UM11207

NTAG 5 NFC Cockpit application

Rev. 1.0 — 13 August 2020
622710

User manual
COMPANY PUBLIC

Document information

Information	Content
Keywords	NTAG 5 switch, NTAG 5 link, NTAG 5 boost, NFC, reference application
Abstract	Description of NTAG 5 NFC Cockpit application allowing to configure NTAG 5 through NFC interface.

Revision history

Rev	Date	Description
v.1.0	20200813	Initial version

1   Abbreviations

Table 1. Abbreviations

Acronym	Description
ALM	Active Load Modulation
EH	Energy Harvesting
ED	Event Detection
GUI	Graphical User Interface
I²C	Inter-Integrated Circuit
LED	Light Emitting Diode
NFC	Near Field Communication
RGB	Red Green Blue
SLDA	Software License and Distribution Agreement
USB	Universal Serial Bus
VCOM	Virtual COMmunication
µC	micro-Controller

2 Introduction

This document describes NTAG 5 NFC Cockpit application allowing to configure NTAG 5 through NFC interface.

The NTAG 5 NFC Cockpit application is a GUI application running on Windows platform, connected to NFC reader board over USB.

Currently supported NFC reader boards are PNEV7462C, PNEV5180B and CLEV6630B running specific NFC Cockpit firmware.

Detailed description of the NTAG 5 NFC Cockpit application can be found in chapter NTAG 5 NFC Cockpit GUI.

In case of issue running the application, one can find debugging information in related Troubleshooting chapter.

3 Setup

3.1 Hardware setup

NTAG 5 NFC Cockpit application requires one of the following NFC reader boards connected over USB.

3.1.1 CLEV6630B

CLEV6630B board is CLRC663 *plus* NFC frontend demo board. To be used with NTAG 5 NFC Cockpit tool, the CLEV6630B board must run NFC Cockpit firmware, this gives access to CLRC663 *plus* functionality via virtual COM port (through USB). More details are given in the board CLEV6630B quick start guide.
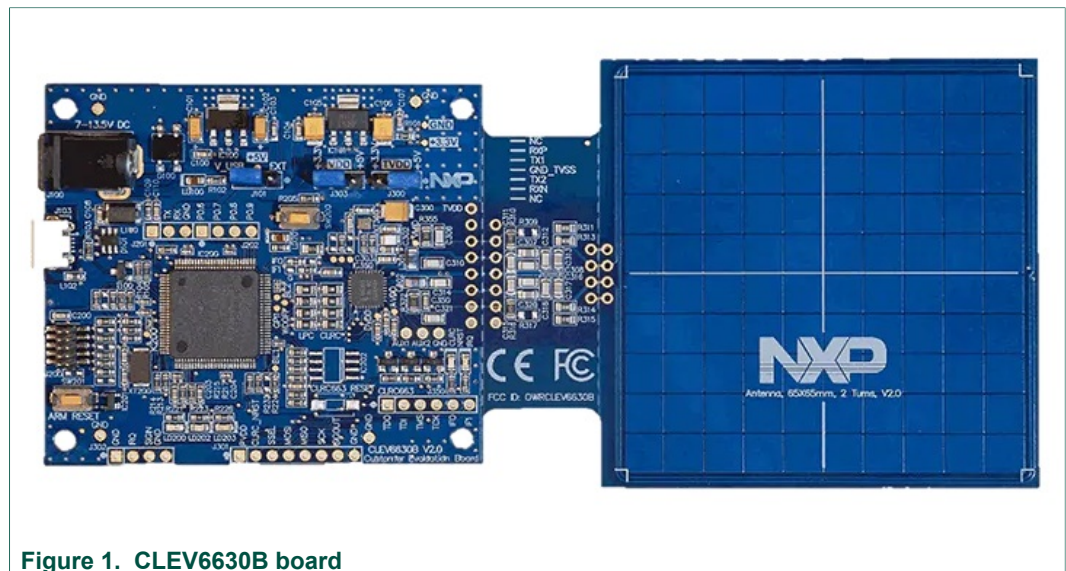

Figure 1. CLEV6630B board

3.1.2 PNEV5180B

PNEV5180B board is PN5180 NFC frontend demo board. To be used with NTAG 5 NFC Cockpit tool, the PNEV5180B board must run NFC Cockpit firmware, this gives access to PN5180 functionality via virtual COM port (through USB). More details are given in the board PNEV5180B quick start guide.
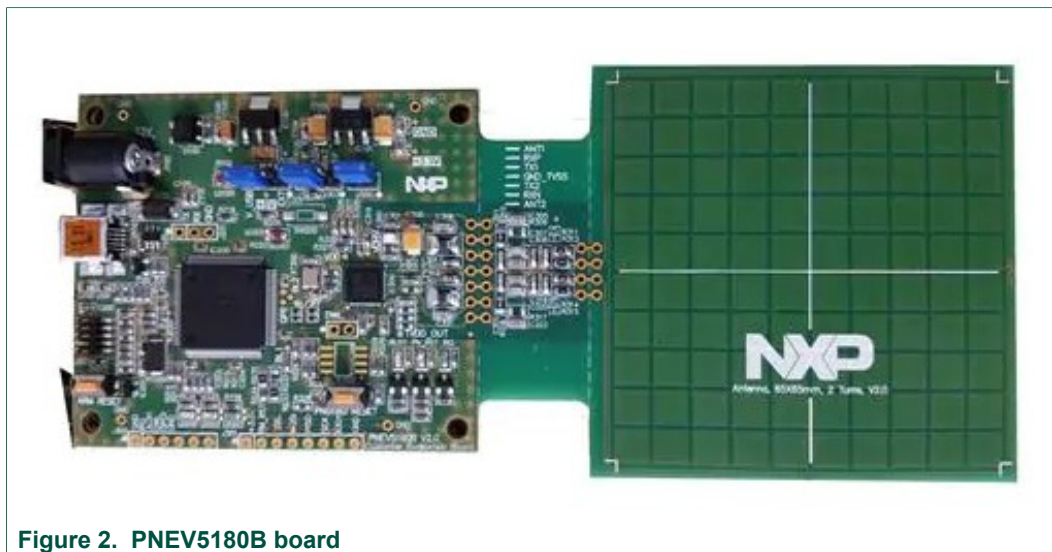
Figure 2. PNEV5180B board

