

DT-824S

Portable Non-linear Junction Detector



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Important Safety Instructions

- The device will emit electromagnetic waves when working, please do not put the detection surface for a long time, close to the human body.
- The input voltage range of the adapter is 100V~240V, out of range will destroy the charger.
- This device is a precision instrument, please do not disassemble it by yourself. Unless it is explicitly stated in the user manual that the user can open the detector casing by himself/herself, the operation should be carried out only by qualified service personnel. Do not drop it or subject it to physical impact. When using the detector, make sure that the cables are securely connected and avoid applying excessive tension to the cables.
- To ensure safety, do not place the device or the backup battery in fire or water. Failure to do so may result in overheating, fire, short circuit or explosion.
- Do not place the device in a place where the temperature is too high, such as in a car that is in direct sunlight with a temperature exceeding 70° . High temperatures may cause the device to malfunction.
- The device should be kept indoors, out of direct sunlight, when not in use. Storage of the device in dark rooms, laboratories, and other places with corrosive chemicals should be avoided.
- Do not touch the electronic contacts of the device with your fingers. To avoid corrosion of the contacts. Corroded contacts may cause the device to malfunction.
- Do not allow any conductive foreign objects to touch the charging connector and do not place any conductive foreign objects at the interface. This may cause a short circuit and result in fire or electric shock.

- The original charger and charging cable must be used for charging to ensure the safe use of the device and battery.
- Store in a dry and cool (temperature 10°C~25°C, humidity below 65%), dust-free and corrosive gas-free environment.
- If unused for 6 months and above, need to charge and discharge every 3 months to maintain the chemical activity of the battery to avoid long-term unused, resulting in battery damage.
- Do not allow solvents such as alcohol, benzene or thinner to come into contact with the detector. Also, do not use a wet cloth or solvent to clean the detector. Otherwise, the housing may be bent or cracked, which may also lead to electric shock, malfunction or fire.
- In the same area, when there are two or more pieces of detector working at the same time, if they are all at the same transmitting frequency, frequency interference may occur between the device. In this case, it is necessary to adjust the transmitting frequency of the device in a staggered manner in order to avoid misjudgment caused by frequency interference.
- If the device has not been used for a long time or if you are about to carry out important detecting activities, please send the device to the dealer for testing or test it by yourself and make sure that the detector is working properly.

Overview

Portable non-linear junction detector is used for search and detonation, anti-eavesdropping, anti-peeping and other tasks, to achieve the detection of explosive devices, eavesdropping and eavesdropping equipment detection.

Non-linear junction detector is through the active emission of fundamental signals to the object under test, after the object under test to generate the second harmonic and third harmonic signals, through

the detection of the reflected harmonic signals to identify the existence of suspicious electronic products.

Parameters

Function	• Detects and identifies semiconductor junctions and corroded metal junctions; • Can detect electronic devices containing semiconductor components in working and non-working conditions; • Gives an audible and visual alarm when detecting electronic devices containing semiconductor components and corroded metal junctions; • The operator interface integrates harmonic intensity mode, peak harmonic time domain mode and harmonic audio functions; • Harmonic intensity interface displays the transmitted signal strength, second harmonic intensity, third harmonic intensity, gives the identification results: “semiconductor junction”, “metal corrosion junction”, and issues sound and light alarms; • Harmonic time domain curve interface shows the second harmonic, third harmonic intensity with time change curve, the curve display time width can be set: 5 seconds, 10 seconds, 20 seconds, 30 seconds, 60 seconds; • Can play harmonic audio through headphones or speakers, for metal rust junction and semiconductor junction, the harmonic audio has different characteristic sound. • With low voltage alarm function (meets GA 1236-2015 “Nonlinear Junction Detector” 5.2.2 requirements).
Weight of main unit (without battery)	≤ 0.5kg

Length of main unit	$\leq 250\text{mm}$
Power supply mode	Battery (non-replaceable)
Continuous working time	≥ 4 hours
Lower limit of working environment temperature	$\geq -30^{\circ}\text{C}$
Upper limit of working ambient temperature	$\leq 55^{\circ}\text{C}$
Lower limit of storage ambient temperature	$\geq -40^{\circ}\text{C}$
Upper limit of storage ambient temperature	$\leq 70^{\circ}\text{C}$
Humidity and heat of working environment	relative humidity 93% (40°C)
Protection class	$\geq \text{IP65}$
Semiconductor junction detection distance	Not less than 10,000 mm (GA1236-2015 Semiconductor Standard Test Sample)
Penetration ability	Not less than 550 mm brick wall (GA1236-2015 Semiconductor Standard Test Sample)
Alarm volume	≥ 60 dB

Unpacking

After opening the carrying case, make sure that the case contains the following items:



Portable Non-linear Junction
Detector x1



Adapter x1



Headphone x1



Test Sample x2

Component Names



Center Button

	On/Off button: Long press to turn on/off
	Mode switching button: press to switch detection mode/return to previous menu level
	Menu/Confirmation button: enter the main menu or confirm each operation.
	Menu direction “up” button, while taking into account the number of buttons to increase.
	Menu direction “down” button, and also take into account the numerical decrease button.
	Menu direction “left” button, and at the same time, adjust the volume down in the detection mode home interface.
	Menu direction “right” button, and at the same time, take into account the volume increase in the detection mode home interface adjustment.

How to Use

Target Identification

1. When suspicious electronic equipment is detected in the target area (semiconductor junction), the second harmonic signal strength is significantly stronger than the third harmonic signal strength.
2. When non-electronic equipment such as metal oxides are detected (metal corrosion junctions), the third harmonic signal strength is significantly stronger than the second harmonic signal strength.
3. At the same time, the system will give auxiliary identify results, the results are directly displayed in the display interface, which can help the user to quickly determine the nature of the target, the auxiliary identification is mainly used to assist the user's identify, the accuracy is high, but for complex environments, please combine with the practical experience of manual final identify.

Function Check

1. Take the product out of the carrying case first;
2. Press and hold the “On/Off” button to turn on the detector, please plug in the haedphone if there is a noisy environment;



3. Immediately enter the detection state after power on. Functional testing with the accessory semiconductor junction test body, metal corrosion junction test body, the use of the detection surface should be directed to the detected area, and then scanned the entire detected area at a constant speed and slowly;
4. Check whether the detection of each test body has obvious false alarms or obvious distance attenuation;
5. If there is no abnormality, normal operation can be carried out. Please contact the manufacturer if there is any obvious abnormality.

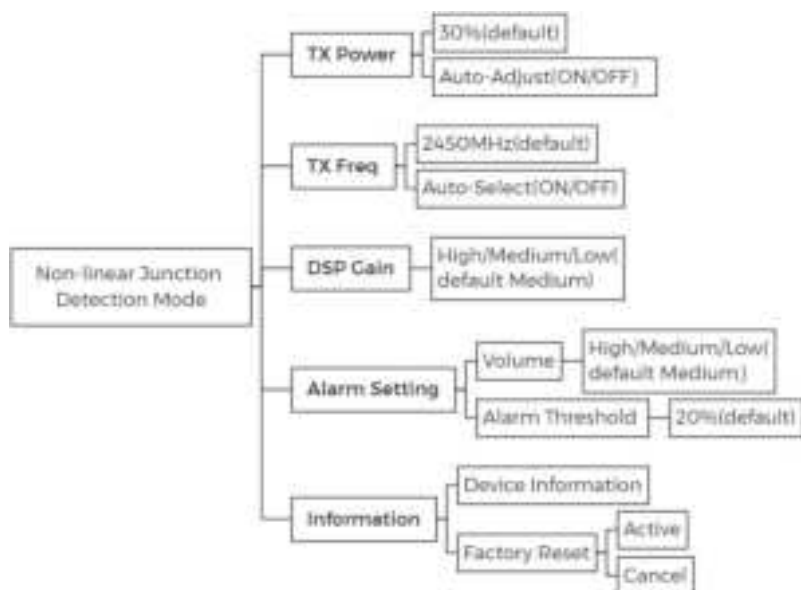
Detection Method

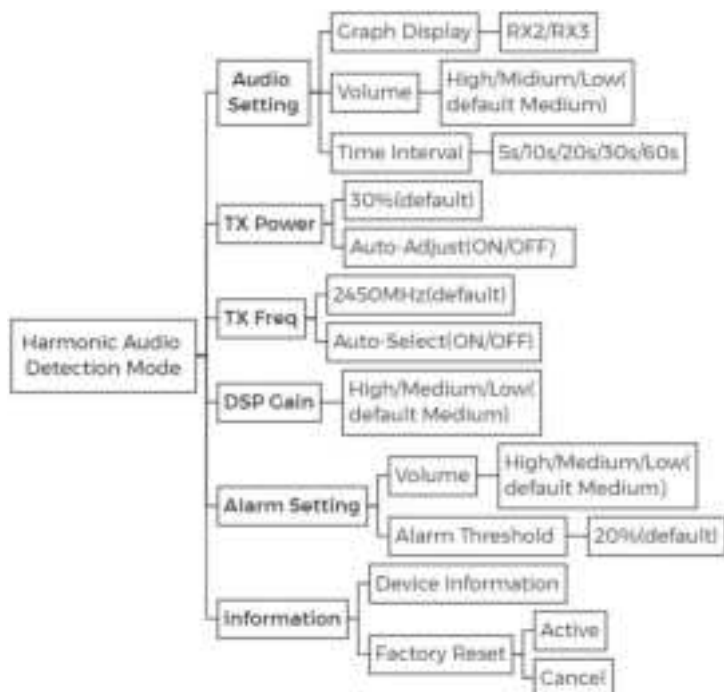
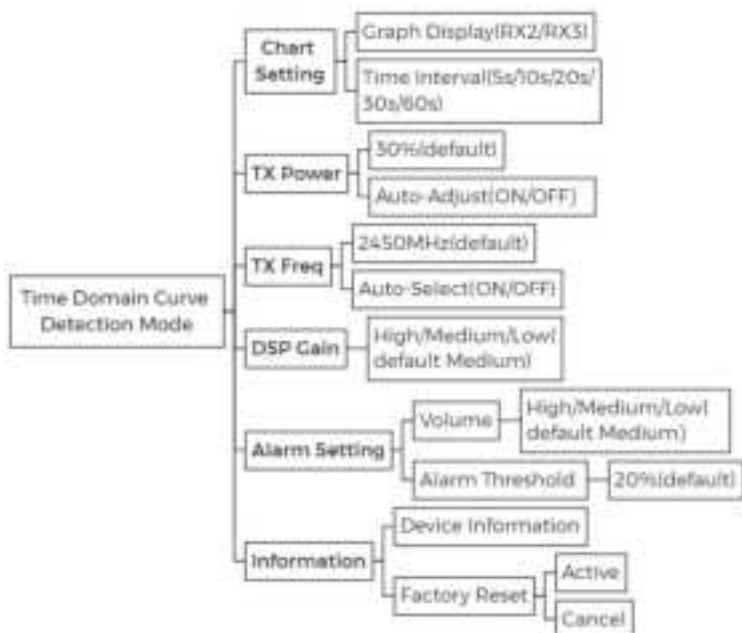
1. Take out the device from the carrying case, connect the headphone, and then long press the “On/Off” button to make the device power on, after powering on, you can enter the working state.
2. When detecting the detection surface toward the object being detected, in the detection process, the device should be around the target scanning slowly and uniformly, in order to ensure the accuracy of the detection, as far as possible, to avoid the scene and the generation of strong electromagnetic interference with the simultaneous use of device.
3. After the device detects the electronic target, the device will transmit the signal to the display and the buzzer, and identify the electronic target according to the harmonic intensity of the display interface as well as the buzzer volume and audio, and provide auxiliary determine. (The intersection detection method or circle detection method can be used to determine the specific location of the detected target more accurately)
4. Short press the “On/Off” button, the system pops up the shutdown confirmation window, select the “Action” button to turn off the device, and put it back into the carrying case.

Danger: The device will emit electromagnetic waves when working, please do not put the detection surface for a long time, close to the human body.



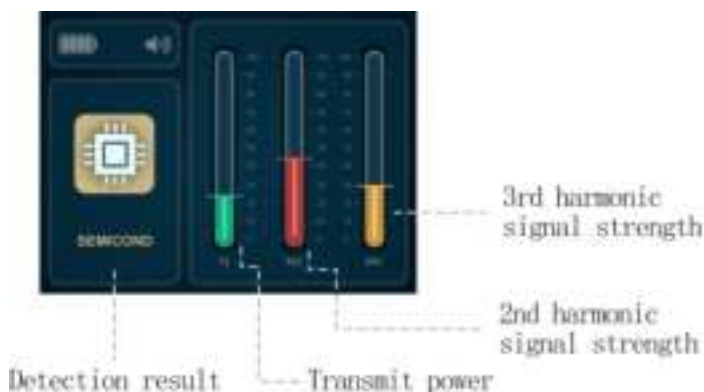
Mode Function Logic





Non-linear Junction Detection Mode

Non-linear Junction Detection Mode is the default mode of the device, the device detector by transmitting a high frequency fundamental signal, and receive the return of the second harmonic and the third harmonic signal, in order to identify the presence of suspicious electronic products in the target area.

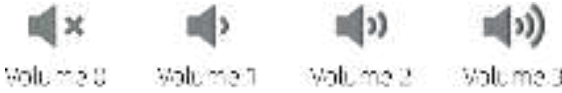


- Transmit power: transmit power 0%~100% adjustable (default 30%), power can be adjusted by up and down buttons, step 5%, long press can be adjusted continuously.
- Second-order signal strength: the second harmonic signal strength generated when the detection signal passes through the detected object. When the second-order signal strength exceeds the threshold, the system determines that the suspected detected object is a semiconductor junction, and the detection results are synchronously displayed on the left.
- Third-order signal strength: the third harmonic signal strength generated after the detection signal passes through the detected object. When the third-order signal strength exceeds the threshold, the system determines that the suspected detected object is a metal corrosion junction, and the detection results are synchronously displayed on the left.

- Battery icon:



- Volume icon:



- Detection icon



The device is transmitting a detection signal



When the second-order signal strength exceeds the threshold, the device determines that the suspected detected object is a semiconductor junction.



When the third-order signal strength exceeds the threshold, the device determines that the suspected detected object is a metal corrosion junction.

TX Power



[Auto-Adjust] is used to turn on/off the function of automatically adjusting the transmit power of the device.

- ON: the device automatically selects the appropriate transmit power according to the actual distance from the detected object(the farther the distance, the higher the power, the closer the distance, the lower the power), to ensure the best detection results.
- OFF: the transmit power is selected manually and remains unchanged in the detection after manual adjustment.

Transmit power 0%~100% adjustable (default 30%), power can be adjusted by up and down buttons, step 5%, long press can be adjusted continuously.

Quick setting: In the mode home interface, you can directly set the transmit power by “up and down button” .

Caution:

When the transmit power automatic adjustment function is turned on, the manually adjusted transmit power value is the highest threshold of the device power automatic adjustment. For example, after manual adjustment to 80%, the threshold of the device's automatic transmit power adjustment is 5%~80%.

TX Freq



[Auto-Select]: the transmit frequency can be selected automatically by the system.

ON: The device can automatically select the transmit frequency when the function is turned on. (Frequency is automatically selected only once each time the device is turned on)

Transmit frequency 2400~2500MHz can be adjusted manually. (Default 2450MHz) The frequency can be adjusted by “up and down button” , “up and down button” step 1MHz.

DSP Gain



The DSP gain is adjustable high/medium/low (default medium):

- High: represents high gain and maximum detectable distance;
- Medium: represents medium gain and moderate detectable distance;
- Low: represents low gain, can be detected at a close distance.

Alarm Setting



The alarm volume is adjustable in high/medium/low/silent (default medium).

- Alarm volume can be adjusted by “up and down buttons” .
- Alarm volume Quick Setting: In the detection mode home interface, the alarm volume can be set directly through the “left and right buttons” .

Alarm threshold 0%~100% (default 20%) is adjustable.

- After sets the alarm threshold for the second and third harmonics, the alarm will be triggered when the threshold is reached.
- Can set the alarm threshold by “up and down buttons” , “up and down buttons” step by 5%.

Information



Device Information:

- Device name: Non-linear Junction Detector
- SN No.: XXXXXXXXXXXXXXXX
- Version: VXRXCX

Click the “Factory Reset” button to restore the system settings to the factory state.

Time Domain Curve Detection Mode

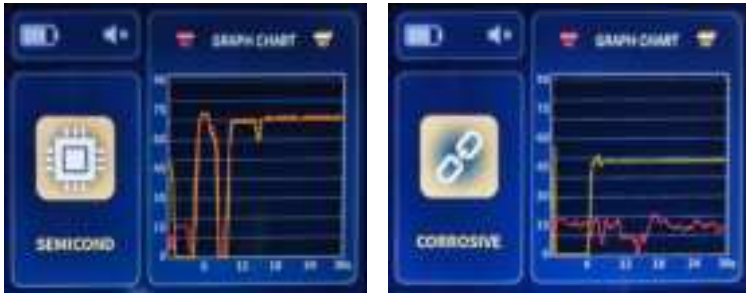


Figure : Characteristics of time domain curves of semiconductors, metal corrosion junctions, and other false junctions after tapping

In the Time Domain Curve Detection Mode, the second-order and third-order signal strengths will show different curve characteristics over time.

- Semiconductor junction: The second and third order signal strengths have high stability, and usually the time domain curve shows a smooth straight line.
- False junctions such as metal corrosion junctions: the signal strength shows obvious instability, and its time domain curve is presented as a jumping curve.
- When a hard object is used to knock the junction, the oscillation of the false junction will be obviously intensified, while the real semiconductor junction can remain stable.

When detecting walls, sofas, desktops and other scenes, if a semiconductor junction is determined in the non-linear junction detection mode, then the time domain curve mode can be switched to observe the stability of the second-order and third-order time domain curves after knocking on the detected area, and if it is a smooth straight line, then it is determined to be a semiconductor junction, and if there is a clear oscillation, then it is determined to be a false junction, such as a metal corrosion junction.

Chart Setting



- Graph Display(RX2/RX3)
- Time Interval(5s/10s/20s/30s/60s)

Harmonic Audio Detection Mode



Figure : Characteristics of harmonic audio of false junctions such as semiconductors and metal-rusted junctions after tapping

The Harmonic Audio Detection Mode demodulates 2nd and 3rd order harmonic signatures to assist in detecting the presence of working electronic devices such as hidden cameras, GPS, bugs, etc. in the environment.

- Semiconductor junction: 2nd order harmonic signature audio (and in some cases 3rd order harmonic signature audio) is present;
- working semiconductor junction: presence of current sound, low noise when listening with headphones based on second-order harmonic characteristic audio response;
- false junctions such as metal rust: almost no response to the second-order harmonic characteristic audio, only the third-order harmonic characteristic audio is present.

When detecting walls, sofas, desktops and other scenes, if a semiconductor junction is determined in the non-linear junction detection mode, it can be switched to the harmonic audio mode. If the second-order harmonic response exists, it can be determined as a semiconductor junction, and there are current sounds and low noise when listening to the audio with headphones, it can be determined as a working semiconductor junction; if only the third-order harmonic characteristic audio exists, it can be determined as a false junction such as metal corrosion.

Audio Setting



- Graph Display (RX2/RX3)
- Volume (High/Midium/Low)
- Time Interval (5s/10s/20s/30s/60s)

Battery

Low Battery Alarm

When the battery level is less than or equal to 20%, the battery icon will show red  and the battery should be charged in time. When the battery level is lower than 10%, the device will shut down automatically.

Charging the Battery

Insert the Type-C end of the adapter into the charging port of the device, and the charging indicator lights up in red when the power is turned on.



Battery Maintenance

This device is designed as a one-piece unit, and the user is not allowed to disassemble the battery without explicit permission. The following principles should be followed in the daily use of the battery:

1. The original charger and charging cable must be used for charging to ensure the safe use of the device and the battery.
2. Store in a dry and cool (temperature 10°C~25°C, humidity below 65%), dust-free, non-corrosive gas environment.
3. If not used for 6 months and above, it needs to be charged and discharged every 3 months to maintain the chemical activity of the battery to avoid long-term unused, resulting in battery damage.

Troubleshooting

1. The device cannot be turned on

Connect the power adapter to charge the device.

2. No sound from headphones

A. Incorrect or weak cable connection

Solution: Make sure the headphone cable is connected correctly and firmly.

B. Headphone sound adjustment is too small

Solution: Adjust the output volume through the system menu.

Maintenance

In order to extend the service life of the device, attention should be paid to the daily use:

- Pay attention to dust, moisture and high temperature.
- The device should be placed in an indoor, no direct sunlight place when not in use.
- Pay attention to the use of the cable connection firmly, avoid excessive tension on the cable.
- Avoid strong impacts and knocks during use.

Transportation

- The device can be transported by rail, road or sea. When transporting, it should be placed firmly and fixed to prevent it from being upended, collapsed or dropped.
- The machine should be placed facing upwards, and the machine can be stored in up to 4 layers of stacking.
- Pay attention to dustproof, rainproof, moistureproof and salt sprayproof during transportation, and don't have sharp objects around to touch the device.
- During transportation and handling of the device, it should be

lightly held and put down, and it is strictly prohibited to fall or throw.

- If warranty is required, keep the original packaging for transportation of the device. Protect the detector from severe mechanical external forces during transportation, the components of the detector are sensitive to shocks and strong vibrations.
- We recommend that you inspect the device for shipping damage immediately upon delivery, noting the presumed damage on the shipping documents and notifying the manufacturer.
- Remove the packaging carefully. If there are no separate guidelines for the recycling of packaging materials, the packaging is retained by the customer.
- If the device is to be disposed of environmentally responsible disposal must be ensured in accordance with the appropriate disposal guidelines.

