See the possibilities

User Manual

Apex Series - 3 CMOS Prism-Based Camera

AP-5100T-CXPA
AP-5100T-5GE
AP-5100T-MCL

CMOS Digital Progressive Scan Prism-Based RGB Camera

Document Version: Tentative

Date: 2025-10-08

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

Table of Contents **2**
About Technical Note 7
Notice/Warranty/Certifications **8**
Notice 8
Warranty 8
Certifications 8
CE Compliance 8
FCC 8
Warning 9
KC 9
China RoHS 10
Usage Precautions **11**
Notes on Cable Configurations 11
Notes on LAN Cable Connection (5GE Model) 11
Notes on Camera Link Cable Connection (MCL Model) 11
Notes on Attaching the Lens 11
Phenomena Specific to CMOS Image Sensors 12
Notes on Exportation 12
Features **13**
Feature Overview 13
Parts Identification **14**
Lens Mount (C-Mount) 14
Connectors 14
DC IN/TRIG Connector (12-Pin Round) 15
AUX Connector (6-Pin Round) 15
CXP (CoaXPress) Connector (CXPA Model) 16
RJ-45 Connector 16
Digital I/O-1 and Digital I/O-2 Video Output Connectors 17
LED 18
Mounting Holes 20

Recommended External Input Circuit Diagram 20

Preparation **21**

Step 1: Install the Software (5GE Model, First Time Only) 21

Step 2: Connect Devices 22

Lens 23

Mounting 24

DC IN / Trigger IN Connection Cable 24

AC Adapter (Power Supply) - Optional 24

CoaXPress Cable (CXPA Model) 24

CXP Frame Grabber Board (CXPA Model) 24

LAN Cable (5GE Model) 24

Network Card (5GE Model) 25

Camera Link Cable (MCL Model) 25

Camera Link Frame Grabber Board (MCL Model) 25

Step 3: Verifying Camera Operation 26

Step 4: Verifying the Connection between the Camera and PC 26

Step 5: Configure Trigger, Exposure, and Frame Rate Settings 29

Control via External Triggers with the Specified Exposure Time 30

Control via External Triggers with Exposure Time Controlled by the Pulse Width of the Trigger Input Signal 31

Control without External Triggers with the Specified Exposure Time 32

Control without External Triggers without Specifying the Exposure Time 32

Step 6: Adjusting the Image Quality 33

Adjust the Gain 33

Adjusting the White Balance 34

Adjusting the Black Level 37

Step 7: Saving the Settings 38

To Save User Settings 38

To Load User Settings 38

Main Functions **39**

Single ROI Function 39

ROICentered 40

Binning Function 41
Image Scaling Mode (Xscale) 42
Specifying the Scaling Ratio 43
Image Flip Function 43
Pixel Format 44
Overlay Mode 45
Multi ROI Function 46
Configuration Example 48
Acquisition Control 49
Changing the Frame Rate 49
Trigger Control 50
FrameStart Trigger 51
FrameStart Trigger and AcquisitionTransferStart Trigger 52
Exposure Mode 53
RCT Mode 54
GPIO (Digital Input/Output Settings) 55
LineSource Items 56
ExposureActive Signal 57
Pulse Generator 58
Gamma Function 59
LUT (Lookup Table) 60
ALC (Automatic Level Control) Function 61
To Use the ALC Function 61
Color Space Conversion (ColorTransformationControl) 62
Chromatic Aberration Correction 64
VideoProcessBypassMode 65
Color Enhancer 66
Shading Correction 67
To Use the Shading Correction Function 68
BlemishCompensation 69
Automatic Detection 69
Manual Configuration 70

Sequencer Function 71
TriggerSequencer Mode 71
Sample TriggerSequencer Mode Operation 72
CommandSequencer Mode 73
Counter and Timer Control Function 74
Action Control Function 76
PTP (Precision Time Protocol) 77
Event Control Function 78
Chunk Data Function 79
Functions That Cannot Be Used Together 80
Setting List (Feature Properties) 81
Selector 81
DeviceControl 82
TransportLayerControl (AP-5100T-CXPA) 86
TransportLayerControl (AP-5100T-5GE) 87
TransportLayerControl (AP-5100T-MCL) 91
ImageFormatControl 91
MultiROIControl 96
AcquisitionControl 97
DigitalIOControl 100
PulseGenerator 102
AnalogControl 105
LUTControl 107
AutoLevelControl 108
ColorTransformationControl 110
ImagingControl 111
ShadingControl 113
BlemishControl 114
SequencerControl 115
CounterAndTimerControl 118
ActionControl 119
EventControl 120

ChunkDataControl 123
TestControl (AP-5100T-5GE) 124
UserSetControl 125
Misc (AP-5100T-MCL) 125
Miscellaneous 126
Troubleshooting 126
Power Supply and Connections 126
Image Display 126
Settings and Operations 126
Specifications 127
Package Contents 130
Spectral Response 132
Dimensions 133
AP-5100T-CXPA 133
AP-5100T-5GE 134
AP-5100T-MCL 135
Comparison of the Decibel Display and Multiplier Display 136
User's Record 137
Appendix 138
Revision History 139

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/Certifications

Notice

The material contained in this manual consists of information that is proprietary to JAI Ltd., Japan, and may only be used by the purchasers of the product. JAI Ltd., Japan makes no warranty for the use of its product and assumes no responsibility for any errors which may appear or for damages resulting from the use of the information contained herein. JAI Ltd., Japan reserves the right to make changes without notice.

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Warranty

For information about the warranty, 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 below model(s) comply with the following provisions applying to their standards.

Models	Comply With
AP-5100T-CXPA	EMI: EN55032:2015/A11:2020 EMS: EN55035:2017(CISPR35:2016)
AP-5100T-5GE	
AP-5100T-MCL	

FCC

This equipment has been tested and found to comply with the limits for a Class B 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:	AP-5100T-CXPA
제조자 및 제조국가:	JAI Ltd., Japan / JAPAN

TBD

상 호:	JAI Ltd. Japan
기자재명칭:	Industrial Camera
모 델 명:	AP-5100T-5GE
제조자 및 제조국가:	JAI Ltd., Japan / JAPAN

TBD

상 호:	JAI Ltd. Japan
기자재명칭:	Industrial Camera
모 델 명:	AP-5100T-MCL
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)
AP-5100T-CXPA	×	○	○	○	○	○
AP-5100T-5GE	×	○	○	○	○	○
AP-5100T-MCL	×	○	○	○	○	○

○: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。

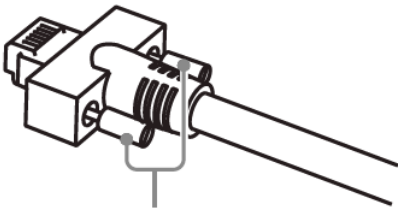
Usage Precautions

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 LAN Cable Connection (5GE Model)

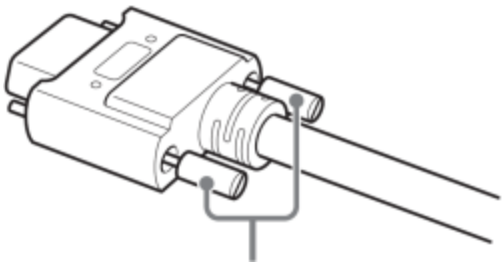
Secure the locking screws on the connector manually, and do not use a driver. Do not secure the screws too tightly. Doing so may wear down the screw threads on the camera. (Tightening torque: 0.147 Nm or less)



Caution: Secure manually. Do not secure too tightly.

Notes on Camera Link Cable Connection (MCL Model)

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 Nm or less)



Caution: Secure manually. Do not secure too tightly.

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.

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.
- **Vertical stripes**: Due to the design characteristics of the sensor used, vertical stripes may appear in the image when using the camera under the following condition(s), especially a combination of these circumstances:
    - A shallow incident angle, a large aperture, a short exposure time, and/or the use of long-waveband lighting (especially infrared)

  You may be able to improve the vertical stripes in the image by changing the above condition(s) (e.g., smaller aperture, longer shutter speed).

Notes on Exportation

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

Features

This camera is an industrial progressive scan camera that uses three global shutter CMOS image sensors.

Enhanced color reproduction is achieved via the compact-designed 3CMOS C-mount prism optical system in addition to the internal color matrix circuit. Even higher definition imaging is made possible by the shading correction and gamma correction circuits.

The ROI and binning functions allow for even faster readout speeds. The gain and exposure time can be configured individually for each CMOS sensor. A color space conversion function is also supported.

	AP-5100T-CXPA	AP-5100T-5GE	AP-5100T-MCL
Image Sensor	Type 1/1.8" 3 CMOS global shutter		
Readout Pixels	2464 x 2056		
Pixel Size	2.74µm x 2.74µm		
Max Frame Rate (Full ROI)	75 fps	32 fps	55 fps

Feature Overview

- Global shutter CMOS image sensor with backside illuminated pixel technology.
- 8/10/12-bit output.
- Flexible ROI; rescaling function; traditional 1x2, 2x1, 2x2 binning; horizontal/vertical image flip function; chromatic aberration correction, blemish correction; shading compensation; sequencer function; and Automatic Level Control (ALC) for dynamic lighting conditions. (See the Main Functions chapter for details).
- Compact size with excellent shock and vibration resistance.
- The CXPA model supports power over CoaXPress interface

  > **Note:** The 5GE and PoCL models do not support the PoE / PoCL function.

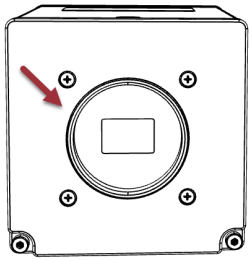
- Lens mount: C-mount

Parts Identification

> **Note:** See "Dimensions" for external view of the entire camera.

Lens Mount (C-Mount)

Mount a C-mount lens, microscope adapter, etc. here.

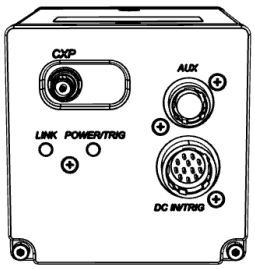
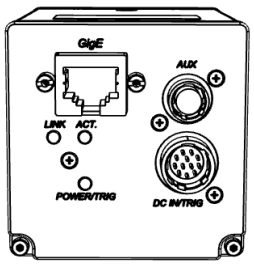


- Back flange distance: 17.526 mm
- Thread pitch: 0.79375mm

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

Connectors

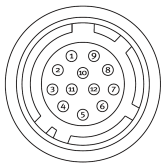
This section displays the pin assignments for each connector.

CXPA Model	5GE Model	MCL Model
		

DC IN/TRIG Connector (12-Pin Round)

Related Setting Items: DigitalIOControl

Connect the cable for a power supply (optional) or for DC IN / trigger IN here.



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

Pin No.	I/O	Signal	Description
1	GND	GND	
2	Power In	DC In (+12V)	DC10.8 ~ 26.4V
3	In	Opt In 2 (-)	Line 6
4	In	Opt In 2 (+)	
5	In	Opt In 1(-)	Line 5
6	In	Opt In 1(+)	
7	Out	Opt Out 1(-)	Line 2
8	Out	Opt Out 1(+)	
9	Out	TTL Out 1	Line 1
10	In	TTL In 1	Line 4
11	Power In	DC In (+12V)	DC10.8 ~ 26.4V
12	GND	GND	

Notes:

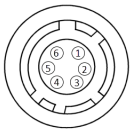
- The pin assignment of this camera is different from other JAI cameras.
- See Recommended External Input Circuit Diagram for the recommended circuit diagram.

TTL Signal Specification

TTL out signal specification (Typ.)	Output voltage: Low 0.0V, High 5.0V
TTL in signal specification (Typ.)	Input voltage: Low 0.0 ~ 0.7V, High 2.0 ~ 5.5V

AUX Connector (6-Pin Round)

Performs external input/output such as trigger input.



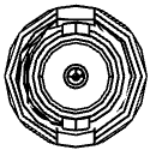
Camera side: HR10A-7R-6SB
Cable side: HR10A-7P-6P (77)

Pin No.	I/O	Signal	Description
1		NC	
2	Out	TTL Out 2	Line 8
3	In	TTL In 2	Line 10
4	Out	Opt Out 2 (-)	Line 3
5	Out	Opt Out 2 (+)	
6	GND	GND	

CXP (CoaXPress) Connector (CXPA Model)

Connect the coaxial cable for digital video output.

> **Note:** The AP-5100T-CXPA model supports the PoCXP function.

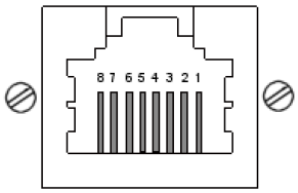


- **Connector**: Micro-BNC
- **CxpLinkConfiguration**: CXP12_X1, CXP6_X1, CXP3_X1

> **Note:** You can check the current CXP version in CxpVersion Used (TransportLayerControl (AP-5100T-CXPA)). Even if you are using a CoaXPress frame grabber board that supports CXP 2.0, if [CxpVersionUsed] is CXP 1.1, you may need to make settings on the frame grabber board side. For the specific setting method, refer to the instruction manual of the frame grabber board to be used.

RJ-45 Connector

Connect a Gigabit Ethernet compatible LAN cable (Category 5e or higher, Category 6 recommended) here.



GigE Vision Interface

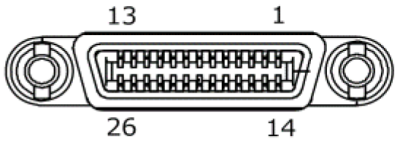
Pin	8	7	6	5	4	3	2	1
Signal	TRD-(3)	TRD+(3)	TRD-(1)	TRD-(2)	TRD+(2)	TRD+(1)	TRD-(0)	TRD+(0)

Digital I/O-1 and Digital I/O-2 Video Output Connectors

Connect a Cable Link compatible cable here.

> **Note:** 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.

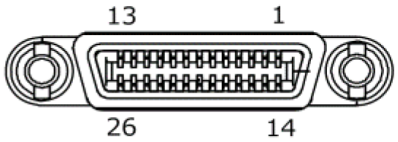
DIGITAL I/O - 1



Camera Side:
HDR-EC26FYTG2-SL+(HONDA)
Cable: SDR Connector Cable

Pin	Input Output	Signal	Description
1, 26		Shield	GND
2 (-), 15 (+)	Out	TxOUT0	Data output
3 (-), 16 (+)	Out	TxOUT1	Data output
4 (-), 17 (+)	Out	TxOUT2	Data output
5 (-), 18 (+)	Out	TxClk	CL Clock
6 (-), 19 (+)	Out	TxOUT3	Data output
7 (+), 20 (-)	In	SerTC (RxD)	LVDS Serial Control
8 (-), 21 (+)	Out	SerTFG (TxD)	
9 (-), 22 (+)	In	CC1	Trigger
10 (-), 23 (+)		CC2	Reserved
11, 24		N.C	
12, 25		N.C	
13, 14		Shield	GND

DIGITAL I/O - 2

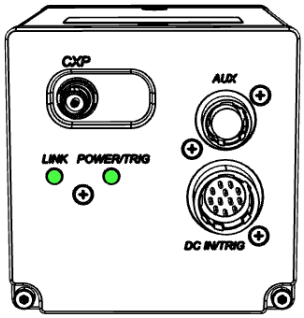
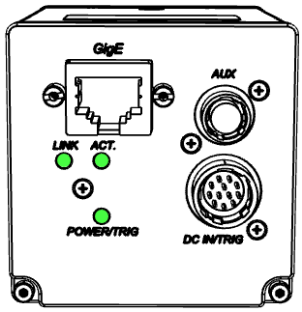


Camera Side:
HDR-EC26FYTG2-SL+(HONDA)
Cable: SDR Connector Cable

> **Caution:** There are no serial communication or CC1/CC2 signals on Connector 2. Use Connector 1 to communicate these signals.

Pin	Input Output	Signal	Description
1, 26		Shield	GND
2 (-), 15 (+)	Out	TxOUT0	Data output
3 (-), 16 (+)	Out	TxOUT1	Data output
4 (-), 17 (+)	Out	TxOUT2	Data output
5 (-), 18 (+)	Out	TxClk	CL Clock
6 (-), 19 (+)	Out	TxOUT3	Data output
7 (+), 20 (-)		Reserved	
8 (-), 21 (+)		N.C	
9 (-), 22 (+)		N.C	
10 (+), 23 (-)		N.C	
11 (-), 24 (+)		N.C	
12 (+), 25 (-)		N.C	
13, 14		Shield	GND

LED

CXPA Model	5GE Model	MCL Model
		

The table below shows the LED light and camera status.

POWER TRIG (All Models)

Light		Status
	Lit amber	Camera initializing.
	Lit green	Camera in operation.
	Blinking green	During operation in trigger mode, trigger signals are being input. **Note:** The blinking interval is not related to the actual input interval of the external trigger.

LINK (CXPA Model)

Light		Status
	Off	The network link is not established (or is in progress).
	Lit amber	System is powering up.
	Red pulse - slow	No connection. **Note:** Not applicable when using PoCXP.
	Alternating between green and amber - rapid	**When using PoCXP:** Detecting link. **Note:** Blinks for 1 second even when detected immediately.

Light		Status
	Blinking amber - rapid	**When not using PoCXP:** Detecting link. **Note:** Blinks for 1 second even when detected immediately.
	Lit green	Connection between device and host is established, but there is no data being transmitted.
	Blinking amber - slow	Established connection between camera and frame grabber. Waiting for an event (trigger, exposure pulse, etc.)
	Blinking green - rapid	Established connection between camera and frame grabber. Data is being transmitted.
	Alternating between green and amber - slow	Sending connection test packet.

LINK (5GE Model)

Light		Status
	Off	The network link is not established (or is in progress).
	Blinking green (slow)	1000BASE-T link is established. (Interval 1sec)
	Blinking green (fast)	2.5GBASE-T or 5GBASE-T link is established. (Interval 200ms)

ACT (5GE Model)

Light		Status
	Off	Communication is not active.
	Blinking amber	Communication is active.

Mounting Holes

Use these holes to mount the camera directly to a structural system.

Location	Available Mounting Holes
Top	M3, Depth 3mm x 4
Side	M3, Depth 3mm x 4
Bottom	M3, Depth 3mm x 4

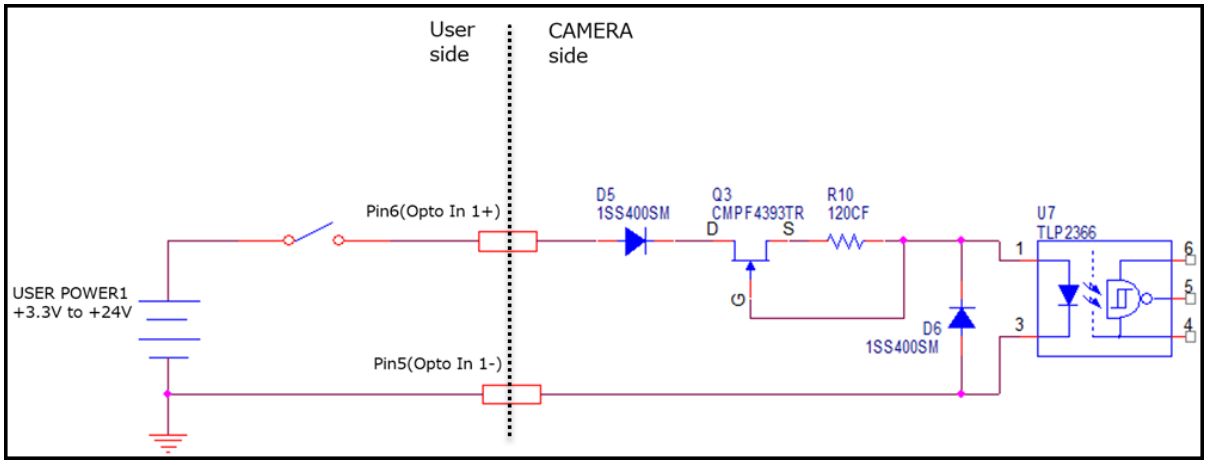
Recommended External Input Circuit Diagram

Related Setting Items: DigitalIOControl

Technical Notes OPTO-In Circuit Characteristics

Reference Example

Caution: Check the recommended external input circuit diagram (reference example) and connect correctly.



Note: Parts may be replaced with equivalent products.

Preparation

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

1	**Step 1: Install the Software (5GE Model, First Time Only)** Install the software for configuring and controlling the camera (eBUS SDK for JAI) on the computer.
2	**Step 2: Connect Devices** Connect the lens, cables, computer, and other devices.
3	**Step 3: Verifying Camera Operation** Verify whether the camera is turned on and ready for use.
4	**Step 4: Verifying the Connection between the Camera and PC** Verify whether the camera is properly recognized via Control Tool.
5	**Step 5: Configure Trigger, Exposure, and Frame Rate Settings** Refer to the setting examples to configure the trigger, exposure, and line rate settings.
6	**Step 6: Adjusting the Image Quality** Refer to the procedures for adjusting image quality.
7	**Step 7: Saving the Settings** Save the current setting configurations in user memory.

Step 1: Install the Software (5GE Model, First Time Only)

When using the camera for the first time, install the software for configuring and controlling the camera (eBUS SDK for JAI) on the computer.

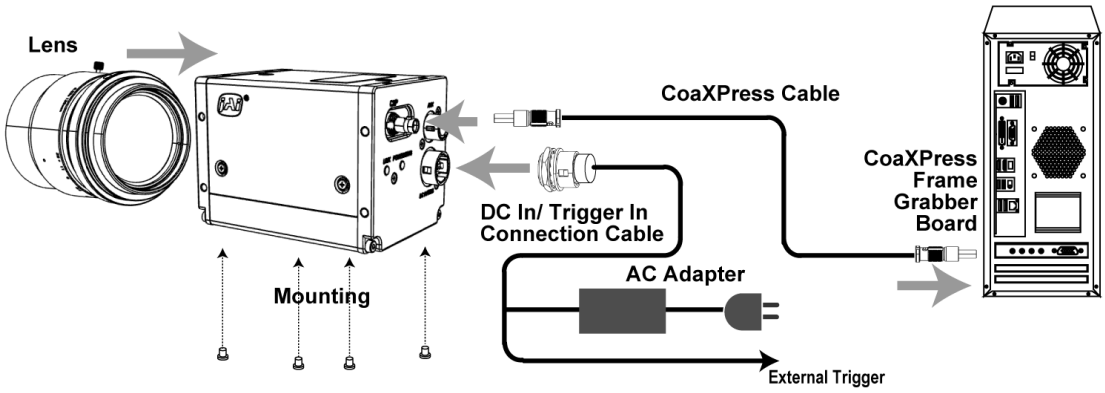
Notes:

- When you install eBUS SDK for JAI, eBUS Player for JAI will also be installed.
- For the operating system (OS) requirements for eBUS SDK for JAI, see the JAI Camera Software page (https://www.jai.com/support-software/jai-software) or eBUS Player User Guide.
- eBUS SDK for JAI does not support the CXPA and MCL models.

1. Download the eBUS SDK for JAI from the JAI website (https://www.jai.com/support-software/jai-software).
2. Install eBUS SDK for JAI on the computer.

Step 2: Connect Devices

AP-5100T-CXPA



Lens

DC IN / Trigger IN Connection Cable

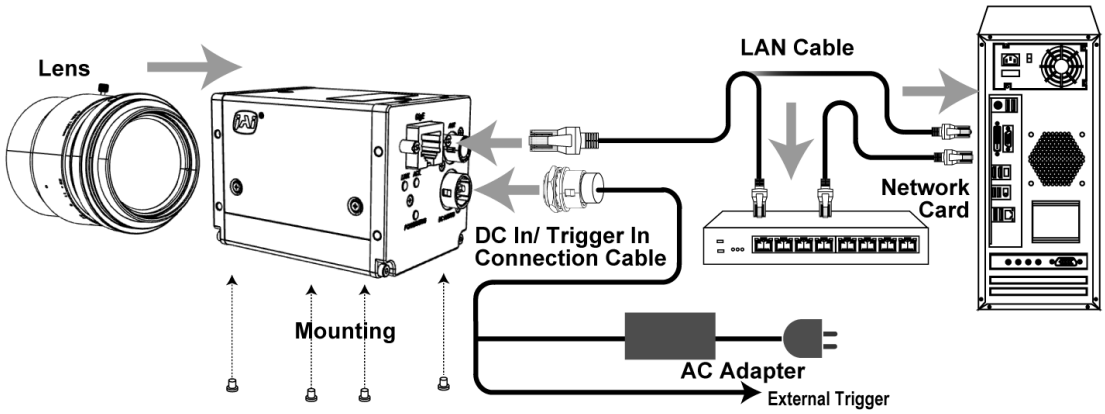
CoaXPress Cable (CXPA Model)

Mounting

AC Adapter (Power Supply) - Optional

Camera Link Frame Grabber Board (MCL Model)

AP-5100T-5GE



Lens

DC IN / Trigger IN Connection Cable

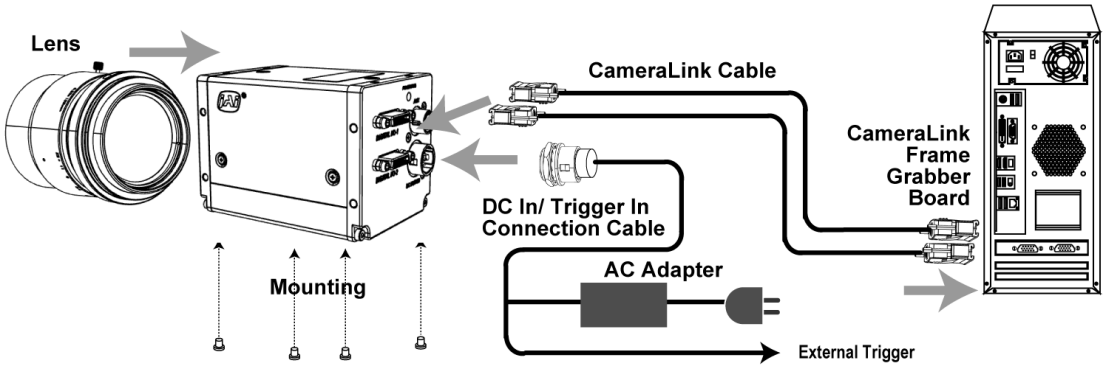
LAN Cable (5GE Model)

Mounting

AC Adapter (Power Supply) - Optional

Network Card (5GE Model)

AP-5100T-MCL



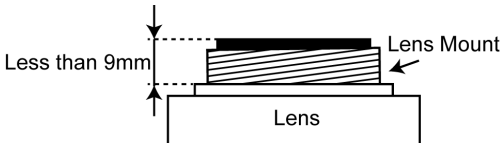
Lens
DC IN / Trigger IN Connection Cable
Camera Link Cable (MCL Model)
Camera Link Frame Grabber Board (MCL Model)
Mounting
AC Adapter (Power Supply) - Optional

Lens

Technical Notes Lens Selection Guide

C-mount lenses with lens mount protrusions of 9 mm or less can be attached.

