UG10083

NTAG X DNA - Quick start guide with product support package

Rev. 1.2 — 27 May 2025 **Getting started guide**

Document information

Information	Content
Keywords	NTAG X DNA
Abstract	This document is the entry point for getting familiar with NTAG X DNA support package contents and how to get started with evaluating and development.

1 About NTAG X DNA

The NTAG X DNA product is a secure authenticator IC with contactless, contact interface and has two additional GPIOs. The target use case is the Device authentication (online or offline) with rich NFC Forum experience. It supports both Symmetric (AES) and Asymmetric crypto functions – SHA, AES, ECDH, and ECDSA. The Common Criteria security certification ensures that the IC security measures and protection mechanisms have been evaluated against sophisticated noninvasive and invasive attack scenarios. On top, it supports contactless Silent mode (not discoverable by ISO14443 reader, for example, POS terminal) and enhanced privacy options (untraceability). It allows a low-power design, and consumes only ~5 µA at Deep-Power-Down mode when an external VDD is supplied.

For more details on all features, refer to the data sheet ref.[1].

Delivered as a ready-to-use solution, the NTAG X DNA has a complete product support package that simplifies design-in and reduces time to market. The NTAG X DNA support package offers:

- Software enablement for different MCUs and MPUs
- Integration and build environment for common operating systems including Linux, Windows
- Example code for major IoT use cases
- Personalization scripts
- Extensive application notes
- Development kits compatible with Kinetis® MCU boards

The NTAG X DNA support package encapsulates the needed tools to evaluate, prototype and implement final NTAG X DNA NFC, IoT or other applications.

2 Hardware

2.1 Evaluation board - NTAG-X-DNA-EVAL

The NTAG X DNA product is supported with a development board that can be connected with any MCU or MPU board through direct I^2C connection. Table 1 summarizes the ordering details of the NTAG X DNA development board.

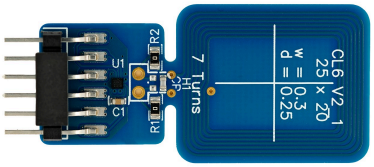
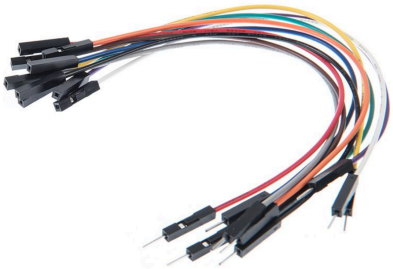
NTAG X DNA is designed for battery-operated applications and for MCUs and MPUs with a supply voltage of 1.8 V. Therefore, the operating supply voltage range of NTAG X DNA is specified from 1.0 V to 2.0 V.

Some MCU families are supporting an operating voltage of 1.8 V, but many of the MCU and MPU demo boards are designed for a supply voltage of 3.3 V or even 5.0 V. To support rapid prototyping, the NTAG-X-DNA-EVAL includes a level shifter which translates the voltage level accordingly.

More details about the NTAG-X-DNA-EVAL and ordering can be found on:

https:/www.nxp.com/products/rfid-nfc/nfc-hf/connected-nfc-tags/ntag-x-dna-development-kit:NTAG-X-DNA-EVAL

Table 1. Development kit NTAG-X-DNA-EVAL

12NC	Quantity	Description	Image
935505096598	3	NTAG X DNA evaluation board	 **Figure 1. NTAG X DNA evaluation board**
	1	Level shifter from 3.3 V to 1.8 V	 **Figure 2. Level shifter**
	6	Connecting wires male to female	 **Figure 3. Connecting wires male to female**

2.1.1 Pinout

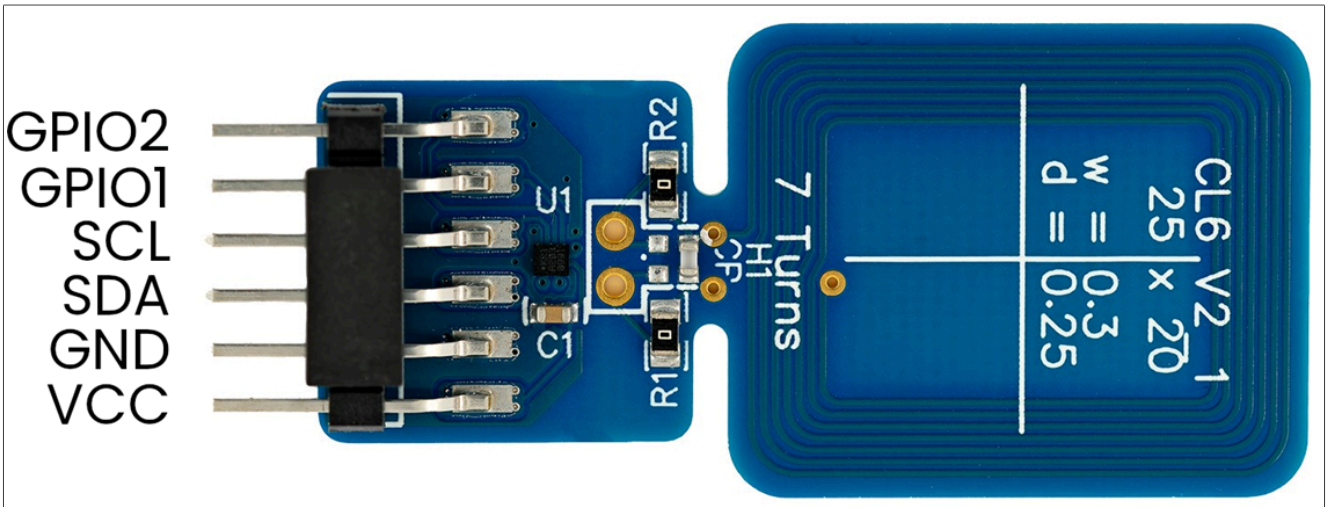


Figure 4. NTAG X DNA evaluation board

Note: *Operating supply voltage range of NTAG X DNA is specified from 1.0 V to 2.0 V. Use enclosed level shifter for higher supply voltages (e.g. to use with MCU development boards).*

Table 2.