3.1.3 PNEV7462C

PNEV7462C board is PN7462 NFC controller demo board. To be used with NTAG 5 NFC Cockpit tool, the PNEV7462C board must run NFC Cockpit firmware, this gives access to PN7462 functionality via virtual COM port (through USB). More details are given in the board PNEV7462C quick start guide.
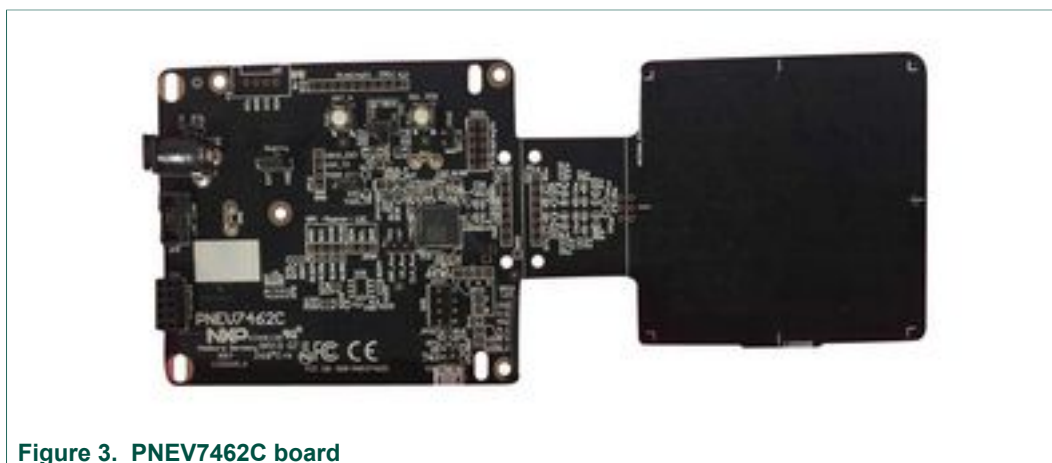

Figure 3. PNEV7462C board

3.2 Software setup

Installation of the tool is done running NTAG 5 Cockpit installer which can be downloaded from NTAG 5 development kit webpage (OM2NTx5332). NTAG 5 Cockpit installer includes both NTAG 5 NFC Cockpit application and NTAG 5 I^{2}C Cockpit application (see UM11406 for more details).

The installer creates an NTAG5_Cockpit folder (by default under "*C:\nxp*" directory) containing:

- NTAG 5 NFC Cockpit application executable
- a link to the present document on NXP website
- NXP Infrastructure SLDA licensing terms
- related Software Content Register detailing components license details

- NTAG 5 I^{2}C Cockpit application executable
- USB-I2C_bridge firmware binary for NXP LPC11U37H MCU
- an executable allowing to uninstall the current package

The installer also allows creating related folder containing shortcuts in Windows Start Menu, as well as NTAG 5 Cockpit application shortcuts on Windows Desktop.

Running the NTAG 5 NFC Cockpit application executable, considering reference setup depicted in chapter Hardware setup is connected to the computer, shall trigger the following window to open:

Figure 4. NTAG 5 NFC Cockpit aspect

If not, please refer to the troubleshooting chapter Troubleshooting.

NTAG 5 NFC Cockpit is continuously scanning for NFC detection of NTAG 5, the presence of the NTAG 5 is then displayed in the related field.
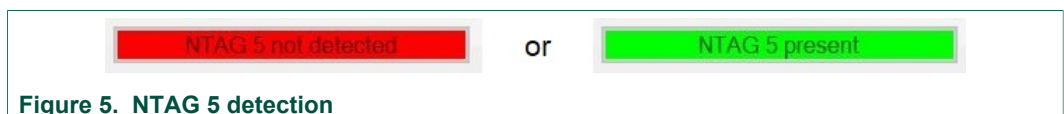

Figure 5. NTAG 5 detection

Obviously, no operation can be done until NTAG 5 has been detected.

4 NTAG 5 NFC Cockpit GUI

The purpose of the current chapter is to describe the NTAG 5 NFC Cockpit tool in details.

4.1 Registers selection

The "Register selection" item allows defining which register bank applies to the "Tabs" items.

Indeed NTAG 5 registers are split between "Configuration registers" (from 1000h to 109Fh in Configuration memory) and "Session registers" (from 10A0h to 10AFh in Configuration memory).

Pay attention that "Session registers" settings apply to the current session (apply as soon as set) while "Configuration registers" settings only apply to the next session (apply after Power On Reset).

Figure 6. Registers selection

4.2 Tabs

"Tabs" items exposes NTAG 5 registers definition allowing to set and get NTAG 5 IC configuration. Detailed registers definition is given in NTAG 5 data sheet for reference.

4.2.1 Status

"Status" tab is only valid for "Session registers" since the related registers are only defined for this memory area.
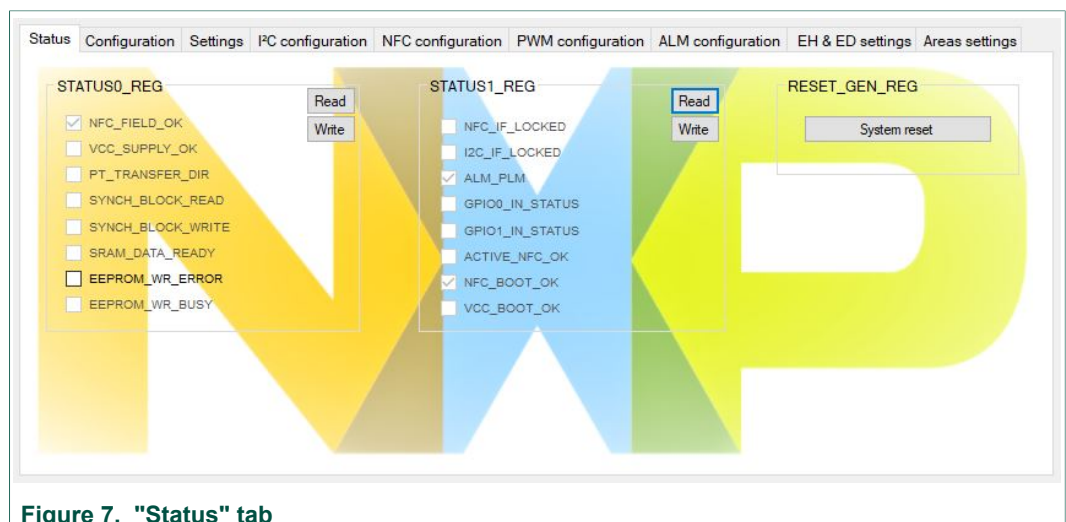

Figure 7. "Status" tab

STATUS0 and STATUS1 registers writeable bits (not grayed ones) can only be written to 0, clearing the related information.

"System reset" button performs software reset of the NTAG 5 IC, thus allowing current configuration settings being loaded to a new session. This software reset prevents NTAG 5 answering to the NFC command explaining related write configuration error in the log window.

