



**AT31/AT61P**  
**Online Temperature**  
**Measurement Thermal Camera**  
**User Manual V1.0.8**



**IRay Technology Co., Ltd.**

[www.infiray.com](http://www.infiray.com)

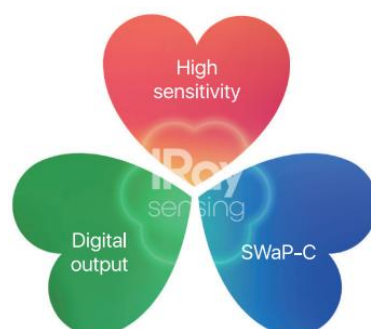
# Explore And Perceive The Future

## 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, 1760 intellectual property projects in terms of IRay have been authorized and accepted: 1099 patented technologies authorized and accepted in China (including those for integrated circuit chips, MEMS sensors design and manufacture, Matrix IV image algorithms and intelligent precise temperature measurement algorithms, etc.); 277 trade mark applications in China; 35 patents and patent applications overseas; 107 trade mark applications overseas; 191 software copyrights; and 51 integrated circuit layout designs. (The statistic data is up to Aug,2022)

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



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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 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 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 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 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: [www.infiray.com](http://www.infiray.com)

- Product Documentation
- Client Software
- Video Teaching Courses

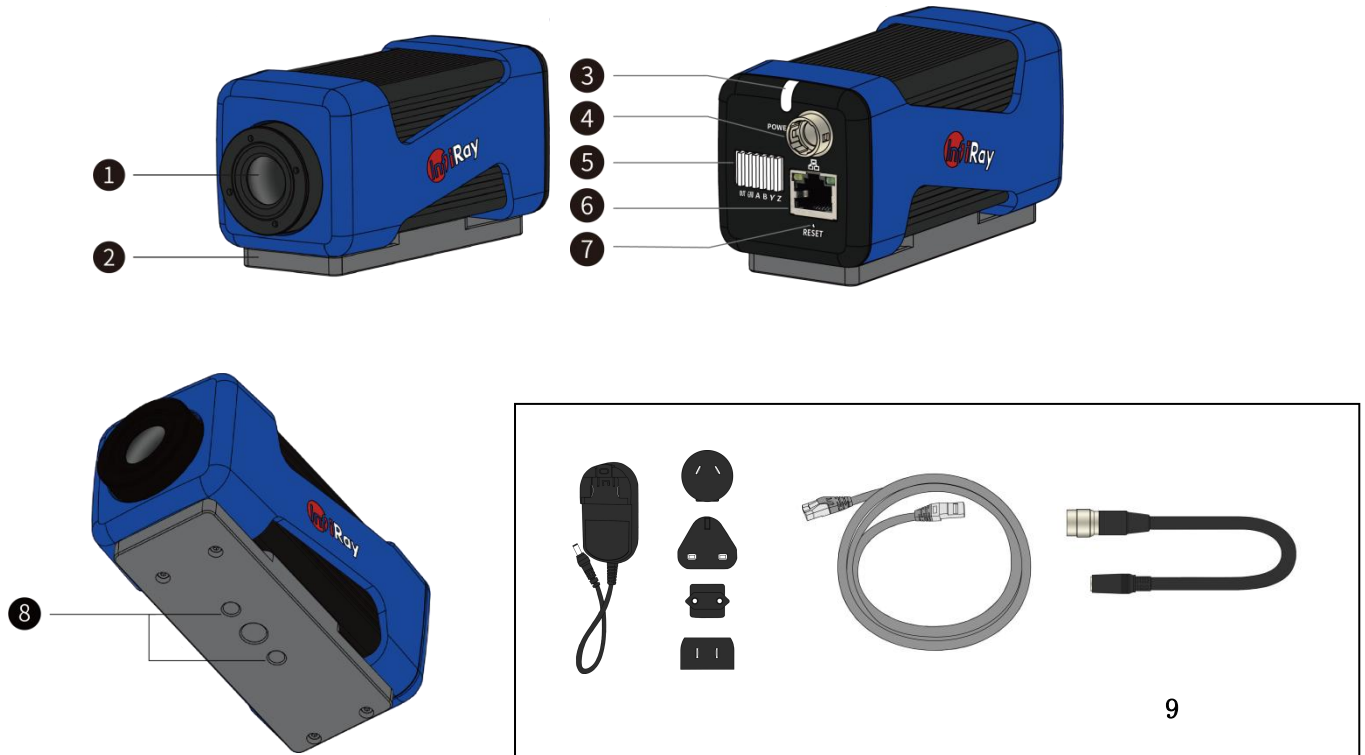
## 5.Product Introduction



<b>Main Features</b>	Accurate temperature measurement
	Quick Installation
	Compact size
	Support PoE
	Several optional lenses
	The second generation auto-focus algorithm
	Simultaneous output of temperature data and image data

<b>Typical Applications</b>	Power detection
	Industrial detection
	Machine vision scientific research
	Process Control
	Quality Inspection
	Status Monitoring
	Fire Warning

## 6.Product Figure and Explanation

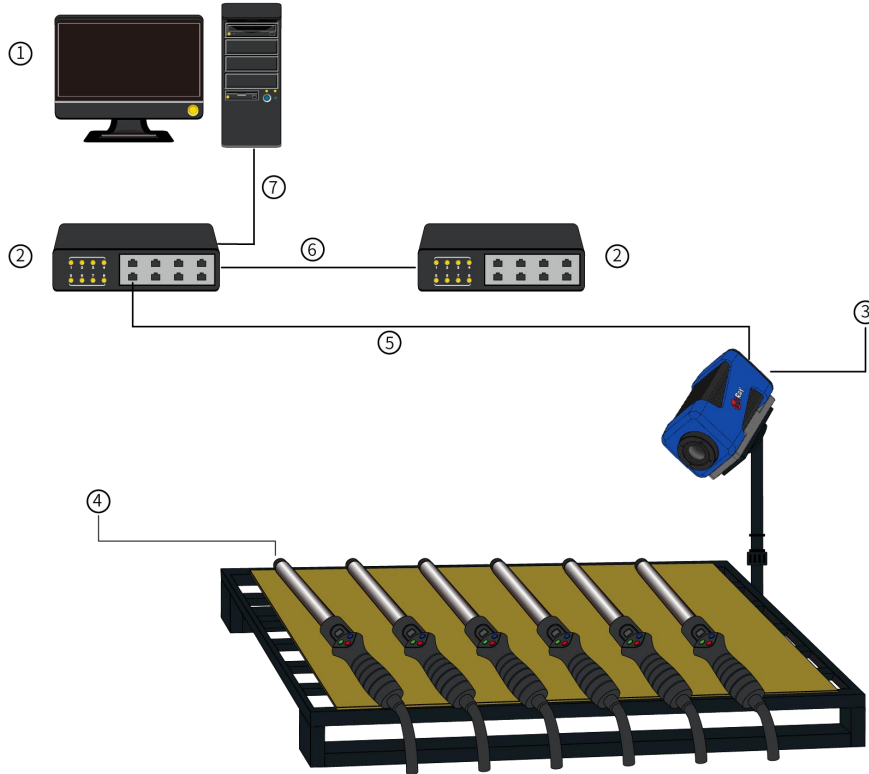


No.	Explanation	No.	Explanation
1	Infrared lens	6	Ethernet/Network cable interface
2	Adapter bracket	7	Reset button
3	LED light	8	Installation holes for tripod and other accessories
4	Power interface	9	Accessories from left to right: Power adapter, gigabit network cable, power cable
5	Data interfaces		

**Table 6.1 Explanation of Product Appearance**



## 7. Product Application Scenarios



No.	Descriptions
1	PC/Display
2	Exchanger
3	Thermal camera
4	The detected product
5.6.7	Cables

## 8.Product Models Reference

AT31	3	X
Model	Lens	Reserved
AT31	3: 7.8mm 4: 13mm 5: 15mm 7: 19mm 8: 25mm	X
AT61P	3: 7.8mm 4: 13mm 5: 15mm 7: 19mm 8: 25mm 9: 17mm	X

**Table 8.1 Product Models List**

You can refer to the below table for the detailed description of the reserved position.

