGain** setting items (WhiteBalance).

5. **WBCalibMode** returns to **Off** after the calibration is completed.
6. Optionally, execute **RefreshPRNU_WBGain** if needed to update PRNU correction using new gain values. This option can be useful when recalibrating after significant lighting or optical changes.

Manual White Balance Adjustment

1. Place a white sheet of paper or similar object under the same lighting conditions as the intended subject, and zoom in to capture the white. White objects near the subject, such as a white cloth or wall, can also be used. Be sure to prevent the high-intensity spot lights from entering the screen.
2. Select **Manual** from **WBCalibMode**.
3. Manually adjust **WBRedGain**, **WBBlueGain** and **s** while observing image output or histogram until proper color balance is achieved.

   > **Note:** These setting items use different setting values when using the ASCII command to configure the setting. For more information, see **rawWBRedGain**, **rawWBBlueGain** and **rawWBGreenGain** setting items (WhiteBalance).

4. Optionally, execute **RefreshPRNU_WBGain** if needed to update PRNU correction using new gain values.

LUT (Lookup Table)

> **Related Setting Items:** LUTControl

The LUT (Look-Up Table) function allows you to apply a non-linear mapping between the sensor's captured signal values and the output values from the camera. This is useful for adjusting image tone, contrast, or dynamic range to suit specific application needs.

This camera supports both predefined LUT options and user-configured LUT, giving users the flexibility to optimize image output for a variety of industrial scenarios.

How to Configure

1. Set **LUTEnable** to **On** to enable the LUT settings.
2. When using a monochrome model, choose an option using **LUTSelector**.
    - **User**: User-defined LUT. Ideal for applying custom tone curves or color grading tailored to specific inspection tasks.

      To configure:

        - **LUTIndex**: Select the LUT index to configure (0 ~ 4095).
        - **LUTValue**: Select the LUT value to configure (0 ~ 4095). After setting this item, the image reflects the setting.
        - Save your custom LUT with **LUTDataSave**.

          > **Note:** Only **User** settings are saved using **LUTDataSave**.

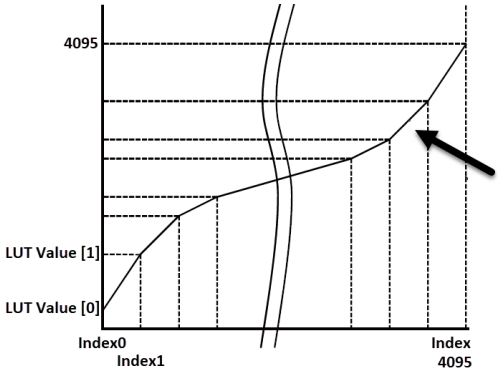
    - **Default1 (Bright Light Suppression)**: Reduces highlights in brightly lit scenes to prevent overexposure and detail loss. Useful for:
        - Environments with high-intensity LED lighting
        - Reflective metal or glossy surfaces
    - **Default2 (Blacklight Compensation)**: Enhances visibility in backlit scenes by lifting shadow areas. Useful for:
        - Objects darker than the background
        - Applications involving backlight inspection
    - **Default3 (Wide Dynamic Effect)**: Expands dynamic range by balancing highlights and shadows to preserve detail. Useful for:

- High-contrast scenes
- Inspections requiring fine gradation detection

3. To apply the selected LUT, execute **LUTDataLoad** after choosing an option via LUTSelector.

LUT Values

LUT values range from 0 at the lowest to 4095 at the highest. Linear interpolation is used to calculate LUT values between the index points.



Interpolation using the average values of data to the left and right is used to determine values between points.

ASCII Commands

This camera can be controlled using ASCII commands, which are plain-text instructions sent from a PC to the camera. These commands can be transmitted via a terminal emulator (e.g., Tera Term, PuTTY, or similar) over a serial communication interface.

ASCII (American Standard Code for Information Interchange) commands are human-readable text instructions. They allow low-level configuration and control of the camera by writing to or reading from specific register addresses. This is particularly useful for development, debugging, and automation in industrial environments.

Communication Settings

Baud Rate	9600
Data Length	8bits
Start Bit	1bit
Stop Bit	1bit
Parity	None
Xon/Xoff Control	XON/XOFF

How to Send Commands

To communicate with the camera, use the register addresses listed in the "Setting List" chapter. Each command references a specific address and follows a simple format.

	Sent to the Camera	Camera Response (When Successful)
Read a setting	`rd Address\r\n`	`[Address] = value\r\n` `OK>\r\n`
Write a setting	`wr Address value\r\n`	`[Address] = value\r\n` `OK>\r\n`
Execute a command	`wr Address 1\r\n`	`[Address] = value\r\n` `OK>\r\n`

> **Note:** For commands that initiate an action (e.g., calibration, reset, load, save, etc.), writing **1** to the register executes the operation.

Examples

1. **Read the current FFCCalTargetMode (Address = 0x01102C04)**

   The camera response "2," Target mode.

```
rd 0x01102C04\r\n
[0x01102C04] = 2\r\n
OK>\r\n
```

2. **Read and then update FFCCalTargetValue (Address = 0x01102C08)** from 3200 to 3600

```
rd 0x01102C08\r\n
[0x01102C08] = 3200\r\n
OK>\r\n

wr 0x01102C08 3600\r\n
[0x01102C08] = 3600\r\n
OK>\r\n
```

3. **Execute FFCCalFPN (Flat Pattern Noise correction, Address = 0x01102084)**

```
wr 0x01102084 1\r\n
[0x01102084] = 1\r\n
OK>\r\n
```

Note: Some setting items use different values between the Control Tool and ASCII commands. Parameters exclusive to ASCII command control are labeled with the prefix "raw" (e.g., ExposureTime in the Control Tool vs. rawExposureTime in ASCII commands).

In addition, the rawExposureTime and rawInternalLineRate are configured based on the camera's internal clock cycle. For details on how to convert between time/frequency values and raw settings, refer to the following sections:

- How to Configure Exposure Time via the ASCII Command
- How to Configure Line Rate via the ASCII Command

Error Messages

The table below shows the error messages:

Error Message	Description	Incorrect Command Example

`Err02!\r\nErr02!\r\n`
`xxx??`
`Invalid Ascii Command!\r\n`
	Incorrect command: other than "wr" or "rd" is entered	`wrr 0x01102C08 3600\r\n`

		`rdrd 0x01102C08\r\n`
`Err03!\r\n`	No parameter/argument is entered for a write command	`wr 0x01102C08\r\n`
`Err04!\r\n`	The entered address is missing "0x"	`wr 01102C08 3600\r\n`
`Err20!\r\n`	Incorrect address is entered.	`wr 0x01102C09 3600\r\n`
`Err21!\r\n`	Read command execution failed	NA
`Err22!\r\n`	Write command execution failed	NA

Note: For the Error02 message, the incorrect command (wrr or rdrd from the incorrect command example) will be displayed in **xxx**.

Setting List

This camera complies with GenICam. Each setting item name conforms to GenICam SFNC (Standard Features Naming Convention). (There are some JAI-specific setting items).

Each setting item is an integer type (IInteger), a real type (IFloat), an element enumeration type (IEnumeration), a character string (IString), a logical type (IBoolean), and a category type (ICategory) or a command type (ICommand) for executing the function.

Beginner: For beginner users.

Expert: For users with deep knowledge of camera functions.

Guru: For advanced users who make settings, including advanced features that can cause the camera to malfunction if not set correctly.

> **Note:** On this manual, parameters exclusive to ASCII command control are labeled with the prefix "raw" (e.g., ExposureTime in the Control Tool vs. rawExposureTime in ASCII commands).

DeviceControl

Display/configure information related to the device.

Device Control Item	Address	Setting Range	Default	Description
DeviceType (IEnum)	0x01600000	0: Transmitter (Fixed)		Display the device type.
DeviceScanType (IEnum)	0x01600004	1: Linescan (Fixed)		Display the scan type.
DeviceVendorName (IString)	0x00000004	-	"JAI Corporation"	Display the manufacturer name.
DeviceModelName (IString)	0x00000044	"SW-8001TL-MCL-M72" "SW-8001M-MCL-M72" "SW-16001M-MCL-M72"		Display the model name.
DeviceVersion (IString)	0x000000C4	-	-	Display the hardware version.
DeviceFirmwareVersion (IString)	0x01600088	-	-	Display the firmware version.
DeviceSerialNumber (IString)	0x00000144	-	-	Display DeviceID.

Device Control Item	Address	Setting Range	Default	Description
DeviceUserID (IString)	0x00000184	Any	-	Set the user ID (16bytes) for the camera.
SensorID (IString)	0x01600048	-	-	Display the sensor's chip ID.
FPGAVersion (IString)	0x01600108	-	-	Displays the FPGA version.
XMLVersion (IString)	0x01600188	-	-	Displays the XML file version.
DeviceTemperature Selector (IEnum)	0x01600324	1: FPGA		Select the area of the camera's interior for which to display the temperature sensor's reading. (fixed Mainboard)
DeviceTemperature (IFloat)	0x01600328	-	-	Display the temperature (°C) of the area selected by DeviceTemperatureSelector.
DeviceVoltageSelector (IEnum)	0x01600334	0: VCC12V (Fixed)		Select to view the voltage values of important voltage points.
DeviceVoltage (IFloat)	0x01600338	-	-	Display the actual voltage value (V) of the selected voltage point.
refreshDeviceState (ICommand)	0x01600218	-	-	Refresh the device state. To initiate this action via the ASCII Commands, write **1** to the register.
LVDSReTraining (ICommand)	0x01600410	-	-	Re-train LVDS data by performing a recalibration operation on the LVDS data channel pair of the sensor chip. To initiate this action via the ASCII Commands, write **1** to the register.
DeviceReset (ICommand)	0x01000040	-	-	Reset software device. To initiate this action via the ASCII Commands, write **1** to the register.

ImageFormatControl

Configure image format settings.

Image Format Control Item	Address	Setting Range	Default	Description
SensorWidth (IInteger)	NA	SW-8001: 8192 (4096) SW-16001: 16384 (8192) (): Binning = On		Display the sensor width in pixel. (Fixed)
BinningHorizontal (IInteger) **Related Topic:** Binning Function	0x01302040	1: Binning Off (Default) 2: Binning On		Configure the horizontal binning setting. (Binning is processed on FPGA)
BinningHorizontalMode (IEnum)	0x01302044	0: Sum (Default) 1: Average		Select Binning Mode. Sum mode increases the sensitivity; while Average mode reduces the noise in the image.
WidthMax (IInteger)	0x01303038	SW-8001: 8192 (4096) SW-16001: 16384 (8192) (): Binning = On		Display the maximum width of the image.
OffsetX (IInteger) **Related Topic:** ROI (Regional Scanning Function)	0x01303048	0 - (WidthMax - Width) Step: 16 (8)* (): Binning = On		Set the horizontal offset.
Width (IInteger)	0x01303040	SW-8001: 64 (32) ~ 8192 (4096) SW-16001: 64 (32) ~ 16384 (8192) (): Binning = On		Set the width of the image.
Height (IInteger)	0x01303044	1 (Fixed)		Set the height of the image.

Image Format Control Item	Address	Setting Range	Default	Description
Pixel Format (IEnum) **Related Topic:** Pixel Format	0x01401040	**Mono model** 0x01080001: Mono8 (Default) 0x010A0046: Mono10P 0x010C0047: Mono12P TBD: Mono10 **TL model** 0x01080001: Mono8 0x02180014: RGB8 (Default)		Set the Pixel Format. Depending on the CICConfiguration setting, the selectable PixelFormat is different. See "Pixel Format" for details.
PixelSizeA (IEnum)	0x01401040	**Mono model** 8: Bpp8 (Default) 10: Bpp10 12: Bpp12 **TL model** 8: Bpp8 (Default) 24: Bpp24		Display the pixel size.
ReverseX (IBoolean) **Related Topic:** ReverseX	0x01301000	0: False (Default) 1: True		Reverse pixels horizontally.
FieldCount (IEnum) **Note:** SW-16001 Only	0x01208000	1: Single field (Default) 1: Two-light field imaging		Set the Field Count.
FieldRset (ICommand) **Note:** SW-16001 Only	0x01208004	-	-	Start the first field. To initiate this action via the ASCII Commands, write **1** to the register.
Test Pattern (IEnum)	0x01100000	0: Off (Default) 1: Black 2: White 3: GreyHorizontalRamp 5: GreyHorizontalRampMoving 7: Color bar* *8001TL model only		Select the test image. **Note:** This function cannot be saved as the camera's default.

AcquisitionControl

Configure image capture settings.

> **Note:** Some setting items use different value formats between the Control Tool and ASCII commands. Setting items exclusive to ASCII command control are labeled with the prefix "raw".

Acquisition Control Item	Address	Setting Range	Default	Description
AcquisitionMode (IEnum)	-	2: Continuous (Fixed)		Display the Acquisition Mode. On this camera, it is fixed to Continuous.
ExposureMode (IEnum) **Related Topic:** Exposure Mode	0x01001080	0: TriggerWidth 1: Timed (Default)		Select the exposure mode.
ExposureTime (µs) (IFloat)	-	3.1µs ~ 4997µs	50µs	Set the ExposureTime in the internal clock cycle. When setting via the ASCII command, see "How to Configure Exposure Time via the ASCII Command" for more information. Exposure Offset Duration: TBD
rawExposureTime (ASCII command) (IInteger) **Related Topic:** How to Configure Exposure Time via the ASCII Command	0x01001010	248 ~ 399760	4000	
MeasuredExposureTime (µs) (IFloat)	-	-	-	Display of the actual internal exposure time during operation.
rawMeasuredExposureTime (ASCII command) (IInteger)	0x01001088	-	-	
rawExposureTimeMIN (ASCII command) (IInteger)	0x01001014	-	-	Display of the minimum exposure time that can be set in the current settings in the internal clock cycle.
rawExposureTimeMAX (ASCII command) (IInteger)	0x01001018	-	-	Display of the maximum exposure time that can be set in the current settings in the internal clock cycle.

Acquisition Control Item	Address	Setting Range	Default	Description
InternalLineRate (Hz) (IInteger) **Related Topic:** Change the Line Rate	-	200Hz ~	-	Set the line rate in the internal clock cycle. See "Specifications" for the maximum line rate. When setting via the ASCII comamnd, see "How to Configure Line Rate via the ASCII Command" for more information.
rawInternalLineRate (ASCII command) (IFloat) **Related Topic:** How to Configure Line Rate via the ASCII Command	0x0100101C	~ 400,000	8000	
rawLinetimeMIN (ASCII command only) (IInteger)	0x01001020	-	-	Display of the minimum line rate that can be set in the current settings in the internal clock cycle.
rawLinetimeMAX (ASCII command only) (IInteger)	0x01001024	-	-	Display of the maximum line rate that can be set in the current settings in the internal clock cycle.
MeasuredLineRate (Hz) (IFloat)	-	-	-	Display of the actual internal line rate during operation.
rawMeasuredLineRate (ASCII command)	0x01001038	-	-	
ExtTriggerRate (Hz) (IFloat)	0x01001078	0.018626 ~ 1000000	-	Display of the external trigger rate.
rawExtTriggerRate (ASCII command) (IInteger)	0x01001078	800 ~ 4294967295	-	
ExtTriggerDropped (IInteger) **Related Topic:** Counter Functions	0x0100107C	0 ~ 4294967295	0	A counter to display the number of dropped external triggers.
ExtTriggerDroppedClear (ICommand)	0x01001074	-	-	Reset on the ExtTriggerDropped counter. To initiate this action via the ASCII Commands, write **1** to the register.
ExtTriggerCount (IInteger)	0x0100106C	0 ~ 4294967295	0	Display the number of external trigger signals received by the sensor.
ExtTriggerCountClear (ICommand)	0x01001060	-	0	Reset the value on the ExtTriggerCount counter. To initiate this action via the ASCII Commands, write **1** to the register.
InputExtTriggerCount (IInteger)	0x01001064	0 ~ 4294967295	0	FPGA Counter. Count the number of lines output from FPGA.

