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The X8CAM4K Series HDMI/NETWORK/USB Multi-outputs CMOS Camera  
Help Manual

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## 1 X8CAM4K Series Camera Application



Figure 1 The X8CAM4K Series Camera

The X8CAM4K series cameras have high resolution, high frame rate, and excellent image quality, making them suitable for professional applications that require extremely high levels of detail capture and colour reproduction. 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
- 4K HDMI/ NETWORK/ USB multiple video synchronous outputs
- 4K/1080P auto switching according to monitor resolution
- SD card/USB flash drive for captured image and video storage, support local preview and playback
- 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
- Provide real-time video EDF function and real-time video WDR output function
- Provide real-time Stitch function to obtain higher quality images through real-time processing
- Provide two sets of default ISP parameters for biological microscope and stereo microscope
- 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 measurement functions
- The text input box supports the input of both Chinese and English languages
- ToupView/ToupLite software for PC
- iOS/Android applications for smart phones or tablets

## 2 X8CAM4K Series Camera Datasheet and Functions (2)

Order Code	Sensor & Size(mm)	Mount	Pixel(μm)	G Sensitivity Dark Signal	Sensor Output (FPS/Resolution)	Binning	Exposure(us)
X8CAM4K22MPA	IMX571(C) 1.7"(23.46x13.21)	M42*0.75	3.76x3.76	485mv with 1/30s 0.07mv with 1/30s	37@6240*3512	1x1	7~10 <sup>6</sup>
X8CAM4K16MPA	IMX383(C) 1/1.1"(13.06x7.34)	C	2.4x2.4	470mv with 1/30s 0.21mv with 1/30s	60@5440*3060	1x1	41~10 <sup>6</sup>

Camera Model	Video Saving(FPS/Resolution)	Picture	H DMI2.0(FPS/Resolution)	USB3.0(FPS/Resolution)	NETWORK(FPS/Resolution)
X8CAM4K22MPA	37@3840*2160	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
X8CAM4K16MPA	60@3840*2160	5440*3060	60@3840*2160 60@1920*1080	25@5440*3060 45@2688*1512 60@1920*1080	30@3840*2160 60@1920*1080 60@1280*720



Figure 2 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 <a href="#">XCamView</a> 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 in real time Connect USB microphone to record 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/1A)
Video Output Interface	Function Description
HDMI Interface	Comply with HDMI2.0 standard; 30fps@4K or 30fps@1080P ( <a href="#">X8CAM4K22MPA</a> ) 60fps@4K or 60fps@1080P( <a href="#">X8CAM4K16MPA</a> )
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( <a href="#">X8CAM4K22MPA</a> ); 60fps( <a href="#">X8CAM4K16MPA</a> );
Image Capture	22M (6240*3512, <a href="#">X8CAM4K22MPA</a> ) JPEG/TIFF/RAW image in SD card or USB flash drive 16M (5440*3060, <a href="#">X8CAM4K16MPA</a> ) 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, Color to Gray, 50HZ/60HZ Anti-flicker, Dark Enhance, DRC Function

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Image Operation	Zoom In/Zoom Out(Up to 10X), Mirror/Flip, Freeze, EDF, Stitch, Grids, Overlay, PIP , Browser(including Picture Browsing , Video Playback , Video Compare , Picture Compare , EDF , Stitch , Image Processing), Measurement Function
Embedded RTC(Optional)	To 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 Movie
Operating System	Microsoft® Windows® XP / Vista / 7 / 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: 4GB or More
	USB interface: USB 2.0 interface or higher
	Ethernet Port: RJ45 Ethernet Port
	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/1A Adapter

### 3 Dimension of X8CAM4K Series Camera



Figure 3 Dimension of X8CAM4K22MPA



Figure 4 Dimension of X8CAM4K16MPA

#### 4 X8CAM4K Series Camera Packing Information



Figure 5 X8CAM4K Series Camera Packing Information

<b>Standard Packing List</b>	
<b>A</b>	Gift box : L:25.5cm W:17.0cm H:9.0cm (1pcs, 1.7Kg/ box)
<b>B</b>	X8CAM4K Camera
<b>C</b>	Power Adapter: Input: AC 100~240V 50Hz/60Hz, Output: DC 12V 1A <b>American standard:</b> Model: POWER-U-12V1A(MSA-C1000IC12.0-12W-US); UL/CE/FCC <b>European standard:</b> Model: POWER-E-12V1A(MSA-C1000IC12.0-12W-DE); UL/CE/FCC EMI standard: FCC Part 15 Subpart B EMS standard: EN61000-4-2,3,4,5,6
<b>D</b>	USB Mouse
<b>E</b>	HDMI2.0 Cable
<b>F</b>	USB3.0 A male to A male gold-plated connectors cable /1.5m
<b>Optional Accessory</b>	
<b>G</b>	Voice Control Module
<b>H</b>	SD Card(16G or above; Speed: class 10)
<b>I</b>	USB flash drive(USB3.0)
<b>J</b>	Ethernet cable
<b>K</b>	USB WiFi adapter (Shape will vary with different models)
<b>L</b>	ToupTek 1.2/1.5X Microscope Adapter (For <b>X8CAM4K22MPA</b> ), ToupTek engineer will help you to determine the right microscope adapter for your application

## 5 Software and App

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

Windows: <https://www.touptekphotonics.com.cn/download/?dlID=0>

macOS: <https://www.touptekphotonics.com.cn/download/?dlID=1>

Linux: <https://www.touptekphotonics.com.cn/download/?dlID=2>

Android: <https://www.touptekphotonics.com.cn/download/?dlID=3>

iOS: <https://www.touptekphotonics.com.cn/download/?dlID=4>

## 6 X8CAM4K Series Camera Configurations

You can use the X8CAM4K series camera in 5 different ways. Each application requires different hardware environment.

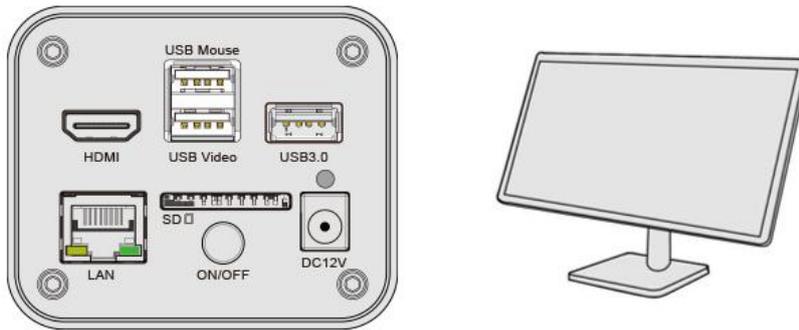
### 6.1 Camera working standalone with built-in XCamView software

For this application, apart from the microscope, 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:

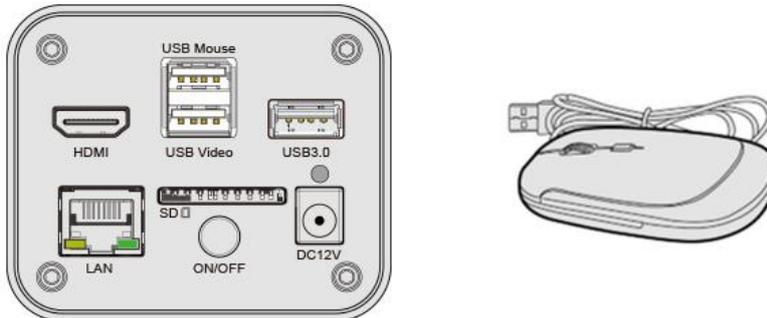


Figure 6 X8CAM4K Series Camera with the HDMI Monitor

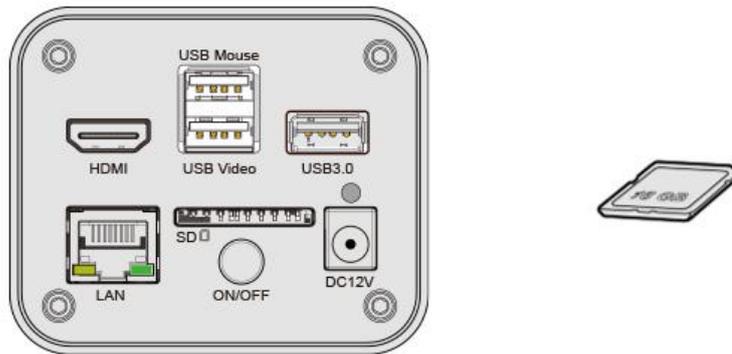
Connect the camera to a HDMI monitor using the HDMI cable;



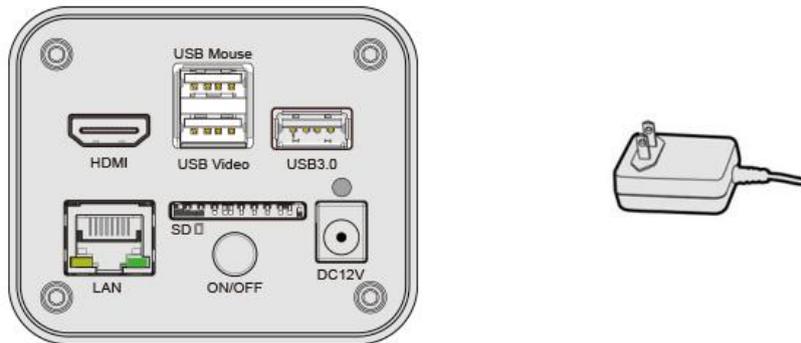
Insert the supplied USB mouse to the camera's USB Mouse port;



Insert the supplied SD card/USB flash drive into the X8CAM4K series 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.

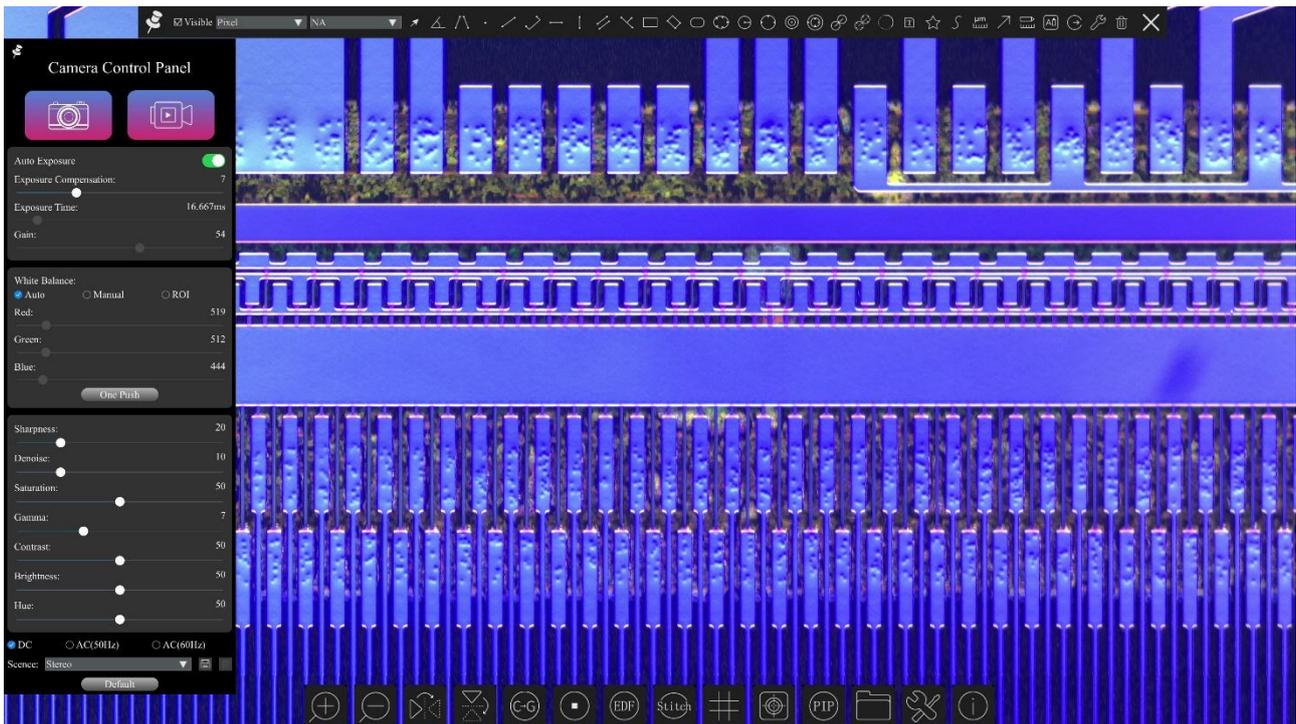


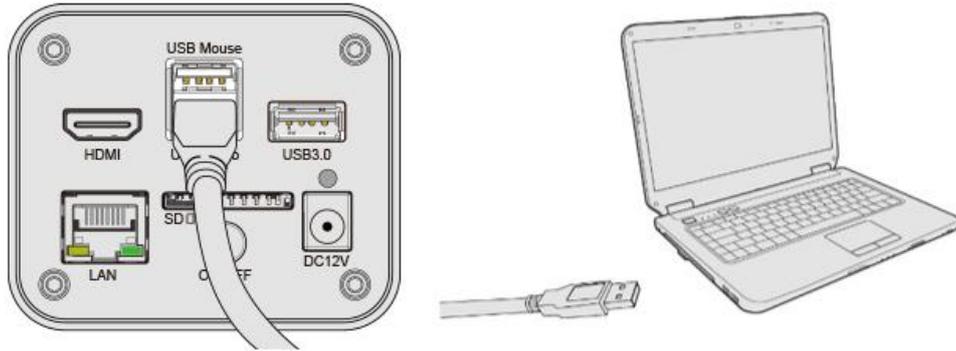
Figure 7 XCamView and X8CAM4K Series Camera in HDMI Mode

## 6.2 Connecting camera to computers with USB3.0 port

For Windows user (Windows XP (32bit), Windows 7/8/10/11 (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. 6.1. After the camera is running, connect 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 8.

