

KITOCAM Auto Focus HDMI Camera User Manual

1 Basic Characteristic

This camera is a multiple interfaces (HDMI+WiFi+SD card, so X here means multiple interfaces) CMOS camera with autofocus function (F means autofocus) and it adopts ultra-high performance Sony CMOS sensor as the image-picking device. HDMI+WiFi are used as the data transfer interface to HDMI display or computer.

For HDMI output, The XCamView will be loaded and a camera control panel and toolbar are overlaid on the HDMI screen, in this case, the USB mouse can be used to set the camera, browse and compare the captured image, play the video ital.

In HDMI output, the camera embedded Auto/Manual focus function can obtain the clear image at ease. No hand rotation of the microscope Coarse/Fine knob is needed.

For WiFi output, unplug the mouse and plug in the USB WiFi adapter, connect the computer WiFi to the camera, then the video stream can be transfer to computer with the advanced software.



Figure 1

The camera basic characteristic is as follows:

- All in 1(HDMI+WiFi) C-mount camera with Sony high sensitivity CMOS sensor;
- **Auto/Manual focus with the movement of the sensor;**
- For HDMI application, with built-in multiple-language XCamView software. The camera characteristic can be controlled by XCamView through the USB mouse. The other basic processing and control can also be realized by the XCamView;
- 1920 × 1080 (1080P) resolutions to match the current high-definition displayer on the market;

Support plug and play application;

- For HDMI application, 2.0M resolution image(1920*1080) can be captured and saved for browsing; For video, 1080P video stream(asf format) can be captured and saved;
- With the USB WiFi adapter, the camera can be used as WiFi camera, the advanced image processing software is used to display the video and capture image. support plug and play application;
- Ultra-Fine Color Engine with perfect color reproduction capability(WiFi);
- With advanced video & image processing application software, which including professional image processing such as 2D measurement, HDR, image stitching, EDF(Extended Depth of Focus), image segmentation & count, image stacking, color composite and denoising(USB);
- The camera can meet various applications and can be widely used in industrial inspection, education and research, materials analysis, precision measurement, medical analyses etc.


The possible applications of the camera as follows:

- Scientific research, education (teaching, demonstration and academic exchanges);
- Digital laboratory, medical research;
- Industrial visual (PCB examination, IC quality control);
- Medical treatment (pathological observation);
- Food (microbial colony observation and counting);
- Aerospace, military (high sophisticated weapons);

1.1 Datasheet(1)

Order Code	Sensor & Size(mm)	Pixel(μm)	G Sensitivity Dark Signal	FPS/Resolution	Binning	Exposure
KITOCAM	1080P/2M/Sony IMX185(C) 1/1.9"(7.20x4.05)	3.75x3.75	1120mv with 1/30s 0.15mv with 1/30s	60/1920*1080 (HDMI) 25/1920x1080 (WiFi)	1x1	0.06ms~918ms

C: Color; M: Monochrome;

Interface & Button Functions		
	USB	USB Mouse/USB WiFi Adapter
	HDMI	HDMI Output
	DC12V	12V/1A Power in
	SD	SD Card Slot
	ON/OFF	Power On/off Switch
	LED	Power Indicator
Other Specification for HDMI Output		
UI Operation	With USB Mouse to operate on the embedded XCamView	
Image Capture	JPEG Format with 2M Resolution in SD Card	
Video Record	ASF Format 1080P 30fps in SD Card(8G)	
Camera Control Panel	Including Exposure, Gain, White Balance, Color Adjustment, Sharpness and Denoising Control	
Toolbar	Including Zoom, Mirror, Comparison, Freeze, Cross, Browser Function, Multi-language and XCamView Version Information	
Other Specification for WiFi Output		
UI Operation	software on Windows/Linux/OSX/Android Platform	
WiFi Performance	802.11n 150Mbps; RF Power 20dBm(Maximum)	
Maximum Connected Devices	3~6(According to the Environment and Connection Distance)	
White Balance	Auto White Balance	
Color Technique	Ultra-Fine™ Color Engine (WiFi)	
Capture/Control API	Standard SDK for Windows/Linux/Mac(WiFi)	
Recording System	Still Picture or Movie (WiFi)	
Software Environment (for USB2.0 Connection)		
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 High-speed Port(As Power Only, not as the USB Data Transfer)	
	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/1A Adapter

