

LEARN ALL ABOUT NFC

SESSION 4: PRODUCT SUPPORT PACKAGE FOR NFC READERS & NFC CONNECTED TAGS

JORDI JOFRE
NFC EVERYWHERE
APRIL 2017



PUBLIC



SECURE CONNECTIONS
FOR A SMARTER WORLD



Learn all about NFC

Session I, 15th March

NFC applications and use cases

<https://attendee.gotowebinar.com/rt/1059402932312036099>

Session II, 22th March

NFC essentials

<https://attendee.gotowebinar.com/rt/6461366231742998273>

Session III, 28th March

NFC product portfolio

<https://attendee.gotowebinar.com/rt/8452313508808186113>

Session IV, 12th April

**Product support package for NFC Readers
& NFC-Connected Tags**

<https://attendee.gotowebinar.com/rt/3965453945970616321>





Agenda

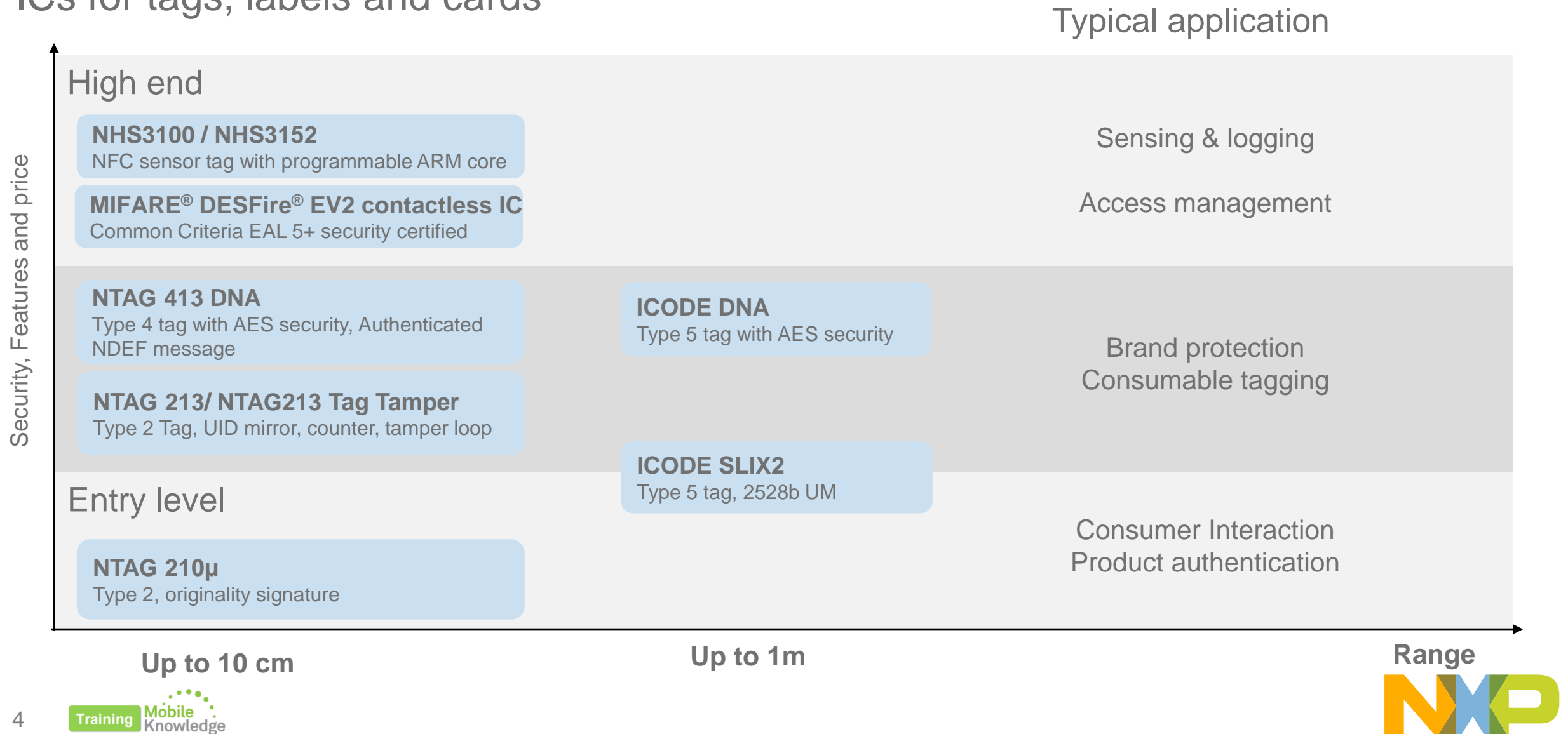
- NFC portfolio and our support package.
- Support package for NTAG I²C *plus*.
- Support package for CLRC663 *plus*, PN5180 and PN7462.
- Support package for PN7150.
- More support material.

NFC portfolio and our support package



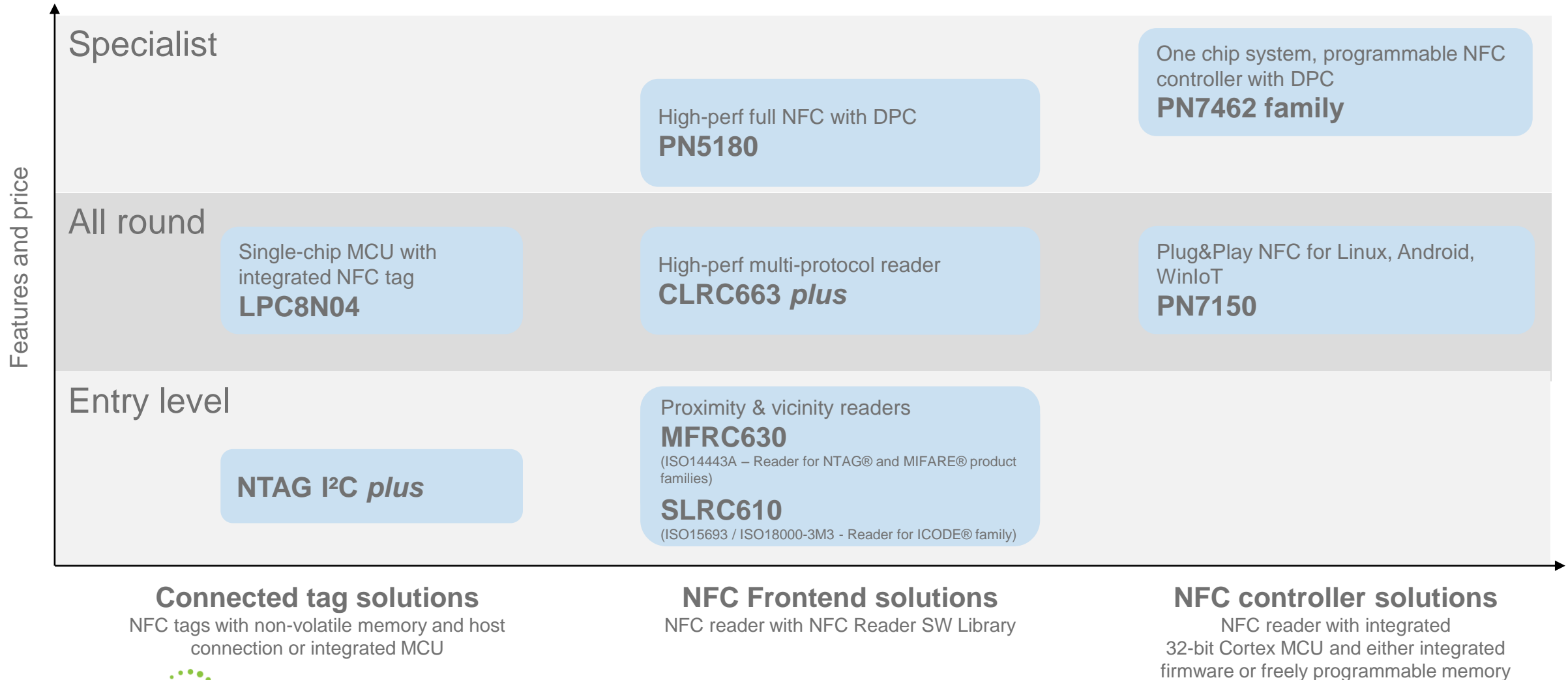
NFC focus products for each application need

ICs for tags, labels and cards



NFC focus products for each application need

Readers/connected tags: for embedded electronics



NXP offers highest level of support on the market

We reduce complexity, streamline tasks and add flexibility
at every point in development



We know each step in the NFC implementation process

Our support package simplifies the process and reduces time to market



We have the right material for each design step

Full range of development kits, design files, sample code, app notes, online training, tutorials



























We find direct answers to your questions

Through our technical NFC community and NXP approved engineering consultants (AECs)

A unique combination of PCB boards, software tools, software examples,
training material, documentation, tutorials and support community

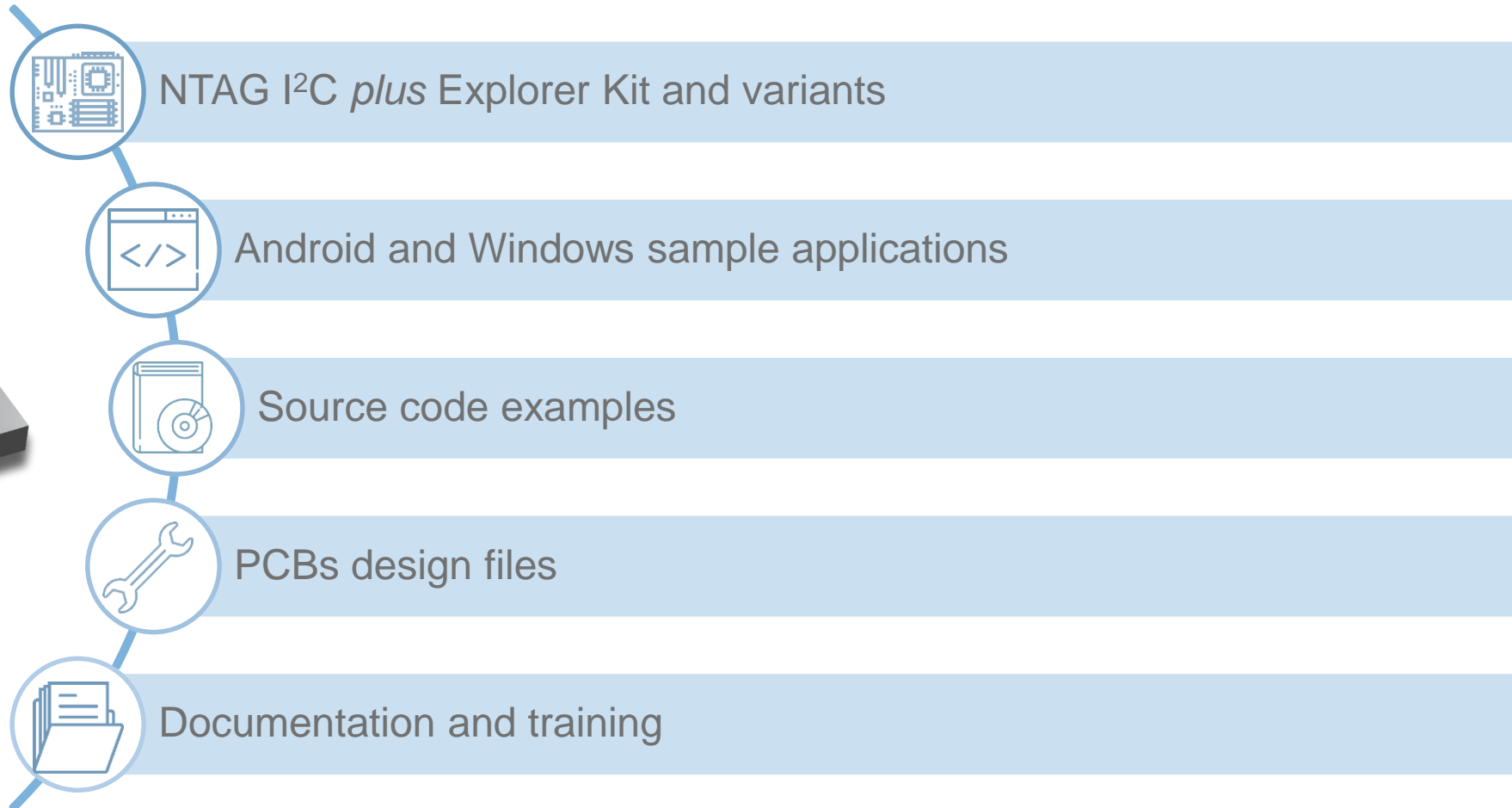
NXP support tools for NFC

NFC Support			
Decide the functionality	 Online selection tools, including selection app, parametric search, and product details on nxp.com	 NFC Everywhere brochure	NXP approved engineering consultants https://nxp.url.ms/NFC_AEC
Select IC	 Z-card with NFC Reader Portfolio	 NFC use case and product webinars	
Evaluate Features	 Full range of development kits for every NFC Product	 Compatibility with common MCU boards and single-board computers	     
Prototype	 NFC Cockpit	 NFC product support package and antenna design webinars	
Test & Debug	 Gerber files for development kits online		
	 NFC Library  App notes	 Design files for development kits	Technical NFC Community https://community.nxp.com/community/nfc
	 Sample code  Tutorials	 Online trainings on software integration and antenna design	
Get Certified	 NFC Cockpit		
	 DPC, strong RF power generation, RF wave shaping, and HW-based EMD error handling	 EMVCo L1 (analog and digital) library in source code	

Support package for NTAG I²C *plus*



Support package for NTAG I²C *plus*



NTAG I²C *plus* Explorer Kit and variants



OM5569-NT322E: NTAG I²C *plus* Explorer Kit

- NFC Explorer board with Class 4 antenna
- Field detector board
- NTAG I²C *plus* mounted on a Class 6 flex-board with built in I²C interface connectors
- 10 NTAG I²C *plus* package SO8 samples for prototyping



OM5569-NT322ER: NTAG I²C *plus* Explorer Kit with NFC Reader

- NFC Explorer board with Class 4 antenna
- Field detector board
- NTAG I²C *plus* mounted on a Class 6 flex-board with built in I²C interface connectors
- 10 NTAG I²C *plus* package SO8 samples for prototyping
- Identiv CLOUD 3700F reader



OM5569-NT322F: NTAG I²C *plus* Flex Kit containing additional flex antennas

- Class 4 flex antenna
- Class 5 flex antenna
- Class 6 flex antenna
- 10 NTAG I²C *plus* package SO8 samples for prototyping



OM23221ARD: NTAG I²C *plus* kit for Arduino pinout

- NTAG I²C *plus* mounted on an antenna board PCB
- Adapter board for connectivity to any device with Arduino pinout (e.g., Kinetis, i.MX, LPC)
- Bluetooth pairing example based on NXP KW41Z
- Library for NTAG I²C *plus* available through MCUXpresso for FRDM-KW41Z

Printed circuit board design files

SW3638 - NTAG I²C *plus* Explorer Kit

SW3640 – Field Detector board

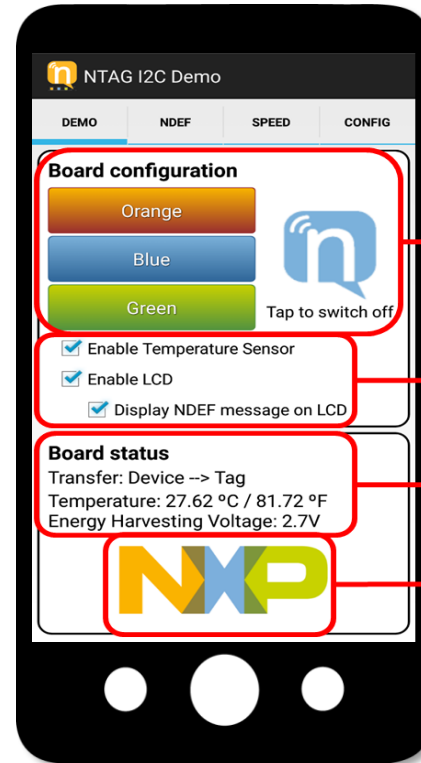
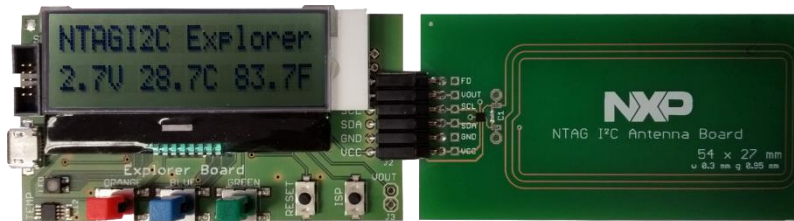


SW3641 - NTAG I²C *plus* flex antenna Class 6

SW3639 - NTAG I²C *plus* Class 4
AN11276 – NTAG Antenna design guide

NTAG I²C Demo App for Android

Get it for free from:



LED color selection

Temperature and LCD enabling selection

Display temperature of the sensor and output voltage on the Vout pin

Board push buttons selection

Explore the NTAG I²C *plus* features:

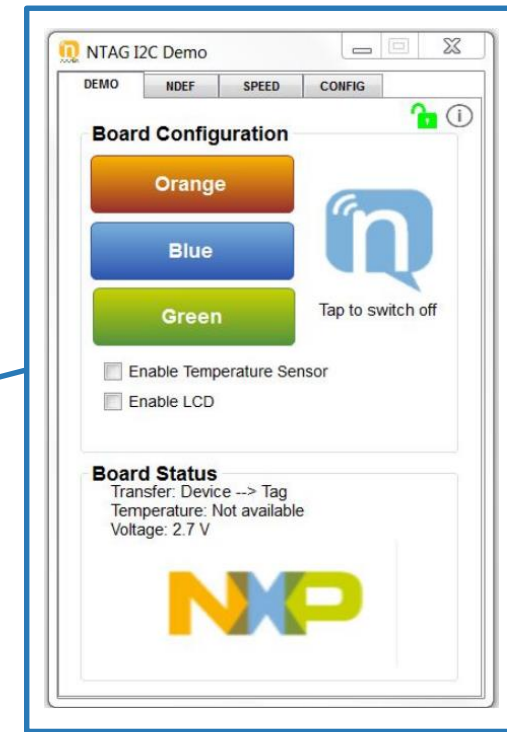
- Energy harvesting.
- Bidirectional data exchange & data throughput.
- Read / write NDEF messages.
- Read / write access to configuration pages.

UM10989 - NTAG I²C Android Demo App developer start-up guide.

UM10966 - NTAG I²C *plus* Explorer Kit Android Demo.

SW3648 - NTAG I²C Android Demo App source code .

NTAG I²C Demo for Windows PC

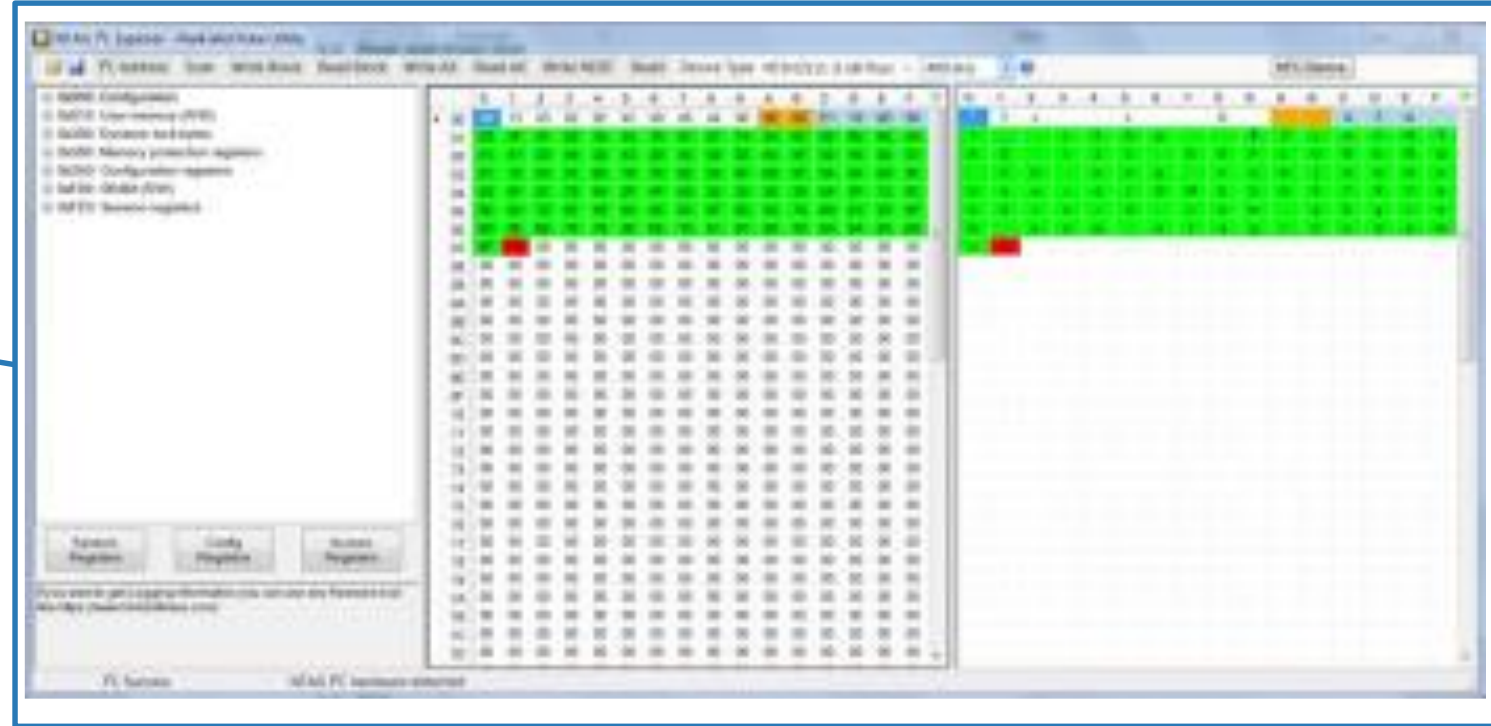
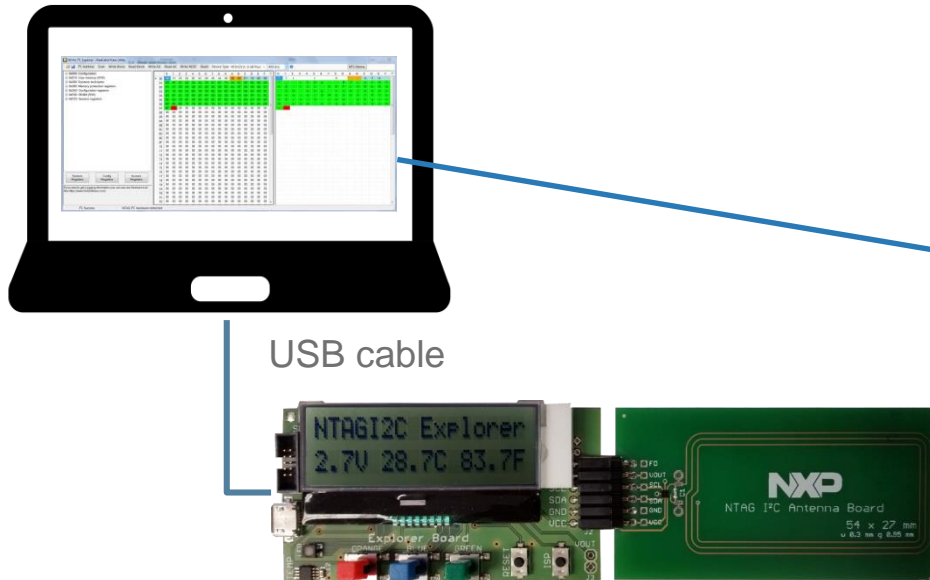


If you do not have an NFC phone, you can use the NTAG I²C demo for Windows PC in combination with the NFC Reader included in the Explorer Kit

SW3651 - NTAG I²C Demo for Windows PC

**Same functionalities as the
NTAG I²C Demo App for Android**

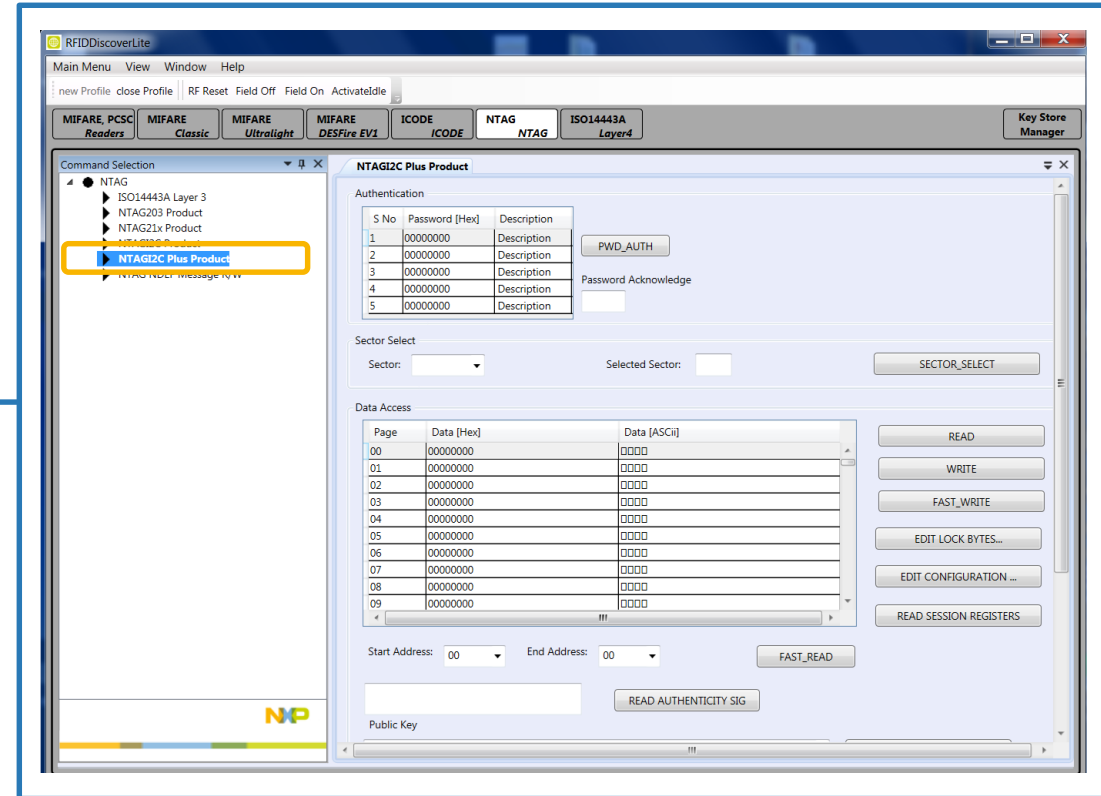
NTAG I²C *plus* Explorer Kit Peek and Poke



UM10967 - NTAG I²C Explorer kit Peek and Poke
SW3652 – Peek and Poke Windows installer
SW3649 – Peek and Poke source code VS2010

The Peek and Poke GUI is a Windows application that can be used to examine the detailed memory contents of the NTAG I²C *plus* EEPROM via I²C interface

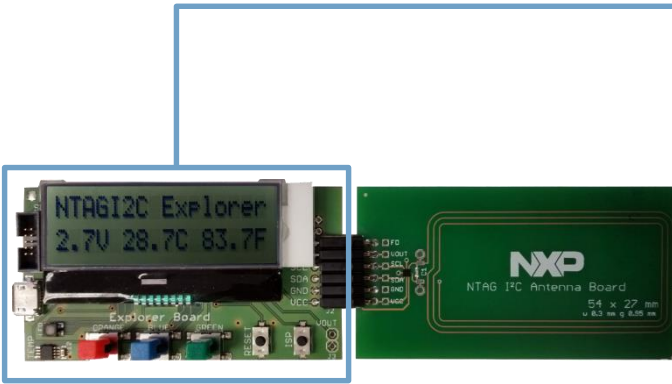
RFIDDiscover Lite 4.1.6



The RFIDDiscover Lite is a GUI for Windows that allows us access and configuration of the NTAG I²C *plus* memory from the RF interface.

SW214441 – RFIDDiscover Lite v4.1

NTAG I²C *plus* Explorer board firmware



Test5 - Develop - NTAG_I2C_Explorer_BootLoader/src/main.c - MCUXpresso IDE

File Edit Source Refactor Navigate Search Project Run FreeRTOS Window Help

Project Explorer

- lpc_chip_11uxx_lib
- NTAG_I2C_API
- NTAG_I2C_Explorer_Blink
- NTAG_I2C_Explorer_BootLoader
 - Binaries
 - Includes
 - Debug
 - inc
 - Release
 - src
 - NTAG_I2C_Explorer_BootLoader Debug.launch
 - NTAG_I2C_Explorer_BootLoader Release.launch
- NTAG_I2C_Explorer_Demo
 - Binaries
 - Includes
 - Debug
 - inc
 - Release
 - src
 - NTAG_I2C_Explorer_Demo Debug.launch
 - NTAG_I2C_Explorer_Demo Release.launch
- nxp_lpcxpresso_11u24h_board_lib

main.c

```
75 int main(void) {
76
77     // Initialize main buffer used to read and write user memory
78     uint8_t Buttons = 0;
79     bool VBUS_sense;
80
81     // Enter peek and poke mode
82     VBUS_sense = Chip_GPIO_Read
83     if (VBUS_sense && (Buttons :
84         hidmain();
85
86     Setup();
87
88     #ifndef INTERRUPT
89     // If Interrupt Mode is e
90     NFC_SetFDOffFunction(ntag_h
91     I2C_LAST_DATA_READ
92     NFC_SetFDOnFunction(ntag_ha
93     #endif
94
95     InitTimer();
96     check_Buttons(&Buttons);
97
98     /* If no button is pressed,
99     * Execution of the user ap
100    * The SP points to the new
101    * The PC contains the loca
102    * From here on, the CPU wi
103    */
104 }
```

The firmware which runs on the NTAG I²C *plus* Explorer board is flashed during the production of the board and supports the demonstration functionality of the hardware

In addition, the NTAG I²C *plus* kit for Arduino pinout includes a BLE pairing example based on KW41Z

Quick... (x)= Glob... (x)= Varia... Brea... Outline

MCUXpresso IDE (Free Edition)

Start here

- New project...
- Import SDK example(s)...
- Import project(s) from file system...
- Build 'lpc_chip_11uxx_lib' [Debug]
- Clean 'lpc_chip_11uxx_lib' [Debug]

Installed SDKs

To install an SDK, simply drag and drop an SDK (zip file/folder) into the 'Installed SDKs' view.

Name	Version	Location
<input checked="" type="checkbox"/> SDK_2x_FRDM-K64F	2.2.0	<Default Location>/SDK_2x_FRDM-K64F
<input checked="" type="checkbox"/> SDK_2x_LPCXpresso54102	2.2.0	<Default Location>/SDK_2x_LPCXpresso54102
<input checked="" type="checkbox"/> SDK_2x_FRDM-K82F	2.2.0	<Default Location>/SDK_2x_FRDM-K82F
<input checked="" type="checkbox"/> SDK_2x_FRDM-KW41Z	2.2.0	<Default Location>/SDK_2x_FRDM-KW41Z

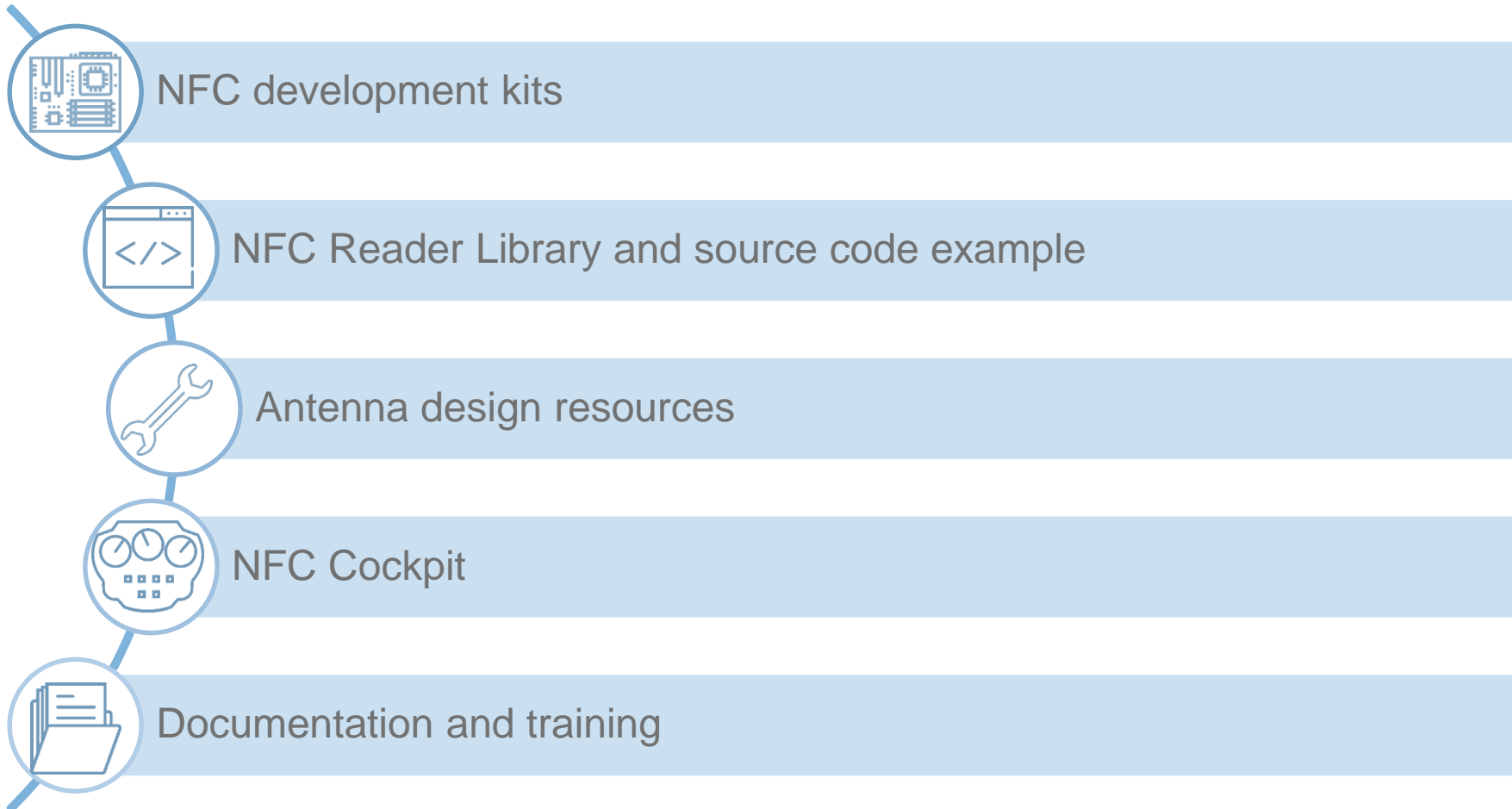
SW3647 - NTAG I²C *plus* Explorer board firmware source files

SW4223 – BLE pairing with NFC on Kw41 and NTAG I²C *plus*

Support package for CLRC663 *plus*, PN5180 and PN7462



Support package for CLRC663 *plus*, PN5180 and PN7462



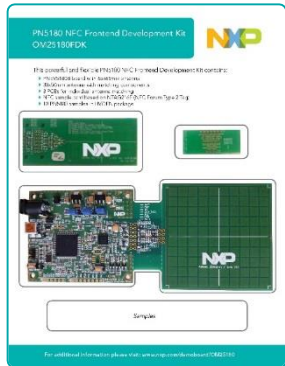
CLRC663 *plus*, PN5180 and PN7462 development kits



OM26630FDK: CLRC663 *plus* NFC frontend development kit

- CLEV6630B board with 65x65mm antenna optimized for EMVCo applications
- 30 mm x 50 mm antenna with matching components optimized for NFC applications
- Three small antenna matching PCBs for custom antenna matching
- NFC sample card (NTAG216) and MIFARE DESFire EV2
- 10 CLRC663 plus IC samples (HVQFN package)

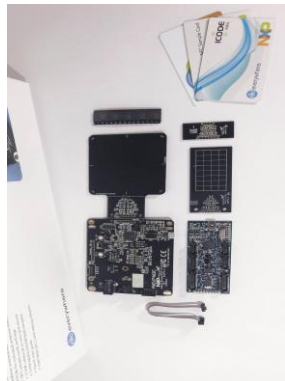
AN11022 – CLRC663 plus evaluation board quick start guide



OM25180FDK: PN5180 NFC frontend development kit

- PNEV5180B board with 65x65mm antenna optimized for EMVCo applications
- 30 mm x 50 mm antenna with matching components optimized for NFC applications
- Three small antenna matching PCBs for custom antenna matching
- NFC sample card (NTAG216)
- 10 PN5180 IC samples (HVQFN package)

AN11744 – PN5180 Evaluation board quick start guide

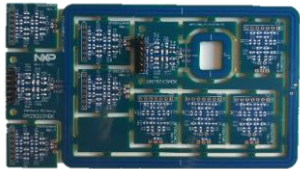
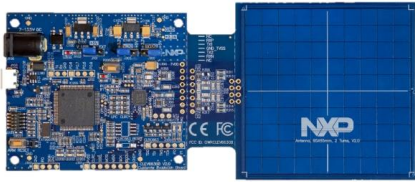


OM27462CDKP: PN7462 NFC controller development kit

- PNEV7462C board with 65x65mm antenna optimized for EMVCo applications
- 30 mm x 50 mm antenna with matching components optimized for NFC applications
- Three small antenna matching PCBs for custom antenna matching
- NFC sample card (NTAG216)
- 7.5V DC power supply and two USB cables
- LPC-Link2 debug adapter (OM13054)
- 5 PN7462 IC samples (HVQFN package)

UM10833 – PN7462 Quick Start Guide.

NFC antenna design resources



CLRC663 *plus* antenna design resources

- AN11019 – CLRC663, MFRC630, MFRC631, SLRC610 antenna design guide
- AN11783 – CLRC663 plus Low Power Card Detection
- AN11535 – Measurement and tuning of a NFC and reader IC antenna with MiniVNA
- AN11246 – Antenna matching calculation
- **OM29263ADK – NFC antenna development kit**

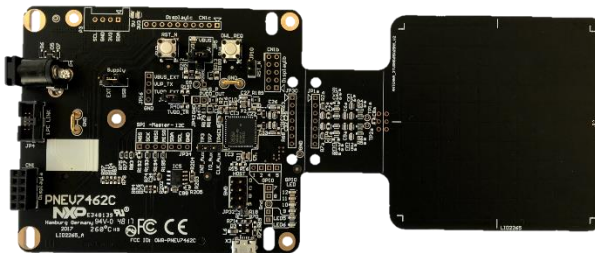
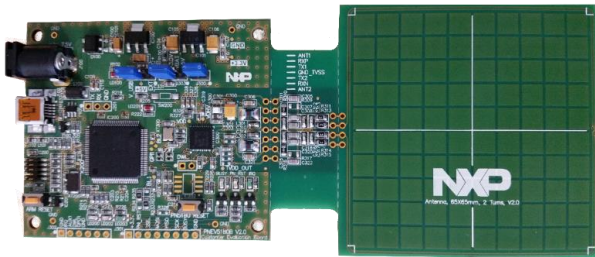
UM11098 – OM29263ADK Quick start guide antenna kit

PN5180 antenna design resources

- AN11740 – PN5180 Antenna design guide
- AN11741 – How to design an antenna with DPC
- SW3545 – PN5180 Antenna design tools
- AN11742 – Dynamic Power Control
- AN11849 – PN5180 Rx Matrix Test

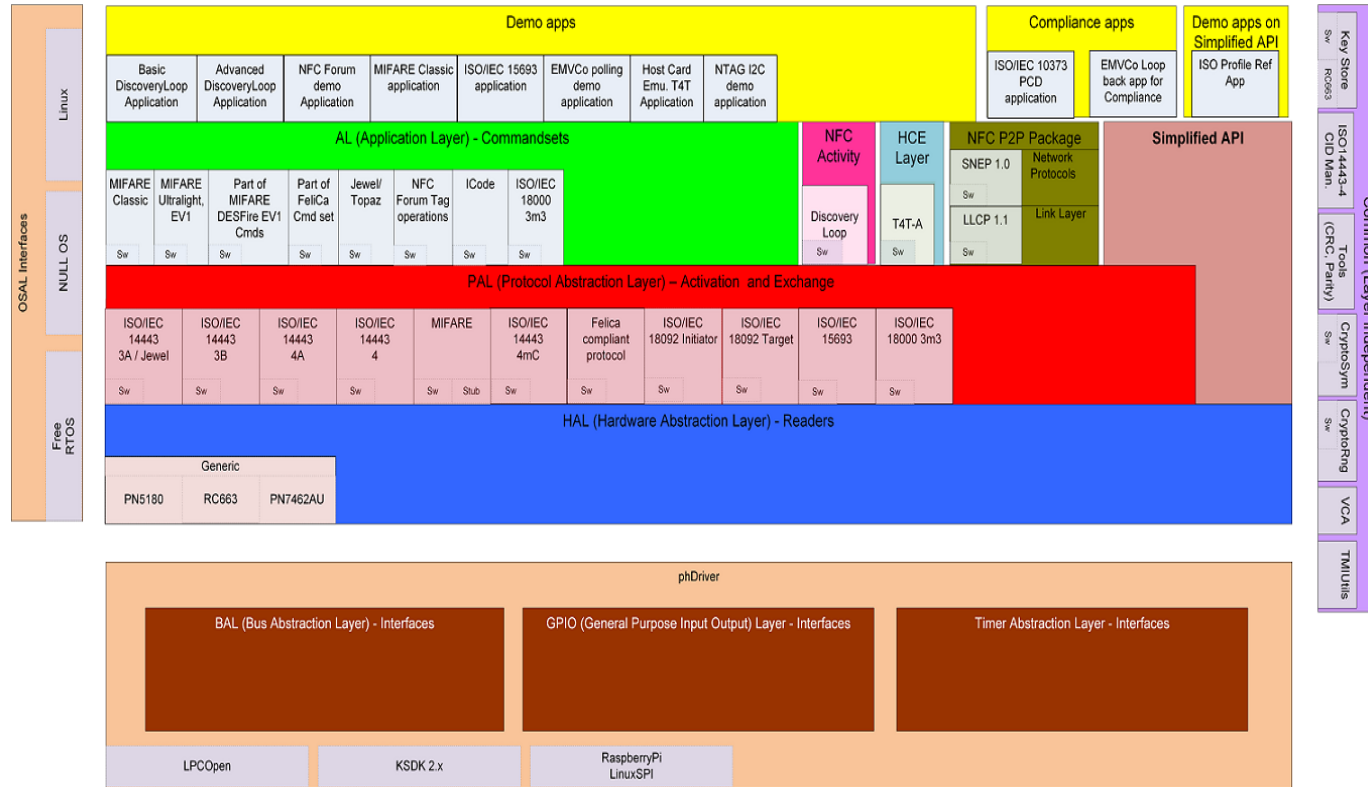
PN7462 antenna design resources

- AN11706 – PN7462AU Antenna design guide
- AN11742 – Dynamic Power Control
- AN11785 – PN7462AU LPCD and standby mode



NFC Reader Library support for multiple products and platforms

NFC Reader Library



Supported products:*

- CLRC663 *plus* family
- PN5180
- PN7462 family

Supported dev boards:*

- CLEV6630A
- CLEV6630B
- PNEV5180B
- PNEV7462B

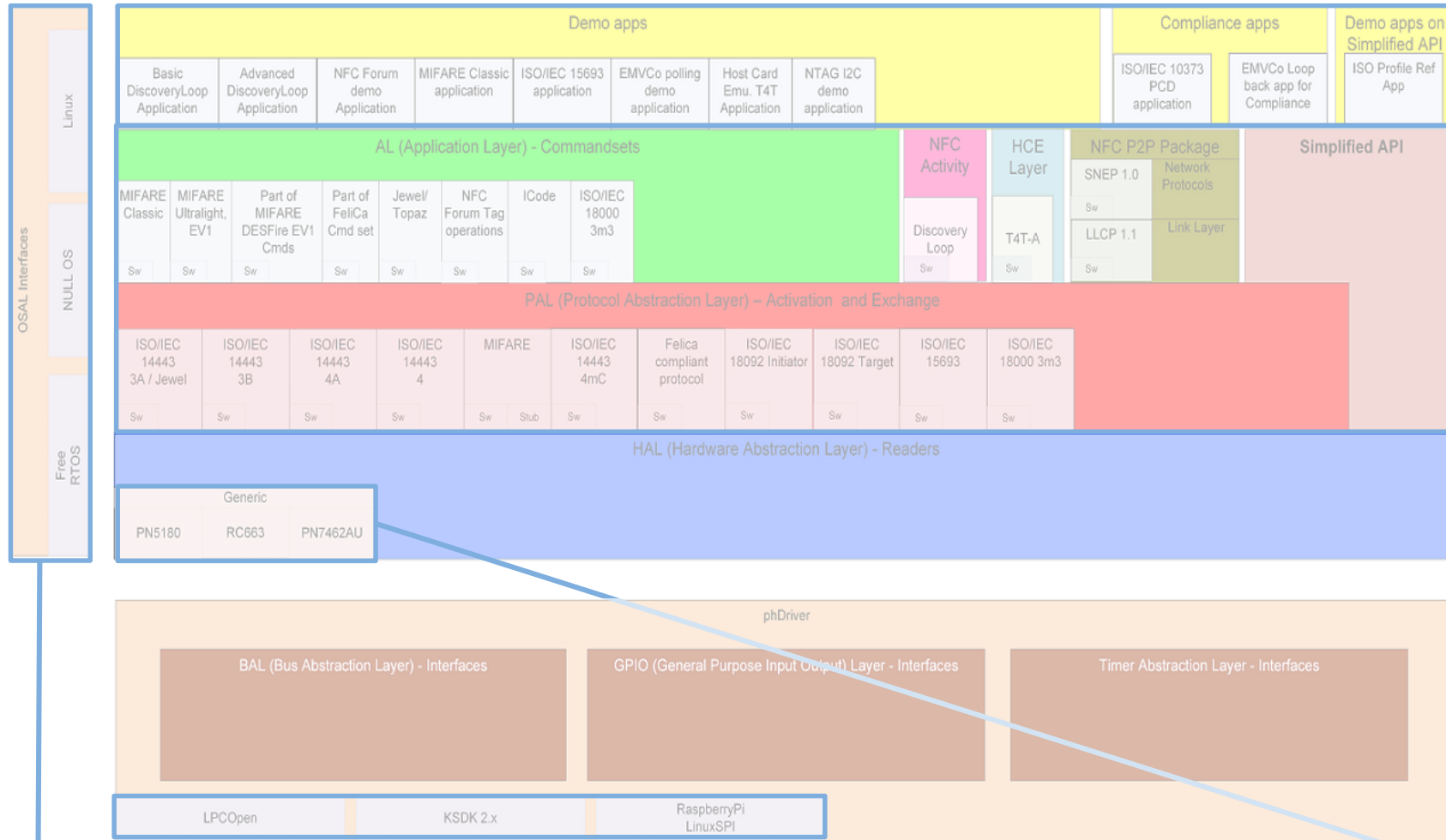
Supported platforms:*

- LPC1769
- FRDM-K82F
- Raspberry Pi Model 3
- ... portable to other MCUs and platforms.

Info and more information: www.nxp.com/pages/:NFC-READER-LIBRARY

* NFC Reader Library v5.02.00

NFC Reader Library architecture



11 software examples available to be tested and re-used.

- Nfcrdlib_SimplifiedAPI_EMVCo
- Nfcrdlib_SimplifiedAPI_EMVCo_Analog
- Nfcrdlib_SimplifiedAPI_ISO
- NfcrdlibEx1_BasicDiscoveryLoop
- NfcrdlibEx2_AdvancedDiscoveryLoop
- NfcrdlibEx4_MIFAREClassic
- NfcrdlibEx5_ISO15693
- NfcrdlibEx7_EMVCo_Polling
- NfcrdlibEx9_NTAGI2C
- NfcrdlibEx11_ISO10373_PCD
- NfcrdlibTst12_RC633LPCD

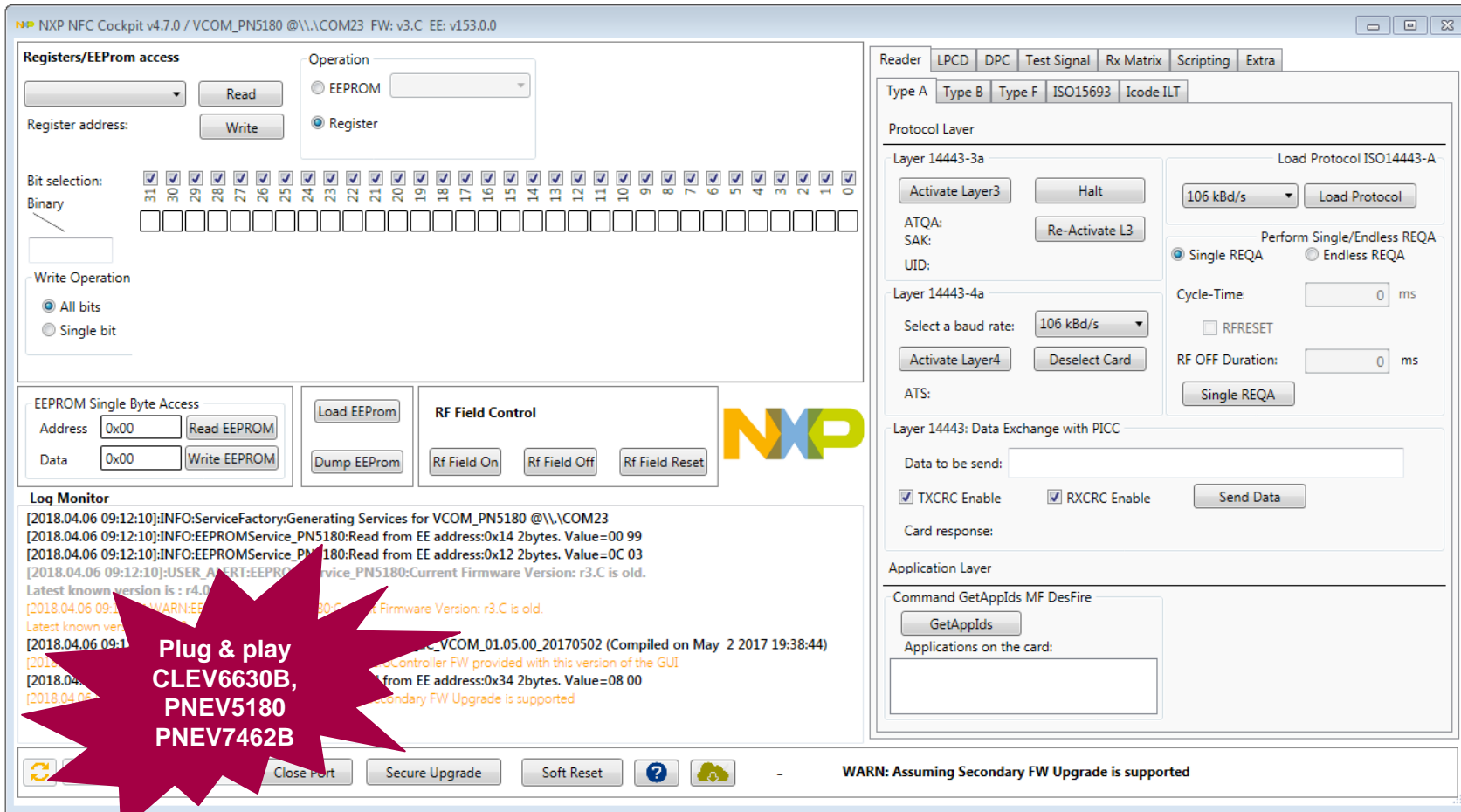
AL and PAL layers are **hardware and platform independent**, so they can be used on top of any supported NFC IC and MCU since they have no adaptation

HAL is **platform independent**, so NXP NFC readers can be used on top of any MCU since they have no adaptation

The software examples can be imported and run the supported platforms without any adaptation.

Support for other platforms requires adaptations in OSAL and DAL.

NFC Cockpit configuration tool for NFC ICs



NFC Cockpit features

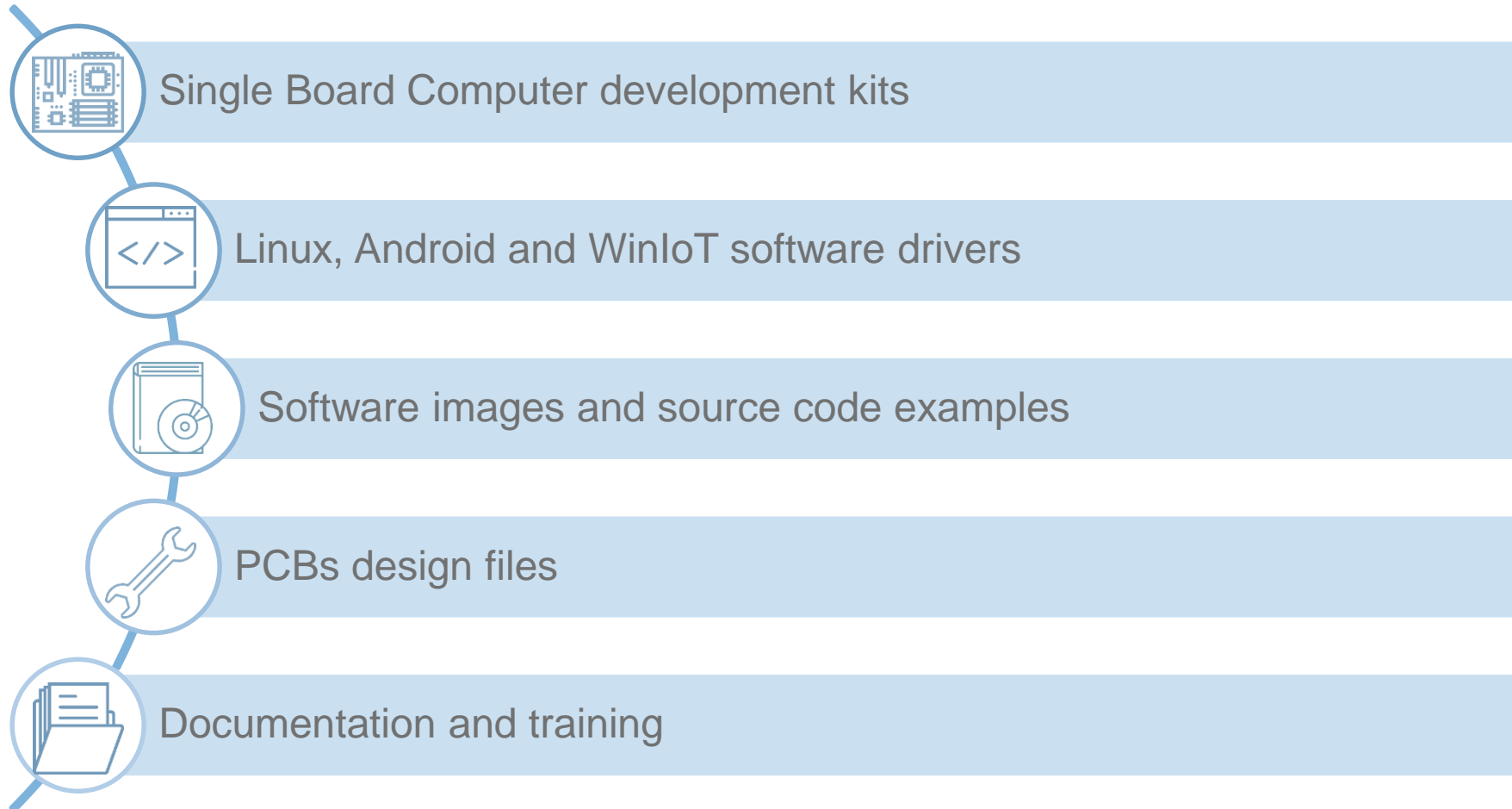
- ▶ Direct access to registers and EEPROM memory.
- ▶ Reader for card activation and card communication.
- ▶ Low Power Card Detection (LPCD) calibration and configuration.
- ▶ Test signal unlocking and routing.
- ▶ RX matrix test for receiver settings optimization.

- Helps to speed up the design, allows quick and easy configuration of registers (USB interface connection to PC) using the development board .
- Get familiar with the IC (on line information of register bits), a fast antenna tuning, a quick DPC parameter setting and perform some tests with NFC devices (cards or mobile phones).

Support package for PN7150



Support package for PN7150



PN7150 NFC controller single board computer (SBC) kits



**PN7150 NFC CONTROLLER
SBC KIT FOR ARDUINO®**

Flexible and easy-to-use SBC Kit
with Arduino interface for many
LPCXpresso, Kinetis and i.MX boards



OM5578/PN7150ARD: PN7150 SBC kit for Arduino

- PN7150 NFC controller board
- Arduino interface board
- NFC Forum Type 2 Tag

AN11841 – PN7150 Arduino SBC kit quick start guide



**PN7150 NFC CONTROLLER
SBC KIT FOR RASPBERRY PI®**

Flexible and easy-to-use SBC Kit
with Raspberry Pi interface board



OM5578/PN7150RPI: PN7150 SBC kit for Raspberry Pi

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

AN11758 – PN7150 Raspberry Pi SBC kit quick start guide



**PN7150 NFC CONTROLLER
SBC KIT FOR BEAGLEBONE® BLACK**

Flexible and easy-to-use SBC Kit
with BeagleBone Black interface board

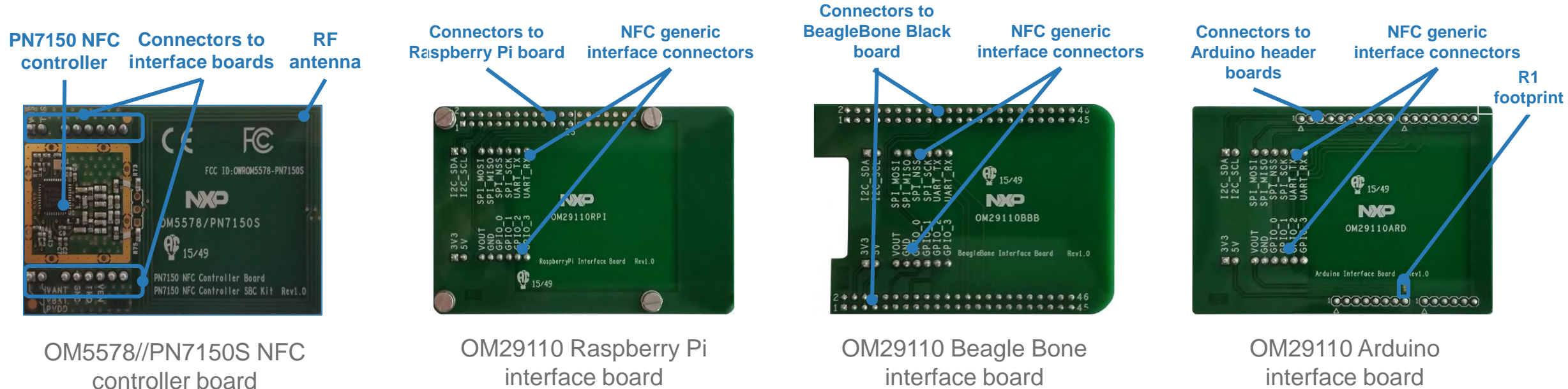


OM5578/PN7150BBB: PN7150 SBC kit for BeagleBone Black

- PN7150 NFC controller board
- Beagle Bone Black interface board
- NFC Forum Type 2 Tag

AN11842 – PN7150 Beagle Bone Black SBC kit quick start guide

PN7150 printed circuit boards design files



OM5578 kits can be reused in another system by building your own interface board

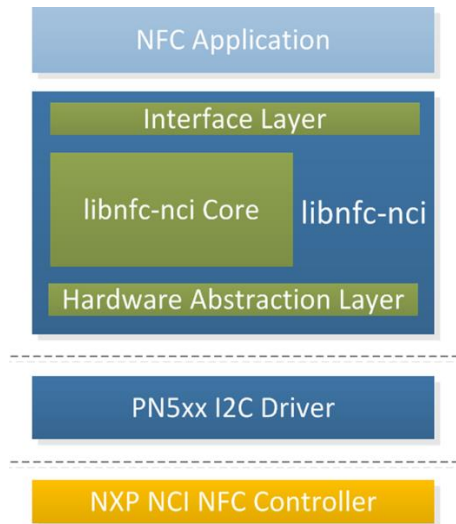
HW3560 – Hardware design files OM5578_PN7150S

HW3561 – Hardware design files OM29110

UM10935 – PN7150 NFC Controller SBC Kit user manual

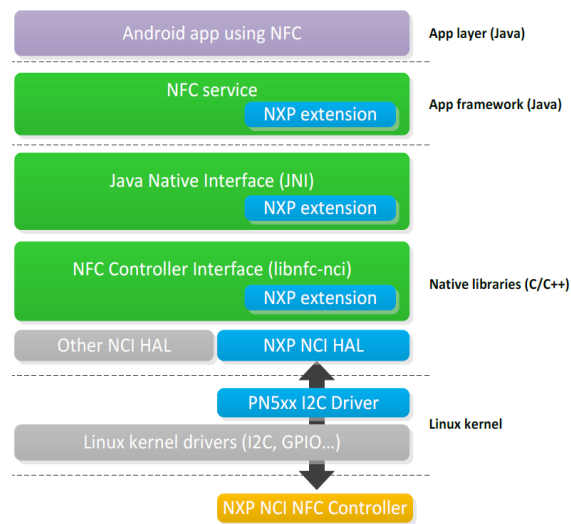
UM10956 – OM29110 NFC SBC Interface Boards user manual

PN7150 software drivers for SW integration into any platform



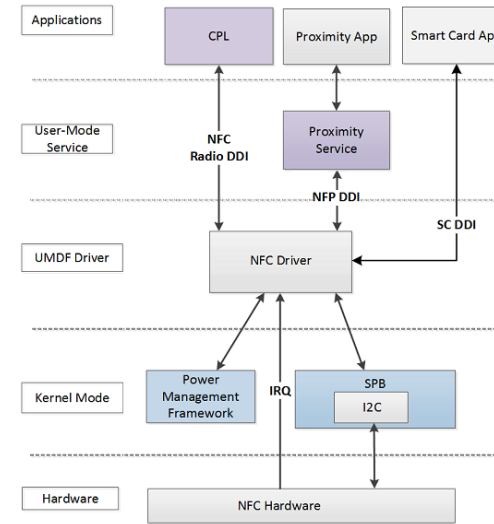
Linux NFC architecture

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



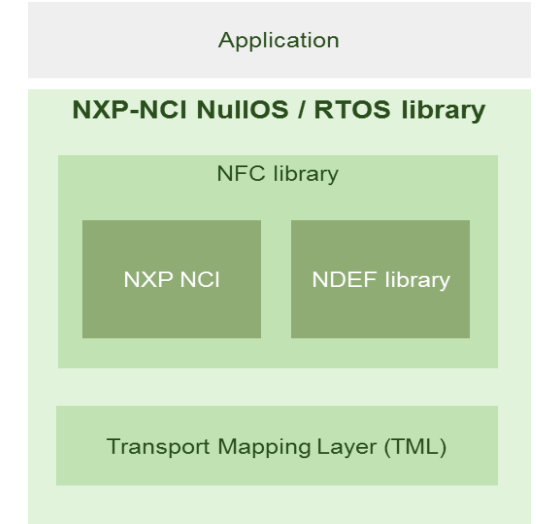
Android NFC architecture

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

PN7150 software images and source code examples



OM5578/PN7150ARD: Software images

- OM5578/PN7150ARD UDOO Neo Linux demo image
- OM5578/PN7150ARD UDOO Neo Android Lollipop demo image
- OM5578/PN7150ARD NXP-NCI MCUXpresso example project



OM5578/PN7150RPI: Software images

- OM5578/PN7150RPI Linux demo image
- OM5578/PN7150RPI WinIoT SW image



OM5578/PN7150BBB: Software images

- OM5578/PN7150BBB Linux demo image
- OM5578/PN7150BBB Android SW image



More support



Use our technical community for your questions

Become a registered member and get expert advice from the developer community

<https://community.nxp.com/community/nfc>

How to get there

- NFC and Reader Ics → NFC Technology hub → NFC support → NFC community
- URL: <https://community.nxp.com/community/nfc>

The screenshot shows the NXP community website interface. At the top, there's a navigation bar with links like Community, Home, News, Content, People, and Places. Below this, a header section features the NXP logo and a search bar. The main content area is titled 'NFC' and includes a welcome message. A red box highlights the 'Log in' button in the top right corner. Another red box highlights the 'Ask your question' input field under the 'ASK NFC YOUR QUESTION' section. A third red box highlights the 'Look for answers' section, which contains a table of categories and their respective counts.

CATEGORIES	24	0	0
Contact Smart Card Reader ICs	24	0	0
HITAG Reader ICs	16	0	0
Connected Tag Solutions	28	0	0
MIFARE SAMs for Reader Systems	20	0	0
NFC Frontend Solutions	52	0	1
NFC Controller Solutions	48	1	0
NFC Reader Library	30	0	1

Watch on-demand any recorded session

Tap into our free on-demand training library.

Hundreds of hours of webinars and presentations on NXP products, applications, software, and tools.

Find recorded sessions, among others, for:

- NFC essentials
- NFC use cases
- NFC standards
- NFC reader antenna design (6 sessions)
- NFC reader portfolio
- NFC in smart home, gaming, payments,
- ...

The screenshot shows the NXP Online Training website. The header includes the NXP logo, navigation tabs for PRODUCTS, SOLUTIONS, SUPPORT, and ABOUT, and a search bar. The left sidebar lists various training categories, with 'Online Training' selected. The main content area is titled 'Online Training' and features a table of training sessions. The table has columns for Event, Type, Language, More Information, and Tags. The first row shows 'NFC Basics: NXP's NFC product portfolio' as a Webinar in English, with links to 'Full Webinar' and 'Short Reel'. The second row shows 'NFC Basics: NFC use cases' as a Webinar in English, also with links to 'Full Webinar' and 'Short Reel'. The third row shows 'NFC Basics: NFC reader design I-How to build your own reader' as a Webinar in English, with links to 'Full Webinar' and 'Short Reel'. The fourth row shows 'NFC Basics: Introduction to NFC technology and functionality' as a Webinar in English, with links to 'Full Webinar' and 'Short Reel'. The fifth row shows 'NFC Applications: POS terminals and NFC' as a Webinar in English, with links to 'Full Webinar' and 'Short Reel'.

Event	Type	Language	More Information	Tags
NFC Basics: NXP's NFC product portfolio This webinar will guide you through NXP'S NFC product portfolio, helping you to select the best product for your design while highlighting product key features, benefits and support packages.	Webinar	English	Full Webinar Short Reel	NFC
NFC Basics: NFC use cases Introduction to NFC use cases, including recommended product solutions.	Webinar	English	Full Webinar Short Reel	NFC
NFC Basics: NFC reader design I-How to build your own reader In these two technical webinars we provide the insights and skills to design and build an NFC reader. We review its main components, how to choose the right reader and microcontroller ICs, and the proper architecture for your application with respect to security requirements. We explain the NFC antenna theoretical fundamentals, its crucial role in the overall system performance, and how to match it in our NFC reader design.	Webinar	English	Full Webinar Short Reel	NFC
NFC Basics: Introduction to NFC technology and functionality Introduction to NFC technology and functionality.	Webinar	English	Full Webinar Short Reel	NFC
NFC Applications: POS terminals and NFC Get the latest updates on the NXP portfolio for payments and discover the existing POS Reader solution kit (SLN-POS-RDR) as well as all the available support tools.	Webinar	English	Full Webinar Short Reel	NFC

How to get there

- NFC and Reader ICs → NFC Technology hub → NFC support → NFC webinars
- URL: <http://www.nxp.com/support/online-academy/nfc-webinars:NFC-WEBINARS>

NXP approved engineering consultants



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Developer Resources

NXP® Approved Engineering Consultants



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- Simplify your design cycle – Consult with experts, hire the resources you need or get training to complement your team's expertise to get to market faster
- Easily find the resources you need – Local partners experienced with NXP technology implementation

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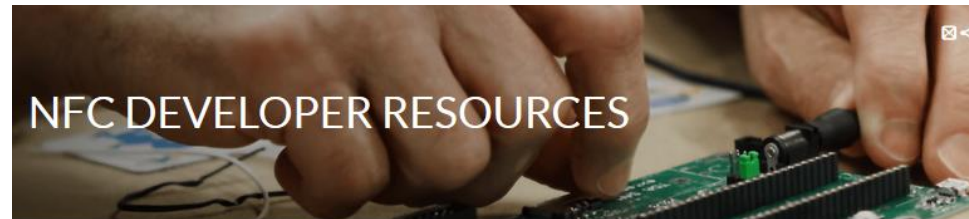
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More information about NFC

Visit **NFC developer resources** for a quick start



Many great NFC and IoT application solutions have been developed and deployed since NFC was introduced, and the ecosystem sees continuous growth and new applications.

Featured Mobile Platforms

NFC and Android

TapLink is a One-Stop-Shop for creating Android apps, community exchange, support and purchasing NFC products.

[Learn More >](#)

NFC and iOS11

Apple's iOS11 and NFC compatible mobile devices now support NFC tag reading. That's a game changer, since all iPhone 7s and newer models will now be able to read NFC tags just like Android devices.

[Learn More >](#)

Software Resources

Software for Android

[TapLink – open API for NFC App development](#)

[TagWriter](#)

[TagInfo](#)

[NHS3100 Temperature Logger](#)

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Software for iOS

[NFC TagInfo by NXP](#)

[NHS Temperature Logger](#)

Software for PC

[TagXplorer \(Windows, MacOS, Linux\)](#)

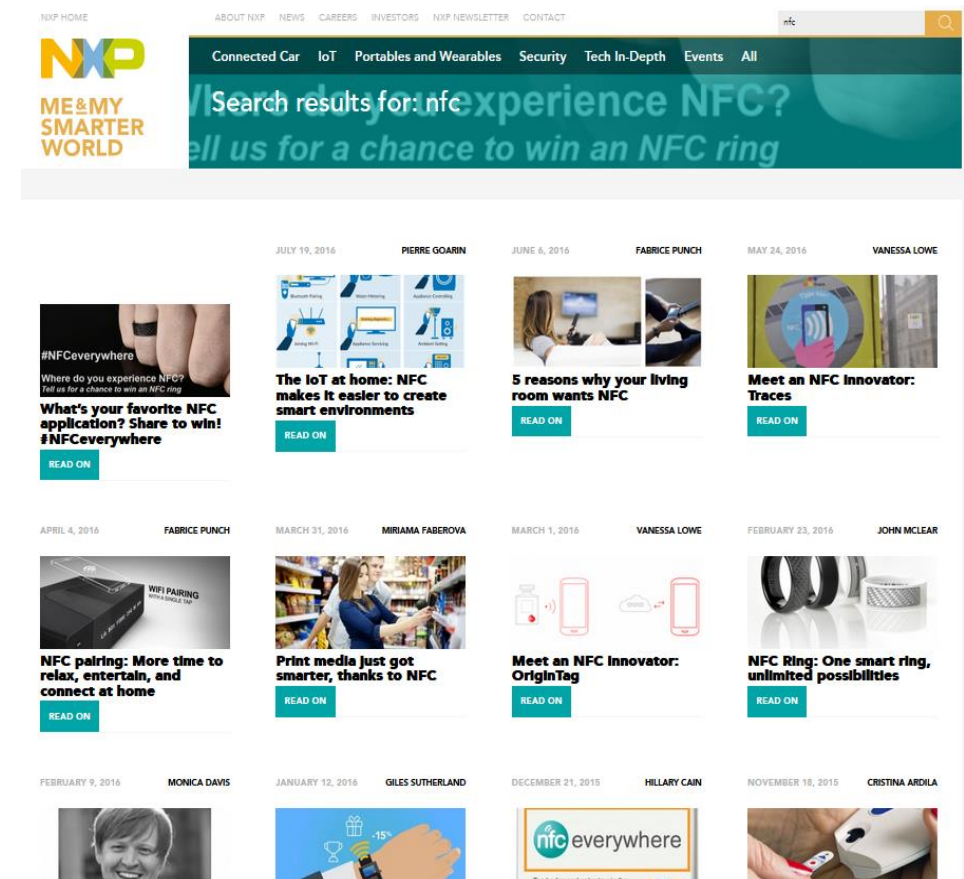
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Product support package for NFC Readers & NFC Connected Tags

Thank you for your kind attention!

Please remember to fill out our **evaluation survey** (pop-up)

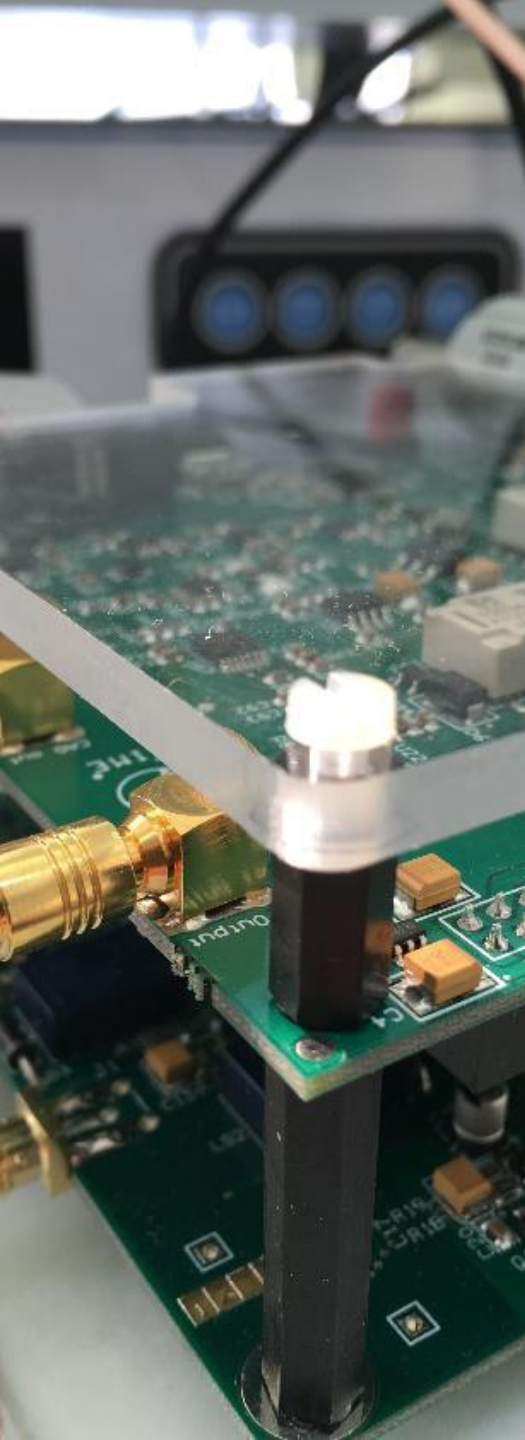
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