Getting started with the ST25R500 evaluation board GUI

Introduction

The PC software package (STSW-ST25R023) contains the ST25R500 evaluation board GUI and the ST25PC-NFC software.

The ST25R500 evaluation board GUI allows the user to communicate with the ST25R500 evaluation board. It provides an interface to change a wide range of settings. It also allows different features of the ST25R500 evaluation board kit to be executed and evaluated. This user manual provides a detailed description of the ST25R500 evaluation board GUI.

The PC software must be used with the ST25R500 evaluation board, which contains all the necessary modules for a fully functional NFC reader.

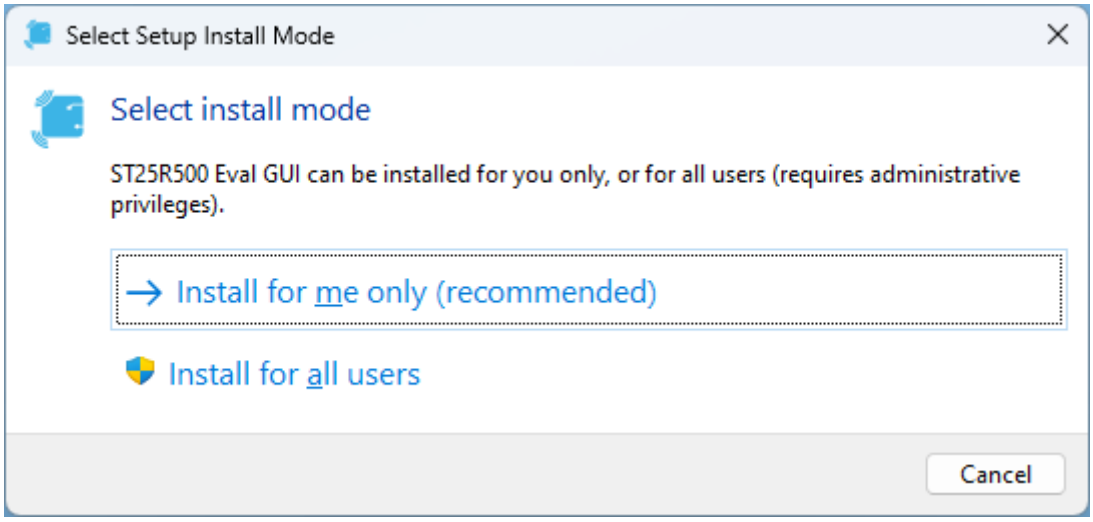
1 Preface

1.1 Downloading and installing the software

After downloading the software (available at st.com), double-click the executable file to begin the installation.

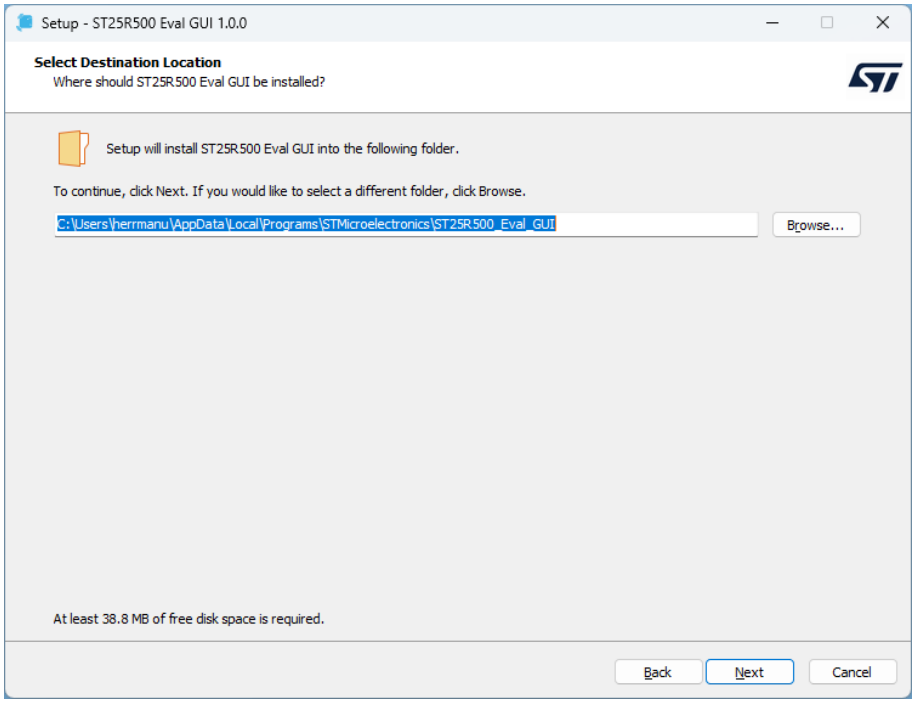
- Select whether to install the software for each user of the PC or only for the current user.

Figure 1. Selecting install mode



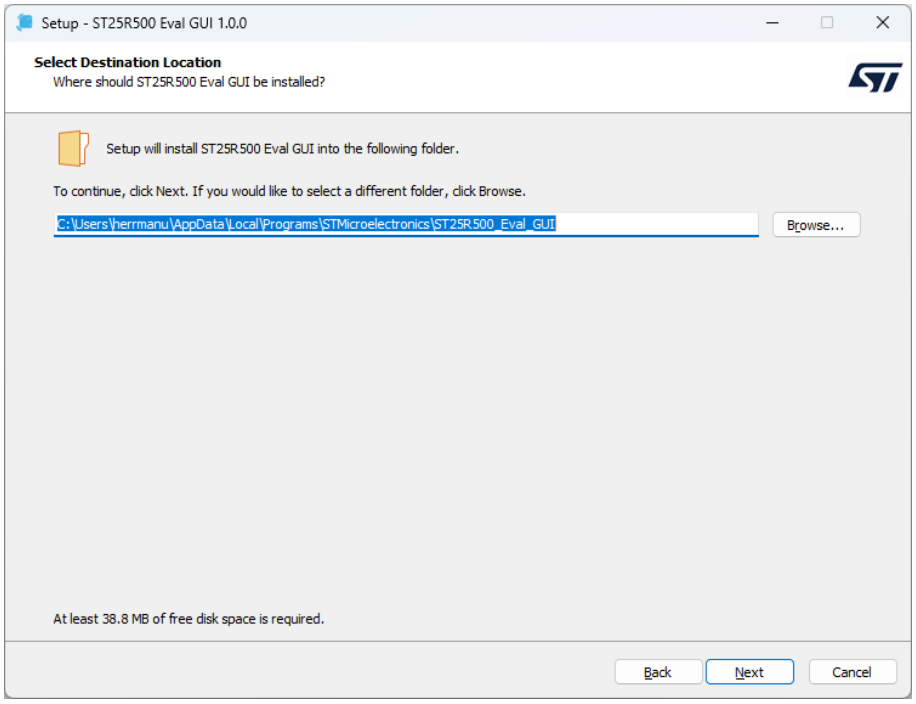
- Select the path to install the software.

Figure 2. Selecting the program destination



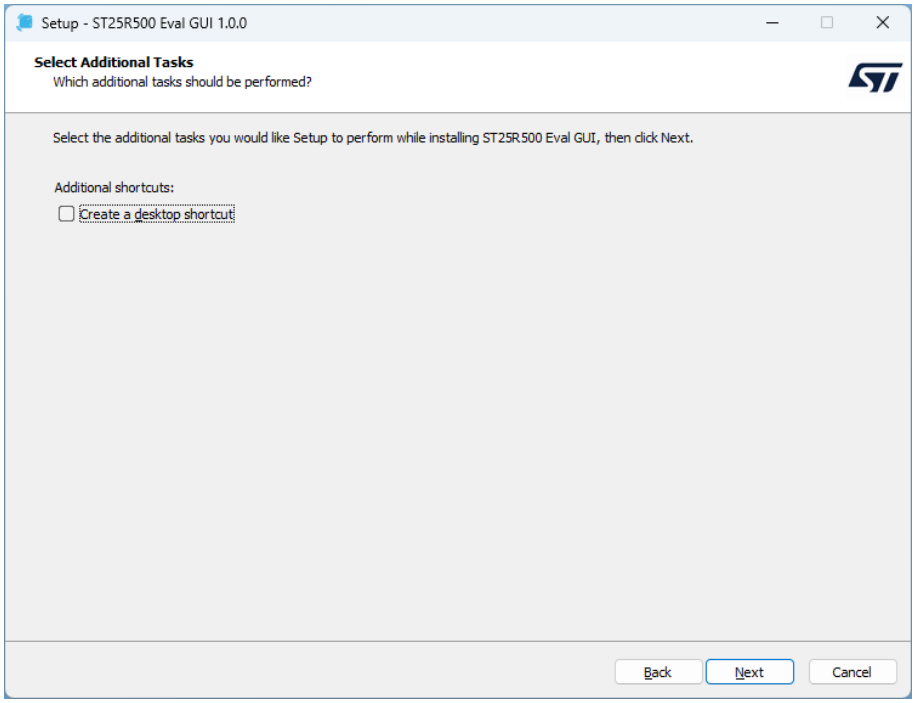
- It is possible to add the ST25R500 evaluation GUI to the start menu. This is recommended to allow the user to always find the software easily using the Windows® search function. If the user does not want to add the software to the start menu, they just need to tick the checkbox in the bottom left corner of the window.

Figure 3. Selecting a start menu folder



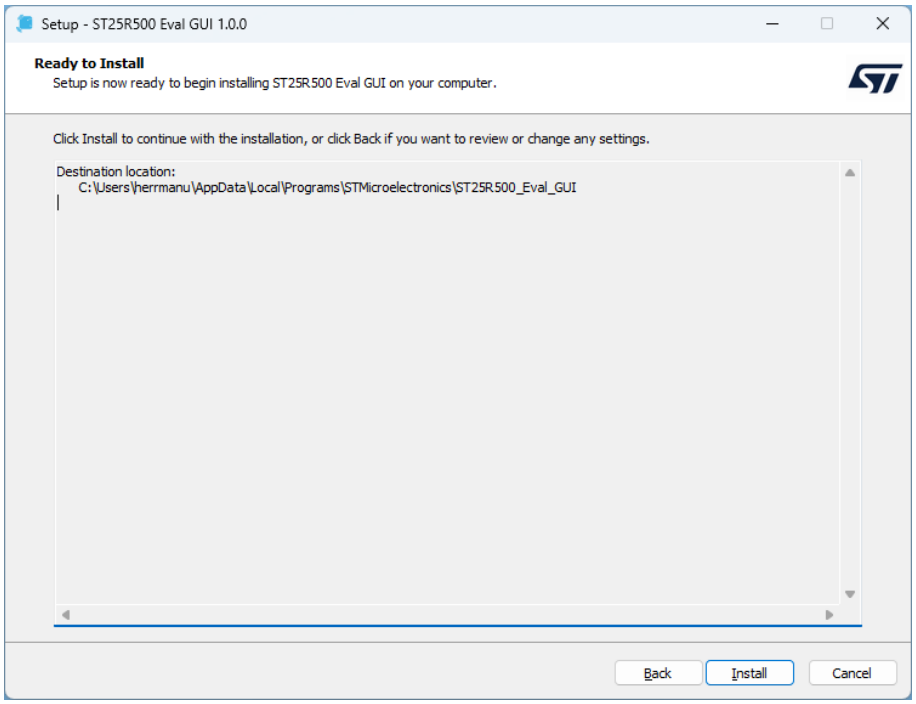
- To create a shortcut on the desktop, tick the checkbox shown below.

Figure 4. Creating a desktop shortcut



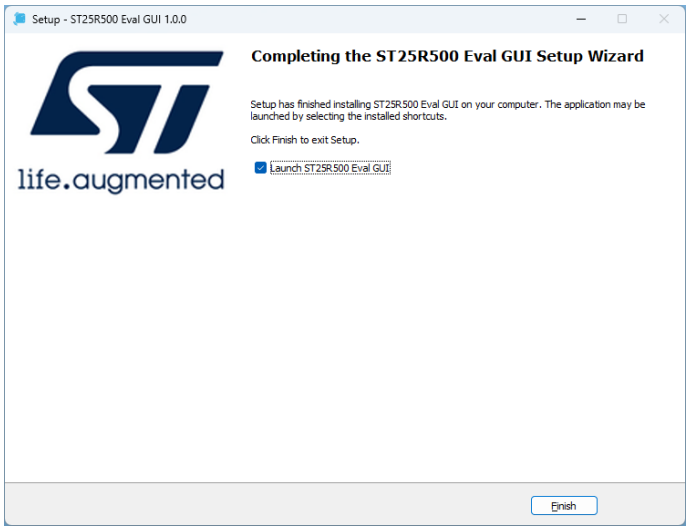
- The figure below shows a summary of the selected installation directories. Click install.

Figure 5. Ready to install



- Installing takes no more than a few minutes to complete. Launch the application by clicking the finish button.

