Application note

13.56 MHz RFID Reader IC

Getting started with AS3910 Demonstration Board

Demo board revision: A-V1.0

Revision of this document: 7 Date of this document: 2010-03-09

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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.

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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.

28 A53910 Evaluation Suite	×
File View Help StartUp ISO 14443A ISO 14443B ISO 15693 NFCIP Advanced Debug MIFARE UL Demo Board Check	
austriamicrosystem	ns
Ready COMIS AS391	

Image: Signature State Image: Signature State File View Help	×
StartUp ISO 14443A ISO 14443B ISO 15693 NECP Advanced Debug MIFARE LU Demo Board Check	
08000304010000 [V1.1.0.5][PIC-v3-091217][Available][0E] >	
austriamicrosystem	ıs
Ready COM5 AS3910	

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).

AS3910 Evaluation Suite	<u> </u>
StartUp ISO 14443A ISO 14443B ISO 15693 NFCIP Advanced Debug MIFARE UL	
Demo Board Check Firmware Version V1.1.0.5	
Demo Board Version PIC-v3-091217 Antenna trimming Available	
Antenna Driver differential Crystal Oscillator 27.12 MHz	
MCU_CLK no output MHz	
Adjust Regulators 3.3 V	
Calibrate Antenna Antenna state unknown	
06000304010000 [V1.1.0.5][PIC-v3-091217][Available][0E] > 0900030415160000 Direct command [E0] >	•
austriamicrosyst	ems
ady Konta Ass	910 //

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).

# A53910 Evaluation Suite File	×
StartUp ISO 144438 ISO 15693 NFCIP Advanced Debug MIFARE UL Demo Board Check	
Direct command	
austriamicrosystem	
Ready COM5 ASS91	///

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.

22 A53910 Evaluation Suite	
StartUp ISO 14443A ISO 14443B ISO 15693 NFCIP Advanced Debug MIFARE UL	1
Configuration	
REQA -> Active	
Transponder Info	
WUPA -> Active	
Frame Size - FSD 16 V bytes Card Identifier - CID 0 V	
HLTA, Frame Size - FSC bytes	
RATS Data Rate Send - DS v kb/s Data Rate Receiver - DR v Kb/s	
FWI SFGI	
PP5 Optional Support: no optional support detected	
Historical bytes	
Change Send and Receive Data Rate	
Direct command [E0]	×
> 090030415180000 Direct command	
	-
	_
	<i>austriamicrosystems</i>
Ready	COM 5 A53910 //

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.

🖉 A53910 Evaluation Suite	_ 🗆 🗙
nie view Help	
StartUp ISO 14443A ISO 14443B ISO 15693 NFCIP Advanced Debug MIFARE UL	
Configuration	
REQA -> Active	
WUPA -> Active	
UID Complete, Transponder compliant with ISO/IEC 14443-4	
Frame Size - FSD 16 V bytes Card Identifier - CID 0 V	
HLTA Frame Size - FSC bytes	
Data Rate Send - DS kb/s Data Rate Receiver - DR Kb/s	
RATS	
FWI SFGI	
Optional Support: no optional support detected	
DESELECT	
Historical bytes	
Change Send and Receive Data Rate	
> 08000304400000	_
Configuration Demo Board for ISO14443A >	_
09000304A1060000 ISO14443A Anticollision Sequence	
[4403](8804514E93)(24)(A93122803A)[04514EA9312280][20]>	•
austriamicrosys	stems
Ready	453910 //

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.

避 AS3910 Evaluation Suite		X
File View Help		
StartUp ISO 14443A	ISO 144438 ISO 15693 NFCIP Advanced Debug MIFARE UL	
Configuration]	
REQB	number of slots 1	Advanced Configuration
WUPB	Transponder Info	Additional Information Setting
HLTB	Frame Size - FSD 16 bytes Application Data	
ATTRIB	Frame Size - FSC bytes	
	Data Rate Send - DS 💌 kb/s Data Rate Receiver - DR 💌 Kb/s	
	FWI SFGI	
	Optional Support: no optional support detected	
DESELECT	MBLI	
>		
08000304A00000 Configutation Demo Board I	or ISO14443A	
> 09000304A1060000 ISO14443A Anticollision Sec [4403](8804514E93)(24)(A	juence 93122803A)[04514EA9312280][20]>	-
		austriamicrosystems
Ready		COM 5 A53910 //

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.

