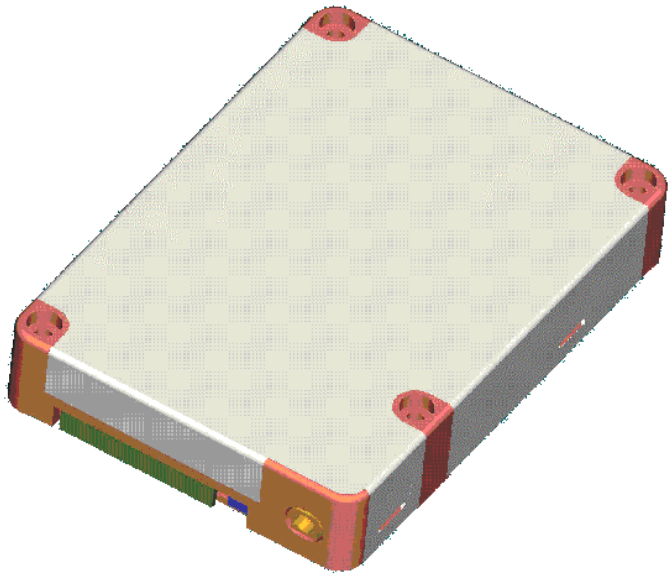
WMOi3 Integrated Modem Functional Specification



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1. Introduction

1.1. Scope

This document describes the interfaces and the technical specifications for the integrated modem called WMOi3.

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2. Generality

2.1. Overview

The integrated modem is a product with a sole connector which puts together all the interface signals in order to facilitate its integration.

It has an integrated SIM connector as well as a standard RF connector type MMCX (Miniature Micro Connector).

2.2. Physical caracteristics

The WMOI3 integrated modem has a complete self-contained shield.

The physical characteristics are the following ones:

Physical characteristic	Qualification
Dimension Absolute maximum dimension	46 x64 x 12.4 mm
Weight	About 80 g
Volume	36.21 cm^3
Case	Zamack + stainless steel

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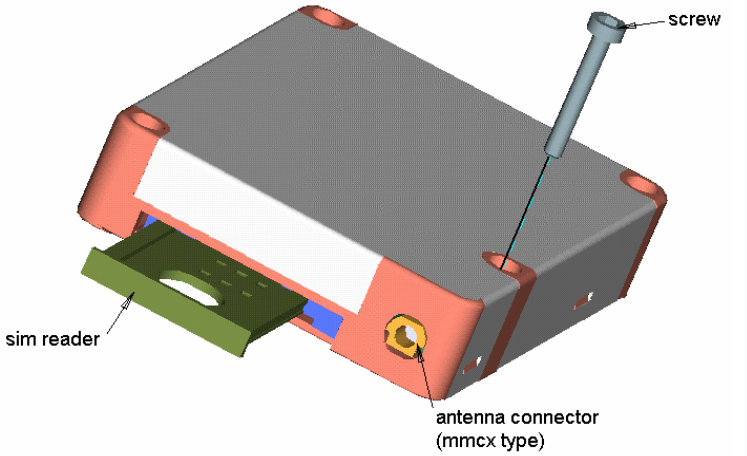
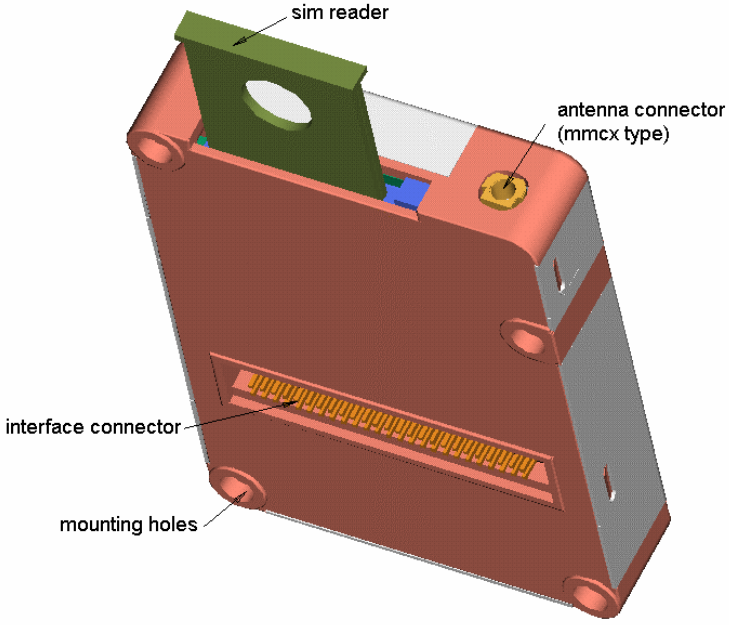
2.3. Integrated modem design