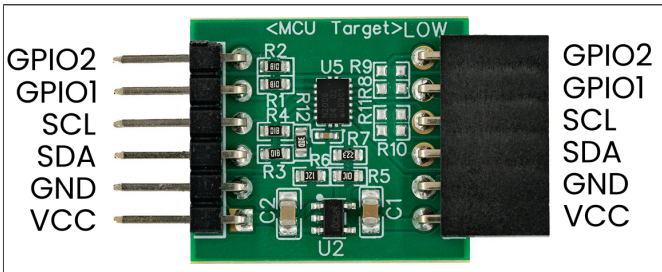


Figure 5. Level shifter - top view

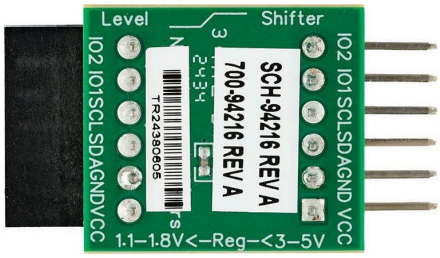


Figure 6. Level shifter - bottom view

2.1.2 Connection

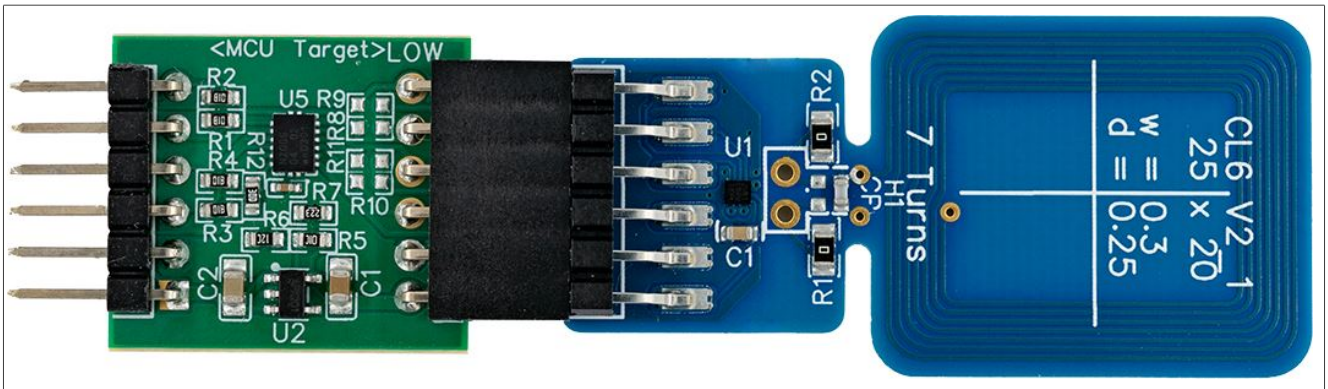


Figure 7. NTAG X DNA evaluation board connected to the level shifter

2.1.3 Schematics

2.1.3.1 NTAG X DNA evaluation board

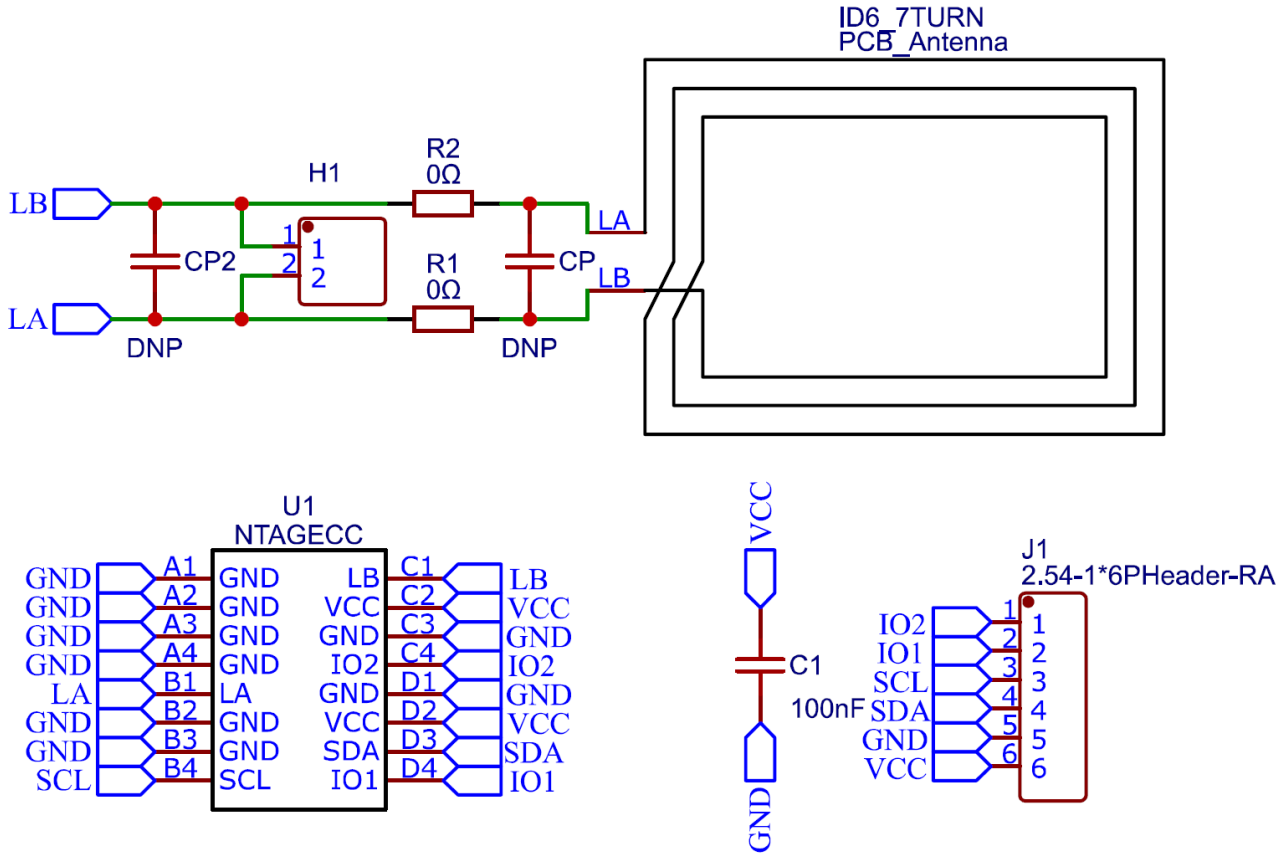


Figure 8. NTAG X DNA evalution board PCB schematics

2.1.3.2 Level shifter board

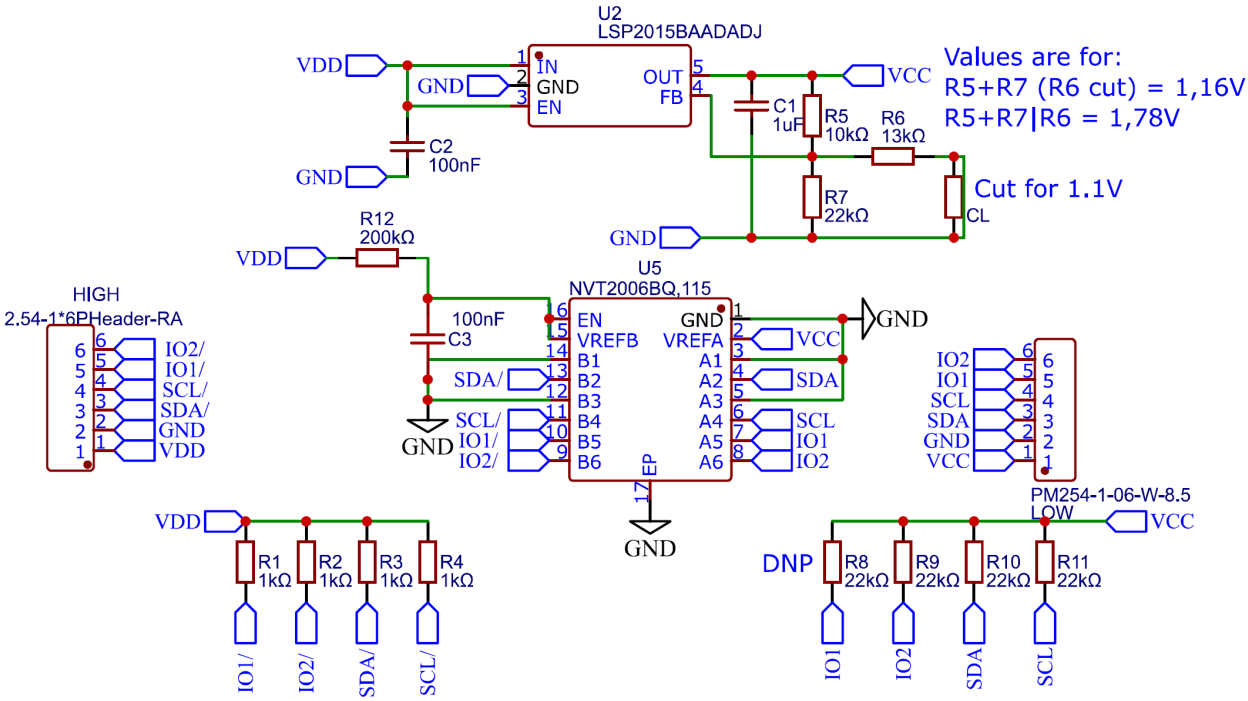


Figure 9. Level shifter PCB schematics

2.1.4 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 radio-frequency power transmitted in the frequency band(s) in which the radio equipment operates.

Table 3. Characteristics

PN	RF Technology	(a) Frequency Range (EU)	(b) Max Transmitted Power
NTAG-X-DNA-EVAL	ISO/IEC 14443-4A (Passive)	10 MHz to 15 MHz	0 dBm

EUROPEAN DECLARATION OF CONFORMITY (Simplified DoC per Article 10.9 of the Radio Equipment Directive 2014/53/EU)

This apparatus, namely NTAG-X-DNA-EVAL board for contactless operation, conforms to Radio Equipment directive 2014/53/EU.

The full EU Declaration of conformity for all apparatus can (will) be found at this location: www.nxp.com/ntagxdna

2.2 Development environment

2.2.1 MCU/MPU boards

The NTAG X DNA IC is designed to be used as a part of an IoT system. It can be interfaced from the NFC or I²C side. It works as an auxiliary security device, which can be physically connected to a host controller. The host controller communicates with NTAG X DNA through the I²C interface. Host controller being as the I²C controller and the NTAG X DNA being as the I²C target.

