秘密级别： 公开
生效时间：2024 年 06 月 24 日
保密期限： 长期

Model WF-R720M-RTM1 Datasheet

IEEE 802.11 1x1 WiFi 4 Wireless LAN

and

Bluetooth 4.2

SMD Uart Combo Module

[SoC RTL8720CM]

for 802.11b/g/n + Bluetooth 4.2

Version： 2.0

For Private Preview

<Specification may be changed without prior notice>

Sichuan AI-Link Technology Co., Ltd

四川爱联科技股份有限公司

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Typed Name	Signature	Date
Please sign and return this page and the front page to our company by email or fax, or by courier to the following address: Address: Anzhou Industrial Park, Mianyang, Sichuan, P.R.C Company: Sichuan AI-Link Technology Co., Ltd.		

Module Name		**WF-R720M-RTM1**	
	Designed by	Reviewed by	Approved by
Signature	TANG, Wei	HUANG, Wei	FAN, Xijun
Date	2024/06/24	2024/06/24	2024/06/24

Model WF-R720M-RTM1

- **Compatible WLAN Standards**

  IEEE Std. 802.11 b/g/n
  Bluetooth 4.2

- **SoC**

  RTL8720CM

- **Product Size**

  18.0mm x20.0mm x2.7mm

- **Product Weight**

  1.5 g

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RoHS

Features

WLAN

- CMOS MAC, Baseband PHY, and RF in a single chip for 802.11b/g/n compatible WLAN
- Complete 802.11n solution for 2.4GHz band
- 65Mbps receive PHY rate and 65Mbps transmit PHY rate using 20MHz bandwidth
- Backward compatible with 802.11b/g devices while operating in 802.11n mode
- One Transmit and one Receive path (1T1R)
- 20MHz bandwidth transmission
- OFDM with BPSK, QPSK, 16QAM, and 64QAM modulation. Convolutional Coding Rate: 1/2, 2/3, 3/4,and 5/6

Bluetooth

- The RTL8720CF highly integrated Bluetooth Low Energy controller with a UART interface. It combines a BLE Protocol (PHY, LL, L2CAP, SM, ATT, GAP, GATT), BLE Baseband, Modem, and BLE RF in chip, also supports BLE user GATT-based profile application.
- Bluetooth 4.2 Low Energy (F/W supported)

Revision Record

Revision	Date	Description	Edited by
V1.0	2024/6/24	Premier Release	TANG, Wei
V2.0	2025/7/7	Add Certification Information	TANG, Wei
** Private Preview Only*			

Contents

1 General Description

1.1 System Overview

WF-R720M-RTM1 SoC module designed base on RTL8720CM chip solution. RTL8720CM are highly integrated single-chip low power 802.11n Wireless LAN (WLAN) network controllers. It combines a KM4 MCU, WLAN MAC, a 1T1R capable WLAN baseband, RF, and Bluetooth in a single chip. It also provides a bunch of configurable GPIOs which are configured as digital peripherals for different applications and control usage.

1.2 System Properties

Dimension	Typically, 18.0mm x20.0mm x2.7mm
Chipset	RTL8720CM
Operating Frequency	2.4GHz: 2400-2483.5MHz
Antenna	PCB Antenna
Operating Voltage	3.3V±10%
PCB Information	2-layers design (0.8+/-0.15mm)
Peripheral Interface	WIFI@UART BT@ UART
Rate	11b: 1, 2, 5.5 and 11Mbps 11g: 6, 9, 12, 18, 24, 36, 48 and 54 Mbps 11n: MCS0~7, up to 65Mbps
Operating Temperature	-20℃ to +85℃
Storage Temperature	-40℃ to +125℃
ESD Protection	HBM：2000V MM：±100V IEC(Contact discharge)：±4000V IEC(Air discharge)：±8000V

1.3 Diagram

The general HW architecture for the module is shown in Figure-1, The WF-R720M-RTM1 module is a chipset solution, system-on-chip-module, 1x1 802.11 b/g/n device optimized for low-power embedded applications with single-stream capability for both transmit and receive, and Bluetooth in a single chip. It has an integrated network processor with a large set of TCP/IP with IPv4/IPv6 based services.

