UM10945

NTAG I²C *plus* Explorer Kit - Program and Debug Start-up

Rev. 2.2 — 10 October 2022   **User manual**

Document information

Information	Content
Keywords	NTAG I2C *plus*, Explorer Kit, Android, NFC tag, OM5569/NT322
Abstract	This user manual aims at describing the procedure how to flash firmware to OM5569/NT322E/ER Connected Tags Explorer Board and use Android application to check successful flashing.

Revision history

Revision history

Rev	Date	Description
2.2	20221010	• Section 6 "Radio Equipment Directive (RED)" added • Section "Legal information" updated
2.1	20180619	Change from LPCXpresso to MCUXpresso
2.0	20170206	Completely reworked version
1.0	20160216	First version

1 Object

NTAG I^{2}C *plus* Explorer kit is an all-in-one demonstration and development resource to demonstrate the unique properties of the NTAG I^{2}C *plus* tag chip. By including a full complement of hardware and software tools, users cannot only investigate the capabilities of the chip through the various demonstrations, but also develop and test their own applications (additional LPC-Link2 debug probe[1] is required).

This User Manual explains how to upload new firmware using LPCLink2 to "Connected Tags Explorer Boards" Rev 2.0 (and up) and older version Rev G.

Technical aspects related to the IC functioning are beyond the scope of this document. In order to get further technical details please consult the dedicated Datasheet "NTAG I^{2}C *plus*, NFC Forum Type 2 Tag compliant IC with I^{2}C interface" (refer to [Section 7]).

The MCUXpresso IDE is the first NXP tools release with combined support for the NXP Kinetis and LPC parts.

MCUXpresso IDE is based on the Eclipse IDE and includes the industry standard Arm GNU toolchain. It brings developers an easy-to-use and unlimited code size development environment for NXP MCUs based on Cortex-M cores (LPC and Kinetis). This new IDE combines the best of the widely popular LPCXpresso and Kinetis Design Studio IDEs, providing a common platform for all NXP Cortex-M microcontrollers. With full-featured free (code size unlimited) and affordable professional editions, MCUXpresso IDE provides an intuitive and powerful interface with profiling, power measurement on supported boards, GNU tool integration and library, multicore capable debugger, trace functionality and more. MCUXpresso IDE debug connections support Freedom, Tower®, LPCXpresso and your custom development boards with industry- leading open-source and commercial debug probes including LPC-Link2, P&E and SEGGER.

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1 www.nxp.com/LPC-LINK2

2   Download and install latest MCUXpresso IDE

Download latest version from MCUXpresso IDE Homepage.

In this user manual all screenshots are taken from version v10.2.0_759.

Installation guide and user manual may be downloaded from that page.

There is no activation process required for the use of MCUXpresso IDE, all features are available after installation.

3 Importing source files

As a first step, download of latest firmware source files from NXP Explorer kit internet pages is recommended.

3.1 Create new workspace for new template.

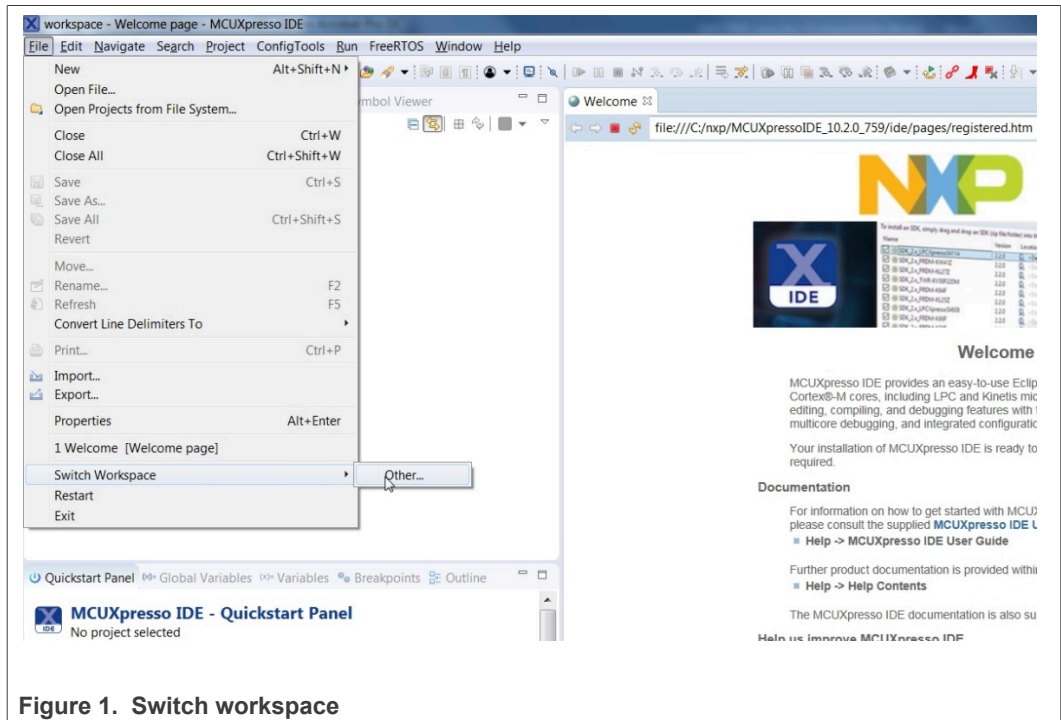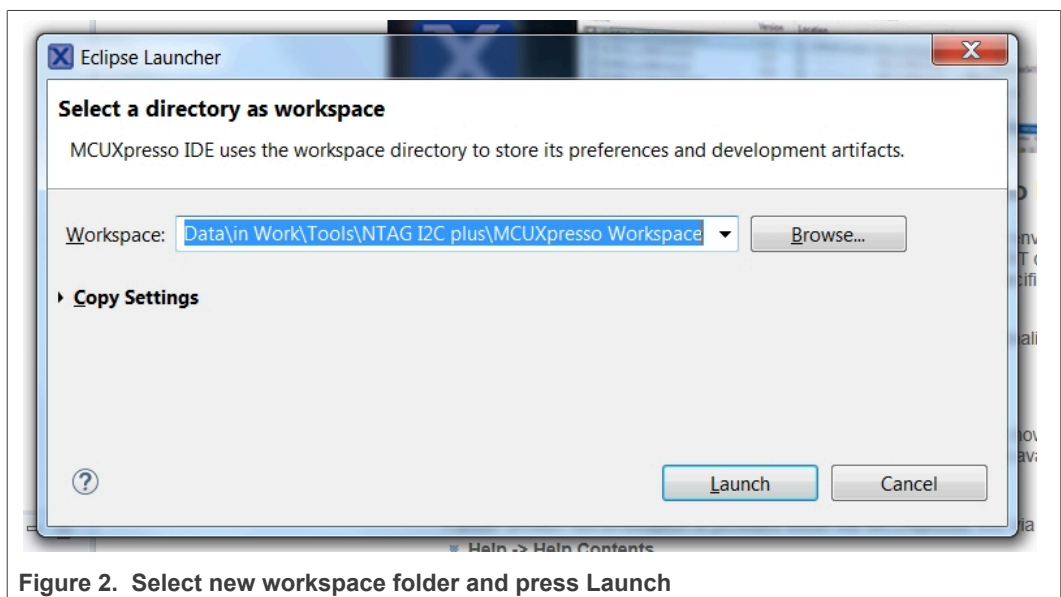**Figure 1. Switch workspace**

