ENERGY-INDEPENDENT LoRa/Sigfox WITH SENSORS

INNOITALY
the present future

PRODUCT APPLICATIONS

- ❑ Infrastructure monitoring
- ❑ Smart Home & Office
- ❑ Waste management
- ❑ Agritech Museum Asset
- ❑ Tracking

KEY FEATURES

ULTRA-LOW ENERGY CONSUMPTION

Designed for extremely low power consumption, the device is ideal for long-term applications without the need for frequent battery replacements.

ENERGY AUTONOMY

Equipped with an autonomous power system that utilizes solar energy or other renewable sources, ensuring uninterrupted operation.

HIGH PRECISION MEASUREMENT

Integrated sensor platform with temperature, humidity, acceleration and pressure sensor and the possibility to add sensors with additional dedicated modules.

WIRELESS TRANSMISSION

Long range embedded radio. Configurable SubGHz connectivity (LoRa and Sigfox)

EASY INSTALLATION

The device is compact and lightweight, facilitating installation and maintenance.

DURABILITY

Maintenance-free long-lasting device.

DESCRIPTION

This device combines ultra-low energy consumption with energy autonomy, using solar or renewable power for uninterrupted operation. It features high-precision measurement with integrated sensors for temperature, humidity, acceleration, and pressure, plus options for additional sensor modules. Its wireless transmission supports long-range connectivity via configurable SubGHz (LoRa, Sigfox). Despite its energy-harvesting design, the device also enables remote reprogramming and command execution by receiving LoRa/Sigfox packets. Compact and lightweight, it is easy to install and maintain, offering durability and maintenance-free performance. Applications include infrastructure monitoring, smart home & office, waste management, agritech, museums and other asset tracking scenarios.

TECHNICAL SPECIFICATIONS

Operating frequency	868 MHz (Europe) 915 MHz (US)
Modulation	LoRaand Sigfox
Communicationprotocol	LoRaWAN and Sigfox
Transmission power	Up to 14 dBm
Sensitivity	-137 dB,m
Power supply	Energy harvesting/Battery-free
Operating Temperature	-40°C to +85°C
Dimensions	41 mm x 45 mm x 5 mm
Weight	10 gr (without external case)
Certifications	RED

EMBEDDED SENSORS

1.Temperature and Humidity sensor

Temperature range	-40°C to +85°C
Temperature accuracy	±0.1°C
Humidityrange	0% to 100% RH
Humidity accuracy	±1.8% RH

2.Acceleration Sensor

Measurement range	±2g / ±4g / ±8g /±16g (±16g by default)
Output data rate:	1.6 Hz to 1600 Hz (1600 Hz by default)
Low noise	down to 181 μg/√Hz
ODR	1.6 Hz to 800 Hz High-
Digital output interface	speed I2C and SPI

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3.Pressure sensor

Pressure range	260 hPa to 1260 hPa
Pressure accuracy	±0.2 hPa
Low pressure sensor noise	0.34 hPa
High-performance TCO	0.45 Pa/°C
Temperature compensation	Embedded
Pressure data output	24-bit
ODR	1 Hz to 200 Hz
Digital output interface	High-speed I2C and SPI

ADDITIONAL SENSORS

- The system includes a connector for adding and integrating additional sensors on a daughter board.
- The connector provides power to the sensors and enables communication with the microcontroller via high-speed I2C and SPI interfaces.

ENERGY TRANSDUCER

The system embeds an energy transducer with a boost converter to be used with harvesters having an open-circuit voltage (Voc) less than 3.0 V. For harvesters with an opencircuit voltage Voc greater than 3.0 V, the boost converter is optional. It is therefore recommended, whenever possible, to use transducers with an open-circuit voltage greater than 3.0V and an operating voltage of 2.5V to achieve greater energy efficiency and cost effectiveness. The minimum power that the energy transducer must provide is 30 µW.

Boost converter	Embedded to be used with harvesters with V∞< 3.0V
Optional Boost converter	For harversters with V∞> 3.0V
RecommendedTransuderOpen	V ∞ _Min= 3.0V ∞ = 2.5V
RecommendedOperating Voltage	V ∞ = 2.5 V
Minimum Output Power	P_{out} = 30 µW
Efficiency	Greater energy efficiency and cost-effectiveness with V ∞ = 3.0V

BLOCK DIAGRAM

Block diagram of the Maintenance-Free Wireless Sensor Node, illustrating the main components and their interconnections.