

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 (PCR1, RLEB)
- Interface to externalios:
 - Wiegand output
 - RS232 interfaces
 - RF beam radar interface
- hole for camera

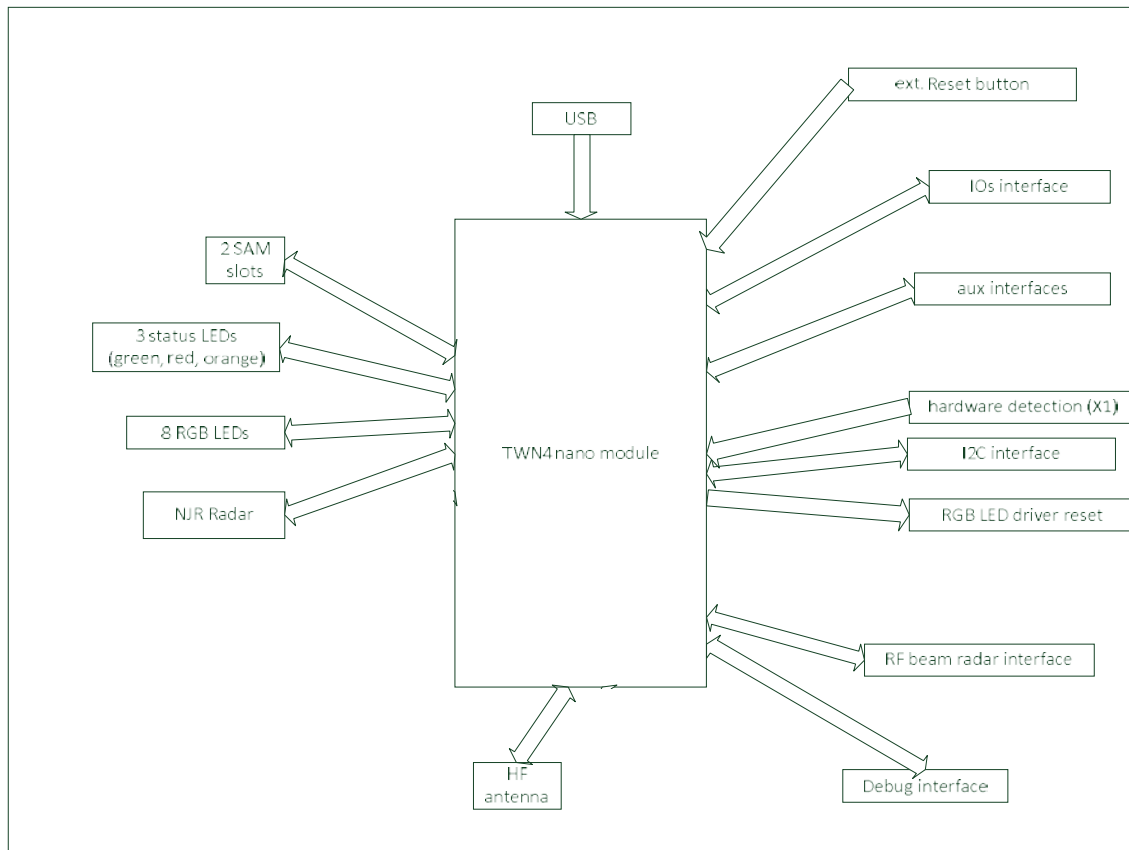
1.2 Compatibility

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] PCR12.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] PCR12 camera support + support cap, mechanical drawing
Z 419 06623 Ae 0

2 General board implementation



Block Schematic

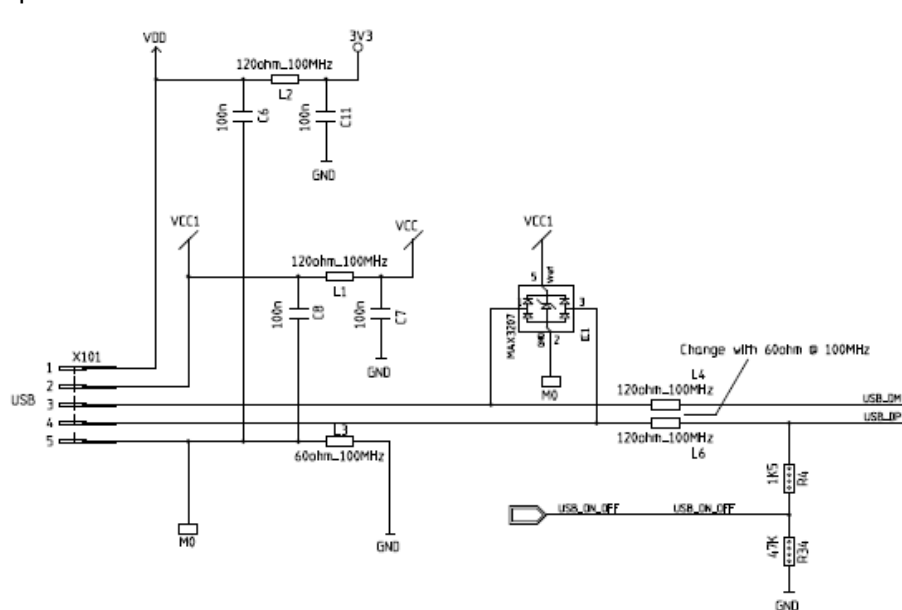
2.1 USB

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:

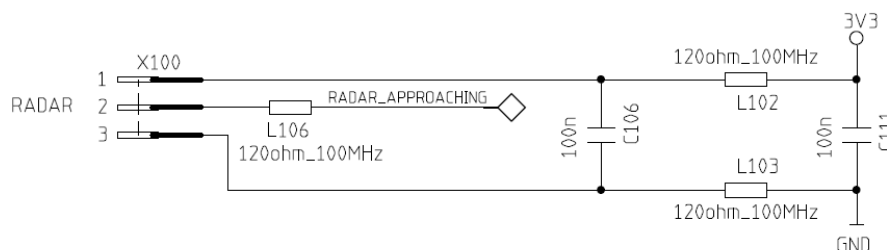


2.2 RADAR

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.

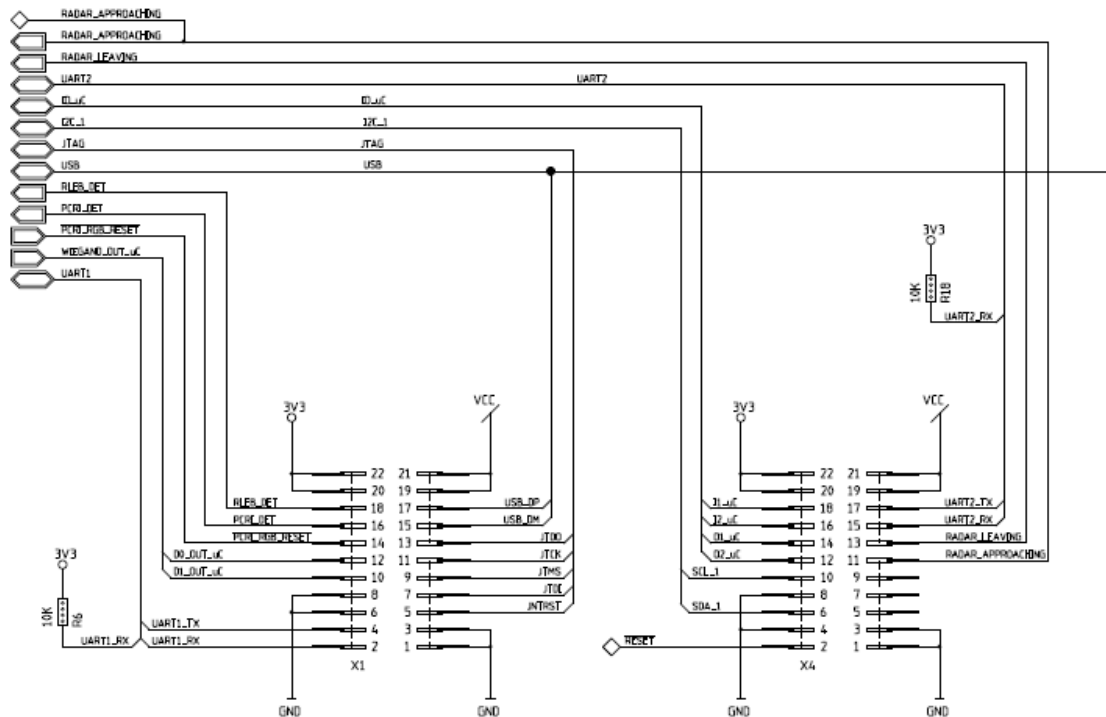
signals on connector RADAR according REF[1], chapter 3.4.2:

- 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

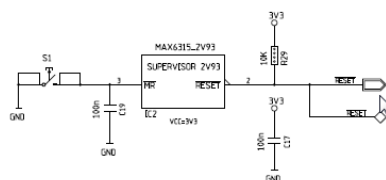
power supply according REF[1], chapter 2.4

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):

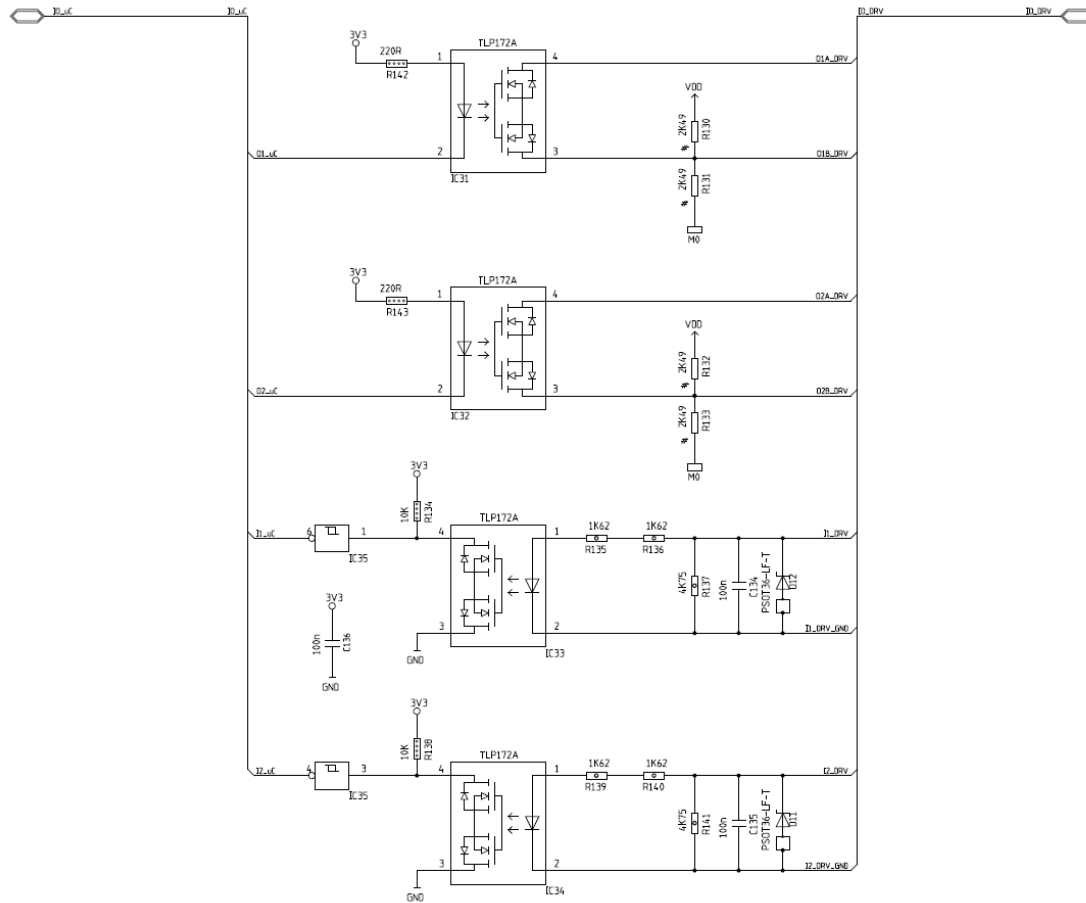


2.3.4 X2 - IOs

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

- O2_uC
- O1_uC
- I2_uC
- I1_uC

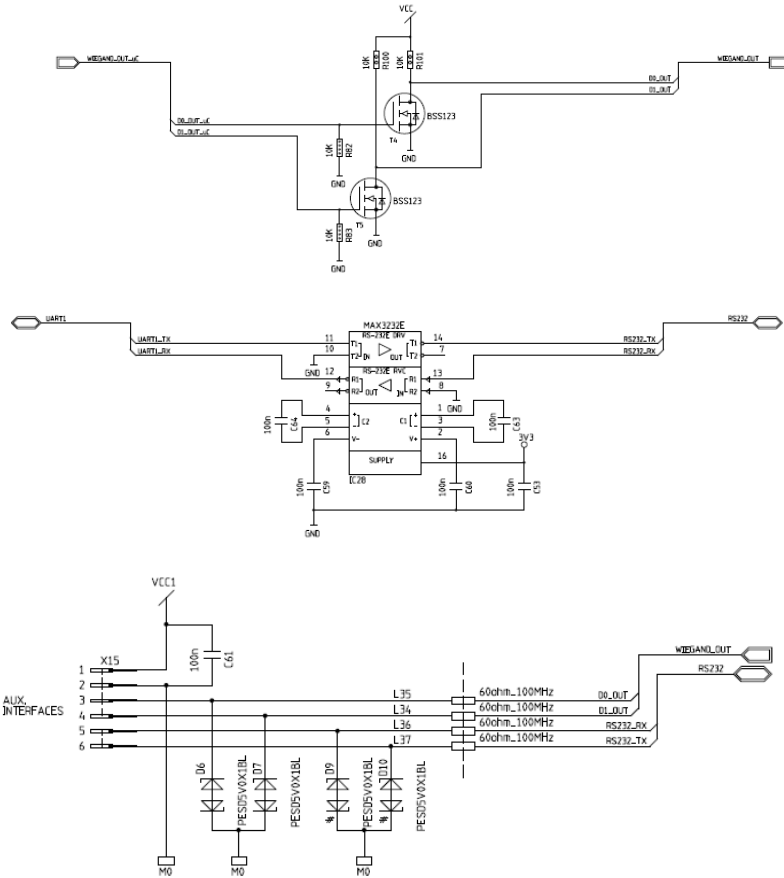
external circuit on PCRI2:



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:



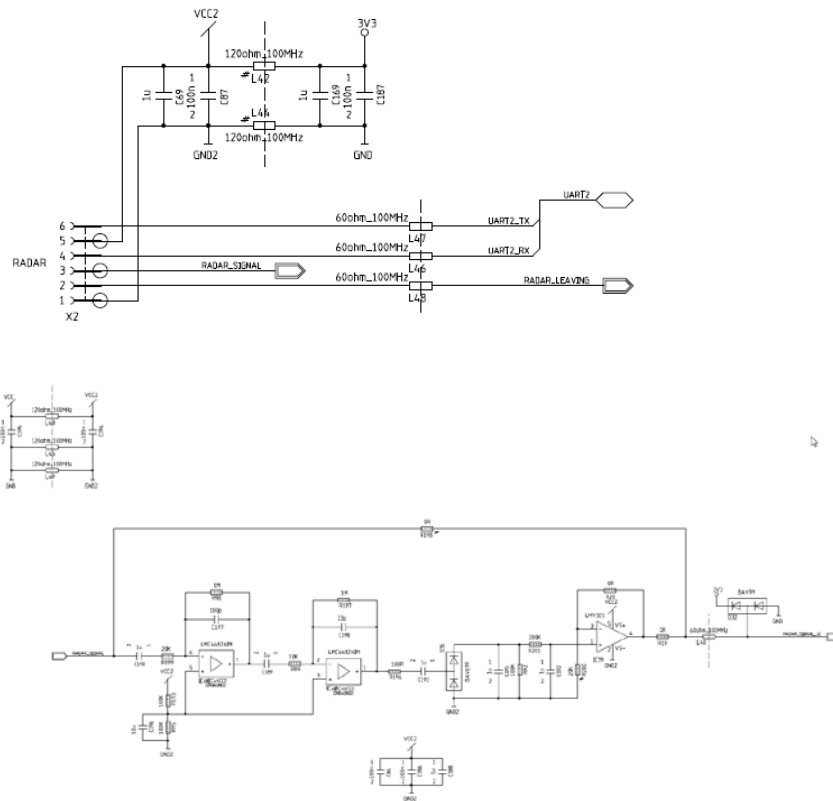
2.3.6 X2 - External radar

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:



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

- PCRI_DET
- RLEB_DET

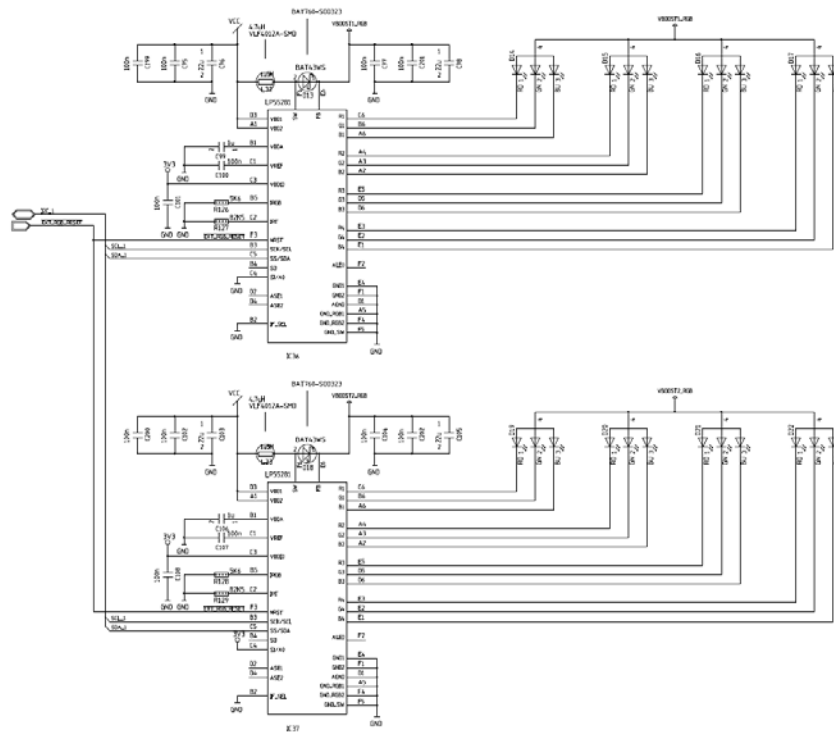
hardware detection according REF[1], chapter 2.8

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

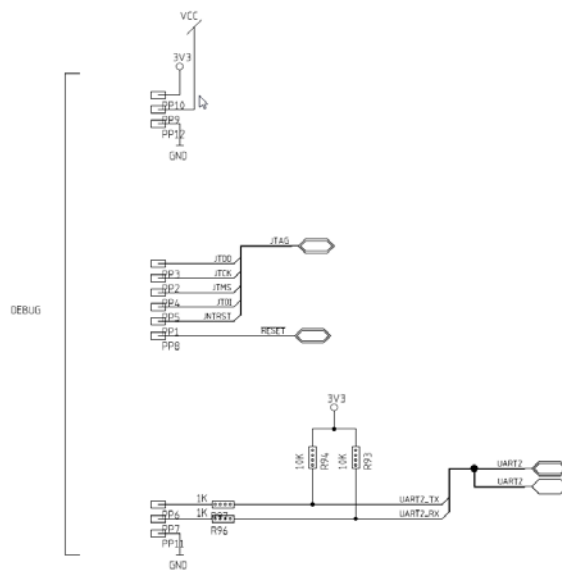
signals on connector X1 according REF[1], chapter 3.5.2.1:
(to be used for Arm Cortex M0?)

- JTDO
- JTCK
- JTMS
- JTDI
- JNTRST
- RESET~

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

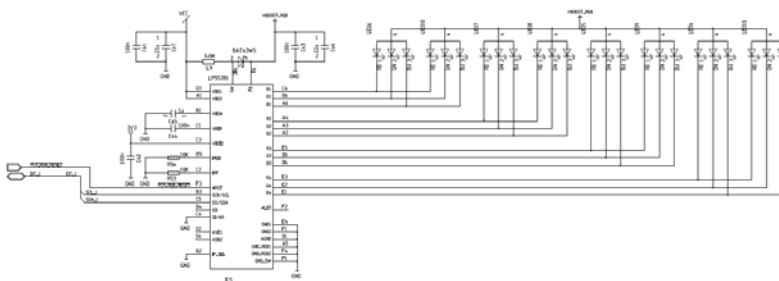
- UART2_TX
- UART2_RX

External circuit on PCR12:



2.4 on-board RGB LEDs

implementation on PCR2:

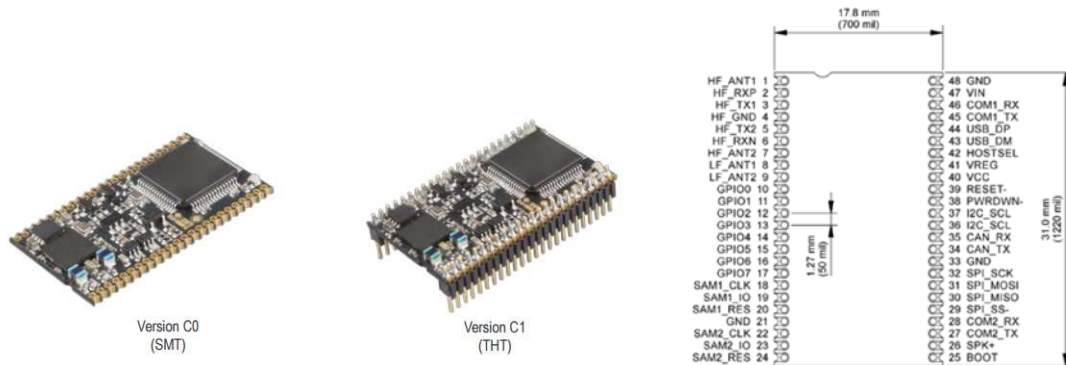


The RGB LED controllers (internal and external) are coordinated by an additional Cortex M0 processor.

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]



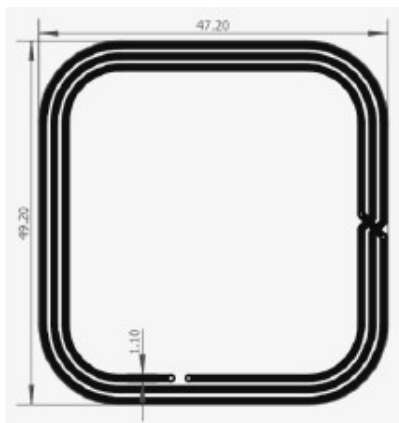
radio

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, $L = 863 \text{ nH}$, trace thickness $35 \mu\text{m}$

2.7 SAM sockets

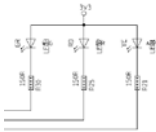
prepared for HID iClass SE Processor (socket 1), customized SAM (socket 2). Socket of HID iClass SE processor might be on the front side of the PCB.



Connector: see picture above
Silkscreen: SAM1 resp. SAM

2.8 Status leds

LEDs according REF[1], chapter 2.13.2

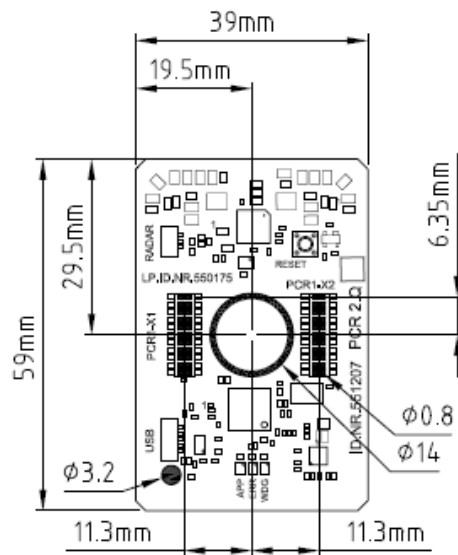


3 Mechanics

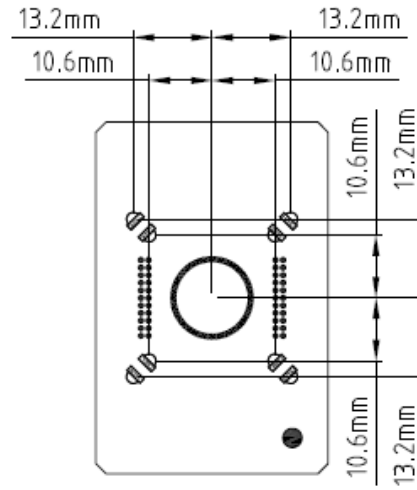
according REF[1], chapter 4

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

extraxt from REF[5]:



TOP SIDE



BOTTOM SIDE

Camera hole

X1 and X2 connector to PCRI or RLEB:

RGB LEDs

USB connector to PORT5 host

RADAR connector to NJR radar

positioning according mechanical drawing

beware of camera support (REF[6])

positioning according mechanical drawing

positioning according mechanical drawing

positioning free

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

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PORT 1

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, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.



CAN ICES-3 (B)/NMB-3(B)

Contains

- | | | |
|--------------------------|--------------------------|------------------------|
| ☐ | FCC ID: XPYNINAB1 | IC ID: 8595A-NINAB1 |
| ☐ | FCC ID: XFIPCR2TWN4 | IC ID: 9114A-PCR2TWN4 |
| ☐ | FCC ID: XFIPORTRADARVER1 | IC ID: 9114A-PORTRADAR |



Power supply

PoE IN: 48V / 190mA / 9W

Aux IN: 24÷48V / 380÷190mA / 9W

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. <i>General Board Implementation</i> : - subchapter <i>radio introduced with description of modulation schemes</i> - subchapter <i>HF and LF antenna</i> introduced with description of physical antenna dimension chapter 4. <i>Reliability</i> - subchapter <i>Certifications</i> introduced