Figure 2. Select new workspace folder and press Launch

3.2 Import project

Select "File/Import", then "General/Existing Project into Workspace".
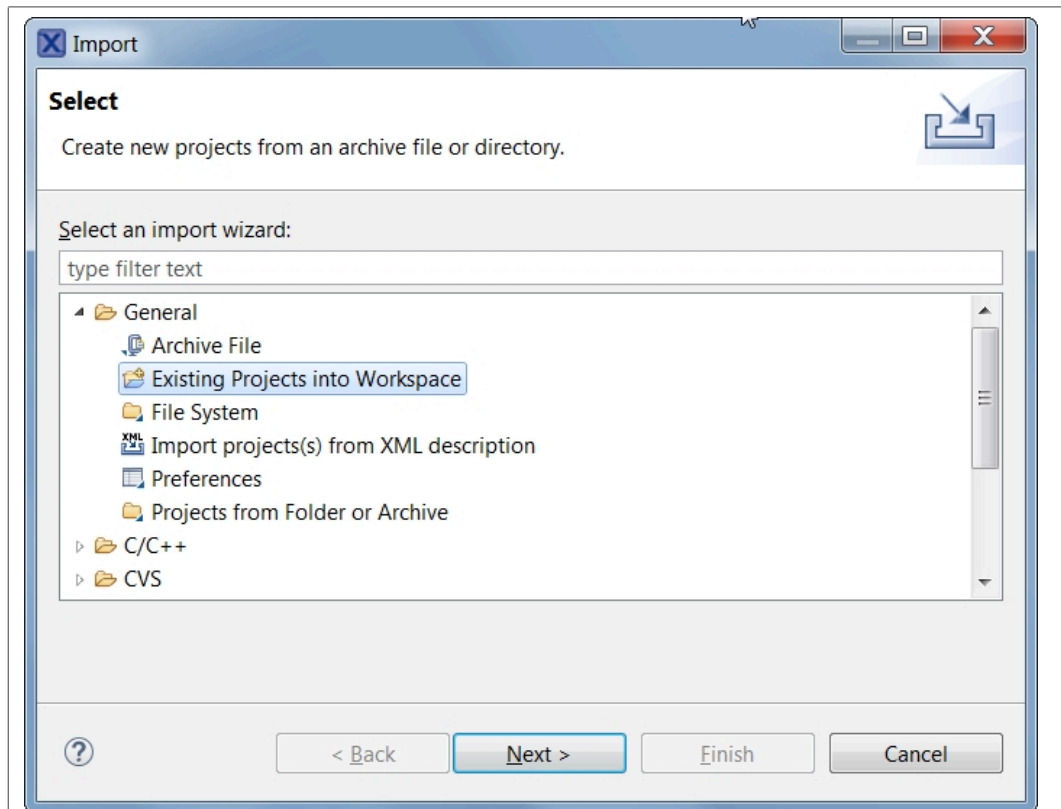

Figure 3. Insert Existing Project into Workspace

Click on "Browse" to the right of "Select Archive File" and select the Project .zip file.