4.2.2 Configuration

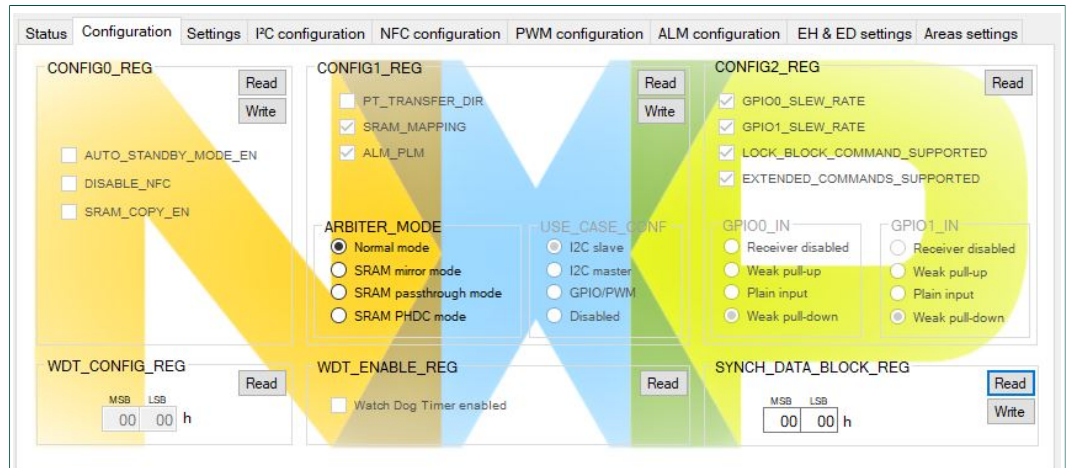"Configuration" tab has different looks according to the register selection.

Figure 8. "Configuration" tab for "Session registers" selection

"ARBITER_MODE" setting from "CONFIG1 register" can only be set if "SRAM_MAPPING" is enabled. Enabling "SRAM_MAPPING is done setting "SRAM_ENABLE" bit is set in "CONFIG1" register within "Configuration register" area.
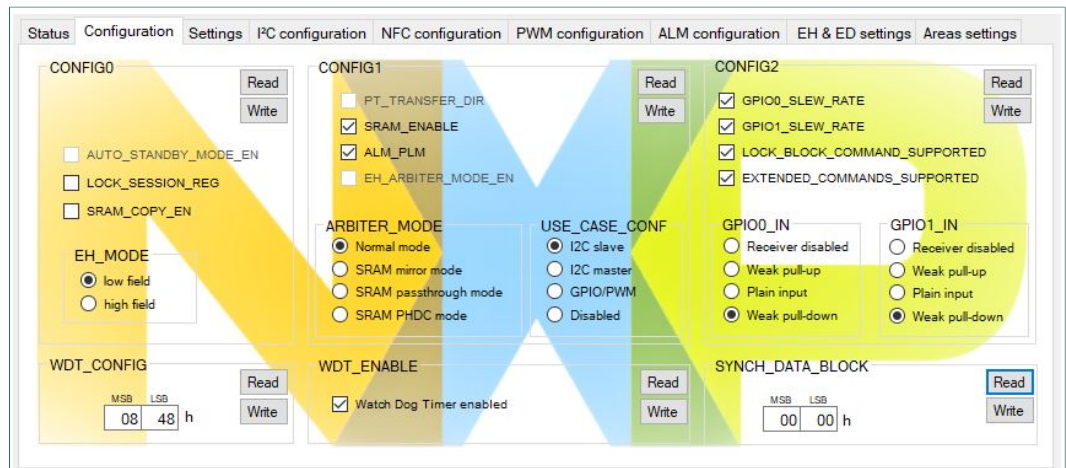
Figure 9. "Configuration" tab for "Configuration registers" selection

4.2.3 Settings

"Settings" tab is only valid for "Configuration registers" since the related registers are only defined for this memory area.

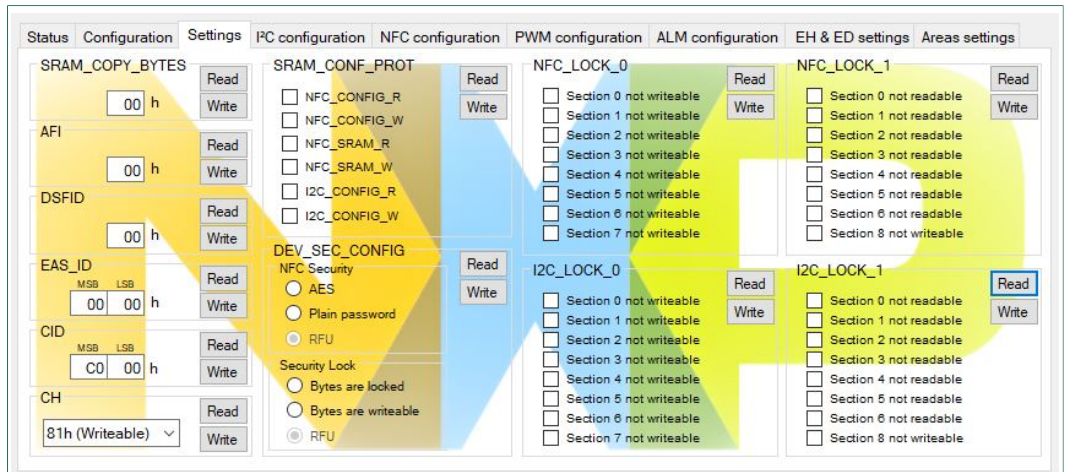**Figure 10. "Settings" tab**

4.2.4 I²C configuration

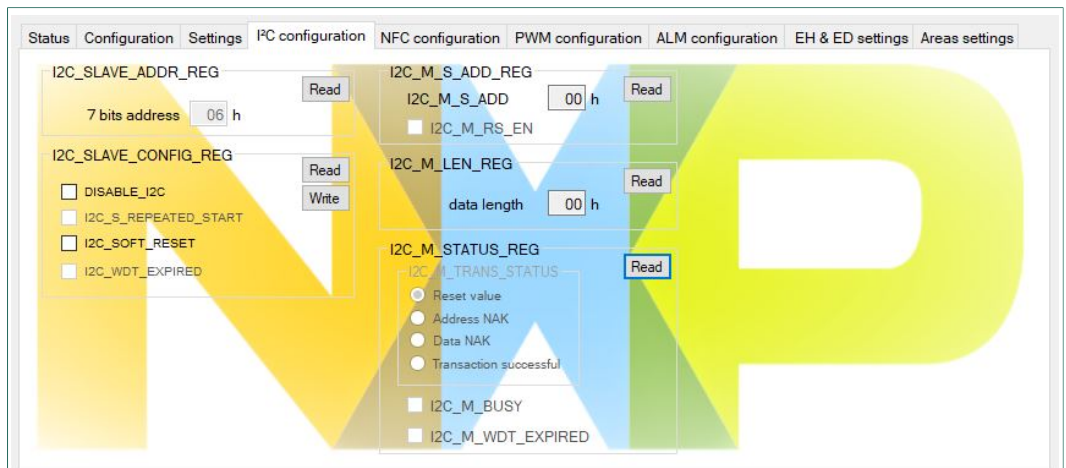"I²C configuration" tab has different looks according to the register selection.

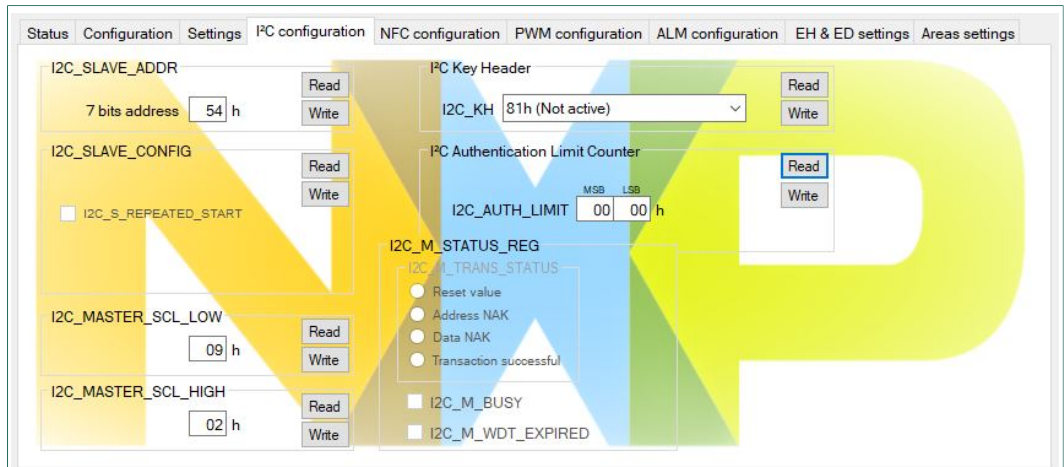**Figure 11. "I²C configuration" tab for "Session registers" selection**

Figure 12. "I²C configuration" tab for "Configuration registers" selection

4.2.5 NFC configuration

"NFC configuration" tab is only valid for "Configuration registers" since the related registers are only defined for this memory area.
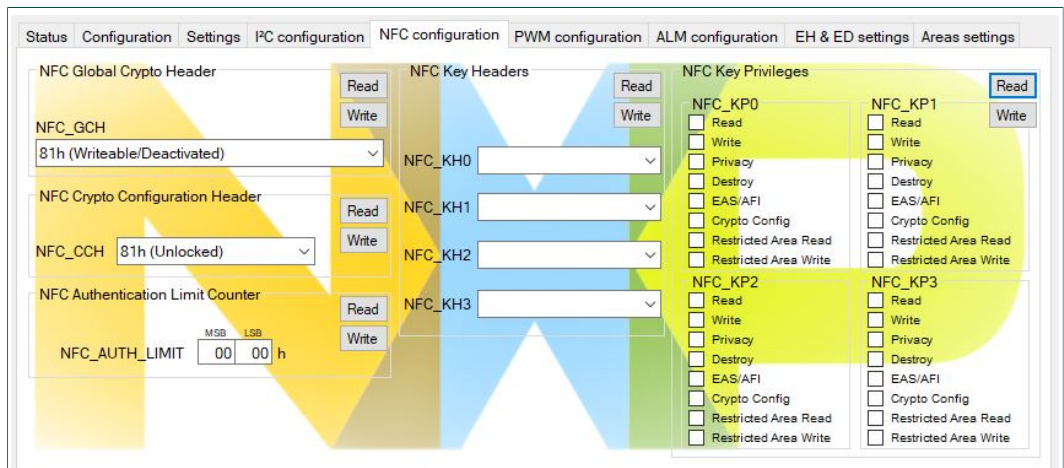

Figure 13. "NFC configuration" tab

"NFC Key Headers" and "NFC Key Privileges" settings can only set if NFC Security is enabled. "NFC Security" setting is set through "DEV_SEC_CONFIG" register (see "Settings" tab).

4.2.6 PWM configuration

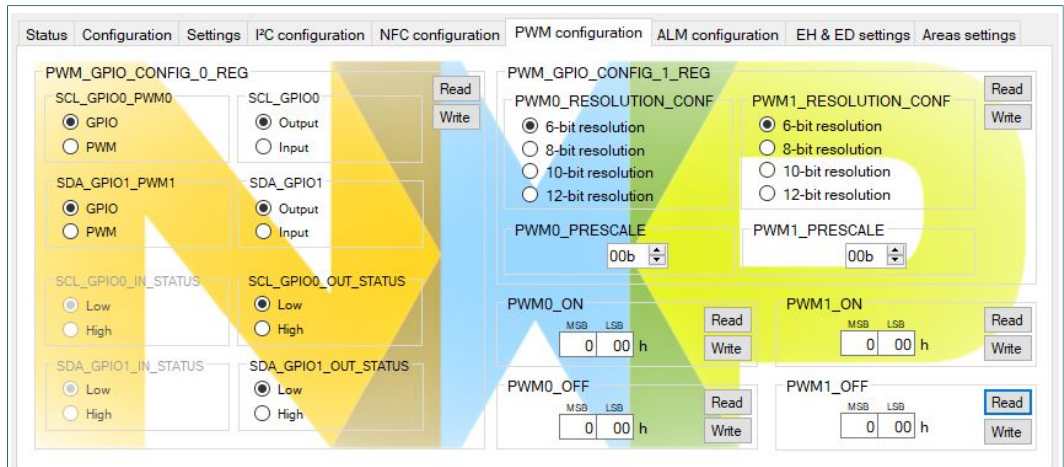"PWM configuration" tab has different looks according to the register selection.

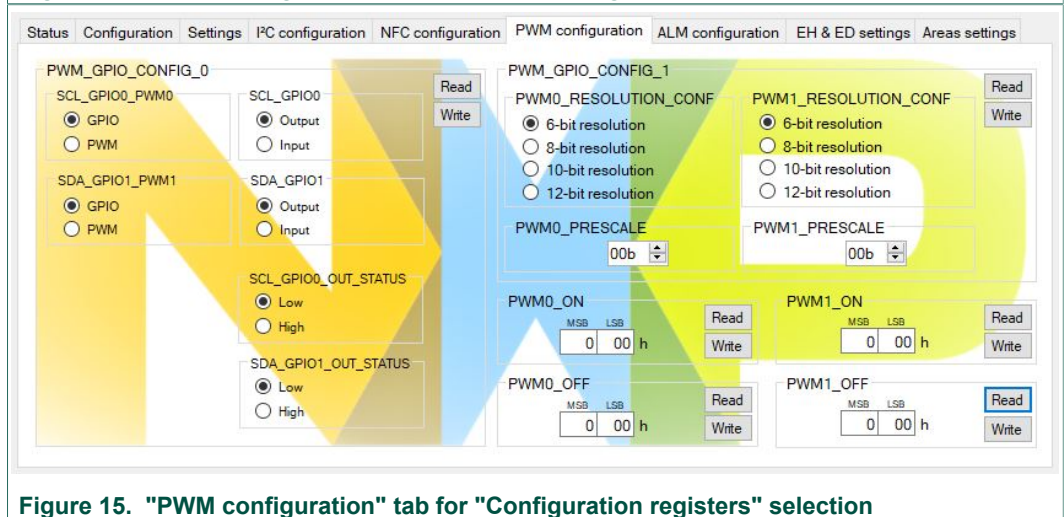**Figure 14.** "PWM configuration" tab for "Session registers" selection

Figure 15. "PWM configuration" tab for "Configuration registers" selection

4.2.7 ALM configuration

"ALM configuration" tab has different looks according to the register selection.