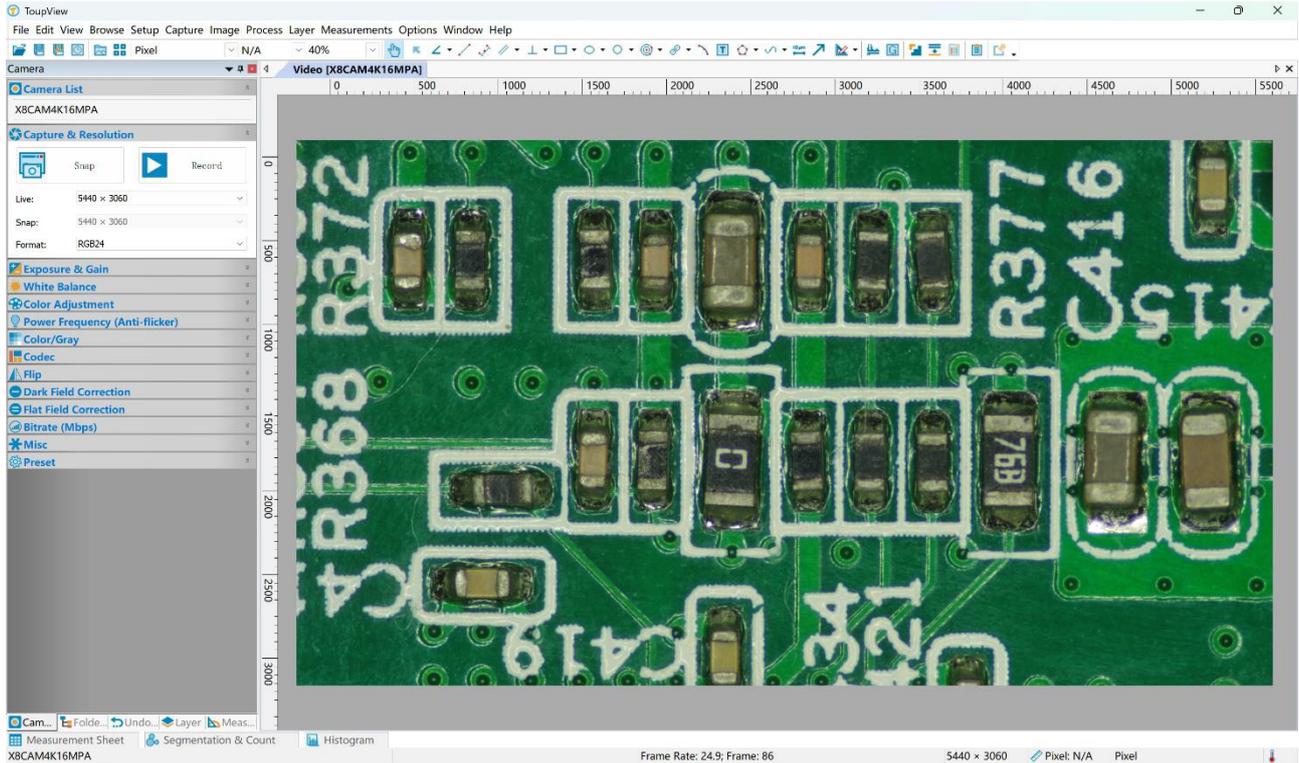


Figure 8 ToupView and X8CAM4K Series Camera in USB Mode

### 6.3 Camera working in WiFi mode (AP mode)

Please make sure your PC is [WiFi](#) enabled.



Figure 9 The PC or Mobile Device Connect to the Camera through WiFi

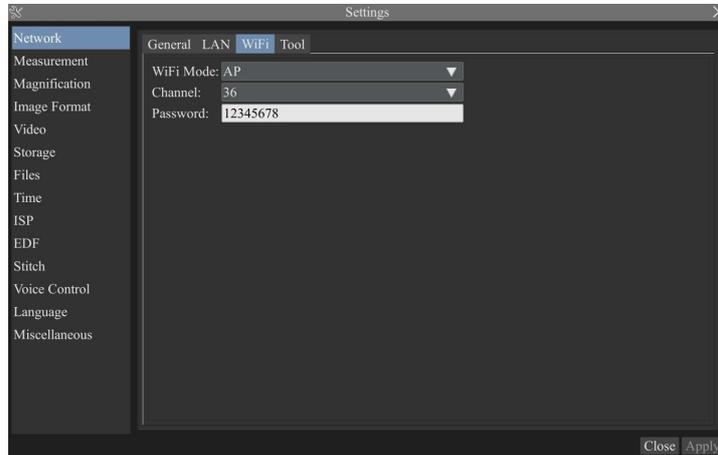
For Windows user (Windows XP (32bit), Windows 7/8/10/11 (32/64 bit)), please use [ToupView](#).

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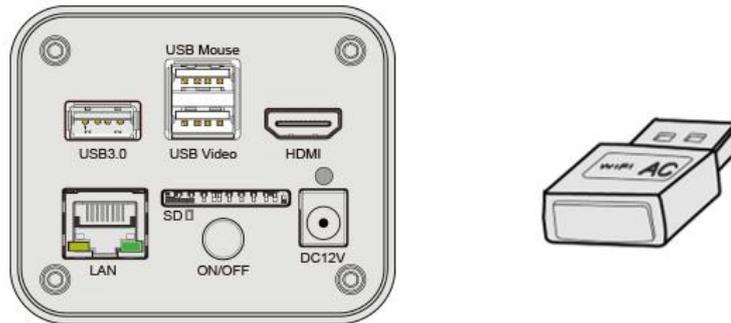
For [macOS](#) and [Linux](#) user ([macOS](#) 10.10 or above or [Linux](#) distributions with kernel 2.6.27 or higher), please use [ToupLite](#). When connecting the camera with a mobile device, the free [ToupView App](#) is required. Just make sure that the mobile device uses iOS 11 or higher/Android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

The steps to start the camera are listed below:

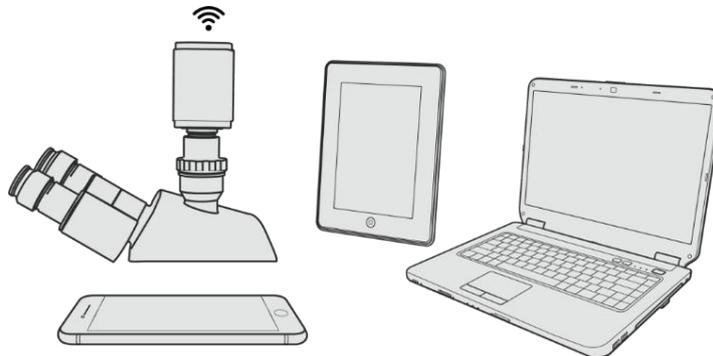
Start the camera according to Sec. 6.1. After the camera is running, move the mouse to the bottom of the GUI and clicking the  button on the [Synthesis Camera Control Toolbar](#) at the bottom of the video window, a small window called [Settings](#) will pop up as shown below. Click [Network](#)> [WiFi](#) 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 X8CAM4K series cameras will be automatically recognized. The live image of each camera is shown in Figure 10. For the display, the [Camera List](#) group is used in [ToupView/ToupLite](#) software, and the [Camera Thumbnail](#) is used in [ToupView App](#).

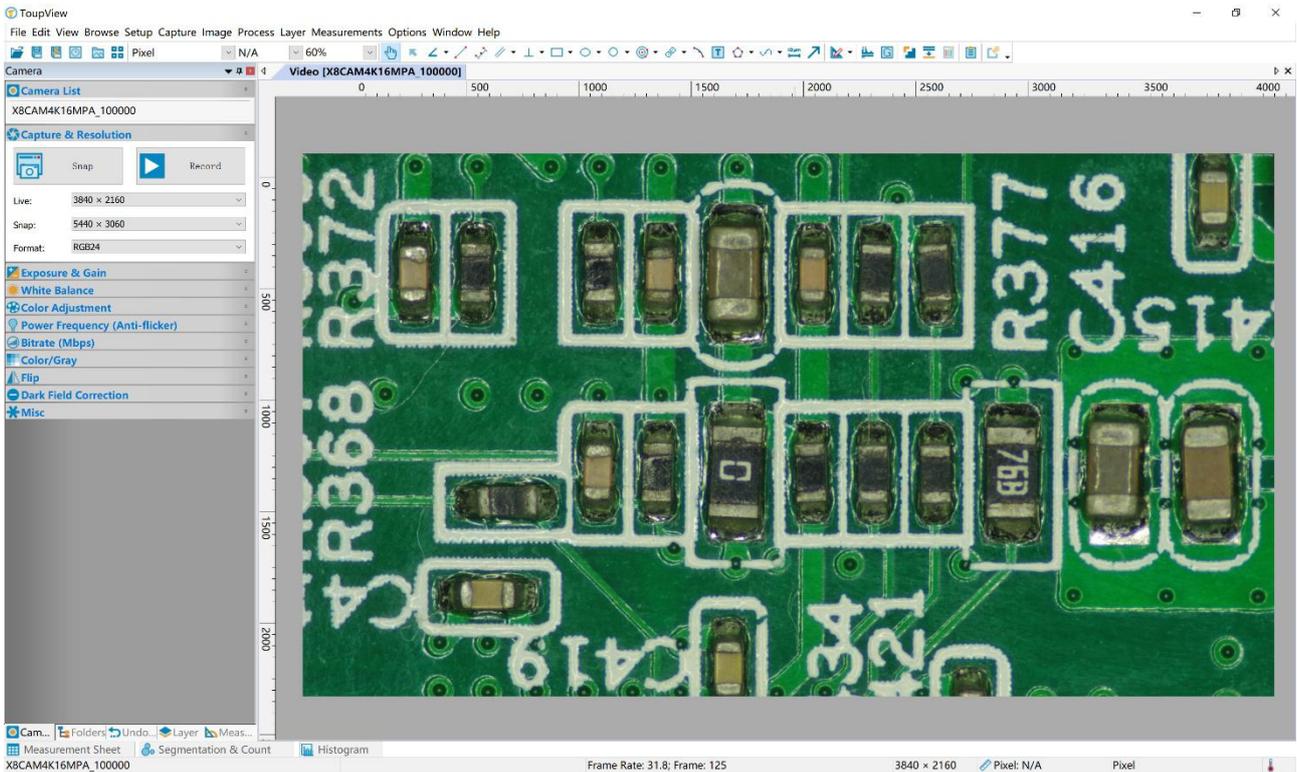


Figure 10 ToupView and X8CAM4K Series Camera in WiFi AP Mode

#### 6.4 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.

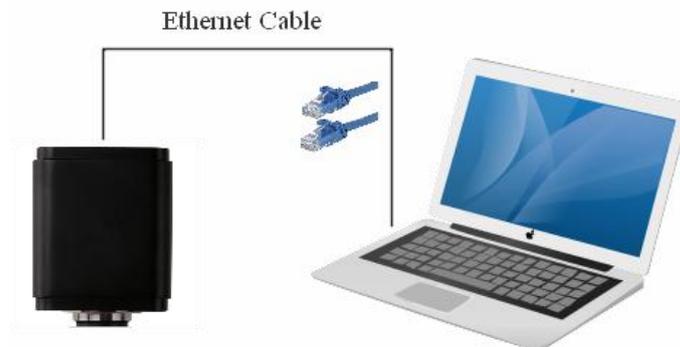


Figure 11 Connecting the X8CAM4K Series Camera with Ethernet Cable to the PC

Start the camera according to Sec. 6.1 after the camera is running, clicking  button on the [Synthesis Camera Control Toolbar](#) at the bottom of the video window (See Figure 7), 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.

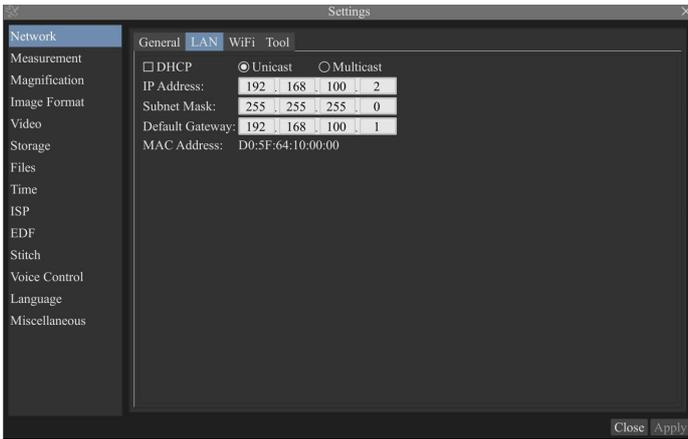


Figure 12 Configure the X8CAM4K Series Camera IP

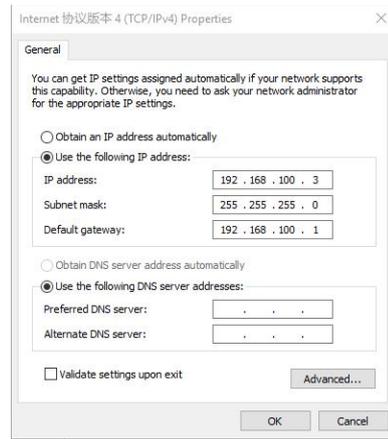
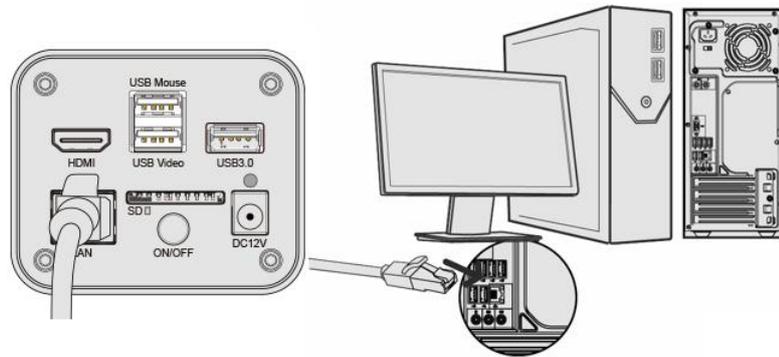


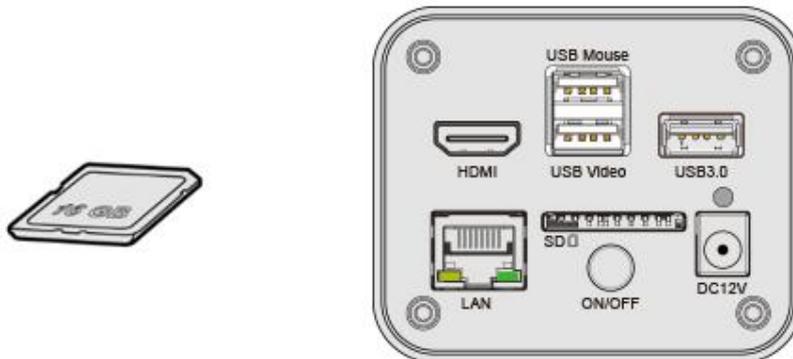
Figure 13 Configure the PC's IP

After the above configurations are finished, user can connect the X8CAM4K series 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;



Insert the supplied SD card/USB flash drive into the X8CAM4K series camera's SD card slot/USB3.0 slot;



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 10.

