

AN11758

PN7150 Raspberry Pi SBC kit quick start guide

Rev. 1.6 — 14 June 2021

Application note

347816

Document information

Information	Content
Keywords	OM5579, PN7150, Raspberry Pi, NFC, P2P, card emulation, Linux
Abstract	This document gives a description on how to get started with the OM5579 PN7150 NFC Controller SBC Kit on Raspberry Pi platform.



1 Revision history

Revision history

Rev	Date	Description
1.6	20210614	Moved to OM5579 because of OM5578 discontinuation
1.5	20210127	Removed Windows IoT support
1.4	20190708	Updated Linux demo part with link to instructions
1.3	20180725	Updated weblinks
1.2	20170222	Updated demo images weblinks
1.1	20160512	<ul style="list-style-type: none">• Dedicating document to Raspberry Pi platform quick start guidelines• Security status changed into COMPANY PUBLIC
1.0	20151210	First official release version

2 Introduction

This document gives a description on how to get started with the OM5579 PN7150 NFC controller SBC kit on Raspberry Pi platform. This document provides a step by step guide to the installation procedure of the hardware and the software. Finally, it shows PN7150 NFC Controller functionalities through demonstration application.

OM5579/PN7150 demonstration kit replaces previous OM5578/PN7150 demonstration kit now discontinued.

2.1 OM5579/PN7150RPI demo kit

OM5579/PN7150RPI kit is a high performance fully NFC-compliant expansion board for Raspberry Pi (refer to [1] for more details). It meets compliance with reader mode, P2P mode and Card emulation mode standards. The board features an integrated high performance RF antenna to insure high interoperability level with NFC devices.

The kit is comprised of a PN7150 NFC controller board, a dedicated interface board, and an NFC sample card.

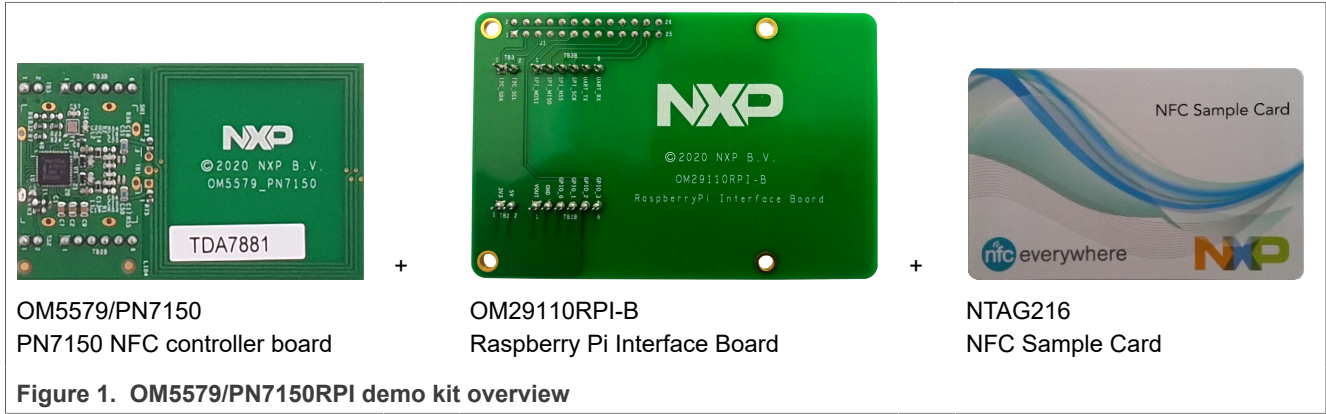


Figure 1. OM5579/PN7150RPI demo kit overview

The demo kit is fully described in UM10935 document [3].

2.2 Linux driver support

PN7150 NFC controller is supported under GNU/Linux system using the NXP Linux libnfc-nci software stack delivered through public GitHub repository https://github.com/NXPnfcLinux/linux_libnfc-nci (for more details, refer to AN11697 [2]).

3 Quick startup on Raspberry Pi

3.1 Required items

- Raspberry Pi [\[1\]](#)
- Compatible SD or MicroSD card (depending on the Raspberry Pi model) of at least 8 Gb memory size
- Micro USB power supply (5 V / 1A)
- USB keyboard
- USB mouse
- HDMI cable to connect to a Monitor / TV
- Computer (running Windows, Linux or Mac OS X) only for SD/MicroSD card installation

3.2 Hardware setup

First of all assemble the PN7150 NFC controller board with the Raspberry Pi interface board.



Figure 2. OM5579/PN7150RPI demo kit assembly

Then stacked the boards together with the Raspberry Pi according to below guidelines.

The Raspberry Pi platforms (new versions) have a 40-pin connector allowing to connect an expansion board. The Raspberry Pi interface board only makes use of the first 26 ones for compatibility reason with the previous Raspberry Pi models. Assemble the boards as shown in figure below:

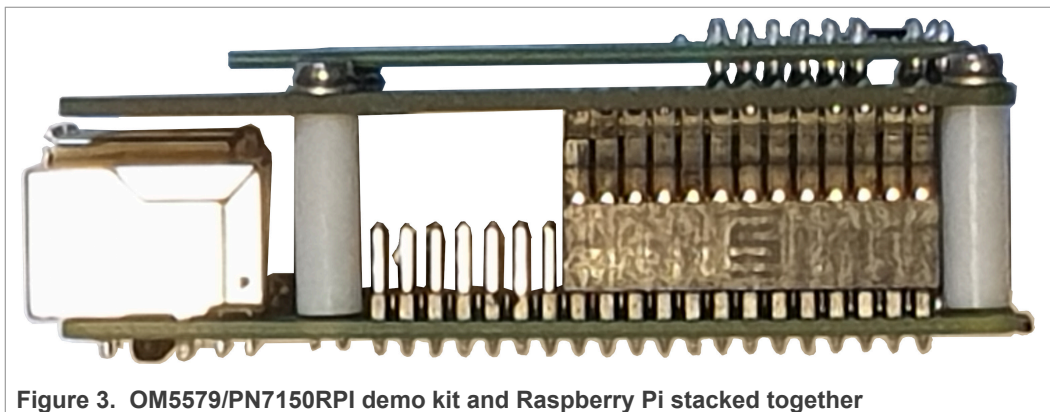


Figure 3. OM5579/PN7150RPI demo kit and Raspberry Pi stacked together

Note: On the old models (A/B series), first remove the 4 white plastic spacers before assembly.

3.3 Linux NFC demo application

3.3.1 Setup

Guidelines to set up this demonstration are provided here <https://community.nxp.com/t5/NXP-Designs-Knowledge-Base/Easy-set-up-of-NFC-on-Raspberry-Pi/ta-p/1099034>. Follow the step-by-step procedure to install the demo from Raspbian distribution.

3.3.2 Application details

The demo application is part of the Linux libnfc-nci stack available on public GitHub repository https://github.com/NXPnfcLinux/linux_libnfc-nci. The related source code can then be found there (more details in document AN11697 [2]).

3.3.3 Starting the application

Open a terminal and browse to the Linux libnfc-nci stack directory (refer to [Section 2.2](#) for more details about the Linux NFC software stack).

```
$ cd ~/linux_libnfc-nci
```

The application requires parameters to run:

```
$ ./nfcDemoApp <OPTIONS>
```

You can get the parameters details by launching the application help menu:

```
$ ./nfcDemoApp --help
```

```

pi@raspberrypi: ~
pi@raspberrypi ~ $ ./nfcDemoApp --help
COMMAND:
poll      Polling mode      e.g. <nfcDemoApp poll >
write     Write tag              e.g. <nfcDemoApp write --type=Text -l en -r "Test">
push     Push to device        e.g. <nfcDemoApp push -t URI -u http://www.nxp.com>
                                     e.g. <nfcDemoApp push --type=mime -m "application/vnd.bluetooth.ep.oob" -d "2200AC597405AF1C0E094761
6C617879204E6F74652033040D0C024005031E110B11">

Help Options:
-h, --help                Show help options

pi@raspberrypi ~ $
    
```

Figure 4. Linux demo application parameters

The demo application offers 3 modes of operation:

- **Polling:** continuously waiting for a remote NFC device (tag or peer device) and displays related information
- **Tag writing:** allows writing NDEF content to an NFC tag
- **Device push:** allows pushing NDEF content to a remote NFC peer device

3.3.3.1 Polling mode

When in this mode, the application displays information of any discovered NFC tags or remote NFC device.

It is reached starting the application with “poll” parameter:

```
$ ./nfcDemoApp poll
```

```

pi@raspberrypi: ~
pi@raspberrypi ~ $ ./nfcDemoApp poll
#####
#####          NFC demo          #####
#####
#####          Poll mode activated          #####
#####
#####          ... press enter to quit ...          #####

Waiting for a Tag/Device...

NFC Tag Found

      Type :          'Type A - Mifare UL'
Record Found :
      NDEF Content Max size :          '868 bytes'
      NDEF Actual Content size :          '29 bytes'
      Readonly :          'FALSE'
      Type :          'URI'
      URI :          'http://www.nxp.com/denoboard/0M5577'

29 bytes of NDEF data received :
01
01 19 55 01 6E 78 70 2E 63 6F 6D 2F 64 65 6D 6F 62 6F 61 72 64 2F 4F 4D 35 35 37 37
NFC Tag Lost

Waiting for a Tag/Device...
    
```

Figure 5. Linux demo application polling mode

3.3.3.2 Device push mode

This mode allows pushing data to a remote NFC device (e.g. an NFC phone). It is reached using “push” parameter:

```
$ ./nfcDemoApp push <OPTIONS>
```

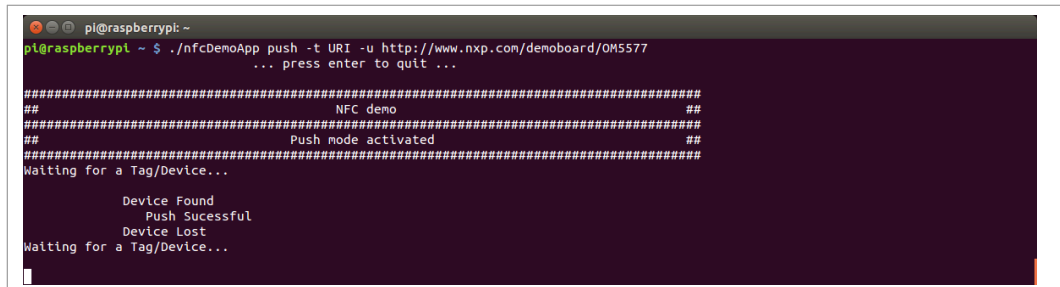


Figure 6. Linux demo application device push mode

You can get more information about the message format using “-h” or “--help” parameter:

```
$ ./nfcDemoApp push --help
```

3.3.3.3 Tag writing mode

This mode allows writing data to an NFC tag. It is reached using “write” parameter:

```
$ ./nfcDemoApp write <OPTIONS>
```

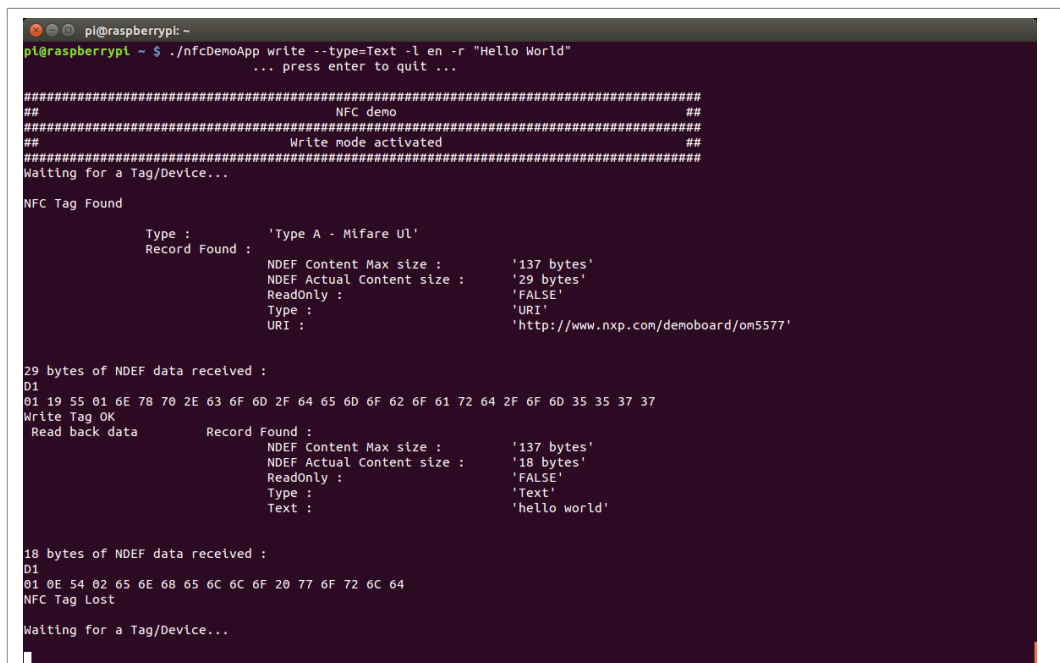


Figure 7. Linux demo application tag writing mode

You can get more information about the message format using “-h” or “--help” parameter:

```
$ ./nfcDemoApp write --help
```

4 References

- [1] The Raspberry Pi is a low cost, credit-card sized computer that plugs into a computer monitor or TV, and uses a standard keyboard and mouse. It is a capable little device that enables people of all ages to explore computing, and to learn how to program in languages like Scratch and Python. It is capable of doing everything you would expect a desktop computer to do, from browsing the Internet and playing high-definition video, to making spreadsheets, word-processing, and playing games. For more information visit <https://www.raspberrypi.org/>
- [2] AN11697 PN71x0 Linux software stack integration guidelines: <https://www.nxp.com/docs/en/application-note/AN11697.pdf>
- [3] UM10935 PN7150 NFC controller SBC kit user manual: <https://www.nxp.com/docs/en/user-guide/UM10935.pdf>

5 Legal information

5.1 Definitions

Draft — A draft status on a document indicates that the content is still under internal review and subject to formal approval, which may result in modifications or additions. NXP Semiconductors does not give any representations or warranties as to the accuracy or completeness of information included in a draft version of a document and shall have no liability for the consequences of use of such information.

5.2 Disclaimers

Limited warranty and liability — Information in this document is believed to be accurate and reliable. However, NXP Semiconductors does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information. NXP Semiconductors takes no responsibility for the content in this document if provided by an information source outside of NXP Semiconductors. In no event shall NXP Semiconductors be liable for any indirect, incidental, punitive, special or consequential damages (including - without limitation - lost profits, lost savings, business interruption, costs related to the removal or replacement of any products or rework charges) whether or not such damages are based on tort (including negligence), warranty, breach of contract or any other legal theory. Notwithstanding any damages that customer might incur for any reason whatsoever, NXP Semiconductors' aggregate and cumulative liability towards customer for the products described herein shall be limited in accordance with the Terms and conditions of commercial sale of NXP Semiconductors.

Right to make changes — NXP Semiconductors reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.

Suitability for use — NXP Semiconductors products are not designed, authorized or warranted to be suitable for use in life support, life-critical or safety-critical systems or equipment, nor in applications where failure or malfunction of an NXP Semiconductors product can reasonably be expected to result in personal injury, death or severe property or environmental damage. NXP Semiconductors and its suppliers accept no liability for inclusion and/or use of NXP Semiconductors products in such equipment or applications and therefore such inclusion and/or use is at the customer's own risk.

Applications — Applications that are described herein for any of these products are for illustrative purposes only. NXP Semiconductors makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification. Customers are responsible for the design and operation of their applications and products using NXP Semiconductors products, and NXP Semiconductors accepts no liability for any assistance with applications or customer product design. It is customer's sole responsibility to determine whether the NXP Semiconductors product is suitable and fit for the customer's applications and products planned, as well as for the planned application and use of customer's third party customer(s). Customers should provide appropriate design and operating safeguards to minimize the risks associated with their applications and products. NXP Semiconductors does not accept any liability related to any default, damage, costs or problem which is based on any weakness or default in the customer's applications or products, or the application or use by customer's third party customer(s). Customer is responsible for doing all necessary testing for the customer's applications and products using NXP Semiconductors products in order to avoid a default of the applications and the products or of the application or use by customer's third party customer(s). NXP does not accept any liability in this respect.

Export control — This document as well as the item(s) described herein may be subject to export control regulations. Export might require a prior authorization from competent authorities.

Evaluation products — This product is provided on an "as is" and "with all faults" basis for evaluation purposes only. NXP Semiconductors, its affiliates and their suppliers expressly disclaim all warranties, whether express, implied or statutory, including but not limited to the implied warranties of non-infringement, merchantability and fitness for a particular purpose. The entire risk as to the quality, or arising out of the use or performance, of this product remains with customer. In no event shall NXP Semiconductors, its affiliates or their suppliers be liable to customer for any special, indirect, consequential, punitive or incidental damages (including without limitation damages for loss of business, business interruption, loss of use, loss of data or information, and the like) arising out of the use of or inability to use the product, whether or not based on tort (including negligence), strict liability, breach of contract, breach of warranty or any other theory, even if advised of the possibility of such damages. Notwithstanding any damages that customer might incur for any reason whatsoever (including without limitation, all damages referenced above and all direct or general damages), the entire liability of NXP Semiconductors, its affiliates and their suppliers and customer's exclusive remedy for all of the foregoing shall be limited to actual damages incurred by customer based on reasonable reliance up to the greater of the amount actually paid by customer for the product or five dollars (US\$5.00). The foregoing limitations, exclusions and disclaimers shall apply to the maximum extent permitted by applicable law, even if any remedy fails of its essential purpose.

Translations — A non-English (translated) version of a document is for reference only. The English version shall prevail in case of any discrepancy between the translated and English versions.

Security — Customer understands that all NXP products may be subject to unidentified or documented vulnerabilities. Customer is responsible for the design and operation of its applications and products throughout their lifecycles to reduce the effect of these vulnerabilities on customer's applications and products. Customer's responsibility also extends to other open and/or proprietary technologies supported by NXP products for use in customer's applications. NXP accepts no liability for any vulnerability. Customer should regularly check security updates from NXP and follow up appropriately. Customer shall select products with security features that best meet rules, regulations, and standards of the intended application and make the ultimate design decisions regarding its products and is solely responsible for compliance with all legal, regulatory, and security related requirements concerning its products, regardless of any information or support that may be provided by NXP. NXP has a Product Security Incident Response Team (PSIRT) (reachable at PSIRT@nxp.com) that manages the investigation, reporting, and solution release to security vulnerabilities of NXP products.

5.3 Licenses

Purchase of NXP ICs with NFC technology

Purchase of an NXP Semiconductors IC that complies with one of the Near Field Communication (NFC) standards ISO/IEC 18092 and ISO/IEC 21481 does not convey an implied license under any patent right infringed by implementation of any of those standards. Purchase of NXP Semiconductors IC does not include a license to any NXP patent (or other IP right) covering combinations of those products with other products, whether hardware or software.

5.4 Trademarks

Notice: All referenced brands, product names, service names and trademarks are the property of their respective owners.

NXP — wordmark and logo are trademarks of NXP B.V.

Figures

Fig. 1.	OM5579/PN7150RPI demo kit overview 3	Fig. 4.	Linux demo application parameters 6
Fig. 2.	OM5579/PN7150RPI demo kit assembly 4	Fig. 5.	Linux demo application polling mode 6
Fig. 3.	OM5579/PN7150RPI demo kit and Raspberry Pi stacked together 5	Fig. 6.	Linux demo application device push mode 7
		Fig. 7.	Linux demo application tag writing mode 7

Contents

1	Revision history	2
2	Introduction	3
2.1	OM5579/PN7150RPI demo kit	3
2.2	Linux driver support	3
3	Quick startup on Raspberry Pi	4
3.1	Required items	4
3.2	Hardware setup	4
3.3	Linux NFC demo application	5
3.3.1	Setup	5
3.3.2	Application details	5
3.3.3	Starting the application	5
3.3.3.1	Polling mode	6
3.3.3.2	Device push mode	6
3.3.3.3	Tag writing mode	7
4	References	8
5	Legal information	9

Please be aware that important notices concerning this document and the product(s) described herein, have been included in section 'Legal information'.

© NXP B.V. 2021.

All rights reserved.

For more information, please visit: <http://www.nxp.com>

For sales office addresses, please send an email to: salesaddresses@nxp.com

Date of release: 14 June 2021

Document identifier: AN11758

Document number: 347816