

Product Document



Application Note: AS3953-AN01 – Demoboard Description

AS3953

NFC interface IC (GP Demonstrator)

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1. General Overview

This application note describes the AS3953 General Purpose Demo board and its usage. The purpose of the demonstrator will to show all the features and functionalities of the IC. The demonstration work with a reader (Phone or AS3911 GP demonstrator) and a Tag. The main features of the demonstrator are:

- Demonstration of a file transfer with different datarates
- Demonstration of passive EEPROM programming via RF Field which then will be read out later when the board is connected and powered – Demonstrating ISO14443A-4 compliance
- File and URL transfer (bidirectional) with an NFC phone – Demonstrating framing mode

The Evaluation Kit allows you to supply all components by the PC USB Port. No external supply or battery is needed. Except the USB cable (included), no wiring is needed which allows a fast and comfortable evaluation of the AS3953.

1.1. Kit Content

The AS3953 Evaluation Kit includes following items:

- AS3953 Evaluation Board
- Controller Board with USB interface
- USB Cable
- USB Data Stick

Figure 1:

Package Content



1.2.Compatibility

This demo works with

- AS3953 GP GUI version 1.2.4 or higher and FW 1.3.1 or higher
- AS3911 GP GUI version 1.5.12 or higher and FW version 1.5.12 or higher
- Google Galaxy Nexus Phone (Android version 4.0 or higher)

2. Hardware Description

2.1. Evaluation Board Description

The AS3953 demokit is comprised of 2 boards. The Analog tag board which mainly consists of the AS3953 and a cap (C13) to tune the ID1 sized standard antenna. This tag (unpowered) works like a standard ISO 14443-4 tag

The BU1 and BU2 are provided to measure the harvested power.

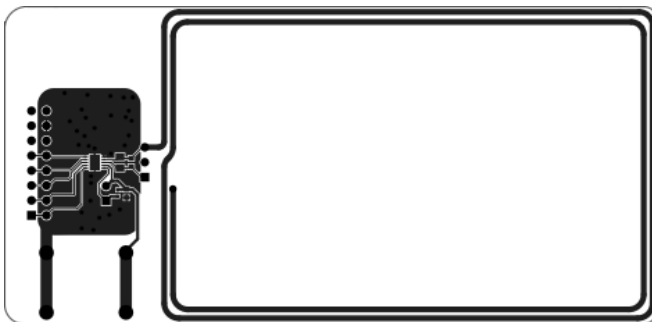
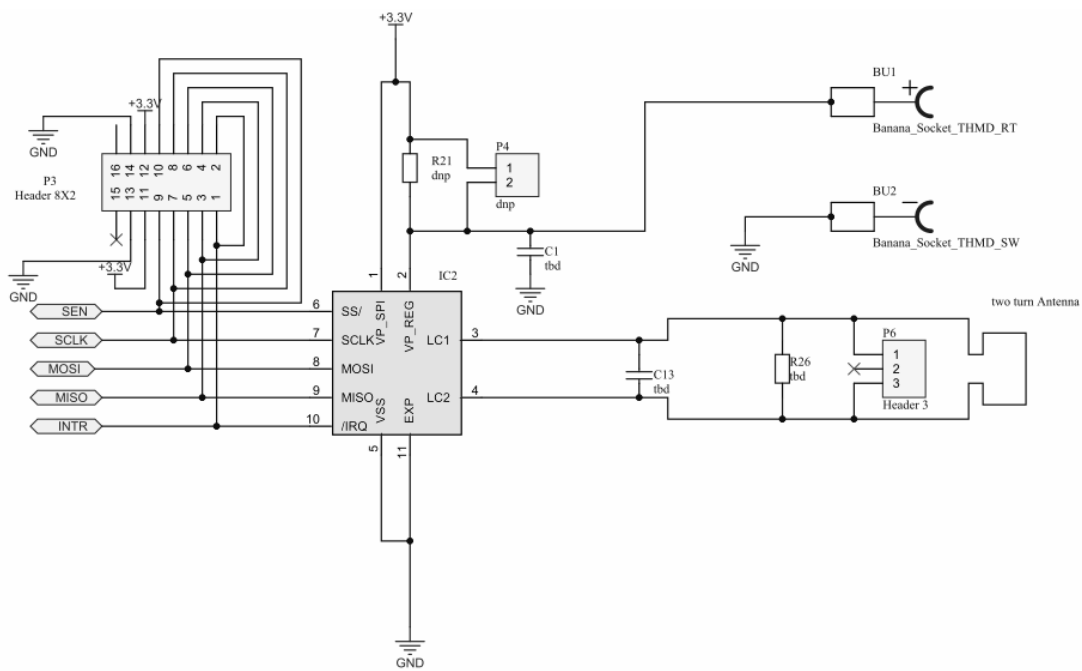
The connector P3 is all the 7 connections required to the microcontroller:

- Vss + VP_Spi – 2 wires
- SPI – 4 wires
- /IRQ

The controller board mainly consists of the USB connector and PIC27FJ64GB002 and a 8MHz crystal. The board is powered by USB. The above mentioned construct allows:

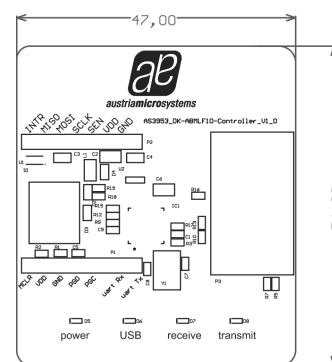
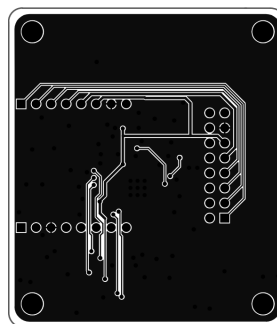
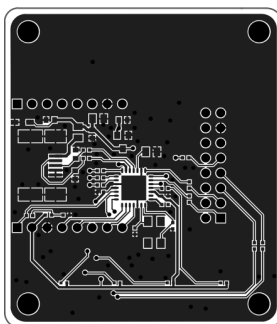
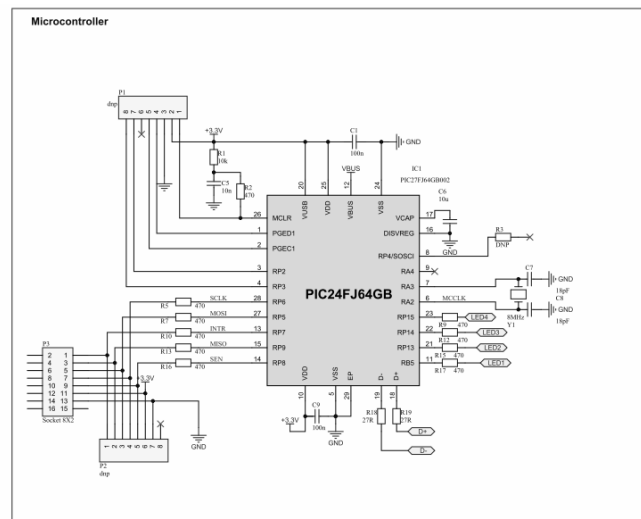
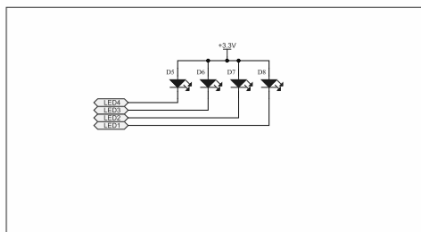
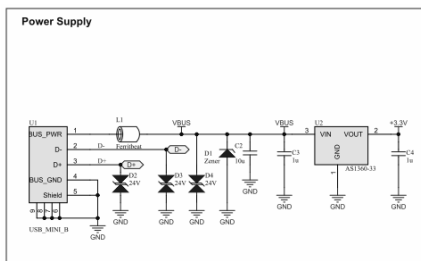
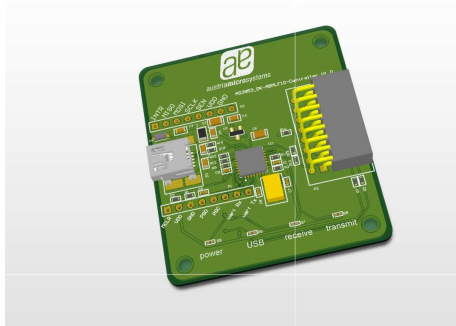
- Optional possibility to add another antenna PCB on top
- a provision to disconnect the on-board micro and connect another micro for the development purpose

