ToupTek Intelligent Imaging AutoFocus Camera Catalog

20251011

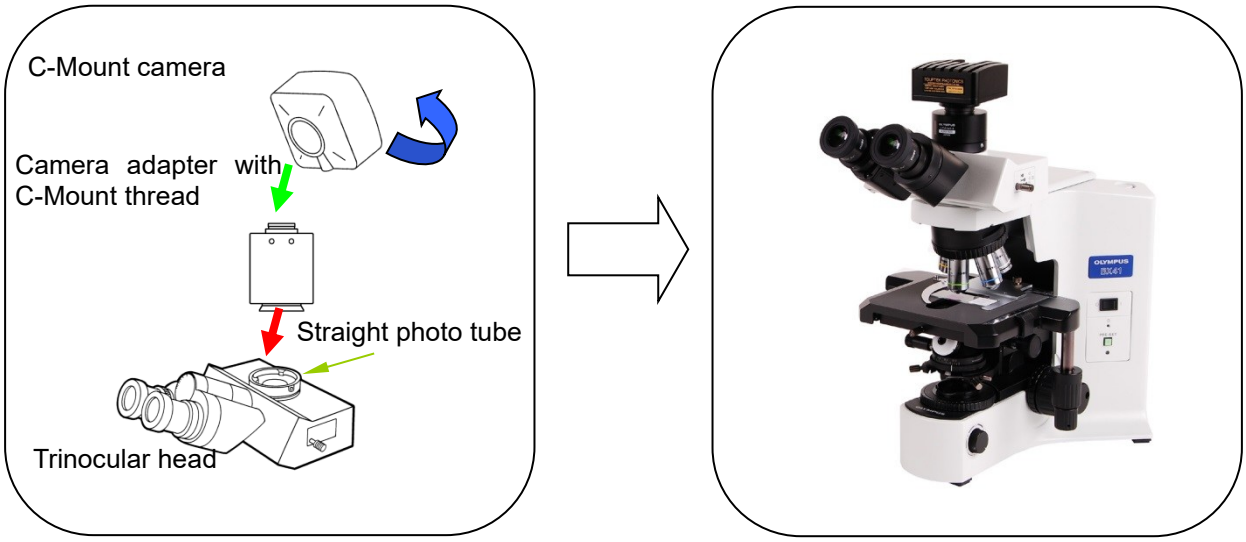
TOUPTEK PHOTONICS
WE KNOW IMAGES, WE MAKE CAMERAS

Product Catalog

1 ToupCam® Camera & Microscope Configuration

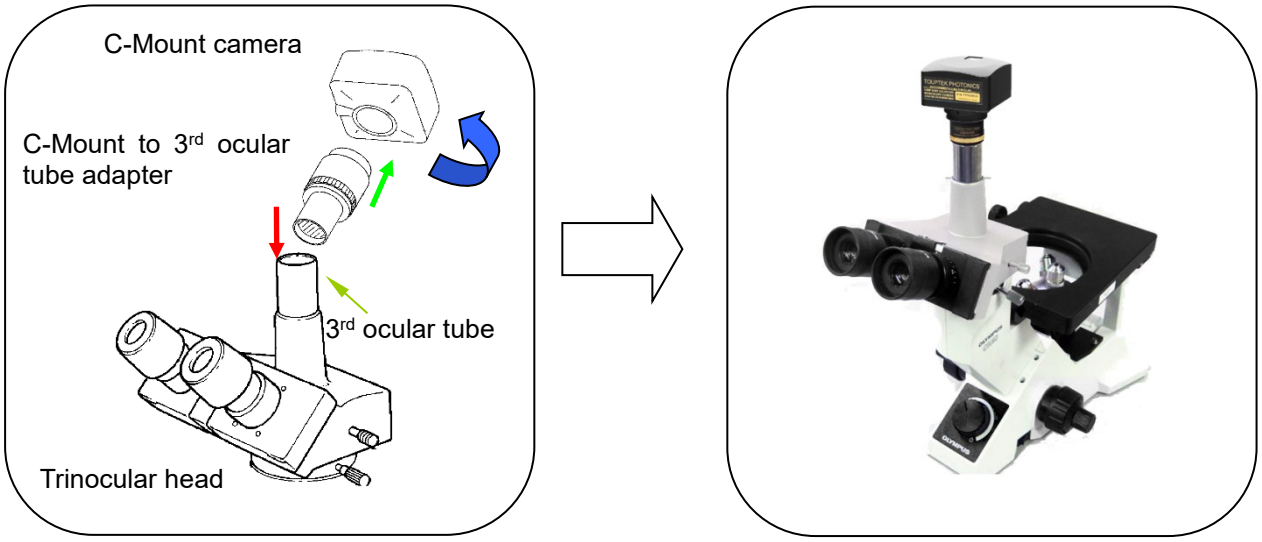
1.1 Trinocular Digital Microscope (1/2)

Attach the C-mount camera and Adapter to the straight photo tube



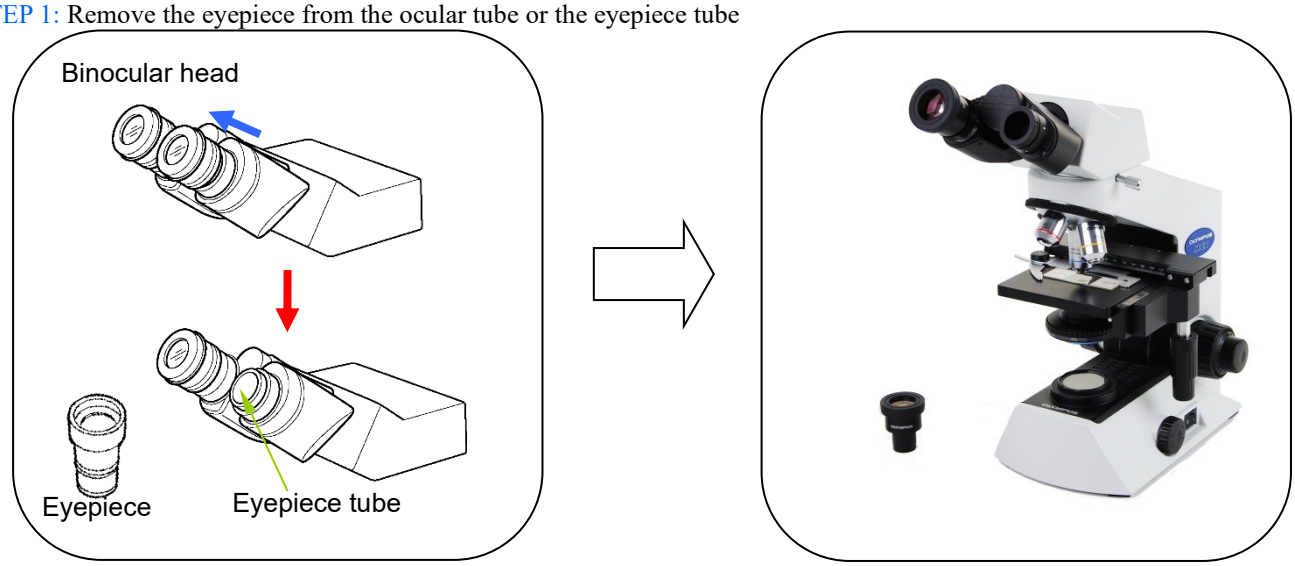
1.2 Trinocular Digital Microscope (2/2)

Attach the C-Mount camera and adapter to the 3rd ocular tube or the other 2 eyepiece tubes

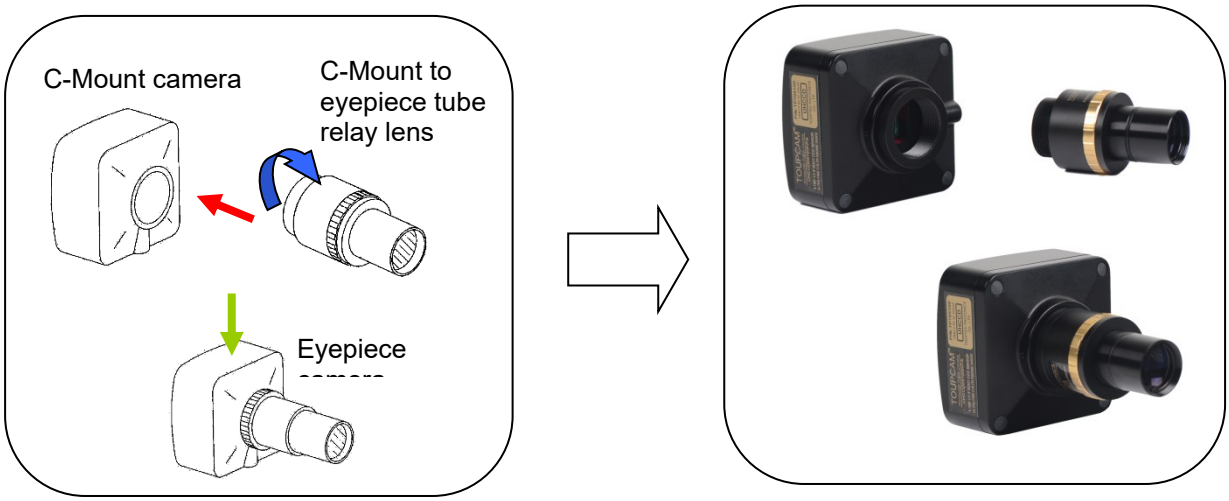


1.3 Binocular Digital Microscope

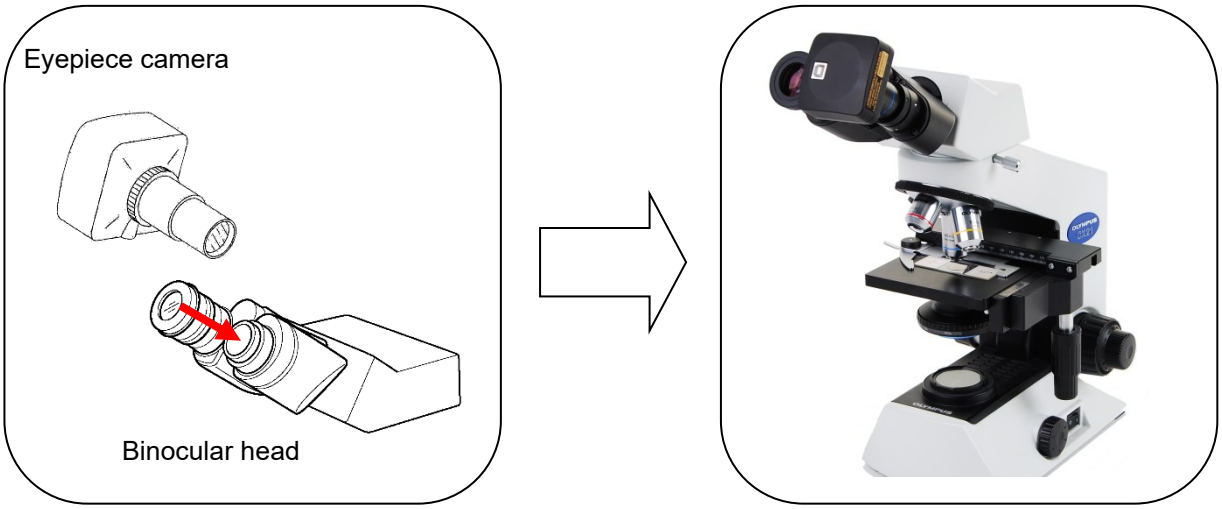
STEP 1: Remove the eyepiece from the ocular tube or the eyepiece tube



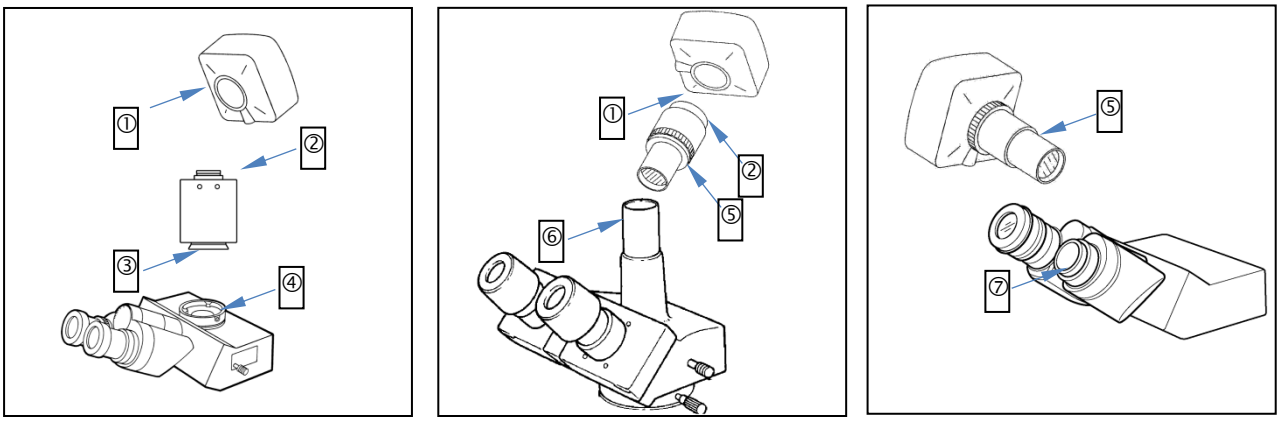
STEP 2: Attach (Screw) the camera Adapter to the C-mount camera



STEP 3: Attach (Insert) the eyepiece camera into the ocular tube or eyepiece tube



1.4 Size Description of the Connection Parts



① Standard C-Mount: Dia.1 inch (25.4mm) female thread
② Standard C-Mount: Dia.1 inch (25.4mm) male thread
③ Camera Adapter connector: size varies between microscope brands
④ Straight photo tube: size varies between microscope brands
⑤ Relay lens: standard eyepiece connector size, Dia.23.2mm (male)
⑥ 3rd ocular tube: standard eyepiece connector size, Dia.23.2mm (female)
⑦ Ocular tube: standard eyepiece connector size, Dia.23.2mm (female)

2 Introduction and Characteristics

ToupTek AutoFocus microscope cameras are designed specifically for microscopes (biological/metallurgic/continuous zoom monoculars, etc.) users without a computer, directly outputting the microscopic video to the HDMI display;

AutoFocus series microscope cameras have built-in ultra-high-performance multi-core microprocessor and run LinuxOS-based XCAMView software. When plugging in the mouse, you can easily perform image processing and operation on the HDMI display;

AutoFocus series microscope cameras also have multiple output functions, which can transfer the video image data of the microscope camera to a computer or mobile devices by USB interface/RJ45 Ethernet interface/WiFi adapter;

The AutoFocus series comes with the built-in Auto Focus system, which can realize Auto Focus on specific areas of the sample.

AutoFocus series microscope cameras can be inserted with SD card or USB flash drive to quickly save images or videos for subsequent analysis and research;

AutoFocus series microscope cameras have high color reproduction ability, what you see is what you get, and the uncompressed raw data or lossless compression technology ensures the authenticity of scientific images; the built-in algorithm can automatically analyze and adjust the image information, regardless of whether the brightfield biological image, polarized light and crystal imaging in dark field, almost no need to manually adjust the parameters, you can get the desired effect.

AutoFocus series microscope cameras break through the concept of traditional microscope cameras, and improve the quality and technological level of industrial and biological microscopic imaging, making it easier and faster for users to control and use.

There are many types of AutoFoucs series of microscope cameras. In order to facilitate the user to choose, the functions of each model are described as follows:

- AFDM512: support HDMI2.0， USB3.0， WiFi， LAN output
- AFDM511: support HDMI2.0， USB3.0， WiFi， LAN output
- AFDM412: support HDMI1.4， USB2.0， WiFi， LAN output
- AFDM411: support HDMI1.4， USB2.0， WiFi， LAN output
- TAFDM41X: support HDMI1.4， USB2.0， WiFi， LAN output
- X8FCAM4K：support HDMI2.0， USB3.0 output， WiFi， LAN output
- X7FCAM4K：support HDMI2.0， USB3.0 output， WiFi， LAN output
- X5FCAM4K：support HDMI2.0，USB3.0 output， WiFi output
- XFCAMTOP4K：support HDMI1.4，USB2.0 output， WiFi output
- XFCAMTOP_MINI：support HDMI1.4，USB2.0 output， WiFi output
- XFCAM1080PHX：support HDMI1.4， WiFi output

3 AFDM Series Electric Controlled Continuous Zoom and Autofocus Digital Microscope

3.1 AFDM512 Series

3.1.1 Introduction to AFDM512 Series

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

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

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

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

AFDM512 series camera supports HDMI/NETWORK/USB control and video output (ToupView). The maximum frame rate of the output is 4K/60FPS, and the zoom range is 1X~18X. It also supports electric zoom and auto focusing.

Figure 3-1 AFDM512 Series Camera Front and Back View

Figure 3-2 AFDM's Side and Front (with LED light) View

3.1.2 The Module Specifications of AFDM512 Series Camera

The AFDM series products consist of three modules, AFDM camera module, AFDM lens module, and AFDM light module. As shown in the table below.

3.1.2.1 AFDM512 Camera Module Datasheet

Order Code	Sensor & Size(mm)	Pixel(μm)	G Sensitivity/Dark Signal	Sensor (FPS/Resolution)	Binning	Exposure(ms)
H4KPA	Sony IMX415LQR-C 1/2.8"(5.57x3.13)	1.45x1.45	300mv/0.13 with 1/30s	60@3840*2160	1x1	0.059~1000

The output parameters of different interfaces are shown in the following table:

Camera Model	Video Saving (FPS/Resolution)	HDMI2.0(FPS/Resolution)	USB3.0(FPS/Resolution)	NETWORK(FPS/Resolution)
H4KPA	60@3840*2160 60@1920*1080 60@1280*720	60@3840*2160 60@1920*1080	30@3840*2160 45@2688*1512 60@1920*1080	60@1920*1080

3.1.2.2 AFDM512 Lens Module Datasheet

Order Code	Working Distance(mm)	Zoom Range	MTF (lp/mm)	Distortion	FOV@1X(mm)	FOV@18X(mm)
EMZO-18XA-250	205~255	0.021X~0.39X	160	0.5%	255x145	14.2x8
EMZO-18XA-640	400-670	0.0085X~0.1529X	160	0.5%	655.8x368.9	36.4x20.5

1X and 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 = 0.021/0.021; 18X=0.39/0.021;

3.1.2.3 AFDM512 Light Module

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

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

AFDM512 series camera can use AALRL-200-7650 as external light for the large FOV illumination.

3.1.2.4 AFDM512 Series Camera Model

Currently there are two models in the AFDM512 series, AFDM512A and AFDM512B, of which the lighting module can be specified at the time of purchase.

Model	Camera Module	Lens Module	Light Module
AFDM512A	H4KPA	EMZO-18XA-250	DRL-5076A-NPC/AALRL-200-7650
AFDM512B	H4KPA	EMZO-18XA-640	DRL-5076A-NPC/AALRL-200-7650

AFDM512 series camera supports two lens modules for different working distances, Users can choose the corresponding camera model according to the needs.

3.1.3 AFDM512 Series Camera Characteristic and Specification

The AFDM512 series camera comes with H4KPA HDMI camera, EMZO-18XA-250 / EMZO-18XA-640 lens and DRL-5076A-NPC light source (Optional);

3.1.3.1 The Basic Characteristic of AFDM512 Series Camera

- 5 groups 16 elements EMZO, 18 zoom ratio, supports auto and manual focus
- AFDM512A: 250mm standard working distance with 205~255mm depth of field; AFDM512B: 640mm standard working distance with 400~670mm depth of field;
- At standard working distance of AFDM512A, the large field of view of AFDM512A at low magnification is 255mm*145mm, and the small field of view at higher magnification is 14.2mm*8mm; At standard working distance of AFDM512B, the large field of view of AFDM512B at low magnification is 655.8mm*368.9mm, and the small field of view at higher magnification is 36.4mm*25mm. Users can quickly locate target objects at low magnification and conduct microscopic observations at high magnification
- Under the standard measurement working distance, the camera has stored 1~18 times the default measurement calibration information, allowing users to accurately measure
- Sony IMX415 1/2.8” 4K Starvis CMOS with high signal-to-noise ratio
- 4K HDMI/NETWORK/USB multiple video outputs
- 4K/1080P auto switching according to monitor resolution
- Support 4K 60fps low delay HDMI output mode, with an average delay of 40ms
- SD card/USB flash drive for captured image and video storage, support local preview and playback
- Support the capture and display of RAW format images
- Support Image Auto Upload to the server over the network
- Support USB voice control module, enabling real-time control of the camera through voice commands for taking photos,

recording videos, freezing, and other operations

- New browsing function, providing rich file operation functions, image to image comparison, image to real-time video comparison, multi-image EDF function, multi-image Stitch function
- Provide multiple focusing methods, and the size of the focusing area can be modified; Provide AF+EDF, facilitating the synthesis of high depth of field images in multiple focus areas at high magnification
- Provide real-time video EDF function
- Provide real-time Stitch function to obtain images with a larger field of view through real-time processing
- Provide default ISP parameters for scene, convenient for secondary adjustment and optimisation
- Built-in mouse control software XCamView, all functions can be realized with USB mouse
- Embedded mouse Camera Control Panel, Measurement Toolbar, Synthesis Control Toolbar, AF Control Panel
- 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 AFDM can be built

Figure 3-3 TPS-30A(bracket)+AFDM512A Camera +HDMI 4K Monitor

3.1.3.2 Specification of AFDM512 Series Camera

Interface & Button Functions		
	**USB Mouse**	Connect USB mouse for easy operation with embedded XCamView software Connect USB voice control for enable real-time control of camera snap, recording, freezing, Control for voice control commands
	USB3.0	Connect USB flash drive to save pictures and videos Connect 5G WiFi module to transfer video wirelessly in real time Connect USB microphone to record audio and video Connect USB voice control for enable real-time control of camera snap, recording, freezing, Control for voice control commands
	HDMI	Comply with HDMI2.0 standard. 4K/1080P format video output and supporting automatic switch between 4K and 1080P format according to the connected monitors
	USB Video	Connect PC or other host device to realize video image transmission with ToupView/ToupLite
	LAN	LAN port to connect router and switch to transfer video with ToupView/ToupLite
	ON/OFF	Power on/off switch
	LED	Power LED indicator
	SD	Comply with SDIO3.0 standard and SD card could be inserted for video and images saving
	DC12V3A	DC12V3A power input

XCamView Software Functions	
UI Operation	With USB mouse to operate on the embedded XCamView
Image Capture	8M (3840*2160) JPEG/TIFF/RAW image in SD card or USB flash drive (Default SD card priority, priority can be modified in settings)
Video Record	Video format：8M (3840*2160) H264 encoded MP4 file Video saving frame rate:60fps
Camera Control Panel	Including Exposure, Gain, White Balance, Sharpness, 3D Denoise, Saturation, Gamma, Contrast, Brightness, Power Frequency control
Measurement Toolbar	Including Calibration, Measurement, and measurement parameter Export functions
Synthesis Control Toolbar	Zoom In/Zoom Out (Up to 10X), Mirror/Flip, Freeze, EDF, Cross Line, Overlay, PIP , AF, LED, Browser(including Picture Browsing , Video Playback , Video Compare , Picture Compare , EDF , Stitch , Image Processing), Measurement Function
Auto Focus Control Panel	Including Zoom, Auto Focus, One Push, Manual Focus, Reset, and other functions
Software ToupView/ToupLite Environment under NETWORK/USB Video Output	
White Balance	Auto White Balance
Color Technique	Ultra-Fine Color Engine
Capture/Control SDK	Windows/Linux/macOS/Android Multiple Platform SDK (Native C/C++, C#/VB.NET, Python, Java, DirectShow, Twain, etc)
Recording System	Still Picture or Movie
Operating System	Microsoft® Windows® XP / Vista / 7 / 8 / 8.1 /10(32 & 64 bit)/ToupView OSx(Mac OS X)/ToupLite Linux/ToupLite
PC Requirements	CPU: Equal to Intel Core2 2.8GHz or Higher
	Memory: 4GB or More
	Ethernet Port: RJ45 Ethernet Port
	Display:19” or Larger
	CD-ROM
Operating Environment	
Operating Temperature (in Centidegree)	-10~ 50
Storage Temperature (in Centidegree)	-20~ 60
Operating Humidity	30~80%RH
Storage Humidity	10~60%RH
Dimension	
Length x Width x Height	80mm x 80mm x 122mm
Shipping Weight	0.75kg

3.1.4 Dimension of AFDM512 Series Camera

Figure 3-4 Dimension of AFDM512 Series Camera

3.1.5 Packing Information of AFDM512 Series Camera

Figure 3-5 Packing Information of AFDM512 Series Camera

	Standard Packing List	
A	Gift box: L:220cm W:220cm H:110cm (1pcs, 2.0kg/box)	
B	AFDM512 Series Camera	
C	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
D	USB Mouse	
E	HDMI Cable	
F	USB3.0 A male to A male gold-plated connectors cable /1.5m	
G	CD (Driver & utilities software, Ø12cm)	
	Optional Accessory	
H	Ethernet cable	
I	LED Ring Light (DRL-5076A-NPC) or AALRL-200-7650 (Not provided)	
J	USB flash drive	
K	USB WiFi adapter	
L	SD card(16G)	
M	USB voice control module	
N	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.)

3.1.6 Installation and Operation of AFDM Series Product

Before use, please install the AFDM512 series camera on an adaptive bracket.

1.Plug HDMI cable into the HDMI port to connect AFDM512 series camera and HDMI monitor;

2.Plug a USB mouse into USB Mouse port, to get control of the AFDM512 series camera by using built-in software XCamView;

3.Plug DC12V3A power adapter into DC12V3A port, to supply power for the AFDM12 series camera, the LED Indicator will turn into red;

4.Insert SD card/USB flash drive into SD card Slot/USB3.0 Slot for saving captured images and recorded videos;

5.Press ON/OFF button to start the AFDM512 series camera, LED Indicator will turn into blue;

6.Move mouse to the left side of the video window, the Camera Control Panel will appear. It includes Manual/Automatic Exposure, White Balance, Sharpness, Denoise.

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

8.Move mouse to the bottom side of the video window, the Synthesis Camera Control Toolbar will appear. Operations like Zoom In, Zoom Out, Flip, Gray, Freeze, EDF, Stitch, Grids, Overlay, PIP, Autofocus, LED brightness control, SD card/ USB flash drive contents browsing, Settings, and Camera Version can be executed.

9.Move mouse to the bottom side of the video window, the Synthesis Camera Control Toolbar will pop up automatically. Click AF button, and Auto Focus Control Panel will show up for autofocus operation, it supports 18X optical zoom, Autofocus, Manual Focus, AF+EDF, Reset, and One Push operation.