Note:

D/F	Chinese/English
S/N	Standard/No logo
H/P	H: support H.264, H.265 and MJPEG network protocols P: support GigE Vision network protocols

T	T should be marked for AT61P with 13mm,15mm,19mm lens
X	Reserved for the customized product

**Table 8.2 Detailed Info for the Reserved Position**

**For example:** AT61P4DSHT stands for AT61P with 13mm lens, Chinese, standard, H.264 , H.265 , MJPEG network protocols supportable.

AT61P9FNPX stands for AT61P with 17mm lens, English, no logo, GigE Vision supportable.

## 9. Lens Parameters

Resolution	Focal Length	FOV (H×V)	IFOV
384×288	7.8mm	47°×35.6°	2.17mrad
384×288	13mm	29.6°×22°	1.3mrad
384×288	15mm	25°×18.7°	1.1mrad
384×288	19mm	19.6°×14.7°	0.89mrad
384×288	25mm	14.8°×11.1°	0.68mrad

**Table 9.1 AT31 Lens Parameters**

Resolution	Focal Length	FOV (H×V)	IFOV
640×512	7.8mm	54.3°×44°	1.54mrad
640×512	13mm	33.7°×27°	0.92mrad
640×512	15mm	29.4°×23.5°	0.80mrad
640×512	17mm	25.2°×20.3°	0.706mrad
640×512	25mm	17.6°×14.1°	0.48mrad
640×512	19mm	22.8°×18.4°	0.63mrad

**Table 9.2 AT61P Lens Parameters**

## 10.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:

- 1.) i5-9500T and above CPU
- 2.) 8G and above memory
- 3.) 64-bit Win10 system,
- 4.) Main board H370 chip set
- 5.) Support Gigabit network.
- 6.) The screen resolution is recommended to be 1920×1080
- 7.) Video Memory 128MB
- 8.) Network card RTL8168/8111/8112 Gigabit Ethernet Controller

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, change the IP to 192.168.1.xxx.(Do not choose 123 or 29 to avoid connection failure for the same IP with the camera.

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 control 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. The client software TAS and VMS are applicable for the thermal camera, which can realize other functions needed.

The client software TAS can realize the below functions:

- Auto focus
- Image capture and video recording
- Thermographic analysis/secondary analysis
- Export recorded infrared data
- Set the parameters and alarm information
- Update firmware to acquire the new functions

The client software VMS can realize the below functions:

- Auto focus
- Multiple thermal camera monitoring
- Set parameters and alarm information of a certain thermal camera
- Get the information in the alarm region

