RAK811 Customer Develop Manual V1.0

Content

1. Overview

RAK811 module integrates semtech SX1276 and stm32L, support customer to do their applications use the internal stm32. And we offer an open source project which implement the loraWAN and loraP2P applications, that customer can easy develop own applications base the lora driver.

RAK811 module support 868/915M loraWAN band, hardware support 860MHz-1020MHz, and can choose RF out from HF or PA_Boost pin, max tx power can reach 19dbm. Module hardware has also be certificated by FCC/KCC/CE.

Current we supply the open source project build IAR Embedded Workbench for ARM (EWARM) tool chain V7.70.1+ SWD Debug.

1.1 system block diagram

The block diagram of module is described in the figure below.

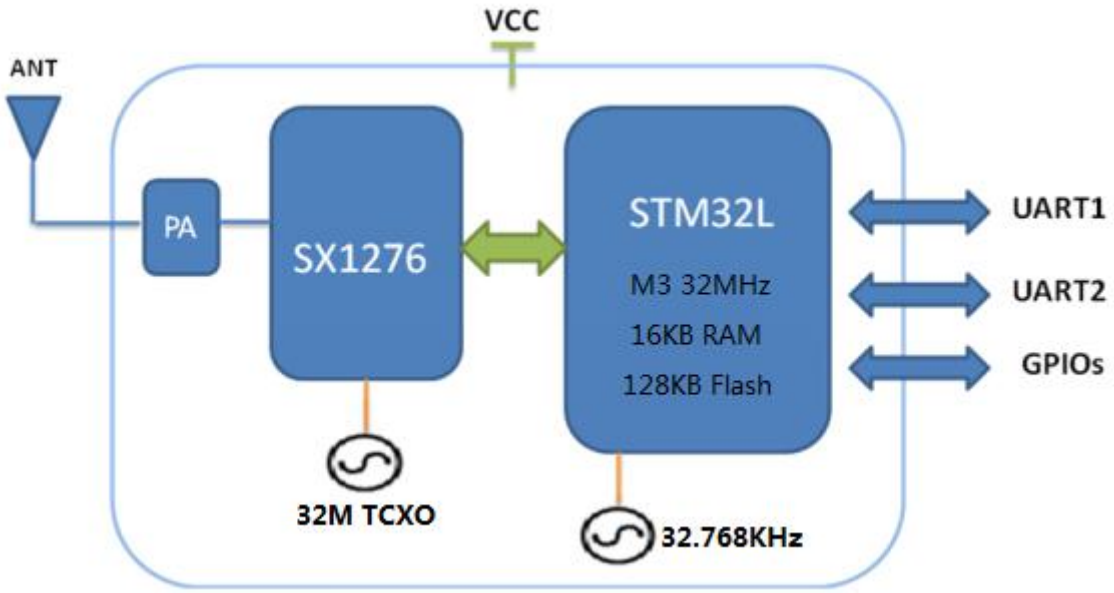

Figure 1-1 System Diagram

2. Module Description

2.1 Pin Outline

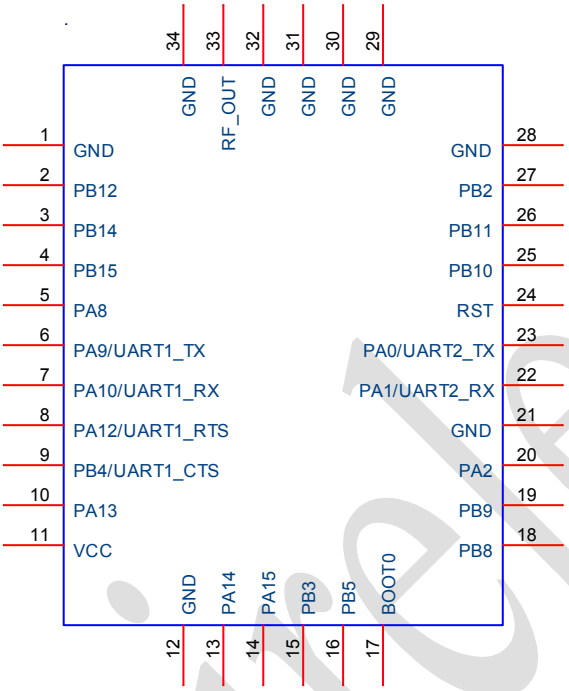

Figure 3-1 Module Pin outline

2.2 Pin definition

Table 4-1: Pin Definition

NO	Name	Type	Description
1	GND	—	Ground connections
2	PB12	I/O	B part for GPIO port
3	PB14	I/O	B part for GPIO port
4	PB15	I/O	B part for GPIO port
5	PA8	I/O	A part for GPIO port
6	PA9/UART1_TX	O	UART1 Interface
7	PA10/UART1_RX	I	UART1 Interface
8	PA12/UART1_RTS	O	UART1 Interface
9	PB4/UART1_CTS	I	UART1 Interface
10	PA13	I/O	A part for GPIO port
11	VCC	P	Main power voltage source input
12	GND	—	Ground connections

13	PA14	I/O	A part for GPIO port
14	PA15	I/O	A part for GPIO port
15	PB3	I/O	B part for GPIO port
16	PB5	I/O	B part for GPIO port
17	BOOT0	I	Boot mode GPIO enable pin
18	PB8	I/O	B part for GPIO port
19	PB9	I/O	B part for GPIO port
20	PA2	I/O	A part for GPIO port
21	GND	—	Ground connections
22	PA1/UART2_RX	I	UART2 Interface
23	PA0/UART2_TX	O	UART2 Interface
24	RST	I	Reset trigger input
25	PB10	I/O	B part for GPIO port
26	PB11	I/O	B part for GPIO port
27	PB2	I/O	B part for GPIO port
28	GND	—	Ground connections
29	GND	—	Ground connections
30	GND	—	Ground connections
31	GND	—	Ground connections
32	GND	—	Ground connections
33	RF_OUT	I/O	RF I/O port
34	GND	—	Ground connections

3. Develop environment

3.1 WiseNode-Lora EVB

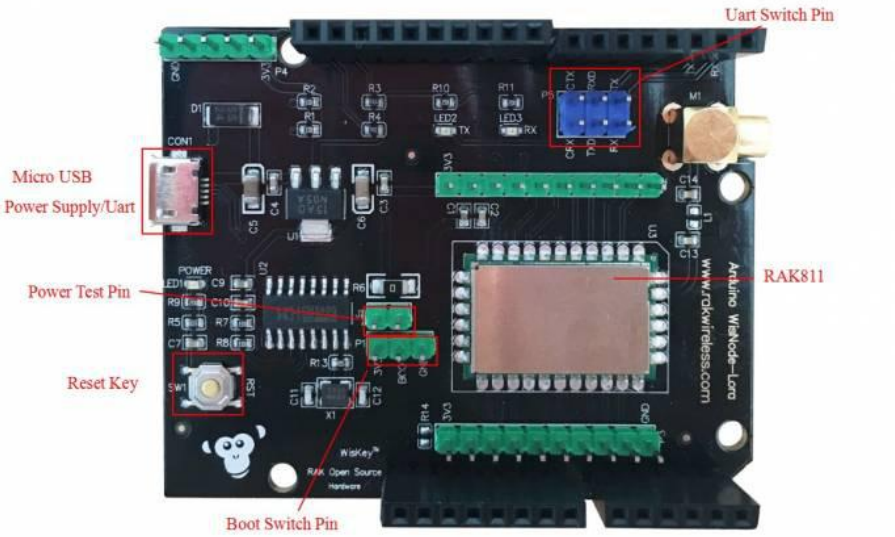

Figure 3-1 WiseNode overview

Function	Name	Description
Module	U3	RAK811 Lora module
External Interface	Micro USB	Power Supply; DC 5V Input,USB to TTL communication interface
Key	Reset	Module Reset Key
Leading Foot	P1	Boot Switch Pin，When Boot Pin Switch to 3.3V Module will into the Boot Mode
	P4	SWD Debug Pin
	P5	Uart Switch Pin
Power Test	J1	Module Power Test Pin
LED Indicator	LED1（Power）	Power Indicator Light

USBTO232 window7/8/10 driver:
http://docs.rakwireless.com/cn/RAK811(LoRa)/%E5%B7%A5%E5%85%B7/CH340%20Drive.rar

3.2 Demo Project

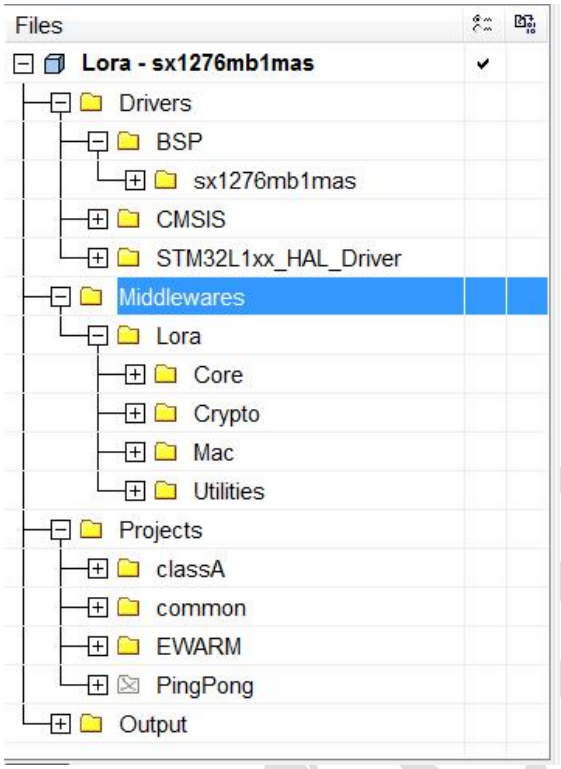

Figure 3-2 Project overview

Drivers

- BSP support the semtech sx1276 driver and stm32 related pins operate
-CMSIS stm32lxx platform system initial
-STM32L1xx_HAL_Driver stm32lxx platform peripheral driver

Middlewares

-Lora

-core lora application driver
-crypto lora transmit security use AES and cmac check
-mac lora mac driver
-utilities delay ,timer, low power support

Project

-classA LoraWAN stack application class A profile
-common stm32 support hardware driver, SPI, RTC,gpio, interrupt
-pingpong Lora point to point application

Project github project: https://github.com/RAKWireless/WisNode-LoRa

3.3 Example ClassA

Test the example class A to connect loraWAN gateway with OTAA way, default 868 band. You just need change the DevEui (if need), AppEui and AppKey match with your gateway.

Check the config in Comissioning.h.

```
Comissioning.h
 94  * \remark see STATIC_DEVICE_EUI comments
 95  */
 96 #define LORAWAN_DEVICE_EUI                          { 0x60, 0xC5, 0xA8, 0xFF, 0xFE, 0x00, 0
 97
 98
 99 /*!
100  * Application IEEE EUI (big endian)
101  */
102 #define LORAWAN_APPLICATION_EUI                     { 0x11, 0x22, 0x33, 0x44, 0x55, 0x66, 0
103
104 /*!
105  * AES encryption/decryption cipher application key
106  */
107 #define LORAWAN_APPLICATION_KEY                     { 0x11, 0x22, 0x33, 0x44, 0x55, 0x66, 0
```

Figure 3-3 loraWAN config

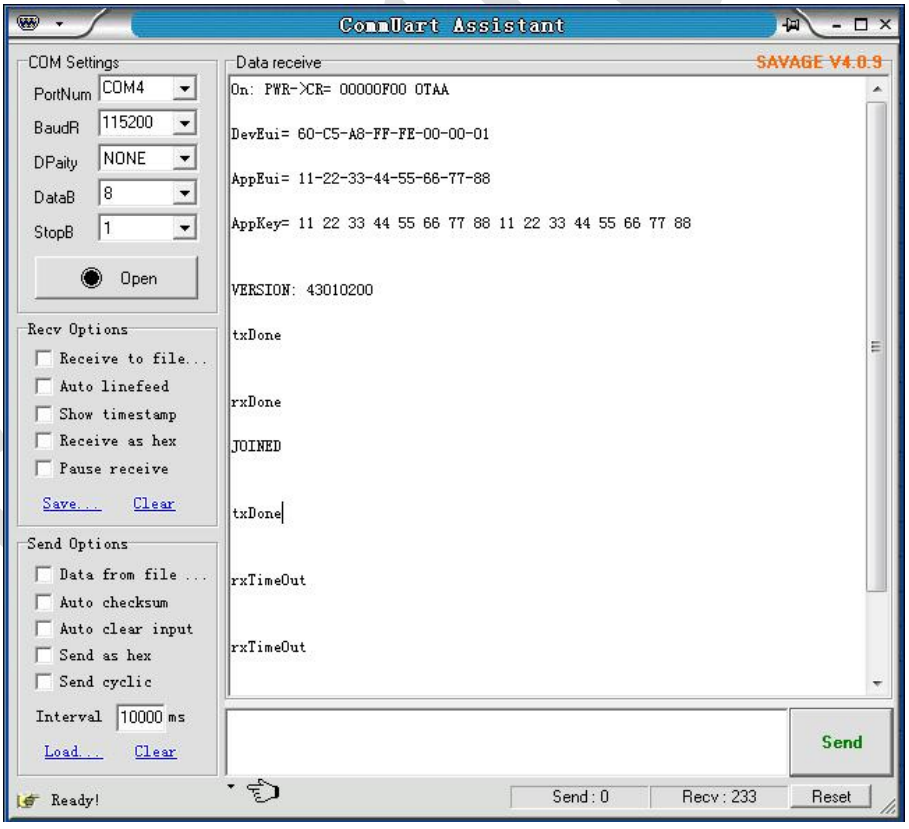

Figure 3-4 loraWAN join&send

3.4 Example PingPong

Test the example pingpong to communicate with two lora module, one as master and another as slave.

Change the follow code:

bool isMaster = false; //true

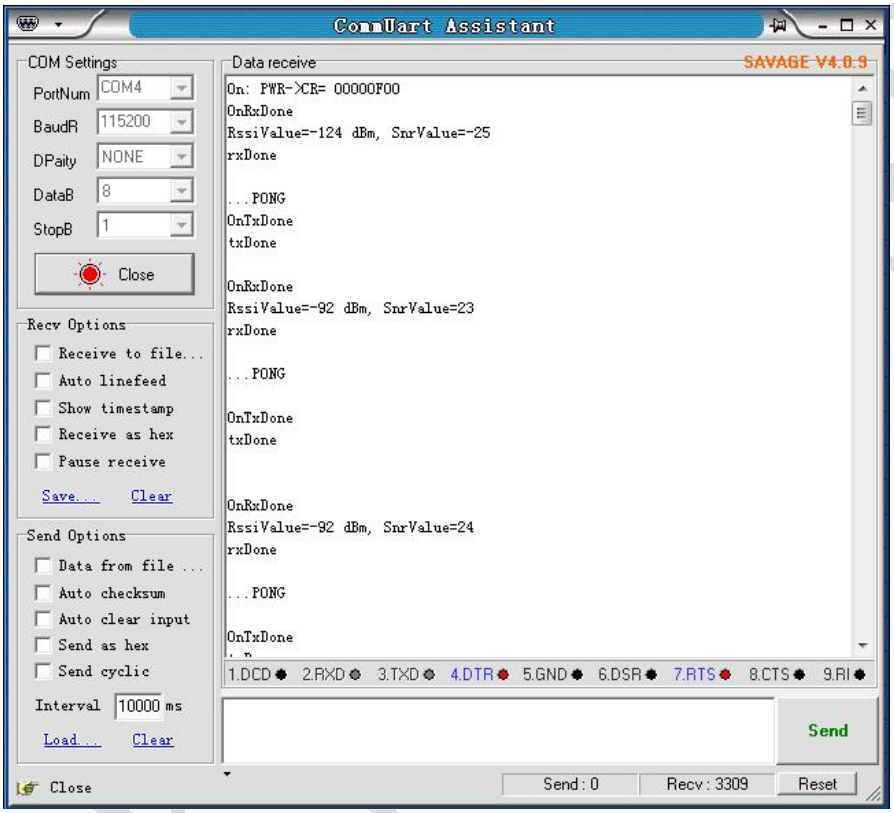

Figure 3-5 loraP2P send&recv

4. Contact information

Shanghai

FAE mailbox:allan.jin@rakwireless.com

Tel : 185-1082-5762

Address: Room B205, Green light kechuang garden, 2588 Lane, Hongmei South road, Minhang District, Shanghai

Shenzhen

FAE mailbox: steven.tang@rakwireless.com

Tel : 0755-26506594

Fax: 0755-86152201

Address: Room 802, Yongfu building, No.1s06, Yongfu road, Baoan District , Shengzhen

5. Change Note

Version	Date	Change
V1.0	2017-03-16	First release