DUR 120 USB and DUR 120 ETHERNET

Desktop UHF RFID reader
User Guide

Ver. 1.3
04/2016

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Contents

1 Introduction

The desktop UHF RFID reader DUR 120 allows solution developers to use applications that require desktop reading and writing of EPCglobal UHF Class 1 Gen 2 tags. The DUR 120 reader is controlled by and powered from a host PC or laptop through a USB interface. In case of DUR 120 ETHERNET the ethernet interface can be used for communication purpose.

2 Connecting the reader and installing the USB driver

The DUR 120 reader can be connected to a PC or a notebook via a USB interface. When connecting the device for the first time, the user has to install the necessary device drivers to allow Windows to recognize the reader. The reader emulates a virtual serial port.

You can download VCP drivers for Windows based systems from this website:
http://www.ftdichip.com/Drivers/VCP.htm

You can download detailed driver installation guide from this website:
http://www.ftdichip.com/Support/Documents/InstallGuides.htm

3 Ethernet connection (Only DUR 120 ETHERNET)

A standard ethernet connection with an 8-pin RJ connector using 2 twisted pairs has to be used to connect DUR 120 ETHERNET. The DUR 120 ETHERNET selects automatically between the USB and ethernet interface based on the first received valid packet after the start up from USB or ethernet interface. The DUR 120 ETHERNET reader is powered through the USB connector.

4 Functionality test

The user can easily test the basic functionalities of the reader with the TSSTagger demo software. Chapter 6 of this guide contains more information on TSSTagger.

5 Technical specifications

DUR 120 USB:

Frequency Band:	865 ÷ 868 MHz (ETSI EN 302 208 v. 1.4.1.)
Number Of Channels:	4 (compliant to ETSI EN 302 208 v. 1.4.1.)
RF Power Output – e.r.p.:	max. 14 dBm
Modulation:	DSB-ASK
Antenna Gain:	5 dBic
Antenna Polarization:	Integrated circular polarized antenna
Air Interface Protocol:	EPCglobal UHF Class 1 Gen 2 Version 2.0.0 Supports tag vendor specific custom commands Supports NXP UCODE DNA
Tag Communication Rate:	40 kbps
Data Encoding Interrogator -> Tag:	PIE, 40kHz
Data Encoding Tag -> Interrogator:	FM0, 40kHz
Tag Read Rate:	Up to 50 tags/second
Tag Read Range:	Up to 50 cm, depending on tag and environment (Tested with an ALN-9662 tag)
USB Interface:	USB 2.0 Full Speed It appears as USB serial port USB mini-B connector
User Interface:	Power LED (orange) Status LED (green)
Operating Temperature:	-20 °C do +55 °C
Power Supply:	5 VDC (Powered by USB interface)
Power Consumption:	max. 200mA
Dimensions:	110mm L x 110mm W x 38mm H
Weight:	240 g
Length Of USB Cable:	1,8m

DUR 120 ETHERNET:

Frequency Band:	865 ÷ 868 MHz (ETSI EN 302 208 v. 1.4.1.)
Number Of Channels:	4 (compliant to ETSI EN 302 208 v. 1.4.1.)
RF Power Output – e.r.p.:	max. 14 dBm
Modulation:	DSB-ASK
Antenna Gain:	5 dBic
Antenna Polarization:	Integrated circular polarized antenna
Air Interface Protocol:	EPCglobal UHF Class 1 Gen 2 Version 2.0.0 Supports tag vendor specific custom commands Supports NXP UCODE DNA
Tag Communication Rate:	40 kbps
Data Encoding Interrogator -> Tag:	PIE, 40kHz
Data Encoding Tag -> Interrogator:	FM0, 40kHz
Tag Read Rate:	Up to 50 tags/second
Tag Read Range:	Up to 50 cm, depending on tag and environment (Tested with an ALN-9662 tag)
Ethernet Interface :	10/100 Mbps TCP/IP protocols Supports IP Configuration - Static, DHCP Supports DNS (Default configuration is: Static IP Address, 192.168.0.110)
USB Interface:	USB 2.0 Full Speed It appears as USB serial port USB mini-B connector
User Interface:	Power LED (orange) Status LED (green)
Operating Temperature:	-20 °C do +55 °C
Power Supply:	5 VDC (Powered by USB interface)
Power Consumption:	max. 450 mA
Dimensions:	110mm L x 110mm W x 66mm H
Weight:	290 g
Length Of USB Cable::	1,8m

6 TSSTagger

The user interface of TSSTagger is split into five sections, or tabs:

Inventory Tab:
This is the main tab of the application used to connect and disconnect the reader and to start and stop the HID emulation. This tab also contains the inventory list where EPC numbers are stored.

Read/Write Tab:
This tab is used to read from and write to different memory banks of the tag.

Kill/Lock Tab:
This tab is used to adjust lock actions and permissions for different memory banks and passwords.

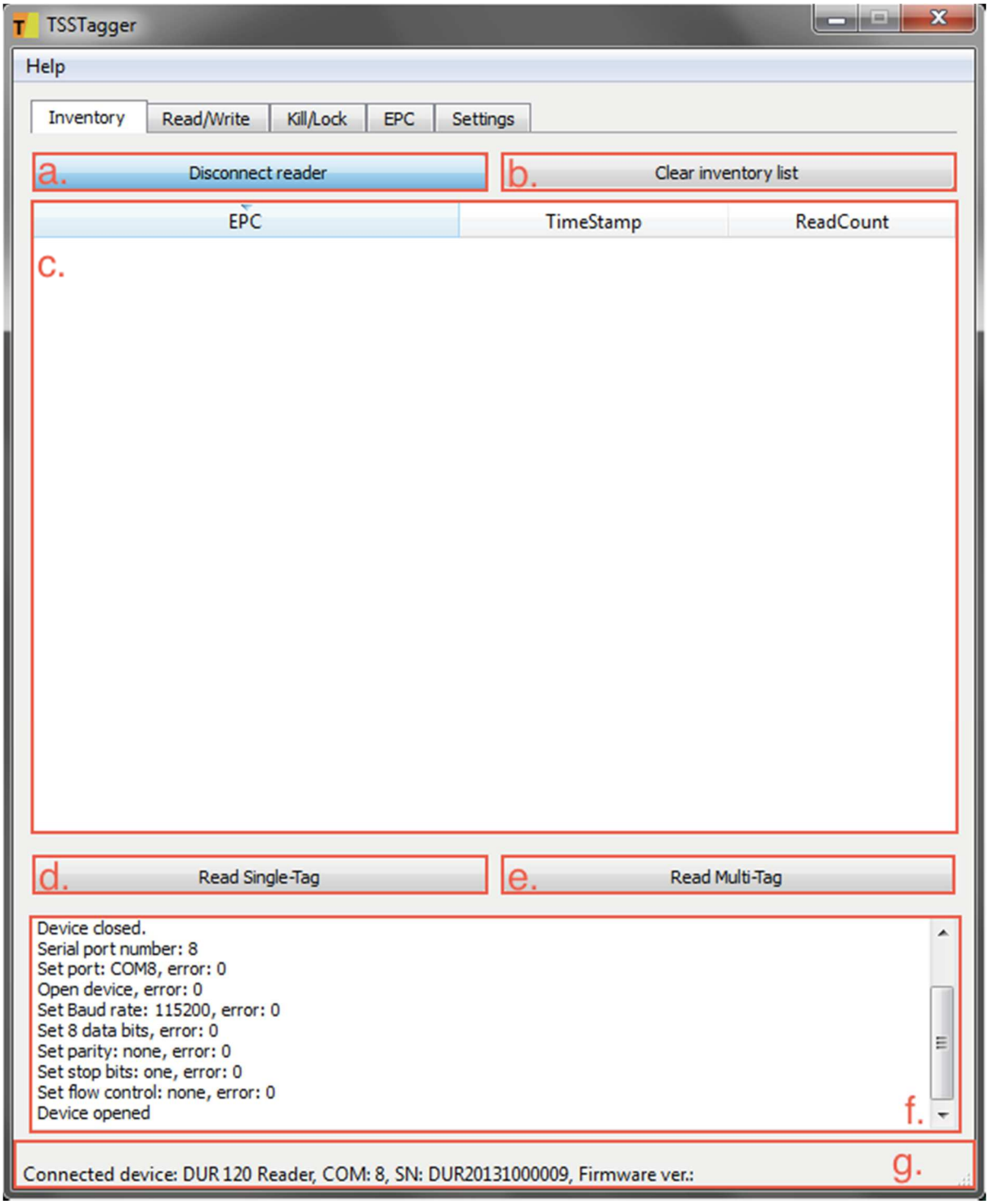
EPC Tab:
This is the application's EPC editor designed for easy EPC number editing.

Settings Tab:
This tab contains several application settings.

6.1 Installation

- Extract the contents of TSSTagger.zip into the program directory.
- Double-click vcredist_x86.exe to start the setup of Microsoft Visual C++ 2013 x86 Redistributable software package.
- The setup program guides you through the installation.
- Wait until Microsoft Visual C++ 2013 x86 Redistributable software package has been successfully installed.

6.2 Inventory Tab



a. **Connect reader**:
This button serves to connect and disconnect the reader. To ensure the reader will connect properly, the user should wait until Windows USB drivers have properly installed (this can be confirmed in the lower right corner of the screen in the Windows task bar notification area).

b. **Clear inventory list:**
This button clears the inventory list.

c. **Inventory list:**
This is where read counts of tags and EPC numbers are listed, sorted by time stamp. The maximum number of tags to be displayed in the inventory list can be set in the "*Settings Tab*". The list can be cleared using the "*Clear inventory list*" button located under the inventory list.

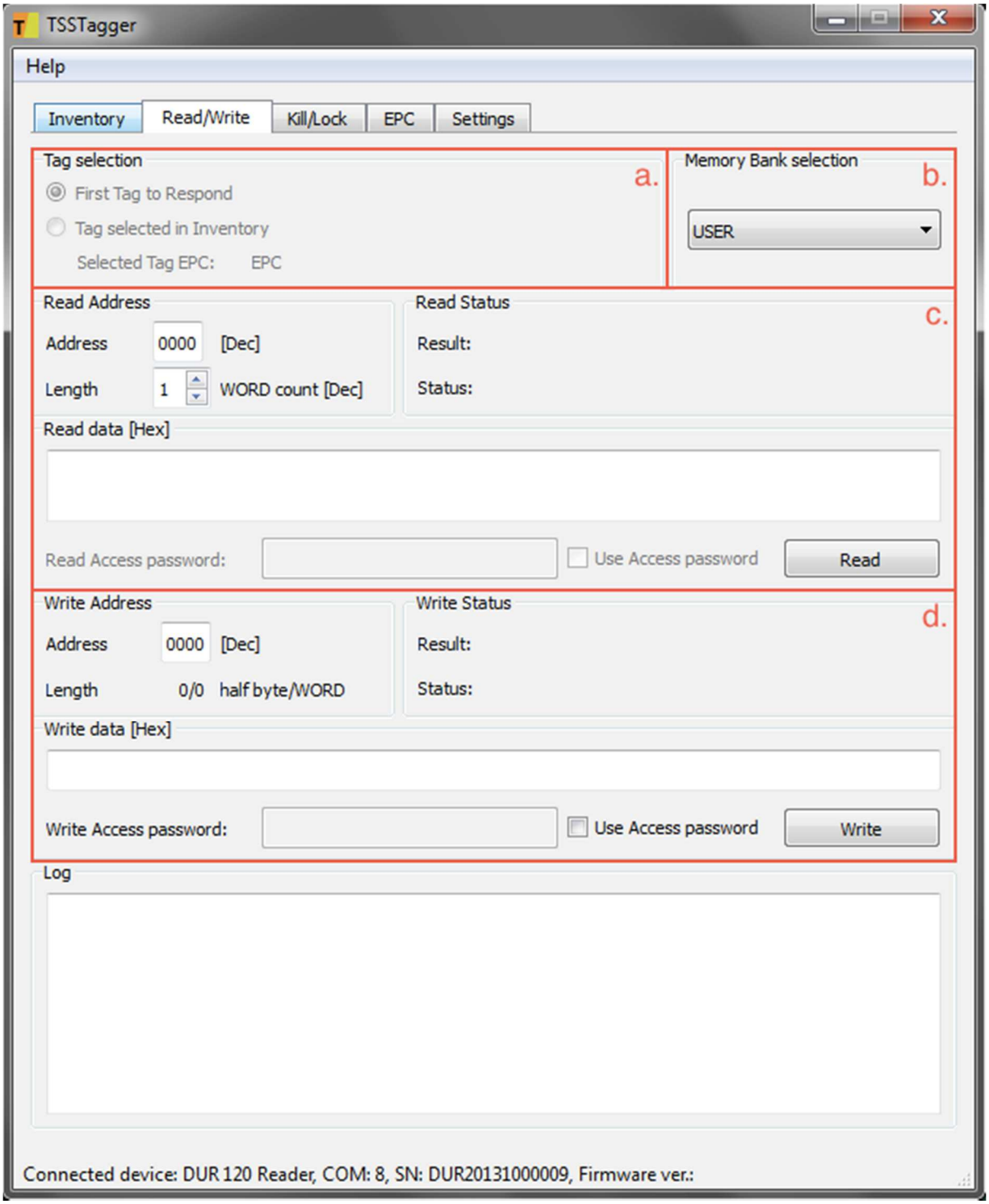
d. **Read Single-Tag:**
This button allows the user to read the EPC number of the tag, displaying it in the inventory list.

e. **Read Multi-Tag:**
This button allows the user to read the EPC numbers of multiple tags.

f. **Main log:**
The main log shows the connection status, sent and received packets and error messages related to serial port communication. Content of the main log can be copied and pasted or cleared using the right-click context menu.

g. **Status Bar:**
The status bar shows information about the currently connected device and any other messages.