Table 4 summarizes the ordering details of the MCU / MPU boards supported by the NTAG X DNA middleware:

Table 4. MCU/MPU boards supported by NX Middleware

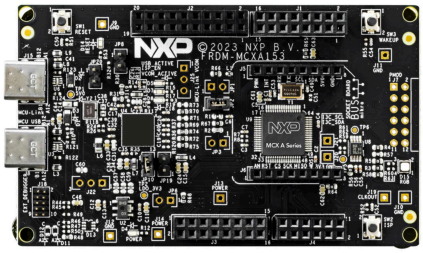
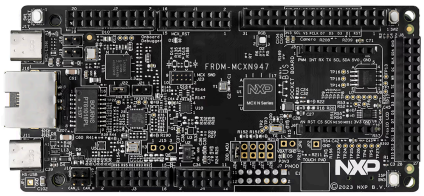
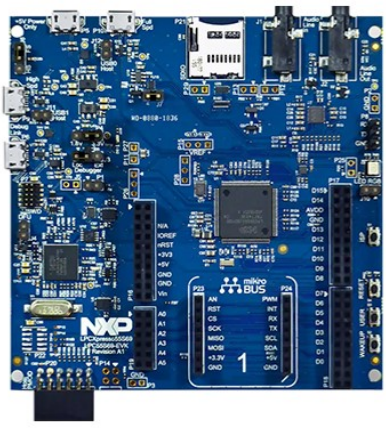
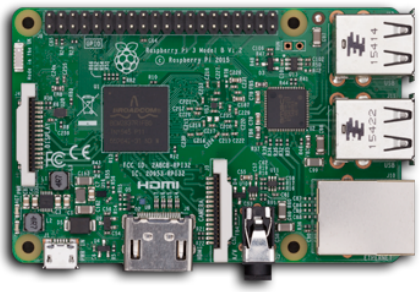
Link	Description	Image
FRDM-MCXA153	FRDM-MCXA153 are compact and scalable development boards for rapid prototyping of MCX A14 and A15 MCUs	 Figure 10. FRDM-MCXA153
FRDM-MCXN947	FRDM-MCXN947 are compact and scalable development boards for rapid prototyping of MCX N94 and N54 MCUs	 Figure 11. FRDM-MCXN947
LPC55S69-EVK	LPCXpresso55S69 Development Board	 Figure 12. LPCXpresso55S69 Development Board

Table 4. MCU/MPU boards supported by NX Middleware*...continued*

Link	Description	Image
Raspberry Pi	Raspberry Pi 3 development board	 Figure 13. Raspberry Pi 3 development board

2.2.1.1 NTAG-X-DNA-EVAL connection to FRDM-MCXA153 development board

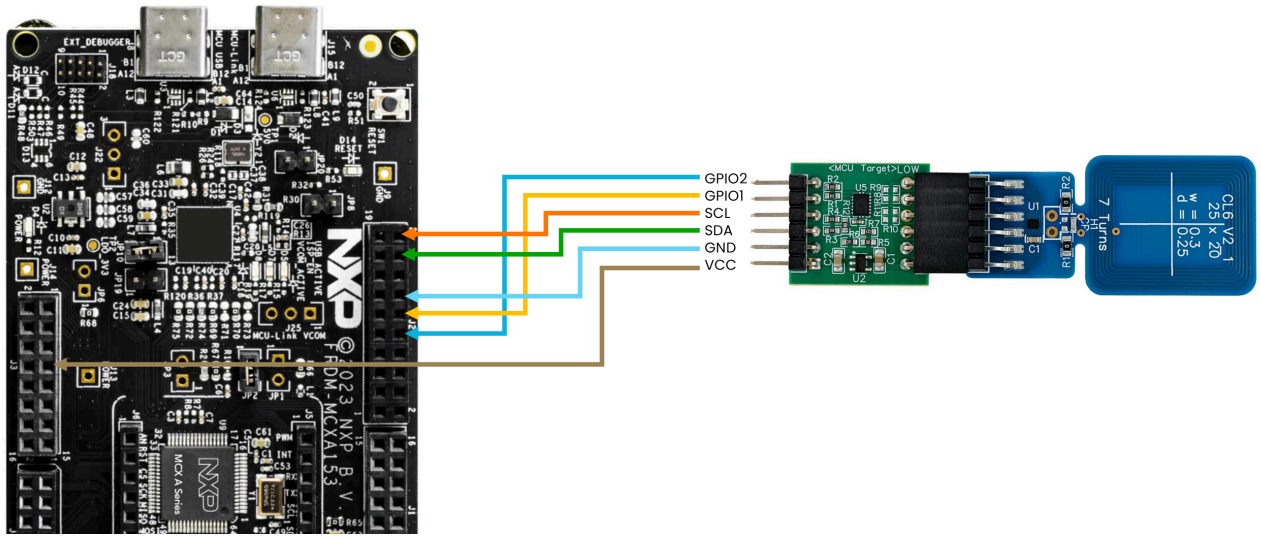


Figure 14. NTAG-X-DNA-EVAL connection to FRDM-MCXA153 development board

Table 5. Connections to FRDM-MCXA153 development board

NTAG-X-DNA-EVAL pin	FRDM-MCXA153 development board pin
IO2	J2 → 10 (PTD5)
IO1	J2 → 12 (PTD7)
SCL	J2 → 20 (PTE1)
SDA	J2 → 18 (PTE0)
GND	J2 → 14 (GND) or J3 → 12, 14 (GND)
VCC	J3 → 8 (+3V3) or 10 (+5V)

