



Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



## Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



# Getting started with AS3910 Demonstration Board

Demo board revision: A-V1.0

Revision of this document: 7

Date of this document: 2010-03-09

# Table of contents

<b><u>1</u></b>	<b><u>Disclaimer</u></b>	<b><u>3</u></b>
<b><u>2</u></b>	<b><u>Package content</u></b>	<b><u>3</u></b>
<b><u>3</u></b>	<b><u>Content of CD ROM</u></b>	<b><u>3</u></b>
<b><u>4</u></b>	<b><u>Installing USB driver</u></b>	<b><u>4</u></b>
<b><u>5</u></b>	<b><u>Connecting the Demo board and starting the GUI</u></b>	<b><u>4</u></b>
<b><u>6</u></b>	<b><u>Operating GUI</u></b>	<b><u>5</u></b>
<b>6.1</b>	<b>STARTUP TAB</b>	<b>5</b>
<b>6.2</b>	<b>ISO14443A TAB</b>	<b>9</b>
<b>6.3</b>	<b>ISO14443B TAB</b>	<b>11</b>
6.3.1	MODULATION INDEX ADJUSTMENT	12
<b>6.4</b>	<b>ISO15693 TAB</b>	<b>14</b>
<b>6.5</b>	<b>NFCIP TAB</b>	<b>17</b>
<b>6.6</b>	<b>ADVANCED TAB</b>	<b>18</b>
6.6.1	PERMANENT MEASUREMENT OF THE ANTENNA	20
6.6.2	PERMANENT TRIMMING OF THE ANTENNA	20
<b>6.7</b>	<b>MIFARE UL TAB</b>	<b>21</b>
<b>6.8</b>	<b>DEBUG TAB</b>	<b>26</b>
<b>6.9</b>	<b>FIRMWARE UPGRADE</b>	<b>26</b>

# 1 Disclaimer

Please note that the provided reference design board, evaluation board, verification board or demonstration board (hereafter named “demonstration circuit board”) are experimental printed circuit boards and are therefore intended for device demonstration and evaluation purposes only for semiconductor integrated circuits supplied by austriamicrosystems. The demonstration circuit boards are not production qualified. Device parameters measured with these demonstration circuit boards may not represent typical production test data.

THE DEMONSTRATION CIRCUIT BOARDS ARE SUPPLIED WITHOUT WARRANTY OF ANY KIND, EXPRESSED, IMPLIED OR STATUTORY, INCLUDING BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. AUSTRIAMICROSYSTEMS ACCEPTS NO LIABILITY WHATSOEVER ARISING AS A RESULT OF THE USE OF THESE DEMONSTRATION CIRCUIT BOARDS.

The fee associated with the demonstration circuit boards is a nonrecurring engineering fee (NRE) to partially defray the hardware and software engineering costs associated with the development and provision of the demonstration circuit boards.

The demonstration circuit boards may be operated for demonstration or evaluation purposes in non-residential areas only. austriamicrosystems’ understanding is that the customer’s products using the semiconductor integrated circuits shall be designed in compliance with all applicable requirements of the appropriate regulatory agency (e.g. FCC, ETSI, CE, JQA, etc.) and will, upon testing and release, be in compliance with these regulatory requirements. Operation of the customer’s products must not cause harmful interference and must accept any interference.

## 2 Package content

- AS3910 Demo board A-V1.0
- Plastic cover for Demo board
- USB cable
- CD-ROM with demo application and documentation
- ISO14443A Mifare Ultralight tag
- ISO14443A Mifare Classic 1k tag
- ISO15693 I-CODE tag

## 3 Content of CD ROM

CD\_ROM contains three directories:

- **GUI:** contains installer file.
- **FTDI USB driver:** contains USB driver needed for USB communication between the PC and the Demo board
- **Documentation:** Contains AS3910 datasheet and description of AS3910 demo board design including demo board schematics and BOM

## 4 Installing USB driver

Before connecting the Demo board to the PC, the FTDI USB driver has to be loaded. Insert the *AS3910 Demo CD*, open the directory *FTDI USB driver* and execute *CDM\_2.04.06.exe*

## 5 Connecting the Demo board and starting the GUI

Slide the AS3910 Demo board in the plastic cover and connect the power supply, then connect the Demo board to a PC with the provided USB cable (FTDI USB driver has to be loaded before).

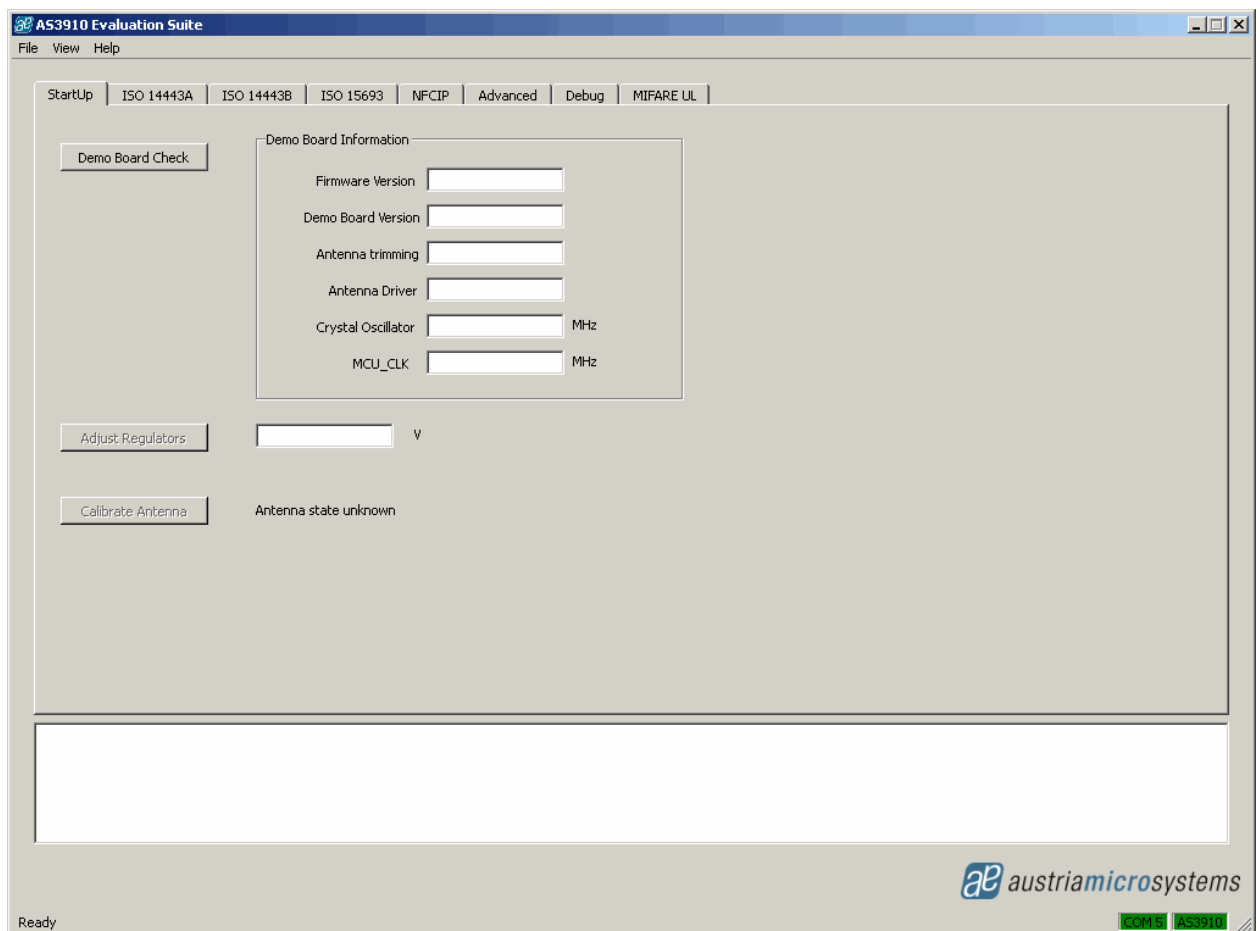
Follow the GUI install procedure by running *AS3910\_EvalSW\_Setup.msi*, located on the GUI directory of the CD.

# 6 Operating GUI

## 6.1 StartUp tab

When the GUI is started, the window depicted below is shown. In the lower right corner the used port is displayed (COM4 in this case). The *StartUp* tab is activated.

First the button *Demo Board Check* has to be clicked. This action checks the USB connection to Demo board and reads some Demo board information which is required for the GUI operation. The configuration of the AS3910 is done based on this information.



