RF-WM-3200B1 CC3200R

Low Power Wi-Fi Module

Version 1.1

Shenzhen RF-star Technology Co., Ltd.

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1 Device Overview

1.1 Description

RF-WM-3200B1 is a low power Wi-Fi SoC module that is based on TI SimpleLink Wi-Fi SoC CC3200R, which has a built-in ARM Cortex™-M4 core processor, and a variety of peripherals including parallel camera interface, I²S, SD/MMC, UART, SPI, I²C, ADC and GPIOs. The subsystem of RF-WM-3200B1 includes an IEEE 802.11 b/g/n radio, baseband, and MAC with a powerful crypto engine for fast, secure Internet connections with 256-bit encryption. The module supports station, access point, and Wi-Fi Direct™ modes. The device also supports WPA2 personal and enterprise security and WPS 2.0. The Wi-Fi Internet-on-a-chip includes embedded TCP and UDP protocols. The power-management subsystem includes integrated DC-DC converters supporting a wide range of supply voltages. This subsystem enables low-power consumption modes, such as the hibernate with RTC mode requiring less than 7 μA of current. The module design provides 3 options for antenna integration, including surface mounted chip antenna, an IPEX interface for connecting an external antenna, and an RF pad for soldering onto the baseboard and routing to an onboard antenna. RF-WM-3200B1 is pin-2-pin compatible with RF-WM-3220B1 series.

1.2 Key Features

- Wi-Fi CERTIFIED™ Chip
- Application microcontroller subsystem:
  - Arm® Cortex®-M4 core at 80 MHz
  - Embedded memory
    - 256 KB RAM
    - External serial flash bootloader, and peripheral drivers in ROM
  - 32- Channel Direct Memory Access (μDMA)
  - Hardware crypto engine for advanced fast security, including
    - AES, DES, and 3DES
    - SHA2 and MD5
    - CRC and Checksum
  - 8-bit parallel camera interface
  - 1 multichannel audio serial port (McASP) interface with support for two I²S channels
  - 1 SD/MMC interface
  - 2 UARTs
  - 1 SPI
  - 1 I²C
  - 4 general-purpose timers with 16-bit PWM mode
  - 1 watchdog timer
  - 4-channel 12-bit ADCs
  - Up to 27 individually programmable, multiplexed GPIO pins
- Dedicated external SPI interface for serial flash
- Wi-Fi network processor subsystem
  - Featuring Wi-Fi internet-on-a-chip™
  - Dedicated ARM MCU
    - Completely offloads Wi-Fi and internet protocol from the Application microcontroller
  - Wi-Fi and internet protocols in ROM
  - 802.11 b/g/n radio, baseband, medium access control (MAC), Wi-Fi driver, and

supplicant
- TCP/IP stack
  - ➢ Industry-standard BSD socket APIs
  - ➢ 8 simultaneous TCP or UDP sockets
  - ➢ 2 simultaneous TLS and SSL sockets
- Powerful crypto engine for fast, secure Wi-Fi and internet connections with 256-bits AES encryption for TIS and SSL connections
- Station, AP, and Wi-Fi direct® modes
- WPA2 personal and enterprise security
- SimpleLink connection manager for autonomous and fast Wi-Fi connections
- SmartConfig™ technology, AP mode, and WPS2 for easy and flexible Wi-Fi provisioning
- TX power
  - ➢ 18.0 dBm @ 1 DSSS
  - ➢ 14.5 dBm @ 54 OFDM
- RX sensitivity
  - ➢ -95.7 dBm @ 1 DSSS
  - ➢ -74.0 dBm @ 54 OFDM
- Application throughput
  - ➢ UDP: 16 Mbps
  - ➢ TCP: 13 Mbps

• Power-Management Subsystem:
- Integrated DC/DC converters support a wide range of supply voltage:
  - ➢ V_{BAT} wide-voltage supply: 2.7 V ~ 3.6 V
  - ➢ VIO is always tied with VBAT
  - ➢ Preregulated 1.85 V mode
- Advanced low-power modes:
  - ➢ Hibernate: 4 μA
  - ➢ Low-power deep sleep (LPDS): 250 μA
  - ➢ RX traffic (MCU active): 59 mA @ 54 OFDM
  - ➢ TX traffic (MCU active): 229 mA @ 54 OFDM, maximum power
  - ➢ Idle connected (MCU in LPDS): 825 μA @ DTIM = 1

1.3 Applications

- Cloud connectivity
- Home automation
- Home appliances
- Access control
- Security systems
- Smart energy
- Internet gateway
- Industrial control
- Smart plug
- Smart metering
- Wireless audio
- IP network sensor nodes

1.4 Functional Block Diagram

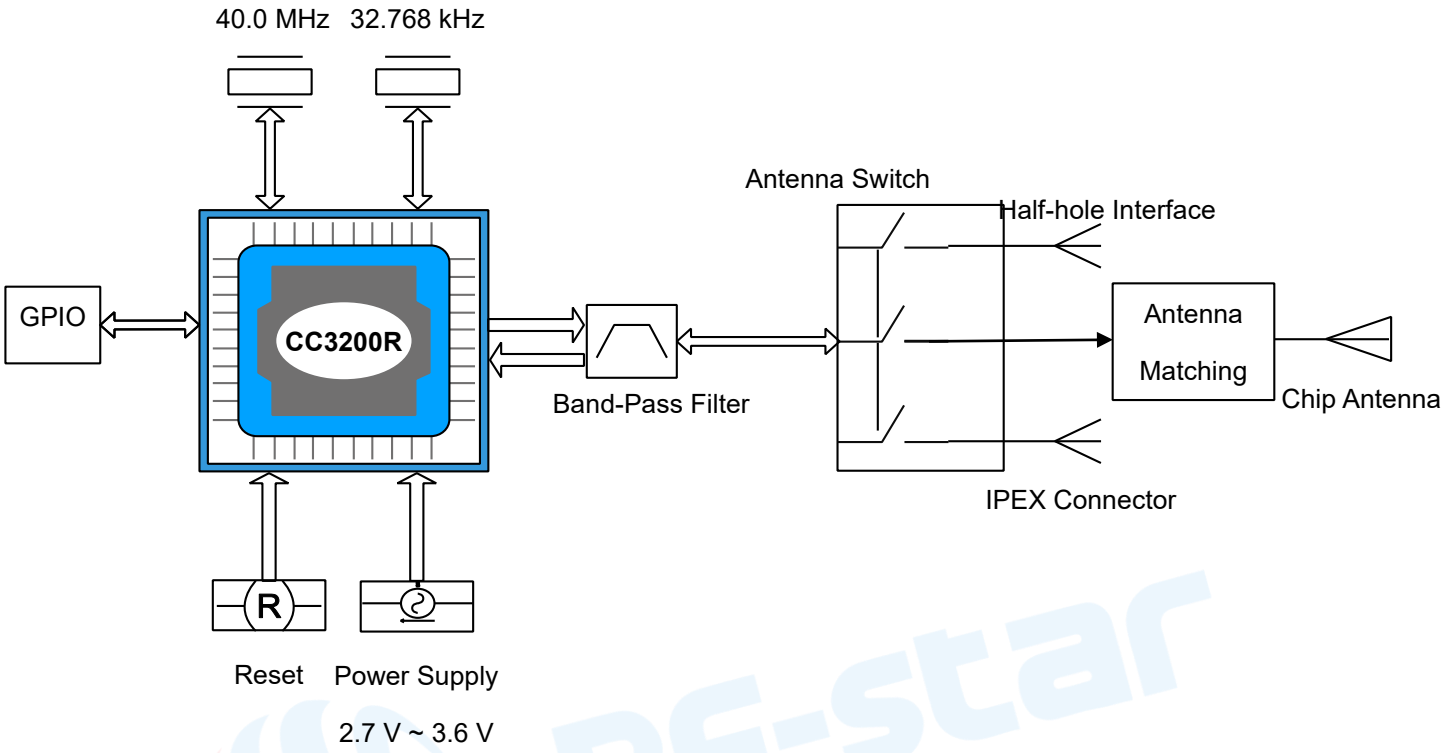


Figure 1. Functional Block Diagram of RF-WM-3200B1

1.5 Part Number Conventions

The part numbers are of the form of RF-WM-3200B1 where the fields are defined as follows:

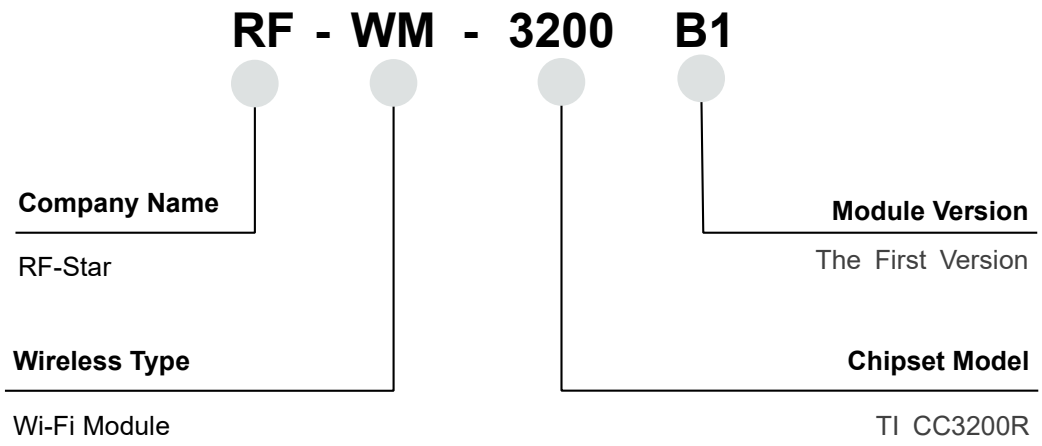


Figure 2. Part Number Conventions of RF-WM-3200B1

Table of Contents

2 Module Configuration and Functions

2.1 Module Parameters

Table 1. Parameters of RF-WM-3200B1

Chipset	CC3200R
Supply Power Voltage	2.7 V ~ 3.6 V, 3.3 V is recommended
Frequency	2.4 GHz
Protocol	802.11 b/g/n
Transmit Power	+18.0 dBm @ 1 DSSS +14.5 dBm @ 54 OFDM
Receiving Sensitivity	-95.7 dBm @ 1 DSSS -74.0 dBm @ 54 OFDM
GPIO	27
Flash	1 MB
RAM	256 kB
Power Consumption	Hibernate: 4 μA Low-power deep sleep (LPDS): 250 μA Idle connected (MCU in LPDS): 825 μA @ DTIM = 1 RX traffic (MCU active): 59 mA @ 54 OFDM TX traffic (MCU active): 229 mA @ 54 OFDM, maximum power
Crystal	40 MHz, 32.768 KHz
Package	SMT packaging (1.27-mm half-hole pitch stamp stick)
Communication Interface	UART, I²S, I²C, SPI, SD/MMC, ADC, DMA, PWM, McASP, Parallel Camera
Dimension	31.0 mm × 20.0 mm × 2.3 mm
Operating Temperature	-40 ℃ ~ +85 ℃
Storage Temperature	-55 ℃ ~ +125 ℃

2.2 Module Pin Diagram

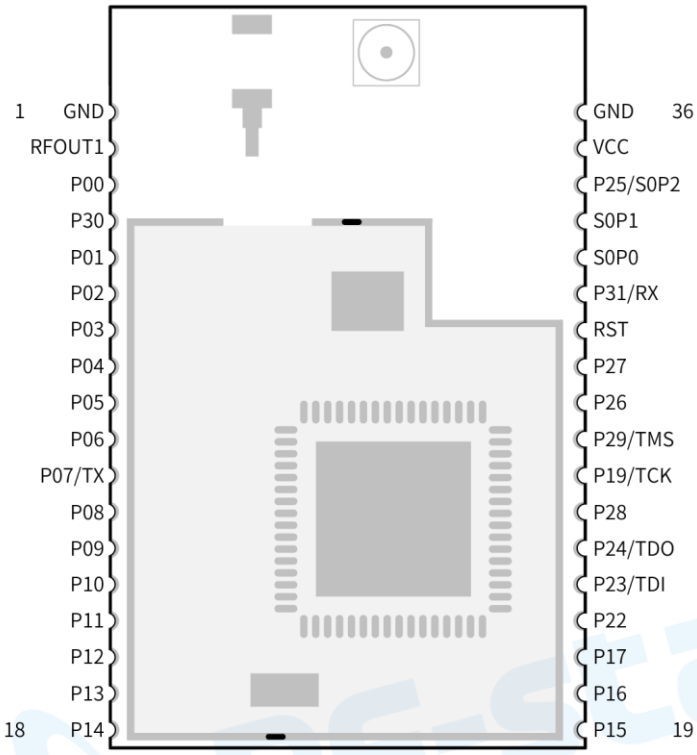


Figure 3. Pin Diagram of RF-WM-3200B1

2.3 Pin Functions

Table 2. Pin Functions of RF-WM-3200B1

Pin	Chip Pin	Name	Function
1		GND	Ground
2		RF_OUT	RF output interface
3	50	GPIO00	GPIO0
			UART0_CTS
			McAXR1
			GT_CCP00
			GSPI_CS
			UART1_RTS
			UART0_RTS
			McAXR0

4	53	GPIO30	GPIO30
			UART0_TX
			McACLK
			McAFSX
			GT_CCP05
			GSPI_MISO
5	55	GPIO01	GPIO1
			UART0_TX
			pCLK Pixel (PIXCLK)
			UART1_TX
			GT_CCP01
6	57	GPIO02	ADC_CH0
			GPIO2
			UART0_RX
			UART1_RX
			GT_CCP02
7	58	GPIO03	ADC_CH1
			GPIO3
			UART1_TX
			pDATA7 (CAM_D3)
8	59	GPIO04	ADC_CH2
			GPIO4
			UART1_RX
			pDATA6 (CAM_D2)
9	60	GPIO05	ADC_CH3
			GPIO5
			pDATA5 (CAM_D1)
			McAXR1

			GT_CCP05
10	61	GPIO06	GPIO6
			UART0_RTS
			pDATA4 (CAM_D0)
			UART1_CTS
			UART0_CTS
			GT_CCP06
11	62	GPIO07	GPIO7
			McACLKX
			UART1_RTS
			UART0_RTS
			UART0_TX
12	63	GPIO08	GPIO8
			SDCARD_IRQ
			McAFSX
			GT_CCP06
13	64	GPIO09	GPIO9
			GT_PWM05
			SDCARD_DATA0
			McAXR0
			GT_CCP00
14	1	GPIO10	GPIO10
			I2C_SCL
			GT_PWM06
			UART1_TX
			SDCARD_CLK
			GT_CCP01
15	2	GPIO11	GPIO11

			I2C_SDA
			GT_PWM07
			pXCLK (XVCLK)
			SDCARD_CMD
			UART1_RX
			GT_CCP02
			McAFSX
16	3	GPIO12	GPIO12
			McACLK
			pVS (VSYNC)
			I2C_SCL
			UART0_TX
			GT_CCP03
17	4	GPIO13	GPIO13
			I2C_SDA
			pHS (HSYNC)
			UART0_RX
			GT_CCP04
18	5	GPIO14	GPIO14
			I2C_SCL
			GSPI_CLK
			pDATA8 (CAM_D4)
			GT_CCP05
19	6	GPIO15	GPIO15
			I2C_SDA
			GSPI_MISO
			pDATA9 (CAM_D5)
			GT_CCP06

			SDCARD_DATA0
20	7	GPIO16	GPIO16 GSPI_MOSI
			pDATA10 (CAM_D6)
			UART1_TX
			GT_CCP07
			SDCARD_CLK
21	8	GPIO17	GPIO17
			UART1_RX
			GSPI_CS
			pDATA11 (CAM_D7)
			SDCARD_CMD
22	15	GPIO22	GPIO22
			McAFSX
			GT_CCP04
23	16	JTAG TDI	TDI
			GPIO23
			UART1_TX
			I2C_SCL
24	17	JTAG TDO	TDO
			GPIO24
			PWM0
			UART1_RX
			I2C_SDA
			GT_CCP06
			McAFSX
25	18	GPIO28	GPIO28
26	19	JTAG TCK	TCK

			GT_PWM03
27	20	JTAG TMS	TMS
			GPIO29
28	29	ANTSEL1	I/O
29	30	ANTSEL2	I/O
30	32	RESET	Module reset pin, internal pull-up by default, active low
31	45	DCDC_ANA2	GPIO31
			UART0_RX
			McAFSX
			UART1_RX
			McAXR0
			GSPI_CLK
			DCDC_ANA2_SW_P
32	35	SOP0	SOP0
33	34	SOP1	SOP1
34	21	SOP2	GPIO25
			GT_PWM02
			McAFSX
			TCXO_EN
			SOP2
35		VCC	Power supply, 2.3 V ~ 3.6 V
36		GND	Ground

3 Specifications

3.1 Absolute Maximum Ratings

All measurements are referenced at the device pins, unless otherwise indicated. All specifications are over process and voltage, unless otherwise indicated.

Table 3. Absolute Maximum Ratings

Parameters	Condition	Min.	Typ.	Max.	Unit
Supply Voltage	V_{BAT} and V_{IO} （Chip pin: 37, 39, 44）	2.7	3.3	3.6	V
	V_{IO} ~ V_{BAT} (differential) （Chip pin: 10, 54）			0.0	V
Digital Inputs	/	-0.5		V_{IO} + 0.5	V
RF Pins	/	-0.5		2.1	V
Analog Pins (XTAL)	/	-0.5		2.1	V
Operating Temperature	/	-40	25	+85	℃
Storage Temperature	/	-55	25	+125	℃

3.2 Recommended Operating Conditions

Over operating free-air temperature range (unless otherwise noted) (1) (2)

Table 4. Recommended Operating Conditions of RF-WM-3200B1

Items	Condition (3) (4)	Min.	Typ.	Max.	Unit
V_{BAT}, V_{IO} (shorted to V_{BAT}) (Chip Pin: 10, 37, 39, 44, 54)	Direct battery connection	2.7	3.3	3.6	V
V_{BAT}, V_{IO} (shorted to V_{BAT}) (Chip Pin: 10, 37, 39, 44, 54)	Preregulated 1.85 V	2.7	1.85	1.9	V
Ambient thermal slew	/	-20	/	20	℃

Notes:

(1) When operating at an ambient temperature of over 75 °C, the transmit duty cycle must remain below 50% to avoid the auto-protect feature of the power amplifier. If the auto-protect feature triggers, the device takes a maximum of 60 seconds to restart the transmission.

(2) To ensure WLAN performance, ripple on the 2.7 V to 3.3 V supply must be less than ±300 mV.

3.3 RF Parameters

3.3.1 RF Configuration

Wireless Mode	Transmission Rate (Modulation)	Tx Power (Typical)	Rx Sensitivity (Typical)
IEEE802.11 B	11 Mbps @ CCK	17.0 dBm	-80 dBm
IEEE802.11 G	54 Mbps @ OFDM	13.0 dBm	-69 dBm
IEEE802.11 N	HT20 @ MCS7	12.0 dBm	-67 dBm

3.3.2 Transmission Distance Test

The transmission distance test was conducted in the outdoor open area, and four RF-WM-3200B1 modules were divided into two groups for Socket communication. Module A1 operates in STA mode, and module B1 operates in AP mode, and the simultaneous bidirectional communication test was conducted under the modules with on-board chip antenna. Module A2 operates in the STA mode, and module B2 operates in the AP mode, and the simultaneous bidirectional communication test was conducted under the modules with external rod antenna. The test results are as follows:

Transmission distance: 100 meters, data packet: 100 bytes.

- UDP Socket bidirectional communication (chip antenna modules):

Wi-Fi Module	Sending Packet	Receiving Packet	Number of Packet Loss	Packet Loss Rate
A1 Module: UDP Client → B1 Module: UDP Server	1009	1005	4	0.4%
A1 Module: UDP Client ← B1 Module: UDP Server	1000	998	2	0.2%

- TCP Socket bidirectional communication (chip antenna modules):

Wi-Fi Module	Sending Packet	Receiving Packet	Number of Packet Loss	Packet Loss Rate
A1 Module: TCP Client → B1 Module: TCP Server	1379	1379	0	0%
A1 Module: TCP Client ← B1 Module: TCP Server	1005	1005	0	0%

- UDP Socket bidirectional communication (external rod antenna modules):

Wi-Fi Module	Sending Packet	Receiving Packet	Number of Packet Loss	Packet Loss Rate
A2 Module: UDP Client → B2 Module: UDP Server	1392	1351	41	2.9%
A2 Module: UDP Client ← B2 Module: UDP Server	1019	998	21	2%

◆ TCP Socket bidirectional communication (external rod antenna modules):

Wi-Fi Module	Sending Packet	Receiving Packet	Number of Packet Loss	Packet Loss Rate
A2 Module: TCP Client → B2 Module: TCP Server	1392	1392	0	0%
A2 Module: TCP Client ← B2 Module: TCP Server	1003	1003	0	0%

