AT31F/AT61F
Online Temperature Measurement Thermal Camera
User Manual
V1.0.2

IRay Technology Co., Ltd.

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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 form 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 that has be 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

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 reserve 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 ISO 9001 standard.

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

2. Safety Information

⚠ WARNING
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.

⚠ WARNING
It is prohibited to use the product in a high temperature above 85 °C or in a low temperature below-45 °C.

⚠ WARNING
It is forbidden to disassemble or refit the thermal camera at will.

⚠ CAUTION
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.

⚠ CAUTION
Do not use the product under conditions that doesn’t match the environmental requirements. For specific use environment requirements, see the product parameter table.

⚠ CAUTION
Do not apply solvents or equivalent liquids to the camera, the cables, or other items.

⚠ CAUTION
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 30 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.

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:

- Product Documentation
- Client Software
- Video Teaching Courses

5. Product Introduction

Main Features:

·Compact Size

·Quick Installation

·Several optional lenses

· I/O Alarm

·Simultaneous output of temperature data and image data

Typical Applications:

·Power detection

·Industrial detection

·Environmental Monitoring

·Fire Warning

6. Product Figure and Explanation

Table 6.1 Explanation of Product Appearance

No.	Explanation
1	infrared lens
2	power/data interface
3	mounting screw holes
4	ATF connecting cable

7. Product Models Reference

Table 7.1 Product Models List

AT31F	3	X
Model	Lens	Reserved
AT31F	1: 4mm 2: 6.2mm 3: 9.7mm 4: 13mm 5: 19mm 6: 25mm 7: 35mm 8: 50mm	X
AT61F	1: 4.1mm 2: 5.8mm 3: 9.1mm 4: 13mm 5: 19mm 6: 25mm 7: 35mm 8: 55mm	X

E.G.: AT31F3X(AT21F-3-X) stands for AT31F with 9.7mm lens.

8. Lens Parameters

Table 8.1 AT31F Lens Parameters

Resolution	Focal Length	FOV（H×V）	IFOV
384×288	4mm	90.3°×68.7°	4.250mrad
384×288	6.2mm	61.5°×45.7°	2.742mrad
384×288	9.7mm	37.9°×28.7°	1.753mrad
384×288	13mm	28.2°×21.3°	1.308mrad
384×288	19mm	19.5°×14.7°	0.895mrad
384×288	25mm	14.9°×11.2°	0.680mrad
384×288	35mm	10.6°×8°	0.486mrad
384×288	50mm	7.4°×5.6°	0.340mrad

Table 8.2 AT61F Lens Parameters

Resolution	Focal Length	FOV（H×V）	IFOV
640×512	4.1mm	89.8°×75.7°	2.92mrad
640×512	5.8mm	70°×57°	2.06mrad
640×512	9.1mm	48°×38°	1.31mrad
640×512	13mm	33.5°×26.9°	0.92mrad
640×512	19mm	22.9°×18.4°	0.63mrad
640×512	25mm	17.4°×14°	0.48mrad
640×512	35mm	12.5°×10°	0.34mrad
640×512	55mm	8°×6.4°	0.21mrad

9. Quick Start Guide

Please follow the steps:

1. Install IRT_VMS if the thermal camera is with other networking equipments, and IRT_TAS_AT can be installed on a single thermal camera for temperature measurement and analysis. The software may have version updates. Please refer to the actual version. It is recommended that the computer configuration for installing the software meet the following conditions: i5-9500T and above CPU, 8G and above memory, 64-bit win10 system, and supporting Gigabit network.

2. Connect the thermal camera, power supply and computer.

3. Set the computer configurations according to the software instructions for IRT_VMS_User Manual or IRT_TAS_AT_User Manual.

4. Double-click the client icon, enter the correct user name and password, and click login to start the client.

5. Select the IP on the client homepage, and add the module number you want to preview to the PC preview interface. If the thermal camera is successfully connected, you can start imaging and monitoring with the thermal camera.

6. The 232 transmission between the computer and the thermal camera can be realized through the RS232 interface on the cable.

7. The 485 transmission between the thermal camera and the PT can be realized through the RS485 interface on the cable to contron the PT.

8. The ALARMIN interface on the cable can be used to manually input signals to trigger the alarm.

9. The I/O alarm output of the thermal camera can be realized through the ALARMOUT interface on the cable. Non-alarm information remains high, and becomes low when there is alarm information. After the alarm disappears, it will continue to be maintained for 30 seconds and then return to high level.

