

AN10731_1

PN533 USB stick for Near Field Communication

Rev.1.0 — July 4, 2008

Application note
CONFIDENTIAL

Document information

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

Revision history

Rev	Date	Description
1.0	2008-07-04	Initial release: description of the USB stick BSX0052-1

Contact information

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1. Introduction

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

- Supports ISO/IEC 14443A reader/writer up to 847Kbit/s
- Supports ISO/IEC 14443B reader/writer up to 847Kbit/s
- Supports MIFARE 1K/4K encryption in reader/writer mode at 106Kbit/s
- Supports all NFCIP-1 modes up to 424Kbit/s. The PN533 handles the complete NFC framing and error detection.
- Supports contactless RF communication according to the Felica protocol at 212Kbit/s and 424Kbit/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 to 5.4V 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 96MHz 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 demoboard 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.

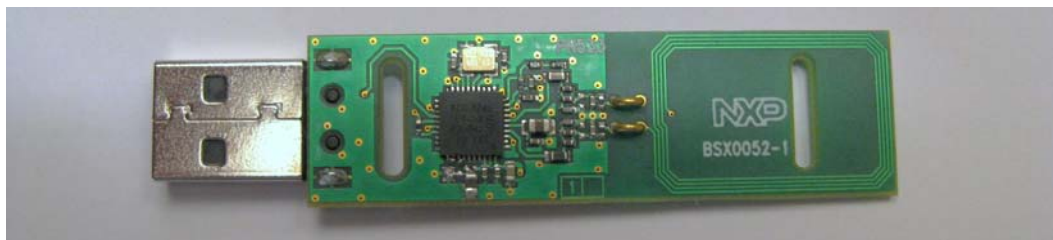
The BSX0052 board is described in paragraph 2.1.

Information for using this demoboard 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 demoboard

This demoboard has simply to be connected through USB interface to a PC using a **PC/SC driver** or our proprietary **software demonstrator SCRTTester** 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

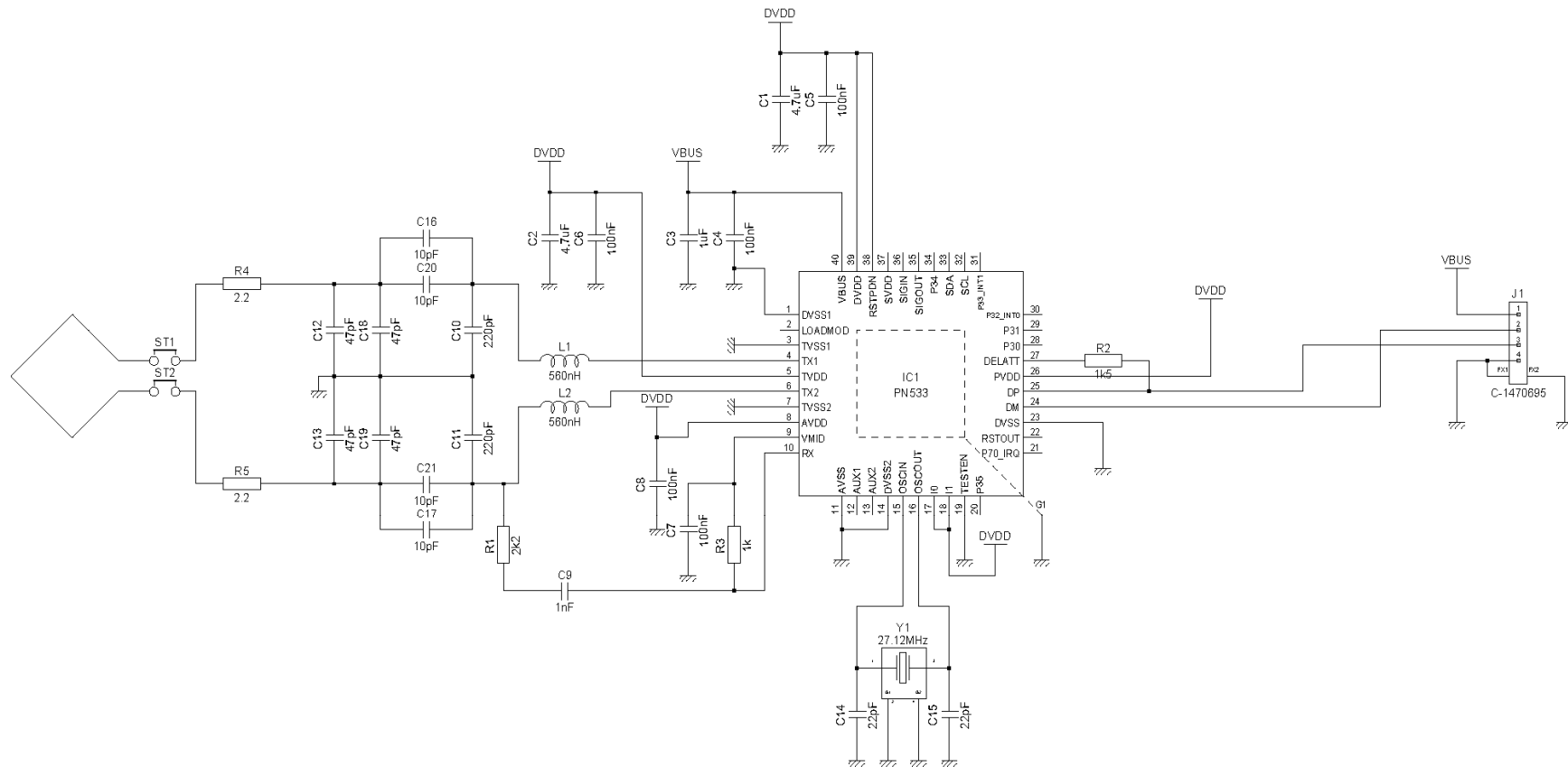
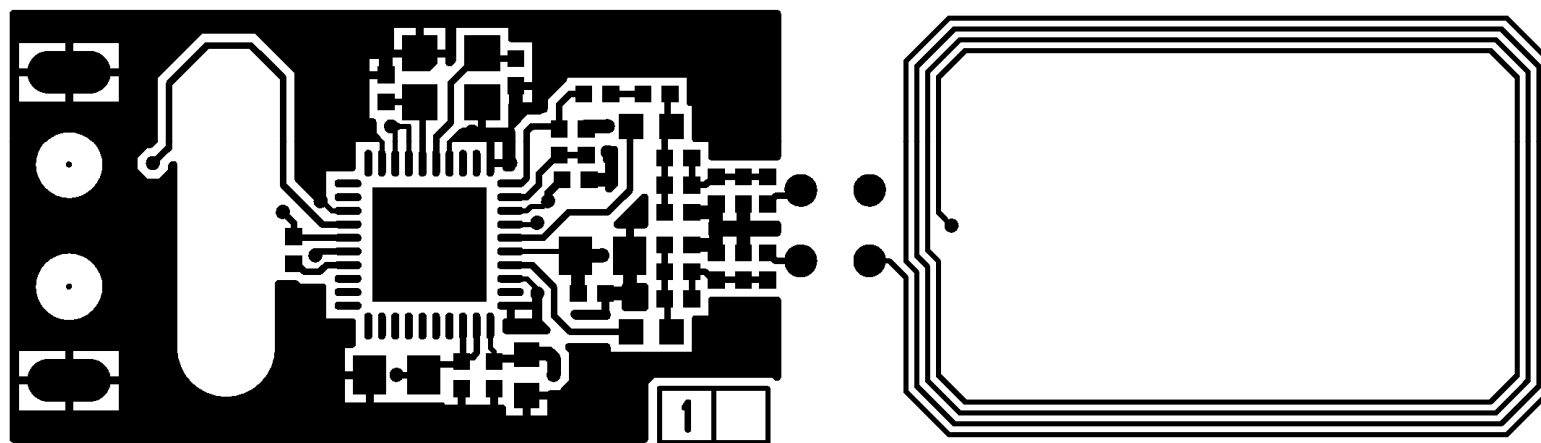


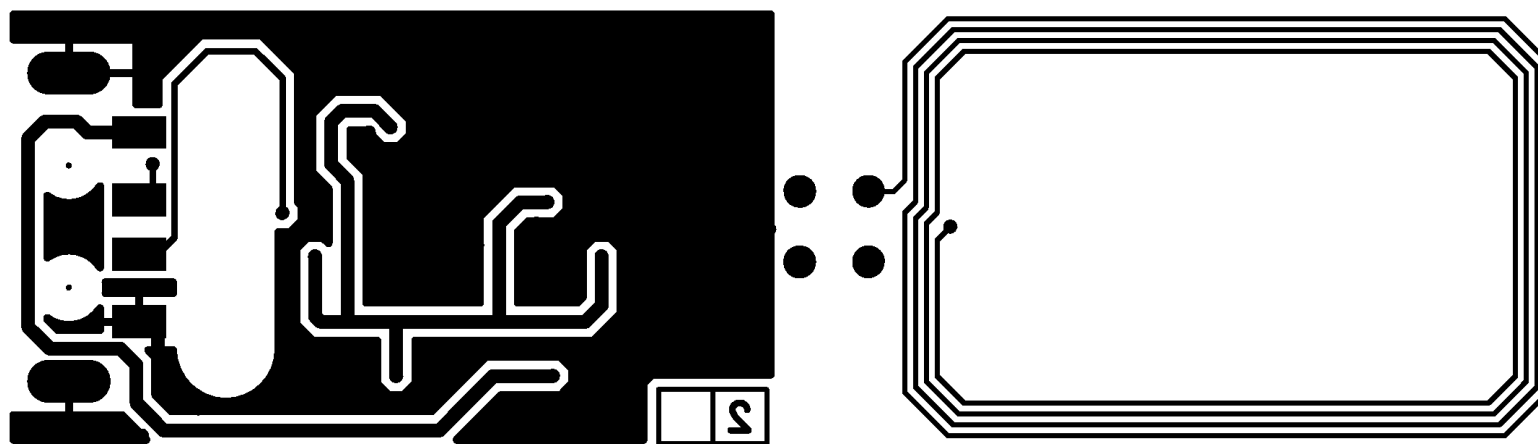
Fig 1. Schematic

2.4 Layout



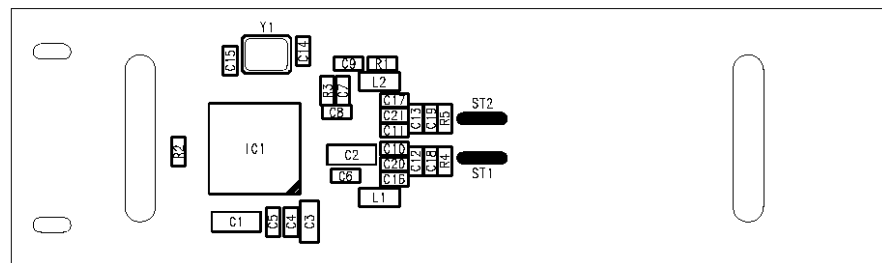
BSX0052-1 Cuivre Top

Fig 2. PCB Top View



BSX0052-1 Cuivre Bottom

Fig 3. PCB Bottom View



BSX0052-1 CABLAGE Top



BSX0052-1 CABLAGE Bottom

Fig 4. Components View

2.5 Components list

NOMENCLATURE		BSX0052-1.a		2008-06
COMPANY PART NO.	COUNT	REFERENCE	GEOMETRY	DESCRIPTION
pn5x_c0402_100n_grm15	5	C4 C5 C6 C7 C8	c0402	capa, 100nF, MURATA: GRM1555R71C104KA88D Capacite 0402 X7R 16V, 10%
pn5x_c0402_10p_grm15	4	C16 C17 C20 C21	c0402	capa, 10pF, MURATA: GRM1555C1H100JZ01D Capacite 0402 C0G 50V, 5%
pn5x_c0402_1n_grm15	1	C9	c0402	capa, 1nF, MURATA: GRM1555C1H221JA01D Capacite 0402 C0G 50V, 5%
pn5x_c0402_220p_grm15	2	C10 C11	c0402	capa, 220pF, MURATA: GRM1555C1H221JA01D Capacite 0402 C0G 50V, 5%
pn5x_c0402_22p_grm15	2	C14 C15	c0402	capa, 22pF, MURATA: GRM1555C1H220JZ01D Capacite 0402 C0G 50V, 5%
pn5x_c0402_47p_grm15	4	C12 C13 C18 C19	c0402	capa, 47pF, MURATA: GRM1555C1H470JZ01D Capacite 0402 C0G 50V, 5%
pn5x_c0603_1uf_6.3V	1	C3	c0603	capa, 1uF, Capacite X5R 0603 6.3V, 10%
pn5x_c0805_4.7uf_16V	2	C1 C2	c0805	capa, 4.7uF, Capacite X5R 0805 16V - KEMET: C0805C475K4PAC, 10%
pn5x_cav_254	2	ST1 ST2	cav_254	cav_1p, CAV_2.54, Cavalier dore 2.54mm KONTEK: 3130826000500
pn5x_l0603_560n_mlf	2	L1 L2	l0603	self, 560nH, TDK: MLF1608DR56K, Inductance Package CMS 0603/1608 35mA, 10%
pn5x_pn533	1	IC1	hvgqm40_05_6x6_sot618_1	pn533, PN533, NXP: PN533 NFC Controller package: hvgqm40
pn5x_r0402_1k	1	R3	r0402	res, 1k, Resistance Package CMS 0402 1% 0.0625W
pn5x_r0402_1k5	1	R2	r0402	res, 1k5, Resistance Package CMS 0402 1% 0.0625W
pn5x_r0402_2.2	2	R4 R5	r0402	res, 2.2, Resistance Package CMS 0402 1% 0.0625W
pn5x_r0402_2k2	1	R1	r0402	res, 2k2, Resistance Package CMS 0402 1% 0.0625W
pn5x_tas3225_27.12mhz	1	Y1	tas3225	quartz_2g, 27.12MHz, Quartz serie TAS-3225A 27.12MHz
pn5x_usba_mc_c147	1	J1	conn_usba_mc_c147	conn4_fx2, C-1470695, TYCO: C-1470695, USB type A, plug, right angle, SMT
zbulle01	1			Circuit_imprime: BSX0052-1

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