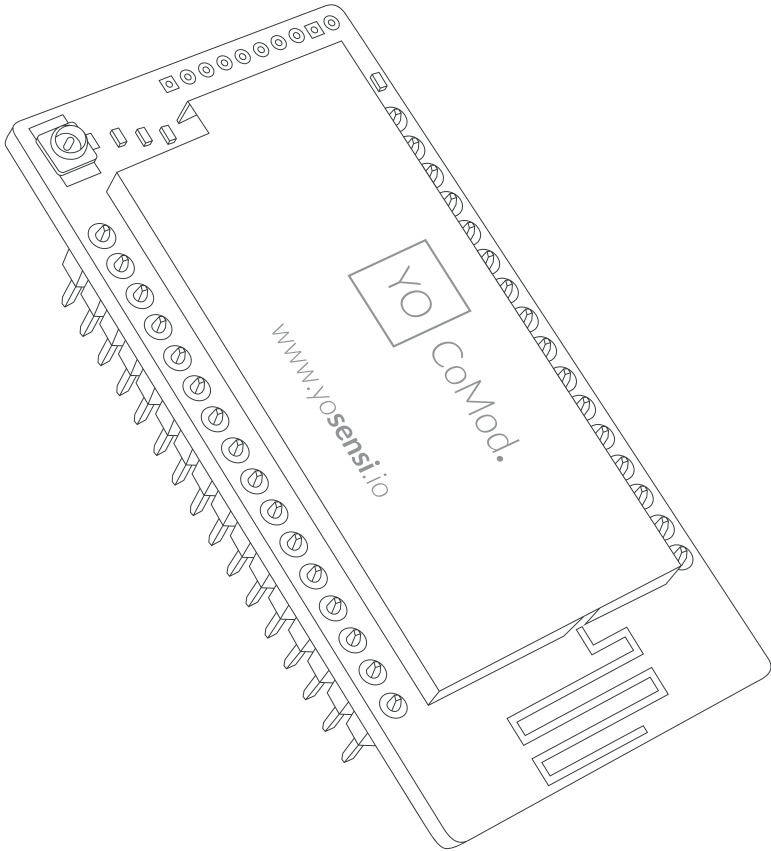




**CoMod.**  
Datasheet



## Application

- YO CoMod is a tiny, ultra low-power, pre-programmed IoT communication module with possibilities to implement new features. The main components are a MCU, plus short- and long-range communications via in-built BLE 5.0 and LoRa radio.
- Create or extend IoT networks using YO CoMod, which allows quick implementation of wireless communication based on LoRa and BLE standards.
- Extend the functionality of the module using available I/O pins by adding e.g. sensors, displays, LEDs, switches.
- Useful across a wide range of applications, e.g. smart building monitoring, industrial IoT, agriculture, wireless communications.

