RAK2560C WisNode Sensor Hub

atasheet Overview

Description

The RAK2560C WisNode Sensor Hub is a modular sensor ecosystem consisting of the main body and multiple pre-configured sensor probes. With pluggable, interchangeable probes, and the option to add third-party sensors to the mixture, the Sensor Hub is a suitable and versatile solution platform for various IoT applications where environmental monitoring is needed.

The Sensor Hub consists of a robust waterproof enclosure with two (2) sensor probe ports to connect the sensors or an external power source like a solar panel.

The device can work in full battery mode or with an external power supply depending on the deployment location.

The Sensor Hub and its sensor probes are easily configured via the WisToolBox app, available for mobile and desktop.

Product Features

- LoRa 868-930 MHz support
- Based on RAK4630⧉ (MCU: nRF52840, Radio Chip: SX1262)
- RUI3⧉ - based code
- Auto-detection of the power source
- Auto-detection of the Sensor Probes
- 2~4 pcs 3.6 V ER18505 4000 mAh Li-SOCl2 primary lithium batteries
- 12 V_{DC} over power supply or solar panel
- NB-IoT interface module (RAK5860C ⧉) support (optional)
- Embedded antenna
  - High efficiency (over 75%) LoRa Band 860~930 MHz
  - Support 700~960 MHz and 1700~2170 MHz.
- NFC tag for power on and smart connect over BLE
- Prevent theft via the hall effect sensor on the exclusive mounting bracket
- IP67-rated waterproof enclosure
- Sensor ports can host multiple Sensor Probes via Probe Splitters

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Overview

Main Specifications

Feature	Specification
Wireless technology	Support LoRa end node (915 MHz / 868 MHz) Support Bluetooth for easy setup Support NFC for easy setup
Antenna	1 x internal: high-gain and high-efficiency LoRa antenna (also support NB-IoT) 1 x internal: NFC antenna 1 x internal: Bluetooth antenna
External interfaces	2 x SP11 connector (IP67) for multiple-purpose sensors The SP11 supports a 12 V power adapter and a solar panel kit for external power
Weatherproof design	IP67 rated SP11 connector for professional installation and fast deployment Plastic top (UL-746C), UV-resistant Metal body, die-casted, with solid and good thermal dissipation Internal gasket (UL-94V0)
Power source	+12 V_{DC} at 1 A (12 W) power adapter Support 12 V_{DC} solar panel 4 x ER18505 Li-SOCl2 batteries (4000 mAh)
Mounting options	Solid mounting kit for wind speed load of 215 km/h Pole-mount (vertical or horizontal) Wall-mount
Enclosure dimensions	120 x 80 x 39 mm
Surge and ESD	6 kV surge and 8 kV ESD protection
Working environment	-30° C to +60° C Suitable for indoor use
Storage temperature	-40° C to +80° C

Dimensions

The dimensions for the body of the Sensor Hub are 120 x 80 x 39 mm. There are two equal physical ports for Sensor Probe—the DC supply and the Probe IO at the bottom of the enclosure.

Figure 1: RAK2560C WisNode Sensor Hub dimensions

Block Diagram

The **RAK2560C Sensor Hub** uses RAK4630 as a core. The One-wire protocol provides easy connection and easy assembly. The device supports two kinds of wireless communication, LoRa, and NB-IoT that are switchable. A hybrid power system provides more possibilities to customize the Hub to correspond to the customer/market demands.
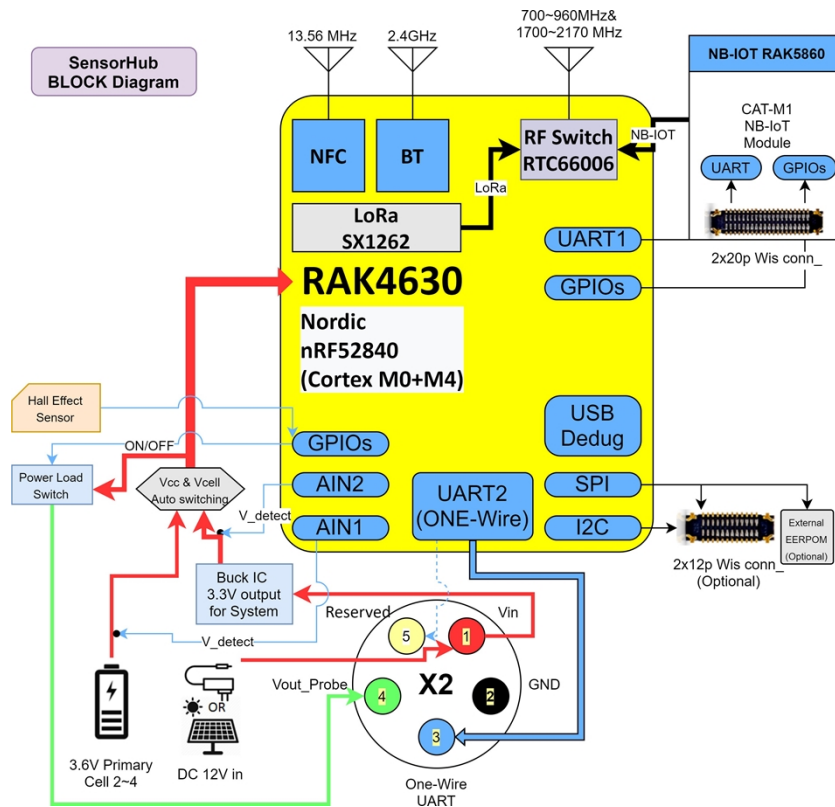

Figure 2: RAK2560C WisNode Sensor Hub block diagram

Hardware

The hardware specification is categorized into five (5) parts. It shows the pinouts of the sensor hub and their corresponding functions and diagram. It also covers the rf, power supply, and environmental characteristics that include the tabular data of the functionalities and standard values of the RAK2560C WisNode Sensor Hub.

Pin Definition

Each of the two ports has five (5) pins and they are the same for both ports.
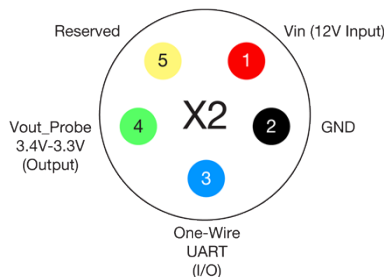

Figure 3: RAK2560C WisNode Sensor Hub pin definition

Pin No.	Name	Type	Description	Remarks
1	Vin	PI	12 V_{DC} supply	Input 5~16 V

Pin No.	Name	Type	Description	Remarks
2	GND	-	Ground	-
3	One-wire UART	IO	Communication with probe	-
4	Vcc_Probe	PO	Power supply for the probe	3.3 V_{DC} support mode; 3.4 V battery mode
5	Reserved	-	Not defined	Reserved for future applications

RF Characteristics

Operating Frequencies

The board supports the following LoRa frequency channels, allowing easy configuration while building the firmware from the source code.

Region	Frequency
Europe	EU868
North America	US915
Asia	AS923, AS920
Australia	AU915
Korea	KR920
India	IN865

> ☐ **NOTE:**
>
> The above frequency band parameters are different, depending on the region, and comply with the local regulatory requirements. Have your location in mind when placing an order.

Power Supply

The **RAK2560C Sensor Hub** must be supplied through the 12 V SP11 pins by a DC power supply or 4 x EVE ER18505 3.6 V Lithium 4000 mAh battery and the voltage must be stable.

Power Consumption

Mode	Condition	Min	Typical	Max
Active mode (TX)	The power of TX channel is 20 dBm and 3.6 V supply	110 mA	120 mA	130 mA
Active mode (RX)	TX disabled and RX enabled	7.5 mA	8.55 mA	15 mA

Mode	Condition	Min	Typical	Max
Active mode (idle)	TX disabled and RX disabled. MCU wake up	3.0 mA	3.3 mA	3.6 mA
Sleep mode	Sleep mode	13 uA	15 uA	20 uA

Environmental Requirements

Operating Conditions

Parameter	Min	Typical	Max
Normal operating temperature	−30° C	+25° C	+80° C

Sensor Connection Diagram

The **RAK2560C** can support both Sensor Probes and Probe IO in all possible combinations.

> ☐ **NOTE:**
>
> If you want to add a Probe IO to your setup, the Sensor Hub must be supplied by an external 12 V_{DC} power source.
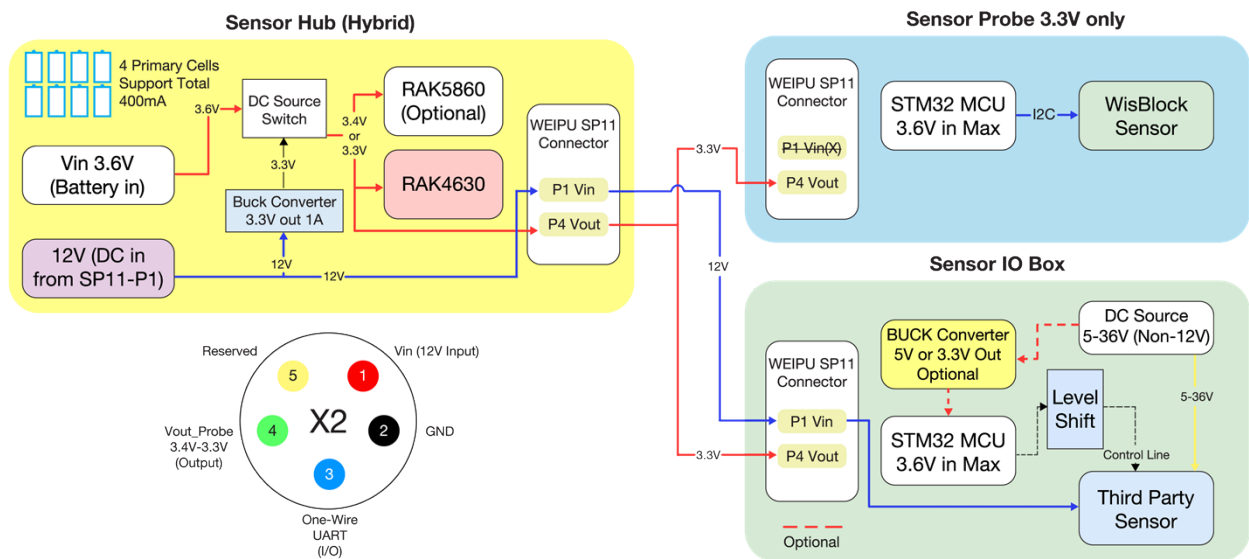

Figure 4: RAK2560C WisNode Sensor Hub connection schematics

Software

Supported Protocol	Description
NFC	For waking up the Sensor Hub via the WisToolBox App
BLE	For pairing the Sensor Hub to a mobile device for configuration via the WisToolBox App
LoRaWAN	For data transfer, provided by the RAK4630 WisBlock LPWAN module
NB-IoT	For data transfer, optional, provided by the RAK5860 WisBlock NB-IoT interface module
One-wire UART	For communication between the Sensor Probe/Probe IO and the Hub

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.

FCC Caution:
Changes or modifications not expressly approved by the part responsible for compliance could void the user's authority to operate the equipment.

FCC Statement:
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. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures

—Reorient or relocate the receiving antenna.
—Increase the separation between the equipment and receiver.
—Connect the equipment into an outlet on a circuit different from that to which the receiver is connected. —Consult the dealer or an experienced radio/TV technician for help.

FCC RF Radiation Exposure Statement:
This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

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:1. This device may not cause interference. 2. This device must accept any interference, including interference that may cause undesired operation of the device.

Ce dispositif contient des émetteurs exonérés de permis(s)/récepteurs)s qui sont conformes aux RSS (s) exemptés de licence du Canada. L'opération est soumise aux deux conditions suivantes : 1. Cet appareil peut ne pas causer d'interférences. 2. Ce dispositif doit accepter toute interférence, y compris les interférences qui peuvent provoquer un fonctionnement indésirable de l'appareil.

RSS-102 Statement:
This equipment complies with IC RSS-102 radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator and your body.

Cet équipement est conforme aux limites d'exposition aux radiations IC CNR-102 établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec une distance minimale de 20 cm entre le radiateur et votre corps.