Training Mobile Knowledge

NXP Development Boards for NFC Readers

Public

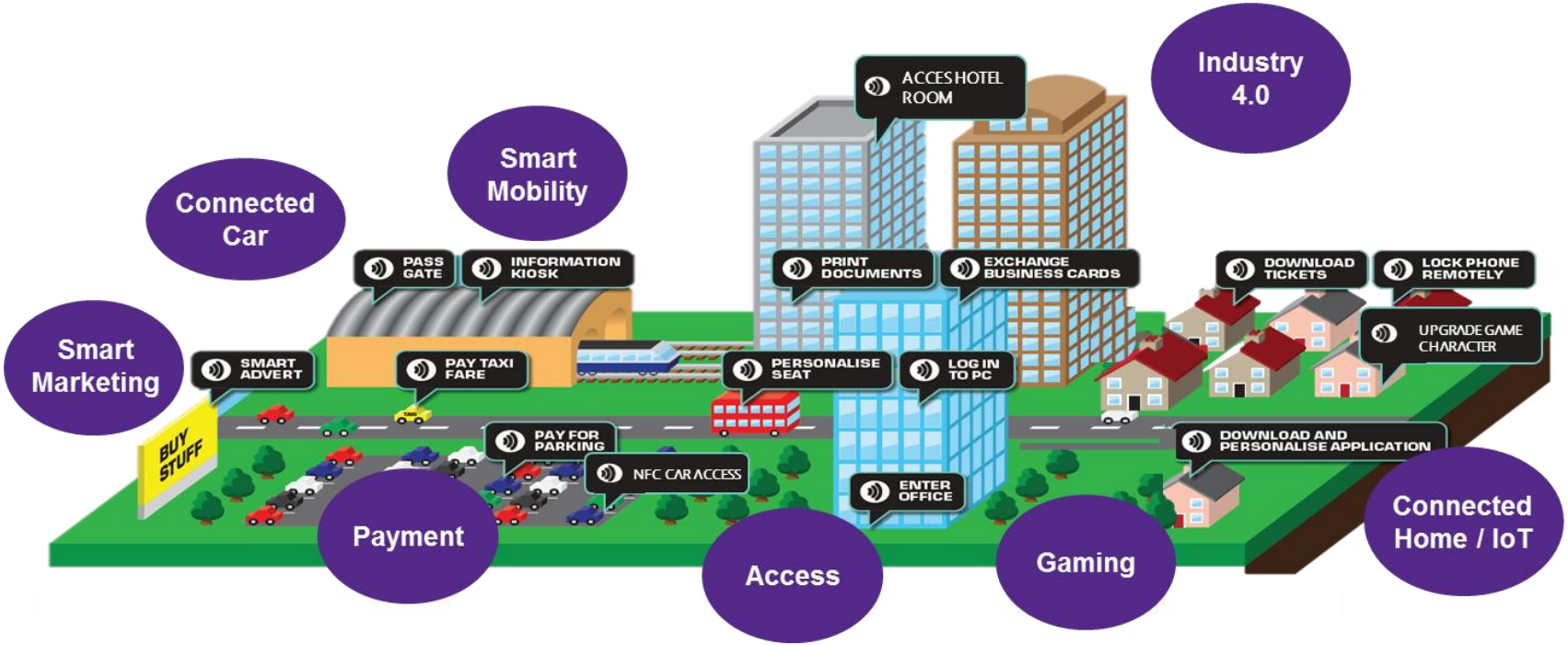
November 2015

Index

- Introduction
  - A steady growing number of NFC applications
  - NFC product families
  - Inside an NFC-enabled system
  - Moving from demo boards to complete demo kits
- Demoboards
  - Blueboards
  - Serialboards
  - Dongles
  - POS
  - Modules
  - Single board computer
  - Connected tags
  - Contact demoboards
- How to order
  - All Customers -> through NXP Distribution
  - Registered Customers -> through NXP Extranet (Distinet)

A steady growing number of NFC applications

Creating wide-ranging user experiences everywhere



NFC product families

Connected NFC tag, NFC frontend and NFC controller solutions

More information in our recorded webinars here

Connected NFC Tag solutions

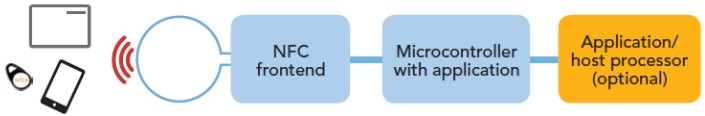
A comprehensive portfolio of NFC Forum type 2 tags covering a broad range of use cases.

***Products**: NTAG21xF , NTAG I²C*

NFC frontend solutions

The lowest-cost and most flexible way to add NFC to a system.

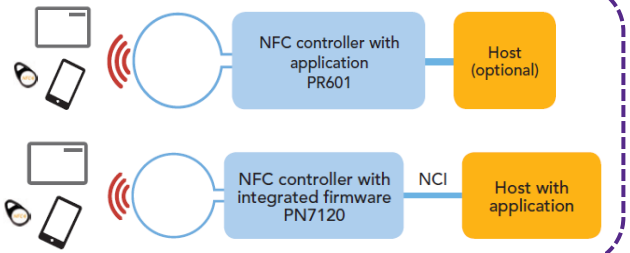
***Products**: MFRC522, MFRC523, PN512, PN5180, CLRC663 family*



NFC controller solutions

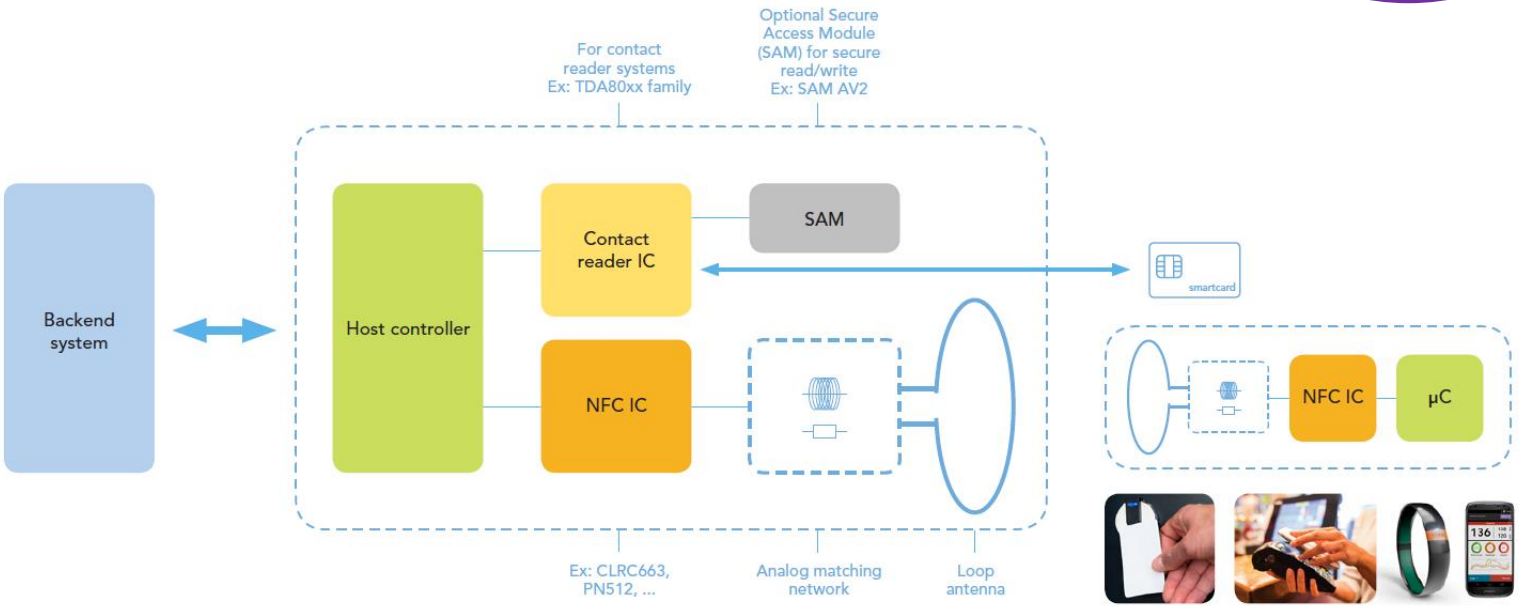
Combination of NFC frontend with an advanced 32-bit microcontroller.
Options include integrated firmware or freely programmable microcontroller.

***Products**: PR601, PN533, PN7120*



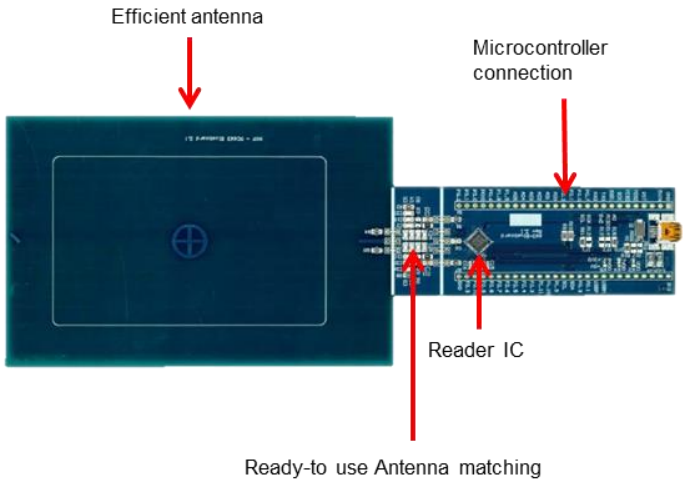
Inside an NFC-enabled system

More information about NFC reader design in our recorded webinars here



Moving from demoboards to complete demo kits

- **Demoboards** are PCBs that contain an NXP Reader IC and which are typically used for application development, reader ICs evaluation, or to get familiar with NXP products and solutions.