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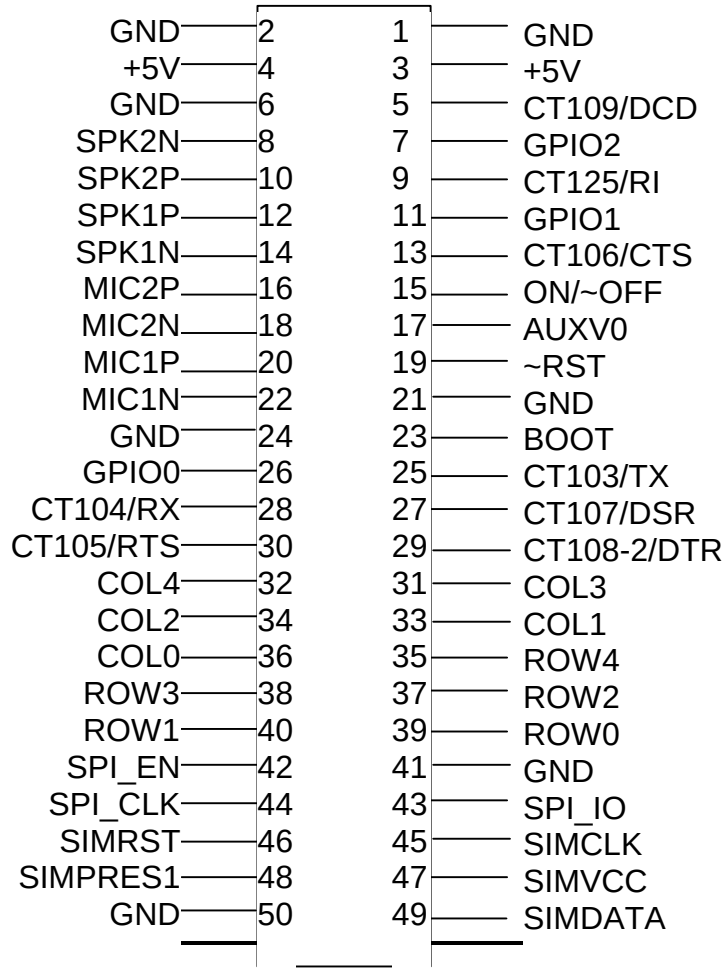
* For technical drawing see Annexe A

3. Interfaces description

3.1. The main connector

This is a 50 pins interface connector with a pitch of 1.27 from SAMTEC, referenced **FTS-125-01-L-DV.** (see figure1)

Figure 1 : 50 pins connector Bottom view



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The following table describes the electrical characteristics of the interface.

Some signals require particular connections and are specified in bold characters.

Pin #	*Name*	*I/O*	*I/O type*	*Description*	*Comment*
1	GND			GROUND	High current
2	GND			GROUND	High current
3	+5V	I	Supply		High current
4	+5V	I	Supply		High current
5	CT109/DCD	O	CMOS/2X	RS232-Data Carrier Detect	
6	GND			GROUND	High current
7	GPIO2	I/O	CMOS/2X	General Purpose I/O	
8	SPK2N	O	Analog	Speaker2 negative output	
9	CT125/RI	O	CMOS/2X	RS232-Ring Indicator	
10	SPK2P	O	Analog	Speaker 2 positive output	
11	GPIO1	I/O	CMOS/2X	General Purpose I/O	
12	SPK1P	O	Analog	Speaker 1 positive output	
13	CT106/CTS	O	1X	RS232 interface Clear To Send	
14	SPK1N	O	Analog	Speaker 1 negative output	
15	ON/~OFF	I		Power ON/OFF control	
16	MIC2P	I	Analog	Microphone 2 positive input	
17	AUXV0	I	Analog	Auxiliary ADC input	
18	MIC2N	I	Analog	Microphone 2 negative input	
19	**~RST**	I		Reset active low	**Open Collector**
20	MIC1P	I	Analog	Microphone 1 positive input	
21	**GND**	I		Ground	
22	MIC1N	I	Analog	Microphone 1 negative input	
23	**BOOT**	I		BOOT	**Open Collector**
24	GND			GROUND	High current
25	**CT103/TX**	I		RS232 interface - Transmit	**Pull up to VCC with 100KΩ when not used**
26	GPIO0	I/O	CMOS/2X	General Purpose I/O	
27	CT107/DSR	O	1X	RS232 interface Data Set Ready	
28	CT104/RX	O	1X	RS232 interface – Receive	
29	**CT108-2/DTR**	I		RS232 interface	**Pull up to VCC with**