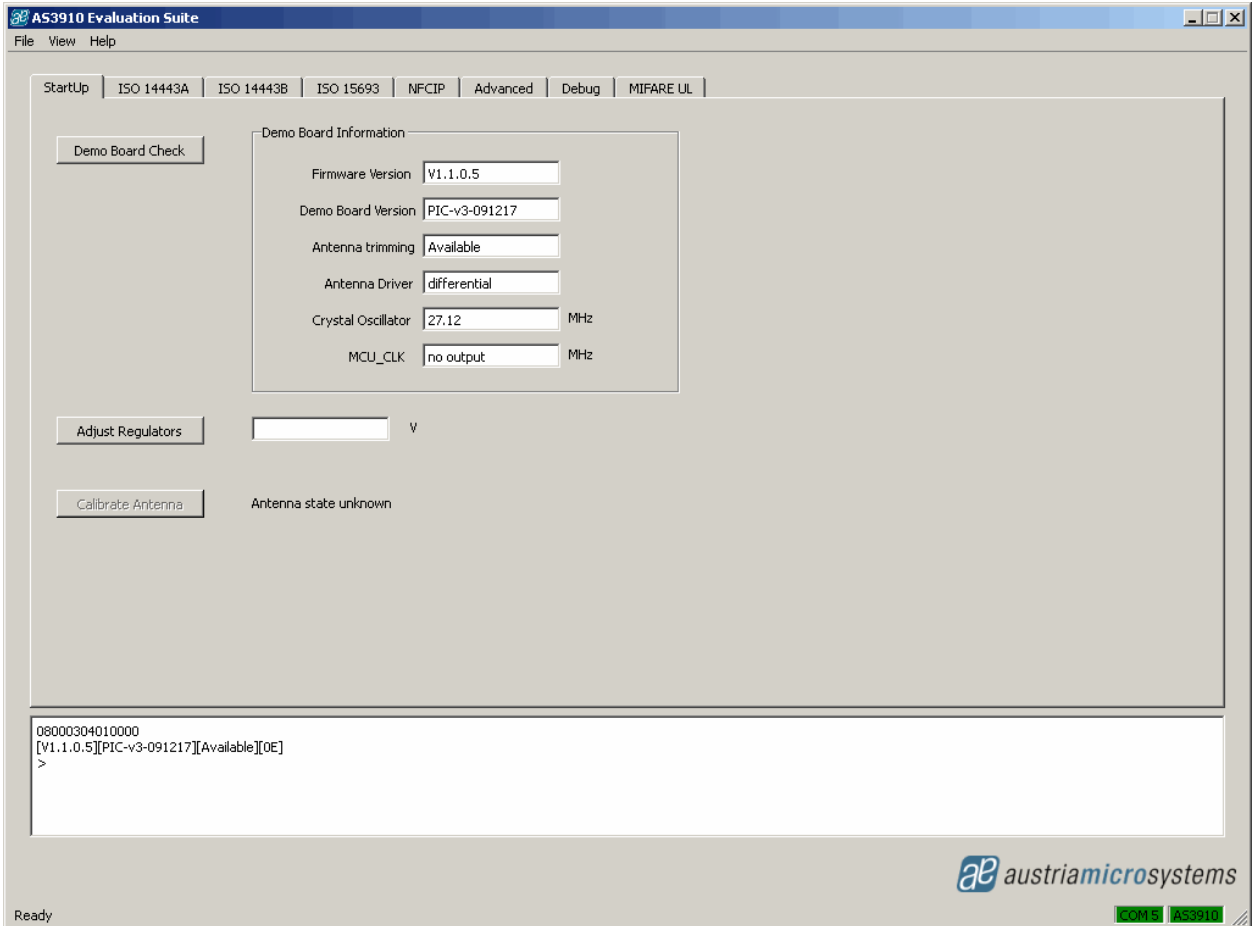


Figure above depicts the GUI window after clicking the button *Demo Board Check*. The button *Adjust Regulators* has to be clicked to run the AS3910 direct command *Adjust Regulators*. This command automatically sets the regulators to improve system Power Supply Rejection Ratio (PSRR).



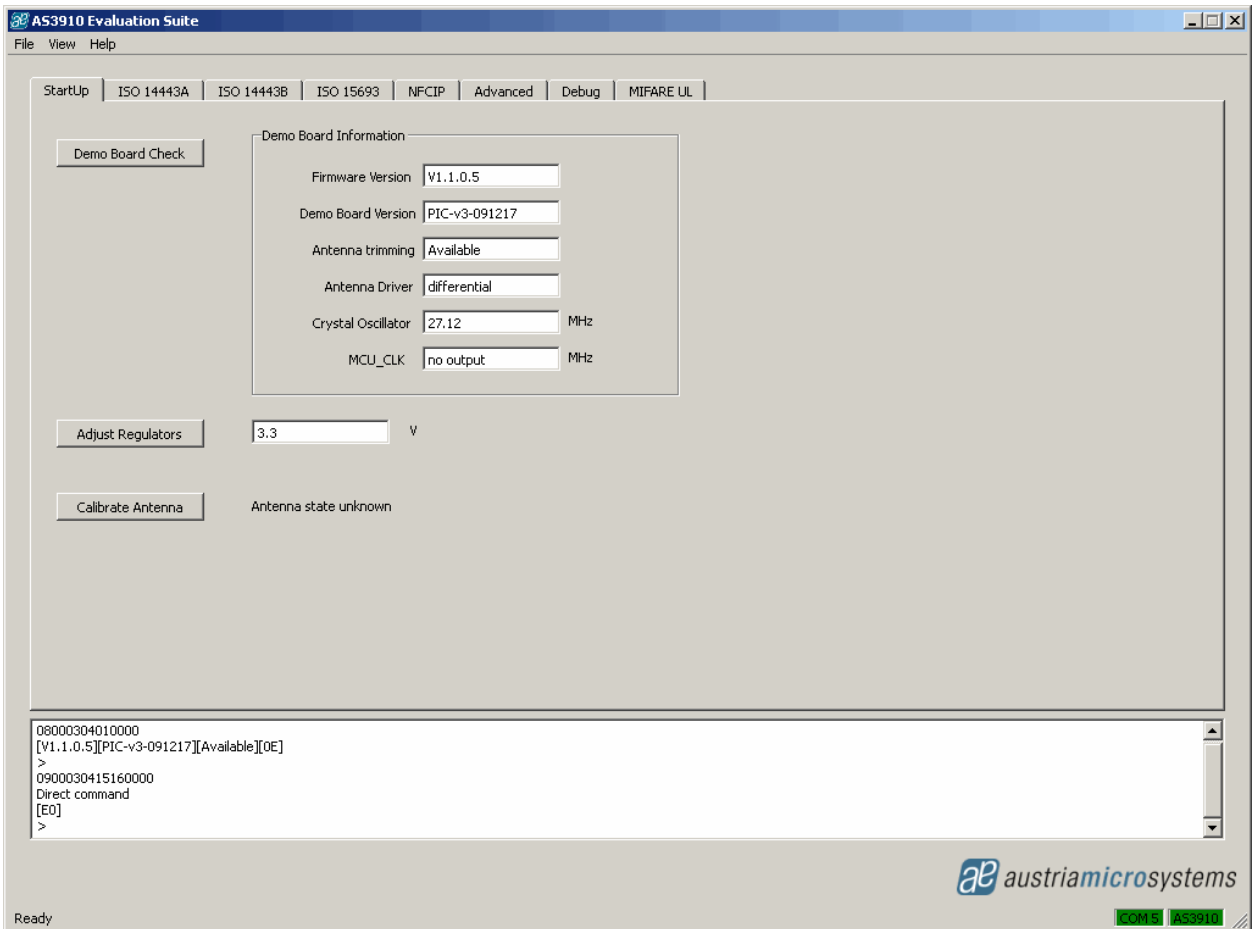


Figure above depicts GUI window after clicking the button *Adjust Regulators*. Regulated voltage is displayed next to the button.

Button *Calibrate Antenna* has to be clicked to run the AS3910 direct command *Calibrate Antenna*. This command automatically adjusts the resonance frequency of the antenna LC tank. Note that this command has to be run again in case environment of antenna coil changed (for example, in case that some metal objects have been placed next to the antenna).



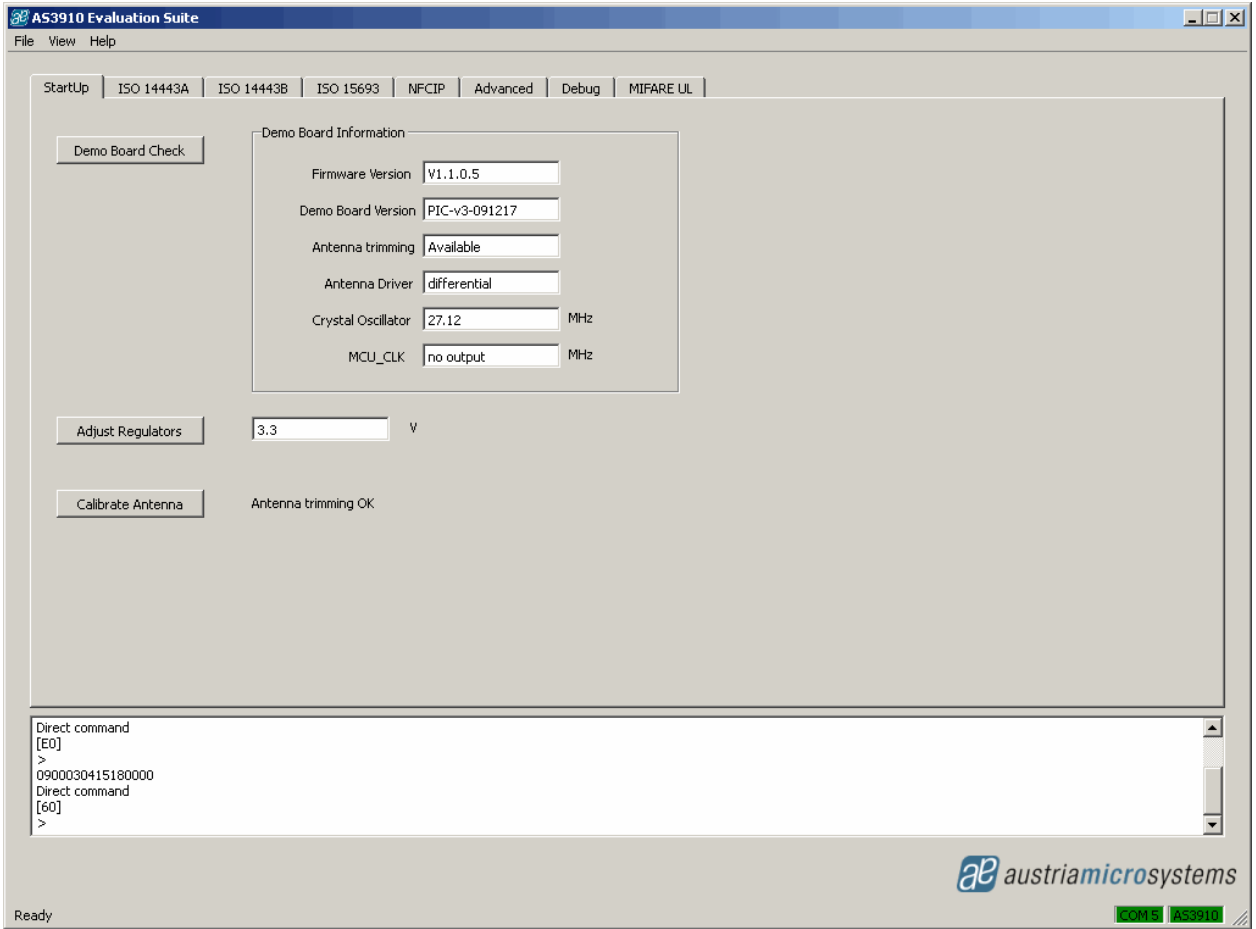
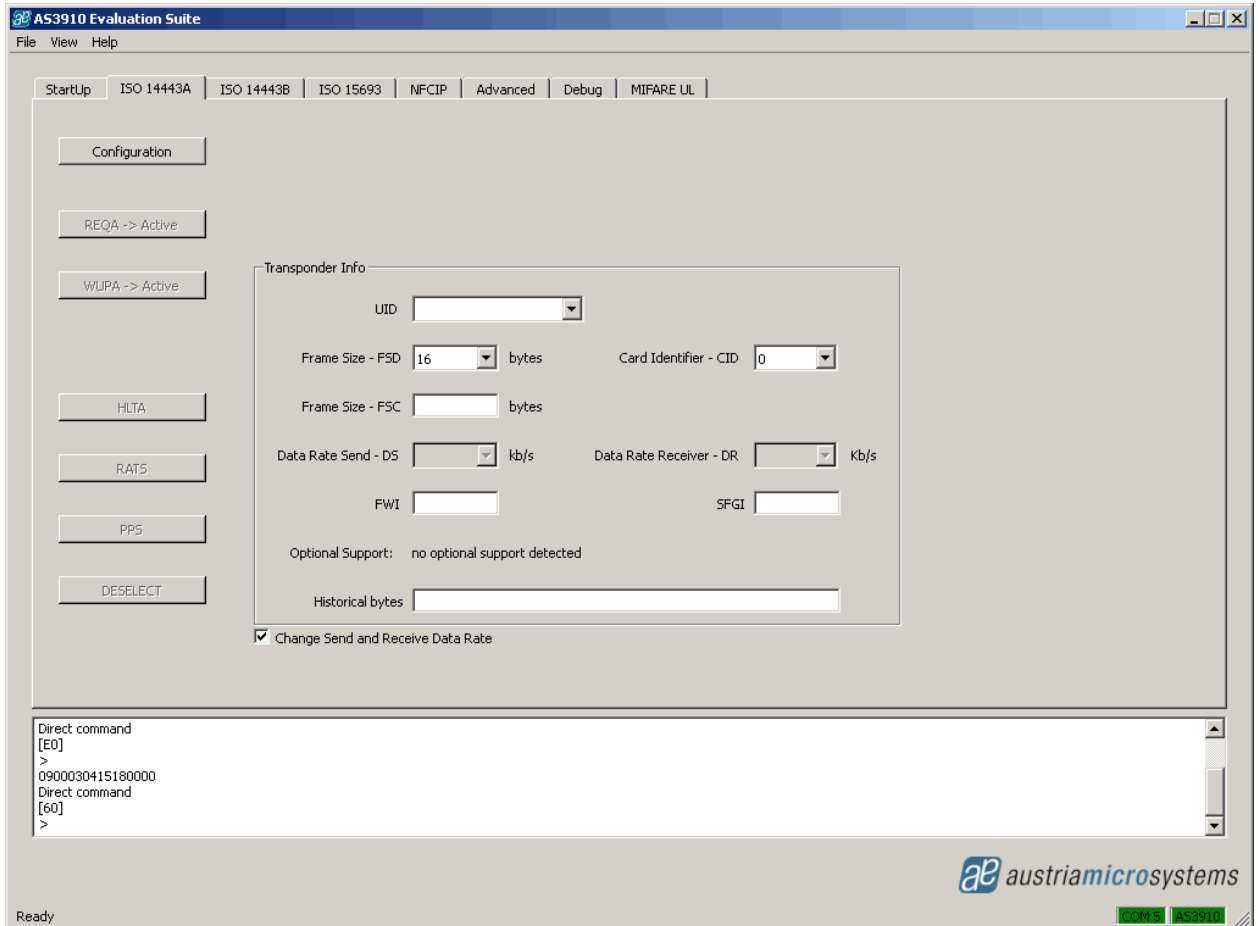