Figure 6. Installation completed

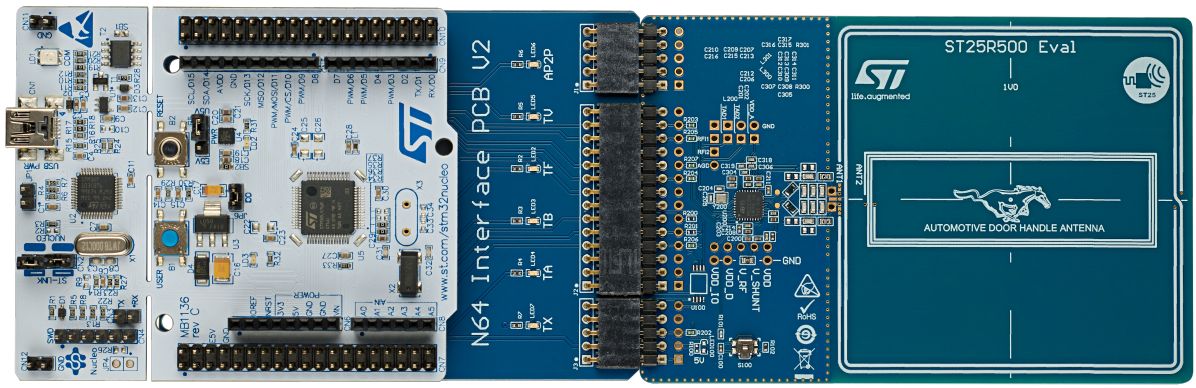


Note: This software is only available for PCs running on Microsoft® Windows®.

1.2 Hardware preparations

Communication with the board happens through the mini-USB CN1 (STLINK-USB). On this port, the STLINK provides a virtual COM port used for communication.

Figure 7. ST25R500 evaluation board - top view



The ST25R500 evaluation board kit is described in a separate user manual.

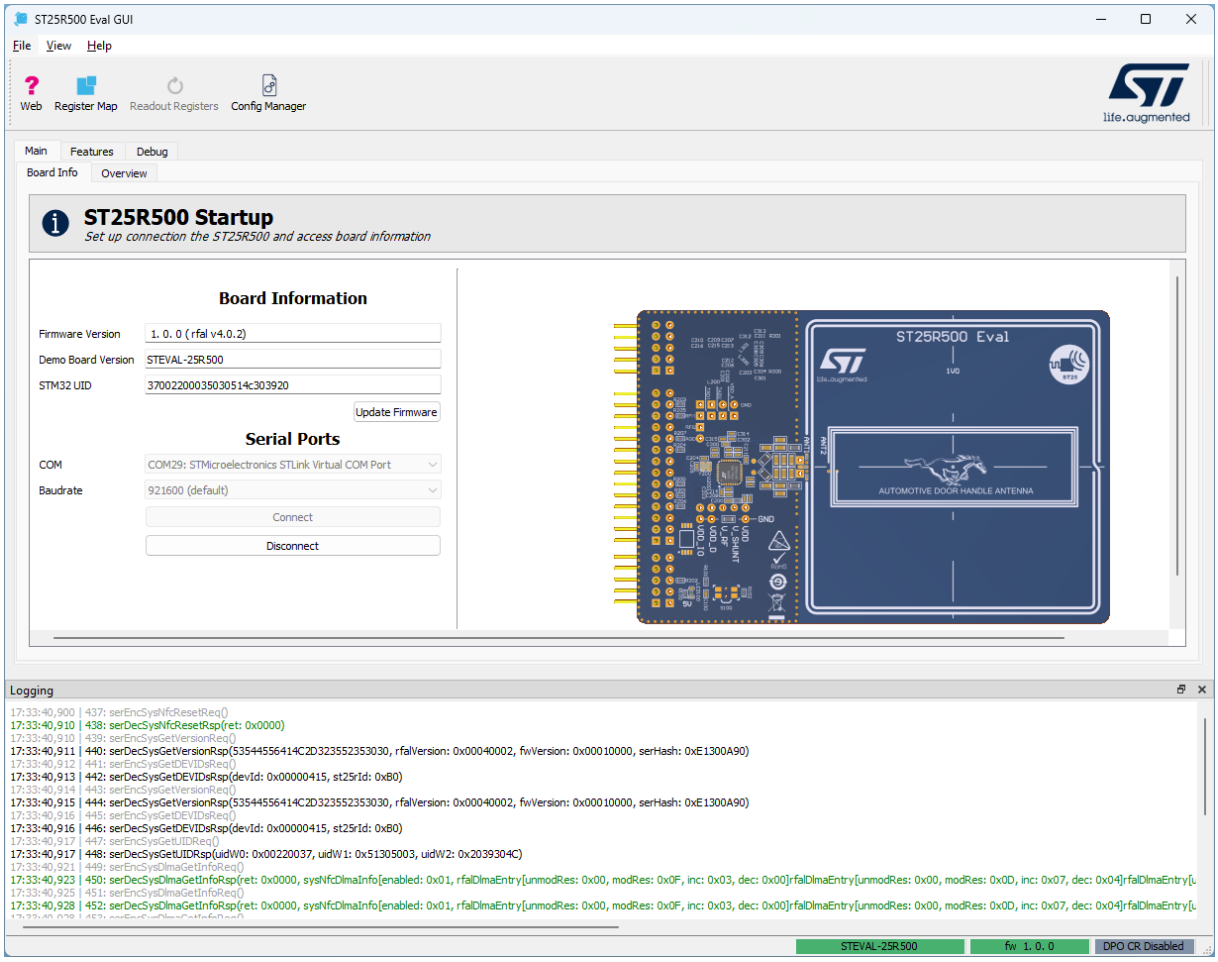
2 Reader mode

2.1 Main tab

The **Main** tab contains the **Board Info** tab and the **Overview** tab.

2.1.1 Board info tab

Figure 8. Board info tab



The **Board info** tab allows the GUI to be connected to the ST25R500 evaluation board. To connect a board, ensure that the correct COM port and baud rate are selected.

When a board is connected, this tab displays basic information about the connected hardware.

- **Firmware version**
  The firmware version currently running on the MCU.
- **Demo board version**
  The type of demonstration board.
- **STM32 UID**
  The unique ID of the STM32 on the NUCLEO-L476 main board.

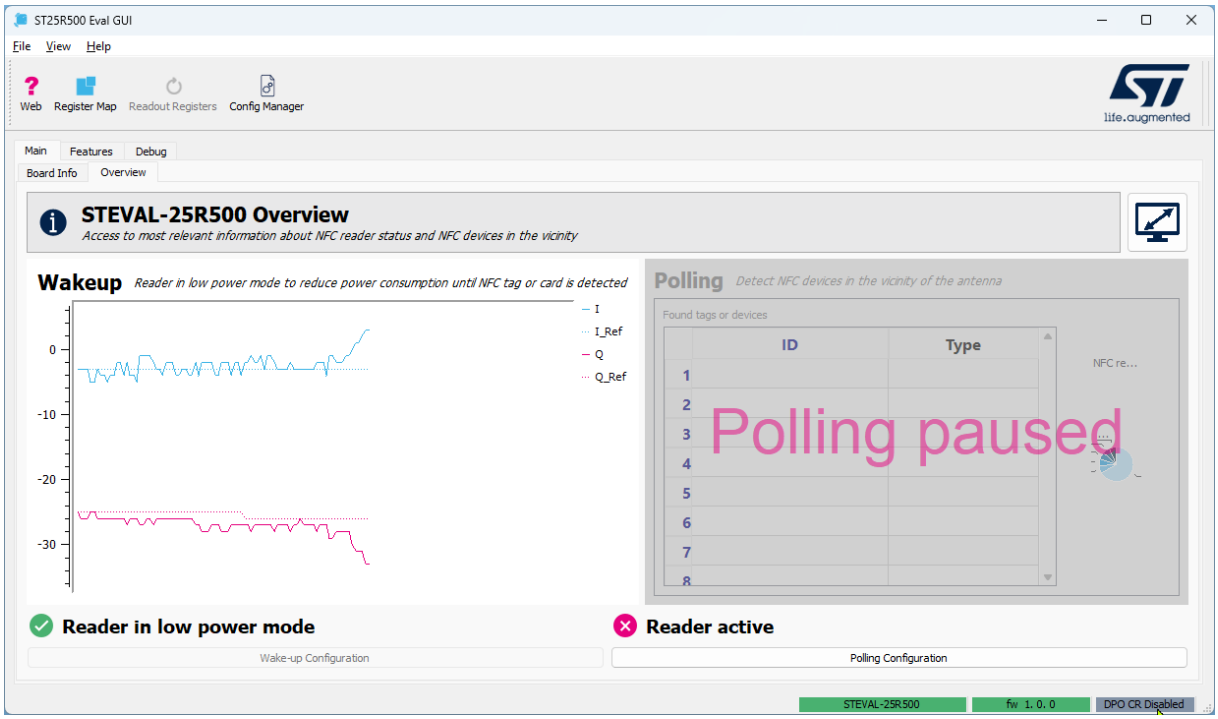
The **Update firmware** button allows the user to update the firmware running on the STM32L4 on the NUCLEO-L476 main board. See Updating the firmware for more information.

2.1.2 Overview tab

The **Overview** tab is a quick demonstration showing a typical NFC application combining wake-up mode and NFC polling. As soon as wake-up mode detects a variation, standard NFC polling is performed and the cards/devices found are listed.

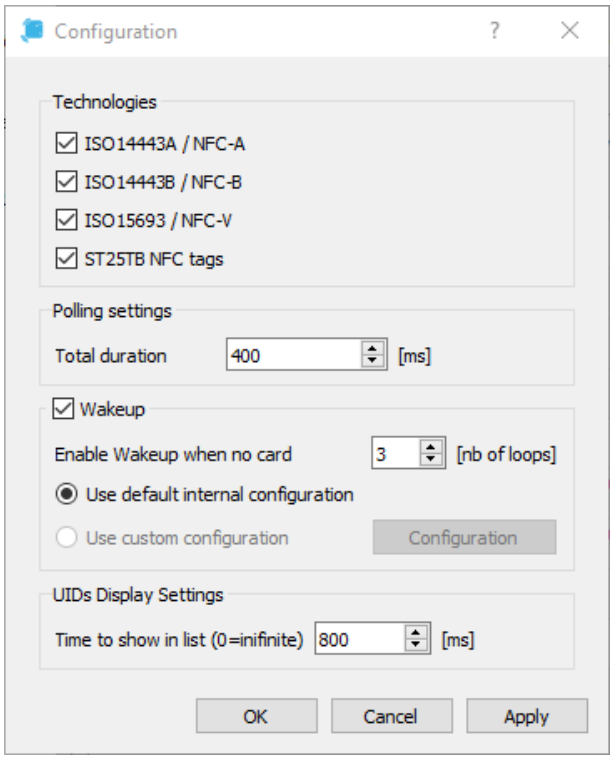
The demonstration remains in polling mode until no more cards/devices are detected.

Figure 9. ST25R500 overview



A small window with settings opens after clicking on the **Polling Configuration** button.

Figure 10. Polling configuration



These settings allow the user to enable/disable polling for different technologies. It is also possible to enable polling only and not to perform a wake-up.

To view the tab in full screen, click on the extended view icon.

Figure 11. Extended view

Click the same button again to exit full screen mode.

2.2 Features tab

This tab allows the user to discover the different features of the ST25R500 in the subtabs. Each subtab represents a feature and provides different settings for the corresponding functionality.

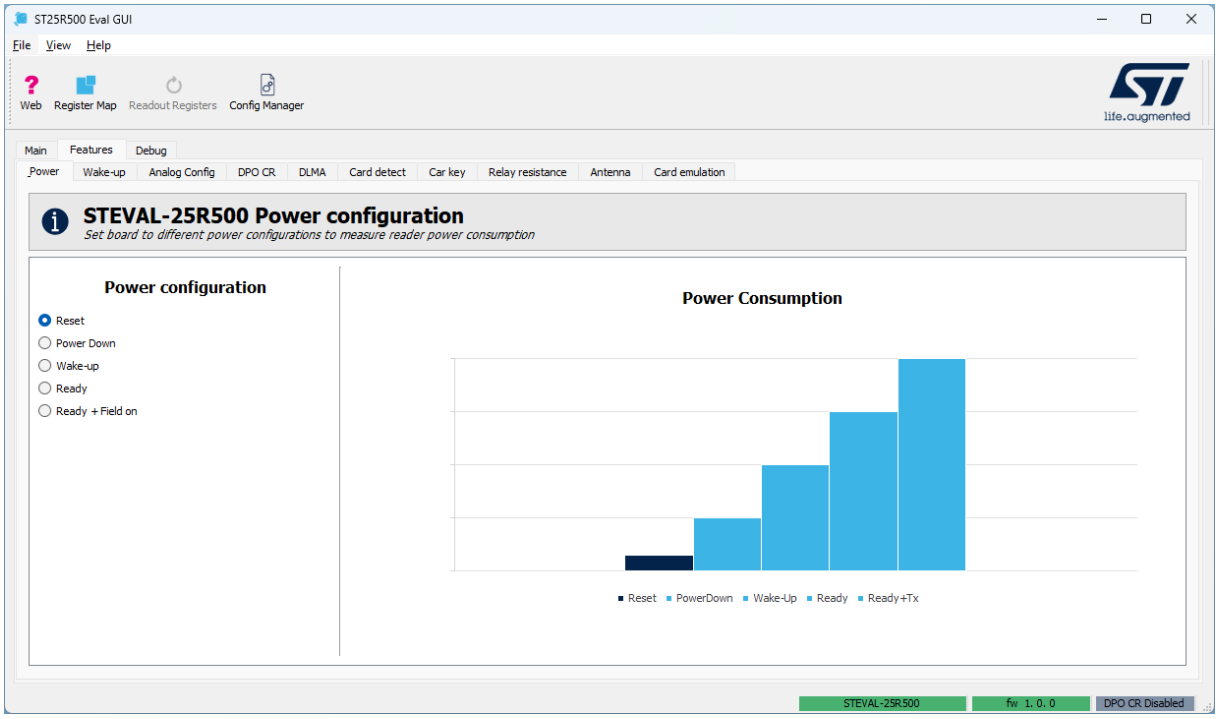
2.2.1 Power tab

The **Power** tab allows the user to set the ST25R500 to five different modes:

- Reset
- Power-down
- Wake-up
- Ready
- Ready + Field on

Each mode has a different power consumption (use the pins of L200 to measure the actual power consumption of the chip). The mode can be changed using the radio buttons on the left. The bar graph on the right side visualizes the different power consumption of the different modes. The currently selected mode is highlighted by a darker color in Figure 12.

Figure 12. Power consumption



2.2.2 Antenna tab

The needle shows the amplitude as measured on RFI, and the phase difference between RFI and RFO (calculated back from I/Q channel values).

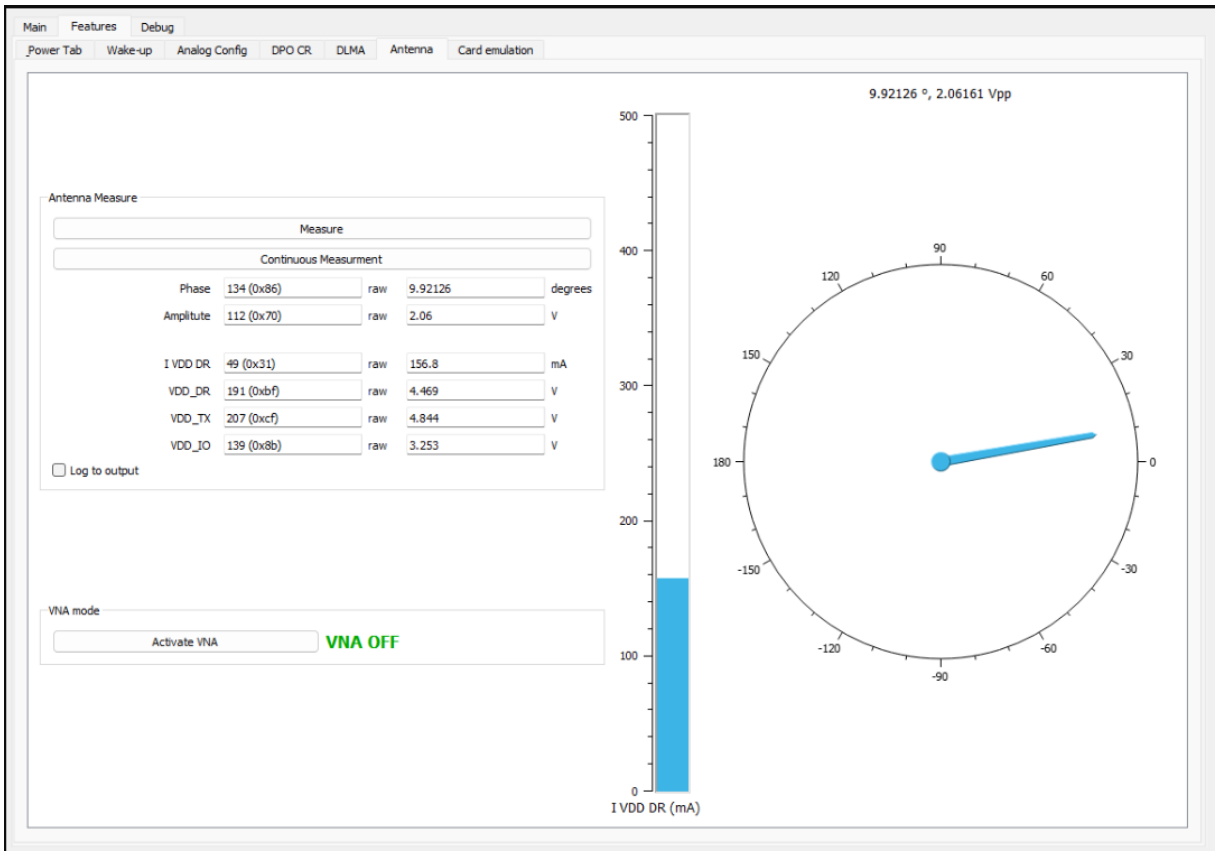
Additionally, other analog voltages and current can be measured.

Click on the **measure antenna** button to measure these values.

Activate VNA puts the output driver into high-Z state to be able to connect a VNA without damaging it. This blocks the GUI until the user has confirmed that VNA is removed.

Amplitude and phase difference can be continuously monitored using the **continuous measurement** button. Moreover, when this option is activated and a piece of metal is approached to the antenna, a detuning effect can be observed.

Figure 13. Antenna tab

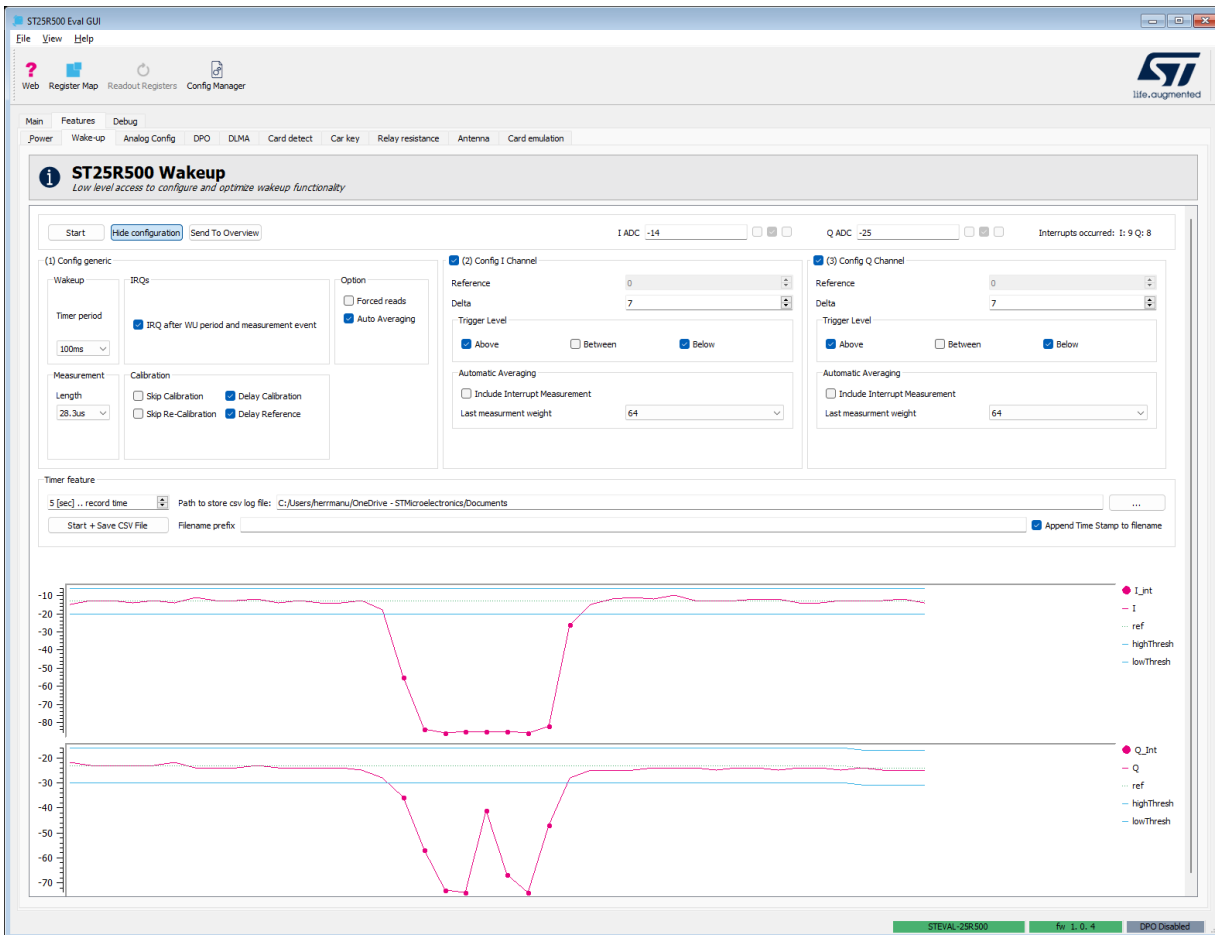


2.2.3 Wake-up tab

The wake-up mode uses very-low power to detect if an object has entered the reader field. The field is switched on for a short time to measure whether an object has entered the field. The measurement provides the I and Q channel values. For more information, see the ST25R500 datasheet (DS14593) and application note (AN6298).

Two graphs show the measured I and Q values. Click the **Start** button to start wake-up mode. The graphs in pink correspond to the measured values. The blue-colored graphs represent the upper and lower thresholds. The last measured I and Q ADC values are displayed above the two graphs.

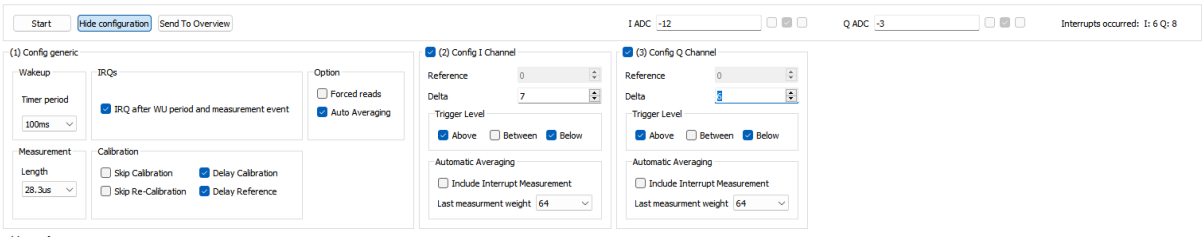
Figure 14. **Wake-up tab with the configuration shown**



By default, a wake-up is triggered when the pink line (measurement) crosses one of the blue lines (threshold). When a wake-up interrupt is triggered, the pink line is marked with a circle.

Click on the **Show configuration** button to display the wake-up mode settings. These settings are mainly those found in the ST25R500 datasheet (DS14593). To change the settings, stop wake-up mode if it is currently enabled.

Figure 15. **Wake-up configuration shown**



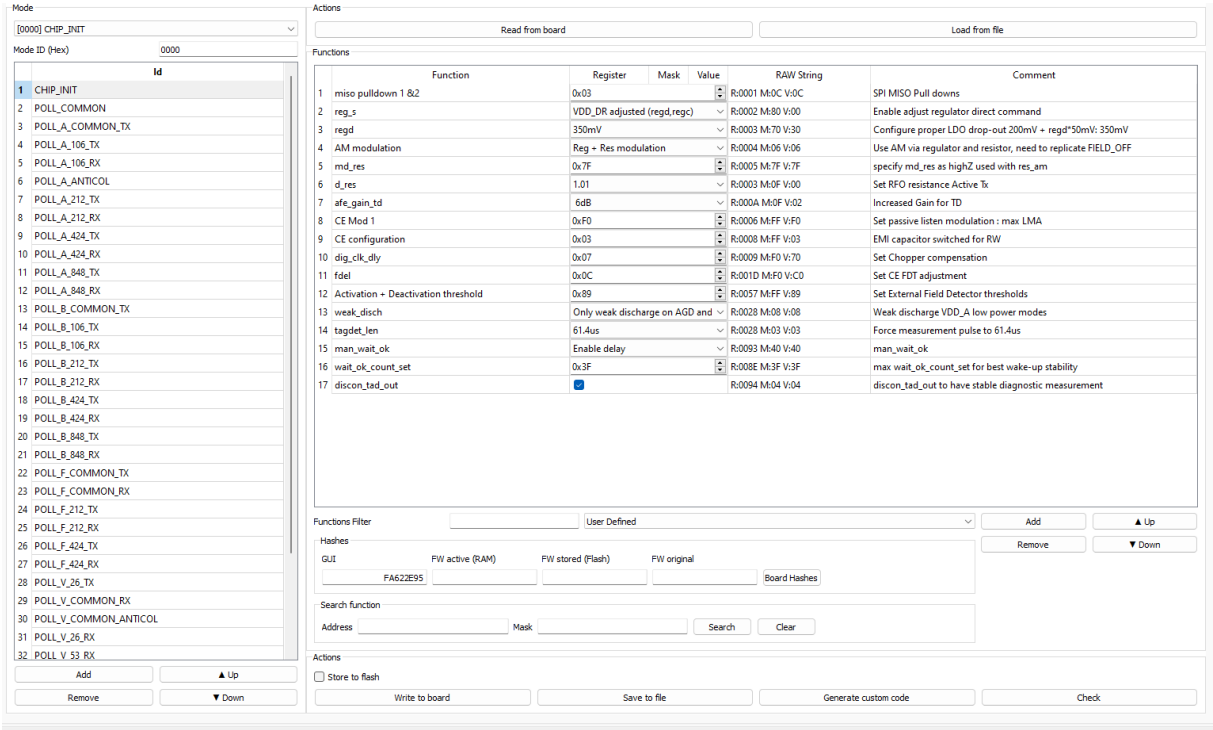
Click the **Send To Overview** button to apply the selected settings to the wake-up functionality provided by the **Overview** tab (refer to Overview tab).

The timer feature enables monitoring of the I/Q values over a fixed time for postprocessing, for example, to calculate standard deviation.

2.2.4 Analog config tab

This tab contains important configuration settings required to set chip-specific configurations for different technologies and bitrates at different operating times. The concept of analog configuration is part of the RFAL library and is used throughout the different ST25R devices. See the RFAL user manual (UM2890) for more details.

Figure 16. ST25R500 analog config tab



The **Analog Config** tab is divided into the **Mode**, **Functions**, **Actions**, and **Hashes** sections.

Mode

The **Mode** section provides a drop-down box containing several chip-specific supported technologies and events. A specific mode can be added to the mode list. This makes it easy to have individual settings for all transmit and receive modes. The CHIP_INIT mode sets global registers that must be used independently of other selected modes. For example, the pull-down of SPI lines can be enabled.

Functions

The **Functions** section contains register values associated with modes. A function consists of a name, the corresponding register, a mask, and the required value for the register. Frequently used functions can be selected from the drop-down box and added to the functions list. These functions are already defined and can be selected from a drop-down box.

For better readability, modes can be ordered using the up and down arrows in the mode section.

Attention: *Be careful when defining the same registers or functions for multiple entries in the mode list: for example, if a function is added to ISO 14443A and not restored in ISO 14443B mode, it is also active for ISO 14443B.*

Actions

The **Actions** buttons complete the analog configuration concept. They read and write information to the board or to the PC.

The **Read from board** button reads the analog configuration from the connected board.

Note: The values currently displayed on the GUI are overwritten.

The **Write to board** button writes the current configuration from the **Analog Config** tab to the connected board.

*Note: If the **Analog Config** tab is left empty, the board remains with its stored values.*

The **Load from file** button is used to load a previously saved configuration file into the **Analog Config** tab.

Use **Write to board** to write these newly loaded settings to the connected board.

The **Save to file** button saves the current configuration in the **Analog Config** tab to the file system.

The **Generate custom code** button can be used to automatically generate a C header file for direct inclusion in a compiled firmware image. See the RFAL user manual (UM2890) for further details.

The **Store to Flash** enables to send the settings into STM32 flash. It is used as a new default on start-up.

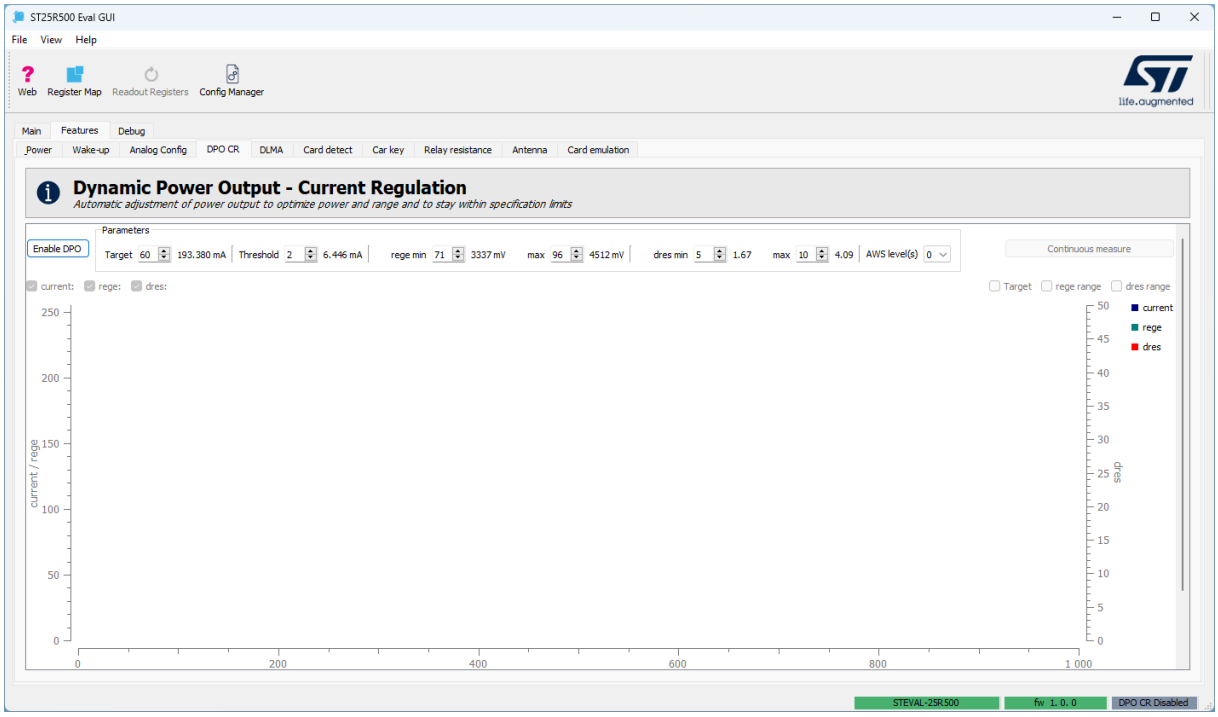
Hashes

The **Hashed** section shows the analog configuration hashes currently loaded into the different areas. The **FW active (RAM)** field is the configuration currently in use. It can be different from the **FW stored (Flash)** field. The **FW stored (Flash)** field contains the hash value that is loaded when the chip is switched on. It is possible to load an analog configuration temporarily until the chip is switched off and on again. Click on **Write to board** without ticking the **Store to flash** checkbox to load a temporary configuration.

2.2.5 DPO CR

DPO CR is a software-based feature that allows dynamic control of the transmitter voltage (VDD_DR), driver resistance, and the generated RF field depending on the presence of a PICC. A dynamic RF power adjustment can be useful in challenging environments where strong antenna detuning causes an abrupt increase in driver current and a violation of the maximum allowed field strength in the applicable standard. The dynamic adjustment of output power uses the current measurement capabilities of the ST25R500.

Figure 17. DPO CR panel overview



The DPO function is enabled by clicking on the “Enable DPO” button.

The following section describes the DPO functionality and using the ST25R500.

2.2.5.1 *DPO CR details*

The goals of DPO CR are:

1. Reduce output power to ensure H_{MAX} anywhere in the operating volume (especially in close distance)
2. Increase output power to ensure H_{MIN} anywhere in the operating volume (especially in far distance (4cm)
3. Limit the power consumption in strong coupling conditions to avoid overloading the board's and USB supply capabilities

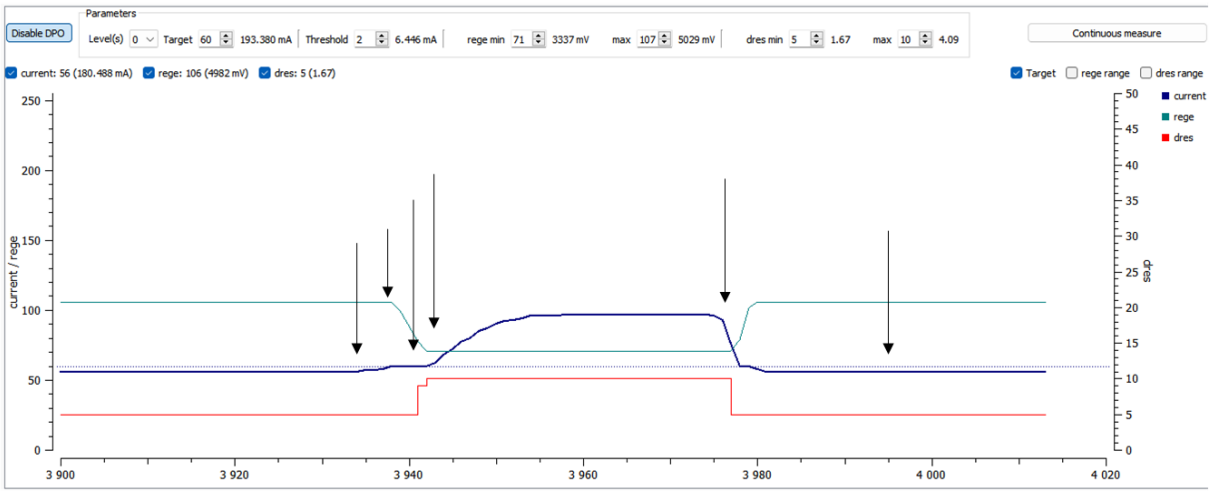
It performs this task by changing the ST25R500 internal regulator (rege) to lower VDD_DR (the output driver supply voltage) and by adjusting the driver resistance (dres). The criterion for regulation is the chip internal measurement of the current flowing through the VDD_DR regulator. The algorithm tries to maintain the lowest dres if possible.

The inputs of the algorithm are:

- Target current with a threshold, when the measured value is off by threshold the algorithm tries to again regulate
- rege min and max: Allowed voltage value range. Limits to be taken into account:
  - Rege min needs to be above 3.3 V to have current measurement operational
  - Rege max setting of VDD_DR should have at least 300mV drop to VDD_TX to have current measurement operational
- dres min and max: Allowed driver resistance setting range. Displayed value is factor for RRFO
- AWS levels can be used to apply different AWS settings depending on rege settings.

The following example illustrates the operation of DPO CR when started from unloaded condition, then a load (field detector) being placed and subsequently removed:

Figure 18. DPO CR operation



The arrows indicate:

1. Current slightly below target, system at maximum rege:107 and minimum dres:5. With approaching load the current increases
2. Current was too high and algorithm starts to decrease rege
3. Decreasing rege was not sufficient anymore, now also dres is getting increased.
4. Rege at minimum, dres at maximum, output power cannot be further decreased. With increasing load now also the current is increasing.
5. Load is getting removed, first dres gets decreased, then also rege gets increased
6. System settled back again to unloaded condition at max rege and min dres

2.2.5.2 *DPO CR parameters*

To use the dynamic power adjustment, the user has to choose parameters.

Figure 19. **DPO CR settings**

The parameters are:

- Target current which the algorithm tries to achieve by changing regulator and driver resistance settings.
- Hysteresis threshold to avoid oscillation. The default is 2.
- Power output is adjusted through regulator voltage (rege) and driver resistance (dres). Minimum rege is the lowest driver supply, resulting in lower output power.
- Power output is adjusted through regulator voltage (rege) and driver resistance (dres). Maximum rege is the highest driver supply, resulting in higher output power.
- Power output is adjusted through regulator voltage (rege) and driver resistance (dres). Minimum dres results in lowest driver resistance and highest output power.
- Power output is adjusted through regulator voltage (rege) and driver resistance (dres). Maximum dres results in highest driver resistance and lowest output power.
- AWS levels can be used to define waveshape settings depending on the regulated voltage chosen by the algorithm.

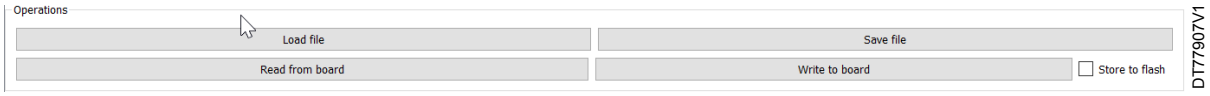
The behavior of DPO CR can be observed by pressing the **Continuous measure** button. Then, the ST25R500 emits a continuous carrier with basic A/B polling, and displays the measured current, rege and dres values, and DPO status in the GUI.

The DPO CR area in the status bar at the bottom right displays the actual AWS level used by the algorithm. It is depicted by the background color (blue, green, yellow, or pink). The area is updated during continuous measurement, displaying the rege voltage and the dres value used by the regulation algorithm. The dres value is marked with an indicator showing when the limit set is reached: the character '_' denotes that the minimum dres value is reached, and the character '^' denotes that the maximum value is reached. Typically, DPO CR is used to reduce the generated field in close proximity to the reader.

2.2.5.3 *Saving a DPO setting*

The **Load file** button enables to restore DPO CR parameters from a file, tune them using the GUI until a satisfying configuration has been found, and save them thanks to the **Save file** button.

Figure 20. **Load and Save DPO dataset**



The **Read from board** button enables reading the current configuration used by the firmware within the connected board. The Write to board button allows writing the configuration displayed by the GUI to the board into volatile memory (RAM). This means that these parameters are lost after the board is reset or removed from the PC. To write the configuration permanently in persistent memory, click on the checkbox **Store to flash** and press the **Write to board** button: the configuration is applied to the board and remains after reset or removal of the board.

2.2.5.4 *AWS*

AWS (active wave shaping) is a feature of the ST25R500. It lets the user control the shaping of the rising and falling edges of the modulated signal. Choosing the number of levels makes more GUI features available, which let the user additionally influence the wave-shaping feature of ST25R500 depending on regulator setting and used technology. The DPO tab lets the user control the static AWS configuration of the ST25R500 in a more flexible way:

- Adjust transients for the waveshapes with slow to fast preset values
- Fine-tune RF undershoot and overshoot patterns per power level and mode
- More granular adjustments of driver resistance
- Selection of modulation index used for each DPO level.

The active wave shaping in ST25R500 is accomplished primarily by using the corresponding AWS registers.

Refer to the document (AN6290: How to use AWS for EMVCo® and NFC Forum in the ST25Rx00 devices) for more details.

