



WE-HS230

Android 4G all-network industrial handheld device

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I. Overview

The WE-HS230 is an Android-powered smart handheld device equipped with an eight-core high-speed processor. It can rapidly read all RFID tags within a 50-meter radius, trigger specified tags to emit light and sound, and establish wireless data transmission channels with tags (modules). We provide development resources including communication interfaces and Android sample code, enabling you to easily create customized applications for item tracking, inventory management, remote device control, and wireless data transfer.

The handheld device-based APP integrates with the warehouse management system, enabling efficient real-time inventory through remote tag scanning and precise item location via voice-light alerts. This automated solution detects missing items promptly, reduces staff workload, and ensures error-free operations with streamlined efficiency.

The handheld device management app enables remote detection and connection of tagged equipment, establishing wireless data transmission channels. It facilitates data collection, parameter adjustments, and control command transmission. Widely adopted in maintenance scenarios where direct personnel access is impractical—including high-voltage transmission line monitoring, lake water quality surveillance, underground hazardous gas leak detection, and wildlife photography—this solution revolutionizes routine equipment inspection and maintenance operations.

II. Key Features

- ◆ Read electronic tags from a distance, the reading distance can reach 100 meters in open space;
- ◆ Can actively call all kinds of sound and light electronic tags, quickly find items;
- ◆ It can establish a data transmission channel with the tag module, and the wireless transmission distance can reach 200 meters.
- ◆ Dual auto-focus cameras: 13MP rear and 5.0MP front (optional).
- ◆ 5.0-inch industrial-grade capacitive touch, Corning triple-glass tempered screen, multi-touch support, and screen drop resistance;
- ◆ QR code hard decoding laser positioning scanner, supporting various barcode types;
- ◆ Full network coverage with CMCC 4G: LTE B1, B3, B5, B7, B8, B20, B38, B39, B40, B41; WCDMA 1/2/5/8; GSM 2/3/5/8
- ◆ Supports dual-band WIFI with 2.4G and 5G frequencies, compliant with 802.11 b/g/n/a/ac standards;
- ◆ Supports Bluetooth 4.0 (BLE);
- ◆ Supports Beidou/GPS/Glonass positioning;
- ◆ Supports UHF (860MHz~960MHz)
- ◆ Supports NFC(13.56MHZ protocols including 14443A/14443B/15693;
- ◆ Equipped with 3.7V 10000mAh high-capacity lithium battery, delivering up to 600 hours of ultra-long standby time.
- ◆ Special structure and external buffer design, with reliable performance against 1.5m height drop;
- ◆ IP66 sealing standard, specially designed to meet the stringent working environment requirements of enterprise users;

3. Technical Parameters

project	specifications	parameter
system	operating system	Android 12.0
	CPU	MTK 6762-8 core (2.0GHz)
	RAM	3G (upgradable to 4G)
	FLASH	32GB (upgradable to 64GB)
LCD	resolution ratio	1280*720
	Display area	5.0 inch
	Display Proportions	16: 9
	Show brightness	400 nits
	Viewing Angle	70 degrees
	touch screen	Multi-touch
camera camera	pixel	Rear 13MP, autofocus with flash / Front 5.0MP (optional)
lithium cell	capacity	10000mAh@3.7V
	type	Non-removable dual polymer lithium battery
	duration of flight	About 16 hours (standby time> 600h)
	Charging times	At least 2000 times
data communication	WIFI	WIFI 802.11 b/g/n/a/ac with dual-band frequency 2.4G+5G
	PDA	Supports Bluetooth 2.0/3.0/4.0 protocol
	China Mobile Communication Corp	4G: TDD-LTE; 3G: TD-SCDMA; 2G: GSM
	China Unicom	4G: TDD-LTD/FDD-LTE; 3G: WCDMA; 2G: GSM
	China Telecommunications	4G: TDD-LTD/FDD-LTE; 3G: CDMA2000; 2G: GSM
	GNSS	Supports BeiDou, GPS, Galileo, and Glonass
Barcode Scan	One-dimensional code	Hard decoding supports EAN, 39, Cross 25, UPC, 128,93, ISBN, and Codabar.
	two-dimension code	Hard decoding, supporting PDF417, MicroPDF417, QR Code, Code 49, Code 16K,

project	specifications	parameter
		Code One, and more.
DA	Ultra-high frequency card reader	UHF (E710_33&920-925 ceramic antenna, 4 dBi, circular polarization)
	High-frequency card reader	NFC card reader
	ZigBee card reader	Read the 2.4G ZigBee electronic tag of Shidian Technology
Appearance	size	178mm*83mm*17mm
	weight	580g
	pigment	Black (black bottom shell, black front shell)
work environment	working temperature	-10°C~ 50°C
	Storage temperature	-20°C~ 60°C
	humidity	5%RH-95%RH (no condensation)
	levels of protection	IP66

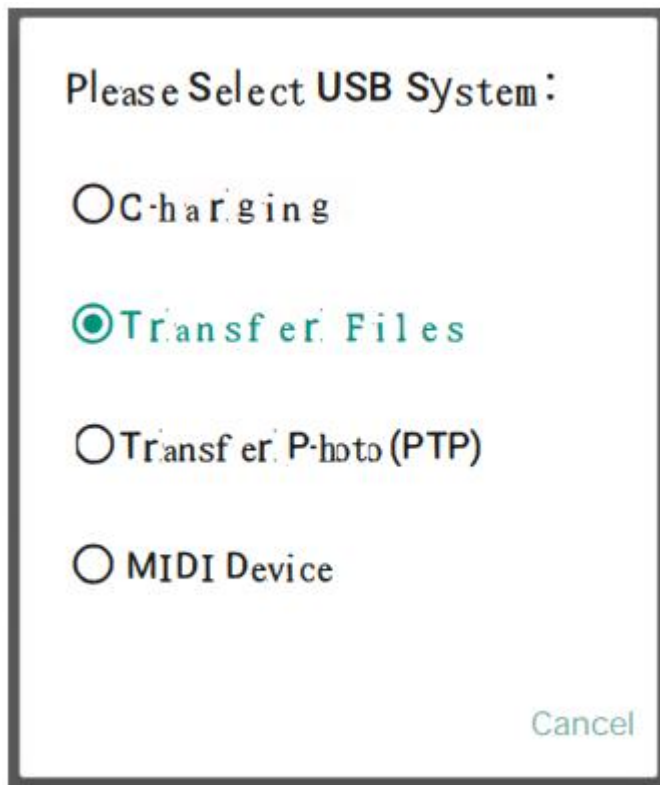
4. Usage Tips

1. Take a screenshot

Hold the Power button and the Volume Down button for 1 second

2. Download and install the app via USB

Connect the handheld device to the computer using a USB cable. On the phone's desktop, tap the [Top Down] menu to find the "Android System Charging This Device via USB" notification. Tap the notification and select "USB Usage: File Transfer" as shown in the figure below.



The computer will display a USB drive labeled "WE-HS230". Copy the installation app to this drive.

Open File Manager on your phone, find the installation file, and click Install.

3. Show all open apps

Double-click the [HOME] button in the middle of the lower part of the handheld device's desktop to display all opened apps. You can clear unnecessary apps to free up system resources.

5. Long-distance card reader app testing

Open the "Remote Card Reader" app and click the "Start Inventory" button to view all electronic tags read by the handheld device.



序号	卡号	电量	dB / cm	活跃次数
1	1901616	正常	-84 / 3739	5
2	2024656	正常	-87 / 4229	9
3	1901620	正常	-87 / 4229	9
4	1931552	80%	-81 / 3278	13
5	2024114	100%	-80 / 3131	3
6	2011452	正常	-92 / 5109	10
7	2019180	100%	-88 / 4398	4
8	2019216	100%	-92 / 5109	3
9	1901641	正常	-88 / 4398	7
10	1901608	正常	-82 / 3429	6
11	2019123	100%	-90 / 4747	5
12	2011206	正常	-90 / 4747	3
13	1924763	正常	-79 / 2987	6
14	2023415	100%	-86 / 4062	3
15	1900165	正常	-52 / 309	11
16	1901677	正常	-89 / 4571	8
17	2019244	90%	-87 / 4229	11
18	1703704	正常	-81 / 3278	11
19	2019151	100%	-84 / 3739	7
20	1901670	正常	-78 / 2846	9
21	2011114	正常	-87 / 4229	6

Readable label details such as "Battery", "Wireless signal strength/Reference distance", and "Reads"

Click the Call Find and Data Through buttons in the lower right corner to test calling specified tags and data through with the tag module.

Call Label Test

远距读卡测试工具1.0

返回

向指定标签发起呼叫，该标签会发光发声（仅对声光标签有效）

☐ 绿灯闪 ☐ 红灯闪 ☒ 交替闪

☒ 蜂鸣器响

☒ 1931539 距离 1 米(-45dB)

☐ 输入要呼叫的标签ID

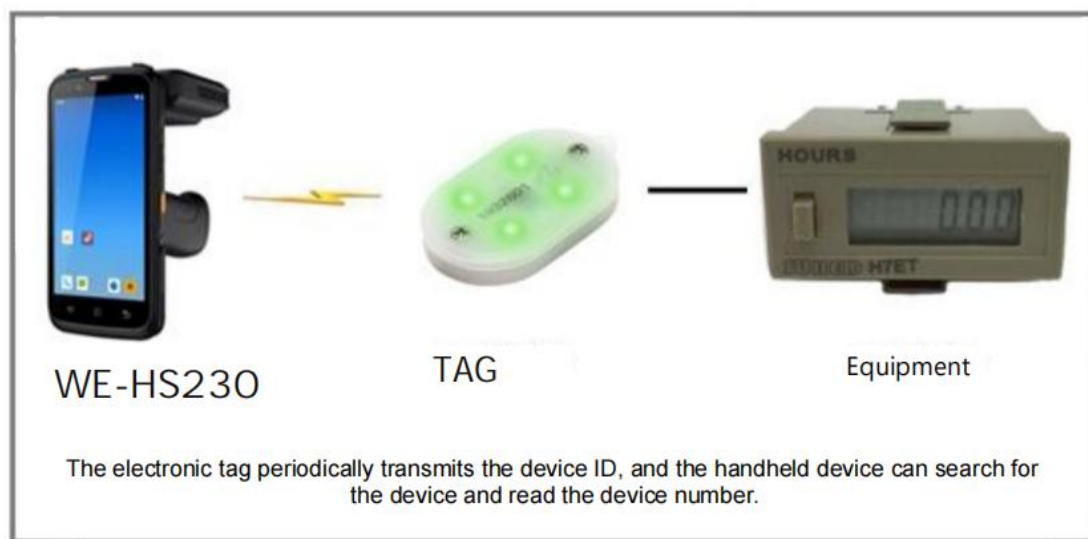
☐ 输入要呼叫的标签ID

停止呼叫

Select the reminder mode, enter the tag ID in the edit box, and click "Start Call". You can see the specified tag emit sound and light reminders, and the APP will also display the distance (signal strength) of the tag.

Data Throughput Test

The data pass-through feature enables remote discovery and control of devices, as shown in the following figure:



Test preparation:

Prepare either the DSM-03 tag module development board (200-meter data transmission) or the DSM-81 tag module development board (50-meter data transmission). Connect the board to your computer via a USB cable and run the development board test software.

The steps are as follows:

- 1、Enable the data transmission-enabled tag modules (DSM-03 and DSM-81) on the development board and configure their IDs.
- 2、The tag module ID is readable during the card reading test. Enter the "Data Through-Transmission" test page.

12	2011206	正常	-90 / 4747	3
13	1924763	正常	-79 / 2987	6
14	2023415	100%	-86 / 4062	3
15	1900165	正常	-52 / 309	11
16	1901677	正常	-89 / 4571	8
17	2019244	90%	-87 / 4229	11
18	1703704	正常	-81 / 3278	11
19	2019151	100%	-84 / 3739	7
20	1901670	正常	-78 / 2846	9
21	2011114	正常	-87 / 4229	6

呼叫查找

数据透传

3. Enter the tag ID and click the "Transmit Switch" button to establish a data transmission channel with the tag module.

远距读卡测试工具1.0

标签ID: 112334 信道: 3 (0-7)

请求超时: 10 秒(3-60) 退出超时: 30 秒(5-60)

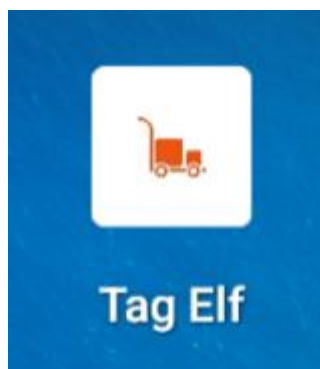
清除 R:5658 S:3 退出透传

[R] 55 aa 01 06 00 1e b1 c8 00 a7 bd a8
 [R] 55 aa 01 06 00 1e b1 c8 00 a7 bd a8 1f
 [R] 55 aa 01 06 00 1e b1 c8 00 a7 bd a8 1f
 [R] 55 aa 01 06 00 1e b1 c8 00 a7 bd a8
 [R] 55 aa 01 06 00 1e b1 c8 00 a7 bd a8
 [R] 55 aa 01 06 00 1e b1 c8 00 a7 bd a8
 [R] 55 aa 01 06 00 1e b1 c8 00 a7 bd a8
 [R] 55 aa 01 06 00 1e b1 c8 00 a7 bd a8
 [R] 55 aa 01 06 00 1e b1 c8 00 a7 bd a8 1f
 [R] 55 aa 01 06 00 1e b1 c8 00 a7 bd a8
 [R] 55 aa 04 05 00 01 b6 ce 00 ef ea
 [S] 12 34 56 78 9a
 [R] bc 45 21 30
 [S] 12 34 56 78 9a
 [R] bc 45 21 30

12 34 56 78 9A HEX发送

Data sent from the handheld device is received by the tag module (test software). Similarly, data sent by the tag module (test software) is also received by the handheld device. Continuous data transmission will maintain the data channel, while bidirectional or unidirectional data transmission will stop. Both the handheld device and the tag module will automatically exit the transparent mode. To resume the transparent mode test, manually click 'Exit Transparent Mode' and then click 'Switch to Transparent Mode'.

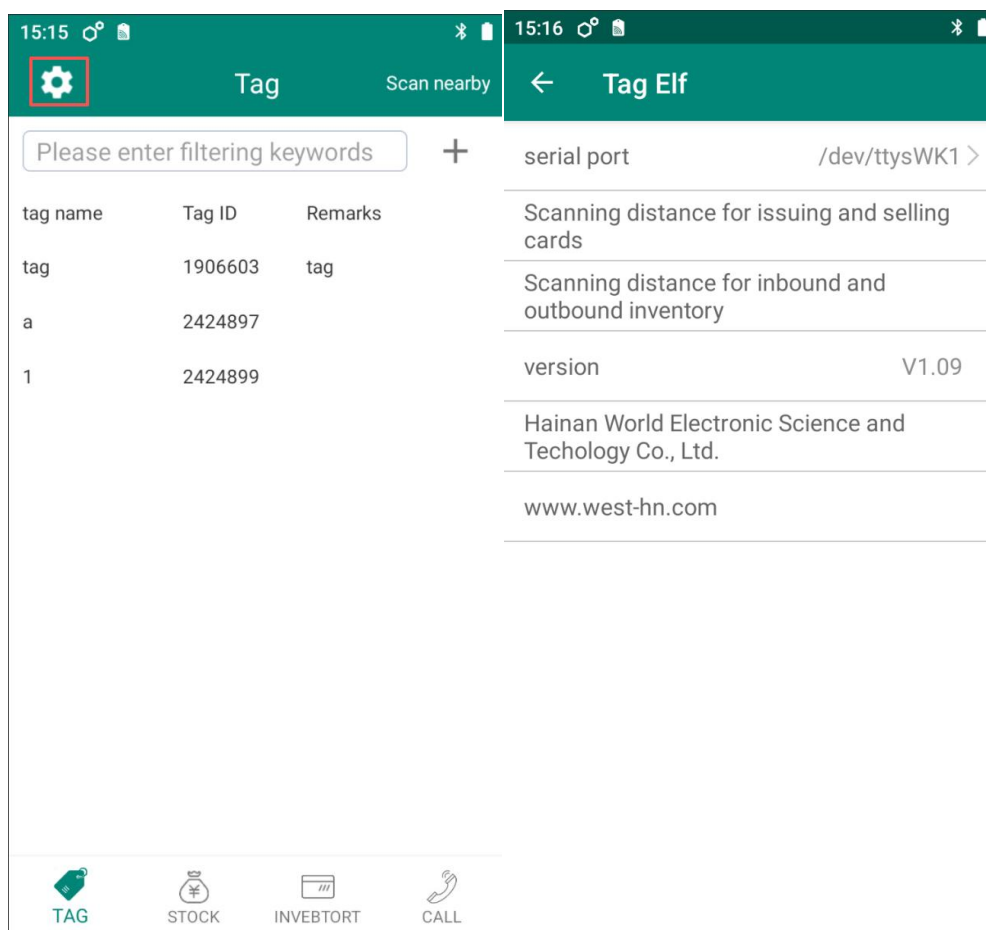
6. Shidian Jingling APP



Open the APP and click the "Start Inventory" button to view all electronic tags read by the smart tablet. Running the [Shidian Jingling] APP allows you to confirm whether warehouse items are online, view detailed information such as item name, model, barcode, inventory quantity, and tag battery level, and call specific tags for quick location via audio-visual alerts.

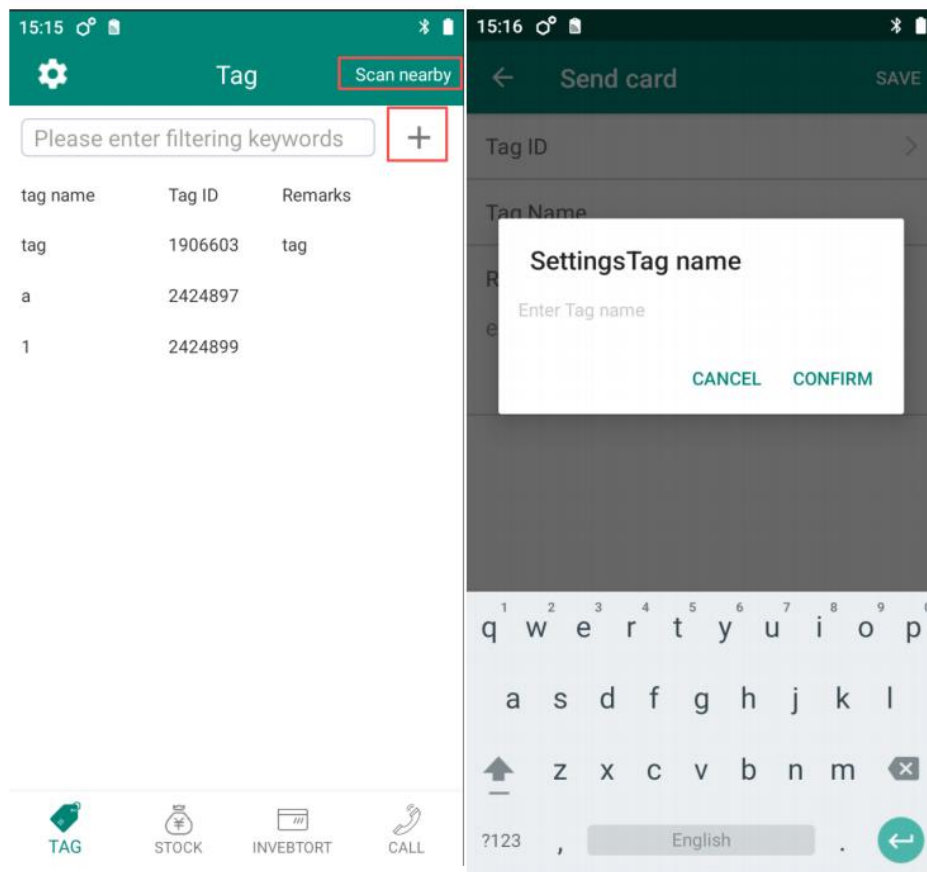
1. View settings in Shidian Jingling APP

When the [Shidian Jingling] APP is running, tap the gear icon (Settings) to access the Settings page. Here you can view system details including the app version, developer information, website URL, card issuance/dissolution intervals, and inventory scanning ranges.

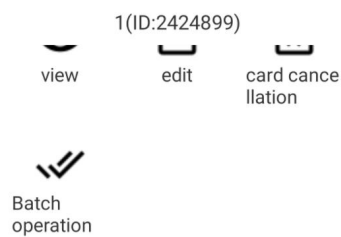
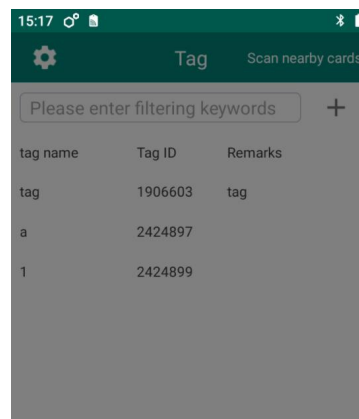


2. Label management (add bound labels)

Click the "+" button in the upper right corner to manually add tags and items to bind. Enter the tag ID and product name, then save the binding. If the item has a barcode (not a tag ID), scan the barcode and tag ID to quickly add the item.

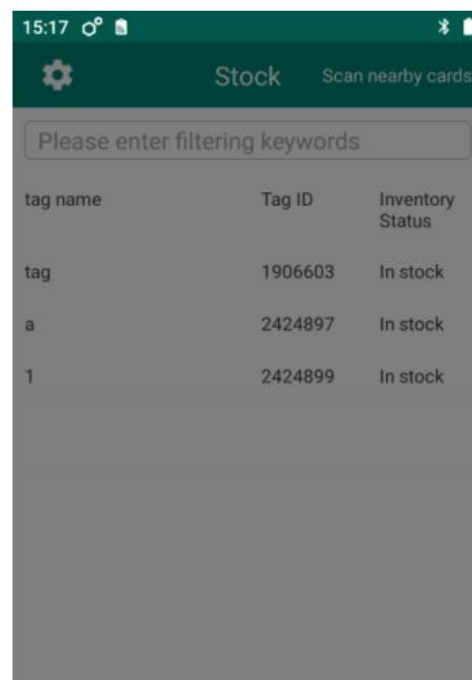
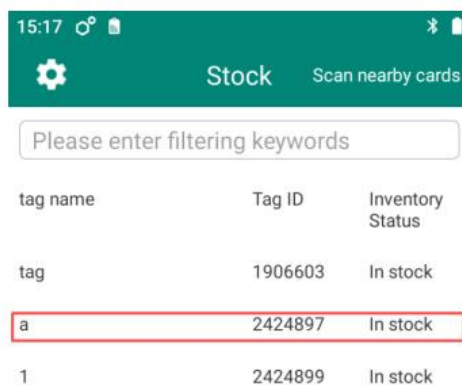


In the list, you can click "View" for any item to check its details, including current inventory and remaining battery power. You can edit the item information, delete individual cards, or delete cards in bulk.



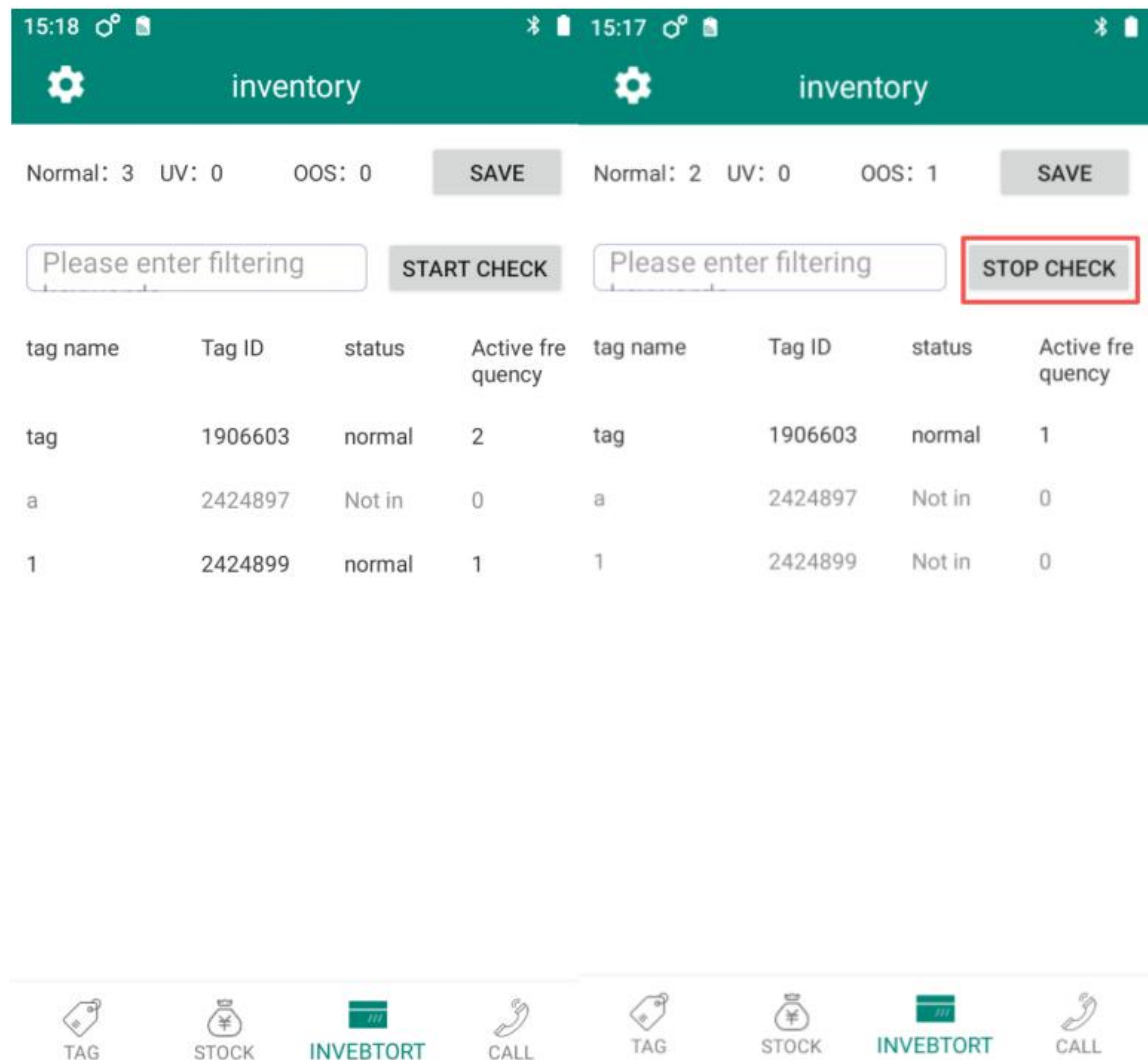
3. Inventory Management (Inbound and Outbound)

Click the second column "Inventory" below to add newly bound items to inventory. If there are multiple items, you can also select to mark them as received. Click Confirm to add to inventory.



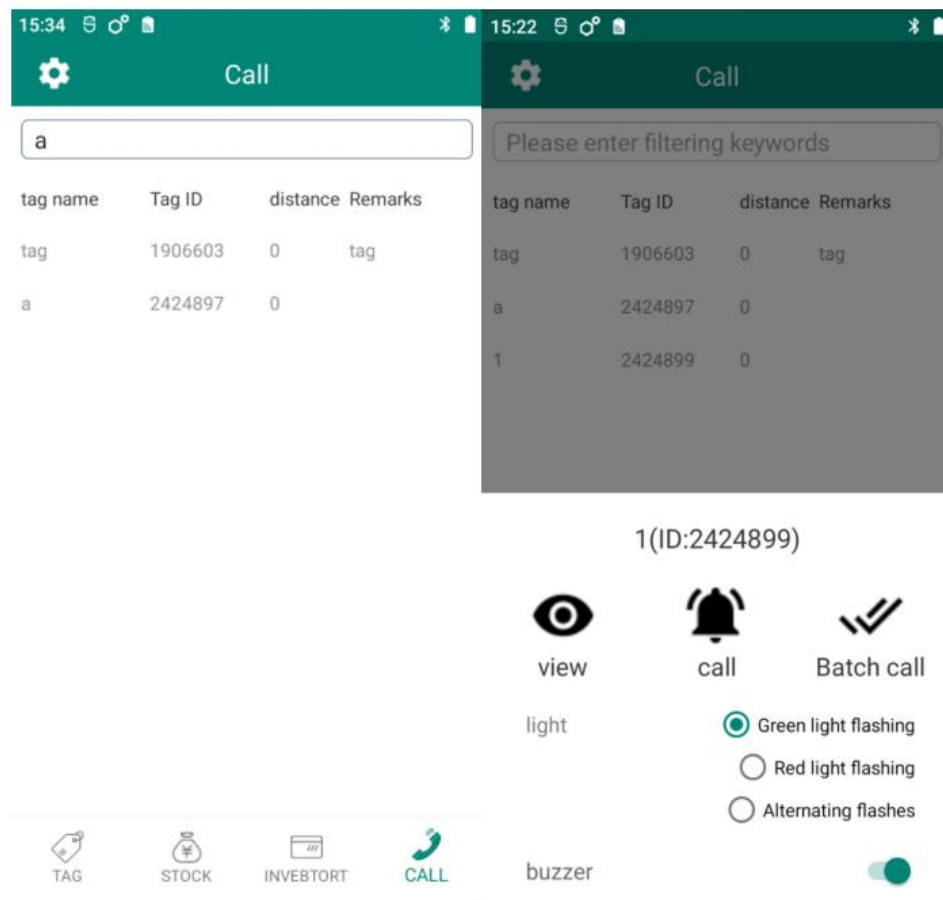
4. Inventory management (item inventory, battery level reminder)

Click the "Inventory" option in the third column below, then select "Start Inventory" to check all bound tag products' inventory status with one click. After completing the inventory, click "Stop Inventory". The system will display which items are missing and which tags are running low on battery, enabling convenient battery management.



5. Call Search (Item Search and Call)

Click the "Call" option in the fourth column below to search for the product you need and call for it with one click.



You can select specific items from the item list bar to call them, or click the "Batch Call" button below to activate all tags. When calling tags, select the flashing mode (red light, green light, or alternating red/green) by clicking the traffic light button, and choose the sound mode (beep or no beep) by clicking the buzzer button.

7. Secondary Development Agreement

The APP (application) accesses the handheld device's serial communication port "/dev/ttyWK2" to read data from remote tags.

The message format for APP access to handheld devices is as follows:

地址	0	1	2	3	4	5	6	7	...	N	N+1	N+2
字段	前导字节		命令	长度	消息内容						CRC校验	
示例	55	AA	02	06	00	19	F0	A0	...	01	32	54

[Lead byte] The fixed 2-byte value (0X55,0XAA) serves as a flag to identify a new data packet.

[Command] 1 byte, indicating the specific meaning of the message, as follows:

Command	name	direction	explain
1	Read label	APP (mobile)	The handheld device reads the tag ID and
2	Call label	APP (mobile)	The APP calls the specified tag (sound and
3	Transparent	APP (mobile)	The APP requests the handheld device and tag
4	Transparent	APP (mobile)	Result of establishing hand-held device

The call function requires the use of the sound and light tag, and the transmission function requires the use of the data transmission tag module.

[Length] 1 byte. The length of the "Message Content" field.

[Message content] is determined by each message.

[CRC Check] The CRC16 result of the message (excluding the preamble byte) to ensure message integrity.

(1) Read tag messages (0X01)

Message content:

	卡号 4字节	属性 1字节	扩展数据 0~7字节	RSSI值 1字节
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[Card number] 4 bytes, the label number.

[Attribute] 1 byte stores the tag type, undervoltage flag, extended data length, and other information.

位 : 7	6	5	4	3	2	1	0
扩展数据长度		运动标志		标签类型		欠压标志	

Bit 0: Low voltage flag. 1: Low voltage, 0: Normal

Position 1-3 label type. 0: Regular label 1: Sound and light label 7: Empty label (Note 1)

Bit 4: Motion flag. This bit is valid only for motion-detection tags. 0: The tag is stationary.
1: The tag is in motion.

5-7 Extend the data length. If necessary, the tag can upload extended data (such as humidity, humidity, etc.). The extended data area follows the attribute byte and can be 0 to 7 bytes long.

Note 1: A blank tag refers to a situation where the handheld device's card reader module fails to detect any electronic tags. To inform the APP that the card reading function is working normally, the module sends a blank tag signal every 3 seconds. If the APP fails to receive either real or blank tag signals for an extended period, this indicates a malfunction in the card reader module.

[Extended Data] 0–7 bytes. The length is specified in the attribute byte and can carry tag-specific data such as temperature and humidity. The extended data can be up to 7 bytes or omitted.

The RSSI value is 1 byte, indicating the signal strength of the tag data received by the positioning antenna. This value can be used to calculate the distance between the tag and the antenna.

(2) Call tag message (0X02)

The APP sends a call tag command to the handheld card reader module, enabling the designated tag to emit light and sound, allowing users to quickly locate it.

Message content:

地址	0	1	2	3	4
字段	标签ID				参数
示例	00	19	F0	A0	01

[Parameter] Byte is in call mode.

The general definition is as follows (the definitions of sound and light tags may vary slightly)

Call Mode	explain
0	Only green light flashing
1	Green light flashing + buzzer sound
2	Only red light flashing
3	Red light flashing + buzzer sounding
4	Red and green alternate
5	Red and green flashing alternately +
255	Stop reminders

When the handheld card reader module receives a start command from the controller, it will maintain the alert operation for the specified tag for 5 seconds. If the controller requires continuous tag calls, it must send call commands repeatedly (recommended at 1 per second). If the handheld card reader module fails to receive a call command for 5 consecutive seconds, it will automatically stop the tag's audio-visual alert operation. This ensures that even if communication between the controller and the card reader module is unexpectedly interrupted, the reader module will promptly cease its alert function.

The handheld device supports up to 80 concurrent reminders. When you need to call multiple tags at the same time, you can send multiple instructions or include multiple tag information in a single instruction.

For example, when calling two electronic tags (1805100,1904212) at the same time, you can send the following call instructions:

55 AA 02 0A 00 1B 8B 2C 01 00 1D 0E 54 01 82 3F

55 AA : 前导字节

02 : 命令 (呼叫标签)

0A : 长度 (10字节)

00 1B 8B 2C : 标签ID (1805100)

01 : 模式 (发光发声)

00 1D 0E 54 : 标签ID (1904212)

01 : 模式 (发光发声)

82 3F : CRC校验

(3) Transparent transmission request message (0X03)

The APP sends a data relay switch command to the handheld device's card reader module. Upon successful switching, the handheld device and tag establish a point-to-point transparent data transmission channel. The data transmitted by the APP is wirelessly relayed to the remote device, and the reverse process also occurs.

After establishing a transparent transmission channel, the APP should limit each data transmission to 120 bytes. If transmitting exceptionally long data is necessary, pause for over 5 milliseconds after sending partial data (less than 120 bytes) through the serial port before resuming transmission.

Message content:

地址	0	1	2	3	4	5	6
字段	标签ID				无线 频道	创建 超时	退出 超时
示例	00	01	E2	40	01	05	0A

[Label ID] 4 bytes, a tag card that requires direct transmission.

[Wireless Channel] 1 byte, channel (0~7), 8 channels in total. This is the wireless channel used for data transmission to avoid mutual interference when transmitting data in the same frequency band.

[Creation timeout] 1 byte, the maximum waiting time for creating a data channel (in seconds). If the timeout occurs, the controller must send a switch command to attempt establishing the channel again. The valid duration is 3 to 60 seconds.

[Exit Timeout] 1 byte. The timeout duration for exiting the data transmission channel (in seconds). When data transmission is enabled, if the channel remains idle (no incoming or outgoing data packets) for the specified timeout, the system automatically exits data transmission mode and returns to card/tag reader mode. The valid duration ranges from 1 to 60 seconds.

For example, the sequence of instructions for establishing a data transmission channel between the card reader and the tag with ID "123456" is as follows:

55 AA 03 07 00 01 E2 40 01 05 0A 0D 5B

Each field is explained as follows:

55 AA	前导字节
03	消息命令 (切换到透传)
07	消息内容长度 (有7个字节的消息内容)
00 01 E2 40	消息内容/ 标签ID (123456)
01	消息内容/ 无线频道 (使用1号频道)
05	消息内容/ 创建超时 (最多等待5秒)
0A	消息内容/ 退出超时 (10秒没有数据退出)
0D 5B	CRC校验

Serial port transparent transmission data packets, each packet up to 120 bytes long, with a minimum packet interval of 10ms. Extra-long data packets will automatically trim the extra part.

(4) Transparent response message (0X04)

The handheld device responds to the APP with the result of the transparent switching operation, indicating success or failure.

Message content:

地址	0	1	2	3	4
字段	标签ID				结果
示例	00	19	F0	A0	01

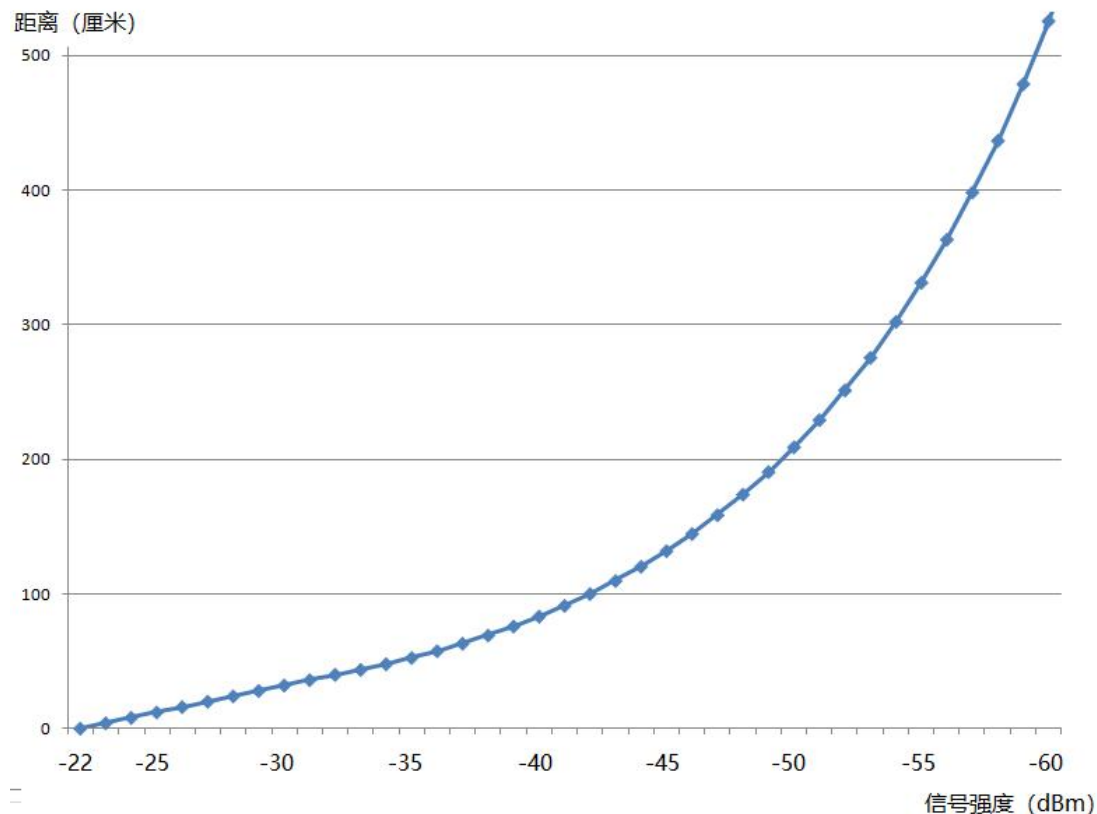
[Result] The result of creating a transparent channel. 0: Success 1: Failure

Example: 55 AA 04 05 00 1B 8B 2C 00 9B 34

55 AA : 前导字节
04 : 命令 (呼叫标签)
05 : 长度 (5字节)
00 1B 8B 2C : 标签ID (1805100)
00 : 结果 (创建透传通道成功)
9B 34 : CRC校验

8. Distance measurement formula

This product calculates the distance between the electronic tag and the antenna by measuring the wireless signal field strength of the tag. The distance and the wireless signal strength have an exponential curve relationship, as follows:



Due to chart size limitations, only the corresponding relationship within 6 meters is displayed.

In the figure above, there are three values that need to be repeatedly measured and calibrated.

- 1、 L0: The signal strength when the tag is 0 cm away from the reader, measured at -22dBm.
- 2、 L1: The signal strength when the tag is 40 cm away from the reader, measured at -32 dBm.
- 3、 L2: The signal strength when the tag is 100 cm away from the reader, measured at -42 dBm.

Based on these three values, the formula is derived as follows:

- 1、信号强度大于等于L0，距离直接判定为0厘米。
- 2、信号强度大于等于L1，距离可以根据线性运算。
距离 = $\left[\frac{(L0 - \text{信号强度})}{(L0 - L1)} \right] * 40$
- 3、信号强度小于L1，距离可以根据指数曲线运算。
距离 = $10^{\left[\frac{(L2 - \text{信号强度})}{25} \right]} * 100$

For the specific algorithm implementation, please refer to our DEMO software source code.