10. Product and Accessories List

Table 10.1 Product and Accessories List

Product and Accessories
ATF online temperature measuring thermal camera
ATF dedicated cable

11. Technical Data

11.1 AT31F

Table 11.1.1 AT31F Performance Parameters

Imaging and Optical Data	
Resolution	384×288
Thermal Sensitivity/NETD	＜50mK(40mK is optional) @25℃, F#1.0
Image Frequency	50Hz

Detector Data	
Detector Type	VOx, Uncooled FPA detector
Spectral Range	8～14μm
Pixel	17μm

Temperature Measurement	
Object Temperature Range	● -20℃～150℃ ● 0℃～550℃
Accuracy	±2℃ or ±2%
Measurement Tools	● Any fixed point ● Full screen max./min. temperature capture ● Center spot ● Line/Area analysis tool ● Manually choose temperature width

Interface	
Analog Video Output	1 channel video
Network Output	RJ45 10M/100M/1000M adaptive
Alarm Interface	1 output, 1 input
Network Protocol	Ethernet/IP, TCP, UDP, SNTP, RTSP, HTTP, ICMP, SMTP, DHCP, UPnP, PPPOE
Ethernet	Control and transmit images
Interface Protocol	ONVIF and GB28181 are supported
Serial Communication Interface	RS-485(control PT)
	RS-232(network data)

Image Adjustment	
Polarity	Black hot/white hot
Palette	18 palettes are available

Compression Standard	
Compression Standard for Videos	H.264/H.265
Video Format	MP4, mov

Alarm	
Alarm Function	Area, line and other individual alarms are configurable and support external equipment to trigger alarms
Alarm Output	I/O output, log, and save image

Power System	
Typical power consumption@25℃	≤3W
Connector type for external power supply	DC
Voltage	9-26VDC
Power Protection	Support reverse connection protection

Environmental Data	
Operating Temperature Range	-20℃～60℃
Storage Temperature Range	-40℃～70℃
Humidity (operating & storage)	5%～95%RH(no condensation)
Shock	30g,11ms, all axial
Vibration	4.3g, random vibration, all axial

Physical Data	
Weight(without lens)	<150g
Thermal Camera without lens（L×W×H）	46.5mm×48mm×83mm

11.2 AT61F

Table 11.2.1 AT61F Performance Parameters

Imaging and Optical Data	
Resolution	640*512
Thermal Sensitivity/NETD	＜50mK(40mK is optional) @25℃, F#1.0
Image Frequency	25Hz

Detector Data	
Detector Type	VOx, Uncooled FPA detector
Spectral Range	8～14μm
Pixel	12μm

Temperature Measurement	
Object Temperature Range	● -20℃～150℃ ● 0℃～550℃
Accuracy	±2℃ or ±2%
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Alarm Interface	1 output, 1 input
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Ethernet	Control and transmit images
Interoperability	Modbus TCP, ONVIF and GB28181
Serial Communication Interface	RS-485(control PT)
	RS-232(network data)

Image Adjustment	
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Palette	18 palettes are available

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Physical Data	
Weight(without lens)	<150g
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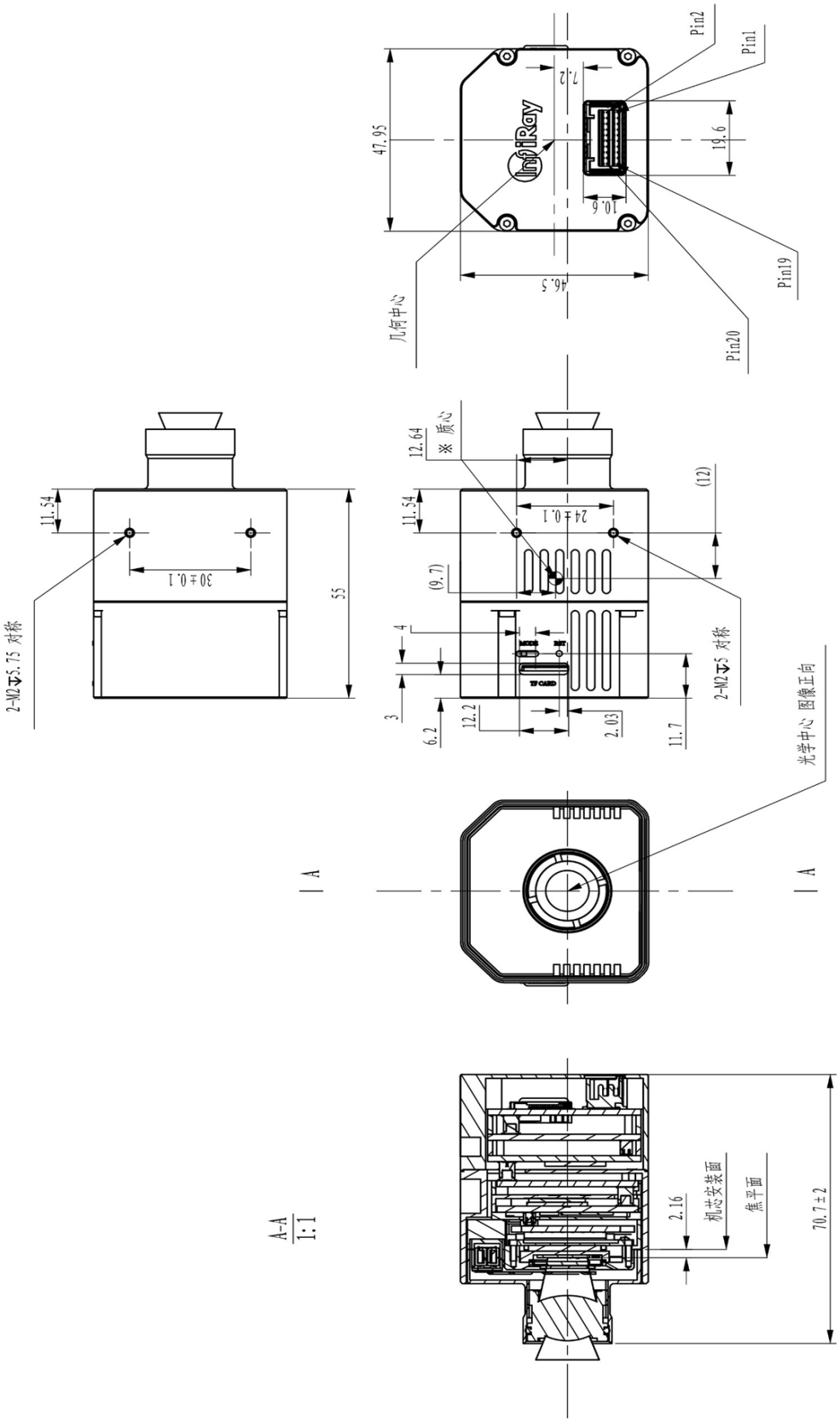
12. Mechanical Drawings