# Components and interfaces specification

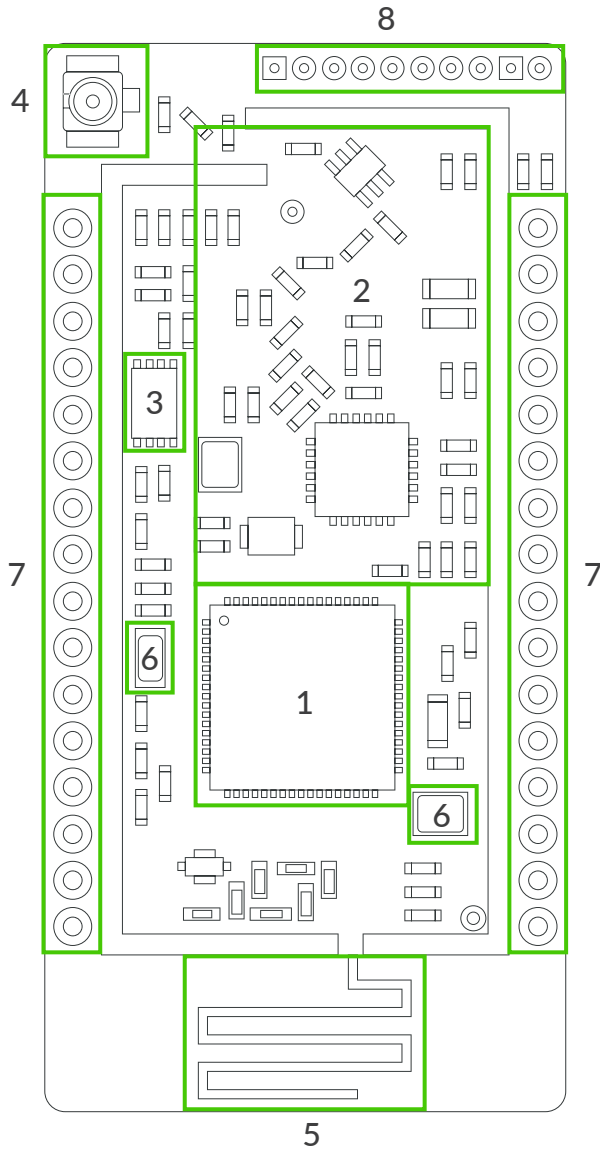


Figure 1. Top board view without protective shield.

**Table 1.** Components description.

Block	Description
1	<ul style="list-style-type: none"><li>• Dual-core, energy-efficient STM32WB55RG processor (VFQFPN68 package).</li><li>• CORTEX-M0+ core dedicated to Bluetooth® (2,4 GHz RF transceiver supporting Bluetooth® specification v5.0 and IEEE 802.15.4-2011 PHY and MAC).</li><li>• CORTEX-M4 core for managing peripherals and communicating with the LoRa interface.</li><li>• MCU memory: 1 MB flash, 256 kB SRAM.</li><li>• Pre-installed firmware: Bluetooth® LE 5.0 stack, Bootloader and configured interfaces – 2 × SPI, UART and LPUART, 2 × I2C, 1 × USB, 1 × SWD, 1 × ADC.</li></ul>
2	<ul style="list-style-type: none"><li>• LoRa based on Semtech chip SX1261 (868 MHz) or SX1262 (915 MHz).</li><li>• 32 MHz crystal oscillator for LoRa communication module.</li></ul>
3	<ul style="list-style-type: none"><li>• Additional non-volatile 256 kb EEPROM memory CAT24C256 (UDFN-8 package).</li></ul>
4	<ul style="list-style-type: none"><li>• U,FL socket for external LoRa antenna.</li></ul>
5	<ul style="list-style-type: none"><li>• Internal PCB antenna for BLE 5.0.</li></ul>
6	<ul style="list-style-type: none"><li>• 32,768 KHz LSE crystal oscillator for RTC.</li><li>• 32 MHz HSE crystal oscillator for MCU and BLE radio (2,4 GHz).</li></ul>
7	<ul style="list-style-type: none"><li>• Peripherals connectors: 32 pins, arranged as two rows of 16 pins with a 2,0 mm pitch.</li></ul>
8	<ul style="list-style-type: none"><li>• Programming and debugging connector: 10 pins, 1,27 mm pitch.</li></ul>

