RFID Reader for PORT

PCR-TWN4

Contents

1 Introduction

Currently PORT Technology by Schindler supports a wide range of readers (C0…C10). In order to reduce the variety of card readers, we would like to introduce the TWN4 reader.

The PCR-TWN4 is a LF Card Reader used in the PORT Technology devices (see table below). The HW is the same for both working frequencies and it is configured according the operation.

Type	Name				Card Type (transponder)[4]	Frequency
C10 [7]	Schindler PCR1				ISO 14443A: Mifare Classic, Mifare Desfire, Mifare Ultra Light, Jewel, Topaz, Infineon SLE55	13.56 MHz
C0 [1,6,7]	Schindler NFCUSB				ISO 14443A: Mifare Classic, Mifare Desfire, Mifare Ultra Light, Jewel, Topaz, Infineon	
C8 [6]	Baltech IDE				ISO HID	
	Baltech IDE with USB				ISO EM PIC I.C	
C1 [1]	Baltech Mifare SNET				ISO Mif Mif	
C2	Baltech Legic SNET				Legic: Prime.	
C3 [5]	HID R10				HID iCla	
C9	HID iClass SE				HID iCL	
					HID Pro ProxCar	
C4	Feig OBID Classic				Philips: Hitag 1, Hitag	
					EM Microelect EM4001, EM4 EM4102, EM4	
					Sokymat: Unique.	
C5 [5]	HID ProxPoint				HID Proximity ProxCard, IsoProx, DuoProx.	
C6 [5]	Honeywell NexWatch				Nexwatch: QuadraKey, NexKey, 2Smart Key, KeyMate. HID Proximity: ProxCard, IsoProx, DuoProx.	
C7 [2,5]	Indala Flexpass				Indala: FlexPass.	

option 1: TWN4 Mifare NFC

option 2: TWN4 Mifare NFC P(l)

option 3: TWN4 Legic NFC

The target devices for PCR-TWN4 are PORT1 and PORT4. Both devices have a metal housing that has an influence on the RFID readers.

PORT1	PORT4

Scope

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

    USB interface to host

    Radar interface (similar PCRI)
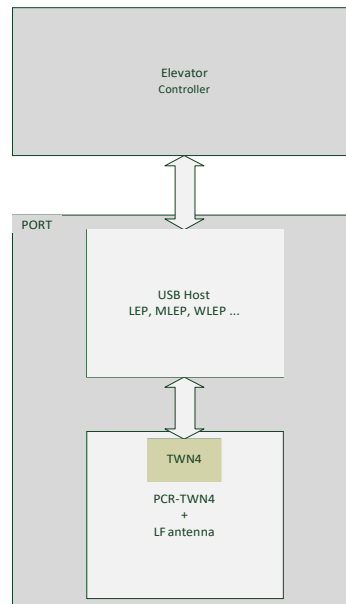
    I/O interface (similar PCRI):
- 2 inputs
- 2 outputs

    Wiegand Output (similar NFCUSB)

    4 x RGB LED's

Compatibility

The PCR-TWN4 is hardware compatible with PCRI resp.   NFCUSB.
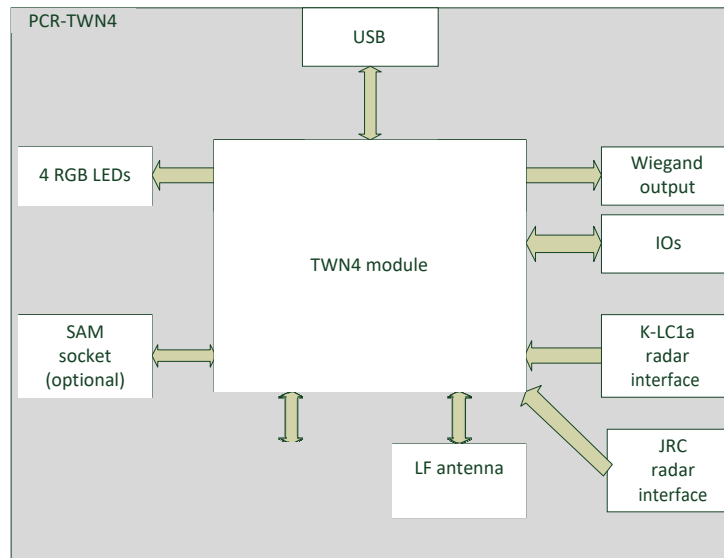

