User Guide of Thermal Analyzer Software

English Version (V2.0)

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Contents

1 Software Application Overview

1.1 Software application scope

- Rationality verification of heating experiment, thermal simulation and heating in circuit design;
- Positioning, detection and repair of leakage, short-circuit and open circuit of PCBA;
- Comparison and evaluation of mobile phones or other smart devices;
- Malfunction maintenance of short circuit, open circuit and leakage of circuit boards;
- Temperature control of electronic cigarette atomizers;
- Thermal analysis of heat conduction and heat dissipation materials;
- Detection of heat dissipation capability of products;
- Evaluation and comparison of the heating condition of the equipment;

1.2 System requirements

- The computer operating system proposed Win10 or above;
- Minimum computer configuration:
  - Intel i5 or above;
  - Memory: minimum of 4G, 8G or above recommended;
- In case that the operation of numerous data curve applications and 3D temperature is needed, Intel i7 and 8G memory or above are recommended;

2 Connection Mode

Below is the connection figure,

Open the USB flash disk attached with the device package, unzip STAD_Setup.zip, and click setup.exe to install thermal analyzer software:

setup.exe
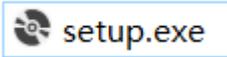
Connect the thermal analyzer and the computer through USB cable. After the connection, power on the thermal analyzer and run the exe file of the thermal analyzer software on the computer. It can work when ● Camera connected is displayed on the upper right corner of the software.

3 Software Menu Description

3.1 Software download link

http://114.115.130.132:8080/dytfile/downloadGET?fileName=Software/STAD/STAD_Setup

3.2 Precautions

(1) Please note that in some computers, the screen scale will be set to be greater than 100%, which will affect the layout of the thermal analyzer. It is recommended to set "Change the size of text, apps and other items" to 100% in the scale and layout settings of windows, as shown in the figure below.

Scale and layout

Change the size of text, apps, and other items

100% (Recommended)

Custom scaling

Resolution

1920 × 1080

Orientation

Landscape

(2) During the temperature measurement, the focal length shall be adjusted manually until the image is focused, otherwise there will be a deviation in temperature measurement.

(3) When testing the circuit boards, the surfaces of some chips on the circuit boards are very smooth and will cause reflection, which may

interfere with the circuit diagnosis and lead to false result. Hence, when testing the circuit boards, it is necessary to tilt the circuit boards from time to time, or turn the lens of TA series products to an angle to eliminate the reflection, and then check whether the hot spots are in the same position.

3.3   Software UI

When the software is opened for the first time, the interface is as shown in the figure:
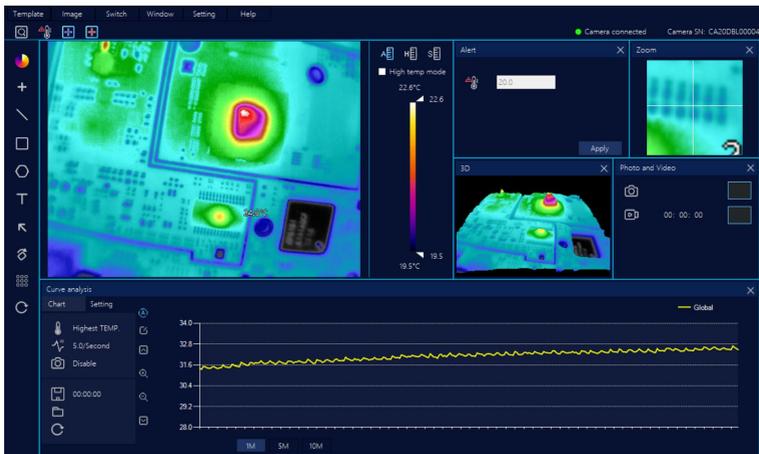
3.4   Main interface description
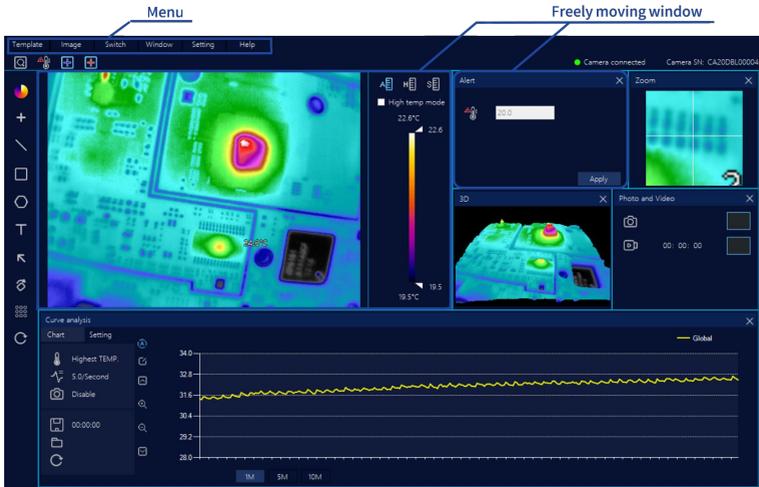
The software mainly consists of two main parts: "menu" and "window":

(1) The menu items include:

Template:

A modular window design is introduced in the software. The users can arrange different windows on the main interface to meet the requirement of different consumers. The consumers can store the personalized interface as a common template, so that they can use the templates directly when they use thermal analysis software every time.

Image:

Perform image operations on the infrared thermal video window to complete the temperature.

Switch:

Switches for thermal imaging data and analysis that are commonly used. When types of switches are opened, the infrared video window can trigger functions.

Window:

Each software function of the thermal analyzers is designed with the modular window. The users can open and execute the function through the window menu, and the window can be freely moved and zoom.

Setting:

The parameter configuration of the thermal analyzers meets more professional applications.

Help:

Software instruction and application cases are included.

(2) Window, independent functional modules in the form of a combined window on the main interface, such as: thermal imaging window, video and photography window, isotherm definition window, amplifying function window, etc.

3.5   Detailed description of menu items

3.5.1 Template
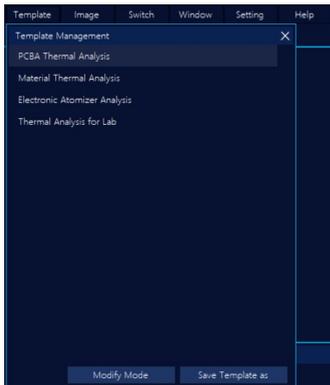
This menu provides four default templates. After clicking the mouse to select, the current interface layout will be displayed.

When the consumers have modified the layout under the current template and design to save it as a new template, the user can click "Template" on the menu to enter the template management, click "Save

Template As" next, modify the template name and description then, and finally click "OK" to save as a new template.
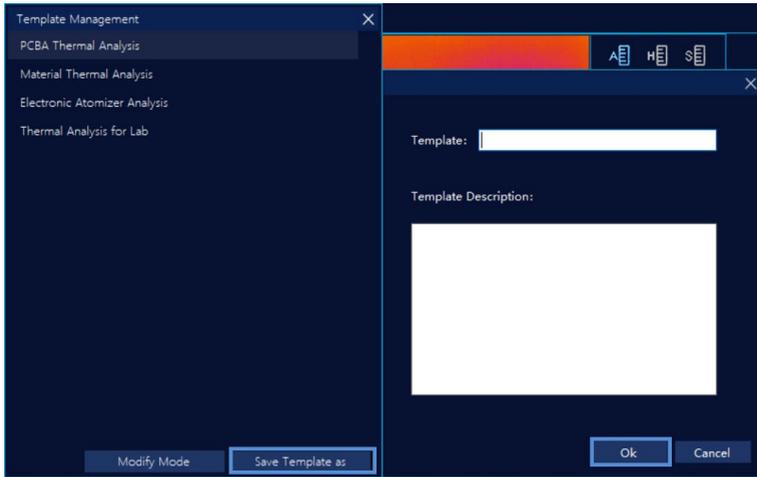
After the new template is saved, it can be used to complete the analysis and measurement when the thermal analysis software is used every time.

3.5.2 Image

8
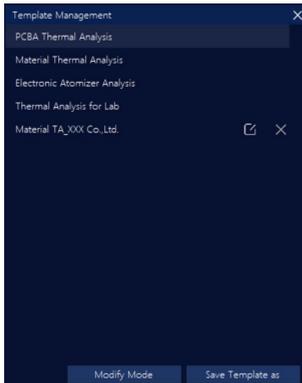
Image	Switch
+	Points
＼	Line
□	Rectangle
○	Polygon
T	Text
↖	Arrow
♂	Rotate
◭	Flip-H
◅	Flip-V
C	Reset Image
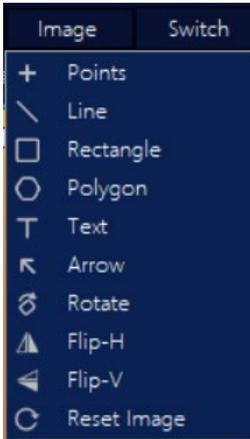
Image clicking and the functions in the drop-down menu can be operated in the thermal analysis video window.
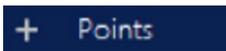
+ Points Draw points in any position in the thermal analysis window for temperature measurement.

＼ Line Draw a straight line in any position of the thermal analysis window to measure the positions of the line with the maximum and minimum temperature and the corresponding temperature values.

□ Rectangle Draw a rectangle in any position of the thermal analysis window to measure the positions of the rectangle with the maximum and minimum temperature and the corresponding temperature values.

○ Polygon Draw a polygon in any position of the thermal analysis window to measure the positions of the polygon with the maximum and minimum temperature and the corresponding temperature values.

T Text Text description can be added in the video screen of

9

the thermal analysis window, as shown in the following figure.

Arrow Arrow indication can be added in the video screen of the thermal analysis window, as shown in the following figure:
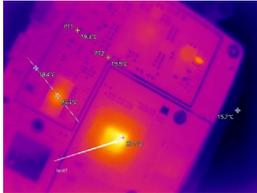
Rotate Video screen of the thermal analysis window, which can be rotated every 90 degrees clockwise.

Flip-H Horizontal image, which can flip the thermal analysis window screen horizontally.

Flip-V Vertical image, which can flip the thermal analysis window screen vertically.

Reset Image Reset the video screen of the thermal analysis window and restore it to the initial state.

3.5.3 Switch
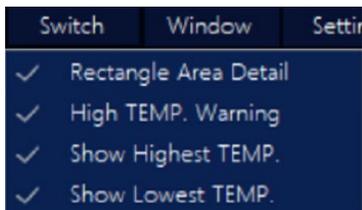
Turn on/off the general switches for various types of thermal imaging data and analysis.

✓ Rectangle Area Detail Analyze the rectangular area in the thermal imaging window video. The color palettes in the rectangular areas are valid, and the color outside the rectangular area is white hot. The adjustment of color palettes and color bars are valid only in the rectangular area, but invalid outside the area.

When the switch of "rectangular area detail" is turned on, a rectangular area will be added automatically in the middle by the software if there is no rectangular area in the video screen. As shown below:
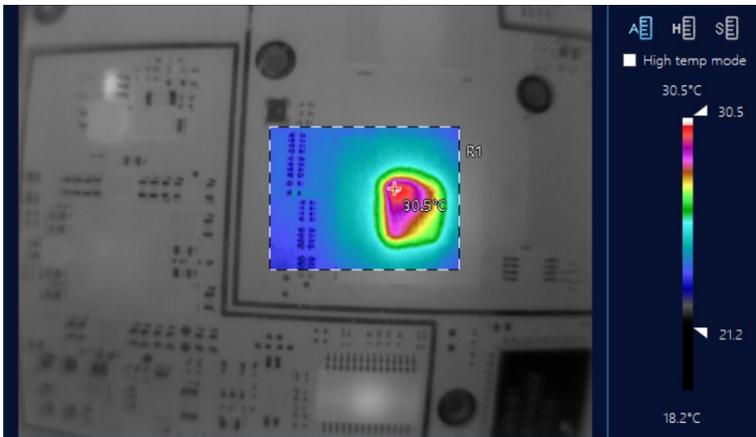
✓ High TEMP. Warning When the temperature threshold of infrared thermal imaging is triggered, an audible alarm will be sent out and the red frame of the video window flashes. The temperature alarm threshold value is set in "Other" window.

✓ Show Highest TEMP. When the high temperature switch is turned on, the hot spot will be displayed on the video screen, including line graphics, rectangular area graphics, polygon area graphics, and the position and temperature value of the hot spots in the whole screen will also be displayed accordingly.

11

 When the low temperature switch is turned on, the cold spot will be displayed on the video screen, including line graphics, rectangular area graphics, polygon area graphics, and the position and temperature value of the cold spots in the whole screen will also be displayed accordingly.

3.5.4 Window
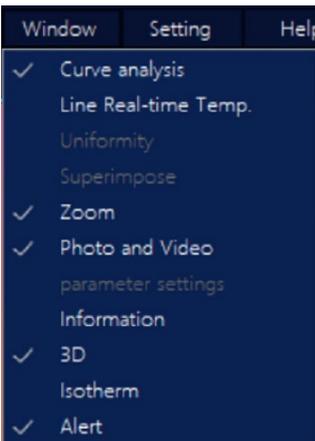
Window function, which can display different function windows on the interface. The thermal analysis video window always exists, and other function windows can be closed and opened.

When the function window has been opened and displayed on the main interface, the function menu item will display √ . , otherwise, there is no such display.

3.5.5 Configuration
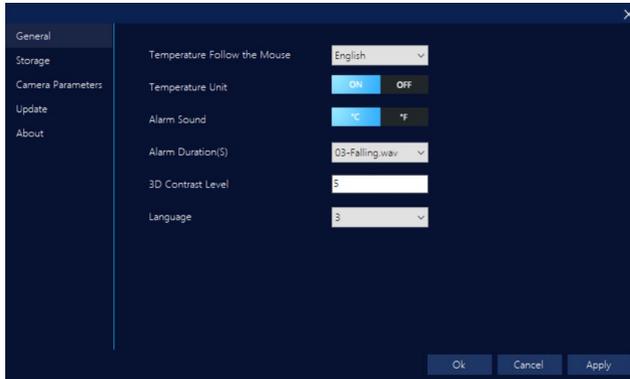
Configuration: To configure the parameters of the thermal analyzers, if the user is not professional with thermal imaging, please keep all the parameters as default.

Function setting	Description
General-> Temperature Follow the Mouse	Whether to display the temperature or not with mouse move.
General-> Temperature Unit	The setting switch of the temperature unit supports "°C" and "°F".
General-> Alarm sound	There are 8 kinds of temperature alarm sound to choose.
General-> Alarm Duration (S)	Setting of alarm duration by seconds, including the sound and flashing time of the thermal image.
3D contrast level	There are 5 comparison categories.
Storage-> Picture folder	The folder of manual taking pictures.
Storage-> Video folder	The folder of manual taking videos.
Storage-> Data folder	The folder of saving data including temperature data and pictures.
Camera parameters-> Emissivity	Emissivity setting range: 0.01-1.00
Camera parameter-> Distance (m)	Camera observation compensation range: 0-5 meters

Camera parameter-> Humidity (%)	Camera humidity parameter setting range: 0-100
Camera parameter-> Correction	Camera correction parameter setting. The temperature unit is the same as the general -> temperature unit setting (℃ or ℉).
Camera parameter-> Reflected temperature	Camera reflection temperature parameter setting. The temperature unit is the same as the general -> temperature unit setting (℃ or ℉).
Camera parameter-> Ambient temperature	Camera ambient temperature parameter setting. The temperature unit is the same as the general -> temperature unit setting (℃ or ℉).
Update-> Automatically check for update	Switch setting of automatic detection and update of software.
Update-> Manual detection	Switch of manual detection and update of software.
About	Official website of the company.

3.6 Function window description

3.6.1 Real-time video window of thermal analysis
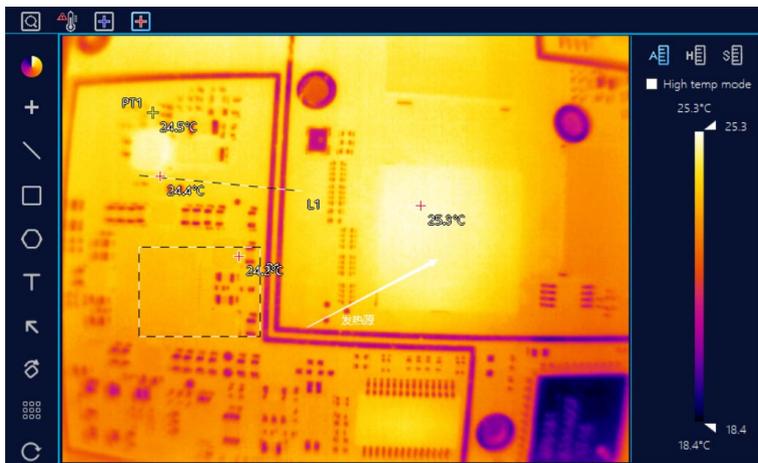
The real-time video window of thermal analysis is the main analysis

window, which cannot be closed by default. The window is divided into four parts.
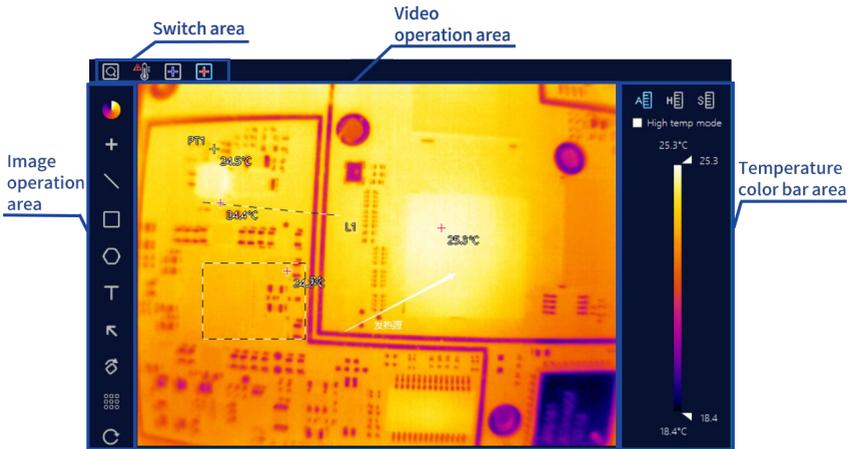
Image operation area:

Carry out the operations on real-time video, such as point temperature measurement, line temperature measurement, text marking.

Switch area:

Turn on various switches, such as high and low temperature tracking switch, temperature alarm switch.

Temperature color bar area:

Select the dynamic temperature bar, extended dynamic temperature bar (high temperature highlighting), fixed temperature bar (isotherm), etc. and set different temperature range display mode.

Video operation area:

Display the video screen of the thermal analysis test.

3.6.1.1 Detailed description of the function of the image operation area

(1) Color board

Selection of color board

Iron: In high temperature areas, the red takes a large proportion and it is suitable for detecting scenes where high temperature areas account for the main proportion.

White Hot: The white indicates the high-temperature section. The whole screen is mainly in the transition from black to white, which is suitable for users liking the traditional mode of black and white.

Black Hot: The black indicates the high-temperature section. The whole screen is mainly in the transition from white to black, which is suitable for users liking the traditional mode of black and white.

Rainbow: The maximum temperature is indicated in red, the medium temperature is indicated in yellow, and the low temperature is mainly blue and black, which is suitable for scenes with distinct colors of high and low temperature.

High Contrast: In the whole temperature range, the whole temperature field is divided into different display areas with 10 fixed and different colors, which is suitable for the application of viewing distinct temperature distribution, such as plane material detection.

Morning Glory: Gradual transition of black, blue, red, yellow and white. The black indicates the minimum temperature and the white indicates the maximum temperature.

It is suitable for scenes highlighting the high temperature during detection.

Red Hot: The main colors are red and black. From the minimum temperature to the maximum temperature, the color transits from black, white to red, which is suitable for the scene of attaching importance to high temperature.

Volcano: The whole main color bar is in red, which is similar to the fire red of lava combustion. The main color is in gradient ramp, and the background level is also relatively clear. It is mainly used in the detection environment where the sense of depth of the whole screen is expected to be reflected in red.

Jade: The medium low temperature, medium temperature and medium high temperature are indicated in red, yellow and white respectively. It focuses on the change from medium low temperature to medium high temperature. The low temperature section is indicated in light blue and white. It is often used in the scenes where the attention is paid to the change from medium low temperature to high temperature instead of the background, such as material detection.

Natural: The maximum temperature is indicated in red, the medium temperature is indicated in yellow, and the low temperature is mainly blue and black, which is suitable for scenes with distinct colors of high and low temperature.

Summer: The maximum temperature is indicated in white, the medium high temperature is indicated in

17

the intermediate color of red, the medium low temperature is indicated in the intermediate color of yellow, and the minimum temperature is indicated in the intermediate color of blue and black. It is suitable for the scenes where the maximum and minimum temperature are indicated by two extreme colors.

Fluorescence: The red, orange, yellow, green, cyan, blue, purple and black are used on the color board to indicate the change from the minimum temperature to the maximum temperature, and the level of each temperature range is clear level. It is suitable for the scenes where the attention is paid to the overall temperature change and the indications of temperature ranges in distinct colors.

Green Hot: The main colors are red, yellow and black. The black, yellow and red are applied to indicate the change from the minimum temperature to the maximum temperature. The high-temperature section is highlighted in red, the medium temperature section in yellow, and the low temperature section in black. It is suitable for scenes where the attention is paid to the medium and high temperature.

Peacock: The key point is the medium temperature section, which is mainly in red and yellow. It is suitable for the detection scenes where the attention is paid to the temperature changes in the medium temperature section.

Iron Segment: The main body is in rust, but it is reflected by different color blocks in the whole temperature range. It is suitable for the scene of dividing the temperature distribution by isotherms.

Peking Opera: The display of color blocks is obvious. It is suitable for the scenes with similar temperature.

(2) Drawing point graphics

Point temperature measurement. Draw point graphics in the video screen for measurement;

(3) Drawing line graphics

Line temperature measurement. Draw line graphics in the video screen and measure the maximum temperature and minimum temperature points on the line;

(4) Drawing rectangular area graphics

Rectangular temperature measurement. Draw rectangular area graphics in the video screen, and measure the maximum temperature and the minimum temperature point in the rectangular area;

(5) Drawing polygonal area graphics

Polygon temperature measurement. Draw polygon area graphics in the video screen, and measure the maximum temperature and the minimum temperature point in the polygon area;

(6) Text marking

Mark the text in the video screen of the thermal analysis window;

(7) Arrow marking

Draw an arrow for marking in the video screen of the thermal analysis window;

19

(8) Arrow marking

Rotating mirror. Rotate the video screen to different angles;

(9) Drawing nine-square diagram (equal-scale segmentation)

Nine-square diagram temperature measurement. Divide the screen into multiple equally divided rectangular areas for temperature measurement;

(10) Screen resetting

Reset the video screen of the thermal analysis window to restore to the initial state. It can remove all drawn graphics and temperature measurement;

3.6.1.2 Detailed explanation of the switch area

Inspection in the rectangular frame:

Analyze the rectangular area in the thermal imaging window video. The color boards in the rectangular area are valid, and the color outside the rectangular area is black and white. The adjustment of color boards and color bars is valid only in the rectangular area, but invalid outside the area.

When the switch of "Inspection in the rectangular frame" is turned on, a rectangular area will be added automatically in the middle by the software if there is no rectangular area in the video screen. As shown below:
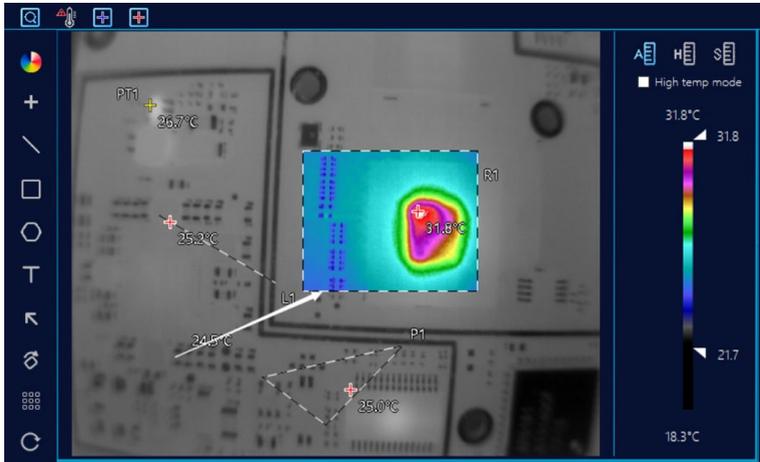
High temperature alarm:

When the temperature threshold of infrared thermal imaging is triggered, an audible alarm will be sent and the red frame of the video window flashes. The temperature alarm threshold is set in "Other" window.

Track the minimum temperature:

When the low temperature switch is turned on, the minimum temperature point will be displayed on the video screen, including line graphics, rectangular area graphics, polygon area graphics, and the position and temperature value of the minimum temperature in the whole screen will also be displayed accordingly.

Track the maximum temperature:

When the high temperature switch is turned on, the maximum temperature point will be displayed on the video screen, including line graphics, rectangular area graphics, polygon area graphics, and the position and temperature value of the maximum temperature in the whole screen will also be displayed accordingly.

3.6.1.3 Detailed explanation of the temperature bar area
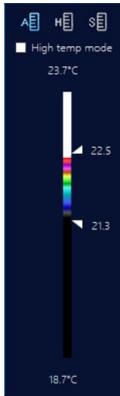
Temperature bar area:

The temperature bar indicates that in the images of thermal analysis video, different colors represent different temperatures. The temperature bar areas can be divided into three modes:

(1) Dynamic temperature bar, which can be selected with the icon . When selecting the dynamic temperature bar, the color distribution of the color board will change from time to time according to the maximum temperature and minimum temperature of the screen. The meanings on the color board are as follows:
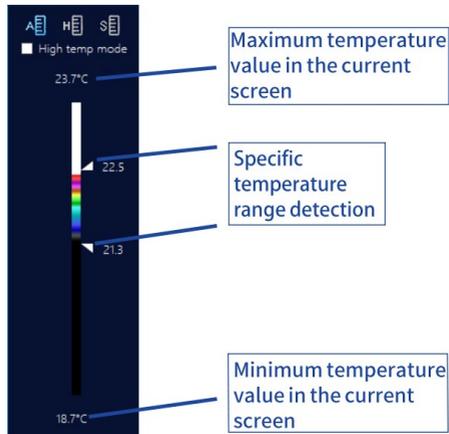
Specific temperature range detection: Users can adjust the temperature range screens that they desire to focus on according to their own needs. The data can be adjusted with the up and down arrows. When the temperature is above the observed maximum temperature, it is displayed in white, and when the temperature is below the minimum temperature, it is displayed in black. The screen of Specific temperature range detection is assigned with colors according to the color palette.

(2) Extended dynamic temperature bar (high temperature and bright area), which can be chosen with the icon .

When choose the extended dynamic temperature bars, automatically, it will set at the maximum temperature of +10℃ (Fahrenheit will be converted) and at the minimum temperature of -10℃.
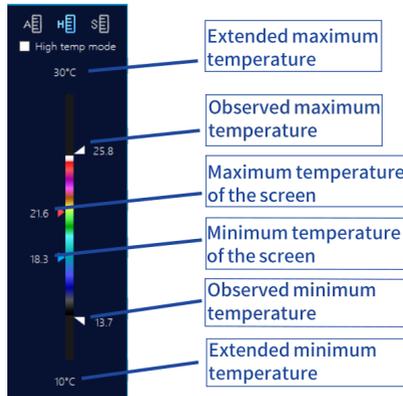
The users can pull the arrows of observing the maximum temperature and the minimum temperature, and focus on the images of the temperature range of concern. The images outside the observing temperature segment are in black and white. As shown below:
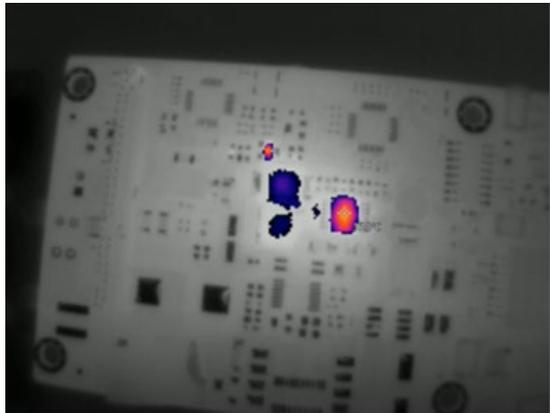
Extended dynamic temperature bars are often used in detection of leakage and short-circuit of the circuit boards.