# Pin definition

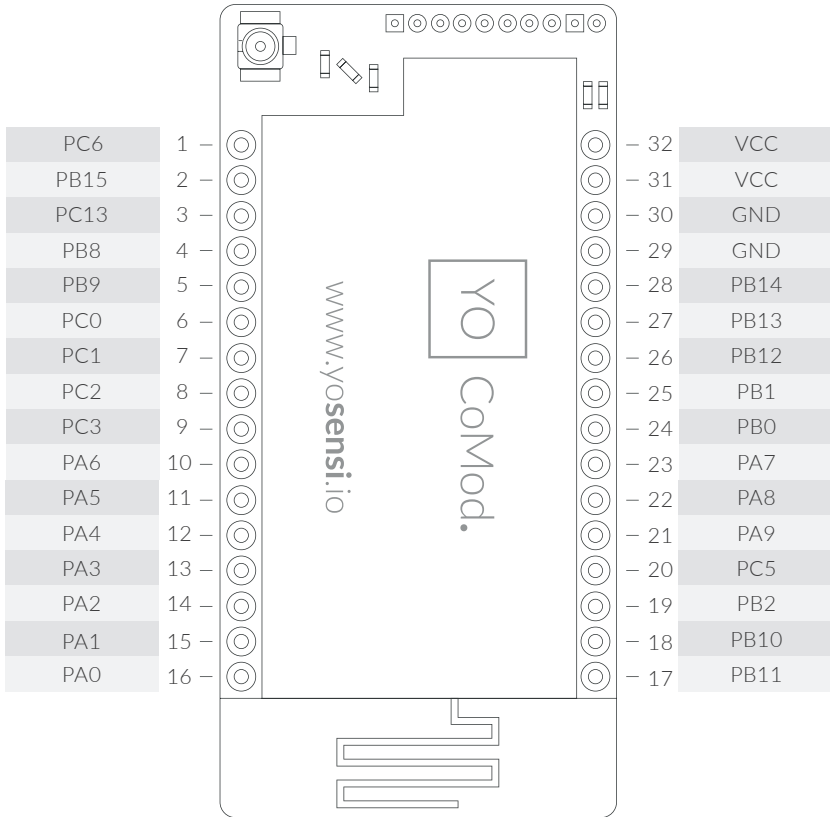


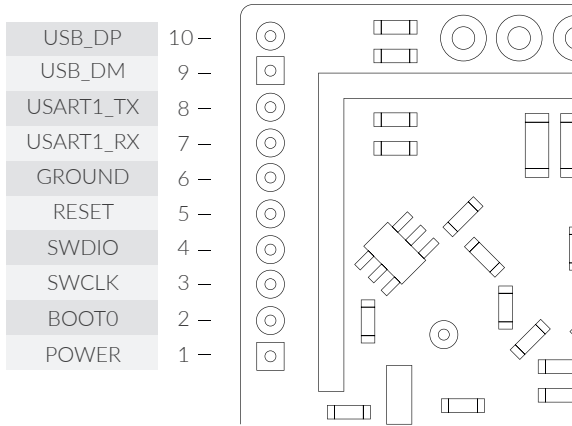
Figure 2. Device pinout.

**Table 2.** IO assignment – main connector.

PIN	Name	Functions	Descriptions
1	PC6	DIGITAL I/O	Multi-purpose digital I/O
2	PB15	SPI2_MOSI	Multi-purpose digital I/O
3	PC13	DIGITAL I/O	Multi-purpose digital I/O
4	PB8	I2C1_SCL	I2C1_SCL
5	PB9	SPI2_SSEL / I2C1_SDA	I2C1_SDA
6	PC0	LPUART1_RX / I2C3_SCL / ADC1_1	Multi-purpose digital I/O
7	PC1	SPI2_MOSI / LPUART1_TX / I2C3_SDA/ADC1_2	Multi-purpose digital I/O
8	PC2	SPI2_MISO / ADC1_3	Multi-purpose digital I/O
9	PC3	SPI2_MOSI / ADC1_4	Multi-purpose digital I/O
10	PA6	SPI1_MISO / LPUART1_CTS / ADC1_11	Digital output
11	PA5	SPI1_SCLK / ADC1_10	Digital output
12	PA4	SPI1_SSEL / ADC1_9	Multi-purpose digital I/O
13	PA3	LPUART1_RX / ADC1_8	Digital output
14	PC0	LPUART1_RX / I2C3_SCL / ADC1_1	Multi-purpose digital I/O
15	PA1	SPI1_SCLK / ADC1_6	Digital output: memory power
16	PA0	ADC1_5	Multi-purpose digital I/O
17	PB11	LPUART1_TX / I2C3_SDA	Multi-purpose digital I/O
18	PB10	UART1_RX / I2C1_SDA	Multi-purpose digital I/O
19	PB2	SPI1_SSEL	Multi-purpose digital I/O
20	PC5	ADC1_14	Multi-purpose digital I/O