6.3 Read/Write Tab



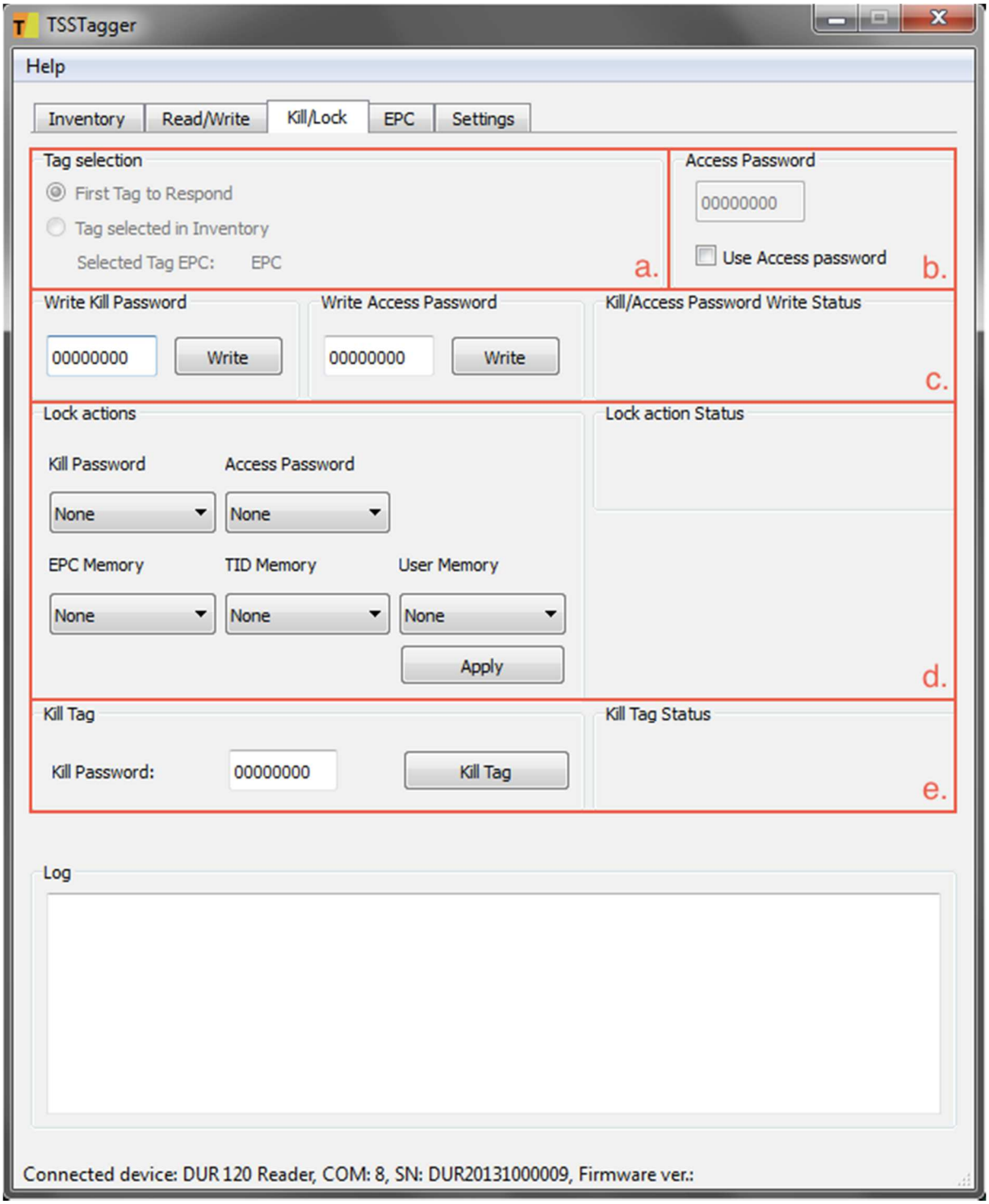
a. **Tag selection:**
These radio buttons allow the user to select between working with the first tag responding to the reader and the tag specified by the EPC number.

b. **Memory Bank Selection:**
Read and Write operations take place in one of the four memory banks (RESERVED, EPC, TID, USER). This combo box selects the memory bank to be used.

c. **Read Section:**
This section is used to read data from one of the four memory banks of the tag. The read operation is specified by an address (a decimal number representing the word starting address) and length (a decimal number representing the word count to be read). After the "*Read*" button is clicked and the process is successful, the requested data is displayed in the Read Data field in hexadecimal format. If the process fails, the Read Status shows an error message. If the memory bank to be read from is password protected, it is necessary to check the Use Access password checkbox and enter the password into the access password field.

d. **Write Section:**
This section is used to write data from one of the four memory banks of the tag. The write operation is specified by an address (a decimal number representing the word starting address). After the "*Write*" button is clicked, data from the Write data field is send to the reader. The success of the operation is indicated in the Write status section. The Read Data field accepts only hexadecimal values and the data have to be written in whole words (2 bytes). If the memory bank we want to write to is password protected, it is necessary to check the Use Access password checkbox and enter the password into the access password field.

6.4 Kill/Lock Tab



a. **Tag selection:**
These radio buttons allow the user to select between working with the first tag responding to the reader and the tag specified by the EPC number.

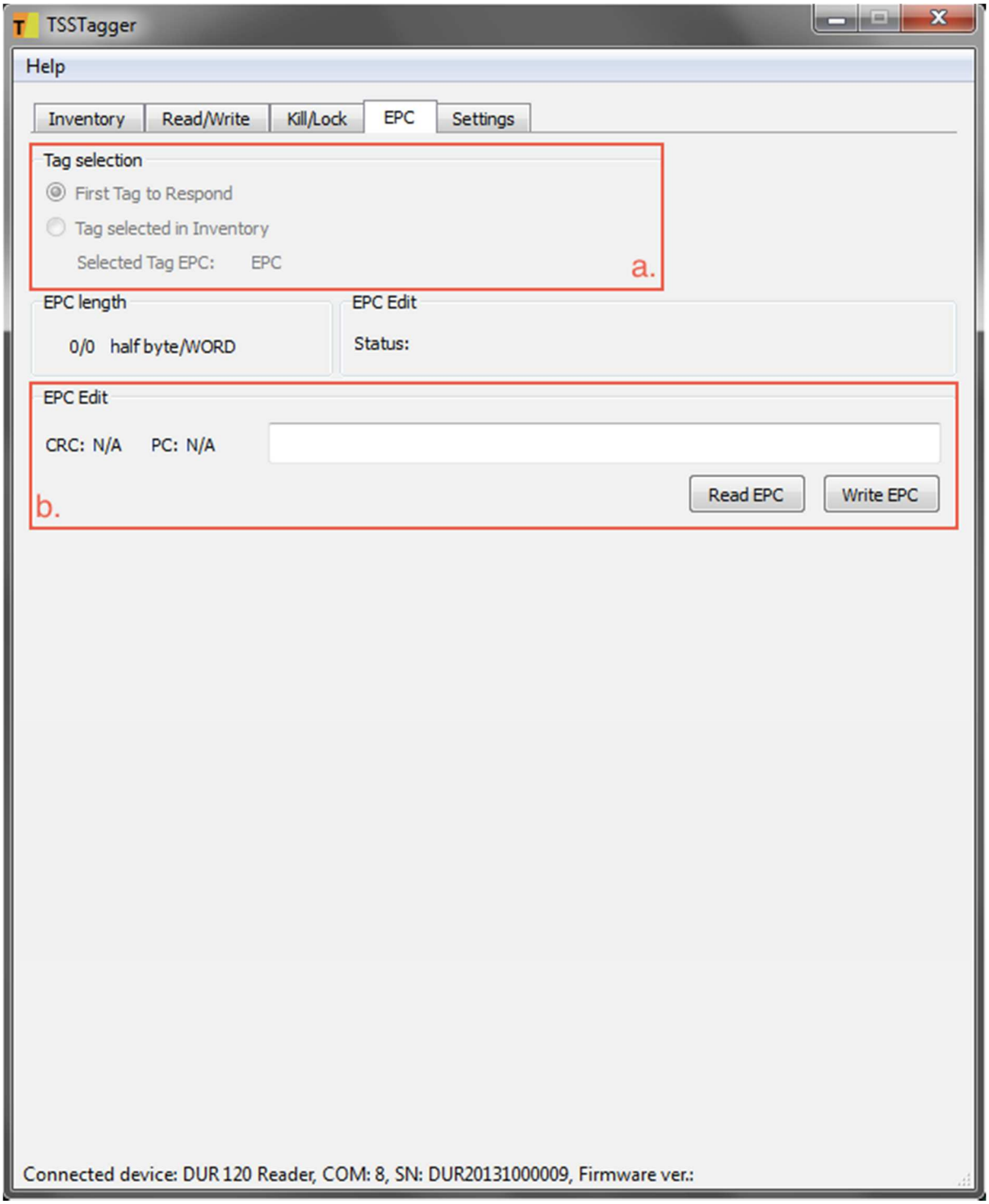
b. **Access Password:**
If the tag is password protected, it is necessary to check the Use Access password and enter the password into the access password field.

c. **Write Kill/Access Password:**
These fields are used to write the kill or access passwords.

d. **Lock actions:**
Lock actions are used to set the permissions for different parts of the memory such as EPC Memory, TID Memory and User Memory, and also to set permissions for kill and access passwords. The following permission types are available: Read/Write, Permalock, Permaunlock, Unlock. After the desired permissions are set in the Lock actions section, click the "*Apply*" button to apply the lock actions.

e. **Kill Tag:**
After filling the Kill password field, this section enables the user to execute the Kill tag command that will permanently disable the tag, making it impossible to read again.

6.5 EPC Tab

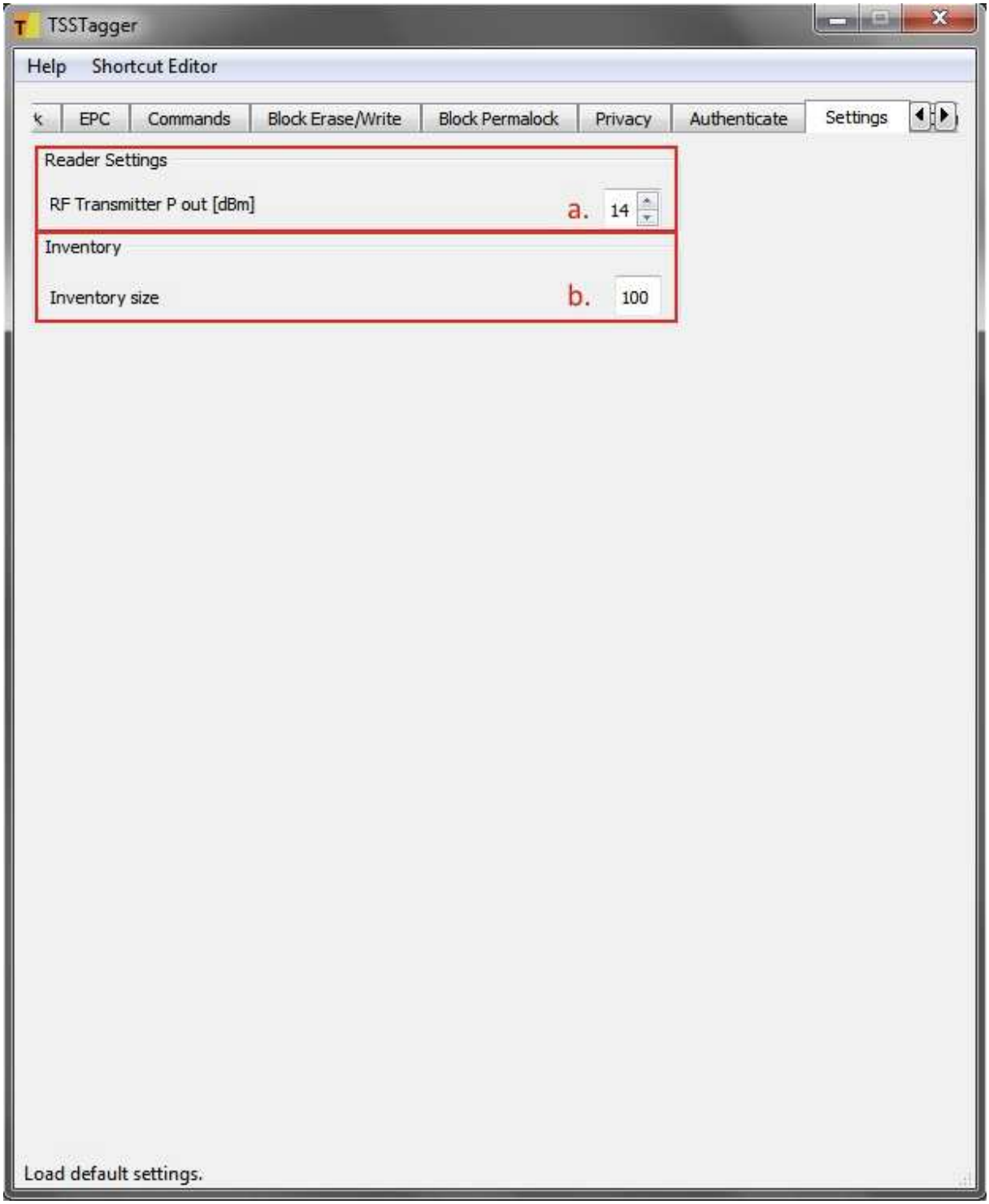


a. **Tag selection:**
These radio buttons allow the user to select between working with the first tag responding to the reader and the tag specified by the EPC number.

b. **EPC Edit:**
After the "*Read EPC*" button is clicked, this field shows the tag's EPC number. After editing, the new EPC number can be written to the tag by pressing the "*Write EPC"* button. The EPC number can be edited in the Write section as well, but the PC number is not automatically calculated. If it is required to automatically calculate the PC number of the tag according to the EPC number, the EPC editor in the "*EPC Tab"* has to be used for this instead.