3.1.7 Images Captured with AFDM512A

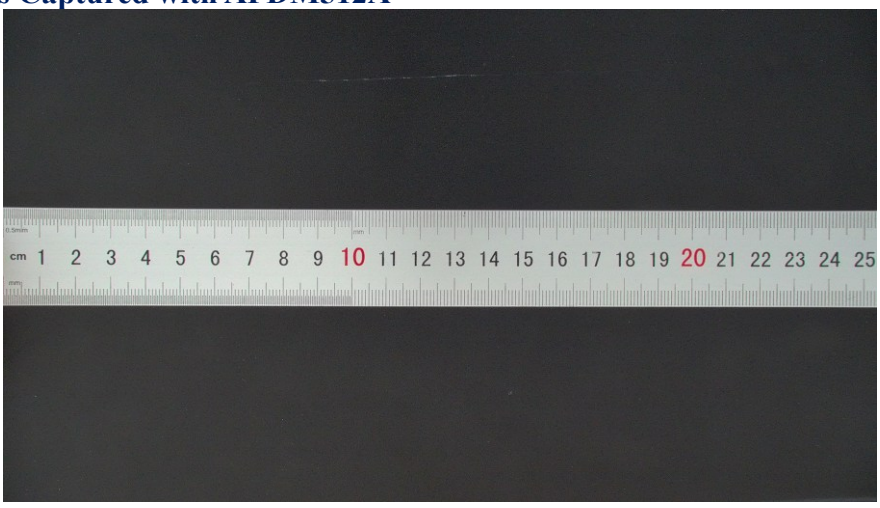


Figure 3-6 Ruler Captured with AFDM512A at 1X

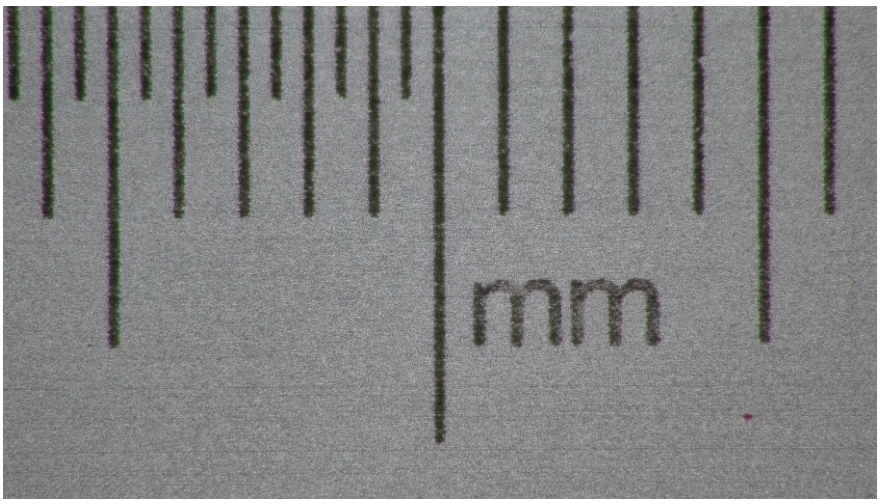


Figure 3-7 Ruler Captured with AFDM512A at 10X

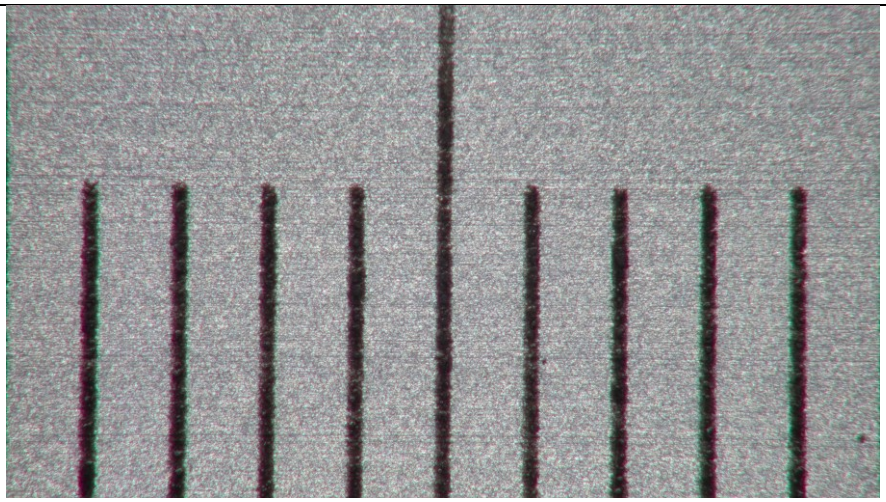


Figure 3-8 Ruler Captured with AFDM512A at 18X

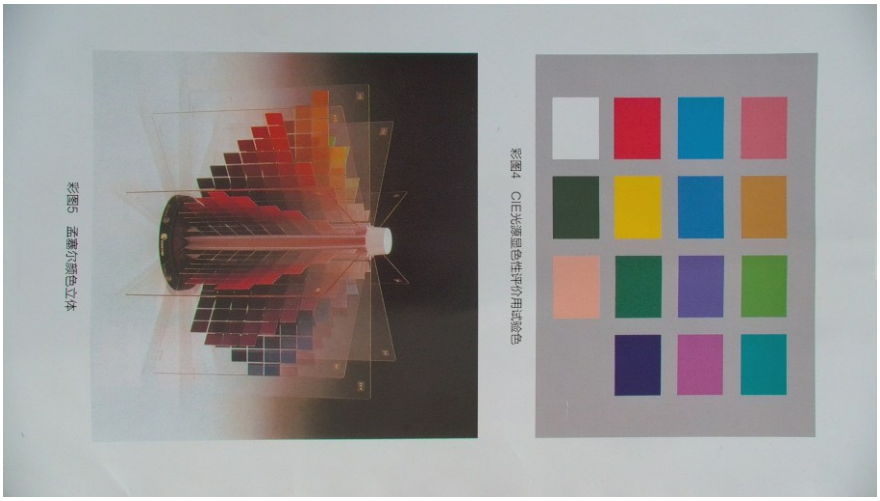


Figure 3-9 Print Captured with AFDM512A at 1.0X

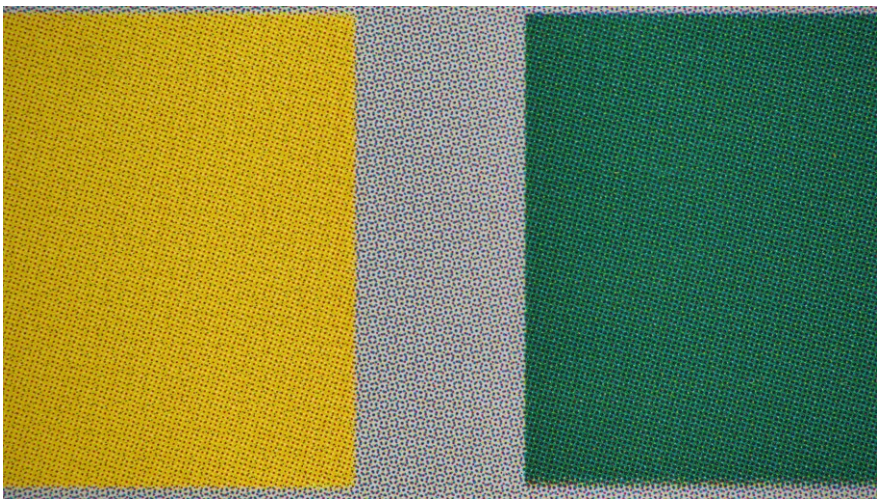


Figure 3-10 Print Captured with AFDM512A at 10X

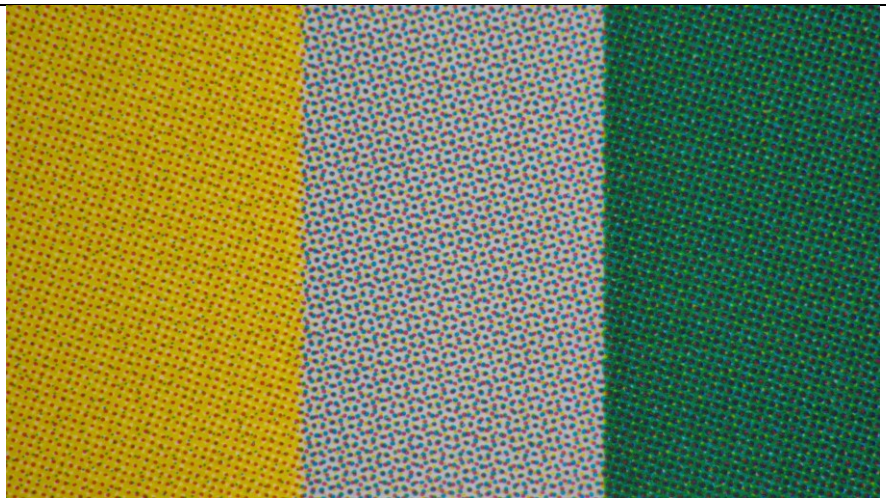


Figure 3-11 Print Captured with AFDM512A at 18X

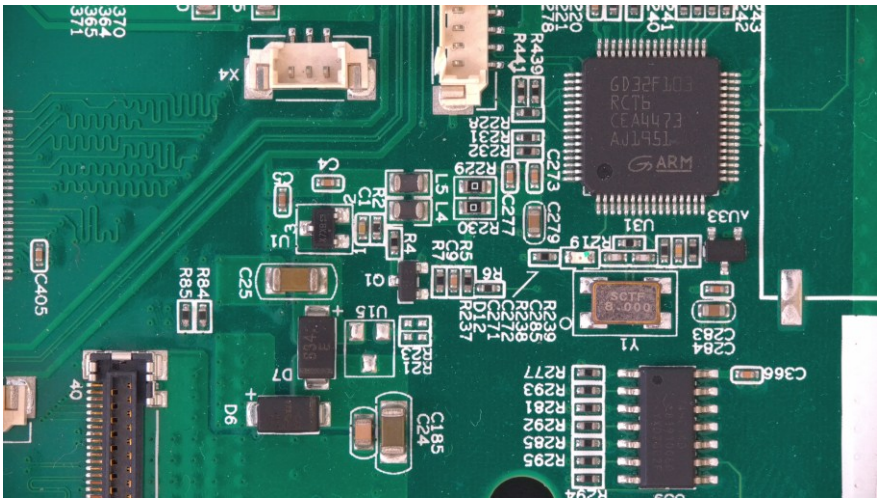


Figure 3-12 PCB Captured with AFDM512A at 4.0X

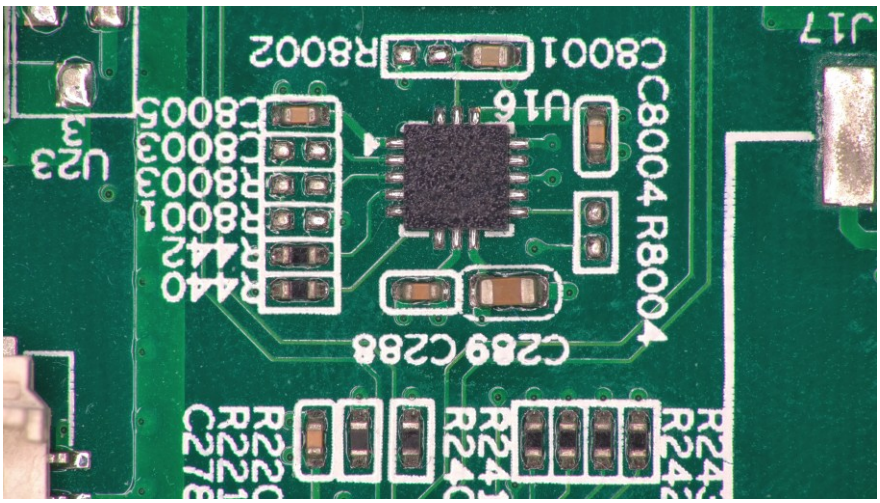


Figure 3-13 PCB Captured with AFDM512A at 10X

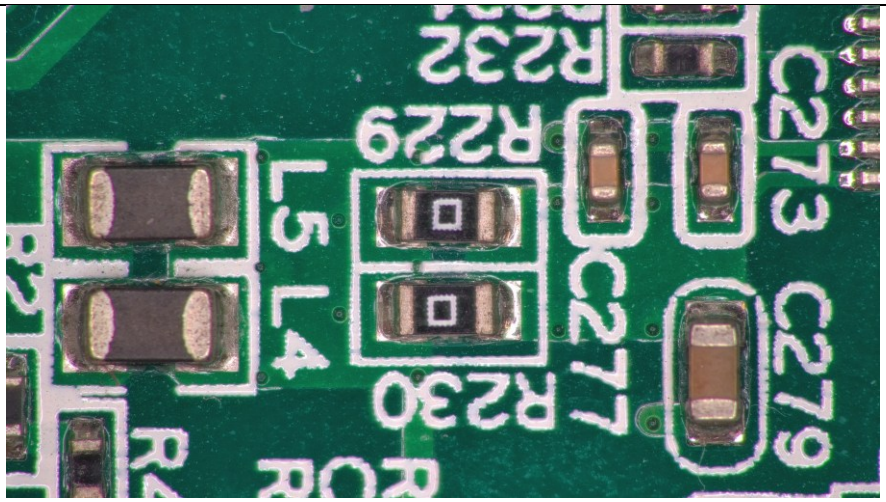


Figure 3-14 PCB Captured with AFDM512A at 18X

3.1.8 Software and App

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

Windows: https://www.touptekphotonics.com.cn/download/?dlID=0

macOS: https://www.touptekphotonics.com.cn/download/?dlID=1

Linux: https://www.touptekphotonics.com.cn/download/?dlID=2

Android: https://www.touptekphotonics.com.cn/download/?dlID=3

iOS: https://www.touptekphotonics.com.cn/download/?dlID=4

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

3.2 AFDM511 Series

3.2.1 Introduction to AFDM511 Series

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

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

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

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

AFDM511 series camera supports HDMI/NETWORK/USB control and video output (ToupView). The maximum frame rate of the output is 4K/60FPS, and the zoom range is 1X~20X. It also supports electric zoom and auto focusing.

Figure 3-15 AFDM511 Series Camera Front and Back View

Figure 3-16 AFDM's Side and Front (with LED light) View

3.2.2 The Module Specifications of AFDM511 Series Camera

The AFDM series products consist of three modules, AFDM camera module, AFDM lens module, and AFDM light module. As shown in the table below.

3.2.2.1 AFDM511 Camera Module Datasheet

Order Code	Sensor & Size(mm)	Pixel(μm)	G Sensitivity/Dark Signal	Sensor (FPS/Resolution)	Binning	Exposure(ms)
H4KPA	Sony IMX415LQR-C 1/2.8"(5.57x3.13)	1.45x1.45	300mv/0.13 with 1/30s	60@3840*2160	1x1	0.059~1000

The output parameters of different interfaces are shown in the following table:

Camera Model	Video Saving (FPS/Resolution)	HDMI2.0(FPS/Resolution)	USB3.0(FPS/Resolution)	NETWORK(FPS/Resolution)
H4KPA	60@3840*2160 60@1920*1080 60@1280*720	60@3840*2160 60@1920*1080	30@3840*2160 45@2688*1512 60@1920*1080	60@1920*1080

3.2.2.2 AFDM511 Lens Module Datasheet

Order Code	Working Distance(mm)	Zoom Range	MTF (lp/mm)	Distortion	FOV@1X(mm)	FOV@18X(mm)
EMZO-20XA	150~195	0.028X~0.56X	160	0.5%	200x112.5	10x5.6

1X and 20x 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 = 0.021/0.021; 20X=0.56/0.028;

3.2.2.3 AFDM511 Light Module

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

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

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

3.2.2.4 AFDM511 Series Camera Model

Model	Camera Module	Lens Module	Light Module
AFDM511A	H4KPA	EMZO-20XA	DRL-5076A-NPC/AALRL-200-7650

AFDM511 series camera supports two lens modules for different working distances, Users can choose the corresponding camera model according to the needs.

3.2.3 AFDM511 Series Camera Characteristic and Specification

The AFDM511 series camera comes with H4KPA HDMI camera, EMZO-20XA lens and DRL-5076A-NPC light source (Optional);

3.2.3.1 The Basic Characteristic of AFDM511 Series Camera

- 5 groups 16 elements EMZO with 0.028X~0.56X, 20 zoom ratio, supports auto and manual focus
- AFDM511A:192mm standard working distance with 150~195mm depth of field;
- At standard working distance of AFDM511A, the large field of view of AFDM511A at low magnification is 200mm*112.5mm, and the small field of view at higher magnification is 10mm*5.6mm; Users can quickly locate target objects at low magnification and conduct microscopic observations at high magnification
- Under the standard measurement working distance, the camera has stored 1~20 times the default measurement calibration information, allowing users to accurately measure
- Sony IMX415 1/2.8" 4K Starvis CMOS with high signal-to-noise ratio
- 4K HDMI/NETWORK/USB multiple video outputs
- 4K/1080P auto switching according to monitor resolution
- Support 4K 60fps low delay HDMI output mode, with an average delay of 40ms
- SD card/USB flash drive for captured image and video storage, support local preview and playback
- Support the capture and display of RAW format images
- Support Image Auto Upload to the server over the network
- Support USB voice control module, enabling real-time control of the camera through voice commands for taking photos, recording videos, freezing, and other operations
- New browsing function, providing rich file operation functions, image to image comparison, image to real-time video comparison, multi-image EDF function, multi-image Stitch function
- Provide multiple focusing methods, and the size of the focusing area can be modified; Provide AF+EDF, facilitating the synthesis of high depth of field images in multiple focus areas at high magnification
- Provide real-time video EDF function
- Provide real-time Stitch function to obtain higher quality images through real-time processing
- Provide default ISP parameters for scene, convenient for secondary adjustment and optimisation

- Built-in mouse control software XCamView, all functions can be realized with USB mouse
- Embedded mouse Camera Control Panel, Measurement Toolbar, Synthesis Control Toolbar, AF Control Panel
- 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 AFDM can be built

Figure 3-17 TPS-30A(bracket)+AFDM511A Camera +HDMI 4K Monitor

3.2.3.2 Specification of AFDM511 Series Camera

Interface & Button Functions		
	**USB Mouse**	Connect USB mouse for easy operation with embedded XCamView software Connect USB voice control for enable real-time control of camera snap, recording, freezing, Control for voice control commands
	USB3.0	Connect USB flash drive to save pictures and videos Connect 5G WiFi module to transfer video wirelessly in real time Connect USB microphone to record audio and video Connect USB voice control for enable real-time control of camera snap, recording, freezing, Control for voice control commands
	HDMI	Comply with HDMI2.0 standard. 4K/1080P format video output and supporting automatic switch between 4K and 1080P format according to the connected monitors
	USB Video	Connect PC or other host device to realize video image transmission with ToupView/ToupLite
	LAN	LAN port to connect router and switch to transfer video with ToupView/ToupLite
	ON/OFF	Power on/off switch
	LED	Power LED indicator
	SD	Comply with SDIO3.0 standard and SD card could be inserted for video and images saving
	DC12V3A	DC12V3A power input
XCamView Software Functions		
UI Operation	With USB mouse to operate on the embedded XCamView	
Image Capture	8M (3840*2160) JPEG/TIFF/RAW image in SD card or USB flash drive (Default SD card priority, priority can be modified in settings)	
Video Record	Video format：8M (3840*2160) H264 encoded MP4 file Video saving frame rate:60fps	
Camera Control Panel	Including Exposure, Gain, White Balance, Sharpness, 3D Denoise, Saturation, Gamma, Contrast, Brightness, Power Frequency control	
Measurement Toolbar	Including Calibration, Measurement, and measurement parameter Export functions	

Synthesis Control Toolbar	Zoom In/Zoom Out (Up to 10X), Mirror/Flip, Freeze, EDF, Cross Line, Overlay, PIP , AF, LED, Browser(including Picture Browsing , Video Playback , Video Compare , Picture Compare , EDF , Stitch , Image Processing), Measurement Function
Auto Focus Control Panel	Including Zoom, Auto Focus, One Push, Manual Focus, Reset, and other functions
Software ToupView/ToupLite Environment under NETWORK/USB Video Output	
White Balance	Auto White Balance
Color Technique	Ultra-Fine Color Engine
Capture/Control SDK	Windows/Linux/macOS/Android Multiple Platform SDK (Native C/C++, C#/VB.NET, Python, Java, DirectShow, Twain, etc)
Recording System	Still Picture or Movie
Operating System	Microsoft® Windows® XP / Vista / 7 / 8 / 8.1 /10(32 & 64 bit)/ToupView OSx(Mac OS X)/ToupLite Linux/ToupLite
PC Requirements	CPU: Equal to Intel Core2 2.8GHz or Higher
	Memory: 4GB or More
	Ethernet Port: RJ45 Ethernet Port
	Display:19" or Larger
	CD-ROM
Operating Environment	
Operating Temperature (in Centidegree)	-10~ 50
Storage Temperature (in Centidegree)	-20~ 60
Operating Humidity	30~80%RH
Storage Humidity	10~60%RH
Dimension	
Length x Width x Height	80mm x 80mm x 122mm
Shipping Weight	0.75kg

3.2.4 Dimension of AFDM511 Series Camera

Figure 3-18 Dimension of AFDM511 Series Camera

3.2.5 Packing Information of AFDM511 Series Camera

Figure 3-19 Packing Information of AFDM511 Series Camera

	Standard Packing List	
A	Gift box: L:220cm W:220cm H:110cm (1pcs, 2.0kg/box)	
B	AFDM511 Series Camera	
C	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
D	USB Mouse	
E	HDMI Cable	
F	USB3.0 A male to A male gold-plated connectors cable /1.5m	
G	CD (Driver & utilities software, Ø12cm)	
	Optional Accessory	
H	Ethernet cable	
I	LED Ring Light (DRL-5076A-NPC) or AALRL-200-7650 (Not provided)	
J	USB flash drive	
K	USB WiFi adapter	
L	SD card(16G)	
M	USB voice control module	
N	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.)

3.2.6 Installation and Operation of AFDM511 Series Product

Before use, please install the AFDM511 series product on an adaptive bracket.

1. Plug HDMI cable into the HDMI port to connect AFDM511 series and HDMI monitor;
2. Plug a USB mouse into USB Mouse port, to get control of the AFDM511 series by using built-in software XCamView;
3. Plug DC12V3A power adapter into DC12V3A port, to supply power for the AFDM511 series, the LED Indicator will

turn into red;

4. Insert SD card/USB flash drive into SD card Slot/USB3.0 Slot for saving captured images and recorded videos;
5. Press ON/OFF button to start the AFDM511 series, LED Indicator will turn into blue;
6. Move mouse to the left side of the video window, the Camera Control Panel will appear. It includes Manual/Automatic Exposure, White Balance, Sharpness, Denoise.
7. Move mouse to the upper side of the video window, the Measurement Toolbar will appear. It includes calibration, measurement of lines, angles, rectangles, circles, etc, and supports data export (*.CSV format).
8. Move mouse to the bottom side of the video window, the Synthesis Camera Control Toolbar will appear. Operations like Zoom In, Zoom Out, Flip, Gray, Freeze, EDF, Stitch, Grids, Overlay, PIP, Autofocus, LED brightness control, SD card/ USB flash drive contents browsing, Settings, and Camera Version can be executed.
9. Move mouse to the bottom side of the video window, the Synthesis Camera Control Toolbar will pop up automatically. Click AF button, and Auto Focus Control Panel will show up for autofocus operation, it supports 20X optical zoom, Autofocus, Manual Focus, AF+EDF, Reset, and One Push operation.

