![ST life.augmented logo]

Getting started with the NFC card reader expansion board based on ST25R200 for STM32 Nucleos
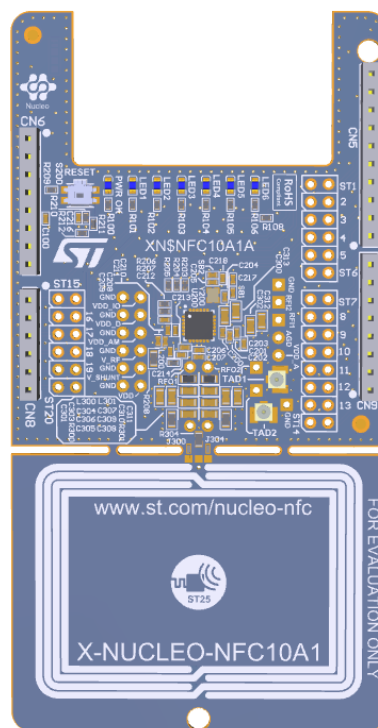
Introduction

The X-NUCLEO-NFC10A1 NFC card reader expansion board is based on the ST25R200 device.

The expansion board supports ISO14443A/B and ISO15693.

The ST25R200 manages frame coding and decoding in reader mode for standard applications, such as NFC, proximity, and vicinity HF RFID standards. It supports ISO/IEC 14443 type A/B and ISO/IEC 15693 RF communication protocols as well as the detection, reading and writing of NFC Forum type 1, 2, 4, and 5 tags.

It embeds a low power wake-up system capable of detecting an approaching tag. It also features a low power RC oscillator and wake-up timer to wake up the device automatically after a selected time period and check for a tag presence.

Figure 1. X-NUCLEO-NFC10A1 expansion board

Notice: *For dedicated assistance, please submit a request through our online support portal at **www.st.com/support**.*

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For further information contact your local STMicroelectronics sales office.

www.st.com

1 Getting started

1.1 Overview

The X-NUCLEO-NFC10A1 expansion board features:

- On-board NFC card reader IC: ST25R200
- 47 mm x 34 mm, four-turn 13.56 MHz inductive antenna etched on PCB and associated tuning circuit
- RC low power wake-up
- Equipped with Arduino® UNO R3 connector
- Free comprehensive development firmware library compatible with STM32Cube and samples for ST25R200
- Scalable solution for multiple board cascade
- Six general-purpose LEDs
- CE, UKCA, FCC, ISED certified
- RoHS and WEEE compliant

1.2 Board connection

Connect the X-NUCLEO-NFC10A1 to an STM32 Nucleo-64 development board via Arduino® UNO R3 connectors.

The PC USB port has to be capable of delivering at least 300 mA at 5 V supply.

A green LED indicates whether the 5 V supply is present, while the six status LEDs are controlled via MCU.

Provision for unpopulated jumpers enable alternative connections of all lines (except the SPI) to the STM32 MCU.

The board is connected to a power supply or a PC. It should be used on a clean and non-flammable surface.

1.3 Hardware requirements

The X-NUCLEO-NFC10A1 expansion board is designed to be used with any STM32 Nucleo board, although complete testing has been performed using the NUCLEO-G071RB hosting the STM32G071RB microcontroller.

The STM32 Nucleo firmware and the related documentation are available at http://www.st.com/stm32nucleo.

1.4 System requirements

To use STM32 Nucleo boards with the X-NUCLEO-NFC10A1 expansion board the following software and hardware are required:

- an STM32 Nucleo-64 development board
- a Windows® PC to install the firmware package
- a USB type A to Micro-B USB cable to connect the STM32 Nucleo board to the PC
- the unit must be supplied by a safety extra low voltage with falling characteristics (<5 V, <15 W), according to EN60950-1. This power supply has to be classified as ES1 (Electrical Source1), PS1 according to EN62368-1

To install the board firmware package (order code: X-CUBE-NFC10) the PC must have:

- 128 MB of RAM
- 40 MB of free hard disk space

The X-CUBE-NFC10 firmware and the related documentation are available at

www.st.com.

2 Board setup

To set up the board:

Step 1. Connect the X-NUCLEO-NFC10A1 expansion board to the STM32 Nucleo board from the top through the Arduino® UNO R3 connectors

Step 2. Power the STM32 Nucleo board using a Micro-B USB cable

Step 3. Program the firmware on the STM32 Nucleo board using the provided example

Step 4. Reset the MCU using the reset button available on the STM32 Nucleo board.
The evaluation kit is ready to be used.

3 Hardware

The X-NUCLEO-NFC10A1 expansion board allows the user to test the functionality of the ST25R200, which supports the reader/writer modes.

The ST25R200 IC module and the STM32 Nucleo board are connected through CN5, CN6, CN8 and CN9 connectors (see the tables below.