Figure above depicts the GUI window after clicking the button *Calibrate Antenna*. *Antenna trimming OK* is displayed next to the button. After the start-up procedure is terminated, the user can proceed with the activation of other tabs.

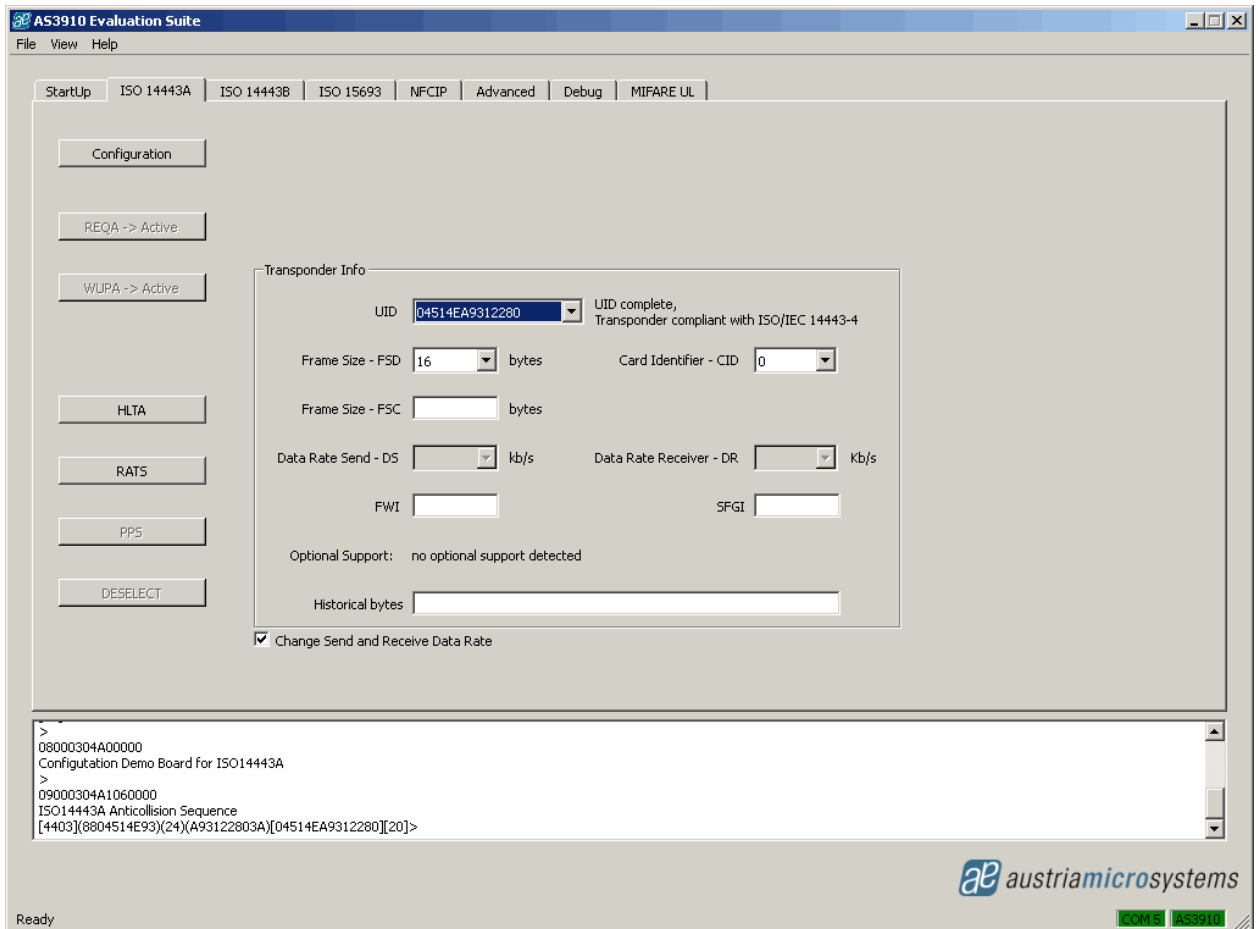
## 6.2 ISO14443A tab

In this tab the ISO14443A operation of the AS3910 is demonstrated. The figure below depicts GUI window after entering the ISO14443A tab.

After entering ISO14443A tab, the button *Configuration* has to be clicked to configure the AS3910 in the ISO14443A mode.



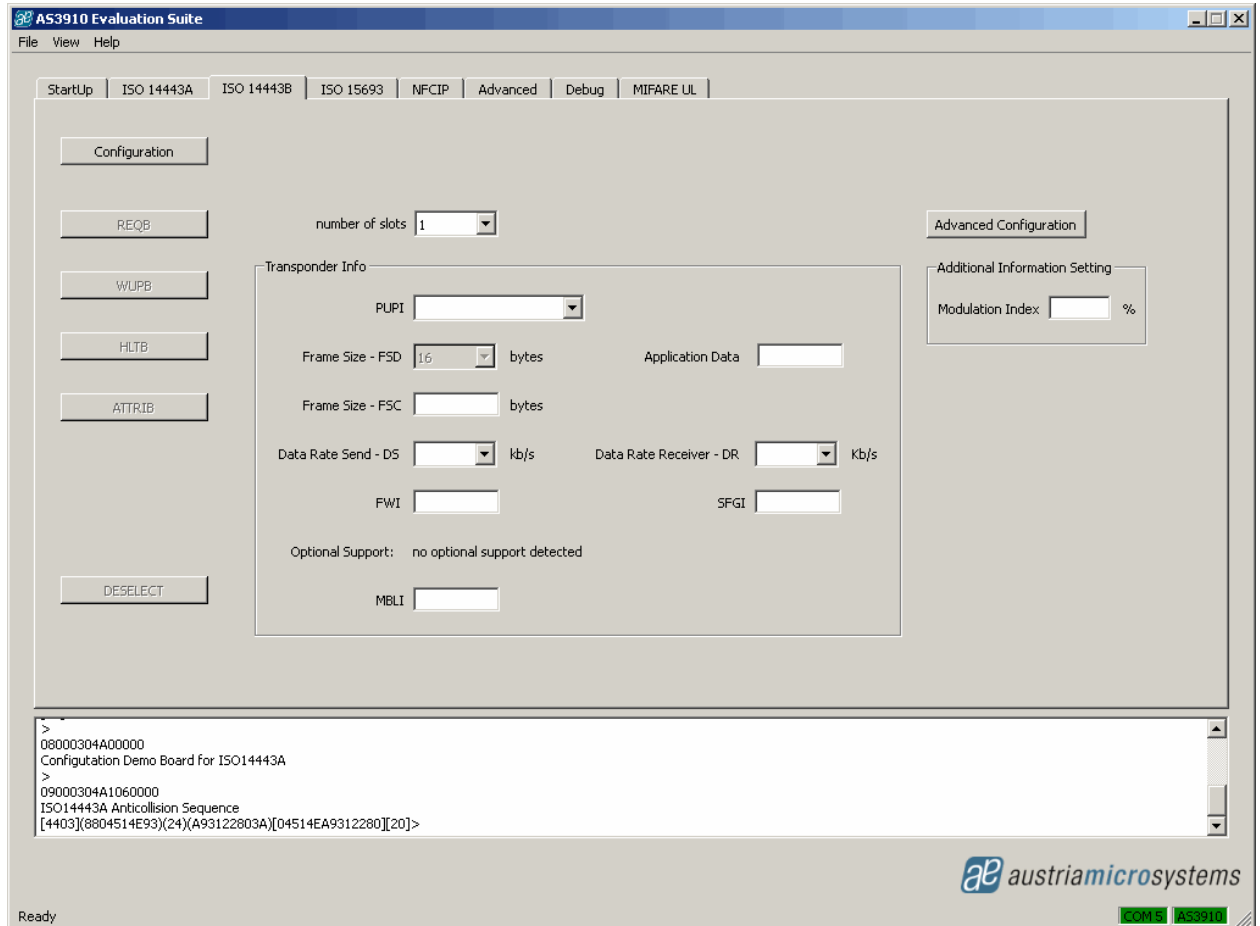
After clicking the button *Configuration*, an ISO14443A tag can be placed close to Demo board antenna. The button *REQA->Active* starts the anticollision procedure and the UID number of the founded tags is displayed.



