

Technical Information Manual

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*RFID SOFTWARE
USER INTERFACE*

NPO:

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1. Overview

The present manual describes how to operate with the software pack provided with CAEN RFID UHF readers and development kits.

The CD includes the following tools:

- RFID Java Demo program
- RFID Visual C++ test program
- RFID .Net Sample
- Upgrade firmware and protocols (for A928EU/A948EU, A828EU/A829EU, A828US/A829US, A949EU/A946EU)
- Uninstall tool

Setup will install the files in the folder listed under "Destination Folder". To install to this folder, click "Next". To install to a different folder, click "Browse" and select another folder.

The Setup program creates the following directories:

Table 2.1 – CAEN RFID DEMO directories

Directory/file name	Directory files description
Java	RFID Demo Java Version (see § 2)
CAENRFIDlib.dll ¹	Include files
lib	CAENRFIDlib.lib (stub for Microsoft Visual C++ 6.0)
sources	demo program Microsoft Visual C++ 6.0 Source files
RFID_Demo.exe	demo program
RFIDUpgrade.exe	Upgrade firmware and protocols
TestRFID.exe	RFID Test program
Unins000	Uninstall tool

2.2. Launching the Software User interface

The RFID Demo Java Version is started by launching the CAENRFIDJavaDemo.jar file in the CAEN_RFID_Development_kit_Java\CAENRFIDJavaDemo folder in the CD's "Programmer's Interface" directory.

The present program is developed for demonstrative purposes, the Java classes are available in the "[Programmer's Interface](#)" directory of the CD.

Before launching the RFID Demo Java Version, it is necessary to install the Java 2 Platform Standard Edition 5.0, available at: <http://java.sun.com/j2se/1.5.0/download.jsp>

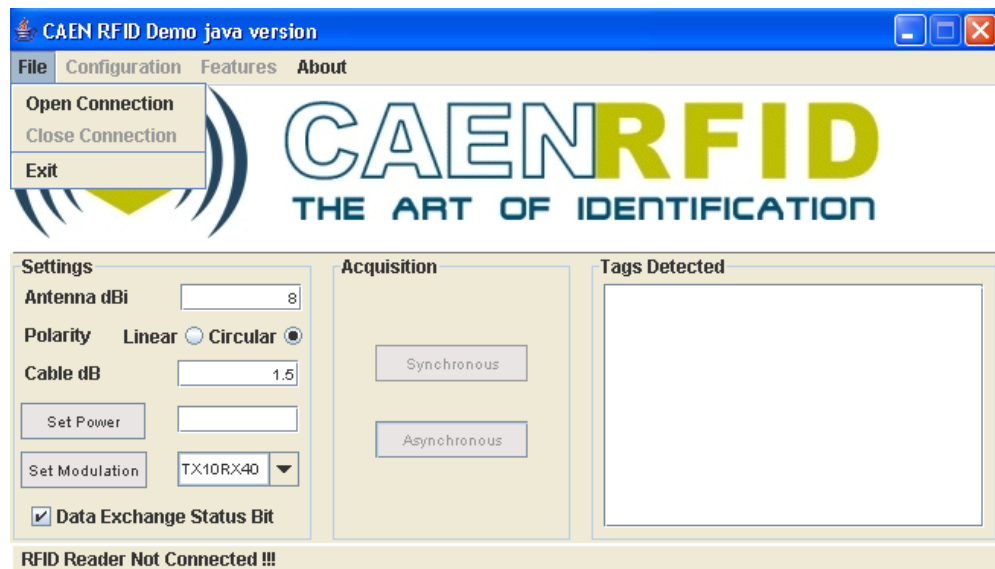


Fig. 2.2 – CAEN RFID Demo start window

¹ CAENRFIDLib library is described in the relevant Technical Information Manual

2.3. Connection configuration

Once you have connected the CAEN UHF RFID Reader to your PC, turn it ON, then:
Click on

File > Open connection

The following pop-up window will open:



Fig. 2.3 – Connection port configuration

Choose the connection type; if you are using TCP-IP enter the IP address (default address: 192.168.0.125), if you are using RS232, type the connected port (COM1, COM2...) then click on <Connect>. If you wish to use RS232 or USB, please make sure that the Java Platform you are running supports such ports.

2.3.1. Reader protocol configuration

Optionally, it is possible to change the used protocol (ISO18000-6B or EPC C1G1/C1G2);

click on

configuration > change reader's protocol

A pop-up window will allow to choose between ISO18000-6B (which supports also Philips UCODE EPC 1.19) and EPC C1G1.

If the protocol is changed, a reader reboot will be performed; then it is necessary to shut and re-start the CAEN RFID Demo program.

2.3.2. Network configuration

Optionally, it is possible to update the reader's network settings;

click on

configuration > network setup

The following pop-up window will open (the figure shows the default configuration):

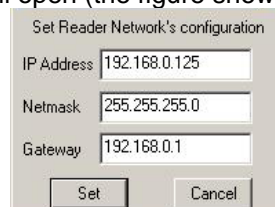


Fig. 2.4 – Reader Network configuration

2.3.3. Input output management

This function allows to handle the reader general purpose inputs/outputs;
click on

configuration > I/O Management

The following pop-up window will open:

By checking the Output boxes, the relevant signal will be driven high. The Input status is also monitored: red = active, green = idle.

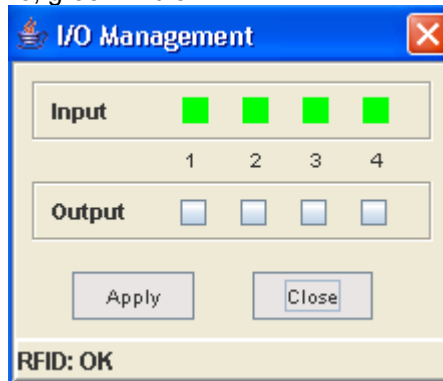


Fig. 2.5 – Reader Network configuration

2.4. Logical source selection

Click on

configuration > configure logical source

The following pop-up window will open:

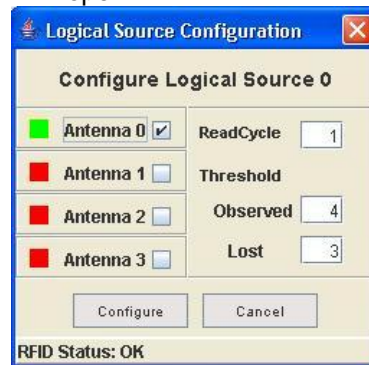


Fig. 2.6 – Logical source selection and test

the antenna(s) status is checked:

BAD (antenna not connected) = RED

POOR (antenna with faulty operation) = YELLOW

GOOD (antenna ok) = GREEN

Then choose the antenna(s) you wish to use.

Finally it is necessary to set the thresholds:

Observed:

READCYCLE MODE (see §2.5): the number of subsequent times a tag must appear in an acquisition before it shifts from “glimpsed” to “observed”

TIME MODE (see §2.5): the number of milliseconds a tag must appear in an acquisition before it shifts from “glimpsed” to “observed”

Lost:

READCYCLE MODE: the number of subsequent times an observed tag must disappear from an acquisition before it shifts from “observed” to “lost”

TIME MODE: the number of milliseconds an observed tag must disappear from an acquisition before it shifts from “observed” to “lost”

Read Cycle: the number of times an acquisition must be timed out and then restarted

Confirm settings by clicking on <Configure>.

Thresholds are meaningful only with Asynchronous Acquisition (see § 2.5)

2.5. Detecting test tags with the RF field

Now the Reader is ready for detecting tags; click on either:

<Synchronous Acquisition>
<Asynchronous Acquisition>

With **Synchronous Acquisition**, a “one shot” readout is performed.

Asynchronous Acquisition allows to perform either Timed Acquisition or a I/O Timed-out acquisition.

In the first place it is necessary to set the “Event mode” by clicking on:

Configuration>Configure Event Mode

The following window opens:



Fig. 2.7 – Event mode configuration

If READCYCLE MODE is selected, the logical source thresholds are expressed in cycles, whose duration is equal to the Delay time set when Asynchronous Acquisition is launched.

If TIME MODE is selected, the logical source thresholds are expressed in milliseconds; it must be noticed that the thresholds might not be multiple of the delay time, so a tag can change its status after a non-integer number of cycles.

If NOEVENT MODE is selected, the tags are continuously scanned, the threshold values are meaningless (the tag is considered either inside or outside the reader’s field and no Glimpsed/Observed status is notified)

After changing Event Mode it is necessary to restart both the Reader and the RFID Demo Java Version. The following message will be shown:

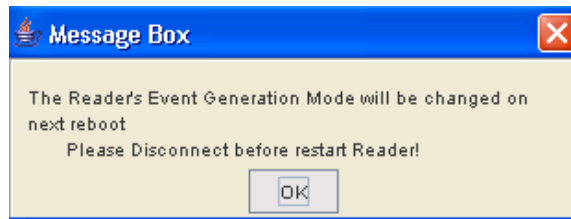


Fig. 2.8 – Change Event mode message

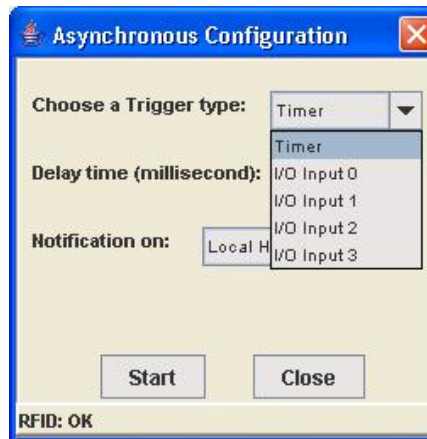


Fig. 2.9 – Asynchronous Acquisition configuration

If you wish to make a **Timed Acquisition** in READCYCLE MODE:

- choose “Timer” as trigger type in the drop down menu of the Asynchronous Configuration which is started as Asynchronous Acquisition is selected.
- set the timer period in “Delay time” field
- set the notification on Local or Remote host: in the latter case you have to enter the host IP address
- “Start” acquisition

The notification takes place on the RFID Server window, which is shown either on the Local host or on the Remote one:

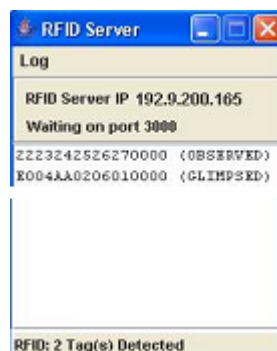


Fig. 2.10 – RFID Server

If you wish to make a **I/O Timed-out Acquisition** in READCYCLE MODE:

- choose the General Purpose Input you wish to use as trigger type in the drop down menu of the Asynchronous Configuration.
- set the time out delay in “Delay time” field

- set the notification on Local or Remote host: in the second case you have to enter the host IP address
- “Start” acquisition

The notification takes place on the RFID ServerConfiguration; after the first acquisition the Reader waits for one “Delay time” period, then checks the status of the used input: if it is high, then the second acquisition takes place, otherwise it is timed out; at this point the Reader waits for another Delay time, then checks the status of the used input again.

If you wish to make a **Timed Acquisition** in TIME MODE:

- choose “Timer” as trigger type in the drop down menu of the Asynchronous Configuration which is started as Asynchronous Acquisition is selected.
- set the timer period in “Delay time” field
- set the notification on Local or Remote host: in the latter case you have to enter the host IP address
- “Start” acquisition

The notification takes place on the RFID Server window, which is shown either on the Local host or on the Remote one. The status does not depend on the number of performed cycles, but ONLY on the threshold values (see §2.4); the “Delay time” must be smaller than the thresholds.

If you wish to make an acquisition in NOEVENT MODE, simply :

- set the timer period in “Delay time” field
- set the notification on Local or Remote host: in the latter case you have to enter the host IP address
- “Start” acquisition

The notification takes place on the RFID Server window, which is shown either on the Local host or on the Remote one, no status is notified.

2.6. Readout of one tag’s memory

Now the ISO18000-6B detected tags are ready for read/write operations. In case of Timed, Continuous or I/O Acquisition it is necessary to stop scanning, by clicking on the stop acquisition button. Now click on one of the tags’ Unique ID’s; then go to:

```

Features
  >ISO18000-6B
    >Read/Write Tag Memory
  
```

The following window is shown:



Fig. 2.11 – Tags memory

By writing in the Value field, it is possible to update the tag memory; changes are saved via the <Update> button, while <Restore> allows to recover the former value.

In order to lock one particular address in the tag memory, go to:

Features
 >ISO18000-6B
 >Lock

The following window is shown; <Lock> allows to lock one particular address, <Cancel> to quit. Locked addresses cannot be changed anymore.



Fig. 2.12 – Tag readout

The configuration of the ISO18000-6B compliant tags is the following:

Byte	Content	Status	Description
0,1	E0, 04 hex	locked	Unique serial number
2÷7	xx hex	locked	Unique serial number
8÷10	00 hex	unlocked	User memory
11	02 hex	unlocked	User memory
12÷17	FF hex	unlocked	User memory
18÷219	00 hex	unlocked	User memory
220÷223	57 5F 4F 4B hex	unlocked	"w_ok" in ASCII, user memory

The CAEN RFID Demo program allows to write only bits [2; 17].

2.6.1. EPC protocol tags operations

If EPC tags are detected, then go to:

Features
 >EPC
 >Program ID

For (over)writing the tags ID, setting the password, and locking them:

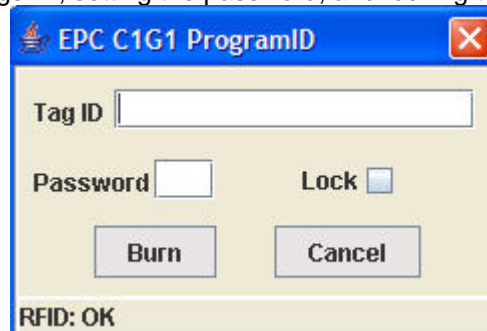


Fig. 2.13 – Tag programming

Go to:
 Features
 >EPC
 >Kill

For killing the tag (the password is required). Once killed the tag does not respond to (any) reader anymore.



Fig. 2.14 – Tag killing

The configuration of the EPC Class 1 Gen 1 compliant tags is the following:

Byte	Type	Status	Description
00, 01 hex	System	locked	Tag header
02 hex	System	unlocked	EPC portion
03÷07 hex	System	unlocked	EPC portion
08÷0F hex	System	unused	
10÷17 hex	System	unlocked	EPC portion
18÷37 hex	User	unlocked	User memory (256 bit)
38÷FF hex	RFU		

2.7. Temperature monitoring with the semipassive tag

The semipassive tag Mod. A927 includes a temperature sensor; so it is possible to view the temperature parameter as a function of time. This is possible by clicking on the thermometer icon.

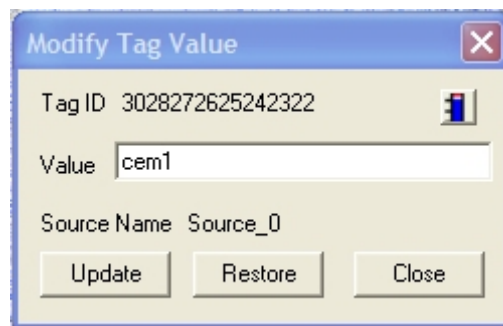


Fig. 2.15 – Temperature monitoring/1

A pop-up window with the temperature trace will be then shown:

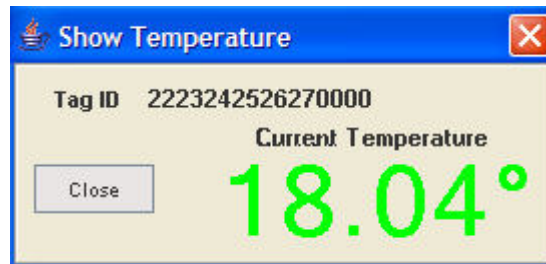


Fig. 2.16 – Temperature monitoring/2

Status: Green = tag inside reader's field
Red = tag outside reader's field

2.8. Creating the Log file

Click on
configuration > Enable logging
Then start the "Continuous acquisition".
When the acquisition is stopped, it will be possible to save the log text file, containing information on the detected tags, for example:

```
Tue Apr 19 11:01:19.011 e004840306010000 Glimpsed  
Tue Apr 19 11:01:19.101 e004840306010000 Glimpsed  
Tue Apr 19 11:01:19.201 e004840306010000 Glimpsed
```

N.B.: creating the Log file is possible only with "Continuous acquisition"

2.9. RF Field test

It is possible to test the RF field emissions in the following way:

Click on
configuration > select test & read point
Then select the read point to be tested (0..3).
Go to the main menu, then set the desired power and choose "single acquisition".

Click on
configuration > experimental > RF ON
It is now possible to test the RF field emission on the selected read point.
In order to test another read point it is necessary to repeat the procedure from the start.

2.10. Quit CAEN RFID Demo program

For quitting the CAEN RFID Demo program click on
File > exit

Then turn off the reader and disconnect the antenna cable, the power cord and the link cable.

2.11. ISO18000-6B protocol tags operations

The ISO18000-6B detected tags are ready for read/write operations. It is necessary to stop scanning, by clicking on the stop acquisition button. Now click on one of the tags' Unique ID's; then go to:

Features

>ISO18000-6B

>Read/Write Tag Memory

The following window is shown:

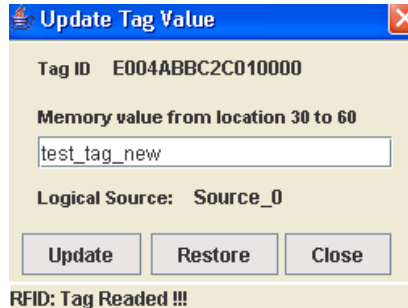


Fig. 2.17 – ISO18000-6B Tags memory

By writing in the Value field, it is possible to update the tag memory; changes are saved via the <Update> button, while <Restore> allows to recover the former value.

In order to lock one particular address in the tag memory, go to:

Features

>ISO18000-6B

>Lock

The following window is shown; <Lock> allows to lock one particular address, <Cancel> to quit. Locked addresses cannot be changed anymore.

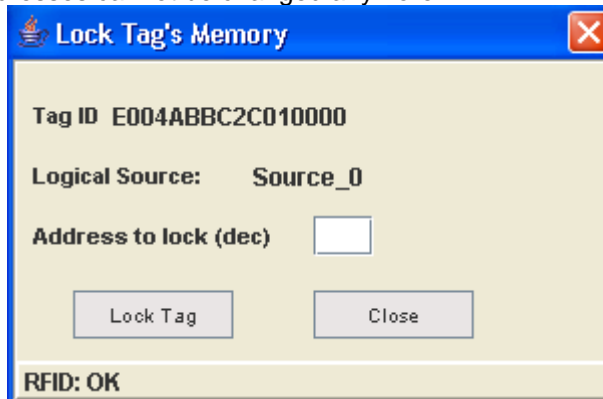


Fig. 2.18 – ISO18000-6B Tag readout

The configuration of the ISO18000-6B compliant tags is the following:

Byte	Content	Status	Description
0,1	E0, 04 hex	locked	Unique serial number
2÷7	xx hex	locked	Unique serial number
8÷10	00 hex	unlocked	User memory
11	02 hex	unlocked	User memory
12÷17	FF hex	unlocked	User memory
18÷219	00 hex	unlocked	User memory
220÷223	57 5F 4F 4B hex	unlocked	"w_ok" in ASCII, user memory

The CAEN RFID Demo program allows to write only bits [2; 17].

2.12. EPC1.19 protocol tags operations

If EPC1.19 tags are detected, then go to:

Features

>EPC1.19

> Read/Write Tag Memory

For (over)writing the tags ID and Memory:

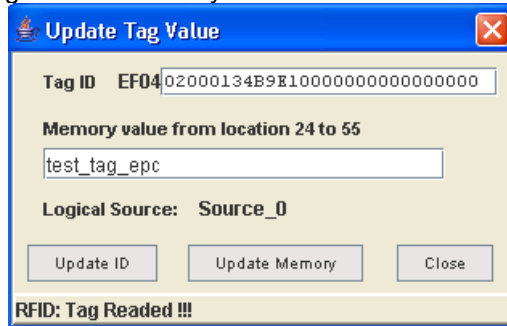


Fig. 2.19 – EPC1.19 Tag programming

In order to lock one particular address in the tag memory, go to

Go to:

Features

>EPC1.19

>Lock

The following window is shown; <Lock> allows to lock one particular address, <Cancel> to quit. Locked addresses cannot be changed anymore.

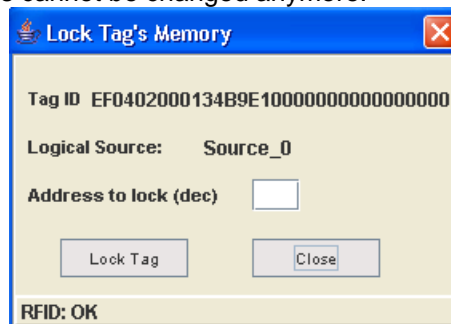


Fig. 2.20 – EPC1.19 Tag locking

The configuration of the EPC 1.19 compliant tags is the following:

2.12.1. EPC 1.19 Tag Data memory mapping (96 bit)

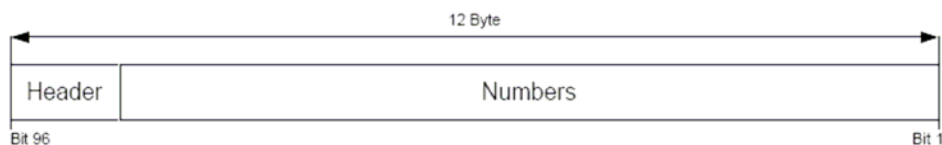


Fig. 2.21 – General structure of 96 bit EPC number

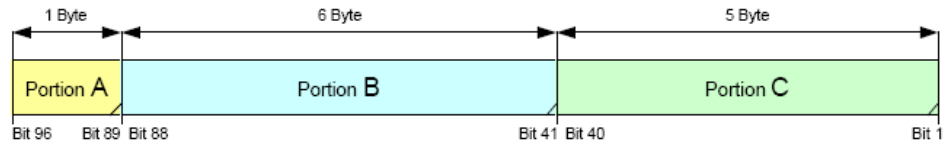


Fig. 2.22 – Separation of 96 bit data structure for UCODE EPC 1.19

Byte	00 _{hex}	01 _{hex}	02 _{hex}	03 _{hex}	04 _{hex}	05 _{hex}	06 _{hex}	07 _{hex}
memory content	EF _{hex}	04 _{hex}	Portion A	Portion C				
Byte	10 _{hex}	11 _{hex}	12 _{hex}	13 _{hex}	14 _{hex}	15 _{hex}	16 _{hex}	17 _{hex}
memory content	Portion B						Partition value	Filter value
							0000 C _{ppp} _{bin}	0000 C _{ff} _{bin}

ppp ... containing a copy of the 3 Bit Partition value for selection possibility if a partition exists, otherwise ppp shall be 000_{bin}

fff ... containing a copy of the 3 Bit Filter value for selection possibility if a filter exists, otherwise fff shall be 000_{bin}

Fig. 2.23 – Mapping of 96 bit data structure into UCODE EPC 1.19 memory

2.12.2. EPC 1.19 Tag Data memory mapping (64 bit)

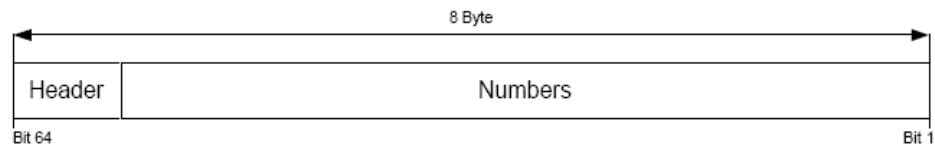


Fig. 2.24 – General structure of 64 bit EPC number

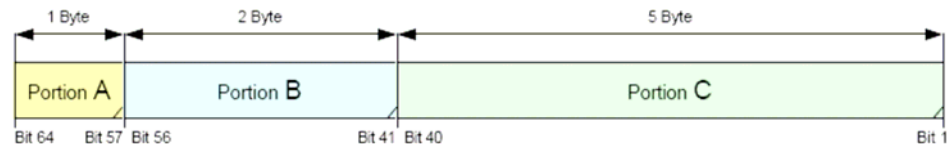


Fig. 2.25 – Separation of 64 bit data structure for UCODE EPC 1.19

Byte	00 _{hex}	01 _{hex}	02 _{hex}	03 _{hex}	04 _{hex}	05 _{hex}	06 _{hex}	07 _{hex}
memory content	EF _{hex}	04 _{hex}	Portion A	Portion C				
Byte	10 _{hex}	11 _{hex}	12 _{hex}	13 _{hex}	14 _{hex}	15 _{hex}	16 _{hex}	17 _{hex}
memory content	Portion B		0000 0000 _{bin}	0000 0000 _{bin}	0000 0000 _{bin}	0000 0000 _{bin}	0000 0000 _{bin}	Filter value
								0000 C _{ff} _{bin}

fff ... containing a copy of the 3 Bit Filter value for selection possibility if a filter exists, otherwise fff shall be 000_{bin}

Fig. 2.26 – Mapping of 64 bit data structure into UCODE EPC 1.19 memory

3. Firmware upgrade

3.1. Firmware upgrade via serial port

In order to upgrade the Reader firmware, connect the it with the PC Host via RS232, then open the following directory:



Fig. 3.1 – CAEN RFID DEMO directories

Now launch RFIDUpgrade.exe:



Fig. 3.2 – CAEN RFIDUpgrade/1

Select “Firmware” in the Upgrade Menu and the connected port, then *Browse* the image file to be uploaded (for example: image-2.0b.bin):

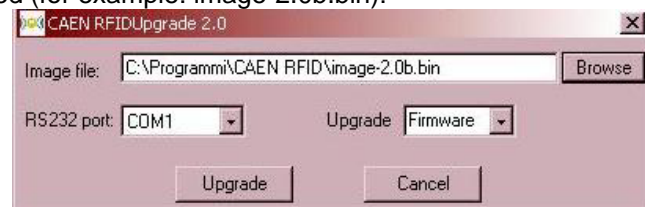


Fig. 3.3 – Selecting the image file

Now click on <Upgrade>; it will take 10 minutes for uploading the updated firmware and rebooting the Reader; when the Reader is ready the ISO/EPC and the Active leds will light up: **do not turn off** the Reader before the Active led lights on and then off!

The image file can be found in the *Upgrade_img_file* directory of the “*Driver, Demo software and Technical manuals*” CD ROM (included in the RFID Development Kit); it can also be downloaded at: <http://www.caen.it/rfid/english/download.php>

3.2. Firmware upgrade via TCP/IP

The Firmware upgrade via TCP/IP works only with the CAENRFID Demo Java Version. First you need a TFTP Server & Client application, if you have not one installed, you can download (from <http://www.klever.net/>), install and run the pumpkin.exe freeware application:

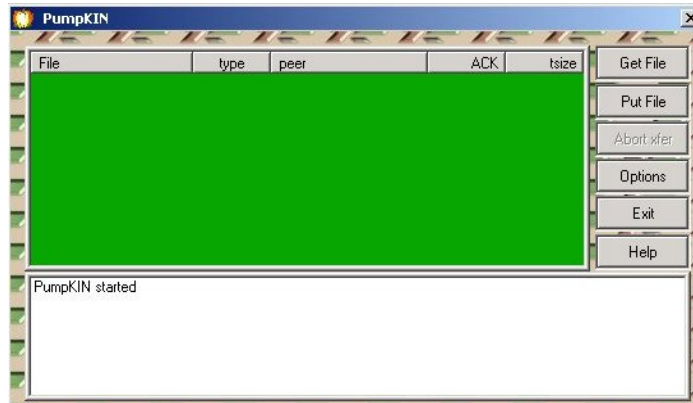


Fig. 3.4 – PumpKIN Menu Window

Select [Options] and browse the folder where the image file resides with the following selections, then press [OK]

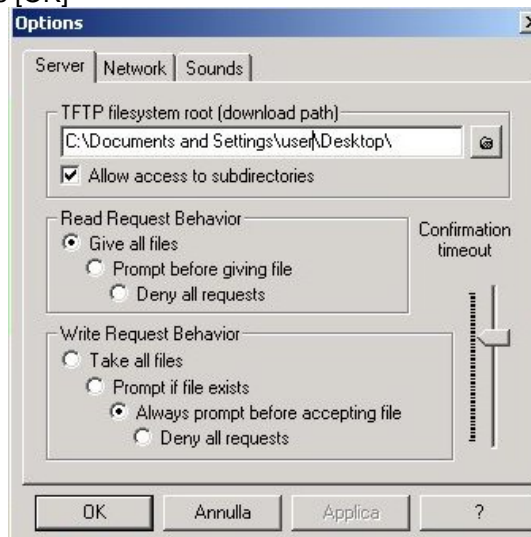


Fig. 3.5 – PumpKIN Options Window

Connect to the Reader by using CAEN RFID Demo Java version and select Configuration>Firmware Upgrade enter the TFTP server address and browse the image file to be loaded into the Reader, then press [OK]:

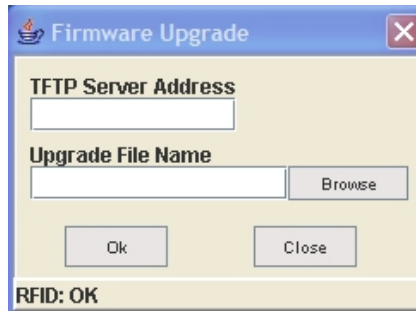


Fig. 3.6 – Firmware upgrade browser

The following information message will then be shown:

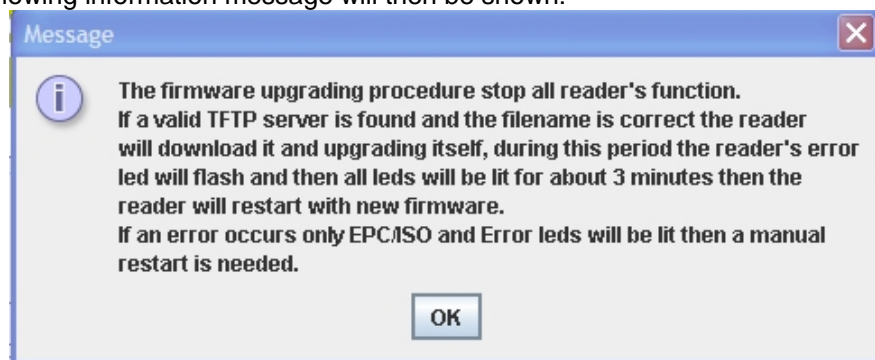


Fig. 3.7 – Firmwareupgrade message

Press ok and this confirmation message will be returned:

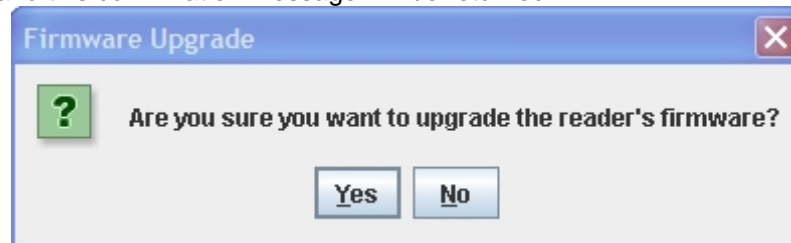


Fig. 3.8 – Confirmation message

Press YES then Download image via TFTP; the Firmware Upgrade is then completed.

4. RFID Test program

This is a simple VisualC++ test program: go to the main directory CAEN RFID DEMO KIT, then launch the TestRFID.exe executable file; the following Menu will be launched:

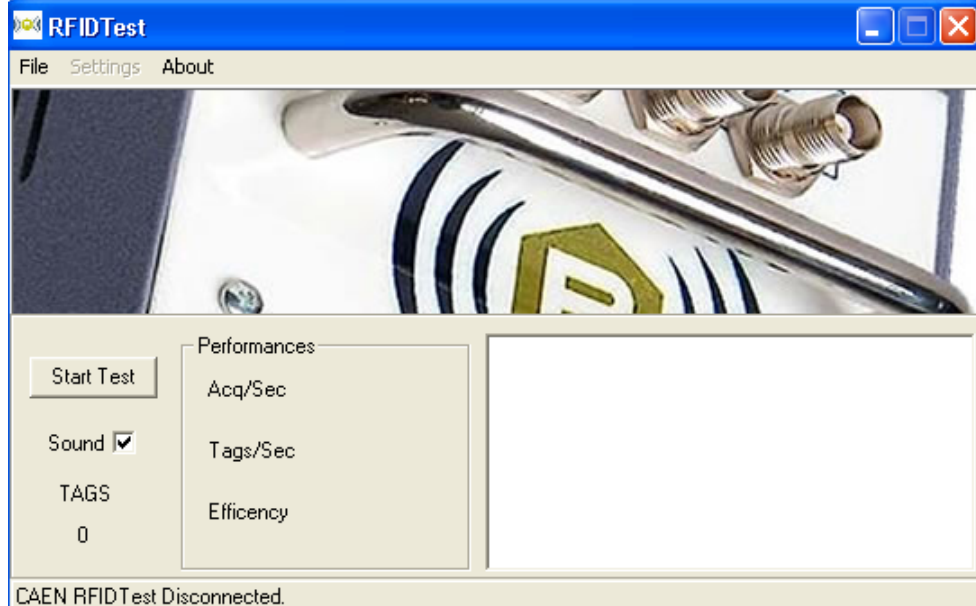


Fig. 4.1 – RFID Test main menu

4.1. Connection configuration

Once you have connected the CAEN UHF RFID Reader to your PC, turn it ON, then: Click on

File > Connect

The following pop-up window will open:



Fig. 4.2 – Connection port configuration

Choose the connection type; if you are using TCP-IP enter the IP address (default: 192.168.0.125), if you are using RS232, type the connected port (COM1, COM2...) then click on <Connect>.

4.2. Settings

4.2.1. Antenna selection

Click on settings > set source ; then flag the antenna(s) you wish to use

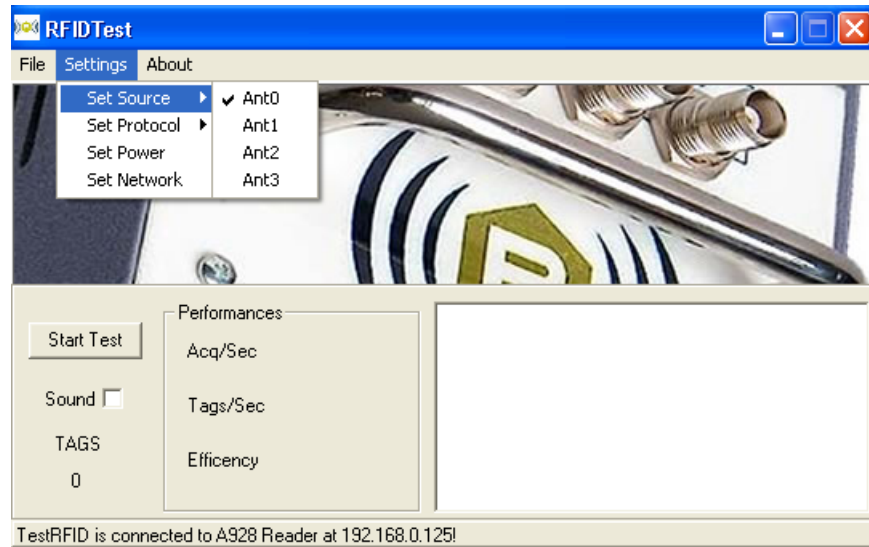


Fig. 4.3 – Source selection

4.2.2. Protocol selection

Click on settings > set source; then flag the protocol you wish to use

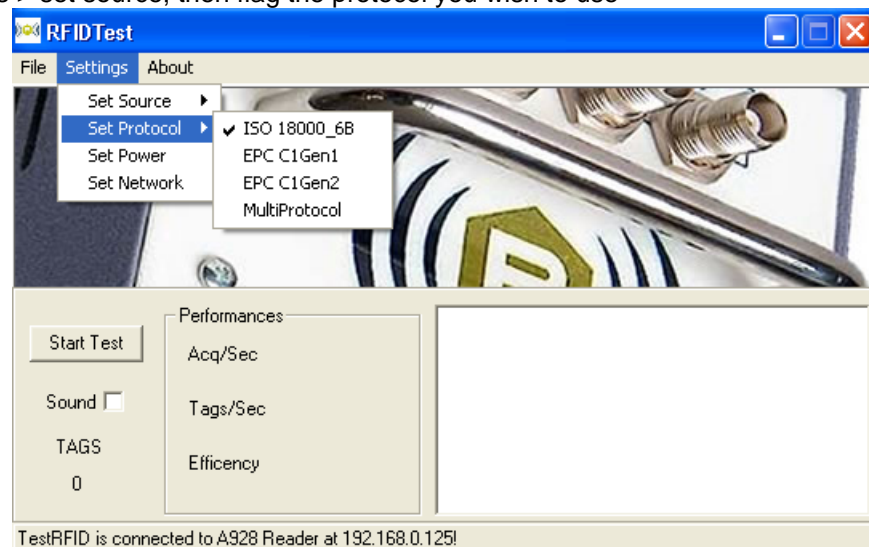


Fig. 4.4 – Setting the protocol

4.2.3. Power settings

Click on settings > set source; then type the power settings you wish to use

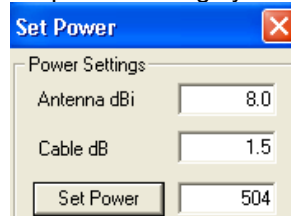


Fig. 4.5 – Power settings fields

4.2.4. Reader network configuration

Optionally, it is possible to update the reader's network settings; click on

settings > set network

The following pop-up window will open (the figure shows the default configuration):

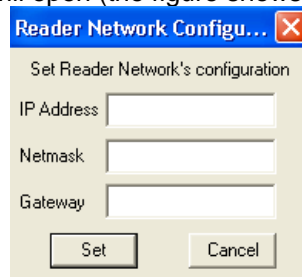


Fig. 4.6 – Network configuration

4.3. Start Test

Now click on « Start Test »: the name of the tags in the reader's field will be shown. Click on « Stop test » in order to stop acquisition.

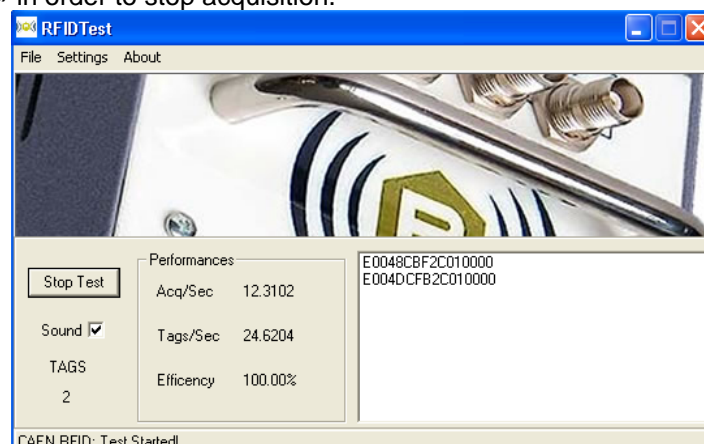


Fig. 4.7 – Tags detection

4.4. Quit CAEN RFID Test program

For quitting the CAEN RFID Test program click on
File > exit

Then turn off the reader and disconnect the antenna cable, the power cord and the link cable.

5. RFID CsDemo program

This is a simple RFID .Net Sample program. First of all, go to:

<http://www.microsoft.com/downloads/>

then download and install on your PC the DotNet Framework 1.1

Then go to the main directory CAEN RFID DEMO KIT, then launch the CAENRFIDCsDemo.exe executable file; the following Menu will be launched:

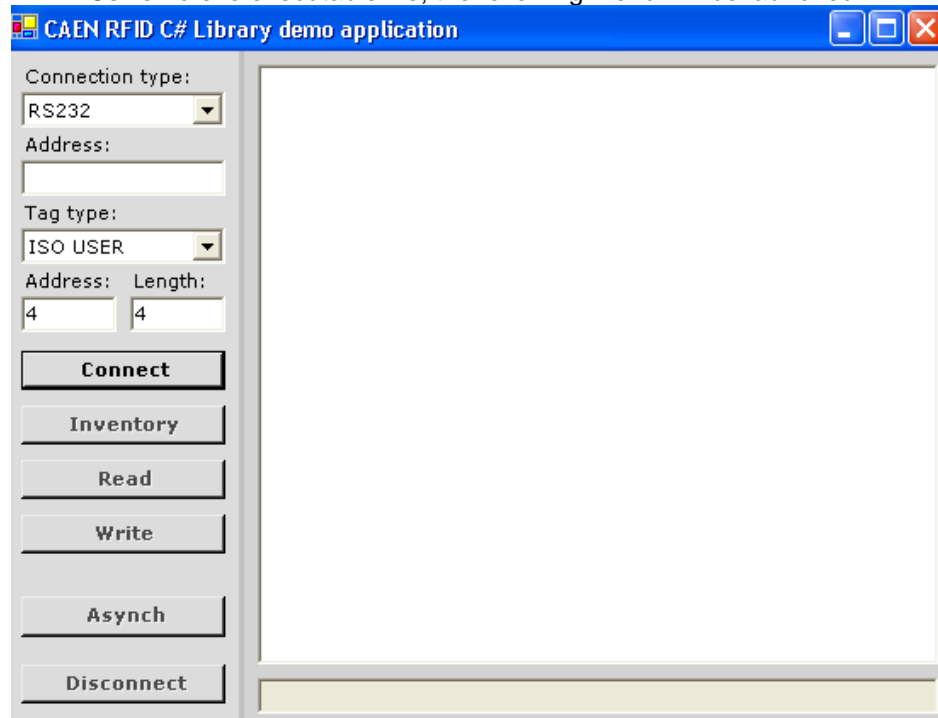


Fig. 5.1 – RFID Test main menu

5.1. Connection configuration

Once you have connected the CAEN UHF RFID Reader to your PC, turn it ON, then: Choose the connection type; if you are using TCP-IP enter the IP address (default: 192.168.0.125), if you are using RS232, type the connected port (COM1, COM2...) then click on <Connect>. The following pop-up window will open:



Fig. 5.2 – Connection confirmation

5.2. Start inventory

Select the tag type you want to read, then click on « Inventory »: the name of the tags in the reader's field will be shown. Click on «Disconnect» in order to stop acquisition.

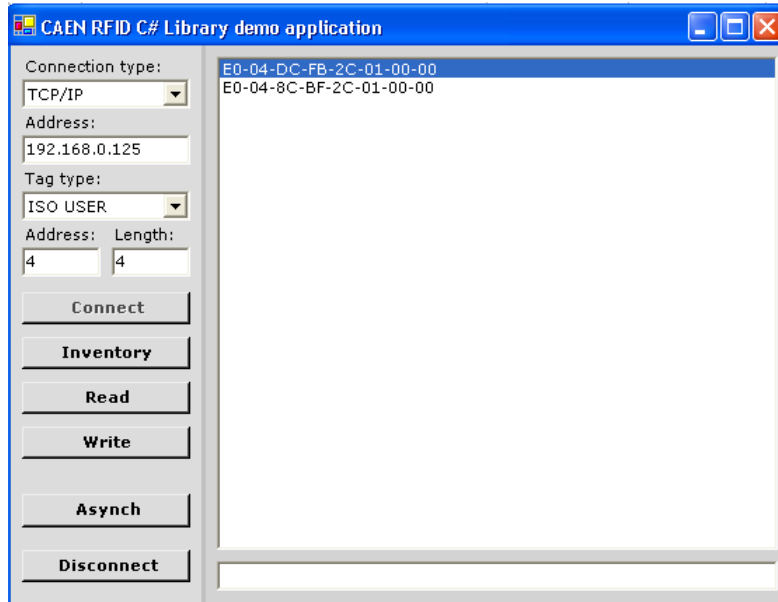


Fig. 5.3 – Tags detection

5.3. Read tags memory

Select the tag type you want to read, then click on «Read»: the memory content of the tags in the reader's field will be shown.

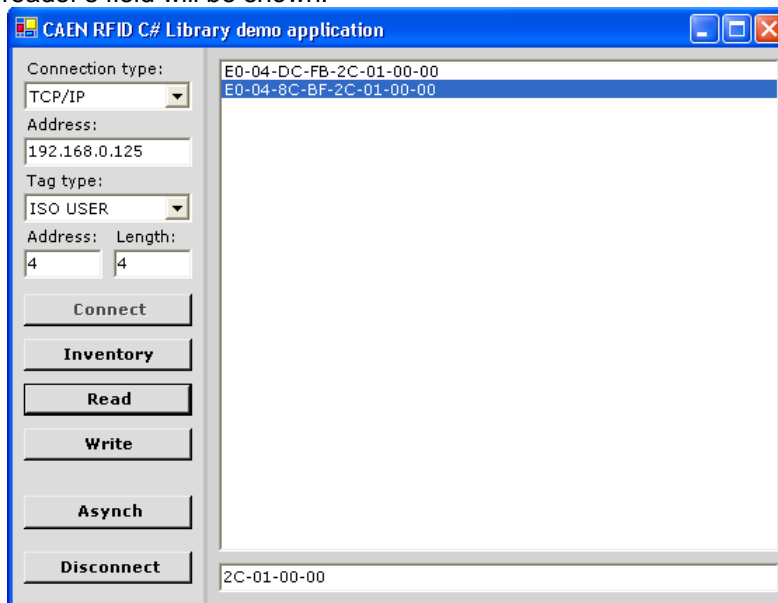


Fig. 5.4 – Tags memory readout