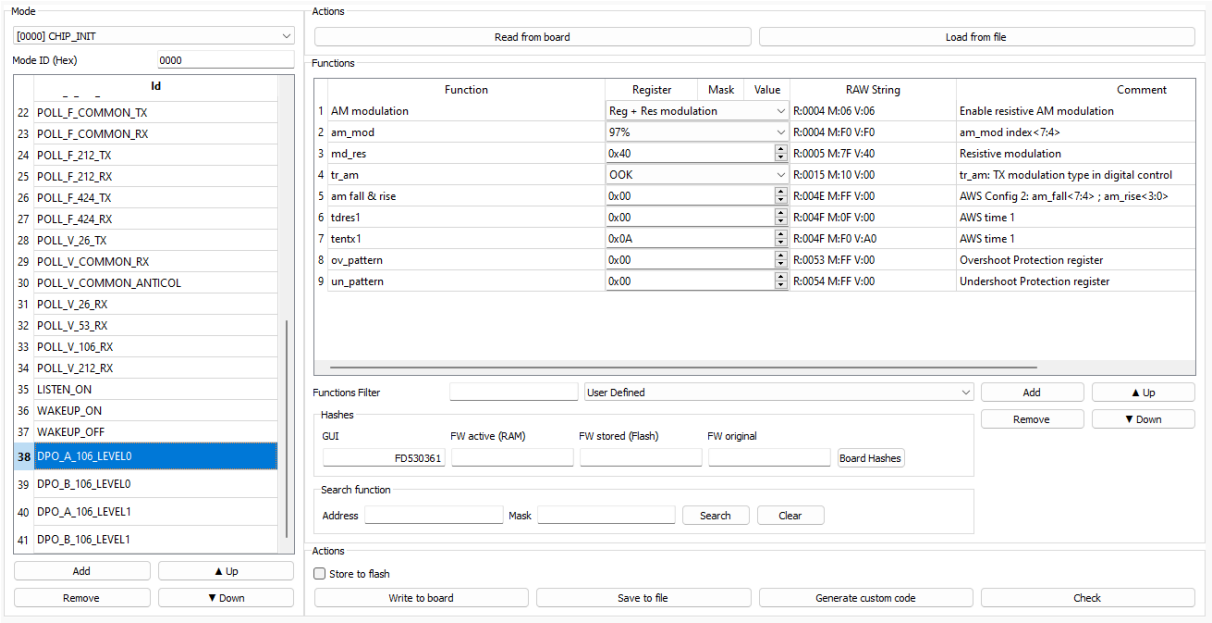
These parameters are stored and transferred to the analog configuration settings and are automatically parsed while switching to the DPO CR tab.

As a result, the user finds the following new modes controlling AWS:

- DPO_A_106_Level0
- DPO_A_106_Level1
- DPO_A_106_Level2
- DPO_A_106_Level3
- DPO_B_106_Level0
- DPO_B_106_Level1
- DPO_B_106_Level2
- DPO_B_106_Level3

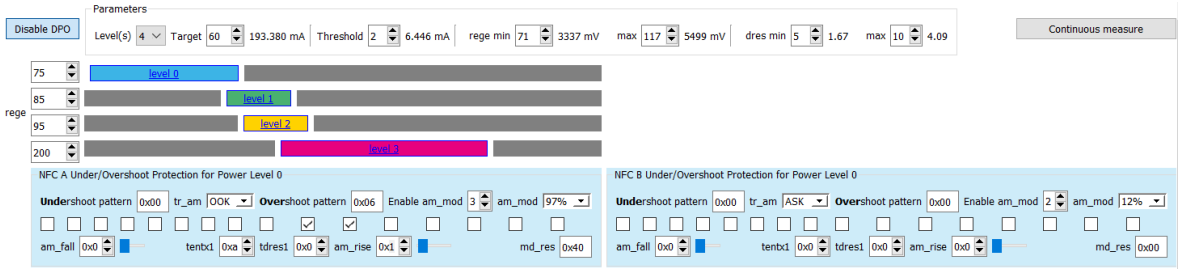
They contain functions with register settings for mode A and B, with distinct parameters for up to four power levels.

Figure 21. Analog configuration with DPO modes



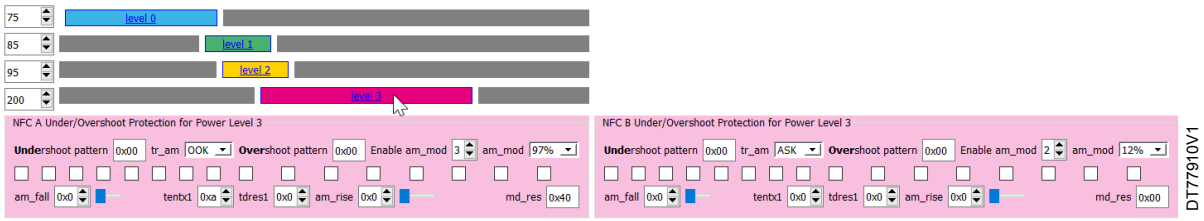
When using such an analog config containing AWS settings, the GUI detects them when switching to the DPO tab. This automatically sets the number of levels and enables advanced GUI widgets, showing NFC-A and NFC-B wave shapes, providing an easy way to fine-tune AWS parameters, as depicted in the following figure.

Figure 22. DPO CR tab



The user can access a given set of power level parameters by clicking on the matching power level bar. The set of registers and the wave shape background color are updated accordingly.

Figure 23. Choose a power level set of parameters



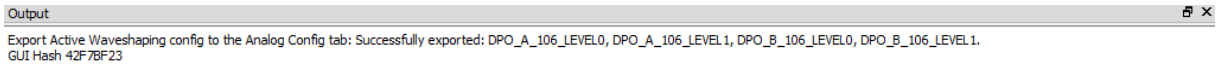
The user can either set manually undershoot/overshoot register value both NFC-A and NFC-B, or click on the tick boxes. The corresponding register value is updated too.

Once the continuous measure button is pressed, the current AWS parameters are saved to the board, and alternatively WUPA and WUPB commands are continuously sent. This feature allows quickly fine-tuning and directly seeing the effect with a scope, without going through the different tabs provided by the tool.

New parameters are sent to the firmware when restarting the continuous measure.

The AWS settings are shared with the analog configuration tab. They are updated when switching back to the analog configuration tab. The log window shows:

Figure 24. Log confirming export of AWS registers

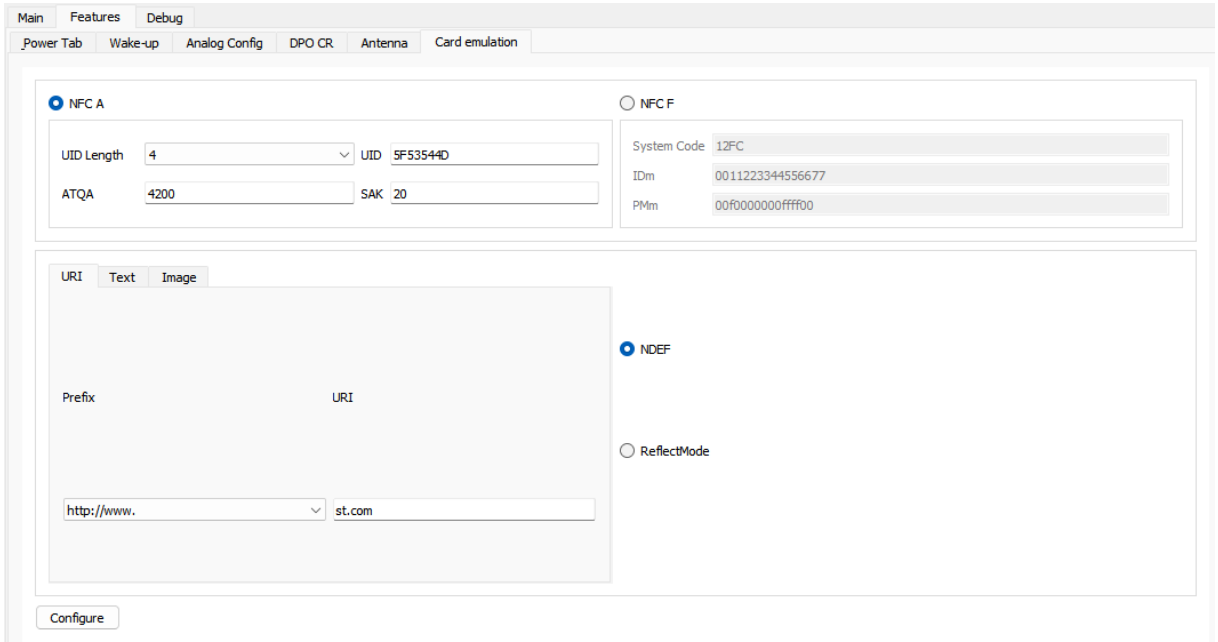


This allows the user to review them and uses the actions documented in the **Analog Config** tab chapter. For example: save a file or generate custom code.

2.2.6 Card emulation tab

This tab allows the user to configure the ST25R500 in card emulation. It either emulates a T4T (in case of NFC-A), or a T3T (in case of NFC-F). Different contents can be configured.

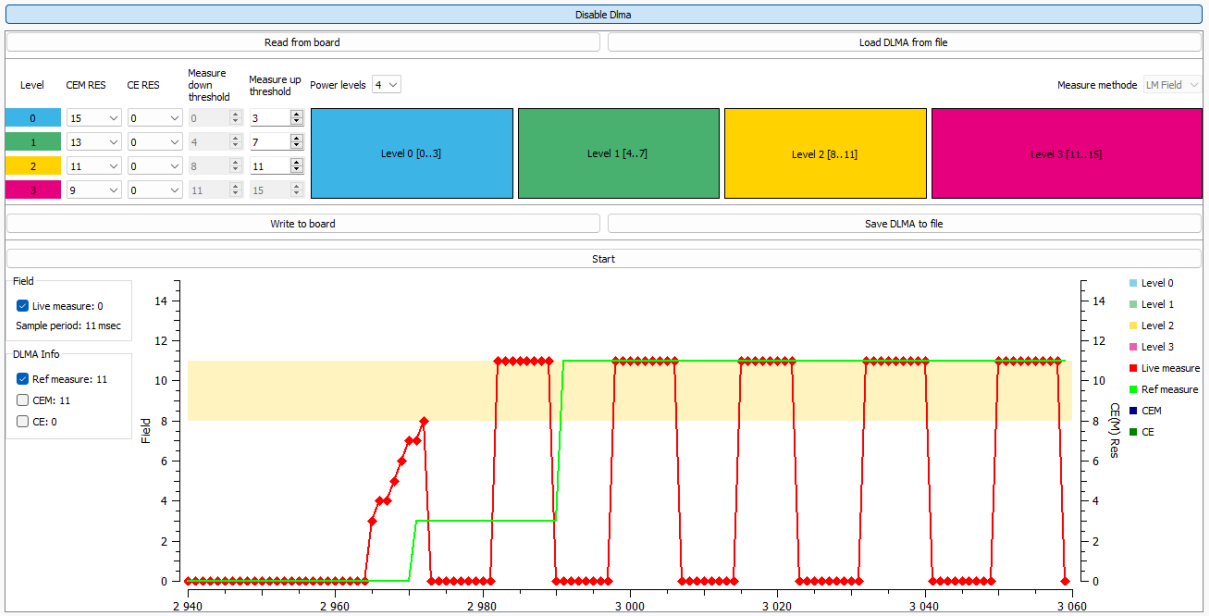
Figure 25. Card emulation tab



Note that some changes to the default values can make this emulation not inter-operable with a phone anymore.
The memory of the card emulated is hosted on the GUI, and depends upon the PC reactivity and speed.

2.2.7 DLMA

Figure 26. **DLMA**



DLMA (dynamic load modulation amplitude) enables to configure the load modulation amplitude depending on perceived field strength. The shown table is used to traverse through the different CE_RES and CEM_RES values. The configuration allows up to four levels to be configured.

The "Read from board" and "Write to board" buttons enable to sync the board with the GUI values, which is only needed if updates are done without any board connected. Otherwise, it is done automatically.

The "Load DLMA from file" and "Save DLMA to file" buttons allow read and write the GUI values from or to a file.

By pressing the "Start" button, the GUI switches the board into CE mode waiting for external field. The detection of an external field triggers an interrupt, which processes the DLMA algorithm to update itself.

Visualization shows only interesting values if an external reader or mobile phone is presented.

Two different values are shown:

- The green line shows the reference measurement value at field on as used by the DLMA algorithm
- The red line represents a live measurement triggered by a GUI timer (accuracy subject to PC load). This value is different from the other value if the reader is moving in relation to the board. Each red dot represents one measurement event.

