RAK3272S Breakout Board Datasheet

Overview

Description

RAK3272S Breakout Board is specifically designed to allow easy access to the pins on the board in order to simplify development and testing. The breakout board footprint is based on the XBee form factor, and its main purpose is to allow the RAK3172 stamp module pins to be transferred to 2.54 mm headers.

The board itself has the RAK3172 at its core, integrating a STM32WLE5CC chip. It has Ultra-Low Power Consumption of 1.69 uA in sleep mode.

This module complies with Class A, B, & C of LoRaWAN 1.0.3 specifications. It also supports LoRa Point-to-Point (P2P) communication mode, which helps you in implementing your own customized long-range LoRa network quickly.

Features

- Based on RAK3172
- Custom firmware using Arduino via RUI3 API
- I/O ports: UART/I2C/GPIO/SPI
- Serial Wire Debug (SWD) interface
- Module size: 25.4 x 32.3 mm
- Ultra-low-power consumption of 1.69 μA in sleep mode
- Supply Voltage: 2.0 V ~ 3.6 V
- Temperature Range: -40 °C ~ 85 °C

Specifications

Overview

The top view of the RAK3272S Breakout Board is shown in Figure 1.



Figure 1: RAK3272S Top and Bottom View

Hardware

The hardware specification is categorized into five parts. It discusses the interfacing, pinouts, and their corresponding functions and diagrams. It also covers the electrical and mechanical parameters of the board, including the tabular data of the functionalities and standard values.

Interface

SWD Programing Interface

When programming via a ST-Link tool, it is required to have all of the following four pins connected to your ST-Link tool:

- 3V3
- SWDIO
- SWCLK
- GND

UART Interface

This board has two UART interfaces:

- UART1 (can allow AT commands if configured via RUI3 Serial Port Mode)
- UART2/LPUART1 (allows AT Commands and FW Update)

I2C and SPI Interface

Only one I2C and SPI interface of RAK3272S:

- I2C2
- SPI1

RF Interface

J3 is soldered to the antenna connector. Depending on your choice, it comes with either SMA or IPEX style connector. Make sure to select the one you need when ordering.

Pin Definition



Figure 2: RAK3272S Breakout Board Pinout

J5 Pin Definitions

Pin	Name	Description	STM32WLE5CC Pin
1	SPI_MOSI	GPIO and SPI (MOSI)	PA7
2	SPI_MISO	GPIO and SPI (MISO)	PA6
3	SPI_CLK	GPIO and SPI (CLK)	PA5
4	SPI_CS	GPIO and SPI (NSS)	PA4
5	UART1_RX	UART1 Interface	PB7
6	UART1_TX	UART1 Interface	PB6
7	GND	Ground	-
8	BOOT0	Boot0 mode enable pin - high active	-
9	3V3	Power Supply	-

J4 Pin Definitions

Pin	Name	Description	STM32WLE5CC Pin
1	I2C2_SDA	I2C2 interface	PA11
2	I2C2_SCL	I2C2 interface	PA12
3	RST	MCU Reset	-
4	GND	Ground	-
5	SWDIO	SWD debug pin (SWDIO)	PA13
6	SWCLK	SWD debug pin (SWCLK)	PA14
7	UART2_TX	UART2/LPUART1 Interface (AT Commands and FW Update)	PA2
8	UART2_RX	UART2/LPUART1 Interface (AT Commands and FW Update)	PA3
9	3V3	*Power Supply (check warning)	-

WARNING

- The J4 pin definition table is applicable to RAK3272S VerC. If you have RAK3272S VerB, pin 9 is not 3V3 but connected to PA8.
- A dedicated internal SPI interface called SUBGHZSPI is used to communicate with the RF subsystem of the STM32WLE5CC.

RF Characteristics

The RAK3272S module supports the LoRaWAN bands shown in the table below. When buying a RAK3272S module, pay attention to specify the correct core module RAK3372PL or RAK3372 for your region. In which L for low-frequency regions, no suffix (RAK3172P) means High-frequency.

Module	Core Module	Region	Frequency
RAK3272SL	RAK3172PL	Europe	EU433
	RAK3172PL	China	CN470
RAK3272S	RAK3172P	Europe	EU868
	RAK3172P	North America	US915
	RAK3172P	Australia	AU915
	RAK3172P	Korea	KR920
	RAK3172P	Asia	AS923-1/2/3/4
	RAK3272P	India	IN865
	RAK3272P	Russia	RU864

Electrical Characteristics

Power Consumption

Feature	Condition	Minimum	Typical	Maximum	Unit
Operating Current	TX Mode	87(@ 20 dBm 8680 MHz)	-	-	mA
	RX Mode	5.22	-	-	mA
Sleep Current	EU868	-	1.69		uA
	CN470	-	1.69		uA

Operating Voltage

Feature	Minimum	Typical	Maximum	Unit
VCC	2.0	3.3	3.6	V

Schematic Diagram





Figure 3: RAK3272S Schematic Diagram

Mechanical Characteristics

Figure 4 show RAK3272S board dimensions.



Figure 4: RAK3272S Mechanical Dimensions

Software

Download the latest firmware of the RAK3272S Breakout Board provided below. RAK3272SL and RAK3272S use the same firmware, and it will automatically detect the variant of the module being used.

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 ^[2] this.

WARNING

Uploading the .hex file via STM32CubeProgrammer will erase all configured data on the device.

RAK3272S uses UART2 serial pins to upload the latest firmware.

VOTE:

RAK3272S should automatically go to BOOT mode when the firmware is uploaded via RAK DFU Tool or WisToolBox.

If BOOT mode is not initiated, you can manually send AT+BOOT command to start bootloader mode.

Firmware / OS

BAK[®] Documentation Center

Model	Version	Source
RAK3272S(.bin)	RUI3 (default baudrate = 115200)	Download ⊡
RAK3272S(.hex)	RUI3 (default baudrate = 115200)	Download 🗗
RAK3272S	DEPRECATED V1.0.4 (default baudrate = 9600)	Download 🗗

There are RAK3172 devices loaded with old firmware versions which are not based on RUI3 (RAKwireless Unified Interface V3). These devices have v1.0.4 and below.

If the host microcontroller code is based on this old firmware, refer to RAK3172 AT Command migration guide 🖸 , which explains in detail the few differences between the two AT commands set.

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