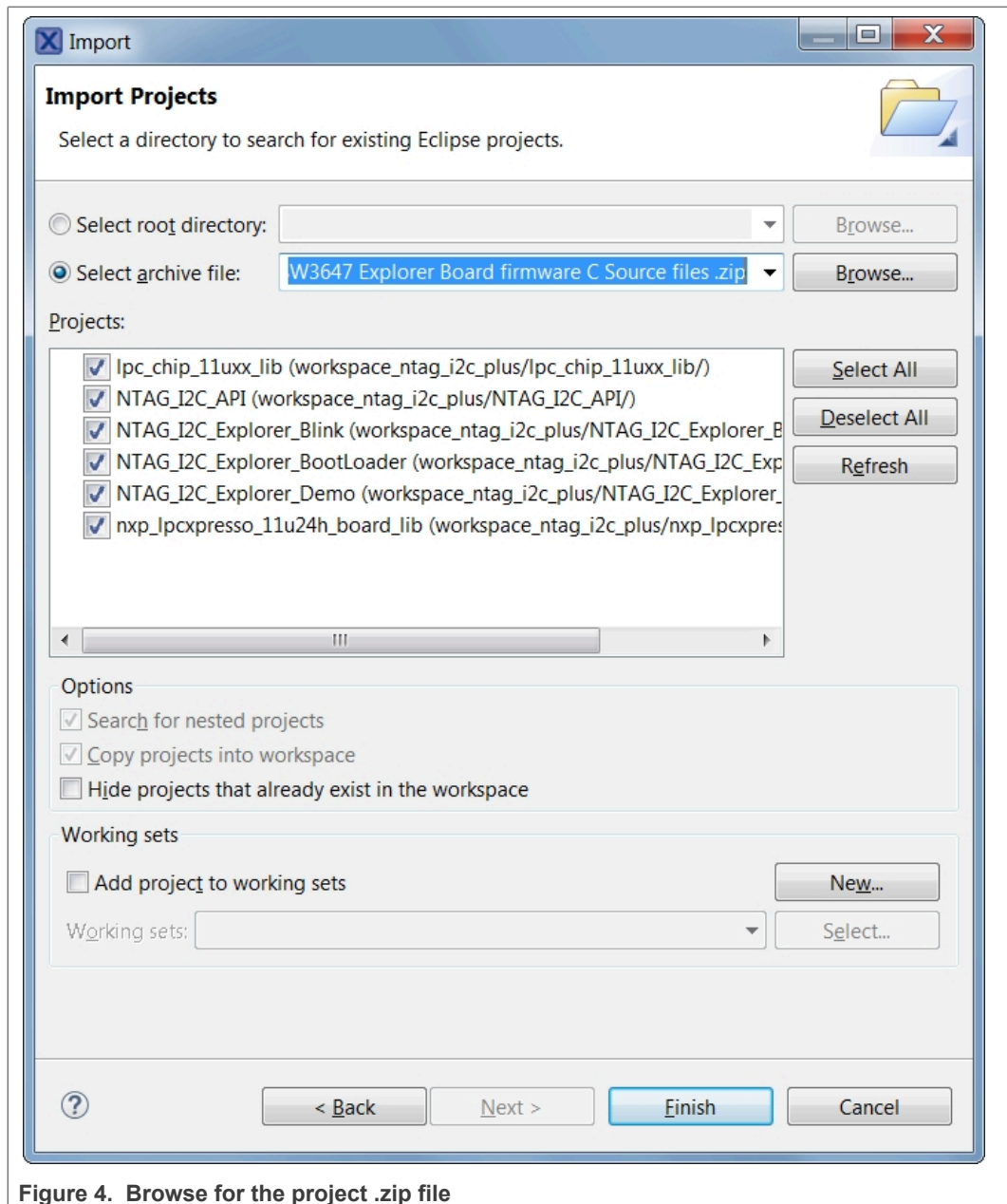Click "Finnish", six (6) projects are now imported.

Figure 4. Browse for the project .zip file

4   Programming (flashing) explorer board

1. Connect the LPCLink2 with the Explorer Board using the **10-pin flat cable**
2. Place the **JP2 Jumper** as shown on the picture to power Explorer Board from LPCLink2
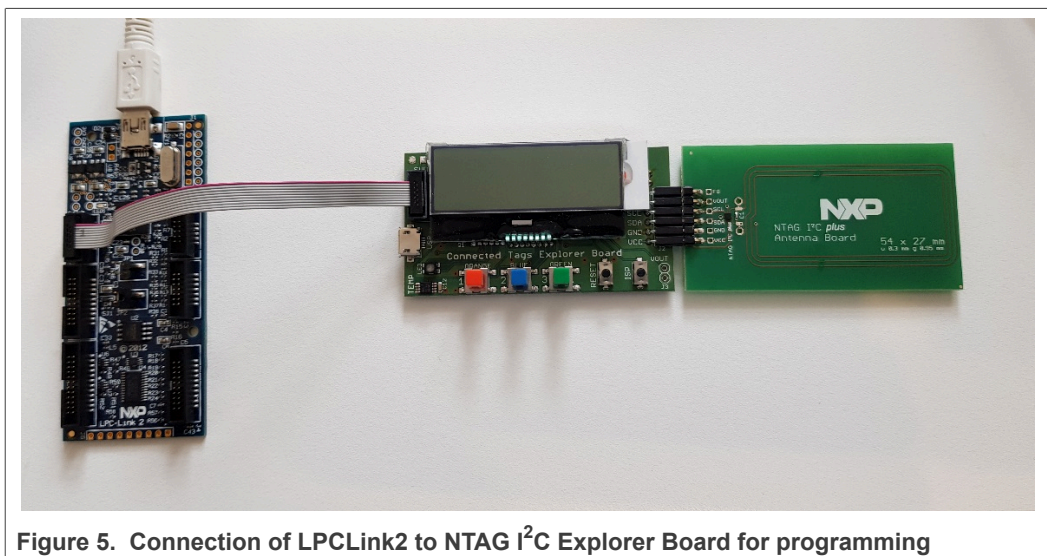3. Connect the LPCLink2 to your computer via **USB** while **pressing ISP button** on Explorer Board

