ThermoTools

User Manual

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1. Disclaimer

1.1. Disclaimer

The infrared thermal imaging camera product enjoys secure after-sales services since the product delivery date of the initial order, provided that such product is stored, used and maintained under normal conditions and operated in accordance with our operating instructions.

Please refer to the notice for details of the warranty during the normal period.

The warranty is solely provided to the original purchaser and must not be transferred to a third party. The warranty does not apply to any product damage caused by misuse, negligence, accident or abnormal operating conditions. Wear parts are not covered by this warranty.

In case of any defects within the scope of this warranty, the involved product must not continue its use to prevent further damage. The purchaser must report any defects to us immediately. Otherwise this warranty will lose its effectiveness.

1.2. Statement of use

We reserve the right to collect anonymous usage statistics in order to help maintain and improve the quality of the software and services.

1.3. Copyright

No part of this software (including source code) may be copied, transmitted, transcribed or translated into any language or computer language in any form or by electronic, electromagnetic, optical, manual or any other means unless prior written permission is obtained.

All or part of the document may not be copied, photocopied, reproduced, translated or transmitted to any readable electronic medium or device unless prior written consent is obtained.

The name and LOGO displayed on the product are registered trademarks or trademarks of Guide Infrared and its subsidiaries. All other trademarks, trade names or company names cited here are for identification purposes only and are the property of their owners.

1.4 Quality assurance

The quality management systems for R&D and production have been certified according to relevant standards.

We are committed to the policy of sustainable development. We reserve the right to modify or improve any product without prior notice.

2. Instructions for users

2.1. Document update

The User Manual is updated several times a year, and the upgraded versions of this software product may also be released occasionally. Please download the latest user manual and installation package from our website.

2.2. Software update

We may release software updates at intervals depending on the software version. The location of the update service will depend on the software version. Please refer to the software documentation.

You can also update your software in real time via online detection.

3. Operating description

3.1. System requirements

Operating environment	Name	Recommended configuration
Software environment	Operating environment	Microsoft Visual C++ 2013-2015 Redistributable
	Operating system	Win7 (64-bit), Win8 (64-bit), Win10 (64-bit), Win11 (64-bit) or above
	Other software	PDF viewer, Word (Microsoft office 2010 or above, or WPS office)
Hardware environment	CPU	Intel i3 and above
	Internal storage	4G and above
	Graphics	2G or above (support OpenGL)
	Hard drive	>40G; The remaining space of the installation directory disk ≥2G
	Network card	Network card above 100M

3.2. Installation notes

If a software installation failure prompts, e.g. xxx.dll does not exist, the follows solutions may be adopted:

Find the installation location of the file:

Program Files (x86) > ThermoTools-QDZG > redist >

Run the following programs and restart the software.

DirectXRepair.zip
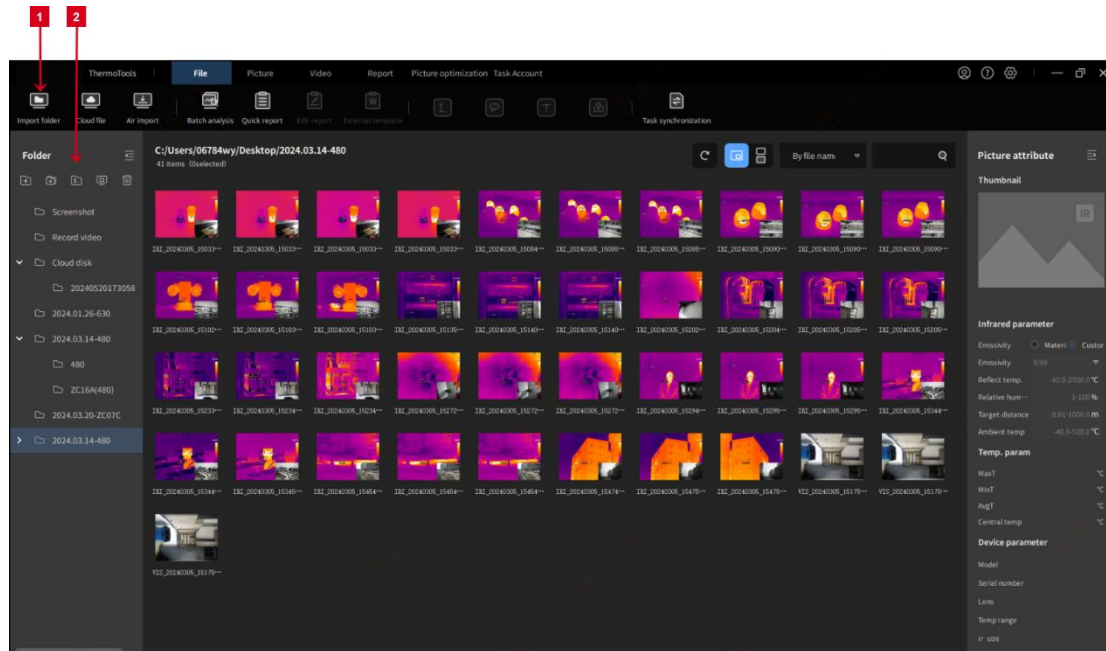vc2010_redist.x64.exe
vc2013_redist.x64.exe
vc2015_redist.x64.exe

4. Software introduction

4.1. Interface description

4.1.1. File import

The infrared thermal image analysis may be imported via 3 approaches: local import from computer, file import from the cloud end and remote import.

4.1.1.1. Local import from computer

① Folder import: you can import infrared thermal image files stored in PC.

② File management: you can view the local infrared thermal image folder. You can also perform Add, Delete, Modify and Rename operations and right-click to pop up Quick Actions.

③ Drag a folder: you can drag an infrared thermal image folder in the local hard disk into the left File Management area for quick classified management.

④ Delete a folder: you can delete a folder in the File Management list. Note: If the associated source file is not selected in the settings, the deleted file is essentially a hidden file, and the local file still exists.

⑤ Import a single image: from the local computer, you can click to select a thermal image file and drag it into any area of the software for rapid import.

4.1.1.2. File import from cloud end

Register a VIP in the camera, and upload the images in the camera to the cloud disk. Thereafter you can download them to the software for analysis when you are logged in the VIP in the analysis software, and view them in the File Management.

A single-account VIP currently supports 1GB of storage space (the actual maximum personal storage is the space displayed in the software interface). After the used space reaches the upper limit, you may delete some historical thermal image files as appropriate.

Please view the downloaded cloud file in the Cloud Disk folder on the left side of File Management.
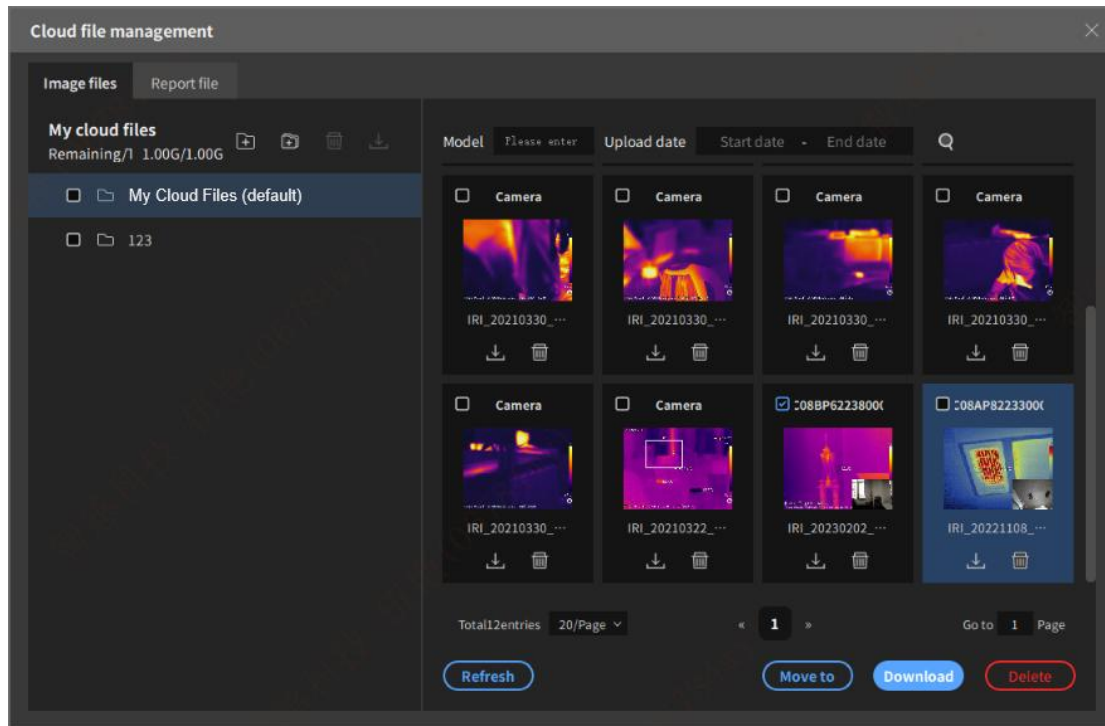
4.1.1.3. Remote import

The camera supports fast connection via USB, AP, LAN, etc. After connection, the local thermal image files in the thermal imaging camera can be quickly downloaded to the computer and can be viewed in File Management.
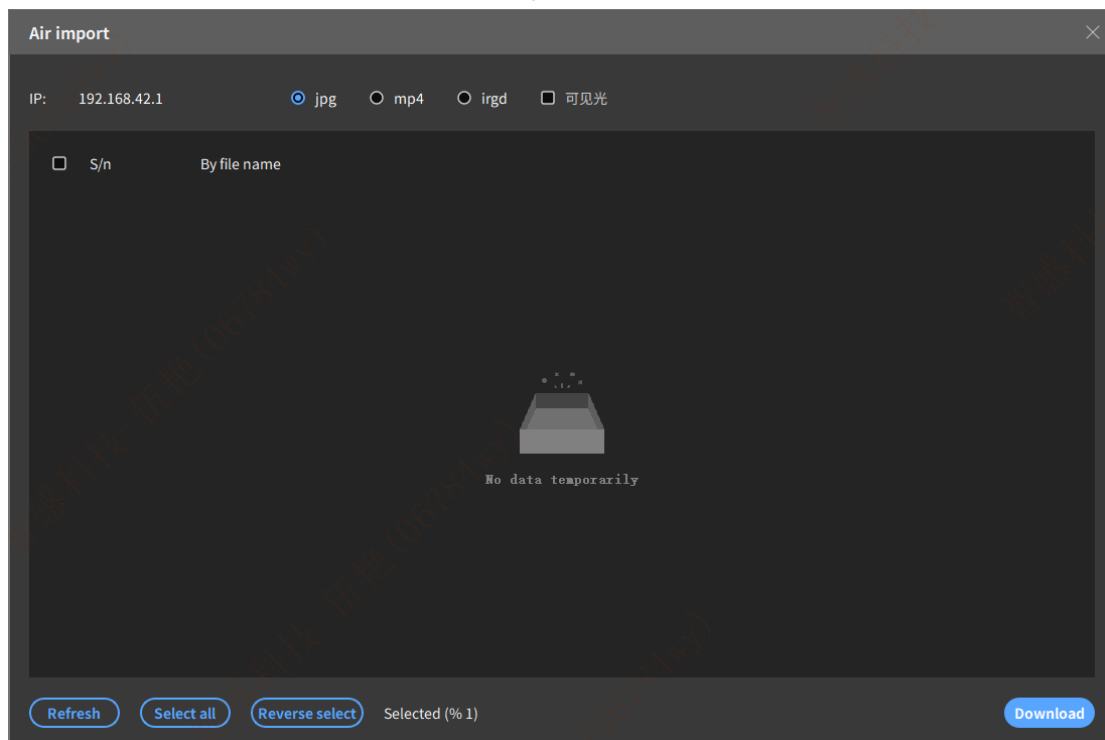
4.1.2. Camera's connection with PC

The analysis software enables the uploading and downloading of files, real-time video control and remote control after being connected to the thermal imaging camera by either wired or wireless means.

There are 4 methods for quick connection: AP, LAN, USB, and automatic search. Which method is available depends on the specific model of the thermal imaging camera.
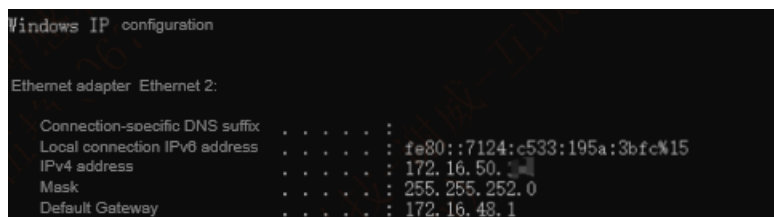
4.1.2.1. AP (available for some models)

① There should be available WiFi.

② Turn on the AP switch of the thermal imaging camera (view the entrance in the sliding panel, but it may vary with model).

③ Connect your computer to the device hotspot "Camera", and input the default password 123456.

④ Click "Connect Device" on PC software and load via AP to complete video streaming and wireless connection.

4.1.2.2. LAN (available for some models)

① There should be available WiFi.

② In the settings of the camera, you can configure IP and gateway in the network connection.

③ Make sure the computer and the camera are in the same network environment.

④ Turn on the LAN switch in the thermal imaging camera (view the entrance in the sliding panel, but it may vary with model).

⑤ Click "Connect Device" on the PC software, select LAN mode, input the camera IP and load it to complete video streaming and wired connection.

Q: How to view the computer IP, subnet mask, gateway and DNS? How to configure the IP address of the camera to keep the computer and device in the same network environment?

A: Press WIN+R simultaneously on the computer, enter "cmd" in the pop-up input box, click Enter to enter the "cmd" mode, input "ipconfig", and click Enter again to get the computer IP:
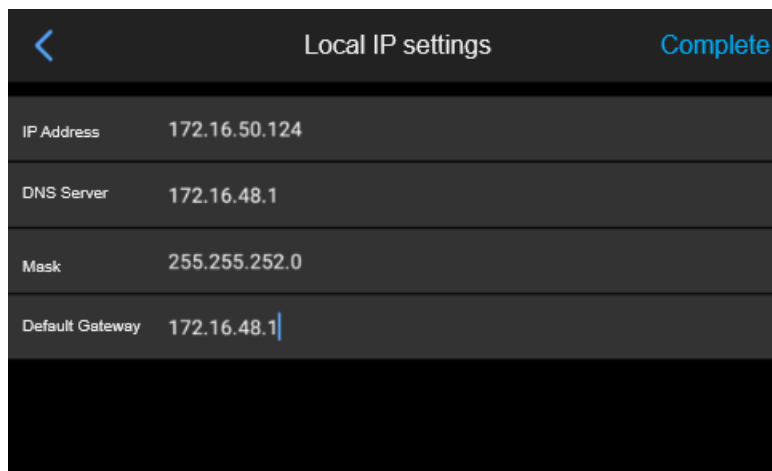

(PC-side IP information)

After getting the IP on PC, you can configure the IP on the camera to ensure that the

default gateway, DNS server and subnet mask are in the same network segment as the IP address of the PC:

(camera-side IP configuration)

Select LAN mode in the PC software and input the IP address configured in the camera.

4.1.2.3. Automatic search (available for some models)

The PC analysis software automatically searches for devices in the same network environment as the current computer and establishes a connection with them (available for some models). The prerequisite is that the device supports WiFi-related functions. The operation steps are as follows:

① Turn on the WiFi function in the thermal imager, connect to the network, and ensure that it is in the same local area network as the computer where the analysis software client is located;

② Click "Connect Device" on the PC analysis software, select "Automatic Search" connection method, and the list below will display the thermal imager information in the same local area network as this computer;

③ Find the thermal imager to be connected in the list and select it, click the OK button to start connecting the device;

4.1.2.4. USB (available for some models)

USB connection is generally used for file data transmission and real-time video streaming (available for some models).

● Data transmission: connect the camera with PC via Type-C and wait for the identification of camera memory files. These files can also be exported to PC for image and video analysis.

● Video streaming: you need to install a driver package to realize video streaming. How to realize video streaming via USB?

① Connect the computer and the thermal imaging camera via USB.

② Turn on the camera and the "USB Real-Time Video" switch.

③ Under the computer device manager, install drivers for devices without drivers. (For driver installation details, please refer to the thermal imaging camera user manual)

- Selection of installation method: Manual installation from disk; Click Next
- Selection of device type: network adapter
- Selection of vendor: Microsoft Corporation
- Selection of type: Remote NDIS Compatible Device; Click Next

④ Under the network connection, find the target network card and set IPs in the 192.168.42 network segment except 192.168.42.129. ping 192.168.42.129 represents a connectivity and successfully installed USB-to-network driver.

⑤ Restart the computer.

⑥ Click "Connect Device" on PC software and select USB mode to complete video streaming and connection.

4.1.3. File management
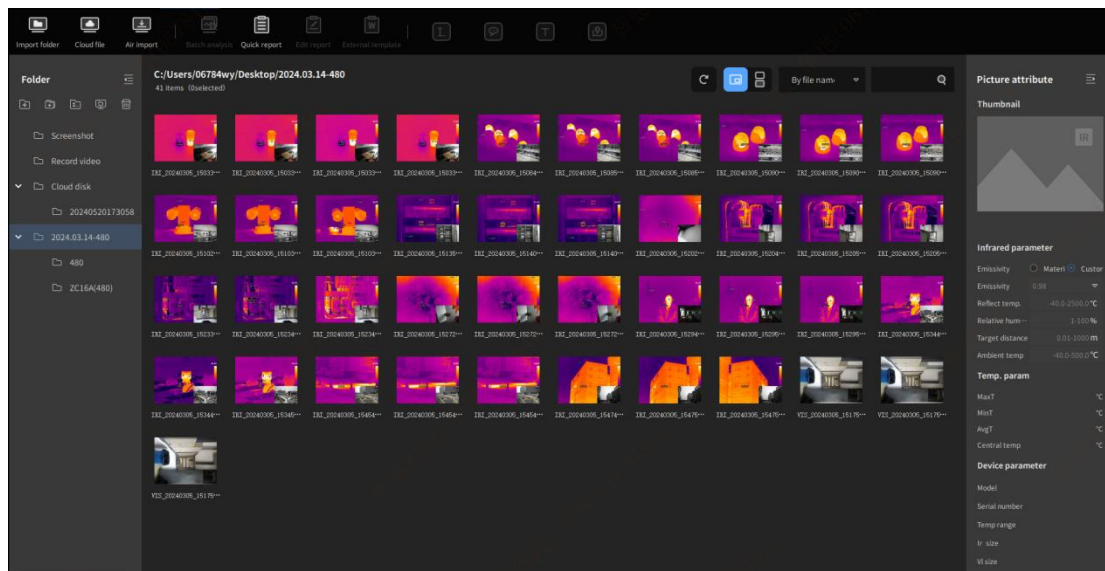
Classify and manage the infrared thermal image or video files stored in the computer. Batch analysis of thermal images and batch export of reports are available.

4.1.3.1. Supported file types

This software only supports the secondary analysis and storage of images or videos with thermal image information.

4.1.3.2. Folder management

You can import a local folder of computer for analysis, including images or videos. The operations, such as Add, Delete and Modify, can be realized quickly through

right-click.
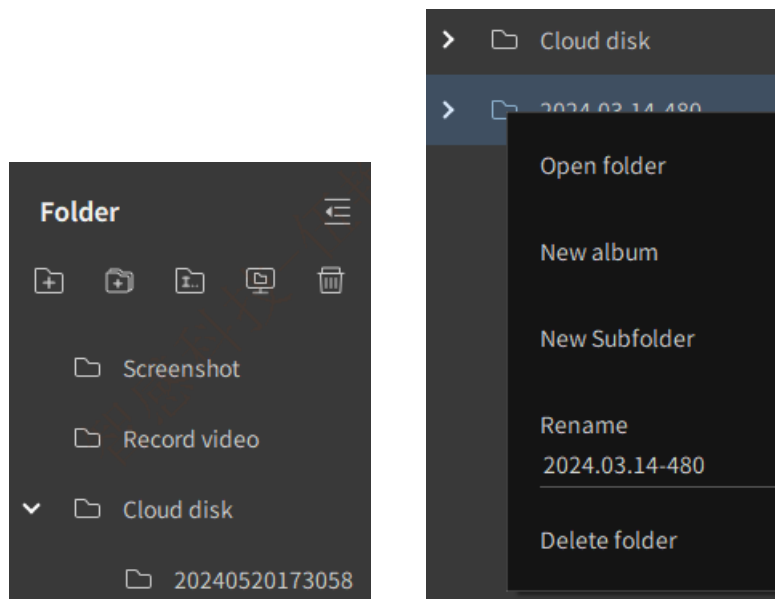
① Create a new folder : Create a new file class locally.

② Create a new subfolder : after folder selection, you can create multi-level subfolder classes.

③ Rename : Rename the folder.

④ Open local path of folder : After folder selection, you can open the local path of this folder.

⑤ Delete : You can only delete the directory. If you want to delete local original files, you have to check and delete source files in the Settings interface.

4.1.3.3. Rapid analysis

In File Management, you can double-click an image or video file for quick analysis.

Drag an image or video file from the computer to the analysis software for quick analysis.

4.1.4. Thermal image analysis
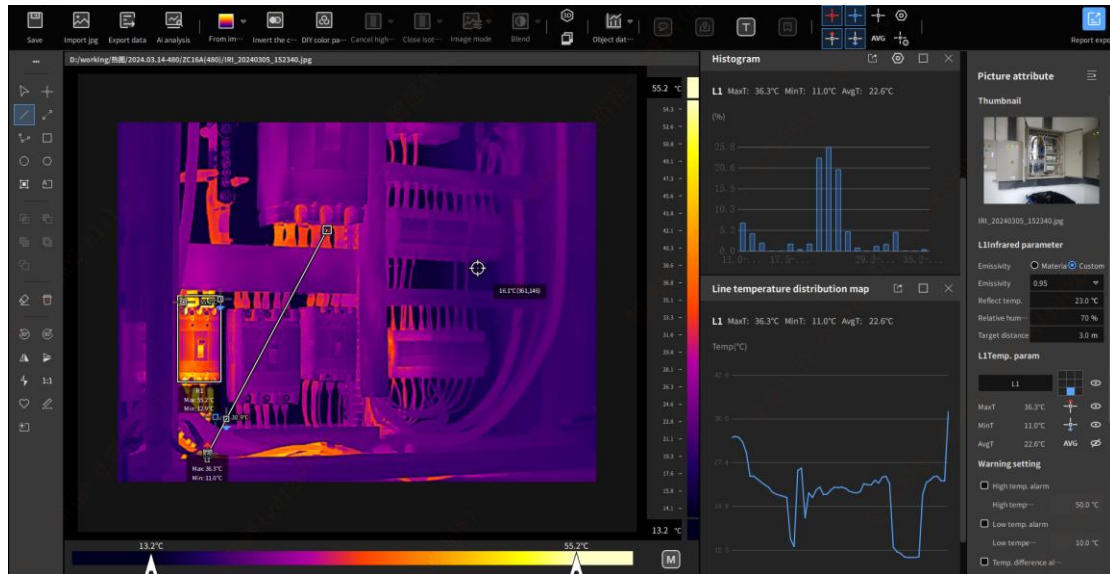
This software supports multiple categories of thermal images for secondary analysis, including analysis object DIY, image dimming (mix/straight/linear), LevelSpan dimming, temperature measurement parameter correction, 3D/straight/linear temperature image, etc.

4.1.4.1. Analytical tools

1. Point (P), line (L), rectangle (R), circle (C), polygon (S)

[icons], [icon], [icon], [icon], [icon]: After pressing the analysis object button, you can add a movable analysis object to the thermal video or thermal image.

How to use:

Draw a rectangle: first left click and select the temperature measurement analysis object rule, then left click the thermal image and drag it diagonally downward to the right to automatically generate a rectangular temperature measurement area; Click the rectangular temperature measuring area, and adjust the size of the rectangular temperature measuring area upward, downward, leftward and rightward. Alternatively, you can click the rectangular temperature measuring area first, and then long press the left mouse button to move on the thermal image and change the position of the rectangular temperature measuring area.
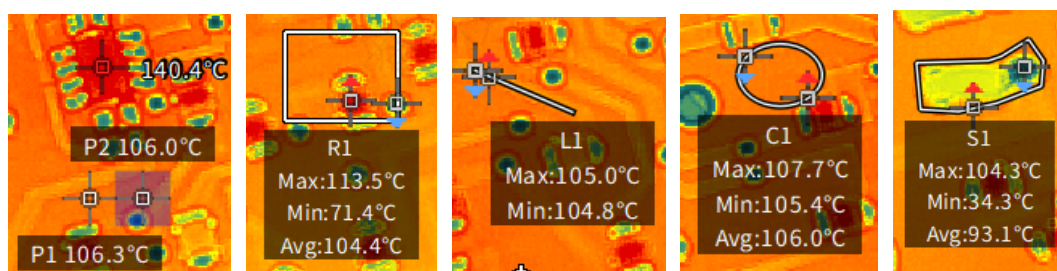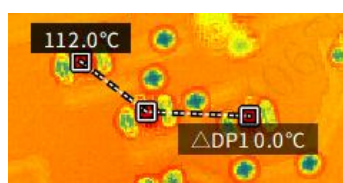
2. Temperature difference line (△DL)

: After enabling this icon, you can add a movable temperature measuring line with adjustable size and direction on the thermal image, and calculate the difference between the highest temperature and the lowest temperature of the temperature measuring line.
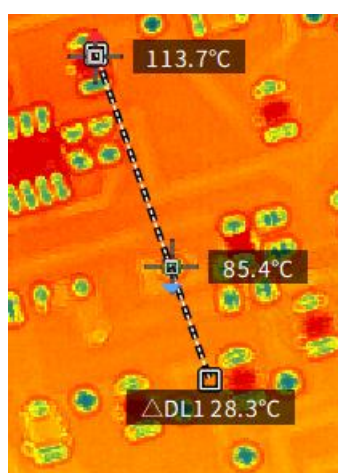
## 3. Multi-point temperature difference line (△DP)

: After enabling this icon, you can left click multiple points to automatically form a polyline. You can move and adjust the position of each point, and calculate the difference between the maximum and minimum values of all points on this polyline.

4. Stroke (O)

: After enabling this icon, you can left click on the thermal image and then release. The

software can intelligently select the object outline according to the currently drawn object.
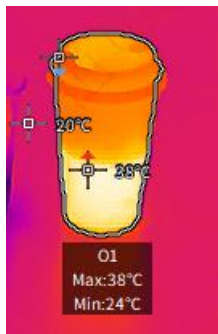
5. Fast three-phase (Q)

: After enabling this icon, you can add a movable rectangular temperature measurement area with adjustable size and direction on the thermal image, and automatically name as Phase A, Phase B and Phase C in sequence.

6. Intersection set, difference set, union set and XOR (X)

You can stitch the closed area or shield the interference area, customize the analysis object area, or integrate into a new analysis object.
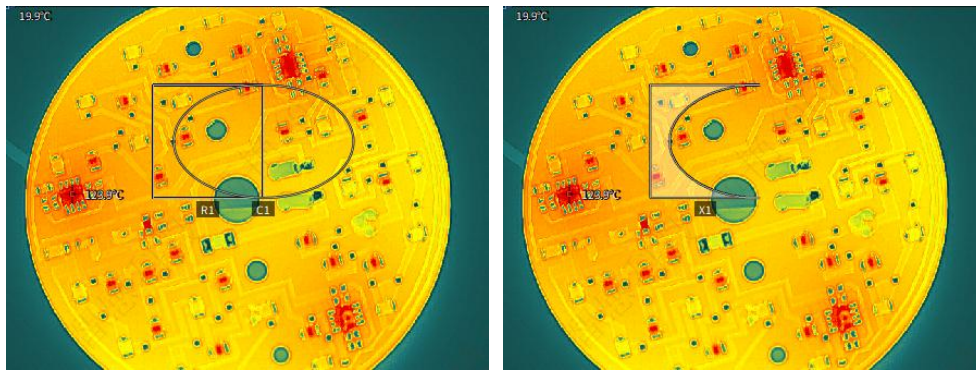
: Intersection Set. First, select an area object, click the Intersection icon and then select the object to perform intersection operation to generate a combined object.

Example: As shown in the figure, there are two area objects R1 and C1. Intersection operation on R1 and C1 will generate a new area object X1.
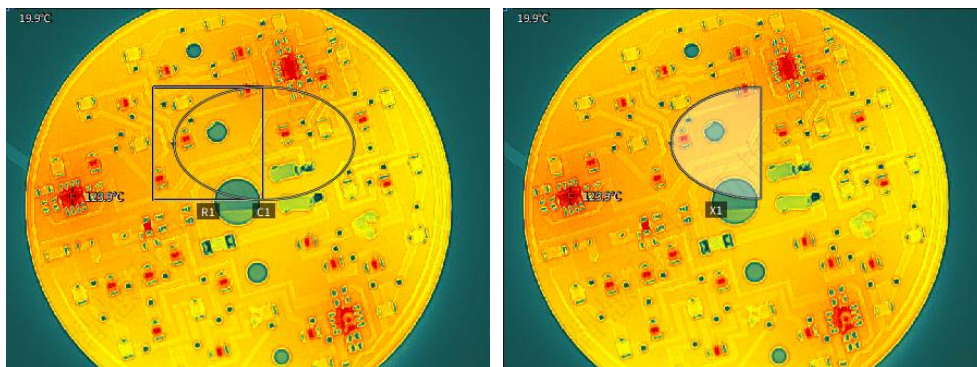

: Difference Set. First, select an area object, click the Difference Set icon, and then select the area object to perform the Difference Set operation to generate a combined object.

: Union. First, select an area object, click the union icon, and then select the area object to perform union operation to generate a combined object.
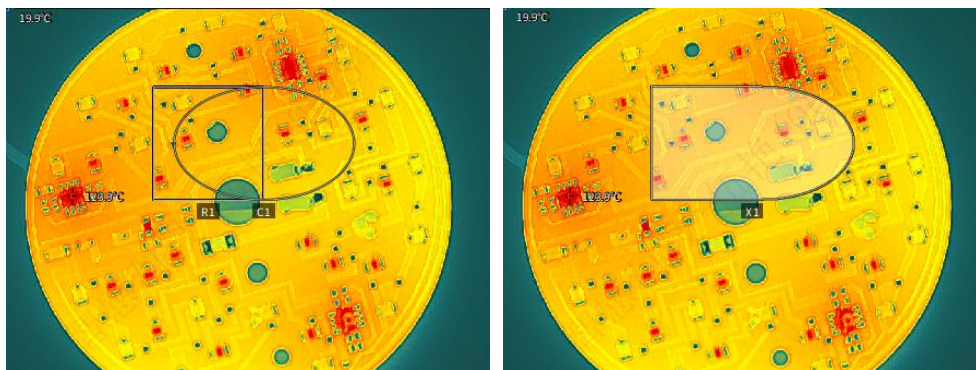
: XOR. First, select an area object, click the XOR icon, and then select the area object to perform XOR operation to generate a combined object.
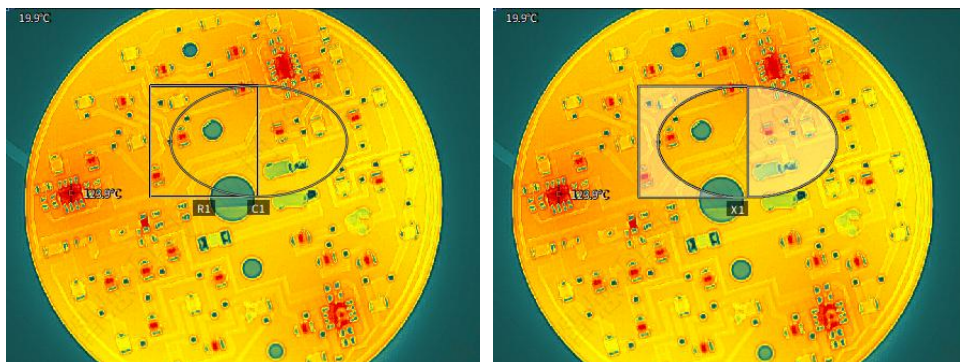
: Ungroup. There is a combined object X1 in the image, which was created by XOR operation on two area objects R1 and C1. You can ungroup the combination into R1 and C1 by Ungroup.

7. Delete a single analysis object

: After analysis object selection, you can clear the display of this analysis object on the image.

8. Clear the analysis objects

: You can clear all the analysis objects on the image.

9. Counterclockwise rotation by 90°.

: Rotate the image 90° counterclockwise, and map the temperature data synchronously.

10. Clockwise rotation by 90°

: Rotate the image 90° clockwise, and map the temperature data synchronously.

11. Horizontal flip

: Flip the image horizontally along the central axis, and map the temperature data synchronously.

12. Vertical flip

: Flip the image vertically along the central axis, and map the temperature data synchronously.

13. Diagonal flip

: Flip the image diagonally along the central axis, and map the temperature data synchronously.

14. 1:1

: After electronic magnification and minification of an image, it can be restored to the optimal display area at 1:1.

15. Collection

♡ : After enabling the collection icon, you can filter by collection status in File Management.

16. Ruler

✎ : You can define the ruler distance, calculate the corresponding straight line length for line segments, broken lines, rectangles and polygons, and analyze the fault length.

After enabling the icon, you can draw a ruler at the specified position of the image with the mouse, and click to set ruler length.
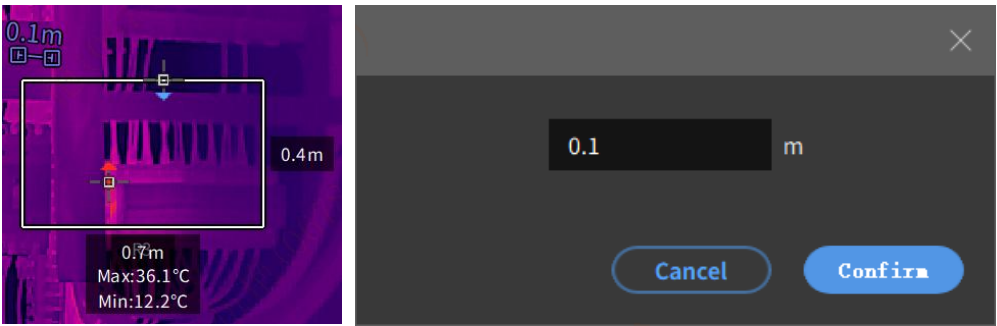
17. Local dimming

▣ : Real-time local dimming tool. After enabling the icon, you can draw a rectangular area, and change its position and size. The current image will be dimmed in real time according to the temperature width of this area, so as to highlight the contrast of the local target.

4.1.4.2. Analyze the position and color of the object
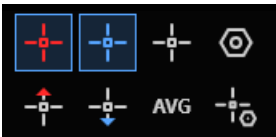
① Cursor tracking : to control and display the high temperature, low temperature, central temperature cursors and temperature values of the whole image; : to control the display of high temperature, low temperature and average temperature of the analysis object.

② Color, size and coordinates of the analysis object : to set the 9 directions such as shape color, text color, font size, coordinates and temperature of the analysis object, or automatic display of the orientations.

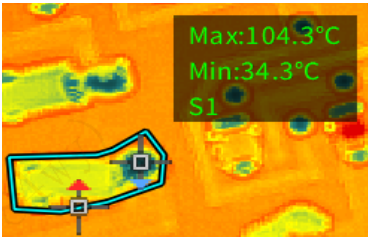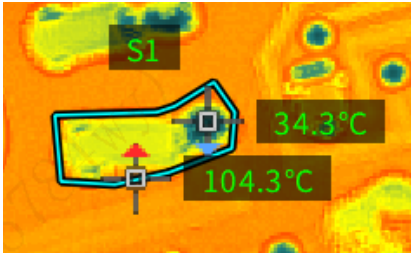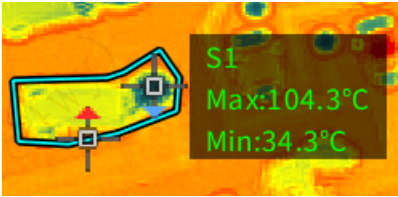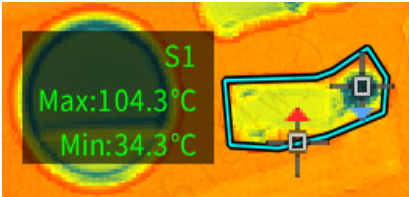(Lower) (Upper)

(Upper right) (Automatic)

(Right) (Left)

③ Batch set of analysis objects : to set the temperature measurement

parameters of analysis objects in batches, e.g. emissivity, distance, etc. and conduct secondary temperature measurement analysis quickly.

4.1.4.3. Mix/linear/straight dimming

● Dimming mode [icon] : 3 dimming modes, including mix dimming, linear dimming and straight dimming. Depending on target scenes, you can choose an appropriate dimming method to highlight the target contrast.

4.1.4.4. LevelSpan dimming

● LevelSpan: support [A] (automatic) mode and [M] (manual) mode to quickly adjust the level and span, and can quickly find the area of interest and map it with the corresponding color.

4.1.4.5. Color highlighting

Set color highlighting to highlight the areas that meet the highlighting conditions with the currently selected color palette, so that you can easily view the temperature details of the highlighted area. It supports high temperature highlighting, low temperature highlighting, highlighting within the range, highlighting outside the range, and canceling the highlighting. After turning it on, the range proportion of the highlighted range is displayed synchronously.

Note: Only images taken by some models support this function. Please refer to the actual interface.

Set color highlighting

1. In the toolbar above the image/video analysis interface, left-click the color highlight drop-down box and select the desired highlighting type.

2. After selecting the highlighting type, the relevant parameters are displayed in the property bar on the right. You can set the corresponding temperature range. The temperature area within the set threshold range is mapped and displayed with the currently selected pseudo color, and the area outside the set threshold range is displayed in the form of visible light.

Highlight type

① High temperature highlight: You can set the high temperature threshold and display the

proportion of the high temperature range. The pixels in the picture that are higher than the current threshold are mapped with the currently selected pseudo color, and other areas are displayed in the form of visible light;

② Low temperature highlight: You can set the low temperature threshold and display the proportion of the low temperature range. The pixels in the picture that are lower than the current threshold are mapped with the currently selected pseudo color, and other areas are displayed in the form of visible light;

③ Highlight within the interval: You can set the high and low temperature thresholds and display the proportion of the range within the interval. The pixels in the picture within the interval threshold are mapped with the currently selected pseudo color, and other areas are displayed in the form of visible light;

④ Highlight outside the interval: You can set the high and low temperature thresholds and display the proportion of the range outside the interval. The pixels in the picture outside the interval threshold are mapped with the currently selected pseudo color, and other

areas are displayed in the form of visible light.

4.1.4.6. Isotherms

: support the low isotherm, high isotherm, in-interval isotherm, out-of-interval isotherm and closing isotherm. Simultaneously display the average temperature of isotherm interval and the temperature proportion data in this interval.

① Low isotherm : low temperature isotherm button of infrared video or infrared image. After clicking, you can fill in the lowest temperature value and set the temperature range. As long as the temperature value of the pixel on the infrared image is below the lowest temperature range, the color of this area will be displayed in the corresponding color.
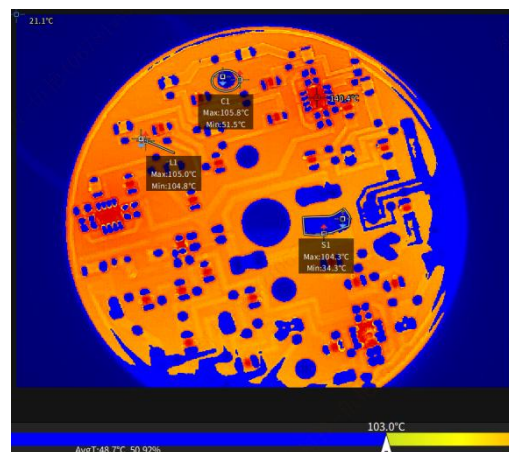
② High isotherm : the high temperature isotherm button of infrared video or infrared image. After clicking, you can fill in the value of the highest temperature and set the temperature range. As long as the temperature value of the pixel on the infrared image is above the highest temperature range, the color of this area will be displayed in the corresponding color.
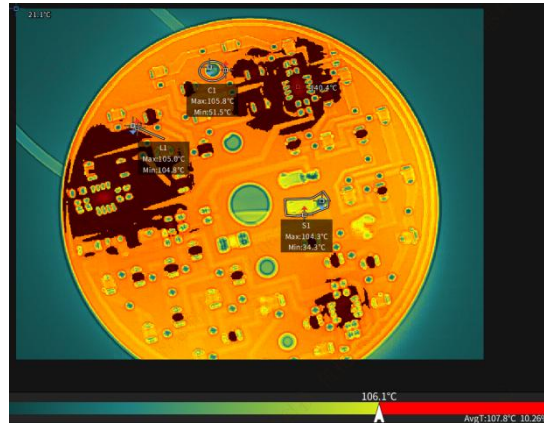
③ In-interval isotherm : the in-interval isotherm button of infrared video or infrared image. After clicking, you can fill in the values of the lowest temperature and the highest temperature, and set the temperature range. As long as the temperature values of the pixels on the infrared image are within the lowest and highest temperature ranges, the colors in this area will be displayed in the corresponding colors.
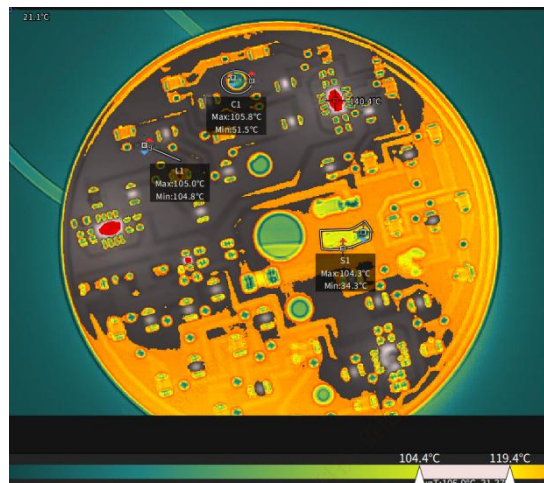
④ Out-of-interval isotherm : the out-of-interval isotherm button of infrared video or infrared image. After clicking, you can fill in the values of the lowest temperature and the highest temperature, and set the temperature range. As long as the temperature value of the pixel on the infrared image is below the lowest temperature or above the highest temperature, the color of this area will be displayed in the corresponding color.
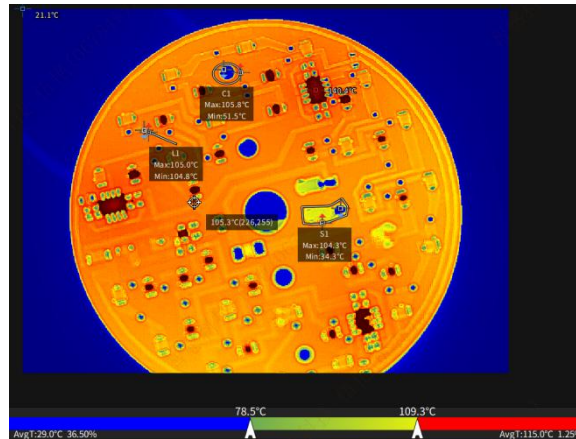
4.1.4.7. Image Mode

Supports selection of different image modes, such as IR, MIF, PIP, VL, etc., which is related to the device model to which the image belongs. Images taken by different models of devices support different modes. Here, display settings are made according to the image mode supported by the device corresponding to the image.

Note: Only images taken by some models support this function. Please refer to the actual interface.

In the toolbar above the image/video analysis interface, click the image mode drop-down box to select a different image mode.

① IR mode: Display thermal imaging images;

② MIF mode: Display images based on thermal imaging and fused with visible light contours. The fusion alignment and enhancement coefficient can be adjusted manually;

- Manually adjust fusion alignment: Click the fusion alignment button , long press the image area in the screen, and drag the visible light contour to align the thermal imaging image and the visible light contour

- Adjust the enhancement coefficient: Click the enhancement coefficient button , move the adjustment slider left and right to change the enhancement coefficient. The larger the value, the clearer the contour

③ PIP mode: Display visible light and infrared fusion images in a picture-in-picture format.

The position, size and transparency of the picture-in-picture infrared image can be adjusted;

- Adjust the size and position of the picture-in-picture: Long press the left button to move the infrared image area of the picture-in-picture, click the infrared image area of the picture-in-picture, and drag any node on the infrared image to change the infrared image area and size

- Adjust the transparency of the infrared image: Click the opacity button , move the adjustment slider left and right to change the transparency of the infrared image. The smaller the value, the higher the transparency of the infrared image and the more

obvious the visible light effect

④ VL mode: Display visible light images.

4.1.4.8. Palette/inverted palette/DIY palette

① Replace the palette ▦ : to map different palette effects on the image in real time.

② Invert color palette ▦ : to invert all color palettes and map the high and low temperature colors on the image in an inverted manner.

③DIY palette ▦ : to DIY and edit palette color values. You can view the imaging effect in real time.

After selecting the custom palette, click "Synchronize to Device" to synchronize to the camera (some models support this function).
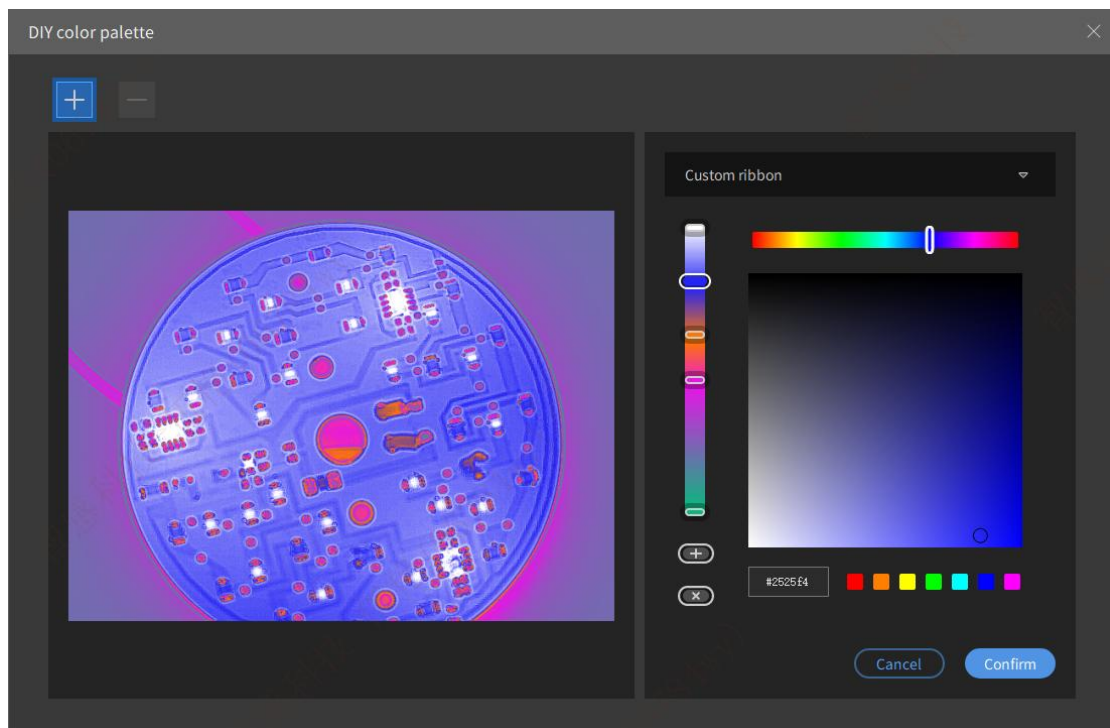
4.1.4.9. 3D mode

▦ : to show the 3D mode diagram indicating the current whole-image temperature.
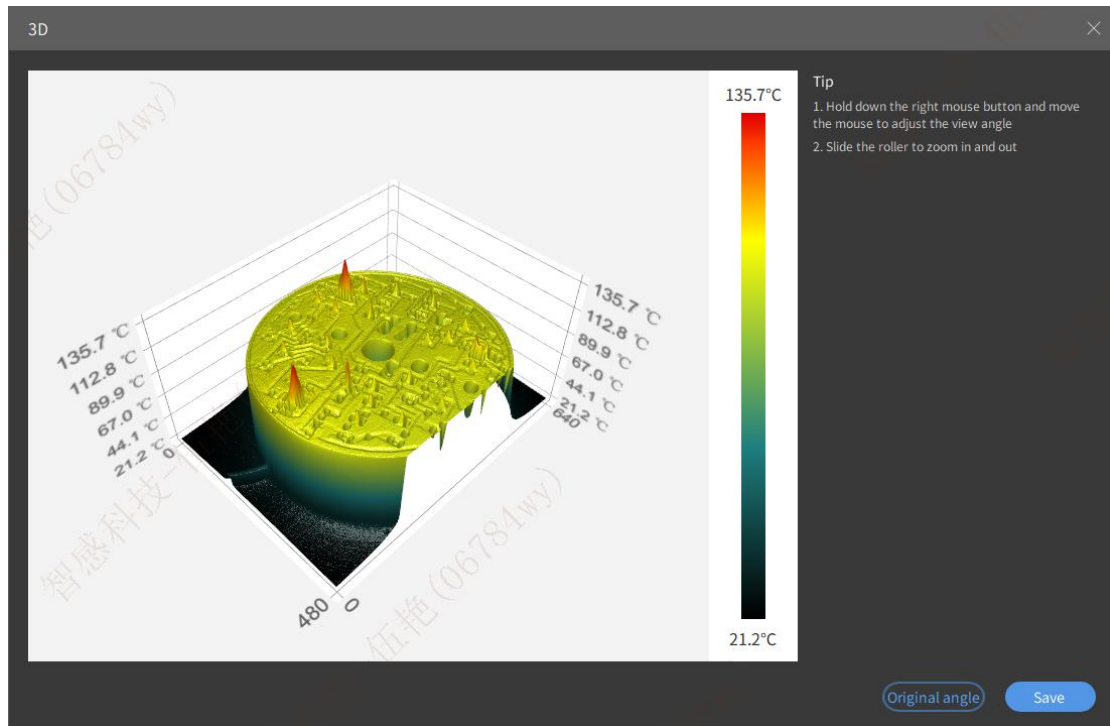
Left click to display the coordinates and temperature.

Right-click and hold the canvas area, for moving up, down, left and right to adjust the view.

Press Ctrl+C to quickly copy images to a third-party clipboard.

4.1.4.10. Fusion

: The infrared thermal image and the corresponding visible light image are manually fused and aligned by selecting 3 registration points.
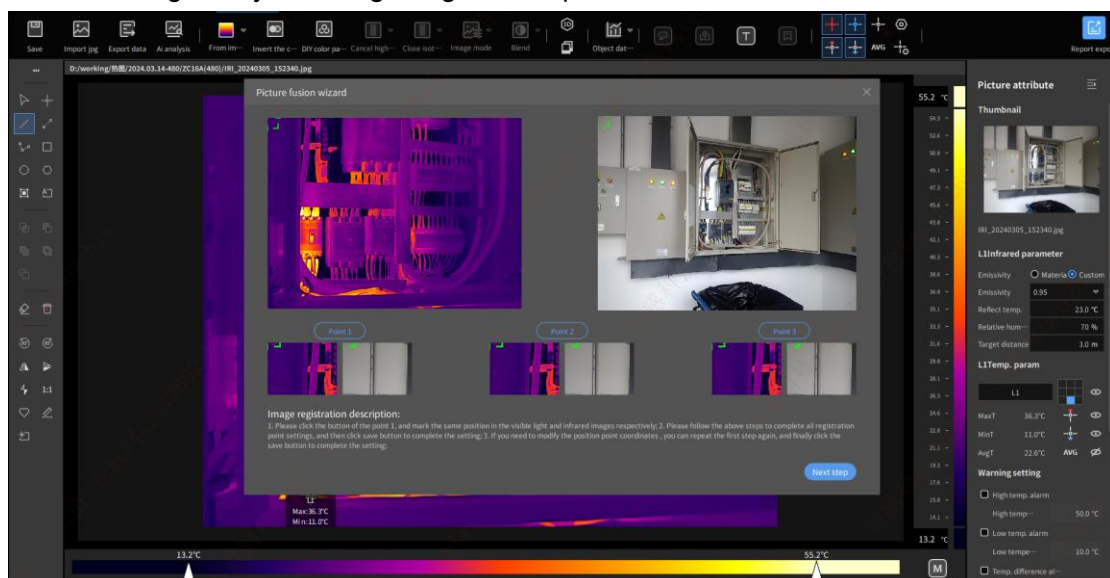
Select the "first position point": left click to select the position in the infrared thermal image, and then select the position corresponding to the same target in the visible light

image.

Likewise, select the second and third position points, and select the infrared and corresponding visible light target positions.

Click Next to realize the fusion and adjust the transparency of the corresponding visible light and infrared.

4.1.4.11. Voice/map/text notes

: voice notes. Get the voice notes entered when taking images on the device, view and download them.

: map notes. If the positioning information is turned on when the device is taking images, you can get the positioning and display it on the map.

: text notes. When the device is taking images, text notes can be made. You can get the text notes, which can be modified and used for reporting.

4.1.4.12. Linear temperature distribution map

: to view the change trend of thermal gradient of the detection target. It only supports line analysis objects and indicates the temperature change of points on the line analysis objects.

: to export data. It supports the export of data sheets or images.

4.1.4.13. Histogram

![icon]: to view the distribution percentage and average temperature data of non-point analysis object temperature data, in pixels. It supports automatic and manual grouping.

You can manually customize the temperature intervals, and view the temperature distribution in different temperature intervals.
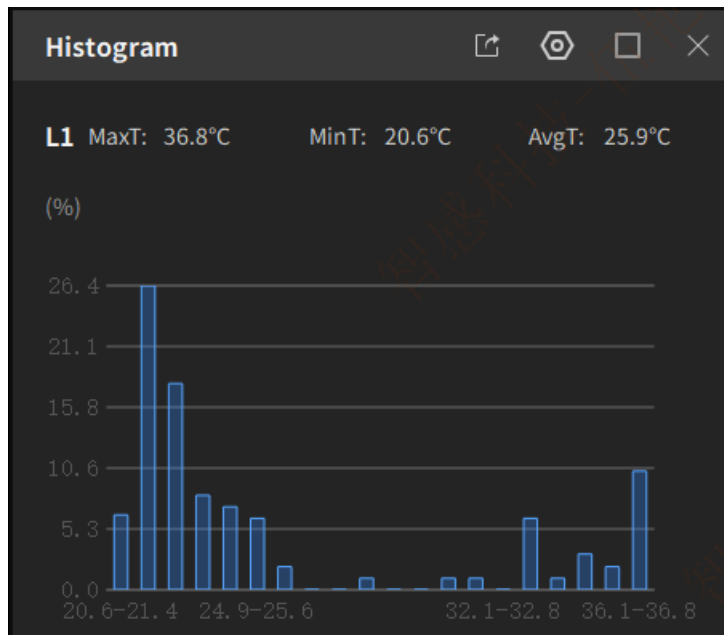
![icon]: To export data. It supports the export of data sheets or images.

![icon]: Histogram temperature custom setting. You can custom horizontal axis temperature interval and vertical axis percentage.

![icon]: View histogram data in large window.

4.1.4.14. Object temperature data

: High temperature, low temperature and average temperature data list of all analysis objects.

Data export. It supports exporting object temperature data table.

4.1.4.15. Regional Isotherms

Set the isotherm parameters of the currently selected analysis object. When turned on, the pixels in the area within the set temperature upper limit will be displayed in red, and the pixels in the set temperature lower limit will be displayed in blue.

Set regional isotherms

1. Draw/select an existing regional analysis object on the image (point and line type analysis objects are not supported), and the property bar on the right will display the analysis object information, including the isotherm of the analysis object;

2. Select the Enable checkbox, and set the regional isotherm type and temperature threshold as needed below. The image will display the temperature distribution according to the set isotherm type and threshold;

Isotherm type

① Upper limit : You can set the upper limit threshold and display the upper limit range ratio. Pixels above the current threshold in the picture are displayed in red, and other areas are displayed according to the current pseudo-color mapping;

② Lower limit : You can set the lower limit threshold and display the lower limit range ratio. Pixels below the current threshold in the picture are displayed in blue, and other areas are displayed according to the current pseudo-color mapping;

③ Within the interval : You can set the upper and lower limit thresholds and display the range ratio within the interval. Pixels within the current threshold range in the picture are displayed in red, and other areas are displayed according to the current pseudo-color mapping;

④ Outside the interval : You can set the upper and lower thresholds and display the upper and lower range ratios. Pixels above the upper threshold in the picture are displayed in red, and pixels below the current threshold are displayed in blue. Other areas are displayed according to the current pseudo-color mapping.

4.1.4.16. Temperature measuring parameters

① Emissivity

Emissivity is defined as the ratio of the energy radiated from an object's surface to the energy radiated from a blackbody at the same temperature and wavelength. It supports material setting and custom emissivity setting.

! Note: The emissivity of the material is a key factor for the thermal imaging camera's accurate temperature measurement of the measured object. The emissivity of analysis software can be set as two types: full-screen emissivity correction and partition emissivity correction.

② Reflection temperature

The reflection temperature is used to compensate or correct the thermal radiation reflected on the measured object. If the measured object has a low emissivity and the actual temperature is much lower than the temperature of its reflection source, it will be crucial to set this parameter correctly and compensate the reflection temperature for accurate temperature measurement.

! Note: If the field test conditions permit, less or no reflection interference will greatly

improve the measurement accuracy.

③ Atmospheric temperature

Atmospheric temperature is the temperature of air between the camera lens and the target object.

! Note: The atmospheric temperature is a default value of the system. This parameter will be set only when the atmospheric temperature is higher than the actual temperature of the measured object.

④ Atmospheric transmittance

Atmospheric transmittance will cause different degrees of attenuation when infrared radiation of the target is transmitted in the atmosphere, where it interacts with the absorption and scattering of atmospheric components (gas molecules such as water, carbon dioxide and aerosol).

⑤ Object distance

Object distance is defined as the distance between the measured object and the camera lens.

The thermal radiation absorbed by the atmosphere between the target and the camera lens in the thermal radiation from the measured object;

Thermal radiation from the atmosphere itself and detected by the thermal imaging camera.

! Note: The measurement distance is usually set as the default value of the infrared thermal imaging camera when the distance is short or less than the farthest accurate temperature measurement distance of the thermal imaging camera.

⑥ Relative humidity

Thermal imaging camera can make up for the local influence of air relative humidity on thermal radiation transmission. So it is important to set the relative humidity to the correct value.

! Note: In the case of short distance and normal humidity, relative humidity is usually set as the default value of infrared thermal imaging camera.

⑦ Optical transmittance

External optical transmittance refers to the transmittance of any external lens or infrared window used in front of the camera lens.

! Note: If the optional external optical lens has been calibrated in the factory, or there is no external infrared window, the external optical transmittance is generally set as the default value of the infrared thermal imaging camera.

⑧ External optical temperature

The purpose of external optical temperature setting is to compensate or correct the influence of the temperature of the external optical device itself on the measured object.

! Note: This function will only be set when the temperature of external optical device is higher than the temperature of the measured object. In general, it is set to the default value.

⑨ Dew point

When the water vapor content in the air and the air pressure kept constant, the temperature at which the air is cooled to saturation is defined as dew point. Dew point will be automatically calculated according to the corresponding parameters.

4.1.4.17. Calculation of temperature difference

ΔT : Select the interested detection objects and calculate the temperature difference between different targets or constants.

Temperature difference data		
S/n	**Name**	**Temperature**
1	R1.Max-R2.Max	2.6℃
2	R1.Max-L1.Max	18.4℃
3	R1.Max-R3.Min	43.0℃

: to export data. It supports the export of data sheets or images.

4.1.4.18. Calculation of local area

: With pixel size, focal length, ranging and other parameters, you can calculate the area and proportion of local objects in real time, and estimate the defect area of the detection object.

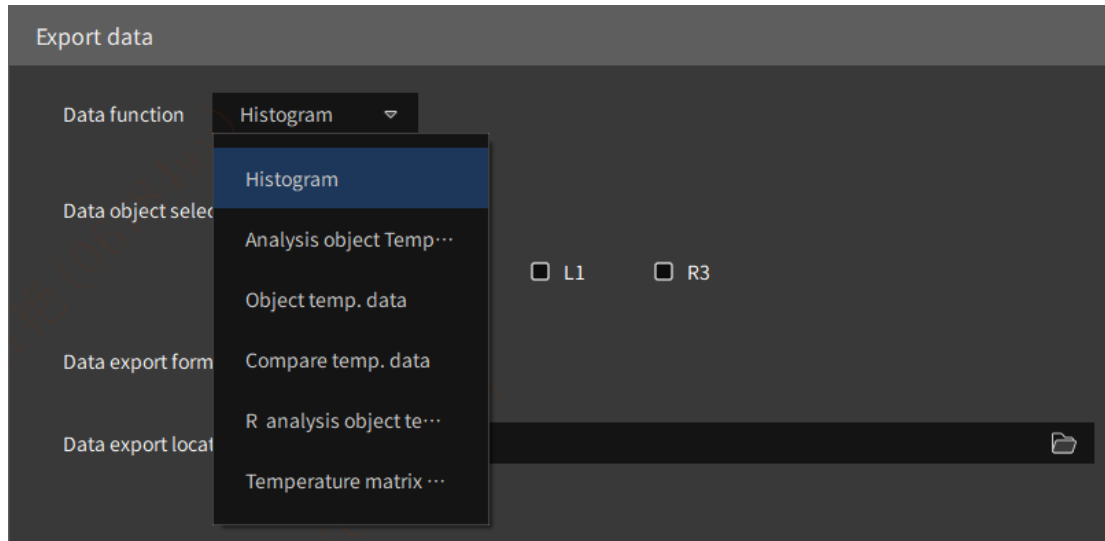| Area of region			
Pixel size:		12 µm	
Focal length:		25 mm	
Distance:		5 m	
S/n	**Name**	**Area**	**Proportion**
1	R1	0.0170m²	1.71%
2	R2	0.0165m²	1.65%
3	R3	0.0676m²	6.79%

: to export data. It supports the export of data sheets or images. The area unit can be changed in the settings.

4.1.4.19. Export the temperature data

[icon]: The full image temperature data matrix is exported in a customized way, e.g. histogram, contrast temperature data, full-image temperature matrix data, etc. It supports export of tables and images.

Export data

Data function	Histogram ▽
	Histogram
Data object selec	Analysis object Temp···
	Object temp. data □ L1 □ R3
Data export form	Compare temp. data
	R analysis object te···
Data export locat	Temperature matrix ···

4.1.4.20. Save the image

① Add watermark information: In the settings, you can customize the saved image watermark information, such as logo, ribbon, ranging, etc.

55.6℃

55.2℃

R1
Max:37.6℃
MP1 24.2℃

ε 0.95   □ 10.9℃

📅 2024-03-05

🌡 3.0m

11.4℃
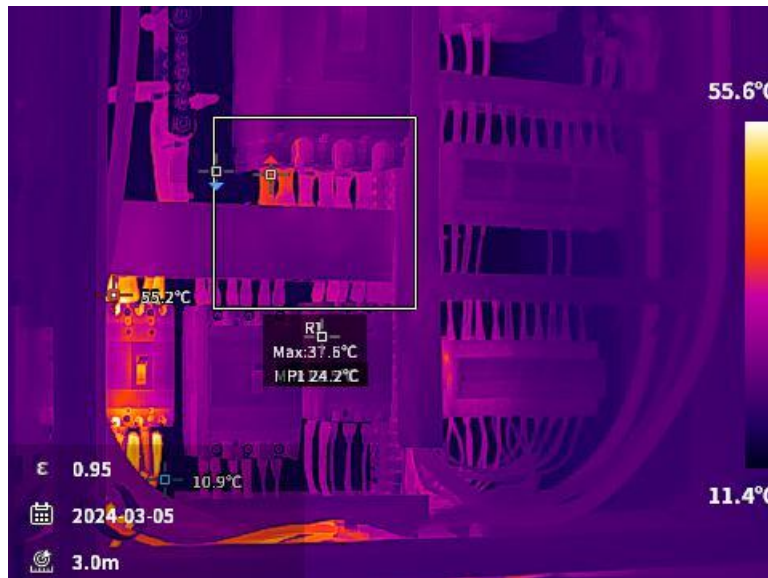
② Save as file: It supports path selection to save the modified image

③ Shortcut key: Ctrl+C, which can quickly copy the current image to the third-party shearing board in the image analysis interface. Such image will not support secondary analysis.

2024/03/05 15:23:40

R1
Max:33.3°C
Min:12.8°C

L1
Max:36.8°C
Min:20.6°C

R3
Max:36.1°C
Min:12.2°C

R2
Max:52.5°C
Min:12.0°C

10.9°C

IRI_20240305_152340.jpg

4.1.5. Acoustic analysis

Supports secondary analysis of acoustic images (pictures and videos) taken by acoustic thermal imagers, including analysis tools, cloud map palette, opacity, positioning map, acoustic spectrum, intelligent analysis and image attributes.
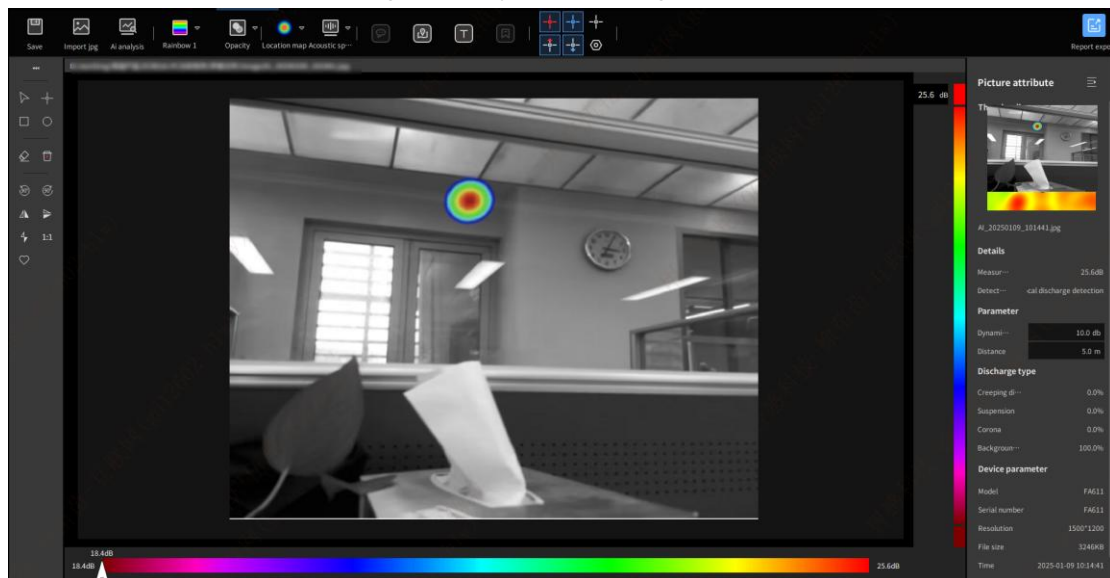
4.1.5.1. Measurement tools

Supports point, rectangle, and circle analysis tools; supports moving, modifying, and deleting analysis objects; supports rotating and flipping images (not supported for videos).
1. Add analysis object
Add one or more analysis objects to the image to perform sound pressure analysis.

- Point: Click ⊹ anywhere on the image to add a point analysis object

- Rectangle: Click ▢ , hold down the left mouse button and drag on the image to add a rectangular analysis object

- Circle: Click ○ , hold down the left mouse button and drag on the image to add an ellipse/circle analysis object

2. Editing Analysis Objects

- Change the size of the analysis object: Click ▷ to select any analysis object on the image, drag the nodes on the analysis object to adjust the size of the analysis object

- Change the position of the analysis object: Click ▷ , select any analysis object on the image and drag it to a new position

3. Deleting an analysis object

- Delete selected: Click ▷ to select any analysis object on the image and then click ◇ to delete the current analysis object.

- Delete All: Click ▣ to clear the analysis objects on the current image.

4. Rotate/flip image

- Rotate: Click 🔄 to rotate the image 90° counterclockwise, click 🔄 to rotate the image 90° clockwise

- Flip: Click ◭ to flip the image vertically, click ▷ to flip the image horizontally, click ⚡ to flip the image diagonally

4.1.5.2. Sound pressure range

The sound pressure range of the sound pressure cloud map refers to the maximum and minimum sound pressure values represented by the cloud map palette.
Drag the slider below to adjust the sound pressure range.

4.1.5.3. Cloud Atlas Palette

The color combination displayed on the cloud map is called a palette. Different colors in a palette represent different sound intensities. 12 palettes are supported. Users can choose

the appropriate palette according to actual conditions to better highlight the sound source location and intensity of the target being measured.

Click ![icon] the drop-down menu to select the desired color palette.

4.1.5.4. Opacity

Adjust the opacity of the cloud map. The smaller the value, the more transparent the cloud map is , and more details of the image can be seen.

Click ![icon] , and the transparency condition slider will be displayed below. Drag the slider left or right to adjust the opacity.

4.1.5.5. Positioning map

Check the location and shape of the sound image cloud map in the image, including pseudo sound image, real cloud map, and full-field sound source map.

- Click ![icon] the drop-down menu to select the desired location map.

- Pseudosonogram ![icon]: A circular sonogram based on the rule of drawing the maximum sound pressure in the center

- Real cloud map ![icon]: draw irregular cloud images based on the sound pressure value within the actual sound field range

- Full-field sound source map ![icon]: Get the full-field sound source

4.1.5.6. Acoustic Atlas

View various acoustic spectra generated by the current image to assist in analysis and diagnosis, including PRPD, spectrum diagram, time-frequency domain diagram, and time domain diagram.

Click ![icon] the drop-down menu to select the graph you want to view. You can select multiple graphs. The selected graphs will be displayed in the right pane.

- **PRPD (Phase Resolved Partial Discharge):** Phase-resolved partial discharge graph, showing the correlation between the discharge signal and the power phase. The horizontal axis represents the discharge phase (0°~360°), and the vertical axis represents the discharge amplitude. By statistically analyzing the distribution density of discharge events in the phase, a scatter plot is formed to help identify the discharge type. It is usually used to analyze partial discharge phenomena in the

insulation system of electrical equipment.
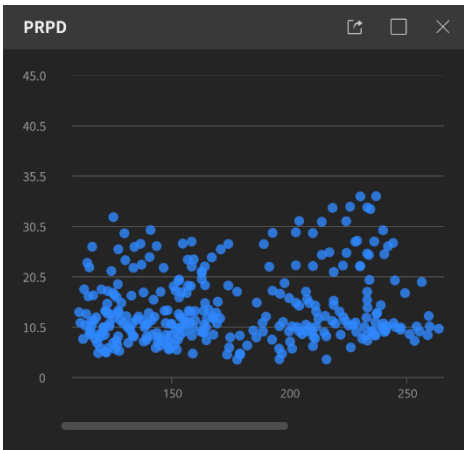
- **Spectrum:** Displays the relationship between signal frequency and energy. The horizontal axis represents frequency and the vertical axis represents amplitude. It displays the frequency components contained in the signal and their relative strength in a bar graph to help identify the characteristic frequencies in the signal.
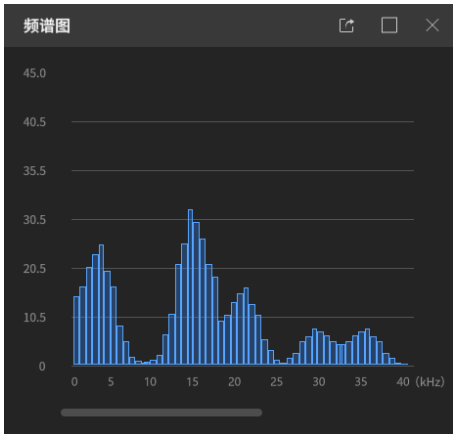
- **Time-frequency domain graph:** This graph displays the changes in numerical intensity across the entire frequency domain during the sampling time. The horizontal axis represents time, and the vertical axis represents frequency. Different loudness gradients are distinguished by color intensity. The horizontal axis represents the sampling time (s), and the vertical axis represents the sampling frequency range (Hz). The diagram on the right shows the relationship between color and signal intensity.
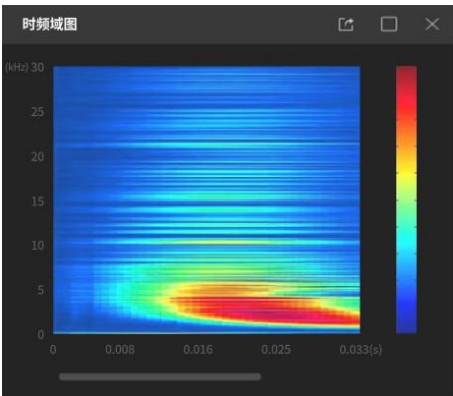
- **Time domain graph:** A representation of a signal on a time axis, showing how the

signal changes over time; the horizontal axis represents time and the vertical axis represents amplitude
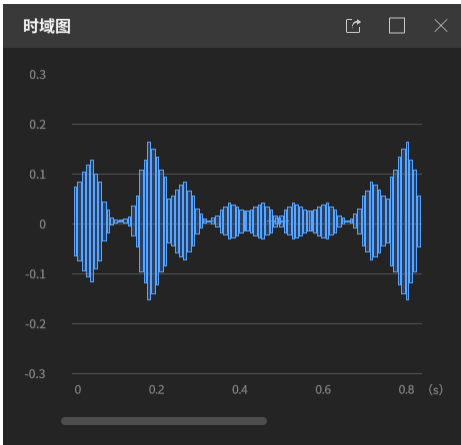
4.1.5.7. Smart Analysis

Automatically diagnose based on acquired image data, and give diagnostic results and suggestions, which can be used to generate reports.

Click the Smart Analysis button on the toolbar at the top of the interface The obtained diagnostic results and suggestions are displayed in the right pane and can be modified.

4.1.5.8. Image/Video Properties

The image properties are displayed on the right side of the interface, including thumbnails (not available for video analysis), detailed information, parameter information, detection type (discharge analysis, leakage analysis, mechanical testing) and device information. The displayed analysis results vary depending on the detection type selected when the image is taken. When the detection type is partial discharge detection , the discharge type analysis results are displayed below; when the detection type is leakage detection, the leakage analysis results are displayed below; when the test type is mechanical test, the analysis results are not displayed below.

1. More Information

Displays the collected audio and video data, sound pressure value and detection type,

and supports the setting of acoustic parameters (dynamic range and distance).

- Measure dB: Displays the maximum sound pressure value of the current image acquisition
- Detection mode: Get the detection mode of the current image

2. Parameter information

Supports acoustic parameter settings, dynamic range and distance. Different detection types support different parameter settings. Please refer to the actual page for details.

- Dynamic Range: The maximum and minimum sound intensity values represented by the cloud palette . You can reduce this range to obtain the exact location of the sound source, or increase the range to see if there are multiple sound sources. The input range is: 0~the maximum sound pressure value measured by the image-the minimum sound pressure value. You can also slide and adjust it through the cloud color band below the image.
- Distance: Detection target distance, can be modified to obtain more accurate analysis results

3. Discharge type

Based on the full-image acoustic sampling data, the discharge type is automatically diagnosed and evaluated, and the possible percentage of each type of discharge is displayed, while distinguishing the impact of background noise.

4. Leakage analysis

Synchronize variable parameters with collected acoustic data to estimate leak size and cost in real time.

The leakage parameters include energy cost, gas value, specific power and working time, and the analysis results are the expected leakage size and the expected leakage cost.

- Energy cost: Set the energy cost according to the type of gas detected and the currency unit
- Gas value: Set the corresponding gas value according to the detected gas type and currency unit

- Specific power: The ratio of the power generated by a generator, motor or other electrical equipment per unit time to its weight or volume. This indicator reflects the performance and economy of the equipment. The higher the specific power, the better the performance and the more economical the equipment.
- Working hours: Set the annual working hours of the equipment
- Estimated leakage size: Dynamically calculate the leakage value based on the collected sound pressure value and the detection target distance
- Estimated leakage cost: The leakage cost estimate is calculated synchronously based on the calculated leakage value and the maintained parameter value

4.1.6. UV analysis

Supports viewing and analysis of UV images (pictures and videos) taken by thermal imagers with UV modules, including opacity adjustment and UV parameter adjustment.
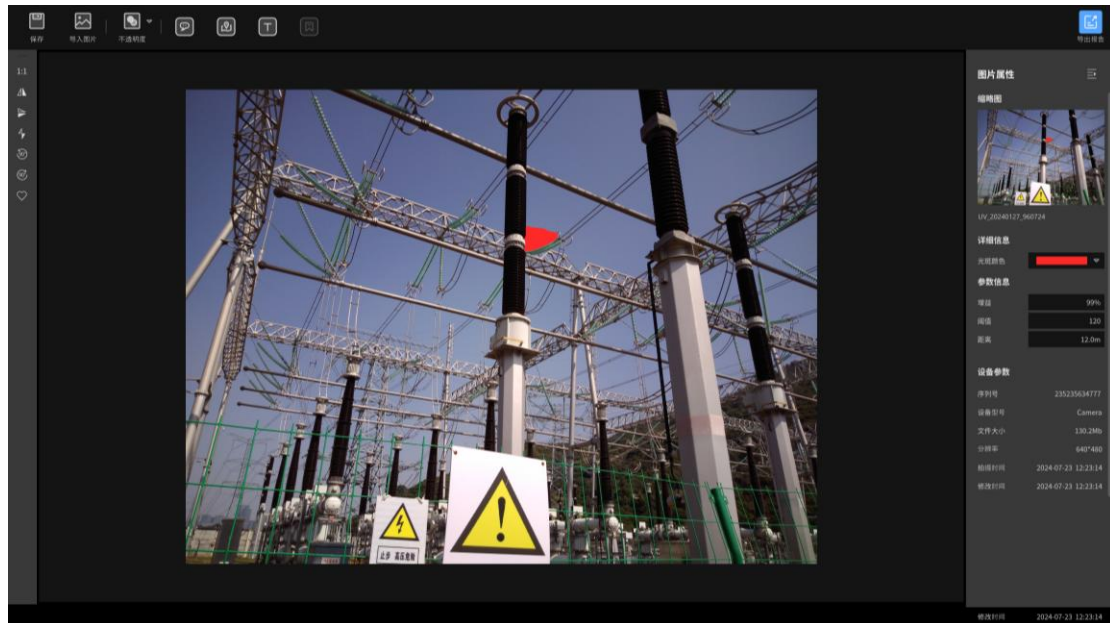
4.1.6.1. Opacity

Adjust the opacity of the UV light spot. The smaller the value, the more transparent the UV light spot is, and you can see more details of the image.

Click , and the transparency condition slide will be displayed below. Drag the slide left and right to adjust the opacity.

4.1.6.2. Opacity

The image properties are displayed on the right side of the interface, including thumbnails (not available for video analysis), detailed information, parameter information, and device information.

1. Detailed information
Displays the collected UV data and supports some parameter settings.
● Spot color: The color of the current UV spot displayed on the image, click to modify.
2. Parameter information
Displays UV parameter information, including gain, threshold, and distance parameters.
● Gain: Displays detection sensitivity. The larger the value, the higher the sensitivity. It can be adjusted in real-time video.
● Threshold: Binarization threshold adjustment, which affects the size of the spot imaging.
● Distance: Displays the distance of the detection target.

4.1.7. Batch analysis

: In the File Management interface, press and hold the left mouse button to move.

After selecting multiple images in batches, click to enter the batch analysis mode.

It supports single processing mode and batch processing mode analysis. One-time batch processing capacity: 100 images.

- Single processing: you can only perform operations on the currently selected single image, such as adding analysis objects, changing color palette, flipping, rotating, etc.
- Batch processing: you can perform batch operations over all images in the current editing area, such as adding points, lines, rectangles, strokes, rotating, flipping, changing color palettes, etc. You can perform one-click operation on all images.
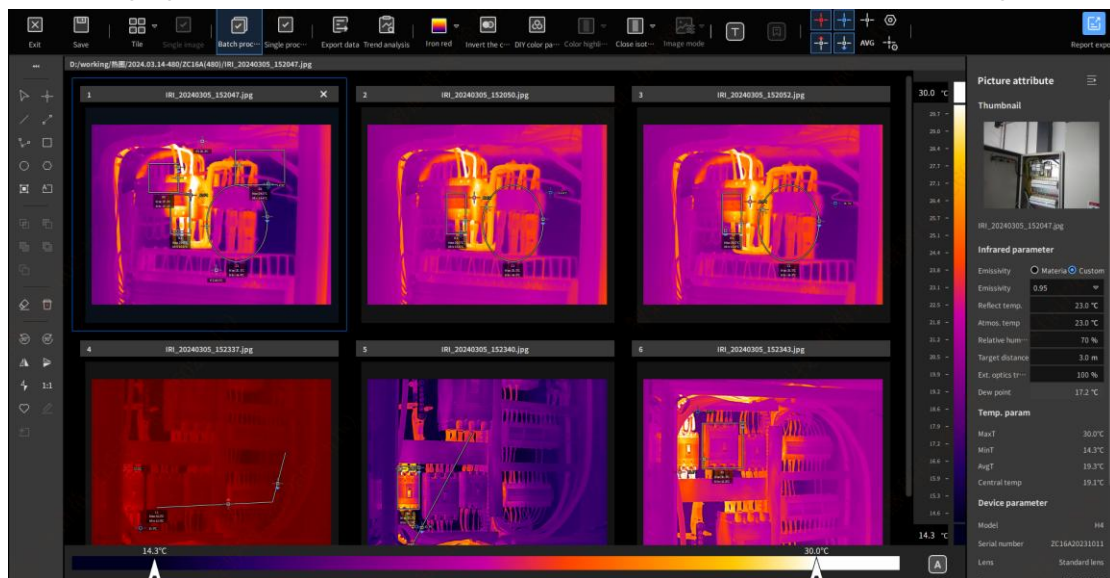
4.1.7.1. Tile/Single Image

Tile is a batch viewing mode of images. It supports 4-column, 3-column and 2-column display.

The batch viewing mode of images is "Single Image". Thumbnails are displayed on the left, and large images are displayed on the right.
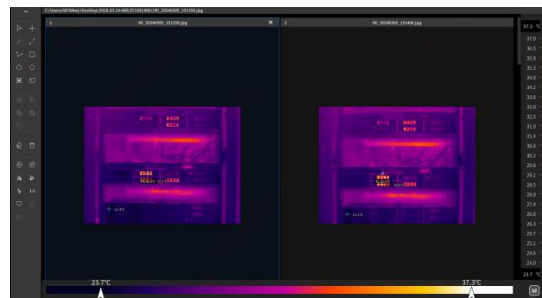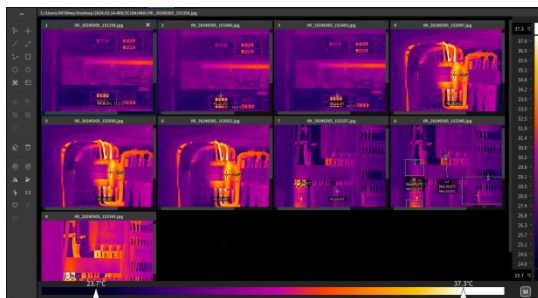
4.1.7.2. Batch add analysis objects

Enable Batch Processing [icon], and click [icon], [icon], [icon], [icon] or [icon] to one-click add the same analysis object in the corresponding positions of all images. Batch addition of points, lines, circles, strokes and other analysis objects.
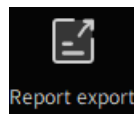
Example: batch processing of one-click adding rectangular analysis objects.

First, enable Batch Processing [icon], then select the rectangular analysis object [icon] in the toolbar, and finally select a thermal image. Long press and draw with the left mouse button to batch add a rectangular object.
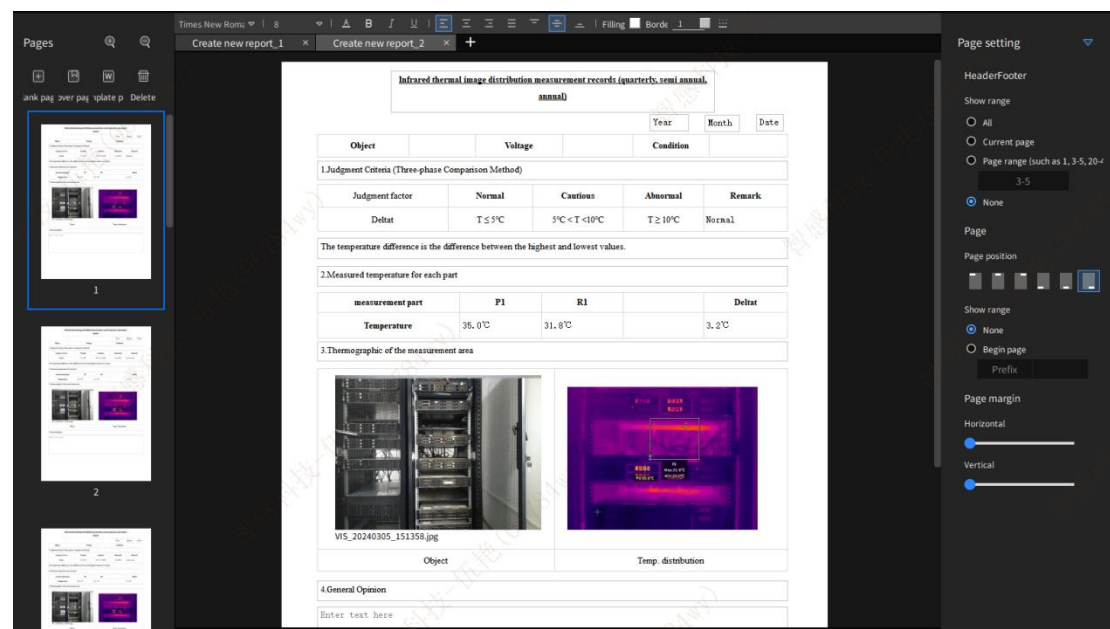
4.1.7.3. Batch analysis report

After one-time batch image analysis (adding interested analysis objects, changing color palette, etc.), you can one-click export the report.

After you batch-draw the analysis objects, the parameters will be automatically filled in the templates built in the system to generate a report.

Click Export Report [Report export icon] to generate the report.

4.1.7.4. Temperature trend analysis

View all the images in sequence, and you can customize the temperature change trend of the corresponding analysis object with time. It can quickly analyze and detect the

temperature change of the target, and give the fault prediction analysis. Both Single Processing and Batch Processing modes are available.
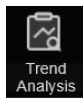
Click Trend Analysis to customize and select objects with the same type and serial number from all the analyzed objects according to the highest temperature, lowest temperature, etc. to generate a temperature trend graph.

4.1.7.5. Batch data export

You can perform batch export of the full-image temperature data matrix.

Click "Export Data" and select "Full-Image Temperature Data" to export the temperature values of all pixels on the image in the form of EXECL.

4.1.8. Video analysis

4.1.8.1. Multi-screen play

Single screen [1 split scr··] and double screen [split screen] display of local total-radiation thermal imaging videos /acoustic video/ultraviolet video are available.

After connecting the thermal imaging camera, you can add measurement and analysis objects, change temperature measurement parameters, set real-time alarm, record and image taking, and create temperature-time curves, line temperature distribution diagrams, histograms, etc.
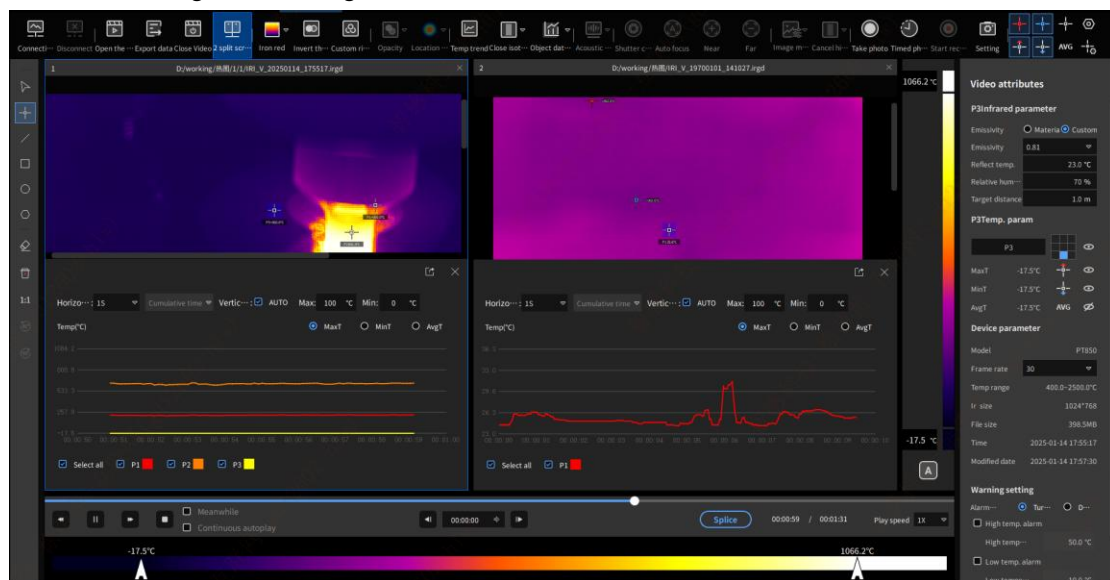
4.1.8.2. Analytical tools

1. Add analysis objects

[icons]: to add analysis objects such as points, lines, circles, rectangles and polygons. You can view the observed target temperature.
Note: UV Video does not support drawing analysis objects.

2. Operate the palette

You can change the video palette information. You can also perform control on the device to change the palette.

① Replace the palette [icon]: to map different palette effects on the image in real

time, UV video is not supported.

② Invert color palette : to invert all color palettes and map the high and low temperature colors on the image in an inverted manner, UV and acoustic video are not supported.

③ DIY palette : to DIY and edit palette color values. You can view the imaging effect in real time, UV and acoustic video are not supported.

3. LevelSpan dimming

Both A (automatic) mode and M (manual) modes are available to quickly adjust the level and span. You can quickly find the area of interest to map with the corresponding color.

Note: UV and acoustic video do not support this function.

4. Color Highlight

Set color highlighting to highlight the areas that meet the highlighting conditions with the currently selected color palette, so that you can easily view the temperature details of the highlighted area. It supports high temperature highlighting, low temperature highlighting, highlighting within the range, highlighting outside the range, and canceling highlighting. After turning it on, the range proportion of the highlighted range will be displayed synchronously.

The specific operation is the same as the color highlighting function in the image analysis, see color highlighting for details.

Note: Only infrared videos taken by some models support this function. Please refer to the actual interface.

5. Isotherms

Supported types: low isotherm, high isotherm, in-range isotherm, out-of-range isotherm and close isotherm. Simultaneously display the average temperature of isotherm interval and the temperature proportion data in this interval.

Regional analysis objects (except point and line analysis objects) support regional isotherms (not supported for real-time videos). The specific operation is the same as the regional isotherms function in image analysis. For details, see Regional Isotherms.

Note: UV and acoustic video do not support this function.

6. Image Mode

Supports selection of different image modes, such as IR, MIF, PIP, VL and other modes. The specific mode is related to the device model to which the image belongs. Images taken by different models of devices support different modes. Here, display

settings are made according to the image mode supported by the device corresponding to the image.

The specific operation is the same as the image mode function in image analysis, see [image mode](#) for details.

Note: Only video taken by some models support this function. Please refer to the actual interface.

4.1.8.3. Object data distribution

View the visualization data of the analysis object chart.

Click the drop-down menu to select the chart you want to view. You can select multiple charts. The selected charts will be displayed in the right pane.

Note: UV and acoustic video do not support this function.

1. Calculation of temperature difference: Given object targets, you can calculate the temperature difference between different objects or constants.

2. Object histogram: to view the distribution percentage and average temperature data of non-point analysis object temperature data, in pixels. Both automatic grouping and manual grouping are available.You can manually customize the temperature intervals, and view the temperature distribution in different temperature intervals. (only applicable to some versions)

3. Line temperature diagram: to view the thermal gradient trend of the line analysis object. It is only applicable to line analysis objects and indicates the real-time temperature change of points on line analysis objects. (only applicable to some versions)

4.1.8.4. Time-temperature trend

: to view the temperature change of the target object drawn on the thermal imaging video (high temperature, low temperature and average temperature) with time.

Note: UV and acoustic video do not support this function.
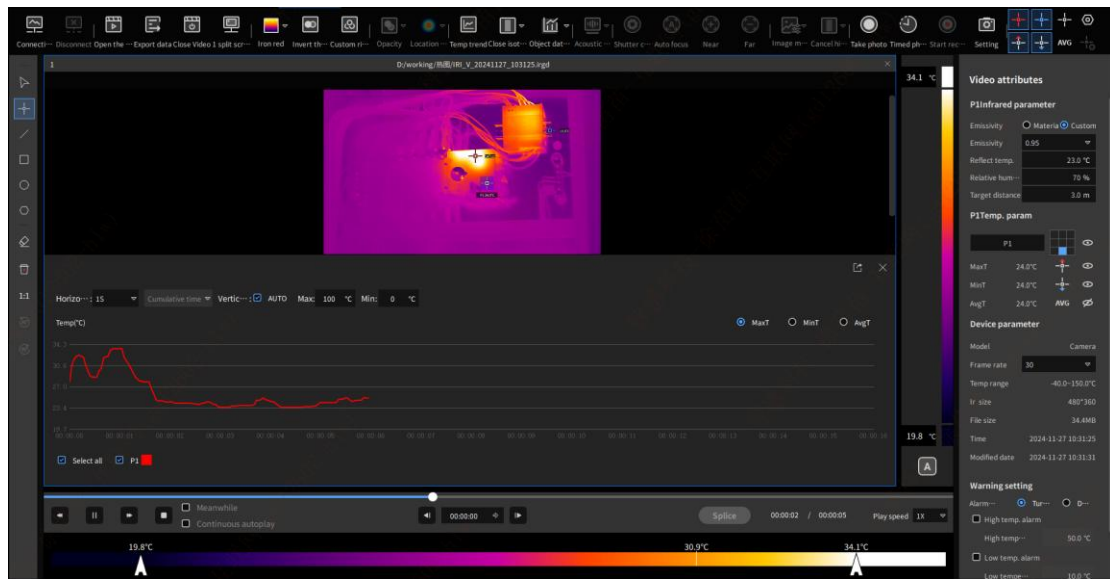
① Left click: click the curve, and the temperature values will be displayed at the sampling points of the time-temperature curve for intuitive display of the temperature values at the sampling points.

② Right click: press and move left and right to view the temperature curve distribution of the all objects.

③ Horizontal axis: cumulative time. After clicking, you can select the display mode of horizontal time axis (actual time/relative time/cumulative time). You can also select a time interval for display.

④ Vertical axis: high and low temperature values. You can select AUTO to display the temperature in full screen, or customize the display temperature interval.

⑤ Temperature curve: to analyze all the frame frequency temperature data of the objects and display it in the form of curve for a dynamic and more intuitive trend display. It supports customized display of high temperature, low temperature or average temperature curve for the analysis object.

⑥ Export data: Export full frame rate temperature matrix data or curve trend images.

4.1.8.5.　Remote device control

You can connect the device via AP or LAN for real-time streaming and remote control.
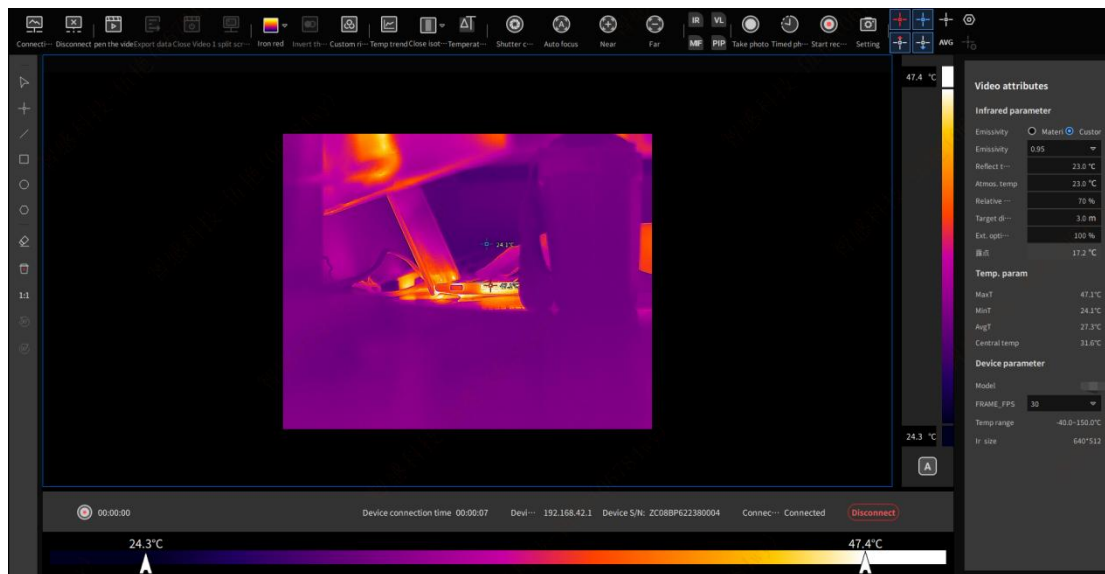
1. Focusing

After automatic identification of device, you can perform remote controls on the device, such as calibration⊚, autofocus Ⓐ, near focus⊕ and far focus⊖ controls.

2. Image mode switching

After device connection and real-time streaming, you can remotely control devices to realize image mode switching among IR, VL, MIF and PIP.

3. Dimming

Both A and M dimming modes are available. At the bottom of the ribbon, you can switch the dimming mode cyclically.
① A: automatic dimming mode, in which the thermal image will automatically display the color distribution in a linear way according to the highest and lowest temperatures in the image;
② M: Manual dimming mode, in which you can set the minimum and maximum temperature values of the image as required. Or you can adjust the slider at the bottom, and drag it left and right to adjust the color display of the current thermal image.

Note: UV and acoustic video do not support this function.

4. Image taking

: real-time video streaming, which allows manual capture of images and storage in the specified location.

5. Timed image taking

: image taking at intervals or at fixed frames. You can customize images or alarms. The prefix naming of stored images are also customizable.
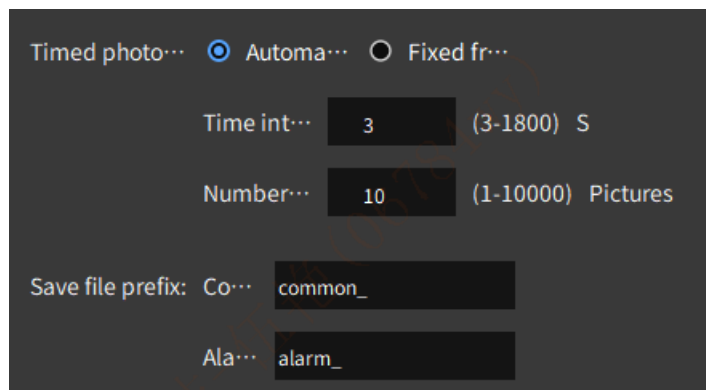
6. Video recording

During real-time video, it supports recording videos. The videos are stored in the specified directory structure. Video formats: mp4/irgd.
In the recording trigger bar in the property area on the right side of the interface, set the trigger type and related parameters, click the record button 录制 or the start recording button on the top toolbar to trigger the recording rules, and automatically end the recording/manually end the recording according to the set recording conditions.

① Manual trigger: Select manual trigger for the trigger type, set the recording interval, and click the record button 录制 to directly trigger the recording. You need to manually click the end button 结束 to end the recording.

② Date trigger: Automatically trigger and end the recording according to the set start and end time. Select date trigger for the trigger type, set the recording start time and end time, click the record button 录制 to start monitoring whether the recording conditions are

met, and automatically trigger the recording when the set start time is reached, and automatically end the recording when the set end time is reached. You can manually end the recording at any time during the period.

③ Duration: Automatically trigger and end the recording according to the set delay time, duration, and number of recordings. Select duration as the trigger type, set the delay time, duration and number of recordings, click the record button ![录制] to start monitoring whether the recording conditions are met, and automatically trigger recording when the set delay time is reached in time from the moment the record button is clicked. The recording ends when the recording duration reaches the set duration; then start timing from the end of recording, and automatically trigger recording again when the set delay time is reached again. The recording ends when the recording duration reaches the set duration; repeat this cycle until the set number of recordings is reached, and the recording ends completely. The recording can be manually ended at any time during this period.

④ Alarm trigger: Automatically trigger and end recording according to the set alarm conditions. Select date trigger as the trigger type, set the alarm conditions, click the record button ![录制] to start monitoring whether the recording conditions are met, and automatically trigger recording when the temperature data in the target area of the screen reaches the set alarm conditions. The recording ends automatically when the temperature data in the target area returns to normal. The recording can be manually ended at any time during this period.

4.1.8.6. Video play control

1-split screen and 2-split screen video play control are available. You can control the video play and pause simultaneously. You can custom frame rate for play.

![◄◄]: previous frame. Click it to play the current total-radiation thermal imaging video backward frame by frame.

![▶]: play/pause. Click it to play the current total-radiation thermal imaging video; The button will automatically switch to Pause when playing.

![►►]: next frame. Click it to play the current total-radiation thermal imaging video forward frame by frame.

![■]: stop. Click it to stop playing the current total-radiation thermal imaging video.

![◄|], previous video. Click it to automatically switch to the previous total-radiation thermal imaging video.

00:00:00 ⇨ : jump to a specified time. In the time interface, you can press Enter to jump to the specified time to start video play.

▶ : next video. Click it to automatically switch to the next total-radiation thermal imaging video.

1X ▽ play speed. At different play speed, the video play speed will play at such speed accordingly.

Simultaneous: Click Simultaneous to perform continuous controls on videos in the 2-split screens, such as play and pause.

Continuous Automatic Play: click Continuous Automatic Play to play all infrared video files in the folder where the current video is located automatically and continuously.

4.1.8.7. Temperature alarm

For analysis of a real-time video or local video, you can set the analysis target threshold to remind temperature change. When a high temperature threshold, low temperature threshold or temperature difference threshold is reached, an alarm can be set to take images and record.

Note: UV and acoustic video do not support this function.

1. Capture when alarming

You can set an alarm threshold and select an alarm type first (high temperature, low temperature or temperature difference). Images can be captured when alarming. When an alarm occurs, images will be captured at 1 image/S, until the alarm is over.

2. Record when alarming

You can set an alarm threshold and select an alarm type first (high temperature, low temperature or temperature difference). Videos can be recorded when alarming. When an alarm occurs, the alarm is recorded, videos will be recorded and saved according to the set format and path until the alarm is over. The video duration is extended by 5S.

4.1.8.8. Video settings

You can modify the storage path of images and videos. You can set the mode of regular image capturing (auto-capture, fixed-frame capture).
Ordinary captured images and videos, as well as alarm captured images and videos will be stored in the preset locations.
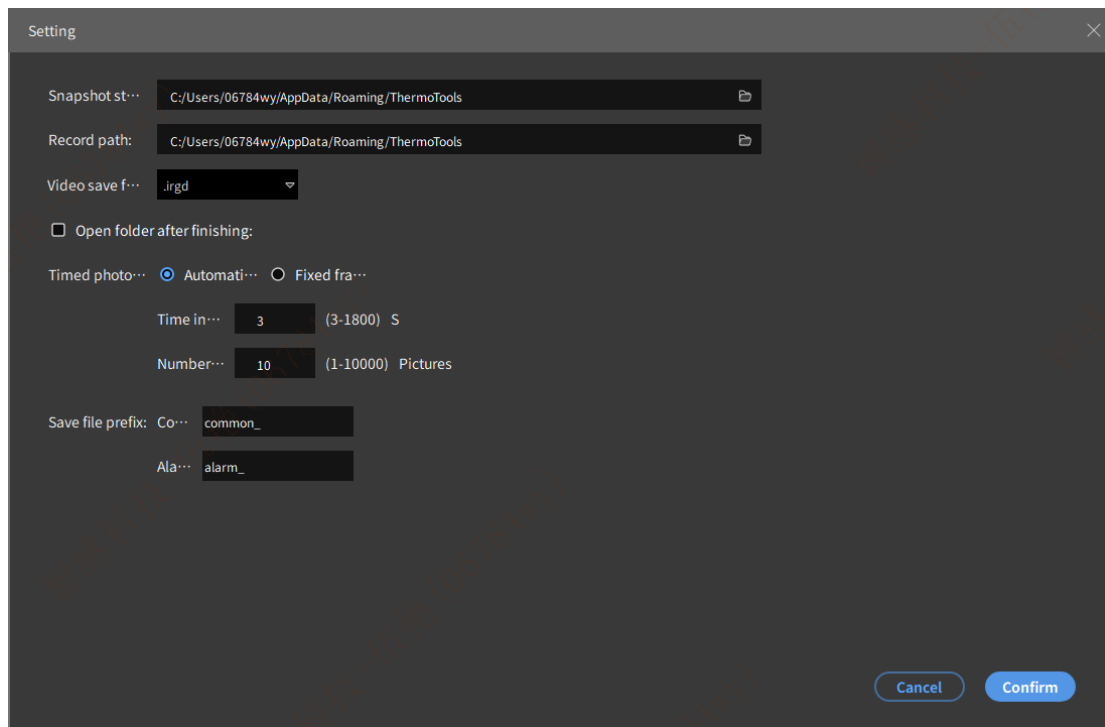
4.1.8.9. Video stitching

When the local video is imported for 2-screen display, the video with temperature data applicable the same device model can be stitched into one video for secondary analysis.
Left click Stitch to stitch into one video.

4.1.8.10. Video splitting

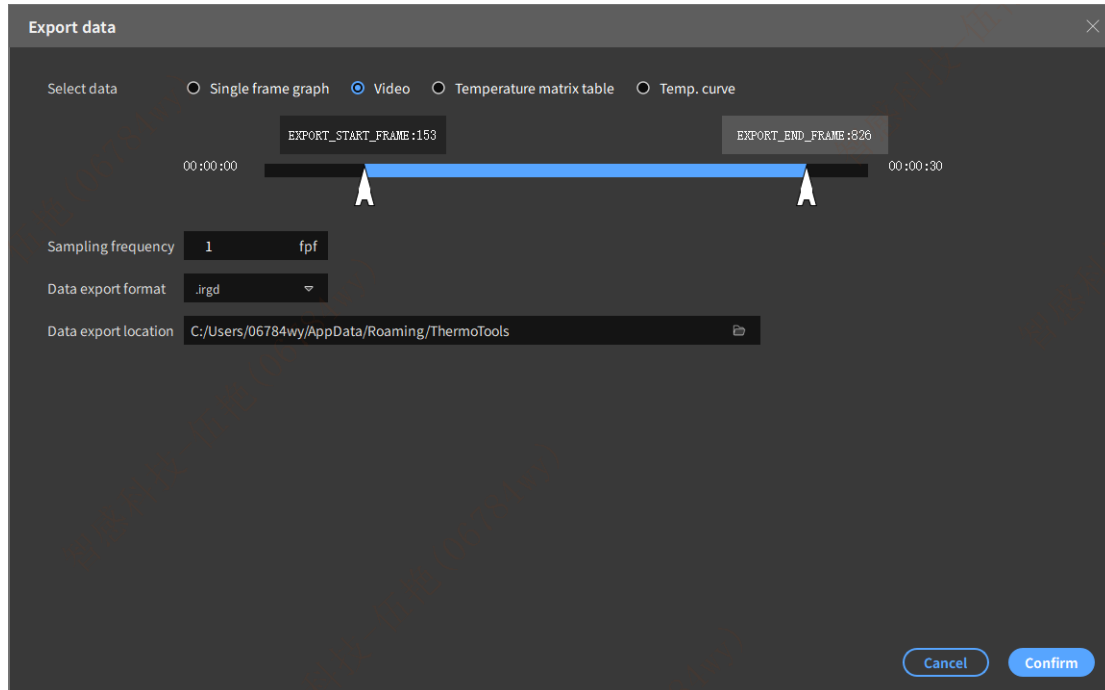A local video with temperature data can be spited into multiple videos. You can customize the basic frame rate location, and select the corresponding path to save.

Click Export Data and select Video to split and intercept the desired video segment.

4.1.6.13. Data saving

You can export the local video data, including images, videos, temperature matrix tables and temperature curves.

Note: UV and acoustic video do not support this function.

1. Image

You can set the start frame, end frame and sampling frequency. You can export the image data of all frames.

① Time/FPS: e.g. numbers "1" and "145" may represent the start frame and total video frame of the current local video. "00:00:00" and "00:05:00" may represent the duration of the video.

② Start frame indication: you can press and drag for setting. But the start frame must not exceed the end frame.

③ End frame indication: press and drag for setting. But the end frame must not exceed the start frame.

④ Sampling frequency: 1fpf—save all frames; 2fpf—save every 1 frame; 3fpf—save every 2 frames.
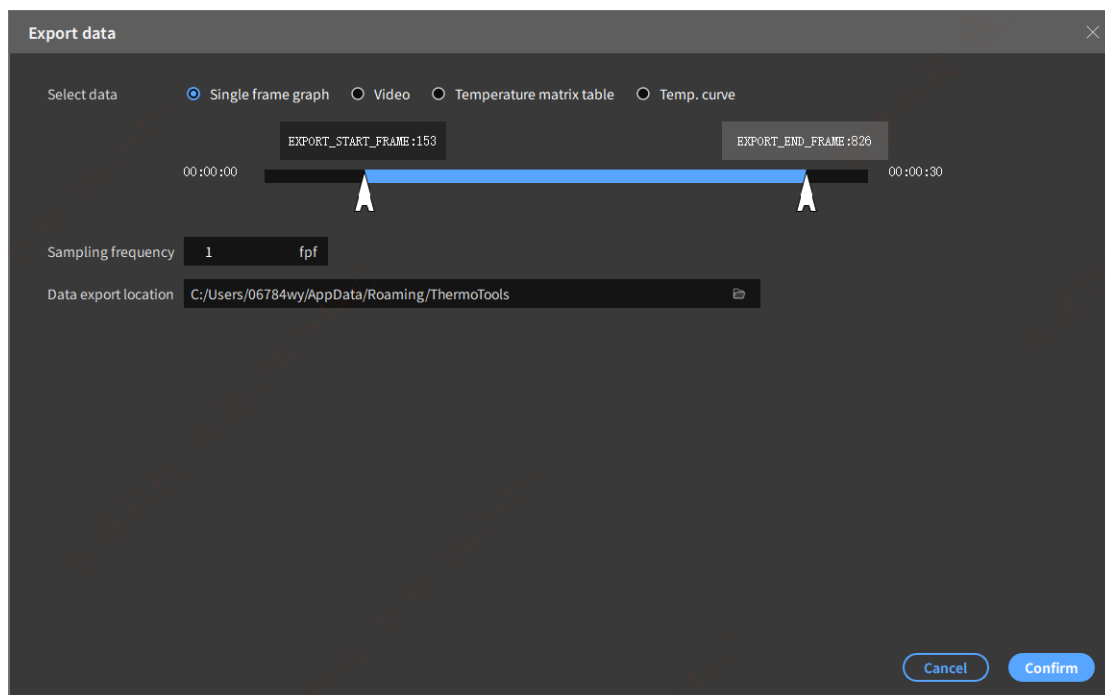
2. Video

The start frame, end frame and sampling frequency can be exported as video files. The formats (irgd, mp4) are available for option.
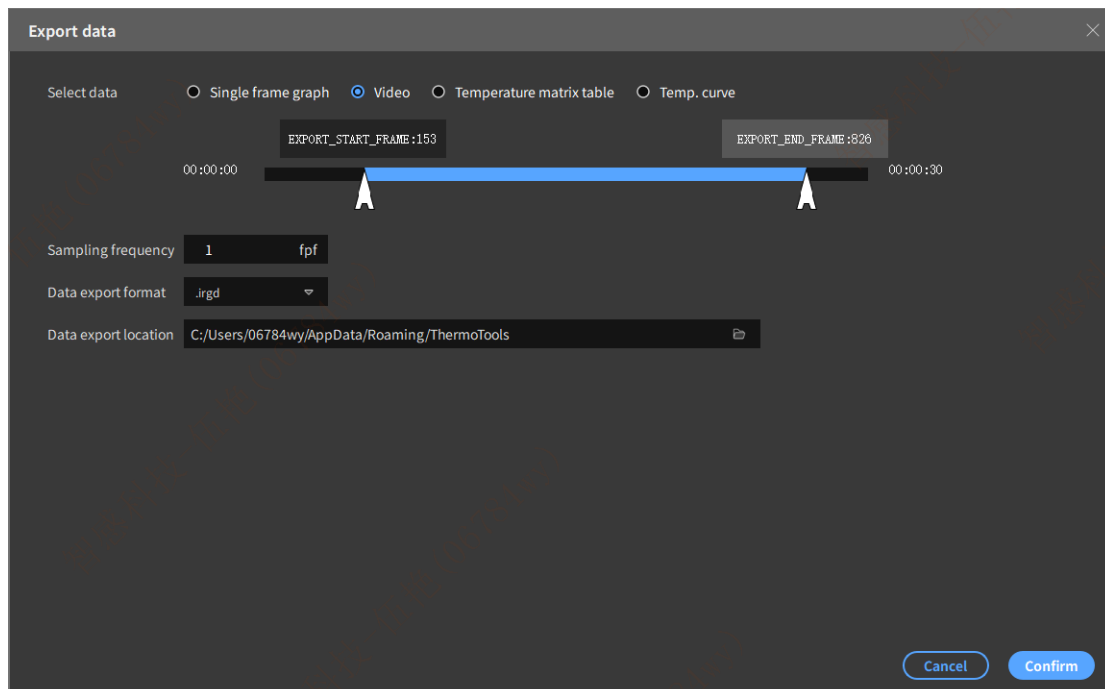
3. Temperature matrix table

The start frame, end frame and sampling frequency of the video are exported according to the sampling frame frequency order. The exported data includes: full image

and analysis object;

① Select the full image: insert the data matrix of each frame into a table in sequence.

② Select the object (point, line, circle, rectangle, polygon, etc.): export the temperature data of the object. Each frame of data matrix is inserted in sequence to export the temperature data table of each object.
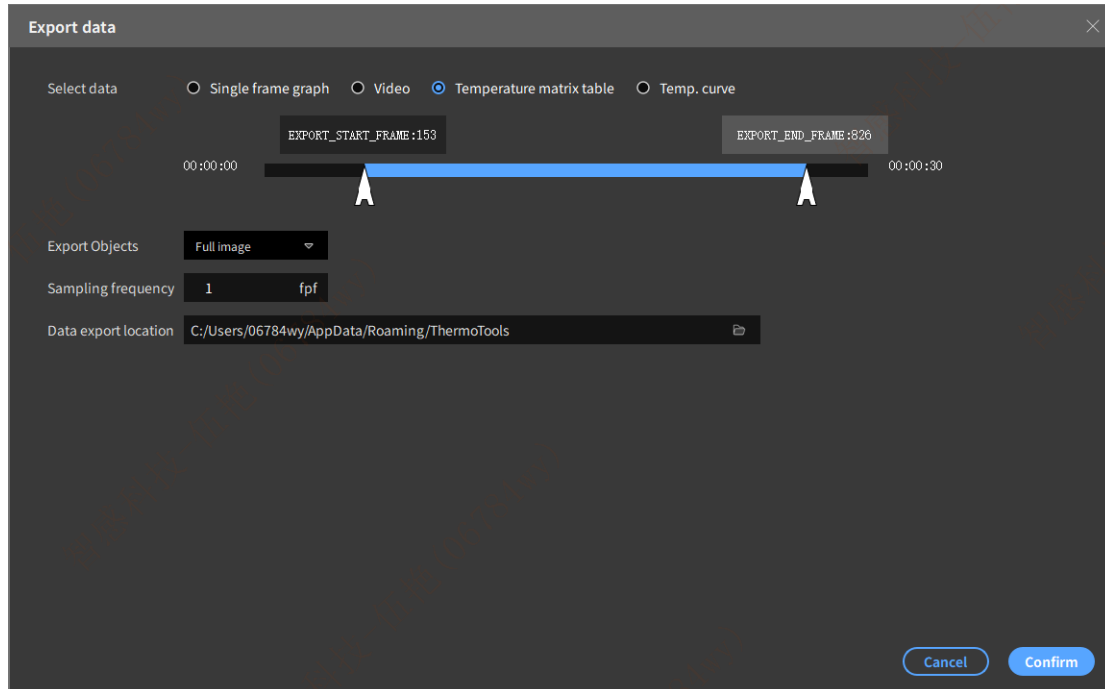

4. Temperature curve

Select object (point, line, circle, rectangle, polygon, etc.), temperature (Max, Min, Avg) and data export format (CSV, JPG).

① In case of CSV format, get the temperature data of all the analysis objects in each frame.

② In case of JPG format, get the full frame frequency image of the video, automatically get all the best time periods, and click Preview to generate a curve preview image.
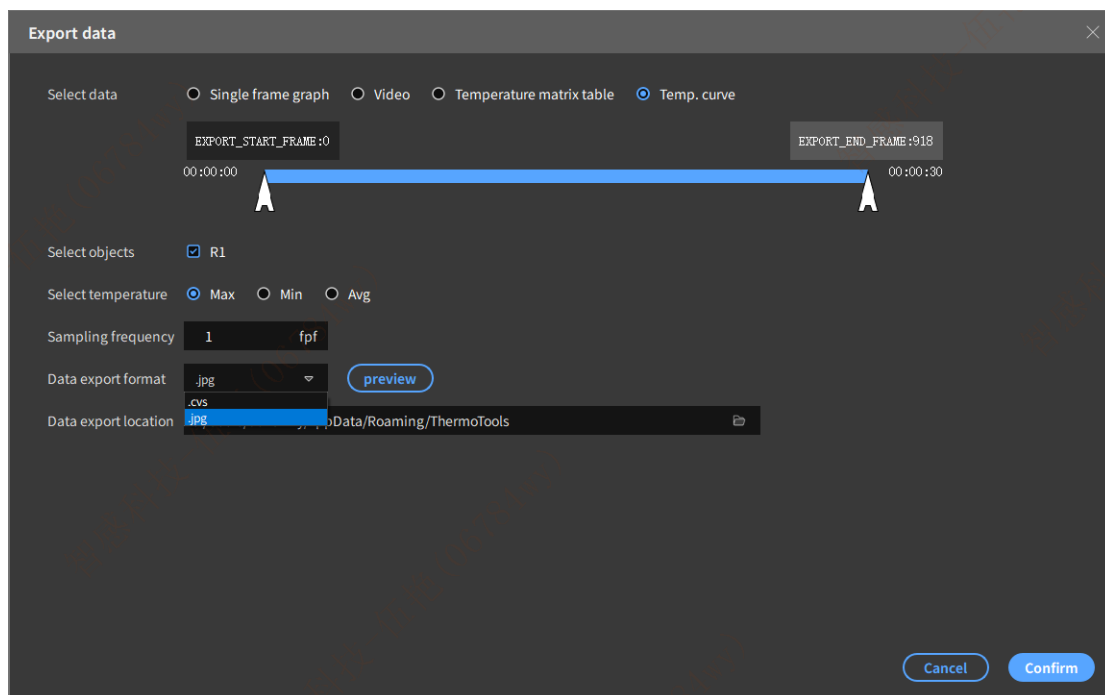
4.1.9. Report editing

The report editing interface is the page where you create the report process. You may create from scratch or based on templates: select an available template or create a new template.

The report will be saved in. irw (advanced infrared report format), and the report template will be saved in. irtp (advanced infrared template format). Both formats can be exported as PDF or Word.

4.1.9.1.　Overview of navigation

● 1. Toolbar

The toolbar includes options for creating, saving, exporting and printing reports, as well as options for editing reports by inserting images and other components.
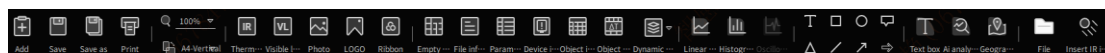
● 2. Image library

Insert the target image file in the folder on your local computer into the report. Use the icon at the top to change the size of the image icon, add any selected image files to the report, or add all the image files in the selected folder to the report.

- 3. Number of pages

View all images contained in the report.

Use the icons at the top to add or delete pages. Right click and hold the pane, and move up or down to change the order of the pages and view the moved position.

Use Zoom In or Zoom Out to view the thumbnail of the report page being edited.
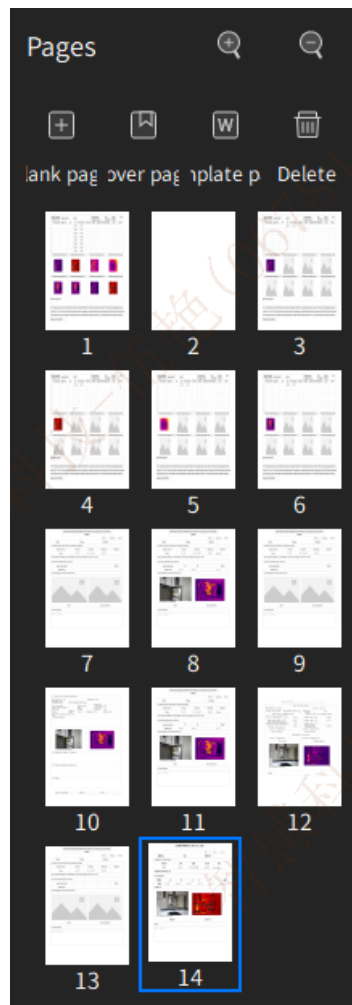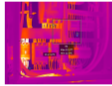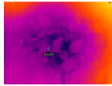
● 4. Work area of report

    Create and edit the work area of report. Use the toolbar to insert images, tables, drawings, fields, infrared fields or parameters into the report. Click and hold the component, move it back and forth on the page, and then place it in the desired position. You can perform page navigation, page scaling and visibility settings.

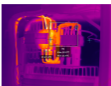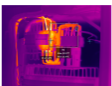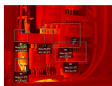|	Thermal Development Testing Record Form	Using electric field:		Address:				Testing personnel: Recording personnel:		Date: Temperature:	Weather: Humidity		Page:
...	Front panel name	Equipment n...	Area	Time	On site temperat...	Abnormal...	Abnormal...	Explanation of thermal image dete...			judge		Remark
1				15:23:37	32.3℃								
2				15:23:40	52.6℃								
3				15:23:43	32.1℃								
4				15:27:24	12.9℃								
5				15:20:52	30.0℃								
6				15:20:52	30.0℃								
7				15:23:37	32.3℃								
8				15:23:40	52.6℃								

1	Thermal development analysis chart	2	Thermal development analysis chart	3	Thermal development analysis chart	4	Thermal development analysis chart
5	Thermal development analysis chart	6	Thermal development analysis chart	7	Thermal development analysis chart	8	Thermal development analysis chart

Improvement suggestions:

Note 1: Evaluation results: G: Good, D: Deteriorated, I: Inspection to be repaired, B: Defective. This evaluation result is based on Article 15 of the user's electrical equipment inspection method. Good. \ n Note 2: Each test should specify the instrument, brand, type, specifications, serial number, calibration date, and evaluation criteria. Please fill in the remarks column and attach A4 paper if necessary, and according to the testing and maintenance standards, Fill in the instrument for reference. Note 3: When full-time electrical technicians and inspection

Signature and seal of full-time

● 5. Properties and settings

Click a component in the report work area to view and change its settings, such as position (left and top) and image size (width and height) on the page. When you click the image watermark overlay and select or deselect the check box in the list, the result will be displayed in the image immediately.
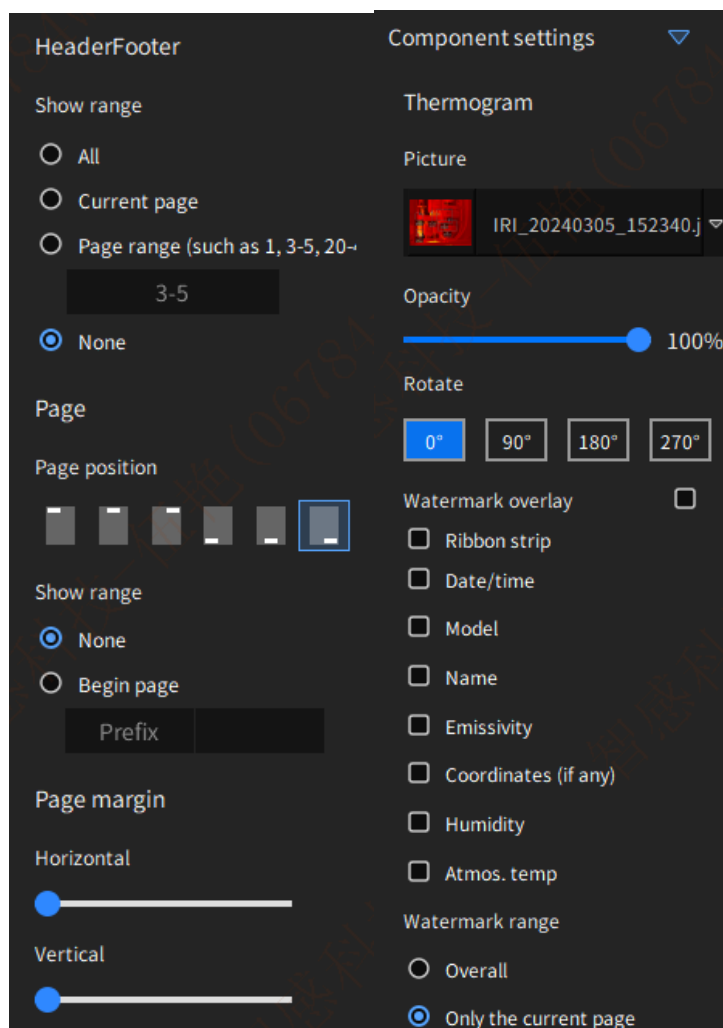
4.1.9.2. How to create a new report

● 1. Add from a blank page

On the report page , you can:

1). Click New, and then click Create Blank Report. A blank report page will be added to the page pane.

2). Select the folder where the image creation report is stored in the image library pane.

3). Add an image:

- To add a single image, you can click this image first, and then click Add the selected item to the report (i.e. "+" button).
- To add multiple images, click the images while holding down the CTRL key, and then click Add the selected items to the report (i.e. "+" button), or drag them into a blank area for automatic addition.

- To add all the images in the folder, please select all the image files and add them to the report. The selected image will be added to the template report that has been selected by default.

4). Use the toolbar to insert images, tables, drawings, fields and infrared fields into the report.

5). To save the report, please click "Save As Report".

6). In the "Save As" dialog box, browse the folder where the report will be stored, type the name of the report, and then click "Save".

● 2. Add based on template

On the report page , you can:

1). Click "New" and then click "Generate a Report based on Template". You will see a page containing available templates and template preview pane.

2). Click the template you want to use and then click to select.

3). Navigate to the folder where you have stored images and want to create a report in the image library.

4). Add images:
- To add a single image, click the image, and then click Add to Report (i.e. "+" button), or you can drag the image to the page pane. It will automatically fill in the order of dragging in.
- To add multiple images, click the images while holding down the CTRL key, and then click Add to Report (i.e. "+" button), or you can drag the images to the page pane. It will automatically fill in the order of dragging in.
- To add all the images in the folder, click Add to Report (Select All button), and the selected images will be added to the report template in the page pane.

5). Click Next to view the report.

7). To save the report, please click "Save As Report".

8). In the save as pop-up box, browse the folder where you want to store the report, type the name of the report and click Save.

● 3. Use external Word template to generate a report

An external Word template may be inserted into the Word layout according to the requirements specified in the parameter table. In batch analysis, you can export the report in the style of Word template. This allows more flexible and efficient batch-making of reports. (only applicable to some versions)

● 4. Use the Quick Report Wizard to generate a report
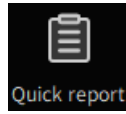
On the File Management page , you can:

1). Click the Quick Report, and then select the internal template cover and content page.

2). One-click export the report content quickly according to the selected image.

4.1.9.3. How to DIY a report

You can perform editing and modification on shortcut components; You can also insert the thermal image data into cells.

Component information includes: infrared thermal image, visible light, acoustic image, ordinary image, LOGO, color ribbon, LevelSpan, empty table, file information table, device information table, thermal map parameter table, object temperature table, object temperature difference table, isotherm table, acoustic parameter table, partial discharge analysis table, leakage analysis table, dynamic table, line temperature diagram, histogram, acoustic spectrum, shape, text box, intelligent analysis, location information, etc.
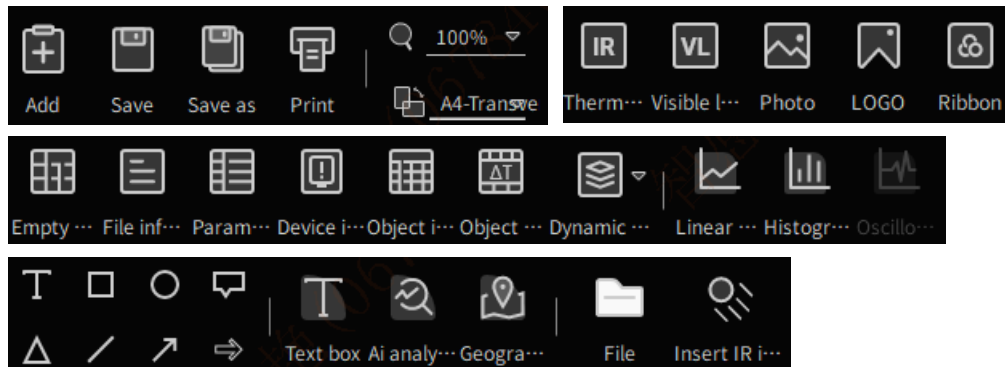
● 1. Page layout

You can use a horizontal page or a vertical page. The margins, headers, footers and page numbers can be adjusted automatically.
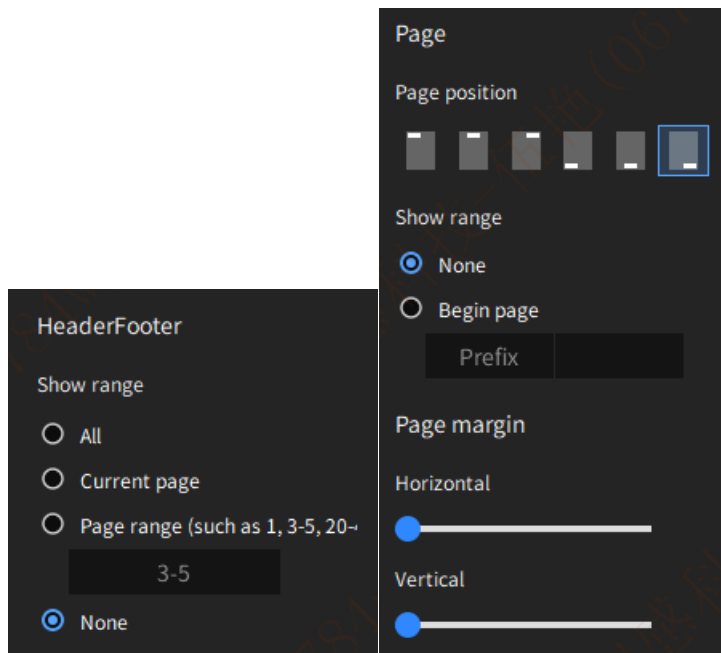
- 2. Add thermal image/table/graph, etc.

Select ![IR] by mouse. Then click anywhere in the report editing interface to add a blank thermal image component by default. After selection, you can operate the thermal image.

① Select the recently imported thermal image in the left image pane and drag it directly into the thermal image component area to automatically load the thermal image for display.

② If you want the basic tables (file information, parameter table, object temperature...) to automatically associate the infrared thermal image parameters, you should first select the table and associate the corresponding infrared thermal image in the table attribute component Image on the right.

Thermogram

Picture

 IRI_20240305_152052.j ▽

Opacity

━━━━━━━━━━●━━━━ 100%

Rotate

| 0° | 90° | 180° | 270° |

Watermark overlay ☐

☐ Ribbon strip
☐ Date/time
☐ Model
☐ Name
☐ Emissivity
☐ Coordinates (if any)
☐ Humidity
☐ Atmos. temp

Watermark range

○ Overall
◉ Only the current page

(Thermal image)

File information table	
Name	IRI_20240305_1514...
Report date	2024-05-29
Shooting date	2024-03-05
File size	1237kb
MaxT	36.8℃
MinT	23.3℃
Central temp	27.8℃
AvgT	26.4℃
Coordinate	
Maximum temperat...	33.9℃
Maximum temperat...	25.7℃
Minimum temperat...	25.9℃
Minimum temperat...	24.0℃

Component settings ▽

Dynamic table
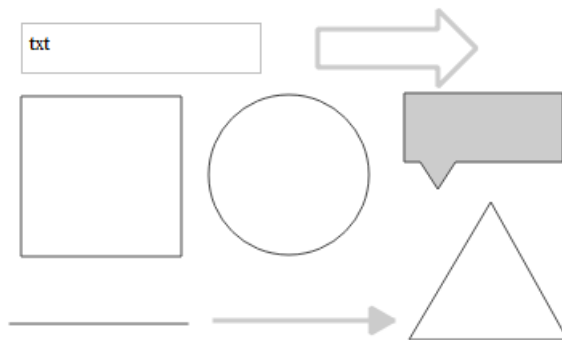
Increase or decrease in ranks of row
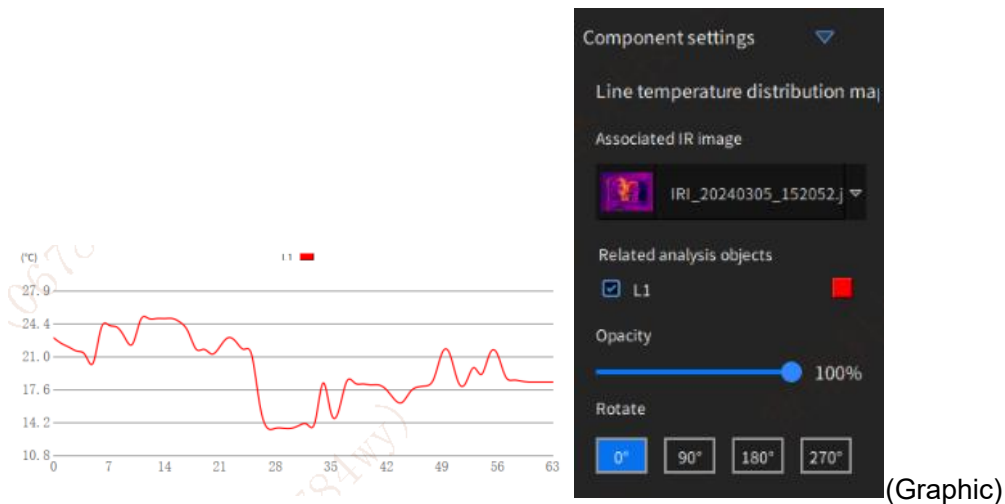
Merge and split cells

Associated picture

 IRI_20240305_152052.j ▽

Related analysis objects

▽

(Basic table)

(Graphic)

(Shape) Double-click to edit.

- 3. Dynamic table

After adding an empty table component, you can customize component content and edit style.

After editing the table content, you can enter the name of the dynamic table and click Save to save the dynamic table. Thereafter you will be able to quickly add the dynamic table components.

You may also sane dynamic table as a template to realize automatic data filling.
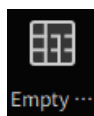
Click the blank table component to add an empty table anywhere in the report editing interface. You can easily edit the cell contents.

DIY an empty table			
Name		voltage	
Time		current	

Example of adding an object data temperature dynamic table: select the Empty Table component, click Insert Object Temperature Value and click Save to save it as a dynamic

table, which can be viewed in ![Dynamic ···] as follows:

	MaxT	MinT	AvgT
P1	25.9°C	25.9°C	25.9°C
R1	31.8°C	25.5°C	28.1°C
R2	29.6°C	24.8°C	26.9°C
R3	33.9°C	25.3°C	26.2°C
R4	28.9°C	24.5°C	26.3°C
R5	25.7°C	24.0°C	24.6°C
R6	29.4°C	24.8°C	27.1°C
R7	29.0°C	24.3°C	25.9°C
R8	27.8°C	24.2°C	25.6°C

Component settings
Empty table
Increase or decrease in ranks of row
Merge and split cells
Associated picture — None
Related analysis objects
Save as dynamic table
Input dynamic table name (···)
保存

- 4. Thermal image import

There are two ways to import thermal image:
① Browse local files and import infrared thermal images.
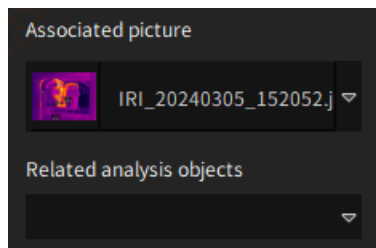② Select an image in the left Thermal Image File Management, and press and drag it to the thermal image component.

- 5. Insert parameter values into the cell

There are two ways to associate thermal image parameter values with cells in the table:
① Select the basic table, where the table properties are displayed on the right. Select the associated thermal image to automatically insert parameter values.
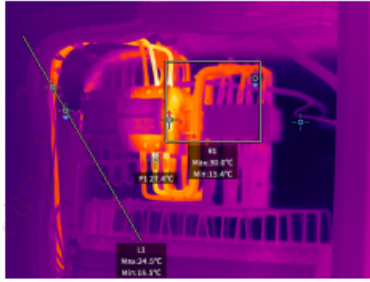
Parameter table	
Emissivity	0.95
Relative humidity	70%
Distance	3.0m
Reflect temp.	23.0℃
Atmos. temp	23.0℃
Ext. optics trans	100%
Ambient temp	21.4℃
Dew point	17.2℃

Associated picture

IRI_20240305_152052.j ▽
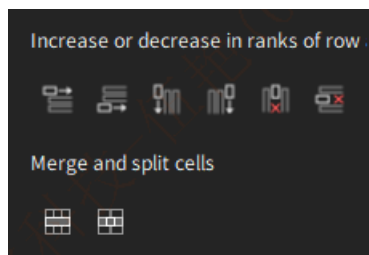
Related analysis objects

▽

② Select an empty cell in the form, associate the infrared thermal image in the right attribute, click the top menu bar to insert the thermal image values, and select the corresponding temperature measurement parameters according to the requirements. In this way different parameter values in the thermal image can be inserted into the cell.

● 6. Modify the component style

① Image: opacity adjustment; rotations 90/180/270.

Opacity
100%

Rotate

| 0° | 90° | 180° | 270° |
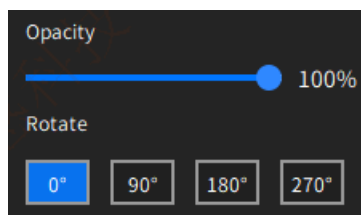
② Table: increase and decrease of rows and columns; merge cells.

Increase or decrease in ranks of row

Merge and split cells

③ Text: font, size, color, italic, bold, underline, left/right/center, top/center/bottom.

Arial ▽ | 8 ▽ | A B I U | ≡ ≡ ≡ ≡ ≡ | ≡ ≡
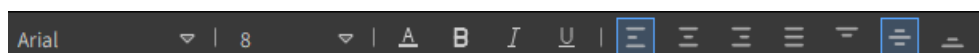
④ Text box/cell/shape: color filling, border thickness, border style, border color, etc.

Filling ☐ Borde 1 ☐ ⠿
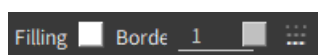
● 7. Export and open the report

The report file can be exported into 2 formats. Select the default opening mode in the settings.

① Word: Office 2010 or above. Secondary editing is available in Word.

② PDF: A PDF reader is required.

4.1.9.4. Batch report making

3 ways to make batch reports.

① On the File Management page: select batch infrared images, click Quick Report, and select cover page and template page for fast export.
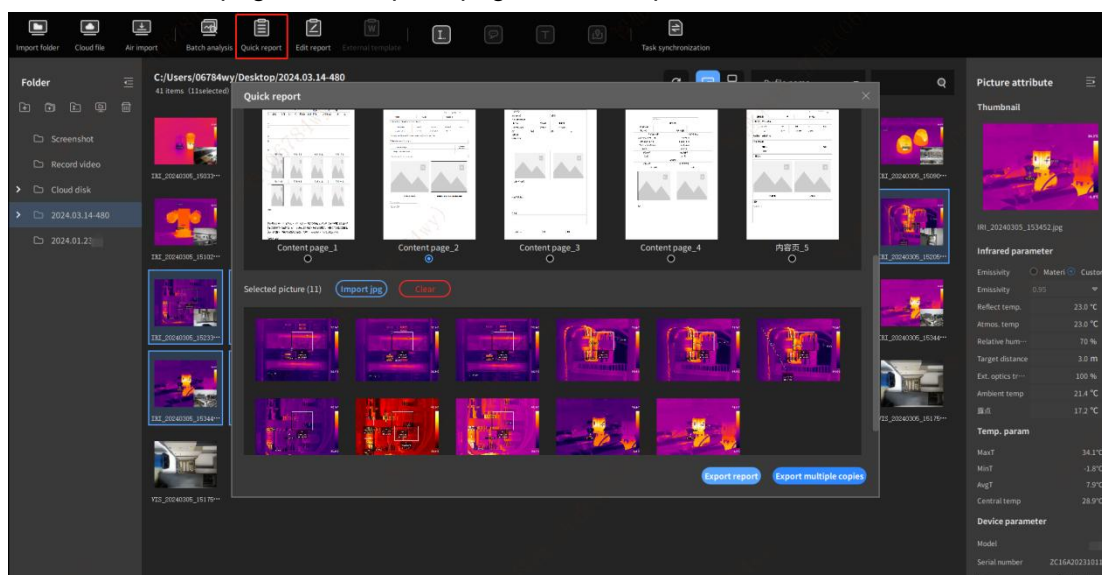
② On the Report page: add a template page or a blank page. Click Ctrl to selects batch images in the left gallery area, and click "+" to create batch new reports.
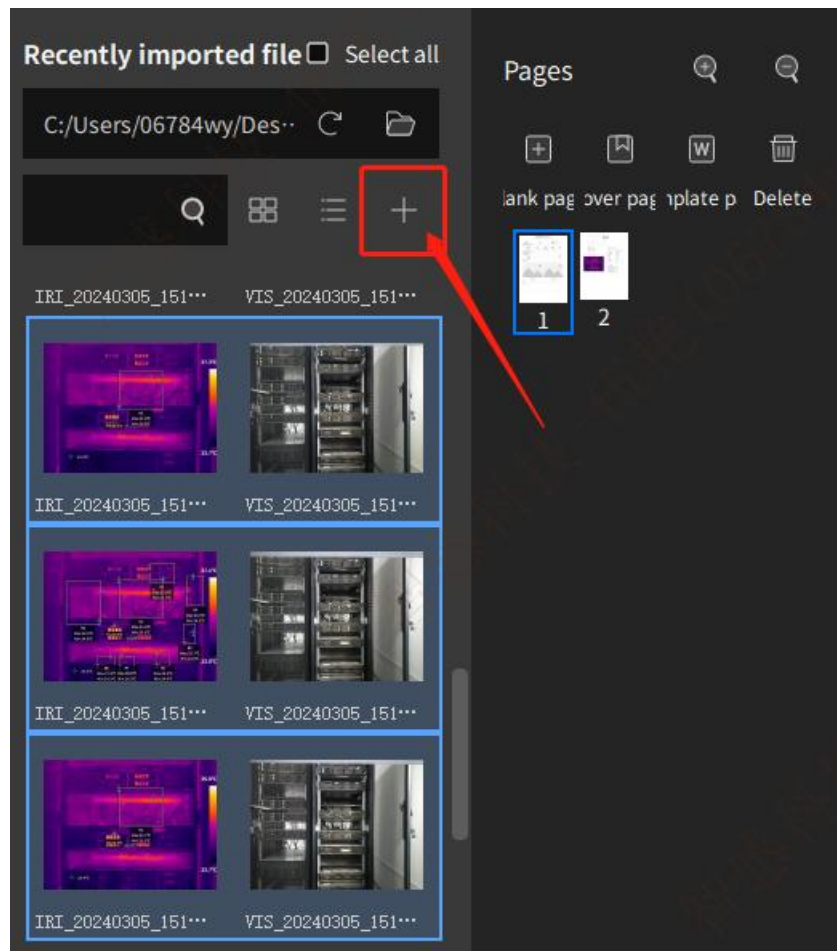
③ On the Report page: add a template page or blank page. Press and hold the thermal image selected on the left, and drag it into the report editing blank page or template page area to create batch new report pages.

4.1.9.5. How to make a report template

You can make custom report templates in this software and import/export templates made by this software.

On the report page , you can:

1. Click New→New Blank Page to add the report page to the page pane.

2. You can use the toolbar to insert tools such as Image, Table, Drawing, Field and Infrared Field into the report. These tool components can associate the corresponding infrared thermal images on the right page attribute.

3. To save the template, please click Save As and select Save This Page as Template.

4. In the dialog box, you can type the name of the template, and then click OK. The template will then be seen in the available templates list.

4.1.10. Image optimization

You can perform operations like panoramic stitching, super-resolution reconstruction and temperature trend analysis.

4.1.10.1. Panoramic stitching

The images taken by the device in panoramic mode are stitched to expand the field of view. You can perform secondary analysis on a successfully stitched image.
• Click the image folder, and then drag the file to the file pane.
• Click an individual image in a folder while holding down the CTRL key to drag the image to the file pane.
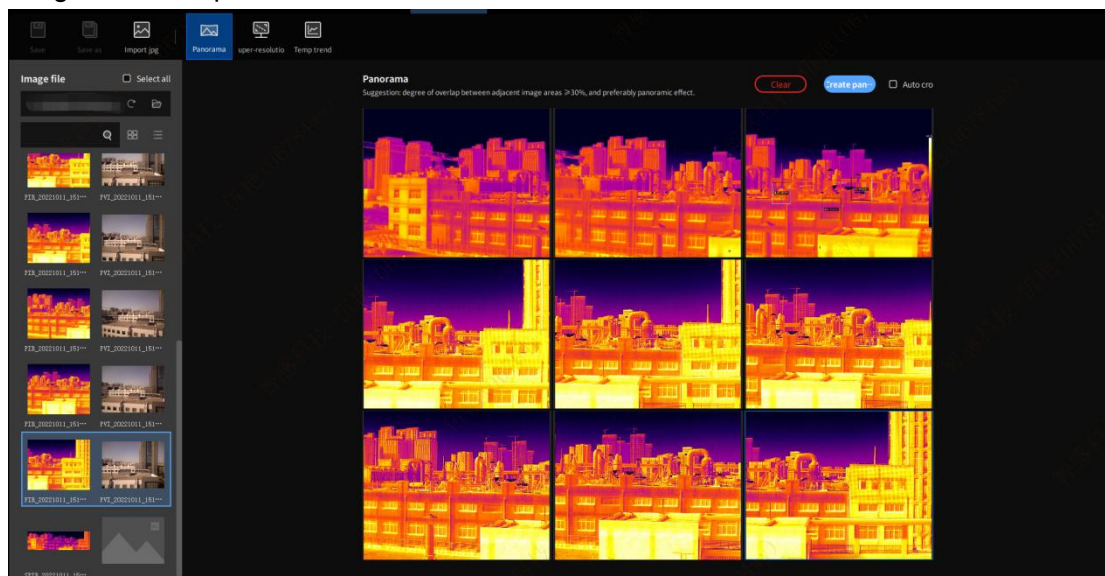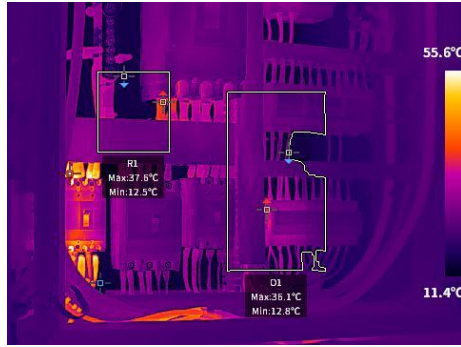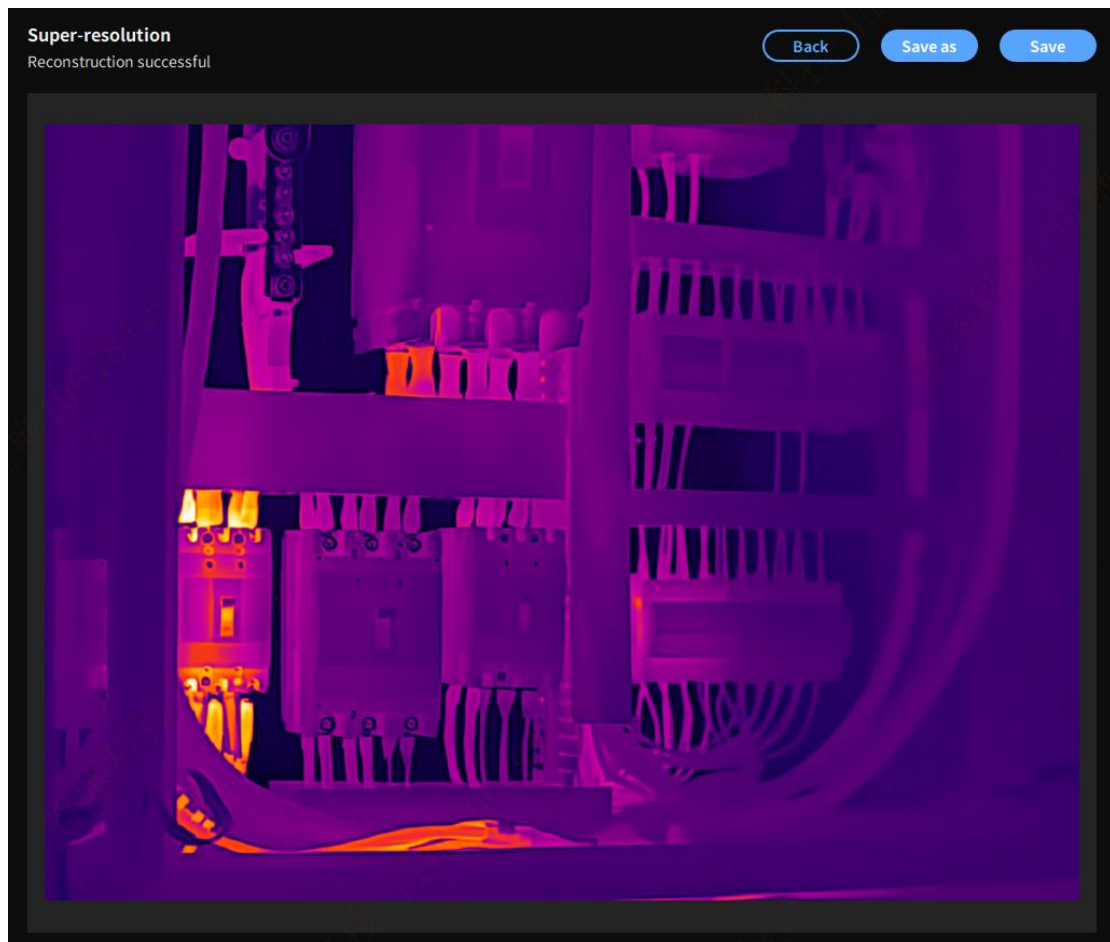

An example of successfully stitched image:

4.1.8.2. Super-resolution

The infrared thermal image is enlarged by a certain magnification based on the intelligent super-resolution algorithm, so as to realize clearer imaging and more accurate temperature measurement.

(Before super-resolution)

(After super-resolution)

4.1.8.3. Trend analysis

You can make accurate temperature trend analysis of multiple infrared images in general mode. Draw the corresponding analysis object target, view the temperature trend change of the analysis target from the perspective of space and time, and provide guidance and suggestions for troubleshooting.

• Click the image folder on the left, select all, and then drag the files to the file pane.

• Click an individual image in a folder while holding down the CTRL key, and then drag the image to the file pane.
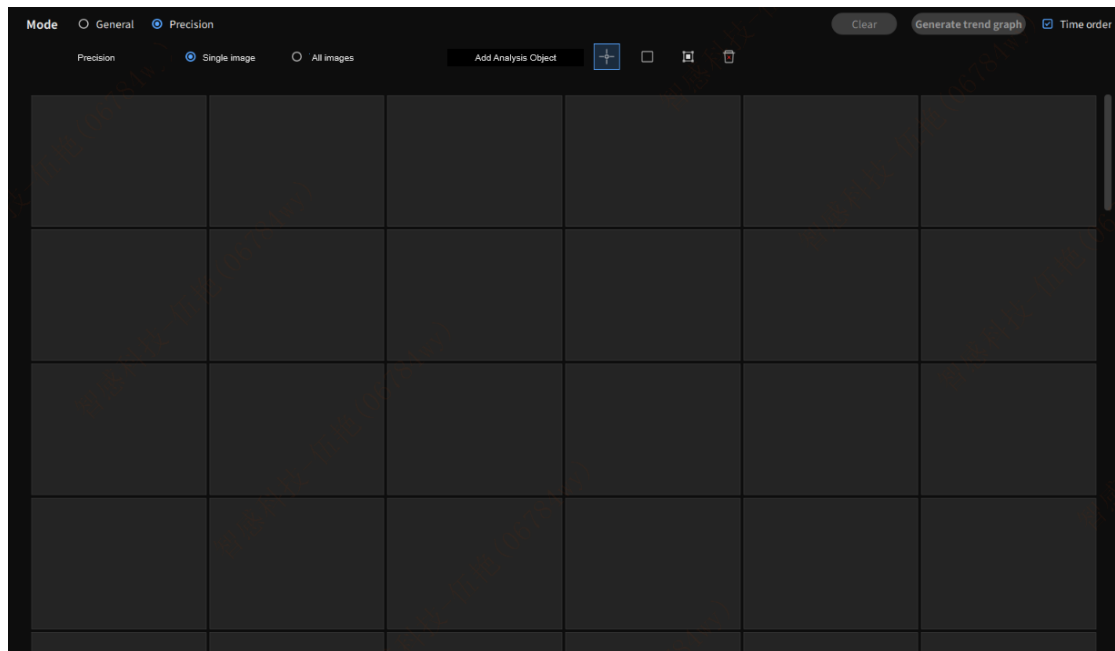
- 1. General mode

This mode allows automatically obtaining highest temperature, lowest temperature and average temperature of the full image. You can draw the temperature trend curve according to the image import order or time order.

- 2. Precision mode

Double-click the image, draw a single analysis object on each image, and analyze the temperature trend of the target object. Analysis object types: point, rectangle and stroke. Precision mode allows drawing the target object in two ways: single image and all images:

①Single image: select a type of analysis object by clicking ![icon], ![icon] or ![icon].

Double-click the thermal image, left click to draw the target, and return to the previous step. At this point, the analysis object has been drawn on the currently selected thermal image.

② All images: select a type of analysis object by clicking ![icon], ![icon] or ![icon]. Double-click the thermal image, left click to draw the target, and return to the previous step. At this point, all thermal images will display the same analysis object in the corresponding area.

4.1.11. Settings management

4.1.11.1. General settings

① Language setting: setup of multiple languages, including simplified Chinese and English.

② Temperature unit: ℃, ℉ or K;

③ Precision setting: the temperature indication may be accurate to several decimal places. You can choose 0, 0.0 or 0.00;

④ Distance unit: m, in or yd.

⑤ Area unit: m2, mm2, ft2 or yd2.

⑥ Preference setting: Basic settings can be saved as preferences and can be imported or exported.

⑦ Restore factory settings: Restore to the default parameter settings as initial installation.

⑧ Intelligent analysis knowledge base: the built-in infrared diagnosis algorithm for detection object can predict the defect level, present fault defects and give suggestions.

⑨ Delete a local source file: associated with File Management. When a file is deleted under File Management, the original files will be completely deleted from the local computer. Please check carefully.

4.1.11.2. Report settings

Initial style settings when adding forms and images in the report editing interface.

① Default format: the default format when exporting reports, including PDF and Word.

② Default font: any one of multiple fonts.

③ Default size: text size at the time of initial creation.

④ Font color: font color at the time of initial creation.

⑤ Bold: bold/not bold font at the time of initial creation.

⑥ Italic: italic/not italic font at the time of initial creation.

⑦ Underline: underlined/no underline at the time of initial creation.

⑧ Automatic report opening after export: automatic/non-automatic report opening

when the report is generated and exported.

4.1.11.3. Watermark settings

Watermark information attached when the image is saved.

Watermark includes: logo, color ribbon, emissivity, shooting date, atmospheric temperature, reflection temperature, relative humidity, object distance, positioning and so on. Such watermark information will make sense only when it exists on the image saved by the device.
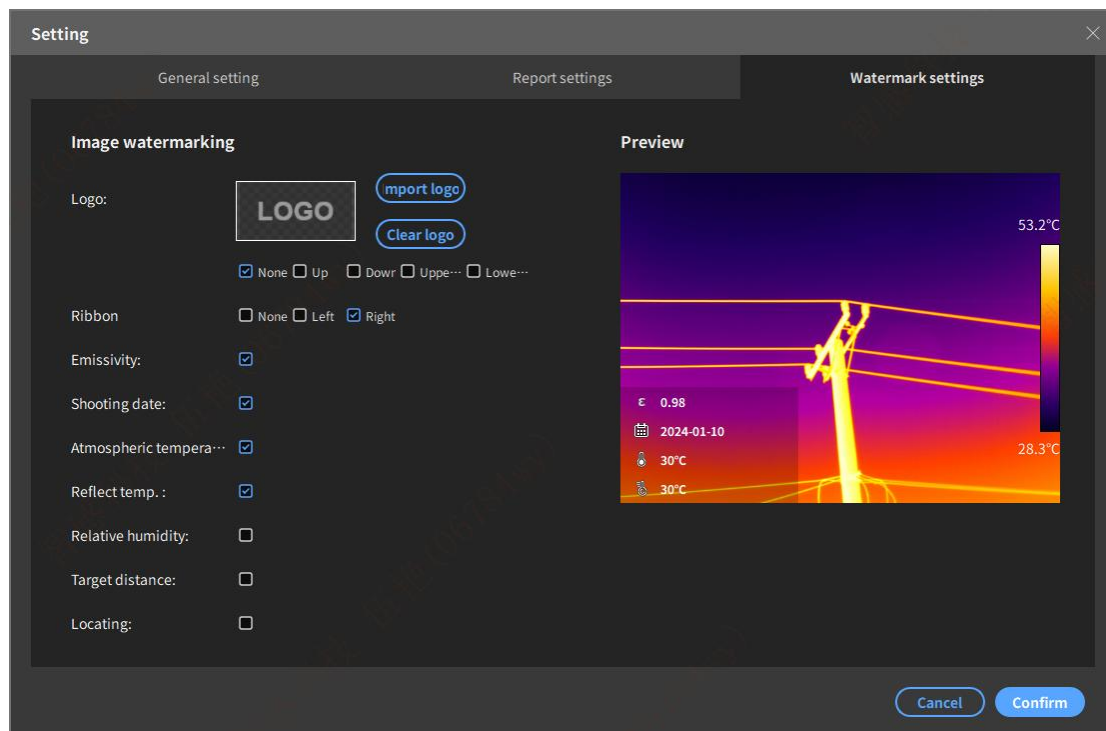

4.1.12. Ledger task

The task ledger function module can simplify data collection and improve the efficiency of report making. (only available for some models)

The camera enabling an inspection task mode will guide inspection crew to operate along the predefined measuring point route, so as to collect images and data in a structured way and avoid point missing. Moreover, such inspection allows ordered inspection results from the beginning, and speeds up the patrol shooting and report making progress.

The inspection route file can be defined to provide high flexibility. You can configure the task path. The camera will automatically set the state and enter the next inspection point when saving an image.
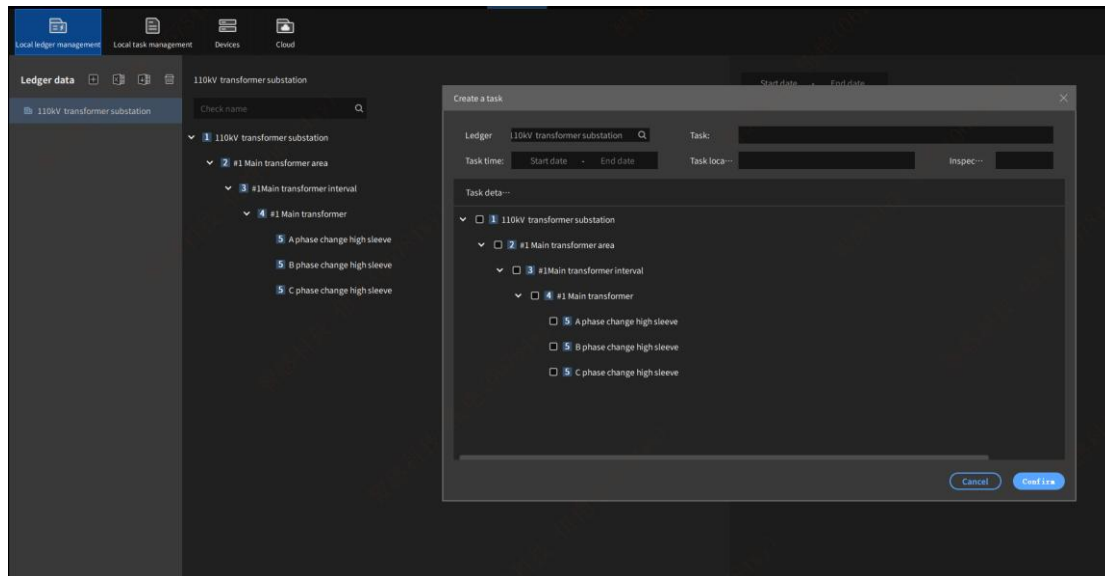
The inspection task workflow generally includes the following steps:

1. Prepare PC-side infrared analysis software with task ledger function.

- Create your own local ledger system for device assets on PC and create daily local inspection tasks.

- Prepare an infrared thermal imaging camera with ledger task function.

- Connect PC infrared analysis software to the thermal imaging camera via wired or wireless way.

2. Create local ledger data on PC according to the inspection path.
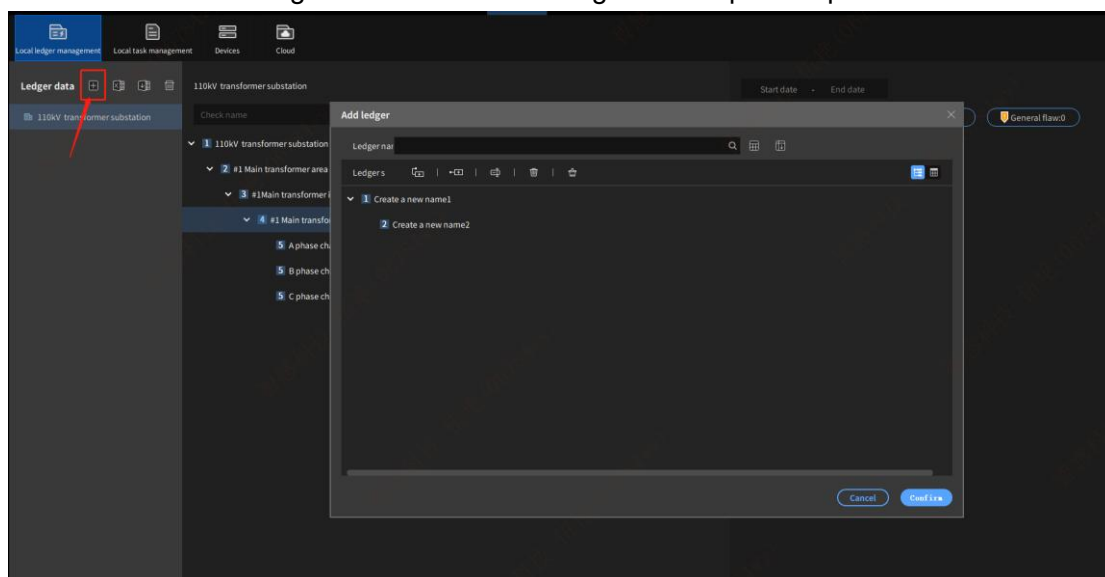
3. Create a local inspection task according to the ledger path.
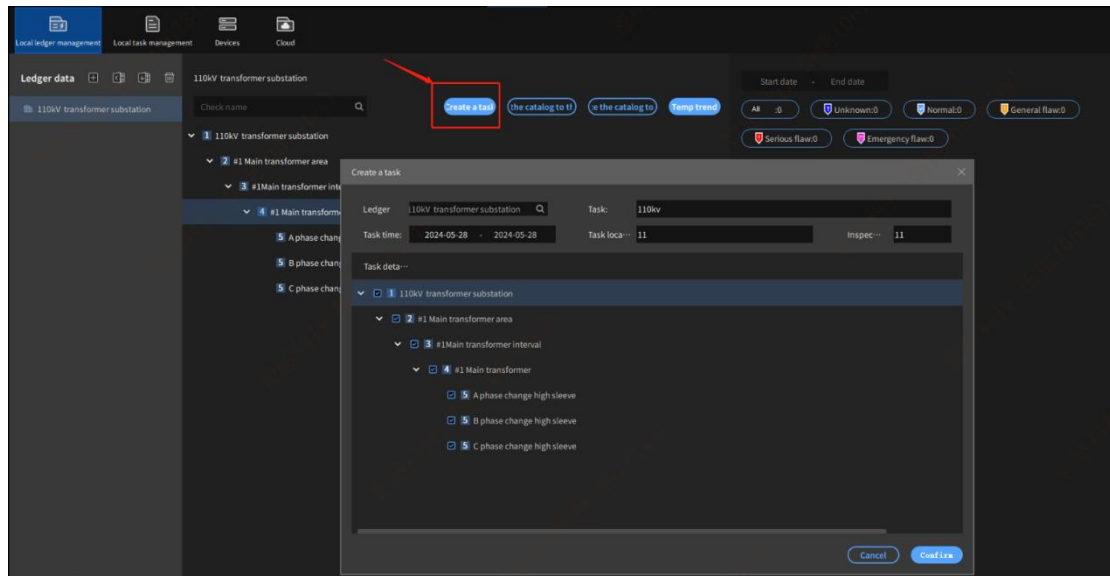
4. Synchronize the local inspection task on PC to the infrared thermal imaging camera or interact with the existing ledger task system.
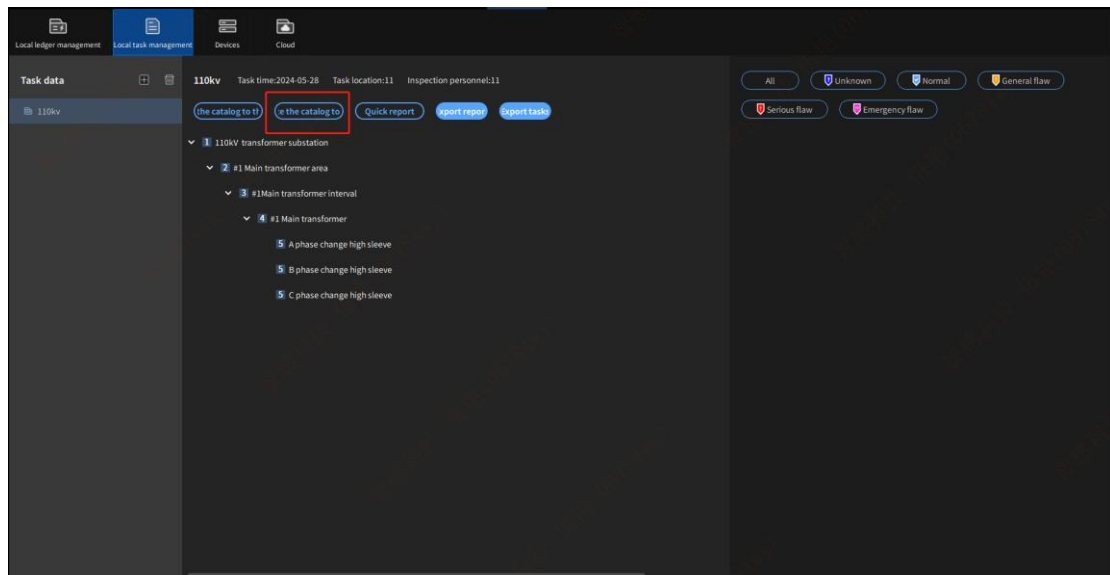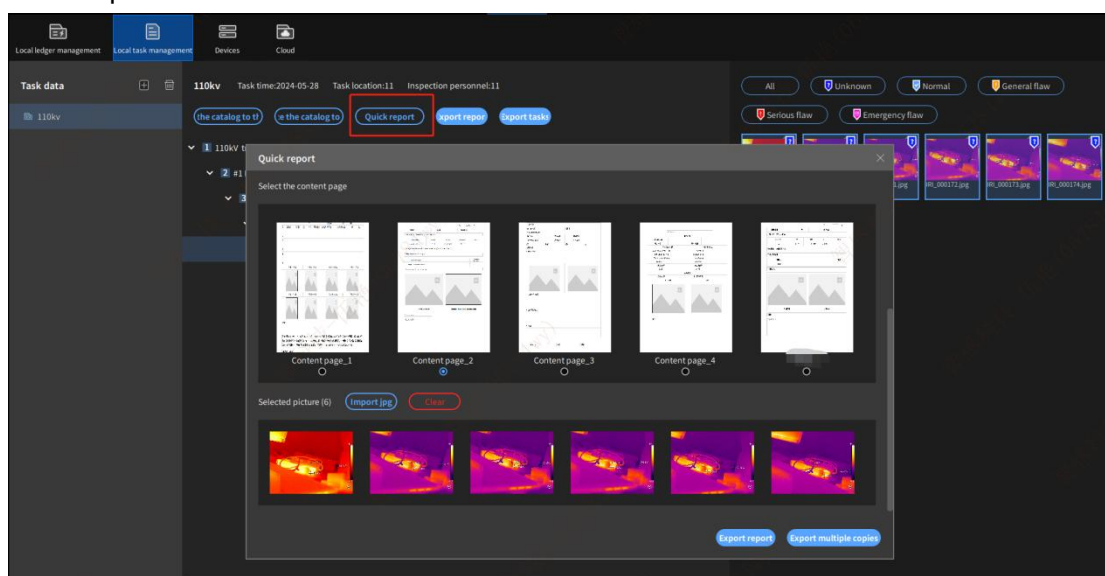

5. The camera performs inspection shooting.

6. After shooting, click Device on the PC software to synchronize the inspection task image data to the local PC infrared analysis software for image management.
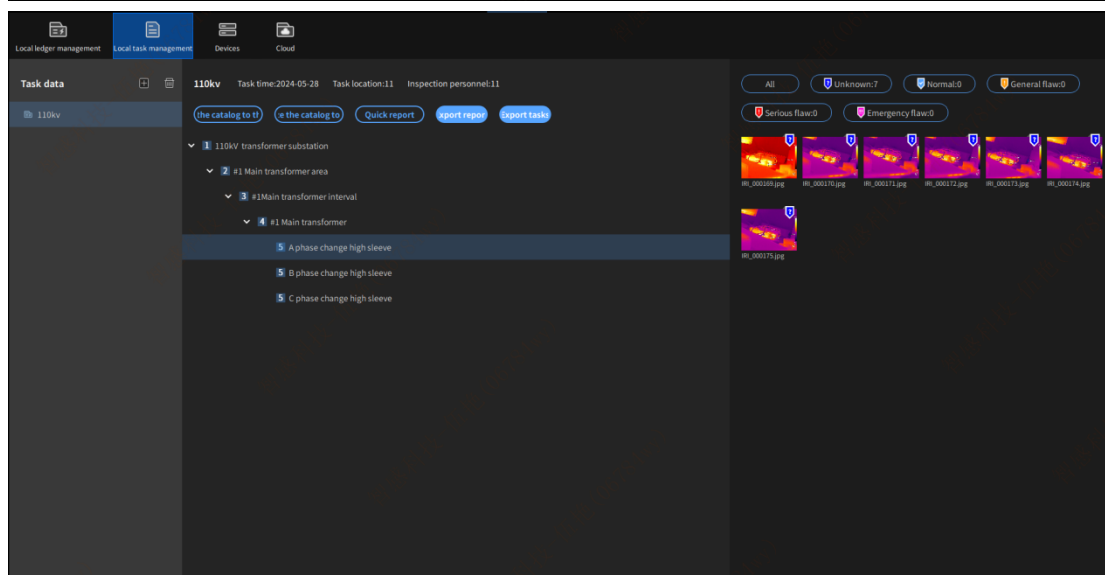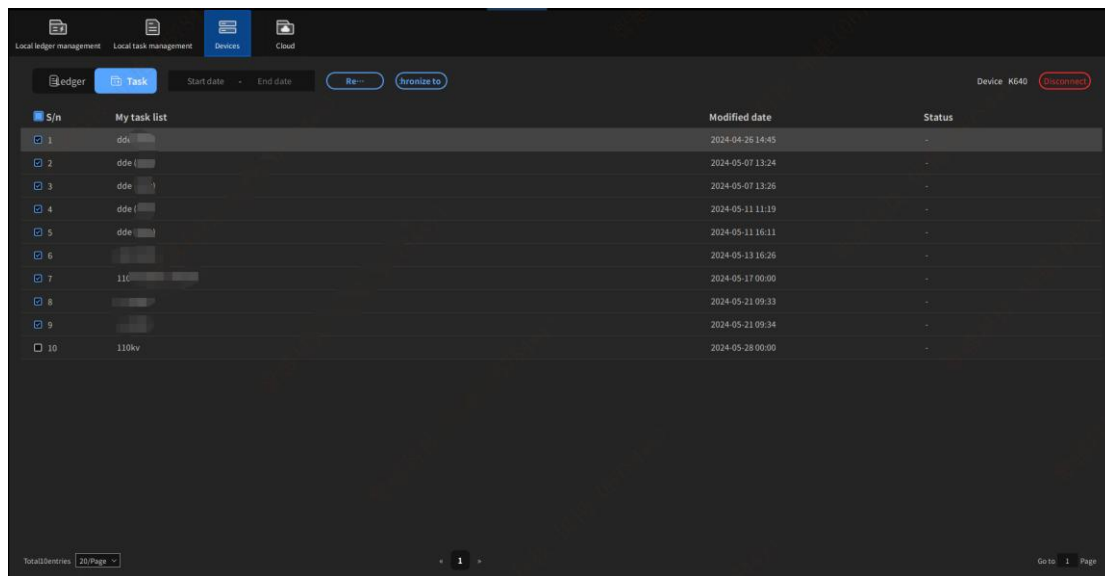
7. Conduct image analysis in the ledger or task module, and create inspection path batch reports.

5. Term explanation

5.1. General

Infrared thermal imaging camera functions by converting invisible infrared electromagnetic wave energy radiated by objects into visible infrared thermal images. Different colors on the infrared image represent the distribution and height of the surface temperature of the measured object.

The infrared radiation received by the thermal imaging camera includes the radiation energy of the measured object itself, the reflection of the environment and the possible transmission energy. Only the thermal radiation energy emitted by the measured object itself can truly reflect the real temperature of the object surface.

Infrared radiation (infrared ray) generally refers to the electromagnetic waves with a wavelength from 0.78 to 1000μm. The short-wave end of the infrared band is connected with the red part of visible light, and the long-wave end is connected with microwave. Like other bands of the electromagnetic spectrum, infrared ray propagates at the speed of light, obeying the same laws of reflection, refraction, diffraction and polarization, but it has different wavelength and frequency ranges.
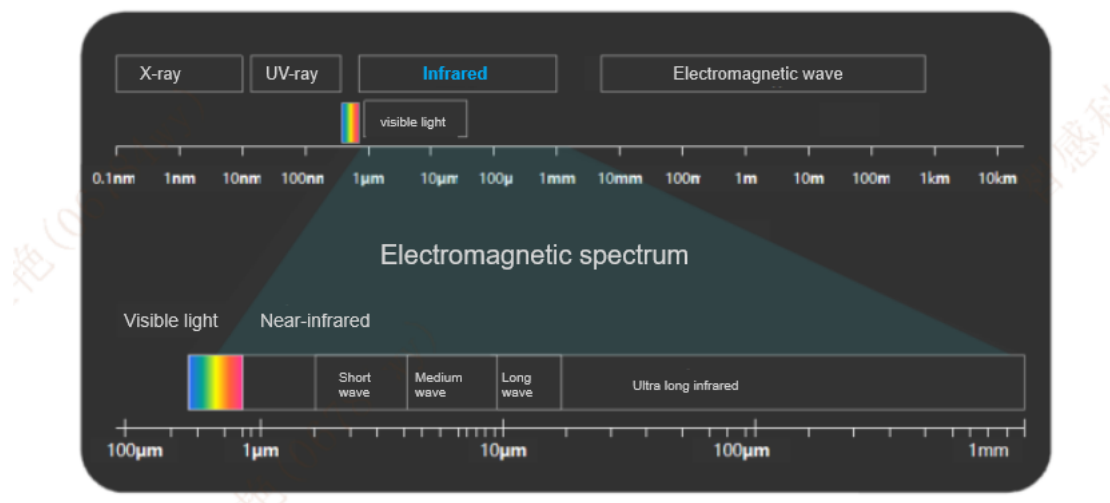
5.2. Emissivity

Emissivity refers to the ratio of the energy radiated from an object's surface to the energy radiated from a blackbody at the same temperature and wavelength.

Emissivity setting is the key factor for the accuracy of temperature measurement of thermal imaging camera.

The emissivity of blackbody radiation is 1; In practical application, the emissivity of the measured object is always

between 0.1 and 1.0. A large emissivity value indicates a higher emissivity and strong

ability to radiate heat externally.

The emissivity of an object depends on its material, surface structure, temperature and wavelength. Generally, materials with electrical insulation and thermal insulation,

such as wood and rubber, have higher emissivity, while metal emissivity have lower emissivity than rubber, especially those with polished surfaces.

Different surface emissivity brings completely different imaging effects. Setting emissivity may effectively improve the accuracy of temperature measurement, but it cannot change the thermal distribution of the image. Specific emissivity of common materials:

Material	Emissivity	Material	Emissivity
Brass mirror	0.03	Bright paint (all colors)	0.90
Polished aluminum or aluminum foil	0.09	Stone	0.92
Slightly oxidized aluminum	0.10~0.20	Calcimine	0.92
Strongly oxidized aluminum	0.20~0.40	Glass (surface)	0.94
Pebble	0.28~0.04	Concrete	0.94
Gold plated copper sheet	0.30	Non-bright paint	0.95
Solder coated copper	0.35	Water	0.95~0.96
Wood	0.78	Smooth black paint	0.96~0.98
Paper	0.80~0.95	Bark	0.98
Asphalt	0.85	Ice	0.98
Sheetmetal	0.88~0.90	Skin	0.98