

# AN10731

## PN533 USB stick for Near Field Communication

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158012

Application note  
COMPANY PUBLIC

### Document information

Info	Content
Keywords	NFC, PN533, USB stick, demo board
Abstract	This document describes the PN533 USB stick BSX0052



## Revision history

Rev	Date	Description
1.2	20180710	Editorial update
1.1	20180108	Security status changed into Company public, no content change
1.0	20080704	Initial release: description of the USB stick BSX0052-1

## Contact information

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

## 1. Introduction

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The **PN5331B3HN** with **embedded firmware** has following features:

- Supports ISO/IEC 14443A reader/writer up to 847 Kbit/s
- Supports ISO/IEC 14443B reader/writer up to 847 Kbit/s
- Supports MIFARE Classic with 1K/4K encryption in reader/writer mode at 106 Kbit/s
- Supports all NFCIP-1 modes up to 424 Kbit/s. The PN533 handles the complete NFC framing and error detection.
- Supports contactless RF communication according to the Felica protocol at 212 Kbit/s and 424 Kbit/s
- Embedded firmware commands allow compliancy with Paypass v1.1 and EMVCo v2.0 specifications
- Embedded firmware commands allow use of the NFC secure layer
- Embedded firmware commands allow RF Activation application
- Reader mode for Jewel cards
- Includes 80C51 micro-controller
- Integrated LDO to allow 2.7 V to 5.4 V power supply voltage
- Integrated antenna component detector
- Host interface: USB 2.0 full speed
- USB bus-powered or host-powered mode possibility
- On-chip PLL to generate internally 96 MHz for the USB interface
- I2C master interface to fetch PID, VID, USB descriptor and RF settings from an external EEPROM
- I2C master interface to support the bridge to the TDA8029 contact reader (2 dedicated GP-IOs)
- 3 additional GP-IOs for external devices control

The PN533 demo board so-called BSX0052 is described in this application note.

This board is an example of implementation of a Near Field Communication reader/writer on a small USB stick.

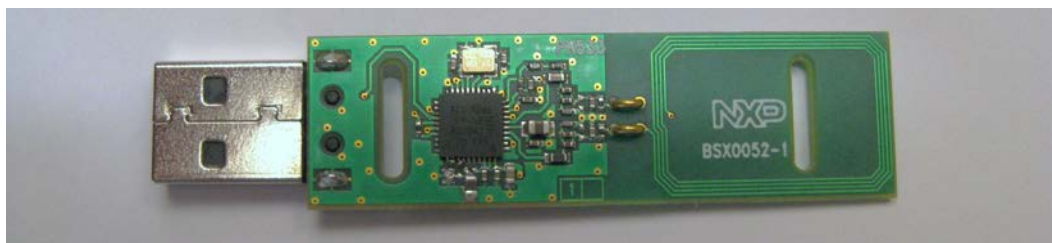
The BSX0052 board is described in paragraph 2.1.

Information for using this demo board is given in paragraph 2.2.

Paragraphs 2.3, 2.4, and 2.5 contain electrical schematic, PCB layout and components information.

## 2. PN533 USB stick description

The BSX0052 board can be used as a reference design for a PN533 USB stick. The interface with the host controller is USB 2.0 full speed.



### 2.1 Description

On the stick board 4 parts are easily visible:

- The USB connector
- The IC part (containing PN533 IC + oscillator crystal + decoupling capacitors)
- The antenna matching components
- The antenna itself.

The 2 jumpers connecting matching components to antenna may be removed to use another antenna.

Two long holes can be seen: they may be used to fix a ferrite antenna instead of the usual antenna made of printed circuit. Using a small ferrite antenna makes the USB stick shorter.

The board uses a type A male USB connector to be connected to a PC.

It is bus powered. All the IC supplies (DVDD, AVDD, TVDD, PVDD) are generated from the USB supply (VBUS) by the internal LDO regulator.

### 2.2 How to use this demo board

This demo board has simply to be connected through USB interface to a PC using a **PC/SC driver** or our proprietary **software demonstrator SCRTester** that we provide with the complete demo kit. Please refer to the **Quick Start Guide** (or Readme file) of the demo kit for more details about installation and use.

When this software demonstrator is installed on PC, then just plug the PN533 USB stick to PC and start using it.

Refer to user manual of the software demonstrator for more details.