Figure 5. Connection of LPCLink2 to NTAG I²C Explorer Board for programming

4.1   NTAG I²C plus Explorer board firmware structure

As described in [Section 7], the firmware which runs on the NTAG I²C *plus* Explorer board, is flashed during the production of the board and supports the demonstration functionality of the hardware. The delivered NTAG I²C *plus* Explorer board firmware consists of three applications:

- NTAG_I2C_Explorer_Bootloader: This project implements the secondary bootloader application. It is flashed at on-chip memory address starting at 0x0000 0000 and it is the first application to be executed after the MCU boots. This application has three functions:
  – Jump to the start memory of the user application.
  – Enter into "flashing mode" functionality.
  – Enter into "USB mode" (Peek and Poke).
- NTAG_I2C_Explorer_Demo: This project implements the logic supporting the Android / Windows demonstration applications. It is flashed at on-chip flash memory starting at 0x0000 4000 address and it is executed after the bootloader jumps to the application start address.
- NTAG_I2C_Explorer_Blink: This is a sample project that sets into blinking mode the NTAG_I2C Explorer board as soon as the RF field is detected. It is flashed at on-chip flash memory starting at 0x0000 4000 address and it is executed after the bootloader jumps to the application start address. This application is provided to illustrate the NFC flashing functionality and its binary image is provided embedded by default into the Android app (see Section 4.5 in [UM10966]).

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4.2 Flash BOOTLOADER

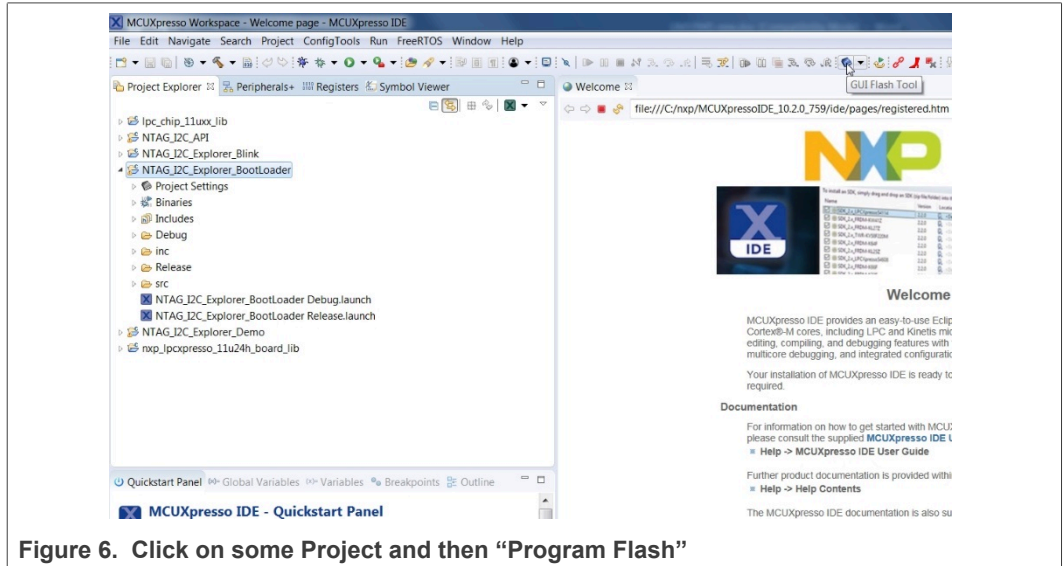Select the Project "NTAG_I2C_Explorer_Bootloader" (1) and click on "Program Flash" (2).

Figure 6. Click on some Project and then "Program Flash"

Check if the right target is selected LPC11xx (NXP LPC11U24/401) as shown on Figure 7. If not, please see Section 5 section.

Click "Workspace…" and search for latest built binary file (.axf). File is located in workspace folder you created in step Section 3.1 (Fig 2), in "Release" folder. Press "OK".

