AFDM423 Electric Controlled Continuous Zoom and Autofocus Digital Microscope

Contents

1 The Basic Characteristic of AFDM Series

AFDM is a series of electric controlled continuous zoom and autofocus all-in-one digital microscope with a large field of view by ToupTek Photonics. It is integrated with HDMI camera, Electric Controlled Continuous Zoom Auto-focus Objective and LED Integrated Illumintaion Light. AFDM is the abbreviation of Auto-focus Digital Microscope. Different products in the AFDM series can be formed with different part to satisfy the applicatuon requirement.

AFDM can be assembled with various brackets or arms and offer a continuous zooming ratio with different lens. AFDM also supports autofocus mode and manual focus mode.

AFDM comes with a high-performance SONY CMOS sensor. It also has an embedded ARM core, allowing the camera to be connected directly to the HDMI monitor. The camera has XCamView software built within it, including Camera Control Panel, Auto Focus Control Panel, Measurement Toolbar, and Synthesis Camera Control Toolbar. Users can directly control the camera and perform various operations through a USB mouse. The images and videos captured by AFDM can be saved on an SD card/USB flash drive for on-site analysis and follow-up research.

AFDM can be widely used in industrial inspection, medical observation, teaching and scientific research, automation system, and other fields.

AFDM423 supports HDMI/NETWORK/USB control and video output (ToupView). The frame rate of the output is 4K/30FPS, and the zoom range is 1X~8.4X. It also supports electric zoom and auto focusing.

Figure 1 AFDM423's Front and Back View

Figure 2 AFDM423's Side and Front(with LED light) View

1.1 The Module Specifications of AFDM Series Product

1.1.1 AFDM Camera Module Datasheet

Order Code	Sensor & Size(mm)	Pixel(μm)	G Sensitivity/ Dark Signal	Max FPS/Resolution	Binning	Exposure(ms)
H4KPA	Sony IMX334LQR-C 1/1.8"(7.68x4.32)	2.0x2.0	505mv with 1/30s 0.1 with 1/30s	30@3840*2160(HDMI) 30@1920*1080*(NETWORK) 30@3840*2160(USB)	1x1	0.04~1000

C: Color; M: Monochrome;

1.1.2 AFDM Lens Module Datasheet

Order Code	Working Distance(mm)	Zoom Range	MTF(lp/mm)	Distortion	FOV@1X(mm)	FOV@18X(mm)
EMZO-8.4XA-600	450~720	0.025X~0.21X	240	0.5%	330x190	40x22.5

1X and 8.4X are defined as the normalized magnification, which is only used to represent the relative relationship between the lowest and highest magnification. Here, the normalized equations are 1x = 0.025/0.025; 8.4X=0.21/0.025;

1.1.3 AFDM Light Module

Order Code	LED	Power	Inner Dia.(mm)	Out Dia.(mm)
DRL-5076A-NPC	8 CREE xpes	3V/3A	50	76
AALRL-200-7650	12 1W LED	12V/2A	50	76

DRL: LED direct ring light with adjustable brightness; NPC: No power cable

AFDM511 series camera can use AALRL-200-7650 as external light for the large FOV illumination,

https://www.touptekphotonics.com.cn/product-Accessory/AALRL.html

1.2 AFDM423 Characteristic And Specification

The AFDM423 comes with H4KPA HDMI camera, EMZO-8.4XA-600 lens and DRL-5076A-NPC light source(Optional);

1.2.1 The Basic Characteristic of AFDM423

- 6 groups 16 elements EMZO with 0.025X~0.21, 8.4 zoom ratio, supports auto and manual focus
- 600mm standard working distance with 450~720mm depth of field
- At standard working distance, the large field of view 330mm*190mm at low magnification, helping users to quickly locate the target object, the small field of view 40mm*22.5mm at higher magnification, helping users to observe microscopically
- Under the standard measurement working distance, the camera has stored 1~8.4 times the default measurement calibration information, allowing users to accurately measure
- Sony IMX334 1/1.8” 4K Starvis CMOS with high signal-to-noise ratio
- 4K HDMI/NETWORK/USB multiple video 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
- Built-in mouse control software XCamView, all functions can be realized with USB mouse
- Embedded mouse Camera Control Panel, Measurement Toolbar, Synthesis Control Toolbar, AF Control Panel

- Multi-language support
- Head suction LED ring light, the brightness can be directly controlled by XCamView
- With the adapter bracket of 76mm diameter, a electric controlled continuous zoom AFDM can be built

1.2.2 Specification of AFDM423

Interface & Button Functions		
	USB Mouse	USB mouse for XCamView control
	USB2.0	Connect USB flash drive to save pictures and videos Connect 5G WiFi module to transfer video wirelessly in real time with ToupView/ToupLite
	HDMI	Comply with HDMI1.4 standard. 4K/1080P format video output and supporting automatic switch between 4K and 1080P format according to the connected monitors
	USB Video	Connect PC or other host device to realize video image transmission with ToupView/ToupLite
	LAN	LAN port to connect router and switch to transfer video with ToupView/ToupLite
	ON/OFF	Power on/off switch
	LED	Power LED indicator
	SD	Comply with SDIO3.0 standard and SD card could be inserted for video and images saving
	DC12V3A	DC12V3A power input

XCamView Software Funcitons	
UI Operation	With USB mouse to operate on the embedded XCamView
Image Capture	8M (3840*2160) JPEG/TIFF image in SD card or USB flash drive
Video Record	Video format：8M(3840*2160) H264 encoded MP4 file Maximum Video saving frame rate:30fps
Camera Control Panel	Including Exposure, Gain, White Balance, Sharpness, Denoise, Denoise, Saturation, Gamma, Contrast, Brightness, Power Frequency control
Measurement Toolbar	Including Calibration, Measurement, and measurement parameter Export functions
Synthesis Control Toolbar	Including software Zoom, Flip, Color Conversion, Freeze, Grids, Overlay, Auto-focus, LED Control, Compare Image, Browser, Setting, Version Check function
Auto Focus Control Panel	Including Zoom, Auto Focus, One Push, Manual Focus, Reset, and other functions

Software ToupView/ToupLite Environment under USB/NETWORK 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(32 & 64 bit)/ToupView OSx(Mac OS X)/ToupLite Linux/ToupLite
PC Requirements	CPU: Equal to Intel Core2 2.8GHz or Higher
	Memory: 4GB or More
	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
Dimension	
Length x Width x Height	80mm x 80mm x 122mm
Shipping Weight	0.75kg

1.2.3 Dimension of AFDM423

Figure 3 Dimension of AFDM423

1.2.4 Packing Information of AFDM423

Figure 4 Packing Information of AFDM423

Standard Packing List		
A	Gift box: L:220cm W:220cm H:110cm (1pcs, 2.0kg/box)	
B	AFDM423	
C	HDMI Cable	
D	USB Mouse	
E	Power Adapter: Input: AC 100~240V 50Hz/60Hz, Output: DC 12V 3A	American Standard: Model: HKA03612030-7K : UL/CE/FCC(With American Standard AC Power Cable) European Standard: Model: HKA03612030-7K : UL/CE/FCC(With European Standard AC Power Cable) EMI Standard: FCC Part 15 Subpart B EMS Standard: EN61000-4-2,3,4,5,6
F	USB2.0 A male to A male gold-plated connectors cable /2.0m	
Optional Accessory		
G	USB WiFi adapter	
H	Ethernet cable	
I	LED Ring Light(DRL-5076A-NPC) or AALRL-200-7650(Not provided)	
J	USB flash drive	
K	SD card(16G)	

2 Installation and Operation of AFDM Series Product

Before use, please install the AFDM series product on an adaptive bracket.

1.Plug HDMI cable into the HDMI port to connect AFDM and HDMI monitor;

2.Plug a USB mouse into USB Mouse port, to get control of the AFDM by using built-in software XCamView;

3.Plug DC12V3A power adapter into DC12V3A port, to supply power for the AFDM, the LED Indicator will turn into red;

4.Insert SD card into SD card Slot for saving captured images and recorded videos;

5.Press ON/OFF button to start the AFDM, LED Indicator will turn into blue;

6.Move mouse to the left side of the video window, the Camera Control Panel will appear. It includes Manual/Automatic Exposure, White Balance, Sharpness, Denoise, and other functions, please refer to section 6.2 for details;

7.Move mouse to the upper side of the video window, the Measurement Toolbar will appear. It includes calibration, measurement of lines, angles, rectangles, circles, etc, and supports data export(*.CSV format), please refer to section 6.3 for detail;

8.Move mouse to the bottom side of the video window, the Synthesis Camera Control Toolbar will appear. Operations like Zoom In, Zoom Out, Flip, Color Conversion, Freeze, Grids, Overlay, Autofocus, LED brightness control, Compare Image, SD card or USB flash drive contents browsing, Settings, and Camera Version can be executed. See section 6.4 for details;

9.Move mouse to the bottom side of the video window, the Synthesis Camera Control Toolbar will pop up automatically. Click AF button, and Auto Focus Control Panel will show up for autofocus operation, it supports 8.4X optical zoom, Autofocus, Manual Focus, Reset, and One Push operation. See section 6.5 for details.