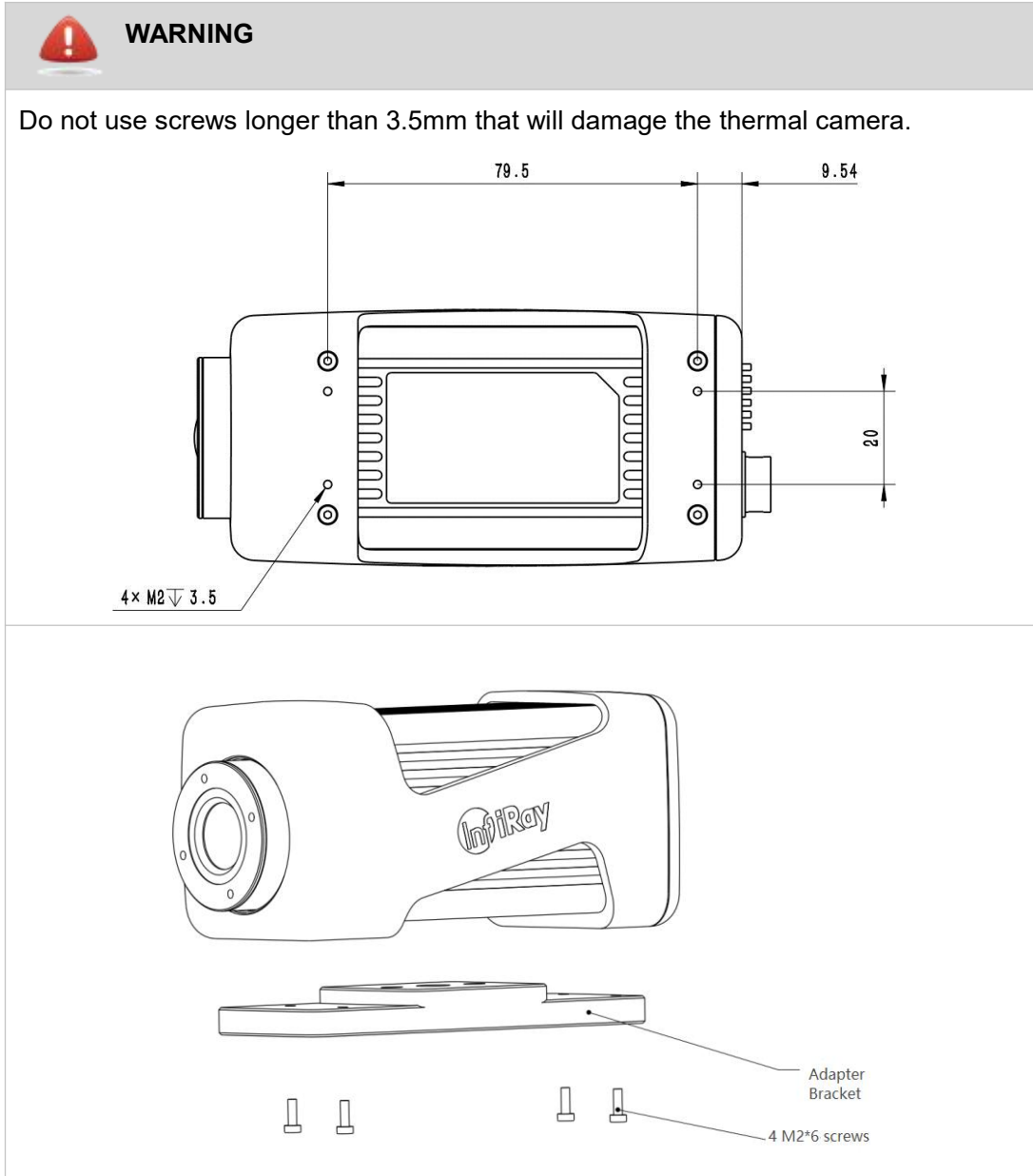
## 11.Product and Accessories List

<b>Product and Accessories</b>
AT online temperature measuring thermal camera (with adapter bracket)
Network cable
Power cable
Power adapter

