TAFDM41X Touchscreen Electric Controlled Continuous Zoom and Autofocus Digital Microscope Operating Manual

Contents

1 The Basic Characteristic of TAFDM41X Series Camera

TAFDM41X is a series of electric controlled continuous zoom and autofocus all-in-one digital microscope is the latest AFDM camera developed by ToupTek Photonics that can connect to a 13.3-inch touch screen. It is integrated with Touch Screen, HDMI camera, Electric Controlled Continuous Zoom Auto-focus Objective and LED Integrated Illumintaion Light. TAFDM is the abbreviation of Touch Auto Focus Digital Microscope. Different products in the TAFDM series can be formed with different part to satisfy the applicatuon requirement.

TAFDM41X series camera can be assembled with various brackets or arms and offer a continuous zooming ratio with different lens. TAFDM41X series camera also supports autofocus mode and manual focus mode. TAFDM41X series camera supports 4K/30FPS HDMI output and USB/NETWORK outputs.

TAFDM41X series camera has XCamView software built within it, which allows direct operation of the Camera Control Panel, Measurement Toolbar, Image Adjustment Toolbar,and Auto Focus Control Panel through the touch interface by default. You can also switch to the mouse interface and perform interface operations through the mouse;The images and videos captured by TAFDM41X series camera can be saved on an SD card for on-site analysis and follow-up research.

Figure 1 TAFDM41X Series Camera Front and Back View

Figure 2 TAFDM41X Series Camera Side and Front(with LED light) View

1.1 The module specifications of TAFDM41X series camera

1.1.1 TAFDM41X series camera module datasheet

Model	Sensor & Size(mm)	Pixel(μm)	G Sensitivity/ Dark Signal	FPS/Resolution	Binning	Exposure(ms)
TAFDM411 TAFDM412	Sony IMX415LQR-C 1/2.8"(5.57x3.13)	1.45x1.45	300mv/0.13 with 1/30s	30@3840*2160(HDMI) 30@3840*2160(NETWORK) 30@3840*2160(USB)	1x1	0.04~1000

C: Color; M: Monochrome or Black and White;

1.1.2 TAFDM41X series camera lens module datasheet

Lens Model	Working Distance(mm)	Zoom Range	MTF(lp/mm)	Distortion	FOV@Min(mm)	FOV@Max(mm)
EMZO-20XA(TAFDM411)	150~195	0.028X~0.56X	160	0.5%	200x112.5(1X)	10x5.6(20X)
EMZO-18XA-250(TAFDM412)	205~255	0.021X~0.39X	160	0.5%	255x145(1X)	14.2x8(18X)

1X and 20X/18X 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 = 0.028/0.028; 20X=0.56/0.028;18X=0.39/0.021;

1.1.3 TAFDM41X series camera light module

Lighting Model	LED	Power	Inner Dia.(mm)	Out Dia.(mm)		
DRL-5076A-NPC	8 CREE XPE	3V/3A	50	76		

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

1.2 TAFDM41X touchscreen electric continuous zoom autofocus digital microscope

The basic characteristic of the TAFDM41X series camera is listed as below:

1.2.1 The basic characteristic of TAFDM41X series camera

- The camera is connected to a 13.3-inch 1080p touch screen for touch operation, providing two sets of interfaces (touch interface and mouse interface), and support switching
- 5 groups 16 elements EMZO with 0.028~0.56X, 20 zoom ratio (TAFDM411), or achieve 0.0218X~0.392X, 18 zoom ratio (TAFDM412), supports auto and manual focus
- 192mm standard working distance with 150~195mm depth of field(TAFDM411), 250mm standard working distance with 205~255mm depth of field(TAFDM412)
-
- At standard working distance, the large field of view 200mm*112.5mm(TAFDM411) / 255mm*145mm(TAFDM412) at low magnification, helping users to quickly locate the target object, the small field of view 10mm*5.6mm(TAFDM411) / 14.2mm*8mm(TAFDM412) at higher magnification, helping users to observe microscopicall
- Sony 1/2.8” 4K Starvis CMOS with high signal-to-noise ratio
- 4K HDMI/USB/NETWORK multiple video outputs
- 4K/1080P HDMI auto switching according to monitor resolution
- SD card/USB flash drive for captured image and video storage, support local preview and playback

- Embedded XCamView software enables camera control through touch screen or mouse, with an embedded touch or mouse controlled Camera Control Panel, Measurement Toolbar, Image Adjustment Toolbar, AF Control Panel

Excellent ISP with local tone mapping and 3D denoising

- ToupView/ToupLite software for PC
- IOS/Android applications for smart phones or tablets
- 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 TAFDM41X can be built

Figure 3 TPS-30A(Bracket)+TAFDM41X Series Camera+1080P Monitor

1.2.2 Specification of TAFDM41X series camera

Interface & Button Functions		
	USB Mouse	When in touch mode, this interface does not require a mouse connection and can be directly touched to control the XCamView software; Connect a USB flash drive to achieve image and video storage functions; Connect the 5G WiFi adapter module to achieve wireless video and image transmission When in mouse mode, connect a USB mouse for controlling the built-in XCamView software
	USB2.0	When in touch mode, connect the USB Type A port to a Type C data cable to the touch screen, providing power and sending data to the touch screen When in mouse mode, connect a USB flash drive to achieve image and video storage functions; Connect the 5G WiFi adapter module to achieve wireless video and image transmission
	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 the computer USB 2.0 interface to achieve video image transmission,

		processing, and capture
	LAN	LAN port to connect router and switch to achieve network transmission of video images
	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 touch/mouse to operate on the embedded XCamView	
Image Capture	8M (3840*2160) JPEG/TIFF image in SD card or USB flash drive(SD card priority)	
Video Record	Video format：8M(3840*2160) H264/H265 encoded MP4 file Video saving frame rate:30fps	
Measurement Saving	Measurement information saved in different layer with image content Measurement information is saved together with image content in burn in mode	
Measurement Toolbar	Including Calibration, Measurement, and measurement parameter Export functions	
ISP	Including Exposure (Automatic/Manual Exposure)/Gain , White Balance (Automatic/Manual/ROI Mode), Sharpening, 3D Denoise, Saturation Adjustment, Contrast Adjustment, Brightness Adjustment, Gamma Adjustment, Color to Gray, 50HZ/60HZ Anti Ficker Function	
Image Operation	Zoom In/Zoom Out (up to 10x d), Mirror/Flip, Freeze, Gridls, Overlay, Autofocus, LED Control, Browser, Recorded Video Playback, and rich image measurement functions	
Embedded RTC	To support accurate time on board	
Auto Focus Control Panel	Including Zoom Control, Auto Focus, Single Focus, Manual Focus, Reset and other functions	
Restore Factory Settings	Restore all camera parameters to factory settings	
Multi Language Support	Multiple languages including English/Simplified Chinese/TraditionaChinese/Korean/Thailand/French/German/Japanese/Italian/Russian	
Software ToupView/ToupLite Environment under USB/NETWORK Video Output		
White Balance	Classic Automatic, Manual, and ROI White Balance	
Color Technique	Ultra-Fine Color Engine and Technologies such as 3D noise reduction and local dynamic range adjustment	
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) OSx(Mac OS X) Linux	
PC Requirements	CPU: Equal to Intel Core2 2.8GHz or Higher	
	Memory: 4GB or More	
	USB Port:USB2.0 Port or Higher	
	Ethernet Port: RJ45 Ethernet Port	
	Display:19” or Larger	
	CD-ROM	
Operating Environment		
Operating Temperature(in	-10~ 50	

Centidegree)	
Storage Temperature(in Centidegree)	-20~ 60
Operating Humidity	30~80%RH
Storage Humidity	10~60%RH
Power Supply	DC 12V/3A adapter
Dimension	
Length x Width x Height	80mm x 80mm x 122mm
Shipping Weight	0.75kg

1.2.3 Dimension of TAFDM41X series camera

Figure 4 Dimension of TAFDM41X Series Camea

1.2.4 Packing information of TAFDM41X series camera

Figure 5 Packing Information of TAFDM41X Series Camera

Standard Packing List		
A	Gift box: L:33cm W:21.5cm H:6.8cm	
B	1080P Touch Screen	
C	TAFDM41X Seires Camera	
D	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
E	USB Type A to Type C data cable/0.5M (suitable for situations where the screen is close to the camera)	
F	USB Type A to Type C data cable/1.5M (suitable for situations where the screen is far away from the camera)	
G	HDMI cable/0.5M (suitable for situations where the screen is close to the camera)	
H	HDMI cable/1.5M (suitable for situations where the screen is far away from the camera)	
I	USB 2.0 Type-A Male to Type-A Male Cable/1.5M	
J	CD (Driver & utilities software, Ø12cm)	
Optional Accessory		
K	USB Mouse	
L	SD card (16GB or above, speed Class 10)	
M	USB flash drive 32GB	
N	LED Ring Light(DRL-5076A-NPC) or (AALRL-200-7650) (Not provided)	
O	Network Cable	

P	USB WiFi adapter(In WiFi mode, a USB WiFi adapter is required to operate the camera.) The shape will vary from model to model.	
Q	Calibration kit(Not provided)	106011/TS-M1(X=0.01mm/100Div.) 106012/TS-M2(X,Y=0.01mm/100Div.) 106013/TS-M7(X=0.01mm/100Div., 0.10mm/100Div.)

2 Installation and Operation of TAFDM41X Series Camera Product

Before use, please install the TAFDM41X series camera on an adaptive bracket.

1.Plug elbows HDMI cable into the HDMI port to connect TAFDM41X series camera and HDMI prot of the touch screen;

2.Connect the USB2.0 port of the camera to the touch screen with the USB Type-A to Type-C cable;The purpose of this data cable is to provide power to the touch screen and facilitate data communication;

3.Plug DC12V3A power adapter into DC12V3A port, to supply power for the TAFDM41X series camera, 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 TAFDM41X series camera, LED Indicator will turn into blue;

6. After startup, the touch screen will display real-time image of sensor. Clicking on the left side of the touch screen will bring up the camera's control panel, which can achieve functions such as capturing/recording, freezing videos, browsing, and comparing images;

7. When the user touches the  button on the left "Camera Control Panel", the "Measurement Toolbar" will be displayed above the video window. It can achieve calibration, measurement of lines, angles, rectangles, circles, etc., and support data export (*. CSV format);

8. When touched on the left  "Camera Control Panel", the "Image Adjustment Toolbar" will be displayed;

9. When the user touches the  button on the "Camera Control Panel" of the video window, the "Focus Area" window will be displayed together with the "Auto Focus Control Panel". Supports 20X (TAFDM411)/18X (TAFDM412) optical continuous zoom, with autofocus mode supporting both auto focus and manual focus.

3 Images Captured with TAFDM41X Series Camera

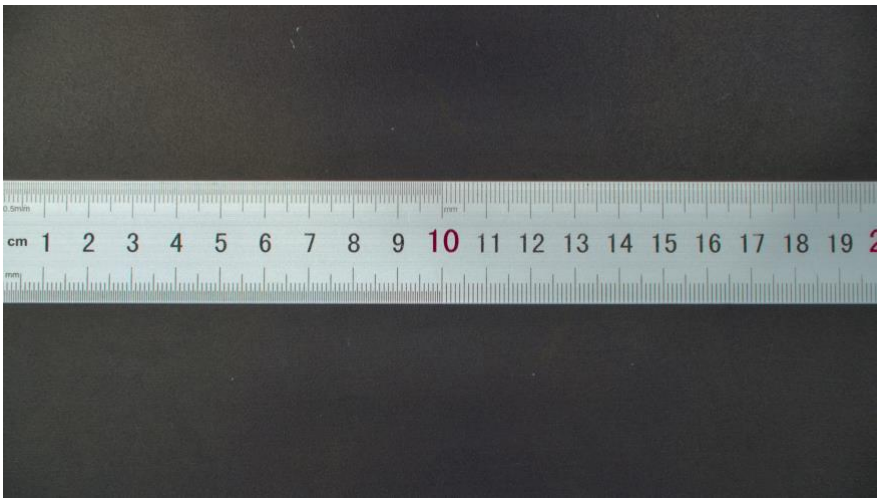


Figure 6 Ruler Captured with TAFDM411 at 1X

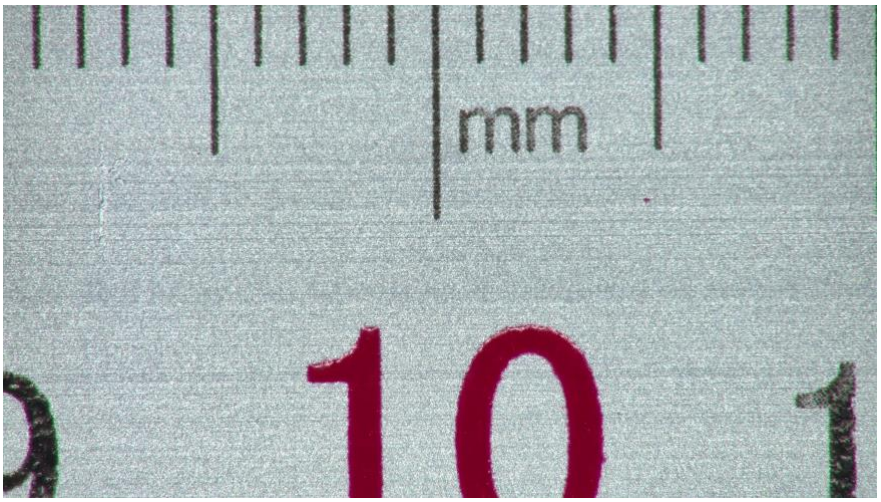


Figure 7 Ruler Captured with TAFDM411 at 10X

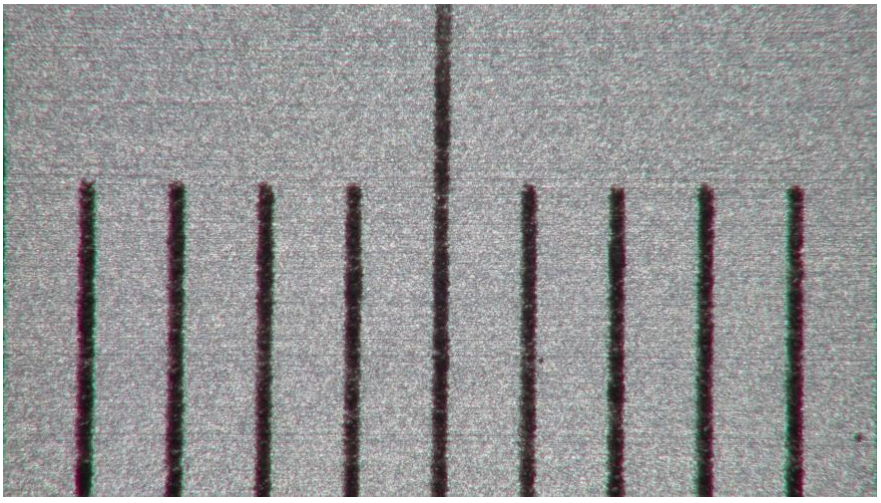


Figure 8 Ruler Captured with TAFDM411 at 20X

Figure 9 Print Captured with TAFDM411 at 1.0X

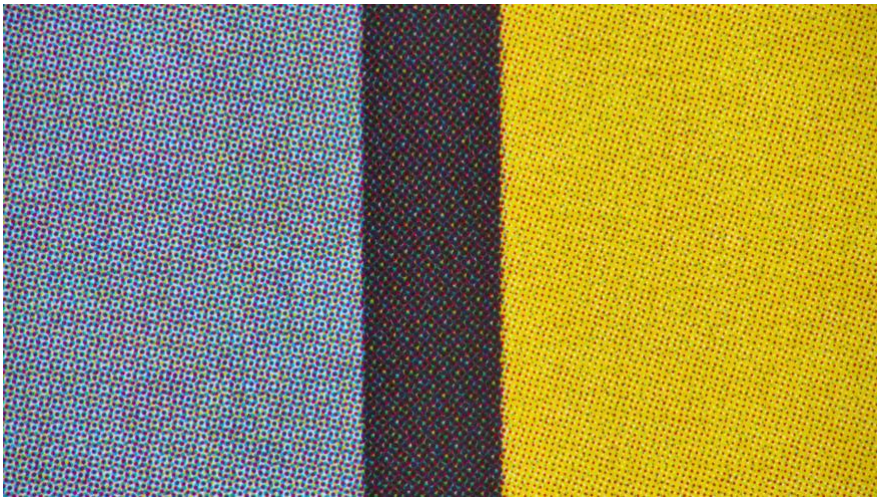


Figure 10 Print Captured with TAFDM411 at 10X

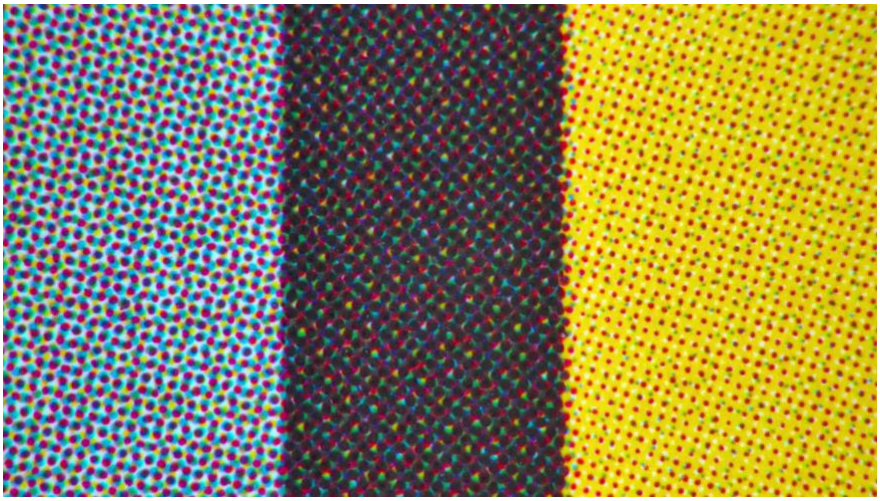


Figure 11 Print Captured with TAFDM411 at 20X

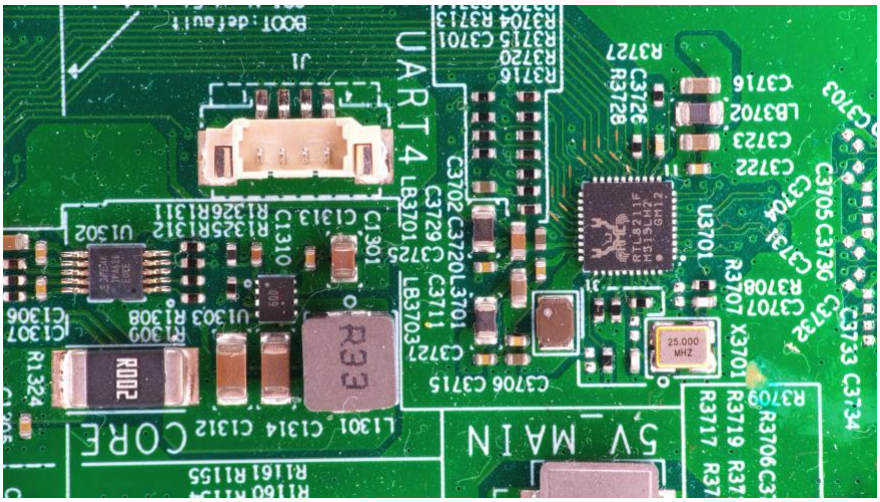


Figure 12 PCB Captured with TAFDM411 at 4.0X

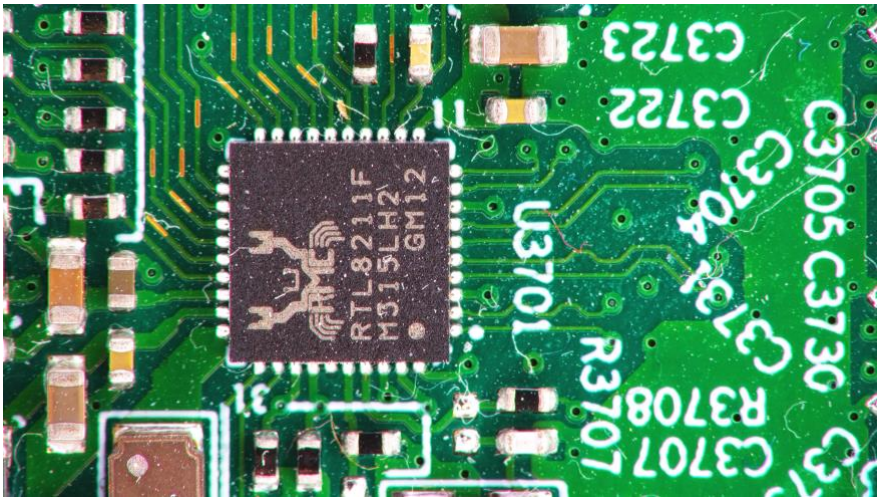


Figure 13 PCB Captured with TAFDM411 at 10X

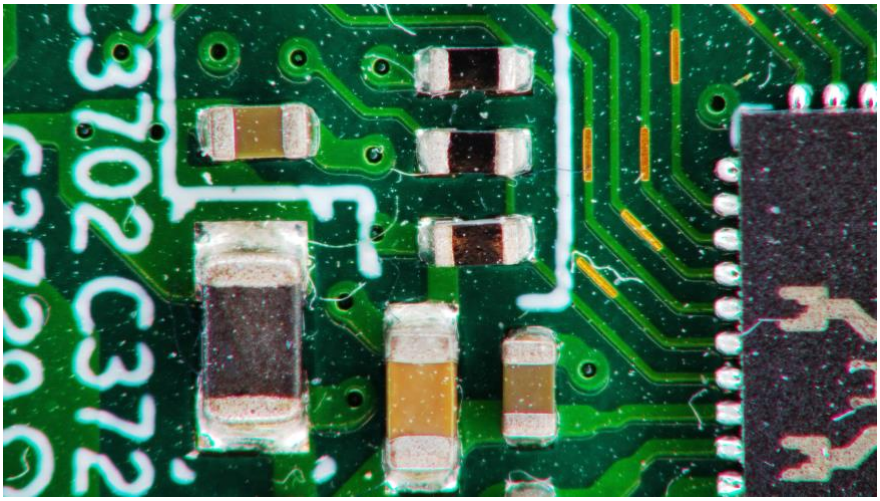


Figure 14 PCB Captured with TAFDM411 at 20X

4 The Software and App for TAFDM41X Series Camera

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

Windows & Linux & macOS: https://www.touptekphotonics.com.cn/download/

iOS: //itunes.apple.com/us/app/toupview/id911644970

Android: https://dl.touptekphotonics.com.cn/software/ToupView.apk

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

5 TAFDM41X Series Camera Configurations

You can use the TAFDM41X series camera in 5 different ways. Each connection requires different hardware configuration.

5.1 TAFDM41X series camera connected to HDMI interface for use on touch screen display

Figure 15 TAFDM411 Series Camera Connected to Touch Screen

For this application, the user only needs a TAFDM41X series camera, a touch screen, a HDMI cable, a USB Type A to Type C data cable, a SD card, a power adapter . The steps to start the camera are listed as below:

- Connect the HDMI output on the TAFDM41X series camera to the touch scrren using the HDMI cable
- Connect the USB2.0 port of the camera to the touch screen with the USB Type-A to Type-C cable;The purpose of this data cable is to provide power to the touch screen and facilitate data communication;
- Insert the supplied SD card into the TAFDM41X series camera SD card slot;