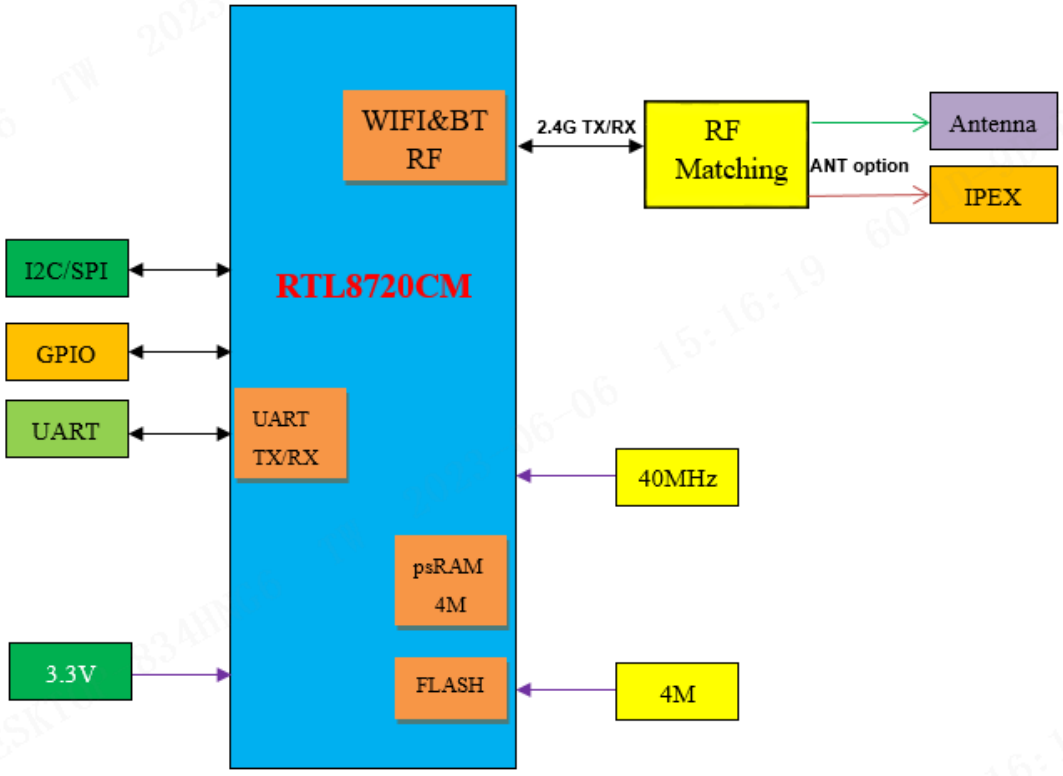


Figure 1: WF-R720M-RTM1 Block Diagram

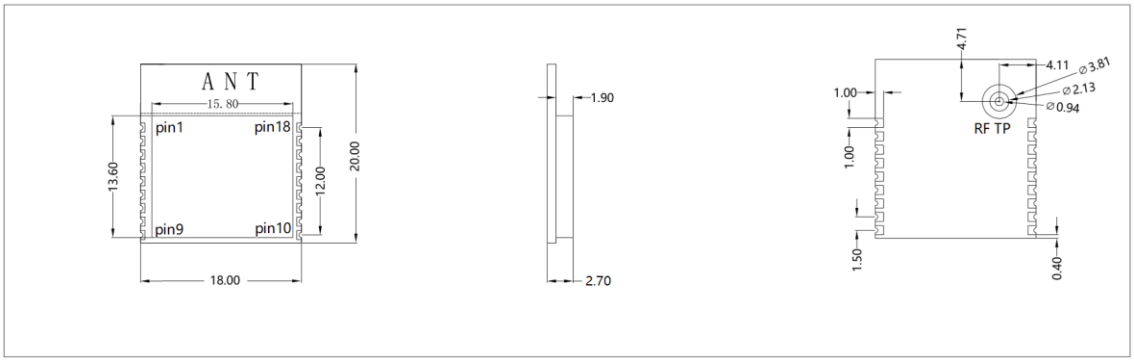
2 Mechanical Dimensions

2.1 Mechanical Outline Drawing

- Typical Dimension (W x L x T): 18.0mm x20.0mm x2.7mm

Note：Tolerance Table

Dimensions (mm)	Tolerance (mm)
0-5	±0.15
5-10	±0.20
10-50	±0.30



Top View *Bottom View*

2.3 Pin definitions

NO.	Definition	Description
1	3V3	3.3V power supply
2	EN	Module enable foot, internally pulled up
3	GPIOA_0	JTAG_CLK/UART1_IN/EXT_32K/PWM0
4	GPIOA_1	JTAG_TMS/UART1_OUT/ PWM1
5	GPIOA_2	JTAG_TDO/UART1_IN/SPI_CS/I2C_SCL/ PWM2
6	GPIOA_3	JTAG_TDI/UART1_OUT/SPI_SCL/I2C_SDA/ PWM3
7	GPIOA_4	JTAG_TRST/UART1_CTS/SPI_MOSI/ PWM4
8	GPIOA_20	SD_D1/SPI_M_D1/UART2_RTS/SPI_MISO/I2C_SDA/ PWM0
9	GND	GND
10	GPIOA_19	SD_D0/SPI_M_D0/UART2_CTS/SPI_MOSI/I2C_SCL/ PWM7
11	GPIOA_13	UART0_RXD, Connect to host
12	GPIOA_14	UART0_TXD, Connect to host & BT FW
13	GND	GND
14	GPIOA_17	SD_CMD/SPI_M_D2/ PWM5
15	GPIOA_18	SD_CLK/SPI_M_D3/ PWM6
