RAK4270 Breakout Board Datasheet

Overview

Description

RAK4270 Breakout Board is a simple board specially designed to facilitate the external connection of RAK4270 pins. The main purpose is to access the pins of the stamp module over two (2) rows of 2.54 mm headers. Hence, it is convenient to debug the RAK4270 Breakout Board.

The RAK4270 Breakout Board includes a **STM32L071 MCU** and a **SX1262 LoRa chip**, which supports eight spreading factors (**SF5** ~ **SF12**) and signal bandwidth that can be adjusted between **7.8 kHz** to **500 kHz**. It has Ultra-Low Power Consumption of 2.31 μ A (down to 1.61 μ A @ 2.0 V) in sleep mode, but during the Transmit mode, it can reach the maximum output power of **22 dBm**. As a receiver, it can achieve a sensitivity of **-148 dBm**.

The module complies with the LoRaWAN 1.0.2 protocol, so it can be used for implementing LoRa networks or Lora point-to-point communications. The module is suitable for various applications that require long-range data acquisition and low power consumption, such as smart meters, supply chain and logistics tracking, agricultural sensors, smart cities, etc.

This module is expected to be controlled by an external controller through its UART interface by sending a set of AT commands. These AT commands control not only the state of this module but also set the LoRaWan communication parameters and payloads (refer to the AT Command Manual).

Features

- · LoRa module for Smart City, Smart Agriculture, Smart Industry
- I/O ports: UART/I2C/GPIO
- Temperature range: -40 °C to +85 °C
- Supply voltage: 2.0 ~ 3.6 V
- Supported bands: EU433, CN470, IN865, EU868, AU915, US915, KR920, and AS923-1/2/3/4
- Low-Power Wireless Systems with 7.8 kHz to 500 kHz bandwidth
- Ultra-Low Power Consumption of 2.31 μA (down to 1.61 μA @ 2.0 V) in sleep mode
- Core: ARM 32-bit Cortex M0+ with MPU
- Up to 128 KB flash memory with ECC
- 20 KB RAM
- 6 KB of data EEPROM with ECC

Specifications

Overview

The RAK4270 Breakout Board is shown in **Figure 1** that displays the top view of the module and the dimensions of the board.

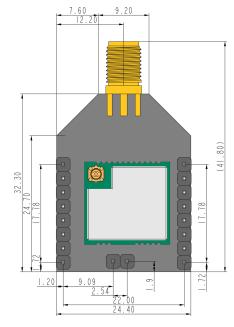


Figure 1: RAK4270 Breakout Board Dimensions

Hardware

Hardware specification is categorized into five parts. It covers the interfacing, pinouts and their corresponding functions and diagrams. It also covers the RF and electrical parameters that include the tabular data of the functionalities and standard values of the RAK4270 Breakout Board.

Interfaces

SWD Programming Interface

To program the breakout board with the DAPLink tool, the following pins are required:

Connector/Pin	Name	I/O	Description	Alternate Functions
J1 5	SWDIO	I/O	Programming (STM32L071KBU6 PA13)	SWDIO, LPUART1_RX
J1 6	SWCLK	I/O	Programming (STM32L071KBU6 PA14)	SWCLK, USART2_TX, LPUART1_TX
J2 1	VDD	-	DC3V3	Supply voltage 2.0~3.3 V
J2 4	GND	-	Ground	-
J2 5	MCU_NRST	I/O	MCU reset (STM32L071KBU6 NRST)	-



It is recommended to keep these GPIO's unconnected and not to use them to connect sensors, buttons, or other external components.

UART Port

There are two UART ports on the RAK4270 Breakout Board. UART2_RX and UART2_TX are used as a command port and UART1_TX and UART1_RX are used as a command or upgrade port. It is recommended to connect UART2 to an external MCU and use UART1 for debugging and flashing.

I2C Port

I2C_SCL and I2C_SDA are the I2C port. Depending on the external device connected to it, it might be necessary to add 10 k Ω pull-up resistors to these lines.

RF Port

The RF port is by default equipped with an SMA connector. If you need an IPEX connector, contact the customer service in advance. RAKwireless will replace the SMA connector with an IPEX-type connector.

Pin Definition

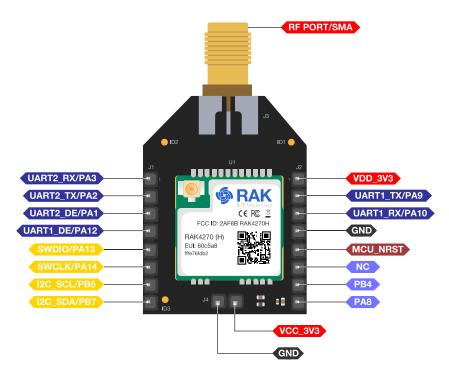


Figure 2: RAK4270 Breakout Board Pinout

The pin definitions of the RAK4270 Breakout Board are shown in the following tables below:

J1 Pin Definitions

Pin	Name	I/O	Description	Alternate Functions
1	UART2_RX	I	AT command UART (STM32L071KBU6 PA3)	TIM21_CH2, TIM2_CH4, USART2_RX, LPUART1_RX
2	UART2_TX	0	AT command UART (STM32L071KBU6 PA2)	TIM21_CH1, TIM2_CH3, USART2_TX, LPUART1_TX, COMP2_OUT
3	UART2_DE	I/O	GPIO (STM32L071KBU6 PA1)	EVENTOUT, TIM2_CH2, USART2_RTS/ USART2_DE, TIM21_ETR, USART4_RX
4	UART1_DE	I/O	General GPIO or UART(Reserved) (STM32L071KBU6 PA12)	SPI1_MOSI,EVENTOUT, USART1_RTS/ USART1_DE, COMP2_OUT
5	SWDIO	I/O	Programming (STM32L071KBU6 PA13)	SWDIO, LPUART1_RX
6	SWCLK	I/O	Programming (STM32L071KBU6 PA14)	SWCLK, USART2_TX, LPUART1_TX
7	I2C_SCL	I/O	I2C interface (STM32L071KBU6 PB6)	USART1_TX, I2C1_SCL, LPTIM1_ETR
8	I2C_SDA	I/O	I2C interface (STM32L071KBU6 PB7)	USART1_RX, I2C1_SDA, LPTIM1_IN2, USART4_CTS

J2 Pin Definitions

Pin	Name	I/O	Description	Alternate Functions
1	VDD	-	DC3V3	Supply voltage 2.0~3.3 V
2	UART1_TX	I/O	Upgrade UART or General GPIO (STM32L071KBU6 PA9)	MCO, USART1_TX, I2C1_SCL, I2C3_SMBA
3	UART1_RX	I/O	Upgrade UART or General GPIO (STM32L071KBU6 PA10)	USART1_RX, I2C1_SDA
4	GND	-	Ground	-
5	MCU_NRST	I/O	MCU reset (STM32L071KBU6 NRST)	-
6	PA8	I/O	STM32L071KBU6 PA8	MCO, EVENTOUT, USART1_CK, I2C3_SCL
7	PB4	I/O	STM32L071KBU6 PB4	SPI1_MISO, TIM3_CH1, TIM22_CH1, USART1_CTS, USART5_RX, I2C3_SDA
6	NC	I/O	Not Connected	-

J4 Pin Definitions

Pin	Name	I/O	Description	Alternate Functions
1	VDD	-	DC3V3	Supply voltage 2.0~3.3 V
2	GND	-	Ground	GND

RF Characteristics Operating Frequencies

The RAK4270 Breakout board supports the following LoRaWAN bands:

Module	Region	Frequency (MHz)
RAK4270(L)	Europe	EU433
	China	CN470
RAK4270(H)	India	IN865
	Europe	EU868
	North America	US915
	Australia	AU915
	Korea	KR920
	Asia	AS923

Electrical Characteristics Power Consumption

Values listed in the table are values measured with a LoRa frequency of **868 MHz**:

Mode	Output Power	Current
Transmit	21 dBm	124 mA on PA_BOOST
Transmit	20 dBm	118 mA on PA_BOOST
Transmit	17 dBm	102 mA on PA_BOOST
Transmit	14 dBm	90 mA on PA_BOOST
Receive	<u>-</u>	15 mA

Sleep Current

Feature	Condition	Minimum (2.0V)	Typical (3.3V)	Maximum	Unit
Current Consumption	EU868	1.74	2.19		μΑ
	US915	1.61	2.31		μΑ

Schematic Diagram

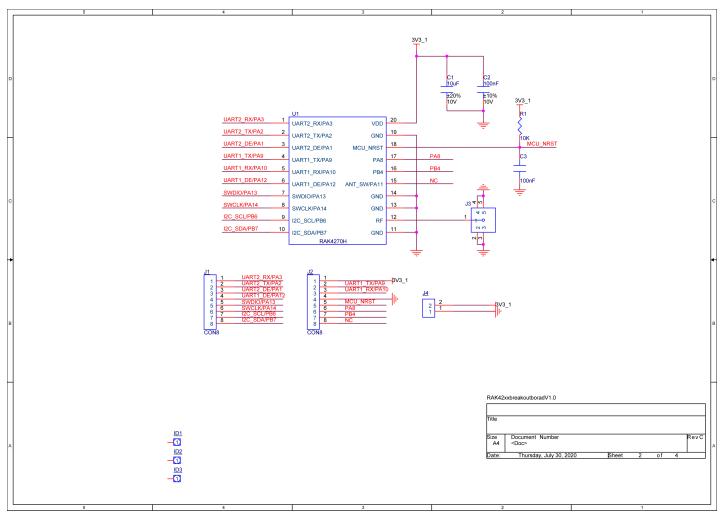


Figure 3: RAK4270 Breakout Board Schematic

Software

Download the latest firmware of the RAK4270 WisDuo LPWAN Module as provided in the table below.



The **bin file** contains the application code only, and you need the RAK DFU Tool to upload this file to the module.

The **hex file** contains both the bootloader and the application code. You need to use STM32CubeProgrammer to upload this.

Firmware

Model	Version	Source
RAK4270	V3.3.0.18	Download ☑