3 Images Captured with AFDM423

Figure 5 Ruler Captured with AFDM423 at 1X

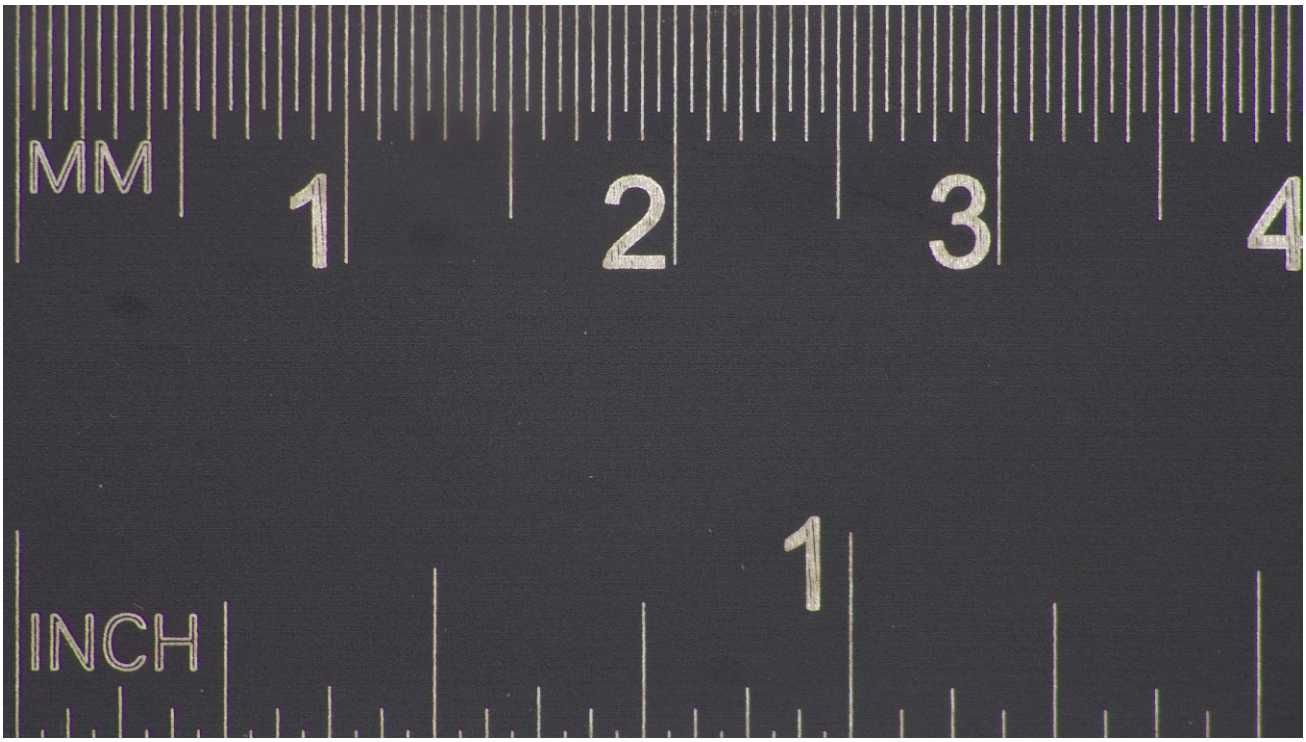


Figure 6 Ruler Captured with AFDM423 at 8.4X

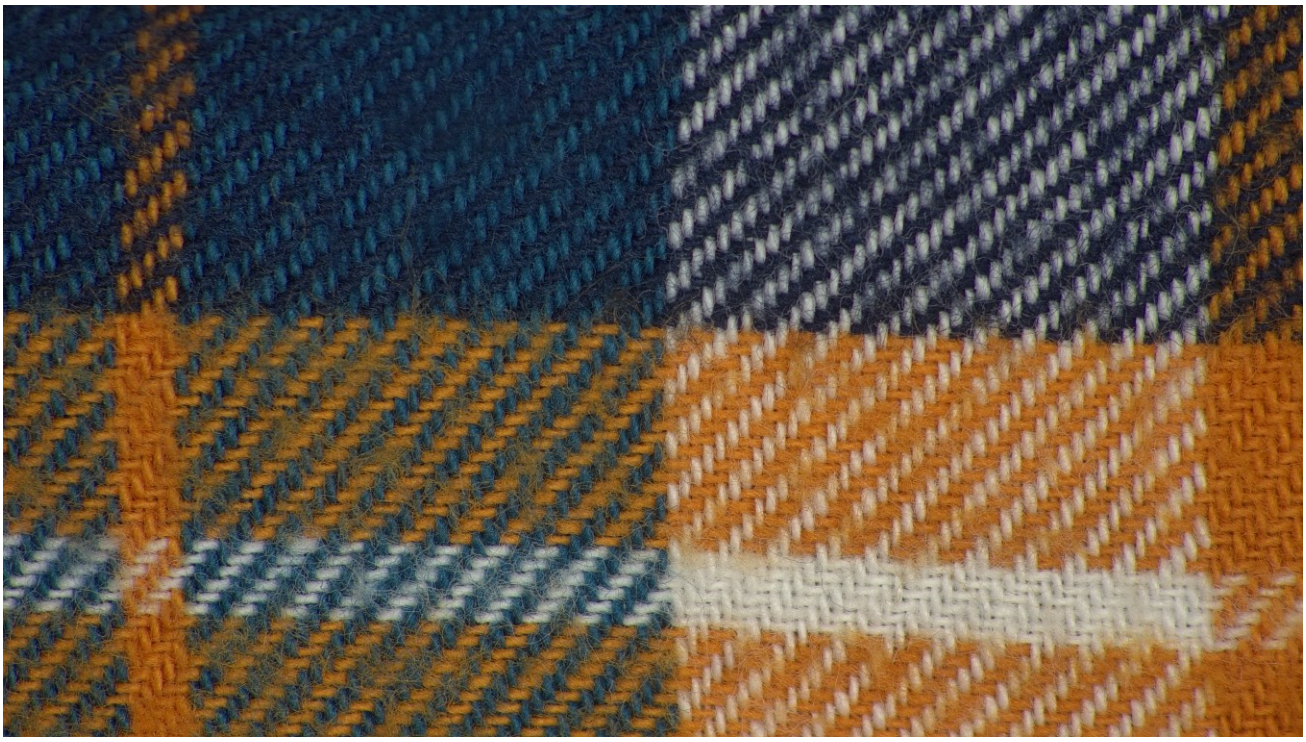


Figure 7 Fabric Captured with AFDM423

Figure 8 24-Color Chart Captured with AFDM423

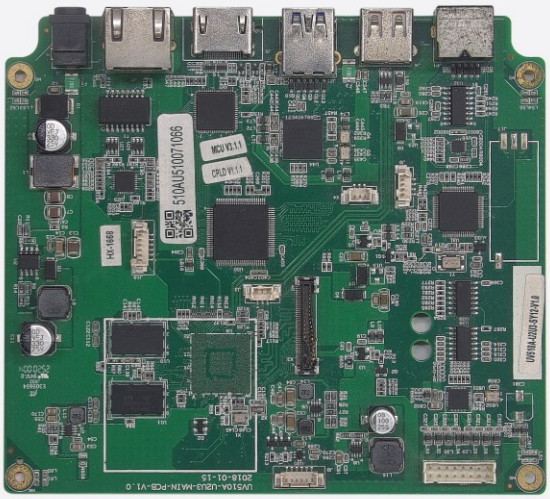


Figure 9 PCB Captured with AFDM423

4 Software and App

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

Windows: https://www.touptekphotonics.com.en/download/?category=Windows

macOS: https://www.touptekphotonics.com.en/download/?category=macOS

Linux: https://www.touptekphotonics.com.en/download/?category=Linux

Android: https://www.touptekphotonics.com.en/download/?category=Android

iOS: https://www.touptekphotonics.com.en/download/?category=iOS

For ToupLite and ToupView App, the Auto-focus and LED Brightness Control are not avaiable

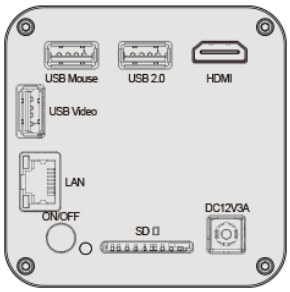
5 AFDM423 Camera Configurations

You can use the AFDM423 camera in 5 different ways. Each connection requires different hardware configuration.

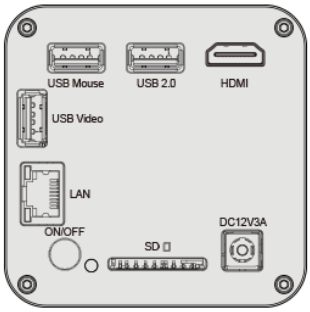
5.1 Camera Working Standalone with Built-in XCamView Software

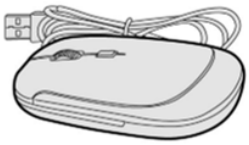
For this application, apart from the microscope, you only need an HDMI monitor, SD card/USB flash drive, the supplied USB mouse, and the camera embedded with XCamView software. The steps to start the camera are listed as below:

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

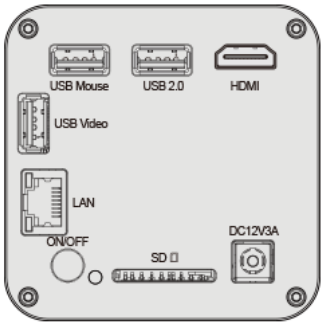


- Insert the supplied USB mouse to the camera's USB port;

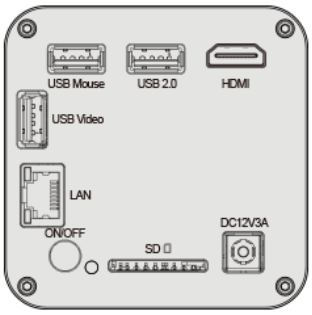


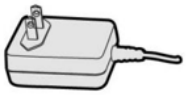


- Insert the supplied SD card/USB flash drive (USB2.0 slot) into the AFDM423 camera SD card slot/USB2.0 slot;



- 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.