Acquisition Control Item	Address	Setting Range	Default	Description
SOLCount (IInteger)	0x01001070	0 ~ 4294967295	0	Counts the number of times a Start of Line (SOL) signal is generated for each line. Indicates the number of times the camera initiated the readout of a new image line.
EOLCount (IInteger)	0x01001074	0 ~ 4294967295	0	Counts the number of times an End of Line (EOL) signal is generated for each line. Indicates the number of times the camera has successfully completed the readout of an image line.
axidgtvalidCount (IInteger) **Note:** SW-8001M Only	0x01206064	0 ~ 4294967295	0	Count the number of AXI DGT VALID signals.
CameratvalidCount (IInteger)	0x01501064	0 ~ 4294967295	0	Counts the number of transfer cycles for valid pixel data output from the camera.

LineTriggerControl

Configure trigger settings.

Related Topic: Trigger Control

Line Trigger Control Item	Address	Setting Range	Default	Description
LineTriggerMode (IEnum)	0x01001004	0: Off 1: On	0:Off	Select the trigger mode.
LineTriggerSource (IEnum)	0x01006044	1: CC1 (Default) 2: CC2 3: CC3 4: CC4		Select the trigger signal source.
LineTriggerActivation (IEnum)	0x01006048	0: Rising Edge 1: Falling Edge 2: Level High 3: Level Low		Select the polarity of the trigger signal (i.e., the location of the signal to which trigger is applied). Selectable TriggerActivation item depends on the ExposureMode setting.

ExposureMode	TriggerActivation
Timed	RisingEdge or FallingEdge
TriggerWidth	LevelHigh or LevelLow

Line Trigger Control Item	Address	Setting Range	Default	Description
LineTrigger Divider (IEnum) **Note:** SW-8001M/8001TL Only	0x0100604C	0: 1 (Default) 1: 2 2: 3 3: 4 4: 5 5: 6 6: 7 7: 8		Determines how frequently the camera responds to incoming trigger signals. It allows the camera to acquire an image only once every N trigger signals, where N is the divider value specified by the user.
LineTriggerPreDivider **Note:** SW-16001 Only	0x0100604C	0 ~ 39	0	Line trigger signal pre-scaling parameter.
LineTriggerMultiplier **Note:** SW-16001 Only	0x01006060	1: Multiplier_1 2: Multiplier_2 4: Multiplier_4 8: Multiplier_8 16: Multiplier_16 32: Multiplier_32		Specifies a division factor for the incoming trigger pulses.
LineTriggerPostDivider **Note:** SW-16001 Only	0x01006064	1 ~40	1	Line trigger signal post-scaling parameter.

AnalogControl

Configure analog control settings.

> **Note:** Some setting items use different value formats between the Control Tool and ASCII commands. Setting items exclusive to ASCII command control are labeled with the prefix "raw".

Analog Control Item	Address	Setting Range	Default	Description
BlackLevelMode (IEnum) **Related Topic:** Black Level Function	0x01209054	0: Normal (Default) 1: DeBackGround		Set Black Level Mode. **Normal**: Performs black level correction without noise compensation. A uniform offset is applied across the entire image. **DeBackGround**: Automatically subtracts background offset only from pixels whose values are below the specified **BlackLevel** threshold.
BlackLevel (IInteger)	0x01206050	-	0	Set BlackLevel setting. Set the BlackLevel setting. The setting range varies depending on the Black Level Mode. **Normal**: - 4095 - +4095 **DeBackGround**: 0 - 4095
DigitalGain (IFloat)	-	0.1 ~ 15.99 (step: 0.01)	1	Set the digital gain value.
rawDigitalGain (ASCII command) (IInteger)	0x0120604C	25 - 4093 (step: 25)	256	
DigitalShift (IEnum)	0x01207040	0: x1 (Default) 1: x2 2: x4 3: x8 4: x16		Gain adjustment is performed through shifting in the digital domain. The setting value represents the multiplication factor, and at x1, no shift is applied and there is no change in brightness (1x).
GammaEnable (IBoolean) **Related Topic:** Gamma Function	0x01203000	0:Off (Default) 1:On		Enable/disable the Gamma function.

Analog Control Item	Address	Setting Range	Default	Description
Gamma (IFloat)	-	0.1 ~ 7.0 (step: 0.1)	1	Set the gamma value.
rawGamma (ASCII command) (IInteger)	0x01203C00	10 ~ 700 (step: 10)	100	

TDIControl

Configure TDI settings.

> **Related Topic:** 2-Step TDI Function

> **Notes:**
> - This function is supported only on the monochrome models.
> - Some setting items use different value formats between the Control Tool and ASCII commands. Setting items exclusive to ASCII command control are labeled with the prefix "raw".

TDI Control Item	Address	Setting Range	Default	Description
TDIStage (IEnum)	0x01106008	0: 1-Stage (Default) 1: 2-Stage		Set the TDIStage setting. To configure the following TDI settings, set to 2-Stage.
TDIMode (IEnum)	0x0110600C	0: Sum (Default) 1: Average		Select TDI mode. Sum mode increases the sensitivity; while Average mode reduces the noise in the image.

<table>
<tr><th>TDI Control Item</th><th>Address</th><th>Setting Range</th><th>Default</th><th>Description</th></tr>
<tr><td>TDIParameter
(IInteger)</td><td>-</td><td>0 ~ 10 lines</td><td>0</td><td rowspan="2">Specifies the vertical pixel offset between readout lines. The setting value depends on the relative speed between the camera's line frequency and the object’s movement.
Control Tool:<table><tr><th>Value</th><th>Camera line frequency vs. Object's movement</th></tr><tr><td>< 2</td><td>Camera line frequency is lower</td></tr><tr><td>= 2</td><td>When frequencies match.</td></tr><tr><td>> 2</td><td>Camera line frequency is higher</td></tr></table>ASCII Command:<table><tr><th>Value</th><th>Camera line frequency vs. Object's movement</th></tr><tr><td>< 818</td><td>Camera line frequency is lower</td></tr><tr><td>= 818</td><td>When frequencies match.</td></tr><tr><td>> 818</td><td>Camera line frequency is higher</td></tr></table></td></tr>
<tr><td>rawTDIParameter
(ASCII command)
(IInteger)</td><td>0x01108044</td><td>0 ~ 40960,
step: 409</td><td>0</td></tr>
<tr><td>TDIRowDirection
(IEnum)</td><td>0x01108040</td><td colspan="2">0: Reverse (Default)
1: Forward</td><td>Set the TDI direction.</td></tr>
<tr><td>Field1Gain (IFloat)
Note: SW-16001M Only</td><td>-</td><td>-</td><td>-</td><td rowspan="2">Light field 1 gain parameter.</td></tr>
<tr><td>rawField1Gain
(ASCII command)
(IInteger)
Note: SW-16001M Only</td><td>0x01106010</td><td>25 ~ 1024,
step 2</td><td>256</td></tr>
</table>

TDI Control Item	Address	Setting Range	Default	Description
Field2Gain (IFloat) **Note:** SW-16001M Only	-	-	-	Light field 2 gain parameter.
rawField2Gain (ASCII command) (IInteger) **Note:** SW-16001M Only	0x01209010	25 ~ 1024, step 2	256	

FlatFieldCorrection

Configure FFC (Flat Field Correction) settings.

