PHYCHIPS

RED UTM
2022-05-13

RED Utility
User Manual

For RED Utility_v4.0.0 or later

Ver 1.0.10 2022-05-13

Contents

1 Revision History

Version	Date	Description
1.0.0	2015.03.05	Initial Release
1.0.1	2015.03.31	Updated Description of Read Option
1.0.2	2015.06.09	Updated Image & rename
1.0.3	2015.06.29	Update Image and Added Description of New Function
1.0.4	2015.08.05	Updated Description of FH & LBT Setting
1.0.5	2016.01.27	Updated Image Updated Description of the Fast Leakage Cal.
1.0.6	2016.08.17	Added Mention of the Sensor tag function
1.0.7	2019.11.08	Integrated GUI to support all of the REDx products
1.0.8	2020.02.24	Updated Image Added Description of Multi antenna function
1.0.9	2021.11.05	Contents list reorganization according to GUI design change Update Image and Added Description of New Function
1.0.10	2022.05.13	Updated Description of 12.3 Save and Load

2 Introduction

The RED Utility helps the user to start working with REDx-DK RFID reader quickly.
From the RED Utility version_v2.6.0, it supports all of the REDx products.

System requirements
Microsoft .NET Framework v4.0 or later version
OS: Windows (Developed and tested on windows 10)

3 GUI Overview

3.1 Basic View

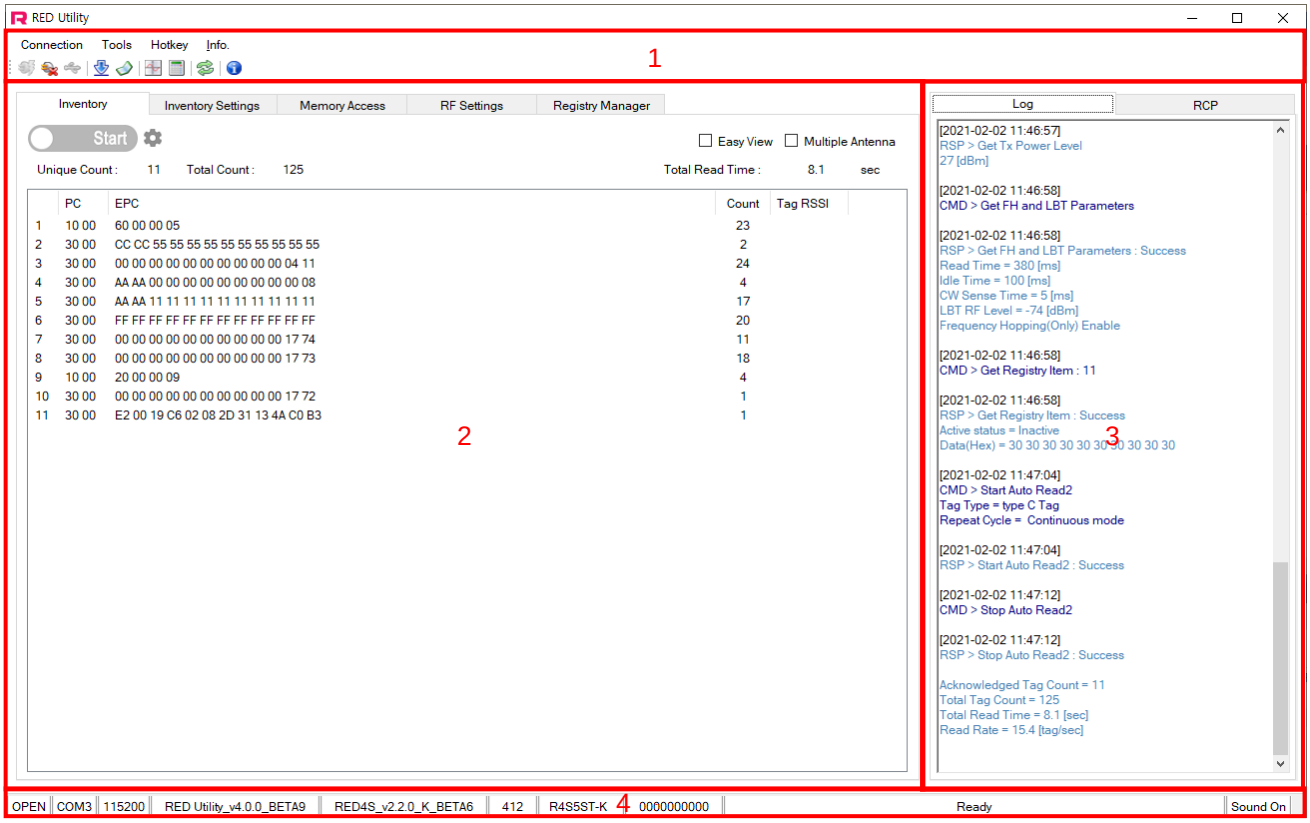


Figure 1 RED Utility Basic Window

✓ The window may not be displayed perfectly in low resolution or high magnification environments.

3.1.1 Menu bar

- Connection: Contains submenu about Module Connection
- Tools: Contains submenu about other tools
- Hotkey: Contains submenu about hotkeys
- Info.: Contains Information about the GUI

: Connect Button
: Disconnect Button
: Port Setting Button
: Firmware Download Open Button
: Log Enable Button
: Tx Leakage RSSI Plot Open Button
: Read Range Calculator Open Button
: Reset Button
: About Info Button

3.1.2 Operation Tab

- Inventory: Provides functions to inventory
- Inventory Settings: Provides functions Inventory settings and select
- Memory Access: Provides functions about access(read, write, lock, kill etc.)

- RF Settings: Provides function about rf power and frequency
- Registry Manager: Provides registry access function

3.1.3 Message Window

This window displays the messages that obtained by decoding the RCP Command.

3.1.4 Status Strip

The Status Strip indicates Comprehensive Information about the Module(Connection state, GUI version, firmware version, Part number, Serial number, Operation status and sound on/off).

4 Start-up Guide

To operate REDx-DK with GUI, follow below step.

STEP1. Connecting REDx-DK

After the device is recognized, connect RFID Antenna, REDx and RED_CTRL.
Plug mini-USB of RED_CTRL to PC using mini-USB cable and check whether POWER LED is ON.

STEP2. Start RED Utility

Open GUI to click ‘RED Utility.exe’

STEP3. Connect to module REDx

If hardware connection is valid, RED Utility connect module REDx automatically.

If utility cannot connect hardware, please follow below step
Click ‘Connection->Connect’ to connect to REDx-DK through USB-to-UART at main window
GUI will find the Device and synchronize parameters with REDx module automatically. If the GUI cannot find the device automatically, Click ‘Connection->Port Setting’ and select other Device. Default Baud rate is 115200 bit/s.

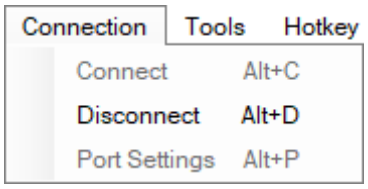


Figure 2 Connection

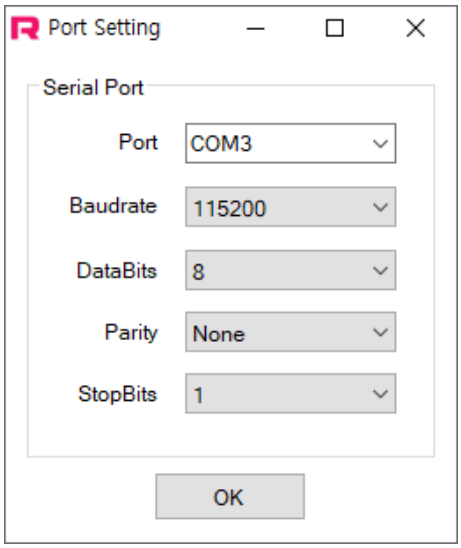


Figure 3 Port Setting

If the Device connected successfully, status bar will display ‘OPEN’ state and device number and so on.

Figure 4 Status Bar

If user can not find RED’s port, follow below step
first, visit silicon labs site and download VCP driver suitable for OS
https://www.silabs.com/developers/usb-to-uart-bridge-vcp-drivers

second, install the driver and check connect Device Manager – Ports(COM & LPT)

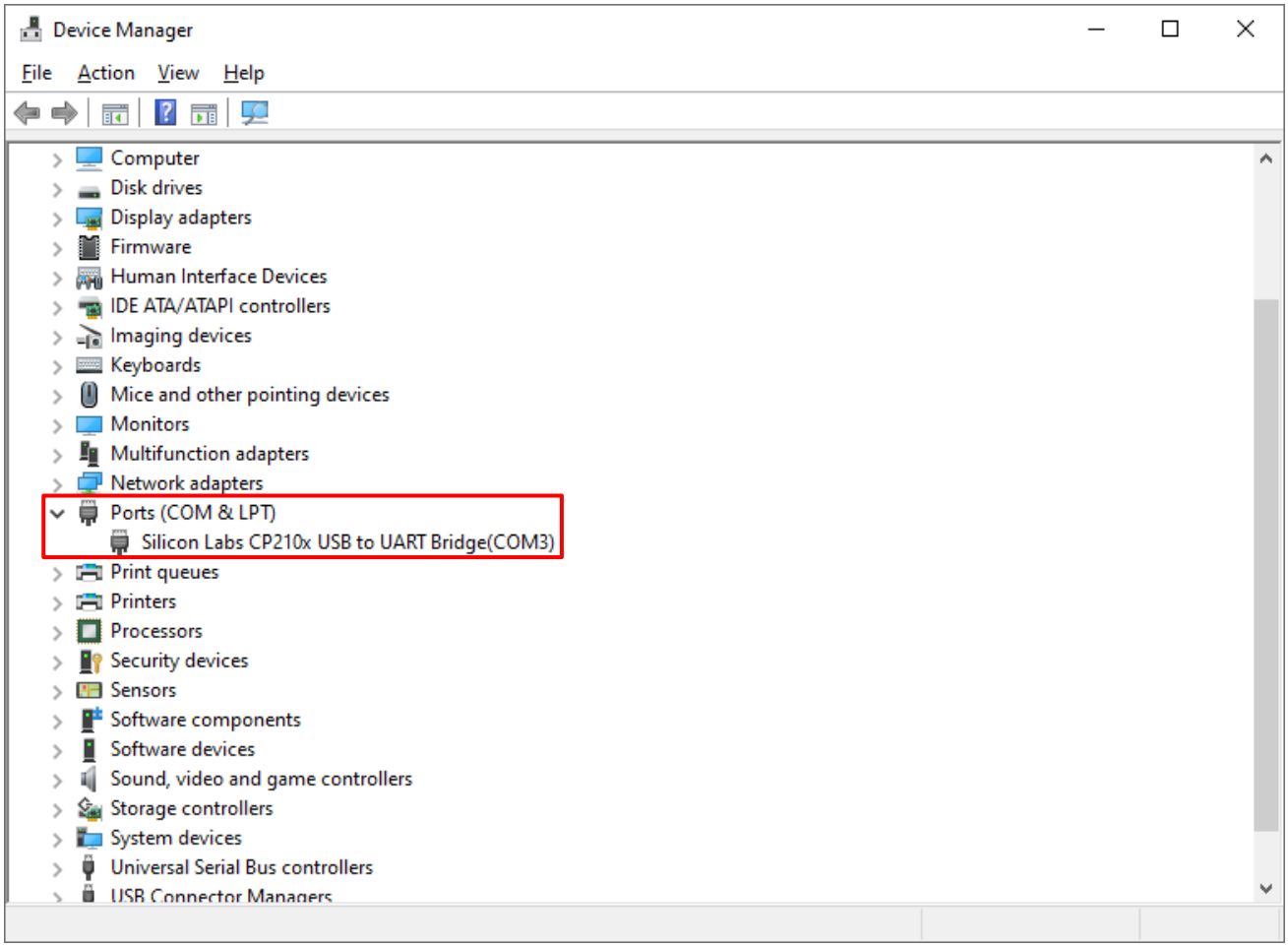


Figure 5 Device Manager

STEP4. Operate RFID reader

REDx-DK is ready to read tag. Send command to REDx using GUI.

5 Inventory

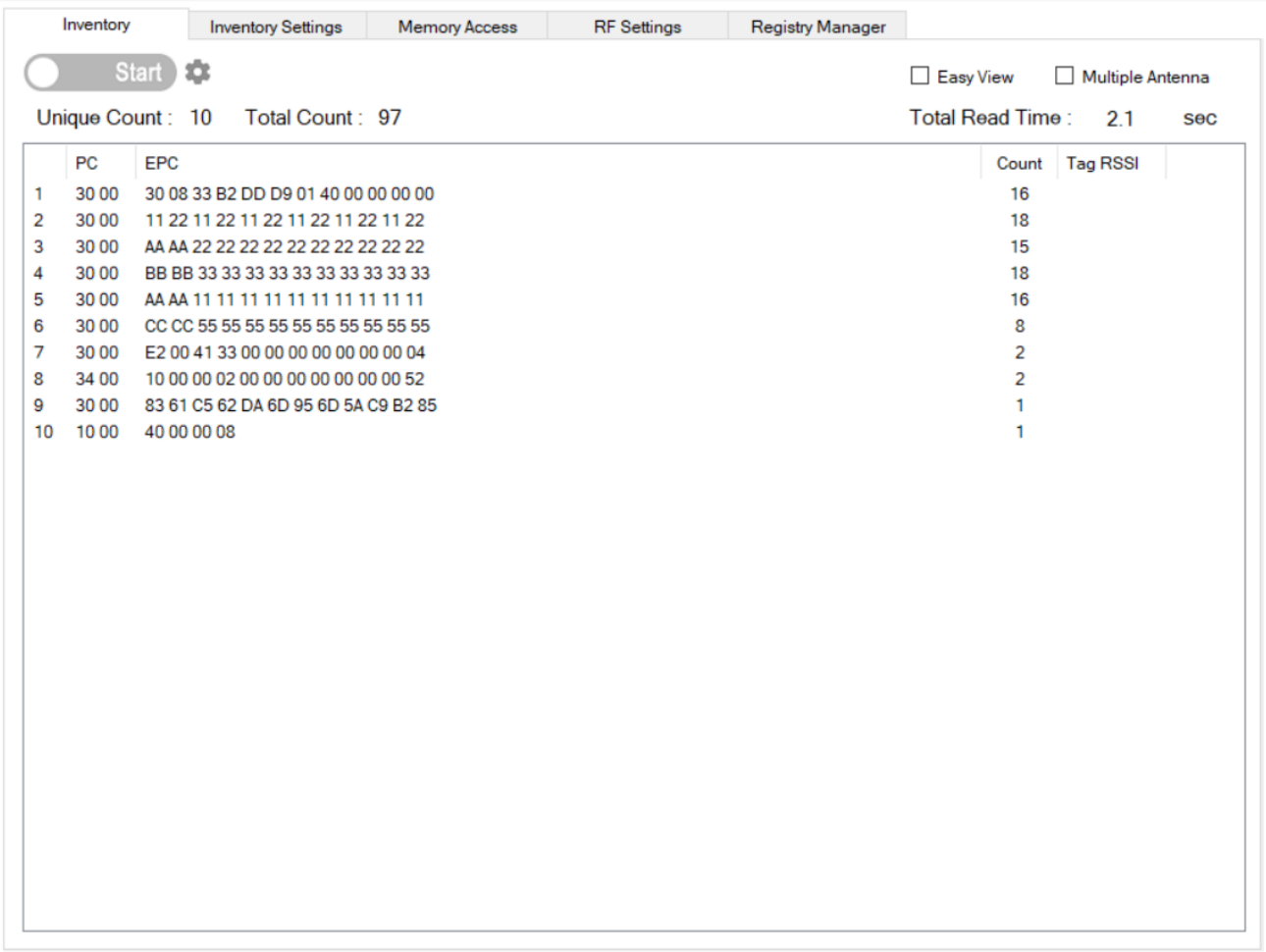


Figure 6 Inventory tab

5.1 Reading Tags

Click ‘Start’ Button to read tags. PC&EPC of tags are displayed on below text box.

5.1.1 Tag read operation buttons

- Start: Tag Reading Start Button
- Stop: Tag Reading Stop Button
- : Read Option(with RSSI, with TID, Conditional Read)

5.1.2 Enable Tag RSSI

Enable or Disable Tag RSSI. To enable Tag RSSI, click ‘Read Option’ Button and check ‘with RSSI’ before Start Reading tags. If ‘with RSSI’ is checked, the data for Tag RSSI are received with EPC when reading the tag. RED Utility calculates the Tag RSSI value by using these data. Tag RSSI value is shown in ‘Tag Information’. The RSSI unit is dBm.

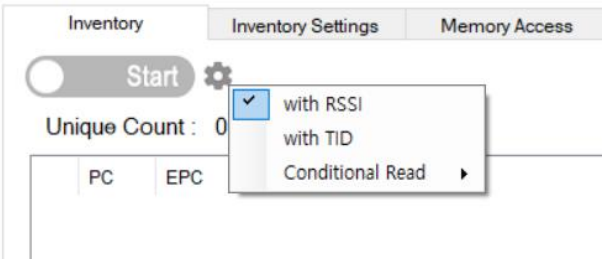
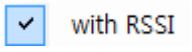
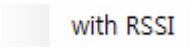


Figure 7 Tag Information with Tag RSSI Option

-  : Enable Tag RSSI
-  : Disable Tag RSSI

5.1.3 Enable TID

Enable or Disable TID. To enable TID, click 'Read Option' Button and check 'with TID' before Start Reading tags. If 'with TID' is checked, the data for TID are received with EPC when reading the tag. TID value is shown in 'Tag Information'.

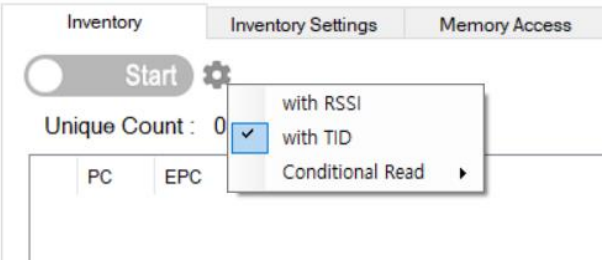
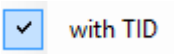
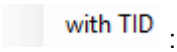


Figure 8 Tag Information with TID Option

-  : Enable TID
-  : Disable TID

5.1.4 Conditional Read

Activate Read Condition. To activate Conditional Read, click 'Read Option' Button -> Conditional Read and Select Read Condition. Select Read Condition before Start Reading tags. If one of the Read Condition has been selected, Parameter of Read Condition will be activated.

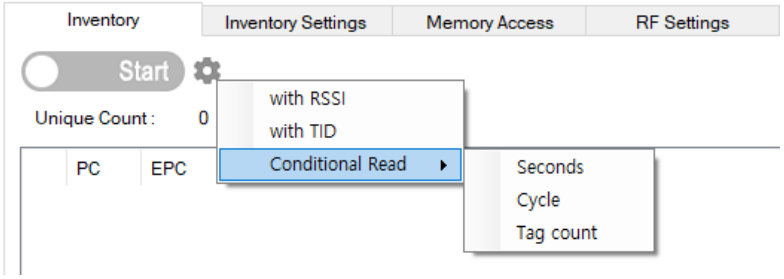


Figure 9 Tag Information with Conditional Read Option

- Seconds: The RFID Reader will read tags for written seconds
- Cycle: The RFID Reader will read tags for written cycle
- Tag Count: The RFID Reader will read tags as much as count

5.1.5 Easy viewing

User can view tag count and read rate more easily. Click ‘Easy View’ Checkbox. Count and read rate are changed to a large size for easy viewing.

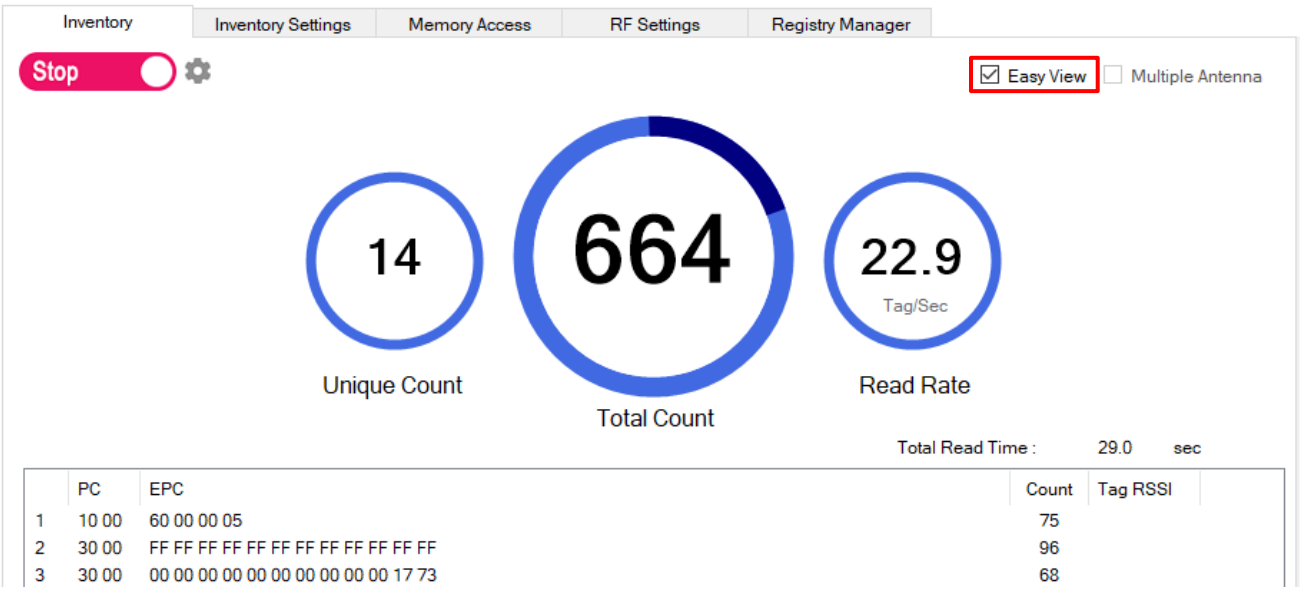


Figure 10 Easy View

5.1.6 Inventory with Multiple Antenna

To activate Multiple Antenna inventory, click ‘Multiple Antenna’ Checkbox.

Figure 11 Tag Information with Multiple Antenna

5.2 Select a Specific Tag to Read

User can read the selected tag. Select tags what you want, right-click Inventory window to select and click 'Select this Tag'.

- If activate select, inventory mode was changed to 'Manual mode' and some parameters are changed saw Figure 13.
- User wants to deactivate select function, click 'Deselect Tag' saw Figure 12.
- It is possible to multi select.
- For detail about select, refer to 6.3 Read Tags by Selection Criteria.

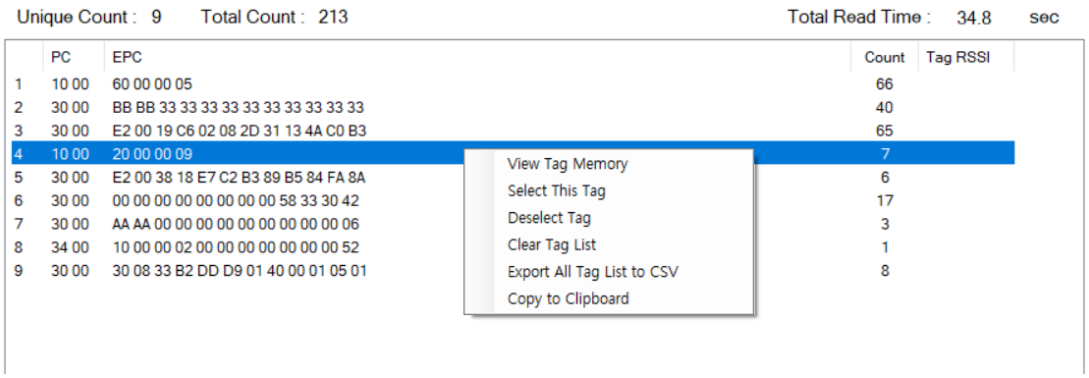


Figure 12 Tag Select

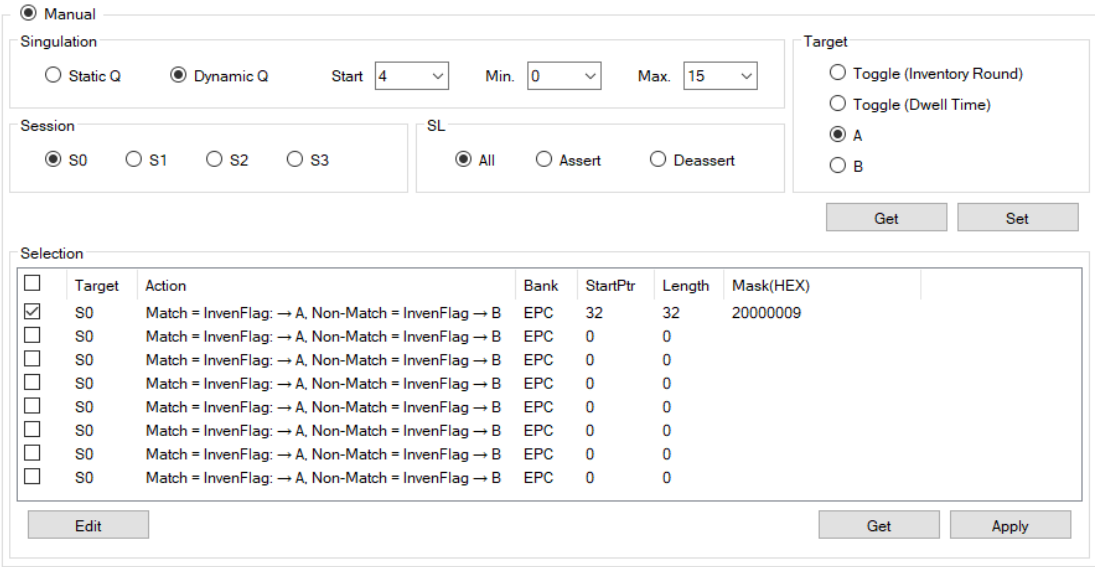


Figure 13 Set Select Parameters

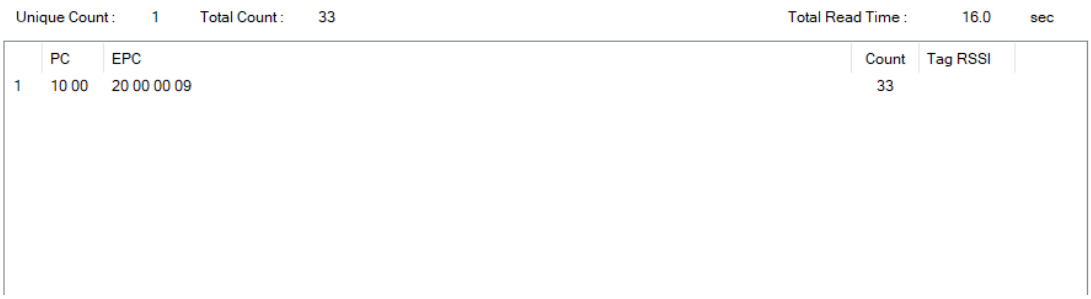


Figure 14 Inventory Result after Tag Select

5.3 Read Memory by Selecting Specific Tag

To access tag memory with RED Utility, follow sequence as described below.

Step 1. Select target tag in tag list.
Step 2. Click the right mouse button, then click ‘View Tag Memory’.

The entire the memory of tag is displayed in the ‘Memory Access tab’ text box.

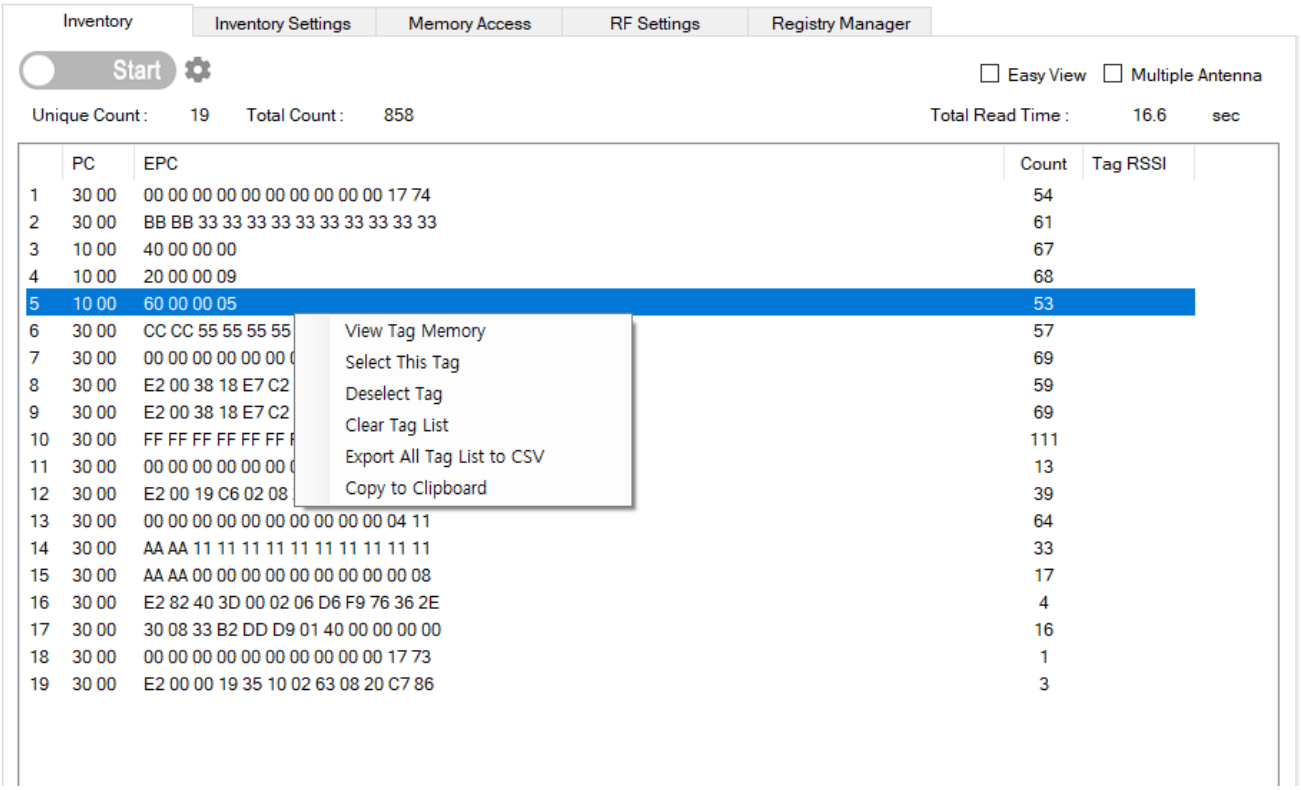


Figure 15 View Tag Memory

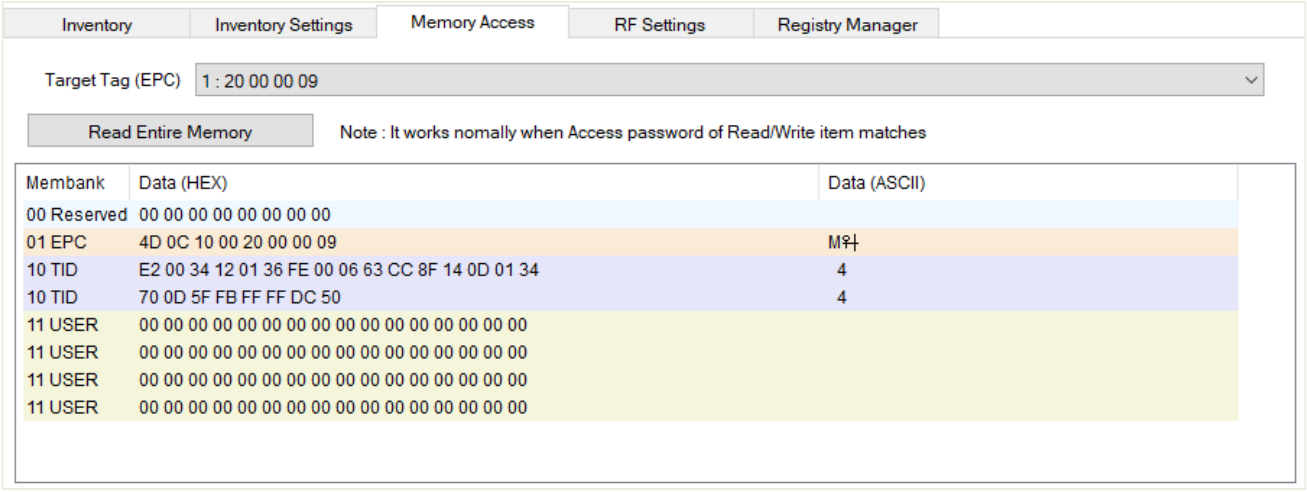


Figure 16 Result of View Tag Memory

5.4 Export Tag List to CSV File

To export tag list to CSV file, follow below step.

Step 1. Right click inventory window and click ‘Export All Tag List to CSV’
Step 2. When location window appears, insert file name and click save.
*If user wants to check export file, click Tools → Open Export Directory

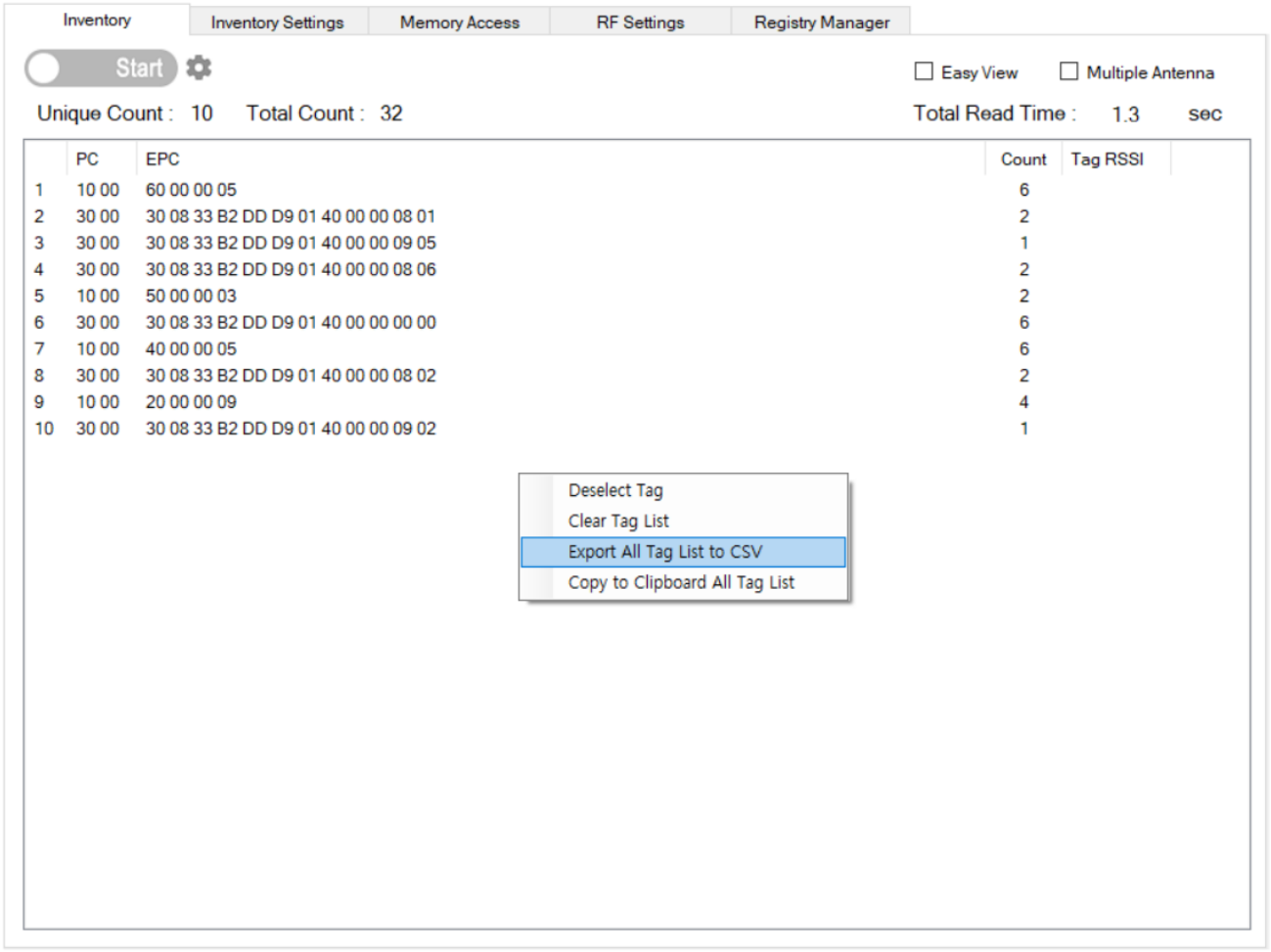


Figure 17 Export All Tag List to CSV

5.5 Copy to Clipboard Tag List

To use ‘Copy to Clipboard All Tag List’ function, follow below step.