- Back flange distance: 17.526 mm
- Thread pitch: 0.79375mm



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

Cautions:

- The maximum performance of the camera may not be realized depending on the lens.
- Attaching a lens with a mount protrusion of 9 mm or longer may damage the lens or camera.

Mounting

When mounting the camera directly to a device, use screws that match the mounting holes on the camera. For more information on the mounting holes, see "Mounting Holes ".

When using the tripod adapter plate (MP-44), attach it to the mounting holes on the bottom of the camera using the supplied screws.

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

DC IN / Trigger IN Connection Cable

Performs external I/O such as power supply and trigger input.

AC Adapter (Power Supply) - Optional

Connect the AC adapter and the round connector of the connection cable to the DC IN / trigger IN connector on the camera.

CoaXPress Cable (CXPA Model)

Connect the CXP cable to the CXP connector on the camera and frame grabber board. Refer to the specifications of the cable for details on its bend radius.

CXP Frame Grabber Board (CXPA Model)

Refer to the operating instructions of the frame grabber board and configure settings on the computer as necessary.

LAN Cable (5GE Model)

Connect a LAN cable to the RJ-45 connector.

> **Note:** The AP-5100T-5GE model does not support the PoE function.

> **Caution:** See the Notes on LAN Cable Connection (5GE Model) topic as well.

The camera supports the following Ethernet standards: 1000BASE-T, 2.5GBASE-T, 5GBASE-T.

- Use a LAN cable that is Category 5e or higher (Category 6 recommended).
- Refer to the specifications of the cable for details on its bend radius.
- LAN cable types, Ethernet standards, and maximum cable lengths are listed in the table below.

	Cat5e	Cat6 / Cat6e	Cat6A	Cat7
1000Base-T	100m	100m	100m	100m
2.5GBase-T	100m	100m	100m	100m
5GBase-T	100m	100m	100m	100m

Network Card (5GE Model)

Install this on the computer that will be used to configure and operate the camera. As the camera supports PoE, you can also use PoE-compatible network cards. Refer to the instruction manual of the network card and configure settings on the computer as necessary.

Camera Link Cable (MCL Model)

Connect the Camera Link cables to the DIGITAL I/O-1 and DIGITAL I/O-2 video output connectors.

> **Note:** The AP-5100T-MCL model does not support the PoE function.

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

> **Caution:** Refer to "Notes on Camera Link Cable Connection (MCL Model)" when connecting the cables to the connectors.

> **Note:** The maximum Camera Link cable length is 10 m. The maximum length of cable you can use will also vary depending on type and maker.

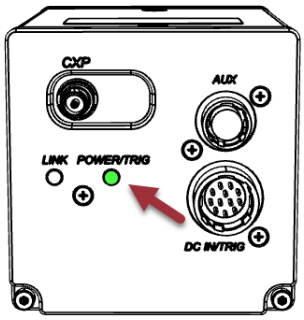
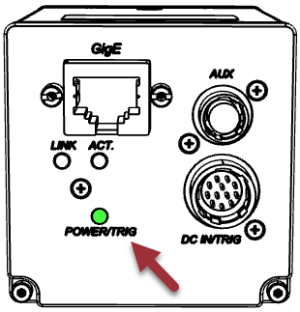
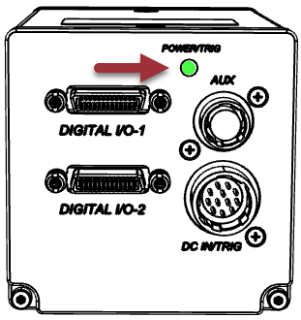
Camera Link Frame Grabber Board (MCL Model)

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).

Step 3: Verifying Camera Operation

When power is supplied to the camera while the necessary equipment is connected, the POWER/TRIG LED at the rear of the camera lights amber, and initialization of the camera starts. When initialization is complete, the POWER/TRIG LED lights green.

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

CXPA Model	5GE Model	MCL Model
		

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

Step 4: Verifying the Connection between the Camera and PC

AP-5100T-CXPA and AP-5100T-MCL

Use an appropriate software tool associated with your frame grabber to set up the camera and display captured images. Refer to the operation manual of the selected software tool for specific instructions.

> **Note:** The AP-5100T-CXPA and AP-5100T-MCL models do not support eBUS Player for JAI.

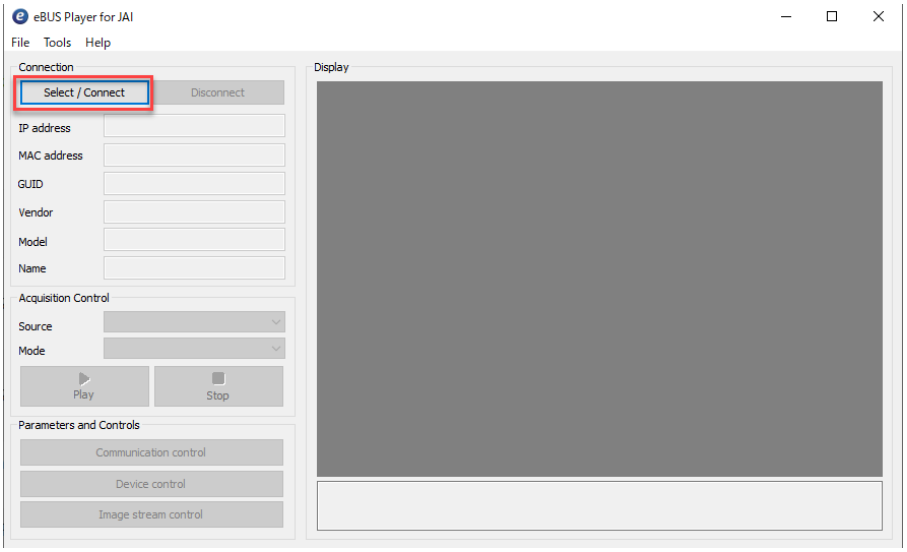
AP-5100T-5GE

Verify whether the camera is properly recognized eBUS Player for JAI.

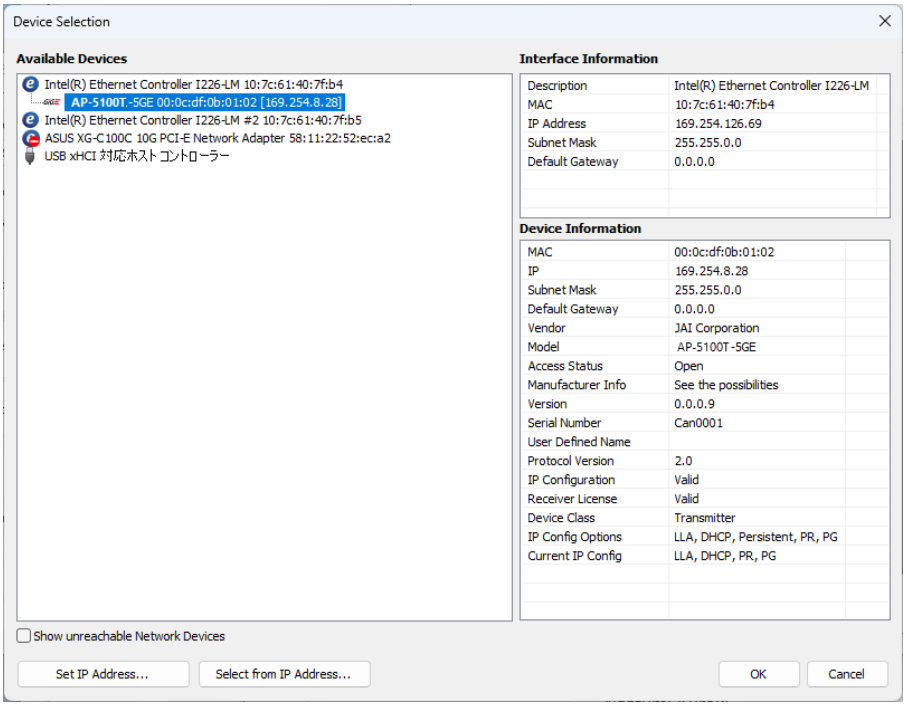
1. Launch eBUS Player for JAI.

   eBUS Player for JAI startup screen appears.

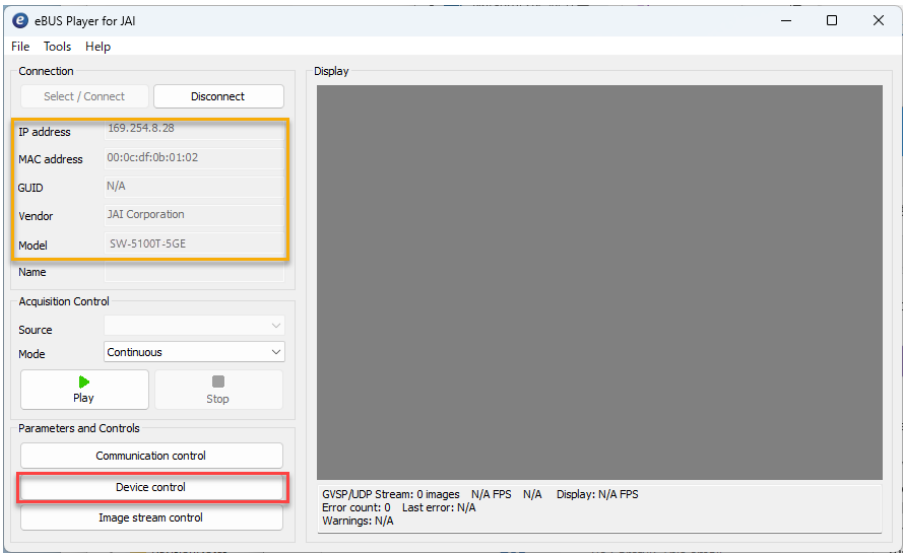
2. Click the **Select / Connect** button.



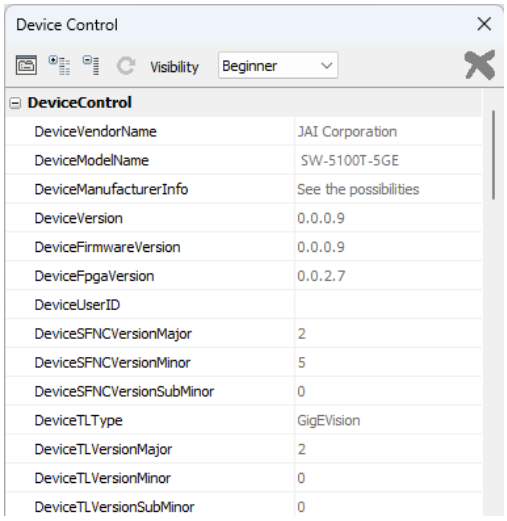
3. The connected camera is listed. Please select one camera and click **OK**.



4. Check that the settings of the selected camera are displayed.



5. Click the **Device control** button. The DeviceControl window will be displayed. In this window, you can adjust various settings of the camera.



6. This completes the procedure for verifying whether the camera is properly recognized and whether control and settings configuration are possible.

Step 5: Configure Trigger, Exposure, and Frame Rate Settings

Related Setting Items: AcquisitionControl

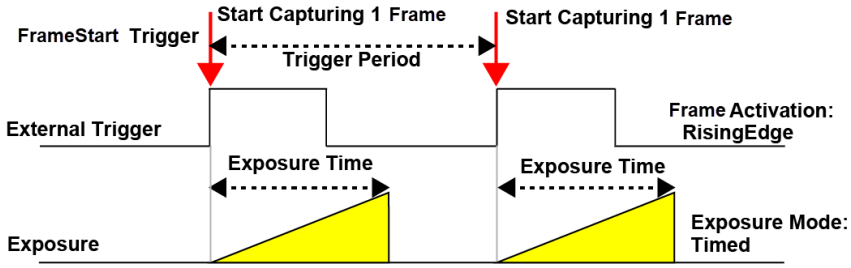
This section describes scenarios for controlling the trigger, exposure, and frame rate.

Note: This section is intended to explain the basic relationship between the trigger, exposure, and frame rate.

Trigger Mode	Exposure Mode	Setting Example
On	Timed	Control via External Triggers with the Specified Exposure Time
	TriggerWidth	Control via External Triggers with Exposure Time Controlled by the Pulse Width of the Trigger Input Signal
Off	Timed	Control without External Triggers with the Specified Exposure Time
	Off	Control without External Triggers without Specifying the Exposure Time

Control via External Triggers with the Specified Exposure Time

In the example below, **TriggerSelector** is set to **FrameStart**.



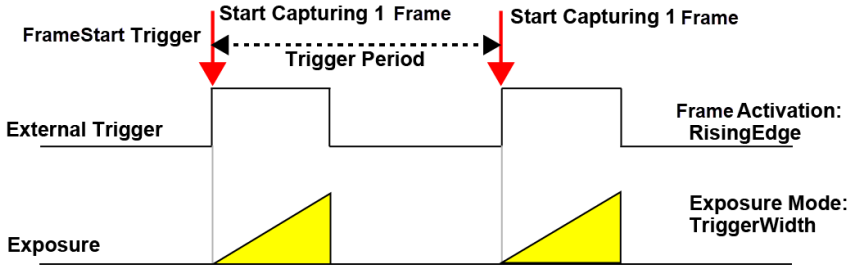
Notes:

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

Item	Setting
Trigger Mode	On
Trigger Selector	Frame Start
Trigger Source	Any
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 Controlled by the Pulse Width of the Trigger Input Signal

In the example below, **TriggerSelector** is set to **FrameStart**.

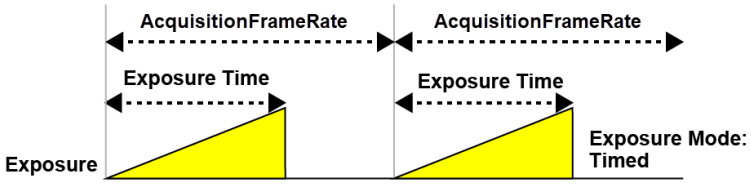


Notes:

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

Item	Setting
Trigger Mode	On
Trigger Selector	Frame Start
Trigger Source	Any
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

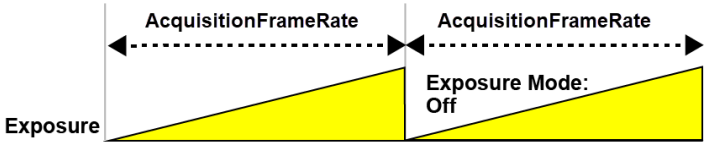


Notes:

- ExposureTime can be set up to 1 frame cycle to lengthen the accumulation time to increase sensitivity.
- The ExposureTime value cannot be longer than the frame period.

Item	Setting
Trigger Mode	Off
Exposure Mode	Timed (control via exposure time)
Exposure Time	Varies depending on settings.
Acquisition Frame Rate	The maximum value varies depending on PixelFormat, ROI, Link Speed, etc.

Control without External Triggers without Specifying the Exposure Time



Notes:

- The frame rate can be set up to 1 frame cycle toto increase sensitivity.
- The exposure time will be the longest possible duration given the operating conditions, such as the frame period.

Item	Setting
Trigger Mode	Off
Exposure Mode	Off
Acquisition Frame Rate	The maximum value varies depending on PixelFormat, ROI, Link Speed, etc.

Step 6: Adjusting the Image Quality

Display the camera image and adjust the image quality.

Adjust the Gain

> **Related Setting Items:** AnalogControl

This topic explains how to manually adjust the gain.

> **Notes:**
> - **Visibility** must be changed from **Beginner** to **Guru**.
> - You can also automatically adjust the gain. For details, refer to the "ALC (Automatic Level Control) Function".

Manual Adjustment

There are two gain control modes: **Master Mode (IndividualGainMode = Off)**, where you adjust the master gain and fine-tune with R and B, and **Individual Mode (IndividualGainMode = On)**, which allows separate gain adjustment for each RGB channel.

> **Notes:**
> - The Gain setting is configured in multipliers. See "Comparison of the Decibel Display and Multiplier Display when configuring the Gain settings"
> - The Analog Gain's resolution is set in about 0.1dB steps.

Master Mode (IndividualGainMode = Off)

1. Set **IndividualGainMode** to **Off**.
2. Select the **Gain** to configure from **GainSelector**.
3. Configure the selected **Gain** value (default: x1). Refer to the table below for the setting range of each gain.

Individual Mode (IndividualGainMode = On)

1. Set **IndividualGainMode** to **On**.
2. Select the **Gain** to configure from **GainSelector**.
3. Configure the selected **Gain** value (default: x1). Refer to the table below for the setting range of each gain.

GainSelector	IndividualGainMode = Off	IndividualGainMode = On
AnalogAll*	0.0dB ~ 18.1dB (x1.0 ~ x8.0)	0db (x1.0) (Fixed)
AnalogRed*	-6.6dB ~ 12.0dB (0.47 ~ 4.0)	0dB ~ 36.1dB (x1.0 ~ x64.0)
AnalogBlue*	-6.6dB ~ 12.0dB (0.47 ~ 4.0)	0dB ~ 36.1dB (x1.0 ~ x64.0)
AnalogGreen*	0db (x1.0) (Fixed)	0dB ~ 36.1dB (x1.0 ~ x64.0)
DigitalRed	-0.9dB ~ 0.8dB (x0.9 ~ x1.1)	
DigitalBlue	-0.9dB ~ 0.8dB (x0.9 ~ x1.1)	
*The resolution is set in about 0.1dB steps.		

Adjusting the White Balance

Related Setting Items: AnalogControl

Adjust the white balance using the automatic adjustment function.

Automatic Adjustment: Once, Continuous, ExposureOnce, ExposureContinuous

1. Place a white/gray White Balance target in front of the camera, at the same position as the inspected object. Ensure that the White Balance target fills the whole image or the area(s) specified with AWBAreaSelector.
2. If you want to restrict the metering area for automatic adjustment, configure each of the 16 areas with **AWBAreaSelector** to enable or disable metering.
3. From **BalanceWhiteAuto**, select the adjustment method according to your application:
    - **Once**: Performs white balance adjustment once and then keeps the fixed value. The correction is carried out by automatically adjusting the gain for each channel. This setting is useful when the lighting environment is constant and stable.
    - **Continuous**: Continuously analyzes the image during acquisition and automatically updates the white balance according to changes in ambient light or the object. The correction is carried out by automatically adjusting the gain for each channel. When this option is selected, you can set the control speed of white balance adjustment with **AWBControlSpeed**. This setting is useful when lighting conditions change or when the subject has different color characteristics.
    - **ExposureOnce**: Performs white balance adjustment once and then keeps the fixed value. The correction is carried out by changing the exposure time of the Red / Blue channels. This setting is useful when the lighting environment is constant and stable.
    - **ExposureContinuous**: Continuously analyzes the image during capture and automatically updates the white balance according to changes in ambient light or the object. The correction is carried out by changing the exposure time of the Red / Blue channels. When this option is selected, you can set the control speed of white balance adjustment with **AWBControlSpeed**. This setting is useful when lighting conditions change or when the subject has different color characteristics.

4. White balance is adjusted automatically.

   When **Once** or **ExposureOnce** is selected, **BalanceWhiteAuto** returns to **Off** after the automatic adjustment.

5. BalanceWhiteAutoResult displays the result of the white balance adjustment (for **Once** / **ExposureOnce**) or the control status (for **Continuous** / **ExposureContinuous**).

BalanceWhiteAutoResult	BalanceWhiteAuto	Description
Processing	Any	White balance adjustment in progress.
Converging	Continuous, Exposure Continuous	White balance adjustment success conditions met. (Automatic adjustment does not stop and continues.)
Succeeded	Once, Exposure Once	Automatic adjustment successful. **BalanceWhiteAuto** returns to **Off**.
Error1 - G Image was too bright	Once, Exposure Once	Adjustment failed. G value is too high.
Error2 - G Image was too dark	Once, Exposure Once	Adjustment failed. G value is too low.
Error3 - Timeout	Once, Exposure Once	Adjustment failed: Success conditions were not met after repeating adjustment for 10 seconds.
Error4 - Could not processing	Once, Exposure Once	Adjustment terminated due to the following reasons: - AcquisitionStart (AcquisitionControl) not executed. - TestPattern (ImageFormatControl) set to a value other than Off. - No valid metering area ([AWBAreaSelector]) - AcquisitionMode (AcquisitionControl) set to Single / MultiFrame - Sequencer Mode active (SequencerControl) - MultiROI Modeactive (MultiROIControl) - IndividualGainMode (AnalogControl) set to On
Error5 - R or B image was out of range	Once, Exposure Once	Adjustment failed. R or G channel signal exceeded control range.

Notes:

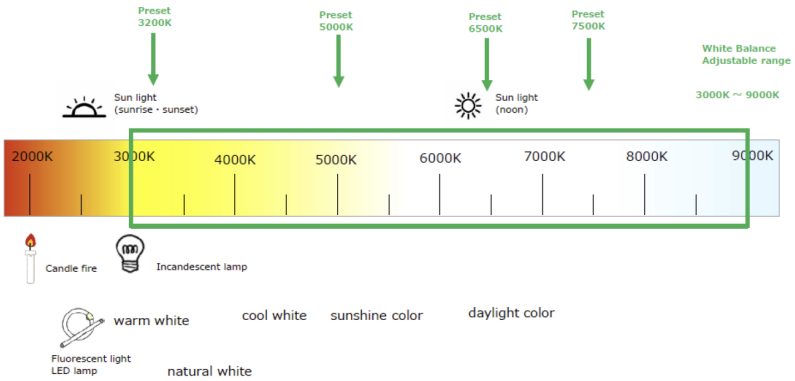
- When **Continuous** or **ExposureContinuous** is selected, automatic adjustment will not execute under the following conditions. However, the adjustment will not be terminated, and automatic adjustment will start or resume once the condition is cleared.

  - AcquisitionStart (AcquisitionControl) not executed.
  - TestPattern (ImageFormatControl) set to a value other than Off.
  - No valid metering area ([AWBAreaSelector])
  - Sequencer Mode active (SequencerControl)
  - MultiROI Modeactive (MultiROIControl)
  - IndividualGainMode (AnalogControl) set to On

> - When **Continuous** or **ExposureContinuous** is selected and the success conditions for white balance adjustment are not met, the adjustment will not be terminated and automatic adjustment continues. In this case, **BalanceWhiteAutoResult** displays **Processing**.

AutomaticAdjustment: Preset3200K, Preset5000K, Preset6500K, Preset7500K

In addition to the automatic adjustment functions described above, this camera allows you to fix the white balance to a specified color temperature (**Preset5000K**, **Preset6500K**, **Preset7500K**). When the preset option is used, set **IndividualGainMode** [AnalogControl] to **Off**.



> **Note:** When a Preset setting is selected, **BalanceWhiteAutoResult** displays **Idle**.

Adjusting the Black Level

> **Related Setting Items:** AnalogControl

Black level adjustment aligns the baseline of dark areas to suppress noise and color cast, ensuring accurate and stable images. **All** applies the same correction value to all channels, useful when simply aligning the overall black reference. **Red** and **Blue** apply corrections to individual color channels, and are used when only the red or blue channel black level is shifted. This helps reduce color cast or unevenness in dark areas, improving stable color reproduction and inspection accuracy.

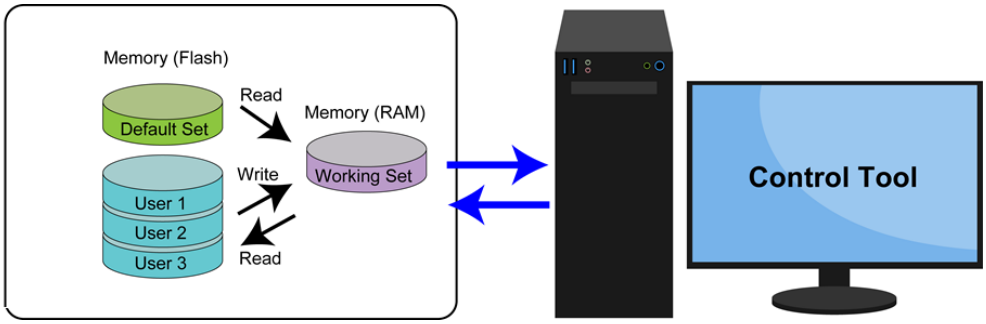
1. Select the black level you want to configure in **BlackLevelSelector**. **All** (master black), **Red**, and **Blue** can be configured.
2. Specify the adjustment value in BlackLevel (Default: 0). The available setting range for each option is as follows.

BlackLevelSelector	Setting Range
All	133 ~ 255
Red	-64 to +64
Blue	-64 to +64

Step 7: Saving the Settings

Related Setting Items: UserSetControl

The setting values configured in the tool 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)



To Save User Settings

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 Default and cannot be overwritten.

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

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

To Load 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.
3. Select **UserSetLoad** and click the **UserSetLoad** button.
4. The selected user settings are loaded.

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

Main Functions

This chapter describes the camera's main functions.

Single ROI Function

Related Setting Items: ImageFormatControl

The ROI (region of interest) function allows you to output images by specifying the areas to scan. Specify the area to scan by specifying width, height, and horizontal/vertical offset values under ImageFormatControl. You can increase the frame rate by specifying a lower height, as the number of lines scanned decreases.

Notes:

- When using this function with Image Scaling Mode (Xscale), first, set the Width, Height, OffsetX, and OffsetY settings, and then configure the Image Scaling Mode settings.
- Refer to Functions That Cannot Be Used Together for usage restrictions.

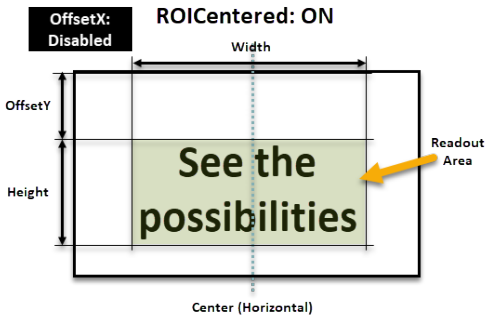
The setting ranges for the ROI function's readable area based on the Binning setting (BinningHorizontal, BinningVertical, FD2x2BinningMode) are as follows.

	Horizontal/Vertical Binning = 1 FD2x2Binning = Off	**Horizontal/Vertical Binning = 2**	**FD2x2Binning = On**
Width	96 ~ 2464, step: 8	48 ~ 1232, step: 4	48 ~ 1228, step: 4
Height	8 ~ 2056, step: 2	4 ~ 1028, step: 1	4 ~ 1024, step: 1
OffsetX	0 ~ 2368, step: 8	0 ~ 1184, step: 4	0 ~ 1180, step: 4
OffsetY	0 ~ 2048, step: 2	0 ~ 1024, step: 1	0 ~ 1020, step: 1

ROICentered

Related Setting Items: ImageFormatControl

When **ROICentered** is set to **ON** while using the Single ROI Function, OffsetX is disabled and the image output position in the X direction is always forced to be centered.