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				Data Terminal Ready	**100KΩ when not used**
30	**CT105/RTS**	I		RS232 interface Request To Send	**Pull up to VCC with 100KΩ when not used**
31	COL3	I/O	1X	Keyboard column	
32	COL4	I/O	1X	Keyboard column	
33	COL1	I/O	1X	Keyboard column	
34	COL2	I/O	1X	Keyboard column	
35	ROW4	I/O	1X	Keyboard row	
36	COL0	I/O	1X	Keyboard column	
37	ROW2	I/O	1X	Keyboard row	
38	ROW3	I/O	1X	Keyboard row	
39	ROW0	I/O	1X	Keyboard row	
40	ROW1	I/O	1X	Keyboard row	
41	GND			GROUND	High current
42	SPI_EN	O	1X	SPI enable	
43	SPI_IO	I/O	1X	I^2C Data or SPI Data	
44	SPI_CLK	O	1X	I^2C Clock or SPI Clock	
45	**SIMCLK**	O	2X	Clock for SIM Interface	**3V mode**
46	**SIMRST**	O	2X	Reset for SIM interface	**3V mode**
47	**SIMVCC**	O		SIM card supply	**3V mode 6mA max**
48	**SIMPRES1**	I		SIM card detect	**Connected to SIM connector pin 8. Pin 4 of SIM connector must be pulled down to GND with 1 KΩ**
49	**SIMDATA**	I/O	3X	I/O for SIM interface	**3V mode**
50	GND			GROUND	High current

Nota : VCC could be either 3V or 5V.

All digital I/O are CMOS 3V compatible.

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Operating conditions

Parameter	I/O type	Min	Max	Condition
V_{IL}	CMOS	-0.5V	0.8V	
V_{IH}	CMOS	2.1V	3.0V	
V_{OL}	1X		0.2V	I_{OL} = -1 mA
	2X		0.2V	I_{OL} = -2 mA
	3X		0.2V	I_{OL} = -3 mA
V_{OH}	1X	2.6V		I_{OH} = 1 mA
	2X	2.6V		I_{OH} = 2 mA
	3X	2.6V		I_{OH} = 3 mA

3.2. Pin Description

3.2.1. Power supply

The main power supply will be provided through a double connection.

These connections are respectively the pin 3 and 4 for the +5V and the pins 1 and 2 for the ground (GND).

The power supply is 5V +/-5% 1A.

3.2.2. Serial Link RS232

This interface is needed for communication with a remote terminal with respect to the RS232 V.28 standard levels. As the integrated modem does not include a transceiver MAX3238 or MAX3237, this one has to be added outside with a SUBD9. The connection between the WMOi3 and the transceiver must not exceed 10 cm. The table below lists the needed signals for this interface :