3.2.7 Images Captured with AFDM511A

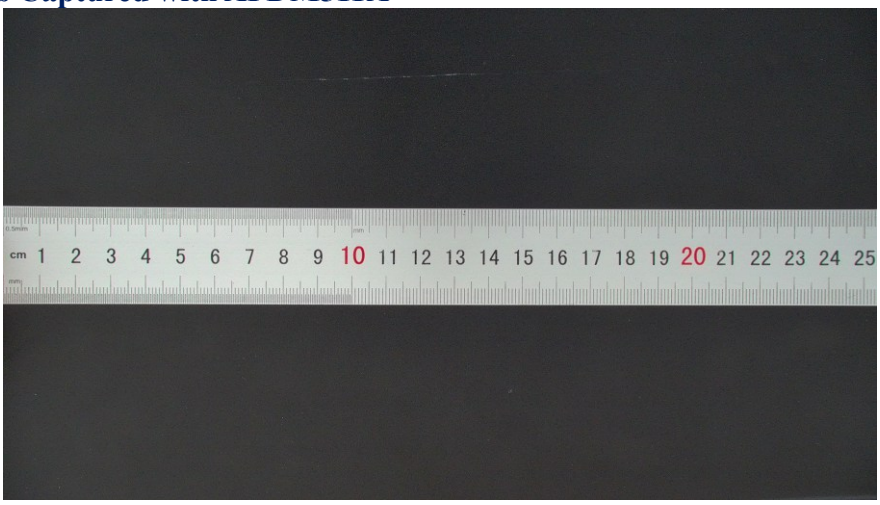


Figure 3-20 Ruler Captured with AFDM511A at 1X

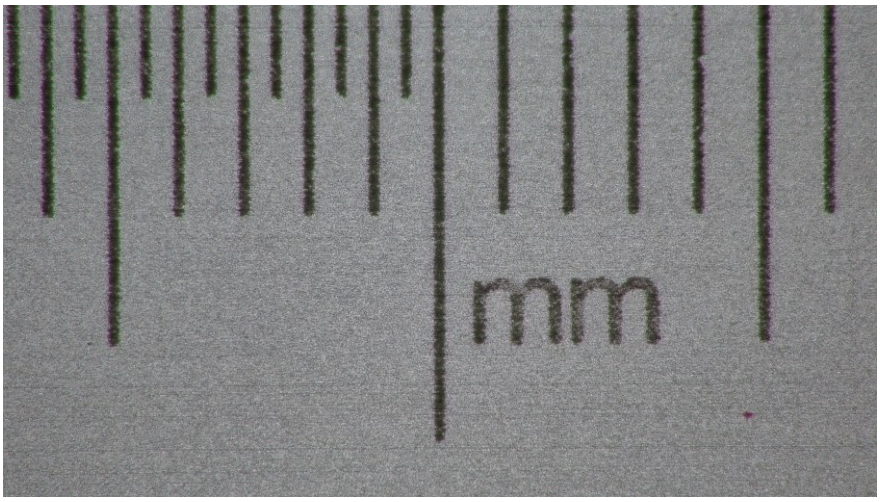


Figure 3-21 Ruler Captured with AFDM511A at 10X

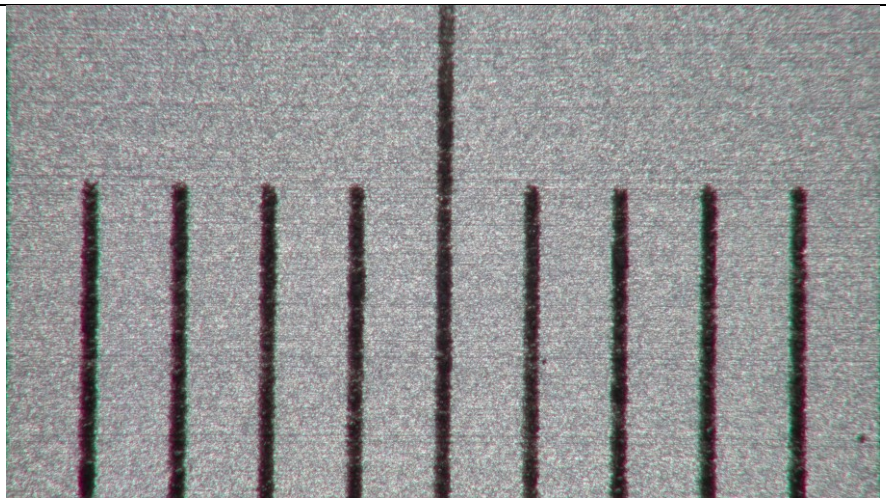


Figure 3-22 Ruler Captured with AFDM511A at 18X

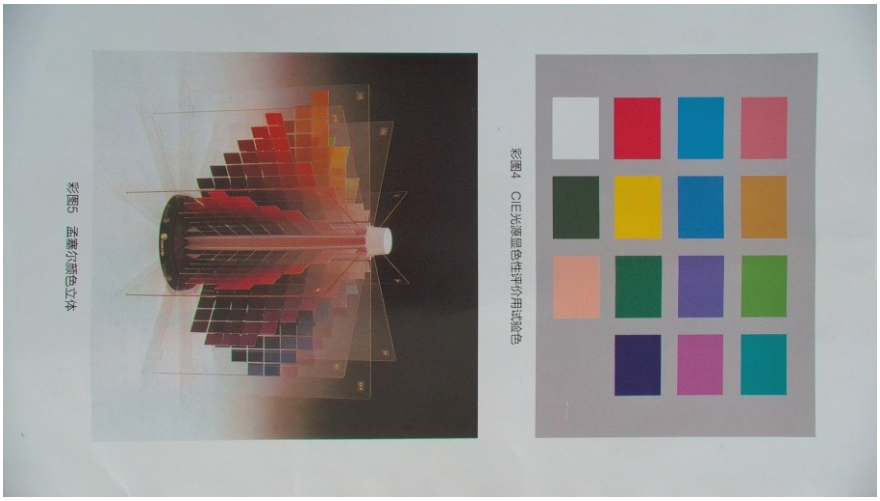


Figure 3-23 Print Captured with AFDM511A at 1.0X

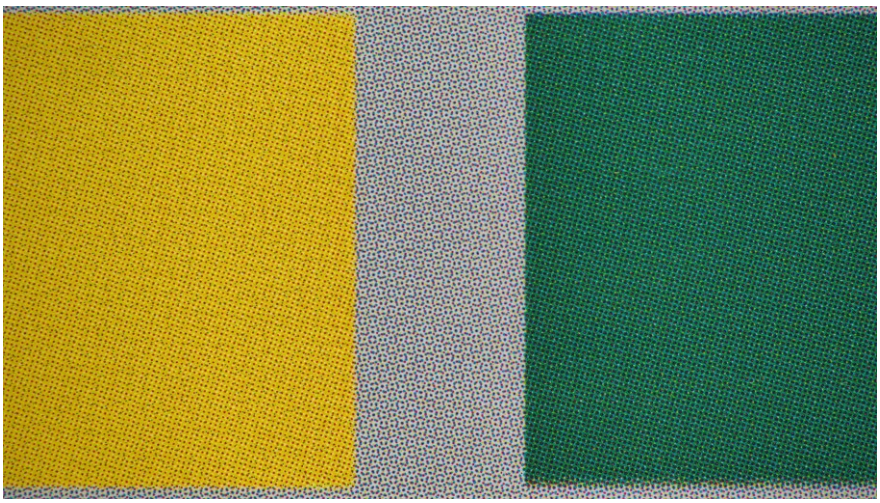


Figure 3-24 Print Captured with AFDM511A at 10X

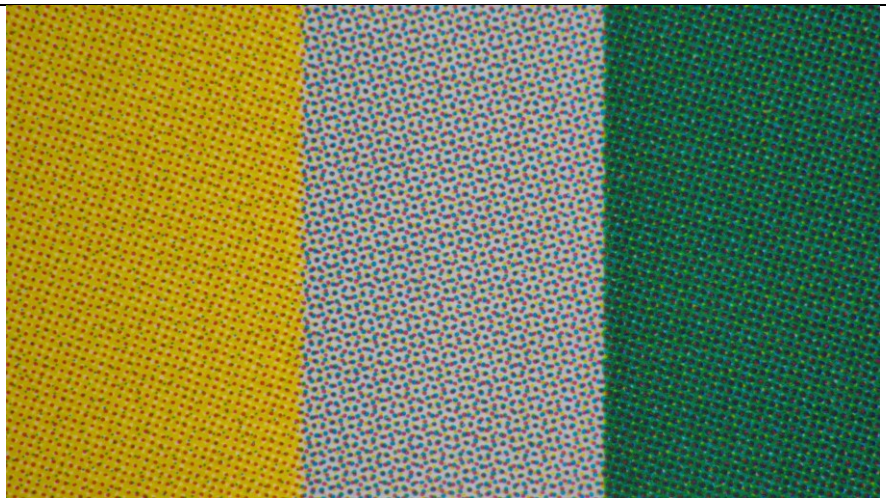


Figure 3-25 Print Captured with AFDM511A at 18X

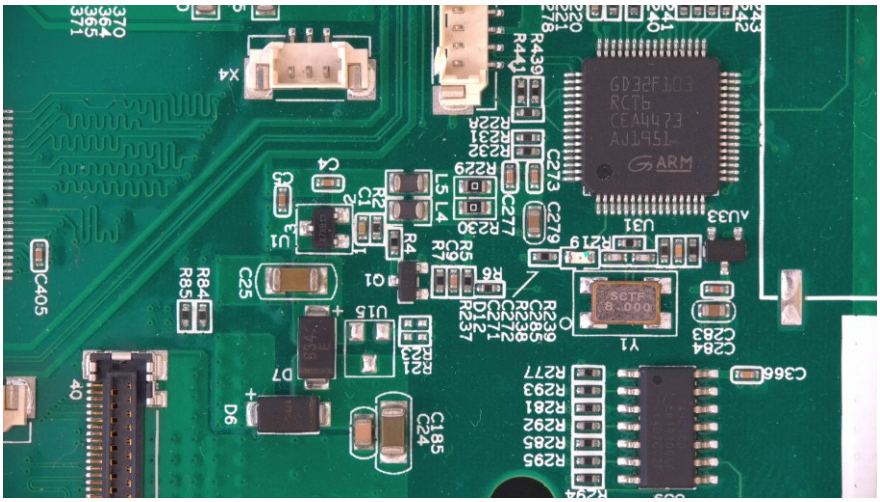


Figure 3-26 PCB Captured with AFDM511A at 4.0X

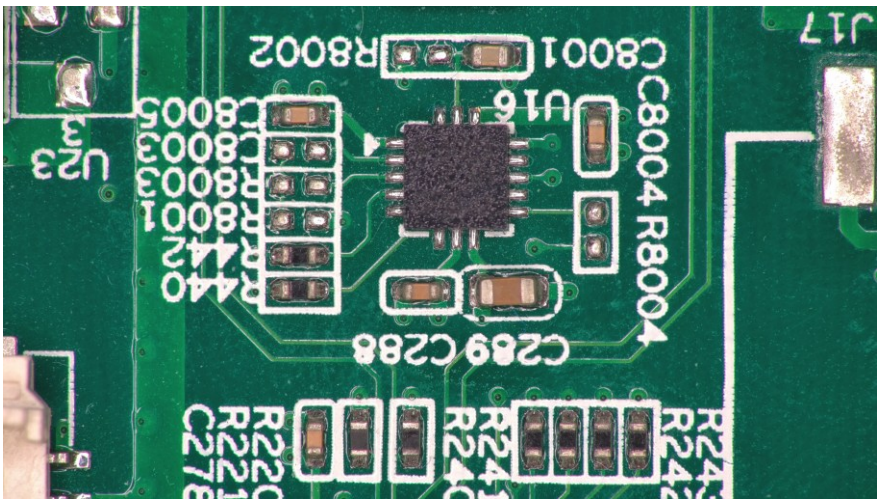


Figure 3-27 PCB Captured with AFDM511A at 10X

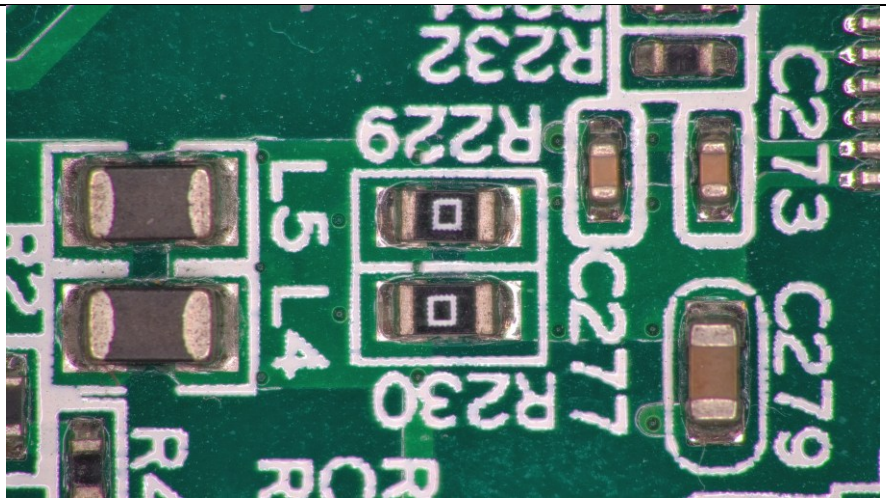


Figure 3-28 PCB Captured with AFDM511A at 18X

3.2.8 Software and App

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

Windows: https://www.touptekphotonics.com.cn/download/?dlID=0

macOS: https://www.touptekphotonics.com.cn/download/?dlID=1

Linux: https://www.touptekphotonics.com.cn/download/?dlID=2

Android: https://www.touptekphotonics.com.cn/download/?dlID=3

iOS: https://www.touptekphotonics.com.cn/download/?dlID=4

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

3.3 AFDM412 Series

3.3.1 Introduction to AFDM412 Series

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

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

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

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

AFDM412 supports HDMI/USB/NETWORK control and video output (ToupView). The frame rate of the output is 4K/30FPS, and the zoom range is 1X~18X. It also supports electric zoom and auto focusing.

Figure 3-29 AFDM's Front and Back View

Figure 3-30 AFDM's Side and Front (with LED light) View

3.3.2 The Module Specifications of AFDM412

3.3.2.1 AFDM412 Camera Module Datasheet

Order Code	Sensor & Size(mm)	Pixel(μm)	G Sensitivity/ |Dark Signal	FPS/Resolution	Binning	Exposure(ms)
H4KPA	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;

3.3.2.2 AFDM412 Lens Module Datasheet

Order Code	Working Distance(mm)	Zoom Range	MTF (lp/mm)	Distortion	FOV@1X(mm)	FOV@18X(mm)
EMZO-18XA-250	205~255	0.021X~0.39X	160	0.5%	255x145	14.2x8

1X and 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 = 0.021/0.021; 18X=0.39/0.021;

3.3.2.3 AFDM412 Light Module

Order Code	LED	Power	Inner Dia.(mm)	Out Dia.(mm)		
DRL-5076A-NPC	8 CREE xpes	3V/3A	50	76		

DRL: LED direct ring light with adjustable brightness; NPC: No power cable
AFDM412 can use AALRL-200-7650 as external light for the large FOV illumination

3.3.3 AFDM412 Characteristic and Specification

The AFDM412 comes with H4KPA HDMI camera, EMZO-18XA-250 lens and DRL-5076A-NPC light source(Optional);

3.3.3.1 The Basic Characteristic of AFDM412

- 5 groups 16 elements EMZO with 0.0218~0.392X, 18 zoom ratio, supports auto and manual focus
- 250mm standard working distance with 205~255mm depth of field
- At standard working distance, the large field of view 255mm*145mm at low magnification, helping users to quickly locate the target object, the small field of view 14.2mm*8mm at higher magnification, helping users to observe microscopically
- Sony 1/2.8” 4K Starvis CMOS with high signal-to-noise ratio
- 4K HDMI/USB/NETWORK multiple video outputs
- 4K/1080P auto switching according to monitor resolution
- SD card/USB flash drive for captured image and video storage, support local preview and playback
- Built-in mouse control software XFCamView, all functions can be realized with USB mouse
- Embedded mouse Camera Control Panel, Measurement Toolbar, Synthesis Control Toolbar, AF Control Panel
- Multi-language support
- Head suction LED ring light, the brightness can be directly controlled by XFCamView
- With the adapter bracket of 76mm diameter, a electric controlled continuous zoom AFDM can be built

Figure 3-31 TPS-30A(bracket)+AFDM412+4K Monitor

3.3.3.1 Specification of AFDM412

Interface & Button Functions	
USB Mouse	USB mouse for XFCamView control
USB2.0	Connect USB flash drive to save pictures and videos Connect 5G WLAN module to transfer video wirelessly in real time with ToupView/ToupLite
HDMI	Comply with HDMI1.4 standard. 4K/1080P format video output and supporting automatic switch between 4K and 1080P format according to the connected monitors
USB Video	Connect PC or other host device to realize video image transmission with ToupView/ToupLite
LAN	LAN port to connect router and switch to transfer video with ToupView/ToupLite
ON/OFF	Power on/off switch
LED	Power LED indicator
SD	Comply with SDIO3.0 standard and SD card could be inserted for video and images saving
DC12V3A	DC12V3A power input
XFCamView Software Functions	
UI Operation	With USB mouse to operate on the embedded XFCamView
Image Capture	8M (3840*2160) JPEG/TIFF image in SD card or USB flash drive
Video Record	Video format：8M (3840*2160) H264 encoded MP4 file Video saving frame rate:30fps
Camera Control Panel	Including Exposure, Gain, White Balance, Sharpness, Denoise, Denoise, Saturation, Gamma, Contrast, Brightness, Power Frequency control
Measurement Toolbar	Including Calibration, Measurement, and measurement parameter Export functions
Synthesis Control Toolbar	Including software Zoom, Flip, Freeze, Crosshair, LED Control, Auto-focus, Comparison, Browser , Setting, Version Check function
Auto Focus Control Panel	Including Zoom, Auto Focus, One Push, Manual Focus, Reset, and other functions
Software ToupView/ToupLite Environment under LAN/WiFi/USB Video Output	
White Balance	Auto White Balance
Color Technique	Ultra-Fine Color Engine
Capture/Control SDK	Windows/Linux/macOS/Android Multiple Platform SDK(Native C/C++, C#/VB.NET, Python, Java, DirectShow, Twain, etc)
Recording System	Still Picture or Movie
Operating System	Microsoft® Windows® XP / Vista / 7 / 8 / 8.1 /10(32 & 64 bit)/ToupView OSx(Mac OS X)/ToupLite Linux/ToupLite
PC Requirements	CPU: Equal to Intel Core2 2.8GHz or Higher
	Memory: 4GB or More
	Ethernet Port: RJ45 Ethernet Port
	Display:19” or Larger
	CD-ROM
Operating Environment	
Operating Temperature (in Centidegree)	-10~ 50
Storage Temperature (in Centidegree)	-20~ 60
Operating Humidity	30~80%RH
Storage Humidity	10~60%RH
Dimension	
Length x Width x Height	80mm x 80mm x 122mm
Shipping Weight	0.75kg

3.3.4 Dimension of AFDM412

Figure 3-32 Dimension of AFDM412

3.3.5 Packing Information of AFDM412

Figure 3-33 Packing Information of AFDM412

Standard Packing List		
A	Gift box: L:220cm W:220cm H:110cm (1pcs, 2.0kg/box)	
B	AFDM412	
C	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
D	USB Mouse	
E	HDMI Cable	
F	USB2.0 A male to A male gold-plated connectors cable /2.0m	
G	CD (Driver & utilities software, Ø12cm)	
Optional Accessory		
H	Ethernet cable	

I	LED Ring Light (DRL-5076A-NPC)	
J	USB flash drive	
K	USB WiFi adapter	
L	SD card(16G)	
M	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.)

3.3.6 Installation and Operation of AFDM412 Series Product

Before use, please install the AFDM412 series product on an adaptive bracket.

1.Plug HDMI cable into the HDMI port to connect AFDM412 and HDMI monitor;

2.Plug a USB mouse into USB Mouse port, to get control of the AFDM412 by using built-in software XFCamView;

3.Plug DC12V3A power adapter into DC12V3A port, to supply power for the AFDM412, 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 AFDM412, LED Indicator will turn into blue;

6.Move mouse to the left side of the video window, the Camera Control Panel will appear. It includes Manual/Automatic Exposure, White Balance, Sharpness, Denoise;

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

8.Move mouse to the bottom side of the video window, the Synthesis Camera Control Toolbar will appear. Operations like Zoom In, Zoom Out, Flip, Freeze, Crossline, LED brightness control, Autofocus, SD card contents browsing, Settings, and Camera Version can be executed;

9.Move mouse to the bottom side of the video window, the Synthesis Camera Control Toolbar will pop up automatically. Click AF button, and Auto Focus Control Panel will show up for autofocus operation, it supports 18X optical zoom, Autofocus, Manual Focus, Reset, and One Push operation.

3.3.7 Images Captured with AFDM412

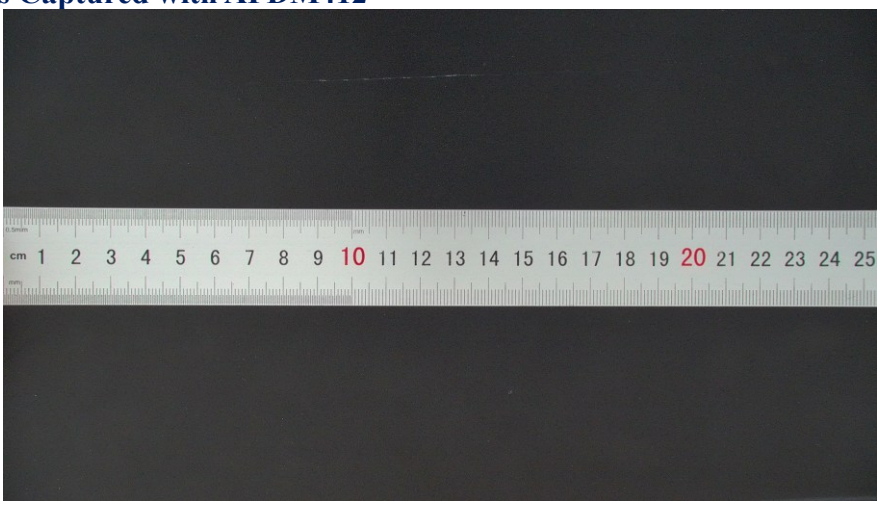


Figure 3-34 Ruler Captured with AFDM412 at 1X

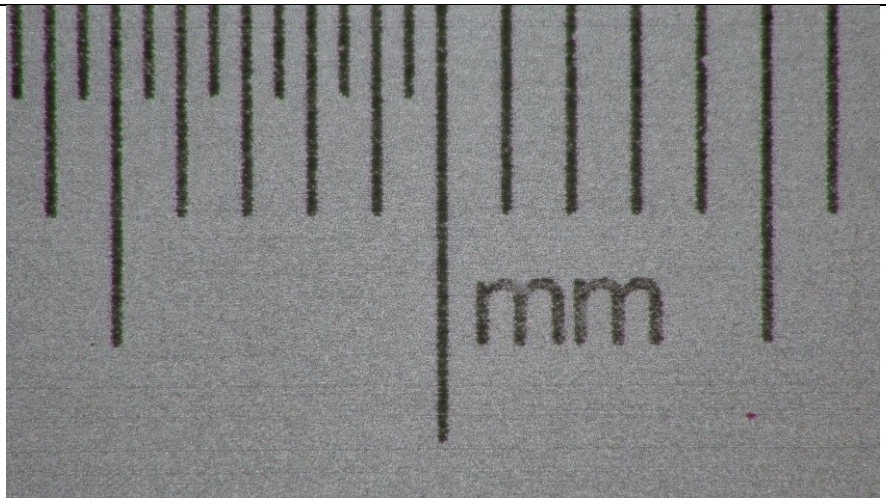


Figure 3-35 Ruler Captured with AFDM412 at 10X

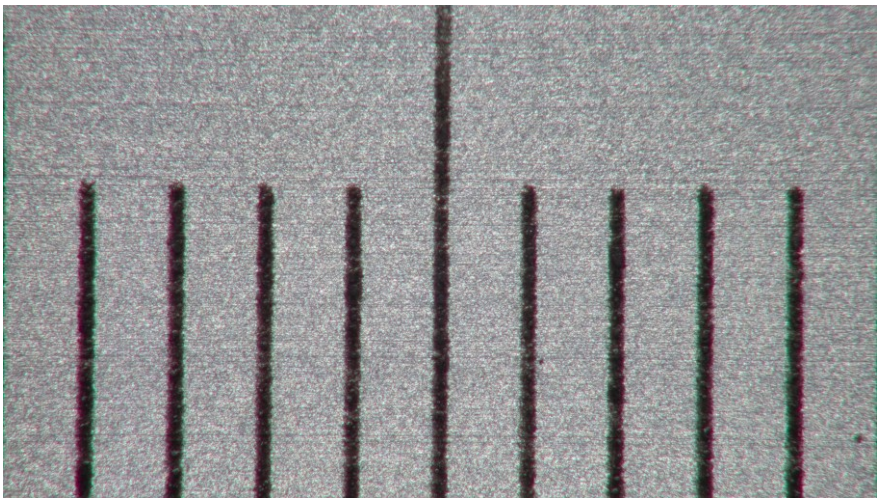


Figure 3-36 Ruler Captured with AFDM412 at 18X

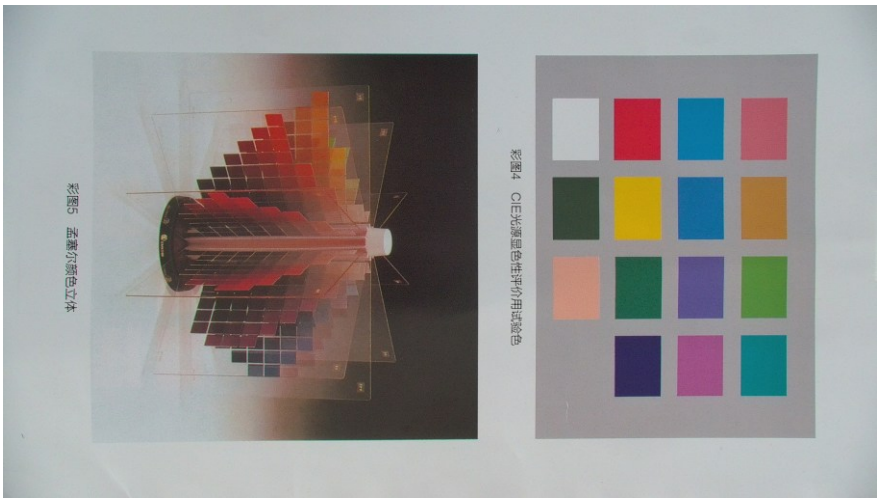


Figure 3-37 Print Captured with AFDM412 at 1.0X

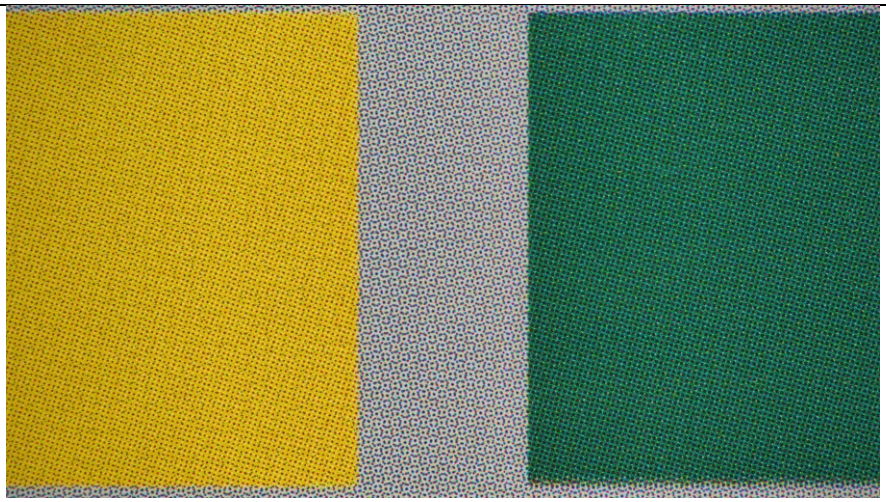


Figure 3-38 Print Captured with AFDM412 at 10X

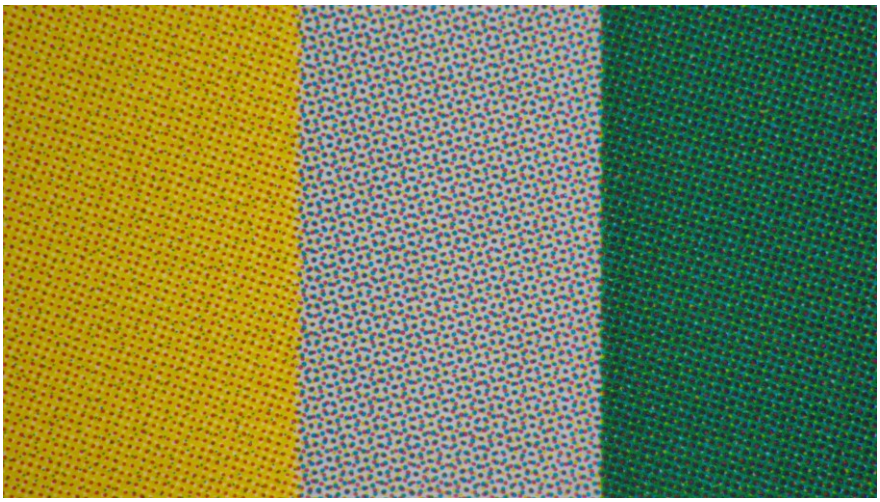


Figure 3-39 Print Captured with AFDM412 at 18X

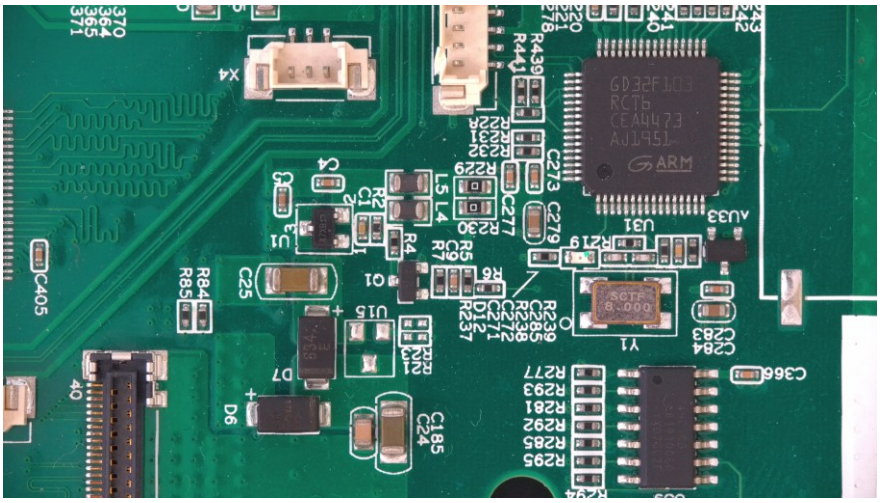


Figure 3-40 PCB Captured with AFDM412 at 4.0X

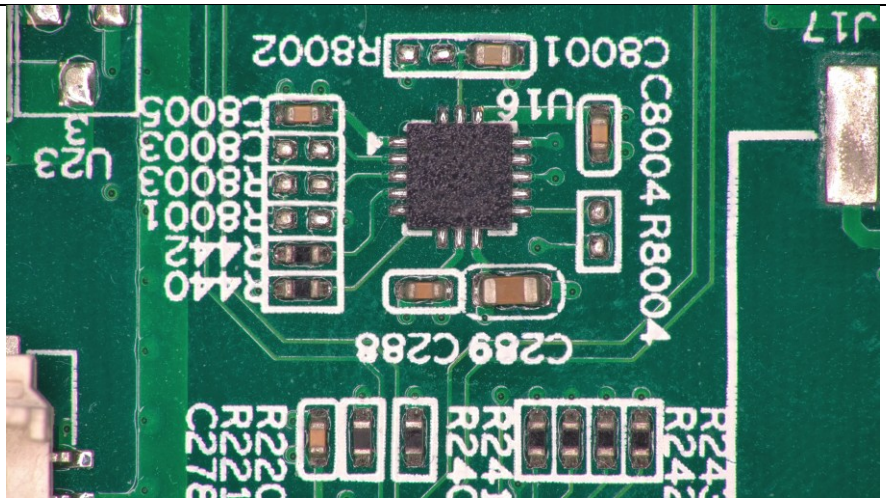


Figure 3-41 PCB Captured with AFDM412 at 10X

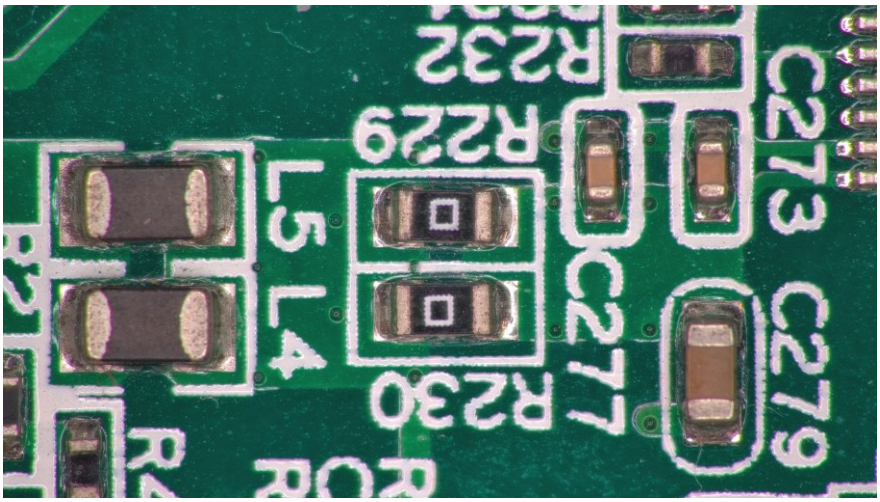


Figure 3-42 PCB Captured with AFDM412 at 18X

3.3.8 Software and App

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

Windows: https://www.touptekphotonics.com.cn/download/?dlID=0

macOS: https://www.touptekphotonics.com.cn/download/?dlID=1

Linux: https://www.touptekphotonics.com.cn/download/?dlID=2

Android: https://www.touptekphotonics.com.cn/download/?dlID=3

iOS: https://www.touptekphotonics.com.cn/download/?dlID=4

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

3.4 AFDM411 Series

3.4.1 Introduction to AFDM11 Series

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

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

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

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

AFDM411 supports HDMI/USB/NETWORK control and video output (ToupView). The frame rate of the output is 4K/30FPS, and the zoom range is 1X~20X. It also supports electric zoom and auto focusing.

