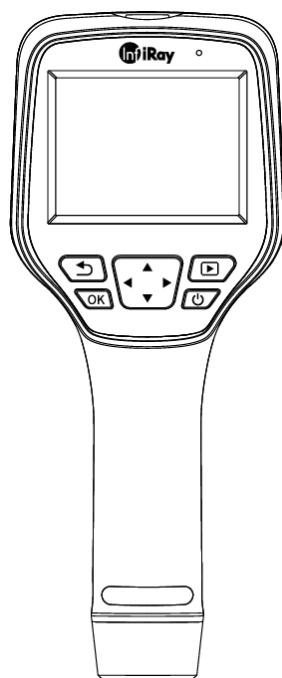




M200 Series

Handheld Thermal Camera

User Manual V1.0.6



IRay Technology Co., Ltd.

www.infiray.com

Explore And Perceive The Future

Introduction to IRay Technology

IRay Technology Co., Ltd. concentrates on developing infrared thermal imaging technologies and manufacturing relevant products, with completely independent intellectual property rights. IRay is committed to providing global customers with professional and competitive infrared thermal imaging products and solutions. The main products include IRFPA detectors, thermal imaging modules, and terminal thermal imaging products.

With R&D personnel accounts for 48% of all employees, 787 intellectual property projects in terms of IRay have been authorized and accepted: 629 patented technologies authorized and accepted in China (including those for integrated circuit chips, MEMS sensors design and manufacture, Matrix III image algorithms and intelligent precise temperature measurement algorithms, etc.); 18 patented technologies authorized and accepted overseas; 101 software copyrights; and 39 integrated circuit layout designs.

(The statistic data is up to August,2021)

IRay products have been applied in various fields, including epidemic prevention and control, industrial thermography, security and fire control, night vision observation, automatic driving, Internet of Things, AI, and machine vision.

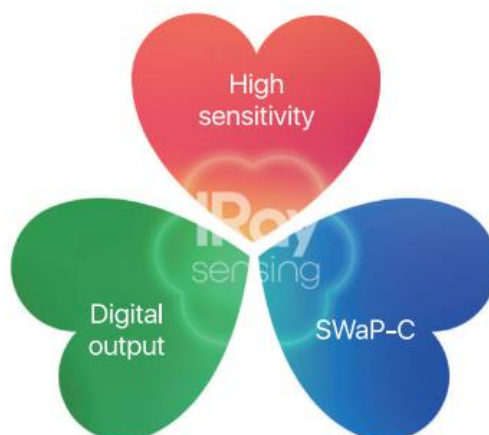


Table of Contents

1. Legal Disclaimer.....	3
1.1 Legal Disclaimer.....	3
1.2 Copyright.....	3
1.3 Quality Assurance.....	3
2. Safety Information.....	4
3. Notice to user.....	5
3.1 Calibration.....	5
3.2 Accuracy.....	5
3.3 Video Teaching.....	5
3.4 Documentation Updates.....	5
3.5 Scope of Application.....	5
4. Customer Help.....	5
4.1 FAQ.....	5
4.2 Download.....	5
5. Comparison of Functions for Different Models.....	6
6. Product Introduction.....	7
6.1 Camera (View from the front)	7
6.2 Buttons (View from the rear)	9
6.3 Connector and Memory Card.....	10
7. Quick Start Guide.....	11
8. User Interface.....	12
9. Operation Instruction.....	13
9.1 Charging.....	13
9.1.1 Charge with a Power Adapter.....	13
9.1.2 Charge with a Computer.....	13
9.1.3 Charge with a Charging Base.....	13
9.2 Power On/Off.....	13
9.3 Focus Adjustment (Only M200F has focus ring).....	13
Figure 9.1 Focus Adjustment through Focus Ring.....	14
9.4 Image Capturing/Video Recording.....	14
9.5 View Photos/Videos.....	14
9.6 Measurement Mode.....	15
9.7 Measurement Parameters.....	15
9.8 Palettes.....	16
9.9 Image Mode.....	16

9.9.1 Image Mode Introduction.....	16
9.9.2 Setting Steps.....	16
9.10 Non-uniformity Correction.....	16
9.10.1 Non-uniformity Correction Introduction.....	16
9.10.2 Non-uniformity Correction Operations.....	17
9.11 Contrast Adjustment.....	17
9.12 Digital Zoom.....	17
9.13 Other Settings.....	17
9.13.1 Temperature Gear.....	17
9.13.2 Above/ Below Alarm.....	17
9.13.3 Wi-Fi Setting.....	18
9.13.4 Set Image Capturing.....	18
9.13.5 Automatic Power-off.....	18
9.13.6 Dual-spectrum Alignment.....	18
9.13.7 System Settings.....	19
10.Structural Drawings.....	20
11.FAQ.....	22
12.Cleaning Thermal Camera.....	23
12.1 Cleaning Camera Housing, Cables and Other Items.....	23
12.2 Cleaning Infrared Lens.....	23

1. Legal Disclaimer

1.1 Legal Disclaimer

The thermal cameras manufactured by IRAY TECHNOLOGY are warranted for a period of two-year and the accessories are warranted for a period of three-month from the delivery date of the original purchase, provided such products have been under normal storage, use and maintenance.

This warranty extends only to the original purchaser and is not transferable. It is not applicable to any product which has been subjected to misuse, neglect, accident or abnormal conditions of operation.

In the case of a defect in a product covered by this warranty the product must not be further used or maintained in order to prevent additional damage. The purchaser shall promptly report any defect to IRAY TECHNOLOGY or this warranty will not apply.

IRAY TECHNOLOGY will, at its option, repair or replace any such defective product free of charge if, upon inspection, the product or accessories prove to be defective, the user can contact with after-sales service department of IRAY TECHNOLOGY within the said warranty period.

1.2 Copyright

©IRay Technology Co., Ltd. 2020. All rights reserved worldwide. All contents in this manual, including words, pictures, images, etc., belong to IRAY TECHNOLOGY CO., LTD. (Hereinafter referred to as "THE COMPANY" or "IRAY TECHNOLOGY"). No part of the manual, in whole or part, may be copied, photocopied, translated, or transmitted without the prior written permission of IRAY TECHNOLOGY.

This manual is used as a guide. The photos, graphics, diagrams and illustrations provided in the manual are only used to explain, which may be different from the specific product. The real product shall prevail. We try our best to make sure the contents in this manual are accurate. We do not provide any representations or warranties in this manual.

IRAY TECHNOLOGY reserves the right to update the manual. If you need the latest version of this manual, please contact us. It is recommended that you use this manual with the guidance of professionals.

1.3 Quality Assurance

The Quality Management System under which these products are developed and manufactured has been certified in accordance with the ISO9001 standard.

We reserve the right to make changes and improvements on any of the products without prior notice.

2. Safety Information



WARNING

1. Make sure you read all applicable Material Safety Data Sheets (SDS) and warning labels on containers before you use a liquid. The liquids can be dangerous. Injury to persons can occur.
2. It is prohibited to use the product in a high temperature above 85 °C or in a low temperature below -45 °C.
3. It is forbidden to disassemble or refit the thermal camera at will.
4. Do not use too long screws when installing the front/rear mounting bracket, which may damage the thermal camera.



CAUTION

1. No matter there is a lens cover or not, do not point the infrared thermal camera towards strong light or equipment with laser radiation. This will affect the accuracy of the thermal camera and even damage the detector in the thermal camera.
2. Do not use the product under conditions that doesn't match the environmental requirements. For specific use environment requirements, see the product parameter table.
3. Do not apply solvents or equivalent liquids to the camera, the cables, or other items.
4. Be careful when you clean the infrared lenses. The lens has an anti-reflective coating which is easily damaged. Damage to the infrared lens can occur with too much force or cleaning with rough objects such as tissues.

3. Notice to user

3.1 Calibration

IRAY TECHNOLOGY recommends that you verify your calibration yearly in order to ensure accuracy. You can verify the calibration through IRAY TECHNOLOGY or third-party organizations.

3.2 Accuracy

For very accurate results, we recommended that you wait 5 minutes after you have started the camera before measuring a temperature.

3.3 Video Teaching

You can search for mount and use videos from our website.

3.4 Documentation Updates

Our manuals are updated several times per year, and we also issue product-critical notifications of changes on a regular basis. Please visit our website to access the latest manuals and notifications.

3.5 Scope of Application

This manual is applicable for all products in a range, which means that parts of the manual may not apply to a particular model.

4. Customer Help

4.1 FAQ

You can find answers to FAQ about this model on the service support page of our official website.

4.2 Download

You can download the following contents from our website: www.infiray.com

- Product Documentation
- Client Software

- Video Teaching Courses

5. Comparison of Functions for Different Models

Function	M200A	M200F
IR Resolution	256×192	256×192
Visual Resolution	200W	500W
Display	3.5 inch touch screen (480×640)	3.5 inch touch screen (480×640)
NETD	40mK	40mK
Temperature Measurement Range	-20℃ ~ +550℃	-20℃ ~ +550℃
FOV	56°×42.2°	24.8°×18.7°
Focus Mode	focus-free	manual focus
Time-lapse Snapshot	yes	yes
Temperature Alarm	screen tip	screen tip
Region Alarm	/	yes
Alarm Snapshot	yes	yes
Digital Zoom	1×, 2×, 4×	1×, 2×, 4×
Temperature Measurement Mode	10 spots/10 lines/10 regions	10 spots/10 lines/10 regions
USB connection	U disk, UVC, support real-time temperature measurement analysis	U disk, UVC, support real-time temperature measurement analysis
Battery Life	8h	8h

6.Product Introduction

6.1 Camera (View from the front)

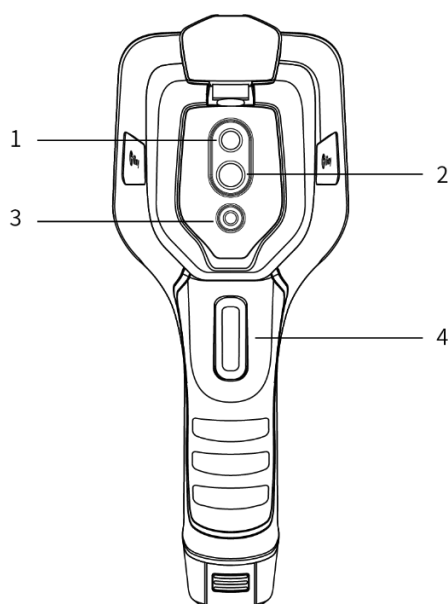


Figure 6.1 Component Introduction of M200A

No.	Component Introduction
1	Digital Camera
2	Infrared Lens
3	Laser Pointer
4	Trigger

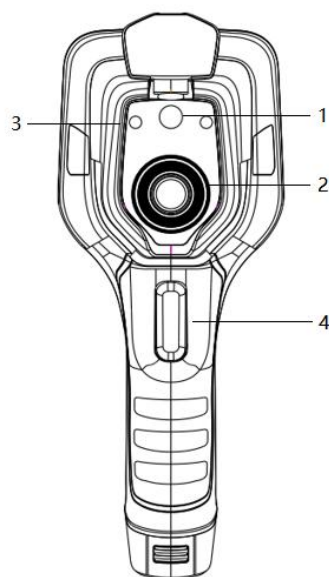


Figure6.2 Component Introduction of M200F

No.	Component Introduction
1	Digital camera
2	Infrared lens
3	Laser pointer
4	Trigger

Note: Do not touch the static-sensitive areas around the lens.

6.2 Buttons (View from the rear)

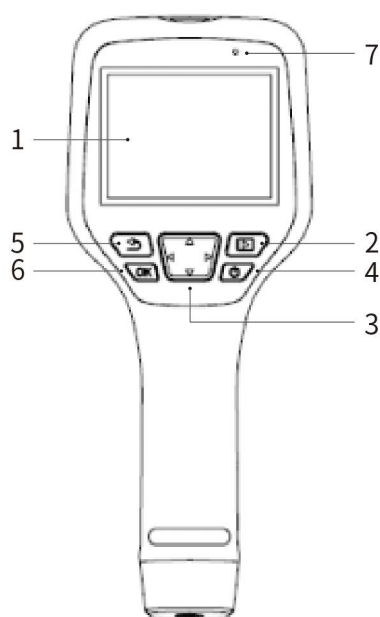


Figure6.3 Introduction to Buttons

No.	Component Introduction
1	Touch screen
2	Gallery button Press to open the gallery. Long press to perform image uniformity correction. Long press to perform manual shutter.
3	Navigation button Make selections for the menu, settings, gallery by clicking up/down/left/right.
4	Power/Laser button Long press to turn on/off. When the camera is on, short press the button to turn on/off the laser pointer.
5	Back button Short press to cancel the operation or return to the previous menu. Long press to perform image uniformity correction.
6	Enter button Click OK to confirm the operation.
7	Microphone It's used to record voice notes after image capturing.

6.3 Connector and Memory Card

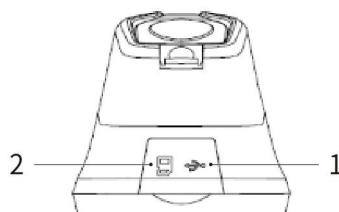


Figure6.4 Illustration of Connector and Memory Card

No.	Component Introduction
1	USB Interface ● Connect a USB cable with the power adapter for charging. ● Connect a USB cable to a computer to charge or transfer data.
2	SD Card ● Standard MicroSD card, standard 32GB, Max 32GB, it can save about 140,000 images. ● The SD card can be taken out and transfer data to PC or other devices with a card reader.

7.Quick Start Guide

Steps to Start:

1.Charging

- 5V 1A or 5V 2A power adapter and USB cable can be used to charge the device.
- You can charge the device by connecting the USB cable in the accessory to the computer.

Note: This method of charging takes longer time than using the power adapter.

- Charging base can also be used to charge the battery.

2. Power on

Long press the power button  to start the device.

3.Target Searching

Point the thermal camera at the object of interest.

4.Image Capturing

Click the trigger button to capture the image, and record the video by long pressing the trigger button.

5. Analysis by PC Software

Run the client after downloading the software to PC, and then use a USB cable or SD card to import data for further analysis.

Note: please import the files naming XX-IR.jpg (Infrared images with temperature data) and files naming XX-DC.jpg (visible images) together.

6. Analysis by App

Download and install the App on the mobile device and run the App. Open camera Wi-Fi, then connect the mobile device to the hotspot of the camera, and import the data for further analysis.

8. User Interface

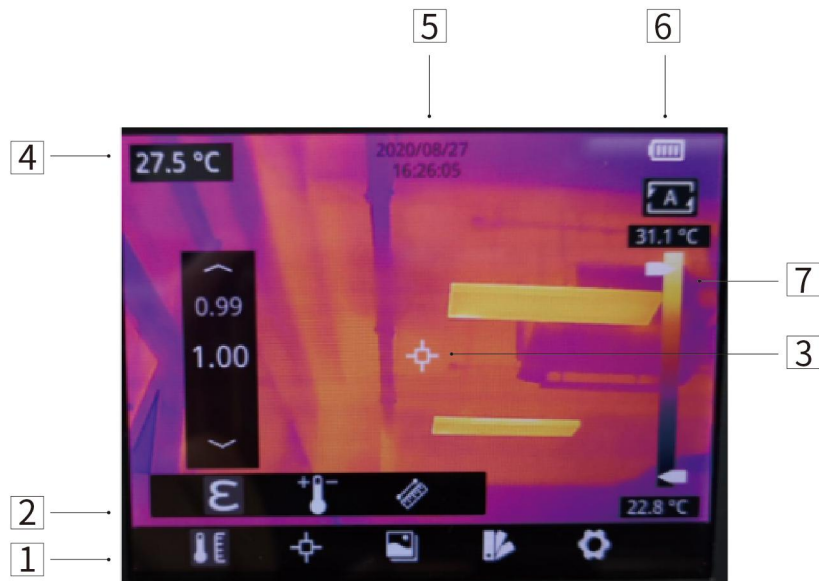


Figure 8.1 User Interface

No.	Interface Introduction
1	Main Menu: measurement parameters, measurement mode, image mode, color palettes and other settings can be set.
2	Sub Menu: specific options can be set, such as a specific color palette.
3	Temperature measurement spot: measurements of center spot, high/low temperature spot tracking, custom spot, custom line, custom region measurement are available.
4	Center spot temperature: the temperature of the center spot is displayed.
5	Date and time: date and time are displayed.
6	Battery capacity: the remaining battery capacity is displayed.
7	Temperature range: the temperature range in the current screen can be displayed.

9. Operation Instruction

9.1 Charging

9.1.1 Charge with a Power Adapter

1. Plug the power adapter into the socket.
2. Use a USB cable to connect the adapter and the camera to charge.

Note: It takes about 3h to get the device fully charged.

9.1.2 Charge with a Computer

1. Use a USB cable to connect the thermal camera to the computer to charge.

Note: when charging with a computer, the computer should be turned on, and the charging time is longer than using an adapter.

9.1.3 Charge with a Charging Base

1. Connect the power adapter and the charging base with a USB cable, and plug the power adapter into the socket.
2. Take out the battery and place it correctly in the charging base to charge.

Note: When the battery is not placed, the indicator of the charging base flashes; the indicator turns red when the battery is placed and charging; the indicator becomes green when the battery is fully charged.

9.2 Power On/Off

1. Press the power button continuously to start the device.
2. Press the power button about 3 seconds to turn it off.

9.3 Focus Adjustment (Only M200F has focus ring)

Make sure that the device is powered on, align the camera at the measured scene, rotate the focus ring beside the lens clockwise or counterclockwise, which can make the image clearer via focal length adjustment, see the following figure for the detailed adjustment method:

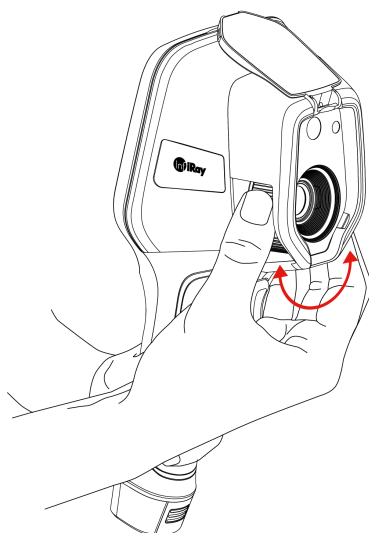


Figure 9.1 Focus Adjustment through Focus Ring

9.4 Image Capturing/Video Recording

1. In the observation interface, adjust the focus ring (Only M200F has focus ring) till the image is clear. Short press the trigger button to take the photo. Long press the trigger button to start recording video, and finish recording by releasing the trigger button.
2. Tap the save button on the screen or click OK to save the picture. Tap other buttons on the screen or use the navigation button + OK to make recording annotation, scan the QR code to name the file, or cancel saving photos.

9.5 View Photos/Videos

The pictures you took are saved in the SD card, and you can follow the below steps to view them at any time.

1. Enter the image archive by clicking gallery button.
2. Select the picture or video you want to view by pressing the navigation button or screen.
3. Press OK or click the image or video to view it in full screen. Select the delete option and then confirm to delete the current item. Select the rename option and confirm to rename the current item.
4. When in the preview interface, click the multiple button in the upper right corner of the screen, then

select the image or video to be deleted, and delete the selected items by pressing the delete button.

5. Return to observation interface by clicking the gallery button, back button or touching the screen.

9.6 Measurement Mode

In the observation interface, press OK shortly to enter the main menu, and select "Measurement Settings" with the navigation button. Press OK again to enter the secondary menu, select different measurement modes by shifting left or right on the navigation button, and press OK to save your option.

In the observation interface, click anywhere on the screen to enter the main menu. Then click "Measurement Settings" to select the desired measurement mode, and make it effective by clicking the screen area.

9.7 Measurement Parameters

In the observation interface, press OK to enter the main menu, use the navigation button to select the "parameter setting", then press OK again to enter the secondary menu. Select different temperature measurement parameters by shifting left or right, and press the enter button to parameterize. After setting, press OK again to save your option.

In the observation interface, click anywhere on the screen to enter the main menu. Click "Parameter Setting" to set the parameter. After finishing the setting, click the screen area to take effect.

- **Emissivity:** in order to obtain more accurate measurement results, you need to set the emissivity according to the target to be measured before each measurement, instead of using the default configuration. Emissivity refers to the ratio of the radiant ability of an object to the radiant ability of a blackbody at the same temperature, which is relative to the reflectivity of the object. The lower the emissivity, the higher the proportion of energy being reflected. The higher the emissivity, the lower the proportion of energy being reflected. For example, the emissivity of human skin is 0.98, and the emissivity of printed circuit boards is 0.91. For more information on emissivity, you can refer to the quick start guide in the package or inquire from other sources.
- **Ambient temperature:** the reflection temperature of the object surface will affect the measurement result, especially when the object emissivity is low or the object temperature and the reflection temperature differ greatly, this effect will increase. So the result needs to be compensated to eliminate influences of the surface reflection temperature. However, it is usually difficult to determine the reflected temperature of an object. The ambient temperature can be used to replace the reflected temperature in actual measurement.
- **Distance:** distances have effects on the measurement results. In order to get accurate measurement, distance information of the object is necessary for the thermal camera to compensate the result.

9.8 Palettes

In the observation interface, short press OK to enter the main menu, and select "palette setting" with the navigation button. Press OK again to enter the sub menu, select different palettes by shifting left and right on the navigation button, and then press the enter button to save your option.

In the observation interface, click anywhere on the touch screen to enter the main menu. Click "palette setting" to choose a palette and save your option by clicking the screen area.

9.9 Image Mode

9.9.1 Image Mode Introduction

Four image modes are available.

- Thermal Fusion: an image fused to a certain scale between an infrared image and a visible image
- PIP: infrared image superimposed at the center of the visible image
- Thermal imaging: infrared images
- Digital camera: visible images

Note: For better dual-light image effects, when in PIP or thermal fusion modes, you need to set the actual distance, that is, the approximate distance from the thermal camera to the object. If the preset registration parameters cannot meet the requirements, you can also manually perform fusion registration in the settings.

9.9.2 Setting Steps

In the observation interface, press OK shortly to enter the main menu, and select "image mode" through the navigation button. Then press OK again to enter the secondary menu, there different image mode can be selected by shifting left or right on the navigation button. Save your option by pressing enter button.

In the observation interface, click any place on the screen to enter the main menu. Click "image mode" and select the desired image mode, and then click on the screen area.

9.10 Non-uniformity Correction

9.10.1 Non-uniformity Correction Introduction

Non-uniformity correction is used to compensate for non-uniformity of detector pixels or non-uniformity caused by other optical interference. When there are more noise in the image, non-uniformity correction is needed, which is common when the ambient temperature changes rapidly.

9.10.2 Non-uniformity Correction Operations

In the imaging interface, long press the back button or the gallery button to perform non-uniformity correction.

9.11 Contrast Adjustment

In the observation interface, the contrast of the infrared image can be adjusted by sliding up and down the arrow button on the "temperature range" on the right side of the screen.

Press "A" in the upper right corner of the interface to return to auto-contrast mode.

9.12 Digital Zoom

In observation interface, press left or right navigation button to perform Max. 4×digital zoom.

Note: this function is only enabled under infrared mode or visible mode.

9.13 Other Settings

Other settings include date and time, unit, language and other items.

- 1) In the observation interface, press OK shortly to enter the main menu, and select "Settings" to enter other settings.
- 2) In the observation interface, tap anywhere on the screen to enter the main menu, and tap "Settings" to enter other settings.

9.13.1 Temperature Gear

- -20~150°C: the image details are better in this gear, and the maximum temperature measured is 150°C.
- 100~550°C: the image details are slightly worse in this gear, and the maximum temperature measured is 550°C.

9.13.2 Above/ Below Alarm

- Temperature alarm setting for M200A: set the above alarm or below alarm; The alarm region setting for M200F: choose the alarm region and set the above alarm and below alarm (The region alarm is only applicable for M200F)
- Auto alarm capture switch: click to turn on or turn off the auto alarm capture
- Set the time interval for auto alarm capture

- Set number of captured images for auto alarm capture

9.13.3 Wi-Fi Setting

Click and enter WiFi setting interface.

- Hotspot Switch: turn on hotspot and set the network name and password, then click OK.

Note:

- 1) The specialized app is needed while this function is enabled. You need connect the hotspot manually after turning hotspot on, and you can transmit the saved pictures or videos to mobile device to perform secondary analysis.
 - 2) Turn off hotspot when it is not used, or else the power consumption will be faster.
- WLAN (only applicable for M200F): search and display the Wi-Fi nearby, choose WiFi and type in the right password, then you can connect the device to the Internet.

Note: hotspot and WLAN can not be turned on at the same time.

9.13.4 Set Image Capturing

Auto saving switch for manual image capturing: click to turn on or turn off the auto saving function for manual image capturing, off by default.

Timed image capturing: click to turn on or turn off the function of timed image capturing

Set the time interval for timed image capturing

Set the number of captured images for timed image capturing

9.13.5 Automatic Power-off

- 5Min: click to set automatically shut down after 5 minutes.
- 10Min: click to set automatically shut down after 10 minutes.
- 20Min: click to set automatically shut down after 10 minutes.
- Off: Click to turn off the automatic shutdown function.

9.13.6 Dual-spectrum Alignment

- Dual-spectrum Fusion Alignment

This function can be used to manually align infrared and visible images. First select coarse tuning and fine tuning, and then perform image alignment by the touch screen or navigation keys. After finished, click OK or enter button to save the settings.

Notes: the dual-spectrum alignment can be adjusted via the touch screen, the alignment can be achieved by dragging the infrared image up-down or left-right with fingers.

- Picture-in-picture Adjustment

This function can be used to adjust the position of the picture-in-picture. First select coarse tuning and fine tuning, and then adjust the position of the picture-in-picture by the touch screen or navigation keys. When finished, click OK or enter button to save the settings.

Notes: the PIP can be adjusted via the touch screen, press the infrared region to drag, press any corner of the infrared region to zoom in or zoom out.

9.13.7 System Settings

- **Device Information**

Click to check model, version, SD card capacity and SD card remaining capacity.

- **Date and Time**

Click to set the date and time.

- **Units of Measurement**

Temperature unit: switchable among Celsius, Fahrenheit, and Kelvin

Distance unit: switchable between meters and feet

- **Formatting the SD Card**

Click and then press OK to format the SD card as FAT32.

- **USB Mode**

There are two options for data transmission: USB disk and USB camera.

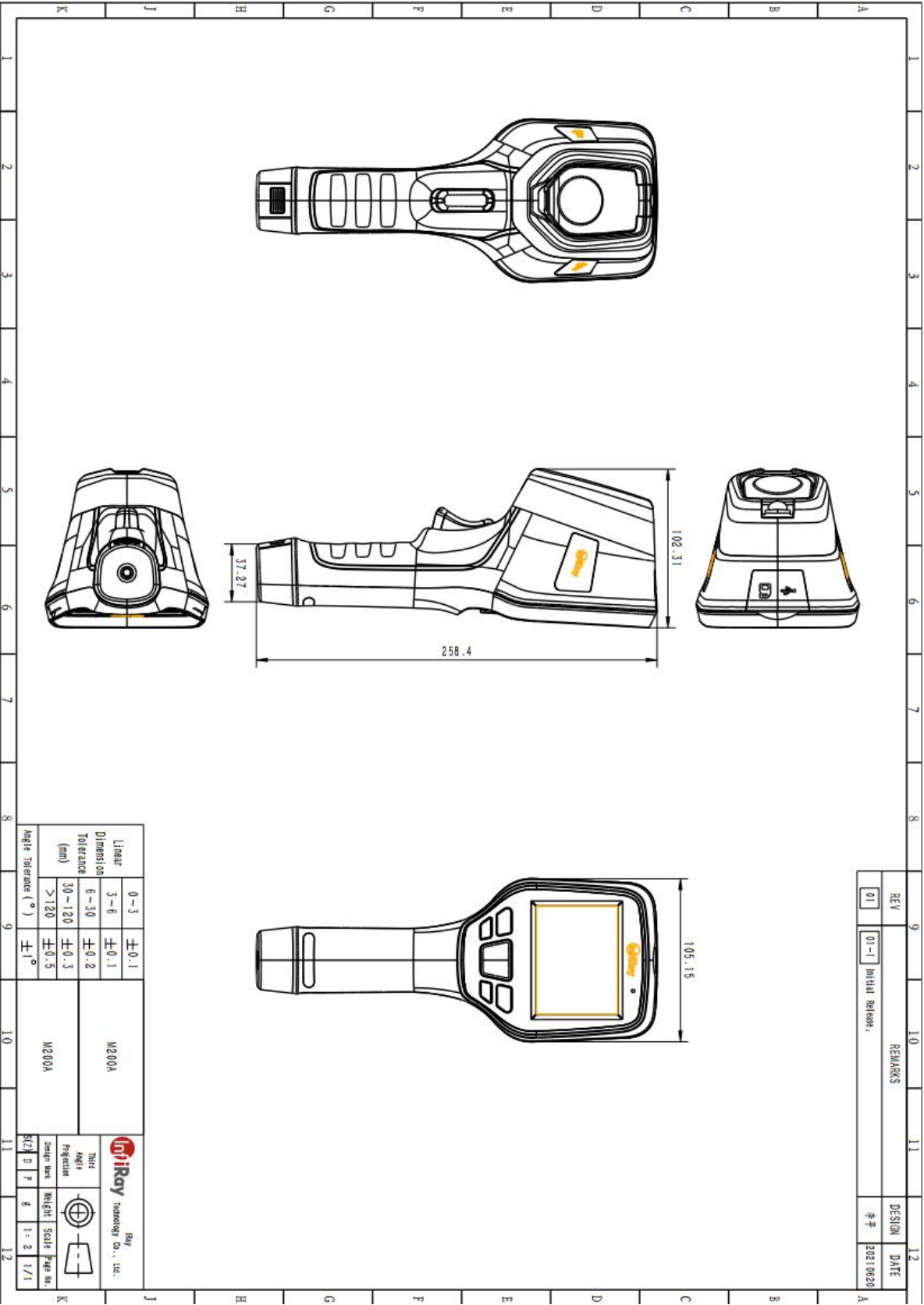
- **Restore Factory Settings**

Click and then press OK to restore the settings to the factory settings.

- **Software Update**

Download the latest version software into SD card, click “update from SD card” to update.

10.Structural Drawings



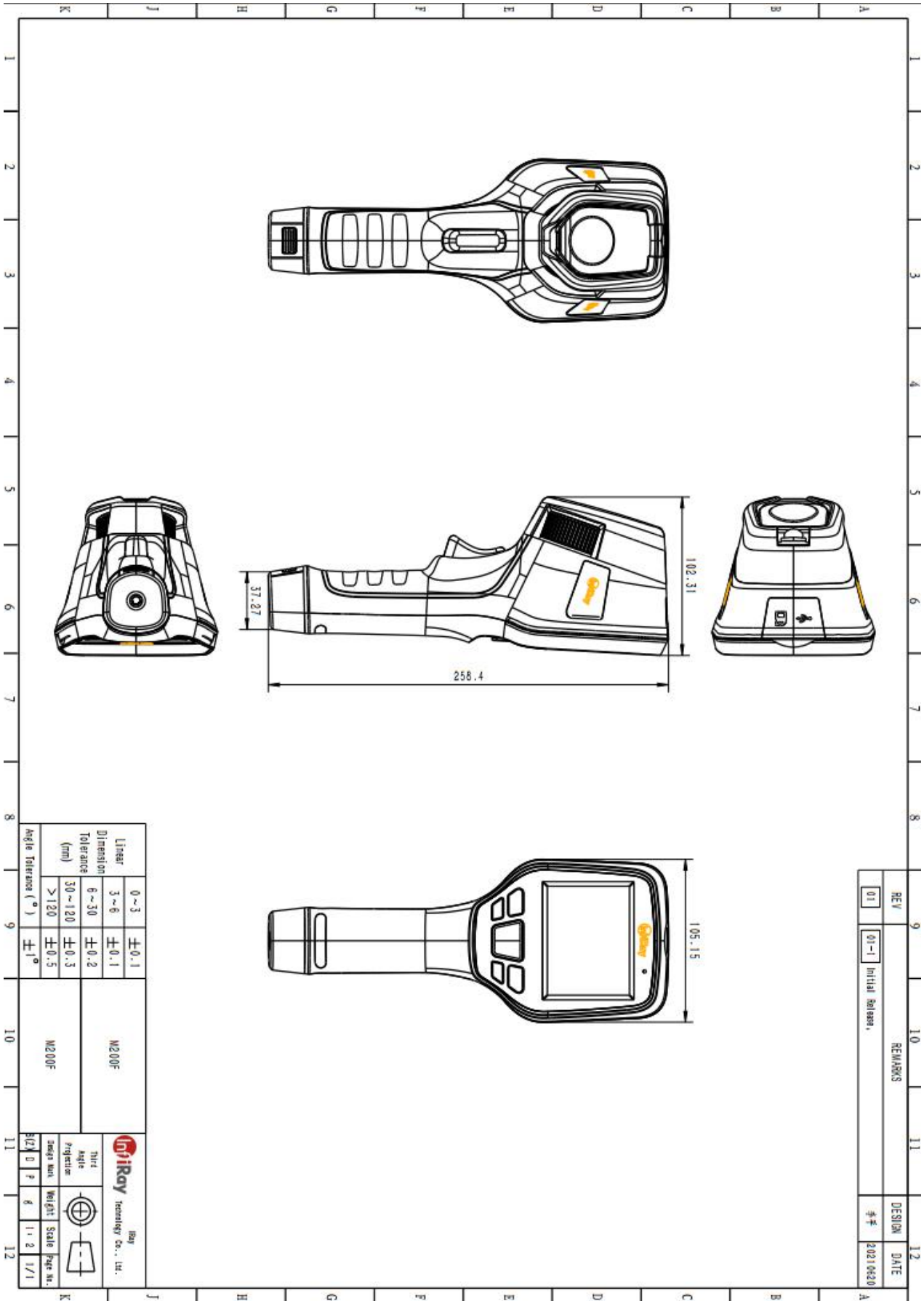


Figure 10.2 Structural Drawings for M200F

11.FAQ

1.The dual-spectrum fusion can not be used properly.

Possible cause: the dual-spectrum fusion has not been adjusted for targets of different distances.

Solution: the dual-spectrum alignment can be adjusted by fine tuning or coarse tuning through the navigation bar.

2.The image is too bright or too dark, highlighting targets within a certain temperature range.

Possible cause: the manual temperature scale has been enabled.

Solution: click A in the top right corner of the screen to enable auto temperature scale.

12. Cleaning Thermal Camera

12.1 Cleaning Camera Housing, Cables and Other Items

Camera Housing, Cables and Other Items	
Liquids	One of the following liquids can be used. 1. Warm water 2. A Weak detergent solution
Cleaning Tools	A soft cloth
Cleaning Procedure	Please follow this procedure: 1. Soak a soft cloth in the liquid. 2. Twist the cloth to remove excess liquid. 3. Clean the camera parts with the cloth.



Caution

Do not apply solvents or similar liquids to the camera, the cables, or other items. This can cause damage.

12.2 Cleaning Infrared Lens

Cleaning Infrared Lens	
Liquids	One of the following liquids can be used. 1. Commercial lens cleaning liquid with more than 30% is isopropyl alcohol. 2. 96% ethyl alcohol (C_2H_5OH).
Cleaning Tools	cotton wool

Cleaning Procedure

Please follow this procedure:

1. Soak the cotton wool in the liquid.
2. Twist the cotton wool to remove the excess liquid.
3. Clean the lens one time only and discard the cotton wool.

**CAUTION**

Do not clean the infrared lens too vigorously. This can damage the anti-reflective coating.

FCC Statement:
FCC-ID: 2AYGT-M200F

Labeling requirements

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Information to the user

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note: The manufacturer is not responsible for any radio or TV interference caused by unauthorized modifications to this equipment. Such modifications could void the user's authority to operate the equipment.

For a Class A digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

Note:

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment.

Body-worn Operation

This device was tested for typical body-support operations. To comply with RF exposure requirements, a minimum separation distance of 0.5cm must be maintained between the user's body and the handset, including the antenna. Third-party belt-clips, holsters, and similar accessories used by this device should not contain any metallic components. Body accessories that do not meet these requirements may not comply with RF exposure requirements and should be avoided. Use only the supplied or an approved antenna.

We, IRay Technology Co., Ltd., hereby declare that this product was tested conforming to the applicable FCC rules under the most accurate measurement standards possible, and that all the necessary steps have been taken and are in force to assure that production units of the same equipment will continue to comply with the Commissions requirements.

Worth comes from Service

24h Hotline:

400-998-3088

Technical Support

Hotline:

400-883-0800

Customized Services