PIN	Name	Functions	Descriptions
21	PC6	SPI2_SCLK / UART1_TX / I2C1_SCL / ADC1_16	Digital output
22	PA8	ADC1_15	Multi-purpose digital I/O
23	PA7	SPI1_MOSI / I2C3_SCL / ADC1_12	Digital output
24	PB0	DIGITAL I/O	Multi-purpose digital I/O
25	PB1	LPUART1_RTS	Multi-purpose digital I/O
26	PB12	SPI2_SSEL / LPUART1_RTS	Multi-purpose digital I/O
27	PB13	SPI2_SCLK / LPUART1_CTS / I2C3_SCL	Multi-purpose digital I/O
28	PB14	SPI2_MISO / I2C3_SDA	Multi-purpose digital I/O
29	GND	GROUND	Ground (0V)
30	GND	GROUND	Ground (0V)
31	VCC	POWER	Normal 3,3V
32	VCC	POWER	Normal 3,3V

# Programming and debugging connector



**Figure 3.** Programmer and debug connector.

**Table 3.** IO assignment – programmer and debug connector.

PIN	Name	Functions	Descriptions
1	VCC	POWER	Normal 3,3V
2	PH3	BOOT0	Bootloader mode
3	PA14	SWCLK	Serial Wire Debug interface clock
4	PA13	SWDIO	Serial Wire Debug interface port
5	NRST	RESET	Reset
6	GND	GROUND	Ground (0V)
7	PB7	USART1_RX	Debug RX
8	PB6	USART1_TX	Debug TX
9	PA11	USB_DM	USB Data -
10	PA12	USB_DP	USB Data +



# Device configuration

## General

- Device can be configured through BLE using CLI or mobile application (Android/iOS).
- Firmware Upgrade Over The Air (FUOTA) supported.
- It is recommended that the device be added to the Yosensi Suite system, which allows for easy management of transmitted data.
- All user-configurable parameters in pre-installed firmware are listed in Table 3.

## LoRa

- ISM regions supported: EU868, AU915, AS923, US915.
- LoRaWAN: v1.0.2.
- Supported classes: Class A and Class C.
- Modes supported: OTAA and ABP.
- ADR: enabled by default.

## Internal Peripherals:

- LoRa module connected via SPI1 interface.
- EEPROM connected via I2C1 interface, PA1 PIN used to power up memory chip.
- USB used for Bootloader mode and Firmware Update.
- SWD and UART1 used for debug of device.

**Table 4.** Configurable parameters.

Name	Description	Value	Default	Read / Write
devname	Device name	HWCM	HWCM	R
conntype	Connection type OTAA/ABP	0 – OTAA 1 – ABP	1	R/W
deveui	Device address EUI	8 B (HEX)	must be set	R/W
appkeyotaa	OTAA application EUI	8 B (HEX)	must be set	R/W
keyotaa	OTAA key	16 B (HEX)	must be set	R/W
ntry	OTAA number trials	1 B (HEX)	3	R/W
addrabp	ABP device address	4 B (HEX)	must be set	R/W
nwkskey	Network Session Key	16 B (HEX)	must be set	R/W
appskey	Application Session Key	16 B (HEX)	must be set	R/W
advble	Interval advertising Bluetooth [s]	MS_INPUT <sup>1</sup>	9999 [~ 6 s]	R/W
measinter	Measuring interval LoRa [s]	1-999999	3600 [1 h]	R/W