> **Related Topic:** Flat Field Correction (FFC)

FFC Control Item	Address	Setting Range	Default	Description
FFCEnable (IEnum)	0x01102000	0:Off (Default) 1:On		Enable/disable the FFC correction.
FFCSampleFrames (IEnum) **Note:** Mono model Only	0x01102080	1024: 1024 (Default) 2048: 2048		Set the number of sample frames to be used for generating FFC correction data. A larger number of samples averages out noise but increases processing time.
FFCUserSetSelector (IEnum)	0x01102D00	0: Default 1: UserSet1 (Default) 2: UserSet2 3: UserSet3		Set the area to which to save FFC correction data. **Note:** You cannot save correction data to Default.
FFCUserSetLoad (ICommand)	0x01102D04	-	-	Reload and save the Default user set. To initiate this action via the ASCII Commands, write **1** to the register..
AWBLink (IBoolean) **Note:** TL model Only	0x01102C18	0: False (Default) 1: True		Enable FFC Auto link WB.
FFCCalAreaStartX (IInteger)	0x01102040	0 (Default)~ (WidthMax - 16 (8)), step: 16 (8) (): Binning = On		Set the start coordinate for FFC calibration. The value must be X + FFCCalAOLWidth ≤ WidthMax. **Models** / **WidthMax** SW-8001: 8192 (4096) SW-16001: 16384 (8192) (): Binning = On
FFCCalAreaWidth (IInteger)	0x01102048	16 (8) ~ WidthMax, step: 16 (8) (): Binning = On		Set the Width for FFC calibration. The value must be X + FFCCalAOLWidth ≤ WidthMax.

FFC Control Item	Address	Setting Range	Default	Description
FFCCalAlgorithm (IEnum)	0x01102C00	1: Off (Default) 2: 1*3 Filter 3: 1*5 Filter 4: 1*7 Filter 5: 1*9 Filter		Set the amount of filtering (smoothing) to apply. When set to Off, no filtering is applied. As the filter size increases, fine features (such as edges) in the image become smoother.
FFCCalTargetMode (IEnum)	0x01102C04	0: Max (Default) 1: Average 2: Target		Select FFC mode. **Max**: Perform correction based on the highest brightness level in the frame. **Average**: Perform correction based on the average brightness level in the frame. **Target**: Perform correction based on the FFCTargetValue.
FFCCalTargetValue (IInteger)	0x01102C08	0 ~ 4000, step: 16	3200	Set the value for FFC correction when **FFCCalTargetMode** is set to **Target**. Increasing the value increases sensitivity.
FFC Cal FPN (ICommand)	0x01102084	-	-	Execute FFC-FPN (Flat Pattern Noise) calibration. To initiate this action via the ASCII Commands, write **1** to the register.
FFC Cal PRNU (ICommand)	0x01102088	-	-	Execute FFC-PRNU (Photo-Response Non-Uniformity) calibration. To initiate this action via the ASCII Commands, write **1** to the register.

ColorSkewCorrection

Corrects the trapezoidal distortion that occurs when a trilinear camera is placed at an off-axis viewing angle.

> **Note:** This function is supported only on the SW-8001TL-MCL-M72 model.

Color Skew Correction Item	Address	Setting Range	Default	Description
CSCEnable (IBoolean)	0x01103000	0: Off (Default) 1: On		Enable/disable the Color Skew Correction controls.
CSCDirection (IEnum)	0x01103040	1: Red 0: Blue (Default)		Selects the color of the skew correction.
CSCLeftSkew (IFloat)	-	0 ~ 128, step 12.8	0	Set the color offset on the left side of the image.
rawCSCLeftSkew (ASCII command) (IInteger)	0x01103044	0 ~ 1280	0	
CSCRightSkew (IFloat)	-	0 ~128, step 12.8	0	Set the color offset on the right side of the image.
rawCSCRightSkew (ASCII command) (IInteger)	0x01103048	0 ~ 1280	0	

SpatialCorrection

Corrects the spatial pixel differences for the R and G lines.

> **Note:** This function is supported only on the SW-8001TL-MCL-M72 model.

Spatial Correction Item	Address	Setting Range	Default	Description
SCEnable (IBoolean)	0x01104000	0: Off (Default) 1: On		Enable/disable the Spatial Correction controls.
SCDirection (IEnum)	0x01104044	0: Red (Default) 1: Blue		Select the color of the spatial correction.
SCParameter (IInteger)	-	-	-	Set the correction value.
rawSCParameter (ASCII command) (IInteger)	0x01104044	0 ~ 12288	4096	

WhiteBalance

> **Related Topic:** White Balance Function

Adjust the white balance.

> **Notes:**
> - This function is supported only on the SW-8001TL-MCL-M72 model.
> - Some setting items use different value formats between the Control Tool and ASCII commands. Setting items exclusive to ASCII command control are labeled with the prefix "raw".

White Balance Item	Address	Setting Range	Default	Description
WBCalibMode (IEnum)	0x01201080	0: Manual 2: Once 3: Off		Select the mode to adjust white balance **Manual**: Gain values must be set manually. **Once**: Performs one-time automatic calibration using the defined AOI (Area of Interest). **Off**: Disables white balance adjustment.
WBRedGain (IFloat)	-	0.00 ~ 63.99	102	Gain values applied to red color channel. Used in both manual and auto calibration modes to balance color levels.
rawWBRedGain (ASCII command) (IInteger)	0x01201040	0 ~ 65526	1024	
WBBlueGain (IFloat)	-	0.00 ~ 63.99	102	Gain values applied to blue color channel. Used in both manual and auto calibration modes to balance color levels.
rawWBBlueGain (ASCII command) (IInteger)	0x01201044	0 ~ 65526	1024	
WBGreenGain (IFloat)	-	0.00 ~ 63.99	102	Gain values applied to green color channel. Used in both manual and auto calibration modes to balance color levels.
rawWBGreenGain (ASCII command) (IInteger)	0x01201044	0 ~ 65526	1024	
WBCalibAOIStartX (IInteger)	0x01201088	0 ~ (WidthMax - WBCalibAOIWidth), Step: 8		Define the horizontal start position of the calibration area (AOI). The camera analyzes this region to compute white balance corrections.
WBCalibAOIWidth (IInteger)	0x01201090	64 ~ (WithMax - WBCalibrAOIStartX)		Define the width of the calibration area (AOI). The camera analyzes this region to compute white balance corrections.
RefreshPRNU_ WBGain (ICommand)	0x01201C00	-	-	Refresh PRNU (Photo Response Non-Uniformity) correction based on the current white balance gains.

ColorTransformationControl

Configure the color correction matrix settings.

Notes:

- This function is supported only on the SW-8001TL-MCL-M72 model.
- Some setting items use different value formats between the Control Tool and ASCII commands. Setting items exclusive to ASCII command control are labeled with the prefix "raw".

