

1 CC-SMART-4K-AF's Basic Characteristic

CC-SMART-4K-AF SmartCam includes multiple modes of output (HDMI+Wi-Fi+USB). It uses ultra-high-performance Sony IMX334(C) 1/1.8"(7.68x4.32). The camera can be directly connected to an HDMI display, or it can be connected to a computer via Wi-Fi or USB, and the image and video can be saved to an SD card or USB flash drive for on-site upload and review.

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

The CC-SMART-4K-AF camera comes with the built-in auto focus system, which can realize auto focus on specific areas of the scene.

- Auto/Manual focus with the movement of the sensor
- Sony Exmor/STARVIS back-illuminated CMOS sensor
- 4K HDMI/USB/LAN/Wi-Fi 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
- Embedded XCamView for the control of the camera and image processing
- Windows 10 Camera App support
- X-View 1000 software for PC
- iOS/Android applications for smart phones or tablets

1.1 CC-SMART-4K-AF Datasheet

Order Code	Sensor & Size(mm)	Pixel(μm)	G Sensitivity	FPS/Resolution	Binning	Exposure (ms)
CC-SMART-4K-AF	Sony IMX334(C) 1/1.8"(7.68x4.32)	2.0x2.0	505mv with 1/30s 0.1mv with 1/30s	60@3840*2160(HDMI) 30@3840*2160(NETWORK) 30@3840*2160(USB)	1x1	0.04~2000

1.2 CC-SMART-4K-AF Interface and Other Function

Interface & Button Functions		
	ON/OFF	Power switch
	SD	Comply with SDIO3.0 standard and SD card could be inserted for video and images saving
	LED	LED status indicator
	DC12V	Power adapter connection (12V/1A)
	USB Mouse	USB Mouse for control of XCamView software
	USB3.0	Connect USB flash drive to save picture and video(Host Mode) Connect 5G WLAN module to transfer video wirelessly in real time(AP/STA, Host Mode) Connect the computer to transfer video image(Device Mode)
	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
Other Specification for HDMI Output		
UI Operation	With USB Mouse to operate on the embedded XCamView	
Image Capture	JPEG Format with 8M(3840*2160) Resolution in SD Card	
Video Record	Video format: 8M (3840*2160) video file encoded by MP4 and H264 Storage frame rate: 50~60fps (related to SD card speed grade and image resolution)	



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Camera Control Panel	Including focus, exposure, gain, white balance (automatic, manual, ROI), color adjustment, sharpness and 3D noise reduction control
Toolbar	Including Zoom, Mirror, Comparison, Freeze, Cross, Browser Function, Multi-language and XCamView Version Information
Other Specification for Wi-Fi /USB3.0 Output	
UI Operation	ToupView or ToupLite on Windows/Linux/OSX/Android Platform
Wi-Fi Performance	Frequency: 2.4G Bandwidth: 20M Protocol: 802.11n Highest rate: 150Mbps RF Power 20dBm(Maximum)
	Frequency: 5G Bandwidth: 40M Protocol: 802.11ac Highest rate: 400Mbps RF Power 20dBm(Maximum)
USB3.0 Performance	5Gbps
Maximum Connected Devices	WiFi:1~3 (According to the Environment and Connection Distance)/USB: 1
White Balance	Automatic/manual/ROI
Recording System	Still Picture or Movie
Software Environment	
PC Operating System	Microsoft® Windows® XP /Vista /7/8/8.1(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
	Display:19" or Larger
	CD-ROM
Operating Environment	
Operating Temperature(Celsius)	-10~ 50
Storage Temperature(Celsius)	-20~ 60
Operating Humidity	30~80%RH
Storage Humidity	10~60%RH
Power Supply	DC 12V/2A Adapter
Size	
Length x Width x Height	78 mm (3.07") x 70 mm (2.76") x 92mm (3.62")
Weight	0.47 kg (1.0lbs)

