KUSAM-MECO®



Acoustic Imager-MiniCAM

User Manual

KM-PDAI

Warranty and Service

Thank you for choosing the **KUSAM-MECO** Acoustic Imager, and we hope that our equipment will be well suited to help you solve the problem of locating target faults.

When you encounter any questions or malfunctions of the instrument in the field use, please contact us in time, we will provide you with the most professional answers and services.

The equipment has been calibrated at the factory, and during long time use, we suggest you contact us every 2 years to have the equipment calibrated for testing and maintenance.

Please read this manual carefully before operating the instrument. When the instrument malfunctions, please do not dismantle the machine privately to avoid expanding the malfunction, please contact us immediately for maintenance.

Document Version: 2024.07.25

This user manual is applicable to the following versions.

Software Version:240530.19743.19689

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I. Introduction

1.1 Device use

This product is a handheld acoustic imager that uses 128 microphone arrays to form a very accurate acoustic image through beamforming technology and works with a high-definition camera to capture video footage in real time. By fusing the sound source distribution data with the video image, it dynamically presents the changing sound sources on the display. Users can accurately know where the sound comes from and separate the observed sound source from the background noise.

The product can locate sound sources that are inaudible to the human ear, and the frequency range extends to ultrasonic frequencies, so as to precisely locate on-site problems through ultrasonic waves.

This product can help you quickly detect possible pressurized gas leaks and vacuum leaks in noisy industrial sites; applied to power systems, it can help you quickly identify potential partial discharge fault points.

The whole machine adopts aluminum alloy shell, which is sturdy and durable, and can adapt to the complex and changing working environment. The operation of the equipment is simple and convenient, quick to start, only need to adjust the test frequency range, sensitivity dynamic range and other parameters to meet most of the test requirements.

Support photo mode, video mode, flexible recording of data at the scene of operation; support high-capacity TF data storage card, test results quickly exported, reported.

When the device is turned on, the heat sink (see below) will become hot. Please be careful when touching it; prolonged touching may cause burns.

Protect the camera lens and microphone array from any foreign objects, dust or liquid.

1.2 Specification

Size: 246*150*46mm

Weight: 1250g

Protection grade: IP5X

Temperature: -20°C~ 50°C

Humidity: 10% ~ 95%

Charging temperature: 0°C ~50°C

Power Supply

Battery capacity: 3450mAh (can be used for 5 hours, depending on environmental conditions)

Rated voltage: 14.4V

Charging power: 16W

Battery: replaceable Li-ion battery, support PD fast charging

Infrared module*optional

Parameters: resolution 640*512, band 8~14μm, NETD 25mK

Display

Display: 7”, brightness adjustable

Input: capacitive touch screen

Power on indicator: green LED

Graphics resolution: 1280x800

Video frame rate: 25fps

Optics

Camera pixels: 8 megapixels

Camera Viewing Angle: 62°* 48°

Camera focal length: fixed focal length 3.04mm

Acoustical

Microphone: 128-channel MEMS digital microphone

Bandwidth:2kHz ~ 55kHz, expandable

Acoustic image viewing angle: 62°

Sound pressure range: 30dB ~ 120dB;

Communication & Storage

Internal storage: 8G, for emergency storage only

External Storage: Expandable TF card, support 64G storage space

USB port: USB 3.0 Type-C

Headphone jack: 3.5m

1.3 Packing list

No.	Item	Quantity
1	Product Mainframe	1
2	Infrared module (optional)	1
3	Hand Strap	1
4	Shoulder Strap	1
5	Charging Stand	1
6	Charger	1
7	DC to Type-C adapter cable	1
8	64G TF card	1
9	Battery	2
10	Headphones	1
11	Card Reader	1
12	Protective Case	1
13	Certificate of Conformity	1
14	Instruction manual	1
15	Factory inspection report	1

* **NOTE:** Use only the accessories supplied by **KUSAM-MECO** and use only the spare parts supplied by **KUSAM-MECO**!

II. Usage

2.1 Battery charging

Make sure all parts are in good condition before each use. The battery is low due to storage and transportation. To ensure a long battery life, please fully charge the battery before first use.

Please charge the power supply of the device through the standard power adapter and the smart seat charger in the device box. The maximum charging current is not more than 2.4A.

1) The charging indicator light is always on after plugging in the charger, indicating that it is charging; the charging indicator light is off, indicating that it is fully charged; please make sure to charge the device in the state of powering off the device.

2) When the battery is fully charged, the device shows 4 cells of power, which can be used for about 6 hours; 3 cells of power can be used for about 4 to 4.5 hours; 2 cells of power can be used for about 2.5 to 3 hours; 1 cell of power can be used for about 1 to 1.5 hours.

3) The device will indicate that the battery is too low when the device is low, please charge the device in time.

Suggestions for use:

①Do not charge the device for more than 24 hours.

②Please charge the battery regularly if it is not used for a long time.

③It is recommended to store the device under the temperature condition of -20°C- +40°C.

* **Caution:**

- Do not place the device near heat sources, flames, or use it in a hot environment.
- Do not leave the unit in the sun for long periods of time or use the unit for long periods of time in the sun.
- Do not disassemble the device without authorization.
- Do not charge the device in a high temperature environment (over 45°C).
- Please stop using the device if it is malfunctioning or abnormal.
- Please contact the manufacturer to take care of the equipment maintenance work.

2.2 Installation of batteries

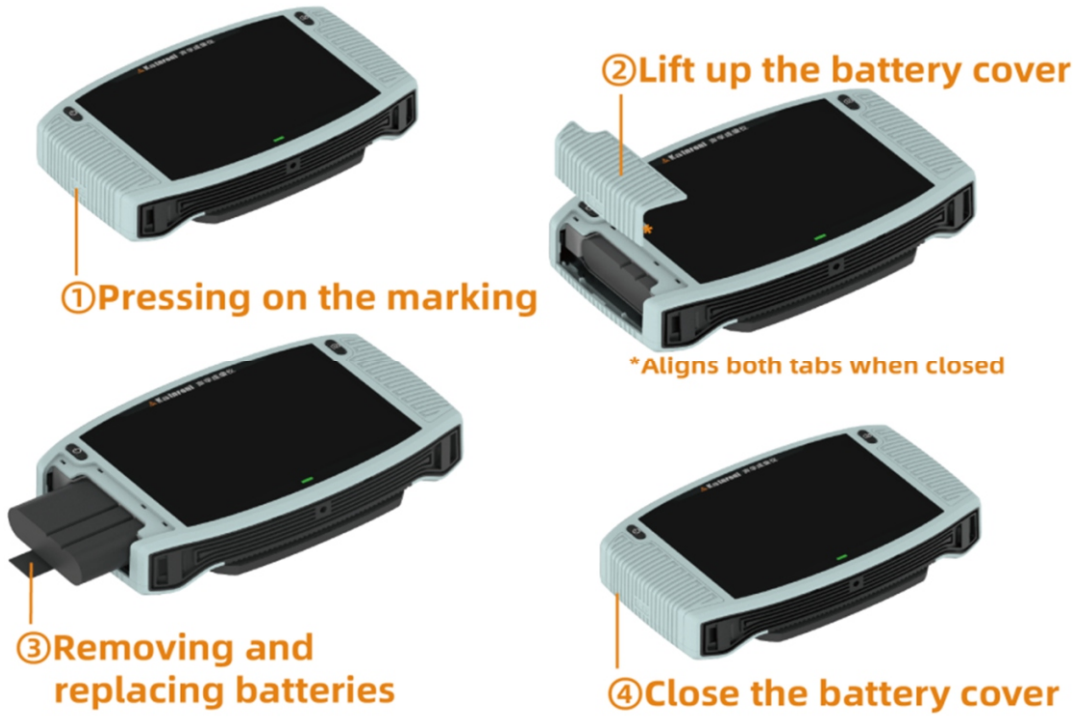


Figure 1 Battery installation

①Press the left side of the battery cover at the marking while lifting up the battery cover.

②Push in or pull out the battery.

③Close the battery cover, note that there are tabs on the inside of the cover at the front and back, align the tabs before inserting.

2.3 Device components

2.3.1 Front view

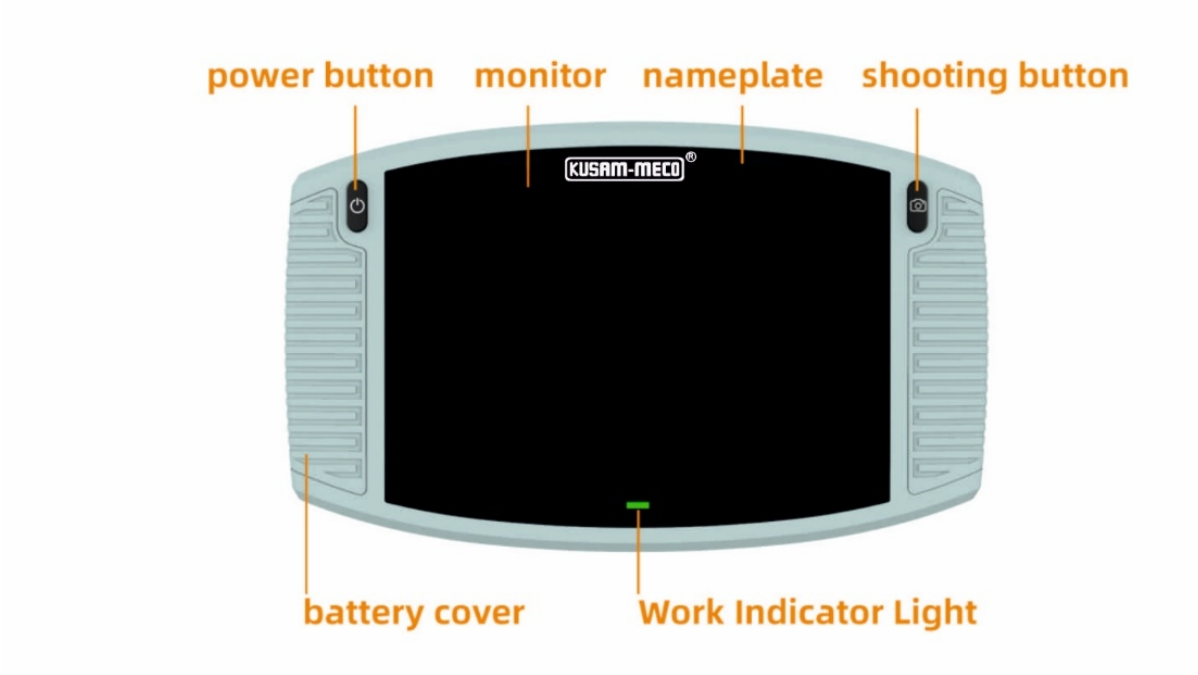


Figure 2 Front view

Power button

Power on: short press

Shutdown: short press to bring up "Cancel" and "Shutdown" buttons, click the shutdown button to shutdown

Forced shutdown: long press for 3 seconds to force shutdown

Shooting button

Photo mode: short press

Video mode: Long press to start recording, short press again to end recording

Work indicator light

Running: green light

Charging: red light (power off), yellow light (power on)

Fully charged: blue light(power off), green light (power on)

2.3.2 Top view

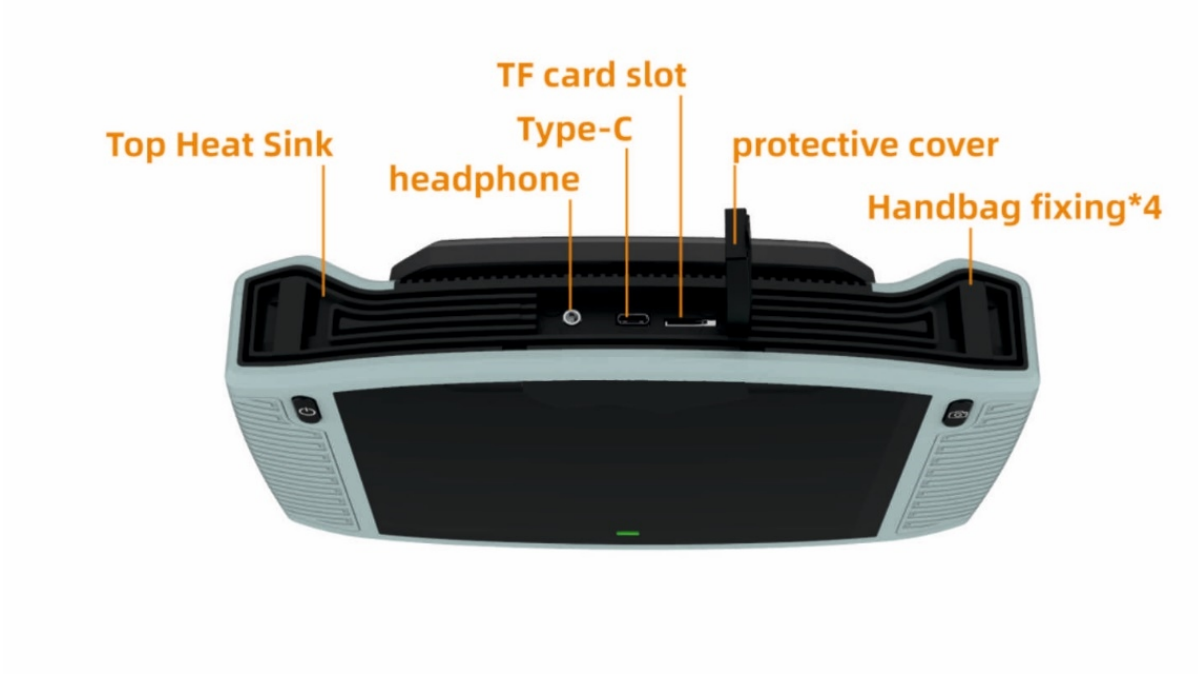


Figure 3 Top view

Top heat sink

*** Note:** The heat sink will become hot when the device is in use, please be careful when touching it, long-term touching may cause burns!

Interface protective cover

It can be pivoted from the left side and the user accesses the memory card or external IR module.

Hand strap holder

Total 4 for securing hand straps.

TF card slot

Insert a TF card to store pictures videos and other files.

Type C interface

USB 3.0, support PD fast charging, user charging or data transfer, support infrared imaging module access.

Headphone jack

The sound signal of the measured sound source can be monitored by connecting headphones.

2.3.3 Bottom view



Figure 4 Bottom view

Bottom heat sink

*** Note:** The heat sink will become hot when the device is in use, please be careful when touching it, long-term touching may cause burns!

1/4 inch threaded connector

For attaching a tripod or other stationary table.

2.3.4 Back view

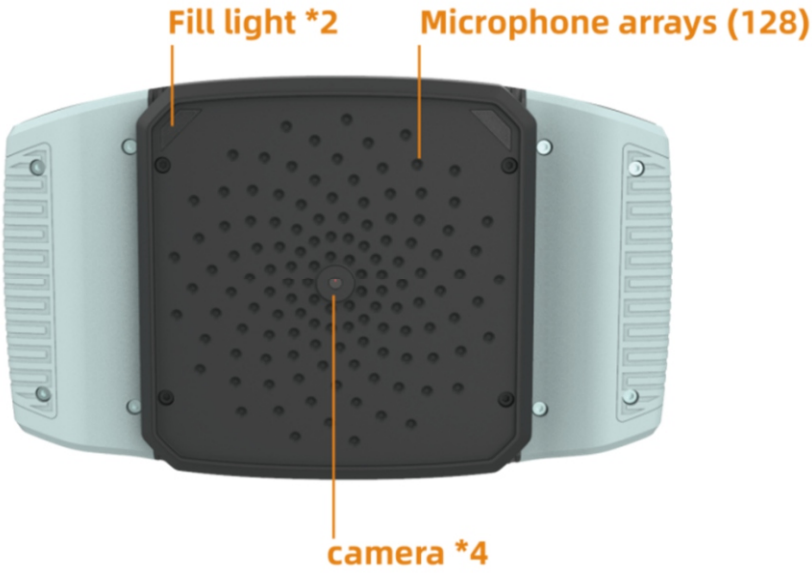


Figure 5 Back view

Fill light

Used for night photography to enhance brightness for clearer images.

Camera

8 megapixel high-definition camera for observing visible light images of the inspected objects.

Microphone array

128 microphone arrays for receiving sound signals.

III. User interface

3.1 Main interface

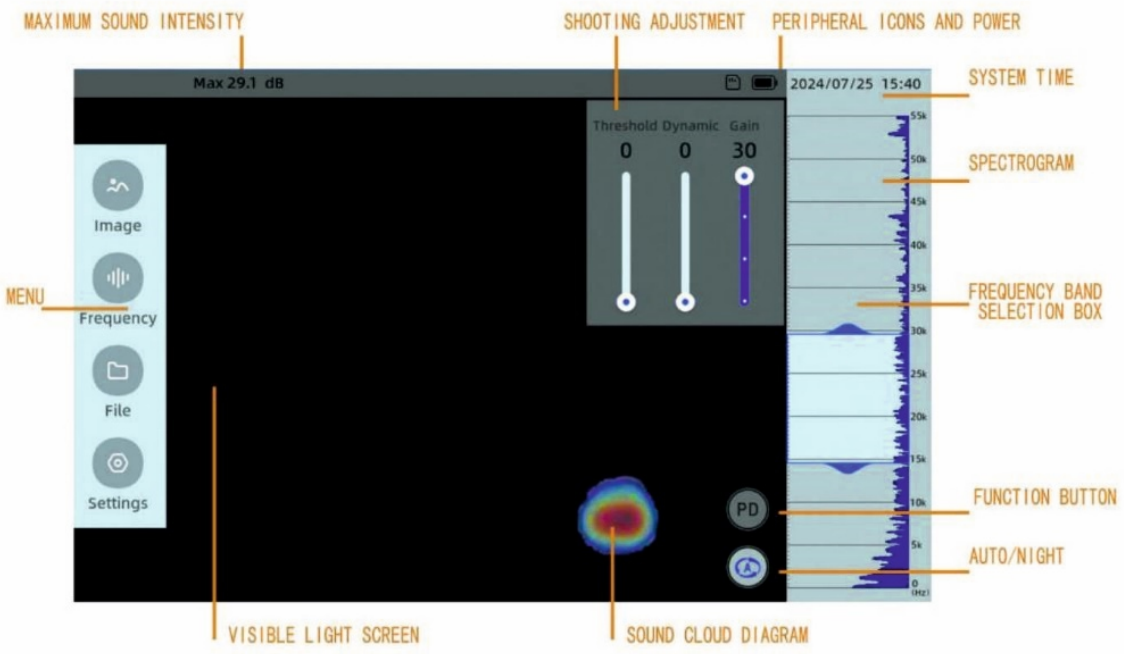


Figure 6 Main interface

Sound cloud diagram

Color pictures that form the sound intensity in palette colors.

Menu

Includes screen, band, file, and settings.

Picture frame

Camera shots are displayed on the screen in real time.

Menu hide

Only the sonogram and spectrogram are displayed when clicked.

Photo/Video

Default photo mode, tap to switch.

Spectrogram

Displays the sound intensity information within the full frequency

range of the received sound signal, and the user can determine in which frequency range the sound source signal is based on the spectrogram.

Frequency band selection box

The target sound source signal is generally within a certain frequency range, and choosing the appropriate frequency range helps to localize this sound source, while excluding the interference of sound source signals in other frequency bands.

Shooting adjustment

Thresholds:Used to set the minimum signal value.

Dynamic:Used to adjust the size of the display area of the acoustic image

Gain:For enhanced detection of acoustic signals

Peripheral icons and power level

The peripheral icons include IR module, U disk, TF card, headphones, etc. The power icon shows the current remaining battery power. (When the battery is fully charged, the device displays 4 cells of power for about 4 hours of use.)

Maximum sound intensity

The sound intensity value at the center point is the sound intensity value at the center of the picture, and the highest sound intensity value is the sound intensity value at the sound source point.

Fill light switch

Click to turn on the fill light.

System Time

Displays the current year, month, day, hour and minute information.

3.2 Infrared imaging

***NOTE:** The functions in this section require an optional infrared module.

3.2.1 Infrared module installation



Figure 7 Infrared module installation diagram

The lens of infrared module faces outward, and the Type C port is inserted into the device. The infrared icon pops up in the status bar at the top of the main interface of the device, indicating that the connection is successful.

The Acoustic IR co-screen display button appears in the lower right corner, click on it to enter the co-screen display.

3.2.2 Infrared imaging interface

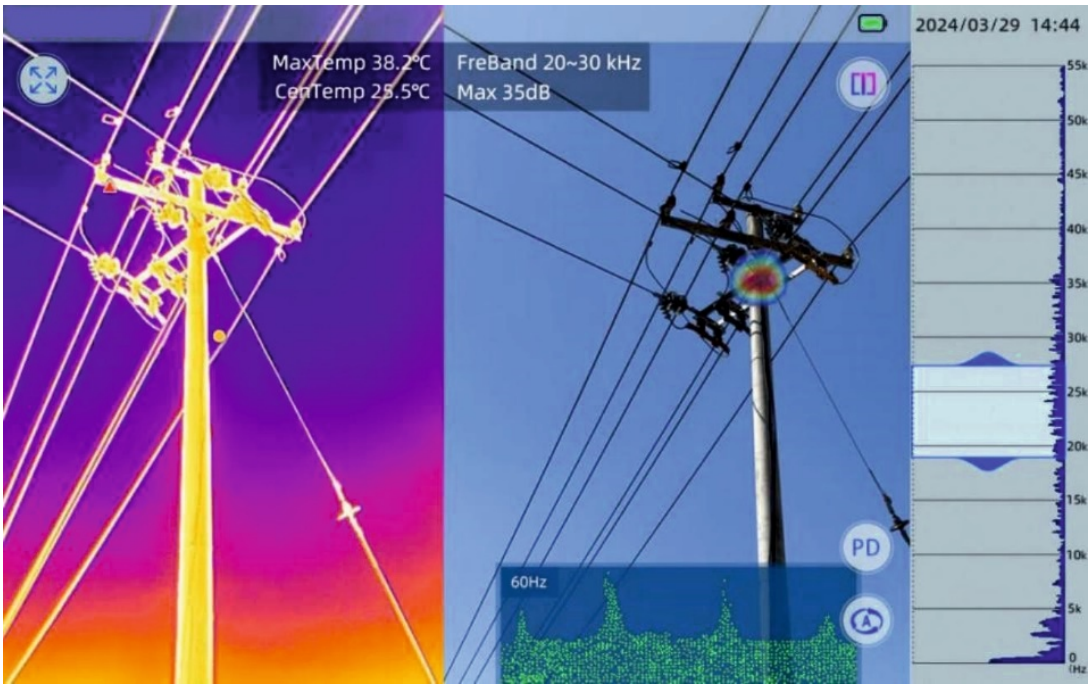


Figure 8 simultaneous screening interface

This screen opens when the infrared imaging module is plugged into the main device.

Upper left button

Click to enter IR mode.

Upper right button

Click to return to acoustic mode.

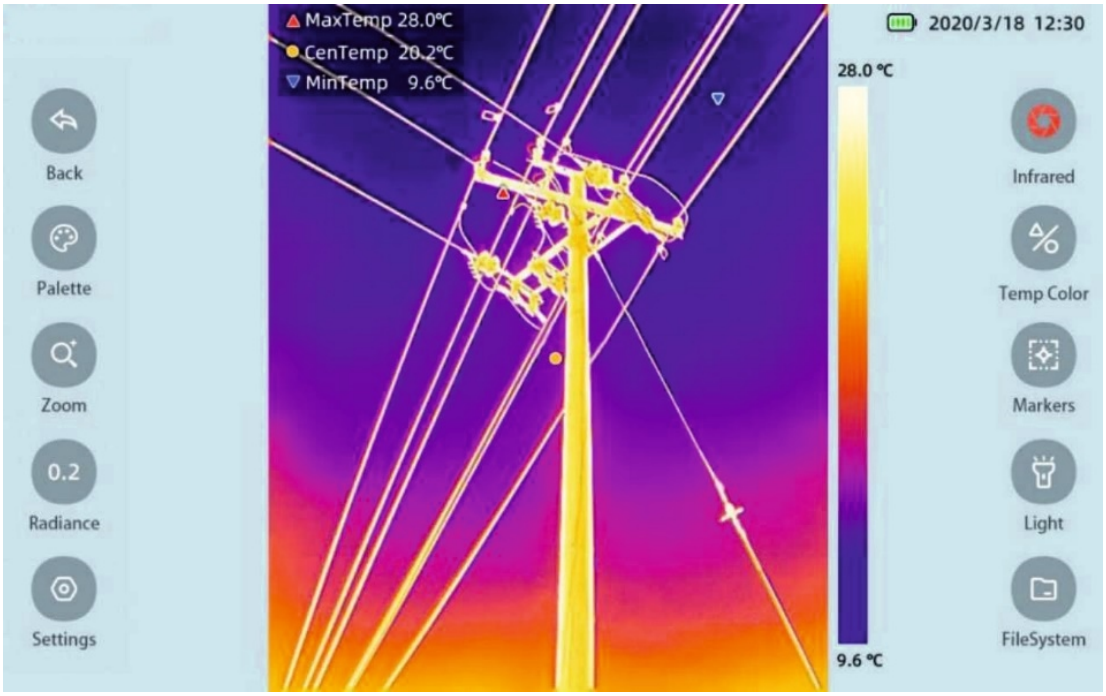


Figure 9 Infrared imaging interface

3.3 Image

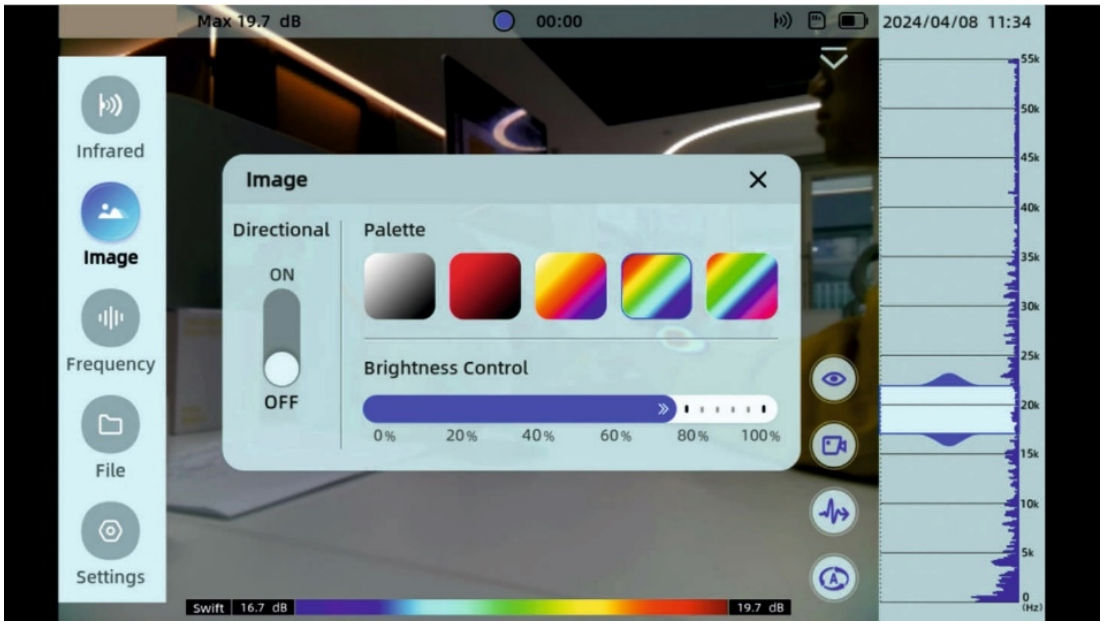


Figure 10 Screen setting screen

Directional recognition of sounds

Turn on the directional recognition function, a box will appear in the middle of the sound image display area, and sound source localization will search for the sound source point in the box area. The application scenario of this function is that there are multiple sound source points around the target to be measured, and you can shield the interference of the sound from other locations to only carry out acoustic monitoring of the needed places.

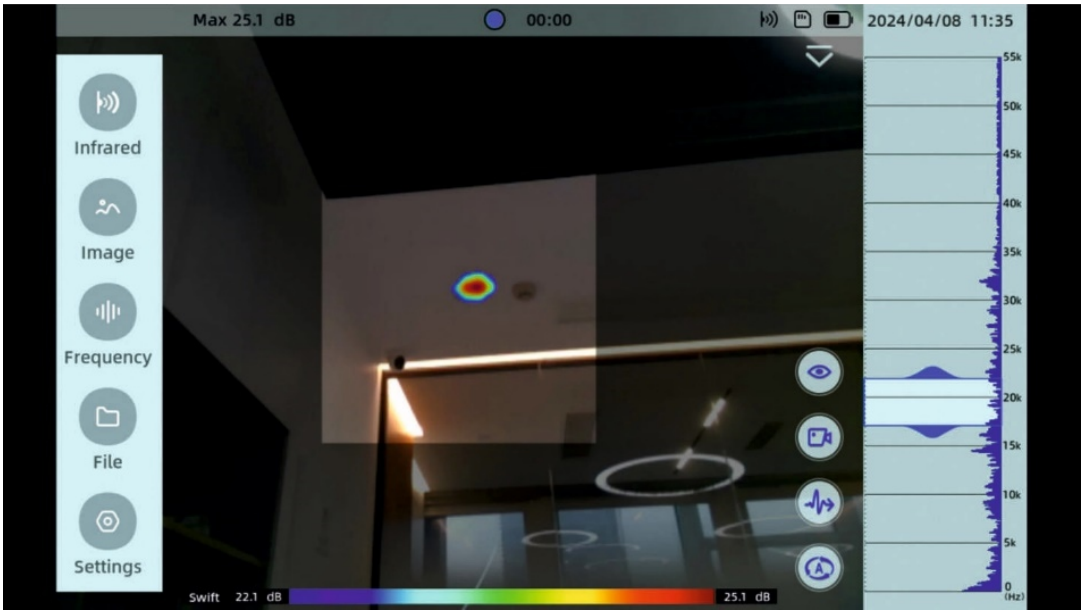


Figure 11 Directional sound recognition settings and interface

Color selection

The display colors of the sound cloud can be selected as desired, including black and white, black and red, iron red, blue and red, and rainbow.

Brightness adjustment

The brightness of the backlight of the screen can be adjusted appropriately according to the light conditions on site.

3.4 Bandwidth

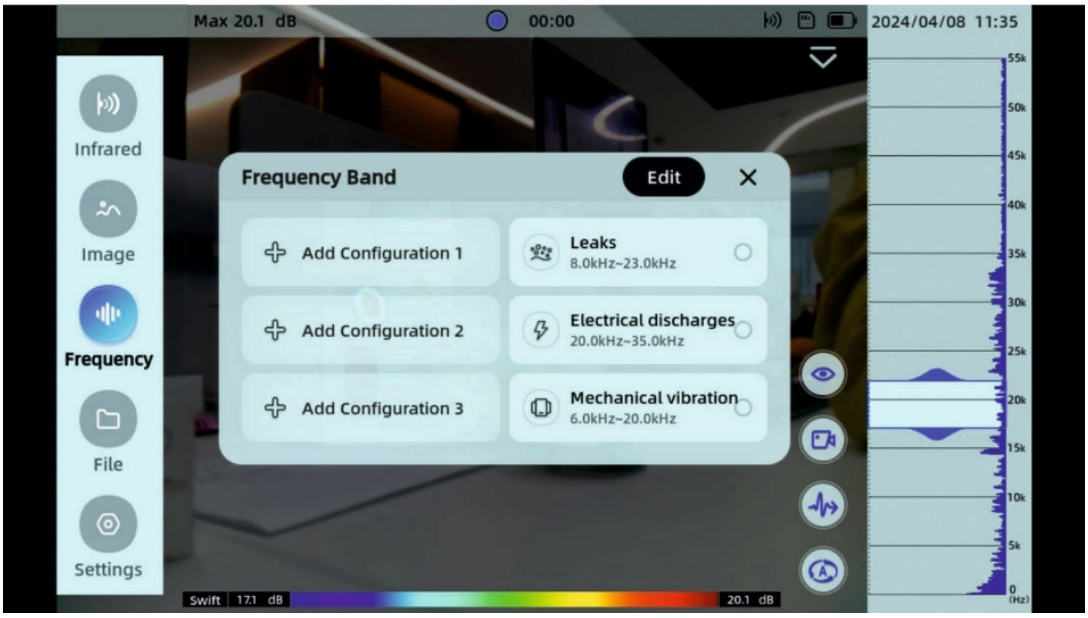


Figure 12 Frequency band preset interface

Bandwidth selection

The frequency band has been preset for three scenarios: "gas leakage", "electrical detection" and "mechanical vibration". According to different application scenarios, you can choose the appropriate frequency range. You can also customize the scene according to your own needs, this device provides three custom scene configuration. Click "Add Configuration Item" on the left side of the frequency band interface or "Edit" button on the upper right corner to open the parameter configuration interface.

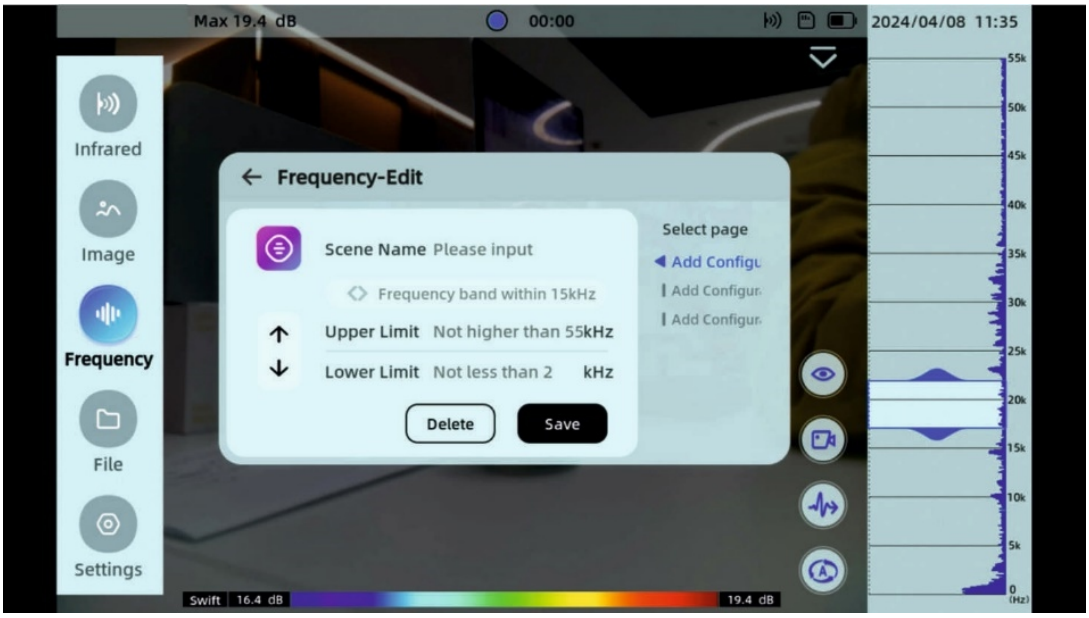


Figure 13 Frequency band preset settings

3.5 File

Folder level interface

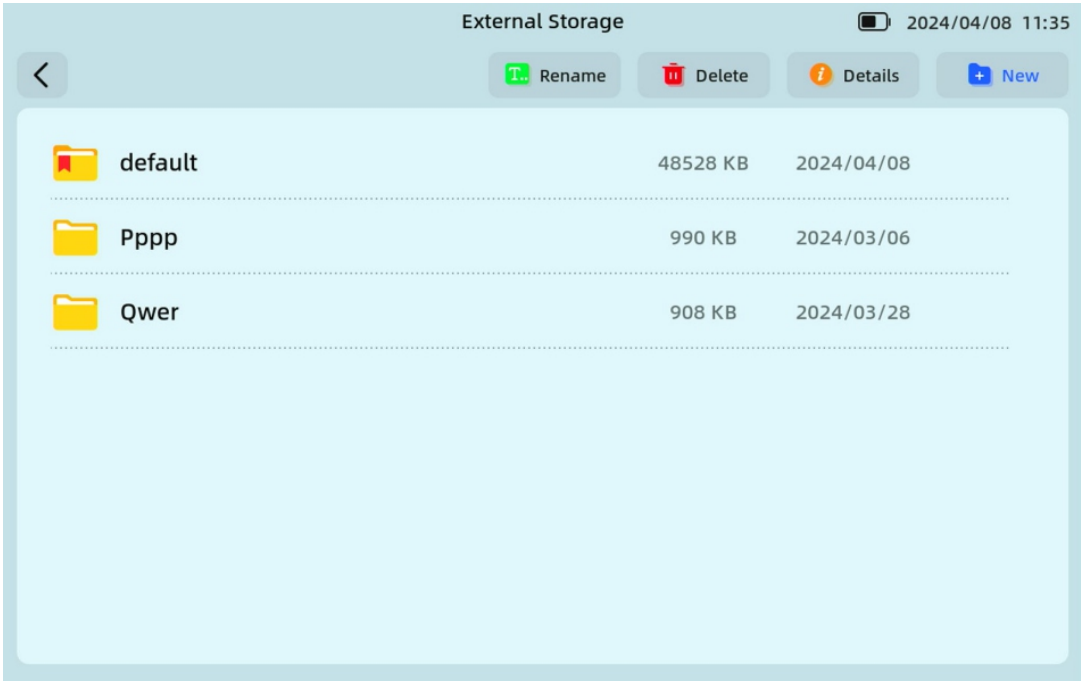


Figure 14 Folder level interface

Pictures and video can be viewed in "Files". Click the File button to open the

folder level interface. You can create, delete, rename and view details of the folder. By factory default, photo and video files are stored in the default folder. Users can click the folder to enter the secondary interface.

Folder secondary interface

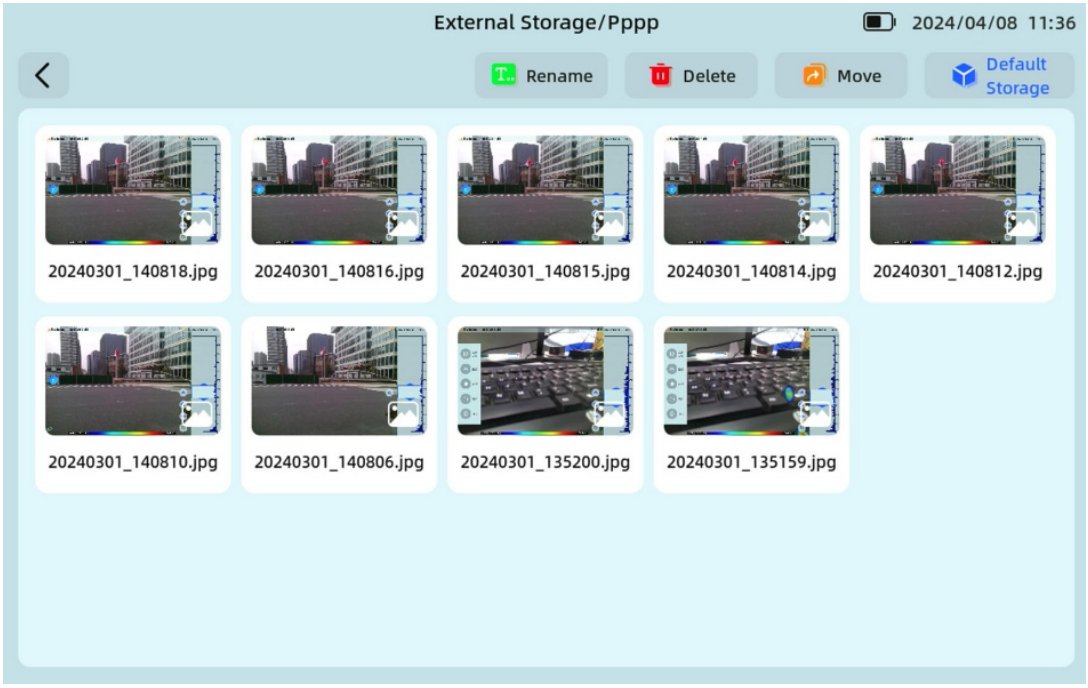


Figure 15 Folder secondary interface

You can preview pictures and videos in the secondary interface of the file, and click the "Set Default Storage" button in the upper right corner to set the folder as the default storage path for pictures and videos. At the same time, long press the preview image to select the image and video and move and delete them. Click the preview image to enter the file level 3 interface to view the image and video information.

Folder three-level interface



Figure 16 Folder three-level interface

The folder level 3 interface supports video play, pause and page flip functions, as well as text notes and deletion functions. Click "Add Note" button to open the text box for editing, and click “Save” button to save the text note information. Click "Text Note" to view the note information, can edit and delete the text note.

Text note



Figure 17 Picture text note

1) Click "Add Note" to open the text note box;
2) After entering the text information, click “Save” button to save the note

information;

3) Click "View Notes" button to open the text note information.

3.6 Set up

Date settings

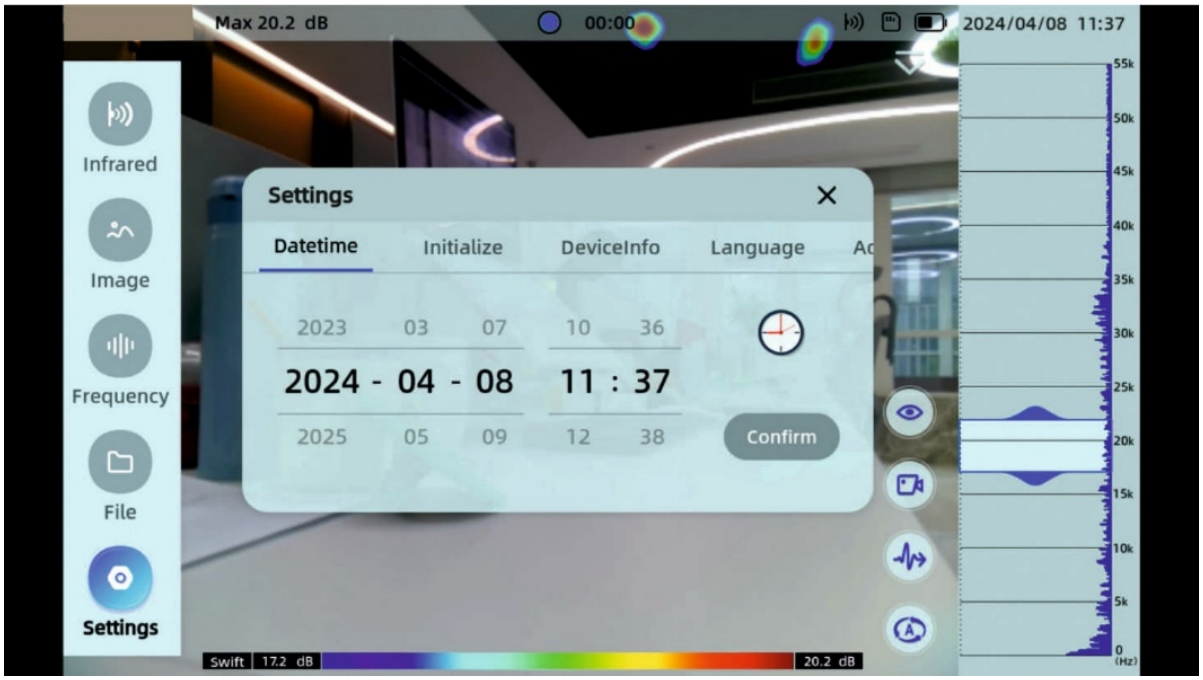


Figure 18 Date settings

The year, month, day, hour and second of the device can be changed.

Initialization settings

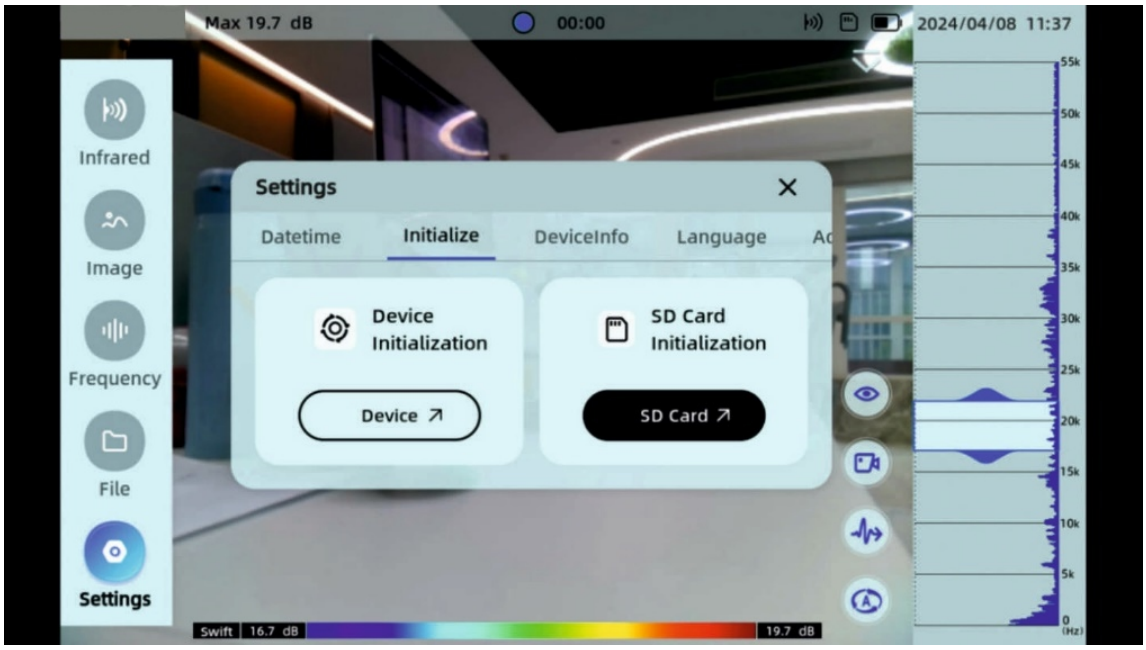


Figure 19 Initialization settings

Initialize the device and TF card, after clicking "Device Initialization", the system will start the initialization procedure to restore the system setting parameters and functions to the factory setting state.

Equipment information and updates

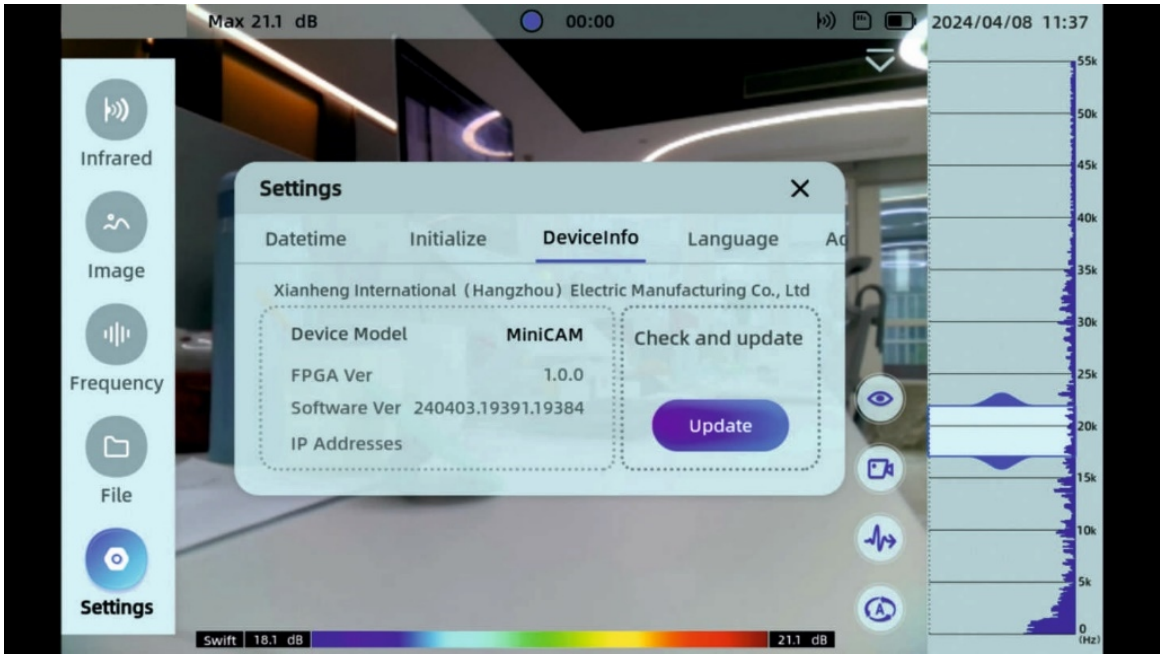


Figure 20 Equipment information and updates

Copy the installation package plug-in to TF and insert it into the device, click "Check and update", then the system will be automatically upgraded to the latest version of the software.

Language

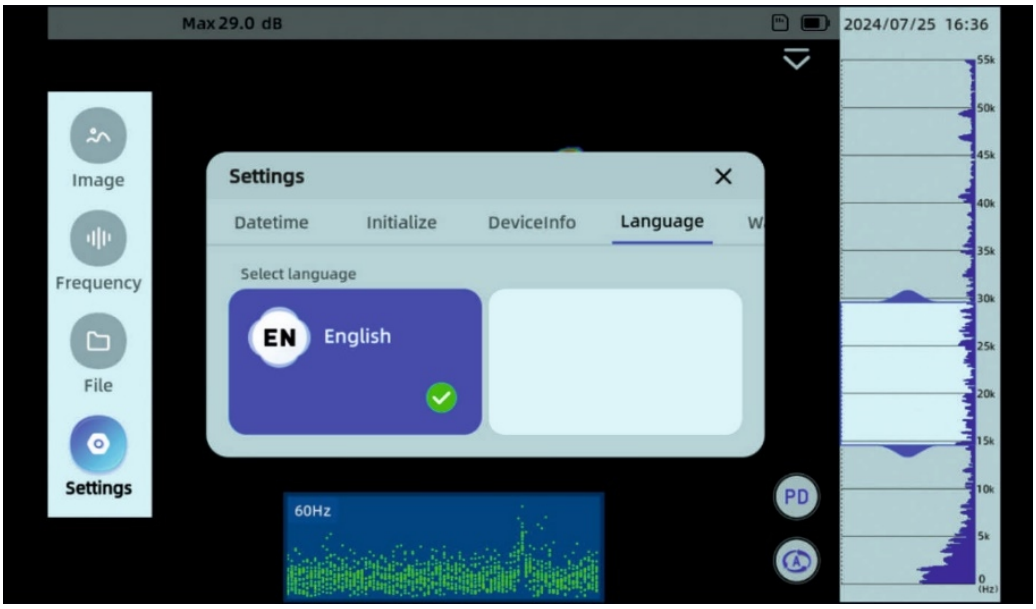


Figure 21 Language

Set English.

Photographic watermarks

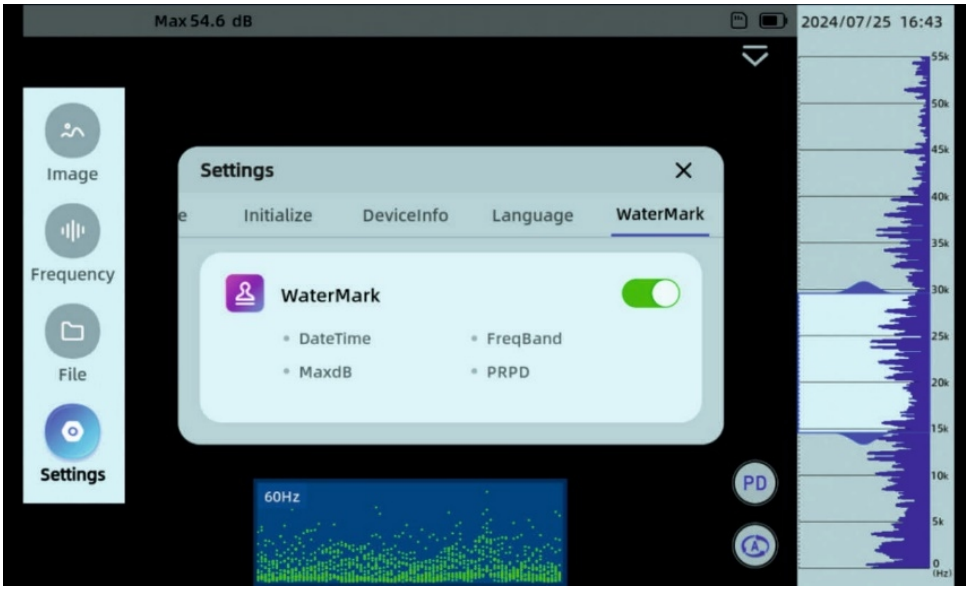


Figure 22 Photographic watermarks

Watermark in the upper left corner of the open shot photo.

IV. Tips for use

4.1 Capturing sound sources

Use of spectrograms

Observe whether a prominent spectral signal or spectral spike exists in the spectrogram. If present, move the band frame so that it contains the frequency range in which the prominent spectral signal or frequency spike is located, and then observe whether a sound source appears in the picture.

Dynamic range adjustment

Try adjusting the dynamic range to a relatively large value to capture multiple sources with similar sound pressure levels in the frame at the same time. A relatively small dynamic range parameter may result in large sources drowning out small ones when the sound pressure levels of multiple sources in the picture vary widely.

4.2 Eliminate interference

Reflection interference

When you are not sure whether the sound source in the picture is the actual sound source or the reflected false image of the sound source, can try to capture the sound source from different angles, if the sound source can be captured from multiple angles, then the sound source is generally the actual sound source location. The reflected false image of the sound source may drift or even disappear at different locations.

Noise interference

1) In low-frequency band is susceptible to environmental noise interference. According to the actual situation of the sound source, it is recommended to use middle and high frequency bands to capture the sound source location.

2) Can choose a relatively narrow frequency band range to locate the sound source, which can exclude the interference noise in other frequency bands.

4.3 Equipment maintenance

1) Keep the acoustic sensor port clean to prevent accumulation of dust; when there is dust in the port, please clean it by blowing air gently, and do not use any strong cleaner. Do not use running or dripping water or other liquids. Do not immerse any part of the device.

2) When the device is not used for a long period of time, put it into the supplied package after charging and store it in a dry environment at room temperature.

3) Regularly checking and replenishing device power can effectively extend the service life of the battery.

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