2.2.1.2 NTAG-X-DNA-EVAL connection to FRDM-MCXN947 development board

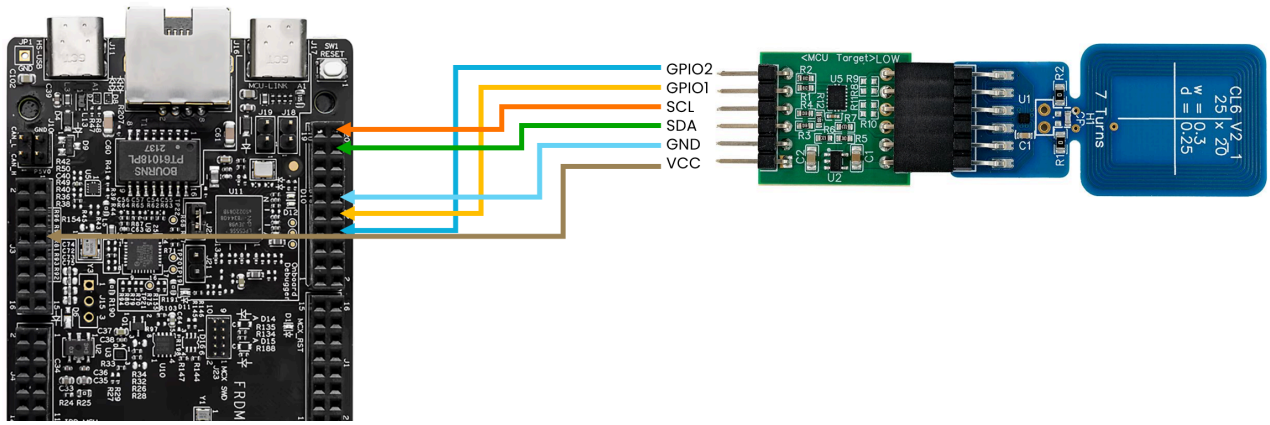


Figure 15. NTAG-X-DNA-EVAL connection to FRDM-MCXN947 development board

Table 6. Connections to FRDM-MCXN947 development board

NTAG-X-DNA-EVAL pin	FRDM-MCXN947 development board pin
IO2	J2 → 10 (P0_26)
IO1	J2 → 12 (P0_25)
SCL	J2 → 20 (P4_1)
SDA	J2 → 18 (P4_0)
GND	J2 → 14 (GND) or J3 → 12, 14 (GND)
VCC	J3 → 8 (+3V3) or 10 (+5V)

2.2.1.3 NTAG-X-DNA-EVAL connection to LPC55 development board

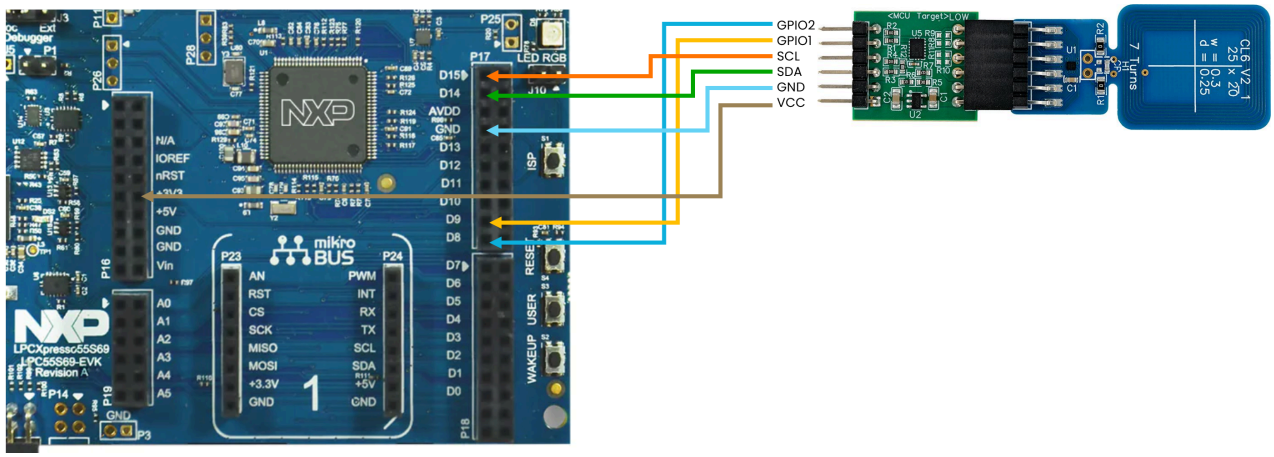


Figure 16. NTAG-X-DNA-EVAL connection to LPC55 development board

Table 7. Connections to LPC55 development board

NTAG-X-DNA-EVAL pin	LPC55 development board pin
IO2	P17 → D8
IO1	P17 → D9
SCL	P17 → D15
SDA	P17 → D14
GND	P16 → 16 (GND) or 18 (GND) / P17 → 7 (GND)
VCC	P16 → 12 (+3V3) or 14 (+5V)

2.2.1.4 NTAG-X-DNA-EVAL connection to RaspberryPi board

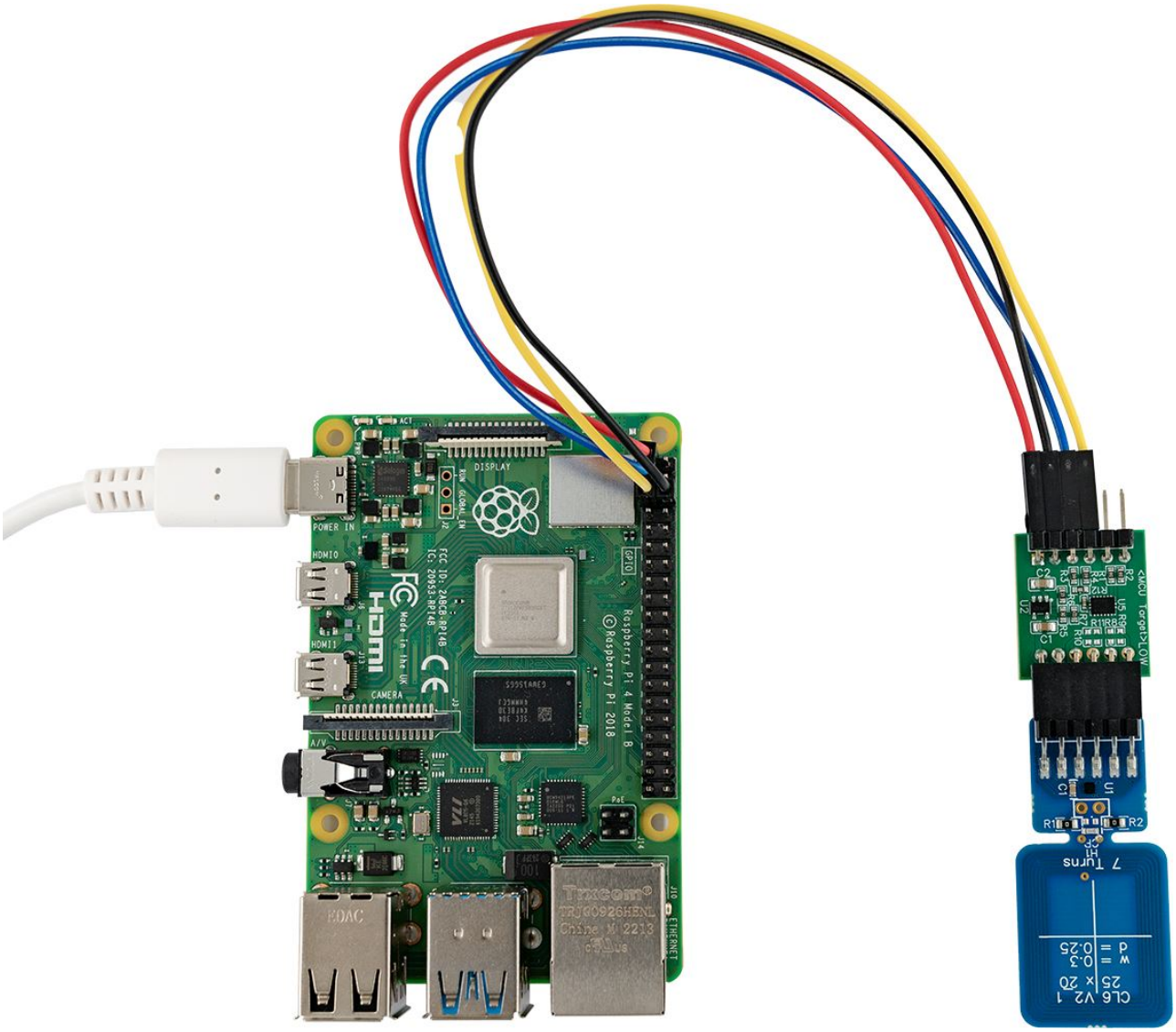


Figure 17. NTAG-X-DNA-EVAL connection to RaspberryPi board

Table 8. Connections to RaspberryPi development board

NTAG-X-DNA-EVAL pin	RaspberryPi development board pin
IO2	Pin10 (GPIO15)
IO1	Pin8 (GPIO14)
SCL	Pin5 (GPIO 3 (SCL))
SDA	Pin3 (GPIO 2 (SDA))
GND	Pin6 (Ground)
VCC	Pin1 (3V3 power)

2.2.2 NFC interfaces

For the NFC interface, a PC/SC compliant reader (NTAG X DNA middleware support), recent NXP NFC reader development board or Pegoda 3 desktop reader can be used.

Table 9. Supporting NFC devices

Part number	12NC	Description	Supporting software
Pegoda 3	935443122596	NXP PN7642 based desktop reader	• RFIDDiscover • Card Test Framework • NxpRdLib (C# .NET lib)
PC/SC reader	Any PC/SC reader	PC/SC interface reader	• NTAG X DNA middleware (through CMAKE build option) • RFIDDiscover
NFC mobile	Any NFC mobile	-	• TagWriter • TagInfo

3 Software

3.1 NTAG X DNA middleware

3.1.1 Multiplatform NTAG X DNA middleware

The NTAG X DNA middleware is a single software stack designed to facilitate the integration of NXP security ICs into your PC Host, microcontroller, or microprocessor software. This middleware has built-in cryptography and device identity features, abstracts of the commands and communication interface exposed by NXP security ICs. It is directly accessible from stacks like OpenSSL, mbedTLS, or other cryptographic libraries. It includes code examples for quick integration of features and uses cases, such as SIGMA-I, ECDSA, or AES authentication. It comes with support for various NXP MCU/MPU platforms, NFC readers and can be ported to multiple host platforms and host operating systems.