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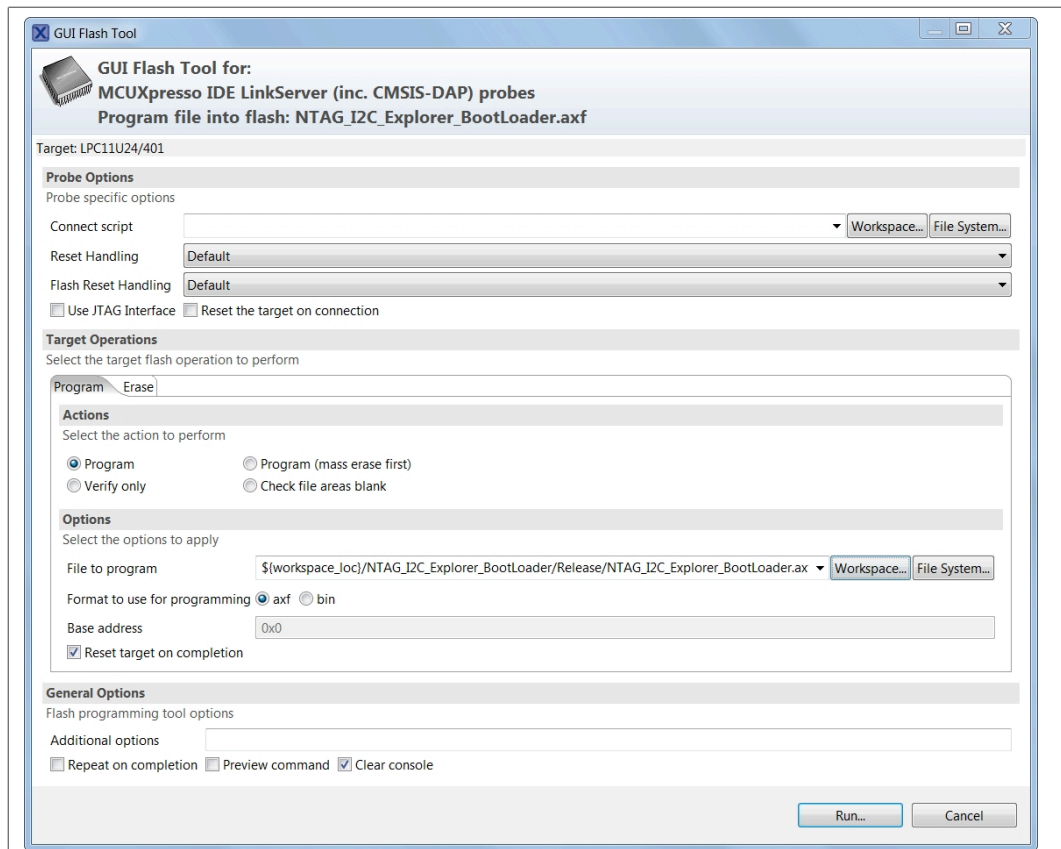
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Figure 7. Program Flashing pop-up window

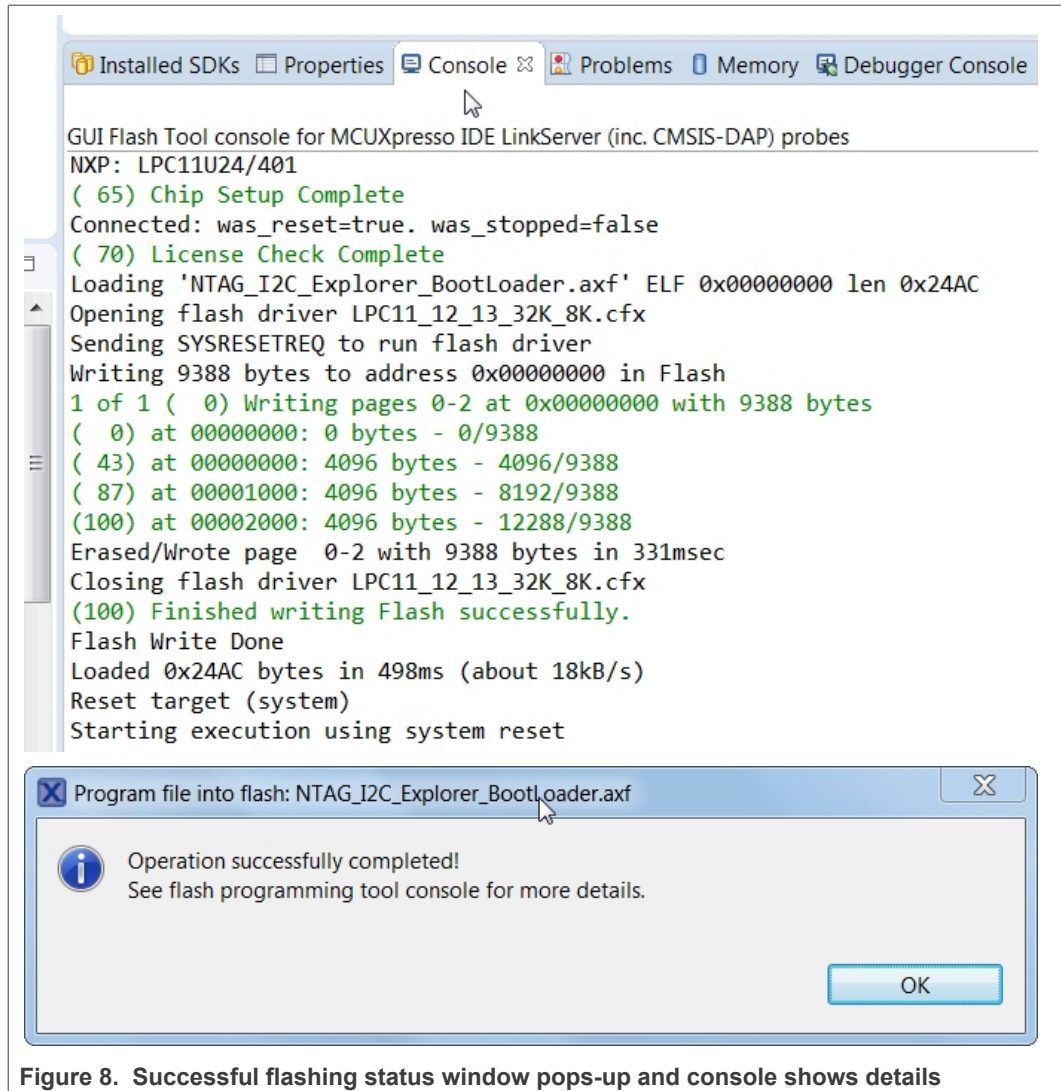Flashing should start. In case of issues please see Section 5 section .