Step 1. Drag tag list what you want to copy.
Step 2. Right click inventory window and click ‘Export All Tag List to CSV’ (or press Ctrl + C).

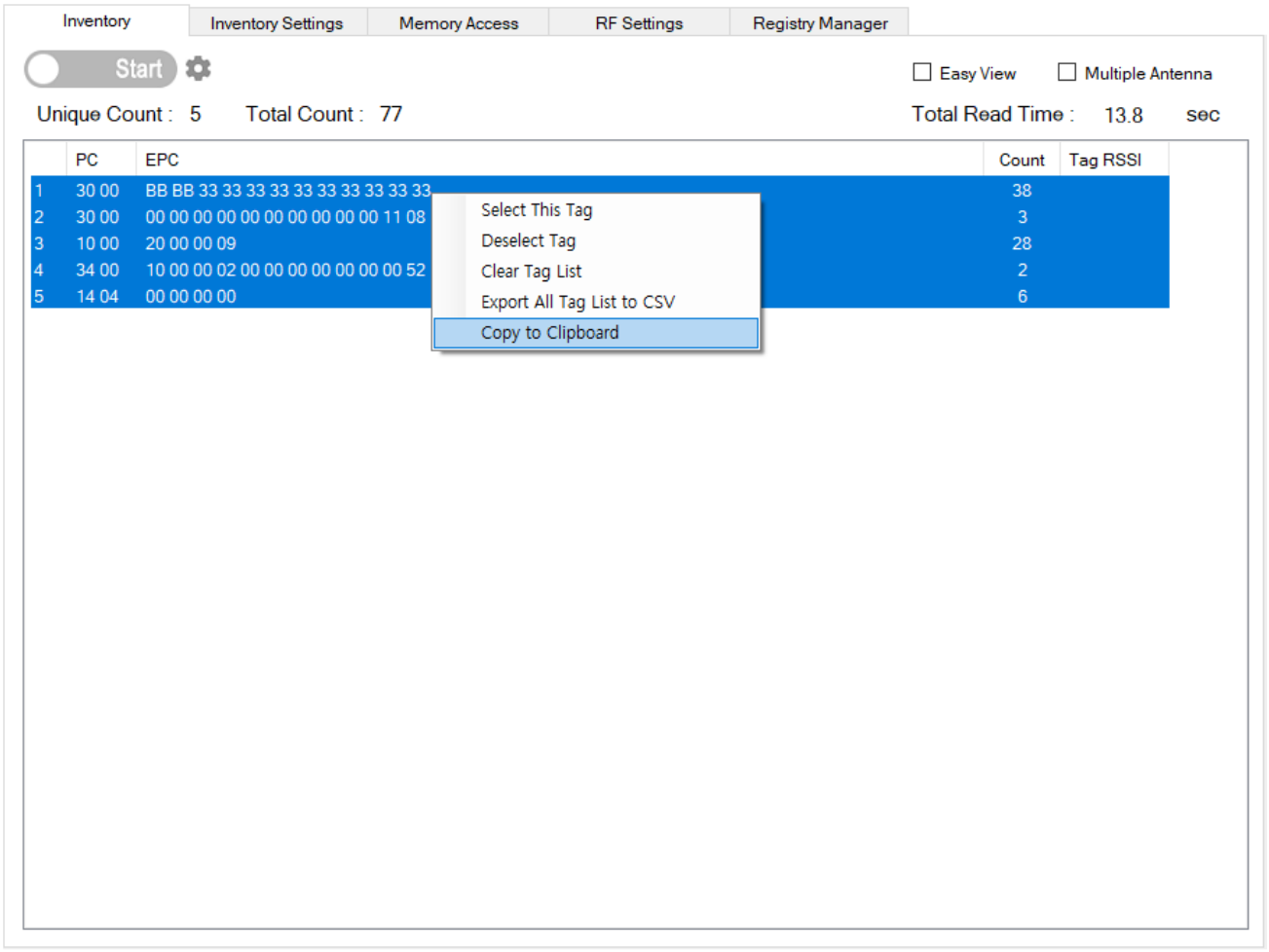


Figure 18 Copy to Clipboard

	A	B	C	D	E
1		PC	EPC	Count	Tag RSSI
2	1	30 00	BB BB 33	38	
3	2	30 00	00 00 00 0	3	
4	3	10 00	20 00 00 0	28	
5	4	34 00	10 00 00 0	2	
6	5	14 04	00 00 00 0	6	

Figure 19 Result of Paste to Excel

6 Inventory Settings

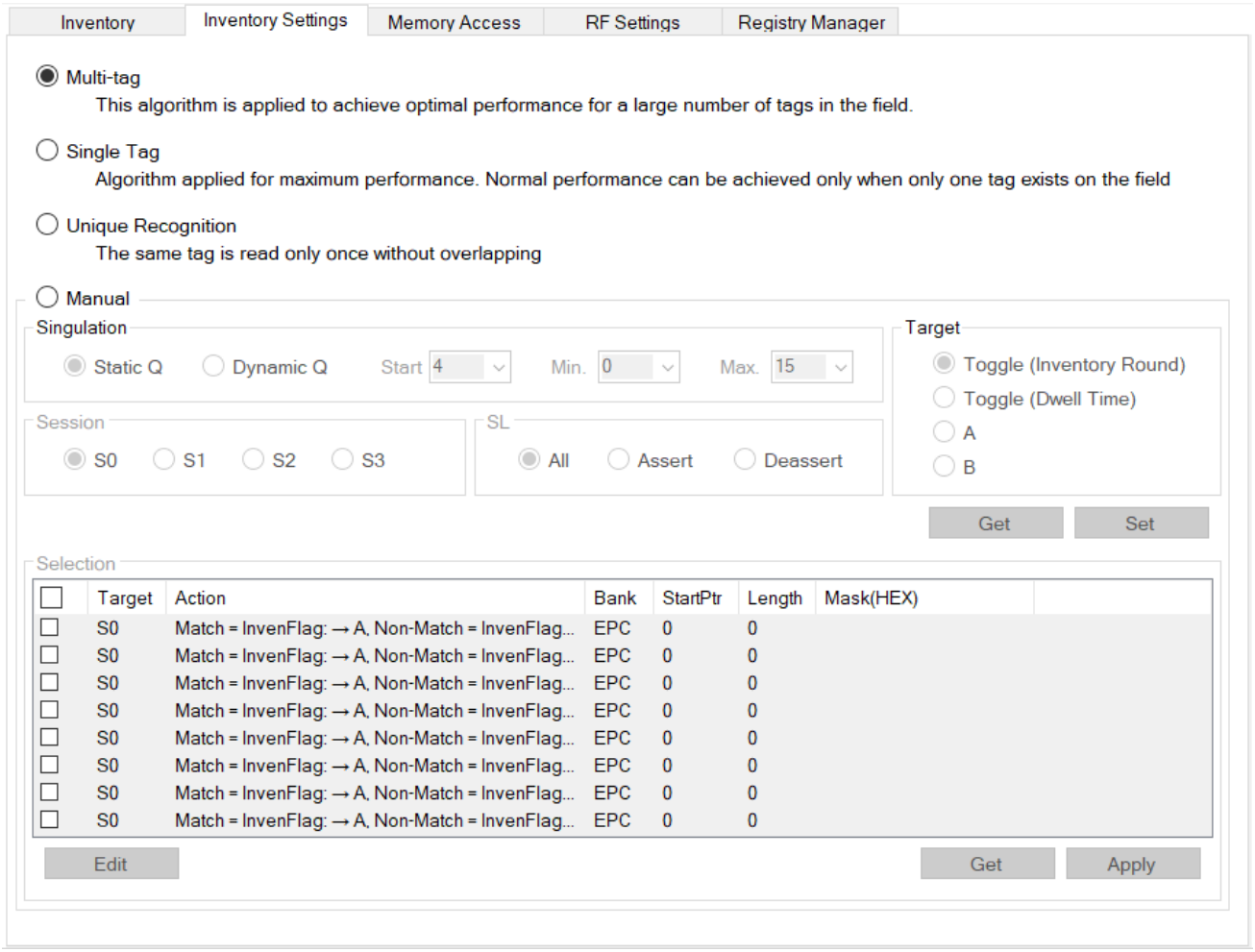


Figure 20 Inventory Settings tab

6.1 Multi-tag Mode

Multi-tag mode automatically sets parameters for multiple tags reading.
To set Multi-tag mode, follow sequence as described below.

Step 1. Click ‘Inventory Settings’ tab.
Step 2. For Change parameter, Click “Multi-tag” mode radio button.

6.2 Single Tag Mode

Single Tag mode automatically sets parameters for single tag reading.
To set Single Tag mode, follow sequence as described below.

Step 1. Click ‘Inventory Settings’ tab.
Step 2. For Change parameter, Click “Single Tag” mode radio button.

6.3 Unique Recognition Mode

Multi-tag mode automatically sets parameters for just one recognition per tag.
To set Unique Recognition mode, follow sequence as described below.

Step 1. Click ‘Inventory Settings’ tab.
Step 2. For Change parameter, Click “Unique Recognition” mode radio button.

6.4 Manual Mode

In Manual mode, User can set query parameters.
To get or set inventory settings in manual mode, follow sequence as described below.
Detail about the Manual Mode is described in [AN035-xx] Configuration of Session for multi-tag and [AN036-xx] Anti-Collision Mode for Multi Tag.

Step 1. Click ‘Inventory Settings’ tab.
Step 2. Press ‘Get’ button to display the currently set value.
Step 3. Change parameter and press ‘Set’ button.

6.4.1 Singulation

Figure 21 Singulation setting

- Static Q: Q value was maintained Start Q value in Query.
- Dynamic Q: Q value in Query was changed each inventory cycle.
- Start: Start Q value setting.
- Min.: Minimum Q Value on Dynamic Q mode.
- Max.: Maximum Q Value on Dynamic Q mode.

6.4.2 Session

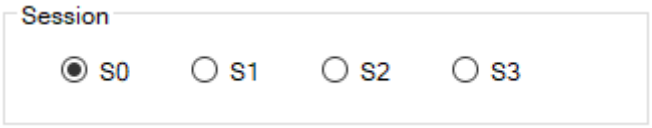


Figure 22 Session setting

- S0: Inventoried flag is changed by energy.
- S1: Inventoried flag is changed by time.
- S2: Inventoried flag is changed by energy and time.
- S3: Inventoried flag is changed by energy and time.

SL

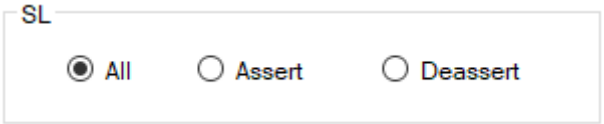


Figure 23 SL Flag setting

- ALL: Tags respond to query regardless of the SL flag state.
- Assert: Tags respond to query only in SL flag asserted state.
- Deassert: Tags respond to query only in SL flag not asserted state.

Target

Figure 24 Target setting

- Toggle(Inventory Round): Query target was changed each Inventory round.
- Toggle(Dwell Time): Query target was changed each dwell time.
- A: Tags respond to query only in inventoried flag A.
- B: Tags respond to query only in inventoried flag B.

6.4.3 Selection

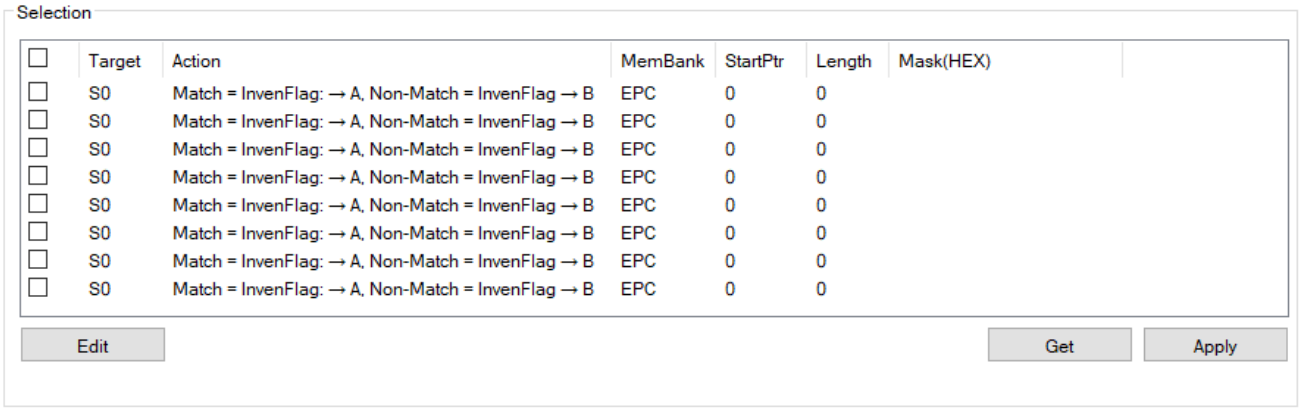


Figure 25 Selection Criteria

- Target: indicates whether the Select modifies a Tag's SL flag or inventoried flag.
- Action: elicits the Tag behavior whether criteria for matching.
- MemBank: specifies how a tag applies mask.
- StartPtr: specifies a starting bit address for the Mask comparison(HEX unit).
- Length: specifies the length of Mask(DEC unit) ex) if Mask have 4byte length, input 32.
- Mask: a bit string that a tag compares to a memory location.

For detail description, refer to 6.3 Read Tags by Selection Criteria.

6.5 Read Tags by Selection Criteria

To select specific tags, follow sequence as described below.

Step 1. Click one line in the Selection list, click ‘Edit’ button.
Step 2. Set select parameters, click ‘OK’ button.
Step 3. Check the checkbox of the set line, click ‘Apply’ button.
Step 4. Set suitable parameters of query.

There are 5 tags as below, this example describes reading number 1,2,5 tags.

Figure 26 Field Tags

Set parameters using ‘Edit’ like below Figure 27, Click ‘Apply’ button.

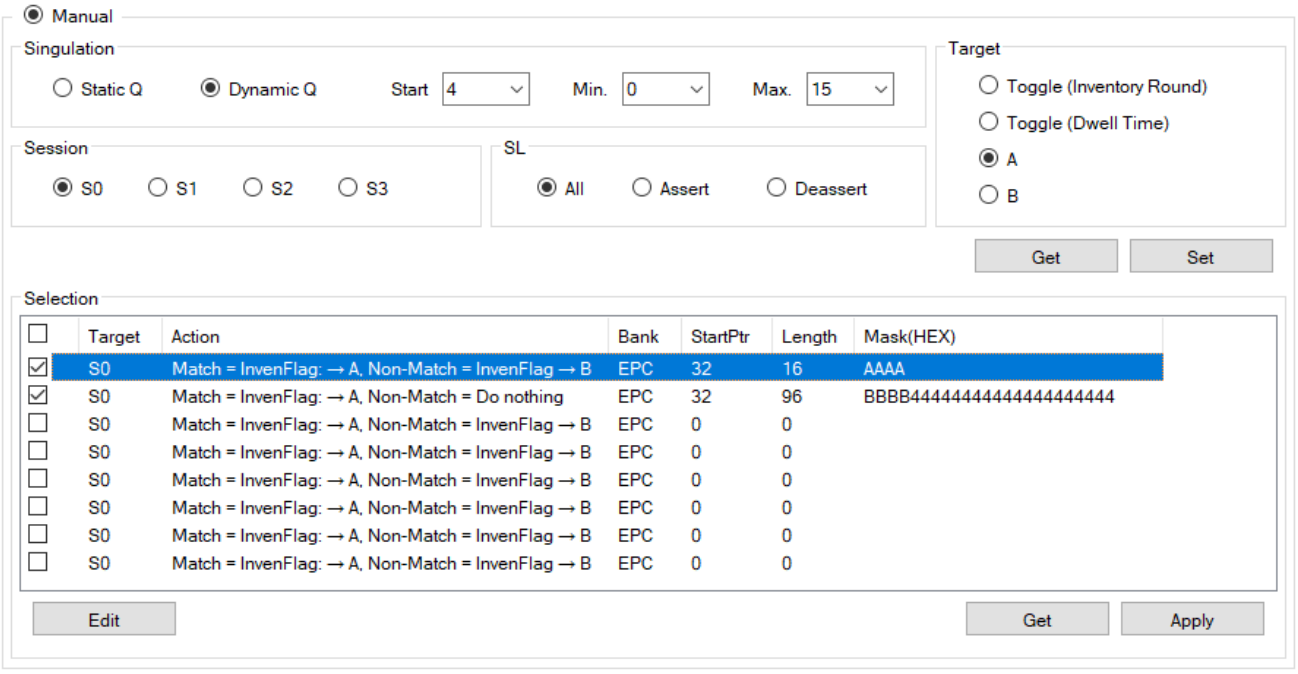


Figure 27 Select Parameters Settings

Return to ‘Inventory’ tab and Click ‘Start’ button. Then, user can see result.

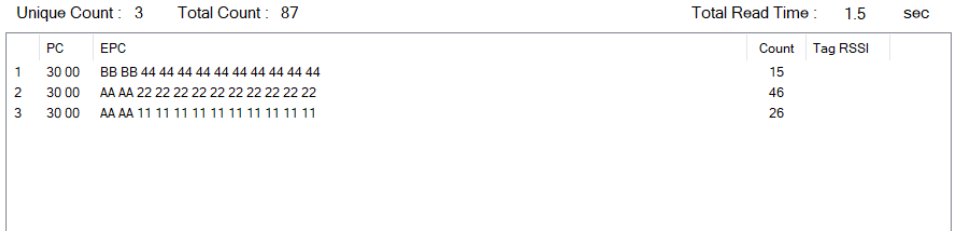


Figure 28 Example Result

7 Memory Access

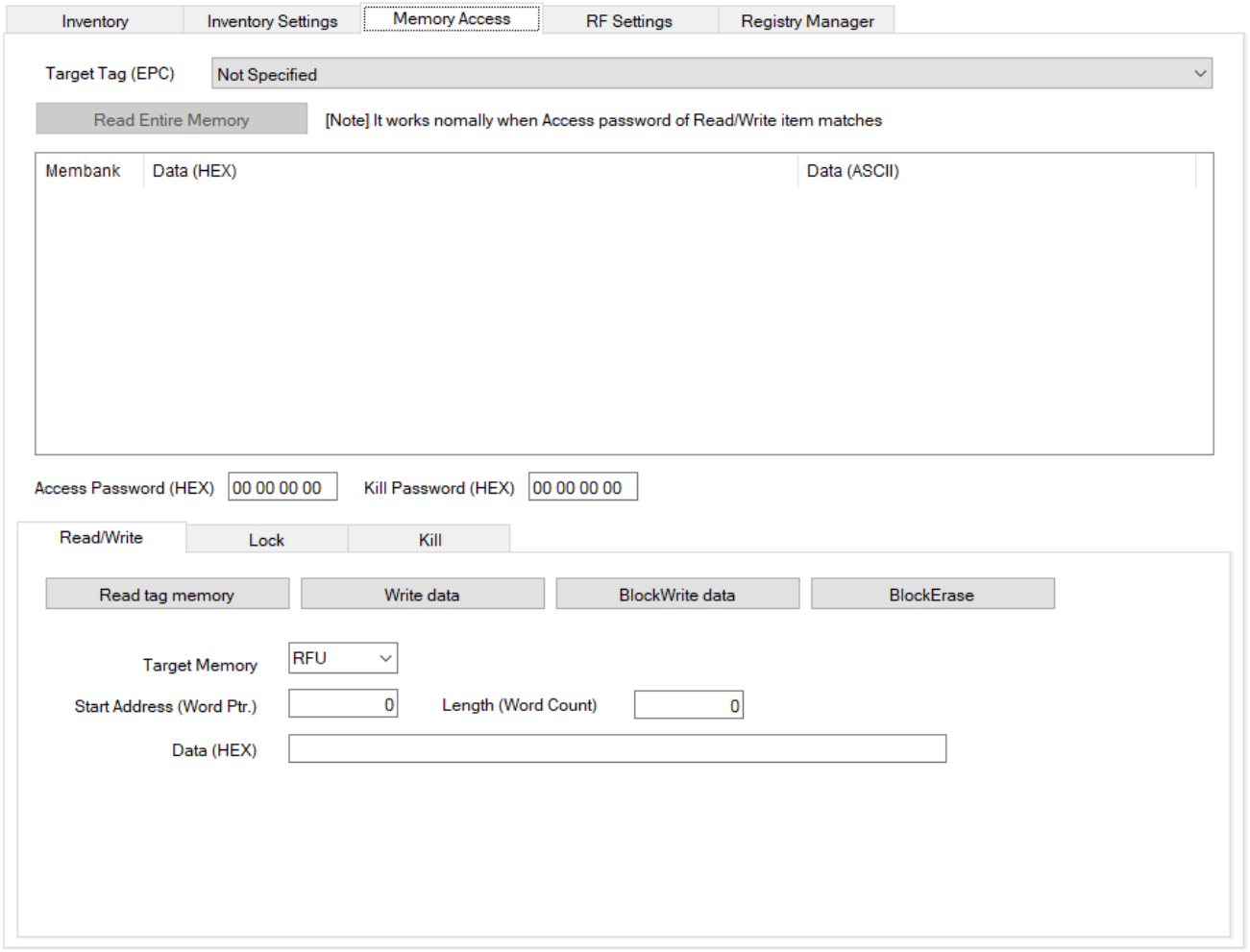


Figure 29 Memory Access tab

7.1 Tag Memory Information View

7.1.1 Read Entire Memory

Step 1. Change selected tab to ‘Memory Access’.
Step 2. Select the tag you want from ‘Target Tag’ list.
- ‘Target Tag’ list is same as inventoried list

Step 3. Click ‘Read Entire Memory’ button.

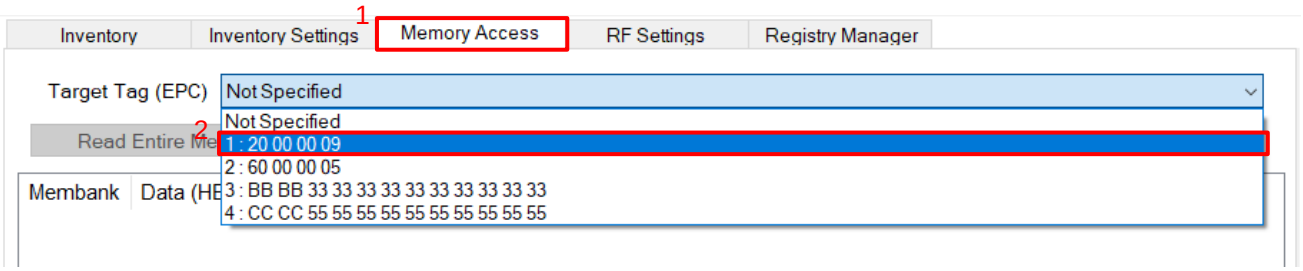


Figure 30 Select Tag to View Tag Memory

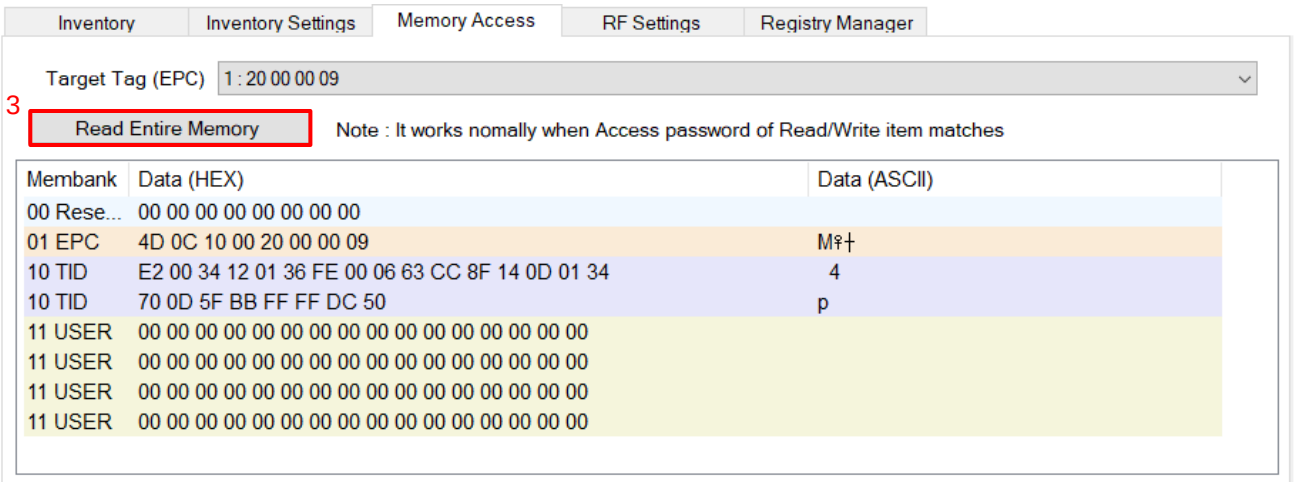


Figure 31 Read Entire Memory

7.1.2 More Information / Memory Modification

Tag Memory is possible to check and modify in the textbox of ‘Memory Access’ tab.
To check Tag Memory information, follow sequence as described below.

Step 1. Select target memory bank in tag memory bank list.
Step 2. Click the right mouse button, then click ‘More Information / Memory Modification’.
Step 3. To modify data, write data in white text box.
Step 4. Click ‘Write’.

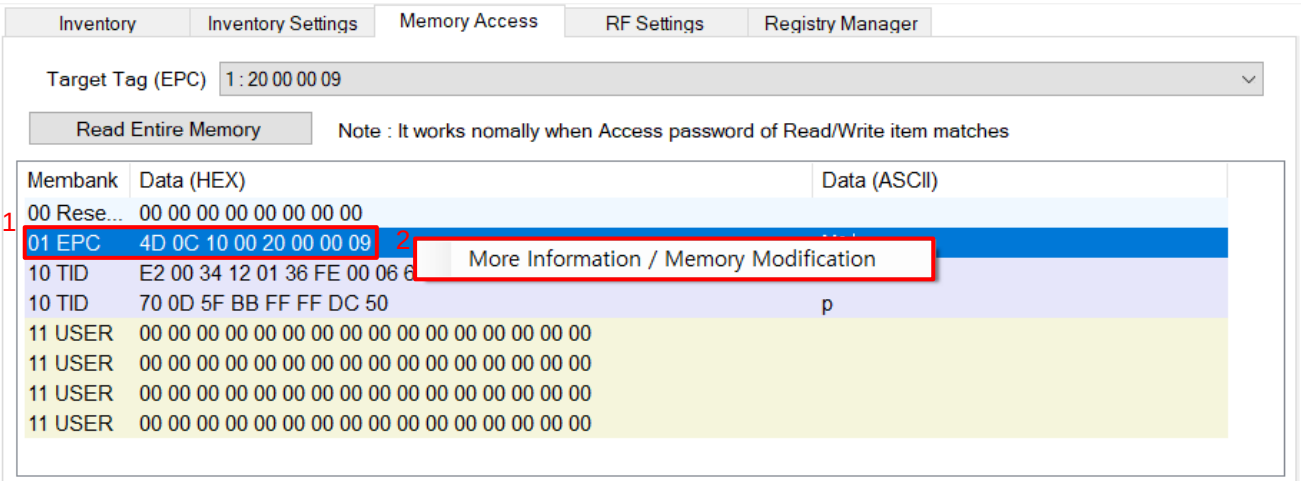


Figure 32 View Tag Memory Information

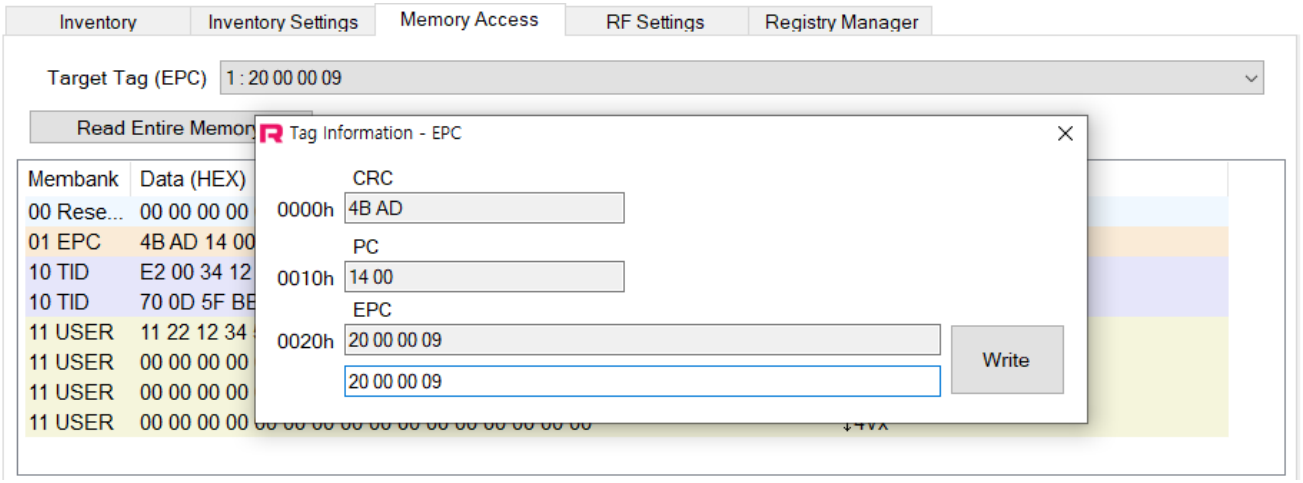


Figure 33 Tag Information Window

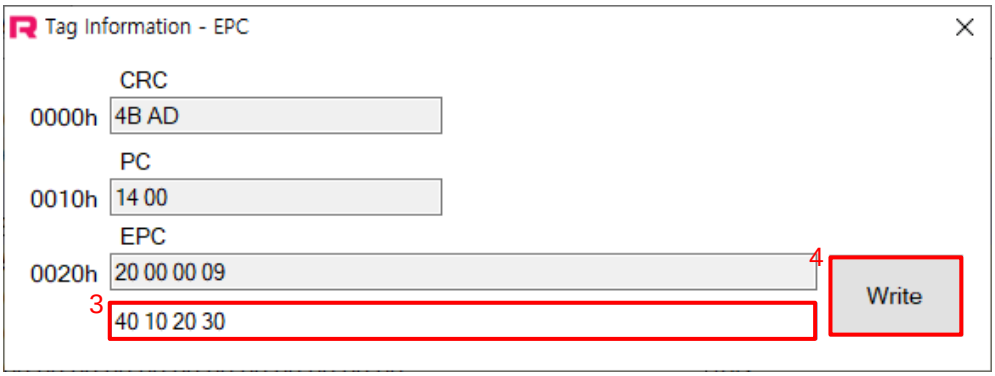


Figure 34 Change EPC

Figure 35 Result EPC Change

7.2 Procedures for Tag Memory Access

7.2.1 Read

To access tag memory with RED Utility, follow sequence as described below.

Step 1. Select target tag in tag list.
Step 2. Select Target memory bank.
Step 3. Give the start address. Start address is word(16-bit) unit.
Step 4. Give the Length. Length is word(16-bit) unit.
Step 5. Give the access password.
Step 6. Click 'Read tag memory'.

RCP flow (log) shows the result in RCP format. To learn more about RCP, please refer to document RED-RCP.
Example) RCP RSP BB 01 29 00 08 00 00 00 00 00 00 00 00 7E CE 00 (Read tag process done)

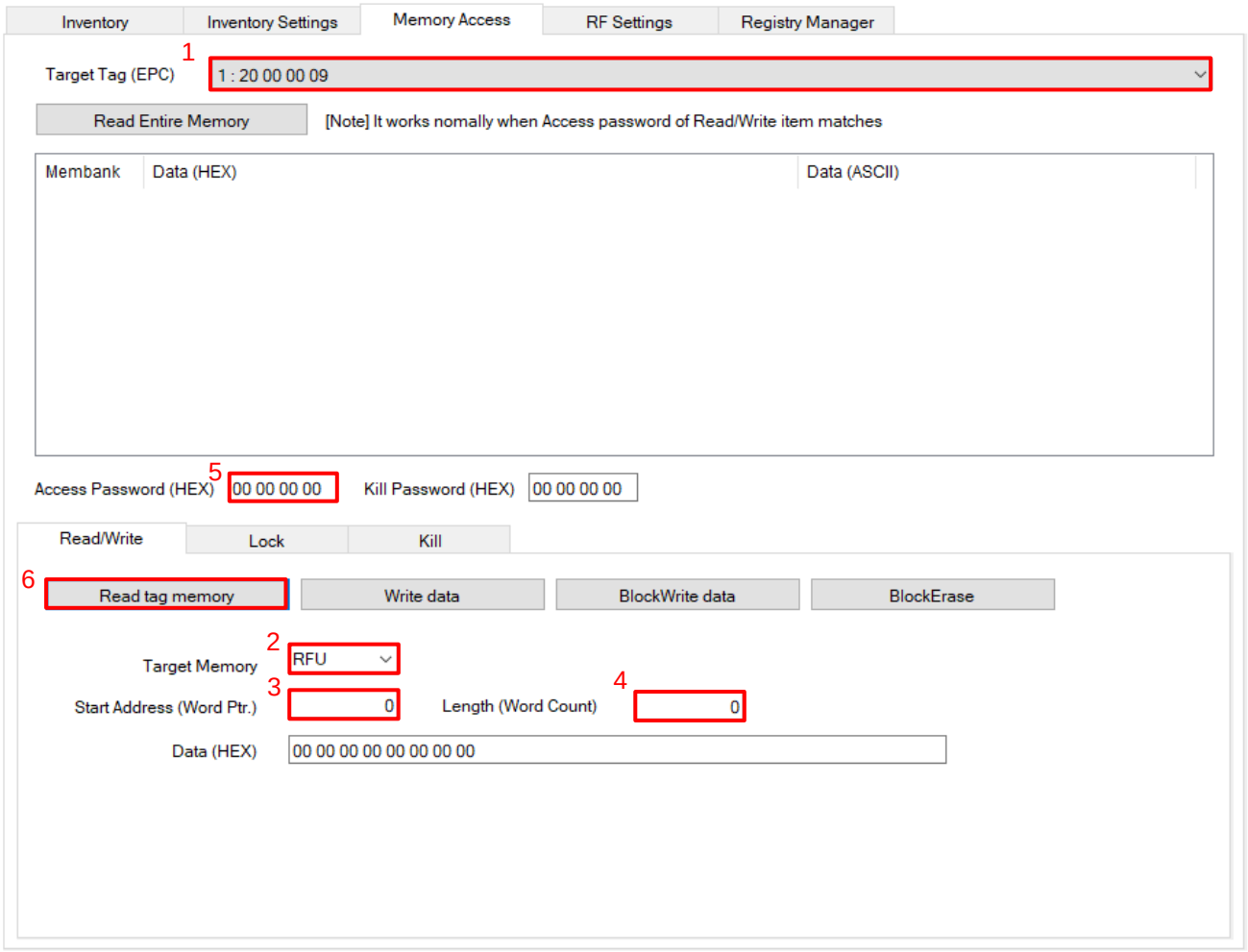


Figure 36 Procedure for Tag Memory Access

7.2.2 Block Erase(Optional Command, This function can be used if Tag IC supports command)

To run tag memory block erase with RED, follow sequence as described below.

Step 1. Select target tag in tag list.
Step 2. Select Target memory bank.
Step 3. Give the start address. Start address is word(16-bit) unit.
Step 4. Give the Length. Length is word(16-bit) unit.
Step 5. Give the access password.
Step 6. Click 'Block Erase'.

RCP flow (log) shows the result in RCP format. To learn more about RCP, please refer to document RED-RCP.
Example) RCP RSP BB 01 48 00 01 00 7E (Block Erase tag process done)

7.3 Procedures for Tag Memory Write

7.3.1 Write

To write data to tag memory with RED Utility, follow sequence as described below.

Step 1. Select target tag in tag list.
Step 2. Select Target memory bank.
Step 3. Give the start address. Start address is word(16-bit) unit.
Step 4. Give the Length. Length is word(16-bit) unit.
Step 5. Give the access password.
Step 6. Click ‘Write data’.

RCP flow (log) shows the result in RCP format. To learn more about RCP, please refer to document RED-RCP.
Example) RCP RSP BB 01 46 00 01 00 7E (Write tag process done)

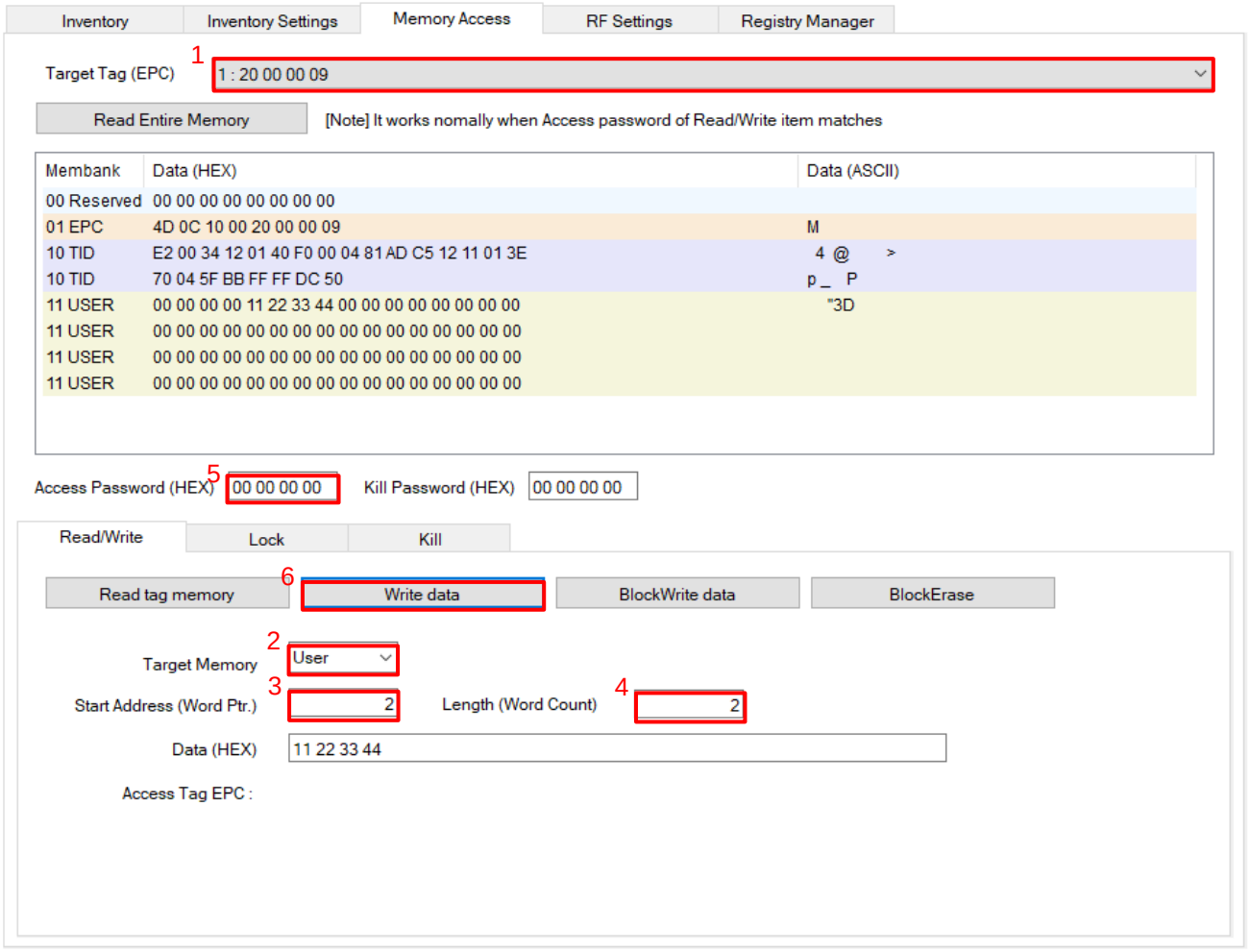


Figure 37 Procedure for Tag Memory Write

7.3.2 BlockWrite(Optional Command, This function can be used if Tag IC supports command)

To run tag memory block write with RED utility, follow sequence as described below.

Step 1. Select target tag in tag list.
Step 2. Select Target memory bank.
Step 3. Give the start address. Start address is word(16-bit) unit.
Step 4. Give the Length. Length is word(16-bit) unit.
Step 5. Give the access password.
Step 6. Click ‘Block Write data’.

RCP flow (log) shows the result in RCP format. To learn more about RCP, please refer to document RED-RCP.
Example) RCP RSP BB 01 47 00 01 00 7E (Block Write tag process done)

7.4 Procedures for Locking Tag Memory

7.4.1 Lock

To lock tag memory with RED utility, follow sequence as described below.

Step 1. Select target tag in tag list.
Step 2. Click ‘Lock’ tab.
Step 3. Give the access password(Access Password should not be zero).
Step 4. Check Lock bit(Action Checked : Lock, Action Unchecked : UnLock).
Step 5. Click ‘Lock’ button.

RCP flow (log) shows the result in RCP format. To learn more about RCP, please refer to document RED-RCP.
Example) RCP RSP BB 01 82 00 01 00 7E (Lock tag process done)

Masks and Associated Action Fields

	Kill pwd		Access pwd		EPC memory		TID memory		File_0 memory	
	19	18	17	16	15	14	13	12	11	10
Mask	skip/ write	skip/ write	skip/ write	skip/ write	skip/ write	skip/ write	skip/ write	skip/ write	skip/ write	skip/ write
	9	8	7	6	5	4	3	2	1	0
Action	pwd read/ write	perma lock	pwd read/ write	perma lock	pwd write	perma lock	pwd write	perma lock	pwd write	perma lock

Table 6-50: *Lock* Action-field functionality

pwd-write	permalock	Description
0	0	Associated memory bank/file is writeable from either the open or secured states.
0	1	Associated memory bank/file is permanently writeable from either the open or secured states and may never be locked.
1	0	Associated memory bank/file is writeable from the secured state but not from the open state.
1	1	Associated memory bank/file is not writeable from any state.
pwd-read/write	permalock	Description
0	0	Associated password location is readable and writeable from either the open or secured states.
0	1	Associated password location is permanently readable and writeable from either the open or secured states and may never be locked.
1	0	Associated password location is readable and writeable from the secured state but not from the open state.
1	1	Associated password location is not readable or writeable from any state.

Figure 38 Lock action-field functionality

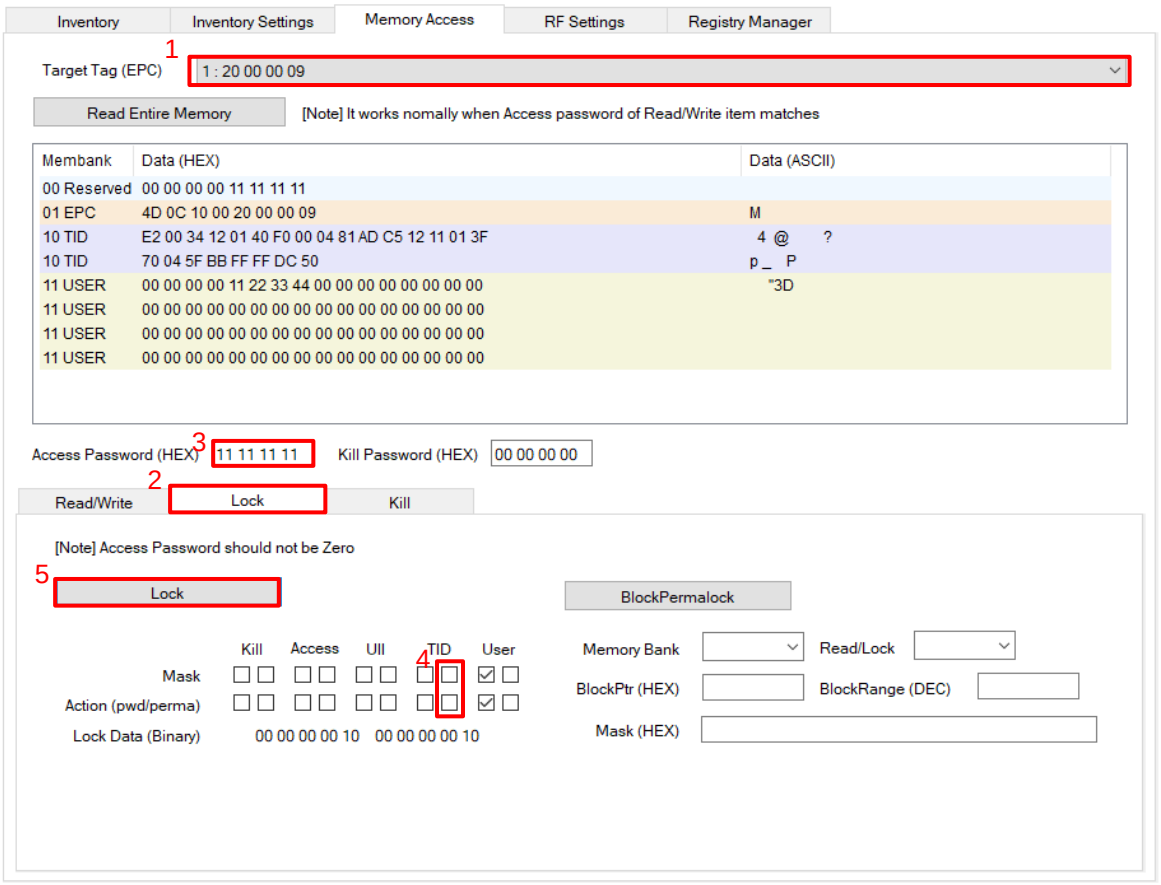


Figure 39 Procedure for Lock Tag Memory

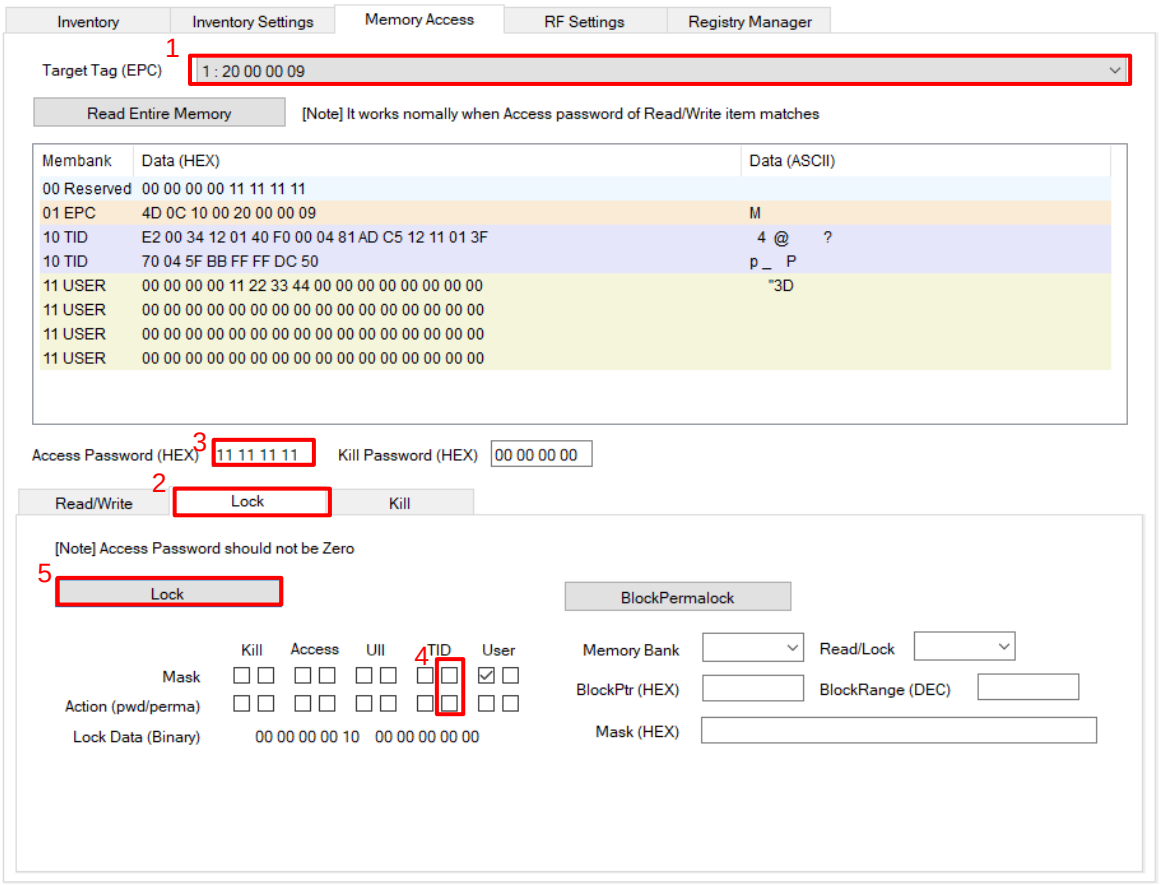


Figure 40 Procedure for Unlock Tag Memory

7.4.2 BlockPermalock(Optional Command, This function can be used if Tag IC supports command)

To Block Permalock tag memory with RED Utility, follow sequence as described below.

Step 1. Select target tag in tag list.
Step 2. Click ‘Lock’ tab.
Step 3. Give the access password(Access Password should not be zero).
Step 4. Select Read or Permalock.
Step 5. Select memory bank.
Step 6. Give the parameters(block pointer, block range, mask data).
Step 7. Click ‘Lock’ button.

RCP flow (log) shows the result in RCP format. To learn more about RCP, please refer to document RED-RCP.
Example) RCP RSP BB 01 83 00 01 00 7E (BlockPermalock tag process done)

8 RF Settings

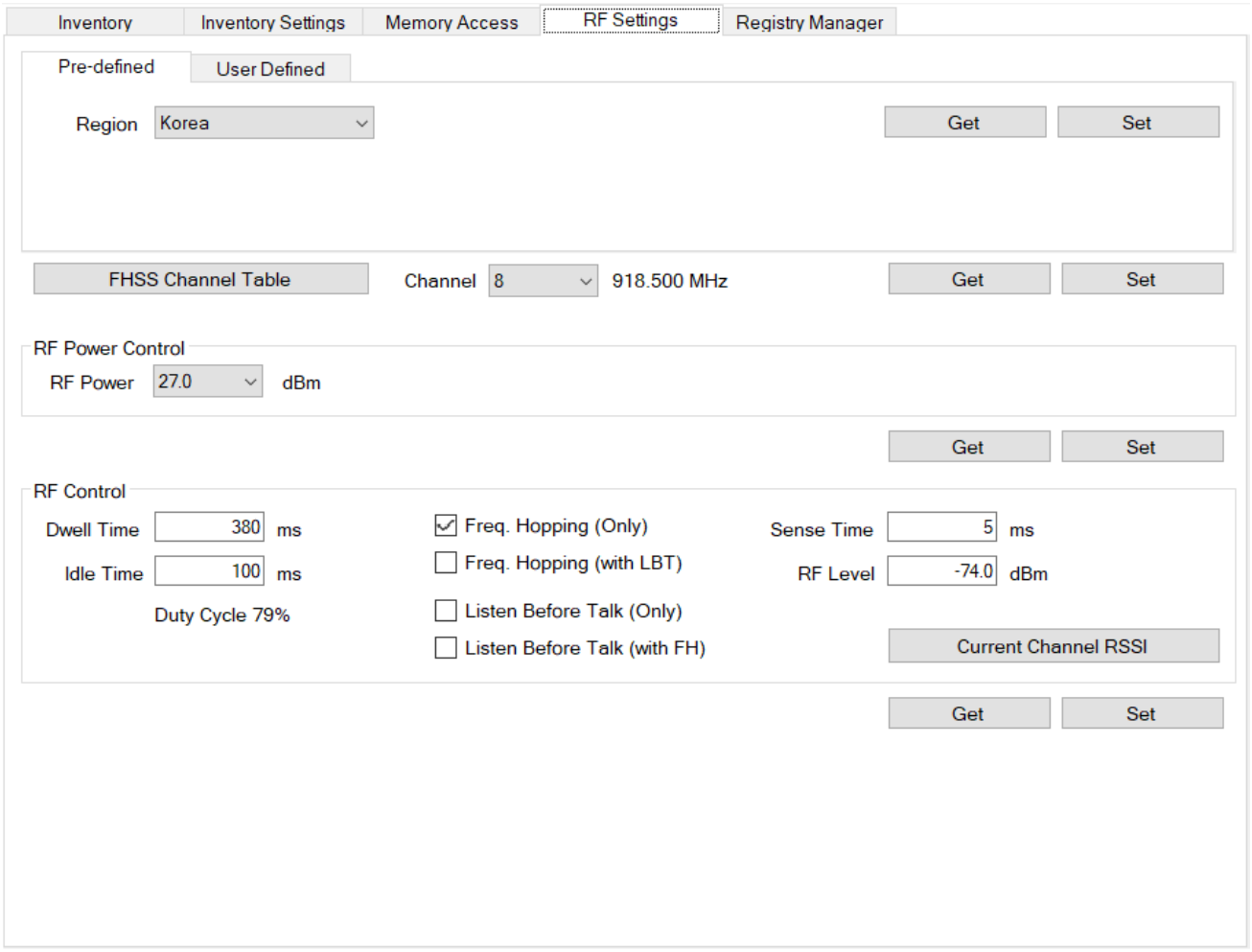


Figure 41 RF Settings tab

8.1 Frequency Control

8.1.1 Pre-defined

To select operating band, band setting should be required. Select band in combo box and click ‘Set’ button to set operating band.

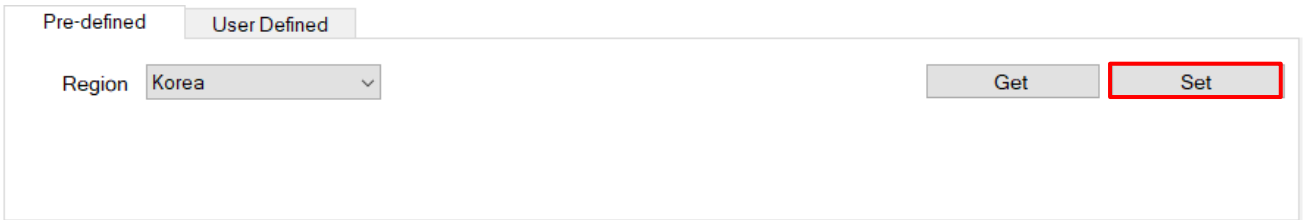


Figure 42 Pre-defined Region Set

8.1.2 User Defined(Support Firmware version RED4S_v2.2.0 or later)

User Defined consist of Start Freq(kHz), Spacing(kHz), number of channels.

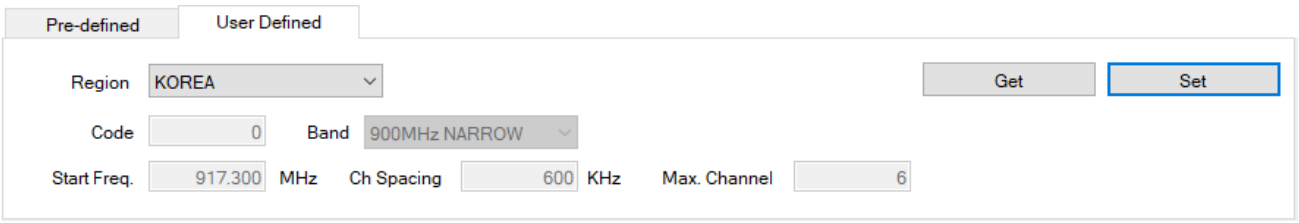


Figure 43 User Defined Region Set

In the RED Utility, 35 Region was defined by default.

Region Code	Region	Band	Start	Spacing	Max.
0	KOREA	900MHz_NARROW	917300	600	6
1	ETSI	800MHz	865700	600	4
2	FCC	900MHz_WIDE	902750	500	50
3	AUSTRALLIA	900MHz_WIDE	920250	500	12
4	BANGLADESH	900MHz_WIDE	952250	500	4
5	BRAZIL	900MHz_WIDE	902750	500	50
6	BRUNEI	900MHz_WIDE	923250	500	4
7	CHINA	900MHz_WIDE	920625	250	16
8	HONGKONG	900MHz_WIDE	920250	500	10
9	INDIA	800MHz	850100	600	4
10	INDONESIA	900MHz_WIDE	923250	500	4
11	IRAN	800MHz	865700	600	4
12	ISRAEL	900MHz_WIDE	916250	500	1
13	JAPAN_1	900MHz_NARROW	916800	1200	6
14	JAPAN_2	900MHz_NARROW	916800	200	34
15	JORDAN	800MHz	865700	600	4
16	MALAYSIA	900MHz_NARROW	919250	500	8
17	MOROCCO	800MHz	867700	200	2
18	NEWZEALAND	900MHz_WIDE	922250	500	11
19	PAKISTAN	800MHz	865700	600	4
20	PERU	900MHz_WIDE	915250	500	25
21	PHILIPPINES	900MHz_NARROW	918250	500	4
22	SINGAPORE	900MHz_WIDE	920250	500	10
23	SOUTH_AFRICA	900MHz_WIDE	915600	200	17
24	TIAWAN	900MHz_WIDE	922250	500	12
25	THAILAND	900MHz_WIDE	920250	500	10
26	URUGUAY	900MHz_WIDE	916250	500	23
27	VENEZUELA	900MHz_WIDE	922250	500	12
28	VIETNAM	900MHz_WIDE	918250	500	10
29	RUSSIA	800MHz	866300	600	3
30	ALGERIA	900MHz_WIDE	915250	500	12
31	EGYPT	800MHz	865700	600	4
32	CHILE	900MHz_WIDE	915250	500	25
33	JAPAN(PHYCHIPS)	900MHz_NARROW	920500	200	13
34	FCC(NARROW, PHYCHIPS)	900MHz_NARROW	917100	200	50

Table 1 Default Region Settings

If user want to create new band, follow below guide.

Step 1. Set ‘Region’ combo box to ‘MANUAL’.
Step 2. Fill ‘Start Freq.’, ‘Ch spacing’, ‘Max. Channel’.

'Start Freq' means lowest the frequency in the desired band.
'Ch spacing' means the frequency spacing of each channel.
'Max. Channel' means the number of channels.

Step 3. Set 'Band' combo box corresponding to the settings.
900MHz NARROW: 917.1MHz ~ 926.9MHz.
900MHz WIDE: 900MHz Bandwidth what does not belong to '900MHz Narrow'.
800MHz: 800MHz ~ Less than 900MHz.

Example) Start Freq: 918.5MHz, Ch Spacing: 300KHz, Max. Channel: 10.
Frequency of Max channel: 918.5 + 0.3*10 = 921.5MHz.
Frequency band 918.5MHz ~ 921.5MHz, it is corresponding to '900MHz NARROW'.

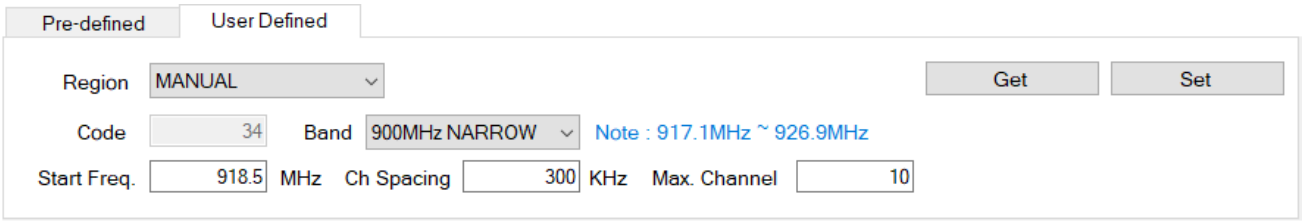


Figure 44 Manual Frequency Setting Example

8.1.3 FHSS Channel Table

If you click 'FHSS Channel Table' button, current frequency hopping channel table is displayed as follows. User cannot only set channels manually by using 'Add' and 'Remove' buttons but also scan channels that has little Tx Leakage RSSI. To update new channel table, click 'Update Table' button.
To Adopt Modified Frequency Hopping Table, User should select 'Modified' in 'Channel Table' Box.

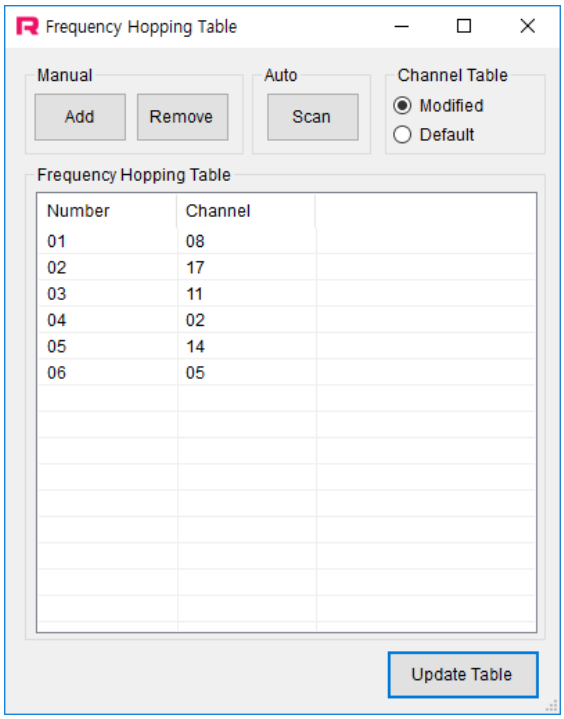


Figure 45 Frequency Hopping Table

8.2 RF Power Control

To set RF power, select the Output Power combo box and click Set button.

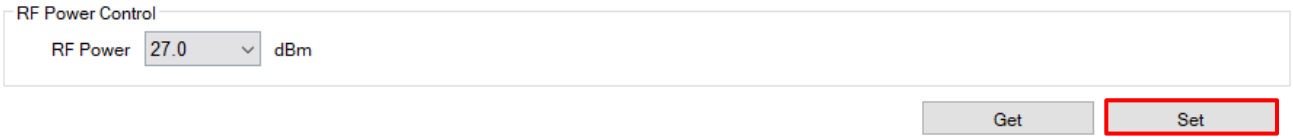


Figure 46 RF Power Set

8.3 RF Control

'RF Control settings' provides functions to set FH and LBT parameters.

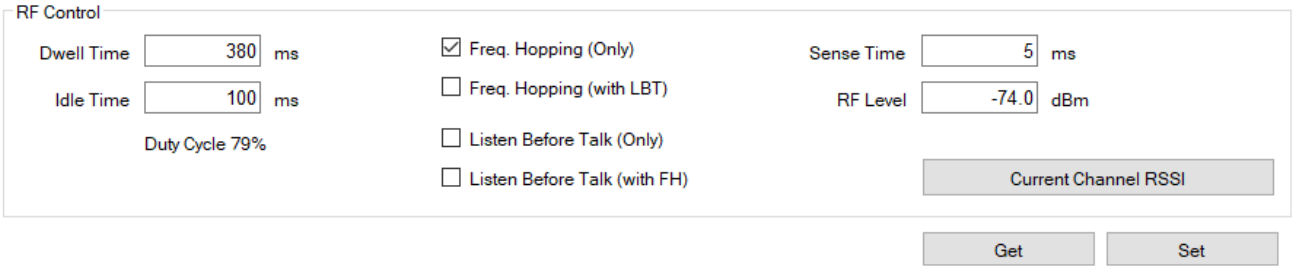


Figure 47 FH and LBT Set

8.3.1 Frequency Hopping (FH)

To enable frequency hopping, follow sequence as described below.

Step 1. Select 'Freq. Hopping(Only)' or 'Freq. Hopping(with LBT)'
Step 2. Give the Dwell Time, Idle Time (If you select the 'Freq. Hopping(with LBT)', CW Sense Time and LBT RF Level are also given).
Step 3. Click 'Set'.

'Freq. Hopping(Only)' moves to another channel after using current channel during Dwell Time. (Channel movement follows FHSS Channel Table).
'Freq. Hopping(with LBT)' measures Channel RSSI before using the channel it moved to and if measured value of Channel RSSI is larger than LBT RF Level, it does not use applicable channel but move to another channel.

8.3.2 Listen Before Talk (LBT)

To set LBT parameters, follow sequence as described below.

Step 1. Select Listen Before Talk(Only) or Listen Before Talk(with FH).
Step 2. Give the Dwell Time, Idle Time, CW Sense Time and LBT RF Level.
Step 3. Click 'Set'.

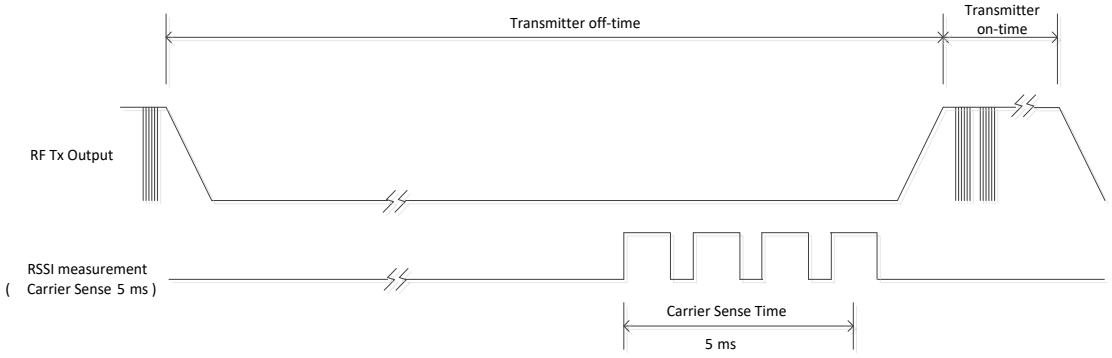


Figure 48 LBT Timing Diagram

Transmitter on-time (Dwell Time) is the duration of the reading process. (1 = 1ms).
Transmitter off-time (Idle Time) is the duration of the non-transmission interval. (1 = 1ms).
Carrier Sense Time (During CST), RSSI measurement process is done. (1 = 1ms).
ramp up / down (RF start / stop time) and processing delay require 0.5ms.

'Listen Before Talk(Only)' measures Channel RSSI before using current channel and wait with not using the channel until next Carrier Sense if there is lager signal than LBT RF Level.
'Listen Before Talk(with FH)' moves to another channel if it cannot use current channel. (Channel movement follows FHSS Channel Table).

8.3.3 Get Current RSSI

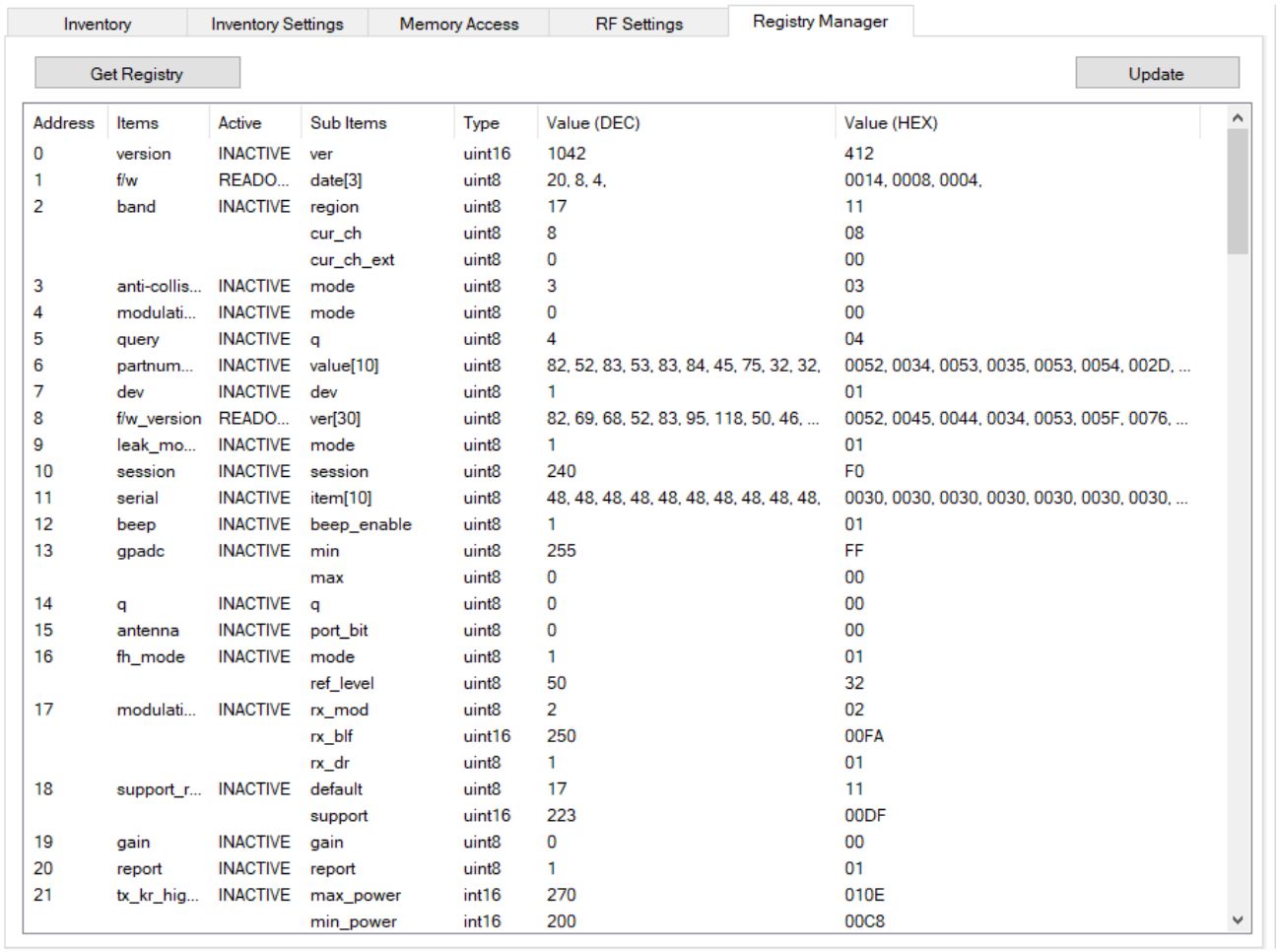
To get RSSI of current channel, click ‘Current Channel RSSI’ button. RSSI is displayed as blow.

Figure 49 Current Channel RSSI

9 Registry Manager

9.1 Configuration

Registry Manager provides functions to get current registry items.



