



**TianXuan M Series
Handheld Thermal Camera
User Manual
V1.0.0**

Yantai IRay Technology Co., Ltd.

www.iraytek.com

©IRay Technology Co.,Ltd. 2020 Reserve all the right. All in this manual including texts, pictures, diagrams and other contents belong to IRay Technology Co.,Ltd (Hereinafter referred to as “Our company” or “IRay Photoelectric”). Without the written permission, no one shall copy, photocopy, translate or disseminate all or part of this manual.

Any third party shall not modify, crack, decompile or delete the documents, systems, software and programs contained in the terminal product without the consent of the company before the terminal product is sold to the end user, and shall not dismantle the terminal product or preinstall other equipment on the terminal product without authorization.

The Company authorizes end users to use the products within the scope of authorization of the terminal equipment and in the areas where the terminal products have obtained patent rights. Anyone shall not dismantle, modify, crack, decompile or make other changes to the terminal equipment without authorization or through any third party. The users should bear the relevant responsibilities of terminal product damage, abnormal function, unstable operation caused by above behaviors without authorization. In case of any damage caused by the above behaviors, the company reserves the right to pursue its legal liability.

The patent technology involved in the terminal product shall be protected by the laws of the People's Republic of China. The product is produced and sold in mainland China, the consumers can only use or resell the product inside mainland China. If any party including the consumer uses or resells the product outside mainland China, the company does not assume any claim responsibility caused by the third party's liability for intellectual property rights outside mainland China, all responsibility shall be undertaken by consumers or other parties.

Version History

Version	Date	Description	Revised by	Checked by
V1.0.0	2020-08-26	Initial version	Wang Peixu	

Table of Contents

1. Notices to the User	1
1.1 Calibration.....	1
1.2 Accuracy	1
1.3 Manual Update.....	1
1.4 Scope of Application	1
2. Quick Start Guide	1
2.1 Steps to Start	1
3. Product Introduction	2
3.1 Camera (View from the front)	2
3.2 Buttons (View from the rear)	3
3.3 Connector and Memory Card	4
3.4 User Interface.....	4
4. Operation Instruction.....	5
4.1 Charging.....	5
4.1.1 Charge with a Power Adapter.....	5
4.1.2 Charge with a Computer.....	5
4.1.3 Charge with a Charging Base	5
4.2 Power On/Off.....	6
4.3 Take Photos/Videos	6
4.4 View Photos/Videos	6
4.5 Measurement Mode	7
4.6 Measurement Parameters.....	7
4.7 Palettes	8
4.8 Image Mode	8

4.8.1 Image Mode Introduction	8
4.8.2 Setting Steps	9
4.9 Non-uniformity Correction.....	9
4.9.1 Non-uniformity Correction Introduction.....	9
4.9.2 Non-uniformity Correction Operations	9
4.10 Contrast Adjustment	9
4.11 Other Settings.....	9
4.11.1 Date and Time.....	10
4.11.2 Languages	10
4.11.3 Units of Measurement.....	10
4.11.4 Temperature Gear	10
4.11.5 High/ Low Temperature Alarm	10
4.11.6 Display Brightness.....	11
4.11.7 Automatic Power-off	11
4.11.8 System Settings.....	11
4.11.9 Dual-spectrum Registration.....	11
5. Structural Drawings	12
6. Important Notices	12
7. Support and Service.....	13
7.1 Technical Supports	13
7.2 After-sales Services	13
8. Company Information.....	13

1. Notices to the User

1.1 Calibration

We recommend that you conduct calibration once a year.

1.2 Accuracy

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

1.3 Manual Update

The user manual will be updated from time to time. Please contact our company to get the latest version.

1.4 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.

2. Quick Start Guide

2.1 Steps to Start

Please follow the below steps to start the device.

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 of the same name with suffixes of jpg and irg together with the data. The file with the suffix irg contains data related to temperature. If lost, normal analysis cannot be carried out.

6. Analysis by APP

Download and install the APP on the mobile device and run the APP. Connect the mobile device to the hotspot of the product after setting hotspot on through the WiFi interface of the thermal camera, and import the data for further analysis.