Dimension of CC-SMART-4K-AF

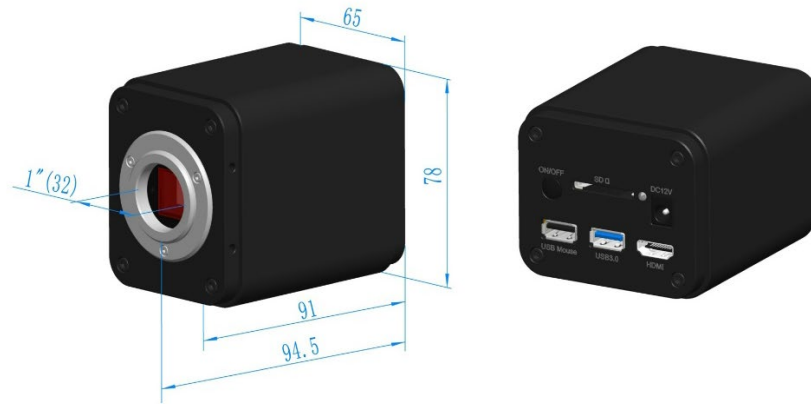


Figure 4-1 Dimension of CC-SMART-4K-AF

1.1 Camera Working Standalone with Built-in XCamView Software

For this application, apart from the microscope, the user only needs an [XCAMLITE4K](#) series camera, an HDMI display, an HDMI cable, an SD card, a USB mouse and a power adapter that come with the camera. The steps to start the camera are listed as below:

- Connect the camera to a HDMI display using the HDMI cable;
- Insert the supplied USB mouse to the camera's USB port;
- Insert the supplied SD card into the [XCAMLITE4K](#) series camera SD card slot;
- Connect power adapter to the camera and switch it on.;
- Switch on the display and view the video in the [XCamView](#) software. Move the mouse to the left, top or bottom of the [XCamView](#) UI, different control panel or UI will pop up and users could operate with the mouse at ease.

1.2 Connecting camera to the PC with USB port

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

For macOS and Linux user (macOS 10.10 or above or Linux distributions with kernel 2.6.27 or higher), please use [ToupLite](#).

The steps to start the camera are listed below:

- Install the [ToupView/ToupLite](#) on your PC;
- Connect power adapter to the camera and switch it on. After starting the camera, plug one end of the USB cable into the USB 2.0 port of the [XCAMLITE4K](#) series camera, and plug the other end into the USB port of the PC;
- Open [ToupView/ToupLite](#) software. The [XCAMLITE4K](#) series camera will be recognized automatically by software. In [ToupView/ToupLite](#) software, select the corresponding [XCAMLITE4K](#) series camera by clicking the camera name in the camera list.

Note:

When the USB cable and the mouse are plugged into the camera at the same time, the USB cable is preferred and the mouse is not available; when the USB cable is unplugged, the mouse can be used normally.

