RAK4600 LoRa Module

WisDuo-LoRa Series

Version V1.2 | November 2019

10 PAGES

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1. Overview

1.1 Introduction

RAK4600 LoRa Module includes an RF52832 MCU and an SX1276 LoRa chip. It has Ultra-Low Power Consumption of 2.0uA in sleep mode, high LoRa output power up to 20dB max in work mode, and BLE output power up to 4dBm.

The module complies with LoRaWAN 1.0.2 protocols. It also supports Lora Point to Point communications. The Module supports BLE 5.0 in addition to LoRa. Its RF communication capabilities (LoRa+BLE) make it suitable for a variety of applications in the IoT field.

1.2 Main Features

- LoRa module for Smart City, Smart Agriculture, Smart Industry
- Compact Form Factor: 15 x 23 x 2.5 mm
- 42 Pin Stamp Pad for PCB SMT mounting
- I/O ports: UART/I2C/GPIO (optional NFC interface)
- Temperature range: -40°C to +85°C
- Supply voltage: 2.0 ~ 3.6V
- Frequency range: 863–870MHz (EU) / 902–928MHz (US)
- Low-Power Wireless Systems with 7.8kHz to 500KHz Bandwidth
- Ultra-Low Power Consumption 2.0uA in sleep mode
- LoRa PA_Boost mode with 20dBm output power
- BLE5.0 (Tx power -20 to +4 dBm in 4dB steps)

2. RAK4600 LoRa Module

2.1 Overview

The figure below shows the top view of the RAK4600 LoRa Module. The dimensions of the Module are 15 x 23 x 2.5 mm.

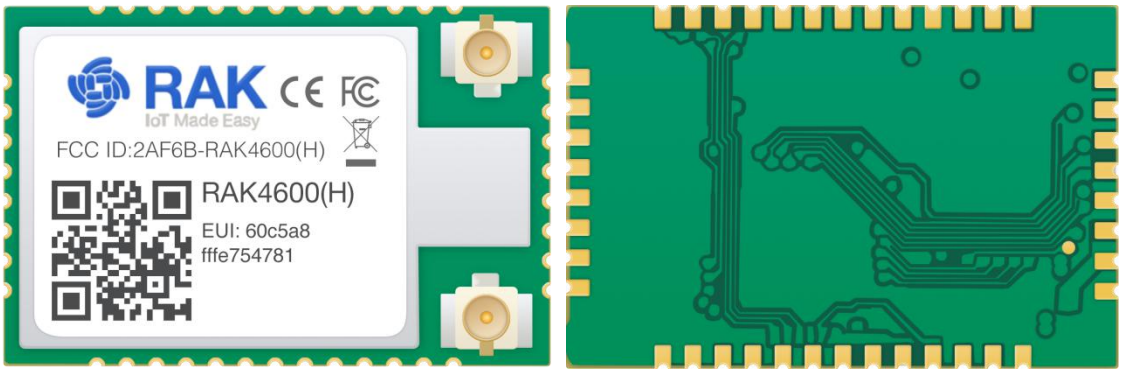


***Figure 1** | RAK4600 LoRa Module*

2.2 Block Diagram

The Block diagram below shows the external interfaces of the RAK4600 LoRa Module.

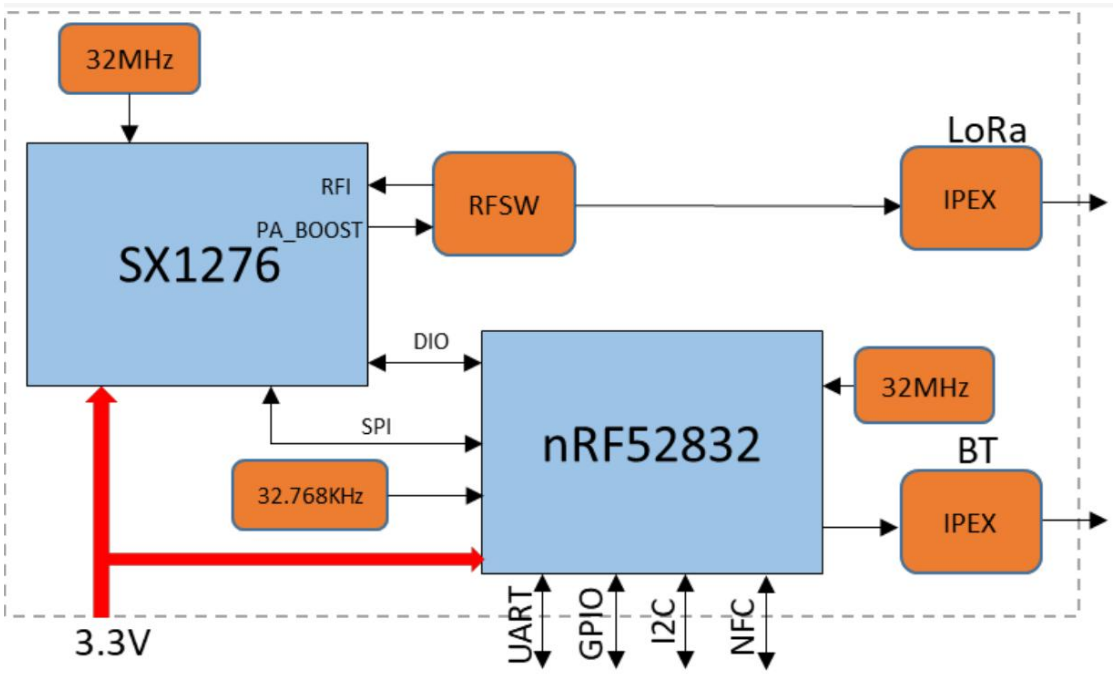


***Figure 2** | Block Diagram*

2.3 Supported LoRaWAN Bands

The RAK4600 LoRa Module supports the high LoRaWAN bands (refer to the Table 1).

Region	Frequency (MHz)
Indian	IN865
Europe	EU868
North America	US915
Australia	AU915
Korea	KR920
Asia	AS923

Table 1 | *Operating Frequencies*

2.4 Pin Definition & Pin Out

The figure below shows the pin out of the RAK4600 LoRa Module.

Figure 3 | *Pinout*

The table below shows the pin definition of the RAK4600 LoRa Module.

Pin	Name	I/O	Description
1	GND	-	Ground
2	NC	-	NC
3	NC	-	NC
4	I2C1_SDA	I/O	I2C,General purpose I/O (p0.13)
5	I2C1_SCL	I/O	I2C,General purpose I/O (p0.12)
6	NFC1	I/O	General purpose I/O、NFC antenna connection(p0.09)
7	NFC2	I/O	General purpose I/O、NFC antenna connection (p0.10)

8	GND	-	Ground
9	USART2_RX	I/O	USART2_RX (General purpose I/O p0.18)
10	USART2_TX	I/O	USART2_TX (General purpose I/O p0.19)
11	NC	-	NC
12	GND	I/O	Ground
13	GND	-	Ground
14	GND	-	Ground
15	RF_BT	I/O	BLE RF OUT
16	GND	-	Ground
17	RF_L	I/O	LoRa RF OUT
18	GND	-	Ground
19	GND	-	Ground
20	GDD	-	Ground
21	GPIO1/P0.14	I/O	General purpose I/O (p0.14)
22	USART1_RX	I/O	USART1_RX (General purpose I/O p0.22)
23	USART1_TX	I/O	USART1_TX (General purpose I/O p0.23)
24	GPIO2/P0.17	I/O	General purpose I/O p0.17
25	NC	-	NC
26	NC	-	NC
27	NC	-	NC
28	NC	-	NC
29	NC	-	NC
30	NC	-	NC
31	GND	-	Ground
32	NC	-	NC
33	NC	-	NC
34	NC	-	NC
35	NC	-	NC
36	MCU_NRST	I/O	MCU reset
37	SYS_SWDIO	I/O	SYS_SWDIO
38	SYS_SWDCLK	I/O	SYS_SWDCLK
39	GND	-	Ground
40	3V3_IN	-	Input power
41	3V3_IN	-	Input power
42	GND	-	Ground

***Table 2** | Pin Definitions*

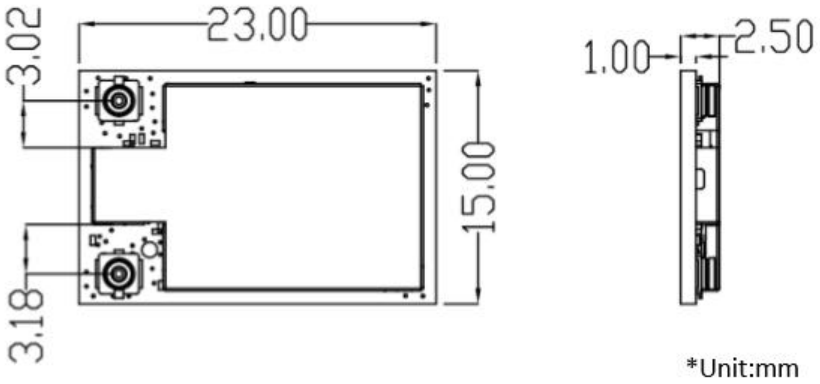
2.5 Power Consumption

Item	Power Consumption	Condition
Tx mode LoRa @20dBm	125mA	LoRa @ PA_BOOST &BT sleep
Tx mode LoRa @17dBm	92mA	LoRa @ PA_BOOST &BT sleep
Tx mode BT@4dBm	9mA	BT Tx mode & Lora sleep
Rx mode LoRa @37.5Kbps	17mA	LoRa @ Receive mode &BT sleep
Rx mode BT@2Mbps	11.5mA	BT Rx mode & Lora sleep
Sleep mode	2.0uA	LoRa&BT sleep

Table 3 | *Power Consumption*

2.6 Mechanical Dimensions

The figure below shows the mechanical dimension of the RAK4600 LoRa Module.



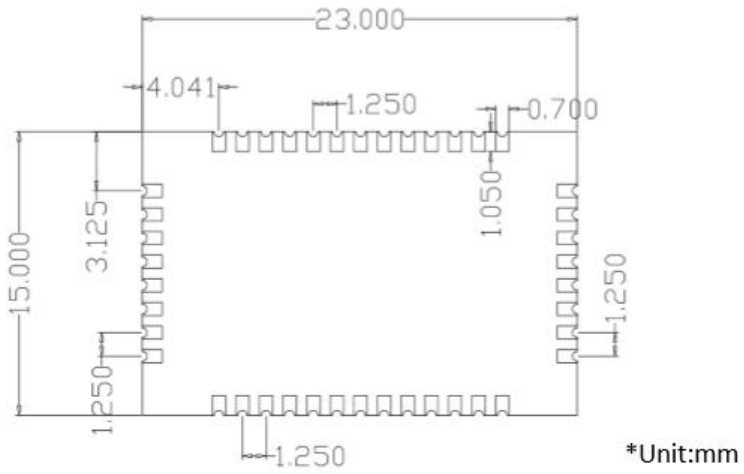


***Figure 4** | Mechanical Dimensions*

2.7 Recommended Reflow Profile

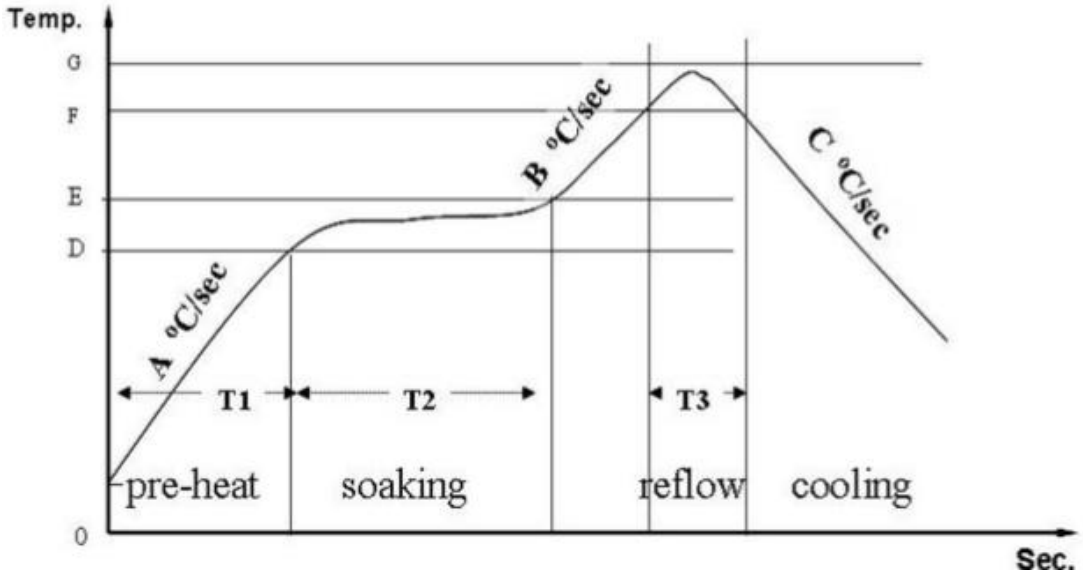


***Figure 5** | Recommended Reflow Profile*

Standard conditions for reflow soldering:

- Pre-heating Ramp (A) (Initial temperature: 150℃): 1~2.5℃/sec;
- Soaking Time (T2) (150℃~180℃): 60sec~100sec;
- Peak Temperature (G): 230~250℃;
- Reflow Time (T3) (>220℃): 30~60 sec;
- Ramp-up Rate (B): 0~2.5℃/ sec;
- Ramp-down Rate (C): 1~3℃/ sec.

Please contact us if you need technical support or need more information.

Support center: https://forum.rakwireless.com/

Start guide and software firmware download:

https://downloads.rakwireless.com/en/LoRa/RAK4600/

Email us: info@rakwireless.com

3. Revision History

Revision	Description	Date
1.0	Initial version	2019-05-27
1.1	Revision of parameters	2019-10-24
1.2	Revision of power consumption	2019-11-22

4. Document Summary

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