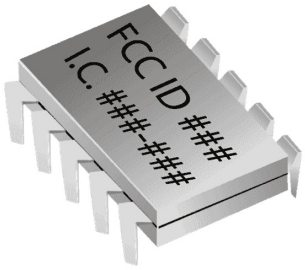


Pairlink Rabbit-S Bluetooth 5 BLE Module User Guide

Rabbit-S User Guide

Project: Rabbit/Bluetooth 5 BLE module
Module name: Rabbit-S
Designed: Suzhou Pair link Network Technology Ltd.

Version	Note	Date
V1.0	Create	2021/06/30
V2.0	Modify Confidential Information	9/1/2021

Contents

Main Application Domain

1. MCU data pass-through.
2. Bluetooth Printer / Scanner / Digital price tag etc.
3. Remote control / Keyboard and Mouse / Toys / Smart phone self timer etc.
4. Industrial remote control / Industrial telemetry / Industrial data collection.
5. Smart home / Intelligent lighting / Intelligent access control system.

Electrical Specifications

Absolute Ratings

Parameter	Specification		Unit
	Min.	Max.	
Power Supply(V)	-0.3V	+3.6V	Burn the module permanently if it exceeds +3.6V
Storage temperature(℃)	-55	+125	
Working temperature (℃)	-40	+85	
ESD HBM	-3.5KV	+3.5KV	Human Body Model
ESD CDM	-500V	+500V	Charged-Device Model

Recommended Operating Conditions

Parameter		Specification			Note
		Min.	Typical	Max	
Power Supply(V)			3.3	3.6	
Communication level (V)			3.3		Can’t communicate with 5V TTL level directly
Working temperature (℃)			20	+85	Industry Standard
Consume	TX Current (mA)		10.2		TX Power=+4dBm
			12.7		TX Power=+8dBm
	RX Current (mA)		6.8		VBAT=3V3,1Mbps
	Sleep Current (a)		3.8		Deep-sleep,Supports GPIO wake-up and timer wake-up
TX Power(dBm)				+8	
Receive Sensitivity(dBm)				-97	1Mbps

Digital I/O Characteristic

Characteristics	Condition	Symbol	Specification			Unit
			Min.	Typical	Max.	
Input Low Voltage	VBAT=3V3	VIL	–	0	0.9	V
Input High Voltage		VIA	2.0	3.3	3.6	V
Output Low Voltage		VOL	0	–	0.33	V
Output High Voltage		VEOH	2.97	–	3.3	V

Physical Parameters

Parameter	Performance	Note
CommunicationDistance	50M	Data Transfer (BLE) Environment: Sunny and open Airspeed: 1Mbps
Crystal	40MHz	Industry Standard
Protocol	BLE 5	Supported data rates: 1Mbps,2Mbps
Package	Patch	Refer to section 3.3
IC	RTL8762CMF	Packaging: QFN-40
Core	ARM Cortex-M4	
RAM	160KByte	
Flash	4Mbits	Embedded SOC memory
Dimensions	17.8mm*12.0mm*1.9mm	L*W*H
RF Interface	PCB Antenna	

Hardware Design and PCB layout

The pin assignment and Pin description

Rabbit-S Pin definition can refer to Figure 1.

Table 1: Module Pin Description

Pin Number	Pin Name	I/O	Alternate Function Description
10	VBA	P	Power Supply(DC1.8V~3.6V).
1,2,16,22,25	GND	P	Connect to Ground.
11	RESET	DI	Reset signal (active high).
13	LOG_OUT	DIO	Log_out, not intended for customer use.
18	P3_1	DIO	GPIO/UART_RX
19	P3_0	DIO	GPIO/UART_TX
23	32K_XI	A	
24	32K_XO	A	
3	P0_4	DIO	INPUT/OUTPUT with selectable pulls up/down resistor. General-purpose I/O port bit or alternate function nodes . Contain state retention mechanism during power down.
4	P0_2	DIO	
5	P0_1	DIO	
6	P4_0	DIO	
7	P4_1	DIO	
8	P4_2	DIO	
9	P4_3	DIO	
12	P5_0	DIO	
14	P1_0	DIO	
15	P1_1	DIO	
17	P2_3	DIO/AIN	GPIO/ADCIN3
20	P2_4	DIO/AIN	GPIO/ADCIN4
21	P2_5	DIO/AIN	GPIO/ADCIN5

