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

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User manual COMPANY PUBLIC

Document information

Info	Content
Keywords	NTAG I ² C 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

Rev	Date	Description
2.1	20180619	Change from LPCXpresso to MCUXpresso
2.0	20170206	Completely reworked version
1.0	20160216	First version

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1. Object

NTAG I²C *plus* Explorer kit is an all-in-one demonstration and development resource to demonstrate the unique properties of the NTAG I²C *plus* tag chip. By including a full complement of hardware and software tools, users can not only investigate the capabilities of the chip through the various demonstrations, but also develop and test their own applications (additional LPC-Link2 debug probe¹ 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 I²C *plus*, NFC Forum Type 2 Tag compliant IC with I²C interface" (refer to [NTAGI2Cplus]).

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.

2. Download and install latest MCUXpresso IDE

Download latest version from <u>MCUXpresso IDE Homepage</u>.

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 <u>firmware source files</u> from <u>NXP Explorer kit internet</u> <u>pages</u> is recommended.

¹ www.nxp.com/LPC-LINK2

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3.1 Create new workspace for new template.

New		Alt+Shift+N >	🥭 🛷 🕶 📴 🛛		D= 01 = 14 (3. (5. (4) = 3) (4) (4) (5. (5) (4) (4) (4) (4) (4) (4) (4) (4) (4) (4
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Prope	nues	Alt+Enter			multicore debugging, and integrated config
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Switc	h Workspace	•	Other		Documentation
Exit]		For information on how to get started with I please consult the supplied MCUXpresso Help -> MCUXpresso IDE User Guide
Quickst	art Panel 🕬 Global Variables	(x)= Variables	Breakpoints 🗄 Ou	tline 🗖 🗖	Further product documentation is provided # Help -> Help Contents
	CUXpresso IDE - Qui	ckstart Panel		Â	The MCUXpresso IDE documentation is al
NC	project selected				Help us improve MCI IX presso IDF



3.2 Import project

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

Select Create new proje	cts from an archive file or dire	ectory.		
Select an import	vizard:			
type filter text				
 ▲ General 	File Projects into Workspace em projects(s) from XML descripti ices from Folder or Archive	ion		
?	< <u>B</u> ack	Next >	<u>F</u> inish	Cancel

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Click on "Browse" to the right of "Select Archive File" and select the Project .zip file. Click "Finnish", six (6) projects are now imported.

Import Projects Select a directory to search for existing Eclipse projects.	
Select root directory:	B <u>r</u> owse
Select <u>a</u> rchive file: W3647 Explorer Board firmware C Source files .zip	B <u>r</u> owse
Projects:	<u>S</u> elect All
 NTAG_I2C_API (workspace_ntag_i2c_plus/NTAG_I2C_API/) NTAG_I2C_Explorer_Blink (workspace_ntag_i2c_plus/NTAG_I2C_Explorer_B NTAG_I2C_Explorer_BootLoader (workspace_ntag_i2c_plus/NTAG_I2C_Explorer_B 	Deselect All
▼ NTAG_I2C_Explorer_Demo (workspace_ntag_i2c_plus/NTAG_I2C_Explorer_ ▼ nxp_lpcxpresso_11u24h_board_lib (workspace_ntag_i2c_plus/nxp_lpcxpres	
Options ✓ Search for nested projects ✓ Copy projects into workspace Hide projects that already exist in the workspace	
Working sets	
Add project to working sets	Ne <u>w</u>
Working sets:	S <u>e</u> lect
	Cancel

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



4.1 NTAG I²C *plus* Explorer board firmware structure

As described in [UM10966], 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:
 - o Jump to the start memory of the user application.
 - o 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]).

4.2 Flash BOOTLOADER

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

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Project Explorer № Repiper State	er □ □ ③ ⊕ ∲ Ø ▼ ▼	Welcome	Cull flant Tool Pages/registered.h Pages/reg
Quickstart Panel 🕬- Global Variables 🔅 Variables 💁 Breakpoints	🗄 Outline 🗧 🗖	Further p # Help	oroduct documentation is provided v -> Help Contents
MCUXpresso IDE - Ouickstart Panel	<u></u>	The MCI	JXpresso IDE documentation is als

Check if the right target is selected LPC11xx (NXP LPC11U24/401) as shown on Fig 7. If not, please see <u>Troubleshoot</u> section.

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

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Program f	ile into flash: NTAG_I2C_Explorer_BootLoader.axf
rget: LPC11U24/401	
Probe Options	
Probe specific options	
Connect script	▼ Workspace File Syste
Reset Handling	Default
Flash Reset Handling	Default
Use JTAG Interface	Reset the target on connection
Target Operations Select the target flash o	peration to perform
Program Erase	
Actions Select the action to p	verform
Program	Program (mass erase first)
Verify only	Check file areas blank
Options	
Select the options to	apply
File to program	\${workspace_loc}/NTAG_I2C_Explorer_BootLoader/Release/NTAG_I2C_Explorer_BootLoader.av Workspace Fle System.
Format to use for pr	ogramming (a) axf () bin
Base address	0x0
Reset target on c	ompletion
Seneral Options	
lash programming too	loptions
Additional options	
Repeat on completi	on 📃 Preview command 👿 Clear console
	Run Cancel

Flashing should start. In case of issues please see <u>Troubleshoot</u> section.

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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 <u>chapter 4.2</u>.
- Since "NTAG_I2C_Explorer_Bootloader" firmware enables functionality of flashing MCU firmware via NFC enabled mobile phone, this step can be taken. Using Android app (NTAG I²C Demo 1.7.6). Detailed procedure is described on page 32 of [UM10966] - User manual NTAG I²C Demo app.

<image>

4.4 Test flashed firmware

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5. Troubleshoot

5.1 No compatible emulators found

onnect to target: LPC11U24/401			
No compatible probes available. They m	ay be disabled, disconnected, not powered, already in	n use or not compatible	with this target.
vailable attached probes			
Name	Serial number/ID	Туре	Manufacturer
pported Probes (tick/untick to enable/di	sable)		
MCUXpresso IDE LinkServer (inc. CMSIS	-DAP) probes		
P&E Micro probes			
obe search options			
earch again	L3		
?)		ОК	Cancel

- → Check JP2 jumper
- → Reconnect the LPCLink2 USB to PC

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5.2 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



➔ 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-eabi/4.9.3/../../arm-none-eabi/bin/ld.exe:
region `MFlash32' overflowed by 200 bytes
collect2.exe: error: ld returned 1 exit status
make: *** [NTAG_I2C_Explorer_Demo.axf] Error 1
Fig 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.

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6. References

[NTAGI2Cplus]	NT3H2111/NT3H2211, NTAG I ² C <i>plus</i> , NFC Forum Type 2 Tag compliant IC with I ² C interface
	http://www.nxp.com/documents/data_sheet/NT3H2111_2211.pdf
[UM10966]	NTAG I ² C Demo app

www.nxp.com/documents/user_manual/UM10966.pdf

[DEMOBOARD] Demo board home page with all resources www.nxp.com/demoboard/OM5569

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