Notes:

- Refer to Functions That Cannot Be Used Together for usage restrictions.
- When switching this function back to **Off**, the OffsetX value will be 0.

Binning Function

Related Setting Items: ImageFormatControl

The Binning function allows you to combine the signal values of clusters of adjacent pixels to create improved virtual pixels. Using the function results in images with a lower pixel resolution and higher sensitivity in summing mode or reduced noise in averaging mode.

This camera model supports the following binning modes:

- **FD2x2BinningMode** (Floating diffusion binning): Performs Horizontal x2 and Vertical x2 analog binning (Sum) on the sensor. This option increases the frame rate compared to the BinningHoizontal/BinningVertical options.
- **BinningHorizontal, BinningVertical**: Performs Horizontal x2 and/or Vertical x2 digital binning (Sum or Average) on the FPGA.

Note: Refer to Functions That Cannot Be Used Together for usage restrictions.

How to Configure

When configuring **FD2x2BinningMode**, set the setting to **On**. When configuring **BinningHorizontal**/ **BinningVertical**, set the setting to **2**.

Note: FD2x2BinningMode and **BinningHorizontal**/ **BinningVertical** cannot be used together.

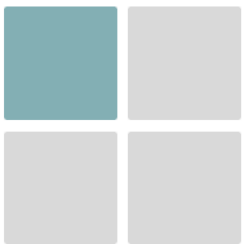
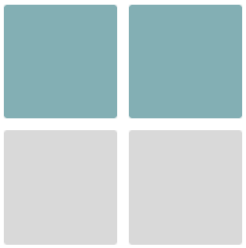
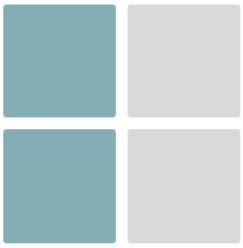
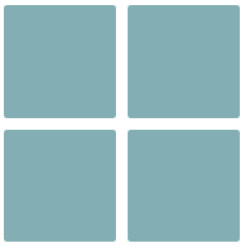
	Binning off 	2 x 1 	1 x 2 	2 x 2 
FD2x2BinningMode	OFF	N/A	N/A	ON
BinningHorizontal	1	2	1	2
Binning Vertical	1	1	2	2

Image Scaling Mode (Xscale)

Related Setting Items: ImageFormatControl

JAI's Xscale algorithm digitally reduces the sensor's pixel resolution by specifying the vertical and horizontal scaling ratio. This function can also be used for color models and allows finer adjustment of resolution than the conventional Binning Function.

The output image types are Average or Sum.

Notes:

- When using this function with the Single ROI Function, first, set the Width, Height, OffsetX, and OffsetY settings, and then configure the Image Scaling Mode settings.
- Refer to Functions That Cannot Be Used Together for usage restrictions.
- For more information, see the JAI news "Xscale".

How To Configure

1. If necessary, configure the Single ROI Function settings.
2. Set **ImageScalingMode** (ImageFormatControl) to **On**.
3. Use **ImageScalingSumMode** to specify the output image mode. The options are "**Average** (Off)" or "**Sum** (On)." Depending on the mode, the output image's brightness will be different.

   Average Mode: The average brightness of the sensor image is equal to the average brightness of the reduced output image.

   Sum Mode: The sum of the brightness of all pixels in the sensor image and the sum of the brightness of all pixels in the reduced output image is equal, thus increasing the brightness of the output image.
4. Use **ImageScalingHorizontal** and **ImageScalingVertical** to specify the horizontal and vertical scaling ratio.

Specifying the Scaling Ratio

Specify the scaling ratio in decimal point (maximum six decimal places) for ImageScalingHorizontal and ImageScalingVertical. The setting range is 0.0625 to 1. If "1" is specified, the image will not be scaled.

Caution: Xscale automatically rounds down the width to the nearest value that is a multiple of 4 and rounds down the height to the nearest value that is a multiple of 2.

Before rounding down, width and height calculations are first rounded (up or down) to seven significant digits. If the subsequent rounding down to the nearest multiple of 4 (or 2) results in a value that is beyond Xscale's maximum 16X scaling limit, the value is rounded up to the nearest multiple of 4 (or 2) and the corresponding ImageScalingHorizontal/Vertical value is adjusted accordingly.

Note: When using Xscale, the horizontal and vertical scaling factors determine the size of the virtual pixels in the scaled image. This information, plus any ROI that has been preset by the user, determines the maximum number of whole virtual pixels possible in the output image.

Image Flip Function

Related Setting Items: ImageFormatControl

Using this function, you can output the image by inverting it horizontally and/or vertically.

ReverseX, ReverseY

- To reverse the image horizontally, set **ReverseX** to True.
- To reverse the image vertically, set **ReverseY** to True.

ReverseX	ReverseY

ReverseXY

ReverseXY inverts the current **ReverseX** and **ReverseY** settings.

> **Note:** The ReverseXY setting can be changed during the acquisition; however, the frame rate will temporarily slow down while the setting is changed.

For example, if ReverseX, ReverseY, and ReverseXY are all set to **False**, changing ReverseXY to **True** will change ReverseX and ReverseY to **True**. If ReverseXY is changed back to **False**, ReverseX and ReverseY are also changed back to **False**. (ReverseXY acts as a toggle).

ReverseXY

Pixel Format

> **Related Setting Items:** ImageFormatControl

Selectable PixelFormat is as follows.

AP-5100T-CXPA	AP-5100T-5GE	AP-5100T-MCL
RGB8, RGB10, RGB12	RGB8, RGB10V1Packed, RGB10p32, RGB12V1Packed	RGB8, RGB10, RGB12

Overlay Mode

Related Setting Items: ImageFormatControl

Notes:

- This function cannot be used with the Sequencer Function.
- This function is always Off when the camera is powered up and when **AcquisitionStop** is executed.

OverlayMode = MultiRoiAreaMode

In this mode, you can check the readout area when using the Multi ROI Function. The area that is not readout is displayed with the brightness reduced to half. This makes it possible to set and adjust the readout area while checking the target area on the screen.

Notes:

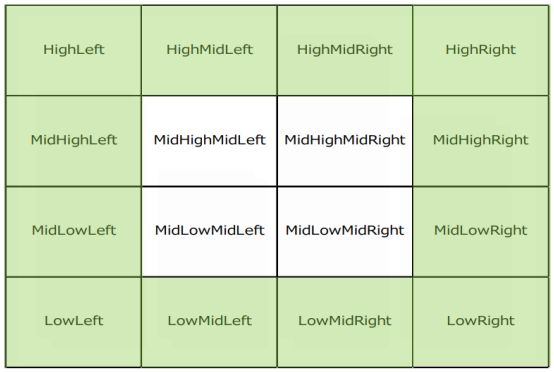
- To set Overlay Mode to **MultRoiAreaMode**, MultiRoiMode (MultiROIControl) must be set to **Off** in advance.
- In the following scenario, OverlayMode = MultiRoiMode will be disabled (you can still set to ALCAreaMode or AWBAreaMode): ImageScalingMode = On, BinningHorizontal = 2, BinningVertical = 2, FD2x2BinningMode = On

OverlayMode = AWBAreaMode or ALCAreaMode

When Overlay Mode is set to **AWBAreaMode** or **ALCAreaMode**, you can check the photometry areas of WhiteBalance and ALC. In the non-target area as shown below, the brightness is reduced to half.

MultiRoiAreaMode

AWBAreaMode or ALCAreaMode



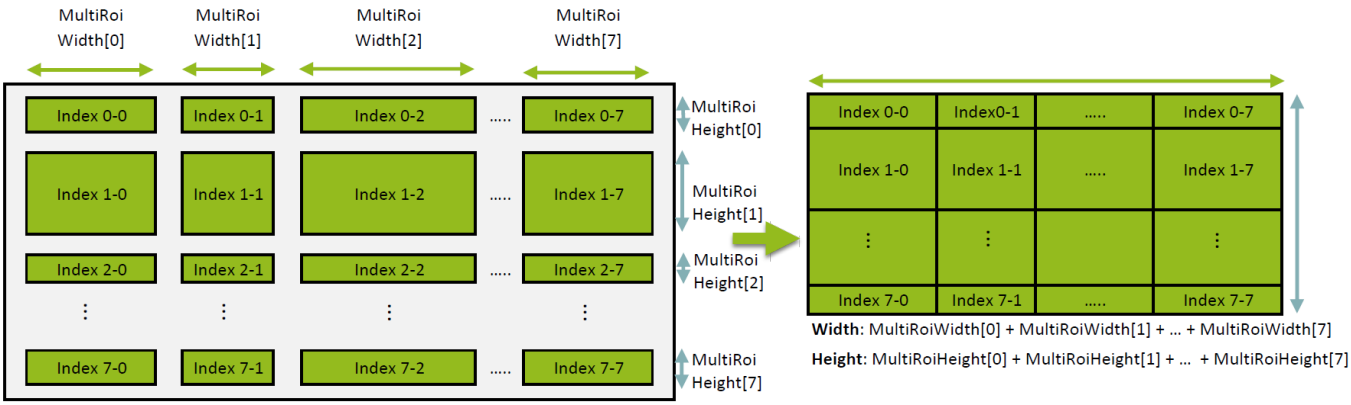
Multi ROI Function

Related Setting Items: MultiROIControl

Notes:

- Refer to Functions That Cannot Be Used Together for usage restrictions.
- If this function is turned on while Shading Correction is set to On, Shading Correction will be forced to Off.

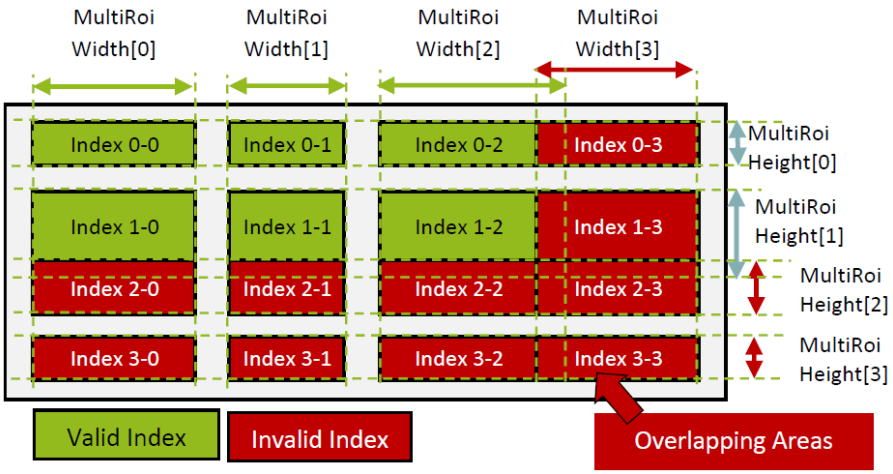
In Multi ROI mode, you can specify up to 64 scanning areas for a single-frame image. By skipping areas that are not specified as regions of interest when scanning a frame, the ROI function outputs the specified regions in a combined state. You can increase the frame rate due to the reduced scanning time for the combined areas. However, you cannot increase the frame rate by compressing in the horizontal direction.



How to Configure

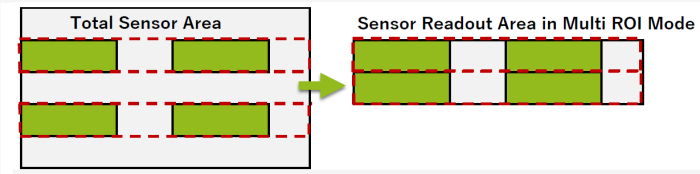
1. Set **MultiRoiMode (MultiROIControl)** to **On**.
2. Select from the eight indexes in MultiRoiIndex then set **MultiRoiWidth**, **MultiRoiHeight, MultiRoiOffsetX**, and **MultiRoiOffsetY**.
3. Set the maximum index number to be enabled to **MultiRoiVerticalEnableNumber** and **MultiRoiHorizontalEnableNumber**.

Caution: The specified areas cannot overlap. If the areas overlap, all indexes after the overlapping areas become unconfigurable.



Notes:

- The frame rate can be increased in relation to the size of the area specified in the vertical direction, but not in relation to the horizontal direction.

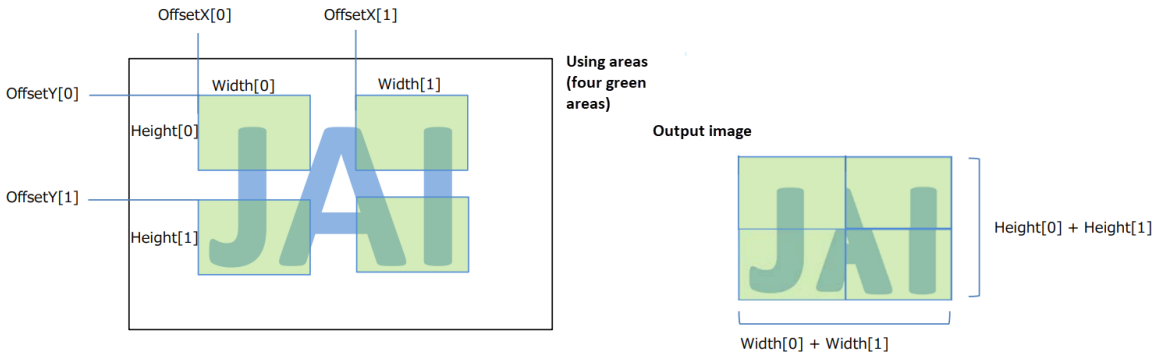


- In the horizontal direction, the configuration for the second and subsequent rows will be identical. In the vertical direction, the configuration for the second and subsequent columns will be identical.

Configuration Example

To use four areas as shown below, refer to the following.

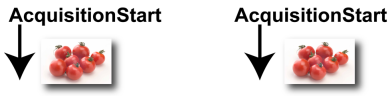
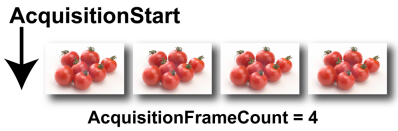
1. Set MultiROIControl-**>MultiRoiMode On**.
2. Select “0” in MultiRoiIndex. Set MultiRoiWidth, MultiRoiHeight, MultiRoiOffsetX and MultiRoiOffsetY.
3. Select “1” in MultiRoiIndex. Set MultiRoiWidth, MultiRoiHeight, MultiRoiOffsetX and MultiRoiOffsetY.
4. Set 2 to MultiRoiVerticalEnableNumber.
5. Set 2 to MultiRoiHorizontalEnableNumber.



Acquisition Control

> **Related Setting Items:** AcquisitionControl

This camera has three Acquisition modes (SingleFrame, MultiFrame, Continuous). Use the AcquisitionControl settings to perform operations and settings for image capture.

AcquisitionMode	Description	
SingleFrame	When the **AcquisitionStart** command is executed, one frame of image is captured.	
MultiFrame	When the **AcquisitionStart** command is executed, the number of frames set in AcquisitonFrameCount are acquired as images.	
Continuous	When the **AcquisitionStart** command is executed, images will continue to be acquired until the AcquisitionStop command is executed.	

> **Note:** After changing various settings, the black level may not be stable for several frames immediately after AcquisitionStart.

Changing the Frame Rate

> **Related Setting Items:** AcquisitionControl

When **TriggerMode** is disabled, you can change the frame rate in **AcquisitionFrameRate**.

The shortest frame period depends on various settings. The longest frame period is 0.125 Hz (8 sec.).

Available Operation Mode

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

> **Note:** When TriggerMode[FrameStart] is enabled, the AcquisitionFrameRate setting is disabled.

Trigger Control

Related Setting Items: AcquisitionControl

The camera allows the following controls to be performed via external trigger signals.

AP-5100T-CXPA, AP-5100T-5GE

TriggerSelector	Description
AcquisitionStart	Start image acquisition in response to the external trigger signal input.
AcquisitionEnd	Stop image acquisition in response to the external trigger signal input.
FrameStart	Start capturing a one-frame image in response to the external trigger signal input. **Notes:** • The FrameStart Trigger can only be used when the Exposure Mode setting is set to **Timed** or **TriggerWidth**. • For more information, see "FrameStart Trigger".
AcquisitionTransferStart	Output acquired images at a specified timing in response to an external trigger signal input. For more information, see "FrameStart Trigger and AcquisitionTransferStart Trigger". **Notes:** • This option is supported only on AP-5100T-5GE. • There is a limit to the number of image frames that can be stored internally.

AP-5100T-MCL

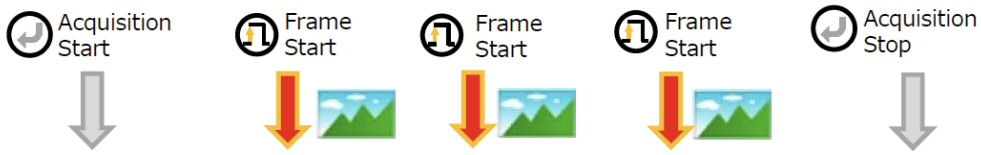
TriggerSelector	Description
FrameStart	Start capturing a one-frame image in response to the external trigger signal input. **Note:** The FrameStart Trigger can only be used when the Exposure Mode setting is set to **Timed** or **TriggerWidth**.

Notes:

- The settings for exposure control and triggers are related to each other. Be sure to configure the settings described in Step 5: Configure Trigger, Exposure, and Frame Rate Settings.
- You can delay when exposure actually starts after a trigger is received for a specific amount of time by configuring **TriggerDelay**.

FrameStart Trigger

For the AP-5100T-CXPA and AP-5100T-5GE models, when **AcquisitionStart** has been executed, a single frame is captured each time a **FrameStart trigger** is received, until the **AcquisitionStop** command is executed.

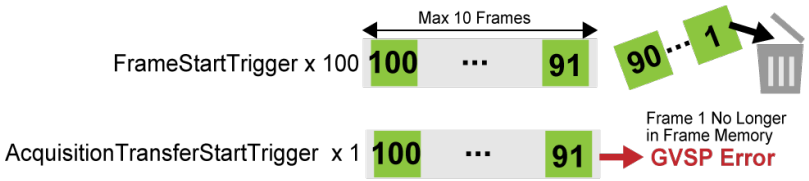


Note: For the configurable source signals of the trigger, refer to **TriggerSource** (AcquisitionControl).

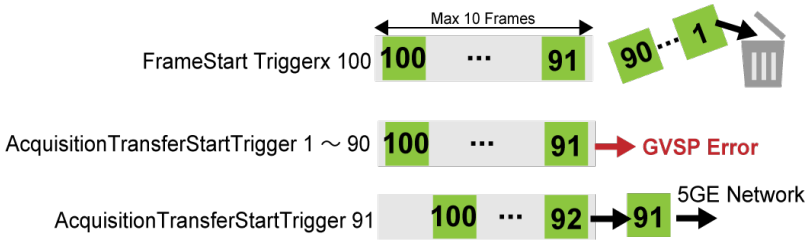
FrameStart Trigger and AcquisitionTransferStart Trigger

On this camera, when **AcquisitionTransferStart** is **On**, the camera expects that the number of **AcquisitionTransferStart** trigger inputs is the same as the number of **FrameStart** trigger inputs. Otherwise, a GVSP error may occur.

For example, if the FrameStart trigger is issued 100 times but the AcquisitionTransferStart trigger is issued only once, the camera attempts to send the first frame, but a GVSP Error will be sent instead because the first frame is already discarded. The below shows an example of when the camera can hold up to 10 frames in the frame memory.



To output an image, the AcquisitionTransferStart trigger must be issued continuously until it reaches the number of frames in the frame memory. For example, if 10 frames remain in the frame memory, the AcquisitionTransferStart trigger must be issued 90 more times to output the image.



Exposure Mode

Related Setting Items: AcquisitionControl

This camera supports the following Exposure modes:

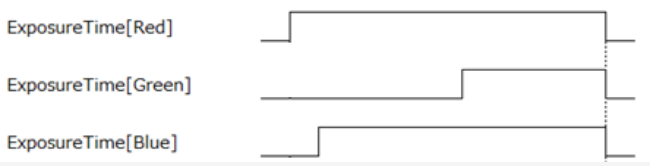
Exposure Mode	Description	Example
Off	Exposure control is not performed (free-running operation). The exposure time is the longest possible time within the operating conditions such as the frame rate.	Control without External Triggers without Specifying the Exposure Time
Timed	Mode in which control is 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 Controlled by the Pulse Width of the Trigger Input Signal

Notes:

- The settings for exposure control and triggers are related to each other. Be sure to configure the settings described in Step 5: Configure Trigger, Exposure, and Frame Rate Settings.
- When exposed to strong light, the accumulation time may appear to shift due to PLS (Parasitic Light Sensitivity) and other effects.
- When set to Timed or TriggerWidth, the actual exposure time is the set exposure time plus the exposure offset time (2.47 μs).

ExposureTimeMode

When ExposureMode is set to Timed, you can select the following Exposure Time Mode.

ExposureTimeMode	Description
Common	Set the common exposure time for Red, Green, and Blue (the RGB channels will have the same exposure time).
Individual	Set the exposure times for Red, Green, and Blue individually. To set the exposure time individually for Red, set ExposureTimeSelector to Red, and configure the exposure time for Red in ExposureTime. Similarly, configure the exposure times individually for Green and Blue. **Note**: The actual exposure time starts with the channel with the longest exposure time and ends with the channel with the shortest exposure time, so that the exposures end at the same time (see image below). 

RCT Mode

Related Setting Items: AcquisitionControl

RCT mode can be used when **Exposure Mode** is **Timed**, and **Frame Start Trigger** is enabled.

In RCT mode, the image is not output from the camera until FrameStartTrigger is input, but internally the imaging operation is continued and the automatic gain control (AGC) function, the automatic shutter control (ASC) function and the automatic white balance (AWB) function can be continued.

GPIO (Digital Input/Output Settings)

Related Setting Items: DigitalIOControl

The camera is equipped with GPIO (general-purpose input/output) functions for generating and using combinations of triggers and other necessary signals within the camera and of signals output from the camera to the system such as those used for lighting equipment control.

These signals can be used as triggers and other necessary signals within the camera or as signals output from the camera to the system, such as those used for lighting equipment control.

Note: See "Recommended External Input Circuit Diagram" for recommended external circuit examples.

You can check the status of each digital I/O as shown in the table below with LineStatusAll.

LineSelector	LineMode	LineFormat	LineInverter	LineStatusAll	Line Source	Connector
20: Line1 TTL Out1	Output	TTL	True/False	Bit0	user-configured	12-pin
21: Line2 Opt Out1	Output	OptoCoupled	True/False	Bit1	user-configured	12-pin
22: Line3 Opt Out2	Output	OptoCoupled	True/False	Bit2	user-configured	6-pin
23: Line4 TTL In1	Input	TTL	False (fixed)	Bit3	-	12-pin
24: Line5 Opt In1	Input	OptoCoupled	False (fixed)	Bit4	-	12-pin
25: Line6 Opt In2	Input	OptoCoupled	False (fixed)	Bit5	-	12-pin
26: Line7 CC1*	Input	TTL	False (fixed)	Bit6	-	CXP
26: Line7 CXP In*	Input	TTL	False (fixed)	Bit6	-	CL
27: Line8 TTL Out2	Output	TTL	True/False	Bit7	user-configured	6-pin
29: Line10 TTL In2	Input	TTL	False (fixed)	Bit9	-	6-pin
53: Nand0 In1	Input	Internal Signal	True/False	-	user-configured	-
54: Nand0 In2	Input	Internal Signal	True/False	-	user-configured	-
55: Nand1 In1	Input	Internal Signal	True/False	-	user-configured	-
56: Nand1 In2	Input	Internal Signal	True/False	-	user-configured	-
255: TimestampReset**	Internal Connection	Internal Signal	False (fixed)	-	user-configured	

***Line7**: AP-5100T-MCL / AP-5100T-CXPA Only
****TimeStampReset**: AP-5100T-CXPA / AP-5100T-5GE Only

For digital output, set the output source signal using LineSource. Set the source signal in the same way for NAND Logic (Nand0In1, Nand0In2, Nand1In1, NandIn2) and TimestampReset.

LineSource Items

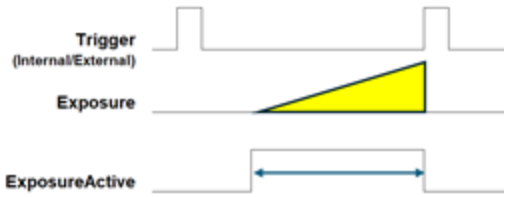
This section describes each item that can be selected in **LineSource**.

LineSource	Description
Off	This item is available only when LineSelector is set to **TimeStampReset**. To enable TimeStampReset, set to the option other than Off.
AcquisitionActive	From AcquisitionStart to AcquisitionStop. See "Acquisition Control" for reference.
FrameActive	A frame is being captured, active from the start of the frame's exposure until the end of FVAL.
ExposureActive	Camera is doing the exposure. See "ExposureActive Signal" for reference.
FVAL	The valid data period of one frame, active from the start of the frame's exposure until the end of FVAL.
AcquisitionTriggerWait	The state in which the camera has received AcquisitionStart but is waiting before actual acquisition begins.
FrameTriggerWait	The period during frame acquisition when the camera is waiting for a FrameTrigger.
PulseGenerator0 ~ 3	PulseGenerator output. For more information, see the following technical note: https://www.jai.com/uploads/documents/Technical-notes/English/TNE-0005-2015XII11-000-TechNote-PulseGenerator-tips.pdf
UserOutput0 ~ 3	Allows you to toggle UserOutput's On / Off on the software. Select the **User Output 0 ~ 3** you want to use from **UserOutputSelector**, and then set the **UserOutputValue** (**High** or **Low**).
Line4 TTL In1	TTL In1
Line5 Opt In1	Opt In1
Line6 Opt In2	Opt In2
Line 7 CC1	CC1 (AP-5100T-MCL Only)
Line7 Cxp In	CXP In (AP-5100T-CXPA Only)
Line10 TTL In2	TTL In2
Nand0 Out	Logic NAND output signal 0
Nand1 Out	Logic NAND output signal 1
Low	The Low signal. (Not available when LineMode = InternalConnection)
High	The High signal. (Not available when LineMode = InternalConnection)

ExposureActive Signal

Perform external output for the timing at which video is accumulated to the sensor. The signal is output to the DC IN / TRIG IN connector (12-pin round) or AUX connector (6-pin round).

> **Note:** ExposureActive includes the exposure offset time.