2.1.1. Analog Tag Board Schematic & Layout





2.1.2. Controller Board Schematic & Layout



2.2.BOM

2.2.1. Analog Tag board

Designator	Footprint	LibRef	Quantity
BU1	SOCKET_THMD_BANANA_D2_RT	Banana_Socket_THMD_RT	1
BU2	SOCKET_THMD_BANANA_D2_SW	Banana_Socket_THMD_SW	1
C1, C13	C0603	C_0603	2
IC2	MLPD_10ld 3x3_0.5_WEEED-5	AS3953	1
P3	PLUG_THMD_HEADER16 - Samtec	Header 8X2	1
P4	HDR1X2	Header 2	1
P6	HDR1X3	Header 3	1
R21	R0402	R_0603	1
R26	R0805	R_0805	1

2.2.2. Controller board

Comment	Designator	Footprint	Quantity
100n	C1, C9	C0402	2
10u	C2, C6	C0805-ss	2
1u	C3, C4	C0603	2
10n	C5	C0402	1
18pF	C7, C8	C0402	2
Zener	D1	SOD323F (SC-90)	1
24V	D2, D3, D4	D0603_SUPRESSOR	3
LED_LUMEX	D5, D6, D7, D8	LED_Lumex_0402	4
PIC27FJ64GB002	IC1	QFN28_6x6	1
Ferritbeat	L1	L0805	1
dnp	P1, P2	HDR1X8	2
Socket 8X2	P3	PLUG_THMD_HEADER16	1
10k	R1	R0402	1
470	R2, R5, R7, R9, R10, R12, R13, R15, R16, R17	R0402	10
DNP	R3	R0402	1
27R	R18, R19	R0402	2
USB_MINI_B	U1	SOCKET_SMD_USB_MINI_B_MOLEX	1
AS1360-33	U2	SOT23	1
8MHz	Y1	CRYSTAL_SMD_GEYER_KX-9A	1

