Training Mobile Knowledge

PN71xx product support package

Plug-and-play NFC solutions

MobileKnowledge
July 2016

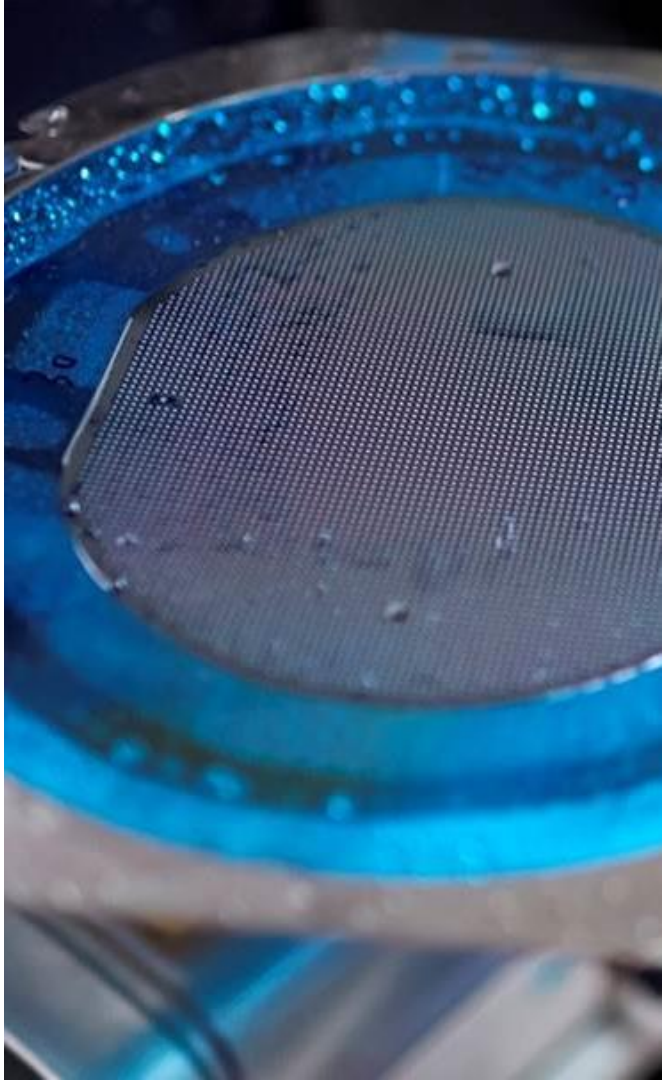
Agenda

Session 11th July: **PN71xx product presentation**

- Product introduction, target market and use cases
- PN7150 vs PN7120
- Product technical specifications
- Software integration
- Product support package
- Final remarks

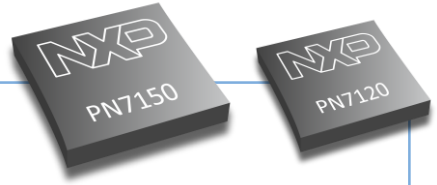
Session 20th July: **PN71xx product support package**

- Review of PN71xx product features
- Where to find PN71xx documentation
- PN71xx NFC controller SBC kits
- OM557x/PN71xx hardware details
- How to get started with OM557x/PN71x0ARD
- How to get started with OM5578/PN7150BB and OM5577/PN7120S
- How to get started with OM5578/PN7150RPI and OM5577/PN7120S



PN71xx family review

PN71xx - *Plug-and-play NFC solutions*



- Full **NFC Forum-compliant** controller
- Support NFC card emulation, reader/writer and peer-to-peer modes
- Compatible with **ISO/IEC 14443-A&B**, **FeliCa** and **ISO/IEC 15693** cards
- Very easy to integrate thanks to the embedded firmware and NCI-standardized interface
- Linux, Android and WinIoT drivers ease integration and reduce time to market
- **Low power** operation mode
- Standard packages: HVQFN40(PN7150), VFBGA49(PN7120)

Easy to integrate

Easy to use

Lower bill of materials

Optimized for portable applications

http://www.nxp.com/products/:PN7120A0EV
http://www.nxp.com/products/:PN7150B0HN

PN71xx key benefits

Best plug’n play and high performance full NFC solutions make your application smarter!

Best plug’n play Fast to market	Smooth integration	High performance & interoperability
Standard NFC Interface (NCI) to the application host	Embedded FW minimizes host interactions and code size	Full NFC Forum compliant R/W, P2P and CE modes
Linux, Android and WinIoT drivers for OS applications	Low power detection mode, fully configurable	Standard (PN7120) or high (PN7150) output power
Code examples for RTOS and NullOs applications	Standard I^2C physical interface	NFC reader Tag type 1 to 5
Demo-kits interfacing with ARD, RPI and BBB platforms	BGA (PN7120) and QFN (PN7150) package	Passive (PN7120) or Active (PN7150) Load Modulation

PN71xx target market and use cases

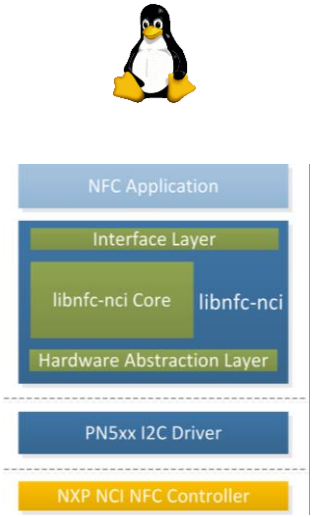
The solution for any market which wants to make its application smarter with NFC

PN7150 vs PN7120

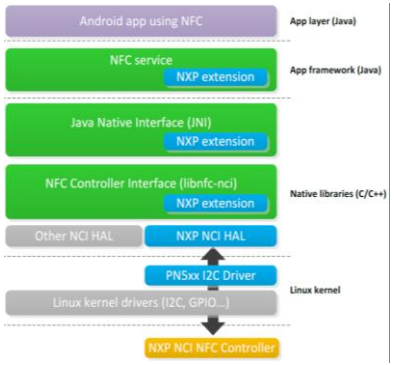
			**Benefits**
RF driver supply voltage	2.7V...**4.75V**	2.7V or 3.3V	More output power to work with smaller antenna or better performance
Card emulation mode	NFC forum T4T - ISO/IEC A&B **NFC forum T3T - FeliCa**	NFC forum T4T - ISO/IEC A&B	Enable FeliCa use cases (Japan, HK, Singapore)
Package	**HVQFN40**	VFBGA49	Decrease PCB manufacturing cost (no microvias)
Load modulation concept	**Active Load Modulation***	Passive Load Modulation	Allow decreasing antenna size with same RF performance in Card Emulation and passive Target modes

PN71xx easy SW integration into any environment

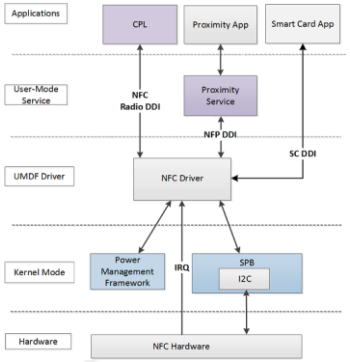
- NXP provides a portfolio of NFC controller solutions optimized for integration in OS environments such as Linux, Android, Windows or RTOS and even without operating system.



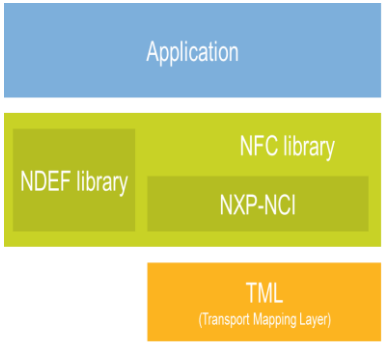
Linux NFC architecture
Linux integration is offered through NXP's Linux libnfc-nci SW stack



Android NFC architecture
Android integration is offered through the Android AOSP SW stack for which NXP delivers dedicated patches.



Windows NFC architecture
Windows integration is offered through Microsoft Windows universal NFC device driver model,

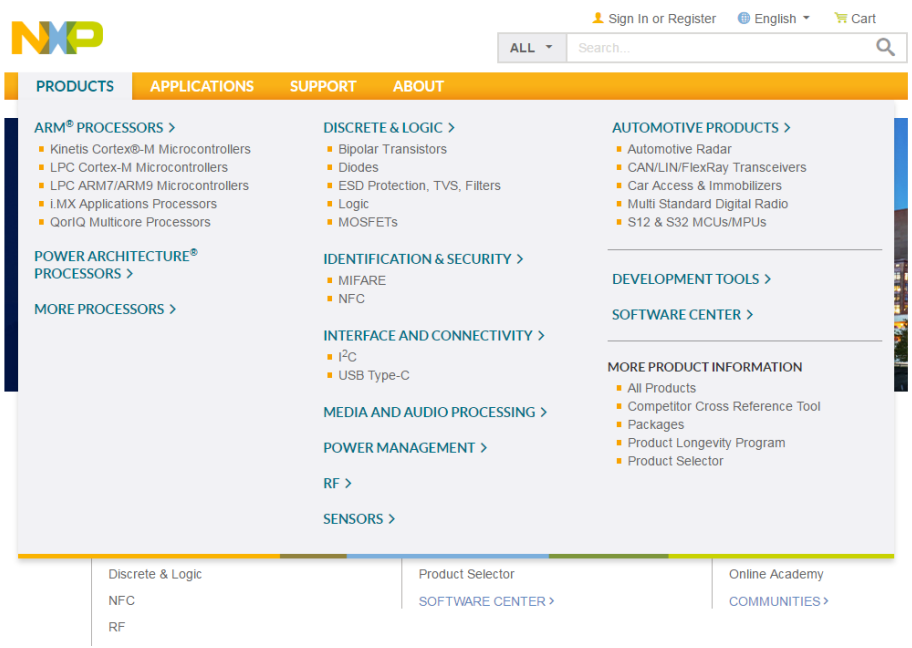


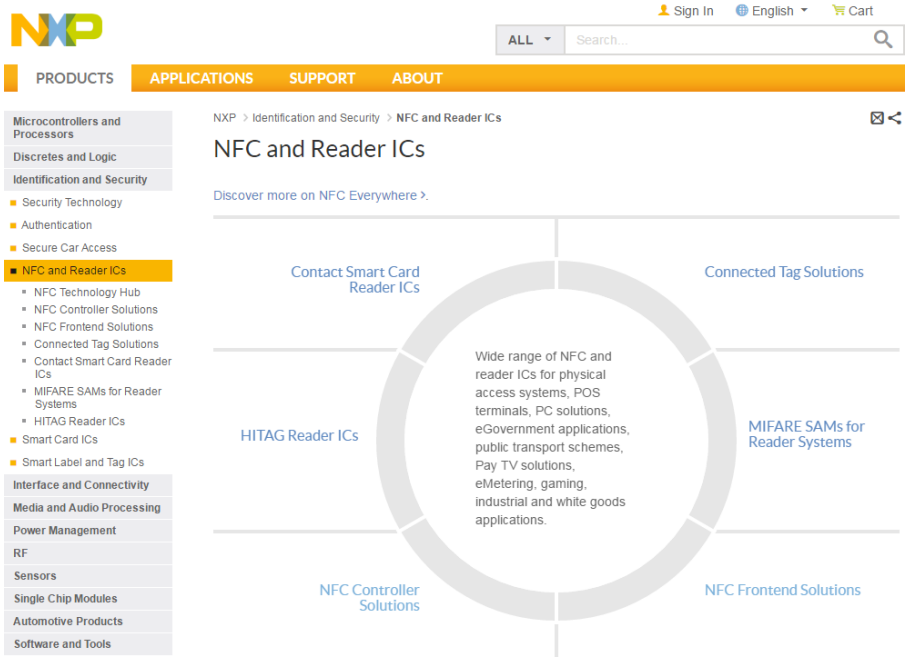
NullOS/RTOS architecture
NullOS/RTOS integration is demonstrated with code examples running on NXP's LPC , Kinetis and i.MX MCUs

Where to find PN71xx support package

Where to find PN71xx support package

Browsing NXP website





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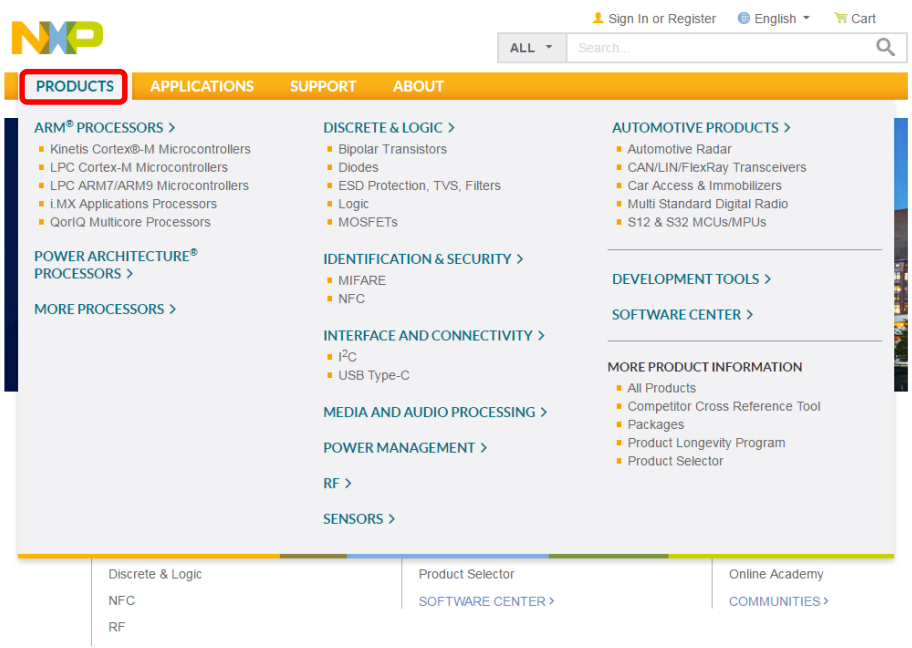

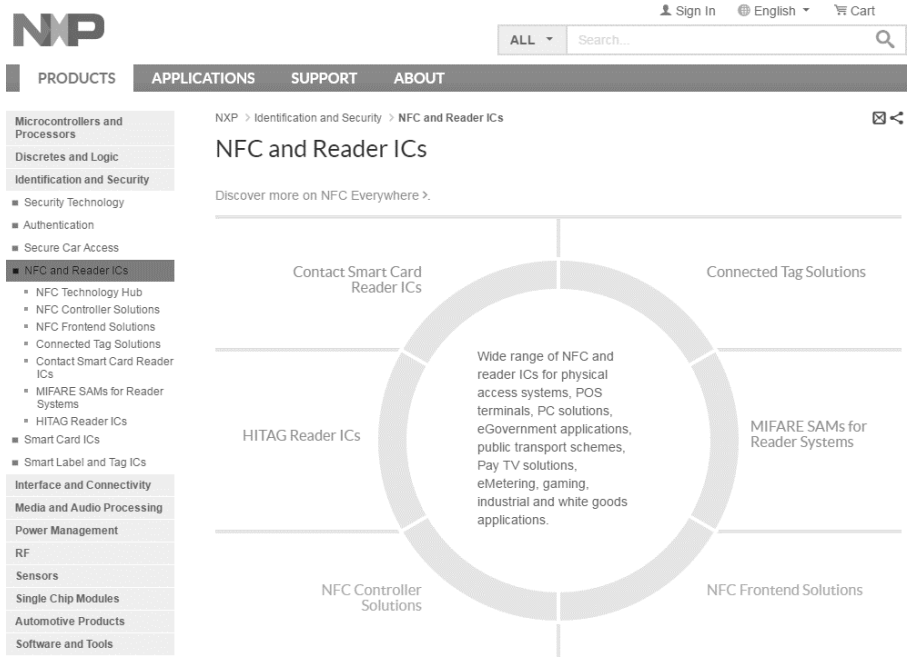

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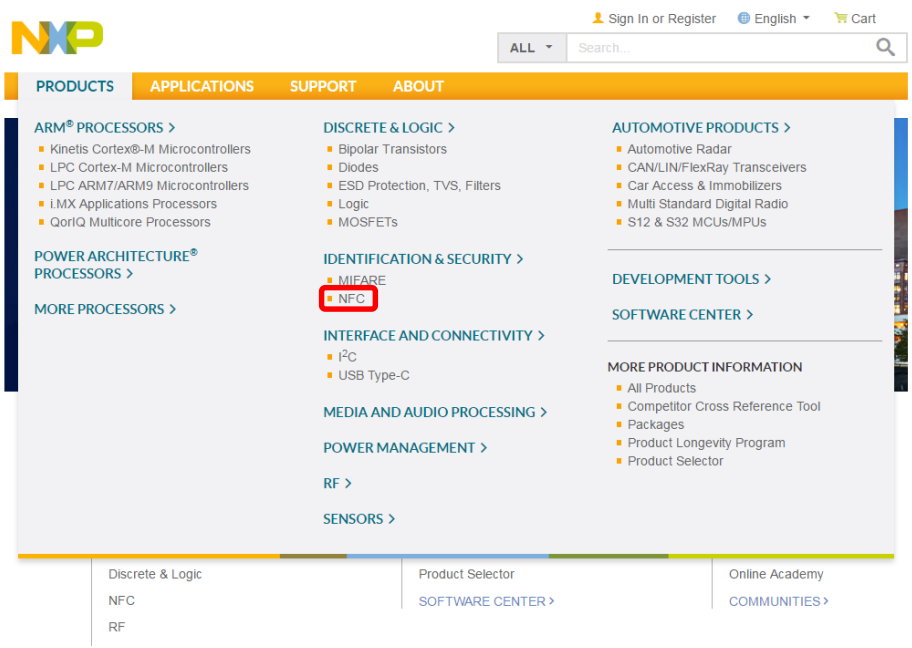

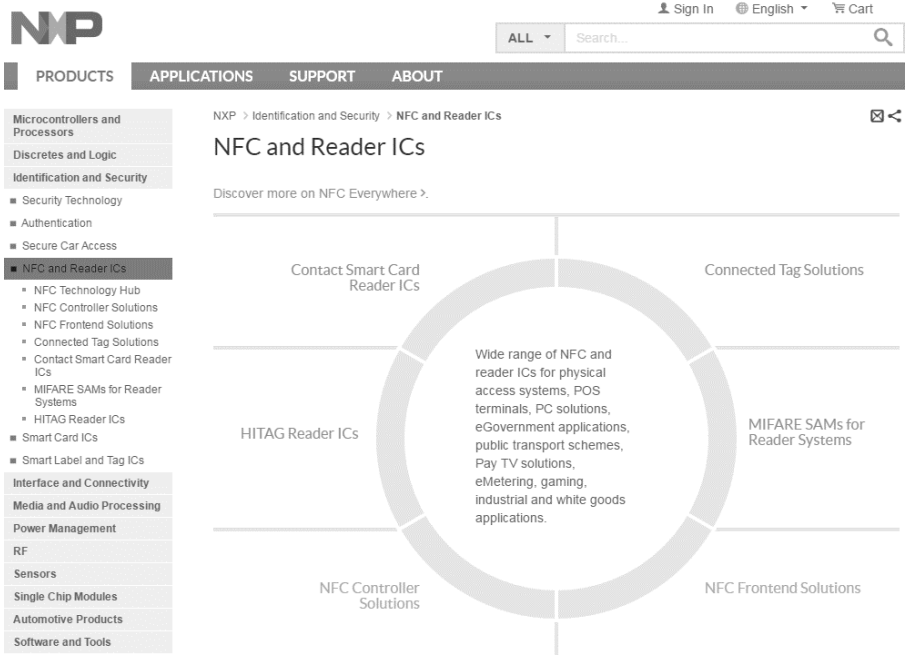

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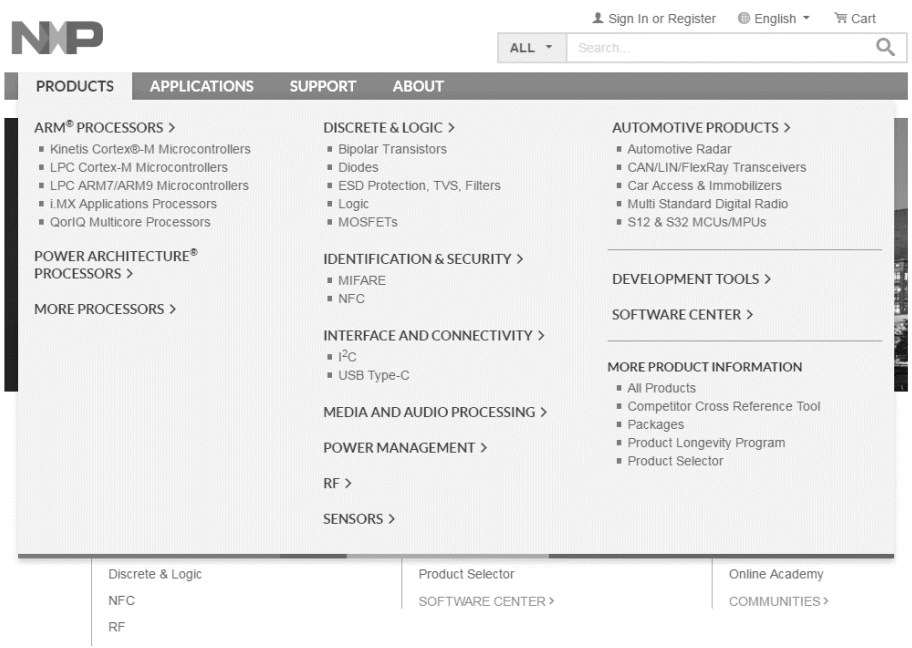

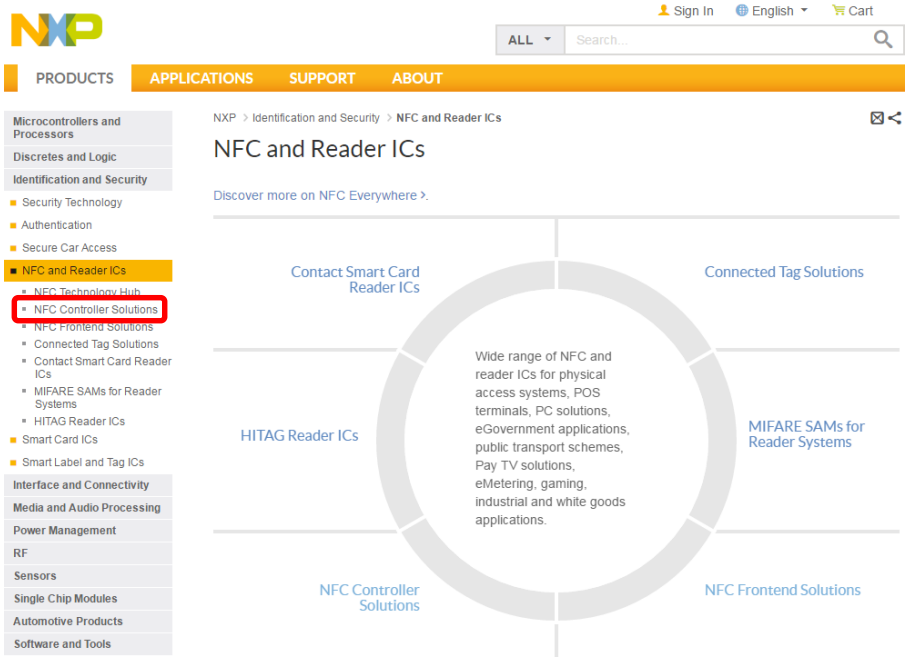

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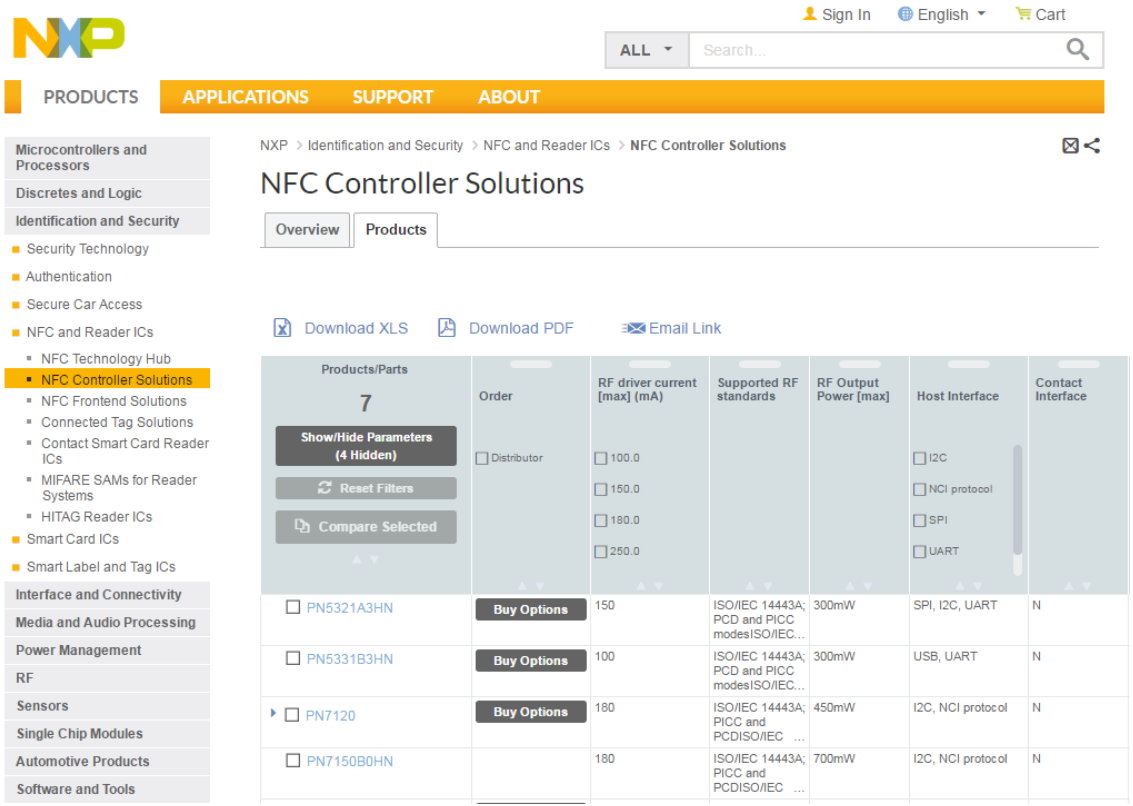

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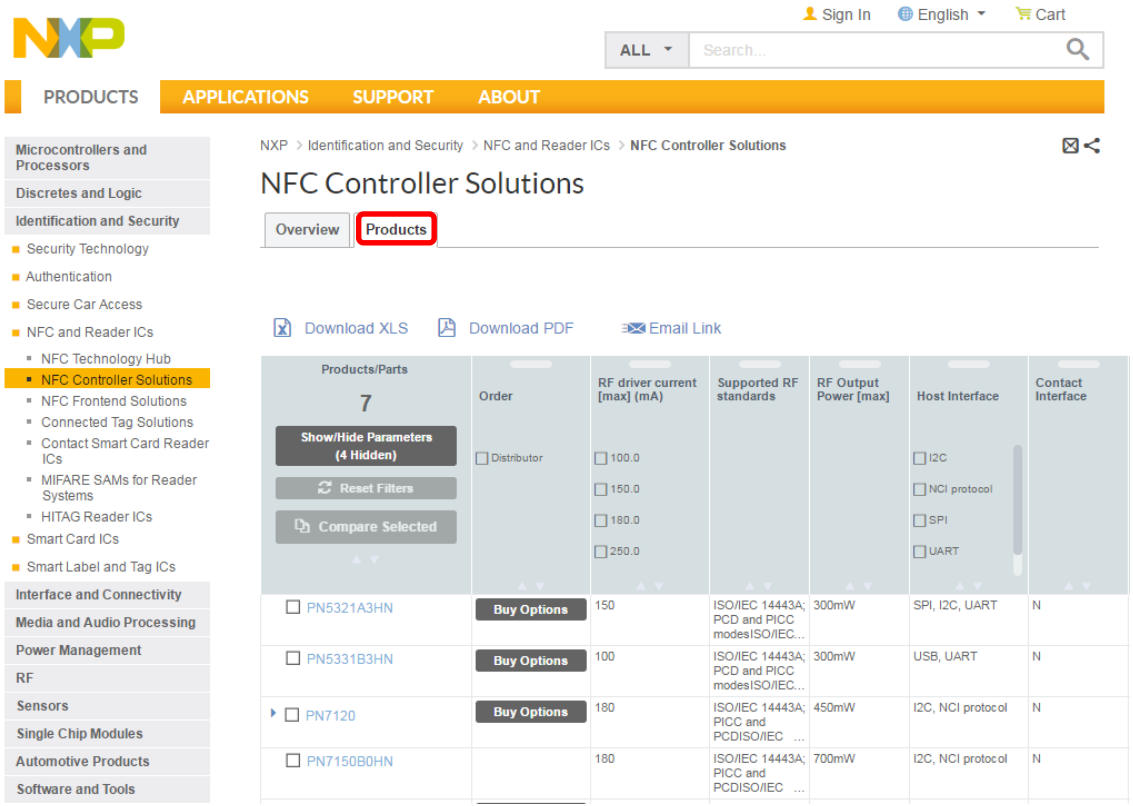

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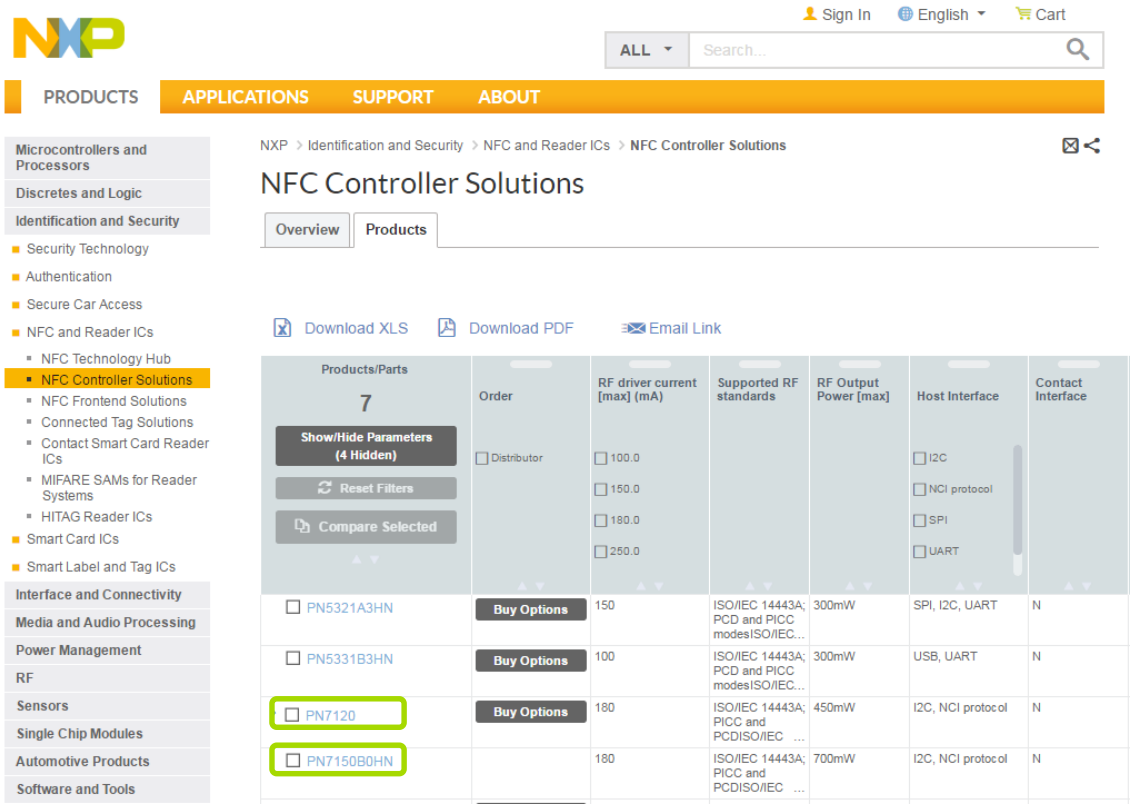

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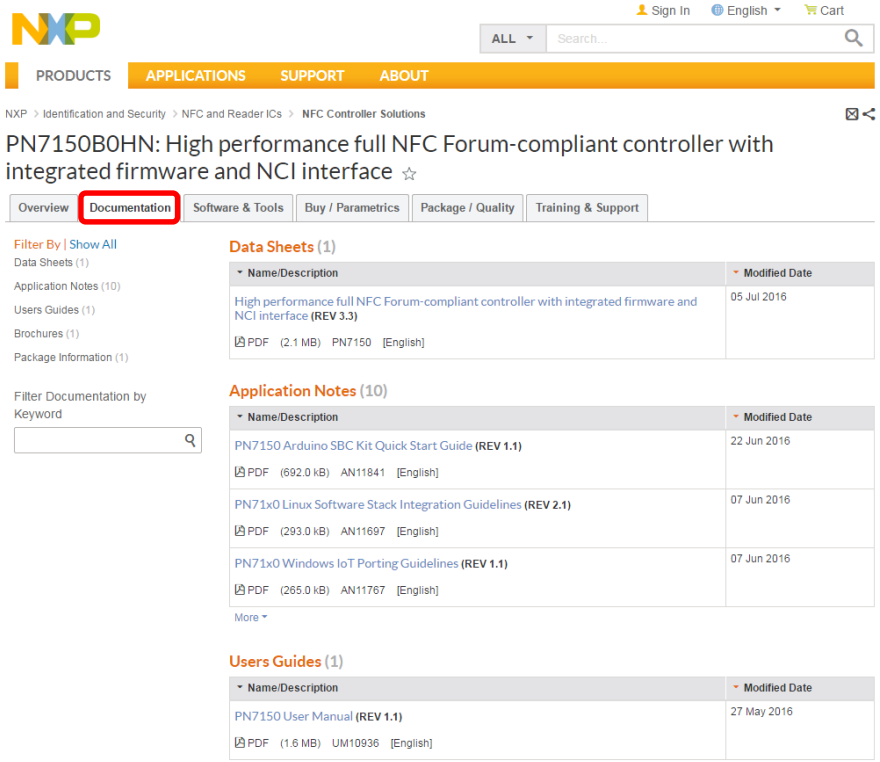

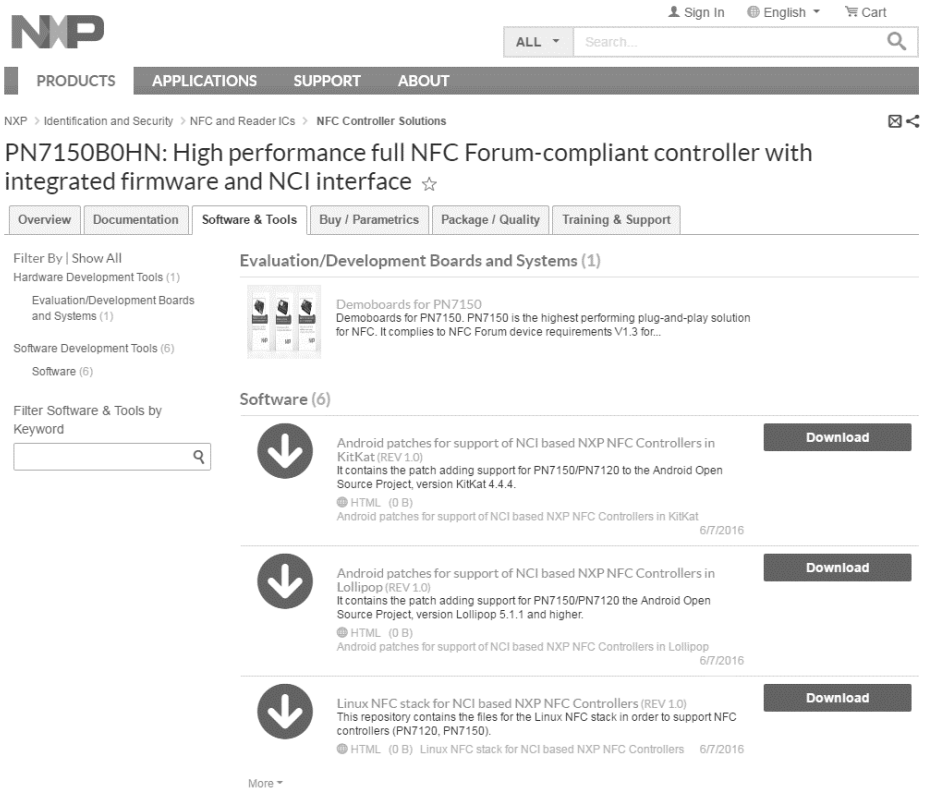

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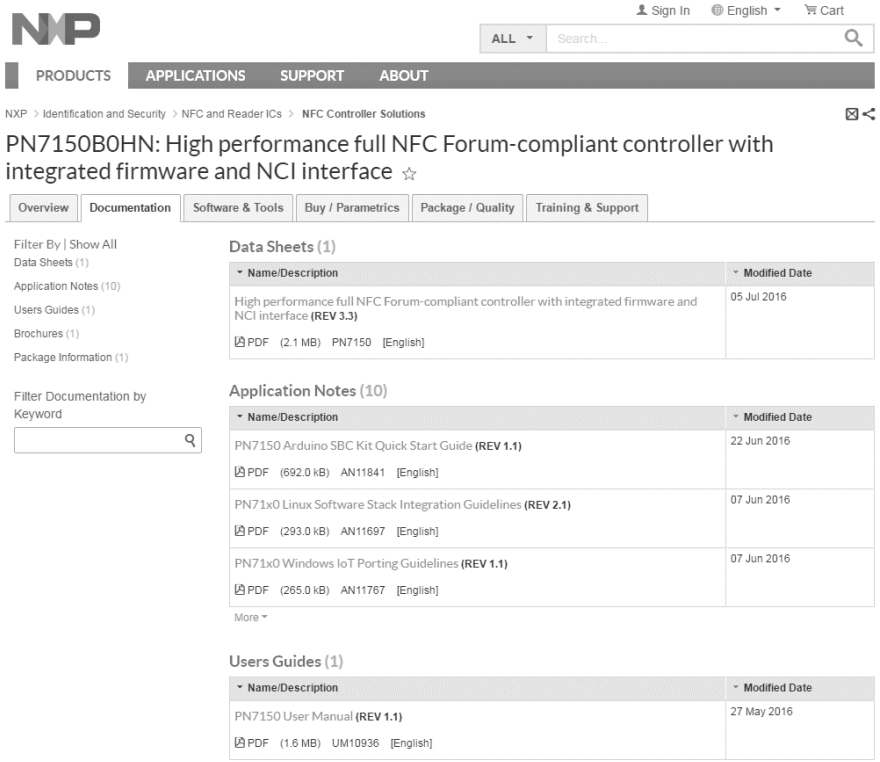

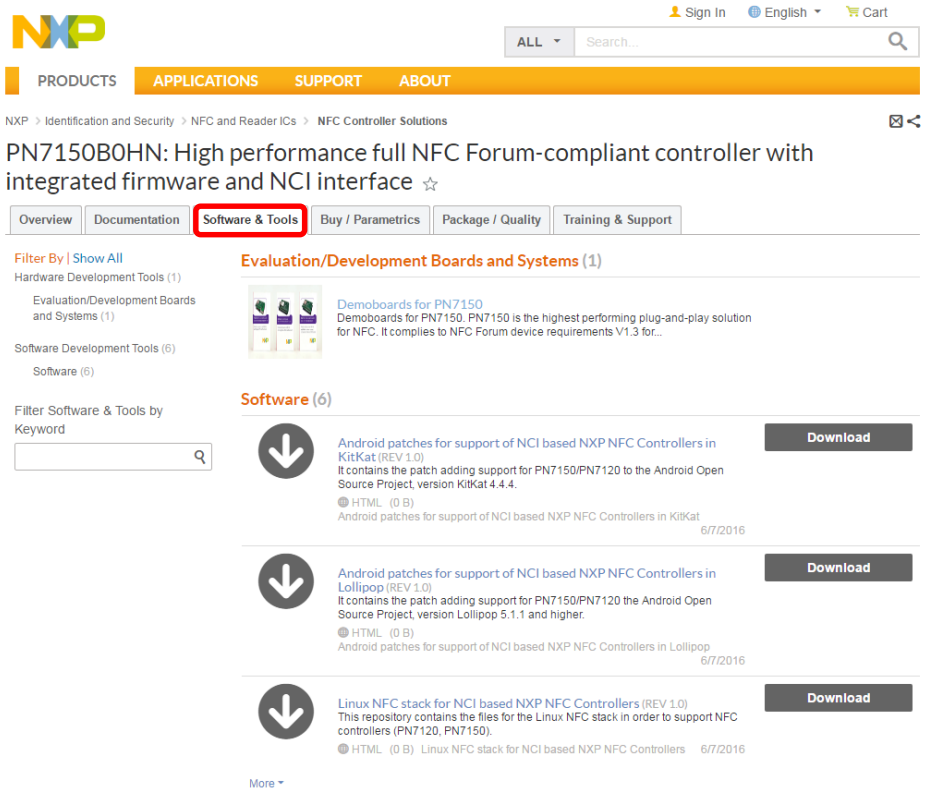

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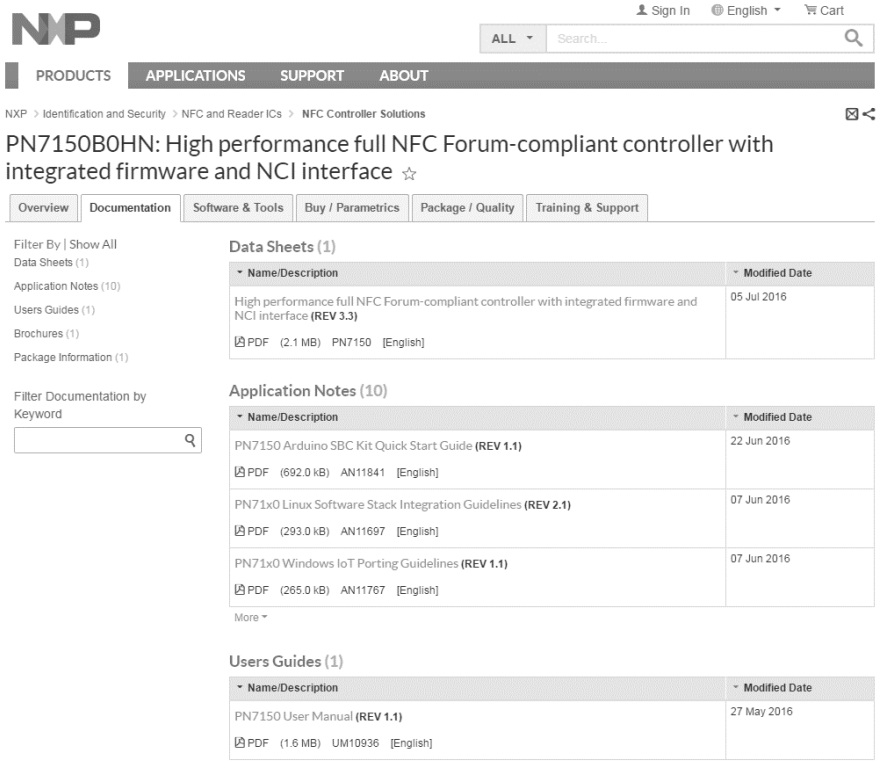

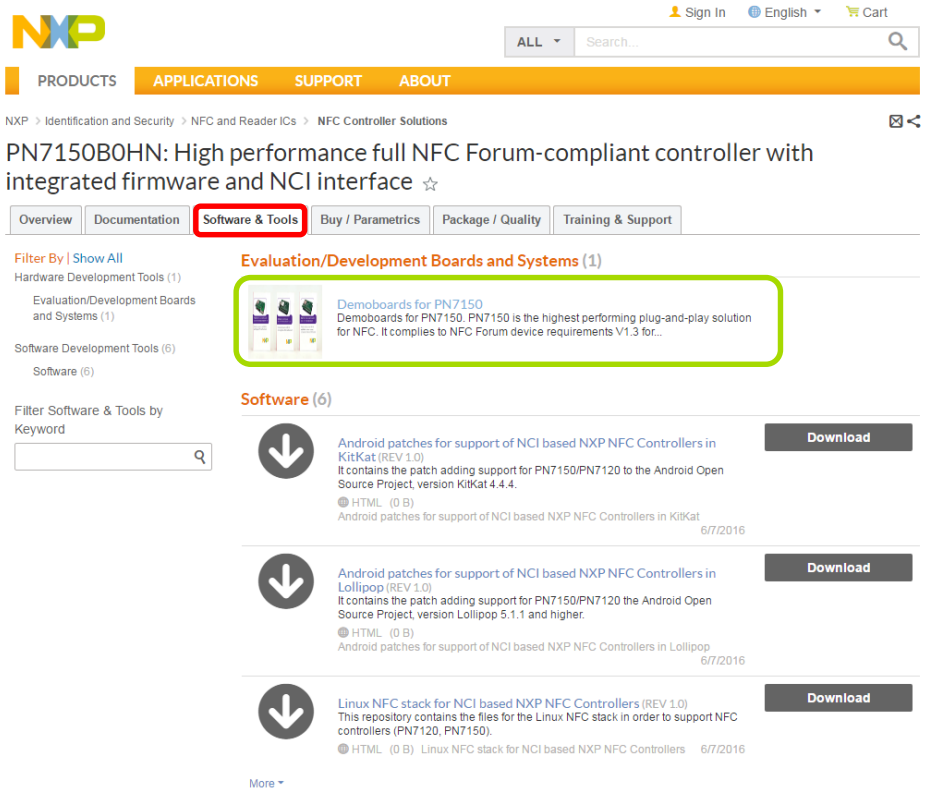

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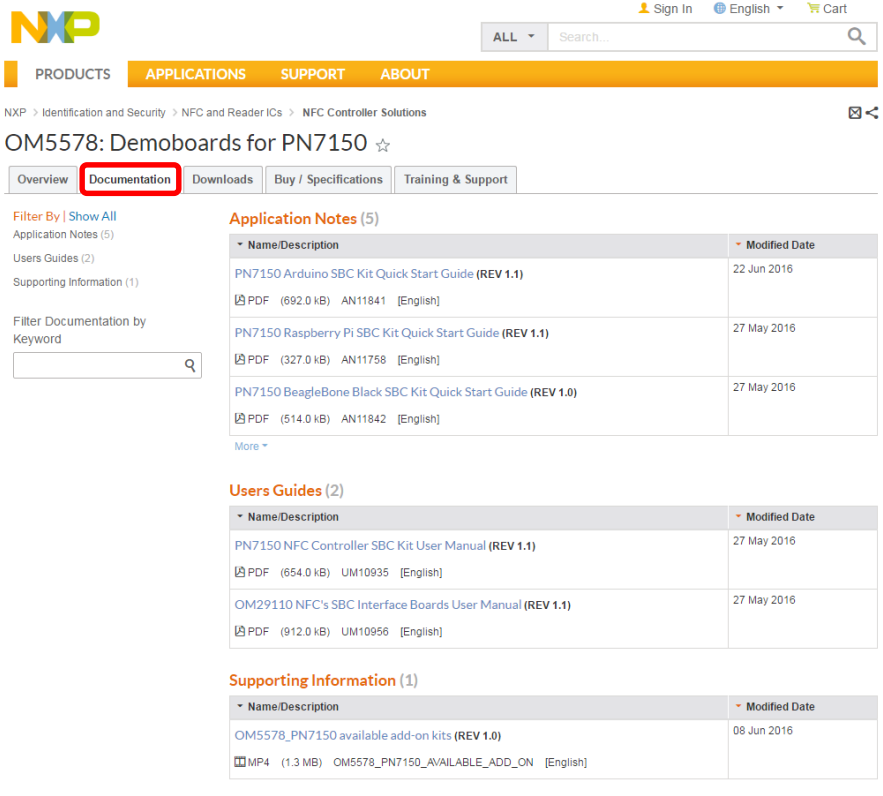

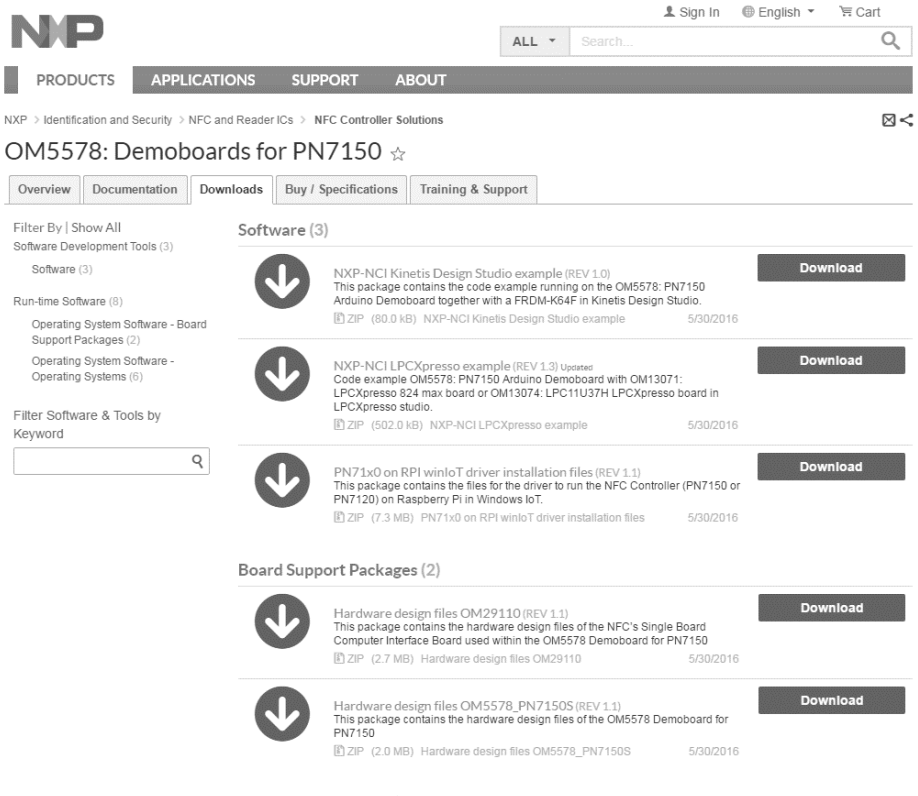

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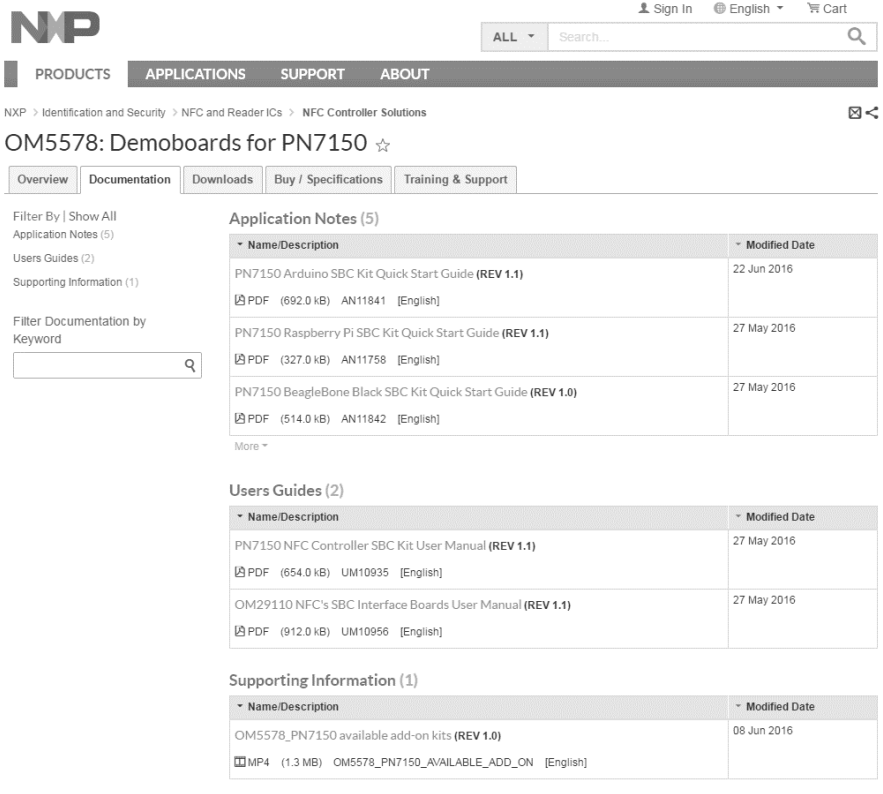
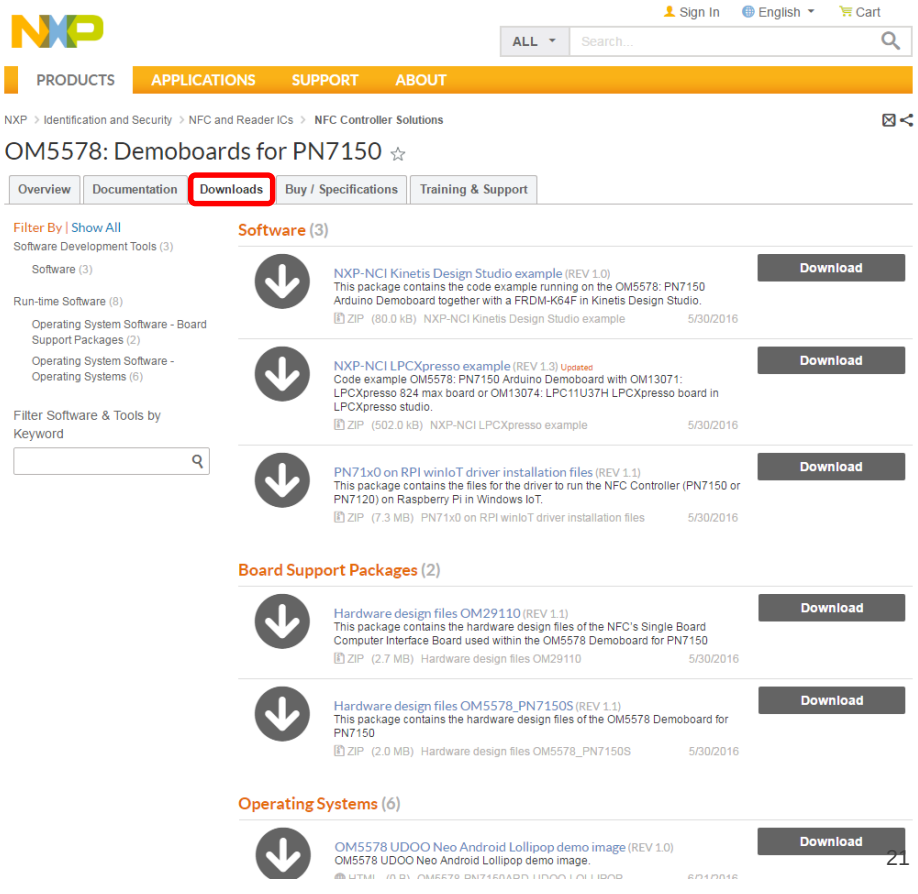




PN71xx NFC controller SBC kits

OM5578/PN7150 and OM5577/PN7120

PN7120 NFC controller single board computer (SBC) kits: OM5577

PN7120 | PN7150

PN7120 SBC Kit for Raspberry Pi and BeagleBone Black
(OM5577/PN7120S)

› PN7120 NFC Controller Board
› Raspberry Pi Interface board
› BeagleBone Black Interface board
› NFC Forum Type 2 Tag (MIFARE UL Card)

PN7120 SBC Kit for Arduino
(OM5577/PN7120ARD)

› PN7120 NFC controller board
› Arduino Interface board
› NFC Forum Type 2 Tag

NEW

PN7150 NFC controller single board computer (SBC) kits: OM5578

PN7120 | PN7150

PN7150 SBC Kit for Arduino
(OM5578/PN7150ARD)

› PN7150 NFC controller board
› Arduino Interface board
› NFC Forum Type 2 Tag

PN7150 SBC Kit for Raspberry Pi
(OM5578/PN7150RPI)

› PN7150 NFC controller board
› Raspberry Pi Interface board
› NFC Forum Type 2 Tag

PN7150 SBC Kit for BeagleBone Black
(OM5578/PN7150BBB)

› PN7150 NFC controller board
› BeagleBone Black Interface board
› NFC Forum Type 2 Tag

OM5578/PN7150 and OM5577/PN7120

Hardware details

OM5578/PN7150S

PN7150 NFC controller board

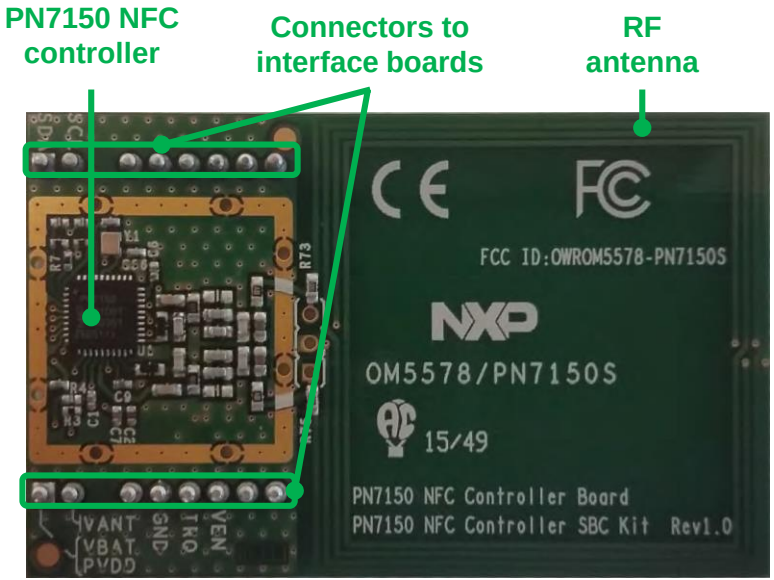


Fig. OM5578//PN7150S NFC controller board

On-board antenna must be disconnected removing resistors R73 and R75

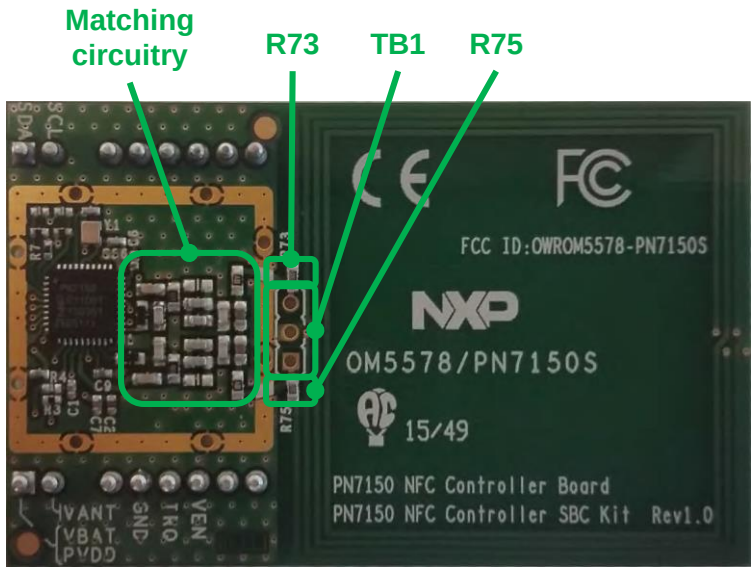


Fig. OM5578/PN7150S NFC controller board RF antenna components

OM5578/PN7150S

PN7150 NFC controller board

R3 and R4

OM5578 comes with configuration 2 (external 5V) used to generate TVDD. Can be changed to Configuration 1 (VBAT to generate the TVDD)

Fig. OM5578//PN7150S NFC controller board TVDD supply option

R6, R23, R24 and R32

OM5578 comes with default I2C address 0x28. It is possible to change it between 0x28 and 0x2B

Fig. OM5578/PN7150S NFC controller board I²C address configuration

OM5578/PN7150S

OM29110 interface boards

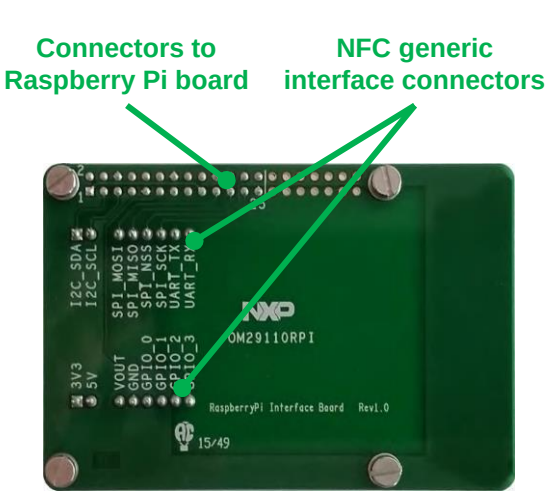


Fig. OM29110 Raspberry Pi interface board

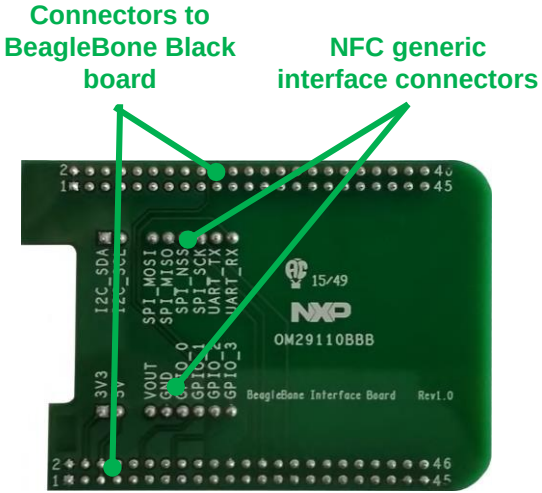


Fig. OM29110 Beagle Bone interface board

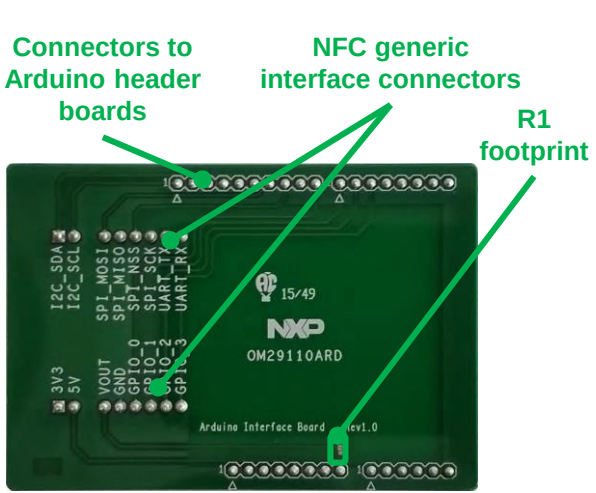
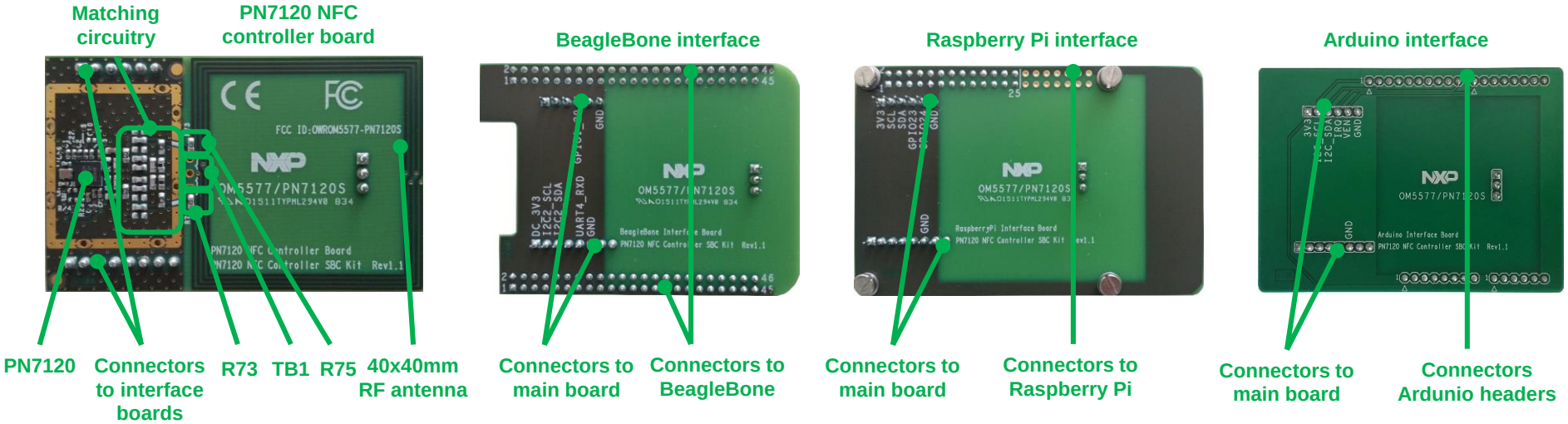


Fig. OM29110 Arduino interface board

OM5578/PN7150 kit can be re-used in another system by building your own interface board

OM5577/PN7120S

PN7120 NFC controller board and interface boards



On-board antenna must be disconnected removing resistors R73 and R75

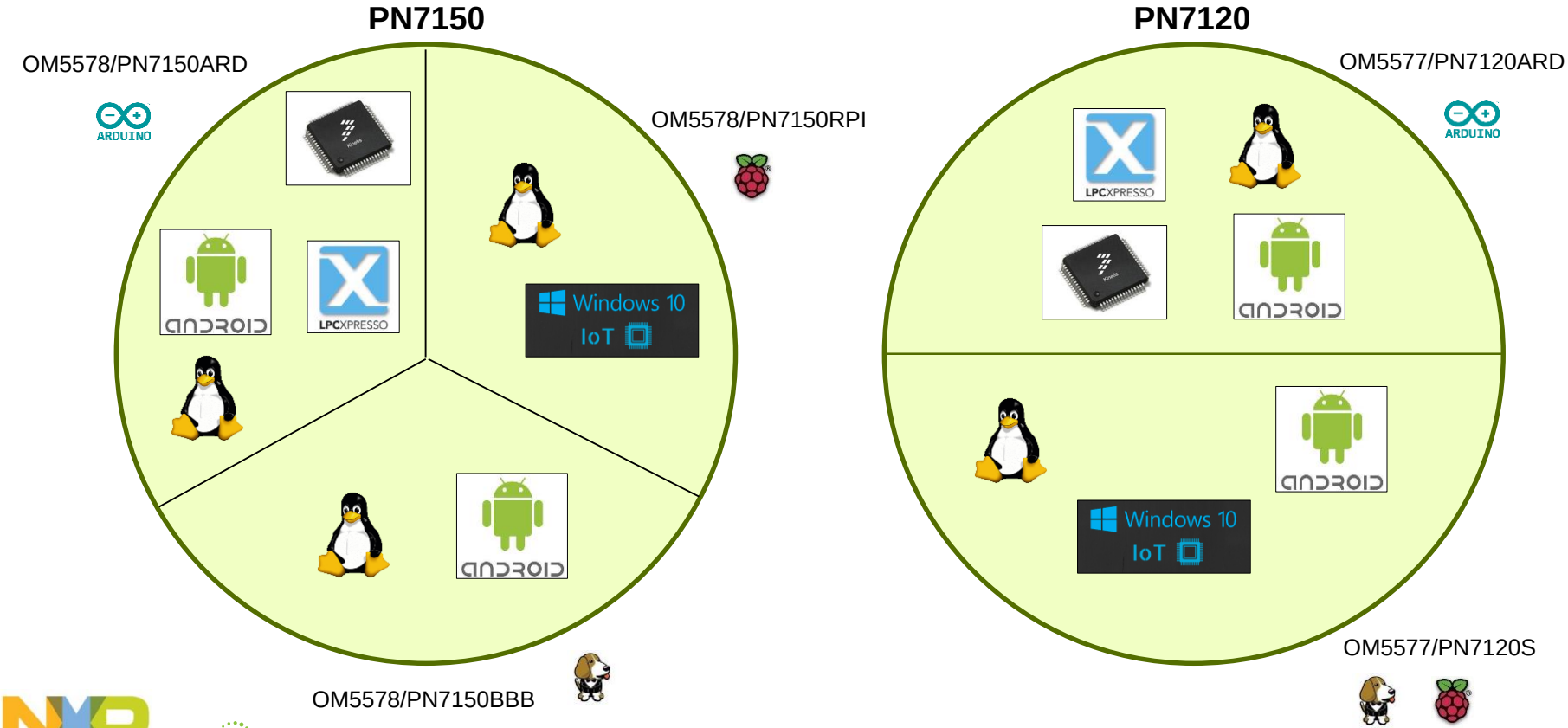
OM5577/PN7120 kit can be reused in another system by building your own interface board

OM5578/PN7150 and OM5577/PN7120

SW images included in the PSP

OM5778/PN7150 and OM5577/PN7120

SW images



How to get started with

OM5578/PN7150ARD

OM5577/PN7120ARD

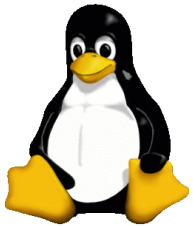
Getting started with OM557x/PN71xxARD

Software compatibility

Linux driver support

OM5578 PN7150 ARD UDOO Linux demo image

OM5577 PN7120 ARD UDOO Linux



Android driver support

OM5578 UDOO Neo Android Lollipop demo image

OM5577 UDOO Neo Android Lollipop demo image

Hardware compatibility

RTOS and NullOS support

NXP-NCI LPCXpresso example

NXP-NCI Kinetis Design Studio example

Getting started with OM557x/PN71xxARD

Software compatibility

Hardware compatibility

LPCXpresso boards

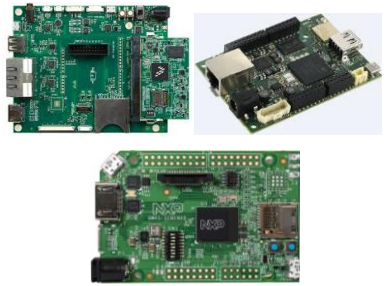
LPC8xx, LPC11xx, LPC12xx + any LPC controller & related boards: LPCXpresso824-MAX and LPCXpresso board for LPC11u37H

Kinetis & Freedom boards

K64F, KL43, KW40Z/KW41Z + most other Kinetis controller & related boards: FRDM-K64F, FRDM-KL43, FRDM-LW40Z/FRDM-KW41Z

i.MX boards

i.MX6, i.MX7 & related boards: i.MXUltralite Evaluation kit, Quick start board for SCM-i.MX 6DQ, UDOO Neo and UDOO Dual/Quad



Quick startup on UDOO Neo

Quick startup on UDOO Neo

Required items

Headless IoT Device Mode

UDOO Neo board

PN71xx controller board

PN71xx Arduino interface board

MicroSD card

External computer

Quick startup on UDOO Neo

Required items

Computer mode

UDOO Neo board

PN71xx controller board

PN71xx Arduino interface board

MicroSD with OS Image

Cables and peripherals

Quick startup on UDOO Neo

Steps to follow

1. Download & Flash the image in the microSD card
2. Assembling the interface board and connecting the UDOO Neo to PC
3. Connect the UDOO Neo to peripherals or computer
4. Start the UDOO Neo board
5. Execute the demo example

Link to video

Quick startup on UDOO Neo

Steps to follow

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Link to video

Quick startup on UDOO Neo

Steps to follow

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2. Assembling the interface board and connecting the UDOO Neo to PC
3. Connect the UDOO Neo to peripherals or computer
4. Start the UDOO Neo board
5. Execute the demo example

Link to video

UDOO Neo – Application Example

Pairing a BLE Phone

Link to video

UDOO Neo – Application Example

Pairing a BLE Phone

Link to video

Pairing and file transfer

Quick startup on Kinetis

Required items

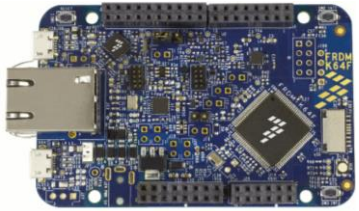
Computer with KDS (running Windows, Linux or Mac OS X)

or

PN71xx controller board

or

PN71xx Arduino interface board



FRDM-K64F board

Freedom FRDMK-K64F:
http://www.nxp.com/products/software-and-tools/hardware-development-tools/freedom-development-boards/freedom-development-platform-for-kinetis-k64-k63-and-k24-mcus:FRDM-K64F

Hardware setup

OM5578/PN7150ARD + FRDM-K64F hardware setup

Stack together PN7150 NFC controller board + Arduino interface board + FRDM-K64F board

OM5577/PN7120ARD + FRDM-K64F hardware setup

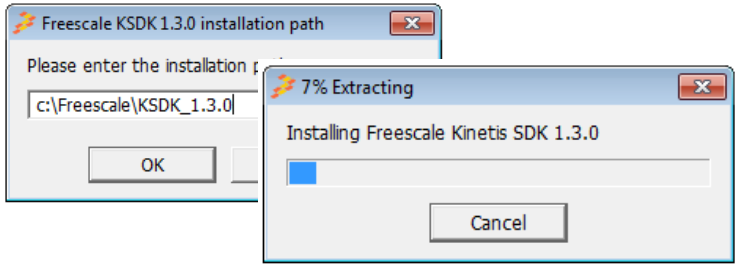
Stack together PN7120 NFC controller board + Arduino interface board + FRDM-K64F board

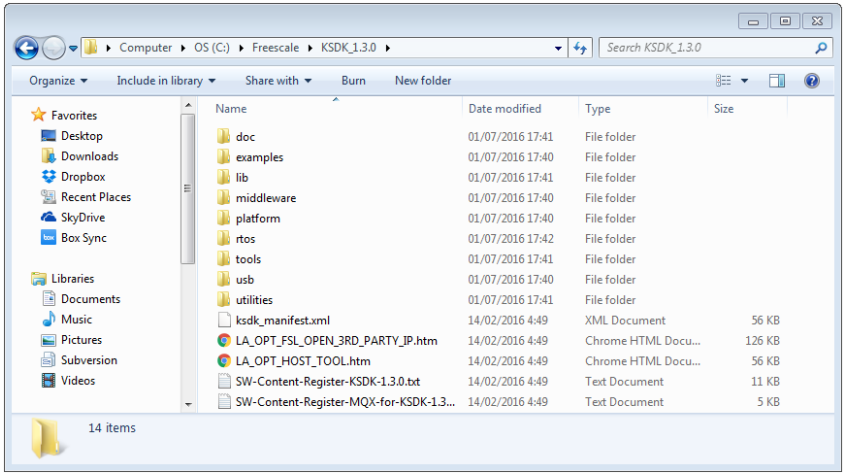
Software setup

FRDM-K64F software setup

Get Kinetis Design Studio (KDS), Kinetis Software Development Kit (KSDK), install virtual COM driver, install a terminal application, import and run the example.

1 **Kinetis SW development kit v1.3 (Download)**





Software setup

FRDM-K64F software setup

Get Kinetis Design Studio (KDS), Kinetis Software Development Kit (KSDK), install virtual COM driver, install a terminal application, import and run the example.

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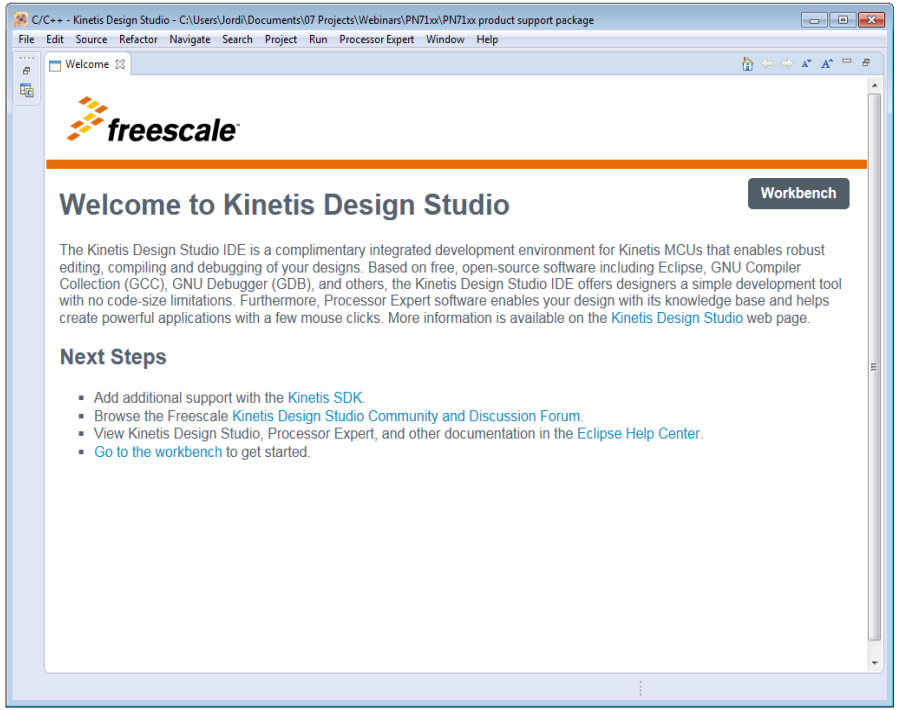

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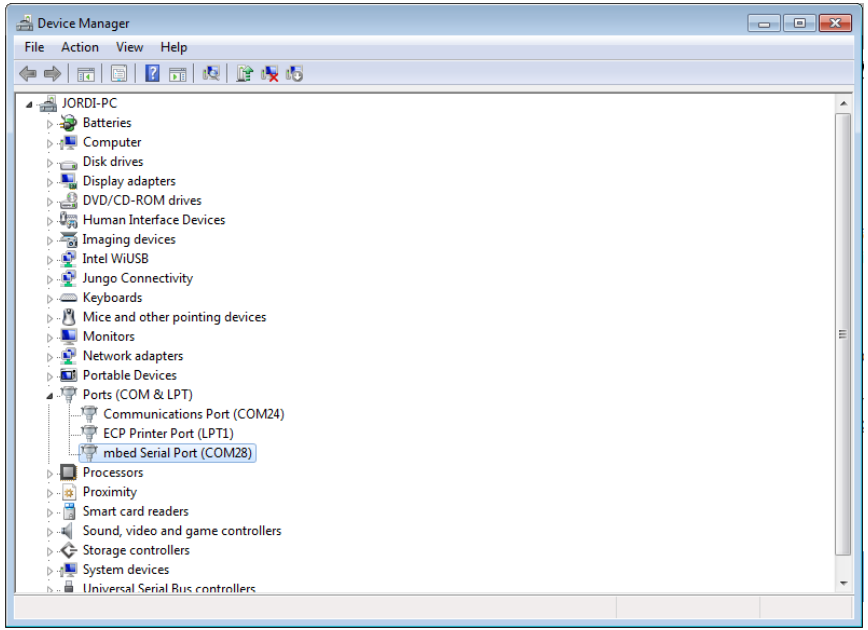

Software setup

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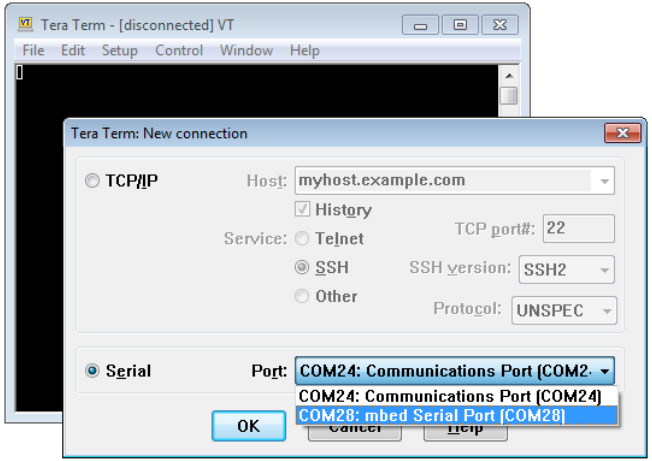
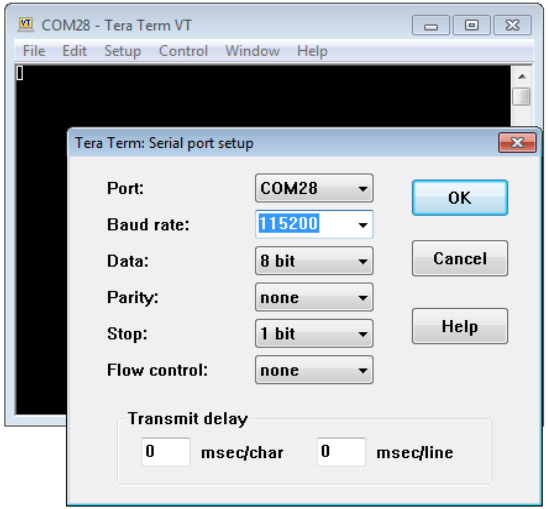
3. **Virtual COM Driver** (*Download*)
4. **Tera Term terminal application** (*Download*)
   - a. **Configure new connection:** *File → New connection → Select mbed Serial Port*
   - b. **Configure serial port settings:** *Setup → Serial Port: Set 115200 baud rate, 8 data bits, no parity and 1 stop bit*

a



b



Kinetis development environment setup

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2. **Import the kdsk_platform_lib_K64F12 project from the Kinetis Software Development Kit (KSDK)**
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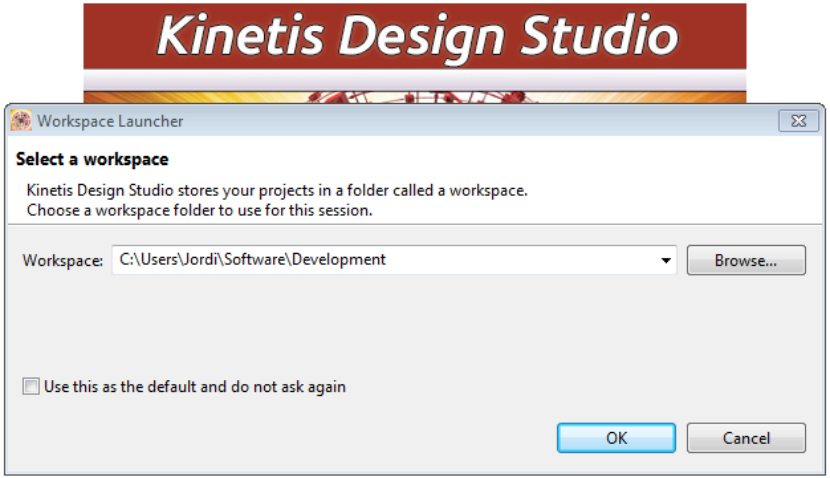
3. **Import the NXPNCI_KDS_Example project**
   SW3735- NXP-NCI Kinetis Design Studio example
4. **Build the NXPNCI_KDS_Example project**
   Clicking on the "hammer" icon
5. **Debug the NXPNCI_KDS_Example project**
   Generate a debug configuration



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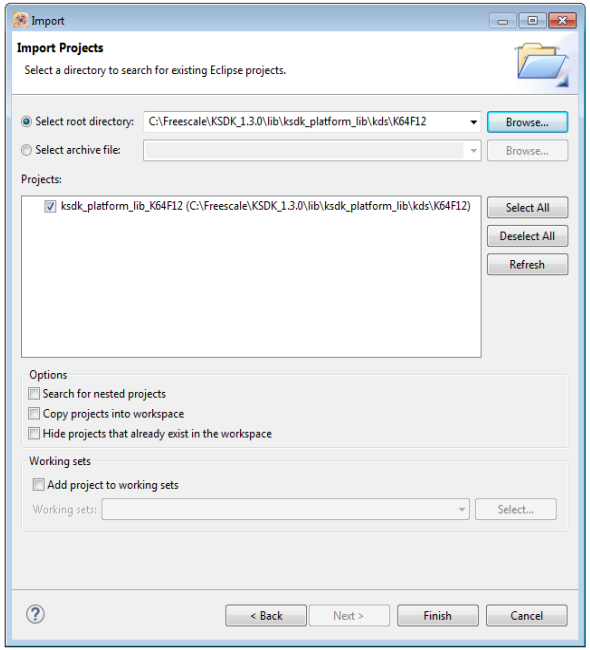
Go to File → Import → General → Existing Projects into Workspace



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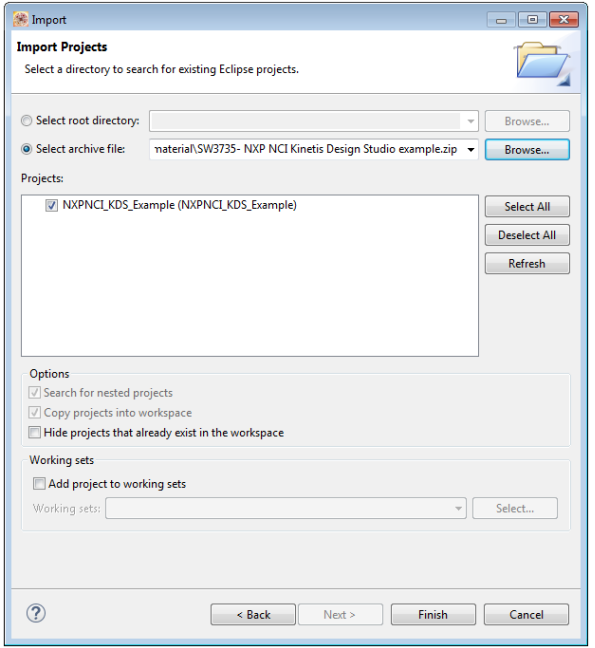

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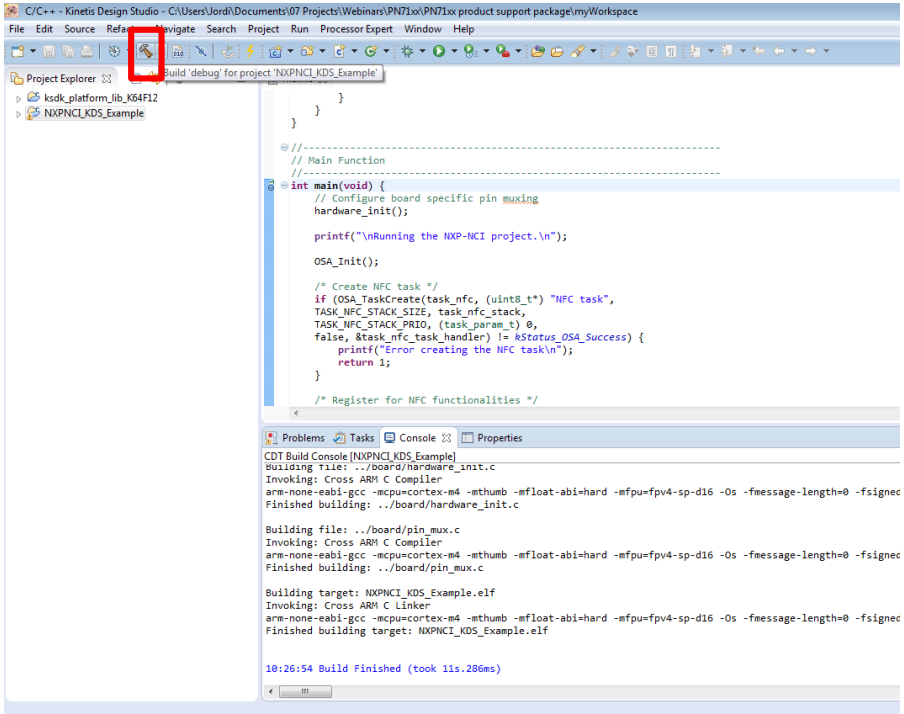

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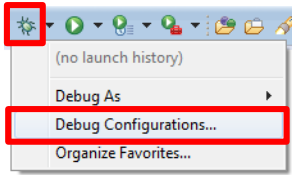
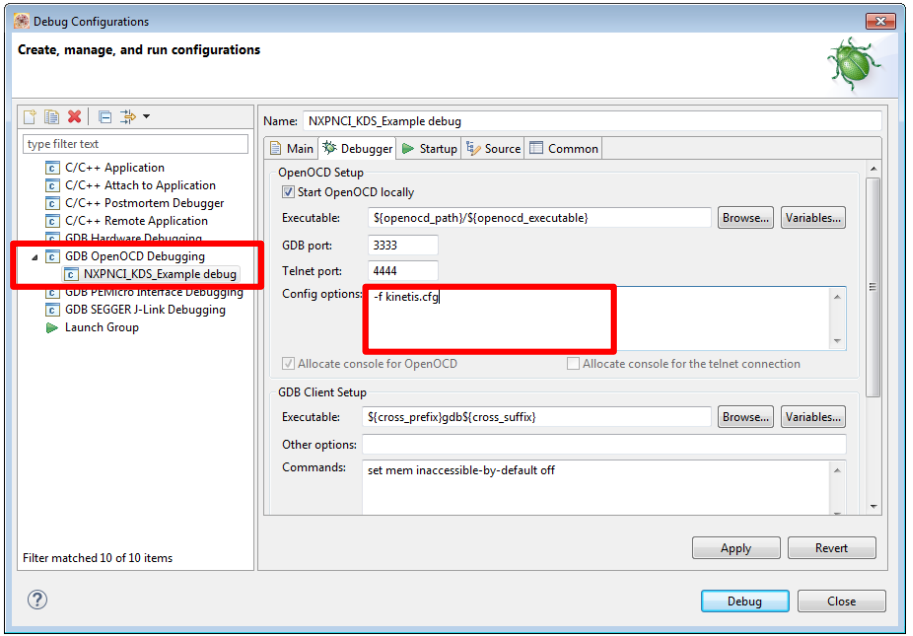




Running the *NXPNCI_KDS_Example*

Example customization

Discovery loop configuration

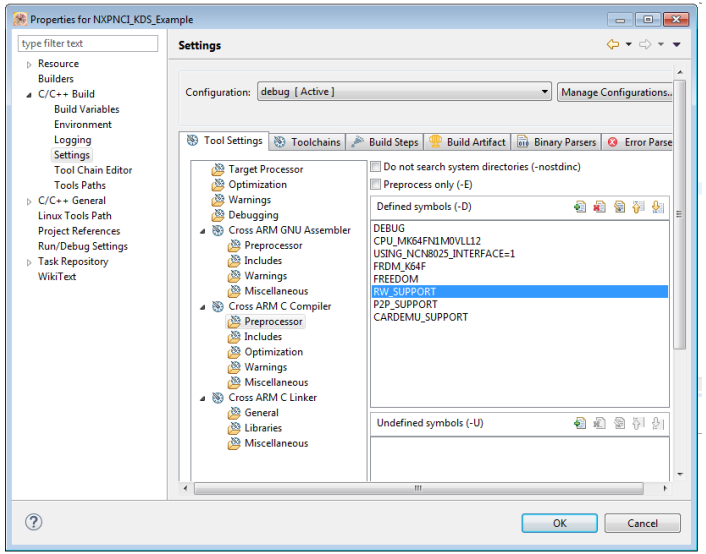
The discovery loop can be configured by setting "discovery technologies" variable inside the main.c function

By default all technologies are enabled (Passive NFC-A, NFC-B and NFC-F as well as Active NFC-F in both Poll and Listen modes

```
    unsigned char DiscoveryTechnologies[] = {
#if defined P2P_SUPPORT || defined RW_SUPPORT
            MODE_POLL | TECH_PASSIVE_NFCA,
            MODE_POLL | TECH_PASSIVE_NFCF,
#endif
#ifdef RW_SUPPORT
            MODE_POLL | TECH_PASSIVE_NFCB,
#endif
#ifdef P2P_SUPPORT
            MODE_POLL | TECH_ACTIVE_NFCF,
#endif
#if defined P2P_SUPPORT || defined CARDEMU_SUPPORT
            MODE_LISTEN | TECH_PASSIVE_NFCA,
#endif
#if defined CARDEMU_SUPPORT
            MODE_LISTEN | TECH_PASSIVE_NFCB,
#endif
#ifdef P2P_SUPPORT
            MODE_LISTEN | TECH_PASSIVE_NFCF,
            MODE_LISTEN | TECH_ACTIVE_NFCA,
            MODE_LISTEN | TECH_ACTIVE_NFCF,
#endif
            };
```

NFC modes compile flags

To disable a mode, just remove the related definition in the project properties ("RW_SUPPORT", "P2P_SUPPORT", "CARDEMU_SUPPORT")



Running the *NXPNCI_KDS_Example*

Read/Write mode

Link to video

Extracts NDEF content from a NFC Forum tag

Authenticates, reads and writes MIFARE Classic block

Running the *NXPNCI_KDS_Example*

Card emulation mode

Link to video

Exposes NDEF content to a remote NFC reader

Running the *NXPNCI_KDS_Example*

Peer-to-Peer mode

Link to video

Exchanges NDEF content with remote P2P device

How to get started with

OM5578/PN7150BBB

OM5577/PN7120S (BBB interface board)

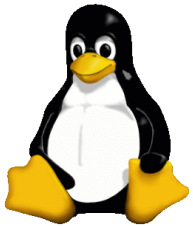
Getting started with OM5578/PN7150BBB and OM5577/PN7120S

Software compatibility

Linux driver support

OM5578 PN7150 BBB Linux demo image

OM5577 BeagleBone Linux demo image



Android driver support

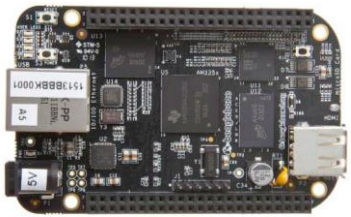
OM5578 PN7150 BBB KitKat demo image

OM5577 BeagleBone Android KitKat demo image

Hardware compatibility

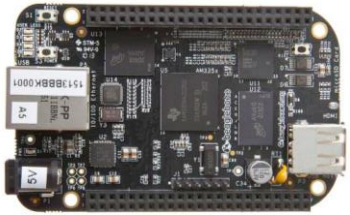
BeagleBone Black

Low-power open-source hardware single board credit-card-sized Linux computer that runs Android and Ubutuntu.



Required items

BeagleBone Black board



PN71xx controller board

PN71xx BBB interface board

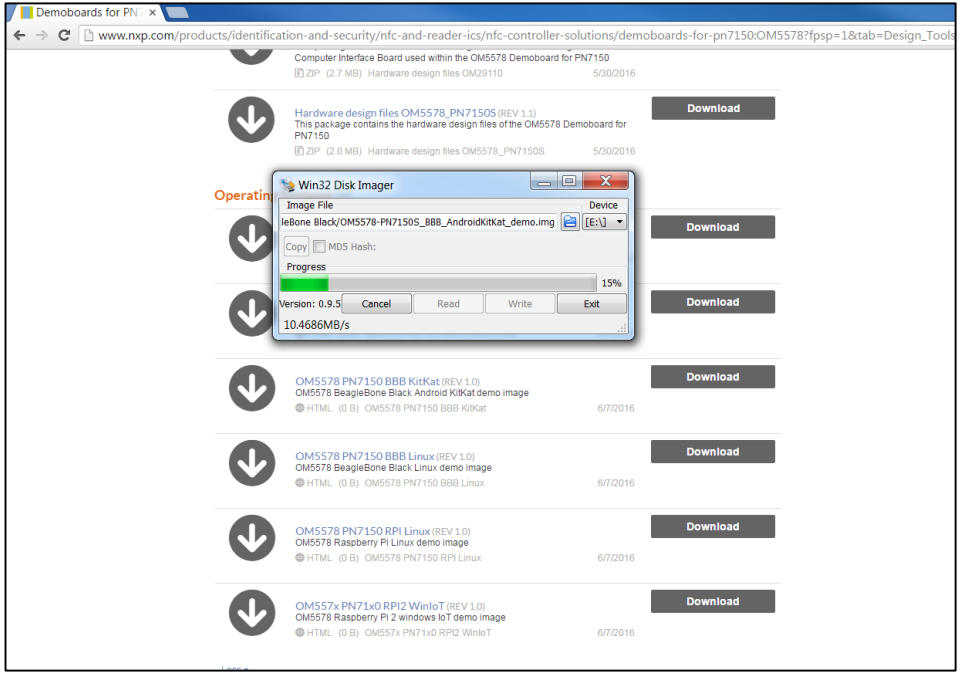
MicroSD with OS Image (8GB)

Cables and peripherals

Quick startup on BeagleBone Black

Steps to follow

1. Download & Flash the image in the microSD card
2. Assembling the interface board to the BeagleBone Black
3. Connect the peripherals to the BeagleBone Black
4. Start the BeagleBone Black board and execute demo example



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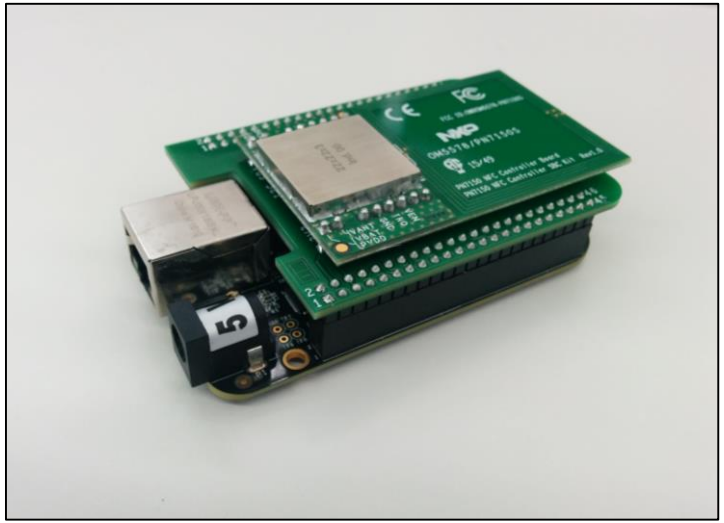

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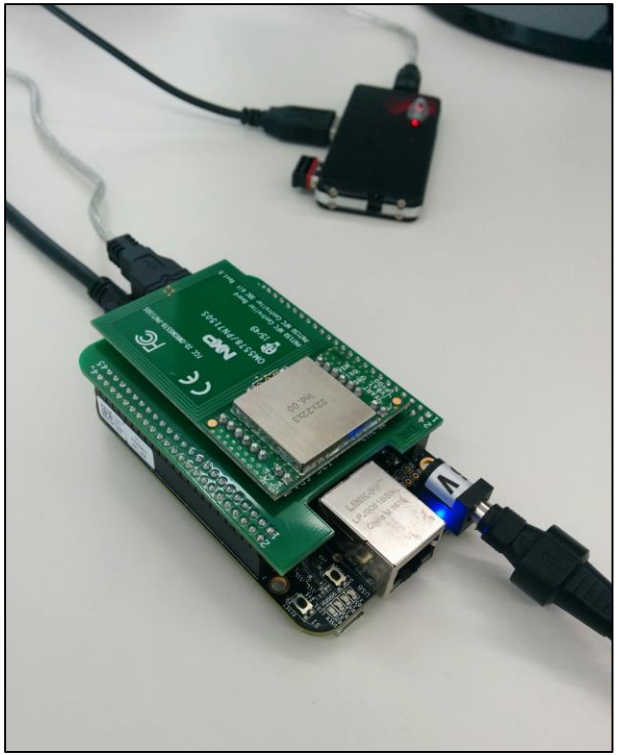

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4. Start the BeagleBone Black board and execute demo example

Link to video

How to get started with

OM5578/PN7150RPI

OM5577/PN7120S (RPI interface board)

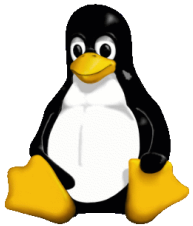
Getting started with OM5578/PN7150RPI and OM5577/PN7120S

Software compatibility

Linux driver support

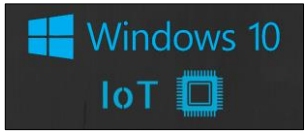
OM5577 Raspberry Pi Linux demo image

OM5578 PN7150 RPI Linux demo image



Win10 IoT driver support

OM557x PN71x0 RPI2 WinIoT



Hardware compatibility

Raspberry Pi

Low-cost, credit-card sized computer that plugs into a computer monitor and uses standard keyboard and mouse

Quick startup on Raspberry Pi

Required items

Computer mode

Raspberry Pi board

PN71xx controller board

PN71xx Raspberry Pi interface board

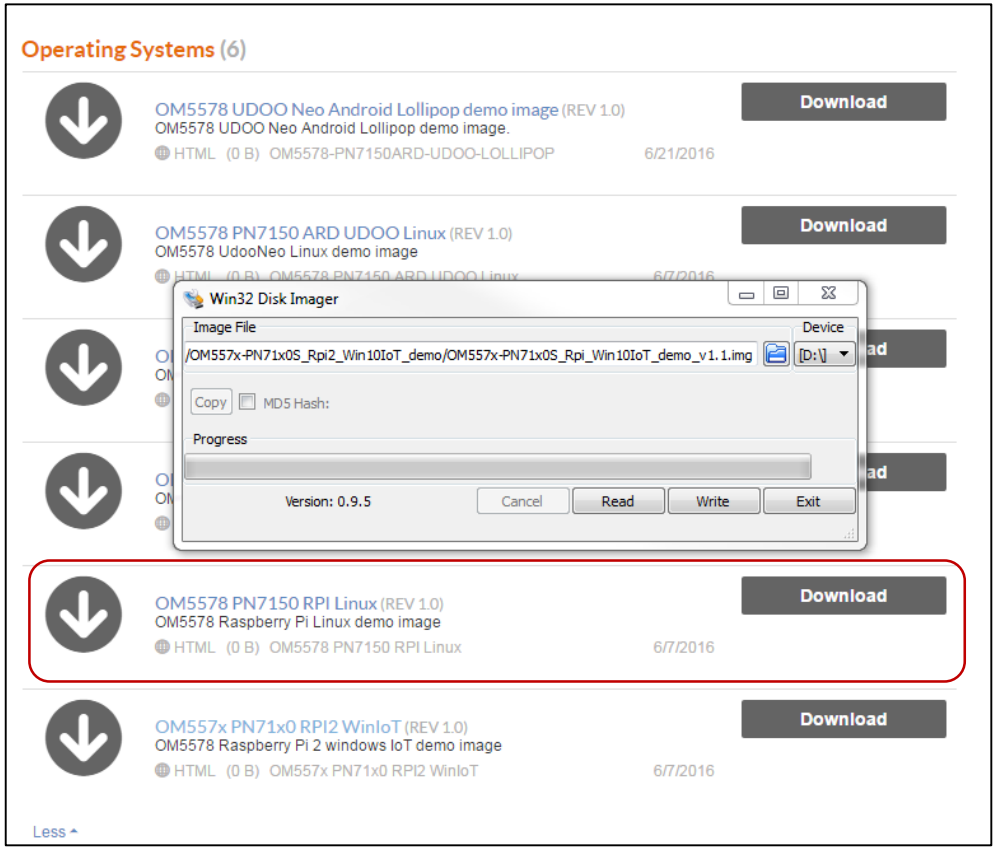
MicroSD with OS Image

Cables and peripherals

Quick startup on Raspberry Pi

Steps to follow (Linux)

1. Download & Flash the Linux image in the microSD card
2. Assembling the interface board to the Raspberry Pi
3. Connect the peripherals to the Raspberry and insert the microSD
4. Start the Raspberry Pi board and execute demo example



Quick startup on Raspberry Pi

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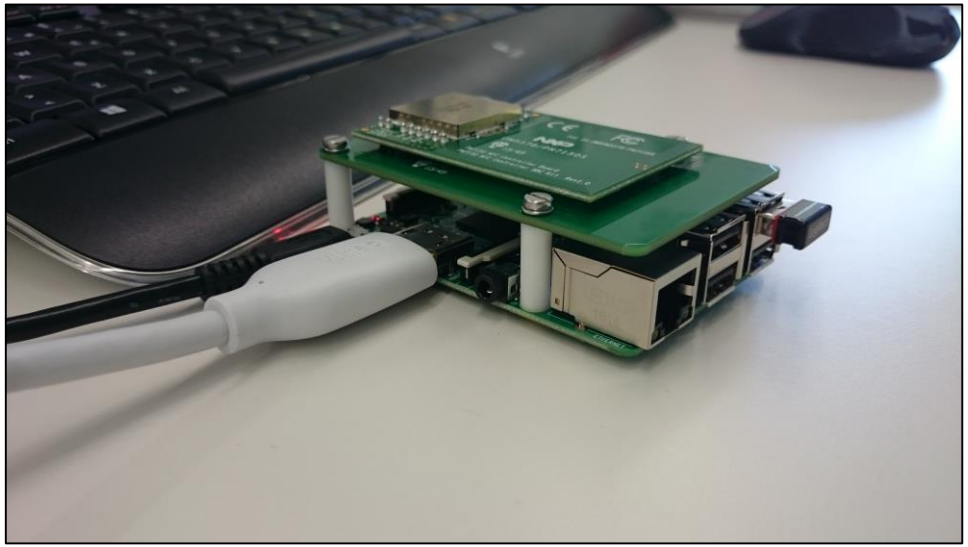

Quick startup on Raspberry Pi

Steps to follow (Linux)

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Link to video

Quick startup on Raspberry Pi

Steps to follow (WinIoT)

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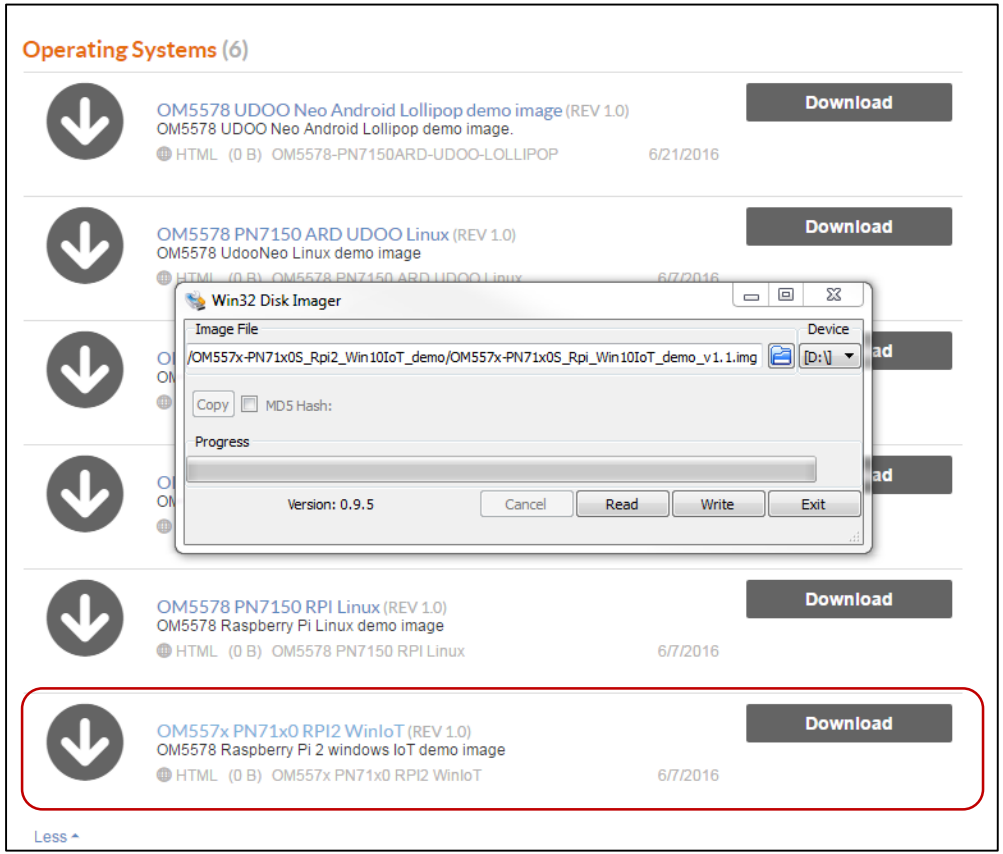
2. Assembling the interface board to the Raspberry Pi
3. Connect the peripherals to the Raspberry and place the micro SD
4. Start the Raspberry Pi board and execute demo example



Quick startup on Raspberry Pi

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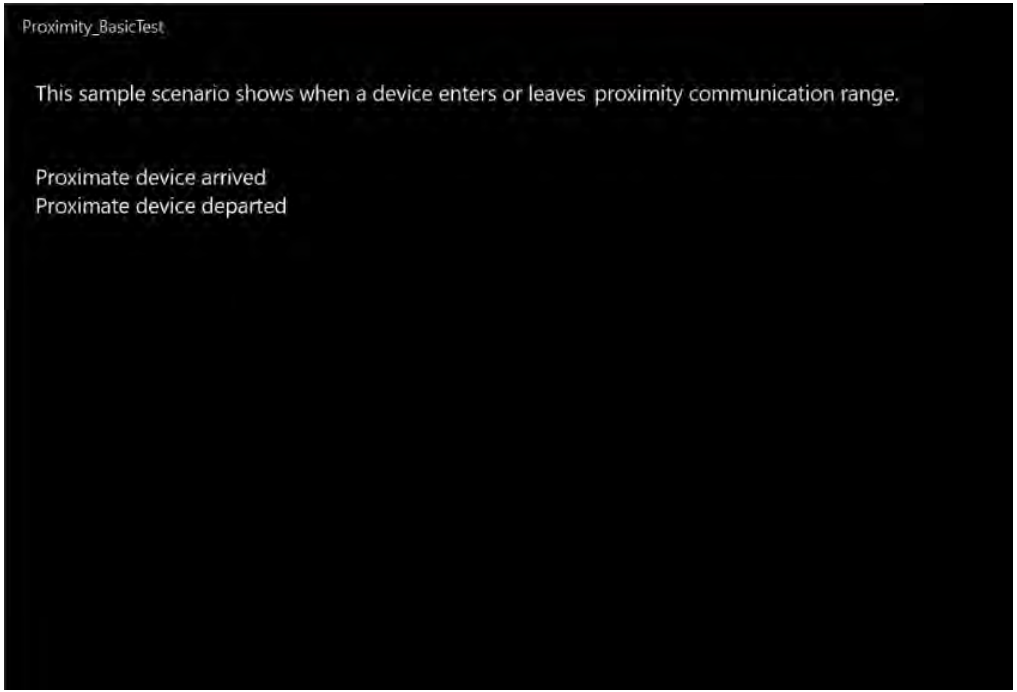

Quick startup on Raspberry Pi

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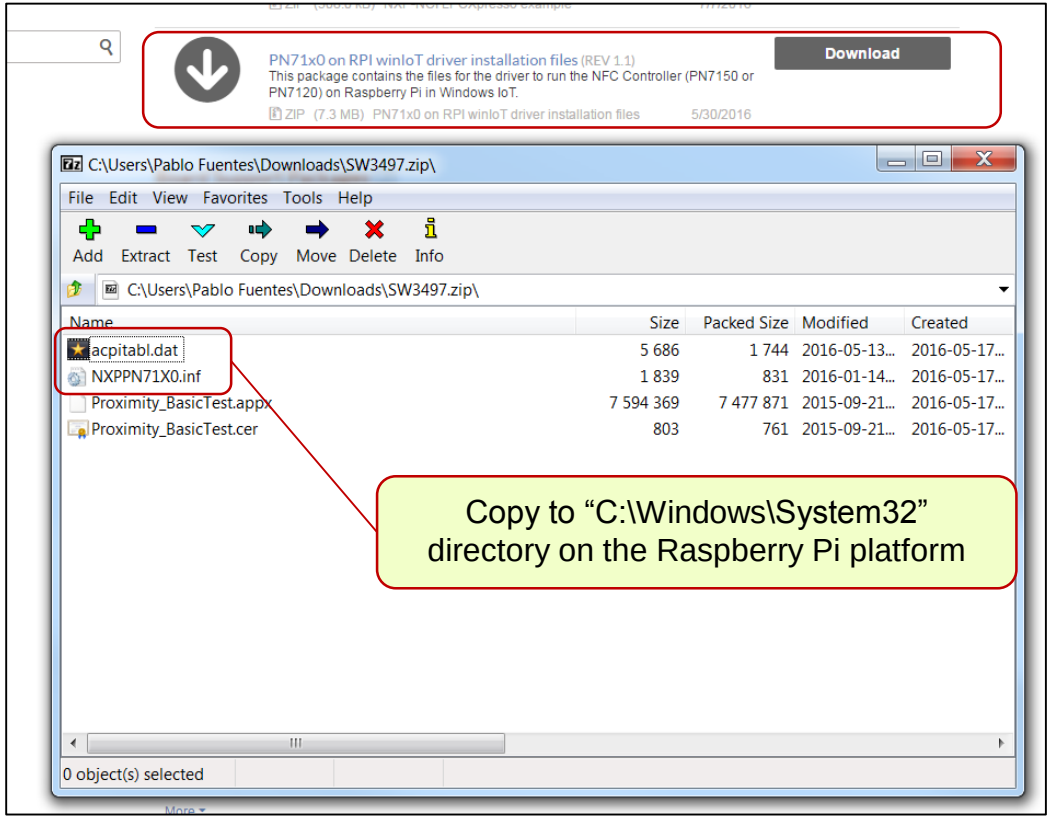

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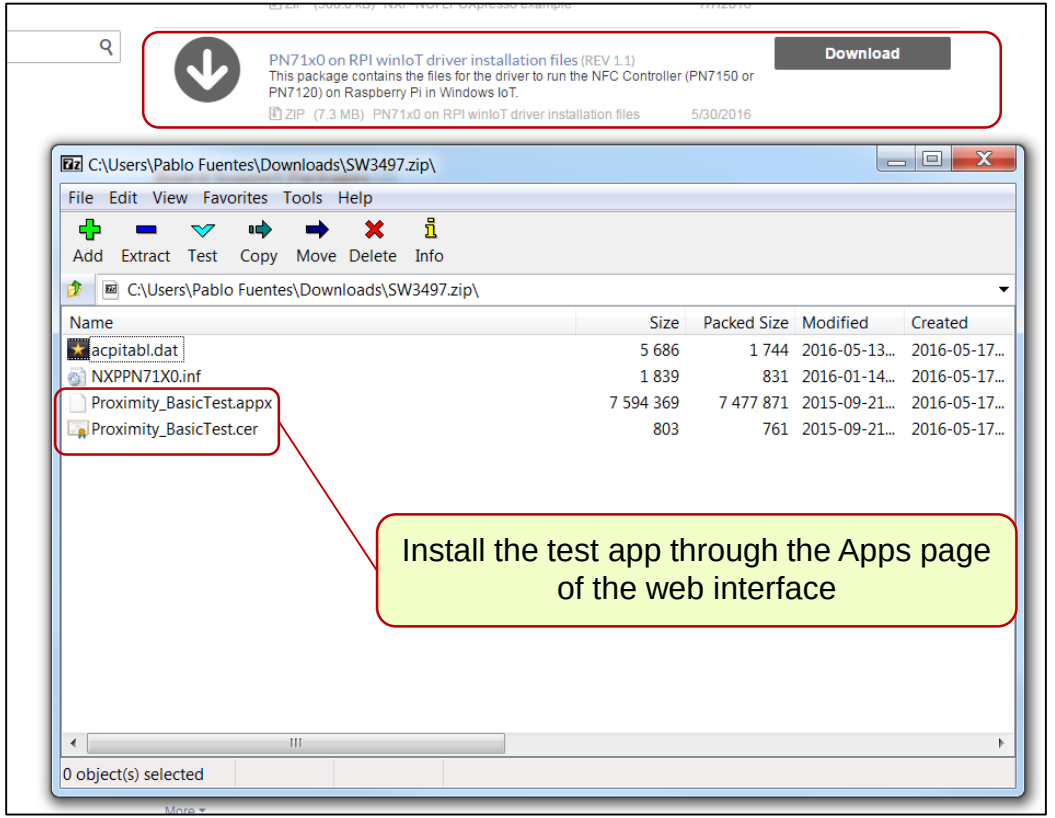


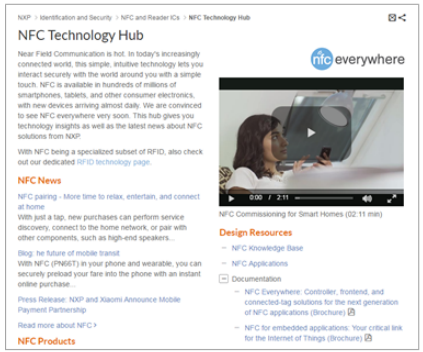
Final remarks

PN71xx product support package in a nutshell

NFC controller SBC kits	▸ OM5577/PN7120S – PN7120 Controller SBC kit ▸ OM5577/PN7120ARD – PN7120 NFC Controller SBC kit for Arduino ▸ OM5578/PN7150ARD – PN7150 NFC Controller SBC kit for Arduino ▸ OM5578/PN7150BBB– PN7150 NFC Controller SBC kit for BeableBone Black ▸ OM5578/PN7150RPI-– PN7150 NFC Controller SBC kit for Raspberry Pi	
SW support	▸ SW3735- NXP-NCI Kinetis Design Studio example ▸ SW3241- NXP-NCI LPCXpresso example ▸ SW3497- PN71x0 on RPI, WinIoT driver installation files ▸ OM5577_BBB_KITKAT – OM5577 BeagleBone Android KitKat demo image ▸ OM5577_BBB_LINUX- OM5577 BeagleBone Linux demo image ▸ OM5577_RPI_LINUX-OM5577 Raspberry Pi Linux demo image ▸ OM5577_RPI_WIN10IOT-OM5577 Raspberry Pi WinIoT10 demo image ▸ SW3497- PN71x0 on Raspberry Pi, WinIoT driver installation files	▸ OM5578 PN7150 UDOO Neo Linux system image ▸ OM5578 PN7150 Beaglebone Black KitKat Linux system image ▸ OM5578 PN7150 Beaglebone Black Linux system image ▸ OM5578 PN7150 Raspberry Pi Linux system image ▸ OM557x PN71x0 Raspberry Pi 2 WinIoT ▸ Linux NFC stack for NCI based NXP NFC Controllers ▸ Android patches for KitKat ▸ Android patches for Lollipop
Docs	▸ AN11646 – PN7120 NFC Controller SBC Kit Quick Start Guide ▸ AN11658 – NXP-NCI LPCXpresso example ▸ AN11845- NXP-NCI Kinetis Design Studio example ▸ UM10819 – PN7120 User Manual ▸ UM10878- NFC Controller SBC Kit User Manual ▸ AN11697 PN71x Linux Software Stack Integration guidelines ▸ AN11700- PN7120 Product Quick Start Guide ▸ AN11690 NXP-NCI Android porting guidelines ▸ AN11564 PN7120 Antenna Design and Matching guide ▸ AN11656 PN120 Hardware design guide	▸ AN11562 PN7120 Low Power Mode configuration ▸ AN11759 – Product quick start guide ▸ AN11755 – Antenna and tuning design guide ▸ AN11756 – Hardware design guide ▸ AN11757 – Low power mode configuration ▸ AN11767 – Windows IoT porting guidelines ▸ AN11758 – Raspberry Pi demo kit quick start guide ▸ AN11842 – BeagleBone demo kit quick start guide ▸ AN11841 – Arduino demo kit quick start guide ▸ UM10936 – User Manual

Find your NFC toolkit at: www.nxp.com

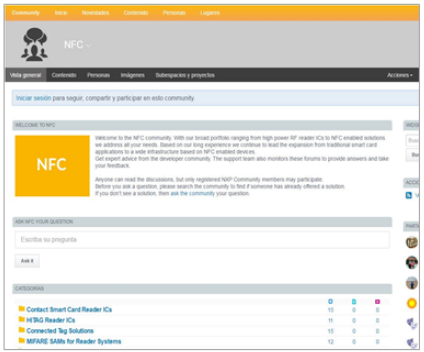
NFC use cases



Use cases & products

@ NFC Everywhere
www.nxp.com/NFC

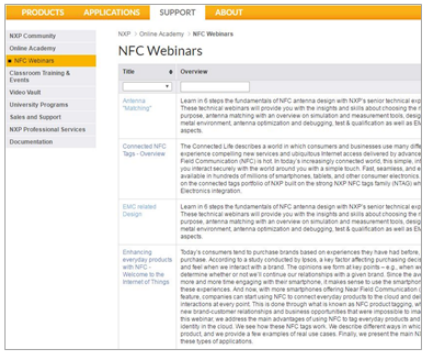
NFC community



Online community & technical support:

Support -> NXP community -> NFC
NXP community NFC

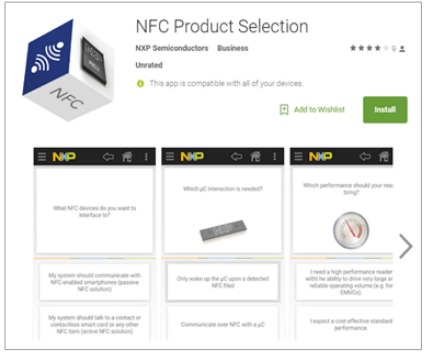
NFC training



Recorded Webinars:

Support -> online academy -> NFC webinars
NFC webinars

NFC product selection guide



NFC product selection guide app available:

Google Play
App Store

NXP partner program

Partner List

PRODUCTS APPLICATIONS SUPPORT ABOUT

NXP > NXP Partner Program > Partner List

Partner List

Our partners are listed in an alphabetical order below. Click on the company name to view a description of the company, their contact information, and a link to their website.

Show 10 entries Search: NFC

Company name	Type	Region	Country	Application areas	Product foc us
Beijing Strong Tech Co., Ltd.	IDH	Greater China	China	Smart appliances NFC and reader IC's	MCU, Logic, GA, Interface, NFC
Britestone Limited	IDH	Greater China	China	NFC and reader IC's	NFC, MCU, Thyristors and Sensor
Engicam	IDH	EMEA	Italy	Smart appliances NFC and reader IC's	MCU, RFID, IPCamera
GOLD FULL ELECTRONICS (H.K.) CO., LIMITED	IDH				Logic, NFC tag module, GA
Golden IC Technology CO.,Ltd	IDH	Greater China	Taiwan	Smart appliances NFC and reader IC's	LPC8xx, LPC11xx, LPC1768, LPC4088, LPC4350, NFC, Logic IC.
IMST	IDH	EMEA	Germany	NFC and reader IC's	NFC
ipTronix	IDH	EMEA	Italy	NFC and reader IC's	NFC
Kronegger GmbH	IDH	EMEA	Austria	NFC and reader IC's	NFC, RFID
MobileKnowledge	IDH	EMEA	Spain	NFC and reader IC's	NFC
New rFid Concept	IDH	EMEA	France	NFC and reader IC's	NFC

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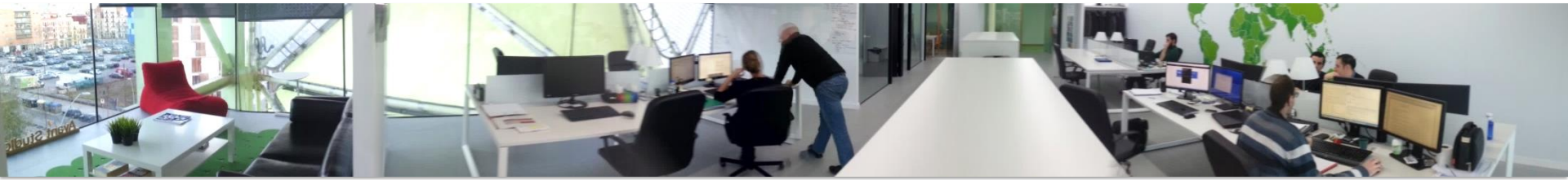
Partner list (and search for NFC)

Training Mobile Knowledge

MobileKnowledge

Software development in Android and iOS
Embedded software for MCUs
JCOP, Java Card operating Systems
Hardware design and development
Digital, analog, sensor acquisition, power management
Wireless communications WiFi, ZigBee, Bluetooth, BLE
Contactless antenna RF design, evaluation and testing

MIFARE applications
End-to-end systems, readers and card-related designs
EMVco applications
Readers, cards, design for test compliancy (including PCI)
Secure Element management
GlobalPlatform compliant backend solutions
Secure services provisioning OTA, TSM services



We help companies leverage the mobile and **contactless revolution**

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NXP Training Mobile Knowledge

NXP Partner IDH Independent Design House
MIFARE Accredited Training Partner
MOBILE WORLD CAPITAL BARCELONA

PN71xx - *Plug-and-play NFC solutions*

Jordi Jofre (Speaker)
Pablo Fuentes (Speaker)
Angela Gemio (Host)

Thank you for your kind attention!

- Please remember to fill out our evaluation survey (pop-up)
- Check your email for material download and on-demand video addresses
- Please check NXP and MobileKnowledge websites for upcoming webinars and training sessions

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