Pulse Generator

Related Setting Items: PulseGenerator

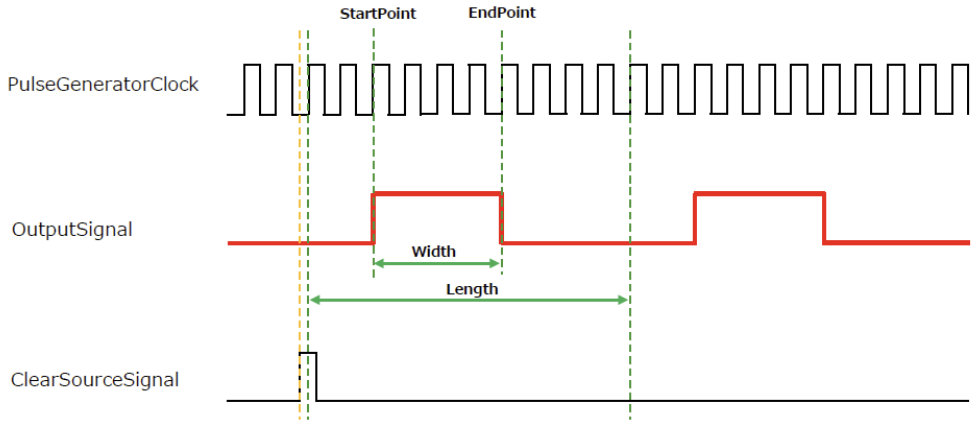
Technical Notes Tips for using the Pulse Generator

By using this function, any signal can be generated inside the camera.

The following is an example of signal generation.

Settings

PulseGeneratorStartPoint = 2
PulseGeneratorEndPoint = 6
PulseGeneratorLength = 10
PulseGeneratorPulseWidth = 4
PulseGeneratorClearSyncMode = AsyncMode



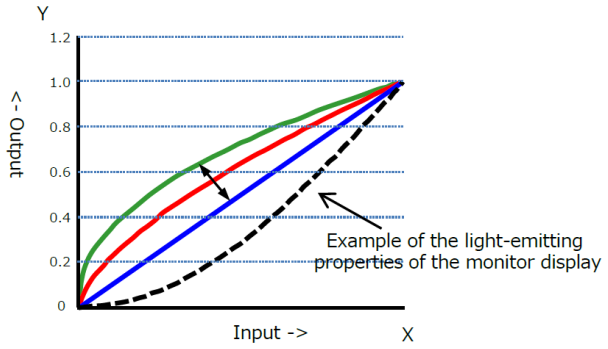
Note: See "PulseGeneratorClearSource (PulseGenerator)" for the available PulseGeneratorSource signals.

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.



How to Configure

1. Select the correction value from **Gamma**. The selectable values are as follows: 0.45, 0.5, 0.55, 0.6, 0.65, 0.75, 0.8, 0.9, 1.0
2. Select **Gamma** from **LUTMode**.

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

LUT (Lookup Table)

Related Setting Items: LUTControl

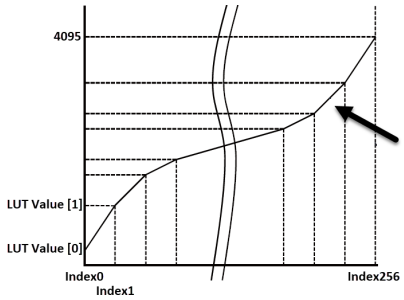
The LUT function is used to generate a non-linear mapping between signal values captured on the sensor and those that are output from the camera. You can specify the output curve using 257 setting points (indexes).

To Use the LUT function

1. Select **LUT** from **LUTMode** (AnalogControl).
2. Select the LUT channel you want to control from LUTSelector (LUTControl). (Red, Green, or Blue)
3. Select the LUT Index from **LUTIndex** (0 ~ 256). Indexes represent the possible pixel values captured on the sensor, from the lowest value (Index 0) to the highest (Index 256). For example, Index 0 represents a full black pixel and Index 256 represents a full white pixel.
4. Set the LUT output value for the selected index in **LUTValue** (0 ~ 4095).

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.



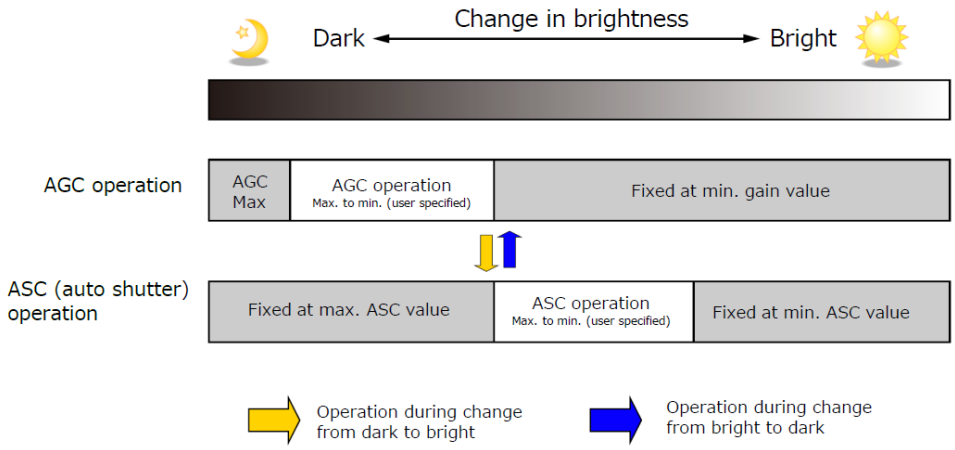
Interpolation using the average values of data to the left and right is used to determine values between points.

ALC (Automatic Level Control) Function

Related Setting Items: AutoLevelControl

The ALC (automatic level control) function combines the automatic gain control (AGC/Auto Gain Control) and automatic exposure control (ASC/Auto Shutter Control) functions and is capable of handling various changes in brightness. The function operates as follows in response to changes in brightness.

- Change from bright to dark: ASC → AGC
- Change from dark to bright: AGC → ASC



To Use the ALC Function

1. Set either **GainAuto** (AnalogControl), **ExposureAuto** (AcquisitionControl), or both to **Continuous** mode.
2. Use **ALCControlReference** to specify the channel used as the reference for ALC control.
   a. **PeakChannel**: Uses the channel with the highest average image level among the RGB channels as the reference.
   b. **SelectedChannel**: Specify which RGB channel signal is used for ALC control. When this option is selected, choose either **Red**, **Green**, or **Blue** with **ALCControlChannel**.
3. Set the target image level for AGC and ASC with **ALCReference**. For example, if **ALCReference** is set to **95%**, AGC and ASC operate to maintain an image level of 95%.
4. If necessary, you can specify the metering area. Select the metering area with **ALCAreaSelector** and set **ALCAreaEnable** to **True**.
5. Set the minimum and maximum values for AGC and ASC. (**AutoShutterControlExposureMin/Max**, **AutoGainControlGainRawMin/Max**)

6. Specify the convergence speed of ALC with **ALCControlRatio** (1 to 8).

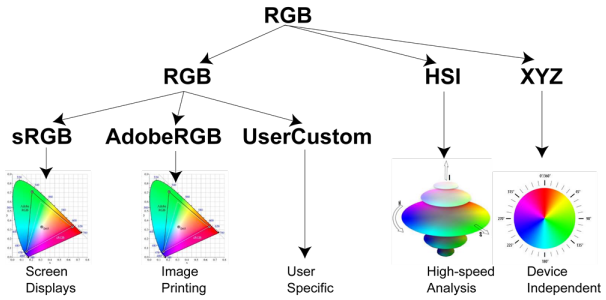
> **Note:** If **ALCControlRatio** is set to a large value, ALC operation may cause hunting depending on the AcquisitionFrameRate setting. In such cases, reduce the AcquisitionFrameRate value or decrease the ALCControlRatio value.

7. Use AutoControlStatus to check the operating status of ALC.

Color Space Conversion (ColorTransformationControl)

> **Related Setting Items:** ColorTransformationControl

This camera allows you to convert the standard color space (RGB) that is used to produce colors into other color spaces.



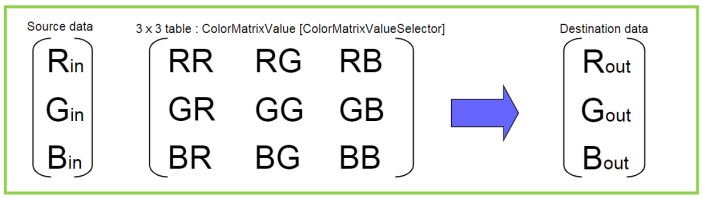
> **Note:** This function is only supported on the color model.

How to Configure

1. Select the color space (RGB, HSI, XYZ) you want to use from **ColorTransformationMode** (ColorTransformationControl).
2. When **RGB** is selected, select the details (sRGB, AdobeRGB, UserCustom) from **ColorTransformationRGBMode**.

   > **Note:** If you select other than RGB, **ColorTransformationRGBMode** is fixed to **Off**.

3. When **UserCustom** is selected,
   i. Select the item you want to configure in **ColorMatrixValueSelector**.
   ii. Configure the value (-2 to +2) in **ColorMatrixValue**.



> **Caution:** If you set the color space to XYZ or HSI, Control Tool will not display the images captured by the camera properly. To display them properly, XYZ- or HSI-compatible image processing must be performed on the computer side.

About Color Space HSI

- Hue Value : 0° to 360° can be specified for 8bit, 10bit and 12bit output as follows.

Output	Description
8bit	Can be specified in 2° increments - 0°(00000000) ~ 360°(10110100)
10bit	Can be specified in 0.5°increments- 0°(0000000000) ~ 360°(1011010000)
12bit	Can be specified in 0.5°increments- 0°(000000000000) ~ 360°(101101000000)

- Saturation value, Intensity value: 0 ~ 100% can be specified for 8bit, 10bit and 12bit output as follows.

Output	Description
8bit	0%(00000000) ~ 100%(11111111)
10bit	0%(00000000) ~ 100%(1111111111)
12bit	0%(00000000) ~ 100%(111111111111)

Chromatic Aberration Correction

> **Related Setting Items:** ImagingControl

Lateral Chromatic Aberration is a common lens imperfection where different wavelengths of light (colors) do not focus at the same point. This results in slightly different image magnifications for the red, green, and blue channels, causing visible color fringing, especially toward the image edges.

The camera includes a lateral chromatic aberration correction function that digitally compensates for this effect by rescaling the color channels to align them more precisely. The correction is defined by:

- **Profile Preset (Preset1, Preset2, Preset3)**: Determines how the correction scales from the image center toward the edges.
- **Coefficient (-128 to +127)**: Sets the strength and direction of the correction.
- **Center Offset**: Adjusts the correction center in cases where the lens is not perfectly aligned with the sensor.

By tuning these settings, users can minimize color fringing and restore uniform sharpness across the image.

VideoProcessBypassMode

Related Setting Items: ImagingControl

The video process bypass mode is a function that bypasses internal video processing on the camera. To use this function, **VideoProcessBypassMode** must be set to **On**.

Note: When Pixel Format is set to 12-bit, VideoProcessBypassMode is automatically forced to On.

	VideoProcessBypassMode = ON	OFF
Operation	When On, the following functions are disabled regardless of their settings: • BinningHorizontal • Gain[DigitalRed][DigitalBlue], BlackLevel[All][Red][Blue], LUTMode • ShadingMode • SequencerBinnigHorizontal, SequencerBlackLevelAll, SequencerLutEnable	All image processing are enabled.
Output	RGB12 (CXPA and MCL models)、RGB12V1Packed (5GE model)	Any

Functions Available in VideoProcessBypassMode

- Gain[AnalogAll], Gain[AnalogRed], Gain[AnalogGreen], Gain[AnalogBlue]
- AutoShutterControl (ASC)
- AutoWhiteBalance
- SequencerMode
- BlemishCompensation

Color Enhancer

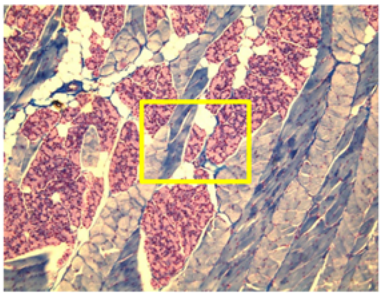
Related Setting Items: ImagingControl

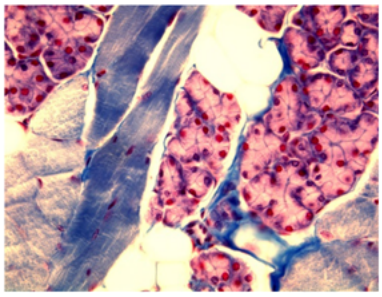
This camera is equipped with a Color Enhancer function for enhancing specified colors.

Color Enhancer Function

The Color Enhancer function is enabled when ColorEnhancerEnable is set to On. Set a value from 0 to 1.0 (0.1 steps) for ColorEnhancerValue to configure the enhancement level: 0 = no enhancement, 1.0 = approx. x2 the color level of the original data.

Six colors can be specified in ColorEnhancerSelector: Red, Cyan, Green, Magenta, Blue, and Yellow.





Shading Correction

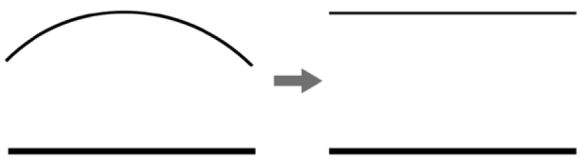
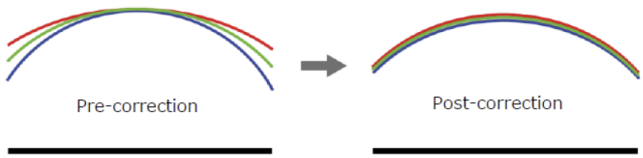
Related Setting Items: ShadingControl

The ShadingCorrection function corrects non-uniformity (i.e., shading) in the amount of light generated by the lens and lighting equipment. Using this function allows correction even if top, bottom, left, and right shading is not symmetrical in relation to the center of the screen (H, V).

This function can be used even when the effective image area is limited (an area with both Width and Height set to more than 512 must be configured) by the Single ROI Function. In such cases, the correction area is included in the image area configured by the ROI.

Note: Block size is 128 × 128 pixels.

The following shading correction modes are available on the camera.

FlatShading	ColorShading
	
Correction is performed using the area of the screen with the highest brightness level as the reference and adjusting the brightness levels of the other areas to match this level.	R-channel and B-channel properties are adjusted to using the G-channel shading properties as a reference.

Cautions:

- For FlatShading and ColorShading, the maximum amount of correction gain for all pixels is limited to 8 times the amount of gain before correction. (The amount of gain cannot be increased to more than 8 times the amount of gain from before correction.)
- If the area in the screen with the highest brightness level is 175 LSB or less (during 10-bit video output), proper correction is not possible.

To Use the Shading Correction Function

Configure the settings as follows.

1. To specify the area used for calculating shading correction values, set the **Width** / **OffsetX** and **Height** / **OffsetY** values of the target area. For details on how to configure this, refer to Single ROI Function.
2. Select the shading correction mode with **ShadingCorrectionMode** (**Flat Shading** (Default) or **Color Shading**).
3. Select the user area (**User1 ~ User3**) in **ShadingMode** where the shading correction values will be stored.
4. Display a white chart under a uniform light and execute **CalibrateShadingCorrection**.
5. After shading correction is completed, the correction values are automatically saved to the user area selected in ShadingMode.
6. When calibration is successful, “Succeeded” is displayed in **ShadingDetectResult**.

> **Note**: The **PerformShadingCalibration** command cannot be executed under the following conditions. (An error also occurs when ShadingMode is set to Off).
>
> - When outputting no image.
> - When outputting TestPattern.
> - Width and/or Height are less than 512 (Single ROI Function)
> - In FD2x2Binning mode (Binning Function)
> - In ImageScaling mode (Image Scaling Mode (Xscale))
> - When BalanceWhiteAuto = Continuous
> - When GainAuto = Continuous
> - In Sequencer mode (Sequencer Function)
> - In MultiRoi mode (Multi ROI Function)
> - In Reverse mode (Image Flip Function)
> - In ALC mode (ALC (Automatic Level Control) Function)

BlemishCompensation

Related Setting Items: BlemishControl

Multiple defective pixels that are not adjacent to each other can occur on CMOS sensor cameras. This camera features a function that interpolates defective pixels using the surrounding pixels. Up to 300 pixels can be corrected. Pixel interpolation can be performed via automatic detection or point-by-point manual settings.

Automatic Detection

Automatic detection can only detect lit defective pixels (i.e., white blemishes).

1. Shield the camera sensor. If a lens is attached, use the lens cap as a shield, for example.
2. Configure the threshold level for defective pixel detection.
    - Up to 300 pixels can be corrected.
    - The threshold value is specified as a percentage.
    - The default setting is "10" with 10% of the full scale (100%) specified as the threshold value.
3. Execute **BlemishDetect** to start automatic detection. After detection, the interpolation data is saved to the camera's internal memory.

To check the number of interpolated pixels after automatic detection

You can check the number of pixels interpolated via automatic detection by loading the BlemishNum data.

Notes:
Automatic detection will not be executed when:

- No image is being output.
- When AcquisitionMode is set to Single or MultiFrame.
- TestPattern is being output
- In Sequencer Mode (Sequencer Function)
- In MultiRoi mode (Multi ROI Function)
- The image is not full ROI size (Single ROI Function)
- Not in lens cap state

Manual Configuration

1. Select the **index** in BlemishCompensationIndex. You can select from 1 to 300. However, configure the indexes in order starting with the smallest index. If you skip indexes while configuring settings, interpolation may not be performed.
2. Specify the pixel points for interpolation using the **BlemishCompensationPositionX** and **BlemishCompensationPositionY** settings.

   > **Notes:**
   > - You can configure values that are within the total effective pixel area. Specify pixels for which interpolation is not necessary as -1. If 0 is specified, the first line or first pixel will be interpolated.
   > - To delete the configured pixel points, execute **BlemishCompensationDataClear** with the corresponding index selected.

3. Execute **BlemishStore**. Blemish compensation data will be stored.
4. Set BlemishEnable to **Enable** and execute interpolation. If it is set to **Disable all**, all interpolation for defective pixels will be disabled (including the factory-set interpolation data).

Sequencer Function

Related Setting Items: SequencerControl

The Sequencer function lets you define up to 32 index combinations of exposure time, gain, ROI, and other settings which can be stepped through each time a trigger is received. This is particularly useful for quickly capturing multiple exposures of objects under inspection to adjust for areas or components with significantly different levels of reflectance. You can specify the next index in the stepping sequence and the order in which indexes are executed. Multiple indexes can also be executed repeatedly.

Two operation modes (TriggerSequencer mode and CommandSequencer mode) are available for the Sequencer function.

Notes:

- Refer to Functions That Cannot Be Used Together for usage restrictions.
- Up to 32 indexes can be configured. For details on the items that can be set for each index, see SequencerControl.

Cautions:

- If the values of ImageFormatControl's Width and Height are smaller than SequencerControl's SequencerWidth and SequencerHeight, the image may not be output correctly.
- When using SequencerWidth / SequencerHeght, set the Width and Height to the default values in advance.

TriggerSequencer Mode

With this mode, the Sequencer Trigger “pattern” is predetermined by the user. The user defines up to 32 different “indexes.” Different camera settings can be configured for each index. The operation of this mode is controlled using the following five commands.

Caution: In TriggerSequencer mode, the TriggerOverlap function of the FrameStart trigger is disabled and the operation is always Off.

SequencerSetActive: This allows you to confirm the index number displayed on the next trigger reception.

SequencerSetStart: This configures the index number to execute at the start of TriggerSequencer mode.

SequencerFrameCount: This configures the number of frame acquisitions for the selected SequencerIndex.

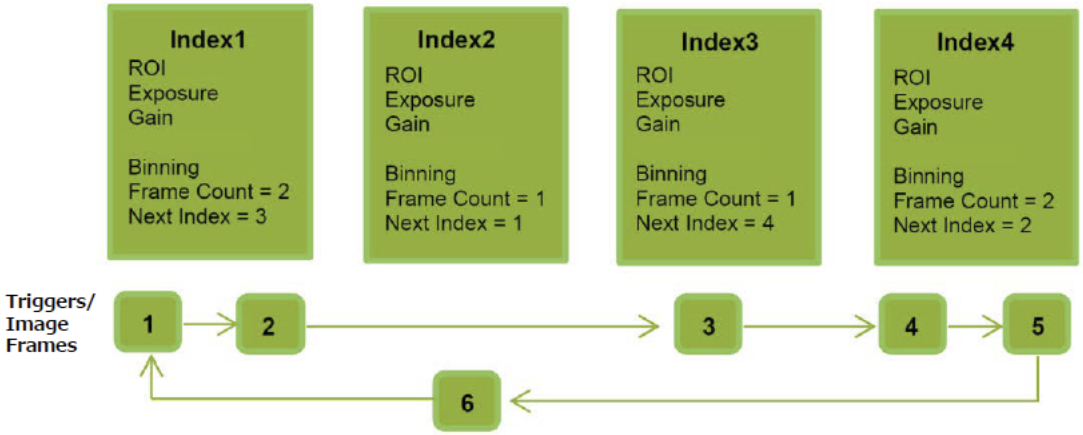
SequencerReset: During TriggerSequencer mode operation, this switches the index number to be executed to that specified in SequencerSetStart.

SequencerRepetition: This parameter applies to TriggerSequencer patterns which include an index whose SequencerROINextIndex is set to 0 (OFF).

When the index whose SequencerROINextIndex is set to 0 (OFF) is finished executing, the value of Sequencer Repetition (range = 1 ~ 255) is decremented internally. If the result of the decrement is not zero, the TriggerSequencer pattern starts over from the index specified in SequencerSetStart. If the result of the decrement is zero, the status changes to Acquisition Stop and external triggers are not accepted.

Sample TriggerSequencer Mode Operation

User-Defined Indexes (Up to 32)



1. Specify "1" in SequencerSetStart and start TriggerSequencer mode with index 1.
2. Based on the SequencerFrameCount setting (= 2), capture a 2-frame image with the first and second triggers.
3. For the next index, configure index 3 specified in SequencerSetNext, and capture an image with the number of frames (the number of triggers) specified in SequencerFrameCount (=1).
4. Proceed to sequence from index 4 to index 2 to index 1.

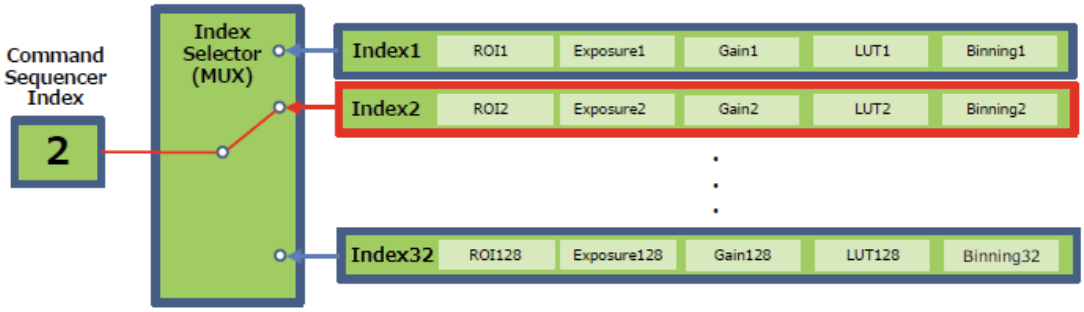
> **Note:** In addition to repeating multiple conditions as in the above example, you can specify "0" (which indicates the end of TriggerSequencer mode) in SequencerSetNext of index 2 and specify the number of repetitions in SequencerRepetition.

CommandSequencer Mode

As with TriggerSequencer mode, you can define up to 32 indexes beforehand in this mode. Set SequencerCommandIndex to point to one of your preconfigured indexes. This index will be executed on each trigger, until it is changed to point to a different index, typically by your vision application.

In this way, Command Sequencer mode allows you to programmatically adjust your sequence in response to image analysis or input from other sensors.

> **Notes:**
> - The same index table will be executed for subsequent triggers unless the CommandSequencerIndex value is changed.
> - SequencerFrameCount, SequencerSetNext and SequencerRepetition cannot be used in CommandSequencer mode.



Counter and Timer Control Function

Related Setting Items: CounterAndTimerControl

Note: This camera supports only the counter function.

The counter function counts up change points in the camera's internal signals using the camera's internal counter and reads that information from the host side. This function is useful for verifying error conditions via the count value using internal camera operations.

When a problem occurs in a system that includes this camera, comparing the values from multiple counters allows you to verify the extent of normal operability and can be useful when investigating the cause of the problem.

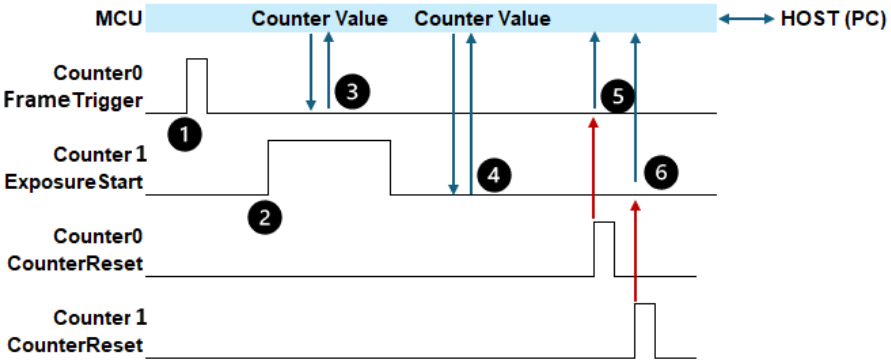
The following counters are available on this camera, and the functions that can be counted are fixed for each counter.

Counter Selector	Counter Event Source (Fixed)	Counter Event Activation
Counter0	Counts the number of FrameTrigger.	Rising Edge (Fixed)
Counter1	Counts the number of ExposureStart.	Rising Edge (Fixed)
Counter2	Counts the number of SensorReadOut.	Rising Edge (Fixed)
Counter3*	Counts the number of FrameTransferEnd.	Falling Edge (Fixed)
*Counter3: Not supported on AP-5100T-MCL.		

How to ConfigureHow to Configure

1. Select the counter you want to use from **CounterSelector**.
2. Enable the counter by selecting the event source in **ConterEventSource** (Defaut = Off).
3. **CounterEventActivation** displays the timing for counting for the selected counter.
4. You can reset and refresh the selected counter's counter value by executing **CounterReset** and **CounterRefresh**, respectively. The selected counter's value and status are displayed in **CounterValue** and **CounterStatus**, respectively.

Counter Occurrence Diagram (Example)



1. A Frame Trigger Event occurs. Counter0 counts up.
2. An Exposure Start Event occurs. Counter 1 counts up.
3. The camera's internal MCU requests and reads the Counter0's counter value.
4. The camera's internal MCU requests and reads the Counter1's counter value.
5. Reset the Counter0's counter value to 0 by a CounterReset command or a CounterResetSource signal.
6. Reset the Counter1's counter value to 0 by a CounterReset command or a CounterResetSource signal.

Action Control Function

Related Setting Items: ActionControl

Technical Notes How to use GigE Vision Action Commands

Note: This function is supported only on the AP-5100T-5GE model.

