



CC1 Series USB3.0 Industrial Area Scan Camera Specifications

V2.1.0



Preface

The purpose of this section is to ensure that users can use the product correctly through this manual to avoid danger or property damage during operation. Before using this product, please read the product manual carefully and keep it for future reference.

Overview

This manual applies to CC1 Series USB3.0 Industrial Area Scan Camera.

Symbolic Conventions

The following designations may appear in this document and have the following meanings:

Markings	Instructions
 Instructions	Instructions text, which indicates the supplement and explanation of the main text.
 Notes	Notes text, indicating a reminder to the user of important operations or to guard against potential hazards of injury and property damage.
 Warning	Warning type text, indicating that there is a potential risk, if not avoided, may cause injury accident, equipment damage or business interruption.
 Danger	Dangerous text indicates a high potential risk that, if not avoided, could result in a significant risk of injury or death.

Revision Record

Version Number	Revised content	Release Date
V1.0.0	First release.	20240224

Safety Instructions for Use

In order to prevent the occurrence of danger and prevent the loss of personnel and property, the following is the correct use of this product. Please read this manual carefully before using the equipment and strictly abide by it when using it. Please keep the manual properly after reading it.



Warning

- During the installation and use of the product, the electrical safety regulations of the country and the use area must be strictly observed.
- Please use the power adapter provided by the regular manufacturer. Please refer to the product parameter table for the specific requirements of the power adapter.
- To reduce the risk of fire or electric shock, do not expose the product to rain or moisture.
- When installing in the use environment, please ensure that the product is firmly fixed.
- If the product is not working properly, please contact the nearest service center and do not disassemble or modify the product in any way.

(The company does not assume any responsibility for problems caused by unauthorized modifications or repairs).



Notes

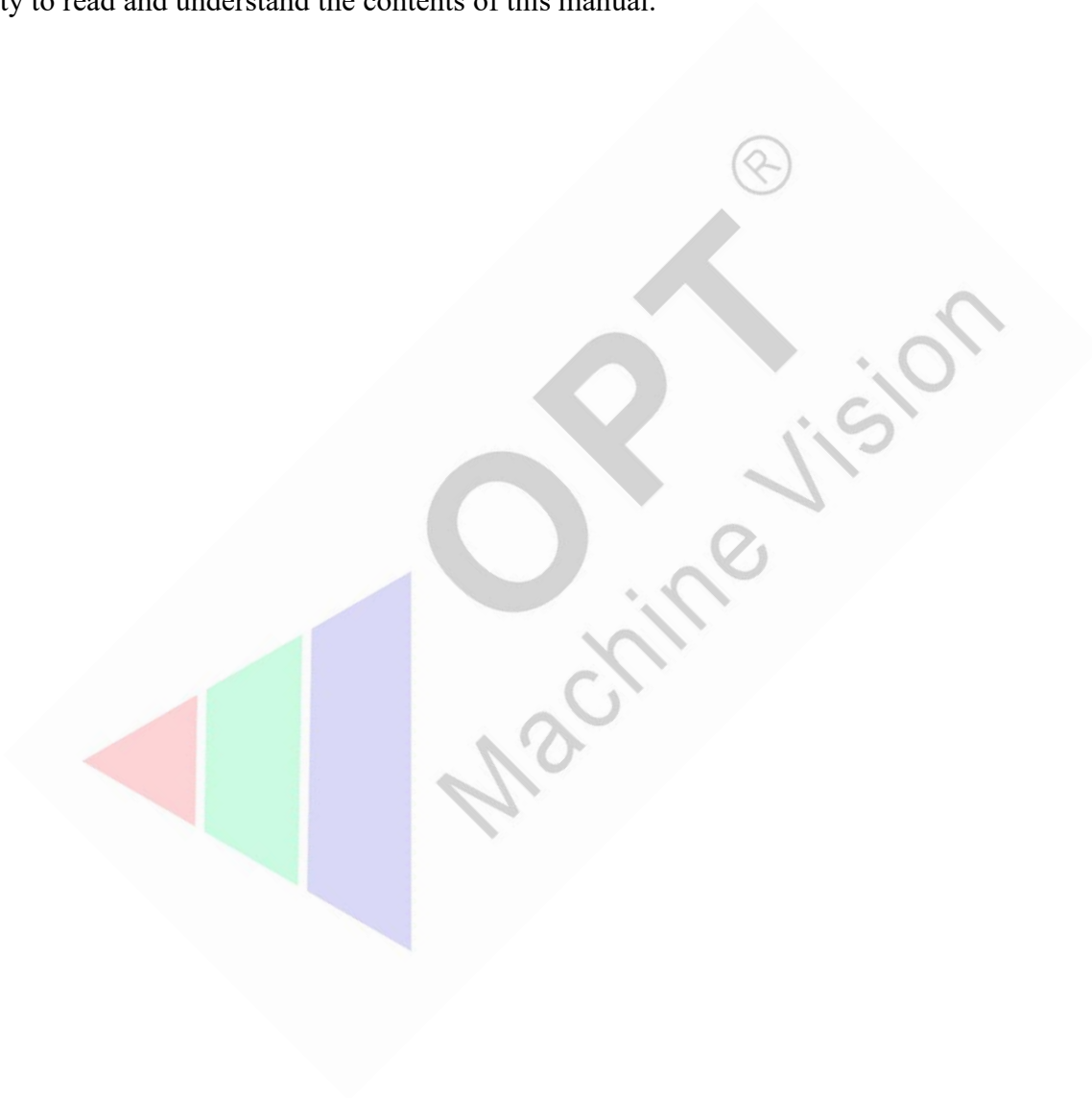
- Avoid installing the product in a vibration or shock environment, and keep the product away from electromagnetic interference. (Ignoring this item may damage the product).
- Do not directly touch the heat dissipation parts of the product to avoid scalding.
- Do not install indoor products in an environment where water or other liquids may be exposed.
- Please do not use the product in extremely hot, cold, dusty, corrosive or high humidity environment. Please refer to the parameter table of the product for specific temperature and humidity requirements.
- Avoid aiming the lens at strong light (such as lighting, sunlight or laser beams), otherwise the image sensor will be damaged.
- Do not touch the image sensor directly. If necessary, please moisten a soft clean cloth with alcohol and gently wipe off the dust. When the product is not in use, please add a dust cover to protect the image sensor.
- Please keep all the original packaging materials of the camera properly, so that when there is a problem, use the packaging materials to pack the camera and send it to the agent or return to the manufacturer for processing. The company does not assume any responsibility for accidental damage during transportation caused by non-original packaging materials.



Instructions

Quality requirements for installation and maintenance personnel:

- Have the qualification certificate or experience in the installation and maintenance of weak current system, and have the experience and qualification to engage in related work, in addition, must have the following knowledge and operation skills.
- Basic knowledge and operation skills of low voltage wiring and low voltage electronic circuit wiring.
- Ability to read and understand the contents of this manual.



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Chapter1 Product overview

1.1 Product Introduction

USB3.0 Industrial Area Scan Camera is the 1 highly reliable and cost-effective area array industrial camera. It uses high-performance photosensitive chip, real-time transmission of non-compressed image data through USB data interface, compatible with USB3.0 Vision and GenICam standard application development tools, can meet the needs of most industrial applications, and can stably work in various harsh environments.

1.2 Functional Characteristics

- Compact structure, suitable for small installation space.
- Support software trigger/hardware trigger/soft and hard mixed trigger/free running and other modes.
- Support gamma correction, look-up table, black level correction, brightness, and other ISP functions.
- 128MB on-board cache for data transmission or image retransmission in burst mode;
- Support multiple image data format output, custom ROI, mirror image, etc.
- The wide-voltage input complies with the USB Vision protocol and GenICam standards.
- USB3.0 interface with locking buckle, can prevent accidental plug out.



Instructions

- Some functions depend on the specific model, please refer to the actual function.
- For the technical parameters of the equipment, please check the technical specifications of the specific model.