1.2 Camera and Microscope



Figure 2 and Its Back Panel



Figure 3 Different Views



Figure 4 with Microscope

1.1.1 Dimensions

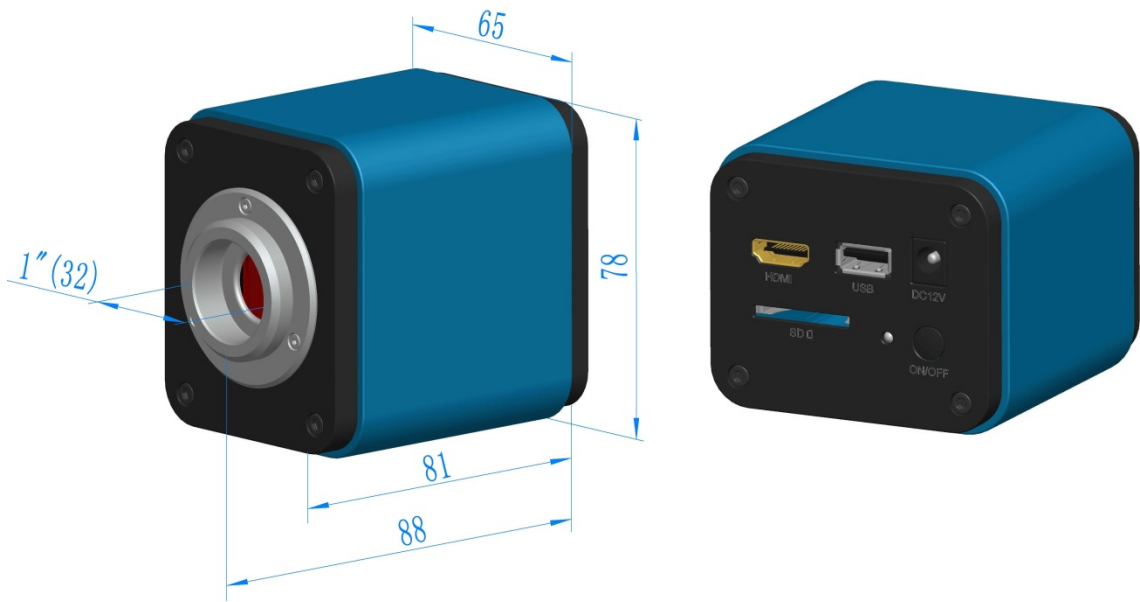


Figure 5 Dimension

1.1.2 Packing Information


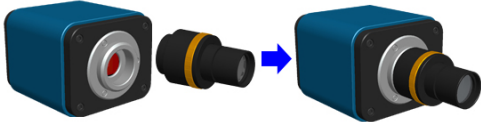




Figure 6 Packing Information of

Standard Packing List			
A	Gift box : L:25.5cm W:17.0cm H:9.0cm (1pcs, 1.43Kg/ box)		
B	HDMI Camera		
C	Power Adapter: Input: AC 100~240V 50Hz/60Hz, Output: DC 12V 1A American standard: Model: GS12U12-P11 12W/12V/1A; UL/CUL/BSMI/CB/FCC EMI Standard:EN55022,EN61204-3, EN61000-3-2,-3, FCC Part 152 class B, BSMI CNS14338 European standard: Model:GS12E12-P11 12W/12V/1A; TUV(GS)/CB/CE/ROHS EMI Standard:EN55022,EN61204-3, EN61000-3-2,-3, FCC Part 152 class B, BSMI CNS14338 EMS Standard:EN61000-4-2,3,4,5,6,8,11,EN61204-3,Class A Light Industry Standard		
D	HDMI Cable		
E	USB Mouse		
F	Wireless network adapter with USB interface		
G	CD (Driver & utilities software, Ø12cm)		
Optional Accessory			
H	Adjustable lens adapter	C-Mount to Dia.23.2mm Eyepiece Tube (Please choose 1 of them for your microscope)	108001/AMA037 108002/AMA050 108003/AMA075
		C-Mount to Dia.31.75mm Eyepiece Tube (Please choose 1 of them for your telescope)	108008/ATA037 108009/ATA050 108010/ATA075
I	Fixed lens Adapter	C-Mount to Dia.23.2mm Eyepiece Tube (Please choose 1 of them for your microscope)	108005/FMA037 108006/FMA050 108007/FMA075
		C-Mount to Dia.31.75mm Eyepiece Tube (Please choose 1 of them for your telescope)	108011/FTA037 108012/FTA050