Note: GPIO has integrated pull-up and pull-down resistors.
Support GPIO super multiplexing function, WAKE_UP / UART / SPI / IIC / PWM / and other functions can be arbitrarily configured on GPIO.

For more GPIO function configuration questions, contact to Pair link.

As shown in the following table: GPIO Pin detailed Information.

Rabbit-B Rabbit-C Rabbit-S	GPIO Index	ADC	Hardware Default Pull setting(100K) Reset state	Rom Code Setting	Pull resistor	Boot code Default	Wakeup Function	Dreier current

P0 -0	GPIO _ 0		Pull Down	Pull Down	10K/1O0K		Yes	8mA
P0 -1	GPIO _ 1		Pull Down	Pull Down	10/1000K		Yes	8mA
P0_2	GPIO _ 2		Pull Down	Pull Down	10K/1OOK		Yes	8mA
P0_3	GPIO_ 3		Pull Up	Output High	10K/1OOK	LOG_UA RT_TX	Yes	8mA
P0_4	GPIO _ 4		Pull Down	Pull Down	10K/100K		Yes	8mA
P0_5	GPIO_ 5		Pull Down	Pull Down	10K/100K		Yes	8mA
P0_6	GPIO _ 6		Pull Down	Pull Down	101K/100K		Yes	8mA
P1_0	GPIO_ 8		Pull Up	Pull Up	101K/1OOK	STUDIO	Yes	8mA
P1_1	GPIO_ 9		Pull Up	Pull Up	10K/1OOK	SWDCLK	Yes	8mA
P5-0	GPIO 2 5		Pull Down	Pull Down	51K/50K		Yes	8mA
32k- XI	GPIO 2 6		Pull Down	Pull Down	10K/1100K		Yes	8mA
32k- X 0	GPIO 2 7		Pull Down	Output Low	10K/1OOK		Yes	8mA
P2- 2	GPIO 1 8	ADCILPC(channel 2) Differential 1+	Pull Down	Pull Down	51K/5OK		Yes	8mA
P2 -3	GPIO 1 9	ADCIPC(c hannel 3) Differential 2-	Pull Down	Pull Down	51K/5OK		Yes	8mA
P2- 4	GPIO 2 0	AD CILPC(channel 4) Differetiat2 +	Pull Down	Pull Down	5K/50K		Yes	8mA
P2- 5	GPIO 2 1	ADCILPC(ctiarrel 5) D ifferetiat 2-	Pull Down	Pull Down	5K/5OK		Yes	8mA
P-26	GPIO 2 2	AD C(chan nel 6) D differenti al 3+	Pull Down	Pull Down	5 1/5OK		Yes	8mA

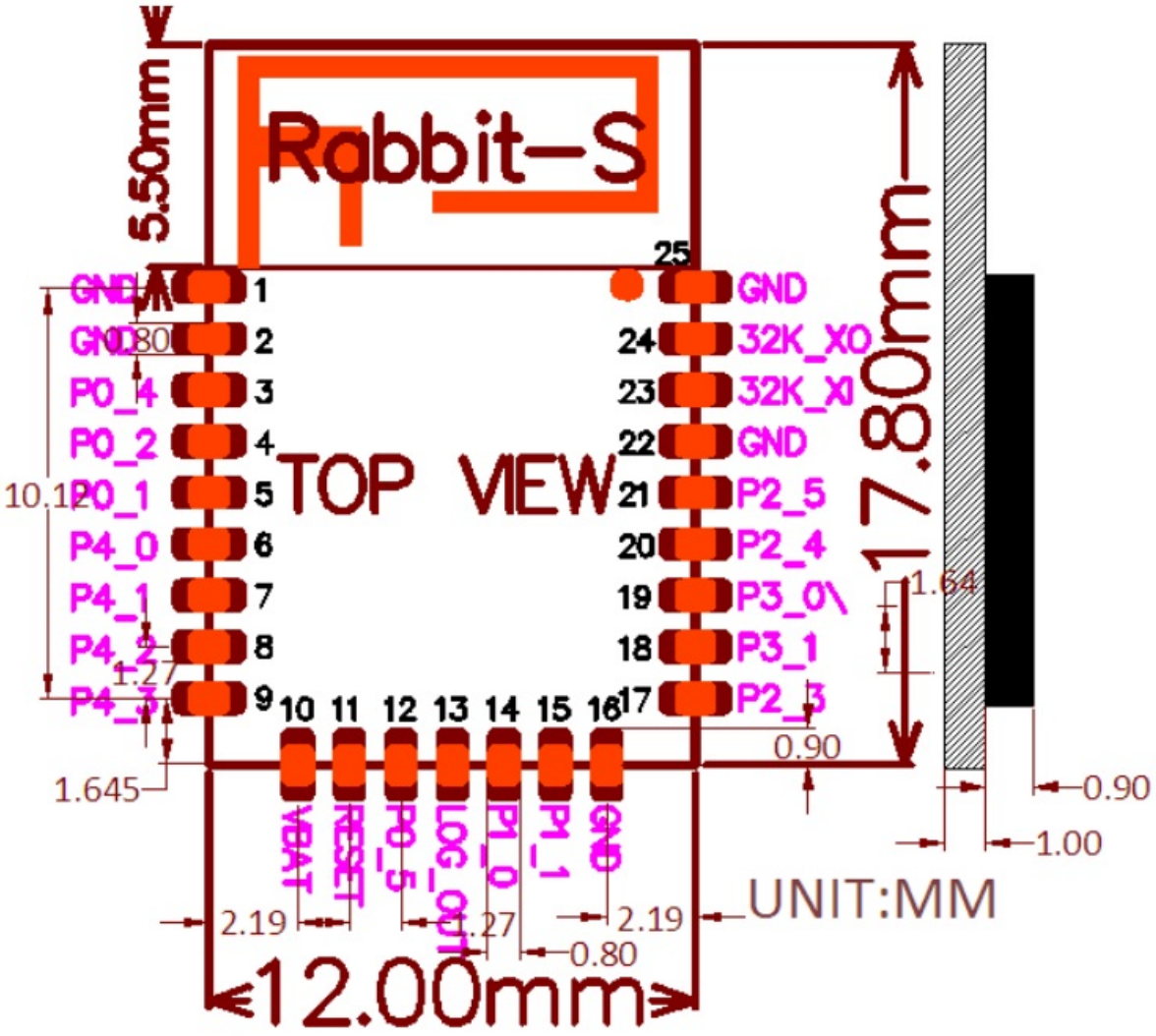
P2_7	GPIO 23	ADC(chanm1 7) Differential 3-	Pull Down	Pull Down	5K/50K		Yes	8mA
P3_0	GPIO 24		Pull Up	Pull Up	10K/1OOK	UART TX	Yes	8mA
P3_1	GPIO_25		Pull Up	Pull Up	10K/1OOK	UART_RX	Yes	8mA
P3_2	GPIO 26		Pull Down	Pull Down	10K/100K		Yes	8mA
P3- 3	GPIO 27		Pull Down	Pull Down	101/100K		Yes	8mA
P4_0	GPIO 28		Pull Down	Pull Down	10K/1OOK		Yes	8mA
P4_1	GPIO 29		Pull Down	Pull Down	10K/1OOK		Yes	8mA
P4_2	GPIO_30		Pull Down	Pull Down	101/100K		Yes	8mA
P4_3	GPIO 31		Pull Up	Pull Up	10K/100K		Yes	8mA

Appearance and Dimensions

Figure 1 shows the size of the module. The components and prominent structure are not allowed put in this size range(17.8mm*12.0mm*1.9mm).

The following land pattern size is recommended for user board design. However, users can modify it according to PCB soldering conditions. Sufficient examination is necessary if using the modified land pattern.

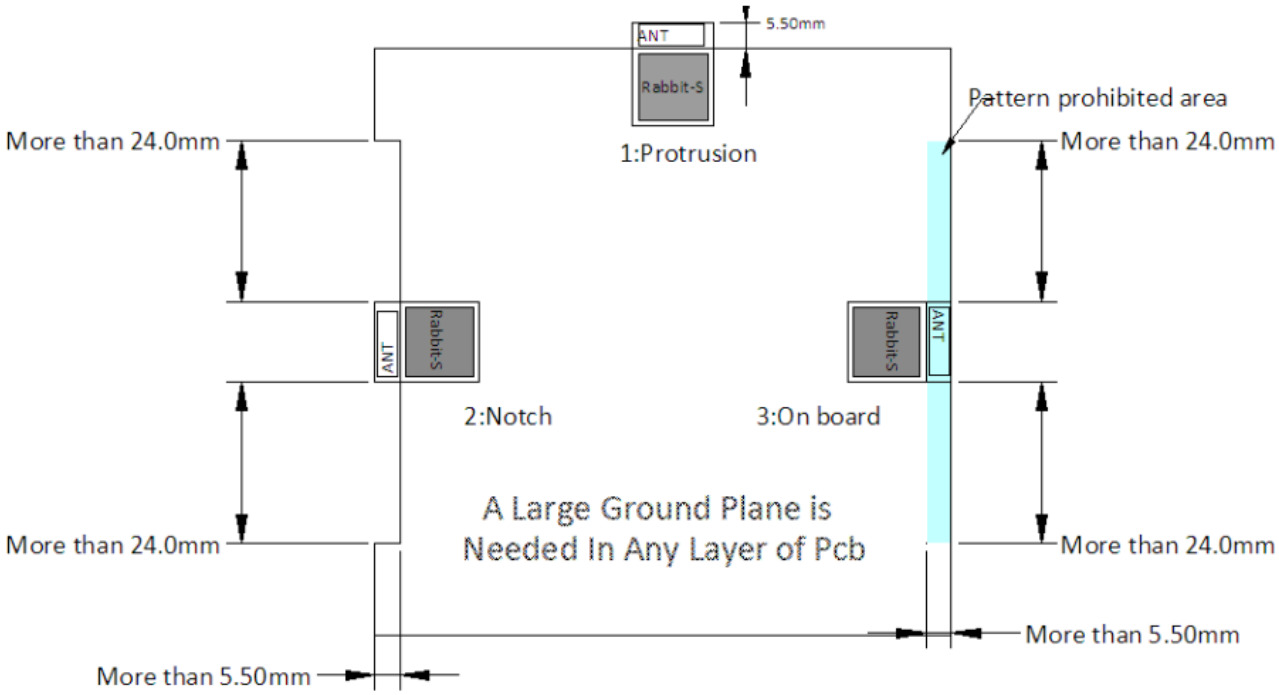
Figure 1: Mechanical Information



Module Layout Guideline

The layout on the user PCB should be designed according to the following guideline.
When the module is placed on the PCB, it must be ensured that the RF antenna area (2 times the width of the module) is hollow or suspended, and there must be no traces, vias, or copper.

Figure 2: Module Placement



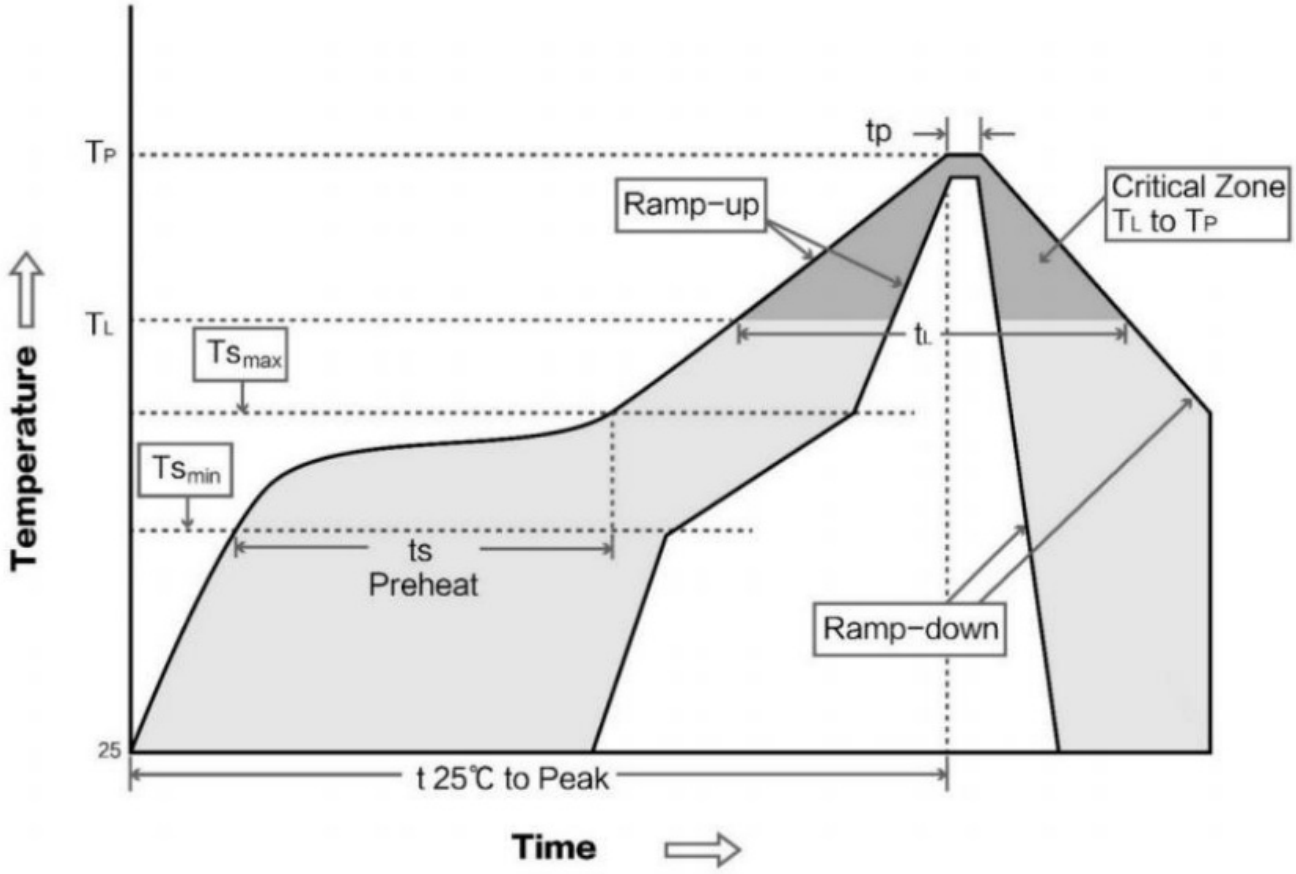
Welding Declaration

The Rabbit-S module only supports one reflow soldering. Our company is not responsible for the module failure caused by multiple reflow soldering.

Figure 3: Reflow Soldering Temperature

Profile Feature	**Sn-Pb Assembly**	**Pb-Free Assembly**
Solder Paste	Sn63/Pb37	Sn96.5/Ag3/Cu0.5
Preheat Temperature min i Tasmin)	100°C	150˚C
Preheat temperature max (Tmax)	150˚C	200˚C
Preheat Time (Tasmin to Tsmax)(ts)	60-120 sec	60-120 sec
Average ramp-up rate(Ts max to Tp)	3˚C/second max	3˚C/second max
Liquidous Temperature (TL)	183˚C	217˚C
Time (to) Maintained Above ITL ‘	60-90 sec	30-90 sec
Peak temperature 1 Tp)	220-235˚C	230-250˚C
Average ramp-down rate (Tp to Tsmax i	6˚C/second max	6˚C/second max
Time 25°C to peak temperature	6 minutes max	8 minutes max

Figure 4: Reflow Soldering Curve



Federal Communications Commission (FCC) Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part15 of the FCC Rules.
These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.
However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

RF exposure warning
This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.
This product may not be collocated or operated in conjunction with any other antenna or transmitter.
Industry Canada (IC)
CAN ICES-003 (B)/NMB-003(B)

This device complies with Industry Canada's license-exempt RSSs. Operation is subject

to the following two conditions:
(1) This device may not cause harmful interference, and
(2) this device must accept any interference received, including interference that may cause undesired operation.

IMPORTANT NOTE:
Radiation Exposure Statement:
This equipment complies with IC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance
20cm between the radiator and your body.

OEM Integration Instructions
This device is intended only for OEM integrators under the following conditions
The module can be used for installation in another host. The transmitter module may not be co-located with any other transmitter or antenna. The module shall be only used with the integral antenna(s) that has been originally tested and certified with this module. As long as the 3 conditions above are met, further transmitter tests will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirement with this module installed (for example, digital device emission, PC peripheral requirements, etc.). OEM integrator is responsible for ensuring the end-user has no manual instruction to remove or install module.

IMPORTANT NOTE
In the event that these conditions cannot be met (for example certain laptop configuration or co-location with another transmitter), then the FCC authorization for this module in combination with the host equipment is no longer considered valid and the FCC ID of the module cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating. The end product (including the transmitter) and obtaining a separate FCC authorization. The final end product must be labeled in a visible area with the following: “Contains Transmitter Module FCC ID: 2AQV6RABBIT-S”.

Antenna Specification:

Antenna Type	**Manufacturer**	**Frequency Range (MHz)**	**Maximum Peak Antenna Gain(dBi)**
PCB Antenna	N/A	2402 – 2480	-0.41

IMPORTANT NOTE
This Module (IC: 24210-RABBITS, PMN: Rabbit Bluetooth 5 BLE module) has been approved by Industry Canada to operate with the antenna types listed below with the
maximum permissible gain indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

The host product shall be properly labeled to identify the modules within the host product. The Innovation, Science, and Economic Development Canada certification label of a
the module shall be clearly visible at all times when installed in the host product; otherwise, the host product must be labeled to display the Innovation, Science, and Economic
Development Canada certification number for the module, preceded by the word “Contains” or similar wording expressing the same meaning, as follows: Contains IC: 24210-RABBITS.

Antenna Specification:

Antenna Type	**Manufacturer**	**Frequency Range (MHz)**	**Maximum Peak Antenna Gain(dBi)**
PCB Antenna	N/A	2402 – 2480	-0.41

www.pairlink.com.cn

Suzhou Pair link Network Technology Ltd.

Documents / Resources

	Pairlink Rabbit-S Bluetooth 5 BLE Module [pdf] User Guide RABBIT-S, RABBITS, 2AQV6RABBIT-S, 2AQV6RABBITS, Rabbit-S Bluetooth 5 BLE Module, Bluetooth 5 BLE Module, 5 BLE Module, BLE Module