16	GPIOA_16	UART2_LOG_TXD，debug
17	GPIOA_15	UART2_LOG_RXD，debug
18	GND	GND

2.4 Product Photos

Top View

Bottom View

3 RF Characteristics

3.1 Wi-Fi Subsystem

Items	Contents	
WLAN Standard	IEEE 802.11b/g/n	
Frequency Range	2.4GHz: 2400-2483.5MHz	
Channels	CH1 to CH13 @ 2.4G	
Modulation Mode	802.11b: DBPSK, DQPSK ,CCK	
	802.11g/n: BPSK, QPSK, 16QAM, 64QAM	
Output Power & EVM	Power Value	EVM
	802.11b /11Mbps: 17dBm ± 2dBm	≤ -10dB
	802.11g /54Mbps: 15dBm ± 2dBm	≤ -25dB
	802.11n HT20 /MCS7: @2.4G 14 dBm ± 2dBm	≤ -28dB
Receiver Sensitivity @2.4G PER≤ 10%	Rate Type	Max
	802.11b /11Mbps @2.4G PER≤8%	-85dBm
	802.11g /54Mbps @2.4G	-72dBm
	802.11n HT20 /MCS7 @2.4G	-68dBm

3.2 Bluetooth Subsystem

Items	Contents
Host Interface	UART

TX Characteristics				
Channel	LE:CH0 to CH39			
Modulation	GFSK、π/4-DQPSK 、8PSK			
TX Power	Rate Type	Min(dBm)	Typ(dBm)	Max(dBm)
	1LE	/	4	/
RX Characteristics				
RX	Rate Type	Min(dBm)	Typ(dBm)	Max(dBm)
	1LE (PER<30.8%)	/	-92	/

** Note: [1] Typical RF Output Power are tested at room temp.25℃*

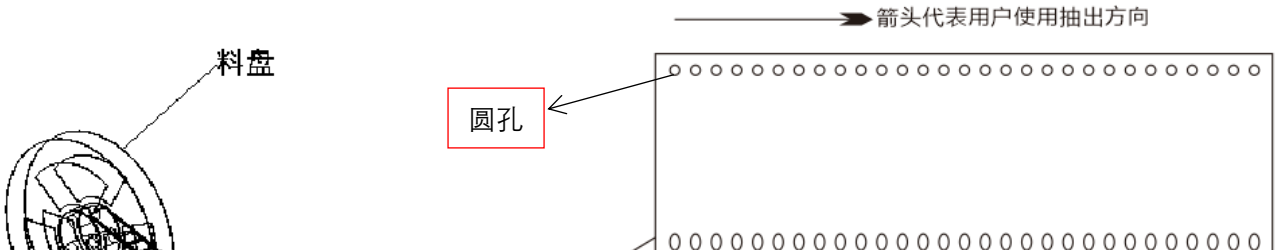
4 Software Information

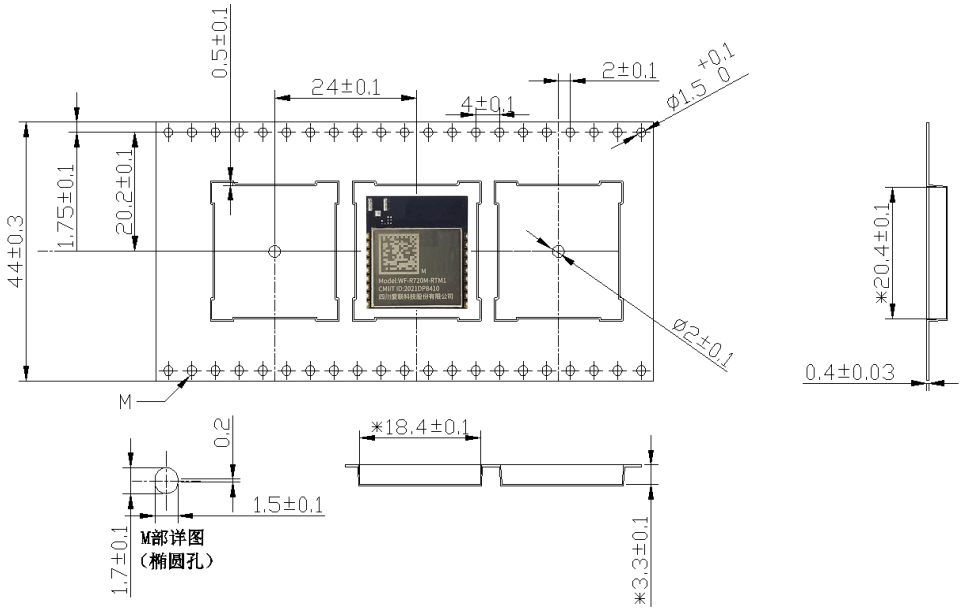
AmebaZII_PGTool_v1.2.34

**Note: The software (driver) package version is subject to change without notice because it may encounter several updates. It is advised to consult with AI-Link for the best right driver package.*

5 Package, Storage & Disposal

5.1 Package





5.2 Packing List

The product placement direction and label pasting position are carried out according to the schematic diagram;

Each roll put 650 products, each small box put 1 roll, a total of 5 large boxes of small boxes, the total number of products 3250pcs / box;

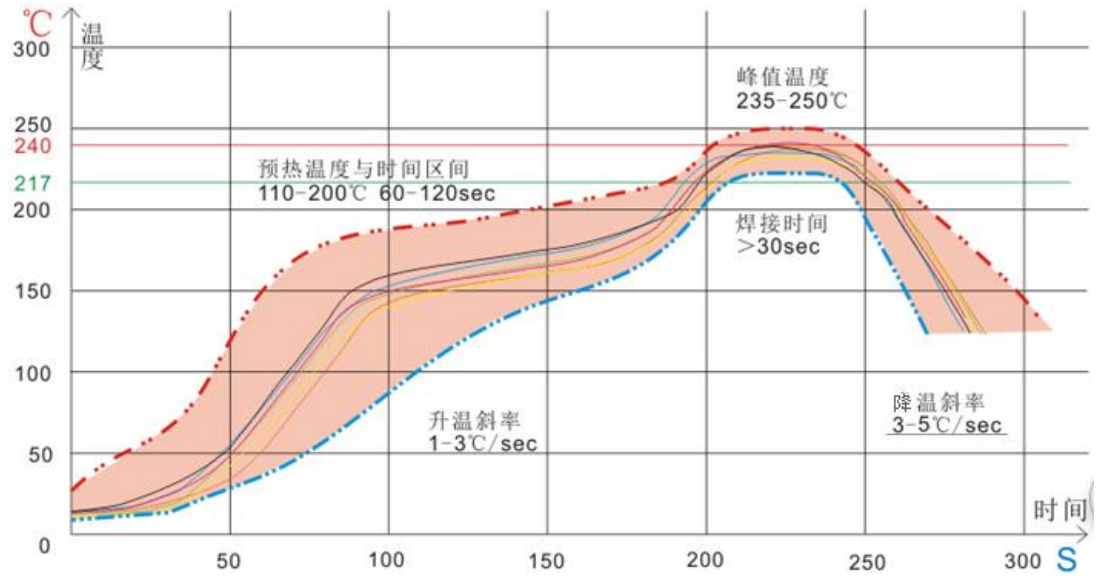
Outer box size: 370mm*370mm*300mm,

Small box size: 360mm*360mm*37mm;

Place 2g desiccant 2 bags in the vacuum bag, 1 6 color humidity card;

Other unfinished matters shall be carried out according to the customer's packaging requirements.

6 Refelow Standard Condition



升 温 区：温度：<150℃，时间：60～90 秒之间，斜率控制在 1～3℃/S 之间。

预热恒温区：温度：150℃～200℃，时间：60-120 秒之间，斜率在 0.3-0.8 之间。

回流焊接区：峰值温度 235℃~250℃(建议峰值温度＜245℃），时间 30-70 秒。

冷 却 区：温度：217℃~170℃，斜率在 3～5℃/S 之间。

焊料为锡银铜合金无铅焊料/ Sn&Ag&Cu Lead-free solder(SAC305)。

注意：

1） 推荐钢网厚度：0.15~0.18mm（优选 0.18mm).

2） 模组 EPAD 接地焊盘钢网开口建议为阻焊层面积的 30%-40%;

7 Storage

All electronic components must be stored in a clean, well-ventilated place free of corrosive gas. Unless otherwise specified, the temperature and humidity of the storage place must meet below requirements:

- Temperature：-40~125℃;

- Humidity：20%~75%;
- Humidity sensitivity grade： MSL 3
- Container Requirement: products shall be placed in a container well-functioning as an electrostatic shielding.

8 Disposal

The waste disposal of this product and the package should comply with the applicable local/regional /state/ international regulations.

9 Certification Information

FCC regulatory compliance statement

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.

Warning: changes or modifications not expressly approved by the party responsible for compliance could void the user’s authority to operate the equipment.

This Module complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Labelling Instruction for Host Product Integrator

Please notice that if the FCC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: “Contains FCC ID: 2AOKI-R720MRTM1” any similar wording that expresses the same meaning may be used.

Installation Notice to Host Product Manufacturer

The OEM integrator is responsible for ensuring that the end-user has no manual instruction to remove or install module.

The module is limited to installation in mobile application, a separate approval is required for all other operating configurations, including portable configurations with respect to §2.1093 and difference antenna configurations.

Antenna Change Notice to Host manufacturer

If you desire to increase antenna gain and either change antenna type or use same antenna type certified, a Class II permissive change application is required to be filed by us, or you (host manufacturer) can take responsibility through the change in FCC ID (new application) procedure followed by a Class

II permissive change application.
FCC other Parts, Part 15B Compliance Requirements for Host product manufacturer
This modular transmitter is only FCC authorized for the specific rule parts listed on our grant, host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification.
[AI-Link Confidential] WF-R720M-RTM1

Host manufacturer in any case shall ensure host product which is installed and operating with the module is in compliant with Part 15B requirements.
Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 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 or more 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.

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