



**UHF-RFID Manager  
Demo & Configuration Software  
Brief Manual**

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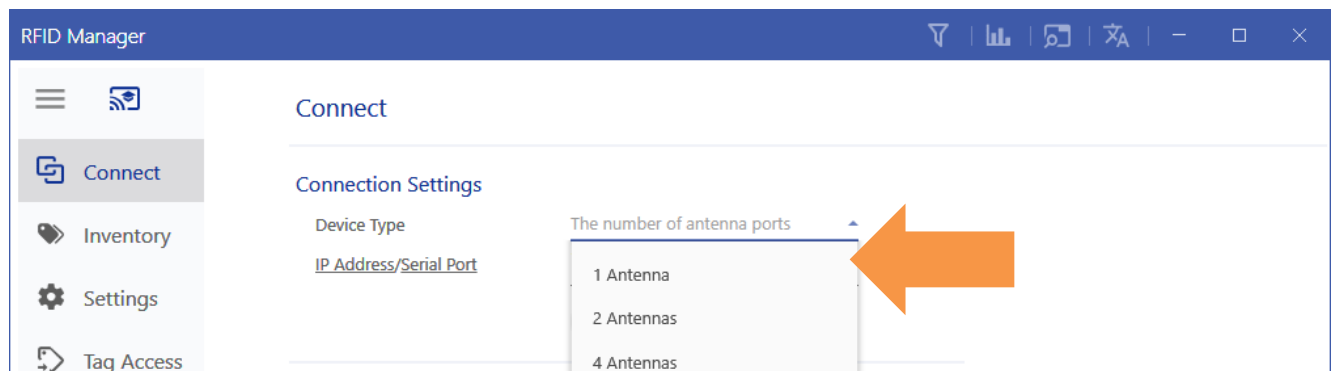
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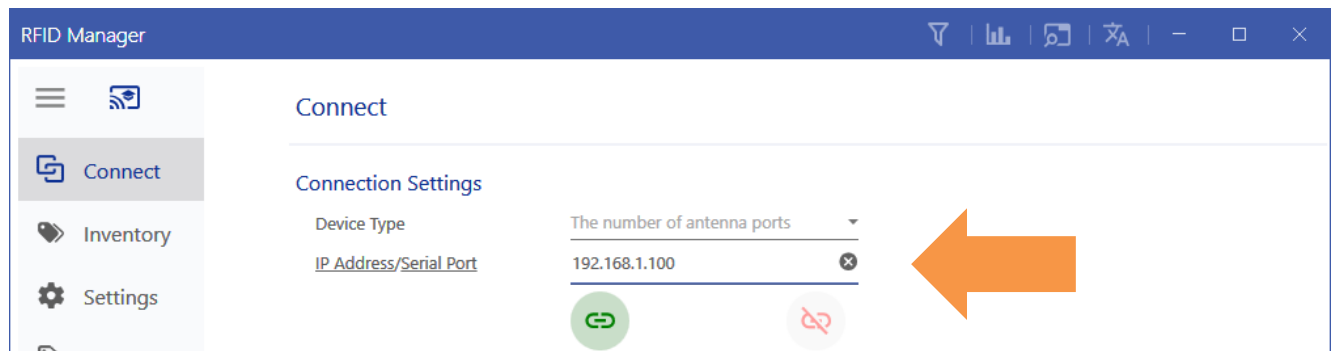
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## 1 Very Brief Overview of Operation

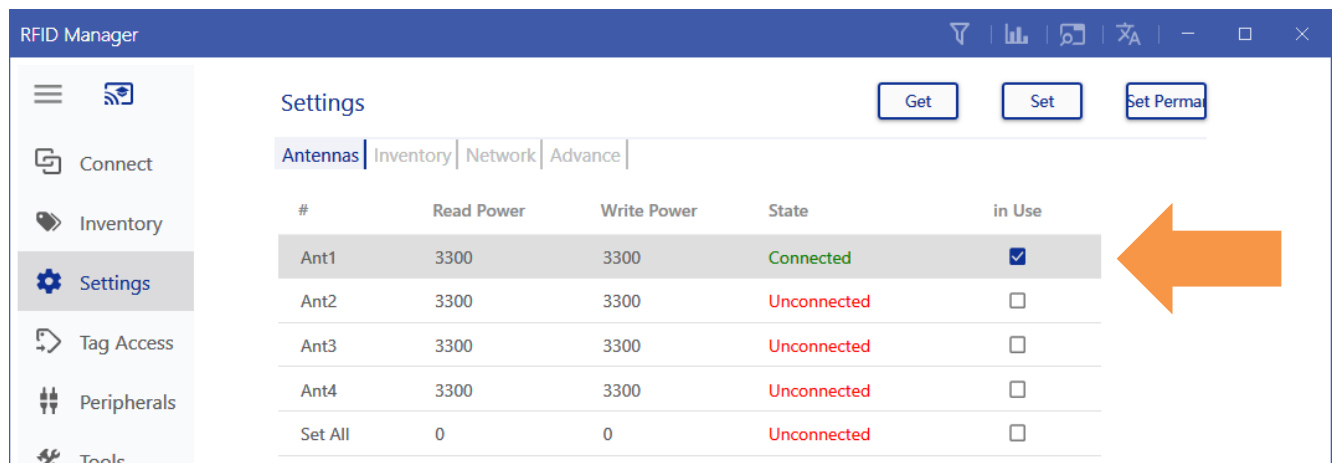
### 1.1 Chose the Device Type by the Number of Antennas



### 1.2 Select the communication via IP Address or Serial Port



### 1.3 Switch on Antennas



### 1.4 Handle RFID Tags

After these steps, you should be able to handle RFID tags either with the tab “Inventory” or “Tag Access”.

“Inventory” can give you a quick overview of all detected tags and is a suitable tool for testing the read range with different settings of “Read Power”.

“Tag Access” allows full access to all functions of UHF RFID tags.

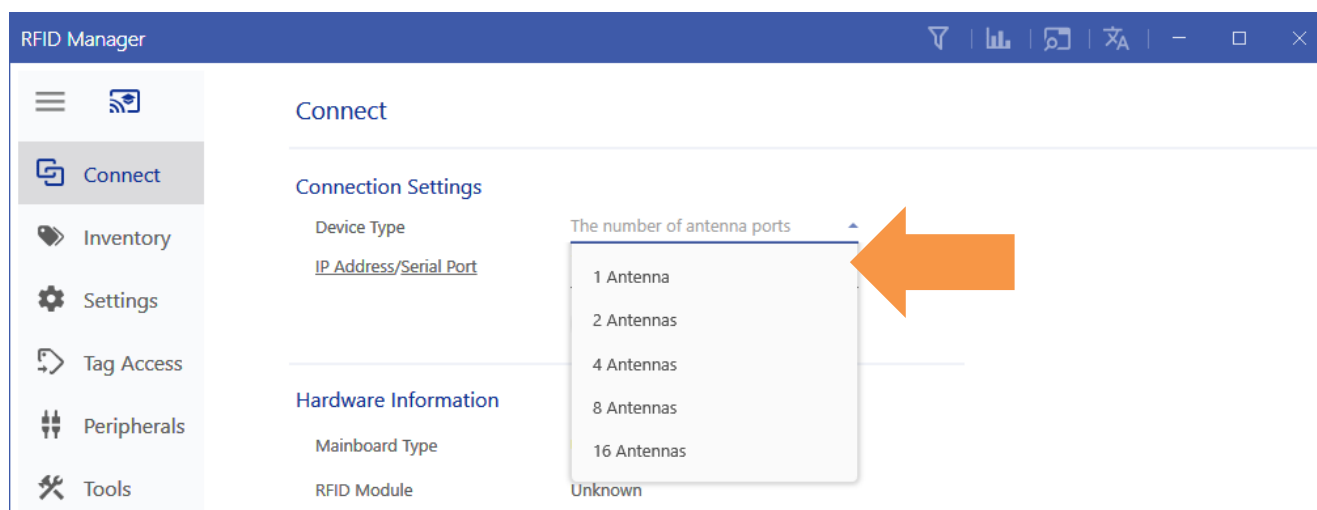
## 2 Connect with the RFID Device

### 2.1 Start Software and Change Language

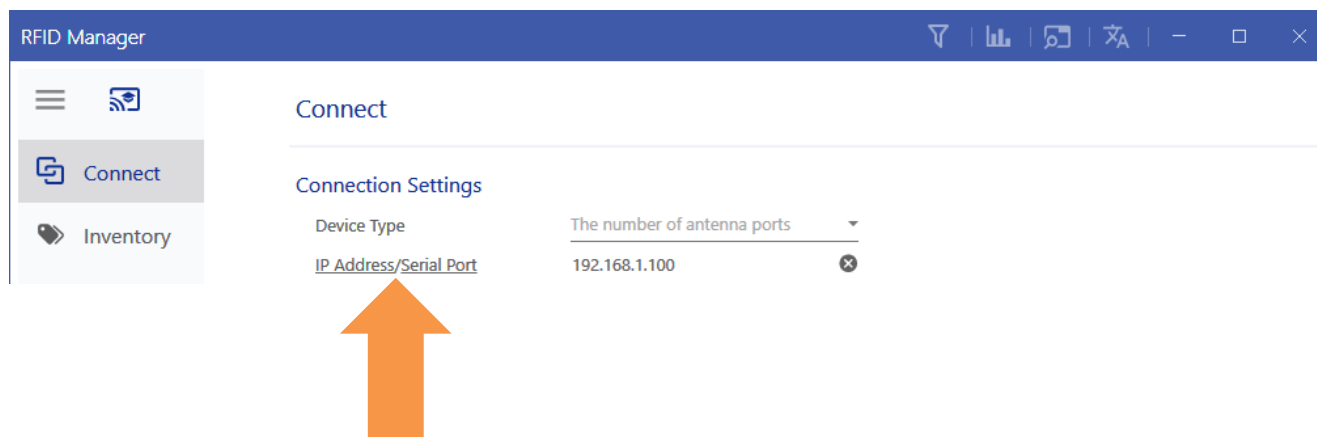


You can change the language at any time.