Color Correction Matrix Item	Address	Setting Range	Default	Description
CCMEnable (IBoolean)	0x01202000	0: Off (Default) 1: On		Enable/disable the Color Correction Matrix controls. **Note:** Enabled only when **PixelFormat** is set to **RGB8**.
CCMSelector (IEnum)	0x01202C00	0: Default 1: UserSet1 2: UserSet2 3: UserSet3		Select under which setting to store / load the correction values.
CCM_A11 (IFloat)	-	10.999 - 10.499	TBD	TBD
rawCCM_A11 (ASCII command) (IInteger)	0x01202040	-11263 ~ 10751	1024	
CCM_A12 (IFloat)	-	10.999 - 10.499	TBD	TBD
rawCCM_A12 (ASCII command) (IInteger)	0x01202044	-11263 ~ 10751	0	
CCM_A13 (IFloat)	-	0	TBD	TBD
rawCCM_A13 (ASCII command) (IInteger)	0x01202048	-11263 ~ 10751	0	
CCM_A21 (IFloat)	-	10.999 - 10.499	TBD	TBD
rawCCM_A21 (ASCII command) (IInteger)	0x0120204C	-11263 ~ 10751	1024	
CCM_A22 (IFloat)	-	10.999 - 10.499	TBD	TBD
rawCCM_A22 (ASCII command) (IInteger)	0x01202050	-11263 ~ 10751	0	
CCM_A23 (IFloat)	-	10.999 - 10.499	TBD	TBD
rawCCM_A23 (ASCII command) (IInteger)	0x01202054	-11263 ~ 10751	0	

Color Correction Matrix Item	Address	Setting Range	Default	Description
CCM_A31 (IFloat)	-	10.999 - 10.499	TBD	TBD
rawCCM_A31 (ASCII command) (IInteger)	0x01202058	-11263 ~ 10751	1024	
CCM_A32 (IFloat)	-	10.999 - 10.499	TBD	TBD
rawCCM_A32 (ASCII command) (IInteger)	0x0120205C	-11263 ~ 10751	0	
CCM_A33 (IFloat)	-	10.999 - 10.499	TBD	TBD
rawCCM_A33 (ASCII command) (IInteger)	0x01202060	-11263 ~ 10751	0	

LUTControl

Configure LUT settings.

> **Related Topic:** LUT (Lookup Table)

LUT Control Item	Address	Setting Range	Default	Description
LUT Enable (IBoolean)	0x01204000	0: Off (Default) 1: On		Enable/disable the LUT controls.
LUT Selector (IEnum) **Note:** Mono model Only	0x01204C00	0: User (Default) 1: Default1 2: Default2 3: Default2		Select the pre-set LUT control option. When set to User, configure the user-set settings using LUTIndex and LUTValue settings. 0: User (Default) 1: Default1 (Bright light suppression) 2: Default2 (Backlight compensation) 3: Default2 (Wide dynamic effect)
LUT Selector (IEnum) **Note:** TL model Only	0x01204C00	0: Green (Default) 1: Blue 2: Red		Select the color channel for the LUT control.
LUT Data Load (ICommand)	0x01204C18	-	-	Load the LUT option selected in LUTSelector. To initiate this action via the ASCII Commands, write **1** to the register.
LUT Data Save (ICommand)	0x01204C1C	-	-	Save the User LUT setting (this setting cannot be used for Default1 ~ 3 LUT options). To initiate this action via the ASCII Commands, write **1** to the register.

LUT Control Item	Address	Setting Range	Default	Description
LUT Index (IInteger)	0x01204C08	0 ~ 4095	0	Select the LUT index to configure. This option is disabled when Default1 ~ 3 is selected in LUTSelector for the mono model.
LUT Value (IInteger)	0x01204C0C	0 ~ 4095	0	Set the LUT output value for the selected index. This option is disabled when Default1 ~ 3 is selected in LUTSelector for the mono model.

UserSetControl

Configure user settings.

> **Related Topic:** Step 6: Save the Settings

User Set Control Item	Address	Setting Range	Default	Description
UserSetSelector (IEnum)	0x01600310	0: Factory 1: UserSet1 (Default) 2: UserSet2 3: UserSet3		Select the user setting. **Note:** This item stores camera function configuration parameters, including module enable/disable settings and register data size, excluding LUT, FFC, Gamma, and other pixel-by-pixel algorithm parameters.
UserSetLoad (ICommand)	0x01600314	-	-	Read the user settings specified in UserSetSelector. When selecting Default for UserSetSelector, the factory settings are loaded. To initiate this action via the ASCII Commands, write **1** to the register.
UserSetSave (ICommand)	0x01600318	-	-	Overwrite the current setting values with the user settings specified in UserSetSelector. Invalid when UserSetSelector is set to Default. To initiate this action via the ASCII Commands, write **1** to the register.
UserSetDefaultSelector (IEnum)	0x01600320	0: Default 1: UserSet1 (Default) 2: UserSet2 3: UserSet3		Select the Userset to load and make active when the camera is power-cycled or DeviceReset is executed.

CameraLinkControl

Configure Camera Link settings.

<table>
<tr><th>Camera Link Control Item</th><th>Address</th><th>Setting Range</th><th>Default</th><th>Description</th></tr>
<tr><td>LinkConfiguration (IEnum)</td><td>0x01501008</td><td colspan="2">0: Base
2: Full
3: EightyBit (Default)</td><td>Set the Camera Link configuration. The available setting varies depending on the TapGeometry setting.<table><tr><th></th><th>DeviceTapGemoetry</th></tr><tr><td>Base</td><td>2Tap, 3Tap, 3Tap, 8Tap, 10Tap</td></tr><tr><td>Full</td><td>8Tap</td></tr><tr><td>EightyBit</td><td>10Tap</td></tr></table></td></tr>
<tr><td>CameraLinkClkFrequency (IEnum)</td><td>0x01501060</td><td colspan="2">40: 40MHz
50: 50MHz
60: 60MHz
65: 65MHz
70: 70MHz
80: 80MHz
85: 85MHz (Default)</td><td>Set Camera Link clock frequency.</td></tr>
<tr><td>DeviceTapGeometry (IEnum)</td><td>0x01501010</td><td colspan="2">2: 2Tap
3: 3Tap
8: 8Tap
10: 10Tap (Default)</td><td>Configure the CameraLink tap count setting. Ensure that this setting and the tap setting on the frame grabber match.
2Tap: Geometry_1X2_1Y
3Tap: Geometry_1X3_1Y
8Tap: Geometry_1X8_1Y
10Tap: Geometry_1X10_1Y</td></tr>
<tr><td>ClFVAL (IEnum)
Note: SW-8001M Only</td><td>0x01501070</td><td colspan="2">0: Low Level
3: FollowLVAL (Default)</td><td>Set the output mode for FVAL (Frame Valid) signal.
Low Level: The FVAL signal remains at a low logic level (inactive). This disables FVAL signaling.
FollowLVAL: The FVAL signal is derived from LVAL (Line Valid). The camera generates FVAL by grouping LVAL periods, indicating the duration of a valid frame based on line activity.</td></tr>
<tr><td>ClDVAL (IEnum)
Note: SW-8001M Only</td><td>0x01501074</td><td colspan="2">0: Low Level
3: FollowLVAL (Default)</td><td>Set the output mode for DVAL (Data Valid) signal.
Low Level: The DVAL signal is held low (inactive). It is not used in the output signal.
FollowLVAL: The DVAL signal follows the LVAL (Line Valid) signal; it is asserted (high) during the valid line period. This ensures that data is marked valid only during active line transmission.</td></tr>
</table>

DeviceSerialPort

Configure Serial Port settings.

Serial Port Control Item	Address	Setting Range	Default	Description
BaudRate (IEnum)	SRBM+0x04 (0x00010004)	-	0x00000001	Set the device CameraLink baud rate setting. The designed SBRM value is 0x00010000. By reading back the address at SRBM + 0x00, the baud rates that the device supports for modification can be obtained. BAUDRATE_9600 = 0x00000001 (Default) BAUDRATE_115200 = 0x00000010 BAUDRATE_460800 = 0x00000040
DataSize	-	-	-	Serial port data bits are fixed at Eight bits.
Parity	-	-	-	None
StopBits	-	-	-	One

Miscellaneous

Troubleshooting

Check the following before requesting help. If the problem persists, contact your local JAI distributor.

Power Supply and Connections

Issue: The POWER LED remains does not turn green, even after power is supplied to the camera.

Cause and Solution: Camera initialization may not be complete due to lack of power. Check the 12-pin power cable connection.

Image Display

Issue: Gradation in dark areas is not noticeable.

Cause and Solution: Use the gamma function to correct the display. As the light-emitting properties of the monitor are not linear, the entire image may be darker or the gradation in the dark areas may be less noticeable when camera outputs are displayed without processing. Using the gamma function performs correction to produce a display that is close to linear. For details, see Gamma Function.