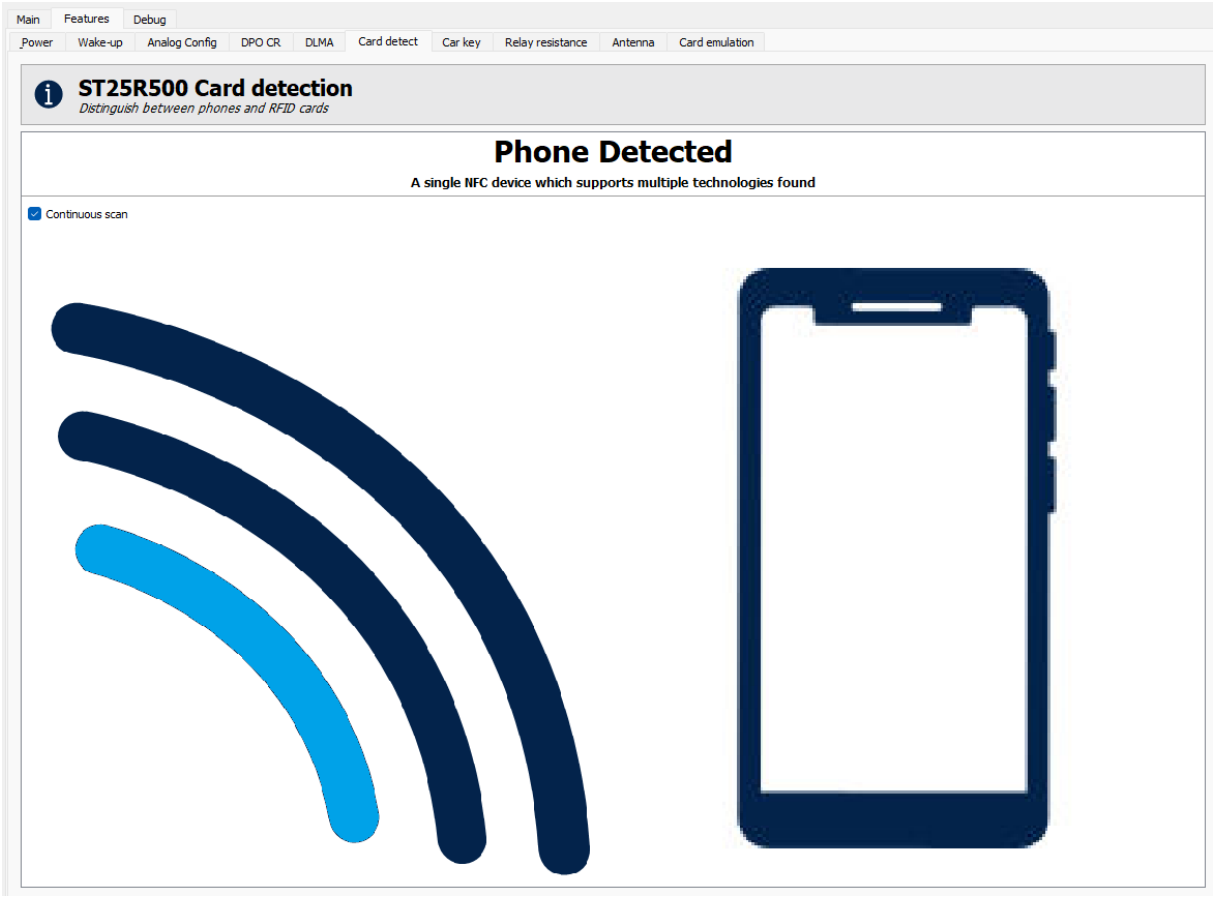
Note: The measurement is triggered asynchronously by the GUI.

To improve the performance during the measurement, the GUI suspends logging while card emulation is running.

2.2.8 Card detect

This tab executes an algorithm to discriminate mobiles from NFC tags using various methods. The verdict and reason are displayed. Such an NFC tag protection and detection mechanism is useful in wireless charging applications to avoid charging in the presence of plastic and paper cards, which can be harmed by the charging process.

Figure 27. **Card detect**



To operate this tab, put at least one NFC listen device (card/phone) close to the antenna to observe the result of the detection. The result is visualized by changing the icon and also with some reasoning.

When running the "Card Detect", the algorithm is able to distinguish between the following scenarios:

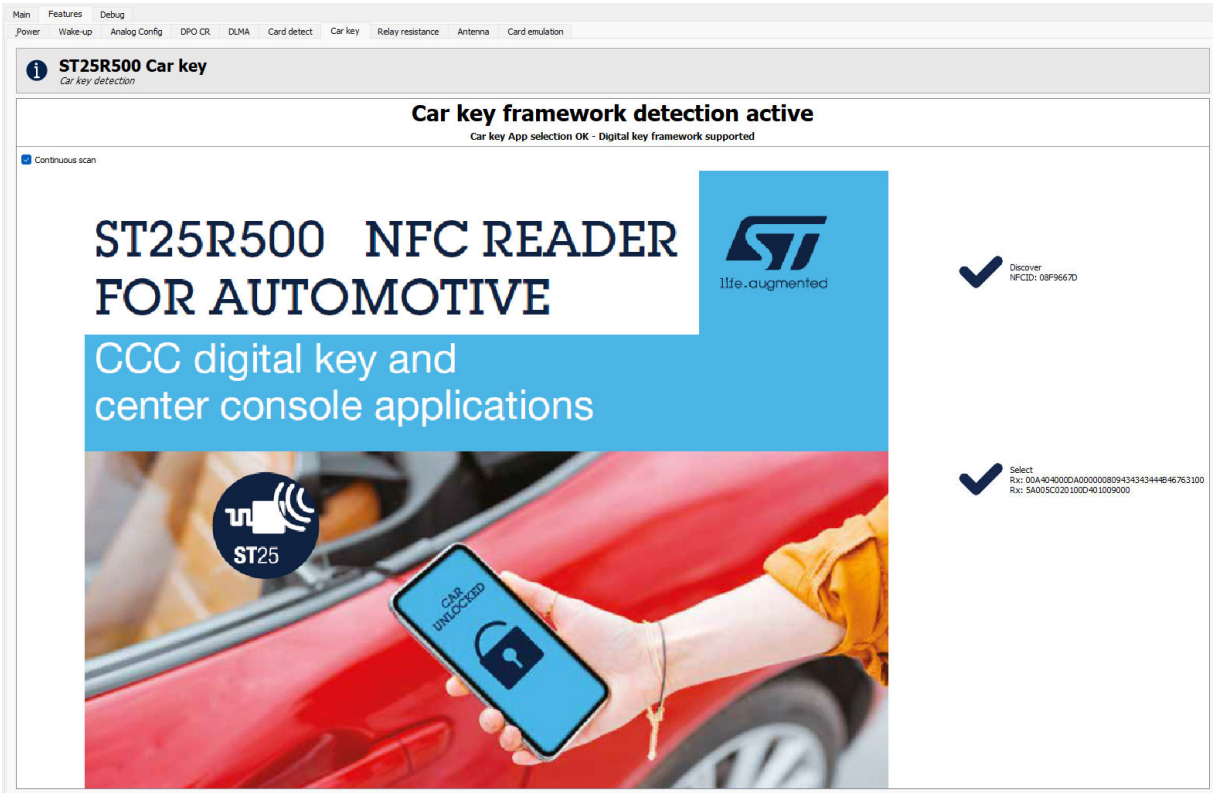
- Single device: A single NFC card was found.
- Multiple devices: Multiple NFC devices were found.
- Multiple technologies: Multiple NFC technologies observed in a single RF carrier.
- Device with other technology: A card-exclusive NFC technology was found.
- Single device with multiple technologies: A single NFC device that supports multiple technologies found.
- Single P2P device: A single NFC device that supports NFC-DEP or P2P found.
- Unknown device: Unable to complete the card detection due to an unknown or unexpected event.

2.2.9 Car key

This feature implements low-power polling, similar to the operation of automotive door handles.

The procedure works with Android phones and Apple iPhones® that are ready to present a digital key. Scanning starts automatically.

Figure 28. **Car key**



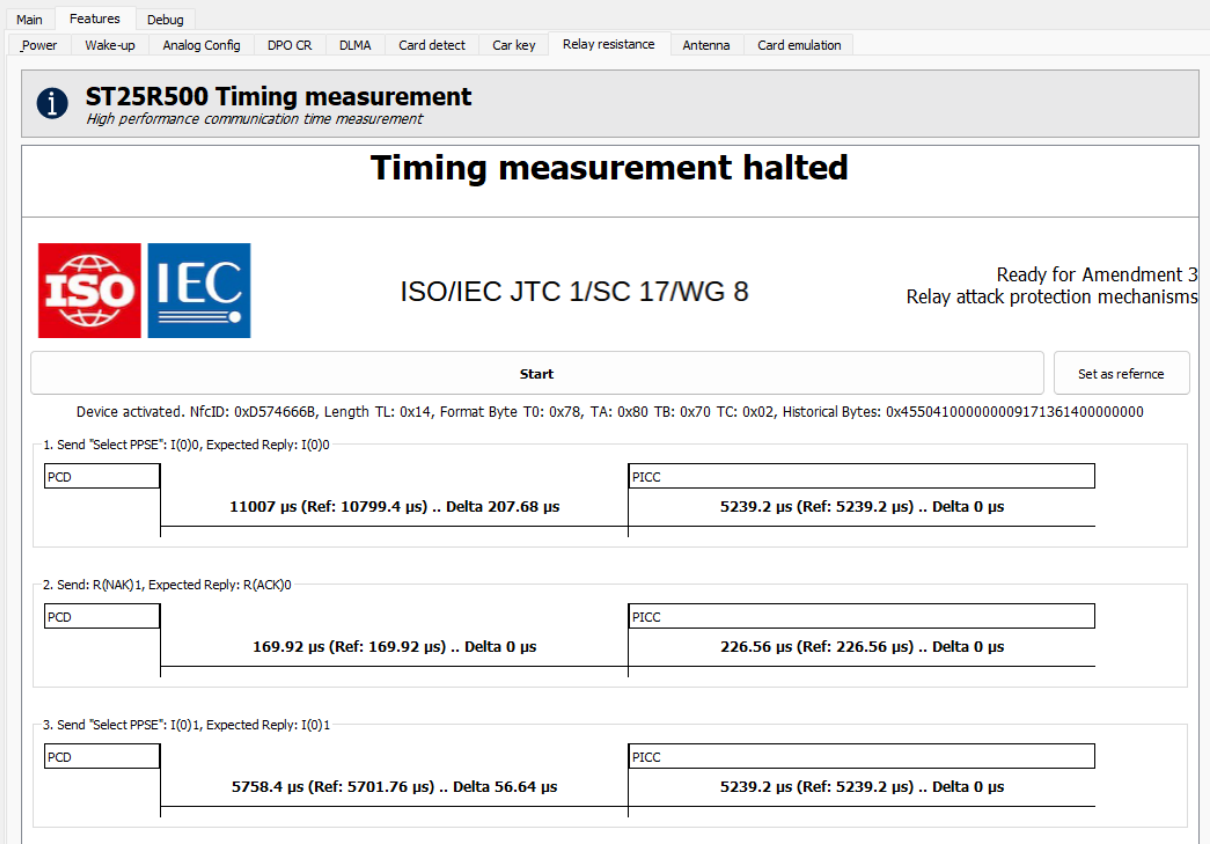
Place a phone on or close to the antenna and observe if the ST25R500 detects it. For discovered devices, it executes a CCC select digital key framework and displays the result. On some devices, this can require specific actions on the phone.

2.2.10 Relay resistance

The ST25R500 includes timers to measure the timing of cards. These timers enable protection against relay attacks and support the implementation of algorithms such as the draft **ISO/IEC 14443-4 Amendment 3 "Relay attack protection mechanisms"**.

Present a card and observe the timing. A timing can be set as a reference, and subsequent scans are compared against this reference. The timing delta is displayed, allowing applications to detect relay attackers using these deltas.

Figure 29. **Relay resistance**

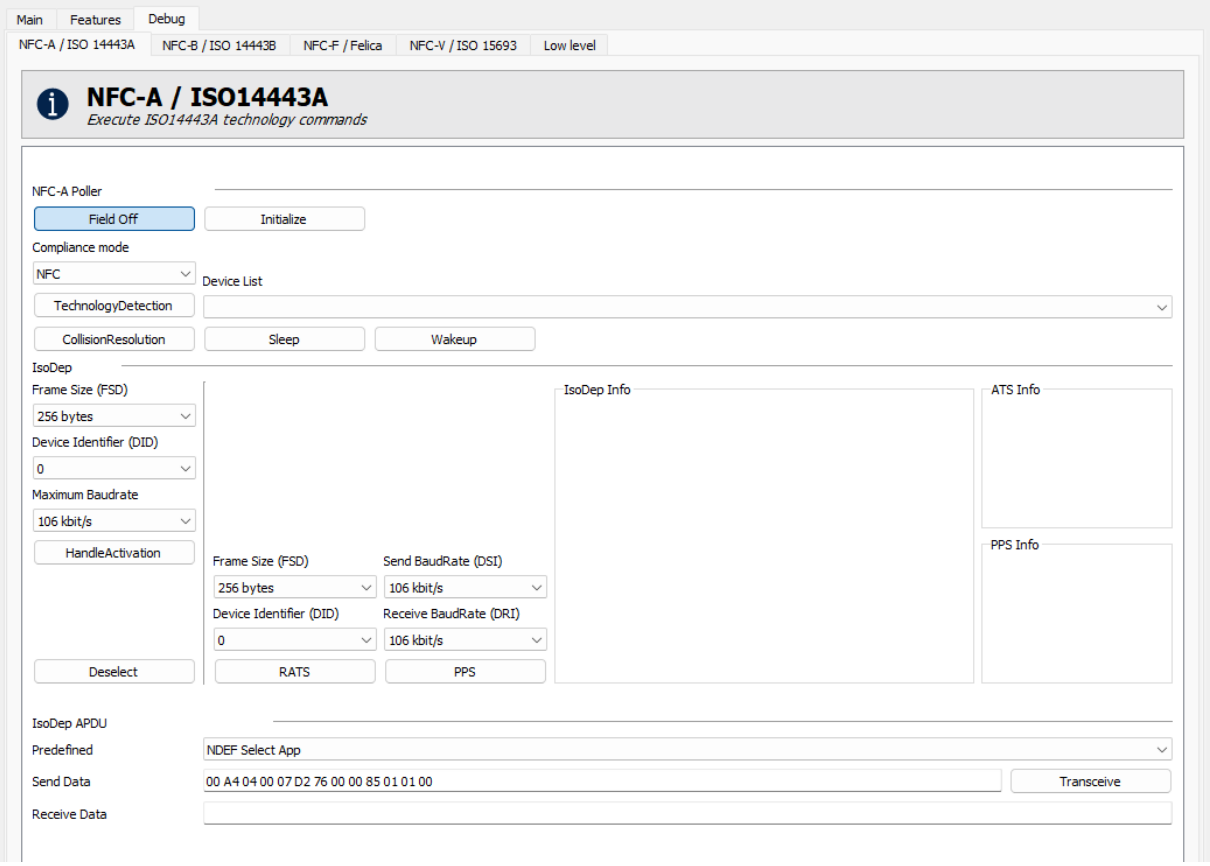


2.3 Debug tab

The **Debug** tab allows the user to access the ST25R500 evaluation board kit at lower levels. Specifically, the user can explore the different technologies in detail using the **NFC-A / ISO 14443A**, **NFC-B / ISO 14443B**, and **NFC-V / ISO 15693** subtabs. The **Low level** subtab is not dedicated to a specific technology. It allows the user to control the assembled reader chip using chip specific commands as specified in the DS13658 datasheet.

