AN12991

PN7160 evaluation kit quick start guide

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Application note

Document information

Information	Content
Keywords	OM27160, PN7160, Raspberry Pi, Arduino, eval kit, NFC, P2P, Card Emulation, Linux, Android, RTOS, Null OS
Abstract	This document gives a description on how to get started with the PN7160 evaluation kit.

1 Introduction

This document gives a description on how to get started with the PN7160 evaluation kit, referenced as OM27160A1EVK for the I^2C host interface version (featuring PN7160A1HN I^2C variant) and OM27160B1EVK (featuring PN7160B1HN SPI variant).

It provides a step-by-step guide to the installation procedure of the hardware and the software.

Finally, it shows PN7160 NFC controller functionalities through demo applications.

1.1 PN7160 evaluation kit description

The PN7160 evaluation kit exists in two versions:

- OM27160A1EVK: embeds PN7161A1HN I^2C variant in HVQFN40 package
- OM27160B1EVK: embeds PN7161B1HN SPI variant in HVQFN40 package

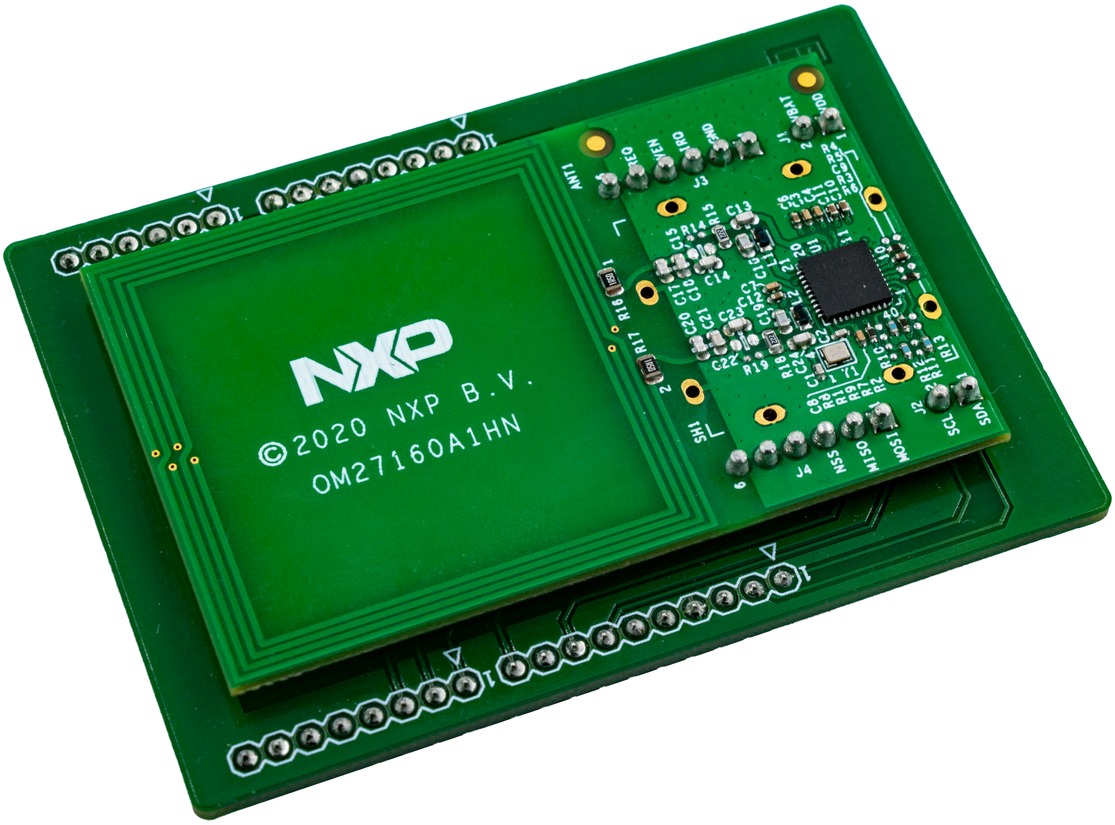
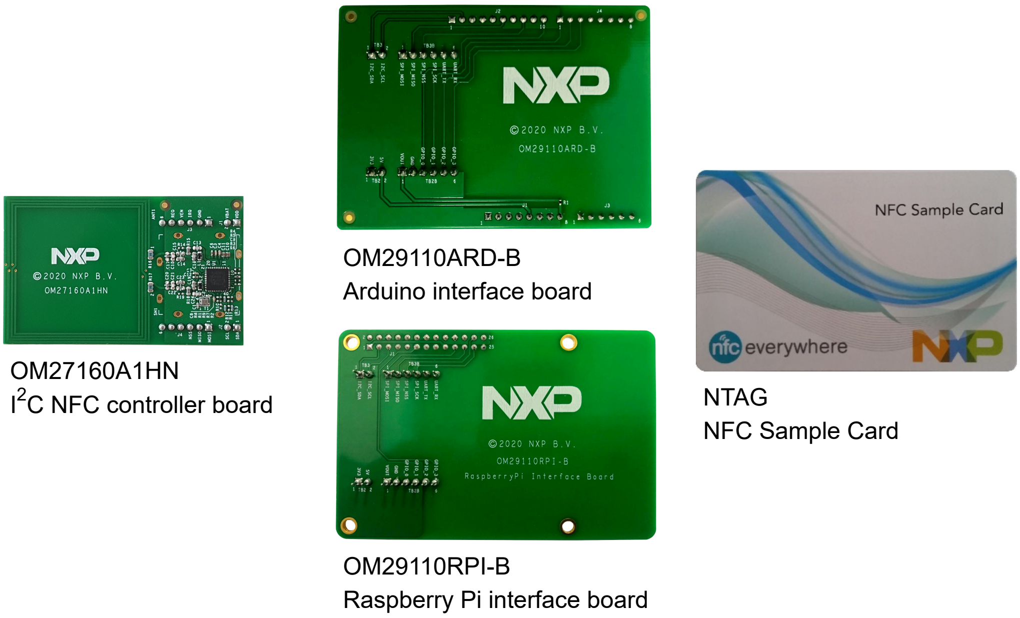


Figure 1. PN7160 evaluation kit

Both versions are composed of three printed-circuit boards and an NTAG card.



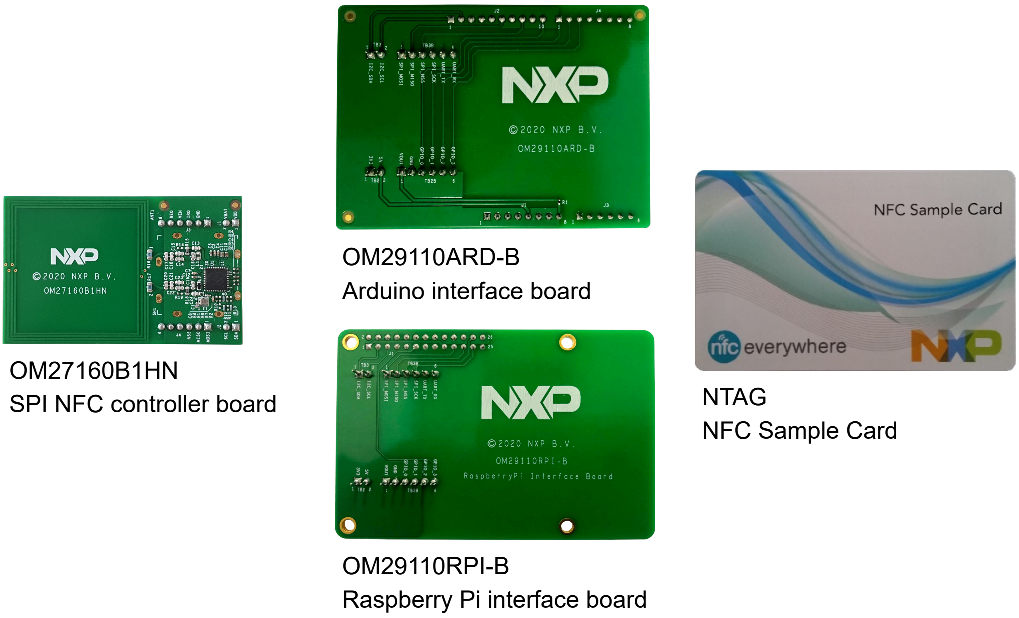
OM27160A1HN
I^2C NFC controller board

OM29110ARD-B
Arduino interface board

OM29110RPI-B
Raspberry Pi interface board

NTAG
NFC Sample Card

Figure 2. OM27160A1EVK I^2C dev kit overview



OM27160B1HN
SPI NFC controller board

OM29110ARD-B
Arduino interface board

OM29110RPI-B
Raspberry Pi interface board

NTAG
NFC Sample Card

Figure 3. OM27160B1EVK SPI dev kit overview

1.2 Linux driver support

PN7160 NFC controller is supported under GNU/Linux systems using the NXP Linux libnfc-nci software stack (see ref.[2]).

1.3 Android driver support

The PN7160 NFC controller is supported from the official Android Open Source Project (refer to ref.[3] for more details) with the addition of dedicated patches (see ref.[4]).

1.4 RTOS and Null OS support

Since implementing NFC Forum NCI 2.0 standardized API, the PN7160 NFC controller can be easily integrated into system based on RTOS or even without OS.

Code examples are given in the form of MCUXpresso projects (dedicated to specific NXP's MCUs) and can easily be ported to any other system (refer to ref.[5]).

2 Quick startup with Raspberry Pi interface board

2.1 Required items

- Raspberry Pi ref.[1] running Raspberry Pi OS.

2.2 Hardware setup

Assemble the PN7160 NFC controller board (OM27160A1HN or OM27160B1HN) with the Raspberry Pi interface board (OM29110RPI).

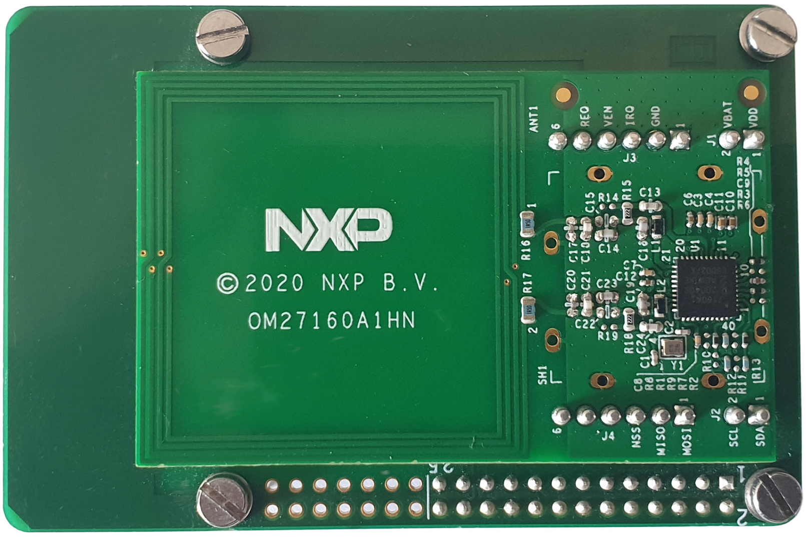


Figure 4. OM27160 RPI configuration

Then stack together the boards with the Raspberry Pi board.

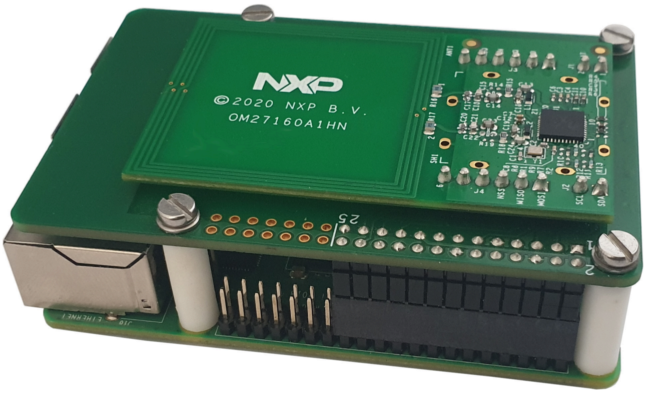


Figure 5. OM27160 evaluation kit and Raspberry Pi board stacked together

2.3 Software setup

Use Raspberry Pi OS (https://www.raspberrypi.org/software/operating-systems/). Guidelines to set up Linux environment on raspberry pi can be found here: https://www.raspberrypi.org/documentation/installation/installing-images/).

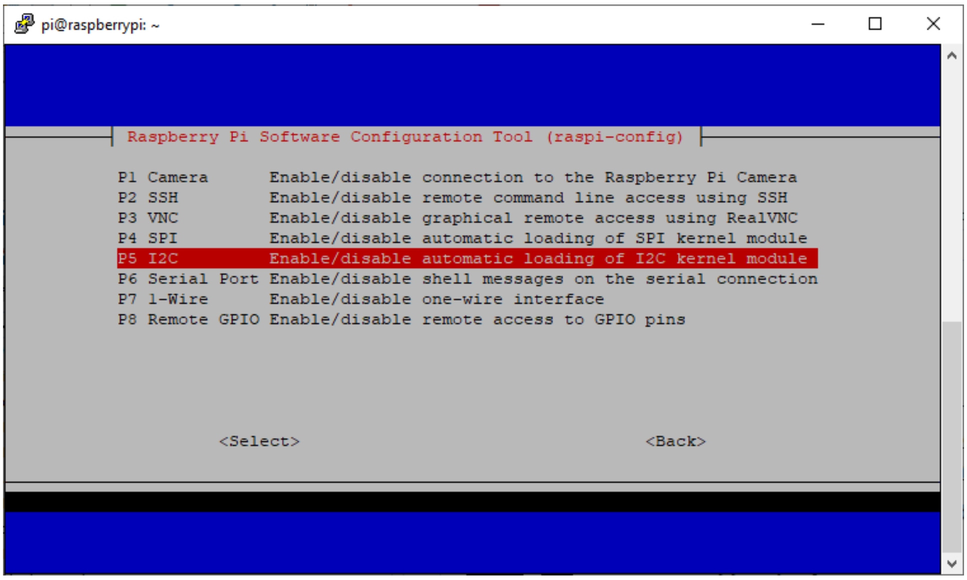
Below is the step-by-step procedure run from the Raspberry Pi to add software support for PN7160:

2.3.1 Enable I^{2}C interface (only for OM27160A1EVK)

1. Run command:

```
sudo raspi-config
```

2. Use the down arrow to select "`Interface Options`"
3. Arrow down to "`P5 I2C`"
4. Select "`yes`" when it asks you to enable I2C
5. Use the right arrow to select the `<Finish>` button



```
Raspberry Pi Software Configuration Tool (raspi-config)

P1 Camera      Enable/disable connection to the Raspberry Pi Camera
P2 SSH         Enable/disable remote command line access using SSH
P3 VNC         Enable/disable graphical remote access using RealVNC
P4 SPI         Enable/disable automatic loading of SPI kernel module
P5 I2C         Enable/disable automatic loading of I2C kernel module
P6 Serial Port Enable/disable shell messages on the serial connection
P7 1-Wire      Enable/disable one-wire interface
P8 Remote GPIO Enable/disable remote access to GPIO pins

          <Select>                          <Back>
```

Figure 6. Enabling I^{2}C interface on Raspberry Pi OS

To verify the I^{2}C interface is enabled, enter the following command `ls /dev/i2c*`.

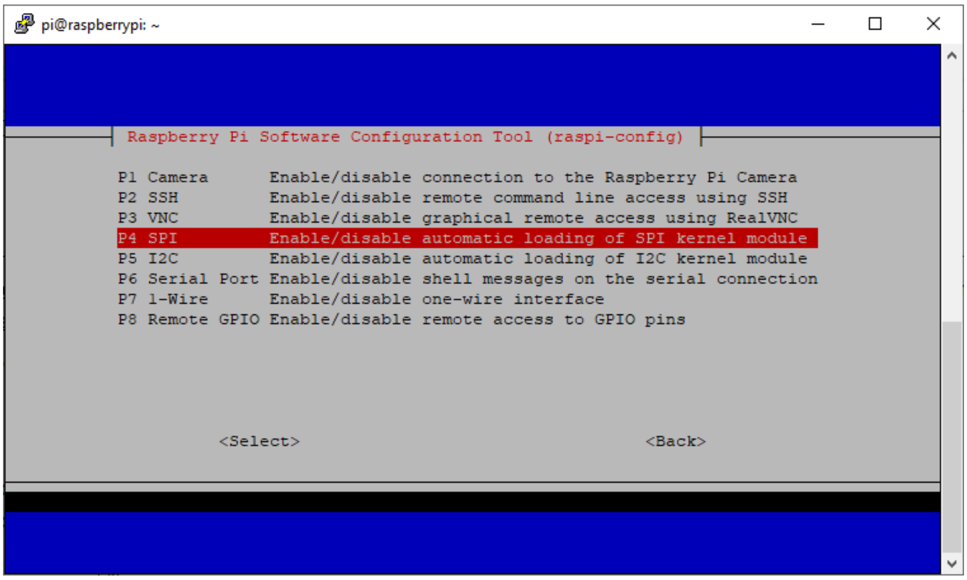
The Pi should respond with "`/dev/i2c-1`" which represents the user-mode I^{2}C interface to which is connected the PN7160.

2.3.2 Enable SPI interface (only for OM27160B1EVK)

1. Run command:

```
sudo raspi-config
```

2. Use the down arrow to select "`Interface Options`"
3. Arrow down to "`P4 SPI`"
4. Select "`yes`" when it asks you to enable SPI
5. Use the right arrow to select the `<Finish>` button



```
Raspberry Pi Software Configuration Tool (raspi-config)

P1 Camera      Enable/disable connection to the Raspberry Pi Camera
P2 SSH         Enable/disable remote command line access using SSH
P3 VNC         Enable/disable graphical remote access using RealVNC
P4 SPI         Enable/disable automatic loading of SPI kernel module
P5 I2C         Enable/disable automatic loading of I2C kernel module
P6 Serial Port Enable/disable shell messages on the serial connection
P7 1-Wire      Enable/disable one-wire interface
P8 Remote GPIO Enable/disable remote access to GPIO pins

          <Select>                                <Back>
```

Figure 7. Enabling SPI interface on Raspberry Pi OS

To verify the SPI interface is enabled, enter the following command `ls /dev/spi*`.

The Pi should respond with "`/dev/spi0.0`" which represents the user-mode SPI interface to which is connected the PN7160.

2.3.3 Install necessary tools

Execute the command:

```
sudo apt-get install autoconf automake libtool git
```

2.3.4 Clone Linux libnfc-nci library repository

Execute the command:

```
git clone https://github.com/NXPNFCLinux/linux_libnfc-nci.git -b NCI2.0_PN7160
```

2.3.5 Configure the library

Execute the commands:

```
cd linux_libnfc-nci
./bootstrap
./configure
```

2.3.6 Set the library to map I^{2}C interface (only for OM27160A1EVK)

Edit `linux_libnfc-nci/conf/libnfc-nxp.conf` file to update `NXP_TRANSPORT` and `NXP_NFC_DEV_NODE` settings as shown below:

```
###############################################################################
# TRANSPORT Type
# 0x00 - I2C /SPI for noraml nxpnfc driver
# 0x01 - Not Used, kept to align with Android code
# 0x02 - ALT_I2C
# 0x03 - ALT_SPI
NXP_TRANSPORT=0x02

###############################################################################
# NXP HW Device Node information
NXP_NFC_DEV_NODE="/dev/i2c-1"
```

2.3.7 Set the library to map SPI interface (only for OM27160B1EVK)

Edit `linux_libnfc-nci/conf/libnfc-nxp.conf` file to update `NXP_TRANSPORT` and `NXP_NFC_DEV_NODE` settings as shown below:

```
###############################################################################
# TRANSPORT Type
# 0x00 - I2C /SPI for noraml nxpnfc driver
# 0x01 - Not Used, kept to align with Android code
# 0x02 - ALT_I2C
# 0x03 - ALT_SPI
NXP_TRANSPORT=0x03

###############################################################################
# NXP HW Device Node information
NXP_NFC_DEV_NODE="/dev/spidev0.0"
```

2.3.8 Build and install the library

Execute the commands:

```
make
sudo make install
export LD_LIBRARY_PATH=/usr/local/lib
```

To make this last setting permanent, run the following command:

```
echo "export LD_LIBRARY_PATH=/usr/local/lib" >> .bashrc
```

2.3.9 Run the demo application (built and installed together with the library during previous step)

To simply display all data collected from remote NFC device (Peer, reader/writer or card), run the demo application in "poll mode" executing the command:

```
nfcDemoApp poll
```

For more details about the demo application modes execute command:

```
nfcDemoApp --help
```

For more detailed information about the demo application, but also for additional example applications, refer to ref.[2].

3 Quick startup with Arduino interface board

Refer to ref.[5] for details about PN7160 demonstration using OM27160 ARD configuration on Arduino compatible NXP's MCU boards.

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] AN13287 - PN7160 Linux porting guide: https://www.nxp.com/doc/AN13287

[3] Android is an open source software stack for a wide range of mobile devices and a corresponding open source project led by Google.
For more information, visit https://source.android.com/

[4] AN13189 - PN7160 Android porting guide: https://www.nxp.com/doc/AN13189

[5] AN13288 - PN7160 NXP-NCI2.0 MCUXpresso examples guide: https://www.nxp.com/doc/AN13288

5 Note about the source code in the document

The example code shown in this document has the following copyright and BSD-3-Clause license:

6 Revision history

Table 1. Revision history

Document ID	Release date	Description
AN12991 v.1.2	5 September 2025	Editoral changes (typos, etc.). Document adapted to latest NXP guidelines. • Section 2.1 "Required items": updated the term "raspbian" to "Raspberry Pi OS". • Section 2.3 "Software setup": corrected typo, updated the term "raspbian" to "Raspberry Pi OS". • Section 4 "References": updated. • Section 5 "Note about the source code in the document": added.
AN12991 v.1.1	13 September 2021	• Security status changed to "Company public", no content change.
AN12991 v.1.0	25 August 2021	• Initial version.

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