TS800 Utility User Manual

2020/06/17

Version 1.1

DEMOSTRATION SOFTWARE LICENSE

Please read this agreement carefully before you start to install this demonstration software. If you do not agree please stop the installation of the software.

Software developed by GIGA-TMS INC. is provided “AS IS” without warranty of any kind, either express or implied, including, but not limited to, the implied warranties of fitness for a purpose, or the warranty of non-infringement. Without limiting the forgoing GIGA-TMS INC. makes no warranty that:

- The software will meet your requirements.
- The software will be uninterrupted, timely, secure or error-free.
- The results that may be obtained from the use of the software will be effective, accurate or reliable.
- The quality of the software will meet your expectations.
- Any errors in the software obtained from GIGA-TMS INC. will be corrected.

The software and its documentation made available for test or demo purpose

- could include technical or other errors, GIGA-TMS INC. may make changes to the software or documentation made available to shipped with the conjunction products

- may be out of date, and GIGA-TMS INC. makes no responsibility to update such materials

In no event shall GIGA-TMS INC. be liable to you or any third party for any special incidental, indirect or consequential damages of any kind, or any damages whatsoever, including, without limitation, those resulting from loss of use, data or profits, whether or not GIGA-TMS INC. has been advised of the possibility of damage, and on any theory of liability, arising out of or in connection with the use of the software.

The installation of the software is done at your own consideration and risk and with agreement that you will be solely responsibility for any damage to your system or loss of data that results from such activities.

LIMITED WARRANTY

GIGA-TMS INC. (GIGA-TMS) warrants that the products sold pursuant to this Agreement will perform in accordance with GIGA-TMS's published specifications. This warranty shall be provided only for a period of **one year** from the date of the shipment of the product from GIGA-TMS (the "Warranty Period"). This warranty shall apply only to the "Buyer" (the original purchaser, unless that entity resells the product as authorized by GIGA-TMS, in which event this warranty shall apply only to the first re-purchaser).

During the Warranty Period, should this product fail to conform to GIGA-TMS's specifications, GIGA-TMS will, at its option, repair or replace this product at no additional charge except as set forth below. Repair parts and replacement products will be furnished on an exchange basis and will be either reconditioned or new. All replaced parts and products become the property of GIGA-TMS. This limited warranty does not include service to repair damage to the product resulting from accident, disaster, unreasonable use, misuse, abuse, negligence, or modification of the product not authorized by GIGA-TMS. GIGA-TMS reserves the right to examine the alleged defective goods to determine whether the warranty is applicable.
Without limiting the generality of the foregoing, GIGA-TMS specifically disclaims any liability or warranty for goods resold in other than GIGA-TMS's original packages, and for goods modified, altered, or treated without authorization by GIGA-TMS.

Service may be obtained by delivering the product during the warranty period to GIGA-TMS (8F No. 31 Lane 169, Kang Ning Street, Hsi Chih Dist New Taipei City, Taiwan). If this product is delivered by mail or by an equivalent shipping carrier, the customer agrees to insure the product or assume the risk of loss or damage in transit, to prepay shipping charges to the warranty service location, and to use the original shipping container or equivalent. GIGA-TMS will return the product, prepaid, via a three (3) day shipping service. A Return Material Authorization ("RMA") number must accompany all returns. Buyers may obtain an RMA number by contacting Technical Support at +886-2-26954214.
EACH BUYER UNDERSTANDS THAT THIS GIGA TMS PRODUCT IS OFFERED AS IS. GIGA TMS MAKES NO OTHER WARRANTY, EXPRESS OR IMPLIED, AND GIGA TMS DISCLAIMS ANY WARRANTY OF ANY OTHER KIND, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

IF THIS PRODUCT DOES NOT CONFORM TO GIGA TMS'S SPECIFICATIONS, THE SOLE REMEDY SHALL BE REPAIR OR REPLACEMENT AS PROVIDED ABOVE. GIGA TMS'S LIABILITY, IF ANY, SHALL IN NO EVENT EXCEED THE TOTAL AMOUNT PAID TO GIGA TMS UNDER THIS AGREEMENT. IN NO EVENT WILL GIGA TMS BE LIABLE TO THE BUYER FOR ANY DAMAGES, INCLUDING ANY LOST PROFITS, LOST SAVINGS, OR OTHER INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OF, OR INABILITY TO USE, SUCH PRODUCT, EVEN IF GIGA TMS HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, OR FOR ANY CLAIM BY ANY OTHER PARTY.

LIMITATION ON LIABILITY

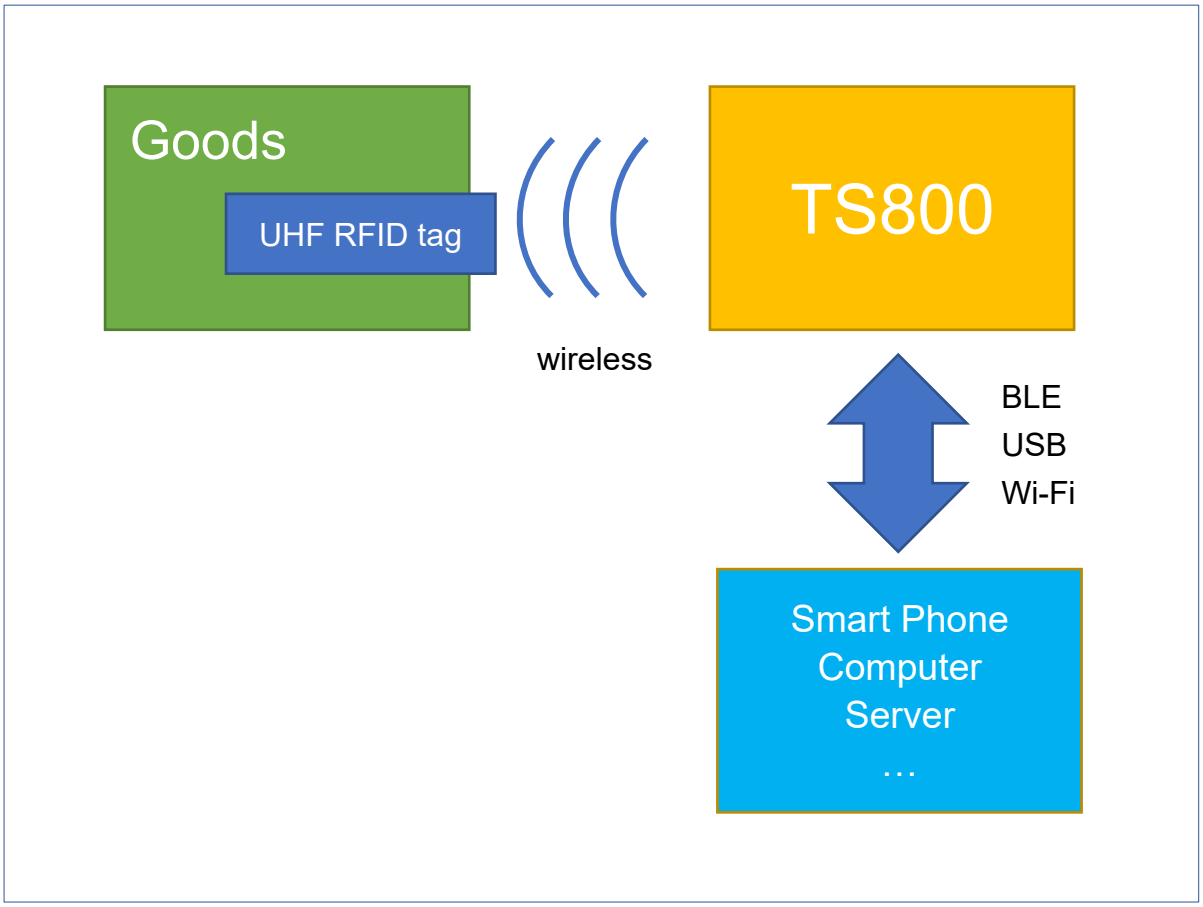
EXCEPT AS PROVIDED IN THE SECTIONS RELATING TO GIGA TMS'S LIMITED WARRANTY, GIGA TMS'S LIABILITY UNDER THIS AGREEMENT IS LIMITED TO THE CONTRACT PRICE OF THIS PRODUCT.
GIGA TMS MAKES NO OTHER WARRANTIES WITH RESPECT TO THE PRODUCT, EXPRESSED OR IMPLIED, EXCEPT AS MAY BE STATED IN THIS AGREEMENT, AND GIGA TMS DISCLAIMS ANY IMPLIED WARRANTY, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.
GIGA TMS SHALL NOT BE LIABLE FOR CONTINGENT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES TO PERSONS OR PROPERTY. GIGA TMS FURTHER LIMITS ITS LIABILITY OF ANY KIND WITH RESPECT TO THE PRODUCT, INCLUDING ANY NEGLIGENCE ON ITS PART, TO THE CONTRACT PRICE FOR THE GOODS.
GIGA TMS'S SOLE LIABILITY AND BUYER'S EXCLUSIVE REMEDIES ARE STATED IN THIS SECTION AND IN THE SECTION RELATING TO GIGA TMS'S LIMITED WARRANTY.

Contents

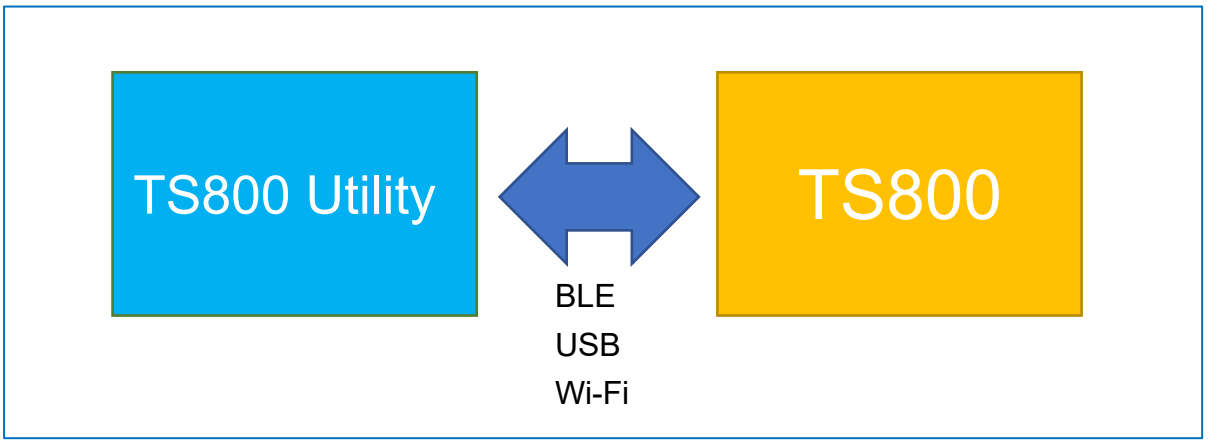
1. Introduction

1.1 Getting Started

TS800 is an UHF RFID reader that can read or write tags. Read tag data can be sent via multiple connection interfaces to host, such as computer, mobile device.



TS800 Utility is a Windows-based application that can be used to configure the settings inside TS800.



1.2 Tag Memory

Tag memory shall be logically separated into the four distinct memory banks shown as following, each of which may comprise zero or more memory words. The memory banks are:

PC Memory

Protocol Control, part of the tag memory. Contains EPC length and other information.

EPC Memory

Electronic Product Code, part of the tag memory.

TID Memory

Tag-identification, part of the tag memory.

User Memory

Part of the tag memory.

Reserved Memory

The reserved memory contains Access and Kill passwords.

1.3 Other Terminologies

UHF

Ultra high Frequency RFID that communications as 860 MHz – 960 MHz.

RFID

Radio-frequency identification that can be used to track tags attached to goods.

Tag

An RFID tag is a small circuit that can attach to goods so RFID readers can inventory them.

Inventory

The process of a RFID reader scan and identify a tag.

Lock

TS800 may issue a Lock command to lock, permanently lock, unlock, or permanently unlock the kill password, access password, EPC memory bank, TID memory bank, or File_0 of User memory.

	No Access Password				**With Access Password**			
	Unlocked	**Permanent Unlocked**	**Locked**	**Permanent Locked**	**Unlocked**	**Permanent Unlocked**	**Locked**	**Permanent Locked**
EPC	Read/Write	Read/Write	Read	Read	Read/Write	Read/Write	Read/Write	Read
Access Password	Read/Write	Read/Write			Read/Write	Read/Write	Read/Write	Read

TCP

Transmission Control Protocol, a reliable internet communication protocol.

TCP Server

The TCP Server can listen at the specified port and wait for multiple connections from TCP clients. In a connection both roles can send and receive reliable data over a network.

TCP Client

The TCP Client can connect to a TCP Server with specified IP Address and port.

BLE

Bluetooth Low Energy is a wireless technology intended to provide considerably reduced power consumption while communication compare to Classic Bluetooth.

2. Configure TS800 Settings

1. **Check whether your compute meets the system requirements**
   - Windows XP/7/10 (x86/x64)
   - .NET Framework 4.7.2

2. **Install TS800 Utility**
   The setup program is located at the software\TS800Utility folder in Disk5472. Execute TS800UtilitySetup.msi to install the program on your computer.

3. **Start the TS800 Utility**
   On the taskbar, click Start, and then point to All Programs, point to GIGA-TMS, and then click TS800 Utility.

4. **TS800 cable set up**
   If you would like to connect TS800 via BLE interface, connect TS800 with a USB power source.
   If you would like to connect TS800 via USB interface, connect TS800 the computer running TS800 Utility.

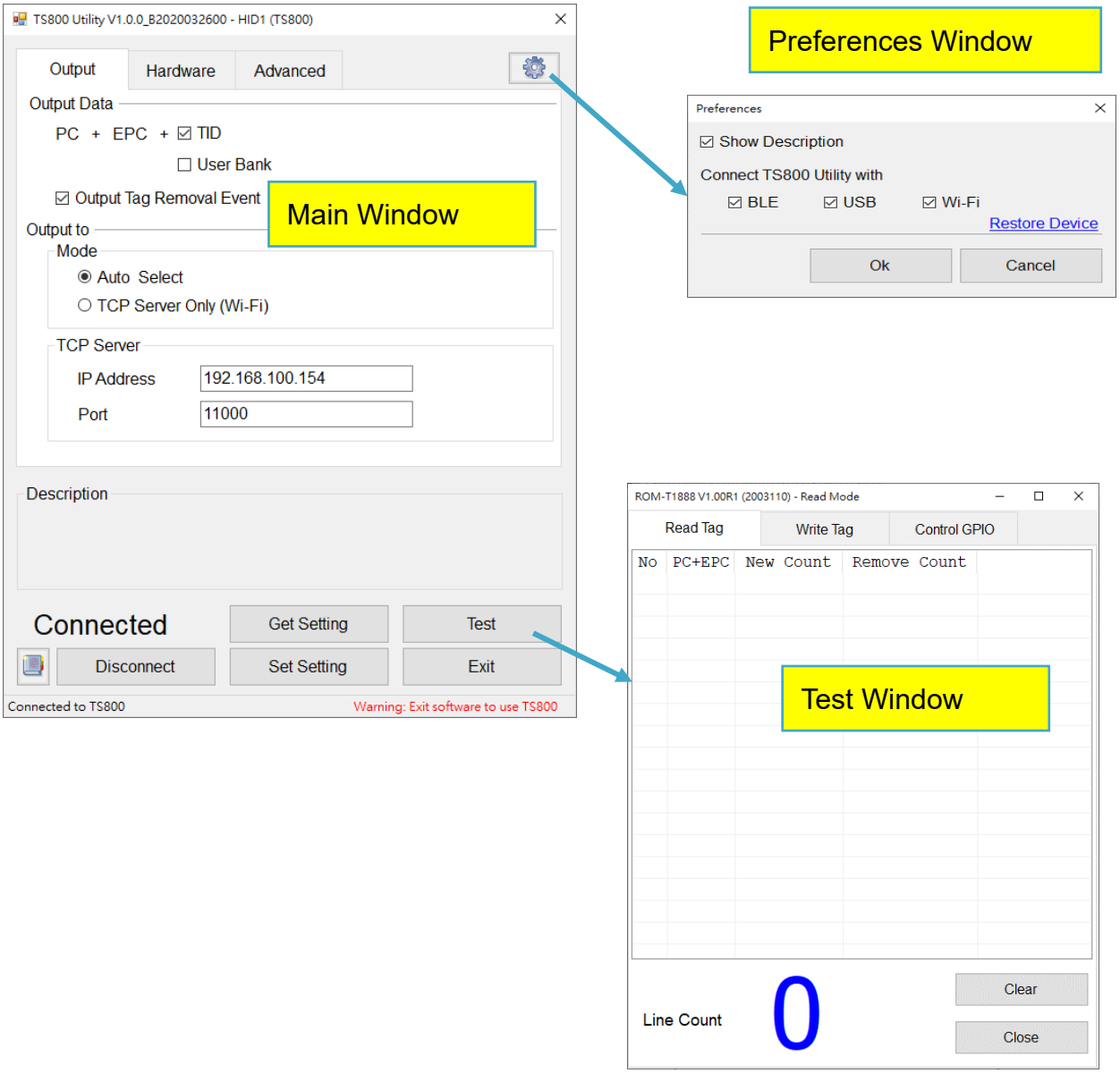
5. **Connect TS800**
   Click **Connect** on bottom left to discover and Connect TS800.

6. **Set up TS800 Settings**
   Adjust settings according to need and click **Set Settings**.

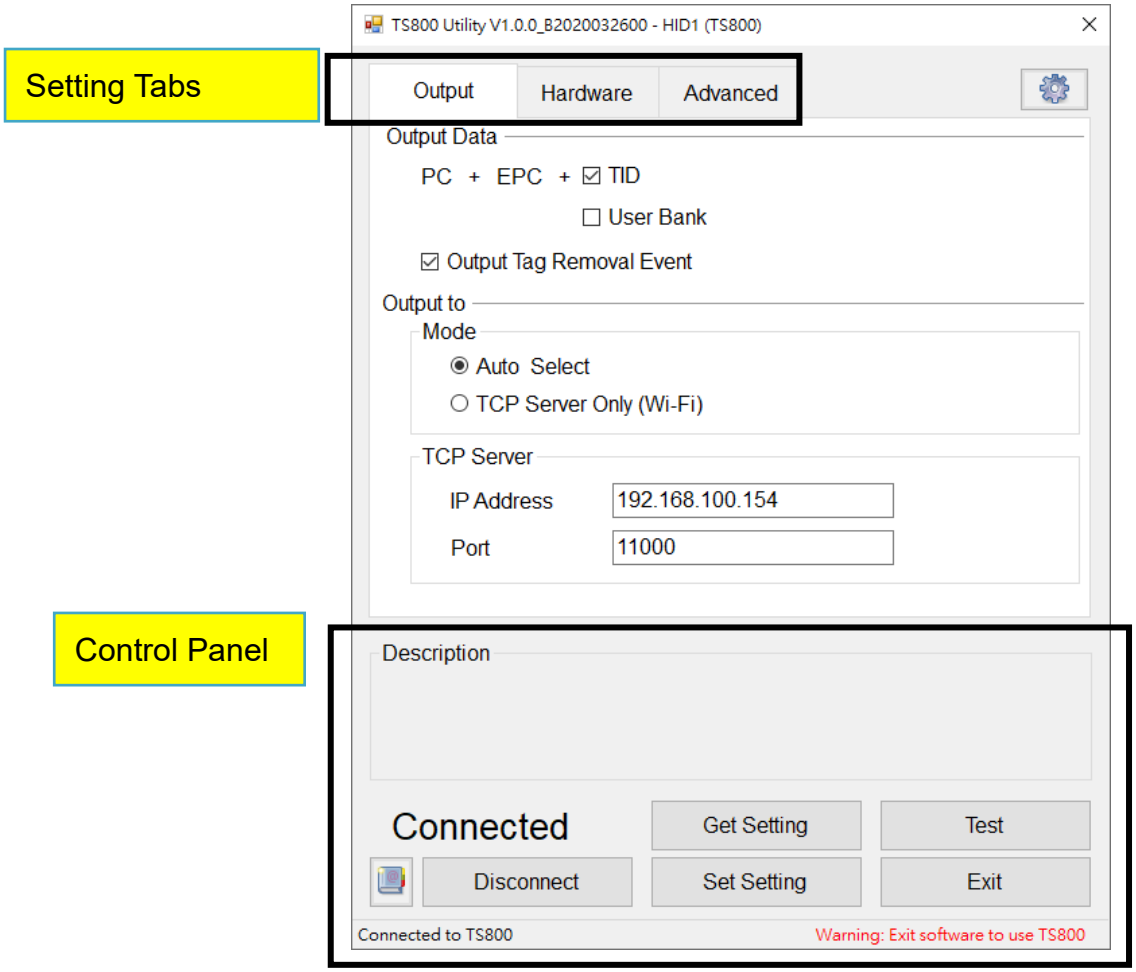
7. **Disconnect TS800**
   Click Disconnect on bottom left to end the connection with TS800.

3. TS800 Utility User Interface

3.1 Layout Overview



3.2 Main Window



3.2.1 Control Panel

1. Description

Show description when the control item is active.

2. Connection Status

Shows the device is connected or disconnected.

3. User Manual

Open and view the user manual.

4. Status Bar

Show current operation.

5. Connect/Disconnect

Connect or Disconnect the TS800.

6. Get Settings

Read settings from connected TS800 and show them on UI.

7. Set Settings

Update settings to TS800.

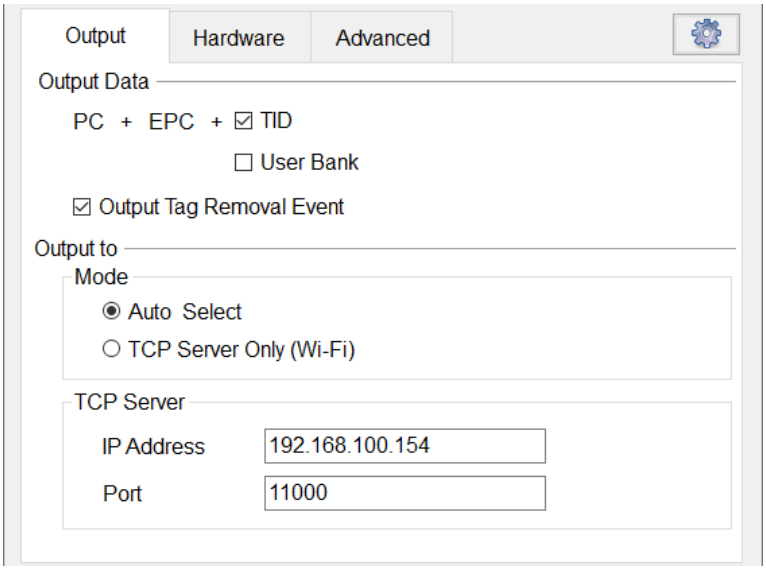
8. Test

Open Test Window to test the functions of inventorying or writing tags.

9. Exit

Exit the program.

3.2.2 Output Tab



3.2.2.1 Output Data

Select which tag memory data that reader is going to output to host. There are two conditions that TS800 will output:

1. when tag is inventoried
2. when an inventoried tag is removed

PC

Protocol Control

EPC

Electronic Product Code

TID

Tag identifier

User Bank

Tag User Memory bank

Output Tag Removal Event

Select this option if you want to get a notify when an inventoried tag is removed. User bank data will not be included in a tag removal event data even if the User Bank is selected.

3.2.2.2 Output to

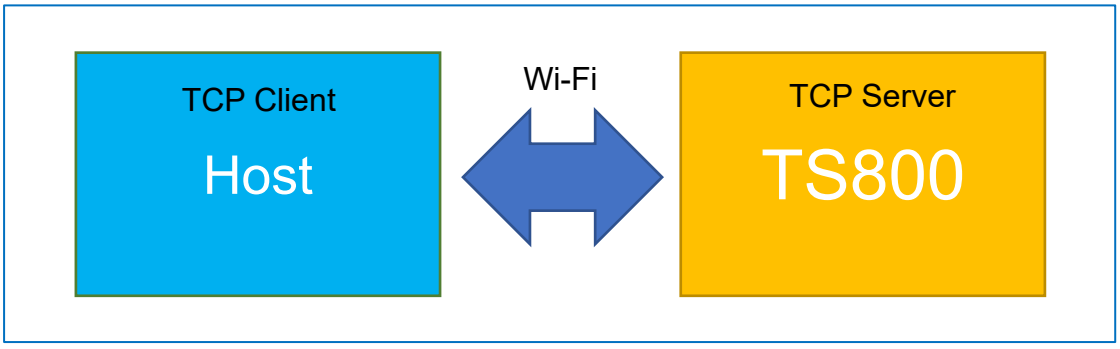
Choose which interface that reader is used to output the data. There are two modes available:

Auto Select

TS800 will auto choose output interface with the following rule:

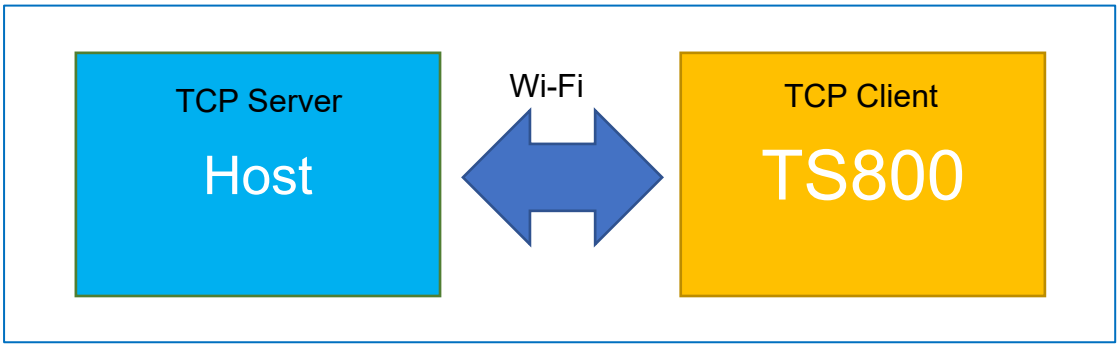
1. If the TCP Server IP Address is not blank, TS800 will try to output to TCP Server.
2. In addition to the TCP Server, TS800 will also try to output one of the following interfaces:

- USB HID
- BLE (TS800 as Peripheral)
- Wi-Fi (TS800 as TCP Server)



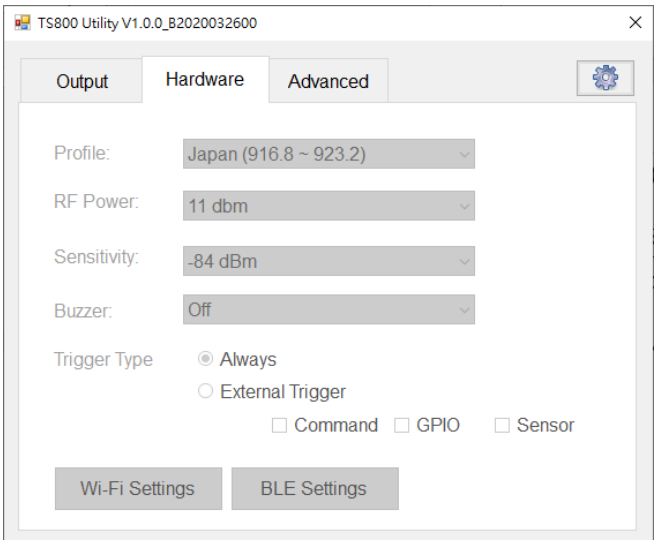
TCP Server Only (Wi-Fi)

Output to specified TCP server only.



Note: Set IP Address to empty string and click Set Settings if the server is not connectable to prevent lag.

3.2.3 Hardware Tab



Profile

Predefined EPC Gen2 band of the UHF spectrum settings.

RF Power

RF antenna output strength. Basically, the more power output, the more distance can be read.

Sensitivity

Radio sensitivity.

Buzzer

- Off: Buzzer is always off.
- On: Buzzer activated when tag is inventoried.

Trigger Type

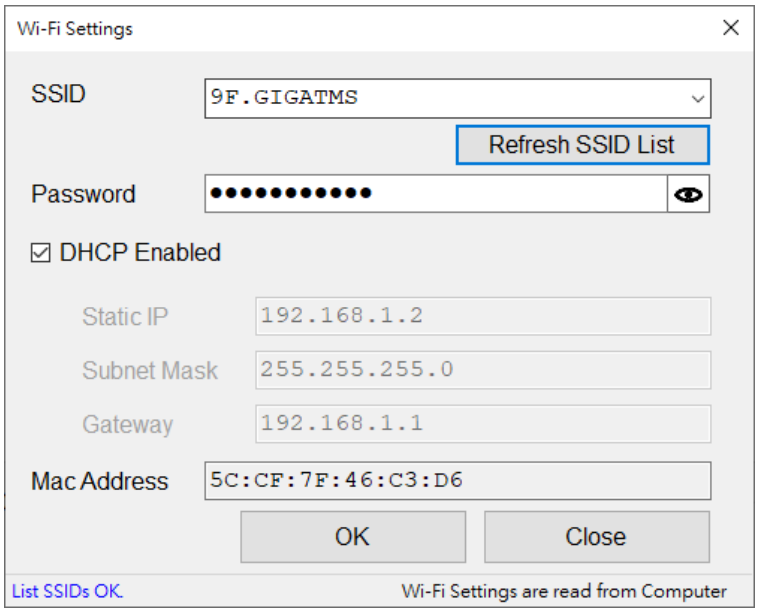
Choose when TS800 will inventory tags.

- Always: Automatically start Inventorying tags when turn on the reader.
- External Trigger: Inventory tags when at least one of the following trigger events occurs and must select at least one trigger:
  - Command: Inventory tags once when TS800 receive an inventory command (works with SDK but not implemented in the TS800 Utility).
  - GPIO: Continuous inventory tags when the digital input pin is low.
  - Sensor: Continuous inventory tags when the onboard sensor is blocked by tags.

3.2.3.1 Wi-Fi Settings

Set up the settings if you want to output tag data to a TCP server or client.

> Note: The settings on UI is NOT read form TS800 but a local saved file.



SSID

Wi-Fi AP SSID, maximum length is 32 (English letters or numbers).

Refresh SSID List

Scan for available Wi-Fi access points, may take a few seconds.

Password

Wi-Fi AP password, Maximum length is 63 (English letters or numbers). Leave the password empty if the AP is an open network.

DHCP Enabled

Click to determine reader's IP address by using Dynamic Host Configuration Protocol.

MAC Address

The Wi-Fi MAC address of TS800.

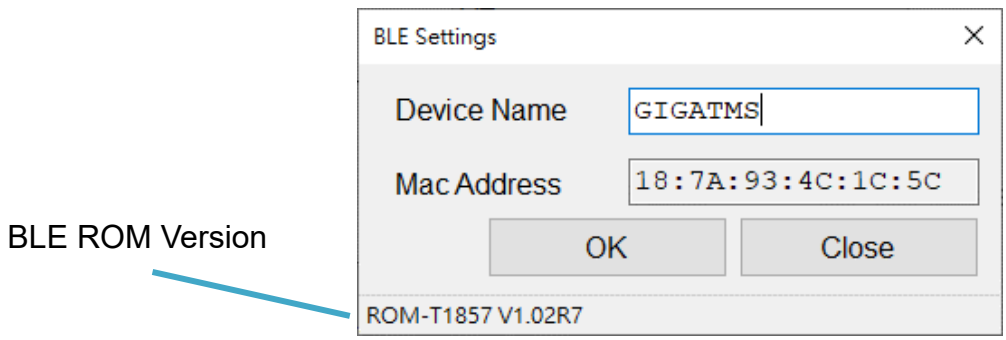
OK

Update current Wi-Fi settings to TS800 immediately and TS800 will try to connect to the Wi-Fi access point. Settings will be saved in a local file and TS800 will remember the settings if connect to the access point successfully.

Close

Close this dialog box.

3.2.3.2 BLE Settings



Device Name

The device name is used when TS800 broadcast as a BLE peripheral. Maximum length is 7 (English letter or number).

MAC Address

TS800 Bluetooth MAC address.

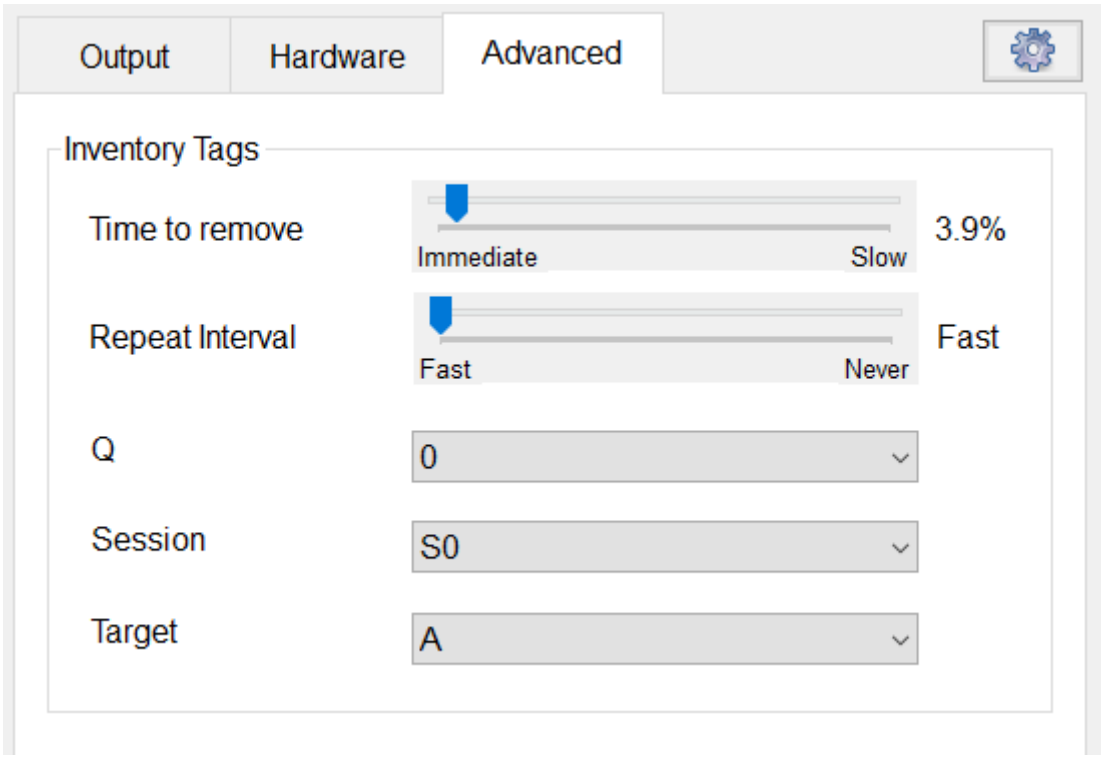
OK

Update current BLE settings to TS800 immediately and close BLE Settings window.

