User manual
Benutzerhandbuch
Manual de usuario
Gebruikershandleiding

BMS Microscopes

Article codes: 76601080PHB

Camera HDMI + WIFI/ 5 MPixel

WWW.BMSMICROSCOPES.COM

BMS_user_manual_ 76601080PHB_v1.PDF90017668

Contents

1 The 76601080PHB Basic Characteristic

- C-mount CMOS camera with Sony high sensitivity sensor
- HDMI+WiFi outputs at the same time
- HDMI output can be controlled by XCamView through the USB mouse
- WiFi output can be enabled with wireless network USB adapter，and can be controlled with ToupView/ToupLite application
- Ultra-Fine Color Engine with perfect color reproduction capability (WiFi)
- 5.04M resolution image (2592*1944 XCAM1080PHB) or 2.0M resolution image (1920*1080 (Global Shutter for PHE) can be captured and saved for browsing; For video, 1080P video stream (asf format) can be captured and saved
- Windows/Linux/OSX multiple platform SDK
- CNC housing
- Can be used for industrial inspection, education and research, materials analysis, precision measurement, medical analyses etc.

2 Camera Specifications

2.1 Camera datasheet

Sensor & Size(mm)	Pixel(μm)	G Sensitivity/Dark Signal	FPS/Resolution	Binning	Exposure/(ms)
1080P/5M/Sony IMX178(C) 1/1.8"(6.22x4.67)	2.4x2.4	425mv with 1/30s 0.15mv with 1/30s	30/1920*1080(HDMI) 25/1920x1080(NETWORK)	1x1	0.03~918
1080P/2M/Sony IMX185(C) 1/1.9"(7.20x4.05)	3.75x3.75	1120mv with 1/30s 0.15mv with 1/30s	30/1920*1080(HDMI) 25/1920x1080(NETWORK)	1x1	0.06~918
1080P/2M/Sony IMX249(C,GS) 1/1.2"(11.25x6.33)	5.86*5.86	1016mv with 1/30s 0.15mv with 1/30s	30/1920*1080(HDMI) 25/1920*1080(NETWORK)	1x1	0.043~1000

C: Color; M: Monochrome;
76601080PHB adopt large Sony global shutter CMOS sensor which is a best replacement of traditional CCD video camera

Figure 1 The Back Panel of the 76601080PHB

Interface & Button Functions	
USB	USB Mouse/USB WiFi Adapter
HDMI	HDMI Output
DC12V	12V 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, Muti-language and XCamView Version Information
Other Specification for WiFi Output	
UI Operation	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 SDK	Windows/Linux/macOS/Android Multiple Platform SDK(Native C/C++, C#/VB.NET, Python, Java, DirectShow, Twain, etc) (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 Core 2 2.8 GHz 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 Centidegree)	-10~ 50
Storage Temperature(in Centidegree)	-20~ 60
Operating Humidity	30~80%RH
Storage Humidity	10~60%RH
Power Supply	DC 12V/1A Adapter

3 The LED Functions of the76601080PHB Camera

Red LED lights on	The camera is powered off
Blue LED flashes 1x per second	The camera is initializing
Blue LED flashes 4x per second	The camera is updating the firmware
Blue LED lights on	The camera is ready

4 Dimension of 76601080PHB Camera

Figure 2 Dimension of 76601080PHB Camera

5 Package Information

Standard Packing List			
A	Gift box : L:25.5cm W:17.0cm H:9.0cm (1pcs, 1.43Kg/ box)		
B	76601080PHB camera		
C	Power Adapter: Input: AC 100~240V 50Hz/60Hz, Output: DC 12V 1A **American standard:** Model: GS12U12-P1I 12W/12V/1A: UL/CUL/BSMI/CB/FCC 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 **European standard:**Model:GS12E12-P1I 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	
		C-Mount to Dia.31.75mm eyepiece tube	
I	Fixed lens adapter	C-Mount to Dia.23.2mm eyepiece tube	
		C-Mount to Dia.31.75mm eyepiece tube	

	Note: For H and I optional items, please specify your camera type(C-mount, microscope camera or telescope camera), 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)	

6 Extension of 76601080PHB with Microscope or Telescope Adapter

Picture	
	Machine vision; Medical imaging; Semiconductor equipment; Test instruments; Document scanners; 2D barcode readers; Web camera and security video; Microscope imaging;

7 Software

The software can be downloaded from the following link:

http://extern.bmsmicroscopes.com/BMS_pix3/BMS_pix3.rar

8 Camera Application Configurations

You can use the 76601080PHB camera in 4 different ways. Each application requires different hardware environment.