Figure 3-43 AFDM's Front and Back View

Figure 3-44 AFDM's Side and Front (with LED light) View

3.4.2 The Module Specifications of AFDM411

3.4.2.1 AFDM411 Camera Module Datasheet

Order Code	Sensor & Size(mm)	Pixel(μm)	G Sensitivity/ Dark Signal	FPS/Resolution	Binning	Exposure(ms)
H4KPA	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;

3.4.2.2 AFDM411 Lens Module Datasheet

Order Code	Working Distance(mm)	Zoom Range	MTF (lp/mm)	Distortion	FOV@1X(mm)	FOV@18X(mm)
EMZO-20XA	150~195	0.028X~0.56X	160	0.5%	200x112.5	10x5.6

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

3.4.2.3 AFDM411 Light Module

Order Code	LED	Power	Inner Dia.(mm)	Out Dia.(mm)		
DRL-5076A-NPC	8 CREE xpes	3V/3A	50	76		

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

3.4.3 AFDM411 Characteristic and Specification

The AFDM411 comes with H4KPA HDMI camera, EMZO-20XA lens and DRL-5076A-NPC light source(Optional);

3.4.3.1 The Basic Characteristic of AFDM411

- 5 groups 16 elements EMZO with 0.028~0.56X, 20 zoom ratio, supports auto and manual focus
- 192mm standard working distance with 150~195mm depth of field
- At standard working distance, the large field of view 200mm*112.5mm at low magnification, helping users to quickly locate the target object, the small field of view 10mm*5.6mm at higher magnification, helping users to observe microscopically
- Sony 1/2.8” 4K Starvis CMOS with high signal-to-noise ratio
- 4K HDMI/USB/NETWORK multiple video outputs
- 4K/1080P auto switching according to monitor resolution
- SD card/USB flash drive for captured image and video storage, support local preview and playback
- Built-in mouse control software XFCamView, all functions can be realized with USB mouse
- Embedded mouse Camera Control Panel, Measurement Toolbar, Synthesis Control Toolbar, AF Control Panel
- Multi-language support
- Head suction LED ring light, the brightness can be directly controlled by XFCamView
- With the adapter bracket of 76mm diameter, a electric controlled continuous zoom AFDM can be built

Figure 3-45 TPS-30A(bracket)+AFDM411+4K Monitor

3.4.3.2 Specification of AFDM411 Series Camera

Interface & Button Functions	
USB Mouse	USB mouse for XFCamView control
USB2.0	Connect USB flash drive to save pictures and videos Connect 5G WLAN module to transfer video wirelessly in real time with ToupView/ToupLite
HDMI	Comply with HDMI1.4 standard. 4K/1080P format video output and supporting automatic switch between 4K and 1080P format according to the connected monitors
USB Video	Connect PC or other host device to realize video image transmission with ToupView/ToupLite
LAN	LAN port to connect router and switch to transfer video with ToupView/ToupLite
ON/OFF	Power on/off switch
LED	Power LED indicator
SD	Comply with SDIO3.0 standard and SD card could be inserted for video and images saving
DC12V3A	DC12V3A power input
XFCamView Software Functions	
UI Operation	With USB mouse to operate on the embedded XFCamView
Image Capture	8M (3840*2160) JPEG/TIFF image in SD card or USB flash drive
Video Record	Video format：8M (3840*2160) H264 encoded MP4 file Video saving frame rate:30fps
Camera Control Panel	Including Exposure, Gain, White Balance, Sharpness, Denoise, Denoise, Saturation, Gamma, Contrast, Brightness, Power Frequency control
Measurement Toolbar	Including Calibration, Measurement, and measurement parameter Export functions
Synthesis Control Toolbar	Including software Zoom, Flip, Freeze, Crosshair, LED Control, Auto-focus, Comparison, Browser, Setting, Version Check function
Auto Focus Control Panel	Including Zoom, Auto Focus, One Push, Manual Focus, Reset, and other functions
Software ToupView/ToupLite Environment under LAN/WiFi/USB Video Output	
White Balance	Auto White Balance
Color Technique	Ultra-Fine Color Engine
Capture/Control SDK	Windows/Linux/macOS/Android Multiple Platform SDK (Native C/C++, C#/VB.NET, Python, Java, DirectShow, Twain, etc)
Recording System	Still Picture or Movie
Operating System	Microsoft® Windows® XP / Vista / 7 / 8 / 8.1 /10(32 & 64 bit)/ToupView Osx (Mac OS X)/ToupLite Linux/ToupLite
PC Requirements	CPU: Equal to Intel Core2 2.8GHz or Higher
	Memory: 4GB or more
	Ethernet Port: RJ45 Ethernet Port
	Display:19” or Larger
	CD-ROM
Operating Environment	
Operating Temperature (in Centidegree)	-10~ 50
Storage Temperature (in Centidegree)	-20~ 60
Operating Humidity	30~80%RH
Storage Humidity	10~60%RH
Dimension	
Length x Width x Height	80mm x 80mm x 122mm
Shipping Weight	0.75kg

3.4.4 Dimension of AFDM411

Figure 3-46 Dimension of AFDM411

3.4.5 Packing Information of AFDM411

Figure 3-47 Packing Information of AFDM411

Standard Packing List		
A	Gift box: L:220cm W:220cm H:110cm (1pcs, 2.0kg/box)	
B	AFDM411	
C	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
D	USB Mouse	
E	HDMI Cable	
F	USB2.0 A male to A male gold-plated connectors cable /2.0m	
G	CD (Driver & utilities software, Ø12cm)	
Optional Accessory		
H	Ethernet cable	

I	LED Ring Light (DRL-5076A-NPC)	
J	USB flash drive	
K	USB WiFi adapter	
L	SD card(16G)	
M	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.)

3.4.6 Installation and Operation of AFDM411 Series Product

Before use, please install the AFDM411 series product on an adaptive bracket.

1.Plug HDMI cable into the HDMI port to connect AFDM411 and HDMI monitor;

2.Plug a USB mouse into USB Mouse port, to get control of the AFDM411 by using built-in software XFCamView;

3.Plug DC12V3A power adapter into DC12V3A port, to supply power for the AFDM411, 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 AFDM411, LED Indicator will turn into blue;

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

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

8.Move mouse to the bottom side of the video window, the Synthesis Camera Control Toolbar will appear. Operations like Zoom In, Zoom Out, Flip, Freeze, Crossline, LED brightness control, Autofocus, SD card contents browsing, Settings, and Camera Version can be executed;

9.Move mouse to the bottom side of the video window, the Synthesis Camera Control Toolbar will pop up automatically. Click AF button, and Auto Focus Control Panel will show up for autofocus operation, it supports 20X optical zoom, Autofocus, Manual Focus, Reset, and One Push operation.

3.4.7 Images Captured with AFDM411

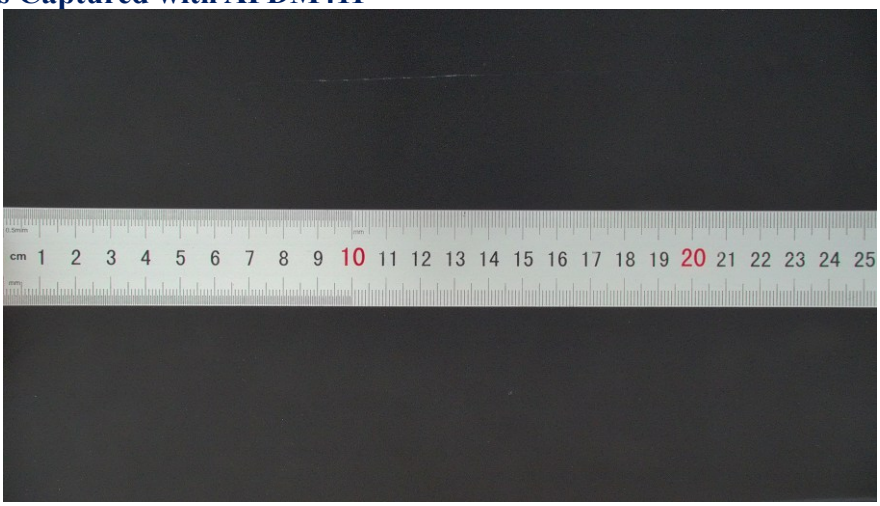


Figure 3-48 Ruler Captured with AFDM411 at 1X

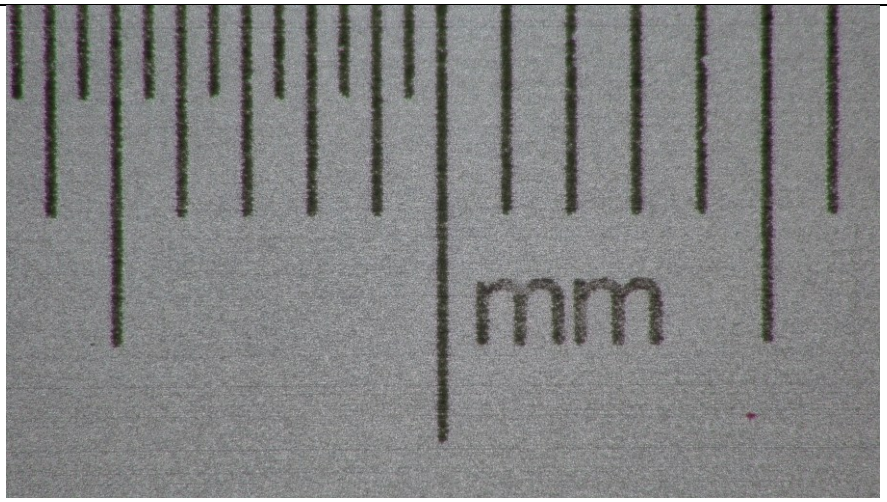


Figure 3-49 Ruler Captured with AFDM411 at 10X

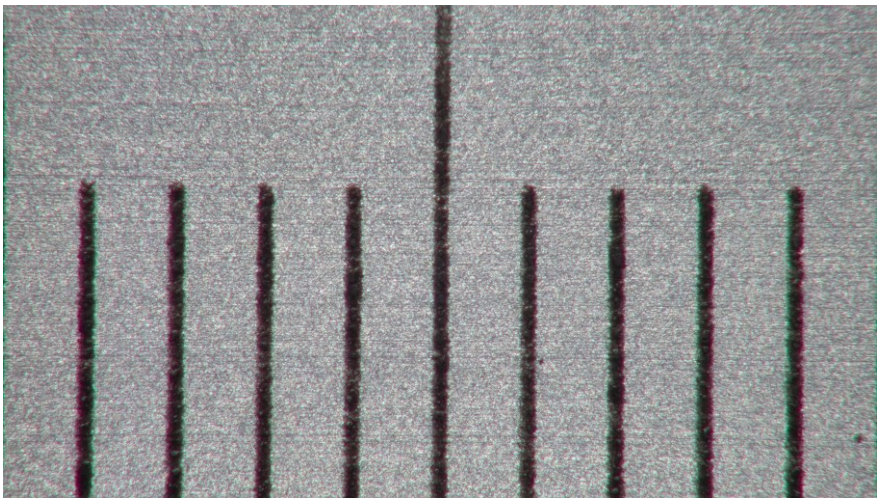


Figure 3-50 Ruler Captured with AFDM411 at 18X

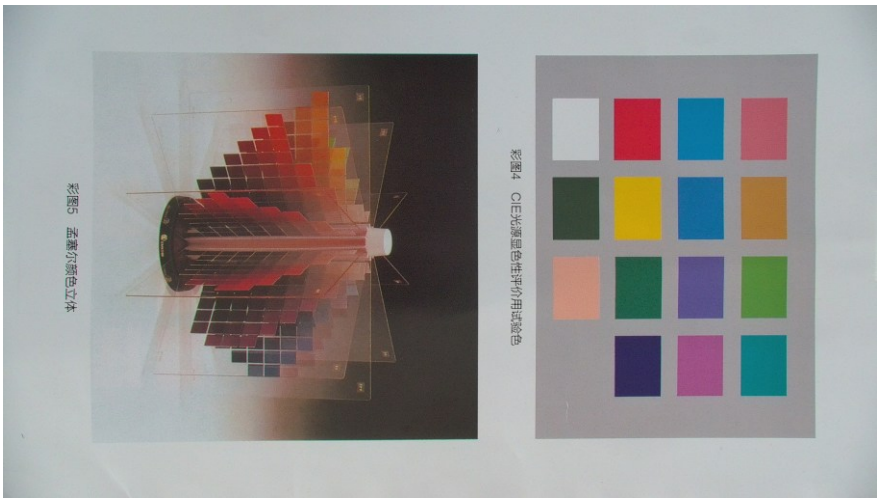


Figure 3-51 Print Captured with AFDM411 at 1.0X

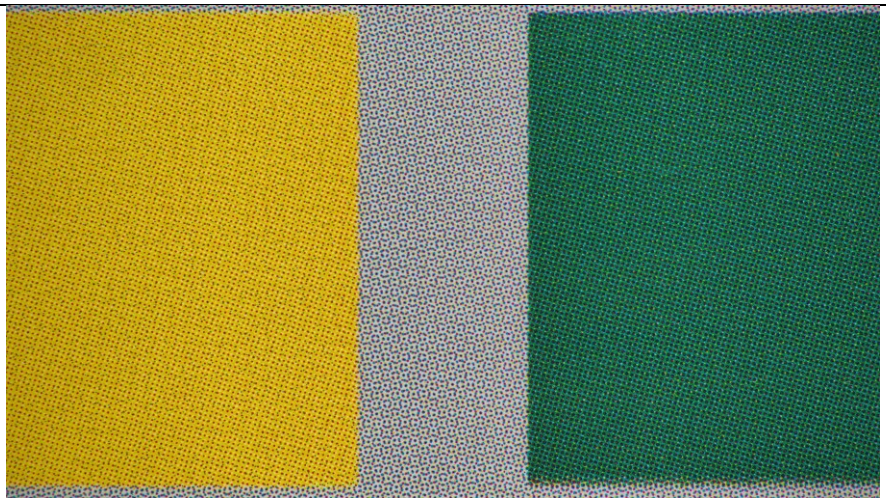


Figure 3-52 Print Captured with AFDM411 at 10X

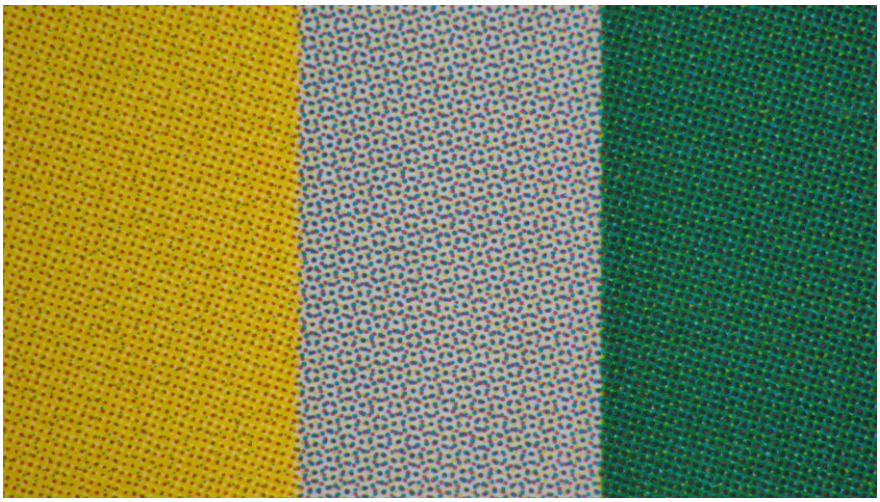


Figure 3-53 Print Captured with AFDM411 at 18X

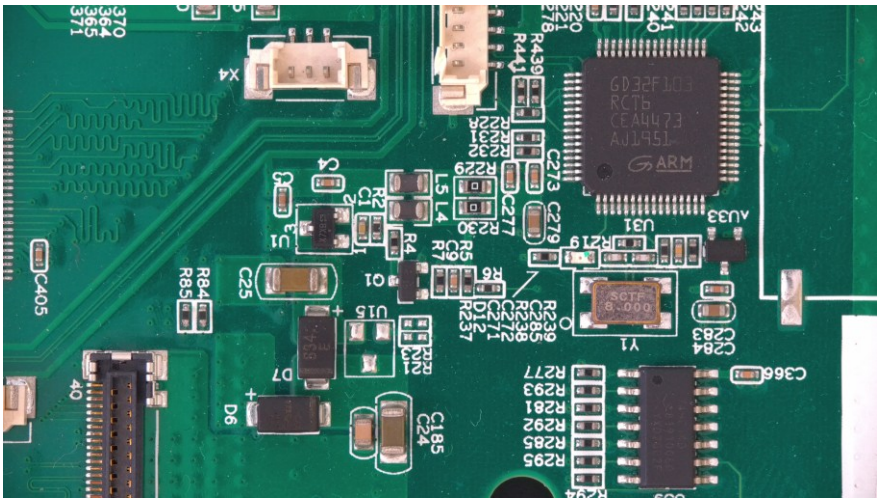


Figure 3-54 PCB Captured with AFDM411 at 4.0X

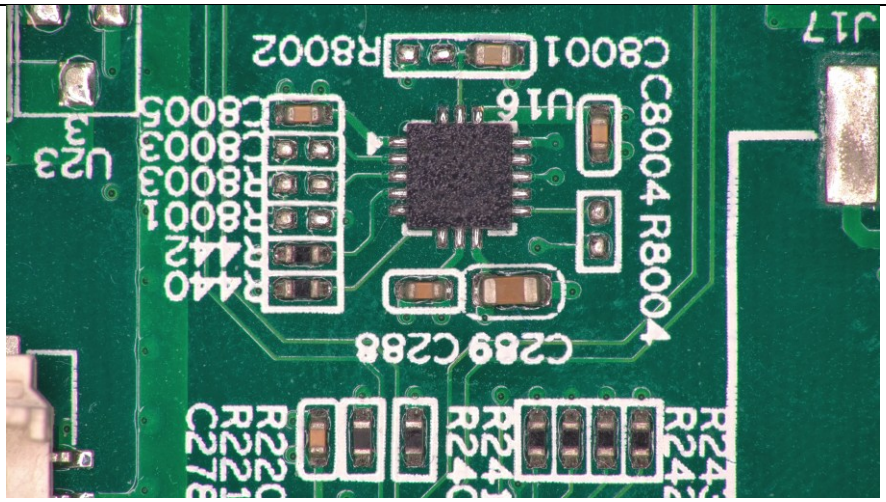


Figure 3-55 PCB Captured with AFDM411 at 10X

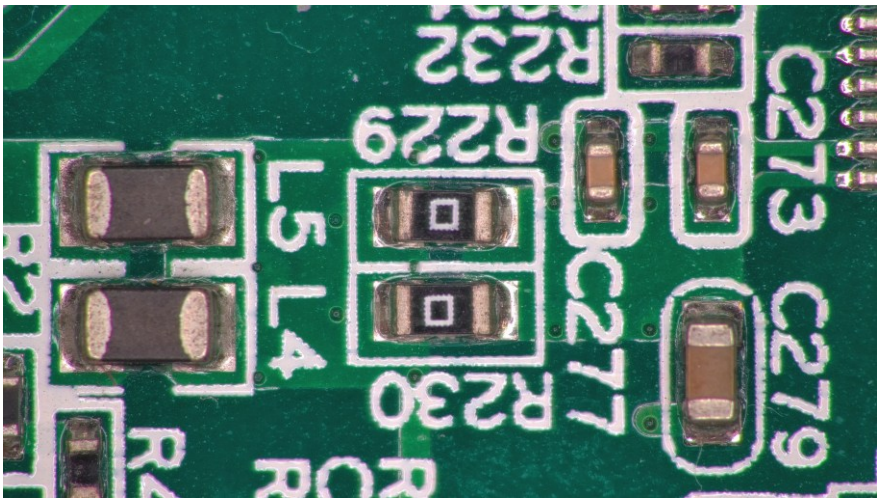


Figure 3-56 PCB Captured with AFDM411 at 18X

3.4.8 Software and App

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

Windows: https://www.touptekphotonics.com.cn/download/?dlID=0

macOS: https://www.touptekphotonics.com.cn/download/?dlID=1

Linux: https://www.touptekphotonics.com.cn/download/?dlID=2

Android: https://www.touptekphotonics.com.cn/download/?dlID=3

iOS: https://www.touptekphotonics.com.cn/download/?dlID=4

3.5 TAFDM41X Series

3.5.1 Introduction to TAFDM11 Series

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. TAFDM41X is the abbreviation of Touch Auto Focus Digital Microscope. Different products in the TAFDM41X 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 3-57 TAFDM41X Series Camera Front and Back View

Figure 3-58 TAFDM41X Series Camera Side and Front (with LED light) View

3.5.2 The module specifications of TAFDM41X series camera

3.5.2.1 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;

3.5.2.2 TAFDM41X series camera lens module datasheet

Order Code	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;

3.5.2.3 TAFDM41X series camera light module

Order Code	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

3.5.3 TAFDM41X touchscreen electric continuous zoom autofocus digital microscope

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

3.5.3.1 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 microscopically
- 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 3-59 TPS-30A(Bracket)+TAFDM41X Series Camera+1080P Monitor

3.5.3.2 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 Functions		
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 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, Grids, 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 Centidegree)	-10~ 50
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

3.5.4 Dimension of TAFDM41X series camera

Figure 3-60 Dimension of TAFDM41X Series Camea

3.5.5 Packing information of TAFDM41X series camera

Figure 3-61 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 Series 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.)

3.5.6 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.

3.5.7 Images Captured with TAFDM41X Series Camera

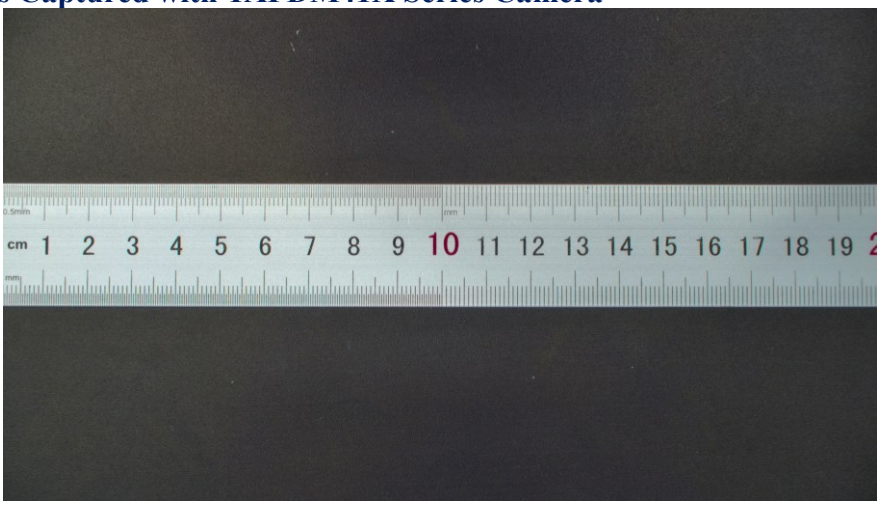


Figure 3-62 Ruler Captured with TAFDM411 at 1X

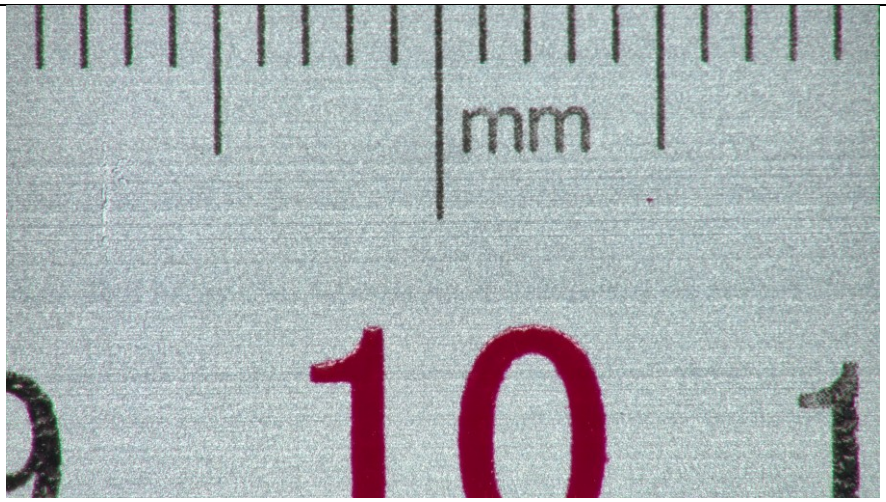


Figure 3-63 Ruler Captured with TAFDM411 at 10X

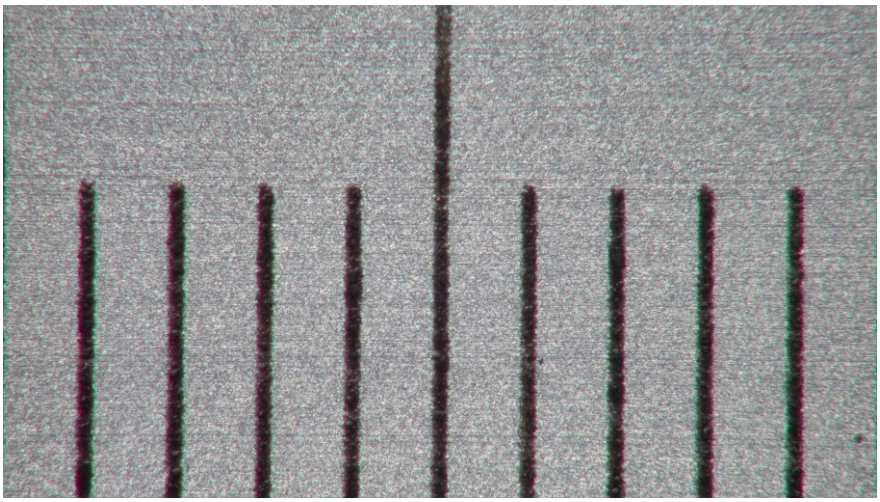


Figure 3-64 Ruler Captured with TAFDM411 at 20X

Figure 3-65 Print Captured with TAFDM411 at 1.0X

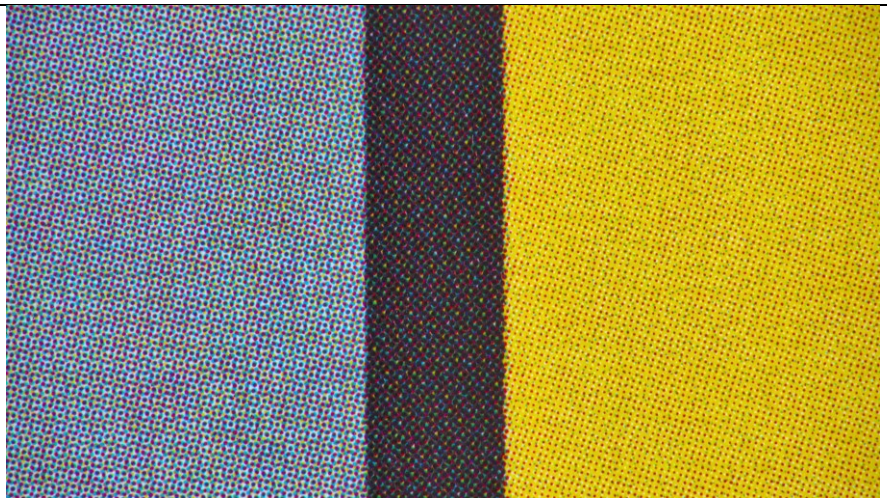


Figure 3-66 Print Captured with TAFDM411 at 10X

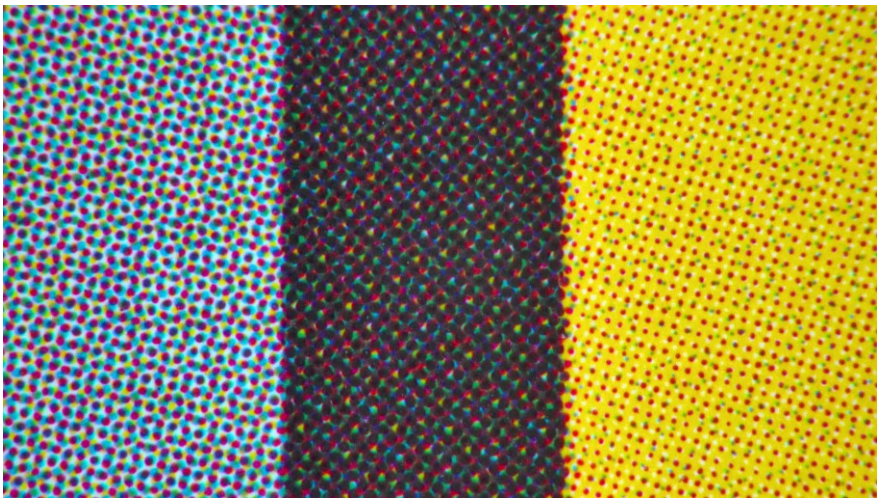


Figure 3-67 Print Captured with TAFDM411 at 20X

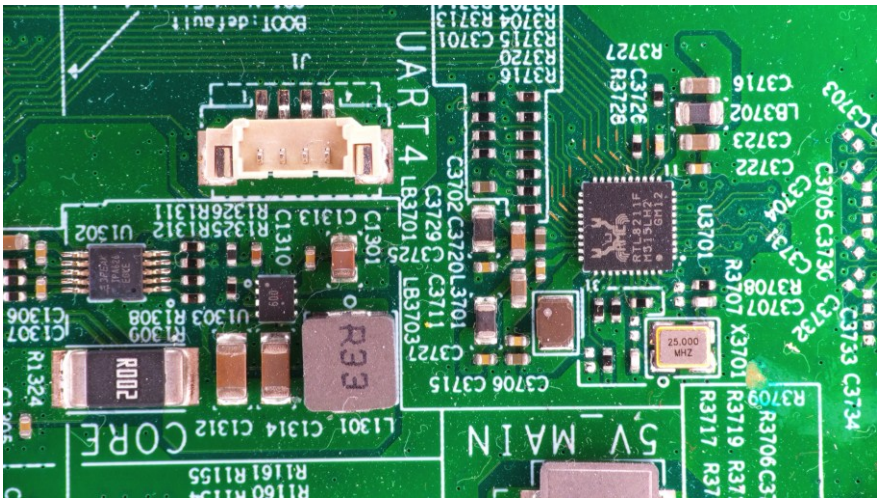


Figure 3-68 PCB Captured with TAFDM411 at 4.0X

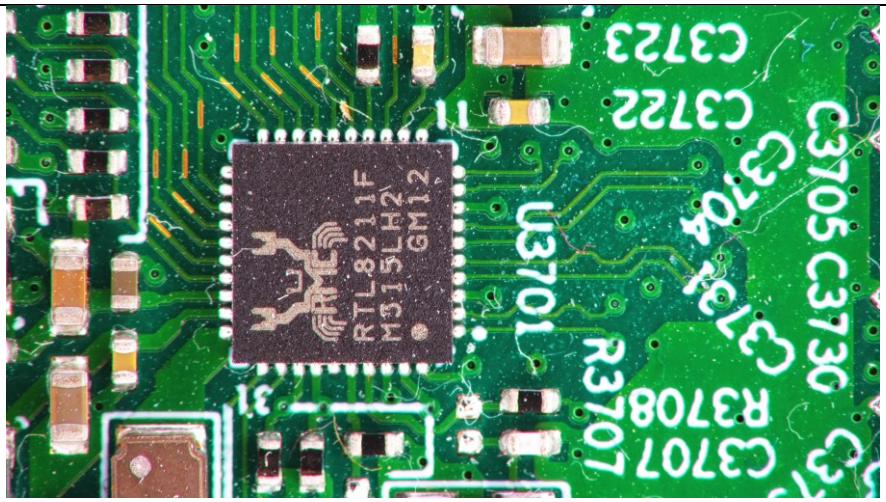


Figure 3-69 PCB Captured with TAFDM411 at 10X

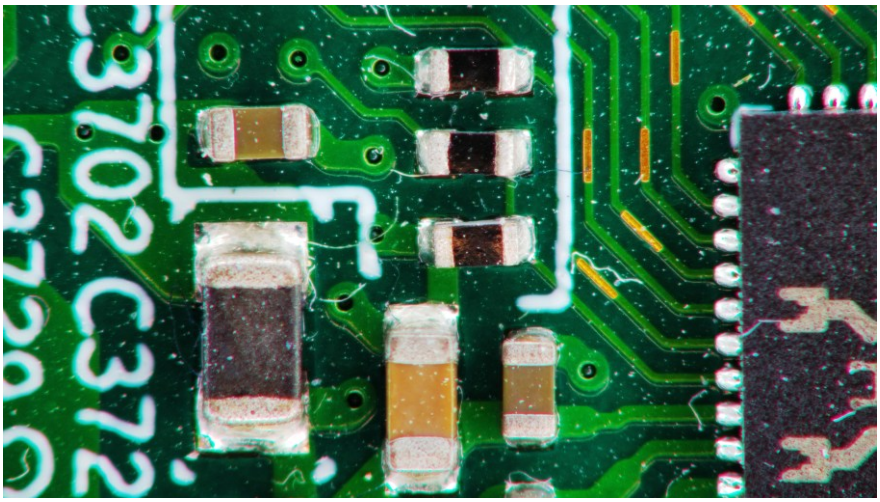


Figure 3-70 PCB Captured with TAFDM411 at 20X

3.5.8 The Software and App for TAFDM41X Series Camera

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

Windows: https://www.touptekphotonics.com.cn/download/?dlID=0

macOS: https://www.touptekphotonics.com.cn/download/?dlID=1

Linux: https://www.touptekphotonics.com.cn/download/?dlID=2

Android: https://www.touptekphotonics.com.cn/download/?dlID=3

iOS: https://www.touptekphotonics.com.cn/download/?dlID=4

4 HDMI Canon EF Mount Auto-Focus Camera

4.1 X8FCAM4K22MPA_EFL Series

4.1.1 X8FCAM4K22MPA_EFL Camera Application

Figure 4-1 The X8FCAM4K22MPA_EFL camera

The X8FCAM4K22MPA_EFL is a camera designed by ToupTek that includes multiple modes of output (HDMI/NETWORK/USB), where X in 'X8FCAM4K22MPA_EFL means multiple interfaces, the 8 series represents the AI high-end platform of Touptek, F means auto focus, 4K represents HDMI output of 4K, 22MP represents maximum camera output of 22MP images, A represents sensor type A, and EFL stands for Canon Electro-Focus Lens, also known as EF mount lens. It uses large-size, high-resolution and ultra-high-performance CMOS sensor. The camera can be directly connected to an HDMI display, or it can be connected to a computer via NETWORK or USB, and the image and video can be saved in an SD card /USB flash drive for on-site analysis and subsequent research.

The X8FCAM4K22MPA_EFL camera outputs real-time images through the HDMI interface, and can operate the graphical interface through a USB mouse to perform image display adjustment, processing, measurement and other functions.

The X8FCAM4K22MPA_EFL camera's most important feature is that it can be used with any supported EF-mount Lens, and after correctly installing the lens, you can get the focal length, aperture and focus of the lens in real time on the HDMI display interface, and you can control the aperture and focus section of the EF lens.

The camera can be used for inspection in medical fields, such as ophthalmology and dentistry; it can also be used for ultra-high-definition industrial inspection. It can be adapted to EF mount Lenses of various focal lengths according to customer needs.

4.1.1.1 The basic characteristic of X8FCAM4K22MPA_EFL series camera

The basic characteristic is listed as below:

- Sony back-illuminated large target surface CMOS sensor
- With 10-bit ISP processing, it offers better color reproduction, remarkable sharpening and 3D noise reduction effects, and more accurate ROI white balance
- Compatible for Canon EF mount Lenses, achieving electric control of lens aperture, manual/auto focusing
- Based on lens focusing control, achieve the depth of field synthesis function of the focused images
- Provide lens distortion correction function
- 4K HDMI/ NETWORK / USB multiple video synchronous outputs
- SD card/USB flash drive for captured image and video storage, customizable storage location and support local preview and playback
- Support video cropping function
- Support the capture and display of RAW format images
- Support Image Auto Upload to the server over the network
- Supports USB voice control module, enabling real-time control of the camera through voice commands for taking photos, recording videos, freezing, and other operations, multi-image Stitch function
- Provide real-time video EDF function
- Provide real-time Stitch function to obtain higher quality images through real-time processing
- New UI interface, the browsing interface provides rich file operation functions, image to image comparison, image to real-time video comparison, multi-image EDF function, multi-image Stitch function
- Embedded XCamView for the control of the camera and image processing, supporting automatic edge finding and

other measurement functions

- Text input fields support bilingual input in Chinese and English
- ToupView/ToupLite software for PC
- iOS/Android applications for smart phones or tablets

Figure 4-2 TPS-600 bracket+X8FCAM4K22MPA_EFL+Canon EF-S 18-55mm f/4-5.6 IS STM

Figure 4-3 TPS-600 bracket+X8FCAM4K22MPA_EFL+Canon EF-S 18-55mm f/4-5.6 IS STM

Figure 4-4 TPS-600 bracket+X8FCAM4K22MPA_EFL+Canon EF-S 18-55mm f/4-5.6 IS STM

Figure 4-5 TPS-600 bracket+X8FCAM4K22MPA_EFL+Canon EF-S 18-55mm f/4-5.6 IS STM+HDMI 4K monitor

4.1.2 X8FCAM4K22MPA_EFL Camera Datasheet and Functions

4.1.2.1 Camera Datasheet

Order Code	Sensor & Size(mm)	Pixel(μm)	G Sensitivity Dark Signal	Sensor Output (FPS/Resolution)	Binning	Exposure(us)
X8FCAM4K22MPA_EFL	IMX571(C) 1.7"(23.46x13.21)	3.76x3.76	485 with 1/30s 0.07mv with 1/30s	37@6240*3512	1x1	7~10^6

4.1.2.2 Frame rate with different output

Camera Model	Video Saving (FPS/Resolution)	Picture	HDMI2.0(FPS/Resolution)	USB3.0(FPS/Resolution)	NETWORK(FPS/Resolution)
X8FCAM4K22MPA_EFL	37@3840*2160 37@1920*1080 37@1280*720	6240*3512	37@3840*2160 37@1920*1080	15@6240*3512 37@2688*1512 37@1920*1080	30@3840*2160 37@1920*1080 37@1280*720

Figure 4-6 Available ports on the back panel of the camera body

4.1.2.1 Specification of X8FCAM4K22MPA_EFL series camera

Interface or Button	Function Description
USB Mouse	Connect USB mouse for easy operation with embedded XCamView software Connect USB voice control for enable real-time control of camera snap, recording, freezing, and other operations
USB3.0	Connect USB flash drive to save pictures and videos Connect 5G WiFi module to transfer video wirelessly at real time

	Connect USB microphone for audio and video Connect USB voice control for enable real-time control of camera snap, recording, freezing, and other operations
USB Video	Connect PC or other host device to realize video image transmission
HDMI	Comply with HDMI2.0 standard. 4K/1080P format video output and supporting automatic switch between 4K and 1080P format according to the connected monitors
LAN	LAN port to connect router and switch to transfer video
SD	SD card slot, comply with SDIO3.0 standard and SD card could be inserted for video and images saving
ON/OFF	Power switch
LED	LED status indicator
DC12V	Power adapter connection (12V/2A)
Video Output Interface	**Function Description**
HDMI Interface	Comply with HDMI2.0 standard; 37fps@4K or 37fps@1080P
LAN Interface	Support real time resolution switching(4K/1080P/720P) H264 encoded video DHCP configuration or manual configuration Unicast/multicast configuration
WiFi Interface	Connecting 5G WiFi adapter (USB3.0 slot) in AP/STA mode
USB Video Interface	Connecting USB Video port of PC for video transfer MJPEG format video
Other Function	**Function Description**
Video Saving	Video format：8M (3840*2160) H264 encoded MP4 file Video saving frame rate：37fps
Image Capture	22M (6240*3512) JPEG/TIFF/RAW image in SD card or USB flash drive (Default SD card priority, priority can be modified in settings)
Measurement Saving	Measurement information saved in different layer with image content Measurement information is saved together with image content in burn in mode
ISP	Exposure(Automatic / Manual Exposure) / Gain， White Balance(Manual / Automatic / ROI Mode)， Sharpening， 3D Denoise， Saturation Adjustment，Gamma Adjustment， Contrast Adjustment， Brightness Adjustment，Hue Adjustment，50HZ/60HZ Anti-flicker, Color to Gray Function
Image Operation	Zoom In/Zoom Out (Up to 10X), Mirror/Flip, Freeze, EDF, Cross Line, Overlay, PIP, Auto Focus, Browser (including Picture Browsing, Video Playback, Video Compare, Picture Compare, EDF, Stitch Image Processing), Measurement Function
Embedded RTC(Optional)	Support accurate time on board
Restore Factory Settings	Restore camera parameters to its factory status
Multiple Language Support	English / Simplified Chinese / Traditional Chinese / Korean / Thailand / French / German / Spanish / Japanese / Italian / Russian / Dutch / Portuguese
Software Environment under NETWORK/USB Video Output	
White Balance	Auto White Balance
Color Technique	Ultra-Fine Color Engine
Capture/Control SDK	Windows/Linux/macOS/Android Multiple Platform SDK (Native C/C++, C#/VB.NET, Python, Java, DirectShow, Twain, etc)
Recording System	Still picture or video
Operating System	Microsoft® Windows® 8 / 8.1 / 10 / 11(32 & 64 bit) OSx (Mac OS X) Linux
PC Requirements	CPU: Equal to Intel Core2 2.8GHz or higher
	Memory: 8GB or more
	USB interface: USB2.0 interface or higher
	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/2A adapter

4.1.3 X8FCAM4K22MPA_EFL Camera Lens Supported

The X8FCAM4K22MPA_EFL camera can be used with any supported Canon EF mount lens. After correctly installing the lens, it can read information such as lens focal length, aperture, and focus position, and can also electrically control the lens aperture and focus position. The X8FCAM4K22MPA_EFL camera theoretically supports any Canon/Tamron/Sigma brand EF mount lens, but not all lenses have been tested. Using lenses from manufacturers other than Canon/Tamron/Sigma may result in uncontrollable and incompatible situations.

The verified compatible EF mount lens models are listed below:

LENS	Closest Focusing Distance	Focal Length Display	Aperture Control	Focus Control	Fixed Distance Focus
Canon EF-S 10-18mm f/4.5-5.6 IS STM	About 0.22 meters	Support	Support	Support	/
Canon EF-S 18-55mm f/3.5-5.6 IS STM	About 0.25 meters	Support	Support	Support	Support
Canon EF-S 18-55mm f/4-5.6 IS STM	About 0.25 meters	Support	Support	Support	/
Canon EF-S 15-85mm f/3.5-5.6 IS USM	About 0.35 meters	Support	Support	Support	/
Canon EF-S 18-135mm f/3.5-5.6 IS USM	About 0.39 meters	Support	Support	Support	Support
Canon EF-S 18-200mm f/3.5-5.6 IS	About 0.45 meters	Support	Support	Support	/
Canon EF 24mm f/1.4L II USM	About 0.25 meters	Support	Support	Support	/
Canon EF 24mm f/2.8 IS USM	About 0.2 meters	Support	Support	Support	/
Canon EF 35mm f/1.4L II USM	About 0.28 meters	Support	Support	Support	/
Canon EF 50mm f/1.2L USM	About 0.45 meters	Support	Support	Support	Support
Canon EF 50mm f/1.4 USM	About 0.45 meters	Support	Support	Support	/
Canon EF 85mm f/1.2L II USM	About 0.95 meters	Support	Support	Support	/
Canon EF 16-35mm f/2.8L III USM	About 0.28 meters	Support	Support	Support	/
Canon EF 16-35mm f/4L IS USM	About 0.28 meters	Support	Support	Support	/
Canon EF 24-70mm f/2.8L II USM	About 0.38 meters (Macro mode is about 0.2 meters)	Support	Support	Support	/
Canon EF 24-70mm f/4L IS USM	About 0.38 meters (Macro mode is about 0.2 meters)	Support	Support	Support	/
Canon EF 24-105mm f/4L IS USM	About 0.45 meters	Support	Support	Support	/
Canon EF 100-400mm f/4.5-5.6L IS II USM	About 0.98 meters	Support	Support	Support	/
Sigma 150-600mm f/5-6.3 DG OS HSM|S	About 2.6 meters	Support	Support	Support	/

Figure 4-7 The Canon EF lens currently supported by X8FCAM4K22MPA_EFL camera

4.1.4 Dimension of X8FCAM4K22MPA_EFL Camera

Figure 4-8 Dimension of X8FCAM4K22MPA_EFL camera

4.1.5 X8FCAM4K22MPA_EFL Camera Packing Information

Figure 4-9 X8FCAM4K22MPA_EFL Camera Packing Information

Standard Packing List	
A	Gift box: L:25.5cm W:17.0cm H:9.0cm (1pcs, 1.7Kg/ box)
B	X8FCAM4K22MPA_EFL Camera
C	Power Adapter: Input: AC 100~240V 50Hz/60Hz, Output: DC 12V 2A American standard: Model: POWER-12V2A(MX24Z1-1202000) + American standard plug European standard: Model: POWER-12V2A(MX24Z1-1202000) + European standard plug
D	USB Mouse
E	HDMI Cable
F	USB3.0 A male to a male gold-plated connectors cable /1.5m
Optional Accessory	
G	USB WiFi adapter (Shape will vary with different models)
H	SD Card (16G or above; Speed: class 10)
I	USB flash drive
J	Ethernet cable
K	USB WiFi adapter (Shape will vary with different models)
L	Canon/Tamron/Sigma EF mount lens (See Sec4.1.3)

4.1.6 The Software and App for X8FCAM4K22MPA_EFL Series Camera

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

Windows: http://www.touptek.com/download/showdownload.php?lang=en&id=33

Linux & macOS: http://www.touptek.com/download/showdownload.php?lang=en&id=28

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

Android: https://play.google.com/store/apps/details?id=com.touptek.tpview

4.1.7 Sample Photos Captured with X8FCAM4K22MPA_EFL Camera

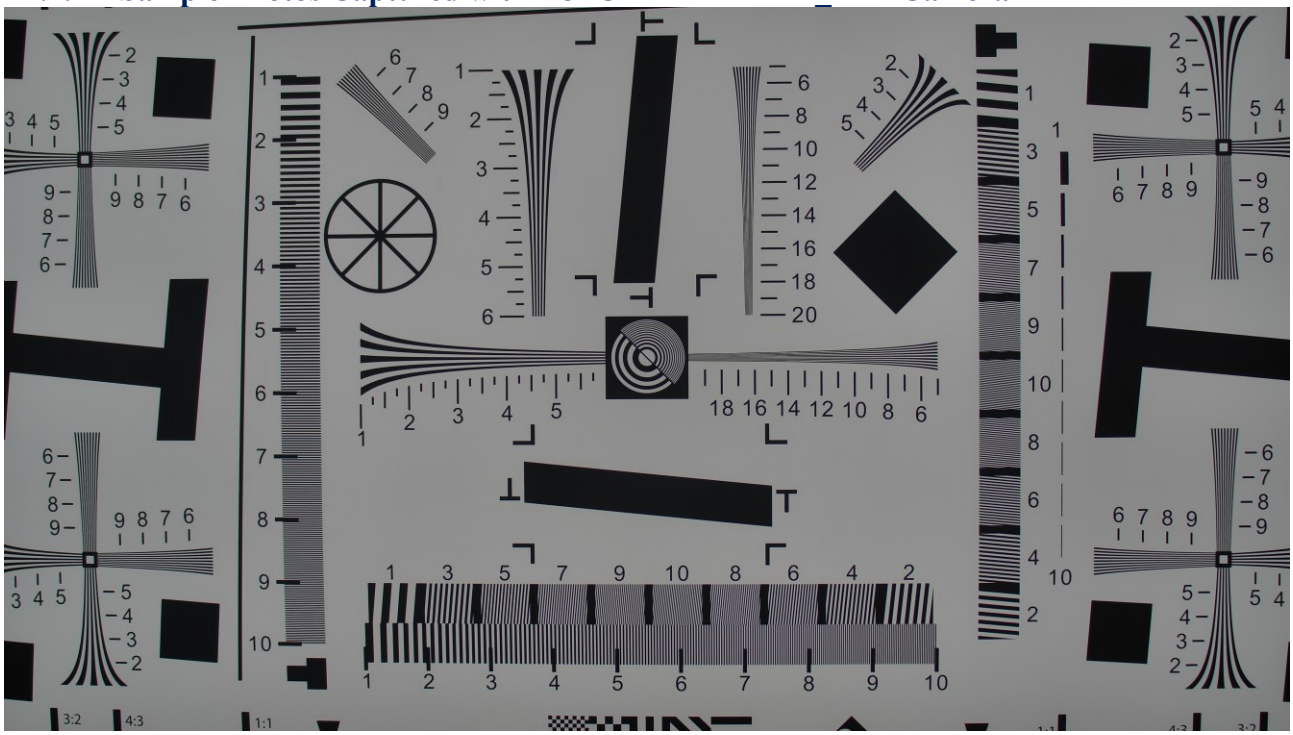


Figure 4-10 Resolution board captured by X8FCAM4K22MPA_EFL

Figure 4-11 Rabbittail grass captured by X8FCAM4K22MPA_EFL

Figure 4-12 Lavender captured by X8FCAM4K22MPA_EFL

4.2 X7FCAM4K16MPA_EFL Series

4.2.1 X7FCAM4K16MPA_EFL Camera Application

Figure 4-13 The X7FCAM4K16MPA_EFL camera

The X7FCAM4K16MPA_EFL is a camera designed by ToupTek that includes multiple modes of output (HDMI/NETWORK/USB), where X in 'X7FCAM4K16MPA_EFL means multiple interfaces, the 7 series represents the AI high-end platform of Touptek, F means auto focus, 4K represents HDMI output of 4K, 16MP represents maximum camera output of 16MP images, A represents sensor type A, and EFL stands for Canon Electro-Focus Lens, also known as EF mount lens. It uses large-size, high-resolution and ultra-high-performance CMOS sensor. The camera can be directly connected to an HDMI display, or it can be connected to a computer via NETWORK or USB, and the image and video can be saved in an SD card /USB flash drive for on-site analysis and subsequent research.

The X7FCAM4K16MPA_EFL camera outputs real-time images through the HDMI interface, and can operate the graphical interface through a USB mouse to perform image display adjustment, processing, measurement and other functions.

The X7FCAM4K16MPA_EFL camera's most important feature is that it can be used with any supported EF-mount Lens, and after correctly installing the lens, you can get the focal length, aperture and focus of the lens in real time on the HDMI display interface, and you can control the aperture and focus section of the EF lens.

The camera can be used for inspection in medical fields, such as ophthalmology and dentistry; it can also be used for ultra-high-definition industrial inspection. It can be adapted to EF mount Lenses of various focal lengths according to customer needs.

4.2.1.1 The basic characteristic of X7FCAM4K16MPA_EFL series camera

The basic characteristic is listed as below:

- Large size, high-resolution, and high-performance Sony back-illuminated CMOS sensor
- Compatible for Canon EF mount Lenses, achieving electric control of lens aperture, manual/auto focusing
- Based on lens focusing control, achieve the depth of field synthesis function of the focused images
- Provide lens distortion correction function
- 4K HDMI/ NETWORK / USB multiple video synchronous outputs
- SD card/USB flash drive for captured image and video storage, support local preview and playback
- New file management system, providing rich file operation functions, image to image comparison (2 or 4 sheets), image to real-time video comparison, multi-image EDF and other functions
- Excellent ISP with local tone mapping,3D denoising and ROI white balance ensures great quality of video image.
- Embedded XCamView for the control of the camera and image processing, supporting automatic edge finding and other measurement functions
- ToupView/ToupLite software for PC
- iOS/Android applications for smart phones or tablets

Figure 4-14 TPS-600 bracket+X7FCAM4K16MPA_EFL+Canon EF-S 18-55mm f/4-5.6 IS STM

Figure 4-15 TPS-600 bracket+X7FCAM4K16MPA_EFL+Canon EF-S 18-55mm f/4-5.6 IS STM

Figure 4-16 TPS-600 bracket+X7FCAM4K16MPA_EFL+Canon EF-S 18-55mm f/4-5.6 IS STM+HDMI 4K monitor

4.2.1.2 X7FCAM4K16MPA_EFL Camera Datasheet

The main parameters of the X7FCAM4K16MPA_EFL camera sensor are shown in the table below:

Order Code	Sensor & Size(mm)	Pixel(μm)	G Sensitivity Dark Signal	Sensor Output (FPS/Resolution)	Binning	Exposure(us)
X7FCAM4K16MPA_EFL	IMX283(C) 1/1.1"(13.06x7.34)	2.4x2.4	1847mv with 1/30s 0.84mv with 1/30s	30@5440*3060	1x1	0.104~1000

4.2.1.3 Frame rate with different output

Camera Model	Video Saving (FPS/Resolution)	HDMI2.0(FPS/Resolution)	USB3.0(FPS/Resolution)	NETWORK(FPS/Resolution)
X7FCAM4K16MPA_EFL	30@3840*2160 30@1920*1080 30@1280*720	30@3840*2160 30@1920*1080	20@5440*3060 30@2688*1512 30@1920*1080	30@3840*2160 30@1920*1080 30@1280*720

Figure 4-17 Available ports on the back panel of the camera body

4.2.1.4 Specification of X7FCAM4K16MPA_EFL series camera

Interface or Button	Function Description
USB Mouse	Connect USB mouse for easy operation with embedded XCamView software Connect USB voice control for enable real-time control of camera snap, recording, freezing, and other operations
USB3.0	Connect USB flash drive to save pictures and videos Connect 5G WiFi module to transfer video wirelessly at real time Connect USB microphone for audio and video Connect USB voice control for enable real-time control of camera snap, recording, freezing, and other operations
USB Video	Connect PC or other host device to realize video image transmission
HDMI	Comply with HDMI2.0 standard. 4K/1080P format video output and supporting automatic switch between 4K and 1080P format according to the connected monitors
LAN	LAN port to connect router and switch to transfer video
SD	SD card slot, comply with SDIO3.0 standard and SD card could be inserted for video and images saving
ON/OFF	Power switch
LED	LED status indicator
DC12V	Power adapter connection (12V/2A)
Video Output Interface	**Function Description**
HDMI Interface	Comply with HDMI2.0 standard; 30fps@4K or 30fps@1080P
LAN Interface	Support real time resolution switching(4K/1080P/720P) H264 encoded video DHCP configuration or manual configuration Unicast/multicast configuration
WiFi Interface	Connecting 5G WiFi adapter (USB3.0 slot) in AP/STA mode
USB Video Interface	Connecting USB Video port of PC for video transfer H264/MJPEG format video
Other Function	**Function Description**
Video Saving	Video format：16M (3840*2160) H264 encoded MP4 file Video saving frame rate：30fps
Image Capture	16M (5440*3060) JPEG/TIFF/RAW image in SD card or USB flash drive (Default SD card priority, priority can be modified in settings)
Measurement Saving	Measurement information saved in different layer with image content Measurement information is saved together with image content in burn in mode
ISP	Exposure(Automatic / Manual Exposure) / Gain， White Balance(Manual / Automatic / ROI Mode)， Sharpening， 3D Denoise， Saturation Adjustment，Gamma Adjustment， Contrast Adjustment， Brightness Adjustment，Hue Adjustment，50HZ/60HZ Anti-flicker, Color to Gray Function
Image Operation	Zoom In/Zoom Out (Up to 10X), Mirror/Flip, Freeze, EDF, Cross Line, Overlay, PIP, Auto Focus, Browser (including Picture Browsing, Video Playback, Video Compare, Picture Compare, EDF, Stitch Image Processing), Measurement Function
Embedded RTC(Optional)	Support accurate time on board
Restore Factory Settings	Restore camera parameters to its factory status

Multiple Language Support	English / Simplified Chinese / Traditional Chinese / Korean / Thailand / French / German / Spanish / Japanese / Italian / Russian / Dutch / Portuguese
Software Environment under NETWORK/USB Video Output	
White Balance	Auto White Balance
Color Technique	Ultra-Fine Color Engine
Capture/Control SDK	Windows/Linux/macOS/Android Multiple Platform SDK (Native C/C++, C#/VB.NET, Python, Java, DirectShow, Twain, etc)
Recording System	Still picture or video
Operating System	Microsoft® Windows® 8 / 8.1 / 10 / 11(32 & 64 bit) OSx (Mac OS X) Linux
PC Requirements	CPU: Equal to Intel Core2 2.8GHz or higher
	Memory: 8GB or more
	USB interface: USB2.0 interface or higher
	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/2A adapter

4.2.2 X7FCAM4K16MPA_EFL Camera Lens Supported

The X7FCAM4K16MPA_EFL camera can be used with any supported Canon EF mount lens. After correctly installing the lens, it can read information such as lens focal length, aperture, and focus position, and can also electrically control the lens aperture and focus position. The X7FCAM4K16MPA_EFL camera theoretically supports any Canon/Tamron/Sigma brand EF mount lens, but not all lenses have been tested. Using lenses from manufacturers other than Canon/Tamron/Sigma may result in uncontrollable and incompatible situations.

The verified compatible EF mount lens models are listed below:

LENS	Closest Focusing Distance	Focal Length Display	Aperture Control	Focus Control	Fixed Distance Focus
Canon EF-S 10-18mm f/4.5-5.6 IS STM	About 0.22 meters	Support	Support	Support	/
Canon EF-S 18-55mm f/3.5-5.6 IS STM	About 0.25 meters	Support	Support	Support	Support
Canon EF-S 18-55mm f/4-5.6 IS STM	About 0.25 meters	Support	Support	Support	/
Canon EF-S 15-85mm f/3.5-5.6 IS USM	About 0.35 meters	Support	Support	Support	/
Canon EF-S 18-135mm f/3.5-5.6 IS USM	About 0.39 meters	Support	Support	Support	Support
Canon EF-S 18-200mm f/3.5-5.6 IS	About 0.45 meters	Support	Support	Support	/
Canon EF 24mm f/1.4L II USM	About 0.25 meters	Support	Support	Support	/
Canon EF 24mm f/2.8 IS USM	About 0.2 meters	Support	Support	Support	/
Canon EF 35mm f/1.4L II USM	About 0.28 meters	Support	Support	Support	/
Canon EF 50mm f/1.2L USM	About 0.45 meters	Support	Support	Support	Support
Canon EF 50mm f/1.4 USM	About 0.45 meters	Support	Support	Support	/
Canon EF 85mm f/1.2L II USM	About 0.95 meters	Support	Support	Support	/
Canon EF 16-35mm f/2.8L III USM	About 0.28 meters	Support	Support	Support	/

Canon EF 16-35mm f/4L IS USM	About 0.28 meters	Support	Support	Support	/
Canon EF 24-70mm f/2.8L II USM	About 0.38 meters (Macro mode is about 0.2 meters)	Support	Support	Support	/
Canon EF 24-70mm f/4L IS USM	About 0.38 meters (Macro mode is about 0.2 meters)	Support	Support	Support	/
Canon EF 24-105mm f/4L IS USM	About 0.45 meters	Support	Support	Support	/
Canon EF 100-400mm f/4.5-5.6L IS II USM	About 0.98 meters	Support	Support	Support	/
Sigma 150-600mm f/5-6.3 DG OS HSM|S	About 2.6 meters	Support	Support	Support	/

Figure 4-18 The Canon EF lens currently supported by X7FCAM4K16MPA_EFL camera

4.2.3 Dimension of X7FCAM4K16MPA_EFL

Figure 4-19 Dimension of X7FCAM4K16MPA_EFL camera

4.2.4 Packing Information for X7FCAM4K16MPA_EFL

Figure 4-20 X7FCAM4K16MPA_EFL Camera Packing Information

Standard Packing List	
A	Gift box: L:25.5cm W:17.0cm H:9.0cm (1pcs, 1.7Kg/ box)
B	X7FCAM4K16MPA_EFL Camera
C	Power Adapter: Input: AC 100~240V 50Hz/60Hz, Output: DC 12V 2A American standard: Model: POWER-12V2A(MX24Z1-1202000) + American standard plug European standard: Model: POWER-12V2A(MX24Z1-1202000) + European standard plug
D	USB Mouse

E	HDMI Cable
F	USB3.0 A male to a male gold-plated connectors cable /1.5m
G	CD (Driver & utilities software, Ø12cm)
	Optional Accessory
H	SD Card (16G or above; Speed: class 10)
I	USB flash drive
J	USB Wi-Fi adapter
K	Ethernet cable
L	Canon/Tamron/Sigma EF mount lens

4.2.5 The Software and App for X7FCAM4K16MPA_EFL Series Camera

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

Windows: http://www.touptek.com/download/showdownload.php?lang=en&id=33

Linux & macOS: http://www.touptek.com/download/showdownload.php?lang=en&id=28

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

Android: https://play.google.com/store/apps/details?id=com.touptek.tpview

4.2.6 Sample Photos Captured with X7FCAM4K16MPA_EFL Camera

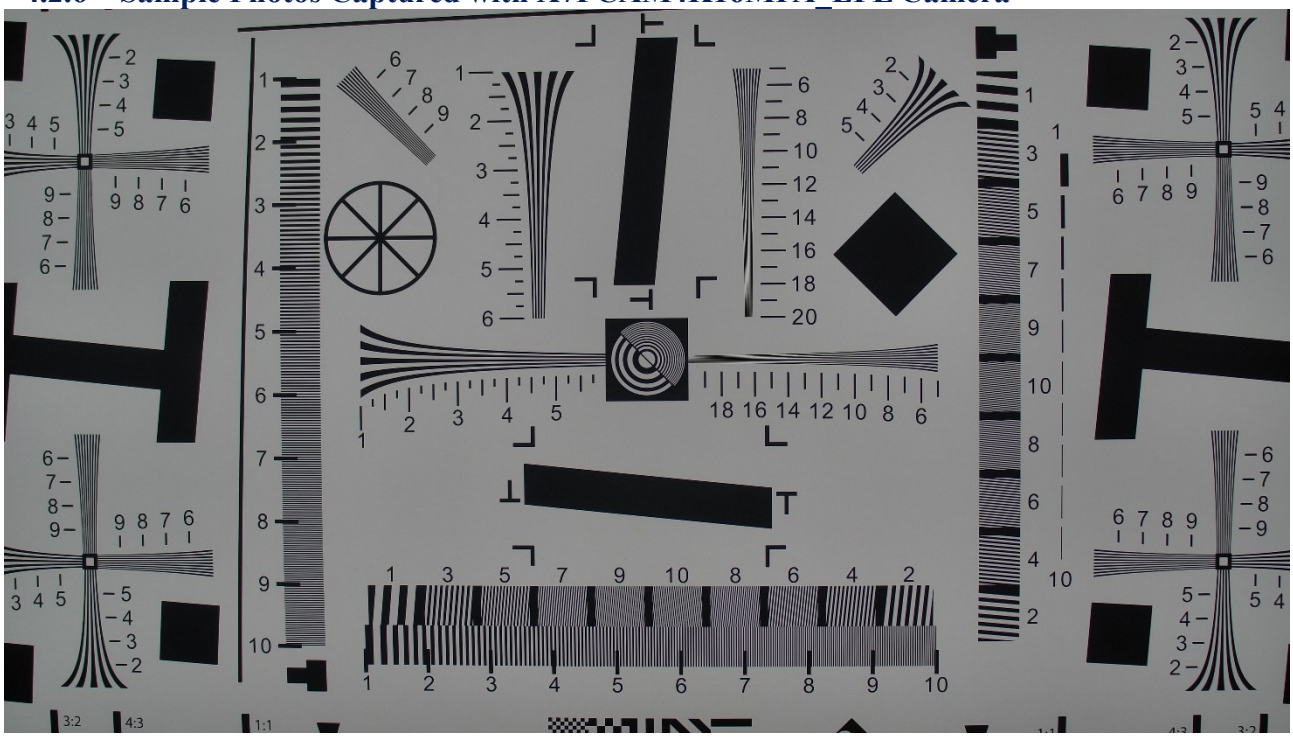


Figure 4-21 Short focus shooting resolution board

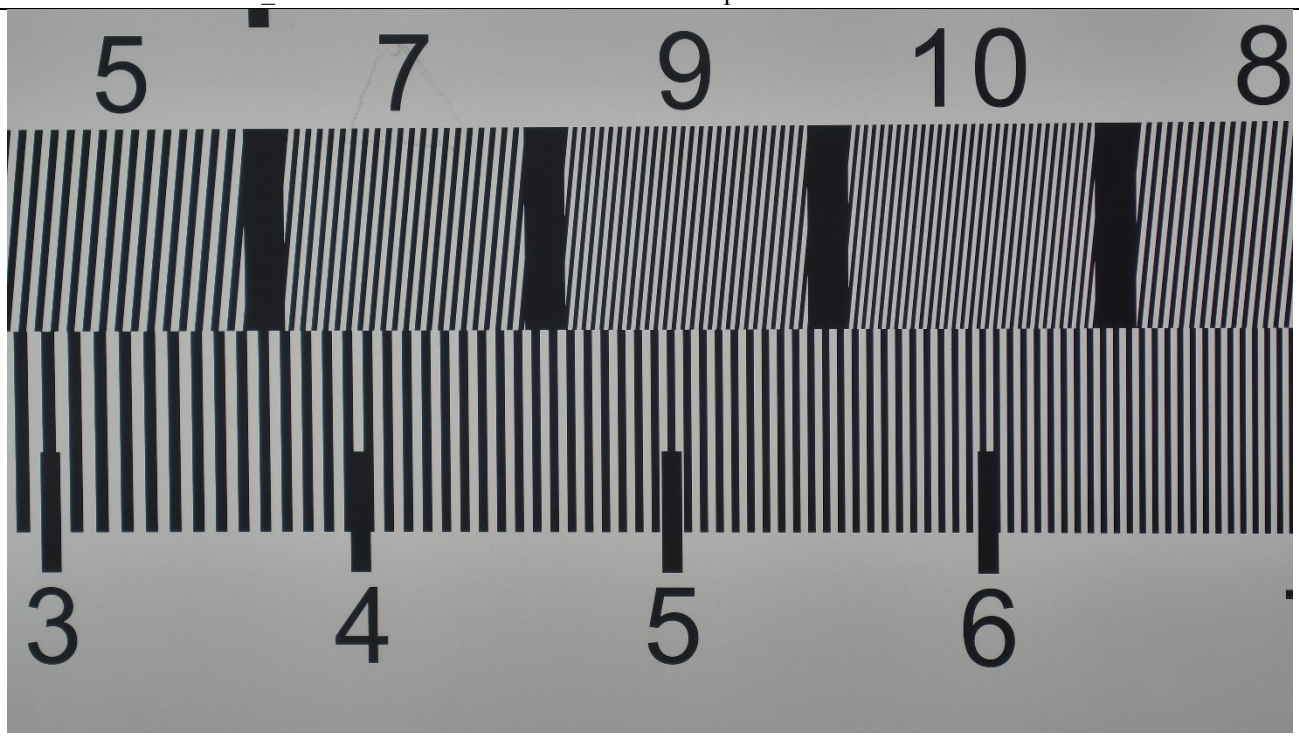


Figure 4-22 Telephoto shooting resolution board

Figure 4-23 Moth

Figure 4-24 Insect

Figure 4-25 Teeth

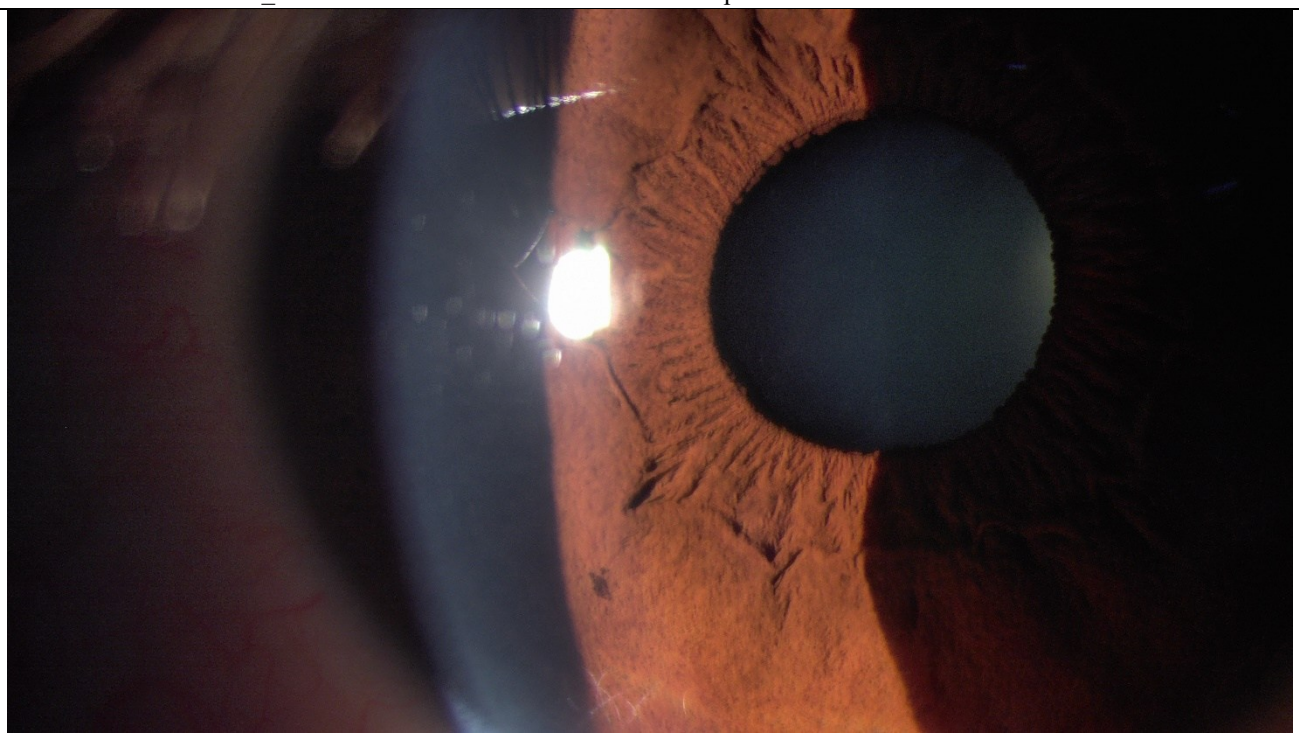


Figure 4-26 Eye

5 Auto Focus C-mount Camera

5.1 X5FCAM4K Series

5.1.1 Introduction to X5FCAM4K8MPA

Figure 5-1 The X5FCAM4K8MPA Camera

The X5FCAM4K8MPA is a camera designed by ToupTek that includes multiple modes of output (HDMI/WiFi/USB), where X in 'X5FCAM' means a CMOS camera with multiple interfaces, and F means auto focus. It uses ultra-high-performance CMOS sensor. The camera can be directly connected to an HDMI display, or it can be connected to a computer via WiFi or USB, and the image and video can be saved in an SD card /USB flash drive for on-site analysis and subsequent research.

Enhanced with an embedded ARM core, this camera integrates various functions inside. With the help of a USB mouse and well-designed UI on the HDMI monitor, all functions could be easily controlled.

The X5FCAM4K8MPA camera comes with the built-in Auto Focus system, which can realize Auto Focus on specific areas of the sample.

By inserting a WiFi module or connecting to a computer via a USB cable, the user can directly control the camera's hardware with the software ToupView or ToupLite. The X5FCAM4K8MPA camera can be used for tool field inspection, microscope observation, etc.

The basic characteristic is listed as below:

- Sony STARVIS 2 back-illuminated CMOS sensor
- 4K HDMI/ WiFi / USB multiple video synchronous outputs
- 4K/1080P auto switching according to monitor resolution
- Support 4K 60fps low delay HDMI output mode, with an average delay of 40ms
- SD card/USB flash drive for captured image and video storage, support local preview and playback
- New browsing function, providing rich file operation functions, image to image comparison, image to real-time video comparison, multi-image EDF and other functions
- Provide multiple focusing methods, and the size of the focusing area can be modified; Provide AF+EDF, facilitating the synthesis of high depth of field images in multiple focus areas at high magnification
- Excellent ISP with local tone mapping and 3D denoising
- Provide real-time video EDF function and real-time video WDR output function
- Provide two sets of default ISP parameters for biological microscope and stereo microscope
- Embedded XCamView for the control of the camera and image processing, supporting automatic edge finding and measurement functions
- ToupView/ToupLite software for PC
- iOS/Android applications for smart phones or tablets

5.1.2 X5FCAM4K8MPA Datasheet

The main parameters of the X5FCAM4K8MPA camera sensor are shown in the table below:

Order Code	Sensor & Size(mm)	Pixel(μm)	G Sensitivity Dark Signal	Sensor Output (FPS/Resolution)	Binning	Exposure(us)
X5FCAM4K8MPA	Sony IMX678(C) 1/1.8"(7.68x4.32)	2.0x2.0	3541mv with 1/30s 0.15mv with 1/30s	60@3840*2160	1x1	0.019~1000

Camera Model	Video Saving (FPS/Resolution)	HDMI2.0(FPS/Resolution)	USB3.0(FPS/Resolution)	WiFi(FPS/Resolution)
X5FCAM4K8MPA	60@3840*2160 60@1920*1080 60@1280*720	60@3840*2160 60@1920*1080	30@3840*2160 45@2688*1512 60@1920*1080	30@3840*2160 60@1920*1080 60@1280*720

Figure 5-2 Available Ports on the Back Panel of the Camera Body

Interface or Button	Function Description
USB Mouse	Connect USB mouse for easy operation with embedded XCamView software Connect USB voice control for enable real-time control of camera snap, recording, freezing, and other operations
USB3.0	Connect USB flash drive to save pictures and videos Connect 5G WiFi module to transfer video wirelessly at real time Connect USB microphone for audio and video Connect USB voice control for enable real-time control of camera snap, recording, freezing, and other operations
USB Video	Connect PC or other host device to realize video image transmission
HDMI	Comply with HDMI2.0 standard. 4K/1080P format video output and supporting automatic switch between 4K and 1080P format according to the connected monitors
SD	SD card slot, comply with SDIO3.0 standard and SD card could be inserted for video and images saving
ON/OFF	Power switch
LED	LED status indicator
DC12V	Power adapter connection (12V/1A)
Video Output Interface	**Function Description**
HDMI Interface	Comply with HDMI2.0 standard; 60fps@4K or 60fps@1080P
WiFi Interface	Connecting 5G WiFi adapter (USB3.0 slot) in AP/STA mode
USB Video Interface	Connecting USB Video port of PC for video transfer H264/MJPEG format video
Other Function	**Function Description**
Video Saving	Video format：8M (3840*2160) H264 encoded MP4 file Video saving frame rate: 60fps in Low Delay mode; 30fps in WDR mode
Image Capture	8M (3840*2160) JPEG/TIFF/PNG/RAW image in SD card or USB flash drive (Default SD card priority, priority can be modified in settings)
Measurement Saving	Measurement information saved in different layer with image content Measurement information is saved together with image content in burn in mode
ISP	Exposure(Automatic / Manual Exposure) / Gain， White Balance(Manual / Automatic / ROI Mode)， Sharpening， 3D Denoise， Saturation Adjustment，Gamma Adjustment， Contrast Adjustment， Brightness Adjustment，Hue Adjustment，50HZ/60HZ Anti-flicker, Color to Gray Function
Image Operation	Zoom In/Zoom Out (Up to 10X), Mirror/Flip, Freeze, EDF, Cross Line, Overlay, PIP, Auto Focus, Browser (including Picture Browsing, Video Playback, Video Compare, Picture Compare, EDF, Stitch Image Processing), Measurement Function
Embedded RTC(Optional)	Support accurate time on board
Restore Factory Settings	Restore camera parameters to its factory status
Multiple Language Support	English / Simplified Chinese / Traditional Chinese / Korean / Thailand / French / German / Spanish / Japanese / Italian / Russian / Dutch / Portuguese
Software Environment under NETWORK/USB Video Output	
White Balance	Auto White Balance
Color Technique	Ultra-Fine Color Engine
Capture/Control SDK	Windows/Linux/macOS/Android Multiple Platform SDK (Native C/C++, C#/VB.NET, Python, Java, DirectShow, Twain, etc)

Recording System	Still picture or video
Operating System	Microsoft® Windows® 8 / 8.1 / 10 / 11(32 & 64 bit) OSx (Mac OS X) Linux
PC Requirements	CPU: Equal to Intel Core2 2.8GHz or higher
	Memory: 4GB or more
	USB interface: USB2.0 interface or higher
	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 or above Adapter

5.1.3 Dimension of X5FCAM4K8MPA

Figure 5-3 Dimension of X5FCAM4K8MPA

5.1.4 Packing Information for X5FCAM4K8MPA

Figure 5-4 X5FCAM4K8MPA Camera Packing Information

Standard Packing List			
A	Gift box: L:25.5cm W:17.0cm H:9.0cm (1pcs, 1.7Kg/ box)		
B	X5FCAM4K8MPA Camera		
C	Power Adapter: Input: AC 100~240V 50Hz/60Hz, Output: DC 12V 1A American standard: Model: POWER-U-12V1A(MSA-C1000IC12.0-12W-US): UL/CE/FCC European standard: Model: POWER-E-12V1A(MSA-C10001C12.0-12W-DE): UL/CE/FCC EMI standard: FCC Part 15 Subpart B EMS standard: EN61000-4-2,3,4,5,6		
D	USB Mouse		
E	HDMI Cable		
F	USB3.0 A male to A male gold-plated connectors cable /2.0m		
G	CD (Driver & utilities software, Ø12cm)		
Optional Accessory			
H	SD Card (16G or above; Speed: class 10)		
I	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
J	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
	Note: For **I** and **J** optional items, please specify your camera type (C-mount, microscope camera or telescope camera), ToupTek engineer will help you to determine the right microscope or telescope camera adapter for your application;		
K	108015(Dia.23.2mm to 30.0mm Ring)/Adapter rings for 30mm eyepiece tube		
L	108016(Dia.23.2mm to 30.5mm Ring)/ Adapter rings for 30.5mm eyepiece tube		
M	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.)
N	USB flash drive		
O	USB WiFi adapter		

5.1.5 Extension of X5FCAM4K8MPA with Microscope or Telescope Adapter

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

5.1.6 X5FCAM4K8MPA Camera AF + EDF Function Description

AF + EDF is a new function that combines the camera's unique focus function with EDF. Users can focus on different areas in high-magnification scenes, and then fuse their respective clear areas to finally obtain a large depth-of-field image.

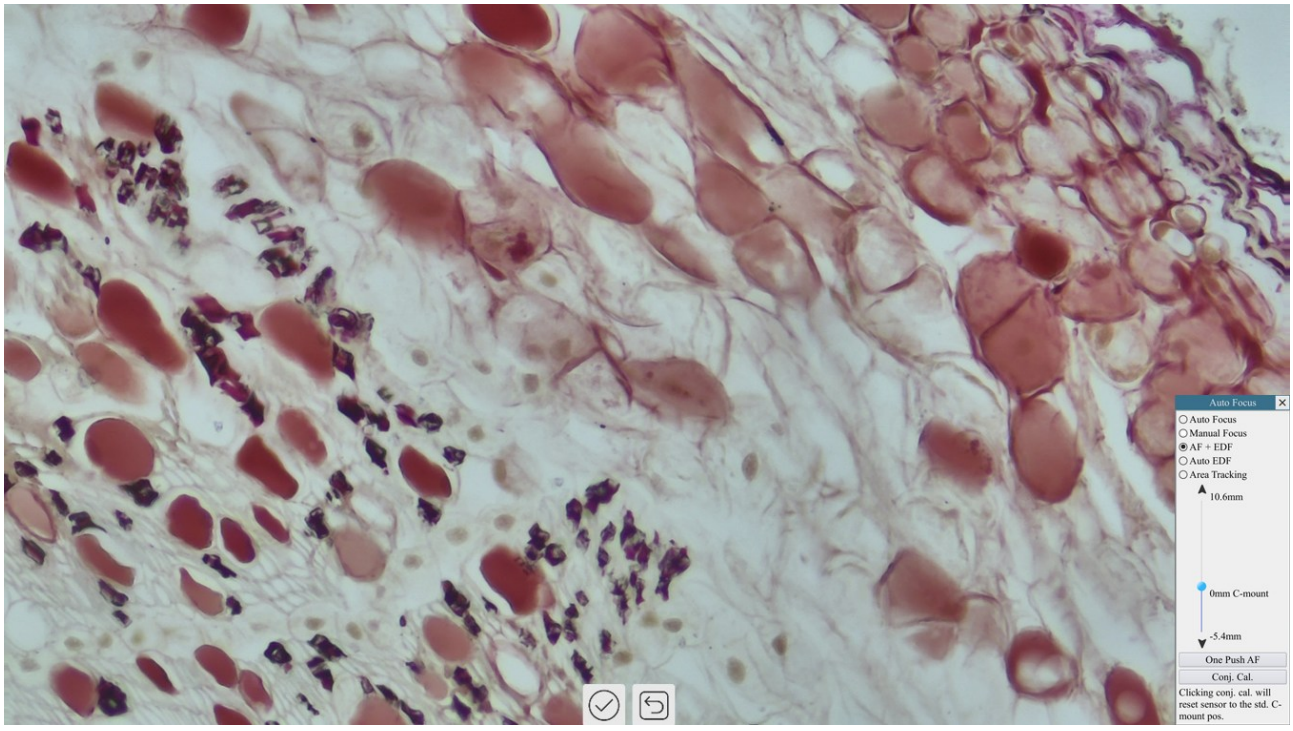


Figure 5-5 Auto Focus Control Panel

Specifically the usage steps are as follows:

- Click the AF+EDF option above the Auto Focus Control Panel. At this time, the word "EDF" will be displayed in the upper right corner of the video interface. The user clicks on the first focus area, and the system will perform an autofocus. If the focus is completed, "FOCUSED" will be displayed in the upper right corner. Once completed, the system will automatically obtain a frame of data containing the current clear area; use the mouse to switch to a different Focus Region, and the system will automatically focus again and obtain data. If the focus fails, "DEFOCUS" will be displayed in the upper right corner, and the system will not obtain the current frame data.
- Repeat the above steps. After obtaining clear data of multiple Focus Region, move the mouse to the bottom of the video interface and click . The camera will perform EDF on the cached frame data containing clear area information and output the fused picture. For use by users

The following are pictures obtained using the AF+EDF function of the X5FCAM4K8MPA camera:

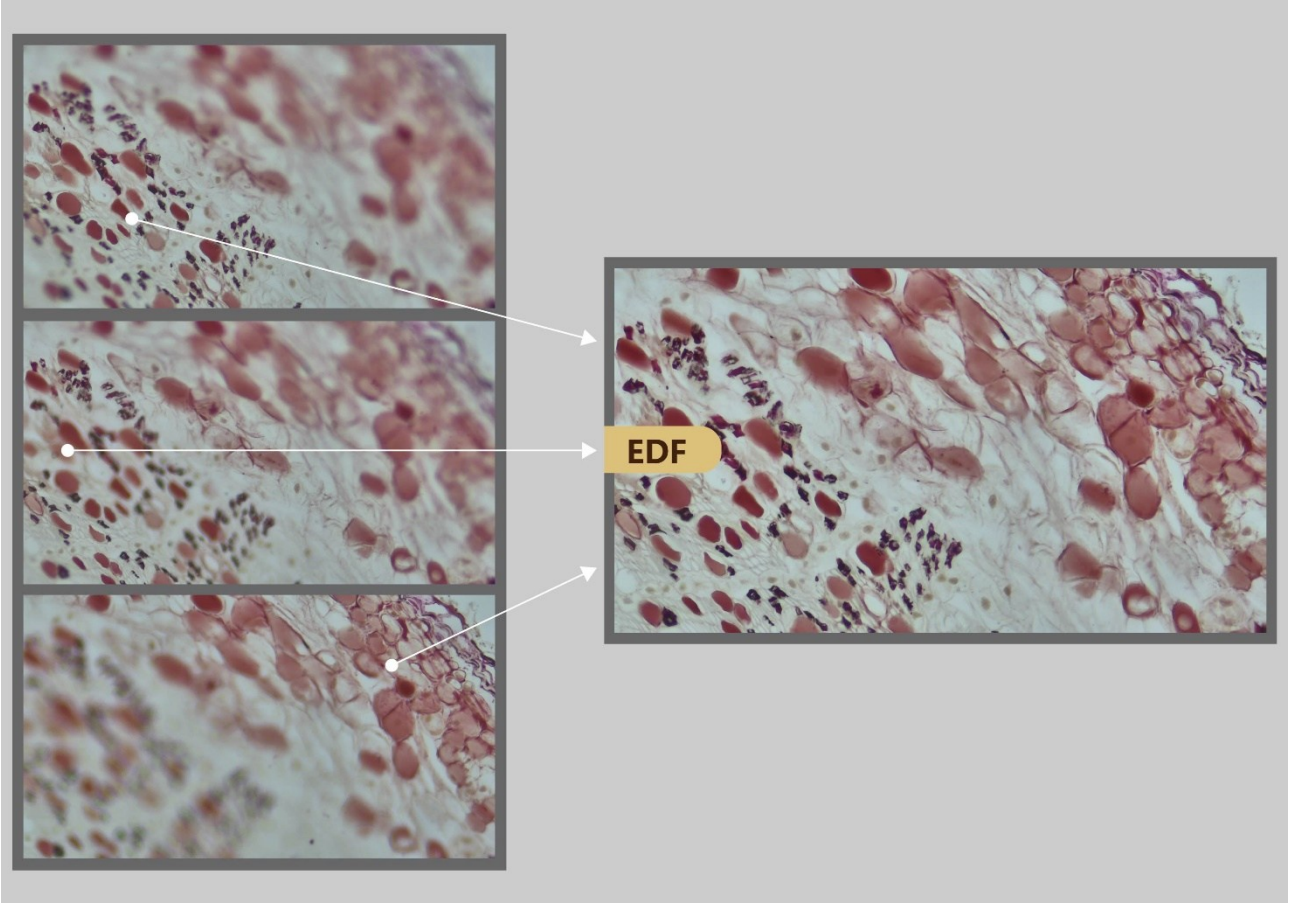


Figure 5-6 Cell Slice EDF Effect

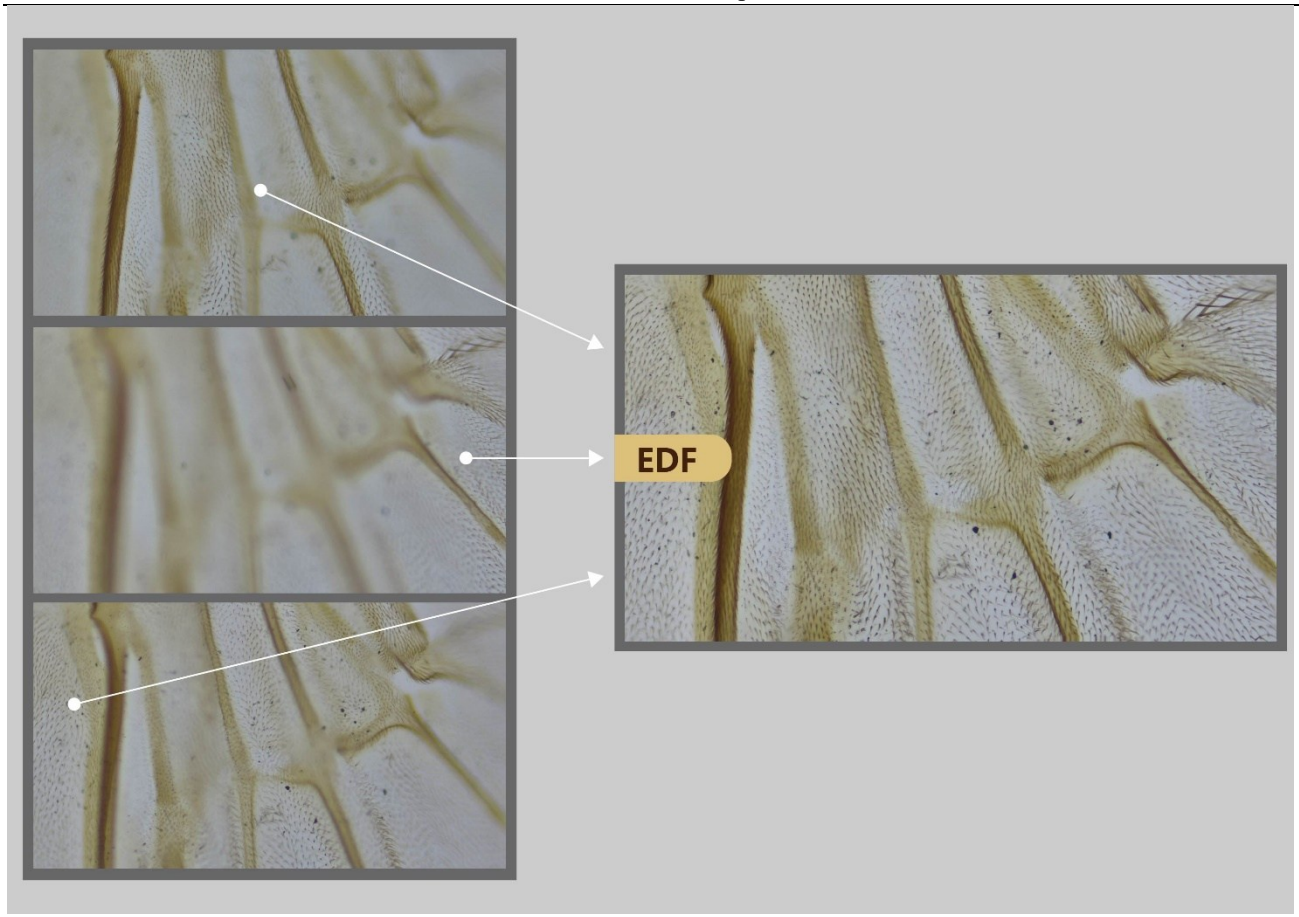


Figure 5-7 Insect Wings Slice EDF Effect

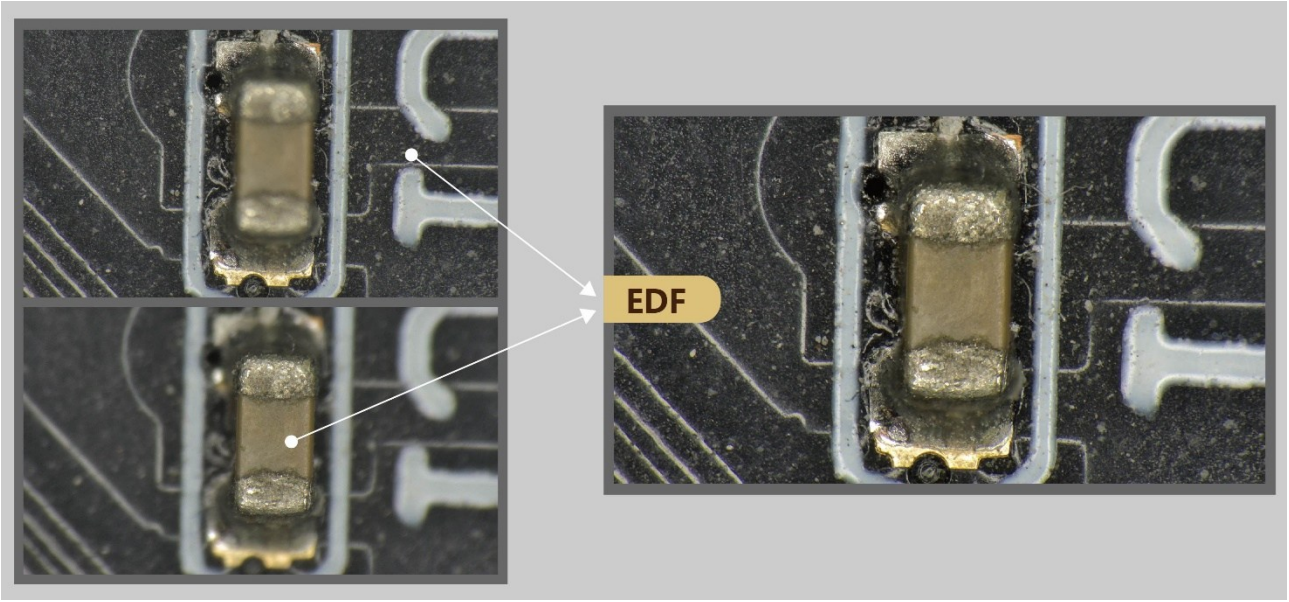


Figure 5-8 Circuit Board EDF Effect

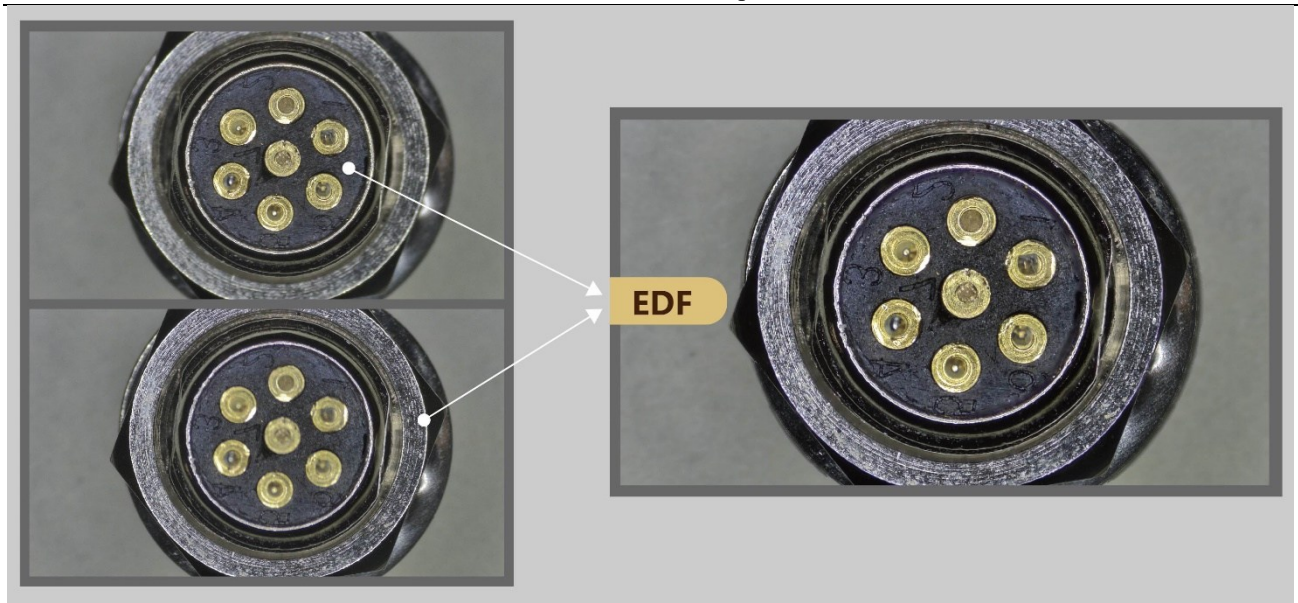


Figure 5-9 Artifact EDF Effect

5.2 XFCAMTOP4K Series

5.2.1 Introduction to XFCAMTOP4K8MPA

Figure 5-10 The XFCAMTOP4K8MPA Camera

XFCAMTOP4K series camera is a camera designed by ToupTek that includes multiple modes of output (HDMI/WiFi/USB), where X in 'XFCAM' means a CMOS camera with multiple interfaces, and F means auto focus. It uses ultra-high-performance CMOS sensor. The camera can be directly connected to an HDMI display, or it can be connected to a computer via WiFi or USB, and the image and video can be saved in an SD card for on-site analysis and subsequent research.

Enhanced with an embedded ARM core, this camera integrates various functions inside. With the help of a USB mouse and well-designed UI on the HDMI display, all functions could be easily controlled.

The XFCAMTOP4K series camera comes with the built-in auto focus system, which can realize auto focus on the specific areas of the sample.

By inserting a WiFi module or connecting with a computer via a USB cable, the user can directly control the camera's hardware with the software ToupView or ToupLite. XFCAMTOP4K series camera can be used for tool field inspection, microscope observation, etc.

- Sony Exmor/STARVIS back-illuminated CMOS sensor
- 4K HDMI/ WiFi/ USB multiple video outputs C-mount camera
- 4K/1080P auto switching according to monitor resolution
- SD card/USB flash drive for captured image and video storage, support local preview and playback
- Auto/Manual focus with the movement of the sensor
- Embedded XCamView for the control of the camera and image processing
- Excellent ISP with local tone mapping and 3D denoising
- ToupView/ToupLite software for PC
- iOS/Android applications for smart phones or tablets

5.2.2 XFCAMTOP4K8MPA Datasheet

Order Code	Sensor & Size(mm)	Pixel(μm)	G Sensitivity	FPS/Resolution	Binning	Exposure(ms)
XFCAMTOP4K8MPA	Sony IMX334(C) 1/1.8"(7.68x4.32)	2.0x2.0	505mv with 1/30s 0.1mv with 1/30s	30@3840*2160(HDMI) 30@3840*2160(WiFi) 30@3840*2160(USB)	1x1	0.04~1000

Figure 5-11 Available Ports on the Back Panel of the Camera Body

Interface or Button	Function Description
USB Mouse	Connect USB mouse for easy operation with embedded XCamView software
USB2.0	Connect USB flash drive to save pictures and videos Connect 5G WiFi module to transfer video wirelessly in real time
USB Video	Connect PC or other host device to realize video 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
ON/OFF	Power switch
SD	Comply with SDIO3.0 standard and the SD card could be inserted for video and images saving
LED	LED status indicator
DC12V	Power adapter connection (12V/1A)
Video Output Interface	**Function Description**
HDMI Interface	Comply with HDMI 1.4 standard, 30fps@4K or 30fps@1080P
WiFi Interface	Connecting 5G WiFi adapter (USB2.0 slot) in AP/STA mode
USB Video Interface	Connecting USB Video port of PC for video transfer in MJPEG format
Other Function	**Function Description**
Video Saving	Video format：8M (3840*2160) H264 encoded MP4 file Video saving frame rate:30fps in SD card or USB flash drive
Image Capture	8M (3840*2160) JPEG/TIFF image in SD card or USB flash drive
Measurement Saving	Measurement information saved in different layer with image content Measurement information is saved together with image content in burn in mode
ISP	Exposure(Automatic / Manual Exposure) / Gain， White Balance(Manual / Automatic / ROI Mode)， Sharpening，3D Denoise， Saturation Adjustment， Contrast Adjustment， Brightness Adjustment， Gamma Adjustment，Color to Gray， 50HZ/60HZ Anti-flicker Function
Video /Image Operation	Zoom In/Zoom Out (Up to 10X), Mirror/Flip, Color/Gray, Freeze, Cross Line, Overlay, Auto Focus, Compare (Comparison between real time video and images in SD card/ USB flash drive), Embedded Files Browser, Video Playback, Measurement Function
Embedded RTC(Optional)	To support accurate time on board
Restore Factory Settings	Restore camera parameters to its factory status
Multiple Language Support	English / Simplified Chinese / Traditional Chinese / Korean / Thailand / French / German / Japanese / Italian / Russian
Software Environment under WiFi/USB Video Output	
White Balance	Automatic/Manual/ROI
Color Technique	Ultra-Fine Color Engine
Capture/Control SDK	Windows/Linux/macOS/Android Multiple Platform SDK (Native C/C++, C#/VB.NET, Python, Java, DirectShow, Twain, etc)
Recording System	Still Picture or Movie
Operating System	Microsoft® Windows® XP / Vista / 7 / 8 / 8.1 /10(32 & 64 bit) OSx(Mac OS X) Linux
PC Requirements	CPU: Equal to Intel Core2 2.8GHz or Higher
	Memory: 4GB or More
	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

5.2.3 Dimension of XFCAMTOP4K8MPA

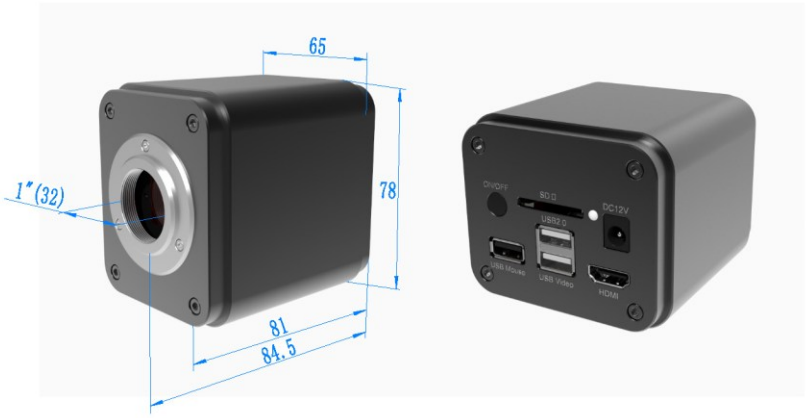


Figure 5-12 Dimension of XFCAMTOP4K Series Camera

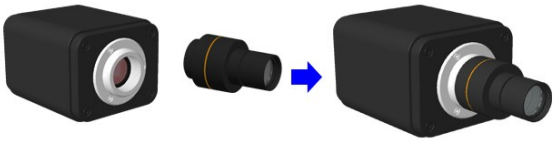
5.2.4 Packing Information for XFCAMTOP4K8MPA

Figure 5-13 Packing Information of XFCAMTOP4K Series Camera

Standard Packing List	
A	Gift box : L:25.5cm W:17.0cm H:9.0cm (1pcs, 1.48Kg/ box)
B	XFCAMTOP4K8MPA Camera
C	Power Adapter: Input: AC 100~240V 50Hz/60Hz, Output: DC 12V 1A American standard: Model: POWER-U-12V1A(MSA-C1000IC12.0-12W-US): UL/CE/FCC European standard: Model: POWER-E-12V1A(MSA-C10001C12.0-12W-DE): UL/CE/FCC EMI standard: FCC Part 15 Subpart B EMS standard: EN61000-4-2,3,4,5,6
D	USB Mouse
E	HDMI Cable
F	USB2.0 A male to A male gold-plated connectors cable /2.0m
G	CD (Driver & utilities software, Ø12cm)
Optional Accessory	
H	SD Card (16G or above; Speed: class 10)

I	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
J	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
	Note: For **I** and **J** optional items, please specify your camera type(C-mount, microscope camera or telescope camera), ToupTek engineer will help you to determine the right microscope or telescope camera adapter for your application;		
K	108015(Dia.23.2mm to 30.0mm Ring)/Adapter rings for 30mm eyepiece tube		
L	108016(Dia.23.2mm to 30.5mm Ring)/ Adapter rings for 30.5mm eyepiece tube		
M	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.)
N	USB flash drive		
O	USB WiFi adapter (In WiFi mode, a USB WiFi adapter is required to operate the camera), different models have different shapes		

5.2.5 Extension of XFCAMTOP4K8MPA with Microscope Adapter

Extension	Picture	
C-mount Camera		Machine vision; Medical imaging; Semiconductor equipment; Test instruments; Document scanners; 2D barcode readers; Web camera and security video; Microscope imaging;
Microscope Camera	 XFCAMTOP4K HDMI+AMAXXX(23.2mm Adapter)  XFCAMTOP4K HDMI+FMAXXX(23.2mm Adapter)	

5.2.6 Sample Photos Captured with XFCAMTOP4K8MPA Camera

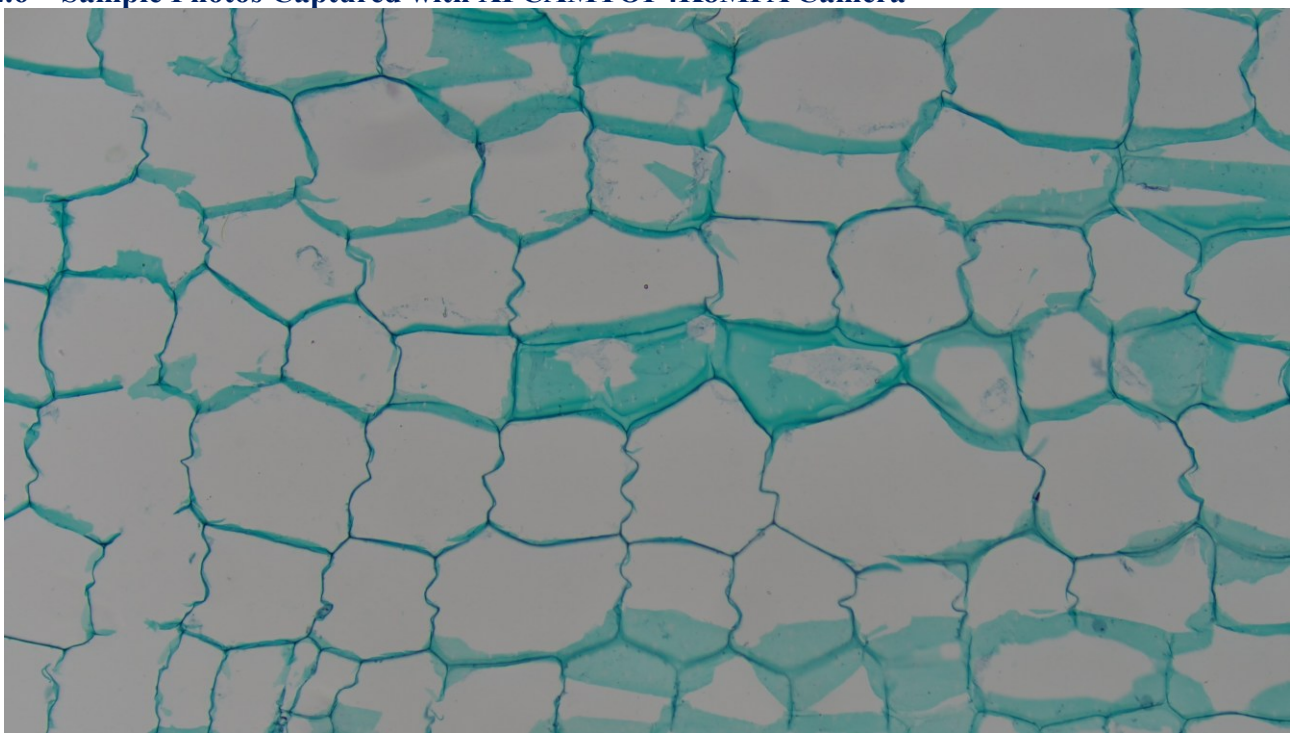


Figure 5-14 Cucurbit Stem.L.S. Captured with XFCAMTOP4K8MPA

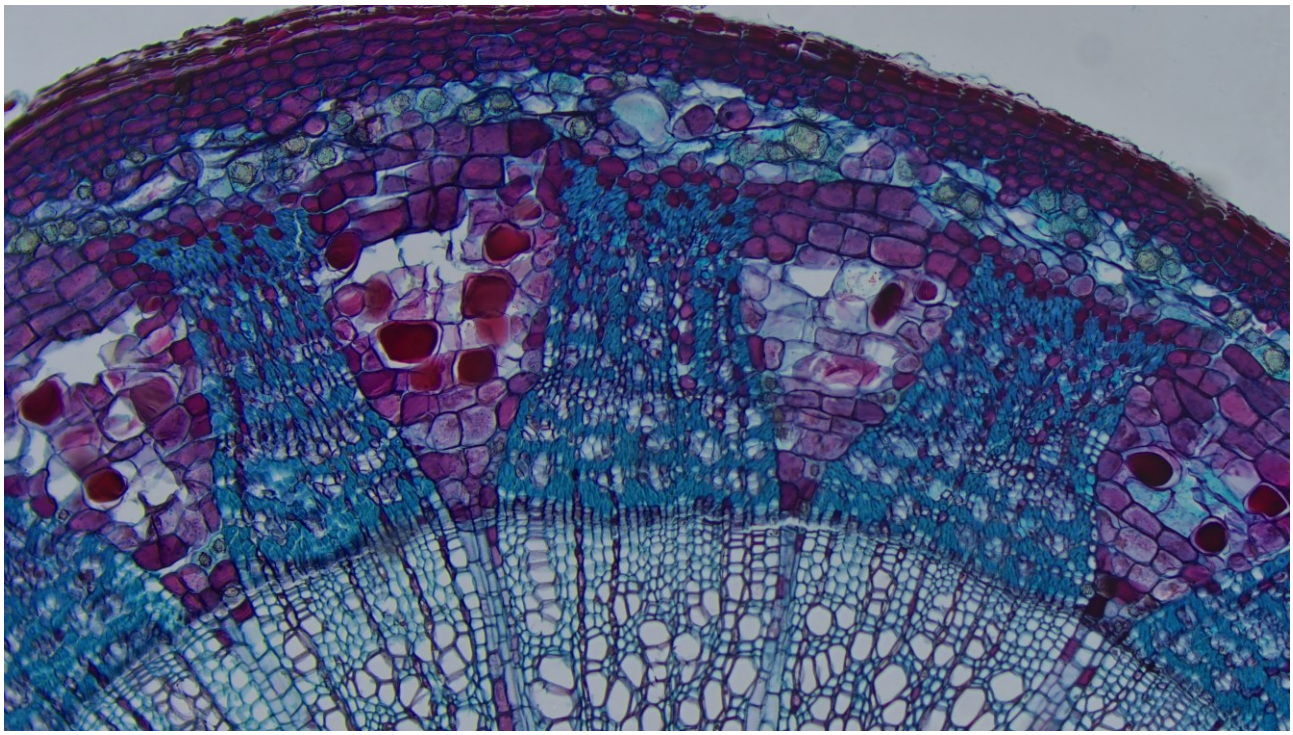


Figure 5-15 Two Year Tilia Stem.C.S. Captured with XFCAMTOP4K8MPA

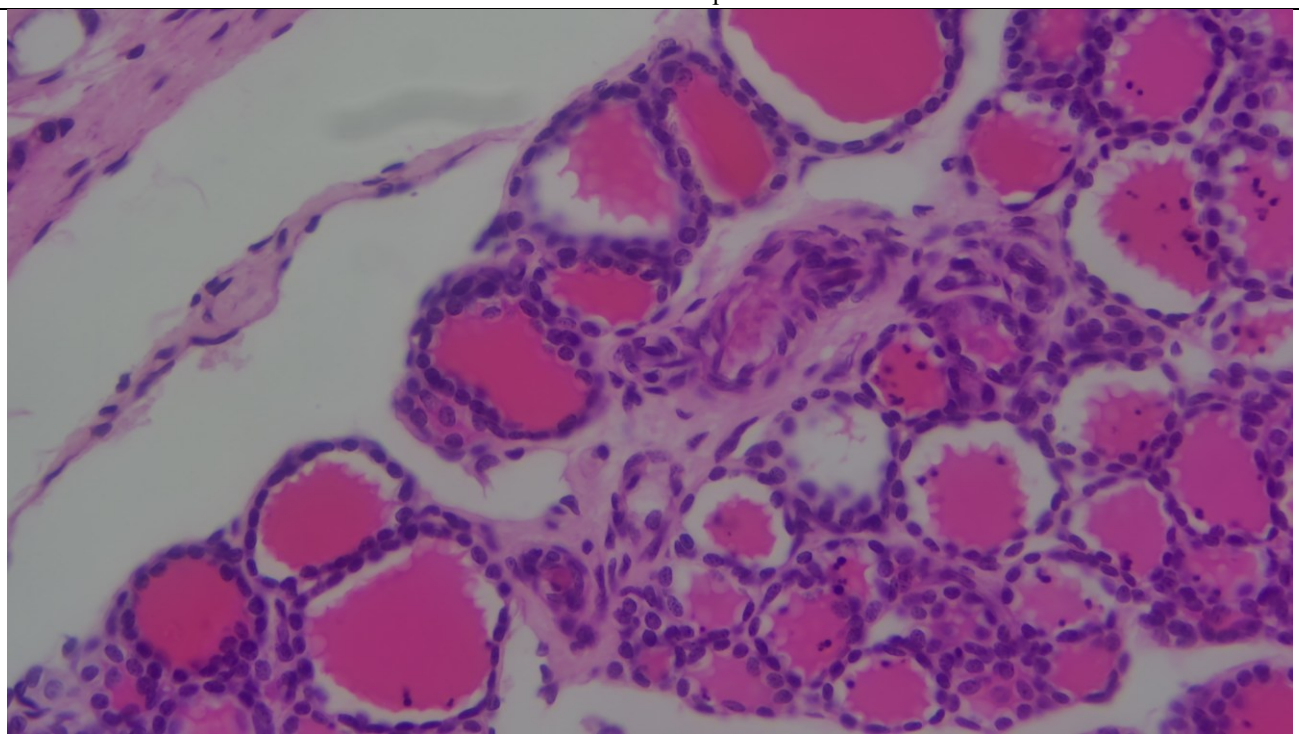


Figure 5-16 Simple Cuboidal Epithelium.Sec. Captured with XFCAMTOP4K8MPA

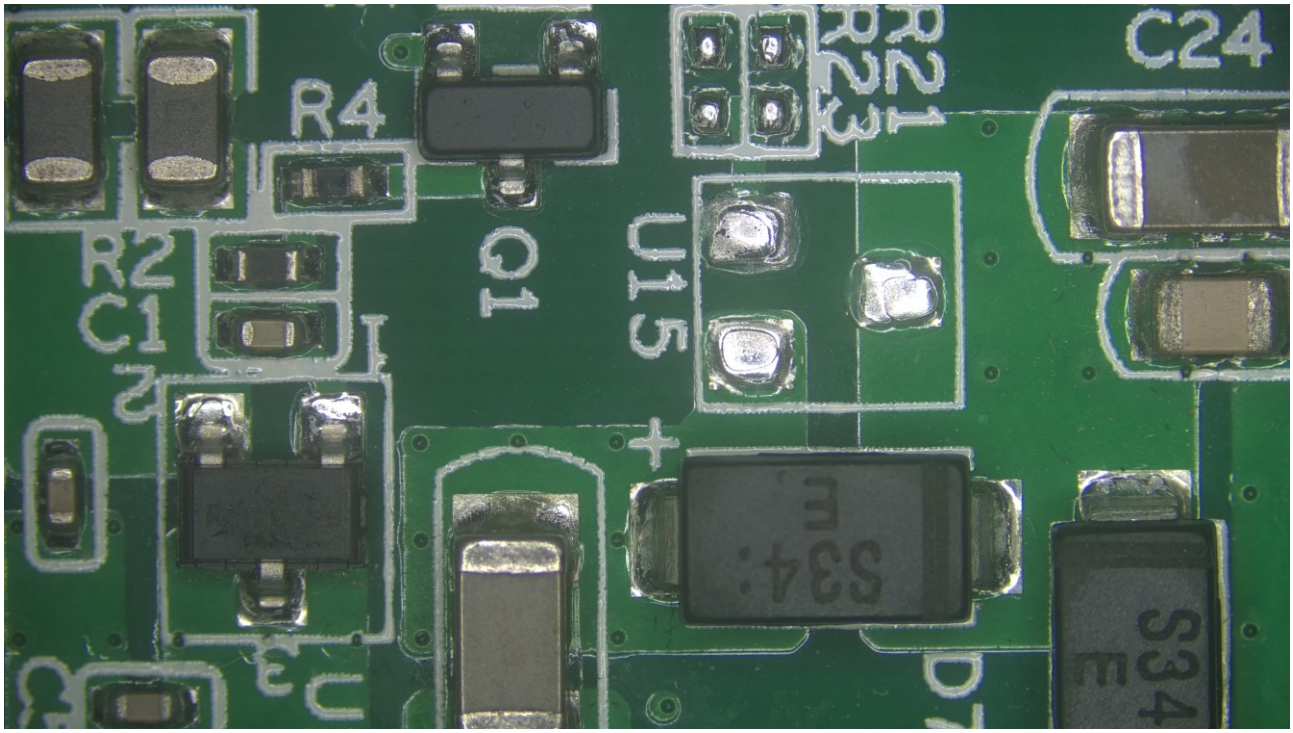


Figure 5-17 Circuit Board Captured with XFCAMTOP4K8MPA

5.3 XFCAMTOP_MINI Series

5.3.1 Introduction to XFCAMTOP_MINI Series

Figure 5-18 The XFCAMTOP_MINI Series Camera

XFCAMTOP_MINI series camera is a camera designed by ToupTek that includes multiple modes of output, where X in 'XFCAM' means a CMOS camera with multiple interfaces, and F means auto focus. It uses ultra-high-performance CMOS sensor. The camera can be directly connected to an HDMI display, or it can be connected to a computer via WiFi or USB, and the image and video can be saved in an USB flash drive for on-site analysis and subsequent research.

The XFCAMTOP_MINI series camera comes with the built-in auto focus system, which can realize auto focus on specific areas of the scene.

By inserting a WiFi module or connecting with a computer via a USB Type-C cable, the user can directly control the camera's hardware with the software ToupView or ToupLite. XFCAMTOP_MINI series camera can be used for tool field inspection, microscope observation, etc.

The basic characteristic is listed as below:

- Small and compact size, convenient for customers to integrate and use
- Auto Focus is fast and precise, with a maximum accuracy of 0.01mm, and the precision is available for configuration
- The AutoFocus area can be selected, and the area size can be configured
- Sony Starvis2 or Starvis back-illuminated CMOS sensor
- 4K/1080P multiple video outputs C-mount CMOS Camera
- 4K/1080P HDMI auto switching according to monitor resolution
- USB flash drive for captured image and video storage, support local preview and playback
- Embedded XCamView for the control of the camera and image processing, supporting automatic edge finding and measurement functions
- Supports USB Voice Control module, enabling real-time control of the camera through voice commands for snap, recording, freeze, and other operations
- Excellent ISP with local tone mapping and 3D denoising
- ToupView/ToupLite software for PC
- iOS/Android applications for smart phones or tablets

5.3.2 XFCAMTOP_MINI Camera Datasheet (2)

The main parameters of the XFCAMTOP_MINI camera sensor are shown in the table below:

Order Code	Sensor & Size(mm)	Pixel(μm)	G Sensitivity Dark Signal	FPS/Resolution	Binning	Exposure(us)
XFCAMTOP4K8MPC_MINI	Sony IMX678(C) 1/1.8"(7.68x4.32)	2.0x2.0	1364mv with 1/30s 0.15mv with 1/30s	30@3840*2160	1x1	0.04~1000
XFCAMTOP1080P2MPA_MINI	Sony IMX385(C) 1/2"(7.2x4.05)	3.75x3.75	1175mv with 1/30s 0.15mv with 1/30s	60@1920*1080	1x1	0.04~1000

Camera Model	Video Saving (FPS/Resolution)	HDMI1.4(FPS/Resolution)	USB2.0(FPS/Resolution)	WiFi(FPS/Resolution)
XFCAMTOP4K8MPC_MINI	30@3840*2160	30@3840*2160	30@3840*2160 30@2688*1512 30@1920*1080	30@3840*2160 30@1920*1080 30@1280*720
XFCAMTOP1080P2MPA_MINI	60@1920*1080	60@1920*1080	60@1920*1080	60@1920*1080 60@1280*720

Figure 5-19 Available Ports on the Back Panel of the Camera Body

Interface or Button	Function Description
USB2.0(2)	Connect USB mouse for easy operation with embedded XCamView software Connect USB flash drive to save pictures and videos Connect 5G WiFi module to transfer video wirelessly in real time Connect USB microphone to record audio and video Connect USB voice control for enable real-time control of camera snap, recording, freezing, and other operations
USB Video	Connect the USB Type C cable to the USB port of the computer to achieve video image output.
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
LED	LED status indicator
DC12V	Power adapter connection (12V/1A)
Video Output Interface	**Function Description**
HDMI Interface	Comply with HDMI1.4 standard 30fps@4K or 30fps@1080P(XFCAMTOP4K8MPC_MINI) 60fps@1080P(XFCAMTOP1080P2MPA_MINI)
WiFi Interface	Connecting 5G WiFi adapter (USB2.0 slot) in AP/STA mode
USB Video Interface	Connecting USB Type-C port of PC for video transfer MJPEG format video
Other Function	**Function Description**
Video Saving	Video format：8M (3840*2160) H264 encoded MP4 file (XFCAMTOP4K8MPC_MINI) 2M (1920*1080) H264 encoded MP4 file (XFCAMTOP1080P2MPA_MINI) Video saving frame rate:30fps (XFCAMTOP4K8MPC_MINI); 60fps（XFCAMTOP1080P2MPA_MINI）
Image Capture	8M (3840*2160 XFCAMTOP4K8MPC_MINI) JPEG/TIFF image in USB flash drive 2M (1920*1080 XFCAMTOP1080P2MPA_MINI) JPEG/TIFF image in USB flash drive
Measurement Saving	Measurement information saved in different layer with image content Measurement information is saved together with image content in burn in mode
ISP	Exposure(Automatic / Manual Exposure) / Gain， White Balance(Manual / Automatic / ROI Mode)， Sharpening，3D Denoise， Saturation Adjustment， Contrast Adjustment， Brightness Adjustment， Gamma Adjustment，Color to Gray， 50HZ/60HZ Anti-flicker Function
Video /Image Operation	Zoom In/Zoom Out (Up to 10X), Mirror/Flip, Color/Gray, Freeze, Cross Line, Overlay, Auto Focus, Compare (Comparison between real time video and images in SD card/ USB flash drive), Embedded Files Browser, Video Playback, Measurement Function
Embedded RTC(Optional)	To support accurate time on board
Restore Factory Settings	Restore camera parameters to its factory status
Multiple Language Support	English / Simplified Chinese / Traditional Chinese / Korean / Thailand / French / German / Japanese / Italian / Russian
Software Environment under WiFi/USB Video Output	
White Balance	Automatic/Manual/ROI
Color Technique	Ultra-Fine Color Engine

Capture/Control SDK	Windows/Linux/macOS/Android Multiple Platform SDK (Native C/C++, C#/VB.NET, Python, Java, DirectShow, Twain, etc)
Recording System	Still Picture or Movie
Operating System	Microsoft® Windows® XP / Vista / 7 / 8 / 8.1 /10(32 & 64 bit) OSx(Mac OS X) Linux
PC Requirements	CPU: Equal to Intel Core2 2.8GHz or Higher
	Memory: 4GB or More
	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

5.3.3 Dimension of XFCAMTOP_MINI Series

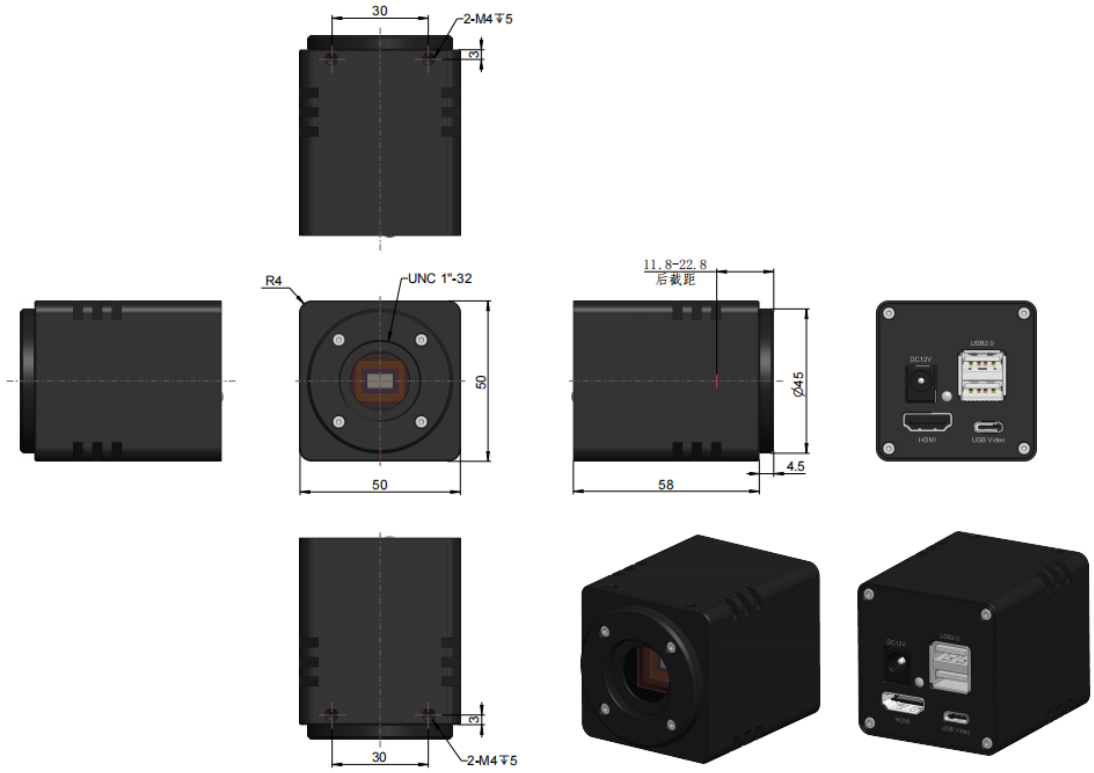


Figure 5-20 Dimension of XFCAMTOP4K_MINI Series

5.3.4 Packing Information for XFCAMTOP_MINI Series Camera

Figure 5-21 XFCAMTOP_MINI Series Camera Packing Information

Standard Packing List	
A	Gift box: L:16.3cm W:16.3cm H:7.4cm (1pcs, 1.48Kg/ box)
B	XFCAMTOP_MINI Camera
C	Power Adapter: Input: AC 100~240V 50Hz/60Hz, Output: DC 12V 1A **American standard**: Model: POWER-U-12V1A(MSA-C1000IC12.0-12W-US): UL/CE/FCC **European standard:** Model: POWER-E-12V1A(MSA-C10001C12.0-12W-DE): UL/CE/FCC EMI standard: FCC Part 15 Subpart B EMS standard: EN61000-4-2,3,4,5,6
D	USB Mouse
E	HDMI Cable
F	USB Type-C to Type-A data cable 1.5 meters
Optional Accessory	
G	USB flash drive
H	USB WiFi adapter (Shape will vary with different models)

5.3.5 The Software and App for XFCAMTOP_MINI Series Camera

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

Windows: https://www.touptekphotonics.com.cn/download/?dlID=0

macOS: https://www.touptekphotonics.com.cn/download/?dlID=1

Linux: https://www.touptekphotonics.com.cn/download/?dlID=2

Android: https://www.touptekphotonics.com.cn/download/?dlID=3

iOS: https://www.touptekphotonics.com.cn/download/?dlID=4

5.3.6 Sample Photos Captured with XFCAMTOP_MINI Camera

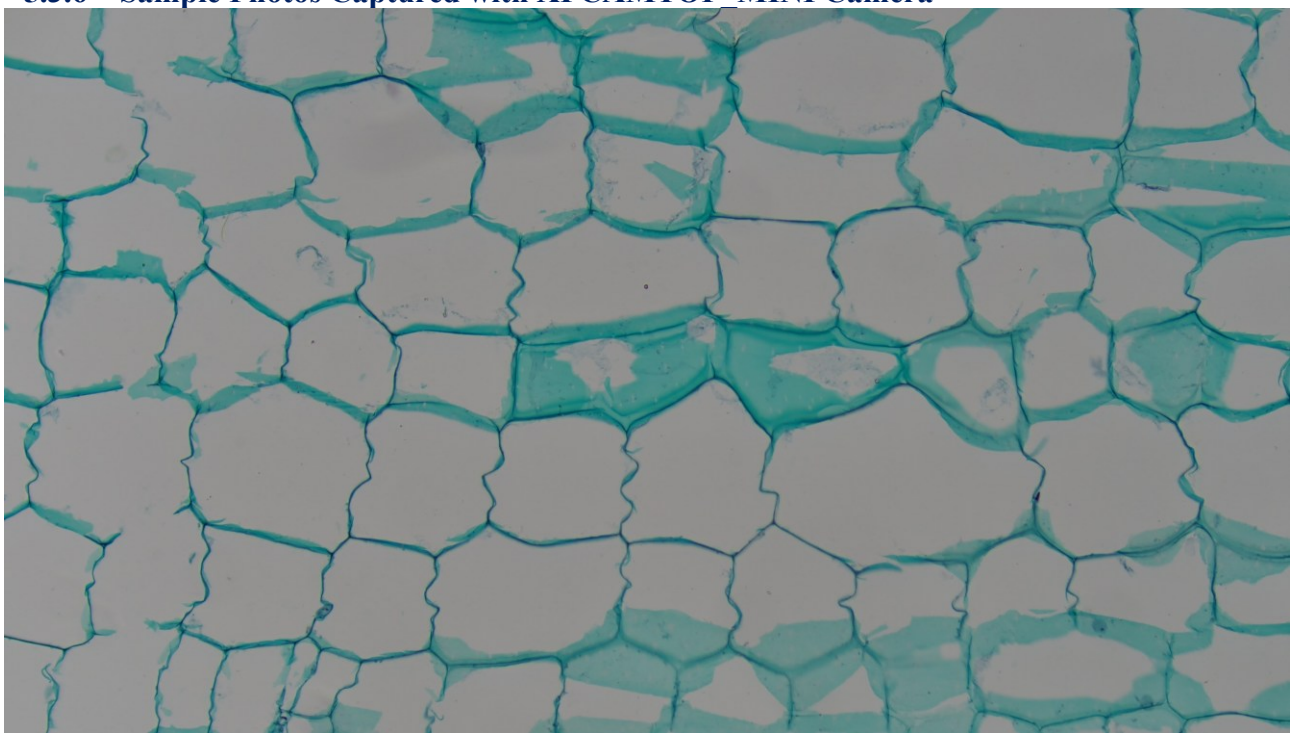


Figure 5-22 Cucurbit Stem.L.S. Captured with XFCAMTOP4K8MPC_MINI

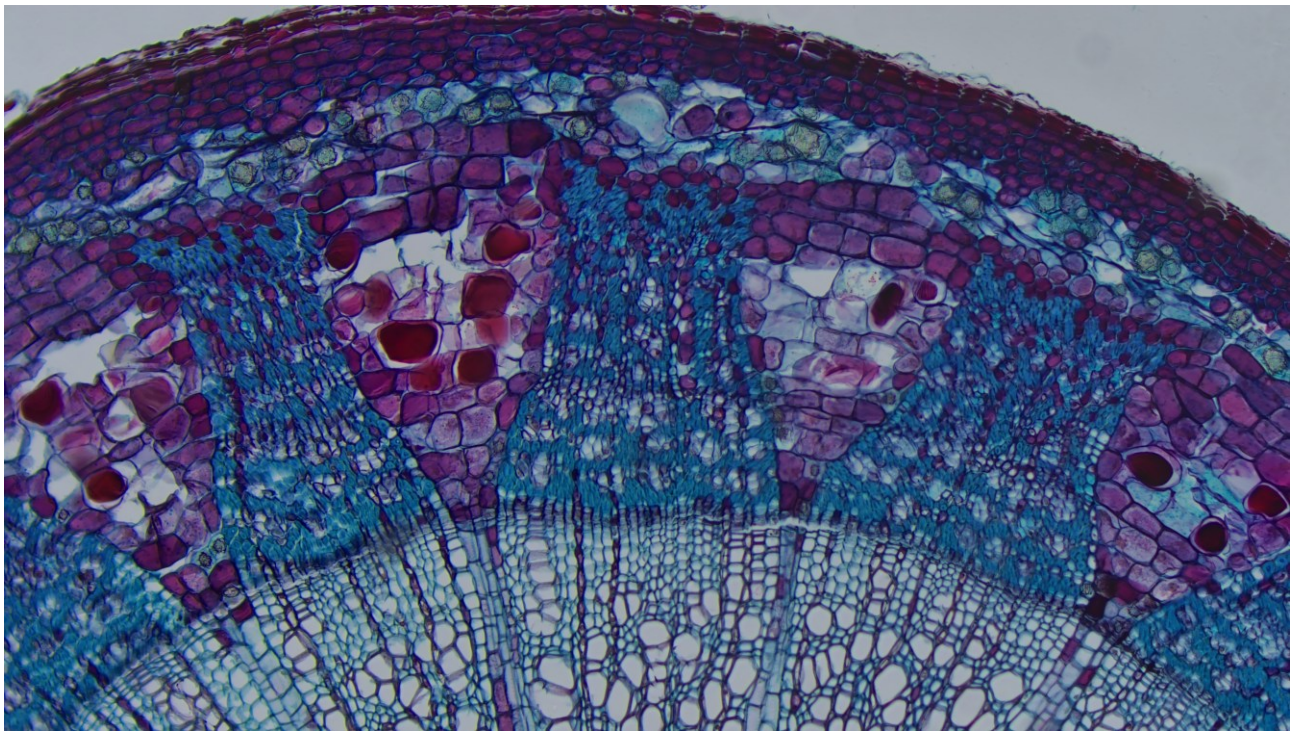


Figure 5-23 Two Year Tilia Stem.C.S. Captured with XFCAMTOP4K8MPC_MINI

Figure 5-24 Flower Captured with XFCAMTOP4K8MPC_MINI

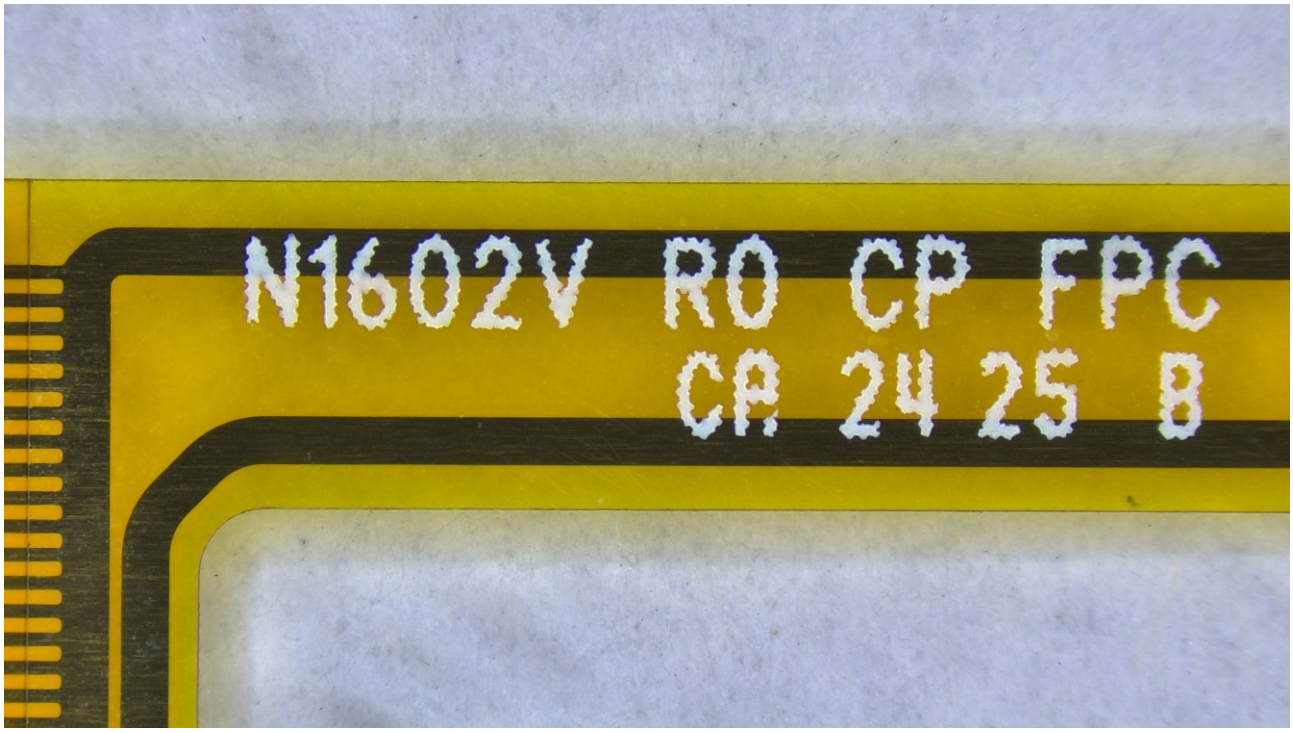


Figure 5-25 FPC Captured with XFCAMTOP4K8MPC_MINI

5.4 XFCAM1080PHX Series

5.4.1 Introduction to XFCAM1080PHB/PHD Series

XFCAM1080PHB/PHD 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.

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 ToupView. With ToupView, you can control the camera, process the image as ToupTek's other USB series camera.

In HDMI and WiFi outputs, 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.

Figure 5-26 The XFCAM1080PHB/PHD Camera

The XFCAM1080PHB/PHD's basic characteristic is as follows:

- All in 1 (HDMI+WiFi) C-mount camera with Sony high sensitivity CMOS sensor;
- 1920 × 1080 (1080P) video resolution;
- Record 1080P video (ASF format) into SD card;
- 5~2M resolution captured image (XFCAM1080PHB/PHD);
- HDMI/WiFi output simultaneously;
- Auto/Manual focus with the movement of the sensor;
- For HDMI output, XCamView is used to control the camera;
- For WiFi output, ToupView/ToupLite is used to control the camera;
- Ultra-Fine Color Engine with perfect color reproduction capability (WiFi);
- With advanced video & image processing application ToupView/ToupLite;
- Windows/Linux/macOS/Android multi-platform SDK;
- CNC Camera housing;

The possible applications of XFCAM1080PHB/PHD are 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);

5.4.2 XFCAM1080PHB/PHD Datasheet (2)

Order Code	Sensor & Size(mm)	Pixel(μm)	G Sensitivity Dark Signal	FPS/Resolution	Binning	Exposure(us)
XFCAM1080PHB XF1080B	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@1920*1080(WiFi)	1x1	0.03ms~918ms
XFCAM1080PHD XF1080D	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@/1920*1080(WiFi)	1x1	0.06ms~918ms

C: Color; M: Monochrome;

Figure 5-27 The XFCAM1080PHB/PHD Camera

Interface & Button Functions	
USB	USB Mouse/USB WiFi Adapter
HDMI	HDMI Output
DC12V	12V/1A Power in
SD	SD Card Slot
LED	Power Indicator Power
ON/OFF	On/off Switch
Other Specification for HDMI Output	
UI Operation	With USB Mouse to operate on the embedded XCamView
Image Capture	JPEG Format with 5M or 2M Resolution in SD Card (XFCAM1080PHB/PHD)
Video Record	ASF Format 1080P 30fps in SD Card(8G)
Camera Control Panel	Including Exposure, Gain, White Balance, Color Adjustment, Sharpness and Denoising Control
Auto-focus Control Panel	Including Auto-focus, Manual Focus, One Push AF and Conjugate Correction Functions
Toolbar	Including Zoom, Mirror, Comparison, Freeze, Cross, WDR, Auto-focus, Browser Function, Setting, Muti-language and XCamView Version Information
Other Specification for WiFi Output	
UI Operation	ToupView or ToupLite 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 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 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

5.4.3 XFCAM1080PHB/PHD and Microscope

Figure 5-28 XFCAM1080PHB/PHD and Its Back Panel

Figure 5-29 Different Views of XFCAM1080PHB/PHD

Figure 5-30 XFCAM1080PHB/PHD and Microscope

5.4.4 Dimension of XFCAM1080PHB/PHD Series Camera

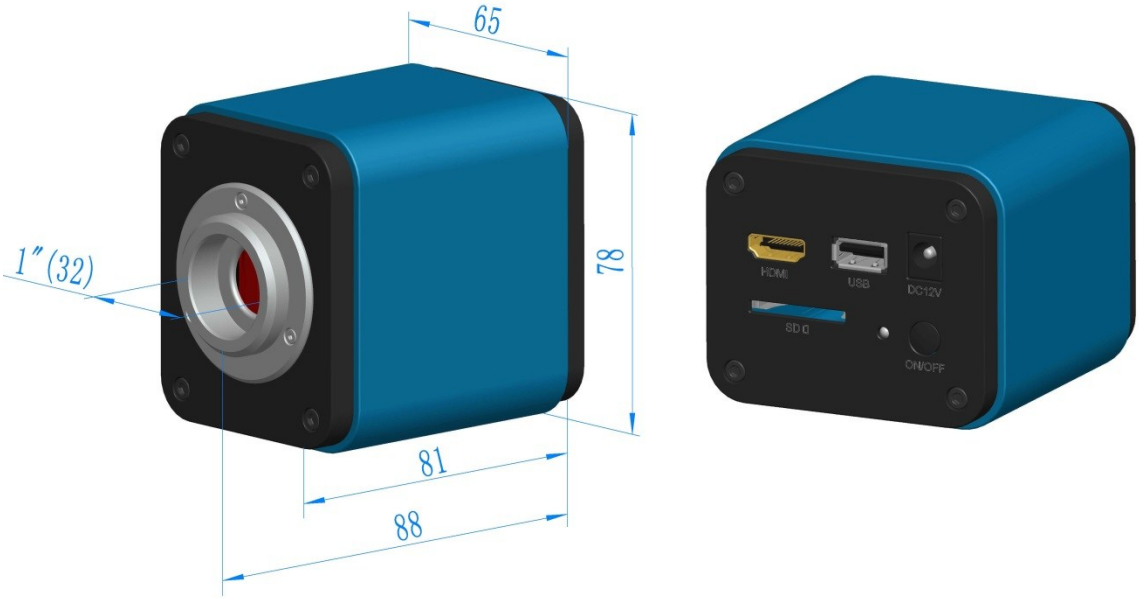


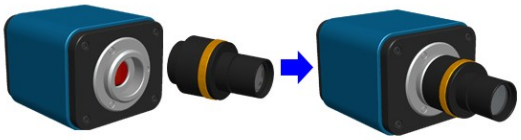
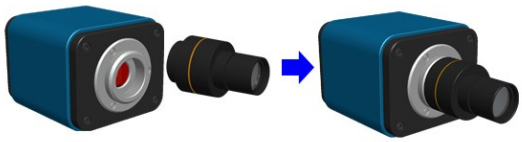
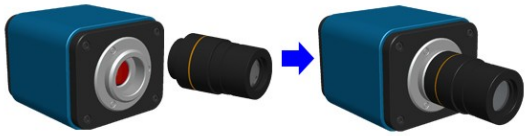
Figure 5-31 Dimension of XFCAM1080PHB/PHD Series Camera

5.4.5 Packing Information for XFCAM1080PHB/PHD

Figure 5-32 Packing Information of XFCAM1080PHB/PHD

Standard Packing List			
A	Gift box : L:25.5cm W:17.0cm H:9.0cm (1pcs, 1.43Kg/ box)		
B	XFCAM1080PHB/PHD		
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 (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), ToupTek 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)		

5.4.6 Extension of XFCAM1080PHB/PHD with Microscope or Telescope Adapter

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

6 ToupTek®-- Contact Information

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

7 Microscopic Web

7.1 Microscopic Web

Chinese: https://www.touptekphotonics.com.cn
English: https://www.touptek.com
English: https://www.touptekphotonics.com

7.2 Astronomy Web

Chinese: https://www.touptek-astro.com.cn
Chinese: https://www.touptek-astro.cn
English: https://www.touptek-astro.com

7.3 Astronomy independent station/shop

English: https://www.touptekastro.com