Table 1. Interconnections between the X-NUCLEO-NFC10A1 expansion board and the NUCLEO-G071RB board (left side)

Signal	Connector	Pin number	NUCLEO-G071RB	X-NUCLEO-NFC10A1
NC	CN6 Power	1	PD1	-
IOREF		2	IOREF	(NC)
RESET		3	NRST	-
3V3		4	3V3	3V3 (VDD_IO)
5V		5	5V	5V (VDD)
GND		6	GND	GND
GND		7	GND	GND
VIN		8	VIN	-
A0	CN8 Power	1	PA0	IRQ_MCU
A1		2	PA1	MCU_LED1
A2		3	PA4	MCU_LED2
A3		4	PB1	MCU_LED3

Table 2. Interconnections between the X-NUCLEO-NFC10A1 expansion board and the NUCLEO-G071RB board (right side)

Signal	Connector	Pin number	NUCLEO-G071RB	X-NUCLEO-NFC10A1
GND	CN5 Digital	7	GND	GND
D13		6	PA5	SCLK_MCU
D12		5	PA6	MISO_MCU
D11		4	PA7	MOSI_MCU
D10		3	PB0	/SS_MCU
D8		1	PA9	RESET
D7	CN9 Digital	8	PA8	MCU_LED4
D6		7	PB10	MCU_LED5
D5		6	PB4	MCU_LED6

3.1 Host interface and GPIO connection

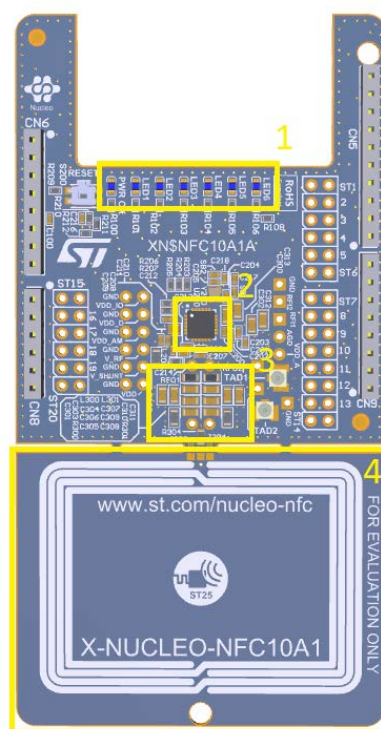The X-NUCLEO-NFC10A1 expansion board contains the ST25R200-BMET chip and is powered by the STM32 Nucleo board.

The ST25R200 is driven by the microcontroller via SPI interface.

The six LEDs indicate the detected RFID technology.

3.2 X-NUCLEO-NFC10A1 expansion board component placement

Figure 2. X-NUCLEO-NFC10A1 component placement

1. General purpose LEDs
2. ST25R200
3. Matching circuit
4. 47x34 mm four-turn antenna

3.3 ST25R200 device

The ST25R200 is a high performance NFC device that includes an advanced analog front end (AFE) and a highly integrated data framing system for:

- NFC-A/B (ISO 14443A/B) reader
- NFC-V (ISO 15693) reader up to 53 kbps

Special mode of the AFE and framing system can be used to implement other custom protocols such as MIFARE® classic.

6 Board versions

Table 4. X-NUCLEO-NFC10A1 versions

PCB version	Schematic diagrams	Bill of materials
X$NUCLEO-NFC10A1 [1]	X$NUCLEO-NFC10A1 schematic diagrams	X$NUCLEO-NFC10A1 bill of materials

1. This code identifies the X-NUCLEO-NFC10A1 expansion board first version. It is printed on the board PCB.

7 Federal Communications Commission (FCC) and Innovation, Science and Economic Development Canada (IC) compliance

7.1 FCC Compliance Statement

7.1.1 Part 15.19

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

7.1.2 Part 15.21

Any changes or modifications to this equipment not expressly approved by STMicroelectronics may cause harmful interference and void the user's authority to operate this equipment.

7.1.3 Part 15.105

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

—Reorient or relocate the receiving antenna.

—Increase the separation between the equipment and receiver.

—Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

—Consult the dealer or an experienced radio/TV technician for help.

7.1.4 FCC ID

FCC ID: YCPNFC10A1

7.2 Formal notices required by Innovation, Science and Economic Development Canada ("IC"

7.2.1 Compliance statement

This device complies with Innovation, Science and Economic Development Canada's license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation.

7.2.2 Compliance declaration

This device contains license-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's license-exempt RSS(s). Operation is subject to the following two conditions:

(1) This device may not cause interference.

(2) This device must accept any interference, including interference that may cause undesired operation of the device.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

1) L'appareil ne doit pas produire de brouillage;

2) L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

7.2.3 IC ID

IC ID: 8967A-NFC10A1

Note: *The grantee is not responsible for any changes or modifications not expressly approved by the party responsible for compliance. Such modifications could void the user's authority to operate the equipment.*

8   Europe and UK regulatory compliance information

Notice for the European Union

The X-NUCLEO-NFC10A1 is in conformity with the essential requirements of the Directive 2014/53/EU (RED) and of the Directive 2015/863/EU (RoHS). Applied harmonized standards are listed in the EU Declaration of Conformity.

Notice for United Kingdom

The X-NUCLEO-NFC10A1 is in compliance with the UK Radio Equipment Regulations 2017 (UK SI 2017 No. 1206 and amendments) and with the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012 (UK SI 2012 No. 3032 and amendments). Applied standards are listed in the UK Declaration of Conformity.

Revision history

Table 5. **Document revision history**

Date	Revision	Changes
02-Jul-2024	1	Initial release.

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IMPORTANT NOTICE – READ CAREFULLY