



AsReaderDesktopMulti

Demo Reference Guide

Revision History

Version	Modified Content	Date
1.0	Initial version	2020/6/8
1.1	Add Power function description.	2021/12/9

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Before Use

Please download the demo APP before using it.

1 Connection

1.1 USB Connection

1.1.1 USB Serial Mode Connection

Step 1: The configuration switch needs to be switched to the following position:

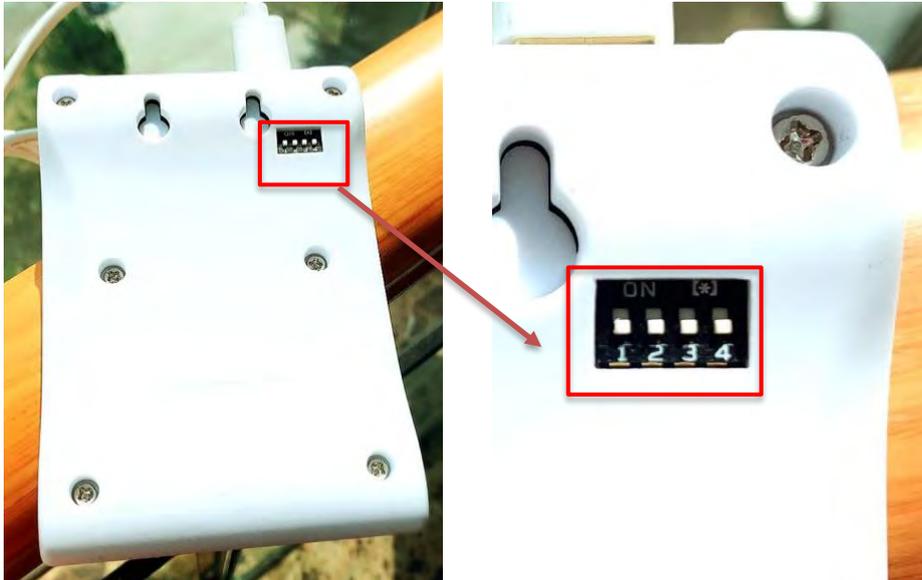


Figure 1-1-1-1 Switch Setting

Step 2: Connect to computer through USB data cable, as shown in the figure:



Figure 1-1-1-2 Connect to computer

When the reader is connected, a beep will be heard and the light will be on. This means that the power on process is normal and the reader can pass self-check.

1.1.2 Multiple Desktop Connections

Step 1: Connect two AsReaderDesktop devices to the computer following the

steps in [1.1.1 USB Serial Mode Connection](#).

Step 2: Open the DemoAPP and click the "Connect" button on the pages of Device1 and Device2, respectively. Once successfully connected, the function of the corresponding page of DemoAPP will be activated. For the parameter setting of each device, please refer to [2.2 Parameter Settings](#).

Note: When you start the software, right click on and select "run as administrator". If you double-click to open the .exe file, you may not be able to connect successfully. The prompt message is as shown in the figure below.



Figure 1-1-2-1 Connection Failed

Interface Overview:

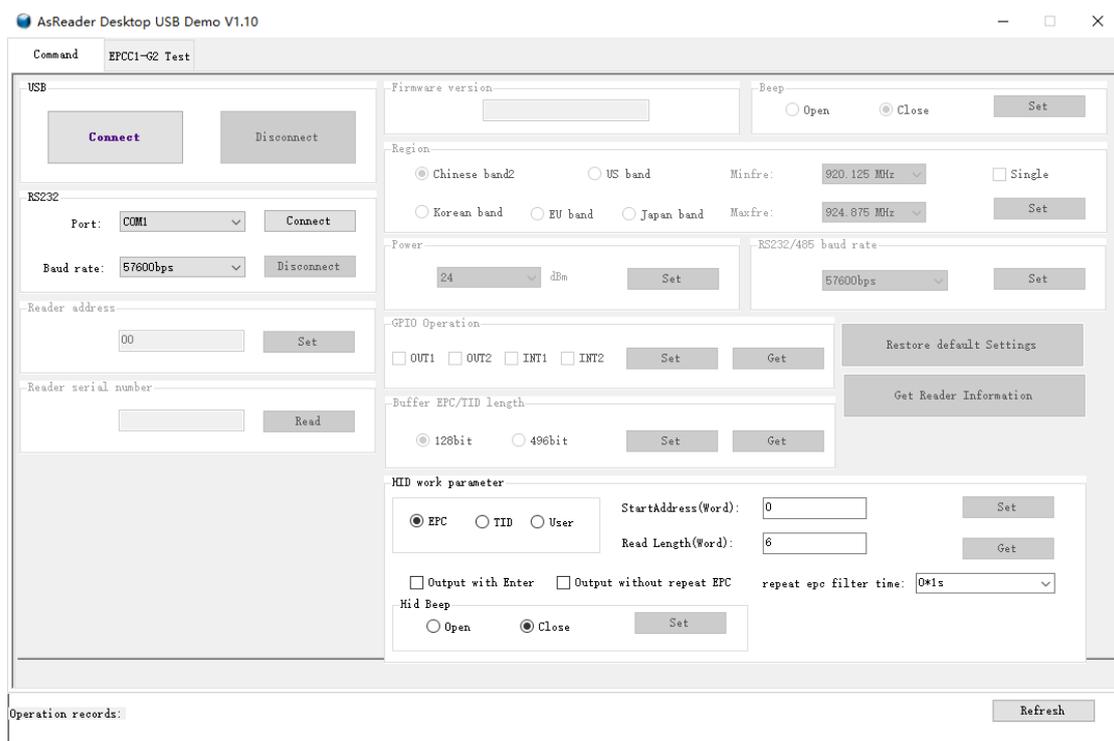


Figure 1-1-2-2 Interface Overview

1.1.3 USB HID Mode Connection

Step 1: The configuration switch needs to be switched to the following position:

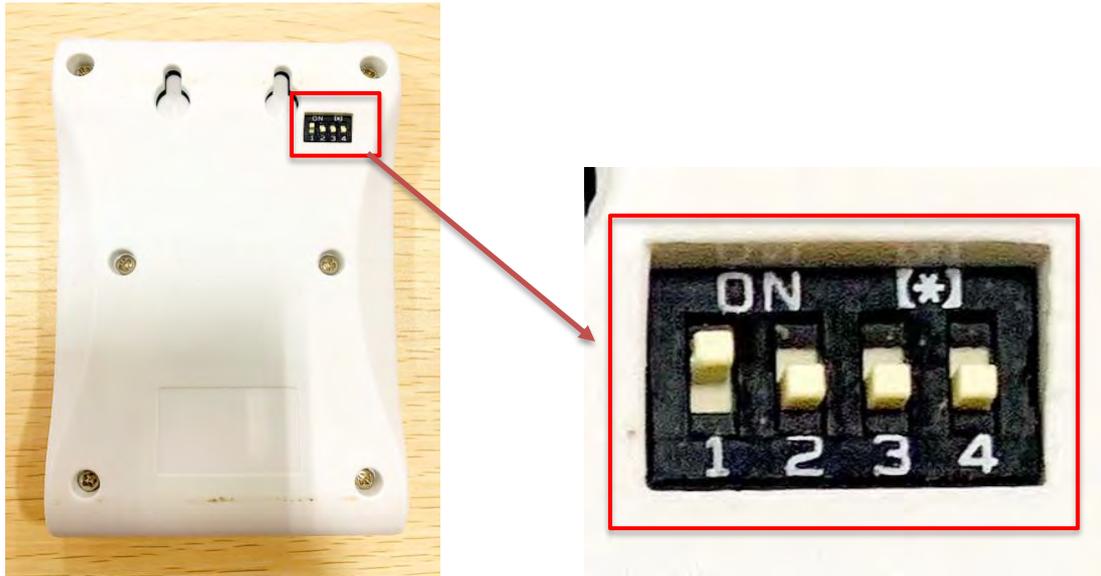


Figure 1-1-3-1 Switch Setting

Step 2: Connect to computer through USB data cable, as shown in the figure:



Figure 1-1-3-2 Connect to computer

When the reader is connected, a beep will be heard and the light inside the device housing will be on. This means that the power on process is normal and the reader can pass self-check.

2 Parameter Interface Operation

2.1 USB Connection



Figure 2-1-1 Connect through USB

Click the “Connect” Button to connect the reader through USB port, and click the “Disconnect” button to disconnect it.

2.2 Parameter Settings

After successfully connecting the reader, we need to set the reader's parameters.

2.2.1 Reader Address

It is used to set the new reader address. This address cannot be “0xFF”. If it is set to be “0xFF”, the reader returns an error message.



Figure 2-2-1-1 Reader Address

2.2.2 RF Output Power

Radio frequency output power refers to the radio frequency signal strength output by the antenna port. It's measured in dBm. It is used to set up and save the power configuration.

The range of output power is 0dbm-24dbm. When this value is set, it will be automatically stored inside the reader, and it will not be lost when the reader is powered down.

The default value of RF output power is 24dBm.

Note: Japan Region ranges from 0 to 13dBm.



Figure 2-2-2-1 RF Output Power

2.2.3 Reader Serial Number

This function is used to get the serial number of the reader. Click the "read" button to get the serial number of the reader.



Figure 2-2-2-1 Serial Number

2.2.4 Region

This bank is used to select the frequency band of the reader. In different frequency band, reader scan frequency is different. It can also be used to set the minimum and maximum frequencies at which the reader works.

