Handheld Thermal Imaging Camera

User Manual

V1.3

Handheld Thermal Imaging Camera User Manual

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V1.0	202001			New
V1.1	202111			Add TI322
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V1.3	202302			TI321 instead TI322

Contents

1 OVERVIEW 1

1.1 APPEARANCE 1

1.2 POWER ON/OFF 6

1.3 QUICK MEASUREMENT 6

1.4 SAVE, DELETE AND VIEW INFRARED THERMAL IMAGE 12

1.5 MAIN PAGE 16

1.6 CONTROL AND TRIGGER KEYS 17

1.7 CHARGE AND EXPORT PICTURES 17

1.7.1 Charge 17

1.7.2 Export Picture 18

2 OPERATION AND SETTINGS 19

2.1 MAIN PAGE OPERATION 19

2.1.1 Quick Operation 19

2.1.1.1 Quick Switch Color Palettes 19

2.1.1.2 Quickly Switch Image Modes 19

2.1.2 First Level Menu 20

2.1.3 Second Level Menu 21

2.1.3.1 Measurement 22

2.1.3.2 Image Mode 23

2.1.3.3 Thermal AGC 24

2.1.3.4 Color Palette 24

2.2 SETTINGS 25

2.2.1 Language 25

2.2.2 Emissivity 27

2.2.3 Temperature alarm 27

2.2.3.1 Alarm above threshold 28

2.2.3.2 Alarm below threshold 29
2.2.4 WiFi 29
2.2.4.1 Enable and Disable WiFi 29
2.2.4.2 WiFi Configuration 29
2.2.5 LED 30
2.2.6 More 30
2.2.6.1 Temperature Unit 31
2.2.6.2 Storage 31
2.2.6.3 Date 32
2.2.6.4 Automatic Power Off 33
2.2.7 Temperature Bar 34
2.2.8 Brightness 34
2.2.9 Restore factory settings 34
2.2.10 About 34
3 MAINTENANCE 36
3.1 BATTERY SERVICE AND REPLACEMENT 36
3.2 CALIBRATION 36
3.3 CLEAN 36
4 SPECIFICATION 37
5 APPENDIX 38
5.1 EMISSIVITY 38

1 Overview

1.1 Appearance

Handheld thermal imaging camera appearance is shown below,




CE FC RoHS



The front of handheld thermal imaging camera has 6 buttons, as shown below,

- OK & Homepage
- Up arrow
- Down arrow
- Left arrow
- Right arrow
- Return & Power



The back of handheld thermal imaging camera has 1 button,

- Trigger


Visible camera
Thermal imaging camera
LED
Trigger
USB interface for battery charge and data transmission

1.2 Power On/Off



- Press “Return & Power” key >1 second to power on handheld thermal imaging camera, the thermal imaging will display later.
- Press “Return & Power” key >3 seconds to power off handheld thermal imaging camera
- If handheld thermal imaging camera has any abnormal issue, Press “Return & Power” key >8 seconds to force shutdown the camera.

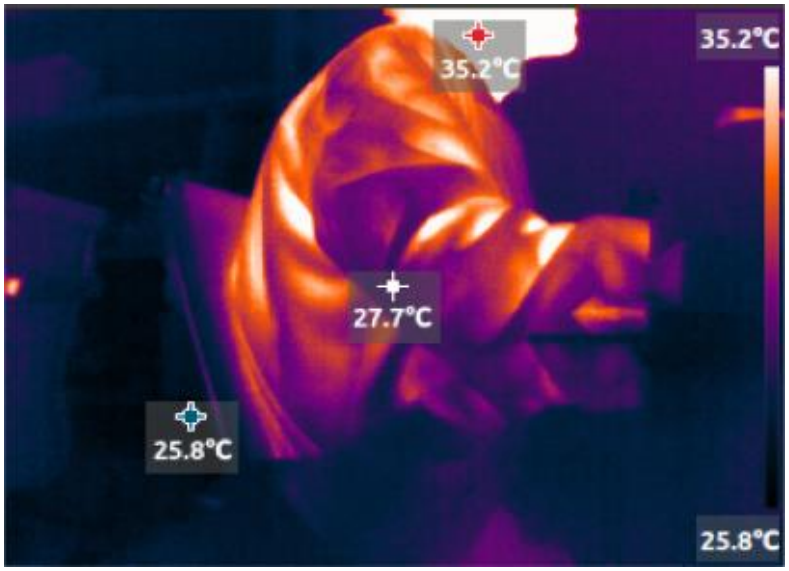
1.3 Quick Measurement

- Power on the thermal imaging camera, press and hold the “Return & Power” reuse key> 1 second as shown in the below figure, wait for the thermal imaging camera to start up, and the main page appears.



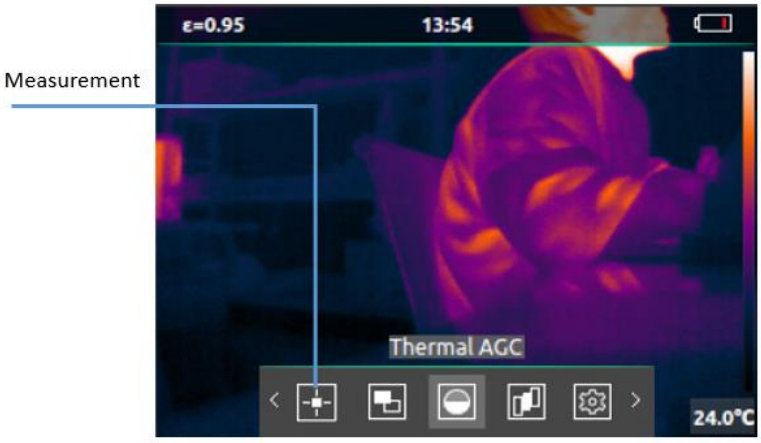
- Point the lens at the measured object as shown in the figure below, and the infrared image of the measured object will be displayed on the screen.

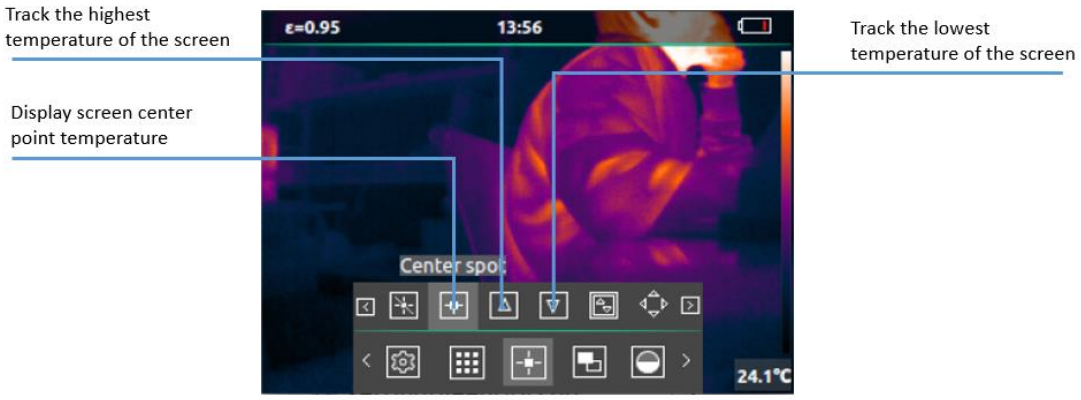




- If the temperature value is not displayed on the screen, press "OK & Homepage", then select the "Measurement" icon , and then select "Center Spot", "Hot Spot" and "Cold Spot" in the figure below to display the temperature,

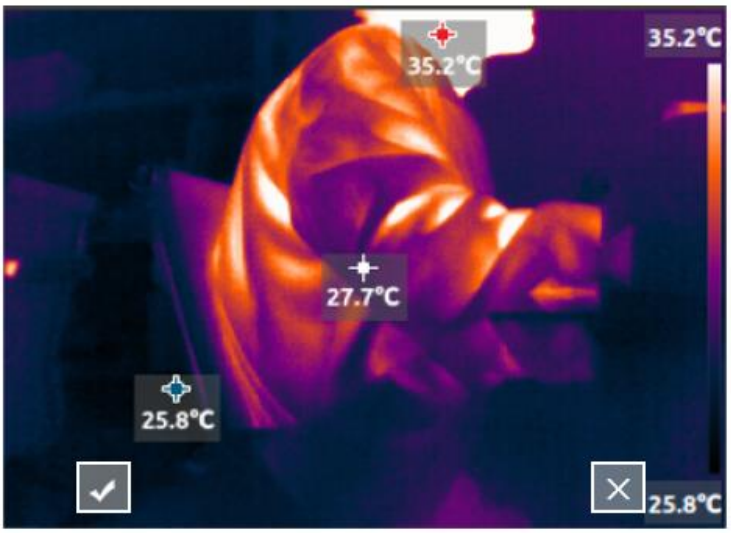

Ok & Homepage


Measurement
ε=0.95
13:54
Thermal AGC
24.0°C



- Press the trigger button will freeze the image as the figure below.





- Press the "trigger" to freeze the thermal image and visible light image, continue to press the "trigger" or "OK & Homepage" to save the thermal image and visible light image, press the "Return & Power" cancel saving.

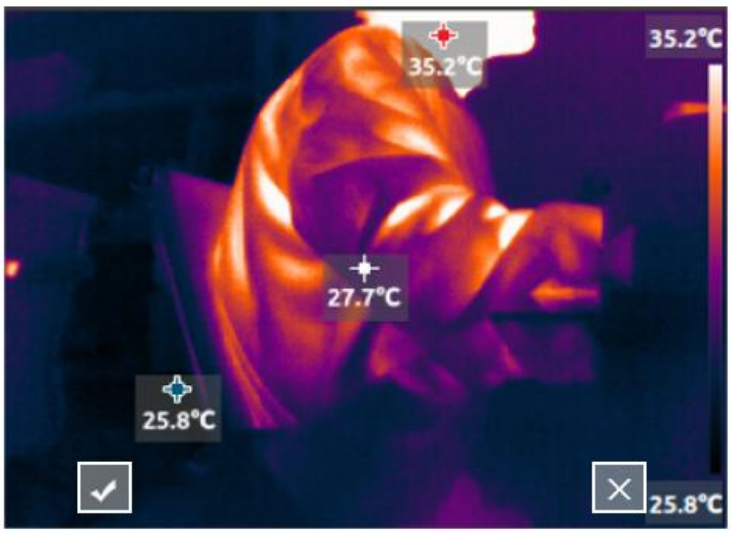




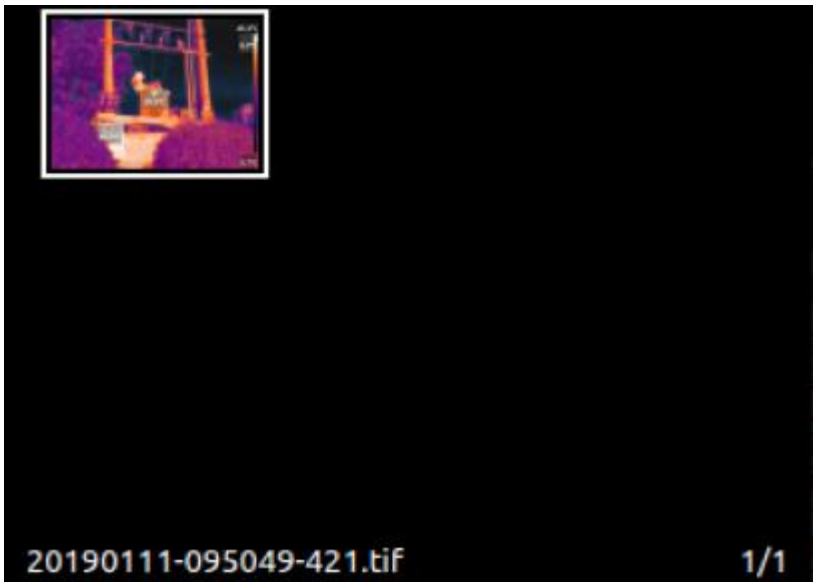
1.4 Save, Delete and View Infrared Thermal Image

- Power on the thermal camera.
- Point the lens to the object.
- Press the "trigger" to freeze the thermal image and visible light image, continue to press the "trigger" or "OK & Homepage" to save the thermal image and visible light image, press the "Return & Power" cancel saving.

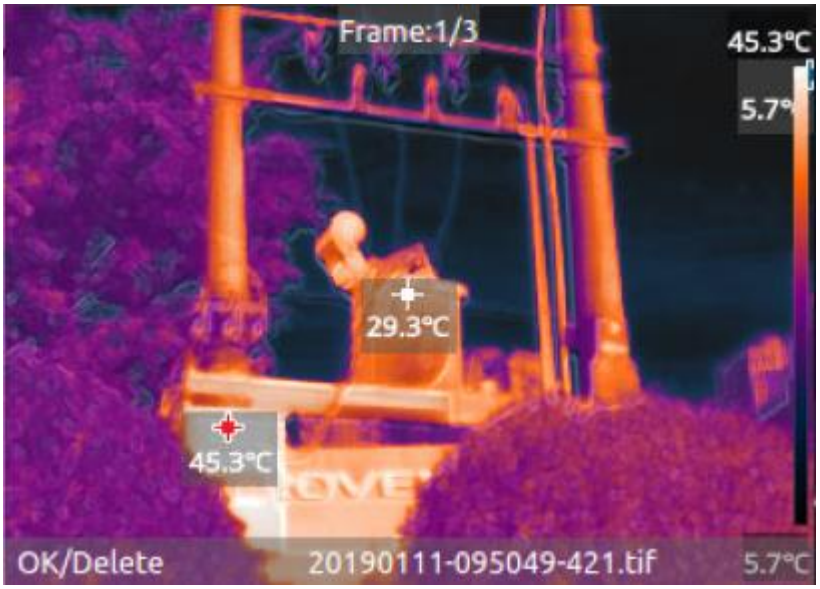




- Press Return will view the saved thermal images and visible images.



- Every time take pictures will save 3 frames into 1 picture,
  - 1st frame: the image frame of what you see is what you get



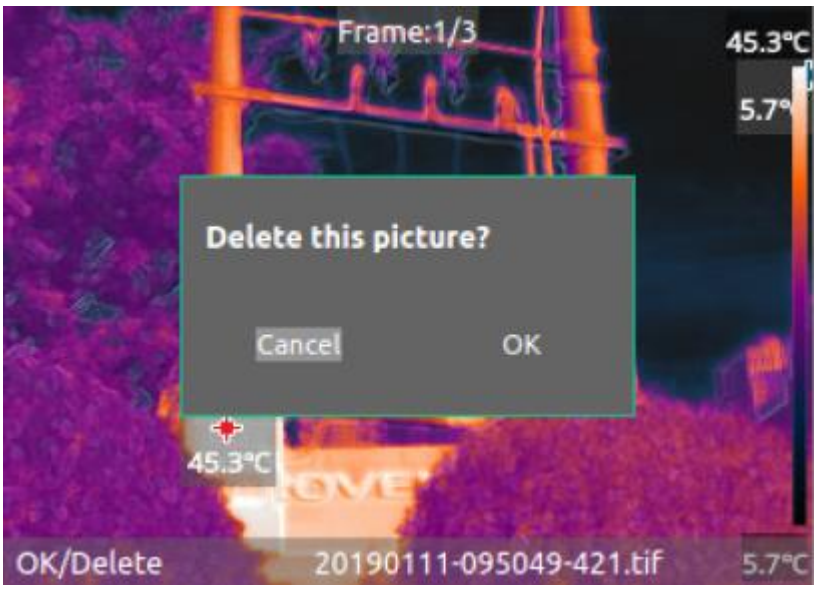
  - 2nd frame: the raw image frame of thermal image



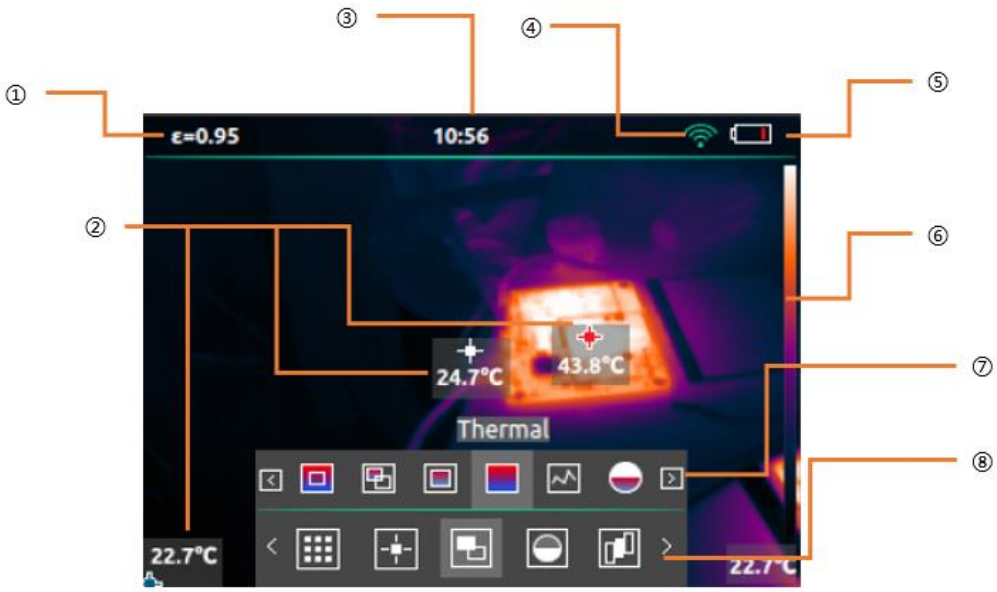
○ 3rd frame: the raw image frame of visible light image



- In the album, press "OK & Homepage" to preview the image in full screen. You can view the 3 frames of each picture by using the up and down arrow keys. The left and right arrow keys select the previous or next picture.
- When previewing the picture in full screen, press "OK & Homepage" to choose deleting the picture, press "Return & Power" to return to the album.



1.5 Main Page



1. Current Emissivity
2. Hot spot, cold spot and central spot
3. Time
4. WiFi
5. Battery

6. Color bar
7. Second level menu
8. First level menu

1.6 Control and trigger keys

According to the below description to operate control and trigger keys,

- "OK & Homepage" is only used as the homepage key to open the menu when the main page interface is turned on, other times as the OK key.
- Use the arrow keys to select the direction of the scroll menu and settings.
- "Return & Power" short press as the return key, press> 3 seconds to power off the camera. If the camera works abnormally, press "Return & Power"> 8 seconds to force turn off the camera.
- The "trigger key" trigger key is taking picture and storing picture confirmation key.

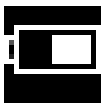
1.7 Charge and Export Pictures

1.7.1 Charge

Open the charging and data interface silicone plug then can see the USB interface. You can use the accessory's USB data cable to charge the camera at any time. The camera can still be used during the charging process.

The transformer chooses a universal USB interface 5V 2A or larger charger.

If the camera is power on and charging, please return to the homepage and press the "OK & Homepage". You can view the current power in the upper right corner of the screen, and the battery will have a green charging mark inside.

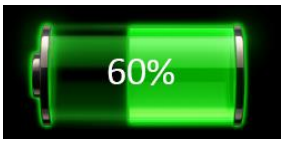


Battery



Charging state

If the camera is power off and charging, the display is always show the current battery level as shown below,



1.7.2 Export Picture

There are several methods to export camera pictures,

- When the thermal imaging camera is power on, connect the camera USB interface to the computer with the accessory's USB cable. A USB drive letter will appear on the computer. You can select the pictures to copy to the computer.
- When the thermal imaging camera is power on, turn on WiFi, and copy the pictures of interest to the computer through the analysis software.

2 Operation and Settings

2.1 Main Page Operation

2.1.1 Quick Operation

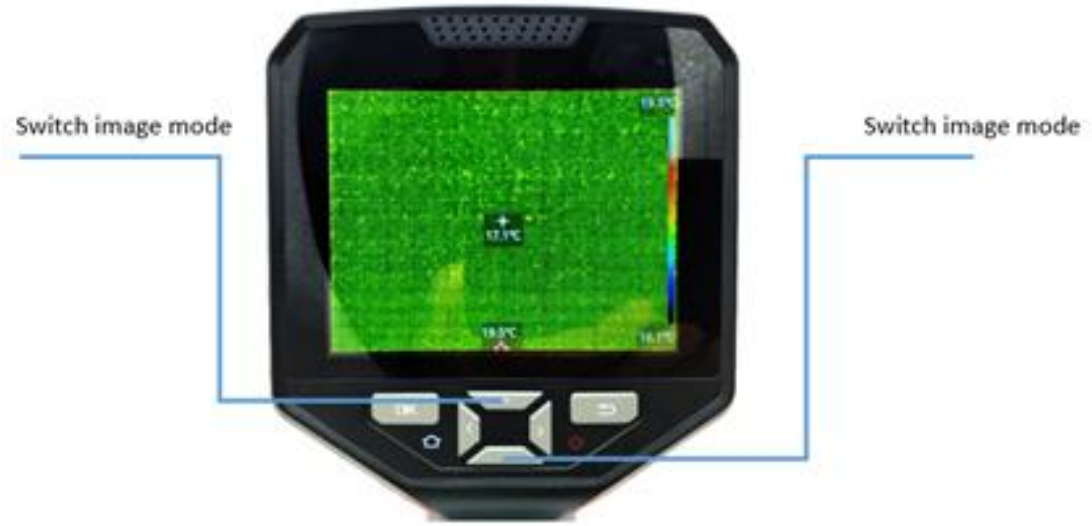
2.1.1.1 Quick Switch Color Palettes

When there is no menu on the main page, you can press the left and right arrow keys to quickly switch between 8 types of color palettes. For details about color palettes, see 2.1.3.4 Color palette. (If the main page displaying visible light image, you cannot switch color palette)



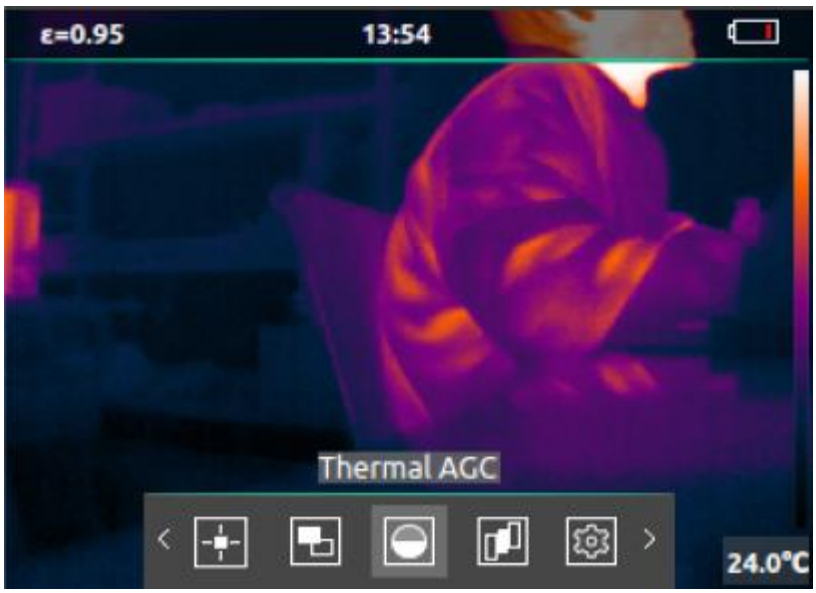
2.1.1.2 Quickly Switch Image Modes

When no menu appears on the main page, you can press the up and down arrow keys to quickly switch between image modes. For details about the image mode, see 2.1.3.2 Image Mode.



2.1.2 First Level Menu

Power on the camera, press the "OK & Homepage" to display the first-level menu and the status bar on the top. In this state, press the "Return & Power" to close the first-level menu and status bar. The icon selected in the menu is the current operable function, and there is a text prompt on the top of icon.

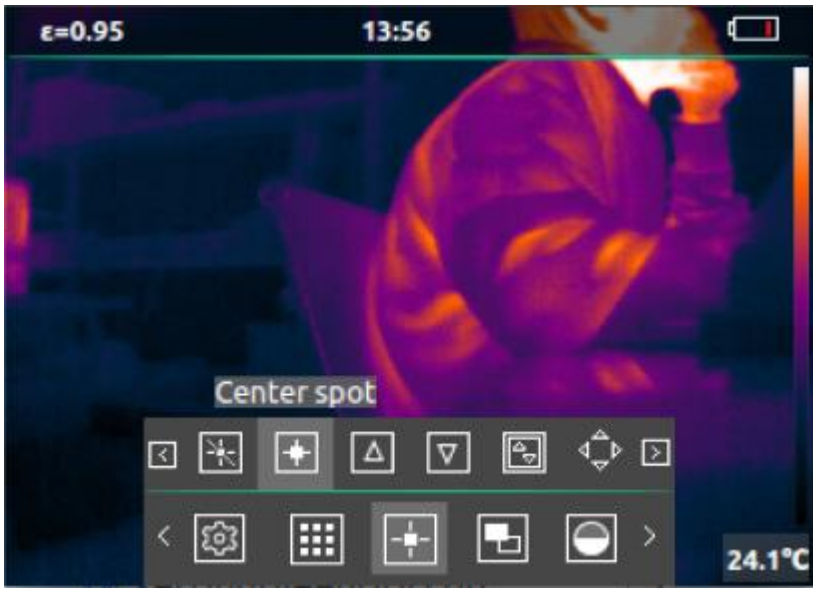


No.	Function	Icon	Description
1	Settings		Setting up the camera
2	Album		Viewing Pictures

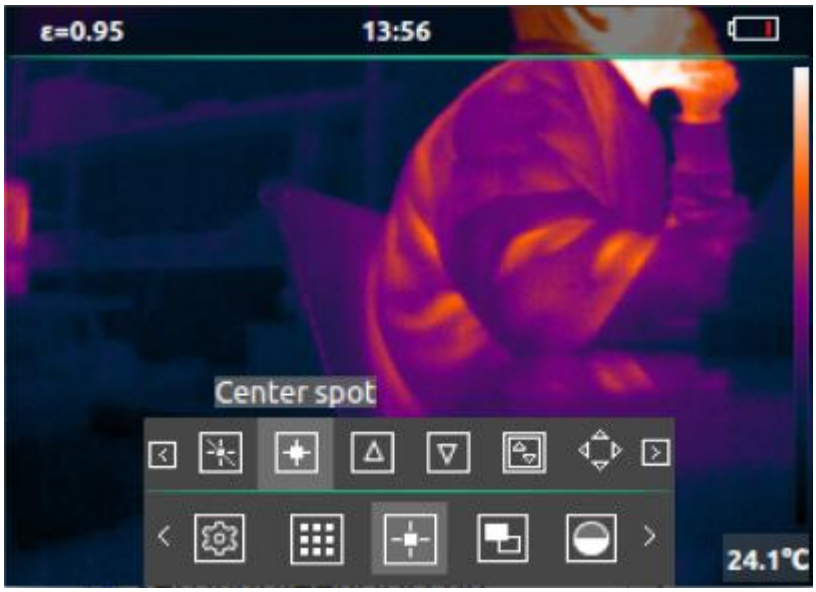
3	Measurement		Temperature measurement options, such as displaying the highest and lowest temperature.
4	Image Mode		Select the image display mode, such as picture-in-picture, outline fusion etc.
5	Thermal AGC		Select the effect of the image, such as high contrast, gentle and so on.
6	Color palette		Select the infrared thermal imaging palette, such as iron, white hot, etc.

2.1.3 Second Level Menu

When the first-level menu is display, press "OK & Homepage" to enter the second-level menu or setting interface, and in the second level menu state or setting interface, press "Return & Power" Return to the first-level menu. The icon selected in the second-level menu is the current operable function, and there is a text prompt on the top of the icon.



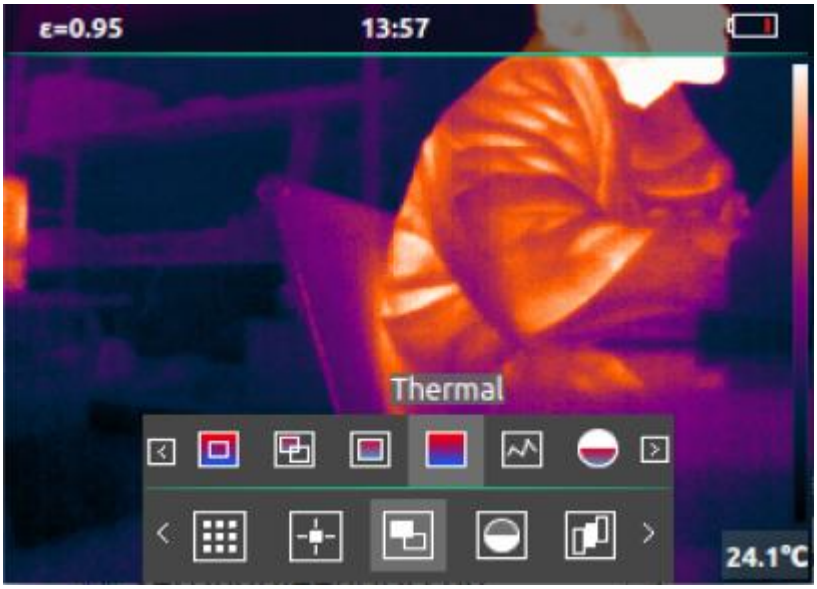
2.1.3.1 Measurement



The function is shown below,

No.	Function	Icon	Description
1	No measurements		Cancel all measurement
2	Center spot		Measure the center point temperature of the thermal imaging camera
3	Hot spot		Track and measure the highest temperature points imaged by the camera
4	Cold spot		Track and measure the lowest temperature point imaged by the camera
5	Zone		Select part of the area for temperature measurement
6	Edit Zone		Zoom in or out the zone.

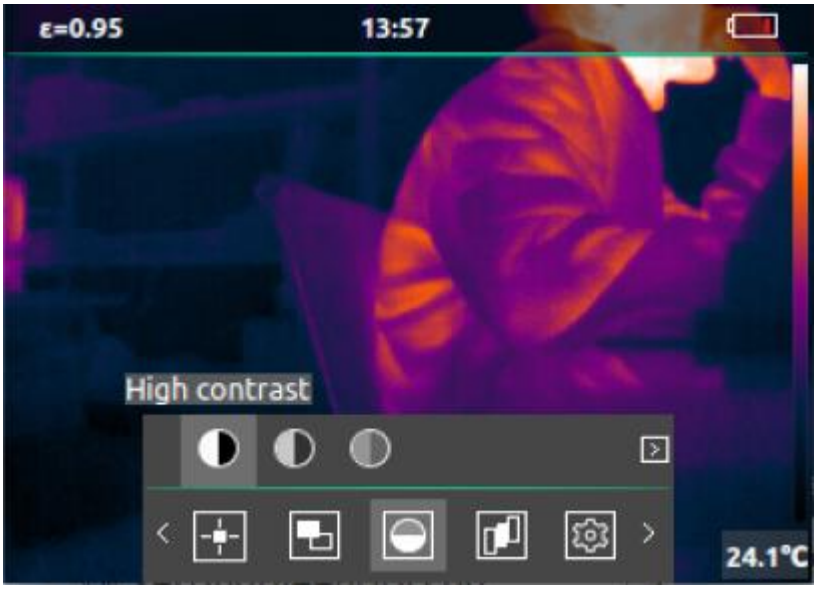
2.1.3.2 Image Mode



The function is shown below,

No.	Function	Icon	Description
1	Outline Fusion		Fusion of visible edge lines and infrared thermal imaging
2	Overlay fusion		Infrared thermal imaging and visible light overlay display
3	Picture in Picture		Infrared thermal imaging as a picture-in-picture display in the center of visible light
4	Thermal		Only display infrared thermal image
5	Visible		Only display visible light
6	Fusion adjustment		Only adjust the fusion percentage of overlay fusion
7	Fusion offset adjustment		When the visible light and thermal image is not 100% coincide based on different distance of the object, then you may use this function to adjust the visible image to coincide the thermal image.

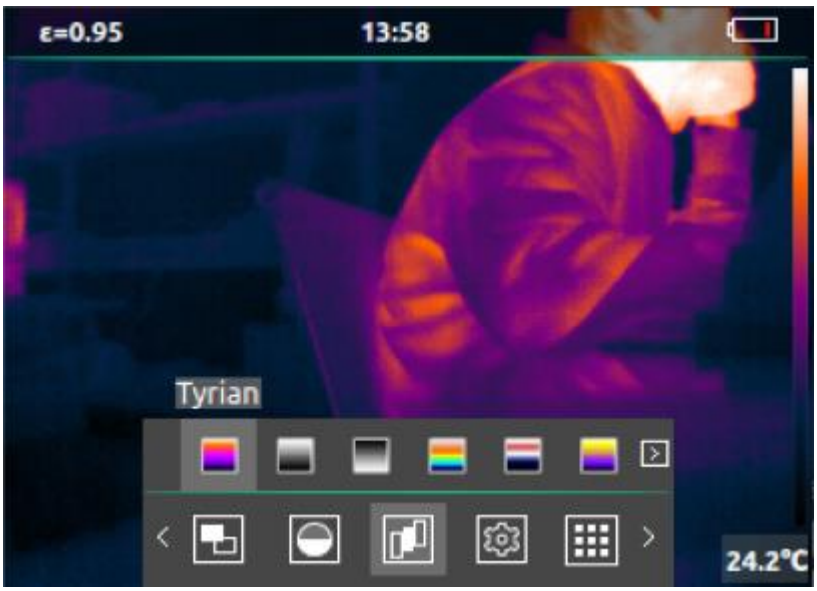
2.1.3.3 Thermal AGC



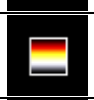
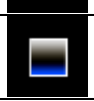
The function is shown below,

No.	Function	Icon	Description
1	High contrast		Choose high contract mode to view infrared thermal image
2	Legacy		Choose legacy mode to view infrared thermal image
3	Gentle		Choose gentle mode to view infrared thermal image

2.1.3.4 Color Palette

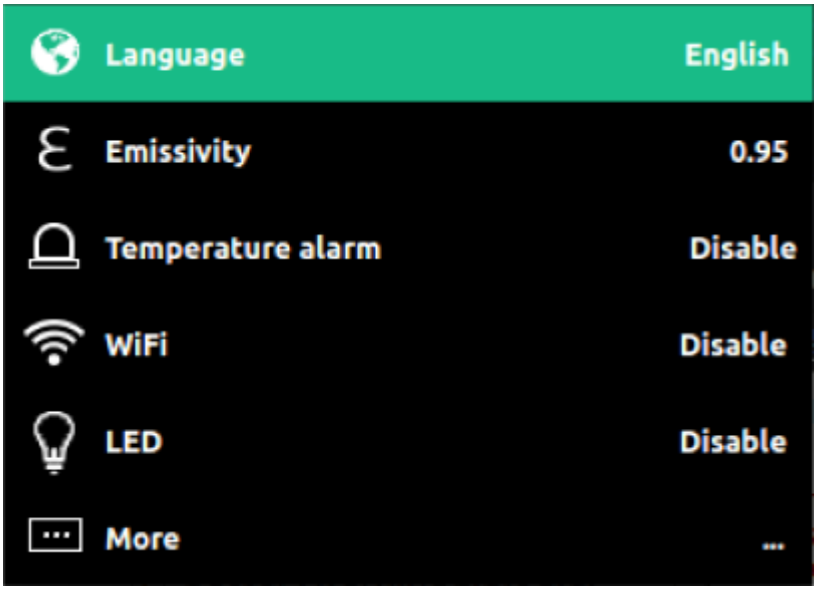


The function is shown below,

No.	Function	Icon	Description
1	Tyrian		
2	White Hot		
3	Black Hot		
4	Rainbow		
5	Glory		
6	Iron		
7	Hottest		
8	Coldest		

2.2 Settings

The settings interface is shown below,



2.2.1 Language

Select the language in the setting interface, click "OK & Homepage" to select the following different languages,

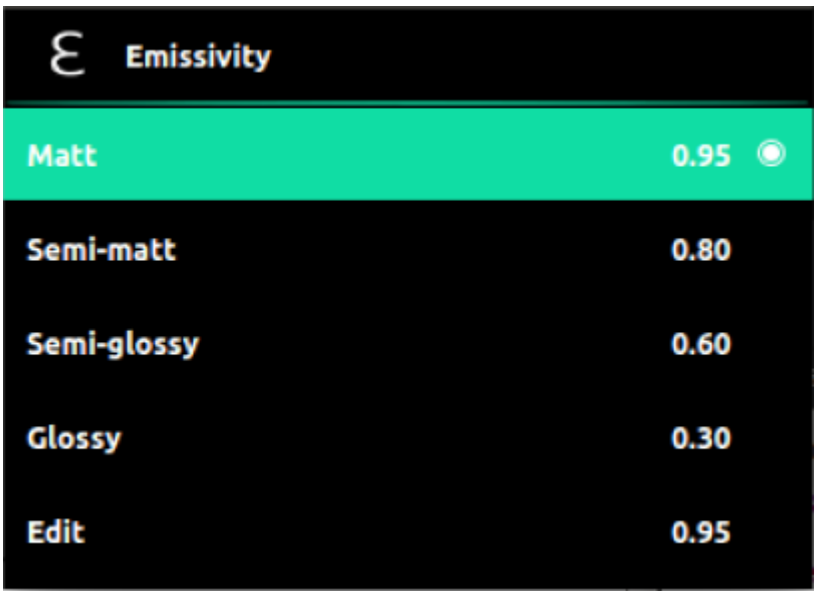




No.	Language
1	English
2	Simplified Chinese
3	Spanish
4	French
5	Japanese
6	Korean
7	Russian
8	Arabic
9	Traditional Chinese

2.2.2 Emissivity

Select the emissivity in the setting interface, and press "OK & Homepage" to set different emissivity of the object, or you can manually edit the emissivity.

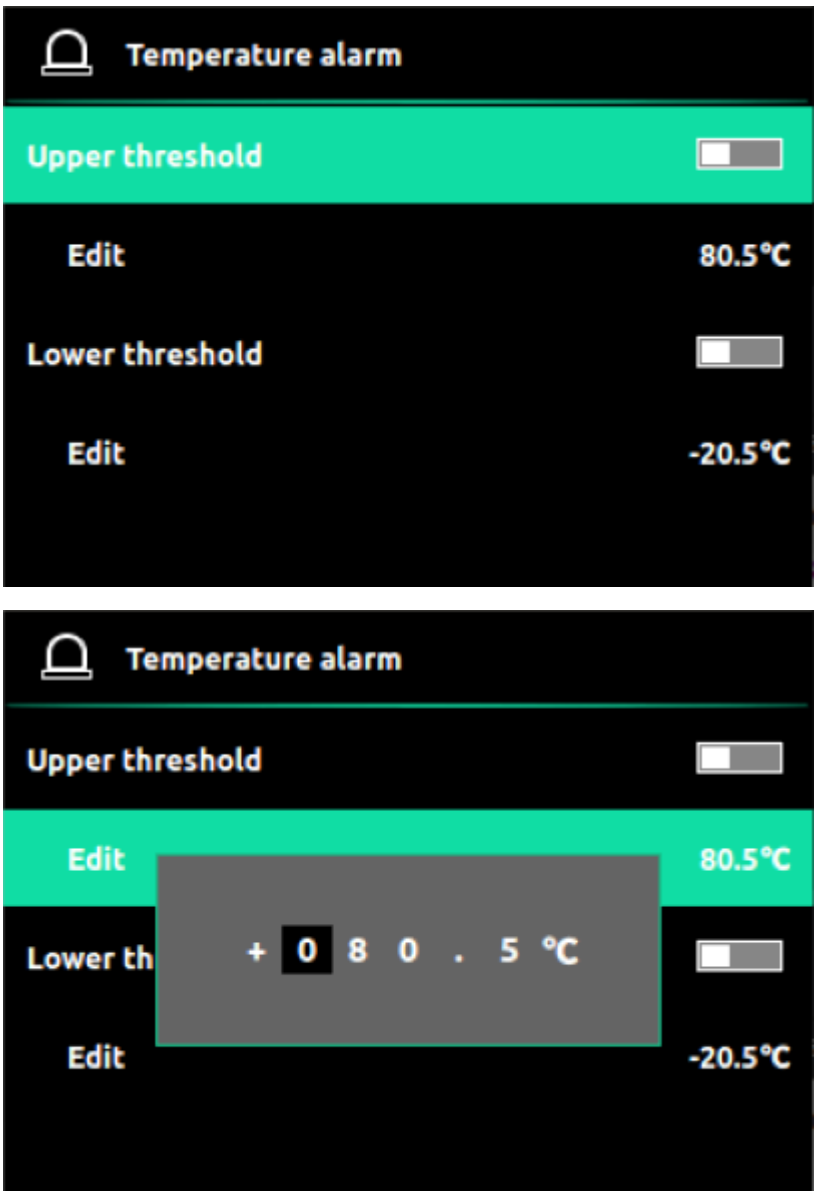


No.	Emissivity	Value
1	Matt	0.95
2	Semi-matt	0.80
3	Semi-glossy	0.60
4	Glossy	0.30
5	Edit Emissivity	Customization

2.2.3 Temperature alarm

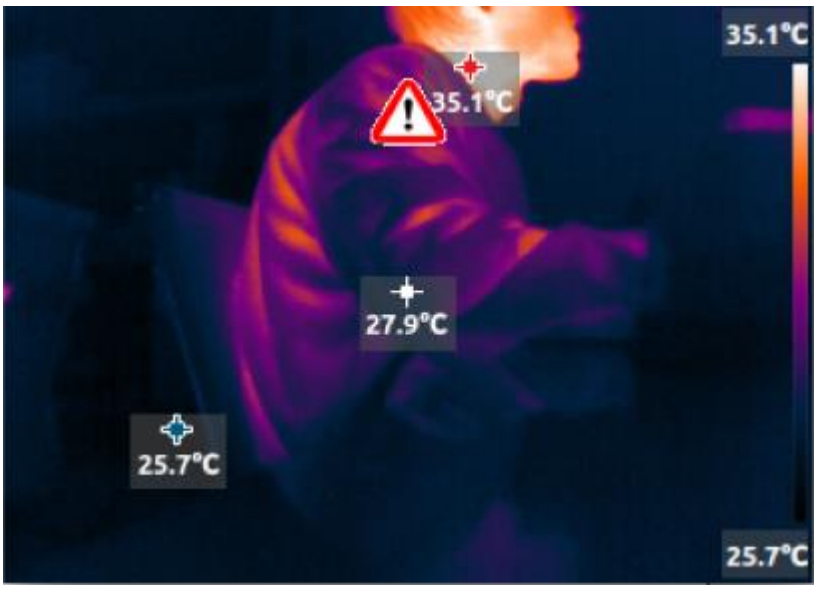
Select the temperature alarm in the setting interface, and press "OK & Homepage" to alert the temperature above or below the threshold on the screen.

When the temperature in the screen meets above or below one of the thresholds, an alarm will pop up. When the zone temperature measurement is selected, the alarm icon will only be displayed when the temperature in the zone is above or below the threshold temperature.



2.2.3.1 Alarm above threshold

Edit the upper limit alarm value, and then turn on the upper limit alarm switch (these two steps are in no particular order). If the temperature value in the screen area is higher than the set threshold temperature, an alarm icon will pop up on the screen. When the temperature value in the screen area is lower than the set threshold temperature, the alarm icon will disappear.



2.2.3.2 Alarm below threshold

Edit the lower limit alarm value, and then turn on the lower limit alarm switch (these two steps are in no particular order). If the temperature value in the screen area is higher than the set threshold temperature, an alarm icon will pop up on the screen. When the temperature value in the screen area is lower than the set threshold temperature, the alarm icon will disappear.

2.2.4 WiFi

2.2.4.1 Enable and Disable WiFi

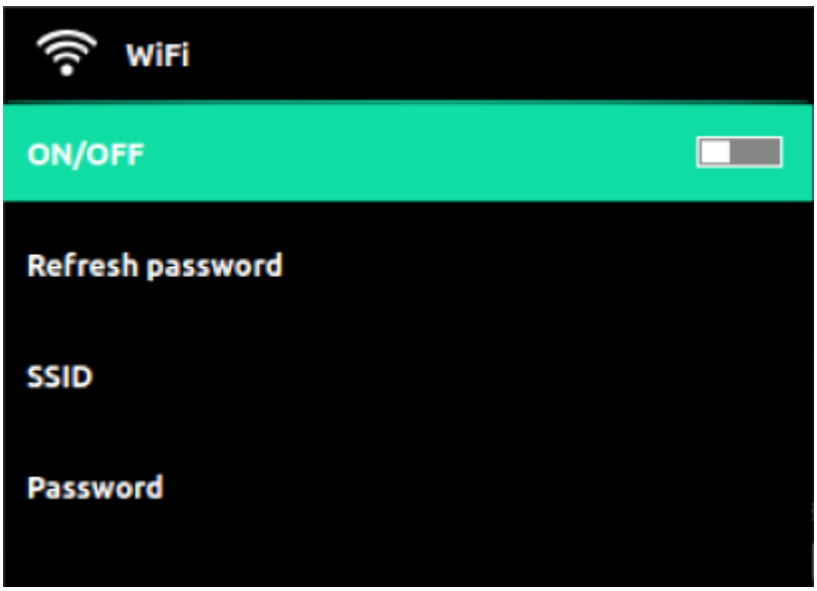
Select WiFi settings in the settings interface. After turning on the WiFi switch, the WiFi icon will be displayed on the status bar of the home page.



When the WiFi switch is turned off, the WiFi icon in the status bar will not be displayed

2.2.4.2 WiFi Configuration

Select the WiFi setting in the setting interface, and press "OK & Homepage" to set the WiFi. The SSID of the WiFi is the same as the serial number on the side of the handheld thermal imaging camera. The initial password is 12345678. When the WiFi is off, select refresh password to randomly change the WiFi password and display it. When the WiFi is on, the WiFi password cannot be changed. If you forget the WiFi password, you can view the current WiFi password on this interface.

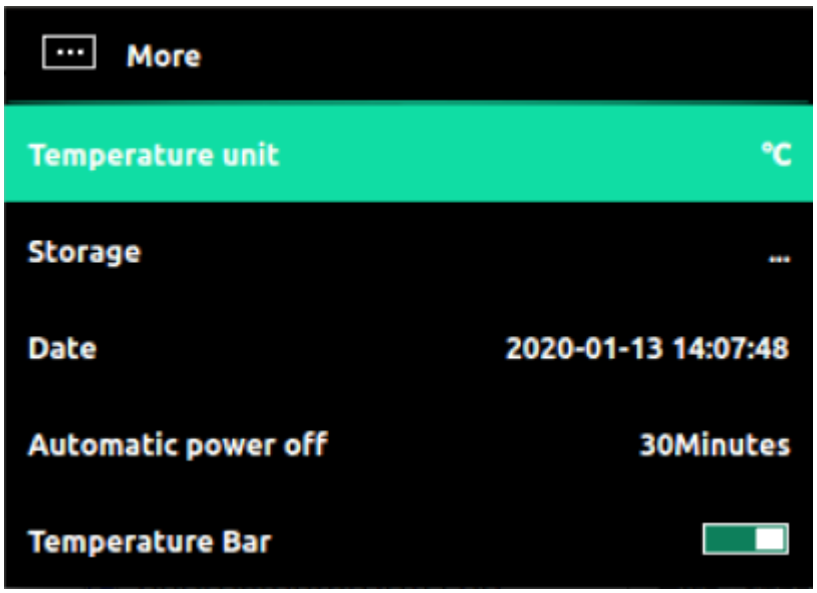


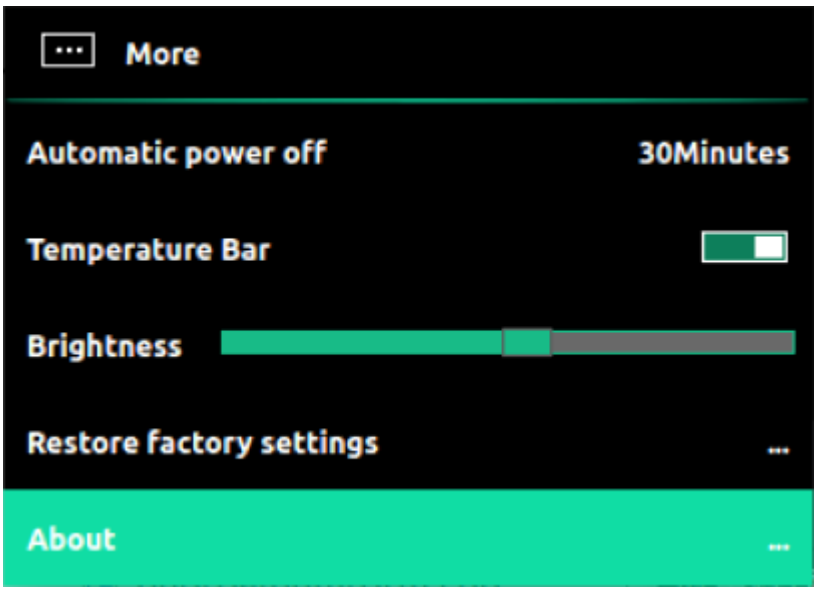
2.2.5 LED

Select the LED in the setting interface, and press "OK & Homepage" to turn the LED on or off.

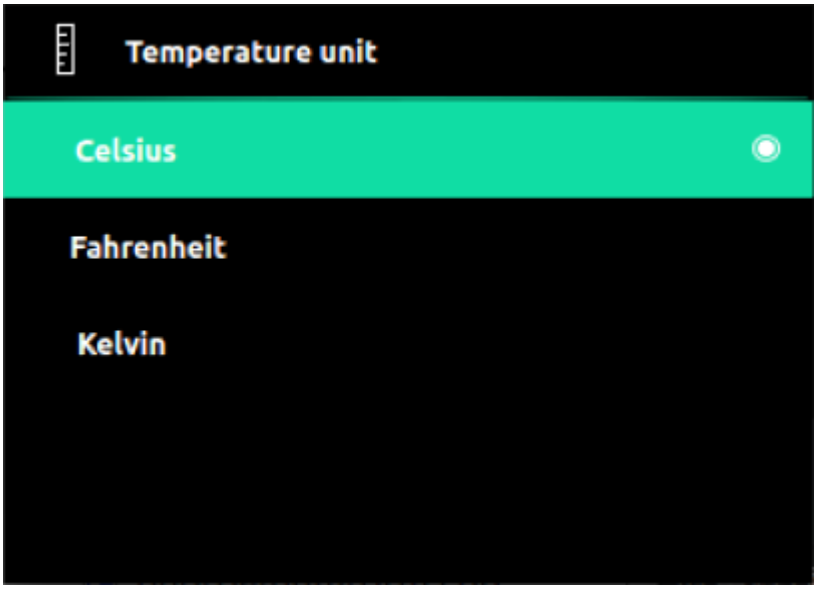
2.2.6 More

Select More in the setting interface, and press "OK & Homepage" to set more settings.





2.2.6.1 Temperature Unit

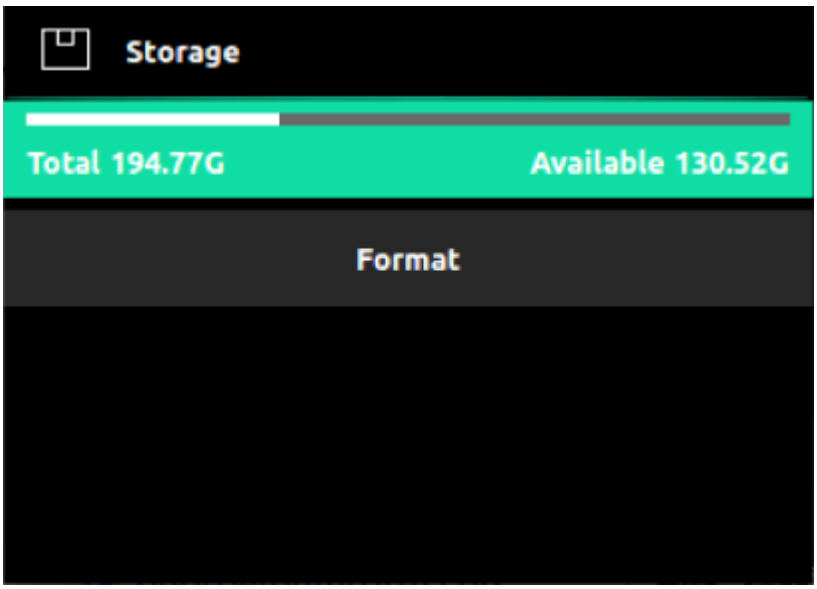


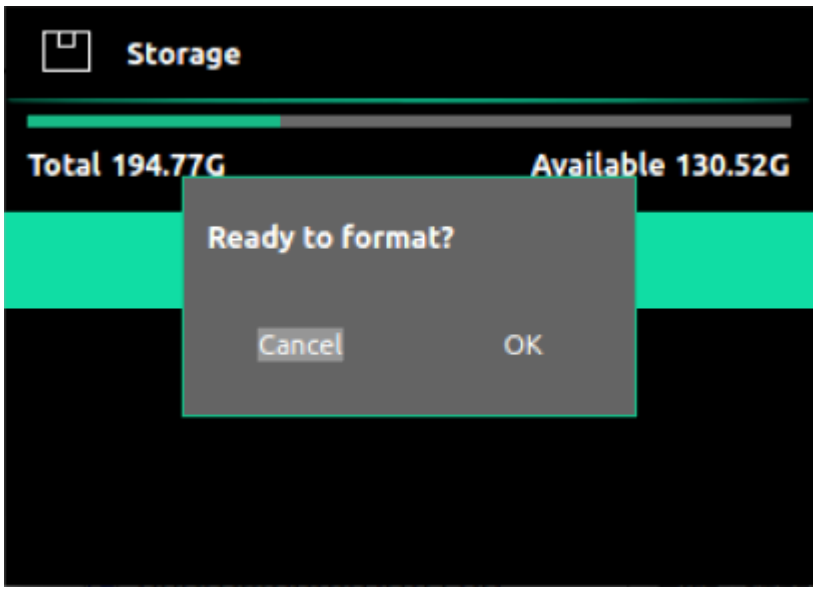
Temperature unit support below,

- Celsius
- Fahrenheit
- Kelvin

2.2.6.2 Storage

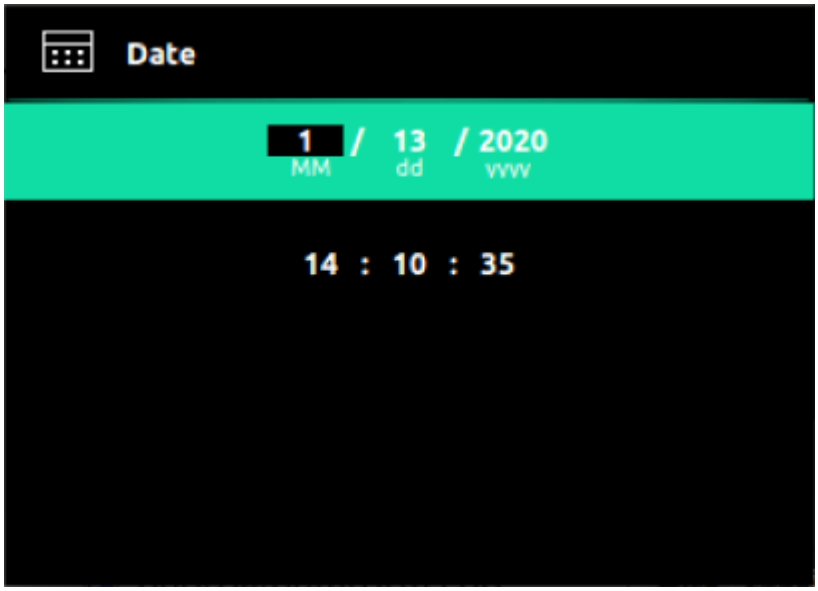
In the storage option, you can view the current and used capacity of the internal storage memory, and you can choose to format the storage memory.



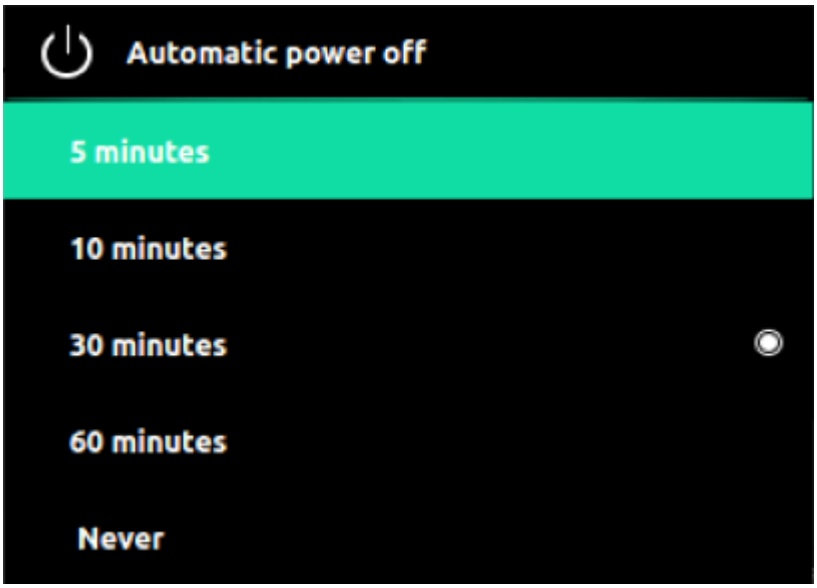


2.2.6.3 Date

Date setting can set the current date and time.



2.2.6.4 Automatic Power Off



Automatic power off can be selected for the following duration if without operating the camera

- 5 minutes
- 10 minutes
- 30 minutes
- 60 minutes
- Never

2.2.7 Temperature Bar

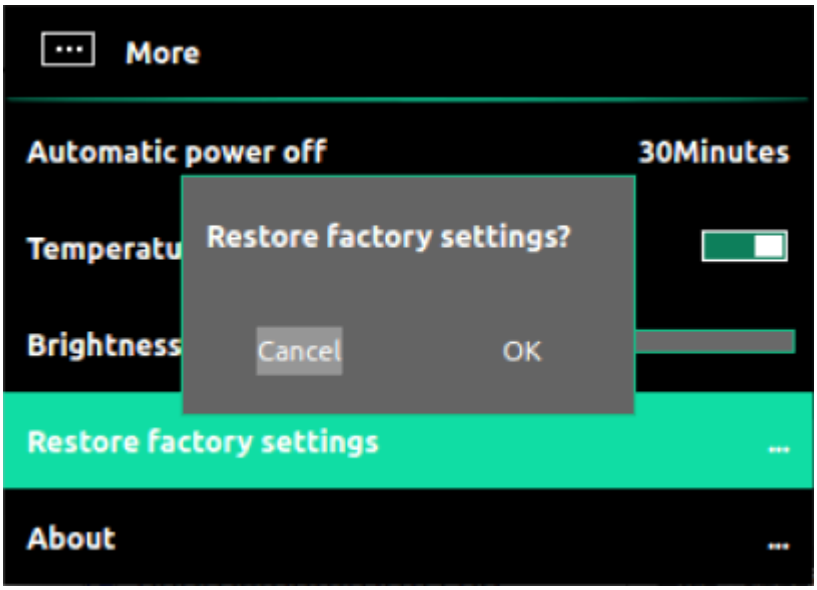
This option can display or not display temperature bar in the home page.

2.2.8 Brightness

This option can adjust the brightness of the screen.

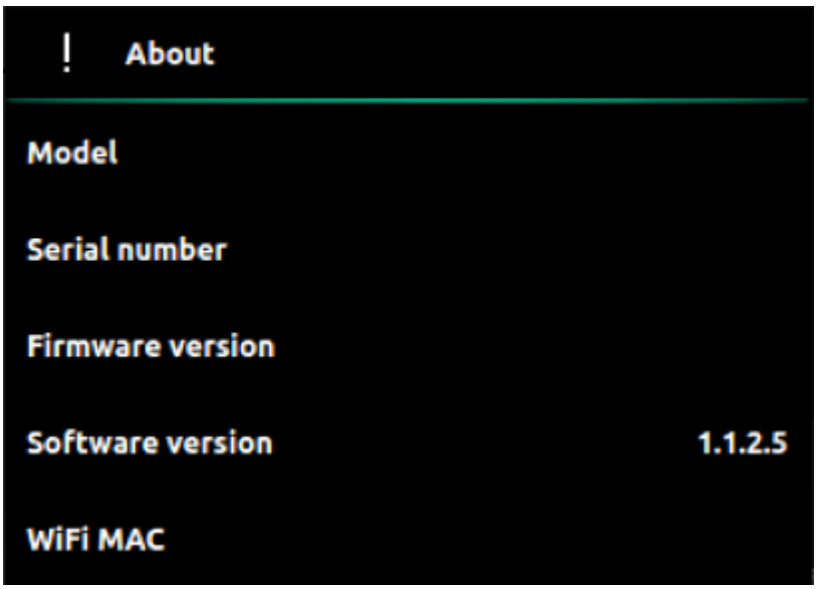
2.2.9 Restore factory settings

Restore factory settings will perform default factory settings on the handheld thermal imaging camera. Please proceed with caution.



2.2.10 About

In the about option can view the basic information of the thermal imaging camera.


About
Model
Serial number
Firmware version
Software version
1.1.2.5
WiFi MAC

3 Maintenance

3.1 Battery Service and Replacement

If the battery cannot be charged and needs to be replaced, please contact your local distributor for repair and replacement.

3.2 Calibration

The camera is calibrated in the factory. If calibration is required, please contact your local distributor.

3.3 Clean

If necessary, wipe the case with a damp cloth. Use high-quality lens cleaning products to wipe off the dust or stains on the instrument lens and display. Do not use abrasives or solvents to clean the case, lens or display.

4 Specification

The specification of TI series thermal imaging camera as below :

Parameter		Specification	
		TI332	**TI322**
Infrared Thermal Imaging	Resolution	320x240	220x160
	Frequency band	7.8~14um	7.8~14um
	Frame rate	9Hz	9Hz
	NETD	70mK@25°C	70mK@25°C
	Field of view	Horizontal 56°, vertical 42	Horizontal 35°, vertical 26
	Lens	4mm	4mm
	Temperature range	-20°C ~ +450°C	-20°C ~ +450°C
	Temperature measurement accuracy	±2°C or ±2%	±2°C or ±2%
	Temperature measurement	Hottest, coldest, central point, zone area temperature measurement	Hottest, coldest, central point, zone area temperature measurement
	Color palette	Tyrian, white hot, black hot, iron, rainbow, glory, Hottest, coldest.	Tyrian, white hot, black hot, iron, rainbow, glory, Hottest, coldest.
Visible	Resolution	640x480	640x480
	Frame rate	25Hz	25Hz
	LED light	Support	Support
Display	Display Size	3.5 inch	3.5 inch
	Image mode	Outline fusion, overlay fusion, picture-in-picture, infrared thermal imaging, visible light	Outline fusion, overlay fusion, picture-in-picture, infrared thermal imaging, visible light
General	Working time	5000mah battery, >4 hours in 25°C (77°F)	5000mah battery, >4 hours in 25°C (77°F)
	Battery Charge	Built-in battery, it is recommended to use +5V & ≥2A universal USB charger	Built-in battery, it is recommended to use +5V & ≥2A universal USB charger
	WiFi	Support PC software data transmission	Support PC software data transmission
	Operating temperature	-20°C~+60°C	-20°C~+60°C
	Storage temperature	-40°C~+80°C	-40°C~+80°C
	Waterproof and dustproof	IP54	IP54
	Camera Dimension	230mm x 100mm x 90mm	230mm x 100mm x 90mm
	Net weight	420g	420g
	Package dimension	325mm x 187mm x 215mm	325mm x 187mm x 215mm

	Gross weight	1.4kg	1.4kg
Storage	Capacity	Built-in memory, can store more than 20,000 pictures	Built-in memory, can store more than 20,000 pictures
	Picture storage mode	Simultaneous storage of infrared thermal imaging, visible light and fusion images	Simultaneous storage of infrared thermal imaging, visible light and fusion images
	File format	TIFF format, support full frame pictures temperature analysis	TIFF format, support full frame pictures temperature analysis
Interface	Data and charging interface	USB Type-C（Support battery charging and data transmission）	USB Type-C（Support battery charging and data transmission）
Analysis system	Analysis software	Analysis system can analyze pictures.	Analysis system can analyze pictures.

5 Appendix

5.1 Emissivity

The emissivity of common materials is as follows,

Material	Emissivity	Material	Emissivity
Asphalt	0.90 - 0.98	Cloth (black)	0.98
Concrete	0.94	Skin (human body)	0.98
Cement	0.96	Leather	0.75 - 0.80
Sand	0.9	Charcoal (powder)	0.96
Soil	0.92 - 0.96	Paint	0.80 - 0.95
Water	0.92 - 0.96	Lacquer (matte)	0.97
Ice	0.96 - 0.98	Rubber (black)	0.94
Snow	0.83	Plastic	0.85 - 0.95
Glass	0.90 - 0.95	Wood	0.9
Pottery	0.90 - 0.94	Paper	0.70 - 0.94

Marble	0.94	Chrome oxide	0.81
Plaster	0.80 - 0.90	Copper oxide	0.78
Stucco	0.89 - 0.91	Iron oxide	0.78 - 0.82
brick	0.93 - 0.96	textile	0.9