UM11737

NCX3310 evaluation board

Rev. 1.0 — 22 August 2022   **User manual**

Document information

Information	Content
Keywords	NCx3310, NFC TAG IC, Automotive, Secure Car Access
Abstract	This document describes how to get started and evaluate the NCx3310 using an NCX3310 Evaluation Board.

Revision history

Rev	Date	Description
v.1.0	20220822	Initial version

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	NXP provides the product under the following conditions:
	This evaluation kit is for use of ENGINEERING DEVELOPMENT OR EVALUATION PURPOSES ONLY. It is provided as a sample IC pre-soldered to a printed-circuit board to make it easier to access inputs, outputs and supply terminals. This evaluation board may be used with any development system or other source of I/O signals by connecting it to the host MCU computer board via off-the-shelf cables. This evaluation board is not a Reference Design and is not intended to represent a final design recommendation for any particular application. Final device in an application heavily depends on proper printed-circuit board layout and heat sinking design as well as attention to supply filtering, transient suppression, and I/O signal quality.
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1 Introduction

This board provides an easy and quick evaluation and development environment for NCx3310 enabled applications, especially for those leveraging I^{2}C leader, I^{2}C follower, Bluetooth Pairing, Energy Harvesting use cases. A broad selection of software packages is available, which are based on modular examples. A broad selection of software packages is available. These packages are based on modular examples. These examples can be easily extracted and reused on any other platform. The NCX3310 evaluation board can be stacked on single-board computer boards, MCU evaluation boards, such as the NXP LPCXpresso Boards and NXP Freedom Boards, or be used standalone.

Note: The antenna part can be broken off and replaced by any other antenna to fit the desired application.

1.1 Potential applications

- BT and WiFi pairing
- Rear seat entertainment
- Personalization and diagnostics
- Connected keys for connected cars
- Originality check of auto parts

2 Finding kit resources and information on the NXP web site

NXP Semiconductors provides online resources for this evaluation board and its supported device(s) on http://www.nxp.com.

The information page for the NCX3310EVB evaluation board is at https://www.nxp.com/products/security-and-authentication/secure-car-access/nfc-forum-compliant-tag-ic-with-ic-for-automotive:NCx3310. The information page provides overview information, documentation, software and tools, parametrics, ordering information and a **Getting Started** tab. The Getting Started tab provides quick-reference information applicable to using the NCX3310EVB evaluation board, including the downloadable assets referenced in this document.

3 Getting ready
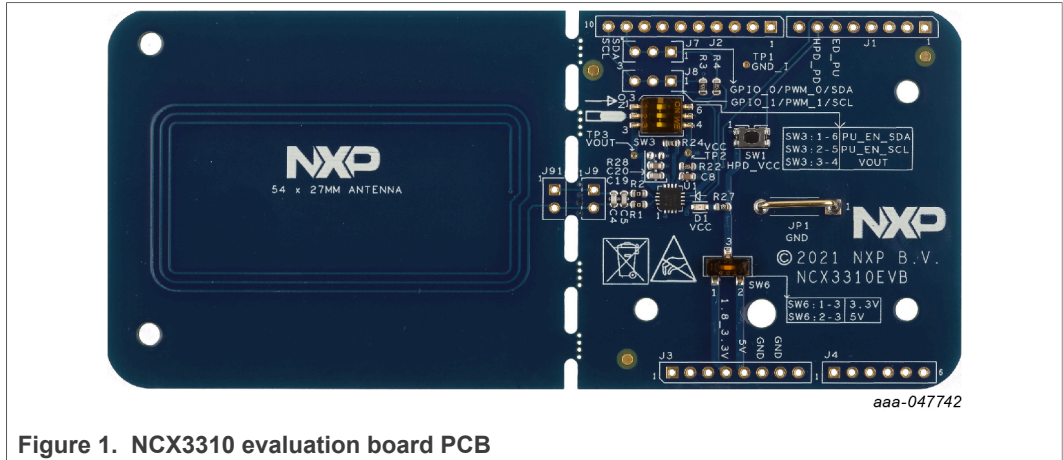
NCX3310 evaluation board package includes:

Figure 1. NCX3310 evaluation board PCB

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. NCX3310EVB evaluation board

Part number	RF Technology	Frequency ranges	Maximum transmitted power
NCX3310EVB	NFC Type 5 Tag	13.54 MHz ± 423.75 KHz	N/A

Europeon Declaration of Conformity, simplified DoC per Article 10.9 of the Radio Equipment Directive 2014/53/EU

This apparatus, namely NCX3310EVB, conforms to the Radio Equipment Directive 2014/53/EU. The full EU Declaration of Conformity for this apparatus can be found at this location: https://single-market-economy.ec.europa.eu/sectors/electrical-and-electronic-engineering-industries-eei/radio-equipment-directive-red_en

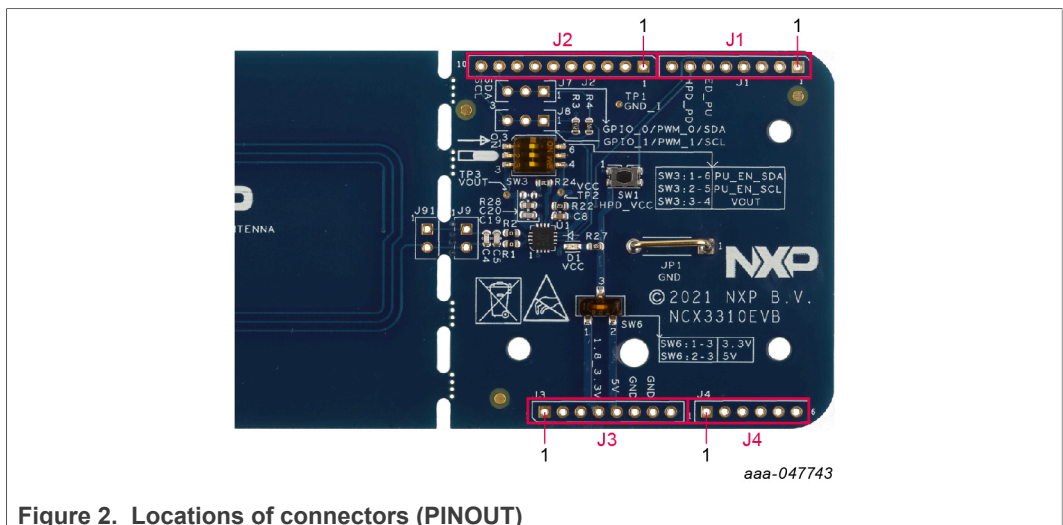## 3.1 Getting to know the hardware

3.1.1 Connector PINOUT description

Figure 2. Locations of connectors (PINOUT)

Table 2. OM2NTP5332 pinout description

Number	Net name	Description
J1:6	ED_PU	Event detection pin. Open drain. Pulled up to Vcc by R22 (4.7 kΩ).
J1:7	HPD_PD	Hard-power-down pin. Pulled down to GND by R24 (10 kΩ).
J2:7	GND	Ground
J2:9	SDA	Multiplexed pin: I^{2}C SDA data line / GPIO1. Can be optionally pulled up to Vcc by switch SW3:2 on position, R26 (4.7 kΩ).
J2:10	SCL	Multiplexed pin: I^{2}C SCL data line / GPIO0. Can be optionally pulled up to Vcc by switch SW3:1 on position, R25 (4.7 kΩ).
J3:4	P1V8_3V3_BRD	Lower-voltage source from underlaying board (e.g. MCU board), usually 3.3 V.
J3:5	P5V0	Higher-voltage source from underlaying board (e.g. MCU board), usually 5 V.
J3:6	GND	Ground
J3:7	GND	Ground

3.1.2 Switches and other components description
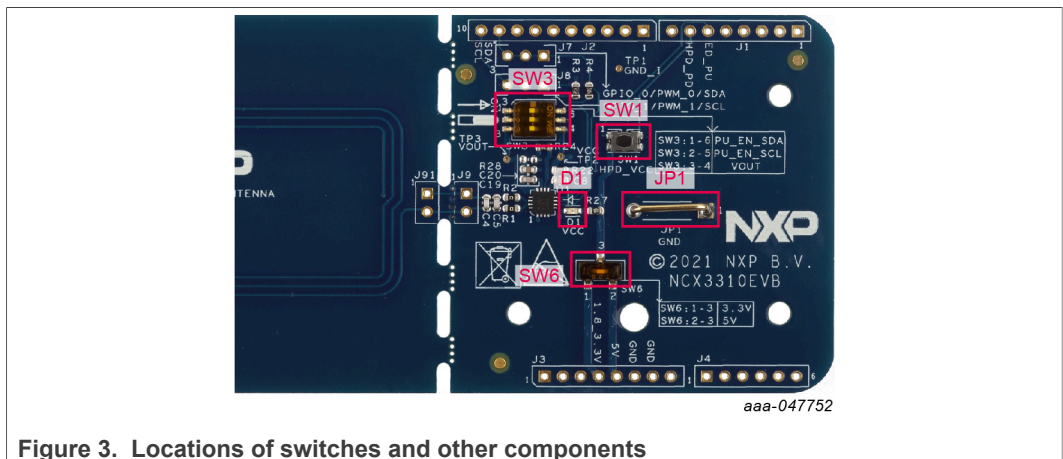

aaa-047752

Figure 3. Locations of switches and other components

Table 3. OM2NTP5332 switches and other components description

Number	Net name / Options	Description
SW3	1-6: PU_EN_SCL	With ON position, Pullup R25 engaged.
	2-5: PU_EN_SDA	With ON position, Pullup R26 engaged
	3-4: VOUT	With ON position, NCx3310's VOUT connected to VCC (a must for energy harvesting)
SW1	HPD_VCC	When HPD is pulled to VCC, NCx3310 enters High Power-down mode. When released, NCx3310 exits from HPD mode. Can be used as NCx3310 reset.
SW6	1.8 - 3.3 V	VCC chooser. It only connects voltage from underlaying board or source to the NCx3310 and whole PCB.
	5 V	
D1	D1	Green LED
JP1	GND	Jumper for easy access to GND.

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3.1.3 Schematics

The schematic of the evaluation board can be seen below.
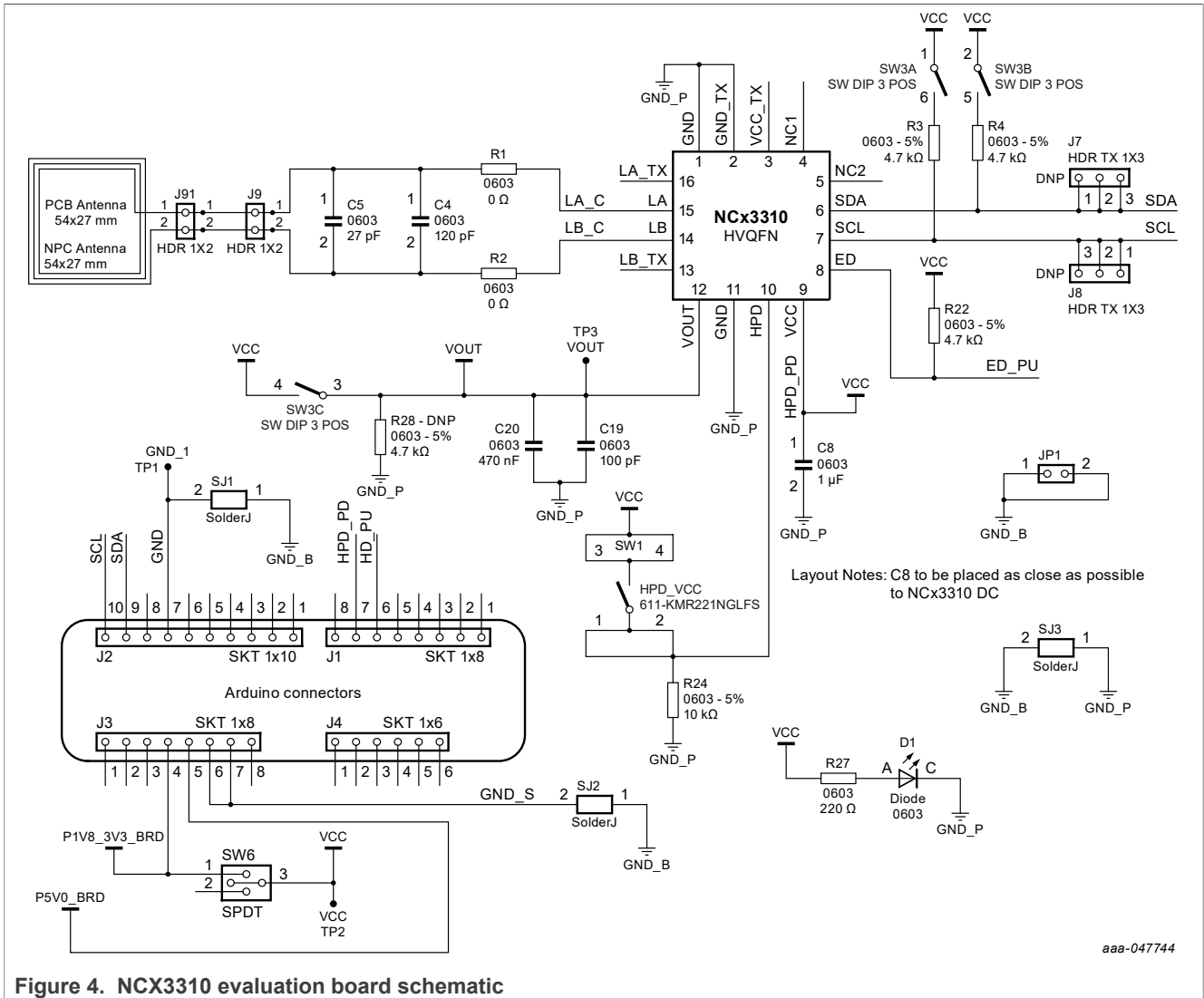

Figure 4. NCX3310 evaluation board schematic

The board layout and bill of materials for the NCX3310EVB evaluation board are available at www.nxp.com/NCX3310EVB.
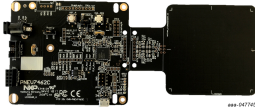
4   Optional hardware that is supported for development

This section lists optional supported hardware that are not included in the board. This hardware eases evaluation and enables faster integration or portation to other similar devices. Optional hardware is ordered separately.

Table 4. Supported optional hardware (NOT included in the board). Needs to be ordered separately.

	Item 1	Item 2	Item 3	Item 4
Description	NFC mobile	RF (ISO15693) reader	MCU development board	NFC Door handle reference design

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Table 4. Supported optional hardware (NOT included in the board). Needs to be ordered separately. *...continued*

	Item 1	Item 2	Item 3	Item 4
Purpose	Developing Android-based applications	Developing VCD (RF, NFC) applications. Either FW or higher software layer.	Developing MCU based I^2C Follower, GPIO, PWM use cases.	Evaluation of I^2C leader, Energy Harvesting use cases
Picture		pnev7462c reader development board	LPCXpresso board for LPC11U37H	FRDM-KW41Z development board
Section in this document	Section 4.1	Section 4.2	Section 4.3	DHRD FreeMASTER SW Tool
Buying options		Via NXP's distribution or through nxp.com.	Via NXP's distribution or through nxp.com.	Via nxp .com

4.1 Mobile NFC application development

Developing Android-based applications.

Hardware:

1. Device with integrated NFC.

Software:

1. TapLinx (Android only) (mifare.net)
2. NCx3310 Configuration over NFC Interface
3. Use cases examples (Bluetooth pairing, energy harvesting, I^2C Leader mode) using native Android NFC application.

Additional documentation:

- NCx3310 configuration from RF interface
- NFC Forum Type 5 Tag configuration
- NFC Forum NDEF
- I^2C leader
- I^2C follower
- Energy harvesting
- Event detection
- Protecting user memory and features, security

4.2 RF (ISO15693) reader development

Easy RF evaluation of NCx3310 features. Also for developing VCD (RF, NFC) applications, either FW or higher layer software.

NCx3310 features that can be evaluated:

- NCx3310 configuration from RF interface

- I^{2}C leader
- I^{2}C follower
- Pass-through mode
- PHDC data transfer
- Energy harvesting
- GPIO
- PWM
- Event detection
- Security
- NDEF

Hardware:

Figure 5. pnev7462c reader development board
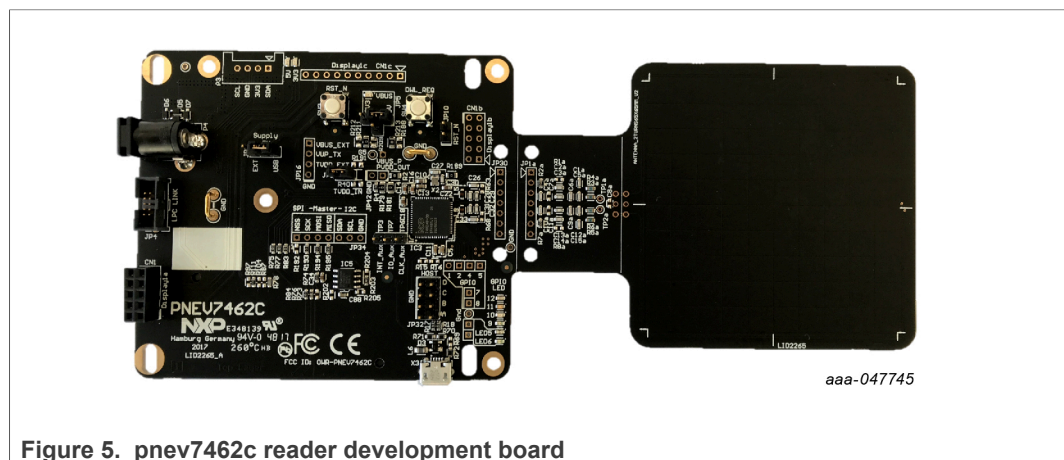
Software:

- GUI
  - RFIDDiscover ([DocStore](#))
  - NFCCockpit ([nxp.com](#))
- Firmware: NFC Reader Library ([DocStore](#))
- .NET: NXP Reader Library ([DocStore](#))

Additional Documentation:

- NCx3310 configuration from RF interface
- I^{2}C leader
- I^{2}C follower
- Energy harvesting
- GPIO
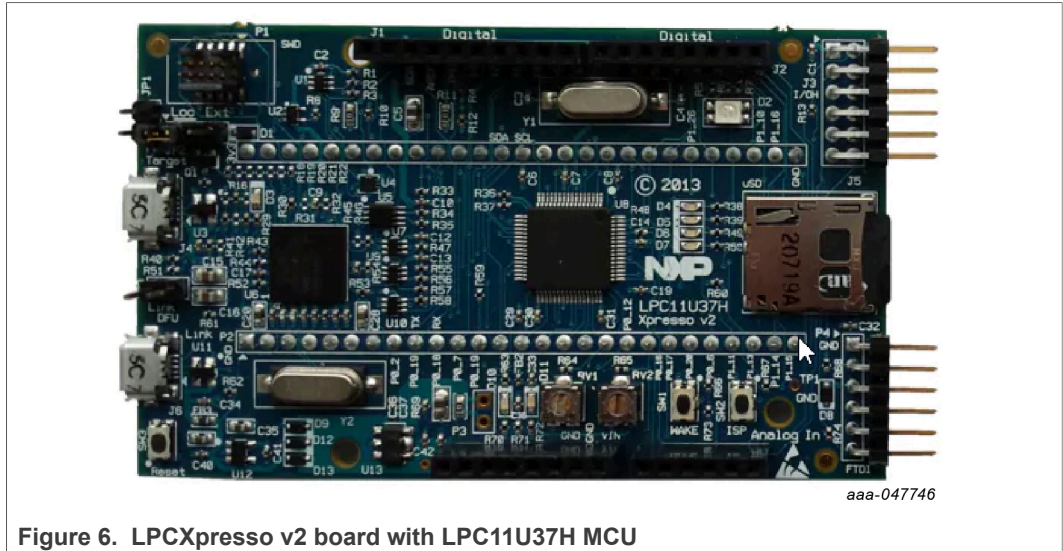- Event detection

4.3 LPC11U37H MCU based

Hardware:

Figure 6. LPCXpresso v2 board with LPC11U37H MCU

Software:

- Use cases Code examples:
  - GPIO
  - Pass-through mode
- GUI - NTAG cockpit (easy I^{2}C access)

Documentation:

- NTAG 5 configuration from I^{2}C interface
- I^{2}C leader
- I^{2}C follower
- Energy harvesting
- GPIO
- Event detection
- NTAG 5 middleware porting guide