Radio requirements vary from country to country. Users can choose to read the sensitive frequency range of smart CARDS based on local conditions. Select the "Single " option, that is, set to single frequency point mode. At this point, "Minfre" and "Maxfre" must be set to the same value.

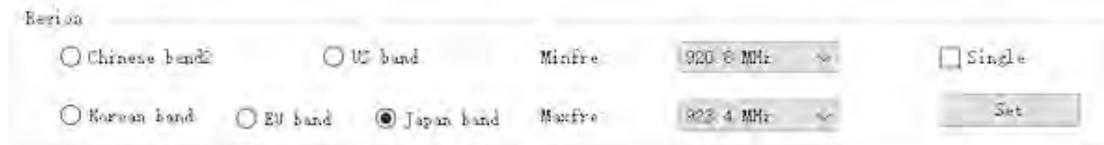


Figure 2-2-4-1 Region

2.2.5 RS232/485 Baud Rate

When the demo software starts up, open COM port by default using baud rate 57600. When the reader power is turned on, the baud rate of the reader is 57,600 by default. The baud rate remains the same when he port is closed or opened. After changing the baud rate, the reader will use the new baud rate until the power is switched off.

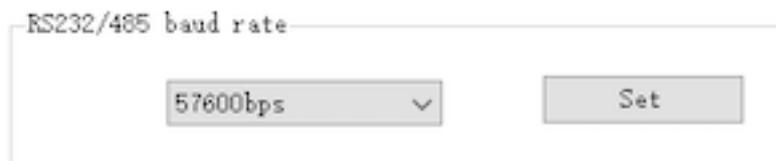


Figure 2-2-5-1 RS232/485 Baud Rate

2.2.6 GPIO Operation

Select a proper pin. Click "Set" to set the status of the pin; Click "Get" to get the status of the pin.



Figure 2-2-6-1 GPIO Operation

2.2.7 Beep

It is used to set the state of the buzzer.



Figure 2-2-7-1 Beep

2.2.8 Buffer EPC Length

It is used to get and set the length of the EPC for the tags on the buffer.



Figure 2-2-8-1 Buffer EPC Length

2.2.9 Restore Default Settings

Click this button to restore the reader to its default settings.

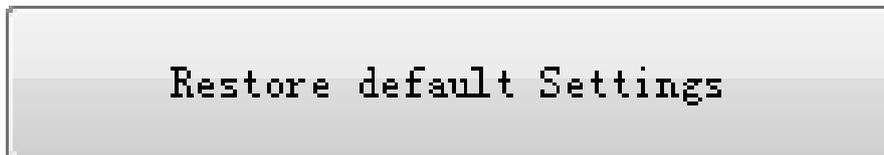


Figure 2-2-9-1 Restore Default Settings

2.2.10 Get Reader Information

Click this button to get the parameter information of the reader.



Figure 2-2-10-1 Get Reader Information

2.2.11 HID Work Parameter

Turn on the switch 1 on the back of the device and connect to the USB cable to enter HID mode. Shown as Figure 1-1-2-1-1 Switch Setting. When a device is running in HID mode, it cannot and does not need to be operated on the software side to connect to the computer. After power on, as long as there is a

tag near, the device will automatically read, the computer screen will automatically display the read tag data.

HID work parameter

EPC TID User

StartAddress(Word): 0 Set

Read Length(Word): 6 Get

Output with Enter Output without repeat EPC repeat epc filter time: 0*1s

Hid Beep

Open Close Set

Figure 2-2-11-1 HID Work Parameter

This bank is used to set which tag memory bank of the tag the device will output after scanning the tags in HID mode, and whether there is beeping when scanning in this mode.

The Set button is used to set the device's operating parameters in HID mode.

The "Get" button is used to get the device's current HID Settings.

3 The Necessary Knowledge

3.1 EPCC1G2 Tag Memories

Tag memory is divided into four memory banks, each consisting of one or more memory words. These four memory banks are:

EPC banks (EPC): This bank is used to store EPC number; this module stipulates it can store 15 words EPC number. This bank can be read and written.

TID bank (TID): This bank is used to store ID number. The tag manufacturer defines the bank. There are currently two types of ID Numbers, four words and eight words. This bank can be read but not written. Because its content cannot be changed, it is often possible to use the TID content to accurately search for the target tag and then change the content of the tag's other memory banks.

User bank (User): The content in this bank is different for different manufacturers. There is no user bank in G2 tag of Impinj. The label, produced by NXP, has 28 words in it. This bank can be read and written.

Password bank (Password): The first two words represent the kill password. The last two words represent the access password. This bank can be read and written.

Write protection can be set for these four memory banks. It means these banks are never writeable. Or it is not writeable under the non-safe state. Only password bank can be set unreadable.

