

# AN14335

## PN7220 Frequently asked questions

Rev. 1.0 — 29 August 2024

Application note

### Document information

Information	Content
Keywords	PN7220, EMVCo, NFC Forum, Android
Abstract	This document covers frequently asked questions about PN7220 in a question-answer style.



## 1 Introduction

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This document is a collection of frequently asked questions about PN7220.

For more information, refer to the PN7220 product page [\[1\]](#) and related documentation (see [Section 13](#)).

## 2 How to build GSI image with PN7220 MW?

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When using a GSI image, users need to include all MW changes introduced by NXP into this specific build. In case of any differences, the user must correct them. See [\[2\]](#) for information on how to include NXP changes into AOSP code. The same (with possible changes) is needed also with GSI image.

## 3 What to do when the following error is reported: Ignore shared library com.nxp.nfc: /system/framework/com.nxp.nfc.jar does not exist

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If MW is reporting the error `Ignore shared library com.nxp.nfc: /system/framework/com.nxp.nfc.jar does not exist`, check if `com.nxp.nfc.jar` exists in the `out/target/product/name_of_board/system/framework/` folder. If not, follow the steps found in [\[2\]](#) chapter 3, subchapter 3.1 (see step 8 for explanation).

## 4 What to do when the following error is reported: Ignore shared library com.nxp.emvco.jar: /system/framework/ com.nxp.emvco.jar does not exist

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If MW is reporting the error `Ignore shared library com.nxp.emvco.jar: /system/framework/ com.nxp.emvco.jar does not exist`, check if `com.nxp.emvco.jar` exists in `out/target/product/name_of_board/system/framework/` folder. If not, follow the steps found in [\[2\]](#) chapter 3, subchapter 3.1 (see step 8 for explanation).

## 5 What to do when VTS and CTS tests are failing?

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When VTS/CTS tests fail, report the failure to NXP by contacting your CAS contact person. Provide the following information:

- the test case that led to the failure,
- debug log of the test case.

Make sure that debug logs are enabled to record information about the failure.

To enable logs, set the flags in specific configuration files to following values:

```
libnfc-nci.conf
NFC_DEBUG_ENABLED=0x01
```

```
libnfc-nxp.conf
NXPLOG_EXTNS_LOGLEVEL=0x03
NXPLOG_NCIHAL_LOGLEVEL=0x03
NXPLOG_NCIX_LOGLEVEL=0x03
NXPLOG_NCIR_LOGLEVEL=0x03
NXPLOG_FWDNLD_LOGLEVEL=0x03
NXPLOG_TML_LOGLEVEL=0x03
```

## 6 How to get PRBS NCI commands?

First, refer to the user manual [4]. Since PN7220 also supports the NFC Cockpit [5], user can get different NCI commands (also for RF settings) inside the Cockpit tool. See [6] for installation instructions. See Figure 1 on how to get the NCI commands for PRBS. Follow the steps below:

1. Select "PRBS" tab (red square)
2. Configure PRBS (orange square)
3. Start/Stop PRBS (green square)
4. Check "Log Monitor" to get the NCI commands

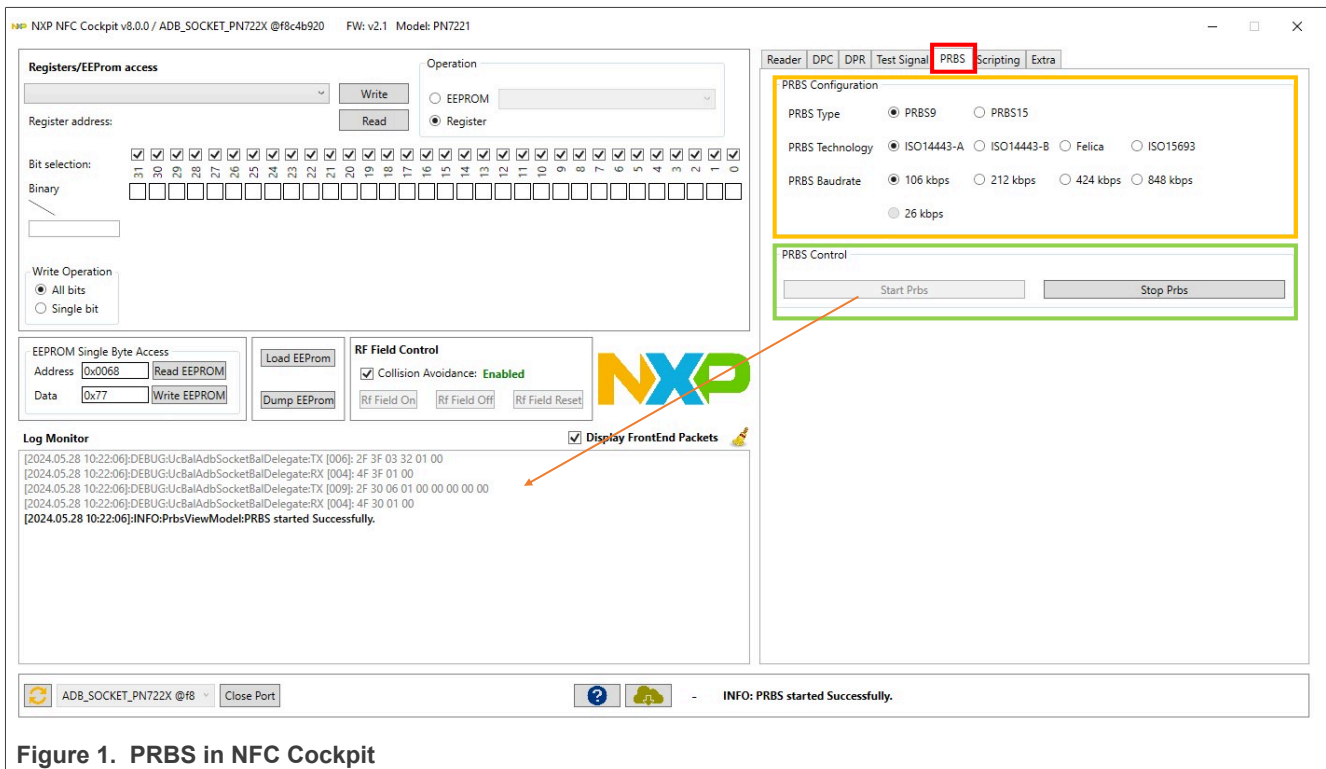


Figure 1. PRBS in NFC Cockpit

## 7 Why does the FW update not work?

NXP supports two versions of PN7220: (check [6] for more details)

- Single-Host
- Dual-Host

In Dual-Host mode, FW update is possible only via Secure MCU and not Android host.

In Single host mode, FW update is possible from Android host. See [6], chapter "Firmware update" for detailed information on requirements and instructions for performing the FW update.

## 8 There is no communication between PN7220 and Android host. What can I do?

First, check the *adb logcat* logs. Inside the logs, users should search for driver probing. If this action was successful, a log as shown in [Figure 2](#) is outputted (specific information in the resulting log may differ):

```
nfc_i2c_dev_init: Loading NXP NFC I2C driver
nfc_i2c_dev_probe: i2c slave address 0x28
nfc_parse_dt: irq 86
nfc_parse_dt: 86, 84, 87, 85, 140, 141, 138, 139
nfc_i2c_dev_probe: requesting IRQ 152
nfc_i2c_dev_probe: requesting IRQ 207
nfc_i2c_dev_probe: probing nfc i2c successfully
init      : Loaded kernel module /lib/modules/nxpnfc-i2c.ko
```

Figure 2. Driver probing

Following this, ensure that all physical connections are correct. The easiest way is to use a logic analyzer. If the actions presented in this chapter do not bring any success, contact NXP and send the logs (including Android bootup and debug level enabled) for an analysis.

## 9 What happens with the VEN pin, when the NFC button is toggled in Android?

In Android, users can enable or disable NFC with a button:

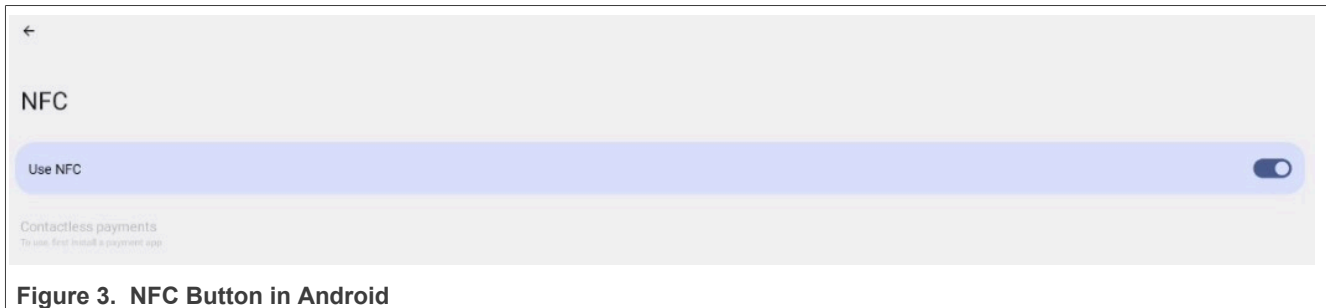


Figure 3. NFC Button in Android

By default, the VEN pin goes to low when users disable NFC in Android (see [Figure 4](#)). When NFC is enabled, the VEN pin goes to high again (see [Figure 5](#)). If this is not the case within the customer environment, then either, changes were made by the user, or integration was not performed correctly. If the cause is incorrect integration, refer to [\[2\]](#) for a step-by-step guide on how to correctly integrate NXP changes into AOSP code.

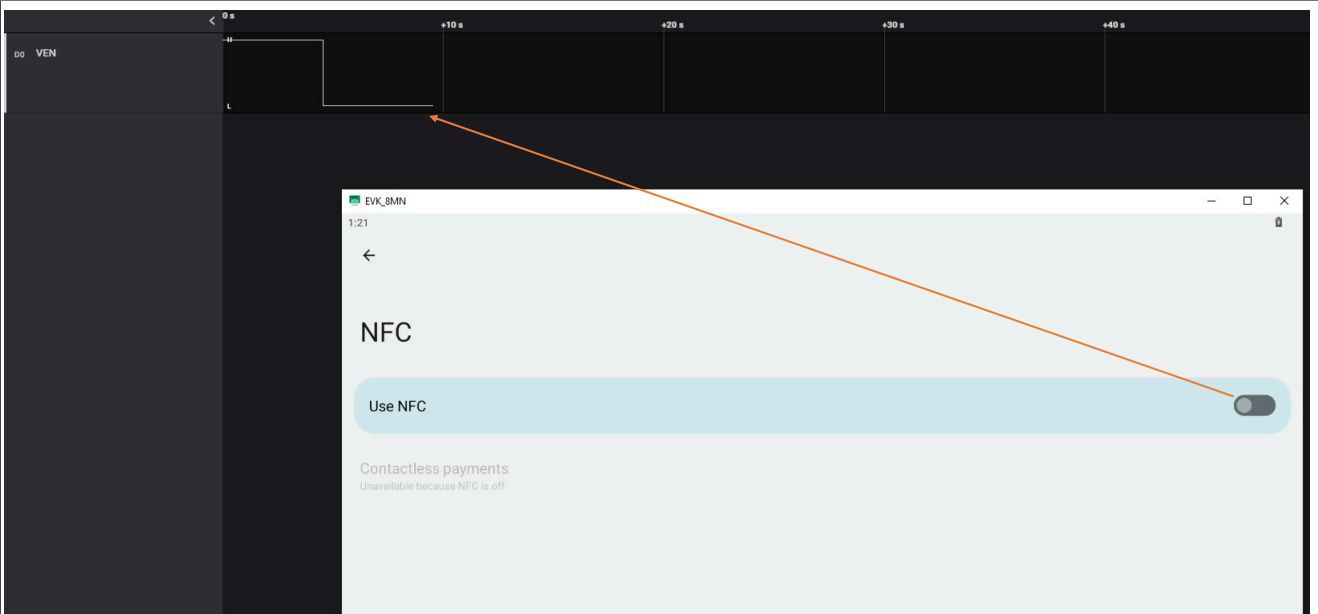


Figure 4. NFC Button to Off

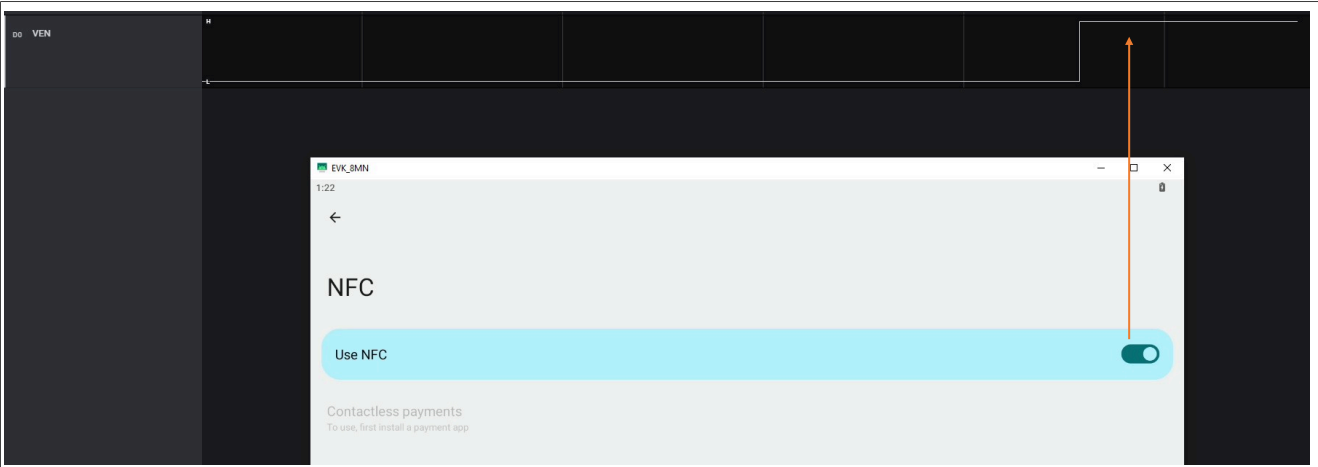


Figure 5. NFC Button to On

## 10 I cannot use the NFC Button in Android since it is disabled. What can I do?

See [\[2\]](#) and ensure that all steps were followed correctly. In most cases, this issue is caused by incorrect integration of changes provided by NXP.

## 11 There is an RF field constantly ON or OFF, what do I need to do?

Provide NXP with a detailed description on how **the issue can be reproduced** and logs from bootup until issue observed if possible. If this is a long-running test, provide two separate logs:

1. bootup logs
2. issue observation

If the issue does not occur every time, provide logs of both successful and unsuccessful test cases recorded by the same card.

It is important that the flags inside the configuration files are configured as follows:

Inside *libnfc-nxp.conf*:

```
NXPLOG_EXTNS_LOGLEVEL=0x03
NXPLOG_NCIHAL_LOGLEVEL=0x03
NXPLOG_NCIX_LOGLEVEL=0x03
NXPLOG_NCIR_LOGLEVEL=0x03
NXPLOG_FWDNLD_LOGLEVEL=0x03
NXPLOG_TML_LOGLEVEL=0x03
```

Inside *libnfc-nci.conf*:

```
NFC_DEBUG_ENABLED=0x01
```

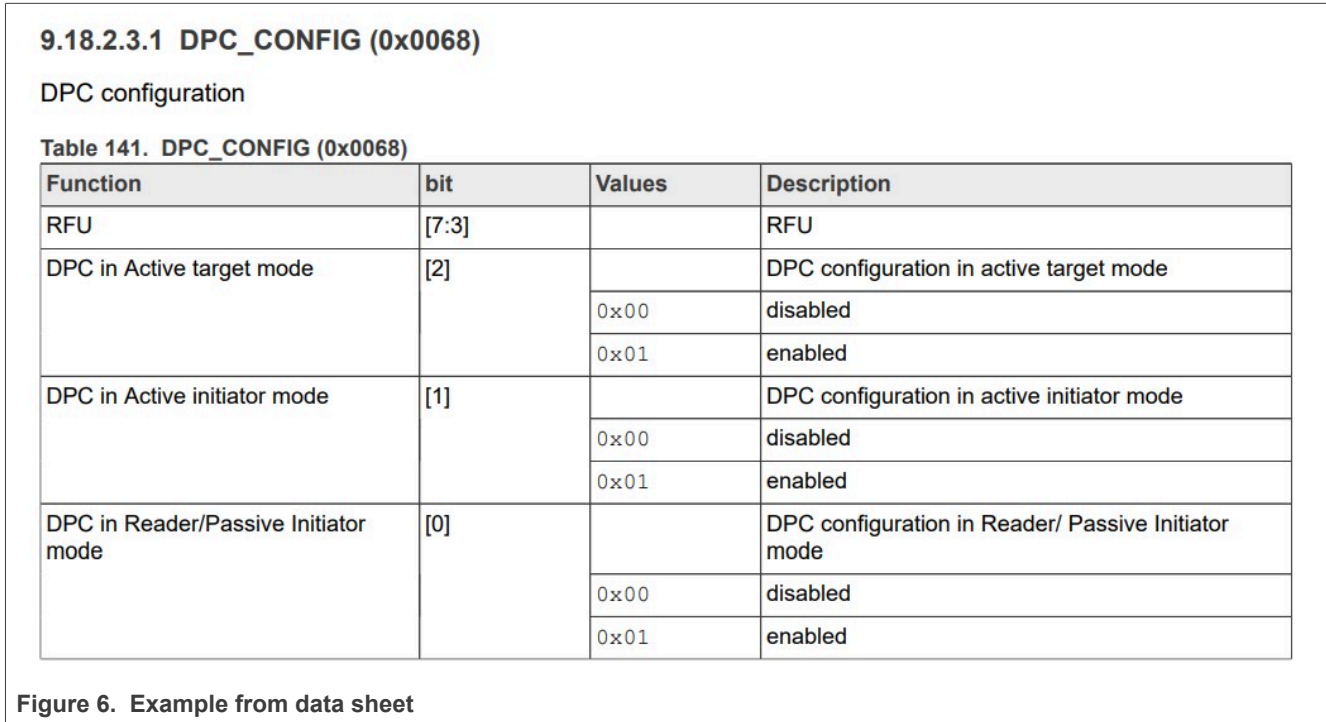
Inside *libemvco-nxp.conf*:

```
NXP_LOG_EXTNS_LOGLEVEL=0x03
NXP_LOG_NCIHAL_LOGLEVEL=0x03
NXP_LOG_NCIX_LOGLEVEL=0x03
NXP_LOG_NCIR_LOGLEVEL=0x03
NXP_LOG_TML_LOGLEVEL=0x03
NXP_EMVCO_DEBUG_ENABLED=0x03
```

If RF logs are available, users can also share them with NXP for analysis of the issue.

## 12 How to link a register address to an NCI command

In the PN7220 data sheet [3], settings are described with their corresponding EEPROM address. For example, as shown in Figure 6 below:



Users can use the NFC Cockpit to read and write to specific addresses via the EEPROM Single-Byte Access (see red square in Figure 7 below). To read, enter the address from the data sheet into the "Address" field, and then click `Read EEPROM`. To "Write", input the content into the "Data" field, and click `Write EEPROM`. If "Display FrontEnd Packets" is enabled, users can also check the NCI commands (see blue square in Figure 7 below).

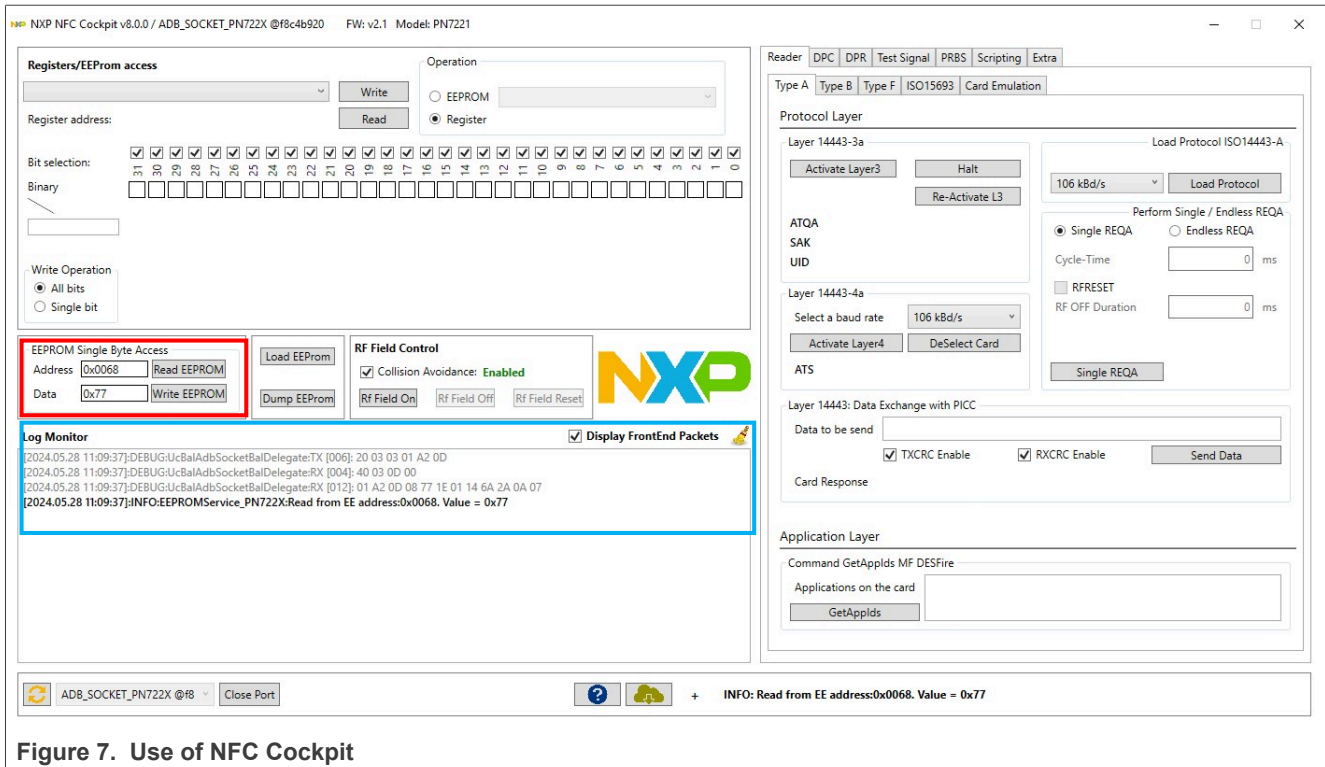


Figure 7. Use of NFC Cockpit

In the Android environment, users need to use the configuration file to link a register address to an NCI command. To map addresses to an NCI tag, the following approach can be used:

Each NCI tag can store 8 bytes of data:

```

0x0000 - 0x0007 = A2 00
0x0008 - 0x000F = A2 01
...
...
0x0068 - 0x006F = A2 0D
...
...
    
```

To read values, issue the NCI Core Get CMD command as follows:

```

20 03 03 01 A2 0D
    
```

Command output example:

```

40 03 0D 00 01 A2 0D 08 77 1E 01 14 6A 2A 0A 07:
77 => 0x0068
1E => 0x0069
01 => 0x006A
14 => 0x006B
6A => 0x006C
2A => 0x006D
0A => 0x006E
07 => 0x006F
    
```



To write to a specific NCI tag, issue the following command:

```
20 02 0C 01 A2 0D 08 77 1E 01 14 6A 2A 0A 07 // This command will write all 8
bytes
20 02 05 01 A2 0D 01 77 // This command is only for 0x0068
```

To write to 0x006A, the user cannot only write to this single byte/tag. Users must also write to all bytes before 0x006A. In this example:

- 0x0068
- 0x0069
- 0x006A

```
20 02 07 01 A2 0D 03 77 1E 01 // This command will write only the first three
bytes
```

0x006F can only be changed by issuing the following command:

```
20 02 0C 01 A2 0D 08 77 1E 01 14 6A 2A 0A 07 // This command will write all 8
bytes, even if we want to change only lasy byte of the tag.
```

## 13 References

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- [1] Webpage - PN7220 - High-Performance, One-Chip NFC Controller for EMVCo 3.1 and NFC Forum Operation([link](#))
- [2] Application note - AN13971 - PN7220 & PN7160 - Android 13 porting guide ([link](#))
- [3] Data sheet - PN7220 - NFC controller with NCI interface supporting EMV and NFC Forum applications ([link](#))
- [4] User manual - UM11810 - PN722X NFC controller ([link](#))
- [5] Software - NFC Cockpit Configuration Tool for NFC ICs ([link](#))
- [6] User guide - UG10068 - PN7220 - Quick start guide ([link](#))

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## 15 Revision history

Table 1. Revision history

Document ID	Release date	Description
AN14335 v.1.0	29 August 2024	• Initial version

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