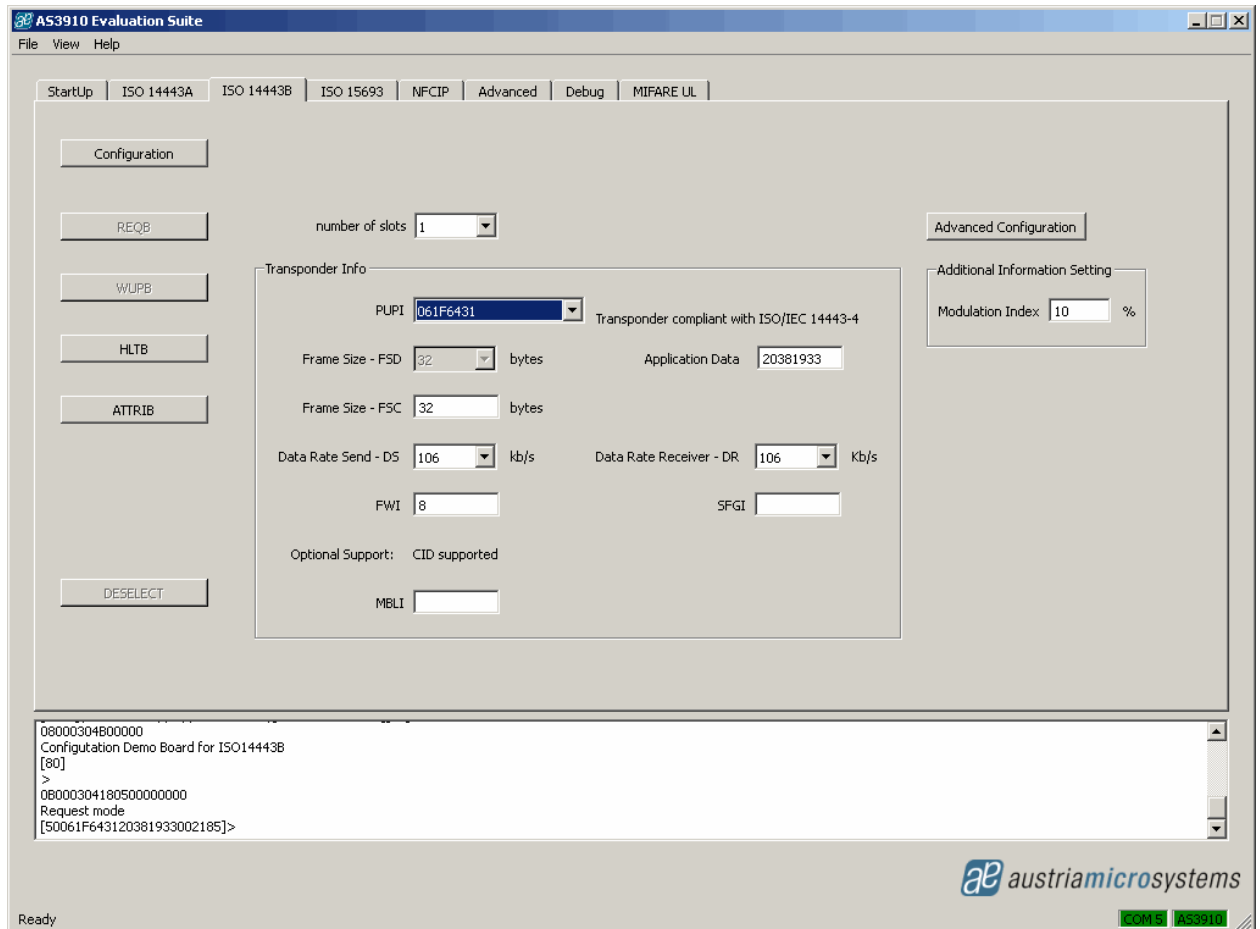
### 6.3 ISO14443B tab

In this tab the ISO14443B operation of the AS3910 is demonstrated. Figure below depicts GUI window after entering ISO14443B tab.

After entering ISO14443B tab, the button *Configuration* has to be clicked to configure the AS3910 in the ISO14443B mode.

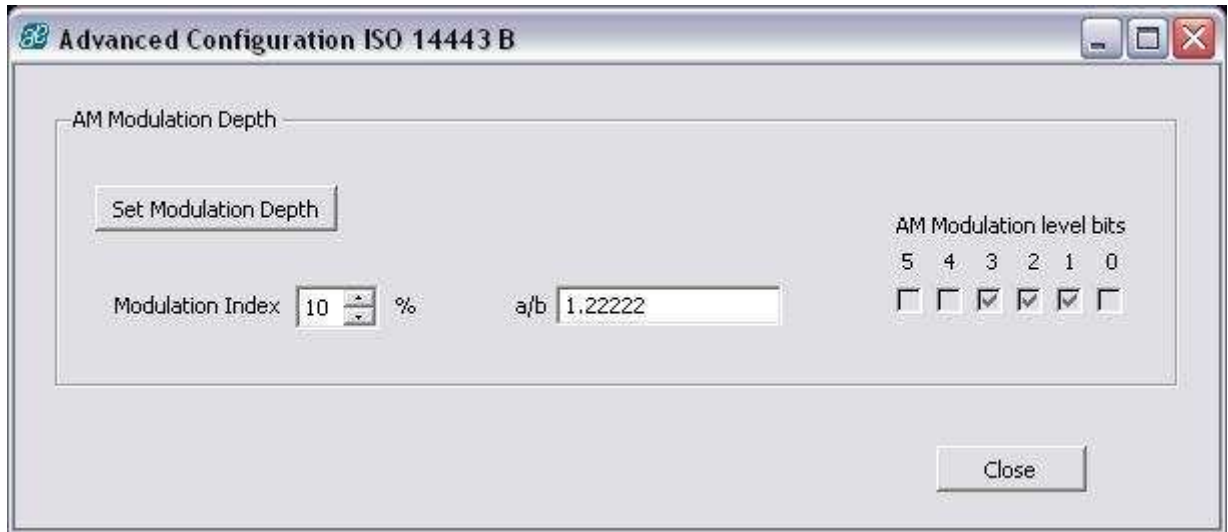


After clicking the button *Configuration*, an ISO14443B tag can be placed close to Demo board antenna. Clicking button *REQB* starts the request procedure. When REQB is terminated the PUPI number of the founded tags is displayed.



### 6.3.1 Modulation Index adjustment

This option activates the transmission, measures the modulation depth and adapts it to comply with the modulation depth specified in the Modulation Depth Definition Register (#10). When calibration procedure is finished result is displayed in Modulation Depth Display Register. See “Device Specification, section 5.15 AM modulation depth definition using direct command Calibrate Modulation Depth” for details about setting the AM modulation depth and running this command.

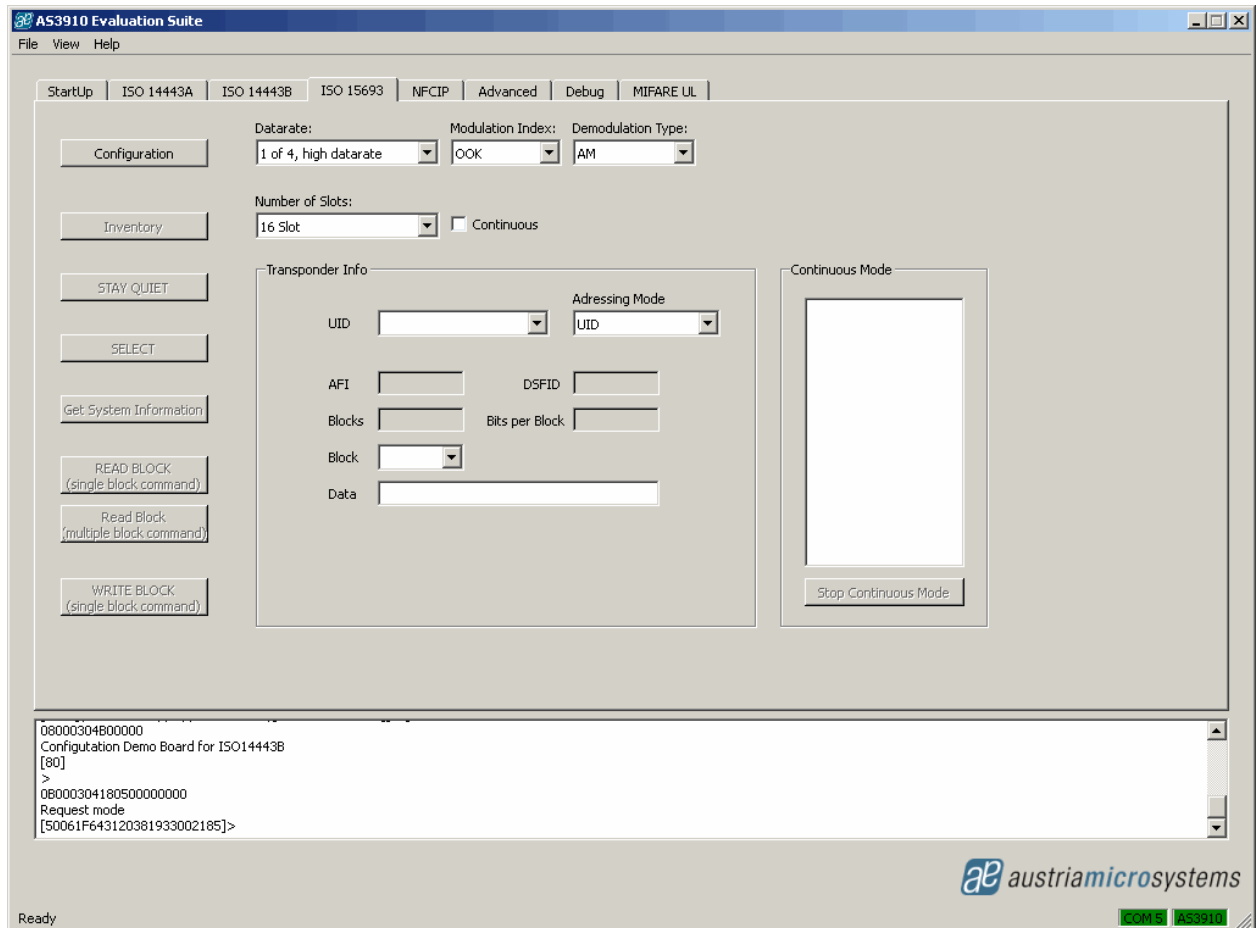


*Advanced Configuration* button is used to change the modulation depth. Once it is selected, an *Advanced Configuration ISO14443B* window pops up. After selecting the wanted modulation depth, it is set by the *Set Modulation Depth* button.

