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TED-Kit 2

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User manual

Document information

Info	Content
Keywords	TED-Kit 2, HITAG, Immobilizer, PKE, RKE
Abstract	The purpose of this document is to describe how to install and use the TED-Kit 2 and its GUI software. The intended audiences are engineers planning to use the TED-Kit 2.

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1. Introduction

The purpose of this document is to describe how to install and use the TED-Kit 2 and its GUI software. The intended audiences are engineers planning to use the TED-Kit 2.

Section 2 gives a very brief system overview to explain all the terms used throughout this manual.

Section 3 describes in detail what requirements the host system must meet to use the TED-Kit 2 software and hardware, how to install the software and how to remove it afterwards.

Section 4 gives a quick-start in 5 simple steps to authenticate with a HITAG 2 transponder and show the content of its EEPROM.

Section 5 introduces the GUI and shows how to accomplish common tasks like configuring the base station and interacting with a transponder IC.

Section 6 describes all elements of the user interface in detail; it may be used as a reference.

Section 7 describes some tips & tricks and how to deal with operation errors.

Section 8 shows the PCBs and schematics of the TED-Kit 2 hardware.

2. System overview

This chapter will give a brief system overview to explain all the terms used throughout this manual.

The TED-Kit 2 system consists of hardware and software used to evaluate and demonstrate the base station and transponder functionality of NXP devices. Fig 1 illustrates all major components of a typical system setup.

Fig 1.   System Overview
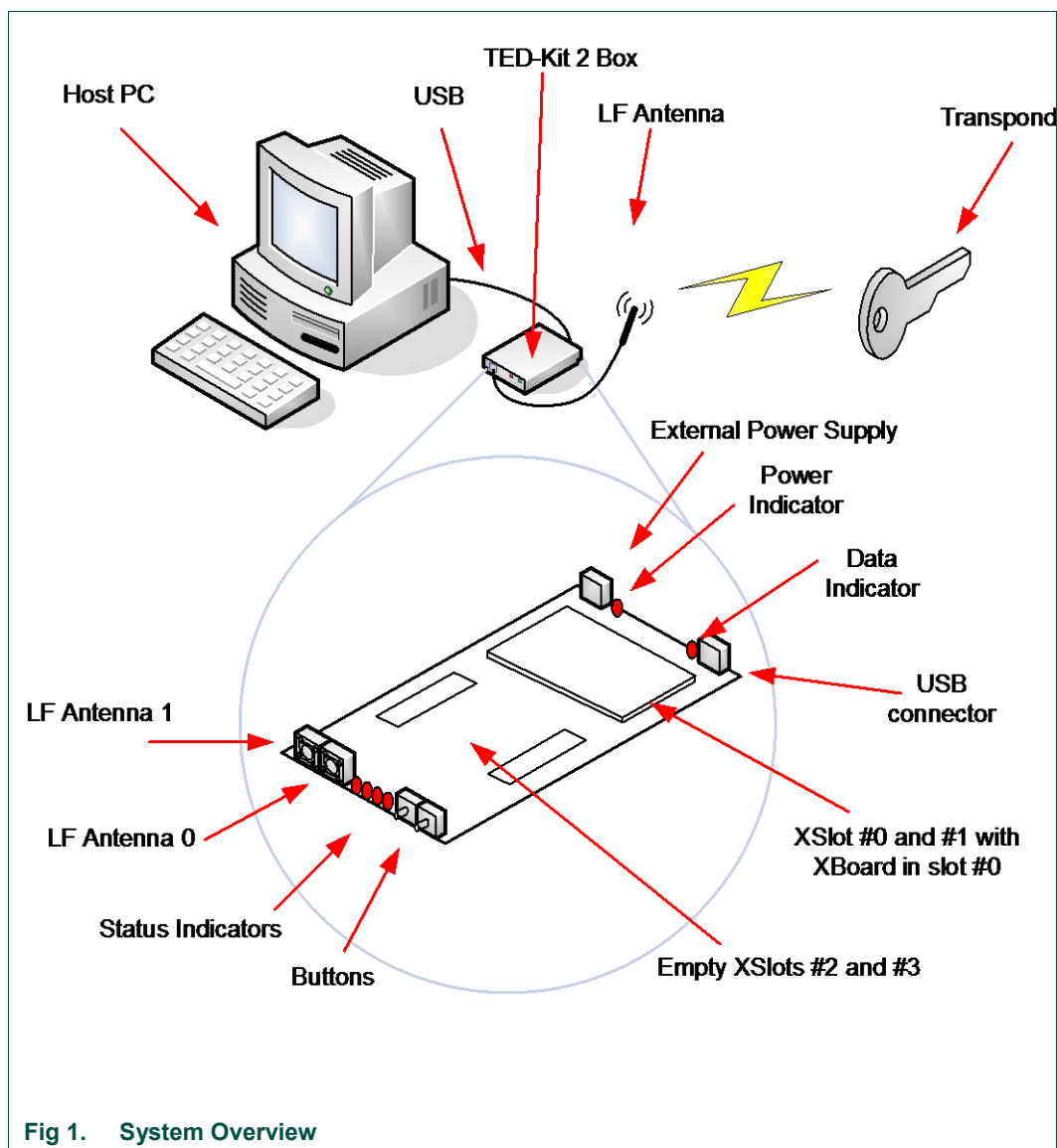
The host PC running the TED-Kit 2 software connects with the TED-Kit 2 box via USB. One or two external LF antennas are connected (depending on the internal configuration). Via the antenna, the TED-Kit 2 box exchanges data with the transponder IC found in e.g. a key.

The TED-Kit 2 box itself has 4 so called XSlots. Each of them can take one XBoard containing actual functionality like e.g. an ABIC1 base station IC. On one side of the box, the USB connector and the external power supply can be found. The later is used if the XBoards require extra power which cannot be delivered by the USB port. Besides that, a power and a data indicator can be found. The first lights as soon as power is available and the TED-Kit 2 box can be used, the second lights if data are transmitted to or from it via USB.

On the opposite side of the TED-Kit 2 box, the two antenna plugs for LF antenna #0 and #1 can be found. Aside of them, 4 LED indicators are located used for several different purposes (e.g. to indicate some status or error condition). Next to the LEDs, 2 buttons

are found which can be used by the firmware of the TED-Kit 2 box (they have no function yet).

2.1 Supported applications and hardware

The table below shows the supported applications and the hardware required by the TED-Kit 2 system:

Table 1.   Supported applications and hardware

| Application | | Hardware | | | |
| | | Transponder | | XBoards | |
		ID	Example	LF	UHF
Immobilizer	HITAG2	A	PCF7936A		
	HITAG2+	A	PCF7946A		
	HITAG2+EE	A	PCF7947A		
	HITAG2-Extended	E	PCF7937EA		n/a
	HITAG3	X	PCF7961X	ABIC1	
	HITAG-Pro	P	PCF7939P		
	HITAG-Pro 2	V	NCF2950V		
Remote Keyless Entry		RKE	PCF7945A		LoPSTer
Passive Keyless Entry		PKE	PCF7952A		

3. Setup

This chapter will explain the necessary system requirements for the TED-Kit 2 software and hardware as well as how to install and remove the software.

3.1 System requirements

The computer system used as host for the TED-Kit 2 software and hardware must meet the following requirements:

1. It must run Windows XP. Although it is expected that Windows 2000, Vista and 7 will work also, these systems are not tested and not supported.

2. For each TED-Kit 2 box, a free USB (Version 2) port must be available on the host PC. Although it is expected that USB V1 or V1.1 ports will work also, this is not tested and thus, not supported.

3. The screen size shall be at least 1024 x 768 pixels. Although the software will run on screens with lower size, it is not recommended because the use of GUI and its forms will become less convenient.

4. Software to show Adobe PDF documents shall be installed on the system to be able to read the documentation and the data sheets.

5. The user account used to install the software must have administration rights (due to device driver and system component installation procedures).

3.2 Installing the software

Note: To avoid any conflicts with previous versions of this software, it is recommended to remove them before continue installing a new version.

The installation process is quite simple. Insert the media containing the TED-Kit 2 Setup software in the host PC and run Setup.exe. The installer will guide the user through the installation process.

Before starting the software for the first time, please install the hardware (see section 3.3, page 6).

Note: To read the documentation and the data sheets, proper PDF reader software is required. Please make sure your system contains such software, e.g. Adobe's PDF Reader (available for free from [Adobe](#)).

3.3 Installing the hardware

Usually, the hardware comes ready to use with everything installed already. In case the XBoard is delivered separately, it must be installed in the TED-Kit 2 board first:

1. Open the TED-Kit 2 box removing 4 screws (2 at each front side).

2. Plug the ABIC1 XBoard in the XSlot #0 of the TED-Kit 2 main board. XSlot #0 can be found on the main board; a label says *Extension slots 0 and 1*. It is the one closer to the USB and power supply plugs. It might be necessary to open the TED-Kit 2 box first.

3. Plug the antenna in port LF0. Port LF0 is the antenna port closer to the 4 status LEDs.

4. Plug the USB cable in the USB port of the TED-Kit 2 and the host PC.

5. The Windows Hardware Wizard will pop-up and ask for the appropriate driver. Point it to:
   `[TED-Kit 2 Installation Folder]\Device Driver`

6. The Hardware Wizard will finish the driver installation.

3.4 Removing the software

To remove the software from the PC, the standard procedure of the Windows operating system shall be used. It will delete all software components as well as the installed driver software, manuals and (if installed) the software development components.

4. Quick start

This section shows how to connect with a transponder, authenticate and read out its EEPROM content very briefly. It will not give any detailed explanations. To walk through the steps, the software must be already successfully installed. The PCF7936AS (HI-TAG 2) transponder used in this example must be configured to do authentication in plain mode with the default settings and passwords.

1. Start the GUI via (Fig 2):
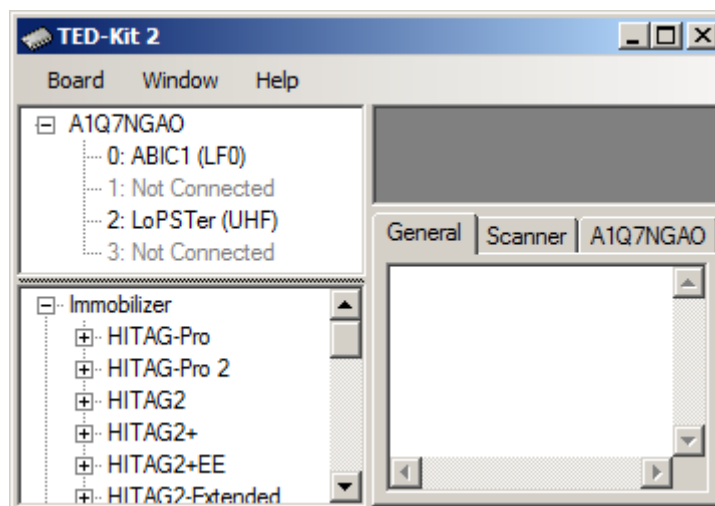   Start→All Programs→NXP Semiconductors→TED-Kit 2 V3→TED-Kit 2

Fig 2.   **TED-Kit 2 main window**

2. Expand the HITAG 2 node of the Immobilizer tree in the applet view and double-click PCF7936A to open the Immobilizer applet form (Fig 3).
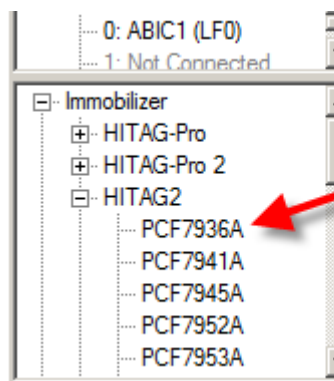

Fig 3.   **HITAG 2 immobilizer selection**

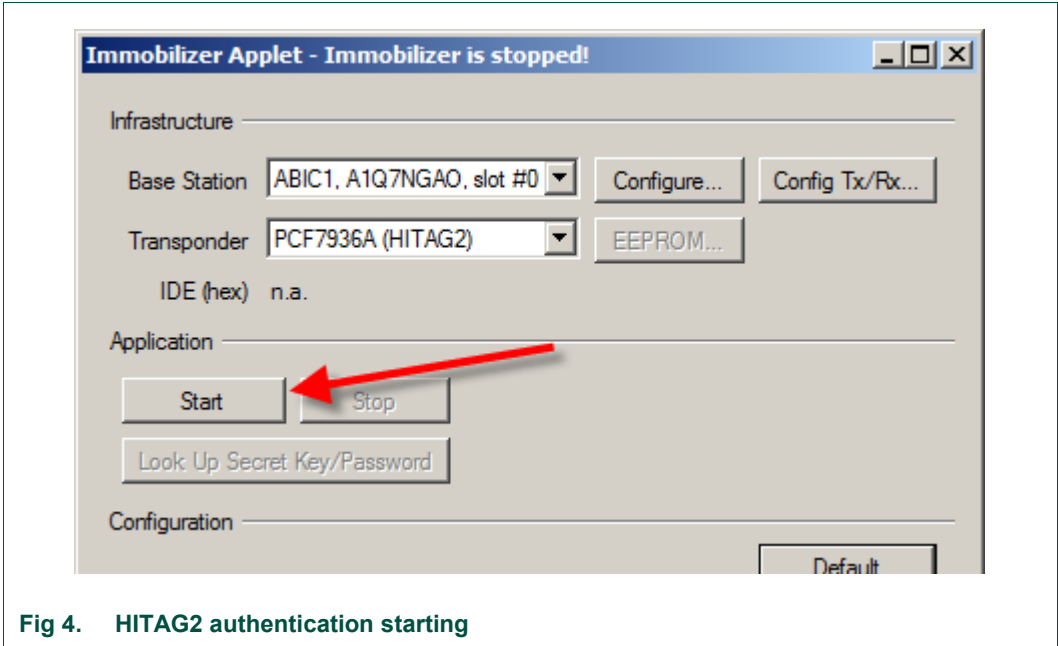3. Click the Start button to start the immobilizer applet form popping up (Fig 4).

Fig 4.   **HITAG2 authentication starting**

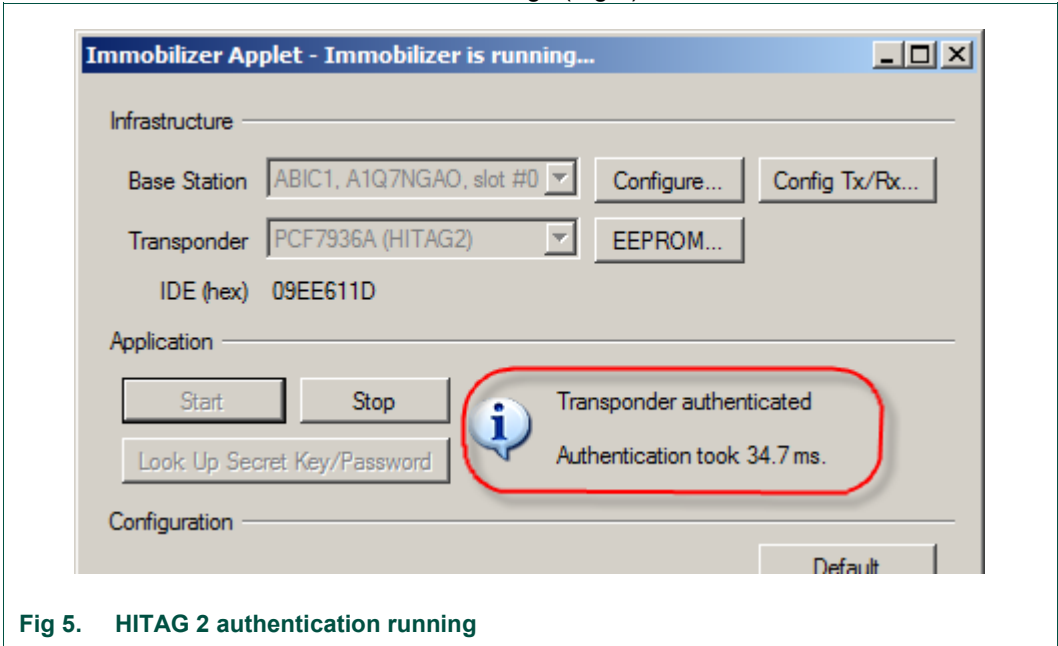4. The immobilizer applet runs and authenticates the transponder with the default communication and authentication settings (Fig 5).

Fig 5.   **HITAG 2 authentication running**

5. Click the EEPROM... button to open the memory window and see the content (Fig 6).
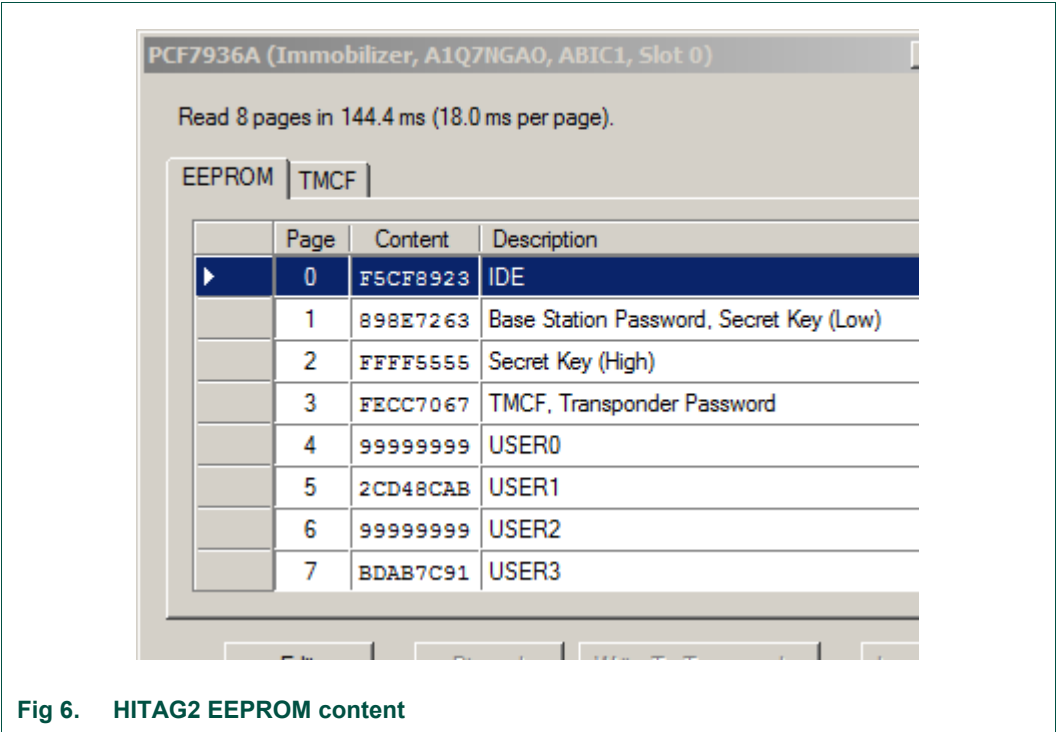
Fig 6. HITAG2 EEPROM content

5. Using the GUI software

This chapter will explain the basic concepts of the GUI software and how to perform common tasks. For a detailed reference of all functions offered, p   7, page 39.

To explain the functionality, the Immobilizer application with a PCF7991 (ABIC1) base station and a PCF7937EA (HITAG2-Extended) transponder is demonstrated.

5.1 Start the GUI

It is assumed that no TED-Kit 2 is currently plugged-in. To start the GUI, click:

Start→All Programs→NXP Semiconductors→TED-Kit 2 V3→TED-Kit 2

The splash screen appears, the application loads and shows the main window (Fig 7).
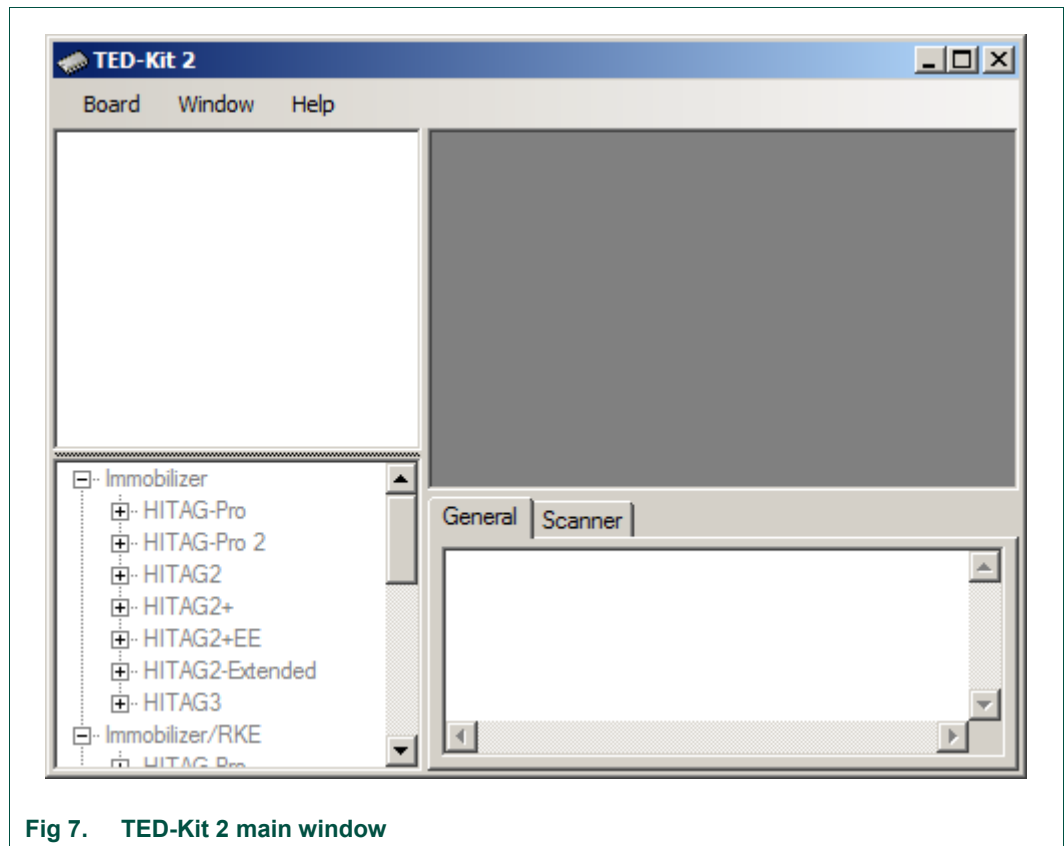
Fig 7.   TED-Kit 2 main window

The GUI will store its window size and location as well as the size of the Hardware-, Applet- and Message View. Each time it is restarted, these settings are restored. The settings are saved in this file:

`[Current User's Application Data]\NXP Semiconductors\TED-Kit 2\[Version]\config.dat`

For a typical Windows XP installation, this resolves to (for user *Me* and software version *3.1.0*):

`C:\Documents and Settings\Me\Application Data\NXP Semiconductors\TED-Kit 2\3.1.0\config.dat`

5.2   Exploring the connected TED-Kit 2 boxes

The upper left part of the main window always shows the hardware view. Here, a list with all connected TED-Kit 2 boxes appears. For each TED-Kit 2 box found, a new root node is created in the tree. Now, plug-in the TED-Kit 2 box in any USB port of the PC and wait until the hardware is detected and the hardware refreshes its content.

Note: The TED-Kit 2 GUI is able of handling multiple TED-Kit 2 boxes at once. DON'T start a new GUI for each TED-Kit 2 box attached to the computer. This will result in undefined behavior.

Depending on the board, the firmware or the hardware check may fail. This will result in different warning dialogs explained in sections 5.8 and 5.9.

If everything is OK with the board, the hardware view looks like Fig 8a. It shows one connected TED-Kit 2 box in the hardware view with the serial number A1Q55A99.
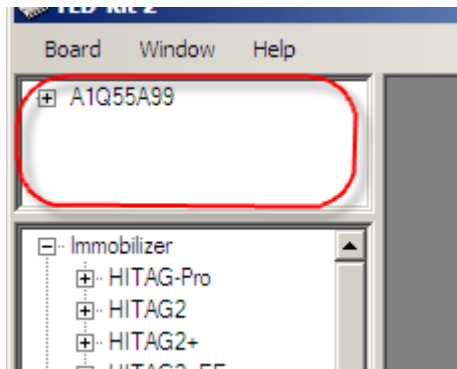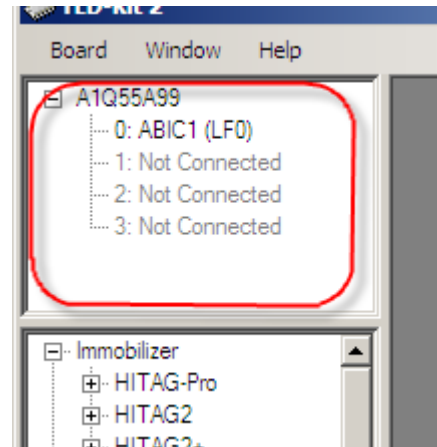
a. collapsed   b. expanded

Fig 8.   Hardware view

Note: TED-Kit 2 boxes can be plugged-in before or after starting the GUI. They are automatically detected. The hardware can also be removed at any time while the GUI is running.

Expanding the nodes will show the configuration of each TED-Kit 2 box according to the XSlots and XBoards plugged in. For each XBoard found, the connected antenna(s) are shown in the tree also (Fig 8b).

The TED-Kit 2 box currently connected has one XBoard: In slot #0, an ABIC1 which is connected to LF antenna #0 (LF0). The slots #1, #2 and #3 are empty. The Hardware View information is shown in Fig 9.
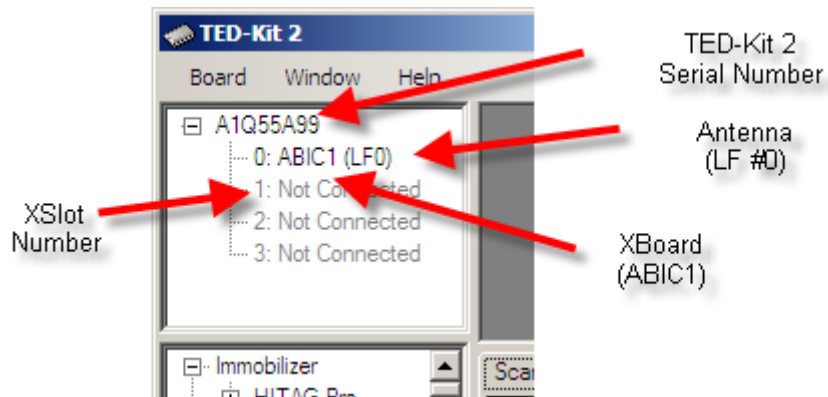
Fig 9.   Hardware view details

To get an even more detailed look at each TED-Kit 2 box, double-click on the tree node of the TED-Kit 2 of interest. A window showing all details available opens (refer to section 6.5 for details).

Double-clicking an ABIC1 node shown in the hardware view will open the ABIC1 XBoard configuration window explained in section 6.6.1.

Double-clicking a LoPSTer node will open the LoPSTer XBoard configuration window explained in section 6.6.2.

5.3 Exploring the available applets

The lower left part of the main window shows the applet view (Fig 10a).

    a.   Transponder families   c.   Transponder types

Fig 10.   Applet view
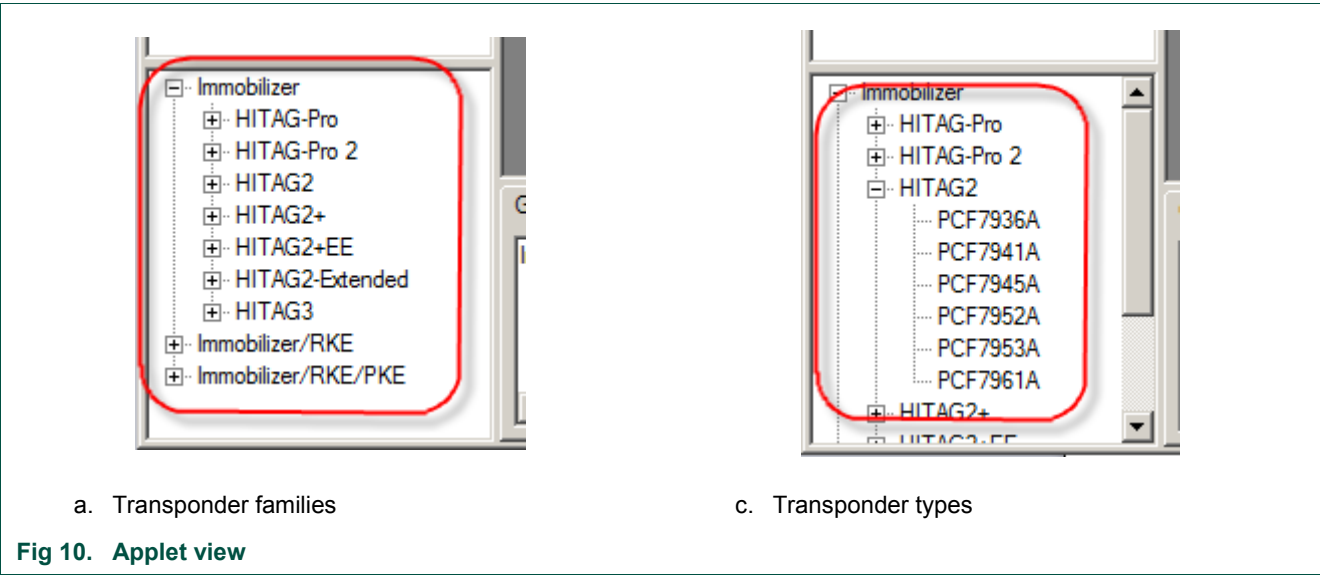
Here, all available applets are listed. In the current version of the software, three different applets exist: Immobilizer, Immobilizer/RKE and Immobilizer/RKE/PKE. Expanding the Immobilizer node shows all transponder families supported by this applet, expanding a family node shows all transponder types belonging to that family (Fig 10b).