13. Common Troubleshooting

Table 13.1 Product Common Troubleshooting

Troubles	Possible Cause	Solutions
Images are blurred	No image calibration for a long time	Click the shutter correction button in the software
Camera can't be started	The supply voltage exceeds the normal working supply voltage range.	Check whether the power supply voltage is between 9 and 26V
	The power connector is loose.	Check whether the power cable is connected
Inaccurate temperature measurement	The stabilization time for thermal camera is too short.	Keep the thermal camera stable for more than 10 minutes.
Image is stuck.	Power cable or network cable connection is loose.	After checking the power supply and network cable connection, preview the images again.
Images cannot be previewed	The thermal camera is not connect with Internet or the network connection doesn't work.	Make sure the connection between the thermal camera and the network is working well.

14. Cleaning Thermal Camera

14.1 Camera Housing, Cables and Other Items

14.1.1 Liquids

One of the following liquids can be used.

- Warm water
- Mild detergent solution

14.1.2 Cleaning Tools

A soft cloth

14.1.3 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.

14.2 Cleaning Infrared Lens

14.2.1 Liquids

One of the following liquids can be used.

- Commercial lens cleaning liquid with more than 30% isopropyl alcohol.

- 96% ethyl alcohol (C_2H_5OH)

14.2.2 Cleaning Tools

Dustless cloth, cotton wool

14.2.3 Cleaning Procedure

Please follow this procedure (Take dustless cloth as an example).

1.Soak the dustless cloth in the liquid.

2.Gently wipe the lens with the dustless cloth.

CAUTION
The dustless cloth or cotton wool should be used one time only.

15. Terms and Definitions

Terms	Definition
FPA (Focal Plane Array)	A type of infrared detector
IFOV (Instantaneous Field of View)	A resolution measure method of infrared thermal camera (that is, the field of view of a pixel)
FOV(Field of View)	The angle of view that the infrared camera can see H is the horizontal angle and V is the vertical angle.
NETD(Noise Equivalent Temperature Difference)	A measure of image interference level of infrared thermal camera.

Appendix A Emissivity of Common Materials

Material	Temperature（℃）	Emissivity
Water	0～100	0.95～0.98
Soil(dry)	20	0.92
Soil(wet)	20	0.95
Woods	17	0.962
Sand	20	0.9
Sandstone	19	0.909～0.935
PVC plastic	70	0.93
Asphalt	20	0.967
Paint	70	0.92～0.94
Wallpaper	20	0.85～0.90
Cloth	20	0.98
Concrete	20	0.92
Pavement surface	5	0.974
Smooth porcelain	20	0.92
Ceramic tile	17	0.94
Gypsum	17	0.86
Bricks	35	0.94
Hard rubber	0～100	0.89
Charcoal	20～400	0.95～0.97
Granite(rough)	20	0.879
Cold rolled steel	70	0.09
Oxidized steel	50	0.88
Copper	20	0.07
Oxidized copper	50	0.6～0.7