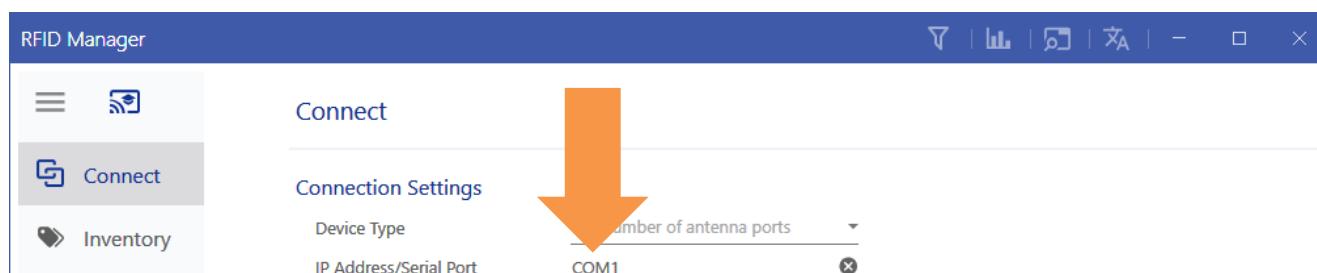
### 2.2 Select Number of Antennas



### 2.3 Select IP Address or Serial Port

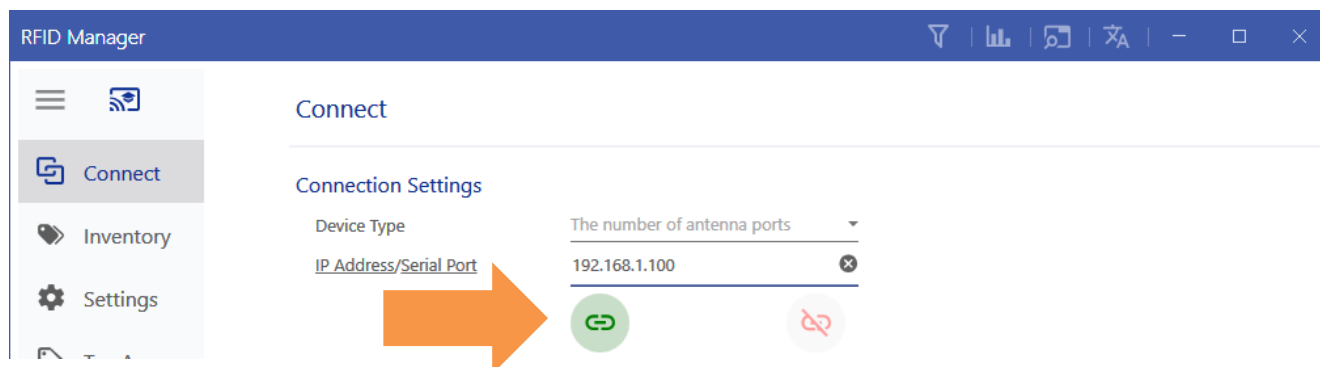


Click on “IP Address” or “Serial Port” first.  
Then click into the input line to correct the value if needed.

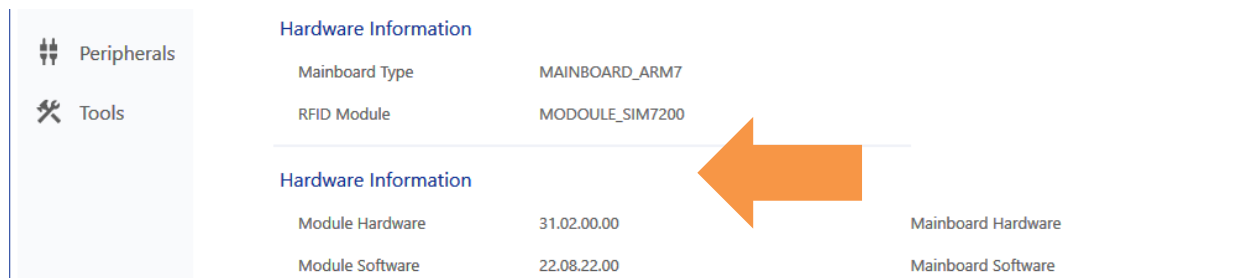


## 2.4 Connect

Finally, click on the green connect symbol to start the connection.



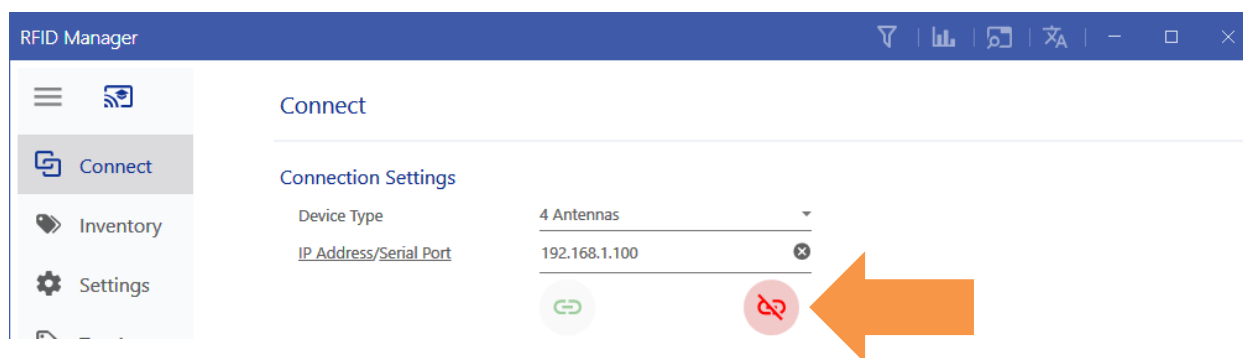
After the connection is established, information on the hardware and firmware is shown in the software.



## 2.5 Close Connection

To close the connection, use the red disconnect symbol.

Now you can access the RFID device from other software.