The Action Control Function is a function that executes the pre-configured action when the camera receives action commands. Action commands can send both unicast and broadcast messages and give instructions for actions to multiple cameras simultaneously by broadcasting them. A camera that has this function can even give instructions for actions to different types of multiple cameras. Although this function includes jitter and delays, it is useful for controlling multiple cameras simultaneously.

Note: When the PTP (Precision Time Protocol) function is turned on, **Scheduled Action Command** (Action Control function) becomes available, which allows you to send Action Commands to multiple cameras synchronized with PTP at the same time. For more information, see the How to use GigEVision Action Commands technical note.

Actions are performed when the following three conditions are met.

1. ActionDeviceKey set to the camera and ActionDeviceKey in the action command match.
2. ActionGroupKey set to the camera and ActionGroupKey in the action command match.
3. ActionGroupMask set to the camera and GroupMask in the action command perform AND operation, and the result is not 0.

How to Configure

1. Specify ActionDeviceKey.
2. Then, specify two actions that can be configured on the camera.

Action 1	1. Select **1** in **ActionSelector**. 2. Specify **ActionGroupMask [ActionSelector]**. 3. Specify **ActionGroupKey [ActionSelector]**.
Action 2	1. Select **2** in **ActionSelector**. 2. Specify **ActionGroupMask [ActionSelector]**. 3. Specify **ActionGroupKey [ActionSelector]**.

3. Set triggers (AcquisitionStart, AcquisitionEnd, FrameStart, AcquisitionTransferStart) to Action1 and Action2.

PTP (Precision Time Protocol)

Related Setting Items: TransportLayerControl (AP-5100T-5GE)

Note: This function is supported only on the AP-5100T-5GE model.

The camera can work as the slave for Precision Time Protocol defined in IEEE 1588. When the IEEE 1588 master clock exists in the network where the camera is connected, this function synchronizes the camera to the time of the master clock.

- Transport to be used: Multicast UDP datagram (224.0.1.129); however, Delay Resp is a unicast UDP datagram.
- Destination port number:
  - 319 : Sync, Delay Req, Pdelay Req, Pdelay Resp
  - 320 : Announce, Follow Up, Delay Resp, Pdelay Resp, Management, Signaling
- Items for synchronization: Time synchronization is performed. Frequency tuning is not performed.
- PTP time data: 80 bit (elapsed time in 1 ns, with 00:00:00, January 1 1970 set as the origin)
- Timestamp (this camera): 64 bit* (PTP synchronization: LSB64bit* of PTP time data)
- Supported PTP messages: Announce message (receive only), Sync message (receive only), Follow Up message (receive only), Delay Req message (send only), Delay Resp message (receive only)

Cautions:

- The Timestamp Tick Frequency register value is fixed at 1,000,000,000 (1 GHz).
- When PTP synchronization is being performed, the Timestamp Reset function is disabled.
- Because GenICam treats the timestamp (64 bit) as a 64 bit signed integer, 63 bit is actually timestamp data without the sign bit.

How To Configure

1. Set **GevIEEE1588** (TransportLayerControl (AP-5100T-5GE)) to **True**.
2. After several statuses from Disable, when a Sync Message is received from the PTP server, **Slave** is Displayed in **GevIEEE1588 Status**.

Note: When the PTP function is **On**, you can use Scheduled Action Command (ActionControl), which allows you to send action commands to multiple cameras synchronized with PTP at the same time.

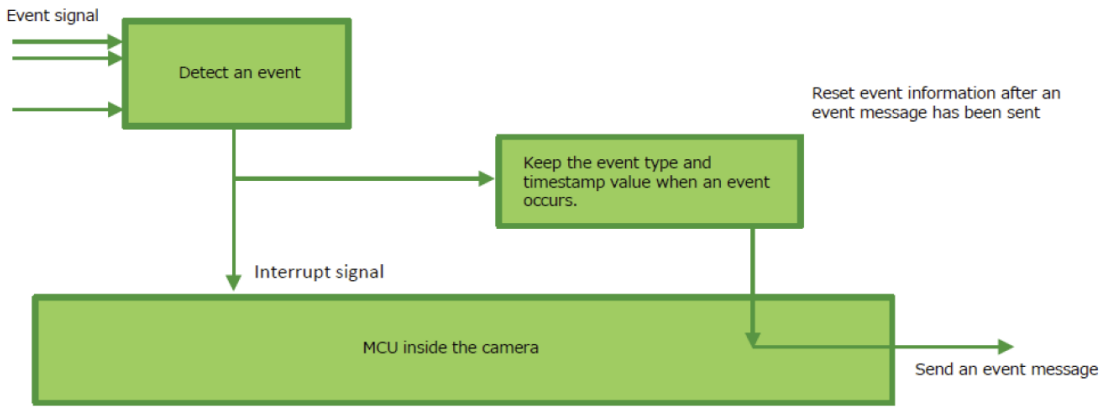
Event Control Function

Related Setting Items: EventControl

Note: This function is not supported on the AP-5100T-MCL model.

The Event Control function is a function that outputs a signal change point inside the camera as information indicative of an event occurrence (event message).

Flow from Detecting an Event to Sending an Event Message



How to Configure

1. Select the even you want to configure from **EventSelector**.
2. Set **EventNotification** to **On**.
3. When an enabled Event occurs, the following Event data will be sent: **EvenID**, **EventTimeStamp**, **EventFrameID**.

   Note: EventFrameID is supported only on the AP-5100T-CXPA model.

   For example, when **AcquisitionStart** is selected from **EventSelector** and **EventNotification** is set to **On**, the following message will be sent when an Acquisition Start trigger occurs.

EventAcquisitionStartData	Display the following data when the enabled Event occurs.
EventAcquisitionStart	Display the EventID 0x9011.
EventAcquisitionStartTimestamp	Display the time stamp value when the enabled Event occurs.
EventAcquisitionStartFrameID	Display the FrameID value when the enabled Event occurs.

Chunk Data Function

Related Setting Items: ChunkDataControl

The Chunk Data function adds camera configuration information to the image data that is output from the camera. In addition, when images are acquired with a single camera in sequence under multiple setting conditions, you can search for images by their setting conditions.

Note: This function is supported only on the AP-5100T-5GE model.

Configuring Chunk Data

1. Set **ChunkModeActive** to **True**. (Default = False)
2. Selects which Chunk to enable or control in **ChunkSelector**.
3. Set **ChunkEnable** to **True**. (Default = False)

Caution: The Chunk Data function settings cannot be changed during image output. To change the settings, stop Acquisition.

Functions That Cannot Be Used Together

The table below shows functions that cannot be used with ImageFormatControl, MultiROIControl and SequencerControl setting items.

> **Note:** For functions that are not in this table, refer to the relevant function topic or setting item topic.

	Single ROI	ROICentered	FD2x2Binning	BinningHorizontal = 2	BinningVertical = 2	ImageScalingMode	ReverseX/Y/XY	Overlay Mode: ALCAreaMode / AWBAreaMode	Overlay Mode: MultiROIAreaMode	MultiRoiMode	SequencerMode
Single ROI (Weight, Height, OffsetX, OffsetY)		1				2					
ROICentered	1		⊖	⊖		⊖				⊖	⊖
FD2x2Binning		⊖		⊖	⊖	⊖			⊖	⊖	⊖
BinningHorizontal = 2		⊖	⊖			⊖			⊖	⊖	
BinningVertical = 2			⊖			⊖			⊖	⊖	
ImageScalingMode	2	⊖	⊖	⊖	⊖				⊖	⊖	⊖
ReverseX/Y/XY											⊖
OverlayMode: ALCAreaMode / AWBAreaMode											⊖
OverlayMode: MultiRoiAreaMode			⊖	⊖	⊖	⊖				3	⊖
MultiRoiMode		⊖	⊖	⊖	⊖	⊖			3		⊖
SequencerMode		⊖	⊖			⊖	⊖	⊖	⊖	⊖	

Empty	Can be used together
⊖	Cannot be used together
1	When ROICentered is set to **On**, OffsetX will be disabled.
2	When using Image Scaling Mode (Xscale) together with the Single ROI Function, first, set the Width, Height, OffsetX, and OffsetY settings, and then configure the Image Scaling Mode settings.
3	To set Overlay Mode to **MultRoiAreaMode**, MultiRoiMode (MultiROIControl) must be set to **Off** in advance.

Setting List (Feature Properties)

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:** Depending on the setting item, you may need to change visibility. Please switch visibility (Beginner / Expert / Guru) as necessary.

Selector

A Selector is used to index which instance of the feature is accessed in situations where multiple instances of a feature exist.

Instance Example:

Each Line-related item (LineSource, LineInverter, etc.) has LineSelector-LineX instances, which can be set or referenced as an index.

Selectors are a feature of element enumeration type (IEnumeration) or an integer type (IInteger). However, unlike normal configuration items, it is only used to select the instance in the following configuration item.

It does not change the behavior of the camera by changing the value of the selector. Also, the selector may have only one selectable value. In this case, use the selector function only for information purposes. In this document, it is described as SelectedFeature[Selector] according to the description method of GenICam.

In the case of Line Selector with a specific I/O line selected, the description could be as follows.

LineSource[LineSelector-LineX] = High

LineInverter[LineSelector-LineX] = False

LineMode[LineSelector-LineX] = Input

LineFormat[LineSelector-LineX] = TTL

Generally, selectors only apply to a single category of features. (Example: TriggerSelector only applies to trigger related functions.)

DeviceControl

Display/configure information related to the device.

Device Control Item	Setting Range	Default	Description
DeviceType (IEnum)	0: Transmitter 1: Receiver 2: Transceiver 3: Peripheral		Display the device's scan type value.
DeviceScanType (IEnum)	0:Areascan		Display the device's scan type.
DeviceVendorName (IString)	"JAI Corporation"		Display the manufacturer name.
DeviceModelName (IString)	"AP-5100T-CXPA" "AP-5100T-5GE" "AP-5100T-MCL"		Display the model name.
DeviceManufacturerInfo (IString)	"See the possibilities"		Display manufacturer information.
DeviceVersion (IString)	-	-	Display the software version.
DeviceFirmwareVersion (IString)	-	-	Display the firmware version.
DeviceFpgaVersion (IString)			Display the FPGA version.
DeviceSerialNumber (IString)	-	-	Display the device serial number.
DeviceUserID (IString)	Any	-	Set the user ID for the camera.
DeviceSFNCVersionMajor (Integer)	-	2	Display the SFNC Major version.
DeviceSFNCVersionMinor (Integer)	-	5	Display the SFNC Minor version.
DeviceSFNCVersionSubMinor (Integer)	-	0	Display the SFNC Sub Minor version.
DeviceManifestEntrySelector (Integer)	1	1	Selects the manifest entry to reference. (Fixed to XML1)
DeviceManifestXML MajorVersion (Integer)	0 ~ 9	-	Indicates the major version number of the XML file of the selected manifest entry.
DeviceManifestXML MinorVersion (Integer)	0 ~ 9	-	Indicates the minor version number of the XML file of the selected manifest entry.
DeviceManifestXML SubMinorVersion	0 ~ 9	-	Indicates the sub minor version number of the XML file of the selected manifest entry.
DeviceManifestSchema MajorVersion (Integer)	-	1	Indicates the major version number of the schema file of the selected manifest entry.

Device Control Item	Setting Range	Default	Description
DeviceManifestSchema MinorVersion (Integer)	-	1	Indicates the minor version number of the schema file of the selected manifest entry.
DeviceManifestPrimaryURL (IString)	-	-	Display the PrimaryURL. **Note:** AP-5100T-CXPA, AP-5100T-5GE Only
DeviceManifestSecondaryURL (IString)	-	-	Display the SecondaryURL. **Note:** AP-5100T-5GE Only
DeviceTLType (IEnum)	0: GigEVision 1: CameraLink 3: CoaXPress		Display the Transport Layer type of the device.
DeviceTLVersionMajor (IInteger)	2 (Fixed)	-	Display the major version number of the Transport Layer type.
DeviceTLVersionMinor (IInteger)	0 (Fixed)	-	Display the minor version number of the Transport Layer type.
DeviceTLVersionSubMinor (IInteger)	-	-	Display the sub minor version number of the Transport Layer type. **Note:** AP-5100T-CXPA, AP-5100T-5GE Only
DeviceMaxThroughput (IInteger) **Note:** CXPA model Only	390625000 ~	-	Maximum bandwidth of the data that can be streamed out of the device. The maximum value depends on the CxpLinkConfiguration setting. | | Max (Bytes/sec) | | CXP-12 | 1562500000 (Default) | | CXP6-1 | 781250000 | | CXP3-1 | 390625000 |
DeviceLinkSelector (IInteger)	0 ~		Select which Link of the device to control. **Note:** AP-5100T-5GE Only
DeviceLinkSpeed (Bps) (IInteger)		125000000	Display the negotiated transmission rate. **Note:** AP-5100T-5GE Only

Device Control Item	Setting Range	Default	Description
DeviceLinkThroughputLimitMode (IEnum) **Note:** CXPA model Only	0: Off 1: On	0: Off	**Off**: No CXP bandwidth limit. Stream packets are transmitted without gaps. **On**: CXP bandwidth is limited. Stream packets are transmitted with packet gaps calculated based on the CXP bandwidth value specified by DeviceLinkThroughputLimit.
DeviceLinkThroughputLimit (IInteger) **Note:** CXPA model Only	195312500 ~ 781250000	-	Enabled when DeviceLinkThroughputLimitMode = On. Limits the maximum bandwidth of the data that will be streamed out by the device.
DeviceLinkHeartbeatMode (IEnum) **Note:** 5GE model Only	0: Off 1: On	1: On	Display whether Heartbeat mode is enabled/disabled.
DeviceLinkHeartbeatTimeout (us) (IFloat) **Note:** 5GE model Only	500000 ~ 120000000, step: 1000	3000000	Configure the timeout value for Heartbeat (unit: μs).
DeviceStreamChannelCount (IInteger)	-	-	Display the number of supported stream channels. **Note:** AP-5100T-CXPA, AP-5100T-5GE Only
DeviceStreamChannelPacketSize (IInteger)	0 ~ 8192 (step: 4)	-	Specifies the stream packet size, in bytes. **Note:** AP-5100T-CXPA Only
DeviceEventChannelCount (IInteger)	-	-	Display the number of supported message channels. **Note:** AP-5100T-5GE Only
DeviceReset (ICommand)	-	-	Reset the device.
DeviceTemperatureSelector (IEnum)	0: Main board (Default) 1: Sensor 2: FPGA		Select the area of the camera's interior for which to display the temperature sensor's reading.
DeviceTemperature (IFloat)	-55 ~ 125	0	Display the internal temperature (˚C) of the camera.

Device Control Item	Setting Range	Default	Description
DeviceSerialPortSelector (IEnum)	0: CameraLink (Fixed)		Selects which serial port of the device to control. **Note:** AP-5100T-MCL Only
DeviceSerialPortBaudRate (IEnum)	0: 9600bps 1: 19200bps 2: 38400bps 3: 57600bps 4: 115200bps 5: 230400bps 6: 460800bps 7: 921600bps		Display the baudrate of the serial port. **Note:** AP-5100T-MCL Only
Timestamp (ns) (IInteger)	0 ~ 64bit max	0	Display the timestamp value (ns). Resets to 0 when the signed maximum 64-bit value is exceeded. **Note:** AP-5100T-CXPA, AP-5100T-5GE Only
TimestampReset (ICommand)	-	-	Forcibly sets the timestamp's count value to 0. **Note:** AP-5100T-CXPA, AP-5100T-5GE Only
TimestampLatch (IInteger)	-	-	Sets the timestamp's count value to TimestampLatchValue. **Note:** AP-5100T-CXPA, AP-5100T-5GE Only
TimestampLatchValue (ns) (IInteger)	0 ~ 64bit max	0	Returns the latched value of the timestamp counter. **Note:** AP-5100T-CXPA, AP-5100T-5GE Only
UserDefinedValueSelector (IEnum)	0: Value1 1: Value2 2: Value3 3: Value4 4: Value5	0: Value1	32bit data x 5 can be set and saved. **Note:** AP-5100T-CXPA, AP-5100T-5GE Only
UserDefinedValue (IInteger)	-2147483648 ~ 2147483647	0	Read and set the value for the 32-bit data (Value 1 to Value5) selected in UserDefinedValueSelector. **Note:** AP-5100T-CXPA, AP-5100T-5GE Only

TransportLayerControl (AP-5100T-CXPA)

Configure Transport Layer settings of the AP-5100T-CXPA model.

<table>
<tr><th>Transport Layer Control Item</th><th>Setting Range</th><th>Default</th><th>Description</th></tr>
<tr><td>PayloadSize (IInteger)</td><td>32 ~ 268369920</td><td>44728320</td><td>Display the payload size information.</td></tr>
<tr><td>DeviceTapGeometry (IEnum)</td><td colspan="2">0: Geometry_1X_1Y (Fixed)</td><td>The method of transferring images from the device at one time (TAP configuration).</td></tr>
<tr><td>CoaXPress (ICategory)</td><td colspan="3"></td></tr>
<tr><td>CxpLinkConfigurationPreferred (IEnum)</td><td colspan="3">Displays the link structure that allows the camera to operate in default mode.
<table>
<tr><th>Configuration</th><th>Speed</th></tr>
<tr><td>CXP12_X1</td><td>CXP-12 (12.50 Gpbs)</td></tr>
<tr><td>CXP6_X1</td><td>CXP-6 (6.25 Gbps)</td></tr>
<tr><td>CXP3_X1</td><td>CXP-3 (3.125 Gpbs)</td></tr>
<tr><td colspan="2">* CXP12 can only be used when VersionUsed = 2.0 or later</td></tr>
</table></td></tr>
<tr><td>CxpLinkConfiguration (IEnum)</td><td>-</td><td>-</td><td>Set the CoaXPress Link Configuration.</td></tr>
<tr><td>JAICxpLinkConfigurationPreferred (IEnum)</td><td colspan="2">0x00010038: CXP3_X1
0x00010048: CXP6_X1
0x00010058: CXP12_X1</td><td>Custom command to change and save the CxpLinkConfigurationPreferred configuration value.</td></tr>
<tr><td>CxpConnectionSelector (IInteger)</td><td>-</td><td>-</td><td>Select the CoaXPress physical connection you want to control.</td></tr>
<tr><td>CxpConnectionTestMode (IEnum)</td><td>0: Off (Fixed)</td><td>-</td><td>Display the test mode. On this camera it is fixed to Off (=Normal Mode).</td></tr>
<tr><td>CxpConnectionTestErrorCount (IInteger)</td><td>-</td><td>-</td><td>Reports the current connection error count for the test packet.</td></tr>
<tr><td>CxpConnectionTestPacketCount (IInteger)</td><td>-</td><td>-</td><td>Reports the current count of test packets.</td></tr>
<tr><td>CxpVersionUsed (IEnum)</td><td>2: CXP1.1
3: CXP2.0</td><td>-</td><td>Display the current CXP version. When the frame grabber supports CXP2.0, "3: CXP2.0" is displayed.</td></tr>
</table>

TransportLayerControl (AP-5100T-5GE)

Configure Transport Layer settings of the AP-5100T-5GE model.

Transport Layer Control Item	Setting Range	Default	Description
PayloadSize (IInteger)	48 ~ 67109240	12288	Display the payload size information.
GigEVision (ICategory)			
GevPhysicalLinkConfiguration (IEnum)	-	SingleLink (Fixed)	Display the LinkConfiguration status.
GevSupportedOption Selector (IEnum)	Select the supported options for GigEVision. The selections are as follows: Link Configuration: SingleLink, MultiLink, StaticLAG, DynamicLAG nif Configuration: PAUSEFrameReception, PAUSEFrameGeneration, IPConfigurationLLA, IPConfigurationDHCP, IPConfigurationPersistentIP GVCP: MessageChannelSourceSocket, CommandsConcatenation, WriteMem, PacketResend, Event, EventData, PendingAck, IEEE1588, Action, UnconditionalAction, ScheduledAction, PrimaryApplicationSwitchover, ExtendedStatusCodes, ExtendedStatusCodesVersion2_0, DiscoveryAckDelay, DiscoveryAckDelayWritable, TestData,ManifestTable, CCPApplicationSocket, LinkSpeed, HeartbeatDisable, SerialNumber, UserDefinedName GVSP: StreamChannelSourceSocket, StandardIDMode, StreamChannelBigAndLittleEndian, StreamChannelIPReassembly, StreamChannelMultiZone, StreamChannelPacketResendDestination, StreamChannelAllInTransmission, StreamChannelUnconditionalStreaming, StreamChannelExtendedChunkData		
GevSupportedOption (IBoolean)	False True	-	Displays whether the function selected by GevSupportOptionSelector is supported or not.
GevInterfaceSelector (IInteger)	-	0 (Fixed)	Selects which logical link to control.
GevMacAddress (IInteger)	-	-	Display the MAC address.
GevPAUSEFrameReception (IBoolean)	False True	True	Controls whether incoming PAUSE Frames are handled on the given logical link.
GevPAUSEFrameTransmission (IBoolean)	False True	True	Controls whether PAUSE Frames can be generated on the given logical link.
GevCurrentIPConfiguration LLA (IBoolean)	-	-	Display whether the current IP configuration is calibrated by LLA (link-local address).

Transport Layer Control Item	Setting Range	Default	Description
GevCurrentIPConfiguration DHCP (IBoolean)	False True	True	Select whether to set the IP configuration to DHCP.
GevCurrentIPConfiguration PersistentIP (IBoolean)	False True	False	Select whether to set the IP configuration to Persistent IP.
GevCurrentIPAddress (IInteger)	-	-	Display the IP address.
GevCurrentSubnetMask (IInteger)	-	-	Display the subnet.
GevCurrentDefaultGateway (IInteger)	-	-	Display the default gateway.
GevIPConfigurationStatus (IEnum)	0: None 1: PersistantIP 2: DHCP (Default) 3: LLA 4: ForceIP		Display the current IP configuration status.
GevPersistentIPAddress (IInteger)	-	192.168.0.100	Set the persistent IP address.
GevCurrentSubnetMask (IInteger)	-	255.255.255.0	Set the persistent subnet mask.
GevPersistentDefaultGateway (IInteger)	-	0.0.0.0	Set the persistent default gateway.
GevIEEE1588 (IBoolean) **Related Topic:** PTP (Precision Time Protocol)	False True	False	True : Enables PTP False: Disables PTP
GevIEEE1588ClockAccuracy (IEnum)	0 ~ 20	Unknown	Indicates clock accuracy. 0:Within25ns, 1:Within100ns, 2:Within250ns, 3:Within1us, 4:Within2p5u, 5:Within10us, 6:Within25us, 7:Within100us, 8:Within250us, 9:Within1ms. 10:Within2p5ms, 11:Within10ms, 12:Within25ms, 13:Within100ms, 14:Within250ms, 15:Within1s, 16:Within10s, 17:GreaterThan10s, 18:AlternatePTPProfile, 19:Unknown, 20:Reserved
GevIEEE1588Status (IEnum)	-	Disabled	Display the IEEE 1588 Status. 1: Initializing, 2: Faulty, 3: Disabled, 4: Listening, 5: PreMaster, 6: Master, 7: Passive, 8: Uncalibrated, 9: Slave

Transport Layer Control Item	Setting Range	Default	Description
GevGVCPExtendedStatus CodesSelector (IEnum)	0:Version1_1 1:Version2_0	Version1_1	Select the GevGVCPExtendedStatusCodes.
GevGVCPExtended StatusCodes (IBoolean)	False True	False	Enables the generation of extended status codes.
GevGVCPPendingAck (IBoolean)	False True	False	Enables/disables the PENDING_ACK.
GevGVSPExtendedIDMode (IEnum)	0: Off 1: On	On	Enables/disables Extended ID Mode.
GevCCP (IEnum)	0: OpenAccess 1: ExclusiveAccess 2: ControlAccess	0: OpenAccess	Control access rights. **0: OpenAccess** - Access rights have not been obtained by the application. **1: ExclusiveAccess** - Once the application has made this setting, no other applications can control or reference the camera. **2: ControlAccess** - Access rights have been obtained by the application. Other applications cannot control the camera, but can refer to it.
GevPrimaryApplicationSocket (IInteger)	-	-	Returns the UDP source port of the primary application.
GevPrimaryApplicationIPAddress (IInteger)	-	-	Returns the address of the primary application.
GevMCPHostPort (IInteger)	-	-	Controls the port to which the device must send messages. Setting this value to 0 closes the message channel.
GevMCDA (IInteger)	-	-	Controls the destination IP address for the message channel.
GevMCSP (IInteger)	-	-	This feature indicates the source port for the message channel.
GevStreamChannelSelector (IInteger)	-	0 (Fixed)	Selects the stream channel to control.
GevSCPHostPort (IInteger)	-	-	Controls the port to which the device must send messages.
GevSCPSFireTestPacket (IBoolean)	False True	True	Sends a test packet.
GevSCPSDoNotFragment (IBoolean)	False True	True	The state of this feature is copied into the "do not fragment" bit of IP header of each stream packet. It can be used by the application to prevent IP fragmentation of packets on the stream channel.

Transport Layer Control Item	Setting Range	Default	Description
GevSCPSPacketSize (byte) (IInteger)	1476 ~ 8192	1476	This GigE Vision specific feature corresponds to DeviceStreamChannelPacketSize and should be kept in sync with it. It specifies the stream packet size, in bytes, to send on the selected channel for a GVSP transmitter or specifies the maximum packet size supported by a GVSP receiver.
GevSCPD (IInteger)	0 ~	0	Controls the delay (in GEV timestamp counter unit) to insert between each packet for this stream channel. The maximum value varies depending on the settings.
GevSCDA (IInteger)	-	-	Controls the destination IP address of the selected stream channel to which a GVSP transmitter must send data stream or the destination IP address from which a GVSP receiver may receive data stream.
GevSCSP (IInteger)	-	-	Indicates the source port of the stream channel.
NetworkStatistics (ICategory)			Category containing statistics about the different modules of the GigE Vision transport layer.
oMACControlFunctionEntity (ICategory)			Category containing statistics related to the device's MAC control PAUSE function.
aPAUSEMACCtrlFrames Received (IInteger)	-	-	Displays the number of Pause frames received.

TransportLayerControl (AP-5100T-MCL)

Configure Transport Layer settings of the AP-5100T-MCL model.

Transport Layer Control Item	Setting Range	Default	Description
DeviceTapGeometry (IEnum)	0: Geometry_1X_1Y (Default) 1: Geometry_1X2_1Y 2: Geometry_1X8_1Y 3: Geometry_1X3_1Y 4: Geometry_10X_1Y 5: Geometry_1X_2Y		Displays the image transfer method (TAP configuration) used to transfer images from the device at one time. **Note:** The value is automatically changed based on the combination of ClConfiguration and PixelFormat.
ClConfiguration (IEnum)	0: Base (Default) 1: Medium 2: Full 3: Full_2_1 4: EightyBit		Set the Camera Link configuration.
CameraLinkClockFrequency (IEnum)	0: 42.5 MHz 1: 74.3 MHz 2: 85.0 MHz (Default)		Set Camera Link clock frequency.