- Connect power adapter to the TAFDM41X series camera the and switch it on;

After startup,the touch screen will display real-time image of sensor as shown in Figure 16 Clicking the left side of the touch screen , the camera control panel will display for the control of the camera.

When switching to mouse mode in Settings->Miscellaneous, real-time images will be displayed on the screen as shown in Figure 17. By moving the mouse to the left, top, and bottom of the screen, the left camera control panel, upper measurement toolbar, or lower comprehensive control toolbar can be accessed to operate the camera.

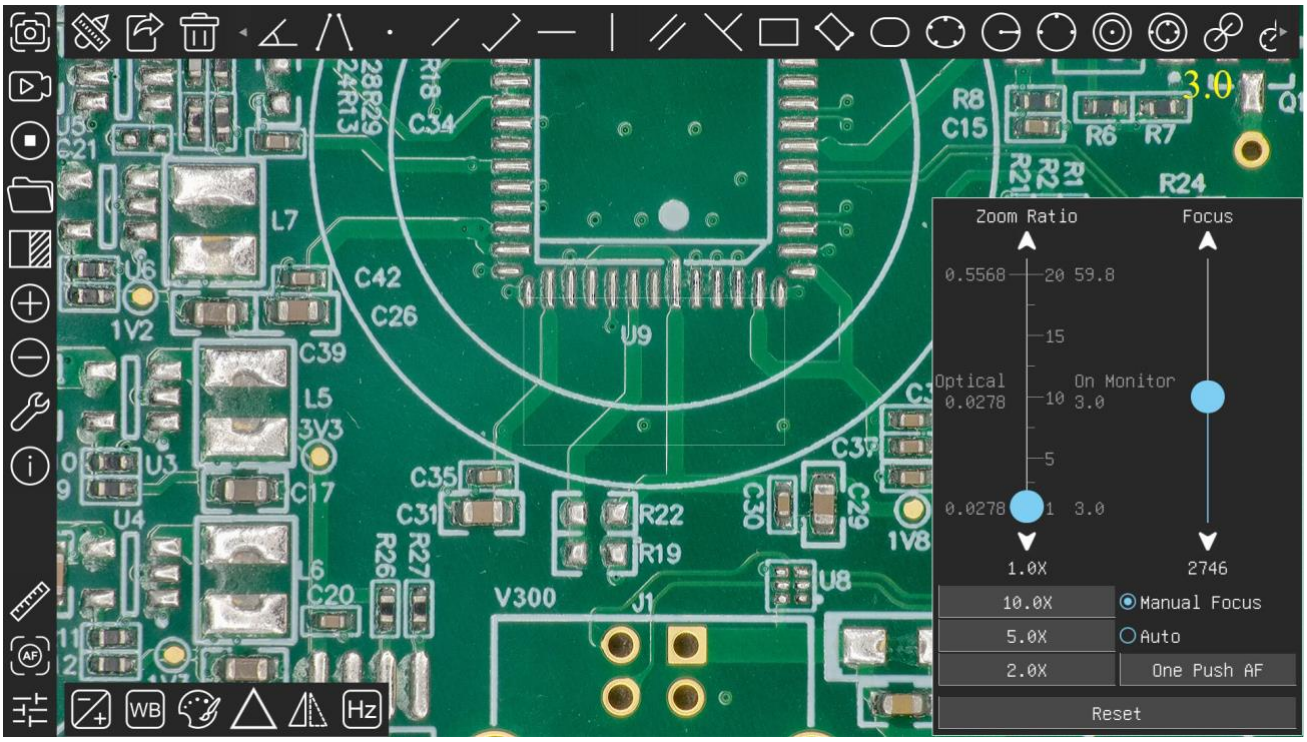


Figure 16 XCamView and TAFDM41X Series Camera in HDMI Mode（Touch Mode）

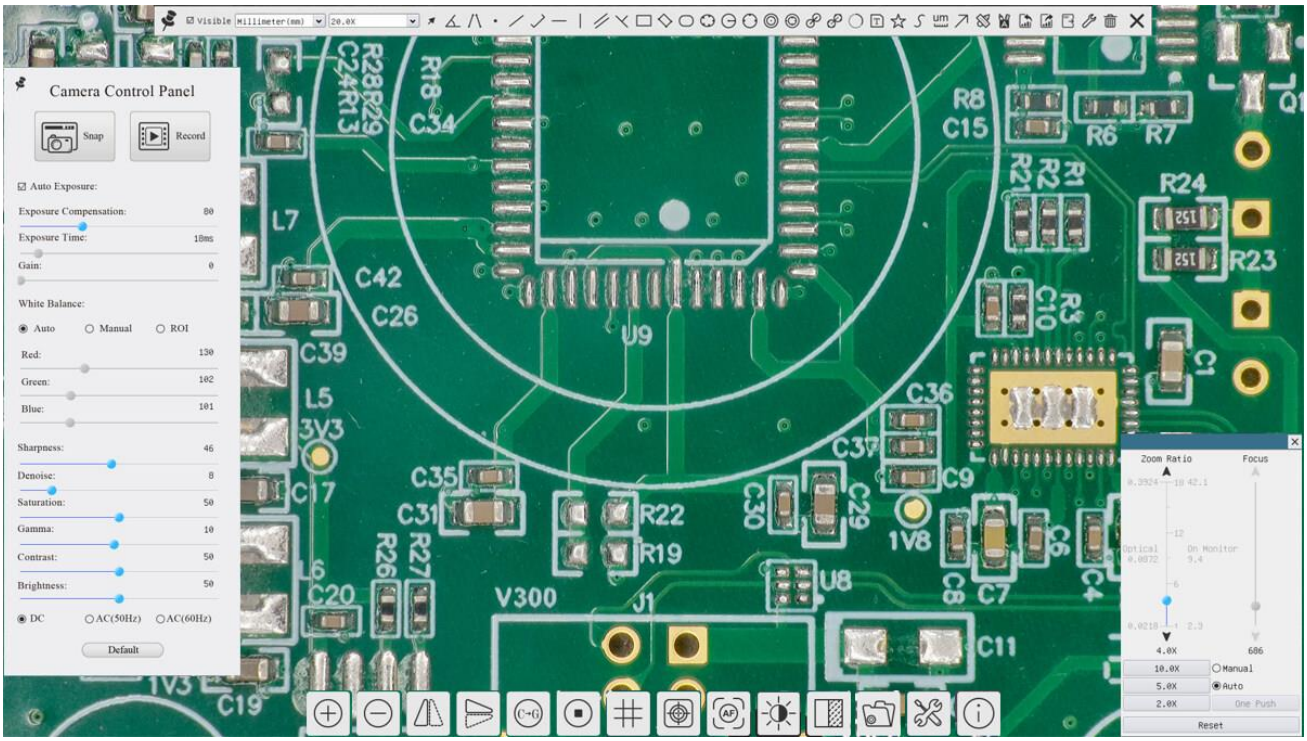


Figure 17 XCamView and TAFDM41X Series Camera in HDMI Mode（Mouse Mode）

5.2 TAFDM41X series camera connects to computer with USB2.0 port

For Windows user (Windows XP (32bit), Windows 7/8/8.1/10/11 (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:

- Install ToupView/ToupLite software on a PC;
- Connect power adapter to the camera the and switch it on. After starting the camera, plug one end of the USB cable into the USB 2.0 port of the TAFDM41X series camera, and plug the other end into the USB port of the PC;
- Open ToupView/ToupLite software. The TAFDM41X series camera will be recognized automatically by software. In ToupView/ToupLite software, select the corresponding TAFDM41X series camera by clicking the camera name in the camera list.

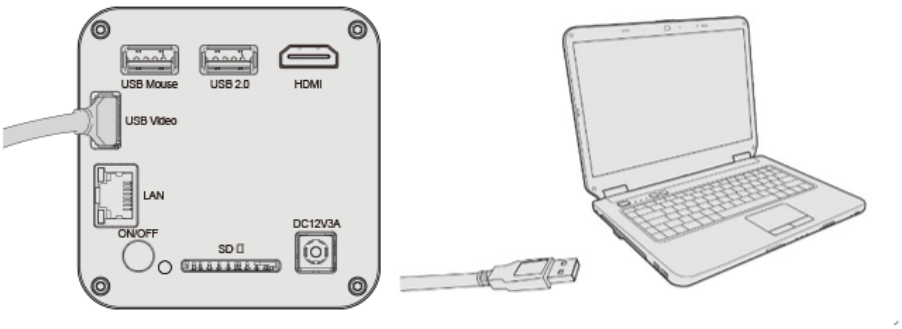


Figure 18 TAFDM41X Series Camera is Connected to a Computer Via USB Video Interface

Note:

The video output function of the USB Video interface and the touch function of the USB port cannot be used simultaneously. When the USB 2.0 Type-A male cable and USB Type-A to Type-C data cable are simultaneously inserted into the camera, the USB Video function is prioritized and the touch function is not available; After unplugging the USB cable and restarting the camera, the touch function can be used normally.

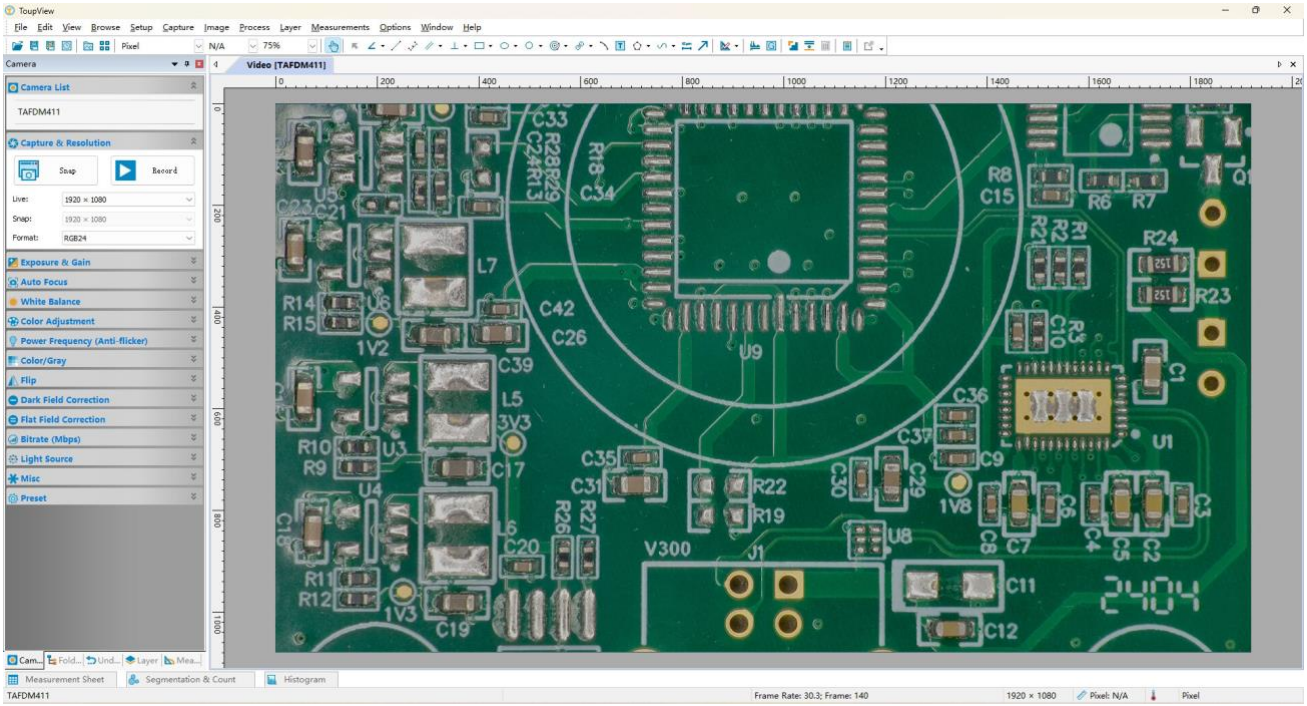


Figure 19 ToupView Interface under TAFDM41X Series Camera in USB Connection Mode

5.3 TAFDM41X series camera working in WiFi mode (AP mode)

Please make sure your PC is WiFi enabled.

For Windows user (Windows XP (32bit), Windows 7/8/8.1/10/11 (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 TAFDM41X series camera according to Sec.5.1 After the camera is running, touch the left side of the XCamView interface,and the Camera Control Panel will be displayed. Touch to the bottom of the  button on the Camera Control Panel at the bottom of the video window, a small window called Settings will pop up as shown below. Touch Setting>Network>WiFi property page and choose the AP in the Wi-Fi Mode edit box (The factory default configuration is AP mode).

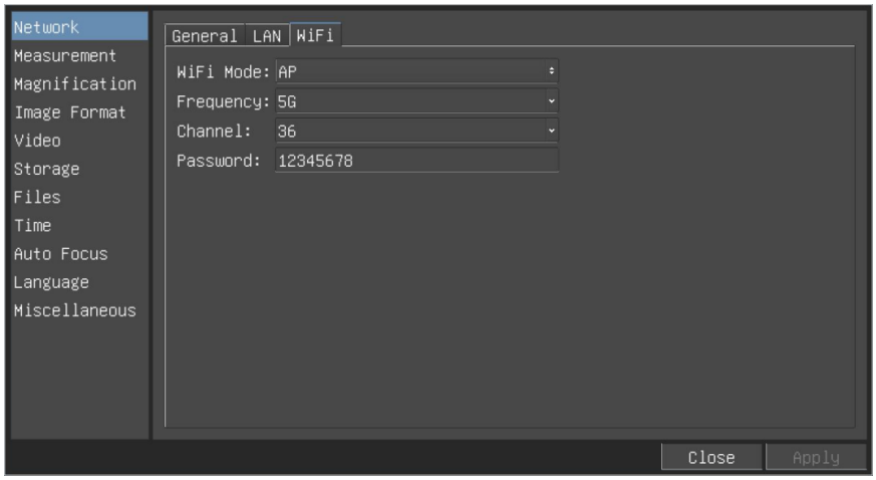


Figure 20 Settings Network>AP Mode on Wireless Property Page

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

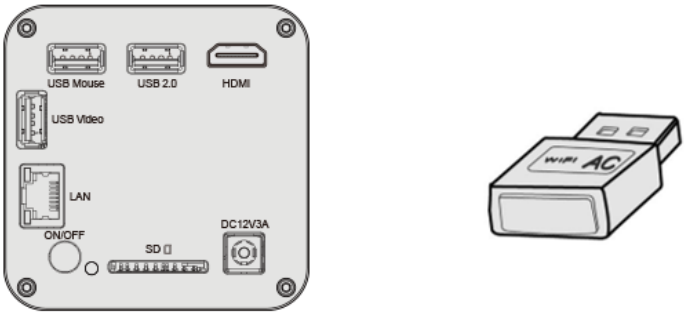


Figure 21 Insert the WiFi Adapter into the USB 2.0 Port of TAFDM41X Series Camera

- 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.

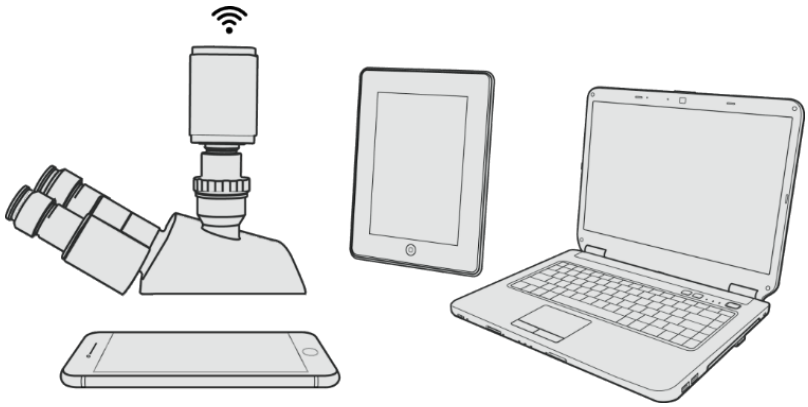


Figure 22 PC or Mobile Device Connected to TAFDM41X Series Camera Wireless Access Point

Start ToupView/ToupLite software or ToupView App and check the configuration. Normally, the active TAFDM411 series camera will be automatically recognized. The live image of each camera is shown in Figure 23 For the display, the Camera List tool window is used in ToupView/ToupLite software, and the Camera Thumbnail is used in ToupView App.

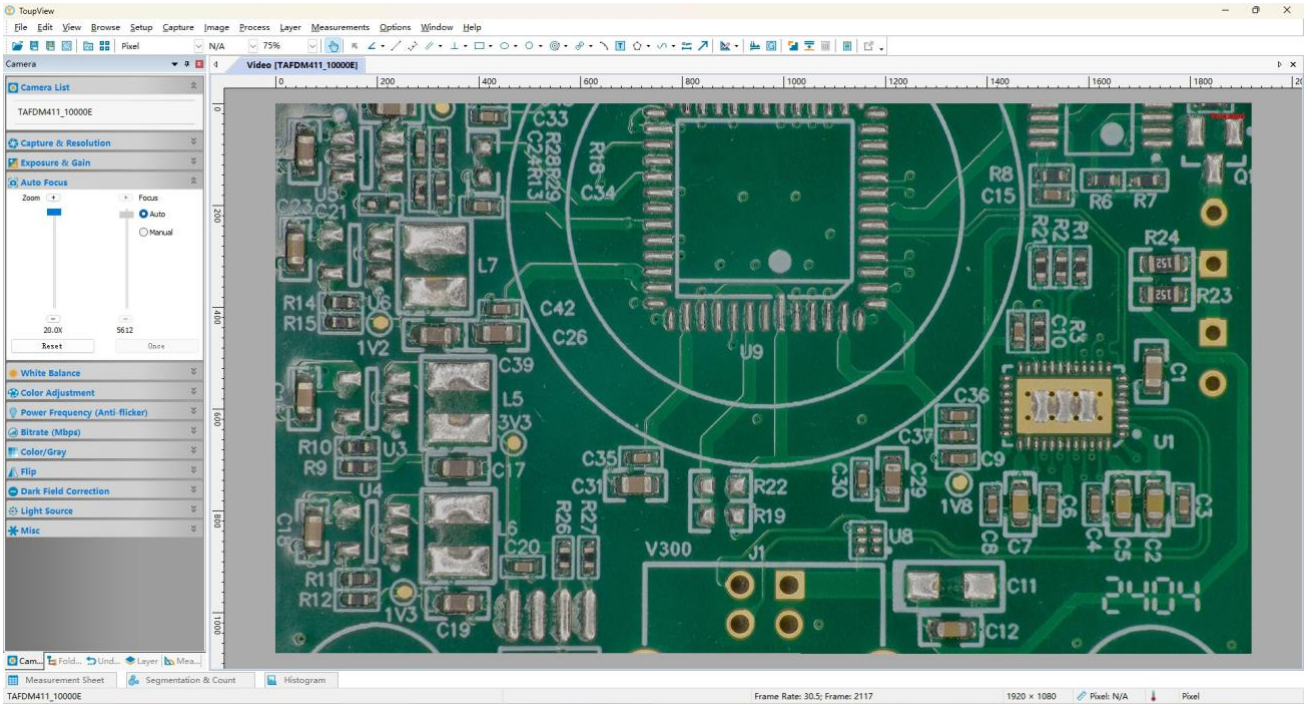


Figure 23 ToupView and TAFDM41X Series Camera in WiFi AP Mode

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, touching  button on the Camera Control Panel, a small window called Settings will pop up as shown below on the left side, touching LAN property page, unchoose 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.

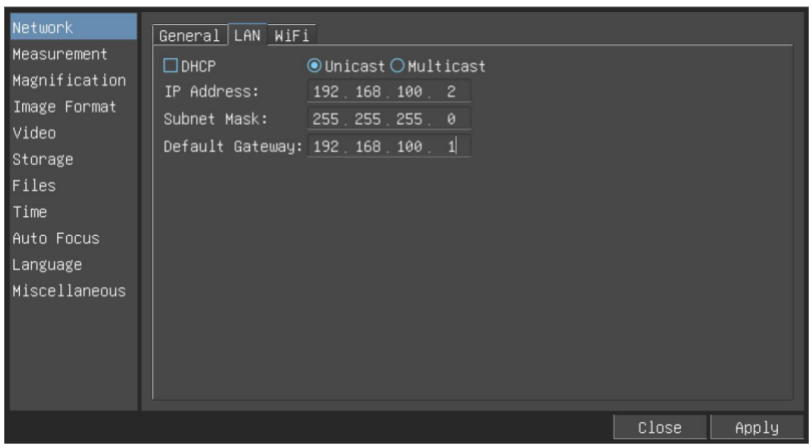


Figure 24 Configure theTAFDM41X Series Camera IP

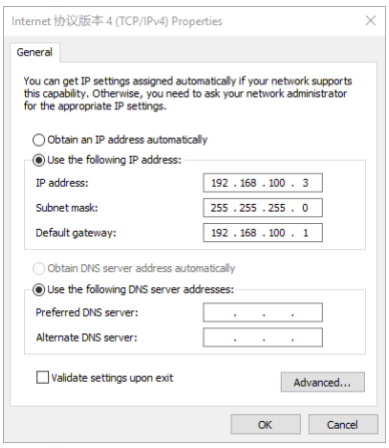


Figure 25 Configure the PC's IP

After the above configurations are finished, user can connect the TAFDM41X 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;

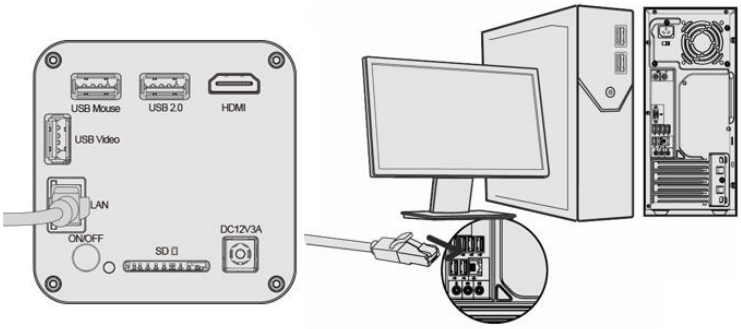
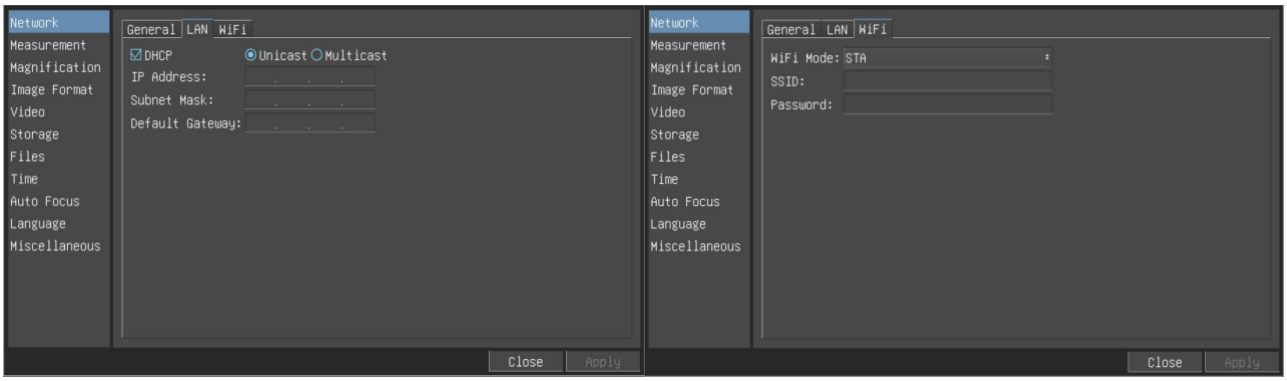


Figure 26 Connect the LAN Port of TAFDM41X Series Camera to the Network Port of the Computer Via Ethernet Cable.

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 23.

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

In LAN/WiFi STA mode, multiple TAFMD41X series 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 TAFDM41X series camera.



Before using the network, please follow the setup steps in Sec 5.1 to start the TAFDM41X series camera, touch the screen, and the Camera Control Panel will be displayed.

Touch the button on the Camera Control Panel and make sure that Settings>Network>LAN Properties page DHPC is checked (as shown in the top left image). 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.

Or start the camera according to Sec.5.1. After the camera is running, touch the button on the Camera Control Panel, a small window called Settings will pop up as shown below. Touching Network>WiFi property page and choosing the STA in the WiFi Mode edit box(The factory default configuration is AP mode). Input the to be connected router's SSID and Password as shown in the upper right image:

- Connect one end of the Ethernet cable to the TAFDM41X series camera and the other end to the router (especially for camera connected to the router through LAN port);

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);

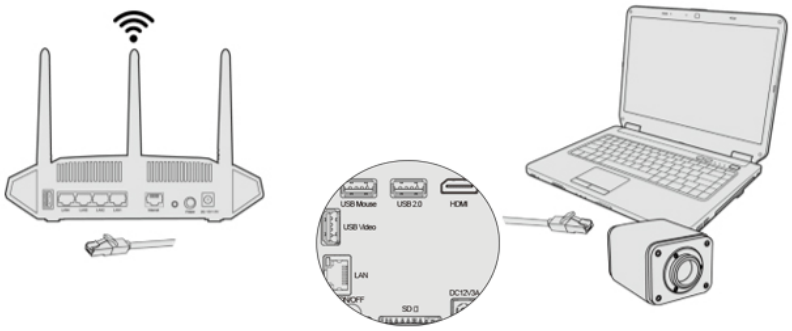


Figure 27 Connect One End of the Network Cable to TAFDM41X Series Camera and the Other End to the Router

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

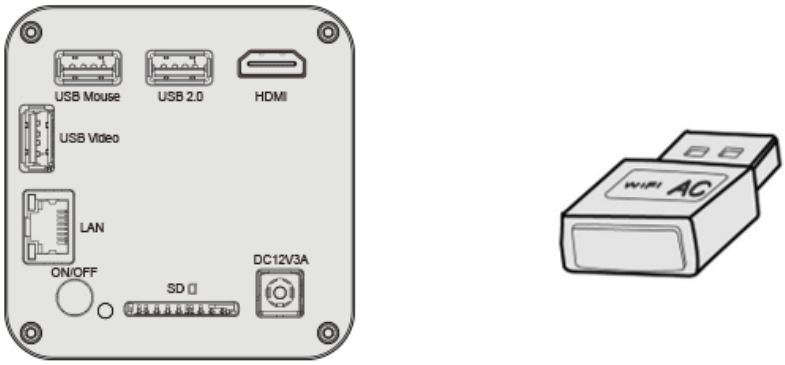
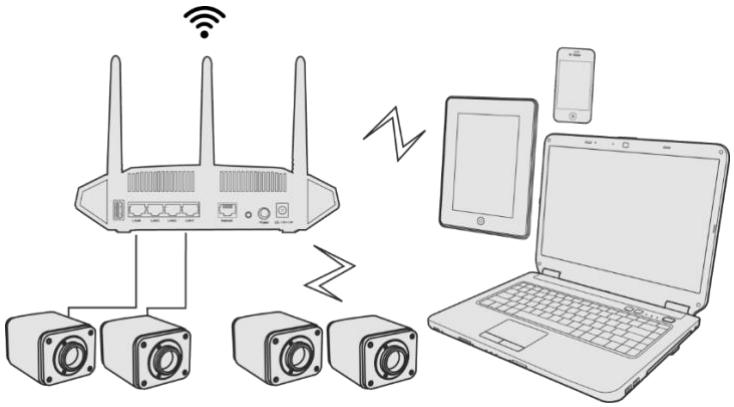


Figure 28 Insert the USB End of the WiFi Adapter into the USB 2.0 Port of TAFDM41X Series Camera

Finally, as shown below, 2 TAFDM41X series cameras are connected to the router with LAN cable and 2 TAFDM41X series cameras are connected to the same router with WiFi STA mode(The number of the camera, 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 TAFDM41X series 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 TAFDM41X 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.

About the routers/switches

- It is suggested that routers/switches supporting 802.11ac 5G segment should be selected to achieve better wireless connection experience.

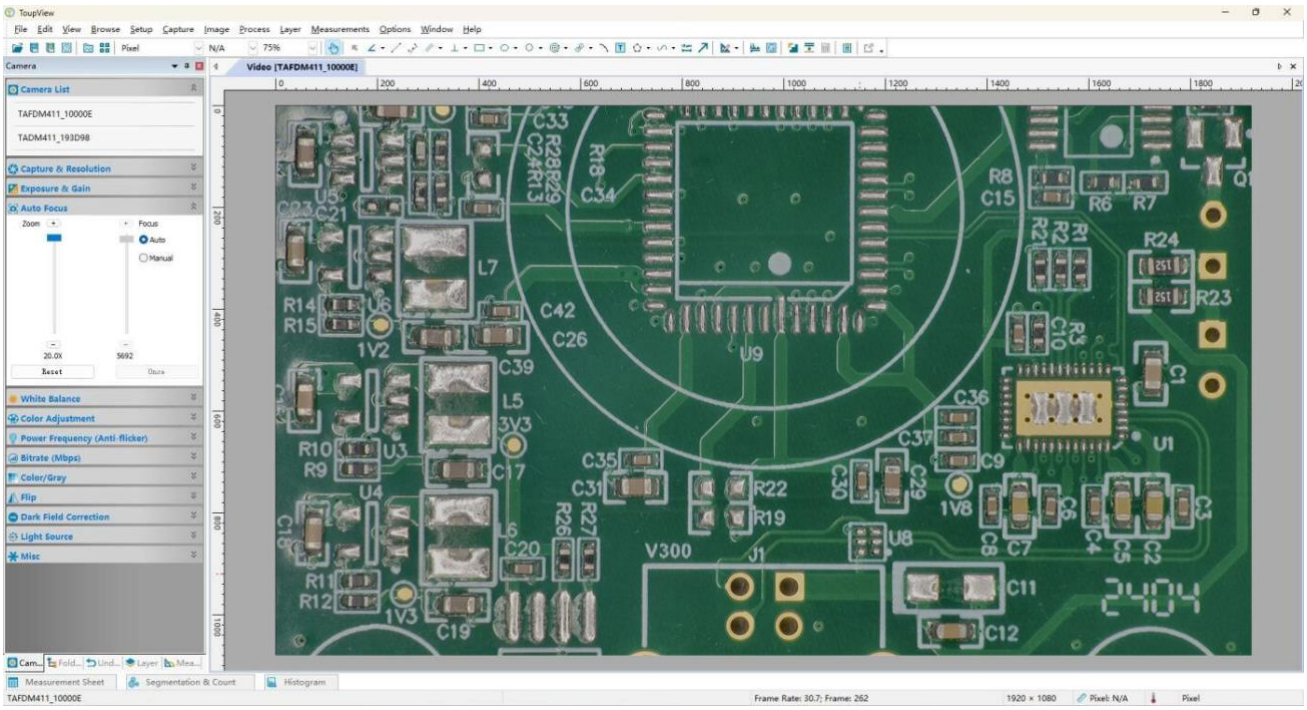


Figure 29 ToupView and TAFDM41X Series Camera in LAN Port/WiFi STA Mode

6 Introduction to the XCamView Software Interface and Functions of TAFDM41X Series Camera

The following is an example of the XCamView control interface in touch mode:

6.1 XCamView control UI

TAFDM41X series camera XCamView software operation UI is shown in Figure 16. It includes Camera Control Panel on the left side of the video window, The Image Adjustment Toolbar at the bottom of the video window, and the Auto Focus Control Panel on the right side of the video window.

Software Toolbar / Control Bar / Control Panel	
1	When the user touches to the left side of the video window, the Camera Control Panel will pop up automatically;
2	When the user touches the  button on the left "Camera Control Panel", The "Measurement Tool Bar" will be displayed above the video window  , Measurement and calibration operations can be carried out. When clicking anywhere else in the video window, the measurement mode can be exited. During the measurement process, users can slide left and right on the measurement toolbar to select the desired measurement tool. When the user selects a single measurement object, At the bottom of the video window,  an "Object Position and Attribute Control Bar" will automatically pop up to change the position and attributes of the measured object;
3	When the user touches the  button on the left "Camera Control Panel", the  bottom of the video window will display the "Image Adjustment Toolbar", which can be used for image adjustment;
4	When the user touches the  button on the left "camera control panel", the "Auto Focus Control Panel" will be displayed in the lower right corner of the video window for auto focus operation;
5	When the user touches the leftmost up and down slide, the "LED Brightness Control" will be activated to adjust the brightness of the camera light source illumination;
6	When the user touches the far right and slides up or down, the "Video Window Zoom In/Out" function will be activated to adjust the zoom in/out of the video window;

6.2 The camera control panel on the left side of the video window

The Camera Control Panel controls the camera to achieve the best image quality according to the specific applications; It will pop up automatically when touch to 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
	Freeze	Make preview Video Freeze
	Browse	Browse images and videos in the SD card or USB flash drive
	Compare Image	Compare image with the current video
	Zoom In	Zoom In the Video Window
	Zoom Out	Zoom Out the Video Window
	Setting	Comprehensive Settings
	About	Check the version of XCamView
	Measure	Measuring objects
	Auto Focus	Auto Focus Control Panel
	Image Adjustment	Adjust the image effect

6.3 The measurement toolbar on the upper side of the video window

6.3.1 Introduction to measurement toolbar

When touched on the "Camera Control Panel" on the left  , the "Measurement Tool Bar" will be displayed. The commands are explained as follows:

Icon	Function	Icon	Function
	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		
	Export the Measurement information to CSV file(*.csv)		Delete all the measurement Objects from the Video Window
	Angle		Four-point method to measure the angle
	Point		Arbitrary Line
	Three-Point method to measure the spacing		Horizontal Line
	Vertical Line		Parallel Line
	Three-Point method to measure vertical line		Rectangle
	Rectangle(Three Point)		Ellipse
	Five Points Ellipse		Center+Radius
	Three-points Circle		Annulus
	Annulus		Two Circles
	Three-points Two Circles		Arc
	Text		Polygon
	Curve		Scale Bar
	Arrow		

	When the measurement ends, left-click on a single measurment object and the Object Location & Properties Control Bar will show up. User could move the object by dragging the object with hand or mouse. But more accurate movement could be done with the buttons. The icons on the control bar mean Move Up, Move Down, Move Left, Move Right, Color Adjustment and Delete.

6.3.2 Calibration method

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

2. When touching the "Camera Control Panel"  on the left, the "Measurement Tool Bar" will be displayed. Click on the "Measurement Tool Bar" to enter calibration.

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

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

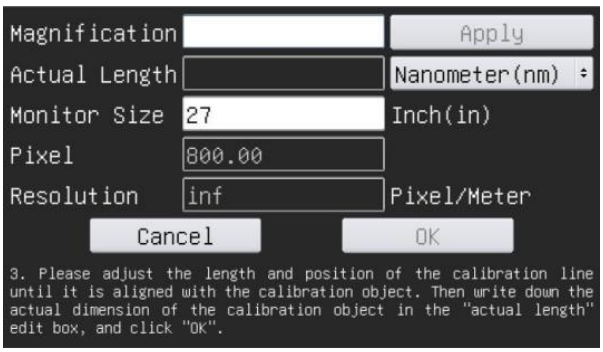


Figure 30 Dialog for Calibration

5. Magnifcation: After entering the naturalization magnification (1-20/18), click the apply button, and TAFDM41X series camera will work at 20X/18X magnification and focus clearly;

6. Actual Length: According to the instructions in section 3 above, after adjusting, fill in the actual length of the calibration object that coincides with the calibration line;

7. Prompt box content: 3. Adjust the "calibration line" to ensure it aligns with the scale line of the "calibration object", fill in the actual size of the alignment in the "actual length" editing box, and click the "OK" button;

8. Monitor Size: The camera software defaults to a monitor size of 27 inches. If the user uses a different monitor size, please enter the corresponding monitor size. The digital magnification is related to the monitor size.

9. Pixel: How many pixels does the calibration line have, and the system will automatically fill them in;

10. Resolution: Calculate the number of pixels per meter based on the actual length and pixels of the calibration line;

6.4 Synthesis image adjustment toolbar at the bottom of the video window

When touched on the left  "Camera Control Panel", the "Image Adjustment Toolbar" will be displayed. The commands are explained as follows:

Icon	Function	Icon	Function
	Exposure and Gain		White Balance
	Color Adjustment		Sharpness and Denoise
	Filp		Light Source Frequency (Anti Flicker)

Below is a detailed introduction to the above functions:

6.4.1 Exposure and Gain

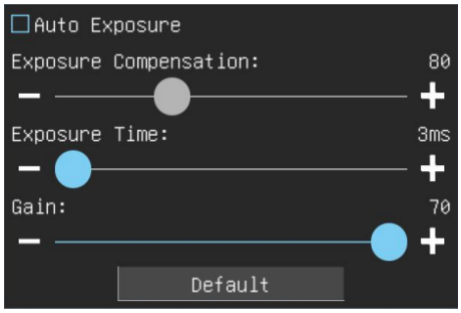


Figure 31 Exposure and Gain

After touching  , the Exposure and Gain dialog box will be displayed;

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;
Default	Restore the Exposure Time and Gain settings to the default values when the camera leaves the factory;

6.4.2 White Balance

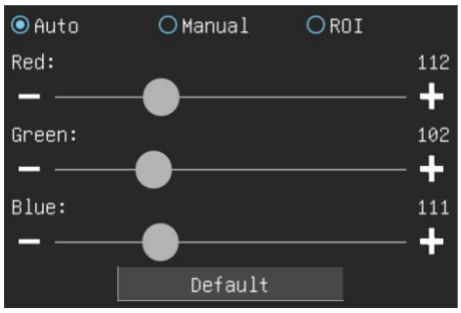


Figure 32 White Balance Regulation

After touching  , White Balance dialog box will be displayed;

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;
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;
Default	Restore the White Balance setting to the default value when the camera leaves the factory;

6.4.3 Color Adjustment

Figure 33 Color Adjustment

After touching  , a color dialog box will be displayed;

Stauration	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;
Default	Restore the settings of color adjustment to the Default values when the camera leaves the factory;

6.4.4 Sharpness and Denoise

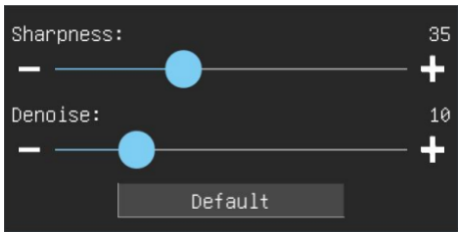


Figure 34 Sharpness and Denoise Adjustment

After touching  , a sharpness and noise reduction dialog box will be displayed;

Sharpness	Adjust Sharpness level of the video;
Denoise	Slide left or right to Denoise the video;
Default	Restore the Sharpness and Denoise settings to the default values when the camera leaves the factory;

6.4.5 Filp

Figure 35 Flip Adjustment

After touching , flip dialog box will be displayed;

Horziontal	After opening, it will flip in Horizontal mode;
Vertical	After opening, it will flip Vertical mode;

6.4.6 Light Source Frequency

Figure 36 Light Source Frequency Adjustment

After touching , the light source frequency dialog box will be displayed;

AC(50Hz)	Check AC(50HZ) to eliminate flickering caused by 50Hz illumination;
AC(60Hz)	Check AC(60HZ) to eliminate flickering caused by 60Hz illumination;
DC	For DC illumination, there will be no fluctuation in light source so no need for compensating light flickering;

6.5 Settings

In the "Camera Control Panel", setting functions are relatively complex. Here is a detailed introduction as follows:

6.5.1 Settings>Network

The network settings interface is divided into three categories: General, LAN, and WiFi, which are described as follows:

6.5.1.1 Settings>Network>General

Taking TAFDM411 display as an example here.

General: Name	The current camera name recognized as the network name;

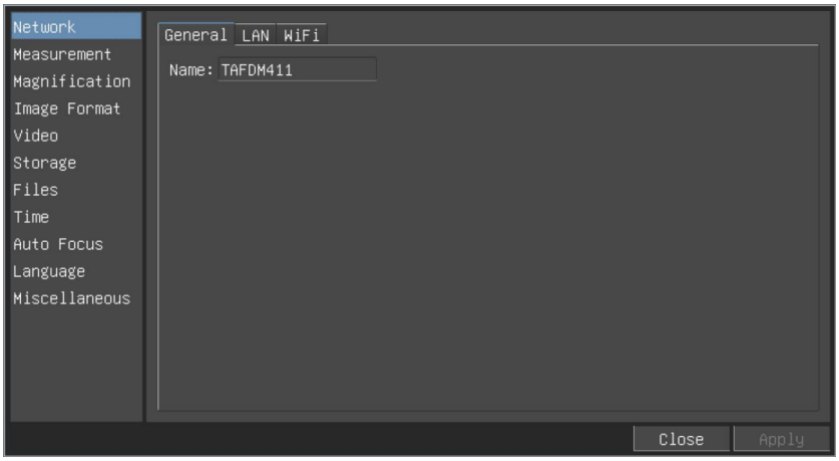


Figure 37 Comprehensive Settings>General

6.5.1.2 Settings>Network>LAN

DHCP	Dynamic host control protocol allows DHCP server to automatically assign IP information to the camera. Only in Sec5.5 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 Figure 39.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.

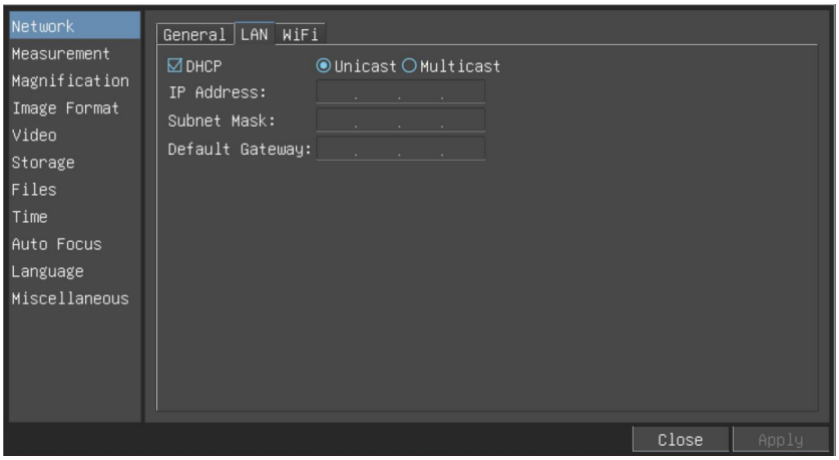


Figure 38 Comprehensive Settings>LAN

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

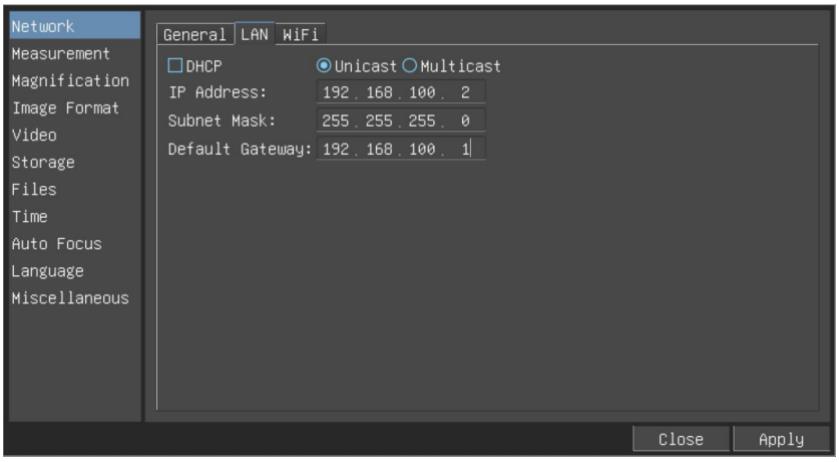


Figure 39 Comprehensive Settings Manual IP Unicast Settings Interface

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

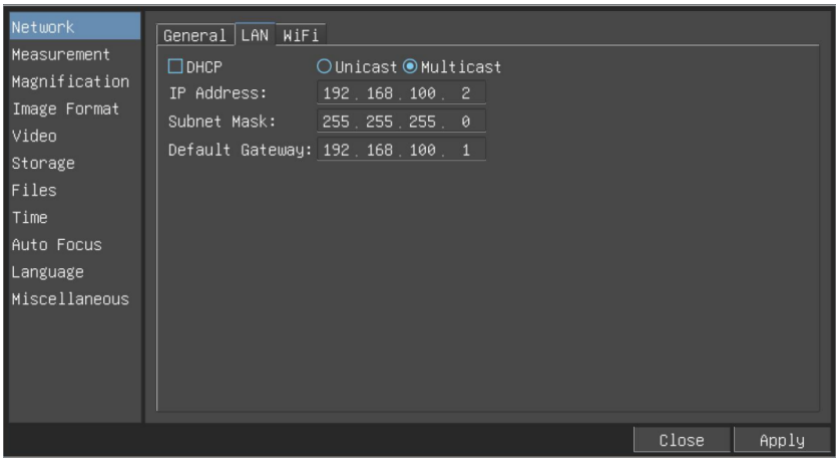


Figure 40 Comprehensive Settings Manual IP Multicast Settings Interface

6.5.1.3 Settings>Network>WiFi

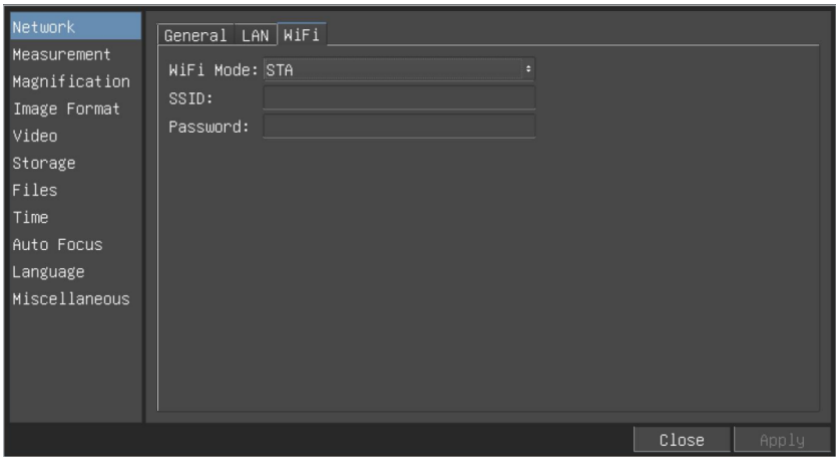


Figure 41 Comprehensive Settings>WiFi

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

6.5.2 Settings>Measurement

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

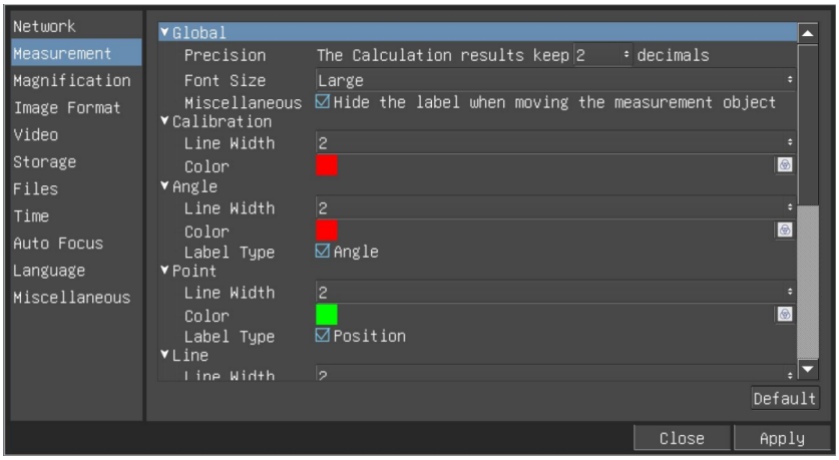


Figure 42 The Measurement Setup

Global	Precision	Used for setting digits behind the decimal point for measurement results;
	Font Size	The font size of measurement data can be divided into three types: large, Middle, and Small;
	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.	

6.5.3 Settings>Magnification

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

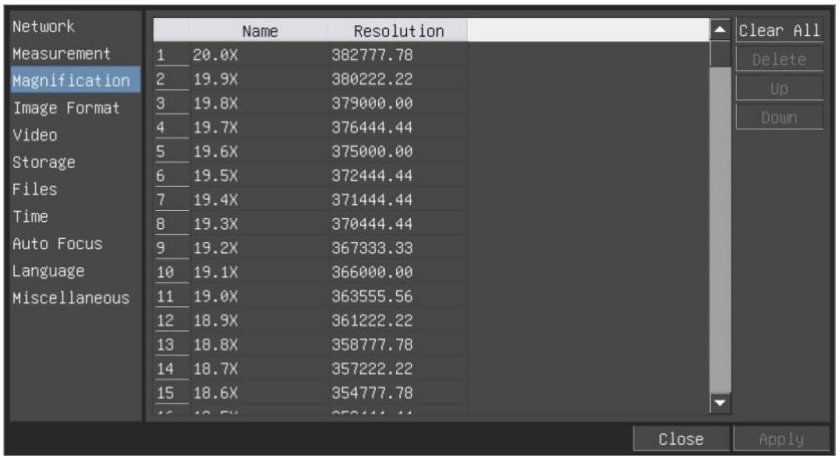


Figure 43 Comprehensive Magnification Settings Page

Name	Names such as 4X,10X, 20X， 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;

1.1.4 Settings>Image Format

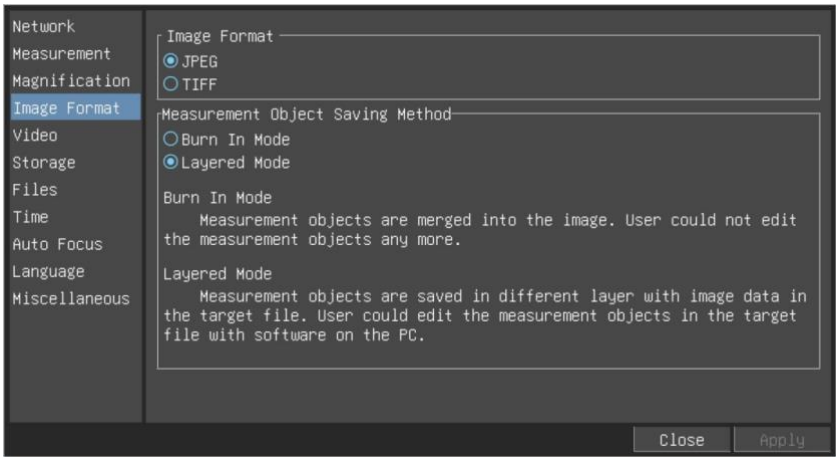


Figure 44 Comprehensive Image Format Settings Page

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.

6.5.4 Settings>Video

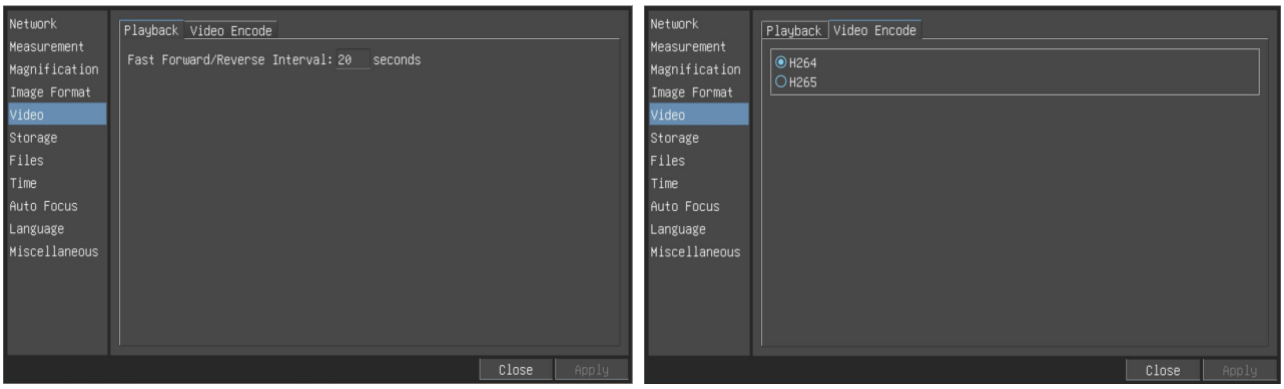


Figure 45 Comprehensive Setting of Video page

Video Playback	Fast Forward/Reverse internal in second unite for Video Playback
Video Encode	Select the Video Encode format. Can be H264 or H265. Compared with H264, H265 has a higher H265 compression ratio which is primarily used to further reduce the design flow rate, in order to lower the cost of storage and transmission

6.5.5 Settings>Storage

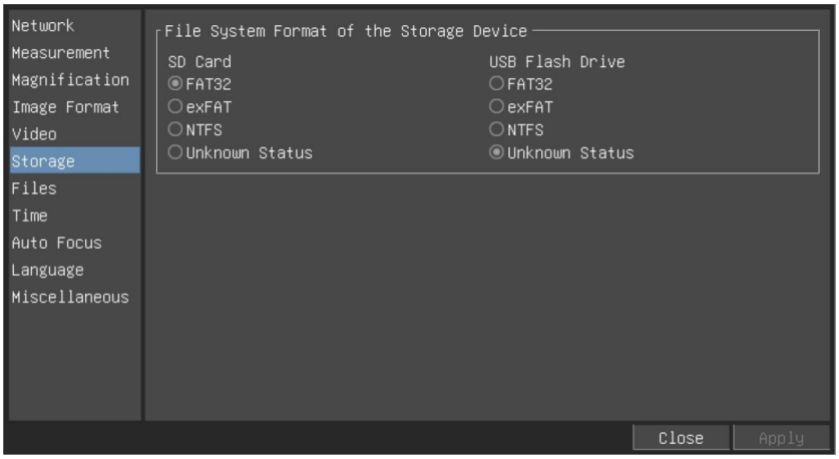


Figure 46 Comprehensive Setting of Storage Page

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.	

6.5.6 Settings>Files

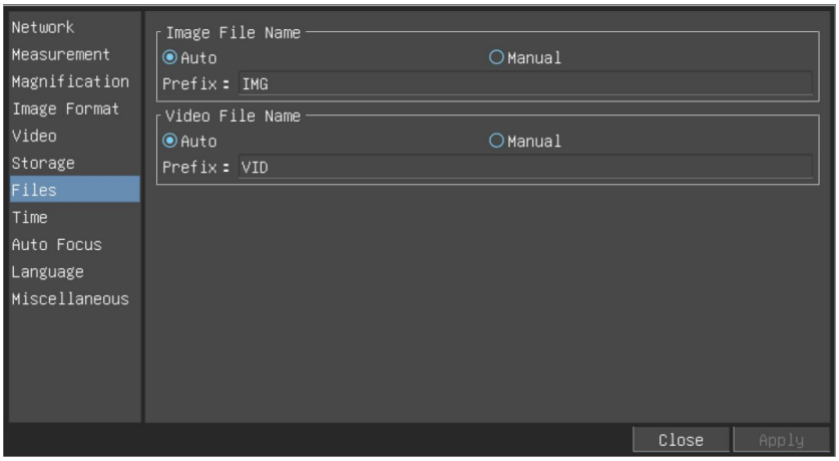


Figure 47 Comprehensive Setting of Files Name

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.

6.5.7 Settings>Time

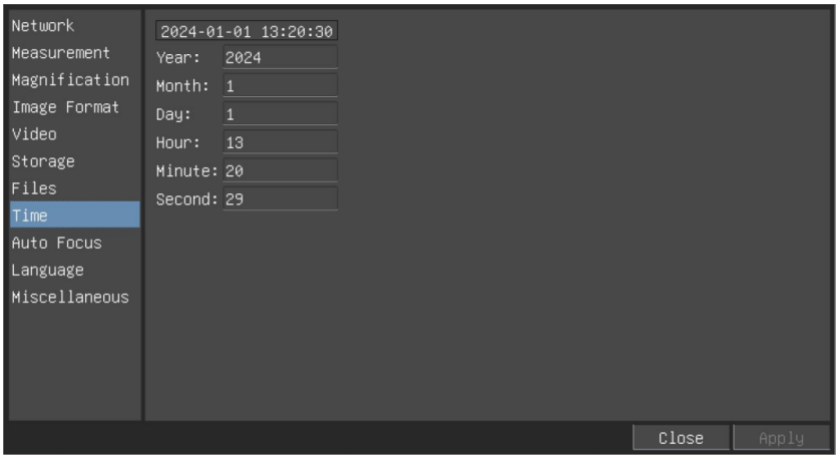


Figure 48 Time Settings

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

6.5.8 Settings>Auto Focus

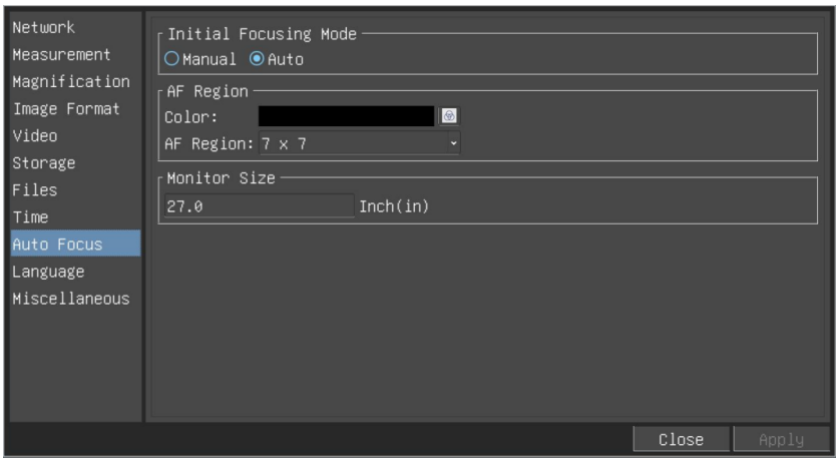


Figure 49 Settings>Auto Focus

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;
Monitor Size	Users can input the display size for better focusing, with a default display of 27.0 inches (in);	

6.5.9 Settings>Language

Figure 50 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;

6.5.10 Settings>Miscellaneous

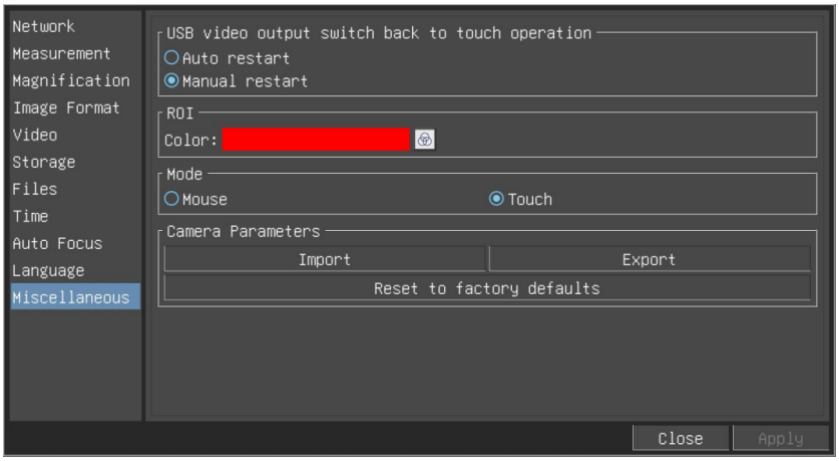
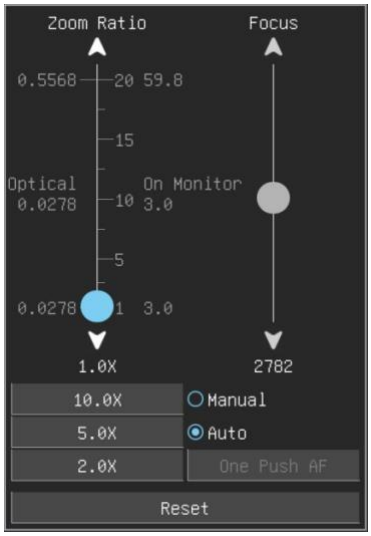


Figure 51 Comprehensive Miscellaneous Settings Page

ROI	Choosing the ROI rectangle line color

Mode	Choose between mouse mode or touch mode;
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;
Note: You can switch to the mouse interface. Please refer to 《AFDM411》 or 《AFDM412》 for the mouse interface manual; When using touch mode, try not to connect the camera USB port to an external mouse;	

6.5.11 Auto Focus control panel on the right side of video window

<table>
<tr><td rowspan="8"> 
</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>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>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 AF</td><td>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 20X normalized magnification, and the Focus is fixed at the standard object distance(195mm 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).</td></tr>
</table>

6.5.12 Focus region on the video window

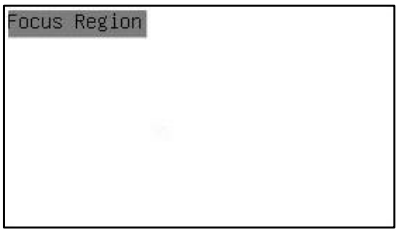


Figure 52 Focus region

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.