**Table 11.1 Product and Accessories List**

## 12. Mechanical Installation

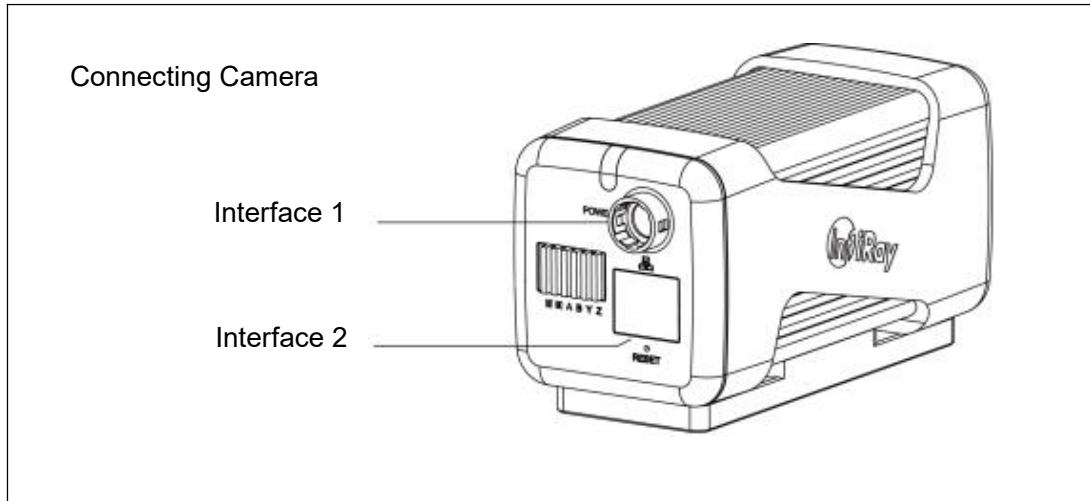
The thermal camera can be mounted via a transfer bracket with four metric M2 mounting holes at the bottom of the mounting interface.





## 12.1 Camera Mounting

### 12.1.1 Illustrations



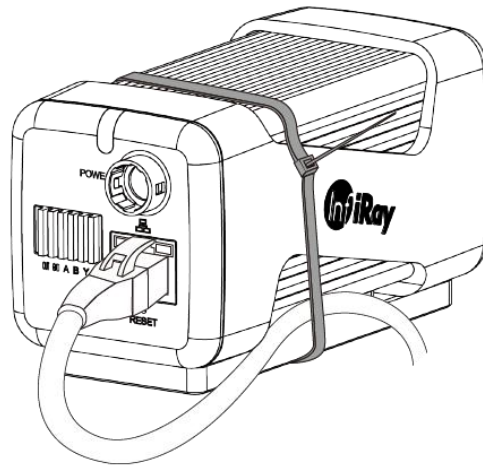
### 12.1.2 Explanations

1. Fix the thermal camera at the desired location according to the specific use method. The recommended location is in a sheltered area with a relatively stable thermal state.
2. Connect the power cable to the power adapter and interface 1 respectively, power on the thermal camera, and connect the two ends of the network cable to interface 2 and the PC Gigabit Ethernet port respectively.
3. Wait 30 minutes after you have started the camera, then the temperature can be measured and analyzed by the client software of the computer.