3. Software Description

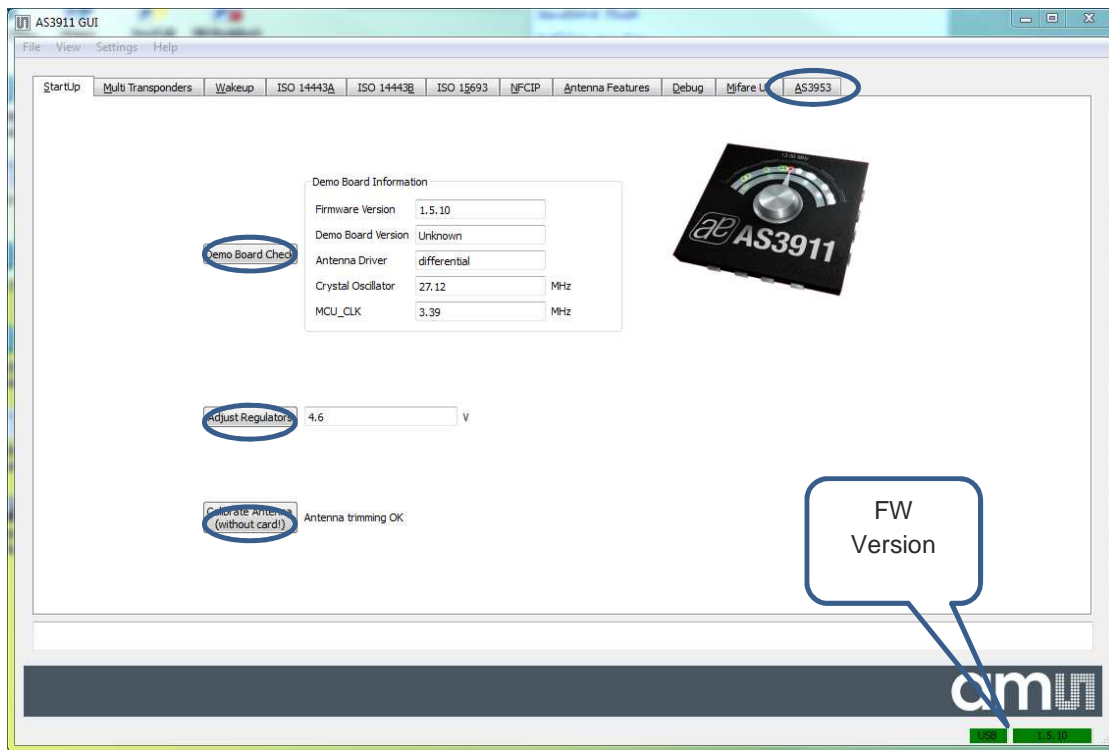
AS3953 demokit behaves like a 14443A-4 Tag. It can be used with AS3911 GP board (Reader) or a standard NFC phone. We have defined Google Galaxy Nexus as our reference mobile phone (Android version 4.0 or higher)

The SW can be downloaded from the following destinations:

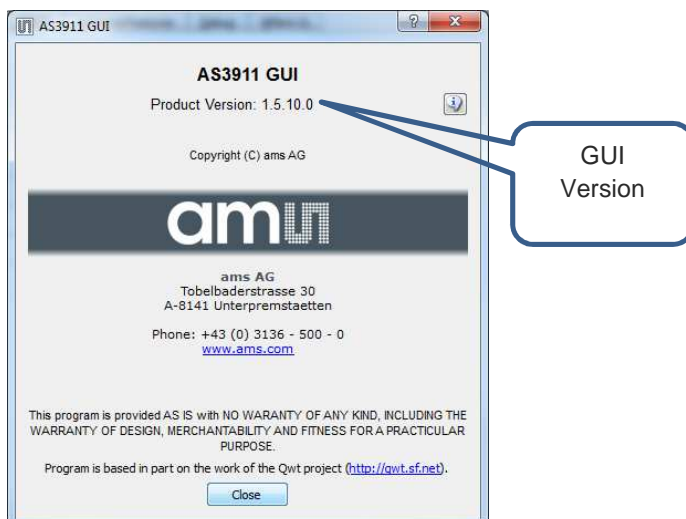
	Software download to:	FTP side	User	password
AS3911G P_GUI	General Purpose Demo GUI	http://www.space4ams.at/user/AS3911GP_GUI/default.php	GPgui	hgewdt3
AS3953 GUI	General purpose	http://www.space4ams.at/user/AS3953_GUI/default.php	as3953_gui	rtvzi3