4 EPCC1-G2 Page Description (Answer-Mode)

There are several modes available to query tags.

The most commonly used is answer-mode (real-time mode). This means that the tag data read by the reader is uploaded immediately. The EPC number of the label is available to the user immediately.

The advantage of real-time mode is good recognition performance of multiple tags and quick response. Users can get the tag data in the first time without delay. However, RSSI (Received Signal Strength Indicator) and frequency point parameters (carrier frequency when reading tags) are also real-time changes, which will generate a large amount of data.

4.1 Parameter Settings

In general, use the following settings.

Q: Session: Max-ScanTime:

Target: Read times no tag then A/B conversion

Figure 3-1-1 Parameter Settings

4.2 Query Tag EPC

When you click the "Start" button, you can see that the EPC data of the tags is uploaded immediately and updated in real time. The reader will continuously inventory the tags if you do not click the "Stop" button, as shown in the figure below:

The screenshot shows the AsReader software interface. At the top, there are tabs for 'Device1', 'Device2', and 'EPCC1-G2 Test'. Below the tabs is a 'Start' button and parameter settings: Q: 4, Session: 0, Max-ScanTime: 10*100ms, Target: A, and a checked 'Read' button with '2' times no tag then A/B conversion. The main area is divided into two sections. On the left, a 'Tag list (No Repeat)' table displays the following data:

ID	EPC	Times	RSSI	Device
1	301B000025B9CACD000000005	12	187	1
2	1234567812345678	15	188	2
3	301B00000000CACD000000003	8	199	2
4	E2004005730A01890830C833	5	184	2

On the right, there are several digital displays: 'Tag Number' showing '4', 'Speed' showing '200', 'end time(ms)' showing '125', 'Total tag number' showing '40', and 'Total read-time(ms)' showing '3063'. At the bottom, there are buttons for 'Query (Answer-Mode)', 'Query (Buffer-Mode)', 'Read/Write Tag', and 'Refresh'. A status bar at the very bottom shows logs: '2020/9/19 14:23:37 Device 1: Return before inventory finished' and 'm_records: 4:23:37 Device 2: Return before inventory finished'.

Figure 4-2-1 Query Tag EPC

Data Meaning:

Tag Number	How many different tags have been queried since clicking "Start".
------------	---

AsReader

Total Tag Number (pc.)	Each read a tag, record a piece of data. Real-time accumulation. Repeated reads will also be added.
Speed (pc. /s)	The speed at which the reader identifies the tag. In units of pieces per second.
CMD time (ms)	The time taken for each query command to be executed. In milliseconds
Total-CMD-Time (ms)	The time taken since the start button is clicked. In milliseconds.

Table 4-2-1 Data Meaning

Tag List (No Repeat) Field Meaning:

No.	The serial number of the data.
EPC	The EPC code of the tag.
Times	The number of times the tag was scanned.
RSSI	The received signal strength of the last time the tag was identified
Device	The device number that read this tag data.

Table 4-2-2 Tag List (No Repeat) Field Meaning

5 EPCC1-G2 Page Description (Buffer-Mode)

In Buffer-Mode, each query of a group of tags can be stored in the reader's buffer, so that all the tags in the buffer can be uploaded and displayed to the tag list of AsReader Desktop USB Demo once needed.

The advantage of the Buffer-Mode is that the communication data is small, because of the aggregated uploaded data is filtered and unduplicated.

However, when recognizing a large number of tags, it will take some time to compare the tag information one by one to filter repeated data, so the efficiency of identifying a large number of tags is slightly lower than the real-time mode. Also, it is important to note that you cannot read or write tags when reading tag data from the buffer.

Next, we query the tags in Buffer-Mode.

Click the "Start" button to start the label query. At this point, the name of the button will change to "Stop".

A query process is: click "Start" (start) - > click "Stop" (end). For each query, the "Total tag number" is automatically added up.

The parameters for this example are set to Q=2, S=1, and Target=A. These parameters are set in the Answer-Mode interface.