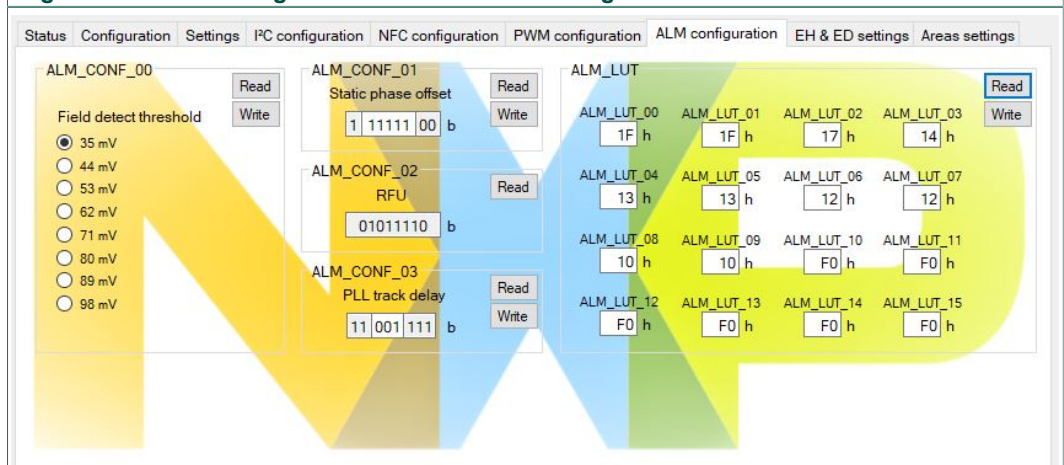**Figure 16. "ALM configuration" tab for "Session registers" selection**

Figure 17. "ALM configuration" tab for "Configuration registers" selection

4.2.8 EH & ED settings

"EH & ED settings" tab has different looks according to the register selection.
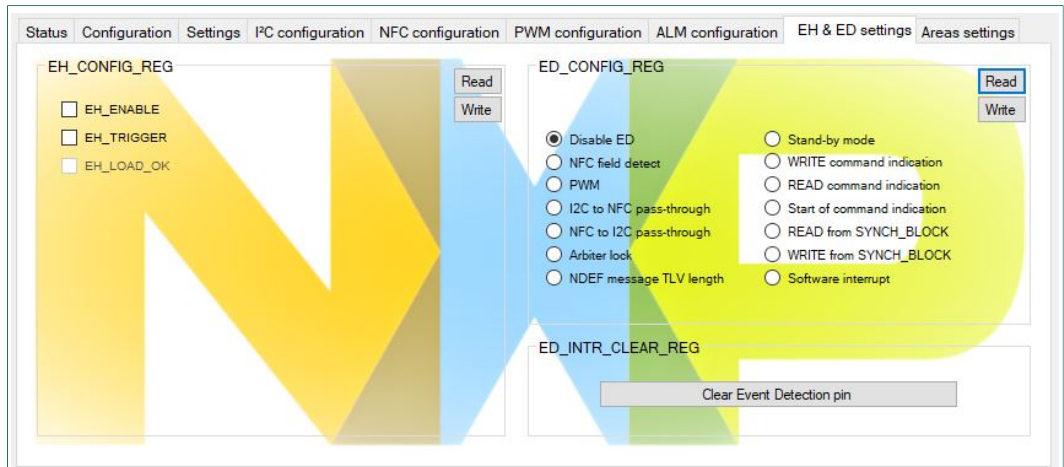
Figure 18.   "EH & ED settings" tab for "Session registers" selection

"Clear Event Detection pin" button trigger clearing the detection pin.
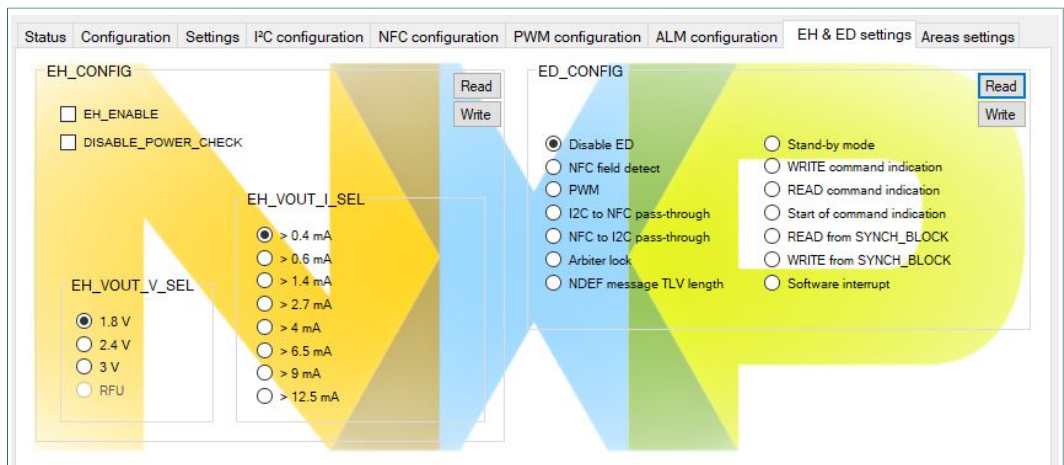

Figure 19.   "EH & ED settings" tab for "Configuration registers" selection

4.2.9 Area settings

"Area settings" tab is only valid for "Configuration registers" since the related registers are only defined for this memory area.
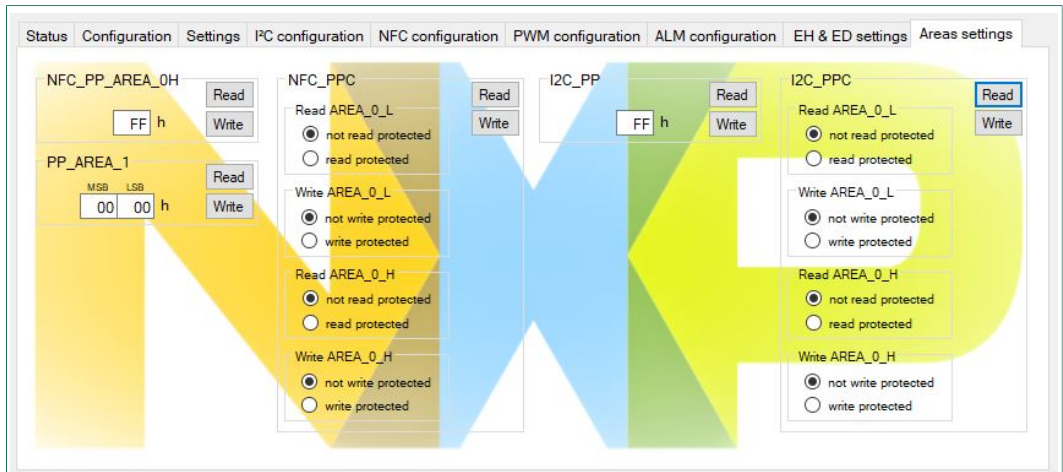
Figure 20. "Area settings" tab

4.3 Logs window

Bottom area of the NTAG 5 NFC Cockpit tool displays logs:

- In blue: operation details
- In Black: status
- In Green: NFC reader sent data (to NTAG 5)
- In Red: NFC reader received data (from NTAG 5)

Figure 21. Logs window

More detailed information about NFC interface is given in NTAG 5 data sheet.

4.4 Menu

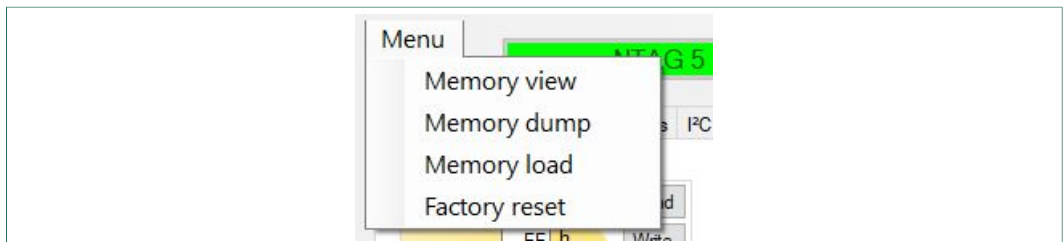Additional functionalities are accessible through "Menu" item.

Figure 22. Menu

4.4.1 Memory view

"Memory view" allows displaying and updating NTAG 5 memory. Values are refreshed while scrolling.
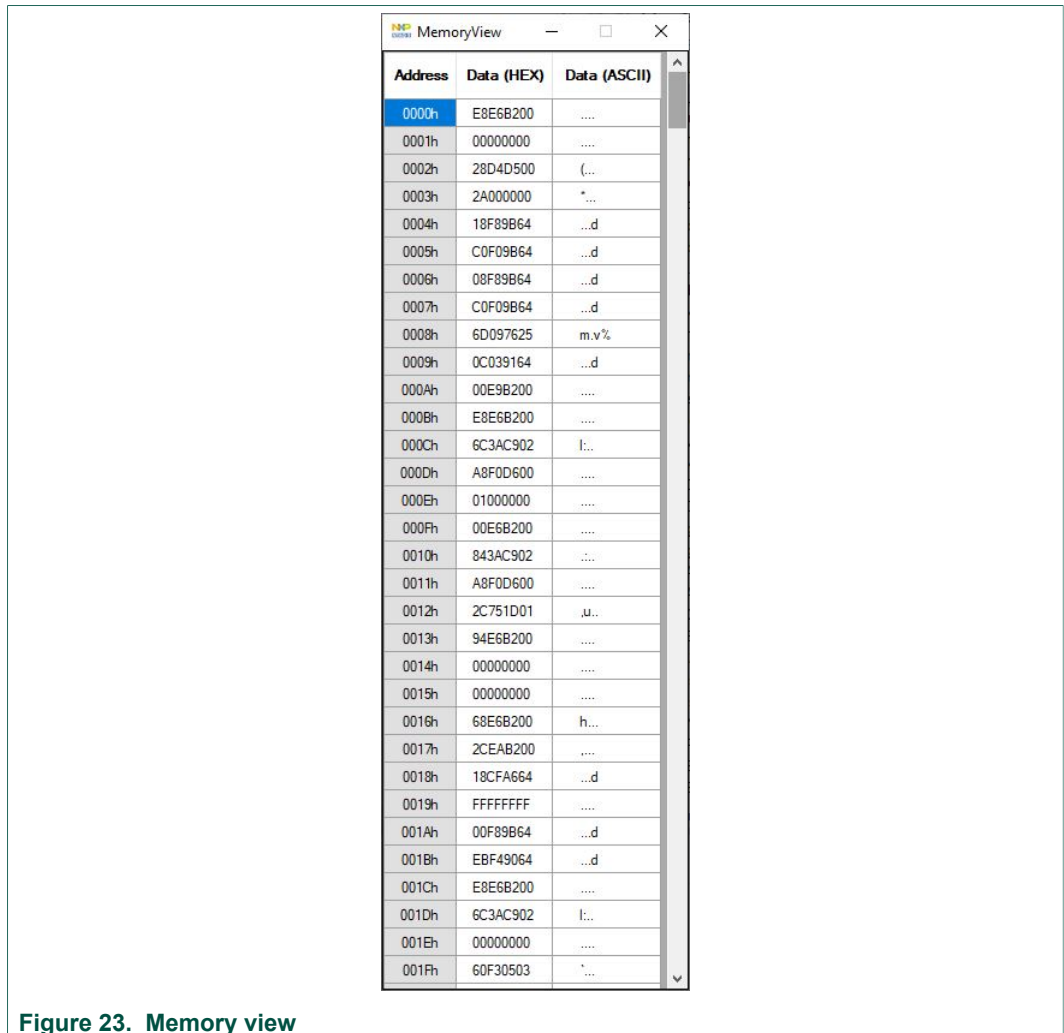

Figure 23. Memory view

4.4.2 Memory dump

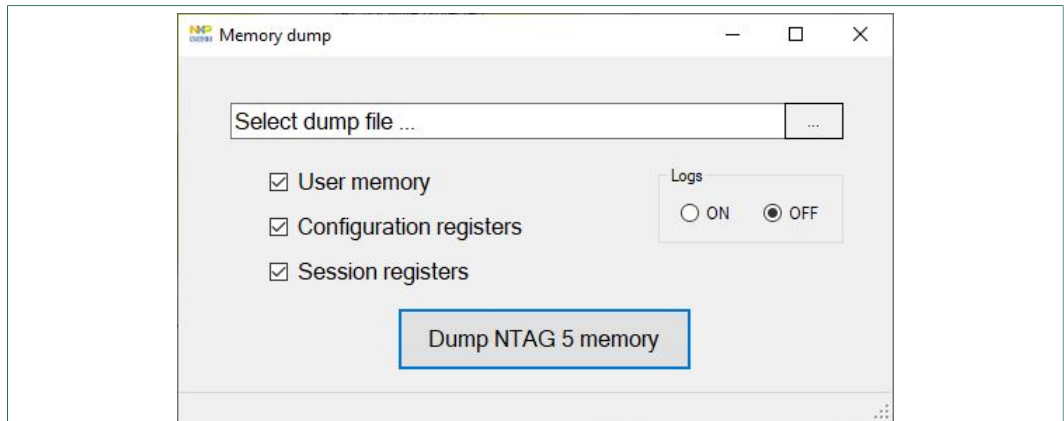"Memory dump" offers possibility to read out NTAG 5 memory and store it to a file.

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Figure 24. Memory dump

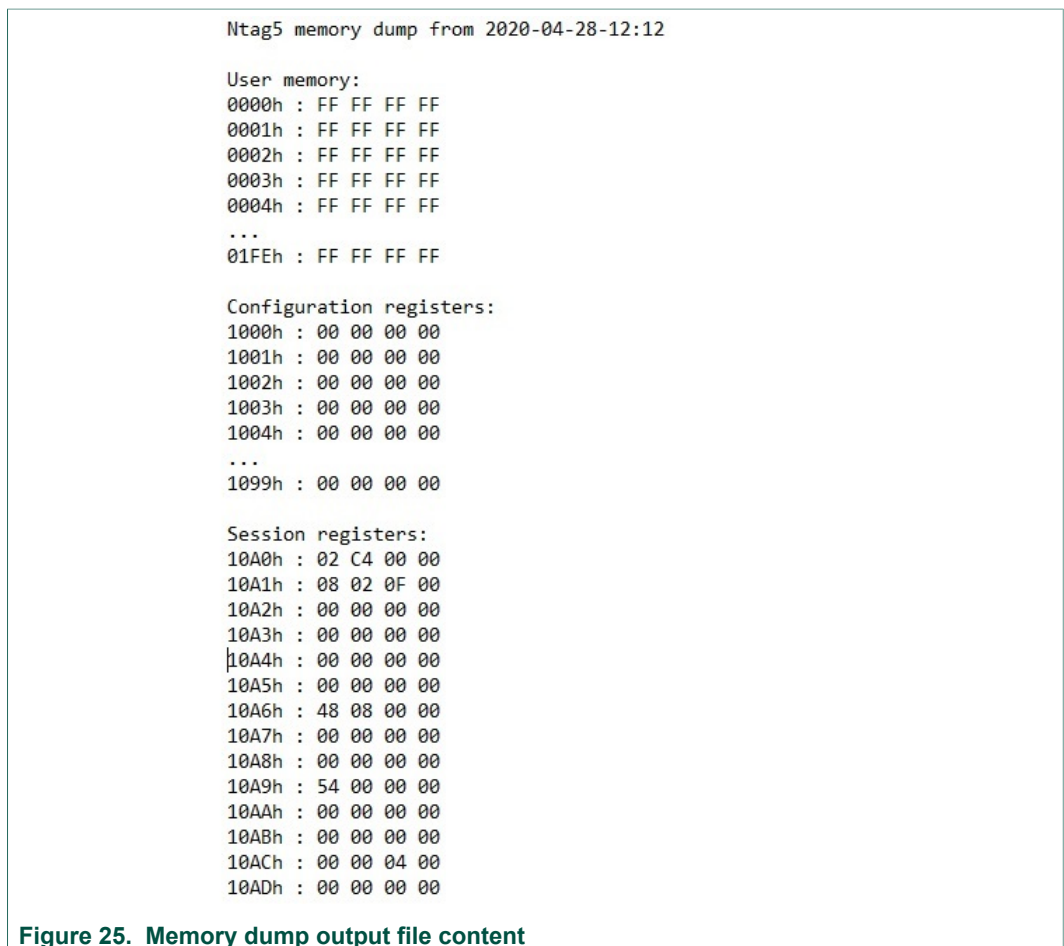Output file content looks like this:

Figure 25. Memory dump output file content

4.4.3 Memory load

"Memory load" offers possibility to load NTAG 5 memory from data contained in a file.
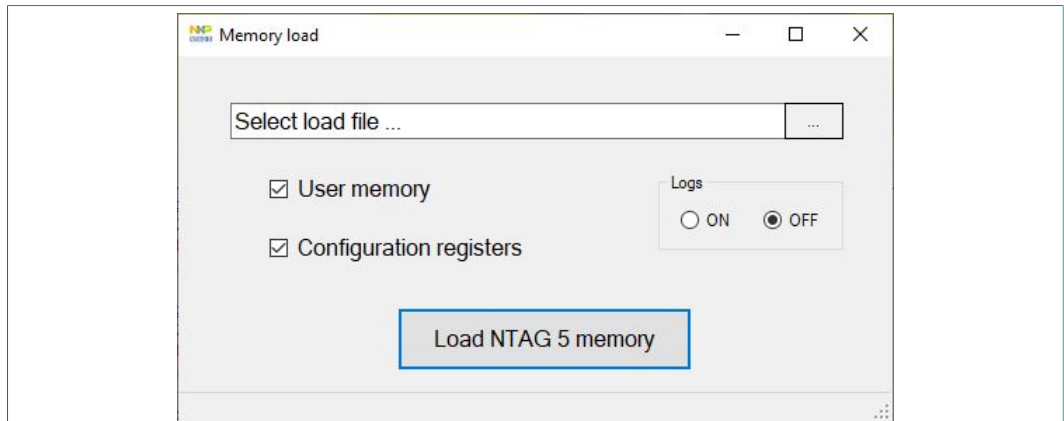
Figure 26. Memory load

The input file must be formatted following below definition for each line (one memory block of 4 bytes per line):

`VVVVh: WW XX YY ZZ` where VVVVh is the memory block base address (in hexadecimal) and WW XX YY ZZ respective values (in hexadecimal) of the memory block.

For example: `1041h: 1F 1F 17 14` triggers writing values 0x1F1F1714 at memory address 1041h (settings ALM_LUT_00, ALM_LUT_01, ALM_LUT_02 and ALM_LUT_03).

File obtained from "Memory dump" operation (see "Memory dump") can be used as input to "Memory load" operation.

It is not possible to load content to "Session registers" area (from 10A0h to 10AFh in Configuration memory) via "Memory Load" operation.

4.4.4 Factory reset

"Factory reset" allows applying default configuration to NTAG 5.

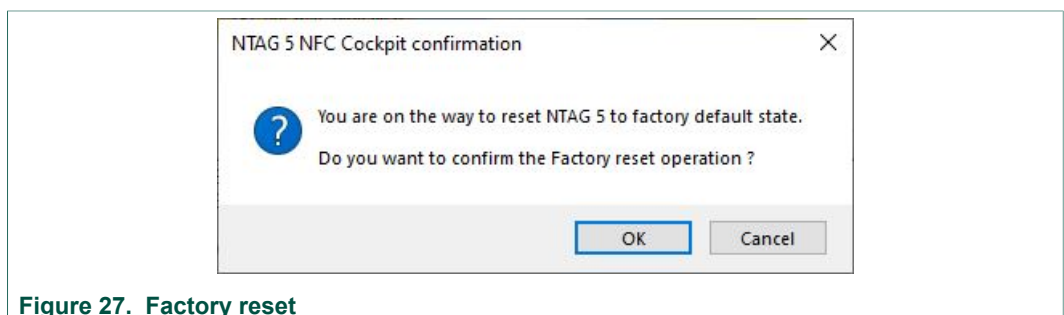The default configuration is only applied after confirmation from user.