AS3910 Evaluation Suite File View Help						<u> </u>
StartUp ISO 14443A	ISO 14443B ISO 15693	NFCIP Advanced	Debug MIFARE UL			
Configuration						
REQB	number of slots	1			Advanced Configuration	
WUPB	Transponder Info	061F6431	Transponder compliant wil	:h ISO/IEC 14443-4	Additional Information Setting Modulation Index 10 %	
HLTB	Frame Size - FSD	32 v bytes	Application Data			
ATTRIB	Frame Size - FSC	32 bytes				
	Data Rate Send - DS	106 💌 kb/s	Data Rate Receiver - DR	106 • Kb/s		
	FWI	8	SFGI			
	Optional Support:	CID supported				
DESELECT	MBLI					
					_	
08000304B00000 Configutation Demo Board fo	r ISO14443B	-				<u> </u>
[80] > 0B000304180500000000 Request mode [50061F6431203819330021	85]>					
					austriamicros	_
Ready						453910

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.

AM Modulation Depth	
Set Modulation Depth Modulation Index 10 * % a/b 1.22222	AM Modulation level bits 5 4 3 2 1 0 「「「アアア」
	Close

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 *Con-figuration* has to be clicked to configure the AS3910 in the ISO15693 mode.

31 AS3910 Evaluation Suite File View Help		
StartUp ISO 14443A	ISO 14443B ISO 15693 NFCIP Advanced Debug MIFARE UL	
Configuration	Datarate: Modulation Index: Demodulation Type: 1 of 4, high datarate Image: Cook image: Co	
Inventory	Number of Slots:	
STAY QUIET	Transponder Info Adressing Mode	Continuous Mode
SELECT		
Get System Information	Blocks Bits per Block	
READ BLOCK (single block command)	Block Data	
Read Block (multiple block command)		
WRITE BLOCK (single block command)		Stop Continuous Mode
08000304B00000 Configutation Demo Board fo [80]	r ISO14443B	
08000304180500000000 Request mode [50061F64312038193300218	85]>	-
		austriamicrosystems
Ready		COM 5 A53910 //

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)

Big A53910 Evaluation Suite Image: Comparison of the second sec
StartUp ISO 14443A ISO 14443B ISO 15693 NFCIP Advanced Debug MIFARE UL Datarate: Modulation Index: Demodulation Type: Configuration 1 of 4, high datarate OOK AM Image: Configuration Number of Slots: Inventory IS Slot Continuous STAY QUIET Transponder Info Adressing Mode Image: Continuous Mode SELECT AFI OS SFID Image: Continuous Image: Continuous Mode READ BLOCK Block Image: Continuous Image: Continuous Mode Image: Continuous Mode (ringle block command) Image: Continuous Image: Continuous Mode Image: Continuous Mode Image: Continuous Mode (ringle block command) Image: Continuous Image: Continuous Mode Image: Continuous Mode Image: Continuous Mode (ringle block command) Image: Continuous Mode Image: Continuous Mode Image: Continuous Mode Image: Continuous Mode
> > > 15000304D4000000A22254988A13D000104E000000 > [00] > > > 0D0000304D4000001E0301] > > @@@austriamicrosystems Ready ISOME ISOME

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.

