

PRODUCT MANUAL

SWIR CAMERA SWIR051AU



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• 1 Preamble

1.1 Disclaimer

To protect the legitimate rights and interests of users, please carefully read the accompanying instruction manual, disclaimer, and safety precautions before using our product. This camera product manual contains basic information about the camera, definitions of external I/O interfaces, and an introduction to the AttosView application, designed to facilitate your use of AttosTek cameras. This document is disclosed solely for the purpose stated above. Please ensure you operate this product in accordance with the instruction manual and safety precautions.

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In summary, before using our product, please ensure you carefully read and understand the above disclaimer. We wish you a pleasant experience with your use of the product. Thank you!

Beijing Attosec Technology Co.,LTD

1.2 Safety And Warning Information

1.2.1 Operation And Usage

- Do not drop, disassemble, repair, or replace internal components yourself. Otherwise, you may damage the camera device or risk electric shock.
- If liquids such as water, beverages, or chemicals enter the device, please stop using it immediately and contact your nearest dealer or the manufacturer for technical assistance.
- Do not touch the device with wet hands, as this may result in electric shock.
- Do not allow children to touch the device without supervision.
- Ensure that the camera is used within the specified temperature range. Otherwise, the device may be

1.2.2 Installation And Maintenance



- Do not install the camera in dusty or dirty locations, or near air conditioners or heaters, to reduce the risk of damage.
- Avoid installing and operating the device in extreme environments with vibration, high temperature, humidity, dust, strong magnetic fields, or the presence of explosive/corrosive gases or fumes.
- Do not subject the device to excessive vibration or impact. This may damage the device.
- Do not install the device under unstable lighting conditions. Significant fluctuations in lighting can affect the quality of the images produced by the device.
- Do not use solvents or thinners to clean the device surface, as this will damage the exterior casing.
- Please ensure at least 20 cm of space is left around the device's vents to allow for proper airflow. Do not




1.2.3 Power Supply

- Please use the camera's original power adapter. Using an incompatible power supply may damage the camera.
- If the voltage applied to the camera is higher or lower than its rated voltage, the camera may be damaged or malfunction.
- Please refer to the specification table for the camera's rated voltage.

• 2 Packaging List

2.1 Package Contents

Standard Items	Specification	Item pictures
1.SWIR CAMERA	SWIR051AU	
2.USB 3.0 data cable	A to B gold-plated data cable, 1.5m in length.	
3.External trigger control line	7-pin connector trigger wire, length 2 meters	

Standard Items	Specification	Item pictures
4.Power cord	Default European standard,Optional US/UK standard configurations	
5.Power adapter	Input:AC100-240V 50/60Hz; Output:DC12V3A	
6.USB flash drive	Includes application software, drivers and instructions	

2.2 AttosView Recommended System Components

Operating system	Microsoft® Windows® XP / Vista / 7 / 8 /10 /11 (32bit和64 bit) 、 Mac OSX、 Linux	
Basic PC Configuration Requirements	CPU	Intel Core 2 2.8GHz or higher
	RAM	2GB or more
	USB Port	USB3.0 / USB 2.0
	Monitor	17" or higher

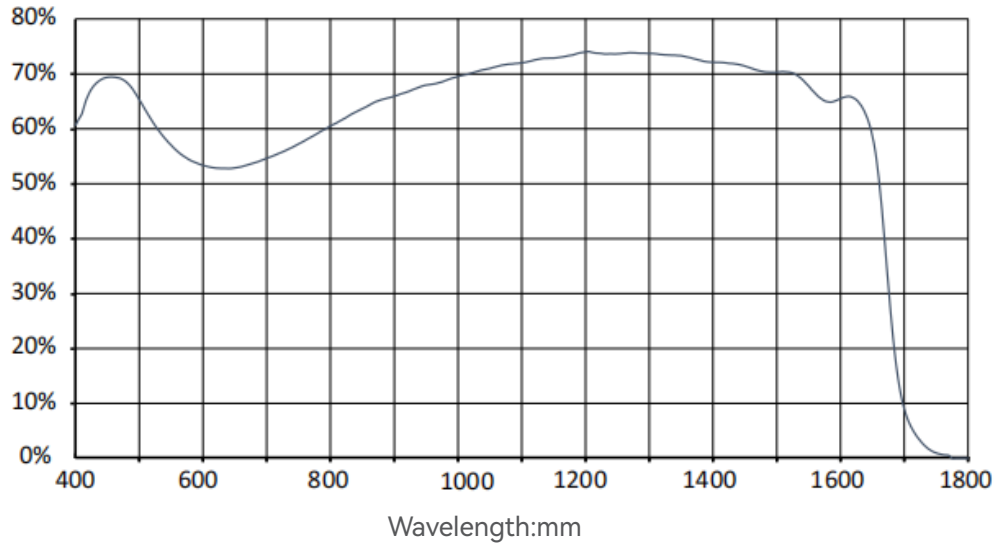
• 3 Product Introduction

The SWIR051AU is a short-wave infrared camera integrating high sensitivity, high frame rate, and excellent stability. It utilizes a Sony IMX990 sensor featuring 1.3 megapixels and a 5µm pixel size. The built-in TEC cooling system provides a 25°C temperature differential. With a USB 3.0 interface, it achieves a full-resolution frame rate of up to 200 fps and a dynamic range of 58.7 dB. Designed for applications demanding high real-time performance and detailed imaging, it is an ideal choice for industrial inspection, scientific research measurement, and advanced vision applications such as laser imaging, spectral analysis, and imaging through haze and smoke.

• 4 Specifications

Model	SWIR051AU
Sensor	Sony IMX990 InGaAs
Spectral Range	400nm-1700nm
Pixel Size	5.0μm×5.0μm
Target Size	1/2"
ADC	12Bit/8Bit
Frame Rate & Resolution	8 Bit: 200fps@1280 x 1024、 392fps@640 x 512 12 Bit: 108fps@1280 x 1024、 209fps@640 x 512
Hardware Image Buffer	512MByte
Dynamic Range	44.3e/ADU
Read Noise	58.7dB
Conversion Gain	211e
Full Well Capacity	181.6ke
Maximum SNR	52.6dB
Sensitivity	121mV
Dark Current	383e/s(0°C)510e/s(10°C)638e/s(20°C)
Gain Range	1x-15x
Exposure Time Range	15μs-60sec
Shutter Mode	Global Shutter
Binning Mode	Software2x2、 3x3、 4x4
Data Interface	USB3.0
Digital IO	1 channel of optically isolated input 1 channel of optically isolated output 2 channels of non-isolated input/output ports.
Data format	8bit/12bit
Temperature Differential	25°C Below Ambient Temperature
Optical Filter	400-1800nm (Standard configuration) ; 1030-1800nm (Optional accessories)
CRA	2.35°
Power supply method	Powered via USB3.0 Interface or 12V Power Adapter
Power consumption	<25W
Temperature	Operating Temperature-20~60°C, Storage Temperature-40~85°C
Humidity	20%-80%, no condensation
Size	80mm×80mm×45.5mm
Weight	<390g
Lens Mount	C-Mount
Software	AttosView/Complete Software Development Kit (SDK)
Operating System	Win32/WinRT/Linux/macOS/Android
Certification	CE, FCC

• 5 Quantum Efficiency (QE) Chart

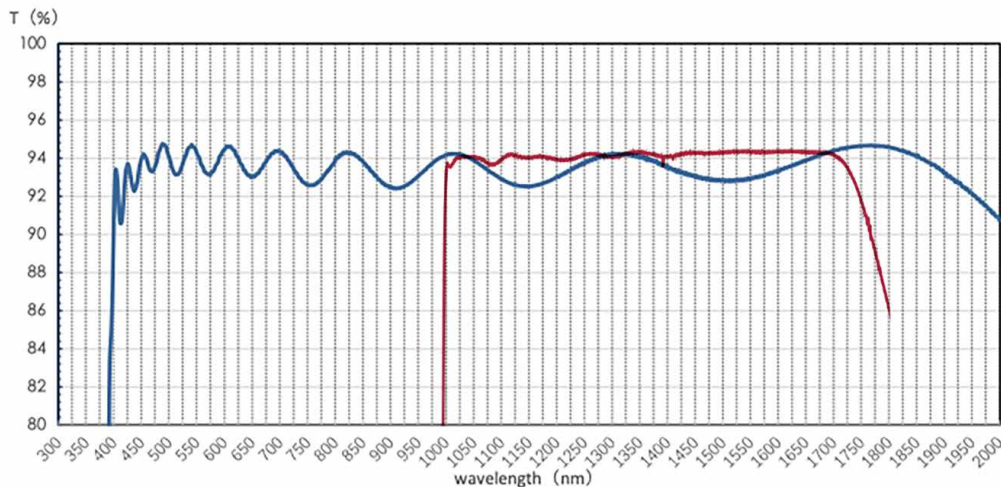


• 6 Glass window spectral transmission plot

Two filters are used: a long-pass filter LPF390H and a long-pass filter LP1000H.

The blue curve indicates the standard configuration: LPF390H: D25X1MM Cut-off 200-375HR-Transmission 400-1800HT-T90-OD5

The red curve indicates the optional configuration: LP1000H: D25x2MM 200-980HR-1030-1800NM T90-OD5



• 7 Camera Functions And Features

7.1 Camera Operation Mode

- Camera operation mode support: Video Mode or Trigger Mode
- Camera Trigger Mode support: Soft Trigger Mode(Software) or External Trigger Mode(Isolated input,G-PIO0, GPIO1, Counter or PWM).

7.2 Bit Depth And ROI Control

SWIR series has a built-in 12bit t / 14bit ADC, and the camera also support hardware ROI. The smaller the ROI size, the faster the frame rate.

7.3 Bandwidth And Precise Frame Rate Control

7.3.1 Bandwidth

SWIR series support bandwidth adjustment from 1% to 100%. As shown in Figure 7-1, the camera is with 100% bandwidth by default, and you can drag the slider to set the desired bandwidth.