Address	Items	Active	Sub Items	Type	Value (DEC)	Value (HEX)
0	version	INACTIVE	ver	uint16	1042	412
1	f/w	READO...	date[3]	uint8	20, 8, 4,	0014, 0008, 0004,
2	band	INACTIVE	region	uint8	17	11
			cur_ch	uint8	8	08
			cur_ch_ext	uint8	0	00
3	anti-collis...	INACTIVE	mode	uint8	3	03
4	modulati...	INACTIVE	mode	uint8	0	00
5	query	INACTIVE	q	uint8	4	04
6	partnum...	INACTIVE	value[10]	uint8	82, 52, 83, 53, 83, 84, 45, 75, 32, 32,	0052, 0034, 0053, 0035, 0053, 0054, 002D, ...
7	dev	INACTIVE	dev	uint8	1	01
8	f/w_version	READO...	ver[30]	uint8	82, 69, 68, 52, 83, 95, 118, 50, 46, ...	0052, 0045, 0044, 0034, 0053, 005F, 0076, ...
9	leak_mo...	INACTIVE	mode	uint8	1	01
10	session	INACTIVE	session	uint8	240	F0
11	serial	INACTIVE	item[10]	uint8	48, 48, 48, 48, 48, 48, 48, 48, 48, 48,	0030, 0030, 0030, 0030, 0030, 0030, 0030, ...
12	beep	INACTIVE	beep_enable	uint8	1	01
13	gpadc	INACTIVE	min	uint8	255	FF
			max	uint8	0	00
14	q	INACTIVE	q	uint8	0	00
15	antenna	INACTIVE	port_bit	uint8	0	00
16	fh_mode	INACTIVE	mode	uint8	1	01
			ref_level	uint8	50	32
17	modulati...	INACTIVE	rx_mod	uint8	2	02
			rx_blf	uint16	250	00FA
			rx_dr	uint8	1	01
18	support_r...	INACTIVE	default	uint8	17	11
			support	uint16	223	00DF
19	gain	INACTIVE	gain	uint8	0	00
20	report	INACTIVE	report	uint8	1	01
21	tx_kr_hig...	INACTIVE	max_power	int16	270	010E
			min_power	int16	200	00C8

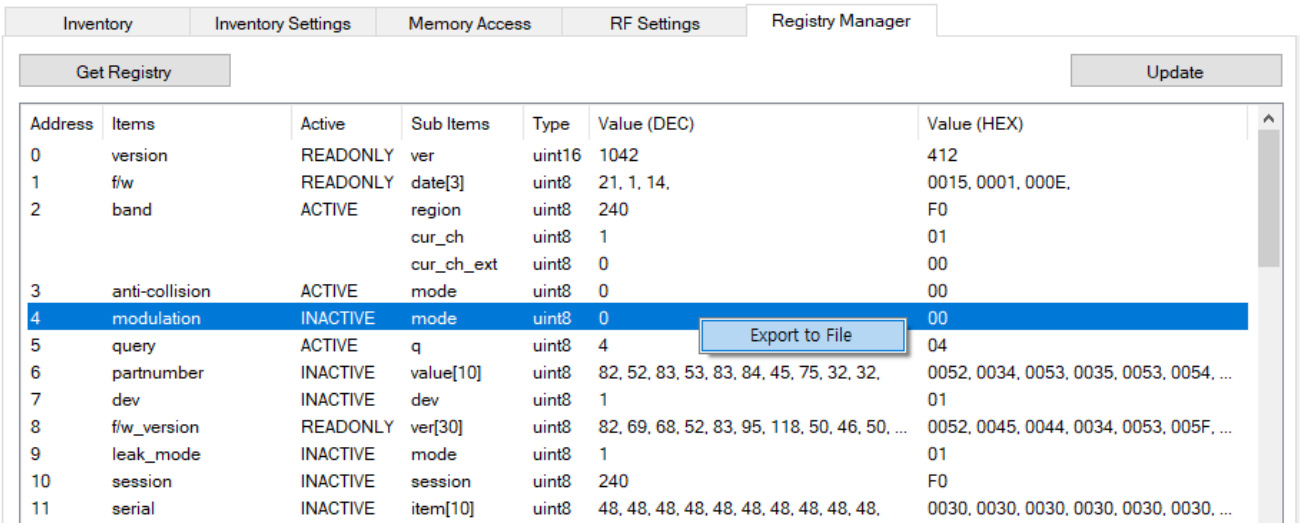
Figure 50 Registry Manager

- Get Registry: display information of current registry items.
- Update: update all items to new value. Registry is used as default setting when RED start-up. If registry is changed as wrong value, RED can operate abnormally. Use carefully ‘Update’ function.

9.2 Export to file registry Data

User can save registry list with ‘Export to File’ button

Step 1. Right click on registry window.
Step 2. Click ‘Export to File’ Button.
Step 3. When location window appears, insert file name and click save.
*If user wants to check export file, click Tools → Open Export Directory



Address	Items	Active	Sub Items	Type	Value (DEC)	Value (HEX)
0	version	READONLY	ver	uint16	1042	412
1	f/w	READONLY	date[3]	uint8	21, 1, 14,	0015, 0001, 000E,
2	band	ACTIVE	region	uint8	240	F0
			cur_ch	uint8	1	01
			cur_ch_ext	uint8	0	00
3	anti-collision	ACTIVE	mode	uint8	0	00
4	modulation	INACTIVE	mode	uint8	0	00
5	query	ACTIVE	q	uint8	4	04
6	partnumber	INACTIVE	value[10]	uint8	82, 52, 83, 53, 83, 84, 45, 75, 32, 32,	0052, 0034, 0053, 0035, 0053, 0054, ...
7	dev	INACTIVE	dev	uint8	1	01
8	f/w_version	READONLY	ver[30]	uint8	82, 69, 68, 52, 83, 95, 118, 50, 46, 50, ...	0052, 0045, 0044, 0034, 0053, 005F, ...
9	leak_mode	INACTIVE	mode	uint8	1	01
10	session	INACTIVE	session	uint8	240	F0
11	serial	INACTIVE	item[10]	uint8	48, 48, 48, 48, 48, 48, 48, 48, 48, 48,	0030, 0030, 0030, 0030, 0030, 0030, ...

Figure 51 Export to File Registry Data

10 RCP log

User can observe the byte stream of the RCP with RED Utility.

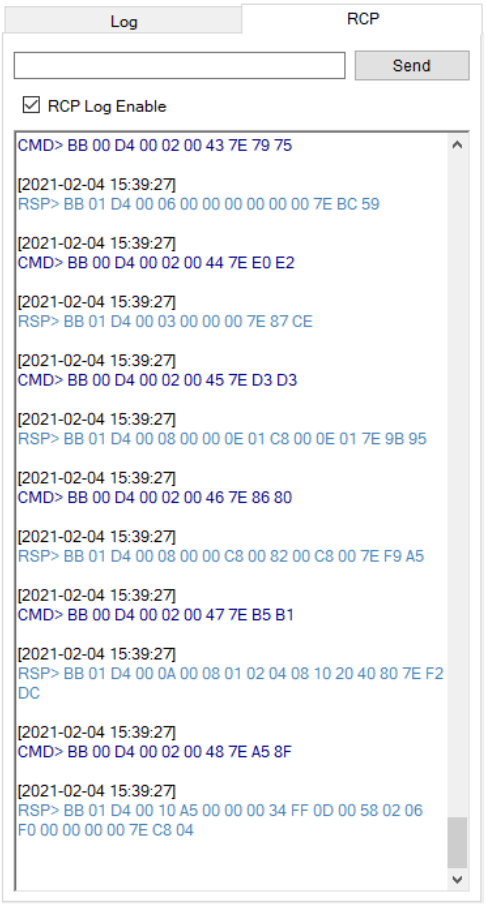


Figure 52 RCP Log Enable

- Move to the ‘RCP’ and click the checkbox on the left side of ‘RCP Log Enabled’ to enable the log.

User want save log data in real time, follow these step.

Step 1. Tools → RCP Logger Enable click.
Step 2. When location window appears, insert file name and click save.
*If user wants to check log file, click Tools → Open Log Directory

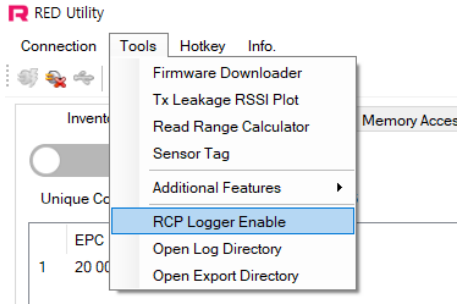


Figure 53 RCP File Logger Enable

11 Download

At Download menu, user downloads firmware through UART IAP(In-Application Programming) without additional hardware. For details about IAP, refer to 'RED-FDM.pdf.

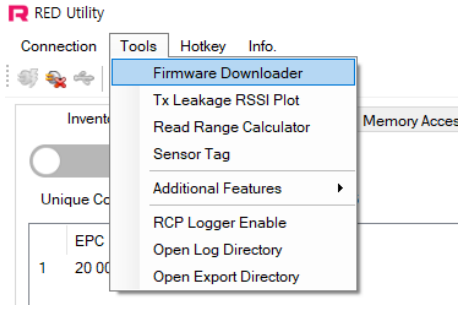


Figure 54 Open Firmware Downloader

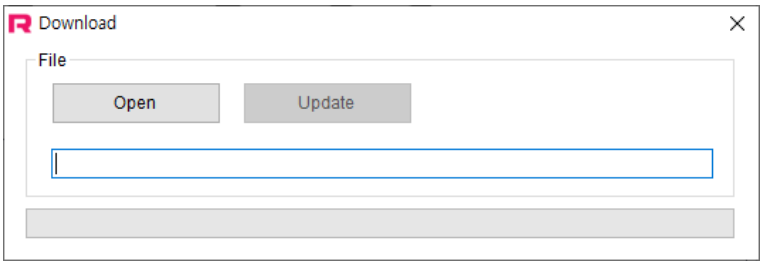


Figure 55 Download Window

Step 1. Tools → Firmware Downloader click
Step 2. At Download window, click Open button to open firmware binary file. After selection firmware file(*.hex), click Update.
Step 3. Push **RESET** button or 'Ctrl+R' for system reset.

12 Tx Leakage RSSI Plot

To Run Tx Leakage RSSI Plot, Click Tools -> Tx Leakage RSSI Plot on menu bar.

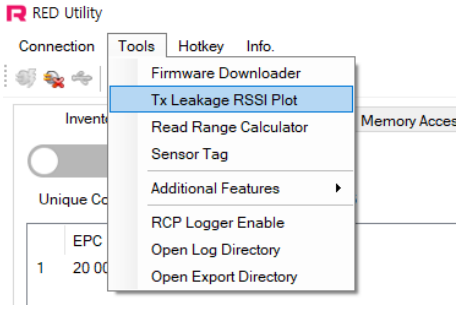


Figure 56 Open Tx Leakage RSSI Plot Window

12.1 Measure

Make sure that antenna is connected to antenna port of module. Please follow next procedure for Measuring Tx Leakage RSSI.

Leakage RSSI Plot shows Tx leakage RSSI value at Rx path according to leakage calibration method of RED module. When ‘measure’ is activated, Tx leakage callibration algorithm is started so that calcurate the leakage RSSI value of rx baseband according to DAC1 and DAC2 value.

Step 1. Check the target channels.
Step 2. Click the ‘Measure’ Button. (GUI set other parameters automatically).

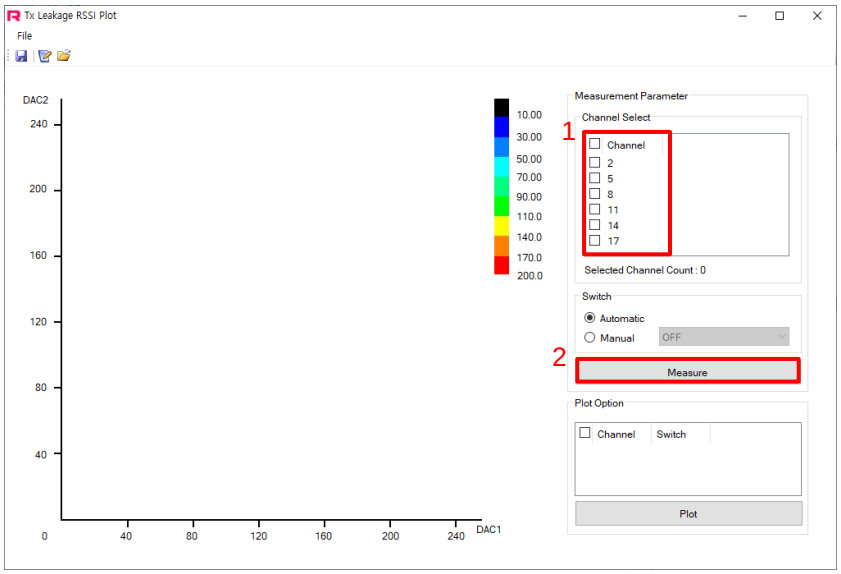


Figure 57 Run Tx Leakage RSSI Plot

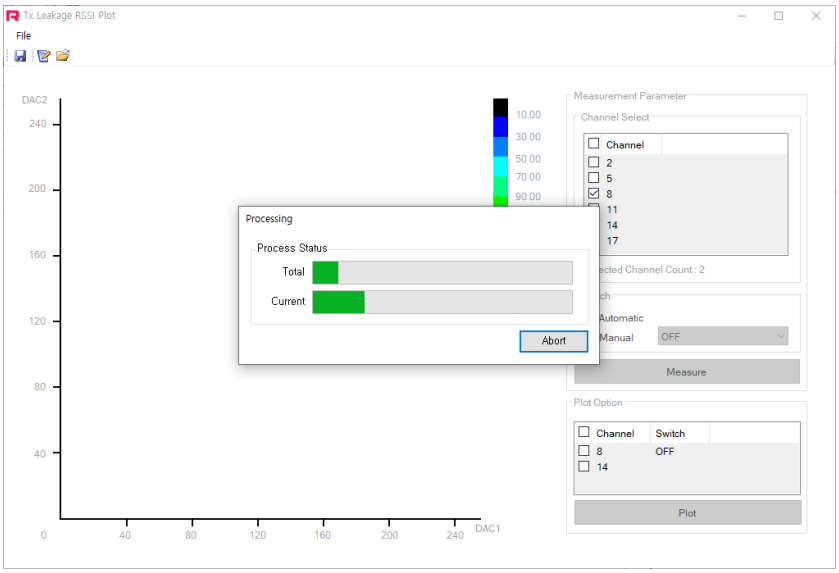


Figure 58 Leakage RSSI Plot Process Window

12.2 Plot

After completing ‘measure’ process, the channel measured is shown in Plot Option area. Check the plot target channels, click ‘Plot’ button.

- Information show when mouse moved on the plot.
- In Multiple Plot, displayed lower RSSI information.

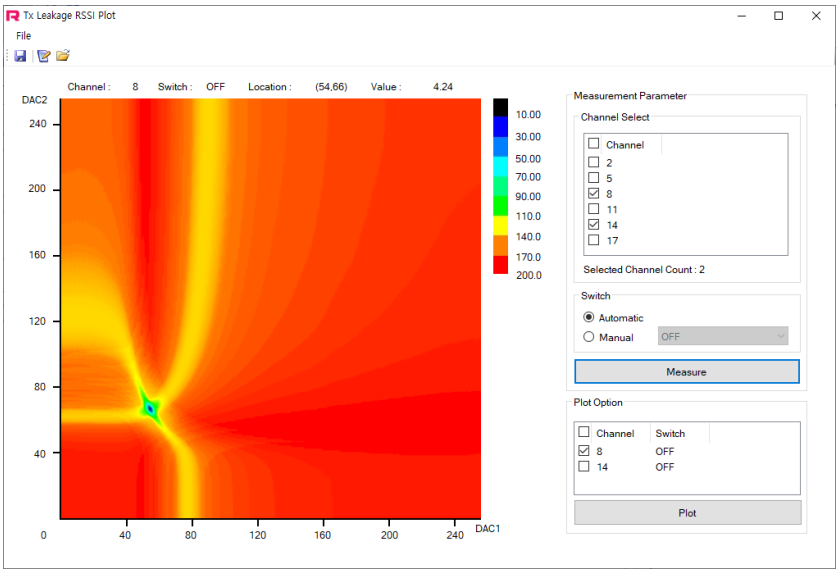


Figure 59 Result Plot

[Analysis of displayed figure]

If you can see ‘BLUE’ color on this plot, min. Leakage value has under 30. This means this antenna can be used without any sensitivity loss.
If you can see RED or GREEN instead of BLUE(or BLACK), Tx leakage from Tx path and antenna matching make Rx sensitivity get worse.
It is usually caused by antenna S_{11}(return loss). Generally our Tx leakage calibration algorithm can support over 15dB S_{11} of antenna.