3.1.Demonstration with AS3953 & AS3911

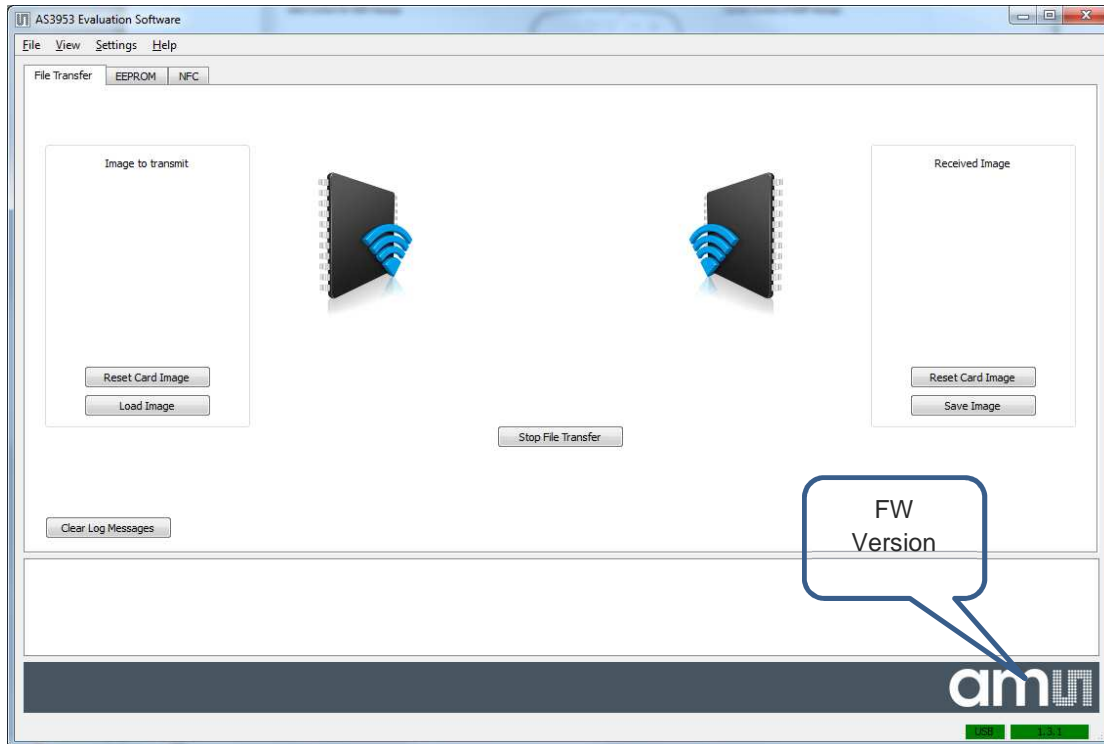
- Connect AS3911 GP demo and AS3953 GP demo with the USB to the computer and start the respective GUIs
- AS3911 FW version must be 1.5.10 or higher
- Click on “Demo Board Check”, “Adjust Regulator” and “Calibrate Antenna” to configure the board.
- Then press Ctrl+Alt+A to bring up the AS3953 Tab



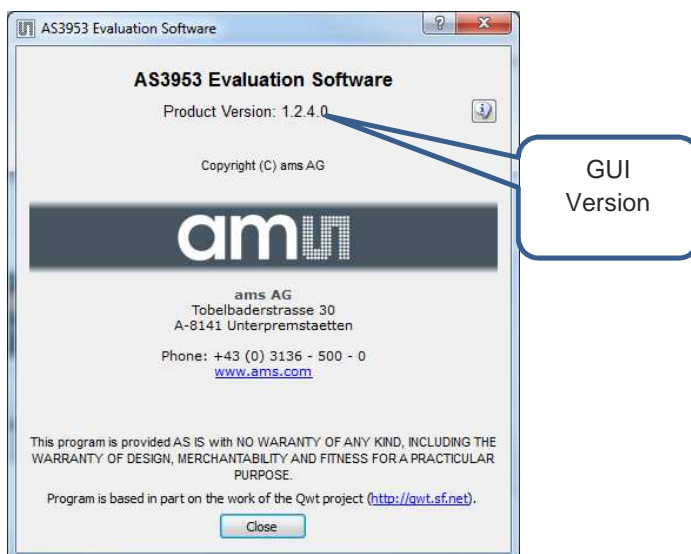
- AS3911 GUI version must be 1.5.10 or higher