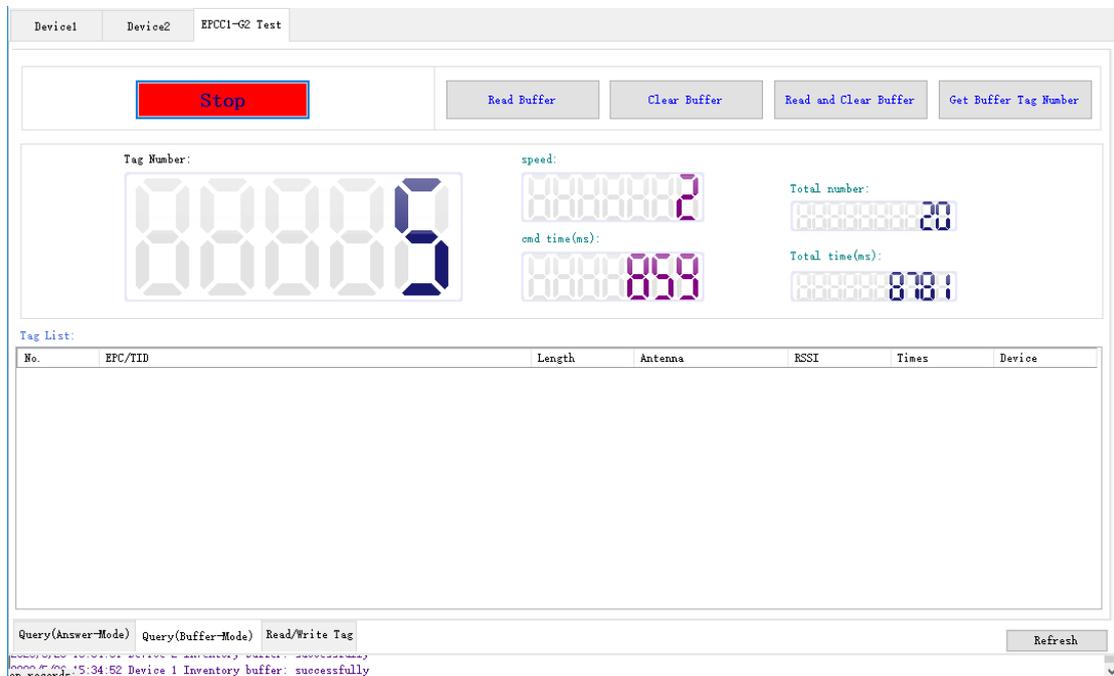


Figure 5-1 Buffer-Mode

We found that "Tag Number" was increasing, but there was no data in the Tag list.

To get the tag data, you need to click "Stop" and then "Read Buffer". At this

point, the tag data stored in the reader's buffer will be uploaded, as shown in the figure below:

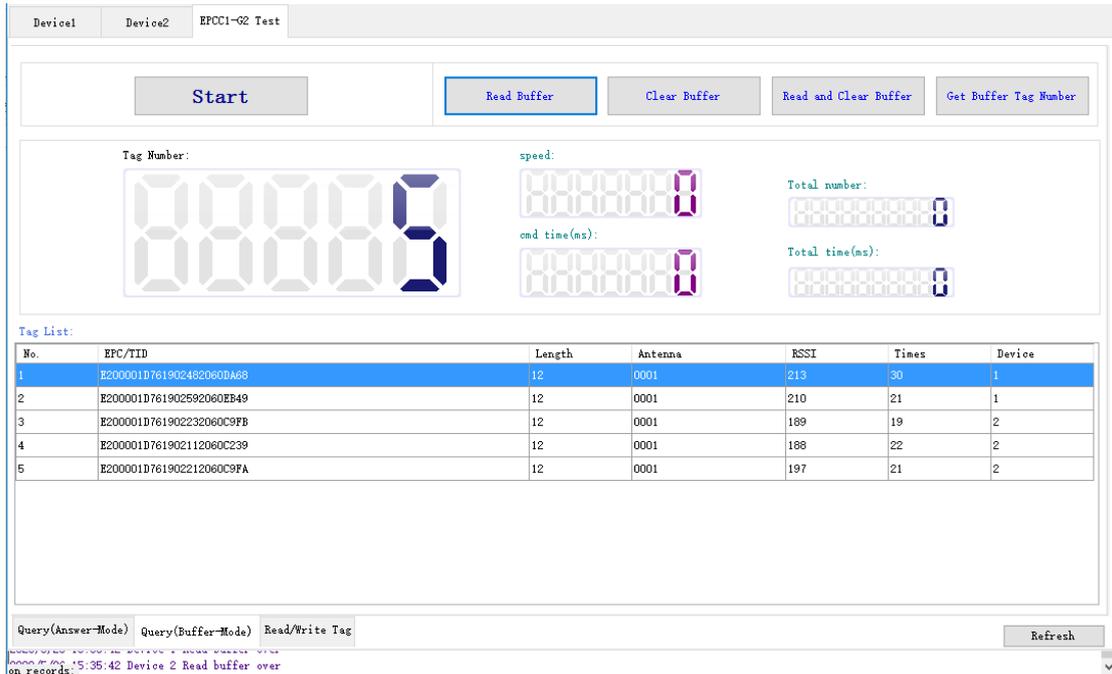


Figure 5-2 Upload Data

Page Meaning:

Tag Number	How many different tags have been queried since clicking “Start”.
Total Tag Number (pc.)	Each read a tag, record a piece of data. Real-time accumulation. Repeated reads will also be added.
Speed (pc. /s)	The speed at which the reader identifies the tag. In units of pieces per second.
CMD time (ms)	The time taken for each query command to be executed. In milliseconds
Total-CMD-Time (ms)	The time taken since the start button is clicked. In milliseconds.