AS3910 Evaluation Suite	×
StartUp ISO 14443A ISO 15693 NFCIP Advanced Debug MIFARE UL Datarate: Modulation Index: Demodulation Type: Configuration 1 of 4, high datarate Image: OOK AM Number of Slots: Number of Slots:	
Inventory 16 Slot Continuous Transponder Info Transponder Info	
Adressing Mode E00401003DA18849 UID E00401003DA18849 SELECT AFI	
Get System Information Blocks 28 Bits per Block 32 READ BLOCK Block Image: Control of the second	
(single block command) Data 00000000 Read Block (multiple block command) 000000000 000000000000000000000000000000000000	
WRITE BLOCK (single block command) Stop Continuous Mode	
>	
≥ austriamicrosystem	-
ady COMS AS3910	_

6.5 NFCIP tab

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

22 AS3910 Evaluation Suite File View Help			X
StartUp ISO 14443A ISO 14443B	ISO 15693 NFCIP Advanced Debug MIFARE UL		1
Configuration		 transmit as hex value transmit as string value 	
NIMbe NFC Transmit	r of bytes to transmit: 0		
Numb	er of bytes received: 0		
.			
0D000304D4000002102B0000 [000F4988A13D000104E000001B0301] > 0E000304D40001031020000000			
[000000000]			•
		aus aus	tria micro systems
Ready			COM 5 A53910 //

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*.

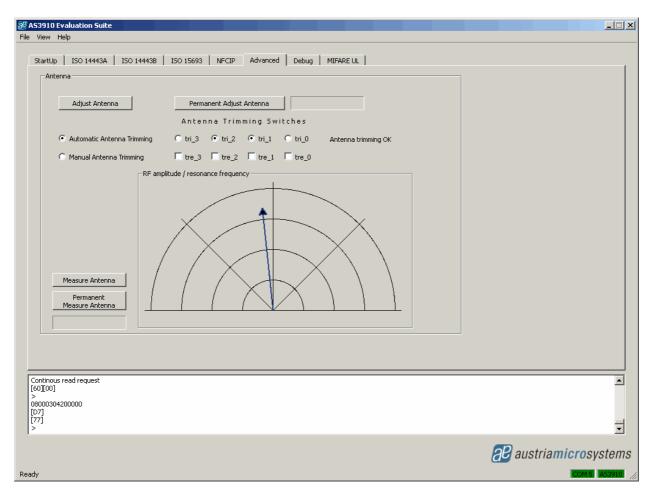
The message is received by the receiving device and appears in the NFC Received field

6.6 Advanced tab

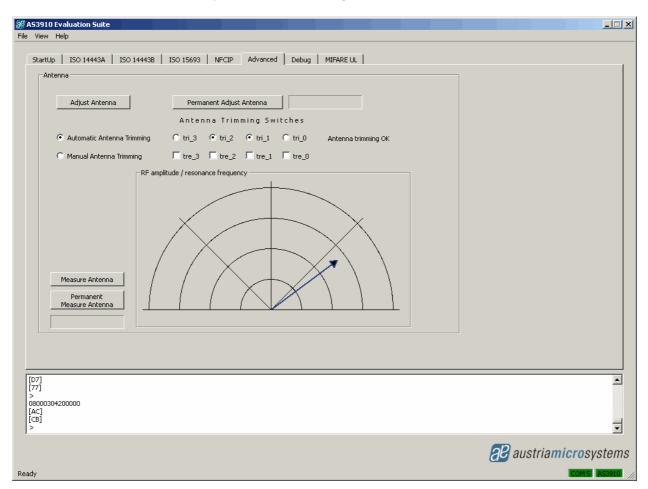
In this tab the advanced antenna trimming operation of the AS3910 is demonstrated. Figure below depicts the GUI window after entering the *Advanced* tab.

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.

Image: Signal State Image: Signal State File View Help	
StartUp ISO 14443A ISO 14443B ISO 15693 NFCIP Advanced Debug MIFARE UL Antenna	1
Adjust Antenna Permanent Adjust Antenna Antenna Antenna Trimming Switches	
Automatic Antenna Trimming tri_3 C tri_2 C tri_1 tri_0 Antenna trimming OK C Manual Antenna Trimming [tre_3 [tre_2 [tre_0	
Measure Antenna Permanent Measure Antenna	
Continous read request [90][00] > 08000304200000 [C9] [75] >	
Ready	ems

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.