## 6.4 ISO15693 tab

In this tab the ISO15693 operation of the AS3910 is demonstrated. The figure below depicts the GUI window after entering the ISO15693 tab.

After entering ISO15693 tab, data-rate and modulation index have to be set and the button *Configuration* has to be clicked to configure the AS3910 in the ISO15693 mode.

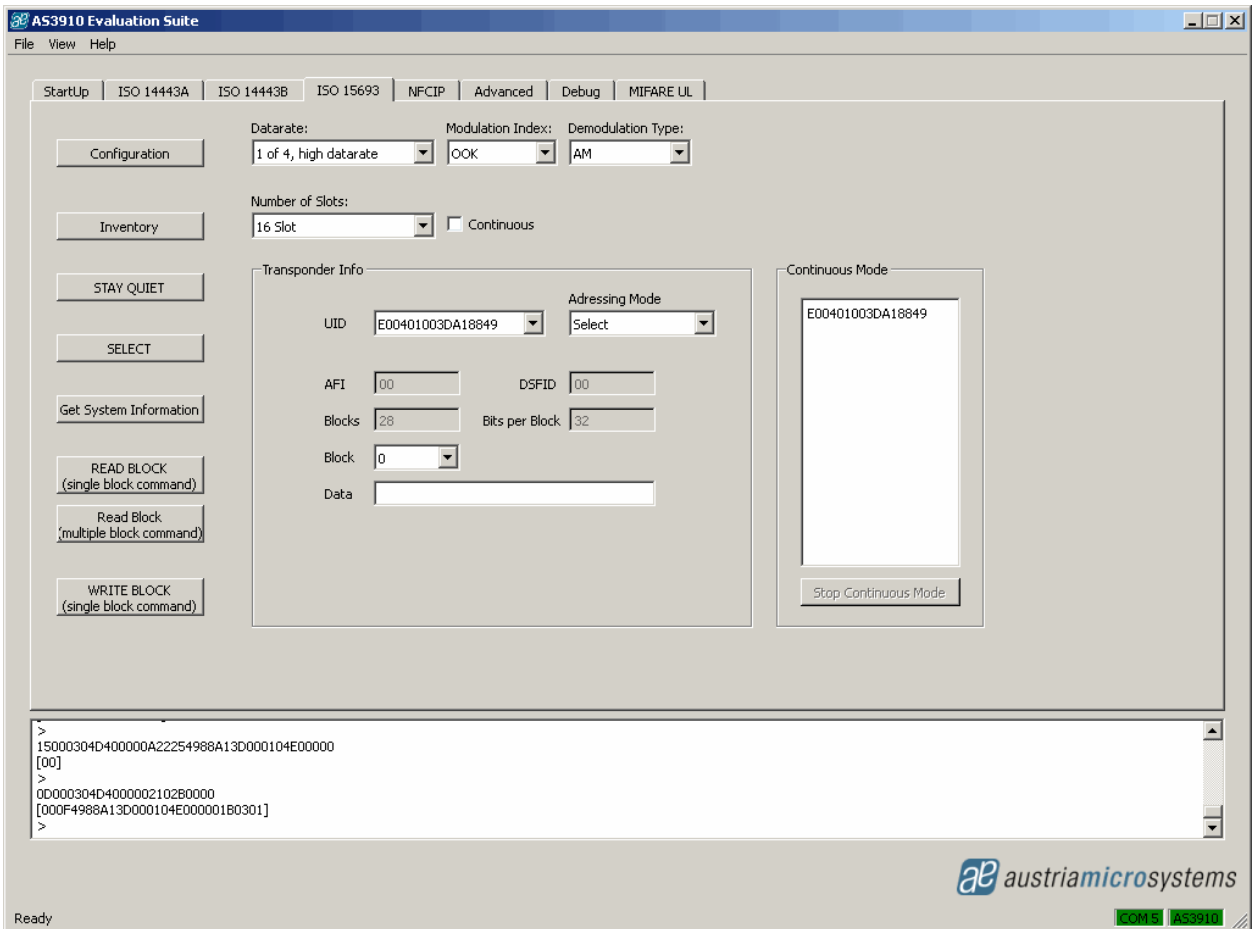


Once the board is configured to operate in the ISO15693 mode, the number of slots is set and *Inventory* button has to be clicked. The result of Inventory command is shown in the picture below (UID is presented).

The selected tag can be put into Quiet mode by the *STAY QUIET* button

In case more than one tag is detected during the *Inventory* command, any of them can be selected using the *SELECT* button, then the following commands are not preceded with the UID. In case the *SELECT* command is not used, the UID must be included in all following commands. This can be selected in the Addressing Mode field (See Picture below)





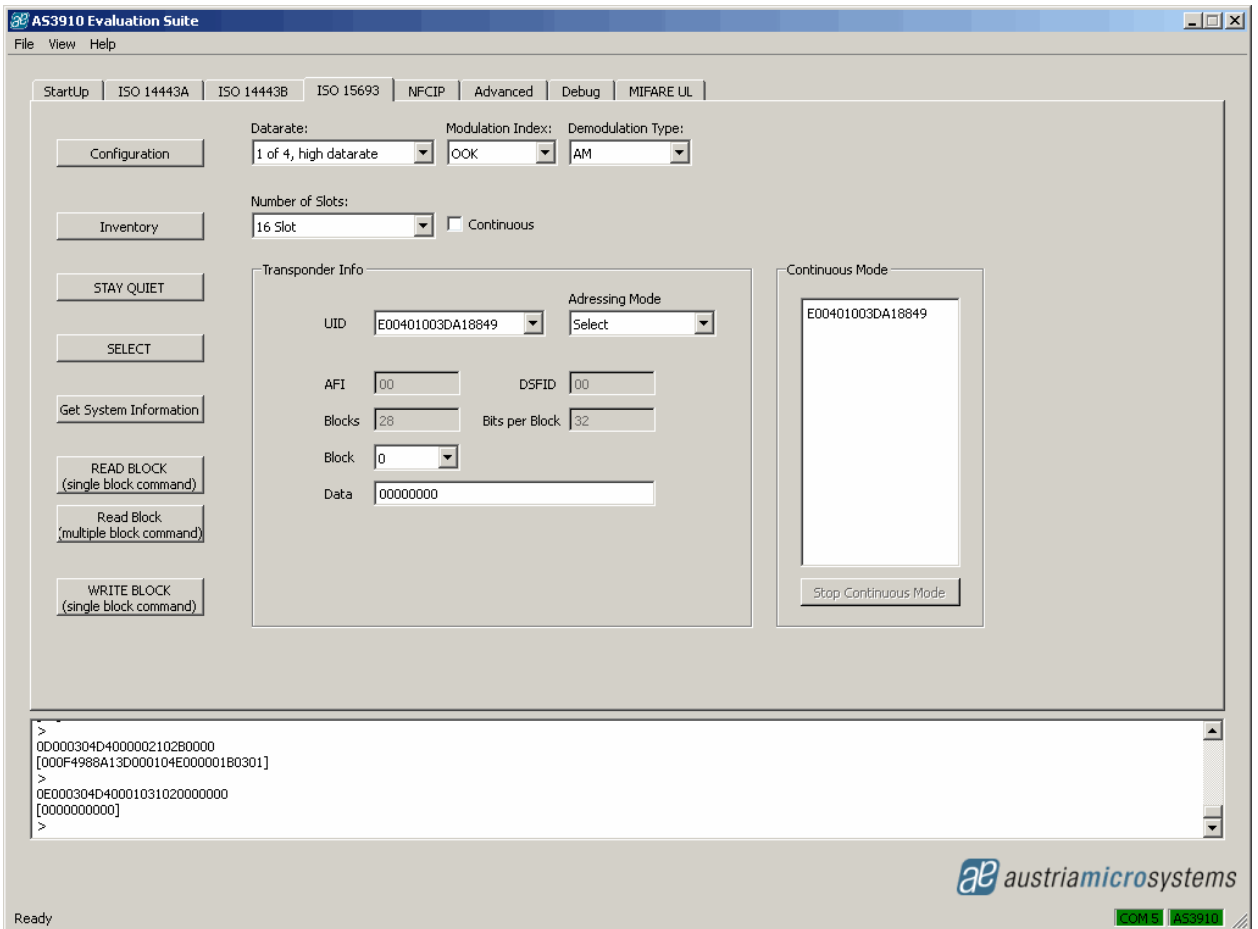
After getting the system information (by using the *Get System Information* button), it is possible to read/write data.

The transponder memory is organised in blocks, the number and size of these blocks is displayed in the *Transponder Info* field.

ISO15693 mandatory commands are *Inventory* and *STAY QUIET*. All others are optional and not every tag may support them. I.e. Some tags do not support single block READ. To overcome this, multiple blocks READ command for reading only one selected block is implemented on this GUI.