General overview

References

REF[1]   data sheet TWN4 reader module (www.elatec-rfid.com)
REF[2]   data sheet K-LC1a radar transceiver (www.rfbeam.ch)
REF[3]   data sheet JRC radar transceiver

2 General board implementation

Block schematic

```
PCR-TWN4
                          ┌──────────┐
                          │   USB    │
                          └──────────┘
                               ↕
┌──────────┐          ┌───────────────┐          ┌──────────────┐
│ 4 RGB LEDs│ ←────→  │               │  ←────→  │   Wiegand    │
└──────────┘          │               │          │   output     │
                      │               │          └──────────────┘
                      │               │          ┌──────────────┐
                      │  TWN4 module  │  ←────→  │     IOs      │
                      │               │          └──────────────┘
┌──────────┐          │               │          ┌──────────────┐
│   SAM    │ ←────→  │               │  ←────→  │   K-LC1a     │
│  socket  │          │               │          │    radar     │
│(optional)│          │               │          │  interface   │
└──────────┘          └───────────────┘          └──────────────┘
                        ↕           ↕                ┌──────────────┐
                  ┌──────────┐                 ↖── │     JRC      │
                  │LF antenna│                      │    radar     │
                  └──────────┘                      │  interface   │
                                                    └──────────────┘
```

The PCR-TWN4 is composed of a main module (TWN4) that communicates through USB with a Host (main board inside the PORT Terminal).

The TWN4 module is able to manage a variety of interfaces (RGB LEDs, IOs, proximity detection, status LEDs, …) and in the same time is also able to manage the reading of cards/tags through the HF and/or LF antenna.

All the activities on the PCR-TWN4 are managed from the host processor inside the PORT Terminal.

Functionality

The main function of the PCR-TWN4 board is a RFID reader to be integrated into Schindler's PORT1 and PORT4 devices. The communication between the PCR-TWN4 and the host is made through the USB.

USB and Power supply

The main board power supply is **U = 5 V_{DC} ± 5% Imax = 500 mA** from the Host. The USB communication is 2.0 Full-Speed (12Mbps). USB from the host is connected to the TWN4 board.

Connector: SMD 4 poles JST male conn., right angle, 2 mm, Id. Nr. 432841
Silkscreen: USB

pin	signal name	max. voltage	Tol.	max. current	description
1	VCC1	5 VDC	±5%	500 mA	power
2	USB_DM	5 VDC	±5%	50 mA	USB data
3	USB_DP	5 VDC	±5%	50 mA	
4	M0	0 VDC	-	-	ground

TWN4 module

As a default the Mifare NFC Standard module should be applied.

The main function of the TWN4 module is simply to manage the RF part of the PCR-TWN4. At the end is the interface between the RF part and the digital part.
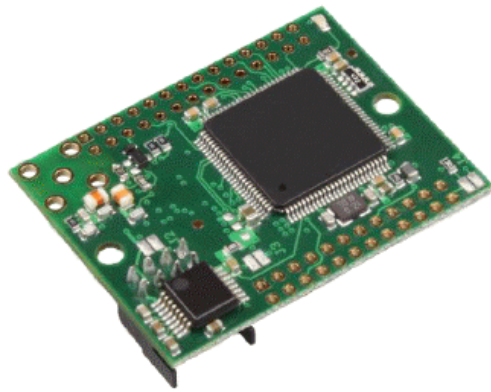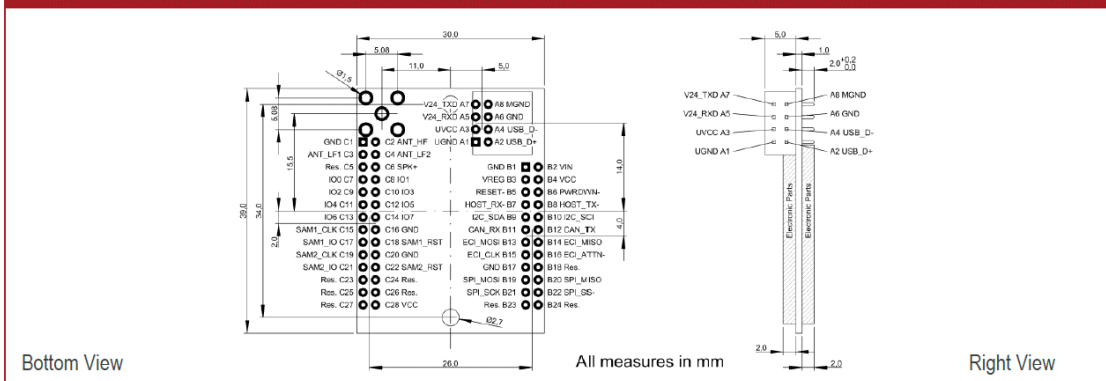

Bottom View

Top View

Drawing/Pin Out

Bottom View

All measures in mm

Right View
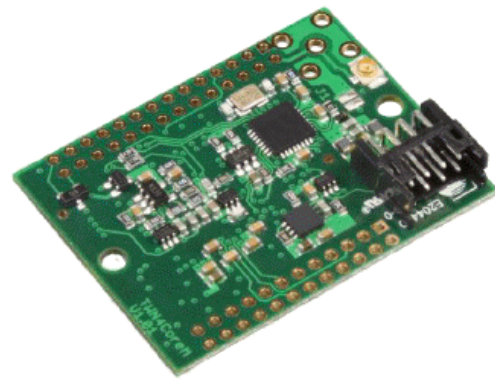
See also REF[1]

radio

The RF frontend handles the transceiver functionality for contactless communication with a transponder at a frequency of 125 kHz with ASK, FSK or PSK.

LF antenna

Housing of PORT devices must be taken into account. Reading distance of min. 2 cm is requested, measured from the top of the housing.

LF antenna implemented as an additional air coil and with the following   features:
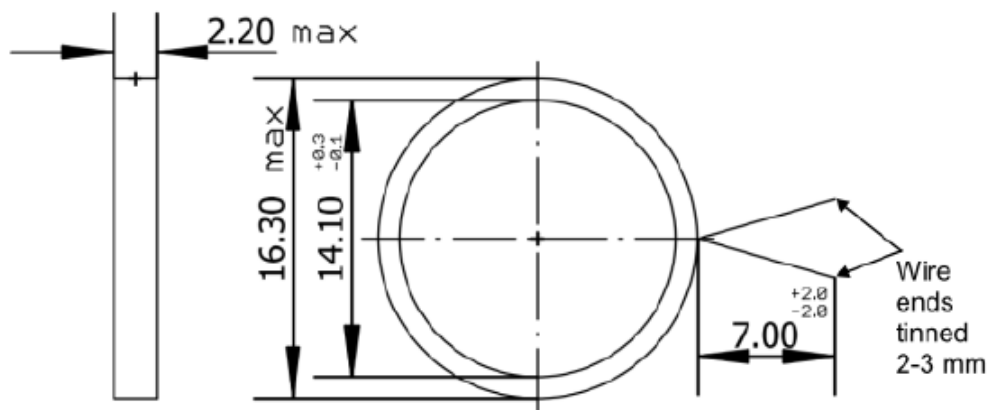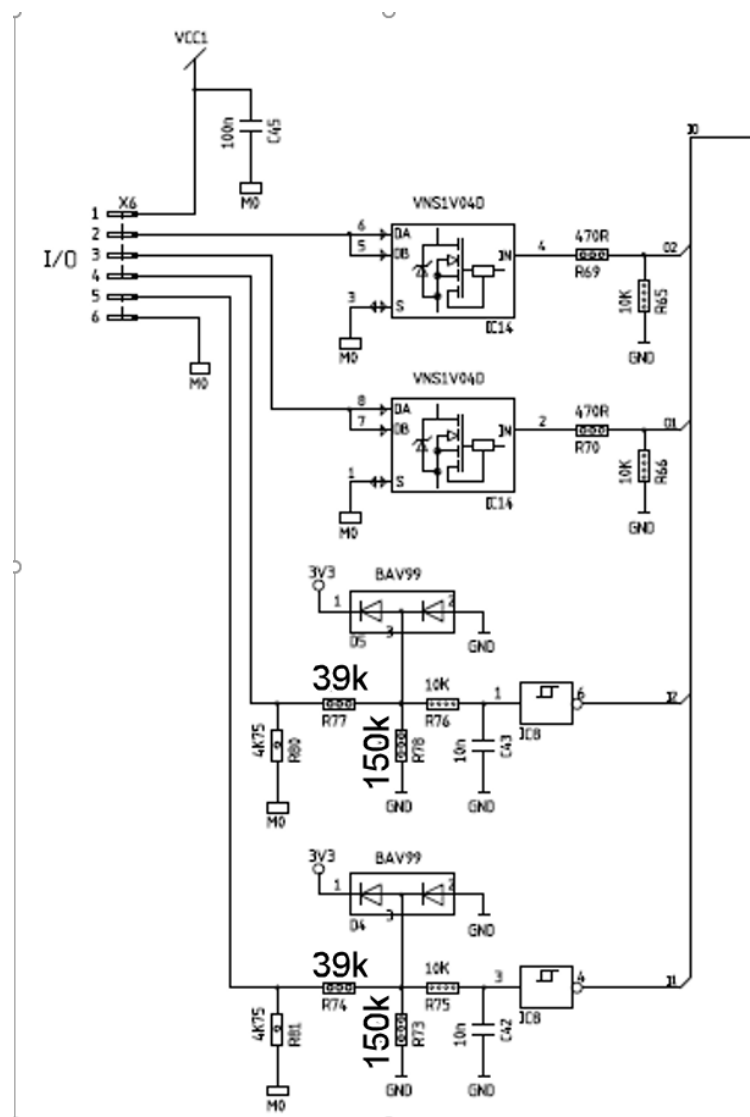

- Inductance: 490µH ± 5%
- Diameter of wire: 0.10 mm

Input/Output

Connector: SMD 6 poles JST male conn., right angle, 2 mm, Id. Nr. 208193
Silkscreen: I/O

pin	signal name	max. voltage	Tol.	max. current	description
1	VCC1	5 VDC	±5%	50 mA	power
2	OUT1	-	-	1 A	open drain output
3	OUT2	-	-	1 A	
4	IN1	24 VDC	±20%		input
5	IN2	24 VDC	±20%		
6	M0	0 VDC	-	-	ground

Wiegand output

Connector: SMD 3 poles JST male conn., right angle, 2 mm, Id. Nr. 59902178
Silkscreen: W_OUT

pin	signal name	max. voltage	Tol.	max. current	description
1	DATA1	12 V		20 mA	Wiegand Data 1
2	DATA0	12 V		20 mA	Wiegand Data 0
3	GND	-	-	-	
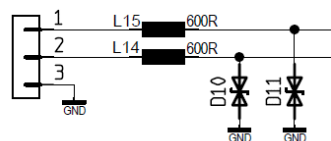
K-LC1A radar interface

Connector: SMD 2x3 poles pass through conn., low profile, 2.54 mm, Id. Nr. 208176
Silkscreen: RADAR

| pin	signal name	max. voltage	Tol.	max. current	description
1	GND	0 VDC	-	-	ground
2	nc	-	-	-	
3	RADAR_SIG	-	-	-	Signal direct from the radar see REF [1]
4	nc	-	-		
5	VCC	5 VDC	±5%	50 mA	power
6	nc	-	-	-	

sample cicuit below:
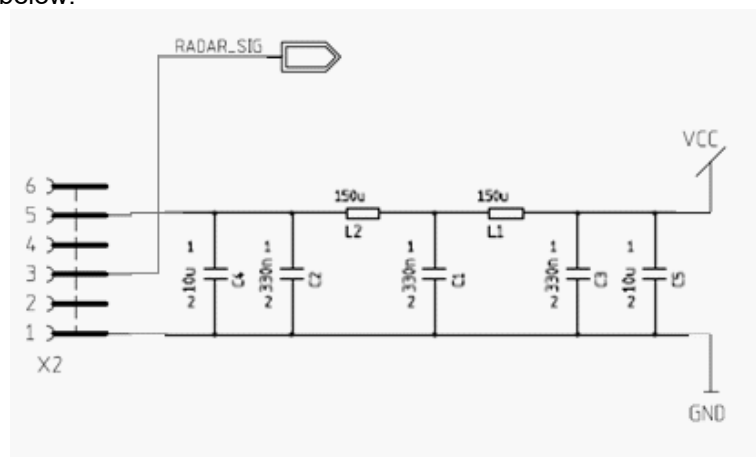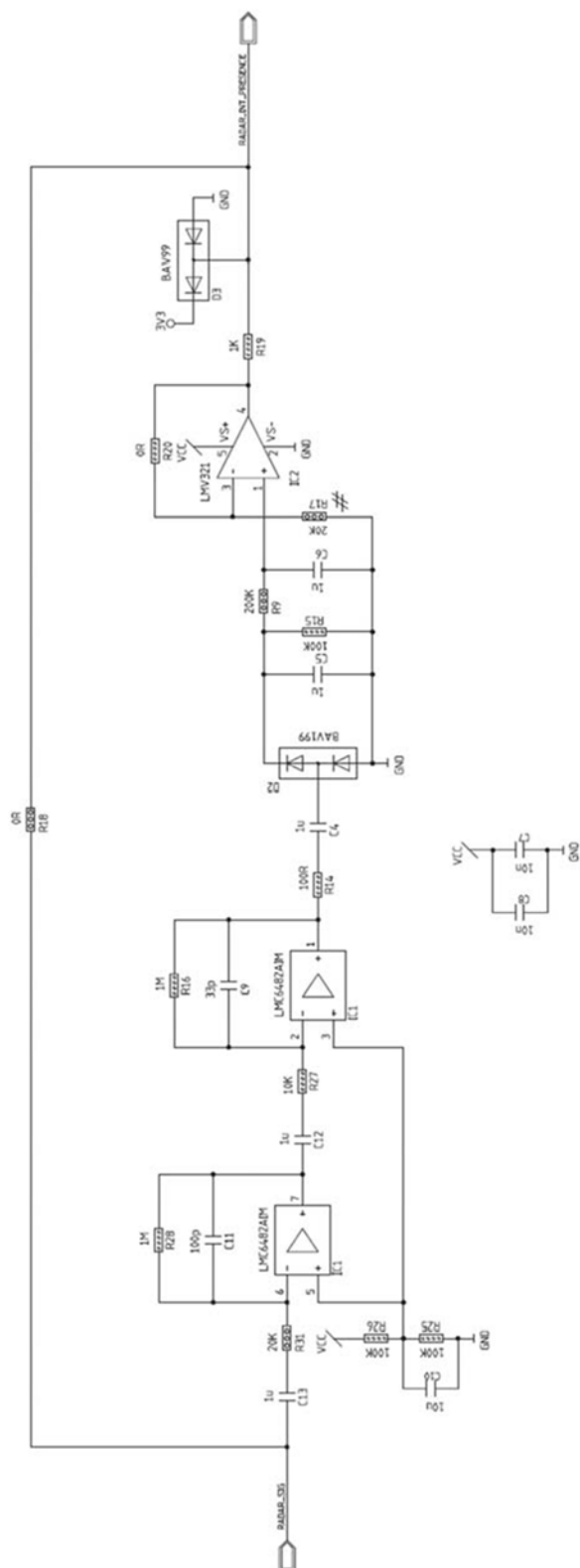
JRC radar interface

Connector: flex cable connector (SFV6R-1STE9HLF)
Silkscreen: RADAR

| pin	signal name	max. voltage	Tol.	max. current	description
1	3V3				power
2	GND				ground
3	UART_RADAR_TX				uart
4	UART_RADAR_RX				uart
5	RADAR_APPROACHING				object approaching signal
6	RADAR_LEAVING				object leaving signal (optionally connected to micro controller)
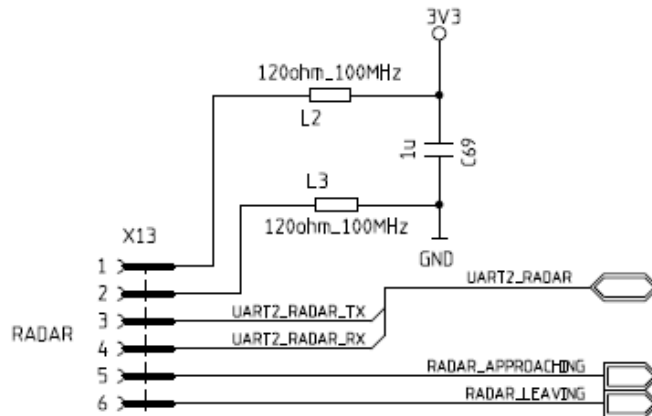
additional pull-up or pull-down resistors fro the following signals:
- UART_RADAR_RX(resp. UART2_RX)
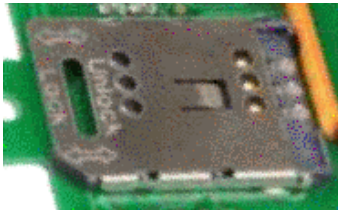- RADAR-APPROACHING
- RADAR_LEAVING
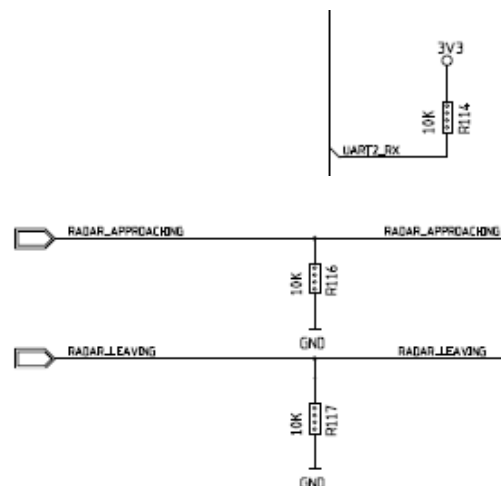
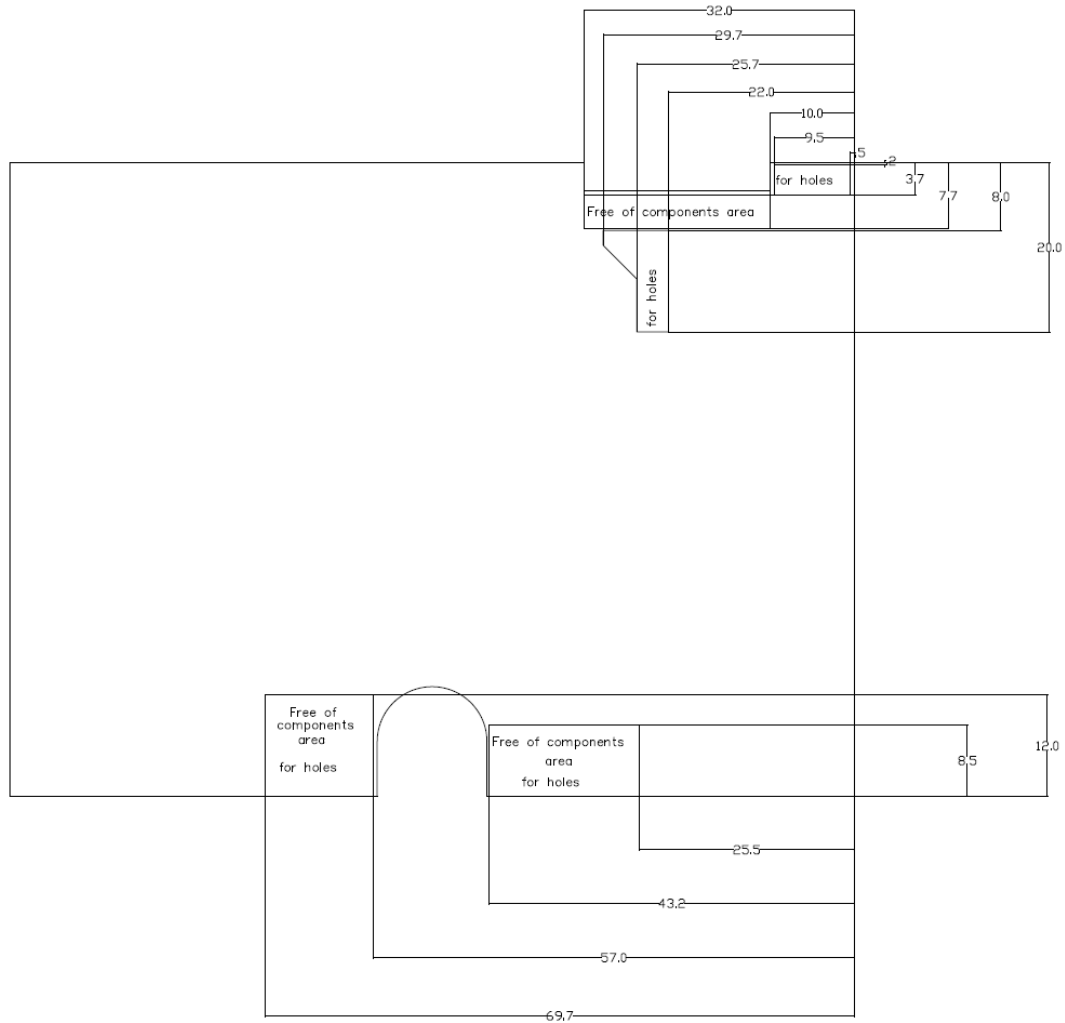## RGB LEDs
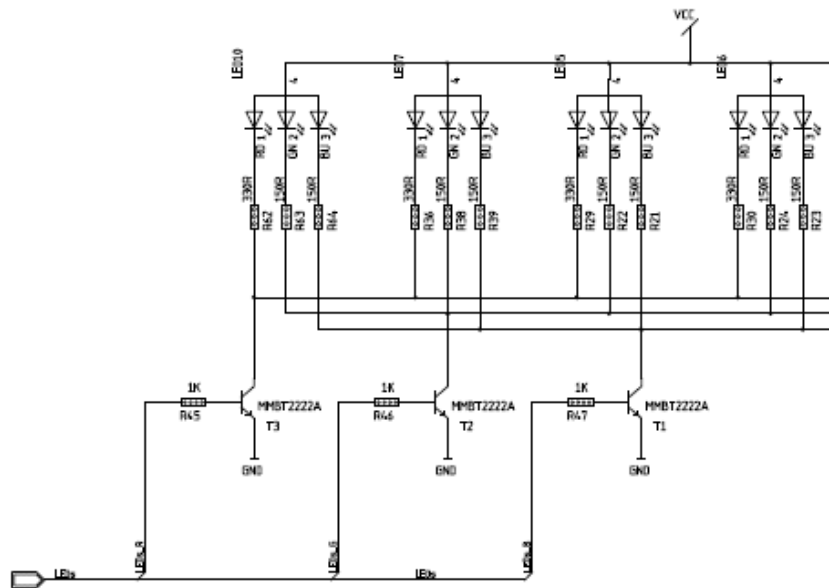
SAM sockets

optionally mounted:
prepared for HID SAM (socket 1), customized SAM (socket 2)

Connector: see picture above
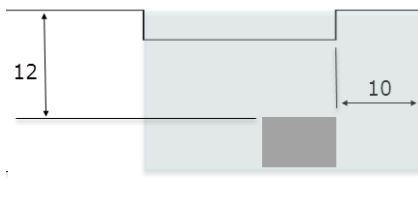Silkscreen: SAM1 resp. SAM2

3 Mechanics

PCB size: 100 mm x 75 mm
PCB thickness: 1.6 mm

cutouts for
- radar (top leftcorner)
- camera (at button in the middle)

connector for K-LC1 radar positioned as designed in the top left corner (grey   area)

connector for JRC radar in line with the cutout for the radar (green area)

position holes (d = 3mm) in the area where marked

4 Reliability

EMC

The board must comply with the requirements of EN12015:2004 and EN12016:2004.

Tests are performed at system level.

Climatic conditions

Operating temperature: ambient temperatures of 0 to 60 °C.
Relative humidity: yearly average less or equal to 65%, 60 days 85%.
Altitude: up to 2000 m above sea level.

Climatic tests are performed at system level.

Certifications

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

The PCR-TWN4 complies with the following requirements:
- FCC (Federal Communications Commission) Part 15
- IC (Industry Canada) RSS-102

This PCR-TWN4 complies with Industry Canada's license-exempt RSSs. Operation is subject to the following two conditions:
- This device may not cause harmful interference, and
- This device must accept any interference received, including interference that may cause undesired operation.

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

FCC ID: XFIPCRTWN4LF

IC ID: 9114A-PCRTWN4LF

All the PORT products that include the PCR2-TWN4 module are compliant with the FCC Part 15 Subpart B ed ICES 003.

PCR-TWN4LF
FCC ID: XFIPCRTWN4LF
IC: 9114A-PCRTWN4LF

Schindler   PORT 4 pro

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.

Contains

FCC ID: XPYNINAB1	IC: 8595A-NINAB1
FCC ID: XFIPCR2TWN4	IC: 9114A-PCR2TWN4
FCC ID: XFIPCR2TWN4LF	IC: 9114A-PCR2TWN4LF
FCC ID: XFIPORTRADARVER1	IC: 9114A-PORTRADAR

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

Power supply
PoE IN: 48V ⎓ / 270mA / 13W
Aux IN: 24÷48V ⎓ / 540÷270mA / 13W

5 Document History

2015 Feb 9	Scs	Version 2 - radar interface: electrical schematics adapted - input/output: max. current specified
2015 July 2	Scs	Version 3 - additional cutouts on pcb for camera and radar - integration of JRC radar module - positioning of connector for K-LC1 radar module
2015 Aug 5	Scs	Version 4: - mechanical dimensions updated
2017 Oct 20	Scs	Version 5: - Input/Output schematic modified for external handicapped button

2018 Nov 17	Bua	Version 6:
		chapter *2. General Board Implementation*:
		    - subchapter *radio introduced*
		      with description of modulation schemes
		    - subchapter *HF and LF antenna* extended
		      with description of physical antenna dimension
		chapter *4. Reliability*
		    - subchapter *Certifications* introduced

6 Appendix

Sample layout of PCB according chapter 3: