User Manual

RadTarge-Mini

RAYCAN | Pioneer of All-Digital Positron Emission Tomography & Radiation Detection

I Product introduction

RadTarge-Mini is a compact, robust and high performance radiation detection system. It interfaces via Bluetooth to mobile devices such as phones and tablets running the RadMay mobile App. Together RadTarge-Mini and RadMay offer a high performance, versatile and low cost radiation detection and dosimetry solution which addresses a very wide range of applications and use cases.

RadTarge-Mini detects ionizing radiation by means of a scintillator and a high performance photo detector. The readout of the photo detector signals is realized through our patented MVT or Multi Voltage Threshold technique. This puts RadTarge-Mini performance in a class of its own. Its detection sensitivity is up to 20 times higher than that of traditional Geiger-Müller or film based systems. A low energy threshold of 20 keV helps reliably detect radiation sources commonly encountered in industry and medical imaging. A maximum count rate of 2 million counts/second serves to cover worst case scenarios in high radiation environments.

The RadMay mobile App and cloud service is a flexible and intuitive tool to view, save and manage dose and dosimetric data received from RadTarge-Mini. The user can configure alarm thresholds, accumulate dosimetric data, map and visualize the radiation environment using GPS geo-location. All data is safely stored to the RAYCloud which offers a wide range of review and analysis functions.

II Product Features

Compact
Delicate Appearance

High Sensitivity
Fast Response

Bluetooth 4.0 Wireless
Communication

Built-In Memory
Data Never Lost

Time, Dose, Location.
Three-in-one
Measurement

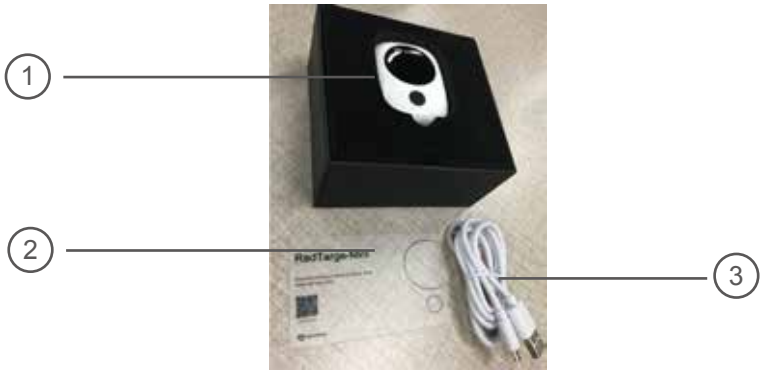
Cloud-Based
Data Storage

Lifetime Personal
Dosage Management

Global Dose Distribution
and Movement Track Log

III Product Display

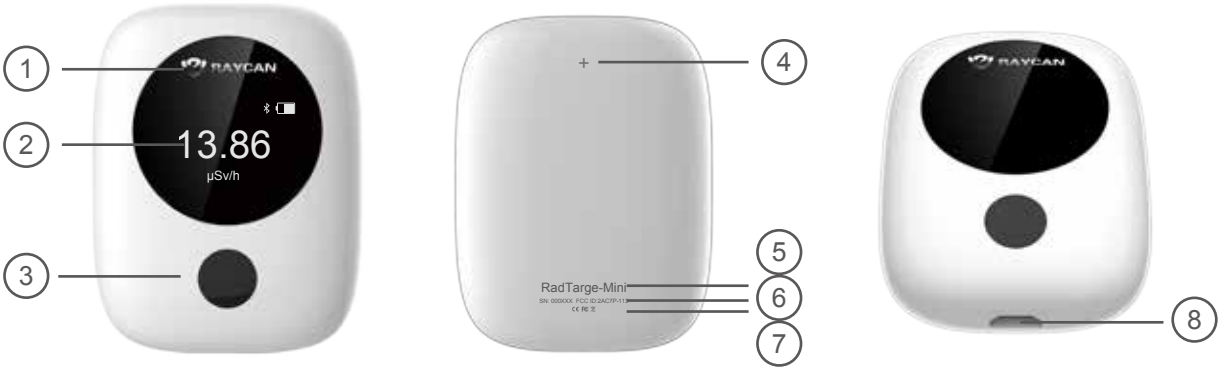
1.Package Diagram



①------RadTarge-Mini ②------User Manual Mini Card

③------Data Cable

2.Product Diagram



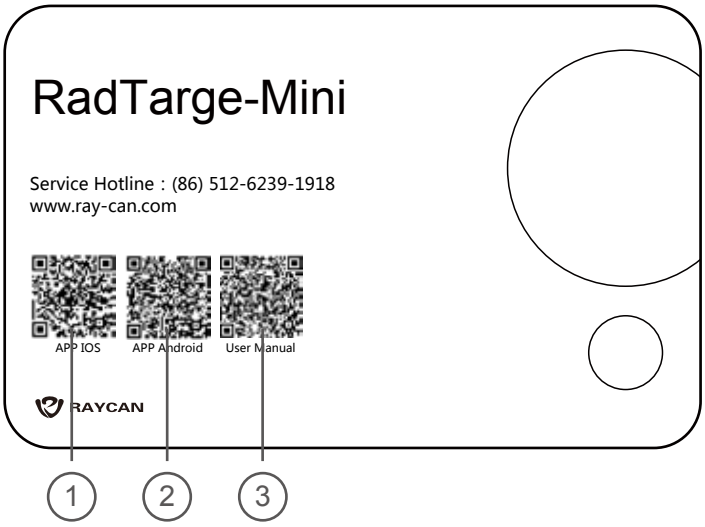
①------Company Logo ⑤------RadTarge-mini Product Name (RadTarge-Mini)

②------Display Screen ⑥------Product Serial Number

③------Operation Button ⑦------FCC & CE Certification

④------Detector Location Mark ⑧------MicroUSB Port

3.Mini Card Diagram



RadTarge-Mini App RadMay

Scan to download

① iOS RadMay Download Code

② Android RadMay Download Code

③ User Manual Download Code

Note:

Visit http://ray-can.com/contact to download. Scan the user manual QR code to enter the user manual website.

IV Operation Manual

1.Device Operation Instructions

1.1 Powering On

Press the operation button for 4 seconds until the screen lights up,accompanied by a beep and vibration. Automatically enters the main interface/dose equivalent rate interface 3 seconds after the machine starts.

Dose rate page

Dose page

1.2 Switch Interface

Press the operation button to switch between Dose Equivalent Rate Interface and Cumulative Dose Interface.

Dose rate page

Dose page

1.3 Powering Off

Press the operation button for 2 seconds to power off the device. The device will vibrate when it is successfully turned off.

1.4 Bluetooth

When the device is connected to RadMay via Bluetooth, the Bluetooth icon will appear at the upper left of the display. Please refer to the RadMay operation manual for connection instructions. An exclamation mark (!) signifies Bluetooth connection problems; please contact the manufacturer for help.

Bluetooth disconnected　　Bluetooth connected　　Bluetooth error

1.5 Charging and Battery

Device enters charging mode when a MicroUSB cable is connected.

When powered on, upper right screen will display a charging animation. When the battery is full, the charging animation stops.

Charge in turn on mode

When powered off, a battery icon is displayed in the middle of the screen with a charging animation. When the battery is full, the charging animation stops.

Charge in turn off mode

When the device is not charged, the battery icon shows the remaining battery life.

	Full
	Partially charged
	Battery low
	No battery, please charge

When the device is low battery, it will notice users to charge and then turn off.

Low battery

1.6 Reset

Users can reset the device via RadMay. After clicking the reset key, the device will take three actions: restore settings, format file system and restart. After restarting, all settings and data will be restored to default settings.

Default settings

Format

Restart

1.7 Overload

When the dose rate passes the dose rate measurement range, the device will enter overload mode, and the screen will display "overload". When the dose rate is back in range, the device will recover in 5 seconds.

过载界面

2. Specifications

Radiological

Detector	YSO(Ce) scintillator + SiPM
Type of Radiation Detected	Gamma; X-ray
Energy Range	30 keV–3 MeV
Dose Rate Range	1 µrem/h–10rem/h (0.01 µSv/h–100mSv/h)
Integrated Dose Range	1 µrem–999 rem (0.01 µSv–9.99 Sv)
Sensitivity	110 cps/mrem/h (11 cps/µSv/h) (∝ Cs-137)
Energy Response	≤ ±30% (∝ Cs-137) @ 30 keV–1.5 MeV
Dose Rate Linearity	≤ 20% up to 10 rem/h (100 mSv/h)
Accuracy	±20% (∝ Cs-137)
Alarm Threshold	User-set values for dose rate: 100 µrem/h–10 rem/h (1 µSv/h–100mSv/h)
Alert Options	Audible (80 dB at 12 in / 30 cm)、Visual (LED and display)、Vibrating
Alarm Response Time	< 8 s
Overload Display	Activation when > 5 rem/h (50 mSv/h)

Electrical and Mechanical

Communications	Bluetooth
Ergonomics	Front facing tilted screen
Power Supply	Rechargeable lithium-ion battery
Battery Life	Typically 120 h in background field
Display	OLED
Dimensions	2.4 x 1.8 x 0.8 in (60 x 46 x 20 mm)
Weight	2.1 oz (60 g)
Accessories	MicroUSB cable
Initialization Time	< 2 s

Environmental

Operating Temperature	32–122 °F (0–50 °C)
Storage/Transport Temperature	-4–158 °F (-20–70 °C)
Relative Humidity	≤ 90% (non-condensing)
IP Rating	TBD

Certification

EMI/EMC Compliance	Exceeds IEC 61526 requirements
FCC	FCC certification
CE	CE certification
FCC ID	2AC7P-113

3. Radiation Detection Features

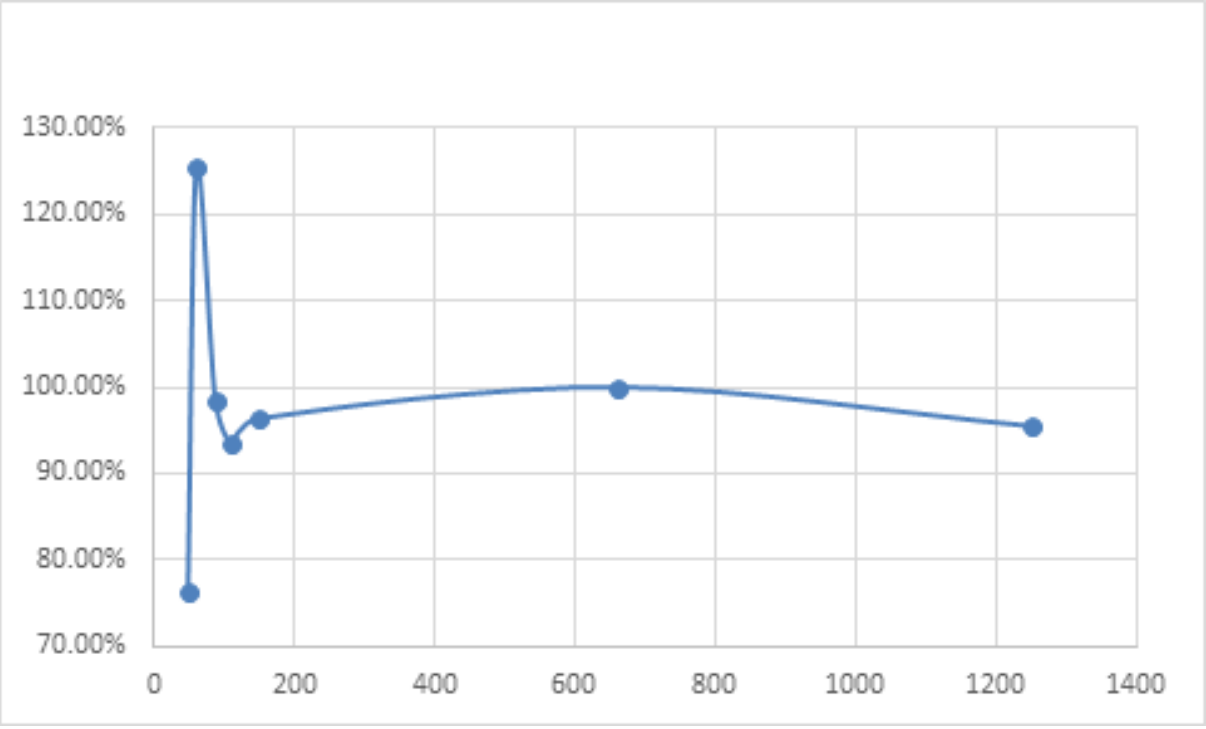
3.1 Detector and Radiation

RadTarge-Mini uses a YSO scintillation crystal coupled with SiPM as the detector to measure gamma and X-rays. It can measure dose equivalent rate and cumulative dose.

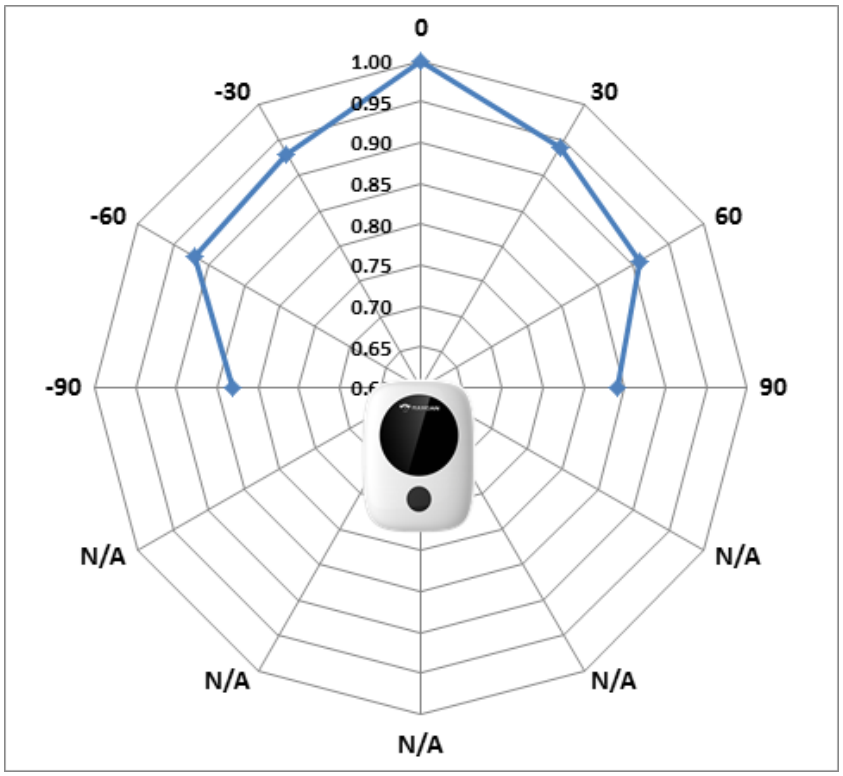
3.2 Dose Display

The device can display real-time dose equivalent rate and cumulative dose. Users can switch the units between international standard units and traditional units through the RadMay app.

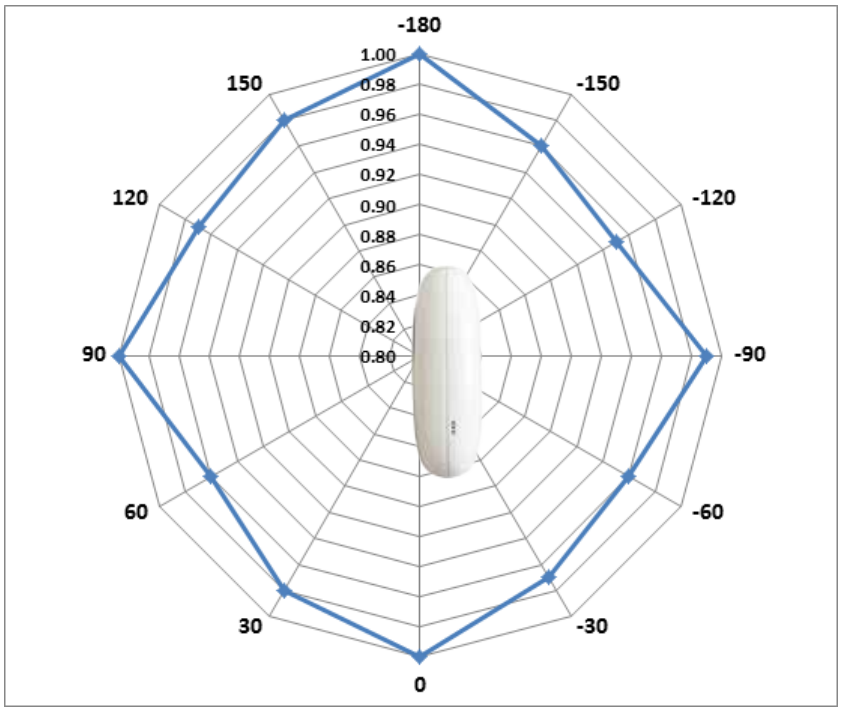
3.3 Gamma and X-Ray Detection Features.



Energy Response Curve



Angular Response



Angular Response

3.4 Alarm Modes

According to the American National Standard for Dosimetry, ANSI HPS N13.11 Personnel Dosimetry Performance - Criteria for Testing, the device should have at least one alarm mode on. RadTarge-Mini supports three alarm modes: audible, vibrating, and audible & vibrating. Users can set the alarm mode via RadMay. The alarm response time is less than 8 seconds when the radiation level passes 10 μSv/h from the background radiation level. Users can set the alarm threshold within the measurement ranges:

· 1μSv/h Real-time dose rate pre-alarm threshold, suggested value: 1 μSv/h
· 10μSv/h Real-time dose rate alarm threshold, suggested value: 10 μSv/h
· 1mSv Cumulative pre-alarm threshold, suggested value: 1 mSv
· 10mSv Cumulative alarm threshold, suggested value: 10 mSv
· Pre-alarm frequency is 1 time/second, alarm frequency is 2 times/second.

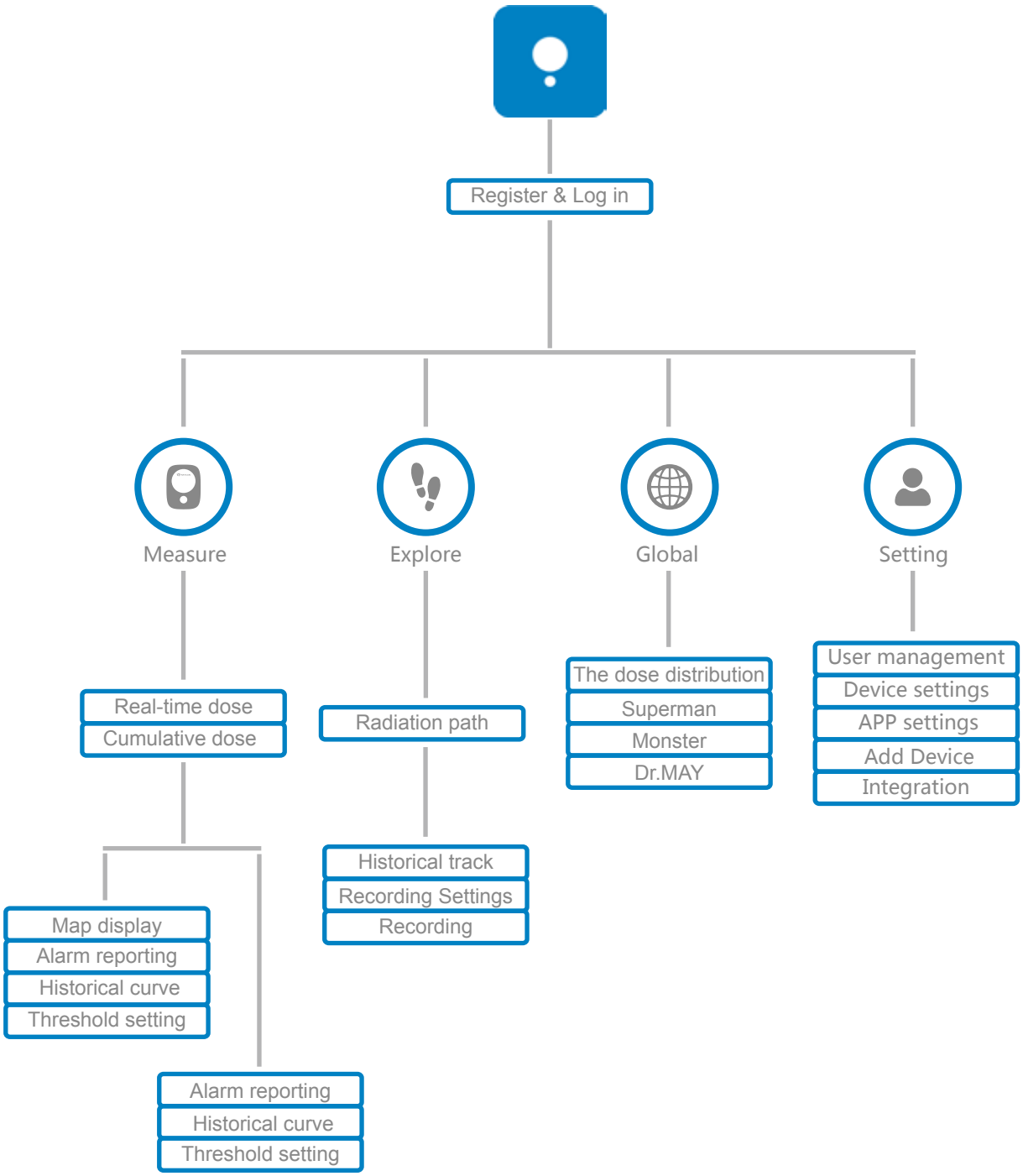
3.5 Data Transfer and Storage

Data Transfer: Built-in Bluetooth 4.0 module transfers data to RadMay to manage dosage data.
Data Storage: Built-in flash storage can store cumulative dose for 1 year and real-time dose alarm events for 1 month.

V RadMay Application

RadMay is a mobile app designed to manage dosage data from RadTarge-Mini. Additionally, using data from the smartphone's GPS, RadMay can establish the global radiation distribution and personal lifetime dosage log by recording, summarizing and analyzing radiation data.

1. RadMay Structure



2. Term Definition

Real-Time Dosage (Dose Equivalent Rate)：

Represents the health effects of ionizing radiation on the human body per unit of time. In the SI system of units, the unit of measure is μSv/h or mSv/h. 1 Sv/h = 1000 mSv/h，1 mSv/h = 10 00 μSv/h

Cumulative Dose：

1000μSv；Represents the health effects of ionizing radiation on the human body over a period of time. In the Si system of units, the unit of measure is μSv or mSv.

Lifetime Cumulative Dose：

Lifetime cumulative dose is the cumulative dose since the user registered his or her account.

Periodic Cumulative Dose:

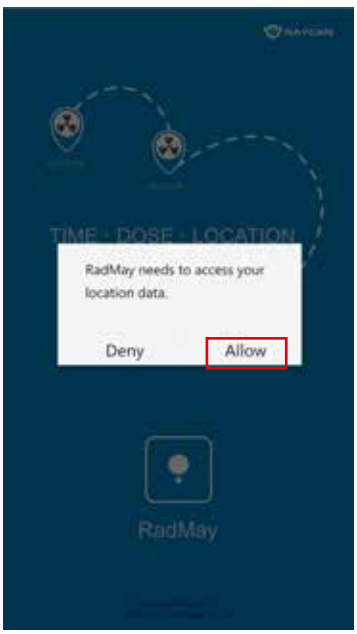
The cumulative dose from the time point defined by the user to now. Users can compare this value to standard annual cumulative dose.

Custom Periodic Dose:

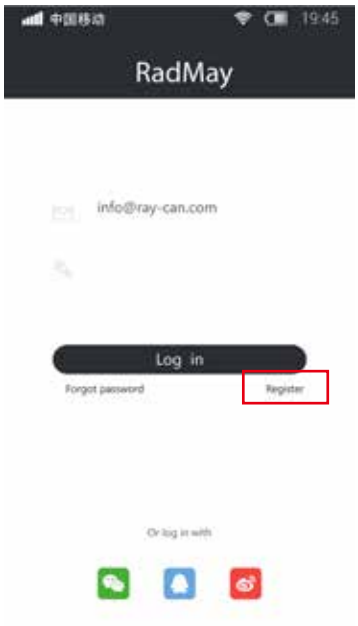
The cumulative dose between the start and stop time points defined by the user.

3. Registration

Open RadMay. The login/registration screen will automatically appear. RadMay will ask permission to access location data; press "allow" so RadMay can provide time, location and dosage data.



Click "Register" to enter the registration page and fill out the form. Press "Click to get verification code" to retrieve and enter the verification code to finish registration. Enter the verification code sent to your e-mail to complete registering.



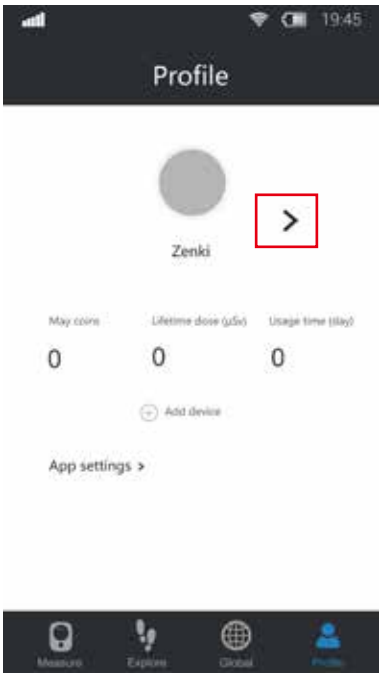
4. Log in

Click "Forgot password" to reset password.

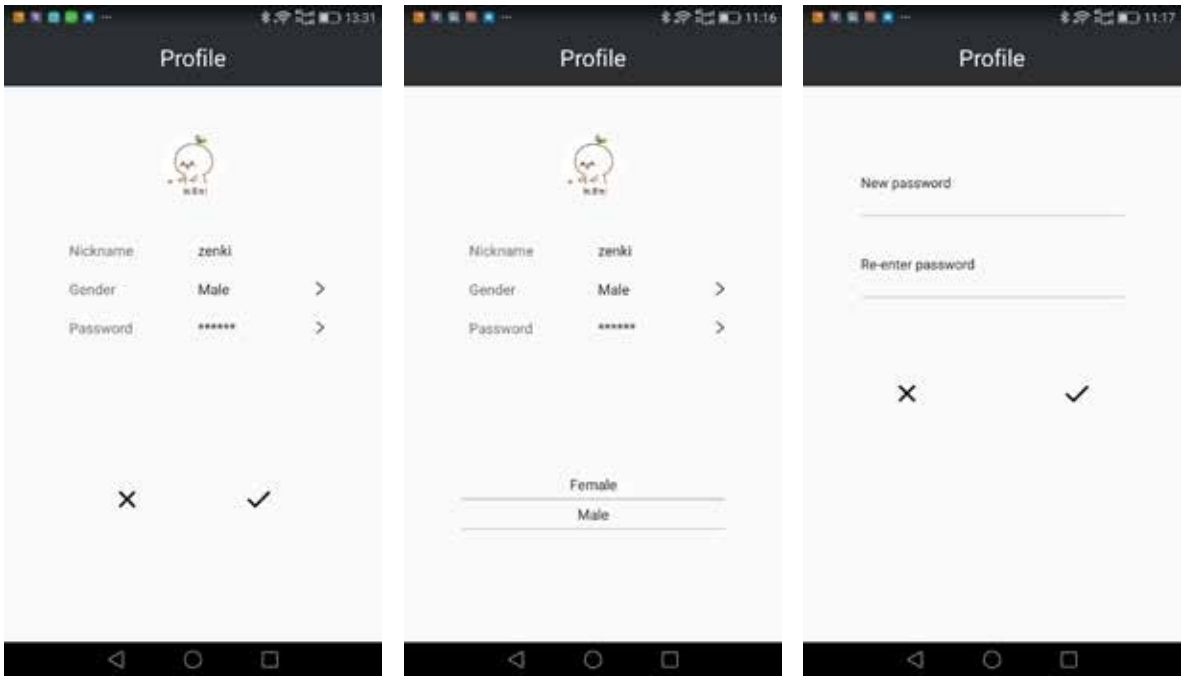
5. Edit Profile

After login, click the "Profile" to edit your profile.

Click ">" to enter the Personal Info page, and click edit to modify personal information.

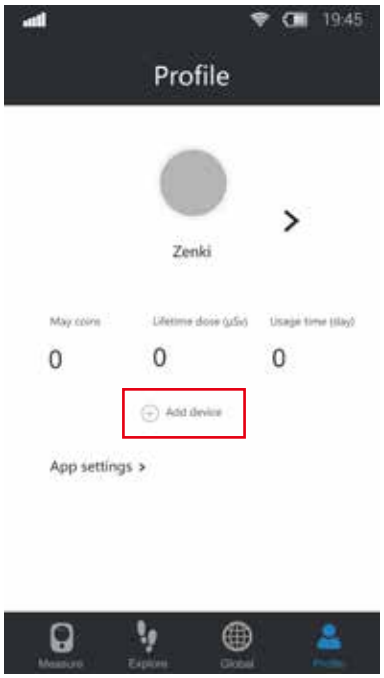


In the Personal Info page, users can edit their nickname, gender, and password. Press“X”to cancel or “√”to save changes and return to the Profile page.



6. Device Connection

RadMay can help users manage their lifetime dosage. One account is tied to one RadTarge-Mini. New users need to pair their device to start their radiation detection journey. If the user needs to change his or her device, unpair the old device before pairing a new device. The data for the old device is still stored in the old account. Turn on Bluetooth, enter the Profile page, click "Add Device," place the device near the phone, and choose the device. The name for the device should be RadTargeMini SN: XXXXXX. XXXXXX is the six-digit serial number on the back of the device. Once the device is connected successfully, the message "Connected successfully" will appaer. RadMay will connect to this device automatically when logging in next time.


19:45
Profile
Zenki
0
0
0
Add device
App settings >


19:45
Link Device
Searching for devices. Place device near your phone.
Linking

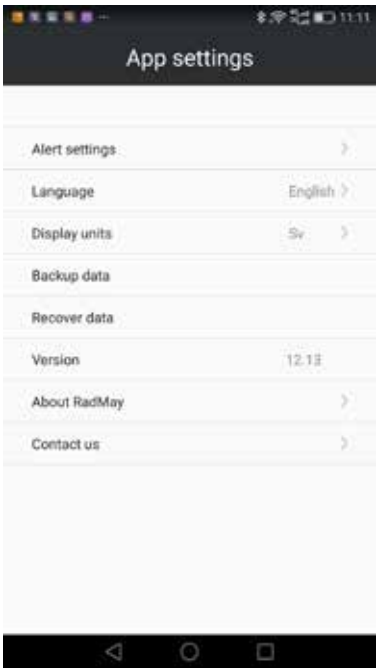

19:45
Link Device
Searching for devices. Place device near your phone.
My device
RadTargeMini SN : 000564
RadTargeMini SN : 000962
RadTargeMini SN : 000695
RadTargeMini SN : 000564
RadTargeMini SN : 000465

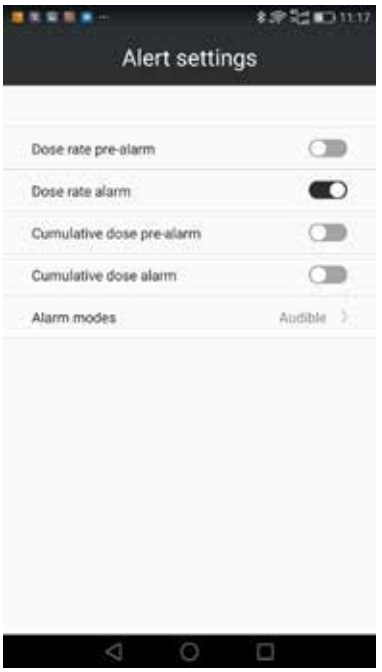

19:45
Link Device
Searching for devices. Place device near your phone.
13.86
Connected successfully

7. App Settings

In the Profile page, click "App Settings" to enter the app settings page. Functions include "Alert settings," "Language," "Display units," "Back up data," "Recover data," "Version," "About RadMay," and "Contact us."

"Alert settings" include "Dose rate pre-alarm," "Dose rate alarm,""Cumulative dose pre-alarm," and "Cumulative dose alarm." "Alarm modes" include Audible, Vibrating,and Audible & Vibrating."Dose rate alarm,""Cumulative dose pre-alarm," and "Cumulative dose alarm." "Alarm modes" include Audible, Vibrating, and Audible & Vibrating.





Language: English, Chinese
Display unit: Sv, rem；
Back up data: Back up data to server
Recover data: Recover data from server
Version: Check RadMay version
About RadMay: Brief introduction to RadMay
Contact us: Manufacturer contact information

8. Device Settings

Click device name on "Profile" to enter "Device Settings" page.

[Link device]: When on, RadMay will automatically link the device to transfer data.

[Energy saver]: When on, the device display will turn off after 10 seconds of inactivity. Recommended function.

[Sync data]: When on, will automatically sync device data to local storage

[Alert settings]: Change the alarm modes of RadTarge-Mini.

[Clear dose]: Reset lifetime cumulative dose to 0. This operation will not clear device data history; please use carefully.

[Unpair device]: Unpair device from app.

[Sync time]: Sync the device time with phone time, GMT.

[Update firmware]: Update RadTarge-Mini firmware.

[Default settings]: Reset settings to default.

9. Measurement

Measurement is the basic

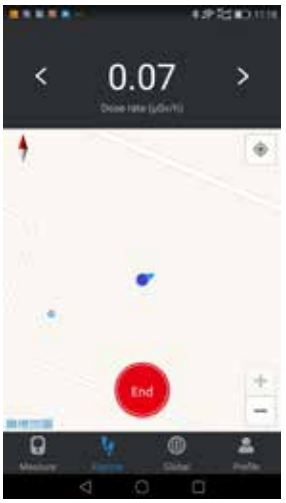
function module of RadMay. It can display and process RadTarge-Mini's dose rate and cumulative dose simultaneously.

10. Explore

By using the phone's GPS function, RadMay can record the trajectory of radiation, including time, location and dosage.

Users can adjust measurement frequency by changing the distance and time parameters. Explore module uses Google Maps and Gaode Maps.

All track logs are stored in the cloud server. Users can review their history and share their data to social media.



11. Global

Users can check the global radiation distribution via the RayCloud data platform.
[Superman]: Rank based on points, cumulative dose, highest real-time dose rate, and track distance.
[Monster]: National and global top 10 realtimedose rate loactions.
[Dr. May]: Radiation related info.

12. May coins

Users can earn May coins by sharing dose rate, cumulative dose and track logs. Please click "Earn May coins" to learn the rules to earning May coins; click "Spend May coins" to contact us to redeem gifts.

13. Problems

13.1 Cannot pair device to app

Check if both the device and the Bluetooth function on your smartphone are turned on. Place the device as close as possible to phone.

13.2 Real-time dose rate doesn't update

Check if the device is linked to the app. If the device works normally, log out of the app and log in again.

13.3 Device/phone does not alarm

Check if the radiation level has already passed the pre-alarm or alarm threshold. If passed, please check if the audible and vibrating functions on device and phone are "on".

Version modification record

Version	Release Date	Note
V1.0		

§ 15.19 Labelling 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.

* RF warning for Portable device: The device can be used in portable exposure condition without restriction.

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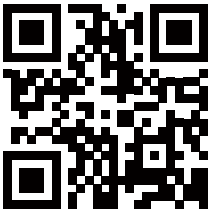

 Edition number : L-2-000002