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PR533 Evaluation Board description - PCB2235

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232513

Application note
COMPANY PUBLIC

Document information

Info	Content
Keywords	PR533, CCID, Evaluation board, Contactless Reader
Abstract	This application note describes the PR533 evaluation board named PCB2235. It provides the schematics and layout for easier understanding and evaluation. It also describes the specific applications that can be evaluated with this board.

Revision history

Rev	Date	Description
1.3	20180515	Editorial updates
1.2	20171107	Security status changed into COMPANY PUBLIC, no content change
1.1	20120801	Section License updated
1.0	20120502	First Version

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1. Introduction

The PR5331C3HN 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 Classic with 1K/4K encryption in reader/writer mode at 106Kbit/s
- Supports contactless RF communication according to the Felica protocol at 212Kbit/s and 424Kbit/s
- Embedded firmware commands allow compliancy with EMVCo v2.0.1 specifications
- 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 PR533 demoboard PCB2235 is described in this application note.

This board is an example of implementation of a reader/writer using the PR533, showing the different personalization possibilities, as LED management or EEPROM use.

Note: Two evaluation boards exist for PR533: a small form factor called PR533 USB stick, and the board described here (PCB2235). In this document, the mentions of PR533 eval board, PR533 evaluation board or PCB2235 will always refer to this PCB2235 board.

If the USB Stick evaluation board is mentioned, it is specifically called PR533 USB Stick, or BSX0252.

2. PN533 Evaluation board description

The PCB2235 board can be used as a reference design for a PR533 application using external LEDs or external EEPROM. It also allows the user to drive an external Contact Smart card reader TDA8029.

The interface with the host controller is USB 2.0 full speed.

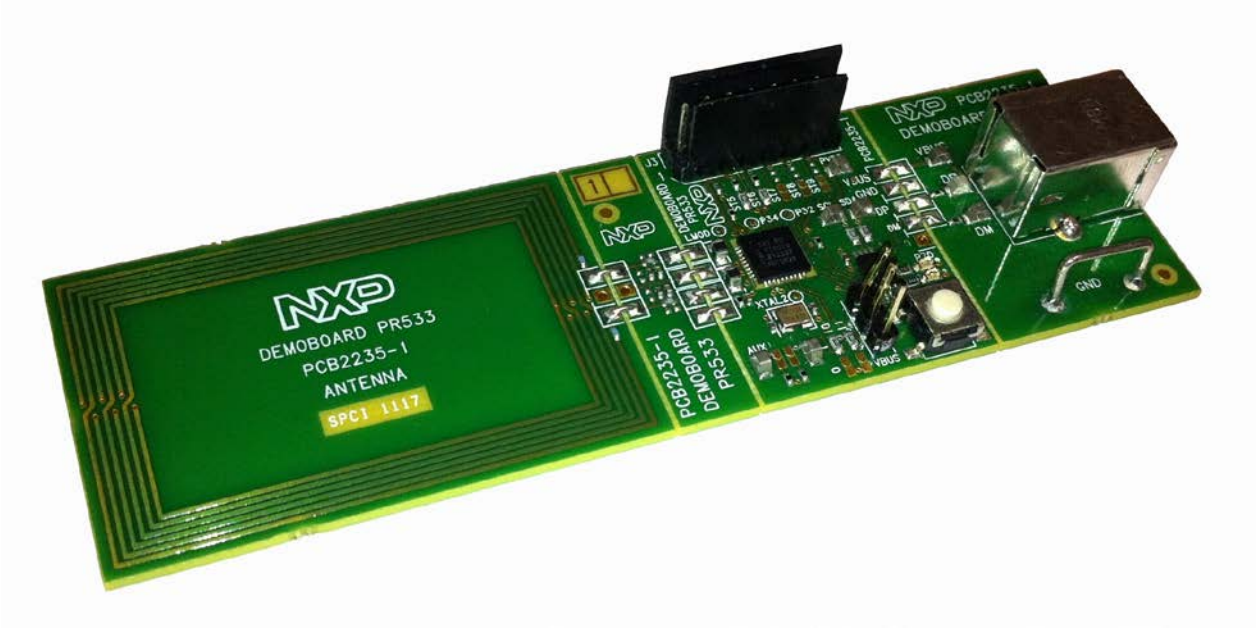

Fig 1. PR533 Evaluation board

2.1 Description

On the board, 4 parts are easily visible:

- The USB connector
- The IC part (containing PR533 IC, oscillator crystal, decoupling capacitors, EEPROM, LEDs, TDA connector, reset button…)
- The antenna matching components
- The antenna itself

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

The board uses a type B female USB connector to be connected to a PC. It can be connected using a standard USB cable: type A male to type B male.

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 simply has to be connected through USB interface to a PC with CCID driver embedded. This driver is available in most of the OS, so that the PR533 USB Stick should be recognized and installed automatically as soon as it is plugged. If it is not the case a simple OS update may resolve the issue.

The PR533 can be used as a PC/SC smart card reader as soon as it is plugged. Any PC/SC application can be used to test this evaluation kit.

A PC/SC application is supplied together with the PR533 Product Support Package, as well as its source code. Refer to the PR533 Product Support Package documentation to get and use it.

2.3 Electrical diagram

Next two figures show the board schematics:

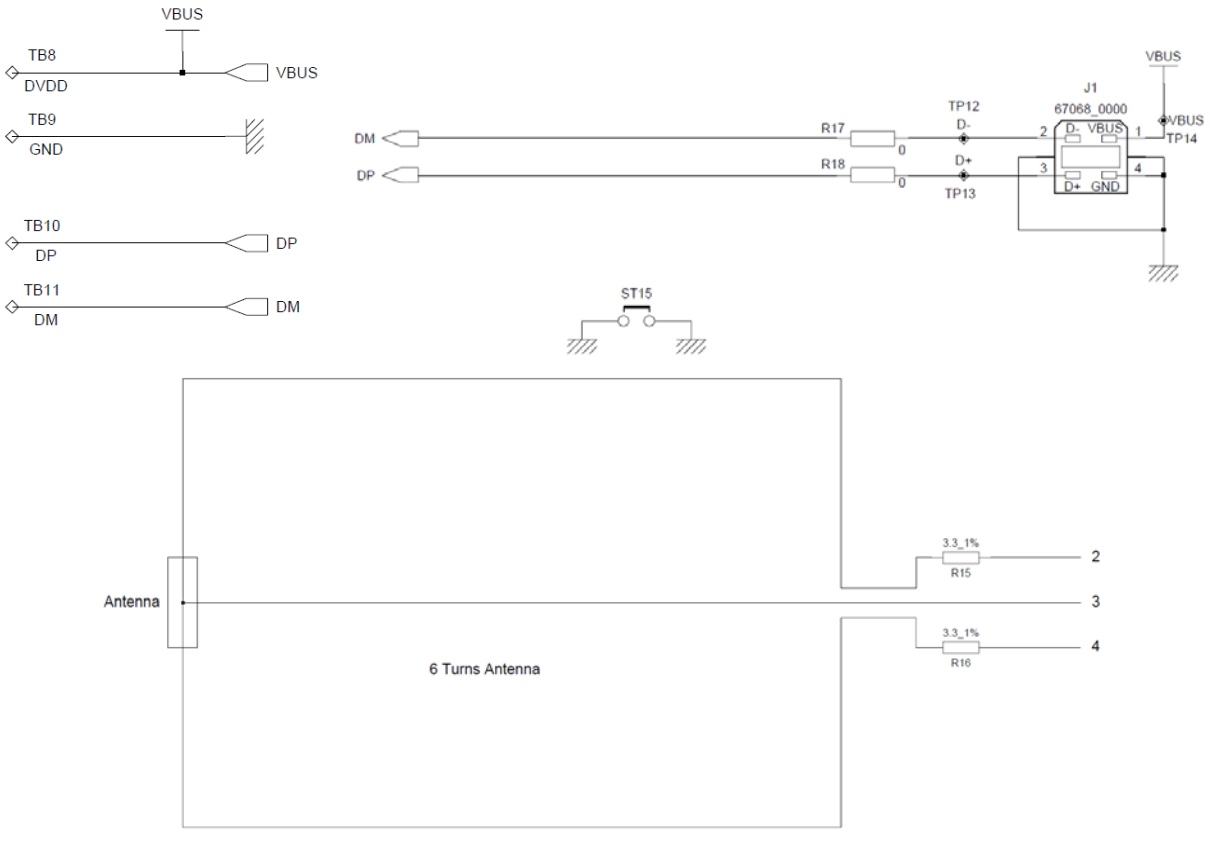

Fig 2. Schematic

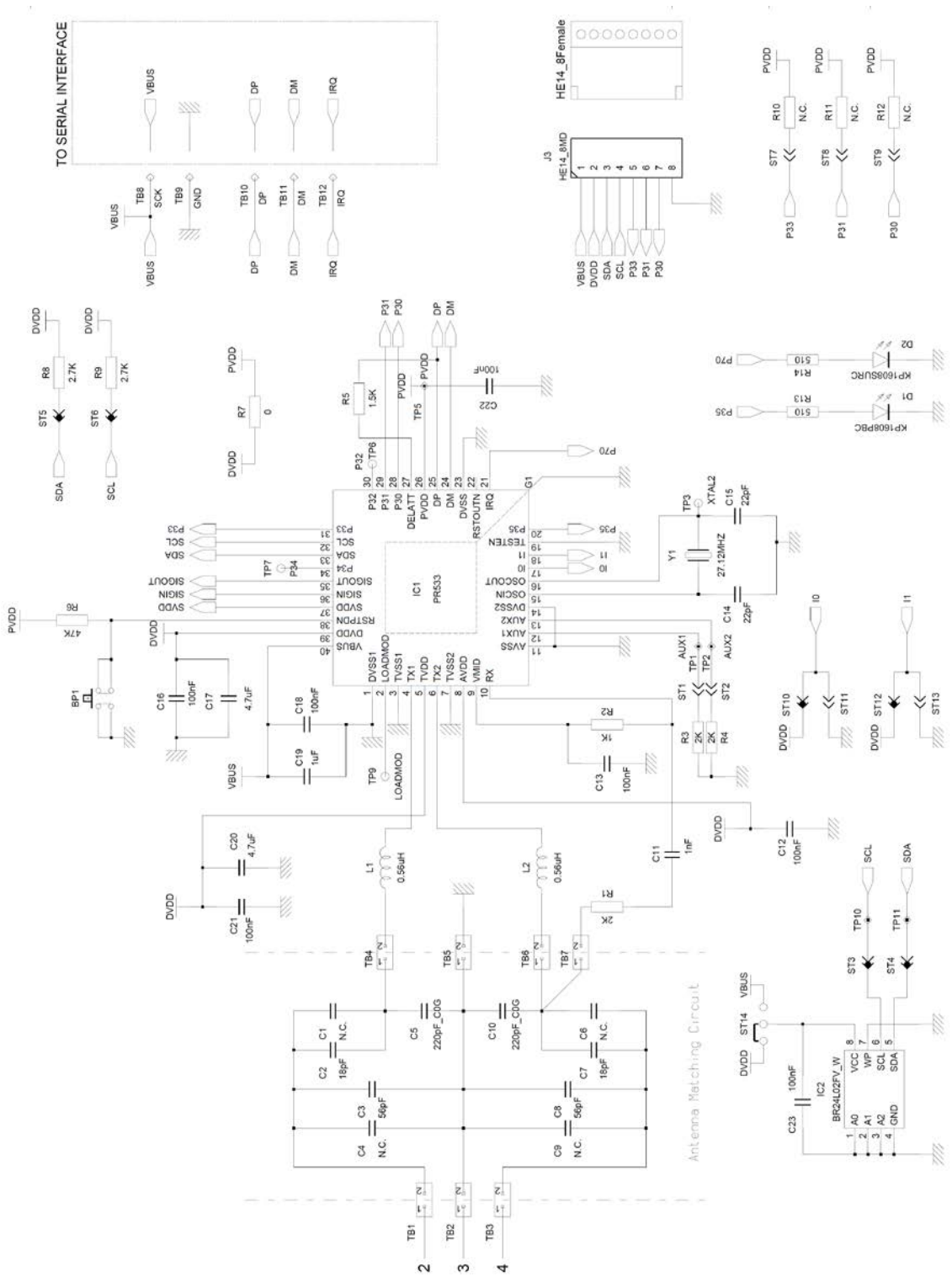

Fig 3. Schematic

2.4 Layout Top

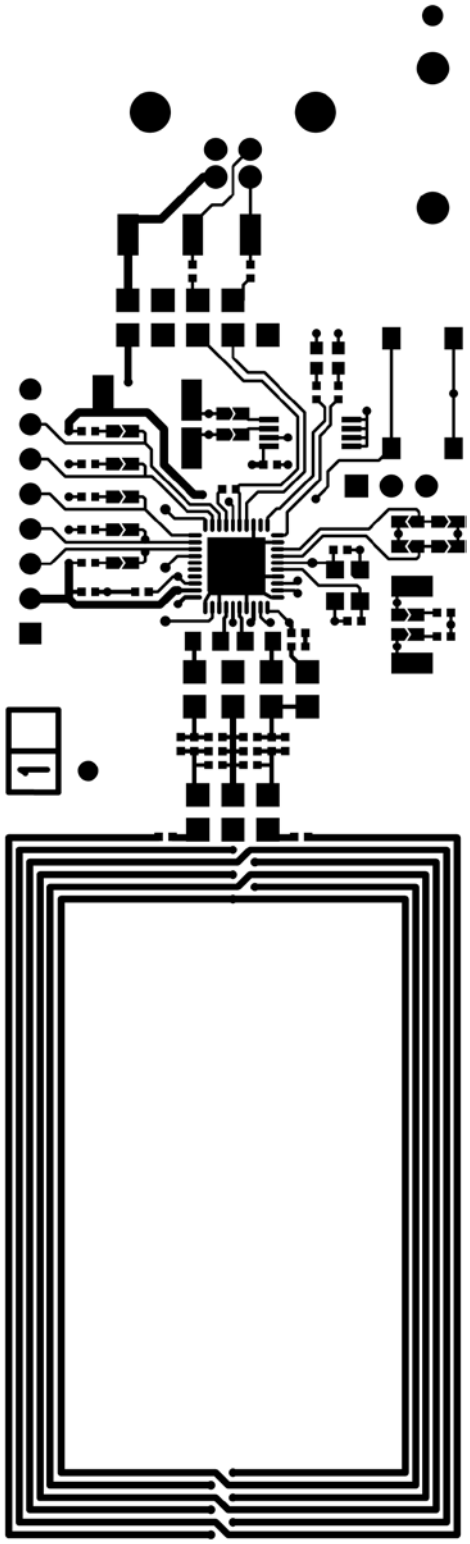

Fig 4. Layout Top

2.5 Layout Bottom

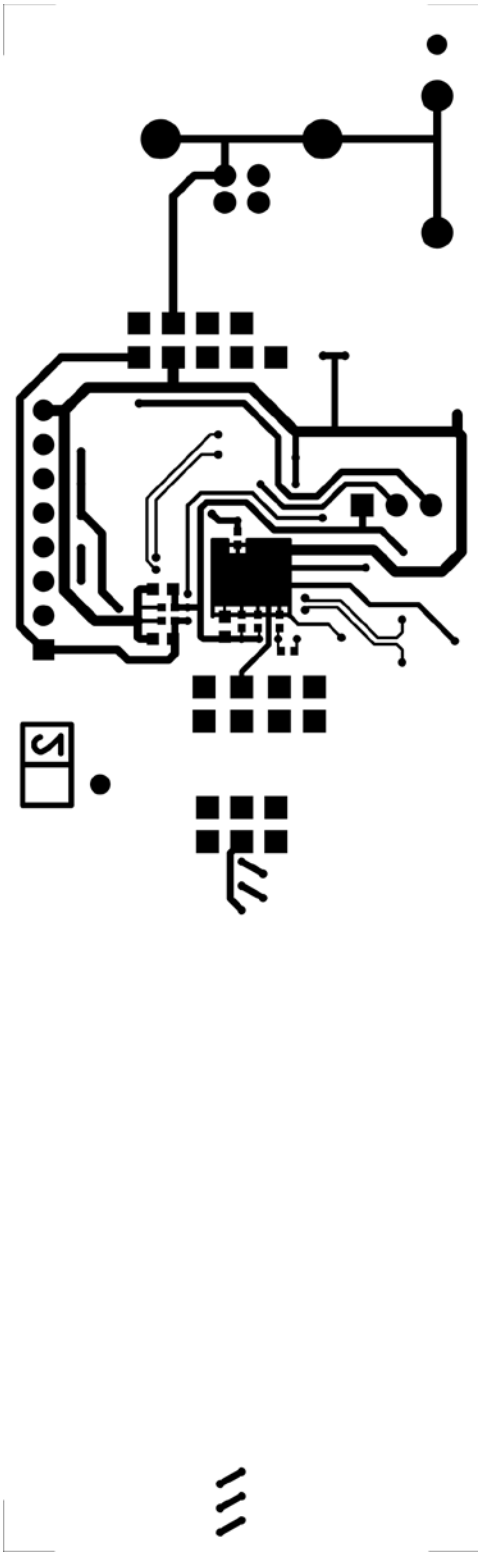

Fig 5. Layout Bottom

2.6 Components view

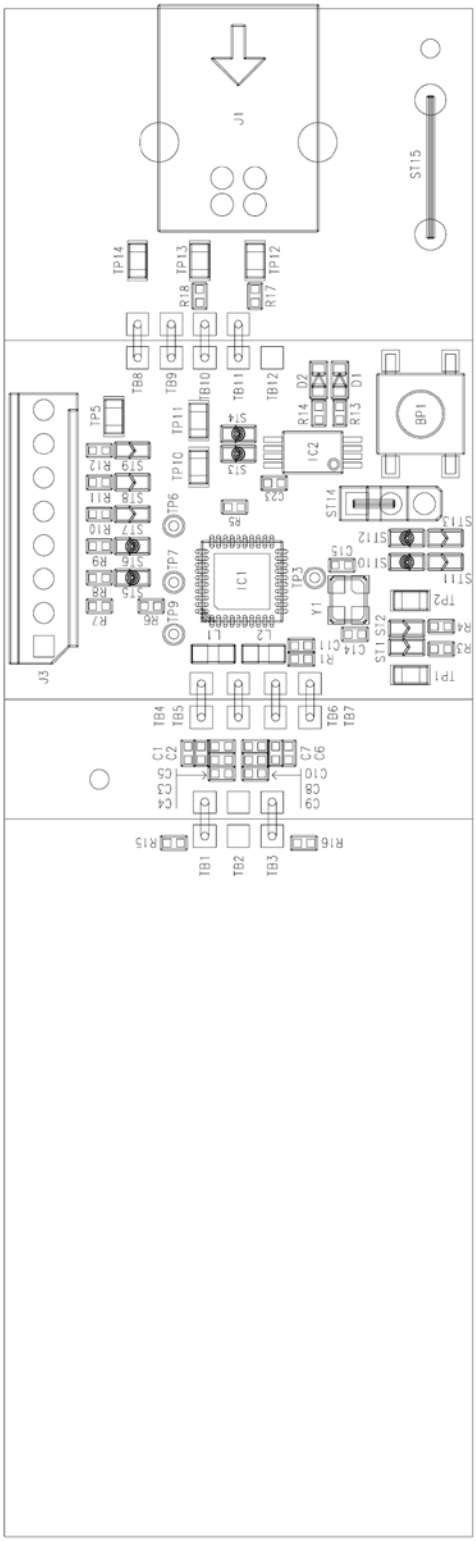

Fig 6. Components view top

2.7 Components view bottom

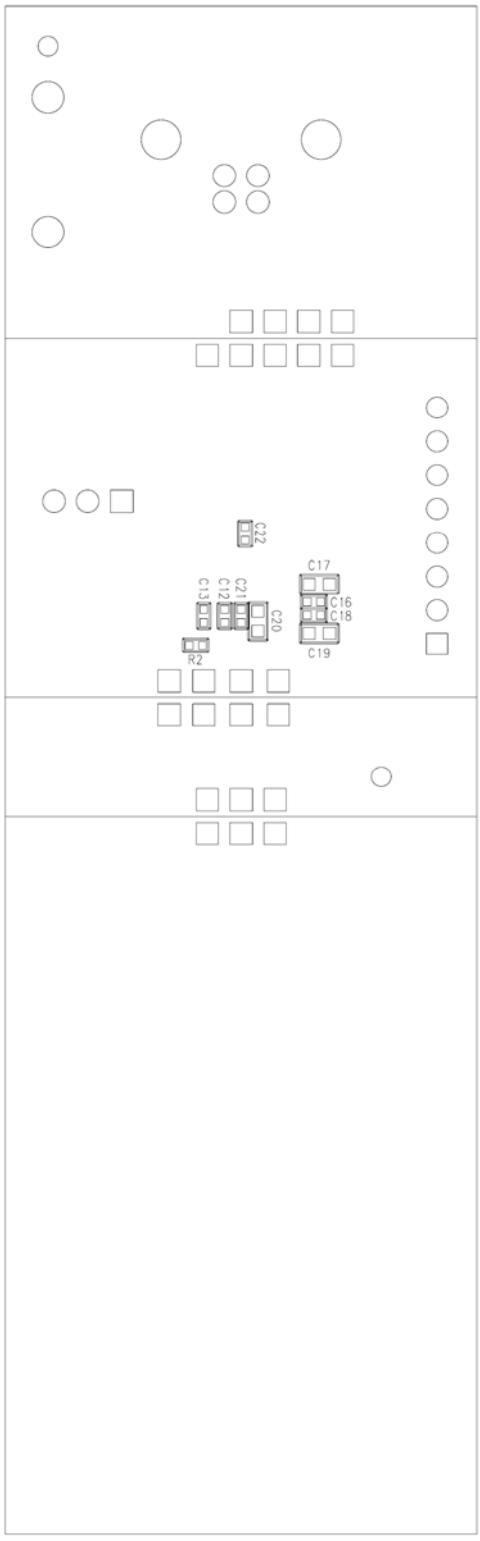

Fig 7. Components view bottom

2.8 Components list

REFERENCE	GEOMETRY	VALUE	DESCRIPTION
BP1	int_b3s	B3S_1000,	OMRON:Tact,Switch,6x6,SMT
C1	c0402	N.C.,	Capacitor,CER2,0402,***NOT,CONNECTED***
C2	c0402	18pF,	Capacitor,CER2,0402,C0G,50V,5%
C3	c0402	56pF,	Capacitor,CER2,0402,C0G,50V,5%
C4	c0402	N.C.,	Capacitor,CER2,0402,***NOT,CONNECTED***
C5	c0402	220pF_C0G,	Capacitor,CER2,0402,C0G,50V,GPR15_5C_1H_221
C6	c0402	N.C.,	Capacitor,CER2,0402,***NOT,CONNECTED***
C7	c0402	18pF,	Capacitor,CER2,0402,C0G,50V,5%
C8	c0402	56pF,	Capacitor,CER2,0402,C0G,50V,5%
C9	c0402	N.C.,	Capacitor,CER2,0402,***NOT,CONNECTED***
C10	c0402	220pF_C0G,	Capacitor,CER2,0402,C0G,50V,GPR15_5C_1H_221
C11	c0402	1nF,	Capacitor,CER2,0402,X7R,50V,10%
C12	c0402	100nF,	Capacitor,CER2,0402,Y5V,16V,-20+80%
C13	c0402	100nF,	Capacitor,CER2,0402,Y5V,16V,-20+80%
C14	c0402	22pF,	Capacitor,CER2,0402,C0G,50V,5%
C15	c0402	22pF,	Capacitor,CER2,0402,C0G,50V,5%
C16	c0402	100nF,	Capacitor,CER2,0402,Y5V,16V,-20+80%
C17	c0603	4.7uF,	Capacitor,CER2,0603,X5R,6.3V,10%
C18	c0402	100nF,	Capacitor,CER2,0402,Y5V,16V,-20+80%
C19	c0603	1uF,	Capacitor,CER2,0603,X5R,16V,10%
C20	c0603	4.7uF,	Capacitor,CER2,0603,X5R,6.3V,10%
C21	c0402	100nF,	Capacitor,CER2,0402,Y5V,16V,-20+80%
C22	c0402	100nF,	Capacitor,CER2,0402,Y5V,16V,-20+80%
C23	c0402	100nF,	Capacitor,CER2,0402,Y5V,16V,-20+80%
D1	led0603	KP1608PBC,	KINGBRIGHT:Blue,LED,0603,20mA
D2	led0603	KP1608SURC,	KINGBRIGHT:Red,LED,0603,20mA
IC1	sot618_1	PR533,	NXP:IC,Package:HVQFN40
IC2	sot530_1	BR24L02FV_W,	ROHM:I2C,Bus,EEPROM,256x8bits,1.8-5.5V,Package:SSOP-B8
J1	usb_b	67068_0000,	MOLEX:USB,Type,B,Right-Angle,Receptacle
J3	he14_1x8md	HE14_8MD,	KONTEK_COMATEL:47503341084401,HE14,Connector,1x8,Straight,Male
L1	self_mlf2012	0.56uH,	TDK:MLF2012DR56K,Chip,Inductor,SMD,0.15A,10%
L2	self_mlf2012	0.56uH,	TDK:MLF2012DR56K,Chip,Inductor,SMD,0.15A,10%
R1	r0402	2K,	Resistor,Package:0402,5%,1/16W
R2	r0402	1K,	Resistor,Package:0402,5%,1/16W
R3	r0402	2K,	Resistor,Package:0402,5%,1/16W
R4	r0402	2K,	Resistor,Package:0402,5%,1/16W
R5	r0402	1.5K,	Resistor,Package:0402,5%,1/16W
R6	r0402	47K,	Resistor,Package:0402,5%,1/16W
R7	r0402	0,	Resistor,Package:0402,5%,1/16W
R8	r0402	2.7K,	Resistor,Package:0402,5%,1/16W
R9	r0402	2.7K,	Resistor,Package:0402,5%,1/16W
R10	r0402	N.C.,	Resistor,Package:0402,***NOT,CONNECTED***
R11	r0402	N.C.,	Resistor,Package:0402,***NOT,CONNECTED***
R12	r0402	N.C.,	Resistor,Package:0402,***NOT,CONNECTED***
R13	r0402	510,	Resistor,Package:0402,5%,1/16W
R14	r0402	510,	Resistor,Package:0402,5%,1/16W
R15	r0402	3.3_1%,	Resistor,Package:0402,1%,1/16W
R16	r0402	3.3_1%,	Resistor,Package:0402,1%,1/16W
R17	r0402	0,	Resistor,Package:0402,5%,1/16W
R18	r0402	0,	Resistor,Package:0402,5%,1/16W
ST1	chev_0603	OPEN,	***OPEN,BY,DEFAULT***

```
ST2         chev_0603       OPEN,           ***OPEN,BY,DEFAULT***
ST3         chev_0603clos   CLOSED,
***TO,BE,CLOSED***with,Resistor,0603,0,ohm,or,Solder,Point
ST4         chev_0603clos   CLOSED,
***TO,BE,CLOSED***with,Resistor,0603,0,ohm,or,Solder,Point
ST5         chev_0603clos   CLOSED,
***TO,BE,CLOSED***with,Resistor,0603,0,ohm,or,Solder,Point
ST6         chev_0603clos   CLOSED,
***TO,BE,CLOSED***with,Resistor,0603,0,ohm,or,Solder,Point
ST7         chev_0603       OPEN,           ***OPEN,BY,DEFAULT***
ST8         chev_0603       OPEN,           ***OPEN,BY,DEFAULT***
ST9         chev_0603       OPEN,           ***OPEN,BY,DEFAULT***
ST10        chev_0603clos   CLOSED,
***TO,BE,CLOSED***with,Resistor,0603,0,ohm,or,Solder,Point
ST11        chev_0603       OPEN,           ***OPEN,BY,DEFAULT***
ST12        chev_0603clos   CLOSED,
***TO,BE,CLOSED***with,Resistor,0603,0,ohm,or,Solder,Point
ST13        chev_0603       OPEN,           ***OPEN,BY,DEFAULT***
ST14        cav_2p          CAV_2POS,
Header,Single,Row,Straight,3Pins,Pitch:2.54,h:7mm,with,blue,Jumper
ST15        cav1016_1p      D3082-B01,      HARWIN:Jumper,1mm,Pitch=10.16
TB1         cav2sp          CAVAL_2.54,     ANTELEC:CCM1D,Jumper,Pitch:2.54
TB2         cav2sp_nc       CAVAL_2.54,     Pattern,Single,Pitch:2.54
TB3         cav2sp          CAVAL_2.54,     ANTELEC:CCM1D,Jumper,Pitch:2.54
TB4         cav2sp          CAVAL_2.54,     ANTELEC:CCM1D,Jumper,Pitch:2.54
TB5         cav2sp          CAVAL_2.54,     ANTELEC:CCM1D,Jumper,Pitch:2.54
TB6         cav2sp          CAVAL_2.54,     ANTELEC:CCM1D,Jumper,Pitch:2.54
TB7         cav2sp          CAVAL_2.54,     ANTELEC:CCM1D,Jumper,Pitch:2.54
TB8         cav2sp          CAVAL_2.54,     ANTELEC:CCM1D,Jumper,Pitch:2.54
TB9         cav2sp          CAVAL_2.54,     ANTELEC:CCM1D,Jumper,Pitch:2.54
TB10        cav2sp          CAVAL_2.54,     ANTELEC:CCM1D,Jumper,Pitch:2.54
TB11        cav2sp          CAVAL_2.54,     ANTELEC:CCM1D,Jumper,Pitch:2.54
TB12        tpvia0.9        TPVIA0.9,       Hole,0.9
TP1         c12000b         C12000B,        NICOMATIC:testpoint,SMT
TP2         c12000b         C12000B,        NICOMATIC:testpoint,SMT
TP3         plage.75        PLAGE.75,       Footprint,Testpoint
TP5         c12000b         C12000B,        NICOMATIC:testpoint,SMT
TP6         plage.75        PLAGE.75,       Footprint,Testpoint
TP7         plage.75        PLAGE.75,       Footprint,Testpoint
TP9         plage.75        PLAGE.75,       Footprint,Testpoint
TP10        c12000b         C12000B,        NICOMATIC:testpoint,SMT
TP11        c12000b         C12000B,        NICOMATIC:testpoint,SMT
TP12        c12000b         C12000B,        NICOMATIC:testpoint,SMT
TP13        c12000b         C12000B,        NICOMATIC:testpoint,SMT
TP14        c12000b         C12000B,        NICOMATIC:testpoint,SMT
Y1          tas3225         27.12MHZ,       TOKYO-DENPA:TAS-3225A,Type,Quartz,Crystal,SMD
BUBBLE01:Printed_Circuit_Board_PCB2235-1
BUBBLE02:KONTEK_COMATEL:4782837108440_Female_HE14_Single_Row_8_pins
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Fig 8. Components list

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4. List of figures

5. Contents

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