Figure 18 is a simplified representation of the layers and components of NTAG X DNA middleware:

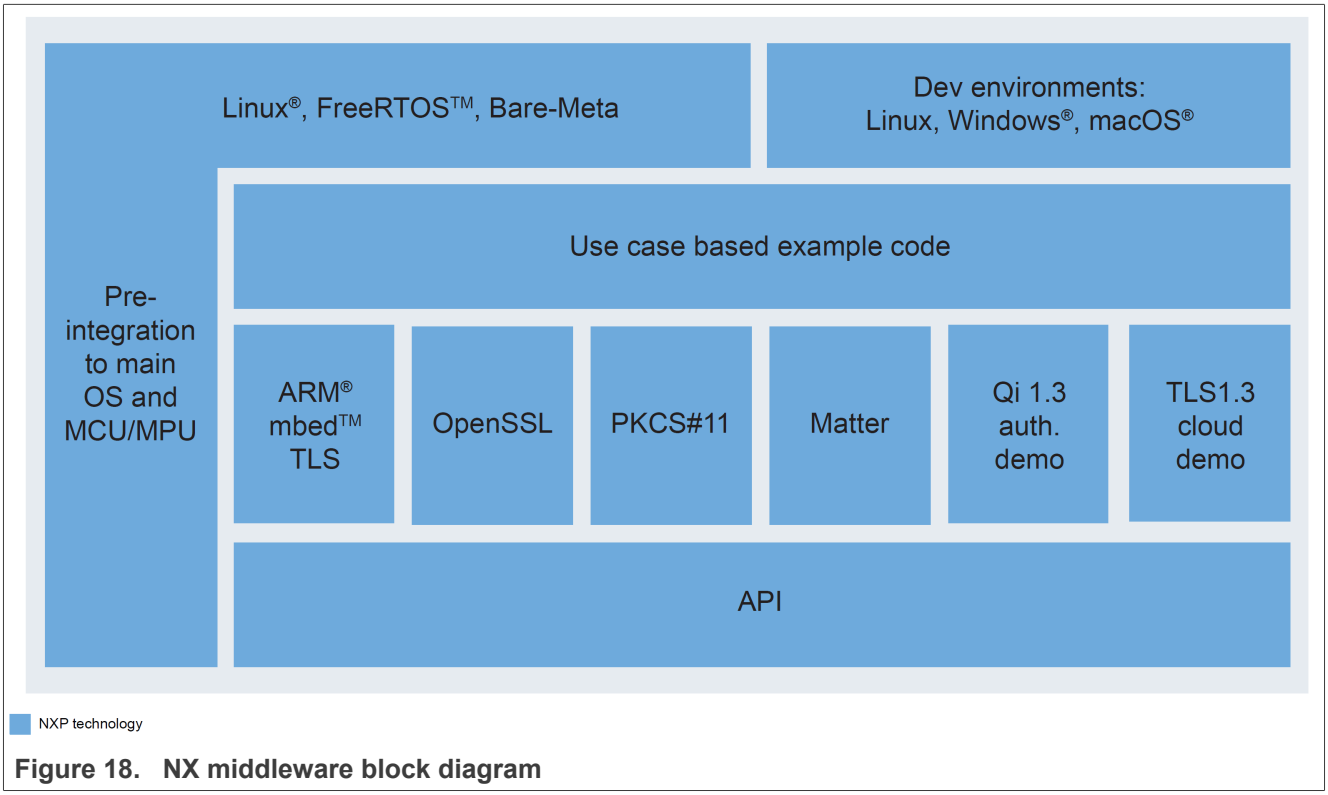


Figure 18. NX middleware block diagram

3.1.1.1 NTAG X DNA middleware availability

The latest NTAG X DNA middleware version can be found in the GitHub repository: https://github.com/NXP/nxmw.

3.1.1.2 Building and compiling the NTAG X DNA middleware

The NTAG X DNA middleware is delivered with CMake files that include a set of directives and instructions describing the project's source files and targets. The CMake files allow developers to build NTAG X DNA middleware for their target platform, enable or disable features, or to change setting flags etc. The CMake-

based compilation option is provided as a convenient way for developers to run a project example on different target platforms, for example, Windows, Linux PCs, or embedded platforms.

The project settings can be specified dynamically using the CMake GUI. Figure 19 shows a CMake GUI screenshot with NTAG X DNA project settings.