Close

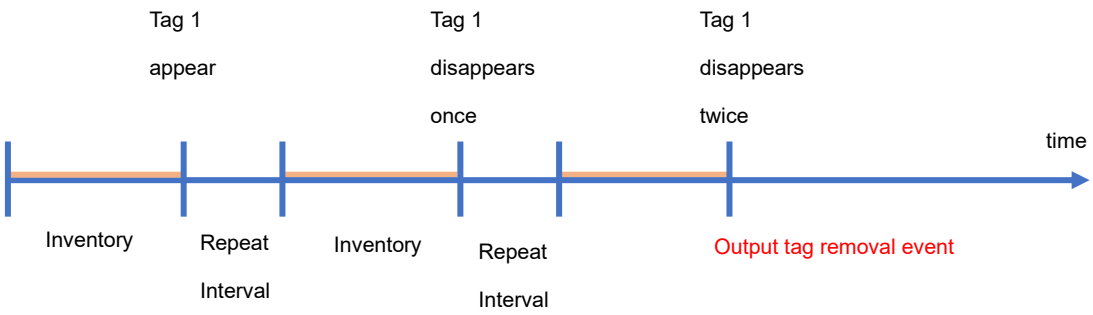
Close BLE Settings dialog box.

3.2.4 Advanced Tab



Time to Remove

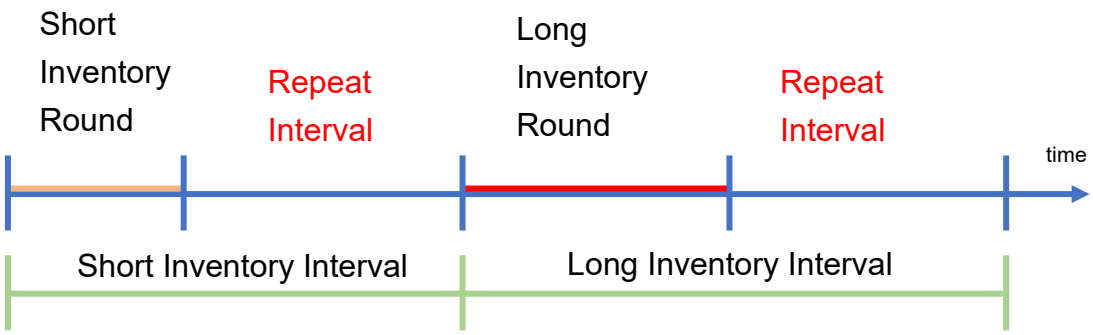
If Time to Remove is set to 2, TS800 will output a tag removal event when an inventoried tag failed to inventory twice.



Time to Remove = 2

Repeat Interval

Waiting time between each inventory round. It is not a precise inventory time interval because of an inventory round may take longer or shorter.



Q

Slot-count parameter **Q** in EPC Gen2 Standard.

If Q is small, the inventory round will become shorter, but the probability of collision will rise.

If Q is large, the probability of collision is low, but inventory round will become longer.

Session

Session in EPC Gen2 Standard. There are 4 sessions in a tag: S0, S1, S2, S3. Each of them has an inventoried flag that can be set to A or B.

Target

Target Inventoried Flag value in EPC Gen2 Standard. Assuming the current Session setting is S1:

A: Inventory tags with [S1.Inventoried Flag = A].

B: Inventory tags with [S1.Inventoried Flag = B].

A or B: Inventory tags with [S1.Inventoried Flag = A] or [S1.Inventoried Flag = B].

The Inventoried Flag in a tag will modify by both reader and the tag itself:

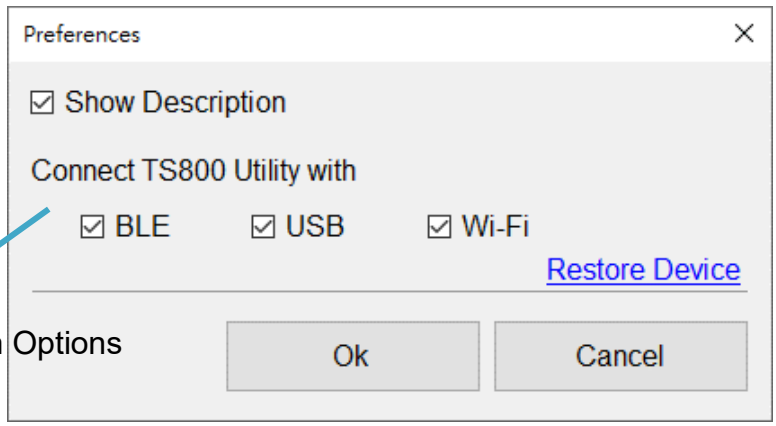
1. When a tag is inventoried by a reader, the value will be inverted ($A \rightarrow B, B \rightarrow A$).
2. When the tag leaves RF field for the time limit defined in EPC Gen2 Standard, the value will become A (S0, S1, S2, S3).

3. When the tag stays in the RF field for the time limit defined in EPC Gen2 Standard, the value will become A (S1).

Flag	Time to Set	Required persistence
S0 **inventoried** flag	≤ 2ms regardless of initial or final value[3]	Tag energized: Indefinite Tag not energized: None
S1 **inventoried** flag[1]	≤ 2ms regardless of initial or final value[3]	Tag energized: Nominal temperature range: 500ms < persistence < 5s Extended temperature range: Not specified Tag not energized: Nominal temperature range: 500ms < persistence < 5s Extended temperature range: Not specified
S2 **inventoried** flag[1]	≤ 2ms regardless of initial or final value[3]	Tag energized: Indefinite Tag not energized: Nominal temperature range: 2s < persistence Extended temperature range: Not specified
S3 **inventoried** flag[1]	≤ 2ms regardless of initial or final value[3]	Tag energized: Indefinite Tag not energized: Nominal temperature range: 2s < persistence Extended temperature range: Not specified

3.3 Preference Window

Click  on the top right to open the preferences windows.



Utility Connection Options

Show Description

Click to select to show the description text in the main window.

Utility Connection Options

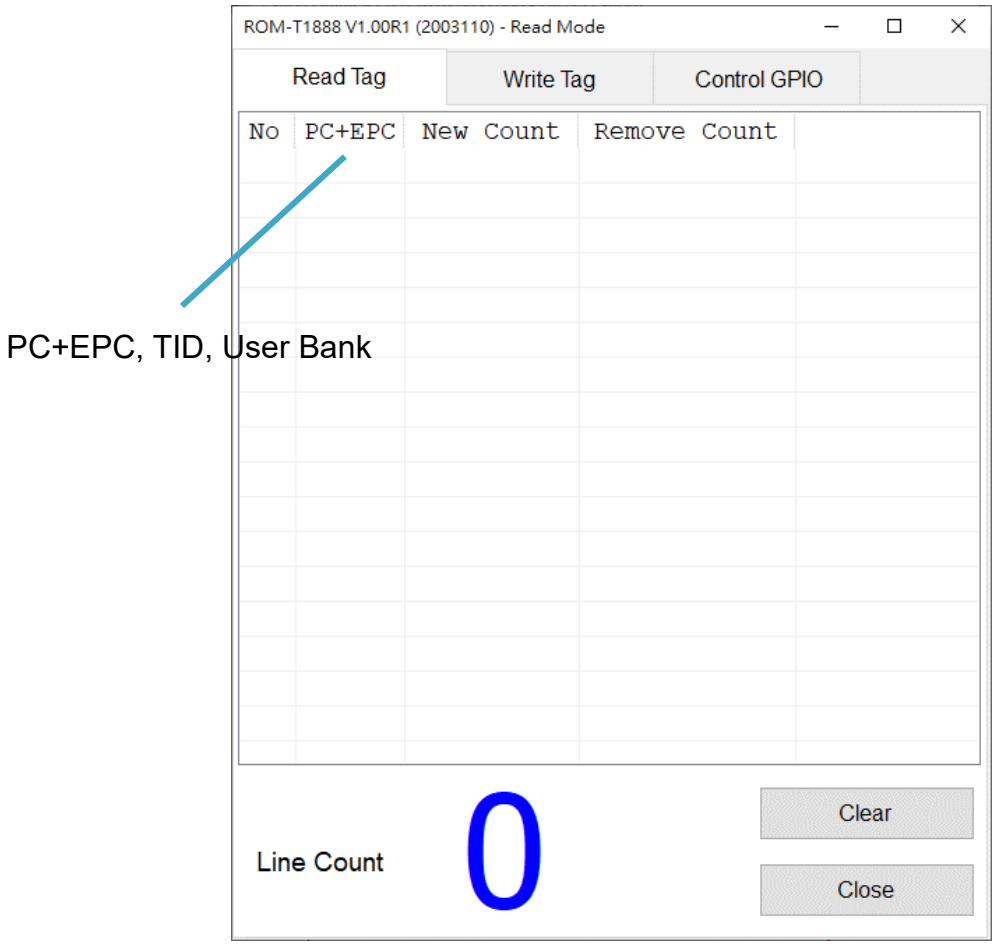
Select the communication interface that TS800 Utility is used to connect to TS800 reader. The settings only affect how the TS800 Utility connect with TS800, not how TS800 connect to a customer device (host).