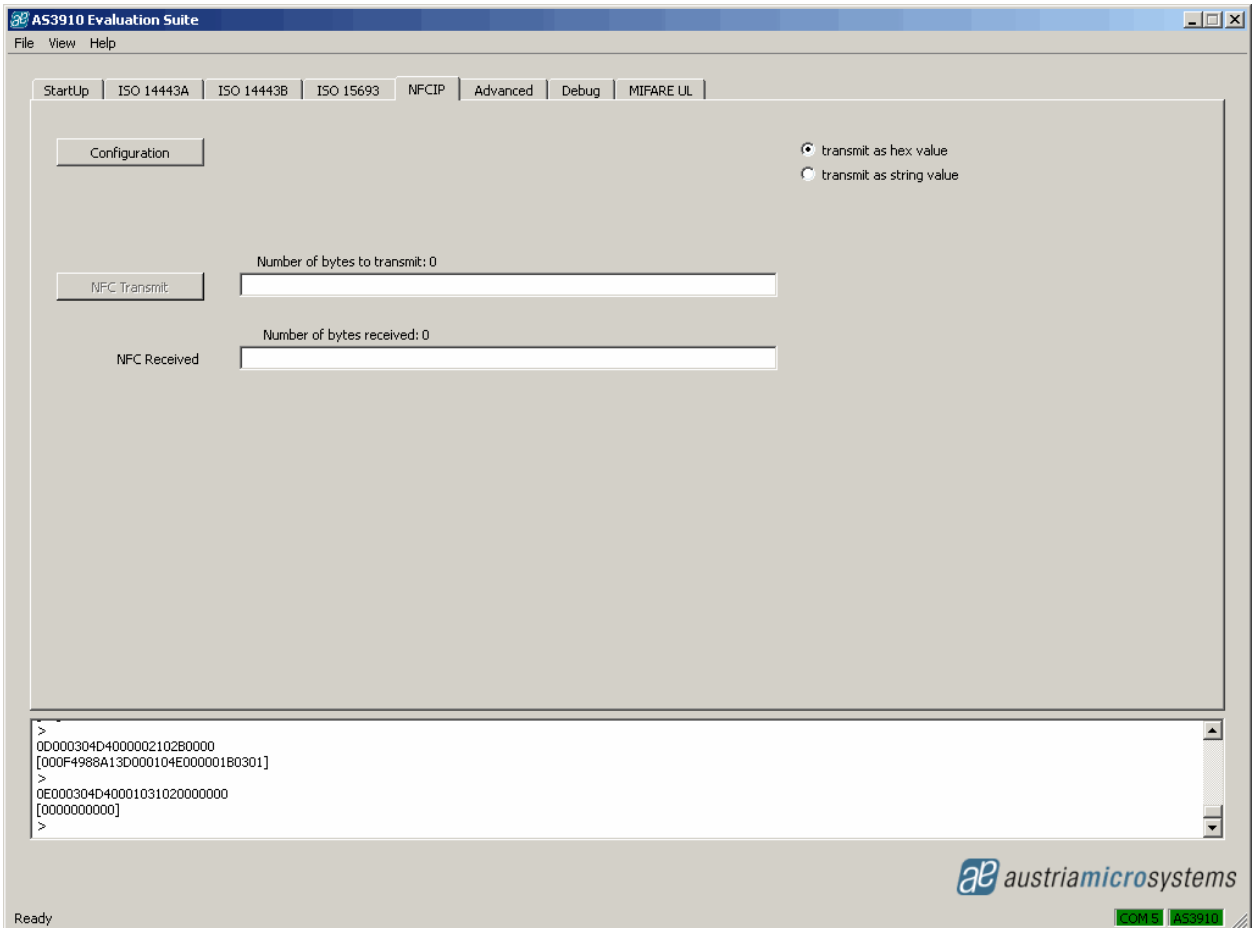
To read data, the wanted block has to be selected in advanced. The result is displayed on the *Data* field as presented in the picture below.

To write data, the block has to be selected and the data placed in the *Data* field.



## 6.5 NFCIP tab

In this tab the NFCIP is demonstrated. Figure below depicts GUI window after entering the *NFCIP* tab.



After entering *NFCIP* tab, the button *Configuration* has to be clicked. This configures the AS3910 in the NFCIP mode.

Immediately after entering in this mode, AS3910 is set to receive mode.

The GUI allows to transmit a hexadecimal (only complete bytes can be sent) or string values. To transmit some data, it has to be written in the *NFC Transmit field* ("AS3940 NFCIP communication test" in this case). The transmission is initiated by the button *NFC Transmit*.

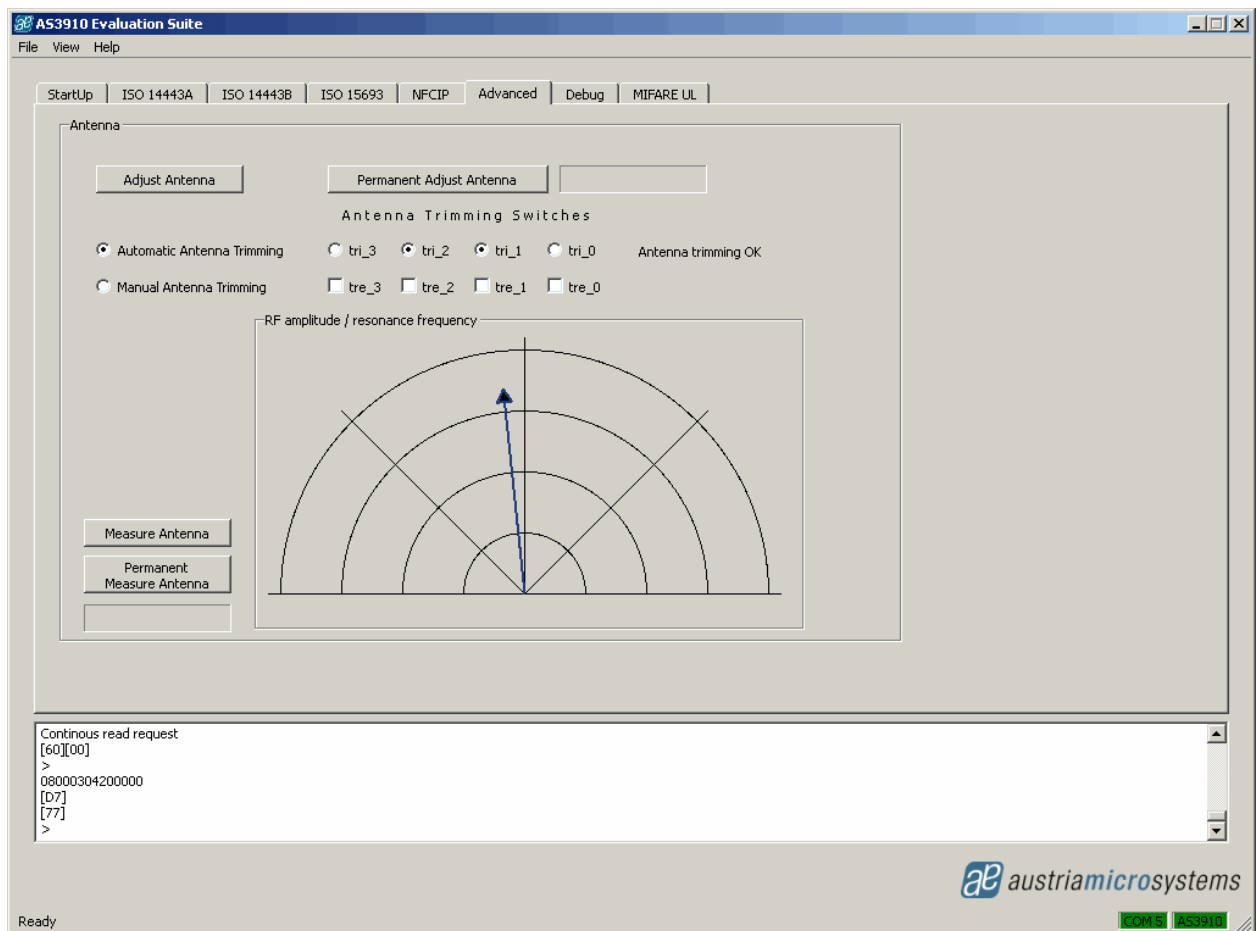
The message is received by the receiving device and appears in the *NFC Received* field

## 6.6 Advanced tab

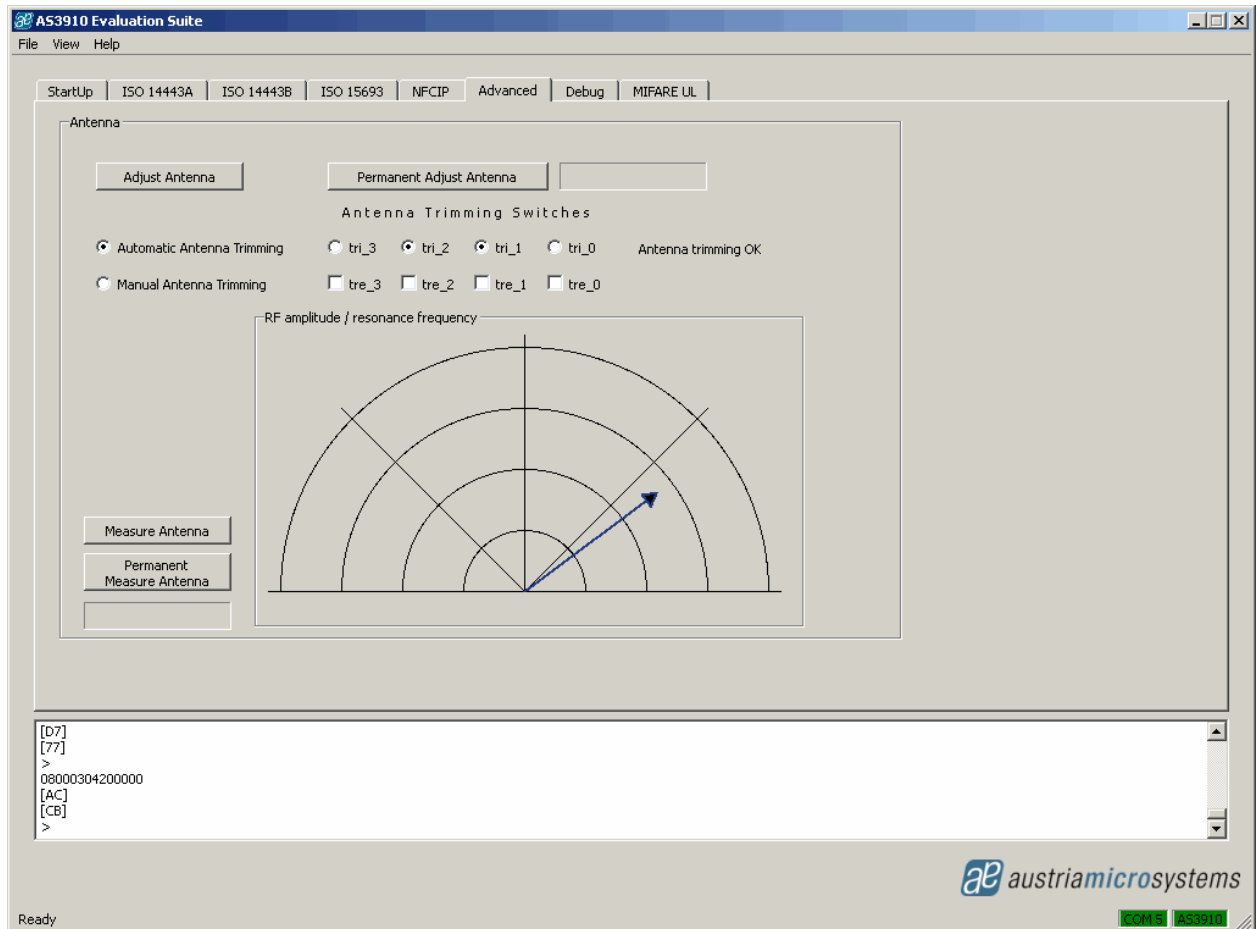
In this tab the advanced antenna trimming operation of the AS3910 is demonstrated. Figure below depicts the GUI window after entering the *Advanced* tab.