<sup>1</sup> Calculation formula:  $MS\_INPUT = INTERVAL\_MS * 1.6$

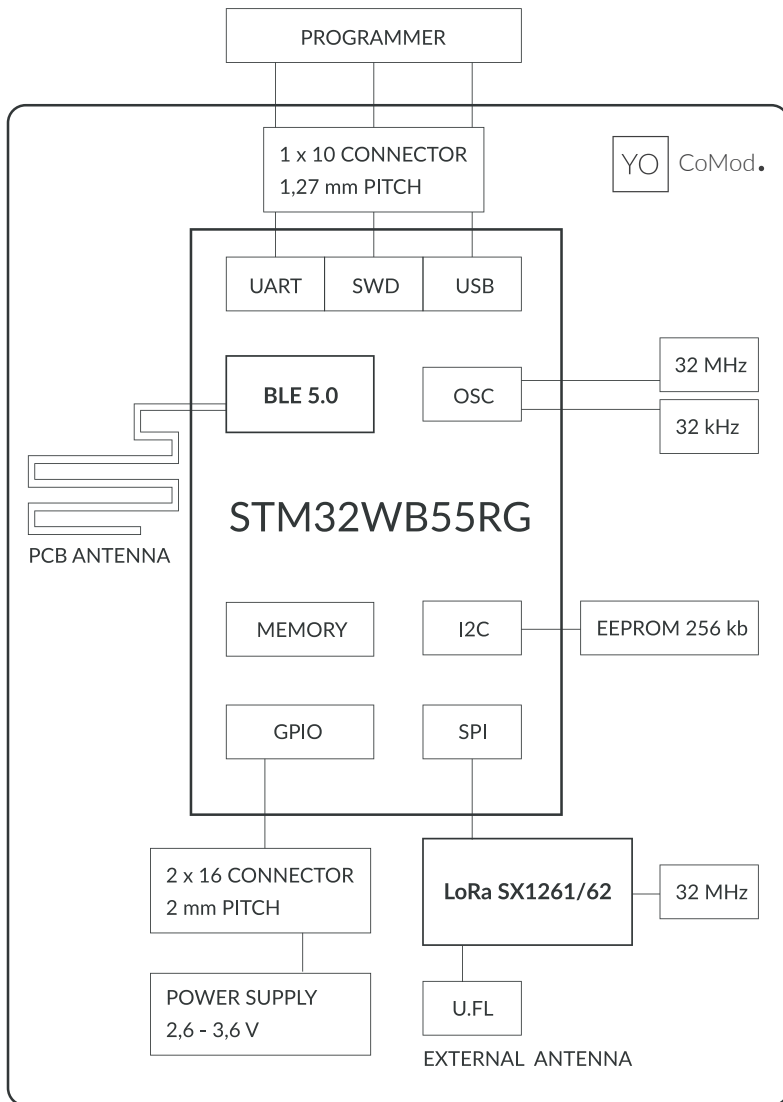


Figure 4. Hardware block diagram.

## Advantages

- Production quality - made in the European Union by qualified engineers.
- Depending on the version, the LoRa radio can operate in different regions (e.g., EU868, US915, AU915), adapted to different ISM frequency bands.
- Very low power consumption – devices run with a long battery life.
- Using Bluetooth Low Energy (BLE) provides:
  - Configuration convenience
  - Possibility of firmware update via OTA
  - Very low energy consumption
- Supported LoRaWAN connection over ABP or OTAA.
- Mobile application for convenient device configuration and network monitoring.
- Access to the Yosensi Suite system for configuring devices and managing infrastructure.

# Electrical and environmental data

**Table 5.** Electrical and environmental characteristics.

Name	Parameter	Test conditions and additional info		Value			
				Min	Typ	Max	Unit
Bluetooth LE	Power consumption	Receive mode		-	4,5	-	mA
		Transmit mode		-	5,2	-	
		BLE advertising		-	2,2	-	
	RX sensitivity	RX		-	-96	-	dBm
	Output power	1 dB steps		-	-	6	
LoRa	Power consumption	SX1261 @ 14 dBm	TX	-	100	-	mA
			RX	-	5	-	
		SX1262 @ 20 dBm	TX	-	110	-	
			RX	-	5	-	
	RX sensitivity	RX		-148	-	-	dBm
	Output power	868 MHz		-	14	-	
		915 MHz		-	20	-	
General	Power supply	DC		2,6	3,3	3,6	V
	Power consumption	Active/operating mode		-	5	110	mA
		Sleep mode		3,8	6,8	-	uA
		Bluetooth LE advertising		-	1,5	-	uA
	Working temperature	-		-20	-	85	°C

# Mechanical data

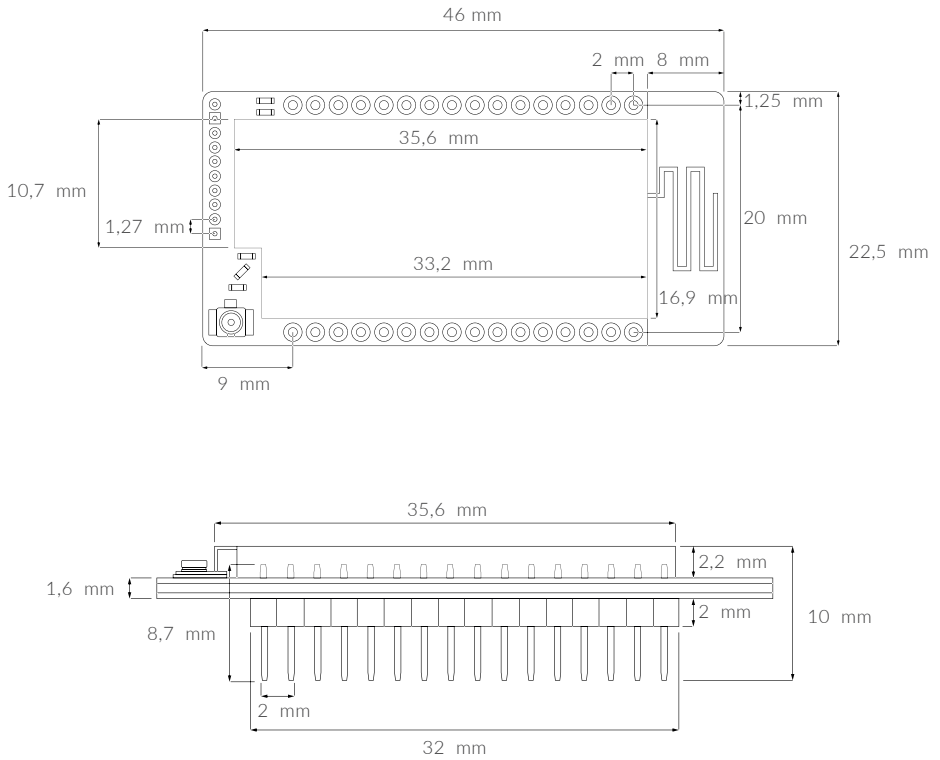


Figure 5. Dimensions.

Table 6. Mechanical characteristics.

Dimensions:	Installation:
Width: 46 mm Length: 22,5 mm Height: 10 mm	2 × 16 pins, 2 mm pitch





# Revision history

Date	Version	Page(s)	Changes
May 2021	1	All	Initial version

The logo for YOSSENSI.IO is displayed in a white rectangular box with a thin black border. The text 'YOSENSI' is in a bold, black, sans-serif font, and '.IO' is in a smaller, lighter weight of the same font. A small green dot is positioned above the 'I' in '.IO'. The background of the entire page is a stylized world map where the continents are filled with intricate white and grey circuit board patterns.

 **LoRa Alliance** Member

## Contact us

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