Elitech® *Innovation Preceding All*

TIC Series Handheld Thermal Camera

User Manual

1.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 60 °C or in a low temperature below-20 °C.

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

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.

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

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.

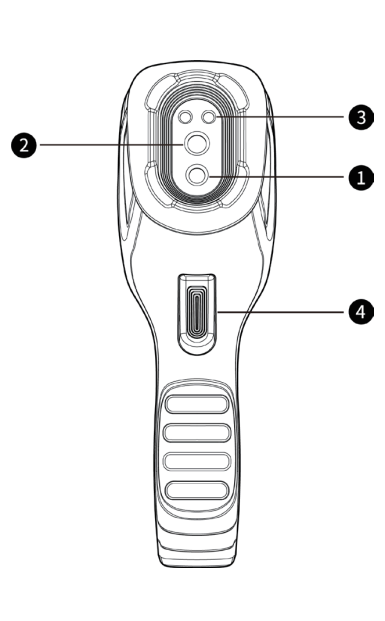
No matter there is a lens cover or not, do not point the infrared thermal camera towards strong light or equipment with laser radiation. This will affect the accuracy of the thermal camera and even damage the detector in the thermal camera.

2006/66/EC (battery directive): This product contains a battery that cannot be disposed of as unsorted municipal waste in the European Union. See the product documentation for specific battery information. The battery is marked with this symbol, which may include lettering to indicate cadmium (Cd), lead (Pb), or mercury (Hg). For proper recycling, return the battery to your supplier or to a designated collection point. For more information see: www.recyclethis.info

2012/19/EU (WEEE directive): Products marked with this symbol cannot be disposed of as unsorted municipal waste in the European Union. For proper recycling, return this product to your local supplier upon the purchase of equivalent new equipment, or dispose of it at designated collection points.
For more information see: www.recyclethis.info

2.Camera Introduction

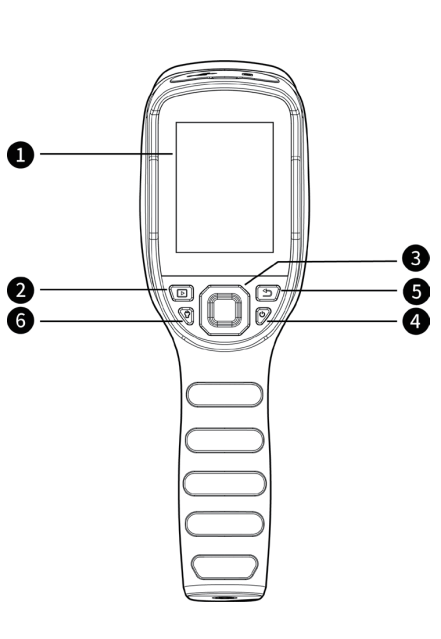
2.1 Camera



No.	Components
1	Digital Camera(optional)
2	Infrared Lens
3	LED lamp
4	Trigger (image/video capture)

Table 2.1 Component Introduction (View from the Front)

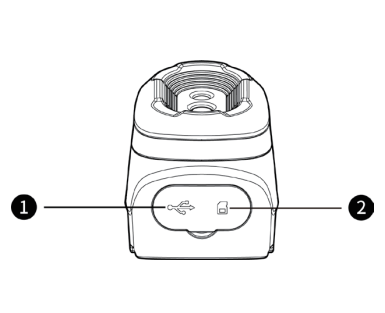
2.2 Buttons



No.	Components	Function Description
1	Screen	
2	Gallery button	Click to open the archive images
3	Navigation button	● Navigation and confirm; ● On the home screen, press the center button to call the main menu ● On the home screen, press the navigation button(left/right) to perform zoom in and zoom out
4	Power button	● Calibrate on the home screen ● Back/exit
5	Back button	Press to cancel operation or back to previous menu.
6	LED lamp	Long press to turn on/off the LED lamp.