ImageFormatControl

Configure image format settings.

Note: Refer to Functions That Cannot Be Used Together for usage restrictions.

Image Format Control Item	Setting Range	Default	Description
SensorWidth (IInteger)	2472		Display the maximum image width.
SensorHeight (IInteger)	2064		Display the maximum image height.
SensorDigitizationBits (IEnum)	8: 8 Bits 10: 10 Bits (Default) 12: 12 Bits		Display the number of bits at which the sensor is operating.

<table>
<tr><th>Image Format Control Item</th><th>Setting Range</th><th>Default</th><th>Description</th></tr>
<tr><td>WidthMax (IInteger)</td><td>-</td><td>-</td><td>Display the maximum image width.
<table>
<tr><th>Binning Horizontal</th><th>FD2x2 BinningMode</th><th>WidthMax</th></tr>
<tr><td>1</td><td>Off</td><td>2464</td></tr>
<tr><td>2</td><td>Off</td><td>1232</td></tr>
<tr><td>1</td><td>On</td><td>1228</td></tr>
<tr><td colspan="3">BinningHorizontal and FD2x2BinningMode cannot be used together.</td></tr>
</table></td></tr>
<tr><td>HeightMax (IInteger)</td><td>-</td><td>-</td><td>Display the maximum image height.
<table>
<tr><th>Binning Vertical</th><th>FD2x2 BinningMode</th><th>HeightMax</th></tr>
<tr><td>1</td><td>Off</td><td>2056</td></tr>
<tr><td>2</td><td>Off</td><td>1028</td></tr>
<tr><td>1</td><td>On</td><td>1024</td></tr>
<tr><td colspan="3">BinningHorizontal and FD2x2BinningMode cannot be used together.</td></tr>
</table></td></tr>
<tr><td>Width (IInteger)

Related Topic: Single ROI Function</td><td>-</td><td>WidthMax</td><td>Set the image width.

Note: This setting is available only when ImageScalingMode = Off.

Setting Range: 96 (48)* ~ [WidthMax - OffsetX] , Step 8(4)*
*When BinningHorizontal = 2 or FD2x2BinningMode = On, the value in parentheses is applicable.</td></tr>
<tr><td>Height (IInteger)</td><td>-</td><td>HeightMax</td><td>Set the image height.

Note: This setting is available only when ImageScalingMode = Off.

Setting Range: 8 (4)* ~ [HeightMax - OffsetY], Step 2(1)*
*When BinningVertical = 2 or FD2x2BinningMode = On, the value in parentheses is applicable.</td></tr>
<tr><td>OffsetX (IInteger)</td><td>-</td><td>0</td><td>Set the horizontal offset.

Note: This setting is available only when ImageScalingMode = Off.

Setting Range: 0 ~ [WidthtMax - Width], Step 8(4)*
*When BinningHorizontal = 2 or FD2x2BinningMode = On, the value in parentheses is applicable.</td></tr>
</table>

Image Format Control Item	Setting Range	Default	Description
OffsetY (IInteger)	-	0	Set the vertical offset. **Note:** This setting is available only when ImageScalingMode = Off. Setting Range: 0 ~ [Height - Height], Step 2(1)* *When BinningVertical = 2 or FD2x2BinningMode = On, the value in parentheses is applicable.
ROICentered (IEnum) **Related Topic:** Single ROI Function	0: Off 1: On	0: Off	When set to On, the image output position in the X direction is always forced to be centered and OffsetX is disabled.
FD2x2BinningMode (IEnum) **Related Topic:** Binning Function	0: Off 1: On	0: Off	Performs 2x2 analog binning (Sum processing).
BinningHorizontalMode (IEnum) **Related Topic:** Binning Function	0: Sum 1: Average	0: Sum	Set the processing method for horizontal binning.
BinningHorizontal (IInteger)	1 ~ 2	1	Set the number of pixels in the horizontal direction for which to perform binning.
BinningVerticalMode (IEnum)	0: Sum 1: Average	0: Sum	Set the processing method for vertical binning.
BinningVertical (IInteger)	1 ~ 2	1	Set the number of pixels in the vertical direction for which to perform binning.
ImageScalingMode (IEnum) **Related Topic:** Image Scaling Mode (Xscale)	0: Off 1: On	0: Off	Enable ImageScalingMode.
ImageScalingSumMode (IEnum)	0: Off (Ave) (Default) 1: On (Sum)		Selects whether to use Sum or Average mode when ImageScalingMode is On.

Image Format Control Item	Setting Range	Default	Description
ImageScalingHorizontal (IFloat)	0.0625 ~ 1	1	Specifies the horizontal scaling ratio in decimal units. For example, if you want to scale the image by 50% in the horizontal direction, specify "0.5".
ImageScalingHorizontalAbs (IInteger)	256 ~ 4096	-	Indicates the horizontal scaling ratio as an integer value (rounded down to the nearest whole number). The formula is: ImageScalingHorizontal X 4096.
ImageScalingVertical (IFloat)	0.0625 ~ 1	1	Specifies the vertical scaling ratio in decimal units. For example, if you want to scale the image by 50% in the vertical direction, specify "0.5".
ImageScalingVerticalAbs (IInteger)	256 ~ 4096	-	Indicates the vertical scaling ratio as an integer value (rounded down to the nearest whole number). The formula is: ImageScalingVertical X 4096.
ImageScalingBaseAbs (IInteger)	4096 (Fixed)		
ReverseX (IBoolean)	0 ~ 1	0	Reverse pixels horizontally.
ReverseY (IBoolean)	0 ~ 1	0	Reverse pixels vertically.
ReverseXY (IBoolean)	0: Off 1: On	0: Off	Reverse the current ReverseX and ReverseY settings.
PixelFormat (IEnum) **Related Topic:** Pixel Format	-	RGB8	Set the pixel format. **AP-5100T-CXPA** 0x02180014: RGB8 0x02300018: RGB10 0x0230001A: RGB12 **AP-5100T-5GE** 0x02180014: RGB8 0x0220001C: RGB10V1Packed 0x0220001D: RGB10p32 0x02240034: RGB12V1Packed **AP-5100T-MCL** 0x02180014: RGB8 (Base 1tap, Medium 2taps, Full 3taps, EightyBit 10taps) 0x02300018: RGB10 (Medium 1tap Full 2taps, EightyBit 8taps) 0x0230001A: RGB12 (Medium 1tap, Full 2taps)

Image Format Control Item	Setting Range	Default	Description
TestPattern (IEnum)	-	0: Off	Select the test image. 0: Off (Default) 1: GreyHorizontalRamp 2: GreyVerticalRamp 3: GreyHorizontalRampMoving 4: HorizontalColorBar 5: VerticalColorBar 6: HorizontalColorBarMoving
OverlayMode (IEnum) **Related Topic:** Overlay Mode	-	0: Off	You can check the target area by reducing the brightness of the non-target area to 50%. 0: Off (Default) 1: MultiRoiAreaMode - Check the active area on MultiROI. 2: ALCAreaMode - Check the photometry area on ALC. 3: AWBAreaMode - Check the photometry area on AWB.

MultiROIControl

Configure settings for Multi ROI.

Related Topic: Multi ROI Function

Note: Refer to Functions That Cannot Be Used Together for usage restrictions.

Multi ROI Item	Setting Range	Default	Description
MultiRoiMode (IEnum)	0: Off (Default) 1: On		Enable/disable Multi Roi.
MultiRoiIndex (IInteger)	0 ~ 7	0	Select the index for the Multi Roi mode.
MultiRoiWidth (IInteger)	-	256	Set the width for the selected Multi Roi index. Step 16 (8)
MultiRoiHeight (IInteger)	-	192	Set the height for the selected Multi Roi index. Step: 4 (2)
MultiRoiOffsetX (IInteger)	-	-	Set the horizontal offset for the selected Multi Roi index. **Min**: The minimum value of the range where each Index does not overlap. **Max**: The maximum value of the range where each Index does not overlap. **Step**: 16 (8) **Default**: 0 (Index1) / 256 (Index2) / 512 (Index3) / 768 (Index4) / 1024 (Index5) / 1280 (Index6) / 1536 (Index7) / 1792 (Index8)
MultiRoiOffsetY (IInteger)	-	-	Set the vertical offset for the selected Multi Roi index. **Min**: The minimum value of the range where each Index does not overlap. **Max**: The maximum value of the range where each Index does not overlap. **Step**: 16 (8) **Default**: 0 (Index1) / 192 (Index2) / 384 (Index3) / 576 (Index4) / 768 (Index5) / 960 (Index6) / 1152 (Index7) / 1344 (Index8)
MultiRoiHorizontalEnableNumber (IInteger)	1 ~ 8	1	Set the maximum number of valid horizontal index numbers.
MultiRoiVerticalEnableNumber (IInteger)	1 ~ 8	1	Set the maximum number of valid vertical index numbers.

AcquisitionControl

Configure image capture settings.

Acquisition Control Item	Setting Range	Default	Description
AcquisitionMode (IEnum) **Related Topic:** Acquisition Control	0:SingleFrame 1:MultiFrame 2:Continuous (Default)		Select the image capture mode.
AcquisitionStart (ICommand)	-	-	Start image capture.
AcquisitionStop (ICommand)	-	-	Stop image capture.
AcquisitionFrameCount (IInteger)	1 ~ 65535	1	In MultiFrame mode, set the number of frames to capture.
AcquisitionFrameRate (Hz) (IFloat)	0.125 ~	-	Set the AcquisitionFrameRate in Hz. See "Specifications" for the maximum acquisition rate value under different settings.
TriggerSelector (IEnum) **Related Topic:** Trigger Control	**AP-5100T-CXPA** 0: AcquisitionStart (Default) 1: AcquisitionEnd 3: FrameStart **AP-5100T-5GE** 0: AcquisitionStart (Default) 1: AcquisitionEnd 3: FrameStart 4: AcquisitionTransferStart **AP-5100T-CXPA** 3: FrameStart (Default)		Select the trigger operation.
TriggerMode (IEnum)	0: Off 1: On	0: Off	Enables/Disables the Trigger mode.
TriggerSoftware (ICommand)	-	-	Execute a software trigger.

<table>
<tr><th>Acquisition Control Item</th><th>Setting Range</th><th>Default</th><th>Description</th></tr>
<tr><td>TriggerSource (IEnum)</td><td>-</td><td>Line4 TTL In1</td><td>Select the trigger signal source.
7 - 10: PulseGenerator0 - 3
11 - 14: UserOutput0 - 3
15: Action0 - 3 (AP-5100T-5GE Only)
19: Software
23: Line4 TTL In1 (Default)
24: Line5 Opt In1
25: Line6 Opt In2
37: Nand1 Out
26: Line7 CXP In (AP-5100T-CXPA Only)
26: Line7 CC1 (AP-5100T-MCL Only)
29: Line10 TTL In2
36: Nand0 Out
37: Nand1 Out</td></tr>
<tr><td>TriggerActivation (IEnum)</td><td colspan="2">1:Rising Edge (Default)
2:Falling Edge
3:Level High
4:Level Low</td><td>Select the polarity of the trigger signal (i.e., location of signal at which trigger is applied). The options vary depending on the TriggerSelector setting.
<table>
<tr><th>TriggerSelector</th><th>TriggerActivation</th></tr>
<tr><td>AcquisitionStart</td><td rowspan="3">RisingEdge or FallingEdge</td></tr>
<tr><td>AcquisitionEnd</td></tr>
<tr><td>AcquisitionTransferStart</td></tr>
<tr><td>FrameStart</td><td>Any</td></tr>
</table></td></tr>
<tr><td>TriggerOverlap (IEnum)</td><td>0: Off
1: ReadOut</td><td>-</td><td>Display the trigger overlap operation. The below table shows the default values.
<table>
<tr><th>TriggerSelector</th><th>TriggerOverlap</th></tr>
<tr><td>AcquisitionStart</td><td rowspan="3">Off (Fixed)</td></tr>
<tr><td>AcquisitionEnd</td></tr>
<tr><td>AcquisitionTransferStart</td></tr>
<tr><td>FrameStart</td><td>ReadOut (Fixed)</td></tr>
</table></td></tr>
<tr><td>TriggerDelay (μs) (IFloat)</td><td>0 - 500000</td><td>0</td><td>Set the time of exposure start from trigger input (in μs).</td></tr>
<tr><td>ExposureMode (IEnum)
Related Topic: Exposure Mode</td><td colspan="2">0: Off (Default)
1: Timed
2: TriggerWidth</td><td>Select the exposure mode.</td></tr>
<tr><td>ExposureTimeMode (IEnum)</td><td colspan="2">0: Common (Default)
1: Individual</td><td>When set to Individual, ExposureTime can be adjusted for RGB individually.</td></tr>
</table>

Acquisition Control Item	Setting Range	Default	Description
ExposureTimeSelector (IEnum)	0: Common (Default) 1: Red 2: Green 3: Blue		Selects which exposure time is controlled by the ExposureTime feature.
ExposureTime (us) (IFloat)	1 ~ ExposureTime Max*	ExposureTime Max*	Set the exposure time for the item selected in ExposureTimeSelector.
ExposureTimeMax (us) (IFloat)	1 ~		Displays the maximum exposure time value under the current settings. (1/AcquisitionFrameRateMax) – Next Trigger Inhibit Period **Note:** AP-5100T-CXPA, AP-5100T-5GEOnly
ExposureAuto (IEnum)	0: Off (Default) 1: Once 2: Continuous		Set whether to enable auto exposure. **Once** automatically changes to **Off** when the signal level converges.
ExposureModeOption (IEnum) **Related Topic:** RCT Mode	0: Off (Default) 1: RCT		Enable RCT mode.

DigitalIOControl

Configure settings for digital input/output.

Related Topic: GPIO (Digital Input/Output Settings)

<table>
<tr><th>Digital IO Control Item</th><th>Setting Range</th><th>Default</th><th></th></tr>
<tr><td>LineSelector (IEnum)</td><td>-</td><td>Line1 TTL Out1</td><td>Select the input / output to configure.
<table>
<tr><th>LineSelector</th><th>LineMode</th><th>LineFormat</th></tr>
<tr><td>20: Line1 TTL Out1</td><td>Output</td><td>TTL</td></tr>
<tr><td>21: Line2 Opt Out1</td><td>Output</td><td>OptoCoupled</td></tr>
<tr><td>22: Line3 Opt Out2</td><td>Output</td><td>OptoCoupled</td></tr>
<tr><td>23: Line4 TTL In1</td><td>Input</td><td>TTL</td></tr>
<tr><td>24: Line5 Opt In1</td><td>Input</td><td>OptoCoupled</td></tr>
<tr><td>25: Line6 Opt In2</td><td>Input</td><td>OptoCoupled</td></tr>
<tr><td>26: Line7 CC1*</td><td>Input</td><td>TTL</td></tr>
<tr><td>26: Line7 CXP In*</td><td>Input</td><td>TTL</td></tr>
<tr><td>27: Line8 TTL Out2</td><td>Output</td><td>TTL</td></tr>
<tr><td>29: Line10 TTL In2</td><td>Input</td><td>TTL</td></tr>
<tr><td>53: Nand0 In1</td><td>Input</td><td>Internal Signal</td></tr>
<tr><td>54: Nand0 In2</td><td>Input</td><td>Internal Signal</td></tr>
<tr><td>55: Nand1 In1</td><td>Input</td><td>Internal Signal</td></tr>
<tr><td>56: Nand1 In2</td><td>Input</td><td>Internal Signal</td></tr>
<tr><td>255: TimestampReset**</td><td>Internal Connection</td><td>Internal Signal</td></tr>
</table>
*Line7: AP-5100T-MCL / AP-5100T-CXPA Only
**TimeStampreset: AP-5100T-CXPA / AP-5100T-5GE Only</td></tr>
<tr><td>LineMode (IEnum)</td><td colspan="2">0: Input
1: Output
2: InternalConnection</td><td>Display the input/ output status (whether it is input or output).Please see the LineSelector's descriptions for the values displayed on this item.</td></tr>
<tr><td>LineInverter (IBoolean)</td><td colspan="2">False (Default)
True</td><td>Enable/disable polarity inversion for the selected input signal or output signal. When LineMode is Output, this parameter can be configured. When Input, configuration is not possible (fixed to False).</td></tr>
<tr><td>LineStatus (IBoolean)</td><td colspan="2">False (Default)
True</td><td>Display the status of the input signal or output signal (True: High, False: Low).</td></tr>
</table>

Digital IO Control Item	Setting Range	Default	
LineStatusAll (IInteger)			Display the input/output signal status. Bit0: Line1 TTL Out1 Bit1: Line2 Opt Out1 Bit2: Line3 Opt Out2 Bit3: Line4 TTL In1 Bit4: Line5 Opt In1 Bit5: Line6 Opt In2 Bit6: Line7 CC1 (AP-5100T-MCL Only) Bit6: Line7 CXP In (AP-5100T-CXPA Only) Bit7: Line8 TTL Out2 Bit8: Unused (fixed 0) Bit9: Line10 TTL In2 Bit10-31: Unused ((Fixed) 0)
LineSource (IEnum)	-	-	Select the line source signal for the item selected in Line Selector. 0: Off (LineSelector=TimestampReset) 1: AcquisitionActive 2: FrameActive 4: ExposureActive 5: FVAL 43: AcquisitionTriggerWait 44: FrameTriggerWait 7-10: PulseGenerator0-3 11-14: UserOutput0-3 23: Line4 TTL In1 24: Line5 Opt In1 25: Line6 Opt In2 26: Line7 CC1 (for AP-5100T-MCL) 26: Line7 CXP In (for AP-5100T-CXPA) 29: Line10 TTL In2 36: Nand0 Out 37: Nand1 Out 41: Low (Not selectable when LineMode = InternalConnection) 42: High (Not selectable when LineMode = InternalConnection) **Note:** The following is fixed to "-": LineSelector = 23: Line4 TTL In1, 24: Line5 Opt In1, 25: Line6 Opt In2, 29: Line10 TTL In2 **Default** LineSelector = TimestampReset: Off (0) LineSelector = Other than TimestampReset: Line4 TTL In1(23)

Digital IO Control Item	Setting Range	Default	
LineFormat (IEnum)	2: TTL 5: OptoCoupled 7: Internal Signal		The signal format for the item selected in **LineSelector** is displayed. For the displayed values, please refer to the LineSelector's description.
OptInFilter (ns) (IInteger)	0 ~ 40000000	0	Select the period for filtering mask of the Opt-In signal. Setting range: 0 ~ 40ms
UserOutputSelector (IEnum)	0: User Output 0 (Default) 1: User Output 1 2: User Output 2 3: User Output 3		Set the user output signal.
UserOutputValue (IBoolean)	False True	False	Set the User Output value selected in User Output Selector.

PulseGenerator

Configure pulse generator settings.

Related Topic: Pulse Generator

Pulse Generator Setting Item	Setting Range	Default	Description
ClockPreScaler (IInteger)	1 ~ 4096	100	Set the division value for the prescaler (12-bit) using the pixel clock as the base clock.
PulseGeneratorClock (MHz) (IFloat)	-	0.7425	Set the clock used for the pulse generator. This value is calculated based on the Clock Pre-Scaler value. PulseGeneratorClock = Source frequency / ClockPreScaler Source frequency: 74.25 MHz
PulseGeneratorSelector (IEnum)	0: PulseGenerator0 (Default) 1: PulseGenerator1 2: PulseGenerator2 3: PulseGenerator3		Select the pulse generator.
PulseGeneratorLength (IInteger)	1 ~ 1048575	22275	Set the maximum count up value using clock value.

Pulse Generator Setting Item	Setting Range	Default	Description
PulseGeneratorLengthMs (ms) (IFloat)	-	30	Set the maximum count up value using ms. This value is calculated based on the Pulse Generator Length value. The setting range varies depending on the Clock Pre-Scaler value. PulseGeneratorLengthMs = 1/PulseGeneratorClock * PulseGeneratorLength
PulseGeneratorFrequency (Hz) (IFloat)	-	33.3333	Set the maximum count up value using frequency. This value is calculated based on the Pulse Generator Length value. PulseGeneratorFrequency = 1sec / PulseGeneratorLengthMs
PulseGeneratorStartPoint (IFloat)	0~ 1048575	0	Set the start point for the High interval using clock value. When the counter reaches this value, the output becomes 1.
PulseGeneratorStartPointMs (ms) (IFloat)	-	0	Set the start point for the High interval using ms. When the counter reaches this value, the output becomes 1. The setting range varies depending on the Clock Pre-Scaler value. PulseGeneratorStartPointMs = 1/PulseGeneratorClock * PulseGeneratorStartPointValue
PulseGeneratorEndPoint (IInteger)	1~ 1048575	11138	Set the start point for the Low interval using clock value. When the counter reaches this value, the output becomes 0.
PulseGeneratorEndPointMs (ms) (IFloat)	-	15.0007	Set the start point for the Low interval using ms. When the counter reaches this value, the output becomes 0. The setting range varies depending on the Clock Pre-Scaler value. PulseGeneratorEndPoint = 1/PulseGeneratorClock * PulseGeneratorEndPointValue
PulseGeneratorPulseWidth (ms) (IFloat)	-	15.0007	Display High interval width for the pulse in ms. This is a calculation of the time between the Start Point and End Point. The setting range varies depending on the Clock Pre-Scaler value. PulseGeneratorPulseWidth = 1/PulseGeneratorClock * (PulseGeneratorEndPoint - PulseGeneratorStartPoint)
PulseGeneratorRepeatCount (IInteger)	0 ~ 255	0	Set the repeat count for the counter. When this is set to 0, the counter will be free-running with limitless repeating.
PulseGeneratorClear Activation (IEnum)	0: Off (Default) 1: Rising Edge 2: Falling Edge 3: Level High 4: Level Low		Set the clear signal condition for the count clear input of the pulse generator.

Pulse Generator Setting Item	Setting Range	Default	Description
PulseGeneratorClearSource (IEnum)	-	Line4 TTL In1	Select the count clear input signal source. 1: AcquisitionActive 2: FrameActive 4: ExposureActive 43: AcquisitionTriggerWait 44: FrameTriggerWait 7-10: PulseGenerator0-3 (※) 11-14: UserOutput0-3 23: Line4 TTL In1 24: Line5 Opt In1 25: Line6 Opt In2 26: Line7 CC1 (AP-5100T-MCL Only) 26: Line7 CXP In (AP-5100T-CXPA Only) 29: Line10 TTL In2 36: Nand0 Out 37: Nand1 Out **Note:** (※) The PulseGenerator currently selected in PulseGeneratorSelector is disabled.
PulseGeneratorClear SyncMode (IEnum)	0: Async Mode (Default) 1: Sync Mode		Select the count clear input signal source.

AnalogControl

Configure analog control settings.

<table>
<tr><th>Analog Control Item</th><th>Setting Range</th><th>Default</th><th>Description</th></tr>
<tr><td>IndividualGainMode (IEnum)</td><td>0: Off
1: On</td><td>Off</td><td>When On, RGB can be configured individually for the entire gain adjustment range of the sensor.</td></tr>
<tr><td>GainSelector (IEnum)
Related Topic: Adjust the Gain</td><td colspan="2">0: Analog All (Default)
1: Analog Red
2: Analog Green
3: Analog Blue
4: Digital Red
5: Digital Blue</td><td>Select the gain to configure.</td></tr>
<tr><td>Gain (IFloat)</td><td colspan="3">Set the gain value for the gain item selected with the GainSelector setting. The Gain setting is configured in multipliers. (Unit: times, step: equivalent to 0.1db, default = x1.00).
<table>
<tr><th>GainSelector</th><th>IndividualGainMode = Off</th><th>IndividualGainMode = On</th></tr>
<tr><td>AnalogAll*</td><td>0.0dB ~ 18.1dB (x1.0 ~ x8.0)</td><td>0db (x1.0) (Fixed)</td></tr>
<tr><td>AnalogRed*</td><td>-6.6dB ~ 12.0dB (0.47 ~ 4.0)</td><td>0dB ~ 36.1dB (x1.0 ~ x64.0)</td></tr>
<tr><td>AnalogBlue*</td><td>-6.6dB ~ 12.0dB (0.47 ~ 4.0)</td><td>0dB ~ 36.1dB (x1.0 ~ x64.0)</td></tr>
<tr><td>AnalogGreen*</td><td>0db (x1.0) (Fixed)</td><td>0dB ~ 36.1dB (x1.0 ~ x64.0)</td></tr>
<tr><td>DigitalRed</td><td colspan="2">-0.9dB ~ 0.8dB (x0.9 ~ x1.1)</td></tr>
<tr><td>DigitalBlue</td><td colspan="2">-0.9dB ~ 0.8dB (x0.9 ~ x1.1)</td></tr>
<tr><td colspan="3">*The resolution is set in about 0.1dB steps.</td></tr>
</table></td></tr>
<tr><td>GainAuto (IEnum)</td><td colspan="2">0: Off (Default)
1: Once
2: Continuous</td><td>Enable/disable gain auto adjustment. Once automatically changes to Off when the signal level converges.</td></tr>
<tr><td>BlackLevelSelector (IEnum)
Related Topic: Adjusting the Black Level</td><td colspan="2">0: All (Default)
1: Red
3: Blue</td><td>Select the black level to configure.</td></tr>
<tr><td>BlackLevel (IFloat)</td><td colspan="2"><table>
<tr><th>BlackLevelSelector</th><th>Setting Range</th></tr>
<tr><td>All</td><td>133 ~ 255</td></tr>
<tr><td>Red</td><td>-64 to +64</td></tr>
<tr><td>Blue</td><td>-64 to +64</td></tr>
</table></td><td>Set the black level value. (Default: 0)</td></tr>
</table>

<table>
<tr><th>Analog Control Item</th><th>Setting Range</th><th>Default</th><th>Description</th></tr>
<tr><td>BalanceWhiteAuto (IEnum)

Related Topic: Adjusting the White Balance</td><td colspan="2">0: Off (Default)
1: Once
2: Continuous
3: Exposure Once
4: Exposure Continuous
5: Preset 3200K
6: Preset 5000K
7: Preset 6500K
8: Preset 7500K</td><td>Enable/disable auto white balance.</td></tr>
<tr><td>AWBAreaSelector (IEnum)</td><td colspan="3">Select the area for which to configure AWBAreaEnable.
<table>
<tr><td>15: High Left</td><td>14: High Mid-Left</td><td>13: High Mid-Right</td><td>12: High Right</td></tr>
<tr><td>11: Mid-High Left</td><td>10: Mid-High Mid-Left</td><td>9: Mid-High Mid-Right</td><td>8: Mid-High Right</td></tr>
<tr><td>7: Mid-Low Left</td><td>6: Mid-Low Mid-Left</td><td>5: Mid-Low Mid-Right</td><td>4: Mid-Low Right</td></tr>
<tr><td>3: Low Left</td><td>2: Low Mid-Left</td><td>1: Low Mid-Right</td><td>0: Low Right (Default)</td></tr>
</table></td></tr>
<tr><td>AWBAreaEnable (IBoolean)</td><td colspan="2">False
True (Default)</td><td>Enable/disable the photometry area selected in AWBAreaSelector.</td></tr>
<tr><td>AWBAreaEnableAll (IBoolean)</td><td colspan="2">False
True(Default)</td><td>**True**: Operate BalanceWhiteAuto with all areas designated as photometry areas, regardless of the individual enabled/disabled photometry area states configured in AWBAreaSelector.
False: Operate BalanceWhiteAuto according to the individual enabled/disabled photometry area states configured in AWBAreaSelector.</td></tr>
<tr><td>AWBControlSpeed (IInteger)</td><td>1~ 8</td><td>4</td><td>Set the response speed for BalanceWhiteAuto. (8 is the fastest)</td></tr>
<tr><td>BalanceWhiteAutoResult (IEnum)</td><td>-</td><td>0: Idle</td><td>Display the results of BalanceWhiteAuto. See "Adjusting the White Balance" for more information on each error.
0: Idle (Default)
1: Processing
2: Converging
3: Succeeded
4: Error1 - G image was too bright
5: Error2 - G image was too dark
6: Error3 - Timeout
7: Error4 - could not processing
8: Error5 - R or B image was out of range</td></tr>
</table>

Analog Control Item	Setting Range	Default	Description
Gamma (IFloat) **Related Topic:** Gamma Function	0.45~ 1	0.45	Set the gamma value. Setting Range: 0.45, 0.50, 0.55, 0.60, 0.65, 0.75, 0.80, 0.90, 1.00
LUTMode (IEnum) **Related Topic:** LUT (Lookup Table)	0: Off (Default) 1: Gamma 2: LUT		Select the LUT mode.