Restore Device

Reset the TS800 settings to factory default.

3.4 Test Window

The Test window imitates the actual use of custom device.



3.4.1 Read Tag Tab

All Inventoried tag will be listed on the list.

> Note: Some tag changes its TID dynamically and may occupy multiple rows.

No

Tag Index.

PC+EPC, TID, User Bank

Inventoried Tag Data. TID and User Bank will show if the output settings in the main window in selected.

New Count

The total number of times that the tag is inventoried. This column will show only if output tag removal event settings in the main window is selected.

Remove Count

The total number of times that an inventoried tag is removed.

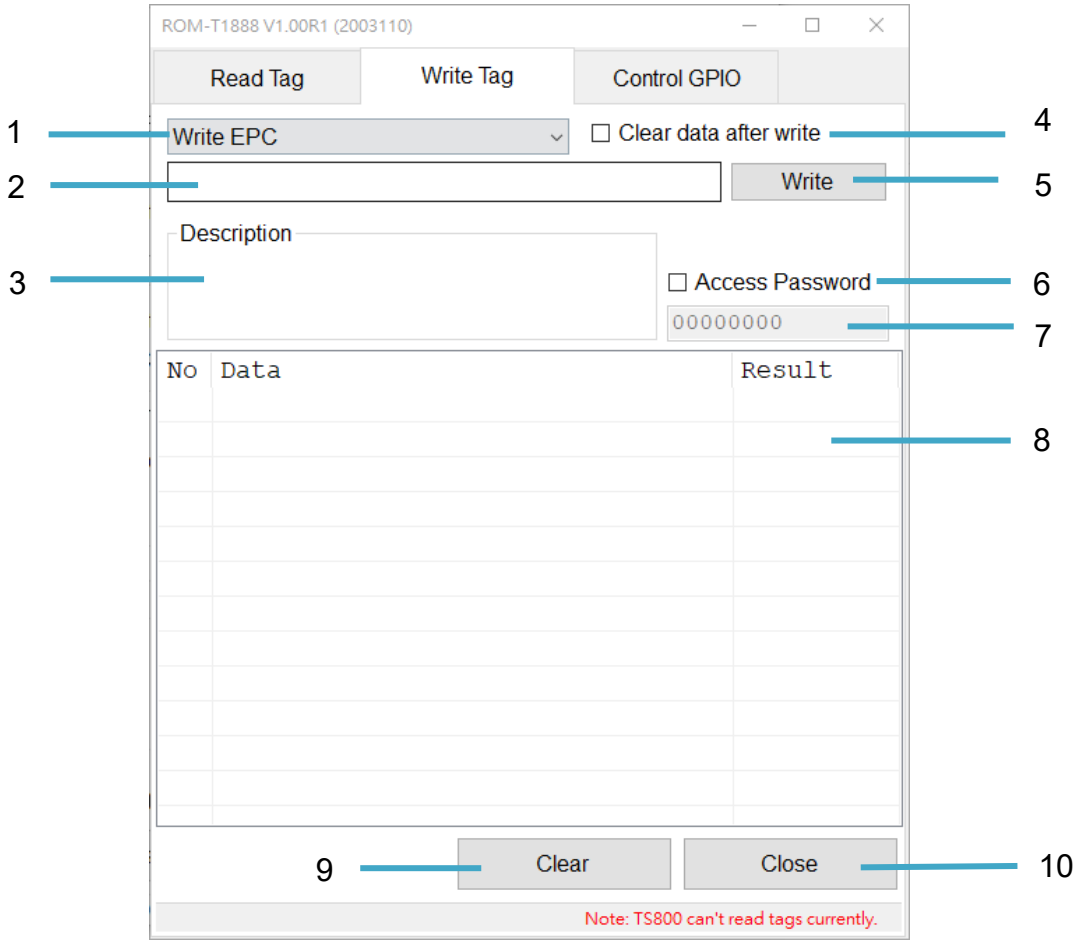
Clear

Clear the list.

Close

Close the window.

3.4.2 Write Tag Tab



1. Select Tag Memory List

Select which tag memory that is going to write to:

- EPC
- Access Password

2. Write Data Box

Type the data that is going to write select tag memory.

- When writing EPC, must be hexadecimal numbers and length must be a multiple of 4.
- When writing Access Password, the data must be 8 hexadecimal numbers when changing access password.

3. Description

Shows description when mouse is point to a control.

4. Clear data after Write Check Box

Click to select to clear Write Data after clicking **Write**.

5. Write Button

Click to write the data to select tag memory.

- For Write EPC

Write Write Data into tag with Current Access Password. PC will also change automatically. Does not lock anything.

- For Write Access Password

Change tag Access Password to Write Data with Current Access Password

Important Note: This operation also locks EPC Bank and Access Password.

	EPC	Access Password
Before	readable and writeable	readable and writeable
After	readable but NOT writeable	NOT readable and NOT writeable

6. Access Password Check Box

If target tag's Access Password is not default (00000000), click to select this check box and then type specified access password in the Current Access Password.

7. Access Password Box

Type access password that is used to access the tag data, which the format is 8-digit hexadecimal number.

8. Write Result List

Show the results of writing tag.

9. Clear

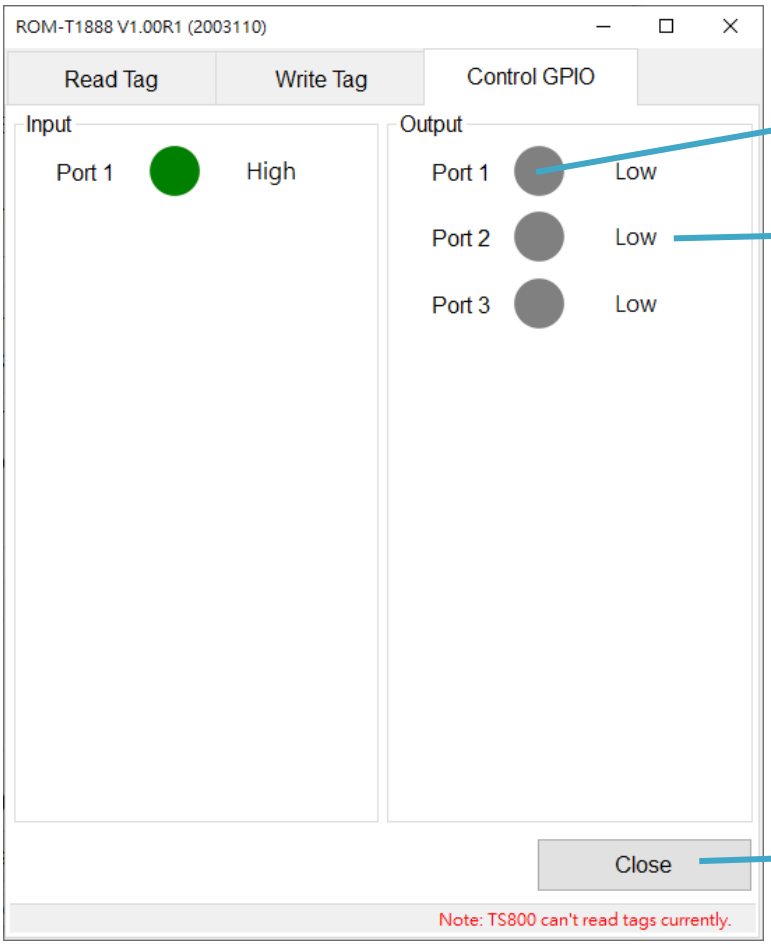
Clear Write Result Table

10. Close

Close window.

3.4.3 Control GPIO Tab

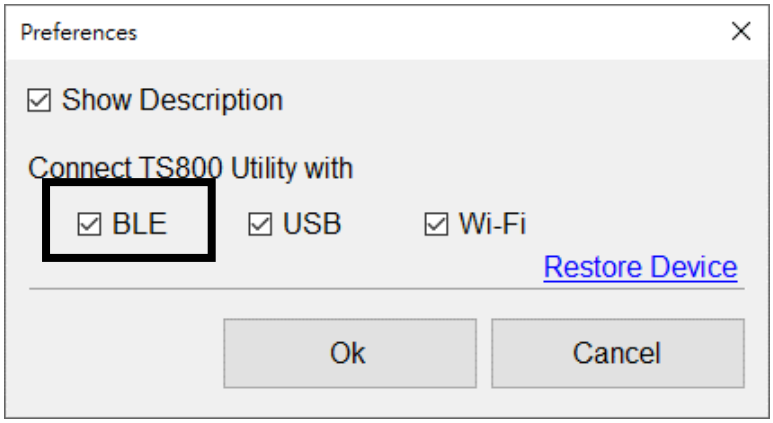
Shows the current TS800 digital IO pin state and can control its output pin state. TS800 will not inventory when this tab is selected.


ROM-T1888 V1.00R1 (2003110)
Read Tag
Write Tag
Control GPIO
Input
Port 1
High
Output
Port 1
Low
Port 2
Low
Port 3
Low
Close
Note: TS800 can't read tags currently.
Click to toggle output pin state
Current pin State
Close window

4. Tutorials

4.1 Connect to TS800 with BLE

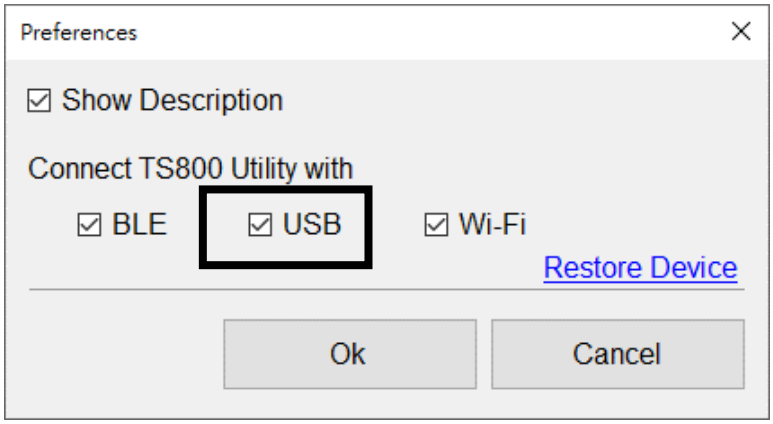
1. Turn on Bluetooth on your computer
2. Select BLE in Preferences setting and click Ok.



3. Turn on TS800 and it should appear in the Connect Window now.

4.2 Connect TS800 with USB

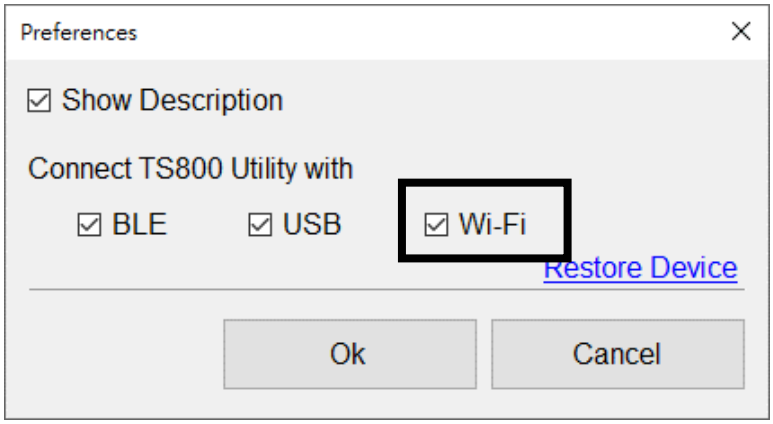
1. Select USB in Preferences setting and click Ok.



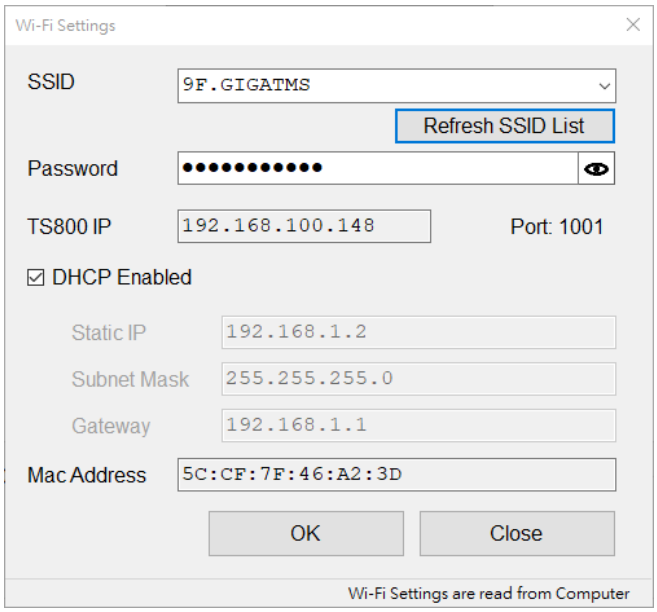
2. Plug TS800's USB cable into your computer and it should appear in the Connect Window now.

4.3 Connect TS800 with Wi-Fi

1. Select Wi-Fi in Preferences setting and click Ok.



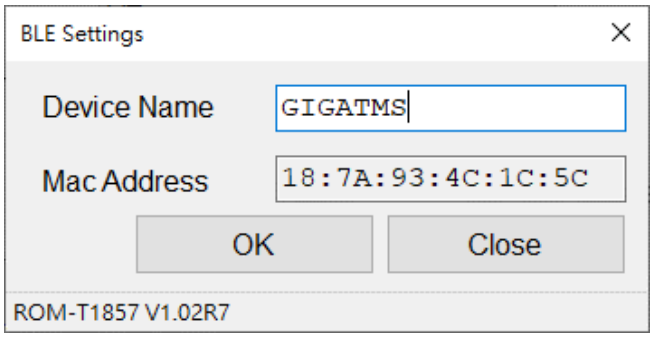
2. First connect TS800 with USB or BLE to set up the Wi-Fi settings.
3. Set up Wi-Fi settings and click OK.



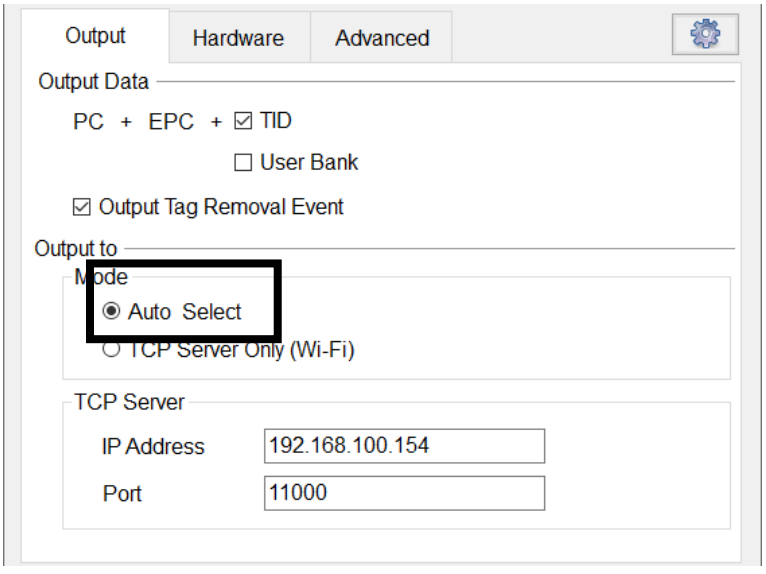
4. Disconnect TS800 and click Connect again.
5. TS800 TCP connection should appear in the list.

4.4 Output Data to Last Connect Host via BLE

1. Set BLE Device name in the BLE settings window and click OK.



2. Select output mode to Auto Select.

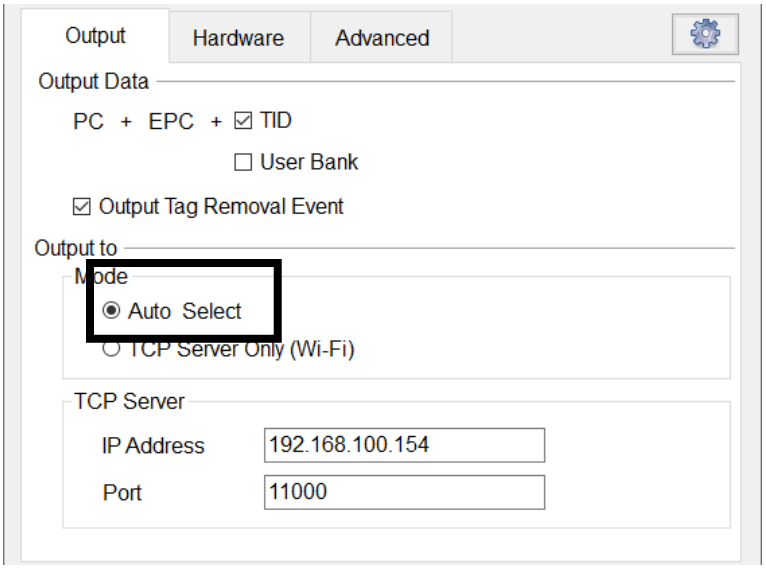


3. Click Set Settings.

4. Disconnect TS800.
5. Now user devices should be able to scan TS800 as a BLE peripheral device.

4.5 Output Data to Last Connect Host via USB

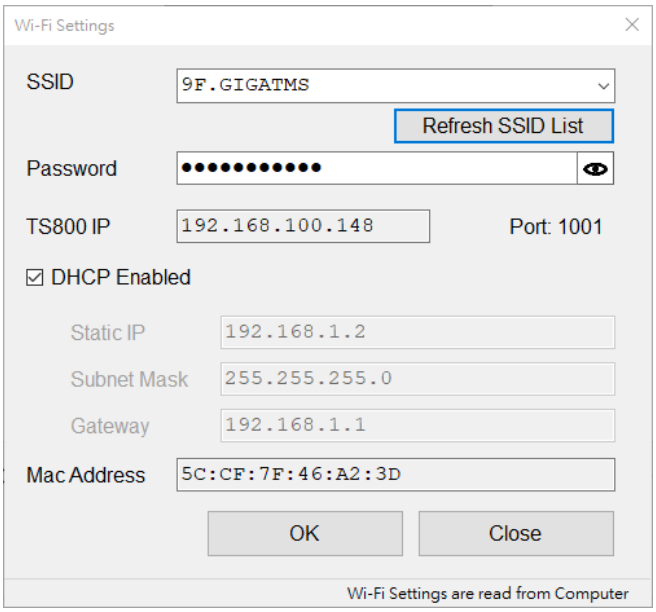
1. Select output mode to Auto Select.



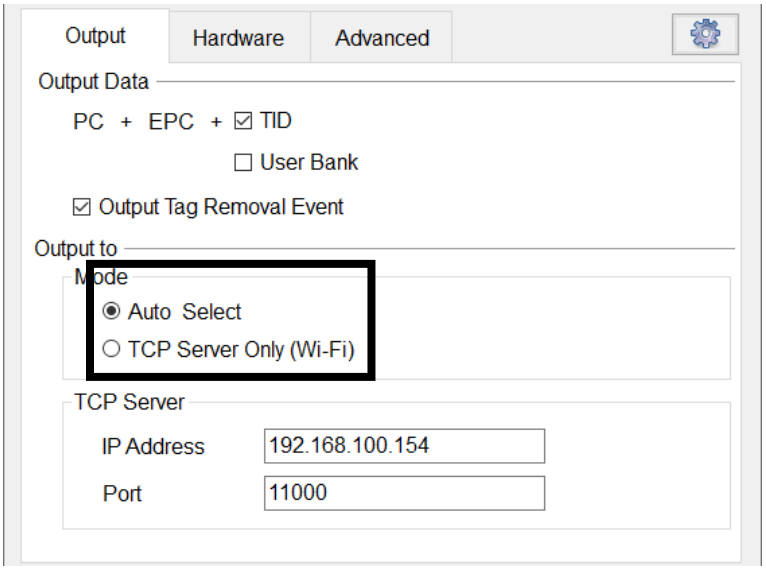
2. Click Set Settings.
3. Disconnect TS800.
4. Unplug TS800.
5. Plug TS800 USB cable into user device.
6. Now user device should be able to receive output.

4.6 Output Data to Specified Host (TCP Server) via Wi-Fi

1. Open Wi-Fi settings dialog box.



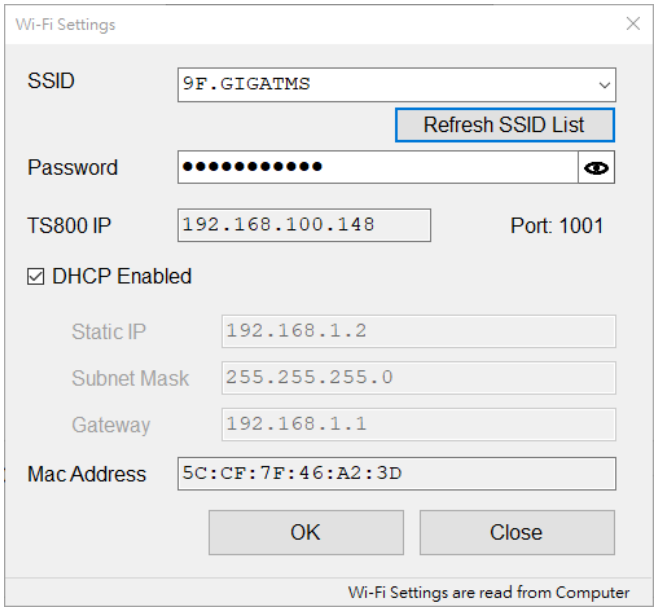
2. Select output mode to Auto Select or TCP Server Only.
3. Type user device's IP Address and Port.



4. Make sure TCP Server IP Address is reachable with the Wi-Fi Settings.
5. Click Disconnect.
6. TS800 will try to connect the server automatically.

4.7 Output Data to Host (TCP Client) via Wi-Fi

1. Select output mode to Auto Select.
2. Open Wi-Fi settings dialog box.



3. Find out TS800 IP on Wi-Fi Settings dialog box.
4. Now user device can connect TS800 with the IP above and port 1001.

4.8 Inventory Tags

1. Open Test Window and try to inventory tags.
2. Disconnect TS800 and exit TS800 Utility if inventory is successful.
3. Connect user device and TS800 with the methods above.
4. Programs on a user device which developed by using the GIGA-TMS UHF SDK can receive inventory output.

5. Troubleshoot

TS800 does not appear in the device list?

- **BLE**
  1. Ensure your computer supports Bluetooth and BLE.
  2. Turn on Bluetooth of your computer.
  3. Check if TS800 is turning on.
  4. Check if TS800 is connected by another device. TS800 can only be connected to 1 BLE device.
  5. Check if the blue LED is blinking. It is connected by another device when not blinking.
  6. If not blinking, turn off TS800 and turn it on again.
  7. Restart the TS800 Utility.
  8. Click Connect again.
- **USB**
  1. Open Windows Device Manager.
  2. Expand Human Interface Devices.
  3. Unplug then plug TS800.
  4. Check Human Interface Devices list changes according to 3.
  5. Restart the TS800 Utility.
  6. Click Connect again.
- **Wi-Fi**
  1. Make sure the Wi-Fi access point in Wi-Fi settings and computer that runs TS800 Utility are in the same local area network.
  2. Make sure TS800 Utility is not blocked by a firewall or other programs.
  3. Restart the TS800 Utility.
  4. Click Connect again.

Why does TS800 becomes so slow sometimes?

If the TCP Server IP Address in Output Tab is set but the server is not connectable at the movement, TS800 will keep trying to connect the server and become much slower. Delete the Server IP Address and click Set Settings until server is set up correctly.
Other possible errors cause by this problem:

1. TS800 Utility connect failed even with USB connection.
2. Connected but Get Settings failed.
3. Tag is present but no inventory output.

What is the reason cause writing tag failed?

1. Make sure entered Access Password is correct.
2. Check RF settings.
3. Write tag will fail if the tag's EPC or Access Password is permanent locked or permanent unlocked.

Revision History

- 2020/06/17
  Version 1.1
  - Add Q, Session, Target.
- 2020/04/17
  Version 1.0