4 Application, Implementation, and Layout

4.1 Module Photos

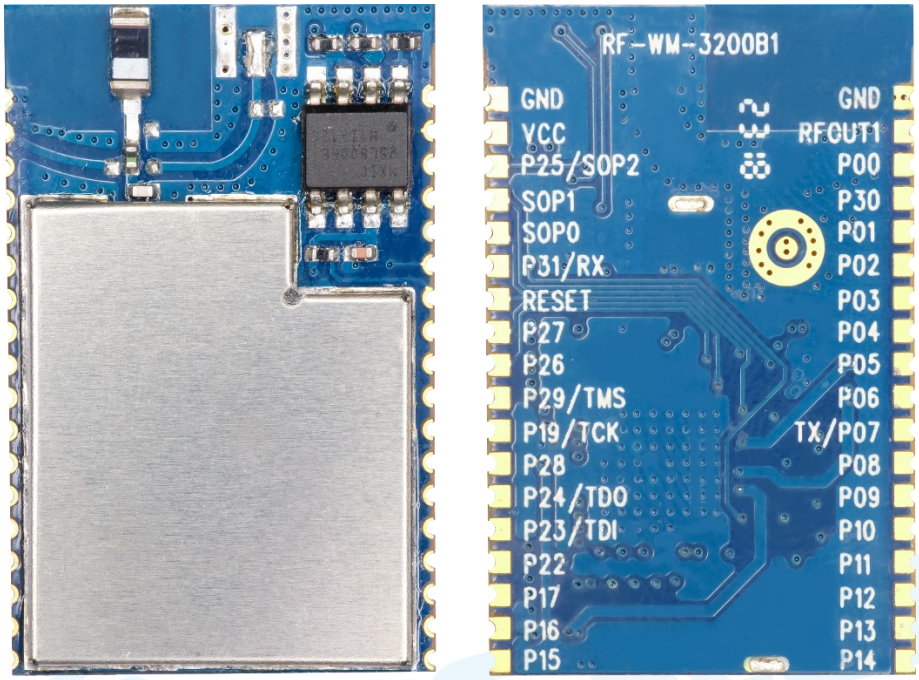


Figure 4. Photos of RF-WM-3200B1

4.2 Recommended PCB Footprint

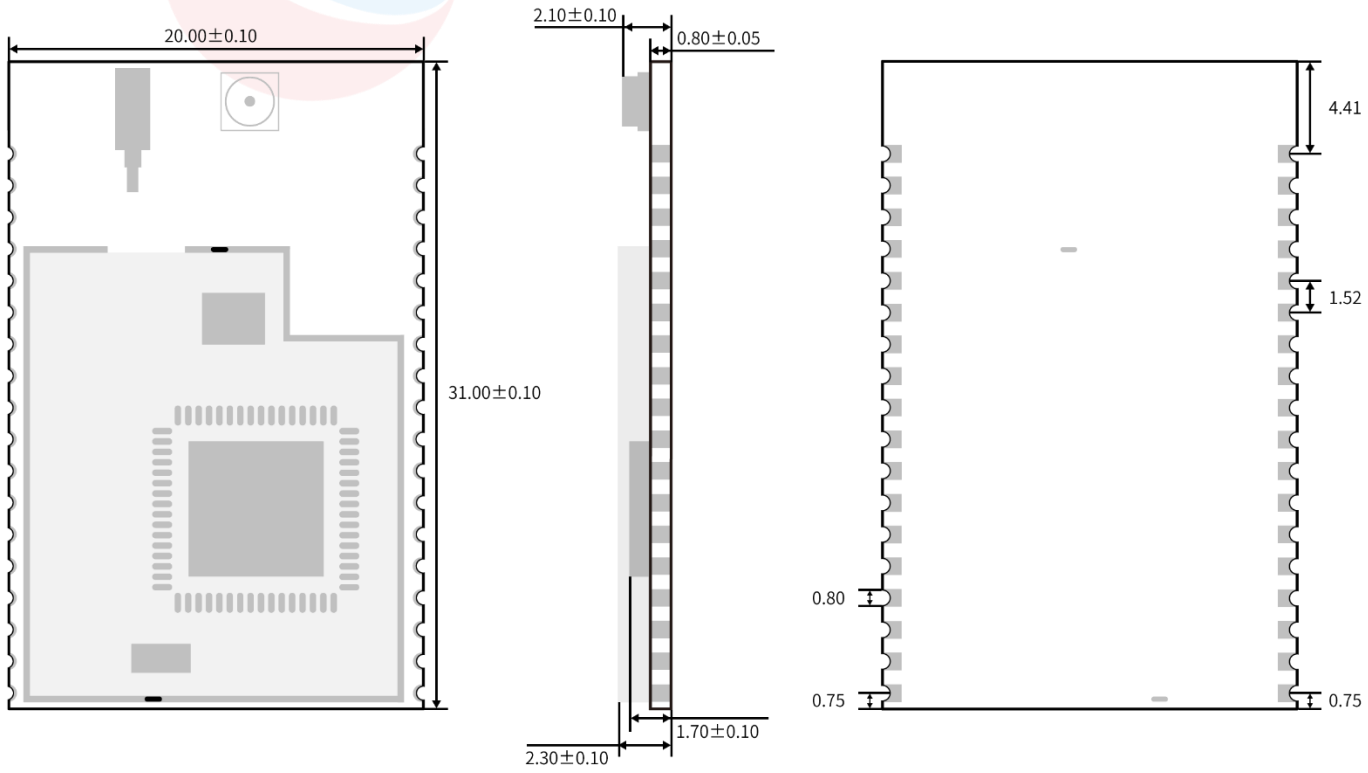


Figure 5. Recommended PCB Footprint of RF-WM-3200B1 (mm)

4.3 Antenna

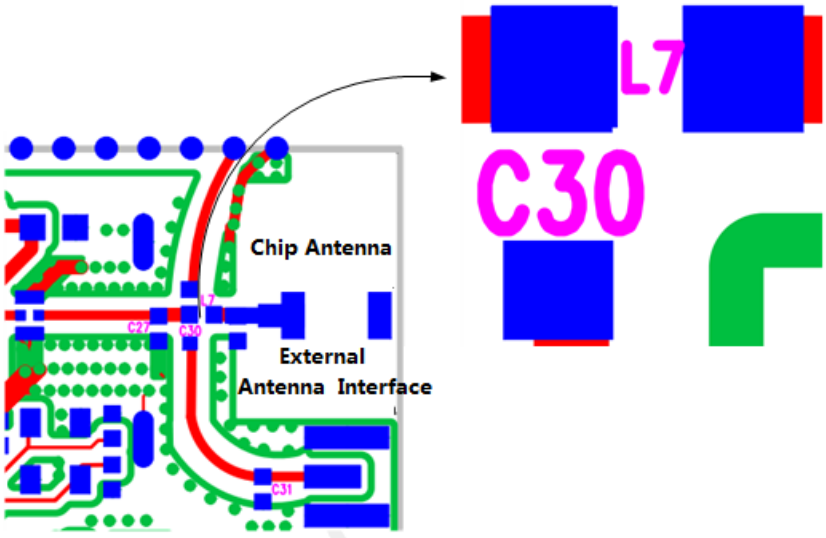


Figure 6. Optional Antenna

Table 5. Optional Antenna Configuration

Parameter / Antenna	C27	C30	C31	L7
Chip Antenna	1 pF	NC	NC	1.8 nH
External Antenna Interface	NC	0 Ω	NC	NC

The module uses the onboard ceramic antenna by default. If you need to use an external antenna, please switch according to the above table.

Note:

NC: Not Connect

C30: When using the external antenna, the position of C30 is measured as 0 Ω according to the actual simulation and debugging.

4.4 Module Operation

4.4.1 SOP Configuration

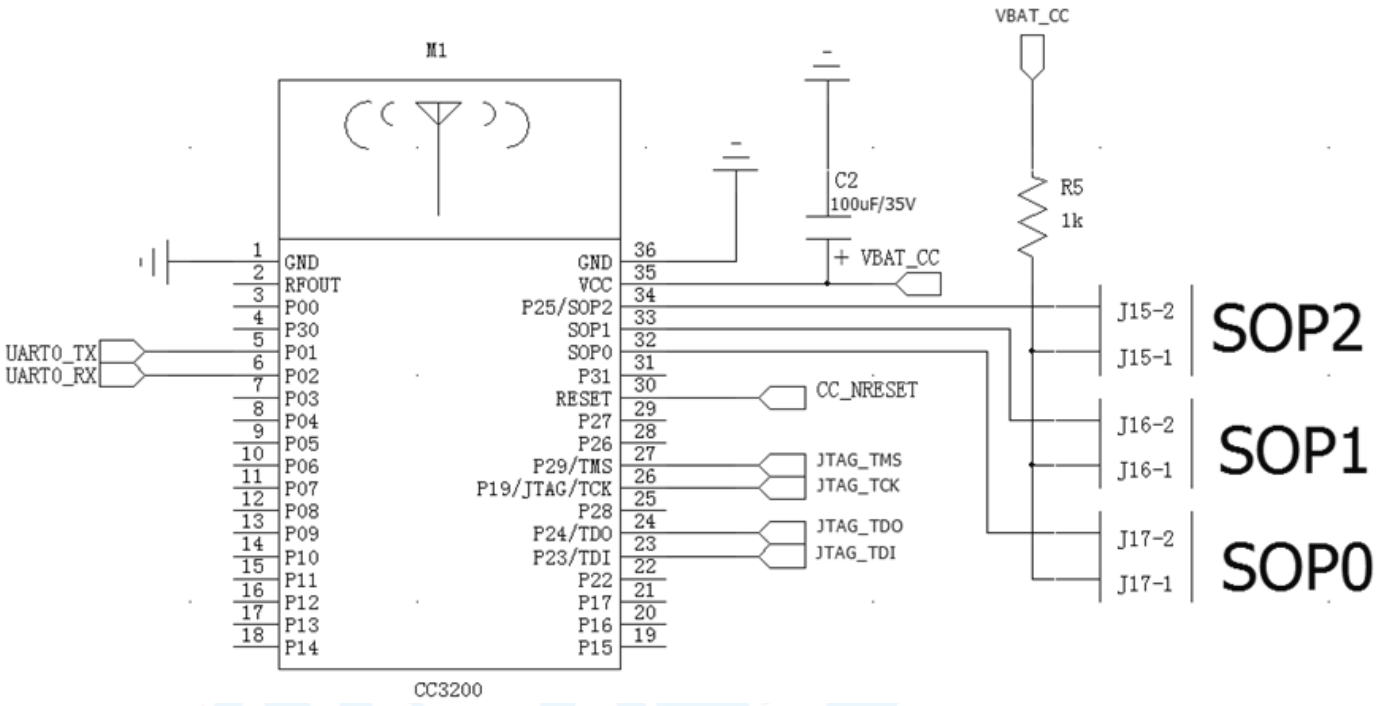


Figure 7. Reference Schematic Diagram of RF-WM-3200B1

Remark:

1) When Pin 1 & 2 of J15 are short connected, and J16 and J17 are disconnected, the module is in flash programming mode. Under this mode, the firmware can be burned into Flash via UART0_TX and UART0_RX.
2) When J15, J16 and J17 are disconnected, the module is in the functional mode + 4 Wire JTAG mode.
3) When Pin 1 & 2 of J17 are shorted connected, and J15 and J16 are disconnected, the module is in Functional mode + 2 Wire JTAG mode.