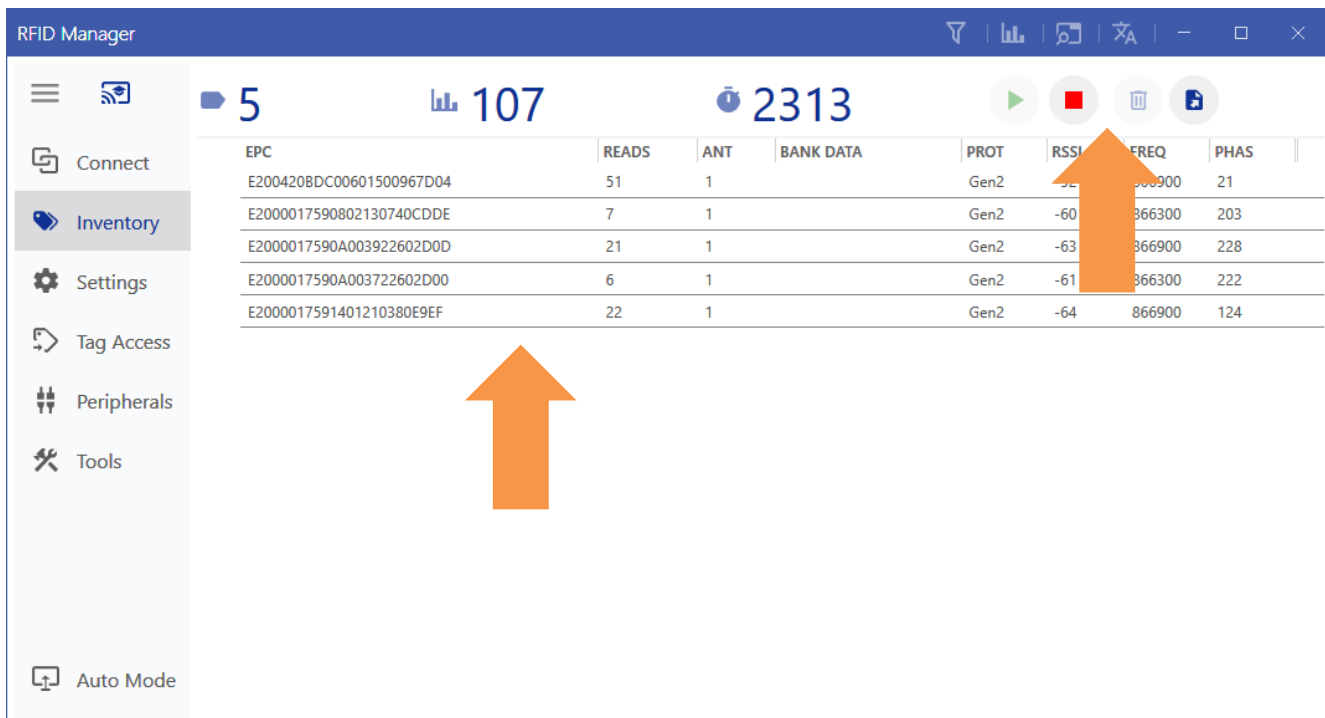
### 3 Inventory of Tags for Quick Test

#### 3.1 Preparation

Please see chapter “Fehler! Verweisquelle konnte nicht gefunden werden.4.1 Antennas” and select at least 1 antenna.

#### 3.2 Simple Inventory Test

-  Start Inventory
-  Stop Inventory
-  Clear Inventory Results
-  Export Inventory Results in XLSX Format



EPC	READS	ANT	BANK DATA	PROT	RSSI	FREQ	PHAS
E2004208DC00601500967D04	51	1		Gen2	-62	866900	21
E2000017590802130740CDDE	7	1		Gen2	-60	866300	203
E2000017590A003922602D0D	21	1		Gen2	-63	866900	228
E2000017590A003722602D00	6	1		Gen2	-61	866300	222
E2000017591401210380E9EF	22	1		Gen2	-64	866900	124

Name	Description
EPC	Electronic Product Code, this is the
Reads	The number of times the tag was read
Ant	The number of the antenna, where this tag was detected the last time
Bank Data	If additional reading of data is enabled, the data will appear here
Prot	Communication Protocol on Air Interface
RSSI	Received Signal Strength Indication
FREQ	The Frequency of the last detection of this tag
PHAS	The Phase

#### EPC, Electronic Product Code

This is the standard information you will always get from an RFID data tag. The EPC can be 4...62 Bytes long. As this information normally can be overwritten, the EPC memory bank can be used to store the data you need from the RFID data tag.

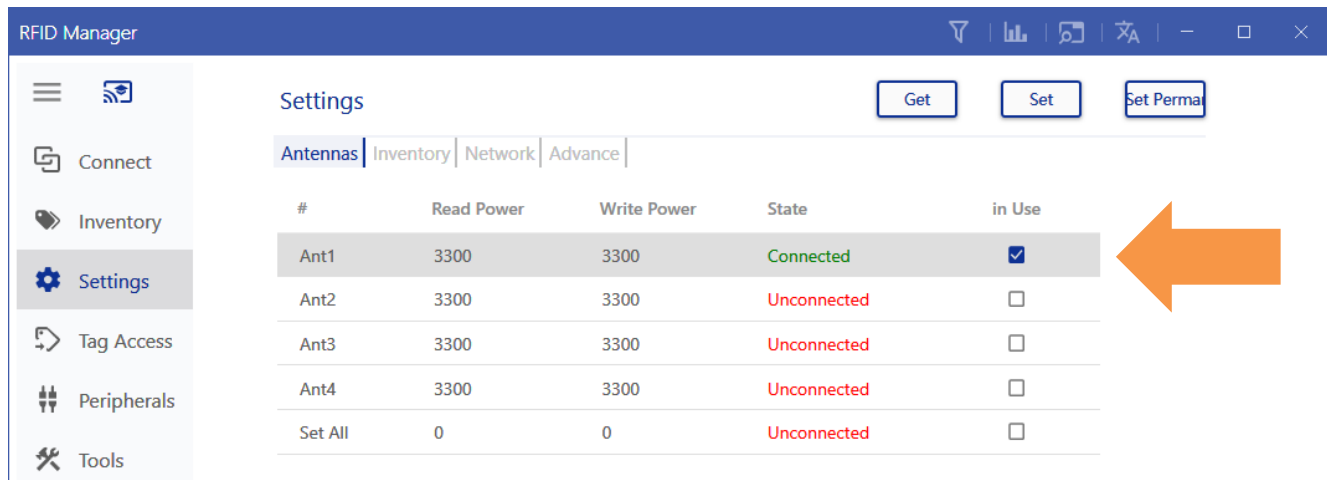
**Bank Data**

If you need to read more than the EPC from RFID data tags, you can enable the function described in “4.2.1 Enable Additional Data”. This allows to read the TID value; together with the filter function you can filter for the readings from a specific data tag type.



## 4 Settings

### 4.1 Antennas



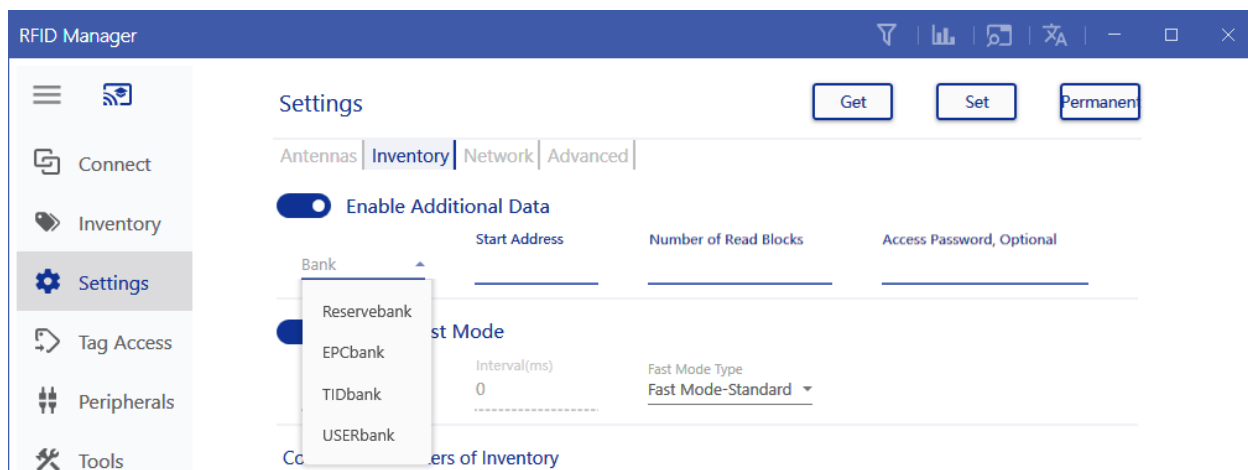
Here you can configure which antennas are used. For each antenna and different TX Power for reading data from and writing data to the RFID tag can be configured. The TX power is given in percents of dBm, so 2000 = +20 dBm = 100 mW.

The RFID devices check and measure the connected antenna. If there is no antenna connected or the values (VSWR) is very bad, the antenna will not be shown as “Connected”.

PS: If you connect an open-loop antenna, “Unconnected” will also be displayed here; but you can manually click to connect, and it can still be used normally.

### 4.2 Inventory

#### 4.2.1 Enable Additional Data



#### Additional Data

Every time an RFID tag is detected in an inventory round, a portion of up to 64 bytes of data can be automatically read from the selected memory bank. So, you can read not only the EPC but also Bytes from the TID or User Memory Bank.

If you need to read the data in the reserved area and the data being read is locked, you need to provide an access password to read the data correctly. If multiple labels have different access passwords, but only one access password can be entered here, only the data in the reserved area of the label with the correct password can be read. It should also be noted that for

EPC area, TID area and USER area, no access password is required for the read operation. No matter whether it is locked or not, if an incorrect access password is provided, the data will not be read.

#### 4.2.2 Fast Modes

Read period, and read interval only work in non-fast mode. Read period indicates how long the reader works at one time, and read interval indicates how long it takes to open the next time.

Fast mode is divided into 'fast mode – Standard', 'fast mode - distance priority', 'fast mode - read times priority'. When selecting the fast mode standard, you can match the common parameters of inventory by yourself, and the latter cannot be modified.

#### 4.2.3 Common Parameters of Inventory

Common parameters are Gen2 protocol parameters, including Gen2 Session, Profile, Gen2 Target, Gen2 Q Value. The Permanent Save button in the inventory setting can only save the above four parameters.

#### 4.2.4 Automatic stop count

Enable automatic stop counting, after the counting interface reaches the specified conditions will automatically stop counting.