2 Brief Introduction of XCAMLITE4K Series Camera's UI and Its Functions

2.1 XCamView UI

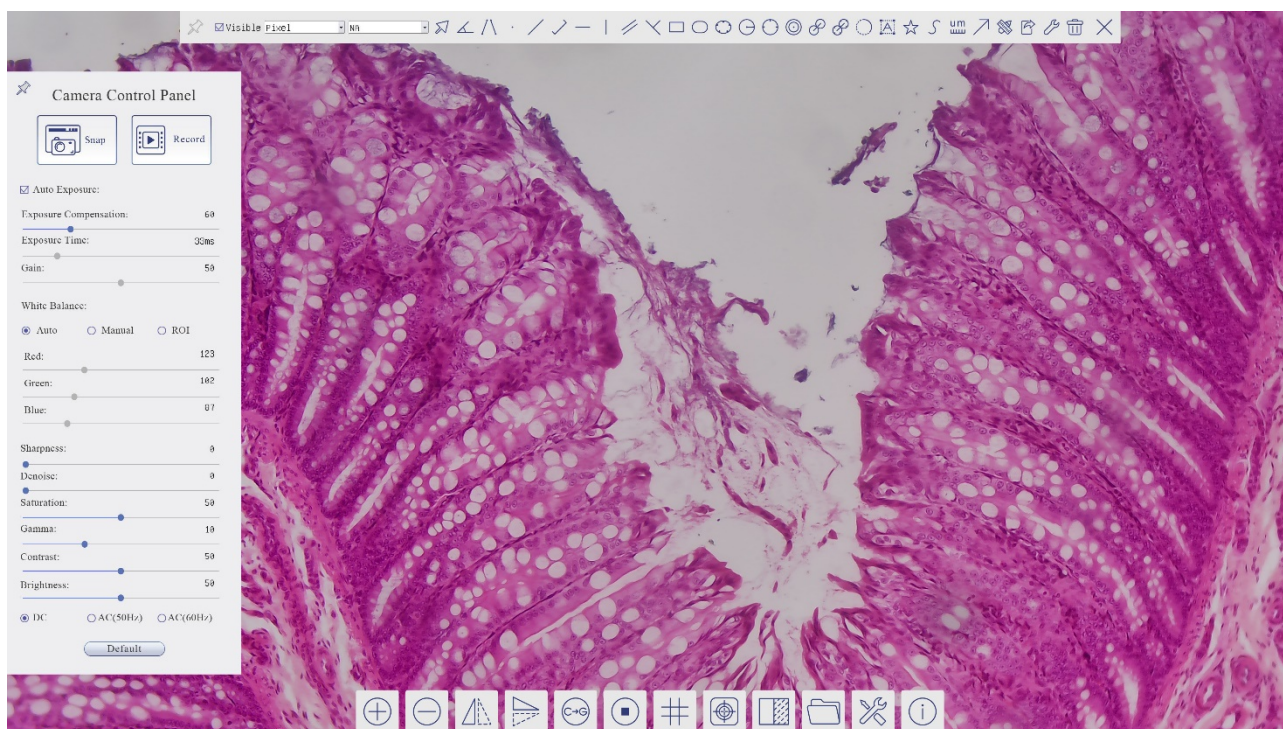
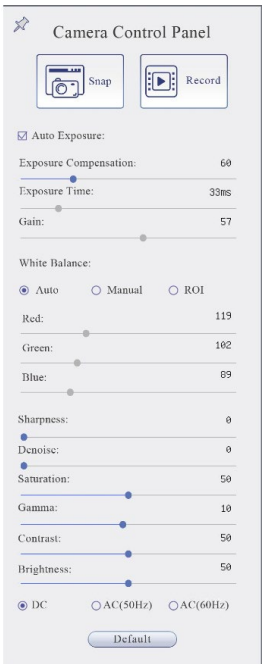


Figure 8-1 The XCAMLITE4K Series Camera Control GUI

Notes	
1	To show the Camera Control Panel , move your mouse to the left of the video window. See Sec.0 for details.
2	Move the mouse cursor to the top of the video window, a Measurement Toolbar will pop up for calibration and measurement operations. When user left-clicks the Float/Fixed button  on the Measurement Toolbar , the Measurement Toolbar will be fixed. In this case the Camera Control Panel will not pop up automatically even if users move mouse cursor to left side of the video window. Only when user left-clicks the  button on the Measurement Toolbar to exit from measuring operations will they be able to do other operations on the Camera Control Panel , or the Synthesis Camera Control Toolbar . During the measuring operations, when a specific measuring object is selected, an Object Location & Attributes Control Bar  will appear for changing location and properties of the selected object. See Sec.8.4 for details.
3	When users move mouse cursor to the bottom of the video window, the Synthesis Camera Control Toolbar will pop up automatically.  . See Sec.0 for details.

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

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

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

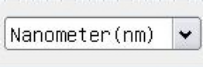
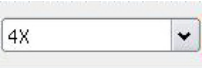
2.3 The Measurement Toolbar on Top of the Video Window

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



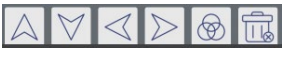
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Icon	Function
	Float/ Fix switch of the Measurement Toolbar
☒ Visible	Show / Hide Measurement Objects
	Select the desired Measurement Unit
	Select Magnification (File name) for measurement after Calibration
	Object Select
	Angle
	4 Points Angle
	Point
	Arbitrary Line
	3 Points Line
	Horizontal Line
	Vertical Line
	3 Points Vertical Line
	Parallel
	Rectangle
	Ellipse
	5 Points Ellipse
	Circle
	3 Points Circle
	Annulus
	Two Circles and its Center Distance

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	3 Points Two Circles and its Center Distance
	Arc
	Text
	Polygon
	Curve
	Scale Bar
	Arrow
	Place calibration standard (Target) under optics. Click icon to begin FOV calibration. When the linear calibration tool appears on the screen line edges up to calibration standard. In calibration menu double click the “magnification” window and enter file name or magnification currently selected on lens. Next select unit of measure of the calibration standard being used. In “unit” window double click and enter the value of calibration standard being used. Click okay and calibration for that file is complete.
	Export the Measurement information to CSV file(*.csv)
	Measurement Setup
	Delete all the measurement objects from
	Exit from Measurement mode
	When the measurement ends, left-click on a single measuring object and the Object Location & Properties Control Bar will show up. User could move the object by dragging the object with the mouse. But more accurate movement could be done with the control bar. The icons on the control bar mean Move Left, Move Right, Move Up, Move Down, Color Adjustment and Delete.

