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

# Contents

# 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 provids 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~$10^6$ |
| 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~$10^6$ |

| 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<br>30@1920*1080 | 15@6240*3512<br>37@2688*1512<br>37@1920*1080 | 30@3840*2160<br>37@1920*1080<br>37@1280*720 |
| X8CAM4K16MPA | 60@3840*2160 | 5440*3060 | 60@3840*2160<br>60@1920*1080 | 25@5440*3060<br>45@2688*1512<br>60@1920*1080 | 30@3840*2160<br>60@1920*1080<br>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 XCamView software<br>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<br>Connect 5G WiFi module to transfer video wirelessly in real time<br>Connect USB microphone to record audio and video<br>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 (X8CAM4K22MPA)<br>60fps@4K or 60fps@1080P(X8CAM4K16MPA) |
| LAN Interface | Support real time resolution switching(4K/1080P/720P)<br>H264 encoded video<br>DHCP configuration or manual configuration<br>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<br>MJPEG format video |
| **Other Function** | **Function Description** |
| Video Saving | Video format：8M(3840*2160) H264 encoded MP4 file<br>Video saving frame rate：37fps(X8CAM4K22MPA); 60fps(X8CAM4K16MPA); |
| Image Capture | 22M (6240*3512, X8CAM4K22MPA) JPEG/TIFF/RAW image in SD card or USB flash drive<br>16M (5440*3060, X8CAM4K16MPA) JPEG/TIFF/RAW image in SD card or USB flash drive<br>(Default SD card priority, priority can be modified in settings) |
| Measurement Saving | Measurement information saved in different layer with image content<br>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 |

| | |
|---|---|
| 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)<br>OSx(Mac OS X)<br>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

| | |
|---|---|
| | **Standard Packing List** |
| A | Gift box : L:25.5cm W:17.0cm H:9.0cm (1pcs, 1.7Kg/ box) |
| B | X8CAM4K Camera |
| C | Power Adapter: Input: AC 100~240V 50Hz/60Hz, Output: DC 12V 1A<br>American standard: Model: POWER-U-12V1A(MSA-C1000IC12.0-12W-US): UL/CE/FCC<br>European standard: Model: POWER-E-12V1A(MSA-C10001C12.0-12W-DE): UL/CE/FCC<br>EMI standard: FCC Part 15 Subpart B<br>EMS standard: EN61000-4-2,3,4,5,6 |
| D | USB Mouse |
| E | HDMI2.0 Cable |
| F | USB3.0 A male to A male gold-plated connectors cable /1.5m |
| | **Optional Accessory** |
| G | Voice Control Module |
| H | SD Card(16G or above; Speed: class 10) |
| I | USB flash drive(USB3.0) |
| J | Ethernet cable |
| K | USB WiFi adapter (Shape will vary with different models) |
| L | ToupTek 1.2/1.5X Microscope Adapter (For X8CAM4K22MPA), 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

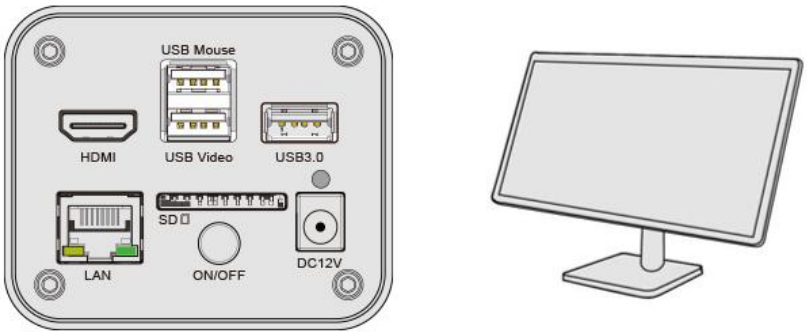
You can use the X8CAM4K series camera in 5 different ways. Each application requires different hardware environment.

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

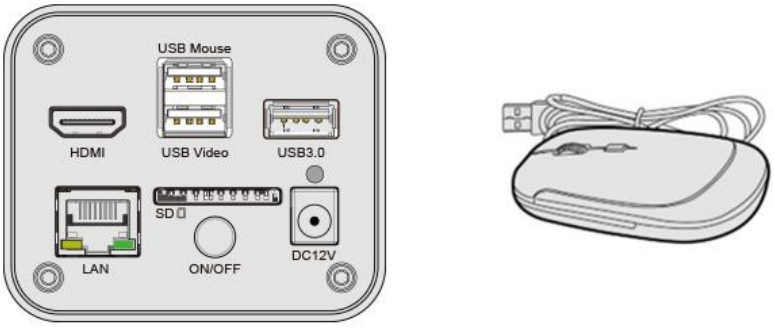
For this application, apart from the microscope, you only need an HDMI monitor, the supplied USB mouse, and the camera embedded XCamView software. A computer or a network connection is not required to operate the camera in this application. The steps to start the camera are listed as below:

Figure 6 X8CAM4K Series Camera with the HDMI Monitor

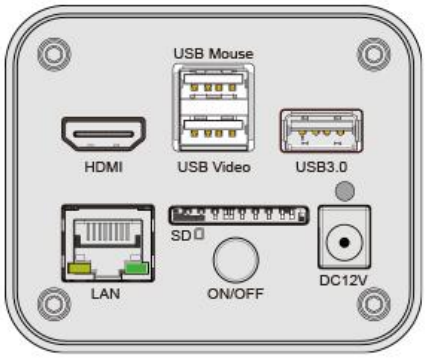
Connect the camera to a HDMI monitor using the HDMI cable;



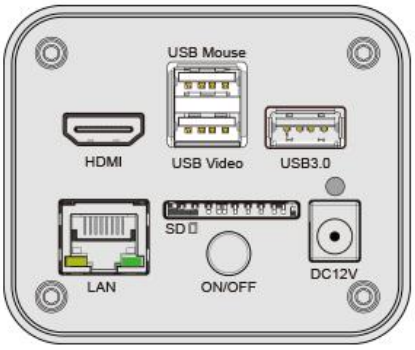

Insert the supplied USB mouse to the camera's USB Mouse port;

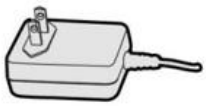



Insert the supplied SD card/USB flash drive into the X8CAM4K series camera SD card slot/USB3.0 slot;




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.

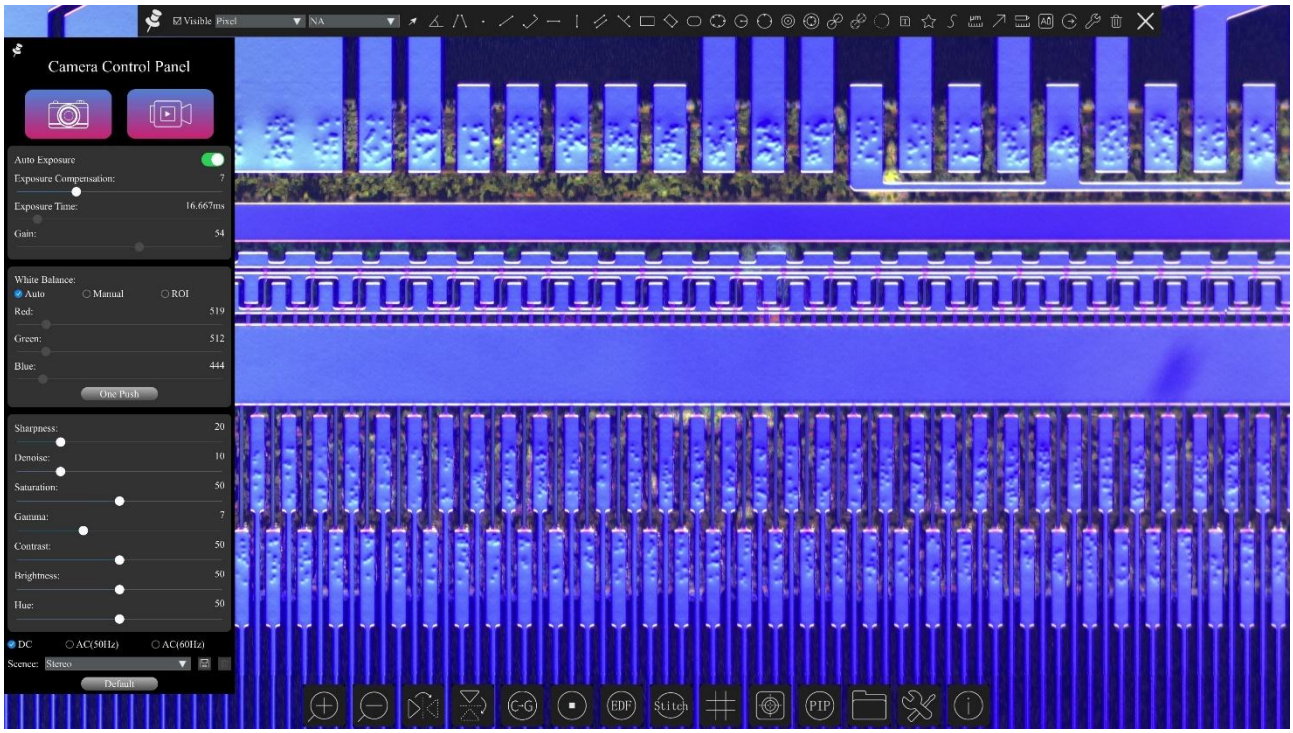


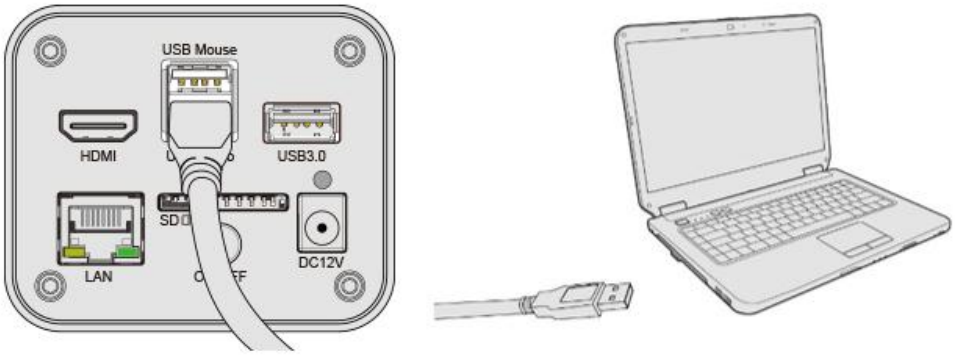

Figure 7 XCamView and X8CAM4K Series Camera in HDMI Mode

## 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.

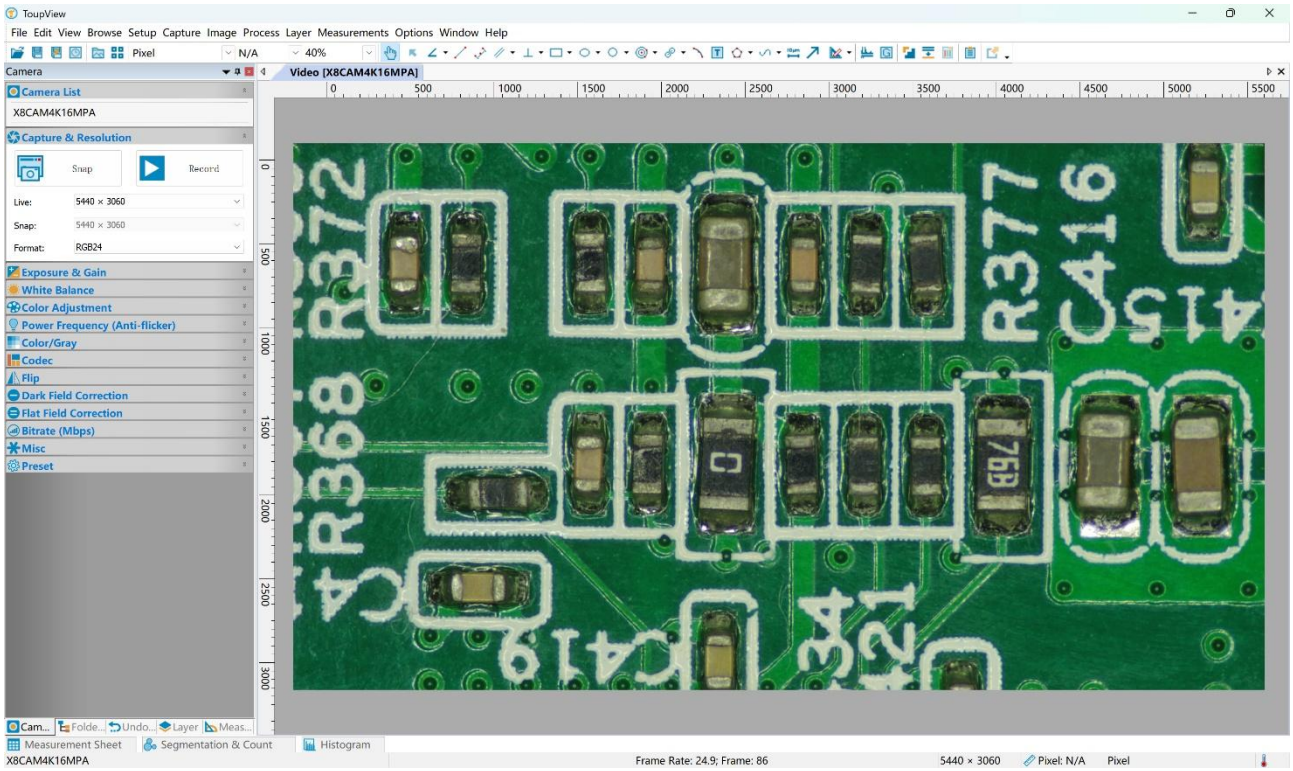



Figure 8 ToupView and X8CAM4K Series Camera in USB Mode

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

Please make sure your PC is WiFi enabled.

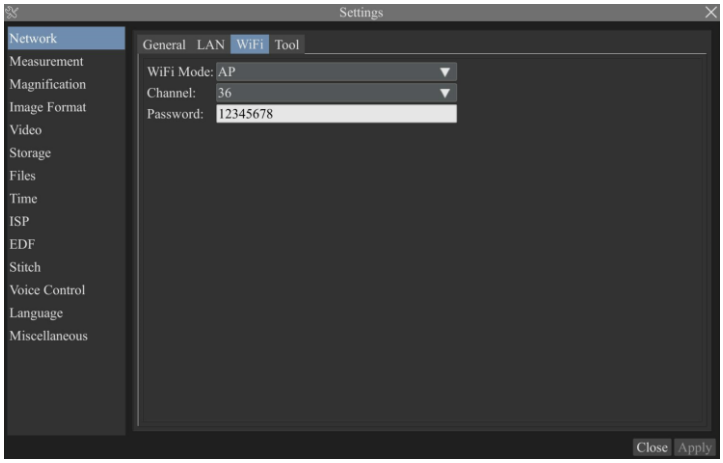

Figure 9 The PC or Mobile Device Connect to the Camera through WiFi

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

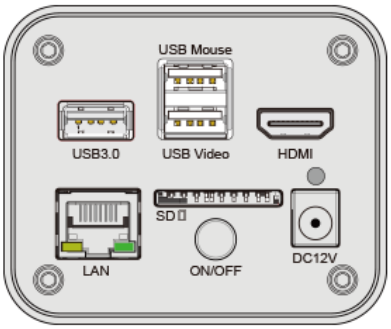
For macOS and Linux user (macOS 10.10 or above or Linux distributions with kernel 2.6.27 or higher), please use ToupLite. When connecting the camera with a mobile device, the free ToupView App is required. Just make sure that the mobile device uses iOS 11 or higher/Android 5.1 or higher operating systems.

The steps to start the camera are listed below:

Start the camera according to Sec. 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 ).

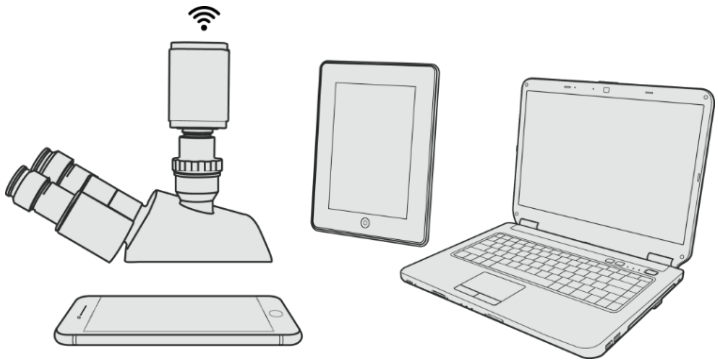



Plug the USB WiFi adapter into the camera's USB3.0 port, the upper left corner of the HDMI graphics interface will display "AP mode";





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.

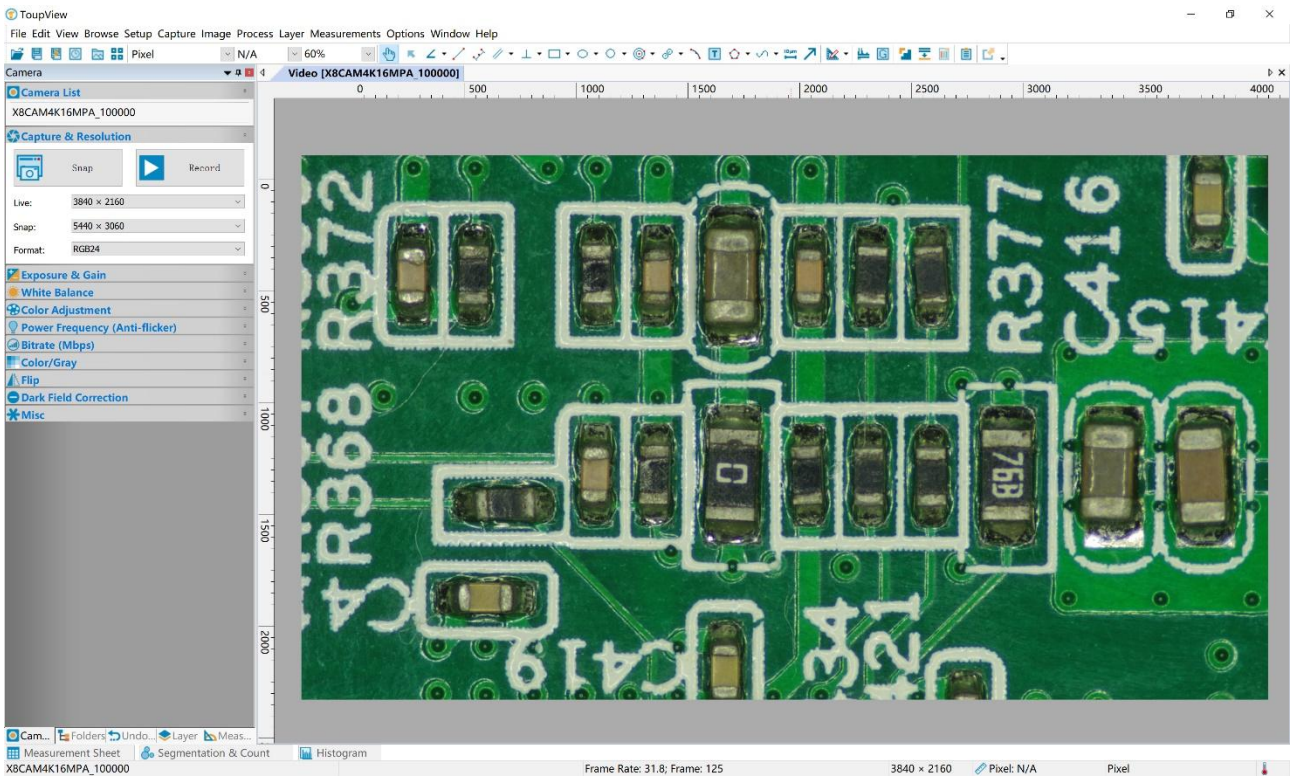



Figure 10 ToupView and X8CAM4K Series Camera in WiFi AP Mode

## 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.

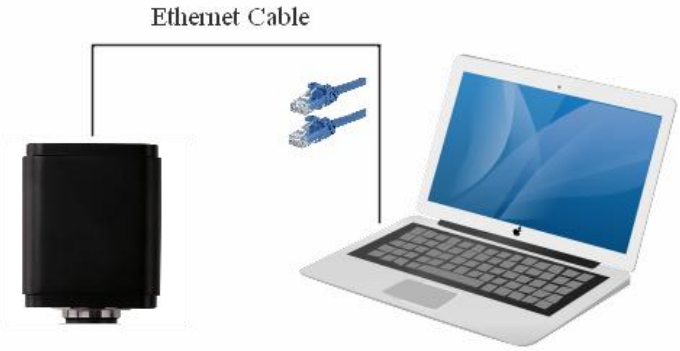



Figure 11 Connecting theX8CAM4K Series Camera with Ethernet Cable to the PC

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.

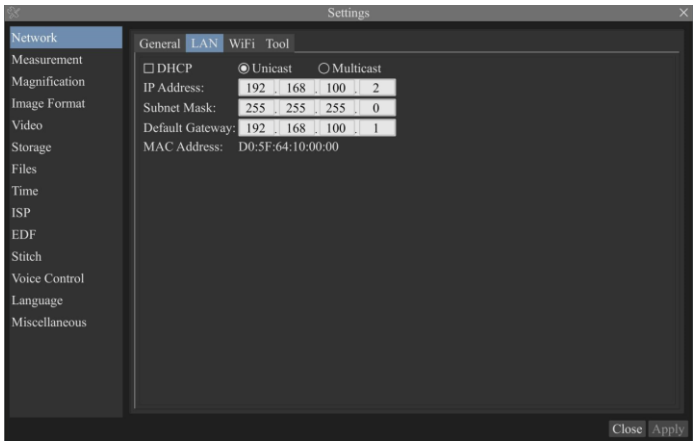



Figure 12 Configure theX8CAM4K Series Camera IP

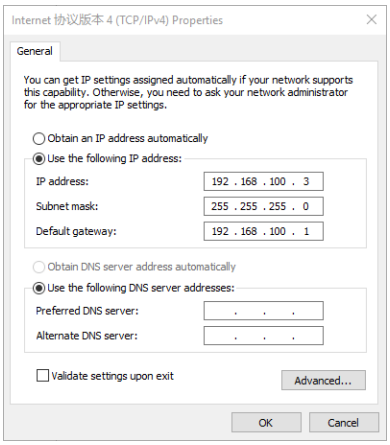
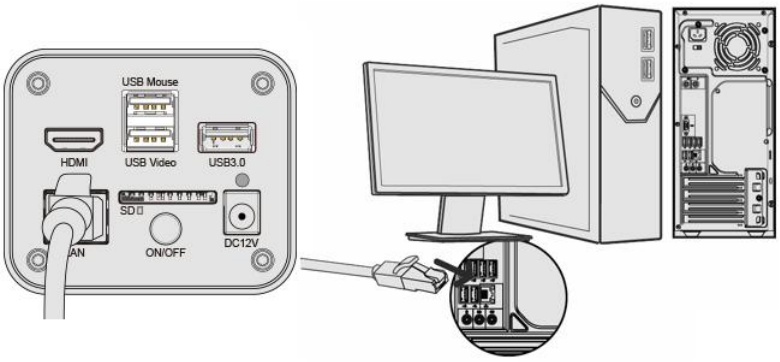


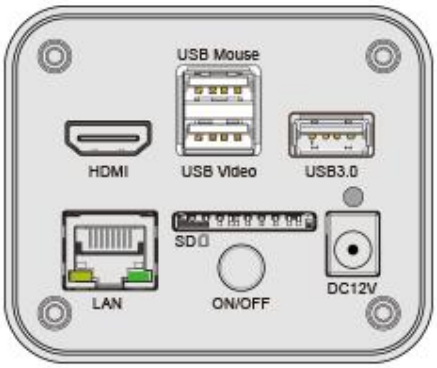

Figure 13 Configure the PC's IP

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.

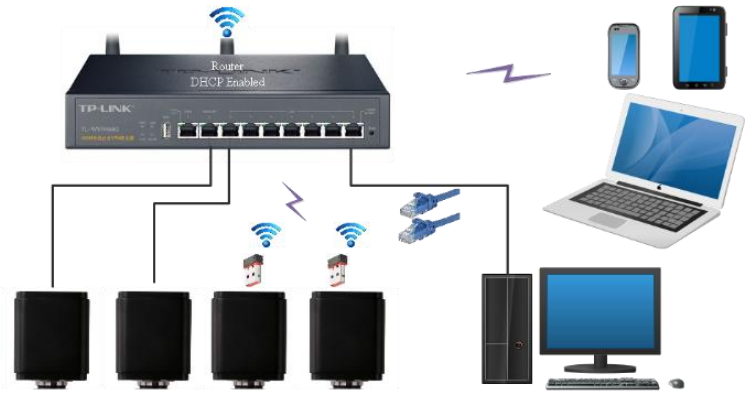
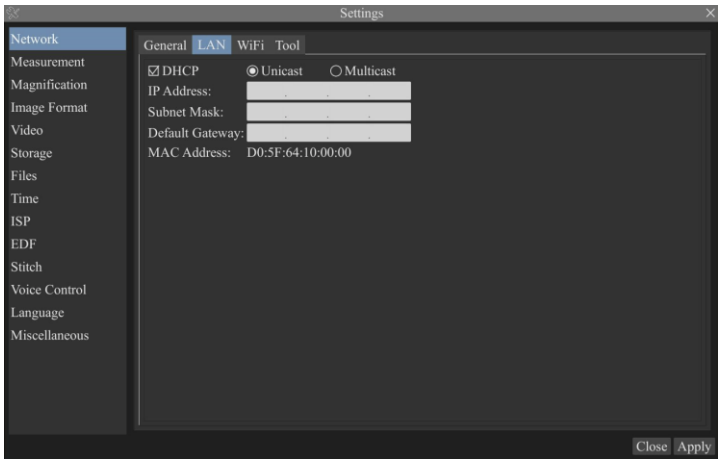


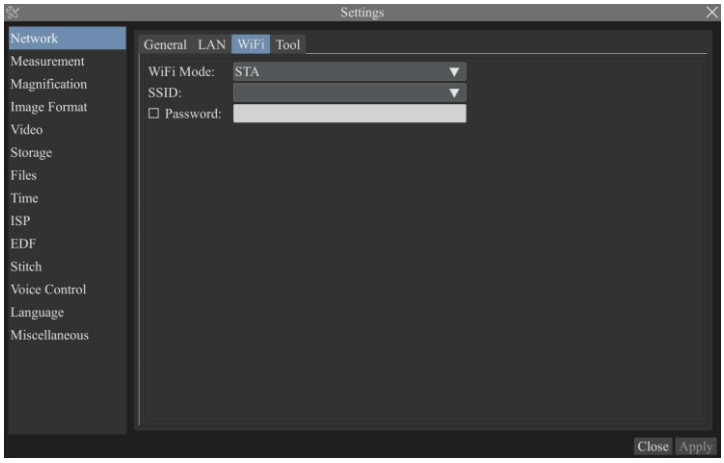

Figure 14 Multi X8CAM4K Series Cameras Connecting to the Router through the LAN Port/ WiFi Style

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.

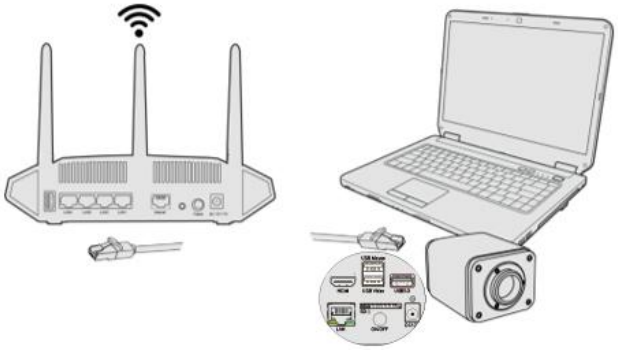



Or start the camera according to Sec. 6.1. After the camera is running, move the mouse to the bottom of the video window and clicking the button on the Synthesis Camera Control Toolbar at the bottom of the video window, a small window called Settings will pop up as shown below. Clicking Network> WiFi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

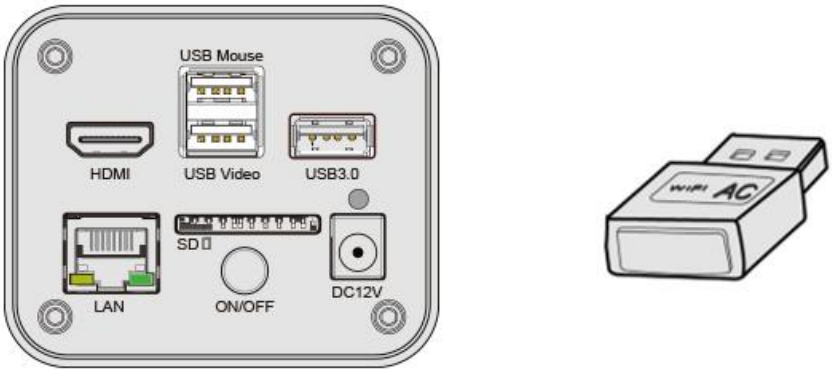



Install ToupView /ToupLite software on your PC. Alternatively, install the free ToupView App on the mobile device;

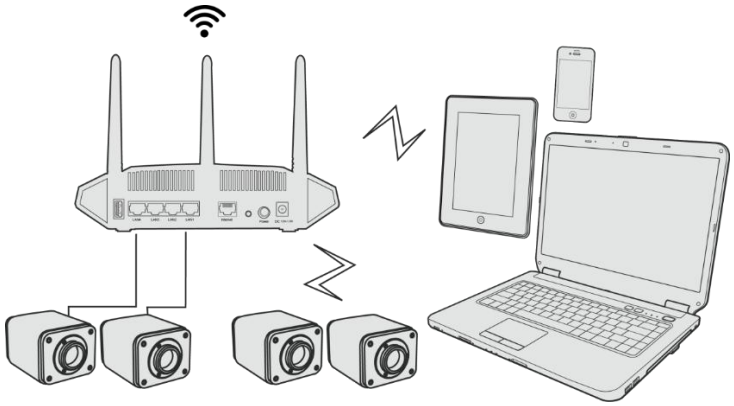
Plug the Ethernet cable into the camera's LAN port and the other end to the PC (for those connected to router with LAN Port), the upper left corner of the HDMI graphics interface will display IP address;



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 theX8CAM4K 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.

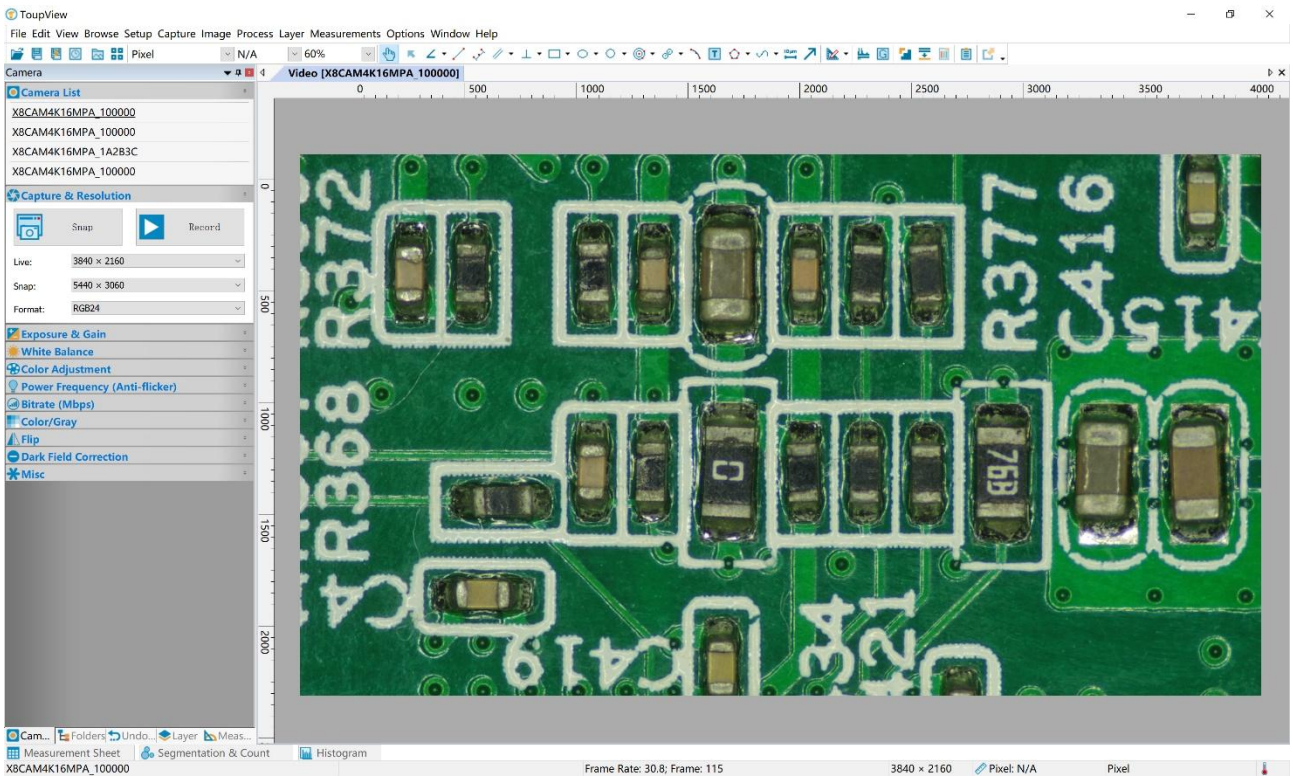



Figure 15 ToupView and X8CAM4K Series Camera in LAN port/ WiFi STA mode

# 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

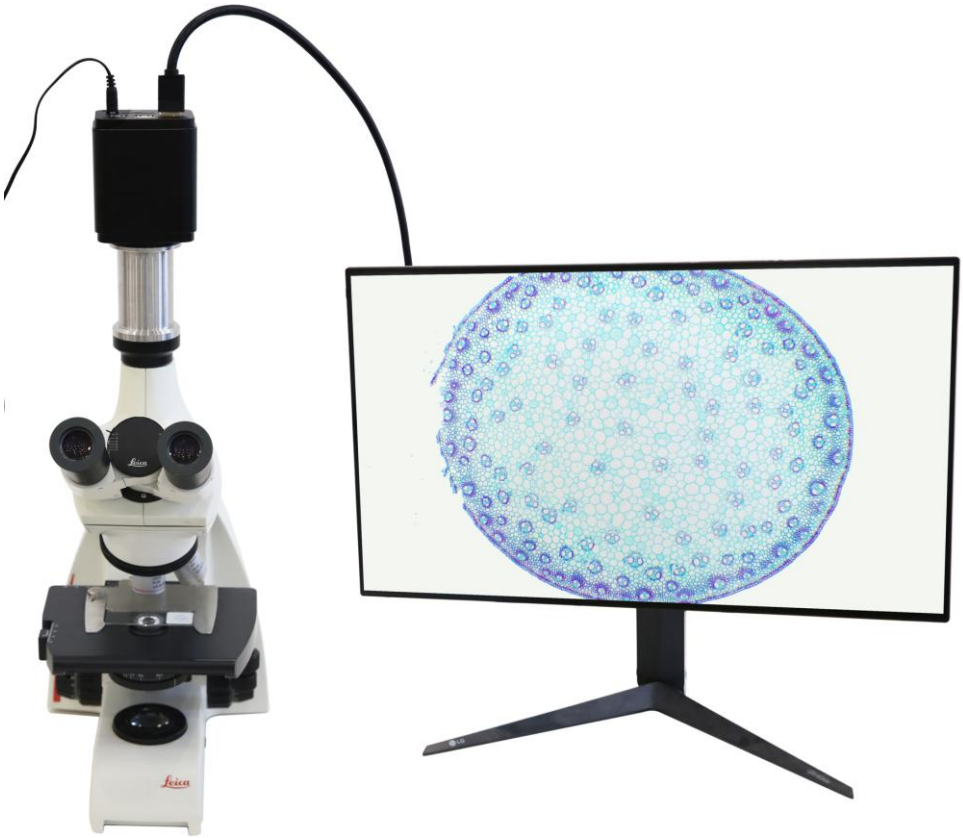



Figure 17 X8CAM4K22MPA Camera for Use with Biomicroscope Via M42 Microscope Adapter

## 7.2 X8CAM4K16MPA camera with trinocular stereo microscope

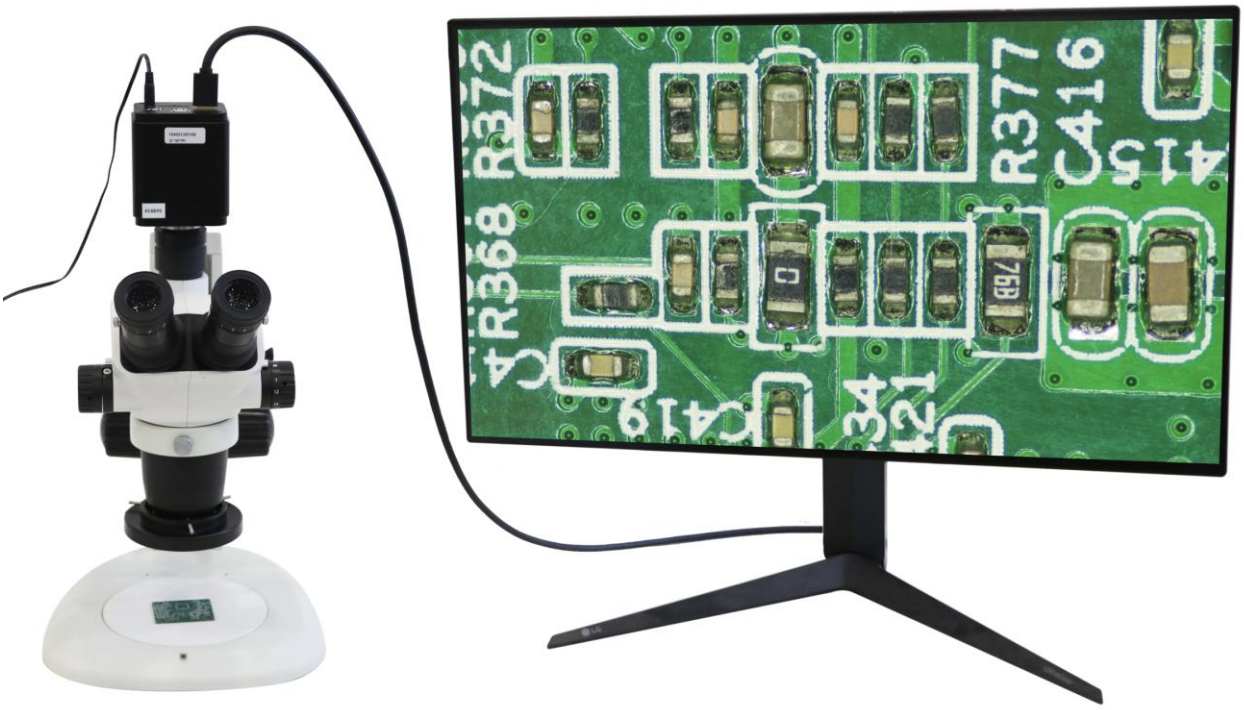



Figure 18 X8CAM4K16MPA Camera with Trinocular Stereo Microscope

## 7.3 X8CAM4K16MPA camera with metallographic microscope

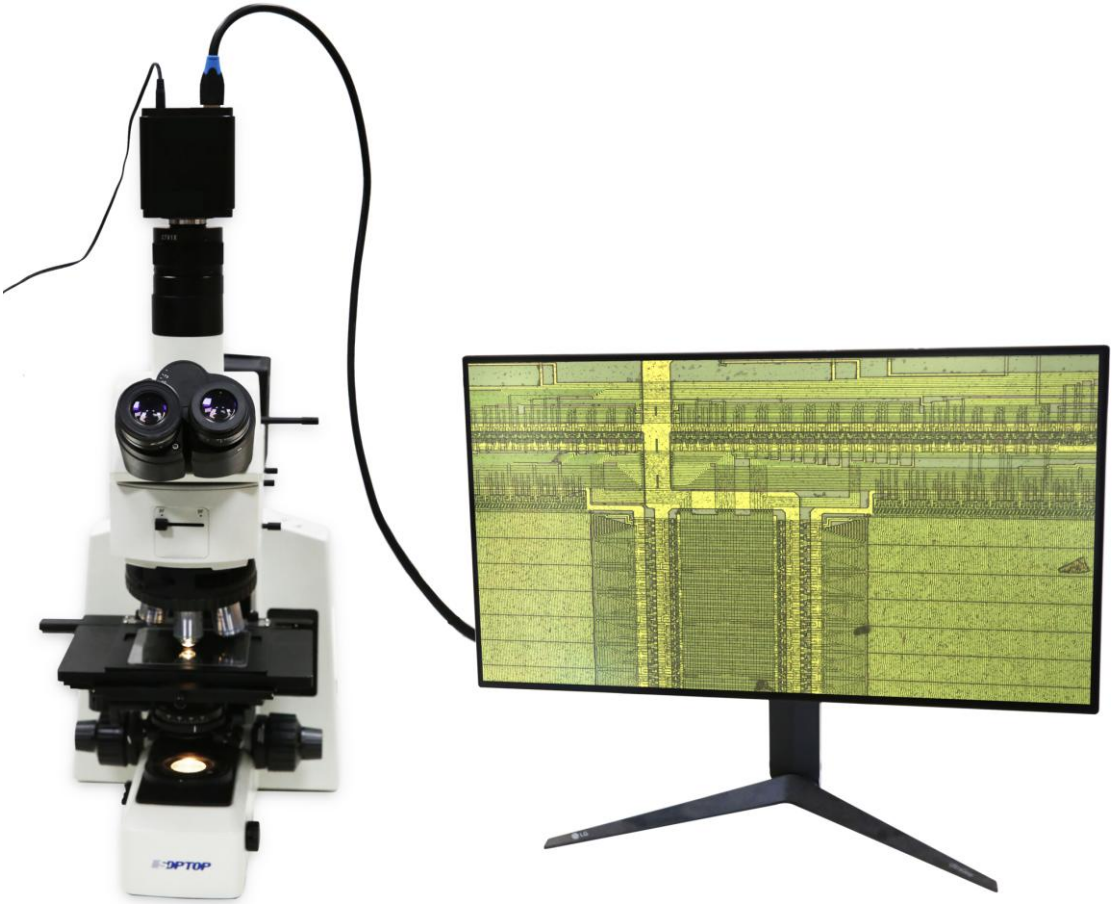


Figure 19 X8CAM4K16MPA Camera with Metallographic Microscope

## 7.4 X8CAM4K22MPA with Canon lenses via M42 to EF mount adapter

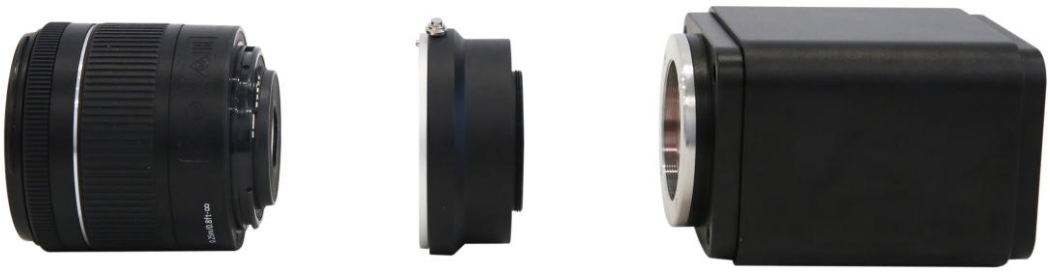


Figure 20 X8CAM4K22MPA with Canon lenses via M42 to EF mount adapter

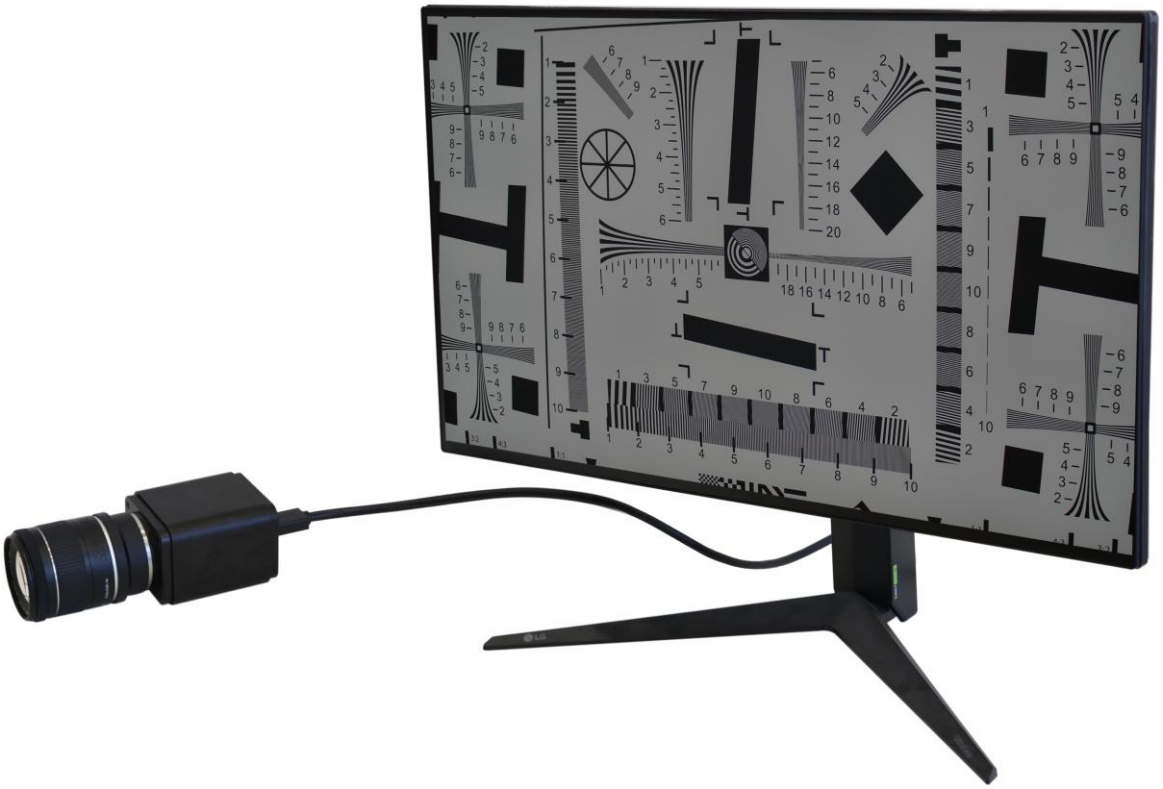


Figure 21 X8CAM4K22MPA with Canon Lenses Via M42 to EF Mount Adapter

# 8 Brief Introduction of X8CAM4K UI and Its Functions

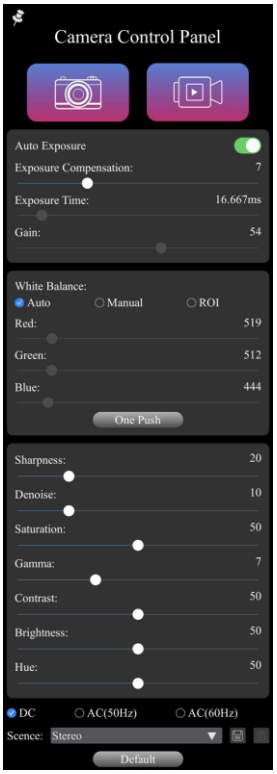
## 8.1 XCamView UI

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 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 ✕ 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. |

## 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 accordingly |
| | 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 | Select different default parameters according to the type of microscope |
| | Default | Restore all the settings in the Camera Control Panel 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 |
| 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 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 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 to8.4.15.

### 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.

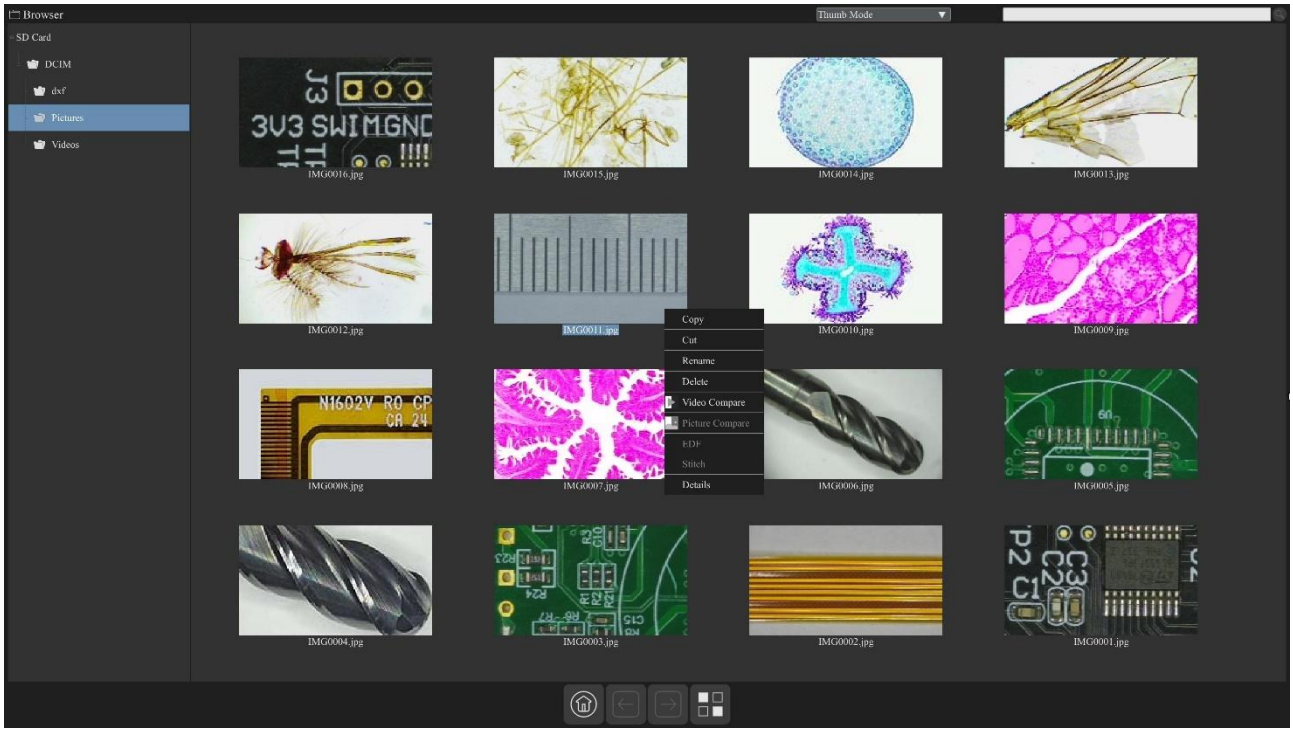



Figure 24 Browsing UI

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 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).

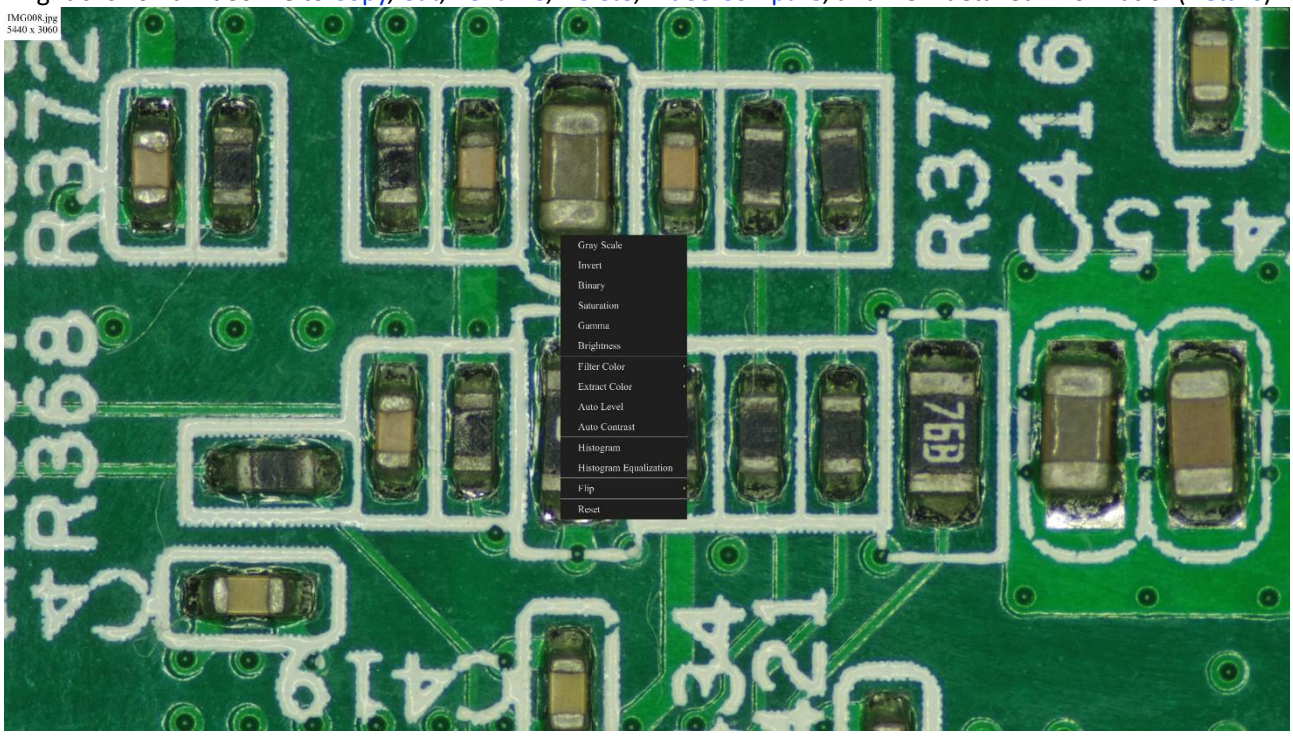



Figure 25 Image Processing

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:

| | |
|---|---|
| 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 contrastin 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

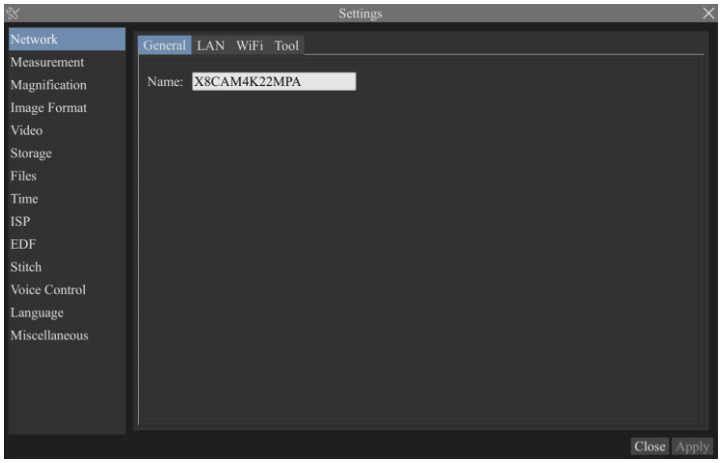



Figure 26 Comprehensive Network General Settings Page

| | |
|---|---|
| Name | The current camera name recognized as the network name |

### 8.4.2.2 Settings>Network>LAN

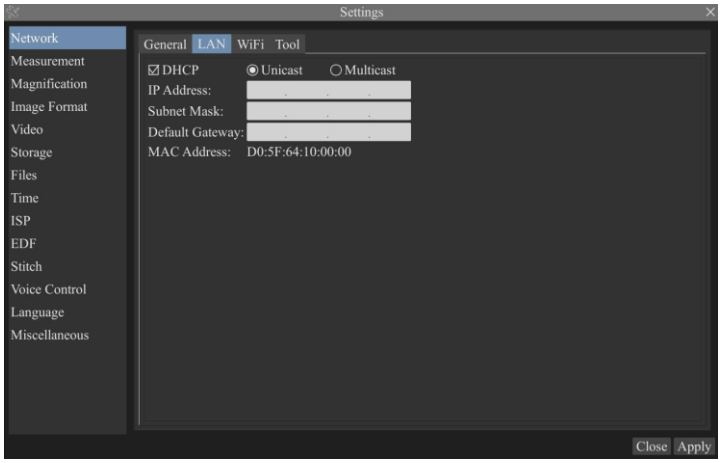



Figure 27 Comprehensive Network LAN Settings Page

| | |
|---|---|
| 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.<br>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.<br>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 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. |
| 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;<br>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. |
| MAC Address | 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:

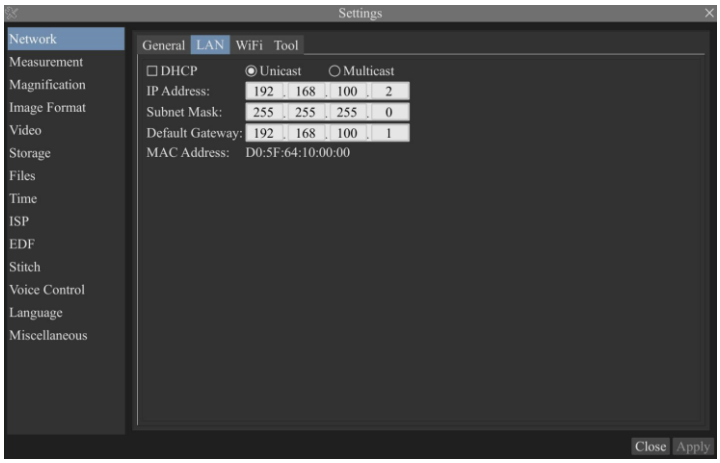



Figure 28 Manual DHCP and Unicast

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

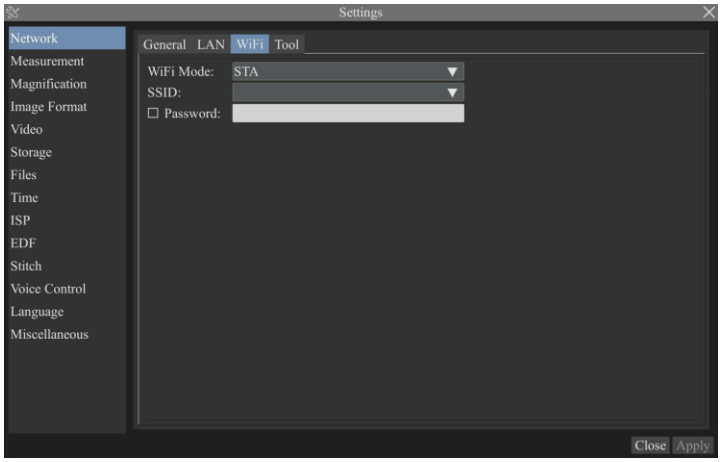



Figure 30 Network Setup

| | |
|---|---|
| Wi-Fi 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

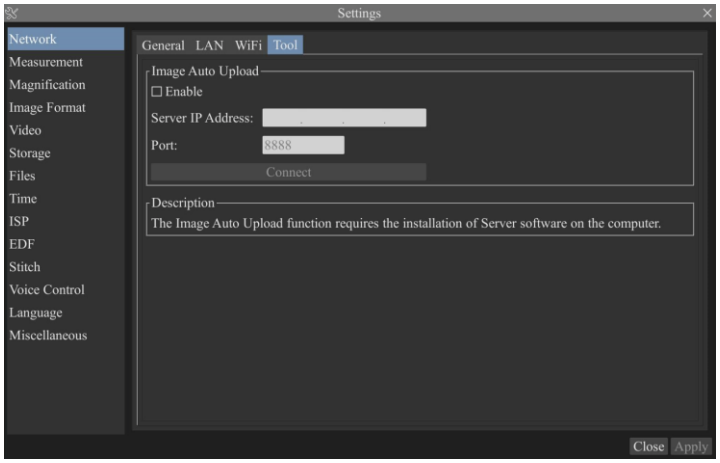



Figure 31 Comprehensive Network Tool Settings Page

| | |
|---|---|
| Image Auto Upload | 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;<br>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.<br>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.

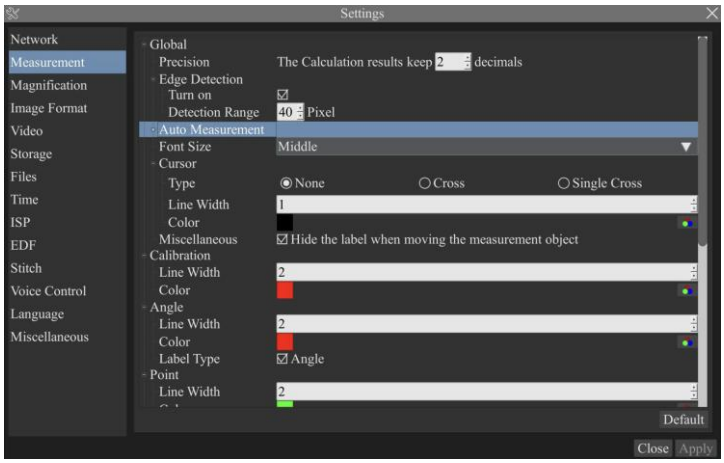



Figure 32 The Measurement Setup

| | | |
|---|---|---|
| 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 cross or a single cross and set the color of the cross or 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.

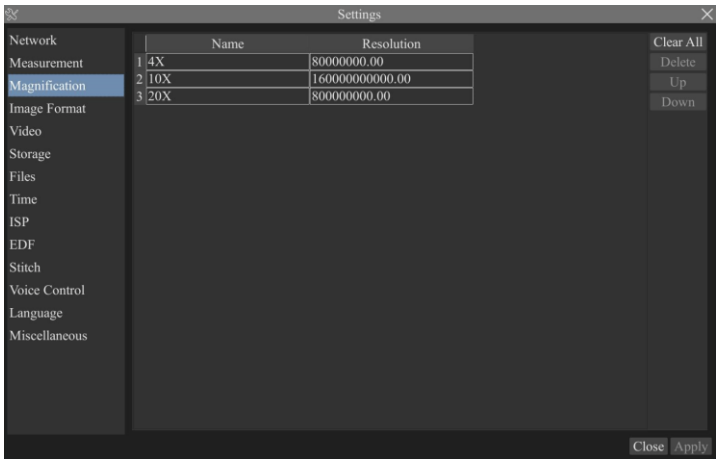



Figure 33 Comprehensive Magnification Settings Page

| | |
|---|---|
| Name | 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. |
| 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

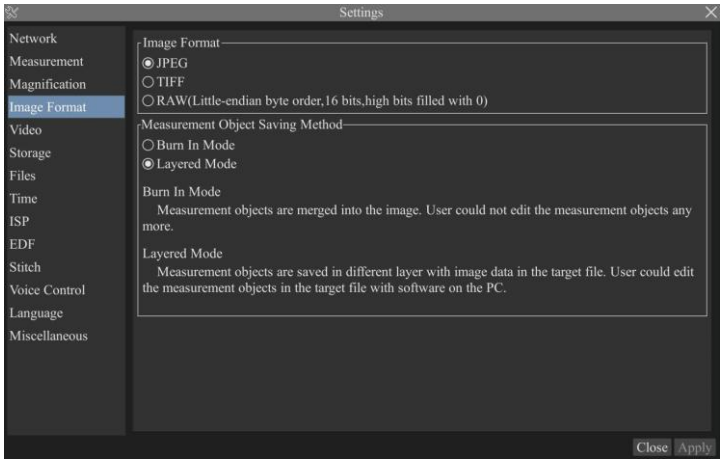



Figure 34 Comprehensive Image Format Settings Page

| | |
|---|---|
| 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.<br>TIFF: TIFF is a flexible bitmap format mainly used to store images including photos and artistic images.<br>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 reversable.<br>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

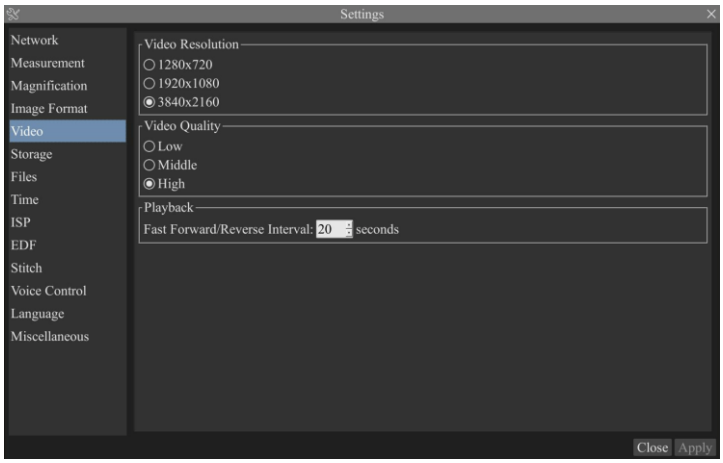



Figure 35 Comprehensive Setting of Video page

| | |
|---|---|
| Video Resolution | Select a Video Resolution of 1280 x 720, 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

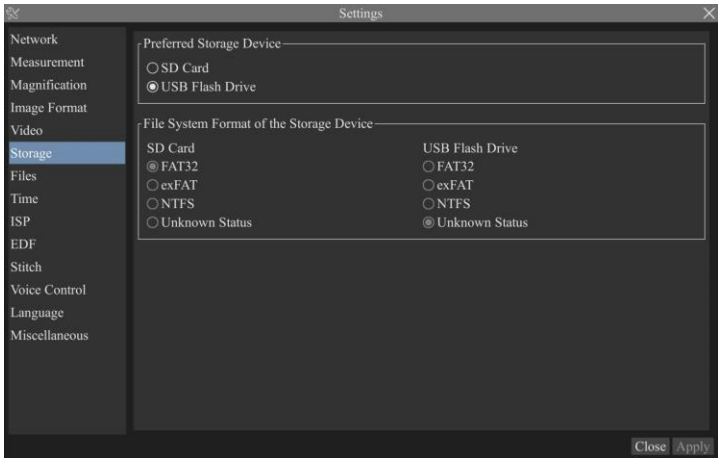



Figure 36 Comprehensive Setting of Storage Page

| | |
|---|---|
| Preferred Storage Page | SD Card: Select it to save the video and image to the SD Card.<br>USB Flash Drive: Select it to save the video and image to the USB Flash Drive. |
| File System Format of the Storage Device | List the file system format of the current storage device<br>FAT32: The file system of SD Card is FAT32. The maximum video file size of single file in FAT32 file system is 4G Bytes;<br>exFAT: The file system of SD Card is exFAT. The maximum video file size of single file in FAT32 file system is 16E Bytes;<br>NTFS: The file system of SD Card is NTFS. The maximum video file size of single file is 2T Bytes.<br>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

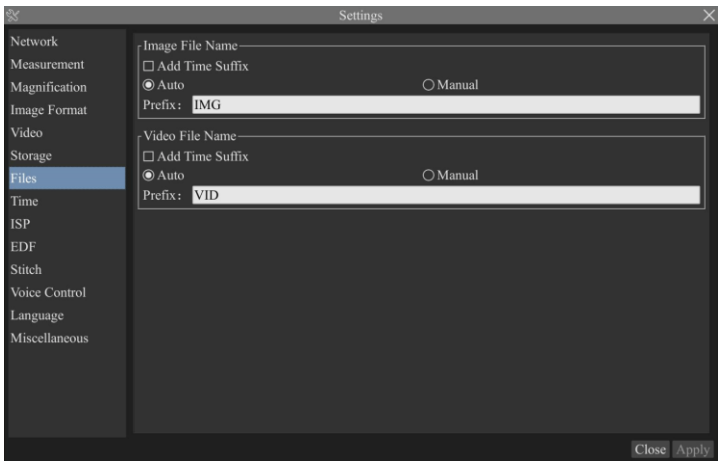



Figure 37 Comprehensive Setting of Files Name

| | |
|---|---|
| Image or Video | Provide Auto or Manual naming paradigm for Image or Video file; |

| File Name Paradigm | |
|---|---|
| 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. |

### 8.4.9 Settings>Time


Figure 38 Time Setting

| Time | User can set Year, Month, Day, Hour, Minute and Second ital.in this page. |
|---|---|

### 8.4.10 Settings>ISP

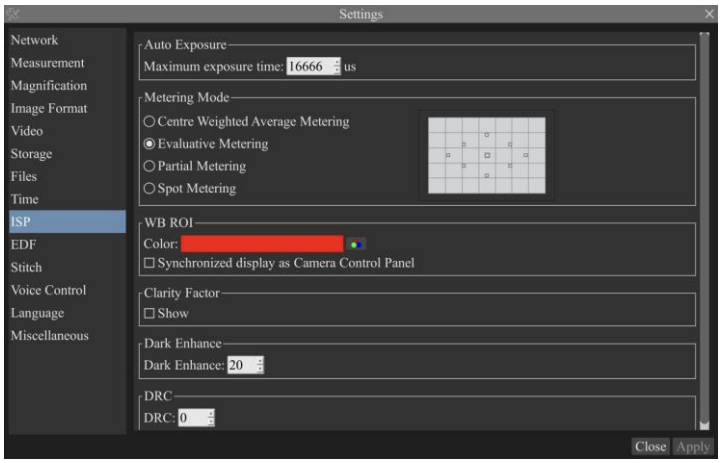



Figure 39 Comprehensive Setting of ISP Page

| Auto Exposure | Define the maximum automatic exposure time; |
|---|---|
| Metering Mode | Select the Metering mode as the Central Weighted Average Metering, Evaluative Metering, Partial Metering, or Spot Metering; |
| 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 Enhance; |
| DRC | Define the intensity value of DRC; |

### 8.4.11 Settings>EDF


Figure 40 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.<br>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

| | |
|---|---|
| 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<br>Stitching Stride: The larger the stitching stride, the lower the precision and the faster the speed. |

### 8.4.13 Settings>Voice Control

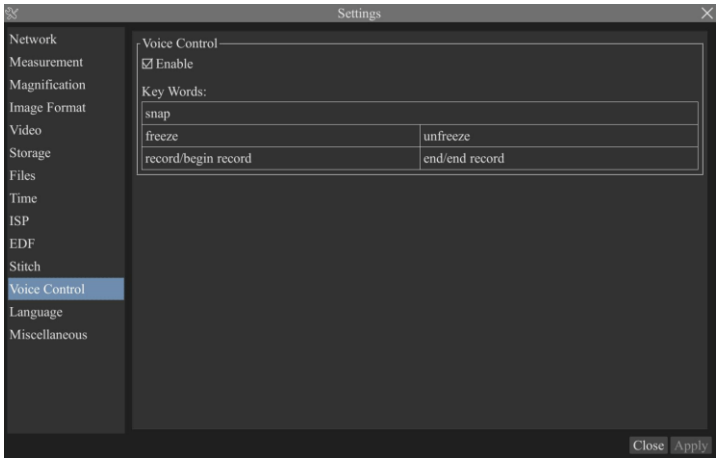



Figure 42 Comprehensive Setting of Voice Control

| | |
|---|---|
| Voice Control | Select whether to enable or not; |

| | |
|---|---|
| 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

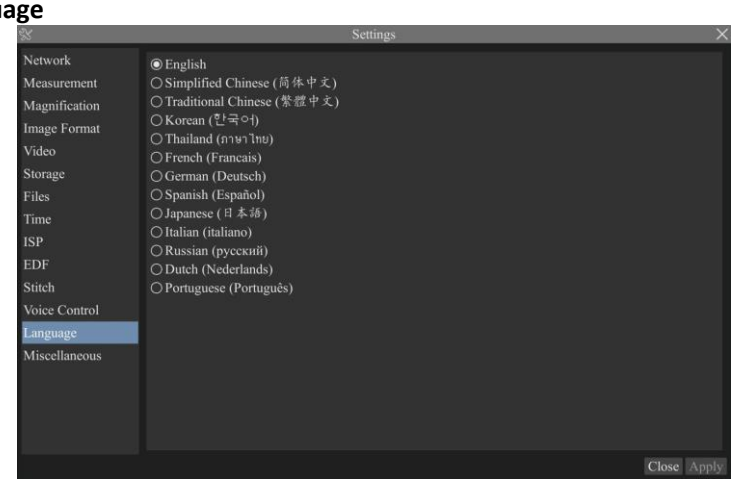



Figure 43 Comprehensive Setting of Language Selection Setting Page

| | |
|---|---|
| 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

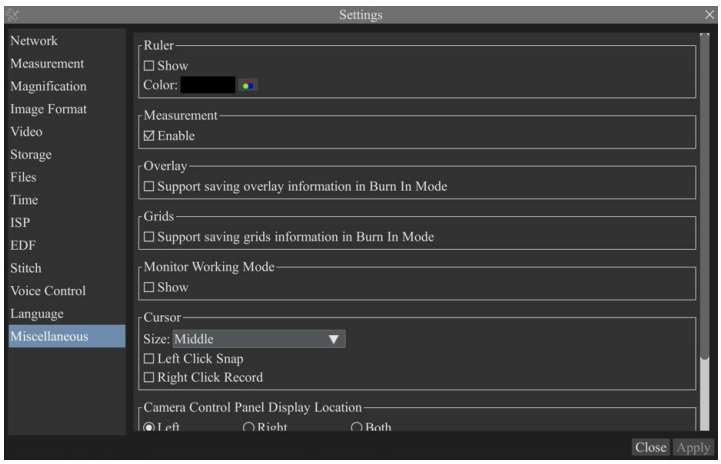



Figure 44 Comprehensive Miscellaneous Settings Page

| | |
|---|---|
| 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 Mouse 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; |

| | |
|---|---|
| Camera Parameters Import | Import the Camera Parameters from the SD Card or USB flash drive to use the previously exported Camera Parameters |
| Camera Parameters Export | 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; |

# 9 Sample Photos Captured with X8CAM4K Series Camera

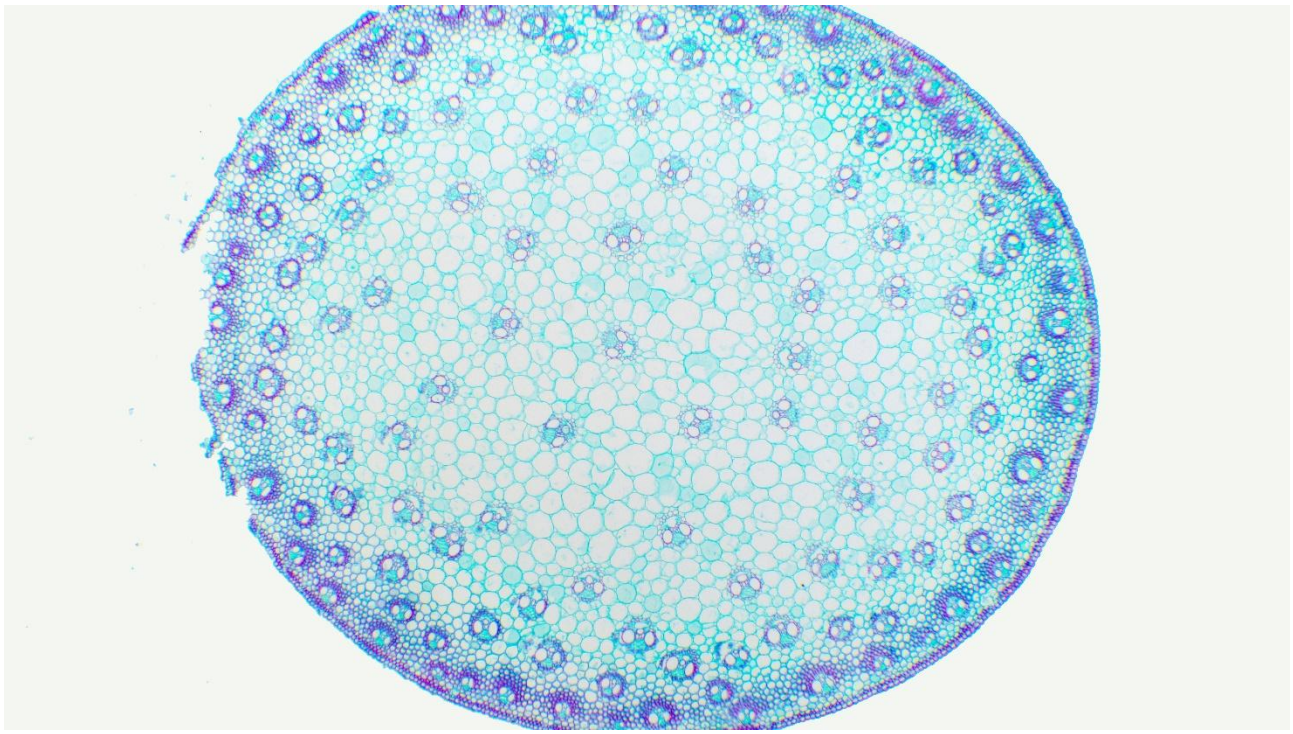


Figure 45 Corn Stem.C.S Captured with X8CAM4K22MPA

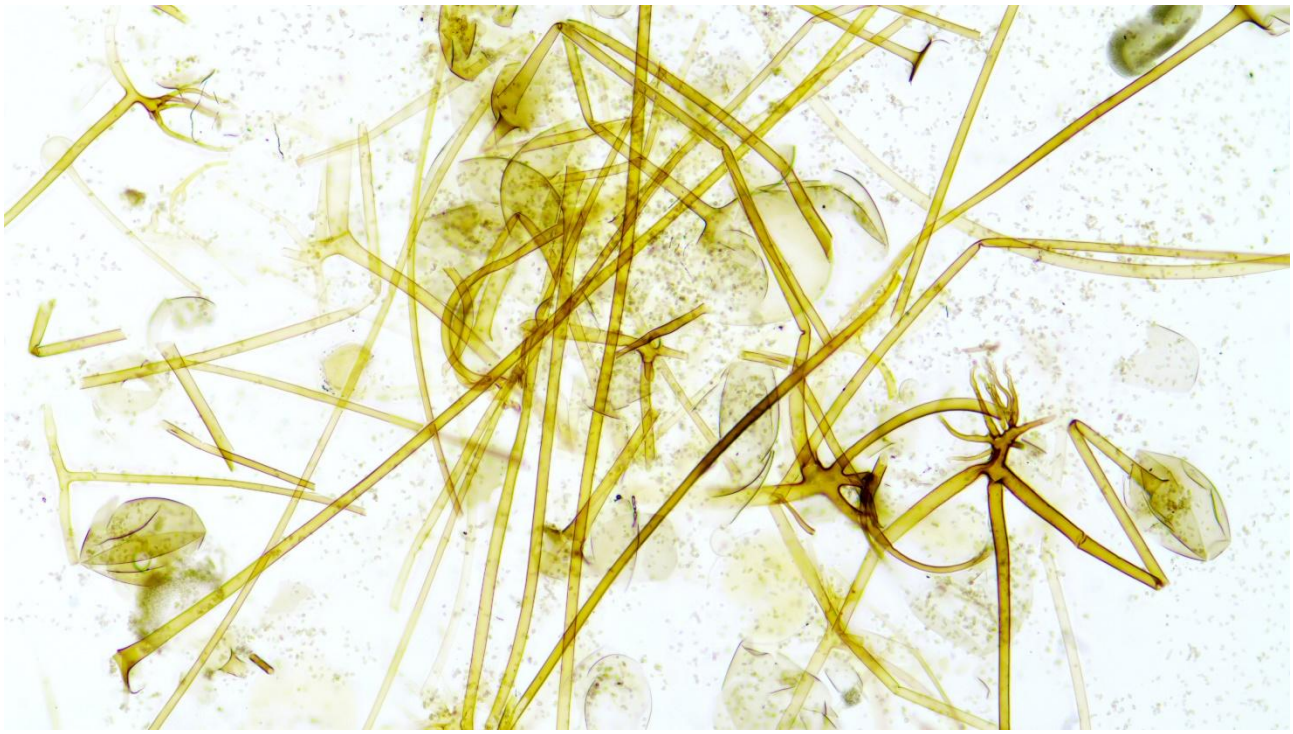


Figure 46 Rhizopus.W.M Captured with X8CAM4K22MPA

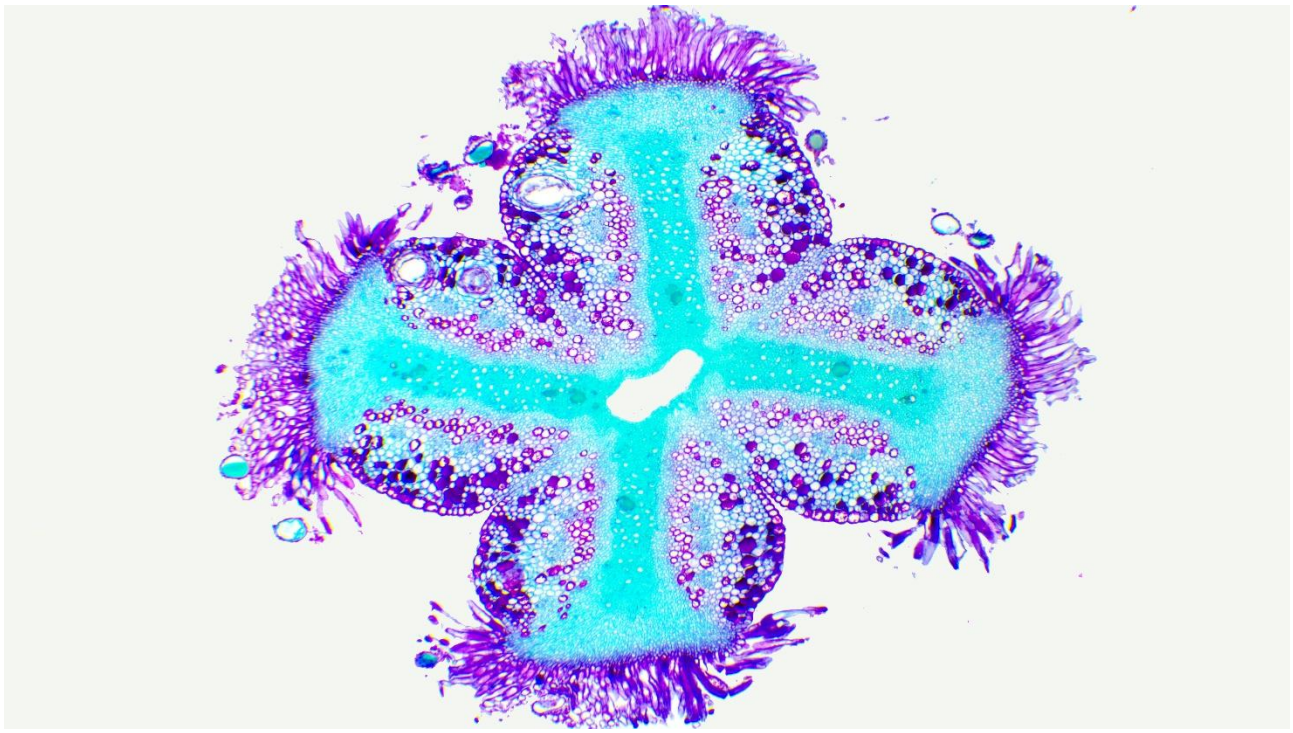


Figure 47 Cross Section of Cotton Stigma Captured with X8CAM4K22MPA

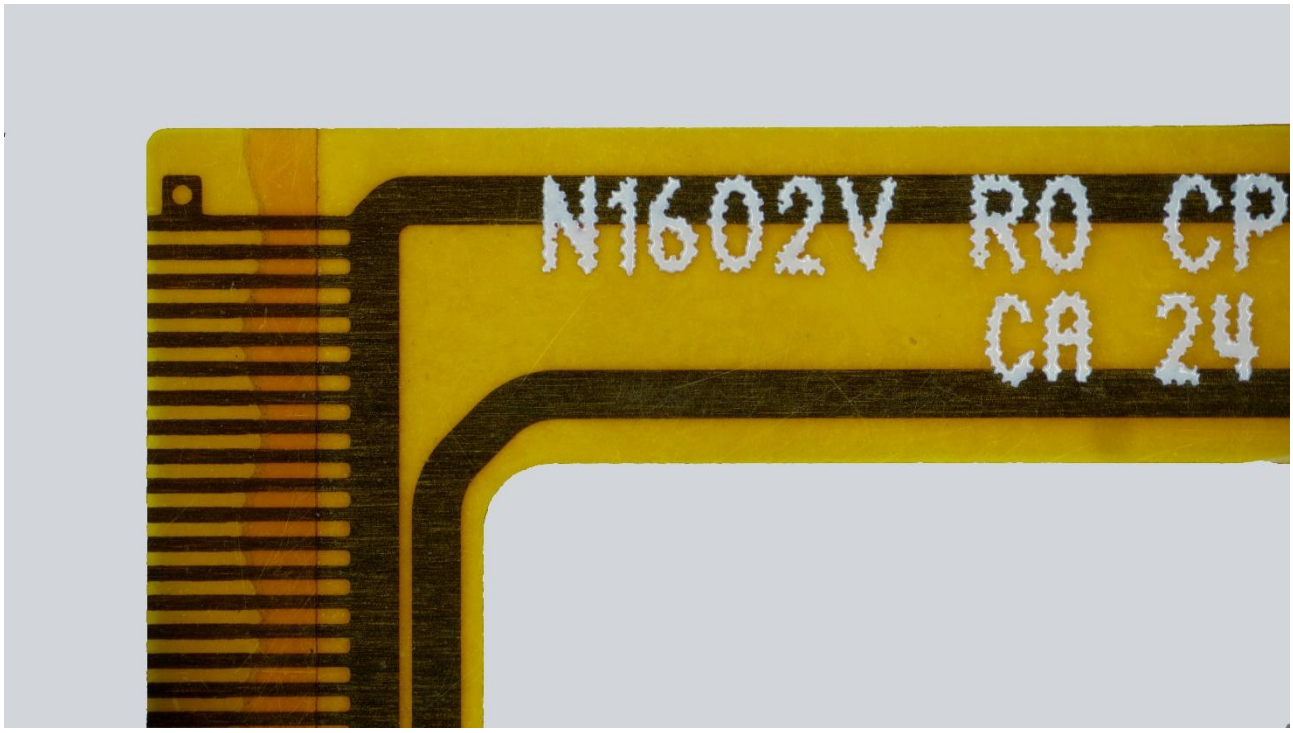



Figure 48 FPC Captured with X8CAM4K16MPA

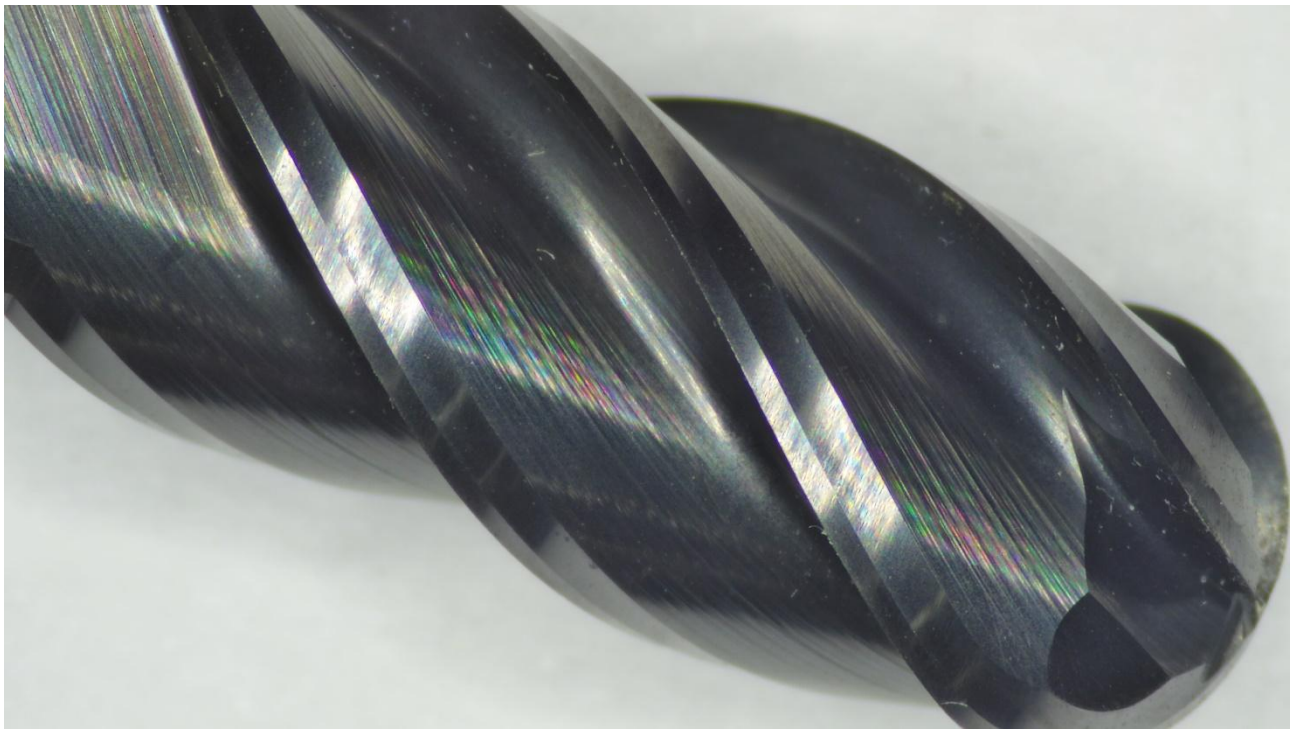


Figure 49 Carbide Tip Captured with X8CAM4K16MPA

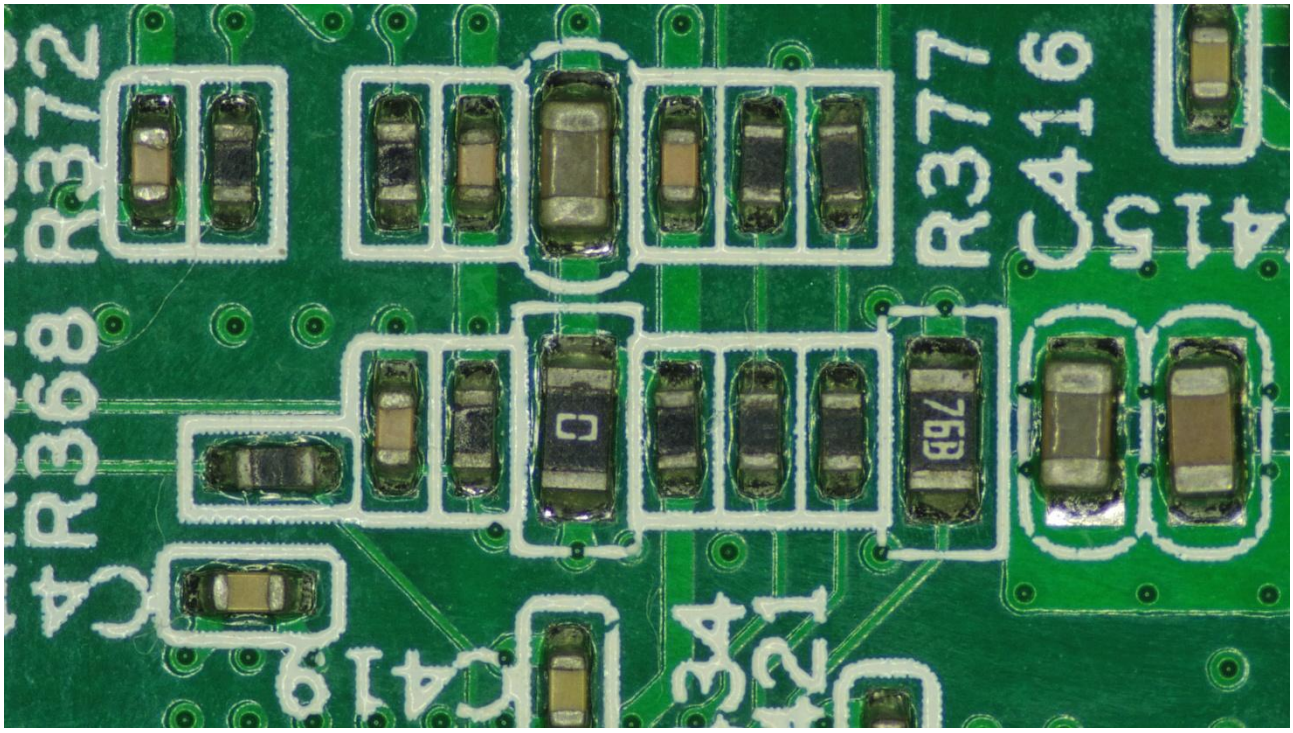



Figure 50 Circuit Board Captured with X8CAM4K16MPA

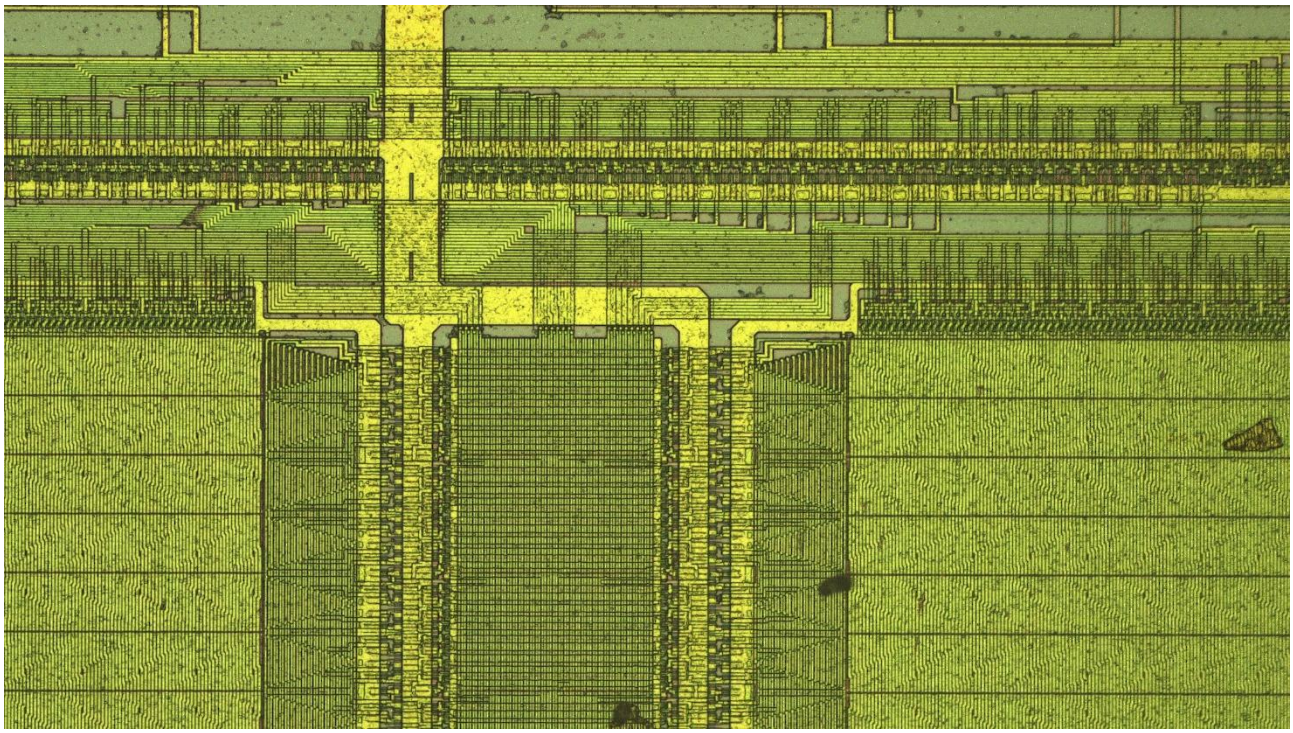


Figure 51 Samples Photographed by the SOPTOP RX50M Metallographic Microscopy System Captured with X8CAM4K16MPA

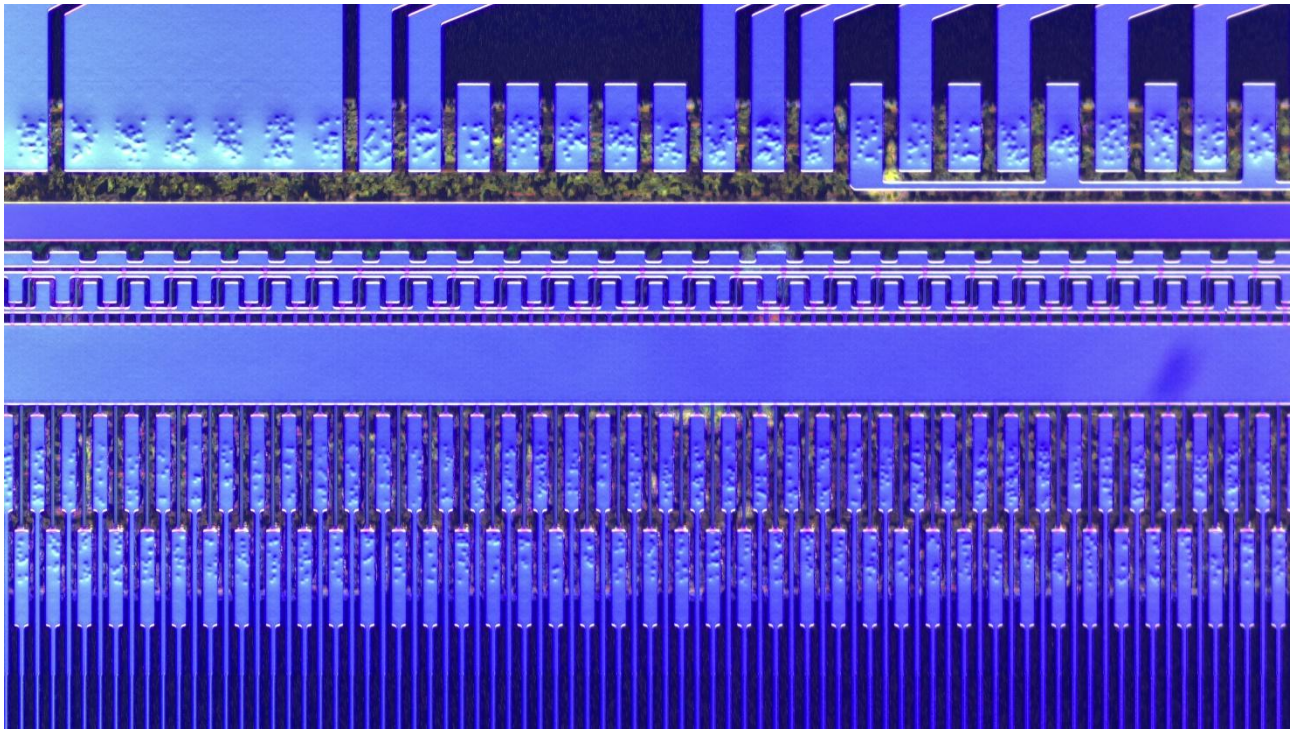


Figure 52 Conductive Particles of the Liquid Crystal Screen Photographed by the DIC-100WVA Differential Interference Contrast (DIC) Microscopy System Captured with X8CAM4K16MPA

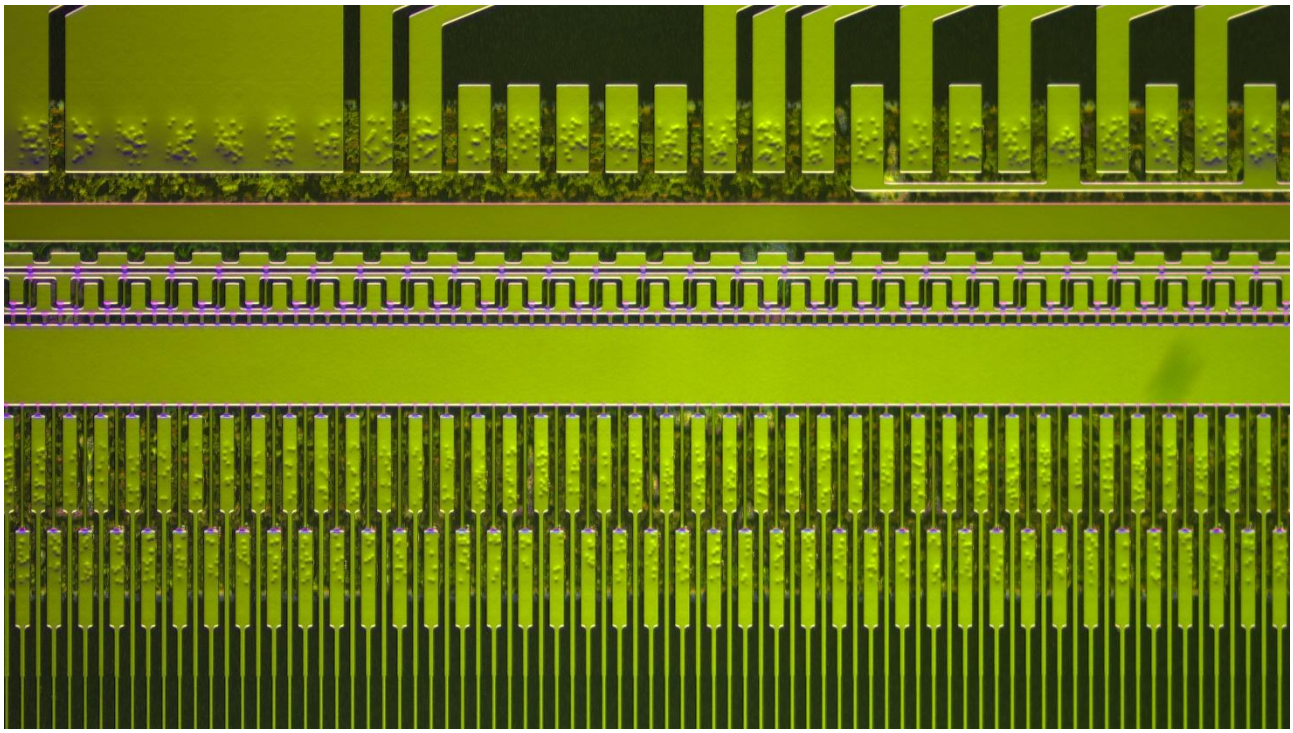


Figure 53 Conductive Particles of the Liquid Crystal Screen Photographed by the DIC-100WVA Differential Interference Contrast (DIC) Microscopy System Captured with X8CAM4K16MPA

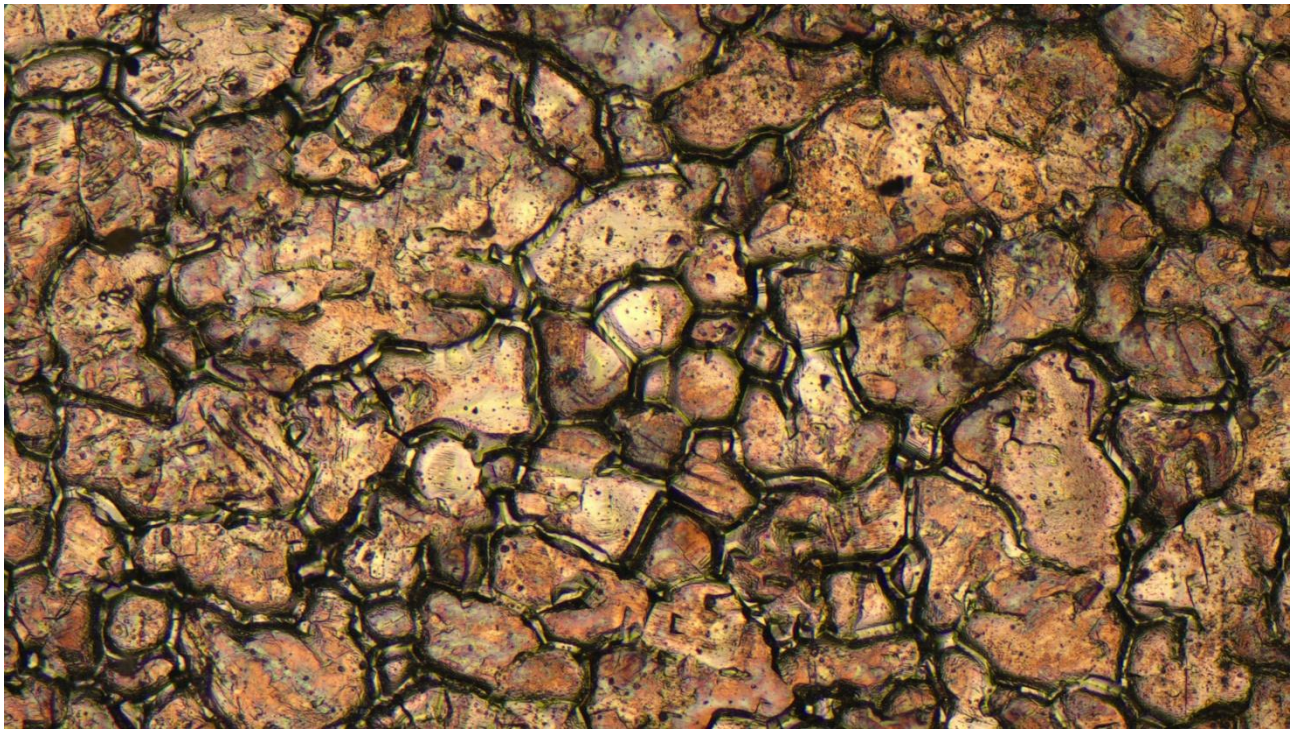


Figure 54 Metal Samples Photographed by the OUMIT CX43M Metallographic Microscopy System Captured with X8CAM4K16MPA

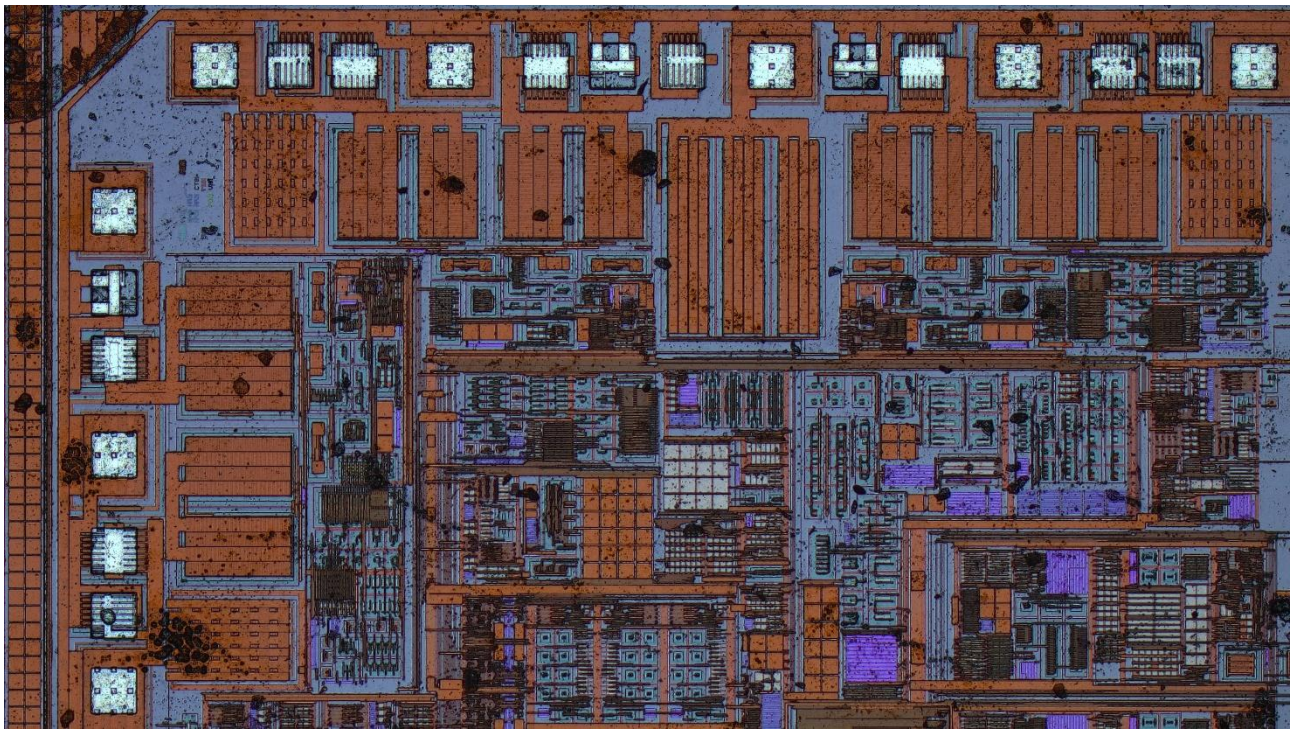


Figure 55 Semiconductor Samples Photographed by the OUMIT CX43M Metallographic Microscopy System Captured with X8CAM4K16MPA

## 10 ToupTek®-- Contact Information


| | |
|---|---|
|  | 杭州图谱光电科技有限公司 |
| | 杭州市西湖区西园五路6号奥强大厦1号楼15层 |
| | 杭州, 310030, 浙江, |
| | 中国 |
| | Hangzhou ToupTek Photonics Co., Ltd |
| | 15F, Aoqiang Building 1, No. 6, Xiyuan 5th Rd., |
| | Hangzhou, 310030, Zhejiang, |
| | P.R.China |
|  | +86-571-8111-0735<br>+86-571-8111-0730<br>+86-571-8810-2638,<br>+86-18058780750 (手机/Mobile Phone) |
| | FAX: +86-571-8668-3738 |
|  | tphz@touptek.com |
|  | Skype: 18058780750/ToupTek Photonics |
| | QQ 2426878316 |
| | Wechat 18058780750 |