8.1 Camera working standalone with built-in XCamView software

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

Figure 3 76601080PHB Camera with the HDMI Displayer

- Connect the camera to a HDMI displayer using the HDMI cable;
- Insert the supplied USB mouse to the camera's USB port;
- Insert the supplied SD card into the camera SD card slot;
- Connect the camera to the power adapter and switch it on;
- Switch on the displayer and view the video in the XCamView software.
- Move the mouse to the left, top or bottom of the screen, different control UI will pop up and users could operate with the mouse.

8.2 Camera working in WiFi mode (AP Mode)

The PC should be a WiFi enabled one.

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

- Install the ToupView/ToupLite on your PC or install the ToupView app on the mobile device;
- Plug the WiFi adapter into the camera's USB port;
- Connect the camera to the power adaptor and switch it on;
- Connect the PC or mobile device with the WiFi that the camera provides;
- The network name (SSID) and the WiFi password (The default one is 12345678) can be found on the camera.

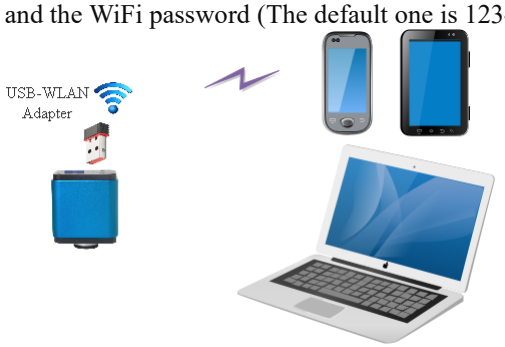


Figure 4 The PC or Mobile Device Connect to the Camera through WiFi

8.3 Camera working with USB to Ethernet adapter to connect PC.

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. 8.1 after the camera is running, 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 in Figure 5. Input the IP Address, Subnet Mask and Default Gateway for the camera. Designate the Internet Protocol Version 4 (TCP/IPv4) Settings page's IP address on the PC with similar configuration as shown in Figure 6.

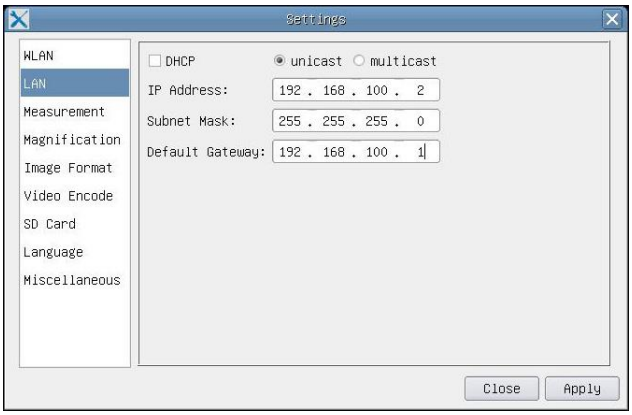


Figure 5 Configure the 76601080PHB Camera IP

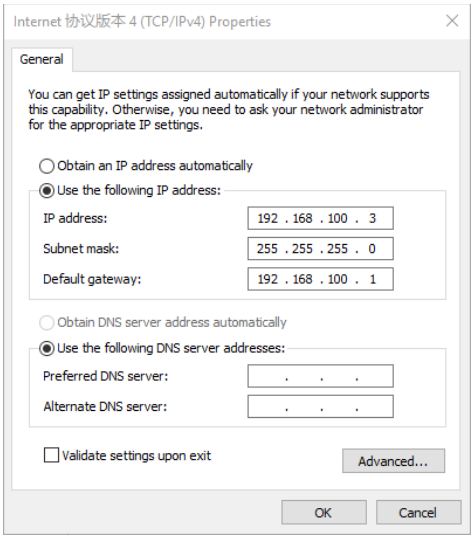


Figure 6 Configure the PC's IP

After the above configurations are finished, user can connect the 76601080PHB camera to the computer through the USB to Ethernet adapter as shown below:

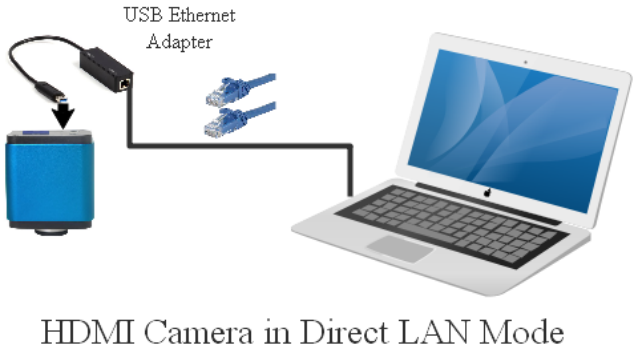


Figure 7 Connecting the 76601080PHB camera with USB Ethernet Adapter to the PC

- Install the ToupView/ToupLite on your PC or install the ToupView app on the mobile device;
- Insert the USB Ethernet's USB port to the camera's USB port;
- Connect the USB Ethernet network port with the network cable and PC's network port;
- Insert the supplied SD card into the camera SD card slot;
- Connect the camera to the power adapter and switch it on;
- Run the software ToupView/ToupLite, clicking the camera name in the camera list starts the live video.

