
The X8FCAM4K22MPA_EFL Auto Focus HDMI/NETWORK/USB Multi-outputs Canon EF Mount CMOS Camera Help Manual



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1 X8FCAM4K22MPA_EFL Camera Application



Figure 1 The X8FCAM4K22MPA_EFL camera

The [X8FCAM4K22MPA_EFL](#) is a camera designed by Touptek that includes multiple modes of output ([HDMI/NETWORK/USB](#)), where [X](#) in '[X8FCAM4K22MPA_EFL](#)' means multiple interfaces, the [8](#) series represents the AI high-end platform of Touptek, [F](#) means auto focus, [4K](#) represents [HDMI](#) output of 4K, [22MP](#) represents maximum camera output of 22MP images, [A](#) represents sensor type A, and [EFL](#) stands for Canon [Electro-Focus Lens](#), also known as [EF](#) mount lens. It uses large-size, high-resolution and ultra-high-performance [CMOS](#) sensor. The camera can be directly connected to an [HDMI](#) display, or it can be connected to a computer via [NETWORK](#) or [USB](#), and the image and video can be saved in an [SD card /USB flash drive](#) for on-site analysis and subsequent research.

The [X8FCAM4K22MPA_EFL](#) camera outputs real-time images through the [HDMI](#) interface, and can operate the graphical interface through a [USB](#) mouse to perform image display adjustment, processing, measurement and other functions.

The [X8FCAM4K22MPA_EFL](#) camera's most important feature is that it can be used with any supported [EF](#)-mount Lens, and after correctly installing the lens, you can get the focal length, aperture and focus of the lens in real time on the [HDMI display](#) interface, and you can control the aperture and focus section of the [EF](#) lens.

The camera can be used for inspection in medical fields, such as ophthalmology and dentistry; it can also be used for ultra-high-definition industrial inspection. It can be adapted to [EF](#) mount Lenses of various focal lengths according to customer needs.

The basic characteristic is listed as below:

- Sony back-illuminated large target surface CMOS sensor
- With 10-bit ISP processing, it offers better color reproduction, remarkable sharpening and 3D noise reduction effects, and more accurate ROI white balance
- Compatible for Canon EF mount Lenses, achieving electric control of lens aperture, manual/auto focusing
- Based on lens focusing control, achieve the depth of field synthesis function of the focused images
- Provide lens distortion correction function
- 4K HDMI/ NETWORK / USB multiple video synchronous outputs
- SD card/USB flash drive for captured image and video storage, customizable storage location and support local preview and playback
- Support video cropping function
- Support the capture and display of RAW format images
- Support Image Auto Upload to the server over the network
- Supports USB voice control module, enabling real-time control of the camera through voice commands for taking photos, recording videos, freezing, and other operations, multi-image Stitch function
- Provide real-time video EDF function
- Provide real-time Stitch function to obtain higher quality images through real-time processing
- New UI interface, the browsing interface provides rich file operation functions, image to image comparison, image to real-time video comparison, multi-image EDF function, multi-image Stitch function
- Embedded XCamView for the control of the camera and image processing, supporting automatic edge finding and other measurement functions
- Text input fields support bilingual input in Chinese and English

- ToupView/ToupLite software for PC
- iOS/Android applications for smart phones or tablets



Figure 2 TPS-600 bracket+X8FCAM4K22MPA_EFL+Canon EF-S 18-55mm f/4-5.6 IS STM



Figure 3 TPS-600 bracket+X8FCAM4K22MPA_EFL+Canon EF-S 18-55mm f/4-5.6 IS STM



Figure 4 TPS-600 bracket+X8FCAM4K22MPA_EFL+Canon EF-S 18-55mm f/4-5.6 IS STM



Figure 5 TPS-600 bracket+X8FCAM4K22MPA_EFL+Canon EF-S 18-55mm f/4-5.6 IS STM+HDMI 4K monitor

2 X8FCAM4K22MPA_EFL Camera Datasheet and Functions

2.1 Camera Datasheet

Order Code	Sensor & Size(mm)	Pixel(μm)	G Sensitivity Dark Signal	Sensor Output (FPS/Resolution)	Binning	Exposure(us)
X8FCAM4K22MPA_EFL	IMX571(C) 1.7"(23.46x13.21)	3.76x3.76	485 with 1/30s 0.07mv with 1/30s	37@6240*3512	1x1	7~10 ⁶

2.2 Frame rate with different output

Camera Model	Video Saving (FPS/Resolution)	Picture	HDMI2.0(FPS/Resolution)	USB3.0(FPS/Resolution)	NETWORK(FPS/Resolution)
X8FCAM4K22MPA_EFL	37@3840*2160 37@1920*1080 37@1280*720	6240*3512	30@3840*2160 30@1920*1080	15@6240*3512 37@2688*1512 37@1920*1080	30@3840*2160 37@1920*1080 37@1280*720



Figure 6 Available ports on the back panel of the camera body

Interface or Button	Function Description
USB Mouse	Connect USB mouse for easy operation with embedded XCamView software Connect USB voice control for enable real-time control of camera snap, recording, freezing, and other operations
USB3.0	Connect USB flash drive to save pictures and videos Connect 5G WiFi module to transfer video wirelessly at real time Connect USB microphone for audio and video Connect USB voice control for enable real-time control of camera snap, recording, freezing, and other operations
USB Video	Connect PC or other host device to realize video image transmission
HDMI	Comply with HDMI2.0 standard. 4K/1080P format video output and supporting automatic switch between 4K and 1080P format according to the connected monitors
LAN	LAN port to connect router and switch to transfer video
SD	SD card slot, comply with SDIO3.0 standard and SD card could be inserted for video and images saving
ON/OFF	Power switch
LED	LED status indicator
DC12V	Power adapter connection (12V/2A)
Video Output Interface	Function Description
HDMI Interface	Comply with HDMI2.0 standard; 30fps@4K or 30fps@1080P
LAN Interface	Support real time resolution switching(4K/1080P/720P) H264 encoded video DHCP configuration or manual configuration Unicast/multicast configuration
WiFi Interface	Connecting 5G WiFi adapter (USB3.0 slot) in AP/STA mode
USB Video Interface	Connecting USB Video port of PC for video transfer MJPEG format video
Other Function	Function Description
Video Saving	Video format: 8M (3840*2160) H264 encoded MP4 file Video saving frame rate: 37fps
Image Capture	22M (6240*3512) JPEG/TIFF/RAW image in SD card or USB flash drive (Default SD card priority, priority can be modified in settings)

Measurement Saving	Measurement information saved in different layer with image content Measurement information is saved together with image content in burn in mode
ISP	Exposure(Automatic / Manual Exposure) / Gain, White Balance(Manual / Automatic / ROI Mode), Sharpening, 3D Denoise, Saturation Adjustment, Gamma Adjustment, Contrast Adjustment, Brightness Adjustment, Hue Adjustment, 50HZ/60HZ Anti-flicker, Color to Gray Function
Image Operation	Zoom In/Zoom Out (Up to 10X), Mirror/Flip, Freeze, EDF, Cross Line, Overlay, PIP, Auto Focus, Browser (including Picture Browsing, Video Playback, Video Compare, Picture Compare, EDF, Stitch Image Processing), Measurement Function
Embedded RTC(Optional)	Support accurate time on board
Restore Factory Settings	Restore camera parameters to its factory status
Multiple Language Support	English / Simplified Chinese / Traditional Chinese / Korean / Thailand / French / German / Spanish / Japanese / Italian / Russian / Dutch / Portuguese
Software Environment under NETWORK/USB Video Output	
White Balance	Auto White Balance
Color Technique	Ultra-Fine Color Engine
Capture/Control SDK	Windows/Linux/macOS/Android Multiple Platform SDK (Native C/C++, C#/VB.NET, Python, Java, DirectShow, Twain, etc)
Recording System	Still picture or video
Operating System	Microsoft® Windows® 8 / 8.1 / 10 / 11(32 & 64 bit) OSx (Mac OS X) Linux
PC Requirements	CPU: Equal to Intel Core2 2.8GHz or higher
	Memory: 8GB or more
	USB interface: USB2.0 interface or higher
	Display:19” or larger
	CD-ROM
Operating Environment	
Operating Temperature (in Centidegree)	-10° ~ 50°
Storage Temperature (in Centidegree)	-20° ~ 60°
Operating Humidity	30~80%RH
Storage Humidity	10~60%RH
Power Supply	DC 12V/2A adapter

3 X8FCAM4K22MPA_EFL Camera Lens Supported

The [X8FCAM4K22MPA_EFL](#) camera can be used with any supported Canon EF mount lens. After correctly installing the lens, it can read information such as lens focal length, aperture, and focus position, and can also electrically control the lens aperture and focus position. The [X8FCAM4K22MPA_EFL](#) camera theoretically supports any Canon/[Tamron](#)/Sigma brand EF mount lens, but not all lenses have been tested. Using lenses from manufacturers other than Canon/[Tamron](#)/Sigma may result in uncontrollable and incompatible situations.

The verified compatible EF mount lens models are listed below:

LENS	Closest Focusing Distance	Focal Length Display	Aperture Control	Focus Control	Fixed Distance Focus
Canon EF-S 10-18mm f/4.5-5.6 IS STM	About 0.22 meters	Support	Support	Support	/
Canon EF-S 18-55mm f/3.5-5.6 IS STM	About 0.25 meters	Support	Support	Support	Support
Canon EF-S 18-55mm f/4-5.6 IS STM	About 0.25 meters	Support	Support	Support	/
Canon EF-S 15-85mm f/3.5-5.6 IS USM	About 0.35 meters	Support	Support	Support	/
Canon EF-S 18-135mm f/3.5-5.6 IS USM	About 0.39 meters	Support	Support	Support	Support
Canon EF-S 18-200mm f/3.5-5.6 IS	About 0.45 meters	Support	Support	Support	/
Canon EF 24mm f/1.4L II USM	About 0.25 meters	Support	Support	Support	/
Canon EF 24mm f/2.8 IS USM	About 0.2 meters	Support	Support	Support	/
Canon EF 35mm f/1.4L II USM	About 0.28 meters	Support	Support	Support	/
Canon EF 50mm f/1.2L USM	About 0.45 meters	Support	Support	Support	Support
Canon EF 50mm f/1.4 USM	About 0.45 meters	Support	Support	Support	/
Canon EF 85mm f/1.2L II USM	About 0.95 meters	Support	Support	Support	/
Canon EF 16-35mm f/2.8L III USM	About 0.28 meters	Support	Support	Support	/
Canon EF 16-35mm f/4L IS USM	About 0.28 meters	Support	Support	Support	/
Canon EF 24-70mm f/2.8L II USM	About 0.38 meters (Macro mode is about 0.2 meters)	Support	Support	Support	/
Canon EF 24-70mm f/4L IS USM	About 0.38 meters (Macro mode is about 0.2 meters)	Support	Support	Support	/
Canon EF 24-105mm f/4L IS USM	About 0.45 meters	Support	Support	Support	/
Canon EF 100-400mm f/4.5-5.6L IS II USM	About 0.98 meters	Support	Support	Support	/
Sigma 150-600mm f/5-6.3 DG OS HSM S	About 2.6 meters	Support	Support	Support	/



Figure 7 The Canon EF lens currently supported by X8FCAM4K22MPA_EFL camera

4 Dimension of X8FCAM4K22MPA_EFL Camera



Figure 8 Dimension of X8FCAM4K22MPA_EFL camera

5 X8FCAM4K22MPA_EFL Camera Packing Information

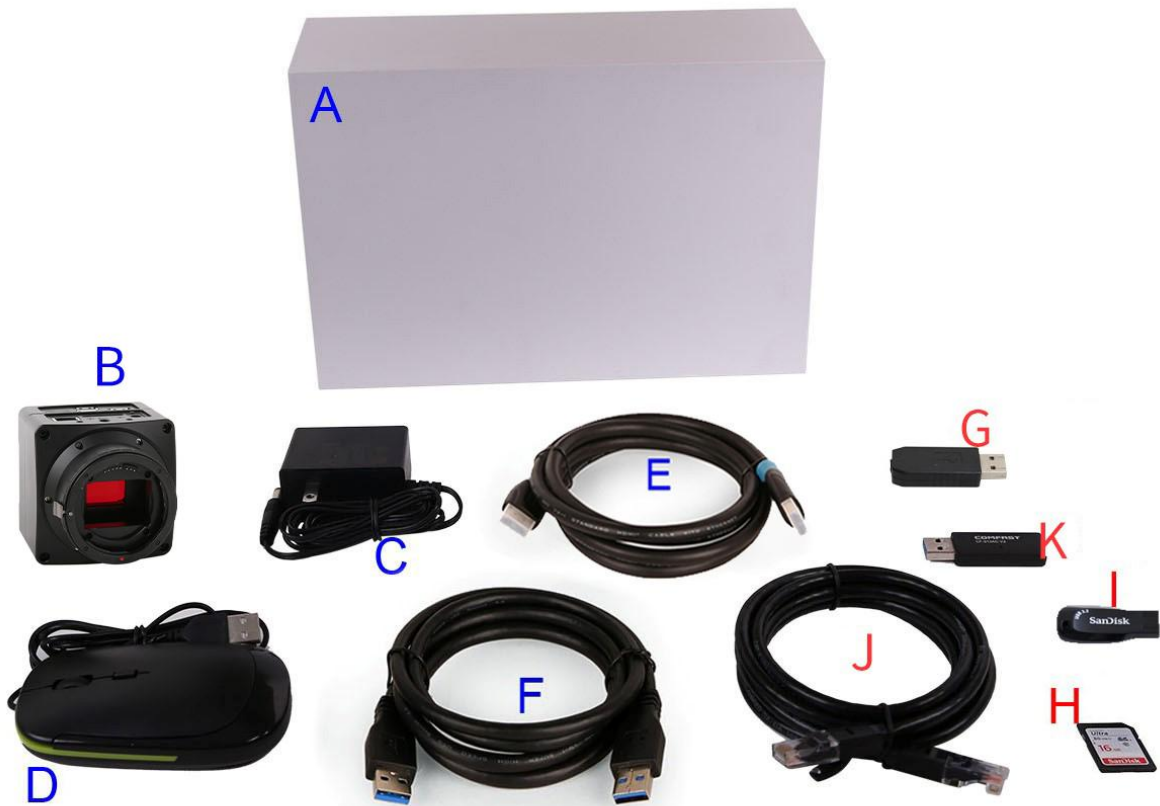


Figure 9 X8FCAM4K22MPA_EFL Camera Packing Information

Standard Packing List	
A	Gift box: L:25.5cm W:17.0cm H:9.0cm (1pcs, 1.7Kg/ box)
B	X8FCAM4K22MPA_EFL Camera
C	Power Adapter: Input: AC 100~240V 50Hz/60Hz, Output: DC 12V 2A American standard: Model: POWER-12V2A(MX24Z1-1202000) + American standard plug European standard: Model: POWER-12V2A(MX24Z1-1202000) + European standard plug
D	USB Mouse
E	HDMI Cable
F	USB3.0 A male to a male gold-plated connectors cable /1.5m
Optional Accessory	
G	USB WiFi adapter (Shape will vary with different models)
H	SD Card (16G or above; Speed: class 10)
I	USB flash drive
J	Ethernet cable
K	USB WiFi adapter (Shape will vary with different models)
L	Canon/Tamron/Sigma EF mount lens(See Sec3)

6 Software and App

The software or the APP can be downloaded from following link:

Windows: <http://www.touptek.com/download/showdownload.php?lang=en&id=33>

Linux & macOS: <http://www.touptek.com/download/showdownload.php?lang=en&id=28>

iOS: <https://itunes.apple.com/us/app/toupview/id911644970>

Android: <https://play.google.com/store/apps/details?id=com.touptek.tpview>

7 X8FCAM4K22MPA_EFL Camera Configurations

You can use the X8FCAM4K22MPA_EFL camera in 5 different ways. Each application requires different hardware environment.

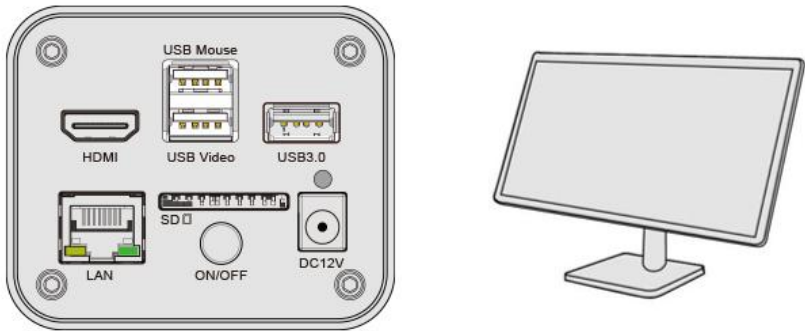
7.1 Camera working standalone with built-in XCamView software

For this application, apart from the camera and EF mount Lens, you only need an HDMI monitor, the supplied USB mouse, and the camera embedded XCamView software. A computer or a network connection is not required to operate the camera in this application. The steps to start the camera are listed as below:

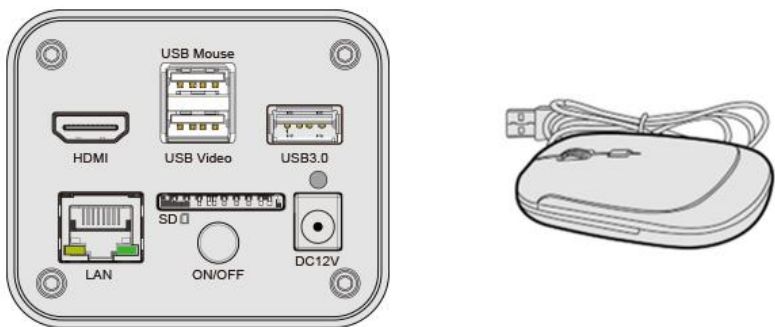


Figure 10 X8FCAM4K22MPA_EFL camera with the HDMI monitor

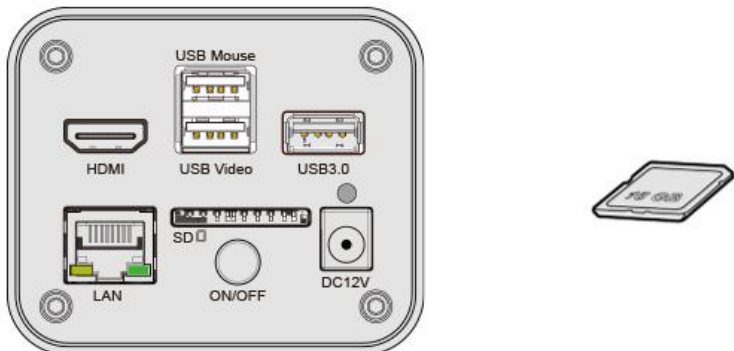
Connect the camera to a HDMI monitor using the HDMI cable;



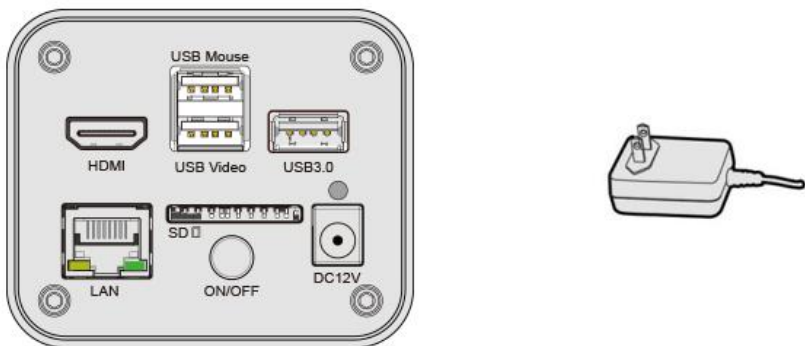
Insert the supplied USB mouse to the camera’s USB Mouse port;



Insert the supplied SD card/USB flash drive into the [X8FCAM4K22MPA_EFL](#) camera SD card slot/USB3.0 slot;



Connect the camera to the power adapter and turn it on;



Turn on the monitor and view the video in the [XCamView](#) software. Move the mouse to the left, top or bottom of the [XCamView](#) UI, different control panel or toolbar will pop up and users could operate with the mouse at ease.



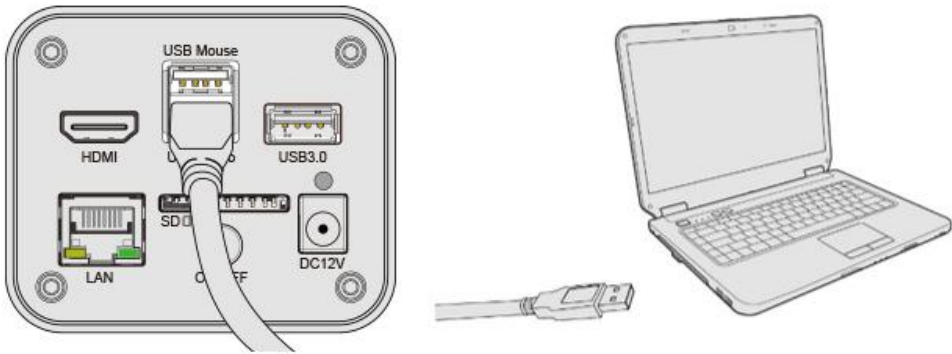
Figure 11 XCamView and X8FCAM4K22MPA_EFL camera in HDMI mode

7.2 Connecting camera to computers with USB3.0 port

For Windows user (Windows 8/10/11 (32/64 bit)), please use [ToupView](#).

For macOS and Linux user (macOS 10.10 or above or Linux distributions with kernel 2.6.27 or higher), please use [ToupLite](#). The steps to start the camera are listed below:

Start the camera according to Sec. 7.1. After the camera is running, connect the camera to computer with USB cable. Please use “USB Video” slot, The upper left corner of the HDMI graphics interface displays “USB3.0 Mode” or “USB2.0 Mode”, indicating that a connection has been established with the PC.



Install [ToupView/ToupLite](#) on your PC or install [ToupView App](#) on the mobile device; Run the software [ToupView/ToupLite](#), clicking the camera name in the [Camera List group](#) to start the live video as shown in Figure 12.

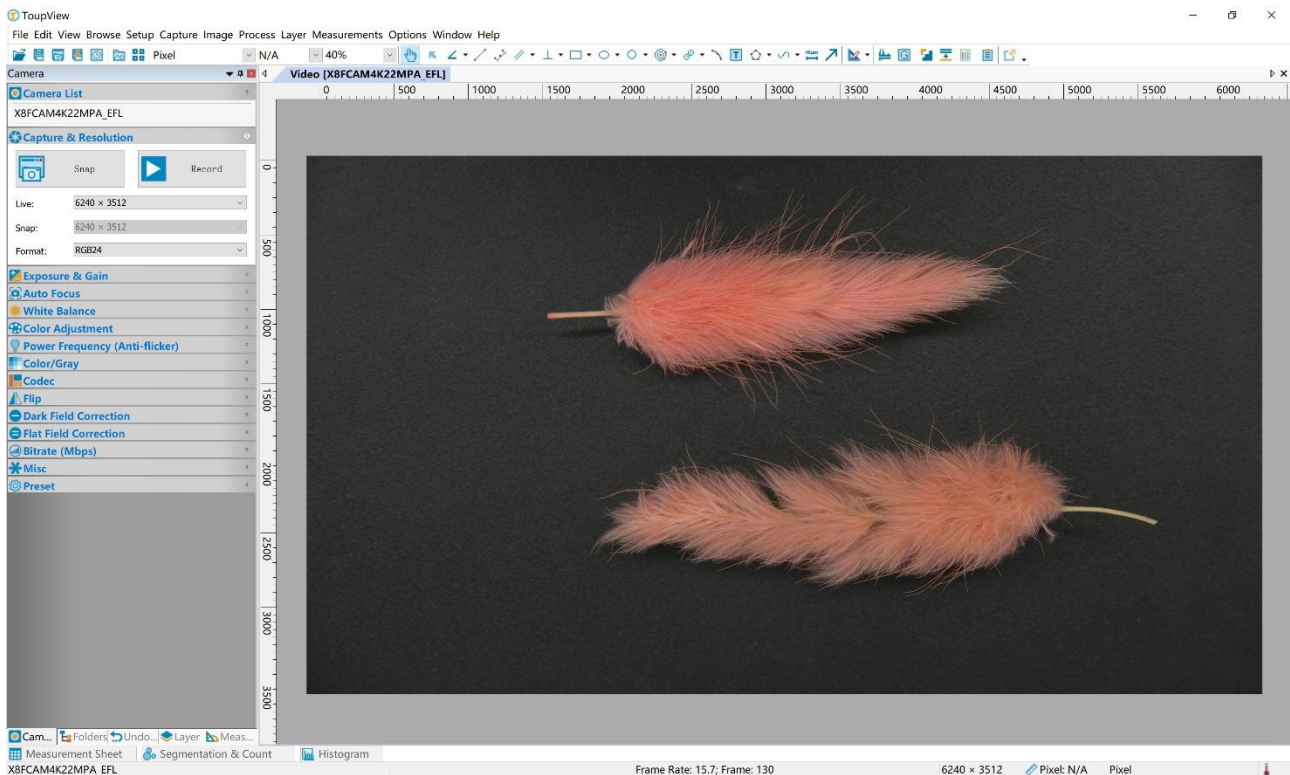


Figure 12 ToupView and X8FCAM4K22MPA_EFL camera in USB mode

7.3 Camera working in WiFi mode (AP mode)

Please make sure your PC is WiFi enabled.



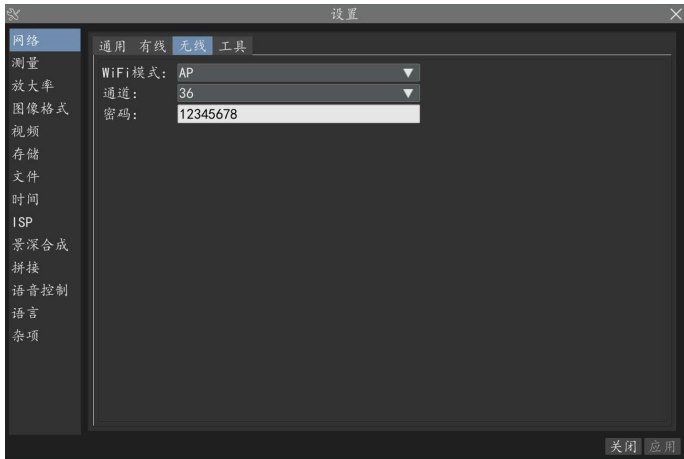
Figure 13 The PC or mobile device connect to the camera through WiFi

For Windows user (Windows 8/10/10/11 (32/64 bit)), please use [ToupView](#).

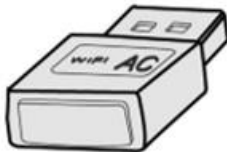
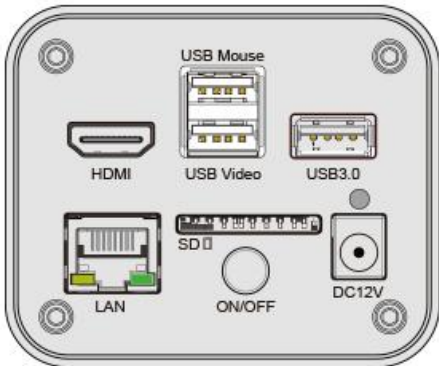
For macOS and Linux user (macOS 10.10 or above or Linux distributions with kernel 2.6.27 or higher), please use [ToupLite](#). When connecting the camera with a mobile device, the free [ToupView App](#) is required. Just make sure that the mobile device uses iOS 11 or higher/Android 5.1 or higher operating systems.

The steps to start the camera are listed below:

Start the camera according to Sec. 7.1. After the camera is running, move the mouse to the bottom of the GUI and clicking the  button on the [Synthesis Camera Control Toolbar](#) at the bottom of the video window, a small window called [Settings](#) will pop up as shown below. Click [Network](#) > [WiFi](#) property page and choose the [AP](#) in the [WiFi Mode](#) edit box (The factory default configuration is [AP](#) mode).



Plug the [USB WiFi](#) adapter into the camera's USB3.0 port, the upper left corner of the HDMI graphics interface will display “[AP mode](#)”;



Install [ToupView/ToupLite](#) on your PC or install [ToupView App](#) on the mobile device, connect the PC or mobile device to the camera's [WiFi AP](#) point; The network name (SSID) and the [WiFi](#) password (The default one is 12345678) can be found on the camera's [Setting>Network> WiFi](#) page in [AP](#) mode.

Start [ToupView/ToupLite](#) software or [ToupView App](#) and check the configuration. Normally, the active [X8FCAM4K22MPA_EFL](#) cameras will be automatically recognized. The live image of each camera is shown in Figure 14. For the display, the [Camera List](#) group is used in [ToupView/ToupLite](#) software, and the [Camera Thumbnail](#) is used in [ToupView App](#).

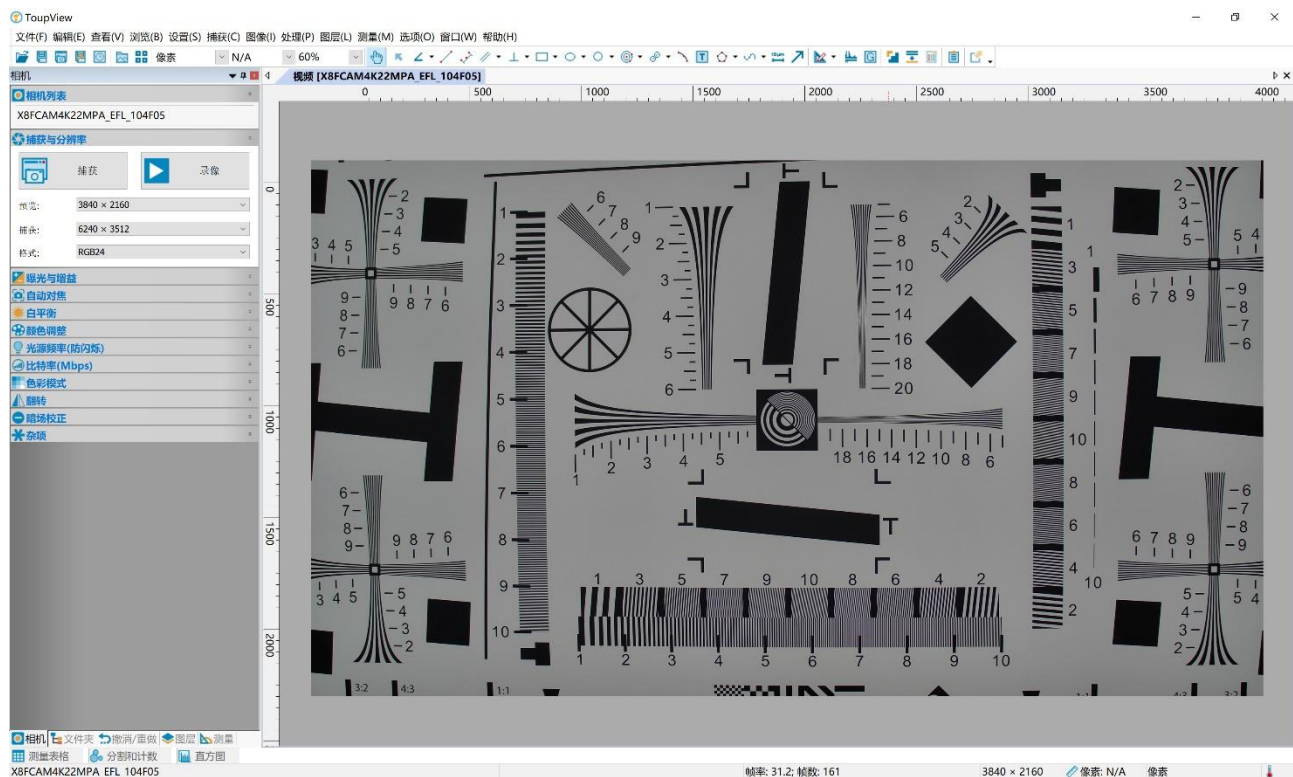


Figure 14 ToupView and X8FCAM4K22MPA_EFL camera in WiFi AP mode

7.4 Connecting camera to the PC with LAN port

This application uses the camera as the network camera. User must configure the IP of the camera and PC manually and ensure their IP addresses in the same net. The subnet mask and gateway of the camera and PC must be the same.



Figure 15 Connecting the X8FCAM4K22MPA_EFL camera with ethernet cable to the PC

Start the camera according to Sec. 7.1 after the camera is running, clicking  button on the [Synthesis Camera Control Toolbar](#) at the bottom of the video window(See Figure 11), a small window called [Settings](#) will pop up as shown below on the left side, clicking [LAN](#) property page, uncheck the DHCP item. Input [IP Address](#), [Subnet Mask](#) and [Default Gateway](#) for the camera. Designate [Internet Protocol Version 4 \(TCP/IPv4\) Settings](#) page's IP address on the PC with similar configuration as shown below on the right side but with different [IP address](#).

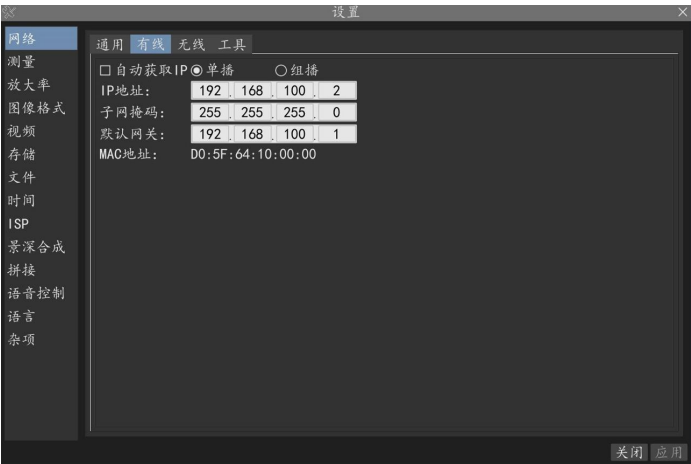


Figure 16 Configure the X8FCAM4K22MPA_EFL camera IP

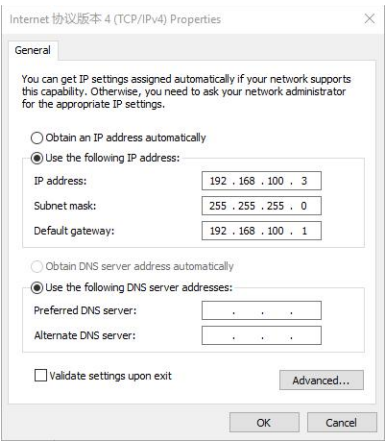
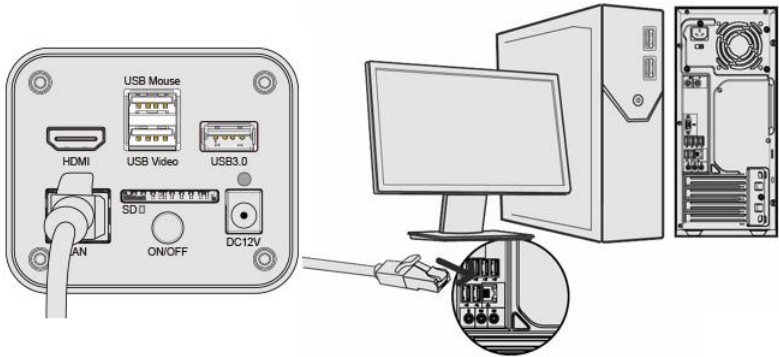


Figure 17 Configure the PC's IP

After the above configurations are finished, user can connect the [X8FCAM4K22MPA_EFL](#) camera to the computer through the Ethernet cable as shown below:

Connect the [LAN](#) port with the Ethernet cable to the PC's network port, the upper left corner of the HDMI graphics interface will display [IP address](#);



Install [ToupView/ToupLite](#) on your PC or install [ToupView App](#) on the mobile device; Run the software [ToupView/ToupLite](#), clicking the camera name in the camera list starts the live video as shown in Figure 14.

7.5 Connecting multi-cameras to the router through the LAN port/ WiFi STA mode for the network application

In [LAN/ WiFi STA](#) mode, the camera connects to the router by [LAN](#) port/ [WiFi STA](#) mode. If a router with [LAN/ WiFi](#) capability is used, users could connect the router with [Ethernet cable/ WiFi](#) to control the camera.

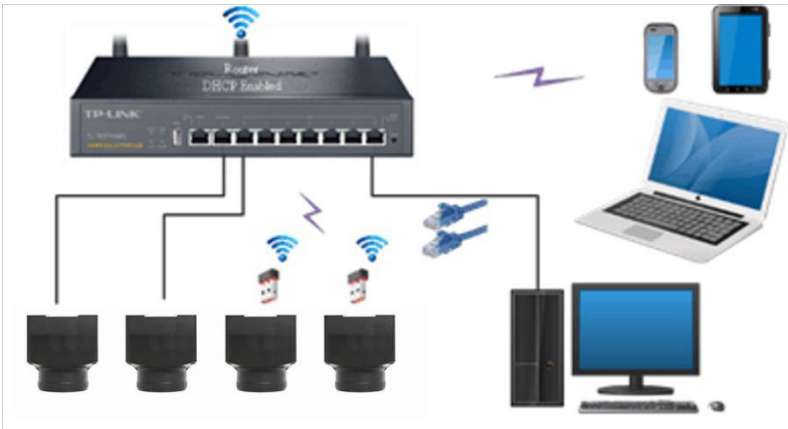
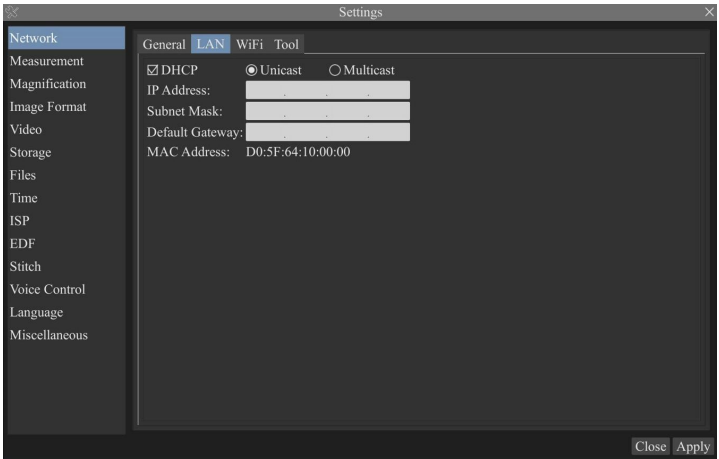


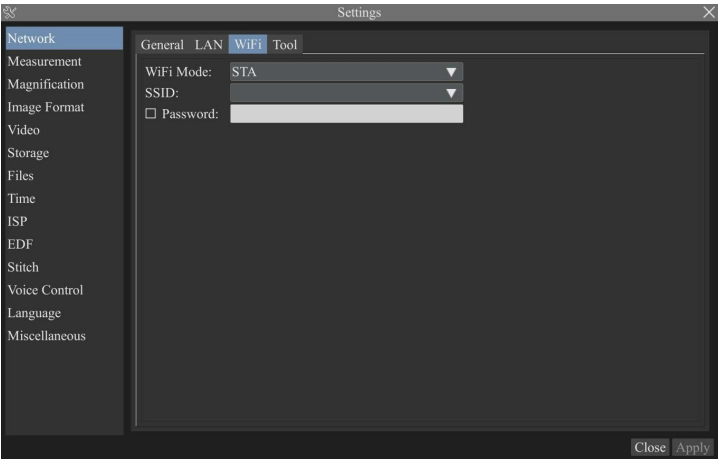
Figure 18 Multi X8FCAM4K22MPA_EFL cameras connecting to the router through the LAN port/ WiFi style

The connection and configuration are just the same as in Sec.7.1 or Sec. 7.4. But here, users need to check [DHCP](#). If [Multicast](#) is disabled or is not supported, users should only select [Unicast](#). If [Multicast](#) is supported by the network, users could select [Multicast](#) to achieve a better performance, especially in the case that multi-users connecting to the same camera. In addition, please guarantee that the broadcasting function is enabled in the network.

Active [X8FCAM4K22MPA_EFL](#) camera is recognized by [ToupView/ToupLite](#) software or [ToupView App](#) and they are displayed as a camera list or thumbnail in the software or app as shown in Figure 12.

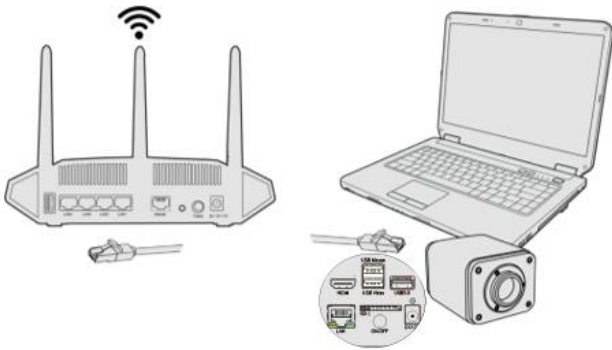


Or start the camera according to Sec. 7.1. After the camera is running, move the mouse to the bottom of the video window and clicking the  button on the [Synthesis Camera Control Toolbar](#) at the bottom of the video window, a small window called [Settings](#) will pop up as shown below. Clicking [Network> WiFi](#) property page and choosing the [STA](#) in the [WiFi Mode](#) edit box(The factory default configuration is [AP](#) mode). Choice or input the to be connected router's [SSID](#) and [Password](#) as shown below:

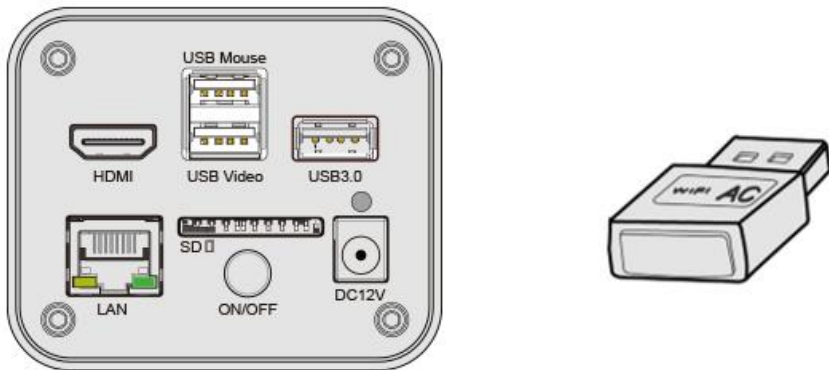


Install [ToupView](#) /[ToupLite](#) software on your PC. Alternatively, install the free [ToupView App](#) on the mobile device;

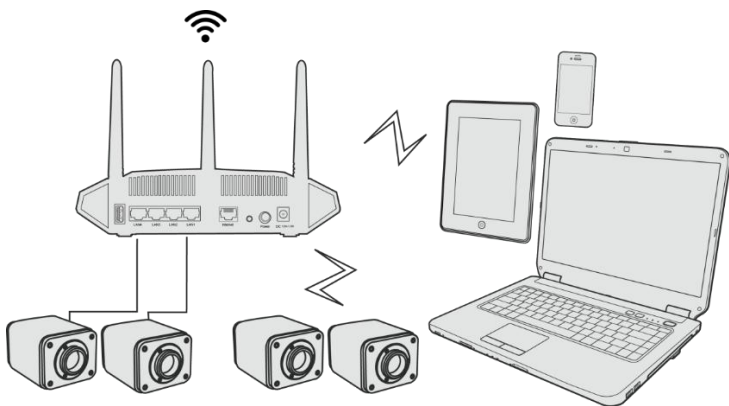
Plug the Ethernet cable into the camera's [LAN](#) port and the other end to the PC (for those connected to router with [LAN Port](#)), the upper left corner of the HDMI graphics interface will display [IP address](#);



Or plug the [USB WiFi](#) adapter into the camera's USB3.0 port(for those connected to router with [WiFi STA](#) mode), the upper left corner of the HDMI graphics interface will display “[STA Mode](#)” ;



Finally, as shown below, 2 X8FCAM4K22MPA_EFL cameras are connected to the router with LAN cable and 2 X8FCAM4K22MPA_EFL cameras are connected to the same router with WiFi STA mode (The number of the cameras, the connection mode (LAN or WiFi STA) connected to the router are determined by the router performance).



Make sure that your PC or your mobile device is connected to the LAN or WiFi of the router; Start ToupView/ToupLite software or ToupView App and check the configuration. Normally, active X8FCAM4K22MPA_EFL cameras are automatically recognized. The live image of each camera is displayed. For the display, Camera List group is used in ToupView/ToupLite software, and Camera Thumbnail is used in ToupView App; Select the X8FCAM4K22MPA_EFL camera you are interested in. To do so, double click the camera's name in Camera List tool window if you use ToupView/ToupLite software; If you use ToupView App, tap the camera's thumbnail in Camera List page (See Figure 19)

About the routers/switches

It is suggested that routers/switches supporting WiFi 5G should be selected to achieve better wireless connection experience.

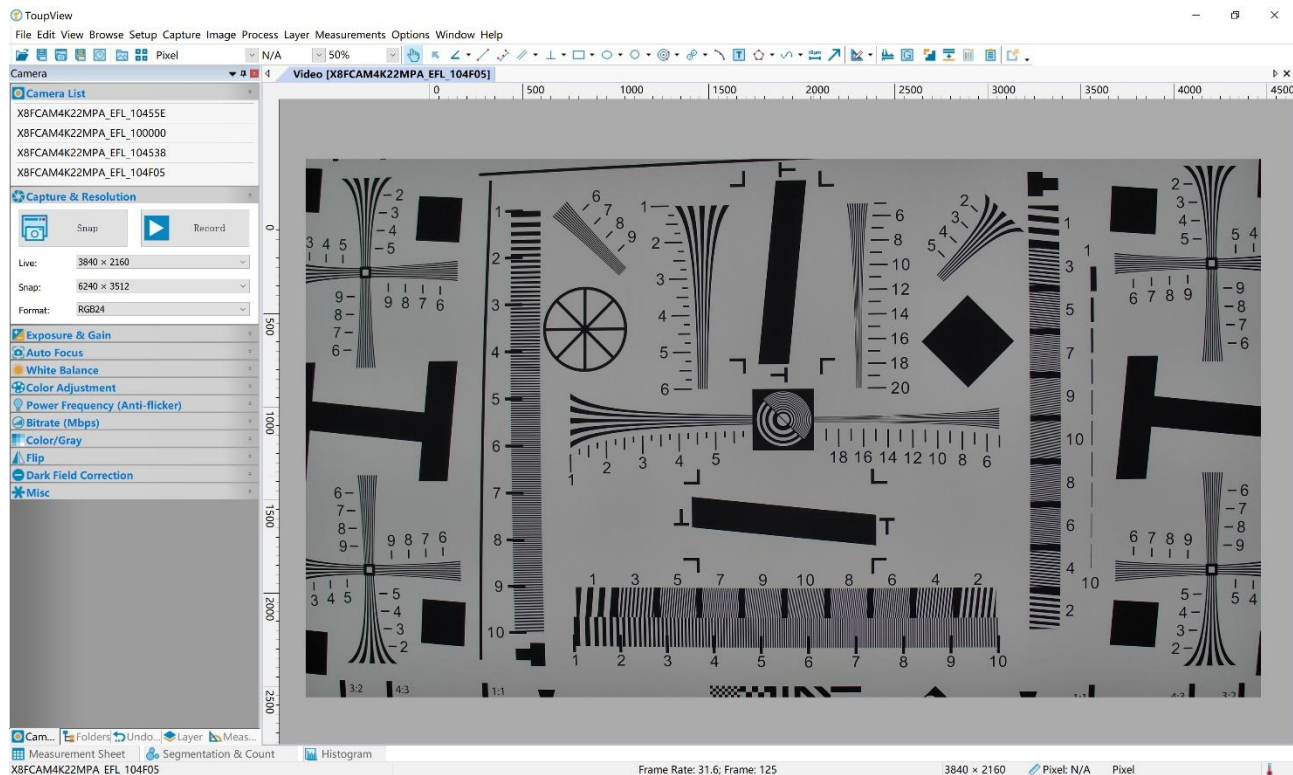


Figure 19 ToupView and X8FCAM4K22MPA_EFL camera in LAN port/ WiFi STA mode

8 Brief Introduction of X8FCAM4K22MPA_EFL UI and Its Functions

8.1 XCamView UI



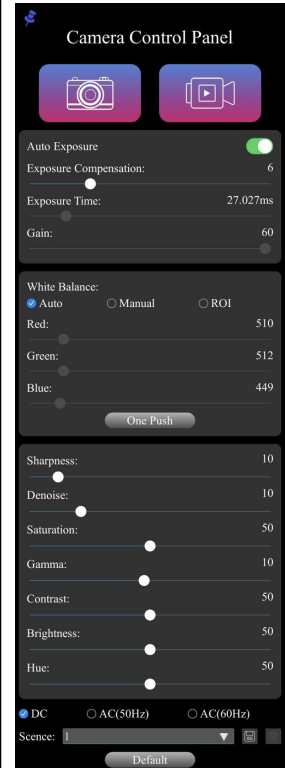
Figure 20 XCamView UI

The X8FCAM4K22MPA_EFL UI shown in Figure 20 includes a Camera Control Panel on the left of the video window, a Measurement Toolbar on the top of the video window and a Synthesis Camera Control Toolbar on the bottom of the video window.

Notes	
1	To show the Camera Control Panel, move your mouse to the left or right of the video window. See Sec.8.2 for details
2	Move the mouse cursor to the top of the video window, a Measurement Toolbar will pop up for calibration and measurement operations. When user left-clicks the Float/Fixed button on the Measurement Toolbar, the Measurement Toolbar will be fixed. In this case the Camera Control Panel will not pop up automatically even if users move mouse cursor to left or right side of the video window. Only when user left-clicks the X button on the Measurement Toolbar to exit from measuring procedure will they be able to do other operations on the Camera Control Panel, or the Synthesis Camera Control Toolbar. During the measuring process, when a specific measuring object is selected, an Object Location & Attributes Control Bar will appear for changing location and properties of the selected object. See Sec.8.3 for details.
3	When users move mouse cursor to the bottom of the video window, the Synthesis Camera Control Toolbar will pop up automatically. See Sec.8.4 for details.
4	When users move mouse cursor to the bottom of the video window, the Synthesis Camera Control Toolbar will pop up automatically. Clicking the button and the Auto Focus Control Panel will appear for autofocus operation.