Note:

- 1) When user left-clicks Display/Hide button  on the Measurement Toolbar, the Measurement Toolbar will be fixed. In this case the Camera Control Panel will not pop up automatically even if moving the mouse cursor to the left edge of the video window. Only when user left-click the  button on the Measurement Toolbar to exit from the measurement mode will they be able to doing other operations with the Camera Control Panel or the Synthesis Camera Control Toolbar.
- 2) When a specific Measurement Object is selected during the measurement operation, the Object Location & Attributes Control Bar  will appear for changing the object location and properties of the selected objects.

2.4 Icons and Functions of the Synthesis Camera Control Toolbar at the Bottom of the Video Window



Icon	Function	Icon	Function
	Zoom In the video Window		Zoom Out the video Window
	Horizontal Flip		Vertical Flip
	Color/Gray		Video Freeze
	Display Cross Line		Overlay
	Compare Image with the current video		Browse Images and Videos in the SD Card
	Settings		Check the Version of XCamView

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

3 Setting>Measurement

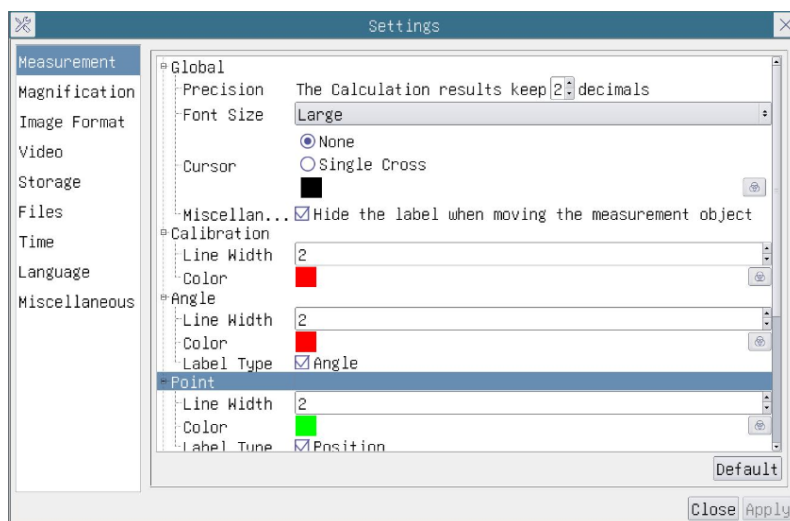


Figure 8-2 The Measurement Setup

Global	Precision	Used to set the number of digits after the decimal point of the measurement result
Calibration	Line Width	Used for defining width of the lines for Calibration;
	Color	Used for defining color of the lines for Calibration;
	EndPoint	Type: Used for defining shape of the Endpoint of lines for calibration: Null means no Endpoint, rectangle means rectangle type of Endpoint. It makes alignment more easily;
Point, Angle, Line, Horizontal Line, Vertical Line, Rectangle, Circle, Ellipse, Annulus, Two Circles, Polygon, Curve		
	Left-click the along with the Measurement command mentioned above will unfold the corresponding attribute settings to set the individual property of the Measurement Objects.	