Figure 27. Factory reset

Pay attention that this is done considering the limitation of register access rights (according to the current configuration some registers may not be writeable).

5 Troubleshooting

5.1 NFC reader board not found

While starting NTAG 5 NFC Cockpit tool, in case following issue appears:

Figure 28. Error NFC reader not found

It indicates that NFC reader board was not properly detected on USB, it should be visible under device manager as a COM port:
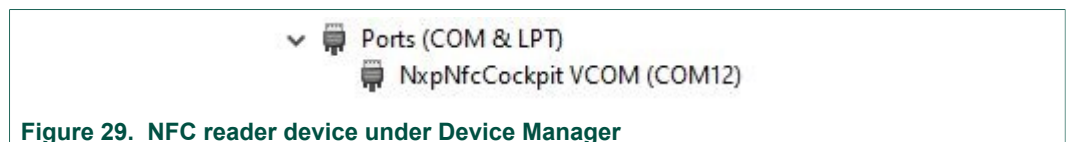

Figure 29. NFC reader device under Device Manager

If not, please refer to the related board quick start guide (PNEV7462C, PNEV5180B or CLEV6630B).

5.2 Virtual COM port already open

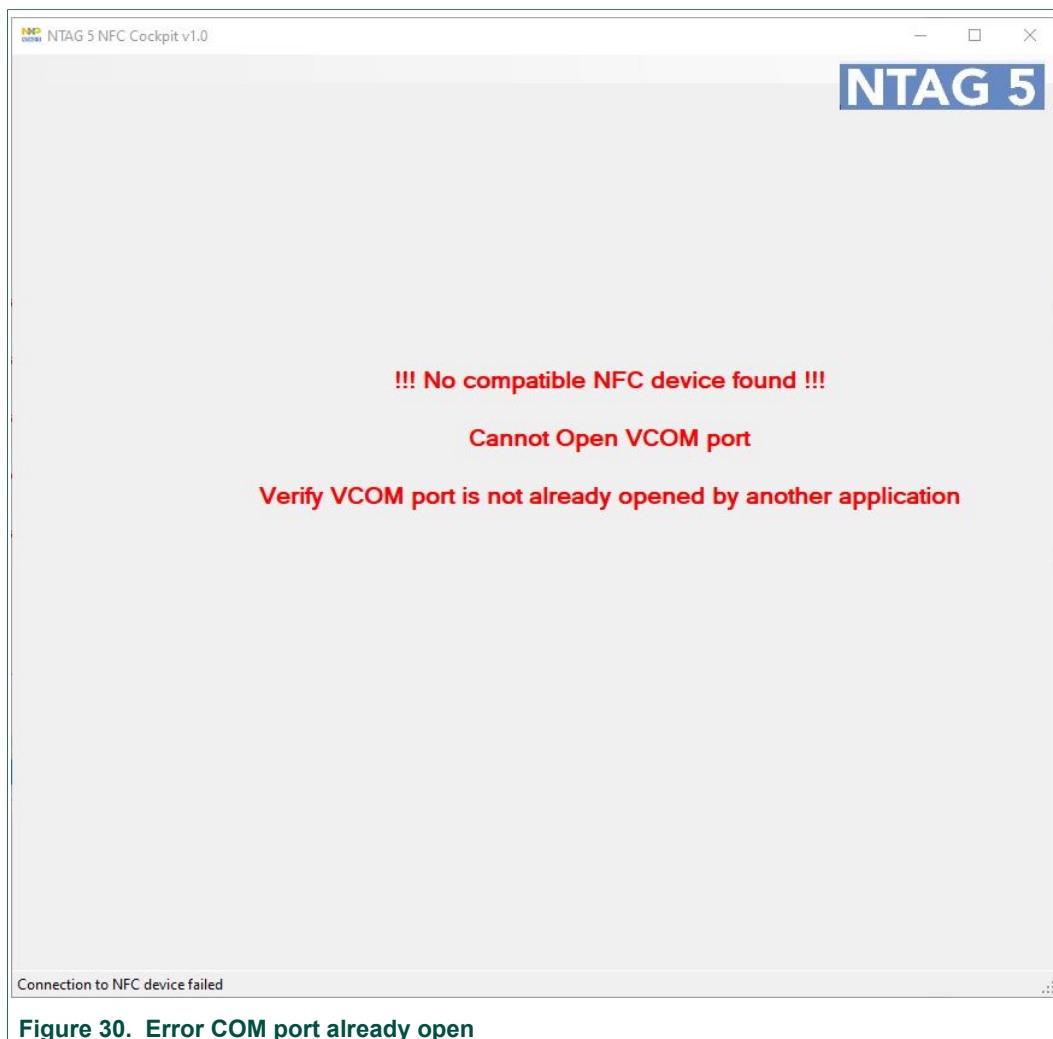While starting NTAG 5 NFC Cockpit tool, in case following issue appears:

Figure 30. Error COM port already open

It indicates that NFC reader board has been detected on USB but related Virtual COM port is already open:

- Verify that no other instance of NTAG 5 NFC Cockpit is running
- Check that no other application has an open channel to the NFC reader board-related COM port.

5.3 Any other issue

For any other issue, refer to [NFC support].

6   References

[1]   NFC support in NXP community forum
https://community.nxp.com/community/identification-security/nfc?tid=community

[2]   OM27462CDKP: NFC Controller development kit
https://www.nxp.com/products/rfid-nfc/nfc-hf/nfc-readers/nfc-controller-development-kit:OM27462CDKP

[3]   UM10883 - PN7462 family Quick Start Guide
https://www.nxp.com/docs/en/user-guide/UM10883.pdf

[4]   OM25180FDK: PN5180 NFC Frontend Development Kit for POS Terminal Applications
https://www.nxp.com/products/rfid-nfc/nfc-hf/nfc-readers/pn5180-nfc-frontend-development-kit-for-pos-terminal-applications:OM25180FDK

[5]   UM10954 - PN5180 SW Quick start guide
https://www.nxp.com/docs/en/user-guide/UM10954.pdf

[6]   OM26630FDK: CLRC663 *plus* NFC Frontend Development Kit for Access Management Applications
https://www.nxp.com/products/rfid-nfc/nfc-hf/nfc-readers/clrc663-iplus-i-nfc-frontend-development-kit-for-access-management-applications:OM26630FDK

[7]   AN11022 - CLRC663 Evaluation board quick start guide
https://www.nxp.com/docs/en/application-note/AN11022.pdf

[8]   NFC-COCKPIT: NFC Cockpit configuration tool for NFC ICs
https://www.nxp.com/products/rfid-nfc/nfc-hf/nfc-readers/nfc-cockpit-configuration-tool-for-nfc-ics:NFC-COCKPIT

[9]   UM11406 - NTAG 5 I²C Cockpit application
https://www.nxp.com/docs/en/user-guide/UM11406.pdf

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