Table 5-1 Page meaning

Tag List (No Repeat) Field Meaning:

No.	The serial number of the data.
EPC	The EPC code of the tag.
Length	The length of the EPC. In Bytes.
RSSI	The received signal strength of the last time the tag was identified
Times	The number of times the tag was scanned.
Device	The device number that read this tag data.

Table 5-2 Tag List (No Repeat) Field Meaning

The functions of the other three buttons in Buffer-Mode are straightforward and described as follows:

AsReader

Clear Buffer: clear the buffer and refresh the interface.

Read and Clear Buffer: empty the buffer immediately after the data is read from the buffer. The buffer is empty when the buffer is read again

Get Buffer Tag Number: sometimes you just want to know how many tags are in the buffer. You can click this button without uploading all of the tag data, and the number of tags will be displayed in the action record bar.

6 EPCC1-G2 Read/ Write Tag

6.1 Select Tag

Steps:

- (1) Select a tag from the drop-down list of tags.
- (2) Click "Select".
- (3) Check "Selected tag".

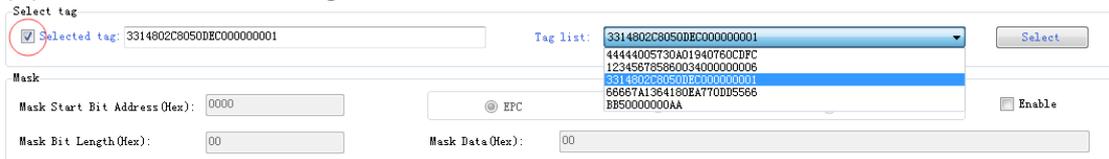


Figure 6-1-1 Select Tag

Note: when reading/writing/locking/killing tags, if a tag is selected, only the selected tag is operated on. If no tag is selected, a tag within the antenna's valid range is randomly selected for operation.

6.2 Read Data/ Write Data/ Block Erase

6.2.1 Text Boxes on Interface Introduction

Start address (word /Hex): 0x00 means to read data from the first word of the specified memory bank, 0x01 means to read data from the second word of the specified memory bank, and so on.

Length (word/decimal): the number of words to be read. Note: the maximum reading length at one time is 120 words (240 bytes, 1920 bits). It cannot be set to 0 or 120, otherwise parameter error messages will be returned. The text box is only valid for read data and block erase data; No effect on writing data.

Password (Hex): default is "00000000". When the password bank is locked/permanently locked, the default password "00000000" can be used to read/write tags; When other memory banks are locked/permanently locked, the default password "00000000" cannot be used to write the tag, but can be used to read the tag.

6.2.2 Read Data

Steps:

- (1) Select a tag. (Refer to [\[6.1 Select Tag\]](#).)
- (2) Enter the starting address.
- (3) Input read length.
- (4) Enter the access password.
- (5) Select the memory bank to be read.

(6) Click “Read”.

If the read is successful, you can see the operation record: read data success. The tag data is displayed in text box “Read/Write data (Hex)”.

In addition, the “Ext Read” button is used to read tags with large memory.

Figure 6-2-2-1 Read Data

Note:

If a tag is selected, the tag data can be read only if the tag is within the antenna's valid range and no other tags can be read. If the tag is not within the antenna's valid range, "Read data failed: No Tag Operable" will be prompted.

If no tags are selected, a tag within the antenna's effective range will be read at random after clicking “Read”.

If mask enabled, only tags whose memory region containing mask data can be read within the antenna's valid range. (Refer to [\[6.3 Mask\]](#).)

6.2.3 Write Data

Steps:

- (1) Enter the start address of the location to be written in the tag and the access password of the tag. No need to fill in the length, the length is adaptive.
- (2) Fill in the data to be written to the tag into the "Read/Write data (Hex)" text box. Note: it must be written in units of words, that is, the number of characters to be written must be a multiple of 4.
- (3) Select the memory bank to be written.
- (4) Click "Write". If the write succeeds, you can see the operation record: Write data success.

Figure 6-2-3-1 Write Data

In addition, the “Ext Write” button is used to write tags with large memory. The “Block” button is used to block write.

6.2.4 Write EPC Code

Steps:

- (1) Select a tag. (Refer to [\[6.1 Select Tag\]](#).)
- (2) Enter the access password.
- (3) Select EPC memory bank.

(4) Check “Auto Compute and Add PC”. After checking this option, the text box marked with the red ellipse will be filled automatically. The number in the text box that follows this option automatically changes with the length of the input in the "Read/Write data :(Hex)" text box.

(5) In the "Read/Write data :(Hex)" text box, write the new EPC code. (The tag memory starting address of EPC is 0002.)