4 Setting>Magnification

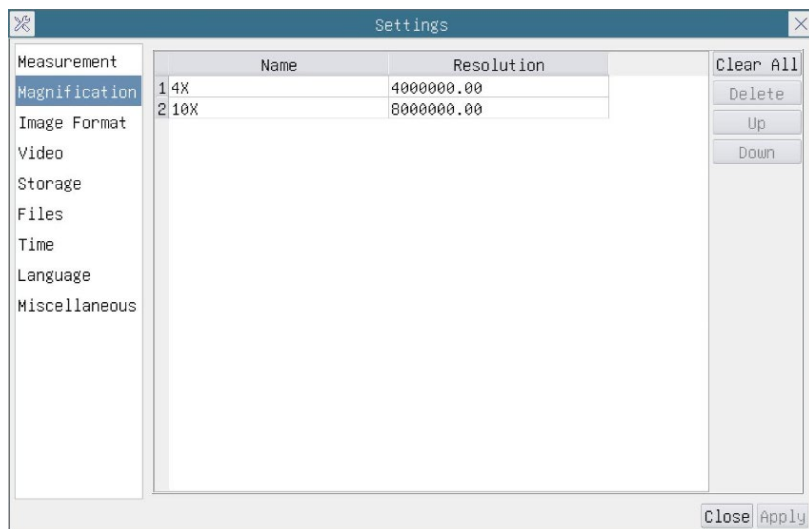


Figure 8-3 Comprehensive Magnification Calibration Settings Page

Name	The name of the Magnification , usually the Magnification of the objective of the microscope is used as the Magnification name when calibration, such as 4X , 10X , 100X , etc. Besides, other user-defined information could be added into the Magnification name too, for example, microscope model, operator name, etc.
Resolution	Pixels per meter. Image devices like microscopes with higher magnifications have higher resolution values. The higher the mag the higher the pixels per meter.
Clear All	Click the Clear All button will clear the calibrated Magnification ;
Delete	Click Delete to delete the selected Magnification ;
Up	Click Move Up to move up the selected Magnification ;
Down	Click Move Down to move the selected Magnification down;

5 Settings>Image Format

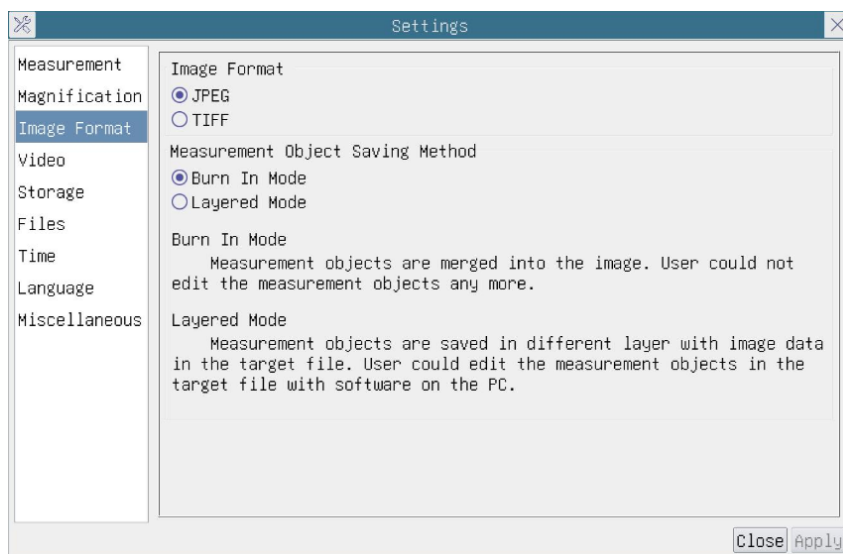


Figure 8-4 Comprehensive Image Format Settings Page

Image Format	JPEG : The extension of JPEG file can get very high compression rate and display very rich and vivid images by removing redundant images and color data. In other words, it can get better image quality with the least disk space. If Measurement Objects are available, the
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	Measurement Objects will be burned into the image and the Measurement Objects cannot be edited. TIFF: Tag Image File Format(TIFF) is a flexible bitmap format that is mainly used to store images including photos and artistic images.
Measurement Object Save Method	Burn in Mode: The Measurement Objects are merged into the current image. User could not edit the Measurement Objects anymore. This mode is not reversible. Layered Mode: The Measurement Objects are saved in different layer with current image data in the target file. User could edit the Measurement Objects in the target file with some software on the PC. This mode is reversible.

6 Settings>Video

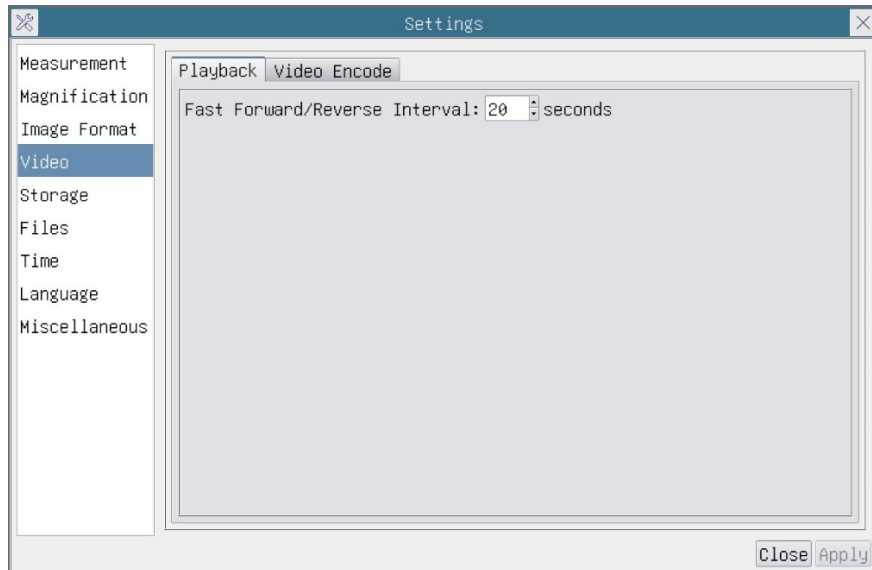


Figure 8-5 Comprehensive Setting of Video Settings Page-Playback

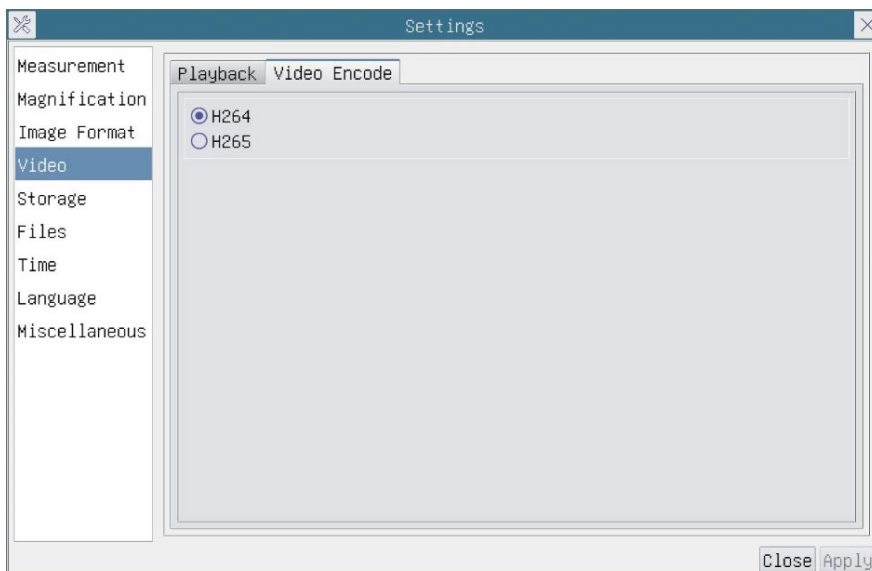


Figure 8-6 Comprehensive Setting of Video Settings Page-Video Encode

Fast Forward/Reverse Interval	The time interval of the playback of video files.
Video Encode	You can choose H264 or H265 encoding. H265 encoding can significantly reduce encoding bandwidth and save storage space under the same encoding quality;

7 Setting>Storage



Figure 8-7 Comprehensive Setting of SD Card Setting Page

Storage Device	SD Card: SD Card is only supported as the storage device.
File System Format of the Storage Device	List the file system format of the current storage device FAT32: The file system of SD Card is FAT32. The maximum video file size of single file is 4G Bytes; exFat: The file system of SD Card is exFat. The maximum video file size of single file is 4G Bytes; NTFS: The file system of SD Card is NTFS. The maximum video file size of single file is 4G Bytes. Use PC to format the SD Card and switch between FAT32, exFat and NTFS. Unknown Status: SD Card not detected or the file system is not identified;

8 Setting>Files

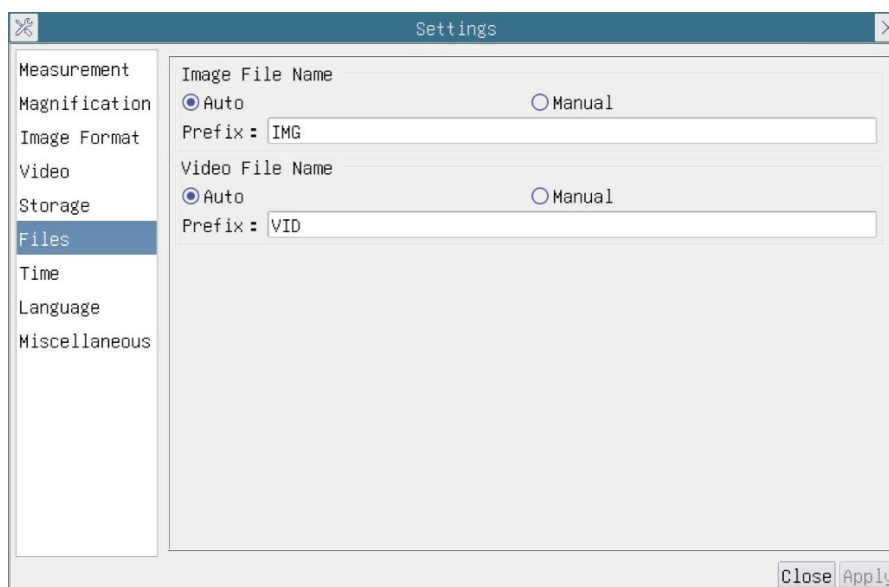


Figure 8-8 Comprehensive Setting of Files Settings Page

Image File Name	Auto: The image files will be saved automatically with the specified prefix. Manual: Users has to specify the file name before image saving.
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Video File Name	Auto: The video file will be saved automatically with the specified prefix. Manual: Users has to specify the Video File Name before video recording.
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9 Setting>Time