8.4 Connecting multi-cameras to the router through the USB to Ethernet adapter for network application

In LAN mode, the camera connects to a switch or router (LAN) by USB Ethernet adapter and Ethernet cable. If a router with WiFi capability is used, users could connect the router wirelessly and control the camera.

The connection and configuration are just the same as in Sec.8.1 and Sec. 8.3. But here, users just 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 connect the same camera. In addition, please guarantee that the broadcasting function is enabled in the network.

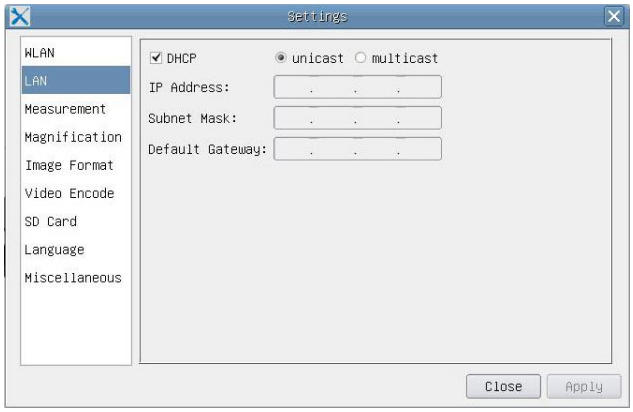


Figure 8 Check the DHCP and Unicast Items to Configure the 76601080PHB Camera

Active 76601080PHB cameras are automatically recognized by the ToupView/ToupLite software or the ToupView app and they are displayed as a camera list or thumbnail in the software or app.

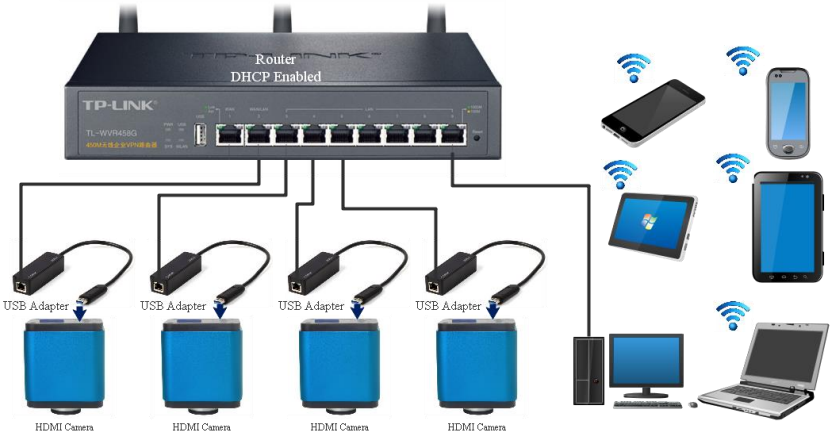


Figure 9 Multi 76601080PHB Cameras Connecting to the Router through the USB to Ethernet Adapter

The steps to start the camera are listed below:

- Install the ToupView /ToupLite software on your PC. Alternatively, install the free ToupView app on the mobile device;
- Plug the USB Ethernet adapter into the camera and plug the network cable in, too;
- Connect the camera to the power supply and switch it on;
- Make sure that your PC or your mobile device is connected to the LAN or WiFi of the router;
- Start the ToupView/ToupLite software or ToupView app and check the configuration. Normally, active 76601080PHB cameras are automatically recognized. The live image of each camera is displayed. For the display, the Camera List tool window is used in the ToupView/Touplite software, and the Camera Thumbnail is used in the ToupView app;
- Select the 76601080PHB camera you are interested in. To do so, double click the camera's name in the Camera List tool window if you use the ToupView /ToupLite software; If you use the ToupView app, tap the camera's thumbnail in the Camera List page.

Note on data security

The data transfer of the 76601080PHB camera in LAN or WiFi is not encrypted. Anyone who is connected to the network and has installed the ToupView software or App, can see the live image of all active 76601080PHB cameras. Operate the camera with the XCamView software, if you want to make sure that nobody in the network can see the camera's live image.

About the routers/switches

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

9 Brief Introduction of 76601080PHB UI and Its Functions

9.1 XCamView UI

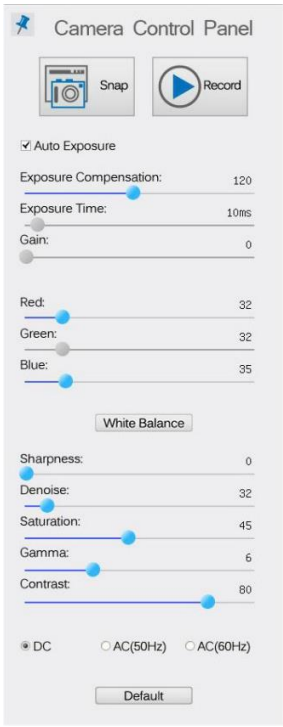
The 76601080PHB UI shown in Figure 10 includes a Camera Control Panel on the left of the video window, a Measurement Toolbar on the top of the video window and a Synthesis Camera Control Toolbar on the bottom of the video window.

Figure 10 The 76601080PHB Camera Control GUI

	Notes
1	To show the **Camera Control Panel**, move your mouser to the left of the video window
2	When users move mouse cursor to the bottom of the video window, the **Synthesis Camera Control Toolbar** will pop up automatically;
3	Move the mouse cursor to the top of the video window, a **Measurement Toolbar** will pop up for calibration and measurement operations. When user left-clicks the **Float/Fixed** button on the **Measurement Toolbar**, the **Measurement Toolbar** will be fixed. In this case the **Camera Control Panel** will not pop up automatically even if users move mouse cursor to left side of the video window. Only when user left-clicks the button on the **Measurement Toolbar** to exit from measuring procedure will they be able to do other operations on the **Camera Control Panel**, or the **Synthesis Camera Control Toolbar.** During the measuring process, when a specific measuring object is selected, an **Object Location & Attributes Control Bar** will appear for changing location and properties of the selected object.

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

The **Camera Control Panel** controls the camera to achieve the best video or image quality according to the specific applications; It will pop up automatically when the mouse cursor is moved to the left side of the video window (in measurement status, the **Camera Control Panel** will not pop up. The **Camera Control Panel** will only pop up when the measurement process is finished or terminated while user's cursor on the left edge of the video window). Left-clicking  button to achieve **Display/Auto Hide** switch of the **Camera Control Panel**.

Camera Control Panel	Function	Function Description
	Snap	**Capture** image and save it to the SD card
	Record	**Record** video and save it to the SD card
	Auto Exposure	When **Auto Exposure** is checked, the system will automatically adjust exposure time and gain according to the value of exposure compensation
	Exposure Compensation	Available when **Auto Exposure** is checked. Slide to left or right to adjust **Exposure Compensation** according to the current video brightness to achieve proper brightness value
	Exposure Time	Available when **Auto Exposure** is unchecked. Slide to left or right to reduce or increase exposure time, adjusting brightness of the video
	Gain	Adjust **Gain** to reduce or increase brightness of video. The Noise will be reduced or increased accordingly
	Red	Slide to left or right to decrease or increase the proportion of **Red** in RGB on video
	Green	**Green** is base for reference and cannot be adjusted
	Blue	Slide to left or right to decrease or increase the proportion of **Blue** in RGB on the video
	White Balance	**White Balance** adjustment according to the window video every time the button is clicked
	Sharpness	Adjust **Sharpness** level of the video
	Denoise	Slide left or right to denoise the video
	Saturation	Adjust **Saturation** level of the video
	Gamma	Adjust **Gamma** level of the video. Slide to the right side to increase gamma and to the left to decrease gamma.
	Contrast	Adjust **Contrast** level of the video. Slide to the right side to increase contrast and to the left to decrease contrast.
	DC	For **DC** illumination, there will be no fluctuation in light source so no need for compensating light flickering
	AC(50HZ)	Check **AC(50HZ)** to eliminate flickering caused by 50Hz illumination
	AC(60HZ)	Check **AC(60HZ)** to eliminate flickering caused by 60Hz illumination
	Default	Restore all the settings in the **Camera Control Panel** to default values

9.3 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 edge of the video window. Here is the introduction of the various functions on the Measurement Toolbar:

Figure 11 The Measurement Toolbar Button on the upper Side of the Video Window

Icon	Function
	Float/ Fix switch of the **Measurement Toolbar**
Visible	Define measuring object in **Show / Hide** mode
Nanometer(nm)	Select the desired **Measurement Unit**
4X	Choose the same **Magnification** as the microscope to ensure accuracy of measurement result when measurement unit is not in Pixel unit
	Object Select
	Point
	Angle
	4 Points Angle
	Arbitrary Line
	3 Points Line
	3 Points Vertical Line
	Parallel
	Horizontal Line
	Vertical Line
	Rectangle
	Circle
	3 Points Circle
	Ellipse
	Annulus
	Two Circles and Center Distance
	3 Points Two Circles and Center Distance
	Arc
	Polygon
	Curve
	Arrow
um	**Scale Bar**
	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 ToupView help manual.