After entering the *Advanced* tab, the value of the RF amplitude and resonance frequency is measured and displayed on a graph. The value of x is derived by executing the direct command *Check Antenna Resonance*, the value of y is derived by executing the direct command *Measure RF*.

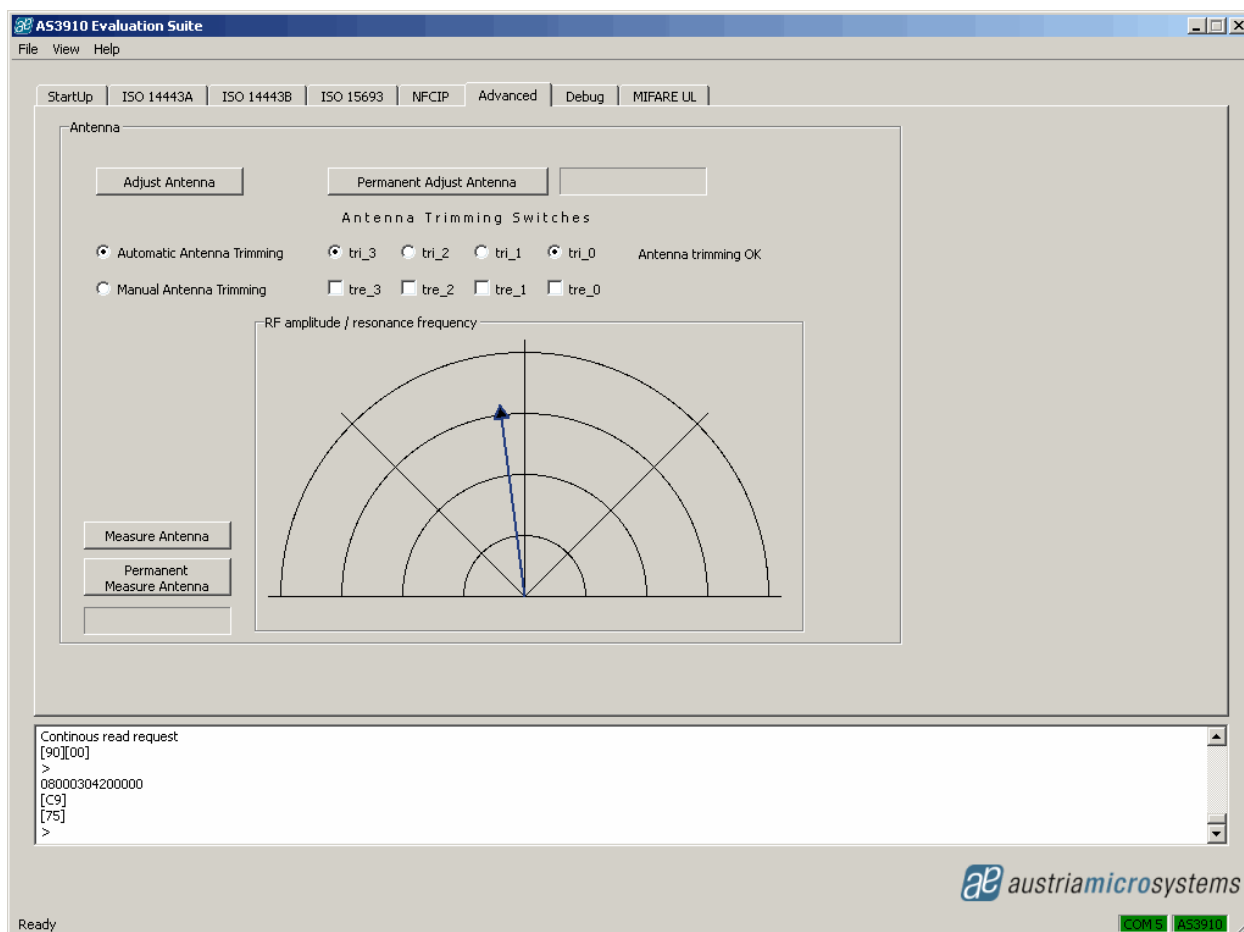
The antenna is in resonance in case the pointer is close to vertical position as depicted on figure below.



Measurement of resonance frequency can be done by the button *Measure Antenna*. Figure below depicts measurement result after placing some metal close to the antenna. In this case the antenna is not in resonance anymore (due to change of its inductance).



The antenna can be tuned by the button *Adjust Antenna* while *Automatic Antenna Tuning* is selected. Figure below depicts the result after clicking this button (metal was kept close to antenna). Note that position of trimming switches changed.



It is possible to define the position of trim switches and observe the effect on the resonance frequency. This is done by selecting *Manual Antenna Trimming* and defining the value of *tre\_3* to *tre\_0* before clicking button *Adjust Antenna* (check box marked indicates that switch is turned on).

### 6.6.1 Permanent measurement of the antenna

The RF amplitude and the resonance frequency of the antenna can be continuously monitored by using the button *Permanent Measure Antenna*. Once this option is activated, the effect can be seen while approaching a piece of metal to the antenna. The measured value is updated constantly.

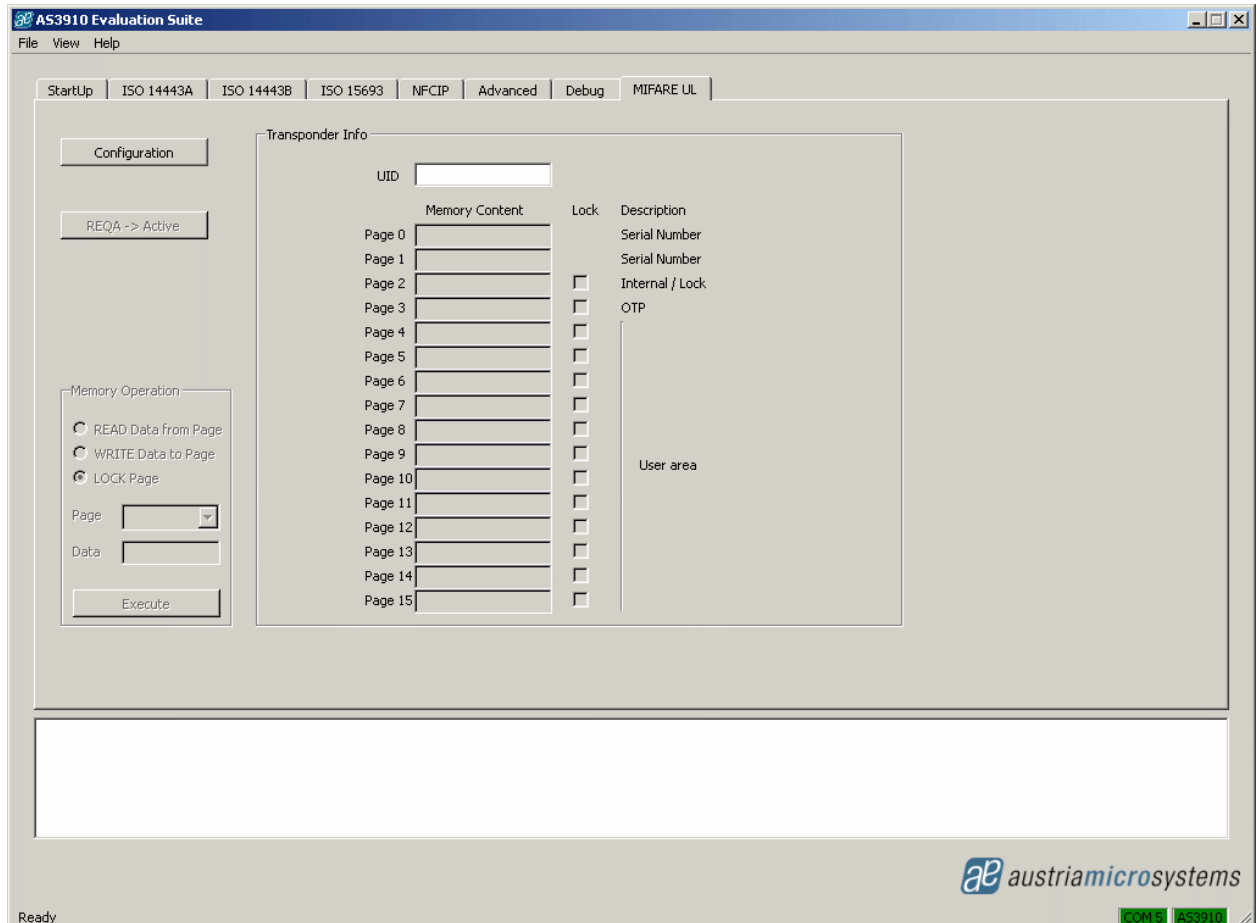
### 6.6.2 Permanent trimming of the antenna

The RF amplitude and the resonance frequency of the antenna can be continuously trimmed by using the button *Permanent Adjust Antenna*. Once this option is activated, the effect can be seen while approaching a piece of metal to the antenna. The antenna trimming value is updated constantly and the resonance frequency is always centred.