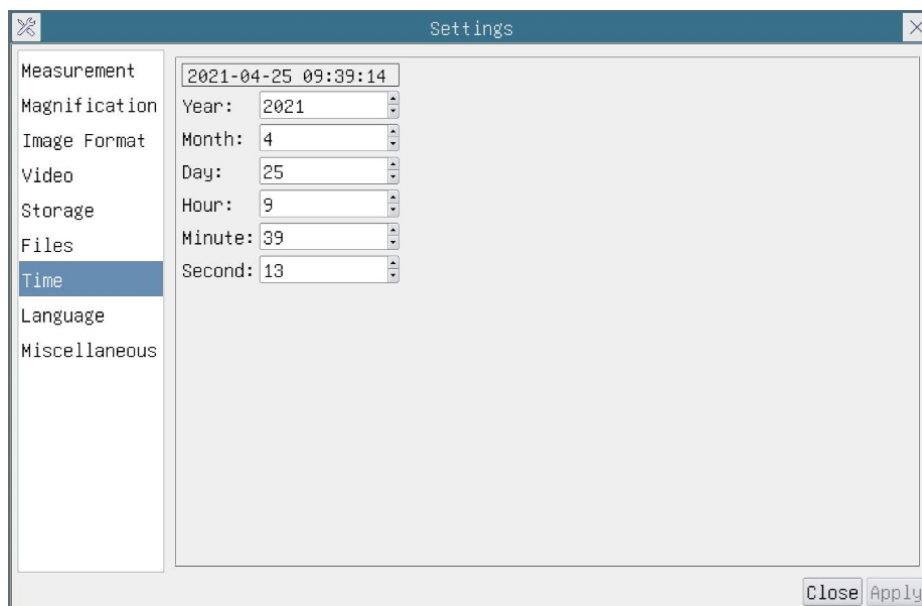


Figure 8-9 Time Setting

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

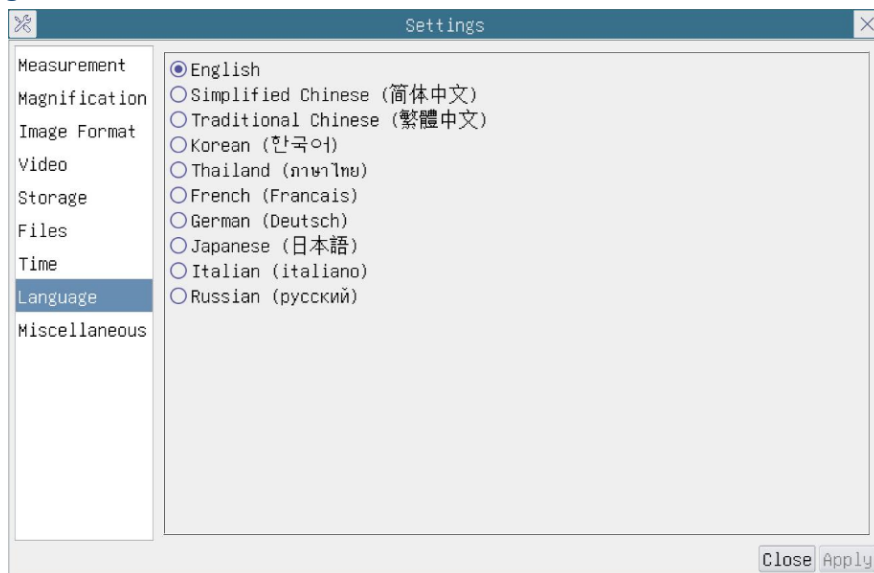


Figure 8-10 Comprehensive Setting of Language Selection Setting Page

English	Set language of the whole software into English ;
Simplified Chinese	Set language of the whole software into Simplified Chinese ;
Traditional Chinese	Set language of the whole software into Traditional Chinese ;
Korean	Set language of the whole software into Korean ;
Thailand	Set language of the whole software into Thailand ;
French	Set language of the whole software into French ;

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German	Set language of the whole software into German ;
Japanese	Set language of the whole software into Japanese ;
Italian	Set language of the whole software into Italian ;
Russian	Set language of the whole software into Russian ;

11 Comprehensive Miscellaneous Settings Page

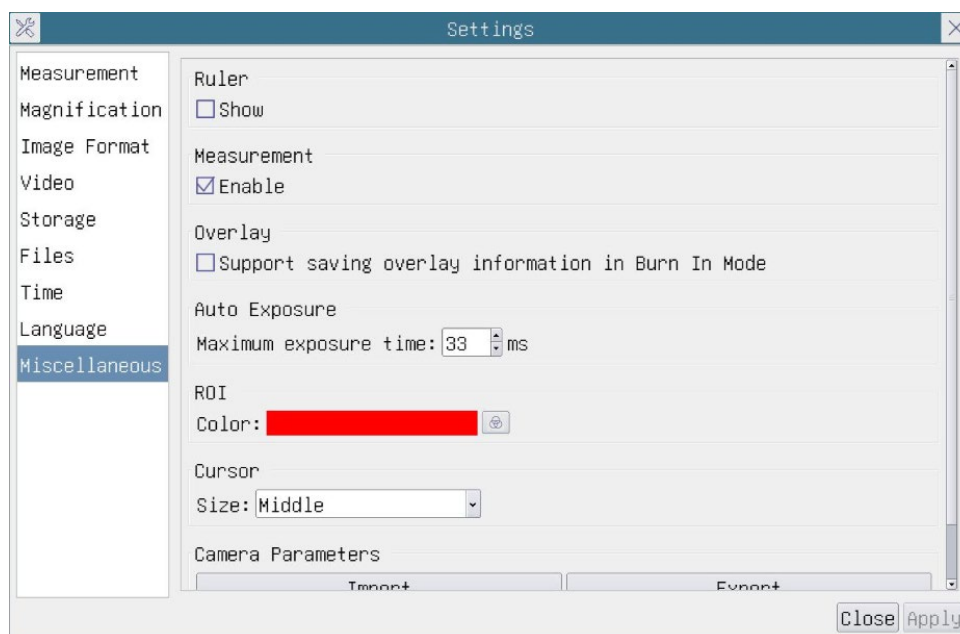


Figure 8-11 Comprehensive Miscellaneous Settings Page

Ruler	Select to display the Ruler in the video window, or not to display the Ruler ;
Measurement	Select to display the Measurement toolbar in the video window, otherwise, the Measurement toolbar will not be displayed;
Overlay	Select to support saving graphics Overlay information in fusion mode, and not to save graphics Overlay information in fusion mode;
Auto Exposure	The maximum exposure time during auto exposure process could be specified. Setting this item to a lower value could guarantee a faster frame rate during Auto Exposure ;
ROI Color	Choosing the ROI rectangle line color ;
Camera Parameters Import	Import the Camera Parameters from the SD card to use the previously exported Camera Parameters ;
Camera Parameters Export	Export the Camera Parameters to the SD card to use the previously exported Camera Parameters ;
Reset to factory defaults	Restore camera parameters to its factory status;