RAK11721 Breakout Board Datasheet

Overview

Description

RAK11721 Breakout Board is specifically designed to allow easy access to the pins on the board to simplify development and testing. The breakout board footprint is based on the XBee form factor, and its main purpose is to allow the RAK11720 stamp module pins to be accessible via 2.54 mm headers.

The board itself has the **RAK11720** at its core, integrating an Ambiq Apollo3 Blue AMA3B1KK-KBR-B0 SoC MCU chip and a Semtech SX1262 LoRa transceiver. It has an ultra-low power consumption of 2.37 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 implement your own customized long-range LoRa network quickly.

Features

- Based on RAK11720
- Custom firmware using Arduino via RUI3 API
- I/O ports: UART/I2C/GPIO/SPI
- Serial Wire Debug (SWD) interface
- Module size: 25.4 mm x 32.3 mm
- Supply Voltage: 1.8 V ~ 3.6 V
- Temperature Range: -40° C ~ 85° C

Specifications

Overview

Hardware

The hardware specification is categorized into five (5) 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 Programming Interface

When programming via a RAKDAP1 or other ARM debugging tool, it is required to have the following four pins connected.

- 3V3
- SWDIO
- SWCLK
- GND

UART Interface

This board has two UART interfaces:

- UART0 (allows AT Commands and FW Update)

- UART1 (can allow AT commands if configured via RUI3 Serial Port Mode)

I2C and SPI Interface

Only one I2C and SPI interface of RAK11721:

- I2C
- SPI

Pin Definition

The tables below show the pin definition of the RAK11721 Breakout Board:

J5 Pin Definitions

Pin No.	Name	Description	APOLLO3_BLUE Pin
1	SPI_MOSI	GPIO and SPI (MOSI) GP	GP7
2	SPI_MISO	GPIO and SPI (MISO)	GP6
3	SPI_CLK	GPIO and SPI (CLK)	GP5
4	SPI_CS	GPIO and SPI (NSS)	GP1
5	UART0_RX	UART0 Interface (AT Commands and FW Update)	GP40
6	UART0_TX	UART0 Interface (AT Commands and FW Update)	GP39
7	GND	Ground	-
8	BOOT0	Boot0 mode enable pin - high active	GP41
9	3V3	Power Supply	-

J4 Pin Definitions

Pin No.	Name	Description	APOLLO3_BLUE Pin
1	I2C_SDA	I2C interface	GP25
2	I2C_SCL	I2C interface	GP27
3	RST	MCU Reset	-
4	GND	Ground	-
5	SWDIO	SWD debug pin (SWDIO)	GP21
6	SWCLK	SWD debug pin (SWCLK)	GP20
7	UART1_TX	UART1 Interface	GP42
8	UART1_RX	UART1 Interface	GP43
9	3V3	Power Supply	-

RF Characteristics

The RAK11721 breakout board supports the LoRaWAN bands shown in the table below. When buying a RAK11721 board, pay attention to the correct module, RAK11721 (L) or RAK11721 (H) for your region, where L is for low-frequency regions. Take note that no suffix means high-frequency.

Module	Region	Frequency
RAK11721 (L)	Europe	EU433
	China	CN470
RAK11721 (H)	Europe	EU868
	North America	US915
	Australia	AU915
	Korea	KR920
	Asia	AS923-1/2/3/4
	India	IN865
	Russia	RU864

Electrical Characteristics

Power Consumption

Feature	Condition	Minimum	Typical	Maximum	Unit
Operating Current	LoRa TX Mode	-	87 @ 20 dBm 868 MHz	-	mA
	BLE TX Mode	-	12.7 @4.0 dBm	-	mA
Sleep Current	With Ch340	-	20		uA

Operating Voltage

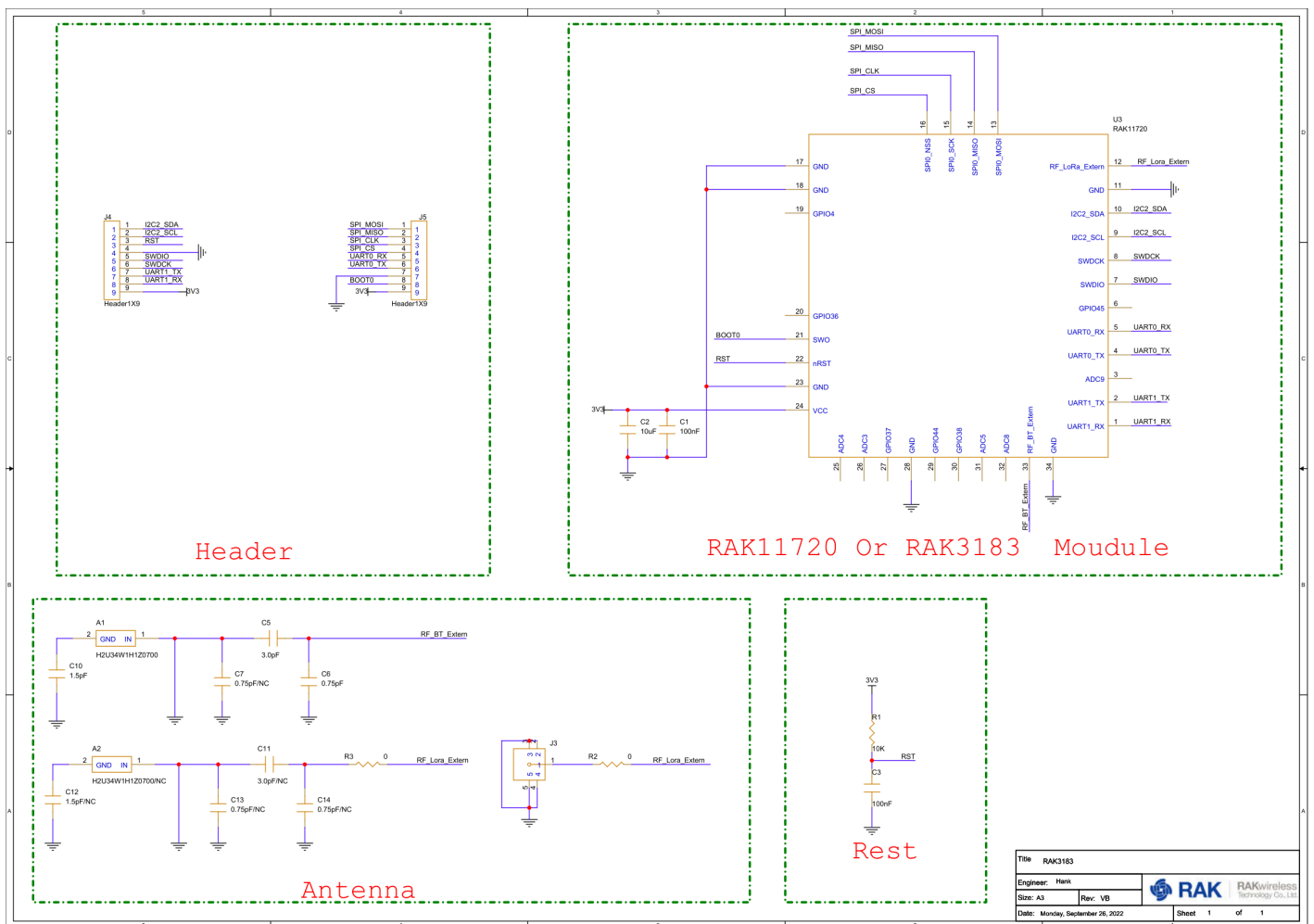| Feature	Minimum	Typical	Maximum	Unit
VCC	1.8	3.3	3.6	V

Schematic Diagram

Figure 1: RAK11721 Schematic Diagram
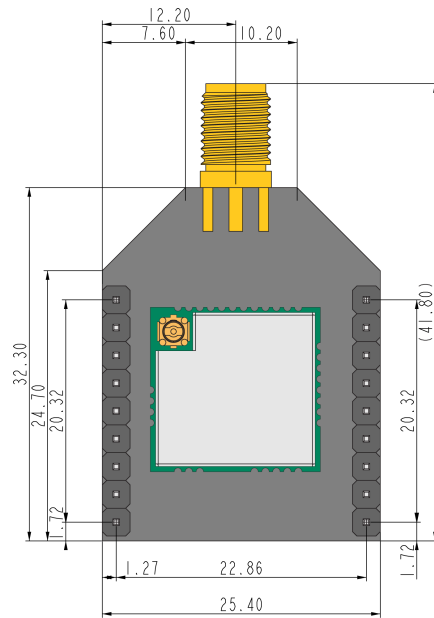
Mechanical Characteristics

Figure 2: RAK11721 Mechanical Dimensions

Software

Download the latest firmware of the RAK11721 Breakout Board provided below. RAK11721 (L) and RAK11721 (H) use the same firmware, and it will automatically detect the variant of the module being used.

Firmware

Model	Note	Source
RAK11721 (.bin via UART)	(default baudrate = 115200)	Download ⤴
RAK11721 (.bin via BLE)		Download ⤴
RAK11721 (.hex)		Download ⤴

Last Updated: 3/6/2023, 7:04:52 PM