The Applet View not just shows the available applets and supported transponder families. It also tracks the connected TED-Kit 2 boxes and their resources. If all resources are consumed by one or more applets running, the applets which cannot be started anymore are grayed out.

Fig 11.   Applet view deactivated
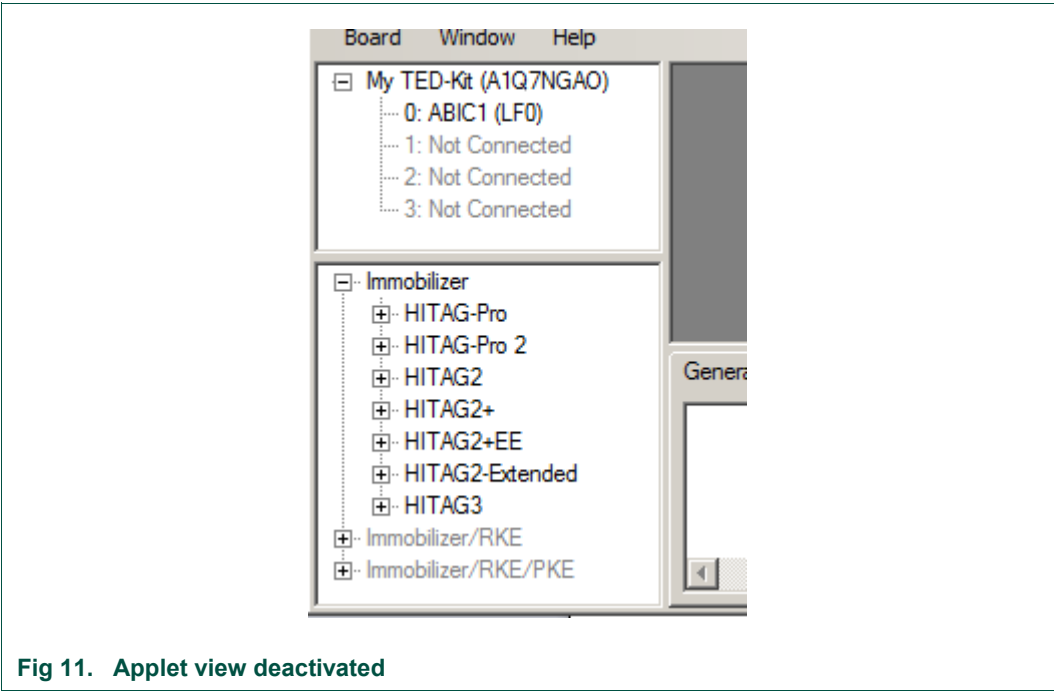
In Fig 11 there is one TED-Kit 2 box connected with one ABIC1 base station XBoard. Thus, the Immobilizer applet could be started.

To run an RKE or PKE applet, a LoPSTer XBoard is required. Because the current TED-Kit 2 does not have any, the Immobilizer/RKE and the Immobilizer/RKE/PKE applet trees are grayed out.

To run any of them, the current TED-Kit 2 box must be equipped with a proper LoPSTer board or a second TED-Kit 2 box (with at least one ABIC1 XBoard and one LoPSTer board) must be plugged-in. This can be done without closing the TED-Kit 2 GUI.

Note: If an applet (e.g. Immobilizer) consumes all remaining resources, the affected parts of the applet view are also grayed out to avoid starting applets without having proper hardware resources.

5.4 Running immobilizer applet

To run the Immobilizer applet, double click at one of the transponders of the desired family node below the Immobilizer node of the applet view. This will set the default values for this transponder in advance (all settings can be changed afterwards though).

The Immobilizer applet window appears (Fig 12).
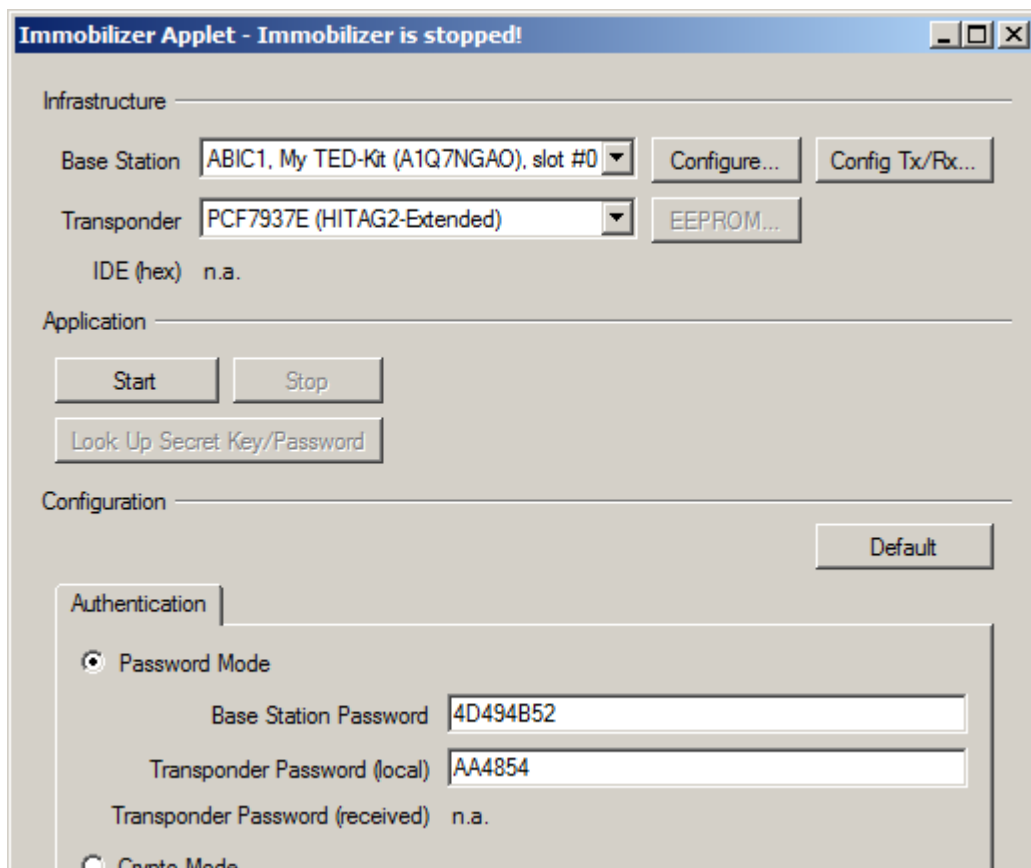
Fig 12. Immobilizer applet

The window contains three different parts: In the upper part, the Infrastructure frame which shows the currently configured infrastructure for the applet. In the window shown

above, the infrastructure consists of one base station (the ABIC1 in slot #0 of the TED-Kit 2 box named *My TED-Kit*) and one PCF7937E transponder of the HITAG 2 Extended family.

In the middle part, the Application frame which allows starting and stopping the application. Currently, it is stopped (the start button is active and window title says: …*stopped*).

The Configuration frame at the bottom of the window allows making all settings relevant for the applet. That includes authentication modes, passwords etc.

5.4.1 Configuring the ABIC1

To configure an ABIC1 XBoard, two options are available. Either double click at the proper node of the Hardware View (see section 6.2) or click the Configure... button in the applet window. The following window appears (Fig 13).
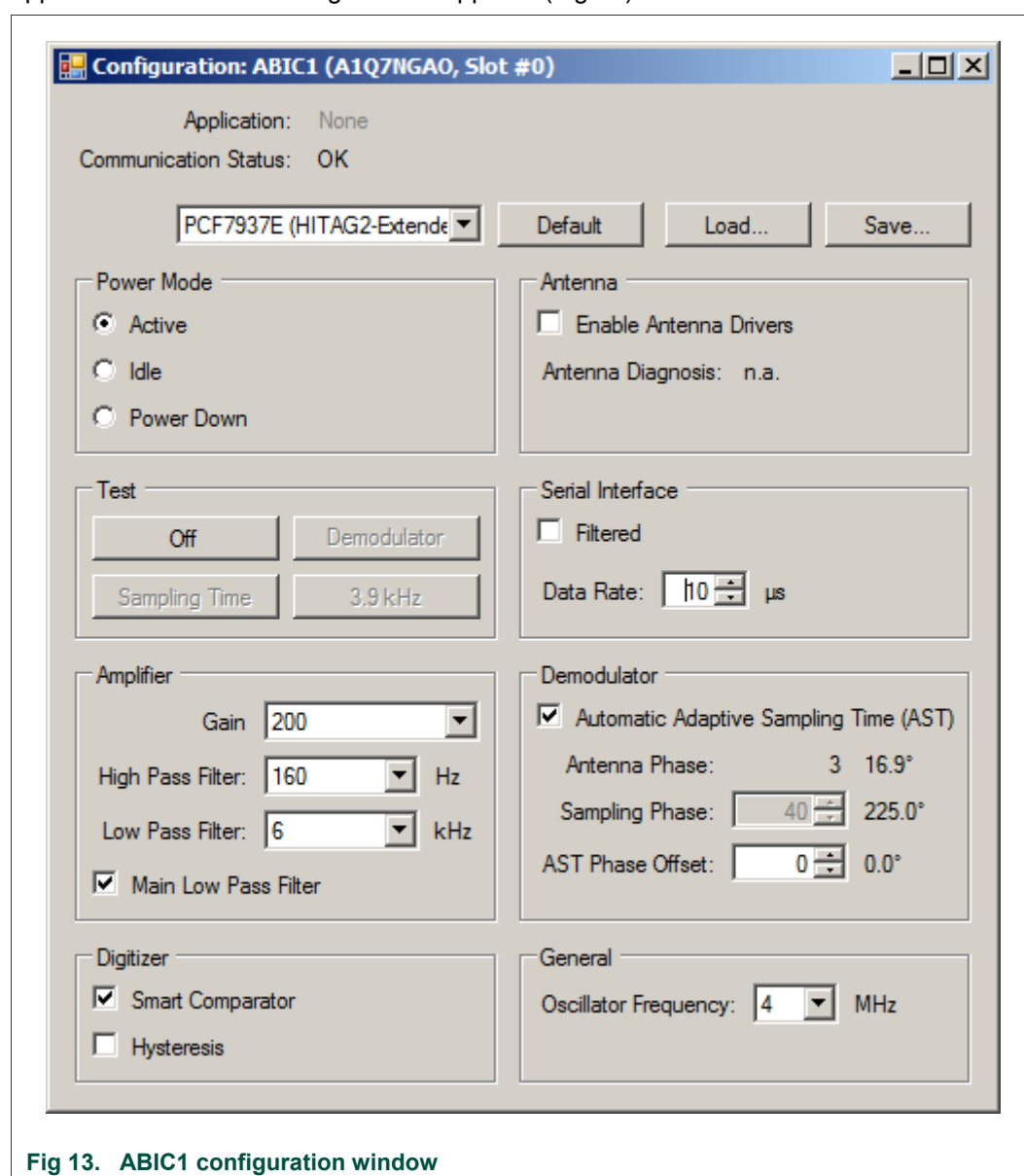
Fig 13. ABIC1 configuration window

For a detailed description of the settings, please refer to section 6.6.

In this example, the ABIC1 default settings are used. To re-apply them, select the transponder family being used (HITAG2-Extended for this example) and click Default (Fig 14).

Fig 14.   ABIC1 default configuration
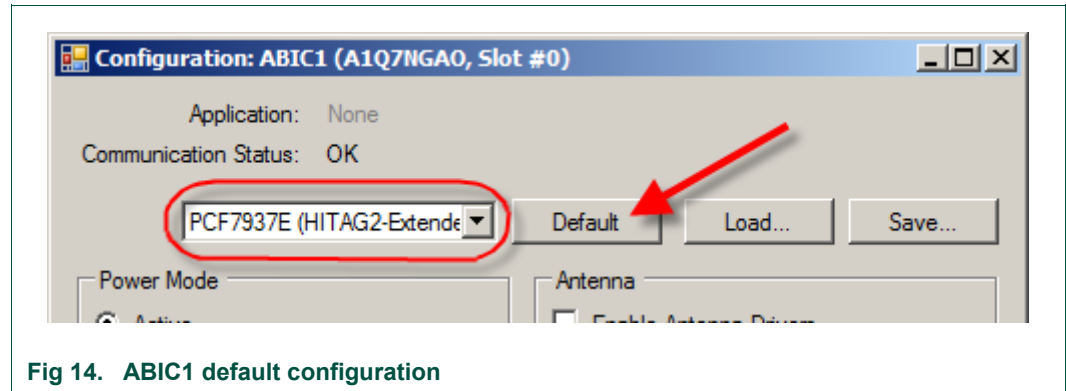
5.4.2 Communication settings

The Immobilizer applet allows configuring the transmission and reception parameters for the LF-Link in detail. To view or change the transmission and reception, click the Config Tx/Rx... button in the Immobilizer applet window ().

Fig 15.   Immobilizer Tx/Rx configuration
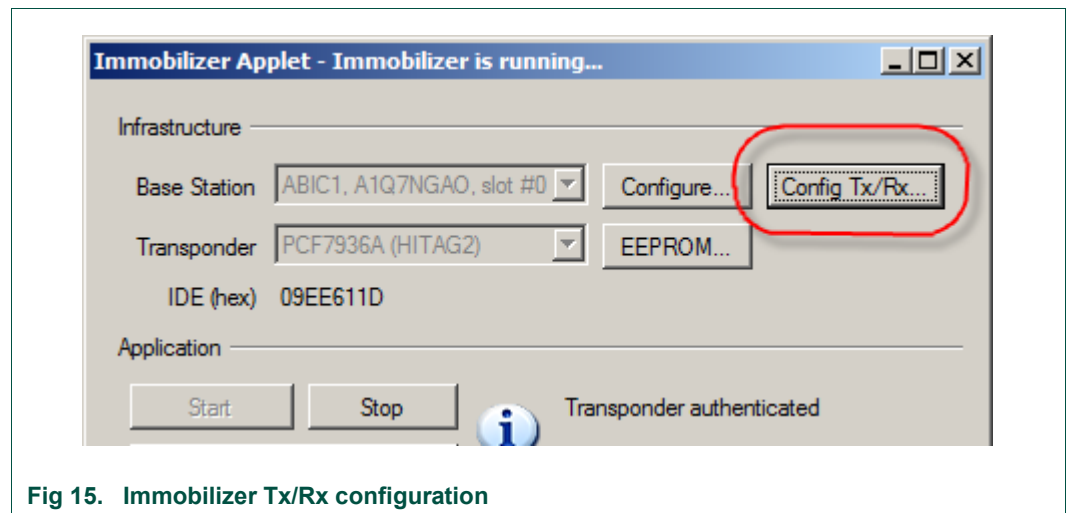
A new window opens and gives access to all communication settings of the LF-Link available. The settings are separated in Transmission to Transponder (Tx) and Reception from Transponder (Rx), see Fig 16.
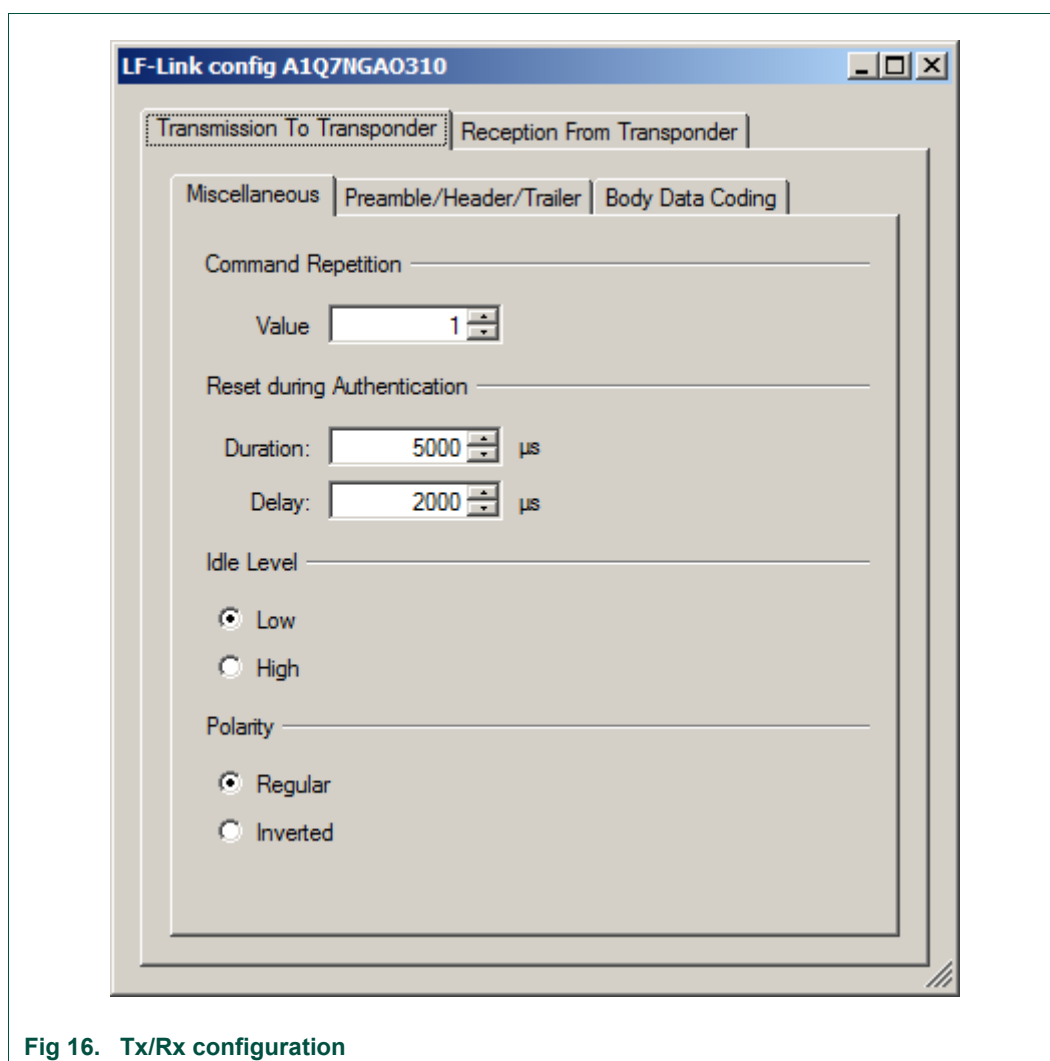
Fig 16. Tx/Rx configuration

5.4.3 Starting immobilizer

To run the Immobilizer application, return to the applet window. Before actually starting the application, the communication settings have to be specified. This is done in the applet window itself.

In this tutorial, the default settings are used. To apply them, just click on the Default button in the applet window (Fig 17).
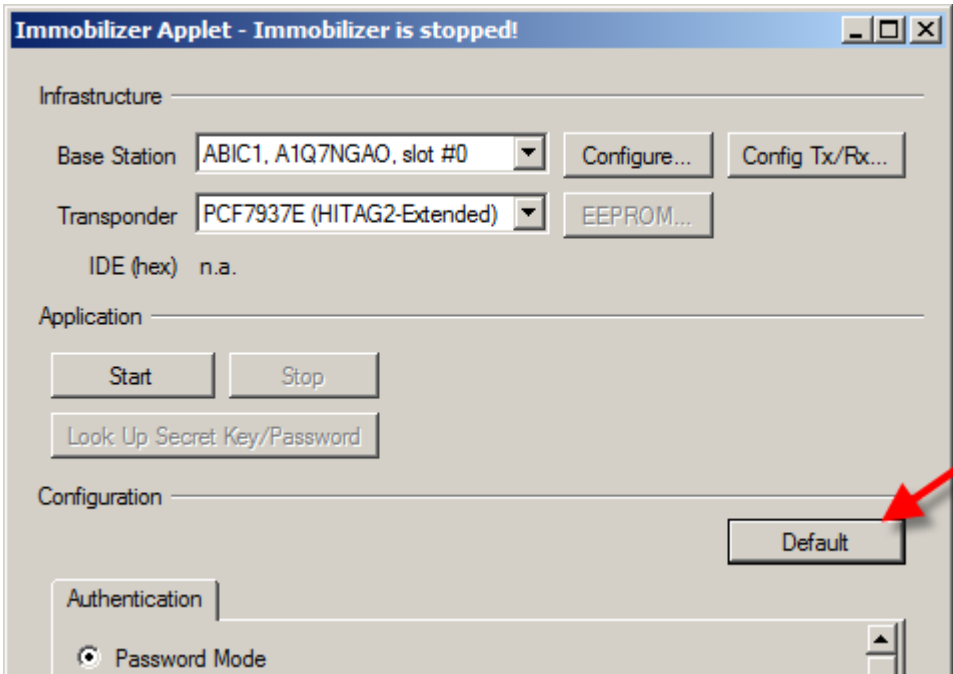
Fig 17.   Immobilizer default settings

This sets the default values (for the selected transponder) for the authentication, transmission and reception parameters at once.

To start the immobilizer applet, one has to click the Start button only (Fig 18).
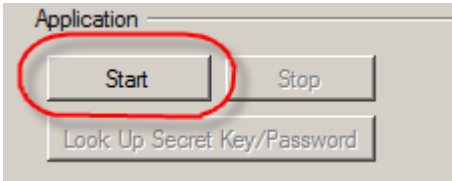
Fig 18.   Immobilizer starting

Now, the applet continuously tries to authenticate with HITAG2-Extended transponder in the antenna's field. If no transponder is in range, the Immobilizer window looks like Fig 19.
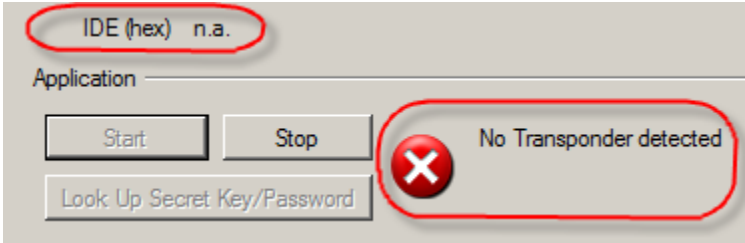
Fig 19.   Immobilizer "No Transponder"

As soon as a transponder is in range, the actual authentication sequence is started. The transponder's IDE is shown in the appropriate field (Fig 20).
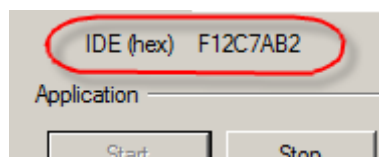
Fig 20. Immobilizer IDE

Depending on the ingredients, the authentication may be successful or not. The current state of the authentication is visualized in the status bar. For a successful authentication, it looks like Fig 21.
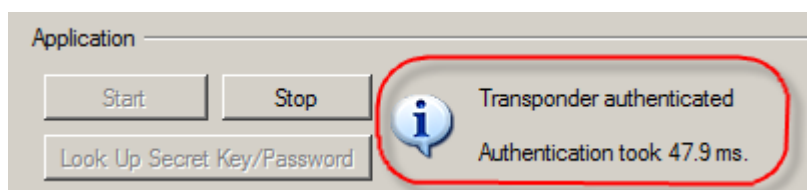
Fig 21. Immobilizer authenticated

For a failed authentication (e.g. bad passwords), the status bar looks like Fig 22.
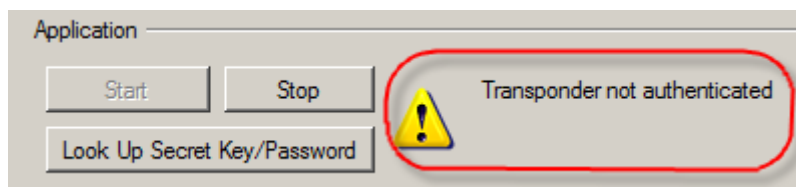
Fig 22. Immobilizer authentication failed

The time required to run a complete authentication sequence is shown.

Note: In case the authentication sequence can be completed but the transponder password is wrong, the authentication time is shown.

5.4.4 Exploring transponder memory

While the Immobilizer applet runs, the EEPROM content of the transponder in range can be explored. To open the appropriate window, click the EEPROM... button in the Immobilizer window (Fig 23).

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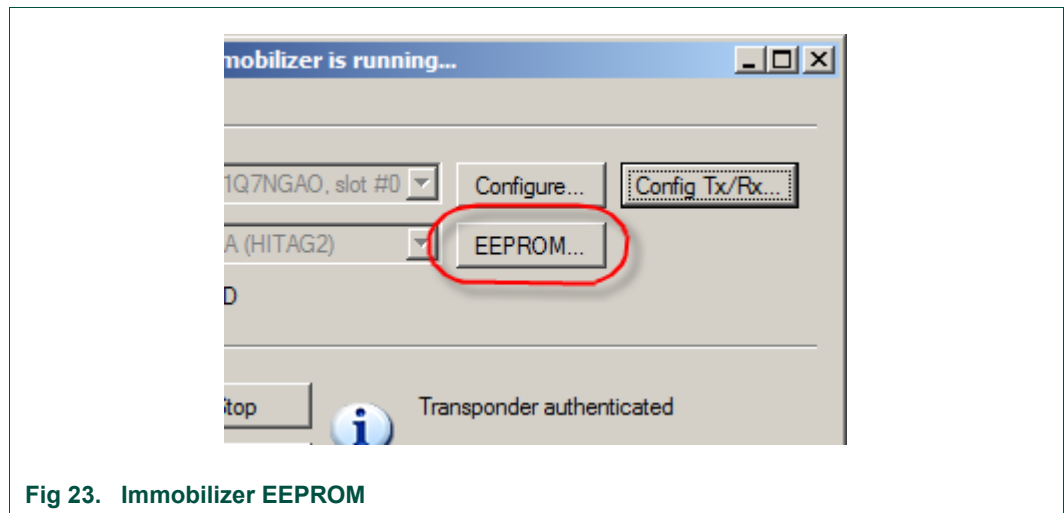
Fig 23. Immobilizer EEPROM

Note: This button is active only while the Immobilizer applet runs.

A new window opens showing 3 main parts. In the upper part of the window, the timings regarding each reading operation are shown.
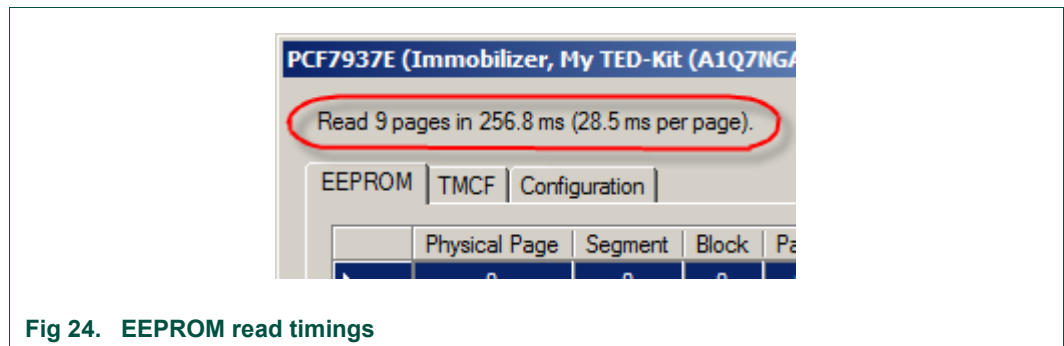

Fig 24. EEPROM read timings

The middle part with the tabs shows the different views for the EEPROM content and its configuration.

Note: In the EEPROM Tab only the memory pages currently visible are read from the transponder. Scrolling to another section of the grid requires a short amount of time until the actual content is shown. As long as the memory window is open the content is refreshed multiple times per second.

The EEPROM tab shows the memory grid for the physical page, segment, block and page number, the content of that page and a description of the value if applicable (Fig 25).

Fig 25.   EEPROM content

The TMCF tab shows the current content of the transponder modes settings (Fig 26).

Fig 26.   EEPROM TMCF

In the picture shown above, the SKL bit is set and thus, cannot be altered anymore. Besides that, the ENC bit is set instructing the immobilizer to run ciphered authentication.

The Configuration tab shows the current memory configuration of the transponder. For each Segment the size and the access mode for read and write operations can be defined. To prevent later manipulation the current settings for mode and size can be locked. Thus later changes are not possible anymore (Fig 27).
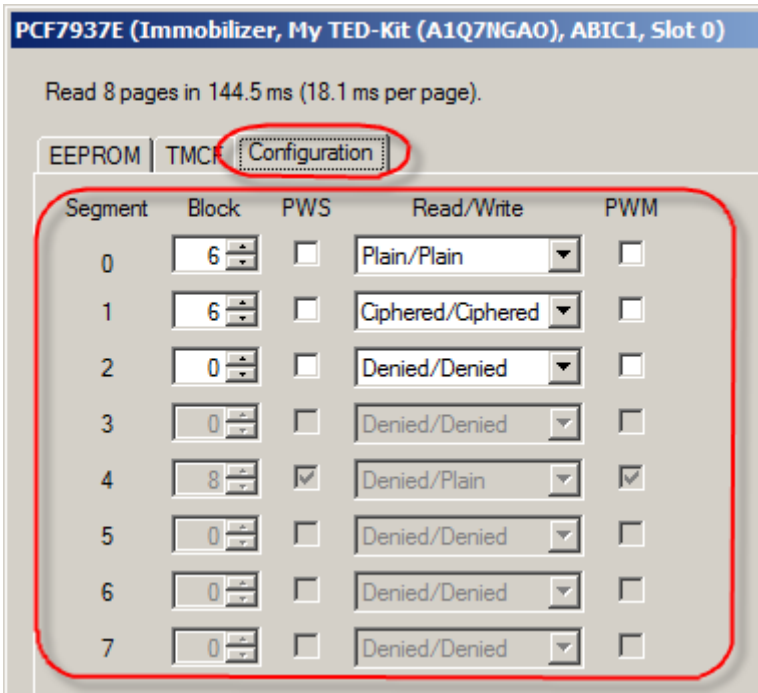
Fig 27. EEPROM XMA configuration

For a detailed description please refer to the Transponder datasheet PCF7937EA.

5.4.5 Manipulating transponder memory

To modify the memory values, the edit mode of the EEPROM window has to be activated. To do so, click the Edit button at the bottom of the window (Fig 28).
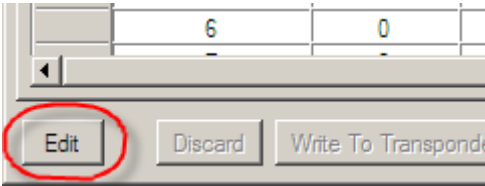

Fig 28. EEPROM edit enable

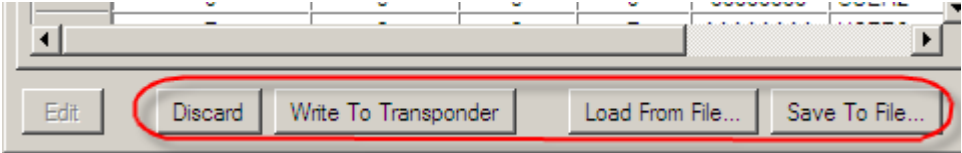The refresh cycle will stop and the other 4 buttons at the bottom become active (Fig 29).

Fig 29. EEPROM edit controls

To enter a new value, just scroll to the page of interest and double-click inside the cell in the column Content and enter the new value. Modify any other page if required. To actually write the changes to the transponder, select Write To Transponder. To discard the changes made, click Discard.

Note: The content of the EEPROM is shown always in hexadecimal notation. New values entered are also required to be hexadecimal numbers.

To save the currently shown transponder memory to a file, select Save To File.... To load a previously made memory snapshot click Load From File... and select the proper file.

5.4.6 Stopping immobilizer

To stop the Immobilizer applet, the Stop button has to be clicked (Fig 30).

Fig 30.   Immobilizer stopping

5.5 Running RKE applet

To run the RKE applet, double click at one of the transponders of the desired family node below the Immobilizer/RKE or the Immobilizer/RKE/PKE node of the applet view. This will set the default values for this transponder in advance (all settings can be changed afterwards though). The Immobilizer applet window appears first.

The RKE applet window appears if you click on the appropriate RKE-tab in the application section (Fig 31).
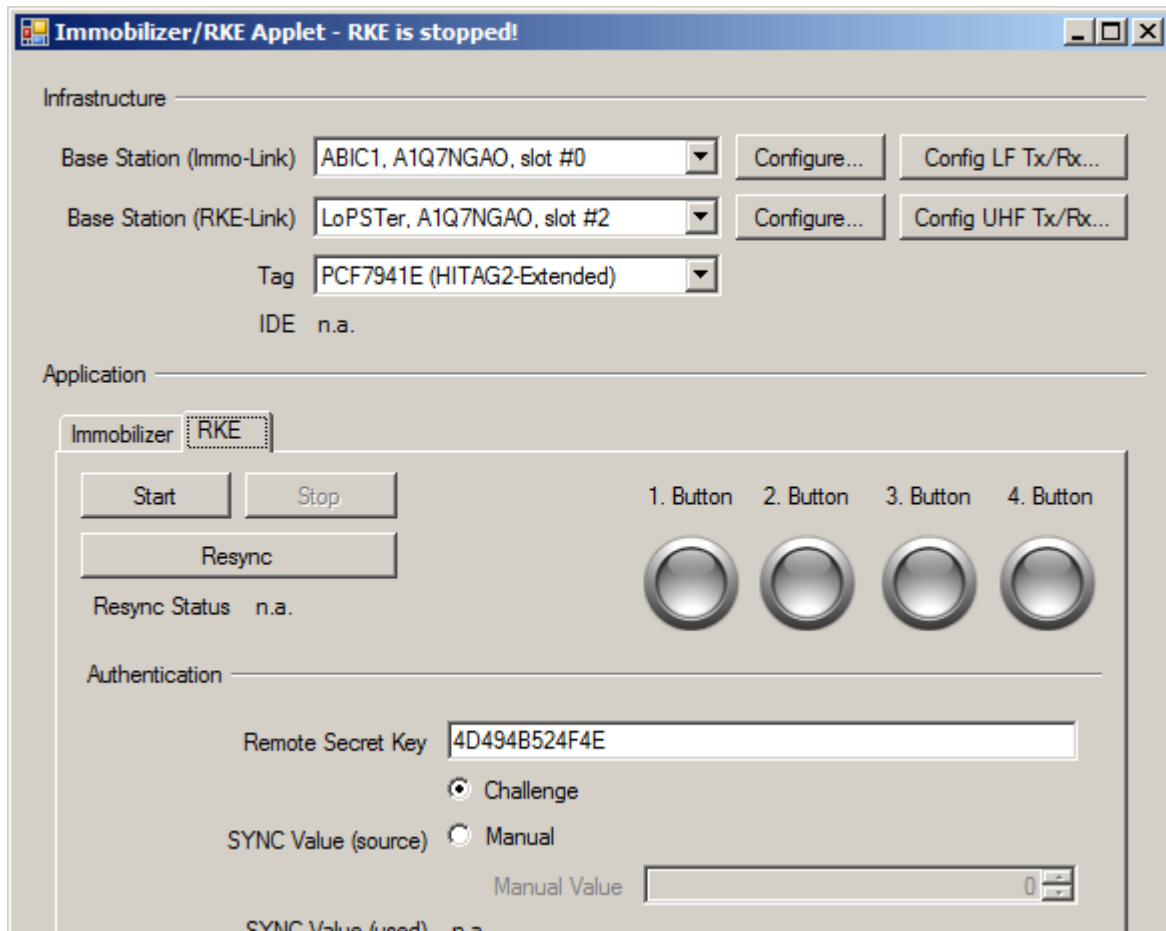
Fig 31. Immobilizer/RKE applet

The window contains two sections: The upper section shows the currently configured infrastructure to run the RKE applet. The LF-Immo-Link base station is needed for the Tag-resynchronization. The UHF RKE/PKE-Link base station is need for the one-way RKE application itself. The Tag combo box allows choosing the transponder family.

The application section in the lower part of the window shows all necessary parts to run RKE.

5.5.1 Configuring the ABIC1

Click on the Configure... button of the Base Station for the Immo-Link (Fig 32) and the window for ABIC1 configuration will appear. For a detailed description of the settings, please refer to section 7.6, page 46.
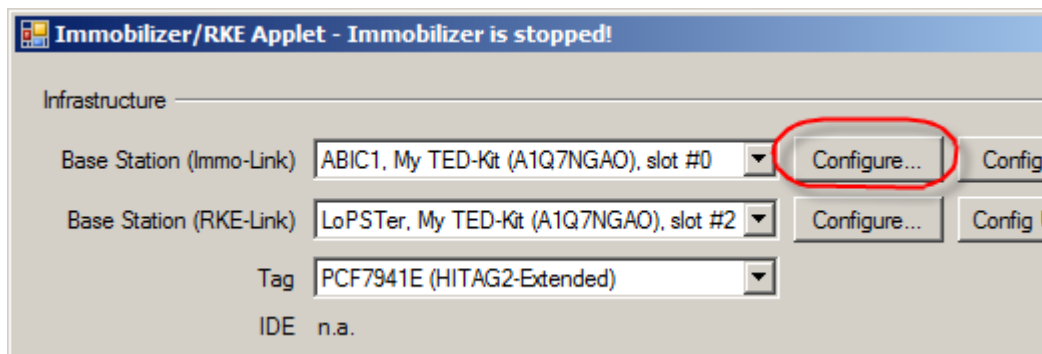
Fig 32.   Immobilizer/RKE configure ABIC1

5.5.2   Configuring the LoPSTer

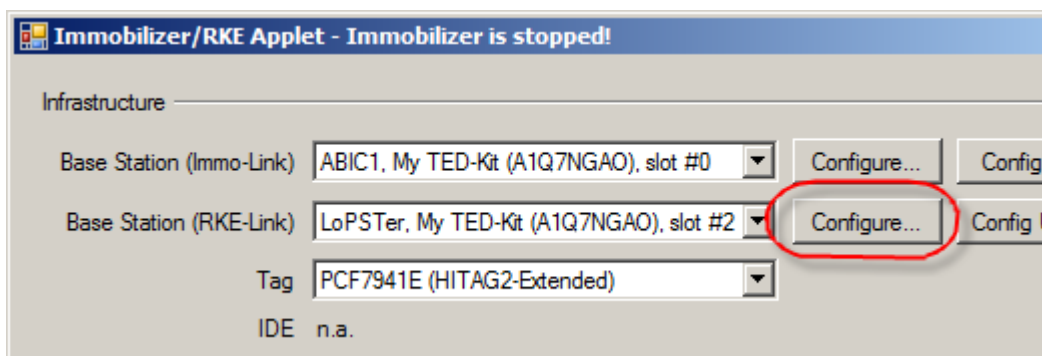Click on the Configure... button of the Base Station for the RKE/PKE-Link (Fig 33).

Fig 33.   Immobilizer/RKE configure LoPSTer

The LoPSTer configuration window will appear (Fig 34). The current settings of the LoP-STer board will be read out first. Many settings are possible but be careful if you do not have much experience with this settings.

Note: The default settings read from the LoPSTer board already fit for typical applications.

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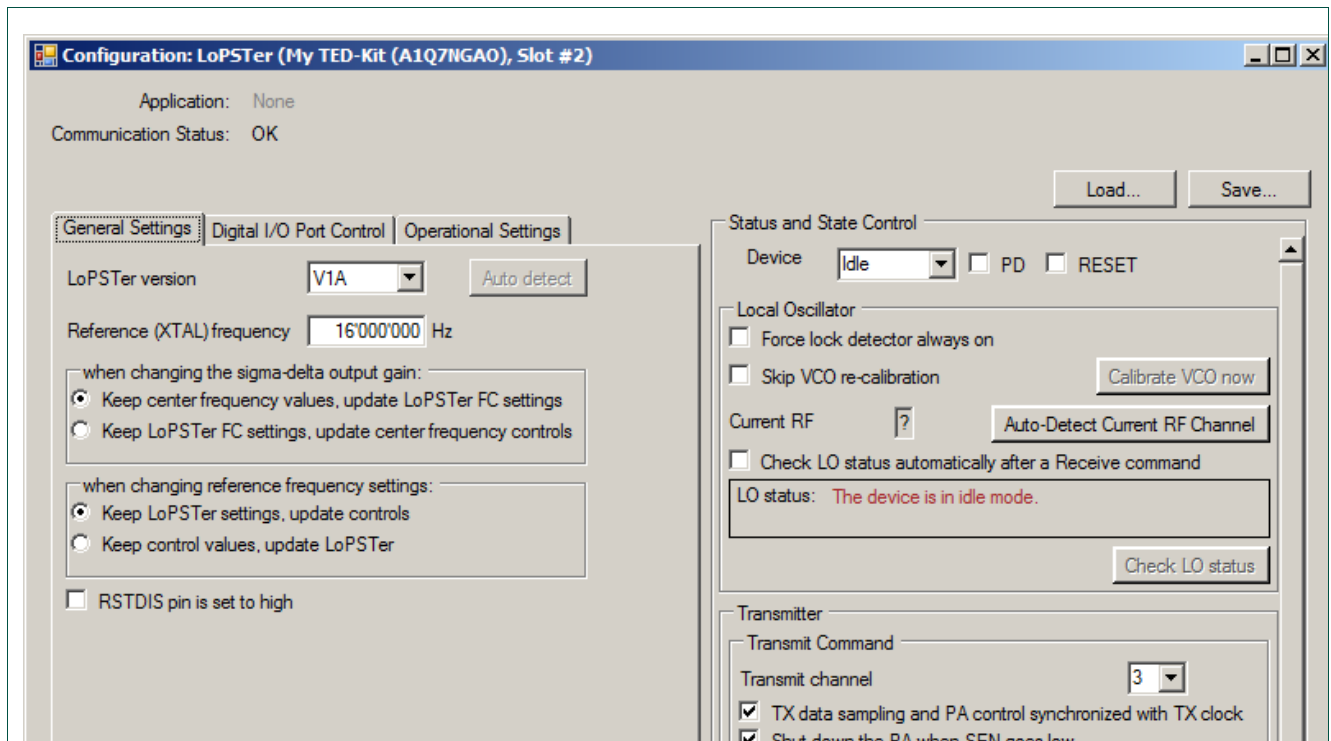
Fig 34. LoPSTer configuration window

5.5.3 Configuration persistence

An entire package of settings can be loaded from a file by pressing the Load... button (Fig 35). An appropriate LoPSTer configuration file is required; this might be a file saved as back-up of the original configuration before a modification is done.
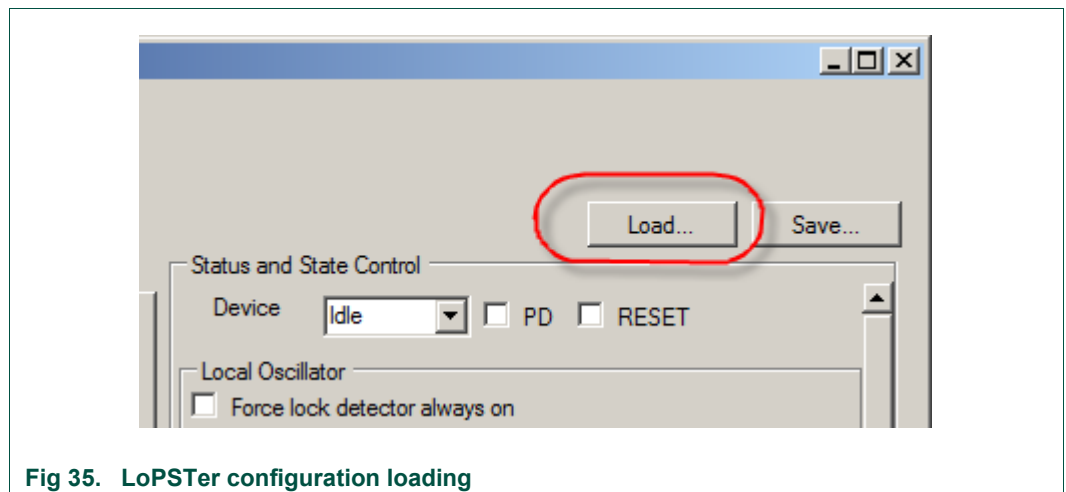

Fig 35. LoPSTer configuration loading

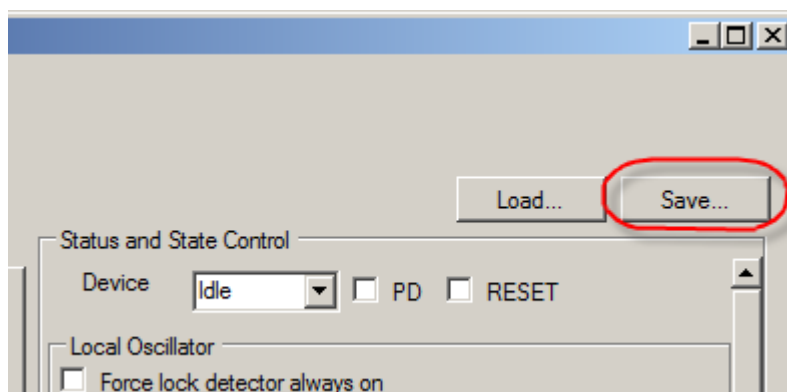An entire package of settings can be stored to a file by pressing the Save... button (Fig 36).

Fig 36. LoPSTer configuration saving

5.5.4 Transponder memory during RKE

During RKE application it is not possible to view the EEPROM window and inspect the EEPROM content of the transponder. This can be achieved only with the Immobilizer applet.

5.5.5 Resynchronization

Before you can start the RKE applet the tag must be resynchronized. Select a manual or random value like shown below and press the Resync button (Fig 37). The resynchronization status can have 3 different states:

Changed - the sync value has been changed successfully to the new value.

not changed - the sync value hasn't been changed. Try again or modify the sync value source.

Error - An error occurred during synchronization. Check the tag type or the position and distance to the LF antenna since resynchronization is done via the LF link.
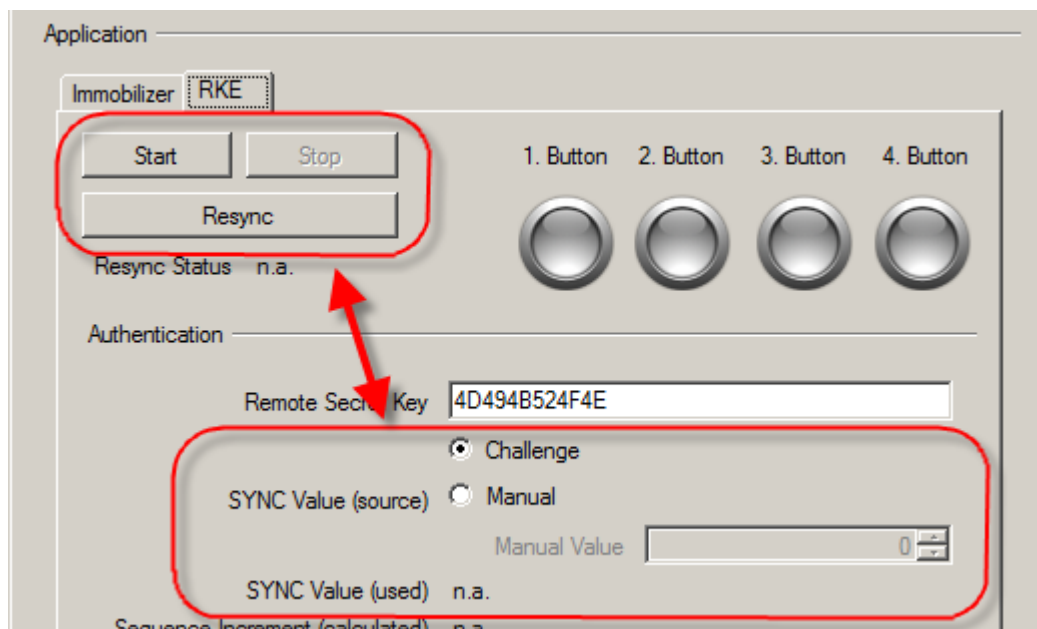
Fig 37. RKE resynchronization

5.5.6 Starting RKE

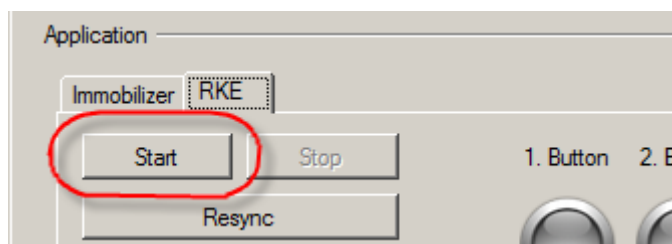Start the RKE application by pressing the Start button (Fig 38).

Fig 38. RKE starting

After the application was started any button on the tag can be pressed and the corresponding LED display will light up in the GUI like shown below. Additional the polling status will be displayed and should be OK.

All exchanged values during the communication like the SYNC value, the calculated and received Sequence Increment as well as the calculated and received Sequence Response are displayed (Fig 39).
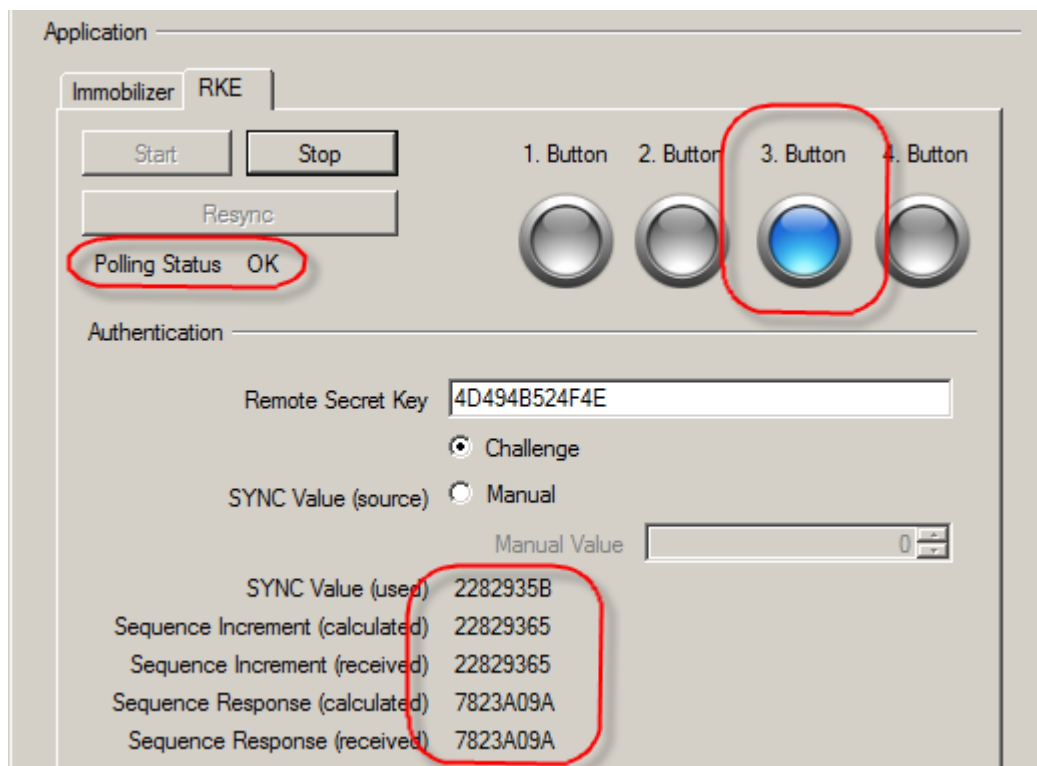
Fig 39.   RKE polling

5.5.7 Stopping RKE

Stop the RKE application by pressing the Stop button ().
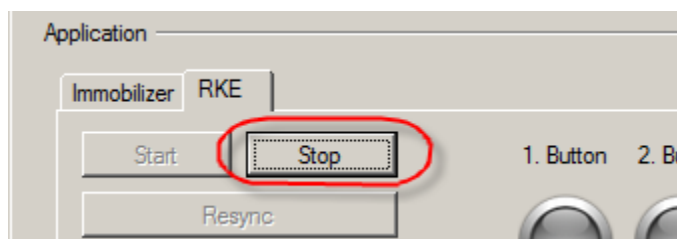

Fig 40.   RKE stopping

5.6 Running PKE applet

To run the PKE applet, double click at one of the transponders of the desired family node below the Immobilizer/RKE/PKE node of the applet view. This will set the default values for this transponder in advance (all settings can be changed afterwards though). The Immobilizer applet window appears first.

The PKE applet window appears if you click on the appropriate PKE-tab in the application section (Fig 41).
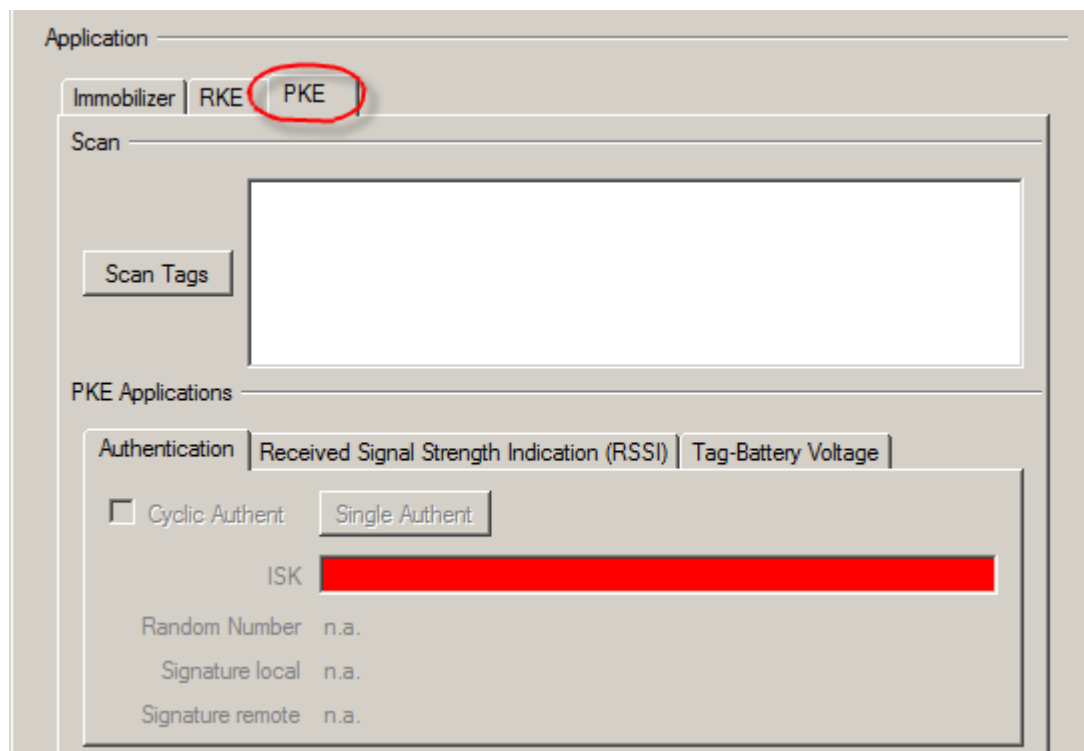
Fig 41. PKE starting

The window contains two sections: The upper section shows the currently configured infrastructure to run the PKE applet. The LF-Immo-Link base station is needed as uplink channel. The UHF RKE/PKE-Link base station is needed as downlink channel. The Tag window allows choosing the Transponder family.

The application section in the lower part of the window shows all necessary parts to run different PKE-applications.

5.6.1 Configuring the ABIC1

For a detailed description of the settings, please refer to section 6.6.1.

### 5.6.2 Configuring the LoPSTer

For a detailed description of the settings, please refer to section 6.6.2.

5.6.3 Transponder memory during PKE

During PKE application it is not possible to open the EEPROM window. If you want to do this select the appropriate Tag from the Immobilizer tree node and press the enabled EEPROM button.

5.6.4 Tag scanning

After pressing the Scan Tags button all available tags in range will be scanned and the appropriate IDE will appear in the list box below the button (Fig 42).

Fig 42. PKE tag scanning
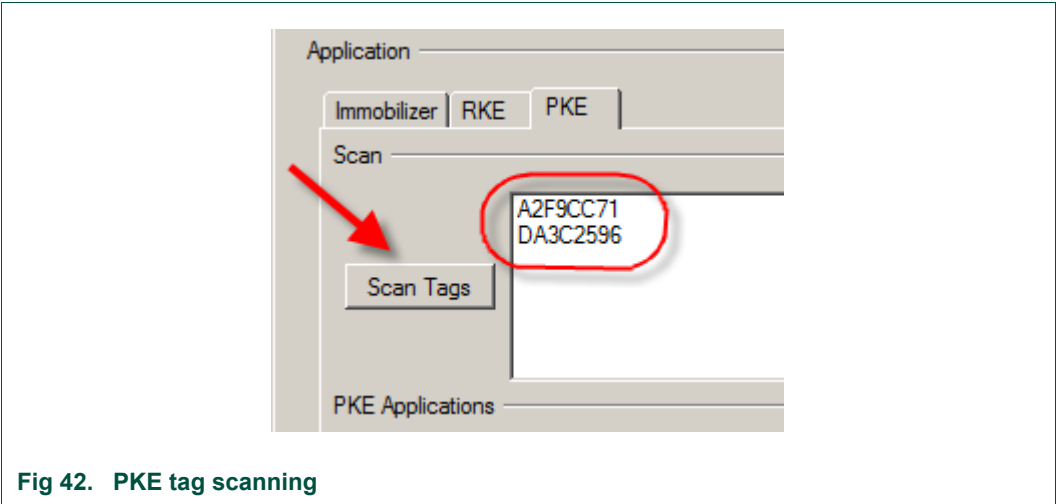
5.6.5 Cyclic PKE authentication

Select one of the available tags. Enabling the Cyclic Authent checkbox performs a cyclic authentication using the HITAG2 crypto algorithm. The exchanged authentication values will be displayed like shown in Fig 43a.

a. starting   b. stopping

Fig 43. PKE cyclic authentication
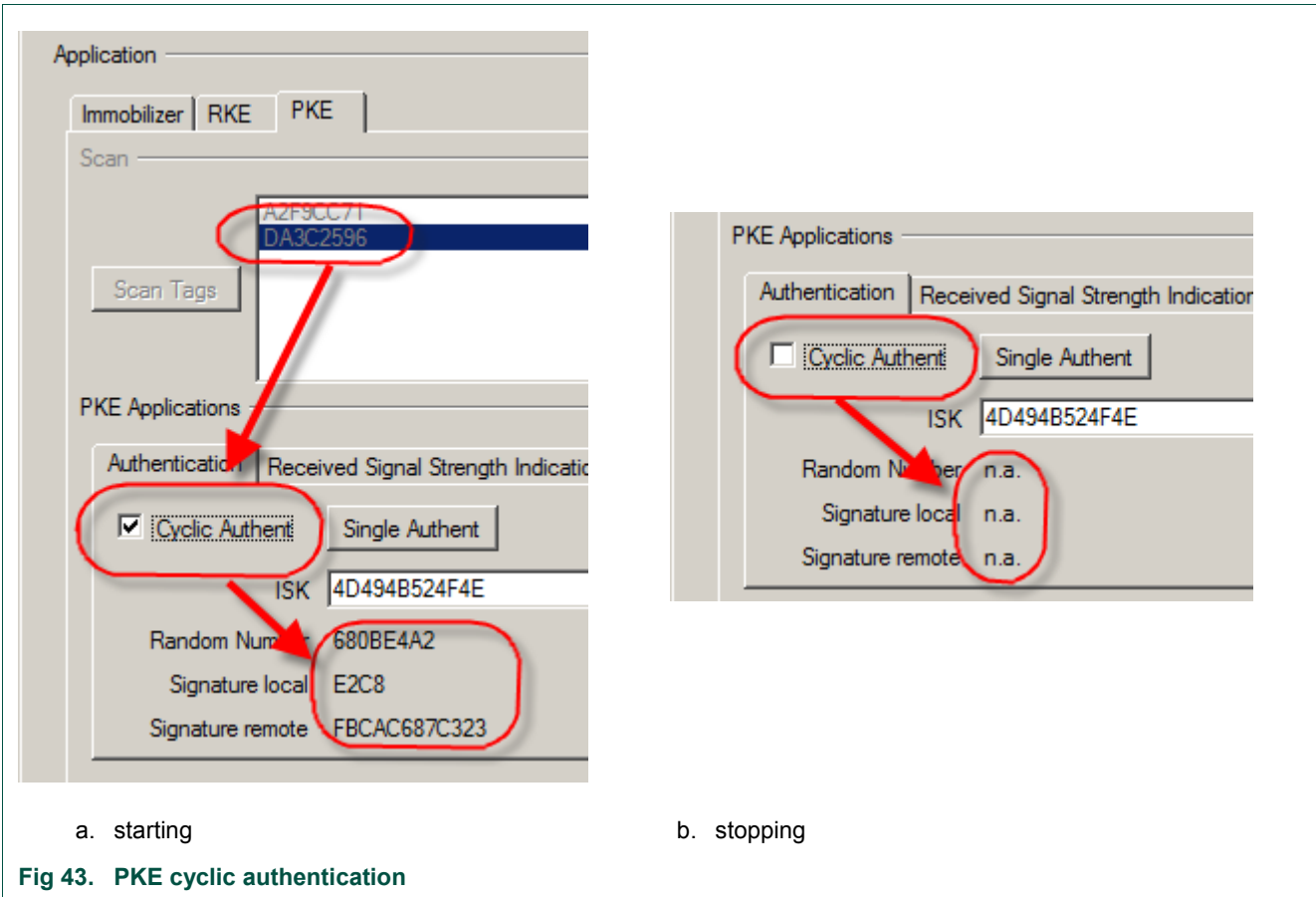
Disabling the Cyclic Authent checkbox stops the cyclic authentication. Exchanged values are no longer available (Fig 43b).

5.6.6 Single PKE authentication

Beside the cyclic authentication, also single step authentication can be performed after each press on the Single Authent button. The exchanged authentication values will be displayed like shown in Fig 44.
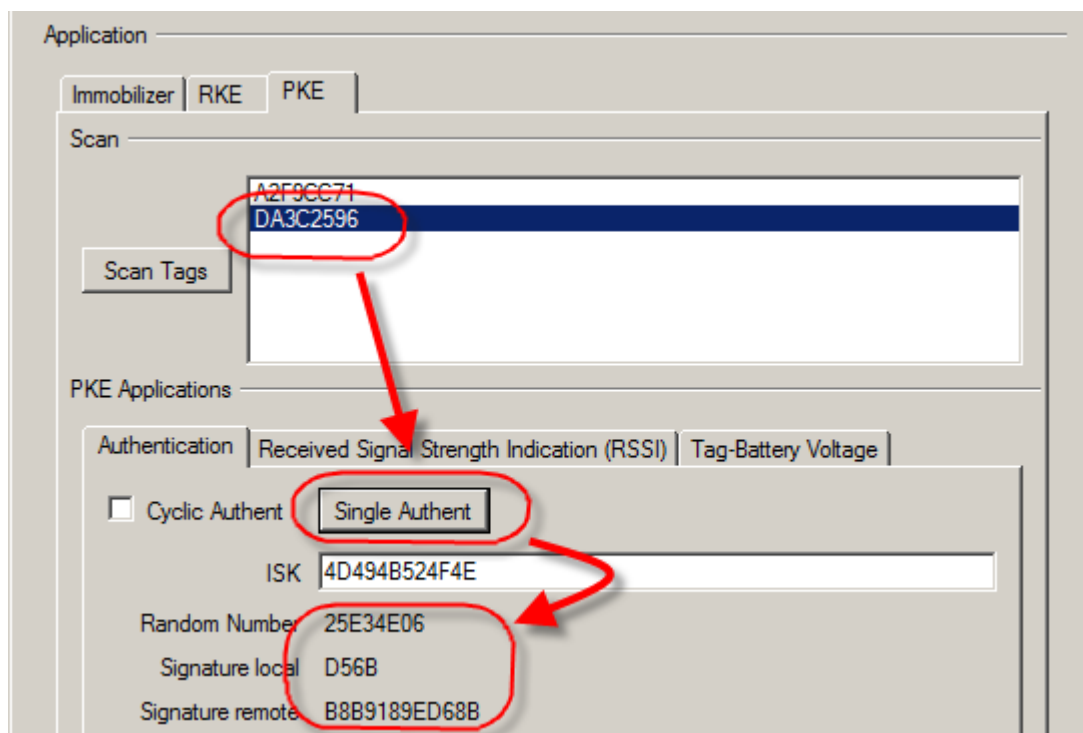

Fig 44. PKE single authentication

5.6.7 Cyclic RSSI

Select one of the available Tags. Enabling the Cyclic RSSI checkbox performs a cyclic RSSI measurement of all three axes, and calculates the sum signal as squared vector length (squared geometric mean) $V^2 = X^2 + Y^2 + Z^2$. Each single value will dynamically be displayed in a separate progress bar (Fig 45).
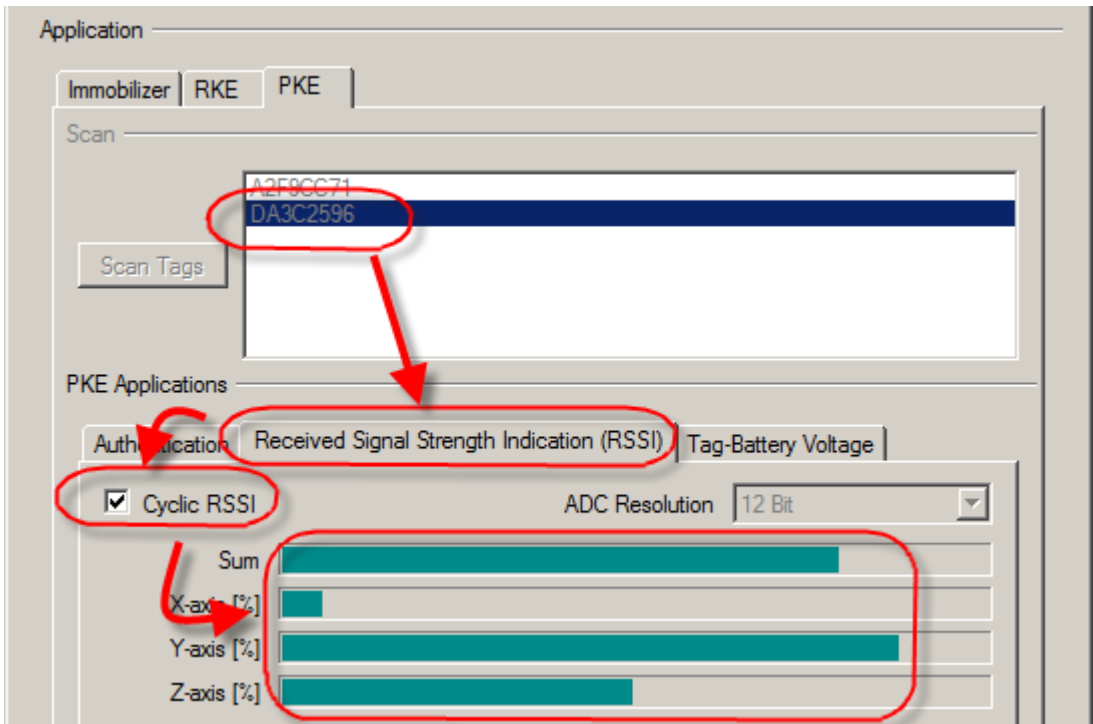
Fig 45.   PKE cyclic RSSI

Disabling the Cyclic RSSI checkbox stops the RSSI measurement. The RSSI values are no longer available thus the progress bars are empty (Fig 46).
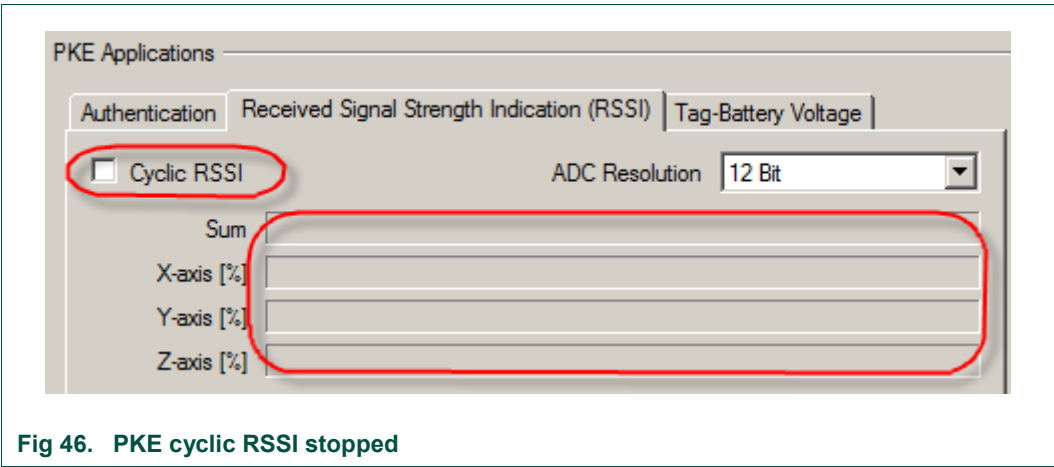

Fig 46.   PKE cyclic RSSI stopped

Select different ADC resolutions for the RSSI measurements using the ADC Resolution combo box. This setting is only enabled when the RSSI measurement is disabled (Fig 47).
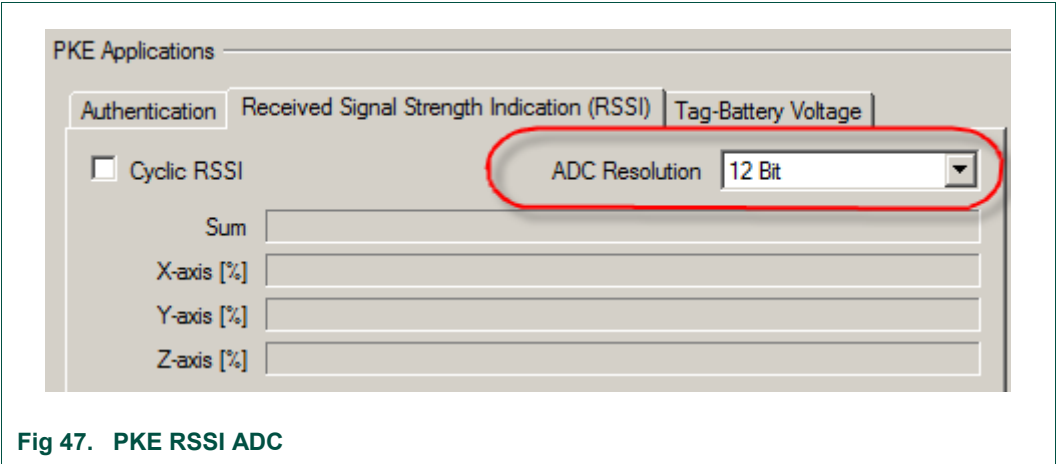
Fig 47.   PKE RSSI ADC

5.6.8   Cyclic V$_{Bat}$

Select one of the available Tags. Enabling the Cyclic Check checkbox performs a cyclic measurement of the Tag battery voltage. The voltage will be displayed like in Fig 48.
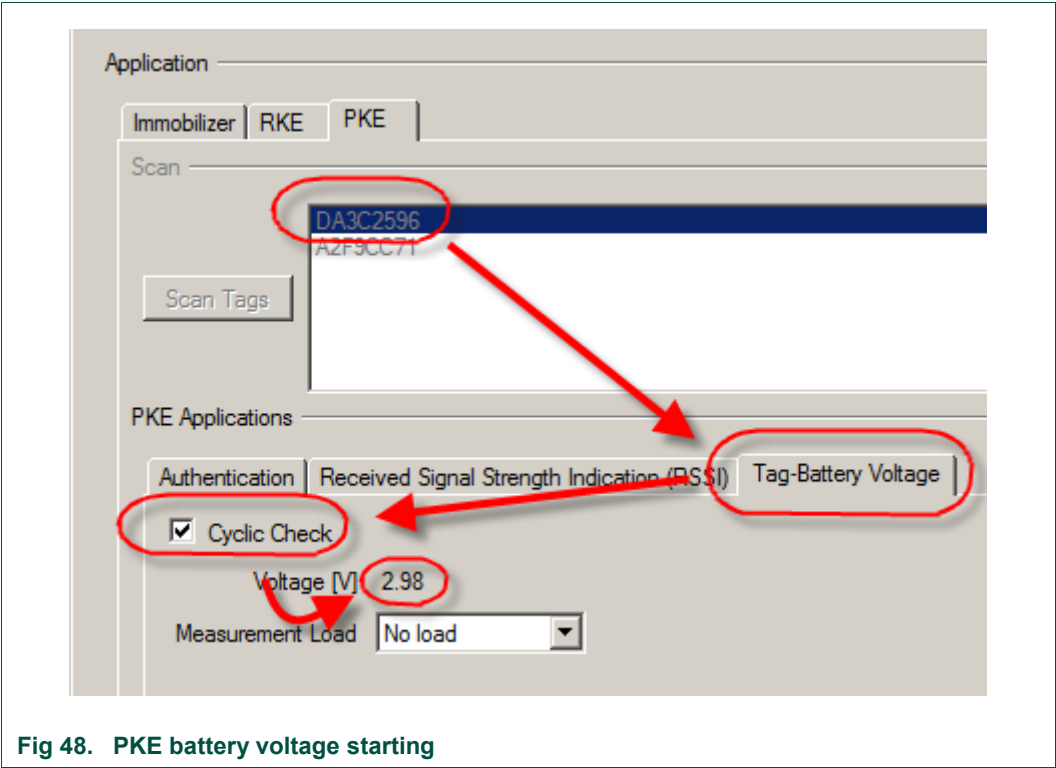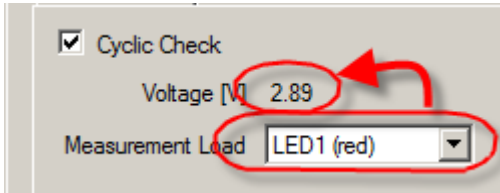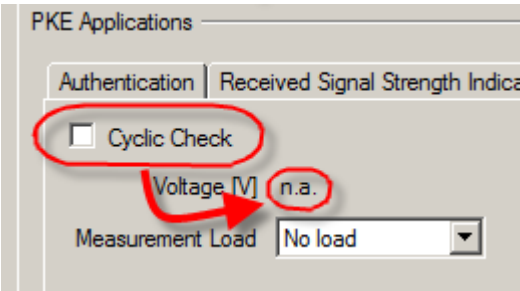

Fig 48.   PKE battery voltage starting

Select different loads for the Tag battery voltage measurement using the Measurement Load combo box. This setting can be changed during a running measurement (Fig 49a).

   a.   Selecting load   c.   stopping

Fig 49. PKE battery voltage load/stop

Disabling the Cyclic Check checkbox stops the Tag battery voltage measurement. The current voltage is no longer available (Fig 49b).

5.7 Getting Help

The Help menu of the GUI's main window contains links to documents and the About... window (Fig 50).
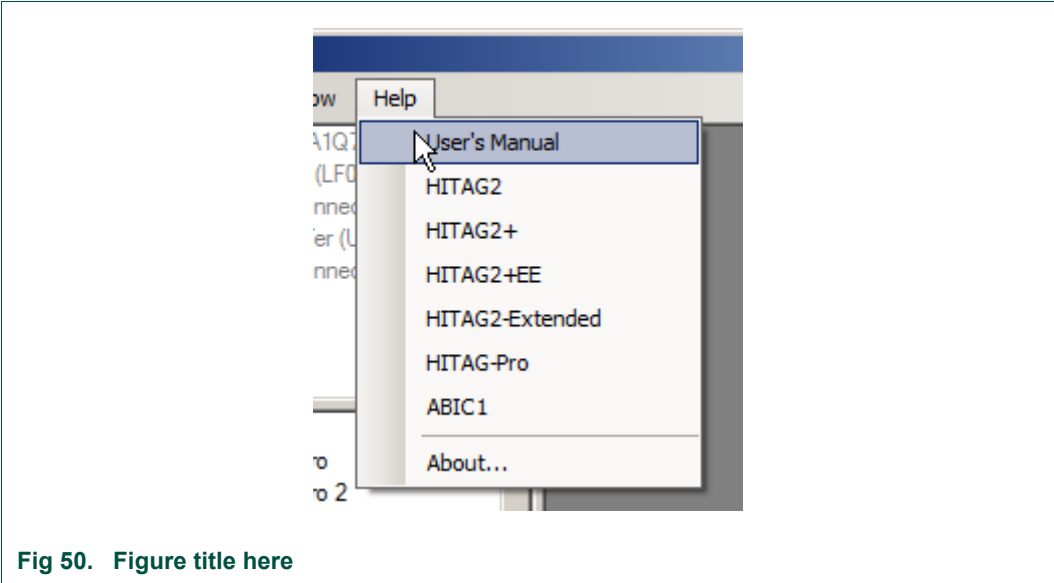

Fig 50. Figure title here

The documents are PDFs and thus, require proper PDF reading software installed. The About... window shows the version numbers of the software package, its components as well as the currently plugged-in TED-Kit 2 boxes (Fig 51).
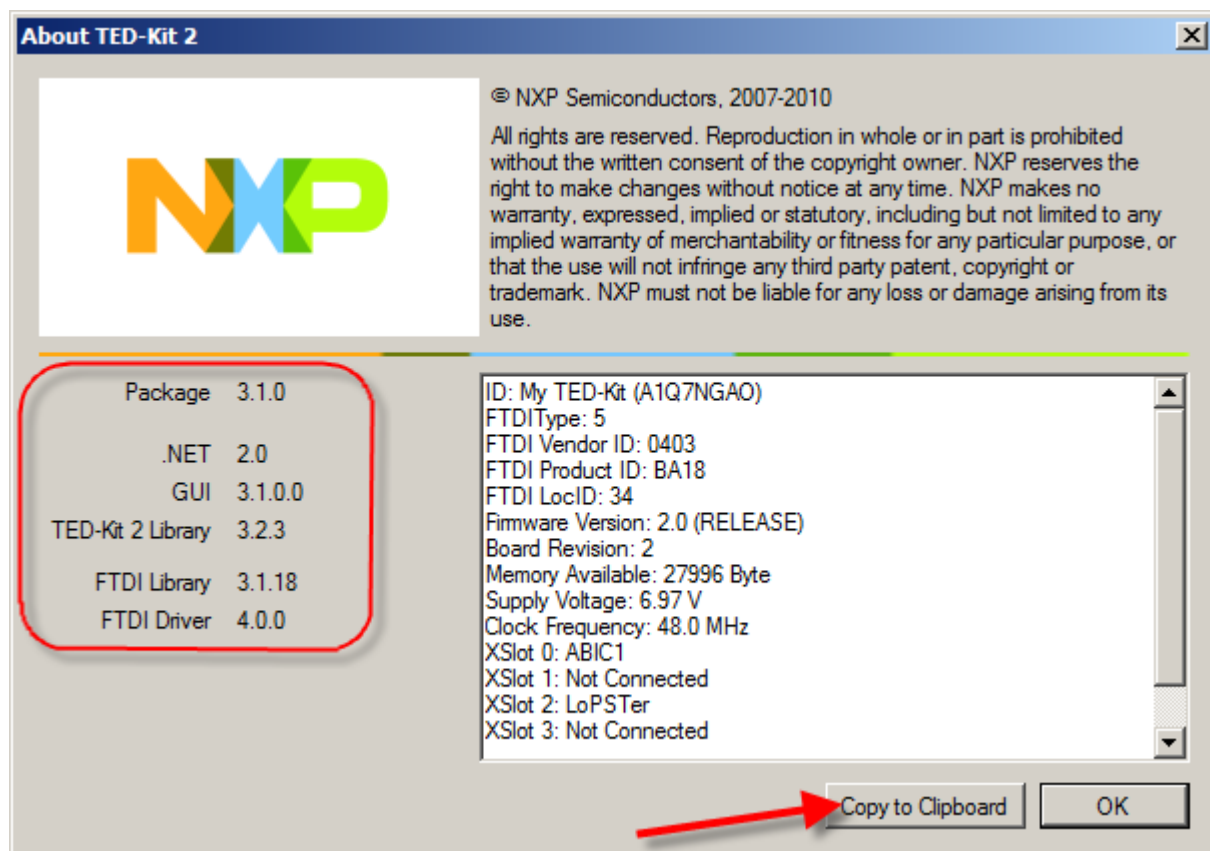
Fig 51. TED-Kit 2 about window

With Copy to Clipboard, this information can be easily copied in a document or an Email and will help the support team to analyze the issues reported.

5.8 Updating the firmware

Each time the GUI is started, it checks the firmware version of each of the connected TED-Kit 2 boards. This check also happens if a board is plugged in while the GUI already runs. The check compares the firmware version running on the board with the one copied to the PC during the installation procedure of the software package.

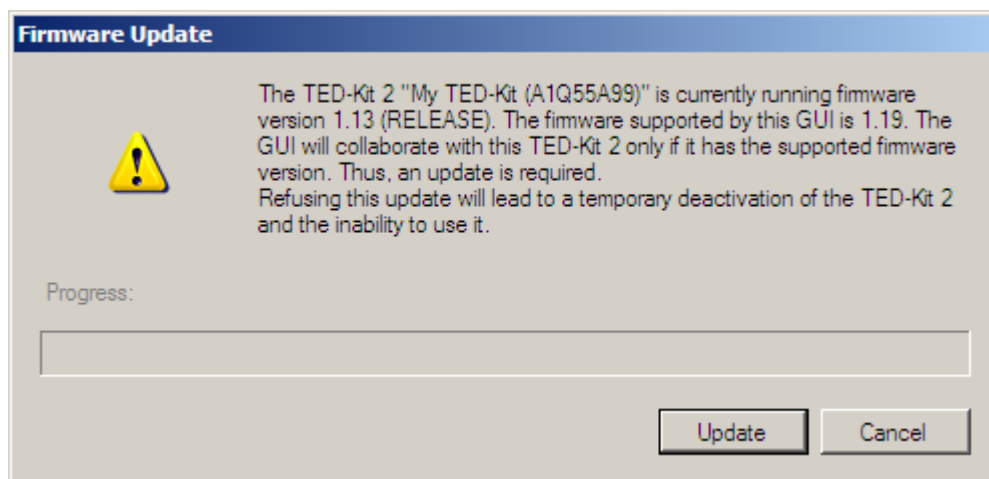In case of a mismatch, a dialog like in Fig 52 is shown.

Fig 52. Firmware update dialog

It explains that the TED-Kit 2 "My TED-Kit" with serial number A1Q55A99 is running firmware version 1.13 while the support firmware is version 1.19.

Clicking the Update button will start the update procedure which takes 10...15 seconds. Clicking the Cancel button will not do anything with the TED-Kit 2. To avoid any conflicts between the GUI and this TED-Kit 2, it is deactivated and cannot be used in the GUI. The hardware view will show it grayed out.

To reactivate the TED-Kit 2, unplug it from the PC and plug it in again or restart the GUI and actually update the firmware.

Note: To ensure each TED-Kit 2 runs exactly the firmware which is known by the GUI, an up- or down(!)grade of the firmware version may take place.

To find the firmware currently supported by the GUI, look in the Firmware folder inside the installation folder:

[TED-Kit 2 Installation]/Firmware

It contains files with names like 03-001019-r.hex. This is the release [r] firmware version 001.019 (or just 1.19) for main board revision 03 (or just 3).

5.9 Using unsupported hardware

In case of a very old main board together with a very new GUI software (or vice versa), a hardware support conflict might happen. The reason for that is that an old GUI version is not certified to work with a newer main board revision or a new GUI does not support an outdated main board anymore. A dialog like in Fig 53 is shown:
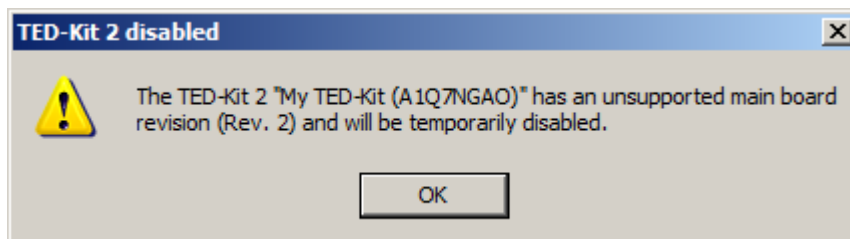
Fig 53. TED-Kit 2 unsupported hardware dialog

The current instance of the GUI is not certified to work with (the outdated) main board revision 1 and thus, disables the TED-Kit 2.

To solve this conflict, either update to the latest version of the TED-Kit 2 software or get the latest version of the main boards or install an older version of the TED-Kit 2 software which supports your main boards.

To see what hardware is supported by the GUI, look in the Firmware folder of the installation folder. It contains files with names like 03-001019-r.hex. The first number indicates the hardware revision supported (01, 02 …). Only boards with hardware revisions found in this folder can be used together with this GUI.

6. Reference

The section explains all elements of the GUI, what they do and when they can be used. The elements are organized in groups; each group represents one module (e.g. window) of the interface.

6.1 Menu bar

The menu bar of the main window contains the following menus and sub-menus:

6.1.1 Board

This menu contains the functions for the TED-Kit 2 board and its XBoards.

TED-Kit 2 Status…

Opens the TED-Kit 2 status window for the currently in the hardware view selected TED-Kit 2 or for the TED-Kit 2 of the currently selected XBoard. The menu is disabled if no TED-Kit 2 or no XBoard is selected. For details of this win   7.5, page 43.

Identify TED-Kit 2

Flashes the 4 status LEDs of the currently in the hardware view selected TED-Kit 2 or for the TED-Kit 2 of the currently selected XBoard. The menu is disabled if no TED-Kit 2 or no XBoard is selected.

Debug TED-Kit 2 Firmware

Shows the type of the firmware of all currently connected and activated TED-Kit 2 box. A checkmark at the left side of the menu entry indicates that the debug version of the firmware is currently used by all TED-Kit 2 boxes. No checkmark indicates the release version of the firmware is used.

Clicking the menu will toggle the firmware type and run the firmware update sequence for all currently connected and active TED-Kit 2 boxes.

Configure & Monitor XBoard…

Opens the Configuration and monitoring window for the currently in the hardware view selected XBoard. The menu is disabled if no XBoard is selected. For details of this window, refer to section 6.6.

6.1.2 Window

The menu contains all functions to control the currently opened windows of the TED-Kit 2 GUI. Only the first three menu items are fixed. For each window opened, a new entry is created and appended below the first three items (and removed if the window is closed). This will make access to each window simpler, especially if many windows are opened at once.

Tile/Horizontal

Arranges all windows currently open in style Tile/Horizontal.

Tile/Vertical

Arranges all windows currently open in style Tile/Vertical.

Cascade

Arranges all windows currently open in a cascade style.

6.1.3 Help

The help menu contains links to certain documents which are installed along with the software. These documents are in Adobe's PDF format and thus, a proper PDF viewer (e.g. Adobe Reader) needs to be installed on the system in order to read them.

User's Manual

Opens this document for reading.

HITAG2

Opens the HITAG2 product profile for reading.

HITAG2+

Opens the HITAG2+ product profile for reading.

HITAG2+EE

Opens the HITAG2+EE product profile for reading.

HITAG2-Extended

Opens the HITAG2-Extended product profile for reading.

HITAG-Pro

Opens the HITAG-Pro product profile for reading.

ABIC1

Opens the ABIC1 product profile for reading.

About…

Opens a window showing all version information of the GUI software and its components used (libraries, .NET environment and device driver) as well as all data collectable of the currently connected TED-Kit 2 boxes and their XBoards.

The data can be easily copied to the system clipboard by clicking Copy to Clipboard. To close the dialog, click OK.

6.2 Hardware view

The hardware view visualizes all currently connected TED-Kit 2 boxes along with their XBoards and antenna configurations. For each TED-Kit 2, a tree like shown below is created:

- TED-Kit 2 Main Board   TED-Kit 2 custom name and serial number

    o XSlot #0 XBoard name and antenna(s)

    o XSlot #1 XBoard name and antenna(s)

    o XSlot #2 XBoard name and antenna(s)

    o XSlot #3 XBoard name and antenna(s)

A double-click at the TED-Kit 2 node opens the TED-Kit 2 status window. Double-clicking at any XSlot opens the appropriate configuration & monitoring window.

If a TED-Kit 2 is deactivated due to an incompatible hardware revision or unsupported firmware, its sub tree is grayed out and cannot be selected/clicked.

6.3 Applet view

The applet view visualizes all currently available applets along with the supported transponder families and types. To open an applet window, the transponder type intended to use out of the applet node has to be double-clicked.

Several or all nodes of the applet view become inactive if no (more) hardware resources are available to run a certain application. To activate the (parts of the) applet view again, running applets must be stopped or more hardware has to be added. This can be done by either plug-in additional (properly configured) TED-Kit 2 boxes or add more appropriate XBoards to the currently available TED-Kit 2 boards.

6.4 Message view

The message view shows all messages issued by all components of the software. That includes the GUI, the API library, the device drivers and the TED-Kit 2 firmware itself. Mainly, these are communication data send between the GUI to the firmware of the TED-Kit 2 box and back.

It is placed in the lower right part of the TED-Kit 2 main window (see Fig 54). Dragging the upper border allows changing its vertical size (down to 0 making it disappear).
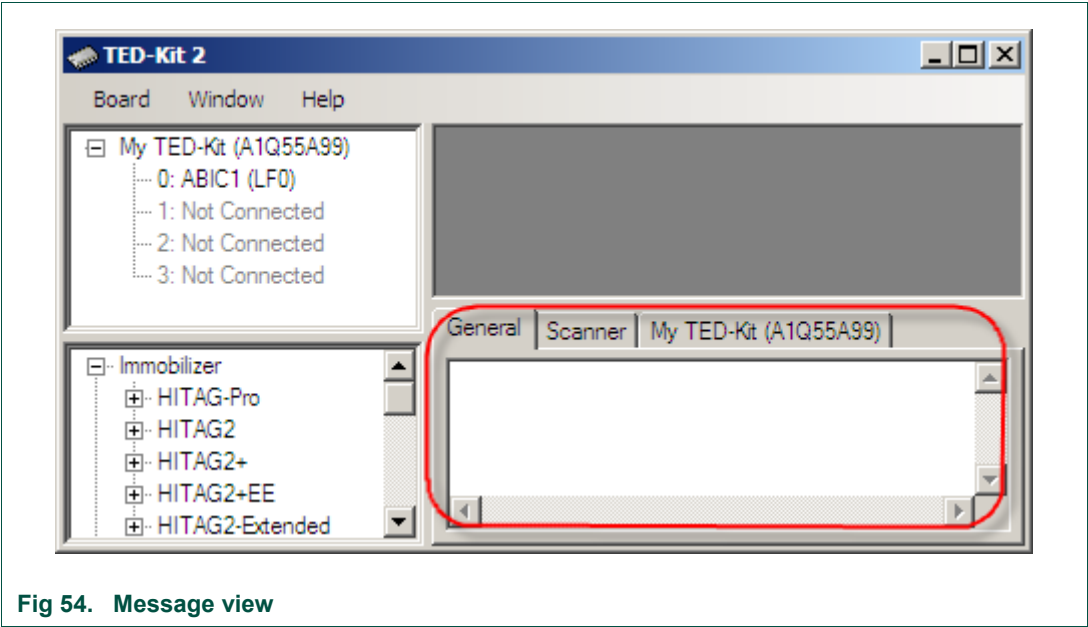
Fig 54. Message view

Several tabs are used to organize the messages and make reading them simpler. Two tabs always exist: The leftmost tab named General shows status messages from the GUI software itself.

Right to the General tab is the Scanner tab. The messages shown here represent the commands used by the GUI to scan for (new) TED-Kit 2 boxes connected to the host PC.

Most important for the user are the tabs dynamically created, one for each TED-Kit 2. Each of them is named with the serial number and the custom name (if applicable). A typical view for one connected TED-Kit 2 box might look like Fig 55.
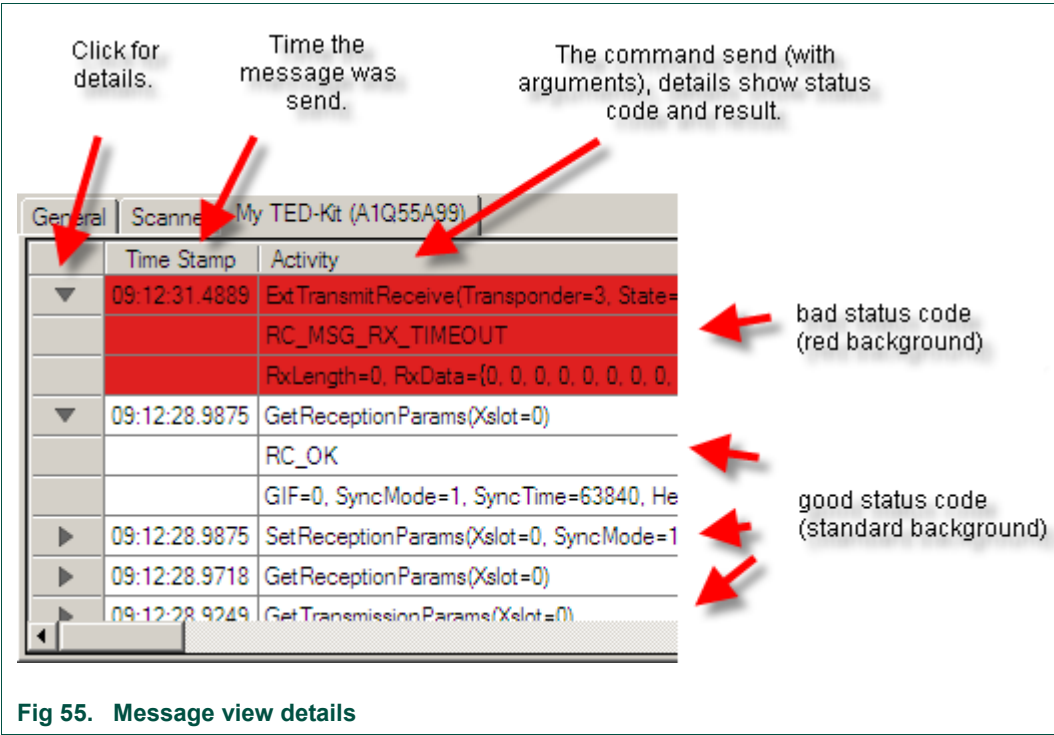
Fig 55. Message view details

New messages are always appended at the beginning of the list. The message view ensures that always the latest messages are shown. The message view holds 1000 messages. If this limit is reached, the oldest messages are discarded.

The message list shows for each message the command and its parameters and when it was send. The triangle to the left can be clicked to show more detailed information such as the status code of executing the command, trace data showing what the TED-Kit 2 firmware actually did and the result of the operation.

Red rows indicate that an error happened during the execution of the command.

Note: The trace information with detailed data about the execution steps done by the TED-Kit 2 firmware is available only if the DEBUG version of the firmware is running.

6.4.1 Context menu

The message view offers a context menu available at right-clicking directly inside the message view.
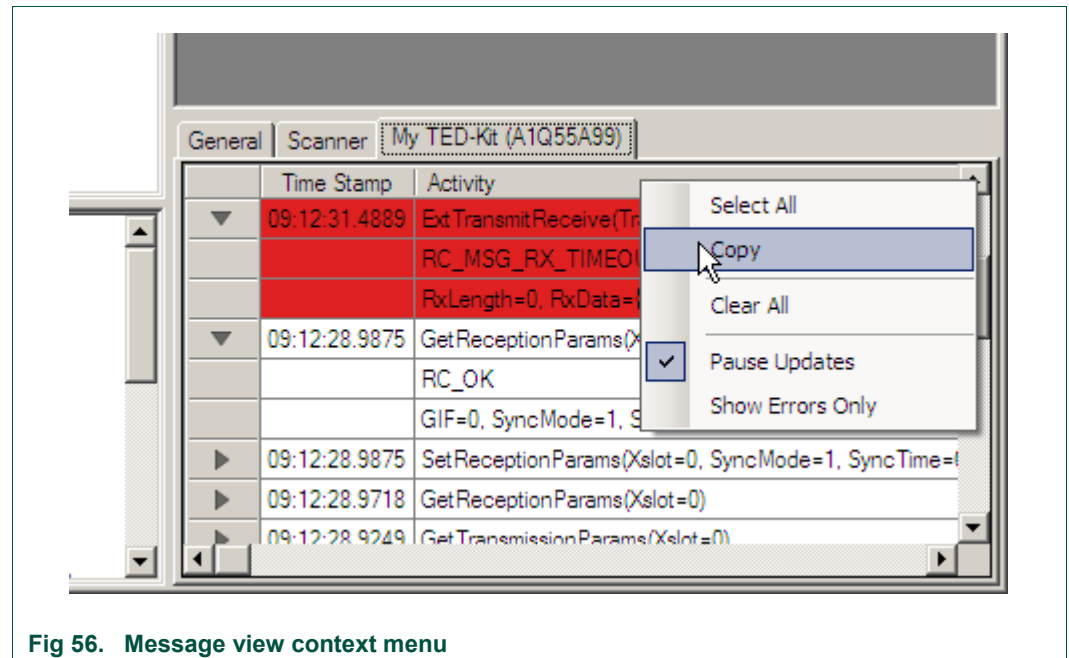
Fig 56. Message view context menu

For each tab, the data can be selected, copied or cleared with command from the context menu available while right-clicking in the message view area:

Select All

Selects all the messages/text shown in the current message view.

Copy

Copies the current selection of messages/text to the system clipboard.

Clear All

Clears the content of the currently visible message view.

Pause Updates

No more text/messages are added to the currently active view. The messages are cached and added immediately after Pause Updates is deactivated.

Show Errors Only

Filters all messages which status code OK and drops them. This is very useful for error analysis because only erroneous commands are shown.

Note: All commands of the context menu affect only the currently visible message view.

6.4.2 Logging

All activities shown in the message view are also logged in a file. This file contains all messages for one TED-Kit 2 session. If the GUI is restarted, the file is emptied and logging starts from the beginning.

The log file can be found at

`[Current User's Application Data]\NXP Semiconductors\TED-Kit 2\[Version]\log.xml`

6.5 TED-Kit 2 status window

The TED-Kit 2 status window shows all information about a TED-Kit 2 and its XBoards. To open the window, double-click the desired TED-Kit 2 node in the hardware view or select the TED-Kit 2 node and click the menu Board→TED-Kit 2 Status....
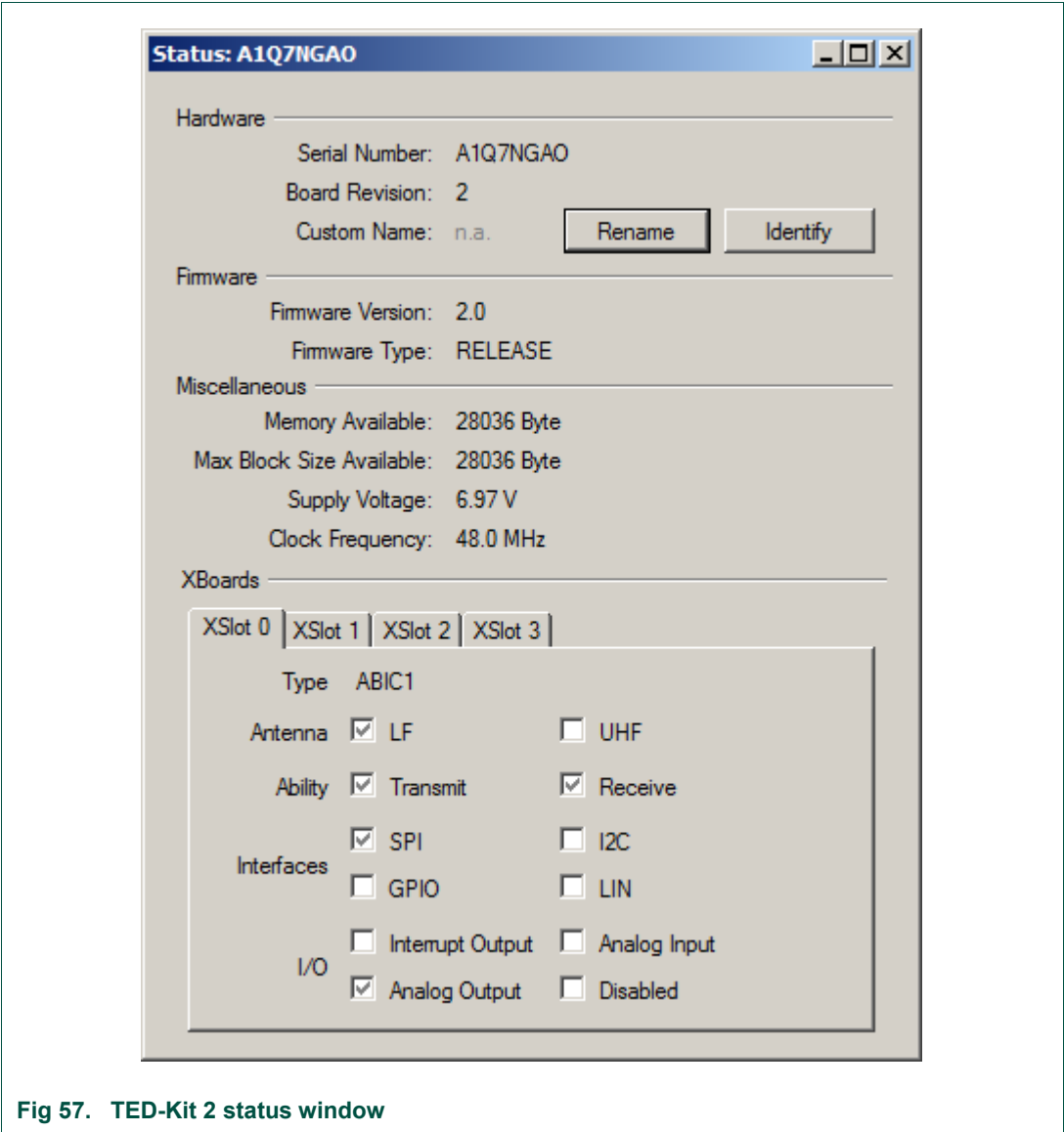
Fig 57. TED-Kit 2 status window

As long as the window is shown, some of the items shown are continuously updated reflecting their changes.

The information and actions available are shown in Table 2.

Table 2. TED-Kit 2 status window items

Name	Auto Update	Description
TED-Kit 2		
Serial Number	✗	The main board's unique serial number.
Board Revision	✗	The revision of the main board hardware.
Custom Name	✗	The TED-Kit 2's custom name or n.a. if not set.
Rename	n/a	Opens the rename dialog which allows setting or changing the TED-Kit 2 custom name.
Identify	n/a	Flashes the status LEDs at this TED-Kit 2.
Firmware Version	✗	The version of the firmware currently running.

Name	Auto Update	Description
Firmware Type	✗	The type of the firmware currently running (either RE-LEASE or DEBUG).
Firmware Code	✗	The firmware code, 0 indicates the firmware works together with the TED-Kit 2 GUI and library.
Memory Available	✓	The RAM currently available at the TED-Kit 2 µController (in bytes).
Max Block Size Available	✓	The size of the largest continuous free RAM block available (in bytes).
Supply Voltage	✓	The board's supply voltage (in Volts).
Clock Frequency	✗	The board's clock frequency (in MHz).
XBoard		
Type	✗	This XBoard's type (e.g. ABIC1) or Empty if not XBoard is in this XSlot.
Antenna		
LF	✗	XBoard is connected to a LF antenna.
UHF	✗	XBoard is connected to a UHF antenna.
Ability		
Transmit	✗	XBoard is capable of transmitting data (via an antenna).
Receive	✗	XBoard is capable of receiving data (via an antenna).
Interfaces		
SPI	✗	The XBoard has a SPI interface.
I2C	✗	The XBoard has an I^2C interface.
GPIO	✗	The XBoard has a GPIO interface.
LIN	✗	The XBoard has a LIN interface.
I/O		
Interrupt Output	✗	The XBoard can interrupt the TED-Kit 2 µController.
Analog Input	✗	The TED-Kit 2 µController can feed analogue signals into this XBoard.
Analog Output	✗	The XBoard can feed analogue signals into the TED-Kit 2 µController.
Disabled	✗	The XBoard is disabled due to resource conflicts at the TED-Kit 2 main board (e.g. it is equipped with 3 ABIC1 XBoards → one is disabled).

6.5.1 Set TED-Kit 2 custom name

Each TED-Kit 2 box can have its own customized name. The status window's Rename button will open a dialog allows setting, changing or removing the custom name of the TED-Kit 2 box (Fig 58).

Fig 58. TED-Kit 2 rename dialog
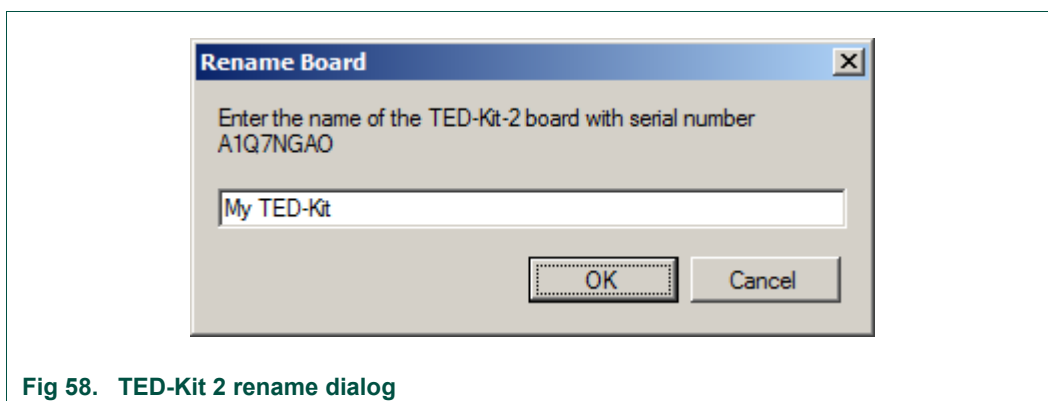
To set or change it, type the new name and click OK. To delete it, remove all characters from the dialog's text box and click OK.

Note: Valid names consist of 0 to 12 characters in the US-ASCII range 20_{hex} to $7E_{hex}$.

The main advantage is to easily distinguish between several connected TED-Kit 2 boxes because a name is easier to recognize than a serial number. To avoid any confusion if there a multiple TED-Kit 2 boxes are connected, one can put stickers with the custom name at the boxes.

6.5.2 Identify TED-Kit 2

This function is also designed to simplify handling of multiple TED-Kit 2 boxes. Clicking this button will flash the four status LEDs of the selected TED-Kit 2 box for a few seconds.

6.6 XBoard configuration window

Currently, two XBoards are supported by the TED-Kit 2 GUI: ABIC1 and LoPSTer. Thus, two different configuration windows exist. Nevertheless, they have some elements in common:

The largest part of this window always shows the current settings and status information.

Note: All changes made to the settings are effective immediately. If the window is opened, it immediately reflects the current settings and status of the XBoard.

As long as the window is open, the status information for the antenna demodulator are continuously read and updated.

Status Information

On top of the configuration window, the status information field shows what application is currently using this XBoard. The communication status indicates whether data can be exchanged with the XBoard (OK) or not (Failure).

Configuration persistence

Each XBoard configuration window can save and load hardware settings to and from files. The Load... button allows to load a previously saved set of settings. The Save... button saves the currently visible settings to a file.

The default storage location is:

`[Current User's Application Data]\NXP Semiconductors\TED-Kit 2\[Version]`

For a user Homer running version 3.1.0 of the GUI, this might resolve on a typical Windows installation to:

`C:\Documents and Settings\Homer\Application Data\NXP Semiconductors\TED-Kit 2\3.1.0`

6.6.1 ABIC1 configuration window

The configuration and monitoring window allows to set the ABIC1 XBoard configuration as wells as to monitor several status information. To open the window, select the desired XBoard from the hardware view tree and select from the menu Board→Configure & Monitor XBoard... or double-click the tree node of the desired XBoard or click the Configure... button in the applet window.

The window consists of three parts. The upper part shows some status information, the middle part allows to set default values depending on a transponder family and the lower part gives direct access to all the ABIC1 specific settings and status information.

Default settings

The default settings for an ABIC1 XBoard depend on the transponder family which will be used with this XBoard. Thus, setting default values involves two steps:

1. Selecting the desired transponder family.
2. Clicking the Default button.

If this window is opened from the applet window via Configure..., the already chosen transponder family is preset for the default button.

6.6.2 LoPSTer configuration window

The configuration and monitoring window allows to set the LoPSTer XBoard configuration as wells as to monitor several status information. To open the window, select the desired XBoard from the hardware view tree and select from the menu Board→Configure & Monitor XBoard... or double-click the tree node of the desired XBoard or click the Configure... button in the applet window.

The "configure and monitoring" window consists of three parts. The upper part shows some status information, the middle part allows to load and save configurations.

The lower part gives direct access to all the LoPSTer specific settings and status information. When opening the LoPSTer configuration window the current settings from the chip will be read out first. Many settings are possible but be careful if you do not have much experience with this settings. Thus it is recommended to use the Load/Save features.

6.7 Immobilizer applet window

To open this window, the appropriate tree node of the desired transponder family below the Immobilizer tree node of the applet view has to be double-clicked.

The window itself consists of three parts. The upper part defines the infrastructure of the applet by means of what base station and what transponder family is being used.

The middle part controls the immobilizer application itself and provides status information of the authentication between base station and transponder.

The lower part defines all the settings for the communication and authentication between base station and transponder.

Infrastructure

The infrastructure required for the immobilizer applet consists of one base station and one transponder.

The base station selector offers all XBoards equipped with an ABIC1 base station. The one selected will be used for the application. The configure button right to the selector opens the ABIC1 configuration window for the currently selected XBoard (see 7.6: ABIC1 Configuration Window, page 46).

The transponder selector allows selecting the desired transponder family. This selection mainly effects the look of the EEPROM window as well as what values are set by clicking at the Default button of the configuration section of this window. The selected transponder family is also preset for the ABIC1 configuration window (if opened from this window).

The IDE shows the transponder identification if the application is started and a transponder is in range. The IDE is shown as soon as a transponder is in range regardless of its family or if it can be authenticated.

Application

The controls for the application are

Start – starts the immobilizer application.

Stop – stops the immobilizer application.

Look Up Secret Key/Password – Looks up the secret key or password and the authentication mode from the local transponder data base and restores the values into the Immobilizer applet window for the transponder currently in range. This function is available only if a transponder is in range, the authentication fails and the IDE can be found in the local transponder data base. A transponder is added automatically to this data base after it has been successfully authenticated. Only the last set of successful authentication data is stored for each transponder.

Configuration

The lower part of the applet window contains the controls to manipulate all the communication and authentication settings. The content of this part of the window depends on the selected transponder family. For a detailed description of each of the settings, please refer to the appropriate ABIC1 and transponder data sheet.

The Default button will set the default values for all settings available depending on the currently selected transponder family.

6.7.1 HITAG-Pro 2 distance

A special functionality of the HITAG-Pro 2 is the ability to save distance records in a special way. If a HITAG-Pro 2 transponder is selected, a second tab is shown in the configuration section of the Immobilizer applet window (Fig 59).

Fig 59. Distance record panel
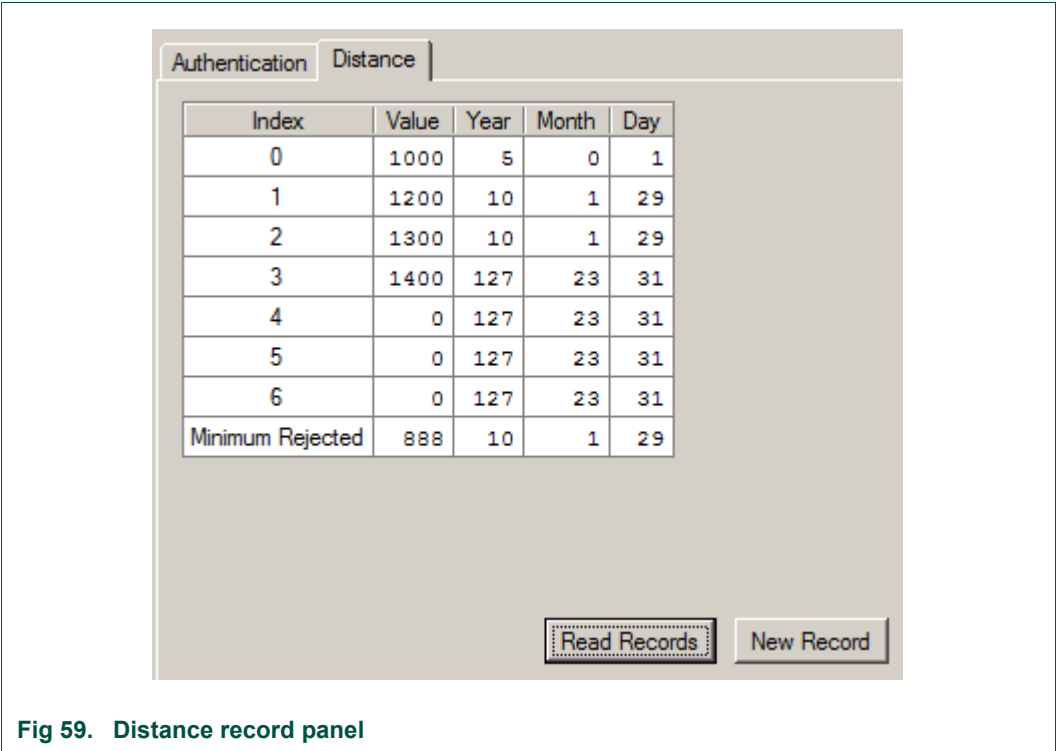
The table contains the 7 current records and the 8th record which is used as internal log. Initially, no records are read. In order to get the current values, click Read Records. To create a new distance record, click New Record and fill the data in the upcoming dialog (Fig 60).