Figure 8. Successful flashing status window pops-up and console shows details

4.3 Flash DEMO APPLICATION

Flashing DEMO APP can be done in two ways:

1. Using LPCLink2 and LPCXpresso, the same way as "Flash BOOTLOADER" was flashed. Described in Section 4.2.

2. Since "NTAG_I2C_Explorer_Bootloader" firmware enables functionality of flashing MCU firmware via NFC enabled cell phone, this step can be taken. Using Android app (NTAG I²C Demo 1.7.6). Detailed procedure is described on page 32 of [Section 7] - user manual NTAG I²C demo app.

4.4 Test flashed firmware

Figure 9. Explorer Board working

5 Troubleshoot

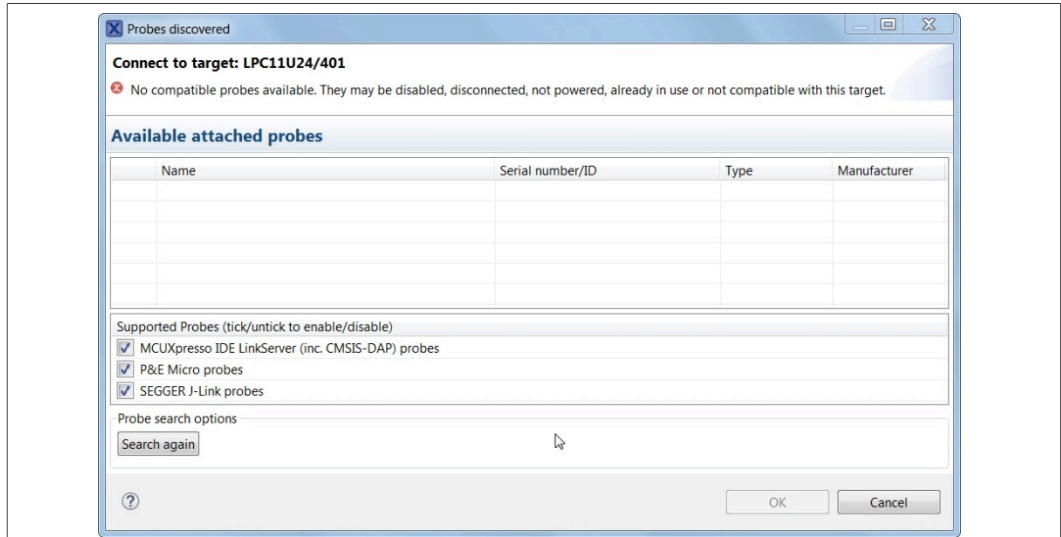## 5.1 No compatible emulators found

Figure 10. No compatible emulators found

- Check JP2 jumper
- Reconnect the LPCLink2 USB to PC

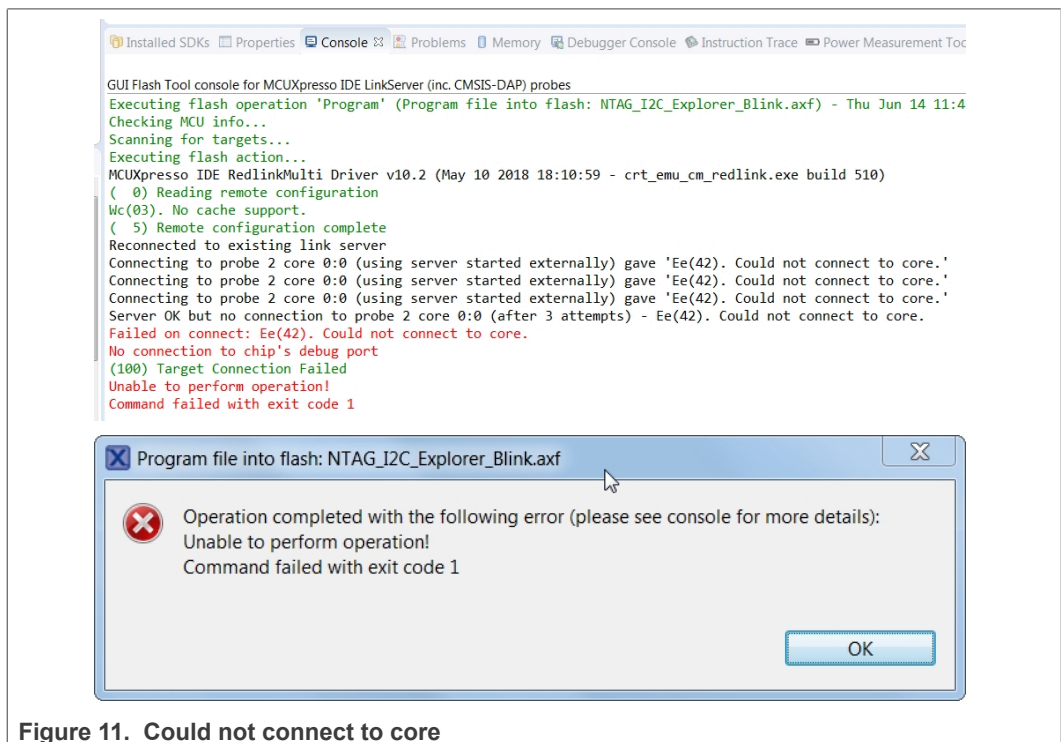## 5.2 Could not connect to core

Figure 11. Could not connect to core

- Check your flat cable connection. Flat cables may run out quickly if not handled appropriately.
- Restart redlinksrv.exe service running in Task Manager
- MCU cannot enter DFU mode. Disconnect Explorer Kit board from LPCLink2 (or external power), press and hold ISP button on Explorer Kit board, connect the Explorer Kit board to LPCLink2 (or external power). Try to flash.
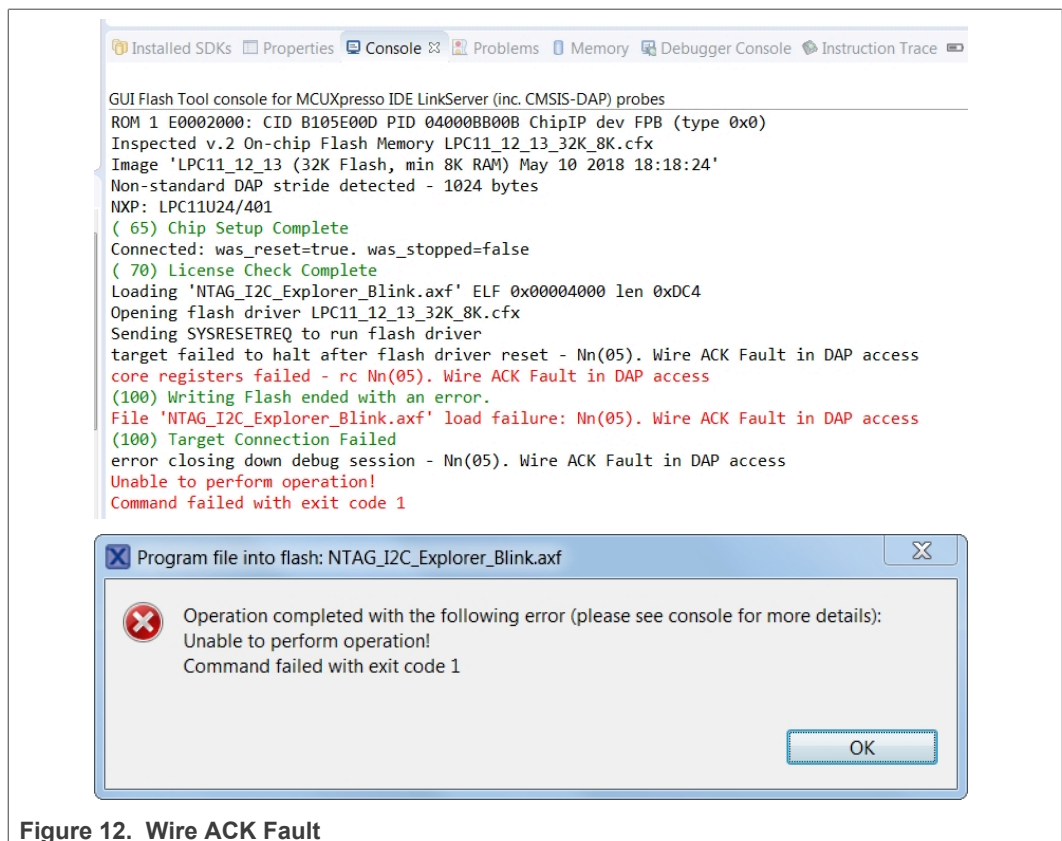
5.3 Wire ACK Fault in DAP access

Figure 12. Wire ACK Fault

- Reconnect Explorer Kit via flat cable or LPClink board via USB cable while pressing ISP button on Explorer Kit.

5.4 Firmware size is too big

```
c:/nxp/lpcxpresso_7.9.0_455/lpcxpresso/tools/bin/../lib/gcc/arm-none-
eabi/4.9.3/../../../../arm-none-eabi/bin/ld.exe: NTAG_I2C_Explorer
_Demo.axf section `.text' will not fit in region `MFlash32'c:/nxp/
lpcxpresso_7.9.0_455/lpcxpresso/tools/bin/../lib/gcc/arm-none-eab
i/4.9.3/../../../../arm-none-eabi/bin/ld.exe: region `MFlash32'
overflowed by 200 bytescollect2.exe: error: ld returned 1 exit
statusmake: *** [NTAG_I2C_Explorer_Demo.axf] Error 1
```
Figure 13. Firmware size is too big.

- Right click Project you are trying to flash. Left click "Properties". Under "C/C++ Build" – "Settings", in the tab "Tool Settings" – "Optimization, set "Optimization Level" to "Optimize (-O0)".
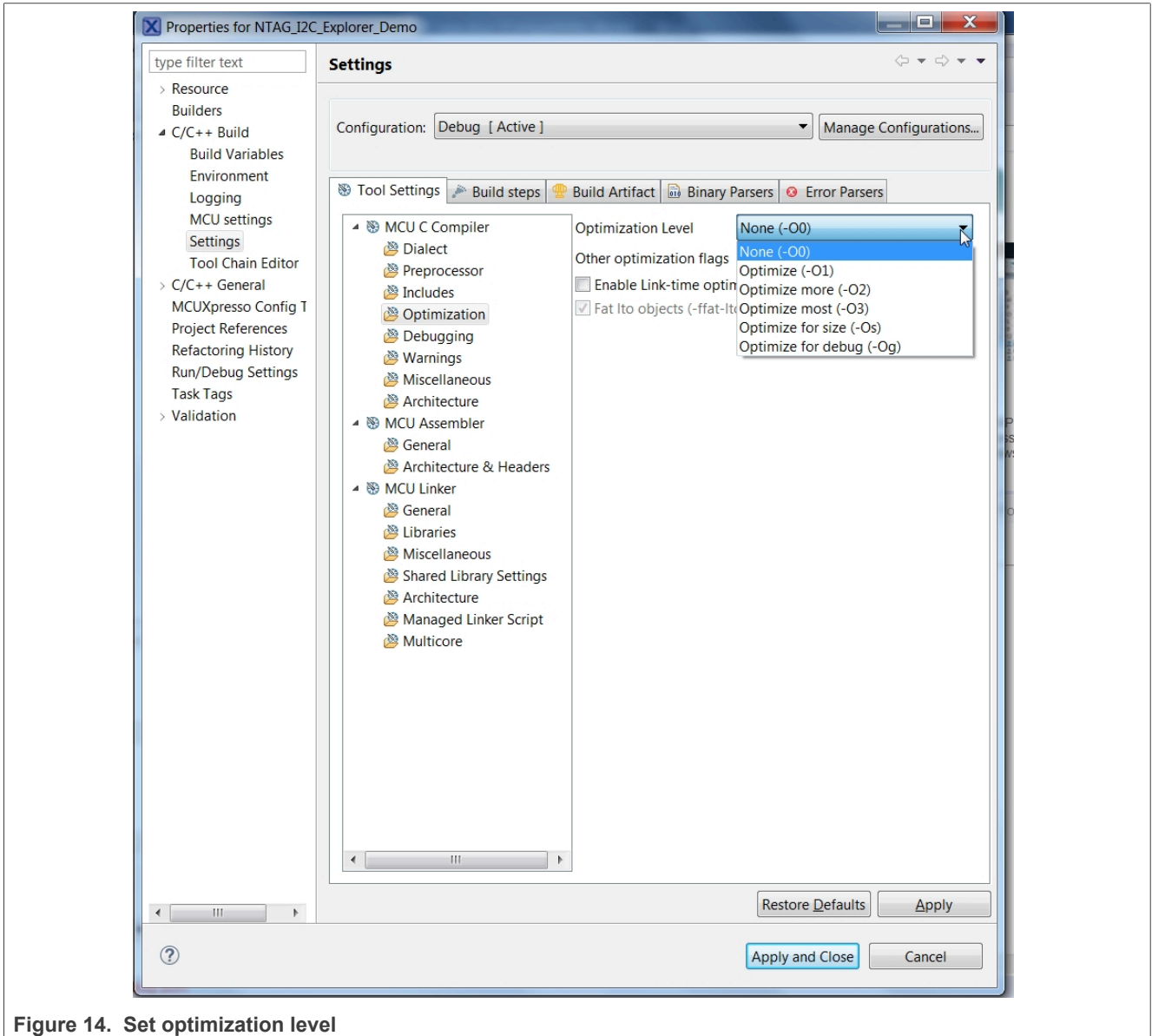
Re-build sources and flash again.

Figure 14. Set optimization level

6   Radio Equipment Directive (RED)

The following information is provided per Article 10.8 of the Radio Equipment Directive 2014/53/EU:

(a) Frequency bands in which the equipment operates.

(b) The maximum RF power transmitted.

Table 1. Characteristics

PN	RF Technology	(a) Freq Ranges (EU)	(b) Max Transmitted Power
OM5569-NT322E	Near Field Communication	13.56 – 13.56 MHz	0 dB

EUROPEAN DECLARATION OF CONFORMITY (Simplified DoC per Article 10.9 of the Radio Equipment Directive 2014/53/EU). This apparatus, namely OM5569-NT322E, conforms to the Radio Equipment Directive 2014/53/EU. The full EU Declaration of Conformity for this apparatus can be found at this location: NTAG I2C *plus* Explorer Kit under "Reliability and Quality Information".

7   References

[NTAGI^{2}C *plus*] NT3H2111/NT3H2211, NTAG I²C *plus*, NFC Forum T2T with I^{2}C interface, password protection and energy harvesting https://www.nxp.com/docs/en/data-sheet/NT3H2111_2211.pdf

[UM10966] NTAG I^{2}C *plus* Explorer Kit - Android Demo https://www.nxp.com/docs/en/user-guide/UM10966.pdf

[DEMOBOARD] demo board homepage with all resources www.nxp.com/demoboard/OM5569

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