		108013/FTA075
	Note: For H and I optional items, please specify your camera type(C-mount, microscope camera or telescope camera), our engineer will help you to determine the right microscope or telescope camera adapter for your application;	
J	108015(Dia.23.2mm to 30.0mm Ring)/Adapter rings for 30mm eyepiece tube	
K	108016(Dia.23.2mm to 30.5mm Ring)/ Adapter rings for 30.5mm eyepiece tube	
L	Calibration kit	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.)
M	SD Card(4G or 8G)	

1.1.3 Extension of camera with Microscope or Telescope Adapter

Extension	Picture	
<p>C-mount Camera</p>	 <p>Machine vision; Medical imaging; Semiconductor equipment; Test instruments; Document scanners; 2D barcode readers; Web camera and security video; Microscope imaging;</p>	
<p>Microscope Camera</p>	 <p>XFCAM1080PHD+AMAXXX(23.2mm Adapter)</p>  <p>XFCAM1080PHD+FMAXXX(23.2mm Adapter)</p>	
<p>Telescope Camera:</p>	 <p>XFCAM1080PHD+ATAXXX(31.75mm Adapter)</p>  <p>XFCAM1080PHD+FTAXXX(31.75mm Adapter)</p>	

2 The Camera Rear Cover Function

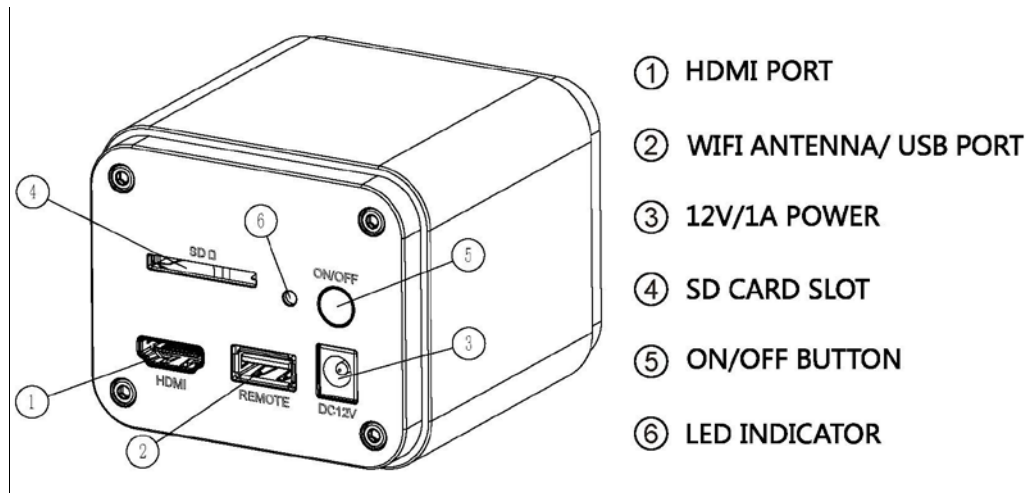


Figure 7 The Layout of Camera Rear Cover

The camera is a HDMI camera with auto focus function. Through the precise control of the sensor position, the image can be focused automatically for the stereo or biological microscope. However, this autofocus principle will destruct the microscope's imaging conjugate principle and we think only a minor focus adjustment can be made to keep the image with high quality.

But for the online basic observation, the camera can greatly increase the working efficiency and eliminate manual focus operations.


3 Quick Instructions for camera

Before starting the camera please connect the standard C-mount camera to camera adapter and connect it to the microscope's 3rd tube which will relay microscope object's middle image to the camera sensor.

3.1 WiFi Mode

1. Plug **12V/ 1A** power cable into **Power Interface** ③ to supply power for the camera. The **LED Indicator** ⑥ will turn into red;
2. Press **ON/ OFF Button** ⑤ to start the camera and the **LED Indicator** ⑥ will turn into blue;
3. Plug the **WiFi** antenna which comes with the camera into **WiFi ANTENNA/ USB PORT** ② to generate **WiFi** signal;
4. After the indicator on the **WiFi** antenna starting blinking, connect computer (may be Pad or Phone) to **WiFi** signal whose name starts with **BHDC-AFC202M**. The **Password** is 12345678;
5. Open software, start by clicking the camera model name listed in **Camera List**.

3.2 HDMI MODE

1. Plug the HDMI cable into the **HDMI Port** ① to connect the camera to HDMI display;
2. Plug a USB mouse into **USB Port** ② to get control of the camera by using built-in software **XCamView**;
3. Plug 12V/ 1A power adapter into **Power Interface** ③ to supply power for the camera. The **LED Indicator** ⑥ will turn into red;
4. Insert SD card into **SD Card Slot** ④ for saving captured images and recorded videos;
5. Press **ON/ OFF Button** ⑤ to start the camera. **LED Indicator** ⑥ will turn into blue;
6. Move mouse cursor 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 2.3 for details;
7. Move the mouse cursor to the upper side of the video window, a **Measurement Toolbar** with calibration and other measurement tools will appear, please refer to 2.3 for details; The measurement data can be output with ***.CSV** format.
8. Move the mouse cursor to the bottom of the video window and a **Synthesis Camera Control Toolbar** will appear. Operations like **Zoom In, Zoom Out, Flip, Freeze, Cross Line, WDR** and etc. can be realized. Please refer to 2.3 for details;
9. Move the mouse cursor to bottom of the video window, the **Synthesis Camera Control Toolbar** will pop up automatically. Click the  button and **Auto Focus Control Panel** will show up for conducting autofocus operation;

3.3 Brief Introduction of the Camera and Functions

The camera UI shown in Fig. 8 includes the **Camera Control Panel** on the left side of the video window, the **Measurement Toolbar** on the upper side of the video window, the **Synthesis Camera Control Toolbar** on the bottom of the video window and the **Auto Focus Control Panel** on right side of the video window.

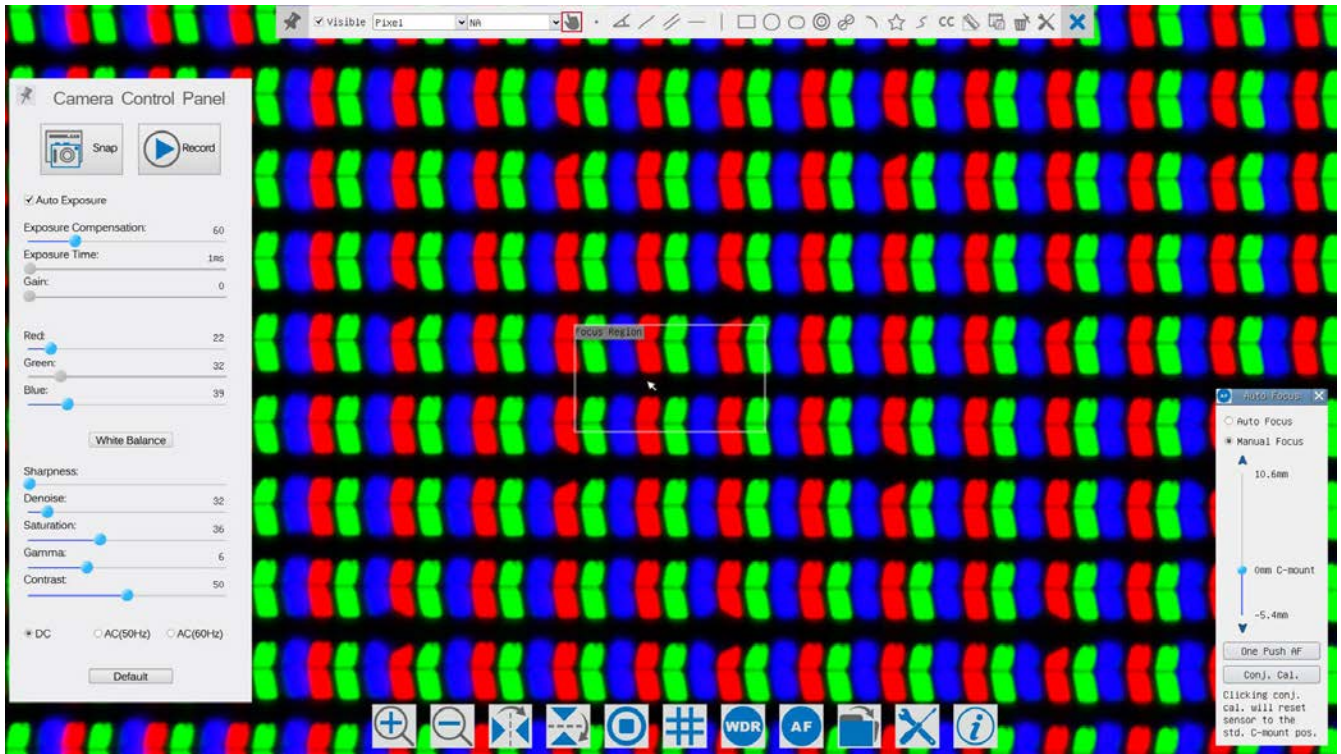







Figure 8 The Camera Control UI

Notes	
1	When users move the mouse cursor to the left side of the video window, the Camera Control Panel will pop up automatically;
2	When users move the mouse cursor to the bottom of the video window, the Synthesis Camera Control Toolbar will pop up automatically;
3	When user moves the mouse cursor to the bottom of the video window, the Synthesis Camera Control Toolbar will pop up automatically. Click the AF button and the Auto Focus Control Panel will appear for autofocus operation;
4	Move the mouse cursor to the upper side of the video window, the Measurement Toolbar will pop up for the calibration and measurement operations. When user left-clicks the Float/Fixed button  on the Measurement Toolbar , the Measurement Toolbar will be fixed. In this case the Camera Control Panel will not pop up automatically even if users move mouse cursor to left side of the video windows. Only when user left-clicks the  button on the Measurement Toolbar to exit from measuring procedure will they be able to do other operations on the Camera Control Panel , Auto Focus 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.

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

Camera Control Panel	Function	Function Description
	Snap	Capture or Snap image from the current video window
	Record	Record video from the current video window
	Auto Exposure	When Automatic Exposure is checked, the system will automatically adjust exposure time according to the value of Exposure Compensation value
	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 brightness value
	Exposure Time	Available when Auto Exposure is unchecked. Slide to left or right to decrease or increase exposure time to adjust the video brightness
	Gain	Adjust Gain to decrease or increase the video brightness. The noise will be reduced or increased accordingly
	Red	Slide to left or right to decrease or increase the proportion of Red in video window
	Green	Green is a base for reference and cannot be adjusted
	Blue	Slide to left or right to decrease or increase the proportion of Blue for the video
	White Balance	Auto White Balance adjustment according to the window video
	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 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
	DC	For DC illumination, there will be no fluctuation in light source so no need for compensating light flickering
AC(50HZ)	Check AC(50HZ) to eliminate flickering “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 cursor is moved to the left side of the video window (in measurement status, the **Camera Control Panel** will not pop up. Only when measurement process is terminated will the **Camera Control Panel** pop up by moving mouse cursor to the left side of the video window). Left-clicking  button to achieve **Display/ Auto Hide** switch of the **Camera Control Panel**;

3.3.2 Icons and Functions of the 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
	Video Freeze		Display Cross Line
	WDR		Start Auto Focus Control Panel
	Browse Images and Videos in the SD Card		Settings
	Check Version of XCamView		

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

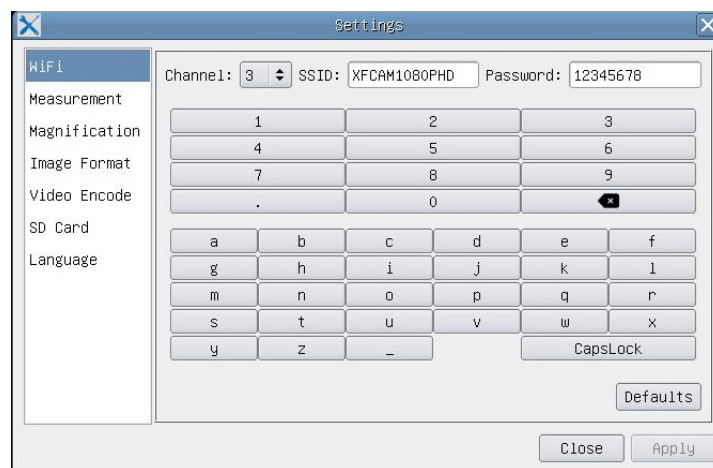


Figure 9 Comprehensive Setting of WiFi Settings Page

Channel: WiFi signal **Channel**. Avoid interference caused by using the same channel. Suggest choosing different channels for different cameras when several WiFi cameras are running at the same time;

SSID: Name of the WiFi signal. Can be user-defined by using the soft keyboard below;

Password: **Password** of the WiFi signal. The **Password** can be user-defined by using the soft keyboard below;

Default: Set **Channel**, **SSID**, **Password** to the default values;

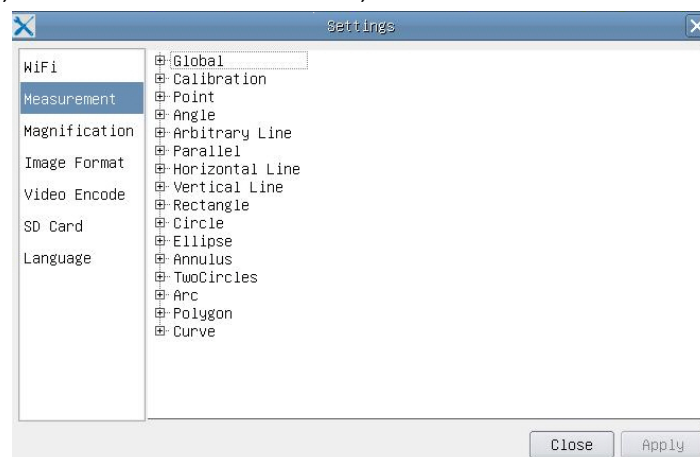


Figure 10 Comprehensive Measurement Settings Page


Global: Used for setting digits behind the decimal point for measurement results;

Calibration Line Width: Used for defining width of the lines in measurement and calibration;

Color: Used for defining color of the lines in measurement and calibration;

EndPoint Type: Used for defining shape of the endpoints of lines in measurement and calibration: Null means no endpoints, rectangle means rectangle type of endpoints. It makes it easier to calibrate;

Point, Angle, Line, Horizontal Line, Vertical Line, Rectangle, Circle, Ellipse, Annulus, Two Circles, Polygon, Curve:

Left-click the  besides the measuring patterns mentioned above will unfold the corresponding attribute settings to set the individual property of the measuring objects.

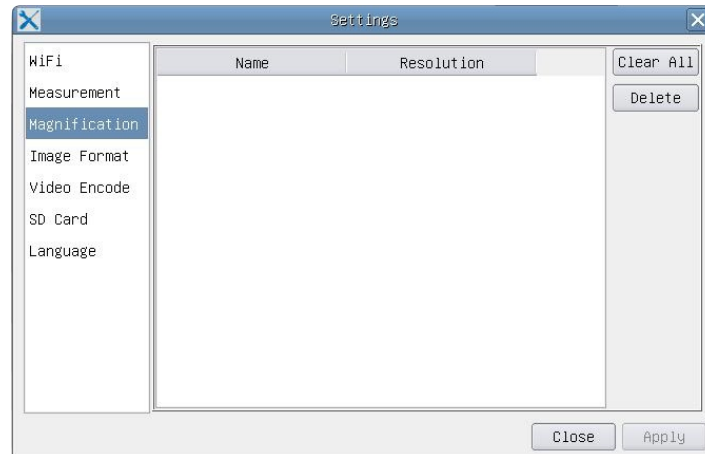


Figure 11 Comprehensive Measuring Units, Calibration, Magnification Management Settings Page

Name: Names such as 4X, 10X, 20X, 40X, 100X are based on magnification of microscopes. For continuous zoom microscopes, ensure that the selected magnification coincides with the scale alignment line;

Resolution: Pixels per meter. Devices like microscopes have high resolution value;

Clear All: Clear All the calibrated magnifications and resolutions;

Delete: Click Delete to delete the selected item for specific resolution;

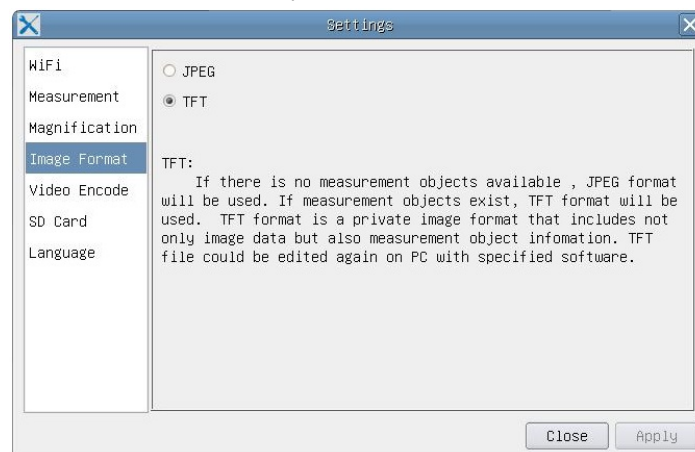


Figure 12 Image Format Setting Page

JPEG: Save captured image in JPEG format into SD card;

TFT: Save captured image in TFT format into SD card. The TFT format saves not only image data but also the measurement data over the image. The camera control & imaging processing software is capable of opening TFT file;

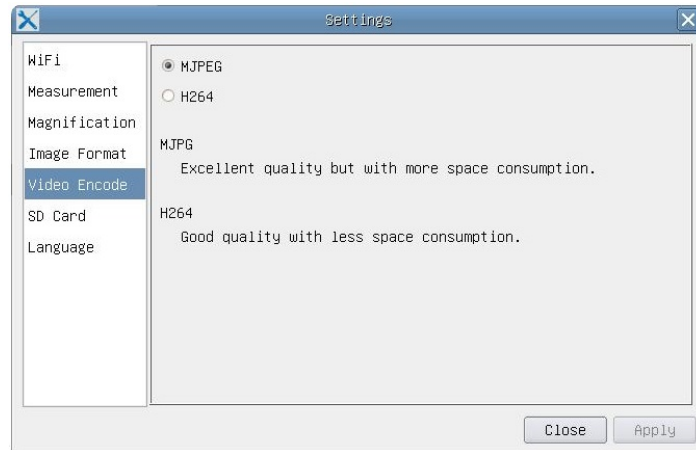


Figure 13 Comprehensive Setting of Video Encode Setting Page

- MJPEG:** Save recorded videos in **MJPEG** coded format;
- H264:** Save recorded videos in **H264** coded format;

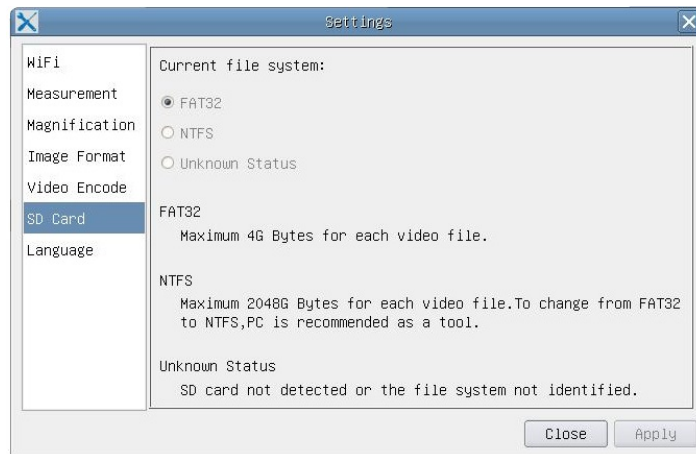


Figure 14 Comprehensive Setting of SD Card Setting Page

- Current File System:** The maximum file **FAT32** can store is of 4G Bytes; for **NTFS** it's 2048G Bytes. Suggest converting **FAT32** file into **NTFS** format on a PC; **Unknown Status:** SD card not detected or the file system is not identified;



Figure 15 XFCAM 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;

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

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

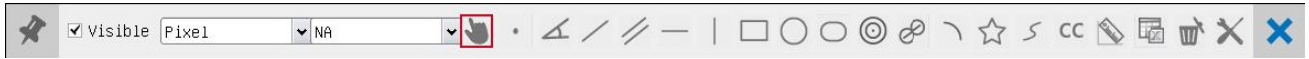
















Figure 16 The Measurement Toolbar Button on the Upper Side of the Video window


Icon	Function
	Float/ Fix switch of the Measurement Toolbar
<input checked="" type="checkbox"/> Visible	Define measuring object in Show up/ Hide mode
Pixel	Select the desired Measurement Unit
NA	Choose the same Magnification as the microscope to ensure accuracy of measurement result when measurement unit is not in Pixel unite
	Object Select
	Point
	Angle
	Arbitrary Line
	Parallel
	Horizontal Line
	Vertical Line
	Rectangle
	Circle
	Ellipse
	Annulus
	Two Circles and Center Distance

	Arc
	Polygon
	Curve
	Make Calibration to determine the corresponding relation between magnification and resolution, this 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 software help manual.
	Conjugate Correction: Click  to do the Conjugate Correction before doing any calibration. Then manually adjust the coarse and fine focus knob of microscope to make sure the video is clear. Make sure the magnification in the software stays in accordance with microscope magnification, and then select the corresponding Measurement Unit for doing the measurement.
	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:

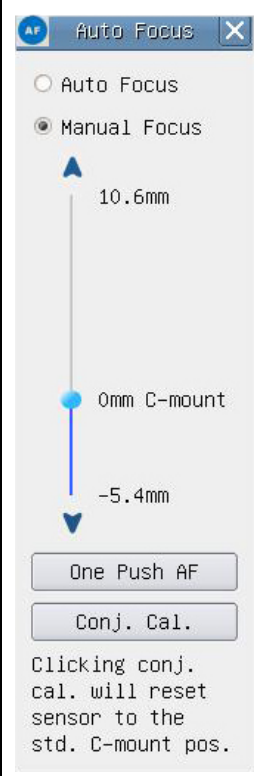
1) When user left-clicks Display/Hide button  on the Measurement Toolbar, the Measurement Toolbar will be fixed. In this case the Camera Control Panel will not pop up automatically even if moving mouse cursor to the left side of the video window. Only when users left click the  button on the Measurement Toolbar to exit from the measurement mode will they be able to doing other operations in the Camera Control Panel, the Auto Focus 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, please click the Conjugate Correction button  to reset the camera sensor to the standard C-mount position before calibration. The measurements can be started after calibration is completed and the video is focused.

4) In case calibration is completed but camera sensor is not on the C-mount position, The Conjugate Correction should be done to reset sensor to the standard C-mount position and the video is focused before measurement is started.

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

	Auto Focus	With Auto Focus button checked, the system will start autofocus according to status of the specimen till it stays in focus;
	Manual Focus	With Manual Focus checked, users should reset position of the camera sensor by using the mouse to scroll up and down till the specimen stays in focus;
	One Push AF	Click One Push button can carry out autofocus operation for just once;
	Conjugate Correction	<p>Left-click the Conjugate Correction button can reset the camera sensor to standard C-mount position. Conjugate Correction allows users to get sensor position calibrated while ensuring that the camera video window is clear as well as image seen from eyepiece is clear. Suggest users do Conjugate Correction when using the camera for the first time to ensure the camera sensor at the standard C-mount position. This ensures the object plane, eyepiece image plane and camera adapter image plane at the standard position;</p> <p>Note: 1) When height of the specimen changes, users must make sure the sensor at the standard C-mount position while adjusting the coarse and fine focus knob of microscope to focus; 2) Before doing measurement please do Conjugate Correction to make sure accuracy of the measurement results (please refer to Measurement Toolbar > Conjugate Correction... for details).</p>

3.3.5 Focus Region in the Video Window

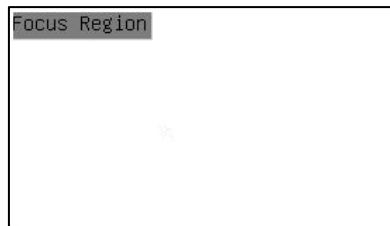



Figure 17 Focus Region

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 show up as well with the **Auto Focus Control Panel**. Users can click any part of the video window to reset the focus region for **Auto Focus** operation.

When users close the **Auto Focus Control Panel**, the **Focus Region** will also be closed automatically.

Note: When **Auto Focus** is working, moving mouse cursor to upper side of the video window does not make the **Measurement Toolbar** pop up.