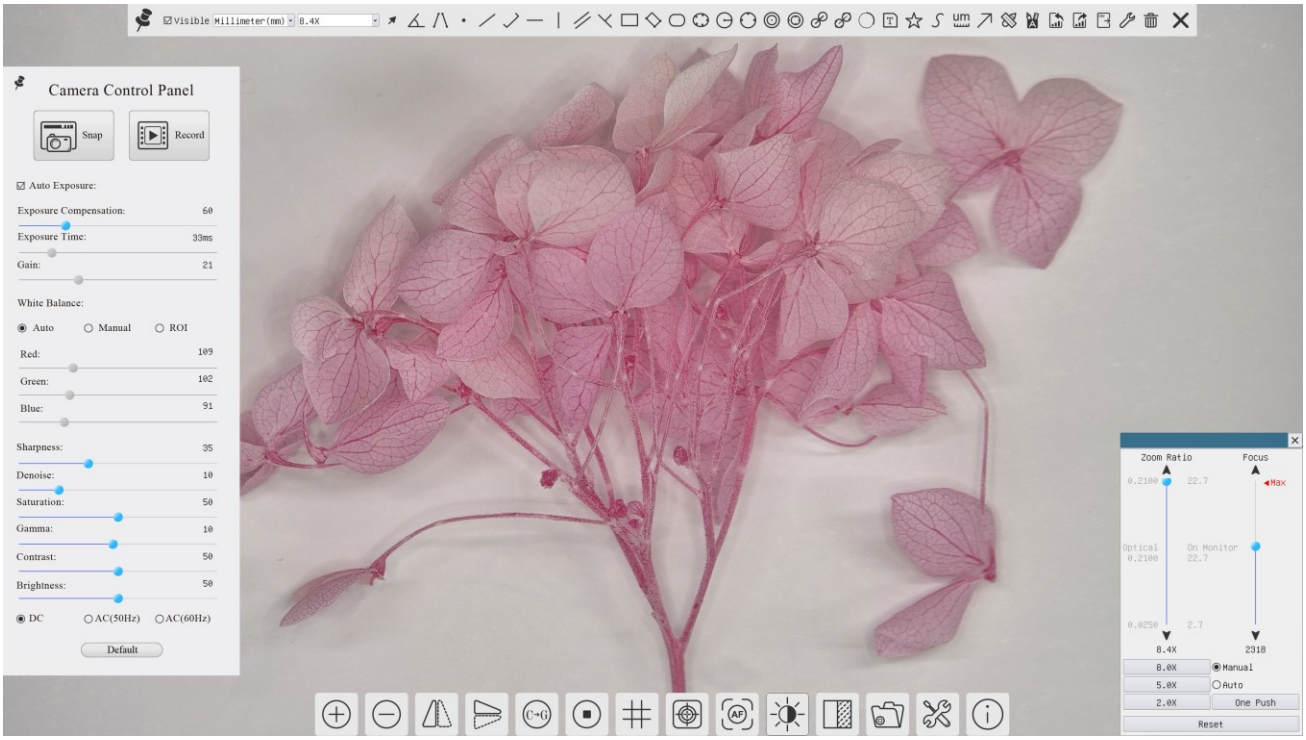


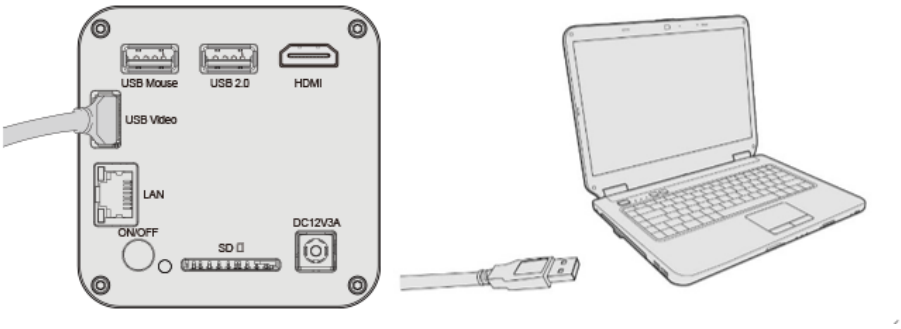
Figure 10 XCamView and AFDM423 Camera in HDMI Mode

5.2 Connecting Camera to Computers with USB2.0 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. 5.1. After the camera is running, connect camera to computer with USB cable. Please use "USB Video" slot, not "USB Mouse" slot as shown below.
- 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 n to start the live video as shown in Figure 11.



- After the USB cable is connected, the mouse will not work. If you want to use the mouse for HDMI application(XCamView), please unplug the USB cable to activate it.

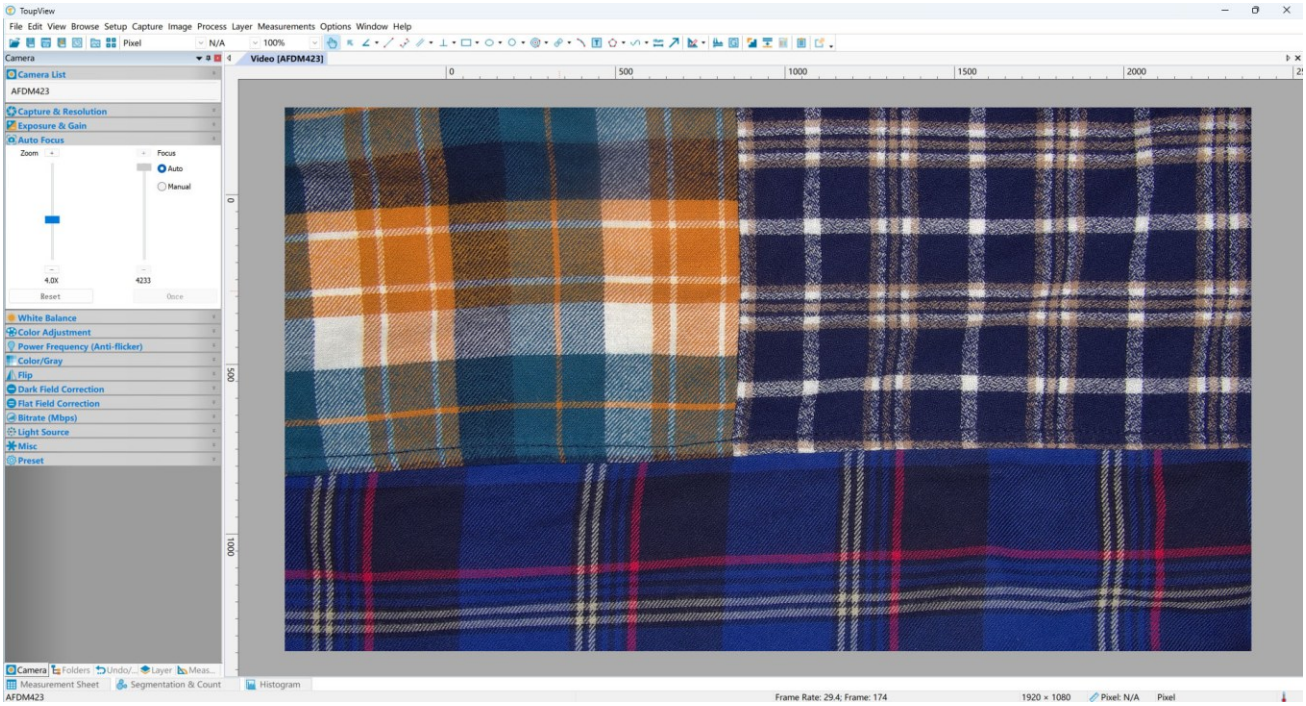


Figure 11 ToupView and AFDM423 Camera in USB Mode

5.3 Camera Working in WiFi Mode (AP Mode)

Please make sure your PC is WiFi enabled.

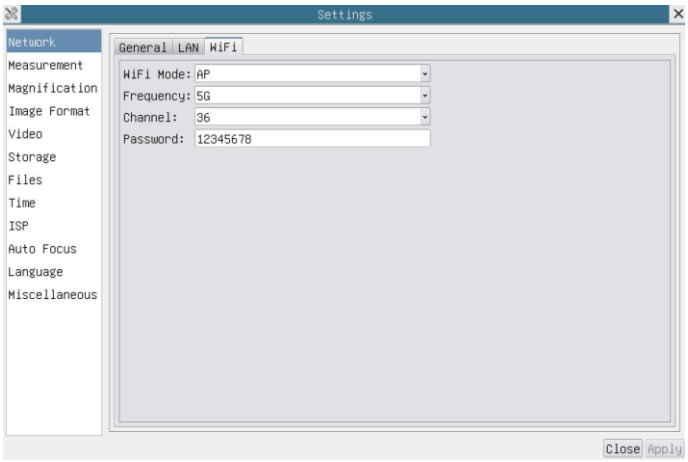
For Windows user (Windows XP (32bit), Windows 7/8/10/10/11 (32/64 bit)), please use ToupView.

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.

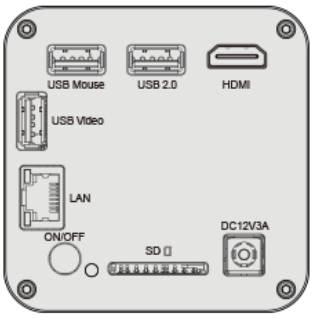
The steps to start the camera are listed below:

Start the camera according to Sec. 5.1. 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

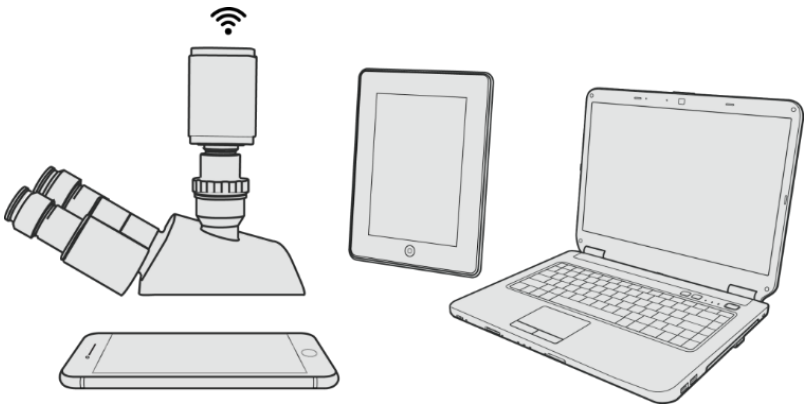
Wi-Fi Mode edit box(The factory default configuration is AP mode).



Plug the USB WiFi adapter into the camera's USB2 .0 port;



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 AFDM423 cameras will be automatically recognized. The live image of each camera is shown in Figure 12. For the display, the Camera List tool window is used in ToupView/ToupLite software, and the Camera Thumbnail is used in ToupView App.

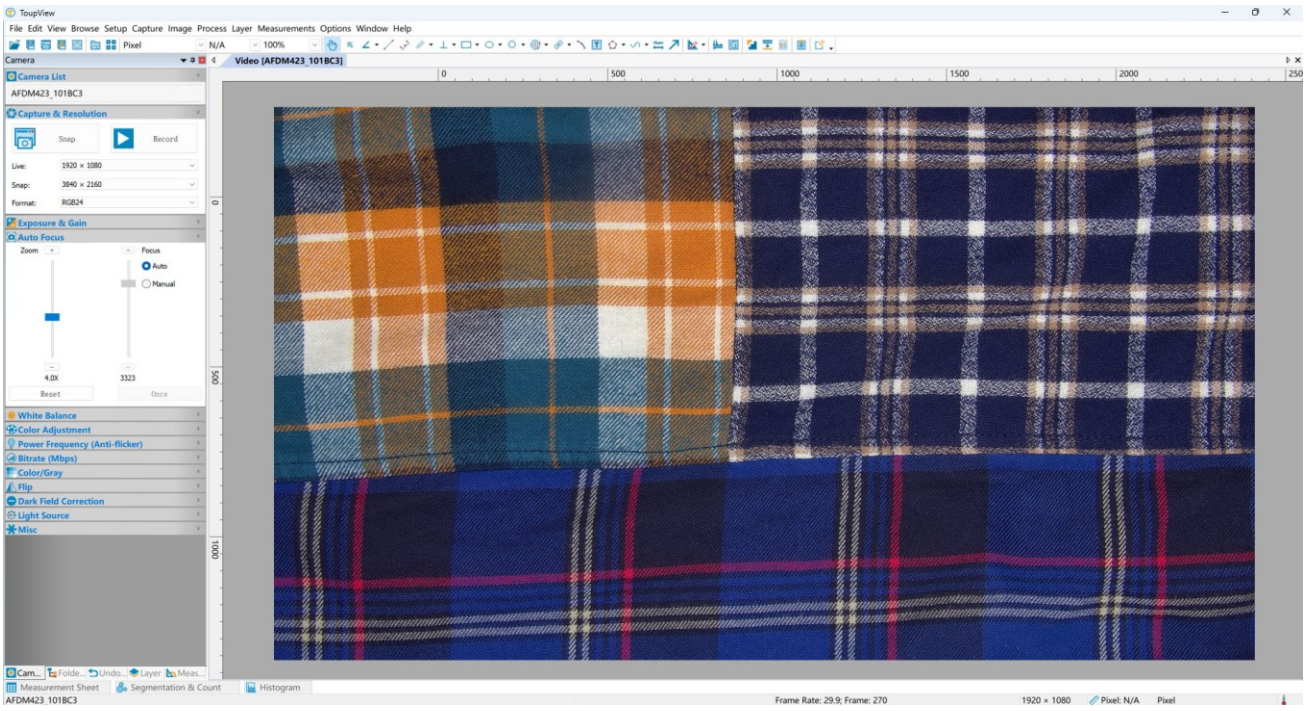


Figure 12 ToupView and AFDM423 Camera in WiFi AP Mode

5.4 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 are in the same net. The subnet mask and gateway of the camera and PC must be the same.

Start the camera according to Sec. 5.1 after the camera is running, clicking  button on the Synthesis Camera Control Toolbar at the bottom of the video window(See Figure 10), 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.

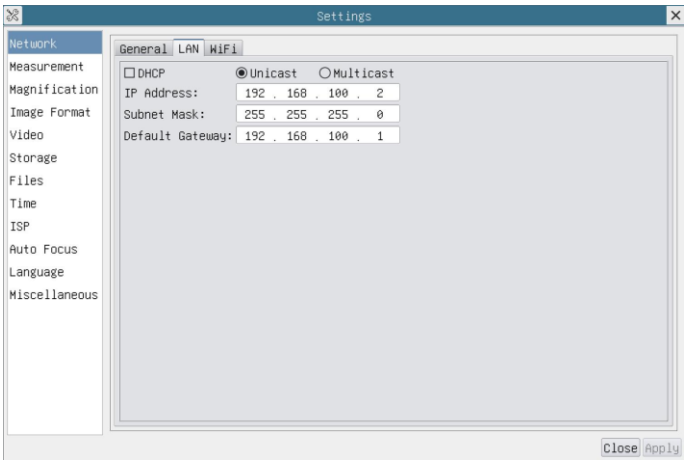


Figure 13 Configure theAFDM423 Camera IP

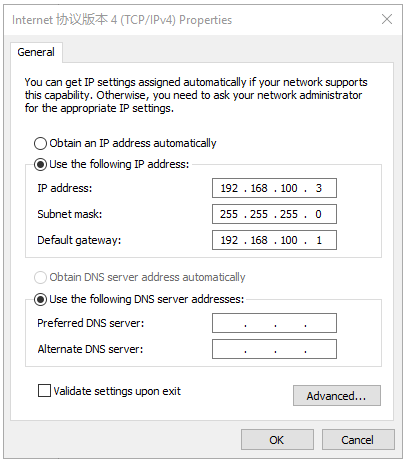
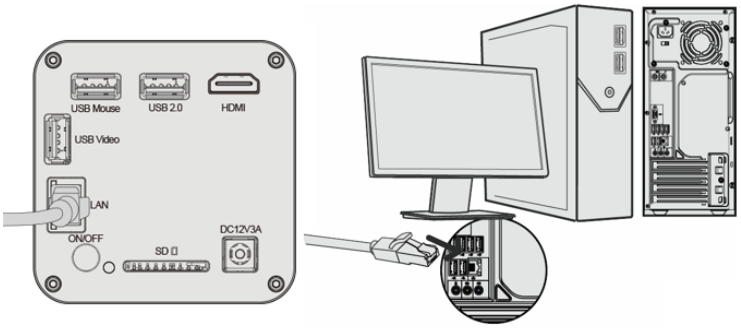


Figure 14 Configure the PC's IP

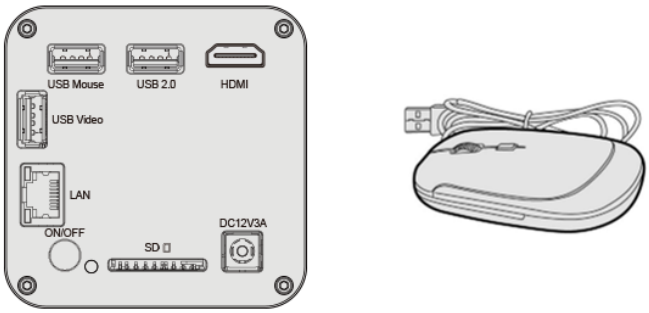
After the above configurations are finished, user can connect the AFDM423 camera to the computer through the

Ethernet cable as shown below:

Connect the LAN port with the Ethernet cable to the PC's network port;



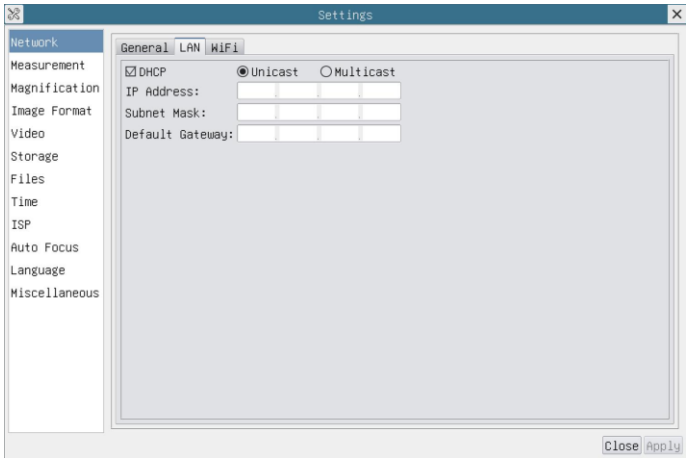
Insert the supplied SD card/USB flash drive (USB2.0 slot) into the AFDM423 camera's SD card slot/USB2.0 slot;



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 12.

5.5 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.

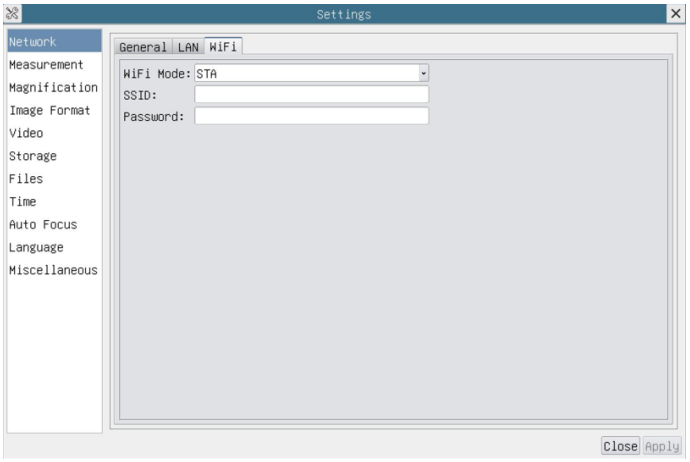


The connection and configuration are just the same as in Sec.5.1. But here, users need to check DHCP. If Multicast is disabled or is not supported, users should only select Unicast. If Multicast is supported by the network,

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.

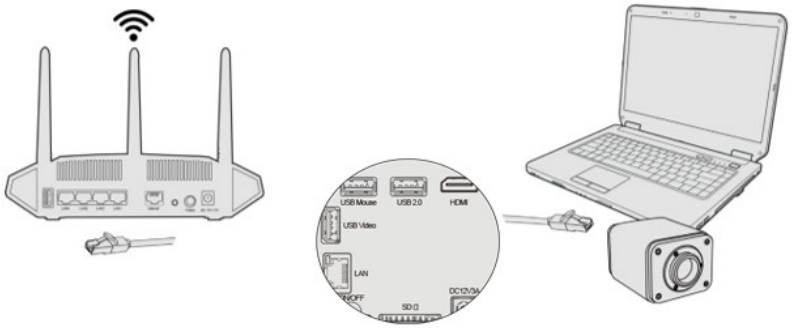
Active AFDM423 camera is recognized by ToupView/ToupLite software or ToupView App and they are displayed as a camera list or thumbnail in the software or app as shown in Figure 11.

Or start the camera according to Sec. 5.1. 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 Wi-Fi Mode edit box(The factory default configuration is AP mode). Input the to be connected router's SSID and Password as shown below:

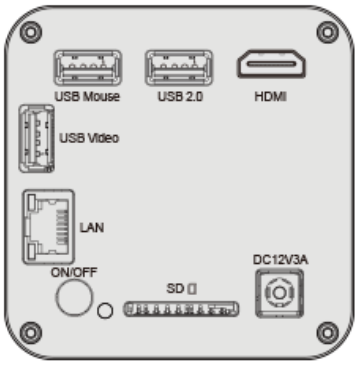


Install ToupView /ToupLite software on your PC. Alternatively, install the free ToupView App on the mobile device;

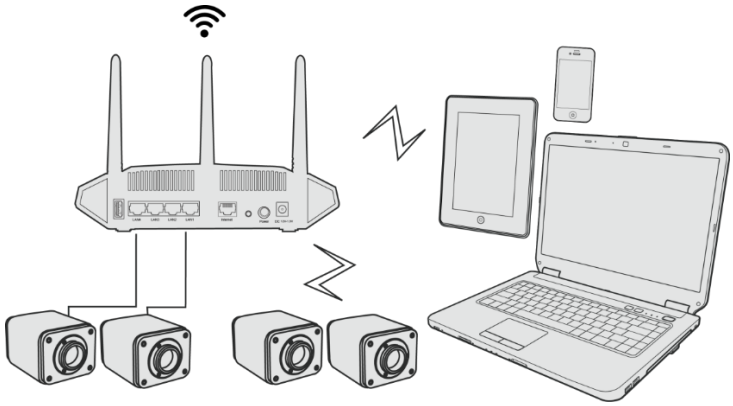
Plug the Ethernet cable into the camera's LAN port and the other end to the PC (for those connected to router with WiFi STA mode);



Or plug the USB WiFi adapter into the camera's USB2.0 port(for those connected to router with WiFi STA mode);



Finally, as shown below, 2 AFDM423 cameras are connected to the router with LAN cable and 2 AFDM423 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 AFDM423 cameras are automatically recognized. The live image of each camera is displayed. For the display, Camera List control panel window is used in ToupView/ToupLite software, and Camera Thumbnail is used in ToupView App; Select the AFDM423 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 802.11ac 5G segment should be selected to achieve better wireless connection experience.

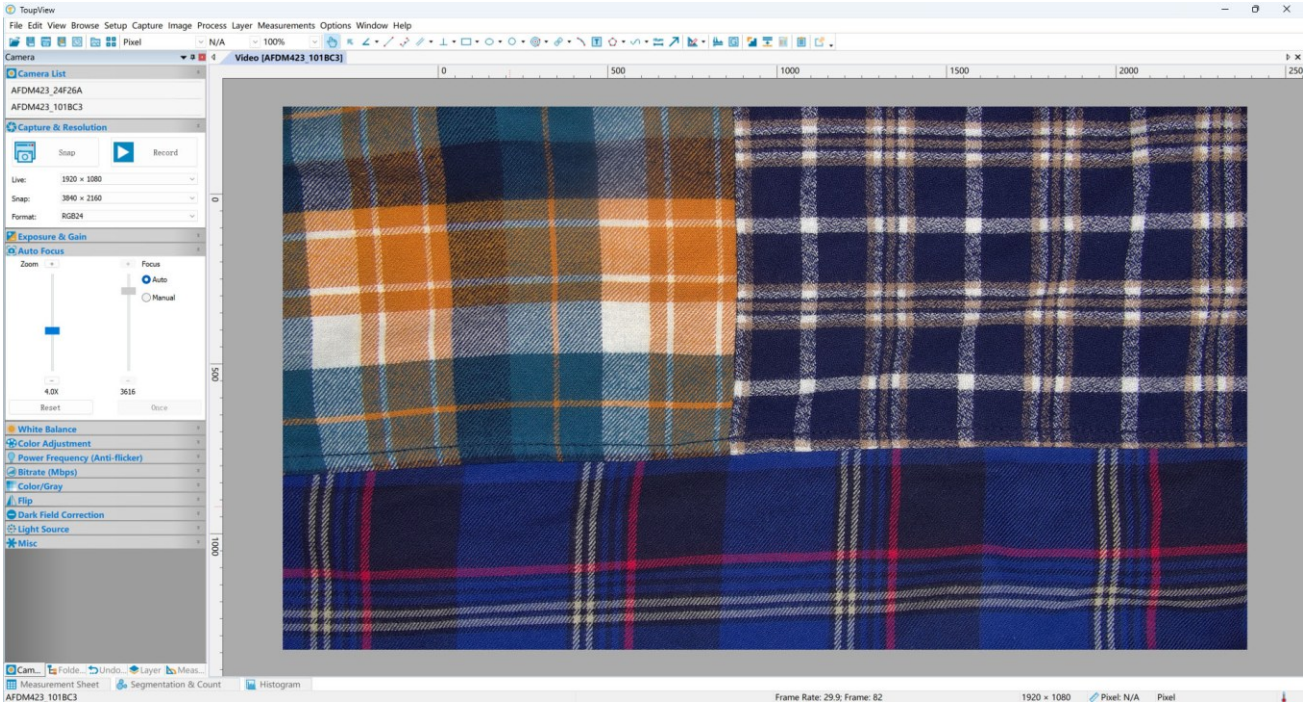


Figure 15 ToupView and AFDM423 camera in LAN port/WiFi STA mode

6 Introduction of XCamView UI and Functions

6.1 Control UI

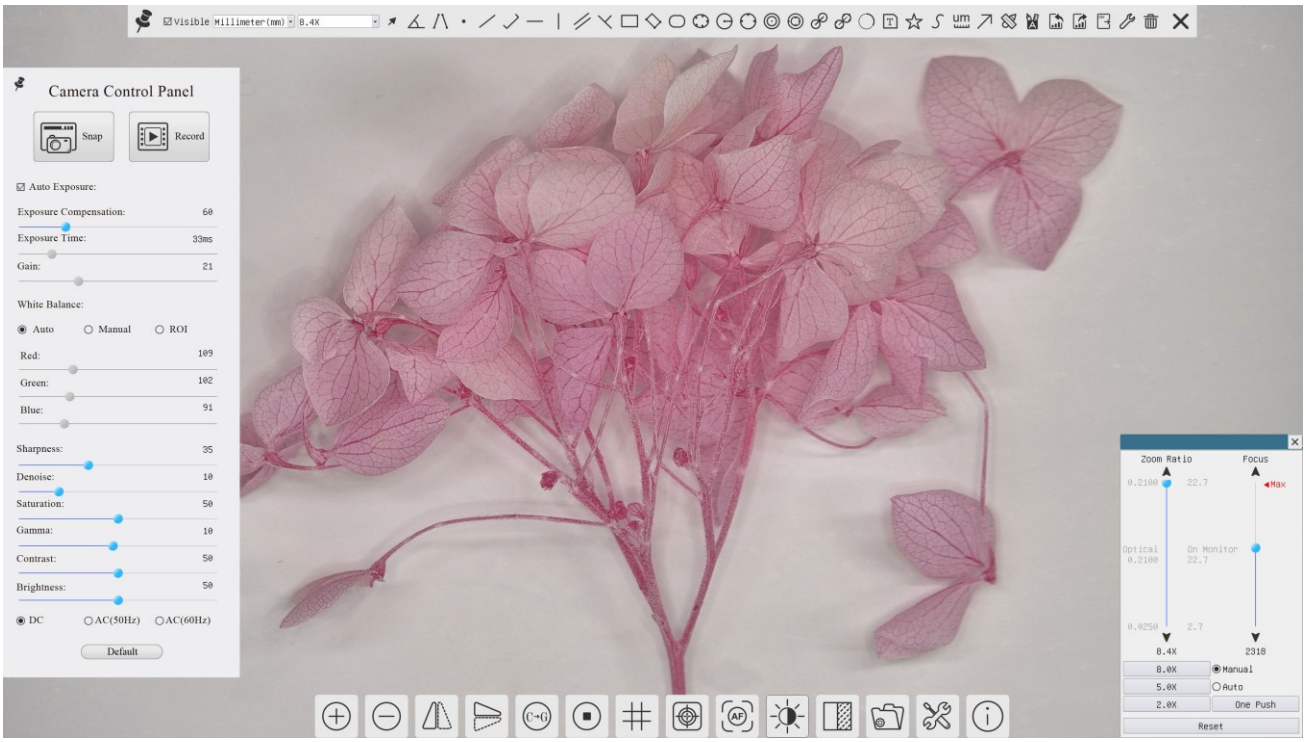
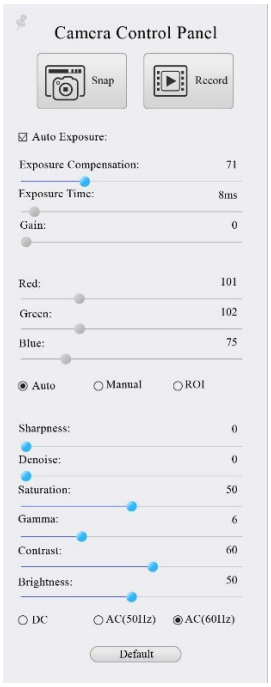


Figure 16 XCamView and Its Control UI

AFDM 's XCamView software operation UI is shown in Figure 16. It includes Camera Control Panel on the left side of the video window, Measurement Toolbar on the top of the video window, Synthesis Camera Control Toolbar, and Autofocus Control Panel on the right side of the video window.

Software Toolbar / Control Bar / Control Panel	
1	Move the mouse to the left side of the video window, the Camera Control Panel will pop up automatically;
2	Move the mouse to the bottom of the video window, the Synthesis Camera Control Toolbar will pop up automatically;
3	Move the mouse to the bottom of the video window, the Synthesis Camera Control Toolbar will pop up automatically. Click the button and the Auto Focus Control Panel will appear for autofocus operation; Click the button will activate the LED Brightness Control to adjust the brightness of the camera's light source.
4	Move the mouse to the upper side of the video window, the Measurement Toolbar will pop up for the calibration and measurement operations. When the 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 user moves mouse to the left side of the video windows. Only when the user left-clicks the button on the Measurement Toolbar to exit from the measuring procedure will he be able to do other operations on Camera Control Panel, Autofocus Control Panel, or 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 objects.

6.2 The Camera Control Panel on the Left Side of the Video Window

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 current video brightness to achieve proper video brightness
	Exposure Time	Available when Auto Exposure is unchecked. Slide to left or right to decrease or increase the exposure time to adjust the video brightness
	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
	Sharpness	Adjust Sharpness level of the video window
	Denoise	Adjust Denoise level of the video window
	Saturation	Adjust Saturation level of the video window
	Gamma	Adjust Gamma level of the video. Slide to the right to increase the gamma value and to the left to decrease the gamma value.
	Contrast	Adjust Contrast level of the video. Slide to the right side to increase and to the left to decrease video contrast
	Brightness	Adjust Brightness level of the video. Slide to the right side to increase Brightness and to the left to decrease Brightness.
	DC	For DC illumination, there will be no fluctuation under the light source so no need for compensating light flickering
	AC(50HZ)	Check AC(50HZ) to eliminate flickering “strap” caused by 50Hz illumination
	AC(60HZ)	Check AC(60HZ) to eliminate flickering “strap” caused by 60Hz illumination
	Default	Set all the settings in the Camera Control Panel to the default values.

The Camera Control Panel controls the camera to achieve the best image quality according to the specific applications; It will pop up automatically when the mouse is moved to the left side of the video window (in measurement status, the Camera Control Panel will not pop up. Only when the measurement process is terminated will the Camera Control Panel pop up by moving mouse to the left side of the video window). Left-clicking button to achieve Display/ Auto Hide switch of the Camera Control Panel;

6.3 The Measurement Toolbar on the Upper Side of the Video Window

6.3.1 Introduction to Measurement Toolbar

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

Icon	Function	Icon	Function
	Float/ Fix switch of the Measurement Toolbar	Visible	Define measuring object in Show up/ Hide mode
Pixel	Select the desired Measurement Unit		
NA	Choose the same Magnification as the digital microscope current Zoom Ratio to ensure accuracy of measurement result when measurement unit is not in Pixel unit		
	Object Selection		Angle
	Four Point Angle		Point
	Arbitrary Line		Three Point Line
	Horizontal Line		Vertical Line
	Parallel Line		Three Point Vertical
	Rectangle		3 Points Rectangle
	Ellipse		5 Points Ellipse
	Center + Radius Circle		Three-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
	Make Calibration to determine the corresponding relation between magnification and resolution, this will establish the corresponding relationship between the measurement unit and the sensor pixel size. The monitor's size can be input to achieve the accurate value of the digital magnification. The Calibration needs to be done with the aid of a ruler with an accuracy of more than 1mm. The detailed Calibration process is described in Sec. 6.3.2		
	Auto Measurement: Two Points Parallel, Circle Detect, Annulus Detect, Rectangle Detect, Polygon		
	Import		Export
	Export the measurement information to CSV file(*.csv)		
	Delete all the Measurement Objects		
	Setting		Exit from Current Measurement Mode
	When the measurement ends, left-click on a single measuring object and the Object Location & Properties Control Bar will show up. The icons on the control bar mean Move Left, Move Right, Move Up, Move Down, Color Adjustment, and Delete.		

Note:1) When the user left-clicks Display/Hide 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 moving the mouse cursor to the left side of the video window. Only when users left-click the button on the Measurement Toolbar to exit from the measurement mode will they be able to perform other operations in the Camera Control Panel, the Autofocus Control Panel, or the Synthesis Camera Control Toolbar.

2) When a specific measuring object is selected during the measuring process, the Object Location & Attributes Control Bar will appear for changing the object location and properties of the selected objects.

3) To ensure accuracy of the measurement, after the calibration is turned on, the camera will automatically reset, and then sets the normalization magnification to 8.4X, and adjusts the focus to the required standard object distance. If the "Calibration Object" on the stage is not clear on the monitor, you need to manually adjust the height of the bracket to the clearest position, which is the standard object distance. After the Calibration is completed, use the Measurement Toolbar to measure the 1mm physical distance on the ruler, which should display 1mm on the monitor.

4) Even if the Calibration has been completed, once the user needs to measure, but is not sure whether the camera is at the standard object distance position, it is always better to reset it first, adjust the stand height in the reset state to make the observation object clear, and ensure that the camera is at the standard object distance position before measurment.

6.3.2 Calibration Method

User needs to prepare an Calibration Object such as ruler before Calibration;

Move the mouse to the upper side of the video window, the Measurement Toolbar will appear. Clicking Calibration on the Measurement ToolBar to start the calibration.

1)The XCamView will pop up a message box: "1. Camera resetting for calibration..."

2)After the reset is finished, a message box: "2. Please put the calibration object on the stage(if not), adjust the height of the stand until the calibration object is in focus, then click OK button; " will pop up.

3)After clicking the OK Button, XCamView will pop up a Calibration dialog shown below:

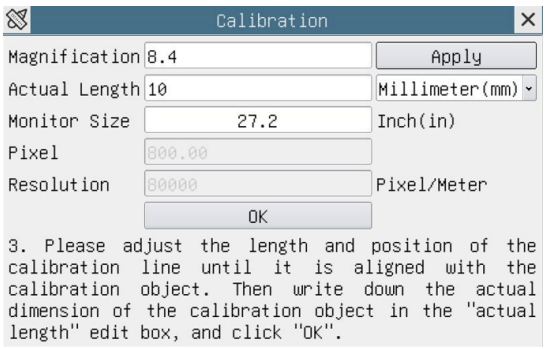


Figure 17 A Dialog for Calibration

Magnification:	the Magnification edit box, can be set from 1 to 18 as user want, Click Apply button to confirm;
Actual Length:	the Actual Length of the Calibration object on the stage, the unit can be selected with the right drop-down list box. Read the hint on the Calbration dialog to get the correct Calibration result;
Monitor Size:	The camera software defaults to a Monitor Size of 27.2 inches. If the user uses a different Monitor Size, please enter the corresponding Monitor Size The digital magnification is related to the Monitor Size.
Pixel:	the length in Pixel of the Calibration Line on the monitor;
Resolution:	the resolution in Pixel/Meter unit which is arrived by Pixel/Actual Length;
OK:	Click OK button to end the Calibration;
Users can refer to the message: "3. Please adjust the length and position of the calibration line until it is aligned with the calibration object. Then write down the actual dimension of the calibration object in the actual length edit box, and click OK." to get the correct calibration result.	

The default monitor size is 27.2 inches. Users can enter the practical Monitor Size. The digital magnification is related to the Monitor Size.

6.4 Synthesis Camera Control Toolbar At 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 Conversion		Video Freeze
	Grids		Overlay
	Auto Focus Control Panel		LED Brightness Control
	Compare Image		Browse Images Videos
	Settings		Check the Version of XCamView

The Setting function is relatively more complicated than the other functions. Here is more info about it:

6.4.1 Settings>Network

6.4.1.1 Settings>Network>General

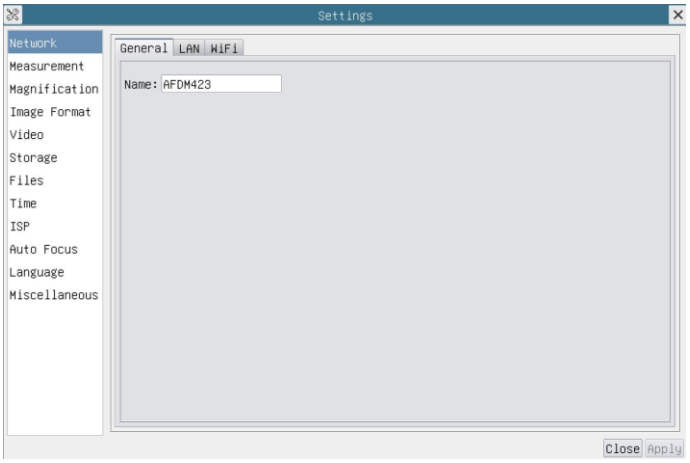


Figure 18 Comprehensive Network General Settings Page

Name	The current camera name recognized as the network name

6.4.1.2 Settings>Network>LAN

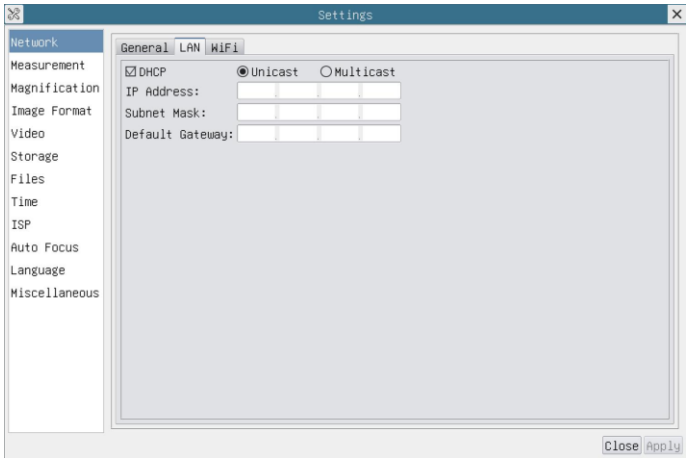


Figure 19 Comprehensive Network LAN Settings Page

DHCP	Dynamic host control protocol allows DHCP server to automatically assign IP information to the camera. Only in Sec 5.4 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 5.5 networking environment, when the router/switch has multicast function, camera can switch to multicast mode, which can save the network bandwidth consumed by the camera and facilitate the connection of more cameras in the same network;
IP Address	Every machine on a network has a unique identifier. Just as you would address a letter to send in the mail, computers use the unique identifier to send data to specific computers on a network. Most networks today, including all computers on the Internet, use the TCP/IP protocol as the standard for how to communicate on the network. In the TCP/IP protocol, the unique identifier for a computer is called IP address. There are two standards for IP address: IP Version 4 (IPv4) and IP Version 6 (IPv6). All computers with IP addresses have an IPv4 address, and many are starting to use the new IPv6 address system as well. Users must manually configure their IP addresses on the camera side and computer side. The IP addresses set on the camera side and computer side should be in the same network segment. The specific settings are shown. It's usually a private address. Private address is a non-registered address used exclusively within an organization. The internal private addresses retained are listed below: Class A 10.0.0-10.255.255; Class B 172.16.0-172.31.255.255; Class C 192.168.0-192.168.255.255. The suggested IP address is Class C.
Subnet Mask	Subnet Mask is used to distinguish network domain from host domain in 32-bit IP address;
Default Gateway	A default gateway allows computers on a network to communicate with computers on another network. Without it, the network is isolated from the outside. Basically, computers send data that is bound for other networks (one that does not belong to its local IP range) through the default gateway; Network administrators configure the computer's routing capability with an IP range's starting address as the default gateway and point all clients to that IP address.