### 6.5 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.

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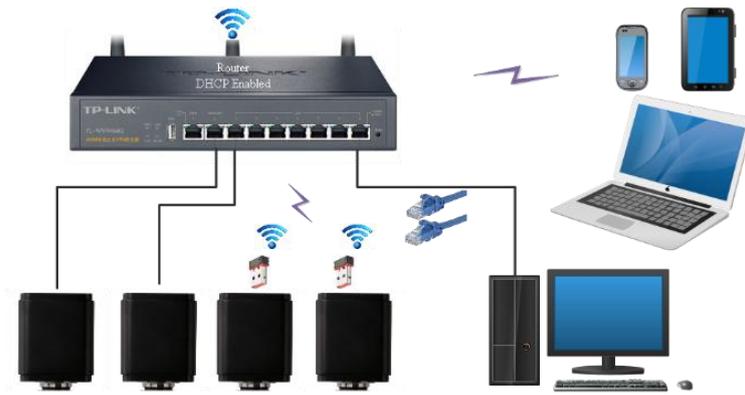
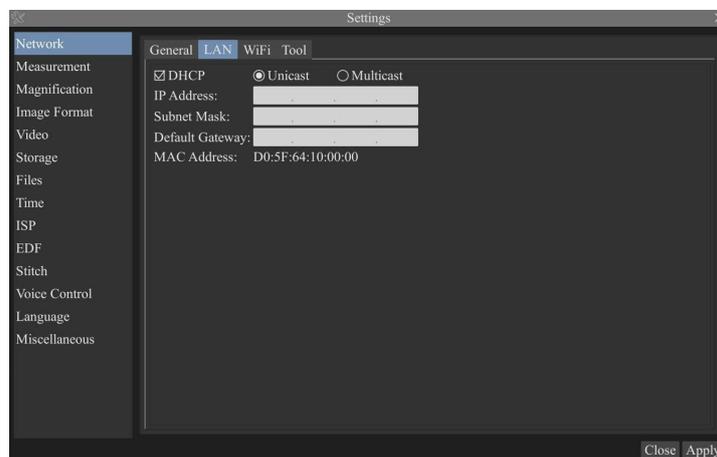


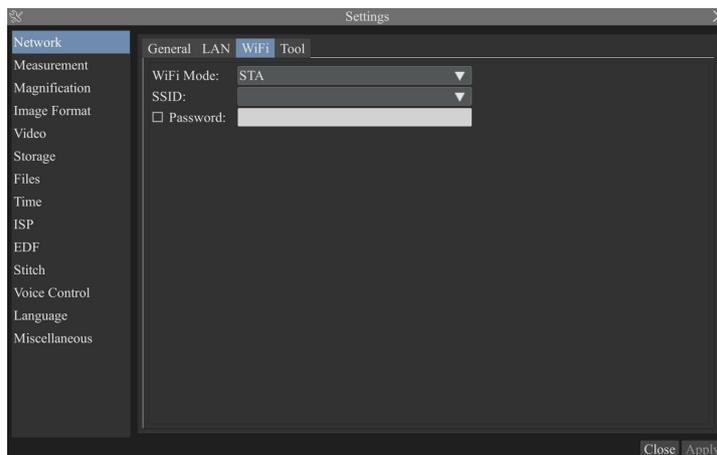
Figure 14 Multi X8CAM4K Series Cameras Connecting to the Router through the LAN Port/ WiFi Style

The connection and configuration are just the same as in Sec.6.1 or Sec. 6.4. 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 X8CAM4K series 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 10.



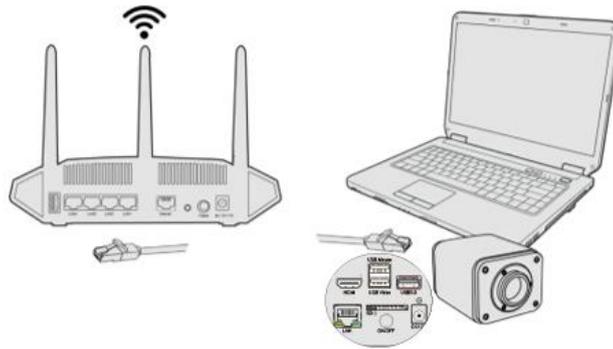
Or start the camera according to Sec. 6.1. After the camera is running, move the mouse to the bottom of the video window and clicking the  button on the **Synthesis Camera Control Toolbar** at the bottom of the video window, a small window called **Settings** will pop up as shown below. Clicking **Network> 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:



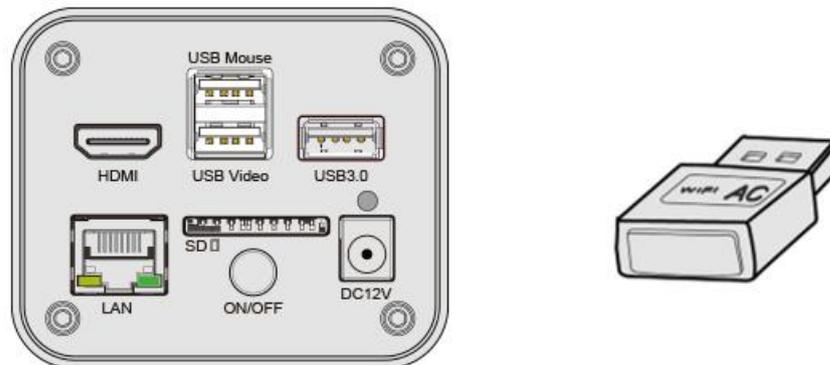
Install **ToupView /ToupLite** software on your PC. Alternatively, install the free **ToupView App** on the mobile device;

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**;

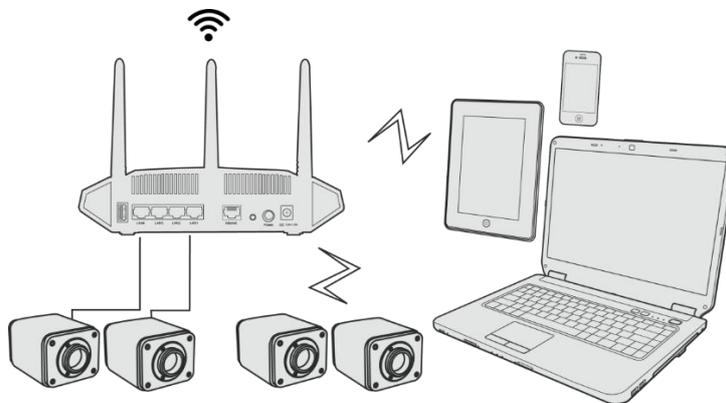
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Or plug the [USB WiFi](#) adapter into the camera's USB3.0 port (for those connected to router with [WiFi STA](#) mode), the upper left corner of the HDMI graphics interface will display "[STA Mode](#)";



Finally, as shown below, 2 X8CAM4K series cameras are connected to the router with LAN cable and 2 X8CAM4K series 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 X8CAM4K series 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 X8CAM4K series 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 15)

### [About the routers/switches](#)

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



## 7 Instructions for Using X8CAM4K Series Cameras with Different Microscopes

### 7.1 X8CAM4K22MPA camera for use with biomicroscope via M42 microscope adapter



Figure 16 Biomicroscope + M42 Micro Adaptor +X8CAM4K22MPA

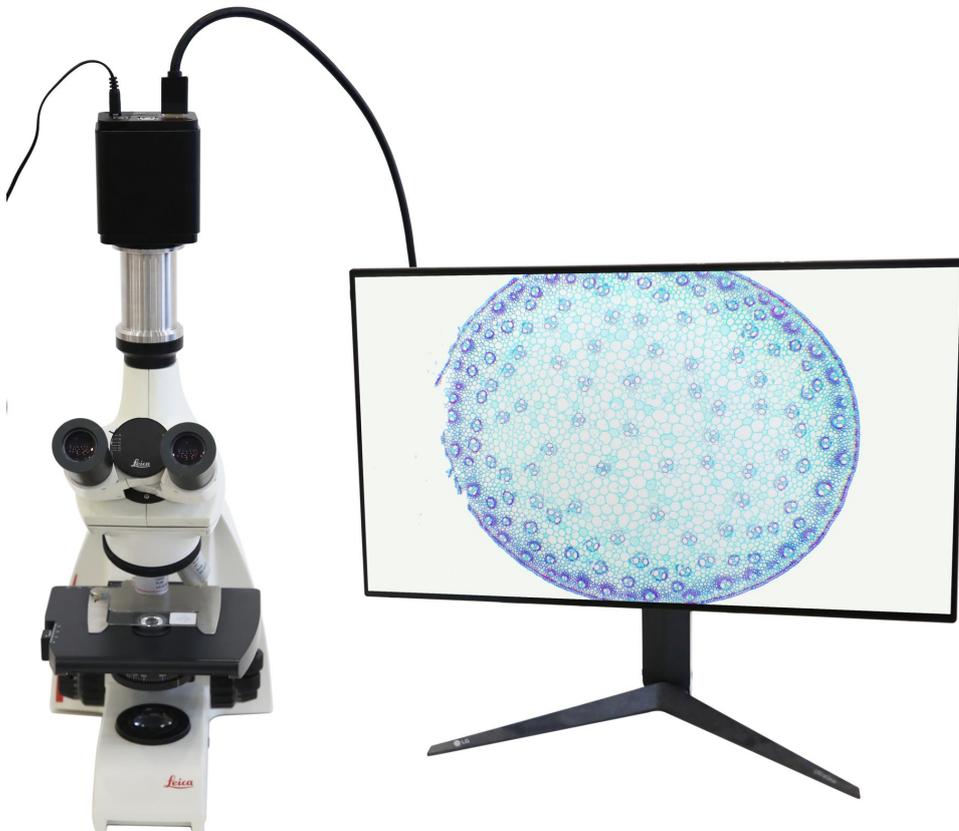


Figure 17 X8CAM4K22MPA Camera for Use with Biomicroscope Via M42 Microscope Adapter

7.2 X8CAM4K16MPA camera with trinocular stereo microscope

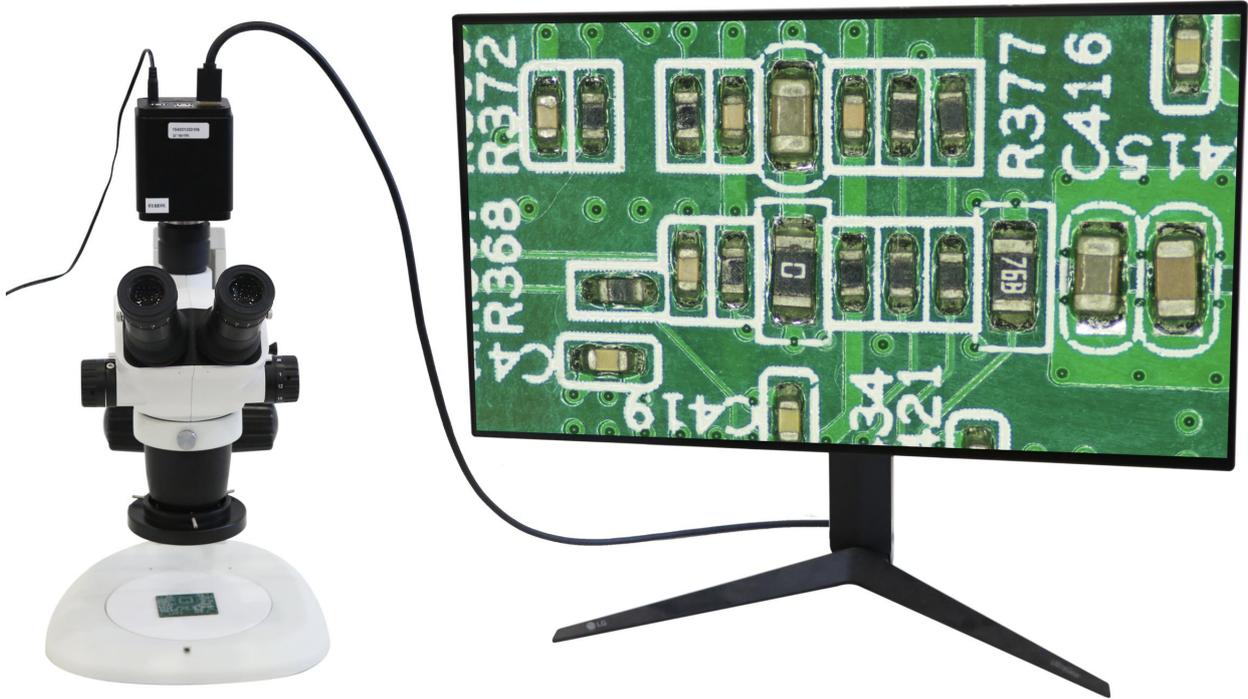


Figure 18 X8CAM4K16MPA Camera with Trinocular Stereo Microscope

7.3 X8CAM4K16MPA camera with metallographic microscope

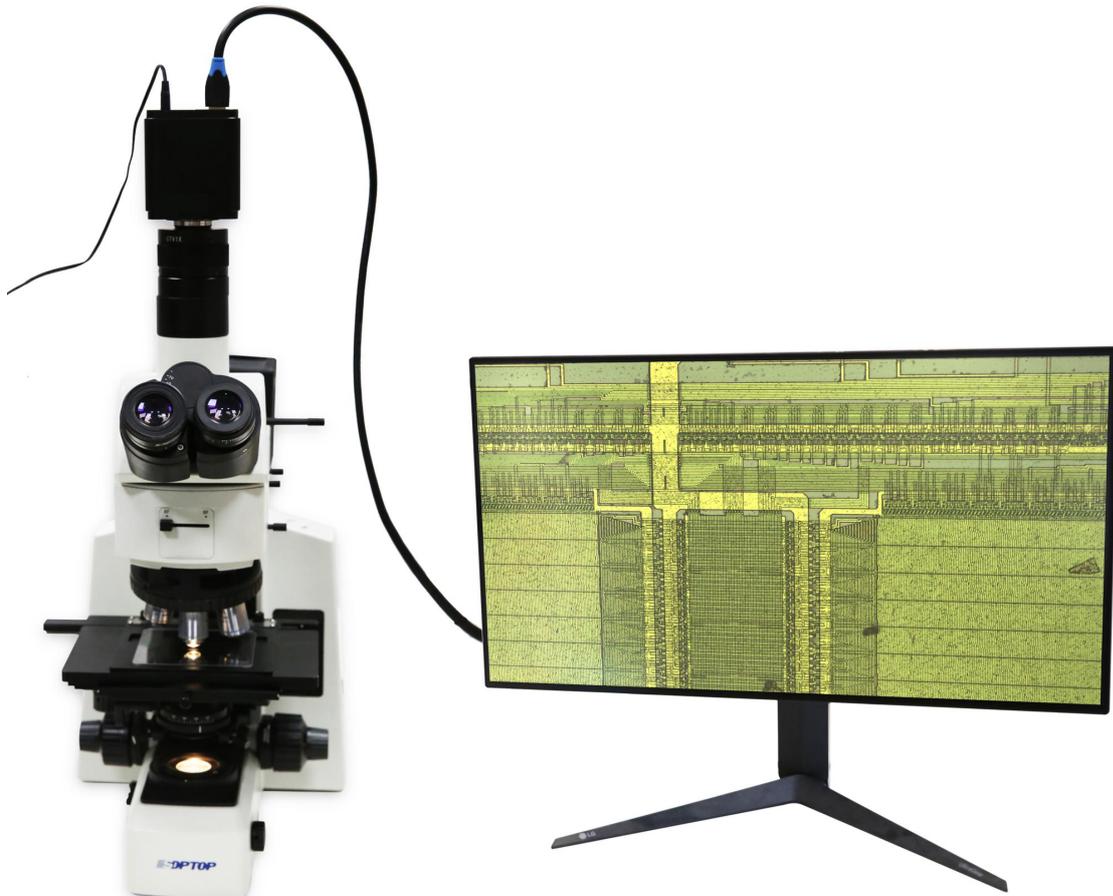


Figure 19 X8CAM4K16MPA Camera with Metallographic Microscope

7.4 X8CAM4K22MPA with Canon lenses via M42 to EF mount adapter



Figure 20 X8CAM4K22MPA with Canon lenses via M42 to EF mount adapter

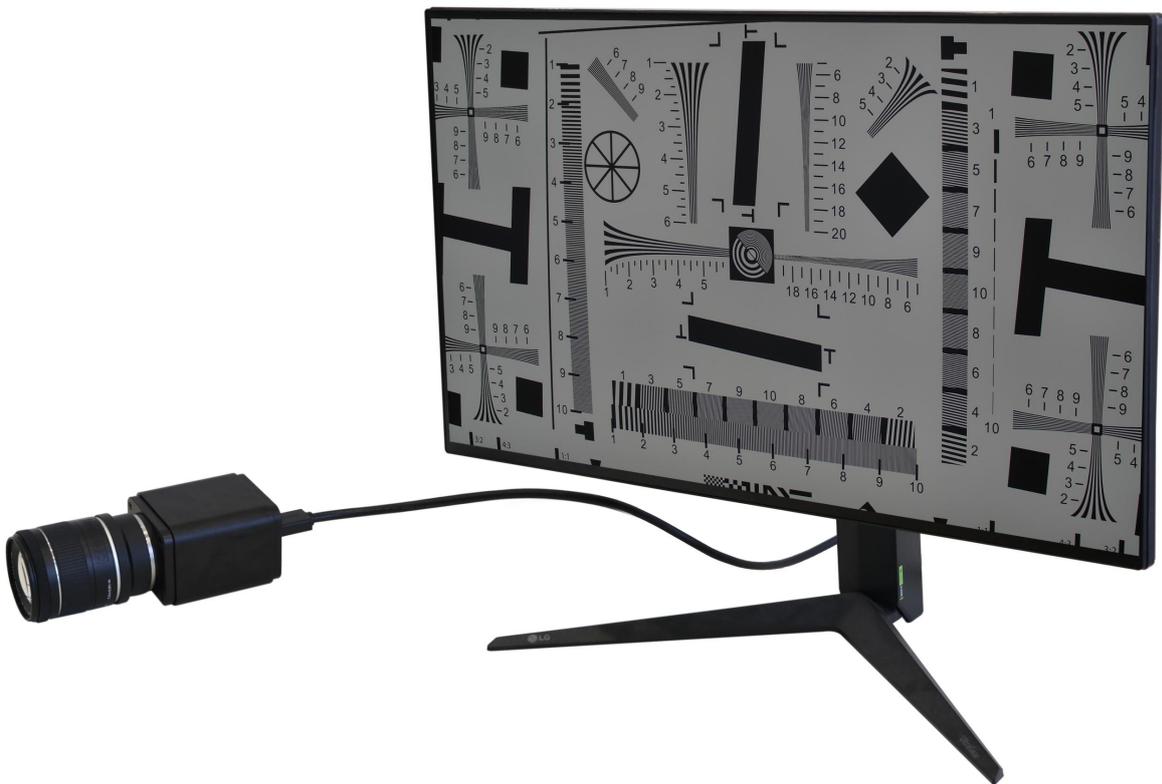
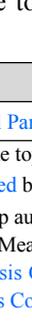


Figure 21 X8CAM4K22MPA with Canon Lenses Via M42 to EF Mount Adapter

## 8 Brief Introduction of X8CAM4K UI and Its Functions

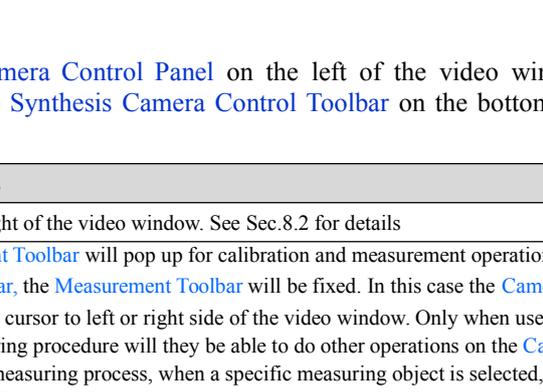
### 8.1 XCamView UI

The X8CAM4K UI shown in Figure 7 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 <a href="#">Camera Control Panel</a> , 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 <a href="#">Measurement Toolbar</a> will pop up for calibration and measurement operations. When user left-clicks the <a href="#">Float/Fixed</a> button  on the <a href="#">Measurement Toolbar</a> , the <a href="#">Measurement Toolbar</a> will be fixed. In this case the <a href="#">Camera Control Panel</a> 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  button on the <a href="#">Measurement Toolbar</a> to exit from measuring procedure will they be able to do other operations on the <a href="#">Camera Control Panel</a> , or the <a href="#">Synthesis Camera Control Toolbar</a> . During the measuring process, when a specific measuring object is selected, an <a href="#">Object Location &amp; Attributes Control Bar</a>  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 <a href="#">Synthesis Camera Control Toolbar</a> will pop up automatically.  See Sec.8.4 for details.

### 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 <a href="#">Auto Exposure</a> is checked, the system will automatically adjust exposure time and gain according to the value of exposure compensation
	Exposure Compensation	Available when <a href="#">Auto Exposure</a> is checked. Slide to left or right to adjust <a href="#">Exposure Compensation</a> according to the current video brightness to achieve proper brightness value
	Exposure Time	Available when <a href="#">Auto Exposure</a> is unchecked. Slide to left or right to reduce or increase exposure time, adjusting brightness of the video
	Gain	Adjust <a href="#">Gain</a> to reduce or increase brightness of video. The Noise will be reduced or increased accordingly
	Red	Slide to left or right to decrease or increase the proportion of <a href="#">Red</a> in <a href="#">RGB</a> on video
	Green	Slide to left or right to decrease or increase the proportion of <a href="#">Green</a> in <a href="#">RGB</a> on video
	Blue	Slide to left or right to decrease or increase the proportion of <a href="#">Blue</a> in <a href="#">RGB</a> on the video
	Auto	<a href="#">White Balance</a> adjustment according to the window video every time the button is clicked
	Manual	Adjust the <a href="#">Red</a> 、 <a href="#">Green</a> or <a href="#">Blue</a> item to set the video <a href="#">White Balance</a>
	ROI	Check the <a href="#">ROI</a> item will display a red <a href="#">ROI</a> rectangle on the video window, drag it to the interested area will perform the <a href="#">White Balance</a> according to the area video data
	One Push	Perform a global <a href="#">White Balance</a> based on image conditions
	Sharpness	Adjust <a href="#">Sharpness</a> level of the video
	Denoise	Slide left or right to denoise the video
	Saturation	Adjust <a href="#">Saturation</a> level of the video
	Gamma	Adjust <a href="#">Gamma</a> level of the video. Slide to the right side to increase <a href="#">Gamma</a> and to the left to decrease <a href="#">Gamma</a> .
	Contrast	Adjust <a href="#">Contrast</a> level of the video. Slide to the right side to increase <a href="#">Contrast</a> and to the left to decrease <a href="#">Contrast</a> .
	Brightness	Adjust <a href="#">Brightness</a> level of the video. Slide to the right side to increase <a href="#">Brightness</a> and to the left to decrease <a href="#">Brightness</a> .
	Hue	Adjust <a href="#">Hue</a> level of the video. Slide to the right side to increase <a href="#">Hue</a> and to the left to decrease <a href="#">Hue</a> .
DC	For <a href="#">DC</a> illumination, there will be no fluctuation in light source so no need for compensating light flickering	
AC(50HZ)	Check <a href="#">AC(50HZ)</a> to eliminate flickering caused by 50Hz illumination	
AC(60HZ)	Check <a href="#">AC(60HZ)</a> to eliminate flickering caused by 60Hz illumination	
Scene	Select different default parameters according to the type of microscope	
Default	Restore all the settings in the <a href="#">Camera Control Panel</a> to default values	

### 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 22 The Measurement Toolbar on the Upper Side of the Video Window

Icon	Function
	Float/ Fix switch of the Measurement Toolbar
<input checked="" type="checkbox"/> Visible	Show / Hide Measurement Objects
Pixel	Select the desired Measurement Unit
NA	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 <b>Calibration</b> to determine the corresponding relation between magnification and resolution, which will establish the corresponding relationship between measurement unit and the sensor pixel size. <b>Calibration</b> needs to be done with the help of a micrometer. For detailed steps of carrying out <b>Calibration</b> please refer to <b>ToupView</b> 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 <b>Object Location &amp; Properties Control Bar</b> 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 <b>Move Left</b> , <b>Move Right</b> , <b>Move Up</b> , <b>Move Down</b> , <b>Color Adjustment</b> and <b>Delete</b> .

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 **X** 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 23 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		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.

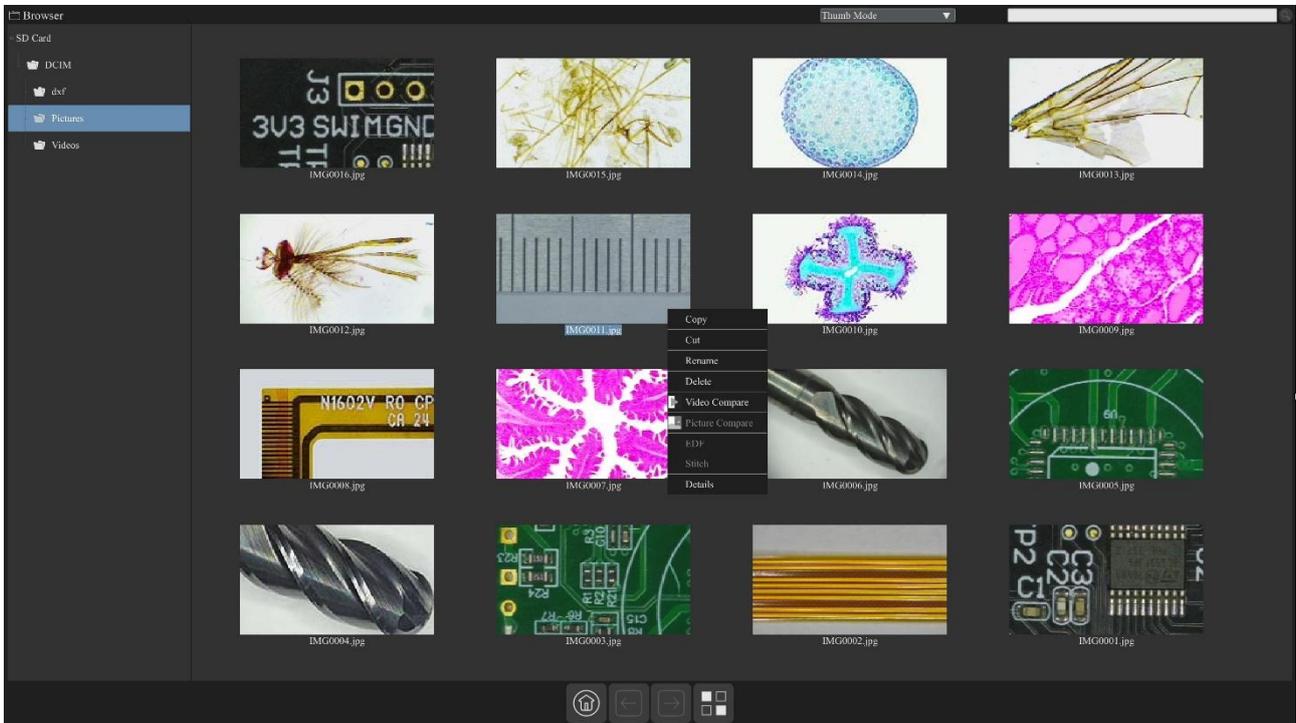


Figure 24 Browsing UI

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.

Double-click the search bar in the upper right corner of the mouse and enter the file name to perform the search.

Right click on an image file to [Copy](#), [Cut](#), [Rename](#), [Delete](#), [Video Compare](#), [Picture Compare](#), [EDF](#), [Stitch](#) and [Details](#). Clicking on a thumb to select the 1<sup>st</sup> image, and clicking on another thumb to select the 2<sup>nd</sup> 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](#)).

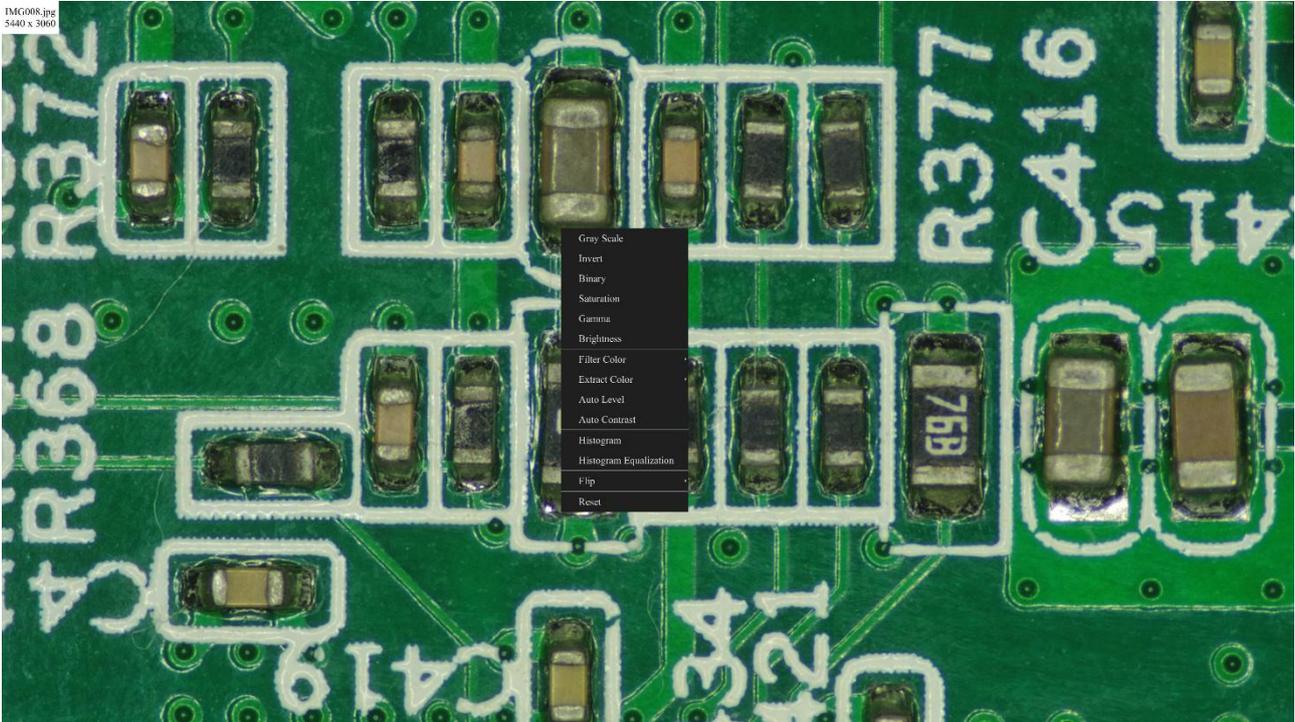


Figure 25 Image Processing

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:

<a href="#">Gray Scale</a>	Choose <a href="#">Gray Scale</a> command to convert a color image to a Gray Scale image
<a href="#">Invert</a>	Choose <a href="#">Invert</a> command to reverse the pixel values of the active image
<a href="#">Binary</a>	<a href="#">Binary</a> 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
<a href="#">Saturation</a>	Adjust the <a href="#">Saturation</a> of the image
<a href="#">Gamma</a>	Adjust the <a href="#">Gamma</a> of the image
<a href="#">Brightness</a>	Adjust the <a href="#">Brightness</a> of the image
<a href="#">Filter Color</a>	Choose <a href="#">Filter Color</a> 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.
<a href="#">Extract Color</a>	Choose <a href="#">Extract Color</a> 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.
<a href="#">Auto Level</a>	The <a href="#">Auto Level</a> 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
<a href="#">Auto Contrast</a>	The <a href="#">Auto Contrast</a> command automatically adjusts the overall contrast in an RGB image
<a href="#">Histogram</a>	Used to show the distribution of brightness, R, G, B of an image over an image
<a href="#">Histogram Equalization</a>	Used to improved image contrast
<a href="#">Flip</a>	Flip image <a href="#">Horizontally</a> / <a href="#">Vertically</a>

#### 8.4.2 Settings>Network

8.4.2.1 Settings>Network>General

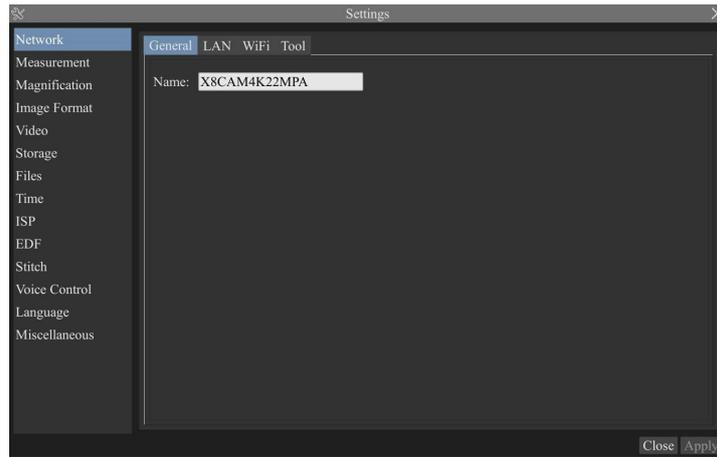


Figure 26 Comprehensive Network General Settings Page

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

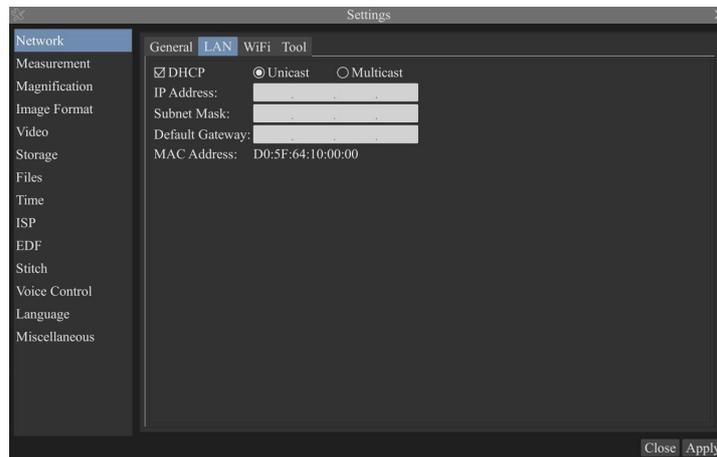


Figure 27 Comprehensive Network LAN Settings Page

<b>DHCP</b>	Dynamic host control protocol allows <b>DHCP</b> server to automatically assign <b>IP</b> information to the camera. Only in Sec 6.4 <b>LAN</b> networking this item should be checked, so that cameras can automatically get <b>IP</b> information from routers/switches to facilitate networking operation;
<b>Unicast/Multicast</b>	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;
<b>IP Address</b>	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 <b>TCP/IP</b> protocol as the standard for how to communicate on the network. In the <b>TCP/IP</b> protocol, the unique identifier for a computer is called <b>IP</b> address. There are two standards for <b>IP</b> address: <b>IP</b> Version 4 ( <b>IPv4</b> ) and <b>IP</b> Version 6 ( <b>IPv6</b> ). All computers with <b>IP</b> addresses have an <b>IPv4</b> address, and many are starting to use the new <b>IPv6</b> address system as well. Users must manually configure their <b>IP</b> addresses on the camera side and computer side. The <b>IP</b> addresses set on the camera side and computer side should be in the same network segment. The specific settings are shown Figure 28. 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.
<b>Subnet Mask</b>	Subnet Mask is used to distinguish network domain from host domain in 32-bit <b>IP</b> address;
<b>Default Gateway</b>	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 <b>IP</b> range) through the default gateway; Network administrators configure the computer's routing capability with an <b>IP</b> range's starting address as the default gateway and point all clients to that <b>IP</b> address.
<b>MAC Address</b>	Camera-independent physical address that identifies the network device.

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

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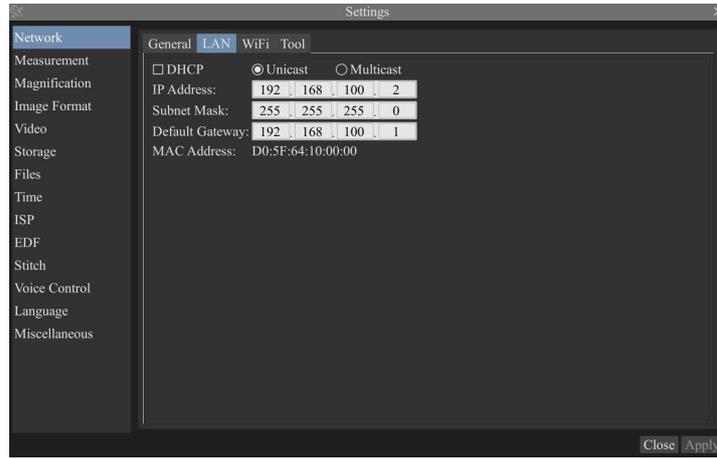


Figure 28 Manual DHCP and Unicast

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

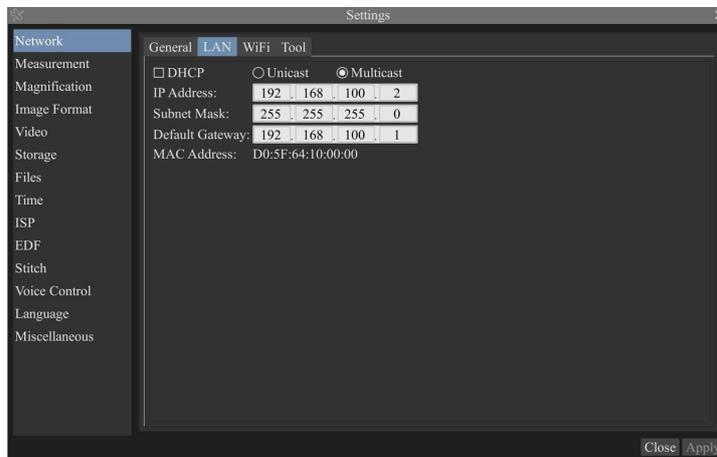


Figure 29 Manual DHCP and Multicast

### 8.4.2.3 Settings>Network> WiFi

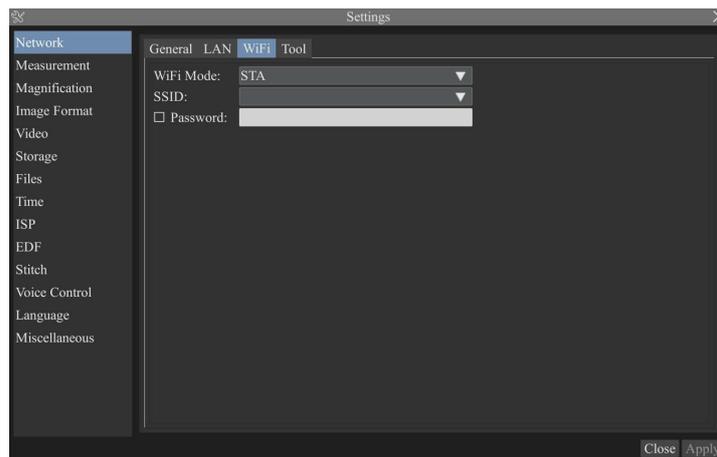


Figure 30 Network Setup

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

8.4.2.4 Settings>Network> Tool

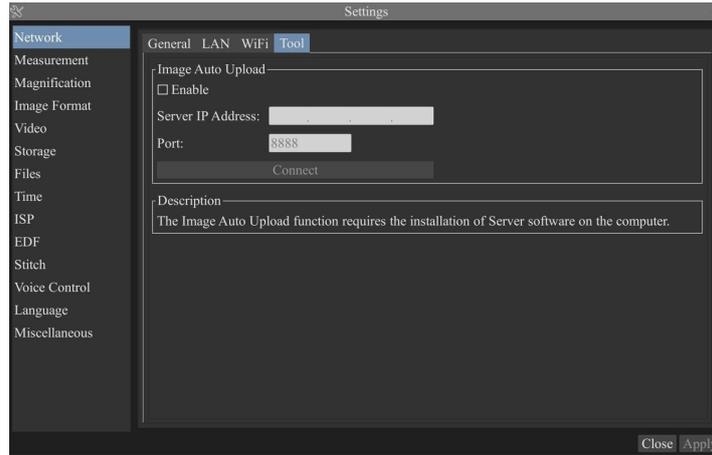


Figure 31 Comprehensive Network Tool Settings Page

<b>Image Upload</b>	<b>Auto</b>	Select whether to enable or not;
<b>Server IP Address</b>		When the WiFi mode is in AP mode, ensure that the PC is connected to the <b>camera's</b> 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 <b>Image Auto Upload</b> ;
		When the WiFi mode is in STA mode, ensure that both the PC and camera are connected to the <b>router's</b> WiFi; When connected via <b>LAN</b> , 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 <b>Image Auto Upload</b> ;
<b>Port</b>		Default 8888
<b>Connect</b>		Ensure that the Server has enabled, click Connect, and the left corner of the interface will display "Connected to Server", indicating successful connection;
<b>Description:</b> The Image Auto Upload function requires the installation of Server software on the computer.		
<b>Note:</b> Enable <b>Image Auto Upload</b> 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 <b>Image Auto Upload</b> 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.

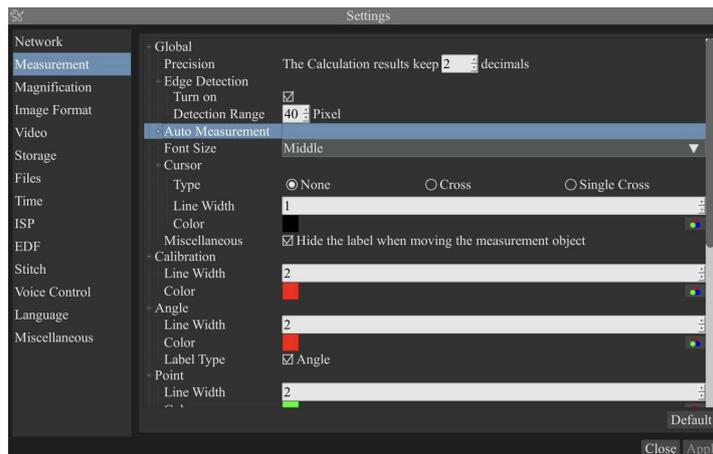


Figure 32 The Measurement Setup

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

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

#### 8.4.4 Settings>Magnification

This page's items are formed by the [Measurement Toolbar](#)'s [Calibration](#) command.

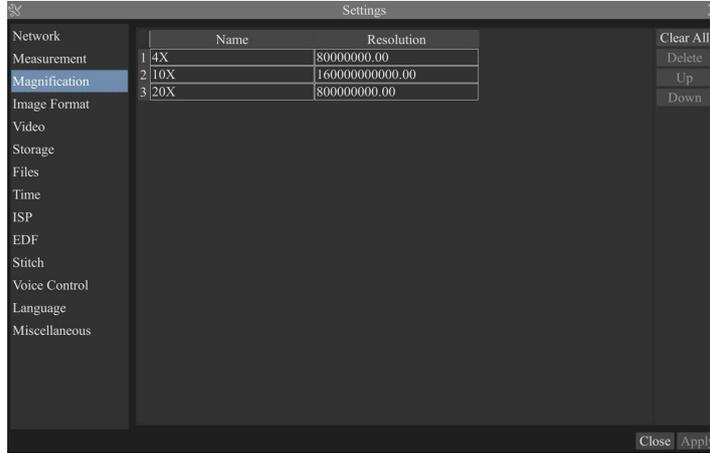


Figure 33 Comprehensive Magnification Settings Page

<a href="#">Name</a>	Names such as 4X, 10X, 20X, 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.
<a href="#">Resolution</a>	Pixels per meter. Image device like microscopes have high <a href="#">Resolution</a> value;
<a href="#">Clear All</a>	Click the <a href="#">Clear All</a> button will clear the calibrated magnifications;
<a href="#">Delete</a>	Click <a href="#">Delete</a> to delete the selected magnification;
<a href="#">Up</a>	Select a row in the magnification and click Move Up to move up the currently selected magnification;
<a href="#">Down</a>	Select a row in the magnification and click Move Down to move up the currently selected magnification;

#### 8.4.5 Settings>Image Format

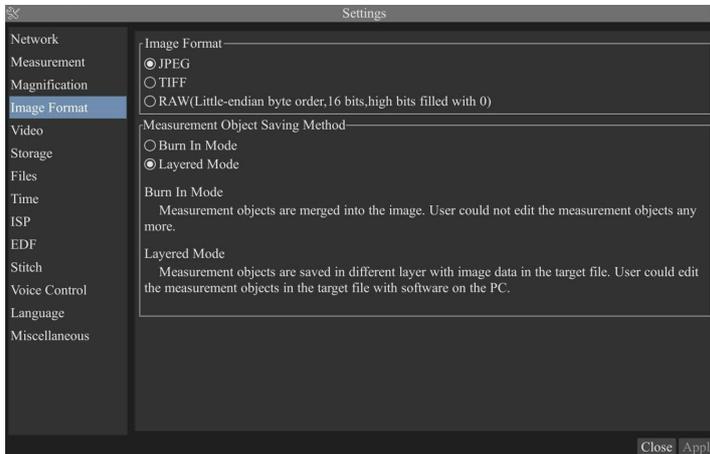


Figure 34 Comprehensive Image Format Settings Page

<a href="#">Image Format</a>	<p><a href="#">JPEG</a>: The extension of <a href="#">JPEG</a> 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.</p> <p><a href="#">TIFF</a>: <a href="#">TIFF</a> is a flexible bitmap format mainly used to store images including photos and artistic images.</p> <p><a href="#">RAW (Little-ending byte order,16bits, high bits filled with 0)</a>: <a href="#">RAW</a> is an uncompressed and unprocessed image format that preserves all raw data directly obtained from the sensor of a digital camera.</p>
<a href="#">Measurement Object Saving Method</a>	<p><a href="#">Burn in Mode</a>: The measurement objects are merged into the current image. User could not edit the measurement objects any more. This mode is not reversible.</p> <p><a href="#">Layered Mode</a>: 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 reversible.</p>

#### 8.4.6 Settings>Video

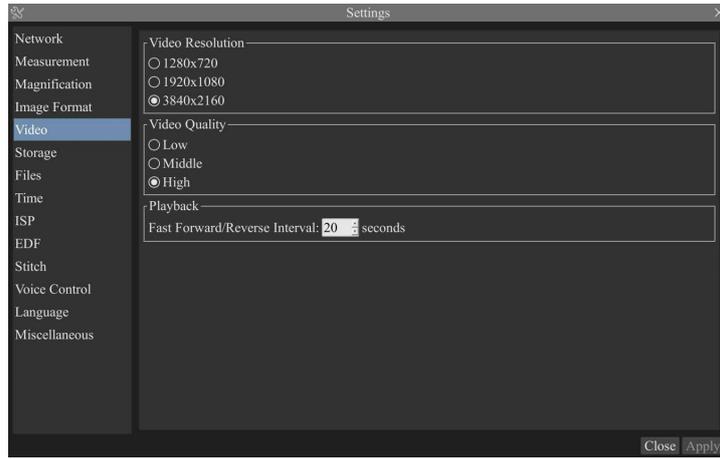


Figure 35 Comprehensive Setting of Video page

<b>Video Resolution</b>	Select a <b>Video Resolution</b> of 1280 x 720, 1920x1080 or 3840x2160;
<b>Video Quality</b>	Select Video Quality as low, medium, or high;
<b>Video Playback</b>	<b>Fast Forward/Reverse interval in second</b> unite for <b>Video Playback</b>

### 8.4.7 Settings>Storage

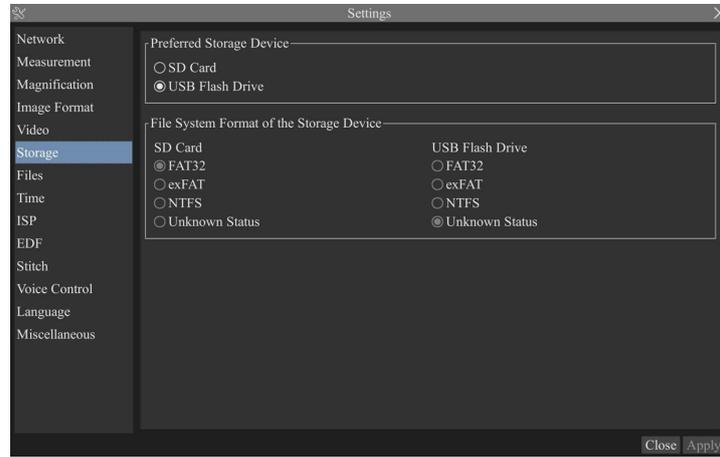


Figure 36 Comprehensive Setting of Storage Page

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

### 8.4.8 Settings>Files

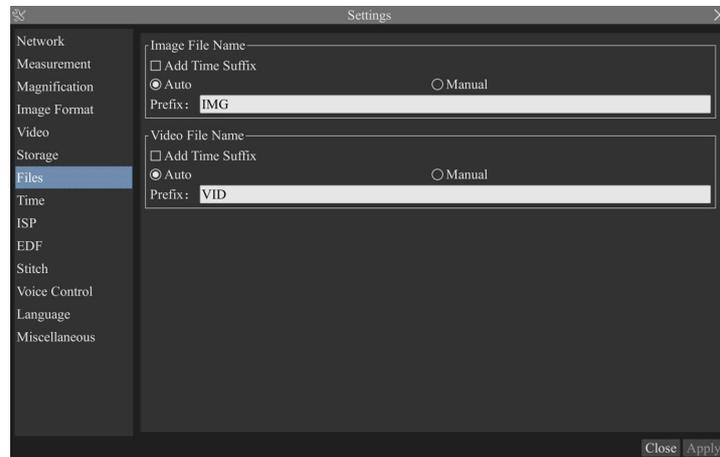


Figure 37 Comprehensive Setting of Files Name

<b>Image or Video</b>	Provide <b>Auto</b> or <b>Manual</b> naming paradigm for <b>Image</b> or <b>Video</b> file;
-----------------------	---

File Paradigm	Name
Auto	With specified name as the <b>Prefix</b> and <b>XCamView</b> will add digital after the <b>Prefix</b> for the <b>Image</b> or <b>Video</b> file;
Manual	A file dialog will pop up to enter the <b>Image</b> or <b>Video</b> file name for the captured <b>Image</b> or <b>Video</b> .

### 8.4.9 Settings>Time

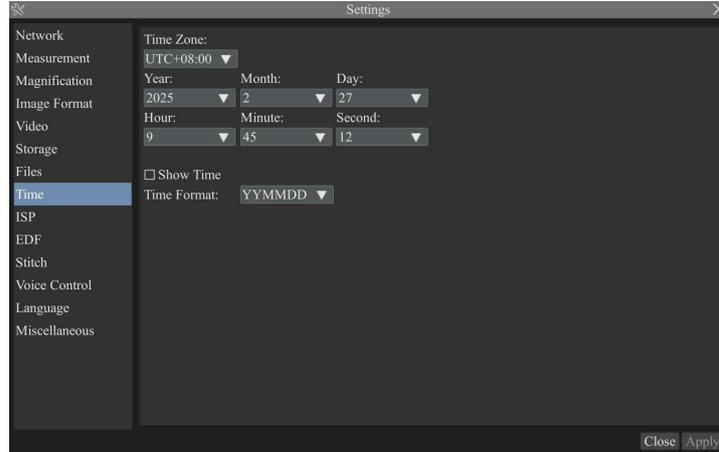


Figure 38 Time Setting

<b>Time</b>	User can set <b>Year</b> , <b>Month</b> , <b>Day</b> , <b>Hour</b> , <b>Minute</b> and <b>Second</b> ital.in this page.
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### 8.4.10 Settings>ISP

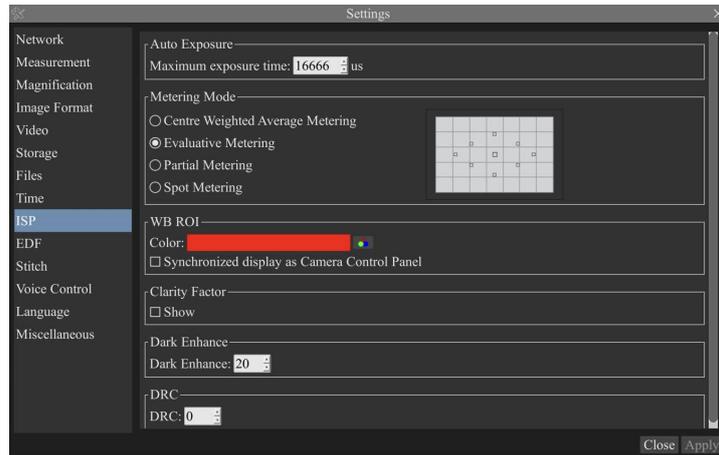


Figure 39 Comprehensive Setting of ISP Page

<b>Auto Exposure</b>	Define the maximum automatic exposure time;
<b>Metering Mode</b>	Select the Metering mode as the Central Weighted Average Metering, Evaluative Metering, Partial Metering, or Spot Metering;
<b>WB ROI Color</b>	Choosing the <b>ROI</b> rectangle line color and whether it is synchronized display as Camera Control Panel;
<b>Clarity Factor</b>	Select to display the clarity factor in the video window, otherwise the clarity factor will not be displayed;
<b>Dark Enhance</b>	Define the intensity value of Dark Enhance;
<b>DRC</b>	Define the intensity value of DRC;

### 8.4.11 Settings>EDF

## The X8CAM4K Series Camera Help Manual

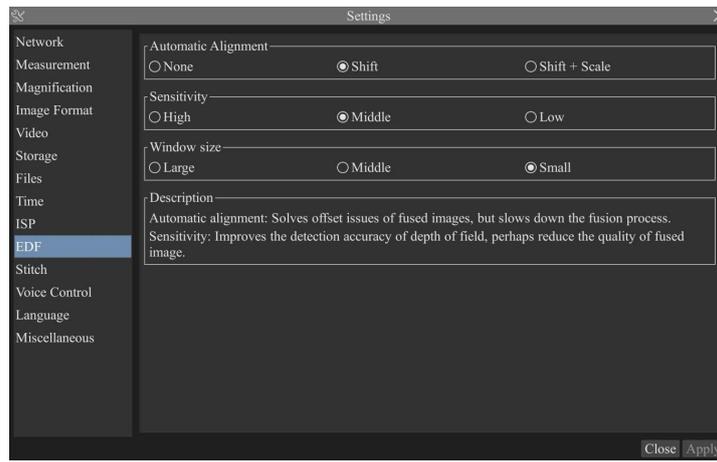


Figure 40 Comprehensive Setting of EDF

<b>Automatic Alignment</b>	Optionally turn on auto-alignment when there is significant displacement or scaling between images;
<b>Sensitivity</b>	Select the sensitivity of EDF;
<b>Window size</b>	Select the window size for displaying real-time images during EDF;
<b>Description</b>	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 41 Comprehensive Setting of Stitch

<b>Detection Precision</b>	Define the level of detection precision;
<b>Stitching Stride</b>	Select the stitching stride;
<b>Background Color</b>	Select the background color of stitch;
<b>Description</b>	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 42 Comprehensive Setting of Voice Control

<b>Voice Control</b>	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”;
<b>Note:</b> 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

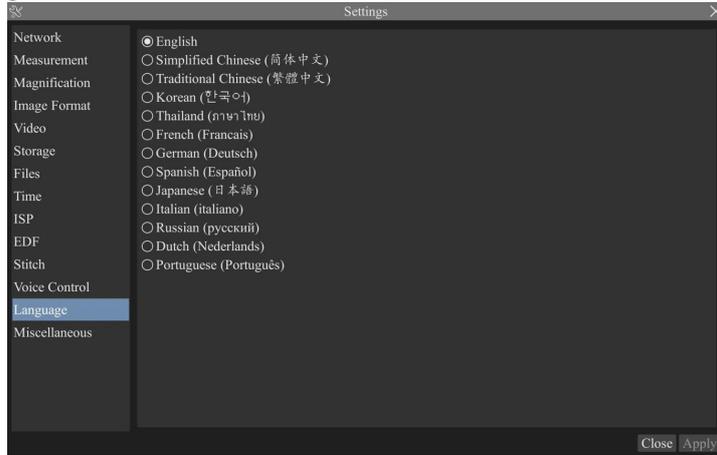


Figure 43 Comprehensive Setting of Language Selection Setting Page

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

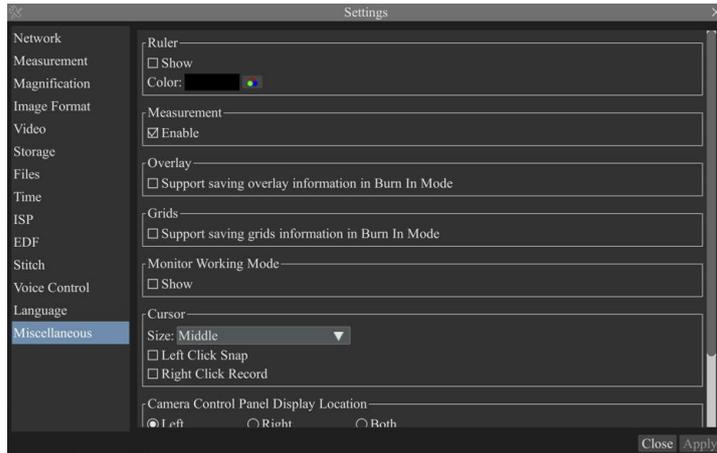


Figure 44 Comprehensive Miscellaneous Settings Page

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;
Cursor	Choosing the <b>Mouse</b> size according to the screen resolution or personal preference; Select to Left Snap Right Record. If not selected, it will not Left Snap Right Record
Camera Control Panel Display Location	Select the camera control panel to display on the left, right, or both sides of the HDMI interface;

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Camera Parameters Import	Parameters	Import the <a href="#">Camera Parameters</a> from the <a href="#">SD Card</a> or <a href="#">USB flash drive</a> to use the previously exported <a href="#">Camera Parameters</a>
Camera Parameters Export	Parameters	Export the <a href="#">Camera Parameters</a> to the <a href="#">SD Card</a> or <a href="#">USB flash drive</a> to use the previously exported <a href="#">Camera Parameters</a>
Reset to factory defaults		Restore camera parameters to its factory status;

**9 Sample Photos Captured with X8CAM4K Series Camera**

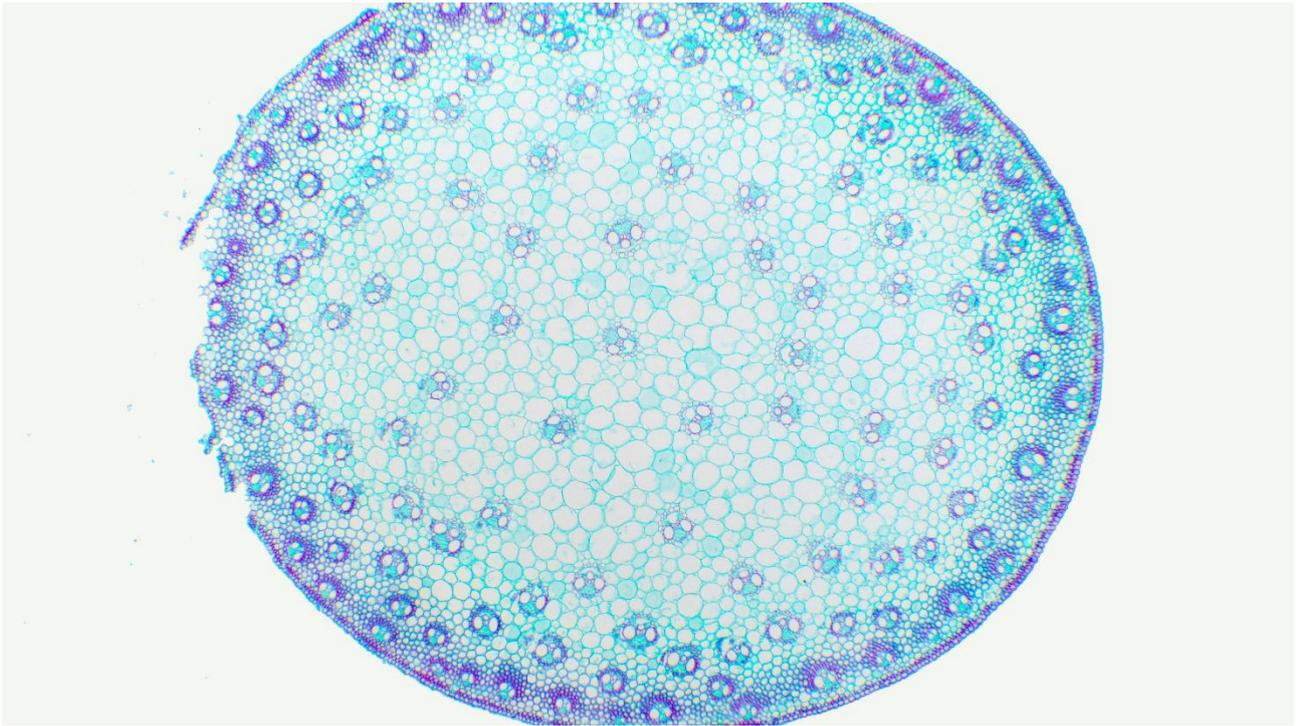


Figure 45 Corn Stem.C.S Captured with X8CAM4K22MPA

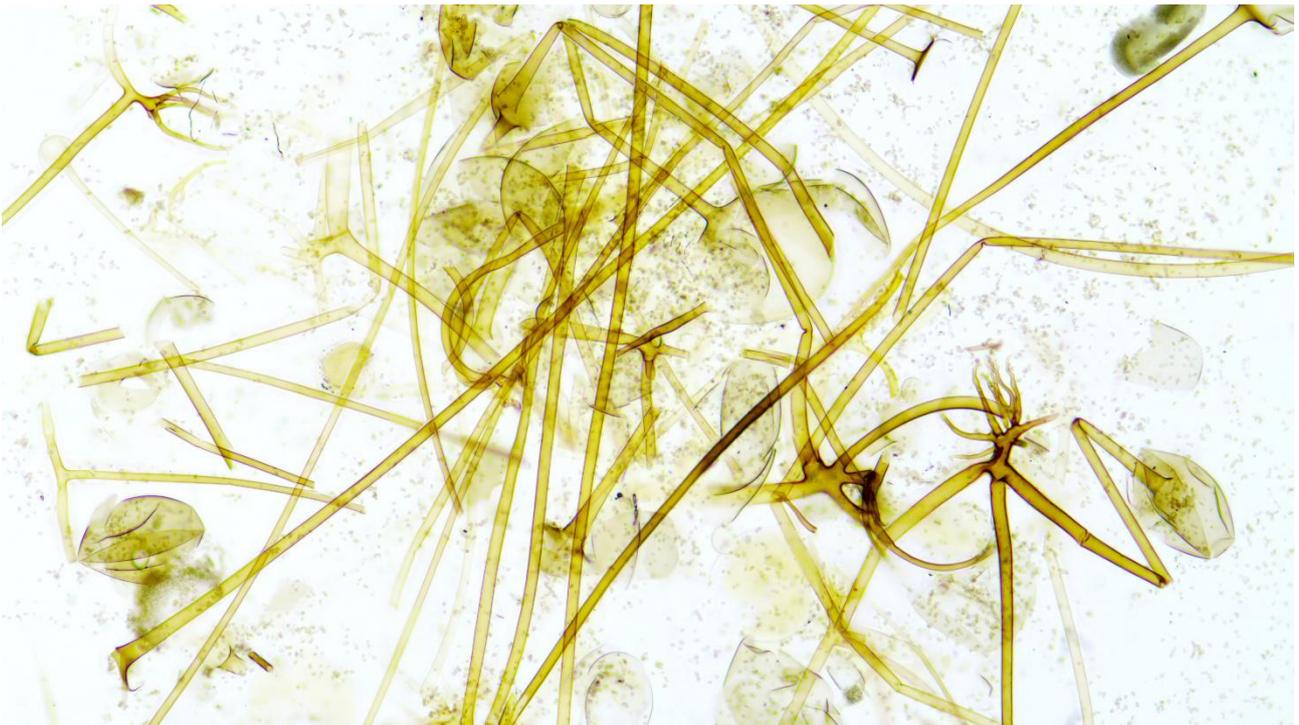


Figure 46 Rhizopus.W.M Captured with X8CAM4K22MPA

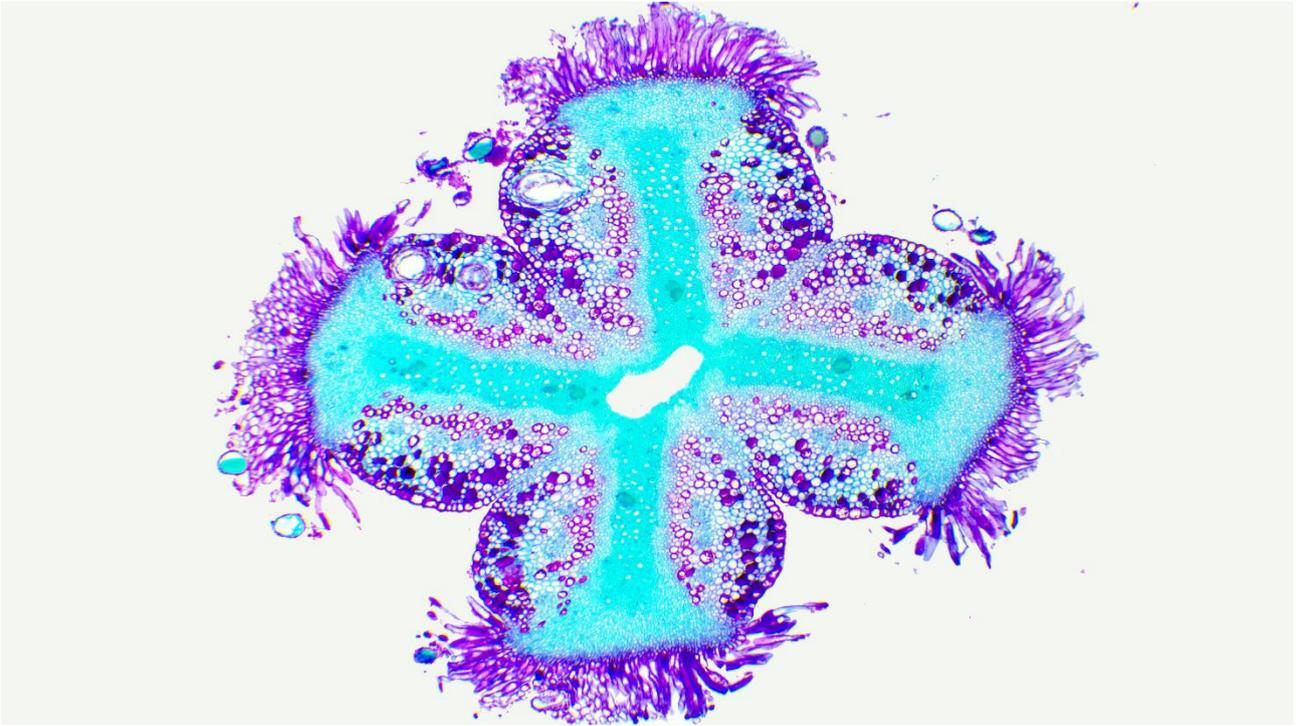


Figure 47 Cross Section of Cotton Stigma Captured with X8CAM4K22MPA

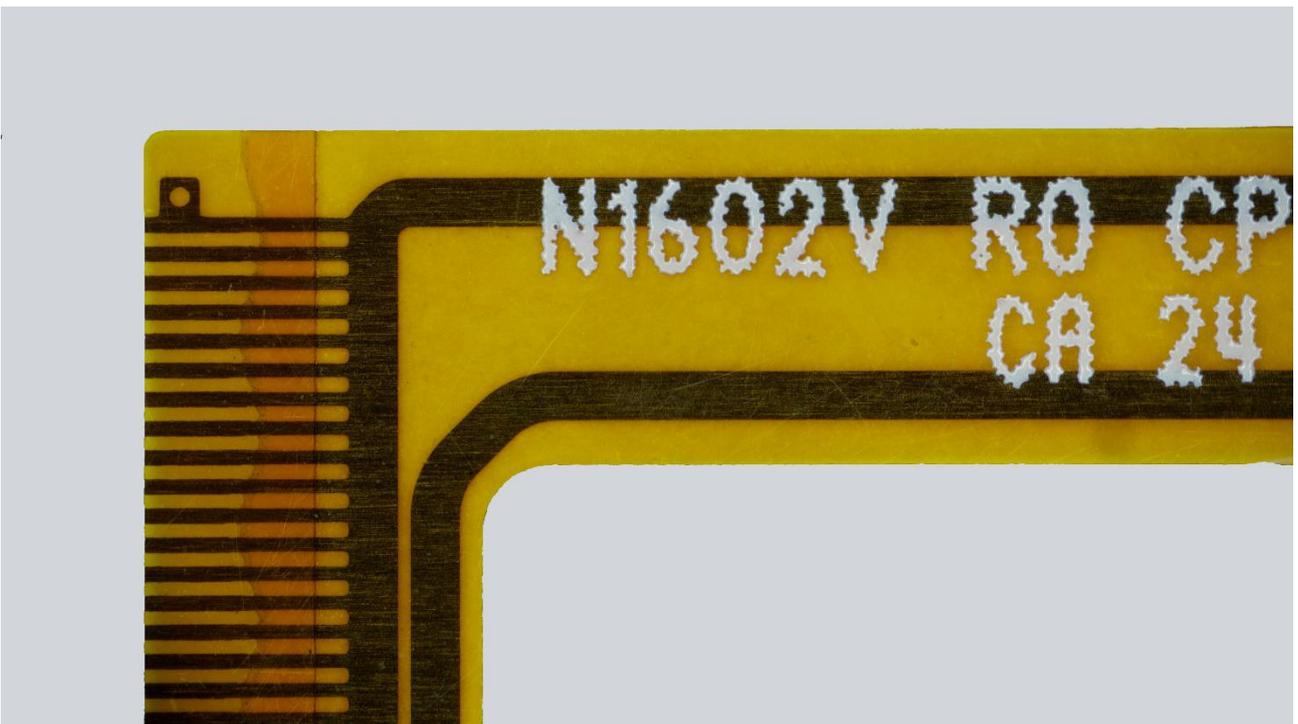


Figure 48 FPC Captured with X8CAM4K16MPA

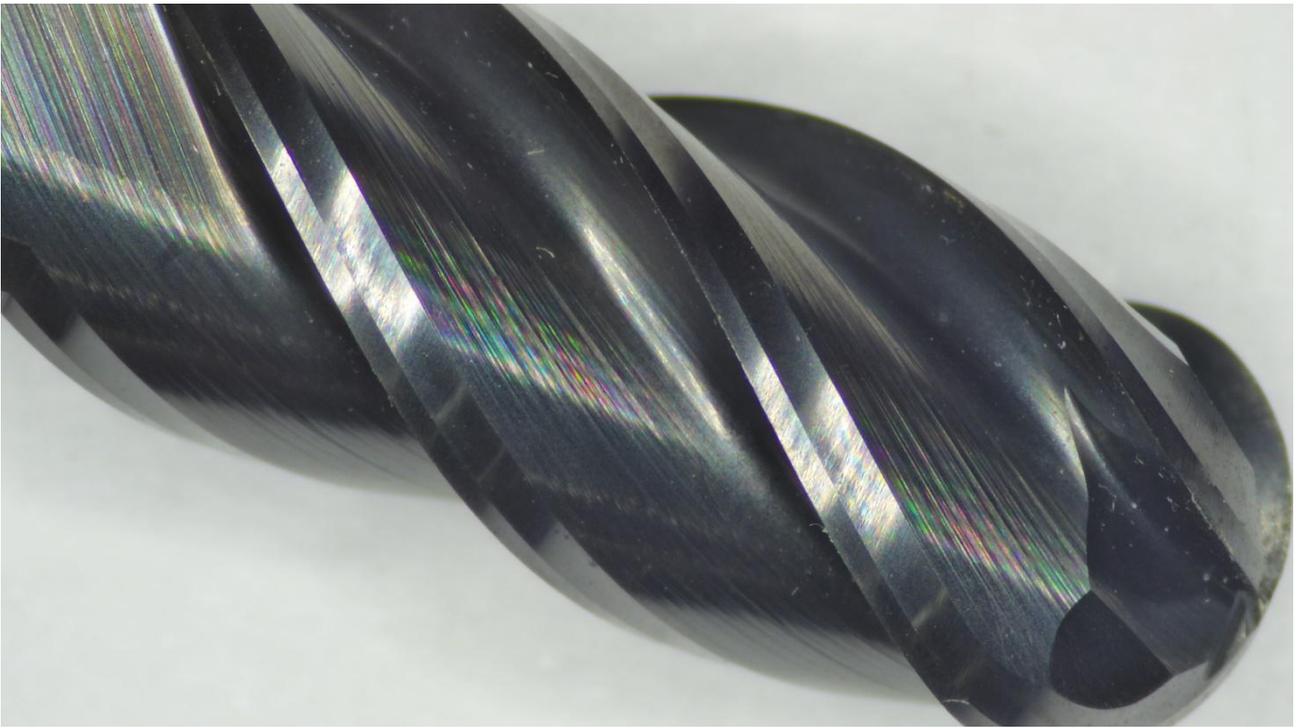


Figure 49 Carbide Tip Captured with X8CAM4K16MPA

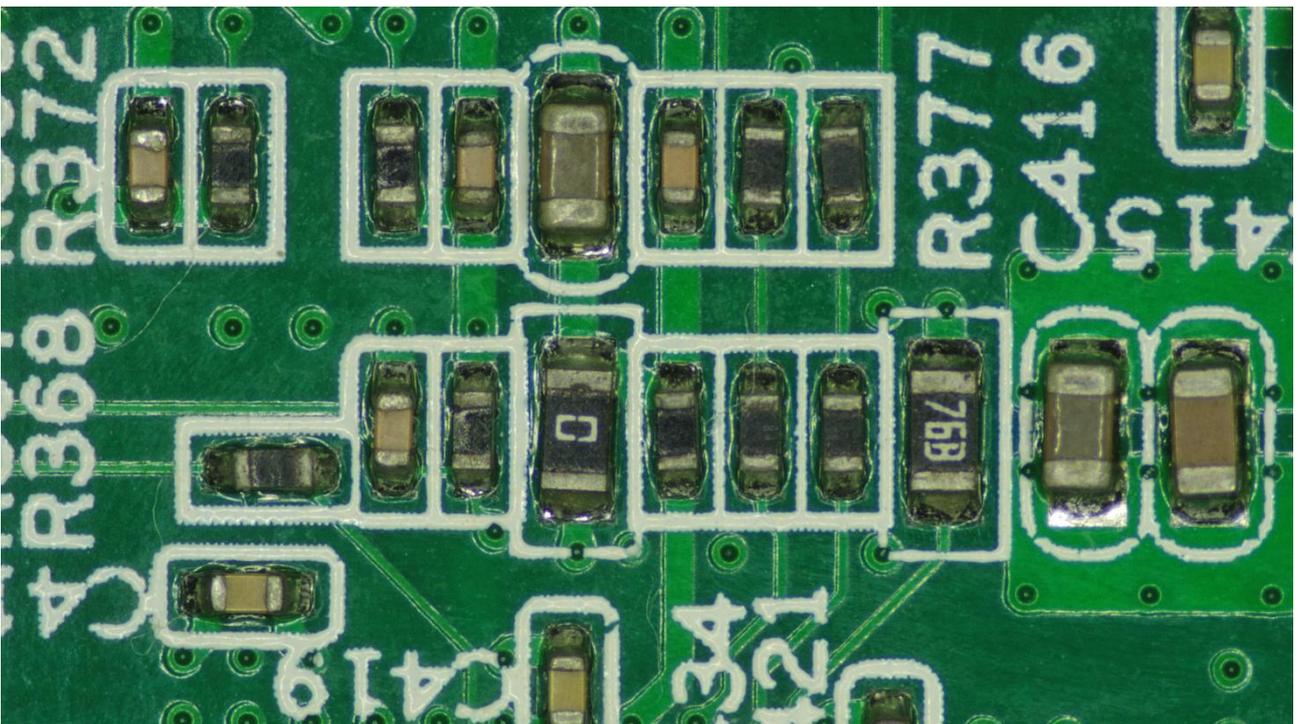


Figure 50 Circuit Board Captured with X8CAM4K16MPA

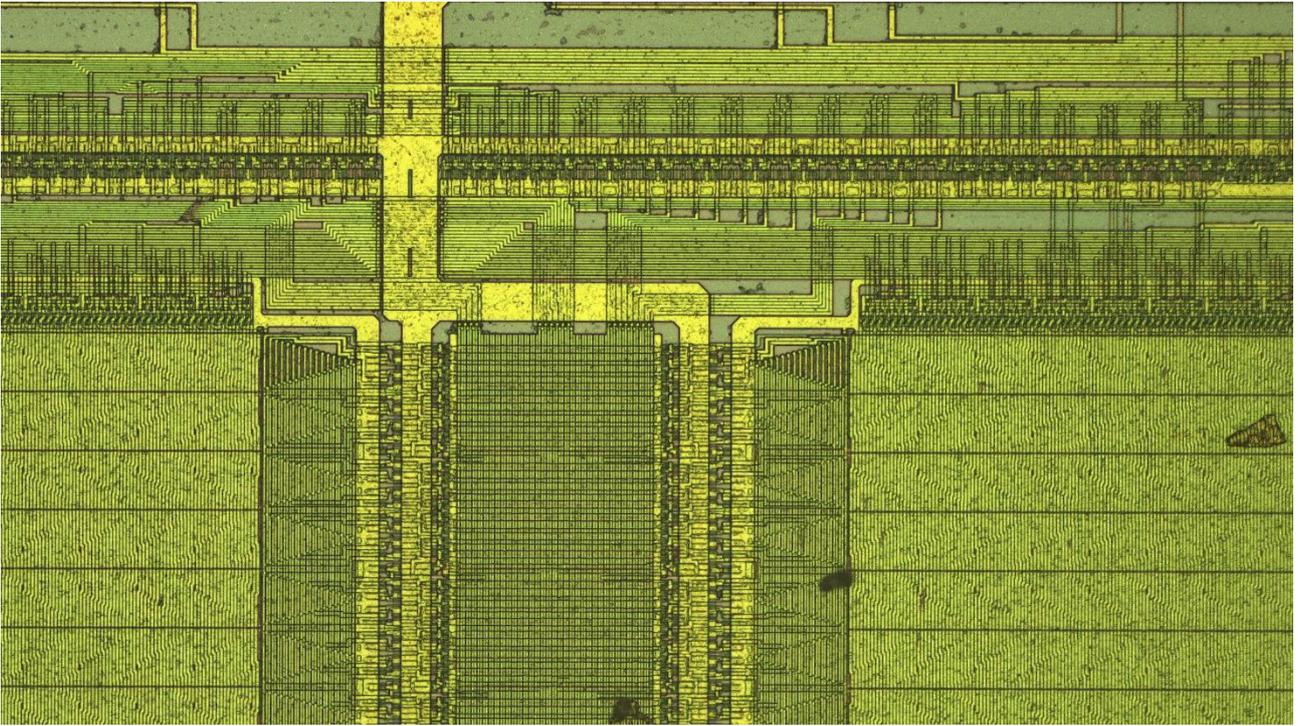


Figure 51 Samples Photographed by the SOPTOP RX50M Metallographic Microscopy System Captured with X8CAM4K16MPA

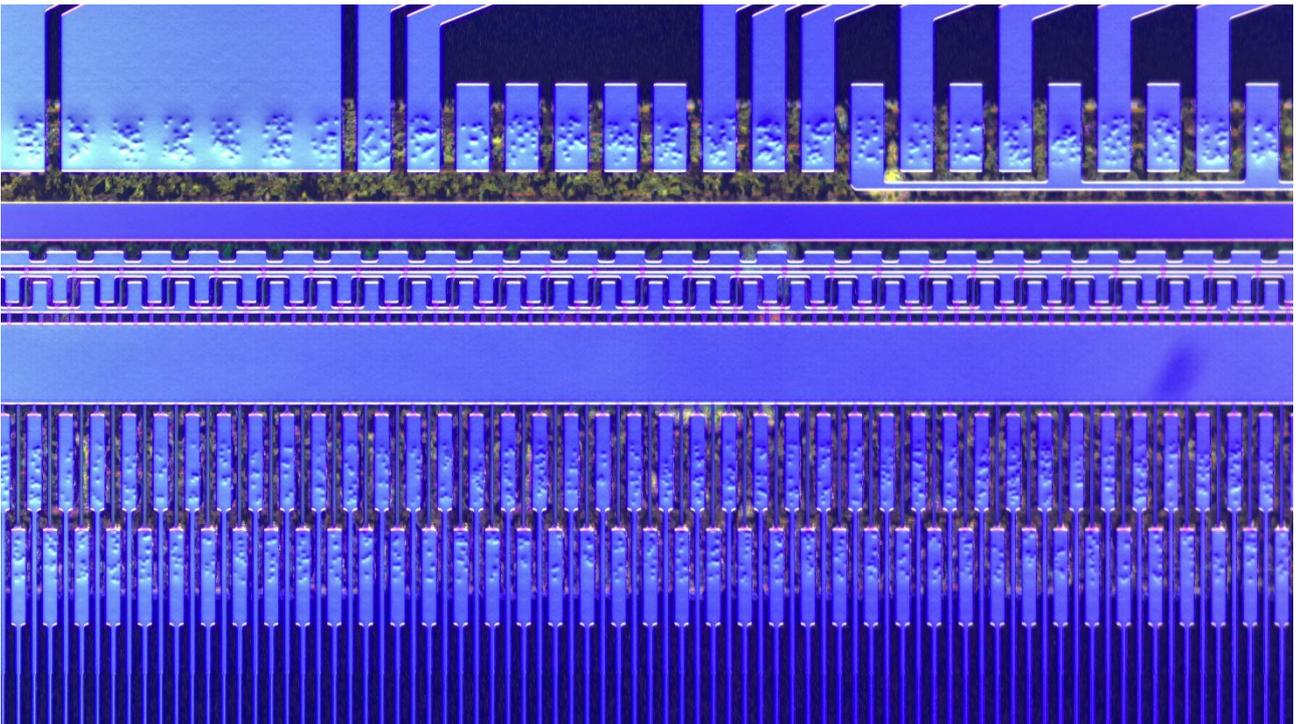


