

RFID Reader for PORT

PCR-TWN4

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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.

Type	Name	Card Type (transponder) ⁴³⁾	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 14443A: HID	
	Baltech IDE with USB	ISO 14443A: EMV PIC I.C.	
C1 1)	Baltech Mifare SNET	ISO 14443A: Mifare Mifare	
C2	Baltech Legic SNET	Legic: Prime.	
C3 5)	HID R10	HID iClass	
C9	HID iClass SE	HID iClass HID Proximity ProxCard	
C4	Felg OBID Classic	Philips: Hitag 1, Hitag 2 EM Microelectronic: EM4001, EM4002, EM4003, EM4102, EM4103 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.	

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



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

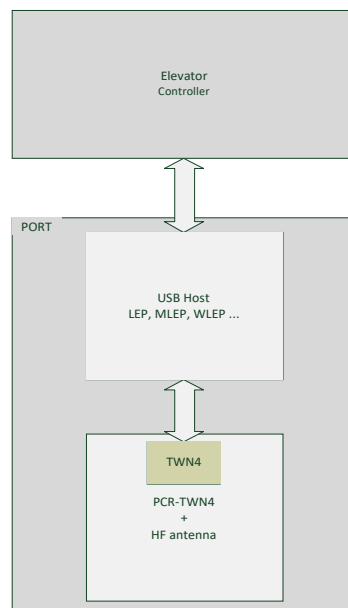
Wiegand Output (similar NFCUSB)

4 x RGB LED's

Compatibility

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

General overview

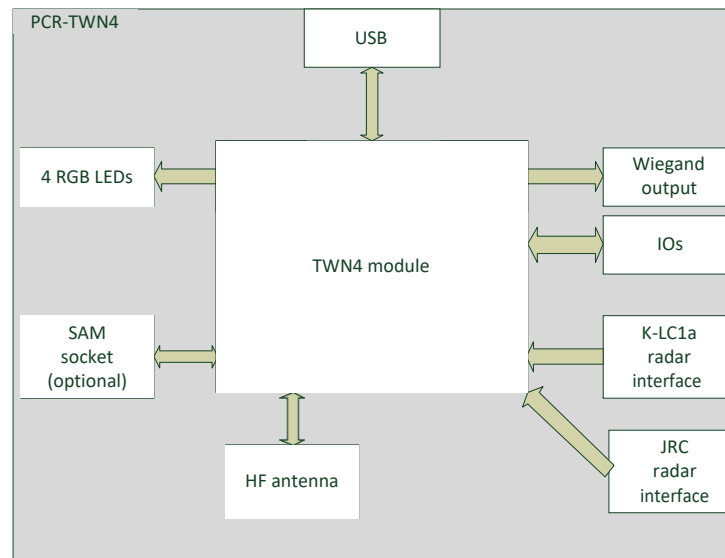


References

- 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



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 $U = 5\text{ V}_{DC} \pm 5\%$ $I_{max} = 500\text{ mA}$ from the Host. The USB communication is 2.0 Full-Speed (12Mbps). USB from the host is connected to the TWN4 board.

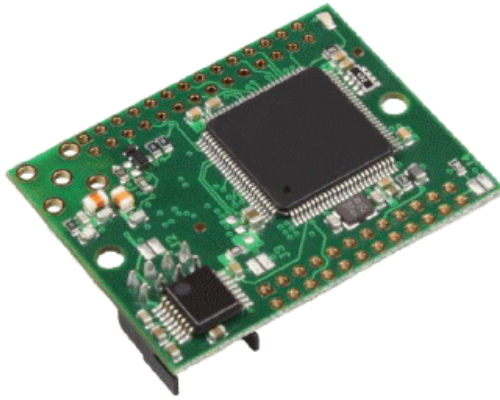
Connector: SMD 4 poles JST male conn., right angle, 2 mm, Id. Nr. 432841