2.3.1 NFC-A / ISO 14443A tab

Figure 30. **NFC-A/ISO 14443A tab**

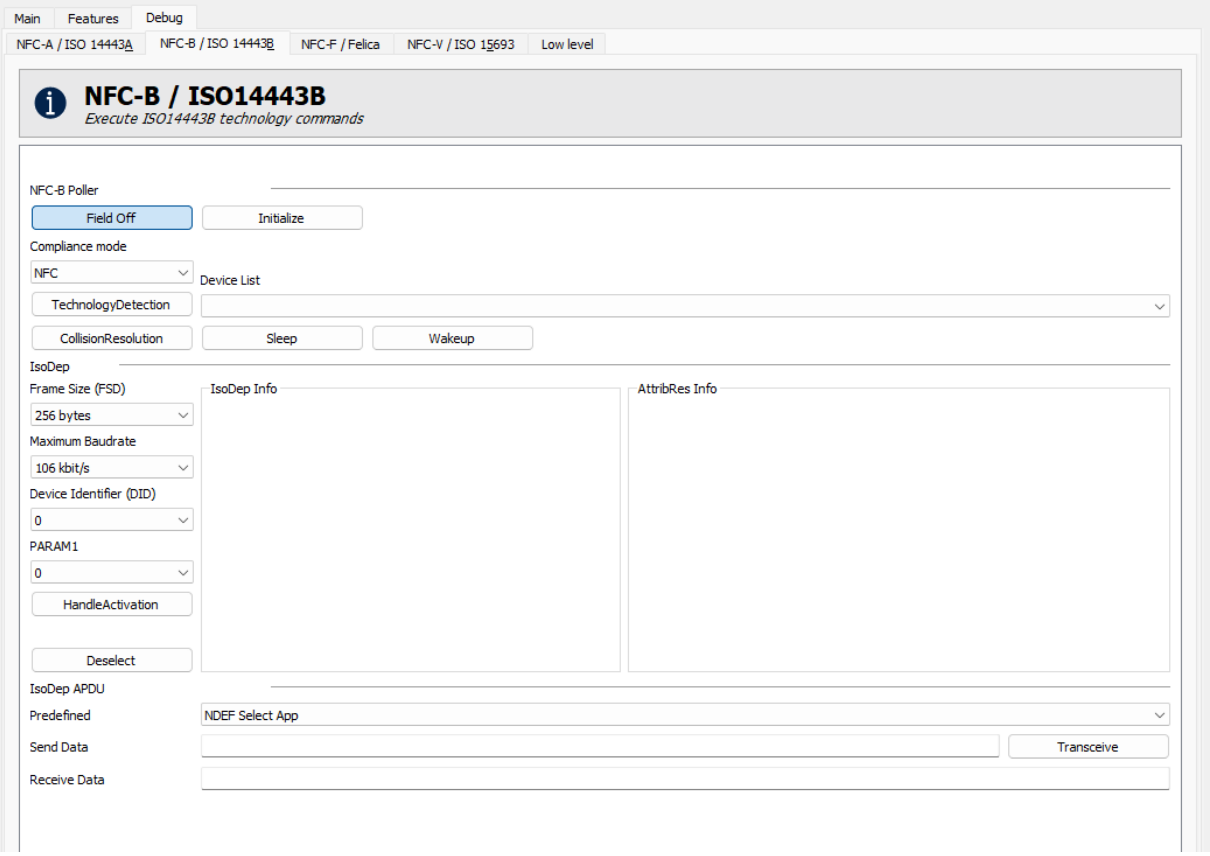


The **NFC-A / ISO 14443A** tab allows the execution/debugging of the different stages of NFC-A technology in accordance with the NFC Forum™/ISO 14443A standard. The GUI highlights the next button to click to assist the user. If the button is clicked and the operation is successful, the next suggested button is highlighted in blue. If a card is present, successful communication guides the user through the **TechnologyDetection** and **CollisionResolution** steps. The user then activates the card by clicking **HandleActivation**. After activation of the card, the user sends predefined or custom commands to the card using the **Transceive** button.

Note: NFC Forum and the NFC Forum logo are trademarks of the Near Field Communication Forum.

2.3.2 NFC-B / ISO 14443B tab

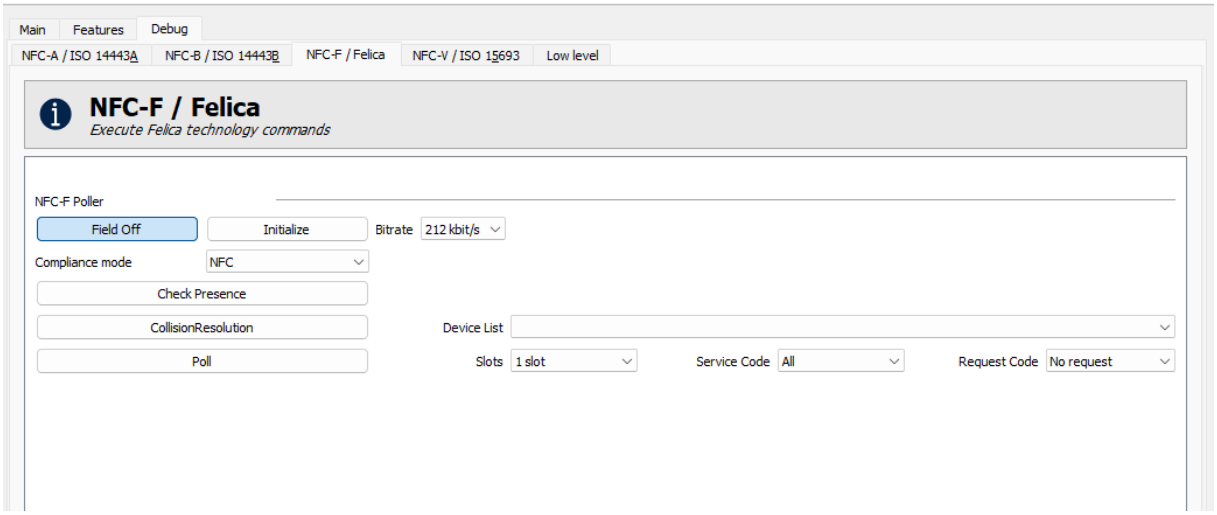
Figure 31. **NFC-B / ISO 14443B tab**



The **NFC-B / ISO 14443B** tab provides functionality to execute/debug the different stages of NFC-B communication according to the NFC Forum™/ISO 14443B standard. The GUI assists the user by highlighting a suggestion of the next button to press. The highlighted buttons take the user through the **Initialize**, **TechnologyDetection**, **CollisionResolution**, and **HandleActivation** steps.

2.3.3 NFC-F/FeliCa tab

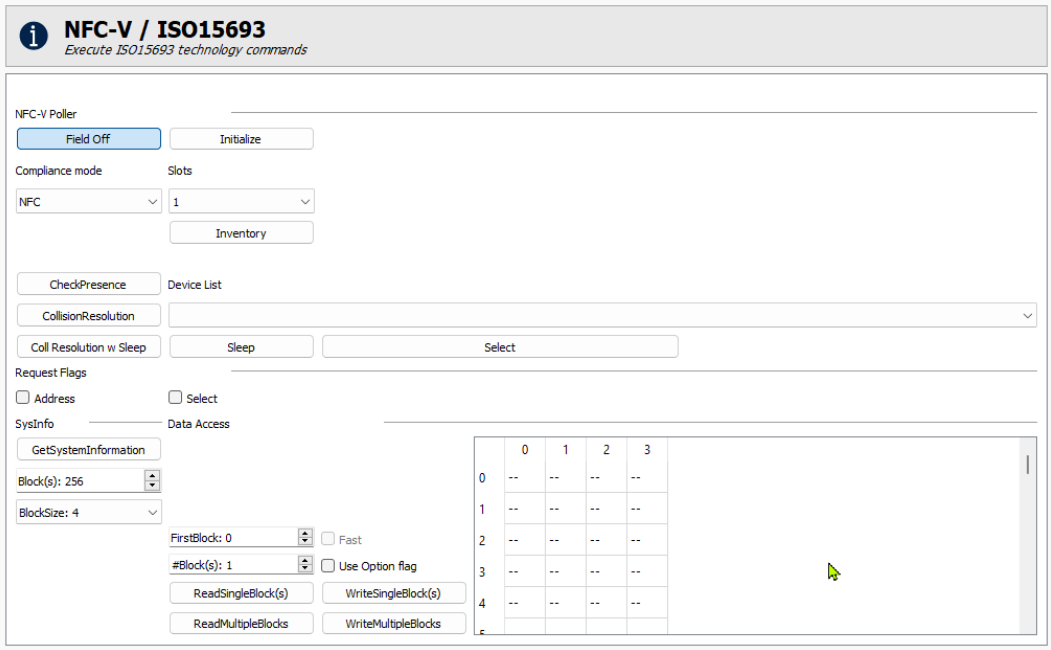
Figure 32. **NFC-F / FeliCa tab**



The NFC-F / FeliCa tab provides functionality to execute/debug the different stages of NFC-F communication according to the NFC Forum/FeliCa standard. The GUI assists to the user by highlighting a suggestion of the next button to press. The highlighted buttons take the user through the **Initialize**, **TechnologyDetection**, and **CollisionResolution** steps.

2.3.4 NFC-V / ISO 15693 tab

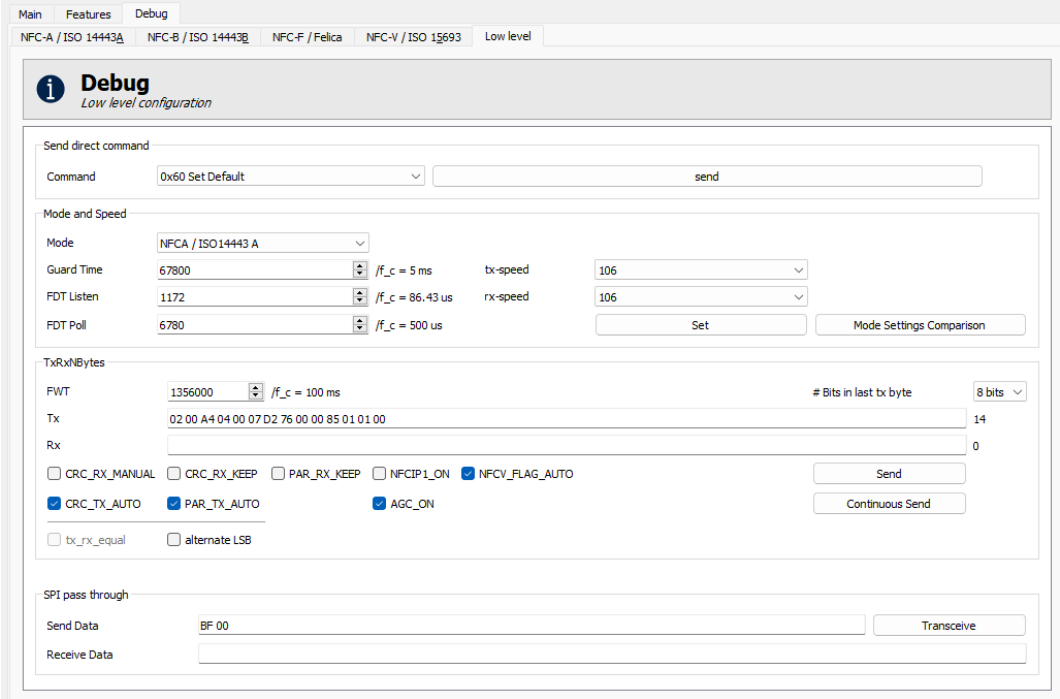
Figure 33. **NFC-V / ISO 15693 tab**



The **NFC-V / ISO 15693** tab provides functionality to execute/debug the different stages of NFC-V communication according to NFC Forum™/ISO 15693. It provides help to the user by highlighting buttons to press. The highlighted buttons guide the user through the **Initialize**, **CheckPresence**, and **CollisionResolution** steps. After that, it is possible to execute **ReadSingleBlock(s)** to read one block of the card memory.