Fig 60. Distance record new
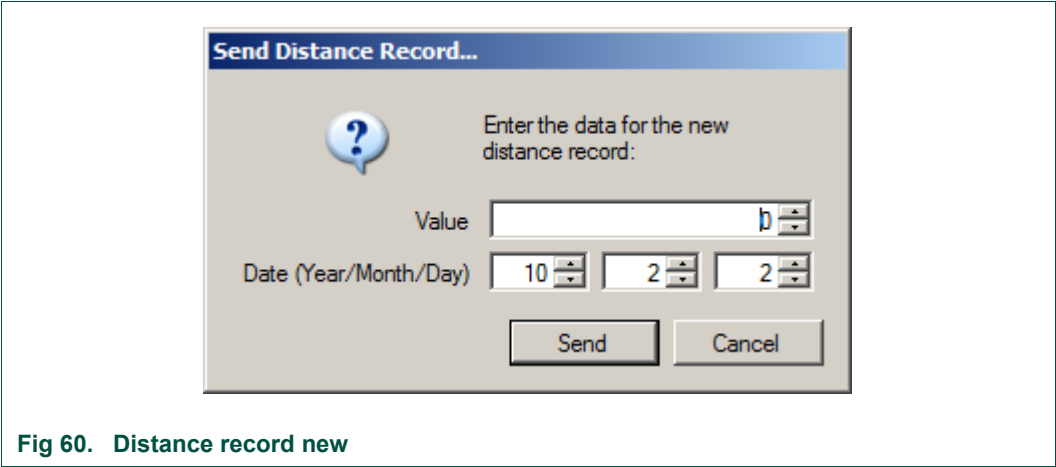
Value - The distance value of the new record.

Date - The date of the distance record, today's date is preselected.

Send - to actually send the data to the transponder (the record table will be re-read immediately)

Cancel -- to close the dialog without sending.

6.8 RKE applet window

To open this window, the appropriate tree node of the desired transponder family below the Immobilizer/RKE or Immobilizer/RKE/PKE tree node of the applet view has to be double-clicked.

The window itself consists of two sections. The upper section defines the infrastructure of the applet by means of what base stations and what transponder family is being used.

The RKE tab of the lower section consists of the RKE application.

Infrastructure

Shows the currently configured infrastructure used by the RKE applet. The LF-Immo-Link base station is needed for the tag resynchronization. The UHF RKE/PKE-Link base station is needed for the one-way RKE application itself. The Tag is the transponder family being used.

RKE Application

Shows all necessary controls to run the RKE application. The controls for the application are:

Start – starts the RKE application.

Stop – stops the RKE application.

Resync – writes a new SYNC value into the tag. The new SYNC value can be given either manually or by a random generator. In both cases the new value will be displayed.

Resync status:

Changed - the new SYNC value has been changed successfully to the new value.

not changed - the SYNC value hasn't been changed. Select a new Manual value or choose Challenge to get a new value.

Error - An error occurred during synchronization. Check the Tag type or the position and distance to the antenna.

RKE settings

To set a new SYNC value to be able to run a RKE application a valid Remote Secret Key and the SYNC value itself has to be given. The source of the SYNC value can be chosen manually or by a random generator.

6.9 PKE applet window

To open this window, the appropriate tree node of the desired transponder family below the Immobilizer/RKE/PKE tree node of the applet view has to be double-clicked.

The window itself consists of two sections. The upper section defines the infrastructure of the applet by means of what base stations and what transponder family is being used.

The PKE tab of the lower section consists of the PKE applications.

Infrastructure

Shows the currently configured infrastructure used by the PKE applet. The LF-Immo-Link base station is needed as uplink channel. The UHF RKE/PKE-Link base station is needed as downlink channel. The Tag window allows choosing the Transponder family.

Tag scanning

Before you can run a PKE application you have to check the Tags infrastructure. After click on the Scan Tags button all available Tags in range will be scanned and added to a list box. By selecting one available Tag from the list you can run different kinds of PKE applications.

Cyclic Authent

Select one of the available tags. Enabling the Cyclic Authent checkbox performs a cyclic authentication using the HITAG2 crypto algorithm. The exchanged values will be displayed in the appropriate fields. Change the default Secret Key (ISK) if necessary. Disabling the Cyclic Authent checkbox stops the cyclic authentication. The authentication values are no longer available.

Single Authent

Select one available Tag from the list. A single authentication can be performed after each press on the Single Authent button. The exchanged values will be displayed in the appropriate fields. Change the default Secret Key (ISK) if necessary.

RSSI

Select one available Tag from the list. Enabling the Cyclic RSSI checkbox performs a cyclic RSSI measurement of all three axes, and calculates the Sum signal as squared vector length (squared geometric mean) $V^2 = X^2 + Y^2 + Z^2$. Each single value will dynamically be displayed in a separate progress bar. Disabling the Cyclic RSSI checkbox stops the RSSI measurement. The RSSI values are no longer available.

Select different ADC Resolutions for the RSSI measurements using the ADC Resolution combo box. This setting is only enabled during stopped RSSI measurement.

V_{Bat}

Select an available Tag from the list. Enabling the Cyclic Check checkbox performs a cyclic measurement of the Tag battery voltage. The Tag battery voltage will be displayed in the appropriate field. Select different loads for the Tag battery voltage measurement using the Measurement Load combo box. This setting can be changed during a running measurement. Disabling the Cyclic Check checkbox stops the Tag battery voltage measurement. The current voltage is no longer available.

PKE Settings

For the PKE authentication change the default Secret Key (ISK) if necessary.

For the RSSI measurement the default value for the ADC resolution is 12 Bit. Different ADC resolutions can be set.

For the Tag battery voltage measurement different measurement loads can be set.

6.10 Transponder EEPROM window

The EEPROM window is opened by clicking EEPROM... in the immobilizer applet window. This button is available only if the immobilizer applet is started. Authentication is not required but without a proper authentication, only limited or even no memory content can be shown (depending on the security configuration of the transponder).

As soon as the window is opened, the transponder is contacted and all pages which are currently visible on the screen (in the main area) are read from the transponder. This is done continuously several times per second until the window is closed or the immobilizer applet is stopped.

The window itself contains of three parts:

Status

The status line shows information about the speed of reading data from the transponder (number of pages, overall time and average per page). Each time a read cycle is executed, the data are refreshed.

Content

The middle part is the main area. Depending on the transponder, different tabs are available.

The EEPROM tab always contains the table with the data from EEPROM of the transponder. See table below for details (Table 3).

Table 3.   EEPROM content

Column	HITAG2	HITAG2+	HITAG2+EE	HITAG2-Extended	HITAG3	HITAG Pro	HITAG Pro 2	Description
Virtual Page						✓	✓	Continuous page address.
Bank						✓		Bank address, 0..3
Physical Page			✓	✓	✓	✓		Continuous page address (within a bank).
Segment				✓	✓	✓	✓	Segment address 0..7
Block			✓	✓	✓	✓	✓	Block address (within a segment).
Page	✓	✓	✓	✓	✓	✓	✓	Page address (within a block) from 0..7
Content	✓	✓	✓	✓	✓	✓	✓	The content of the memory page shown as hexadecimal 32 bit number.
Description	✓	✓	✓	✓	✓	✓	✓	A textual description of the memory content.

The TMCF tab to setup transponder modes is available for the HITAG2, HITAG2+, HITAG2+EE, HITAG2-Extended and HITAG3 transponders.

The Configuration tab to setup memory configuration is available for HITAG2+EE, HITAG2-Extended, HITAG3, HITAG-Pro and HITAG-Pro 2 transponders.

For a detailed description of each of the settings, please refer to the appropriate ABIC1 and transponder data sheet.

Editing/Memory snapshots

The lower part of the window contains buttons to control editing and loading/saving memory snapshots to disk. To modify the transponder memory content or configuration, click Edit. The continuous refresh is stopped and the cells of the column named Content can be edited. It is possible to edit as many cells as desired. Each value changed is colored red. Cells which cannot be edited are grayed out.

All changed values are written to the transponder by clicking Write To Transponder. To discard all changes made and leave the transponder memory content unchanged, click Discard.

To save the currently shown transponder content, click Save To File.... To load a previously made memory snapshot, click Load From File.... These functions are available in edit mode only.

7. Troubleshooting

7.1 Cannot authenticate in immobilizer mode

Common checklist for all transponders

Check the correct transponder type. Compare the type printed on the tag with the selected tag from the Transponder list.

Check the correct physical position and distance to the antenna. The tag should be placed in parallel on the antenna. The distance should not exceed more than 5 cm.

Check ABIC1 base station settings. Press the Configure... button and check the ABIC1 settings. It is recommended to use the Default button within the ABIC1 settings window.

Check the Configuration. Press the Default button.

Special Checklist for HITAG2 / HITAG2-Extended transponders

Check the Authentication type Password mode or Crypto mode. If you are not sure which authentication type is currently stored in the tag click the other authentication type than the currently selected one.

Check Password Mode settings. The Transponder Password (local) has to be the same as the Transponder Password (received).

Check Crypto Mode settings. The Secret Key has to be the same as the current one stored in the tag. The Transponder Password (local) has to be the same than the Transponder Password (received).

Check the transmission parameters in the Transmission to Transponder tab. Check the BPLM coding timings and the Reset timings.

Check the reception parameters in the Reception from Transponder tab. For HITAG2 transponders check Polarity, Coding and Synchronization Delay. For HITAG2-Extended transponders check Polarity, Coding, Equalizer Pattern and Synchronization Delay.

Special Checklist for HITAG-Pro (2) transponders

Check the Authentication. If Fast Authentication is currently selected change to Standard Authentication to resynchronize the Transponder Sequence Increment counter.

Check the Secret Key. The Secret Key has to the same than the currently one stored in the tag.

Check the transmission parameters in the Transmission to Transponder tab. Check the BPLM coding timings and the Reset timings.

Check the reception parameters in the Reception from Transponder tab. Check Polarity, Equalizer Pattern and Synchronization Delay.

In order to authenticate a HITAG-Pro (2), at least one block of XMA memory must be configured (even if the access modes are denied for read and write).

7.2 Cannot read data from EEPROM

A successful authentication is the main condition to have read access to the transponders EEPROM memory. Depending on the transponder type several additional restrictions to the EEPROM areas can be set or have to be checked.

HITAG2

The HITAG2 EEPROM memory consists only of 8 pages. The read access to these pages is controlled via the TMCF register which can be modified by the user via the TMCF tab of the EEPROM window.

Page 0 is locked against reading if the Secret Key Lock (SKL) checkbox is enabled.

HITAG2-Extended

Since the HITAG2-Extended transponder is an extension of the HITAG2 transponder the read control of the first 8 pages is the same. The read access of the extended memory is controlled via the Configuration page of the EEPROM window. The memory can be divided by the user into segments and blocks. If you want to read memory the according segments and block sizes have to be "open".

Check the block size of each segment in the Block column.

Check the read access mode of each segment in the Read/Write column.

The block size can't be changed anymore if the appropriate PWS checkbox is enabled (locked). The read access mode can't be changed anymore if the appropriate PWM checkbox is enabled (locked).

HITAG-Pro

The read access of the entire memory is controlled via the Configuration page of the EEPROM window. The memory can be divided by the user into segments and blocks. If you want to read memory the according segments and block sizes have to be "open".

Check the block size of each segment in the Block column.

Check the read access mode of each segment in the Read column.

The block size can't be changed anymore if the appropriate PWS checkbox is enabled (locked). The read access mode can't be changed anymore if the appropriate PWM checkbox is enabled (locked).

7.3 Cannot write data into EEPROM

A successful authentication is the main condition to have write access to the transponder EEPROM memory. Depending on the transponder type several additional restrictions to the EEPROM areas can be set or have to be checked.

HITAG2

The HITAG2 EEPROM memory consists only of 8 pages. The write access to these pages is controlled via the TMCF register which can be modified by the user via the TMCF tab of the EEPROM window.

Page 0 is locked against writing if the Secret Key Lock (SKL) checkbox is enabled.

Page 3 is locked against writing if the Page 3 Lock (PG3L) checkbox is enabled.

Page 4 and 5 are locked against writing if the Protect Writer User Page 4 and 5 (PWP1) checkbox is enabled.

Page 6 and 7 are locked against writing if the Protect Writer User Page 6 and 7 (PWP0) checkbox is enabled.

HITAG2-Extended

Since the HITAG2-Extended transponder is an extension of the HITAG2 transponder the write control of the first 8 pages is the same. The read access of the extended memory is controlled via the Configuration page of the EEPROM window. The memory can be divided by the user into segments and blocks. If you want to write memory the according segments and block sizes have to be "opened". The first definition with block size zero disables the rest of the memory. Thus:

Check the block size of each segment in the Block column.

Check the write access mode of each segment in the Read/Write column.

The block size can't be changed anymore if the appropriate PWS checkbox is enabled (locked). The write access mode can't be changed anymore if the appropriate PWM checkbox is enabled (locked).

HITAG-Pro

The write access of the entire memory is controlled via the Configuration page of the EEPROM window. The memory can be divided by the user into segments and blocks. If you want to write memory the according segments and block sizes have to be "opened". The first definition with block size zero disables the rest of the memory. Thus:

Check the block size of each segment in the Block column.

Check the write access mode of each segment in the Write column.

The block size can't be changed anymore if the appropriate PWS checkbox is enabled (locked). The write access mode can't be changed anymore if the appropriate PWM checkbox is enabled (locked).

7.4 Use HITAG2-Extended as HITAG2

Since the HITAG2-Extended transponder is an extension of the HITAG2 transponder the first 8 pages are almost the same. These pages are relevant for the authentication. This circumstance you can use to access the first 8 page memory of the HITAG2-Extended via a HITAG2 configuration.

The values for the Reset during Authentication in the Transmission to Transponder tab have to be changed to the HITAG2-Extended values:

Reset Duration value from HITAG2 (5000) to HITAG2-Extended (10000).

Reset Delay value from HITAG2 (2000) to HITAG2-Extended (7000).

7.5 No access to HITAG-Pro 2 distance

In order to access the HITAG-Pro 2 distance functionality, check the following items:

1. DEN must be set in the transponder, check EEPROM... → Mode → Distance Enable (DEN).

2. The transponder requires more time for booting and thus, the Delay after reset timing must be increased to ~19ms.

3. The first segment of the transponder's XMA memory must be readable in plain mode in order to read distance data.

4. The first segment of the transponder's XMA memory must be writeable in at least ciphered mode (or ciphered/plain) in order to write new distance records in the transponder.

8. PCB and schematics

This section contains the PCBs and schematics of the TED-Kit 2 hardware, the ABIC1 and LoPSTer XBoards as well as the LF antenna.

8.1 TED-Kit 2
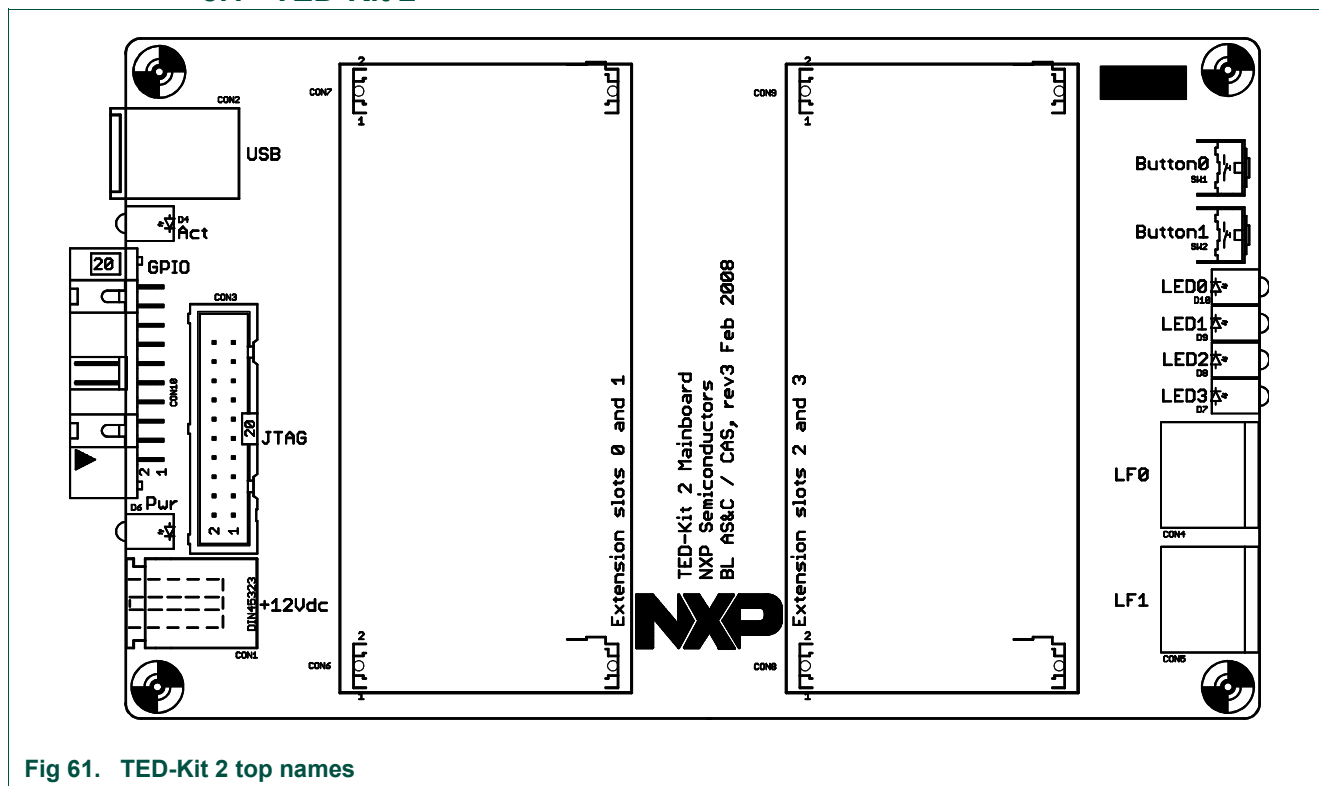
Fig 61. TED-Kit 2 top names
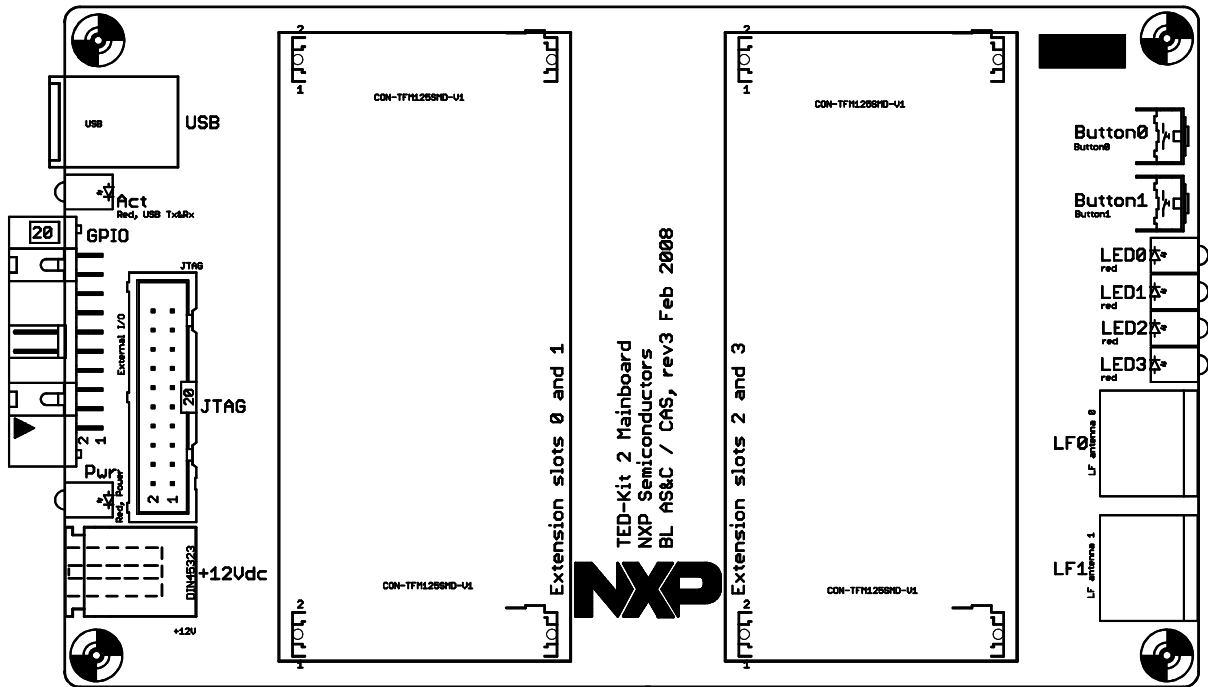
Fig 62. TED-Kit 2 top values
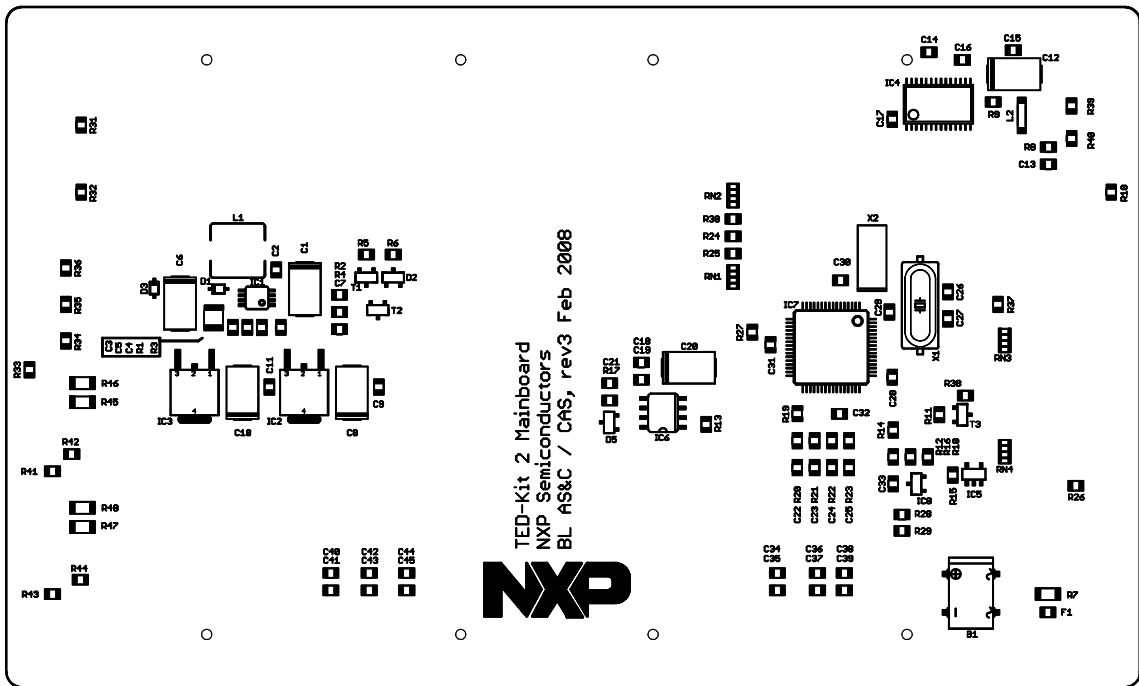
Fig 63. TED-Kit 2 bottom names
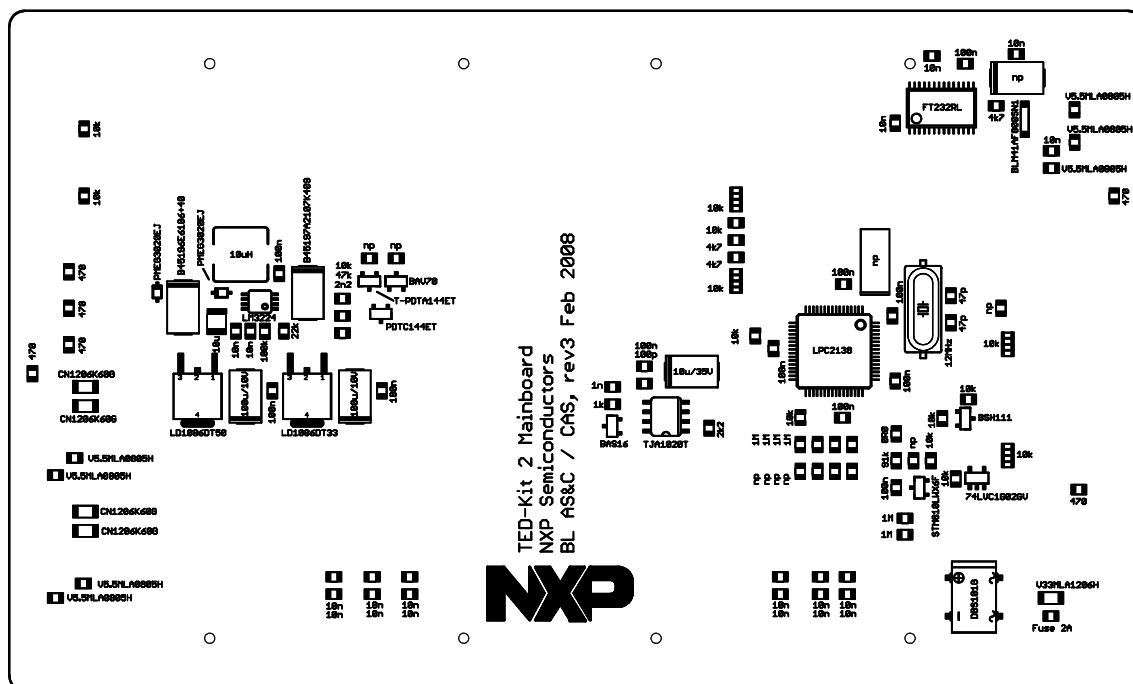
Fig 64.   TED-Kit 2 bottom values
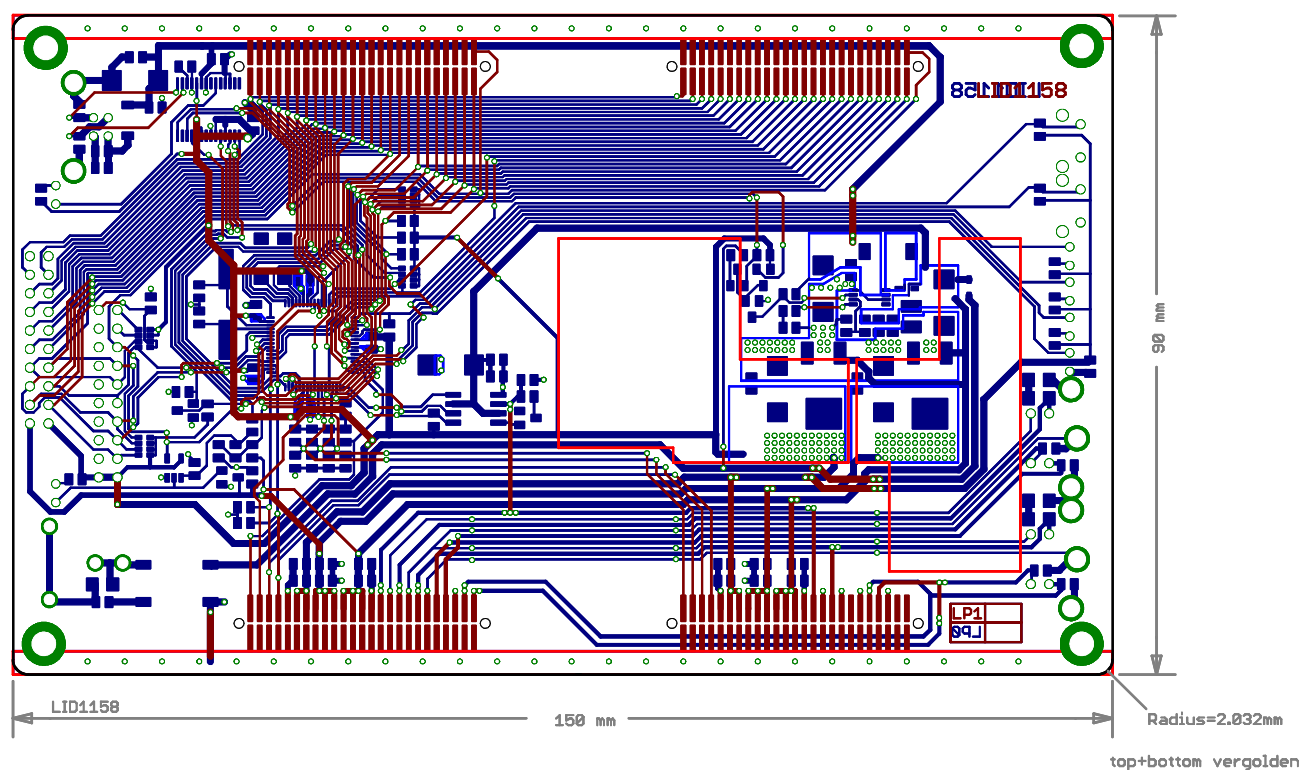
Fig 65.   TED-Kit 2 layout
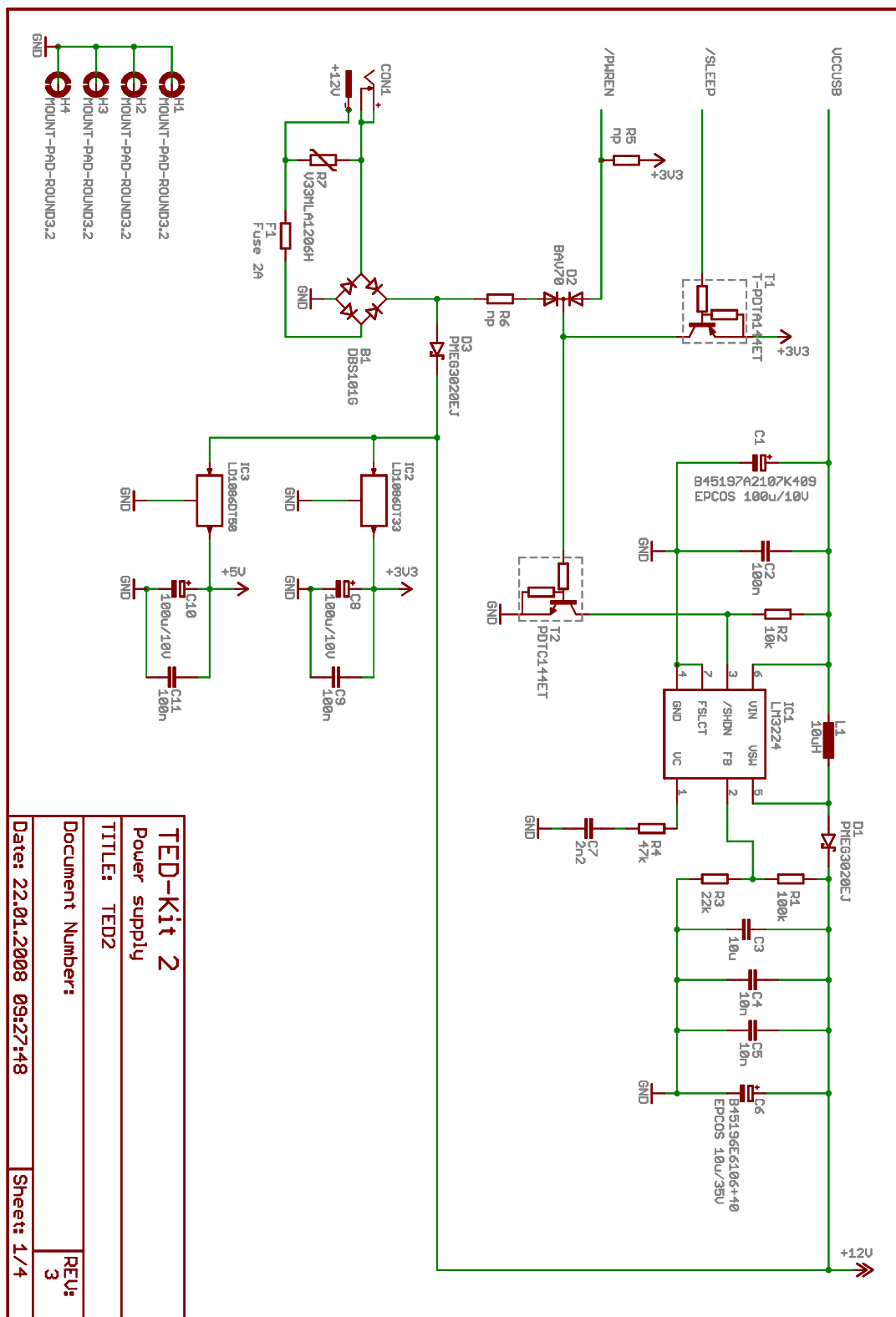
Fig 66.   TED-Kit 2 power supply
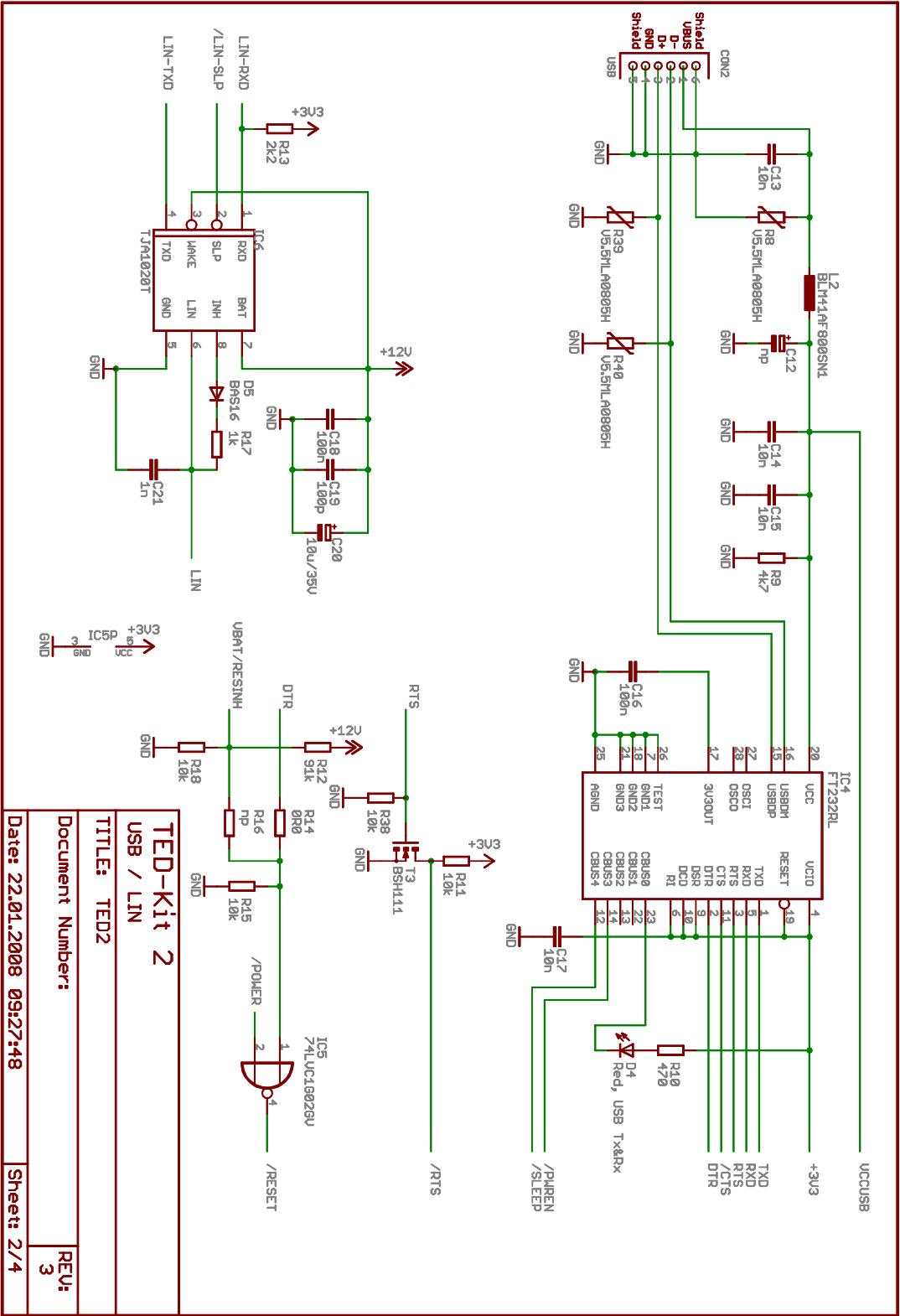
Fig 67.   TED-Kit 2 USB/LIN
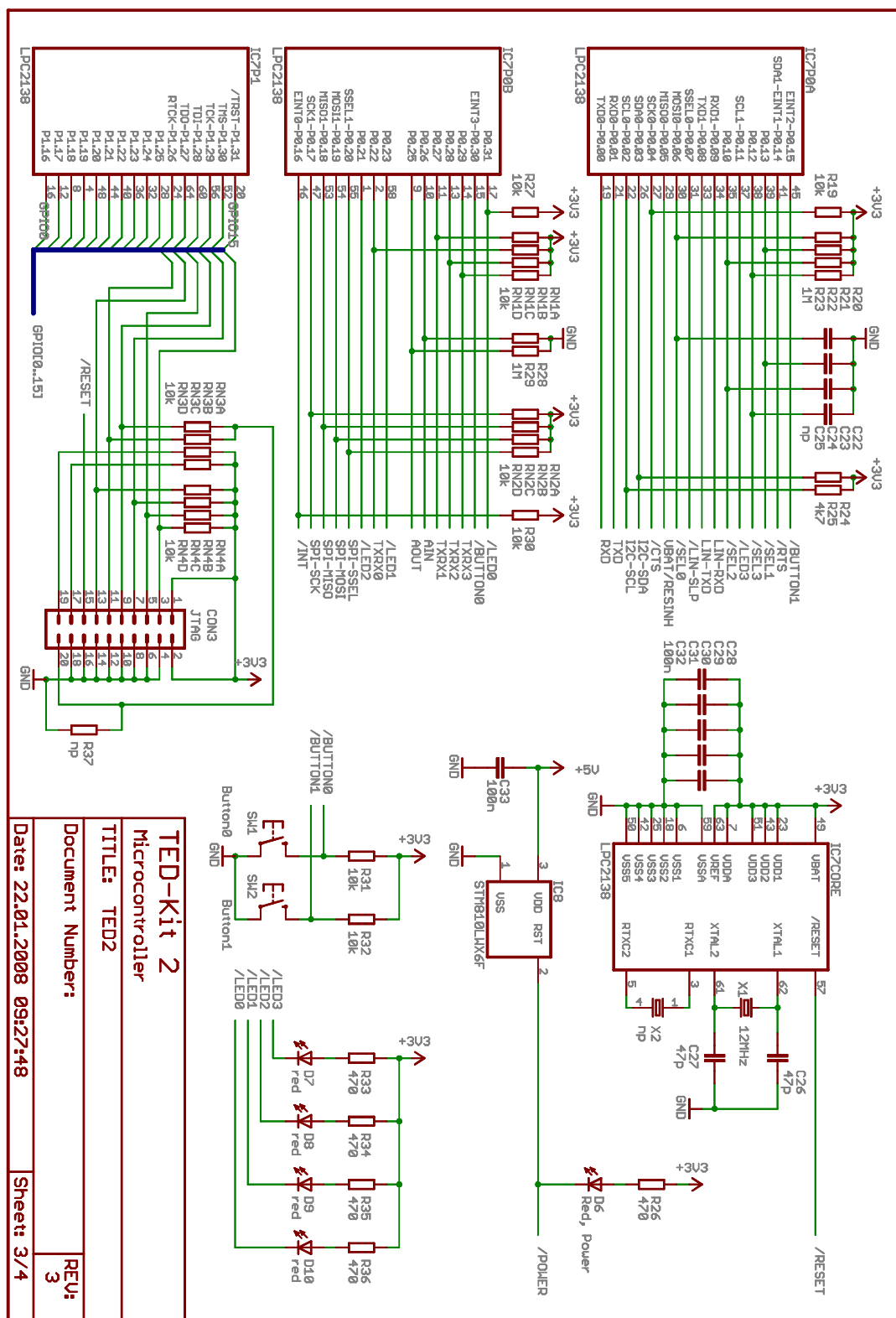
Fig 68.   TED-Kit 2 microcontroller
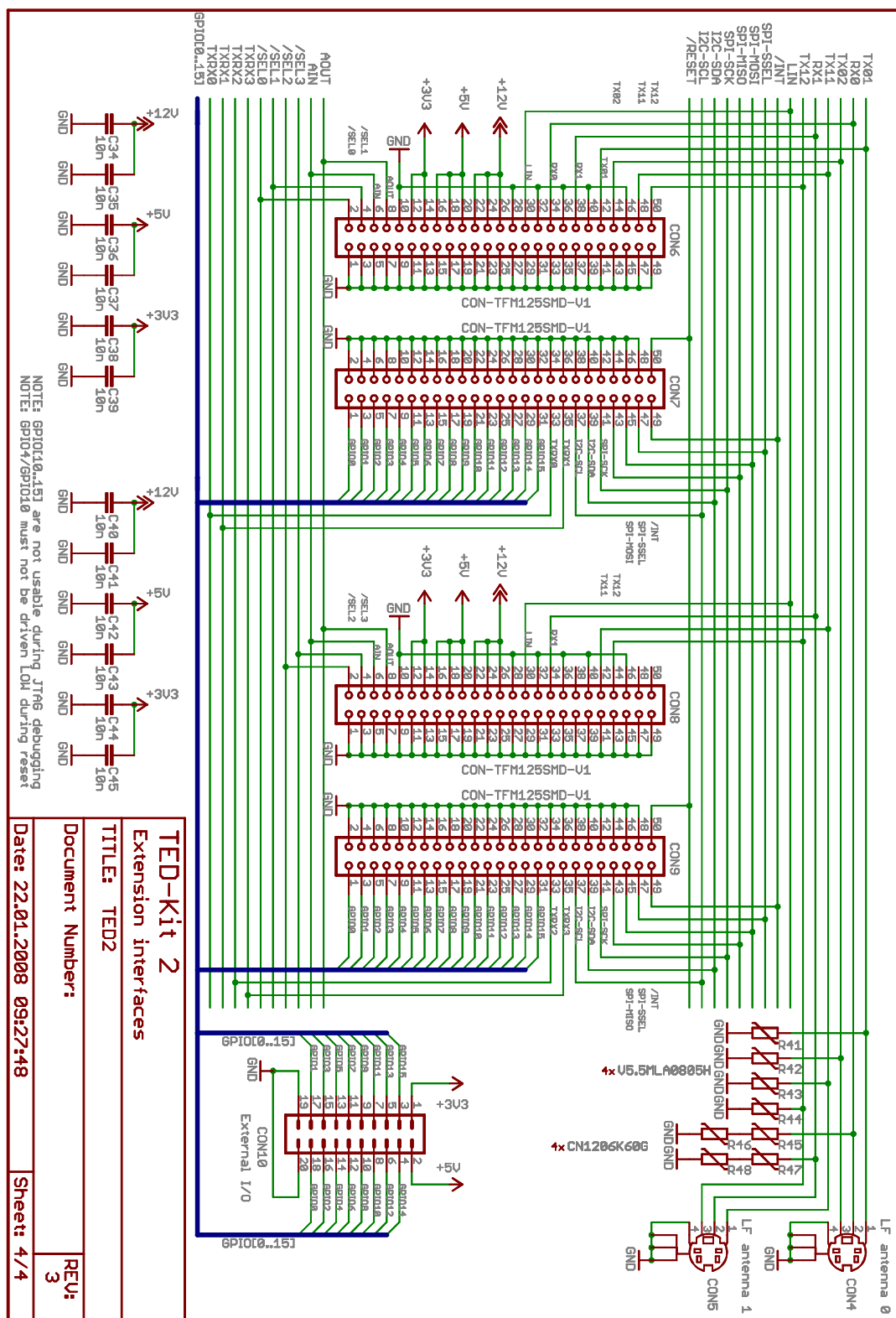
Fig 69. TED-Kit 2 extension interface

8.2 ABIC1
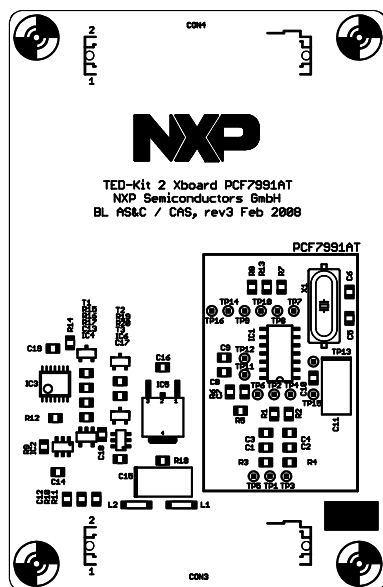
a. Names
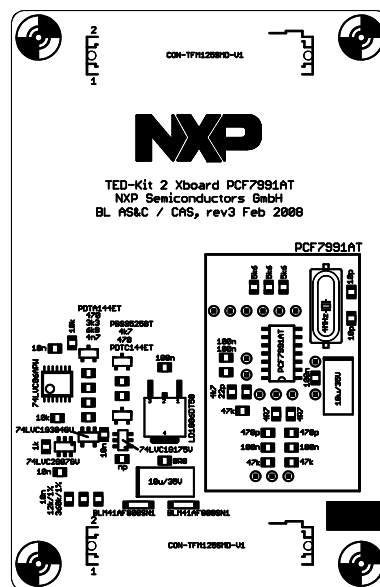
d. Values

Fig 70. XBoard/ABIC1 top
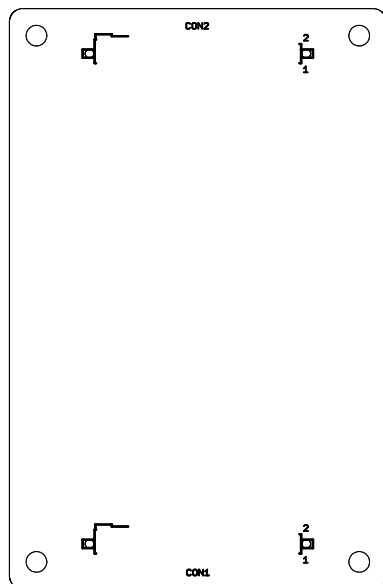
a. Names
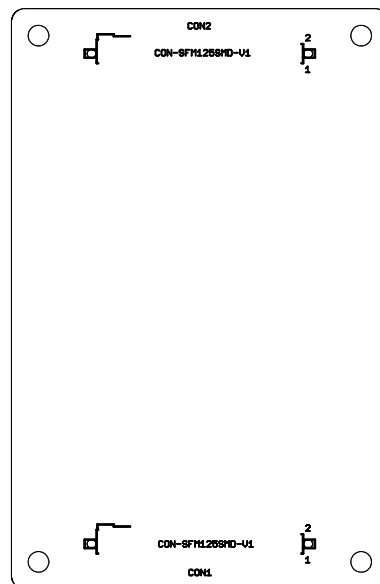
b. Values

Fig 71. XBoard/ABIC1 bottom
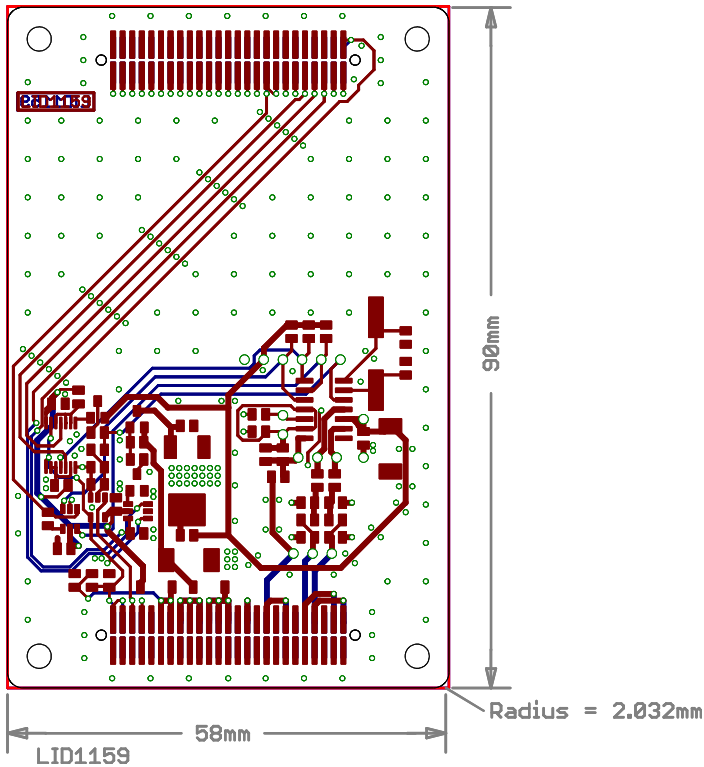
Fig 72.   XBoard/ABIC1 layout
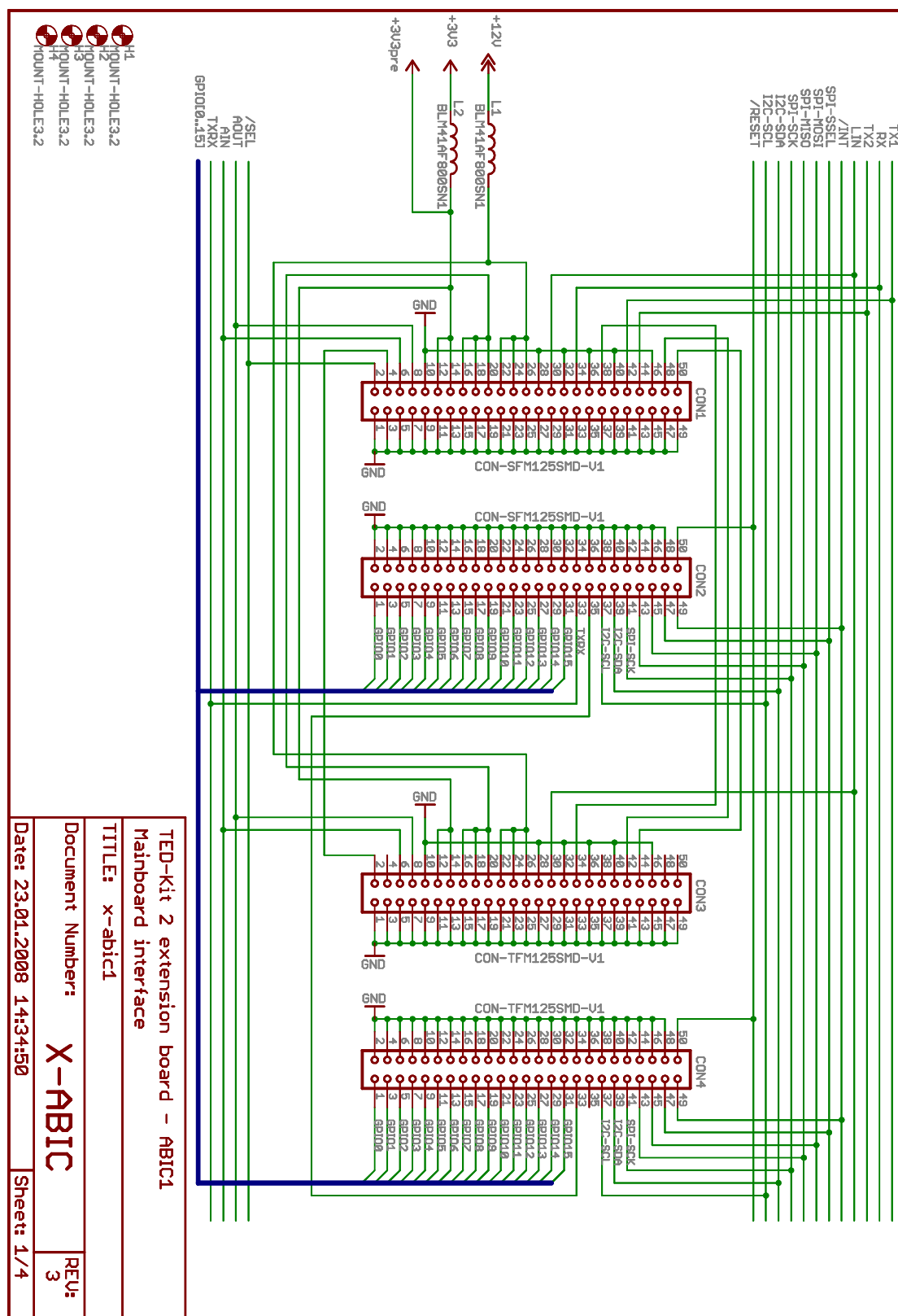
Fig 73. XBoard/ABIC1 main board interface
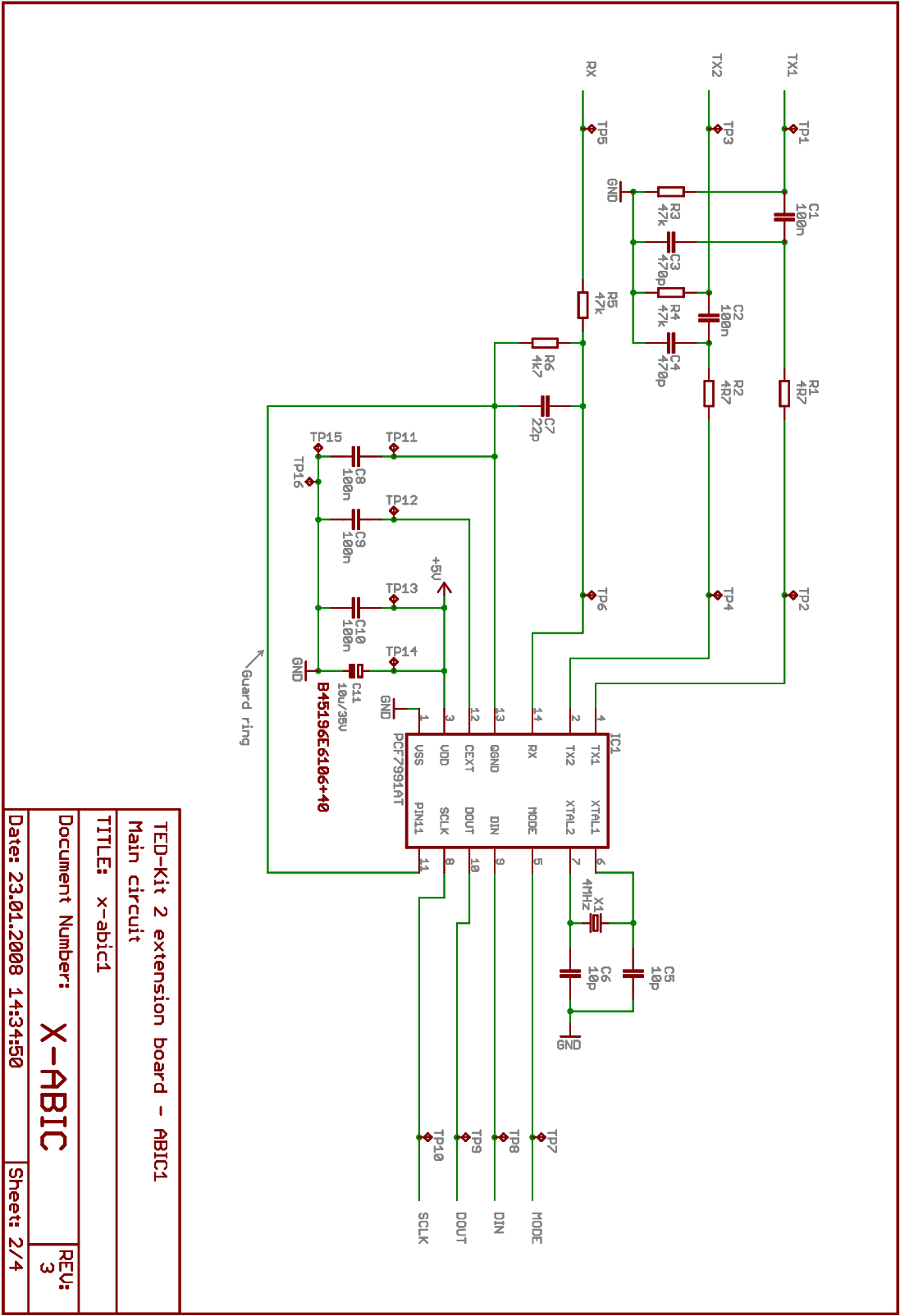
Fig 74.   XBoard/ABIC1 main circuit
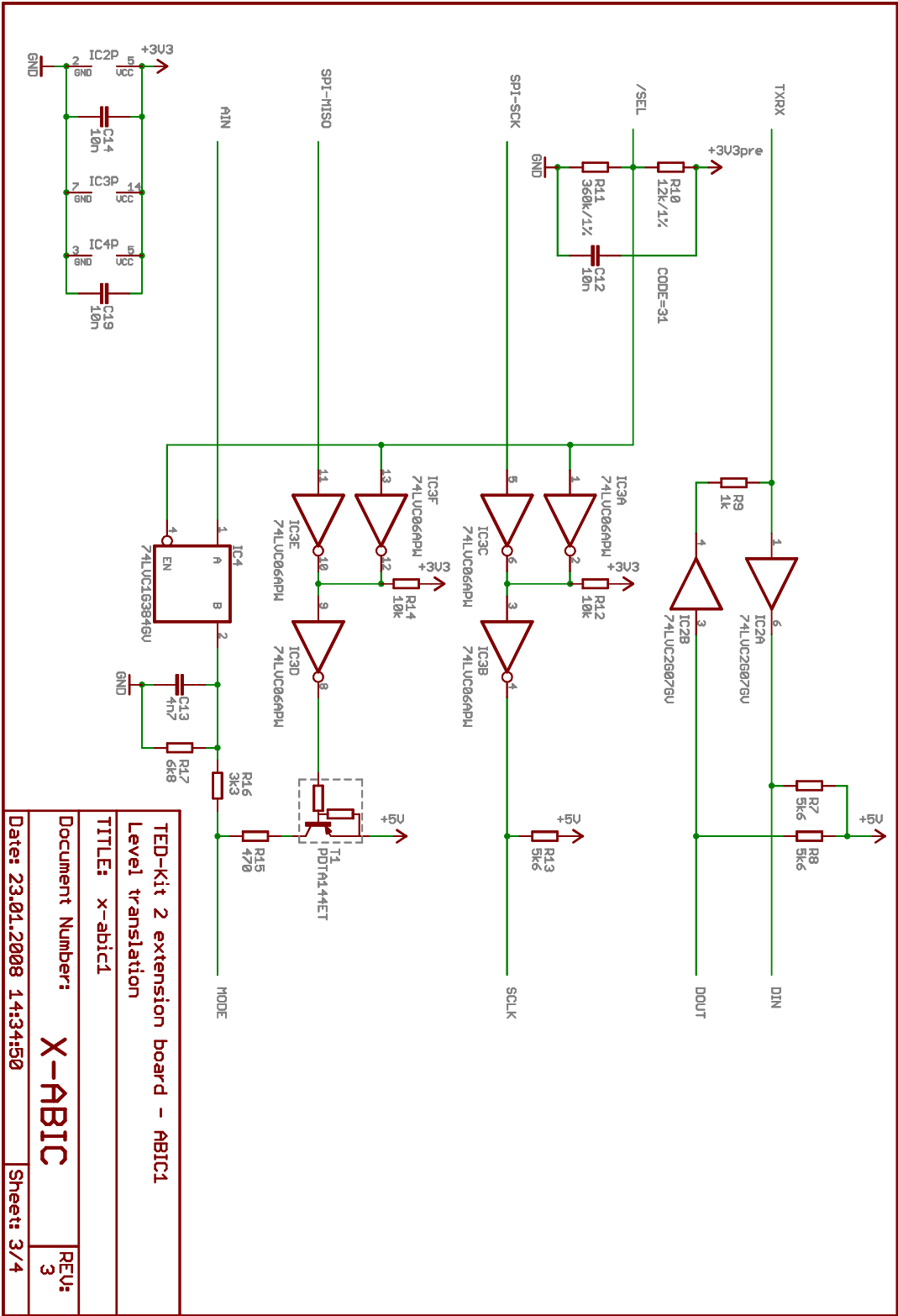
Fig 75.   XBoard/ABIC1 level translation
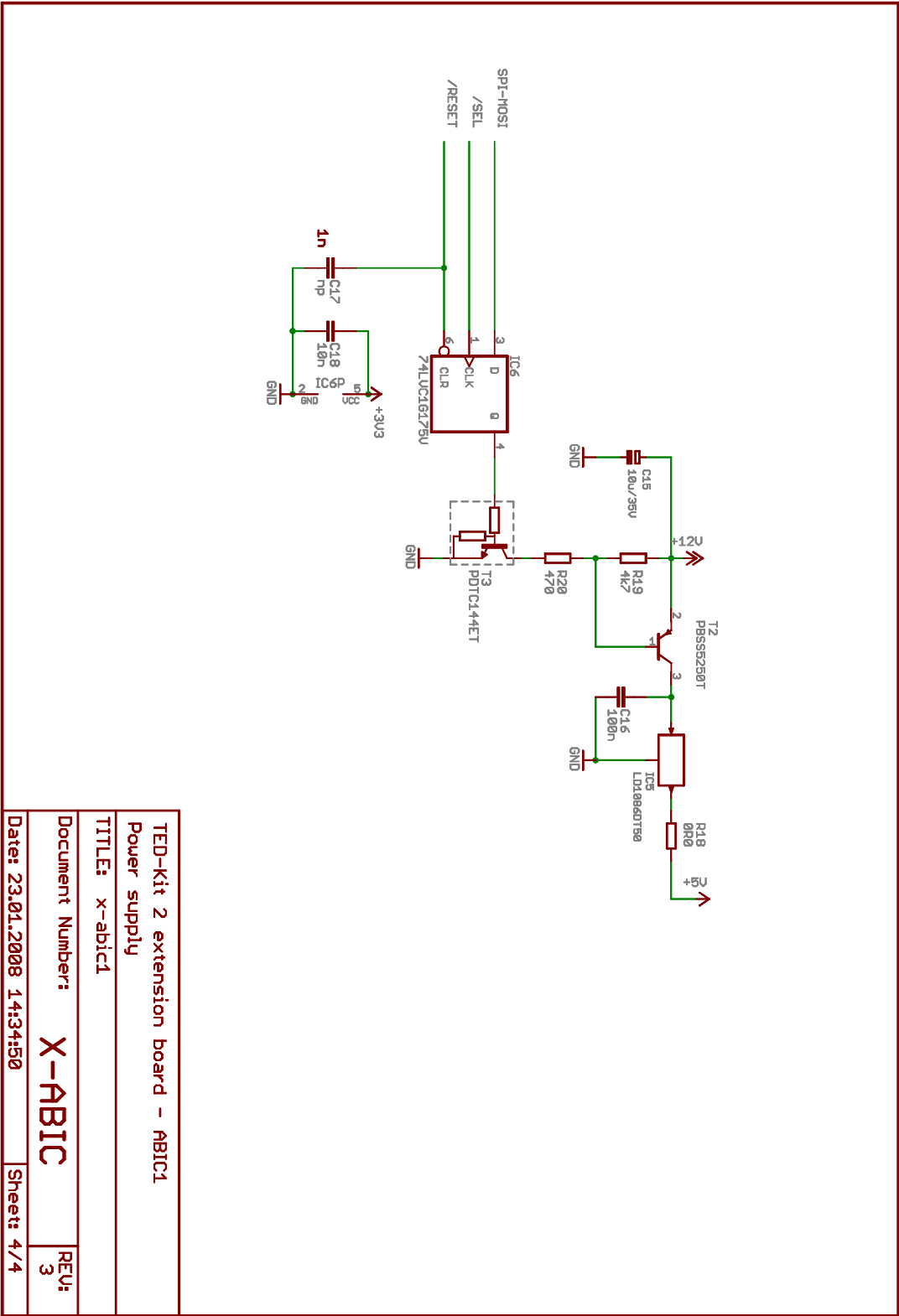
Fig 76.   XBoard/ABIC1 power supply

8.3   LoPSTer
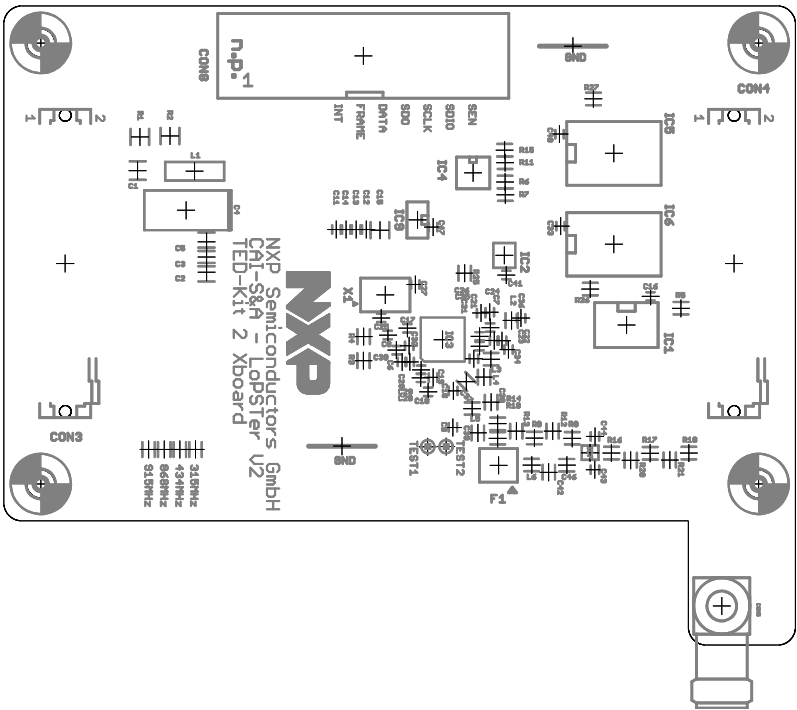
Fig 77.   XBoard/LoPSTer component/IC names
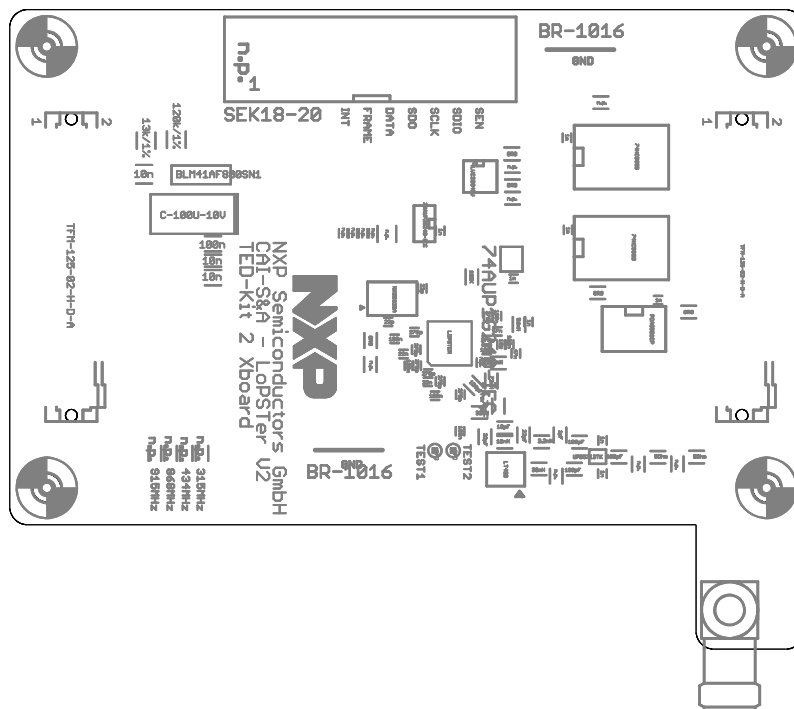
Fig 78.   XBoard/LoPSTer component/IC values
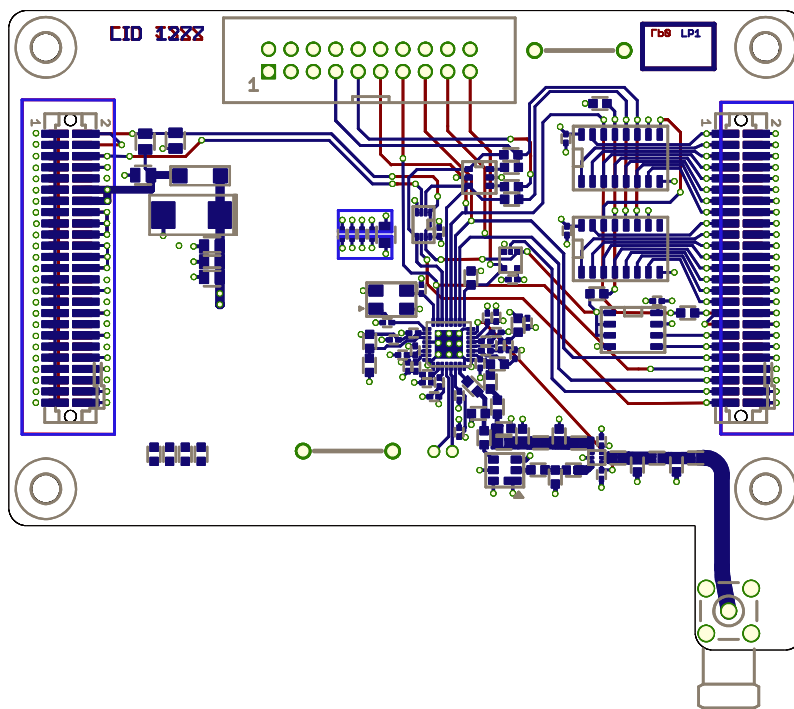
Fig 79.   XBoard/LoPSTer schematic pg 1
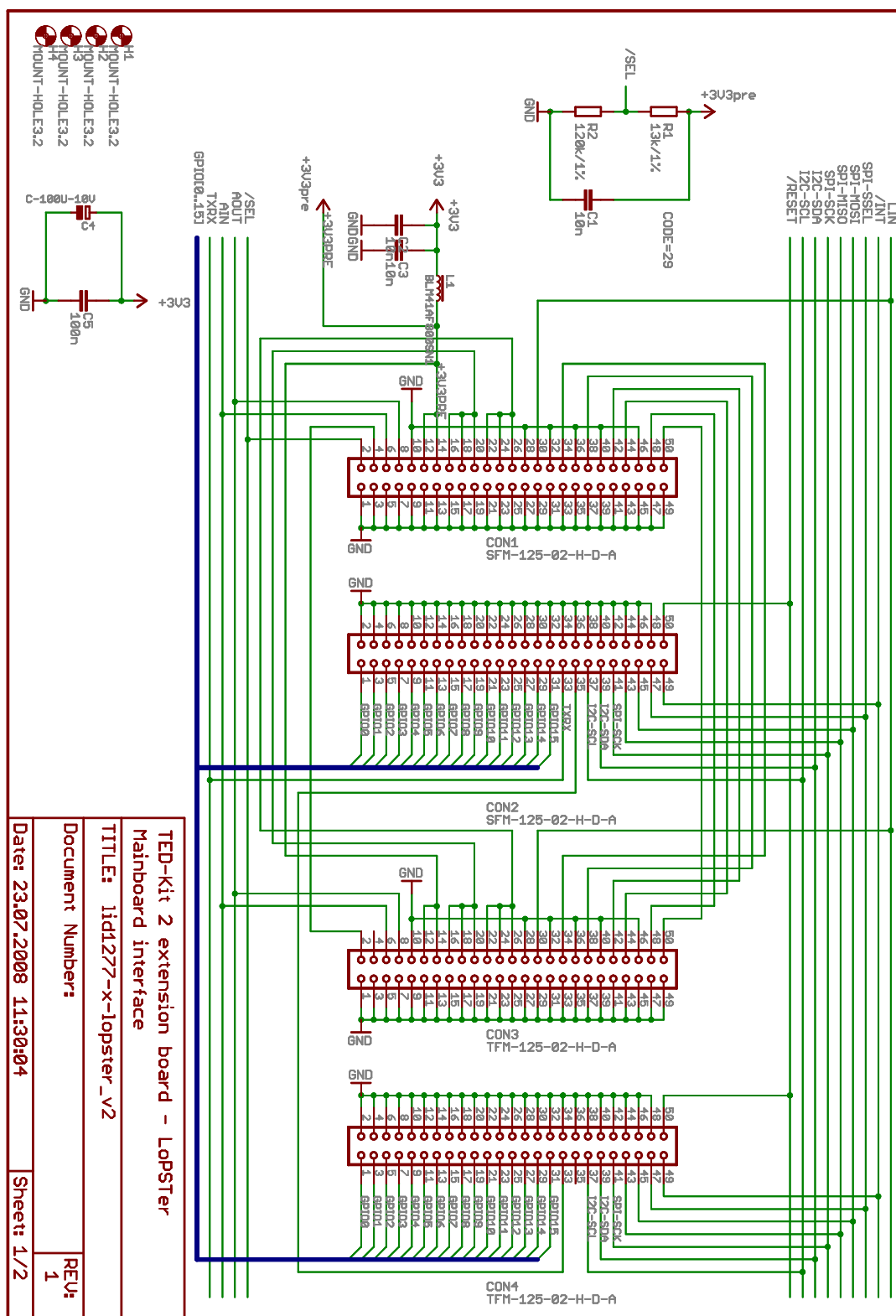
Fig 80.   XBoard/LoPSTer main board interface pg 1
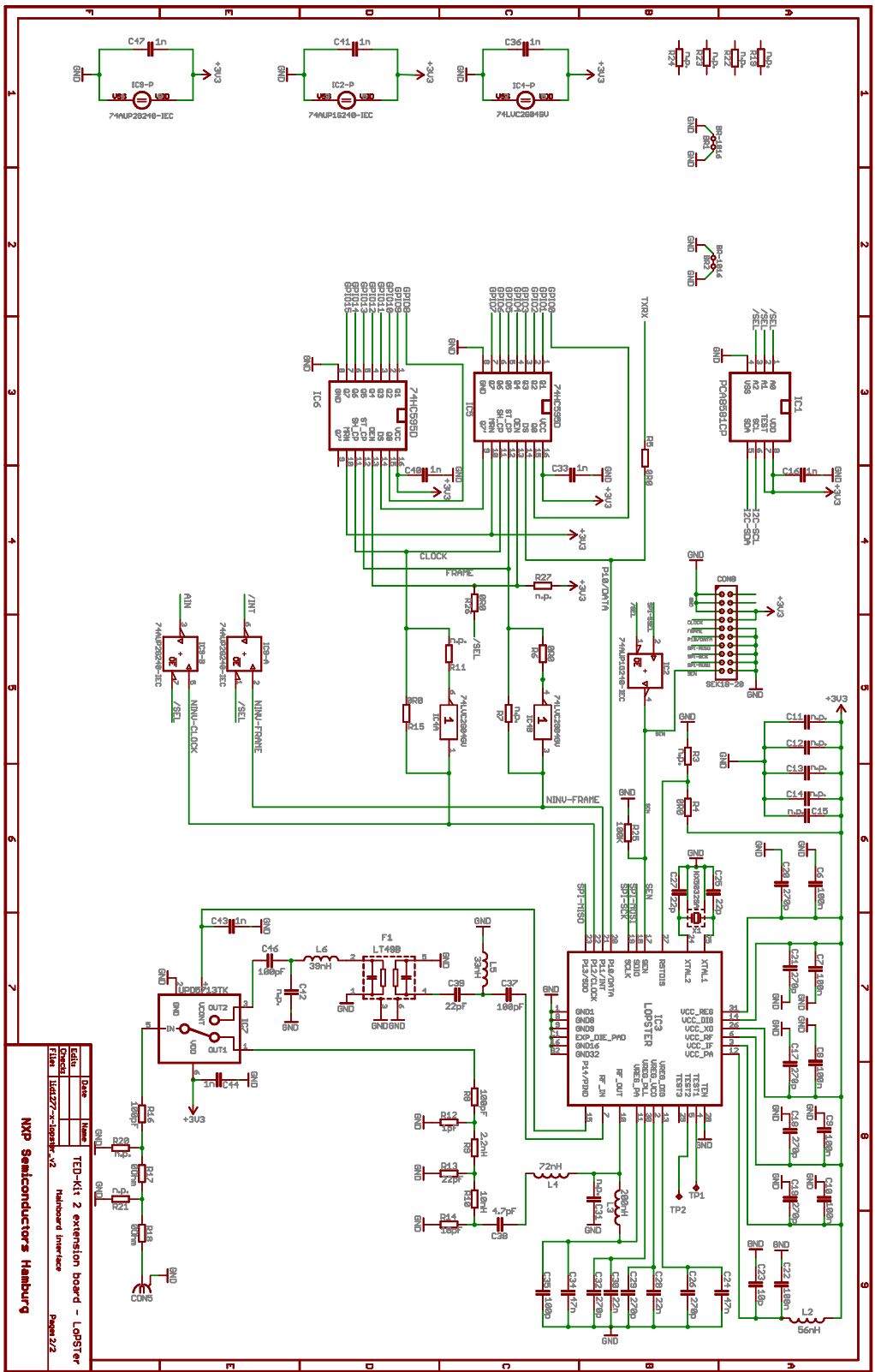
Fig 81. XBoard/LoPSTer main board interface pg 2

8.4 LF Antenna

The LF-Antenna is provided by VACUUMSCHMELZE GmbH & Co. KG:

VACUUMSCHMELZE GmbH & Co. KG

Dr. Achim Kipper
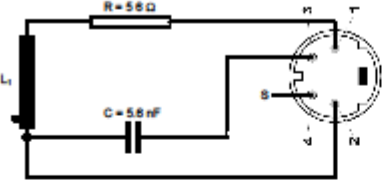
Phone: +49 (6181) 38-2029 or +49 (6181) 38-0

E-Mail: Achim.Kipper@vacuumschmelze.com

E-Mail: info@vacuumschmelze.com

Web: http://www.vacuumschmelze.com

The antennas are samples and thus, not available as a mass product.

Fig 82. LF antenna data sheet page 1
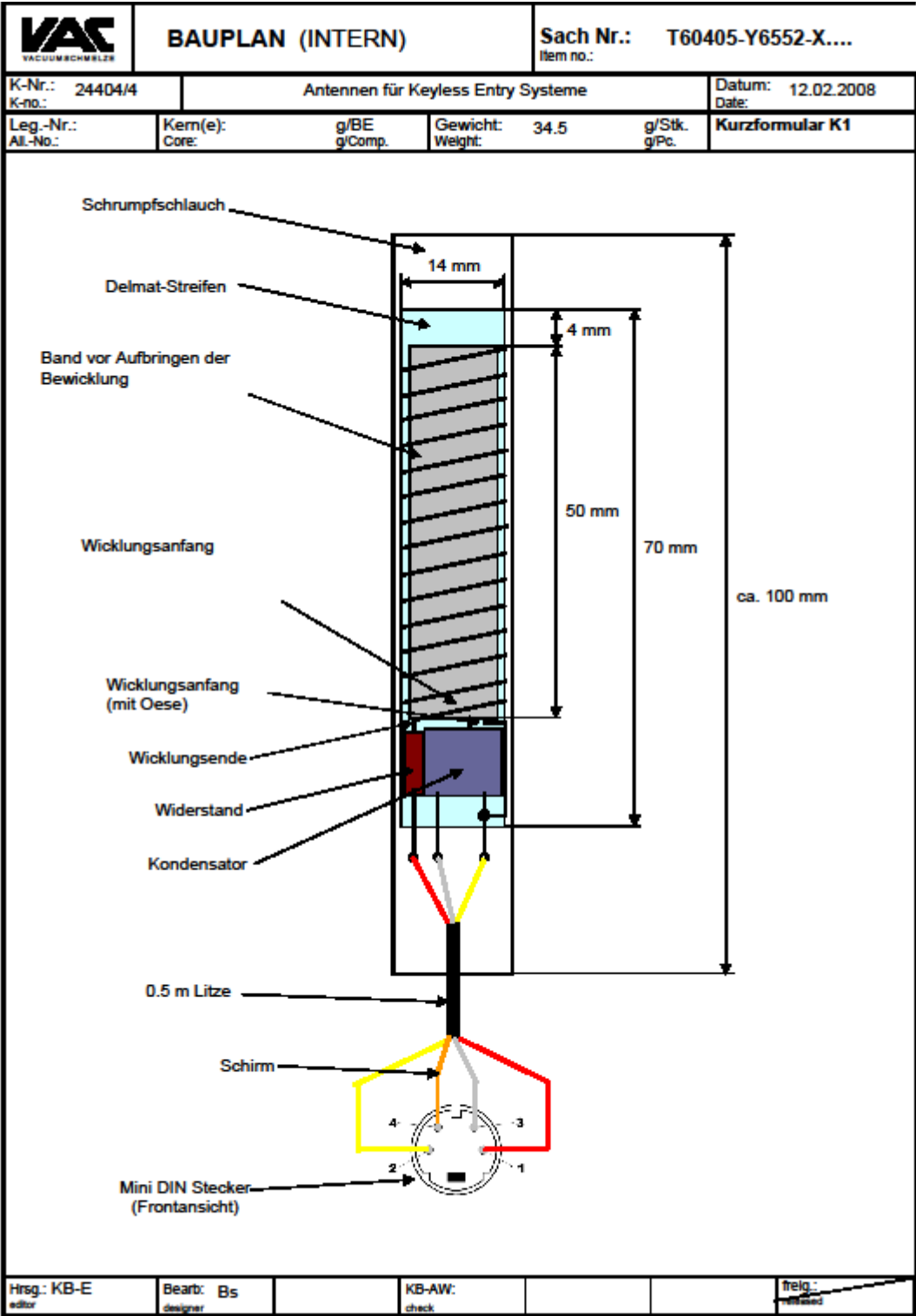
Fig 83.   LF antenna data sheet page 2

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I2C Bus — is a trademark of NXP B.V.

10. Abbreviations

Abbreviation	Description
.NET	The Microsoft *.NET* Framework is a software component that is a part of Microsoft Windows operating systems.
ABIC1	*A*dvanced *B*ase station *IC 1*
ASCII	*A*merican *S*tandard *C*ode for *I*nformation *I*nterchange
EEPROM	*E*lectrically *E*rasable *P*rogrammable *R*ead-*O*nly *M*emory
GPIO	*G*eneral *P*urpose *I*nput/*O*utput
GUI	*G*raphical *U*ser *I*nterface
I2C, I²C	*I*nter-*I*ntegrated *C*ircuit
IC	*I*ntegrated *C*ircuit
IDE	Unique 32-Bit *Ide*ntifier used by NXP transponders
ISK	*I*mmobilizer *S*ecret *K*ey
LED	*L*ight-*E*mitting *D*iode
LF	*L*ow *F*requency
LIN	*L*ocal *I*nterconnect *N*etwork
LoPSTer	*L*ow *P*ower *S*ingle-chip *T*ransceiv*er*

Abbreviation	Description
PC	*P*ersonal *C*omputer
PCB	*P*rinted *C*ircuit *B*oard
PDF	*P*ortable *D*ocument *F*ormat
PKE	*P*assive *K*eyless *E*ntry
RAM	*R*andom *A*ccess *M*emory
RKE	*R*emote *K*eyless *E*ntry
RSSI	*R*eceive *S*ignal *S*trength *I*nformation
SKL	*S*ecret *K*ey *L*ock
SPI	*S*erial *P*eripheral *I*nterface
TED-Kit 2	*T*ransponder *E*valuation and *D*emonstration-*Kit 2*
TMCF	*T*ransponder *M*ode *C*onfiguration
UHF	*U*ltra *H*igh *F*requency
USB	*U*niversal *S*erial *B*us
WHQL	*W*indows *H*ardware *Q*uality *L*abs
XBoard	E*X*tension *Board*
XSlot	E*X*tension *Slot*

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Please be aware that important notices concerning this document and the product(s) described herein, have been included in the section 'Legal information'.

OCEAN CHIPS
Океан Электроники
Поставка электронных компонентов

Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «**JONHON**», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «**FORSTAR**».

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели, кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).

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