3.Product Introduction

3.1 Camera (View from the front)

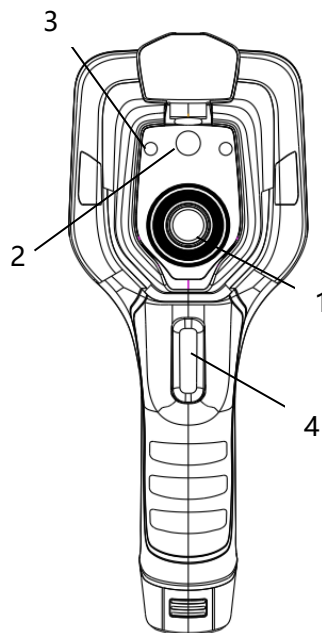


Figure3.1 Introduction to Camera Components

Components

1. IR lens

2. Digital camera
3. Laser pointer
4. Photo trigger

3.2 Buttons (View from the rear)

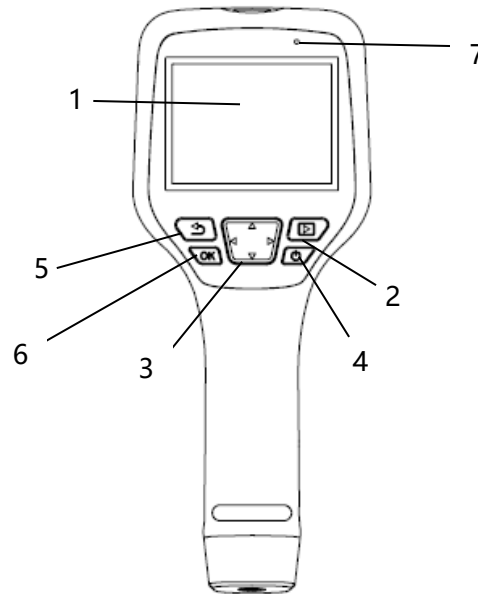


Figure3.2 Introduction to Buttons

Components

1. Display screen
2. Gallery button

Press to open the gallery. Long press to perform image uniformity correction.

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 it is on, click to turn on/off the laser pointer.

5. Back button

Click to cancel the operation or return to the previous one. 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 shooting.

3.3 Connector and Memory Card

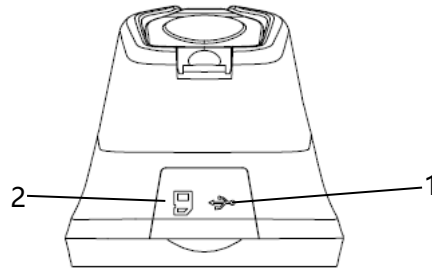


Figure3.3 Illustration of Connector and Memory Card

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.
- The SD card can be taken out and transfer data to PC or other devices with a card reader.

3.4 User Interface

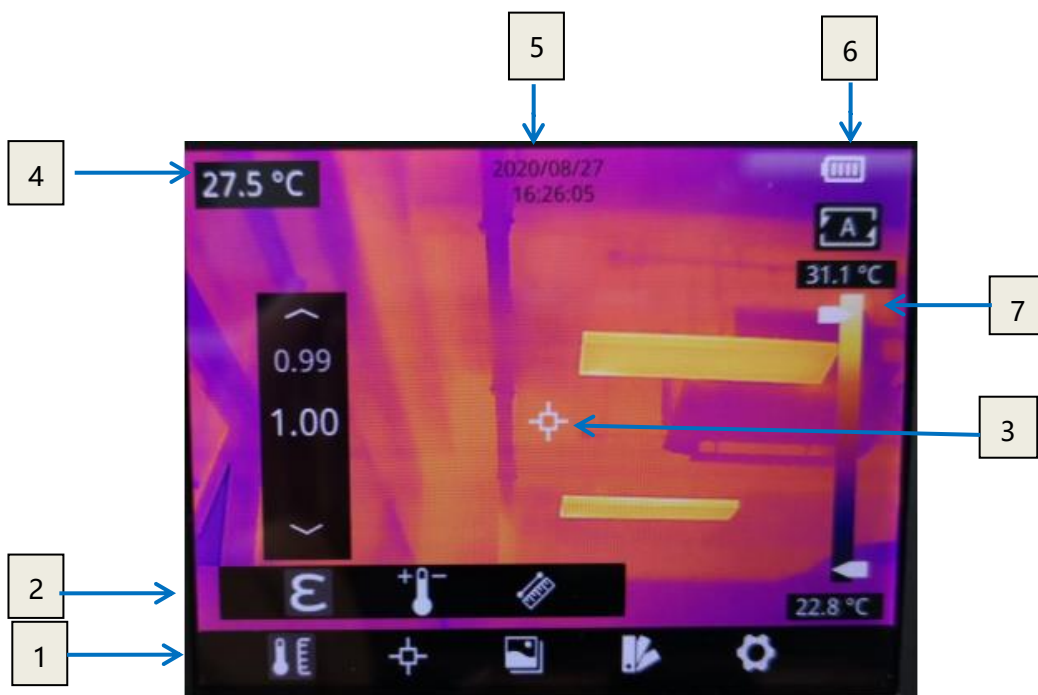


Figure3.4 User Interface

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, customize spot, customize line, customize area 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.

4.Operation Instruction

4.1 Charging

4.1.1 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.

4.1.2 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.

4.1.3 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.

4.2 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.

4.3 Take Photos/Videos

1. In the observation interface, adjust the 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.

4.4 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 photo gallery 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 picture 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 picture 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.

4.5 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.

4.6 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.*

4.7 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.

4.8 Image Mode

4.8.1 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.

4.8.2 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. The option is saved.

4.9 Non-uniformity Correction

4.9.1 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.

4.9.2 Non-uniformity Correction Operations

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

4.10 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.

4.11 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.

4.11.1 Date and Time

4.11.2 Languages

- Simplified Chinese
- English

4.11.3 Units of Measurement

- Temperature unit: switchable among Celsius, Fahrenheit, and Kelvin
- Distance unit: switchable between meters and feet

4.11.4 Temperature Gear

- Automatic switching: automatically switching gain, if the temperature of more than 15% of the spots in the field of view exceeds 140°C, it will automatically switch to the 0~550°C gear; If the temperature of more than 95% of the spots in the field of view is below 120°C, it will automatically switch to -20~550°C gear.
- -20~150°C: the image details are better in this gear, and the maximum temperature measured is 150°C.
- 0~550°C: the image details are slightly worse in this gear, and the maximum temperature measured is 550°C.

4.11.5 High/ Low Temperature Alarm

- High temperature alarm switch: click to turn on or off the function of high temperature alarm.
- Temperature setting for high temperature alarm: click on the pop-up keyboard and set the alarm temperature.
- Low temperature alarm switch: click to turn on or off the function of low temperature alarm. Function.

- Temperature setting for low temperature alarm: click on the pop-up keyboard and set the alarm temperature.

4.11.6 Display Brightness

- High brightness: click to set the screen brightness as high brightness.
- Medium brightness: click to set the screen brightness as medium brightness.
- Low brightness: click to set the screen brightness as low brightness.

4.11.7 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.

4.11.8 System Settings

- Device information: click to check model, version, SD card capacity and SD card remaining capacity.
- Restore factory settings: click and then press OK to restore the settings to the factory settings.
- Formatting the SD card: click and then press OK to format the SD card as FAT32.
- WiFi Settings: click to enter the WiFi setting interface. Turn on the hotspot switch and set the network name and password. Click OK to save the settings.

Note: 1) This function needs to be worked with a dedicated app. After turning on the hotspot switch, you need to manually connect to the hotspot set above. After connecting, you can transfer the saved pictures or videos to the mobile device for secondary analysis. 2) Please keep the hotspot off when not using WIFI, otherwise the power consumption will be high.

4.11.9 Dual-spectrum Registration

- Dual-spectrum Fusion Registration

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

- 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.

5.Structural Drawings

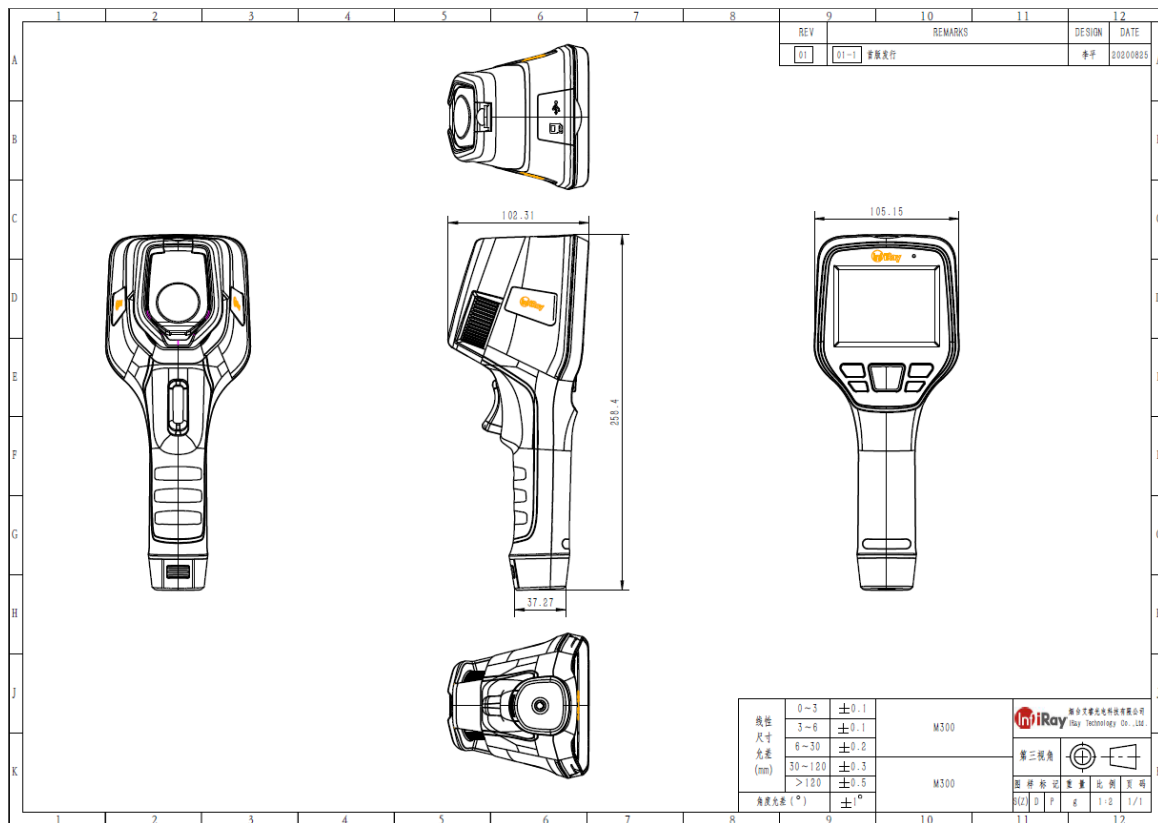


Figure5.1 Structural Drawings

6.Important Notices

To avoid damage to others and yourself, or your device, please read all the below information carefully prior to using this device.

1. Please do not point to the Sun and other high-intensity radiation source directly.

2. Ideal working temperature is $-10^{\circ}\text{C} \sim 50^{\circ}\text{C}$.
3. Do not touch the lens with your hands or other things.
4. Do not touch the device with wet hands.
5. Do not wipe and clean your device with diluent.
6. Please do not wrongly connect the attached cables to avoid damage to the device.
7. Please take care to avoid static electricity.
8. Please do not disassemble the device. If there is any problem, please contact our company for professional maintenance.

7.Support and Service

7.1 Technical Supports

System training can be carried out for users' technical staff and operators.

7.2 After-sales Services

TianXuan M series handheld thermal cameras, developed by our company, are guaranteed of good after-sales service for device maintenance and repair. If you have any request, please contact us.

8.Company Information

Yantai IRay Technology Co., Ltd.

Website: www.iraytek.com

Tel: 86-0535-3410623

Fax: 86-0535-3410610

Mail: sales@iraytek.com

Add: 11th Guiyang Street, YEDA, Yantai, Shandong Province, P.R. China.

FCC Warning

§ 15.19 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.

§ 15.21 Information to user.

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

§ 15.105 Information to the user.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Specific Absorption Rate (SAR) information:

This **device** meets the government's requirements for exposure to radio waves. The guidelines are based on standards that were developed by independent scientific organizations through periodic and thorough evaluation of scientific studies. The standards include a substantial safety margin designed to assure the safety of all persons regardless of age or health.

Body Operation

This device was tested for typical body-support operations. To comply with RF exposure requirements, a minimum separation distance of **0.5 cm** must be maintained between the user's body and the device, 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.