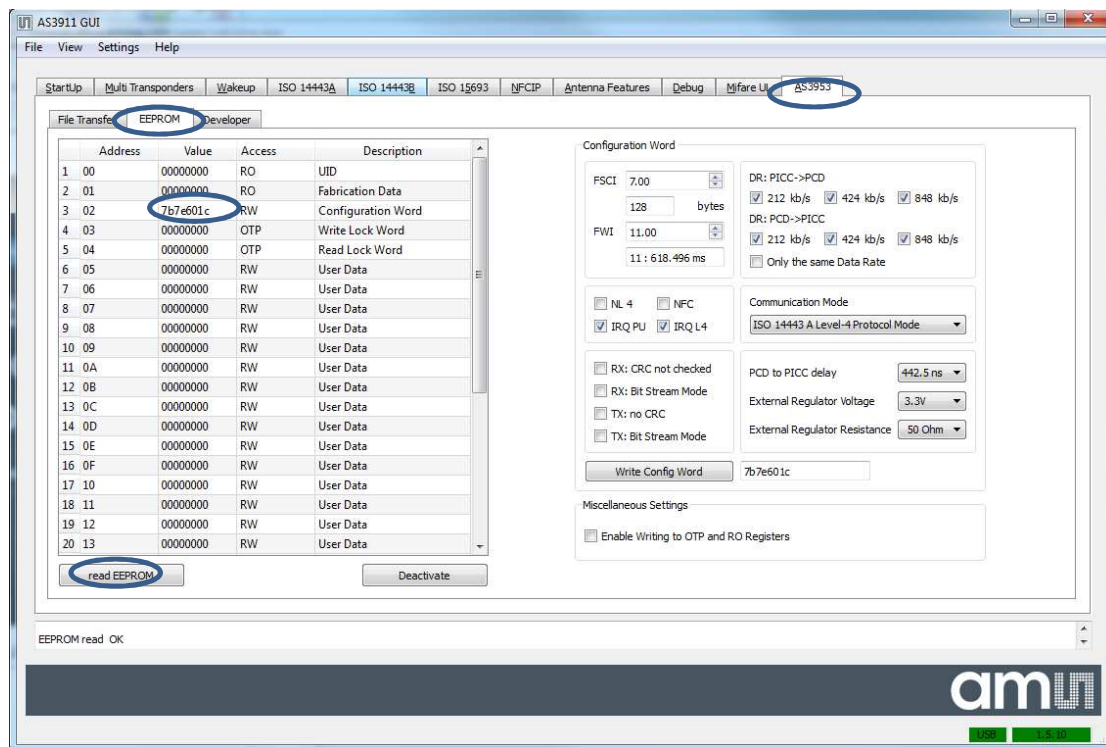
- AS3953 FW version must be 1.3.1 or higher



- AS3953 GUI version must be 1.2.4 or higher



- To transmit from AS3911 (Reader) to AS3953(NFiC):
On AS3911 GUI select “load image”, select “speed settings” and click on “Write to Card” to execute the file transfer. NOTE: do not forget to keep the AS3953 antenna on AS3911 antenna.
- To transmit from AS3953(NFiC) to AS3911 (Reader):
On AS3953 GUI select “load Image”. On AS3911 GUI, select “speed settings” and click on “Read from Card” to execute the file transfer. NOTE: do not forget to keep the AS3953 antenna on AS3911 antenna.
- EEPROM Read/write (from RF Field):
This can be done passively. Disconnect the analog tag board from the controller board so that it is not powered. Place it on the top of the AS3911. Use the GUI sub-tab in the AS3953 tab of AS3911 GUI. Click on “Read EEPROM” and see the config bit changing. The EEPROM can be written by just changing the values here. NOTE: be aware of the effects whilst writing address 3 and 4.

