AT Fixed Focus Series

AT31U/AT61U

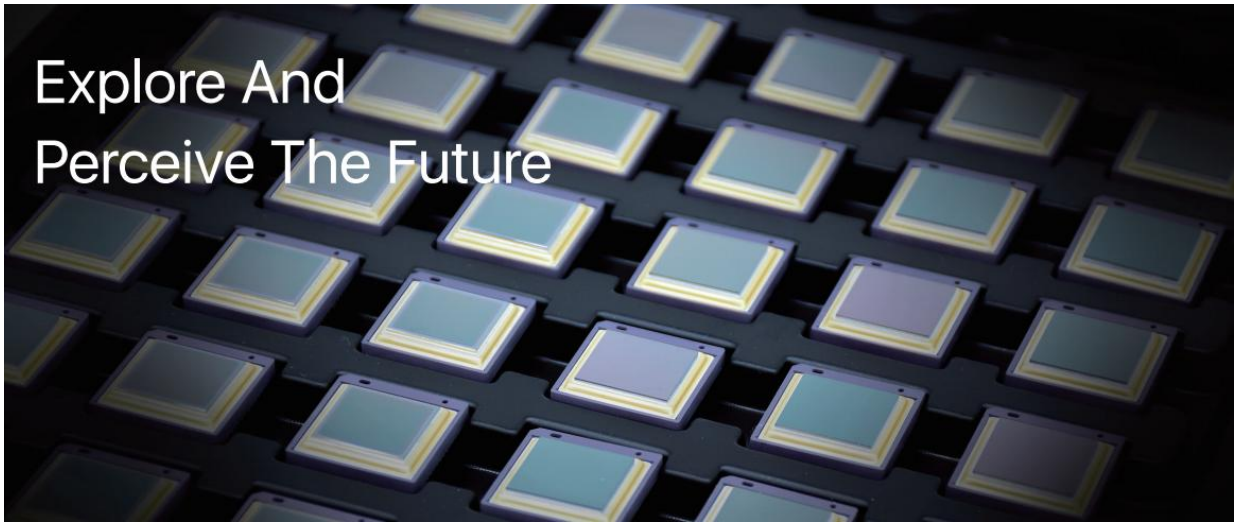
Online Thermal Camera

For Ultra-high Temperature Measurement

User Manual V1.0.5

IRay Technology Co., Ltd.

www.infiray.com

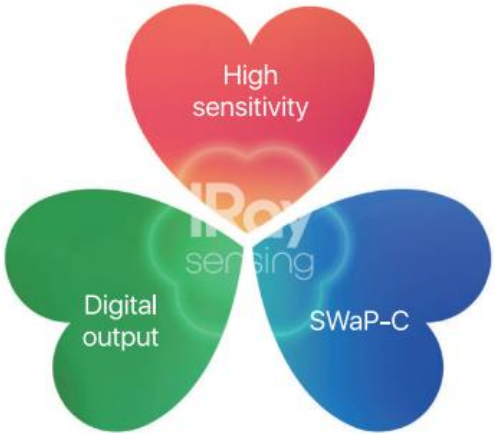


Introduction to IRay Technology

IRay Technology 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 cameras and imagers.

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 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. Please refer to the real object. 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
1. Before using the cleanser, make sure you read all applicable material safety data sheets (SDS) and warning labels on cleanser containers.
2. It is forbidden to disassemble or refit the thermal camera at will.

CAUTION
1. Never apply cleaning solutions or similar liquids directly to the thermal camera, cables, or other components.
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.Notice to user

3.1 Calibration

Annual calibration to the thermal camera is recommended to ensure the accuracy of temperature measurement, either through IRAY TECHNOLOGY or third-party organizations.

3.2 Accuracy

For accurate measurement, the below operations are recommended.

1. Use the thermal camera after it is stable for 30 minutes.
2. Operation distance is 0.5m～1.5m, and 0.7m～1.2m is the ideal distance.
3. This thermal camera is designed for ultra-temperature measurement, so it's not recommended to monitor the targets at the normal temperature.

3.3 Usage

In order to avoid the prolonged stress on the connecting parts and improve the product stability, it's recommended to make proper support for the lens during integration use.