12.3 Save and Load

12.3.1 Save Plot Image

To save plot image, Press ‘Ctrl + S’ or Click menu ‘File - Save Image’
Images saved to the directory “{Documents}\Phychips\TxLeakageRSSIPlot”

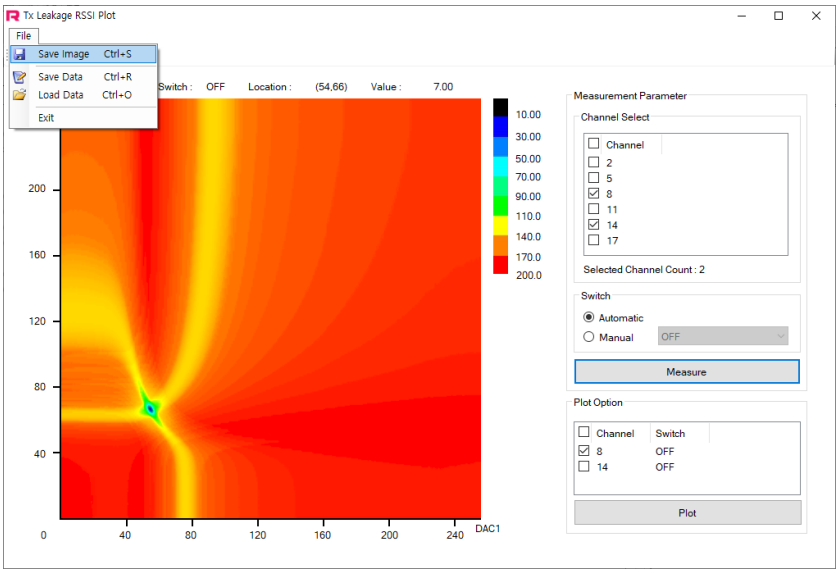


Figure 60 Save Raw Data

12.3.2 Save & Load Raw Data

User can save or load measured raw data.
To save raw data, Press ‘Ctrl + R’ or Click menu ‘File – Save Data’.
To load raw data, Press ‘Ctrl + O’ or Click menu ‘File – Load Data’.
Raw data saved to the directory “{Documents}\Phychips\TxLeakageRSSIPlot\Rawdata“

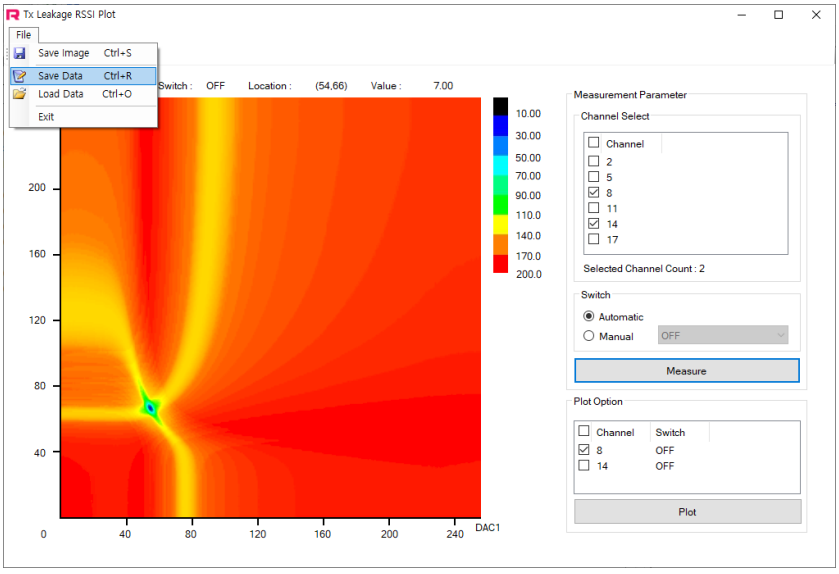


Figure 61 Save Plot Image

13 Read Range Calculator

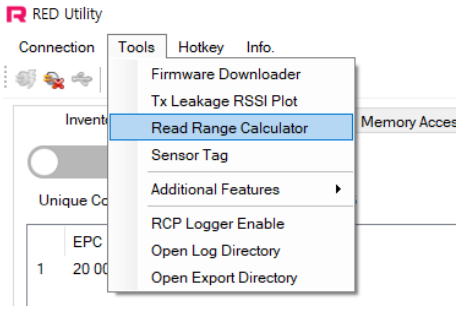


Figure 62 Open Read Range Calculator Window

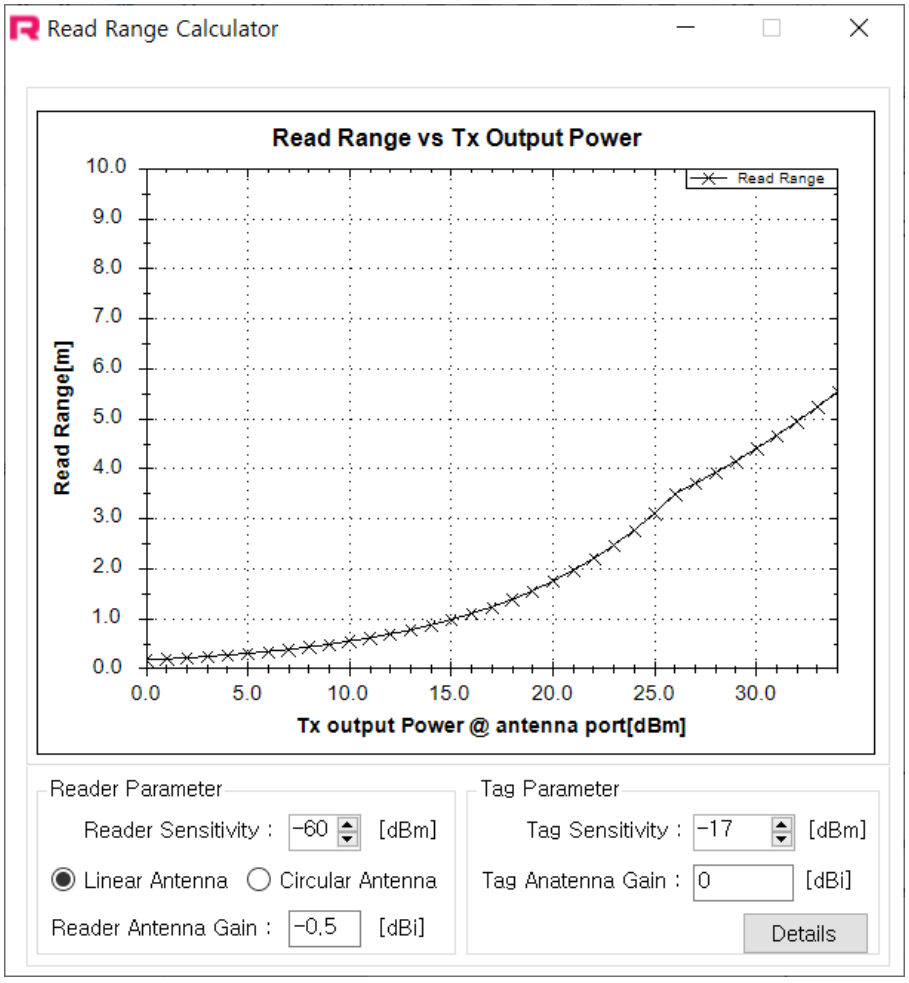


Figure 63 Read Range Calculator

13.1 Read Range Calculator Overview

Read range Calculator shows the relationship between Tx Output Power and Read Range based on other parameters. In order to set other parameter Click the Details button that indicated by red rectangle in Figure 63 Read Range Calculator.

Read range is related in Reader sensitivity, Reader antenna gain, tag sensitivity, tag antenna gain.
This calculator show theoretical results according to these parameter.
X axis show Tx output power at antenna port. This value do not include antenna gain.
Y axis show read range with m.

You can choose antenna type: linear and circulator. Generally RFID use circular type antenna because tag use linear antenna. Tag sensitivity usually depends on tag IC inside tag inlay. Table 1 show sensitivity of some tag ICs.

company	model name	Sensitivity(reading)	Unit
Alien	Higgs-2	-14	dBm
	Higgs-3	-18	dBm
	Higgs-4	-18.5	dBm
Impinj	Monza-2	-11.5	dBm
	Monza-3	-15	dBm
	Monza-4	-17.4	dBm
	Monza-5	-17.8	dBm
NXP	UCODE G2XM/G2XL[1]	-15	dBm
	UCODE G2iM/G2iM+ [2]	-17.5	dBm
	UCODE G2iL/G2iL+	-18	dBm
	UCODE 7	-21	dBm

Table2 Tag Sensitivity

13.2 Read Range Calculator Detail View

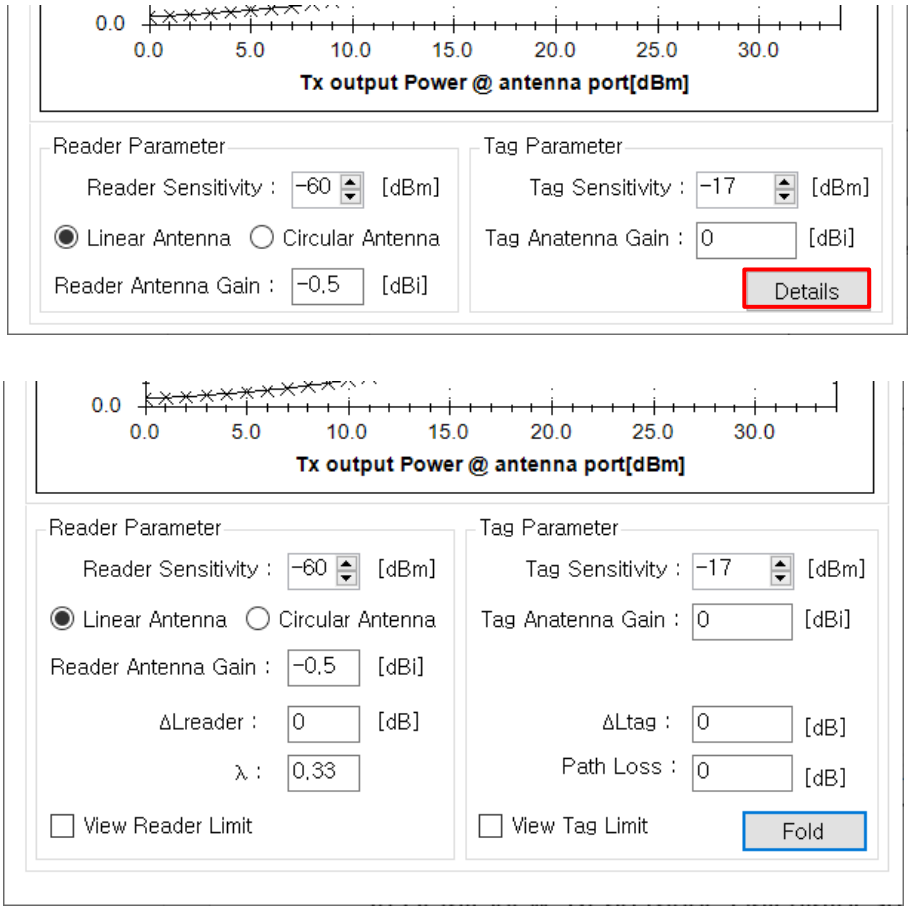


Figure 64 Read Range Calculator Detail View

In Detail View, Read range Calculator show reader limit and tag limit.
Read range can be limited due to reader sensitivity or tag sensitivity.
This graph show which is mainly affected to read range according to Tx output power.
You can roughly estimate read range when you know some parameter of reader and tag.
It is very useful to design your RFID system.

14 Sensor Tag Demo

To read AXZON(RF micron) and EM Micro sensor tag, use ‘Sensor Tag Demo’.

Step 1. Click Tool -> Sensor Tag on menu bar.
Step 2. Select Tag manufacture company, click ‘Start’ button.

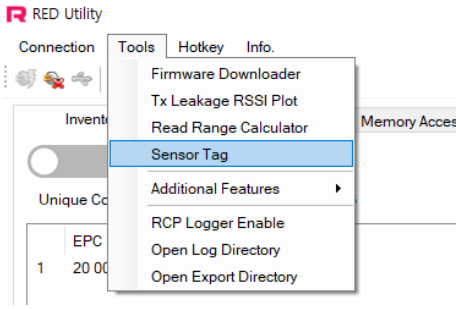


Figure 65 Open Sensor Tag Window

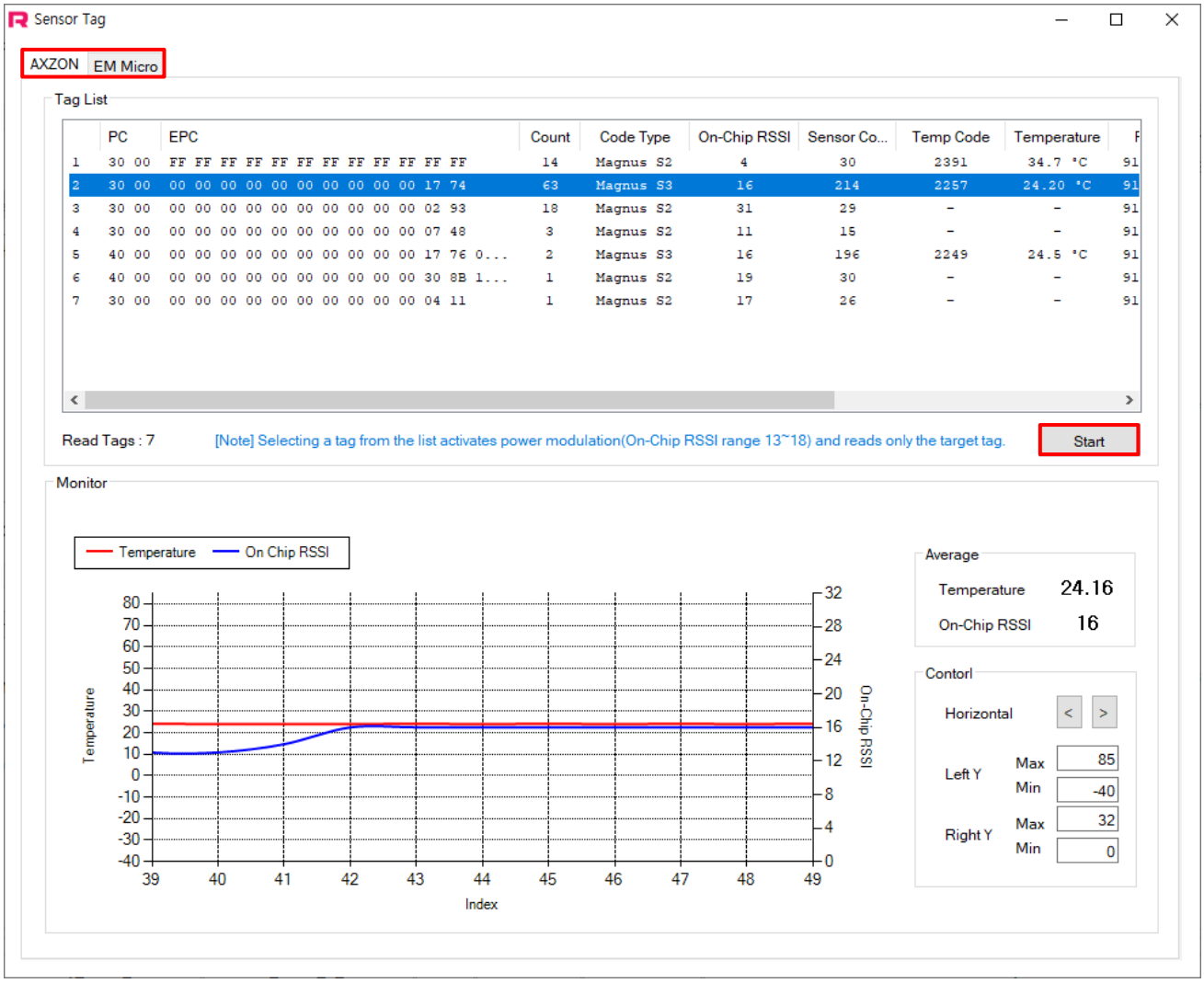


Figure 66 Sensor Tag Demo Window

Detail about the Sensor Tag Demo is described in [AN111-02] Sensor Tag application.

15 Hotkey Function

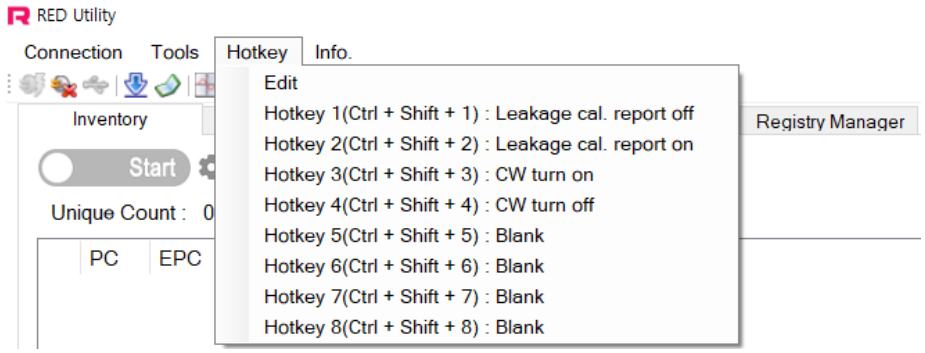


Figure 67 Open Hotkey Edit Window

User can save, load and edit a set of RCP Packet through a User Define Function. In order to edit a set of RCP Packet, Click the 'Edit' Button in Hotkey menu.
To make RCP Packet, refer to RED-RCP manual.

15.1 Hotkey Function Editor

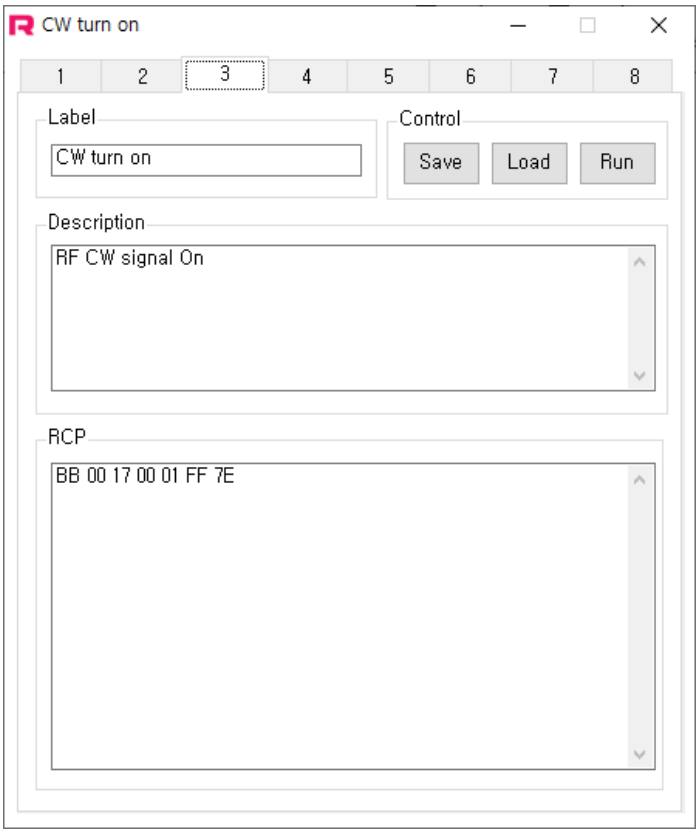


Figure 68 Hotkey Edit Window

User can save name and description of the Button.
First, select number tab to edit. Write RCP Packet and save.
In this case, a 'CW turn on' Command used for an example. The edited contents apply promptly like Figure 68.
To Send Saved RCP Command, Click the 'Run' button in Figure 68 or press hotkey(Ctrl + Shift + Number).

16 Address Information

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