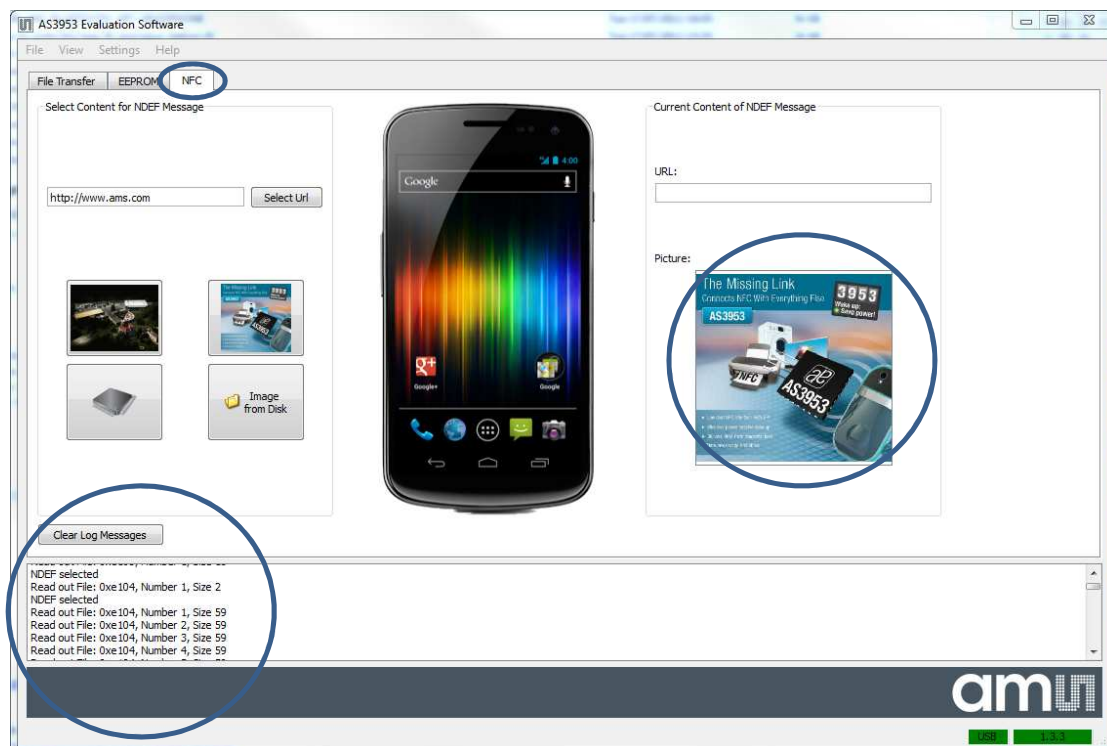


- EEPROM Read/write (from MCU):
Now connect this Analog tab board to the controller board and connect it to GUI via USB. The EEPROM tab in the AS3953 GUI can be used to read/write out the EEPROM content when this AS3953 is not in the field.

3.2.Demonstration with AS3953 & NFC phone (Android 4.0 onwards)

The NFC FW in the PIC MCU has been written such that this sends and receives the NDF messages. Hence no special app is required to send a message to a standard NFC phone. Nevertheless, we have developed an app to send info from phone to the AS3953 GP demo.

- Move to NFC tab in the AS3953 GUI and install the provided android app on the NFC phone.
- File/URL Transfer from GUI to Phone:
Select an image or URL which needs to be transferred to phone. Selected option should show up in the right side of the GUI. Now just unlock the phone and place it on the AS3953 GP demo antenna. Note: The filesize is limited to 64Kbit (limited by NDEF message framework)



- File/URL Transfer from GUI to Phone:
open the amsNFC app and click on “transfer image” or “transfer Url”. Select an image or url respectively and place the phone on the AS3953 GP demo antenna. The file transfer starts automatically.



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