Table 2.2 Component Introduction (View from the Rear)

2.3 USB port & SD card



No.	Name	Description
1	USB port	● Connect the power adapter to charge via USB cable ● Connect the computer to charge or transmit data via USB cable
2	SD card	● Standard MicroSD card, user-expandable, supports up to 128GB. ● The microSD card can be removed to transmit data to PC or other equipment with card readers.

Table 2.3 Connector and Memory Card

3.Quick Start Guide

Please follow the procedures:

1.Charging:

- Please charge with 5V 1A or 5V 2A power adapter and USB cable.
- You can connect the PC with the USB cable to charge the device.
- Open the protective cover on the top of the device, and charge the device by connecting the USB Type-C connector with the PC or adapter via data cable.

2.Power on

Long press the power button ⏻ to turn on.

3.Find a target

Point the camera at the object you are interested in.

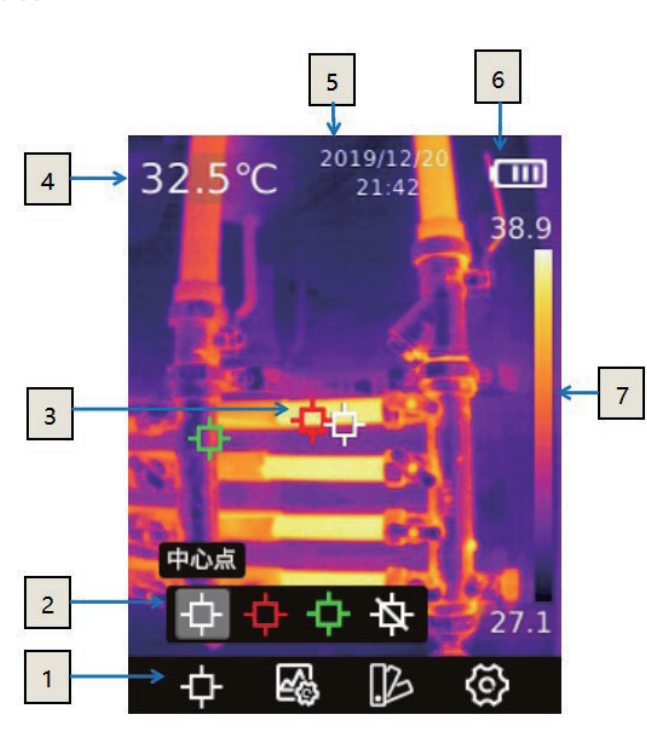
4.Image Capture

Click the trigger to capture the image.

5.PC analysis

Download the client software, start client, import the data to perform the secondary analysis via USB cable or SD card.

4.User Interface



No	Name	Description
1	Main toolbar	Measurement mode, image mode, color palette and settings can be set.
2	Secondary toolbar	Detailed options can be set here, such as selecting color palette.
3	Temperature measurement point	It is divided into center point, Max. temperature / Min. temperature point tracing, closing temperature measurement point, custom temperature measurement point.
4	Center point temperature measurement	Display the temperature of the central point
5	Date and time	Display date and time
6	Battery Capacity	Display the remaining battery capacity
7	Temperature scale	Display the temperature range in the current image

Table 4.1 interface Introduction

5.Operating Instructions

5.1 Power On & Off

1. In the shutdown status, long press the power button to turn on.

2. In the power-on status, long press the power button to turn off.

3. If the device crashes, you can shut it down by pressing and holding the power button.

5.2 Saving Images

1. In the auto save mode, click the trigger to save the picture automatically.

2. In the manual mode, click the trigger, then manually save images or cancel saving.

Note: Automatic/manual mode can be switched in the settings options.

5.3 View / Delete Images

When you take and save an image, it will be stored in SD card, you can view the saved image at any time as follows:

1. Click the Gallery button to enter the gallery.

2. Use the direction button to select the image you want to view.

3. Press confirm button to view the image in full screen.

4. Click the Gallery button or the return button continuously to return to the thermal imaging interface.

5.4 Measurement

5.4.1 Center Point Temperature Measurement

You can use point temperature measurement to measure temperature. The measurement results will be displayed in the upper left corner of the screen.