Silkscreen: USB

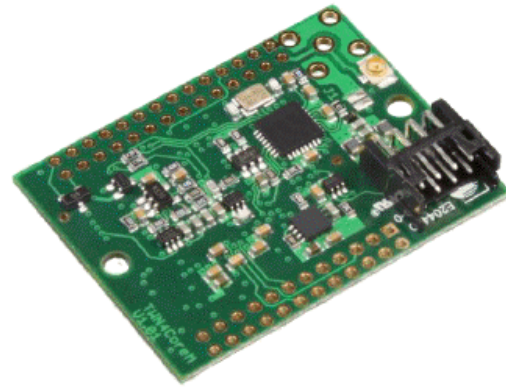
pin	signal name	max. voltage	Tol.	max. current	description
1	VCC1	5 VDC	±5%	500 mA	power
2	USB_DM	5 VDC	±5%	50 mA	USB data
3	USB_DP	5 VDC	±5%	50 mA	
4	M0	0 VDC	-	-	ground

TWN4 module

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

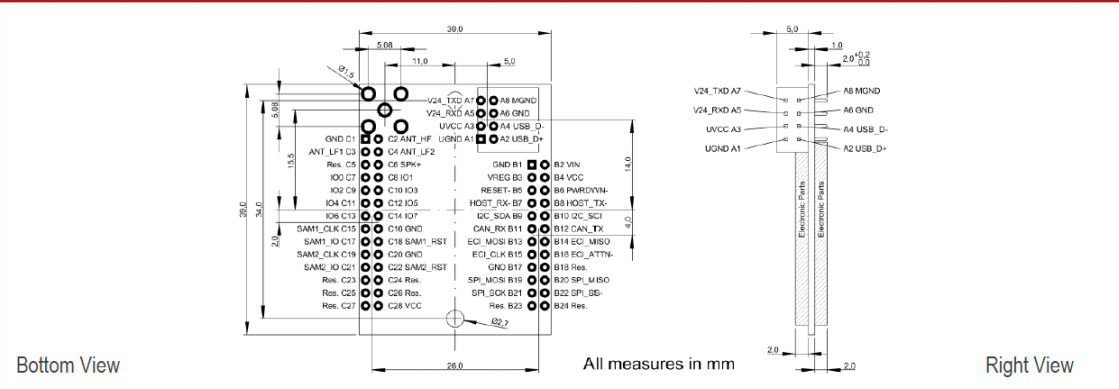


Bottom View



Top View

Drawing/Pin Out



See also REF[1]

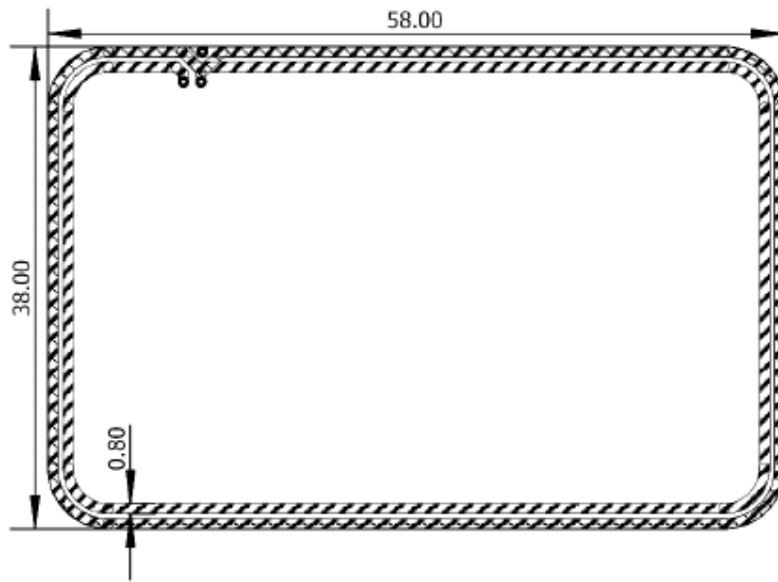
radio

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

HF antenna integrated into the PCB with the following features:



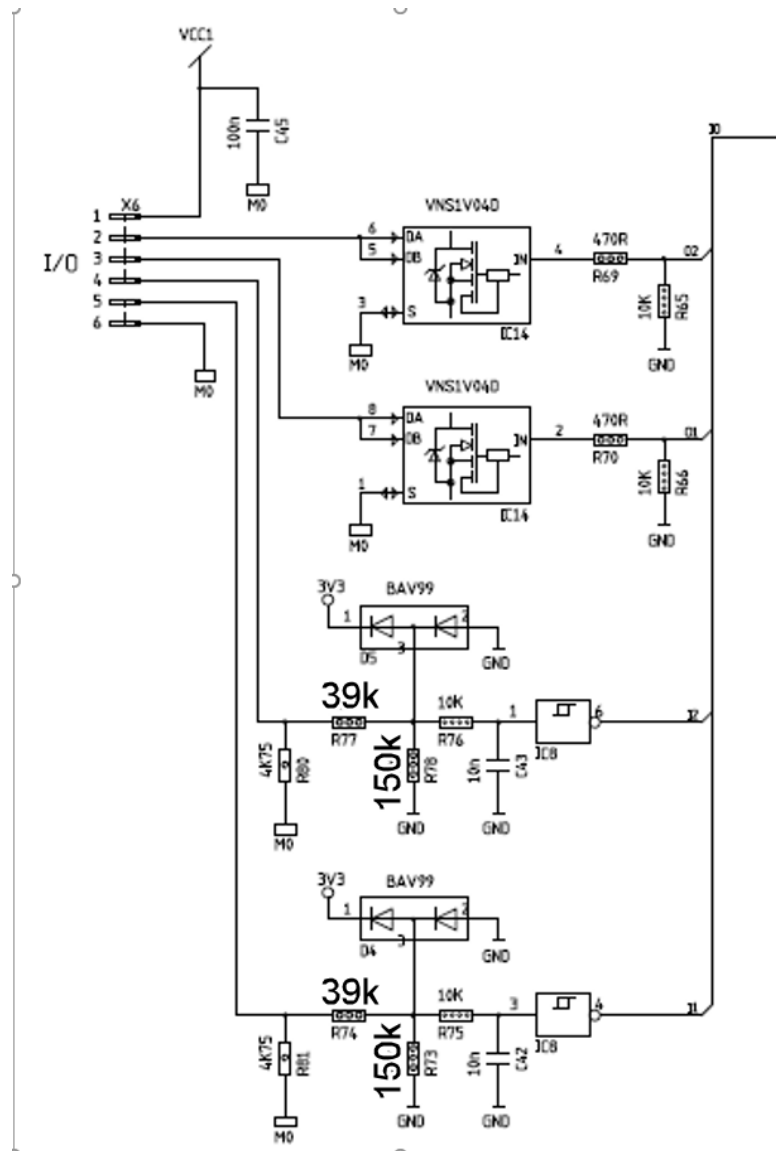
3 Turns, 887nH, trace thickness 35 μ m

Input/Output

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

Silkscreen: I/O

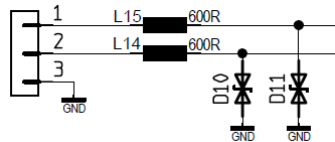
pin	signal name	max. voltage	Tol.	max. current	description
1	VCC1	5 VDC	±5%	50 mA	power
2	OUT1	-	-	1 A	open drain output
3	OUT2	-	-	1 A	
4	IN1	24 VDC	±20%		input
5	IN2	24 VDC	±20%		
6	M0	0 VDC	-	-	ground



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	-	-	-	

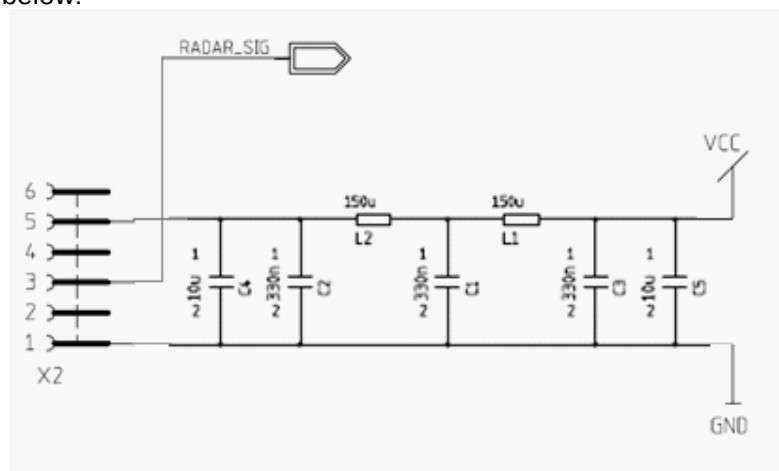


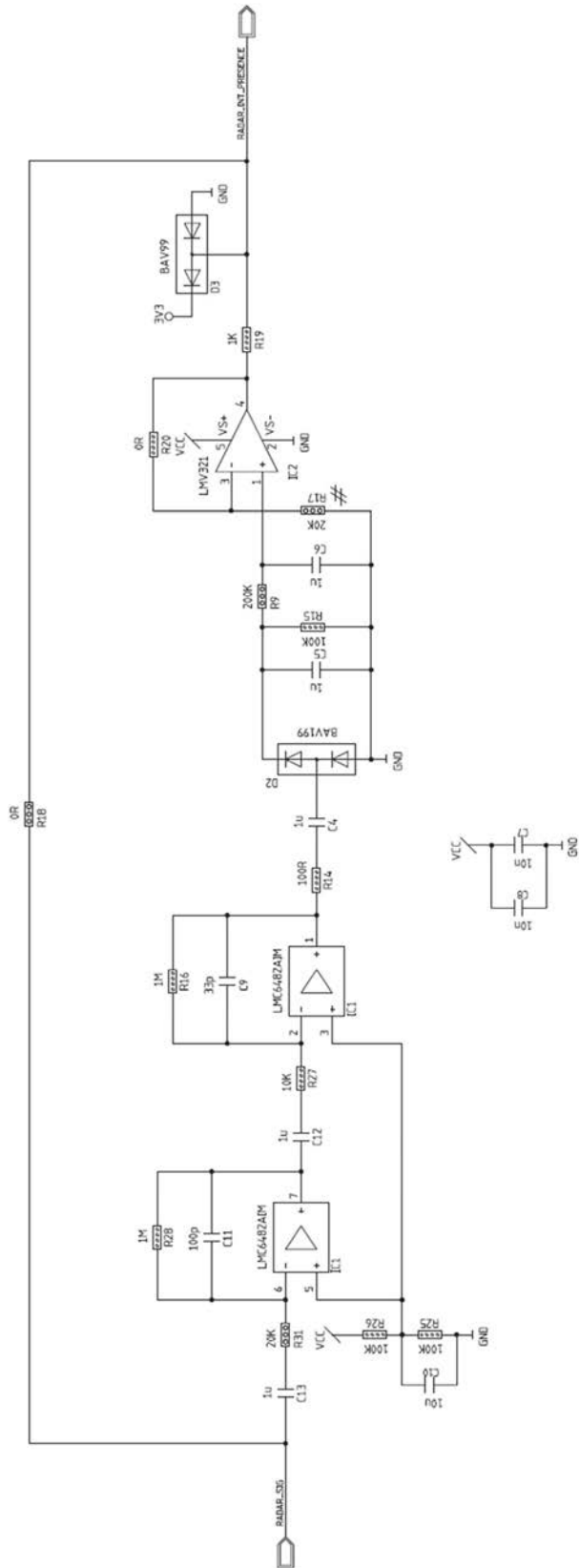
K-LC1A radar interface

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:



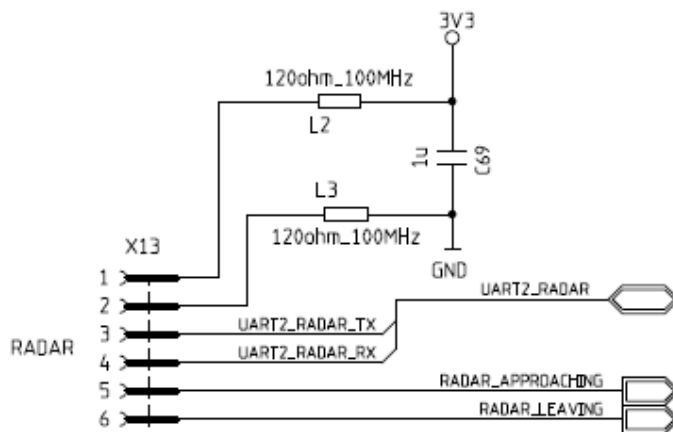


JRC radar interface

Connector: flex cable connector (SFV6R-1STE9HLF)

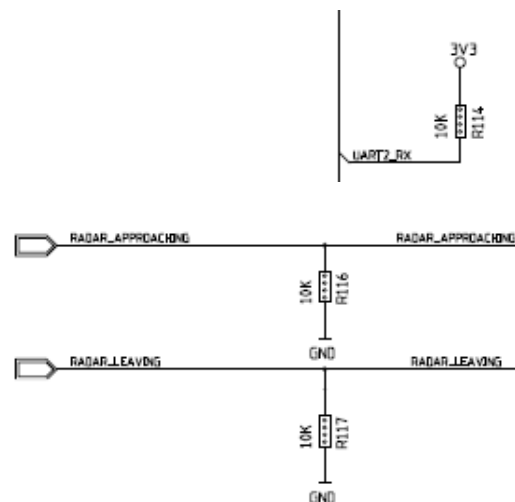
Silkscreen: RADAR

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)

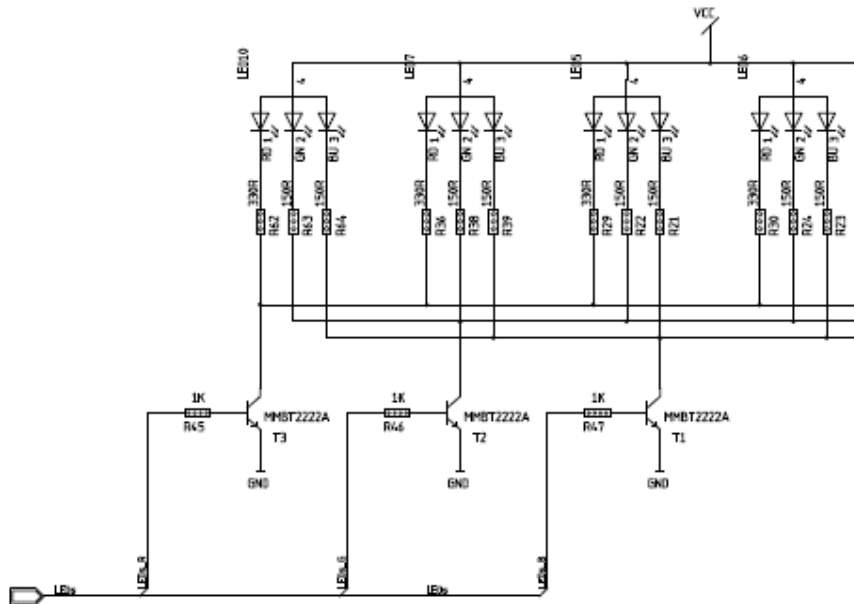


additional pull-up or pull-down resistors fro the following signals:

- 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)

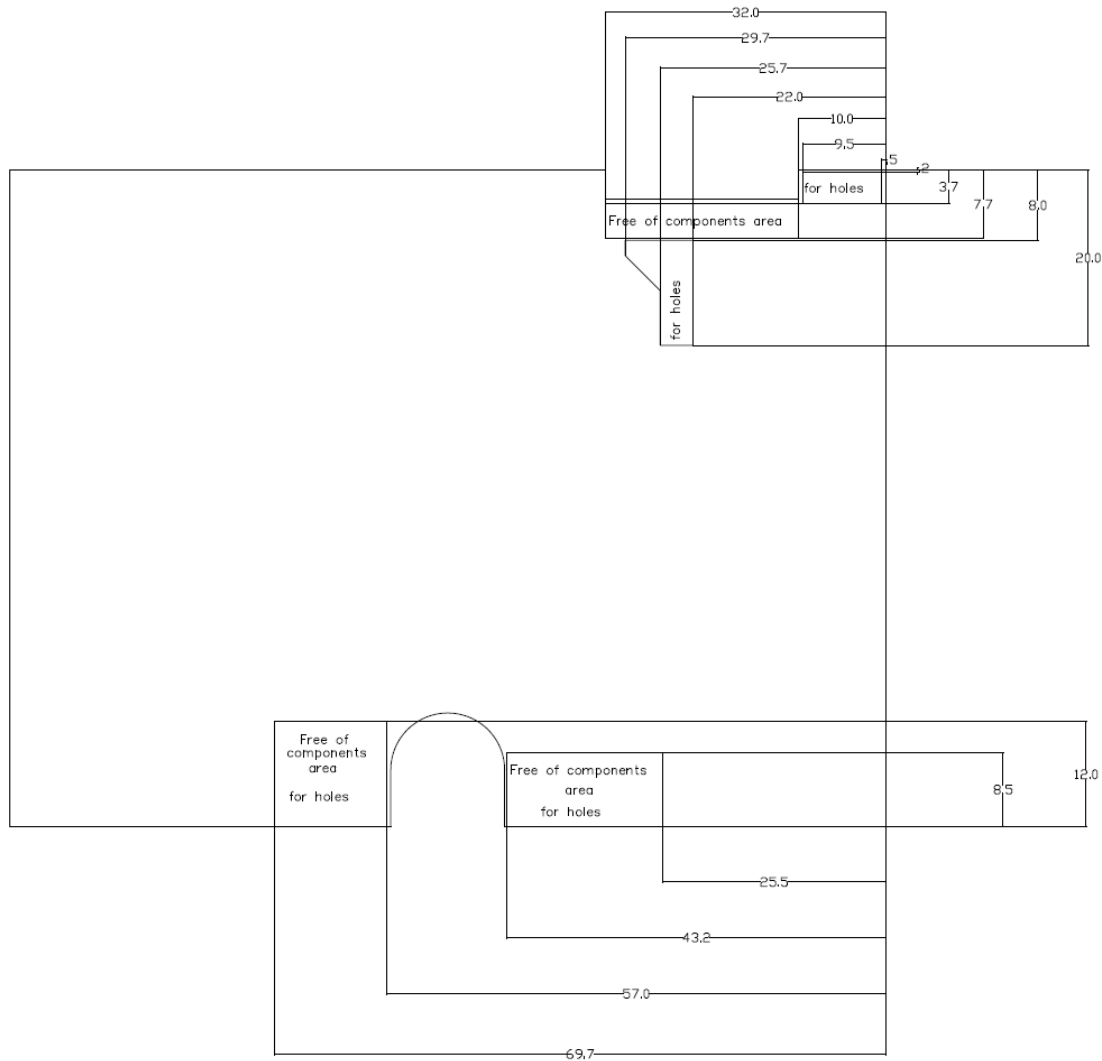


Connector: see picture above

Silkscreen: SAM1 resp. SAM2

3 Mechanics

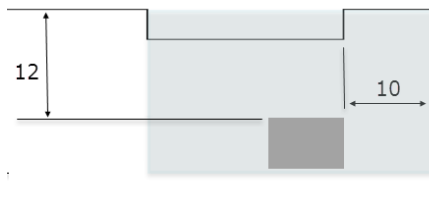
PCB size: 100 mm x 75 mm
PCB thickness: 1.6 mm



cutouts for

- radar (top left corner)
- 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 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: XFIPCRTWN4
IC ID: 9114A-PCRTWN4



Label example of the final product



PORT 1.2-2

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: XFIPCRTWN4 | IC ID: 9114A-PCRTWN4 |
| ☐ | FCC ID: XFIPORTRADARVER1 | IC ID: 9114A-PORTRADAR |



Power supply

PoE IN: 48V / 190mA / 9W

Aux IN: 24+48V / 380+190mA / 9W

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

Sample layout of PCB according chapter 3:

