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2.1 Characteristics

2.1.1 Intro

Power Debugger integrates the real-time source level debugging function of **local USB(HID + Winusb), local direct connection, LAN, and public network four working modes**, supplemented by **RTT Viewer**, Real-time Trace functions such as **RTT Scope**, multi-function (ARM) debugger tool with **universal serial port**, ultra-small size and weight, highly integrated functions, Users can use it as a high-speed debugger, voltage isolation debugger, remote real-time source debugging (technical support) and other application scenarios, as well as debugging assistance **Trace** function, and add other features, such as UART in full scene mode (local USB, local WIFI direct connection, cross-regional public network). And provide full platform support for small and efficient debugger equipment.

2.1.2 Product parameter

2.1.2.1 TX

- **Size**：55mm x 18mm x 9mm (≈)
- **Voltage**：5V (**USB TypeA**)
- **Consumption**：110mA@5V(min) / 140mA@5V(max)
- **Capacity**：5.0V@750mA (Max)

2.1.2.2 RX

- **Size**：56mm x 39mm x 9mm (≈)

- **Voltage**：5V (**USB TypeC**) / **5V PIN**
- **Consumption**：130mA@5V(min) / 160mA@5V(max)
- **Capacity**：5.0V@**1000mA** (Max)

> **TIPS**
>
> Product parameters are theoretical data, due to batch, working environment, product improvement and other reasons, actual differences may exist, for reference only, subject to change without notice!

2.1.3 Interface

- ①：Transmitter USB port
- ②：Transmitter status indicator

    - Power light (red)
        - On: The system power supply is normal
        - 1 On 2 Off: The input power supply is faulty (the voltage and load do not match).
        - 2 On 1 Off: The output power supply is faulty (short circuit, excessive load).
    - Status light
        - On: The transmitter and receiver are successfully paired
        - Off: The sending end and the receiving end are not paired
        - Blinking: Communication is in progress
            - 5HZ Connecting to WIFI
            - 2.5Hz Connecting pairing devices
            - 1.67Hz Debugging communication
        - 1 On 4 Off: Bluetooth connected
        - 4 On 1 Off: The public network mode is not authorized

- ③：Receiver status indicator (**Define same as transmitter**)

- ④：Receiver JTAG interface (Compatibility mode)

    - **VREF**：IO reference voltage, which can be configured by software to 1.8V, 3.3V, 5V IO reference voltage.
    - **TRST**：JTAG reset
    - **TDI**：JTAG TDI
    - **TMS**：JTAG TMS
    - **TCK**：JTAG TCK
    - **TDO**：JTAG TDO
    - **NRST**：Target chip reset pin
    - **5V**：Independent 5V power output(**It can be used as system power input**) (Max 400ma, self-protection)
    - **GND**：Ground

- ⑤：Receiver SWD interface
    - **VREF**：IO reference voltage, which can be configured by software to 1.8V, 3.3V, 5V IO reference voltage.
    - **DIO（SWDIO）**：Serial debug data line
    - **CLK（SWCLK）**：Serial debug clock line
    - **GND**：Ground
- ⑥：Receiving USB Type C port
- ⑦：Receiving UART interface：
    - **VREF**：IO reference voltage, which can be configured by software to 1.8V, 3.3V, 5V IO reference voltage。
    - **RX**：Debugger UART receive pin (corresponding to TX of the target chip)
    - **TX**：Debugger UART send pin (corresponding to RX of target chip)
    - **GND**：Ground

2.1.4 Function list

☑ Multi-mode high-speed Arm cortex-M debugger

☑ Supports local debugging of a single device at the receiving end, and the maximum speed is close to 3M bps.

☑ Supports local networking debugging at the transmitter and receiver (WIFI direct connection).

☑ Support transmitting and receiving LAN Intranet debugging (Local LAN).

☑ Supports remote public network debugging (WLAN) on the transmitter and receiver.

☑ Multi-mode serial port transceiver

☑ Local serial port forwarding on the receiving end.

- ☑ Transmitter + receiver remote local network serial port forwarding (WIFI direct connection).
- ☑ Transmitter + Receiver Local LAN Serial Port Forwarding (Local LAN)
- ☑ Transmitter + receiver remote serial port forwarding (WLAN).

☑ Support SWD/JTAG

☑ WinUSB /HID dual mode support

☑ 1.8V / 3.3V / 5V IO voltage support

☑ Support for on-board external power input (easy integration)

☑ RTT Viewer Support (Full features)

☑ RTT Scope support (Support for RTT channels and variable monitoring)

☑ Bluetooth support (WeChat Mini-app)

☑ Cross-platform support (Windows /Linux/MacOS， Wait for upgrade)

☐ web support (luci)(TBD)

> ⚠ **NOTICE**
>
> - In public network mode, low latency and stability of the network are highly dependent. For example, high latency or high network fluctuation may cause high failure rate. Therefore, optimize network processing.
> - Some features that are **not checked** are still under evaluation and there is no guarantee that they will be developed in the future.
> - If you have any suggestions or comments, please give us feedback.

2.1.5 Supported dev-platform

☑ IAR， all version， CMSIS-DAP V1 interface

☑ IAR， >=7.40.2， CMSIS-DAP V2 interface

☑ Keil， all version， CMSIS-DAP V1 interface

- [x] Keil，>=5.36，CMSIS-DAP V2 interface
- [x] Segger Embedded Studio，CMSIS-DAP V1 interface
- [x] Segger J-Flash，==V7.22B，CMSIS-DAP V1 interface
- [x] OpenOCD
- [x] PyOCD
- [x] Probe RS
- [x] FreeMASTER，CMSIS-DAP V1 interface
- [x] RT-Thread Studio
- [ ] Others

2.1.6 Supported operating systems

- [x] Windows >= Windows 7 SP1
- [x] Linux（>= Ubuntu 20.xx; Centos; Debian,Deepin ...）
- [x] MacOS >= 13.xx
- [x] WeChat Mini Program

2.2 Software installation

2.2.1 Intro

The Power Debugger provides the Windows/Linux like/MacOS configuration client software and function modules such as device function configuration, serial port, RTT, and firmware upgrade. Install the software according to the corresponding system.

2.2.2 Windows

2.2.2.1 Software download

See the official website for the latest client download address：

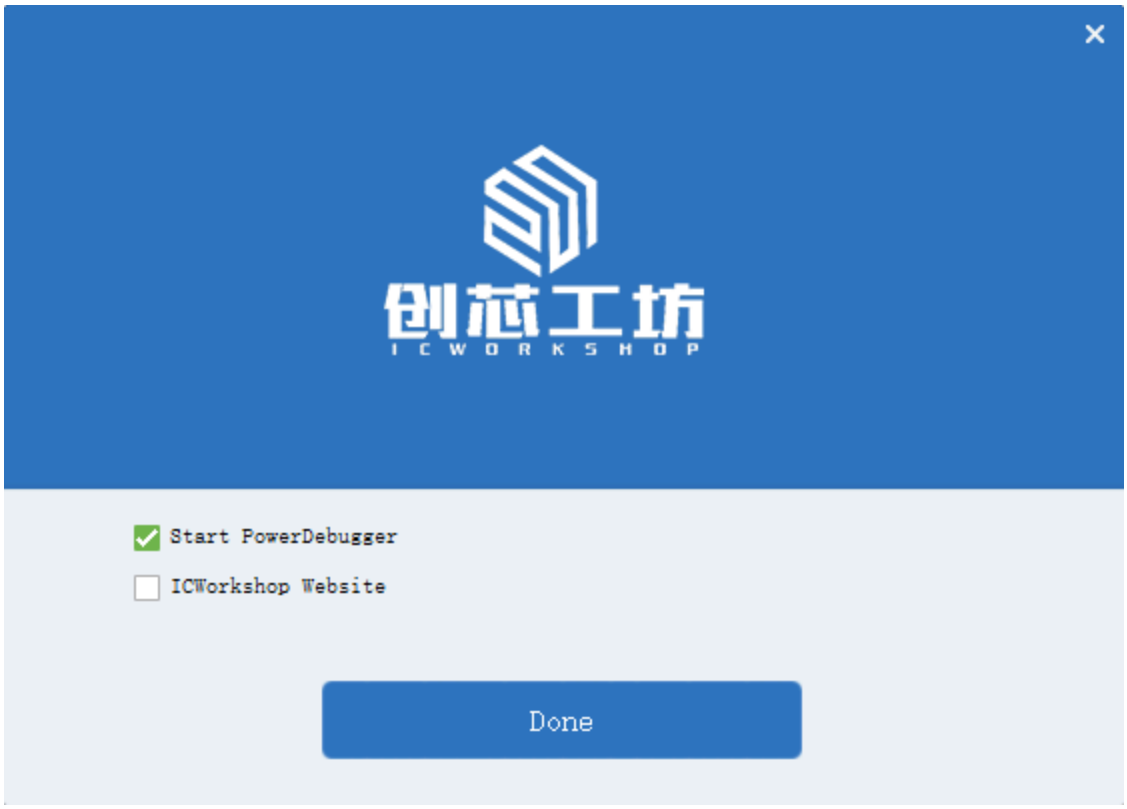
https://www.powerwriter.com/index/index/products.html?p=23&c=files&t=Client

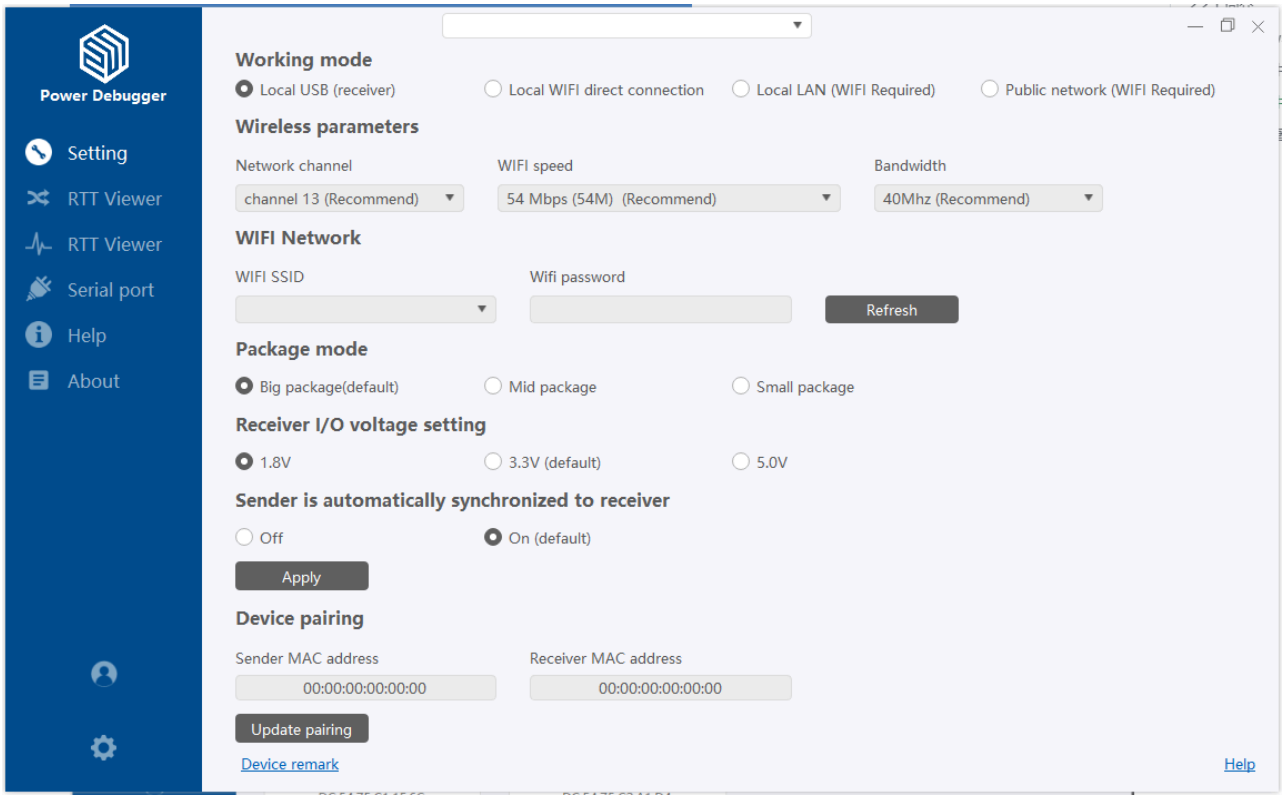
Download the Power Debugger installation package based on the current system platform.

2.2.2.2 Software Installation Process

Run the installation software, click **【Install Now】** and wait for the installation to complete.

After the installation is complete, click [**Done**] to start the software.


创芯工坊
ICWORKSHOP
Start PowerDebugger
ICWorkshop Website
Done


Power Debugger
Setting
RTT Viewer
RTT Viewer
Serial port
Help
About
Working mode
Local USB (receiver)
Local WIFI direct connection
Local LAN (WIFI Required)
Public network (WIFI Required)
Wireless parameters
Network channel
channel 13 (Recommend)
WIFI speed
54 Mbps (54M) (Recommend)
Bandwidth
40Mhz (Recommend)
WIFI Network
WIFI SSID
Wifi password
Refresh
Package mode
Big package(default)
Mid package
Small package
Receiver I/O voltage setting
1.8V
3.3V (default)
5.0V
Sender is automatically synchronized to receiver
Off
On (default)
Apply
Device pairing
Sender MAC address
00:00:00:00:00:00
Receiver MAC address
00:00:00:00:00:00
Update pairing
Device remark
Help

2.2.2.3 Quick lancher

- Find the Power Debugger icon from the system desktop to start.
- Search for the Power Debugger from the application search bar and launch it.

2.2.3 Linux

2.2.3.1 Software download

See the official website for the latest client download address：

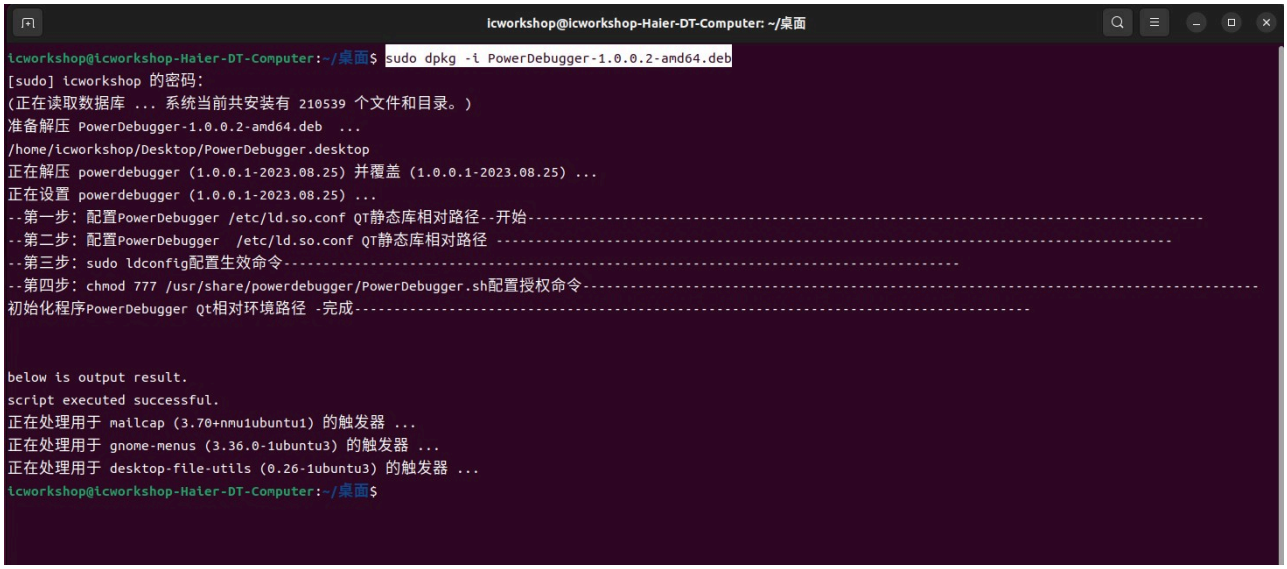
https://www.powerwriter.com/index/index/products.html?p=23&c=files&t=Client

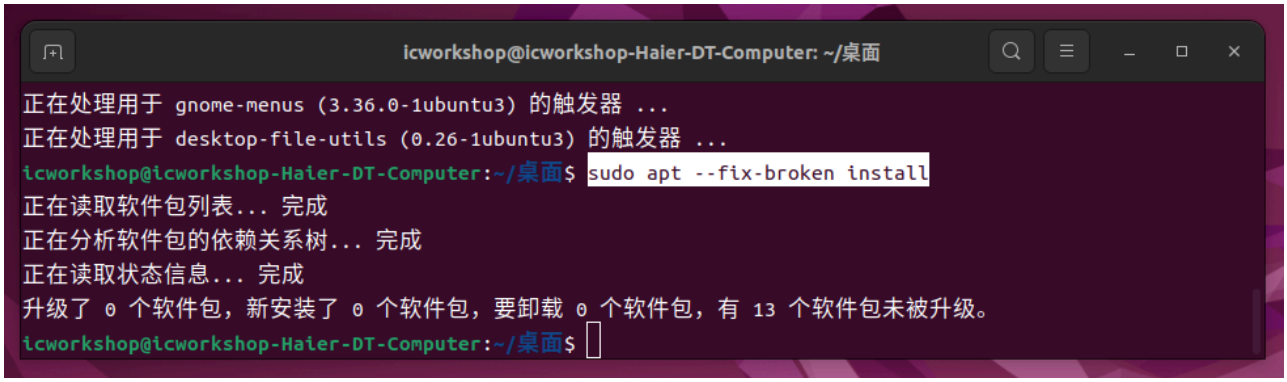
Download the Power Debugger installation package based on the current system platform.

2.2.3.2 Software Installation Process

```
sudo dpkg -i PowerDebugger-*.*.*.*-amd64.deb
# If the version is 20.xx, you may need to add a software source
sudo vi /etc/apt/sources.list
deb http://th.archive.ubuntu.com/ubuntu jammy main
sudo apt-get update
#Installation dependency
sudo apt --fix-broken install
```

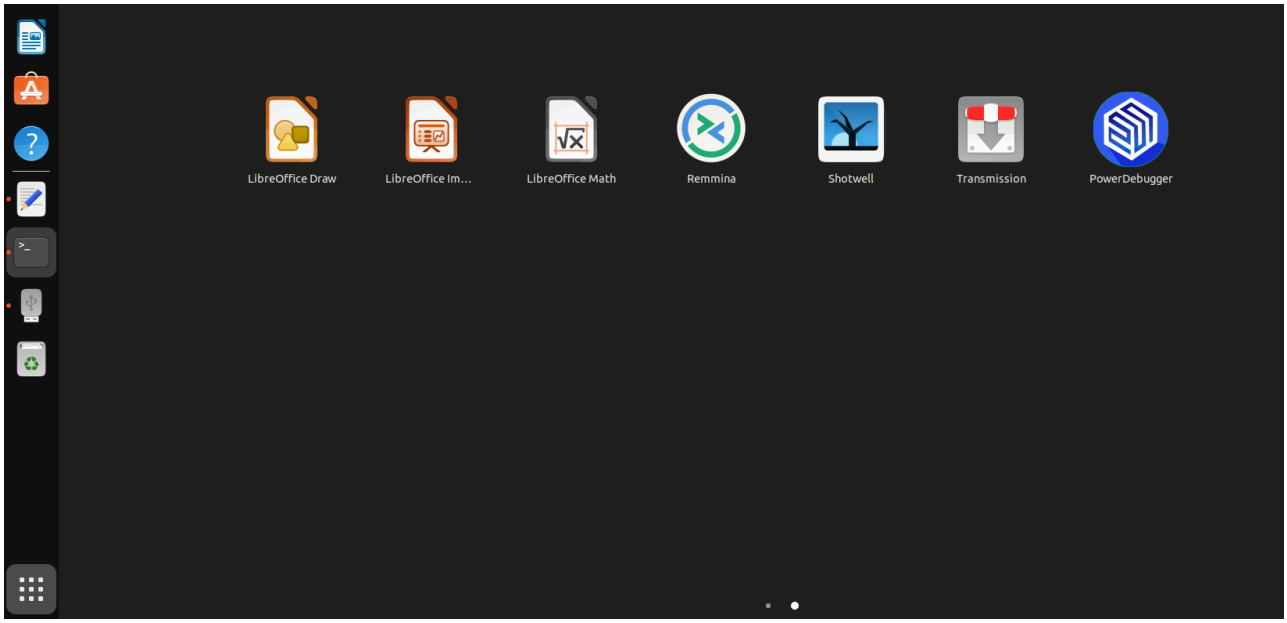
as shown in the following figure：





2.2.3.3 Quick start

- Enter PowerDebugger in the terminal to start.
- Start from the application panel, as shown in the following image.



2.2.3.4 Uninstall

```
sudo dpkg -r PowerDebugger
```

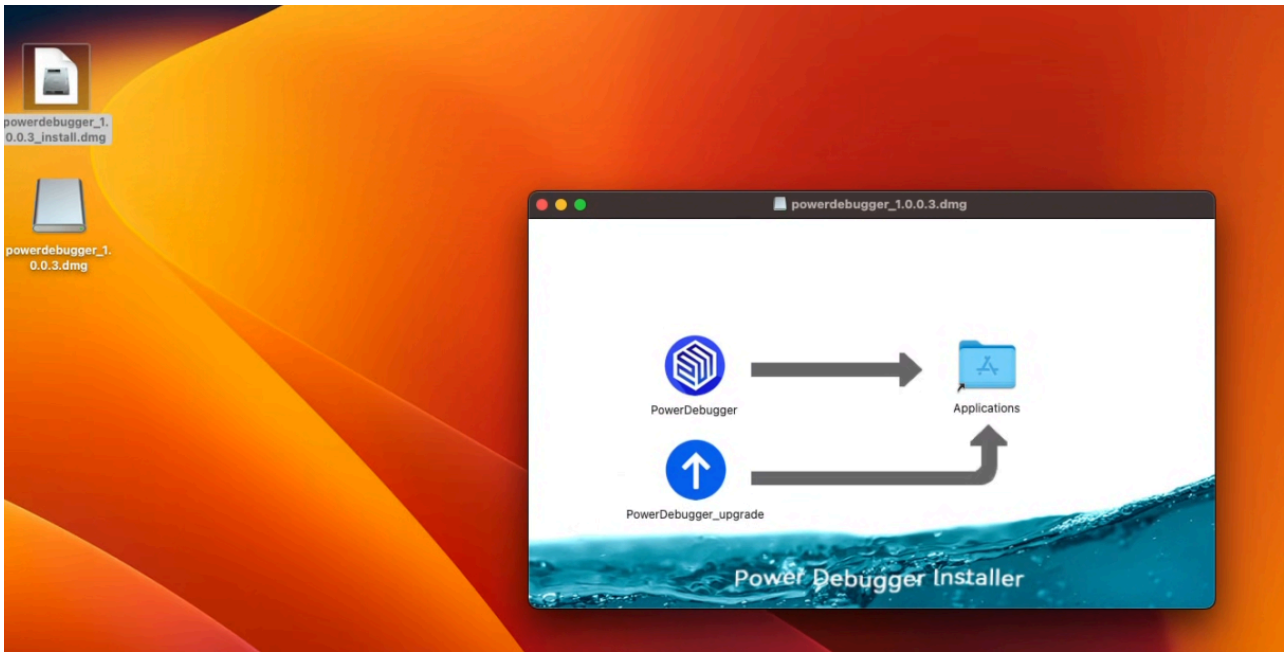
2.2.4 MacOS (Beta)

2.2.4.1 Software download

- download package from https://www.powerwriter.com/index/index/products.html?p=23&c=files&t=Client
- install from mac app store.

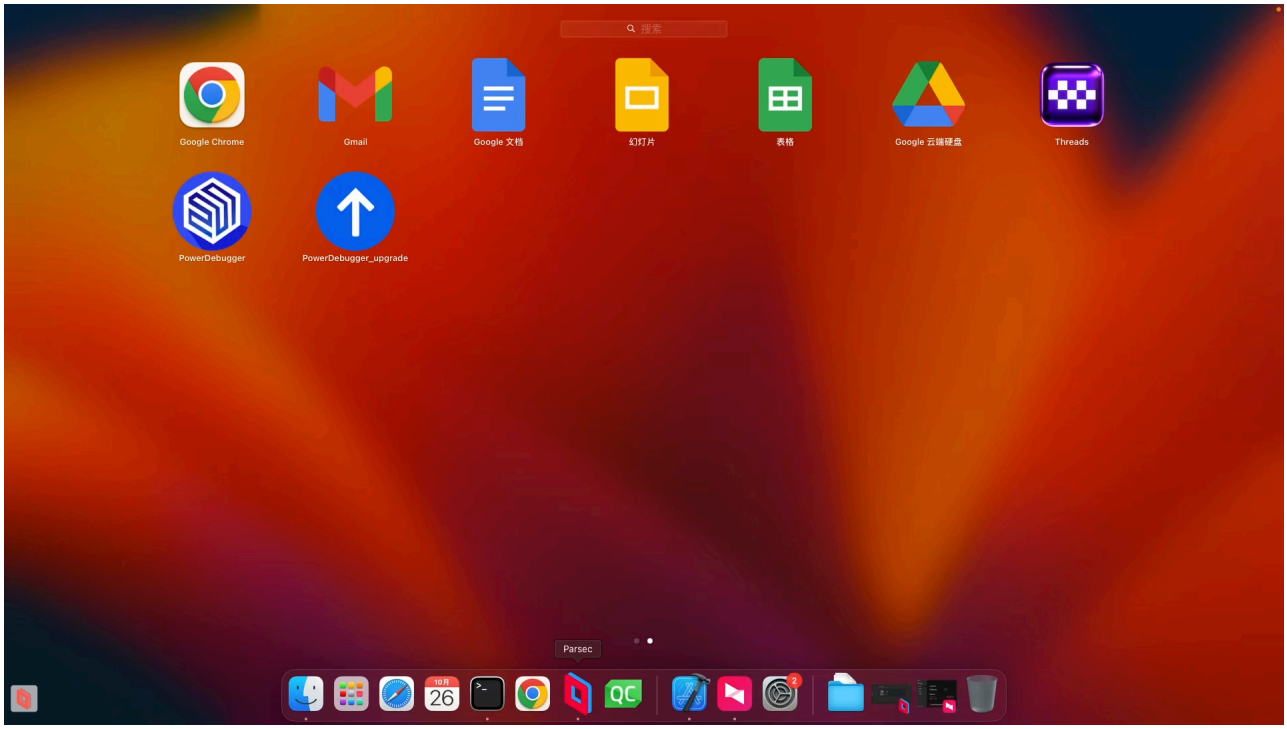
2.2.4.2 Software Installation Process

Double-click powerdebugger_x.x.x.xx_installer. dmg to go to the software installation page. Next, drag and drop PowerDebugger and PowerDebuggerUpgrade into the Applications folder to complete the installation of the PowerDebugger main application and upgrade service, as shown in the following figure：



2.2.4.3 Quick start

Start from the application panel, as shown in the following image.



2.2.4.4 Fix broken

If it cannot start, try lifting the quarantine

```
sudo xattr -r -d com.apple.provenance /Applications/PowerDebugger.app
sudo xattr -r -d com.apple.quarantine /Applications/
PowerDebugger_upgrade.app
```

2.2.5 We Chat App (Mobile)

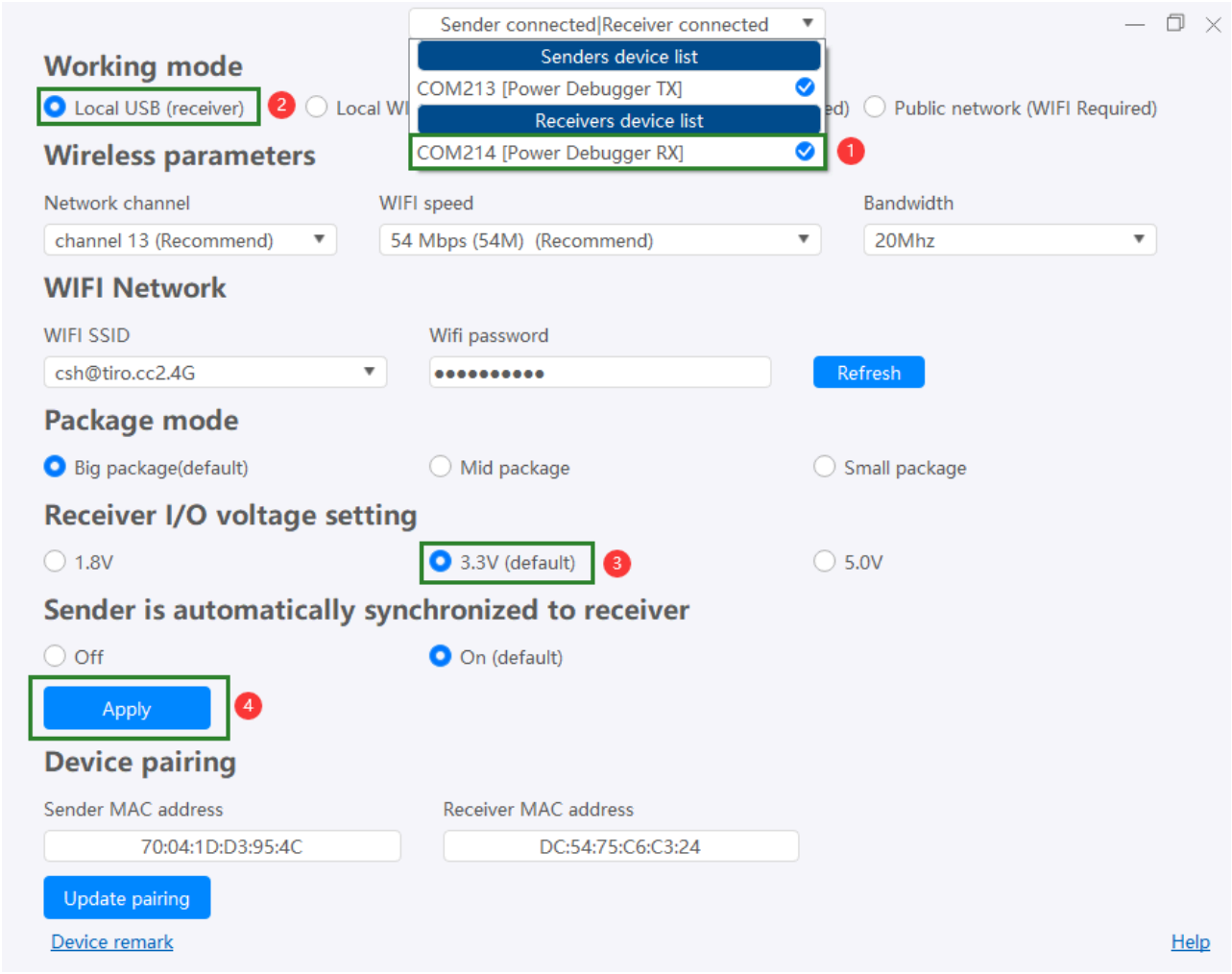
TIPS

The application scenarios of wechat mini programs are as follows: LAN or public network mode, quick setting scenario when the receiving device is configured and the working mode is switched **without installing the desktop software**, please install the Power Debugger client for full functions.

3.1 Debugger

3.1.1 Local USB mode

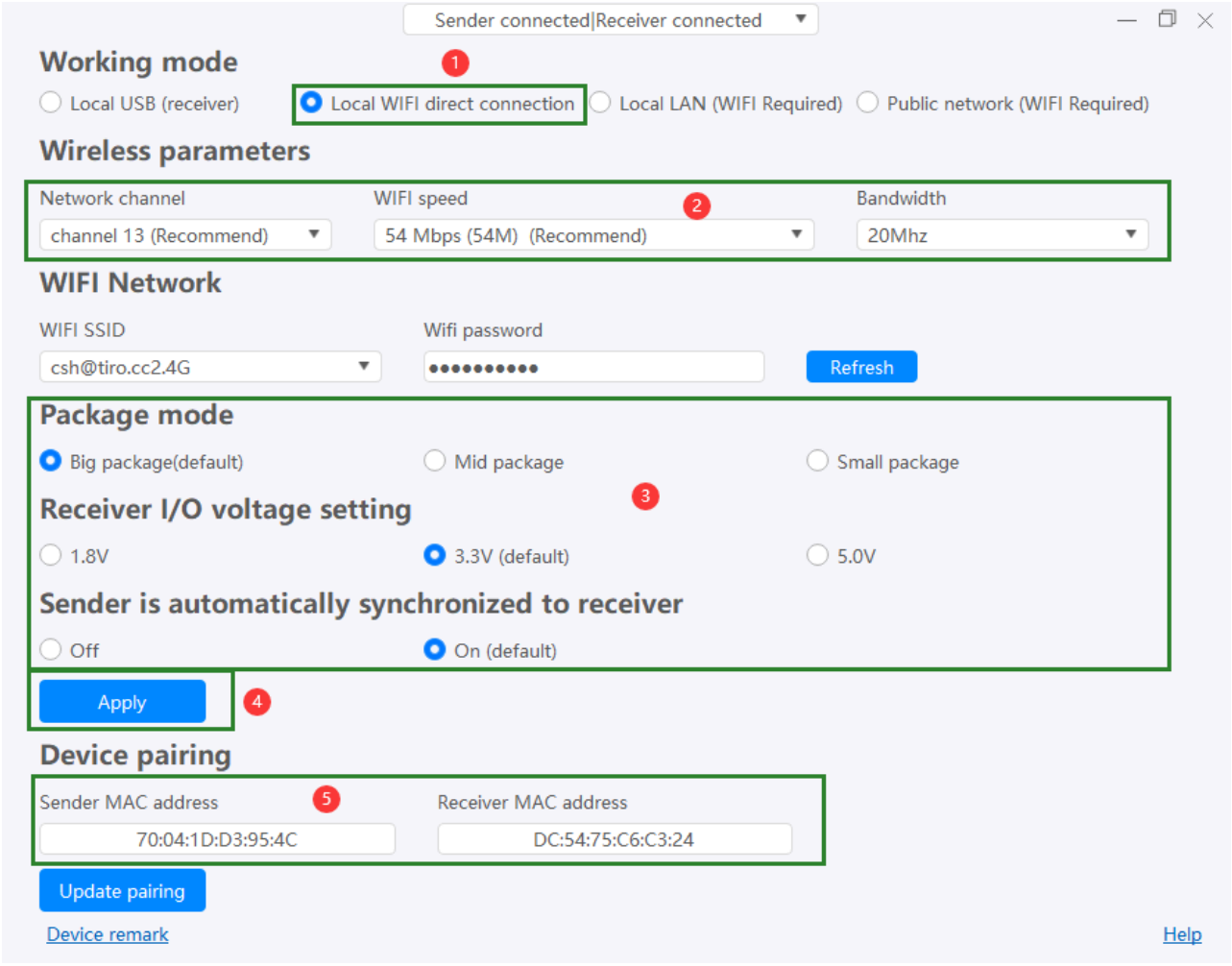
- Connect the Power Debugger receiver device (**Whether the transmitter is connected or not**)
- Set the working mode to **Local USB (receiver)**.
- Check the I/O voltage (default is 3.3V).
- Then apply the Settings.



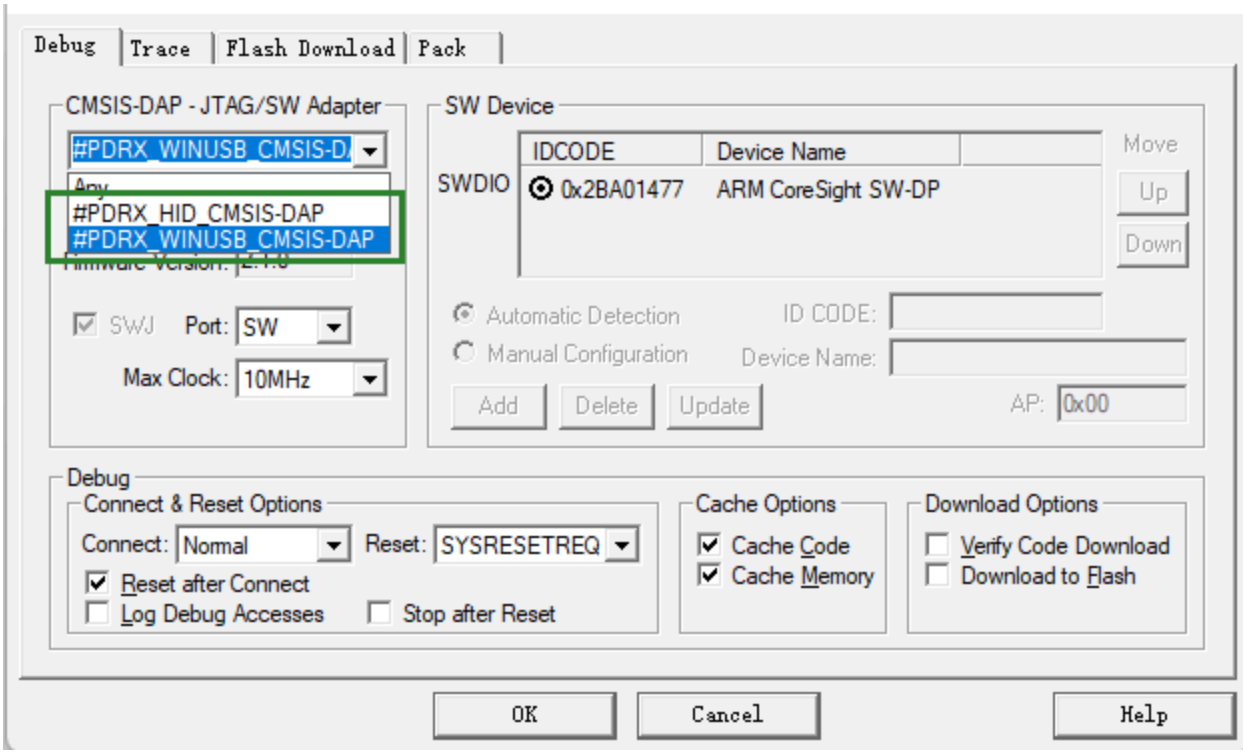
3.1.2 Local WIFI direct connection mode

- Connect the transmitter and receiver
- Select **Local WIFI Direct connection mode**
- Adjust network channel, wireless speed, bandwidth and other Settings (**Generally default**)
- Adjust the packet mode (default large packet mode, can provide higher speed, small packet mode can provide better stability)
- IO voltage (default 3.3V, mainstream scheme)
- Set synchronization (enabled by default), change the parameters of the transmitter,

will be synchronized to the receiver



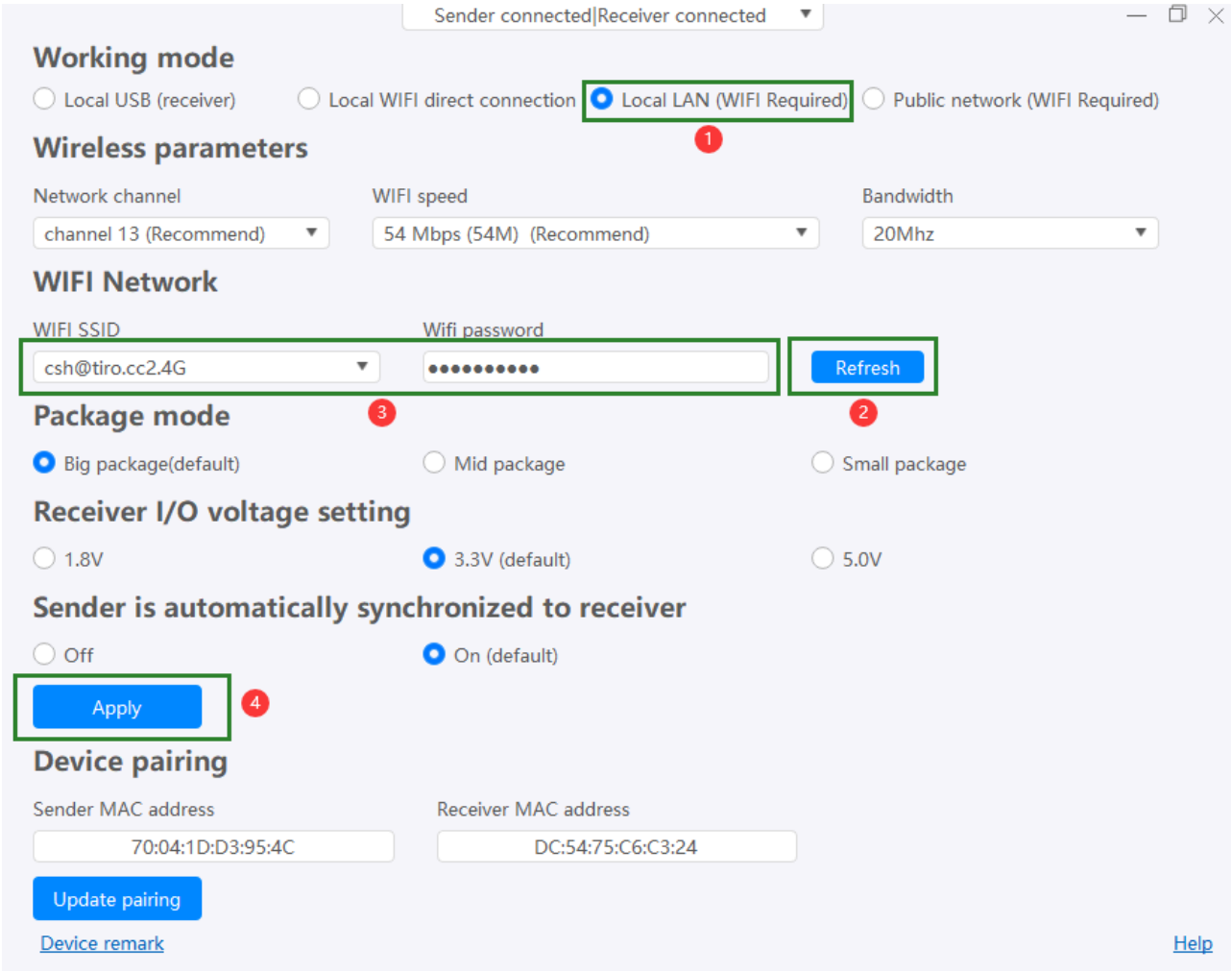
As shown below, high-speed mode is recommended.



See the full debugger setup tutorial and FAQ Debugger setup tutorial

3.1.3 LAN mode (network required)

In LAN mode, in addition to the need to set the working mode to LAN mode, you need to configure the SSID and password of the wireless network, as shown in the following figure:

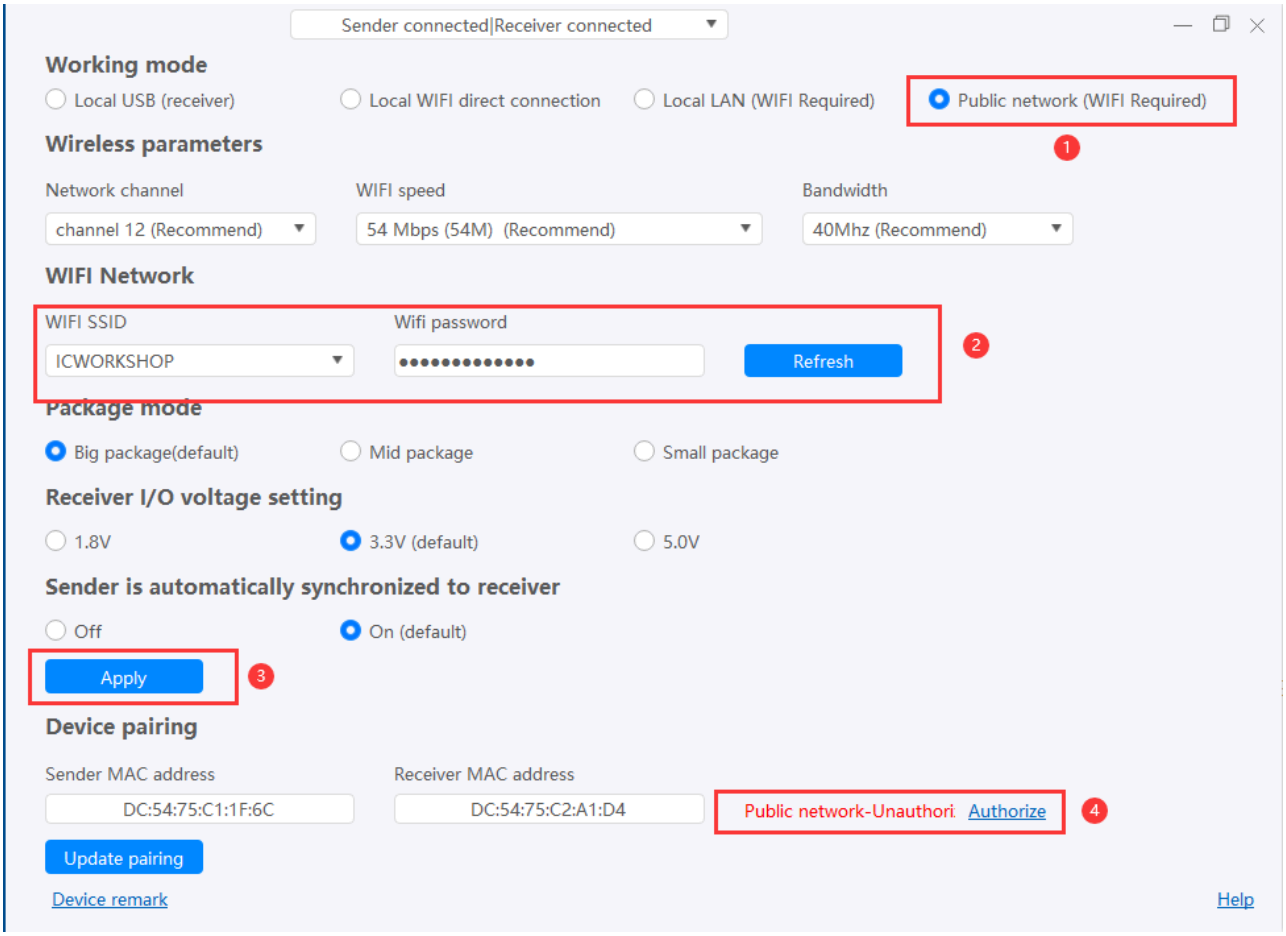


SPECIAL INSTRUCTIONS

- LAN mode is associated with the response real-time of routing, such as the delay of large delay, unable to find the equipment and other problems, please check the routing setting, restart the router when necessary, or the device, if necessary, contact us in time.
- In LAN mode, data is encrypted.
- After the synchronous setting, please check whether the green status light of the transmitting end (receiving end) is on (if it is on, the communication is normal).
- This section describes other parameters in LAN mode Direct local WIFI connection

3.1.4 WLAN mode (Network required)

In public network mode, in addition to setting the working mode to public network mode, you need to configure the SSID and password of the wireless network, as shown in the following figure:



SPECIAL INSTRUCTIONS

- Public network mode is closely related to the real-time and stability of the network. ICWorkshop will provide the platform CDN server node(**Open Beta**), which can stabilize the real-time debugging in most parts of China (North,

Central, South and East China) at present, and some parts of West, Southwest and Northwest China have high delay, so it **does not provide overseas public network debugging service for the time being**.

- In WLAN mode, data is encrypted.
- After the synchronous setting, please check whether the green status light of the transmitting end (receiving end) is on (if it is on, the communication is normal).
- **In public network mode, the device authorization is required**, See Account.
- This section describes other parameters in public network mode Direct local WIFI connection
- **The first update of the Settings requires a public network test to establish the lowest delay route, which takes a long time (>15 seconds), after the test is complete, the current Settings are saved so that the best Settings can be used, and the optimal route can be retested by re-updating the Settings to the transmitter and receiver to clear the Settings.**
- The current product has no plan to provide P2P connection mode.

3.1.5 Supplementary statement

3.1.5.0 Bluetooth applet in LAN and public network mode

We chat mini app can be used to quickly distribute the network and switch the working mode of the device, see Mini-App

3.1.5.1 Check the connection before use

No matter what mode the device is in, the constant green indicator indicates that the device is successfully initialized. If the green indicator blinks, it indicates that the

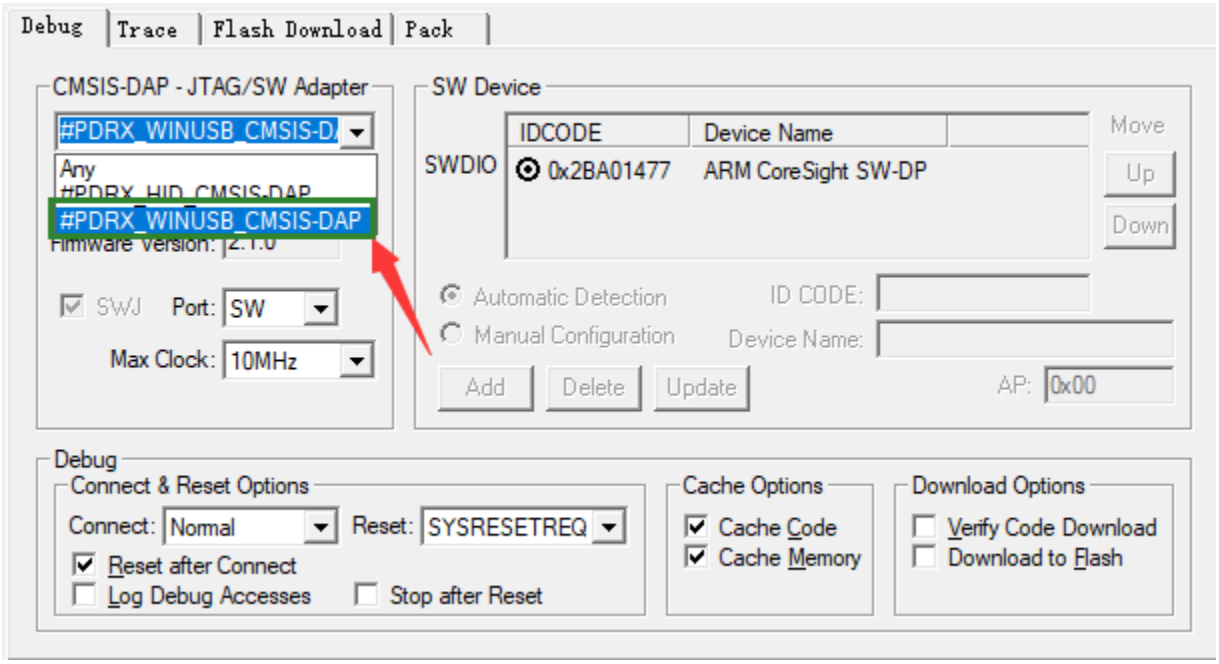
connection fails. Check the device mode and ensure that the transmitter is paired with the receiver.

3.2.5.2 WINUSB mode

In the debugger selection screen, you can see the dual-mode debugging equipment:

- HID channel, standard mode.
- WINUSB mode, high speed mode.

As shown below, high-speed mode is recommended.



If the device is not recognized or the WINUSB channel is not recognized, try updating the driver,See **Drive installation**， If it can be used normally, no installation is required!

See the full debugger setup tutorial and FAQ Debugger setup tutorial

3.2.5.3 Supported development environment

Refer to 2.1 Characteristic | IDE

Edit this page

Last updated on ***Dec 20, 2023*** *by* ***Alan Chen***

3.2 RTT Viewer

3.2.1 Ready for use

Download the RTT software package from the official website and integrate it into the project. For specific usage methods, please refer to the official documentation. Attached is the RTT software package and Sample routine for quick reference.

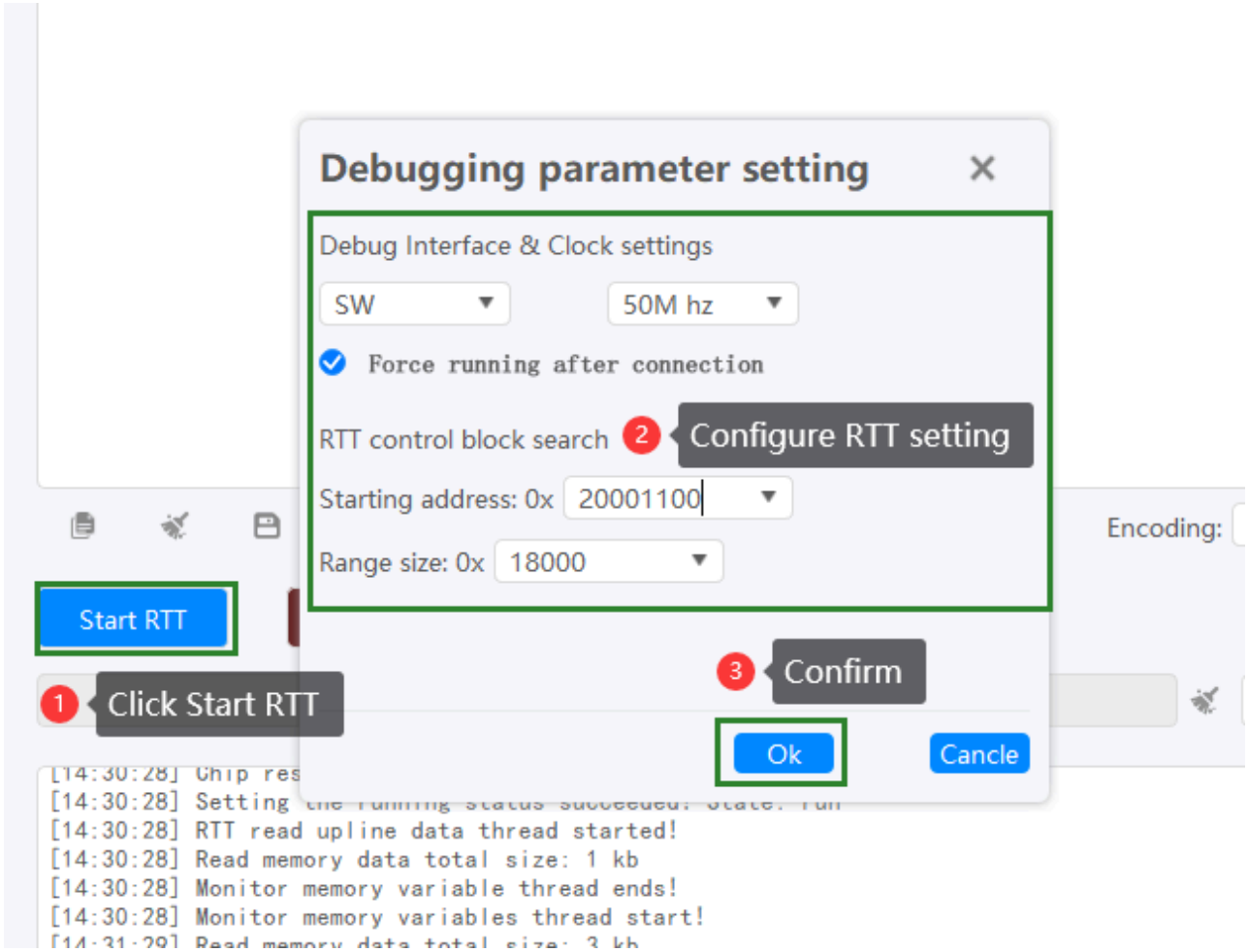
attachments：

SEGGER_RTT_V766b.zip download

STM32F407 RTT test demo

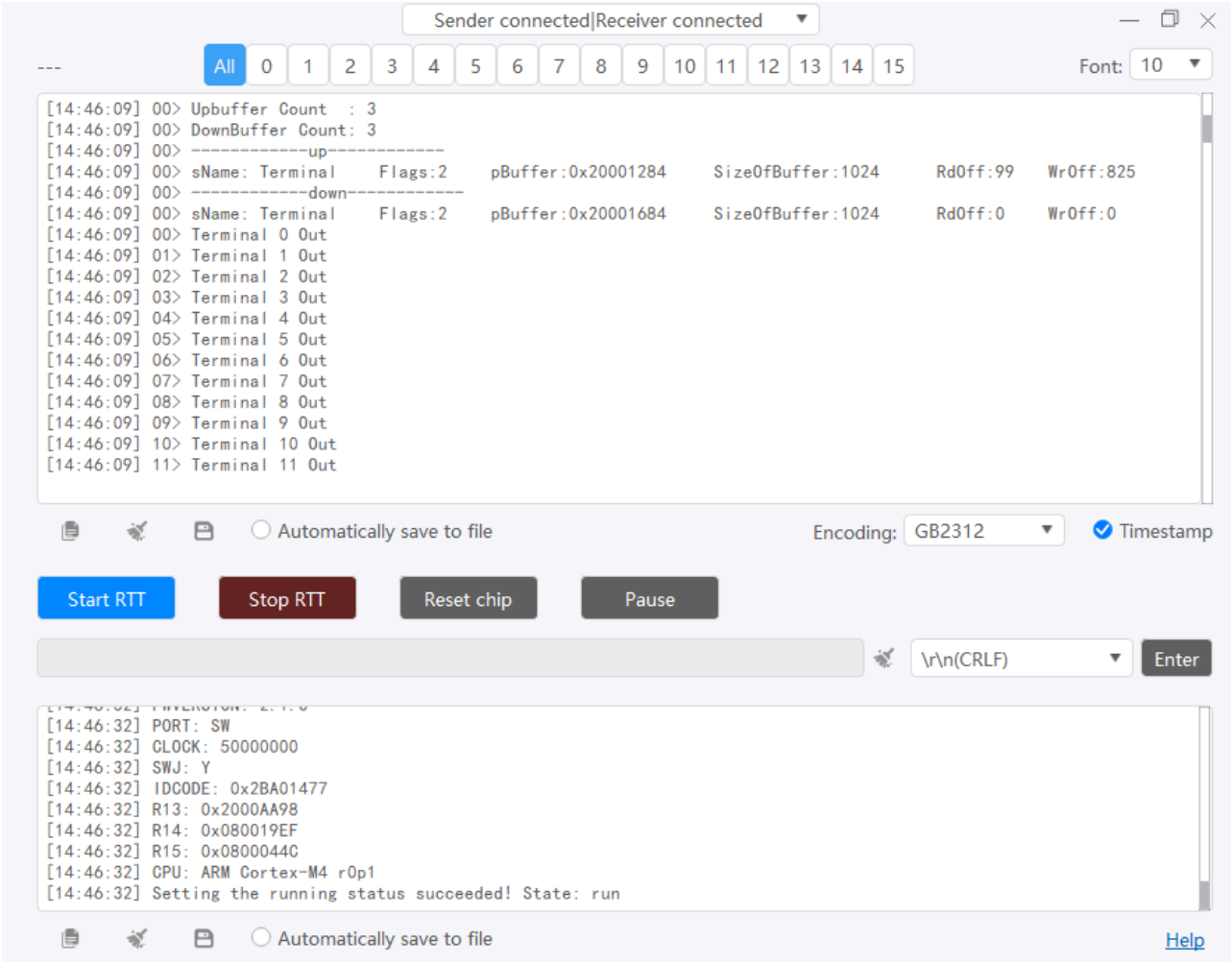
3.2.2 Start RTT

The following figure shows the process for enabling RTT monitoring:



- Click the Start RTT button.
- Configure working parameters between the target chip and the Power Debugger: interface type, clock speed, and RTT control block search configuration.
- Click the OK button.
- Wait for RTT initialization to complete.

After the initialization is complete, you will see the following output from the RTT terminal.



3.2.3 Stop RTT

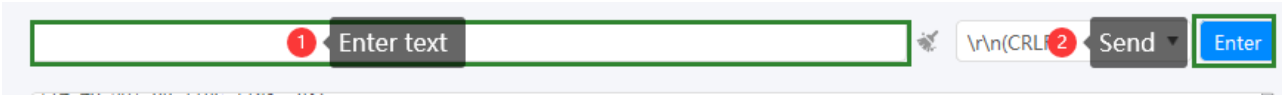
Click the 【**Stop RTT**】 button to stop.

3.2.4 Reset chip & switch run state

You can reset the target chip and switch between Run and Halt states by clicking the "**Reset chip** " and "**Run (Pause)** " buttons.

3.2.5 Transmission of data

To send data in the downlink channel, Enter the text to be sent in the send edit box and click the [**Enter**] button to send data, as shown in the figure below.



TIPS

- Data can be sent directly by the Enter key, and the currently set carriage return option is added to the end of the data.
- [Enter] Send the original data of the edit box will be sent, without the carriage return option.

3.2.6 Reference

For more information please refer to Reference manual-RTT Viewer

Edit this page

*Last updated on **Jul 5, 2023** by **Alan Chen***

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3.3 RTT Scope

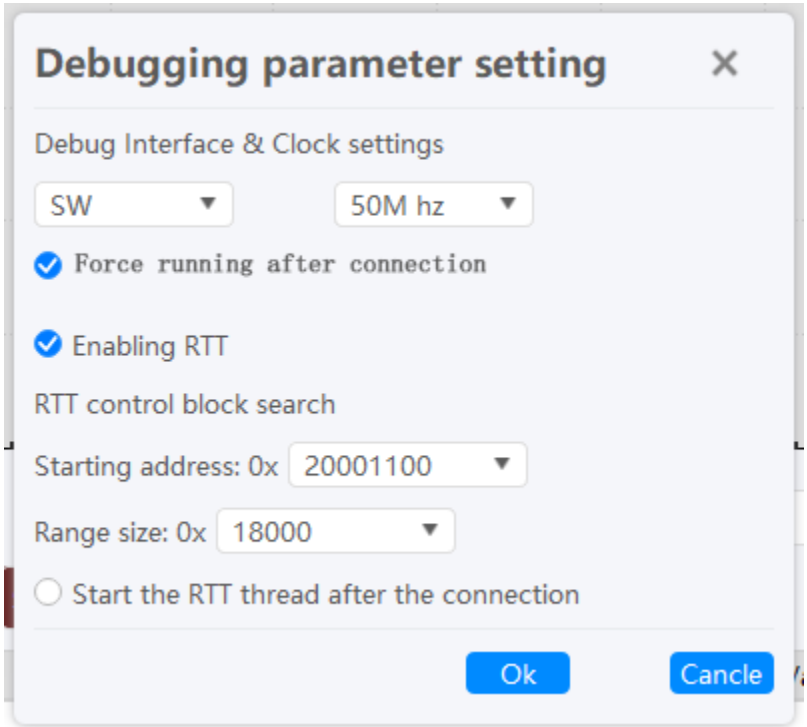
3.3.1 Ready for use

SEGGER_RTT_V766b.zip download (optional)

STM32F407 Scope test demo

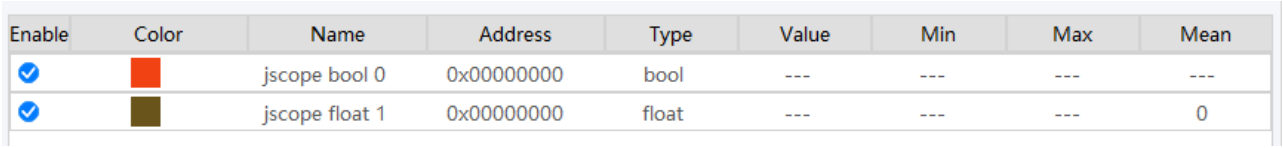
3.3.2 Start sampling

The following figure shows the process for enabling RTT jscope monitoring:



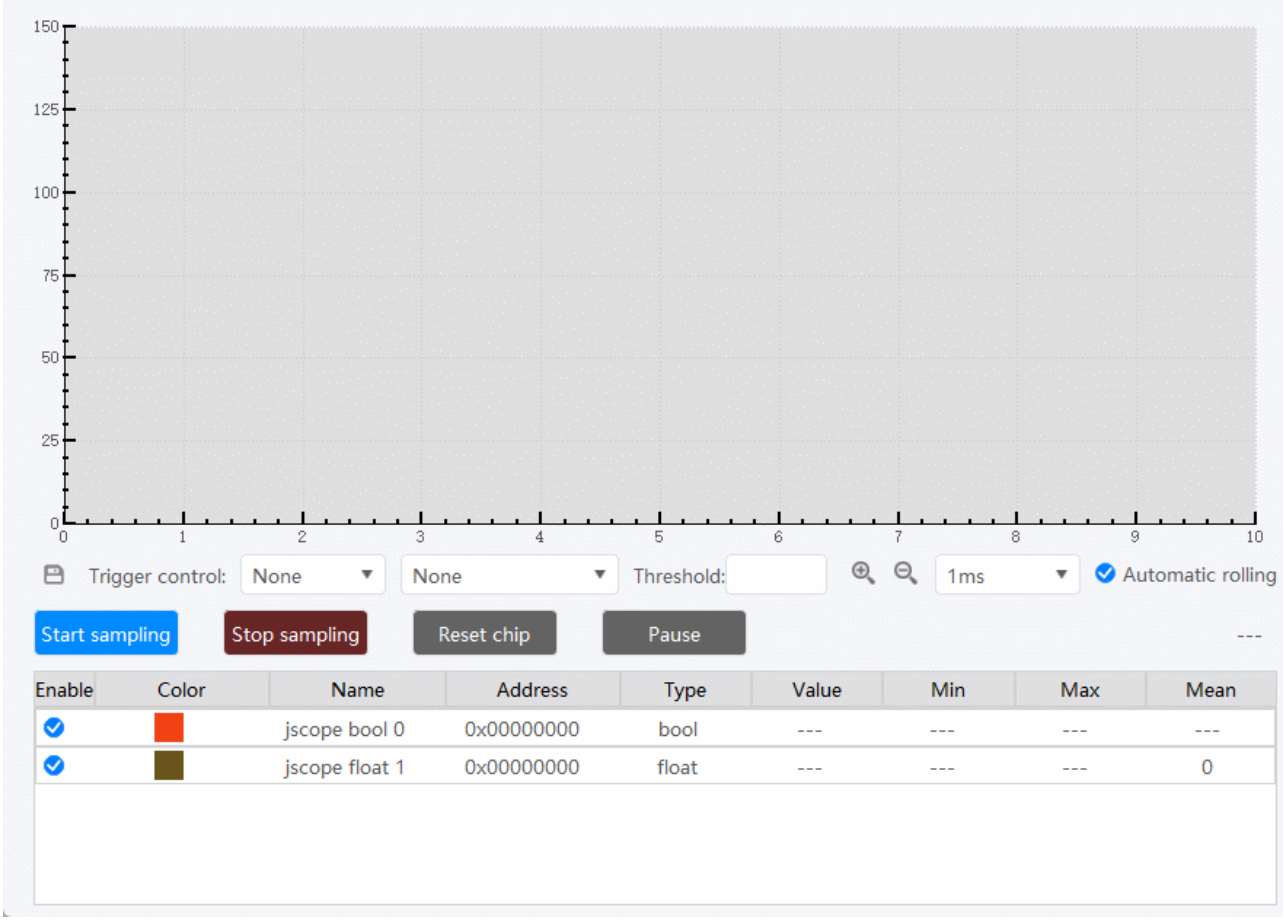
- Click the Start sample button.
- Configure working parameters between the target chip and the Power Debugger: interface type, clock speed, and RTT control block search configuration (**Optional**).
- Click the OK button.
- Wait for RTT initialization to complete.

After initialization is complete, you will see the following j-scope monitoring channel, as follows:



Enable	Color	Name	Address	Type	Value	Min	Max	Mean
✓		jscope bool 0	0x00000000	bool	---	---	---	---
✓		jscope float 1	0x00000000	float	---	---	---	0

At the same time, you will see j-scope's output test positive wave information as follows:



3.3.2 Add any object monitor

3.3.2.1 Get object information

By compiling demo, view the map file information and find the structure. Similar information is shown below. The address of m_VarScope is 0x200011c8, as shown below:

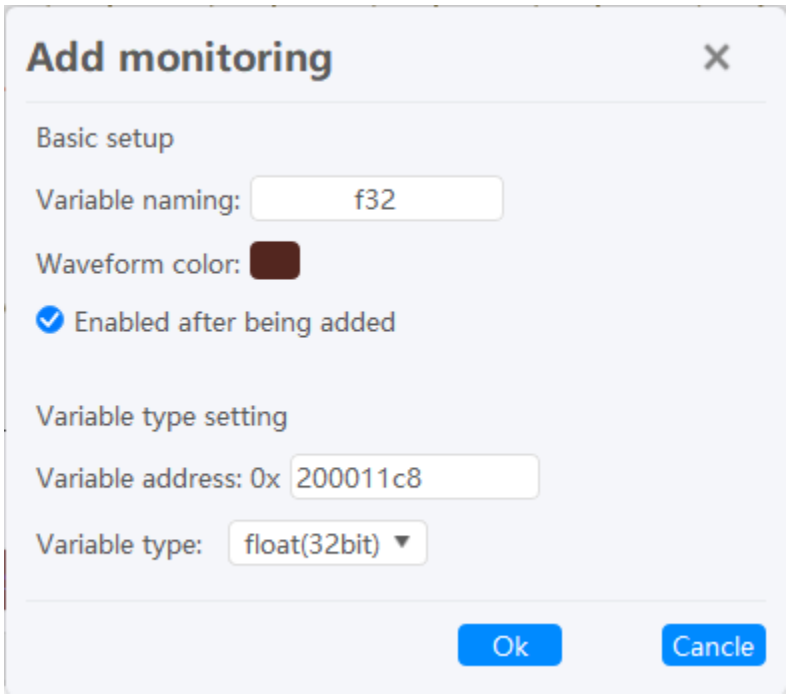
```
#pragma pack(push,1)
typedef struct S_WatchScope{
    float           f32;        //offset:   0
    int32_t         i32;        //offset:   4
    uint32_t        u32;        //offset:   8
```

View the corresponding information in the map, and the corresponding address can be found as follows:

```
    m_VarScope                              0x200011c8   Data
19  main.o(.bss)
```

3.3.2.2 Add monitoring

Click the Add Object button ＋, The dialog box for adding object properties is displayed, as shown below, according to the interface content, set variable name, waveform color, whether to enable after adding, variable address and variable type, and then click OK button, as shown below:



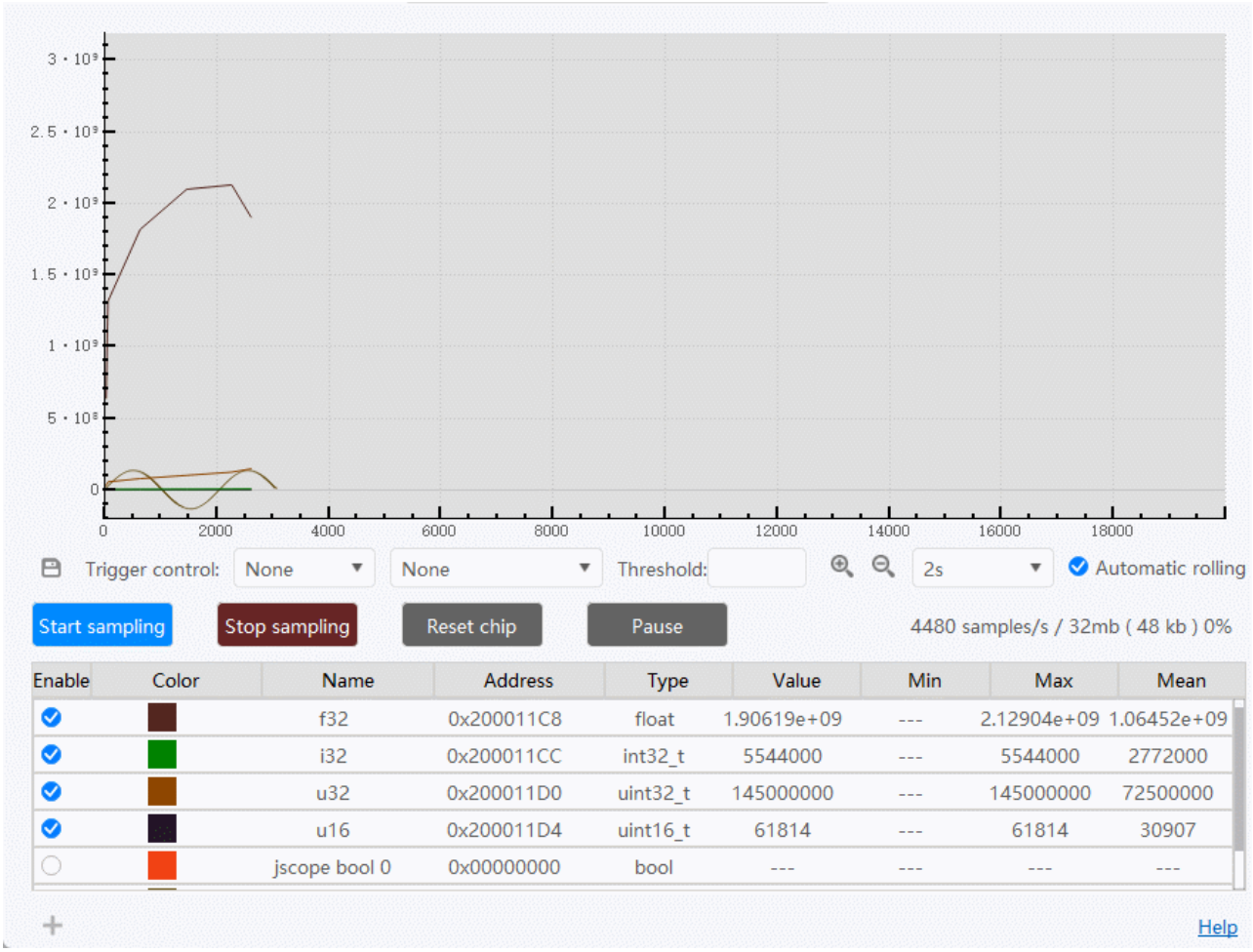
Next, add all the structure members that you want to monitor in the lower left corner of the RTT Scope, and when the final addition is complete, look like this:

	f32	0x200011C8	float
	i32	0x200011CC	int32_t
	u32	0x200011D0	uint32_t
	u16	0x200011D4	uint16_t
	i16	0x200011D6	int16_t
	i8	0x200011D8	int8_t
	u8	0x200011D9	uint8_t
	b8	0x200011DA	bool

> **TIPS**
>
> Before adding a custom monitor, stop sampling.

3.3.2.3 Start sampling

Select the object you want to monitor and then start sampling to see the output, as shown below.



3.3.4 Stop sampling

Click the 【 **Stop sampling** 】 button to stop.

3.3.5 Reset & Run state

You can reset the target chip and switch between Run and Halt states by clicking the "**Reset chip** " and "**Run (Pause)** " buttons.

3.3.6 Reference

For more information please refer to Reference -RTT Scope

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*Last updated on **Jul 5, 2023** by **Alan Chen***

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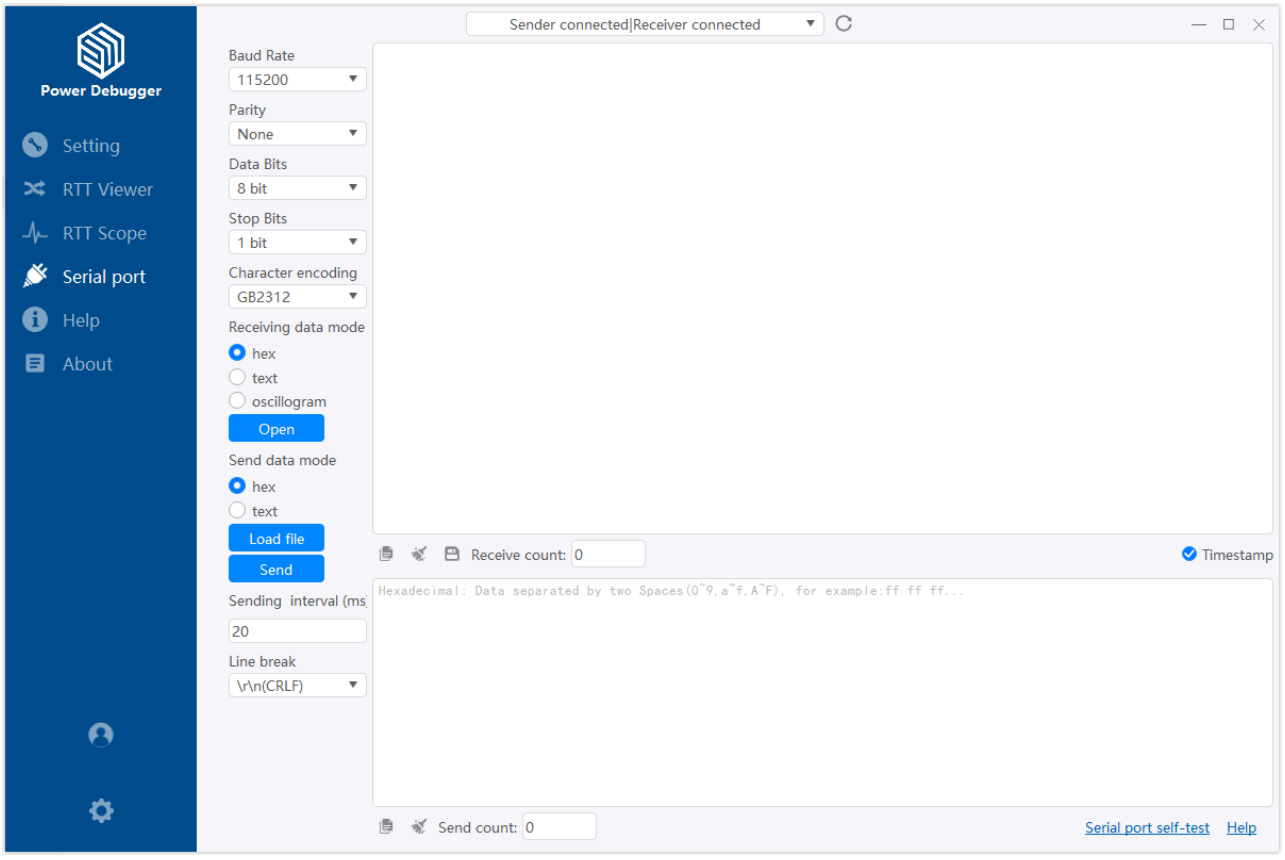
3.4 Serial assistant

The Power Debugger has a built-in serial port assistant, which automatically connects matching devices and forwards services for different working modes. After switching to the connected device, you can use the serial port, as shown in the following figure:



TIPS

- **Local USB mode** : The serial port assistant is connected to the receiving end for direct communication without forwarding.
- **Local WIFI mode** : The serial port assistant is connected to the transmitter, and

the transmitter and receiver are forwarded by proxy.

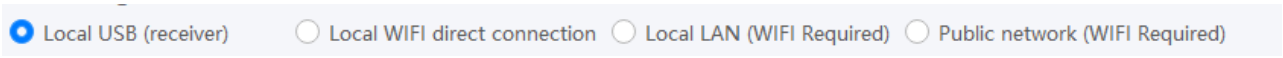
- **Local LAN mode** : Serial port assistant is connected to the transmitter, and the transmitter and receiver are forwarded by proxy.
- **WLAN mode** : Connected to the transmitter, the transmitter and the receiver through the server for public network forwarding.

Edit this page

Last updated on ***Nov 2, 2023*** *by* ***Alan Chen***

4.1 Setting

4.1.1 Working mode



The Power Debugger works in four modes: local USB mode, local wifi direct connection mode, local LAN mode, and public network mode. In these modes, the debugger can debug the target chip, forward the serial port proxy, RTT Viewer, and Scope.

4.1.1.1 Local USB

Local USB mode: **No need for the transmitter** , the receiving end is used separately, and the receiving end is connected to the development host through the USB Type-C cable for project debugging, log forwarding, RTT Viewer and other functions.

4.1.1.2 Direct local WIFI connection

Local WIFI direct connection: In this mode, the transmitter and the receiver need to be paired, wait for the device status light to be long, and the transmitter and the receiver need to be in the same area, according to the wireless carrier condition of the environment, the longest communication distance can reach 200 meters.

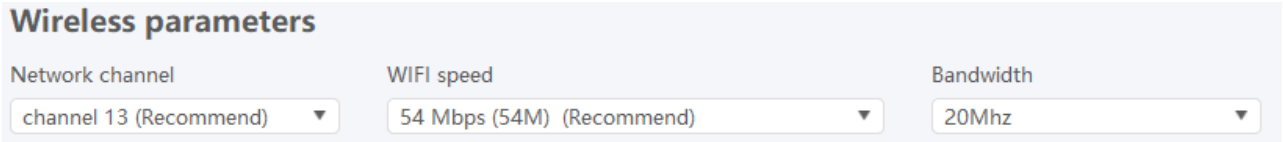
4.1.1.3 Local LAN and WLAN

In this mode, it is necessary to pair at the same time, configure WIFI networking on the transmitting end and the receiving end, and wait for the device status indicator to light up

before entering the subsequent function.

> **TIPS**
>
> At present, the server real-time agent function is provided by ICWorkshop, which requires users to be in a good network environment. For users with general network status, only **gdb remote + openocd (pyocd)** component can be used.

4.1.1 Wireless parameter



4.1.1.1 Network channel

The default channel is 13. If the surrounding wireless routers have interference, you can set the channel to avoid crowded channels and improve communication stability and speed.

> **TIPS**
>
> By scanning WIFI, the optimal network channel can be automatically selected.

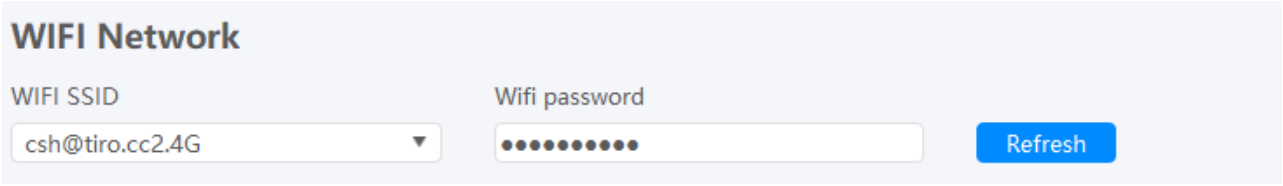
4.1.1.2 Wireless speed

The default value is 54 Mbps. If there is communication interference, try to reduce the communication rate to reduce or avoid communication interruption.

4.1.1.3 Bandwidth

The default is 40mhz bandwidth, which can choose 20mhz bandwidth.

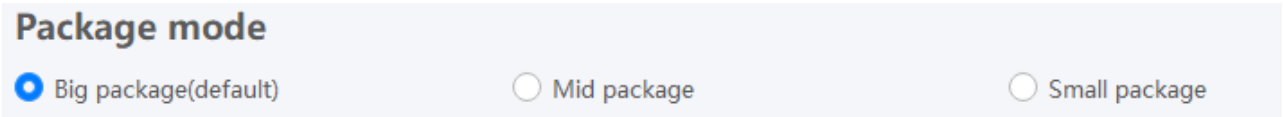
4.1.2 WIFI Network



In public network mode, this setting takes effect. Press the refresh button to obtain the WIFI list of the current environment, fill in the wireless password, and configure the network of the device.

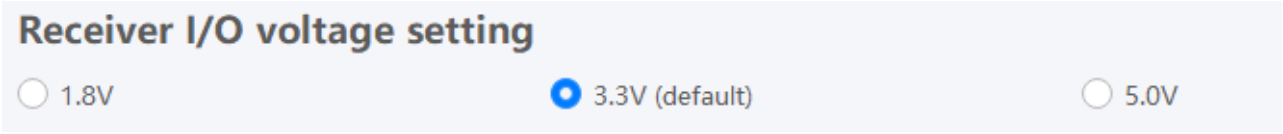
> **TIPS**
>
> Refresh the wireless network function, automatically optimize the local WIFI mode, and avoid over-occupied channels to improve speed and stability.

4.1.3 Packet mode setting



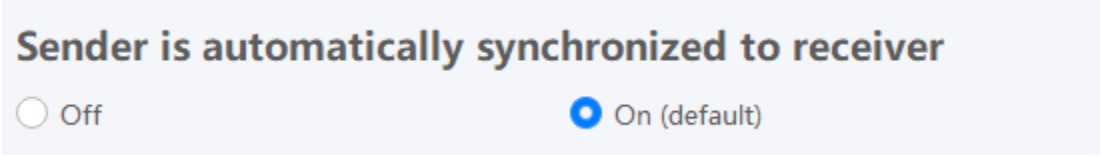
- **Big package(default)** : Tends to increase speed
- **Mid package** : Balance between speed and load balancing
- **Small package** : prefers to maintain load balance

4.1.4 Receiver I/O voltage setting



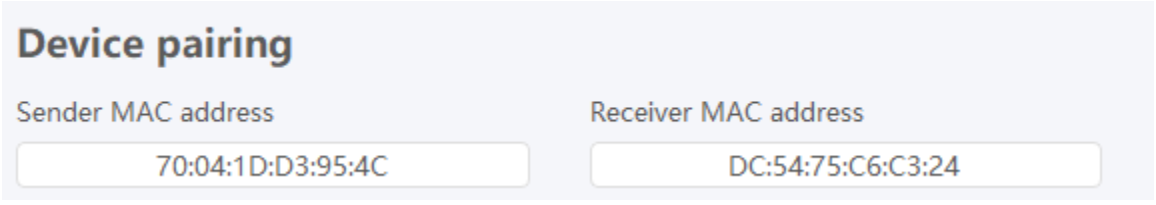
Through this setting, the reference voltage of VREF, SWDIO, SWCLK, TRST, TDI, TDO, TMS, TCK and NRST can be set, and the switch can be made under the three voltages of 1.8V, 3.3V and 5V. The default is 3.3V.