8.2 The camera control panel on the left or right side of the video window

The Camera Control Panel controls the camera to achieve the best video or image quality according to the specific applications; It will pop up automatically when the mouse cursor is moved to the left or right side of the video window (in measurement status, the Camera Control Panel will not pop up. The Camera Control Panel will only pop up when the measurement process is finished or terminated while user's cursor on the left edge of the video window). Left-clicking button to achieve Display/Auto Hide switch of the Camera Control Panel.

Camera Control Panel	Function	Function Description
	Snap	Capture image and save it to the SD card or USB flash drive
	Record	Record video and save it to the SD card or USB flash drive
	Auto Exposure	When Auto Exposure is checked, the system will automatically adjust exposure time and gain according to the value of exposure compensation
	Exposure Compensation	Available when Auto Exposure is checked. Slide to left or right to adjust Exposure Compensation according to the current video brightness to achieve proper brightness value
	Exposure Time	Available when Auto Exposure is unchecked. Slide to left or right to reduce or increase exposure time, adjusting brightness of the video
	Gain	Adjust Gain to reduce or increase brightness of video. The Noise will be reduced or increased
	Red	Slide to left or right to decrease or increase the proportion of Red in RGB on video
	Green	Slide to left or right to decrease or increase the proportion of Green in RGB on video
	Blue	Slide to left or right to decrease or increase the proportion of Blue in RGB on the video
	Auto	White Balance adjustment according to the window video every time the button is clicked
	Manual	Adjust the Red, Green or Blue item to set the video White Balance
	ROI	Check the ROI item will display a red ROI rectangle on the video window, drag it to the interested area will perform the White Balance according to the area video data
	One Push	Perform a global white balance based on image conditions
	Sharpness	Adjust Sharpness level of the video
	Denoise	Slide left or right to Denoise the video
	Saturation	Adjust Saturation level of the video
	Gamma	Adjust Gamma level of the video. Slide to the right side to increase Gamma and to the left to decrease Gamma.
	Contrast	Adjust Contrast level of the video. Slide to the right side to increase Contrast and to the left to decrease Contrast.
	Brightness	Adjust Brightness level of the video. Slide to the right side to increase Brightness and to the left to decrease Brightness.
	Hue	Adjust Hue level of the video. Slide to the right side to increase Hue and to the left to decrease Hue.
	DC	For DC illumination, there will be no fluctuation in light source so no need for compensating light flickering
	AC (50HZ)	Check AC (50HZ) to eliminate flickering caused by 50Hz illumination
	AC (60HZ)	Check AC (60HZ) to eliminate flickering caused by 60Hz illumination
	Scence	Default scene reference; scenes may be defined.
	Default	Restore all the settings in the Camera Control Panel to default values Right click to select different default parameters according to the type of microscope

8.3 The Measurement Toolbar on top of the video window

The Measurement Toolbar will pop up when moving mouse cursor to any place near the upper edge of the video window. Here is the introduction of the various functions on the Measurement Toolbar:

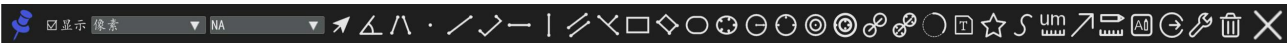


Figure 21 The Measurement Toolbar on the upper side of the Video Window

Icon	Function
	Float/ Fix switch of the Measurement Toolbar
	Show / Hide Measurement Objects
	Select the desired Measurement Unit
	Select Magnification for Measurement after Calibration
	Object Select
	Angle
	4 Points Angle
	Point (Point Counter)
	Arbitrary Line
	3 Points Line
	Horizontal Line
	Vertical Line
	3 Points Vertical Line
	Parallel

	Rectangle
	3 Points Rectangle
	Ellipse
	5 Points Ellipse
	Circle
	3 Points Circle
	Annulus
	3 Points Annulus
	Two Circles and its Center Distance
	3 Points Two Circles and its Center Distance
	Arc
	Text
	Polygon
	Curve
	Scale Bar
	Arrow
	Execute Calibration to determine the corresponding relation between magnification and resolution, which will establish the corresponding relationship between measurement unit and the sensor pixel size. Calibration needs to be done with the help of a micrometer. For detailed steps of carrying out Calibration please refer to ToupView help manual.
	Auto Measurement: Two Points Parallel, Circle Detect, Annulus Detect, Rectangle Detect, Polygon
	Export the Measurement information to CSV file(*.csv)
	Measurement Setup
	Delete all the measurement objects
	Exit from Measurement mode
	When the measurement ends, left-click on a single measuring object and the Object Location & Properties Control Bar will show up. User could move the object by dragging the object with the mouse. But more accurate movement could be done with the control bar. The icons on the control bar mean Move Left , Move Right , Move Up , Move Down , Color Adjustment and Delete .

Note:

- 1) When user left-clicks [Display/Hide](#) button on [Measurement Toolbar](#), [Measurement Toolbar](#) will be fixed. In this case [Camera Control Panel](#) will not pop up automatically even if moving the mouse cursor to the left edge of the video window. Only when user left-click the button on [Measurement Toolbar](#) to exit from the measurement mode will they be able to doing other operations on [Camera Control Panel](#) or [Synthesis Camera Control Toolbar](#).
- 2) When a specific [Measurement Object](#) is selected during the measurement process, [Object Location & Attributes Control Bar](#) will appear for changing the object location and properties of the selected objects.

8.4 [Icons and functions of the Synthesis Camera Control Toolbar at the bottom of the video window](#)



Figure 22 The Synthesis Camera Control Toolbar on the bottom of the Video Window

Icon	Function	Icon	Function
	Zoom In the Video Window		Zoom Out the Video Window
	Horizontal Flip		Vertical Flip
	Color/gray		Video Freeze
	EDF		Stitch
	Grids		Image Overlay
	PIP		Auto Focus
	Browse images and videos in the SD Card		Settings
	Check the Version of XCamView		

The [Browsing](#) function, for detailed introduction, please refer to Section 8.4.1.

The  [Setting](#) function, for detailed introduction, please refer to Sections 8.4.2 to 8.4.15.

8.4.1 Browse

Clicking the  to browse the dxf, images, videos, and other files saved on the SD card or USB flash drive, as shown in the following figure.

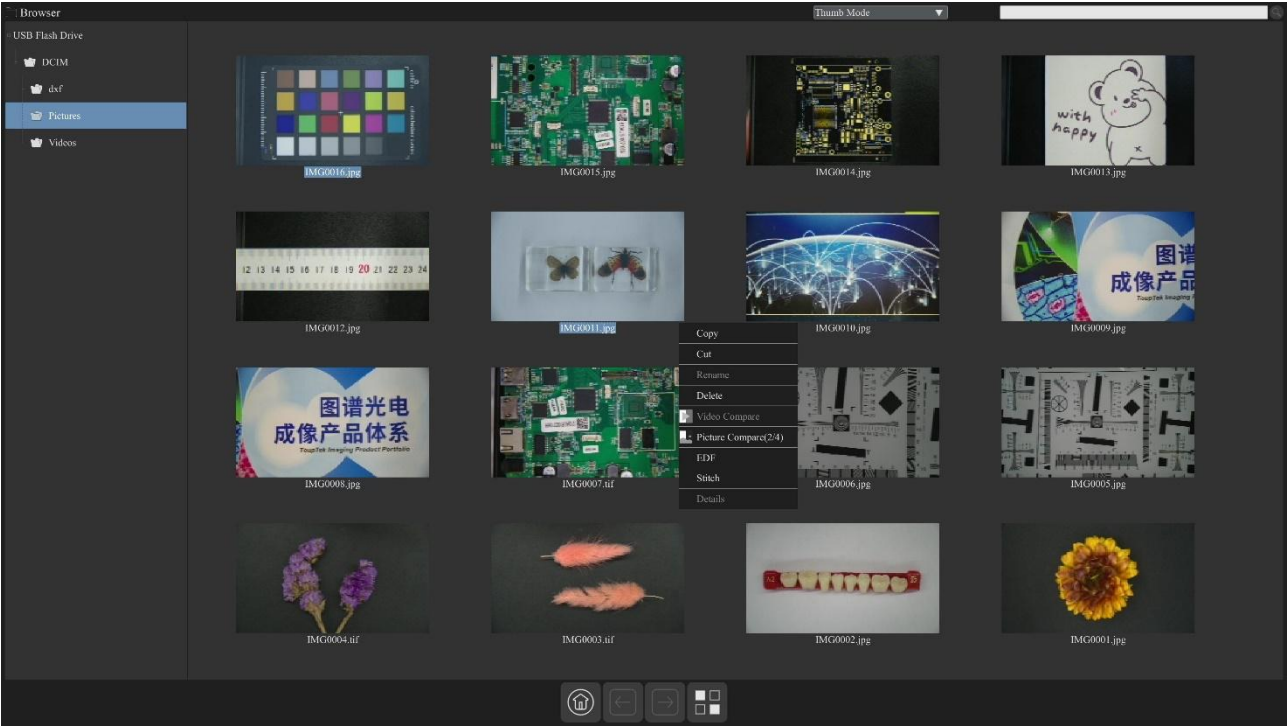


Figure 23 Browsing UI

There are two browsing modes: [List mode](#) and [Thumb mode](#). The default is [Thumb mode](#).

Right click on an empty area to create a new folder.

Right click on an image file to [Copy](#), [Cut](#), [Rename](#), [Delete](#), [Video Compare](#), and view detailed information ([Details](#)). Clicking on a thumb to select the 1st image, and clicking on another thumb to select the 2nd image (or selecting 2 images with frame), then clicking the right mouse button to bring up the context menu and select [Picture Compare](#) to analyze and compare the two images (Four images can also be compared). Clicking on a thumb to select 3 (or box select 3) pictures focusing on different targets in the same scene, you can perform depth of field compositing on the selected pictures. Clicking on a thumb to select 2~32 (or box select 2~32) pictures, The selected images can be stitch in ascending order of the numerical numbers in the file name.

Right click on a video file to [Copy](#), [Cut](#), [Rename](#), [Delete](#), [Video Compare](#), and view detailed information ([Details](#)).



Figure 24 Image processing

Double-click the thumbnail of the picture with the left mouse button to open the picture, and then right-click the picture to [Gray Scale](#), [Invert](#), [Binary](#), [Saturation](#) , [Gamma](#) , [Brightness](#) , [Filter Color](#), [Extract Color](#), [Auto Level](#), [Auto Contrast](#), [Histogram](#), [Histogram Equalization](#), [Flip](#), and other image processing functions, and then after the processing is completed, you can choose reset to revert back to the original picture, and also you can choose save or save as in the lower sidebar of the picture. The description of each function is as follows:

Gray Scale	Choose Gray Scale command to convert a color image to a Gray Scale image
Invert	Choose Invert command to reverse the pixel values of the active image
Binary	Binary is a kind of gray level process. If the gray of the pixel is greater than the given threshold, the pixel's color will be changed into white. Otherwise, the pixel's color will be changed into black
Saturation	Adjust the Saturation of the image
Gamma	Adjust the Gamma of the image
Brightness	Adjust the Brightness of the image
Filter Color	Choose Filter Color command to filter a special color channel from a color image. Select either Red, or Green, or Blue color to filter. For every pixel, if select Red color to filter, only information about the Red channel will be discarded, the Green and Blue information will remain there.
Extract Color	Choose Extract Color command to extract a special color channel from a color image. Select either Red or Green, or Blue color to extract for every pixel, if selecting Red color to extract, only information about the Red channel will be kept, the Green and Blue information will be discarded.
Auto Level	The Auto Level command moves the level's sliders automatically to set highlight and shadow. It defines the lightest and darkest pixels in each color channel as white and black and then redistributes the pixels' color values proportionately
Auto Contrast	The Auto Contrast command automatically adjusts the overall contrast in an RGB image
Histogram	Used to show the distribution of brightness, R, G, B of an image over an image
Histogram Equalization	Used to improved image contrast
Flip	Flip image Horizontally / Vertically

8.4.2 Settings>network

8.4.2.1 Settings>Network>General

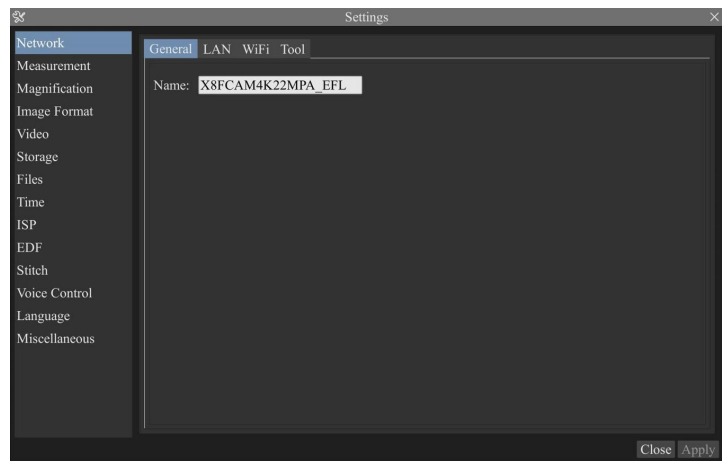


Figure 25 Comprehensive Network General Settings page

Name	The current camera name recognized as the network name
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8.4.2.2 Settings>Network>LAN

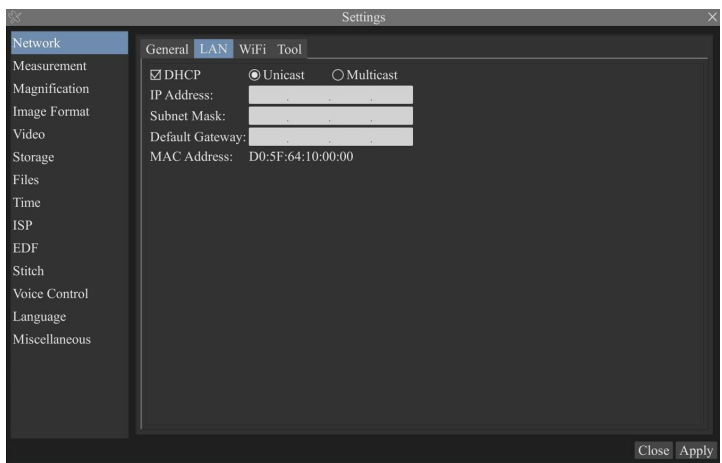


Figure 26 Comprehensive Network LAN Settings page

DHCP	Dynamic host control protocol allows DHCP server to automatically assign IP information to the camera. Only in Sec 6.4 LAN networking this item should be checked, so that cameras can automatically get IP information from routers/switches to facilitate networking operation;
Unicast/Multicast	By default, unicast function is used. Only in Sec 6.4 networking environment, when the router/switch has multicast function, camera can switch to multicast mode, which can save the network bandwidth consumed by the camera and facilitate the connection of more cameras in the same network;
IP Address	Every machine on a network has a unique identifier. Just as you would address a letter to send in the mail, computers use the unique identifier to send data to specific computers on a network. Most networks today, including all computers on the Internet, use the TCP/IP protocol as the standard for how to communicate on the network. In the TCP/IP protocol, the unique identifier for a computer is called IP address. There are two standards for IP address: IP Version 4 (IPv4) and IP Version 6 (IPv6). All computers with IP addresses have an IPv4 address, and many are starting to use the new IPv6 address system as well. Users must manually configure their IP addresses on the camera side and computer side. The IP addresses set on the camera side and computer side should be in the same network segment. The specific settings are shown Figure 27. It's usually a private address. Private address is a non-registered address used exclusively within an organization. The internal private addresses retained are listed below: Class A 10.0.0-10.255.255; Class B 172.16.0-172.31.255.255; Class C 192.168.0-192.168.255.255. The suggested IP address is Class C.
Subnet Mask	Subnet Mask is used to distinguish network domain from host domain in 32-bit IP address;
Default Gateway	A default gateway allows computers on a network to communicate with computers on another network. Without it, the network is isolated from the outside. Basically, computers send data that is bound for other networks (one that does not belong to its local IP range) through the default gateway; Network administrators configure the computer's routing capability with an IP range's starting address as the default gateway and point all clients to that IP address.

Uncheck the DHCP and select the Unicast item, user still need to set the IP address, Subnet mask and Default

Gateway as shown below:

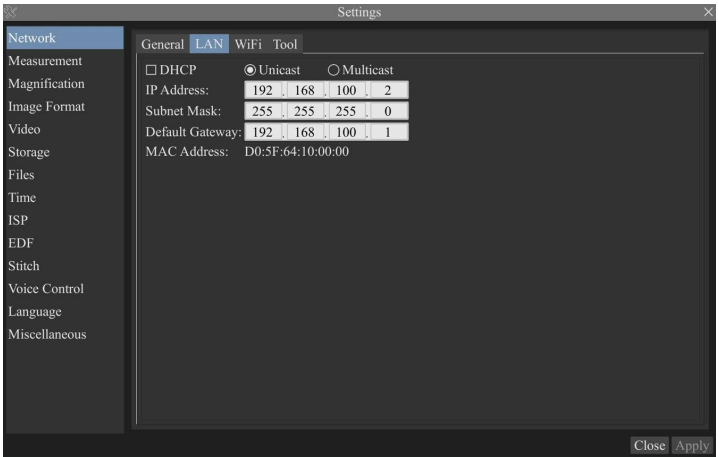


Figure 27 Manual DHCP and Unicast

Uncheck the **DHCP** and select the **Multicast** item, user still need to set the **IP address**, **Subnet Mask** and **Default Gateway** as shown below:

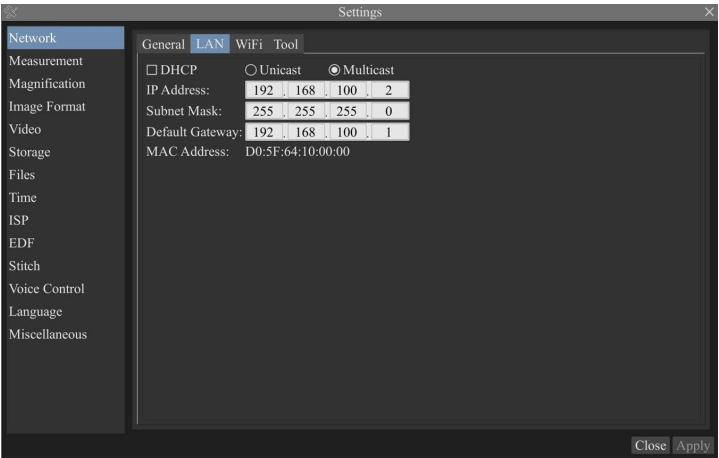


Figure 28 Manual DHCP and Multicast

8.4.2.3 Settings>Network>WiFi

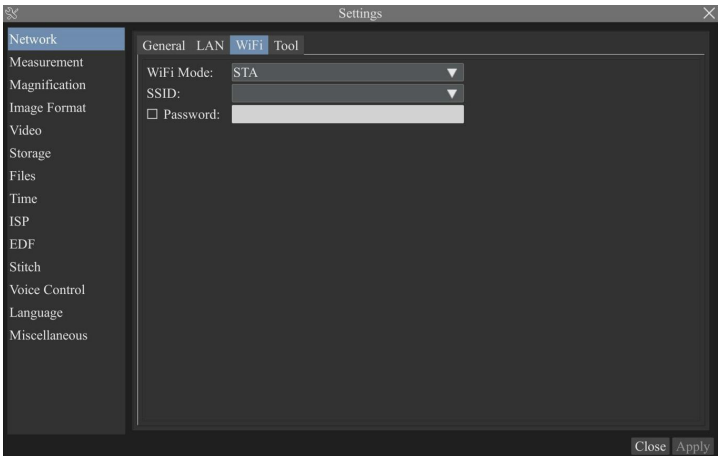


Figure 29 Network petup

WiFi Mode	AP/STA mode to select;
Channel/SSID	Channel for the AP mode and SSID for the STA mode. Choice or input the to be connected router's SSID. Here, the SSID is the router's SSID;
Password	Camera Password for the AP mode. Router Password for the STA mode

8.4.2.4 Settings>Network>Tool

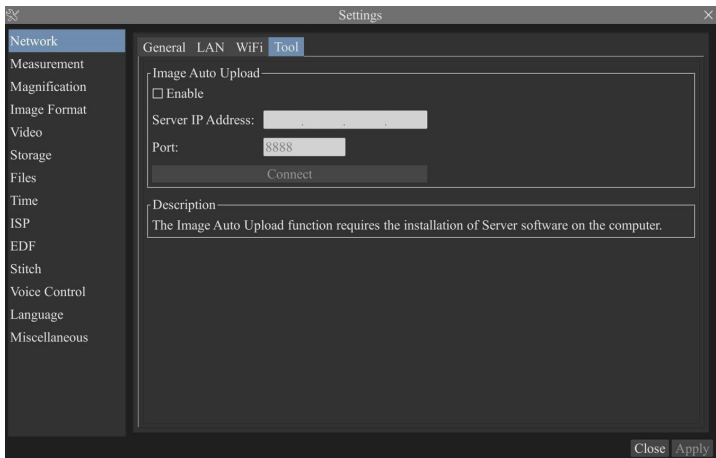


Figure 30 Comprehensive Network Tool Settings Page

Image Upload	Auto	Select whether to enable or not;
Server IP Address		When the WiFi mode is in AP mode, ensure that the PC is connected to the camera's AP, open the Server, click Update, and the IP address assigned by the camera to the PC will be displayed. Ensure that the Server has enabled; Manually enter the IP address and port on the camera end and click Connect. The left corner of the interface will display "Connected to Server", indicating successful connection. Click the snap button/click the left mouse button/use an external device to snap, The Server will display the number of Detections and Total Downloads, indicating successful Image Auto Upload;
		When the WiFi mode is in STA mode, ensure that both the PC and camera are connected to the router's WiFi; When connected via LAN, ensure that the PC and camera are on the same LAN, open the Server, click Update, and the IP address assigned by the camera to the PC will be displayed. Ensure that the Server has enabled; Manually enter the IP address and port on the camera end and click Connect. The left corner of the interface will display "Connected to Server", indicating successful connection. Click the snap button/click the left mouse button/use an external device to snap, The Server will display the number of Detections and Total Downloads, indicating successful Image Auto Upload;
Port		Default 8888
Connect		Ensure that the Server has enabled, click Connect, and the left corner of the interface will display "Connected to Server", indicating successful connection;
Description: The Image Auto Upload function requires the installation of Server software on the computer.		
Note: Enable Image Auto Upload function, unable to save pictures to SD card or USB drive; If you need to save pictures to an SD card or USB drive, you need to first turn off the Image Auto Upload function. For detailed instructions on the Image Auto Upload function and the Server on the upper computer, please consult our company for more information.		

8.4.3 Settings>Measurement

This page is used for the define of the Measurement Object properties.

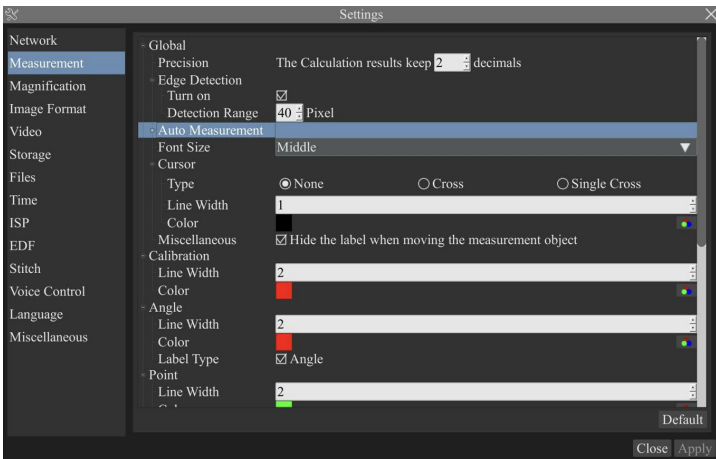


Figure 31 The Measurement Setup

Global	Precision	Used for setting digits behind the decimal point for measurement results;
	Edge Detection	Select whether to enable the automatic edge search function and set the detection range;
	Auto Measurement	Used for define the level of accuracy used for auto measurement;
	Font Size	The font size of measurement data can be divided into three types: large, Middle, and Small;
	Cursor	Select whether the cursor is a single crosshair and set the color of the single cross;
	Miscellaneous	Whether to hide the label when moving the measurement objects;
Calibration	Line Width	Used for defining width of the lines for calibration;

	Color	Used for defining color of the lines for calibration;
	EndPoint	Type: Used for defining shape of the endpoints of lines for calibration: Null means no EndPoint, rectangle means rectangle type of endpoints. It makes alignment more easily;
Point, Angle, Line, Horizontal Line, Vertical Line, Rectangle, Circle, Ellipse, Annulus, Two Circles, Polygon, Curve		
	Left-click the  along with the Measurement command mentioned above will unfold the corresponding attribute settings to set the individual property of the Measurement Objects.	

8.4.4 Settings>Magnification

This page's items are formed by the Measurement Toolbar's Calibration command.

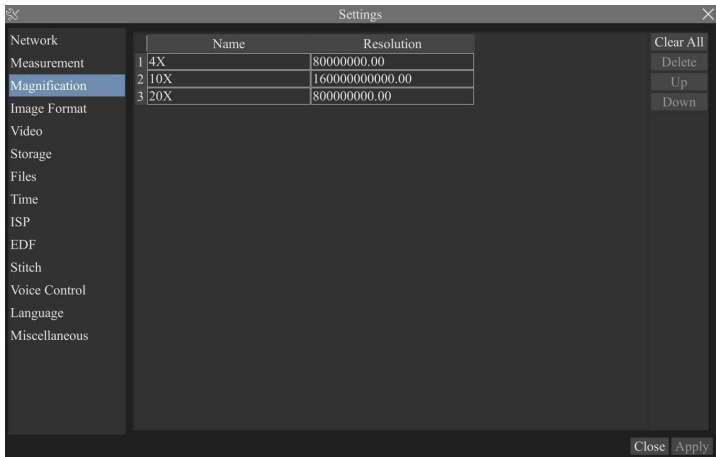


Figure 32 Comprehensive Magnification Settings page

Name	Names such as 10X, 40X, 100X are based on magnification of the microscopes. For continuous zoom microscopes, ensure that the selected magnification coincides with the scale alignment line on the microscope zoom knob; Users could also edit the name of the magnification with other information, for example, microscope mode, users name, etc.
Resolution	Pixels per meter. Image device like microscopes have high Resolution value;
Clear All	Click the Clear All button will clear the calibrated magnifications;
Delete	Click Delete to delete the selected magnification;
Up	Select a row in the magnification and click Move Up to move up the currently selected magnification;
Down	Select a row in the magnification and click Move Down to move up the currently selected magnification;

8.4.5 Settings>Image Format

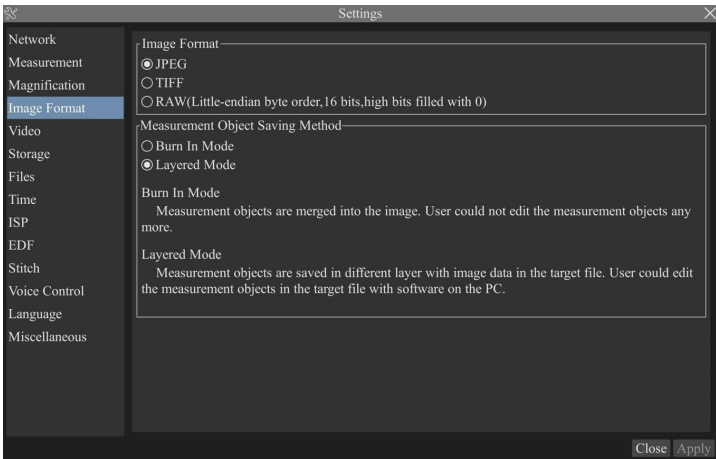


Figure 33 Comprehensive Image Format Settings page

Image Format	JPEG: The extension of JPEG file can get very high compression rate and display very rich and vivid images by removing redundant images and color data. In other words, it can get better image quality with the least disk space. If measurement objects are available, the measurement objects will be burned into the image and the measurement cannot be edited. TIFF: TIFF is a flexible bitmap format mainly used to store images including photos and artistic images. RAW (Little-ending byte order,16bits, high bits filled with 0): RAW is an uncompressed and unprocessed image format that preserves all raw data directly obtained from the sensor of a digital camera.
Measurement Object Saving Method	Burn in Mode: The measurement objects are merged into the current image. User could not edit the measurement objects any more. This mode is not reversible. Layered Mode: The measurement objects are saved in different layer with current image data in the target file. User could edit the measurement objects in the target file with some software on the PC. This mode is reversable.

8.4.6 Settings>Video

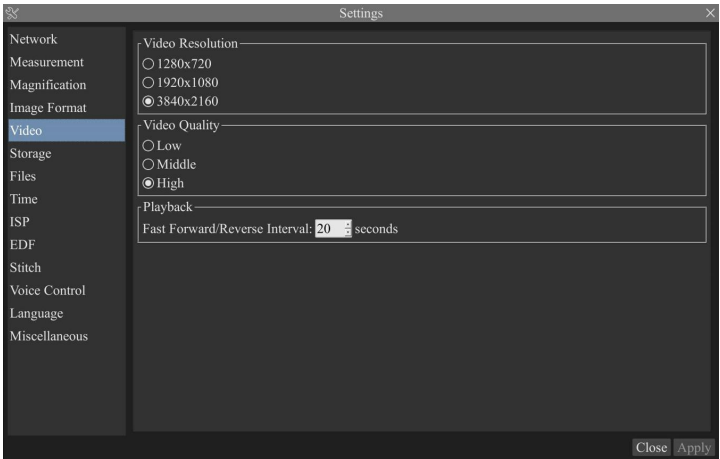


Figure 34 Comprehensive Setting of Video page

Video Resolution	Select a Video Resolution of 1280X720,1920x1080 or 3840x2160;
Video Quality	Select Video Quality as low, medium, or high;
Video Playback	Fast Forward/Reverse internal in second unite for Video Playback

8.4.7 Settings>Storage

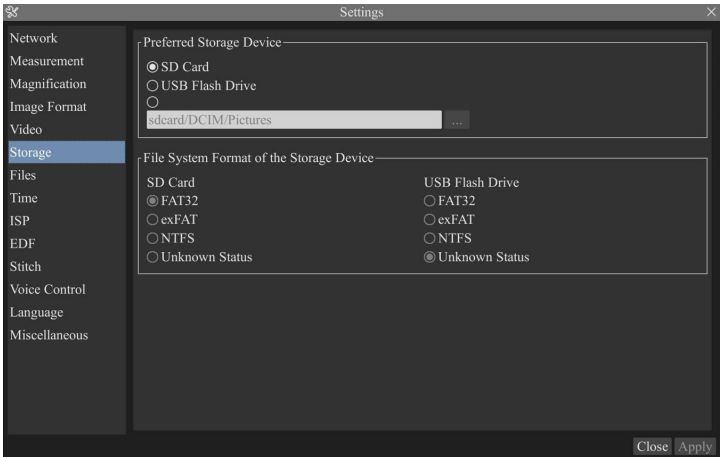


Figure 35 Comprehensive Setting of Storage page

Preferred Storage Page	SD Card: Select it to save the video and image to the SD Card. USB Flash Drive: Select it to save the video and image to the USB Flash Drive. Custom Storage Location: Select it to save the video and image to the Custom Storage Location.
File System Format of the Storage Device	List the file system format of the current storage device FAT32: The file system of SD Card is FAT32. The maximum video file size of single file in FAT32 file system is 4G Bytes; exFAT: The file system of SD Card is exFAT. The maximum video file size of single file in FAT32 file system is 16E Bytes; NTFS: The file system of SD Card is NTFS. The maximum video file size of single file is 2T Bytes. Unknown Status: SD Card not detected or the file system is not identified;
Note: For USB Flash Drive, USB 3.0 interface is preferred.	

8.4.8 Settings>Files

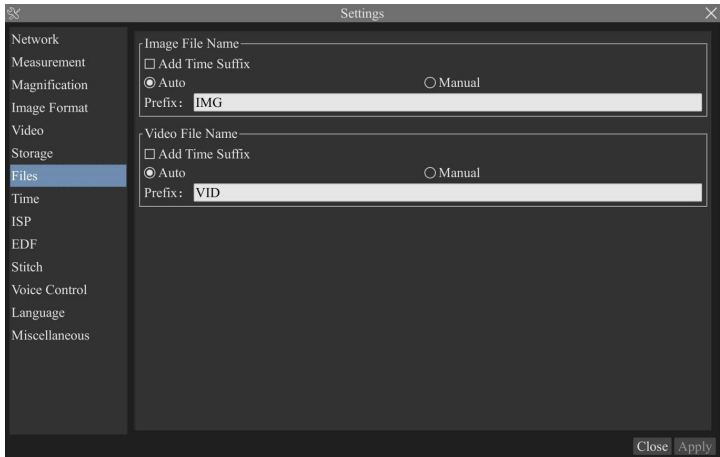


Figure 36 Comprehensive Setting of Files Name

Image or Video File Paradigm	Provide Auto or Manual naming paradigm for Image or Video file;
Auto	With specified name as the Prefix and XCamView will add digital after the Prefix for the Image or Video file;
Manual	A file dialog will pop up to enter the Image or Video file name for the captured Image or Video .
Add Time Suffix	Select to add a time suffix after the file name, otherwise do not add it;

8.4.9 Settings>Time

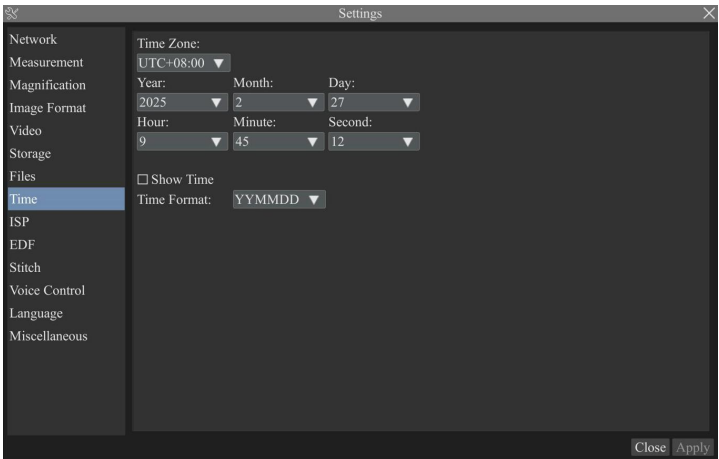


Figure 37 Time Setting

Time	User can set Year , Month , Day , Hour , Minute and Second in this page;
Show Time	Select to display the time in the bottom right corner of the video window. If not selected, the time will not be displayed. You can set the Time Format ;

8.4.10 Settings>ISP

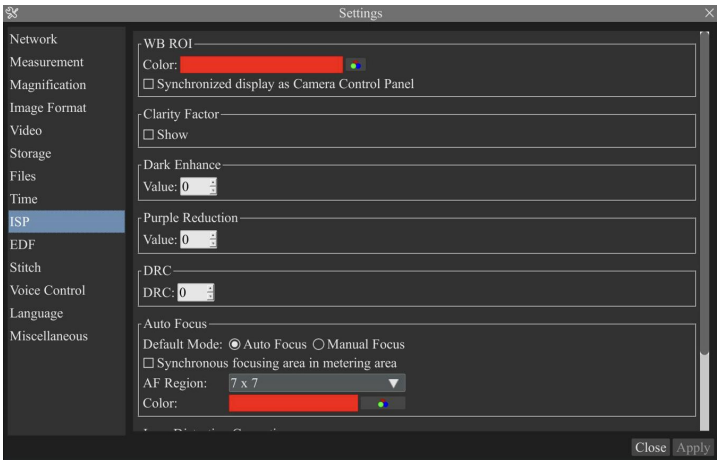


Figure 38 Comprehensive Setting of ISP page

WB ROI Color	Choosing the ROI rectangle line color and whether it is synchronized display as Camera Control Panel;
Clarity Factor	Select to display the clarity factor in the video window, otherwise the clarity factor will not be displayed;
Dark Enhance	Define the intensity value of dark enhancement;
Purple Reduction	Define the intensity value for purple reduction edges;
DRC	Define the intensity value of DRC;
Metering area	Adjust the metering mode, synchronize the metering area with the focusing area when turned on, and switch to global average metering when turned off;
AF Region	Adjustable AF area and focus box color;
Lens Distortion Correction	The distortion generated by optical systems can be corrected, with an intensity range of -30~30. Negative values can correct pillow shaped distortion, positive values can correct barrel shaped distortion.

8.4.11 Settings>EDF

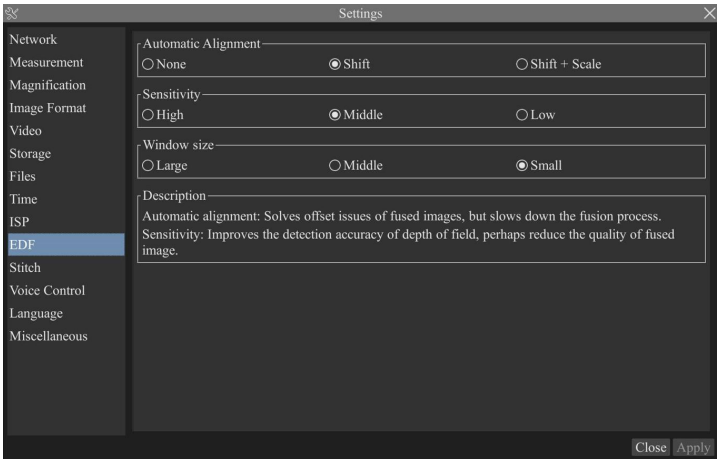


Figure 39 Comprehensive Setting of EDF

Automatic Alignment	Optionally turn on auto-alignment when there is significant displacement or scaling between images;
Sensitivity	Select the sensitivity of EDF;
Window size	Select the window size for displaying real-time images during EDF;
Description	Automatic alignment: Solves offset issues of fused images, but slows down the fusion process. Sensitivity: Improves the detection accuracy of depth of field, perhaps reduce the quality of fused image.

8.4.12 Settings>Stitch



Figure 40 Comprehensive Settings of Stitch

Detection Precision	Define the level of detection precision;
Stitching Stride	Select the stitching stride;
Background Color	Select the background color of stitch;
Description	Detection Precision: The higher the detection precision, the more precision the stitching and the longer it takes Stitching Stride: The larger the stitching stride, the lower the precision and the faster the speed.

8.4.13 Settings>Voice Control

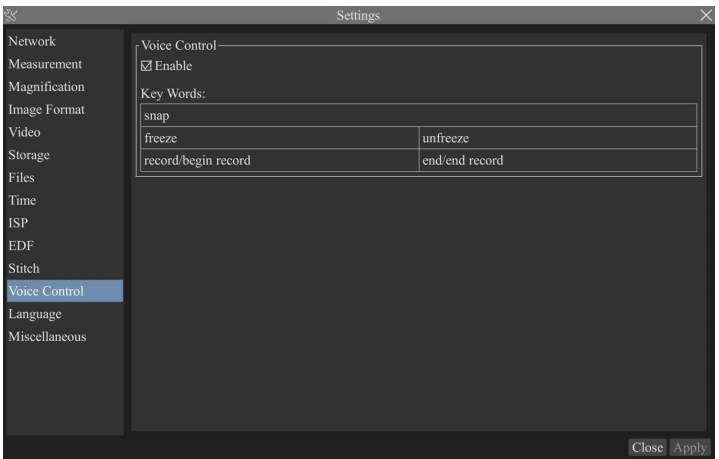


Figure 41 Comprehensive Settings of Voice Control

Voice Control	Select whether to enable or not;
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Key Words	Provide Key Words for “snap”;
	Provide Key Words for “freeze”, “unfreeze”;
	Provide Key Words for “record/begin record”, “end/end record”;
Note: After the camera is turned on, if the voice control module is not plugged in, the Key Words information will not be displayed by default;	

8.4.14 Settings>Language

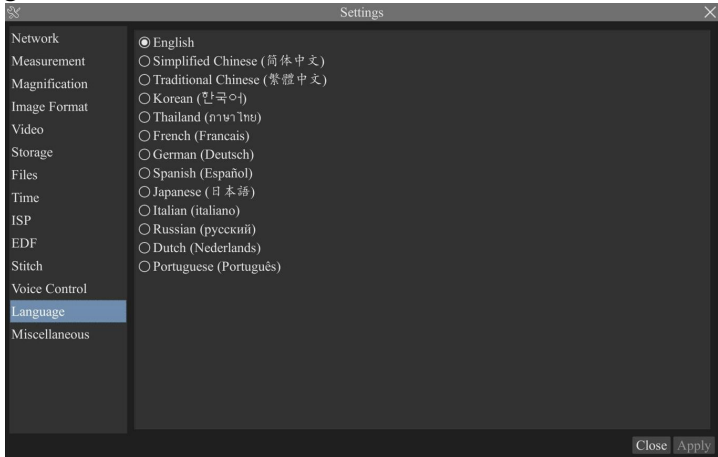


Figure 42 Comprehensive Setting of Language Selection Setting page

English	Set language of the whole software into English;
Simplified Chinese	Set language of the whole software into Simplified Chinese;
Traditional Chinese	Set language of the whole software into Traditional Chinese;
Korean:	Set language of the whole software into Korean;
Thailand	Set language of the whole software into Thailand;
French	Set language of the whole software into French;
German	Set language of the whole software into German;
Spanish	Set language of the whole software into Spanish;
Japanese	Set language of the whole software into Japanese;
Italian	Set language of the whole software into Italian;
Russian	Set language of the whole software into Russian;
Dutch	Set language of the whole software into Dutch;
Portuguese	Set language of the whole software into Portuguese;

8.4.15 Settings>Miscellaneous

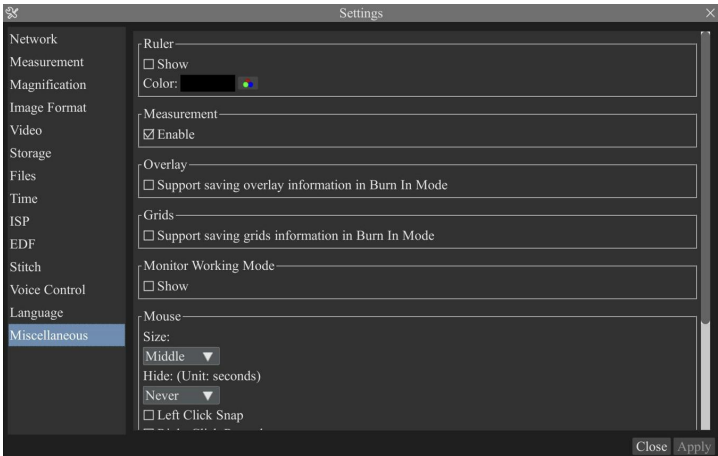
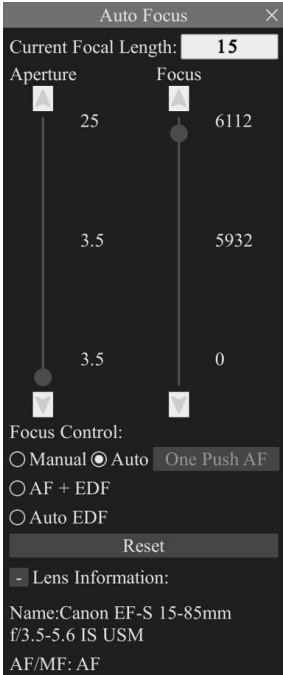


Figure 43 Comprehensive Miscellaneous Settings page

Ruler	Select to display the ruler in the video window, otherwise not to display the ruler. You can choose the ruler color;
Measurement	Select to display the measurement toolbar in the video window, otherwise not to display the measurement toolbar;
Overlay	Select to support saving graphics overlay information in fusion mode, otherwise it will not support;
Grids	Select to support saving mesh information in fusion mode, otherwise not to support;
Monitor Working Mode	Select to display the Monitor Working Mode in the video window, otherwise the Monitor Working Mode will not be displayed;
Mouse	Select the mouse size and hide time; Select to capture the video with the left button and the right button. If not selected, the video will not be captured with the left button or the right button;
Camera Control Panel Display Location	Select the camera control panel to display on the left, right, or both sides of the HDMI interface;

Camera Import	Parameters	Import the Camera Parameters from the SD Card or USB flash drive to use the previously exported Camera Parameters ;
Camera Export	Parameters	Export the Camera Parameters to the SD Card or USB flash drive to use the previously exported Camera Parameters ;
Reset to factory defaults		Restore camera parameters to its factory status;

8.5 Auto Focus Control Panel on the right side of the Video Window

	Current Focal Length	Display the current focal length of the lens
	Aperture	Display the adjustable aperture range of the current lens, and users can use the mouse to move the slider on the scroll bar to control the aperture. Note that when the focal length changes, the range of aperture settings will also change according to the real range. Please pay attention to the aperture range displayed on the right side of the "aperture" slider;
	Focus	Display the focusing range of the current lens. The user can drag the slider on the focusing slider with the mouse to modify the focusing position of the focusing lens;
	Auto Focus	The system will automatically focus based on the current scene in the focusing area until it becomes clear. The right side of the "Focus" slider will refresh in real-time to display the current focusing position; when the object is moved or the brightness is changed, the camera will perform the Focus automatically again and again until the scene becomes stable.
	Manual Focus	With Manual Focus checked, users should reset position of the camera sensor by using the mouse to scroll up and down till the specimen stays in focus;
	AF+EDF	With AF+EDF checked, system turns on the autofocus mode, which requires the user to change the focus area in sequence to focus on multiple different targets in the same scene. After all targets are successfully focused, move the mouse to the bottom of the video window, click  , and then the camera will perform EDF on the previously focused images and output the fused image.
	Auto EDF	With Auto EDF checked, system turns on the autofocus mode, The system will Auto EDF of field for multiple different targets based on the current scene within the focus area. After all targets are successfully synthesized, the camera will output the synthesized image.
	One Push AF	Click this button to perform an autofocus operation once;
	Reset	Click this button, the system will reset the aperture and focus position of the lens, and re read the lens information, aperture range, focus range, and other information. After calibration, the aperture will return to the maximum aperture, the focusing power will return to the nearest focusing position, and the system will regain the focusing range;
	Lens Information	Click the button on the left side of the lens information, and the name of the currently used lens will be displayed at the bottom of the lens control panel, and the MF/AF button status of the lens body will be updated in real time. Lens control can only be performed when in AF state;

8.6 Focus Region on the Video Window

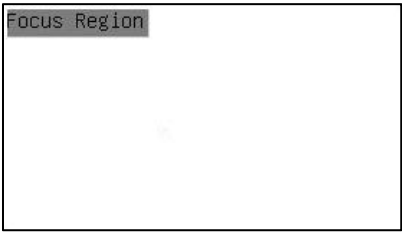


Figure 44 Focus Region

The [Focus Region](#) is used for selecting the region of interest for the [Auto Focus](#) operation. When user clicks the  button on the [Synthesis Camera Control Toolbar](#), the [Focus Region](#) will show up as well with the [Auto Focus Control Panel](#). Users can click any part of the Video window to reset the focus region for [Auto Focus](#) operation.

9 Sample Photos Captured with X8FCAM4K22MPA_EFL Camera

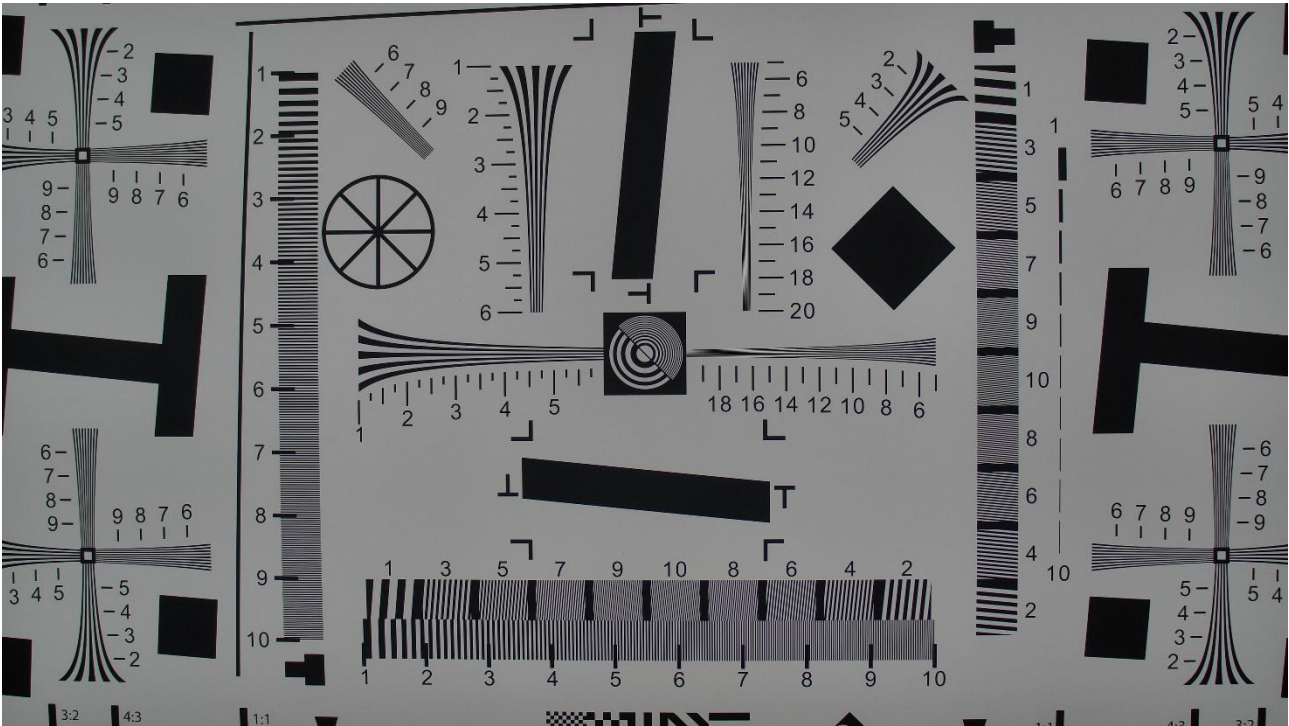


Figure 45 Resolution board captured by X8FCAM4K22MPA_EFL



Figure 46 Rabbittail grass captured by X8FCAM4K22MPA_EFL



Figure 47 Lavender captured by X8FCAM4K22MPA_EFL

10 Contacting Customer Service

Please contact your local distributor if you have any questions about the product.