LUTControl

Configure LUT settings.

Related Topic: LUT (Lookup Table)

LUT Control Item	Setting Range	Default	Description
LUTSelector (IEnum)	0: Red (Default) 1: Green 2: Blue		Select the LUT channel to control.
LUTIndex (IInteger)	0 ~ 256	0	Set the LUT index table number.
LUTValue (IInteger)	0 ~ 4095	Gamma≒ 1.0	Set the LUT value.

AutoLevelControl

Configure AutoLevelControl.

> **Related Topic:** ALC (Automatic Level Control) Function

<table>
<tr><th>Auto Level Control Item</th><th>Setting Range</th><th>Default</th><th>Description</th></tr>
<tr><td>ALCControlReference (IEnum)</td><td colspan="2">0: Peak Channel
1: Selected Channel (Default)</td><td>Sets the channel to be used for ALC control reference.</td></tr>
<tr><td>ALCControlChannel (IEnum)</td><td colspan="2">0: Red
1: Green (Default)
2: Blue</td><td>When ALCControlReference is set to SelectedChannel, this setting determines which RGB channel signal is used for ALC control. When ALCControlReferenc is set to PeakChannel, this setting is disabled.</td></tr>
<tr><td>ALCReference (IInteger)</td><td>30 ~ 95</td><td>50</td><td>Set the target level for ALC. (unit: %)</td></tr>
<tr><td>ALCAreaSelector (IEnum)</td><td colspan="3">Select the area for which to configure ALCAreaEnable.
<table>
<tr><td>15: High Left</td><td>14: High Mid-Left</td><td>13: High Mid-Right</td><td>12: High Right</td></tr>
<tr><td>11: Mid-High Left</td><td>10: Mid-High Mid-Left</td><td>9: Mid-High Mid-Right</td><td>8: Mid-High Right</td></tr>
<tr><td>7: Mid-Low Left</td><td>6: Mid-Low Mid-Left</td><td>5: Mid-Low Mid-Right</td><td>4: Mid-Low Right</td></tr>
<tr><td>3: Low Left</td><td>2: Low Mid-Left</td><td>1: Low Mid-Right</td><td>0: Low Right (Default)</td></tr>
</table></td></tr>
<tr><td>ALCAreaEnable (IBoolean)</td><td>False
True</td><td>True</td><td>Enable/disable the photometry area selected in ALCAreaSelector.</td></tr>
<tr><td>ALCAreaEnableAll (IBoolean)</td><td>False
True</td><td>True</td><td>True: Operate ALC with all areas designated as photometry areas, regardless of the individual enabled/disabled photometry area states configured in ALCAreaSelector.
False: Operate ALC according to the individual enabled/disabled photometry area states configured in ALCAreaSelector.</td></tr>
<tr><td>ALCControlRatio (IInteger)</td><td>1 ~ 100</td><td>90</td><td>Set the response speed (%). (100 is the fastest.)</td></tr>
<tr><td>AutoControlStatus (IEnum)</td><td colspan="2">0: Idle (Default)
1: Processing - Exposure Time
2: Processing - Gain
3: Converging - Exposure Time
4: Converging - Gain
5: Error1 - Could not processing
6: Error2 - Timeout</td><td>Allows confirmation of the AGC, ASC, and AWB convergence status.</td></tr>
</table>

Auto Level Control Item	Setting Range	Default	Description
ExposureAuto ControlMin (IFloat)	-	100	Set the minimum value for the ExposureTime control range. (us) **Min**: 100 **Max**: ExposureTimeMax*-1
ExposureAuto ControlMax (IFloat)	-	ExposureTimeMax*	Set the maximum value for the ExposureTime control range. (us) **Min**: ExposureAutoControlMin + 1 **Max**: ExposureTimeMax*
GainAutoControlMin	-	1	Set the minimum value for the GainAuto control range. **Min**: 1 **Max**: (GainAutoControlMax - 1)
GainAutoControlMax (IFloat)	-	126	Set the maximum value for the GainAuto control range. **Min**: GainAutoControlMin+1 **Max**: 126

Note: *ExposureTimeMax: The maximum exposure time value under the current setting conditions.

ColorTransformationControl

Configure color transformation settings.

Related Topic: Color Space Conversion (ColorTransformationControl)

Color Transformation Control Item	Setting Range	Default	Description
ColorTransformationMode (IEn80um)	0: RGB (Default) 1: HSI 2: XYZ		Set the output image format.
ColorTransformationRGBMode (IEnum)	0: OFF (Default) 1: sRGB 2: AdobeRGB 3: UserCustom		Set the detailed mode when RGB is selected for the color space.
ColorMatrixValueSelector (IEnum)	0: R-R (Default) 1: R-G 2: R-B 3: G-R 4: G-G 5: G-B 6: B-R 7 :B-G 8: B-B		Select the ColorMatrix setting component.
ColorMatrixValue (IFloat)	-2 ~ 2	-	Set the Color Matrix value. (Step = 0.1) **ColorMatrixValueSelector** / **Default** R-R, G-G, B-B / 1.0 Other than above / 0.0

ImagingControl

Configure other JAI functions.

Imaging Control Item	Setting Range	Default	Description
PixelShiftAlignment	0: Off 1: On	0: Off	Enable/Disable PixelShiftAllignment.
PixelAlignmentChannelSelector	0: Red (Default) 2: Blue		Select the channel to perform alignment.
PixelShiftAlignmentHorizontal (pixel)	-128 to +127	0	Set the correction value for horizontal sensor alignment.
PixelShiftAlignmentVertical (pixel)	-128 to +127	0	Set the correction value for vertical sensor alignment.
ChromaticAberrationCorrectionMode **Related Topic:** Chromatic Aberration Correction	0: Off 1: On		Enable / Disable Chromatic Aberration Correction.
ChromaticAberrationCorrection ChannelSelector	0: Red (Default) 2: Blue		Select the color of the Chromatic Aberration Correction values.
ChromaticAberrationCorrection Preset	1: Preset1 2: Preset2 3: Preset3		Select the correction pattern of the Chromatic Aberration Correction.
ChromaticAberrationCorrection Coeff	-256 to +256	0	Set the coefficient value of the Chromatic Aberration Correction.
ChromaticAberration CenterOffsetHorizontal	-128 to +127	0	Set the correction value for the horizontal position of chromatic aberration.
ChromaticAberration CenterOffsetVertical	-128 to +127	0	Set the correction value for the vertical position of chromatic aberration.
PixelShiftCheckMode	0: Off (Default) 1: R-G 2: B-G		Registration Misalignment Check Mode
VideoProcessBypassMode (IEnum) **Related Topic:** VideoProcessBypassMode	0: Off 1: On	0: Off	Enable/disable VideoProcessBypass mode.

Imaging Control Item	Setting Range	Default	Description
ColorEnhancerEnable (IBoolean) **Related Topic:** Color Enhancer	0: Off 1: On	0: Off	Enable/disable ColorEnhancer.
ColorEnhancerSelector (IEnum)	0: Red (Default) 1: Cyan 2: Green 3: Magenta 4: Blue 5: Yellow		Index for configuring detailed settings of ColorEnhancer.
ColorEnhancerValue (IFloat)	0~ 1.0	0	Set the enhancement to one of ten levels for each color element. (Step = 0.1) 0: No enhancement

ShadingControl

Configure shading correction settings.

> **Related Topic:** Shading Correction

Shading Control Item	Setting Range	Default	Description
ShadingCorrectionMode (IEnum)	0: Flat Shading (Default) 1: Color Shading		Select the shading correction method.
ShadingMode (IEnum)	0: Off (Default) 1: User1 2: User2 3: User3		Set the area to which to save shading correction data. When this is set to Off, PerformShadingCalibration will not be executed.
PerformShadingCalibration (ICommand)	Execute shading correction. This command can not be executed under the following conditions. (Could not calibrated error is displayed) - When outputting no image. - When outputting TestPattern. - Width and/or Height are less than 512 (Single ROI Function) - In FD2x2Binning mode (Binning Function) - In ImageScaling mode (Image Scaling Mode (Xscale)) - When BalanceWhiteAuto = Continuous - When GainAuto = Continuous - In Sequencer mode (Sequencer Function) - In MultiRoi mode (Multi ROI Function) - In Reverse mode (Image Flip Function) - In ALC mode (ALC (Automatic Level Control) Function)		
ShadingDetectResult (IEnum)	0: Idle (Default) 1: Succeeded 2: Error1 - image was too bright 3: Error2 - image was too dark 4: Error3 - Could not calibrated 5: Error4 - Correction limit		Display the shading correction results.

BlemishControl

Configure settings for JAI white blemish correction.

> **Related Topic:** BlemishCompensation

Blemish Control Item	Setting Range	Default	Description
BlemishEnable (IBoolean)	False True	True	Enable/disable blemish correction.
BlemishDetect (ICommand)	-	-	Execute blemish detection. This command cannot be executed under the following conditions. - No image is being output. - When AcquisitionMode is set to Single or MultiFrame. - TestPattern is being output - In Sequencer Mode (Sequencer Function) - In MultiRoi mode (Multi ROI Function) - The image is not full ROI size (Single ROI Function) - Not in lens cap state
BlemishDetectionResult (IEnum)	-	Idle	Display the blemish detection results. 0: Idle 1: Succeeded 2: Error1 - image was too bright 5: Error4 - detect blemishes too many
BlemishStore (ICommand)	-	-	Save the location information of detected blemishes, manually specified by BlemishiCompensationPositionX and BlemishCompensasionPositionY.
BlemishCompensation ChannnelSelector (IEnum)	0 ~ 2	0	Selects the channel of the blemish data to be referenced.
BlemishDetectThreshold (IInteger)	1 ~ 100	10	Set the blemish detection threshold.
BlemishCompensationIndex (IInteger)	1~ 300	1	Select the index for the target blemish coordinates.
BlemishCompensation PositionX (IInteger)	-	-1	Display the X coordinate (horizontal pixel position) of the target blemish selected in BlemishCompensationIndex. You can also manually enter the X coordinate of the blemish you want to correct. **Min**: -1 **Max**: WidthMax - 1

Blemish Control Item	Setting Range	Default	Description
BlemishCompensation PositionY (IInteger)	-	-1	Display the Y coordinate (horizontal pixel position) of the target blemish selected in BlemishCompensationIndex. You can also manually enter the Y coordinate of the blemish you want to correct. **Min**: -1 **Max**: HeightMax - 1
BlemishCompensation DataClear (ICommand)	-	-	Delete detected or specified blemish information selected in BlemishCompensationIndex.
BlemishCompensationNumber (IInteger)	0 ~ 2000	0	Display the number of target blemishes.

SequencerControl

Configure sequencer settings.

Related Topic: Sequencer Function

Note: Refer to Functions That Cannot Be Used Together for usage restrictions.

Sequencer Control Item	Setting Range	Default	Description
SequencerMode (IEnum)	0: Off 1: On	0: Off	Enable / disable SequencerMode.
SequencerModeSelect (IEnum)	0: Trigger Sequencer Mode (Default) 1: Command Sequencer Mode		Select the sequencer mode.
SequencerSetSelector (IInteger)	1 ~ 32	1	Select the index number to configure.
SequencerWidth (IInteger)	-	WidthMax	Set the Width of the selected SequencerIndex. The setting range is the same as Width [ImageFormatControl].
SequencerHeight (IInteger)	-	HeightMax	Set the Height of the selected SequencerIndex. The setting range is the same as Height [ImageFormatControl].
SequencerOffsetX (IInteger)	-	0	Set the OffsetX of the selected SequencerIndex. The setting range is the same as OffsetX [ImageFormatControl].

Sequencer Control Item	Setting Range	Default	Description
SequencerOffsetY (IInteger)	-	0	Set the OffsetY of the selected SequencerIndex. The setting range is the same as OffsetY [ImageFormatControl].
SequencerBinningHorizontal (IInteger)	-	0	Set the BinningHorizontal of the selected SequencerIndex. The setting range is the same as BinningHorizontal [ImageFormatControl].
SequencerBinningVertical (IInteger)	-	0	Set the BinningVertical of the selected SequencerIndex. The setting range is the same as BinningVertical [ImageFormatControl].
SequencerExposureTime Common (IFloat)	-	-	Set the ExposureTimeCommon of the selected SequencerIndex. The setting range is the same as ExposureTimeCommon [AcquisitionControl].
SequencerExposureTime Red (IFloat)	-	-	Set the ExposureTimeRed of the selected SequencerIndex. The setting range is the same as ExposureTimeRed [AcquisitionControl].
SequencerExposureTime Green (IFloat)	-	-	Set the ExposureTimeGreen of the selected SequencerIndex. The setting range is the same as ExposureTimeGreen [AcquisitionControl].
SequencerExposureTime Blue (IFloat)	-	-	Set the ExposureTimeBlue of the selected SequencerIndex. The setting range is the same as ExposureTimeBlue [AcquisitionControl].
SequencerGainAnalogAll (IFloat)	-	-	Set the Gain[AnalogAll] of the selected SequencerIndex. The setting range is the same as Gain[AnalogAll] [AnalogControl].
SequencerGainAnalogRed (IFloat)	-	-	Set the Gain[AnalogRed] of the selected SequencerIndex. The setting range is the same as Gain [AnalogRed] [AnalogControl].
SequencerGainAnalogGreen (IFloat)	-	-	Set the Gain[AnalogGreen] of the selected SequencerIndex. The setting range is the same as Gain [AnalogGreen] [AnalogControl].
SequencerGainAnalogBlue (IFloat)	-	-	Set the Gain[AnalogBlue] of the selected SequencerIndex. The setting range is the same as Gain [AnalogBlue] [AnalogControl].
SequencerBlackLevelAll (IFloat)	-	-	Set the BlackLevelAll of the selected SequencerIndex. The setting range is the same as BlackLevelAll [AnalogControl].

<table>
<tr><th>Sequencer Control Item</th><th>Setting Range</th><th>Default</th><th>Description</th></tr>
<tr><td>SequencerLUTEnable (IBoolean)</td><td>False
True</td><td>False</td><td>Set the LUTEnable of the selected SequencerIndex.</td></tr>
<tr><td>SequencerFrameCount (IInteger)</td><td>1 ~ 255</td><td>1</td><td>Set the FrameCount value for the selected SequencerIndex.].</td></tr>
<tr><td>SequencerSetNext (IInteger)</td><td colspan="3">Set the next index to be displayed for the selected SequencerIndex. (Enabled only for TriggerSequencer.)
<table>
<tr><th colspan="2">AP-5100T-CXPA, AP-5100T-5GE</th></tr>
<tr><td>Setting Range:</td><td>0* ~ 32</td></tr>
<tr><td rowspan="2">Default:</td><td>SequencerSetSelector = 1 ~ 31: SequencerSetSelector value + 1</td></tr>
<tr><td>SequencerSetSelector = 32: 0</td></tr>
<tr><td colspan="2">*If 0 is specified, the operation of the Sequencer is stopped.</td></tr>
</table>
<table>
<tr><th colspan="2">AP-5100T-MCL</th></tr>
<tr><td>Setting Range:</td><td>1 ~ 32</td></tr>
<tr><td rowspan="2">Default:</td><td>SequencerSetSelector = 1 ~ 31: SequencerSetSelector value + 1</td></tr>
<tr><td>SequencerSetSelector = 32: 1</td></tr>
</table></td></tr>
<tr><td>SequencerRepetition (IInteger)</td><td>1 ~ 255</td><td>1</td><td>Set the repeat count for the sequencer.</td></tr>
<tr><td>SequencerSetActive (IInteger)</td><td>1 ~ 32</td><td>1</td><td>Displays the active index number.</td></tr>
<tr><td>SequencerSetStart (IInteger)</td><td>1 ~ 32</td><td>1</td><td>Specify the first index number to switch to when starting TriggerSequencerMode.</td></tr>
<tr><td>SequencerCommandIndex (IInteger)</td><td>1 ~ 32</td><td>1</td><td>Set this to change the SequencerIndex. (Enabled only for CommandSequencer.)</td></tr>
<tr><td>SequencerReset (ICommand)</td><td>-</td><td>-</td><td>In TriggerSequencerMode, reset the current index number to the number configured in SequencerSetStart.</td></tr>
</table>

CounterAndTimerControl

Configure counter settings.

Note: This camera only supports the counter functions.

Related Topic: CounterAndTimerControl

<table>
<tr><th>Count And Time Control</th><th>Setting Range</th><th>Default</th><th>Description</th></tr>
<tr><td>CounterSelector (IEnum)</td><td colspan="2">0: Counter0 (Default)
1: Counter1
2: Counter2
3: Counter3*</td><td>Select the counter.
*Counter3: AP-5100T-CXPA, AP-5100T-5GEOnly</td></tr>
<tr><td>CounterEventSource (IEnum)</td><td>-</td><td>0: Off</td><td>Assign the Counter Event signal for which you want to read the count value to a dedicated counter, and read the value.
0: Off (Default)
1: FrameTrigger(Counter0 only)
2: Exposure Start(Counter1 only)
3: Sensor Readout(Counter2 only)
4: FrameTransferEnd*(Counter3 only)
*,AP-5100T-CXPA, AP-5100T-5GEOnly</td></tr>
<tr><td>CounterEventActivation (IEnum)</td><td colspan="2">1:Rising Edge
2:Falling Edge</td><td>Set the count timing. The setting value is fixed with the following data.
<table>
<tr><th>Counter Selector</th><th>CounterEventActivation</th></tr>
<tr><td>Counter0, 1, 2</td><td>Rising Edge</td></tr>
<tr><td>Counter3</td><td>Falling Edge</td></tr>
</table></td></tr>
<tr><td>CounterReset (ICommand)</td><td>-</td><td>-</td><td>Reset the counter.</td></tr>
<tr><td>CounterValue (ICommand)</td><td>0 - 32bit max</td><td>0</td><td>Display the count value.</td></tr>
<tr><td>CounterStatus (IEnum)</td><td>-</td><td>CounterIdle</td><td>Display the counter status.
0: CounterIdle
1: CounterTriggerWait
2: CounterActive
3: CounterCompleted
4: CounterOverflow</td></tr>
</table>

Count And Time Control	Setting Range	Default	Description
CounterRefresh (ICommand) **Note:** AP-5100T-MCL Only	-	-	Refresh the count value.

ActionControl

Related Topic: Action Control Function

Configure action control settings.

Note: This function is supported only on the AP-5100T-5GE model.

Action Control Item	Setting Range	Default	Description
Action Device Key (IInteger)	0x0 ~ 0xFFFFFFFF	0x00	Set the action device key.
Action Queue Size (IInteger)	0 ~ 32bit max	256	Set the size of action queue.
Action Selector (IInteger)	0 ~ 3	0	Select the action.
Action Group Mask (IInteger)	0x0 ~ 0xFFFFFFFF	0x00	Set the mask value that creates the action 0 group,
Action Group Key (IInteger)	0x0 ~ 0xFFFFFFFF	0x00	Set the key that executes action 1.

EventControl

Related Topic: Event Control Function

Configure event control settings.

Notes:
- This function is not supported on the AP-5100T-MCL model.
- Items with "*" are only supported on the AP-5100T-5GE model. Items with "**" are only supported on the AP-5100T-CXPA model.

Event Control Item	Setting Range	Default	Description
EventSelector (IEnum)	Select the event for which to send notifications. 0: AcquisitionStart** 1: AcquisitionEnd**) 40: AcquisitionTrigger* 42: FrameStart 44: FrameEnd 6: ExposureRedStart 7: ExposureRedEnd 8: ExposureGreenStart 9: ExposureGreenEnd 10: ExposureBlueStart 11: ExposureBlueEnd		
EventNotification (IEnum)	0: Off (Default) 1: On		Select whether to output the Event message selected by **EventSelector**. When set to **On**, the following data will be displayed each time the specified Event occurs.
EventAcquisitionTriggerData* (ICategory)			Display the following data when the Event occurs.
EventAcquisitionTrigger* (IInteger)	-	0x9002	Display the EventID.
EventAcquisitionTriggerTimestamp* (IInteger)	0 ~ 64bit max	0	Display the Timestamp value when an Event occurred.
EventAcquisitionTriggerFrameID* (IInteger)			Displays the FrameID value when an event occurs.
EventAcquisitionStartData** (ICategory)			Display the following data when the Event occurs.
EventAcquisitionStart** (IInteger)	-	0x0102	Display the EventID.
EventAcquisitionStart Timestamp** (IInteger)	0 ~ 64bit max	0	Display the Timestamp value when an Event occurred.
EventAcquisitionEndData** (ICategory)			Display the following data when the Event occurs.

Event Control Item	Setting Range	Default	Description
EventAcquisitionEnd** (IInteger)	-	0x0103	Display the EventID.
EventAcquisitionEnd Timestamp** (IInteger)	0 ~ 64bit max	0	Display the Timestamp value when the Event occurred.
EventFrameStartData (ICategory)			Display the following data when the Event occurs.
EventFrameStart (IInteger)	-	CXP: 0x0114 5GE: 0x9300	Display the EventID.
EventFrameStartTimestamp (IInteger)	0 ~ 64bit max	0	Display the Timestamp value when an Event occurred.
EventFrameStartFrameID* (IInteger)			Displays the FrameID value when an event occurs.
EventFrameEndData (IInteger)			Display the following data when the Event occurs.
EventFrameEnd (IInteger)	-	CXP: 0x0115 5GE: 0x9301	Display the EventID.
EventFrameEnd Timestamp (IInteger)	0 ~ 64bit max	0	Display the Timestamp value when the Event occurred.
EvenFrameEndFrameID* (IInteger)			Displays the FrameID value when an event occurs.
EventExposureRedStartData (ICategory)			Display the following data when the Event occurs.
EventExposureRedStart (IInteger)	-	CXP: 0x0130 5GE: 0x9302	Display the EventID.
EventExposureRedStart Timestamp (IInteger)	0 ~ 64bit max	0	Display the Timestamp value when the Event occurred.
EventExposureRedStartFrameID* (IInteger)			Displays the FrameID value when an event occurs.
EventExposureRedEndData (ICategory)			Display the following data when the Event occurs.
Event ExposureRedEnd (IInteger)	-	CXP: 0x0131 5GE: 0x9303	Display the EventID.
EventExposureRedEnd Timestamp (IInteger)	0 ~ 64bit max	0	Display the Timestamp value when the Event occurred.
EventExposureRedEndFrameID* (IInteger)			Displays the FrameID value when an event occurs.
EventExposureGreenStartData (ICategory)			Display the following data when the Event occurs.

Event Control Item	Setting Range	Default	Description
EventExposureGreenStart (IInteger)	-	CXP: 0x0132 5GE: 0x9304	Display the EventID.
EventExposureGreenStart Timestamp (IInteger)	0 ~ 64bit max	0	Display the Timestamp value when the Event occurred.
EventExposureGreenStartFrameID* (IInteger)			Displays the FrameID value when an event occurs.
EventExposureGreenEndData (ICategory)			Display the following data when the Event occurs.
EventExposureGreenEnd (IInteger)	-	CXP: 0x0133 5GE: 0x9305	Display the EventID.
EventExposureGreenEnd Timestamp (IInteger)	0 ~ 64bit max	0	Display the Timestamp value when the Event occurred.
EventExposureGreenEndFrameID* (IInteger)			Displays the FrameID value when an event occurs.
EventExposureBlueStartData (ICategory)			Display the following data when the Event occurs.
Event ExposureBlueStart (IInteger)	-	CXP: 0x0134 5GE: 0x9306	Display the EventID.
Event ExposureBlueStart Timestamp (IInteger)	0 ~ 64bit max	0	Display the Timestamp value when the Event occurred.
EventExposureBlueStartFrameID* (IInteger)			Displays the FrameID value when an event occurs.
EventExposureBlueEndData (ICategory)			Display the following data when the Event occurs.
EventExposureBlueEnd (IInteger)	-	CXP: 0x0135 5GE: 0x9307	Display the EventID.
EventExposureBlue Timestamp (IInteger)	0 ~ 64bit max	0	Display the Timestamp value when the Event occurred.
EventExposureBlueEndtFrameID* (IInteger)			Displays the FrameID value when an event occurs.

ChunkDataControl

Related Topic: Chunk Data Function

Configure Chunk Control settings.

Note: This function is only supported on the AP-5100T-5GE model.

Chunk Data Control Items	Setting Range	Default	Description
ChunkModeActive (IBoolean)	False True	False	Set whether to enable ChunkData.
ChunkExposureTimeSelector (IEnum)	0: Common (Default) 1: Red 2: Green 3: Blue		Select the ExposureTime to display.
ChunkExposureTime (IFloat)	-	-	Display the ExposureTime (AcquisitionControl) value. The data acquisition timing is on the first line's ExposureTime. ChunkID: 0x2004 — ChunkExposureTimeCommon ChunkID: 0x2004 — ChunkExposureTimeGreen ChunkID: 0x201C — ChunkExposureTimeRed ChunkID: 0x201D — ChunkExposureTimeBlue
ChunkGainSelector (IEnum)	0: Analog All (Default) 1: Analog Red 2: Analog Green 3: Analog Blue 4: Digital Red 5: Digital Blue		Select the Gain to display.
ChunkGain (IFloat)	-	-	Display the Gain value (AnalogControl). ChunkID: 0x201F — ChunkGainAnalogAll ChunkID: 0x201F — ChunkGainAnalogGreen ChunkID: 0x2020 — ChunkGainAnalogRed ChunkID: 0x2021 — ChunkGainAnalogBlue TBD — ChunkDigitalRed TBD — ChunkDigitalBlue

Chunk Data Control Items	Setting Range	Default	Description
ChunkFrameTriggerCounter (IInteger)			Display the CounterValue[Counter0] (CounterAndTimerControl) value. Data acquisition timing is FrameStart. ChunkID: 0x200E
ChunkLineStatusAll OnExposureStart (IInteger)	-	-	Display the LineStatusAll (DigitalIOControl) value. The data acquisition timing is at theExposureStart, and the displayed value is the value determined by the Line Inverter setting. ChunkID: 0x2016

TestControl (AP-5100T-5GE)

Tests the PendingAck function.

Test Control Item	Setting Range	Default	Description
TestPendingAck (ms) (IInteger)	-	-	After the time specified by TestPendingAck has elapsed, a WriteRegAck is issued. If the specified time period exceeds the maximum device response time defined by DeviceLinkCommandTimeout, a PendingAck is issued instead. When read, the current Value is returned immediately without any waiting period.

UserSetControl

Load factory default settings or save/load user settings for camera settings.

> **Related Topic:** Step 7: Saving the Settings

User Set Control Item	Setting Range	Default	Description
UserSetSelector (IEnum)	0: Default (Default) 1: User1 2: User2 3: User3		Select the user settings. **Note:** The factory default setting values are stored in Default and cannot be overwritten.
UserSetLoad (ICommand)	-	-	Load user settings. When selecting Default, the factory settings are loaded.
UserSetSave (ICommand)	-	-	Save the current setting values as user settings. This item is disabled when UserSetSelector is set to Default.

Misc (AP-5100T-MCL)

Configure VideoSendMode.

Misc Item	Setting Range	Default	Description
VideoSendMode (IEnum)	0: Normal Mode (Default) 1: TriggerSequencerMode 2: CommandSequencerMode 3: MultiRoiMode		Display the VideoSendMode setting.

Miscellaneous

Troubleshooting

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

Power Supply and Connections

Issue: The POWER/TRIG LED remains lit amber and 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 CoaxPress cable (CXPA model only) or 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 in the Feature Properties tab to restore the factory default settings.

Specifications

<table>
<tr><th>Item</th><th>Specifications</th></tr>
<tr><td>Image Sensor</td><td>5.1 megapixel 3CMOS global shutter prism camera
Image Sensor: Type 1/1.8
Readout Pixels (Full ROI): 3x 2464 (H) x 2056 (V) pixels
Active Pixels: 3x 2472 (H) x 2064 (V) pixels
Pixel Size: 2.74 µm x 2.74 µm
Image Size (Effective Image): 6.77mm(H)×5.66mm(V), 8.82mm (diagonal)</td></tr>
<tr><td>Scanning System</td><td>Progressive scan, 1 tap</td></tr>
<tr><td>Synchronization</td><td>Internal</td></tr>
<tr><td>Interface</td><td>AP-5100T-CXPA: CoaxPress v2.0/v1.1 (CXP-12_1, CXP6_X1, CXP3_X1)
AP-5100T-5GE: 5GBASE-T Ethernet (GigE Vision 2.0)
AP-5100T-MCL: CameraLink (Specification v2.1)</td></tr>
<tr><td>Max Frame Rate:

AP-5100T-CXPA (Full ROI)</td><td>
<table>
<tr><th>CxpLinkConfiguration</th><th>RGB8</th><th>RGB10</th><th>RGB12</th></tr>
<tr><td>CXP12_X1</td><td>75 fps</td><td>60 fps</td><td>50 fps</td></tr>
<tr><td>CXP6_X1</td><td>37 fps</td><td>30 fps</td><td>25 fps</td></tr>
<tr><td>CXP3_X1</td><td>18 fps</td><td>15 fps</td><td>12 fps</td></tr>
</table>
</td></tr>
<tr><td>Max Frame Rate:

AP-5100T-5GE (Full ROI)</td><td>
<table>
<tr><th>RGB8</th><th>RGB10V1Packed, RGB10p32</th><th>RGB12V1Packed</th></tr>
<tr><td>32 fps</td><td>24 fps</td><td>21 fps</td></tr>
</table>
</td></tr>
<tr><td>Max Frame Rate:

AP-5100T-MCL (Full ROI)</td><td>
<table>
<tr><th>RGB 8-bit 10-tap</th><th>RGB 10bit 8-tap</th><th>RGB FULL 2TAP</th></tr>
<tr><td>55 fps</td><td>44 fps</td><td>33 fps</td></tr>
</table>
</td></tr>
<tr><td>Dark SN</td><td>TBD</td></tr>
<tr><td>Bright SN</td><td>TBD</td></tr>
<tr><td>Digital Image Output</td><td>
<table>
<tr><th></th><th>Horizontal/Vertical Binning = 1
FD2x2Binning = Off</th><th>Horizontal/Vertical Binning = 2</th><th>FD2x2Binning = On</th></tr>
<tr><td>Width</td><td>96 ~ 2464, step: 8</td><td>48 ~ 1232, step: 4</td><td>48 ~ 1228, step: 4</td></tr>
<tr><td>Height</td><td>8 ~ 2056, step: 2</td><td>4 ~ 1028, step: 1</td><td>4 ~ 1024, step: 1</td></tr>
<tr><td>OffsetX</td><td>0 ~ 2368, step: 8</td><td>0 ~ 1184, step: 4</td><td>0 ~ 1180, step: 4</td></tr>
<tr><td>OffsetY</td><td>0 ~ 2048, step: 2</td><td>0 ~ 1024, step: 1</td><td>0 ~ 1020, step: 1</td></tr>
</table>
</td></tr>
<tr><td>Pixel Format</td><td>
<table>
<tr><th>AP-5100T-CXPA</th><th>AP-5100T-5GE</th><th>AP-5100T-MCL</th></tr>
<tr><td>RGB8, RGB10, RGB12</td><td>RGB8, RGB10V1Packed, RGB10p32, RGB12V1Packed</td><td>RGB8, RGB10, RGB12</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th>Item</th><th>Specifications</th></tr>
<tr><td>ImageScalingMode (Xscale)</td><td>Independent, sub-pixel rescaling of H and/or V resolution (1/16 Max)</td></tr>
<tr><td>Acquisition Mode (AP-5100T-CXPA, AP-5100T-5GE Only)</td><td>SingleFrame, MultiFrame (AcquisitionFrameCount 1 ~ 65535), Continuous</td></tr>
<tr><td>Trigger Selector</td><td>AP-5100T-CXPA: AcquisitionStart, AcquisitionEnd, FrameStart
AP-5100T-5GE: AcquisitionStart, AcquisitionEnd, FrameStart, AcquisitionTransferStart
AP-5100T-MCL: FrameStart</td></tr>
<tr><td>ExposureMode / Time</td><td>
<table>
<tr><th>Model</th><th>ExposureMode</th><th>ExposureTime (µs)</th></tr>
<tr><td rowspan="4">AP-5100T-CXPA</td><td>Off</td><td>TBD</td></tr>
<tr><td>Timed (Trigger Off)</td><td>1µs ~ TBD</td></tr>
<tr><td>Timed (Trigger On)</td><td>1µs ~ 8s</td></tr>
<tr><td>TriggerWidth</td><td>1µs ~ ∞</td></tr>
<tr><td rowspan="4">AP-5100T-5GE</td><td>Off</td><td>TBD</td></tr>
<tr><td>Timed (Trigger Off)</td><td>1µs ~ TBD</td></tr>
<tr><td>Timed (Trigger On)</td><td>1µs ~ 8s</td></tr>
<tr><td>TriggerWidth</td><td>1µs ~ ∞</td></tr>
<tr><td rowspan="4">AP-5100T-MCL</td><td>Off</td><td>TBD</td></tr>
<tr><td>Timed (Trigger Off)</td><td>1µs ~ TBD</td></tr>
<tr><td>Timed (Trigger On)</td><td>1µs ~ 8s</td></tr>
<tr><td>TriggerWidth</td><td>1µs ~ ∞</td></tr>
<tr><td colspan="3">Exposure Offset Duration: 2.47µs</td></tr>
</table>
</td></tr>
<tr><td>ExposureModeOption</td><td>Off / RCT</td></tr>
<tr><td>OptInFilter</td><td>0 ~ 40 ms (step: 100ns)</td></tr>
<tr><td>TriggerOverlap</td><td>Off, Readout</td></tr>
<tr><td>Trigger Input Signals</td><td>TTL In x2, Opto In x2, CXP In (AP-5100T-CXPA Only),CC1 (AP-5100T-MCL Only), Software, Pulse Generator x 4, User Output x 4, Action x4 (AP-5100T-5GE Only), NAND 0 Out, NAND 1 Out
Minimum trigger width: TBDµs and more</td></tr>
<tr><td>Exposure Auto</td><td>Off, Once, Continuous</td></tr>
<tr><td>ALCControlRatio</td><td>1 ~ 100%</td></tr>
<tr><td>Digital IO</td><td>LineSelector (12-pin, 6-pin): GPIO IN / OUT</td></tr>
</table>

<table>
<tr><th>Item</th><th>Specifications</th></tr>
<tr><td>Gain Adjustment (Manual)</td><td>
<table>
<tr><th>GainSelector</th><th>IndividualGainMode = Off</th><th>IndividualGainMode = On</th></tr>
<tr><td>AnalogAll*</td><td>0.0dB ~ 18.1dB (x1.0 ~ x8.0)</td><td>0db (x1.0) (Fixed)</td></tr>
<tr><td>AnalogRed*</td><td>-6.6dB ~ 12.0dB (0.47 ~ 4.0)</td><td>0dB ~ 36.1dB (x1.0 ~ x64.0)</td></tr>
<tr><td>AnalogBlue*</td><td>-6.6dB ~ 12.0dB (0.47 ~ 4.0)</td><td>0dB ~ 36.1dB (x1.0 ~ x64.0)</td></tr>
<tr><td>AnalogGreen*</td><td>0db (x1.0) (Fixed)</td><td>0dB ~ 36.1dB (x1.0 ~ x64.0)</td></tr>
<tr><td>DigitalRed</td><td colspan="2">-0.9dB ~ 0.8dB (x0.9 ~ x1.1)</td></tr>
<tr><td>DigitalBlue</td><td colspan="2">-0.9dB ~ 0.8dB (x0.9 ~ x1.1)</td></tr>
<tr><td colspan="3">*The resolution is set in about 0.1dB steps.</td></tr>
</table>
</td></tr>
<tr><td>Gain Adjustment (Automatic)</td><td>Off, Once, Continuous</td></tr>
<tr><td>Black Level Adjustment</td><td>All: -133 ~ +255; Red/Blue: -64 ~ +64</td></tr>
<tr><td>White Balance</td><td>Manual: WB Gain: AnalogRed, AnalogBlue (0.47 ~ 4.0, 1step = 0.1dB)
Auto: BalanceWhiteAuto: Once, Continuous, Exposure Once, Exposure Continuous, 3200K, 5000K, 6500K, 7500K
WB Area : 16 (4x4)
WB Range: 3000K~9000K</td></tr>
<tr><td>Blemish Compensation</td><td>Detection: Detect white blemishes using threshold values (100 steps available) (black blemish correction performed only at the factory)
Correction: Interpolation using adjacent pixels. Continuous blemishes can be corrected up to 3 horizontal pixels
Correctable pixels: 300 pixels</td></tr>
<tr><td>ALC</td><td>Video level adjusted automatically using AGC and ASC</td></tr>
<tr><td>Gamma</td><td>0.45, 0.5, 0.55, 0.6, 0.65, 0.75, 0.8, 0.9,1.0 (9 steps available)</td></tr>
<tr><td>LUT</td><td>OFF: γ = 1.0、ON = 257 points can be set</td></tr>
<tr><td>Power : AP-5100T-CXPA</td><td>
<table>
<tr><td rowspan="2">12-pin</td><td>Input Range</td><td>DC10.8 to 26.4 V</td></tr>
<tr><td>Consumption*</td><td>8.4W (typ), Max 10.3W</td></tr>
<tr><td>PoCXP</td><td>Consumption*</td><td>8.4W (typ), Max 10.3W</td></tr>
<tr><td colspan="3">*Default Setting/25°C Environment)</td></tr>
</table>
</td></tr>
<tr><td>Power: AP-5100T-5GE, AP-5100T-5GE</td><td>
<table>
<tr><td rowspan="2">12-pin</td><td>Input Range</td><td>DC10.8 to 26.4 V</td></tr>
<tr><td>Consumption*</td><td>TBD</td></tr>
<tr><td colspan="3">*Default Setting/25°C Environment)</td></tr>
</table>
Note: PoE / PoCL is not supported.
</td></tr>
<tr><td>Lens Mount</td><td>C-mount (back flange distance: 17.526mm)</td></tr>
</table>

<table>
<tr><th>Item</th><th>Specifications</th></tr>
<tr><td>Back flange distance</td><td>17.526mm</td></tr>
<tr><td>Optical Filter</td><td>IR cut filter</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 section.</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>3G (20 Hz ~ 200 Hz X-Y-Z direction)</td></tr>
<tr><td>Shock Resistance</td><td>50G</td></tr>
<tr><td>Regulations</td><td>CE [EN 55032:2015(CISPR32:2015) Class B, EN 55035:2017 (CISPR35:2016)], FCC Part 15 Class B, EU RoHS/WEEE, China RoHS, KC</td></tr>
<tr><td>Dimensions</td><td>54mm x 54 mm x 74 mm(Excluding lens mount protrusions and connectors)</td></tr>
<tr><td>Weight</td><td><table><tr><th>AP-5100T-CXPA</th><th>AP-5100T-5GE</th><th>AP-5100T-MCL</th></tr><tr><td>210g</td><td>TBD</td><td>TBD</td></tr></table></td></tr>
</table>

Package Contents

- Camera (1)
- Sensor protection cap (1)
- Dear customer (sheet) (1)

Optional Accessories (Sold Separately)

- MP-44 Tripod Adapter Plate

Notes:

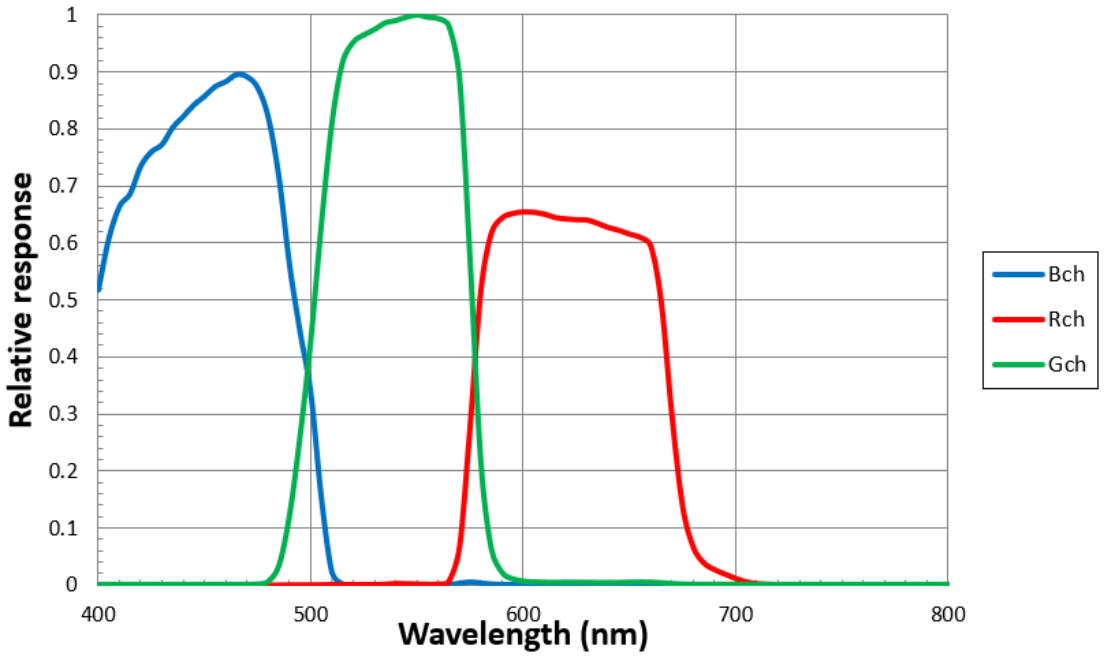
- Design and specifications are subject to change without notice.
- Approximately 30 minutes of warm-up are required to achieve these specifications.

Cautions:
The performance specifications given for this camera have been verified for the Operating Temperature range shown in the Specifications table. The camera may be able to perform outside of the specified temperature range, but such performance has not been verified and is therefore not guaranteed.

- The camera's internal temperature should not exceed 72 °C during operation.

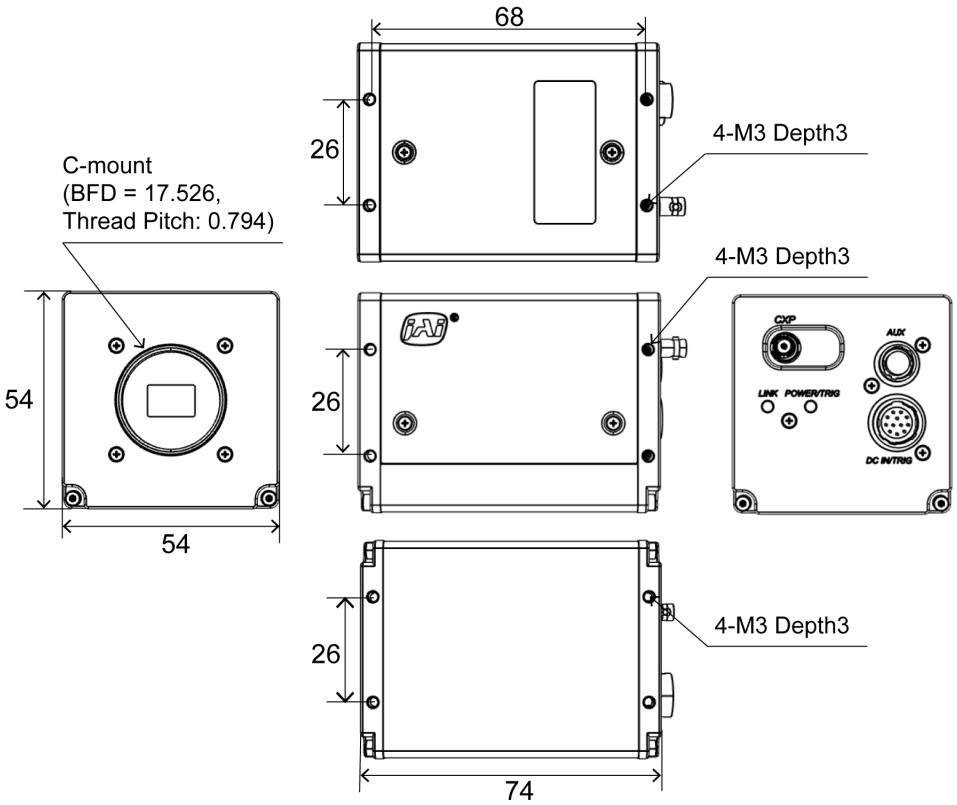
If the above temperature conditions are exceeded, take measures to dissipate heat according to your installation environment and conditions.

Spectral Response



Dimensions

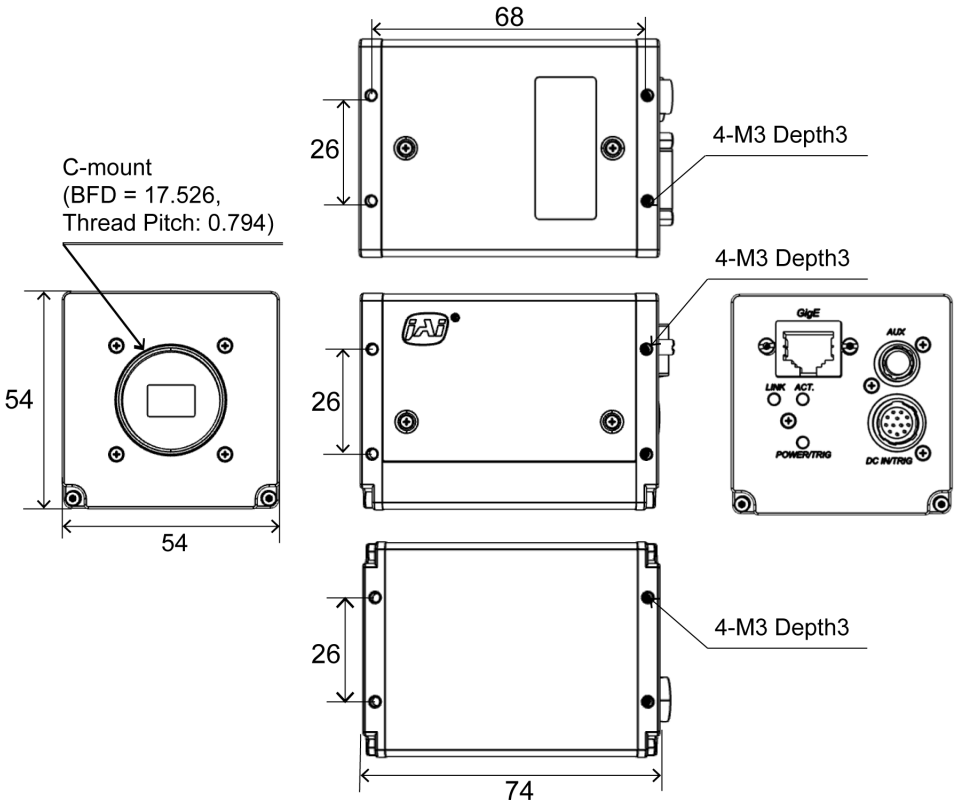
AP-5100T-CXPA



Notes:

- Dimensional tolerance: ± 0.3mm
- Unit: mm
- BFD = Back flange distance

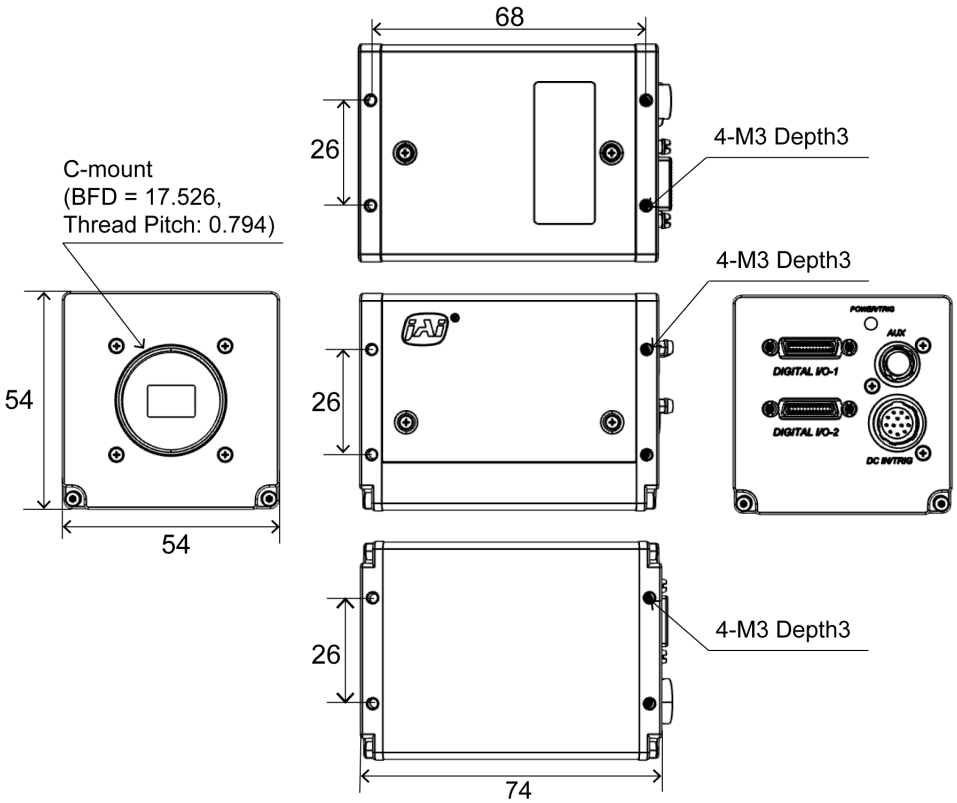
AP-5100T-5GE



Notes:

- Dimensional tolerance: ± 0.3mm
- Unit: mm
- BFD = Back flange distance

AP-5100T-MCL



Notes:

- Dimensional tolerance: ± 0.3mm
- Unit: mm
- BFD = Back flange distance

Comparison of the Decibel Display and Multiplier Display

Decibels [dB]	Multipliers [X]	Remarks
-6	0.501	
-5	0.562	
-4	0.631	
-3	0.708	
-2	0.794	
-1	0.891	
0	1	
1	1.122	
2	1.259	
3	1.413	
4	1.585	
5	1.778	
6	1.995	
7	2.239	
8	2.512	
9	2.818	
10	3.162	
11	3.548	
12	3.981	
13	4.467	
14	5.012	
15	5.623	
16	6.31	
17	7.079	
18	7.943	
19	8.913	
20	10	
21	11.22	
22	12.589	
23	14.125	
24	15.849	
25	17.783	
26	19.953	
27	22.387	
28	25.119	
29	28.184	
30	31.623	
31	35.481	

Decibels [dB]	Multipliers [X]	Remarks
32	39.811	
33	44.668	
34	50.119	
35	56.234	
36	63.096	
37	70.795	
38	79.433	
39	89.125	
40	100	
41	112.202	
42	125.893	

User's Record

Model name: ……

Revision: ……

Serial No: ……

Firmware version: ……

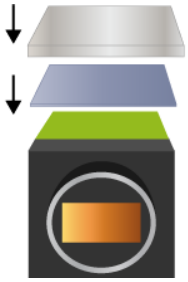
For camera revision history, please contact your local JAI distributor.

Appendix

This section provides information about the thermal management of this camera.

Recommended Passive Cooling Method

If the camera's internal temperature exceeds the allowed maximum temperature (72 °C), JAI recommends attaching a thermal pad to the camera and place a metal plate over it.



Notes:

- A thermal pad and metal plate can be attached to the top, bottom, or a side of the camera, depending on how the camera is installed.
- You can monitor the camera's internal temperature by DeviceTemperature (DeviceControl).

Revision History

Revision	Date	Changes
Tentative	2025/10/08	For Marketing Launch.

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