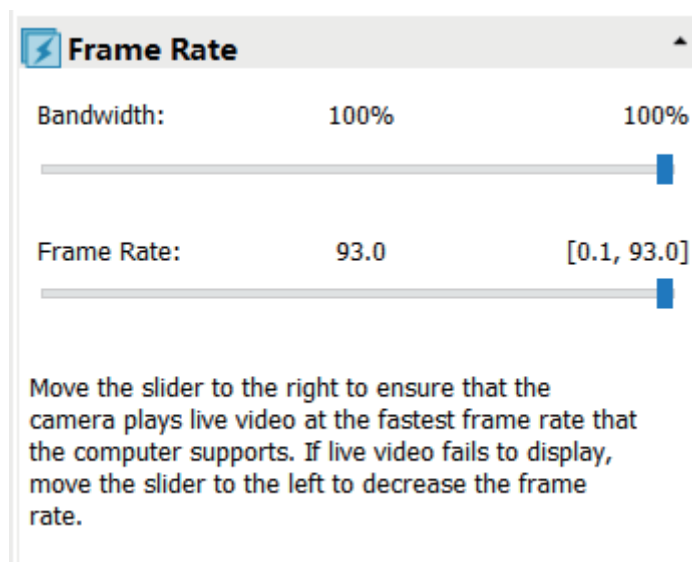


Figure 7-1 Bandwidth and precise frame rate settings

7.3.2 Precise Frame Rate Control

SWIR series support precise frame rate control. The frame rate range will vary based on bandwidth, bit depth, resolution, ROI. As shown in Figure 8, the current frame rate can be set by dragging the Bandwidth or Frame Rate slider bar left or right.

7.4 DDR3 Buffer

SWIR series has a built-in 512MByte (4Gb) DDR3 buffer, which can effectively improve the stability of USB3/ Cameralink / GigE data transmission and ensure that the camera does not lose frames when working.

7.5 Binning

SWIR series support additive or averaged 1x1 to 8x8 digital binning, and averaged 1x1 to 2x2 hardware binning. Hardware binning can achieve higher frame rates than software binning.

7.6 DC12V Power Supply And Cooling System

When the DC12V power supply is plugged in, both the camera cooling system and the imaging system use a unified 12V power supply.

When the DC12V power supply is disconnected, the camera cooling system stops working, and the imaging system will automatically switch to the USB 5V power supply and the camera can work normally in passive cooling mode.

The cooling system of SWIR series has a built-in TEC cooling for the sensor. It uses an external heat dissipation structure and a fan to assist heat dissipation. The working temperature can be adjusted to a specific value, and the effective cooling temperature can be lower than the ambient temperature by 10–25 °C. The efficient cooling system guarantees extremely low dark current levels.

The TEC system is controlled by PID algorithm, so that the TEC can be accurately adjusted to the target temperature, and the temperature deviation is 0.1°C.

7.7 Camera Performance Analysis

The performance of the camera can be evaluated by e-/ADU, Readout Noise, Full Well and Dynamic Range.

- E-/ADU: The electron signal of the CCD/CMOS camera is converted into a digital signal through a series of circuits such as readout, amplification, and analog-to-digital converter. The converted digital signal unit is called ADU. The conversion factor is e-/ADU.
- Readout Noise: Readout noise is the most important reference indicator for measuring camera performance. Low readout noise usually means better signal-to-noise ratio and better image quality. Readout noise occurs when electrons go through steps such as analog-to-digital conversion, amplification, and processing to create an image during readout.
- Full Well: The maximum capacity of how many electrons could be held by each pixel of the camera. Under the same conditions of noise and A/D conversion, the larger the full-well charge capacity of the sensor, the wider the dynamic range.
- Dynamic Range: Dynamic range is specified as the maximum achievable signal divided by the camera noise, where the signal strength is determined by the full-well capacity and noise is the sum of dark and readout noises.. Dynamic range represents the camera's ability to display the brightest and darkest parts of an image and how much there is variation between the two. There may be one part of an image that is completely black and another part that is completely saturated.

For SWIR series, when describing camera performance, Gain Value In xxx% mode, here use xxx as the x - axis (Gain Value)

$$\begin{aligned} \text{Rel Gain(dB)} &= 20 * \log_{10} [\text{xxx}(\text{Gain Value})/100] \\ \text{xxx}(\text{Gain Value}) &= 100 \times 10^{(\text{Rel Gain(dB)}/20)} \end{aligned}$$

7.8 Lens Design Guidelines

The following information introduces details regarding lens selection.

The sensor imaging and lens are shown in Figure 7-2.

Figure 7-3 and Table 7-1 recommend the CRA characteristics for image heights from 0–100%.

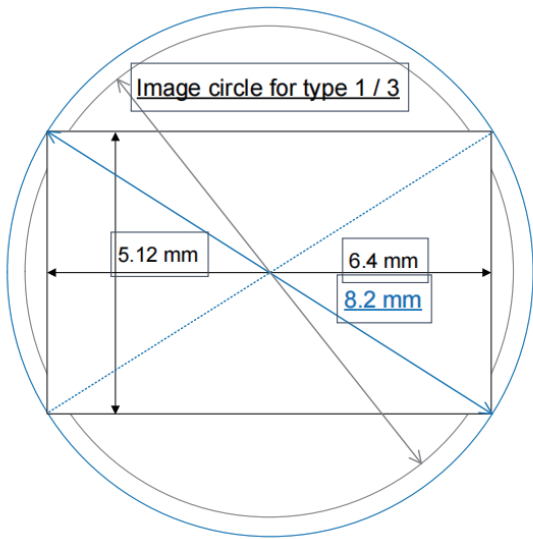


Figure 7-2 IMX990 relationship between image circle and pixel area

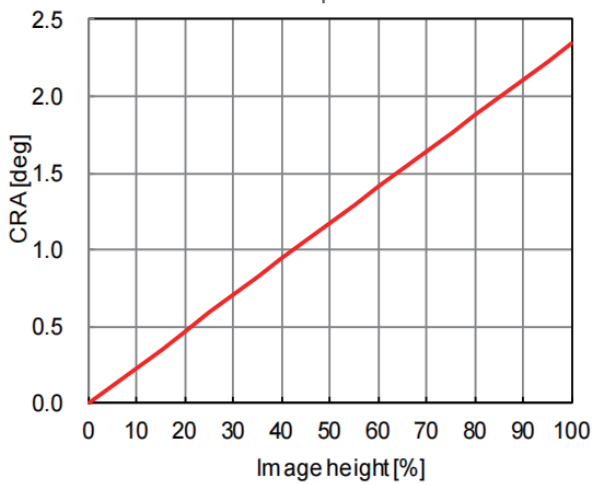


Figure 7-3 IMX990 CRA characteristics

IMX990		
Image height		CRA (deg)
(%)	(mm)	
0	0.00	0.00
5	0.20	0.12
10	0.41	0.23
15	0.61	0.35
20	0.82	0.47
25	1.02	0.59
30	1.23	0.70
35	1.43	0.82
40	1.64	0.94
45	1.84	1.06
50	2.05	1.17
55	2.25	1.29
60	2.46	1.41
65	2.66	1.53
70	2.87	1.64
75	3.07	1.76
80	3.28	1.88
85	3.48	1.99
90	3.69	2.11
95	3.89	2.23
100	4.10	2.35

Table 7-1 CRA(Chief Ray Angle) characteristics

• 8 Camera Dimensions And Port

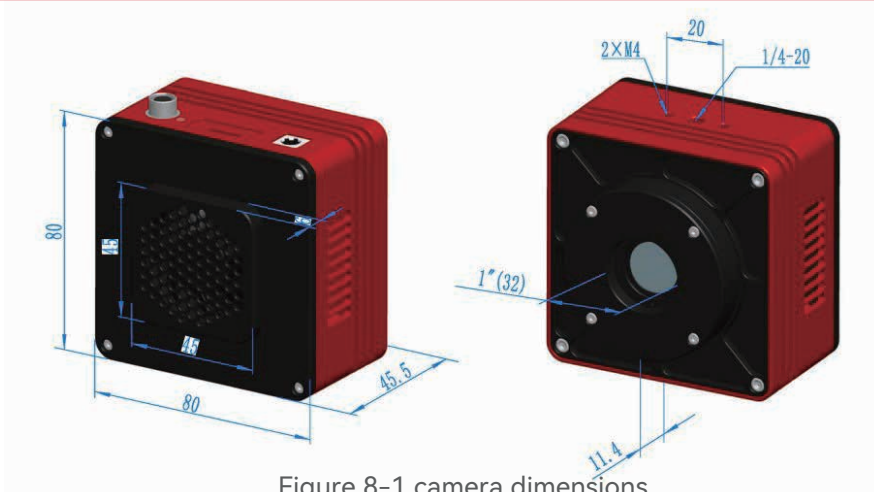


Figure 8-1 camera dimensions

Parameter	Specification
Size	80*80*45.5mm
Mount	C mount

Table 8-1 camera dimensions specification

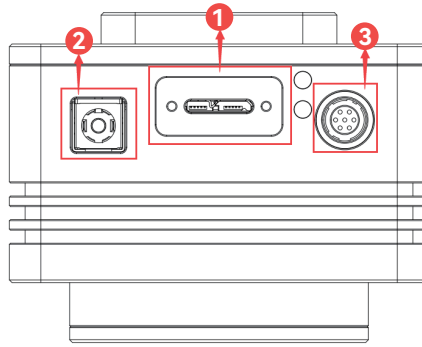


Figure 8-2 Camera USB 3.0 Interface

Item	Specification
1	USB3.0 port
2	DC 12V power
3	External IO connection port

Table 8-2 Camera Interface Specifications

● 9 External IO Connector And Electrical Characteristics

9.1 Camera Pin Signal

	Color	Pin	Signal	Description of the signal
	White	1	GDN	Direct-coupled signal ground
	Red	2	12V	12VDC power input
	Blue	3	OPTO_GND	Opto-isolated signal ground
	Yellow	4	DIR_GPIO0	Direct-coupled General Purpose I/O (Software configurable input/output) (line2)
	Black	5	DIR_GPIO1	Direct-coupled General Purpose I/O (Software configurable input/output) (line3)
	Green	6	OPTO_IN	Opto-isolated input signal (line0)
	Pink	7	OPTO_OUT	Opto-isolated output signal (line1)

Table 9-1 camera pin signal definitions

9.2 I/O Electrical Characteristics

9.2.1 Opto-isolated Input Circuit (line0)

In the I/O control of the camera, the opto-isolated input circuit is shown in Figure 9-1.

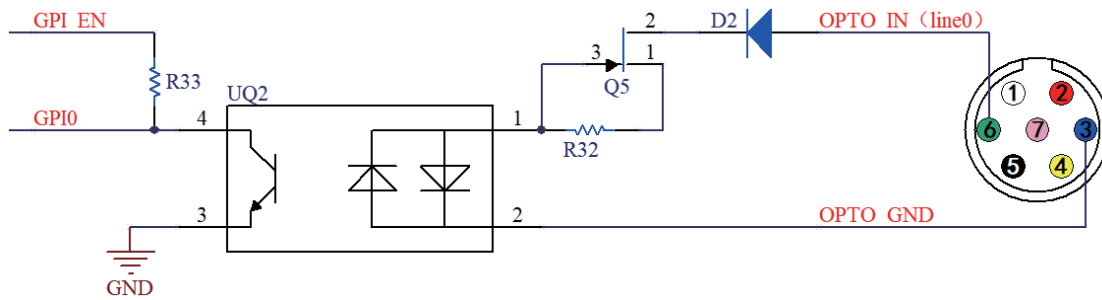


Figure 9-1 Opto-isolated input circuit

Logic 0 input level: 0~2.2VDC (OPTO_IN pin)

Logic 1 input level: 3.3~24VDC (OPTO_IN pin)

Maximum input current: 30mA

When the input level is between 2.2V and 3.2V, the circuit operation state is uncertain, please do not let SWIR camera work within this voltage range.