4.1.5 Synchronization



When the device is working in local WIFI mode and remote mode, the relevant Settings will be automatically synchronized to the receiving end by adjusting the parameters on the transmitter.

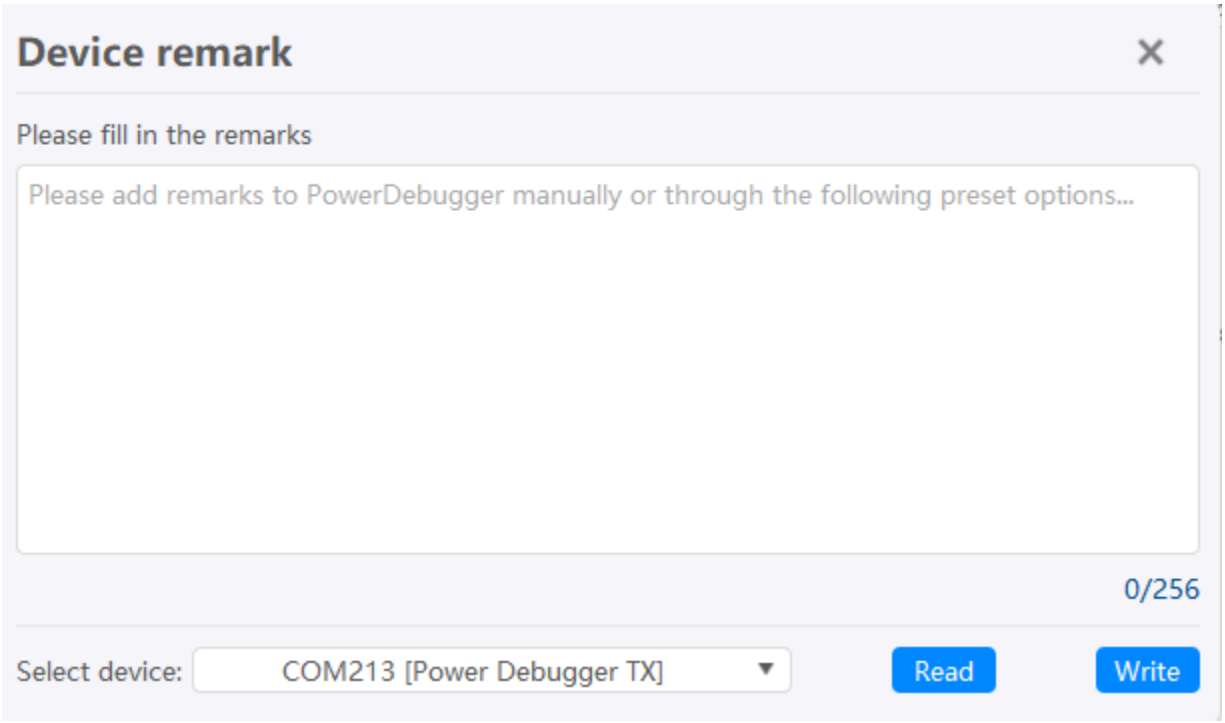
4.1.1 Device pairing



In the mode of local WIFI direct connection and public network, it is necessary to pair the transmitting end and the receiving end of the device before use. The device has been

paired during the production of the product. If you need to modify the pairing, you can modify it here.

4.1.1 Device remark



The device can be marked by writing specific data to the device, such as indicating the purpose of the device, up to 256 bytes of data can be written.

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4.2 RTT Viewer

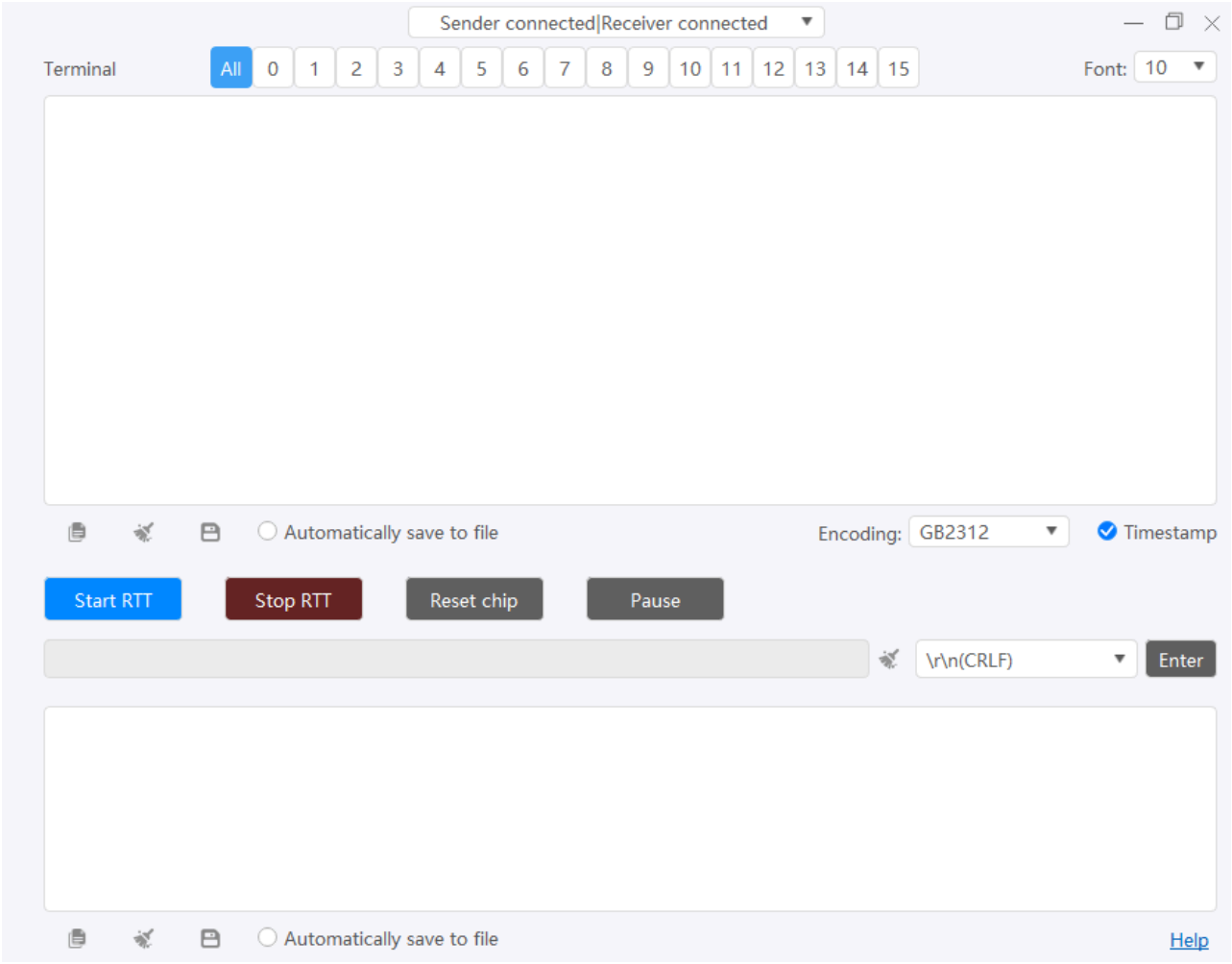
The Power Debugger integrates full RTT Viewer functionality (**channel 0**) and supports the following features and functions

- ☑ Support HID and Win USB driver interface.
- ☑ Supports RTT Viewer communication in local USB mode, local direct connection mode, local area network mode, and public network mode.
- ☑ Supports terminal font size Settings.
- ☑ Supports 0 to 15 channels (all endpoints).
- ☑ Support copy, clear, save to file, automatic caching and other functions (upstream and downstream).
- ☑ Support extended commands (clear screen, text color, background color).
- ☑ Text encoding switch is supported.
- ☑ Supports displaying time stamps.
- ☑ Supports newline Settings.
- ☑ Supports both SW and JATG protocols.
- ☑ Support clock up to 50Mhz.
- ☑ Supports chip target chip reset.
- ☑ Support target chip running status switching.

> **TIPS**
>
> If you work in LAN or public network mode, the output speed may be slow. Therefore, avoid large data and low latency terminal output.

4.2.1 RTT Viewer General

The RTT Viewer interface consists of uplink and downlink, parameter Settings, and auxiliary functions, as shown below:



4.2.2 Upload channel of RTT Viewer

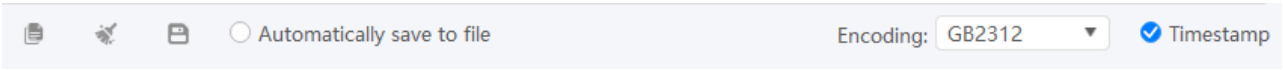
4.2.2.1 Terminal ID

By default, the terminal ID is All. You can click the TAB corresponding to 0 to 15 to switch to the terminal ID page.

4.2.2.2 Font

The font size can be set between 8 and 20 pounds.

4.2.2.3 Copy, clear, save, auto caching

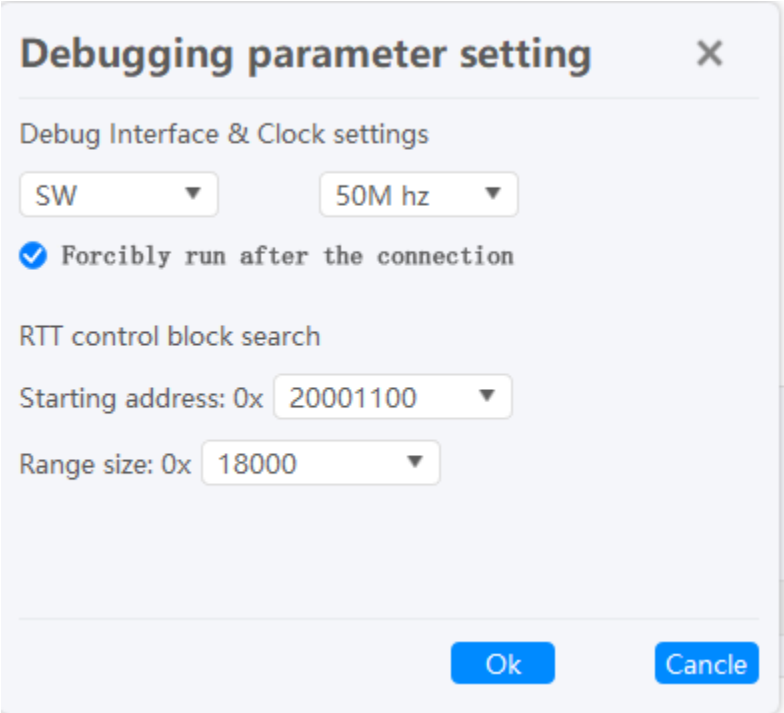


- **Copy** : Copies the current terminal to the system clipboard.
- **Clear** : Clear the text content in the terminal.
- **Save to file** : Saves the received data to a file.
- **Automatically save to file** ： to the file: the automatic incoming data is cached to the user's specified file.
- **Encoding:** Set text encoding to switch between GB2312 and UTF-8.
- **Timestamp:** Shows the timestamp of the data.

4.2.2.4 Start, stop, reset, and run RTT

- **Start RTT** : Start RTT Viewer

- **Debugging parameter setting** :



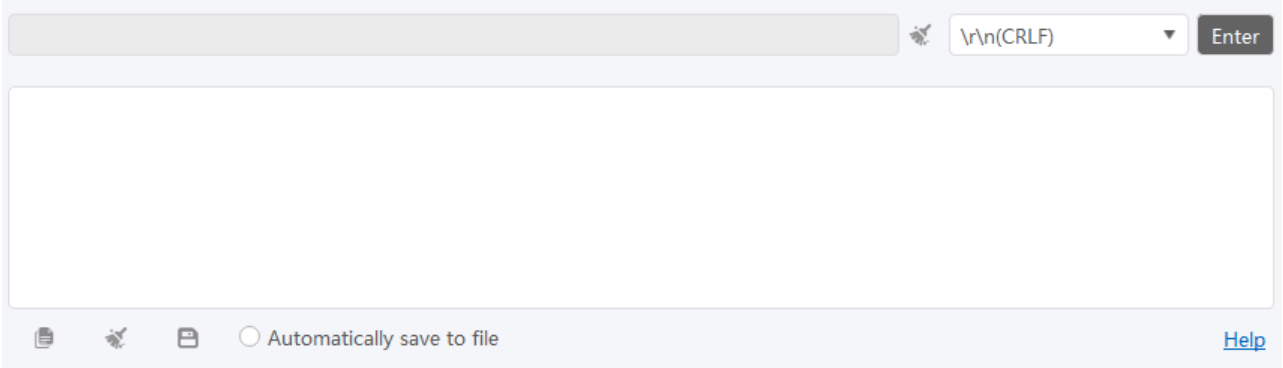
Debug port and speed Settings: Set the working protocol mode SWJ or JTAG, and set the working clock frequency, up to 60Mhz.

Forced run after connection: Check this function, after connecting to the target chip, the target chip will be forced to run.

RTT Control block Search: Set the address of the control block in SRAM (found by map), and the search size (quickly set by template).

- **Stop RTT** : Stop RTT Viewer.
- **Reset chip:** Reset target chip.
- **Run (Pause) :** Set the target chip to run mode or Halt mode.

4.2.3 RTT Viewer download channel

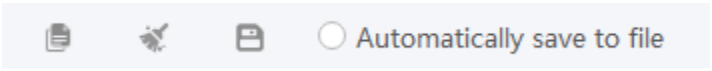


4.2.3.1 Send setting

- **Send Input Box** : Enter the text to be sent to the terminal.
- **Clear** : Clear the current text.
- **Break line** : Sets break line（CRLF、CR、LF）。
- **Enter** : Send data.

> **TIPS**
>
> By default, the return key initiates the sending, and Padding is set according to the current setting. If you click the [Enter] button to send, the default does not contain a newline. If necessary, you can manually add a newline or other control characters.

4.2.3.2 Copy, clear, save, auto caching



- **Copy** : Copy the current terminal to the system clipboard.
- **Clear** : Clear the text content in the terminal.

- **Save to file** : Saves the received data to a file.
- **Automatic caching to files:** Automatically caches the received data to the file specified by the user.

Edit this page

*Last updated on **Jul 5, 2023** by **Alan Chen***

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4.3 RTT Scope

4.3.1 Feature list

The Power Debugger integrates full RTT Viewer functionality (**channel 0**) and supports the following features and functions

- ☑ Support for RTT j-scope channels, see details UM08028 J-Scope - SEGGER Wiki。
- ☑ Supports adding custom variable monitoring.
- ☑ Support graphics X axis, Y axis waveform adaptive, automatic scrolling, scaling, drag operations.
- ☑ Support to view any sampled frame data.
- ☑ Data export (csv format) is supported.
- ☑ Support rising edge, falling edge, bidirectional edge trigger control.
- ☑ Support target chip reset, pause (resume) operation.
- ☑ Support sampling rate, buffer usage view.
- ☑ Supports SWD/JTAG dual-protocol interfaces.
- ☑ Supports up to 60Mhz clock speed.
- ☑ Support RTT Scope and RTT Viewer to work simultaneously.
- ☑ Supports float, bool, uin8_t, in8_t, uin16_t, in16_t, uin32_t, and in32_t Mainstream types.
- ☑ Waveform color Settings are supported.
- ☑ Supports monitoring object enabling Settings.
- ☑ Support the maximum value, minimum value, average value, current value and so on.

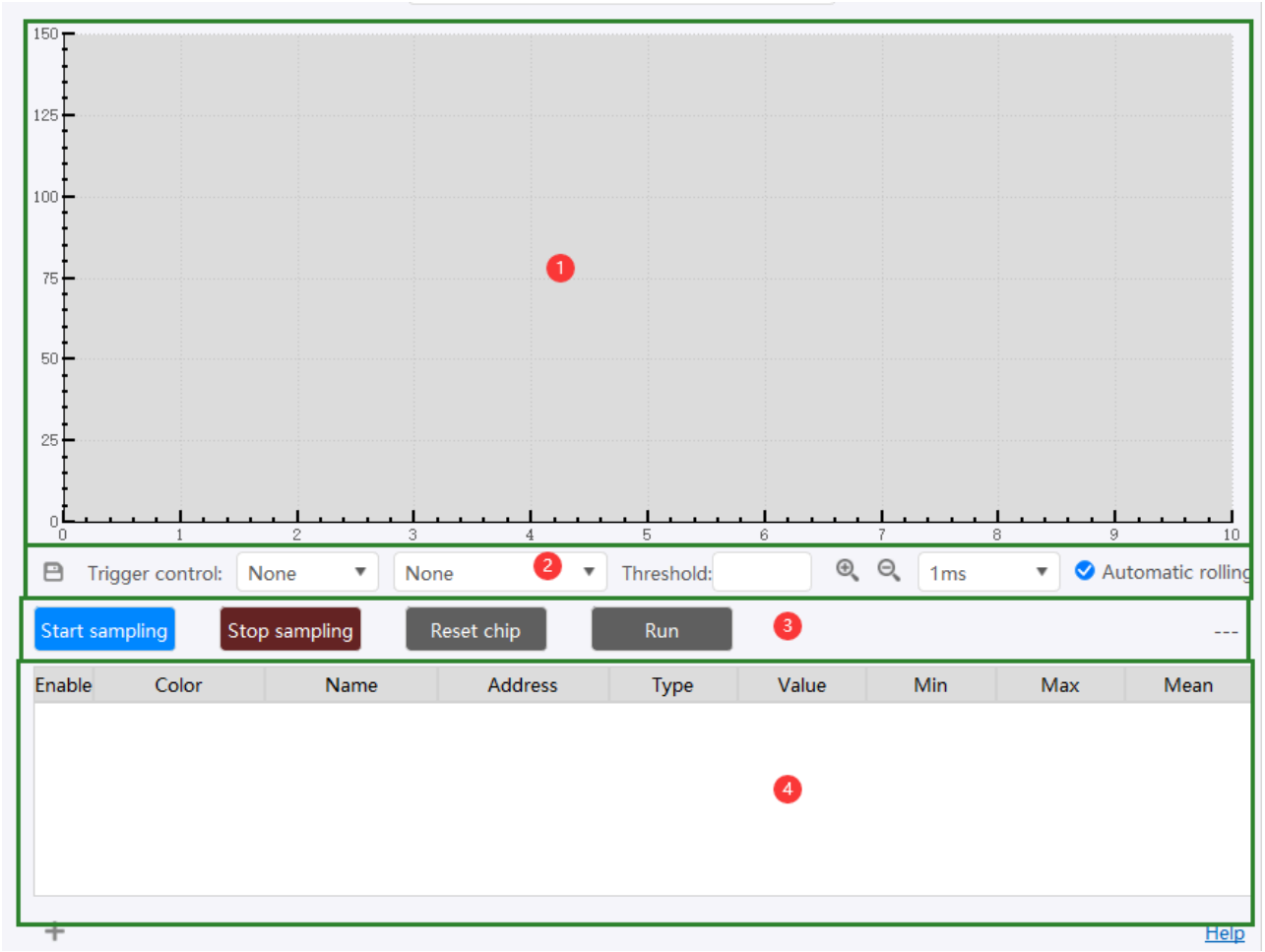
> **TIPS**
>
> If you work in LAN or public network mode, the output speed may be slow. Therefore, avoid large data and low latency terminal output.

4.3.1 RTT Scope screen

The main functions of RTT Scope include:

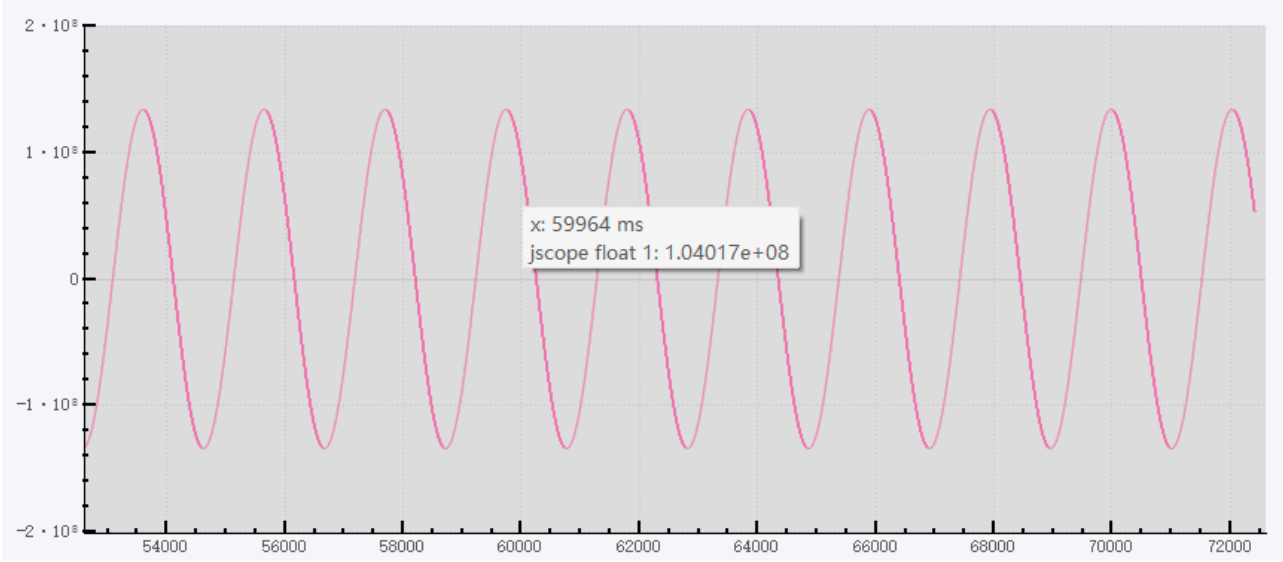
- Waveform display area
- Data storage, trigger Settings, waveform control.
- Function button, real-time status.
- Monitor variable area.

It consists of four parts, as shown in the figure below:

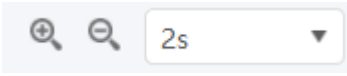
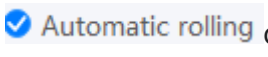


4.3.2 RTT Scope waveform display

The drawing area is displayed as follows, real-time display of the monitored waveform, as well as the time stamp of the X axis, the value of the Y axis and other information.



4.3.2.1 Zoom and scroll on the X-axis

Available by clicking  **Zoom in** , **Zoom out** Icon to zoom in and out of the waveform， you can also select a time value for a square directly from the drop-down list， checked  option automatically refreshes the read data frame information。

> **MANUAL ROLLING**
>
> Drag and drop the left mouse button to view the waveform at any sampling point.

4.3.2.2 Zoom and scroll on the Y-axis

Cancel **Auto scrolling** and scroll the mouse wheel to zoom in or out the Y axis. Hold down the left mouse button and drag to move the visible range of the Y axis vertically.

> **TIPS**
>
> Ratcheting Auto scroll will adapt to the visible range of the Y-axis.

4.3.2.3 Any sample frame information

You can view the sampling information of a frame by hovering the mouse, as shown in the following figure.

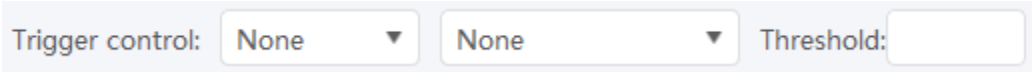
4.3.3 Data export

This can be done by clicking the Save button export all current sample data， the data format is csv， you can use office excel to view the data in the following format.

	No	jscope bool 0	jscope float 1
2	0	0	6.43E+07
3	1		6.46E+07
4	2		6.51E+07
5	3		6.54E+07
6	4		6.57E+07
7	5		6.61E+07
8	6		6.64E+07
9	7		6.68E+07
10	8		6.71E+07
11	9		6.76E+07
12	10		6.79E+07
13	11		6.82E+07
14	12		6.86E+07
15	13		6.89E+07
16	14		6.93E+07
17	15		6.96E+07
18	16		7.00E+07

> **TIPS**
>
> The legend is a test sample. The icon format of exported data depends on the actual situation.

4.3.4 Trigger



You can set the trigger to capture key data frames. The data drop before it is triggered will not refresh the display. For details, see the following process

- **Set trigger mode** : rising edge, falling edge, bidirectional edge.
- **Trigger monitoring object:** Select the trigger monitoring object.
- **Set trigger Range** : Set the trigger threshold of the monitored object.
- **Start monitoring**

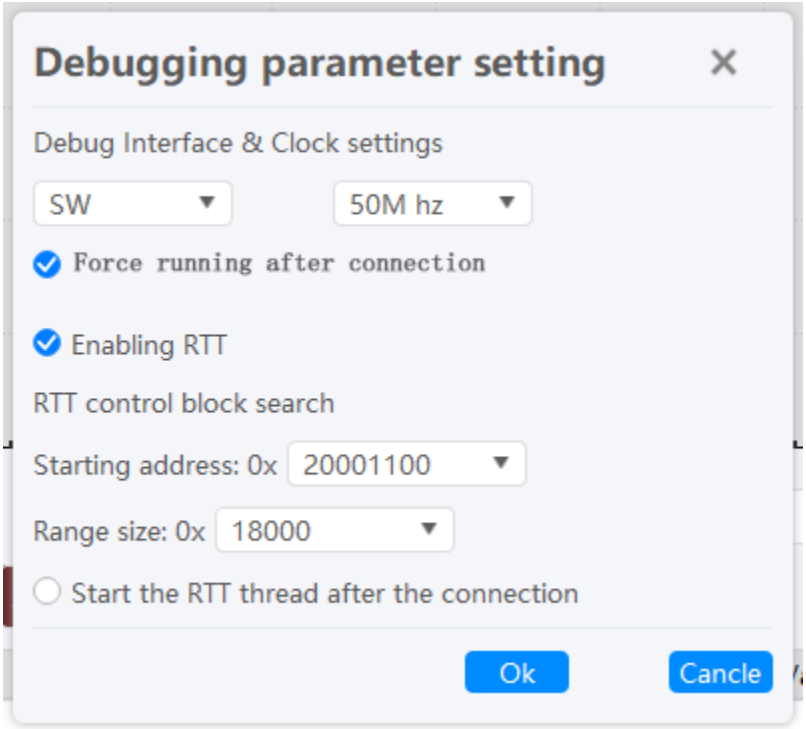
4.3.5 Real-time state

```
4200 samples/s / 32mb ( 24 mb ) 77%
```

The real-time status displays the current sampling rate information and buffer usage.

> **TIP**
>
> The buffer is set to 32 MB bytes. When the buffer is full, the current sampled data will be overwritten. If data storage is required, save it in time.

4.3.6 Start sampling



- **Debugging port:** Can select SW, JTAG communication protocol.
- **Clock:** Can be set up to 60Mhz.
- **Forced Run after connection** : After connecting to the target chip, the operation of the target chip is resumed.
- **Enabling RTT** : Enable the monitoring of the j-scope_xxx channel in the RTT channel when Scope is enabled.
- **Start Address** : Set the start address of RTT.
- **Range Size** : Set the search range size of RTT.
- **Start the RTT thread after the connection:** The RTT Viewer function will be synchronously enabled after the connection is successful.

4.3.7 Stop sampling

Click Stop sampling to stop data collection.

> ⚠ **WARNING**
>
> Stop sampling will stop the sampling of the RTT Viewer simultaneously (**If the RTT thread is started after connection selection**).

4.3.8 Reset chip

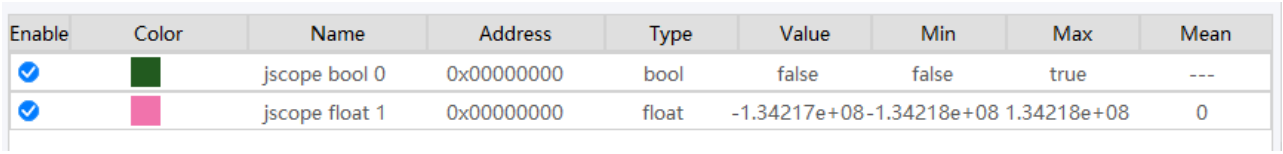
Reset the target chip.

4.3.9 Pause (Resume)

Pause or resume the running of the target chip.