Settings and Operations

Issue: Settings cannot be saved to user memory.

Cause and Solution: You cannot save to user memory while images are being acquired by the camera. Stop image acquisition before performing the save operation.

Issue: I want to restore the factory default settings.

Cause and Solution: Load Default under User Set Selector to restore the factory default settings.

Specifications

<table>
<tr><th>Item</th><th>Specifications</th></tr>
<tr><td>Image Sensor</td><td>SW-8001TL-MCL-M72:Trilinear CMOS line scan image sensor
SW-8001M-MCL-M72: Monochrome CMOS line scan image sensor
SW-16001M-MCL-M72: Monochrome CMOS line scan image sensor
<table>
<tr><th></th><th>Effective Pixels</th><th>Pixel Size</th></tr>
<tr><td>SW-8001TL-MCL-M72</td><td>8192 x 3</td><td>7.0 µm x 7.0 µm</td></tr>
<tr><td>SW-8001M-MCL-M72</td><td>8192 x 2</td><td>7.0 µm x 7.0 µm</td></tr>
<tr><td>SW-16001M-MCL-M72</td><td>16384 x 2</td><td>3.5 µm x 3.5 µm</td></tr>
</table></td></tr>
<tr><td>Synchronization</td><td>Internal</td></tr>
<tr><td>CameraLink PixelClock</td><td>40MHz, 50MHz, 60MHz, 65MHz, 70MHz, 80MHz, 85MHz</td></tr>
<tr><td>Line Rate
SW-8001M-MCL-M72</td><td>
<table>
<tr><th>CIConfiguration</th><th>Pixel Clock</th><th>PixelFormat</th><th>Line Rate</th></tr>
<tr><td rowspan="3">Base</td><td>85MHz</td><td>Mono8</td><td>200Hz ~ 30kHz</td></tr>
<tr><td>85MHz</td><td>Mono10p</td><td>200Hz ~ 20kHz</td></tr>
<tr><td>85MHz</td><td>Mono12p</td><td>200Hz ~ 20kHz</td></tr>
<tr><td>Full</td><td>85MHz</td><td>Mono8</td><td>200Hz ~ 82kHz</td></tr>
<tr><td rowspan="2">80Bit (Deca)</td><td>85MHz</td><td>Mono8</td><td>200Hz ~ 100kHz</td></tr>
<tr><td>85MHz</td><td>Mono10</td><td>TBD</td></tr>
</table></td></tr>
<tr><td>Line Rate
SW-8001TL-MCL-M72</td><td>
<table>
<tr><th>CIConfiguration</th><th>Pixel Clock</th><th>PixelFormat</th><th>Line Rate</th></tr>
<tr><td rowspan="2">Base</td><td>85MHz</td><td>RGB8</td><td>200Hz ~ 10kHz</td></tr>
<tr><td>85MHz</td><td>Mono8</td><td>200Hz ~ 30kHz</td></tr>
<tr><td rowspan="2">80Bit (Deca)</td><td>85MHz</td><td>RGB8</td><td>200Hz ~ 33kHz</td></tr>
<tr><td>85MHz</td><td>Mono8</td><td>200Hz ~ 50kHz</td></tr>
</table></td></tr>
<tr><td>Line Rate
SW-16001M-MCL-M72</td><td>
<table>
<tr><th>CIConfiguration</th><th>Pixel Clock</th><th>PixelFormat</th><th>Line Rate</th></tr>
<tr><td rowspan="3">Base</td><td>85MHz</td><td>Mono8</td><td>200Hz ~ 15kHz</td></tr>
<tr><td>85MHz</td><td>Mono10p</td><td>200Hz ~ 10kHz</td></tr>
<tr><td>85MHz</td><td>Mono12p</td><td>200Hz ~ 10kHz</td></tr>
<tr><td rowspan="2">80Bit (Deca)</td><td>85MHz</td><td>Mono8</td><td>200Hz ~ 50kHz</td></tr>
<tr><td>85mHz</td><td>Mono10</td><td>TBD</td></tr>
</table></td></tr>
<tr><td>Dark and Bright SN - Mono
DarkLevel@12bit
Bright SN 3449DB@12bit
(215DN@8bit)</td><td>
<table>
<tr><th></th><th></th><th>SW-8001M-MCL-M72</th><th>SW-16001M-MCL-M72</th></tr>
<tr><td rowspan="2">Dark SN</td><td>TDI1</td><td>60.8dB</td><td>63dB</td></tr>
<tr><td>TDI2 (Sum)</td><td>57.0dB</td><td>59dB</td></tr>
<tr><td rowspan="2">Bright SN</td><td>TDI1</td><td>39dB</td><td>39.4dB</td></tr>
<tr><td>TDI2 (Sum)</td><td>38dB</td><td>39.1dB</td></tr>
<tr><td colspan="4">FPN Correction: On; PRNU Correction: On; DigitalGain: x1; DigitalShift: x1</td></tr>
</table></td></tr>
</table>

<table>
<tr><th>Item</th><th>Specifications</th></tr>
<tr><td>Dark and Bright SN - Color
DarkLevel@12bit
Bright SN 3449DB@12bit
(215DN@8bit)</td><td>
<table>
<tr><th></th><th></th><th>SW-8001TL-MCL-M72</th></tr>
<tr><td rowspan="3">Dark SN</td><td>R</td><td>62.63dB</td></tr>
<tr><td>G</td><td>62.69dB</td></tr>
<tr><td>B</td><td>62.59dB</td></tr>
<tr><td rowspan="3">Bright SN</td><td>R</td><td>39.3dB</td></tr>
<tr><td>G</td><td>39.7dB</td></tr>
<tr><td>B</td><td>38.1dB</td></tr>
<tr><td colspan="3">FPN Correction: On; PRNU Correction: On; White Balance: Off; DigitalGain: x1; DigitalShift: x1</td></tr>
</table>
</td></tr>
<tr><td>Exposure Mode</td><td>
<table>
<tr><th>Exposure Mode</th><th>ExposureTime (step: 0.01µs)</th></tr>
<tr><td>Off</td><td>Line Period - TBD</td></tr>
<tr><td>Timed (Trigger Off)</td><td>3.1µs ~ 4.997ms</td></tr>
<tr><td>Timed (Trigger On)</td><td>3.1µs ~ 4.997ms</td></tr>
<tr><td>TriggerWidth</td><td>TriggerWidth + 3µs (3.1µs ~ 4.997ms)</td></tr>
<tr><td colspan="2">Exposure Offset: TBD</td></tr>
</table>
</td></tr>
<tr><td>Trigger</td><td>Trigger Inputs: CC1, CC2, CC3, CC4
Trigger Divider: 1 ~ 8</td></tr>
<tr><td>Gain</td><td>
<table>
<tr><th>Gain Mode</th><th>Gain Setting Range</th></tr>
<tr><td>Digital Gain</td><td>0.1 ~ 15.9</td></tr>
<tr><td>Digital Shift</td><td>x1, x2, x4, x8, x16</td></tr>
</table>
</td></tr>
<tr><td>2-step TDI</td><td>
<table>
<tr><th></th><th>TDI Setting Range</th></tr>
<tr><td>TDI stage</td><td>1-Stage or 2-Stage</td></tr>
<tr><td>TDI mode</td><td>Sum or Average</td></tr>
<tr><td>TDI parameter</td><td>0 ~ 10 lines</td></tr>
<tr><td>TDI row direction</td><td>Forward or Reserve</td></tr>
</table>
</td></tr>
<tr><td>Black Level</td><td>Normal or DeBackground (-4095 ~ +4095DN @12bit)</td></tr>
<tr><td>Test Pattern</td><td>Black, White, GreyHorizontalRamp, GrayHorizontalRampMoving, ColorBar*

*SW-8001TL-MCL-M72 Only</td></tr>
<tr><td>Image Processing</td><td>FFC (Flat Field Correction): FPN and PRNU corrections
LUT: 1 user-configure set and 3 preset controls (bright light suppression, blacklight compensation, wide dynamic effect)
Gamma : 10 ~ 700 (Step 10)</td></tr>
<tr><td>Counters</td><td>ExtTriggerDropped, ExtTriggerCount, InputExtTriggerCount, SOLCount, EOLCount, axidgtvalidCount*, CameratvalidCount

*SW-8001M-MCL-M72 Only</td></tr>
</table>

<table>
<tr><th>Item</th><th>Specifications</th></tr>
<tr><td>Power Supply Voltage (12-pin)</td><td>
<table>
<tr><th></th><th>8001M</th><th>8001TL</th><th>16001M</th></tr>
<tr><td>Input Range</td><td colspan="3">DC +12 ~ +24 V +/-15%</td></tr>
<tr><td>Consumption*</td><td>10.6W @ DC12V, TBDW Max</td><td>10.08W @ DC 12V, TBDW Max</td><td>11.28W @ DC 12V, TBDW Max</td></tr>
<tr><td colspan="4">*Default /25°C Environment, DC24V, 100kHz, 240DN (Image Grayscale Value)</td></tr>
</table>

Note: This camera does not support PoCL.
</td></tr>
<tr><td>Lens mount</td><td>M72 Mount (Thread pitch: 0.75mm)</td></tr>
<tr><td>Back flange distance</td><td>12mm, tolerance: 0 mm ~- 0.05 mm</td></tr>
<tr><td>Verified Performance Temperature/Humidity</td><td>0°C ~ +45°C (20 to 80%, non-condensing)
Note: It may change depending on the installation environment. Please refer to the Caution in this chapter.</td></tr>
<tr><td>Storage Temperature/Humidity</td><td>-25°C ~ +60°C (20 to 80%, non-condensing)</td></tr>
<tr><td>Vibration Resistance</td><td>10G (20 Hz~ 200 Hz X-Y-Z direction)</td></tr>
<tr><td>Shock Resistance</td><td>80G</td></tr>
<tr><td>Regulations</td><td>EN 55032:2015+A1+A11, EN 55035:2017+A11, EN IEC 61000-6-2:2019, EN IEC 61000-6-4:2019, FCC Part15 Class A, KC, RoHS</td></tr>
<tr><td rowspan="2">Dimensions (Housing) (WHD, excluding connectors)</td><td>SW-8001 models:78mm x 78mm x 45mm</td></tr>
<tr><td>SW-16001 model: 78mm x 78mm x 44.6mm</td></tr>
<tr><td>Weight</td><td>360g (TBD)</td></tr>
</table>

Notes:

- Design and specifications are subject to change without notice.
- Approximately 30 minutes of warm-up are required to achieve these specifications.

Caution: About the verified performance temperature

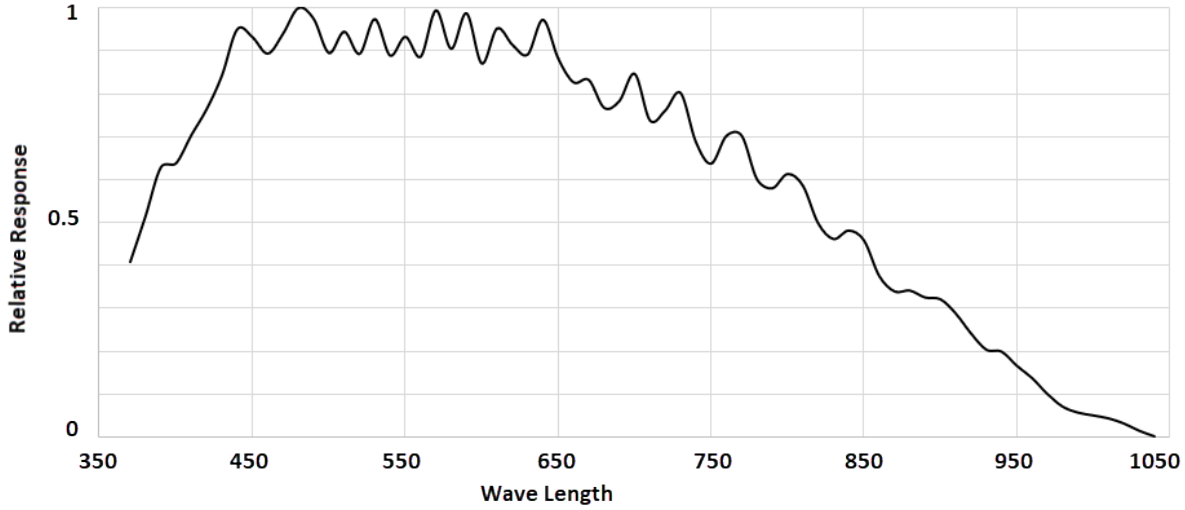
Make sure the following temperature conditions are met when operating the unit.

The camera's internal temperature should not exceed 80 °C during operation.

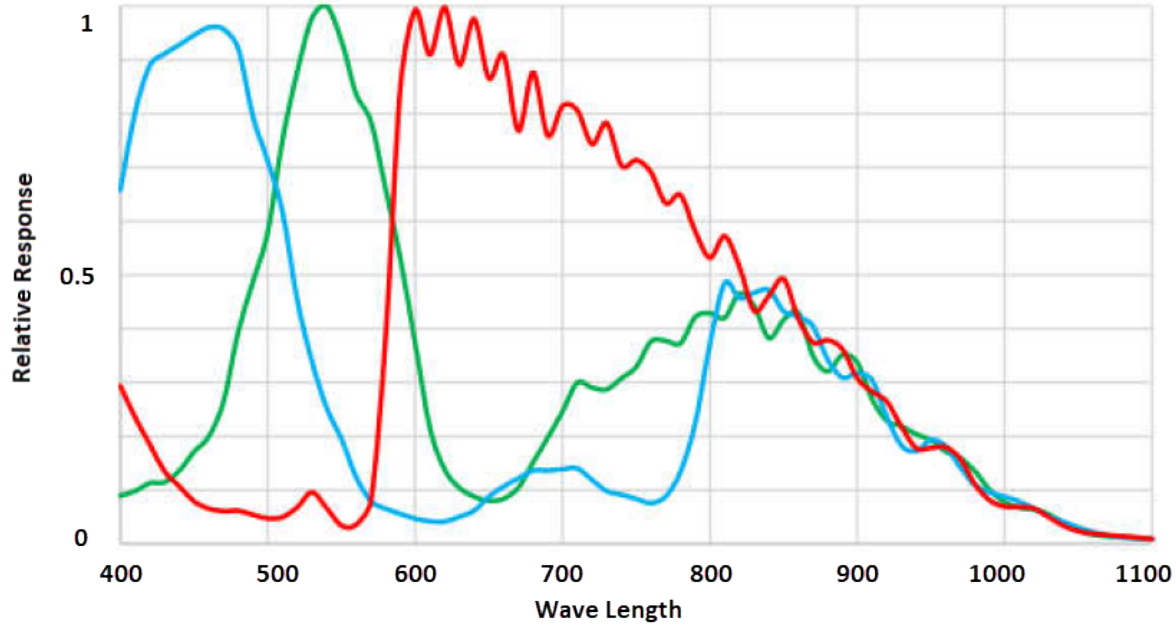
If the above temperature conditions are exceeded, take measures to dissipate heat according to your installation environment and conditions.

Spectral Response

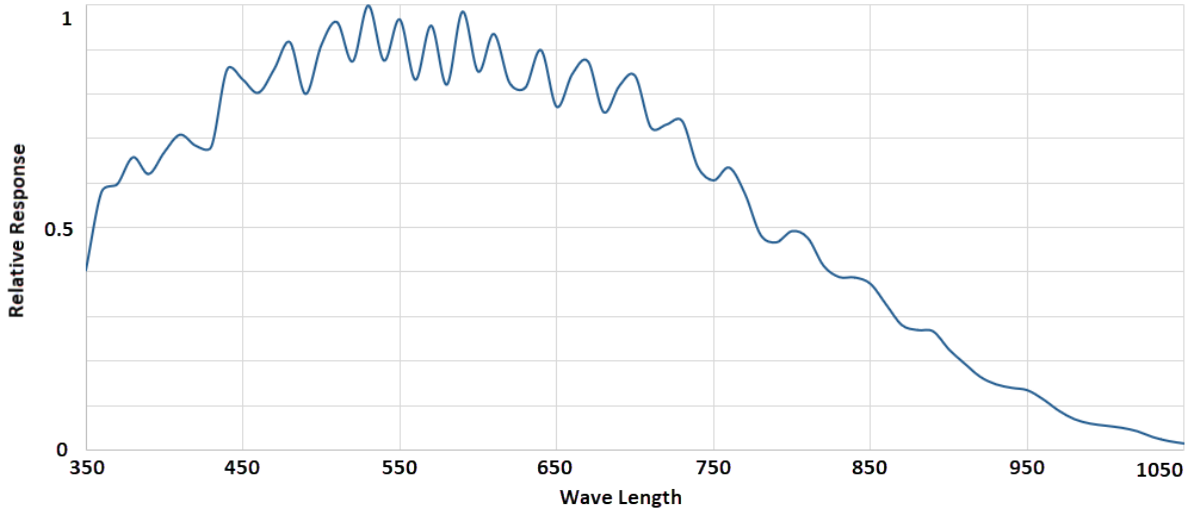
SW-8001M-MCL-M72



SW-8001TL-MCL-M72



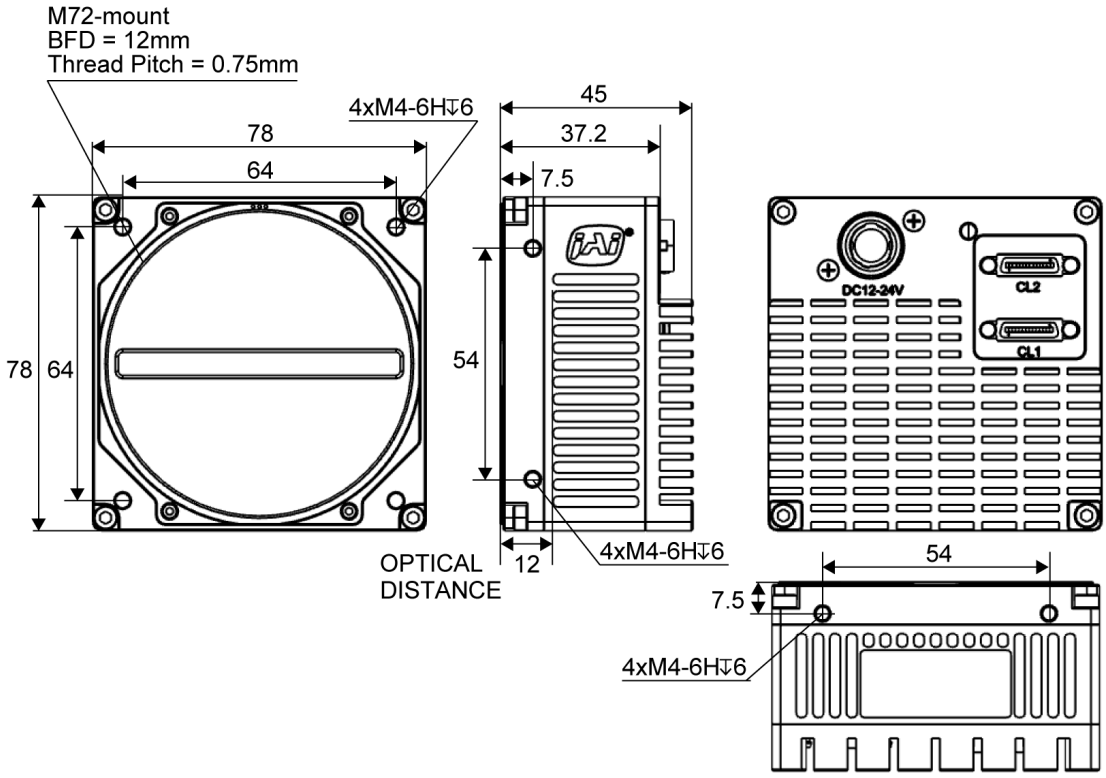
SW-16001M-MCL-M72



Dimensions

This section shows the dimensional drawings of each camera model.

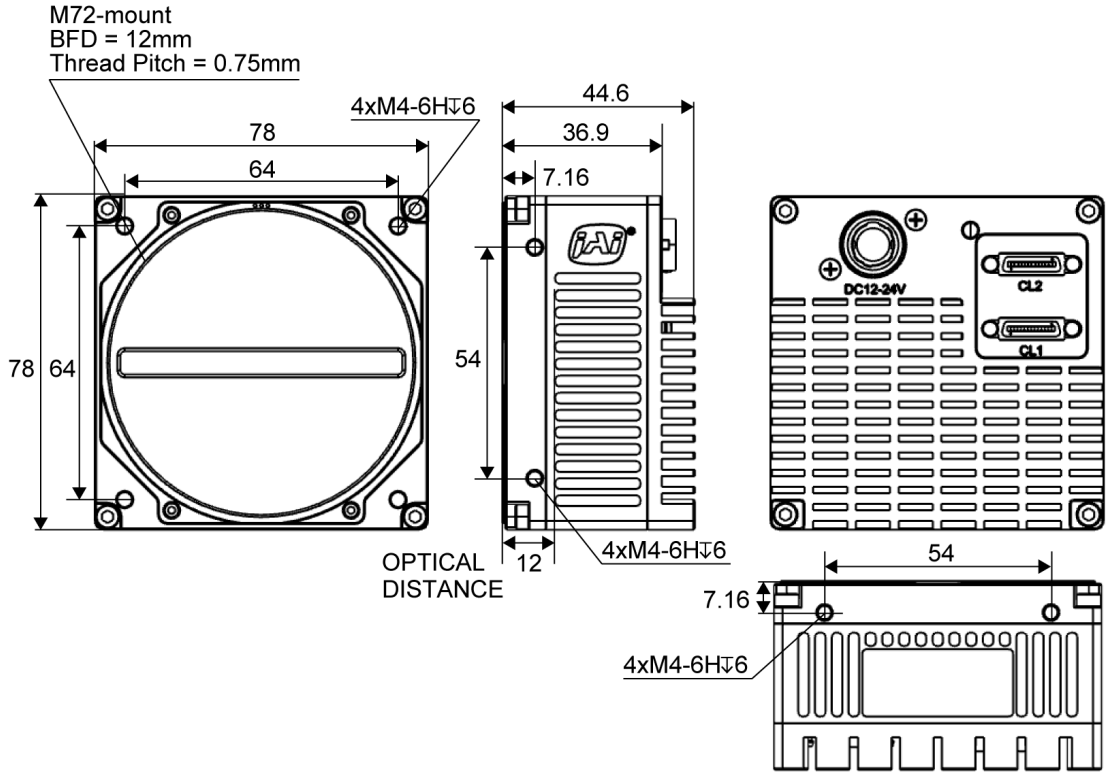
SW-8001M-MCL-M72, SW-8001TL-MCL-M72



Notes:

- Dimensional Tolerance: ± 0.3mm
- Unit: mm

SW-16001M-MCL-M72



Notes:

- Dimensional Tolerance: ± 0.3mm
- Unit: mm

User's Record

Model name:

Revision: ……

Serial No: ……

Firmware version: ……

For camera revision history, please contact your local JAI distributor.

Revision History

Revision	Date	Device Version	Changes
Tentative	2025/07/28	-	For marketing launch

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