6.6 Settings Tab

This Tab is used to configure the connection settings. Note: LAN settings are available on for DUR 120 Ethernet device.



6.6.1 Reader Settings

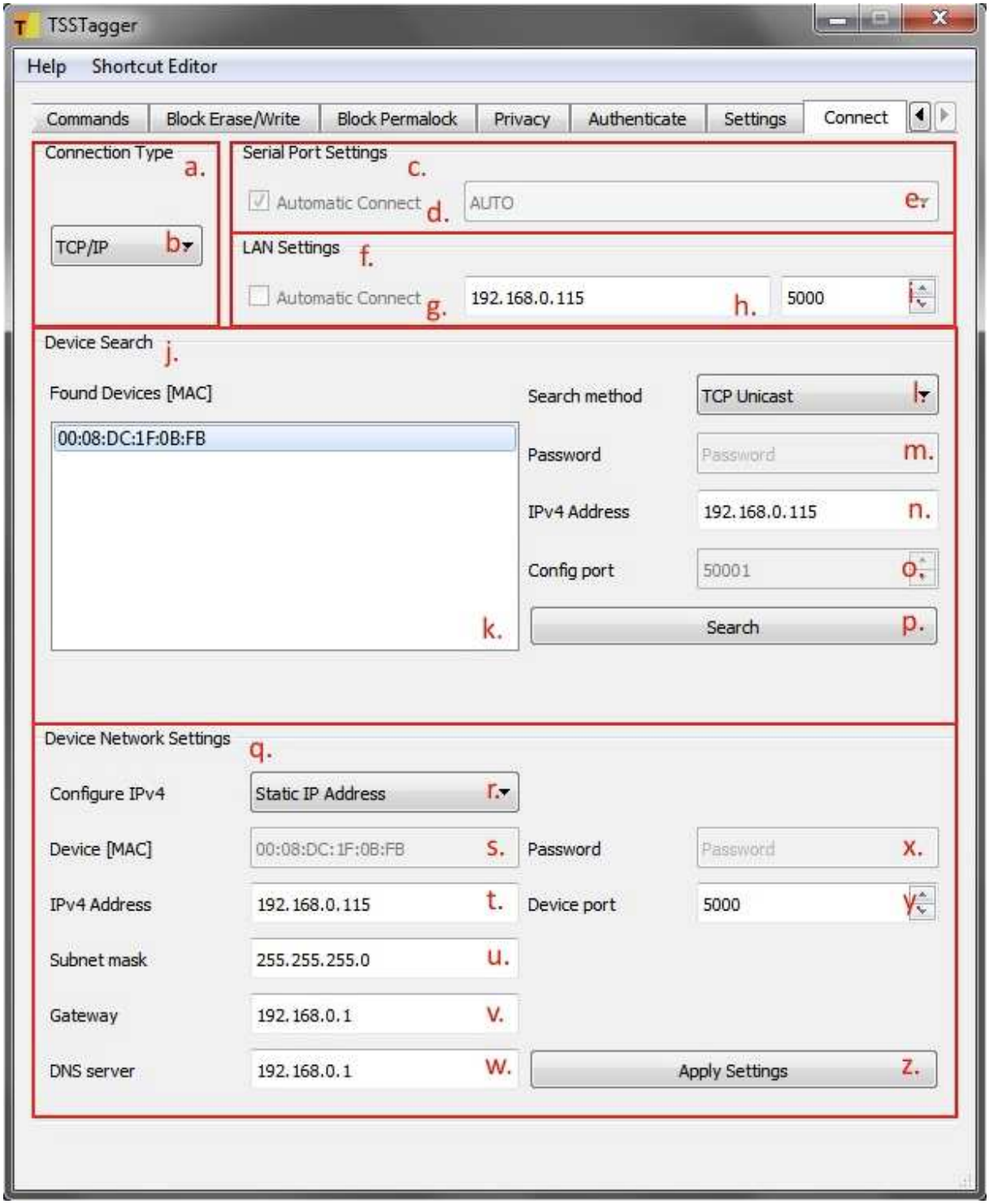
RF Transmitter Power (a)
Here you can set the RF Transmitter power output to values from 0 to 14 dBm. Higher values translate to longer reading distances, but also higher possibility of reading other tags in the proximity.

6.6.2 Inventory

Inventory (b)
The inventory size defines the maximum number of EPC numbers listed in the inventory list. If the inventory size limit is reached, the oldest EPC numbers are discarded. This also happens if inventory size gets decreased.

6.7 Connect Tab

This Tab is used to configure the connection settings. Note: LAN settings are available on for DUR 120 Ethernet device.



6.7.1 Connection Type (a)

Connection Type (b)
This combo box select the communication method used to connect to the reader. Supported communication methods are Serial Port and TCP/IP. Note: TCP/IP connection method is only available for DUR 120 Ethernet device.

6.7.2 Serial Port Settings (c)

Automatic connect (d)
If checked, the application automatically connects to the serial port specified in the “Port Selection” setting.

Port selection (e)
The default setting for serial port selection is Automatic, so the application tries to find the device connected to the computer. In case of any problems, the automatic COM port selection can be overridden, enabling the user to choose from the list of available devices manually. If there is more than one TSS Company Reader connected to the computer, please select the COM Port manually.

6.7.3 LAN Settings (f)

Automatic connect (g)
Disabled function.

Host IP Address (h)
This field specifies the reader IP Address. Default IP address of DUR 120 ETHERNET is 192.168.0.110

Port selection (i)
This field specifies the reader port number. Default value is 5000.

6.7.4 Device Search (j)

This section is used to search for devices connected to network. When device is found a MAC address appears on found devices list. These devices can be configured in the "Device Network Settings" section.

Found Devices List (k)
List of found devices identified by MAC Address. After clicking on the desired devices we can start to configure this device in the "Device Network Settings" section.

Search method (i)
In this combo box we can chose which method we want to use to search for devices.
TCP Unicast – this method is used when we know the IP address of the device we want to configure.
UDP Broadcast – this method is used when we want search for multiple devices or we don't know the exact IP address of the devices.

Password (m)
Disabled function – This field is used when the device is password protected.

IP Address (n)
This field is used to specify the device IP Address we want to search for. Note: In case you chose UDP Broadcast the Broadcast address (255.255.255.255) can be used only when the devices is not behind router. I the device is behind router please specify your subnet e.g. (192.168.1.255).

Config port (o)
Disabled function – This field specify the device configuration port number.

Search Button (p)
This button executes the search according to the chosen criteria in "Device Search" section. Found devices will be listed in "Found devices" list.

6.7.5 Device Network Settings (q)

After selecting device in “Found Devices” list selected device configuration is displayed in this section

Device MAC (s)
This field shows the selected device MAC Address.

Configure IPv4 Address (t)
This field is used to change the reader IP address.

Subnet Mask (u)
This field is used to change the device Subnet Mask.

Gateway (v)
This field is used to change the device Gateway.

DNS Server (w)
This field is used to change the device DNS Server address.

Password (x)
Disabled function - This field is used to change the reader security password.

Device port (y)
This field is used to change the device port number.

Apply Settings Button (t)
This button starts the configuration of the device.

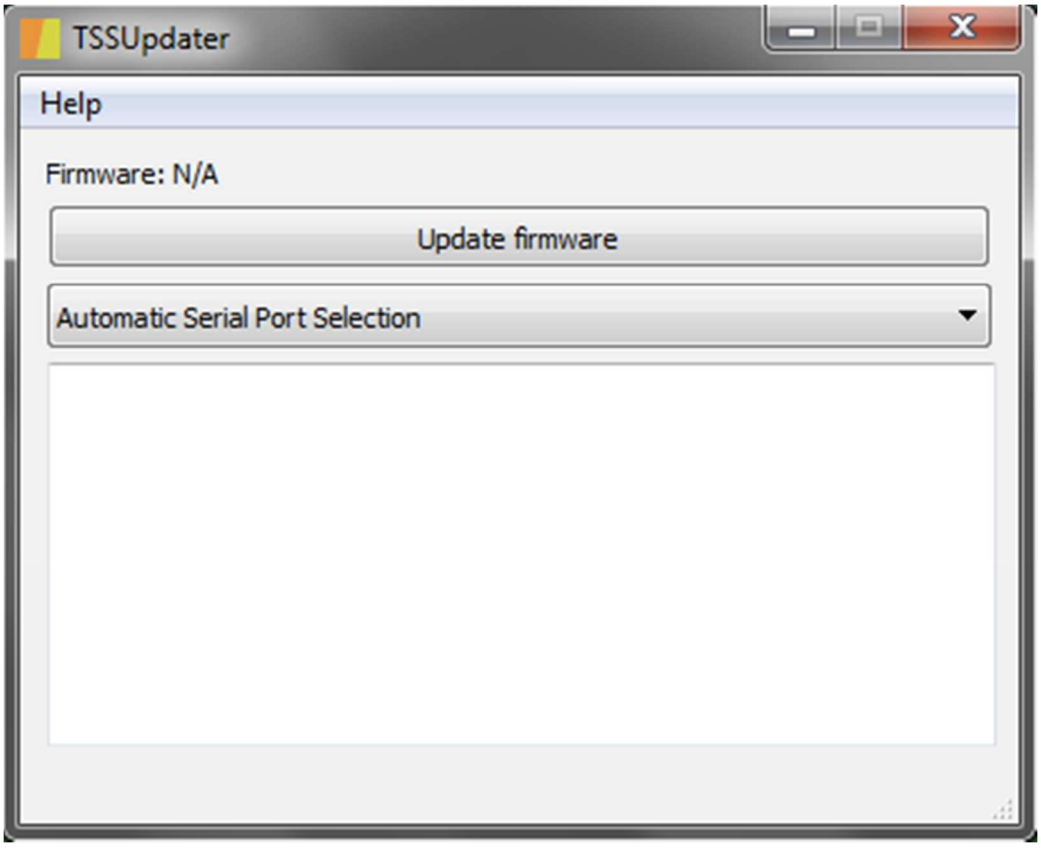
7 TSSUpdater

7.1 Installation

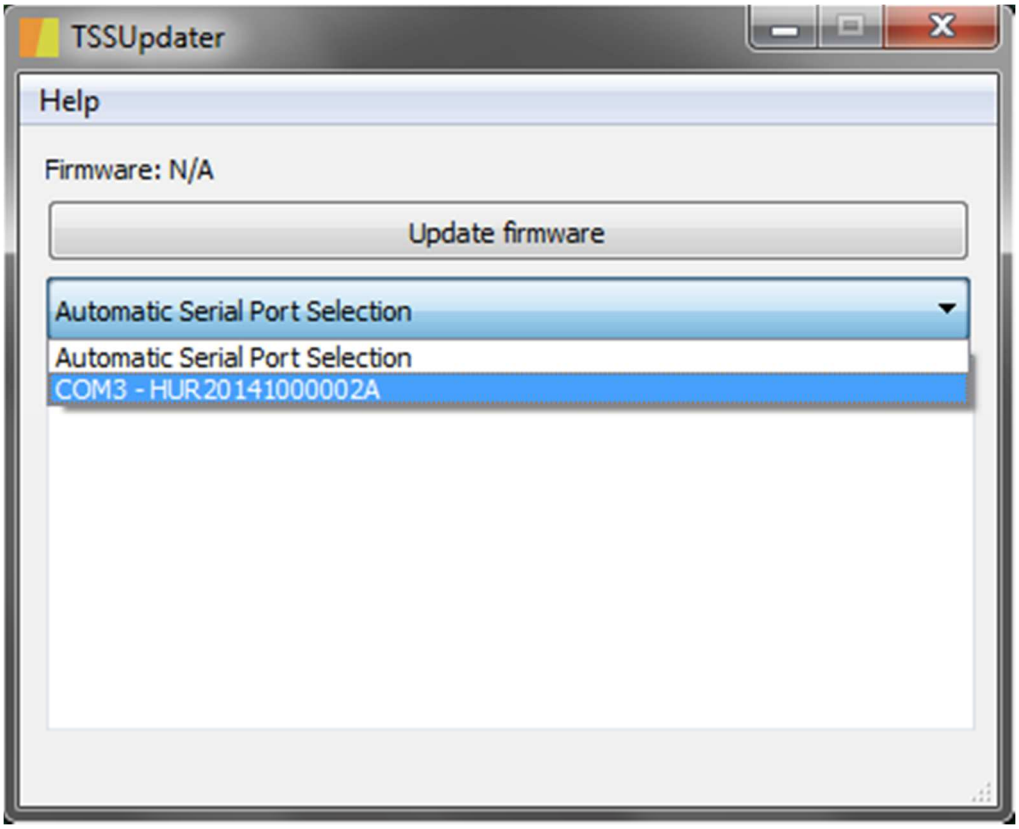
- Extract the contents of TSSUpdater.zip into the program directory.
- Double-click vcredist_x86.exe to begin the setup of Microsoft Visual C++ 2013 x86 Redistributable software package
- The setup program guides you through the installation.
- Wait until Microsoft Visual C++ 2013 x86 Redistributable software package has been successfully installed.

