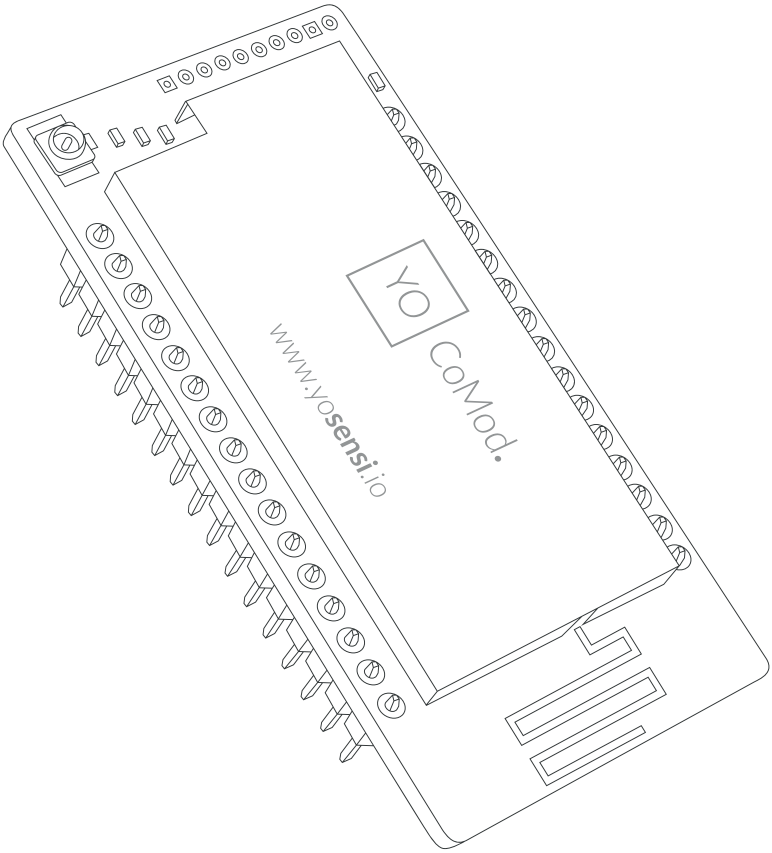
CoMod.

Datasheet



YOSENSI.IO

LoRa Alliance Member

YO CoMod.

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

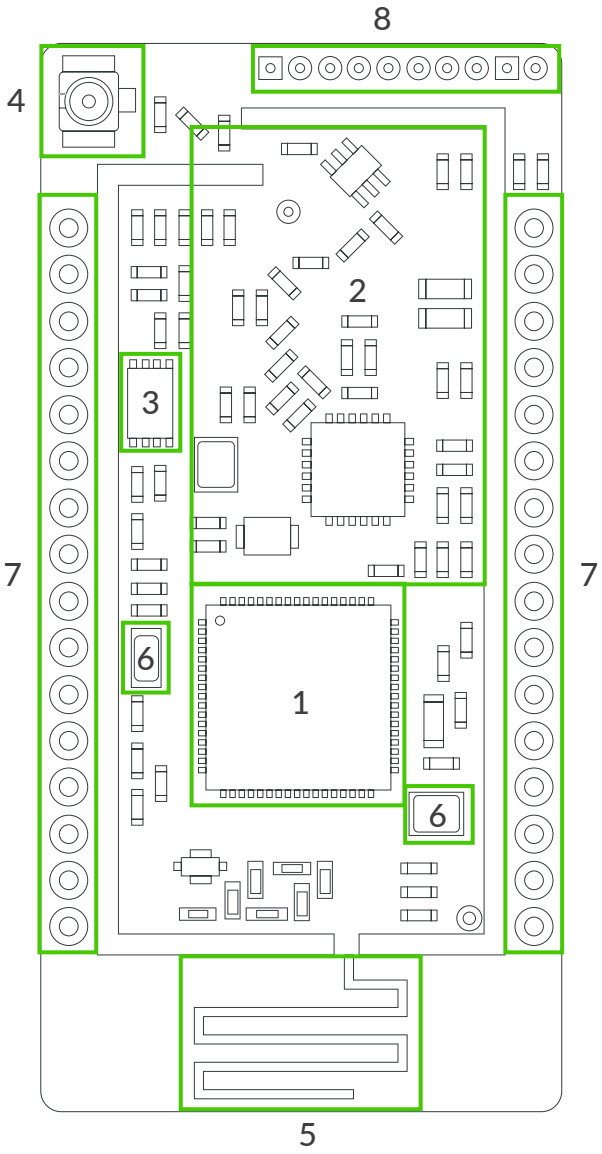


Figure 1. Top board view without protective shield.

Table 1. Components description.

Block	Description
1	• Dual-core, energy-efficient STM32WB55RG processor (VFQFPN68 package). • 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). • CORTEX-M4 core for managing peripherals and communicating with the LoRa interface. • MCU memory: 1 MB flash, 256 kB SRAM. • 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.
2	• LoRa based on Semtech chip SX1261 (868 MHz) or SX1262 (915 MHz). • 32 MHz crystal oscillator for LoRa communication module.
3	• Additional non-volatile 256 kb EEPROM memory CAT24C256 (UDFN-8 package).
4	• U.FL socket for external LoRa antenna.
5	• Internal PCB antenna for BLE 5.0.
6	• 32,768 KHz LSE crystal oscillator for RTC. • 32 MHz HSE crystal oscillator for MCU and BLE radio (2,4 GHz).
7	• Peripherals connectors: 32 pins, arranged as two rows of 16 pins with a 2,0 mm pitch.
8	• Programming and debugging connector: 10 pins, 1,27 mm pitch.

Pin definition

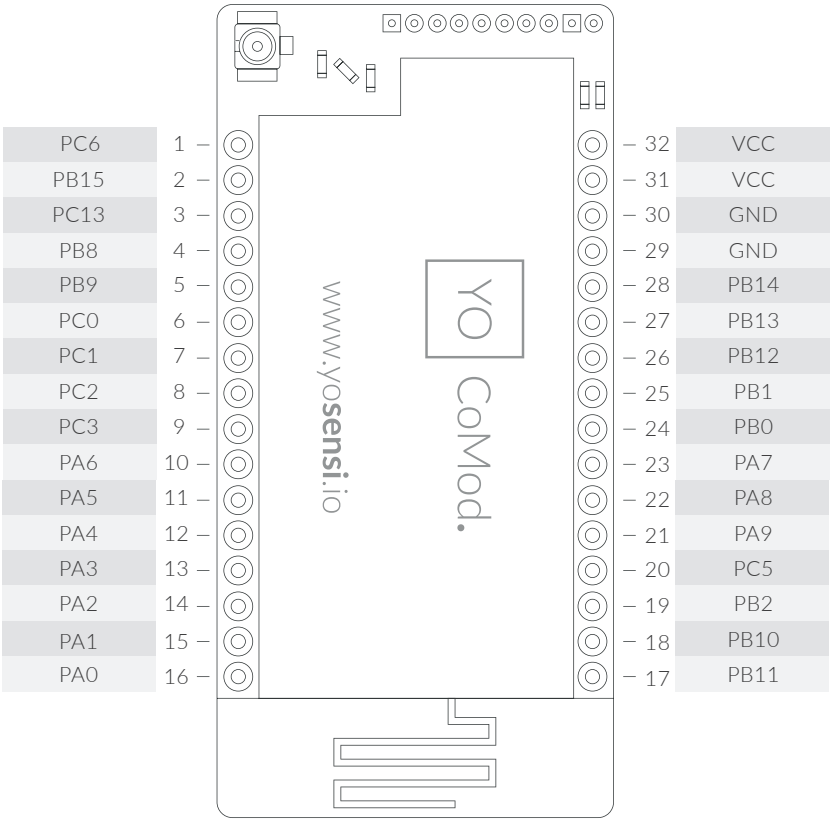


Figure 2. Device pinout.

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

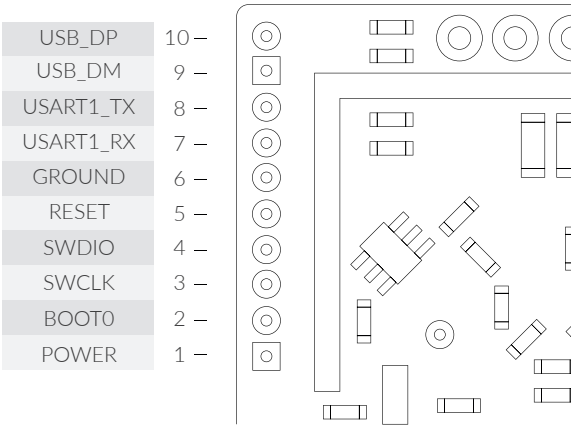


Figure 3. Programmer and debug connector.

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 to add the device to the Yosensi Management Platform, which allows detailed and easy monitoring of the data transmitted by the devices.
- 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[1]	9999 [~ 6 s]	R/W
measinter	Measuring interval LoRa [s]	1-999999	3600 [1 h]	R/W

[1] Calculation formula: MS_INPUT = INTERVAL_MS * 1.6

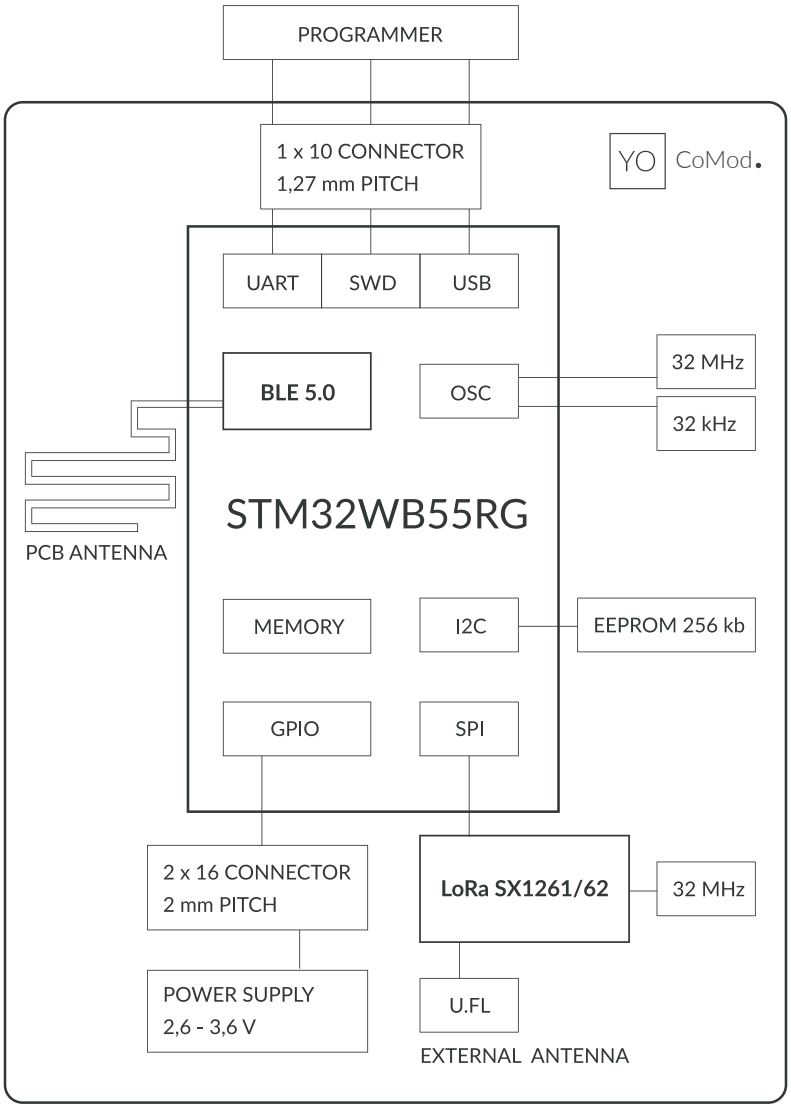


Figure 4. Hardware block diagram.

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 Management Platform 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

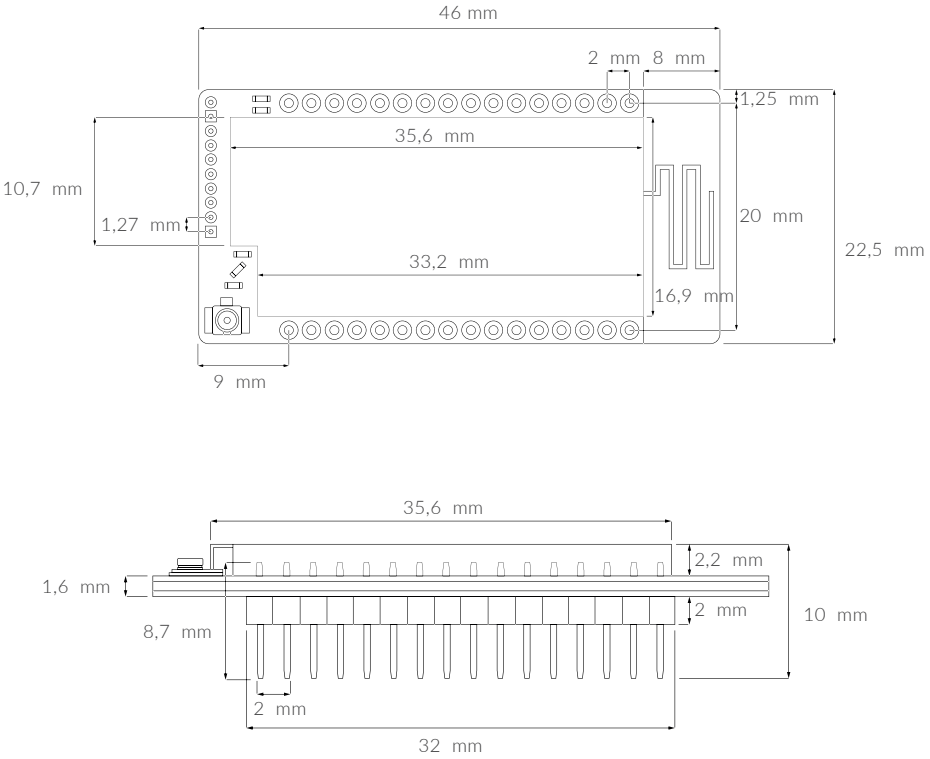


Figure 5. Dimensions.

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

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