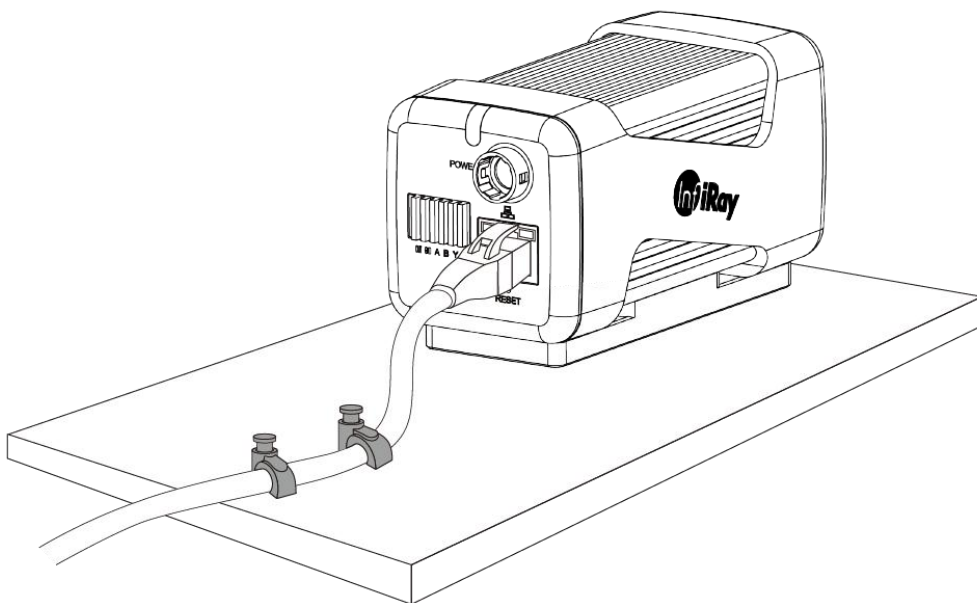
## 12.2 Cable strain relief

In installations where the camera is subject to vibrations or shocks the power cord may need an external strain relief arrangement to avoid power port failure.

The following pictures show two examples on how cable strain relief of the power cord can be solved.



**Example 1 Cable strain relief with zip ties**



**Example 2 cable strain relief with cable clamps**

## 13. Technical Data

### 13.1 AT31

Imaging and Optical Data	
Resolution	384×288
Thermal Sensitivity/NETD	<50mK(40mK is optional) @25°C, F#1.0
Image Frequency	50Hz
Focus	Support Auto-focus/Manual focusing

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

Temperature Measurement	
Object Temperature Range	-20°C ~ 150°C 0°C ~ 550°C
Accuracy	±2°C or ±2%
Measurement Tools	Any fixed point Full screen max./min. temperature capture Center spot Line/Area analysis tool Manual temperature scale

Ethernet	
Ethernet	Control and imaging
Ethernet Type	Gigabit
Ethernet Standard	IEEE 802.3
Ethernet Connector Type	RJ45
Ethernet Image Stream	RTSP, ONVIF
Ethernet Power Supply	POE power supply supported
Ethernet Protocol	TCP,UDP,ICMP,DHCP

Image Adjustment	
Brightness and Contrast Adjustment	Manual/Auto 0(defaulted)/Auto 1
Polarity	Black hot/white hot
Palette	18 palettes are available
Image Flip	Left and right/up and down/diagonal
ROI	Support

Power System	
Typical power consumption@25°C	≤3W
Connector type for external power supply	DC
Voltage	10-36VDC

Environmental Data	
Operating Temperature Range	-20°C ~ 60°C
Storage Temperature Range	-45°C ~ 85°C
Humidity (operating & storage)	5% ~ 95%RH(no condensation)
EMC	With EMC design
Shock	30g, 11ms, all axial
Vibration	4.3g, random vibration, all axial

Physical Data	
Weight	430g±5g(without adapter bracket)
Thermal Camera (L×W×H)	55mm×55mm×110mm
Base Installation	Fix the adapter bracket on the thermal camera with 4 M2*6 screws
Housing Material	Aluminum

Shipping Information	
Packing Type	Carton
Weight with Package	1.1kgs
Packaging Size	224.4mm×126.4mm×144.4mm
List of Contents	Thermal camera Adapter bracket Power adapter Power cable Gigabit cable
Country of Origin	China

**Table 13.1.1 AT31 Performance Parameters**

## 13.2 AT61P

Imaging and Optical Data	
Resolution	640×512
Thermal Sensitivity/NETD	<50mK(40mK is optional) @25°C, F#1.0
Image Frequency	25Hz
Focus	Support Auto-focus/Manual focusing

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

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

Ethernet	
Ethernet	Control and imaging
Ethernet Type	Gigabit
Ethernet Standard	IEEE 802.3
Ethernet Connector Type	RJ45
Ethernet Image Stream	RTSP, ONVIF
Ethernet Power Supply	POE power supply supported
Ethernet Protocol	TCP,UDP,ICMP,DHCP