## 6.7 Mifare UL tab

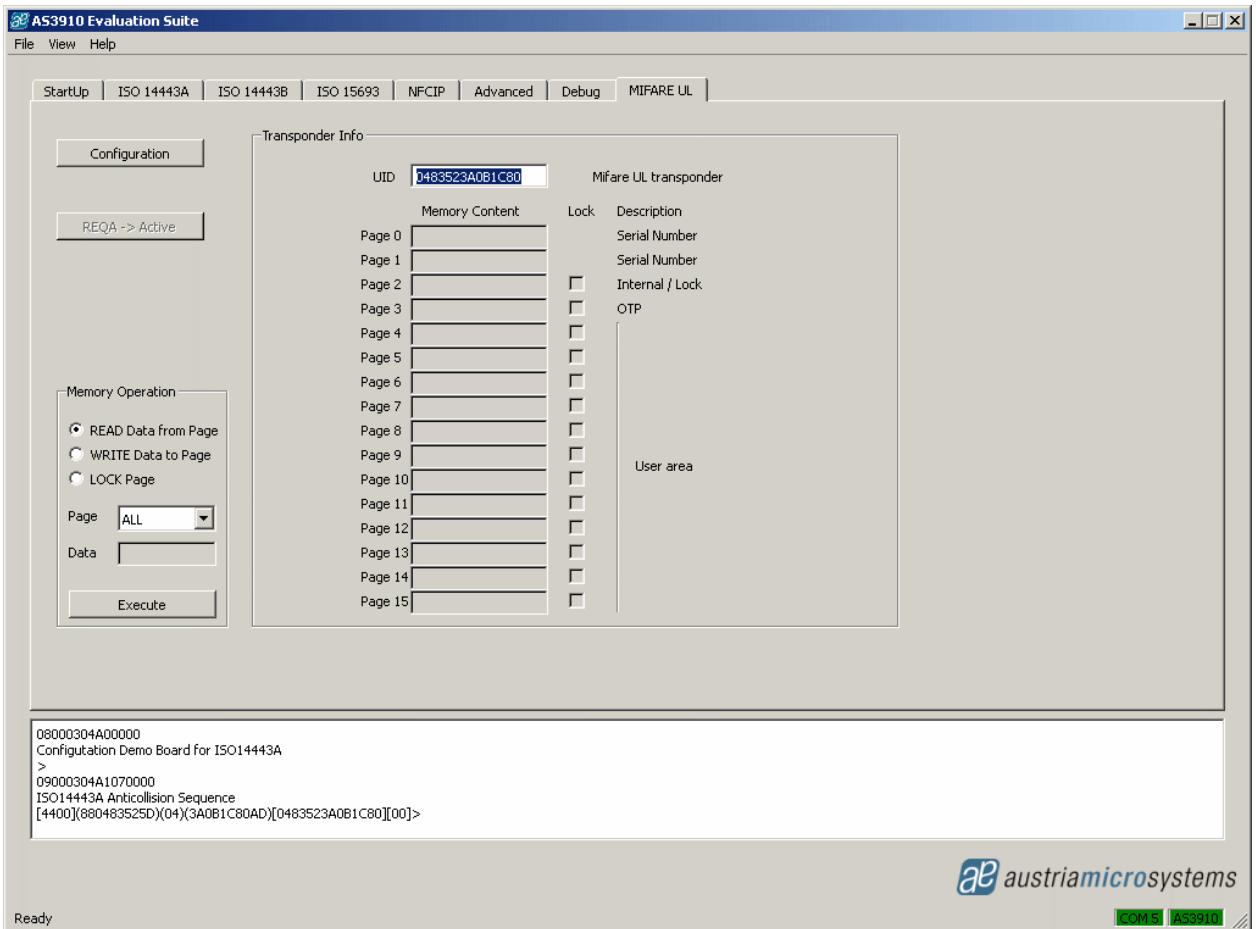
In this tab the Mifare UL operation of the AS3910 is demonstrated. The figure below depicts the GUI window after entering the Mifare UL tab.

After entering Mifare UL tab, the button *Configuration* has to be clicked to configure the AS3910 in the Mifare UL mode.



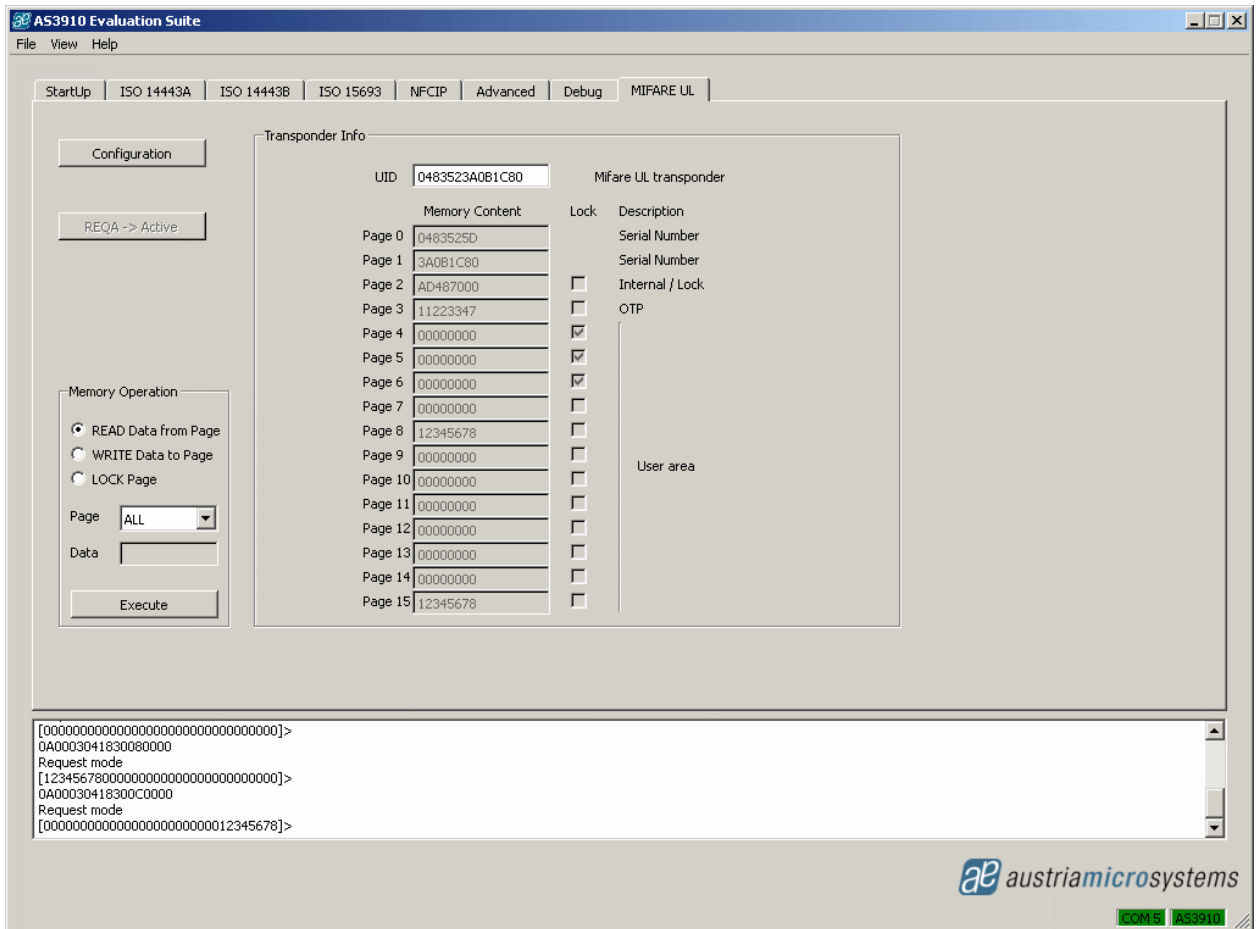
After clicking the button *Configuration*, a Mifare UL tag can be placed close to the demo board antenna. The button *WUPA->Active* starts the activation procedure and the UID number of the founded tag is displayed. In case more than one tag is detected during the *REQA->Active* command, the message "More then ONE transponder" is presented



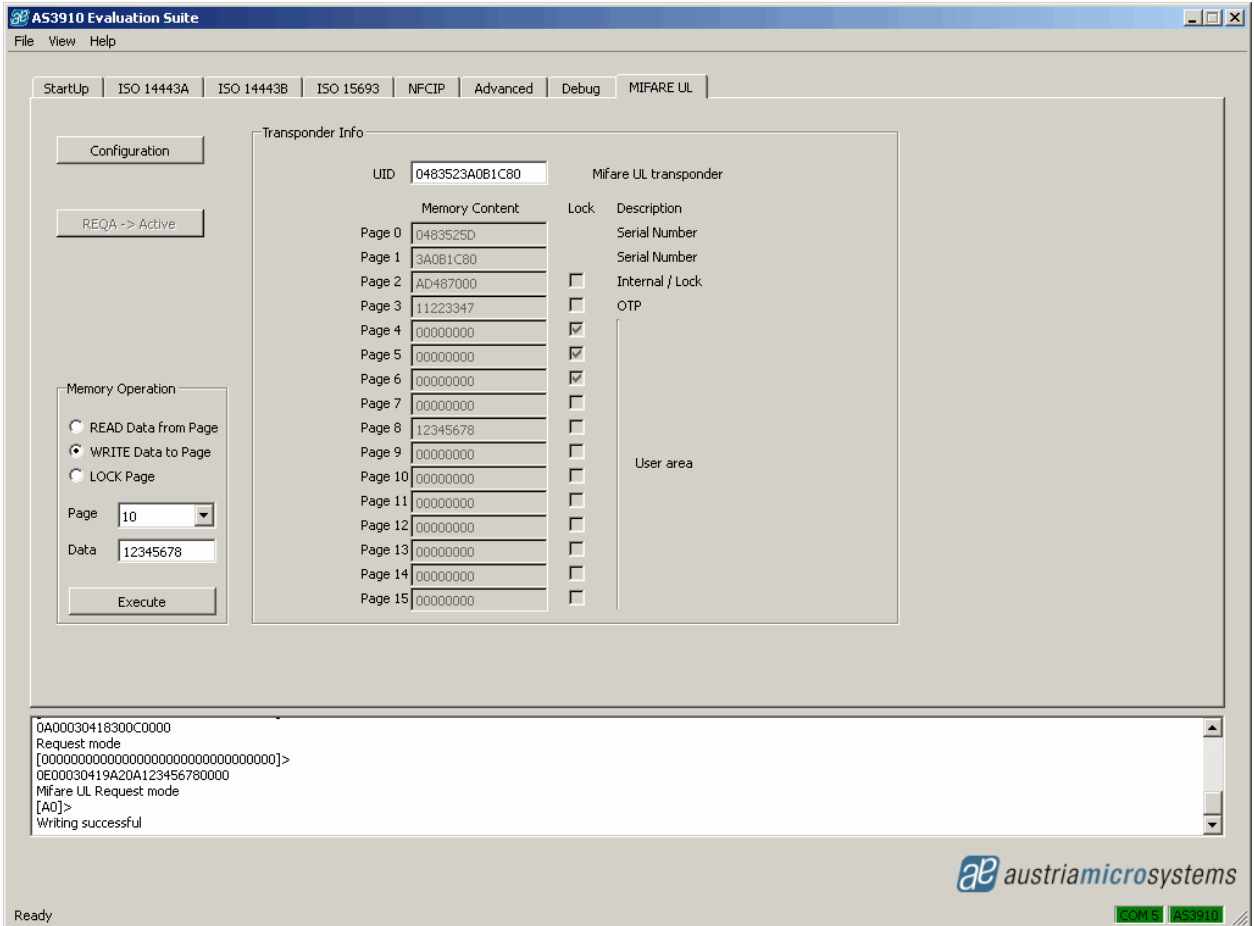


After getting the UID of Mifare UL tag, it is possible to read/write data. The transponder memory is organised in pages, the size of these pages is 4 bytes.

To read data, radio button "READ Data from Page" and the wanted Page have to be selected in pull down menu of Page. The result is displayed on the *Memory Contents* fields of Transponder Info as presented in the picture below.



To write data, radio button "WRITE Data to Page" and the wanted Page have to be selected and the data placed in the *Data* field (4 bytes).



To Lock Page, radio button "LOCK Page" and the wanted Page have to be selected in the "Page" pull down menu. Note that this command locks the page in read-only memory Page.