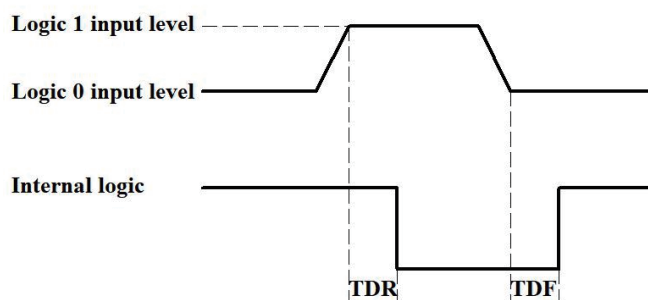


Figure 9-2 Input logic levels

Input rise delay (TDR): 6us

Input fall delay (TDF): 6us

9.2.2 Opto-isolated Output Circuit (line1)

In the camera I/O control, the opto-isolated output circuit is shown in Figure 9-3. The opto-isolated output maximum current is 30mA.

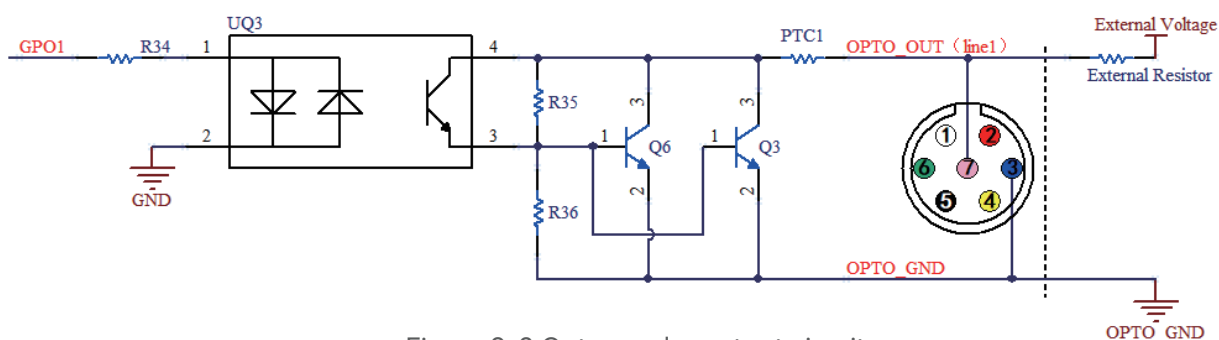


Figure 9-3 Optocoupler output circuit

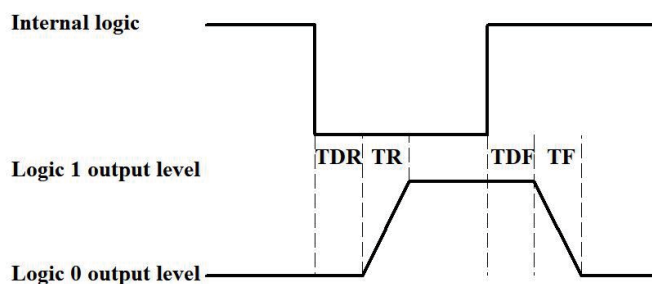


Figure 9-4 Output logic levels

The electrical characteristics of the opto-isolated output (external voltage 5V, external resistor 1K) are shown in Table 9-2.

The output of the corresponding output current and VL when using different voltages and resistors in external circuit are shown in Table 9-3.

Parametername	Parameternotation	Parametervalue
Output logic low	VL	742mV
Output logic high	VH	4.134V
Output rise time	TR	4us
Output fall time	TF	1.8us
Output rise delay	TDR	12us
Output fall delay	TDF	2us

Table 9-2 Opto-isolated output signal's electrical characteristics

Externalvoltage	Externalresistor	VL	Outputcurrent
3.3V	1KΩ	510mV	2.82mA
5V	1KΩ	742mV	4.31mA
12V	2.4KΩ	795mV	4.68mA
24V	4.7KΩ	850mV	4.97mA

Table 9-3 Opto-isolated output logic's low levels parameters

9.2.3 Input And Output I/O Circuit (line2/line3)

The non-isolated configurable input and output I/O circuits are shown in Figure 9-5 and Figure 9-6.

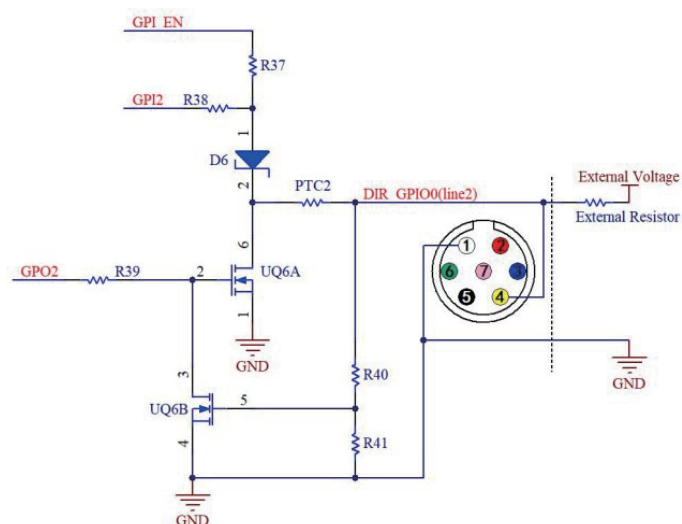


Figure 9-5 Non-isolated configurable input and output I/O circuit (line2)

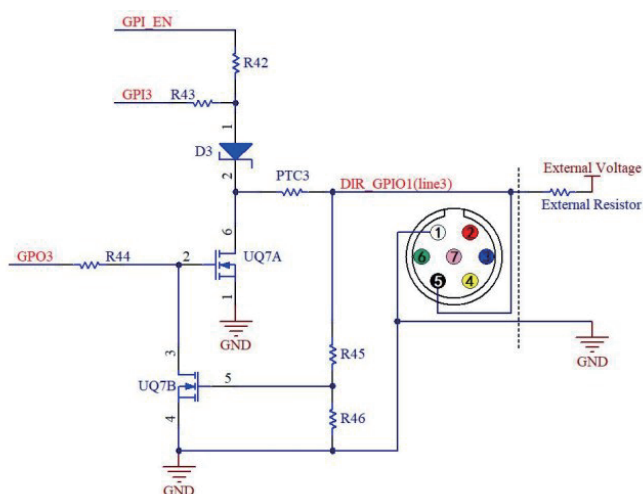


Figure 9-6 Non-isolated configurable input and output I/O circuit (line3)

1、 Line2/line3 is set as input pin

Logic 0 input level: 0~0.6VDC (DIR_GPIO0/DIR_GPIO1 pins)

Logic 1 input level: 2.0~24VDC (DIR_GPIO0/DIR_GPIO1 pins)

Maximum input current: 25mA

When the input level is between 0.6V and 2.0V, the circuit action state is uncertain, please avoid the input voltage range working in this range.

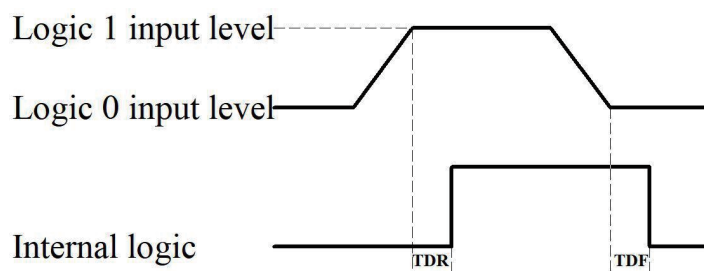


Figure 9-7 Input logic levels

To prevent damage to the GPIO pins, please connect the pin GND first, and then input voltage to the Line2 pin.

Input rise delay (TDR): 0.02us

Input fall delay (TDF): 0.02us

2、Line2/line3 are set as output pins

The maximum current allowed through this pin is 25mA. When the ambient temperature is 25 degrees Celsius, the relationship between the external voltage, resistance and low-level voltage output is shown in Table 9-4.

Externalvoltage	Externalresistor	VL(GPIO)
3.3V	1KΩ	0.11V
5V	1KΩ	0.167V
12V	2.4KΩ	0.184V
24V	4.7KΩ	0.385V

Table 9-4 Non-isolated output Logic's low level parameters

The external pull-up voltage is 5V, the pull-up resistor is 1KΩ, and the GPIO is configured to output the logic level and electrical characteristics as shown in Figure 9-8.

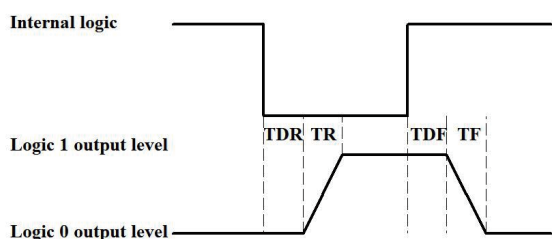


Figure 9-8 Output logic levels

Parametername	Parameternotation	Parametervalue
Output rise time	TR	0.08us
Output fall time	TF	0.02us
Output rise delay	TDR	0.1us
Output fall delay	TDF	0.04us

Table 9-5 Non-isolated output electrical characteristics

• 10 AttosView Application

10.1 Application installation

In terms of software, customers are welcome to visit our website:<https://attostek.com/software-download> to download the latest AttosView. Camera can also be used with ASCOM, DirectShow interface. If the third-party software is compatible with these interfaces, customers can also download software drivers from our website and install them into the third-party software.

10.2 Introduction to AttosView

AttosView is a professional software that integrates camera control, image acquisition and processing, image browsing and analysis functions. ToupView has the following characteristics:

- x86: XP SP3 and above ; CPU support SSE2 and above
- x64: Win7 and above
- Support video mode and Trigger Mode (Raw format or RGB format)
- Automatic capture and quick recording capabilities
- Support multiple languages
- Hardware ROI and digital binning capabilities
- Rich image processing functions, such as image stitching, real-time overlay, flat field correction, dark field correction, etc.
- Support all ToupTek cameras

10.2.1 User Interface Design

- The menus and toolbars are properly set to ensure quick operation
- Professionally integrated with 5 sidebars - Camera, Folders, Undo/Redo, Layers, Measure
- Comfortable operation method (double-click or right-click context menu)
- Detailed help manual

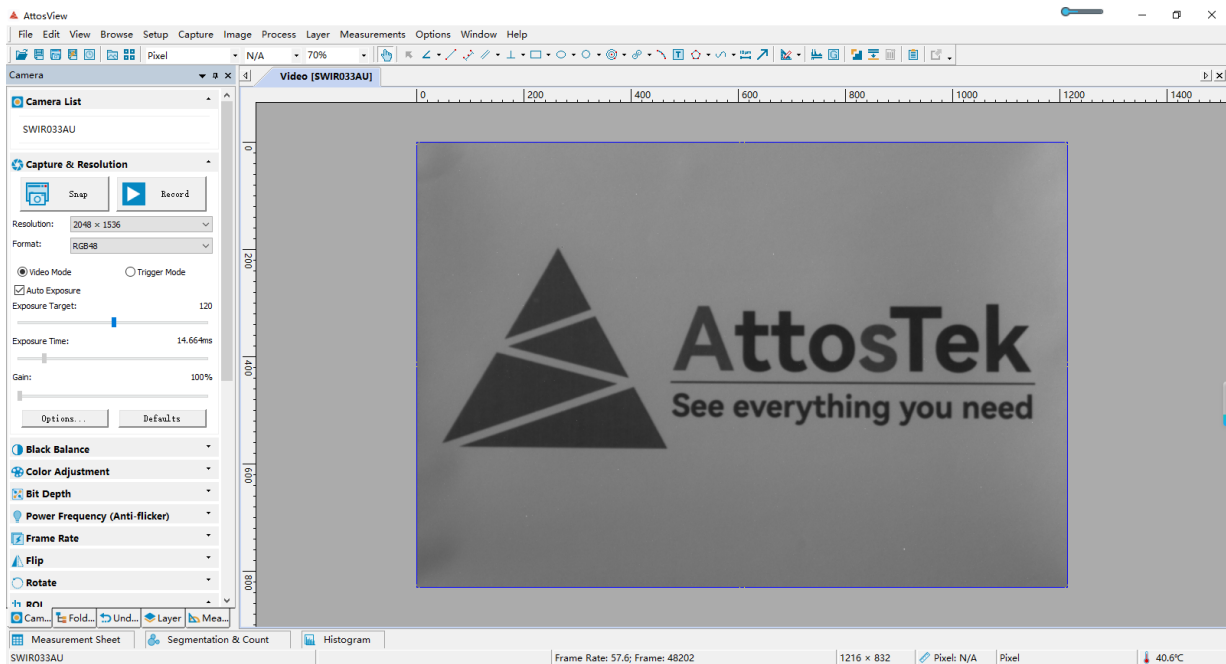


Figure 10-1 AttosView video window

10.2.2 Professional Camera Control Sidebar

Capture & Resolution	Set up live and still capture, snap images, or record video
Exposure & Gain	Auto exposure (preset exposure target value), manual exposure (exposure time can be manually entered and set by slider); gain up to 5 times
White Balance	Advanced one-click smart white balance settings, and you can adjust white balance by manually setting color temperature and color
Color Adjustment	Color, saturation, brightness, contrast, gamma initial high-speed adjustment function
Frame Rate Control	For different computer and USB performance, the camera can be super compatible by adjusting the frame rate
Flip	Select "Horizontal" or "Vertical" to adjust the sample orientation to ensure the same orientation as the visual system
Sampling	Neighborhood averaging can improve the signal-to-noise ratio of the video stream; while the sampling extraction mode can ensure the sharpness of the video stream. Support histogram expansion of video stream, image negative and positive switching, grayscale calibration, and sharpness factor calculation to facilitate video focusing
Bit Depth	8, 12-bit switching, 8-bit is the basic Windows image format. 12-bit has higher image quality but reduces frame rate
ROI	ROI, Region of interest. This function can set the ROI value of the video window. After the ROI group is expanded, a rectangular box will appear in the middle of the video window, and the ROI can be changed. The mouse can adjust the size of the ROI. If

	there is no problem with the ROI, click "Apply" to set the video to the size of the ROI, and the default value will be restored to the original size
Dark Field Correction	To enable darkfield correction, you should first capture a field image, then click Enable. Check Enable to enable darkfield correction. Uncheck it to disable darkfield correction
Cooling	Set TEC Target Temperature, fan on/off
Parameter Save	Load, save, overwrite, load, export custom camera panel controls (including calibration information, exposure parameters and color settings information, etc.)

10.2.3 Professional And Practical Image Processing Functions

Video Function	Various video professional processing functions: video broadcasting, timing capture, video recording, video watermarking, watermark mobile alignment, watermark rotation alignment, video grid overlay, video measurement, video scaling, gray scale calibration, video high dynamic (HDR), video depth of field extension, video image stitching, video scale, date, etc.
Image Processing and Enhancement	Image contrast control and adjustment, image denoising, various image filtering algorithms, image mathematical morphology algorithms, image rotation, image scaling and image printing, etc.
Image Overlay	The AttosView image overlay denoising function introduces advanced image matching technology. Users only need to record a short video of the image to be superimposed, and they can superimpose and output high fidelity in the case

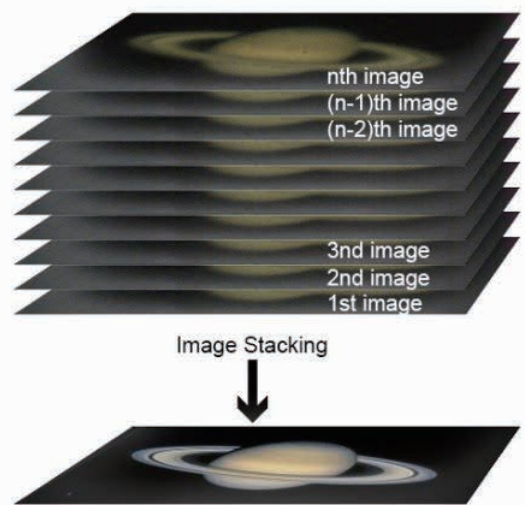


Figure 10-2 Image overlay denoising

10.2.4 Super compatibility

Camera Video Interface	Provide Twain, DirectShow, Labview, SDK installation package (native C++, C#)
Supported Operating Systems	Compatible with Microsoft® Windows® XP / Vista / 7 / 8 /10 /11(32 & 64 bit), Mac OSX, Linux
Language Support	Language support can be added manually, currently support English, Simplified Chinese, Traditional Chinese, German, Japanese, Russian, French, Italian, Polish, Turkish

10.3 AttosView Trigger Modes And Configuration

10.3.1 Video mode and Trigger mode

The trigger function can be found on the Capture & Resolution group on the Camera Sidebar in AttosView. When the camera is opened, it is in Video Mode as shown in Figure 10-3 on the left. In Video Mode, Auto Exposure, Exposure Target, Exposure Time and Gain can be set. One can switch to Trigger Mode by checking the Trigger Mode check box.

After the Trigger Mode is checked, the Capture & Resolution group will switch to Trigger Mode as shown in Figure 10-3 on the right. Where, the Trigger Source, Exposure Time, Gain, Single, Loop, Multiple, Frame Box, and Options can be set.

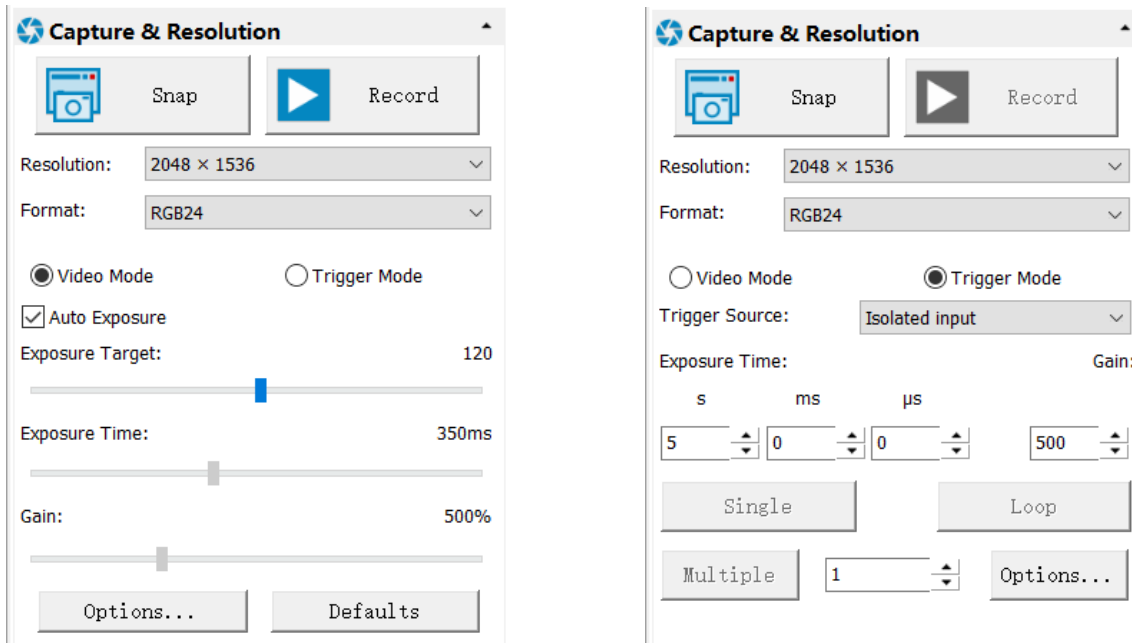


Figure 10-3 Video Mode and Trigger Mode on the Capture & Resolution group in AttosView

10.3.2 Trigger Sources And Their Capture Style

The Trigger Source can be any external input signal inputted into the camera which is called Hardware (Trigger Source), it can also be a command from the application which is called Software (Trigger Source). For the Software Trigger Source, it can be Single, Loop, Multiple, or Sequence style. Figure 10-4 shows the possible Trigger Sources. Table 10-1 shows the designed Trigger Source descriptions and possible capture styles for AttosTek camera.

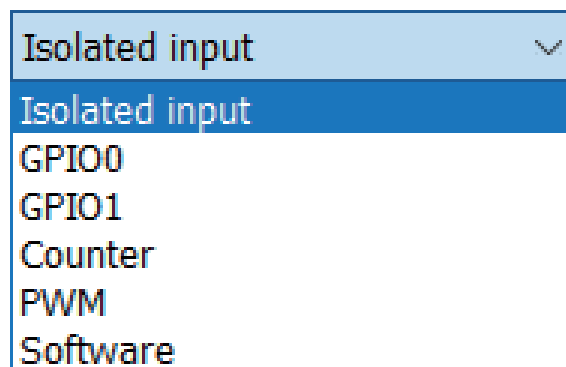
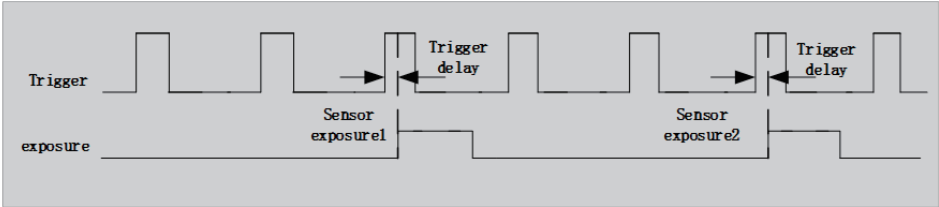
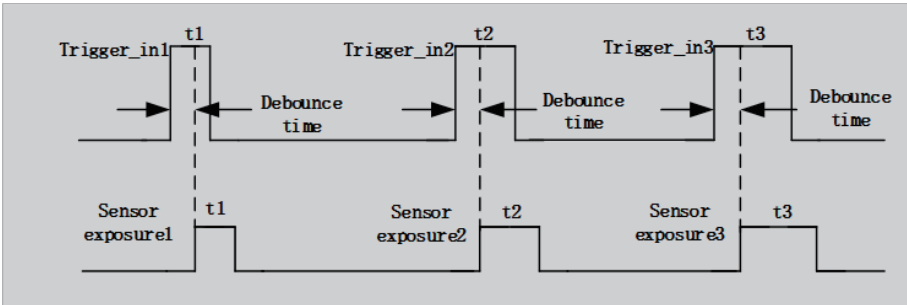
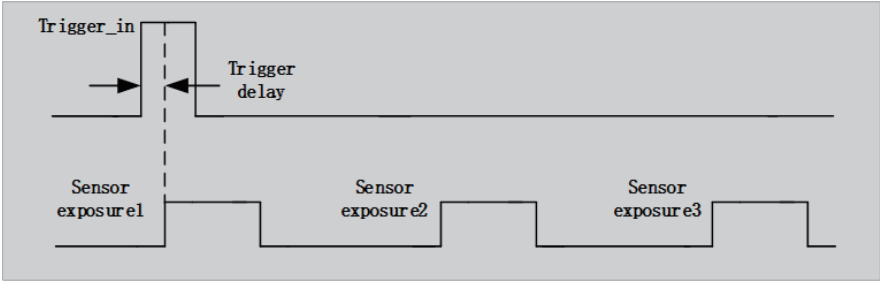


Figure 10-4 Possible Trigger Sources

Table 10-1 Description of possible Trigger Sources and their capture styles

Trigger Source	Description
Isolated input	Logic 0 input level: 0~2.2VDC; Logic 1 input level: 3.3~24VDC; Maximum input current: 30mA;
GPIO0	Logic 0 input level: 0~0.6VDC (DIR_GPIO0/DIR_GPIO1 pins); Logic 1 input level: 2.0~24VDC (DIR_GPIO0/DIR_GPIO1 pins); Maximum input current: 25mA; If GPIO0 is chosen as Trigger Source, it should be configured as Input in the GPIO Mode's combo box on the Options>IO Control page;
GPIO1	Logic 0 input level: 0~0.6VDC (DIR_GPIO0/DIR_GPIO1 pins); Logic 1 input level: 2.0~24VDC (DIR_GPIO0/DIR_GPIO1 pins); Maximum input current: 25mA; If GPIO1 is chosen as Trigger Source, it should be configured as Input in the GPIO Mode's combo box on the Options>IO Control page;
Counter	<p>Counter refers to the operation mode in which the camera can divide the frequency of the external input trigger signal through the preset Counter Value and perform image acquisition according to the customer's logic. For example, when the counter value(Counter Value: <input type="text" value="3"/> [1,1023]) is set to 3, the camera needs to receive 3 trigger signals to trigger once;</p>  <p>When Counter is chosen in Trigger Source combo box in the Capture & Resolution group, the Counter Source can be Isolated input, GPIO0 or GPIO1 which can be chosen on Options>IO Control page;</p> <p>If GPIO0 or GPIO1 is chosen in the Counter Source combo box on Options>IO Control page. It should be configured as Input in the GPIO Mode combo box;</p> <p>Check Options > IO Control page's Line Select related items and Counter related items for details;</p>
PWM	<p>PWM refers to the operation mode in which the camera exposure time is controlled by the input trigger signal's pulse width;</p>  <p>PWM Trigger Source can be Isolated input, GPIO0 or GPIO1. If GPIO0 or GPIO1 is chosen in the PWM Source combo box on the Options>IO Control page, it should be configured as Input in the GPIO Mode combo box;</p> <p>Check Options>IO Control page's Line Select related items and PWM related items for details;</p>
Software	<p>When Software trigger is chosen, the client software can send the command through USB3.0 to trigger, acquire and transfer images, In AttoTek , Single, Loop, Multiple, or Sequence can be used to send the Software trigger command;</p>

	<p>If the Plan or Hardware is chosen in the Type combo box on the Options>Sequence page, the Multiple button will switch to Sequence button and the camera will use the Exposure Time and Gain in the Sequence table on this page one by one to capture the specified frames. Check Single, Loop, Multiple, or Sequence on Capture & Resolution group for the Software capture operations;</p> <p>Check Options>Sequence page and Options>Advanced page for the related Sequence and Software capture setup options;</p>
Single	<p>When Single is clicked, the camera will start to capture the image. At the same time the Single button will switch to Stop button. Clicking Stop button to stop the current Single capture operation, the Stop button will switch to Single button again for the next capture operation;</p> <p>Note: 1) The captured frames will always Show in the video window to prevent too many captures;</p> <p>2) Enabled when Software in the Trigger Source combo box is chosen or Always enable software trigger checkbox is checked on the Options>Advanced property page;</p>
Loop	<p>When Loop is clicked, the camera will start to capture the image continuously and the Loop button will switch to Stop button. Clicking Stop button to stop Loop captures and the Stop button will switch to Loop button for the next Loop capture operation;</p> <p>Note: 1)The captured frames will always Show in the video window to prevent too many captures;</p> <p>2)Enabled to capture continually when Software in the Trigger Source combo box is chosen or Always enable software trigger checkbox is checked on the Options > Advanced property page;</p>
Multiple	<p>Multiple refers to the operation mode in which the camera receives Software trigger signal or command and export multiple frames of images. An edit box with spin(we call it Frames Box) is designed and affiliated to the Multiple button(Counter Value: <input type="text" value="1"/> [1,1023]) for the setting of the frames to be captured;</p> <p>The Frames Box can be set in the range of 1~ 65535. If the Frames Box is 3, a three-frame image will be captured and exported;</p>  <p>Note: 1)Multiple capture is enabled to capture continually when Software in the Trigger Source combo box is chosen;</p> <p>2) Multiple capture is enabled when Always enable software trigger is checked on the Options>Advanced property page, no matter whether Trigger Source is Software or Hardware on the Capture & Resolution group;</p> <p>3) If the Plan or Hardware is chosen in the Type combo box on the Options > Sequence page, the Multiple button will switch to Sequence button and the camera will use the Exposure Time and Gain in the Sequence table on this page. The captured frames will be displayed either in Show in the video window, or Show in a new window or Save to disk which can be specified on Options>Output page;</p>
Sequence	<p>When Sequence is clicked, the camera will start to capture the image until the specified frames in the Frames Box are captured. At the same time the Sequence button will switch to Stop button. Clicking Stop button will stop the current Sequence capture and the Stop button will switch to Sequence again for the next Sequence capture operation;</p> <p>Note: 1) Switched from Multiple to Sequence to capture the specified frames in the edit box</p>

with spin (Frames Box) when Plan or Hardware in the Type combo box is chosen on the Options > Sequence property page;

2) If the Plan or Hardware is chosen in the Type combo box on the Options>Sequence page, the Sequence button will be enabled and the capture will use the Exposure Time and Gain in the Sequence table list below one by one on the Options>Sequence page;

3) If the Plan or Hardware is chosen in the Type combo box on the Options > Sequence page and Always enable software trigger is checked on the Options > Advanced property page, the Sequence button will not switch to Multiple button and will be enabled only when the still in Sequence enable;

4) If the Plan is chosen in the Type combo box on the Options>Sequence page and the Software is chosen in the Trigger Source combo box, the Sequence button will be enabled;

5) If the Hardware is chosen in the Trigger Source combo box, the Sequence button will be disabled, but the Frame Box will still be enabled and the Sequence will switch to the Hardware Sequence capture. One Hardware trigger signal will capture the specified frames on the Frame Box using the Exposure Time and Gain in the Sequence table on Options > Sequence page;

6) Check Options > Sequence page for the related Sequence setup options;

10.3.3 The Trigger Capture And IO Control Configurations

The Trigger Source can be Isolated input, GPIO0, GPIO1 (when configured as input), Counter, or PWM which can be configured on the Options property sheet. Also the camera's Isolated output, GPIO0 or GPIO1 (can be configured as Output) can be used as Output or UART (GPIO0, GPIO1 only) applications. All of these configurations can be realized on the Options property sheet described in Table 10-2 below. About the captured file operation style, one can find it on the Option>Output page;

About the Sequence setup, one can find it on the Option>Sequence page;

About the camera pin IO Control style, one can find it on the Options>IO Control page;

About the Always enable software trigger and UART setup, Shutter Mode, and Exposure Active Mode, one can find it on the Options>Advance page.

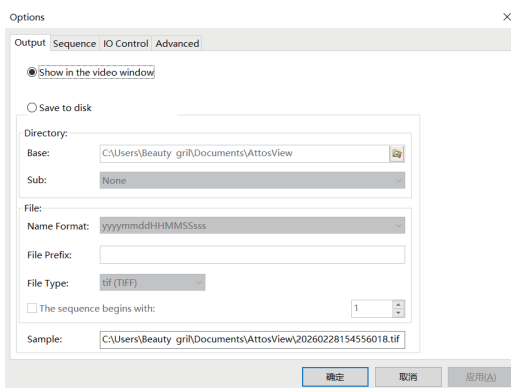


Figure 10-5 Options>Output page

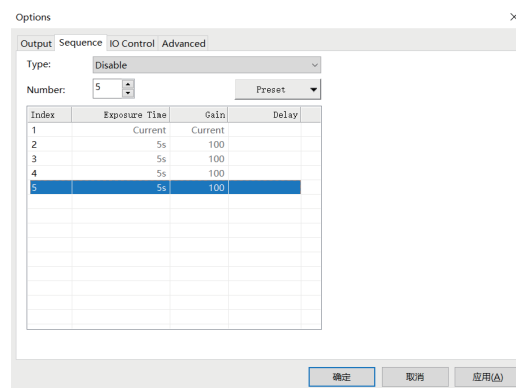


Figure 10-6 Options>Sequence page

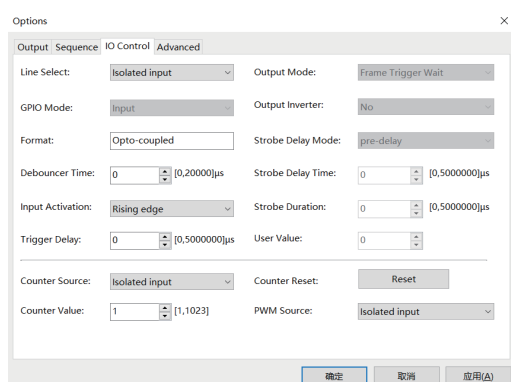


Figure 10-7 Options>IO Control page

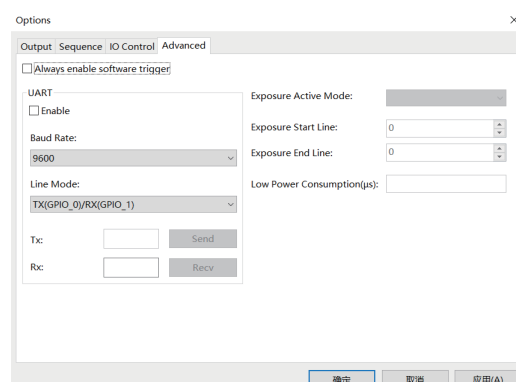

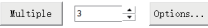


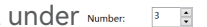
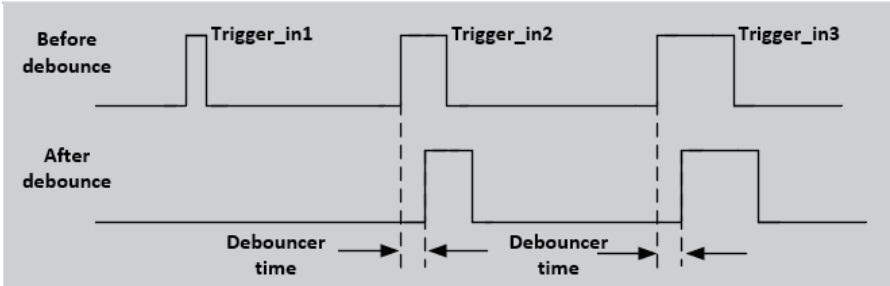
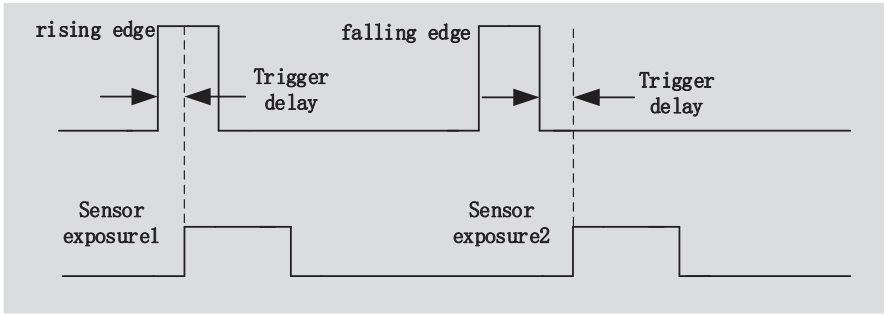


Figure 10-8 Options>Advanced page

Table 10-2 Options property sheet for Trigger Source or camera pin configuration

Pages	Items	Descriptions
Output page	Output Destination	<p>Used to set the captured frame's Output destination, can be Show in the video window, Show in a new window or Save to disk;</p> <p>When Save to disk is checked, the  button will be enabled clicking it to choose the Base directory, clicking the Sub combo box's dropdown button to choose the Sub directory;</p> <p>The File Name Format, File Prefix, File Type, and even The sequence begin with can be chosen, set, or defined.</p> <p>Note: 1)Valid only for Sequence or Multiple capture setup; 2)For Single or Loop capture, the captured image will be always displayed on the video window;</p>
Sequence page	Type Disable Plan Hardware	<p>Disable: If the Disable button is chosen in the Type combo box on the Options > Sequence page, the Sequence button on the Capture & Resolution page will switch to Multiple button;</p> <p>Plan: 1) If Plan is chosen in the Type combo box on the Options>Sequence page, the Multiple button on the Capture & Resolution group will switch to Sequence button; 2) If the Software Trigger Source is chosen in the Capture & Resolution group or the Always enable software trigger is checked on the Options > Advanced property page, the Sequence button will be enabled After the Software trigger signal is arrived (By clicking Single, Loop, or Sequence button), the camera will capture frames specified in the edit box with spin  (we call it Frames Box) affiliated to the Sequence button; The whole captures will use the Exposure Time, Gain and Delay in the Sequence table list under  by one by the software; 3) If the Disable button is chosen in the Type combo box on the Options > Sequence page, the Sequence button on the Capture & Resolution page will switch to Multiple button; 4) The Sequence button will be enabled only when a) the Plan in the Type combo box is chosen on the Options>Sequence page and b) he Software Trigger Source is chosen in the Capture & Resolution group or c)Always enable software trigger is checked on the Options>Advanced property page;</p> <p>Hardware: 1) if Hardware is chosen in the Type combo box on the Options>Sequence page, the Multiple button on the Capture & Resolution group will switch to Sequence button and will be disabled for Hardware trigger. But users can still set the frames number in the Frame Box on the Capture & Resolution group; 2) After the Hardware trigger signal arrives, the camera will capture frames specified in the edit box with spin  (we call it Frame Box) affiliated to the Sequence button; The whole capture will use the Exposure Time, Gain (Delay is not used) in the Sequence table list under  by one by one but stored in the camera hardware for the quick operation; 3) If the Disable button is chosen in the Type combo box on the Options > Sequence page, the Sequence button on the Capture & Resolution page will switch to Multiple button. 4) The Sequence button is always disabled if a) The Hardware is chosen in the Type combo box on the Options>Sequence page and b)the Hardware Trigger Source is chosen in the Capture & Resolution group; 5) The Sequence button will be enabled if a) the Software Trigger Source is chosen in the Capture & Resolution group or b) the Always enable software trigger checkbox is checked on the Options>Advanced property page, in this case, both the Plan and Hardware Sequence capture are supported;</p>

	<p>Number</p> <p>Index</p> <p>Exposure Time</p> <p>Gain</p> <p>Delay</p> <p>Preset</p>	<p>The possible Sequence(capture) frames to be captured. If the Number is larger than the Sequence Number in the Frames Box on the Capture & Resolution group, the other Indices will be executed at the next Sequence operation one by one recycled;</p> <p>The order of the Number group;</p> <p>The camera Exposure Time for the specified capture Index in the Sequence capture;</p> <p>The camera Gain for the specified capture Index in the Sequence capture;</p> <p>The Delay time for the specified capture Index in the Plan Sequence capture(Valid for Plan Sequence capture only);</p> <p>Choosing Save to save the current Sequence table's settings; Clicking Management to Rename the saved Sequence table's setting files or Remove them from the Management list;</p>
IO Control page	<p>Line Select</p> <p>GPIO Mode</p> <p>Format</p> <p>Debouncer Time</p>	<p>Choosing which line to set. Can be Isolated input, Isolated output, GPIO0 or GPIO1 et al;</p> <p>To configure whether the line selected in Line Select is for Input or Output. Only GPIO0 or GPIO1 can be configured as either Input or Output; If Isolated input or Isolated output is chosen, the GPIO Mode will be specified as Input or Output (Not configurable) respectively;</p> <p>Specify the current selected signal's Format in the Line Select combo box, can be Opto-coupled (Isolated input, Isolated output)or TTL (GPIO0 or GPIO1) for clarity (Unconfigurable);</p> <p>Since there may be a glitch in the external trigger input signal if it directly enters into the internal logic circuit of the camera, it will cause false triggering, so the input trigger signal should be debounced. In addition, the effective pulse width of the trigger signal input by the user should be greater than the Debouncer Time, otherwise, the trigger signal will be ignored;When Isolated input, GPIO0 or GPIO1 is chosen in the Line Select combo box and GPIO0 or GPIO1 is configured as Input in the GPIO Mode combo box, the Debouncer Time will be enabled for the user to input the Debouncer Time between 0 to 20000us;</p> 
	Input Activation	<p>When Isolated input, GPIO0 or GPIO1 is chosen in the Line Select combo box and GPIO0 or GPIO1 is configured as Input in the GPIO Mode combo box; The Input Activation combo box will be enabled to configure the Input Activation as either Rising Edge or Falling Edge;</p> 

Trigger Delay

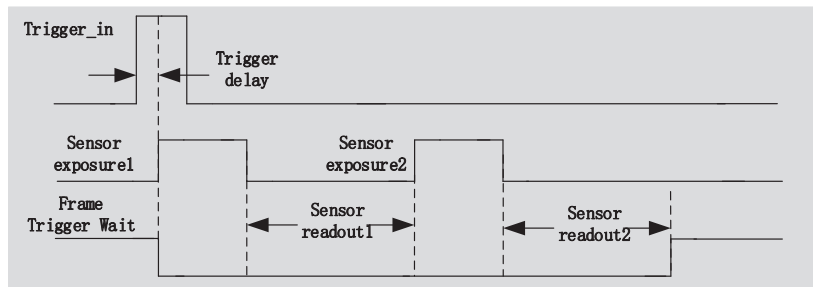
When Isolated input, GPIO0 or GPIO1 is chosen in the Line Select combo box and GPIO0 or GPIO1 is configured as Input in the GPIO Mode combo box, the Trigger Delay will be enabled for the user to input the Trigger Delay time between 0 to 5000000us;
If the Trigger Delay time is set to 1000000us, the camera will wait for 1s to capture the image after receiving the trigger signal;

Output Mode

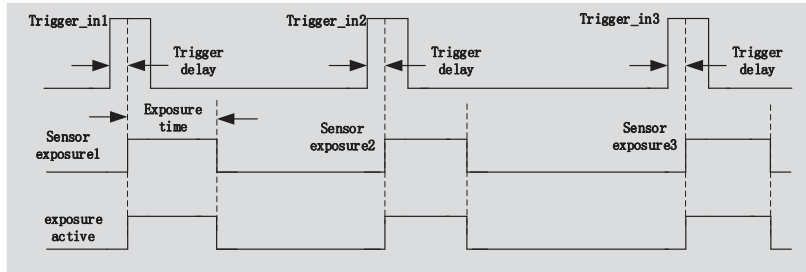
- Frame Trigger Wait
- Exposure Active
- Strobe
- User Output

When Isolated output, GPIO0 or GPIO1 is selected in the Line Select combo box and GPIO0 or GPIO1 is configured as Output in the GPIO Mode combo box, the Output Mode will be enabled. It can be Frame Trigger Wait, Exposure Active, Strobe, or User Output. The chosen mode can be used for diversified applications;

The FrameTriggerWait signal is pulled low at the start of exposure and pulled high when the last frame of data is read out. The trigger signal input by the user should be in the valid period. If the user inputs a trigger signal when the signal is low, the trigger signal input at this time will be ignored. The following example is the case when Burst Count = 2, as shown below;



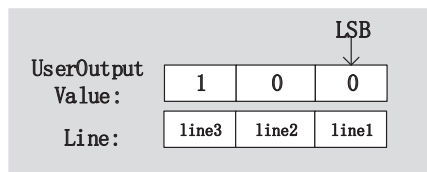
Exposure Active: when this signal is high, it means the sensor is exposing. This signal can be used to control an external mobile device to remain stationary or move at low speed while the camera is at exposure. The timing diagram of the exposure valid signal is shown below;



When the relative position of the camera and the object to be photographed changes, you can refer to Exposure Active signal to prevent the captured image from being affected by movement and focus adjustment during the exposure process;

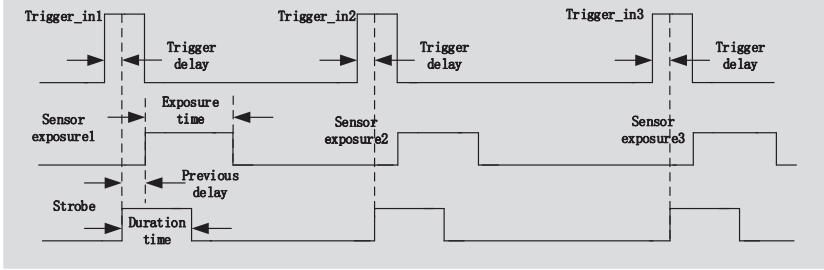
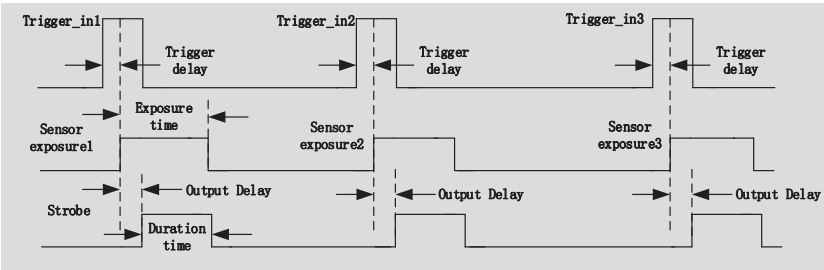
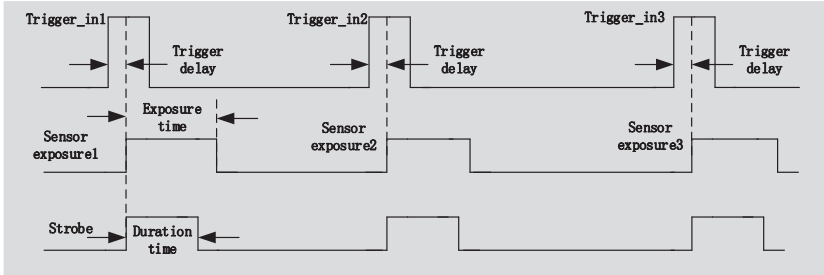
When Strobe is chosen, Strobe Delay Mode, Strobe Delay Time, Strobe Duration will be enabled;

When UserOutput is chosen, User Value will be enabled. line3, line2, line1 are the combination of GPIO1, GPIO0 and Isolated output respectively. If User Value is 001, then line GPIO1 and GPIO0 will be disabled and Isolated output will be enabled;



Output Inverter

When Isolated output, GPIO0 or GPIO1 is selected in the Line Select combo box and Output is chosen for GPIO0 or GPIO1 in the GPIO Mode combo box, the Output Inverter will be enabled to configure the current selected line's output as either inverted or not(Yes or No).

Strobe Delay Mode	Strobe can be used to control external devices such as the strobe, and the effective level duration, delay time, and pre-delay time of the strobe signal can be set; When the Output Mode is Strobe, Strobe Delay Mode will be enabled. It can be pre-delay or delay;												
Strobe Delay Time	<p>When exposure starts, the strobe does not take effect immediately, and the output is delayed according to the value set by Strobe Delay Time which is between 0 to 5000000us. The Strobe Delay Mode can be pre-delay or delay; It is described below;</p> <p>pre-delay:</p>  <p>delay:</p> 												
Strobe Duration	<p>The high level duration of the strobe is determined by the Strobe Duration which is between 0 to 5000000us as shown below;</p> 												
User Value	<p>Users can input a value at User Value edit box with spin to control the line as disable or enable. Enabled when User Output is chosen in the Output Mode combo box. The logical value 0 or 1's combination of GPIO1 (line3) ,GPIO0 (line2) and Isolated output (line1);</p> <p>When the output mode is selected as User Output, the user can input a value at User Value edit box to control the corresponding line output with 0 or 1;</p> <p>The value here is only valid for the lower three bits of a binary. For example, when line 1 and line 3 are set to User Output mode, and its User Value is set to 4 ('b100), then line 3 outputs 1, and line 1 outputs 0, as shown below.</p> <table border="1" data-bbox="695 1783 1195 1980"> <tr> <td></td> <td></td> <td></td> <td style="text-align: center;">LSB</td> </tr> <tr> <td>UserOutput Value:</td> <td style="text-align: center;">1</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> </tr> <tr> <td>Line:</td> <td style="text-align: center;">line3</td> <td style="text-align: center;">line2</td> <td style="text-align: center;">line1</td> </tr> </table>				LSB	UserOutput Value:	1	0	0	Line:	line3	line2	line1
			LSB										
UserOutput Value:	1	0	0										
Line:	line3	line2	line1										
Counter Source	When Counter is chosen in the Trigger Source combo box in the Capture & Resolution group, the Counter Source can be chosen from Isolated input, GPIO0 or GPIO1 in this combo box on the Option>IO Control page;												

	Counter Value	The Counter Value is used to divide the frequency of the external input trigger signal when the Counter Trigger Source is chosen in the Capture & Resolution group; See Counter in Table 84 for detail;
	Counter Reset	Click Reset button can clear the current counting process and begin a new one;
	PWM Source	When PWM is chosen in the Trigger Source combo box in the Capture & Resolution group, the PWM Source can be from Isolated input, GPIO0, or GPIO1 in this combo box et al. ;
Advanced page	Always enable software trigger	When this button is checked, no matter whether Trigger Source is Software or Hardware, the software trigger buttons(Single, Loop, Multiple) are always enabled; If the Plan or Hardware is chosen in the Type combo box on the Options > Sequence page, the Multiple button will switch to Sequence button; The Sequence button will be enabled if a)the Software Trigger Source is chosen in the Capture & Resolution group or b) the Always enable software trigger checkbox is checked on the Options> Advanced property page, in this case, both the Plan and Hardware Sequence captures are supported;
	UART	There is a serial port function on the Advanced page, which can be used to communicate with external devices via serial port. Check Enable to enable this function. When enabled, GPIO0 and GPIO1 can only be used as UART transfers; The Baud Rate support 9600-115200. Cable Select can configure GPIO0 and GPIO1, which can be configured as TX or RX respectively. Setting a value at TX, clicking Send to send the set value out; click Accept at RX to receive the value from the external device;
	Shutter Mode	Enabled if the camera support. Users can select Rolling Shutter or Global Reset;
	Exposure Active Mode	Enabled if the camera support. Users can select Specified lines or Common exposure time;
	Exposure Start Line	Enabled when Specified lines in the Exposure Active Mode combo box is selected. To configure when the Exposure Active signal is valid;
	Exposure End Line	Enabled when Specified lines in the Exposure Active Mode combo box is selected. To configure when the Exposure Active signal is invalid;

10.4 Cooling

There is a Cooling group on the left sidebar in ToupView. To enable the Cooling function, an external 12V power supply is required. By default, the TEC is turned on. One can set the Target Temperature. After entering the value, click "Apply", and the sensor temperature will gradually approach to the Target Temperature. At the same time, ToupView can display the current temperature in real time. And the cooling effect can reach about 10-25 degrees lower than the ambient temperature, as shown in Figure 10-9.

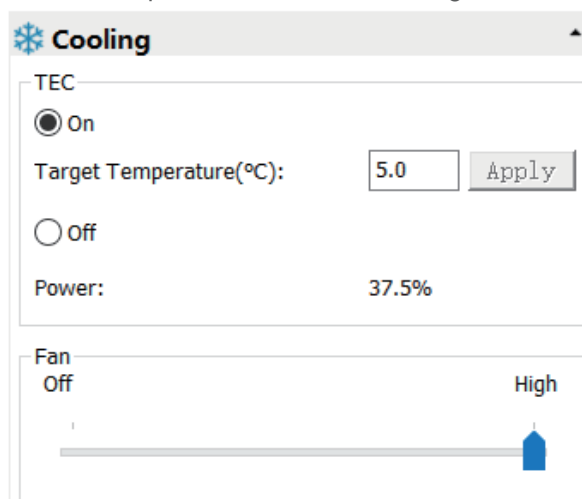


Figure 10-9 TEC settings

The Fan has two gears from Off to High. When High, the Fan speed reaches the highest. When Off, the Fan is turned off, the TEC is also turned off, and the power is 0, as shown in Figure 10-10.

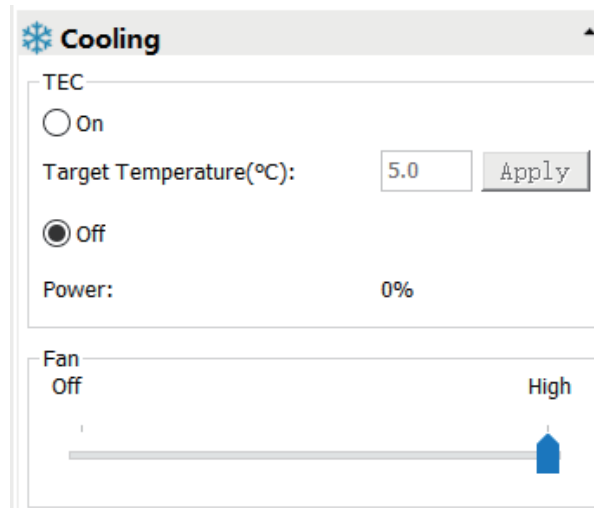


Figure 10-10 Fan settings

When the TEC is turned on, the Fan will automatically turn on preventing the abnormal situation such as the housing temperature is too high if the Fan stops running when the TEC is working; when the Fan is turned off, the TEC will automatically turn off.

10.5 Software Development Instructions

10.5.1 SDK description

The download link of the SDK is as follows:
<https://attostek.com/software-download>

10.5.2 SDK Support Platform

- Win32:
 - x86: XP SP3 and above; the CPU needs to support at least the SSE2 instruction set.
 - x64: Win7 and above.
 - arm: Win10 and above.
 - arm64: Win10 and above.
- WinRT: x86, x64, arm, arm64; Windows 10 and above.
- macOS: universal (x64+x86) ; macOS 10.10 and above.
- Linux: core 2.6.27 and above.
 - x86: The CPU needs to support at least the SSE3 instruction set; GLIBC 2.8 and above.
 - x64: GLIBC 2.14 and above.
 - Armel: GLIBC2.17 and above; compiled by toolchain arm-linux-gnueabi(version 5.4.0).
 - Armhf: GLIBC2.17 and above; compiled by toolchain arm-linux-gnueabihf(version 5.4.0).
 - arm64: GLIBC2.17 and above; compiled by toolchain aarch64-linux-gnu(version 5.4.0).
- Android: arm: armeabi-v7a; arm64: arm64-v8a, x86; x64: x86_64; compiled by android-ndk-r18b.

10.5.3 Introduction To SDK Content

ascamsdk series cameras support a variety of APIs, including: Native C/C++, .NET/C#/VB.NET, Python, Java, DirectShow, Twain, LabView, Matlab, etc. Compared with other APIs, Native C/C++ API as a low-level API is characterized by using pure C/C++ development without relying on other runtime libraries. The interface is simple and the control is flexible. This SDK zip package contains all the resources and information needed. The directory is as follows:

- Inc:
ascam.h, the C/C++ header file.
- win: Microsoft Windows platform file
 - dotnet:
ascam.cs, support C#.ascam.cs uses P/Invoke to call ascam.dll. Please copy ascam.cs to your C# project for use.
ascam.vb, support VB.NET. ascam.vb uses P/Invoke to call ascam.dll. Please copy ascam.vb to your VB.NET project for use.
 - x86:
ascam.lib, x86 lib file.
ascam.dll, x86 dynamic library file.
democpp.exe, x86 C++ demo execute the procedure.
- x64:
ascam.lib, x64 lib file.
ascam.dll, x64 dynamic library file.
democpp.exe, x64 C++ demo execute the procedure.
- arm:
ascam.lib, arm lib file.
ascam.dll, arm dynamic library file.
- arm64:
ascam.lib, arm64 lib file.
ascam.dll, arm64 dynamic library file.
- winrt:
They can be applied for Dynamic library files of WinRT/ UWP (Universal Windows Platform)/Windows Store App. They are compatible with Windows Runtime and can be referenced by Universal Windows Platform apps. If you use C# to develop UWP, you can use the ascam.cs wrapper class.
Please pay attention to the Device Capability of uwp. Refer to how to add USB device capabilities to the app manifest. (Microsoft seems to limit the Device entry under DeviceCapability to no more than 100) demouwp.zip is a simple example of uwp. Please modify vid and pid. under DeviceCapability in the file Package.appxmanifest before compiling the run example.
- drivers: (Cameras produced after 2017.1.1 support WinUSB, and drivers no longer need to be installed on Windows 8 and above)
The x86 folder contains the x86 kernel-mode driver files, including ascam.cat, ascam.inf and ascam.sys.
The x64 folder contains the x64 kernel-mode driver files, including ascam.cat, ascam.inf and ascam.sys.
- samples:
 - democpp, C++ example. This example demonstrates enumerating devices, opening devices, previewing videos, capturing images, setting resolution, triggering, saving images to files in various image formats (.bmp, .jpg, .png, etc.), wmv format video recording, Trigger Mode, IO control and so on. This example uses the Pull Mode mechanism. To keep the code clean, the WTL library used by the examples can be downloaded from this link <http://sourceforge.net/projects/wtl/>.
 - demopush, C++ example, using the Push Mode mechanism, StartPushModeV3.
 - demomfc, a simple C++ example, uses MFC as a GUI library, support opening devices, previewing videos, capturing images, setting resolution, saving images to files in various image formats (.bmp, .jpg, .png, etc.), etc. This example uses the Pull Mode mechanism.

- demowinformcs1, take C# winform for example, it support opening devices, previewing videos, capturing images, saving images to files, and setting white balance. This example uses the Pull Mode mechanism, StartPullModeWithWndMsg.
- demowinformcs2, take C# winform for example, it support opening devices, previewing videos, capturing images, saving images to files, and setting white balance. This example uses the Pull Mode mechanism, StartPullModeWithCallback.
- demowinformcs3, take C# winform for example, it support opening devices, previewing videos, capturing images, saving images to files, and setting white balance. This example uses the Push Mode mechanism, StartPushMode.
- demowinformvb, take VB.NET winform for example, it support opening devices, previewing videos, capturing images, saving images to files, and setting white balance. This example uses the Pull Mode mechanism.
- linux: Linux platform files
Udev: 99-ascam.rules, udev rule file;
Please refer to: http://reactivated.net/writing_udev_rules.html;
- c#: ascam.cs, Support. Net Core C#. ascam.cs uses P/Invoke to call libtoupcam.so。
Please copy ascam.cs to your C# project for use.
- x86: libtoupcam.so, x86 version so file.
- x64: libtoupcam.so, x64 version so file.
- armel: libtoupcam.so, armel version so file, toolchain is arm-linux-gnueabi
- armhf: libtoupcam.so, armhf version so file, toolchain is arm-linux-gnueabihf.
- arm64: libtoupcam.so, arm64 version so file, toolchain is aarch64-linux-gnu.
- android: libtoupcam.so for four architectures of Android platform arm, arm64, x86, x64.
- mac: macOS platform files.
- python: ascam.py and example code.
- doc: SDK usage documentation, Simplified Chinese, English.
- java: ascam.java and example code (console and Swing).
- sample:
demosimplest, the simplest example, is about 60 lines of code.
demoraw, RAW data and still shots, about 120 lines of code.

10.5.4 Plugin

Labview SDK and demo program;

MatLab SDK and demo program;

DirectShow plugin;

Micromanager plugin;

TWAIN SDK plugin;

• 11 After-Sales Support

11.1 Product Warranty Policy

Attostek provides comprehensive product quality assurance. All camera products, lenses, and other optical accessories come with a 12-month warranty service. All warranty periods are calculated from the date of purchase. During the warranty period, if the product experiences performance failures caused by material or workmanship defects under normal operating conditions in accordance with the user manual, Attostek will provide free repair services. Our goal is to ensure you enjoy a stable and reliable product experience during the warranty period, free from concerns about product quality.

11.1.1 Out-of-Warranty Repair Policy

For products that are out of warranty or experience failures not covered by the warranty (e.g., accidental damage, liquid ingress, unauthorized disassembly/modification, or use beyond specified environmental conditions), Attostek also provides professional and transparent repair support services.

You may submit a repair request at any time. Based on your initial description, we will provide a preliminary estimate of the repair scope and cost. After you confirm and ship the faulty product back, our engineers will conduct a comprehensive inspection and provide you with a formal written report including the cause of failure, the repair plan, and detailed costs for parts and labor. Upon your confirmation of the quotation, we will complete the professional repair within the agreed timeframe.

Attostek is committed to delivering transparent and reasonable pricing, along with standardized and efficient procedures, to provide your equipment with full life-cycle technical support—helping you continue to create value and maximize your return on investment.

11.1.2 Repair Process

Submit Request	Method: Submit the [Attostek Product Return/Repair Request Form] via email to joanna@attostek.com or contact online customer service. Required Information: Proof of purchase (order number), product model, contact email, and detailed reason for return. We will respond to your request or inquiry within 48 hours.
Troubleshooting & Quotation	The technical team conducts preliminary troubleshooting. Failures covered under warranty are repaired free of charge (shipping costs to be borne by the customer). For out-of-warranty failures, we will provide a Repair Cost Quotation. Once the quotation is confirmed, the repair process will be officially initiated.
Return the Product	Upon approval, we will provide you with a unique RMA (Return Merchandise Authorization) number and return address via email. Please write the RMA number on the outside of the package and ship the product to the specified address. Note: Returns without a valid RMA number will not be processed.
Repair Execution & Testing	Standard repair cycle: 10–15 business days (counting from receiving the product and confirmation of payment). For complex faults or when special components need to be replaced, the cycle may be extended, and we will promptly inform you. Repair includes: Fault repair / component replacement + basic cleaning and calibration + factory-standard functional testing.
Return of Repaired Product	After the repair is completed, the product will be returned via air freight. Attostek will provide a Repair Report specifying the following details: cause of failure, replaced components, test results, and repair date.
Customer Receipt & Inspection	Once the repaired product is dispatched, we will provide you with the tracking number. After receiving the product, please inspect and confirm its condition, and retain the repair report as proof of service completion.

11.2 Product Return Policy

11.2.1 Non-Returnable Cases

To protect the legitimate rights and interests of both parties, returns will not be accepted under the following circumstances:

- Customized Products
- Cameras, lenses, or systems specially customized according to your personal requirements with no quality defects.
- Artificially Damaged Products
- Damage caused by improper operation, accidental drops, liquid intrusion or unauthorized disassembly.
- Consumable Components
- Components explicitly stated to have a fixed lifespan or be subject to natural aging (e.g., coatings on certain lenses).
- Products Exposed to Harmful Substances
- Any product that has been in contact with biological specimens or hazardous materials will not be accepted for return for safety reasons.

11.2.2 Return Process

Submit Request	Method: Submit the [Attostek Product Return/Repair Request Form] via email to joanna@attostek.com or contact online customer service. Required Information: Proof of purchase (order number), product model, contact email, and detailed reason for return. We will respond to your request or inquiry within 48 hours.
Review & Return	Upon approval, we will provide you with a unique RMA (Return Merchandise Authorization) number and return address via email. Please write the RMA number on the outside of the package and ship the product to the specified address. Note: Returns without a valid RMA number will not be processed.
Receipt & Inspection	Once we receive the returned product, we will conduct an inspection to verify that it meets the “Good Return” standards.
Refund Processing	Processing Time: The refund will be completed within 7 business days after confirming the returned product is in acceptable condition. Refund Channel: The payment will be fully refunded through your original payment method.。

• 12 AttosTek Contact Information

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• 13 AttosTek Web Address

www.attostek.com/

• Appendix: Update Log

Version	Date	Revised content
V1.0	2026.1.5	Create a document

See everything you need



Web Address: attosectech.com Visit our website to explore more product models.

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