(3) Fixed temperature bar (isotherm), which can be chosen with icon ⬛. It is defined as: the fixed upper and lower range of temperature and the color distribution is also fixed according to the fixed temperature. When the temperature

range is exceeded, it cannot be displayed. Therefore, the temperature of the tested object should not exceed the setting range when using a fixed temperature bar.

The color shall be set in the isotherm color board after selecting the fixed temperature bar, as shown in the following window:
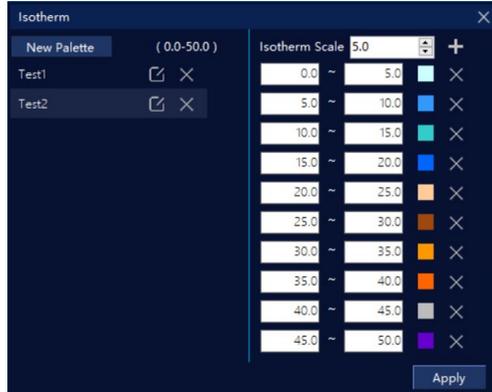
For isotherm settings, please refer to the instruction of the window.

(4) Switch mode between the measurement of normal and high temperature

■ High temp mode High temperature mode. It is the switch between the measurement of normal and high temperature. The normal temperature measurement mode ranges from -10℃ to 120℃ and it can be switched to the high-temperature section of the temperature measurement range. It supports the temperature display of TA20 (-10℃~450℃), TA30 (-10℃~550℃) and TA60 (-10℃~550℃).

3.6.2 Curve chart window
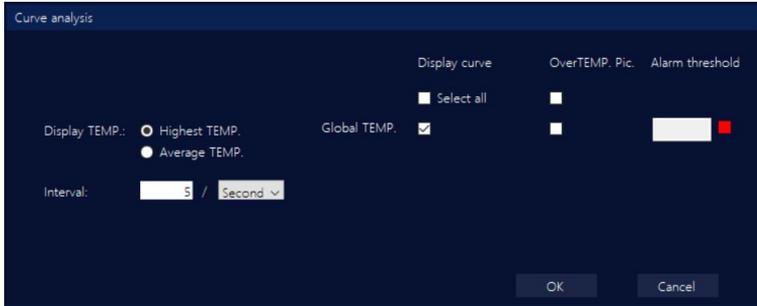
Display temperature:

The curves show the maximum temperature or the average temperature.

Sampling interval:

Times of collecting the temperature per second or minute, for example, 5 times per second, i.e. once in 200ms.
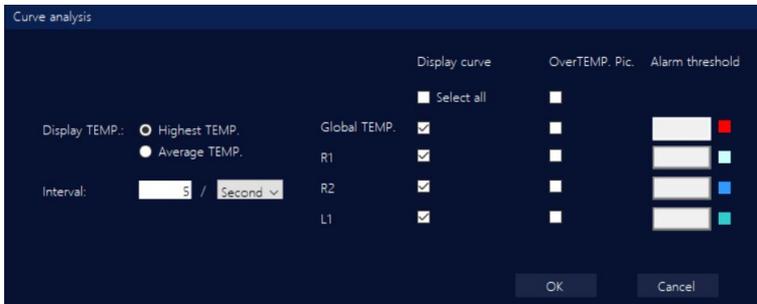
Global:

Full screen. R1/R2 is the rectangles drawn by the users, and L1 is the line drawn by the users.

Photographing of overtemperature:

The temperature threshold can be set, and when it is triggered, a photo will be taken automatically.

Curve colors:

Each graphic drawn on the thermal image will be automatically assigned with different colors by the system.
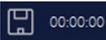
Start to record CSV format data.

Storage location of CSV data.

Update the curve chart and display again.

Different time display periods can be selected, which is 1 minute, 5 minutes, 10 minutes.