1.3 Product Size

The structural dimensions of the product are as follows:

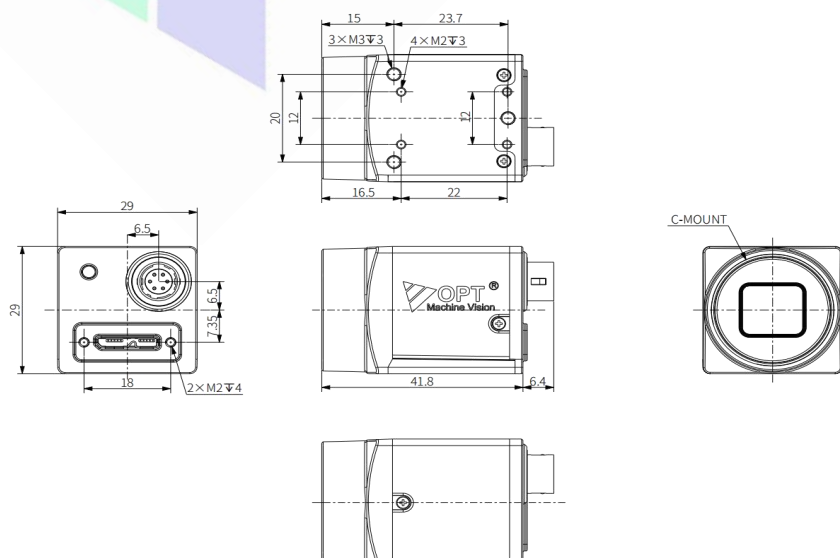


Figure 1-1 29mm × 29mm × 29mm (Dimensions)

1.4 Power and I/O Interface Definitions

There are two interfaces on the back of the device, network interface, 6pin power supply and I/O interface, as shown in the following figure:

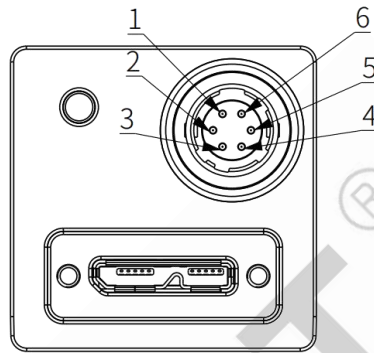


Figure 2-1 Camera Appearance Interface

The definition of I/O interface pin signals is shown in Table 2-1 (power 6-core interface):

Table 2-1 Pin Signal Definition

Pin	Signal	Description
1	Power	DC 12V ~ 24V camera power supply
2	Line1	Optocoupler isolation input
3	Line3	GPIO (non-isolated software configurable input/output I/O)
4	Line2	Optocoupler isolated output
5	ISO_GND	Optocoupler isolation signal ground
6	GND	Camera power ground and GPIO signal ground

1.5 Status Indicator

The status indicator of the equipment is shown in Table 2-2:

Status	Indicator Status		Description
Normal state	Red	Red light flash	The device is starting up.
	Green	The green light is always on	The camera is connected, does not start to acquire images, and is in continuous acquisition mode or single frame acquisition mode.
		Green light blitz	The camera is connected and is in continuous acquisition mode or single frame acquisition mode

			during image acquisition.
		Green light flashing slowly	The device is in triggered mode (both triggered and untriggered).
Abnormal state	Red	The red light is always on	No codestream, firmware upgrade failure, or other fatal error.

Table 2-2 Description of Indicator Lights



Chapter2 I/O Electrical Characteristics and Wiring

2.1 I/O Electrical Characteristics

2.1.1 Optocoupler isolation input

In the I/O signal of the camera, Line1 is an optocoupler isolation input, and the maximum input current of Line1 is 25mA.

Table 2-3 Optocoupler Isolation Input

Input voltage	Description
30V	Limit voltage, the input can not exceed this limit value, otherwise it will cause damage to the equipment
DC 0~24V	I/O input safe operating voltage range
DC 0~1.4V	Represents logical "0"
DC >1.4V~2.2V	The input state is flipped here, and the logic state is uncertain within this voltage range.
DC >2.2V	Indicates logical "1"



Notes

Isolated I/O input port pouring current 5mA ~ 15mA.

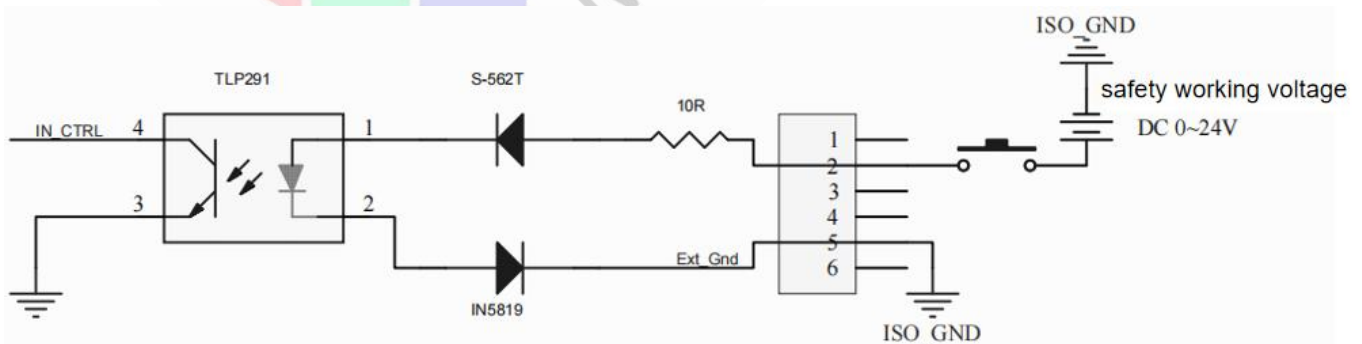


Figure 2-2 Optocoupler isolated input circuit diagram

2.1.2 Optocoupler isolated output

Table 2-4 Optocoupler Isolation Output

Voltage	Description
DC 30V	Limit voltage, the input can not exceed this limit value, otherwise it will cause damage to the equipment
DC<3.3V	I/O output may be wrong
DC 3.3V~+24V	I/O Output Safe Operating Range

Notes

The isolated I/O output port continuously passes a maximum of 50mA current.

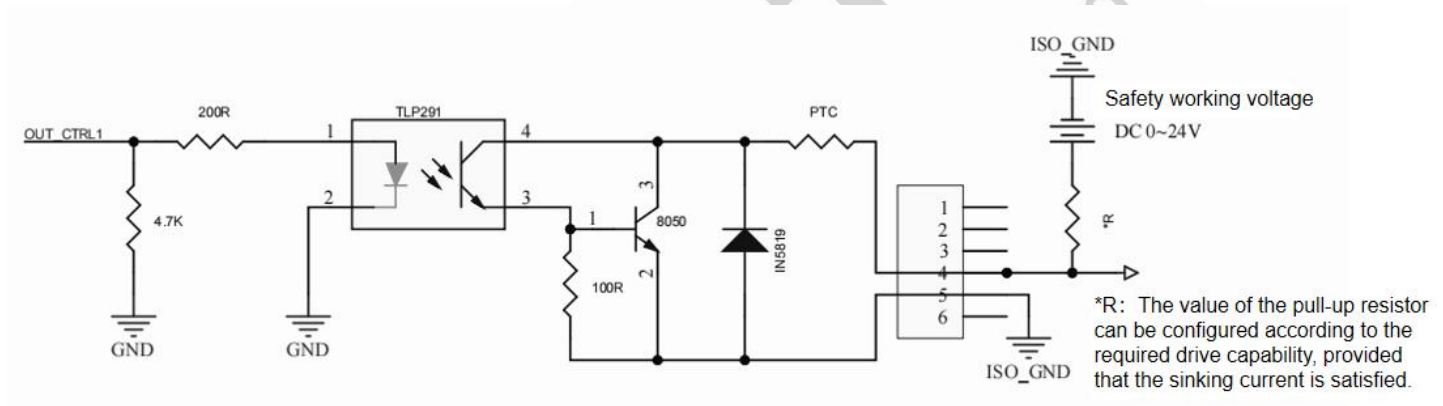


Figure 2-3 Optocoupler isolated output circuit diagram

2.1.3 GPIO input

Table 2-5 GPIO Input

Voltage	Description
DC 30.0V	Limit voltage, the input can not exceed this limit value, otherwise it will cause damage to the equipment
DC 0~5.0V	Safe operating voltage range at input (minimum voltage DC 3.3V at external pull-up)
DC 0~0.8V	Represents logical "0"
DC>0.8V~2.0V	The input state is flipped here, and the logic state is uncertain within this voltage range.
DC>2V	Indicates logical "1"

! Notes

When the user externally inputs logic 0, the maximum filling current is 2mA, and when the user inputs logic 0, the maximum filling current of the interface is 100uA.

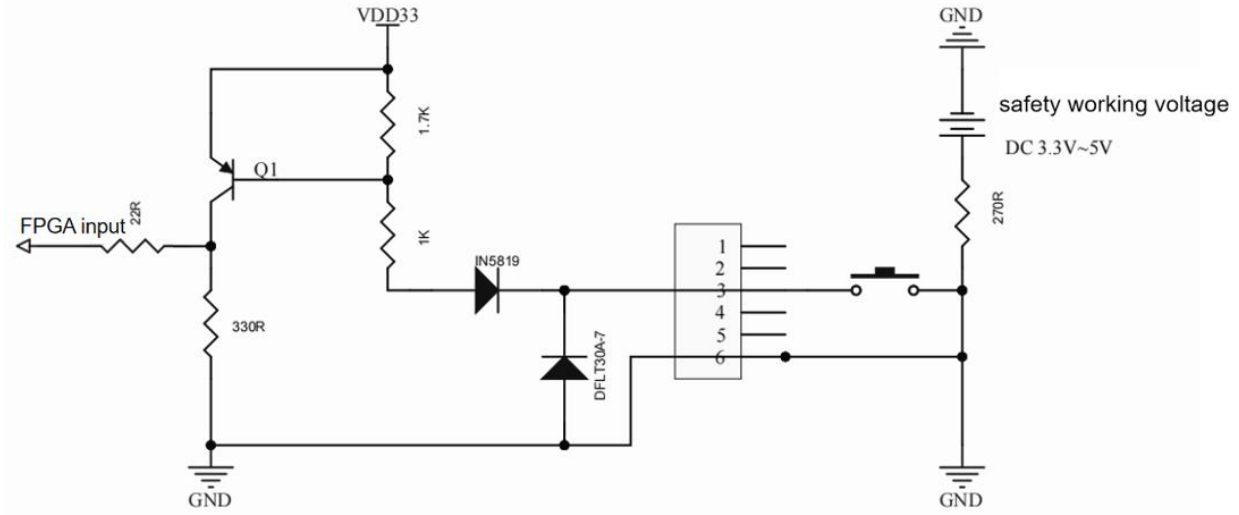


Figure 2-4 GPIO input circuit diagram

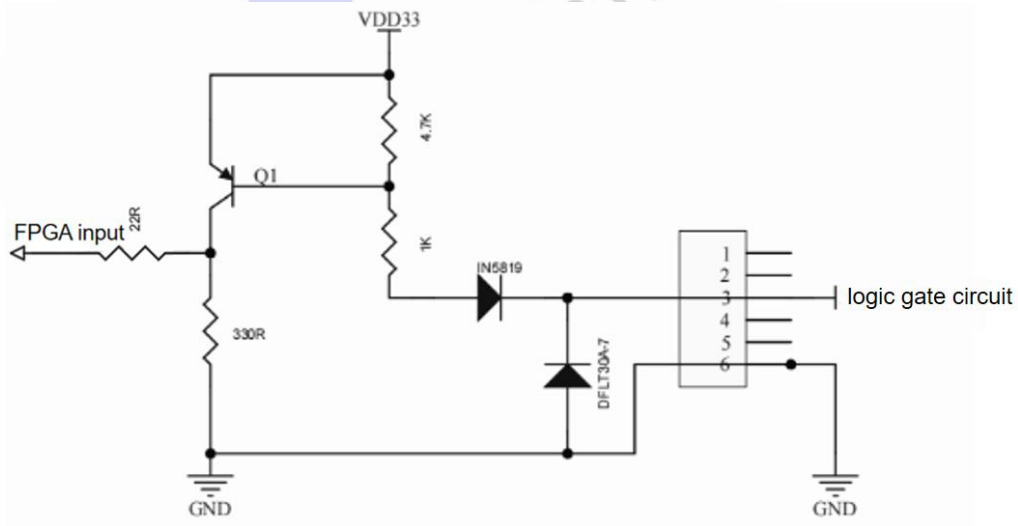


Figure 2-5 Circuit diagram using 5V TTL logic level input

2.1.4 GPIO output

Table 2-6 GPIO Output

Voltage	Description
DC 30V	Limit voltage, the output can not exceed this limit value, otherwise it will cause damage to the equipment
DC +3.3V~+24V	Safe operating voltage range at output
DC <3.3V	I/O output may be wrong



Notes

When used as output, IO port can input 50mA current at most.

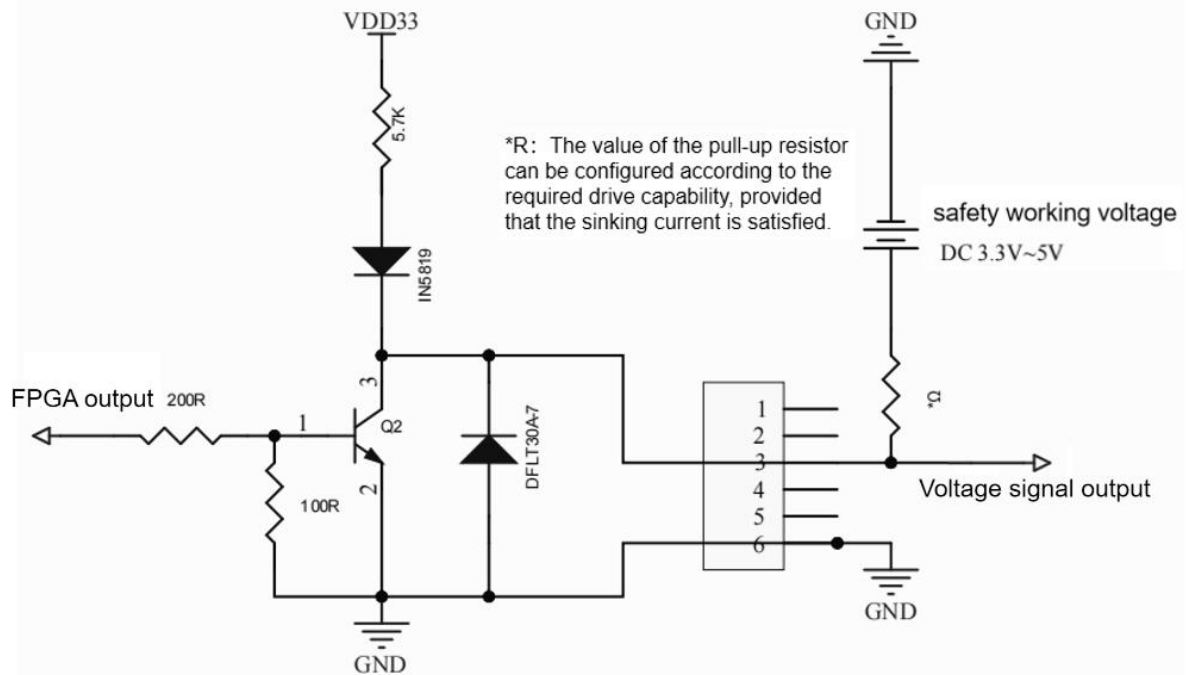


Figure 2-6 GPIO output circuit diagram

Chapter3 Product Installation

Installation is mainly divided into hardware installation and application installation.

3.1 Hardware Installation

Before installation, please check the equipment for obvious damage and confirm whether it is consistent with the matching list.

3.1.1 Accessories

The list of accessories is shown in Table 3-1.

Table 3-1 List of Accessories

Serial Number	Accessory Name	Quantity
1	area array industrial camera	1
2	M2 × 6 screw	4
3	M3 × 8 screw	Three

3.1.2 Camera Installation

1. Fix the camera to the installation position and select the appropriate lens to install on the camera.
2. Use standard USB3.0 cable to connect camera and host USB3.0 interface.

3.2 Application Installation

The steps for the host to install the application are as follows:



Instructions

Contact the relevant technical support personnel to obtain the application installation package.



1. Open the software, double-click the desktop shortcut to open the application installation package.
2. Double-click the installation package to enter the installation interface, pop up "Select installation language", and click "OK" after selection ".

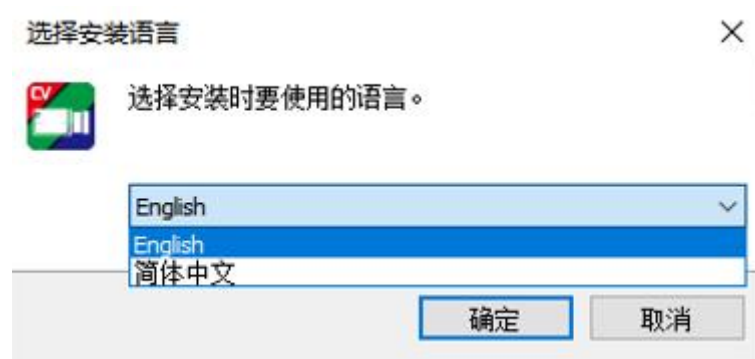


Figure 3-1 Ready to Install Window

3. Wait for the window shown in Figure 3-2 to pop up and click the Next button. After carefully reading the license agreement, confirm that you agree to the license terms, and then click the Next button to continue the installation process.

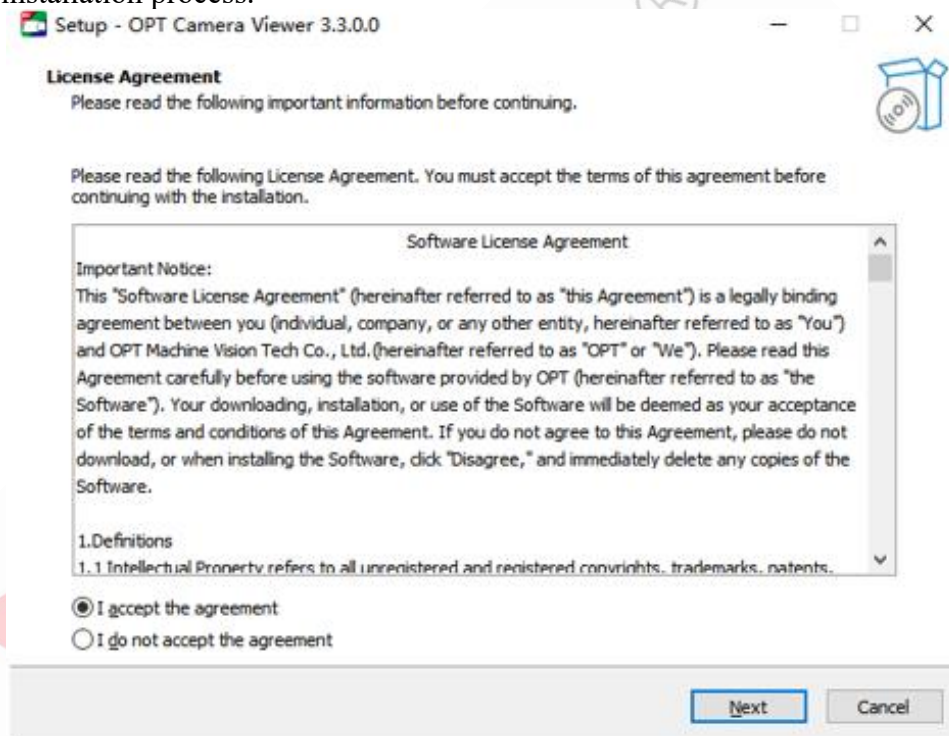


Figure 3-2 License Agreement Window

4. Enter the installation folder window, as shown in Figure 3-3, select the software installation path (the default path is: C:\Program Files\OPT\OPT Camera Viewer_v3.0.0.0) and click the Next button to continue the installation process.

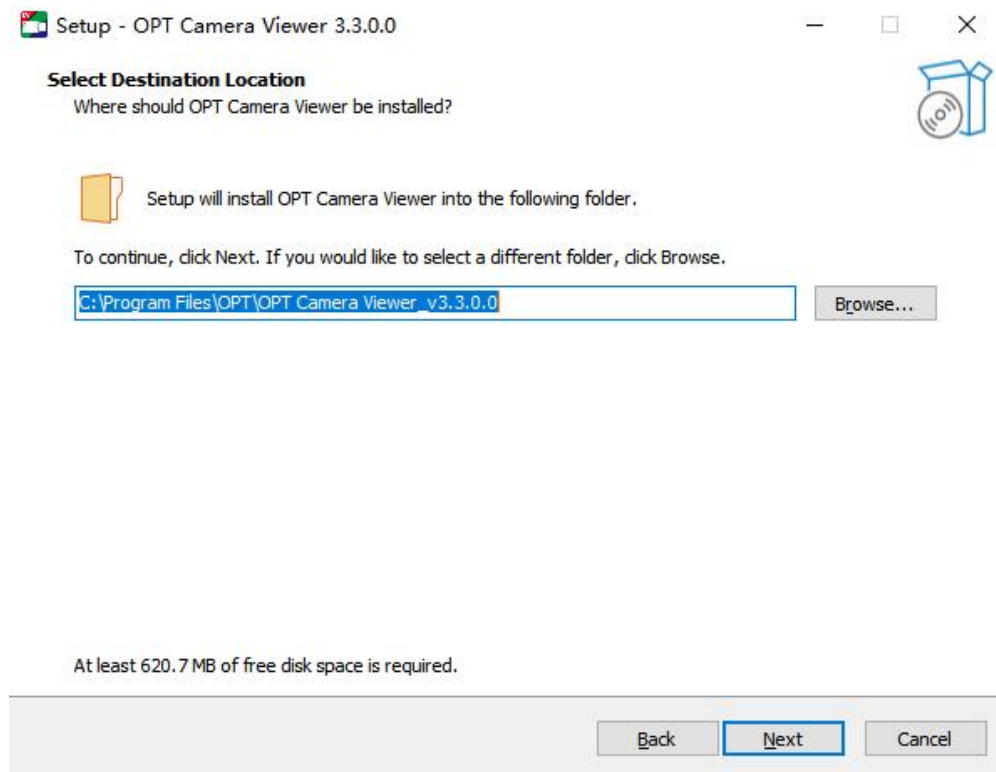


Figure 3-3 Installation folder window

5. Enter the Ready to Install window as shown in Figure 3-3, and click Next to continue the installation process.

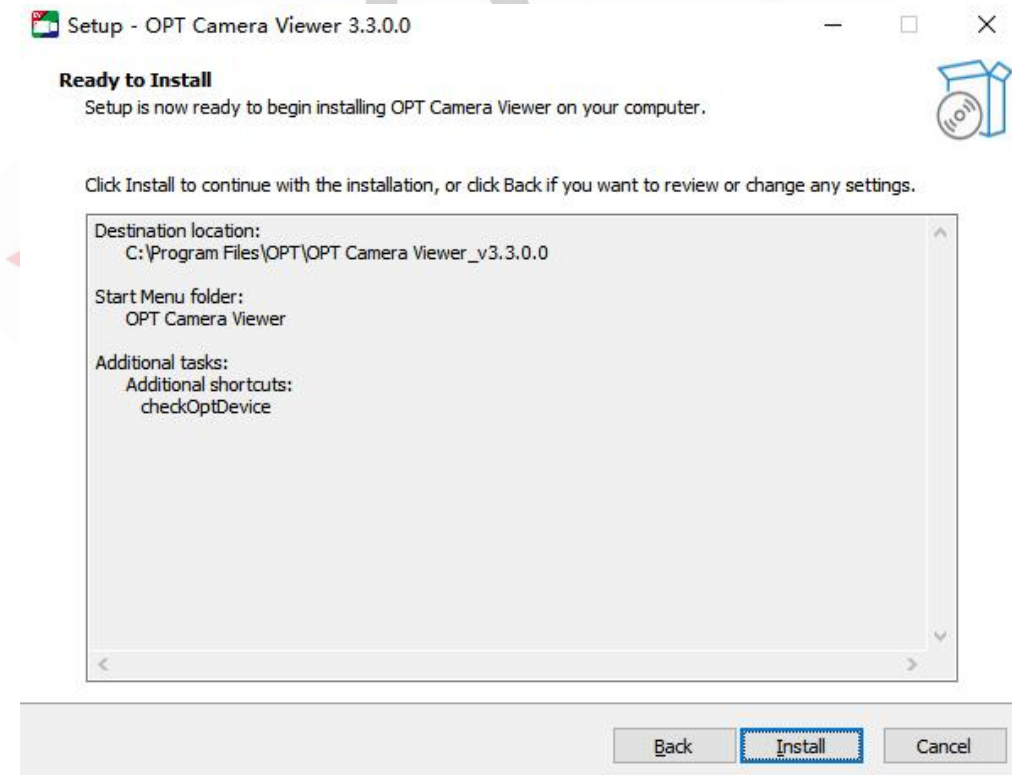


Figure 3-4 Installation Preparation Window

6. Wait for the installation progress of the program, as shown in Figure 3-5.

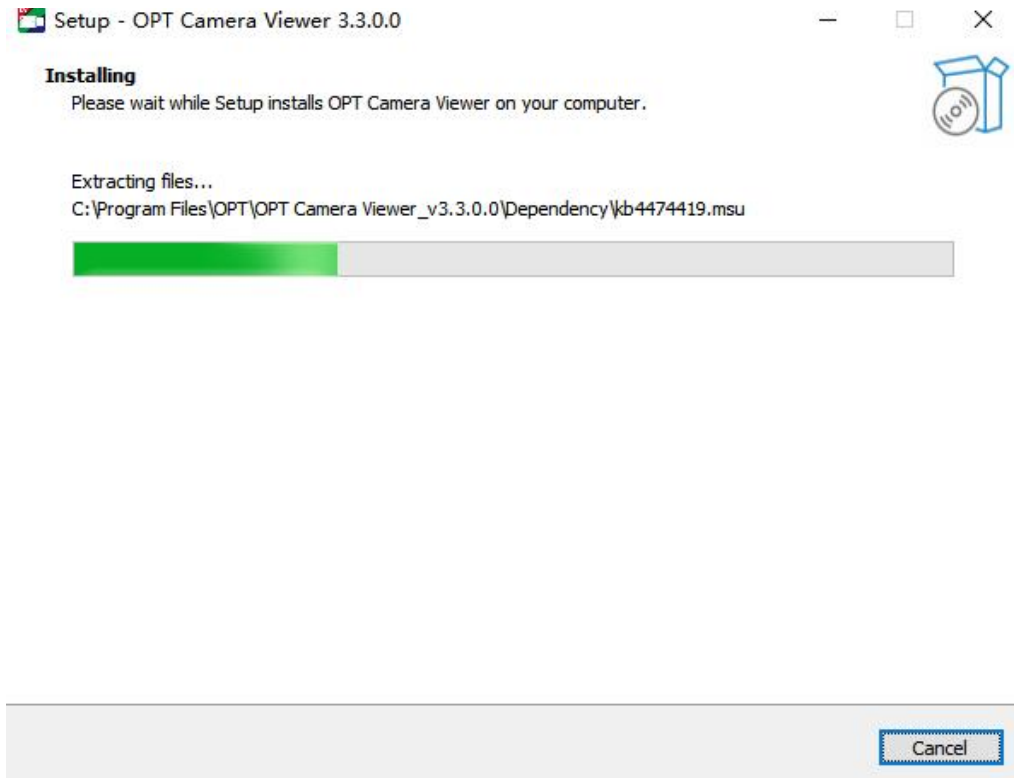


Figure 3-5 Program Installation Progress Window

7. After the program is installed, restart the computer, as shown in Figure 3-6.

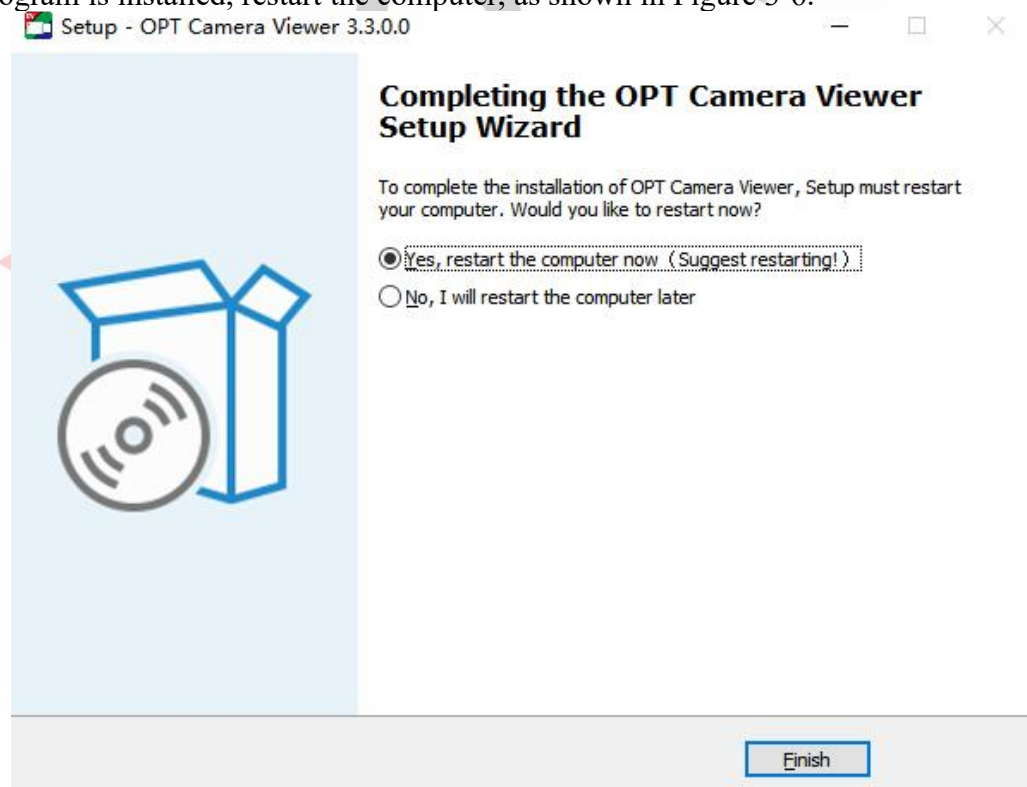
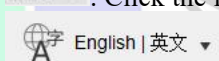


Figure 3-6 Program installation success window

Table 3-7 OPT Camera Viewer parameters

Serial Number	Parameters	Parameter Description
1	Menu Bar	Provides functions for files, views, settings, tools, and help. For more information, see Table 4-2.
2	Control Tool Area	Provides quick, easy manipulation of camera images as follows:  Import Attribute : Click the icon to quickly import the configuration parameter attribute information. (This icon appears gray when the camera is in stream fetching state.)  Export Attribute : Click the icon to quickly export the configuration parameter attribute information. (This icon appears gray when the camera is in stream fetching state.)  Layout ▾ : The screen layout is a display setting for the preview multi-window layout.  Full Screen : Click the icon to globally expand the image preview, press the keyboard ESC to return. (Global preview is also available by double-clicking under the Image Preview window)  Log : Quickly use the log information preview function, the information type can be customized selection and support the output to save as text view.  Statistics : Click this icon for a quick preview of the information statistics.  Setting : Click this icon to jump to the settings window for image saving and caching options.  Help ▾ : Click the icon to quickly view the software version information, etc.  English 英文 ▾ : Click this icon to select the software system display language.
3	Equipment List	Displays a list of devices that detect all online devices, Including GigE, USB, CameraLink and other common multi-protocol interface devices.
		 Refresh . Click the icon to manually refresh the online device information.
		 Click this icon to manually configure the camera IP.:
		 indicates that the device is in a connectable state.
		 indicates that the device is connected.
4	Equipment Details	The details of the camera and the connection information of the interface are displayed here.
5	Image Preview Window	Display camera real-time image data, and the camera real-time information statistics and display.
6	Functional Parameter Area	Parameter items for this camera in different (operation level) roles.  User Level ▾ : parameter visibility. You can click ▾ to select an entry, professional, or master role from the drop-down menu as needed. The parameters for each role are slightly different.
7	Parameter Interpretation Area	Click a parameter property item to display the explanation of the parameter.

8	Window Action Menu	●  : Maximize the window. ●  : Restores the window size downward. ●  : Minimum speech window. ●  : Close the application.
9	Data Flow Area	The frame rate, total number of frames, transfer rate, number of error frames, and display frame rate in the camera capture are shown here.

Table 3-8 Menu Bar-Parameter Explanation

Menu Bar		Description
File	Import Properties	Import configuration parameter property information as a file.
	Export Properties	Export configuration parameter attribute information as a file
	Save Ganicam XML	Saves the output XML file information.
View	Equipment List	
	Equipment Details	
	Common Properties	
	All Properties	
		You can choose to open or hide the above four windows.