Few software scripts are provided as examples. Using these scripts, cards reading and writing or peer to peer communication with another NFC device can be demonstrated.

Notice that due to very small size of the antenna, communication distance is limited to about 3cm.

## 2.3 Electrical diagram

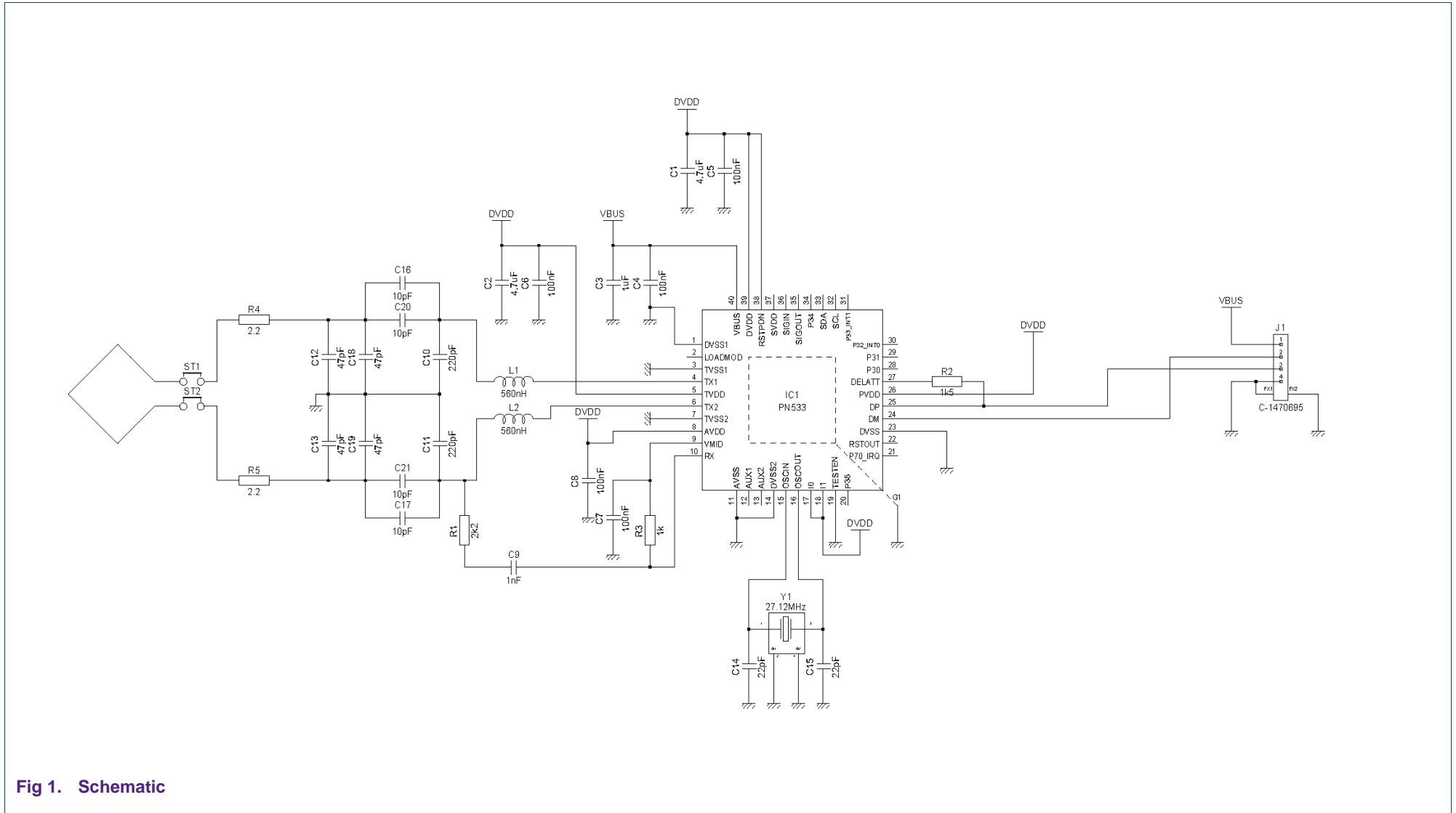
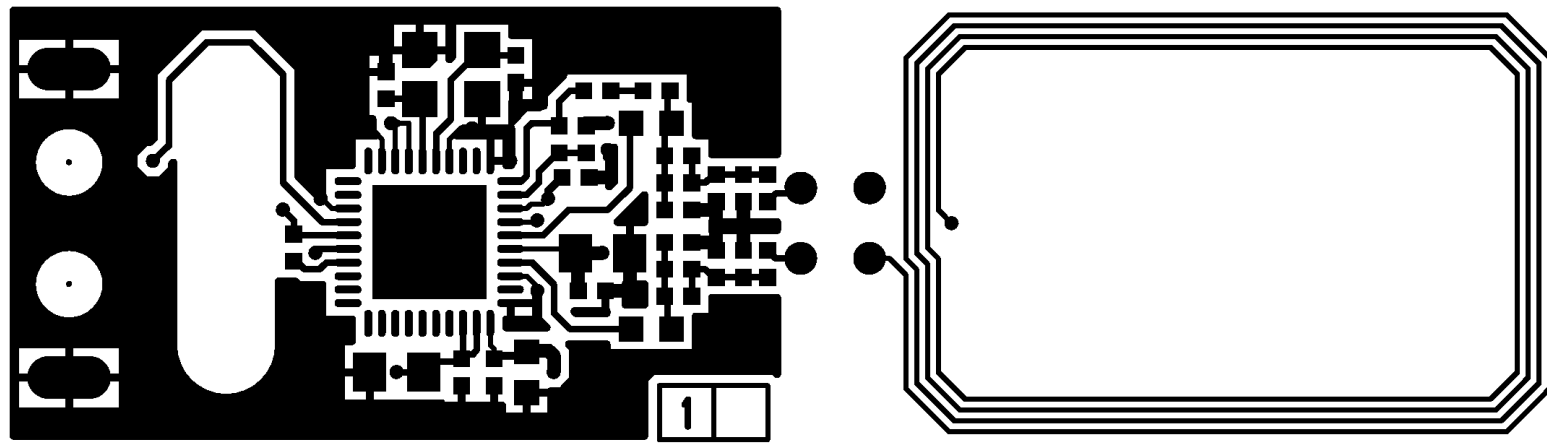


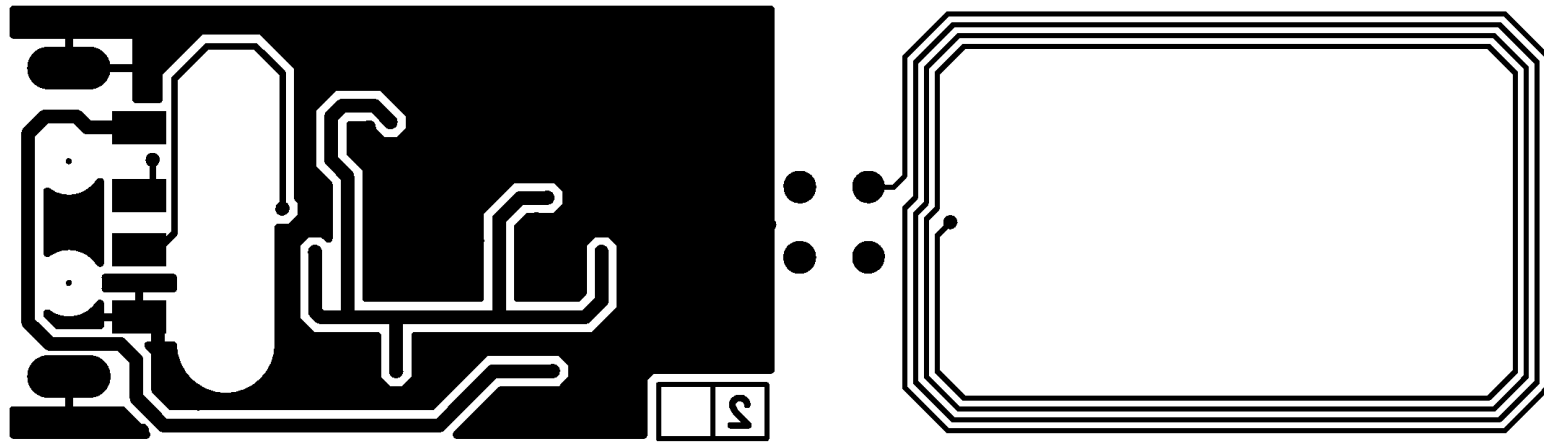
Fig 1. Schematic

## 2.4 Layout



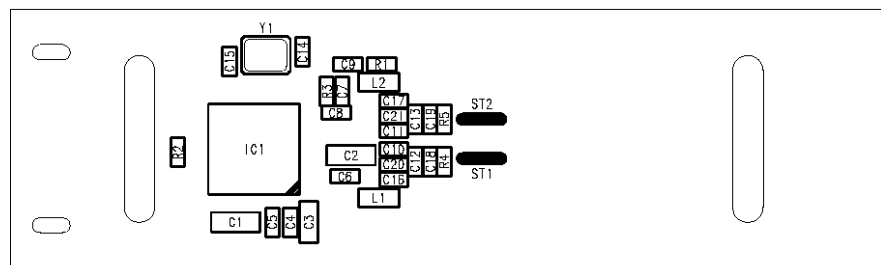
BSX0052-1 Cuivre Top

Fig 2. PCB Top View



BSX0052-1 Cuiivre Bottom

Fig 3. PCB Bottom View



BSX0052-1 CABLAGE Top



BSX0052-1 CABLAGE Bottom

Fig 4. Components View



## 2.5 Components list

NOMENCLATURE		BSX0002-1.a	2008-06-06	
COMPANY PART NO.	COUNT	REFERENCE	GEOMETRY	DESCRIPTION
pn53_c0402_100p_gsm15	5	C4 C5 C6 C7 C8	c0402	capc, 100nF, MURATA GRM1555R0106A88D Capacite 0402 X7R 10V, 10%
pn53_c0402_10p_gsm15	4	C14 C17 C20 C21	c0402	capc, 10pF, MURATA GRM1555C1H10J020 ID Capacite 0402 C0G 50V, 5%
pn53_c0402_1n_gsm15	1	C9	c0402	capc, 1nF, MURATA GRM1555C1H22J1001D Capacite 0402 C0G 50V, 5%
pn53_c0402_220p_gsm15	2	C10 C11	c0402	capc, 220pF, MURATA GRM1555C1H22J1001D Capacite 0402 C0G 50V, 5%
pn53_c0402_22p_gsm15	2	C4 C15	c0402	capc, 22pF, MURATA GRM1555C1H22J020 ID Capacite 0402 C0G 50V, 5%
pn53_c0402_47p_gsm15	4	C12 C13 C18 C16	c0402	capc, 47pF, MURATA GRM1555C1H47J020 ID Capacite 0402 C0G 50V, 5%
pn53_c0603_1k_0.3V	1	C3	c0603	capc, 1uF, Capacte XSR 0603 6.5V, 10%
pn53_c0603_4.7uF_10V	2	C1 C2	c0603	capc, 4.7uF, Capacte XSR 0603 10V - H2MET C0603C4704BPAC, 10%
pn53_cav_254	2	S71 S72	cav_254	cav, 1p, CAV, 2.54, Carrier dore 2.54mm HCONTEK 313020000500
pn53_3903_590p_nfl	2	L1 L11	l3903	sol 700nH, TDN MLF 3903DF06, Inductance Package CMS 06031608 35mA, 10%
pn53_uf53	1	IC1	hvd401_05_svf_s0618_1	pn533, PN533, NXP, PN533 NFC Controller package hvd401, appro client
pn53_r0402_1k	1	R3	r0402	res, 1k, Resistance Package CMS 0402 1% 0.025W
pn53_r0402_100	1	R2	r0402	res, 100, Resistance Package CMS 0402 1% 0.025W
pn53_r0402_2.2	2	R4 R5	r0402	res, 2.2, Resistance Package CMS 0402 1% 0.025W
pn53_r0402_300	1	R1	r0402	res, 300, Resistance Package CMS 0402 1% 0.025W
pn53_qm3225_27.12MHz	1	Y1	qm3225	quartz, 27.12MHz, Quartz serie FAS-3225A 27.12MHz
pn53_usb_nfc_c147	1	J1	conn_usb_nfc_c147	conn4_p2, C-1470695, TYCO, C-1470695, USB type A, 4kg, right angle, SMT, appro client
zba1601	1			Creat_imprieme BSX0002-1

Fig 5.

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