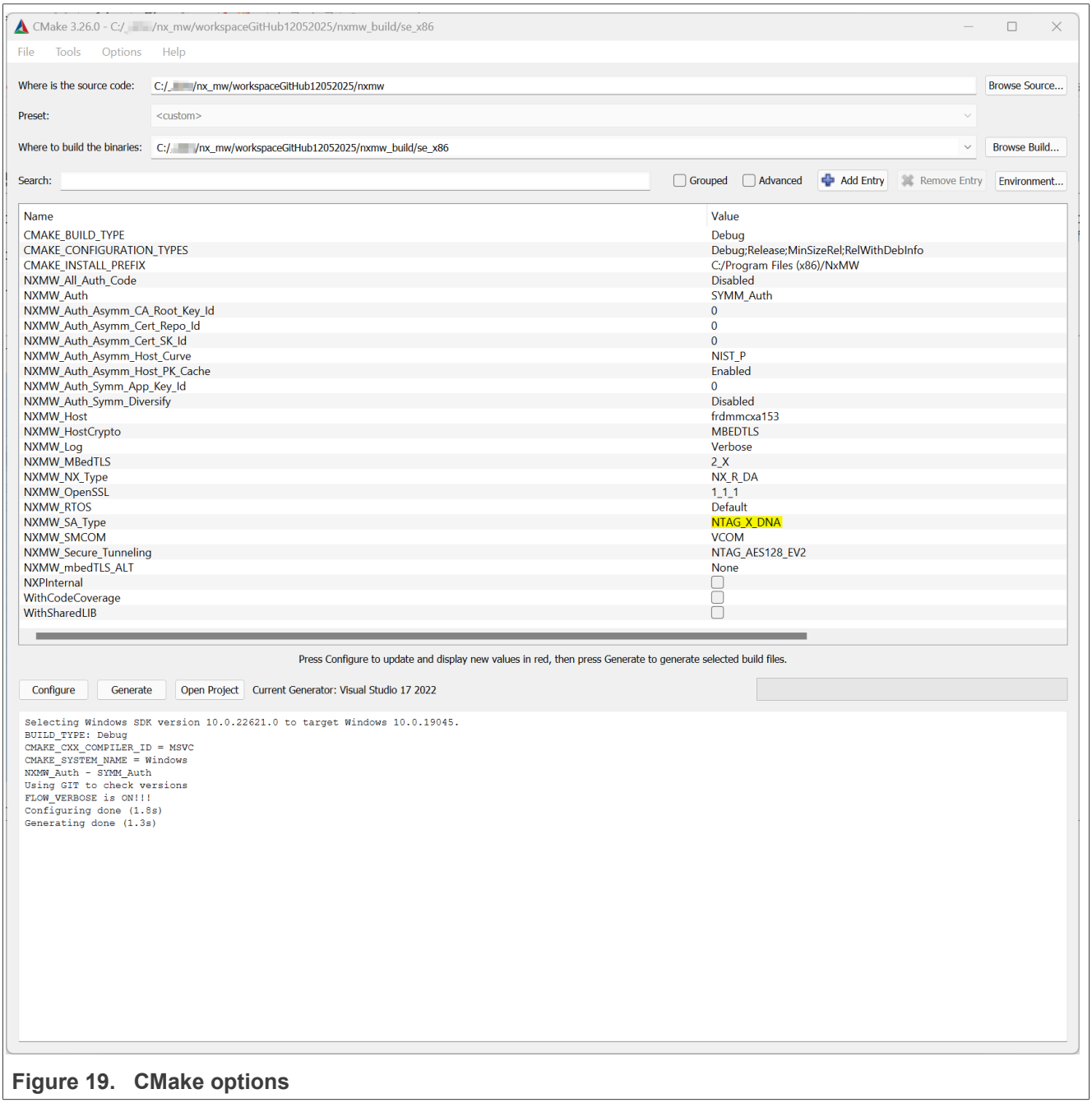


Figure 19. CMake options

3.1.1.2.1 Product specific CMake build settings

The NTAG X DNA middleware is delivered with CMake files that include the set of directives and instructions describing the project's source files and the build targets. The CMake files are used to select a dedicated application.

The NTAG X DNA product identification can be obtained as described in -TBD- *Product Information*.

3.1.2 Code documentation

The code documentation is provided as a part of the NTAG X DNA middleware package in the form of HTML and PDF (https://github.com/NXP/nxmw/tree/main/doc). The primary audiences for this HTML documentation are programmers, developers, system architects, and system designers. It includes:

- Technical API reference guide
- Instructions to compile and build NTAG X DNA middleware
- Developer guides to execute the demo and examples´

4 Support documentation

The NTAG X DNA support package includes extensive application notes, user guides that explain NTAG X DNA features, use cases, and how to try out the example code and demo examples provided in the NTAG X DNA middleware.

Table 10 summarizes the NTAG X DNA documentation available.

Table 10. NTAG X DNA support documentation

Document	Title
AN14137	NTAG X DNA - Features and hints ref.[2]
AN14123	NX middleware documentation (included in archive of the middleware sources)
AN14362	NTAG X DNA - Energy Harvesting ref.[3]
AN14513	NTAG X DNA - Dual Interface ref.[4]
AN14326	NTAG X DNA - Antenna Design Guide ref.[5]
UG10083	NTAG X DNA - Quick start guide with product support package (this document) ref.[6]

5 References

[1] Data sheet - NTAG X DNA - Secure NFC Forum T4T compliant IC with PKI (Public Interface Structure) (link)
[2] Application note - AN14137 - NTAG X DNA - Features and hints (link)
[3] Application note - AN14362 - NTAG X DNA - Energy harvesting (link)
[4] Application note - AN14513 - NTAG X DNA - Dual Interface (link)
[5] Application note - AN14216 - NTAG X DNA - Antenna Design Guide (link)
[6] User guide - UG10083 - NTAG X DNA - Quick start guide with support package (link)

6 Revision history

Table 11. Revision history

Document ID	Release date	Description
UG10083 v.1.2	27 May 2025	Editorial changes. Document security status changed to "public". • Section 1 "About NTAG X DNA ": updated. • Section 2.1.4 "Radio Equipment Directive (RED)": updated. • Section 2.2.1 "MCU/MPU boards": updated. • Section 2.2.1.1 "NTAG-X-DNA-EVAL connection to FRDM-MCXA153 development board": added. • Section 2.2.1.2 "NTAG-X-DNA-EVAL connection to FRDM-MCXN947 development board": added. • Section 2.2.1.3 "NTAG-X-DNA-EVAL connection to LPC55 development board": updated. • Section "NTAG-X-DNA-EVAL connection to FRDM-K64 development board": removed. • Section 2.2.2 "NFC interfaces": updated. • Section 3.1 "NTAG X DNA middleware": updated. • Section 3.1.2 "Code documentation ": updated. • Section 4 "Support documentation": updated. • Section 5 "References": updated.
UG10083 v.1.1	11 April 2025	• Section 1 "About NTAG X DNA ": updated • Section 2 "Hardware": added • Section 3 "Software": added • Section 3.1 "NTAG X DNA middleware": updated • Section 4 "Support documentation": updated • Section 5 "References": updated
UG10083 v.1.0	28 July 2024	• Initial version

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