(6) Click "Write". If the write succeeds, you can see the operation record: Write data success.

Figure 6-2-4-1 Write EPC Code

At this point, go to Answer-Mode page and click “Start”. You can see that the EPC code of the tag has been modified.

Note: this function is equivalent to [\[6.5 Write EPC over Broadcast\]](#) if no tag is selected. Writing EPC code is different from writing data to EPC region in [\[6.2.3 Write Data\]](#). The first 5 bits in the EPC bank are PC bits, EPC code is starting from the 6th bit. If “Auto Compute and Add PC” is not checked, the PC bit is also taken into account when calculating the starting address of the write.

6.2.5 Erase Data

Steps:

- (1) Select a tag. (Refer to [\[6.1 Select Tag\]](#).)
- (2) Enter the starting address.
- (3) Enter the length of the data to be erased.
- (4) Enter the access password.
- (5) Select the memory bank to be erased.
- (6) Click “Erase”.

If the data erasure is successful, you can see the operation record: block erase success. After this operation, the erased part of the data will be replaced to 0

Figure 6-2-5-1 Erase Data

6.3 Mask

This function is used to search for tags with specified mask data. It is mainly used to change the EPC code of a tag after searching for it with the data of TID region.

We can use TID data to accurately search the tag, because of TID is defined by tag manufacturers, which is not writable.

Take TID mask as an example:

Example: to find a tag within the antenna range, the search condition is:

In the TID region of the tag, starting from bit 10 (Hex); length 10 (Hex) bits; the data is "3412"

Mask

Mask Start Bit Address (Hex): 0010

Mask Bit Length (Hex): 10

Mask Data (Hex): 3412

Read Data / Write Data / Block Erase

Start address: (Hex): 0000

Length (Dec): 10

Password: (Hex): 00000000

Read/Write data (Hex): E20034120174FA0002C8CD661E0C01A930055FFB

Auto Compute and add PC: 2000

Block Erase Ext Read

Block Erase Ext Write

6-3-1 Mask Enable

- (1) Check "Enable". To mask, you must check "Enable".
- (2) Select "TID" for the mask bank.
- (3) Input "0010" in the "Mask Start Bit Address (Hex)" text box.
- (4) Input "10" in "Mask Bit Length (Hex)". (Mask Bit Length (Hex) =10, representing 16 bits in decimal)
- (5) Fill in "Mask Data (Hex)". (Meaning: to look for a tag that contains this data.)
- (6) Fill in the starting address, length, access password and select the memory bank to read.
- (7) Click "Read".

At this point, only tags that match the mask condition will respond. The mask condition for this example is: the second word of TID is "3412".

If you want to change the EPC code of the tag, please refer to [\[6.2.4 Write EPC Code\]](#).

6.4 Change Password

6.4.1 Change Access-Password

Example: to change the access password of a tag to "12345678".

Steps:

- (1) Select a tag. (Refer to [\[6.1 Select Tag\]](#).)
- (2) Enter the starting address. (The start address of the access password is "0002".)
- (3) Enter the current access password. (The default value is "00000000"; if the password has been changed, you need to enter the current access password.)
- (4) Memory bank, Select "Password".

(5) Fill in the new access password "12345678" to the "Mask Data :(Hex)" text box.

(6) Click "Write". If the password is modified successfully, you can see the operation record: write data success.

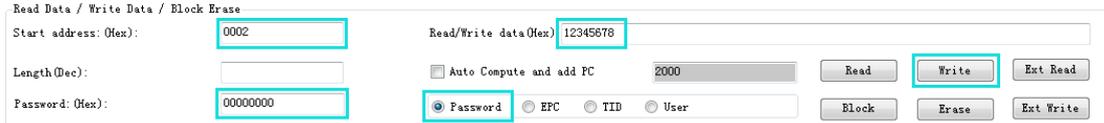


Figure 6-4-1-1 Change Access Passwords

6.4.2 Change Kill-Password

The operation steps are the same as [\[6.4.1 Change Access-Password\]](#). Difference: the starting address for Kill-Password is "0000".

6.5 Write EPC Code Over Broadcast

Steps:

- (1) Enter the access password. (The password is "00000000" if the EPC bank is not locked.)
- (2) Enter the EPC code to write in the EPC text box.
- (3) Each time "Write EPC" is clicked, the EPC code of a tag within the antenna range is written randomly.

