RFID Reader for PORT

PCR2-TWN4

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1 Introduction

PCR2-TWN4 is the successor of PCR-TWN4 resp. PCR-TWN4-mini adapted to the next generation PORT design. The major difference is the arrangement of camera and RFID reader within the fancy RGB LED circle.

The target devices for PCR2-TWN4 are:

PORT1	PORT4	PORT5
		

1.1 Scope

The PCR2-TWN4 board implements the following main parts and functions:

- ,
- USB connector to PORT5
- Connector for NJR radar
- Fancy RGB LED circle: on-board and off-board (PCRI, RLEB)
- Interface to external ios:
  - Wiegand output
  - RS232 interfaces
  - RF beam radar interface
- hole for camera

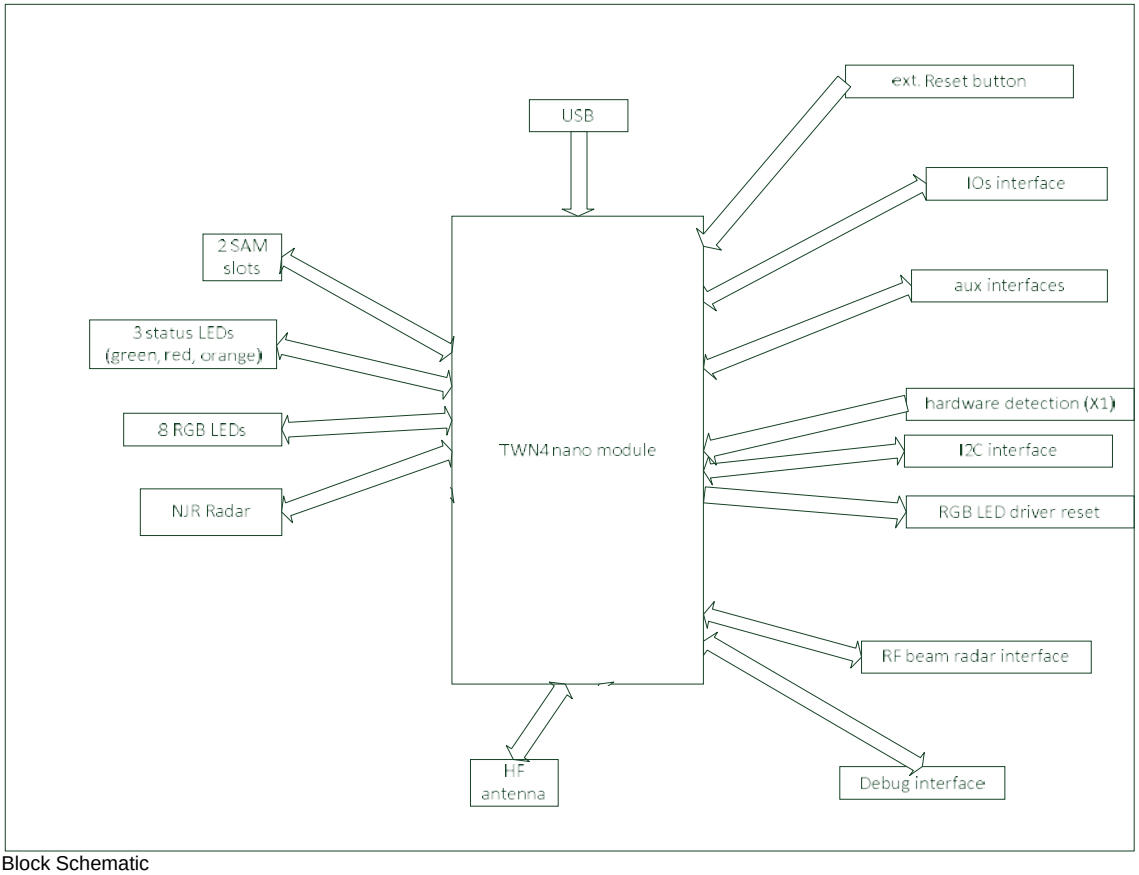
1.2 Compatibility

The PCR2-TWN4 is hardware compatible with the PCR2 PCB and software compatible with PCR-TWN4 resp. PCR-TWN4-mini.

1.3 References

REF[1]	PCRI2.Q + PCR2.Q + RLEB1.Q, technical description Q xx xxx xxx Ae 0
REF[2]	PCR-TWN4, Reader for PORT July 2 2015
REF[3]	PCR-TWN4-mini, Reader for PORT Feb 4 2016
REF[4]	data sheet TWN4 MultiTech Nano module www.elatec-rfid.com
REF[5]	blank board PCR2.Q, mechanical drawing Q xx xxx xxx Ae 0
REF[6]	PCRI2 camera support + support cap, mechanical drawing Z 419 06623 Ae 0

2 General board implementation



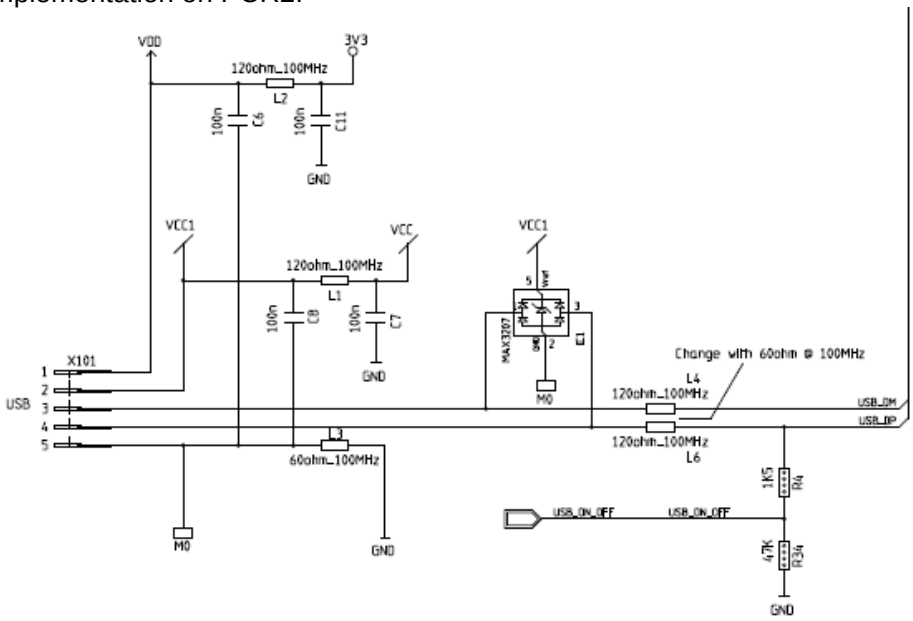
Block Schematic

2.1 USB

signals on connector USB according REF[1], chapter 3.3.2:
- VDD
- VCC1
- USB_DM
- USB_DP
- M0

power supply according REF[1], chapter 2.4

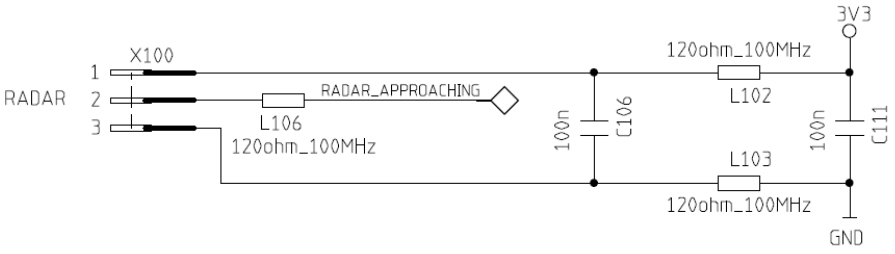
implementation on PCR2:



2.2 RADAR

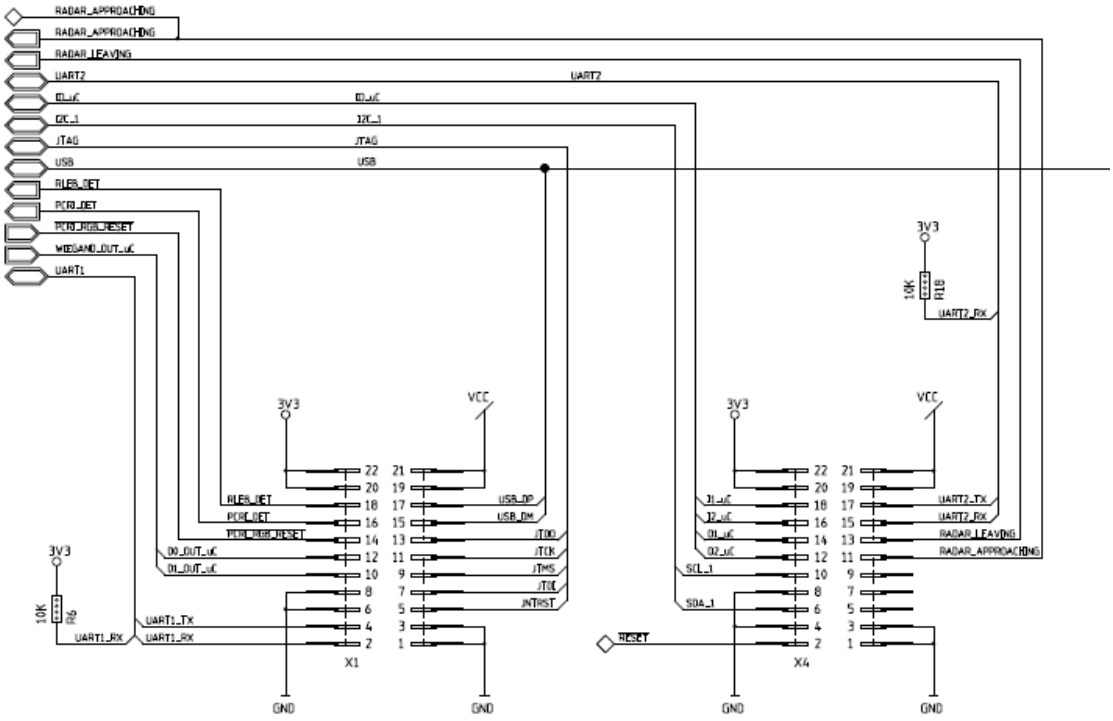
As a standard, NJR radar is connected. However, with an extension board (analog filter) it is also possible to connect a radar by RF Beam.

signals on connector RADAR according REF[1], chapter 3.4.2:
- 3V3
- RADAR_APPROACHING (NJR or RF Beam)
- GND



2.3 IO-Extension Connector X1 and X2

implementation on PCR:



2.3.1 X1 - USB

signals on connector X1 according REF[1], chapter 3.5.2.1:
- USB_DM
- USB_DP

2.3.2 X1/X2 - Power Supply

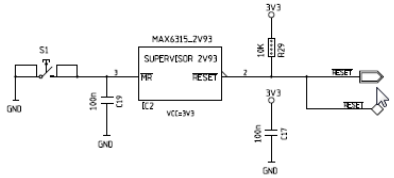
signals on connector X1 and X2 according REF[1], chapter 3.5.2.1 and 3.5.2.2:
- GND
- VCC
- 3V3

power supply according REF[1], chapter 2.4

2.3.3 X2 - Ext. reset button

signals according REF[1], chapter 3.5.2.2:
- RESET~

implementation on PCR (on-board reset button not required):

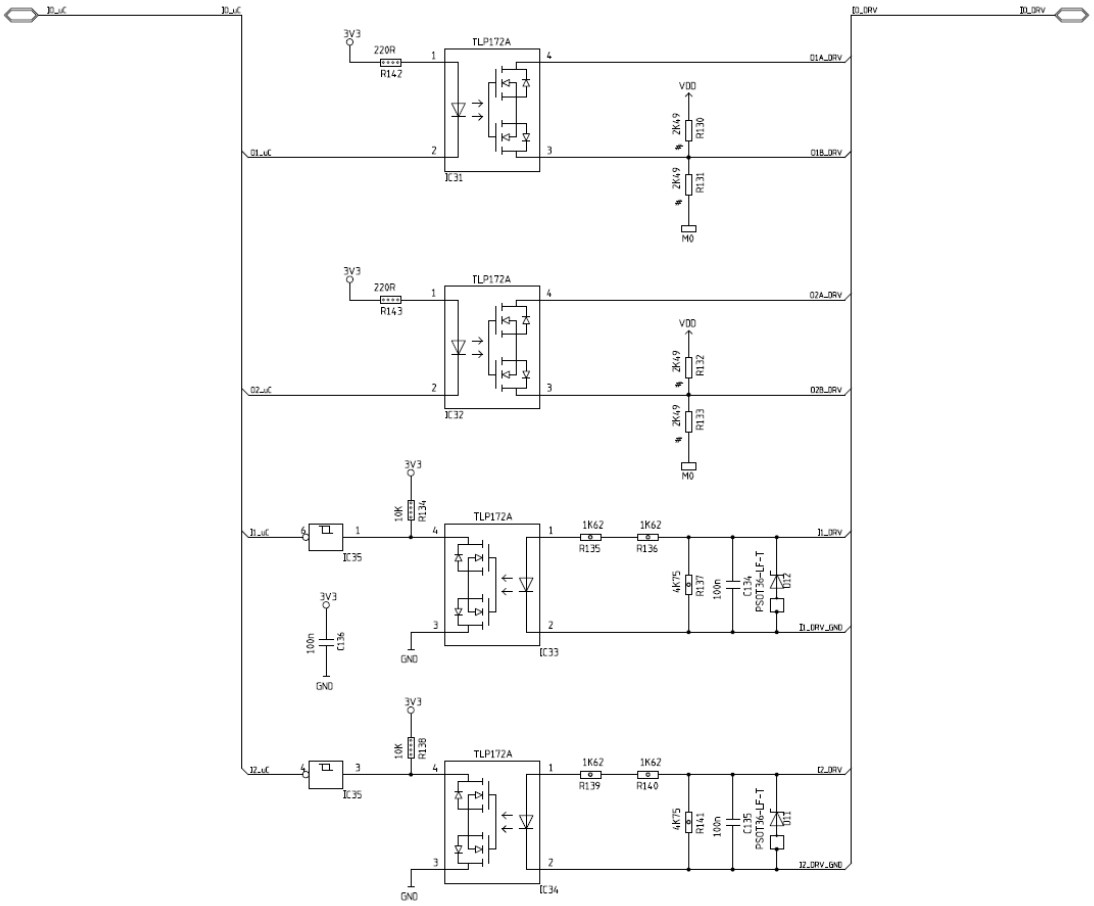


2.3.4 X2 - IOs

signals on connector X2 according REF[1], chapter 3.5.2.2:

- O2_uC
- O1_uC
- I2_uC
- I1_uC

external circuit on PCRI2:

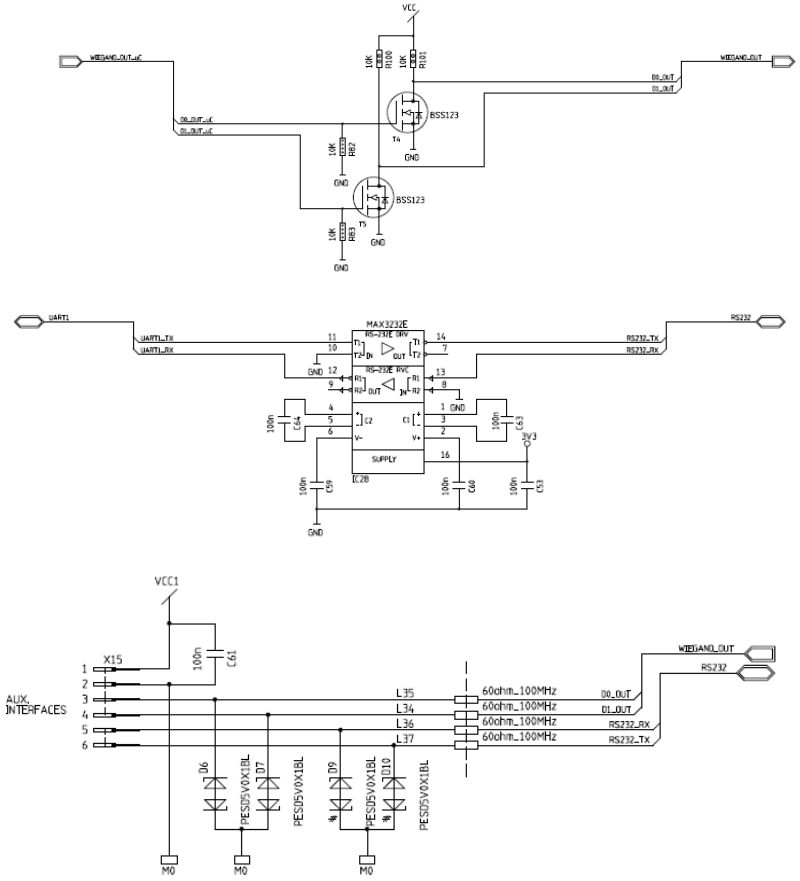


2.3.5 X1 - aux interfaces - wiegand output and UART

signals on connector X1 according REF[1], chapter 3.5.2.1:

- D1_OUT_uC
- D0_OUT_uC
- UART1_RX
- UART1_TX

external circuit on PCRI2:

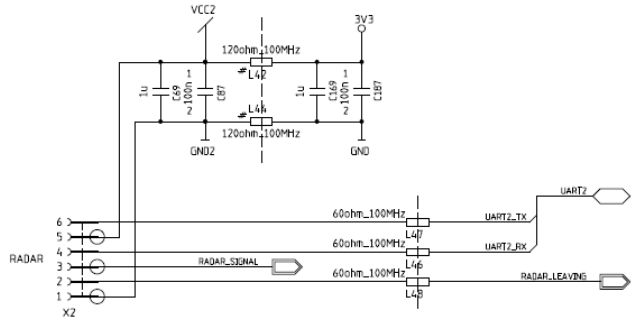


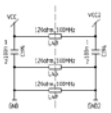
2.3.6 X2 - External radar

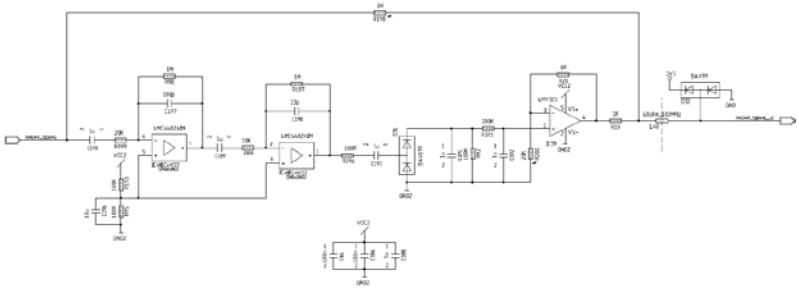
The RADAR interface designed for both: NJR and RF Beam. When NJR is used the UART can be used to set the sensitivity (however the default value on the NJR is supposed to be ok for our application).

signals on connector X2 according REF[1], chapter 3.5.2.2:
- RADAR_APPROACH (NJR and RF Beam)
- RADAR_LEAVING (NJR only)
- UART2_RX (NJR only)
- UART2_TX (NJR only)

Circuit on external PCRI board:







2.3.7 X1 - Hardware detection

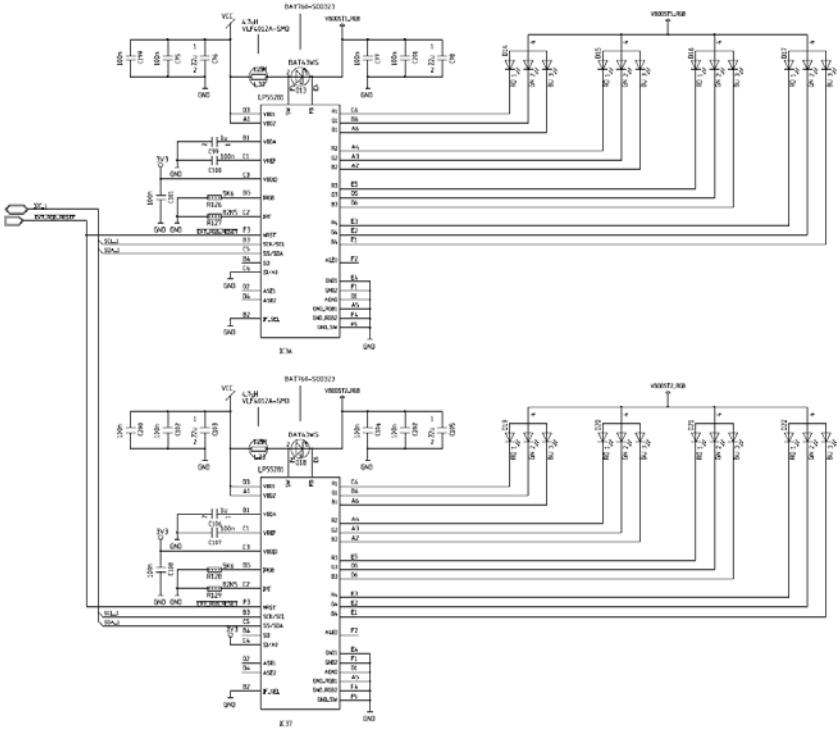
signals on connector X1 according REF[1], chapter 3.5.2.1:
- PCRI_DET
- RLEB_DET

hardware detection according REF[1], chapter 2.8

2.3.8 X2 - I2c serial interface

signals on connector X2 according REF[1], chapter 3.5.2.2:
- SDA_1
- SCL_1

external circuit on PCRI2:



2.3.9 X1 - LED driver reset output

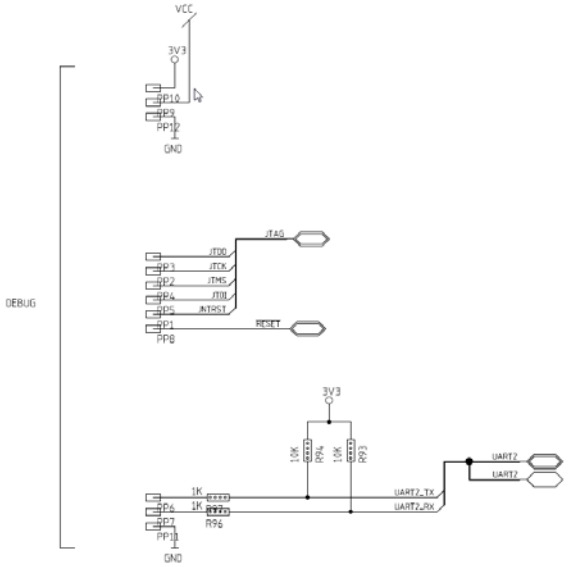
signal on connector X1 according REF[1], chapter 3.5.2.1:
- PCRI_RGB_RESET~

2.3.10 X1/X2 – Debug interface

signals on connector X1 according REF[1], chapter 3.5.2.1:
(to be used for Arm Cortex M0?)
- JTDO
- JTCK
- JTMS
- JTDI
- JNTRST
- RESET~

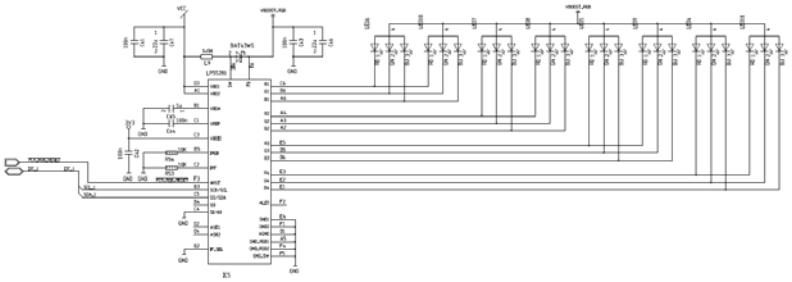
signals on connector X2 according REF[1], chapter 3.5.2.2:
- UART2_TX
- UART2_RX

External circuit on PCRI2:



2.4 on-boad RGB LEDs

implementation on PCR2:



The RGB LED controllers (internal and external) are coordinated by an additional Cortex M0 processor.

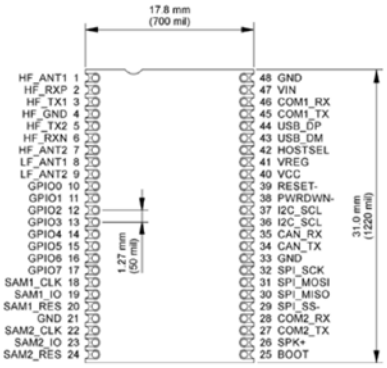
2.5 TWN4 module

TWN4-nano module is required to be used.

Default hardware option with Elatec's TWN4 MultiTech Nano module with PI taglist. PI taglist should always be activated independent if TWN4 SIO card (HID iClass) is present in SAM socket. See also REF[4]

Version C0
(SMT)

Version C1
(THT)



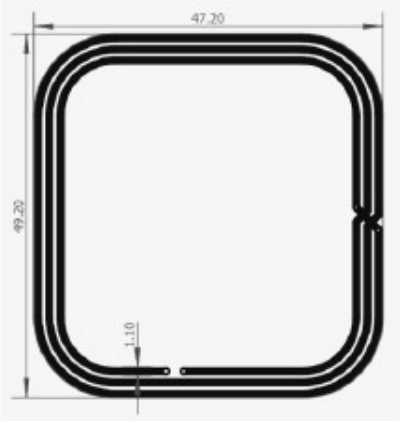
radio

The RF frontend handles the transceiver functionality for contactless communication with a transponder at a frequency of 13.56 MHz with ASK.

HF antenna

Housing with metal backplate of PORT1 and PORT4 device must be taken in account.
Reading distance of min 2 cm is requested.

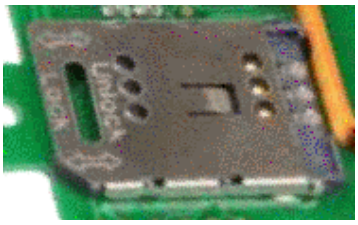
HF antenna integrated into the PCB with the following features:



3 Turns, L = 863 nH, trace thickness 35µm

2.7 SAM sockets

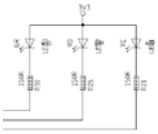
prepared for HID iClass SE Processor (socket 1), customized SAM (socket 2). Socket of HID iClass SE processor might be on the front side of the PCB.



Connector: see picture above
Silkscreen: SAM1 resp. SAM

2.8 Status leds

LEDs according REF[1], chapter 2.13.2

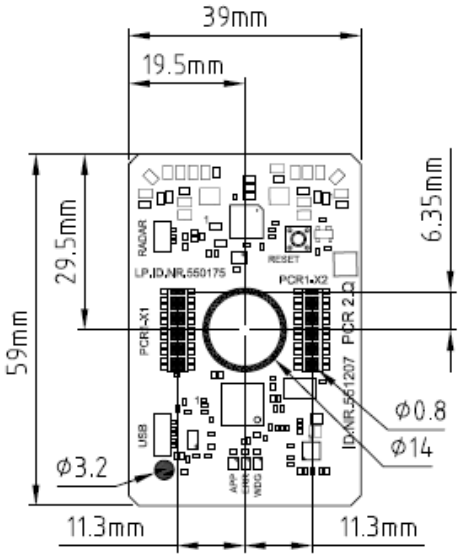


3 Mechanics

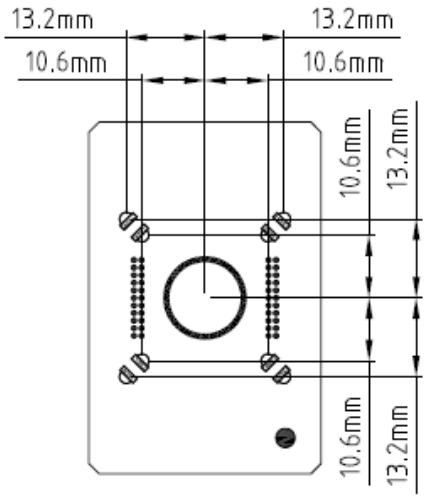
according REF[1], chapter 4

PCB size: 59 mm x 39 mm
PCB thickness: 1.0 mm

extraxt from REF[5]:



TOP SIDE



BOTTOM SIDE

Camera hole	positioning according mechanical drawing beware of camera support (REF[6])
X1 and X2 connector to PCRI or RLEB:	positioning according mechanical drawing
RGB LEDs	positioning according mechanical drawing
USB connector to PORT5 host	positioning free
RADAR connector to NJR radar	positioning free

4 Reliability

see REF[1], chapter 5

Certifications

The PCR2-TWN4 comply from 15.19 / 15.21 and RSS-Gen clause 8.4.

The PCR2-TWN4 complies with the following requirements:

- FCC (Federal Communications Commission) Part 15
- IC (Industry Canada) RSS-102

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference
2. This device must accept any interference received, including interference that may cause undesired operation

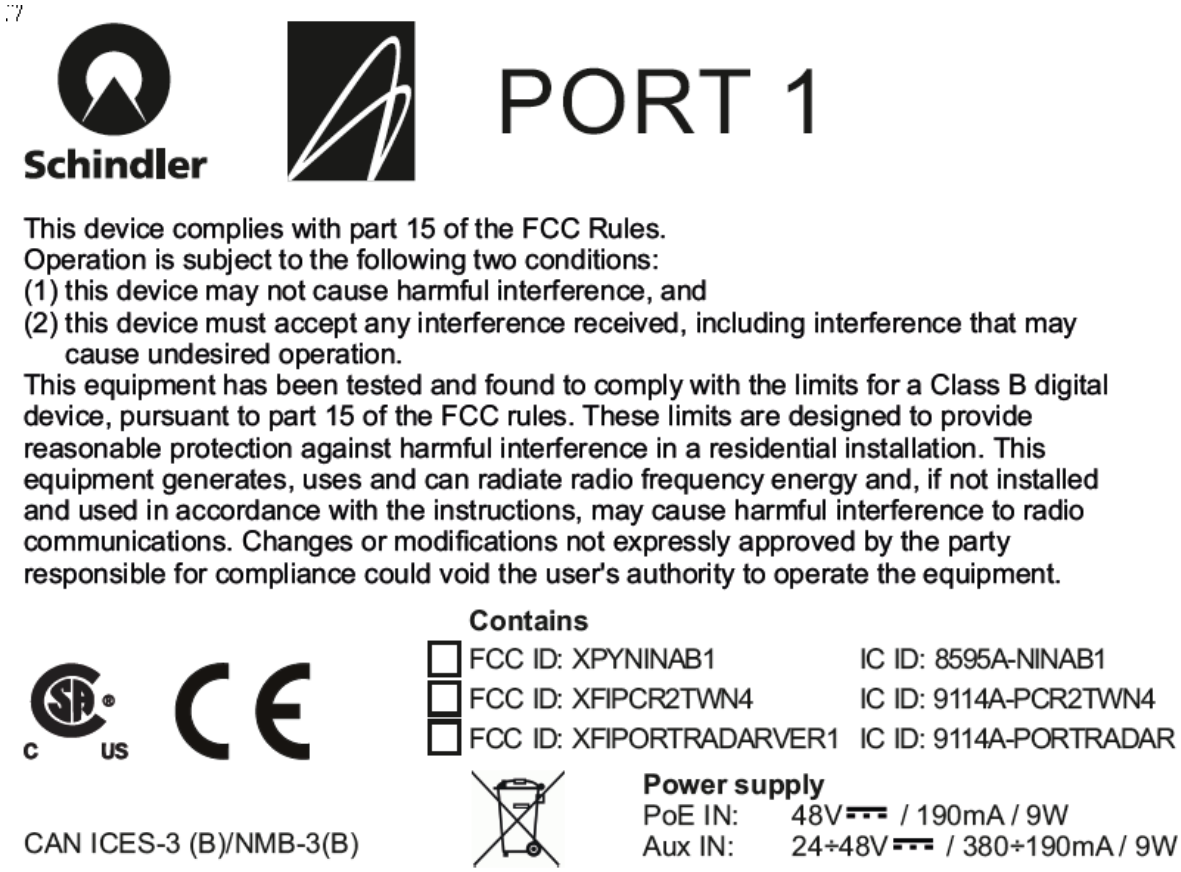
This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

- This device may not cause interference.
- This device must accept any interference, including interference that may cause undesired operation of the device

Changes or modification not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC ID: XFIPCR2TWN4
IC ID: 9114A-PCR2TWN4

Label example of the final product



5 Document History

2017 Mai 29	Scs	1st draft
2017 Juni 2	Scs	Adapted to feedback from A. Buetti
2018 Nov 16	Bua	Version 2 chapter *2. General Board Implementation*: - subchapter *radio introduced with description of modulation schemes* - subchapter *HF and LF antenna* introduced with description of physical antenna dimension chapter *4. Reliability* - subchapter *Certifications* introduced