Example of Demoboard (CLEV663B)

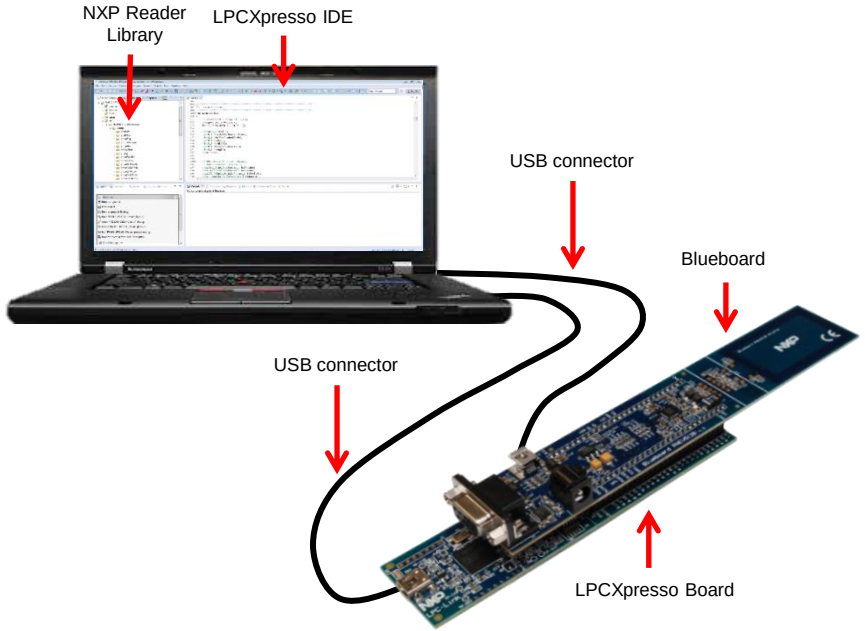
- **Demo kits** are comprehensive packages including demo boards and a wealth of resources that support these demo boards, such as:
  - Documentation material: Application Notes, User manuals, Quick Starting Guides, etc
  - Software tools and sample source code
  - Sample ICs
  - Other accessories
  - ...

Examples : OM5577/PN7120S and OM5569/NT312D demokits

DEMOBOARD	NFC Frontends			NFC Controlles				Connected NFC tags	Contact readers
	PN512	CLRC663	PN5180	PN533	PR533	PR(H)601	PN7120	NTAG I2C	TDA80xx
Blueboards 	PNEV512B	CLEV633B	OM25180FDK			PREV601			
Serialboard 	PNEV512	CLEV633							
Dongles 				PNEV533D	PREV533D				
POS 	OM5597 / RD2612								
Modules 						PREV601M			
Single board computer 							OM5577/ PN7120S		
Connected tag EXPLORER kits 								OM5569/ NT312D	
Explore NFC 	PNEV512R								
Contact 									OM9800/MCT800 OM9800 / DCT80xx

Blueboards

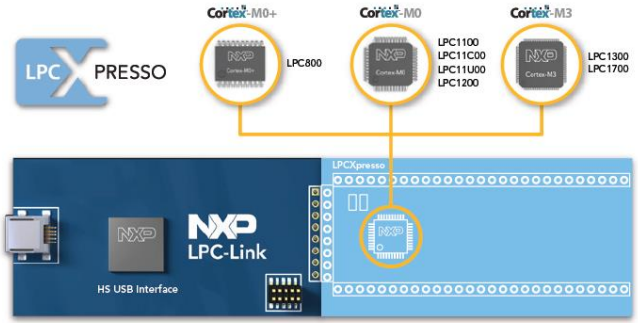
- Blueboards are evaluation boards specially meant for embedded software development.
- Blueboards embed a contactless reader IC, and include all the elements needed for the transmission (EMC filter, matching network and antenna).
- The full product support package includes additional key software and hardware components:
  - **LPCXPresso board**: Development board containing a NXP LPC microcontroller
  - **LPCXpresso IDE**: Development environment for NXP's LPC microcontrollers (SW)
  - **NFC Reader Library**: Software library providing APIs to simplify the NFC applications development.



Note: Blueboard development environment setup (Except PREV601, which does not need an LPCXpresso board)

LPCXpresso Boards

- LPCXpresso boards are low cost boards designed for rapid prototyping and evaluation.
- They include an NXP's ARM-based Cortex-M MCU and an integrated CMSIS-DAP debug probe.
- LPCXpresso boards are supported by free drivers and example code available as LPCOpen packages



The LPCXpresso development board

LPCXpresso board MCU	Core	Flash (KB)	Ordering Code (12NC)	
LPC1115	Cortex M0	64	P/N OM13035 12NC 9352 976 64598 BECAME OBSOLETE *	
LPC1227	Cortex M0	128	P/N OM13008 12NC 9352 946 03598 BECAME OBSOLETE **	
LPC1769	Cortex M3	512	P/N OM13085 12NC 9353 065 25598 NEW BOARD ***	

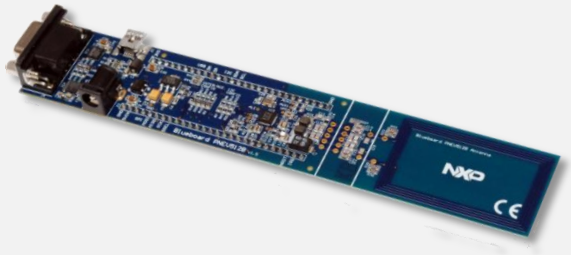
Software and support for NXP MCUs: http://www.lpcware.com/
NXP LPC microcontroller family: http://www.nxp.com/products/microcontrollers/

* Will soon be replaced by OM13087 to be released within Q1 2016
** In order to replace NFC applications based on LPC1227 board, NXP suggests to port application to LPC11U68, supported by LPCxpresso board named OM13058 board (12NC 9353 035 79598) which shall be wired to Blueboards
*** This new board replaces the former OM13000

PNEV512B

Description

- The PN512B demoboard embeds the contactless communication transceiver IC PN512 together with all the elements needed for the transmission: the EMC filter, the matching network and the antenna.
- Read/Write functionality compatible with ISO/IEC14443A&B and FeliCa.
- Full Peer-to-Peer functionality.
- Card emulation functionality.
- NFC Forum compliant
- EMVCo compliant (RF amplifier required).
- 64 byte FIFO



Reader IC: **PN512**

Orderable part number: PNEV512B,699

12NC: 9352 981 99699

URL: http://www.nxp.com/demoboard/PNEV512B.html

Features

- Fast software development based on an easy to understand firmware.
- PNEV512B demoboard connectors are designed to exactly fit the LPCXpresso target boards.
- Power supply by USB cable.
- The antenna can be separated from the reader section.
- Serial connector for optional use of PCSerial and scripts.
- The hardware allows antenna matching and tuning.
- LPC link boards and the USB cables are not included in the PNEV512B.
- I2C, SPI and UART host interfaces.
- CE certified.

Software

- Easy development through the LPCXpresso IDE, LPCXpresso target boards and the NXP Reader Library.
- Available project examples: Type 2 and 4 Tag Emulation, P2P communication and card polling.

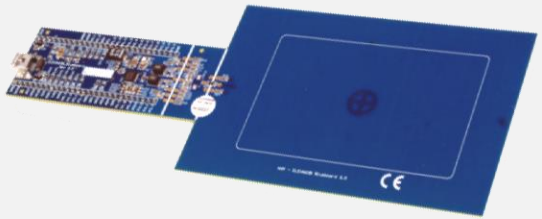
Documentation

File name	Title	Type	Date
AN11342	How to Scale Down the NXP Reader Library	Application note	2013-03-19
AN11367	How to build a NFC Application on Android	Application note	2013-06-19
AN11308	Quick Start Up Guide PNEV512B Board	Application note	2014-05-27
AN11583	Guide about how to port the Passive Target example from the NFC Reader Librart to another MCU	Application note	2014-08-12
SW297931	NFC Reader Library v3,010 for PNEV512B	Software	2014-05-27
255811	PNEV512B: Card Emulation of a Tag 2 Type and a Tag 4 Type Card for LPC1227	Software	2014-01-16
SW302410	Schematics and BOM for PNEV512B	Software	2014-08-08
UM10663	NXP Reader Library User Manual based on CLRC663 and PN512 Blueboard Reader projects	User manual	2013-10-24
UM10721	NXP Reader Library Peer to Peer User Manual based on CLRC663 and PN512 Blueboard Reader projects	User manual	2013-07-24

CLEV663B

Description

- The CLEV663B demoboard embeds the contactless communication transceiver IC CLRC663 with all the elements needed for the transmission: the EMC filter, the matching network and the antenna.
- Reader/Writer functionality compatible with ISO/IEC14443A, ISO/IEC14443B and FeliCa, ISO/IEC15693, ISO/IEC18000-3M3 and EPC Class-1 HF.
- NFC Peer-to-Peer Passive Initiator (NFC Ready).
- High Output Power, Boundary Scan, Integrated EEPROM for fast protocol switching and Low power card detection advanced functionalities.
- EMVCo compliant.



Reader IC: **CLRC663**

Orderable part number: CLEV663B,699

12NC: 9352 978 15699

URL: http://www.nxp.com/demoboard/CLEV663B.html

Features

- Fast software development based on an easy to understand firmware.
- CLEV663B demoboard connectors are designed to exactly fit the LPCXpresso target boards
- Power supply by USB cable.
- The antenna can be separated from reader section.
- The hardware allows antenna matching and tuning.
- LPC link boards and the USB cables are not included in the CLEV663B.
- 512 byte FIFO.
- I2C, SPI and UART host interfaces.
- CE certified.

Software

- Easy development through the LPCXpresso IDE, LPCXpresso target boards and the NXP Reader Library.
- Available project examples: P2P communication and card polling.

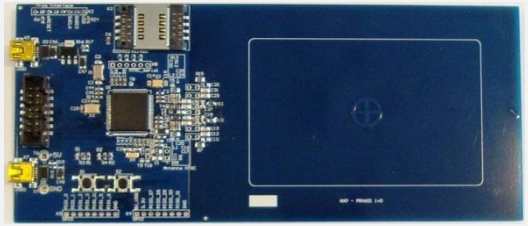
Documentation

File name	Title	Type	Date
AN11342	How to Scale Down the NXP Reader Library	Application note	2013-03-19
AN11211	Quick Start Up Guide RC663 Blueboard	Application note	2013-11-21
AN11402	How to implement the ICODE ILT anti-collision	Application note	2013-10-24
AN11367	How to build a NFC Application on Android	Application note	2015-09-28
314130	Schematics and BOM for CLEV663B	Other	2014-11-17
SW297831	NFC Reader Library V3.010 for CLEV663B	Software	2014-05-19
SW335612	NFC Reader Library v3.092 for CLEV663B including ICODE SLI and ICODE ILT components only. Contais ICODE ILT and ICODe SLI examples	Software	2015-10-20
UM10663	NXP Reader Library User Manual based on CLRC663 and PN512 Blueboard Reader projects	User manual	2013-10-24
UM10721	NXP Reader Library Peer to Peer User Manual based on CLRC663 and PN512 Blueboard Reader projects	User manual	2013-07-24
UM10663	NXP Reader Library User Manual based on CLRC663 and PN512 Blueboard Reader projects	User Manual	2013-10-24

PREV601

Description

- The PREV601 evaluation board embeds the integrated IC PRH601 for contactless communication.
- PRH601 integrates and combines the functionality of CLRC663, HTRC110 and LPC1227 ARM Cortex-M0 microcontroller.
- Multi-frequency reader support in a single package: 13,56Mhz and 125kHz.
- Reader/Writer functionality compatible with ISO/IEC14443A, ISO/IEC14443B and FeliCa, ISO/IEC15693, ISO/IEC18000-3M3, EPC Class-1 HF and HITAG.
- NFC Peer-to-Peer Passive Initiator (NFC Ready).
- Support for SAM AV2 interface.