2.3.5 Low level tab

Figure 34. Low level tab



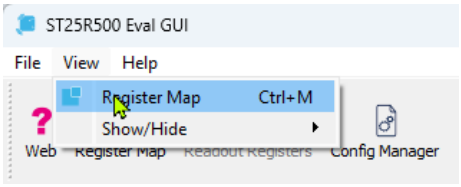
The **Low level** tab allows direct control of the ST25R500 reader mounted on the board. For details, see the ST25R500 datasheet (DS14593).

3 Other dialog boxes and panels

3.1 Register map

In the menu, click **View** > **Register Map** to open the register map.

Figure 35. Open the register map



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The **Register Map** window, shown in the figure below, is a view that displays all registers and their values. It also allows changes to the register settings.

Figure 36. Register map

Register Map

File View

	Addr.	7	6	5	4	3	2	1	0	Value
00h: Operation	0x00	0	0	0	0	1	0	0	0	0x08
01h: General	0x01	0	0	0	0	1	1	0	0	0x0c
02h: Regulator	0x02	0	1	1	1	1	1	1	1	0x7f
03h: TX Driver Config	0x03	0	0	1	1	0	0	0	0	0x30
04h: TX Modulation 1	0x04	0	1	1	1	0	1	1	0	0x76
05h: TX Modulation 2	0x05	0	1	1	1	1	1	1	1	0x7f
06h: CE Modulation 1	0x06	1	1	1	1	0	0	0	0	0xf0
07h: CE Modulation 2	0x07	0	0	0	0	0	0	0	1	0x01
08h: GPIO Control	0x08	0	0	0	0	0	0	1	1	0x03
09h: RX Path Ana 1	0x09	0	1	1	1	0	0	1	1	0x73
0Ah: RX Path Ana 2	0x0a	0	0	0	0	0	0	1	0	0x02
0Bh: RX Path Ana 3	0x0b	1	0	0	0	0	1	0	1	0x85
0Ch: RX Path Ana 4	0x0c	0	0	0	0	0	0	0	0	0x00
0Dh: RX Digital	0x0d	1	1	0	0	1	1	0	0	0xcc
0Eh: Correlator 1	0x0e	1	1	0	0	0	0	0	1	0xc1
0Fh: Correlator 2	0x0f	0	1	0	1	1	0	1	0	0x5a
10h: Correlator 3	0x10	0	0	0	0	0	1	1	1	0x07
11h: Correlator 4	0x11	1	0	1	0	1	0	1	0	0xaa
12h: Correlator 5	0x12	0	0	0	0	0	0	1	1	0x03
13h: Correlator 6	0x13	0	0	1	1	0	0	0	0	0x30

When the **Register Map** window is open, it displays a list of register names with their addresses on the left side. On the right side, it shows the register values in hexadecimal. Between the register names and the register values, there are also 8 bits, which represent the current contents of the registers. Click on a bit to toggle the state from 1 to 0, or vice versa. This feature is disabled for some read-only registers. When it is the case, the register bits are grayed out.

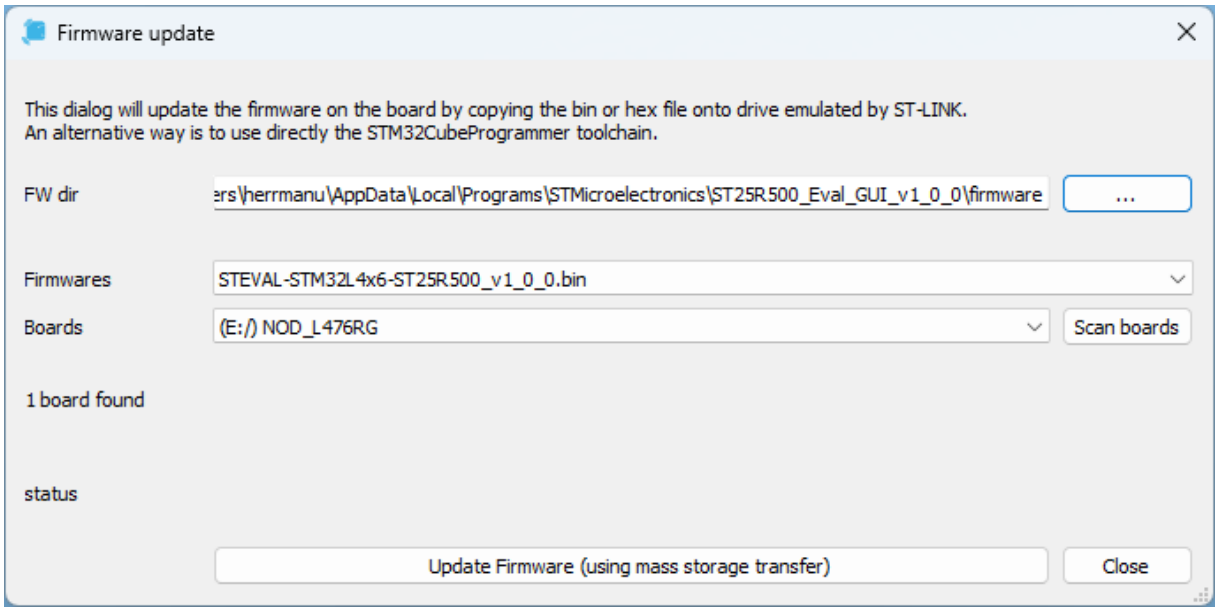
3.2 Updating the firmware

To update the firmware, do one of the following:

- Click the **Update Firmware** button in the **Board Info** tab.
- In the top menu, click **Help** > **Firmware Update**.
- Press CTRL + F.

The **Firmware update** dialog box illustrated below allows the flashing of firmware on the MCU of the ST25R500 evaluation board directly from the ST25R500 evaluation board GUI. The GUI comes with firmware for the evaluation board. The firmware combo box shows all the pieces of firmware located in the firmware folder specified by the firmware dir parameter. The latest version of the firmware can be found at st.com. Clicking the **Update Firmware (using mass storage transfer)** button flashes the firmware to the board. If multiple boards are connected, ensure that the correct board is selected in the **Boards** combo box.

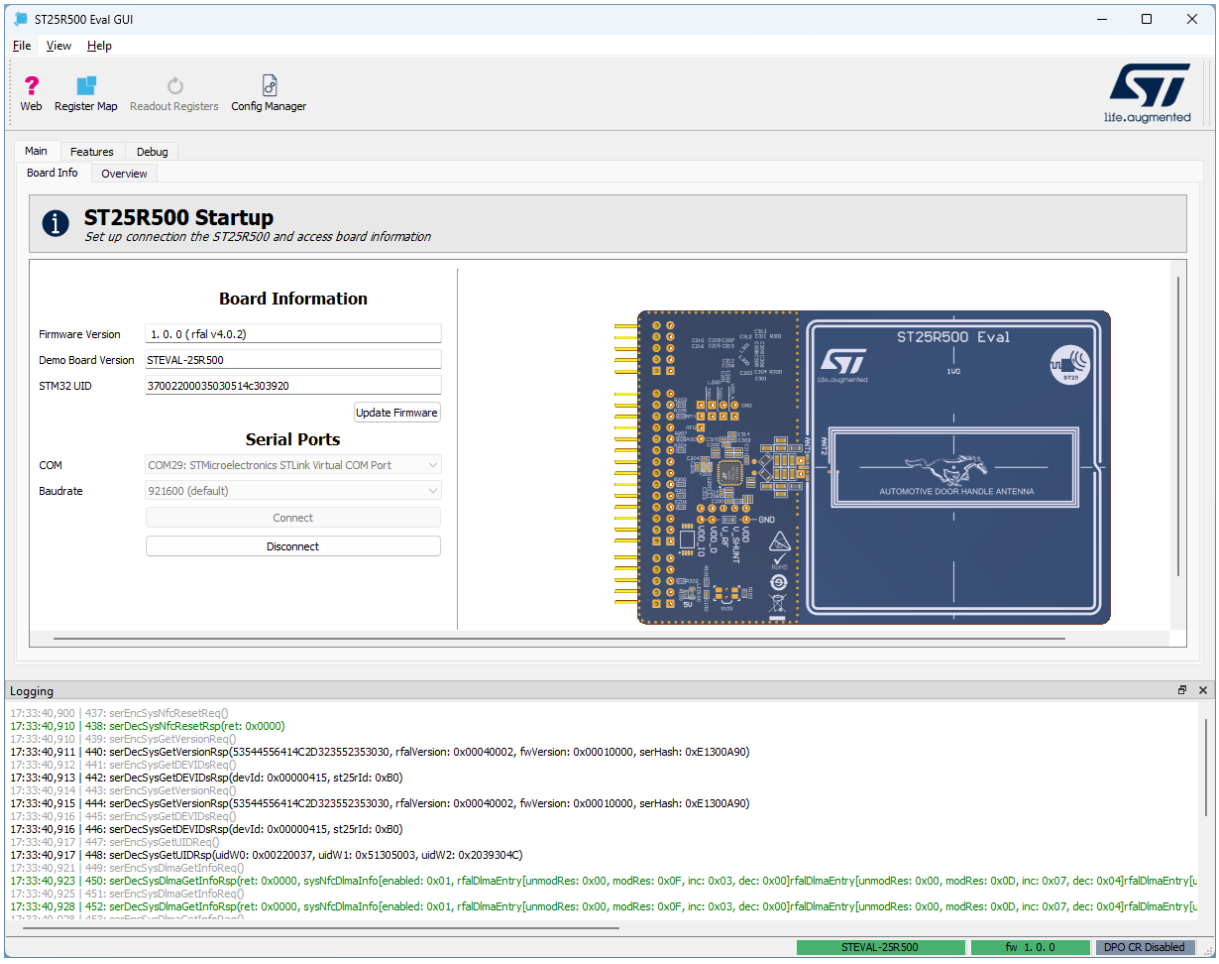
Figure 37. Firmware update



3.3 Logging

The **Logging** window is at the bottom of the GUI. It can be enabled/disabled in the **View** menu by selecting **Show/Hide** > **Logging**. It shows the entire communication between the GUI and the connected reader. Any request from the GUI is displayed in gray, while a positive response is displayed in green.

Figure 38. Logging

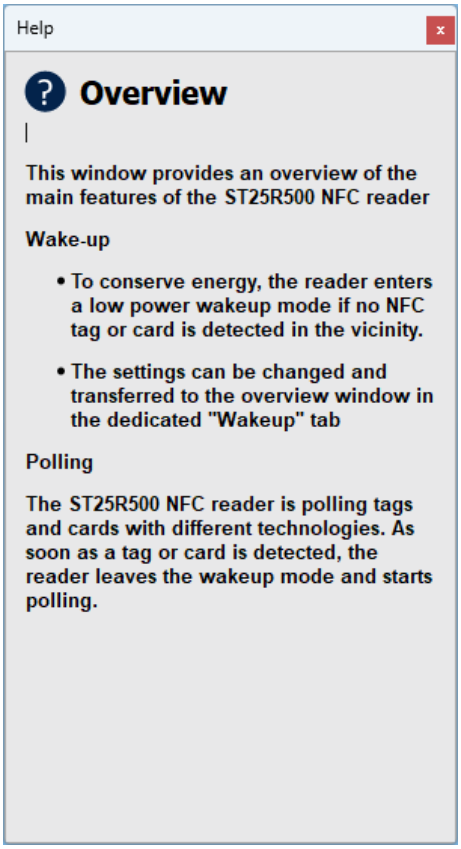


If the communication fails for any reason, this is indicated by a red font in the **Logging** window.

3.4 Help panel

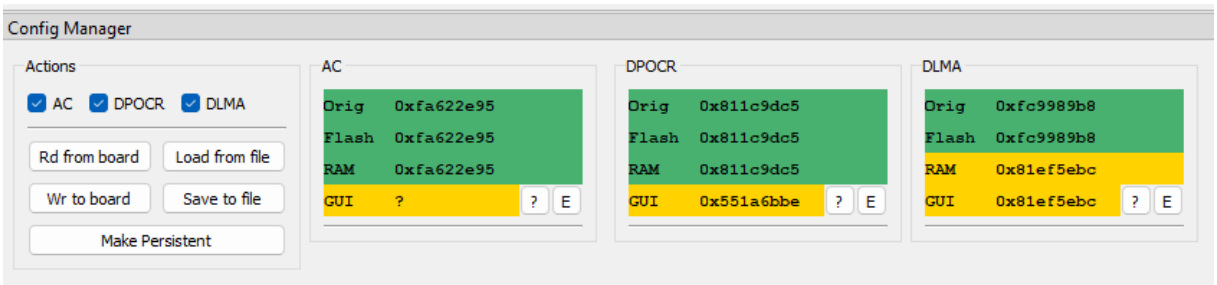
To the right of each tab, there is a help panel that provides basic information about the current tab.

Figure 39. Help



3.5 Configuration manager

Figure 40. Configuration manager



The configuration manager enables users to load and store complete bundles of analog configurations and DPO CR configurations in files and firmware. These configurations can be stored in RAM or, by selecting "Make persistent," in an STM32 flash page.

The window contains an **Actions** group and groups with the relevant hash values for each configuration.The **Actions** group allows the execution of commands on selected configurable items, such as reading and writing a configuration generated in the GUI to or from the board. It is also possible to store the configuration in a file that contains the selected configuration combination. The files are flexible and can store or load a single configuration item or multiple configurations.

Revision history

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Date	Version	Changes
22-Sep-2025	1	Initial release.

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