4.3.10 User-defined monitoring objects

Power debugger's RTT Scope feature， at the same time, it supports the monitoring of custom objects (variables). This function can realize the real-time Scope function without adding the software support package of RTT. The object property panel is shown as follows：

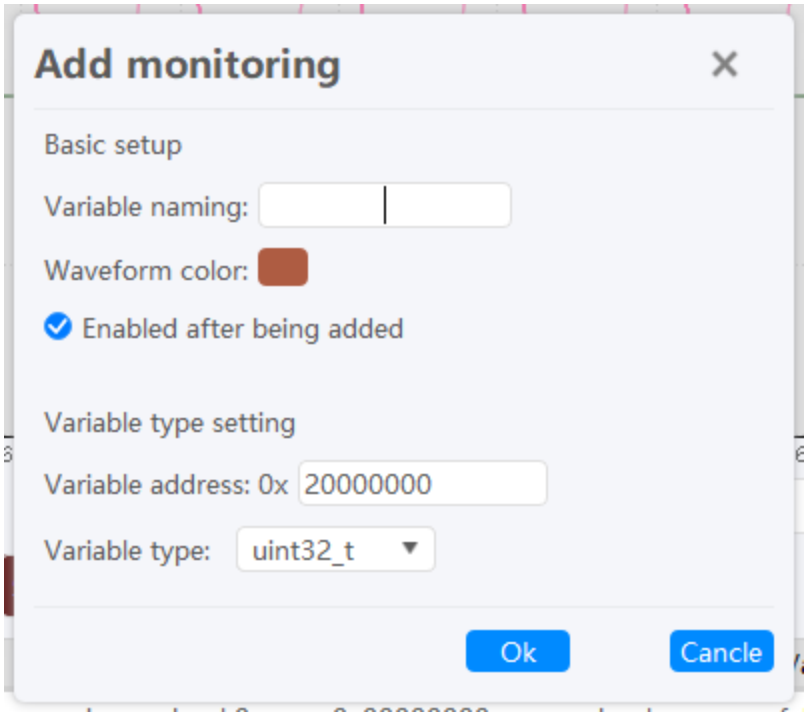


Enable	Color	Name	Address	Type	Value	Min	Max	Mean
✓		jscope bool 0	0x00000000	bool	false	false	true	---
✓		jscope float 1	0x00000000	float	-1.34217e+08	-1.34218e+08	1.34218e+08	0

- **Enable:** Enables or disables the monitoring of the current object.
- **Color:** Object waveform display color.
- **Name:** Name of the object.
- **Address:** Address of the monitoring object in the SRAM (view it through the map file, elf file is not supported for now).
- **Type:** Type of the monitored object, which can be float, uint8_t, int8_t, uint16_t, int16_t, uint32_t, int32_t.
- **Value:** Current value.
- **Min:** Minimum value of the monitored object.
- **Max:** Maximum value of the monitored object.
- **Average:** Average value of the monitored object.

4.3.10.1 Add object

Click the Add Object button  ， pop-up add object property setting box, as shown below, according to the interface content, set variable name, waveform color, whether to enable after adding, variable address and variable type, and then click OK button, as shown below:



> **TIP**
>
> - The address of the monitored object can be viewed by viewing the generated compiler output information such as map and list, or obtained by analyzing elf files, or fixed to the specified address.
> - Waveform color provides a default color setting template. If you are not satisfied with the default color template, you can adjust the template color value.

4.3.10.2 Modify object

Double-click the object property list, in the pop-up window you can modify the object name, waveform color, address, and type settings.

> **TIP**
>
> The RTT j-scope channel supports only attribute viewing.

4.3.10.3 Delete object

Double-click the object property list and click the Delete button in the pop-up window to delete the monitoring object.

> **TIP**
>
> User-defined objects can be deleted. Built-in RTT objects cannot be deleted (the function can be disabled).

4.3.11 Export and import configuration

 Click the Import and Export button to import and export the Settings of the user-defined object.

Skip to main content

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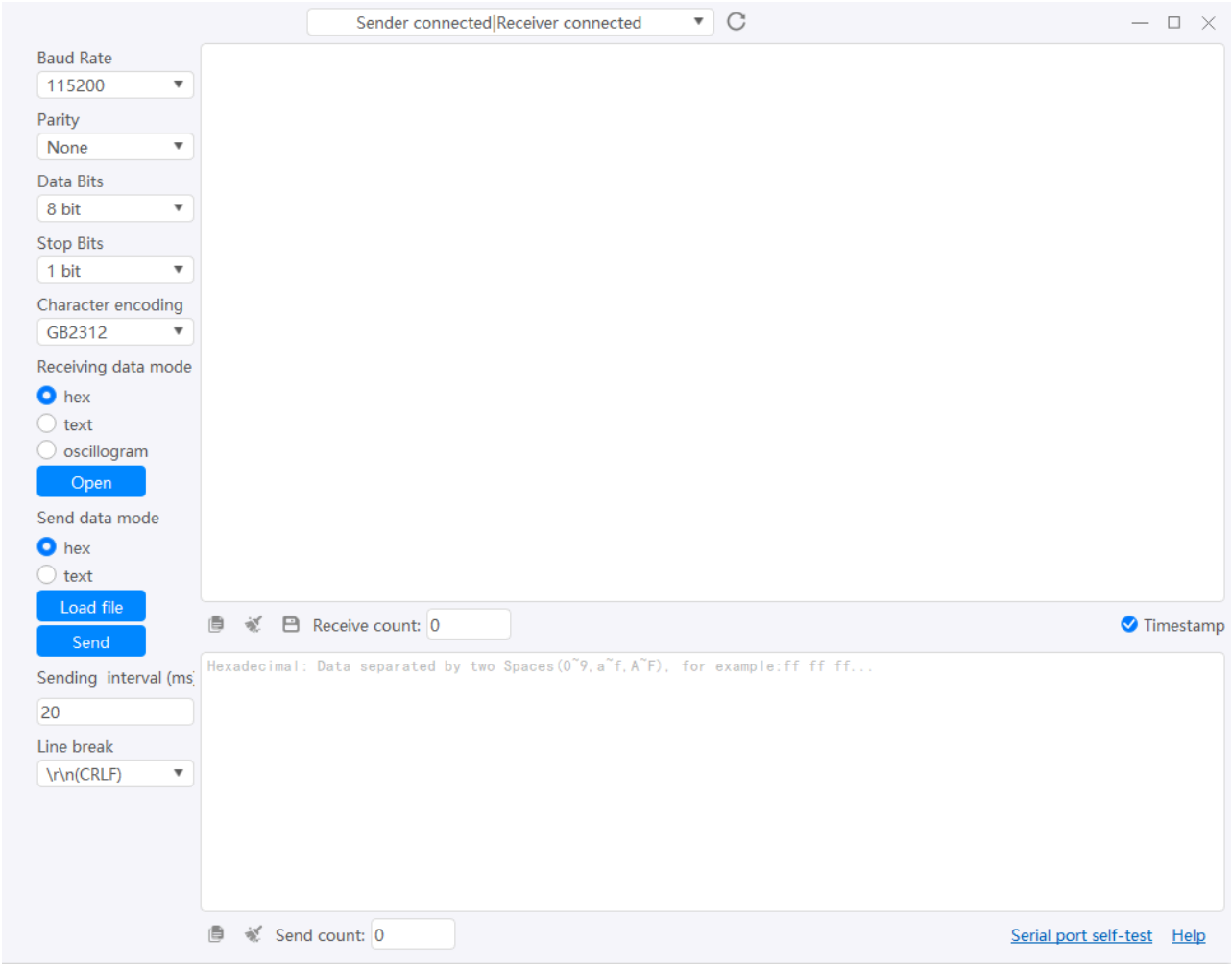
4.4 Serial assistant

The Power Debugger integrates an automatic serial port assistant to automatically connect the corresponding device according to the working mode of the device. In local USB mode, the serial port assistant connects to the serial port on the **receiver**. In local WIFI mode, LAN mode, and public network mode, the serial port on the receiving end is connected to the serial port on the **transmitter**. The user interface is as follows:



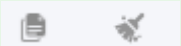
4.4.1 Data receive buffer

The receiving buffer will display the data received by the serial port in real time, and the hexadecimal and text modes can be switched by switching the **receiving data mode** function.

> **TIP**
>
> Click the**Copy, Clear, Save** button  Copy, clear, save to a file, or display a timestamp for receiving buffer data.

4.4.2 Data sending buffer

Fill in the data in the send buffer, or load hexadecimal data from the file, or text, execute the send button, you can complete the data send, by switching the **send data mode** function, switch the send data to string or hexadecimal data (RAW),

> **TIP**
>
> - Can be copied and cleared by  button copies and clears data in the receiving buffer.
> - The stability of the forwarding service can be tested by short-circuiting the receiver**RX and TX pins** to perform a serial port self-test.

4.4.3 Serial port parameter Settings

- **Baud rate** : Set the baud rate of the serial port.

- **Parity:** Sets the check bit of the serial port. The default value is none. You can select odd check or even check.
- **Data bit:** Default is 8bit, can be switched in 5, 6, 7, 8bit.
- **Stop bit:** The default bit is 1bit, which can be switched between 1bit, 1.5bit and 2bit.
- **Encoding:** Default GB2312, can be switched in UTF-8, GB2312.
- **Data Receiving mode:** You can switch between hexadecimal and text modes as well as waveform display modes.

4.4.4 Send data format Settings

- **Hexadecimal:** Default sending format, data will be sent as is.
- **Text:** Data will be converted to string mode for sending. (There will be a \0 terminator at the end).
- **Load file** : The data to be sent can be loaded from the file, and the file type will be automatically recognized as a text file or a hexadecimal file.
- **Sending period:** When sending files, optional interval of each packet, the default is 20, the unit is ms, can be adjusted according to the network environment used (to avoid packet loss)
- **Line break**：Set the newline mode in the sending string mode, can be **\r\n(Windows)、\r(Linux)、\n(MacOS)**。

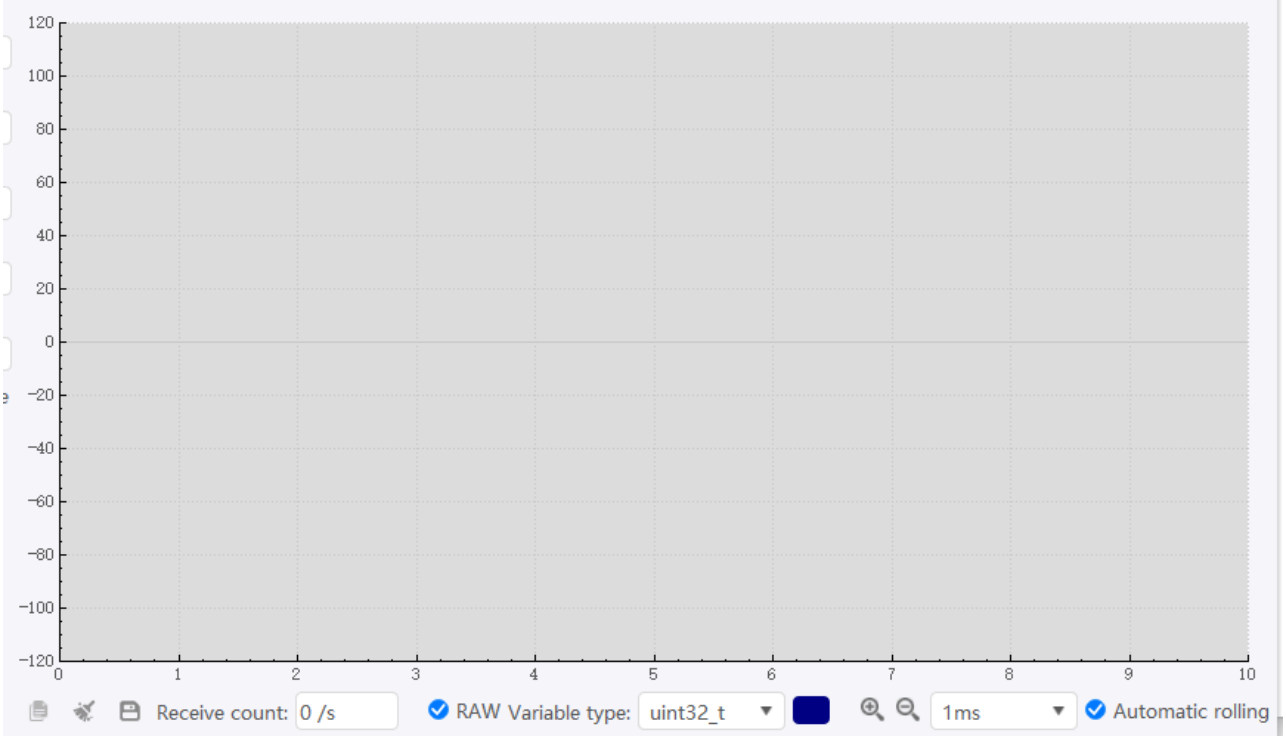
> **SUPPLEMENT OF LINE BREAK**
>
> In different systems, the corresponding line feed mode is automatically selected and can be switched manually.

> **TIPS**
>
> - As a proxy serial port tool, it contains the cache design, there will be a certain

delay, when large-scale data needs to be sent, it may cause overflow, and will display overflow tags in the accept buffer, in order to avoid these potential problems, it is recommended to use integrated serial port assistant. A series of optimizations have been made for the Power Debugger appliance.

- Through the **serial port self-check** function, you can check whether the current serial port Settings can work stably (before using this function, you need to short-circuit the receiver RX and TX).

4.4.5 Serial waveform display



- Support RAW format (binary) display format, this mode can achieve the best communication efficiency (data alignment problems caused by packet loss can be sent at intervals **"PDSY"** for synchronization), for example

```
0x12,0x13,0x14,0x15,.....'P','D','S','Y',0x12,0x13,0x14,0x15,0x13,0x14,0x150x13,0x
```

- Support text mode, this mode can provide convenience, format frame: "frame header | data | frame tail", for example

```
: "$123;"
```

- All basic data types are supported
- Supports waveform color customization
- Support scaling
- Support automatic scrolling

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*Last updated on **Nov 2, 2023** by **Alan Chen***

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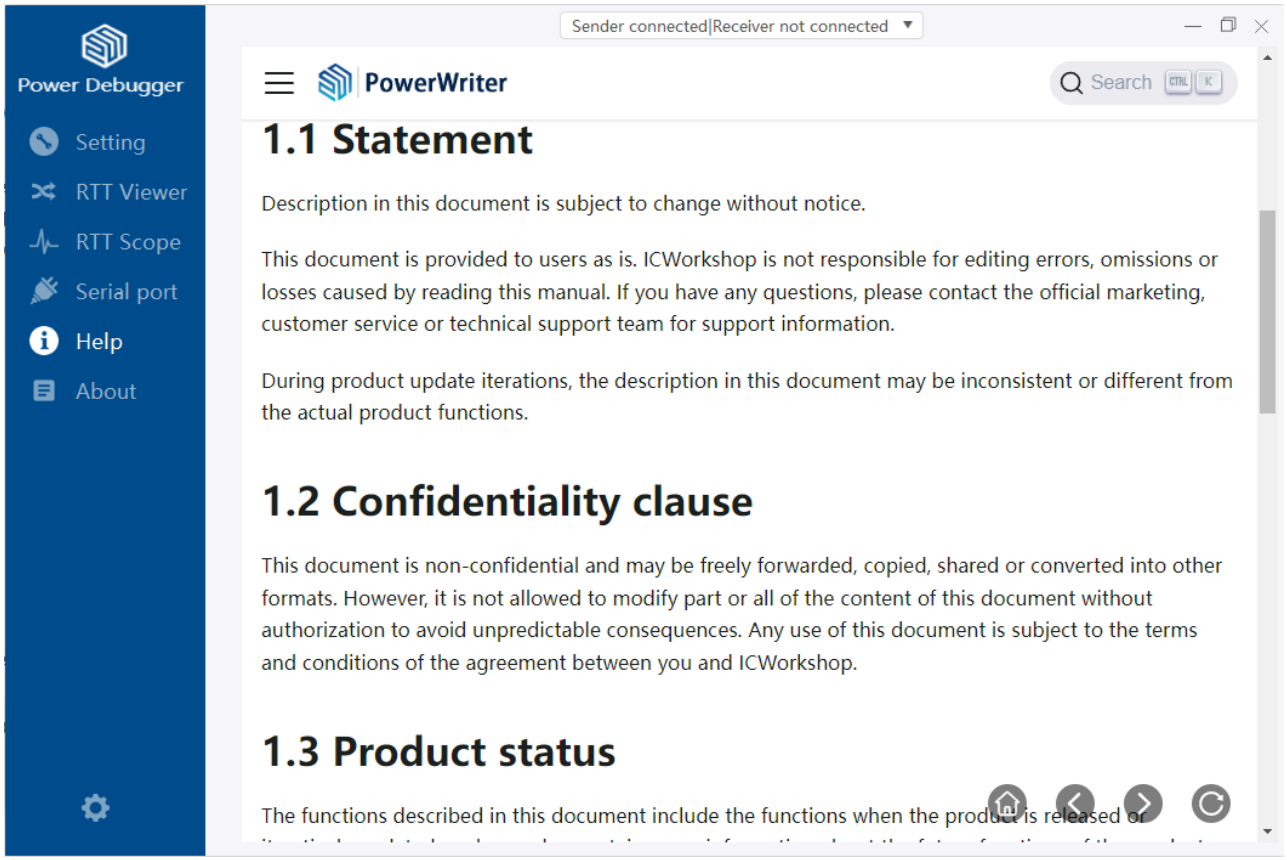
4.5 Document

The online help document contains information about the Power Debugger, such as documentation updates, product features, quick guides, reference manuals, application notes, and FAQs. It can be used as a tutorial or help document for the Power Debugger and supports the following features:

- Automatically follow the system theme (can be manually switched).
- Automatically follow system language (can be manually switched).
- Support Back to Home.
- Refresh support.
- Support return to previous page.
- Support back to the next page
- Mobile device support
- Support for opening documents in external browsers
- Search supported.
- others

The interface is shown as follows：



TIPS

- Click the **"Help"** button on the user interface to quickly jump to the corresponding chapter of the document.

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*Last updated on **Nov 2, 2023** by **Alan Chen***

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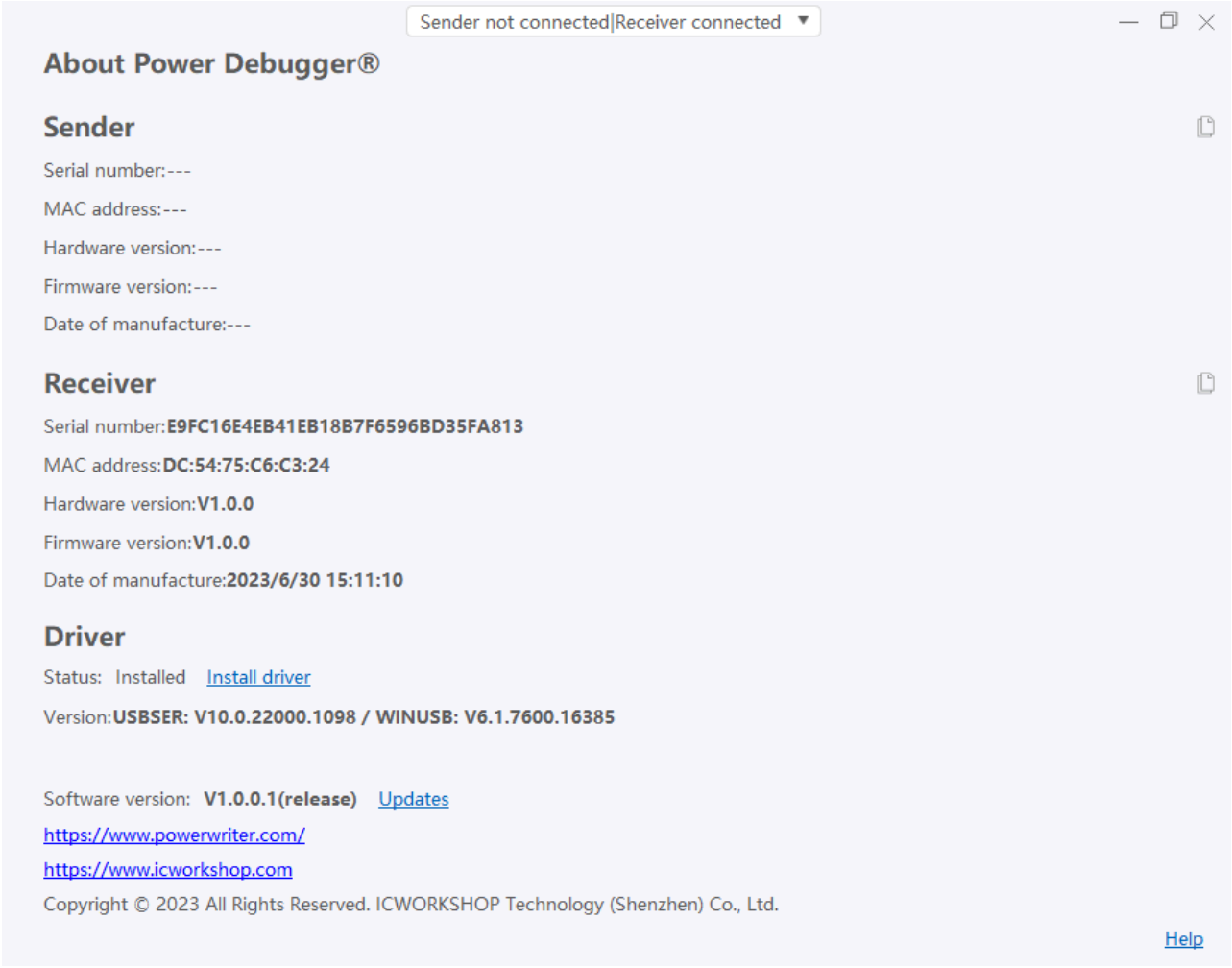
4.6 About

On this page, you will be able to view the product information of the device, including：

- **Serial number of the device**
- **MAC Address**
- **Hardware version**
- **Firmware version**
- **Production Date**

As shown in the following：



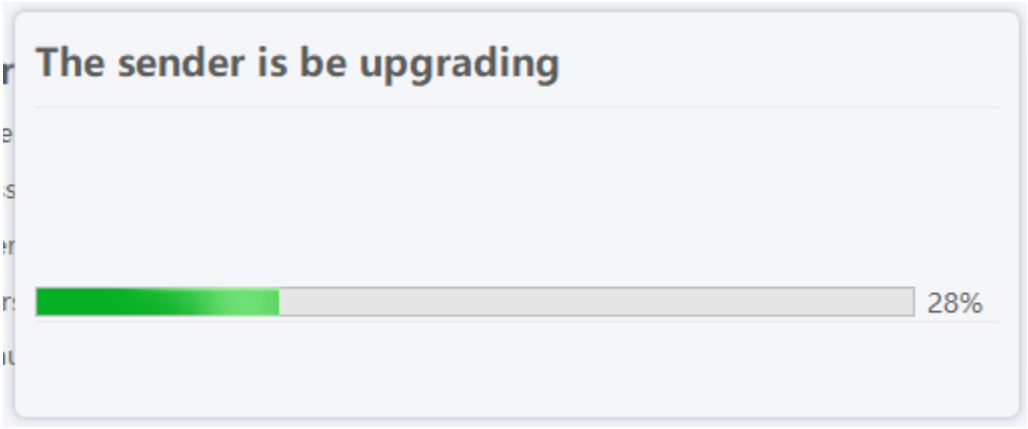
TIPS

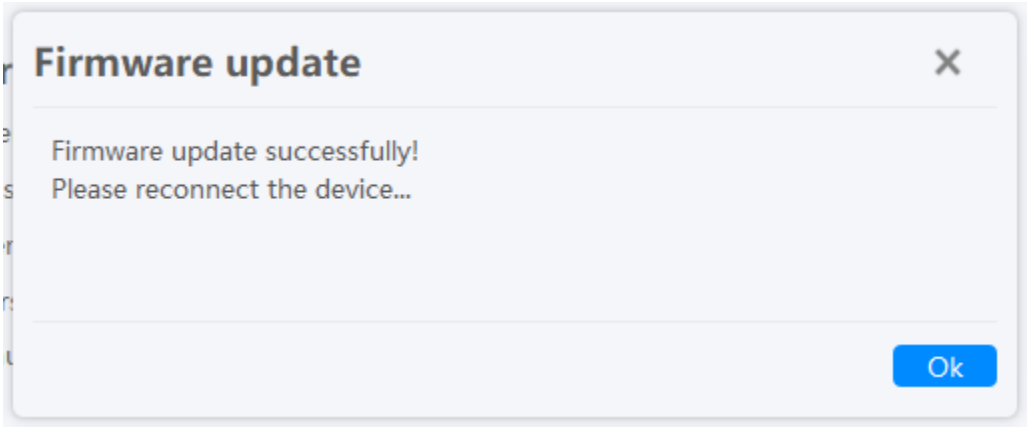
Information can be copied by the Copy button, click button copies the information to the clipboard.

4.6.1 Firmware update

When a new firmware is available, you can view the firmware version of the current device and the current available version on the Firmware update page. When you need to update the firmware, click the Update firmware button to update the firmware.

As shown in the following





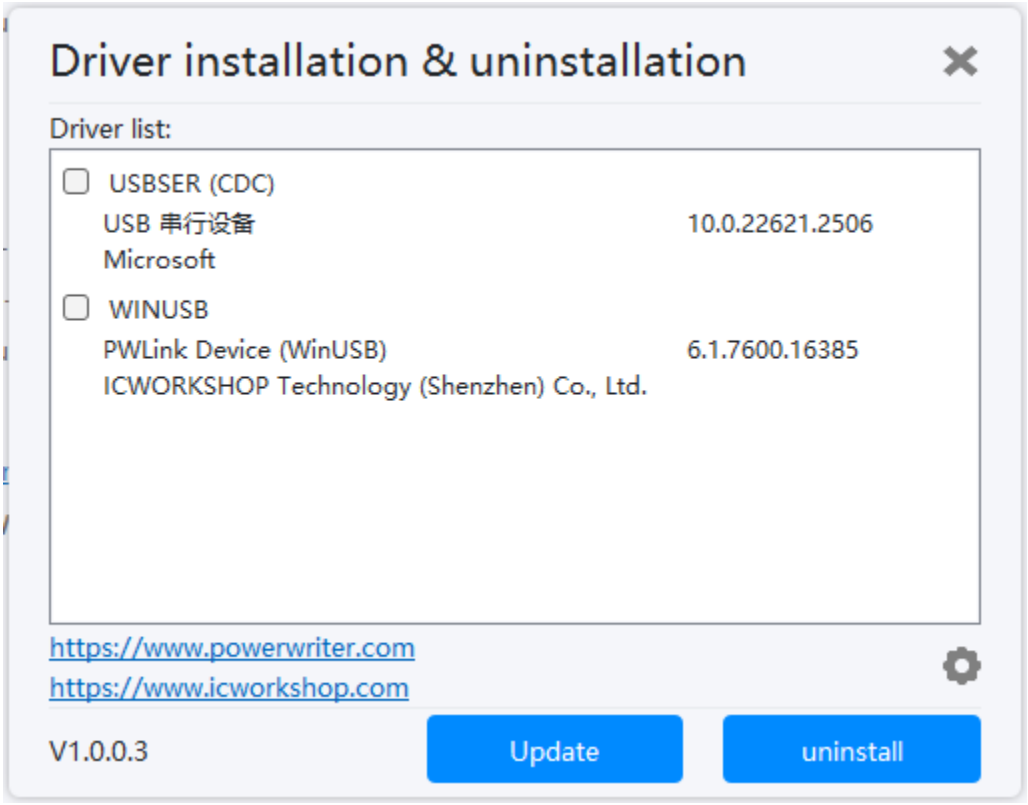
TIPS

- You can force firmware updates by continuously clicking on the **[Firmware version]** header.
- To avoid unpredictable risks, do not remove the device during firmware update.
- After updating the firmware, you may need to plug and unplug the device or manually reconnect the device.

4.6.2 Drive installation

The HID channel of the Power Debugger is driverless. Windows 7 does not have a serial port driver or WinUSB driver by default. You can install the CDC+WINUSB driver by installing the driver.

Click [Install Driver] button, you will see the following driver installation interface.



Select the serial port and WINUSB drivers on the transmitter (TX) and receiver (RX) of the Power Debugger, and then click the install (uninstall) button to install the driver.

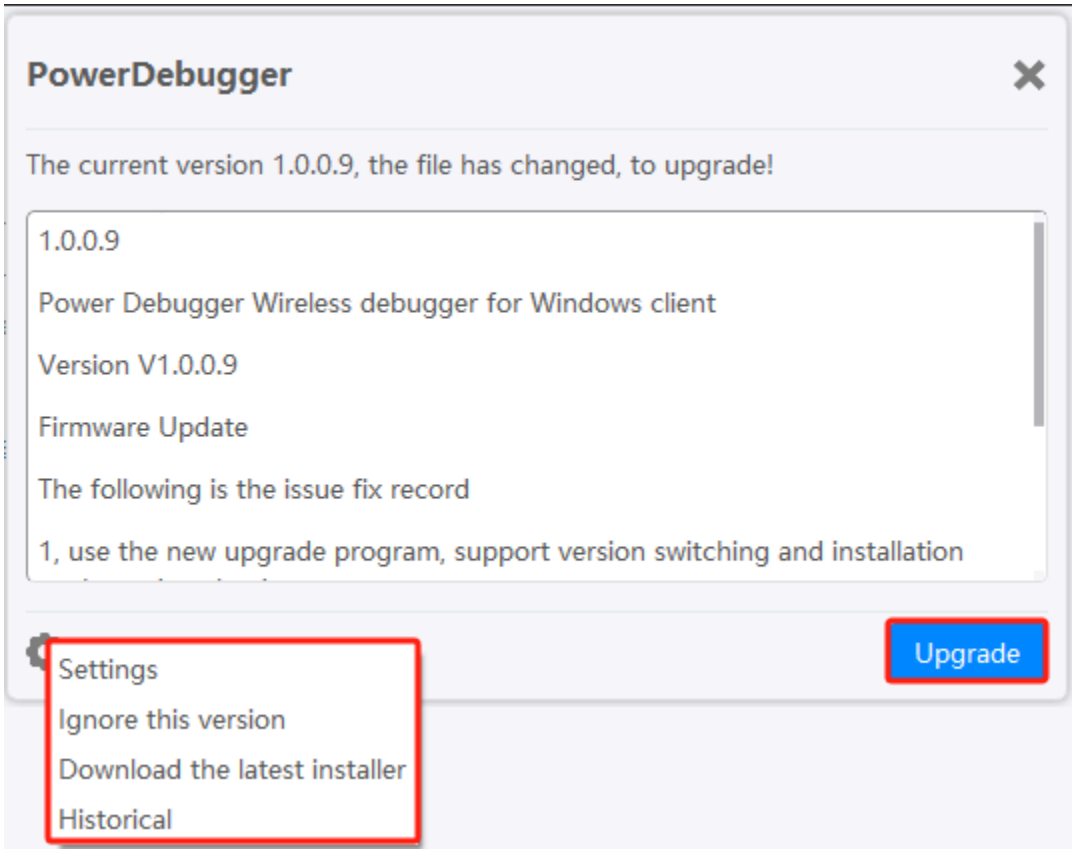
> **NOTICE**
>
> - Windows 7 and later are non-drive systems, and no additional serial port and

WinUSB drivers are required.

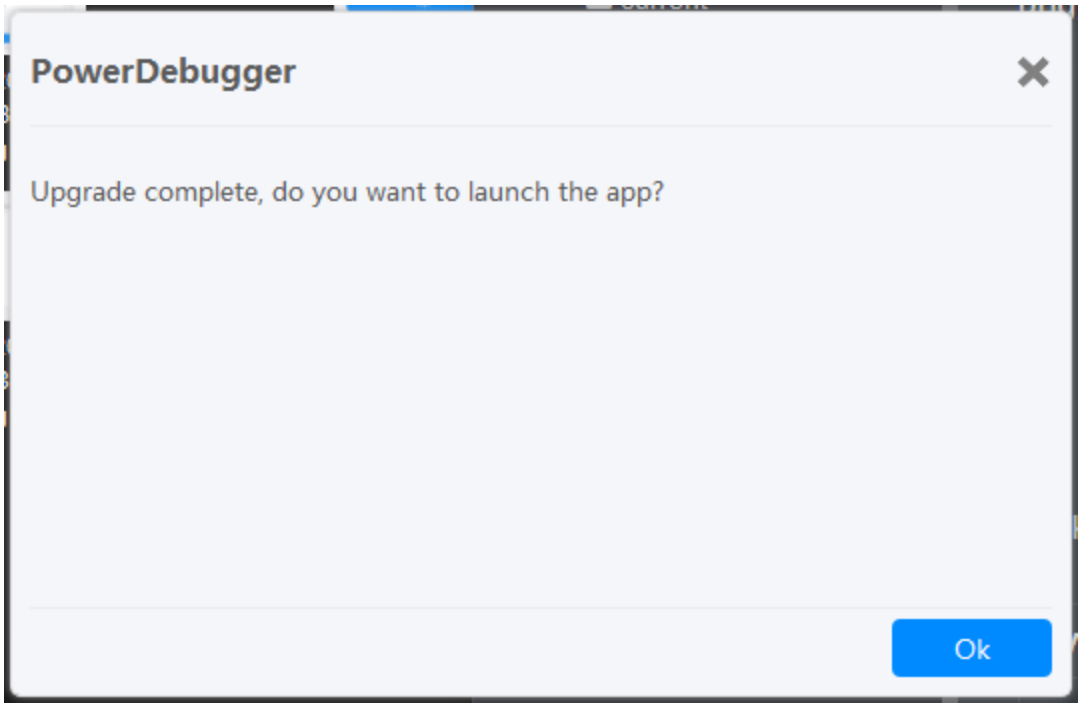
- Linux (Mac) systems may not be able to use WinUSB mode, but can only use HID mode, not to get the best performance (please keep an eye on the log for updates).

4.6.3 Software update

By clicking the **[Check update]** button to check the software update, you can view the update log of the current version, as shown in the picture below:

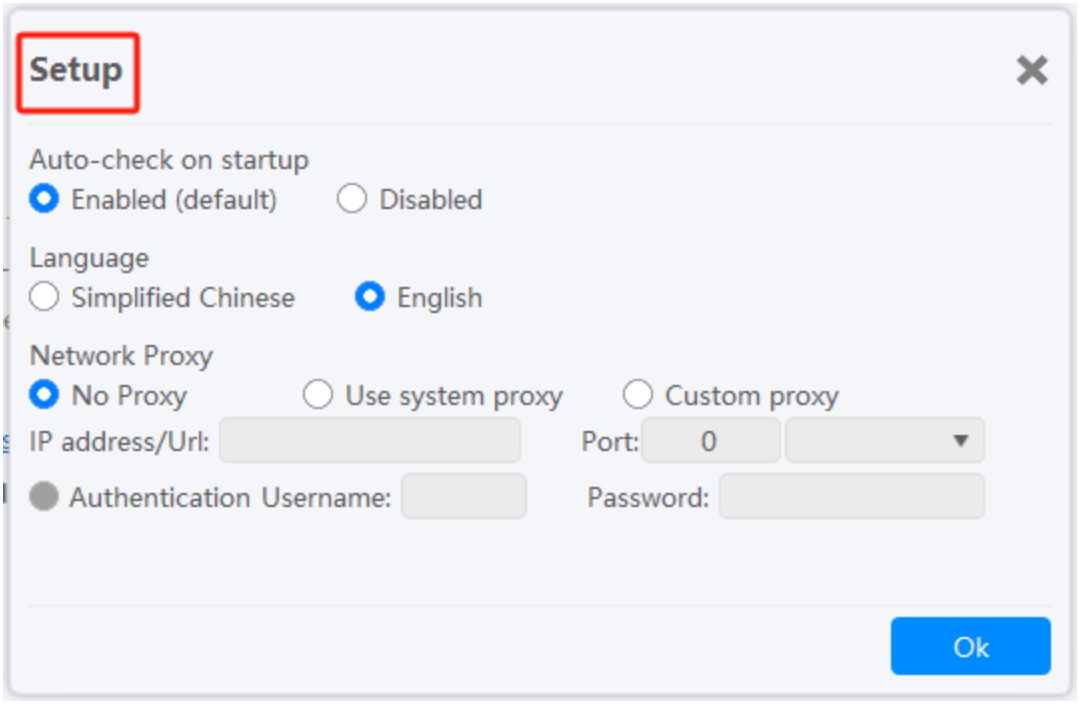


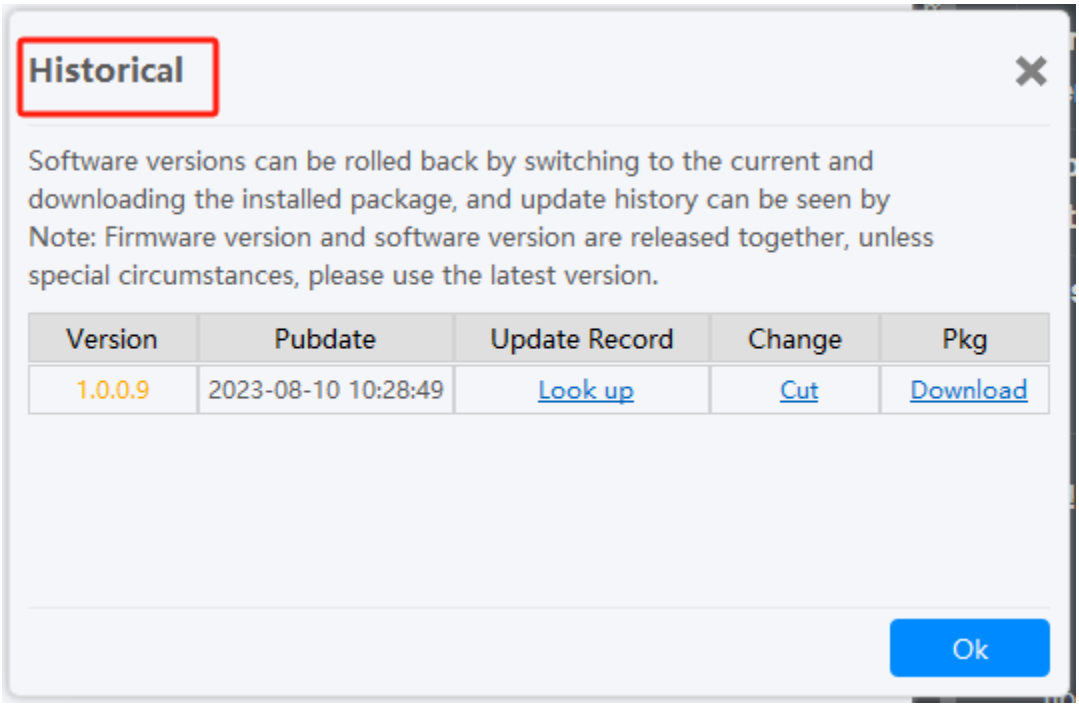
Click the **Update** button to update the software to the latest, and click the "OK" button to restart the client software.



Click the **Setting** button to set the version of PowerDebugger.

Setting	Can be set up to automatically check for updates, language and network proxies
Ignore this version	You can set this parameter to ignore the latest version number
Download the latest installer	Download the latest installer
Historial	You can query, switch, and download installation packages in the version history.(Version 1.0.0.9 and later only)





TIPS

- When the client software is already up to date, the [**Update**] button will not be visible.
- If the update is slow or cannot be updated, download the latest version from the

official download site for installation.

Edit this page

*Last updated on **Mar 12, 2024** by **zhouzhouj***

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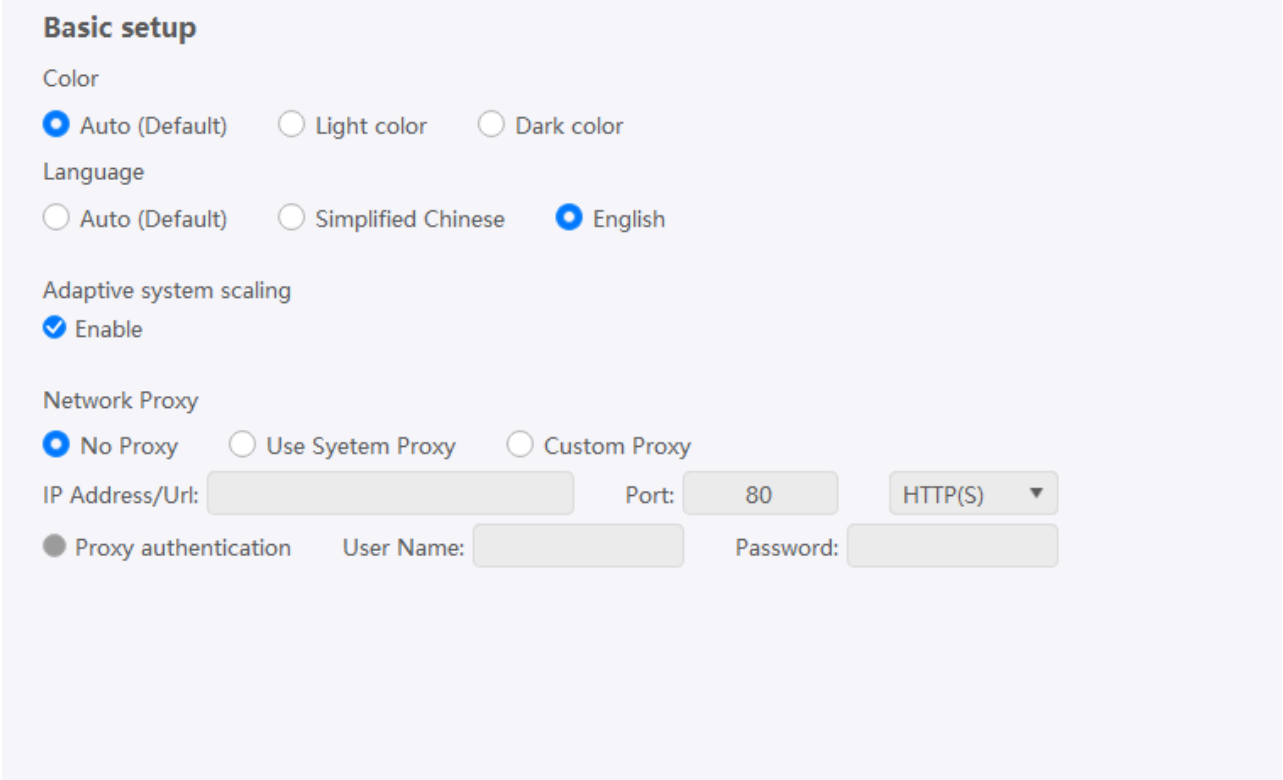
4.7 Settings

4.7.1 Basic setup



4.7.1.1 Color

- **Auto (default)**：Automatic selection of software color matching (based on system color matching or DST automatic Settings).
- **Light color**：Set to light color (blue and white)
- **Dark color**：Set to dark (black and grey)

4.7.1.2 Language

- **Auto (default)**：Automatic language selection
- **Simplified Chinese**：Set the mode to Simplified Chinese
- **English**：Set to English

> **TIPS**
>
> In automatic selection mode, if the system language is Simplified Chinese, the system will be set to Simplified Chinese mode, and all other coding systems will be set to English mode (please pay attention to the log).

4.7.1.3 Adaptive system scaling

- **Enable**：If this function is enabled, the zoom ratio is automatically matched
- **Disable**：Disable adaptive scaling, you can manually adjust the scale and range1.0~2.5

4.7.1.4 Network agent

In some network restricted environments, you may need to enable the network proxy to access the server of Chuangxin Workshop. You can enable the network proxy service according to the actual network environment.

- **IP Address** : indicates the proxy IP address
- **Port** : indicates the proxy port
- **Protocol:**HTTP(S) or socket5
- **Username** : User name for proxy access
- **Password** : Password of the proxy access user

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Last updated on ***Nov 2, 2023*** *by* ***Alan Chen***

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4.8 App

4.8.1 Introduce

The initial Settings of the Power Debugger are preset before delivery, and can be used without configuration in standard application scenarios. **In local area network (LAN) and public network (public network) mode**, configure the network according to the user's network environment. In this environment, the difficulty of using the power debugger is minimized without importing complex Settings. Power Debugger Provides WeChat Mini-App Power Debugger quick setup application, provided

- Quickly configure WIFI network .
- Change the working mode to LAN mode or public network mode.

> **TIPS**
>
> Mini-App only provides **distribution network** and **working mode** switch, more detailed Settings please use the Power Debugger desktop client software.

4.8.2 Get App

Use wechat scan function to scan the following QR code to access the Power Debugger mini program.

4.8.3 Usage

The main interface includes:

- **Device Connection Management** : Connect the device at the transmitter or interface of the Power Debugger
- **Fast network config** : Quickly configure the WIFI network for the Power Debugger
- **Working mode switch:** Switching working mode

PowerWriter®

PowerDebugger蓝牙配网工具

快速配网

保持设备上电,打开手机蓝牙

工作模式

4.8.3.1 Connect Device

Click the Bluetooth icon to enter the device management page, and then Power on the Power Debugger device again. The device information of PDTX-XXXX or PDRX-XXXX will be displayed on the page. Click the SWITCH on the right side of the name and request to connect to the device. It will automatically return to the main page, as shown below:

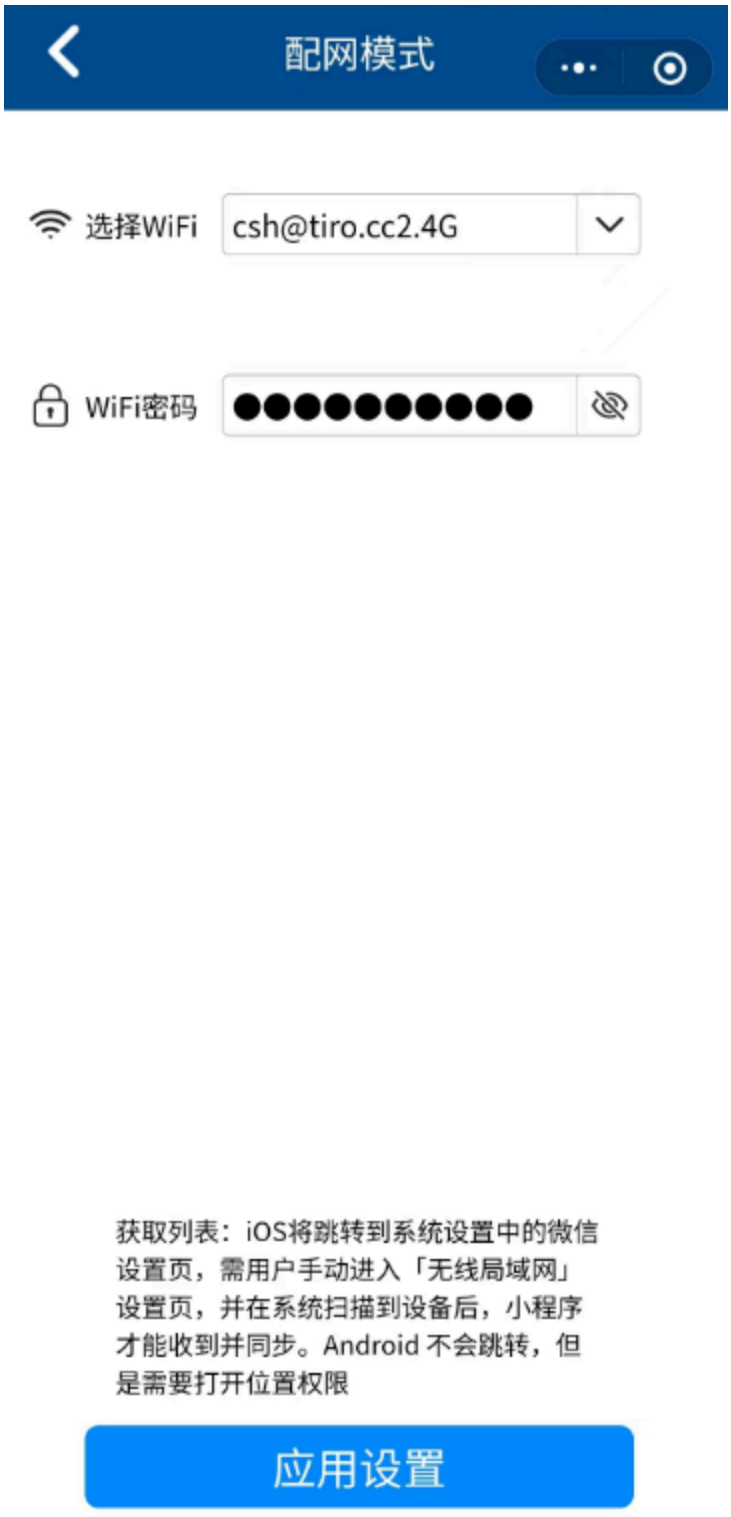
TIPS

If you cannot see the device, please check whether the Bluetooth is turned on in the

> mobile phone system and whether the wechat Location service (Bluetooth) is enabled. In addition, the device needs to be powered on within 30 seconds to complete the connection and pairing, and the Bluetooth function will be automatically turned off when the device expires.

4.8.3.2 Quick setup network

Click the "quick distribution network" button to enter the distribution network mode, select the WIFI network to be set from the list of WIFI selection, then enter the WIFI password, and wait for the distribution network result.



注意：

- Before configuring the network, change the working mode of the device to LAN

or public network mode. For details, see Working mode.

- WIFI only supports 2.4G networks, not 5G.

4.8.3.3 Work mode

With this function, the device can be switched from other working modes to the local LAN mode or the public network mode, as shown below:

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*Last updated on **Aug 7, 2023** by **Alan Chen***

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4.9 Account

4.9.1 Introduce

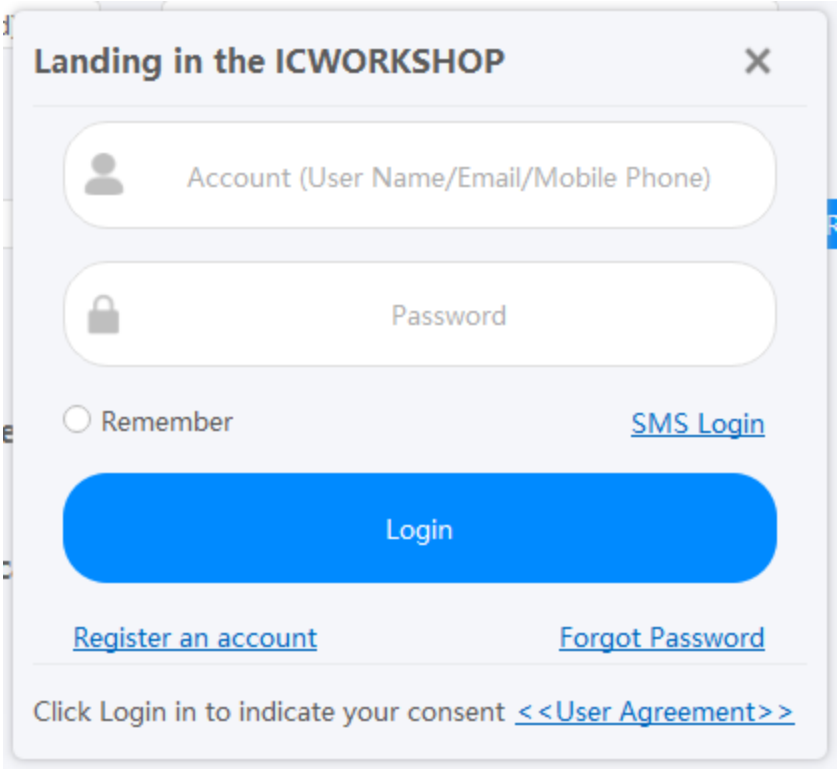
Power Debugger Public network mode: the power Debugger platform provides the proxy forwarding service. In this mode, the device needs to be registered and authorized to bind. On the account page, the device also needs to be registered, authorized to bind, and record view.

TIPS

- Devices that are not registered and authorized cannot be supported for public network debugging.
- The added device is not bound to the account, and different accounts can share the device.
- The registered device only needs to be bound to the Power Debugger receiver device.

4.9.2 Login

Click  account button， enter the account page, if the current account is not logged in, the account login page will be displayed, enter the ICWorkshop platform account for account login, as shown below:

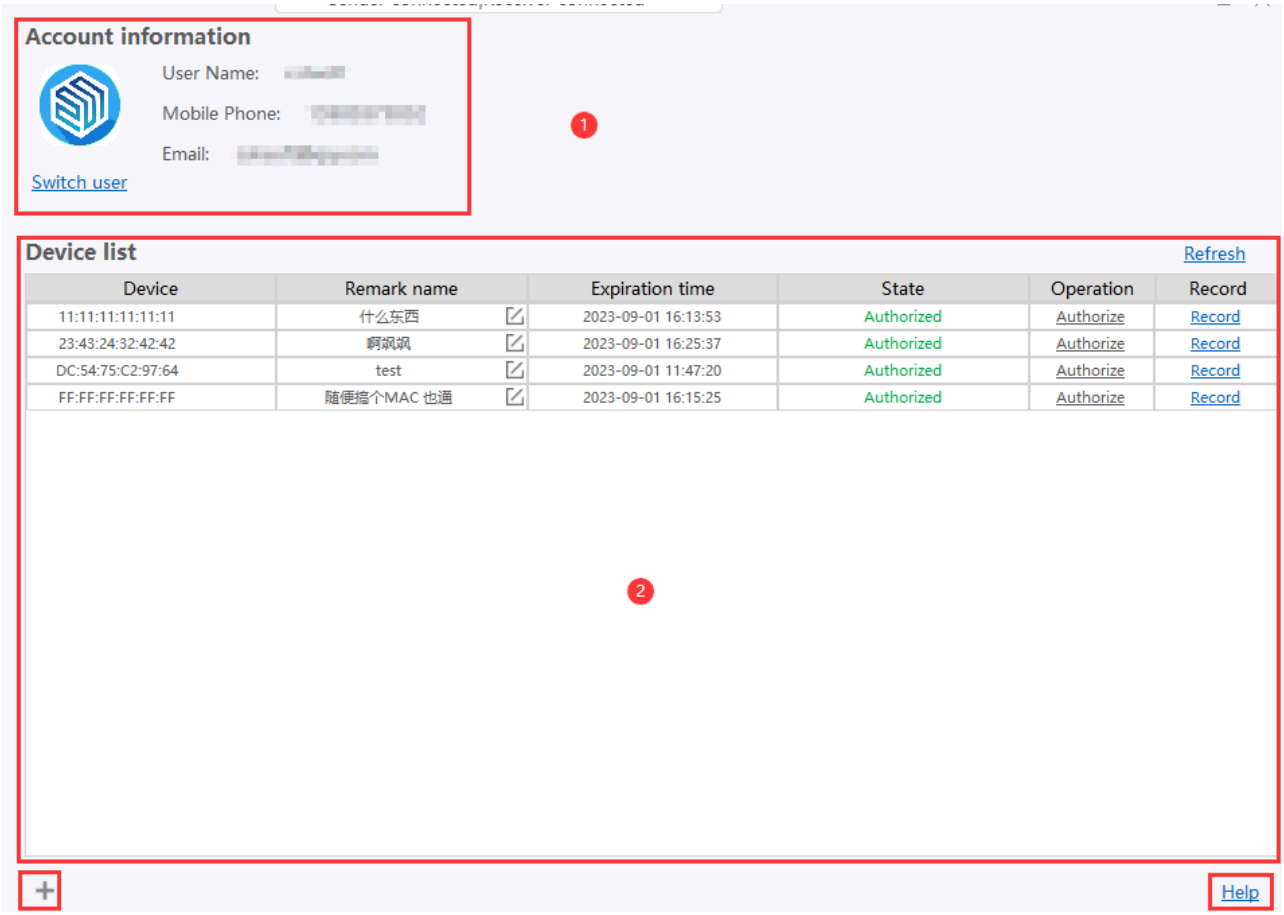


tips：

- If you are not currently registered with the platform account, click the Register Account button to register the account.
- Forget password Click Forget Password to retrieve password.
- Support verification code login.

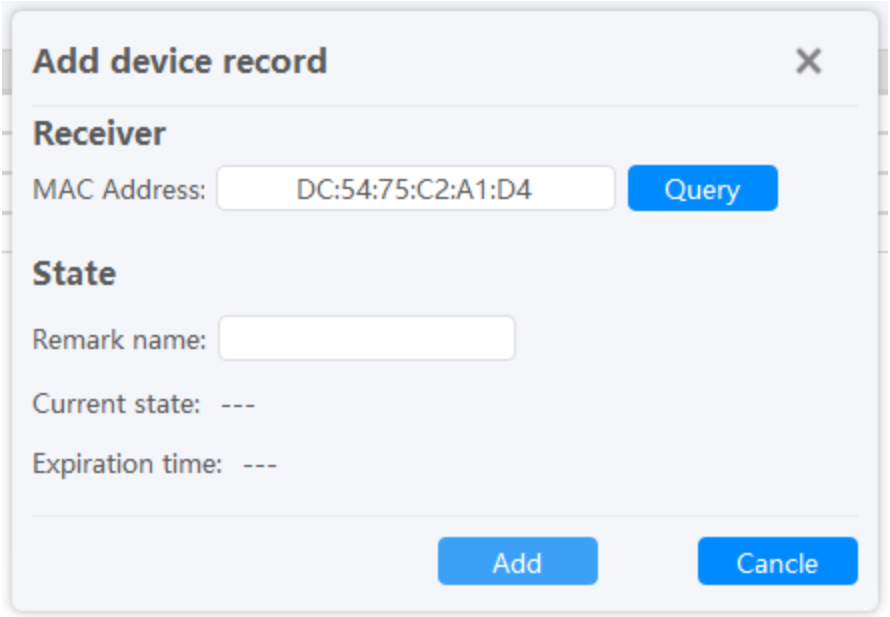
4.9.3 Device manager

After logging in to the account, the details of the device account page are displayed as follows: View account information, switch accounts, list of registered devices, view authorization status, and add devices.



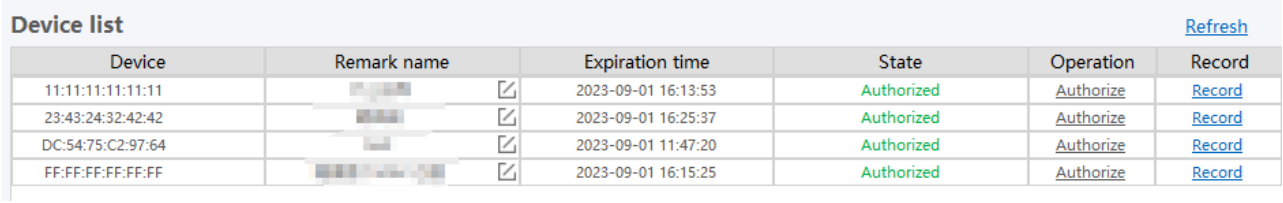
4.9.3.0 Device registration

Click the Add Device button + device registration page is displayed， Fill in the MAC address of the receiving device, click **Query** button to obtain the current information of the device, fill in the note name of the device, and click Add, as shown below:



> **WARN**
>
> Add the MAC address of the device to the MAC address of the receiver. You can view the device information in about.

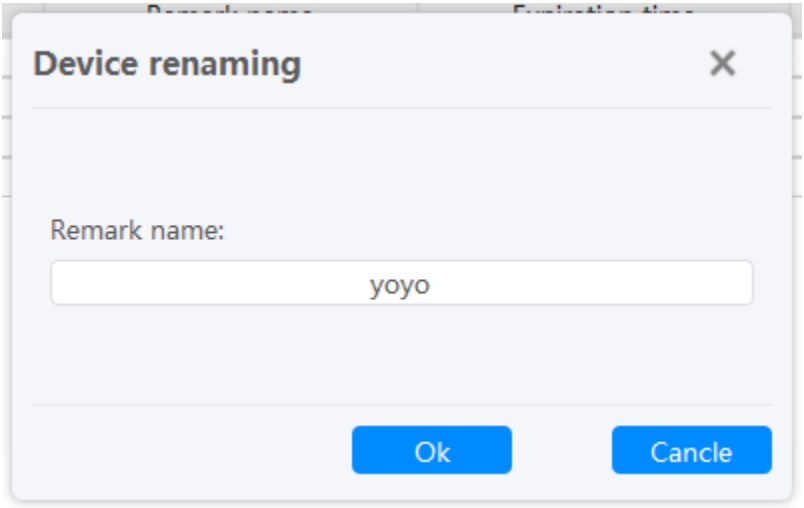
4.9.3.1 Device list



- **Device:** MAC address of the currently registered device.
- **Remark Name:** Note name of the current device.
- **Expiration Time:** The expiration time of the current device authorization.
- **Status:** Current device status.
- **Operation:** If it expires, you can apply for authorization.
- **Records:** View the authorization records of the device.

4.9.3.2 Modify remarks

click pop up the device remarks setting box, enter a new device name, and then click OK, as shown below:

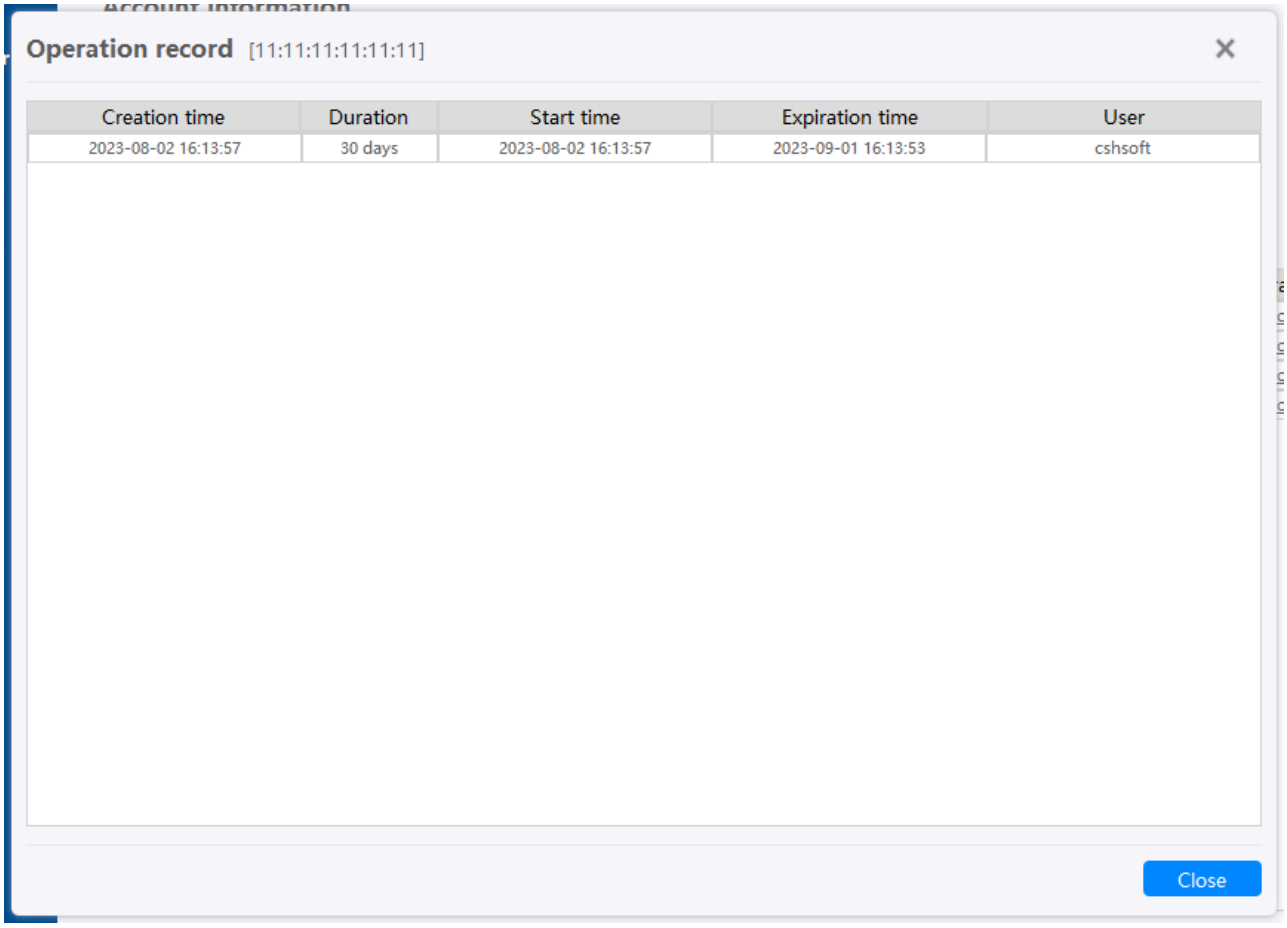


4.9.3.3 Obtain authorization

Click the Get Authorization [Extend authorization] button to authorize or extend the authorization of the device.

4.9.3.4 View record

Click Record button to view the device's authorization record, as shown below:



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*Last updated on **Aug 7, 2023** by **Alan Chen***

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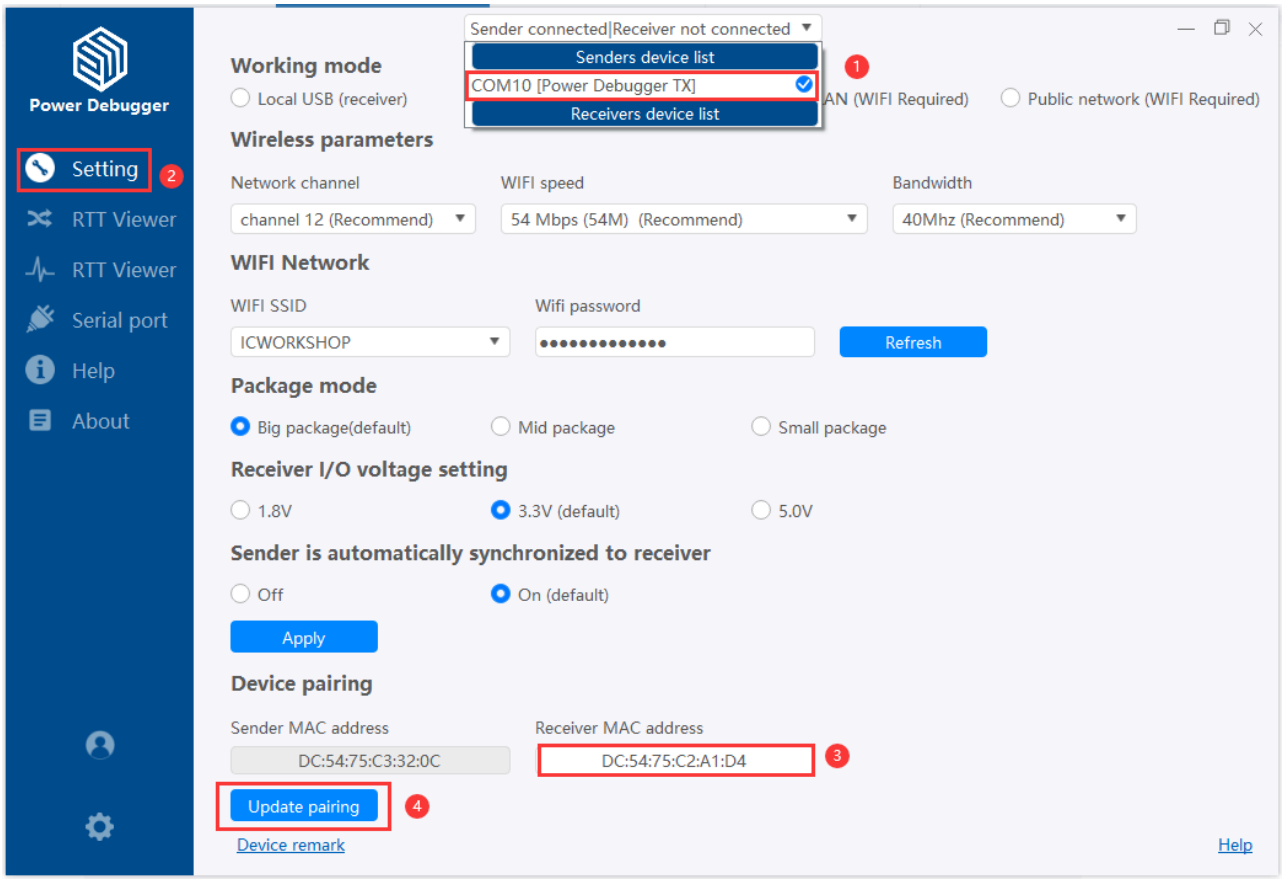
5.1 Device pair modify

Each set of Power Debugger devices has been paired before delivery and can be used out of the box in local WIFI direct connection mode. In LAN or public network mode, there may be a complete set of Power Debugger devices (two sets of complete devices, two transmitter terminals and two receiver terminals) on the development end and target board. At this time, if it is necessary to connect the development end transmitter to the receiving end of the target board, the pairing of the device needs to be modified. The specific operation process is as follows.

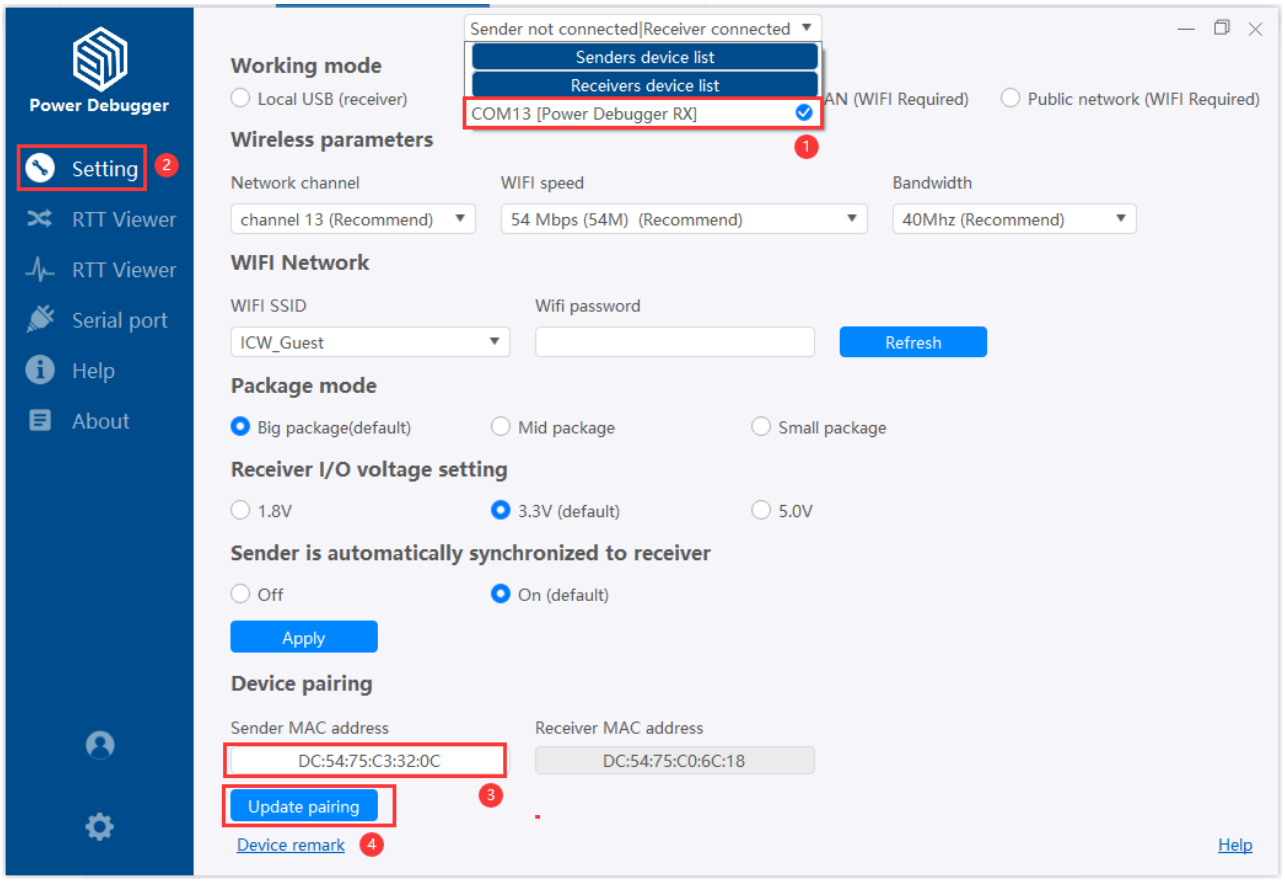
5.1.1 Transmitter pairing adjustment

- Connect the transmitting device (**Do not connect the receiving device**)
- Switch to the hardware Settings page and adjust the MAC address of the required pairing receiver on the device Pairing function page (**Manually enter**)
- Update pairing



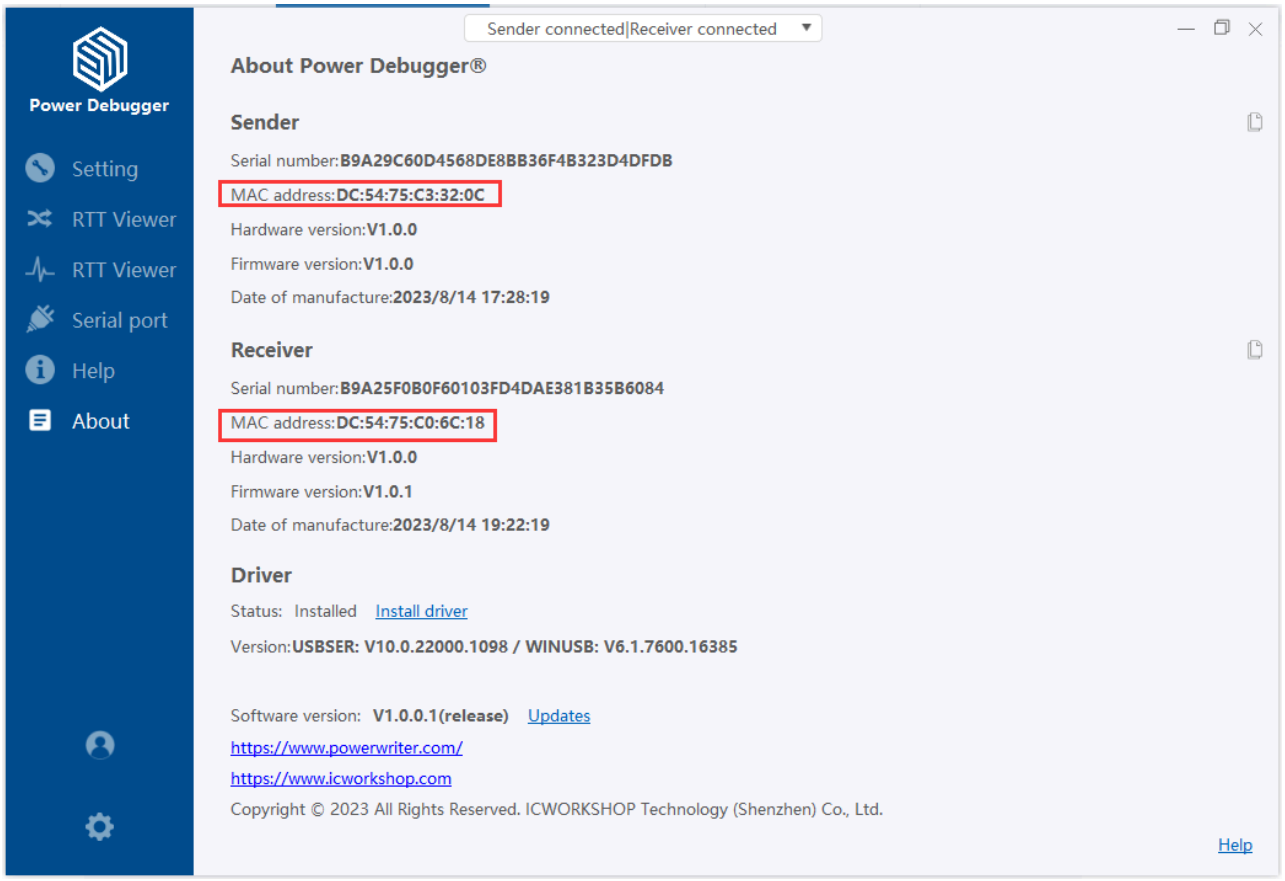
5.1.2 Receiver pairing adjustment

- Connect the receiving device (**do not connect the transmitting device**)
- Switch to the hardware Settings page and adjust the transmitter MAC address you want to pair on the Device Pairing function page (**Manually enter**)
- Update pairing



5.1.3 How do I view the MAC information of my device

Connect the corresponding device, you can view the corresponding MAC address information on the About page, as shown below.



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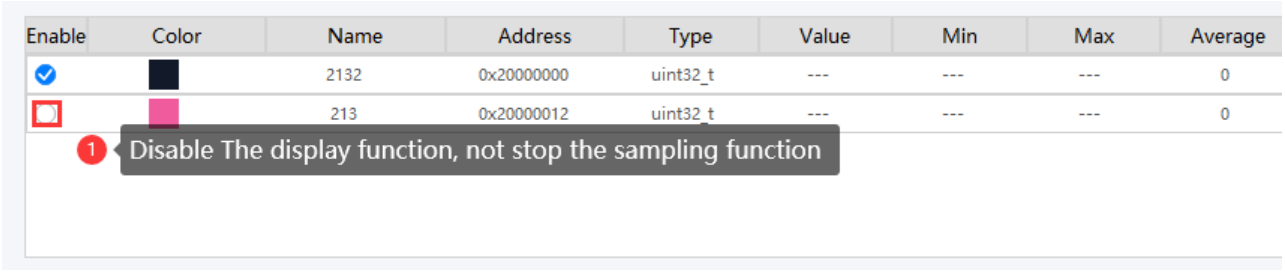
*Last updated on **Sep 6, 2023** by **Alan Chen***

5.2 Sampling optimized

5.2.1 Delete unwanted samples

The Power Debugger RTT function and Scope function are integrated with the autonomous debugger driver. The enable function on the function interface only enables the waveform display. Data sampling cannot be disabled temporarily.



TIP

Plan to optimize the driver and stop data sampling at the driver layer when the enable is turned off to further improve performance.

5.2.2 Avoid mixed sampling

The Power Debugger Scope also supports the jscope_xx channel in RTT and arbitrary variable sampling. However, since the implementation of RTT is a frame structure, multiple sample data are read each time sample data is read, while variable sampling data is read one sample data each time. Therefore, the sampling may be low, and even the abnormal phenomenon of waveform display is not synchronized. In this case, it is a better choice to

sample RTT Scope or variables separately.

5.2.3 sampling rate

The Power Debugger can achieve the maximum sampling speed of **200K Samples /s (4us/Sample)** in RTT mode with the current driver. If a large amount of data is monitored, the sampling speed of a single data will be reduced (average allocation). Do not exceed the sample rate of the Power Debugger; otherwise, the data may be overwritten because it is not read in time, and the expected waveform may not be displayed correctly.

> **TIP**
>
> The driver will be updated from time to time, and the updated driver will continue to optimize in terms of stability and performance. The above data is for reference only, please refer to the latest driver performance.

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5.3 MDK clock optimization

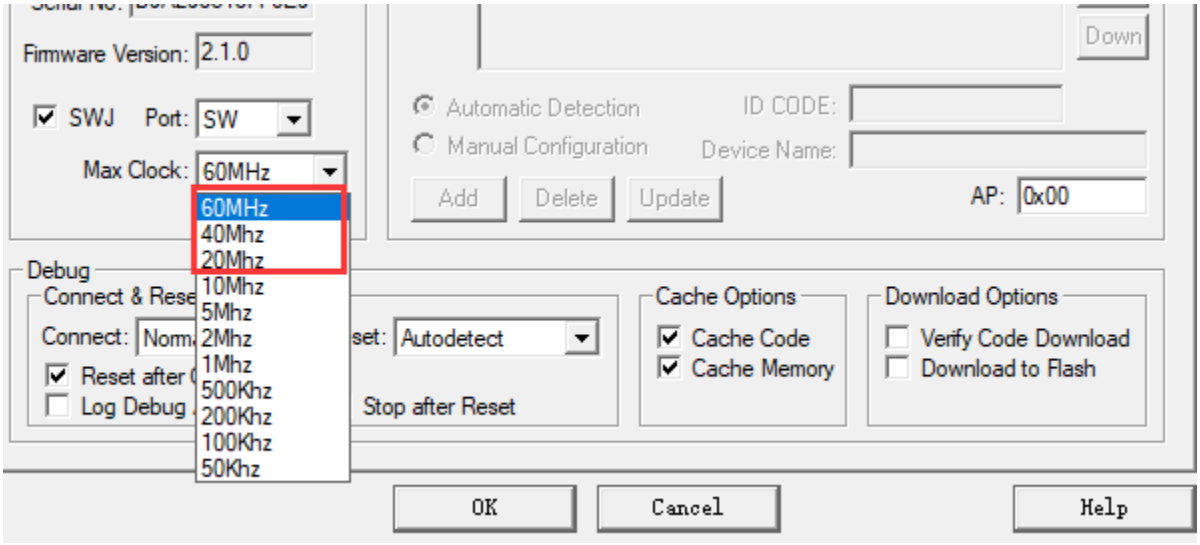
5.3.1 Patch download

Link： https://url39.ctfile.com/f/50733739-983878198-520fd5?p=abcd (Access password: abcd)

unpack password：gd465411asd

5.3.2 Usage

- [x] Select the MDK installation directory.
- [x] Click the Execute button or Restore button to perform the patch or restore to the default Settings.
- [x] After execution, you will see that the driver of the CMSIS-DAP device can choose a 60Mhz, 40Mhz, 20Mhz clock signal.



> **TIP**
>
> Tip: This tool is collected from the internet, please pay attention to identification.

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Last updated on ***Nov 30, 2023*** *by* ***Alan Chen***

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6.1 Performance

Test environment:

- **Platform**：keil5 version:5.38.0.0
- **Target**：stm32f407vgt6
- **Firmware size**：200K；
- **Clock**：60Mhz

Num	Mode	USB	WiFi Direct	Local-LAN	WLAN
1	Debugging	1.52Mbps	413.2Kbps	151.76Kbps	65.6Kbps
2	RTT	1.82Mbps	600Kbps	304Kbps	128Kbps
3	Serial transmit	977.76Kbps	981.52Kbps	622.56Kbps	747.6Kbps
4	Serial Scope	977.76Kbps	981.52Kbps	622.56Kbps	747.6Kbps

TIPS

In different environments, the performance may be higher or lower than the test speed in the table (measured at 60Mhz clock).

TIPS

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Last updated on ***Dec 27, 2023*** *by* ***Alan Chen***

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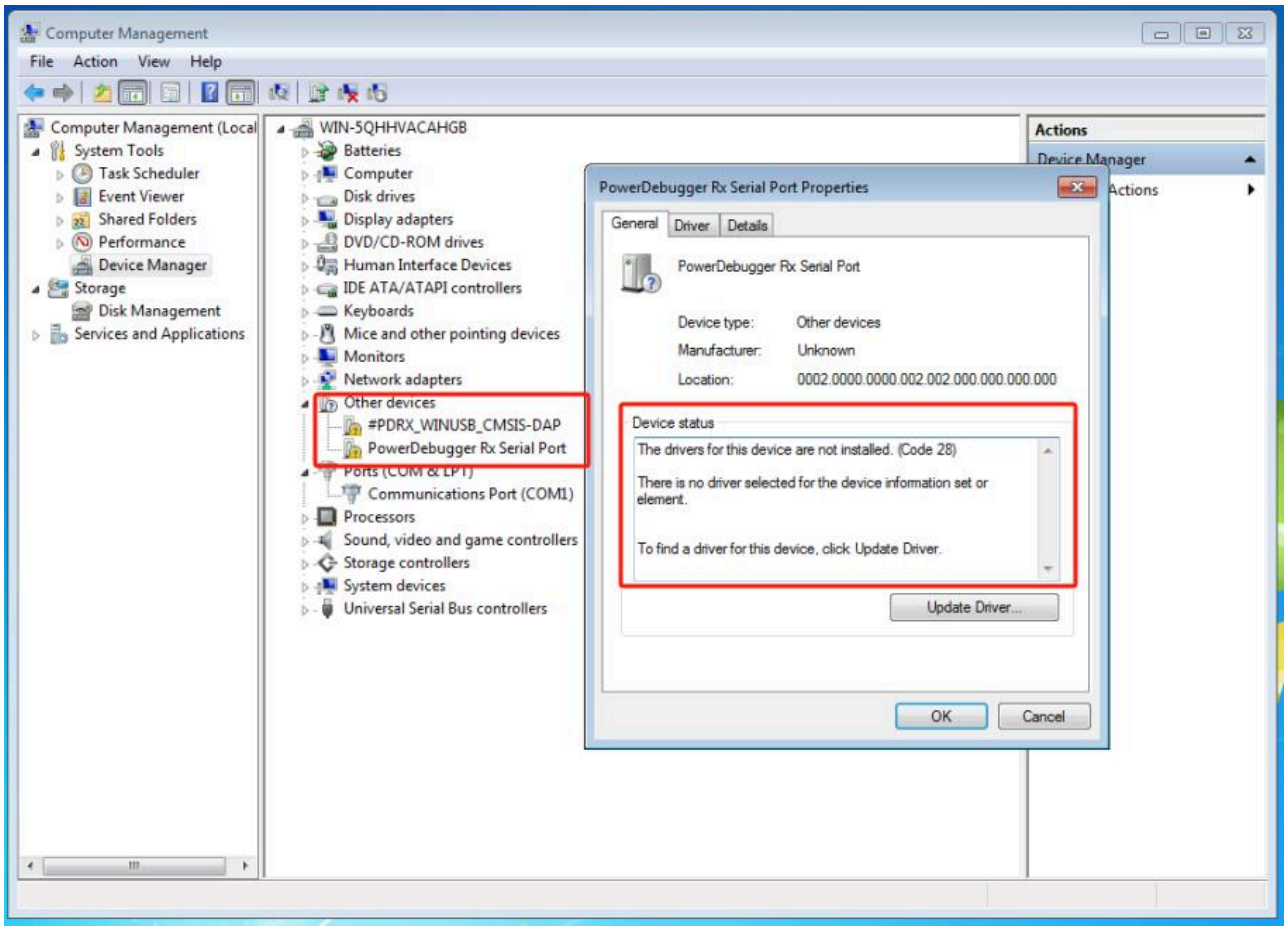
6.2 Drive installation

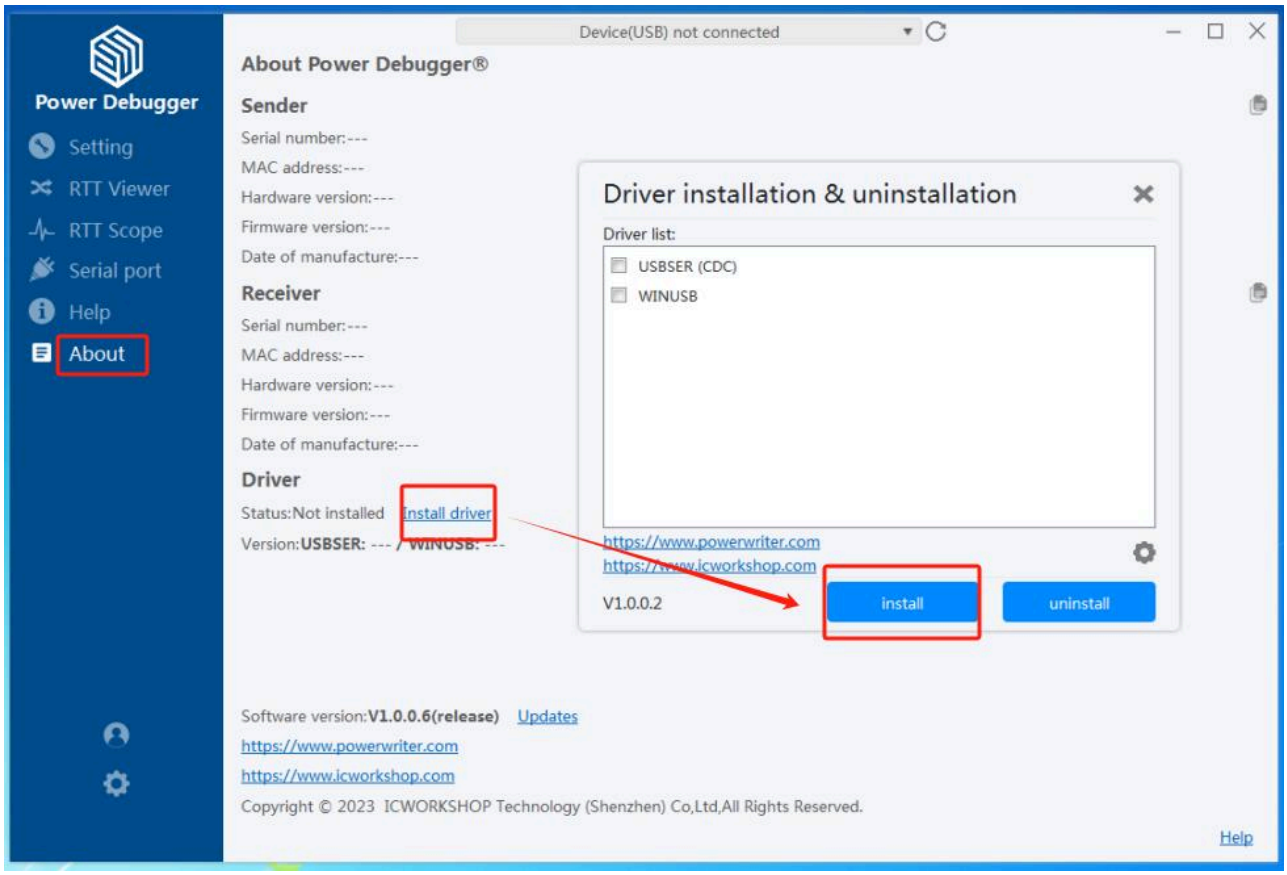
6.2.1 PowerDebugger latest driver installation

If the PowerDebugger driver is not installed, the device manager displays the following figure:



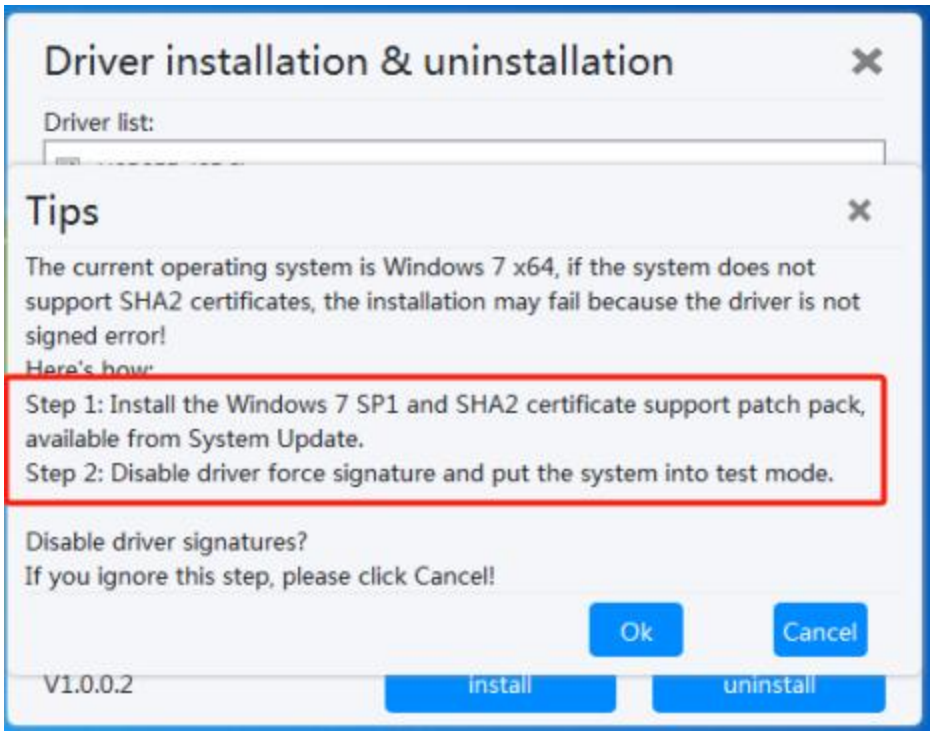
Click the link to download:**PowerDebugger latest driver**

PowerDebugger APP》Menu Bar》About,PowerDebugger Drive can also be installed here.



6.2.2 Windows7 x64 Drive installion

Because Windows7 x64 does not support SHA2 certificate.Failure to verify the driver's digital signature may result in an installation failure.



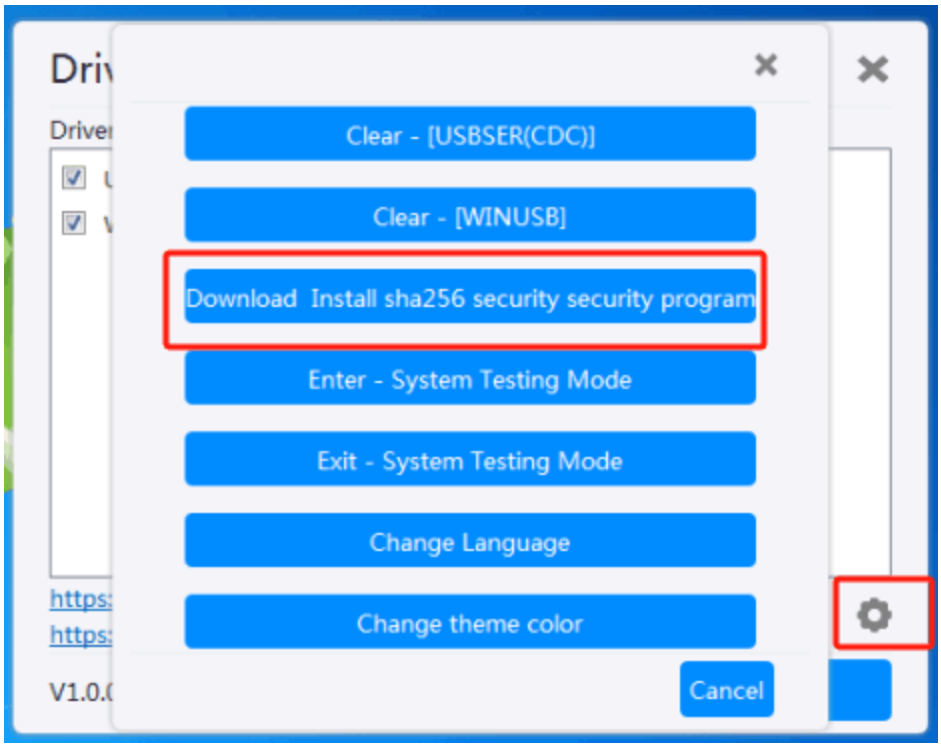
At this point, you need to perform the next two steps.

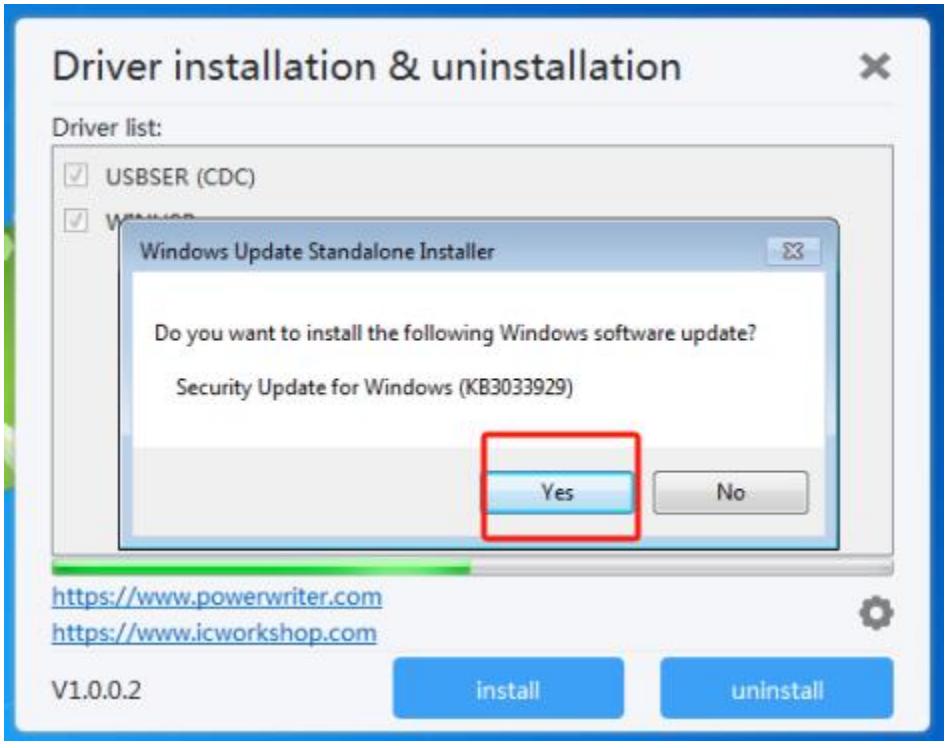
1.Install the Windows 7 SP1 and SHA2 certificate support patch packages, which can be obtained from System Update.

2.Disable driver forced signature and put the system into test mode.

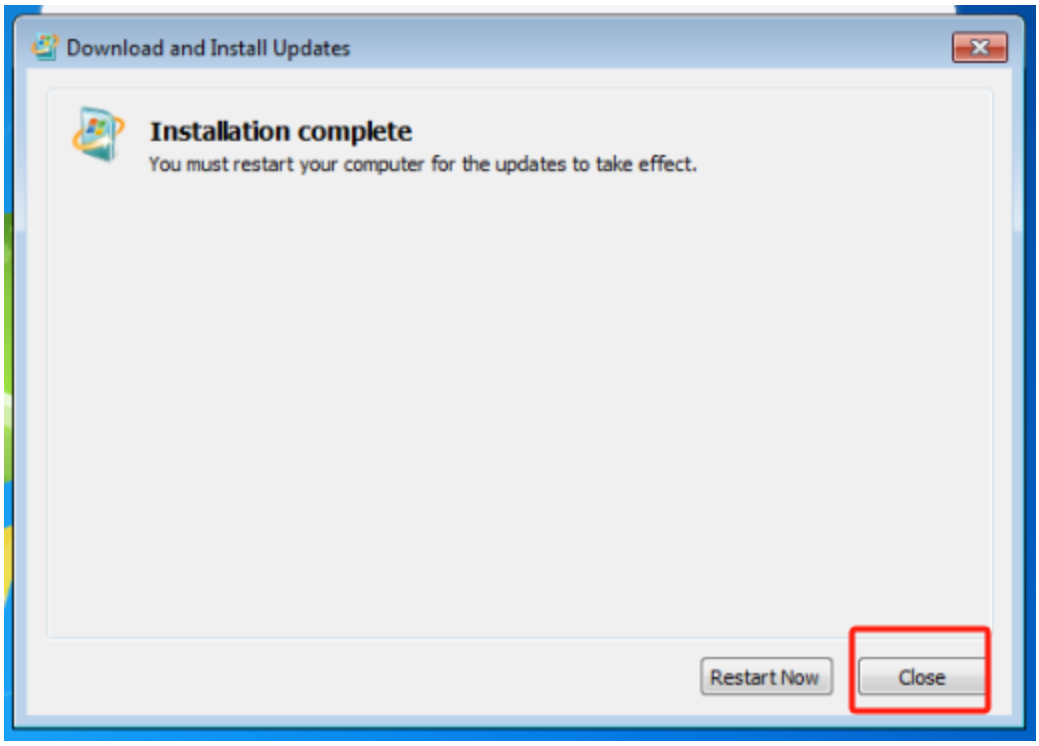
1.Download and install the sha256 patch

Click the Settings button in the driver installer to see the button to download the sha256 patch.

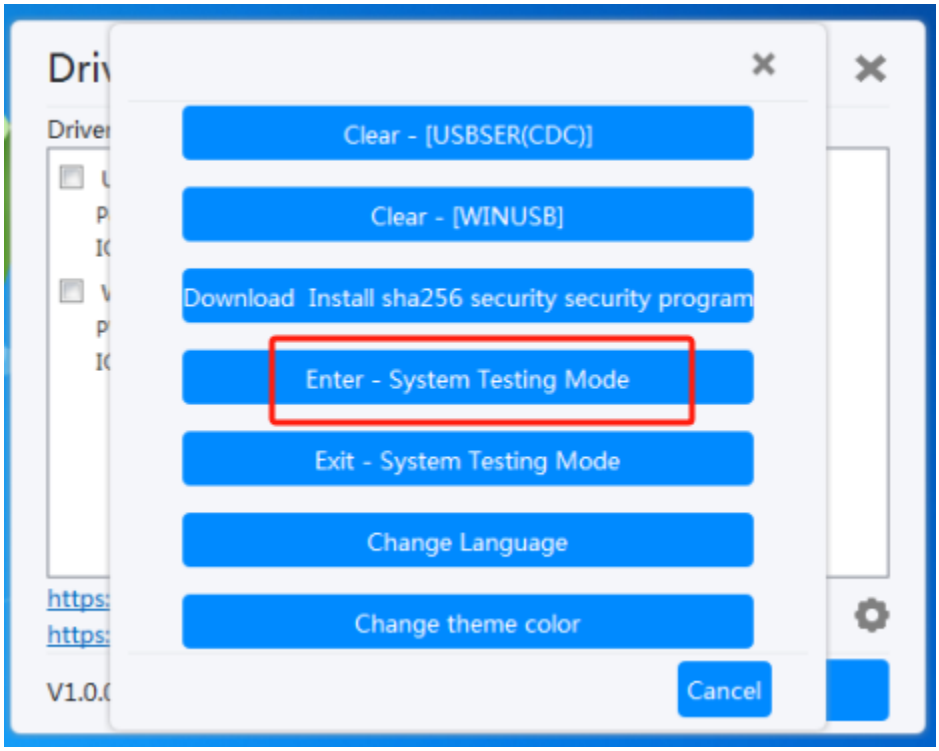




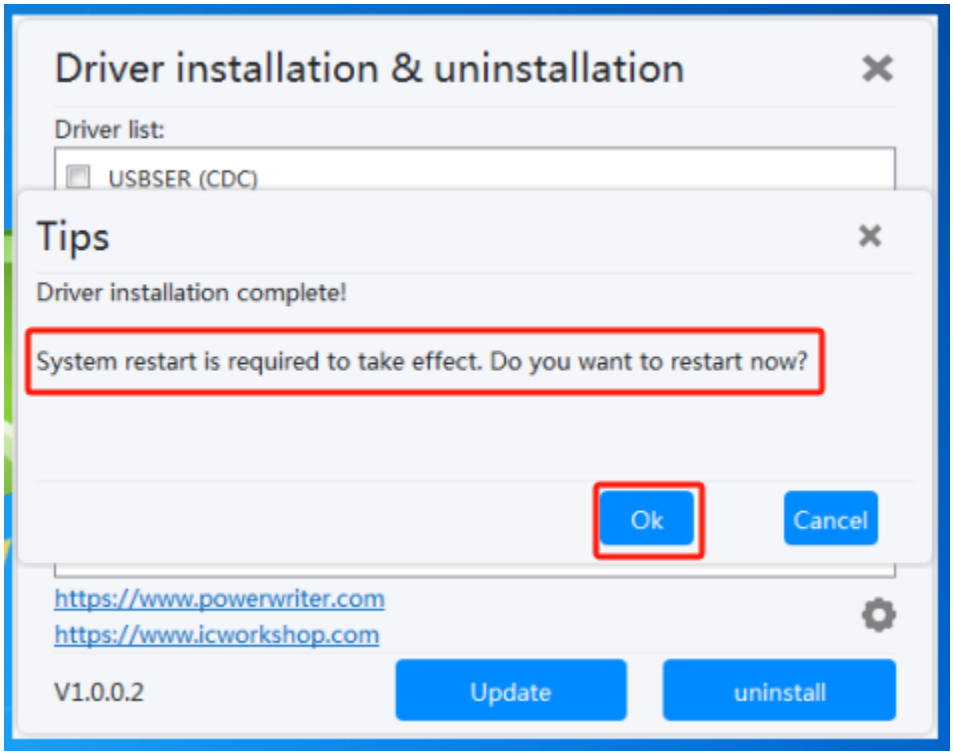
When prompted to restart the system, you need to click Close.



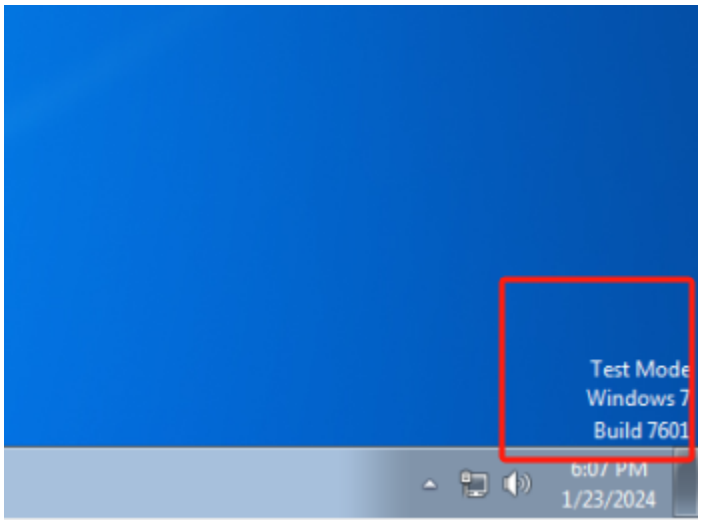
2.Enter test mode



System restart is required to take effect.Now you need to restart the system.



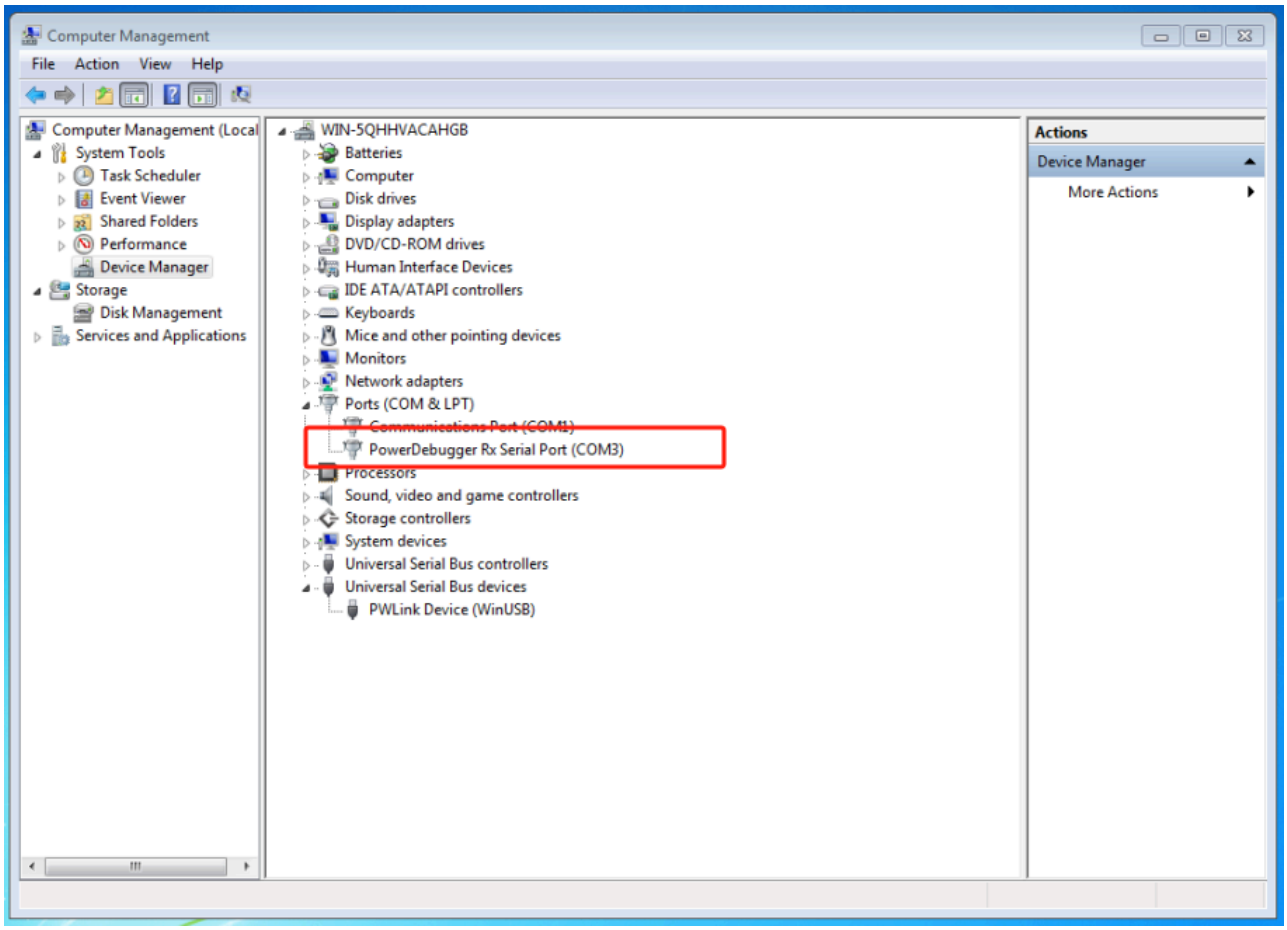
After restarting, you will find that the word **test mode** appears in the lower right corner of the computer.That indicates that you have entered system test mode.



After that, you can install the driver smoothly. If a prompt box pops up: Windows cannot

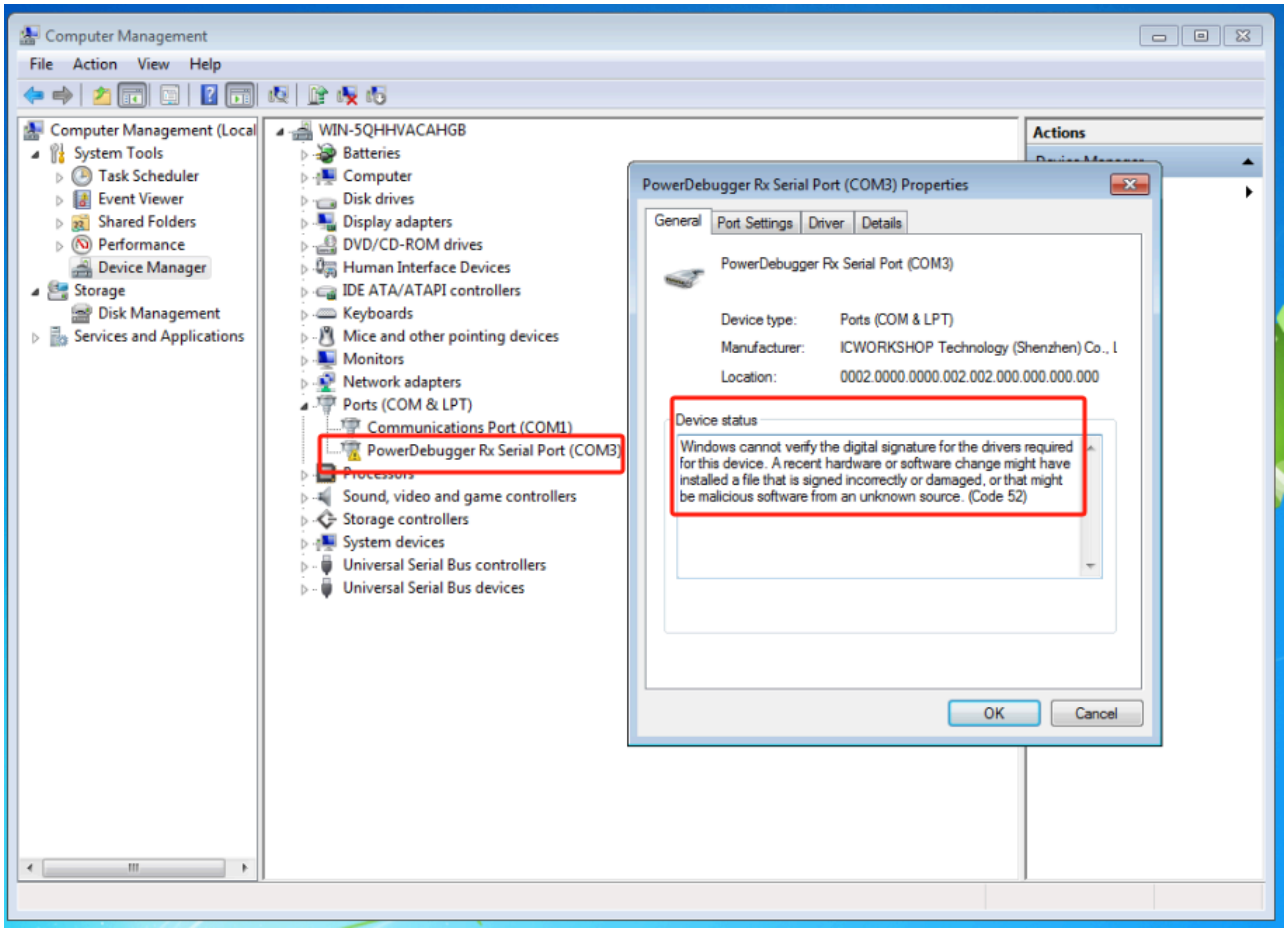
verify the publisher of the driver software, click **Always install**.

After the installation is complete, the Device Manager will display as follows.



Above, the Windows7 x64 driver is installed.

3.A special note on error code 52



If an error (code 52) is reported in the device manager, the error may be caused by the user exiting the test mode . In this case, you do not need to repeat the preceding operations to install the sha256 patch,Enter test mode.

> **TIP**
>
> If the network is unavailable, you cannot download and install the sha256 patch through the Settings,You can install the sha256 patch by following the link below:SHA2 certificates support patch packages

> **S 提示**

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Last updated on ***Feb 16, 2024*** *by* ***zhouzhouj***