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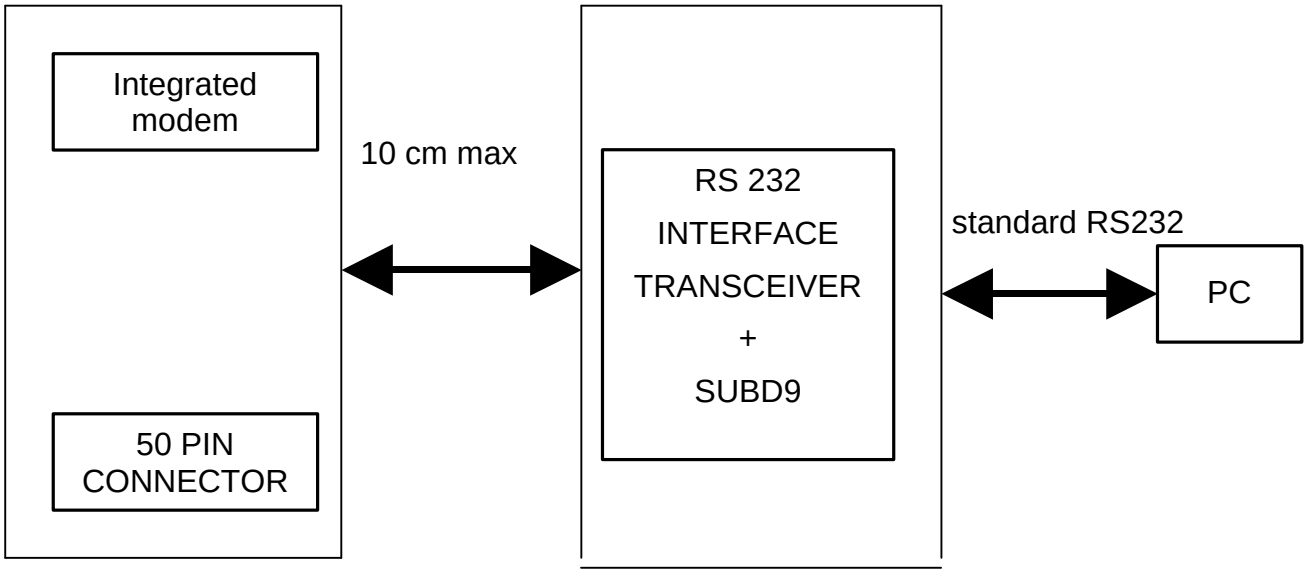
PIN number	Signal	Description
5	DCD	Data Carrier Detect
28	RX	Reception
25	TX	Transmission
29	DTR	Data Terminal Ready
27	DSR	Data Set Ready
30	RTS	Request To Send
13	CTS	Clear To Send
9	RING	Ring indicator
2	GND	Ground

When the RS232 V.28 level is not needed, the above signals can be used as TTL 3V CMOS compatible signals.

Application example needing V.28 levels :



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3.2.3. Remote SIM interface

A SIM connector is already integrated on the integrated modem (see 3.3 SIM interface). However there is the possibility to implement a remote SIM connector using the signals described in the table below.

PIN number	Signal
47	SIMVCC
46	SIMRST
45	SIMCLK
50	GND
49	SIMDATA
48	SIMPRES

3.2.4. AUDIO

The modem allows the connection of a handset or a headset through AUDIO signals

The audio end stage must respects the following specifications :

3.2.4.1. Microphone 2

The MIC2 inputs are differential ones. They already include the convenient biasing for an electret microphone (0,5 mA and 2 Volts). This electret microphone can be directly connected on these inputs. The impedance of the microphone 2 has to be around 2kΩ. These inputs are the standard ones for an handset design while MIC1 inputs can be connected to an external headset or a handsfree kit.

The gain of MIC2 inputs is internally adjusted. The gain can be tuned from 30dB to 51dB. The connexion to the microphone is direct.

Pin description

Signal	Pin #	I/O	I/O type	Description
MIC2P	16	I	Analog	Microphone 2 positive input
MIC2N	18	I	Analog	Microphone 2 negative input

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3.2.4.2. Microphone 1

The MIC1 inputs are differential and do not include internal bias. To use these inputs with an electret microphone, bias has to be generated outside the WMOI3 modem according to the characteristic of this electret microphone. These inputs are the standard ones used for an external headset or a handsfree kit. The connection can be either differential or single-ended but using a differential connection in order to reject common mode noise and TDMA noise is recommended. When using a single-ended connection, be sure to have a very good ground plane, a very good filtering as well as shielding in order to avoid any disturbance on the audio path.

The gain of MIC1 inputs is internally adjusted. The gain can be tuned from 30dB to 51dB.

Pin description

Signal	Pin #	I/O	I/O type	Description
MIC1P	20	I	Analog	Microphone 1 positive input
MIC1N	22	I	Analog	Microphone 1 negative input

3.2.4.3. Speaker 2

Speaker outputs SPK2 are push-pull amplifiers and can be loaded down to 50 Ohms and up to 1nF. These outputs are differential and the output power can be adjusted by step of 2dB. The output can be directly connected to a speaker.

The connection can be differential or single-ended but using a differential connection to reject common mode noise and TDMA noise is recommended. When using a single-ended connection, be sure to have a very good ground plane, a very good filtering as well as shielding in order to avoid any disturbance on the audio path.

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Pin description

Signal	Pin #	I/O	I/O type	Description
SPK2P	10	O	Analog	Speaker 2 positive output
SPK2N	8	O	Analog	Speaker 2 negative output

3.2.4.4. Speaker 1

Speaker outputs SPK1 are push-pull amplifiers and can be loaded down to 50 Ohms and up to 1nF. These outputs are differential and the output power can be adjusted by step of 2dB. The output can be directly connected to a speaker.

The connection can be differential or single-ended but using a differential connection to reject common mode noise and TDMA noise is recommended. When using a single-ended connection, be sure to have a very good ground plane, a very good filtering as well as a shielding in order to avoid any disturbance on the audio path.

Pin description

Signal	Pin #	I/O	I/O type	Description
SPK1P	12	O	Analog	Speaker 1 positive output
SPK1N	14	O	Analog	Speaker 1 negative output

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3.3. SIM Interface

The provided SIM connector has been designed **for 3V technology SIMs only.** The remote Sim connectormust be placed at 10cm max. from the WMOi3.

3.4. RF interface

The RF connector is MMCX (Miniature Micro Connector) standard type for a surface mounting.

An antenna can be directly connected through the matting connector or using a small MMCX / SMA adaptor.

The antenna must comply with the following specifications :

	EGSM	**DCS**
Frequency RX	925 to 960 MHz	1805 to 1880 MHz
Frequency TX	880 to 915 MHz	1710 to 1785 MHz
Impedance	50 Ω	

4. Connectors

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4.1. Interface connector

The main connector is a 50 pins interface connector from SAMTEC, referenced FTS-125-01-L-DV (see 3.1)…….

4.2. RF connector

The standard RF connector is a MMCX type (Miniature Micro Connector)…….

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5. Appendix

5.1. Mechanical Drawings

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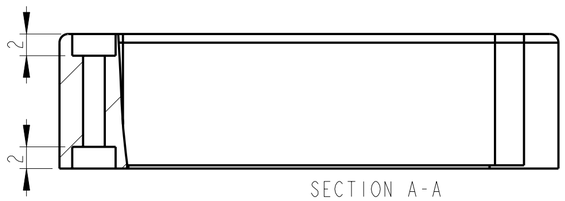

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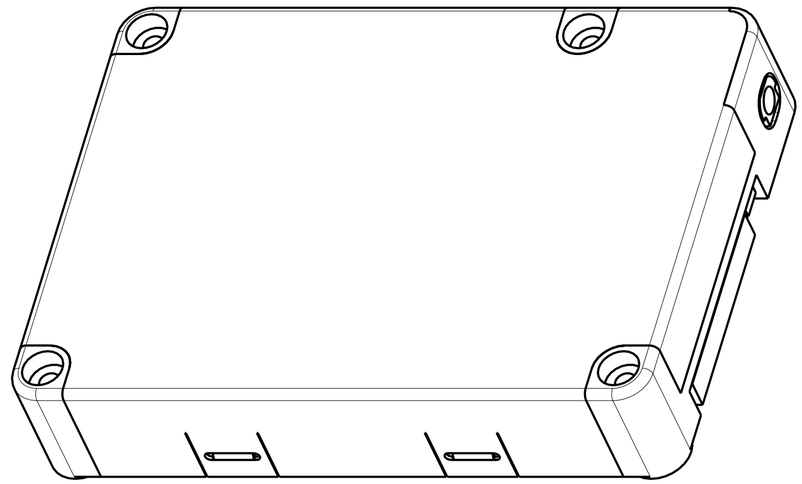

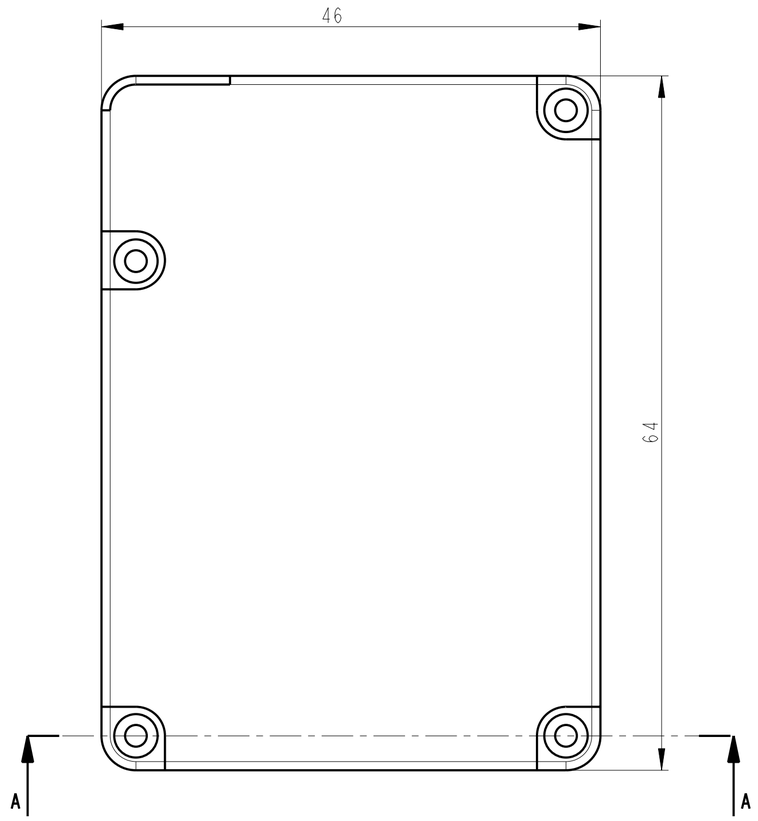

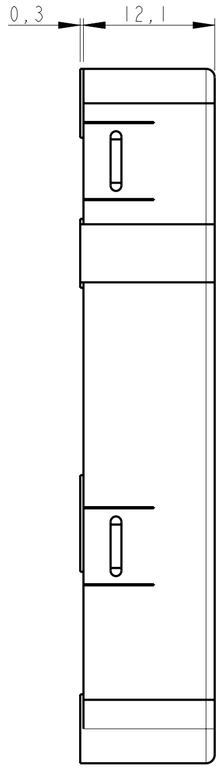

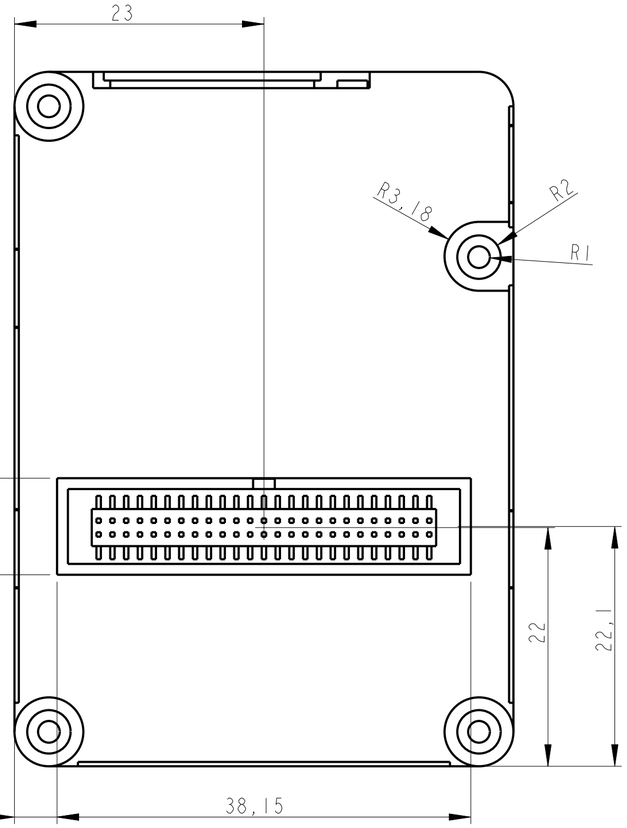

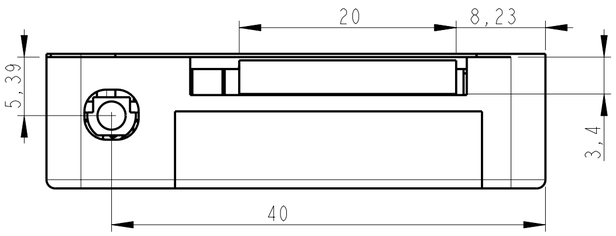

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