

Hikrobot Co., Ltd.

HDMI Microscope Camera

User Manual

HIKROBOT

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Symbol Conventions

The symbols that may be found in this document are defined as follows.

Symbol	Description
 Danger	Indicates a hazard with a high level of risk, which if not avoided, will result in death or serious injury.
 Caution	Indicates a potentially hazardous situation which, if not avoided, could result in equipment damage, data loss, performance degradation, or unexpected results.
 Note	Provides additional information to emphasize or supplement important points of the main text.

Available Model

This manual is applicable to the HDMI microscope camera.

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Chapter 1 Safety Instruction

The safety instructions are intended to ensure that the user can use the device correctly to avoid danger or property loss. Read and follow these safety instructions before installing, operating and maintaining the device.

1.1 Safety Claim

- To ensure personal and device safety, when installing, operating, and maintaining the device, follow the signs on the device and all safety instructions described in the manual.
- The note, caution and danger items in the manual do not represent all the safety instructions that should be observed, but only serve as a supplement to all the safety instructions.
- The device should be used in an environment that meets the design specifications, otherwise it may cause malfunctions, and malfunctions or component damage caused by non-compliance with relevant regulations are not within the scope of the device's quality assurance.
- Our company will not bear any legal responsibility for personal safety accidents and property losses caused by abnormal operation of the device.

1.2 Safety Instruction

Caution:

- Do not install the device if it is found that the device and accessories are damaged, rusted, water ingress, model mismatch, missing parts, etc., when unpacking.
- Avoid storage and transportation in places such as water splashing and rain, direct sunlight, strong electric fields, strong magnetic fields, and strong vibrations.
- Avoid dropping, smashing or vigorously vibrating the device and its components.
- It is forbidden to install the indoor device in an environment where it may be exposed to water or other liquids. If the device is damp, it may cause fire and electric shock hazard.
- Place the device in a place out of direct sunlight and ventilation, away from heat sources such as heaters and radiators.
- In the use of the device, you must be in strict compliance with the electrical safety regulations of the nation and region.
- Use the power adapter provided by the official manufacturer. The power adapter must meet the Limited Power Source (LPS) requirements. For specific requirements, please refer to the device's technical specifications.
- It is strictly forbidden to wire, maintain, and disassemble the device is powered on. Otherwise, there is a danger of electric shock.

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- Before powering on the device, please confirm that the device is installed in good condition, the wiring is firm, and the power supply meets the requirements.
- If the device emits smoke, odor or noise, please turn off the power and unplug the power cord immediately, and contact the dealer or service center in time.
- It is strictly forbidden to touch any terminal of the device when operating it. Otherwise there is a danger of electric shock.
- It is strictly forbidden for non-professional technicians to detect signals during device operation, otherwise it may cause personal injury or device damage.
- It is strictly forbidden to maintain the device is powered on, otherwise there is a danger of electric shock.
- Avoid aiming the lens at strong light (such as lighting, sunlight, or laser beams, etc.), otherwise the image sensor will be damaged.
- If it is necessary to clean the device, use a damp paper towel or a soft clean cloth to moisten a little pure water, gently wipe off the dust, and do not use alcohol-based corrosive solutions. Make sure to power off the device and unplug the power socket when cleaning.
- Keep clean of the device's image acquisition window. It is recommended to use cleaning water to wipe off the dust.
- If the device does not work properly, please contact your dealer or the nearest service center. Never attempt to disassemble the device yourself (we shall not assume any responsibility for problems caused by unauthorized repair or maintenance).
- Caution: If the device has battery, risk of explosion if battery is replaced by an incorrect type. Dispose of used batteries according to the instructions.
- Please dispose of the device in strict accordance with the relevant national or regional regulations and standards to avoid environmental pollution and property damage.

Note:

- Check whether the device's package is in good condition, whether there is damage, intrusion, moisture, deformation, etc. before unpacking.
- Check the surface of the device and accessories for damage, rust, bumps, etc. when unpacking.
- Check whether the quantity and information of the device and accessories are complete after unpacking.
- Store and transport the device according to the storage and transport conditions of the device, and the storage temperature and humidity should meet the requirements.
- It is strictly prohibited to transport the device in combination with items that may affect or damage the device.
- Quality requirements for installation and maintenance personnel:
 - Qualification certificate or working experience in weak current system installation and maintenance, and relevant working experience and qualifications. Besides, the personnel must possess the following knowledge and operation skills.
 - The basic knowledge and operation skills of low voltage wiring and low voltage electronic circuit connection.
 - The ability to comprehend the contents of this manual.

- Please read the manual and safety instructions carefully before installing the device.
- Do not contact the device with strong acids, alkalis, oils, greases or organic solutions such as thinners.
- Do not expose the device directly to flashlights, high-frequency switch lighting devices, or to sunlight, which may affect the performance.

1.3 Electromagnetic Interference Prevention

- Make sure that the shielding layer of cables is intact and 360° connected to the metal connector when using shielded cables.
- Do not route the device together with other equipment (especially servo motors, high-power devices, etc.), and control the distance between cables to more than 10 cm. Make sure to shield the cables if unavoidable.
- The control cable of the device and the power cable of the industrial light source must be wired separately to avoid bundled wiring.
- The power cable, data cable, signal cable, etc. of the device must be wired separately. Make sure to ground them if the wiring groove is used to separate the wiring and the wiring groove is metal.
- During the wiring process, evaluate the wiring space reasonably, and do not pull the cables hard, so as not to damage the electrical performance of the cables.
- If the device is powered on and off frequently, it is necessary to strengthen the voltage isolation, and consider adding a DC/DC isolation power supply module between the device and the adapter.
- Use the power adapter to supply power to the device separately. If centralized power supply is necessary, make sure to use a DC filter to filter the power supply of the device separately before use.
- The unused cables of the device must be insulated.
- When installing the device, if you cannot ensure that the device itself and all equipment connected to the device are well grounded, you should isolate the device with an insulating bracket.
- To avoid the accumulation of static electricity, ensure that other equipment (such as machines, internal components, etc.) and metal brackets on site are properly grounded.
- Make sure that the connector metal barrier of the device is well connected to the PC and other chassis, and if necessary, copper foil should be used to enhance the grounding effect.
- During the installation and use of the device, high voltage leakage must be avoided.
- Use a figure-eight bundle method if the device cable is too long.
- When connecting the device and metal accessories, they must be connected firmly to maintain good conductivity.

Chapter 2 Overview

2.1 Introduction

The HDMI microscope camera adopts CMOS sensor to provide high-quality images, and has an embedded operating system to support multi-image processing. It can be directly connected to a monitor without a computer, providing image acquisition in real time. The HDMI microscope camera is applicable to the electronic semiconductor, PCBA, biomedical industry, etc.

2.2 Key Features

- Provides HDMI interface to connect to a monitor directly.
- Provides USB 2.0 interface to connect to a mouse.
- Supports cross line on the image, and horizontal and vertical reverse image output.
- Supports image adjustment.

 **Note**

- Refer to the device's datasheet for specific parameters.
-

Chapter 3 Appearance and Indicator

3.1 Appearance

Note

Appearance here is for reference only. Refer to the device's datasheet for detailed dimension information.

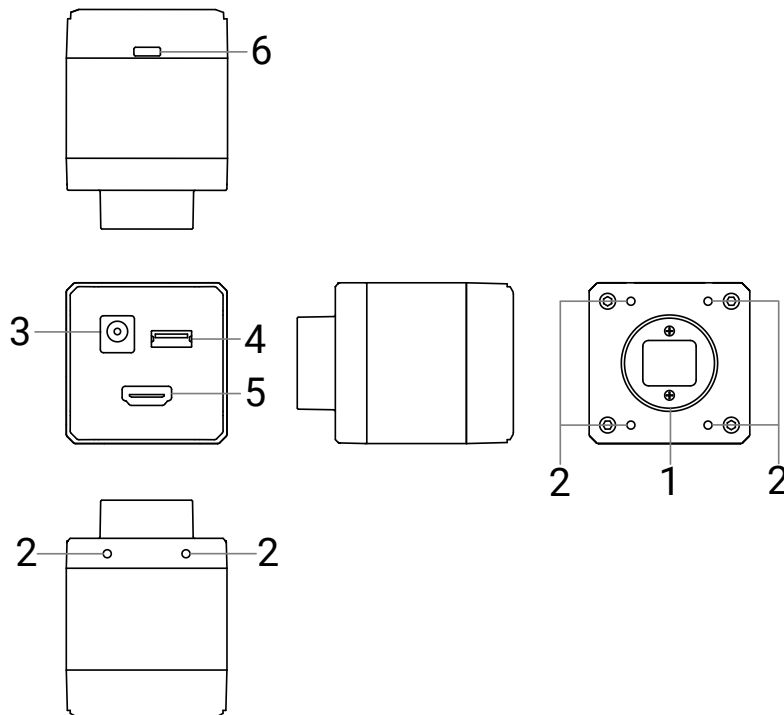


Figure 3-1 Appearance

Table 3-1 Component Description

No.	Component	Description
1	Lens Mount	It is used to install the lens. Refer to the device's datasheet for specific lens mount information.
2	Screw Hole	It refers to the M3 screw hole which is used to fix the device to the installation position.
3	Power Interface	It refers to the 12 VDC power jack for powering the device.
4	USB 2.0 Interface	<ul style="list-style-type: none"> It is used to connect to a wired or wireless mouse. You can operate on the camera.

No.	Component	Description
		<ul style="list-style-type: none">● It is used to insert the USB flash drive for firmware upgrade or storage of captured images.
5	HDMI Interface	It is used to connect to a monitor for image acquisition in real time.
6	LED Indicator	It indicates the device's status.

3.2 LED Indicator

The device's LED indicator is used to indicate the operation status of the device.

Table 3-2 Indicator Description

No.	Indicator Color	Status	Device Status Description
1	Red	Solid	<ul style="list-style-type: none">● The device is being powered up.● The HDMI interface is not connected.
2	Blue	Solid	The device is acquiring images.
3	Red and blue	Flash alternatively	The firmware is upgrading.
4	Purple	Flashing	The device is exceptional.

Chapter 4 Device Installation and Debugging

4.1 Installation Preparation

You need to prepare following accessories before device installation.

Table 4-1 Accessories

No.	Name	Quantity	Description
1	DC Power Supply	1	You should select suitable power adapter or switch power supply according to the device power supply and consumption. You need to purchase separately.
2	HDMI Cable	1	It is used to connect to a monitor. You need to purchase separately.
3	Monitor	1	The monitor with a resolution of 1920 × 1080 is recommended. You need to purchase separately.
4	Mouse	1	It refers to the wired or wireless mouse with USB 2.0 interface. You need to purchase separately.
5	Lens	1	It refers to the lens that is suitable for the device. You need to purchase separately.
6	Lens Adapter	1	If the lens you used does not match with lens mount of the device, you need to use a lens adapter. You need to purchase separately.

Note

- The device mentioned in this manual is an electronic product that requires operation and storage under dry conditions. In case of hot and humid, acidic and alkaline environment, please take isolation and protection measures to avoid corrosion damage of the device's internal components.
- When using the lens, it is necessary to prevent humid environment and avoid steam from entering inside, causing fogging.

4.2 Install Device

Before You Start

- Make sure that the device in package is in good condition and all assembly parts are

included.

- Make sure that all related devices are powered off during the installation.

Steps

1. Fix the device to the installation position.
2. Install the lens to the device.
3. Use a DC power supply to power the device.

Note

The independent power supply is required.

4. Use a HDMI cable to connect the device to the monitor.
5. Connect the wired or wireless mouse via the USB 2.0 interface.

4.3 Debugging

After the device is connected to the monitor, the window of image acquisition is shown on the monitor. You can use the mouse to expand the settings page on the right of the window.

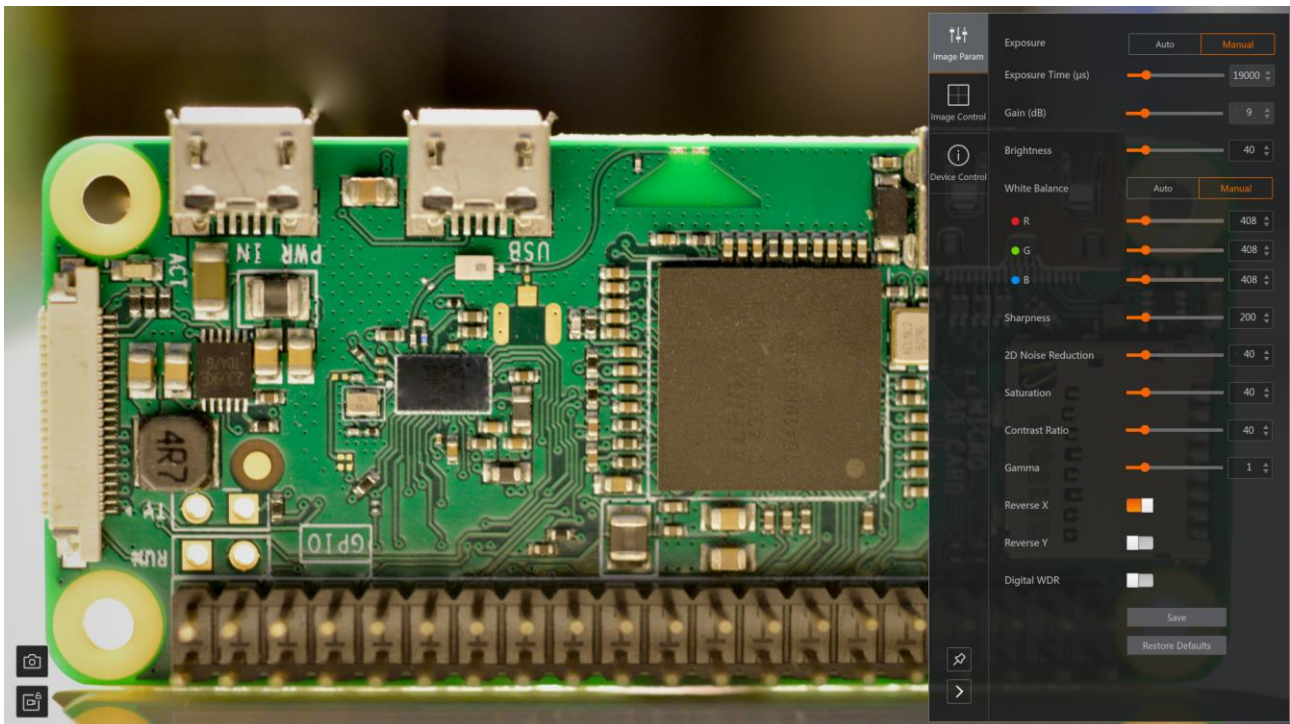




Figure 4-1 Home Page

- You can set image-related parameters and view device information on the settings page.
- Click  in the lower-left corner of the settings page to fix the page.
- Click  in the lower-left corner of the settings page to collapse the page.
- You can zoom in or zoom out the image via mouse wheel, and view the image scaling shown next to the mouse icon in the real time.

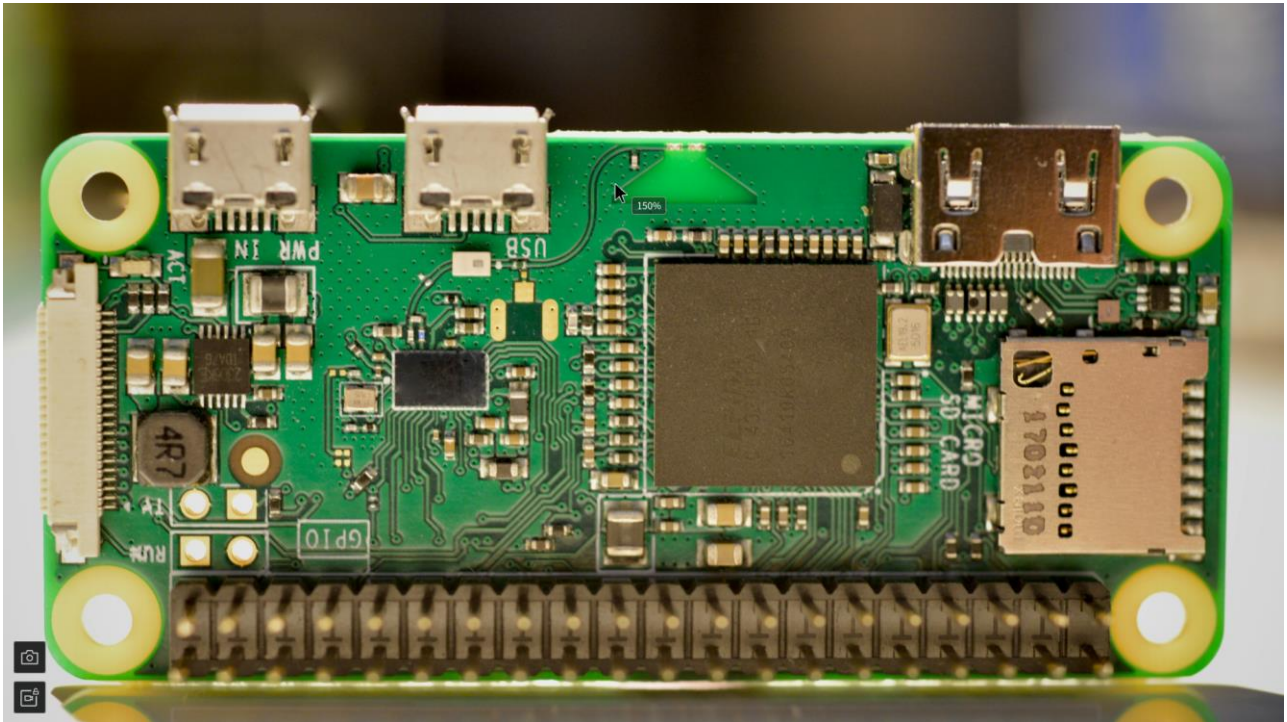



Figure 4-2 Zoom In/Out

- You can click  to freeze the image. After freezing, when you scroll the mouse wheel, the image scaling will be displayed in real time, but the image will not be zoomed in or out. After unfreezing, the image will change corresponding to the scale.

Chapter 5 Basic Functions

5.1 Set Exposure Mode

The device supports 2 types of exposure modes, including **Auto** and **Manual**.

- **Auto**: The device's exposure time is adjusted automatically according to the scene. When the exposure time reaches the limit, the value of the gain will be adjusted automatically.
- **Manual**: You can drag the slider or click on the parameter box to change the values of the exposure time and the gain.

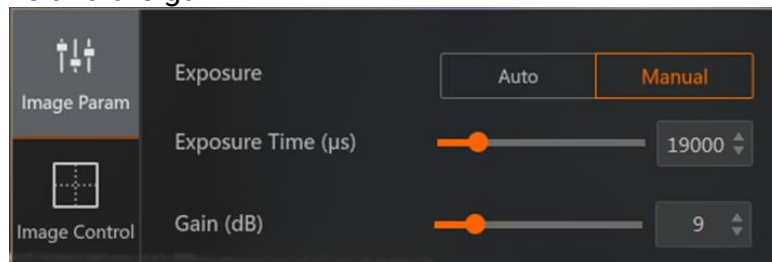


Figure 5-1 Set Exposure Mode

Note

- The range of the exposure time should be between 300 µs and 100000 µs.
 - Refer to the section [Set Gain](#) to see the gain settings.
-

5.2 Set Gain

When the exposure mode is **Manual**, you can drag the slider or click on the parameter box to adjust the value of the gain.

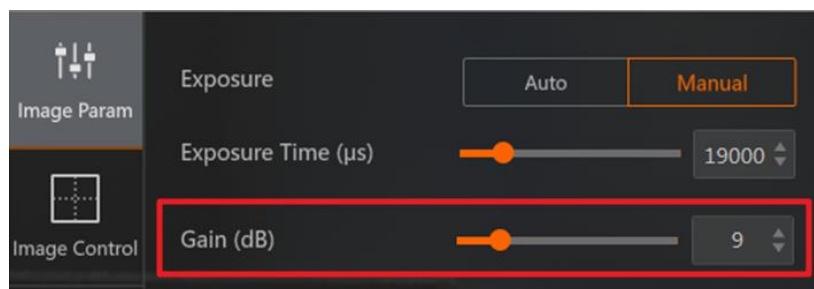


Figure 5-2 Set Gain

Note

- The higher the gain value, the brighter the image will be and the higher the image noise
-

will be, which affects the image quality.

- The range of the gain should be between 0 dB and 42 dB.

5.3 Set Brightness

You can drag the slider or click on the parameter box to adjust the value of the brightness.

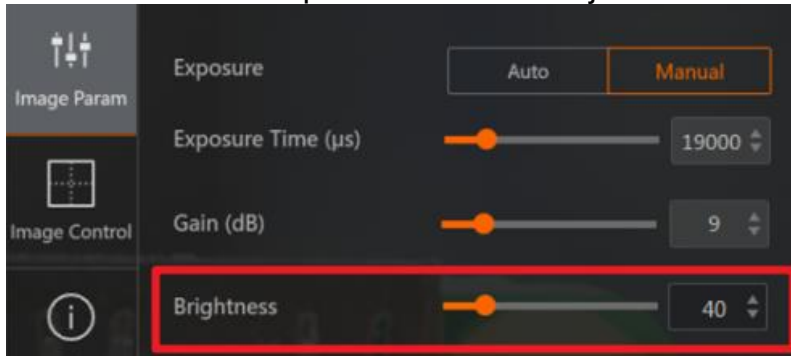
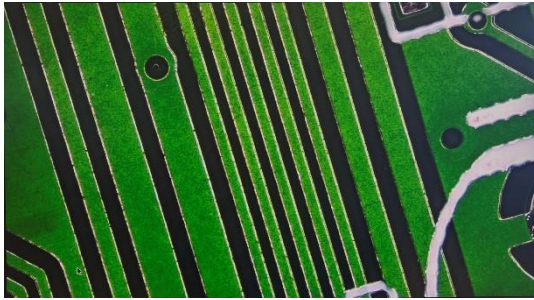
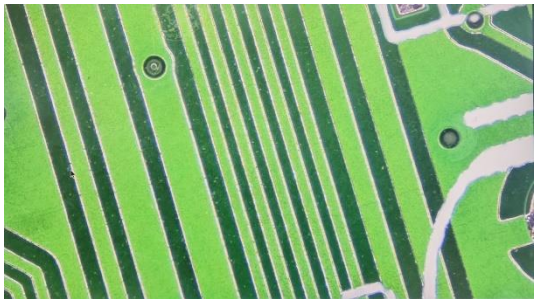


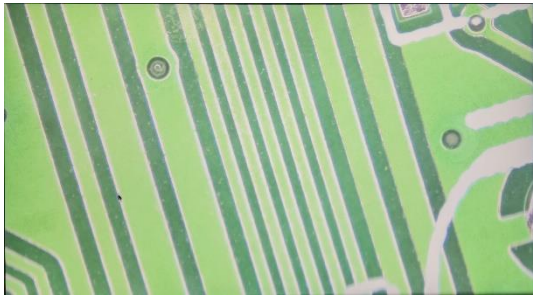
Figure 5-3 Set Brightness

Note

- The range of the brightness should be between 0 and 200.
- The higher the brightness value, the brighter the image will be.

Table 5-1 Brightness Example

Brightness Value	Image
Brightness=50	
Brightness=100	

Brightness Value	Image
Brightness=150	

5.4 Set White Balance

The white balance refers to the device color adjustment, depending on different light sources. Adjust the R/G/B ratio to ensure that the white regions are white under different color temperatures. Ideally, the proportion of R/G/B in the white region is 1:1:1.

The device supports 2 types of white balance mode, including **Auto** and **Manual**.

Auto: The white balance is adjusted automatically according to the actual scene.

Manual: You need to set the R, G, B ratio manually. The range is from 1 to 2047, and 256 means the ratio is 1.0.

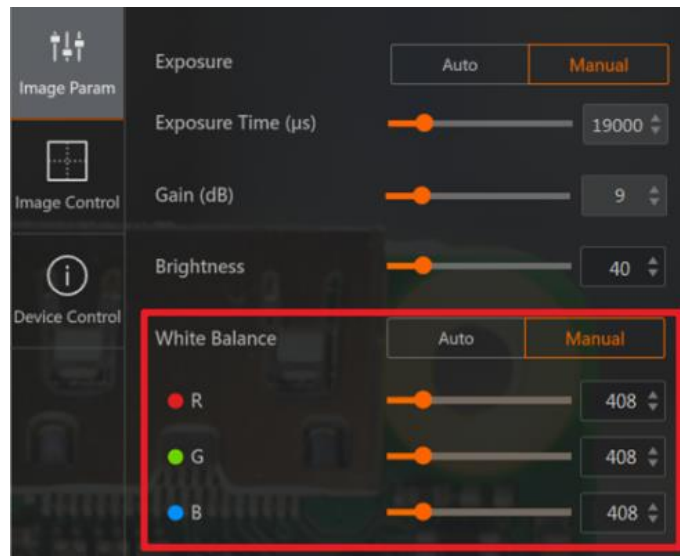


Figure 5-4 Set White Balance

It is recommended to correct white balance when there is great difference between the device's color effect and actual effect. You can correct white balance as shown below.

Steps

1. Put a white paper in the range of the device's field of view, and make sure the paper covers the entire field of view.
2. Set exposure and gain.

Note

It is recommended to set image brightness value between 120 and 160.

3. Select **Auto** as white balance mode.

If there is still great difference between correction effect and actual color, it is recommended to manually correct white balance according to the following steps.

Steps

1. Select **Manual** as white balance mode.

2. Manually adjust the R/G/B value until the image color is similar to the actual color.

Note

If the light source and color temperature in environment change, you need to correct white balance again.

5.5 Set Sharpness

The device supports the sharpness function that can adjust the sharpness level of the image edge. You can drag the slider or click on the parameter box to adjust the sharpness value.

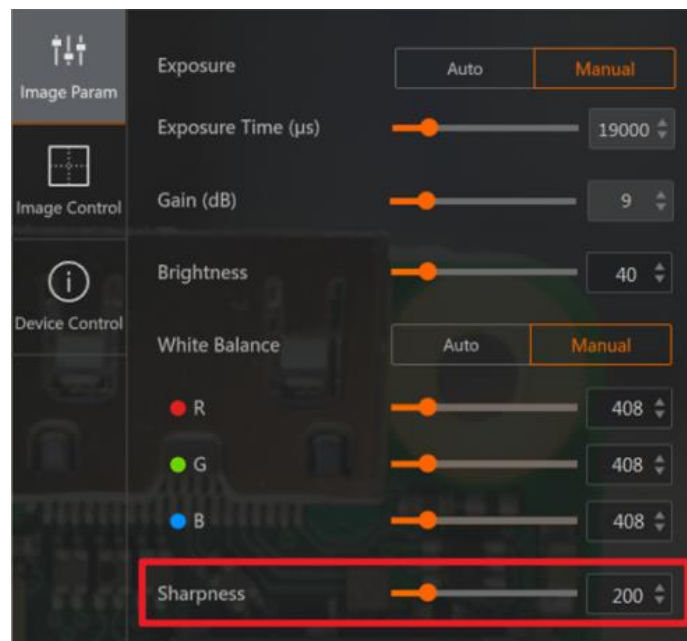


Figure 5-5 Set Sharpness

Note

- The range of the sharpness should be between 0 and 1023.
-

5.6 Set 2D Noise Reduction

The function of 2D noise reduction can increase the image's SNR and improve its quality.

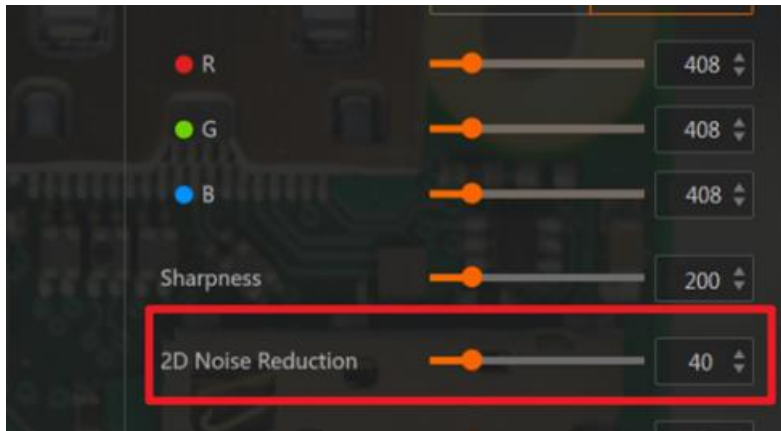


Figure 5-6 Set 2D Noise Reduction

Note

- The larger the value, the higher the SNR will be and the better the image quality will be.
- The range of the 2D noise reduction should be between 0 and 200.

5.7 Set Saturation

Adjusting the saturation changes the colorfulness of the colors. A higher saturation, for example, makes colors easier to distinguish. Image examples of different saturation values are shown below.

Table 5-2 Saturation Example

Saturation Value	Image
Saturation=25	A microscopic image of a green printed circuit board (PCB) with various components and traces. The image is rendered with low saturation, making the colors appear muted and less vibrant.

Saturation Value	Image
Saturation=100	
Saturation=175	

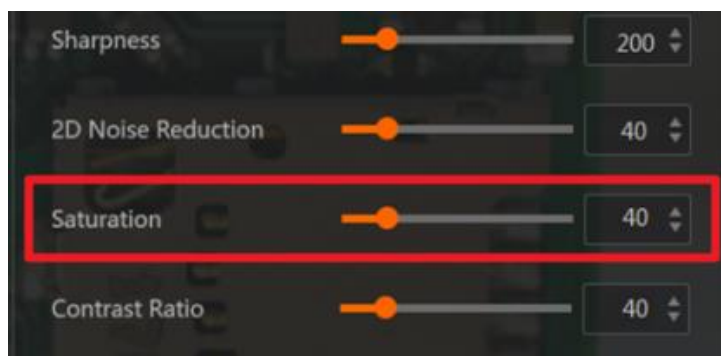


Figure 5-7 Set Saturation

Note

- The range of saturation is between 0 and 200.

5.8 Set Contrast Ratio

The device supports the contrast ratio function that adjusts the intensity of light and darkness and color. The larger the contrast ratio, and more clear the image is.

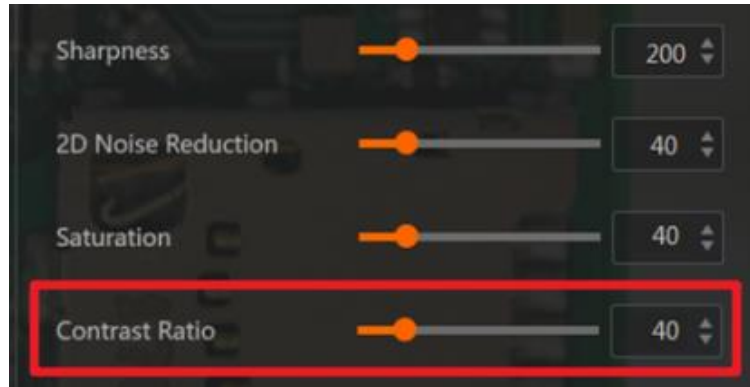


Figure 5-8 Set Contrast Ratio

Note

The range of contrast ratio is from 0 to 200.

5.9 Set Gamma Correction

The device supports Gamma correction function. Generally, the output of the device's sensor is linear with the photons that are illuminated on the photosensitive surface of the sensor. Gamma correction provides a non-linear mapping mechanism as shown below.

- Gamma between 0.5 and 1: image brightness increases, dark area becomes brighter.
- Gamma between 1 and 4: image brightness decreases, dark area becomes darker.

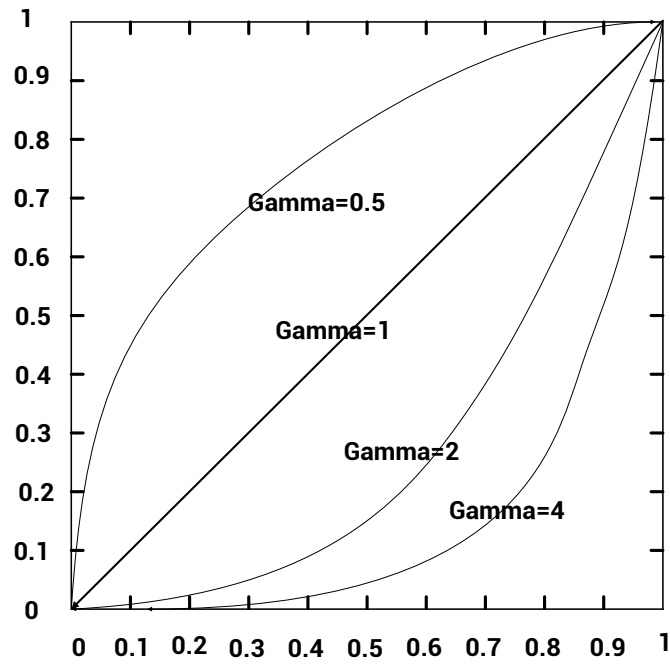
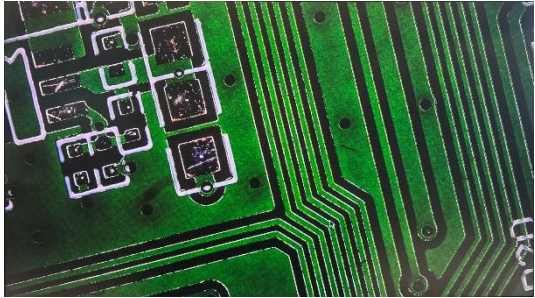


Figure 5-9 Set Gamma Correction

Table 5-3 Gamma Correction Example

Gamma Value	Image
Gamma=0.5	
Gamma=1	

Gamma Value	Image
Gamma=2	

You can set the Gamma value in the settings page.

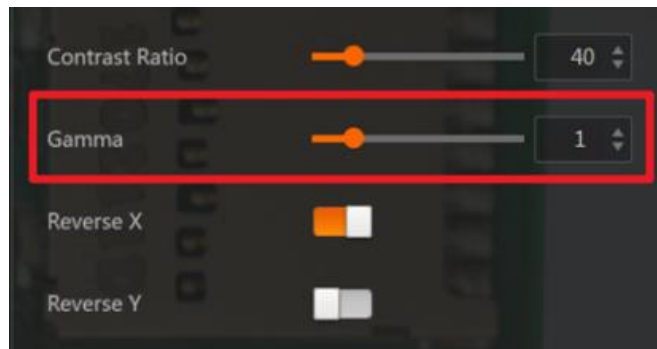


Figure 5-10 Set Gamma Correction

Note

- The range of Gamma correction is from 0 to 4.

5.10 Set Image Reverse

Reverse X refers to the image reverses in a horizontal way, and **Reverse Y** refers to the image reverses in a vertical way.

You can enable **Reverse X** or **Reverse Y** according to actual demands.

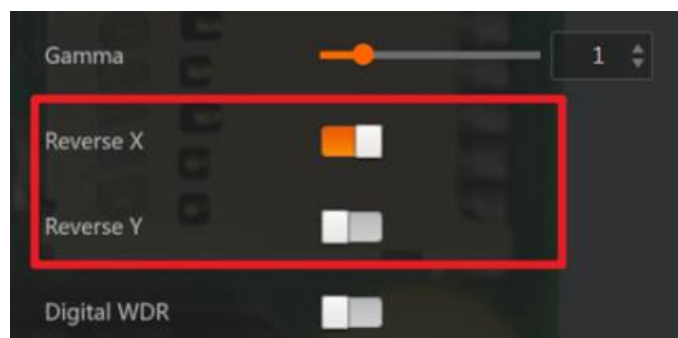


Figure 5-11 Set Image Reverse

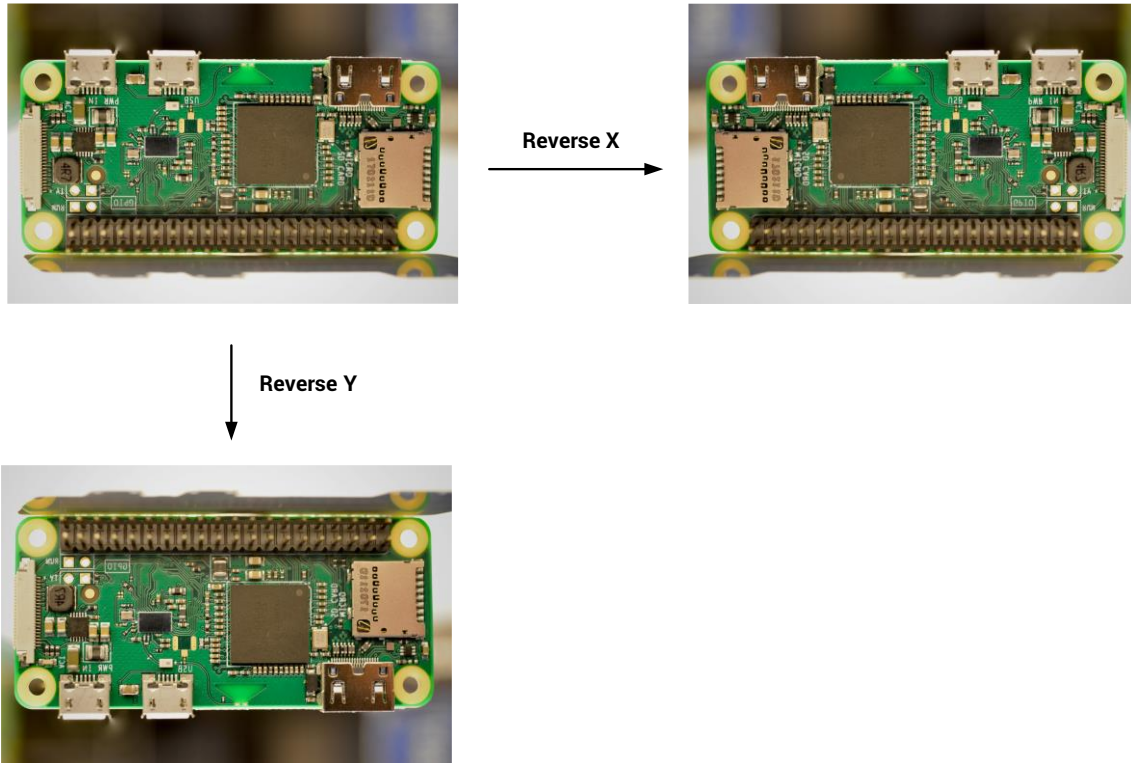


Figure 5-12 Image Reverse Comparison

5.11 Set Digital WDR

The camera supports digital WDR function that the camera acquires images to digitally brighten too-dark areas and dim too-bright areas for easy viewing.

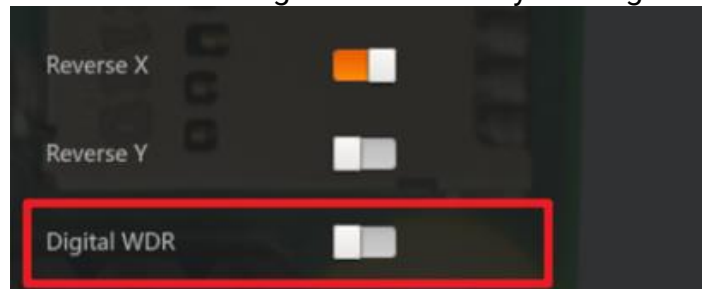


Figure 5-13 Set Digital WDR

5.12 User Parameter Settings

After the parameter settings are finished, there are two options for parameter operation.

Save: Click **Save** to save all settings. After you reopen the device, the saved settings will be shown.

Restore Defaults: Click **Restore Defaults** to restore the default parameters of the device,

and the set parameters will not be saved.



Figure 5-14 User Parameter Settings

Note

After you click **Save**, only the parameters on the **Image Param** will be saved.

Chapter 6 Other Functions

6.1 Image Control

It supports displaying grid lines for dividing the image. You can edit the lines according to the needs.

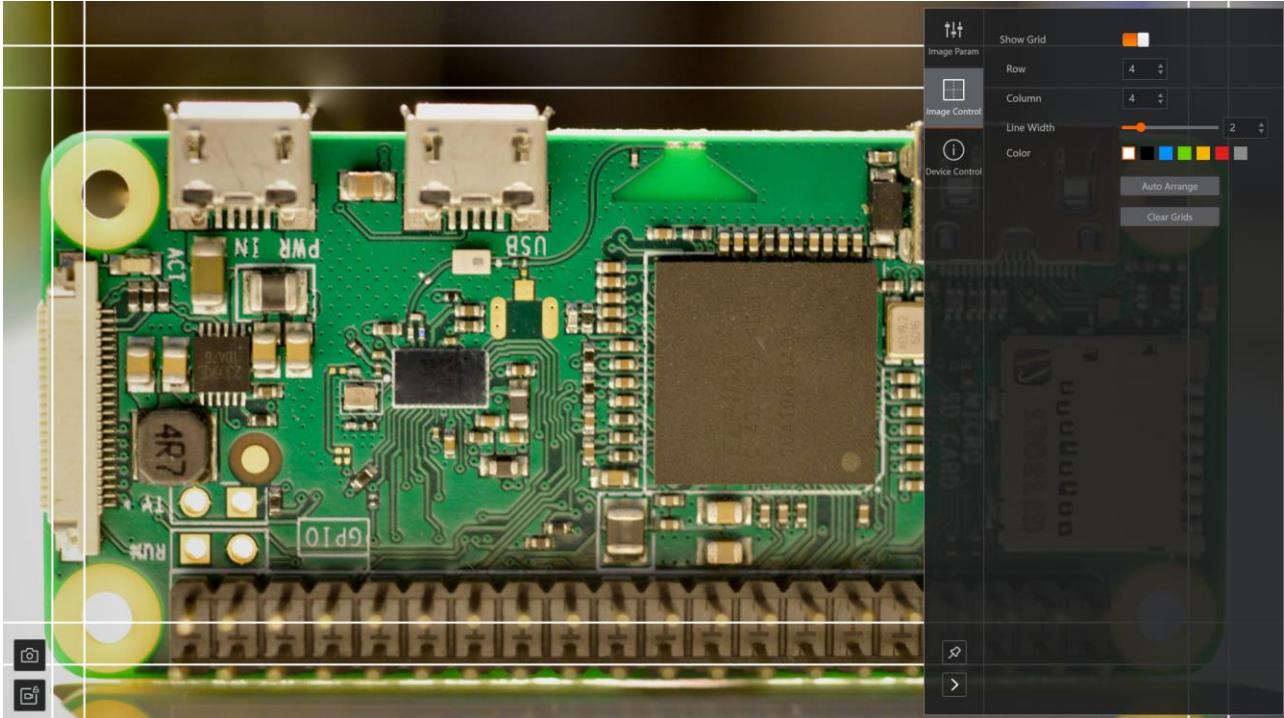


Figure 6-1 Image Control

Steps

1. Add the grid lines on the image. There are two methods:
 - Go to **Image Control** to enable **Show Grid**, and edit the quantity of rows and columns. The grid lines will be shown on the image and spaced equally.
 - Right-click on the image, and select **Add Row** or **Add Column**. The grid lines will be added at the clicking position.

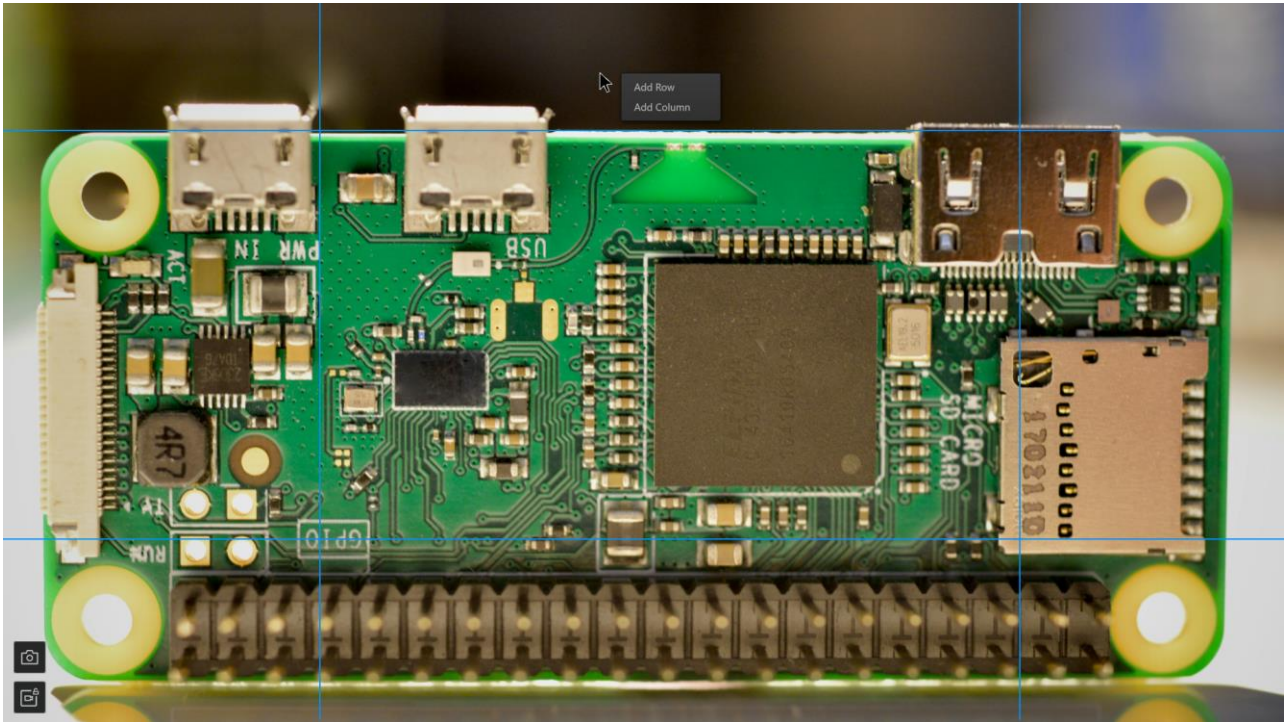


Figure 6-2 Add Grid Line

2. Select a line in the row or column to drag according to the needs.
3. (Optional) You can click **Auto Arrange** to arrange the grid lines equally.
4. (Optional) You can edit **Line Width** to change the widths of all grid lines. The value is 5 by default, and its range is between 0 and 10.
5. (Optional) You can change the colors of the grid lines.
 - To change the colors of all grid lines, go to **Image Control > Color** to change the color.
 - To change the color of a line in the row or column, right-click the line and select the color.

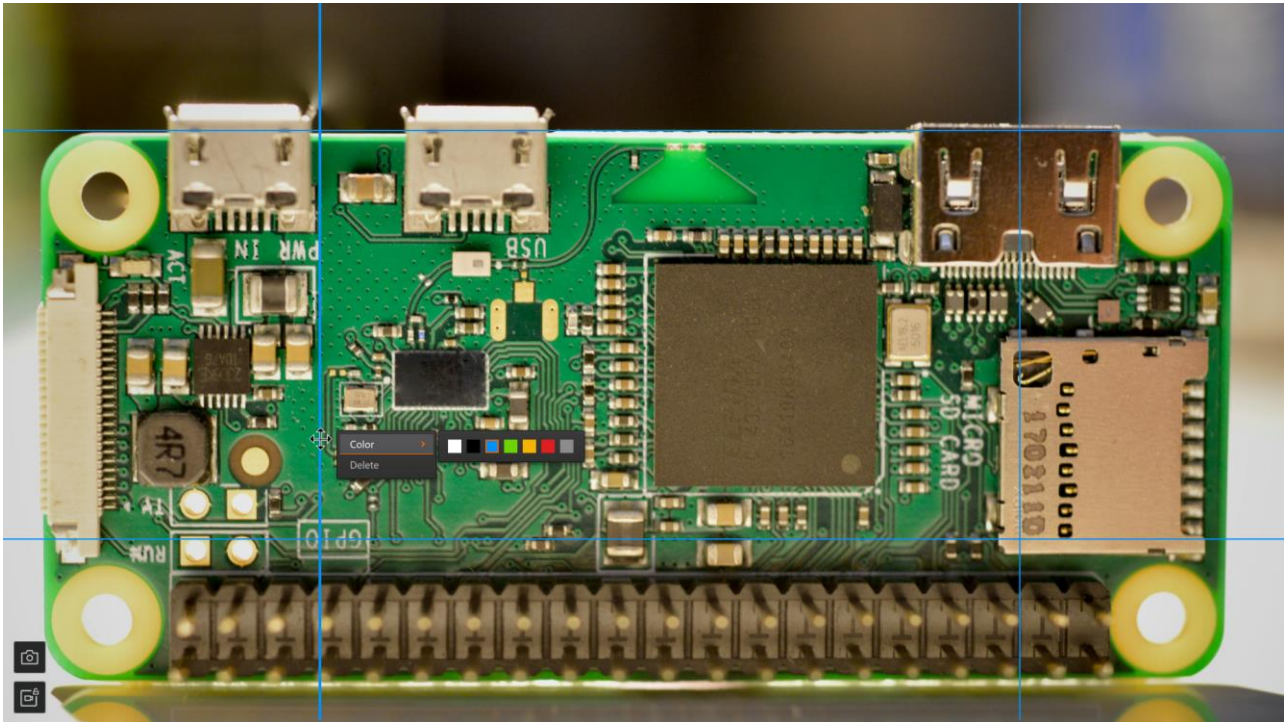


Figure 6-3 Change Color


6. (Optional) You can delete the grid lines if needed.

- To delete all grid lines, go to **Image Control** and click **Clear Grids** to clear all grid lines on the image.
- To delete a line in the row or column, right-click the line and click **Delete**.

Note

- All grid lines will be cleared after the device is restarted.
-

6.2 Image Storage

You can click  to capture images, and the captured images will be stored in the USB flash drive automatically.

- When no USB flash drive is inserted into the USB 2.0 interface of the device, up to 5 captured images can be stored in the device. After a USB flash drive is inserted and connected to the device, the 5 images will be stored in the USB flash drive automatically.
- When there is a USB flash drive inserted into the USB 2.0 interface of the device, the captured images will be stored in the USB flash drive automatically.

6.3 Device Control

In **Device Control**, you can view device information, change language, restart or upgrade

the device, etc. The specific parameters in **Device Control** are shown below.

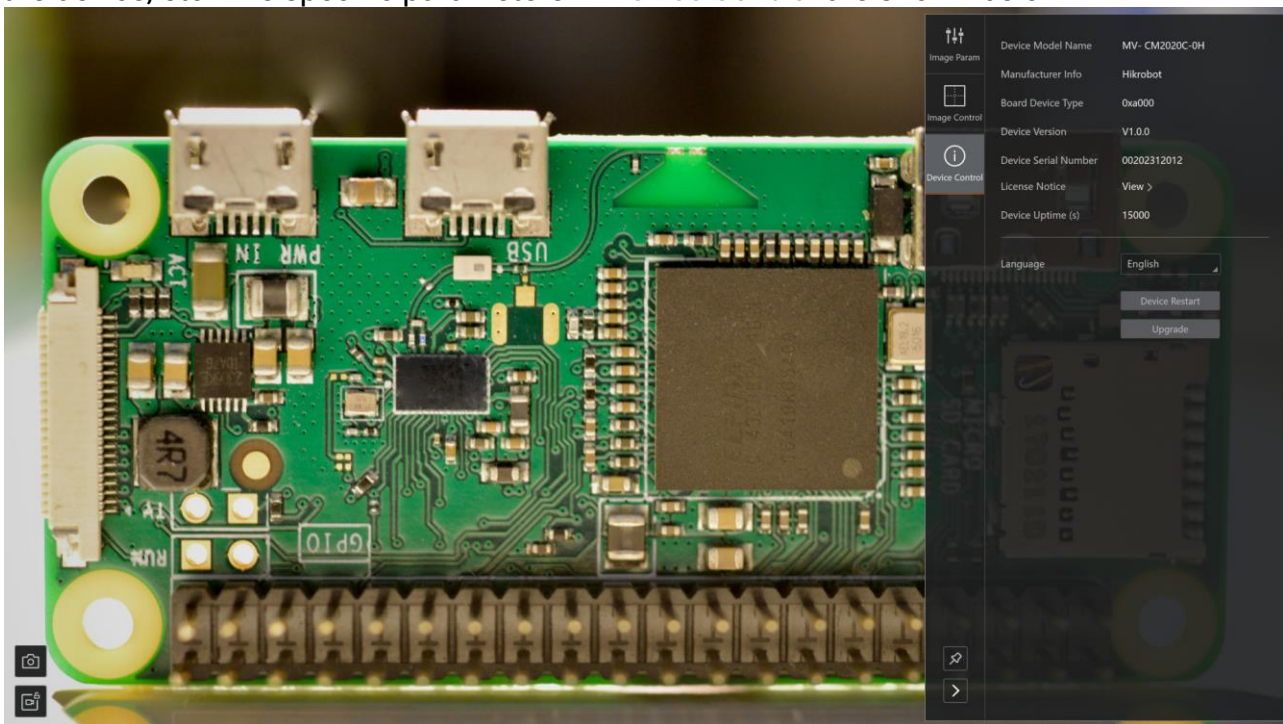


Figure 6-4 Device Control

Table 6-1 Parameter Description

Parameter	Read/Write	Description
Device Model Name	Read Only	It is the model of the device.
Manufacturer Info	Read Only	It is the manufacturer information about the device.
Board Device Type	Read Only	It is the device type.
Device Version	Read Only	It is the version of the device.
Device Serial Number	Read Only	It is device's serial number.
License Notice	Read & Write	Click View to view the license.
Device Uptime (s)	Read Only	It is the period of time when device is powered up.
Language	Read & Write	Edit the language in the drop-down list.
Device Restart	Write Only	Click Device Restart to restart the device. After the confirmation, the device will restart in 3 seconds.

6.4 Upgrade Firmware

You can use the USB flash drive with a format of FAT32 to upgrade the device's firmware.

Steps

1. Go to **Device Control** and click **Upgrade**.
2. Insert the USB flash drive into the USB 2.0 interface of the device. Make sure the mv_digicap.dav file exists in the root directory of the USB drive.

Note

- The device will restart automatically after the firmware is upgraded. If the upgrading fails, the reason will be shown on the screen.
 - The firmware upgrading process will be shown on the screen. It may take a few minutes. Please wait patiently.
 - During firmware upgrading, do not power off or restart the device.
-

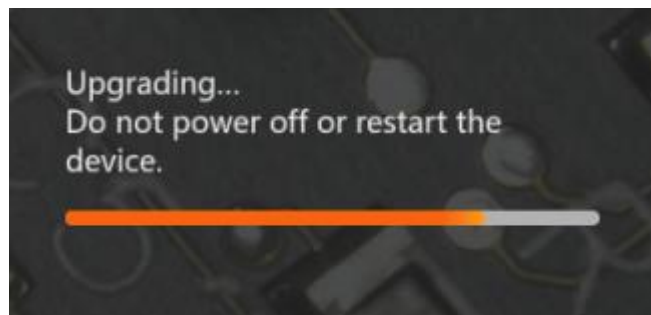


Figure 6-5 Upgrading Process

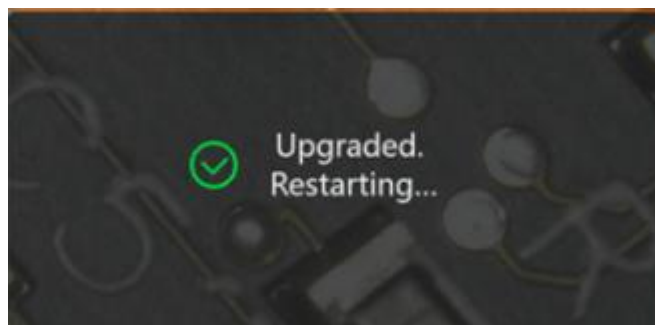


Figure 6-6 Upgrading Succeeded

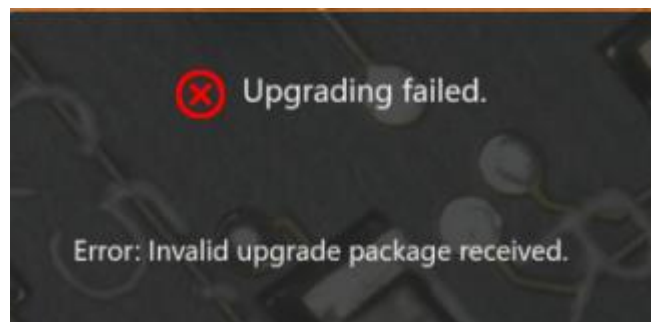


Figure 6-7 Upgrading Failed

Chapter 7 Revision History

Table 7-1 Revision History

Version	Document No.	Revision Date	Revision Details
V1.0.1	UD39955B	Oct. 8, 2024	<ul style="list-style-type: none">• Edit section 3.1 Appearance.• Edit section 4.3 Debugging.• Add section 6.2 Image Storage.
V1.0.0	UD37101B	Apr. 2, 2024	Original version.



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