1.In the thermal imaging interface, press the center button to display the main toolbar

2.Select the measurement icon on the toolbar, and press the center button to bring up the secondary toolbar.

3.Select "Center Point" icon on the secondary menu, and press the center button to enable the Center Point Temperature Measurement(on by default), the temperature of the center point will be displayed in the upper left corner of the screen.

5.4.2 Cold/Hot Point Tracing

You can turn on cold point / hot point tracking to identify the lowest/highest temperature on the screen by checking the moving cursor:

1.In the thermal imaging interface, click center button to display the main toolbar.

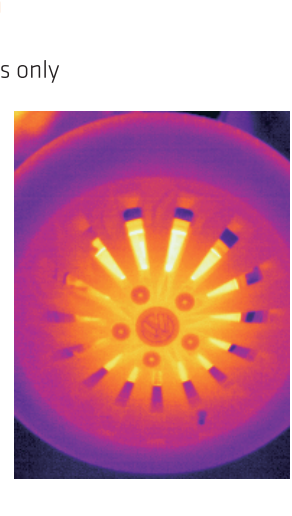
2.Select the measurement icon on the toolbar, and press the center button to bring up the secondary toolbar.

3.Select "High Temperature" or "Low Temperature" icon on the secondary menu, and press the confirm button to enable tracking of high/low temperature point.

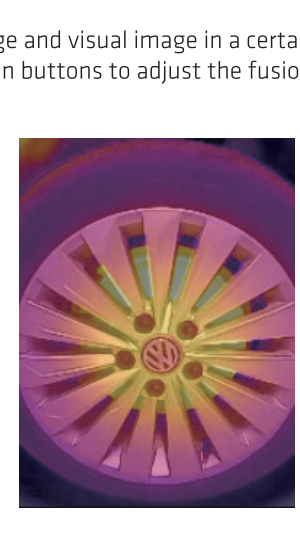
5.5 Image Mode

5.5.1 Image Mode Introduction

- **Thermal image:** Infrared images only

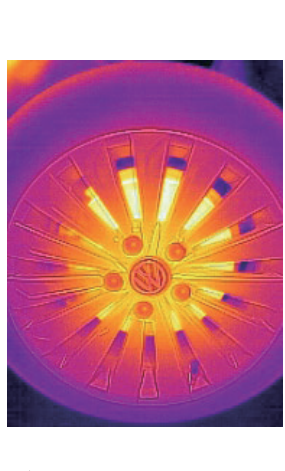


- **Fusion:** Fusion of infrared image and visual image in a certain scale. In the home screen, you can use the left and right navigation buttons to adjust the fusion ratio of infrared and visible light (TIC-210 does not support Fusion).



- **PIP(Picture in Picture):** Thermal image is overlaid on the center of visual image(TIC-210 does not support PIP).

- **iMIX:** The infrared image with enhanced edge details of the object (TIC-210 does not support iMIX).



- **Digital Camera:** Visual image only (TIC-210 does not support Digital Camera).

Note:
In order to achieve better overlay image effect, when using iMIX, PIP, and thermal fusion modes, you need to set the alignment distance, which is the approximate distance from the thermal camera to the target. In IMIX /PIP/ thermal fusion / digital camera mode, please make sure that the thermal image displayed on the screen is aligned with the target.

5.5.2 Steps of Changing Image Modes

1. In the thermal imaging interface, press the center button to display the main toolbar

2. select the "Image Mode" icon on the toolbar, and press the center button to bring up the secondary toolbar

3. Select the image mode you need on the secondary toolbar and press the confirm button to switch to the selected image mode.

5.5.3 Color Palettes

You can change the color palette to distinguish temperature difference on the thermal camera. A appropriate color palette can help you analyze images more easily.

1.In the thermal imaging interface, press the center button to display the main toolbar

2.Select the "Color Palette" icon on the toolbar, and press the center button to bring up the secondary toolbar

3.You can select a new palette and press the center button to switch to the selected palette.

5.6 Shutter Correction

5.6.1 Shutter Correction Introduction

Shutter correction is used to compensate for the non-uniformity of the detector pixels or the non-uniformity caused by other optical interference. When the picture effect is poor, you can perform shutter correction, which is common in situations where the ambient temperature changes rapidly.

5.6.2 Shutter Correction Operation

In the imaging interface, long press the return button to perform a non-uniformity correction. During shutter correction, the screen will freeze for a short time, which is normal.

6.Settings

6.1 Measurement Parameters

6.1.1 Setting Emissivity

In order to get 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 radiation ability of an object to that of a blackbody at the same temperature, which is relative to the reflectivity of the object. The lower the emissivity, the higher the percentage of energy reflected, and the higher the emissivity, the lower the percentage of energy reflected.
For example, human skin emissivity is 0.98 and printed circuit board emissivity is 0.91. For more emissivity information, you can refer to the quick start guide in the package or inquire from other ways.

Emissivity Setting

1. In the thermal imaging interface, press the center button to display the main toolbar.

2. In the toolbar, select the "Settings" option, click the center button to enter "Settings".

3. In the list, select "Measurement Parameters", click the center button, then select "Emissivity" to set the emissivity.

6.1.2 Setting Ambient Temperature

1. In the thermal imaging interface, press the center button to display the main toolbar.

2. Select the "Settings" icon on the toolbar， and press the center button to enter the settings menu.

3. Select "measurement parameters" in the list, press the confirm key, and then select "ambient temperature" to set ambient temperature.

6.1.3 Setting Distance

Different distances will have different effects on the measurement results. For accurate temperature measurement, the distance information of the object is necessary for compensating for the result.

1. In the thermal imaging interface, click the OK button, and the main menu toolbar will be displayed.

2. In the toolbar, select the "Settings" option and click the OK button to enter "Settings".

3. Select "measurement" in the list, click the confirm button, and then select "distance" to set the distance.

6.2 Temperature Measurement Mode

The temperature measurement mode: HIGH, LOW and AUTO. Users can choose different temperature measurement ranges to ensure temperature measurement accuracy according to the application conditions.

6.3 High/Low Temperature Alarm

The camera supports the high and low temperature alarm function. The user can set the high and low temperature alarm threshold. The alarm function can be turned on or off by setting the "on" and "off" options. After the high and low temperature alarm is triggered, a prompt icon will appear on the screen. If the "LED alarm" option is turned on, the LED light will flash promptly when an alarm occurs.

For alarm snapshot function, you can set the alarm snapshot time interval and the number of photos taken. Turn on this function, after triggering the high and low temperature alarm, it will take pictures according to the set time interval. When the set number of pictures is reached, the camera will stop taking photos and this function will be turned off automatically. It needs to be turned on again when it is used.

6.4 Photo-taking Settings

6.4.1 Automatically Save Photos

Turn on this function, the picture will be automatically saved after taking a picture.

6.4.2 Time-lapsed Photo

The camera supports the function of taking pictures at regular intervals, and users can independently set the time interval and number of pictures taken. If this function is turned on, photos will be taken at the set time interval. After the set number of photos is reached, the camera will stop taking photos and this function will be automatically turned off.

6.5 Temperature Unit

The camera supports temperature displays in degrees Celsius, Fahrenheit, and Kelvin.

6.6 Auto Power-Off

The camera supports auto power-off, five options: 5 mins, 10mins, 20mins, 120mins and off.

6.7 System Settings

In system settings, you can view the relevant information of this camera, and perform operations such as restoring factory default settings and formatting the SD card.

7.Technical Data

7.1 TIC-210

Thermal Module	
Resolution of Detector	256×192
Infrared Frame Rate	25Hz
Pixel Pitch	12μm
NETD	<40mK
Focal Length	3.2mm
FOV	56°×42°
IFOV	3.8mrad
Focus Mode	Fixed focus
Radiometric Function	
Temperature Measuring Functions	Center point/Max./Min.
Temperature Measuring Range	Low:-20~150℃ High:100~400℃ Auto
Temperature Measuring Accuracy	±2% or ±2°C
Temperature Measuring Unit	Celsius, Fahrenheit, Kelvin
Emissivity Setting	Adjustable between 0.01 and 1.0, in 0.01 increment
System Functions	
Camera Lamp	Support illuminator and flashlight mode
Image Mode	Thermal
Color Palettes	White hot, Black hot, Iron, Rainbow
Digital Zoom	2×, 4×
Temperature Alarm	The highest and lowest temperature alarm in the full frame
Alarm Method	Image Pop-up,Flashlight Notification
Automatic Alarm Snapshot	Available(with temperature data)
Time-lapsed Image Capture	Available(with temperature data)
Saving Images	Auto, manual
Image Format	JPG(new national grid format)
Video Transmission	Support UVC screen mirroring (with temperature data)
PC Analysis Software	Available
Display Dimension	2.8-inch LCD (320×240)
Memory Card	32GB Micro SD card
	Support expandable memory up to 128GB
Battery Type	Rechargeable Lithium battery
Power Interface	USB Type-C
Charging Time	4hours (shutdown state)
Operation Time	9 hours
Power Management	Automatic shutdown:5 mins, 10 mins, 20 mins, 120 mins, off
Others	
Tripod Mounting	Support
Operating Temperature Range	-10℃～+50℃
Storage Temperature Range	-20℃～+60℃
Relative Humidity	10% ～95%,non-condensing
Encapsulation/Drop	IP54/2m
Dimensions(L×W×H)	237mm×75mm×92mm
Weight	520g
Accessories	USB cable,32GB SD card, user documentation, storage bag, certificate of qualification,calibration certificate

7.2 TIC-270

Thermal Module	
Resolution of Detector	256×192
Infrared Frame Rate	25Hz
Pixel Pitch	12μm
NETD	<40mK
Focal Length	3.2mm
FOV	56°×42°
IFOV	3.8mrad
Focus Mode	Fixed focus
Radiometric Function	
Temperature Measuring Functions	Center point/Max./Min.
Temperature Measuring Range	Low:-20~150°C High:100~550°C Auto
Temperature Measuring Accuracy	±2% or ±2°C
Temperature Measuring Unit	Celsius, Fahrenheit, Kelvin
Emissivity Setting	Adjustable between 0.01 and 1.0, in 0.01 increment
System Functions	
Camera lamp	Support illuminator and flashlight mode
Image Mode	Thermal, dual-spectrum fusion, visible light, PIP,iMIX*
Color Palettes	White hot, Black hot, Iron, Lava, Rainbow, Rainbow HC, Black red.
Digital Zoom	2×, 4×
Temperature Alarm	The highest and lowest temperature alarm in the full frame
Alarm Method	Image Pop-up,Flashlight Notification
Automatic Alarm Snapshot	Available(with temperature data)
Time-lapsed Image Capture	Available(with temperature data)
Saving Images	Auto, manual
Image Format	JPG(new national grid format)
Video Transmission	Support UVC screen mirroring(with temperature data)
PC Analysis Software	Available
Display Dimension	2.8-inch LCD (320×240)
Memory Card	32GB Micro SD card Support expandable memory up to 128GB
Battery Type	Rechargeable Lithium battery
Power Interface	USB Type-C
Charging Time	4hours (shutdown state)
Operation Time	11hours
Power Management	Automatic shutdown: 5 mins, 10 mins, 20 mins, 120mins, off
Others	
Tripod Mounting	Support
Operating Temperature Range	-10℃～+50℃
Storage Temperature Range	-20℃～+60℃
Relative Humidity	10% ～95%,non-condensing
Encapsulation/Drop	IP54/2m
Dimensions(L×W×H)	237mm×75mm×92mm
Weight	520g
Accessories	USB cable,32GB SD card, user documentation, storage bag, certificate of qualification,calibration certificate

*indicates that it is unavailable for some models.

8.Application Scenarios

8.1 Warehouse Detecting

With the help of handheld thermal camera, warehouse inspection personnel can quickly find abnormal high temperature objects in the warehouse, and take corresponding measures to eliminate potential safety hazards timely.