7.2 Firmware update

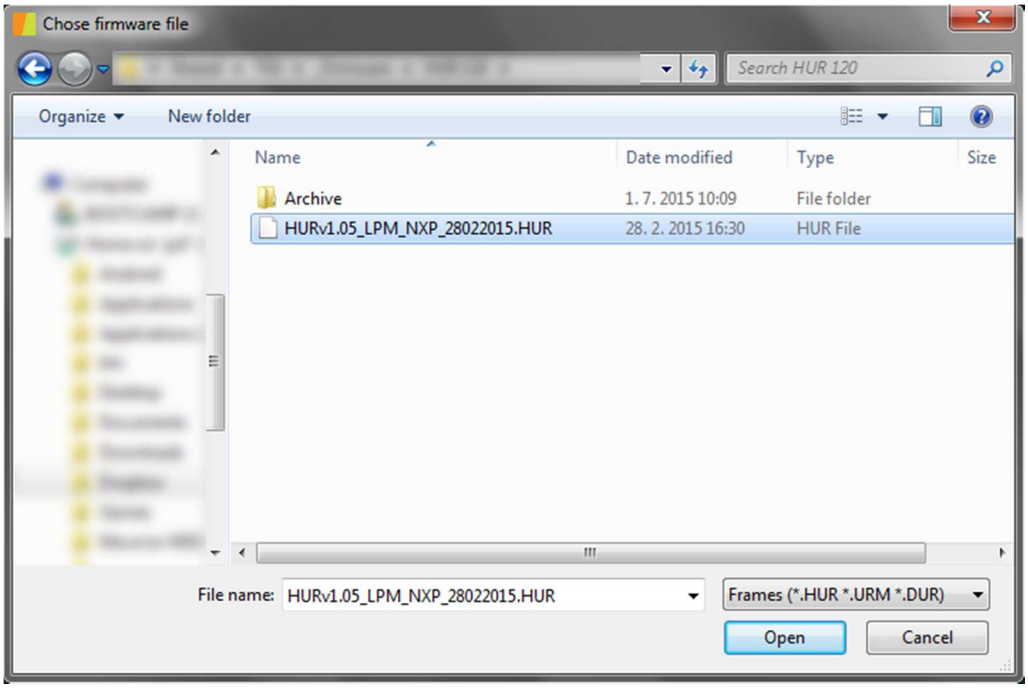
- Connect the device to a PC via a USB connection. (A USB to Serial driver has to be installed on the PC)
- Run TSSUpdater.exe from the program directory.



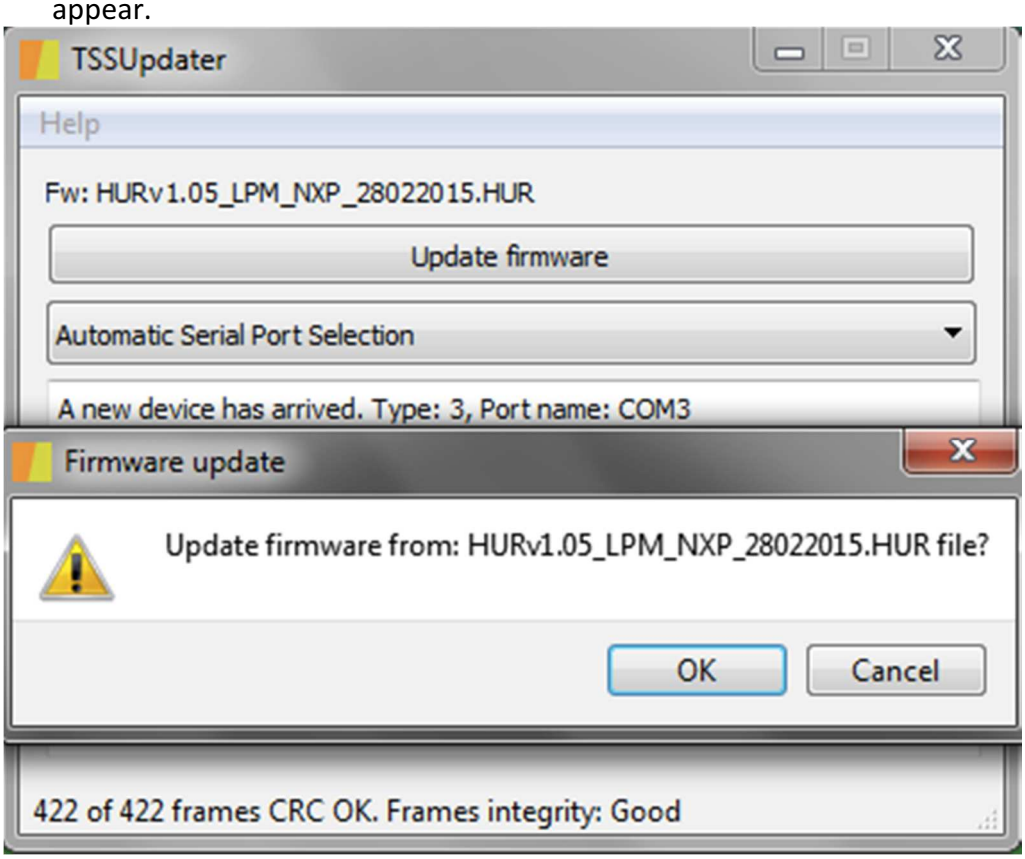
(Optional) If you want to update the firmware of mURM module in other device than HUR120, DUR120, or mURM Evaluation Board, please select the device from combo box menu.



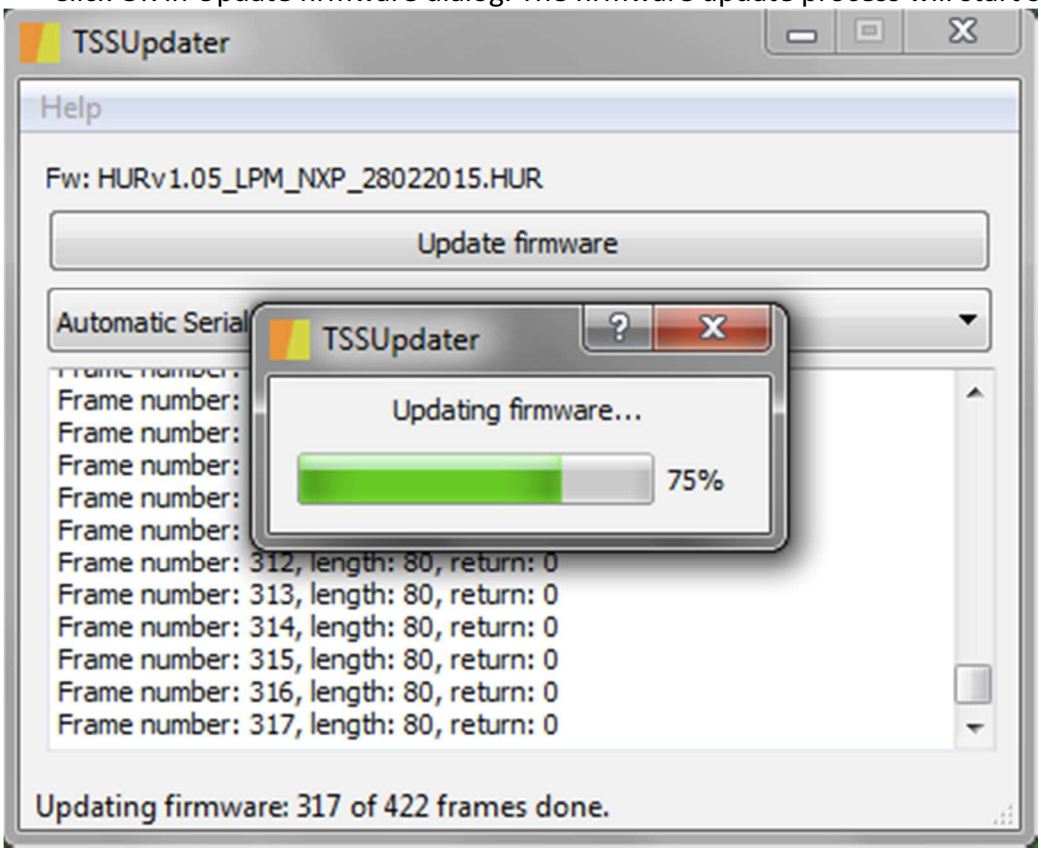
- Click the Update firmware button. The firmware file selection dialog will appear.



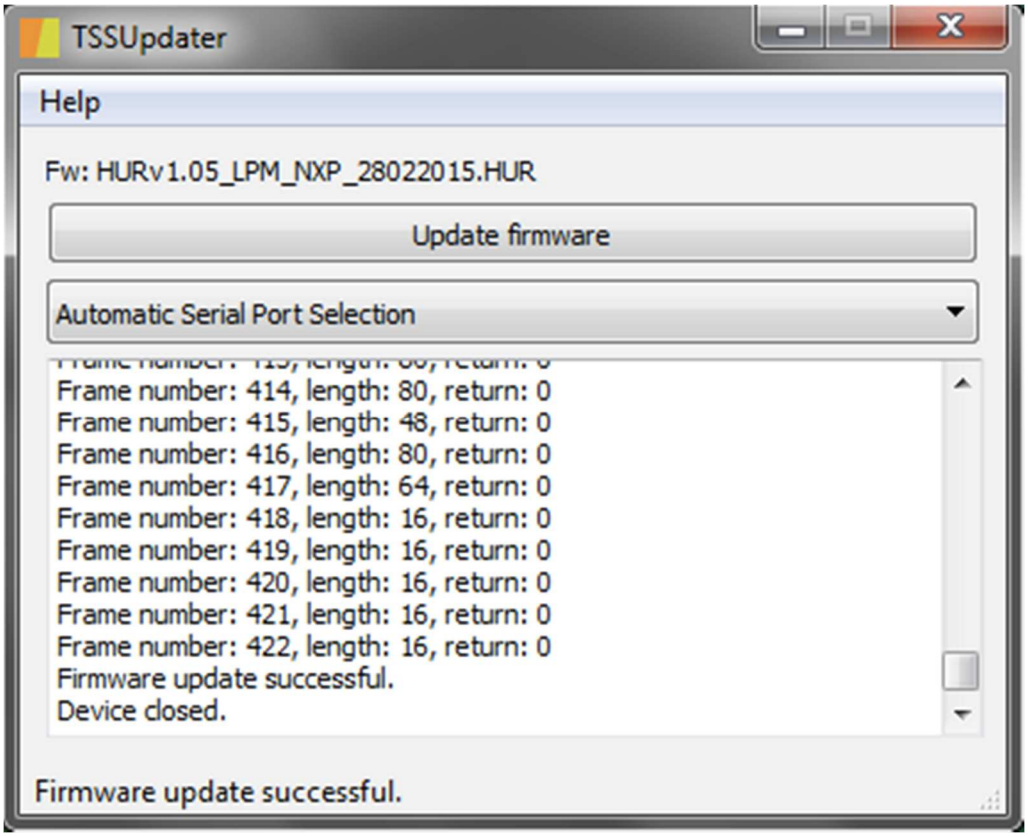
- Select the desired firmware file and click Open. The Update firmware dialog will appear.



- Click OK in Update firmware dialog. The firmware update process will start shortly.



- Wait until the “Firmware update Successful” message appears in the status bar.



7.3 Troubleshooting

System Error

This error can occur if one of the required DLLs is missing from the program directory, or when the Microsoft Visual C++ 2010 x86 Redistributable software package is not installed.
Extract the contents of TSSUpdater.zip into the program directory and install the Microsoft Visual C++ 2010 x86 Redistributable software package.

Bad Frames integrity

This error can occur if the firmware file is corrupted.
Obtain a new copy of the firmware file.

Serial port error

This error can occur when opening a session while using a serial port.
Restart the application or unplug your device and plug it back in again.

Firmware update error

This error can occur if the device was accidently unplugged before the update process has finished or because of a communications error between the device and the connected computer.
Start the firmware update process again.

Error 33

This error can occur in the rare situation of the device firmware being faulty.

8 References

[1] EPCglobal Low Level Reader Protocol (LLRP), Version 1.1, Ratified Standard, October 13, 2010
http://www.gs1.org/sites/default/files/docs/epc/llrp_1_1-standard-20101013.pdf

[2] EPC Radio-Frequency Identity Protocols, Class-1 Generation-2 UHF RFID, Version 1.2.0
http://www.gs1.org/gsmp/kc/epcglobal/uhfc1g2/uhfc1g2_1_2_0-standard-20080511.pdf

[3] URMSP Serial Communication Protocol, Reference Manual, Ver. 1.2 (TSS_URMSP_ver1.2_15062015.pdf)

[4] TSSAPI-C Application programming interface, Developer's Guide, Ver. 1.3 (TSSAPI_1.3_Developer's_Guide.pdf)

9 Revision History

Version	Date	Description
1.0	1.7.2014	Initial version
1.1	13.8.2014	Added TSSUpdater
1.2	4.10.2015	Added DUR 120 ETHERNET
1.3	20.4.2016	Added some default configurations of DUR 120 ETHERNET

Disposal of the product
Do not dispose of the product in municipal or household waste. Please check your local regulations for proper disposal and/or recycling of electronic products.

Annex 1: Declaration of Conformity

R&TTE Declaration of Conformity (DoC)

Unique identification of this DoC: 2014010104

We, TSS COMPANY s.r.o.
Pod Rovnicami 41,
84104 Bratislava,
Slovakia,

CE

declare under our sole responsibility that the product:

PRODUCT NAME:	Desktop UHF RFID reader
TRADE NAME:	DUR 120
TYPE OR MODEL:	DUR 120 ver. 1.0

to which this declaration relates is in conformity with the essential requirements and other relevant requirements of the R&TTE Directive (1999/5/EC).
The product is in conformity with the following standards and/or other normative documents:

SAFETY (Art. 3(1)(a)):	EN 60950-1: 2006 EN 60950-1: 2006/A11: 2009 EN 60950-1: 2006/A1: 2010 EN 60950-1: 2006/A12: 2011 EN 60950-1: 2006/AC: 2011
EMC (Art. 3(1)(b)):	EN 301 489-3: V1.4.1: 2002 EN 301 489-1: V1.9.2: 2008
SPECTRUM (Art. 3(2)):	EN 302 208-1 V1.4.1: 2011 EN 302 208-2 V1.4.1: 2011
Supplementary information: Technical file held by:	TSS COMPANY s.r.o.
Place and date of issue (of this DoC):	TSS COMPANY s.r.o. Pod Rovnicami 41 84104 Bratislava 1.1.2014

Signed by or for the manufacturer: .....

Peter Spiess
Chief Executive Officer

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Pod Rovnicami 41, 841 04 Bratislava
IČO: 46410309 IČ DPH: SK2023364431