Reader IC: **PRH601**

Orderable part number: PREV601M

12NC: 9352 998 73699

URL: http://www.nxp.com/demoboard/PREV601.html

Features

- Fast software development based on an easy to understand firmware.
- Multiple functions integrated in a small form factor package.
- Power supply by 2 USB cables.
- The 13,56 MHz antenna can be separated from the reader section.
- A customized 125 KHz Antenna can be connected on the pads.
- The hardware allows antenna matching and tuning.
- LPC link boards and the USB cables are not included in the PREV601.

Software

- Easy development through the LPCXpresso IDE, LPCXpresso target boards and the NXP Reader Library.
- Available project examples: P2P communication, Card polling, MIFARE Classic, DESFire and Ultralight.

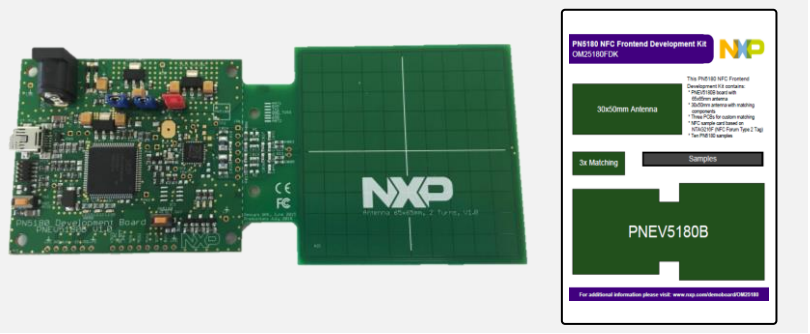
Documentation

File name	Title	Type	Date
AN11367	How to build a NFC Application on Android	Application note	2013-06-19
AN11281	Quick Start Up Guide PREV601 Demo Board	Application note	2013-11-12
249711	PREV601 Polling Project	Software	2013-01-17
249411	PREV601 MIFARE Classic Project	Software	2013-01-17
249511	PREV601 MIFARE DESFire Project	Software	2013-01-17
270310	PREV601 Peer to Peer Snep Client project	Software	2013-06-18
249611	PREV601 MIFARE Ultralight Project	Software	2013-01-17
UM10721	NXP Reader Library Peer to Peer User Manual based on CLRC663 and PN512 Blueboard Reader projects	User manual	2013-07-24

OM25180FDK

Description

- PNEV5180B Evaluation board embeds the PN5180 high integrated and high power output NFC frontend IC. PN5180 combines the features of the PN512 and the CLRC663.
- PNEV5180B can be used for SW development, hardware design, to explore PN5180 functionality and perform RF and antenna design related tests.
- PNEV5180B board with 65x65mm antenna and 30x50mm antenna with matching components
- LPC1769 uC mounted fix on the board. SPI interface accessible for connection of other uC
- CE/FCC certified PNEV5180B board



Reader IC: **PN5180**

Orderable part number: Not available yet

12NC: Not available yet

URL: Not available yet

Features

- Highest RF performance
- Full compliance with all standards relevant to NFC and contactless operation (ISO/IEC 14443, FeliCa, NFC Forum, MIFARE, ISO/IEC 15693, ISO/IEC 18000, ISO/IEC 18000-3M3, EMVCo)
- Onboard Dynamic Power Control (DPC) for optimized RF performance
- Active load modulation (supporting smaller antenna with Card Emulation mode)
- Low-power card detection to minimize current consumption during polling loop
- Optimized for payment terminals, access readers or industrial readers needing to generate a strong RF field in a difficult environment.
- Eases PCI-compliance certification
- Temperature sensor avoids permanent damage of the IC due to overheating

Software

- Easy application development with NFC Library
- Straightforward antenna design with NFC Cockpit
- LPC firmware and LPC driver installation

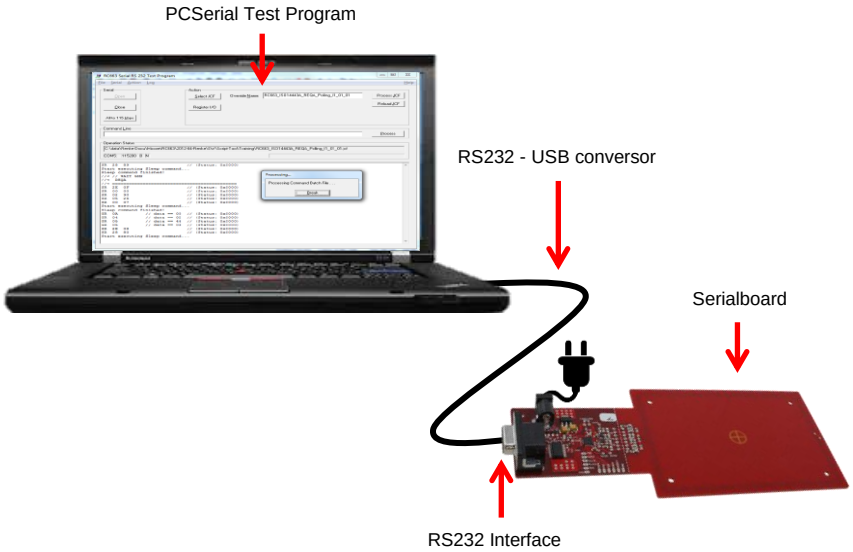
Documentation

File name	Title	Type	Date
240910	PN5180 Data sheet	Data sheet	
AN5180001	PN5180 evaluation board quick start guide	Application note	
Anxxxx	PN5180 Antenna design guide	Application note	
SWxxx	Support tool package	Software	

* Availability : Dec 2015

Serialboards

- Serialboards (Redboards) are evaluation boards especially meant for testing the reader IC functionality.
- RS232 interface for PC connection (scripts execution or other PC-based control software)
  - Modern PC's are not equipped by default with RS232 interface.
  - Converters that are converting the signals of a USB interface to RS232 signals are available in the market.
- PCSerial Test Program
  - Simple GUI utility for register-based access to the hardware using the serial interface.
  - Built-in line parser capable of processing ASCII text files containing command lines (.jcf script file).
  - The parser supports commands for both PC (host) and hardware control.
  - Two versions
    - RC663 Serial RS232 (for the CLEV663)
    - Joiner Serial RS232 (for the PNEV512)

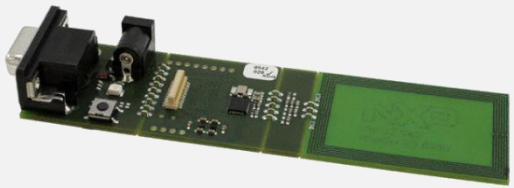


Example: CLEV663 demoboard

PNEV512

Description

- Read/Write functionality compatible with ISO/IEC14443A&B and FeliCa.
- Full Peer-to-Peer functionality.
- Card emulation functionality.
- EMVCo compliant
- The evaluation reader PCB is divided in 4 parts. The interface section, which enables the direct connection to an RS232 interface via a DSUB9 socket connector. The Reader section, which is the basic module including the PN51x IC and all required components for a NFC reader plus the filter circuitry. The Antenna matching circuit, which includes the matching circuit for single ended or complementary driver operation and the Antenna section with the Antenna coil.



Reader IC: **PN512**

Orderable part number: PNEV512,699

12NC: 9352 981 98699

URL: http://www.nxp.com/products/interface_and_connectivity/nfc_contactless_reader_ics/series/PN512.html

Features

- Single 5 V up to 12 V unregulated external power supply.
- RS232 DSUB9 connector for easy connection to a host PC.
- Analog and digital debug pins.
- Breakable line between serial RS232 and PN51x section.
- Breakable line between serial PN51x and antenna matching section.
- Breakable line between antenna matching and antenna section.
- PN51x reader section can be connected via Serial UART, I2C or SPI.
- Antenna matching is designed to fulfill all supported RF protocols.
- NRESET, IRQ signals externally accessible.

Software

- Reader evaluation through the PCSerial Test Program (Joiner Serial RS232 version).
- Available script examples: MIFARE Reader, NFC Active initiator, NFC Active target, NFC passive initiator, NFC passive target and loop example.

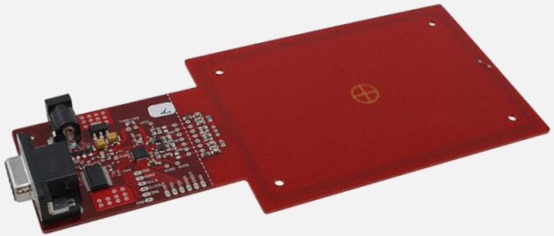
Documentation

File name	Title	Type	Date
AN1194	How to use PN51x demo board	Application note	2010-11-23
AN11116	Using the RS232 serial evaluation boards on a USB port	Application note	2013-10-24
AN108511	PN51x Design-In Kit Quick Start Guide	Application note	2006-05-24
109141	PN51x, Basic function library (v4.2) and JoinerPC Serial installation	Software	2010-06-15

CLEV663 Redboard

Description

- Reader/Writer functionality compatible with ISO/IEC14443A, ISO/IEC14443B and FeliCa, ISO/IEC15693, ISO/IEC18000-3M3 and EPC Class-1 HF.
- NFC Peer-to-Peer Passive Initiator (NFC Ready).
- High Output Power, Boundary Scan, Integrated EEPROM for fast protocol switching and Low power card detection advanced functionalities..
- Divided in 2 parts: the general reader part (includes Power supply, RS232 Interface and RC663 related part also EMC filter for TX circuit) and The Antenna and matching part (without EMC filter) with fully differential receiver and PCB antenna coil.
- Supports transfer speed communication up to 848Kbps with credentials.



Reader IC: **CLRC633**

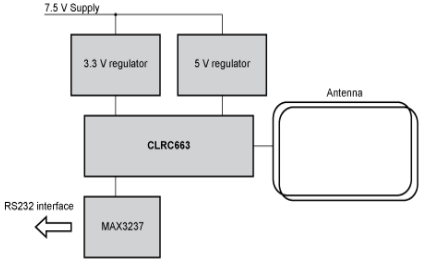
Orderable part number: CLEV663,699

12NC: 9352 960 56699

URL: http://www.nxp.com/demoboard/CLEV663.html

Features

- Single 7.5 V external power supply.
- RS232 DSUB9 connector for easy connection to a host PC.
- The antenna can be separated from reader section. Seven vias have been added to allow the connection of another antenna matching the evaluation reader.
- Analog and digital debug pins.
- Antenna matching is designed to fulfill all supported RF protocols.
- IntegerN PLL providing clock for standard microcontroller used frequencies.
- Low power card detection.
- I/O pins (GPIO/SIGIN; SIGNOUT).



Software

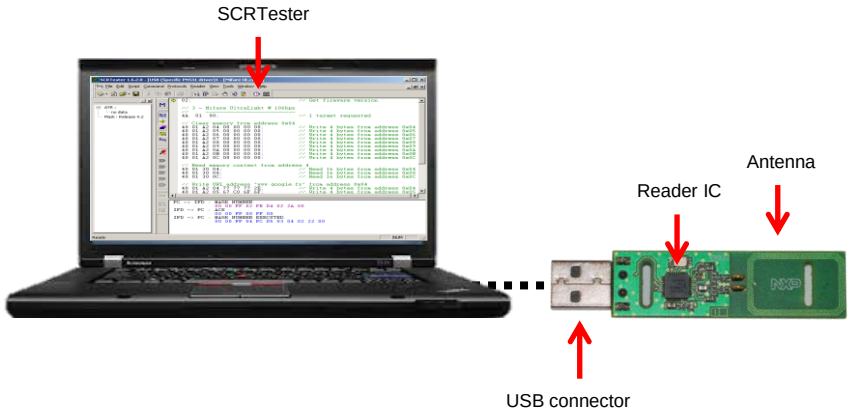
- Reader evaluation through the PCSerial Test Program (RC663 Serial RS232 version).
- Available script examples: Low Power Card Detection, Load protocol functionality for ISO/IEC14443 Type A , ISO14443 Type B, ISO/IEC15693 and FeliCa protocol.

Documentation

File name	Title	Type	Date
AN11022	CLRC663 Quickstart Guide	Application note	2012-07-13
AN11116	Using the RS232 serial evaluation boards on a USB port	Application note	2013-10-24
AN11145	CLRC663, MFRC630, MFRC631, SLRC610 PC-Serial RS232 and low power card detection Quick Start Guide	Application note	2013-10-24
119121	PCSerial, SW	Software	2010-05-07
AN11505	CLRC663, MFRC631, MFRC630, SLRC610 PC-Serial RS232 Quick Start Guide	Application Note	2014-09-09
210910	CLRC663 redboard scripts	Software	2011-12-09
119221	UM 119221 PCSerial	User manual	2009-12-22

Dongles

- Dongles are evaluation boards delivered in a USB stick form factor.
- The interface with the host controller is USB 2.0 full speed.
- SCRTester is a PC software allowing us to communicate with NXP reader demo boards through several links (RS232, USB, I2C or SPI).
  - Commands are composed of bytes in hexadecimal value, ended with a semi-colon character.
  - The software is composed of two views, nine toolbars and several menus.
    - The first view shows selected card ATR and the firmware release.
    - The second view is split in two parts. The top view is used to implement a script file and the bottom one to see each command answer.
    - The toolbars allow a quick access to the main commands.
  - SCRTester supports the Alpar, Alpar USB, CCID USB, TAMA, PC/SC protocols.

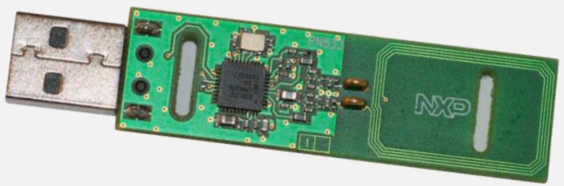


Example: PNEV553D demoboard

PNEV533D

Description

- The PNEV533D demoboard embeds the contactless PN533 IC, together with all the elements needed for the transmission: the EMC filter, the matching network and the antenna.
- The PN533 is a highly integrated transmission module for contactless communication at 13,56Mhz including microcontroller functionality based on 80C51 core with 44Kbytes of ROM and 1232 bytes of RAM.
- Reader/Writer functionality compatible with ISO/IEC14443A, ISO/IEC14443B and FeliCa, Full Peer-to-Peer functionality, Card emulation functionality.
- The 80C51 microcontroller incorporates non-rewritable firmware implementing the RF protocols.



Reader IC: **PN533**

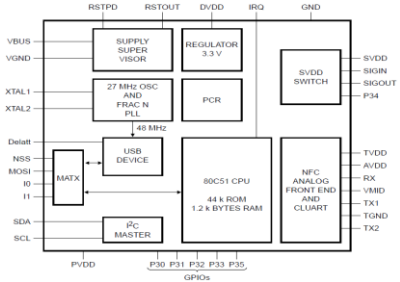
Orderable part number: PNEV533D,699

12NC: 9352 981 96699

URL: http://www.nxp.com/products/interface_and_connectivity/nfc_contactless_reader_ics/PN5331B3HN.html

Features

- USB 2.0 full speed Host interface.
- It is possible to break the PCB to remove the USB connector in order to connect the demoboard directly to the application or change the antenna.
- Integrated LDO to allow 2,7 to 5,4V power supply voltage.
- 3 additional GPIOs for external devices control.
- Embedded firmware commands ensure compliancy with Paypass v1.1 and EMVCo v2.0.



** PN533 block diagram*

Software

- The demoboard can be connected through USB interface of a PC using the PC/SC driver or our proprietary test tool SCRTester.
- Available scripts for SCRTester using TAMA protocol: MIFARE card reader, card writing and Peer-to-Peer communication.

Documentation

File name	Title	Type	Date
PN5331B3HN	Near Field Communication Controller	Data sheet	2010-11-23
158010	PN533 USB stick for Near Field Communication	Application note	2008-07-04
AN10683	PN533 demoboard	Application note	2008-08-18
141410	SCRTester including user manual	Software	2010-05-26
123622	Installer for WIN_XP HAL SDK for NXP NFC IC PN531 USB/Serial	Software	2010-08-20
NfcHAL_SDK	Installer for Win7 HAL SDK for NX NFC IC PN531 USB/ Serial	Software	2012-02-01
157830_PN533	PN533 User Manual UM0801-03	User Manual	2009-01-14

PREV533D

Description

- The PREV533D demoboard embeds the contactless PR533 IC, together with all the elements needed for the transmission: the EMC filter, the matching network and the antenna.
- The PR533 is a highly integrated transmission module for contactless reader/writer at 13,56Mhz. A dedicated ROM code is implemented to handle different RF protocols by an integrated microcontroller (80C51).
- Reader/Writer functionality compatible with ISO/IEC14443A, ISO/IEC14443B and FeliCa, NFC Passive Initiator.
- Embedded firmware commands ensure compliancy with EMVCo v2.0, German ID and ICAO.
- PC/SC driver.

Reader IC: **PR533**

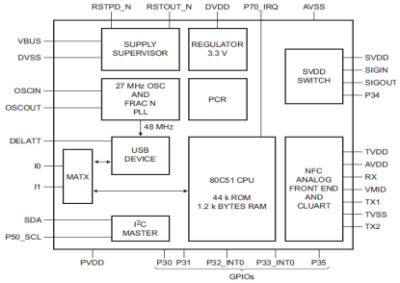
Orderable part number: PREV533D,699

12NC: 9352 981 96799

URL: http://www.nxp.com/products/interface_and_connectivity/nfc_contactless_reader_ics/PR533C3HN.html

Features

- USB 2.0 host interface and CCID protocol support.
- It is possible to break the PCB to remove the USB connector in order to connect the demoboard directly to the application or change the antenna.
- Integrated LDO to allow 2,7 to 5,4V power supply voltage.
- 3 additional GPIOs for external devices control.



** PR533 block diagram*

Software

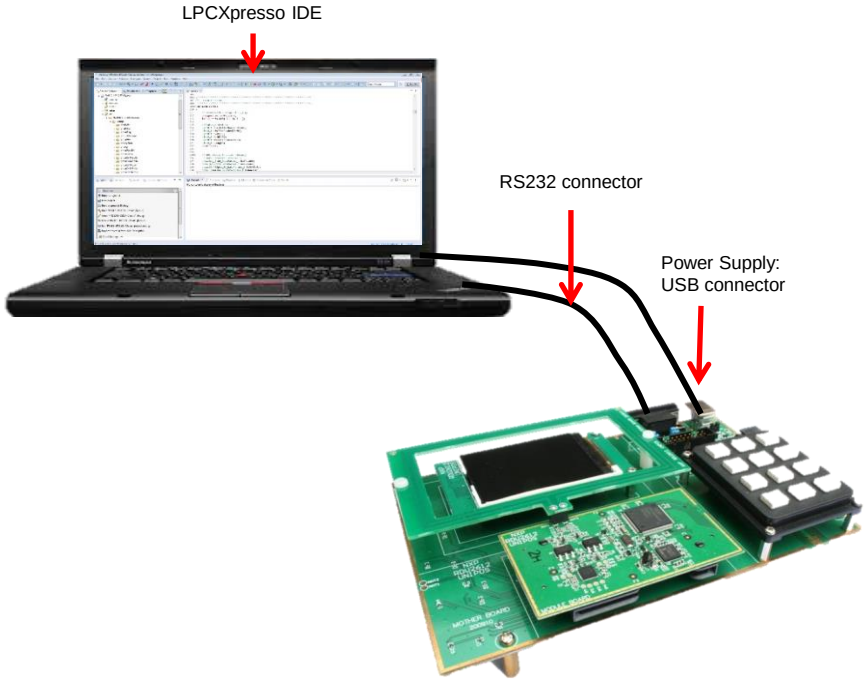
- The demoboard can be connected through USB interface of a PC with CCID driver embedded. This driver is available in most of the OS.
- A PC/SC application and its source code is supplied together with the PREV533D. But any PC/SC application can be used with this demoboard.

Documentation

File name	Title	Type	Date
PR533	Contactless Interface Controller	Data sheet	2012-10-29
AN11193	PR533 Evaluation Board Description	Application note	2012-08-08
AN11064	PR533 USB Stick – Evaluation board	Application note	2012-08-09
UM10464	PR533 – PCSC Tool	User Manual	2012-12-11
UM10463	PR533 Contactless Interface Controller	User Manual	2012-07-05
PR533_PSP_12	PR533 Product Support Package	Other	2012.12-11

Point of Sales (POS)

- POS are reference designs of cost effective EMV compliant Point of Sales Terminal based on NXP components.
- POS board is used to demonstrate and evaluate the implementation of NXP's devices in a POS terminal.
- The board is delivered with a pre-loaded firmware, so that the board is ready to be used for demonstration.
- The user interface composed out of an LCD screen and a keyboard.
- New software can be compiled and adapted using the LPCXpresso environment and making use of:
  - CodeSourcery
  - MinGW
  - FlashMagic
  - ComCom



OM5597 / RD2612

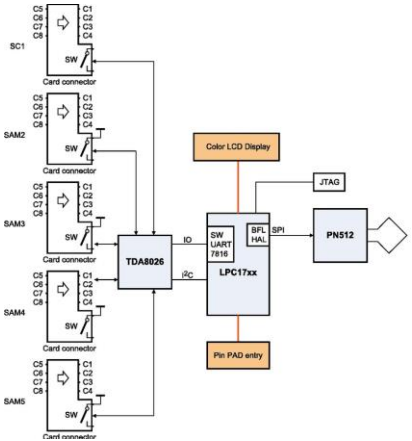
Description

- OM5597/RD2612 is a reference design of a cost effective EMV compliant Point of Sales Terminal based on NXP components. It provides an EMV Level 1 compliant software stack for contactless as well as contact payment based on PN512/C2 and TDA8026.
- Easy integration of NXP components into a cost efficient POS reader.
- Fast development of a certifiable software stack, due to reuse of already EMV L1 certified source files.
- Reusable showcase of closed loop payment, contact and contactless payment card selection as well as NFC functionality.

Reader IC: POS Reference Design Based on **PN512 & TDA8026**
MCU: LPC1768
Orderable part number: OM5597/ RD2612,699
12NC: 9352 949 09699
URL: http://www.nxp.com/demoboard/OM5597.html

Features

- First step of contact and contactless EMV payment application selection with card/phone showcase.
- Closed loop payment showcase.
- NFC Peer to Peer communication showcase.
- The user interface composed out of an LCD screen and a keyboard demonstrates the following showcases:
  - Closed loop payment based on MIFARE DESFire EV1 together with MIFARE SAM AV2
  - First steps of contact and contactless EMV payment with JCOP Dual Interface card
  - First steps of payment with a mobile phone including P2P data exchange
- The OM5597/RD2612 board comes together with all design files including the hardware Gerber Files and the software source files.
- One smartcard slot and four SAM slots.

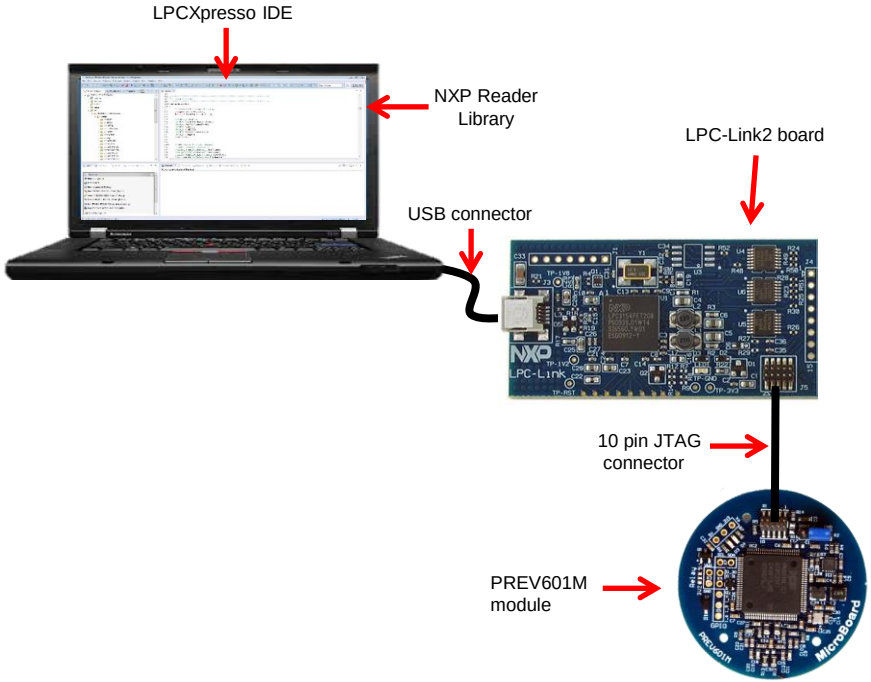


Documentation

File name	Title	Type	Date
OM5597_RD2612_SDS	POS Reference Design	Short data sheet	2012-10-02
SW304012	SW stack and schematics for OM5597/RD2612	Software	2014-04-15
UM10493	POS Reference Design - Firmware description	User manual	2014-04-14
AN11271	Toolchain information for POS development kit OM5597/RD2663	Application note	2014-08-06
AN11270	Hardware description for POS development Kit OM5597/RD2663	Application note	2014-08-01
AN11269	Software Design Guide for POS development kit OM5597/RD2663	Application note	2014-08-11
AN11268	Quick starup guide for POS development kit OM5597/RD2663	Application note	2014-09-09

Modules

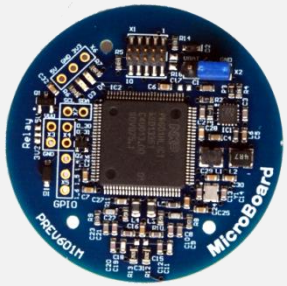
- Modules are small demoboards with an integrated Reader IC, build-in antenna, battery power supply and multifunctional GPIO connectors.
- Modules are focused on application and software-design. Electronics can immediately be used without adaptations.
- Modules can be programmed similarly to the Blueboards, using the LPCXpresso IDE. Additionally, it requires:
  - LPC-Link2 board to flash the firmware into the microcontroller.
  - A 10-pin JTAG cable to connect the microboard with the LPC-Link2 board.
  - USB cable.
- Lithium battery CR2 and LPC-link2 board not included.



PREV601M Microboard

Description

- The board PREV601M implements a PR601 including matched antenna for 13.56 MHz.
- Power supply by single battery.
- Integrated LPC1227 ARM Cortex-M0 microcontroller.
- PR601 combines the functionality of CLRC663 and LPC1227.
- Reader/Writer functionality compatible with ISO/IEC14443A, ISO/IEC14443B and FeliCa, ISO/IEC15693, ISO/IEC18000-3M3 and EPC Class-1 HF.
- NFC Peer-to-Peer Passive Initiator (NFC Ready).



Reader IC: **PR601**

Orderable part number: PREV601M/01,699

12NC: 9353 005 38699

URL: http://www.nxp.com/demoboard/PREV601M.html

Features

- Fast software development based on easy-to-understand firmware.
- 13,56 MHz Antenna implemented on board, possibility to attach external antenna.
- GPIO's, I²C interface, and relay connection available on board.
- The LPC-Link board (LPC3154 or similar), one USB cable and one Lithium battery CR2 are required for debugging, but not included.

Software

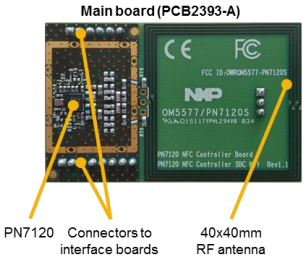
- Easy development through the LPCXpresso IDE and the NXP Reader Library.
- User code can be downloaded by means of a LPC-Link board (LPC3154 or similar).
- Available project examples: P2P communication, Card polling, MIFARE Classic, DESFire and Ultralight.

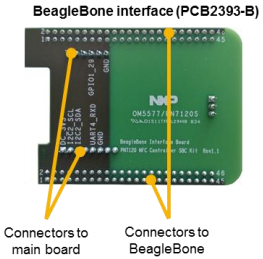
Documentation

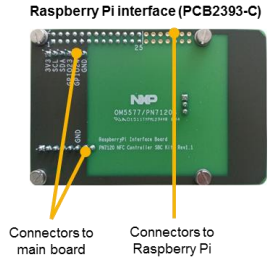
File name	Title	Type	Date
AN11281	Quick Start Up Guide PREV601 Demo Board	Application note	2013-11-12
AN11367	How to build a NFC Application on Android	Application note	2013-06-19
249411	PREV601 MIFARE Classic Project	Software	2013-01-17
249511	PREV601 MIFARE DESFire Project	Software	2013-01-17
249611	PREV601 MIFARE Ultralight Project	Software	2013-01-17
249711	PREV601 Polling Project	Software	2013-01-17
270310	PREV601 Peer to Peer Snep Client project	Software	2013-06-18
UM10721	NXP Reader Library Peer to Peer User Manual based on CLRC663 and PN512 Blueboard Reader projects	User manual	2013-07-24
314220	Schematics and BOM and PREV601M	Application note	2015-09-28

Single board computer kit

- NFC compliant expansion board for both Raspberry Pi and BeagleBone.
- The board features an integrated high performance RF antenna to insure high interoperability level with NFC devices.
- PCB boards are prepared to be easily assembled and stacked on top of Raspberry Pi and BeagleBone boards.
- Software demo images available to be downloaded and installed







Raspberry-Pi

BeagleBone Black

SD card

Peripherals

Check our quick startup on Raspberry Pi hands-on video

Check our hands-on video on how to integrate PN7120 into a Raspbian system

OM5577/PN7120S

Description

- OM5577/PN7120S is a flexible easy-to-use Single Board Computer (SBC) kit for the PN7120 NFC Controller.
- It enables the development of an NFC solution based on PN7120 in a Linux, Android or Windows IoT environment.
- It contains a Raspberri Pi Interface board, a BeagleBone Interface board, as well as an NFC Forum Type 2 Tag in form of MIFARE UL card
- CE and FCC certified
- NFC Forum device requirements v1.3 compliant for all modes
- NCI over I^2C host interface

Reader IC: **PN7120**

Orderable part number: OM5577/PN7120S

12NC: 935306352699

URL: http://www.nxp.com/board/OM5577

Features

- OM5577/PN7120S kit is a high performance fully NFC compliant expansion board for both Raspberry Pi and BeagleBone.
- 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.

Software

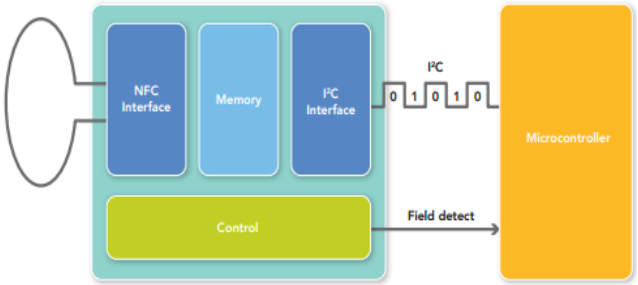
- PN7120 NFC controller is supported under GNU/Linux system using the NXP Linux libnfc-nci SW stack
- PN7120 NFC controller is supported from the official Android Open Source project.
- PN7120 NFC controller is natively supported as Proximity platform device by Win10 IoT OS through the universal NFC device driver model
- PN7120 NFC controller can be integrated in an embedded system with no OS resource required or RTOS system (e.g. LPCXpresso platform)

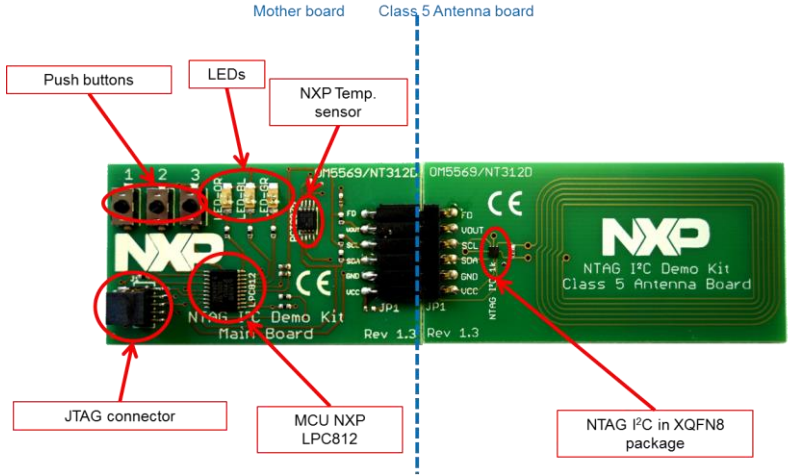
Documentation

File name	Title	Type	Date
AN11646	PN7120 NFC Controller SBC Kit Quick Start Guide	Application Note	2015-10-22
PN7120_SBC_Kit	PN7120 NFC Controller SBK Kit OM5577/PN7120S	Leaflet	2015-07-01
OT334610	Hardware Design Files for OM5577/PN7120S	Other	2015-06-15
OM5577_BBB_Linux	OM5577 BeagleBone Linux demo image	Software	2015-06-17
OM5577_BBB_Kitkat	OM5577 BeagleBone Android Kitkat demo image	Software	2015-06-17
OM5577_RPi_Win10IoT	OM557 Raspberri Pi Win10 IoT demo image	Software	2015-10-19
OM5577_RPi_Linux	OM557 Raspberri Pi Linux demo image	Software	2015-10-19
UM10878	PM7120 NFC Controller SBC Kit User Manual	User Manual	2015-10-22

Connected tags

- NFC Connected tag
  - Behaves similarly to a dual port memory.
  - One of the memory ports is accessed wirelessly through an NFC interface.
  - The other port is accessed by the embedded system via an I2C interface
  - Data can pass from an external source (e.g., an NFC-enabled mobile device) to the embedded system.
  - As passive devices, they can be read from, or written to, by the external source even when the embedded system is powered off





OM5569/NT312D

Description

- The NTAG I²C Demo kit is a simple all-in-one demonstrator kit for the NFC connected tag chips.
- It enables the end user to demonstrate the basic principle of dual interface communication (NFC / I²C) as well as also developing and testing their own applications while being to explore all NTAG I²C features.
- It contains two PCBs:
  - **Main board** based on NXP LPC812 MCU with NXP PCT2075 temperature sensor, I2C serial bus connector and JTAG debug connector
  - **Class 5 Antenna board** with NTAG I2C tag chip mounted with separate antenna pads for custom antenna use

Reader IC: **NTAG I²C**

Orderable part number: OM5569/NT312D

12NC: 935305377699

URL: http://www.nxp.com/board/OM5569

Features

- RF interface fully NFC Forum Tag type 2 compliant
- Contact Interface for dual interface communication (I2C)
- Interoperability with every NFC-enabled device on the market
- Configurable field detection pin based on open drain implementation for low power Bluetooth and WiFi pairing
- Energy harvesting functionality to power external devices (e.g. microcontroller)
- FAST READ command
- Fast data exchange between NFC and I2C using Pass Through mode (64 byte SRAM memory buffer, no cycling limitations)

Software

- Complete set of tools to evaluate NTAG I2C features and develop own applications from both microcontroller and NFC side
  - Android application, PC applications and board firmware

Documentation

File name	Title	Type	Date
AN11597	NTAG I2C demo application for Android	Application Note	2014-11-12
SW309711	Android App Source code NTAG I2C 1,7,0	Software	2015-02-10
SW309910	NTAG I2C design file antenna board	Software	2014-10-29
SW309111	NTAG I2C demo kit design files including firmware	Software	2014-11-06
White paper	What NFC means for smart factories, intelligent supply chains and Industry 4.0	White paper	2015-05-18
GooglePlay_store	NTAG I2C demoboard	Software	2014-09-16
SW313210	PC application for I2C access via USB	Software	2014-11-11
75017479	NTAG I2C	Leaflet	2015-05-27

Others: EXPLORE-NFC board

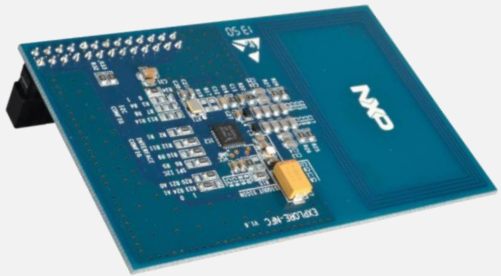
- Raspberry Pi:
  - The Raspberry Pi is a credit card sized computer. The initial idea behind it was to develop a small and cheap computer to be used by kids all over the world to learn programming. In the end it became very popular among developers all over the world.
  - The Raspberry Pi Foundation provides several preconfigured Linux distributions.
    - Raspbian is a Debian-based free operating system optimized for the Raspberry Pi hardware.

- EXPLORE-NFC
  - A high performance full NFC expansion board for the Raspberry Pi.
  - The NXP Reader Library ported to work on Linux.
  - At the moment, only the SPI protocol is ported for the communication between reader IC and the Raspberry Pi.

PNEV512R EXPLORE-NFC

Description

- EXPLORE-NFC is a high performance full NFC expansion board for the Raspberry Pi, only available through element14: EXPLORE-NFC.
- Based on the NXP PN512 solution, EXPLORE-NFC meets compliance with Reader mode, P2P mode and Card emulation standards.



Reader IC: **PN512**

Orderable part number: PNEV512RM

12NC: 9353 038 28699

Only available through element14

URL: http://www.element14.com/exploreNFC
http://www.nxp.com/demoboard/PNEV512R.html

Features

- EXPLORE-NFC is a board that attaches to Raspberry Pi and provides an interface which is fully compliant with the NFC Forum specifications.
- Reader mode supports 4 NFC Forum Tag Types and NXP MIFARE proprietary command.
- The board features an integrated high performance antenna, is supported by libnfc and offers a flexible SPI interface.

Software

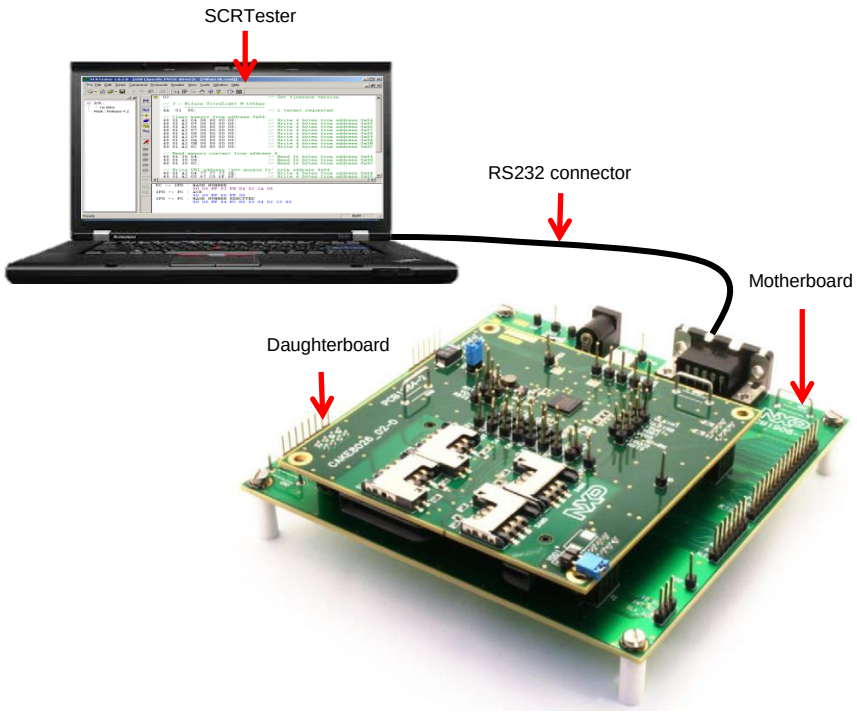
- NXP Reader Library ported to work under Linux environment.
- Software available for Card Polling: find out which contactless smart card you have in your pocket.
- Software available for P2P Communication: transmit data from the RaspberryPI to the NFC enabled mobile phone through NFC.
- Software available for Card Emulation: implement your Paper Chase Game using NFC on the RaspberryPI together with your NFC enabled mobile phone.

Documentation

File name	Title	Type	Date
AN11480	Quick Start Up Guide for EXPLORE NFC working with Raspberry Pi	Application note	2014-01-13
SW282910	EXPLORE Card Emulation – build your own paperchase application with NFC technology	Software	2014-01-13
SW282810	EXPLORE Peer to Peer – transfer a picture from the Raspberry PI to the mobile phone over NFC	Software	2014-01-13
SW282710	EXPLORE Polling Cards – find out which contactless smart card you have in your pocket	Software	2014-01-13
OT344310	Schematics and BOM for EXPLORE-NFC	Other	2015-09-09

Demoboards for contact reader ICs

- Contact boards are evaluation boards to test the contact reader IC functionalities.
- These are single boards embedding an NXP contact reader, its capacitors, some connectors for external signals and a smart card connector.
- These evaluation boards are planned to be used as daughter boards, plugged on a motherboard embedding the correct connectors.
- SCRTester is a PC software allowing to communicate with NXP reader demoboards through several links (RS232, USB, I2C or SPI).
  - Can be used as a GUI communicating with the daughterboard together with the motherboard.



TDA Demo boards

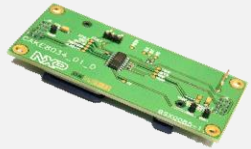
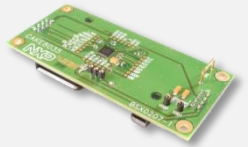
Description

- Demoboards for contact smartcards and SAMs.
- Stackable configuration: combining motherboard with various daughterboards.
- Used for evaluation and migration.
- Software tool: SCRTester.

Motherboard OM9800/MCT800

Reader IC: Used for TDA daughterboards
MCU: **LPC2212**
Orderable part number: **OM9800/MCT8000,599**
12NC: 9352 931 68599
URL: http://www.nxp.com/documents/application_note/AN11079.pdf

Daughterboards

Daughterboard	Reader IC	Orderable part number & (12NC)	
OM9800/DCT8026	TDA8026	OM9800/DCT8026,599 (9352 931 69599)	
OM9800/DCT8034	TDA8034	OM9800/DCT8034,599 (9352 931 71599)	
OM9800/DCT8035	TDA8035	OM9800/DCT8035,599 (9352 931 72599)	

Documentation

File name	Title	Type	Date
AN11079	Contcat reader ICs – TDA product suport packages	Application note	2011-05-23

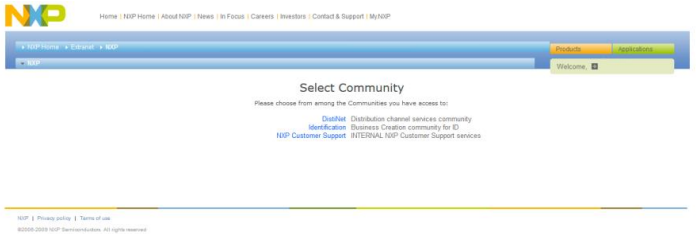
How to order

All customers -> through NXP Distribution

- For each demoboard, available distributors for ordering are indicated in the specific demoboard webpage
  Example: http://www.nxp.com/demoboard/PNEV512B.html
- Information about NXP Distributors can be found at NXP website, in the top menu “Contact” option
  http://www.nxp.com/support.html

Registered customers -> NXP Extranet (DistiNet)

- Only for customers with direct marketing agreements
- URL: extranet.nxp.com
- For further information, contact your NXP sales representative (info available at the NXP website, in the top menu “Contact” option
  http://www.nxp.com/support.html



How to order

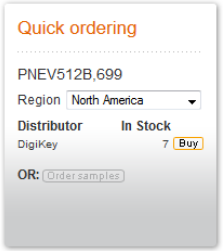
All customers -> through Distribution

Option A. Contact your local NXP distributor directly:

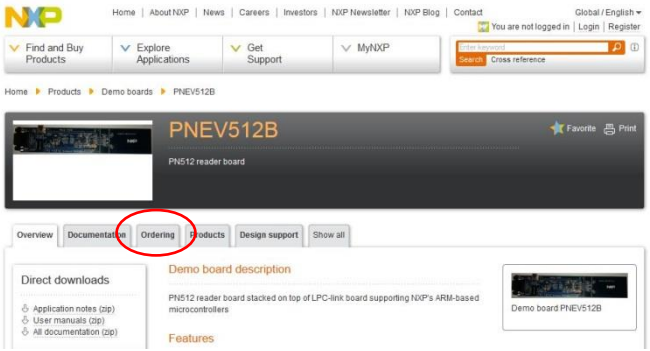
http://www.nxp.com/support.html

Option B. Through the NXP website:

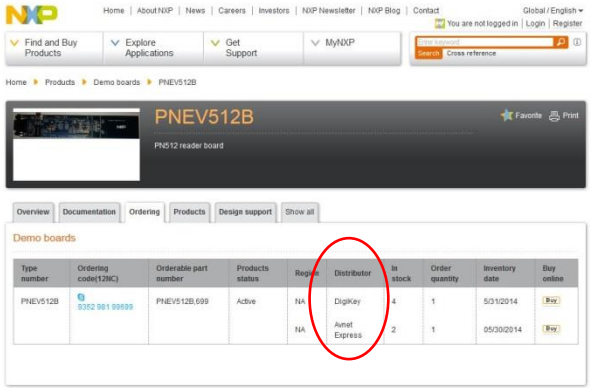
1. Go to the demoboard webpage
   eg: http://www.nxp.com/demoboard/PNEV512B.html
2. Go to the Ordering tab
3. Find the distributors available
4. Go to the distributor's webpage



You can also use the Quick ordering option from the demoboard webpage when avialable



2

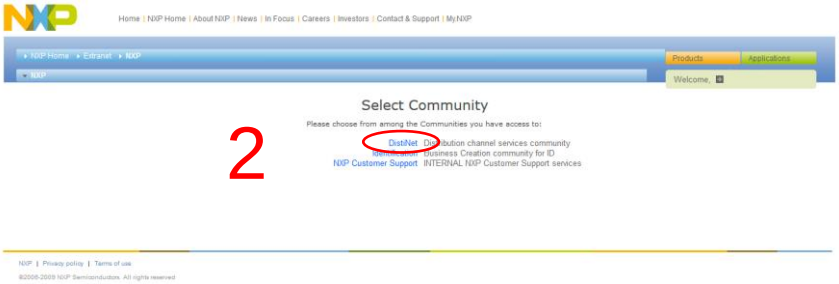


3

How to order

Registered Customers NXP Extranet (DistiNet)

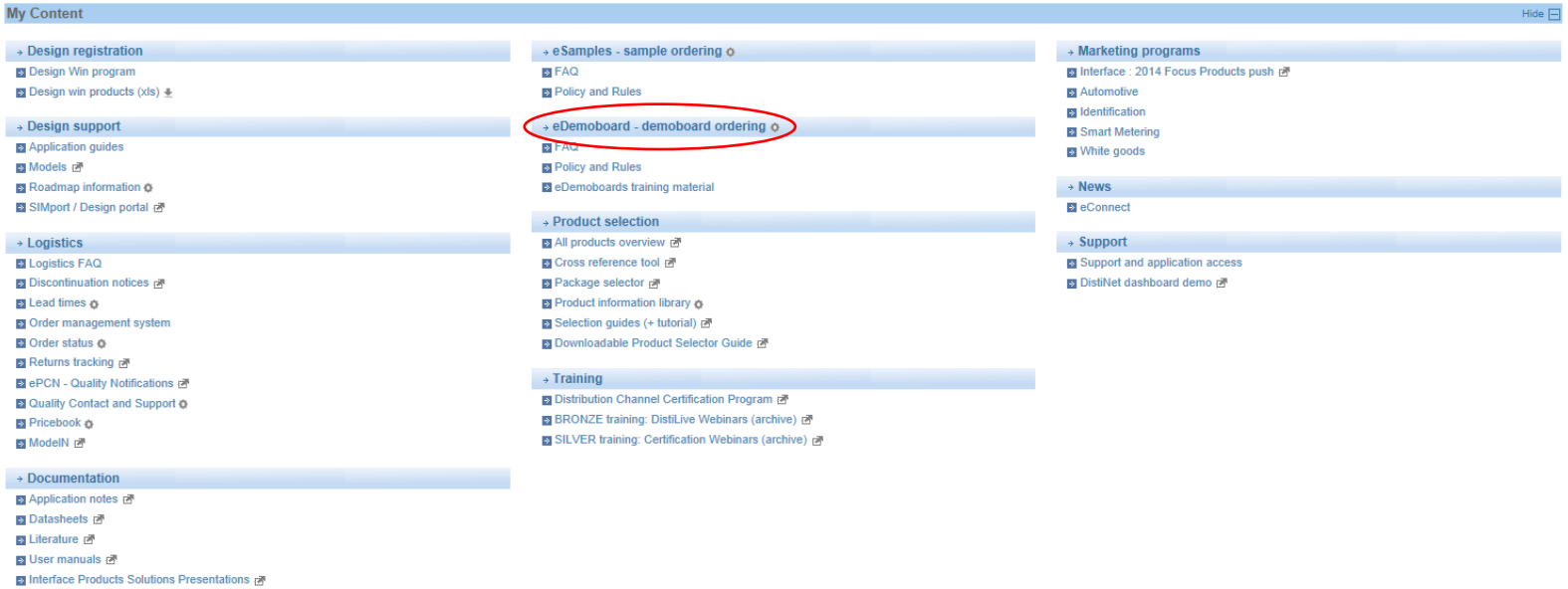
1. Log in to the NXP Extranet (register if not registered yet) extranet.nxp.com
2. Select Community: DistiNet



For a more detailed description on how to order through DistiNet, please refer to:
https://extranet.nxp.com/pages/common/docs/eDemoBoards_Disti_Training.ppt

NXP Extranet

3. Select eDemoboard



NXP Extranet

4. Order the Demoboard:

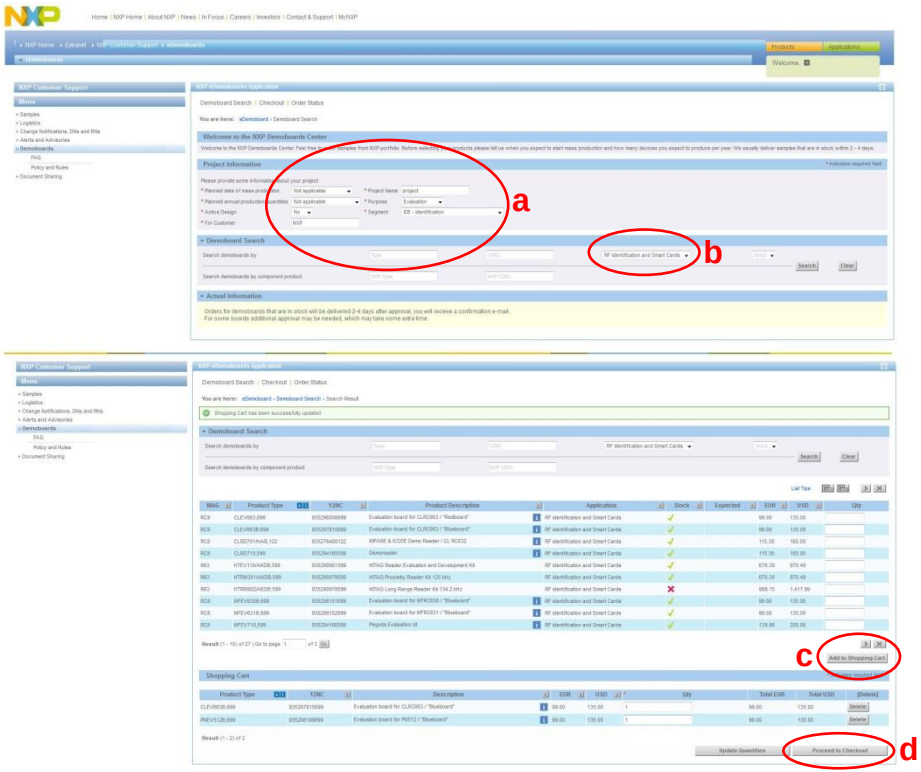
   a. Fill the form with your project information and with the information about the demoboard you are looking for

   b. On the demoboard search form, select “RF identification and Smart Cards”

   c. Find the demoboard(s) you want, select the quantity and click on “Add to Shopping Cart”

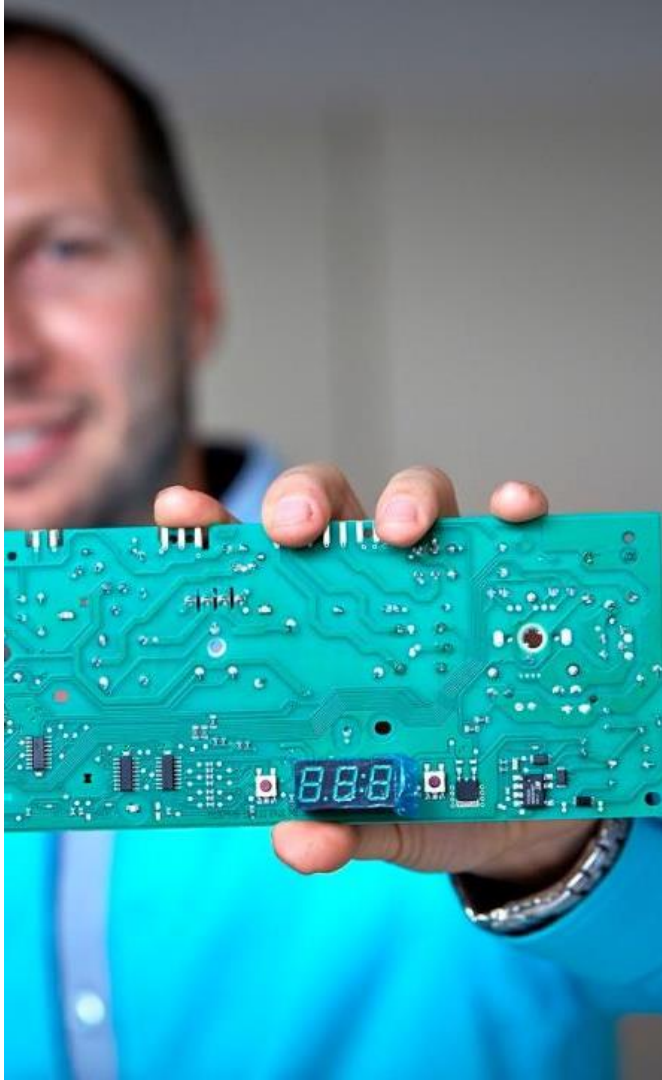
   d. Once you have added all the demoboards you want, click on “Proceed to Checkout”

   e. After that, you will be required to provide the shipping and invoicing information, and the ordering process will be finished.



To sum up

- Moving from demoboards to complete demo kits
  - Application Notes, User manuals, Quick Starting Guides …
  - Software tools and sample source code
  - Hardware design files and schematics
  - Sample ICs
  - Other accessories
- NXP demokits aimed to be used as a reference for:
  - HW design, SW development, IC functionality testing, etc
- Ordering demoboards and demokits can be done through
  - Distribution channel
  - NXP extranet



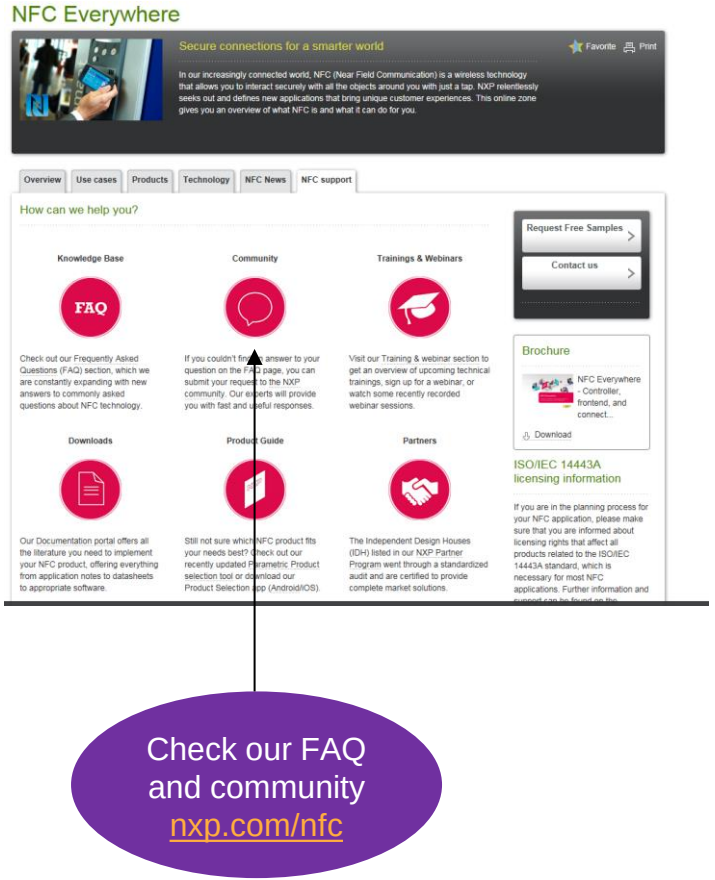
Do you need more?

Resources and useful links

Reference material & documentation:

- **NFC Everywhere**
  http://www.nxp.com/nfc
- **NFC Everywhere support page:**
  http://www.nxp.com/techzones/nfc-zone/community.html
- **From here check out the community for FAQs of post your question into the**
  discussion forum for NFC Readers

For other questions or further support, please contact: nfc.readers@nxp.com



MobileKnowledge

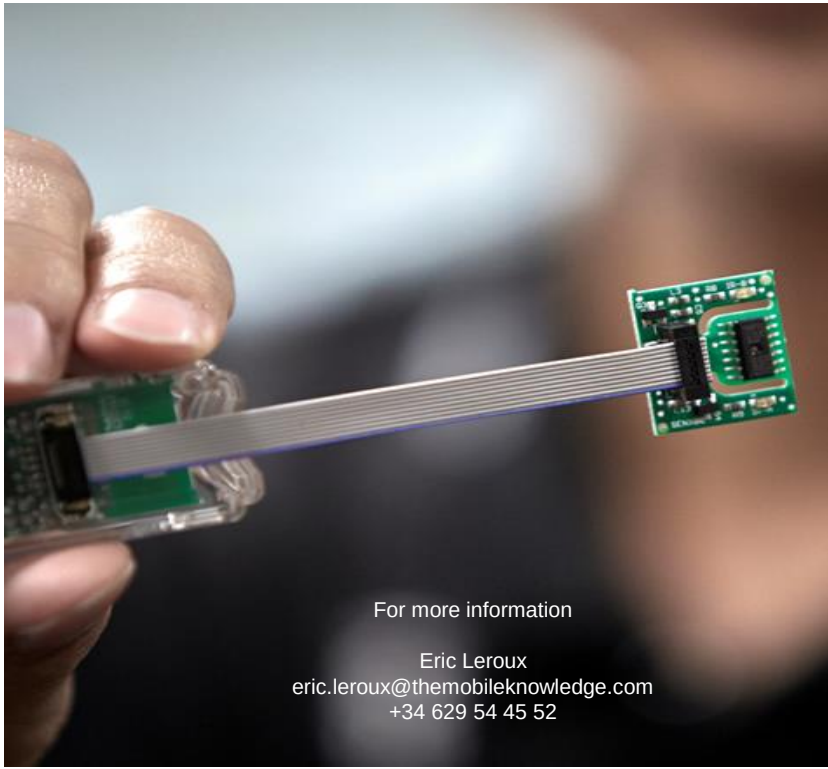
Thank you for your attention

MobileKnowledge
www.themobileknowledge.com

- We are a global competence team of hardware and software technical experts in all areas related to contactless technologies and applications.

- Our services include:
  - Application and system Design Engineering support
  - Project Management
  - Technological Consulting
  - Advanced Technical Training services

- We address all the exploding identification technologies that include NFC, secure micro-controllers for smart cards and mobile applications, reader ICs, smart tags and labels, MIFARE family and authentication devices.



NXP Development Boards for NFC Readers

Jordi Jofre (Speaker) / Eric Leroux (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

  www.nxp.com/products/related/customer-training.html

  www.themobileknowledge.com/content/knowledge-catalog-0