Figure 52 Conductive Particles of the Liquid Crystal Screen Photographed by the DIC-100WVA Differential Interference Contrast (DIC) Microscopy System Captured with X8CAM4K16MPA

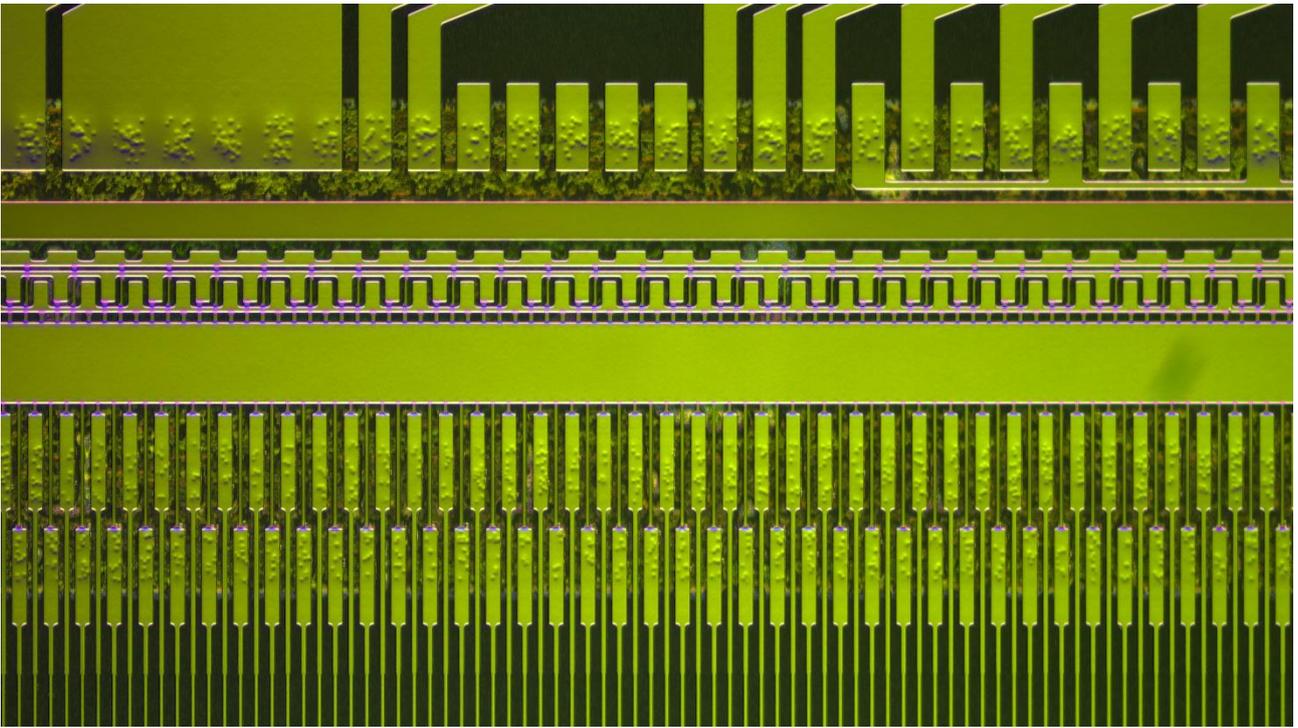


Figure 53 Conductive Particles of the Liquid Crystal Screen Photographed by the DIC-100WVA Differential Interference Contrast (DIC) Microscopy System Captured with X8CAM4K16MPA

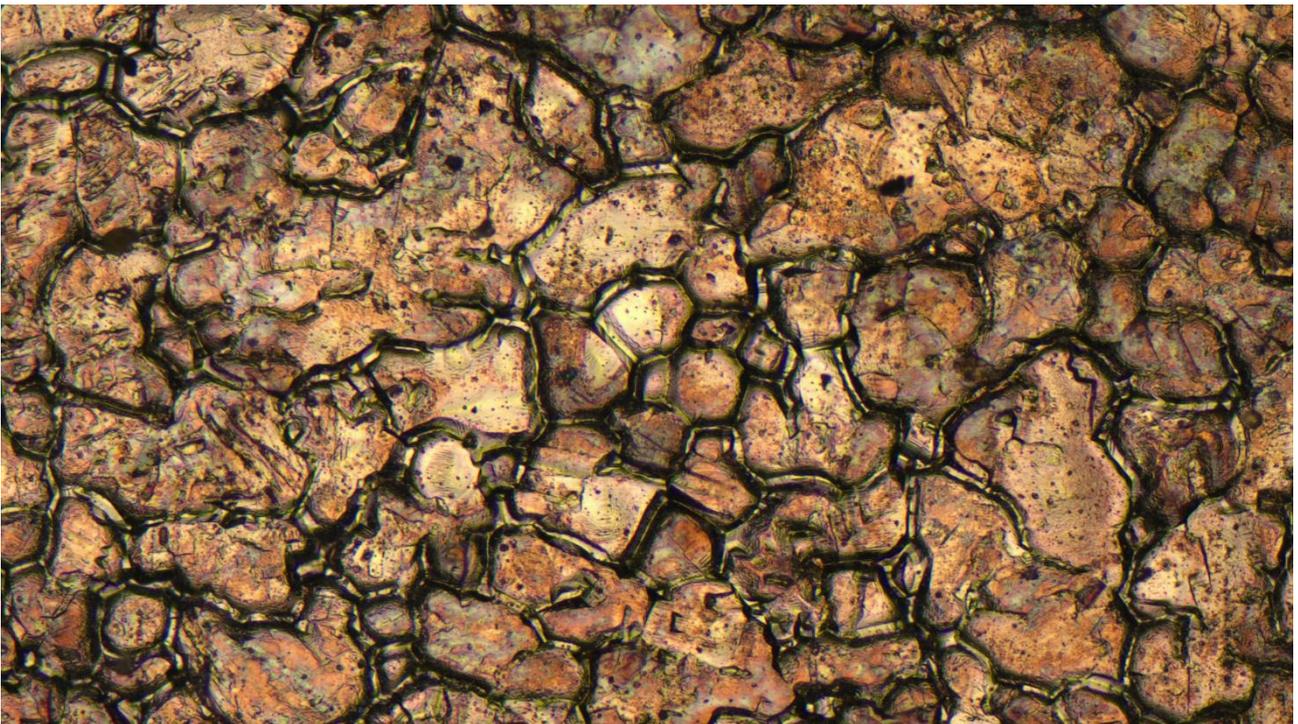


Figure 54 Metal Samples Photographed by the OUMIT CX43M Metallographic Microscopy System Captured with X8CAM4K16MPA

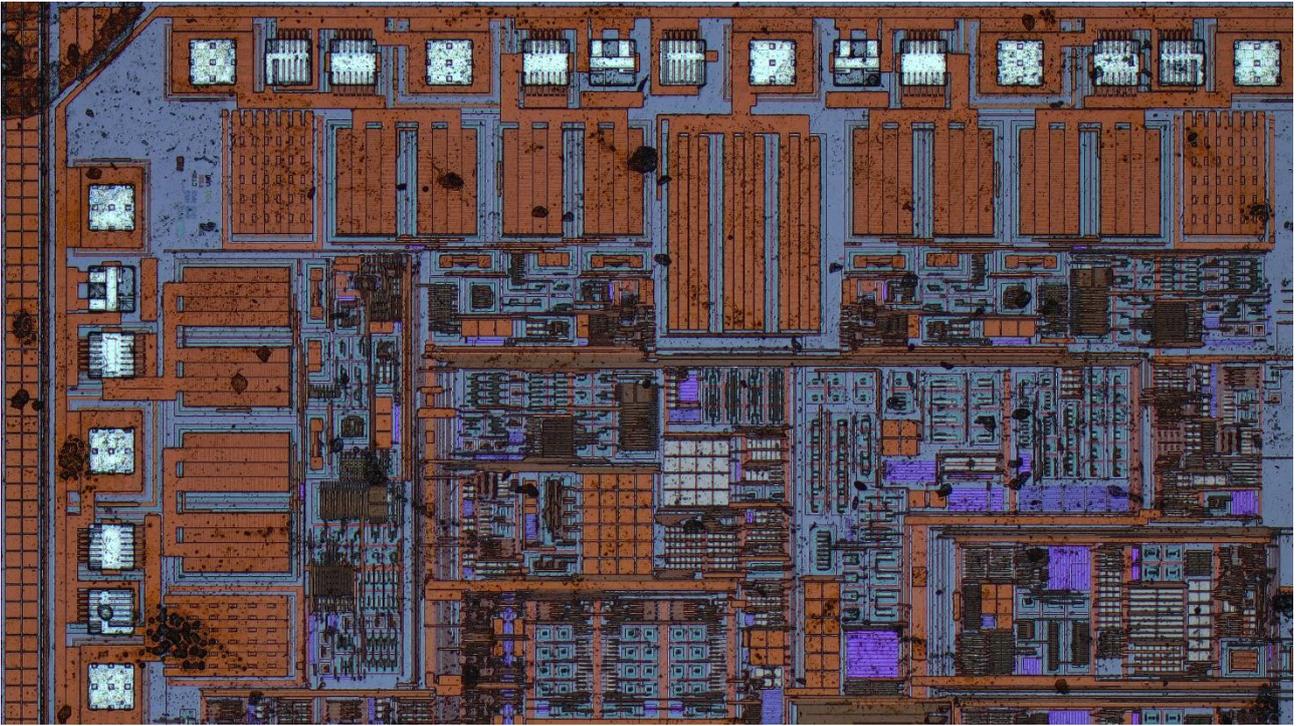


Figure 55 Semiconductor Samples Photographed by the OUMIT CX43M Metallographic Microscopy System  
Captured with X8CAM4K16MPA

## 10 ToupTek®-- Contact Information

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