4.Camera Introduction

Main Features	● Compact size
	● Easy installation
	● Wide range of temperature measurement

Typical Applications	● Blast furnace monitoring
	● Molten iron tank monitoring
	● Sintering monitoring
	● Material level monitoring
	● Kiln Monitoring

5.Camera Models

AT31U	1	X
Model	Lens	Reserved
AT31U	1:3.3mm	X

Table 5.1 Camera Models

AT61U	1	X
Model	Lens	Reserved
AT61U	1: 6mm	X
AT61U	2: 3.9mm	X

Table 5.2 Camera Models

E.G.: AT31U1X stands for AT31U with 3.3mm lens.

6.Lens Parameters

Resolution	Lens F.L.	FOV（H×V）	IFOV
384×288	3.3mm	89.3°×73.1°	5.15mrad
640×512	6mm	72.5°×57°	2mrad
640×512	3.9mm	104°×84°	3.07mrad

Table 6.1 Lens Parameters

7.Quick Start Guide

Please follow the steps below:
1. Install IRT_TAS (one set of thermal camera) or IRT_VMS (multiple sets of thermal cameras). Please refer to the actual version since the software may have version updates. The computer configuration for installing the software is recommended to 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 imager, power supply and computer.
3. Set the computer configuration according to the manual of the software, change the IP to 192.168.1.×××.(Do not choose 123 or 29 to avoid connection failure for the same IP with the camera.
4. Double-click to run the software, type in the correct user name and password, and click Login.
5. Continue to operate according to the steps of the software manual. If the product is successfully connected and the image is normal, you can use the software for thermal imager control, temperature analysis or monitoring at this time.
6. 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:
● 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:
● Multiple thermal camera monitoring
● Set parameters and alarm information of a certain thermal camera
● Get the information in the alarm region

8.Product and Accessories List

Product and Accessories
ATU online ultra-high temperature measurement thermal camera
ATU special cable

Table 8.1 Product and Accessories List

9.Technical Data

9.1AT31U

Imaging and Optical Data	
Resolution	384×288
NETD	<50mk(optional 40mk)
Image Frequency	50Hz

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

Temperature Measurement	
Object Temperature Range	● 0℃～400℃ ● 400℃～1500℃
Accuracy	● ±2℃ or ±2%,the larger value shall prevail@(100℃～1500℃)
Measurement Tools	● Any fixed point ● Full screen max./min. temperature capture ● Center point ● Line/Area analysis tool ● Manually choose temperature width ● Radar temperature measurement tool

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,GB28181,Modbus TCP(support the

	transmission of regional temperature information)

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

Power System	
Typical power consumption@25℃	≤3W
Connector type for external power supply	DC
Voltage	9～26VDC

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	314g±5g
Dimension(L×W×H)	46.5mm×48mm×148mm
Housing Material	Aluminum

Table 9.1 AT31U Performance Parameters

9.2 AT61U

Imaging and Optical Data	
Resolution	640×512
NETD	<50mk(optional 40mk)
Image Frequency	25Hz