Note: After modifying the parameters in the inventory setting, you need to click the "Setting" button above, otherwise the setting cannot take effect.

### 4.3 Network

The screenshot shows the 'RFID Manager' application window with the 'Settings' tab selected. The 'Network' sub-tab is active. The 'IP Settings' section displays the following values: IP Address: 192.168.1.100, Subnet Mask: 255.255.255.0, and Gateway: 192.168.10.10. Below this, there is a toggle switch for 'Disable Wireless Network' which is currently turned off. At the bottom, there are fields for 'SSID', 'Authentication Mode', 'Key Type', and 'KEY'.

Here you can configure the basic network settings if your device has an Ethernet port.

If your device has a WiFi port, you can also configure these settings.

### 4.4 Advanced Settings

#### 4.4.1 Special Parameters

The screenshot shows the 'RFID Manager' application window with the 'Settings' tab selected. The 'Advanced' sub-tab is active. The 'Special Parameters' section includes: 'Hop Mode' set to 'Mode0', 'Max Dwell Time of Ant' set to '0', and 'Gen2 Write Mode' set to 'Word Write'. There are also checkboxes for 'Bank Data Uniqueness' (checked) and 'Record the Highest RSSI' (unchecked). Dropdown menus for 'Hop Mode' and 'Gen2 Write Mode' are open, showing options: Mode0, Mode1, Mode2 for Hop Mode; and Word Write, Block Write for Gen2 Write Mode.

#### Hop Mode

TBD

#### Antenna dwell time

The maximum working time of a single antenna (ms). In fast mode, if the antenna does not read the label, it will immediately switch to the next antenna. In non-fast mode, the antenna will work up to the maximum time and then switch.

#### Gen2 Write mode

The program provides two modes of 'word write' and 'block write', the default is 'word write' mode, some early labels do not support 'word write', you need to manually change the write mode to 'block write'.

#### 4.4.2 Tag Data Cache Settings

The screenshot shows the 'RFID Manager' application window with the 'Settings' tab selected. The 'Tag Data Cache Settings' section includes three checkboxes: 'Antenna Uniqueness' (unchecked), 'Bank Data Uniqueness' (checked), and 'Record the Highest RSSI' (unchecked). Above this section, there are dropdown menus for 'Hop Mode' (set to 'Mode0') and 'Gen2 Write Mode' (set to 'Word Write').

In the daily inventory process, when encountering labels of EPC system, the program provides three methods: 'antenna number as unique identification', 'Bank data as unique identification', and 'record maximum RSSI' in order to distinguish labels. The default is 'Bank data as unique identification', and multiple options are available.

#### 4.4.3 Region and Frequency Hopping Table

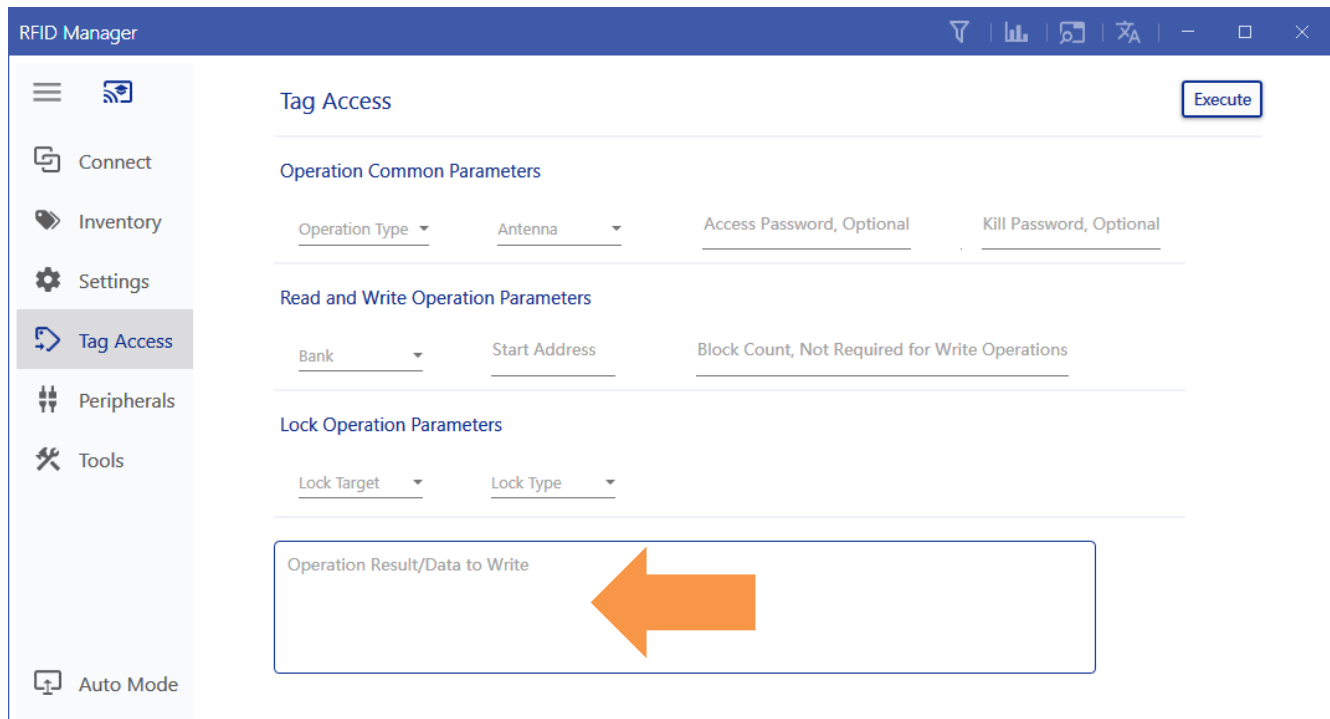


Due to the different frequency band control rules of different countries and regions in the world, in order to match the frequency band of the reader, it is necessary to select the appropriate frequency band. In the regional setting, different regions can be set, such as North America, Japan, Europe, China, etc. Click 'Get' first to get the current region setting. Select the region and click 'Settings' to complete the selection of the frequency band. In the frequency modulation table, click 'Get' to display the current selected frequency point, or you can change the selected frequency point. Click 'Set' to complete the selection of frequency point. **Regions and frequency points can be 'permanently saved'**

## 5 Tag Access

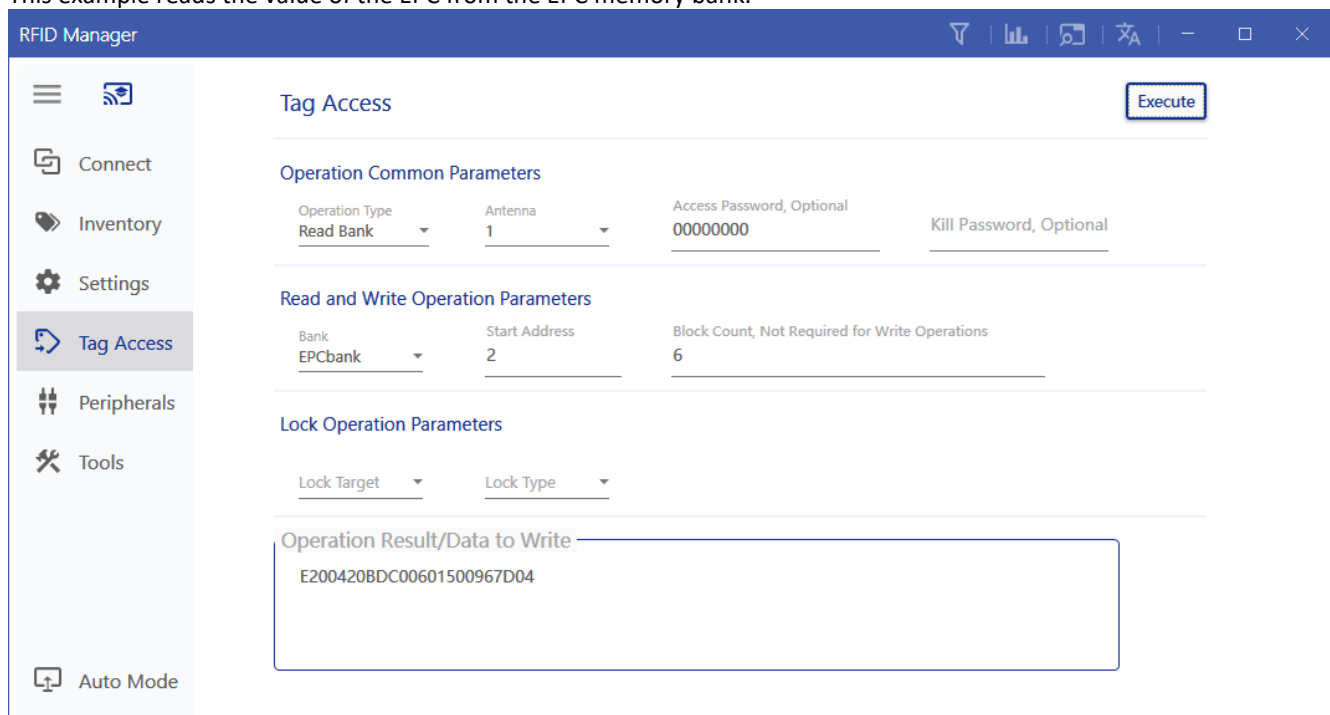
This functions access a random tag if there are several tags in reach of the antennas. So, to be on the safe side, you should remove all tags that should not be affected.

If you want to do write operations, do not forget to enter the data to write in the input field on the bottom of this tab.



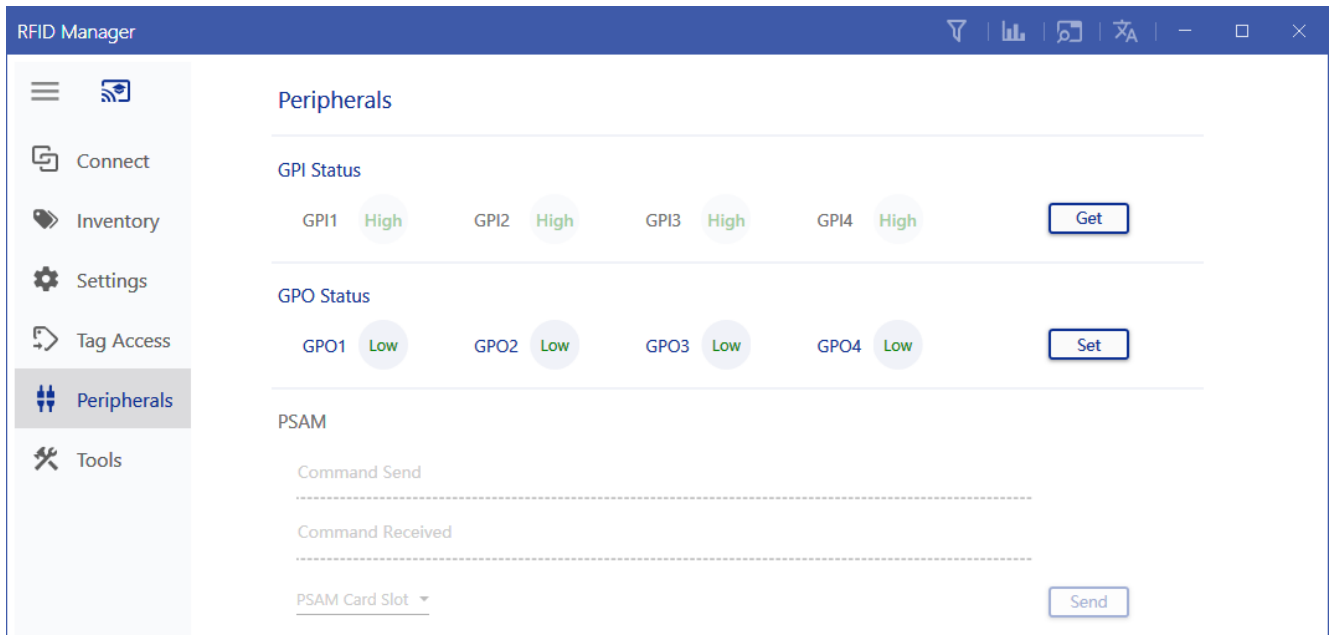
The screenshot shows the 'Tag Access' tab in the RFID Manager application. The interface includes a sidebar with navigation options: Connect, Inventory, Settings, Tag Access (selected), Peripherals, and Tools. The main area is titled 'Tag Access' and contains an 'Execute' button. Below the title, there are three sections of parameters: 'Operation Common Parameters' with fields for Operation Type, Antenna, Access Password, and Kill Password; 'Read and Write Operation Parameters' with fields for Bank, Start Address, and Block Count; and 'Lock Operation Parameters' with fields for Lock Target and Lock Type. At the bottom, there is a large text input field labeled 'Operation Result/Data to Write', which is highlighted by a large orange arrow pointing left.

This example reads the value of the EPC from the EPC memory bank.



The screenshot shows the 'Tag Access' tab in the RFID Manager application, displaying the result of a read operation. The 'Operation Common Parameters' section shows 'Operation Type' set to 'Read Bank', 'Antenna' set to '1', 'Access Password' set to '00000000', and 'Kill Password' set to 'Optional'. The 'Read and Write Operation Parameters' section shows 'Bank' set to 'EPCbank', 'Start Address' set to '2', and 'Block Count' set to '6'. The 'Lock Operation Parameters' section shows 'Lock Target' and 'Lock Type' both set to 'Optional'. The 'Operation Result/Data to Write' field now contains the hexadecimal value 'E200420BDC00601500967D04'.

## 6 Peripheral



### GPI (General Purpose Input)

This allows to monitor the status of inputs. The RFID devices can have up to 4 digital inputs to monitor for light barriers, switches, etc.

### GPO (General Purpose Output)

Furthermore, you can set the status of outputs. The outputs can engage lamps, horns or inform other equipment to do something. This function in the demo software is to set the outputs low/high to test your external wiring.

## 7 Tools

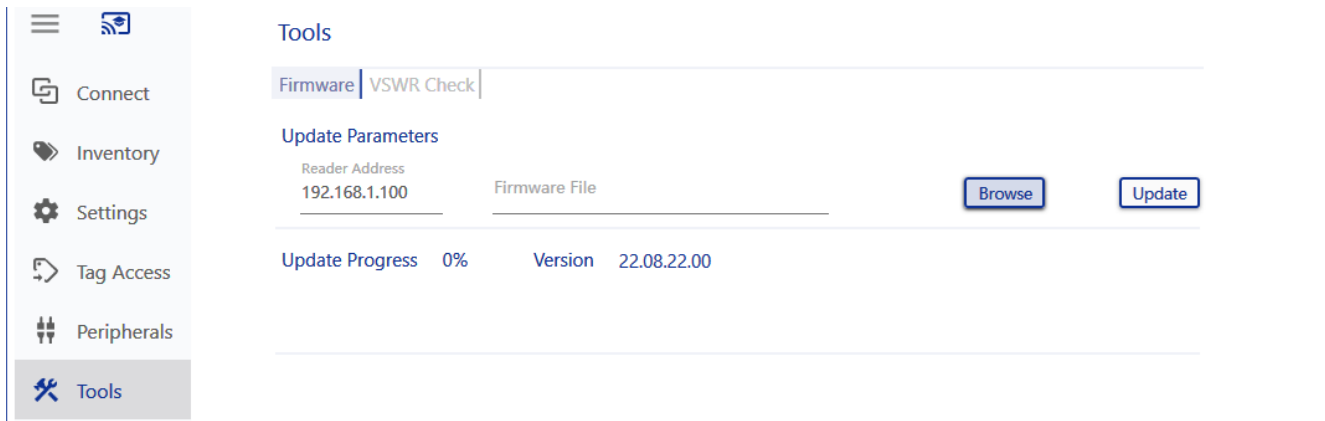
### 7.1 Firmware Update

Make sure the firmware file is valid before upgrading the firmware. There are two types of firmware:

- module firmware and
- communication board firmware.

Upgrade module firmware through serial port and communication board firmware through network port.

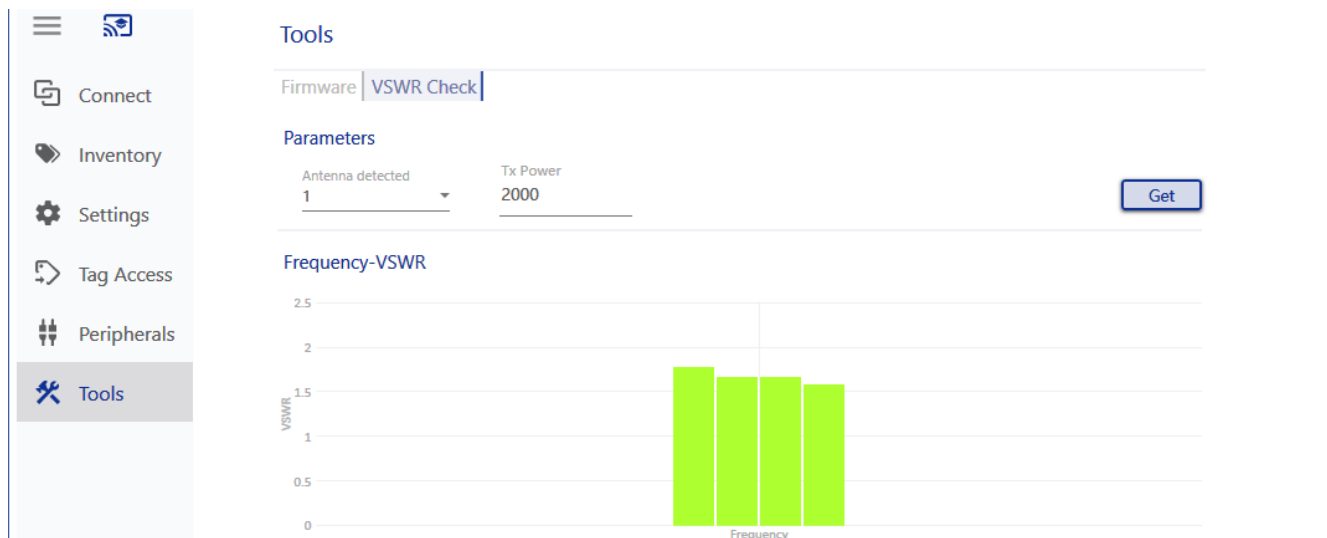
Enter the address of the serial port or network address, click preview to select the firmware file, click upgrade and wait for the upgrade progress to complete. When the message is successful, you need to disconnect the power and reconnect.



The screenshot shows the 'Tools' menu with 'Firmware' selected. The 'Update Parameters' section includes a 'Reader Address' field with the value '192.168.1.100' and a 'Firmware File' field with a 'Browse' button. An 'Update' button is also present. Below this, the 'Update Progress' is shown as '0%' and the 'Version' is '22.08.22.00'.

Click on [Browse] to select a firmware file. Then start the process with click on [Update]. Please wait until all activities in the software and on the status LEDs of the RFID device are back to normal operation.

### 7.2 VSWR Check



VSWR = voltage standing wave ratio, the ratio between energy given of the RFID device to the antenna and energy reflected back from the antenna into the RFID device. Ideally this is 1, meaning, that the maximum TX power is transferred into the antenna. This is not a value of the quality of the antenna itself, the function of the antenna to transfer this energy from the antenna cable into the air is another parameter.

Rule of thumb: The standing wave ratio test can detect the antenna matching. 0...1.5 is good matching, 1.5...2 is average matching, above 2 you can expect poor performance.

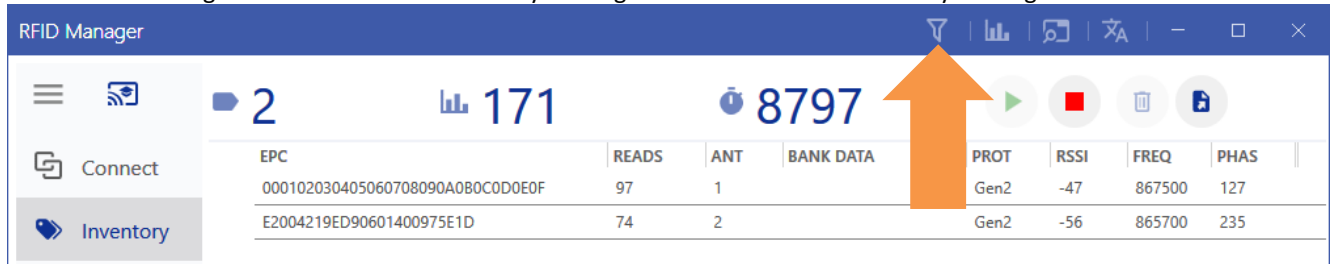
## 8 Additional Functions

### 8.1 Filter

The address is in bits. So you can single out on a specific bit sequence. This can be the length of the EPC, the AFI field.

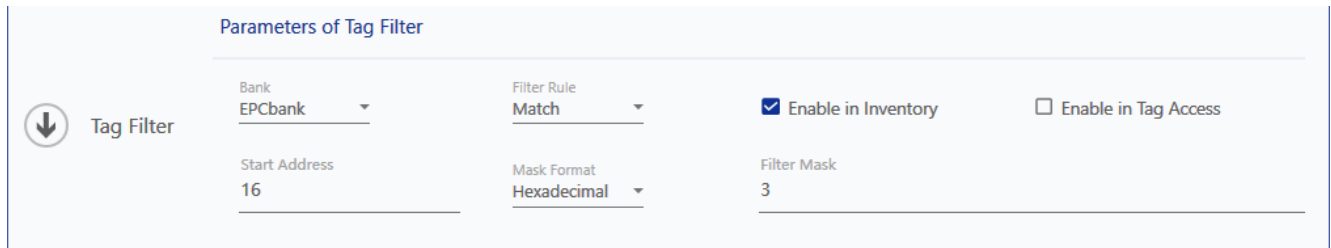
#### 8.1.1 Filter for a specific EPC length

Here we have 2 tags in the field: one with a 16 Bytes long EPC and another with a 12 Bytes long EPC:



EPC	READS	ANT	BANK DATA	PROT	RSSI	FREQ	PHAS
000102030405060708090A0B0C0D0E0F	97	1		Gen2	-47	867500	127
E2004219ED90601400975E1D	74	2		Gen2	-56	865700	235

First we switch on the filter function. The size information starts in the 5 bits after bit #16. So, to filter for 12 byte long EPCs set the filter with this values:



**Parameters of Tag Filter**

Tag Filter

Bank: EPCbank

Filter Rule: Match

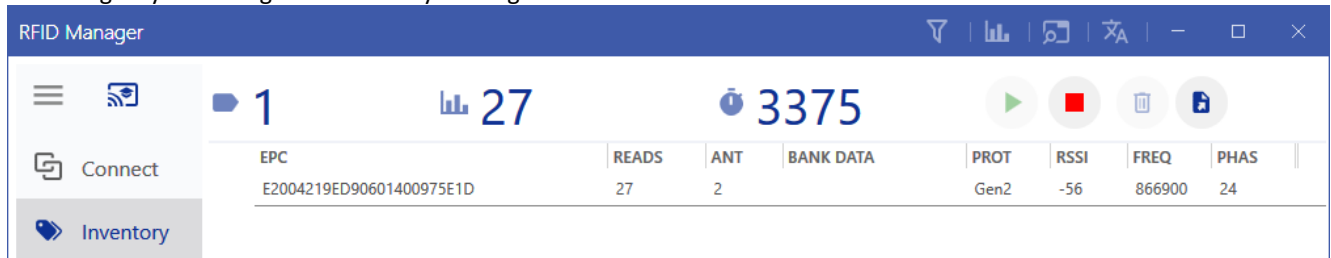
Start Address: 16

Mask Format: Hexadecimal

Filter Mask: 3

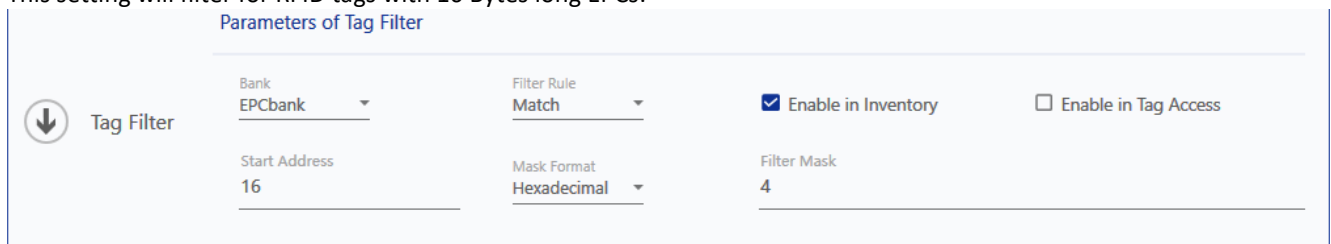
☒ Enable in Inventory ☐ Enable in Tag Access

This will give you the tag with the 12 Bytes long EPC:



EPC	READS	ANT	BANK DATA	PROT	RSSI	FREQ	PHAS
E2004219ED90601400975E1D	27	2		Gen2	-56	866900	24

This setting will filter for RFID tags with 16 Bytes long EPCs:



**Parameters of Tag Filter**

Tag Filter

Bank: EPCbank

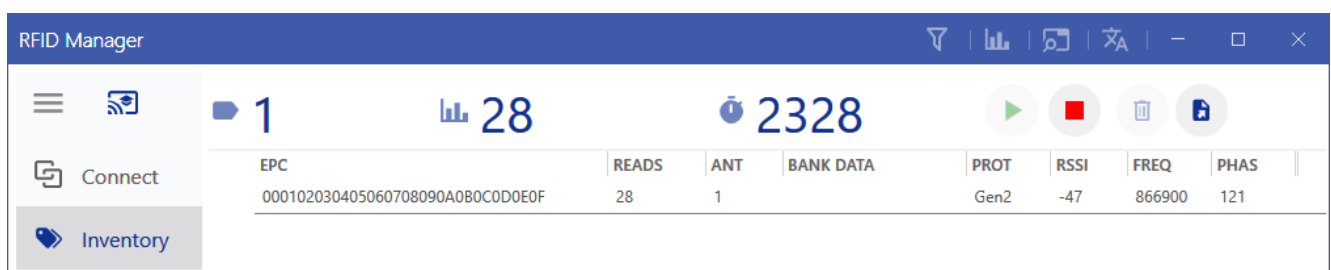
Filter Rule: Match

Start Address: 16

Mask Format: Hexadecimal

Filter Mask: 4

☒ Enable in Inventory ☐ Enable in Tag Access



EPC	READS	ANT	BANK DATA	PROT	RSSI	FREQ	PHAS
000102030405060708090A0B0C0D0E0F	28	1		Gen2	-47	866900	121



### 8.1.2 Filter for a specific value in the TID

Here we have a large number of tags in the field. Goal is to filter out all manufactured by Alien.

RFID Manager									
<div> <div> <div>17</div> <div>293</div> <div>5766</div> </div> <div> <div>▶</div> <div>■</div> <div>🗑️</div> <div>📄</div> </div> </div>									
EPC	READS	ANT	BANK DATA	PROT	RSSI	FREQ	PHAS		
E2004219ED90601400975E1D	27	1	E200381160006014	Gen2	-56	866300	251		
022532000000000000023E7	14	1	E280110520007B91	Gen2	-50	866300	140		
02138100000000000000C2B	14	1	E280110520005782	Gen2	-56	866300	136		
0225320000000000000029F2	27	1	E280110520007544	Gen2	-54	866300	129		
02138100000000000000C34	12	1	E280110520005442	Gen2	-60	867500	210		
3005FB63AC1F3681EC880468	13	1	E20060031819BE2C	Gen2	-42	867500	131		
E20068070000000000000000	14	1	E200680720480D14	Gen2	-44	866300	220		
035510000000000000007008	26	1	E280110C20007A99	Gen2	-55	866300	135		
02253200000000000000026B6	13	1	E280110520007954	Gen2	-63	866300	248		
E2000017590A003922602D0D	27	1	E2003412013F1800	Gen2	-61	866300	147		
E2003412DC03011931232156	14	1	E2003412013D1000	Gen2	-47	866300	2		
02253200000000000000026CF	13	1	E28011052000764B	Gen2	-51	867500	177		
E20068070100000000000000	14	1	E200680720483C01	Gen2	-46	866300	30		
E2003412DC03011931234422	27	1	E2003412013C1000	Gen2	-42	866300	127		
000102030405060708090A0B0C0D0E0F	26	2	E20034120130F200	Gen2	-53	865700	210		
E200410268100143152079DC	11	2	E20034120134F401	Gen2	-53	866900	114		
E200410268100143152079DC	1	2	E20034120134F400	Gen2	-53	865700	35		

The manufacturer code is part of the TID and starts at bit address 8. It contains 3 nibbles. So, with this filter setting, we will get all RFID tags manufactured by Alien.

RFID Manager									
<div> <div> <div>6</div> <div>539</div> <div>13985</div> </div> <div> <div>▶</div> <div>■</div> <div>🗑️</div> <div>📄</div> </div> </div>									
EPC	READS	ANT	BANK DATA	PROT	RSSI	FREQ	PHAS		
E2003412DC03011931234422	109	1	E2003412013C1000	Gen2	-42	866900	174		
E2003412DC03011931232156	54	1	E2003412013D1000	Gen2	-47	865700	230		
000102030405060708090A0B0C0D0E0F	107	2	E20034120130F200	Gen2	-53	866300	7		
E2000017590A003922602D0D	108	2	E2003412013F1800	Gen2	-62	866300	69		
E2004219ED90601400975E1D	107	2	E200381160006014	Gen2	-53	866300	79		
E200410268100143152079DC	54	2	E20034120134F401	Gen2	-53	866300	78		

Parameters of Tag Filter

Tag Filter

Bank

TIDbank

Start Address

8

Filter Rule

Match

Mask Format

Hexadecimal

Filter Mask

003

☒ Enable in Inventory

☐ Enable in Tag Access

### 8.1.3 Filter for an AFI

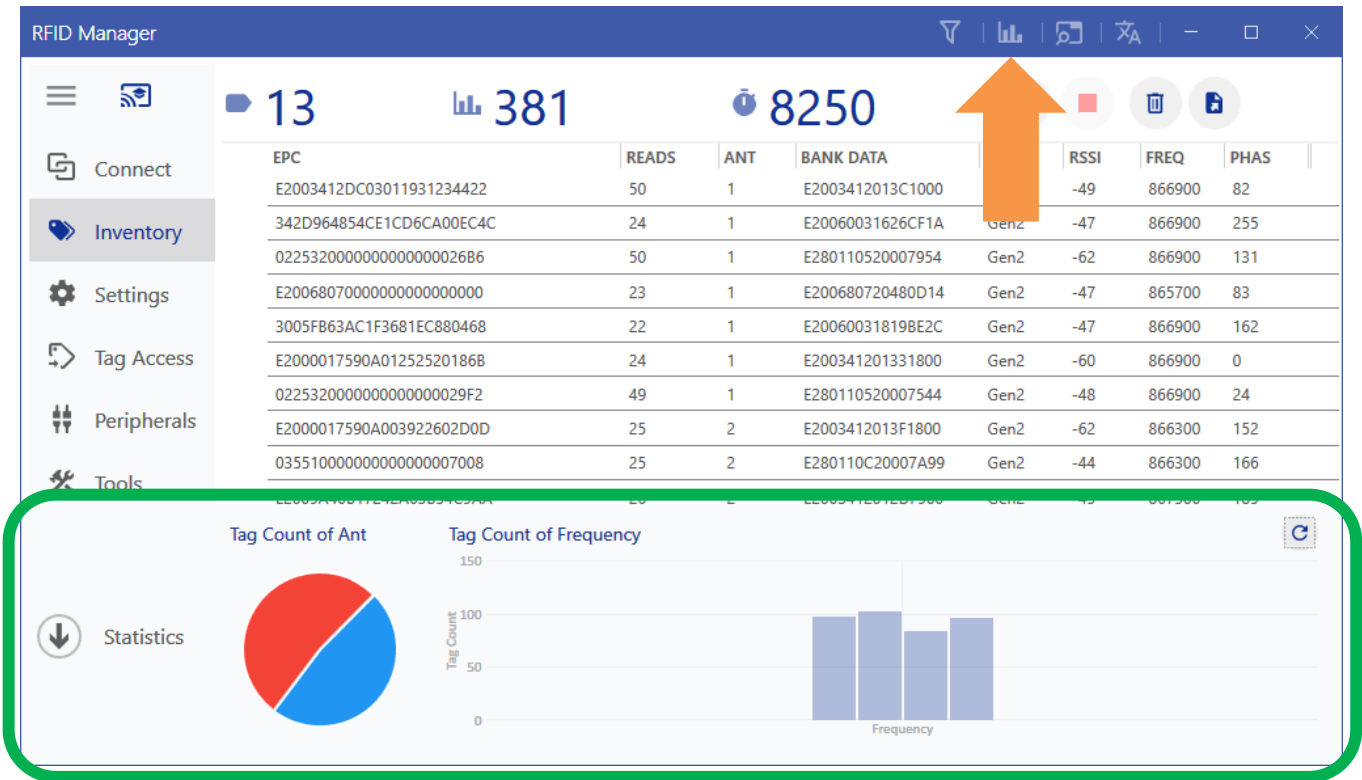
TBD

8.2 Statistics

Click on this icon in the windows header to open a simple statistics.

The pie chart labelled “Tag Count of Ant” shows the portion of RFID tags detected by each antenna. The pies should be somewhat evenly distributed if there are many tags visible from all antennas.

The bar chart labelled “Tag Count of Frequency” shows the summary of the frequencies at which tags are detected. After a few seconds this should show an even distribution for all frequencies. If you operate in regions where a large amount of channels are used to hop, this will look different and can probably show the frequency response of a narrow-band antenna.

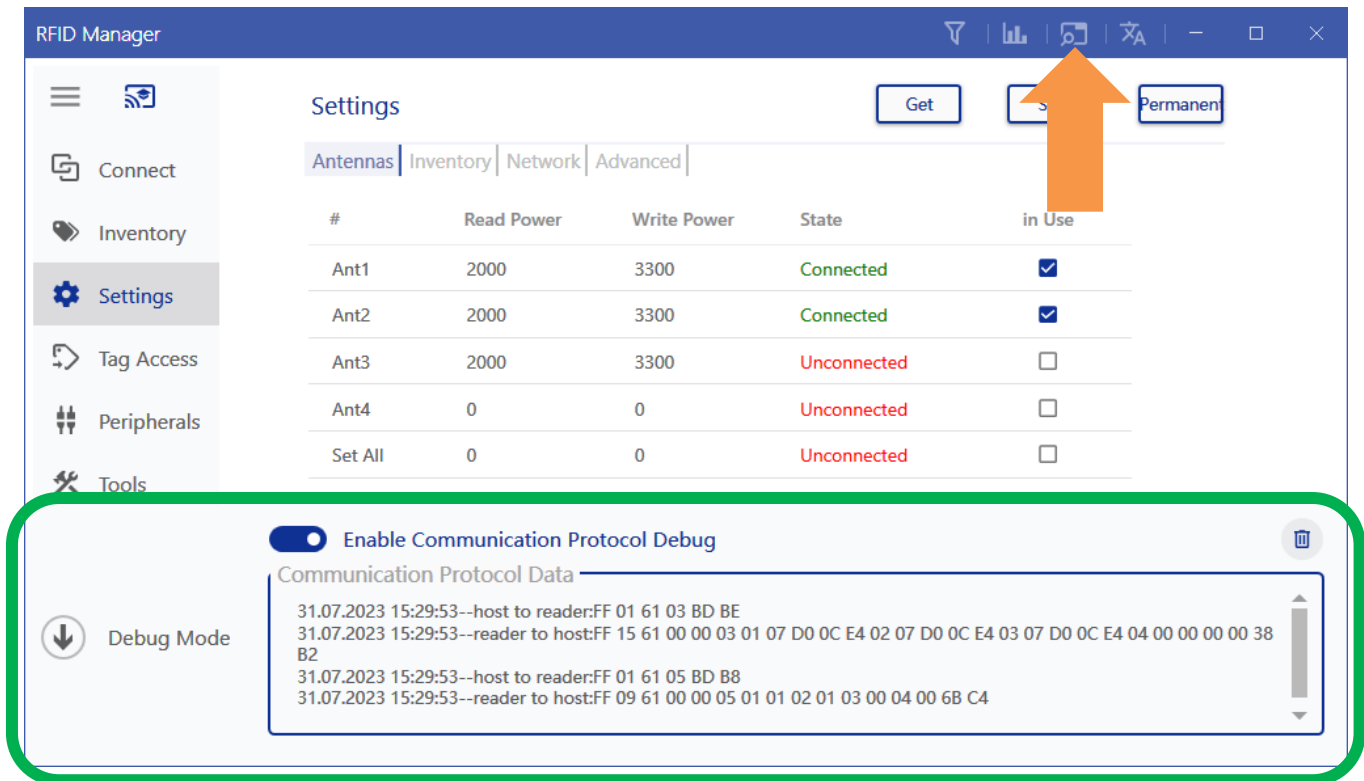


Click in this icon to refresh with new data.



### 8.3 Debug

Click on this icon in the window header to open the debug window. Furthermore you need to switch the slider to “Enable Communication Protocol Debug”.



The example shows two configuration commands sent from the PC software to the RFID device. The first configures the Read Power, Write Power and Setting Time for all 4 antennas, while the second configures which antennas are in use.

You can use the standard keyboard shortcuts to copy communication protocol data to text processors for detailed analysis:

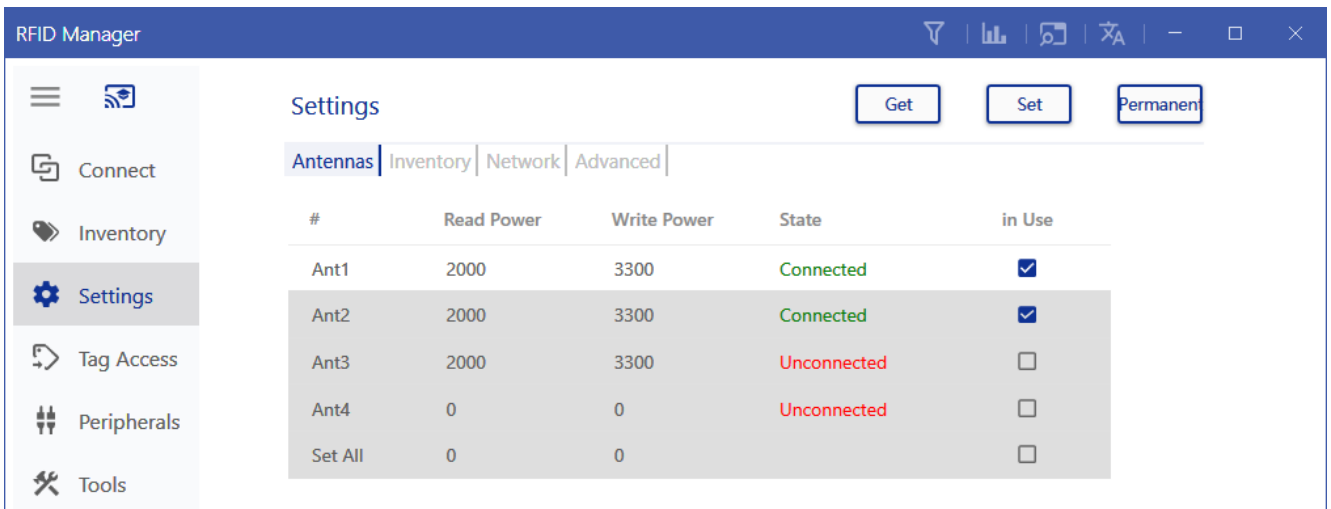
- Place the cursor inside the data. Select all data with [Ctrl] + [A].
- Copy the data to the clipboard with [Ctrl] + [C].

And you can use the arrow keys in conjunction with [Shift] to select the desired part to be copied.

Click on the dustbin icon to erase the current communication protocol data.



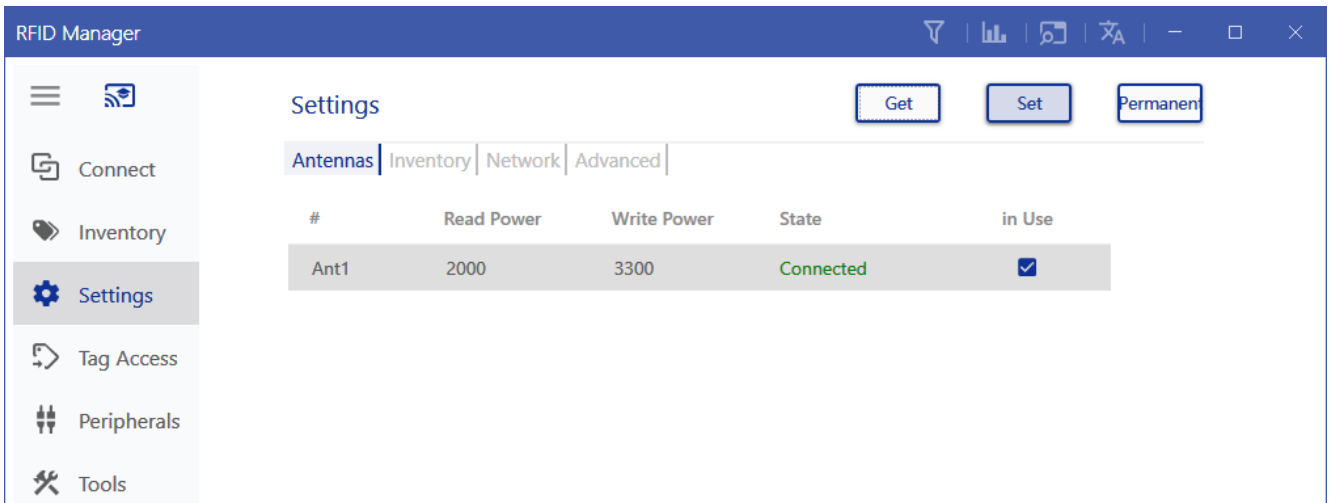
## 8.4 Configure only a Selection of Antennas



The screenshot shows the 'RFID Manager' application window with the 'Settings' tab selected. The 'Antennas' sub-tab is active, displaying a table with the following data:

#	Read Power	Write Power	State	in Use
Ant1	2000	3300	Connected	<input checked="" type="checkbox"/>
Ant2	2000	3300	Connected	<input checked="" type="checkbox"/>
Ant3	2000	3300	Unconnected	<input type="checkbox"/>
Ant4	0	0	Unconnected	<input type="checkbox"/>
Set All	0	0		<input type="checkbox"/>

Select all rows of antennas you do NOT want to configure, then click on [Delete].



The screenshot shows the 'RFID Manager' application window with the 'Settings' tab selected. The 'Antennas' sub-tab is active, displaying a table with the following data:

#	Read Power	Write Power	State	in Use
Ant1	2000	3300	Connected	<input checked="" type="checkbox"/>

Now you can configure only one or a few antennas and store the settings with click on [Set].

### Important Note

In the current version you cannot retrieve the settings of single antennas using [Get].

You need to disconnect and connect first. This will rebuild the tab "Settings => Antennas".

## 9 Revision History

Version	Date	Notes
0.1	2023-06-13	Initial User's Guide Version
0.2	2023-07-14	Added Screenshots
0.3	2023-07-21	Screenshots of new Version
0.4	2023-07-31	More details added
0.5	2023-08-02	Cleaned up style sheets