3.6.3 Online real-time temperature window

It is shown as follows in the first opening.
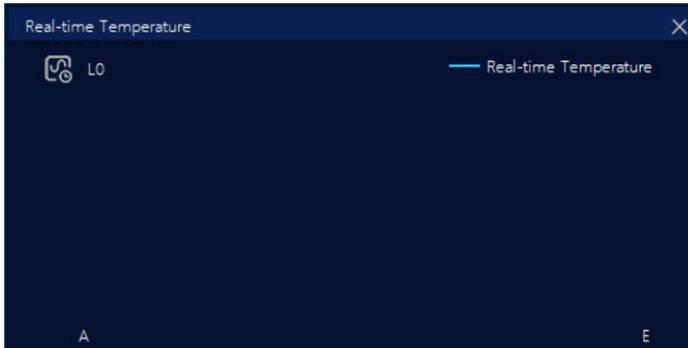
All the temperature states on one line will appear when selecting

 and drawing a straight line in the window of thermal analysis video, as shown in the following figure:

Click on any point on the right line to mark the corresponding point and temperature in the left video. As shown below:
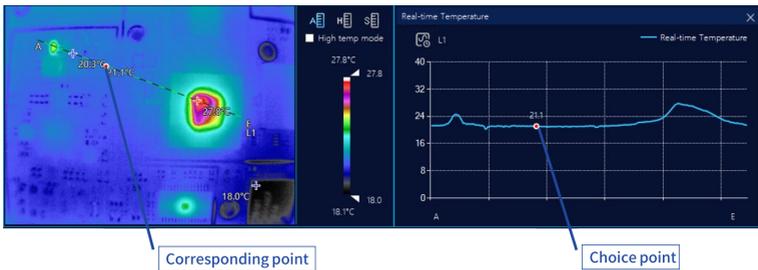
3.6.4 Amplifying window

Window amplifying function: small objects can be amplified for 6 times with the mouse.

3.6.5 Isotherm window

The isotherm window is only valid when selecting a fixed temperature bar (isotherm). It can be chosen with the icon , as shown in the following figure:
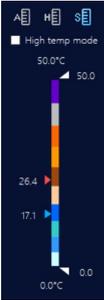
The following steps can be done after selecting the fixed temperature bar in the isotherm window:

(1) Click to create a new isotherm template.
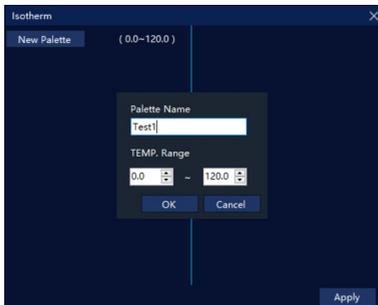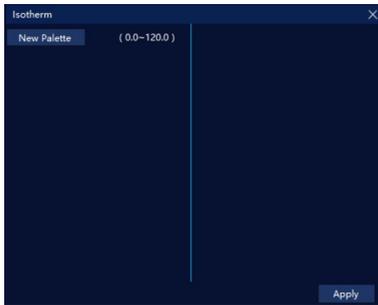
(2) Enter the palette name of the isotherm color board and the fixed temperature range of the isotherm color board. Press "OK" and store it as an isotherm template. It will work for the thermal analysis video after the application.
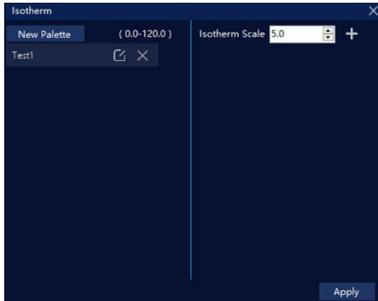
(3) The isotherm color blocks can be added on the right side. Different isotherm color blocks can be added by clicking "+" following the width of the temperature line.

3.6.6 Photography and video window
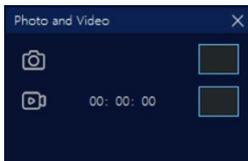
Photographing of the main screen.

Video recording of the full screen.

4 Application Mode Introduction

The software is designed in modularization, and the users can combine different windows according to their own needs as the standard form of the post.

4.1 PCBA maintenance industry

As shown in the following figure, an infrared thermal imaging window can be used to diagnose and locate the leakage and short-circuit of mobile phones.

4.2 Heat dissipation and heat conduction materials

In the material testing:

- View the temperature distribution on a line;
- Record the curve charts;

31

- Mark materials with different temperature color blocks;
- View the temperature change of temperature field in 3D mode;

Based on the above required functions, the interface can be displayed in the following combination of analysis windows, as shown in the following figure:

4.3   Electronic cigarette atomizer

Detection for the resistance wires when the electronic cigarette atomizer is heated for inspection:

- Enlarge the drawing points of resistance wires to measure the temperature;
- Record the heating process of resistance wire;
- Analyze the heating uniformity of atomizers;

Based on the above required functions, the interface can be displayed in the following combination of analysis windows, as shown in the following figure: