Rd-101A / Rd-103A Quick Start Guide

This guide is intended for debugging the **Rd-101A** and **Rd-103A** modules. It explains how to connect the **Rd-101A** and **Rd-103A** modules to a USB-TTL adapter with factory-default firmware, use the host computer tool to read version / device information and adjust parameters, and use a serial assistant to adjust parameters according to the protocol. Both modules use the same protocol and the same host computer tool, `XenD101HSTool`.

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1. Preparation Checklist

Category	Item	Description
Module	Rd-101A or Rd-103A	Presence-detection firmware pre-programmed at the factory
Power / communication	USB-to-TTL adapter	Wiring: `VCC / GND / OT1 / RX` ↔ TTL `3.3V / GND / RX / TX`
Host computer	XenD101HSTool\ICL_XenD101HS_Tool.exe	Host computer tool
Serial tool	sscom5.13.1.exe	Common commands preconfigured
Firmware	Regular Firmware No. 3699 V1.0.0	Used for OTA through the host computer tool
PC	Windows, able to recognize COM ports	Baud rate **115200, 8N1**

Notes:

- The TTL adapter **must be 3.3V**. The module supply range is 3.0-3.6V, with 3.3V typical. **Do not connect 5V**.
- **The host computer tool and sscom cannot occupy the same COM port at the same time**. Close or disconnect one before opening the other.
- The factory firmware baud rate for the Rd-101A / Rd-103A is **115200**.

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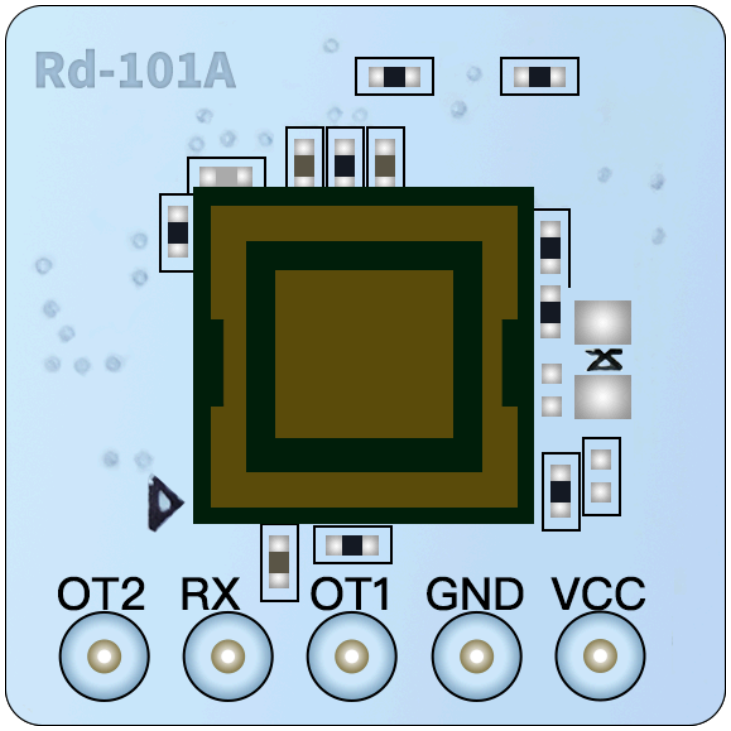
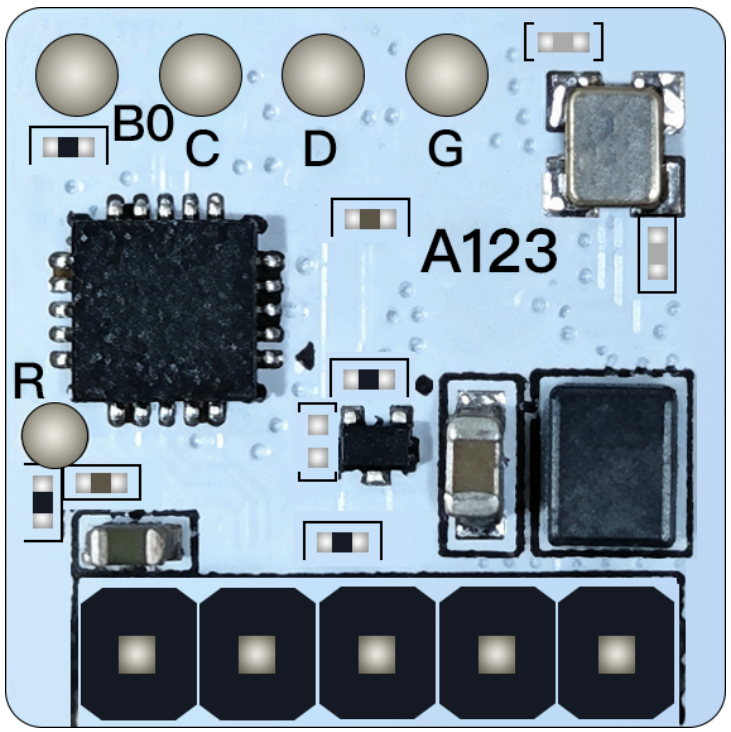
2. Differences Between the Two Modules

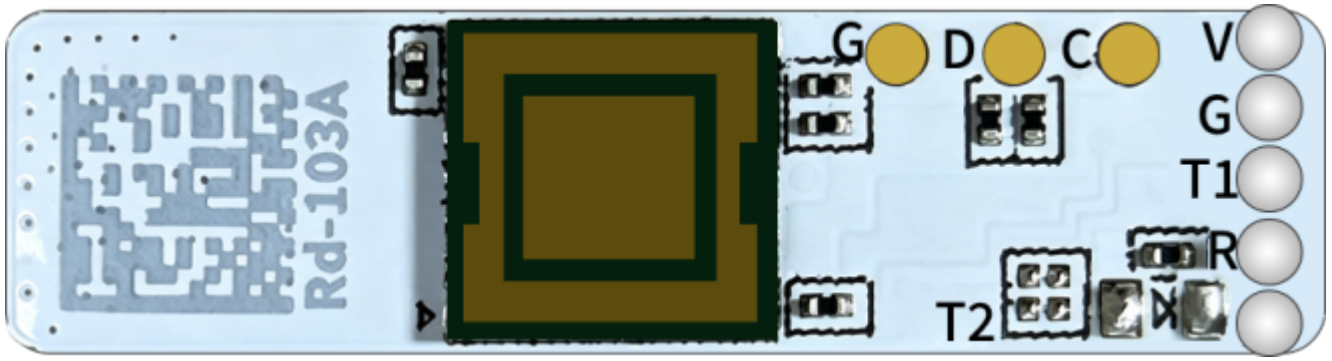
The wiring, host computer tool, and serial commands are the same for both modules. For physical wiring, connect according to the **pin names** (the silkscreen markings differ between the two modules).

Category	Rd-101A	Rd-103A
Dimensions	12mm x 12mm	6mm x 23mm (narrow design)
Power / UART 5-pin header	From left to right on the front: OT2, RX, OT1, GND, VCC	From top to bottom on the front: 3.3V, GND, OT1, RX, OT2

Category	Rd-101A	Rd-103A
SWD programming pads	From left to right on the back: VCC, CLK, DIO, GND	From left to right on the front: GND, DIO, CLK; connect the VCC from the separate header during programming







3. Connecting the Module to the USB-TTL Adapter

3.1 Pin Functions

Name	Direction	Function	Voltage level
VCC	Power input	Module power supply	3.0-3.6V, 3.3V typical
GND	-	Ground	-
OT1	Module output	**UART_TX** (module transmits, computer receives)	0-3.3V
RX	Module input	**UART_RX** (computer transmits, module receives)	0-3.3V
OT2	Module output	High when a person is present and low when no person is present (controlled by the target-disappearance delay)	0-3.3V

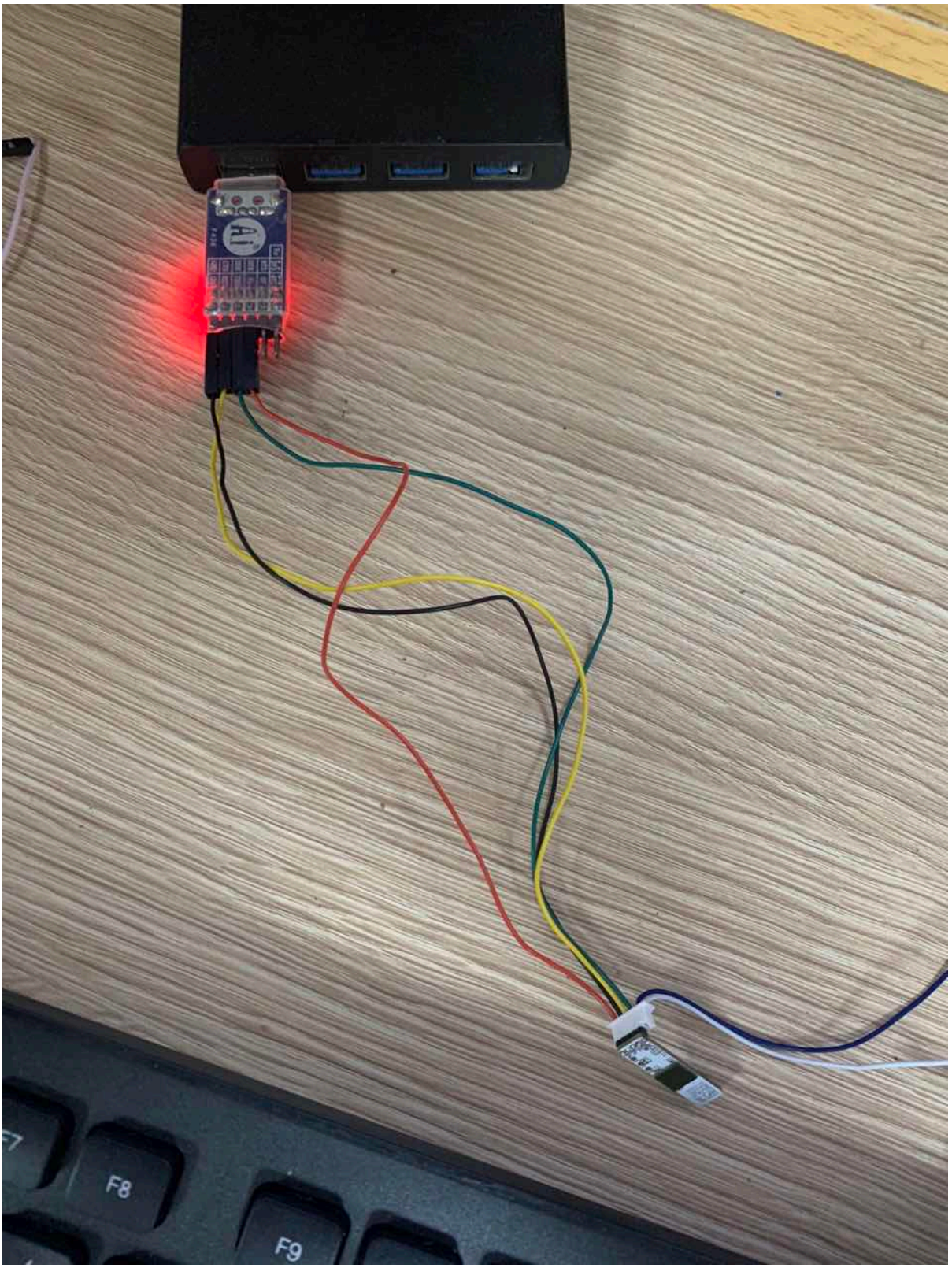
Module	USB-TTL
VCC	3.3V
GND	GND
OT1 (UART_TX)	RX / RXD
RX (UART_RX)	TX / TXD
OT2	Optional. Connect it to an oscilloscope or MCU only when a GPIO presence indicator is needed

3.2 Physical Wiring for Rd-101A

The physical wiring for the Rd-101A is shown below:

3.3 Physical Wiring for Rd-103A

The physical wiring for the Rd-103A is shown below:



3.4 Power-On Check

1. Connect the grounds first, then connect 3V3. After plugging the USB-TTL adapter into the computer, confirm in Device Manager that a new COM port appears.
2. The operating voltage is 3.3V. The average operating current is approximately 40mA, and the maximum operating current is approximately 100mA. Confirm that the TTL adapter can provide sufficient power.
3. OT2 can be used to confirm the detection status: it outputs high when a person is present and outputs low when no person is present and the disappearance delay has elapsed.

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4. Connecting with the Host Computer Tool and Reading Version / Firmware Package Information

Tool path: Click to download.

The interface is divided into three sections: device operations on the left (serial port, baud rate, and connection), function pages in the center, and parameter read/write buttons at the bottom.

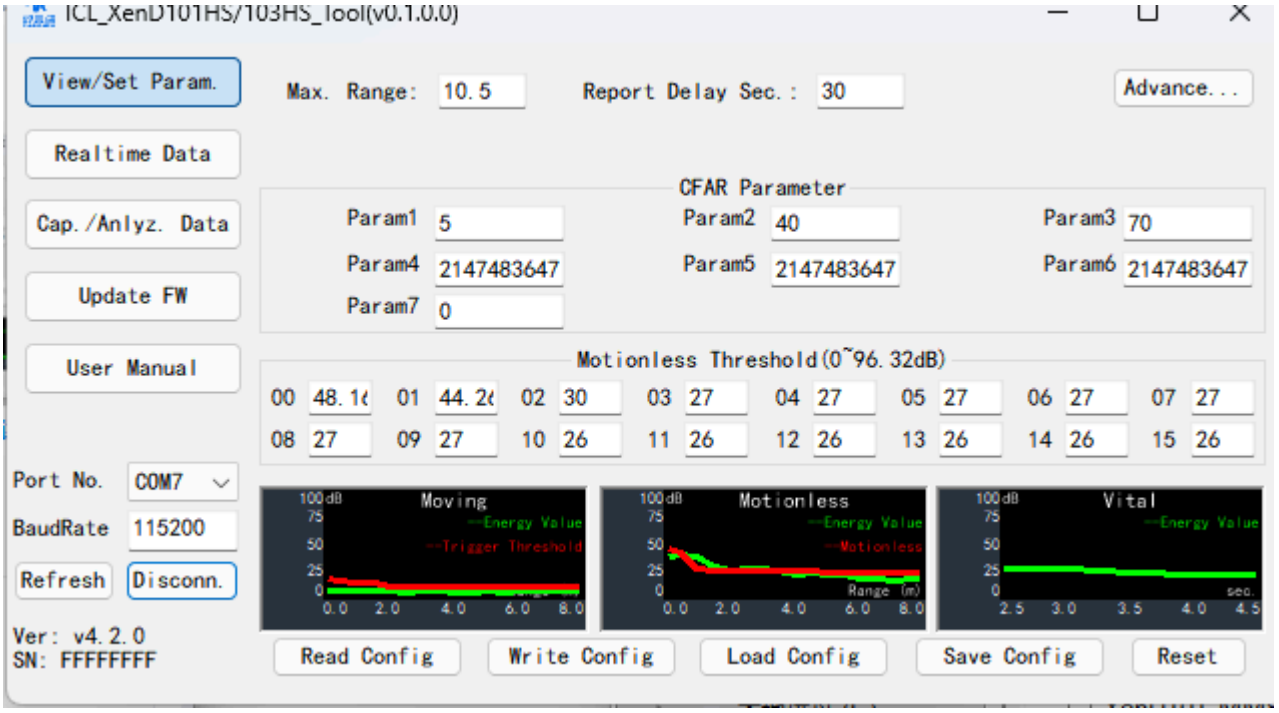
4.1 Connecting the Device

1. Confirm that sscom and other serial-port software are closed.
2. Open `ICL_XenD101HS_Tool.exe`.
3. Click **Refresh**, then select the COM port corresponding to the TTL adapter under **Port No.**.
4. **Set the baud rate to 115200** (`appConfig.xml` in the tool directory is already set to 115200).
5. Click **Connect**.

After the connection succeeds, the left panel displays:

- **Ver:** SDK firmware version, currently `v4.2.0`

The tool also automatically reads the current parameters. The default configuration is shown below.



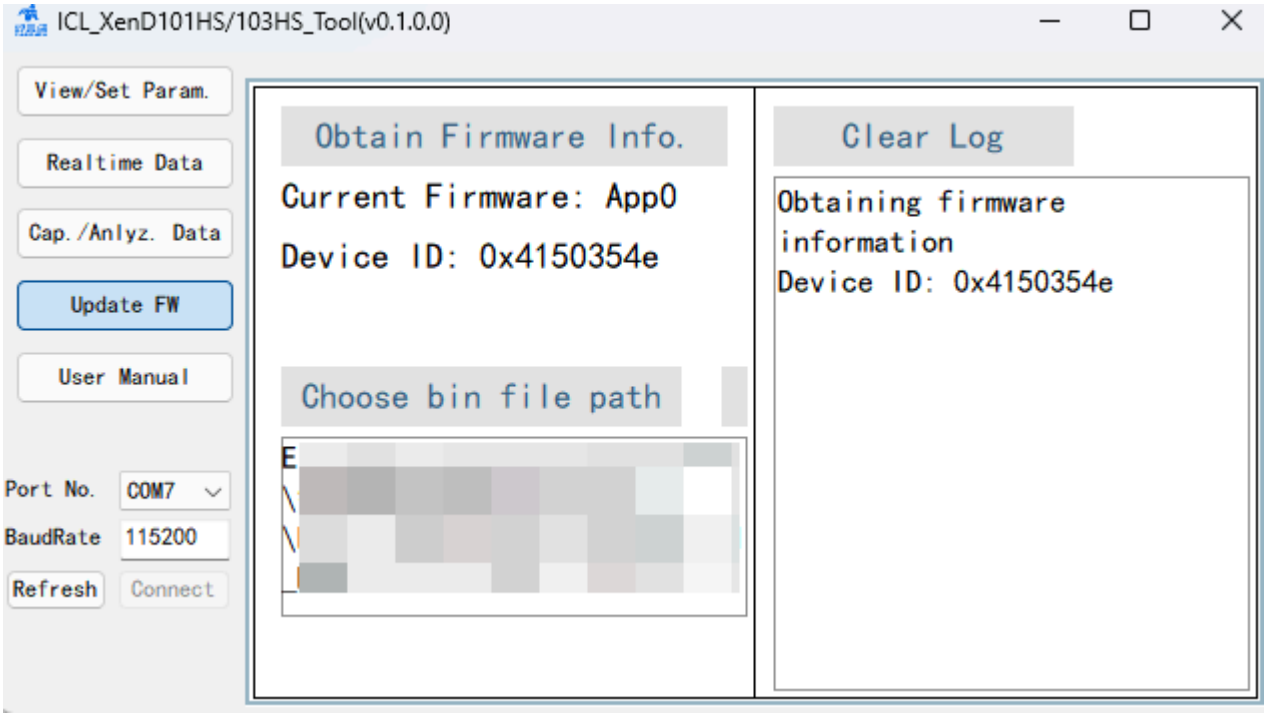
If the connection fails, check the following first:

- Whether the wrong COM port was selected or the port is occupied by sscom
- Whether TX/RX are connected in reverse, whether GND is shared, and whether 5V was connected by mistake
- Whether the baud rate is 115200

4.2 Reading the Device ID / Current Firmware on the "Update FW" Page

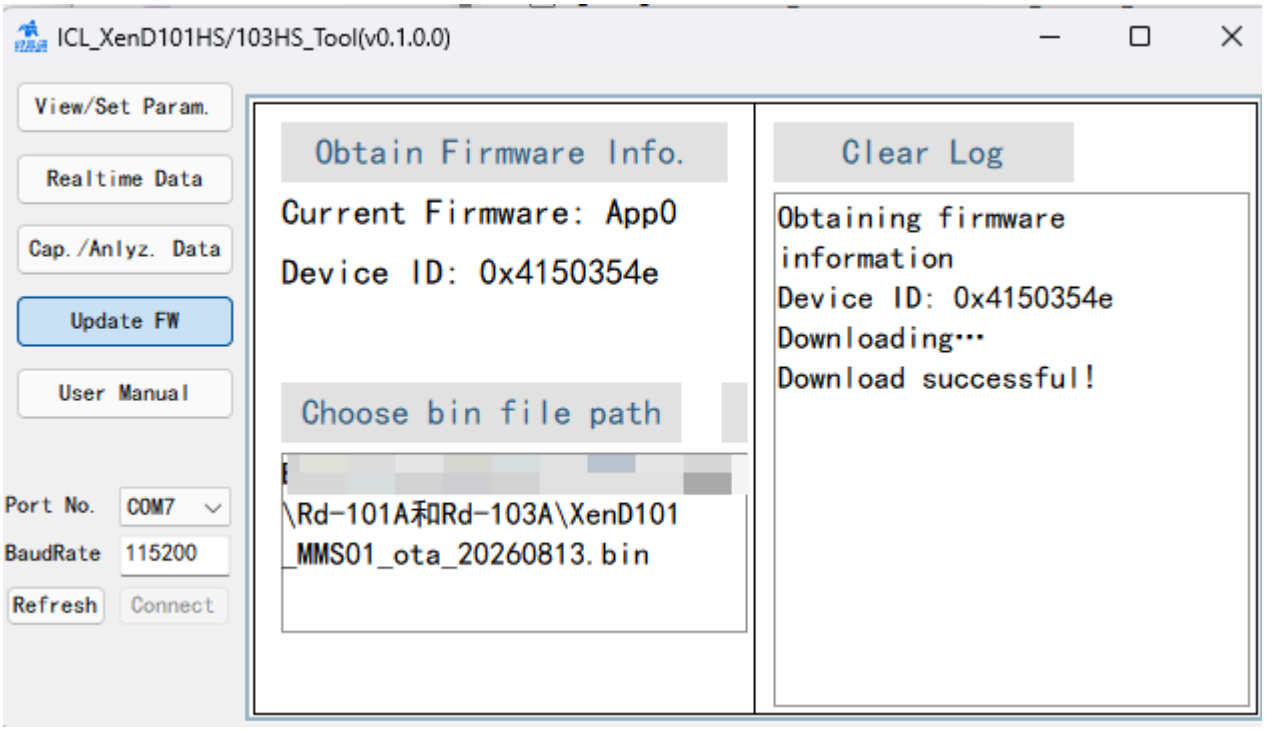
1. Keep the device connected.
2. Click **Update FW** on the left.

3. **You must click "Obtain Firmware Info." first**. The device information will then appear in the prompt box on the right.
4. The page displays:
    - **Current Running Firmware**
    - **Device ID** (IAP command `0x0075`, equal to the first 32 bits of the ChipID)



OTA procedure:

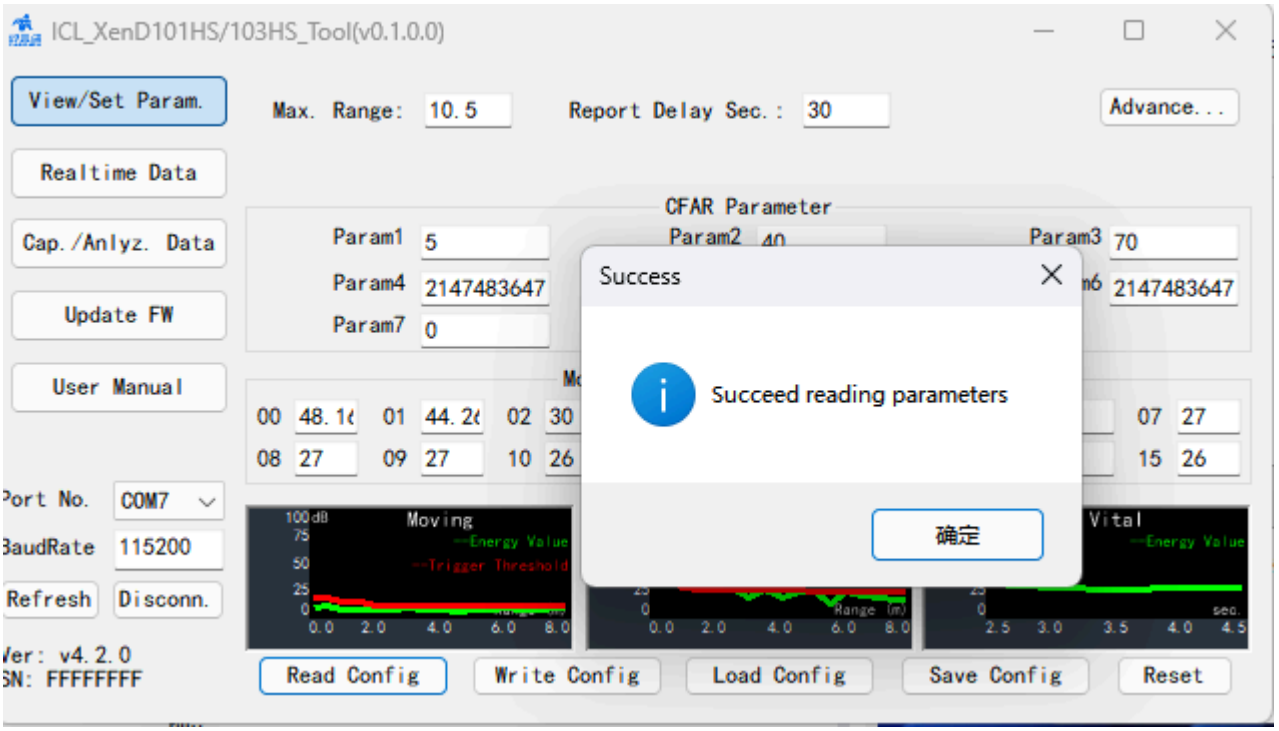
1. Click **Choose bin file path** and select the OTA firmware.
2. Click **Flash** and monitor the progress on the right. A successful operation displays "Download successful!".
3. After the upgrade, use `0x002A` in Section 6 to read the version and build information for verification.



5. Adjusting Parameters with the Host Computer Tool

5.1 Reading / Writing Parameters

Open **View/Set Param.**:



Operation	Button	Result
Read the current values from the module	**Read Config.**	Displays "Succeed reading parameters" and refreshes the interface
Write the interface values to the module	Click **Write Config.** after making changes	Displays "Succeed writing parameters"
Save the current interface values to a file	**Save Config.**	Generates an `.xml` file, by default in the tool directory
Restore parameters from a file	**Load Config.** -> **Write Config.**	Loads the file into the interface first, then writes it to the module

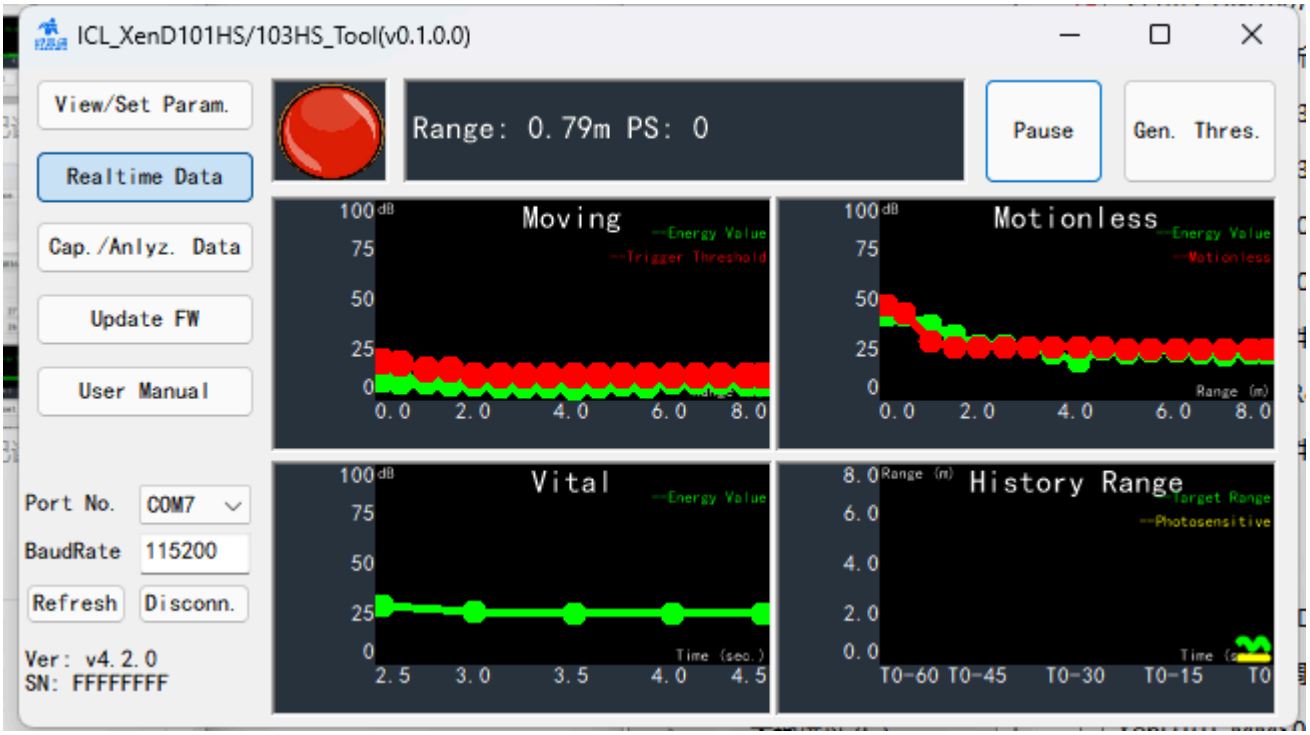
Normally, only the following items need to be changed:

Interface name	Meaning	Range
Max. Range (m)	Farthest valid detection range	0-108, precise to 0.1m
Report Delay Sec. (s)	The target must remain absent for T seconds before switching from presence to absence	0-65535
Param 7	Installation method: `0` ceiling-mounted, `1` wall-mounted	0 / 1
Param 1	Starting range gate for vital-sign detection	0-16
Param 2	Motion detection threshold coefficient	10-500

Interface name	Meaning	Range
Param 3	Vital-sign detection threshold coefficient	10-500
Motionless Threshold (dB)	Holding threshold for 16 range gates	0-96.32, precise to 0.01

Param 4-6 are reserved. A threshold that is too high can cause missed detections, while one that is too low can cause false alarms.

5.2 Real-Time Data and Automatic Thresholds



After connecting, click **Realtime Data**. The tool enters debug mode and displays graphs:

- Top indicator light: **red = person present, green = no person present**
- **Range**: Straight-line distance between the person and the module
- PS: Reserved interface
- Moving / Motionless: Green line for energy, red line for threshold; black background for valid range gates, gray background for invalid range gates
- History Range: Range changes over the previous approximately 60s

In an empty environment, click **Gen. Thres.**. The tool generates the holding threshold for each range gate based on the current noise, after which you can return to the parameter page and write the values.

Start/Pause only pauses interface refresh; it does not change parameters that have already been written.

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6. Adjusting Parameters Through the Serial Port

The protocol uses TTL UART, little-endian byte order, and the following frame format:

Frame Header	Length (2 bytes, little-endian)	Data	Frame Footer
`FD FC FB FA`	Number of bytes in the command word + command value	Command word (2) + command value (N)	`04 03 02 01`

Configuration commands must be preceded by entering configuration mode.

Standard sequence:

1. Enable configuration with `0x00FF`
2. Read / write parameters
3. Send the save command `0x00FD` when the settings need to be stored after power-off
4. End configuration with `0x00FE`; the module resumes operation and reports its status

6.1 sscom Settings

1. Close the host computer tool connection.
2. Open `sscom5.13.1.exe`.
3. Select the TTL COM port, set the baud rate to **115200**, 8N1, with no parity.
4. Check **HEX** for transmission. For reception, you can initially use ASCII to view report strings, then switch to HEX when adjusting parameters to inspect ACKs.

6.2 Operating Modes and Reports

After configuration ends, the module outputs according to the current system mode:

Mode	Parameter Value	Serial-Port Behavior
Debug mode	`04 00 00 00`	Binary debug frames (frame header `F4 F3 F2 F1`) for graphing by the host computer tool
Report mode	`64 00 00 00`	Outputs `OFF` when no person is present, and `distance:` + range when a person is present

Use report mode when integrating the module with an MCU product. Use debug mode to view waveforms in the host computer tool. The host computer tool switches to debug mode as soon as it connects.

6.3 Common Commands

All commands below are sent in **HEX**. Send "Enable Configuration" before sending other configuration commands.

Enable Configuration `0x00FF`

```
FD FC FB FA 04 00 FF 00 01 00 04 03 02 01
```

Successful ACK example:

```
FD FC FB FA 08 00 FF 01 00 00 02 00 20 00 04 03 02 01
(Protocol version 2, buffer size 32)
```

End Configuration `0x00FE`

```
FD FC FB FA 02 00 FE 00 04 03 02 01
```

Successful ACK example:

```
FD FC FB FA 04 00 FE 01 00 00 04 03 02 01
```

Read SDK Firmware Version `0x0000`

```
FD FC FB FA 02 00 00 00 04 03 02 01
```

Successful ACK example:

```
FD FC FB FA 0C 00 00 01 00 00 06 00 76 34 2E 32 2E 30 04 03 02 01
```

Here, `76 34 2E 32 2E 30` is the ASCII string `v4.2.0`.

Read Software Version and Build Information `0x002A`

```
FD FC FB FA 02 00 2A 00 04 03 02 01
```

Successful ACK example:

```
FD FC FB FA 29 00 2A 01 00 00 23 00 72 65 6C 65 61 73 65 2F 76 31 2E 30 2E 30 20
41 75 67 20 31 33 20 32 30 32 36 20 31 35 3A 30 30 3A 34 38 04 03 02 01
```

Here, `72 65 6C 65 61 73 65 2F 76 31 2E 30 2E 30` is the ASCII string `release/v1.0.0`, which indicates the software version. `20 41 75 67 20 31 33 20 32 30 32 36 20 31 35 3A 30 30 3A 34 38` is the ASCII string `Aug 13 2026 15:00:48`, which indicates the build time.

Read ChipID `0x0029`

```
FD FC FB FA 02 00 29 00 04 03 02 01
```

The ACK data area contains a 12-byte UID (little-endian 3×u32). The first 4 bytes should match the **Device ID** shown by the host computer tool and the IAP result. The ChipID differs between modules.

Read the IAP Device ID (configuration must be enabled first):

```
FD FC FB FA 02 00 75 00 04 03 02 01
```

Read Ambient-Light ADC `0x0028` (Reserved; the Default Hardware Does Not Include a Photoresistor)

```
FD FC FB FA 02 00 28 00 04 03 02 01
```

ACK data: `raw(u16 LE) + mV(u16 LE)`. Conversion: `mV = raw x 3300 / 4095`.

Example: `raw=4090`, `mV=3295` indicates a value close to 3.3V, which is common in dark conditions or when no photoresistor is installed.

Read Sensor Parameters `0x0008`

Read the maximum range (parameter ID `0x0001`):

```
FD FC FB FA 04 00 08 00 01 00 04 03 02 01
```

The 4-byte little-endian value in the ACK is the parameter value.

Read the installation method (parameter ID `0x000E`):

```
FD FC FB FA 04 00 08 00 0E 00 04 03 02 01
```

`00` means ceiling-mounted, and `01` means wall-mounted.

Configure Parameters `0x0007`

Configure the maximum range gate to `0x0C` (1.2m):

```
FD FC FB FA 08 00 07 00 01 00 0C 00 00 00 04 03 02 01
```

Configure the target disappearance delay to 12s:

```
FD FC FB FA 08 00 07 00 04 00 0C 00 00 00 04 03 02 01
```

Ceiling-mounted:

```
FD FC FB FA 08 00 07 00 0E 00 00 00 00 00 04 03 02 01
```

Wall-mounted:

```
FD FC FB FA 08 00 07 00 0E 00 01 00 00 00 04 03 02 01
```

Save Parameters `0x00FD`

Without saving, the settings are lost after power-off:

```
FD FC FB FA 02 00 FD 00 04 03 02 01
```

Switch Between Report / Debug Mode `0x0012`

Debug mode (for the host computer tool):

```
FD FC FB FA 08 00 12 00 00 00 04 00 00 00 04 03 02 01
```

Report mode (for the MCU / sscom to view `OFF` / `distance:`):

```
FD FC FB FA 08 00 12 00 00 00 64 00 00 00 04 03 02 01
```

6.4 Shortest Serial Parameter-Adjustment Example

Goal: wall-mounted, maximum range gate 10, disappearance delay 12s, save after power-off, then restore report mode.

```
FD FC FB FA 04 00 FF 00 01 00 04 03 02 01
FD FC FB FA 08 00 07 00 0E 00 01 00 00 00 04 03 02 01
FD FC FB FA 08 00 07 00 01 00 0A 00 00 00 04 03 02 01
FD FC FB FA 08 00 07 00 04 00 0C 00 00 00 04 03 02 01
FD FC FB FA 02 00 FD 00 04 03 02 01
FD FC FB FA 08 00 12 00 00 00 64 00 00 00 04 03 02 01
FD FC FB FA 02 00 FE 00 04 03 02 01
```

Each command should receive an ACK with status `00 00`. When a person approaches, `distance:` should appear. After the person leaves and the delay expires, `OFF` should appear.

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7. Command Quick Reference

Function	**Command Word**	**Must `0x00FF` Be Sent First?**	**HEX**
Enable configuration	`0x00FF`	-	`FD FC FB FA 04 00 FF 00 01 00 04 03 02 01`
End configuration	`0x00FE`	Yes	`FD FC FB FA 02 00 FE 00 04 03 02 01`
Read firmware version	`0x0000`	Yes	`FD FC FB FA 02 00 00 00 04 03 02 01`
Read version and build information	`0x002A`	Recommended	`FD FC FB FA 02 00 2A 00 04 03 02 01`
Read ChipID	`0x0029`	No	`FD FC FB FA 02 00 29 00 04 03 02 01`
Read Device ID	`0x0075`	Yes	`FD FC FB FA 02 00 75 00 04 03 02 01`
Read ambient light	`0x0028`	No	`FD FC FB FA 02 00 28 00 04 03 02 01`
Read parameters	`0x0008`	Yes	Command value = parameter ID
Write parameters	`0x0007`	Yes	Command value = parameter ID + 4-byte value
Save parameters	`0x00FD`	Yes	`FD FC FB FA 02 00 FD 00 04 03 02 01`
System mode	`0x0012`	Yes	Debug `04...` / report `64...`

Common parameter IDs:

ID	Meaning
`0x0001`	Maximum range / maximum range gate
`0x0004`	Target disappearance delay (seconds)
`0x000E`	Installation method: 0 ceiling-mounted / 1 wall-mounted
`0x0030`-`0x003F`	16 micro-motion & stationary thresholds

For complete register-type commands, see the Rd-101A_Rd-103A Serial Port Protocol Document.

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8. Frequently Asked Questions

Failed to connect to the host computer / No ACK when reading version.

- Set the baud rate back to 115200 and confirm 8N1.
- Check the wiring: OT1 → TTL RX, RX → TTL TX. A common ground is required.
- Close sscom, then reconnect the host computer tool.
- If the log shows ASCII text (such as `distance` / `error`) rather than `FD FC FB FA`, the module is in reporting mode and the command did not enter a configuration frame. Confirm HEX transmission is enabled and contains no unintended spaces.

The host computer software shows "Ver", but the real-time chart does not refresh.

- Switch to **Realtime Data**; do not click **Pause**.
- Make sure no other application is using the COM port.

The maximum range / delay reverts after power-off.

- The serial procedure omitted the `0x00FD` save command. After clicking **Write Config.** in the host computer tool, it is recommended to read the values back for verification.

OT2 stays high or stays low.

- First shorten the disappearance delay (e.g., to 5s), then wait through one full detection cycle — a person enters (area occupied) and then leaves (area empty).
- Make sure you are monitoring OT2, not OT1. (OT1 is UART_TX and will continuously toggle.)

The firmware-configured maximum range is 10.5m, but the measured range is only 6m.

- This is normal. Even under wall-mounted, normal-direction-motion, indoor open-space conditions, the maximum range is about 6m. The firmware-configured maximum range of 10.5m exceeds the actual coverage — it is an upper limit of the parameter, not a guaranteed detection range.