artUp ISO 14443A ISO 144	4438 ISO 15693 NFCIP Advanced	d Debug MIFARE UL	
Configuration	Transponder Info		
	UID		
	Memory Content	Lock Description	
REQA -> Active	Page 0	Serial Number	
	Page 1	Serial Number	
	Page 2	Internal / Lock	
	Page 3		
	Page 4 Page 5		
	Page 6		
Memory Operation	Page 7		
C READ Data from Page	Page 8		
C WRITE Data to Page	Page 9	User area	
C LOCK Page	Page 10	Г	
Page 🚽	Page 11		
	Page 12		
Data	Page 13 Page 14		
Everyte	Page 15		
Execute	1030 10		

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

2 A53910 Evaluation Suite File View Help		<u>_ ×</u>
StartUp ISO 14443A Configuration REQA -> Active Memory Operation © READ Data from Pa © WRITE Data to Pag © LOCK Page	Transponder Info UID 9493525A0051C60 Mifare UL transponder Memory Content Lock Description Page 0 Page 1 Serial Number Page 2 I Internal / Lock Page 3 I OTP Page 4 I Page 5 I Page 6 I Page 6 I Page 6 I Page 7 I Page 8 I	
Execute 08000304A00000 Configutation Demo Board fo > 09000304A1070000 ISO14443A Anticollision Seq [4400](880483525D)(04)(3A	Page 15	

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.

88 AS3910 Evaluation Suite File View Help			
StartUp ISO 14443A ISO 14443B ISO 15693	NFCIP Advanced	Debug MIFARE UL	
,Transponder Info			
Configuration			
UII	0483523A0B1C80	Mifare UL transponder	
	Memory Content	Lock Description	
REQA -> Active Page	0 0483525D	Serial Number	
Page		Serial Number	
Page		T Internal / Lock	
Page		9TO 고	
Page Page		<u> </u>	
Page			
Memory Operation Page			
	8 12345678		
C WRITE Data to Page Page	9 0000000	User area	
	10 00000000		
Page Au w	11 00000000	<u> </u>	
Page	12 0000000		
	13 0000000	Г	
	14 00000000 15 12345678		
Execute Page	10/12345070		
[0000000000000000000000000000000000]>			
0A0003041830080000 Request mode			
[1234567800000000000000000000000]> 0A00030418300C0000			
Request mode [0000000000000000000000012345678]>			_
[[0000000000000000000000000000000000000			•
			<i>B</i> austriamicrosystems
			COM 5 A53910 //

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).

View Help						
StartUp ISO 14443A ISO	0 14443B ISO 15693	NFCIP Advanc	ed Debug	MIFARE UL		
	Transponder Info					
Configuration	UID	0483523A0B1C80) Mi	are UL transponder		
		Memory Content	: Lock	Description		
REQA -> Active	Page C			Serial Number		
	Page 1			Serial Number		
	Page 2	AD487000		Internal / Lock		
	Page 3	11223347		OTP		
	Page 4	00000000	M			
	Page 5	00000000	M			
Memory Operation	Page 6	0000000	M			
	Page 7					
READ Data from Page	Page 8					
WRITE Data to Page	Page 9			User area		
C LOCK Page		0 0000000				
Page 10 V		1 00000000				
		2 0000000	— ¦			
Data 12345678		3 0000000				
		4 00000000	— -			
Execute	Page I	5 00000000				
0A00030418300C0000						
tequest mode						-
00000000000000000000000000000000000000	000000]>					
Mifare UL Request mode						
A0]> Writing successful						
					aP.	austria <mark>micro</mark> systei

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.

避 AS3910 Evaluation Suite File View Help		
File View Help StartUp ISO 14443A ISO 14443B	ISO 15693 NFCIP Advanced Debug MIFARE UL onder Info UID 0483523A081C80 Mifare UL transponder Memory Content Lock Description Page 0 0483525D Serial Number Page 1 3A081C80 Serial Number Page 2 AD487000 I Internal / Lock Page 3 11223347 OTP	
Memory Operation C READ Data from Page C WRITE Data to Page C LOCK Page Page Data 12345678 Execute	Page 4 00000000 Image Page 5 00000000 Image Page 6 00000000 Image Page 7 Image Image Page 7 Carefully! After execution is page locked ar Page 7 Image Image Page 7 Image Image	and becomes read-only
[0000000000000000000000000000000000000		austriamicrosystems