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

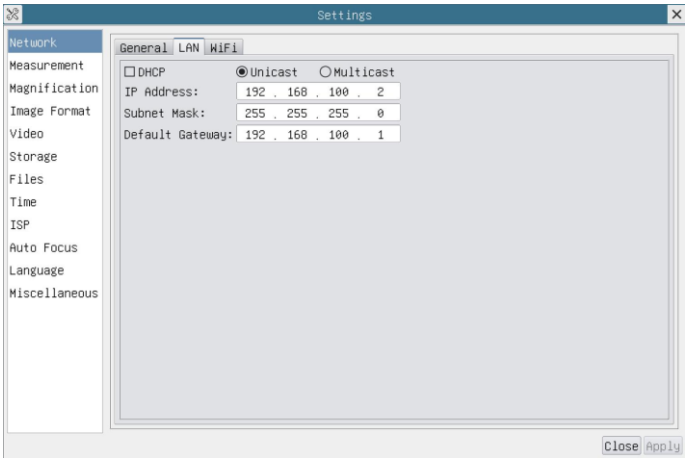


Figure 20 Manual DHCP and Unicast

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

6.4.1.3 Settings>Network>WiFi

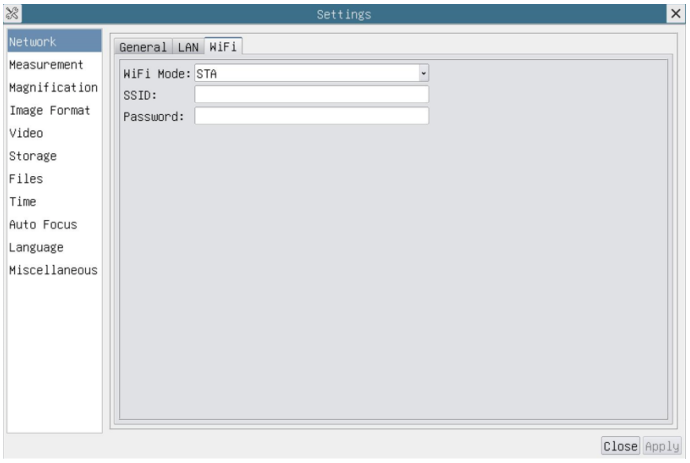


Figure 21 Network Setup

Wi-Fi Mode	AP/STA mode to select;
Channel/SSID	Channel for the AP mode and SSID for the STA mode. Here, the SSID is the router's SSID;
Password	Camera Password for the AP mode. Router Password for the STA mode

6.4.2 Settings>Measurement

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

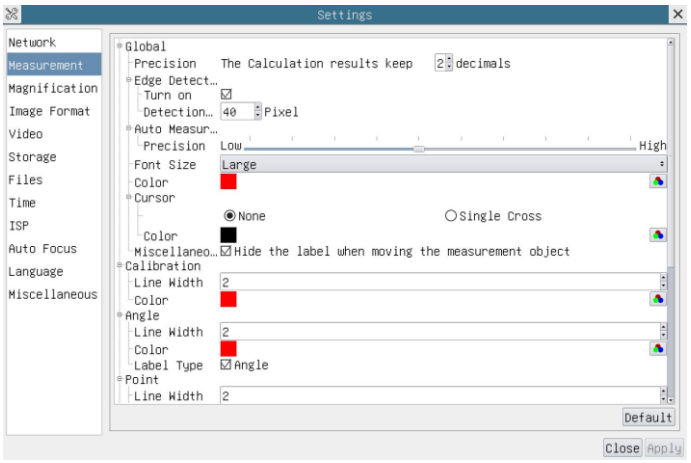


Figure 22 The Measurement Setup

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 Measurment	Used for define the level of accuracy used for auto measurement;
	Fort Size	The font size of measurement data can be divided into three types: large, Middle, and Small;
	Cursor	Select whether the cursor is a single crosshair and set the color of the single cross;
	Miscellaneous	Whether to hide the label when moving the measurement objects;
Calibration	Line Width	Used for defining width of the lines for calibration;
	Color	Used for defining color of the lines for calibration;
	EndPoint	Type: Used for defining shape of the endpoints of lines for calibration: Null means no EndPoint, rectangle means rectangle type of endpoints. It makes alignment more easily;
Point, Angle, Line, Horizontal Line, Vertical Line, Rectangle, Circle, Ellipse, Annulus, Two Circles, Polygon, Curve		

	Left-click the ⊞ along with the Measurement command mentioned above will unfold the corresponding attribute settings to set the individual property of the Measurement Objects.

6.4.3 Settings>Magnification

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

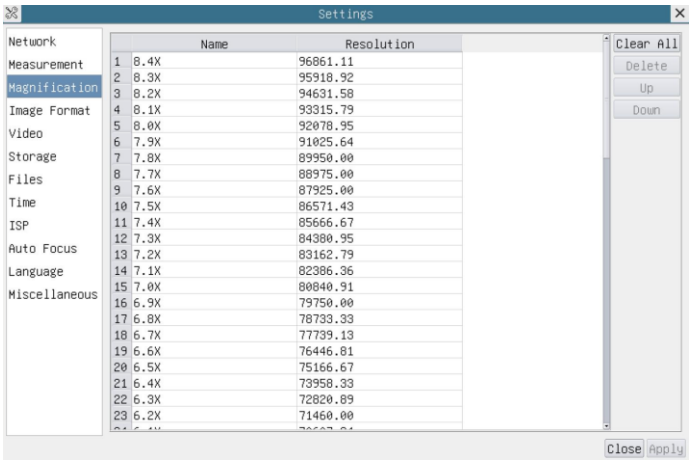


Figure 23 Comprehensive Magnification Settings Page

Name	Names such as 2X, 5X, 8.4X， are based on magnification of the Digital microscopes.
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 ratio and click Up to move up the currently selected magnification ratio;
Down	Select a row in the magnification ratio and click Down to move down the currently selected magnification ratio;

6.4.4 Settings>Image Format

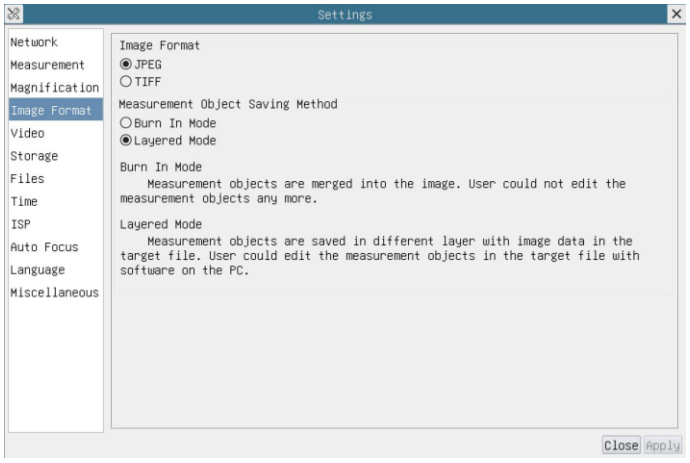


Figure 24 Comprehensive Image Format Settings Page

Image Format	JPEG: The extension of JPEG file can get very high compression rate and display very rich and vivid images by removing redundant images and color data. In other words, it can get better image quality with the least disk space. If measurement objects are available, the measurement objects will be burned into the image and the measurement cannot be edited. TIFF: TIFF is a flexible bitmap format mainly used to store images including photos and artistic images.

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. 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.

6.4.5 Settings>Video

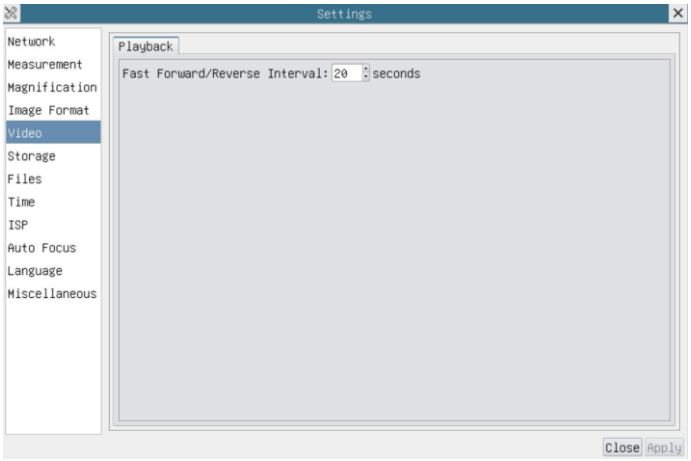


Figure 25 Comprehensive Setting of Video page

Video Playback	Fast Forward/Reverse internal in second unite for Video Playback

6.4.6 Settings>Storage

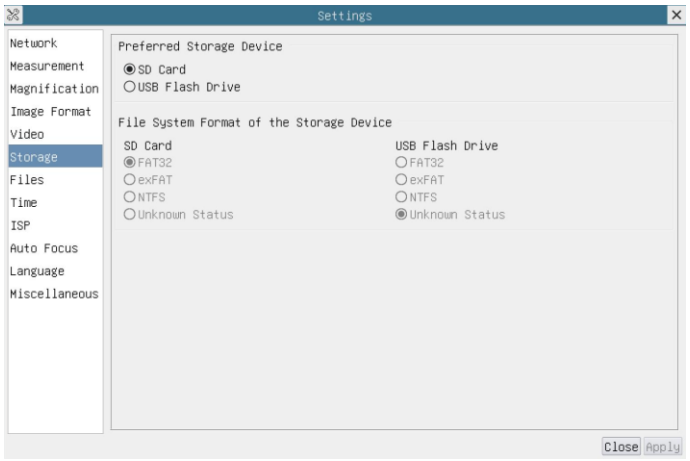


Figure 26 Comprehensive Setting of Storage Page

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

6.4.7 Settings>Files

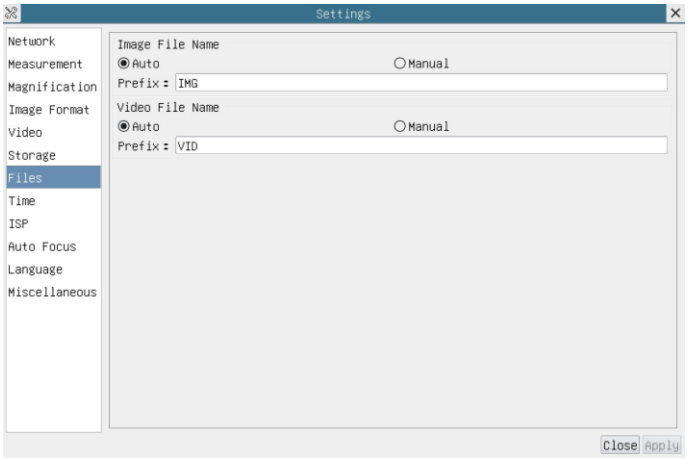


Figure 27 Comprehensive Setting of Files Name

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

6.4.8 Settings>Time

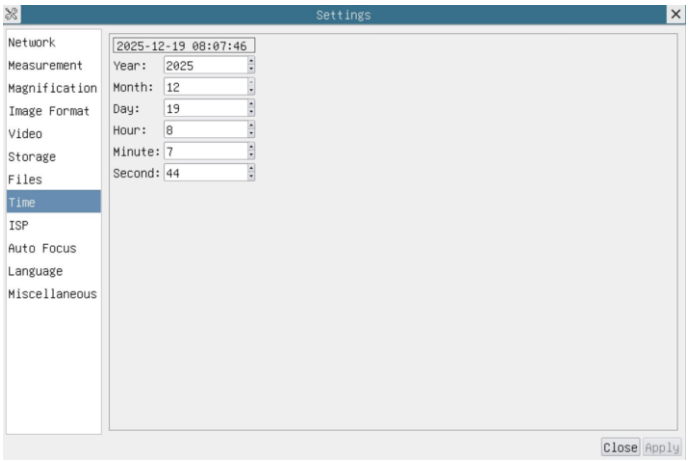


Figure 28 Time Setting

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

6.4.9 Settings>ISP

Figure 29 Comprehensive Setting of ISP Setting Page

Clarity Factor	Check this will show the Clarity Factor on the video window screen to tell if the camera is focused correctly or not;
ROI Color	Choosing the ROI rectangle line color
Dark Enhance	Define the intensity value for dark enhancement
Clarity Enhance	Define the intensity value of Clarity Enhance;
Bringhtness Enhance	Define the intensity value of Bringhtness Enhance;
Purple Reduction	Define the intensity value of Purple Reduction edges;
Metering Mode	Select the Metering mode as the Evaluative Metering, Peak Metering or Region Metering; Peak Metering Mode: Provides metering intensity configuration, default is 8; The larger the value, the stronger the overexposure inhibition
Lens Distortion Correction	Define the strength value for lens distortion correction Description: Negative: correction for pillow shaped distortion Positive: correction for barrel shaped distortion The lens has slight distortion at low magnification, the recommended configuration value is -4. Please adjust it according to the actual effect.

6.4.10 Settings>Auto Focus

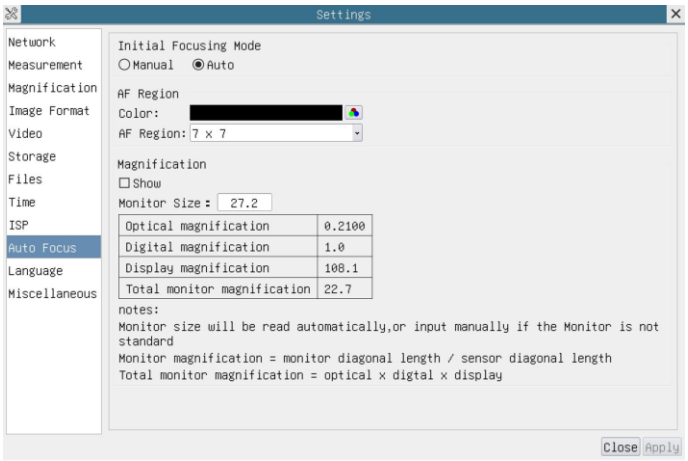


Figure 30 Comprehensive Setting of Auto Focus Setting Page

Initial Focusing Mode	Choose between Manual or Auto mode, which will be displayed after restarting the camera;	
AF Region	Color	Define the color of the AF region border;
	AF Region	Define the size of the AF region border;
Magnifcation	Choose whether the interface displays magnification	
Monitor Size	Users can input the display size for better focusing, with a default display of 27.2 inches (in); (The camera automatically acquires optical magnification, digital magnification, monitor magnification, and total monitor magnification)	
Notes:1.Monitor size will be read automatically or input manually for abnormal monitor 2.Monitor magnification = monitor diagonal length / sensor diagonal length 3.Total monitor magnification = optical * digtal * monitor		

6.4.11 Settings>Language

Figure 31 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;
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;

6.4.12 Settings>Miscellaneous

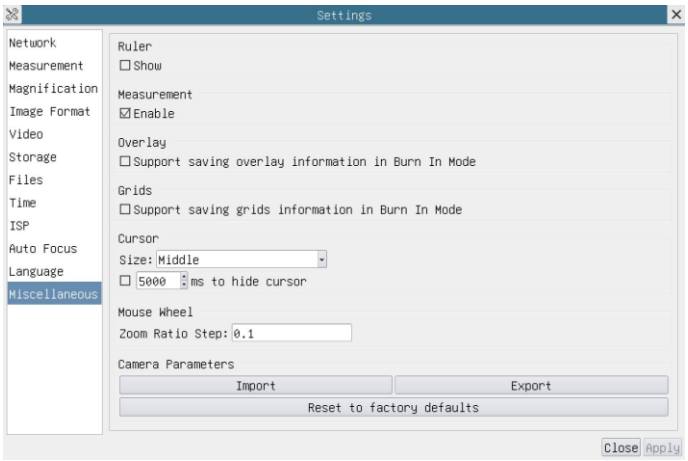
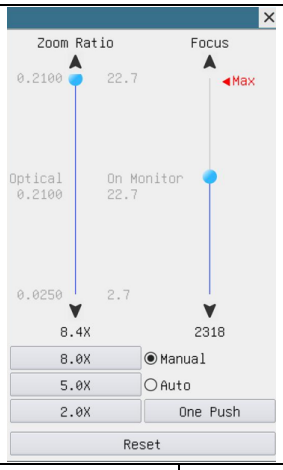


Figure 32 Comprehensive Miscellaneous Settings Page

Ruler	Select to display the ruler in the video window, otherwise not to display the ruler;
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;
Cursor	Select the Cursor size and hide time;

Mouse Wheel	Define the value of mouse wheel zoom ratio step
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;

6.5 Auto Focus Control Panel on the Right Side of Video Window

<table>
<tr><td rowspan="5"> 
</td><td>Zoom Slider</td><td>Move the Zoom Slider to change the Zoom Ratio, the value will be displayed below the slider. It can be edited to set the desired Zoom Ratio</td></tr>
<tr><td>Zoom Button</td><td>There are 3 Zoom Buttons, users can set specific zoom ratio for the quick control</td></tr>
<tr><td>Optical Magnification</td><td>Optical Magnification is the designed lens magnification</td></tr>
<tr><td>Digital Magnification</td><td>Digital Magnification is the object length on the monitor divided by the actual object length</td></tr>
<tr><td>Focus Slider</td><td>Move the Focus Slider to change the focus lens position; The focus lens position value will be displayed below the slider. It can be edited to set the desired focus lens position;</td></tr>
<tr><td>Manual Focus</td><td colspan="2">With Manual Focus radio button is checked, users can move the Focus Slider to change the focus lens position to get a clear image. The position value of the focus lens below the slider can be set by the user</td></tr>
<tr><td>Autofocus</td><td colspan="2">With Autofocus radio button is checked, the system will automatically focus the object on the stage, the focus lens position value under the Focus Slider will be refreshed in real-time; When the ROI or Object state is changed, the camera will perform the Auto Focus operation automatically</td></tr>
<tr><td>One Push</td><td colspan="2">Clicking One Push button will perform a Autofocus operation at a time</td></tr>
<tr><td>Reset</td><td colspan="2">Click Reset button to reset the Zoom and Focus modules. After the process is finished, the Zoom is set to 8.4X normalized magnification, and the Focus is fixed at the standard object distance(600mm in this model), if the object(such as a ruler for Calibration) is not clear, adjust the stand bracket to move the object to the standard object distance.
Note: (see Measurement Toolbar>Calibration items for details 6.3.2).</td></tr>
</table>

6.6 Focus Region On The Video Window

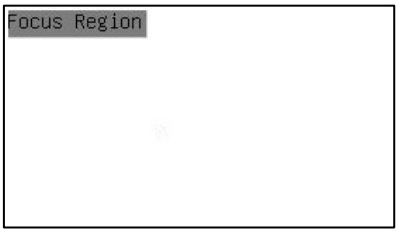


Figure 33 Focus region

The Focus Region is used for selecting the region of interest for Auto Focus operation. When user clicks the  button on the Synthesis Camera Control Toolbar, the Focus Region will pop up as well with the Autfoocus Control Panel. Users can click any part of the video window to select the focus region for Auto Focus operation.

When users close the Autofocus Control Panel, the Focus Region will be closed automatically.