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

Temperature Measurement	
Object Temperature Range	● 0℃～400℃ ● 400℃～1500℃
Accuracy	● ±2℃ or ±2%,the larger value shall prevail@(100℃～1500℃)
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Physical Data	
Weight	314g±5g
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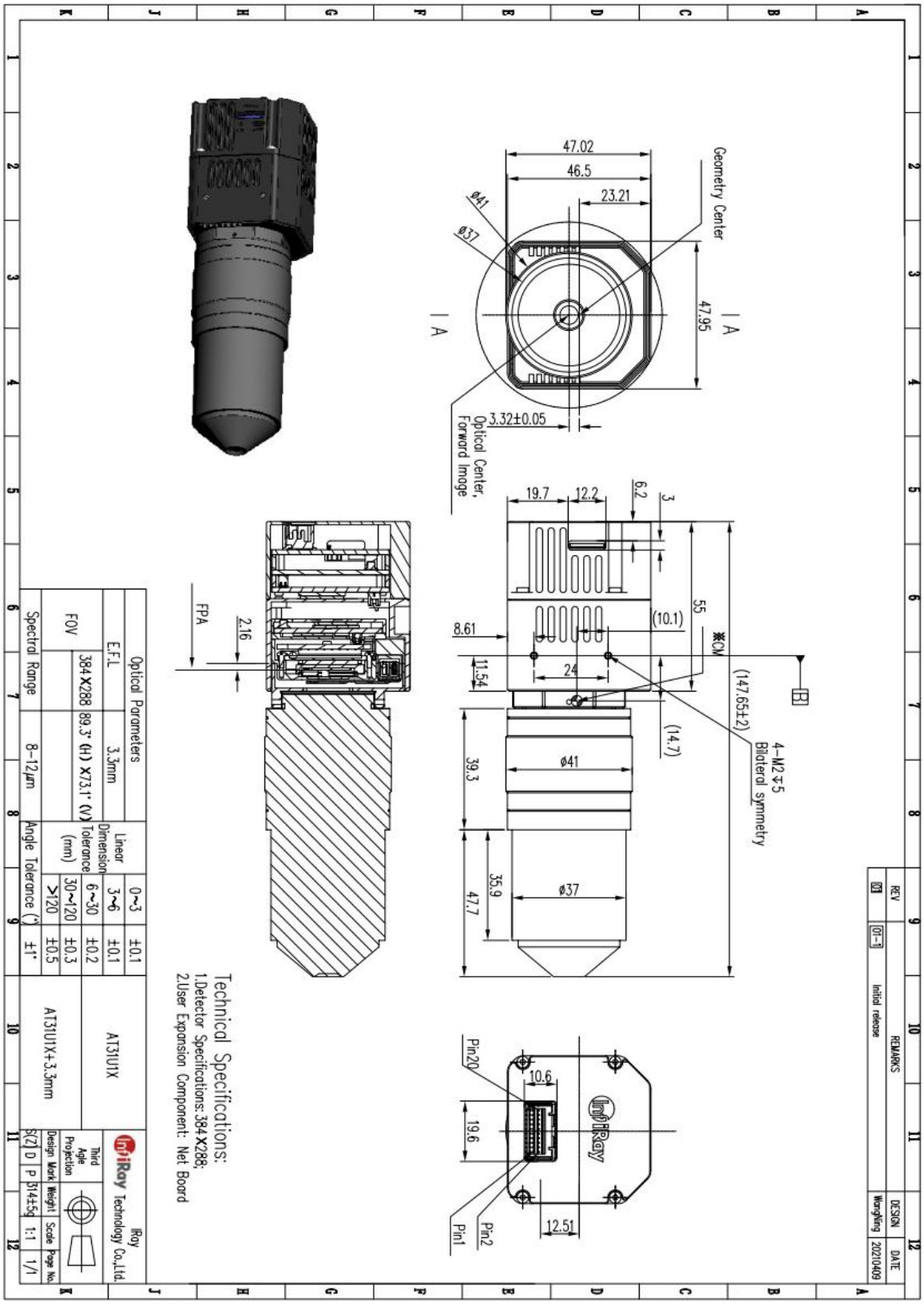
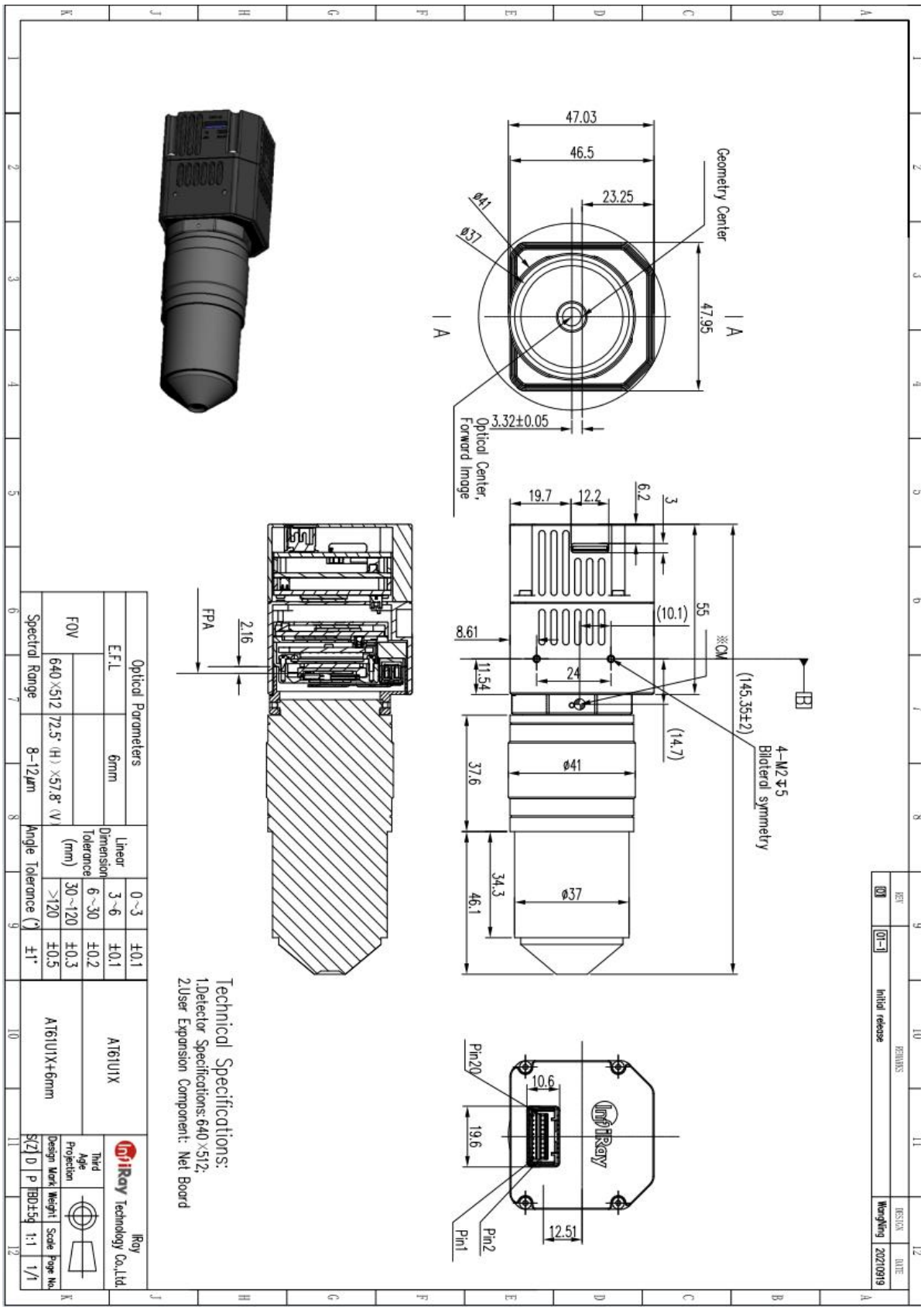
Table 9.2 AT61U Performance Parameters

10. Mechanical Drawings

10.1 AT31U1X



10.2 AT61U1X


47.03
46.5
23.25
Ø41
Ø37
47.95
Geometry Center
3.32±0.05
Optical Center,
Forward Image
19.7
12.2
6.2
3
(10.1)
55
※CM
8.61
11.54
24
(14.7)
(145.35±2)
4-M2↧5
Bilateral symmetry
37.6
Ø41
34.3
46.1
Ø37
FPA
2.16
Pin20
10.6
19.6
Pin1
Pin2
12.51
Technical Specifications:
1.Detector Specifications:640×512;
2.User Expansion Component: Net Board
Optical Parameters
E.F.L
6mm
FOV
640×512
72.5°(H)×57.8°(V)
Spectral Range
8-12μm
Linear Dimension Tolerance (mm)
0~3
3~6
6~30
30~120
>120
Angle Tolerance (°)
±1'
±0.1
±0.1
±0.2
±0.3
±0.5
AT61U1X
AT61U1X+6mm
IRay Technology Co.,Ltd.
Third Age Projection
Design Work
Weight
Scale
Page No.
S(2)
D
P
TBD±5g
1:1
1/1
REV
01
01-1
Initial release
REMARKS
Wangfeng
DESIGN
20210919
DATE

11.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 camera is not connected to Internet or the connection between the camera and the Internet is not good.	Connect the camera to Internet and make sure that they are connected well.

Table11.1 Common Troubleshooting

12.Cleaning Thermal Camera

12.1 Cleaning Camera Housing, Cables and Other Items

Camera Housing, Cables and Other Items	
Cleaning Liquids	One of the following liquids can be used. ● warm water ● mild detergent solution
Cleaning Tools	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.

12.2 Cleaning Infrared Lens

Cleaning Infrared Lens	
Cleaning Liquids	One of the following liquids can be used. ● Commercial lens cleaning liquid with more than 30% is opropyl alcohol. ● 96% ethyl alcohol(C_2H_5OH).
Cleaning Tools	Dustless cloth, absorbent cotton
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.

13.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

Worth comes from Service

Technical Support Hotline:

400-883-0800

24h Hotline:

400-998-3088

Customized Services