Setup	Image Save	Set the image save path, image format, etc.
	Cache Options	Set the cache parameters for the data stream.
Tools	Driver Management	The relevant basic drivers of the OPT Camera Viewer can be loaded or enabled autonomously.
	Bandwidth Management	Monitor network bandwidth and data transmission.
	Network card property settings	Can switch and configure the computer network card parameters.
	Log	Log information preview (including device parameter update, event message channel, pull stream cache and other event notifications), information type can be customized selection and support output saved as text view
	Information statistics	Statistics can be set to capture the frame rate, bandwidth, the number of images received, frame loss rate, the number of error images.
Help	Firmware Upgrade	The camera firmware can be upgraded.
	About	View the current software version information (software version number, software belonging and official website).
	Help documentation	Path location to place the relevant Operations Guide document

Chapter4 Main Functions

This chapter mainly explains the functional parameters related to industrial cameras.



Instructions

- The industrial camera supports the selection of three user levels: Beginner (Beginner), Professional (Expert), or Guru, with each level corresponding to slightly different parameter items in the properties window.
- A parameter item displayed in black indicates that the parameter can be modified or set, and a parameter item displayed in gray indicates that the parameter does not support modification or setting in the current operation mode.

4.1 DeviceControl

In this attribute, you can view the device information and modify the device name. For details about parameter settings, see Table 5-1.

Table 5-1 below explains the parameters for device management.

Parameters	Description
DeviceScanType	Scan type of the device Sensor, such as area array or line array
DeviceVendorName	Equipment Supplier
DeviceModeName	Equipment Model
DeviceManufacturerInfo	Equipment Manufacturer
DeviceVersion	Device Hardware Version
DeviceFirmwareVersion	Device Firmware Version
DeviceSerialNumber	Device Serial Number
DeviceUserID	User-defined device name
MaximumDeviceResponse Time	The maximum response time of the device. If the device fails to respond after the time, it is considered disconnected.
DeviceManifestTableAddress	ID of the current camera selection GenICam XML
DeviceSBRMAddress	Protocol Specific Register Base Address
DeviceMessageChannelID	Device Message Channel ID
DeviceTimestamp	Device current timestamp
DeviceTimestampLatch	Execute the Execute button to obtain the current timestamp of the device.
DeviceTimestampIncrement	Maximum value of the device timestamp
DeviceLinkSelector	Device Connection Selector
DeviceLinkSpeed	Device connection speed
DeviceLinkThroughputLimitMode	When turned on, the transmission bandwidth can be controlled.
DeviceLinkThroughputLimit	Transmission bandwidth control, when necessary, will evenly insert delays between transport layer packets to control peak bandwidth
DeviceLinkCurrentThroughput	The device is currently transmitting actual bandwidth
DeviceReset	Device restart button, call the API to restart the camera
DeviceSFNCVersion Major	Device SFNC protocol major version
DeviceSFNCVersionMinor	Device SFNC protocol minor version
DeviceSFNCVersion SubMinor	Device SFNC protocol subversion

Table 5-1 Device Management-Parameter Interpretation

4.2 ImageFormatControl

In this attribute, you can modify the size of the image captured by the current device, the pixel format of the image, the region of interest, and the test image mode. For detailed parameter settings, see Table 4-2.

The following table 4-2 explains the parameters for image format management.

Parameters	Description
SensorWidth	Maximum image width supported by the Sensor (in pixels)
SensorHeight	Maximum image height (in pixels) supported by the Sensor
WidthMax	Maximum image width (pixels)
HeightMax	Maximum image height (pixels)
Width	Actual output image width (pixels)
Height	Actual output image height in pixels
OffsetX	The horizontal offset of the image, starting from the upper left corner, is determined by the Width value.
OffsetY	The vertical offset of the image, starting from the upper left corner, is determined by the value of Height.
CenterX	Output Image Horizontally Centered
CenterY	Output image is vertically at the middle
BinningHorizontal	Image horizontal compression (only some models support this function)
BinningVertical	Image compression in vertical direction (only some models support this function)
ReverseX	Image Flip Horizontal
ReverseY	Image vertical flip
PixelFormat	Image output format, different models support different formats
PixelSize	pixel bit width
PixelDynamicRangeMin	Pixel Dynamic Range Minimum
PixelDynamicRangeMax	Pixel Dynamic Range Max
TestImageSelector	Select the test image (OFF by default, indicating that the test image is not output)

Table 4-2 Image Format Management-Parameter Interpretation

4.3 AcquisitionControl

In this property, you can set the camera's image capture mode, trigger mode, exposure time, etc. For details, see Table 4-3.

Table 4-3 below explains the parameters of acquisition management.

Parameters	Description
AcquisitionMode	Image acquisition mode: ● SingleFrame (single frame): refers to the collection of 1 frames at a time, and the pull stream is automatically stopped after collection. ● Continuous (continuous): refers to continuous acquisition until the Acquisition Stop is issued to stop the acquisition of pull flow.
AcquisitionStart	SDK Start/Stop Pull Stream
AcquisitionStop	
AcquisitionBurstFrameCount	In trigger mode, the number of images captured by the camera after receiving a trigger signal
AcquisitionFrameRateEnable	Frame rate limiting enabled. When the value is true, the frame rate set by the AcquisitionFrameRate is valid.
AcquisitionFrameRate	Limit Frame Rate Value  instructions If the set frame rate exceeds the maximum frame rate that the camera under the current parameters can achieve, the actual output frame rate of the camera is ResultingFrameRateAbs instead of the AcquisitionFrameRate set frame rate value.
ResultingFrameRateAbs	ResultingFrameRateAbs the maximum frame rate that the camera can achieve under the current parameters
AcquisitionStatusSelector	Select and view the collection status Select the FrameTriggerWait (frame trigger waiting status) in the AcquisitionStatusSelector and view it in the AcquisitionStatus. True means waiting for triggering, and False means triggered.
AcquisitionStatus	
TriggerSelector	Select trigger type and trigger mode Select the trigger type in the TriggerSelector, and select to turn the trigger mode on or off in the TriggerMode
TriggerMode	
TriggerSoftware	Soft trigger button. Click or call the API to generate a soft trigger

TriggerSource	Trigger source and trigger signal type.
TriggerActivation	TriggerSource support SoftwareTrigger (software triggered), lineN (hardware triggered) and Counter1 (counter triggered) ● When the soft trigger is selected, the trigger signal is generated by executing the TriggerSoftware or calling the API, and is output to the camera. ● When the hardware trigger is selected, set the RisingEdge (rising edge trigger), FallingEdge (falling edge trigger) LevelHigh (high level trigger) or LevelLow (low level trigger) in the TriggerActivation, and then the corresponding type of trigger signal is generated by the external cable and output to the camera through the IO interface. ● When the selection counter is triggered, the trigger signal is generated by the Counter inside the camera. At this time, the trigger source of the Counter1 should be set to Line1,Counter1 when the current count value is equal to the Counter Value, the Counter1 outputs a collection trigger signal.
TriggerDelay	Trigger delay. Refers to the time when the camera receives the trigger signal and the trigger takes effect.  instructions Valid only when the TriggerMode is on and valid for any trigger source.
TriggerCacheEnable	Trigger cache. When the trigger mode is enabled, if the trigger process receives a new trigger signal, the signal may be retained and processed.
ExposureMode	Exposure mode and exposure time. Currently, only the Timed exposure mode is supported, and the exposure duration is determined by the specific time. The time set by the ExposureTime is the exposure time
ExposureTime	
ExposureAuto	
	Set automatic exposure. ● Off means to turn off automatic exposure. ● Once means that the camera can automatically modify the exposure once according to the ambient brightness, and automatically return to Off mode after modification, and the modified exposure value is displayed in the ExposureTime. ● Continuous means that the camera can continuously modify the exposure time according to the ambient brightness, and the exposure value is displayed in real time in the ExposureTime.

Table 4-3 Acquisition Management-Parameter Interpretation

4.4 AnalogControl

In this property, you can adjust the image analog signal captured by the camera, including gain, lookup table, gamma correction, etc., see Table 4-4 for detailed parameter settings.

Table 4-4 below is an explanation of the parameters of the simulation control.

Parameters	Description
GainSelector	Choose which gain to control.
Gain	Analog gain. The larger the gain value, the brighter the image; different models have different settable ranges.  instructions

		Enable analog gain first.
GainAuto		Set the automatic gain. ● Off indicates that the automatic gain is turned off. ● Once indicates that the camera can automatically modify the gain once according to the ambient brightness, and the modified gain value is displayed in gray in Gain. ● Continuous indicates that the camera can continuously modify the gain according to the ambient brightness to adapt to the change of the environment. The modified gain value is displayed in gray in Gain in real time.
GammaEnable		Gamma correction function. For correcting the 1 non-linearity of image data due to the non-linear response of a display or the like, the smaller the gamma value, the brighter the image.  instructions Setting the image gamma value is only valid when the GammaEnable is True.
Gamma		
LUT	LUTSelector	In this attribute, you can highlight the gray range of interest, which can be a linear curve or a custom mapping curve. Select the gray value of the replaced pixel in the LUTIndex. The gray value after modification by the pixel specified by the LUTIndex is set in the LUTValue. The LUTIndex and LUTValue settings are only valid when the LUTEnable is True.
	LUTEnable	
	LUTIndex	
	LUTValue	
BalanceWhiteAuto		USB color camera support white balance function, according to different light intensity for color correction. By adjusting the R, G and B components in the image, the white area can always remain white at different color temperatures. Ideally, the white area The ratio of R, G and B components of the domain is 1:1:1. White balance is divided into three modes. Off Manual: Users can manually adjust the R/G/B components in the range of 0~7 by Balance the Ratio Selector and Balance the Ratio parameter. Once: once according to the current scene, run for a period of time automatic white balance after stop, Continuous Continue: according to the current scene, automatically white balance adjustment
Balance Ratio Selector		
Balance Ratio		

Table 4-4 Analog Control-Parameter Interpretation

4.5 DigitalIOControl

In this attribute, different I/O input or output signals can be managed. Please refer to Table 4-5 for detailed parameter settings.

Table 4-5 below explains the parameters of digital input/output management.

Parameters	Description
LineSelector	Select the external IO line to be configured.

LineMode	Sets the output mode of the currently selected IO line: input or output
LineInverter	Set the signal inversion of the selected IO line, True means that the signal is inverted, and False means that the signal is not inverted.
LineStatus	Displays the status of LineSelector selected IO line.
LineStatusAll	Displays the status of all available IO lines.
LineSource	When the IO line is set to output, the trigger source can be selected. Currently, the following trigger sources are supported: ● Timer1Active: output timer 1 output pulse ● UserOutput: Output values of user-defined settings ● ExposureActive: light source control signal output

Table 4-5 Digital Input/Output Management-Parameter Interpretation

4.6 CounterAndTimerControl

In this attribute, you can set the device-specific delay unit. For details, see Table 4-6.

Table 4-6 below explains the parameters of counter and timer management.

Parameters	Description
CounterSelector	Select the counter source. Currently, only Counter1 are supported.
CounterEventSource	Set the signal source triggered by the counter. Currently, the following trigger sources are supported: ● FrameTrigger: frame trigger signal ● FrameStart: image frame valid signal ● Line1: Physical IO Line Line1
CounterEventActivation	Select the type of trigger signal that triggers the counter count.
CounterValue	Upper counter value.
CounterCurrentValue	The current count value of the counter.
CounterResetSource	Set the signal source for resetting the counter, which can only be reset by Software.
CounterReset	Execute to reset the counter.
TimerSelector	Select the timer source. Currently, only Timer1 is supported.
TimerTriggerSource	Sets the trigger source for the timer.
TimerTriggerActivation	Select the type of trigger signal that triggers the timer.
TimerDelay	Adjust the time delay (in us) between the timer receiving the trigger and the output high level signal to meet the needs of external devices for delayed response.
TimerDuration	Adjust the hold time of the high level of the timer output signal (in us)

Table 4-6 Counter and Timer Management-Parameter Interpretation

4.7 ISPControl

In this attribute, the brightness and contrast of the image can be adjusted. Please refer to Table 4-7 for detailed parameter settings.

Table 4-7 below explains the parameters of ISP management.

Parameters	Description
DigitalShift	Adjust the DigitalShift, adjust the image data left shift bit, make the image brighter
Brightness	Adjust the brightness value of the exposure target, the default value is 50;

	When the value is larger, the exposure will adjust the image brighter.
Hue	Tone Adjusting the overall tendency of colors in the image, with a default value of 50.
Saturation	Saturation adjusts how vivid the colors are in the image. The default value is 50.
ContrastMode	Set contrast adjustment mode
BLCEnable	Black dot flat enable, default to on
BLCLevelMode	Set the black dot flat mode, choose to use the default adjustment or manual adjustment
BLCLevel	Adjust the overall black level offset in manual black level adjustment mode, Displays the overall black point level offset in the default black point level adjustment mode.

Table 4-7 ISP Management-Parameter Interpretation

4.8 AutoFunctions

In this attribute, you can set parameters for automatic functions. For details about parameter settings, see Table 4-8.

The following table 4-8 explains the parameters set by the automatic function parameter item.

Parameters	Description
AutoTargetValue	Automatic target value. The target grayscale value, which is in the 8-bit pixel format.
AutoGainLowerLimit	The lower limit of the automatic gain parameter.
AutoGainUpperLimit	The upper limit of the automatic gain parameter.
AutoExposureTimeLowerLimit	Lower limit of automatic exposure time parameter
AutoExposureTimeUpperLimit	Upper limit of automatic exposure time parameter
AutoFunctionProfile	Automatic function configuration. Choose to use minimum exposure or minimum gain to bring the image to the target grayscale value.
AutoFunctionAOIWidth	AOI width for automatic function. AOI area width for auto gain, auto exposure calculation.
AutoFunctionAOIHeight	Automatic function of AOI height. Height of AOI area used for auto gain, auto exposure calculation.
AutoFunctionAOIOffsetX	Automatic function of AOI horizontal offset. The image horizontal offset of the AOI area used for automatic gain and automatic exposure calculations, starting from the upper left corner.
AutoFunctionAOIOffsetY	Automatic function of AOI vertical offset. The image vertical offset of the AOI area used for auto gain and auto exposure calculations, starting from the upper left corner.

Table 4-8 Automatic Function Parameter Item Setting-Parameter Interpretation

4.9 ColorTransformationControl

In this attribute, a parameter item of the color correction function may be set to adjust the overall color of the image to make the overall color of the image more vivid.

The following Table 4-9 explains the parameters set for the color conversion control (I. e., the color correction function).

Parameters	Description
Color Transformation Enable	Color conversion enabled. Enables the color correction function.
Color Transformation Value Selector	Color conversion value selector. Gain or Offset offset that can be used to select the transformation matrix to be accessed in the selected color transformation module.
Color Transformation Value	Color conversion parameter value. After the 1 group coefficient is selected at the Color Transformation Value Selector parameter, the Color Transformation Value will display the default value, which can also be modified according to actual needs.

Table 4-9 Color conversion control (I. e. color correction function) setting parameter interpretation

When the image after white balance processing, the image as a whole will appear relatively dim, while a variety of colors may exist in varying degrees from its standard value. At this time, the color of the image needs to be multiplied by the correction matrix to correct each color to its standard value, so that the overall color of the image is more vivid.

The color correction function is realized by multiplying each RGB component by a correction matrix. The currently supported color conversion module is RGBtoRGB, which can be set through the Color Transformation Control attribute. Finally, the color correction is realized by adjusting the value of each parameter in the Color Transformation Value Selector.

The specific operation steps are as follows:

1. After selecting the 1 group coefficient at the Color Transformation Value Selector parameter, the Color Transformation Value will display the default value, which can also be modified according to actual needs.
2. Enable parameter Color Transformation Enable to enable the color correction function, as shown in

Figure 4-9:

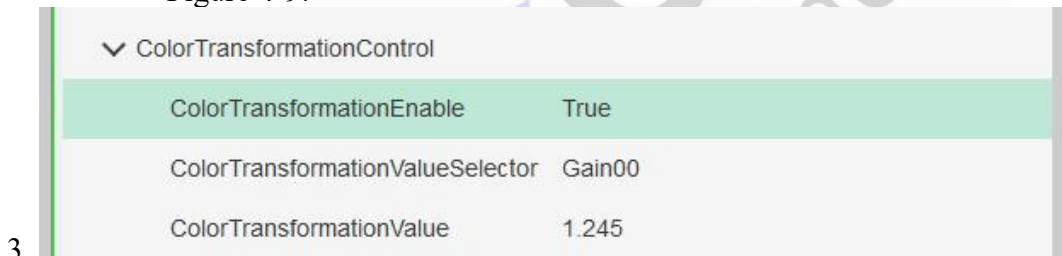


Figure 4-9 Color correction settings

4.10 TransportLayerControl

In this attribute, you can set the parameters related to the transmission protocol of the camera. Please refer to Table 4-9 for detailed parameter settings.

Table 4-9 below explains the parameters of transport layer management.

Parameters	Description
PayloadSize	The payload size. 1 the size of the frame data, that is, the length of each message.
SIPayloadTransferSize	The expected size of a single payload transmission.
SIPayloadTransferCount	The expected number of payload transmissions.
SIPayloadFinalTransfer1Size	The size of the first final payload transmission.
SIPayloadFinalTransfer2Size	The size of the second final payload transmission.

Table 4-9 Transport Layer Management-Parameter Interpretation

4.11 UserSetControl

In this attribute, you can save or load the user-adjusted parameter scheme, and set the default parameter configuration when the client is opened. For details, see Table 4-10.

The following table 4-10 explains the parameters of user settings management.

Parameters	Description
UserSetCurrent	Displays the configuration currently in use, 0 indicates the default configuration, the rest are user configurations
UserSetSelector	UserSetSelector the user to set the group selection. Currently supports Default, UserSet1, UserSet2, and UserSet3.
UserSetLoad	User settings are loaded. The configuration of the camera is restored to the user-selected configuration.
UserSetSave	User settings are saved. Saves the current configuration to the selected group, Default saving is not supported for groups.
UserSetDefaultSelector	Power-on default user settings. UserSet1, UserSet2, and UserSet3 need to be UserSetSave before they can be displayed here.

Table 4-10 User Settings Management-Parameter Interpretation

Chapter5 Frequently Asked Questions

Problem Description	Possible causes	Solution
Start the client software and cannot find the camera.	The driver is not installed or the camera does not start normally or the USB cable is connected abnormally.	Open the device manager to check whether the driver is installed, check whether the camera power and network connection are normal (observe the LED indicator)
The startup client is able to enumerate to the camera, but the connection fails	● Access host USB2.0 port ● The camera is connected by another program.	● Access host USB3.0 interface ● After disconnecting the camera from other programs, reconnect it.
Preview screen all black	● Lens aperture closed ● The camera works abnormally	● Open lens aperture ● Power off and restart the camera
Preview is normal but cannot be triggered	● The trigger mode is not turned on or the trigger source is selected incorrectly. ● Trigger connection error	● Confirm whether the trigger mode of the camera is on, and whether the selected trigger source is consistent with the IO interface used. ● Confirm whether the trigger signal input and wiring are normal
Unable to enable external triggering.	● External trigger connection error. ● The trigger mode does not have an external trigger selected.	Select the correct trigger mode and ensure that the external wiring is correct.
When the client software viewed the image, it was found that the image was upside down.	● When installing the equipment, the installation direction is wrong.	You can correct the image in the client software by "Properties> ImageFormatControl>ReverseX (horizontal flip) or ReverseY (vertical flip).

APPENDIX A PARAMETER INDEX

Table A- 1 Camera parameters and functions List

Seri al Nu mbe r	Property	Parameters	Function Description
1	DeviceControl (Equipment Management)	<i>DeviceScanType</i>	Scan type of the device Sensor, such as area array or line array
		<i>DeviceVendorName</i>	Manufacturer name of the device
		<i>DeviceModelName</i>	Equipment Model
		<i>DeviceManufacturerInfo</i>	Manufacturer information for the device
		<i>DeviceVersion</i>	Device Hardware Version
		<i>DeviceFirmwareVersion</i>	Device Firmware Version
		<i>DeviceSerialNumber</i>	Device ID (to display device serial number)
		<i>MaximumDeviceResponse Time</i>	The maximum response time of the device. If the device fails to respond after the time, it is considered disconnected.
		<i>DeviceManifestTableAddress</i>	ID of the current camera selection GenICam XML
		<i>DeviceSBRMAddress</i>	Protocol Specific Register Base Address
		<i>DeviceMessageChannelID</i>	Device Message Channel ID
		<i>DeviceTimestamp</i>	Device current timestamp
		<i>DeviceTimestampLatch</i>	Execute the Execute button to obtain the current timestamp of the device.
		<i>DeviceTimestampIncrement</i>	Maximum value of the device timestamp
		<i>DeviceLinkSelector</i>	Device Connection Selector
		<i>DeviceLinkSpeed</i>	Device connection speed
		<i>DeviceLinkThroughputLimitMode</i>	When turned on, the transmission bandwidth can be controlled.
		<i>DeviceUserID</i>	User-defined device name
		<i>DeviceLinkCurrentThroughput</i>	The device is currently transmitting actual bandwidth
		<i>DeviceReset</i>	Restart the device (device restart button, call the API to restart the camera)
		<i>DeviceSFNCVersionMajor</i>	Device SFNC protocol major version
		<i>DeviceSFNCVersionMinor</i>	Device SFNC protocol minor version
		<i>DeviceSFNCVersionSubMinor</i>	Device SFNC protocol subversion
2	ImageFormatControl (image format management)	<i>SensorWidth</i>	Maximum image width supported by the Sensor (in pixels)
		<i>SensorHeight</i>	Maximum image height (in pixels) supported by the Sensor
		<i>WidthMax</i>	Maximum image width (pixels)
		<i>HeightMax</i>	Maximum image height (pixels)
		<i>Width</i>	Actual output image width (pixels)
		<i>Height</i>	Actual output image height in pixels
		<i>OffsetX</i>	The horizontal offset of the image, starting from the upper left corner, is determined by the Width value.
		<i>OffsetY</i>	The vertical offset of the image, starting from the upper left corner, is determined by the value of Height.
		<i>CenterX</i>	Output Image Horizontally Centered
		<i>CenterY</i>	Output image is vertically at the middle

		<i>BinningHorizontal</i>	Image horizontal compression (only some models support this function)
		<i>BinningVertical</i>	Image compression in vertical direction (only some models support this function)
		<i>ReverseX</i>	Image Flip Horizontal
		<i>ReverseY</i>	Image vertical flip
		<i>PixelFormat</i>	Image output format, different models support different formats
		<i>PixelSize</i>	pixel bit width
		<i>PixelDynamicRangeMin</i>	Pixel Dynamic Range Minimum
		<i>PixelDynamicRangeMax</i>	Pixel Dynamic Range Max
		<i>TestImageSelector</i>	Select the test image (OFF by default, indicating that the test image is not output)
3	AcquisitionControl (Acquisition Management)	<i>AcquisitionMode</i>	Image acquisition mode, continuous, single frame, etc.
		<i>AcquisitionStart</i>	Start fetching stream
		<i>AcquisitionStop</i>	Stop fetching
		<i>AcquisitionBurstFrameCount</i>	In trigger mode, the number of images captured by the camera after receiving a trigger signal
		<i>AcquisitionFrameRateEnable</i>	Frame rate limit is enabled. When it is true, the frame rate set by the AcquisitionFrameRate is valid.
		<i>AcquisitionFrameRate</i>	Limit Frame Rate Value
		<i>ResultingFrameRateAbs</i>	The maximum frame rate that the camera can achieve under the current parameters (actual capture frame rate)
		<i>AcquisitionStatusSelector</i>	Select Acquisition Status
		<i>AcquisitionStatus</i>	View collection status (True means waiting for trigger, False means triggered)
		<i>TriggerSelector</i>	Trigger Type (Trigger Event Selection, Select Trigger Type to Configure)
		<i>TriggerMode</i>	Trigger Mode
		<i>TriggerSoftware</i>	Perform a soft trigger
		<i>TriggerSource</i>	Trigger Source (Specifies the internal signal or physical input line used as the trigger source.)
		<i>TriggerActivation</i>	Trigger polarity (trigger rising edge, falling edge, high level, low level, etc.)
		<i>TriggerDelay</i>	Trigger delay (the time from when the camera receives the trigger signal to when the trigger takes effect)
		<i>TriggerCacheEnable</i>	Trigger buffer (when the trigger mode is on, if the trigger process receives a new trigger signal, the signal can be retained and processed)
		<i>ExposureMode</i>	Exposure mode
		<i>ExposureTime</i>	Exposure time
4	AnalogControl (Analog Control)	<i>GainSelector</i>	Gain Selection
		<i>Gain</i>	The gain value (the larger the gain value, the brighter the image, and the settable range of different models is different)
		<i>Gain Auto</i>	Set Auto Gain
		<i>GammaEnable</i>	Gamma correction enable (set image gamma value only valid when GammaEnable to True)
		<i>Gamma</i>	Gamma adjustment (the smaller the gamma value, the brighter the image)

5	LUT Control (User Lookup Table Control)	<i>LUTSelector</i>	Look-up table selection (select the display look-up table to be controlled; LUT is a gray scale mapping table that can be customized by the user)
		<i>LUTEnable</i>	Lookup table enable (LUTIndex and LUTValue settings are only valid when LUTEnable is True)
		<i>LUTIndex</i>	The index number of the lookup table (set the offset of the camera through the LUT Index parameter)
		<i>LUTValue</i>	The value of the lookup table (set the value corresponding to the offset through the LUT Value parameter)
6	DigitalIOControl (Digital IO Control)	<i>LineSelector</i>	Line selector (IO configuration selection, select the external IO line to be configured)
		<i>LineMode</i>	Line Mode (sets the input/output mode of the currently selected IO line)
		<i>LineInverter</i>	Line reversal (set the signal reversal of the selected IO line, True means the signal is reversed, False means the signal is not reversed)
		<i>LineStatus</i>	Line Status (displays the status of LineSelector selected IO line)
		<i>LineStatusAll</i>	Line Status All (displays the status of all available IO lines)
		<i>LineSource</i>	Line Source (When setting the IO line as the output, you can select the trigger source.)
7	Counter And Timer Control (counter and timer management)	<i>CounterSelector</i>	Counter Selection
		<i>CounterEventSource</i>	Counter Event Source (sets the source of the counter trigger)
		<i>CounterEventActivation</i>	Counter Event Activation Polarity (Selects the type of trigger signal that triggers the counter count)
		<i>CounterValue</i>	Counter upper limit value
		<i>CounterCurrentValue</i>	Current count value of the counter
		<i>CounterResetSource</i>	Counter Reset Source (Set the source of the reset counter)
		<i>CounterReset</i>	Counter Reset
		<i>TimerSelector</i>	Timer selection
		<i>TimerTriggerSource</i>	Set the trigger source of the timer
		<i>TimerTriggerActivation</i>	Timer trigger activation polarity (select the type of trigger signal that triggers the timer)
		<i>TimerDelay</i>	Timer delay (adjust the delay between the timer receiving the trigger and the output high-level signal, in us; used to meet the needs of external devices that need to delay response.)
		<i>TimerDuration</i>	Timer duration (Adjust the hold time of the high level of the timer output signal, in us.)
8	ISPControl (ISP Management)	<i>DigitalShift</i>	Digital Gain (adjusts the left shift of image data to make the image brighter)
		<i>Brightness</i>	Brightness (adjust the exposure target brightness value, the default value is 50, the larger the value, the exposure will adjust the image brighter)
		<i>Hue</i>	Tone Adjusting the overall tendency of colors in the image, with a default value of 50.
		<i>Saturation</i>	Saturation adjusts how vivid the colors are in the image. The default value is 50.

		<i>ContrastMode</i>	Contrast mode (set contrast adjustment mode)
		<i>BLCEnable</i>	Black level enable, default is on
		<i>BLCLevelMode</i>	Black level adjustment mode (Select to use the default adjustment or manual adjustment.)
		<i>BLCLevel</i>	Black level adjustment (adjust the overall black point level offset manually or display the default black point level adjustment mode.)
9	AutoFunction (Automatic function parameter item setting)	<i>AutoTargetValue</i>	Automatic target value (target grayscale value, this grayscale value range applies to 8-bit pixel format)
		<i>AutoGainLowerLimit</i>	Lower limit of automatic gain parameter
		<i>AutoGainUpperLimit</i>	Upper limit of automatic gain parameter
		<i>AutoExposureTimeLowerLimit</i>	Lower limit of automatic exposure time parameter
		<i>AutoExposureTimeUpperLimit</i>	Upper limit of automatic exposure time parameter
		<i>AutoFunctionProfile</i>	Automatic function configuration (the choice of using minimum exposure or minimum gain to make the image reach the target grayscale value)
		<i>AutoFunctionAOIWidth</i>	AOI width of auto function (AOI area width for auto gain, auto exposure calculation)
		<i>AutoFunctionAOIHeight</i>	AOI height of automatic function (used for automatic gain, automatic exposure calculation of AOI area height)
		<i>AutoFunctionAOIOffsetX</i>	AOI horizontal function of automatic offset (used for automatic gain, automatic exposure calculation of the AOI area of the image horizontal offset, from the upper left corner offset)
		<i>AutoFunctionAOIOffsetY</i>	Automatic function of the AOI vertical offset (used for automatic gain, automatic exposure calculation of the AOI area of the image vertical offset offset, from the upper left corner start offset)
10	Transport Layer Control (Transport Layer Management)	<i>PayloadSize</i>	Payload size (size of 1 frame data)
		<i>SIPayloadTransferSize</i>	The expected size of a single payload transmission.
		<i>SIPayloadTransferCount</i>	The expected number of payload transmissions.
		<i>SIPayloadFinalTransfer1Size</i>	The size of the first final payload transmission.
		<i>SIPayloadFinalTransfer2Size</i>	The size of the second final payload transmission.
11	UserSetControl (User Settings Management)	<i>UserSetCurrent</i>	Set Current User
		<i>UserSetSelector</i>	UserSetSelector the user to set the group selection. Currently supports Default, UserSet1, UserSet2, and UserSet3.
		<i>UserSetLoad</i>	User settings are loaded. The configuration of the camera is restored to the user-selected configuration.
		<i>UserSetSave</i>	User settings are saved. Saves the current configuration to the selected group, Default

			saving is not supported for groups.
		<i>UserSetDefaultSelector</i>	Power-on default user settings. UserSet1, UserSet2, and UserSet3 need to be UserSetSave before they can be displayed here.



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