8.2 Detecting of Power Distribution Cabinet

The temperature distribution of power distribution equipment can directly reflect the running status of the equipment. Improper contact or damage may cause abnormal high temperature. The inspection personnel can detect anomalies in time to ensure the safety of power distribution equipment.

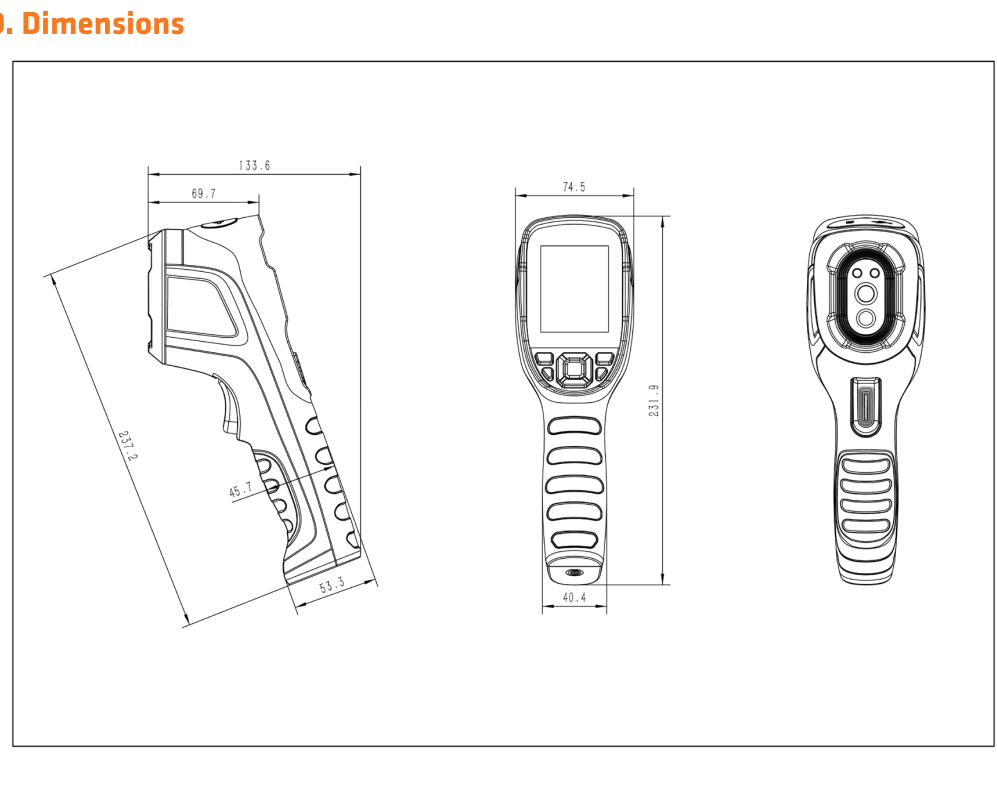
8.3 Detecting of Heating Wire of Rear Car Window

The heating wire on the rear car window can defrost and defog to ensure the safety of driving, especially on rainy and snowy days. The whole on-off condition of the heating wire cannot be seen through visible light. The whole heating wire can be quickly detected by the handheld thermal camera to analyze whether the heating wire is broken.

8.4 HVAC Detecting

The handheld thermal camera can help HVAC engineers to fully capture the temperature distribution of the measured pipeline, quickly find abnormal points, make accurate judgment and positioning, effectively avoid the economic loss caused by disassembly, and at the same time improve service quality and enhance customer satisfaction.

9. Dimensions



10.Cleaning Thermal Camera

10.1 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.

10.2 Cleaning Infrared Lens

Cleaning Infrared Lens	
Liquids	One of the following liquids can be used. 1. Commercial lens cleaning liquid with more than 30% 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.

Appendix A Emissivity of Commonly Used Materials

(1) Metal

Material	Temperature (°C)	Emissivity
Aluminum		
Polished aluminum	100	0.09
Commercial aluminum foil	100	0.09
Mild aluminum oxide	25～600	0.10～0.20
Strong aluminum oxide	25～600	0.30～0.40
Brass		
Brass mirror (highly polished)	28	0.03
Brass oxide	200～600	0.59～0.61
Chromium		
Polished chromium	40～1090	0.08～0.36
Copper		
Copper mirror	100	0.05
Strong copper oxide	25	0.078
Cuprous oxide	800～1100	0.66～0.54
Molten copper	1080～1280	0.16～0.13
Gold		
Gold mirror	230～630	0.02
Iron		
Polished cast iron	200	0.21
Machined cast iron	20	44
Completely rusted surface	20	0.69
Cast iron (oxidized at 600°C)	19～600	0.64～0.78
Electrolytic iron oxide	125～520	0.78～0.82
Iron oxide	500～1200	0.85～0.89
Iron plate	925～1120	0.87～0.95
Cast iron, heavy iron oxide	25	0.8
Melted surface	22	0.94
Melted cast iron	1300～1400	0.29
Pure molten iron	1515～1680	0.42～0.45
Steel		
Steel (oxidized at 600°C)		
Steel oxide	100	0.74
Melted mild steel	1600～1800	0.28
Molten steel	1500～1650	0.42～0.53
Lead		
Pure lead (non-oxidized)	125～225	0.06～0.08
Mildly oxidized	25～300	0.20～0.45
Magnesium		
Magnesium oxide	275～825	0.55～0.20
Mercury		
Mercury	0～100	0.09～0.12
Nickel		
Electroplating and polishing	25	0.05
Electroplating without polishing	20	0.01
Nickel wire	185～1010	0.09～0.19
Nickel plate (oxidized)	198～600	0.37～0.48
Nickel oxide	650～1255	0.59～0.86
Nickel alloy		
Nickel-chromium (heat resistant) alloy wire (bright)	50～1000	0.65～0.79
Nickel-chromium alloy	50～1040	0.64～0.76
Nickel-chromium (heat resistant)	50～500	0.95～0.98
Silver		
Polished silver	100	0.05
Stainless steel		
18/8 stainless steel	25	0.16
304 (8Cr, 18Ni)	215～490	0.44～0.36
310 (25Cr, 20Ni)	215～520	0.90～0.97
Tin		
Commercial tin plate	100	0.07
Zinc		
Oxidation at 400°C	400	0.01
Galvanized bright iron plate	28	0.23
Grey zinc oxide	25	0.28

(2) Non-metal

Material	Temperature (°C)	Emissivity
Brick	1100	0.75
Firebrick	1100	0.75
Graphite (lamp black)	96～225	0.95
Enamel (white)	18	0.9
Asphalt	0～200	0.85
Glass (surface)	23	0.94
Heat-resistant glass	200～540	0.85～0.95
Wall plaster	20	0.9
Oak	20	0.9
Carbon sheet	-	0.85
Insulating sheet	-	0.91～0.94
Metal sheet	-	0.88～0.90
Glass tube	-	0.9
Coil type	-	0.87
Enamel product	-	0.9
Enamel pattern	-	0.83～0.95
Capacitor		
Rotary type	-	0.30～0.34
Ceramic (bottle type)	-	0.9
Film	-	0.90～0.93
Mica	-	0.94～0.95
Flume type mica	-	0.90～0.93
Glass	-	0.91～0.92
Semiconductor		
Transistor (plastic package)	-	0.80～0.90
Transistor (metal)	-	0.30～0.40
Diode	-	0.89～0.90
Transmitting coil		
Pulse transmission	-	0.91～0.92
Flat chalk layer	-	0.88～0.93
Top ring	-	0.91～0.92
Electronic materials		
Epoxy glass plate	-	0.86
Epoxy phenol plate	-	0.8
Gold-plated copper sheet	-	0.3
Solder-coated copper	-	0.35
Tin-coated lead wire	-	0.28
Copper wire	-	0.87～0.88