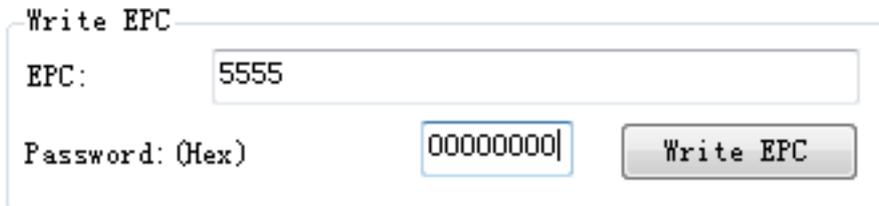


Figure 6-5-1 Write EPC

In the antenna range, if there is a tag whose access password is the same as the input access password or whose EPC bank is not locked. Then, click "Write EPC", a tag within the antenna range will be randomly selected, and its EPC code will be written.

Note: this function is equivalent to [\[6.2.4 write EPC code\]](#) without specifying a tag. A tag within the antenna range will be randomly selected, and its EPC code will be written and the PC bit is ignored (the first 5 bits in the EPC bank are PC bits).

6.6 Read Protection

- (1) Select a tag. (Refer to [\[6.1 Select Tag\]](#).)
- (2) Select the memory bank.
- (3) Select protection type.

- (4) Enter the access password. (The password cannot be "00000000." To change the password, please refer to [6.4.1 Change Access-Password].)
- (5) Click "Lock", and the operation is completed.

Figure 6-6-1 Set Protect for Reading or Writing

The default password "00000000" cannot read/write the tag when the access password /kill password is locked/permanently locked; when other memory banks are locked/permanently locked, the default password "00000000" cannot be used to write the tag, but can be used to read the tag.

6.7 Read Protection

Note: this functional module is only valid for the NXP UCODE EPC G2X tag.

Figure 6-7-1 Read Protection

6.7.1 Set Privacy By EPC

This method sets read protection on the selected tag according to the EPC code of the tag so that the tag cannot be read or written. Also, the tag cannot be found when you query it. It must be reset privacy before the tag can be queried.

6.7.2 Set Privacy Without EPC

This method does not set privacy through the EPC number on the tag, that is, do not specify the tag. It randomly sets read protection for a tag within the antenna's effective range.

The difference with "[6.7.1 Set Privacy by EPC](#)" is that when there are multiple tags within the antenna's effective range, the reader does not operate on a specified tag. Instead, it sets read protection on one tag randomly each time

this button is clicked. For convenience, it is recommended that the access password for all tags that want to be read protected be set to the same.

6.7.3 Reset Privacy

This function is used to remove read protection for tags.

Note: only one tag is allowed within the antenna's valid range for this operation. It doesn't require EPC code.

6.7.4 Detect Privacy

This function can only detect if the tag is set to read protection, and cannot detect if the tag supports set read protection.

Note: when doing this, make sure the tag is within the antenna's valid range and there is only one tag. No access password is required for this operation.

6.8 EAS Alarm

Note: this function only works on the NXP UCODE EPC G2X tags.



The screenshot shows a software interface for configuring an EAS Alarm. The window title is "EAS Alarm". It features a text input field labeled "Password (Hex)" containing the value "12345678", followed by a "Configure" button. Below the password field is a radio button group with two options: "Alarm" (which is selected) and "No Alarm". At the bottom right of the interface is a "Detect" button.

Figure 6-8-1 EAS Alarm

6.8.1 Configure Alarm

Steps:

- (1) Select a tag. (Refer to [\[6.1 Select Tag\]](#).)
- (2) Select alarm state: Alarm/No Alarm.
- (3) Click "Configure".

6.8.2 Detect Alarm

This function is used to check the EAS alarm status of the tag. Click "Detect" button directly to detect the alarm status of the tags. No EPC and access password required for this operation.

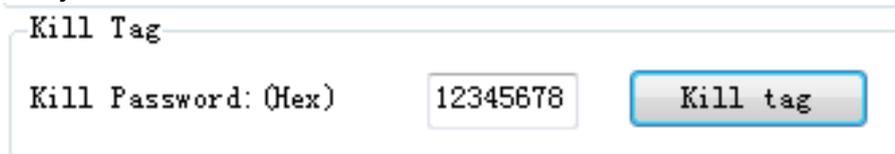
If the tag is set with an EAS Alarm, the operation record shows: EAS Alarm; If the tag is not set with an EAS Alarm, the operation record shows: No EAS Alarm.

6.9 Kill Tag

- (1) Select a tag. (Refer to [\[6.1 Select Tag\]](#).)
- (2) Enter the kill password of the tag.

Note: the kill password cannot be "00000000", otherwise the tag cannot be killed, and the response message will be returned, indicating the parameter error. (To change the kill password, please refer to [\[6.4.2 Change Kill-Password\]](#).)

(3) Click "Kill Tag". If the operation record shows success, the tag is successfully killed.



The screenshot shows a web interface titled "Kill Tag". It features a text input field labeled "Kill Password: (Hex)" with the value "12345678" entered. To the right of the input field is a button labeled "Kill tag".

Figure 6-9-1 Kill Tag