Image Adjustment	
Brightness and Contrast Adjustment	Manual/Auto 0(defaulted)/Auto 1
Polarity	Black hot/white hot
Palette	18 palettes are available
Image Flip	Left and right/up and down/diagonal
ROI	Support

Power System	
Typical power consumption@25°C	≤3.3W
Connector type for external power supply	DC
Voltage	10-36VDC

Environmental Data	
Operating Temperature Range	-20°C ~ 60°C
Storage Temperature Range	-45°C ~ 85°C
Humidity (operating & storage)	5% ~ 95%RH(no condensation)
EMC	With EMC design
Shock	30g, 11ms, all axial
Vibration	4.3g, random vibration, all axial

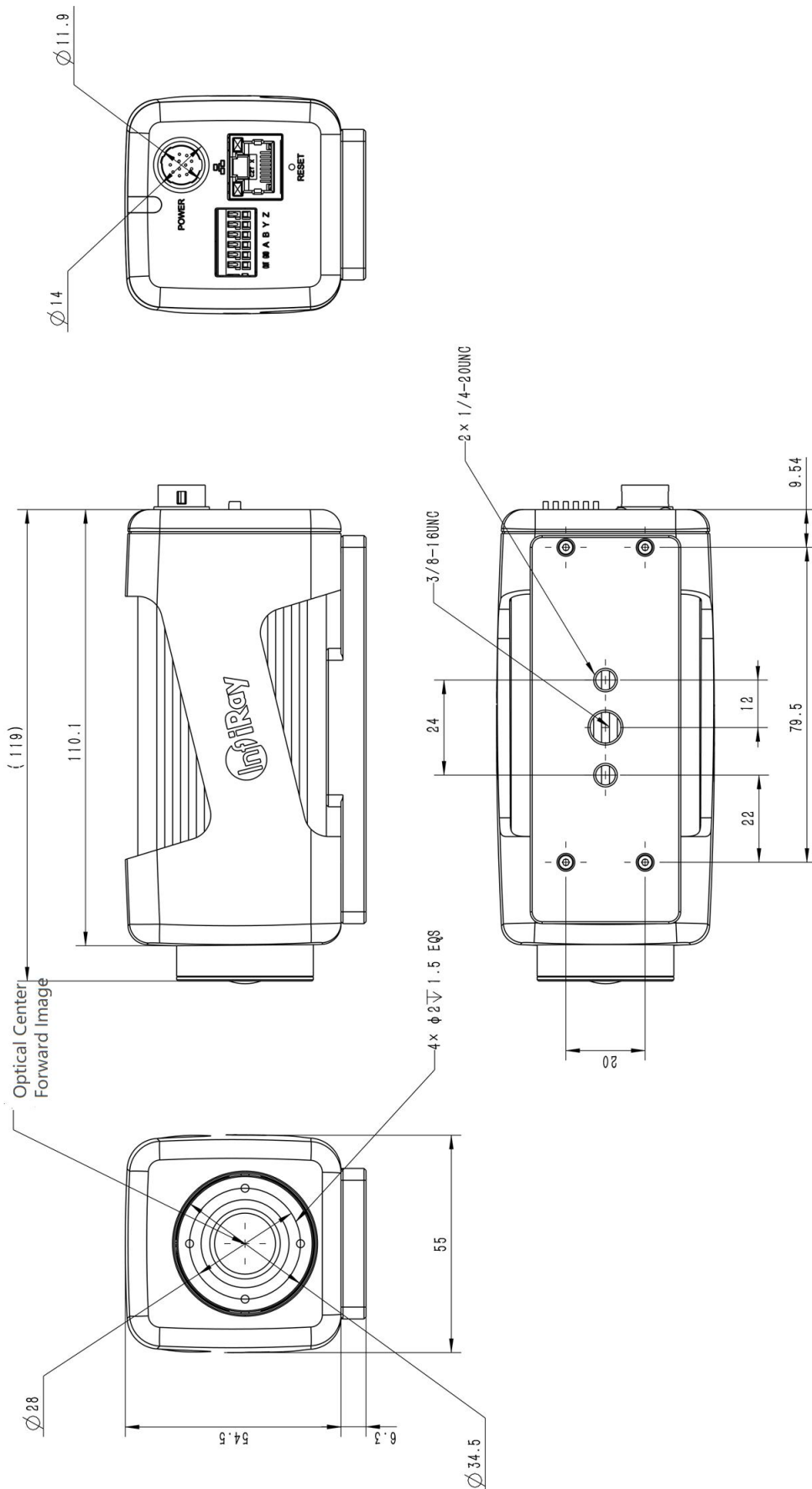
Physical Data	
Weight	430g±5g(without adapter bracket)
Thermal Camera (L×W×H)	55mm×55mm×110mm
Base Installation	Fix the adapter bracket on the thermal camera with 4 M2*6 screws
Housing Material	Aluminum

Shipping Information	
Packing Type	Carton
List of Contents	Thermal camera Adapter bracket Power adapter Power cable Gigabit cable
Weight with Package	1.1kgs
Packaging Size	224.4mm×126.4mm×144.4mm
Country of Origin	China

**Table 13.2.1 AT61P Performance Parameters**



## 14. Mechanical Drawings



## 15.Common Troubleshooting

Troubles	Possible Cause	Solutions
Images are blurred	Objective lens focal length does not match	Click auto focus in the software after aiming the thermal camera at the target
	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 10 and 36V
	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.
	Focus is not good.	Align the target for automatic focus calibration.
The client cannot open, the error shows no mfc300.dll	VC environment is not installed	Install Microsoft Visual Studio
Network parameters can be recognized, but can't be connected.	Network IP address setting is not correct.	Change the network configuration back to automatic acquisition.
Image is frozen.	Power cable or network cable connection is loose.	After checking the power supply and network cable connection, restart the software.
Image temperature cannot be seen clearly	Default font is smaller.	Adjustment font size by Aa icon
Video is not continuous.	Computer configuration is not matched.	The network card is not a gigabit network port.

**Table 15.1 Product Common Troubleshooting**

## 16.Cleaning Thermal Camera

### 16.1 Cleaning Camera Housing, Cables and Other Items

Camera Housing, Cables and Other Items	
Liquids	One of the following liquids can be used. <ol style="list-style-type: none"><li>1.Warm water</li><li>2.A Weak detergent solution</li></ol>
Cleaning Tools	A soft cloth
Cleaning Procedure	Please follow this procedure: <ol style="list-style-type: none"><li>1.Soak a soft cloth in the liquid.</li><li>2.Twist the cloth to remove excess liquid.</li><li>3.Clean the camera parts with the cloth.</li></ol>

## 16.2 Cleaning Infrared Lens

Cleaning Infrared Lens	
Liquids	One of the following liquids can be used. <ol style="list-style-type: none"><li>1. Commercial lens cleaning liquid with more than 30% is isopropyl alcohol.</li><li>2. 96% ethyl alcohol(<math>C_2H_5OH</math>).</li></ol>
Cleaning Tools	Dustless cloth, cotton wool
Cleaning Procedure	Please follow this procedure (Take dustless cloth as an example). <ol style="list-style-type: none"><li>1. Soak the dustless cloth in the liquid.</li><li>2. Gently wipe the lens with the dustless cloth</li></ol>



### CAUTION

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

## 17. 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 HFOV is the horizontal angle of FOV, VFOV is the vertical angle of FOV.
NETD (Noise Equivalent Temperature Difference)	A measure of image anti-interference level of infrared thermal camera.

## Appendix A Emissivity of Common Materials

Material	Temperature (°C)	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

## Worth comes from Service

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**24h Hotline:**  
**400-998-3088**

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**Technical Support**

**Hotline:**  
**400-883-0800**

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**Customized Services**