4.4.2 Module Operation

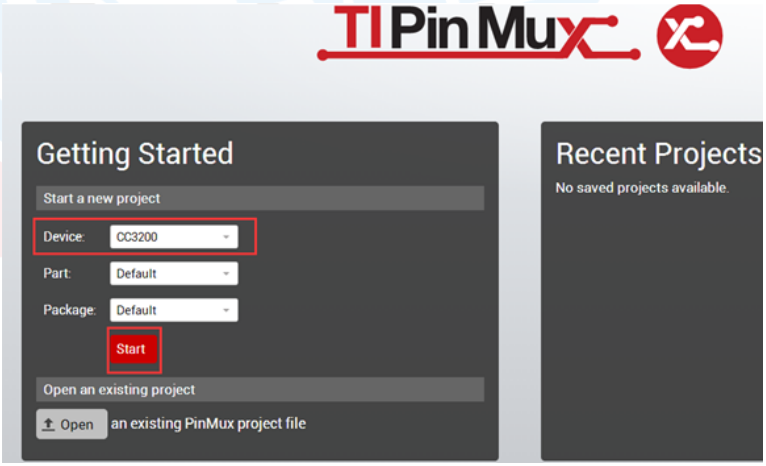
4.4.2.1 Pin Application Sample

When one serial port and two IO ports are needed to be used, pin function table will use for reference to choose the related pins. For example, GPIO3 can work as UART1_TX, GPIO4 as UART1_RX, GPIO2 as normal output port and GPIO5 as normal input port.

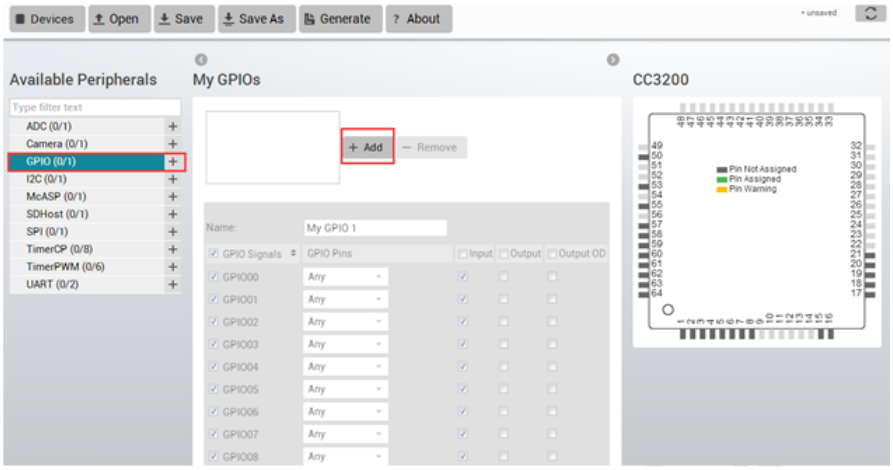
6	57	GPIO02	ADC_CH0
			GPIO2
			UART0_RX
			UART1_RX
			GT_CCP02
7	58	GPIO03	ADC_CH1
			GPIO3
			UART1_TX
			pDATA7(CAM_D3)
8	59	GPIO04	ADC_CH2
			GPIO4
			UART1_RX
			pDATA6(CAM_D2)
9	60	GPIO05	ADC_CH3
			GPIO5
			pDATA5(CAM_D1)
			McAXR1
			GT_CCP05

Figure 8. Pin Application Example of RF-WM-3200B1

The functions of IO ports can be configured flexibly and the program is generated easily by the program “Pin Mux” offered by Texas Instruments.

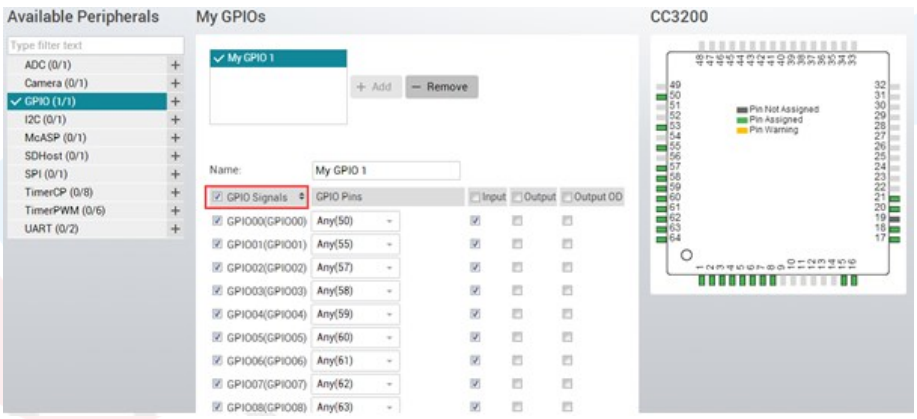


Select “CC3200” as “Device” and click “Start”

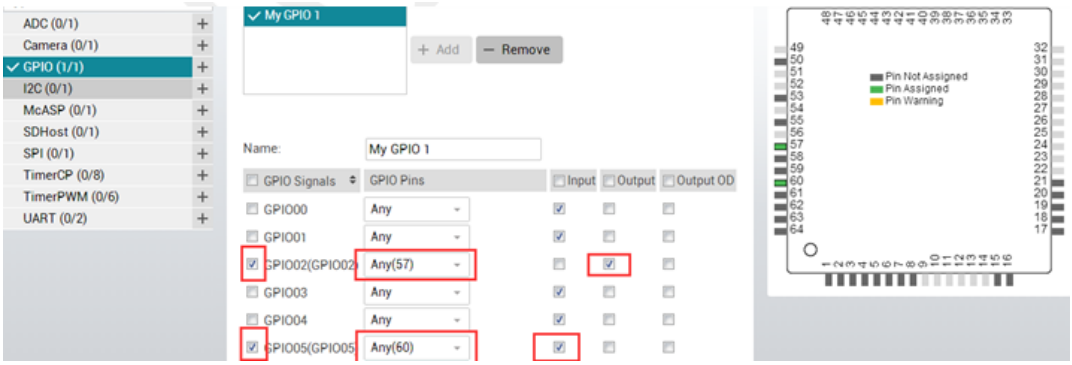


Select “GPIO” and click “+ Add”

Remove the select of “GPIO Signals”

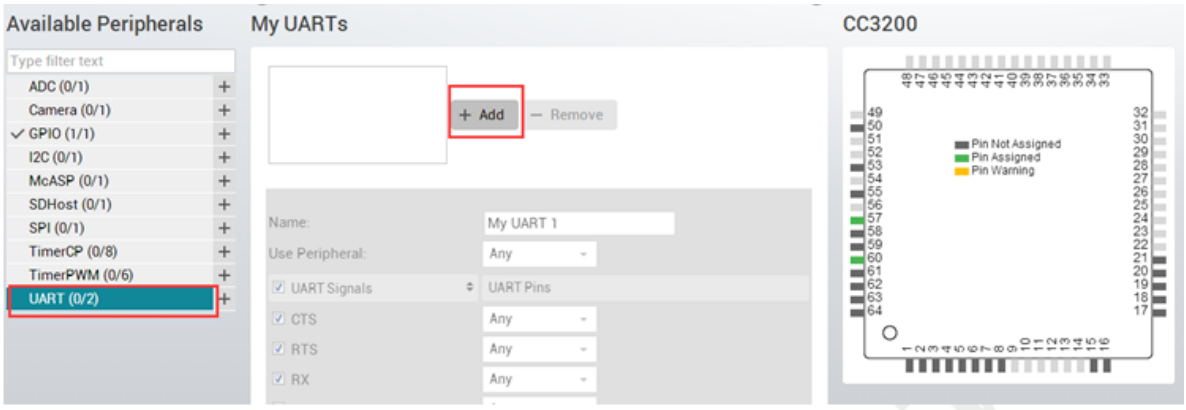


Select “GPIO2” and “GPIO5”, and choose the corresponding IO type

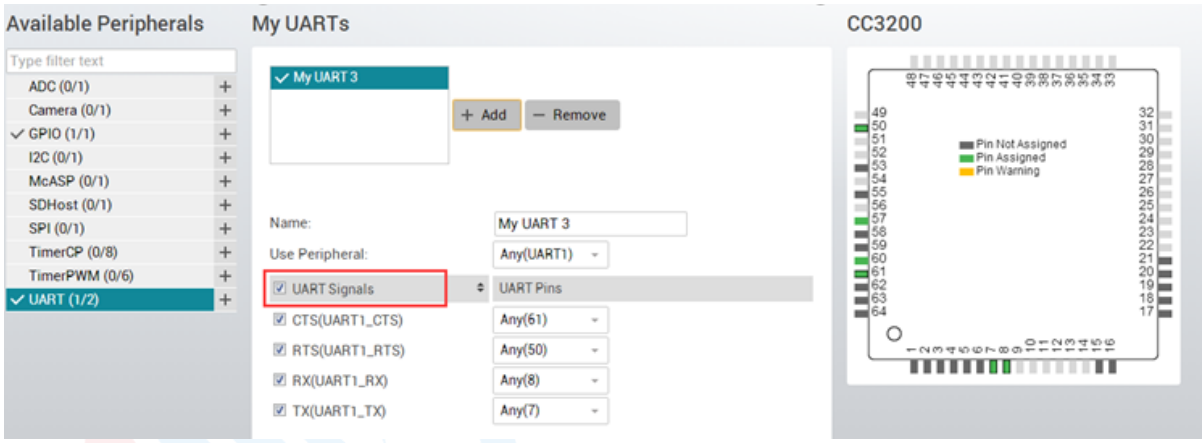


Select “UART” and click “+ Add”

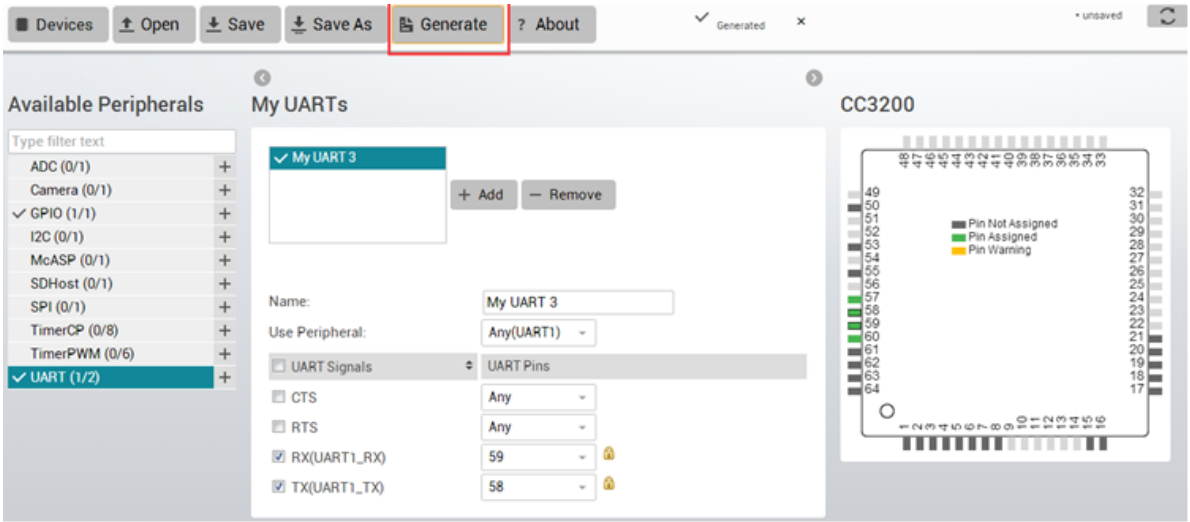
Remove the select of “UART Signals”



As the pin numbers of GPIO03 and GPIO04 are 58 and 59 respectively, just select the corresponding pin as shown.



After configuration is done, click “Generate” to generate .c and .h files. Add the files generated into the corresponding program. All the configuration is done.



4.5 Basic Operation of Hardware Design

1. It is recommended to offer the module with a DC stabilized power supply, a tiny power supply ripple coefficient and the reliable ground. Please pay attention to the correct connection between the positive and negative poles of the power supply. Otherwise, the reverse connection may cause permanent damage to the module;
2. Please ensure the supply voltage is between the recommended values. The module will be permanently damaged if the voltage exceeds the maximum value. Please ensure the stable power supply and no frequently fluctuated voltage.
3. When designing the power supply circuit for the module, it is recommended to reserve more than 30% of the margin, which is beneficial to the long-term stable operation of the whole machine. The module should be far away from the power electromagnetic, transformer, high-frequency wiring and other parts with large electromagnetic interference.
4. The bottom of module should avoid high-frequency digital routing, high-frequency analog routing and power routing. If it has to route the wire on the bottom of module, for example, it is assumed that the module is soldered to the Top Layer, the copper must be spread on the connection part of the top layer and the module, and be close to the digital part of module and routed in the Bottom Layer (all copper is well grounded).
5. Assuming that the module is soldered or placed in the Top Layer, it is also wrong to randomly route the Bottom Layer or other layers, which will affect the spurs and receiving sensitivity of the module to some degrees;
6. Assuming that there are devices with large electromagnetic interference around the module, which will greatly affect the module performance. It is recommended to stay away from the module according to the strength of the interference. If circumstances permit, appropriate isolation and shielding can be done.
7. Assuming that there are routings of large electromagnetic interference around the module (high-frequency digital, high-frequency analog, power routings), which will also greatly affect the module performance. It is recommended to stay away from the module according to the strength of the interference. If circumstances permit, appropriate isolation and shielding can be done.
8. It is recommended to stay away from the devices whose TTL protocol is the same 2.4 GHz and 5 GHz physical layer, for example: USB 3.0.
9. The antenna installation structure has a great influence on the module performance. It is necessary to ensure the antenna is exposed and preferably vertically upward. When the module is installed inside of the case, a high-quality antenna extension wire can be used to extend the antenna to the outside of the case.
10. The antenna must not be installed inside the metal case, which will cause the transmission distance to be greatly weakened.
11. The recommendation of antenna layout.

    The chip antenna position on PCB is free space electromagnetic radiation. The location and layout of antenna is a key factor to increase the data rate and transmission range.

Therefore, the layout of the module antenna location and routing is recommended as follows:

（1） Place the antenna on the edge (corner) of the PCB.

（2） Make sure that there is no signal line or copper foil in each layer below the antenna.

（3） It is the best to hollow out the antenna position in the following figure ensure that S11 of the module is minimally affected.

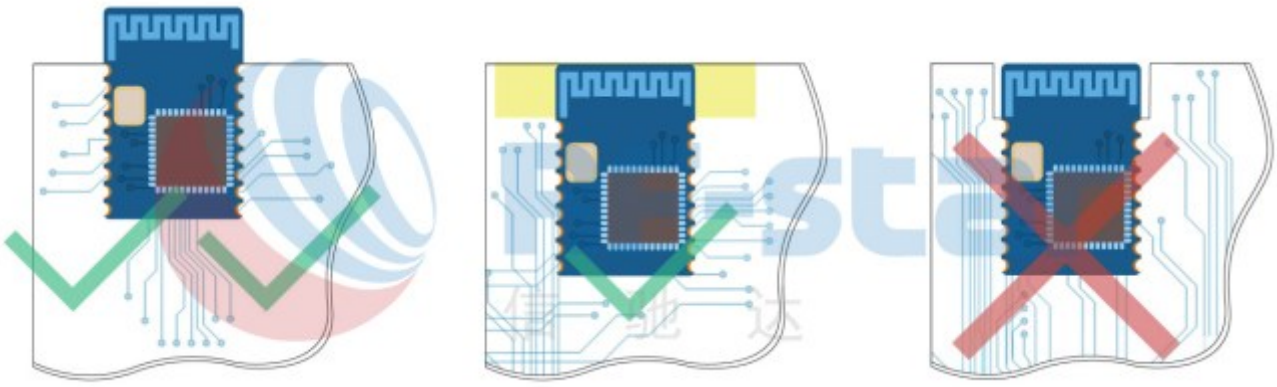


Figure 9. Recommendation of Antenna Layout

Note: The hollow-out position is based on the antenna used.

4.6 Trouble Shooting

4.6.1 Unsatisfactory Transmission Distance

1. When there is a linear communication obstacle, the communication distance will be correspondingly weakened. Temperature, humidity, and co-channel interference will lead to an increase in communication packet loss rate. The performances of ground absorption and reflection of radio waves will be poor, when the module is tested close to the ground.
2. Seawater has a strong ability to absorb radio waves, so the test results by seaside are poor.
3. The signal attenuation will be very obvious, if there is a metal near the antenna or the module is placed inside of the metal shell.
4. The incorrect power register set or the high data rate in an open air may shorten the communication distance. The higher the data rate, the closer the distance.
5. The low voltage of the power supply is lower than the recommended value at ambient temperature, and the lower the voltage, the smaller the power is.
6. The unmatchable antennas and module or the poor quality of antenna will affect the communication distance.

4.6.2 Vulnerable Module

1. Please ensure the supply voltage is between the recommended values. The module will be permanently damaged

if the voltage exceeds the maximum value. Please ensure the stable power supply and no frequently fluctuated voltage.

2. Please ensure the anti-static installation and the electrostatic sensitivity of high-frequency devices.
3. Due to some humidity sensitive components, please ensure the suitable humidity during installation and application. If there is no special demand, it is not recommended to use at too high or too low temperature.

4.6.3 High Bit Error Rate

1. There are co-channel signal interferences nearby. It is recommended to be away from the interference sources or modify the frequency and channel to avoid interferences.
2. The unsatisfactory power supply may also cause garbled. It is necessary to ensure the power supply reliability.
3. If the extension wire or feeder wire is of poor quality or too long, the bit error rate will be high.

4.7 Electrostatics Discharge Warnings

The module will be damaged for the discharge of static. RF-star suggest that all modules should follow the 3 precautions below:

1. According to the anti-static measures, bare hands are not allowed to touch modules.
2. Modules must be placed in anti- static areas.
3. Take the anti-static circuitry (when inputting HV or VHF) into consideration in product design.
   Static may result in the degradation in performance of module, even causing the failure.

4.8 Soldering and Reflow Condition

1. Heating method: Conventional Convection or IR/convection.
2. Solder paste composition: Sn96.5 / Ag3.0 / Cu0.5
3. Allowable reflow soldering times: 2 times based on the following reflow soldering profile.
4. Temperature profile: Reflow soldering shall be done according to the following temperature profile.
5. Peak temperature: 245 ℃.

Table 6. Temperature Table of Soldering and Reflow

Profile Feature	Sn-Pb Assembly	Pb-Free Assembly
Solder Paste	Sn63 / Pb37	Sn96.5 / Ag3.0 / Cu0.5
Min. Preheating Temperature (T_{min})	100 ℃	150 ℃
Max. Preheating Temperature (T_{max})	150 ℃	200 ℃
Preheating Time (T_{min} to T_{max}) (t_1)	60 s ~ 120 s	60 s ~ 120 s
Average Ascend Rate (T_{max} to T_p)	Max. 3 ℃/s	Max. 3 ℃/s

Liquid Temperature (T_L)	183 ℃	217 ℃
Time above Liquidus (t_L)	60 s ~ 90 s	30 s ~ 90 s
Peak Temperature (T_p)	220 ℃ ~ 235 ℃	230 ℃ ~ 250 ℃
Average Descend Rate (T_p to T_{max})	Max. 6 ℃/s	Max. 6 ℃/s
Time from 25 ℃ to Peak Temperature (t_2)	Max. 6 minutes	Max. 8 minutes
Time of Soldering Zone (t_P)	20±10 s	20±10 s

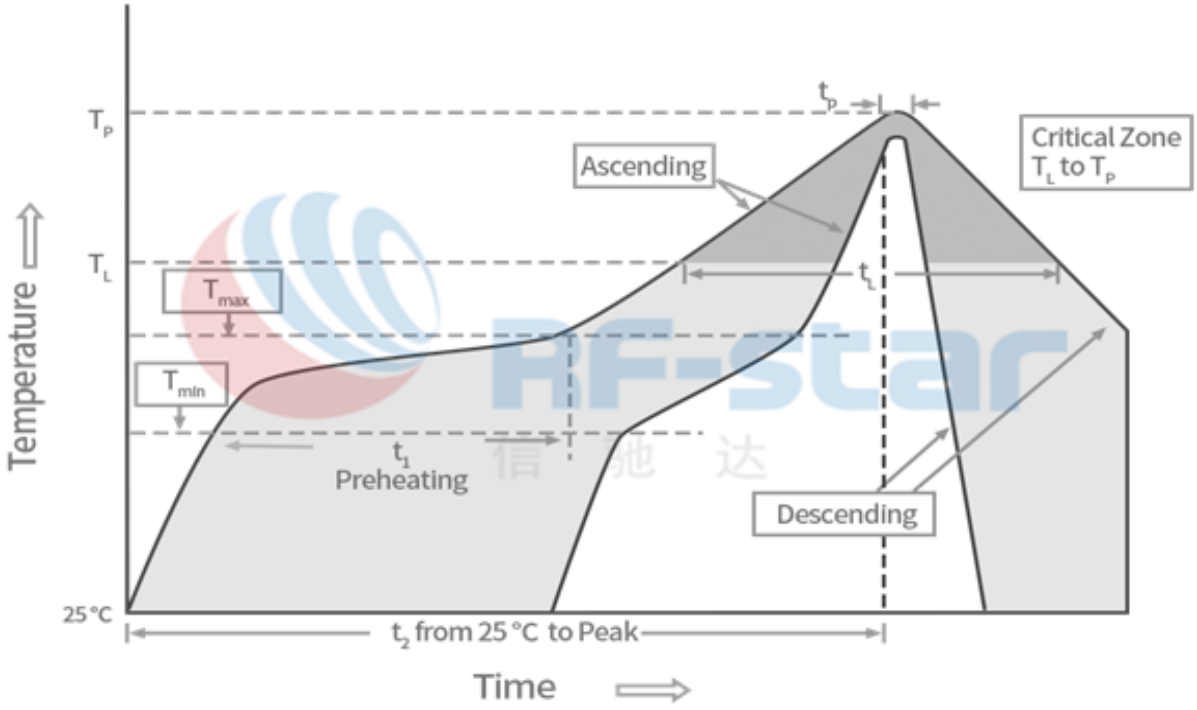


Figure 10. Recommended Reflow for Lead Free Solder

5 Optional Package Specification

The default package method is ***by tray***. If you need the modules to be shipped by tape & reel, pls contact us in advance.

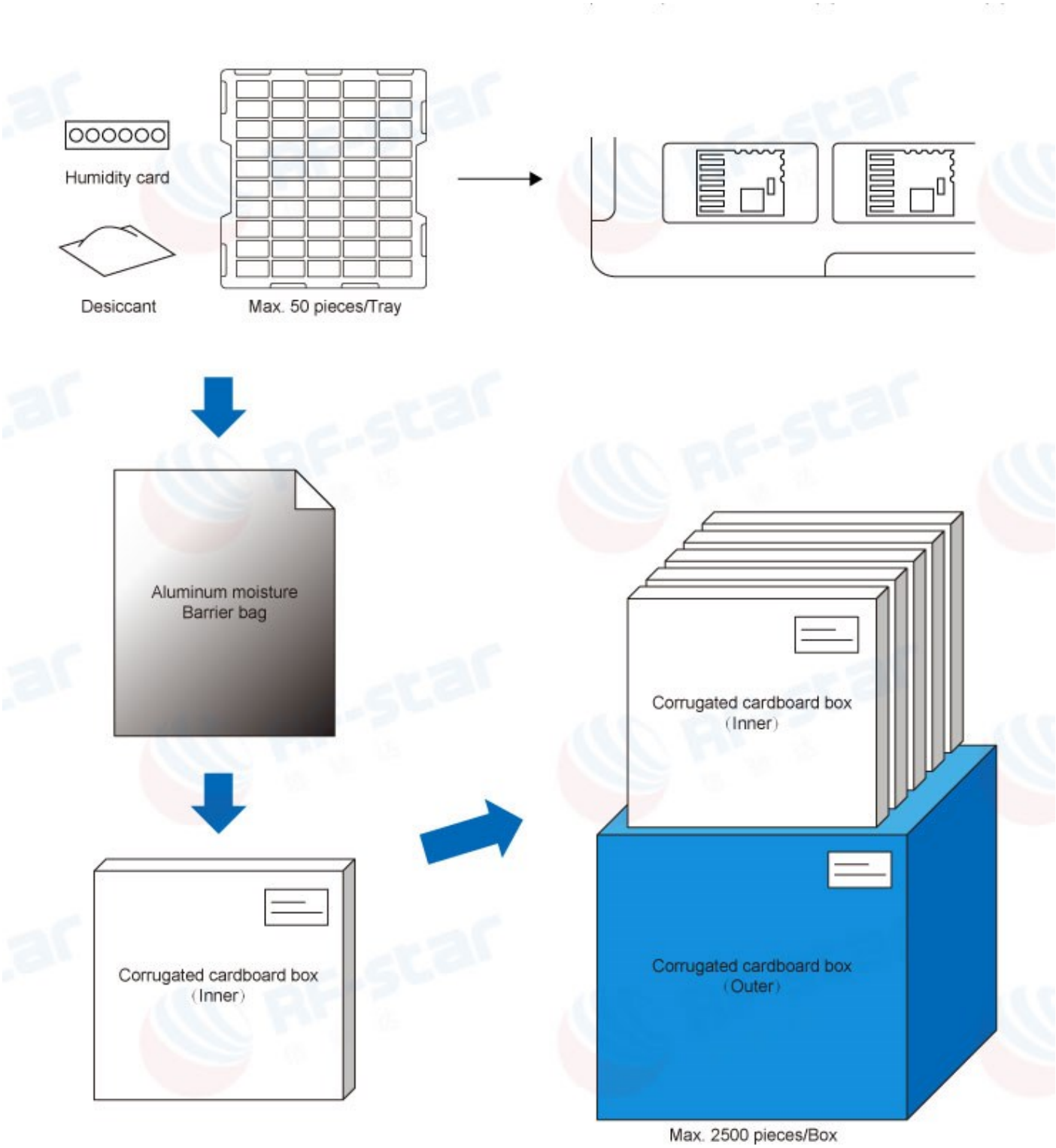


Figure 11. Default Package by Tray

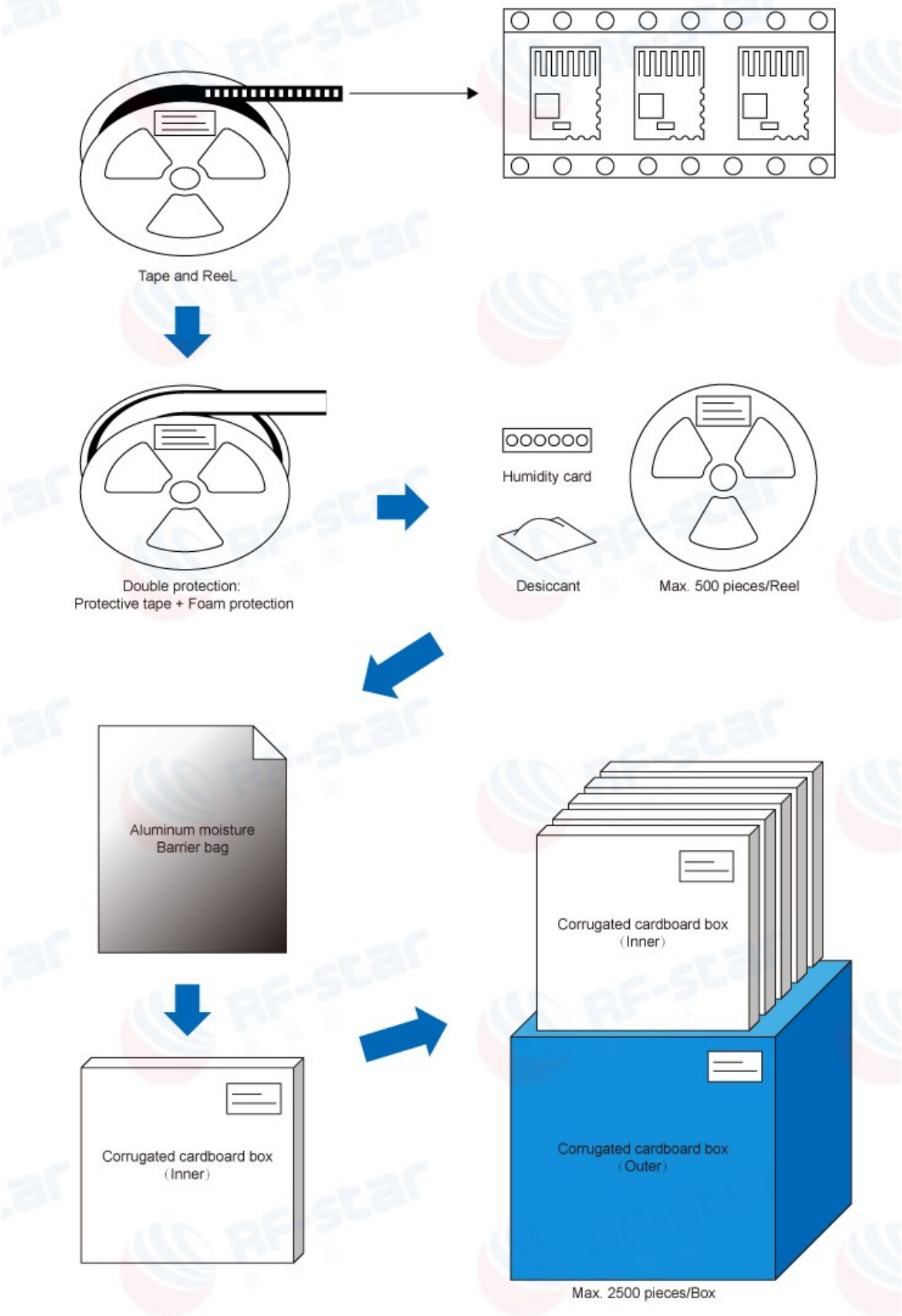
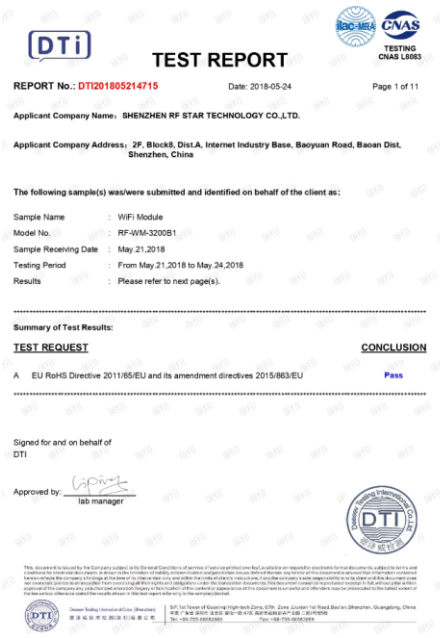


Figure 12. Package by Tape & Reel

6 Certification

6.1 RoHS

RoHS Report No.: DTI201805214715



DTi

TEST REPORT

TESTING
CNAS L8083

REPORT No.: DTI201805214715 Date: 2018-05-24 Page 1 of 11

Applicant Company Name: SHENZHEN RF STAR TECHNOLOGY CO.,LTD.

Applicant Company Address: 2F, Block8, Dist.A, Internet Industry Base, Baoyuan Road, Baoan Dist, Shenzhen, China

The following sample(s) was/were submitted and identified on behalf of the client as:

Sample Name	:	WiFi Module
Model No.	:	RF-WM-3200B1
Sample Receiving Date	:	May.21,2018
Testing Period	:	From May.21,2018 to May.24,2018
Results	:	Please refer to next page(s).

Summary of Test Results:

TEST REQUEST		CONCLUSION
A	EU RoHS Directive 2011/65/EU and its amendment directives 2015/863/EU	Pass

Signed for and on behalf of
DTI

Approved by: lab manager

Figure 13. RoHS certificate

7 Revision History

Date	Version No.	Description
2015.05.05	V1.0.0	The initial version is released.
2015.08.21	V1.0.1	Add “parameter” chapter.
2015.11.03	V1.0.2	Add transmission distance.
2015.11.10	V1.0.3	Modify product photo.
2016.07.06	V1.0.4	Add side view of the module.
2016.07.25	V1.0.5	Add “optional antenna” chapter.
2016.09.22	V1.0.6	Modify module model.
2019.09.20	V1.1	English version rewritten.
2023.05.25	V1.1	Update the Shenzhen office address.

Note:

1. The document will be optimized and updated from time to time. Before using this document, please make sure it is the latest version.
2. To obtain the latest document, please download it from the official website: www.rfstariot.com and www.szrfstar.com.

8 Contact Us

SHENZHEN RF-STAR TECHNOLOGY CO., LTD.

Shenzhen HQ:

Add.: Room 502, Podium Building No. 12, Shenzhen Bay Science and Technology Ecological Park, Nanshan District, Shenzhen, Guangdong, China, 518063

Tel.: 86-755-8632 9829

Chengdu Branch:

Add.: N2-1604, Global Center, North No. 1700, Tianfu Avenue, Hi-Tech District, Chengdu, Sichuan, China, 610095

Tel.: 86-28-8692 5399

Email: sunny@szrfstar.com, sales@szrfstar.com

Web.: www.rfstariot.com, www.szrfstar.com