	Export the measurement information to **CSV** file(*.csv)
	Delete all the measurement objects
	Setting
	Exit from Measurement mode
	When the measurement ends, left-click on a single measuring object and the **Object Location & Properties Control Bar** will show up. Users could move the object by dragging the object with the mouse. But more accurate move could be done with the control bar. The icons on the control bar mean **Move Left**, **Move Right**, **Move Up**, **Move Down**, **Color Adjustment** and **Delete**.

Note:

1) When user left-clicks Display/Hide button  on 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 edge of the video window. Only when user left-click the  button on the Measurement Toolbar to exit from the measurement mode will they be able to doing other operations on the Camera 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.

9.4 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**
	Wide Dynamic Range Mode		**Compare Image** with the Current Video
	Browse Images and Videos in the SD Card		**Settings**
	Check the Version of XCamView		

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

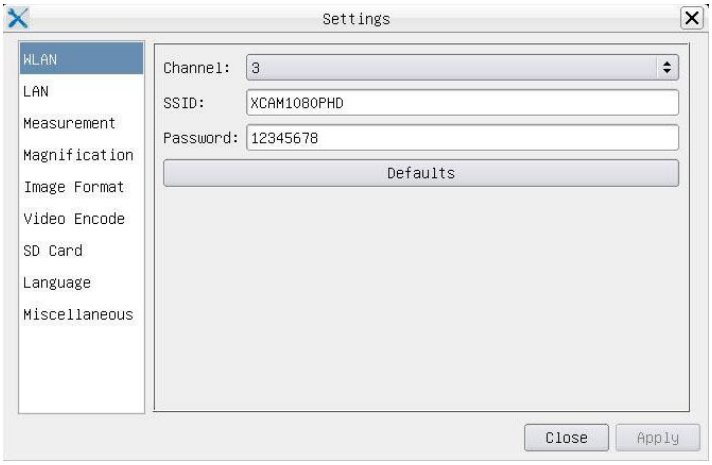


Figure 12 Comprehensive WiFi Settings Page

Channel	Wireless communication channel, also known as wireless "**Channel**", is a data transmission **channel** with wireless signals as transmission media;
SSID	Camera name sent by USB to WiFi adapter;
Password	WiFi **Password**, default is 12345678;

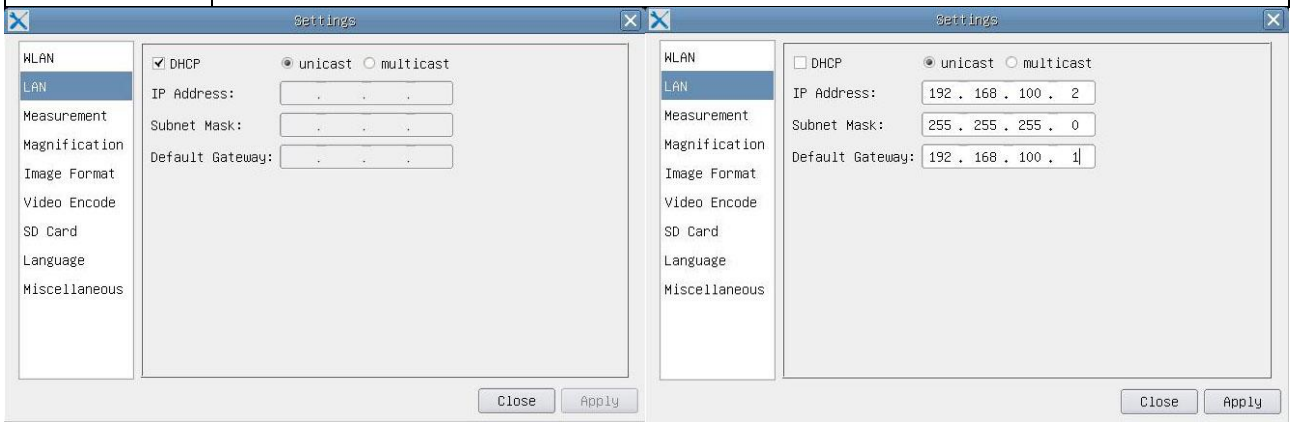


Figure 13 Comprehensive LAN Settings Page

DHCP	Dynamic host control protocol allows DHCP server to automatically assign IP information to the camera. Only in Sec 6.4 LAN networking this item should be checked, so that cameras can automatically get IP information from routers/switches to facilitate networking operation;

unicast/multicast	By default, **unicast** function is used. Only in Sec 6.4 networking environment, when the router/switch has **multicast** function, camera can switch to multicast mode, which can save the network bandwidth consumed by the camera and facilitate the connection of more cameras in the same network;
IP Address	Every machine on a network has a unique identifier. Just as you would address a letter to send in the mail, computers use the unique identifier to send data to specific computers on a network. Most networks today, including all computers on the Internet, use the TCP/IP protocol as the standard for how to communicate on the network. In the TCP/IP protocol, the unique identifier for a computer is called **IP address**. 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 on the right of Figure 13. 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 Getway	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.

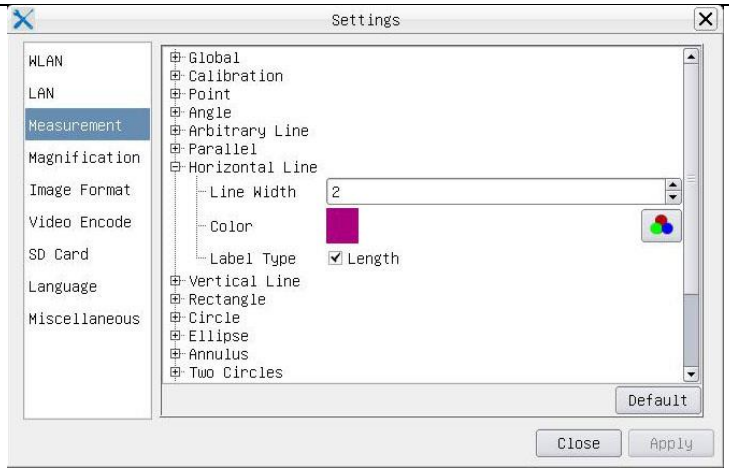


Figure 14Comprehensive Measurement Settings Page

Global	Used for setting digits behind the decimal point for measurement results;	
Calibration	Line Width	Used for defining width of the lines 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 measuring pattern names mentioned above will unfold the corresponding attribute settings to set the individual property of the measuring objects.	

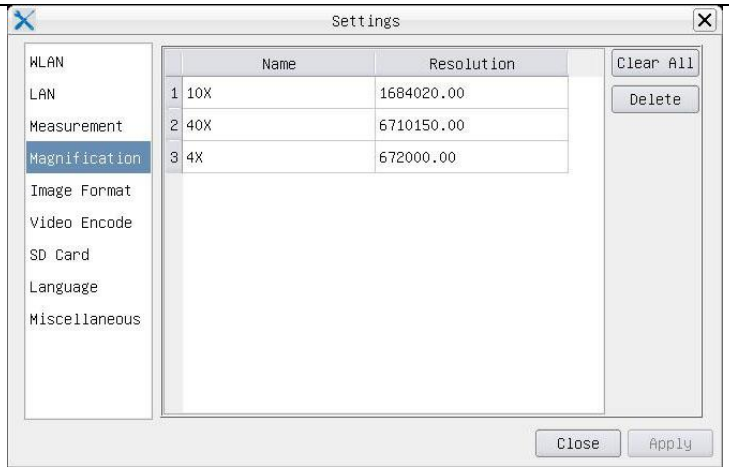


Figure 15 Comprehensive Magnification Calibration Management Settings Page

Name	Names such as 10X, 40X, 100X are based on magnification of the microscopes. For continuous zoom microscopes, ensure that the selected magnification coincides with the scale alignment line on the microscope zoom knob; Users could also edit the name of the magnification with other information, for example, microscope mode, users name, etc.
Resolution	Pixels per meter. Image device like microscopes have high resolution value;
Clear All	Click the **Clear All** button will clear the calibrated magnifications;
Delete	Click **Delete** to delete the selected magnification;

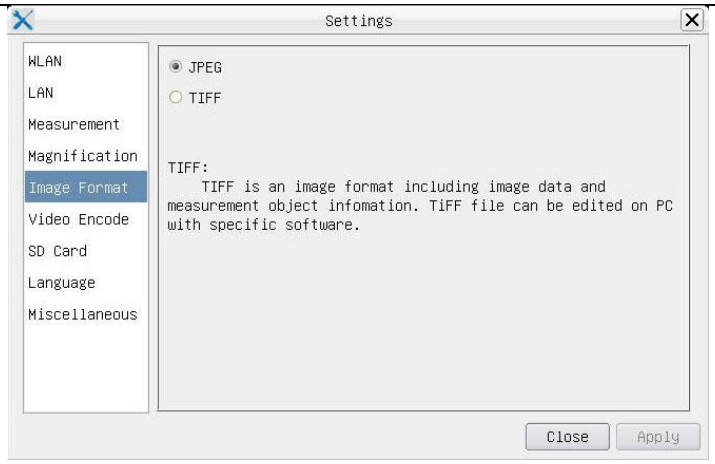


Figure 16 Comprehensive Image Format Settings Page

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 is available, the measurement objects will be burned into the image and the measurement cannot be edited.
TIFF	TIFF is an image format which can include both the image data and measurement object. Measurement objects are saved separately from the image data and can be edited later with specified software.

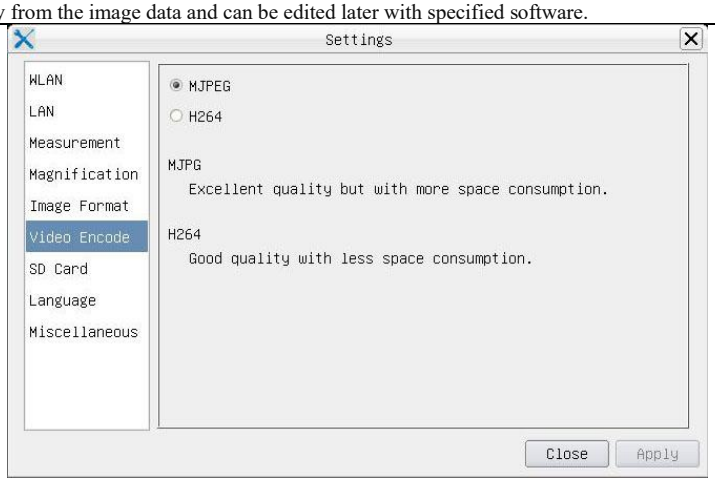


Figure 17 Comprehensive Video Encode Settings Page

MJPEG	Codec format for video is MJPEG. Excellent quality but with more space consumption than H264;
H264	Codec format for video is H.264. Good quality with less space consumption;

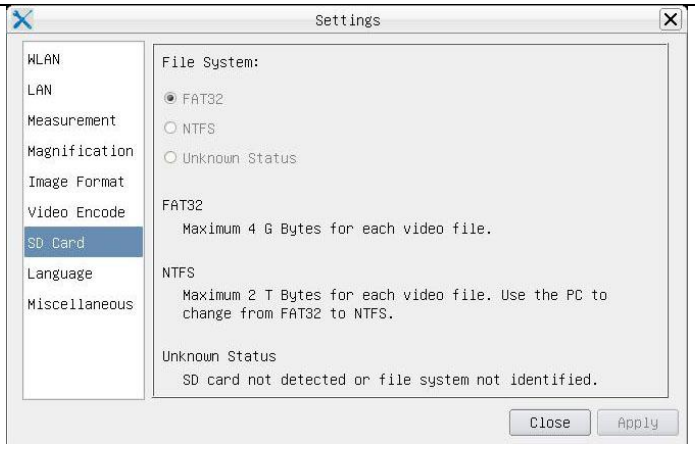


Figure 18 Comprehensive Setting of SD Card Setting Page

File System	**FAT32:** The file system of SD card is FAT32. The maximum video file size of single file in **FAT32** file system is 4G Bytes; **NTFS:** The file system of SD card is NTFS. The maximum video file size of single file is 2T Bytes. Use PC to format the SD cards and switch between **FAT32** and **NTFS**. **Unknown Status**: SD card not detected or the file system is not identified;

Figure 19 76601080PHB 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;

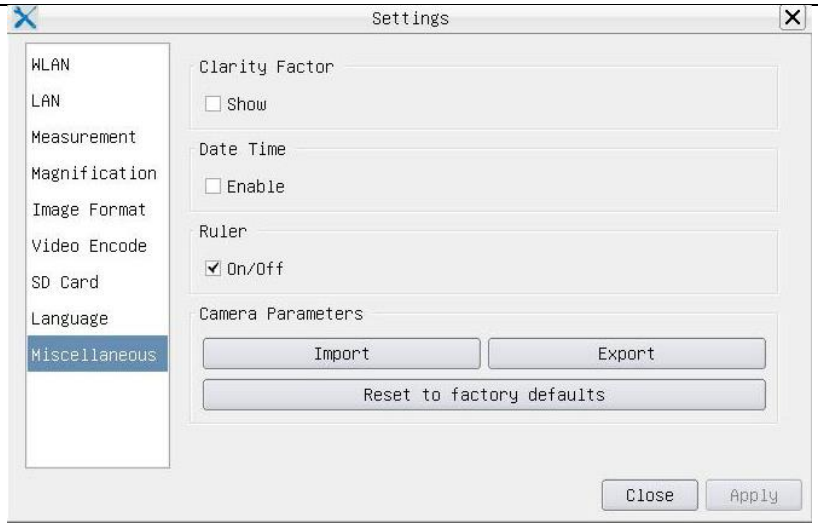
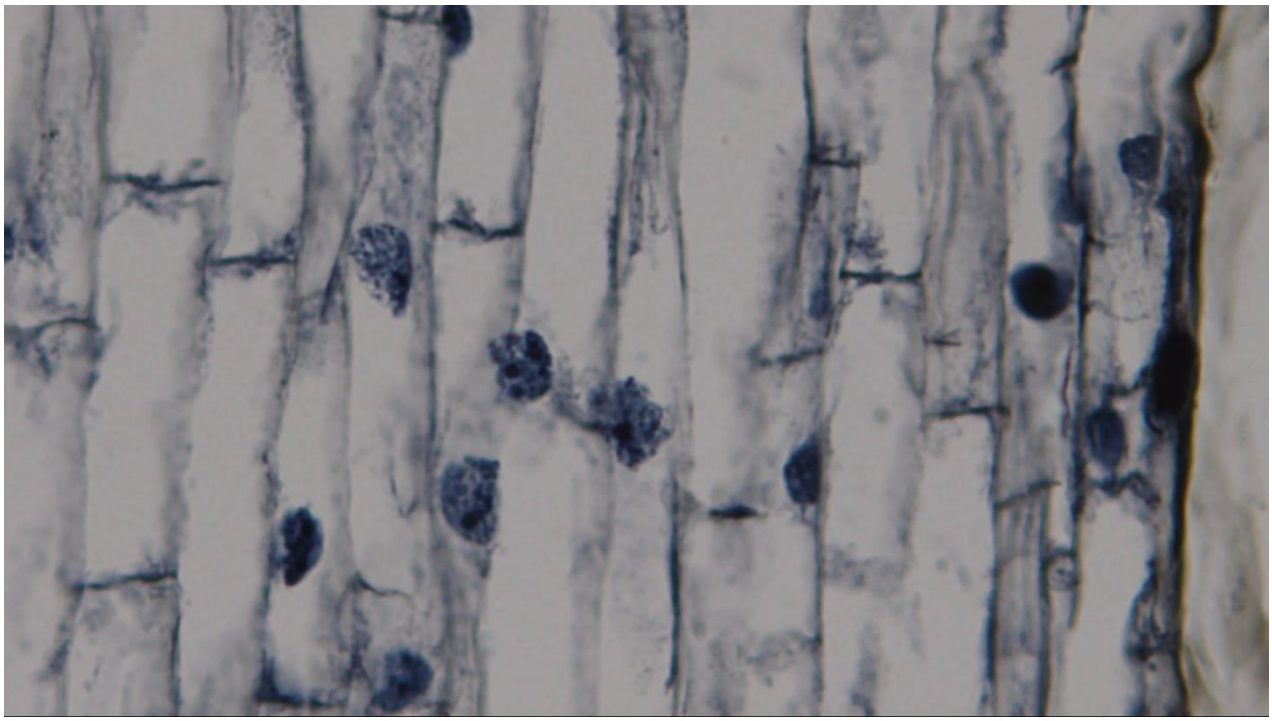


Figure 20 Comprehensive Miscellaneous Settings Page

Clarity Factor	The **Clarity Factor** can tell if the sample is in good focused state or not. The larger the **Clarity Factor**, the better the sample focused. Check **Show** to see if the video is fully focused or not;
Date Time	For cameras without RTC configuration, users could configure system time after the camera is stated, which is not saved because there is no built-in RTC;
Ruler (On/Off)	Check to show the Ruler on the video window;
Import	Import saved parameter settings from SD card;
Export	Export current camera parameters to SD card for later use;
Reset to factory defaults	Restore camera parameters to its factory status;

10 Sample Photos Captured with 76601080PHB Camera



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