4.4 DHRD FreeMASTER tool

Easy I^{2}C Leader mode evaluation of NCx3310. I^{2}C Leader mode can be evaluated with any I^{2}C based sensor IC. Detailed description can be found in: UM-SCA1702 - NCx3320 Door Handle Reference Design User Manual.
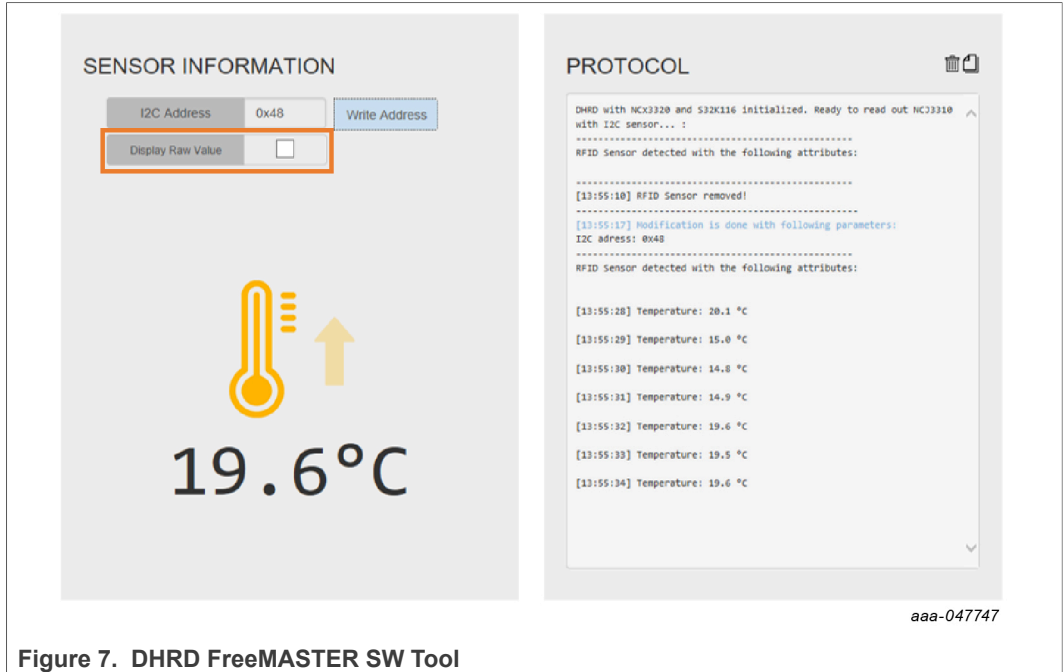
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Figure 7. DHRD FreeMASTER SW Tool

Hardware:

1. NCx3320 door handle reference design [UM-SCA1702 - NCx3320 Door Handle Reference Design User Manual]
2. I^{2}C follower IC

Software:

1. NCx3320 DHRD SW Tool

Additional documentation:

- NCx3310 configuration from RF interface
- I^{2}C Leader
- Energy harvesting
- DHRD user manual: [UM-SCA1702 - NCx3320 Door Handle Reference Design User Manual]

5 Abbreviations

Table 5. Abbreviations

Acronym	Description
EEPROM	Electrically Erasable Programmable Read-Only Memory
GPIO	General Purpose Input/Output
I^{2}C	Inter-Integrated Circuit
NFC	Near-Field Communication
PHDC	Personal Health Device Communication
POR	Power-On Reset
PWM	Pulse-Width Modulation
RF	Radio Frequency

Table 5. Abbreviations...*continued*

Acronym	Description
SRAM	Static Random-Access Memory

6   References

[1]   AN_SCA 2023   NCx3310 - Use of GPIO and Event detection

[2]   AN_SCA 2019   NCx3310 - Bidirectional Data Exchange

[3]   AN_SCA   2016 NCx3310 - Energy Harvesting

[4]   AN_SCA   2021 NCx3310 - Memory Configuration and Scalable Security

[5]   AN_SCA   2020 NCx3310 - I^2C Leader mode

[6]   UM-SCA1702   NCx3320 - Door Handle Reference Design User Manual

[7]   UM_SCA   2004 NCx3310 - LPC11U37 firmware development

[8]   UM-SCA1702   NCx3320 - Door Handle Reference Design User Manual

[9]   AN_SCA   2018 NCx3310 - Antenna Design guide for Active Load Modulation

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