6.8 Debug tab

The *Debug* tab allows running implemented commands separately. It is also possible to prepare a file with sequence commands and then execute them

Imple	mented commands in uC firmware
01	Setting Reader to corresponding Demo Board
03	RF field reset
10	Writing of a single Byte (e.g. 100190 – write to register address 0x01 data 0x90)
11	Writing of Register Data with auto-incrementing Address (e.g. 110040D006 – write data 0x40 to register address 00, D0 to register address 0x01 and 0x06 to register address 0x02)
12	Reading of a single Register Byte (e.g. 1201 – read data from register ad- dress 0x01)
13	Reading Register Data with auto-incrementing Address (exp. 130300 – read 3 consecutive registers started with register address 0x00, this mean read data from register address 0x00, read from register address 01 and read data from register address 0x02)
15	Direct Commands (e.g. 1502 – 0x02 is code from the list of direct command clear FIFO, see "Device Specification, section 5.2 Direct Commands")
16	FIFO load (e.g. 161020304050 – load data 1020304050 in the FIFO, pre- pare data for transmission)
17	FIFO read (e.g. 1710 – read 10 bytes data from the FIFO, only available by receiving)
18	Request with CRC (e.g. 189370 – transmit command and data with CRC)
1A	Request without CRC (e.g. 1A9320 – transmit command and data without CRC)
20	Antenna Measure (send direct command 13 Measure RF and 19 Check Antenna Resonance)
A0	Configuration ISO14443A protocol
A106	REQA -> Active – REQA and Anti-collision sequence for ISO14443A
A107	WUPA -> Active – WUPA and Anti-collision sequence for ISO14443A
B0	Configuration ISO14443B protocol
C0	Configuration NFCIP-1 protocol
C1	NFC Transmit with CRC (e.g. C1081020304050 – send direct command 0x08 with data 1020304050 and with added CRC). See Device Specification, section 5.2 Direct Commands.

6.9 Firmware Upgrade

For upgrade with new or different firmware, chose Firmware Upgrade from Help menu. The figure below depicts the GUI window after is chosen Firmware Upgrade

AS3910 Evaluation Suite	×
StartUp ISO 14443A ISO 14443B ISO 15693 NFCIP Advanced Debug MIFARE UL	
Open Firmware Upgrade File ? × Demo Board Check Look in: 🗁 AS3910 	
Adjust Regulators Image: Assgn = 0, fw_1, 1, 0, 5, bin Adjust Regulators Image: Assgn = 0, fw_1, 1, 1, 0, 5, bin Adjust Regulators Image: Assgn = 0, fw_1, 1, 1, 0, 5, bin My Documents Image: Assgn = 0, fw_1, 1, 1, 0, 5, bin My Documents Image: Assgn = 0, fw_1, 1, 1, 0, 5, bin My Documents Image: Assgn = 0, fw_1, 1, 1, 0, 5, bin My Documents Image: Assgn = 0, fw_1, 1, 1, 0, 5, bin My Network File name: AS3910, fw_1, 1, 1, 0, 5, bin My Network File name: AS3910, fw_1, 1, 1, 0, 5, bin File soft type: Filmware Upgrade Files (", bin) Image: Cancel	
Direct command [E0] > 0900030415180000 Direct command	<u> </u>
[60]	
	austriamicro systems
	COM 5 AS3910 //

The figure below depicts the GUI window after is update finished and successful.

Big AS3910 Evaluation Suite File View Help	
StartUp ISO 144438 ISO 15693 NFCIP Advanced Debug MIFARE UL Demo Board Check Pero Board Information Firmware Version V1.1.0.5 Demo Board Version PIC-v3-091217 Antenna trimming Available Antenna Driver Additable Antenna Driver MHz Antenna Driver MHz MHz MHz	
> 0900030415180000 Direct command [60] > AMSFirmwareUpdater.exe Exit Code: 0	1 1
	austriamicrosystems