四川爱联

WF-R710-RTA1

特性 Features:

- **接收制式 Supported WLAN Standard**
  IEEE Std. 802.11b
  IEEE Std. 802.11g
  IEEE Std. 802.11n

- **芯片方案 Chip Solution**
  RTL8710B

- **结构大小 Size**
  18.0mm x20.0mm x2.9mm

接口	接受制式	频段	天线接口	供电电压
UART	IEEE 802.11b/g/n	2.4G	PCB 天线	3.3V

Company Confidential /Country of Origin :

四川爱联科技有限公司

Sichuan AI-Link Technology Co.,Ltd.

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地址：四川省绵阳市安州工业园区

ADD： Anzhou,Industrial park,Mianyang,Sichuan

公司：四川爱联科技有限公司

Factory： Sichuan AI-Link Technology Co.,Ltd.

Approved	Checked	Designed	Product	Module Name
白 浪	丁双朋	杨冰泉	**Model**	**WF-R710-RTA1**
			Date	**2019-2-27**

更改记录 Record of Modification

版本 Version	更改日期 Date	主要更改内容 Main content of modification	确认 Confirm
V1.0	2019/1/16	首次发布	杨冰泉
V1.1	2019/2/27	增加 G 系列料号	杨冰泉

1. Introduction

WF-R710-RTA1 SoC module designed base on RTL8710B chip solution, The SOC module is a highly intelligent platform for the Internet of Everything that contains a low-power Wi-Fi connectivity solution on one package. It includes a number of TCP/IP based connectivity protocols along with SSL, enabling a low-cost, low-complexity system to obtain full-featured internet connectivity and reliable information exchange.

Realtek RTL8710B is a highly integrated single-chip low power 802.11n Wireless LAN (WLAN) network controller. It combines an ARM-CM4F MCU, WLAN MAC, a 1T1R capable WLAN baseband, and RF in a single chip. It also provides a bunch of configurable GPIOs which are configured as digital peripherals fordifferent applications and control usage.

RTL8710B integrates internal memories for complete WIFI protocol functions. The embedded memory configuration also provides simple application developments.

1.1 RF module Overview

The general HW architecture for the module is shown in Figure-1, The WF-R710-RTA1 module is a aloned 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. It has an integrated network processor with a large set of TCP/IP with IPv4/IPv6 based services.

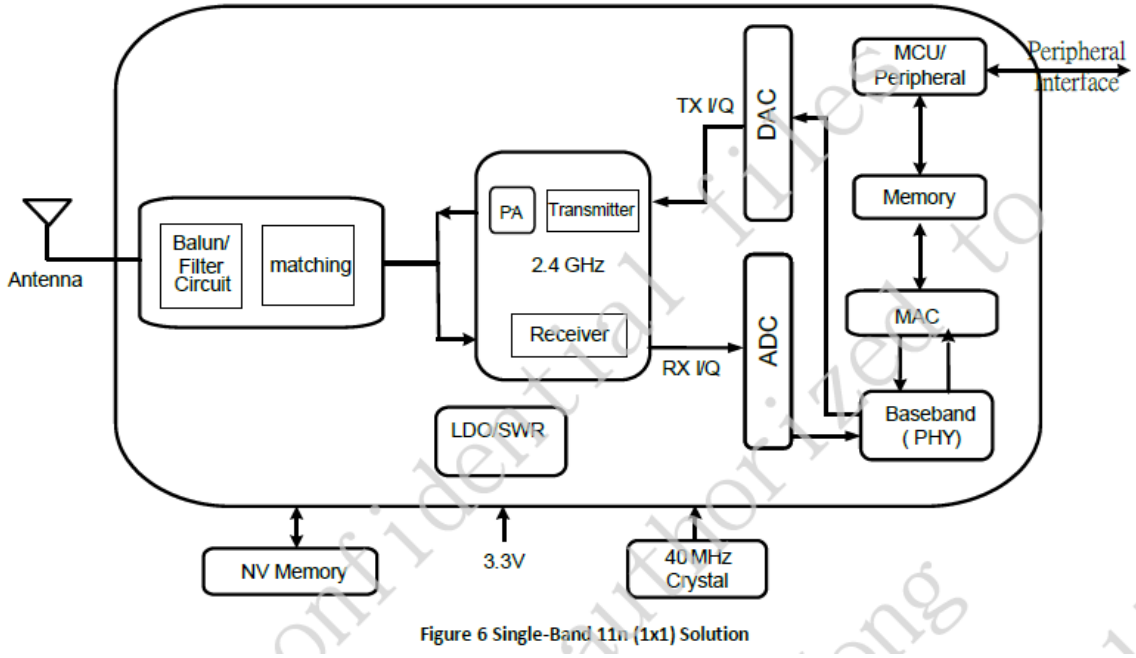


Figure 1 WF-R710-RTA1 Block Diagram

1.2 RF Specification Reference

SoC RF specification refer to below list.

Main Chipset	RTL8710B
SoC RF standard	IEEE 802.11 b/g/n
Operating Frequency	2.412~2.484 GHz
UART Interface	For testing and OTP programming (Calibration data)
Antenna Design Options	PCB printed
RF Modulation	WIFI: 11b: DBPSK, DQPSK and CCK and DSSS 11a/g: BPSK, QPSK, 16QAM, 64QAM and OFDM 11n: BPSK, QPSK, 16QAM, 64QAM and OFDM
Operation Voltage	3.3V +/-10% input

1.3 System Functions

SoC S/W & system general specification refer to below list:

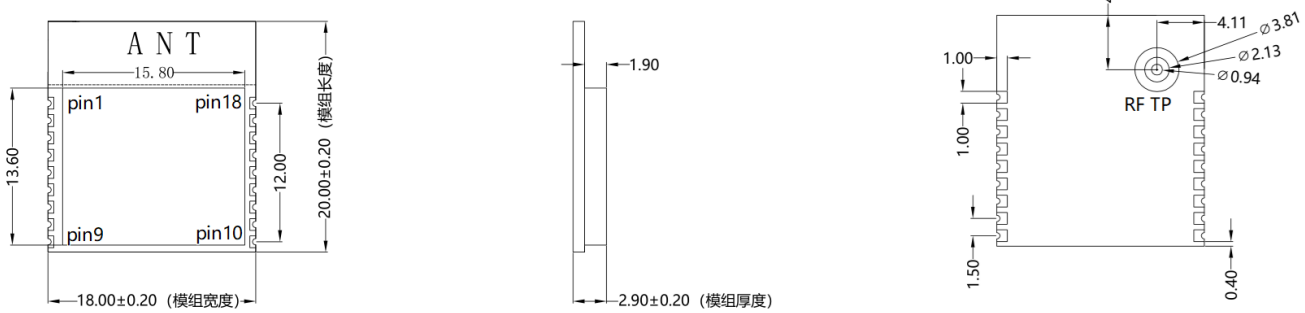
Main Chipset	RTL8710B
WLAN PHY Features	1T1R
Connective	WIFI Direct support
Package	QFN32 (5x5mm)
HW acceleration	WPA,WPA2, WPS2.0
Form factor	Maximum 12 GPIO pins
PCB Stack	2-layers design (1+/-0.15mm)
Module Dimension	Typical，18.0mm x20.0mm x2.9mm
Operation Temperature	-20℃ to +85℃（G系列支持工规：-40℃ to +125℃）
Storage Temperature	-40℃ to +125℃
Power Consumptiom（Deep sleep）	7uA
Power Consumptiom （TX CCK 11M）	270mA（@16dBm） 330mA（@20dBm）
Power Consumptiom （TX OFDM 54M）	250mA（@14dBm）
Power Consumptiom （TX HT20 65M）	250mA（@13dBm）
Power Consumptiom （TX HT20 150M）	220mA（@13dBm）

2. Mechanical Specification

2.1 PCBA Mechanical Outline Drawing

Typical Dimension (W x L x T): 18.0 mm x20.0mm x2.9mm (+/-0.2 mm)

PCB Thickness: 1mm (+/-0.15mm)



备注：未注公差±0.1mm

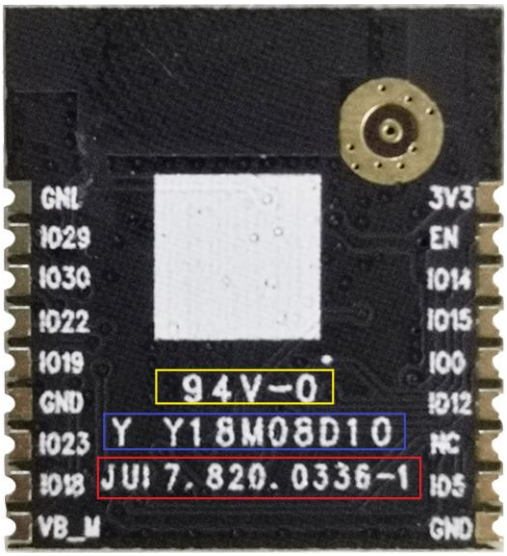
2.2 Pin Distribution Definition

Pins sequence and distribution list as follows

Pin	Define	Description
1	3V3	3.3V 供电
2	EN	模组使能脚，内部已上拉
3	IO14	PWM0
4	IO15	PWM1
5	IO0	PWM2
6	IO12	PWM3
7	NC	无连接
8	IO5	PWM4
9	GND	接地脚
10	NC	无连接
11	IO18	UART0_RXD,SPI1_CLK,SPI0_SCL,I2C1_SCL,TIMER4_TRIG
12	IO23	UART0_TXD,SPI1_MOSI,SPI0_MOSI,I2C1_SDA, PWM0
13	GND	接地脚
14	IO19	UART0_CTS,SPI1_CS,SPI0_CS,I2C0_SDA, TIMER5_TRIG
15	IO22	UART0_RTS,SPI1_MISO,SPI0_MISO,I2C0_SCL,PWM5
16	IO30	UART1_LOG_TXD
17	IO29	UART1_LOG_RXD
18	GND	接地脚

2.3 Product Picture

Top View



Bottom View

- top 面标签字符说明：
  - 黄色框内字符为产品技术状态信息
  - 蓝色框内为产品 mac 号
  - 红色框内为产品型号
  - 绿色框内为产品 SRRC 认证号
- Bottom 面 PCB 丝印字符说明：
  - 黄色框内为阻燃标志
  - 蓝色框内字符为 PCB 批次信息
  - 红色框内字符为我司 PCB 图号
  - 未标示字符为引脚定义

3. Electrical Specification

This Specification is based-on conductive DVT testing result. The extreme condition include overall temperature +25℃ and overall voltage 3.3V.

3.1 IEEE 802.11b Section:

Items	Contents				
Specification	IEEE802.11b				
Mode	DBPSK, DQPSK and CCK and DSSS				
Channel	CH1 to CH13				
Data rate	1, 2, 5.5, 11Mbps				
TX Characteristics	Min.	Typ.	Max.	Unit	Remark
1. Power Levels(Calibrated)					
1) 17dBm Target (For Each antenna port)	14	16	18	dBm	
2. Spectrum Mask @ Target Power					
1) fc +/-11MHz to +/-22MHz	-	-	-30	dBr	
2) fc > +/-22MHz	-	-	-50	dBr	
3. Constellation Error(EVM) @ Target Power					
1) 1Mbps	-	-27	-10	dB	
2) 2Mbps	-	-	-10	dB	
3) 5.5Mbps	-	-	-10	dB	
4) 11Mbps	-	-25	-10	dB	
4. Frequency Error	-15	-	15	ppm	
RX Characteristics	Min.	Typ.	Max.	Unit	
5. Minimum Input Level Sensitivity(each chain)					
1) 1Mbps (FER ≦8%)	-	-98	-94	dBm	
2) 2Mbps (FER ≦8%)	-	-96	-92	dBm	
3) 5.5Mbps (FER ≦8%)	-	-94	-90	dBm	
4) 11Mbps (FER ≦8%)	-	-90	-86	dBm	
6. Maximum Input Level (FER ≦8%)	-10	-	-	dBm	

3.2 IEEE 802.11g Section:

Items	Contents				
Specification	IEEE802.11g				
Mode	BPSK, QPSK, 16QAM, 64QAM and OFDM				
Channel	CH1 to CH13 @ 11g				
Data rate	6, 9, 12, 18, 24, 36, 48, 54Mbps				
TX Characteristics	Min.	Typ.	Max.	Unit	Remark
1. Power Levels					
1) 15dBm Target (For Each antenna port) @ 11g	12	14	16	dBm	
2. Spectrum Mask @ Target Power					
1) at fc +/-11MHz	-	-	-20	dBr	
2) at fc +/-20MHz	-	-	-28	dBr	
3) at fc > +/-30MHz	-	-	-40	dBr	
3. Constellation Error(EVM) @ Target Power					
1) 6Mbps	-	-32	-10	dB	
2) 9Mbps	-	-	-11	dB	
3) 12Mbps	-	-	-12	dB	
4) 18Mbps	-	-	-13	dB	
5) 24Mbps	-	-	-16	dB	
6) 36Mbps	-	-	-19	dB	
7) 48Mbps	-	-	-22	dB	
8) 54Mbps	-	-32	-25	dB	
4. Frequency Error					
1) IEEE802.11g	-15	-	15	ppm	
RX Characteristics	Min.	Typ.	Max.	Unit	
5. Minimum Input Level Sensitivity(each chain)					
1) 6Mbps (PER ≦10%)	-	-93	-89	dBm	
2) 9Mbps (PER ≦10%)	-	-92	-88	dBm	
3) 12Mbps (PER ≦10%)	-	-91	-87	dBm	
4) 18Mbps (PER ≦10%)	-	-89	-85	dBm	
5) 24Mbps (PER ≦10%)	-	-86	-82	dBm	
6) 36Mbps (PER ≦10%)	-	-82	-76	dBm	
7) 48Mbps (PER ≦10%)	-	-79	-75	dBm	
8) 54Mbps (PER ≦10%)	-	-76	-72	dBm	
6. Maximum Input Level (PER ≦10%)					
1) IEEE802.11g	-20	-	-	dBm	

3.3 IEEE 802.11n HT20 Section:

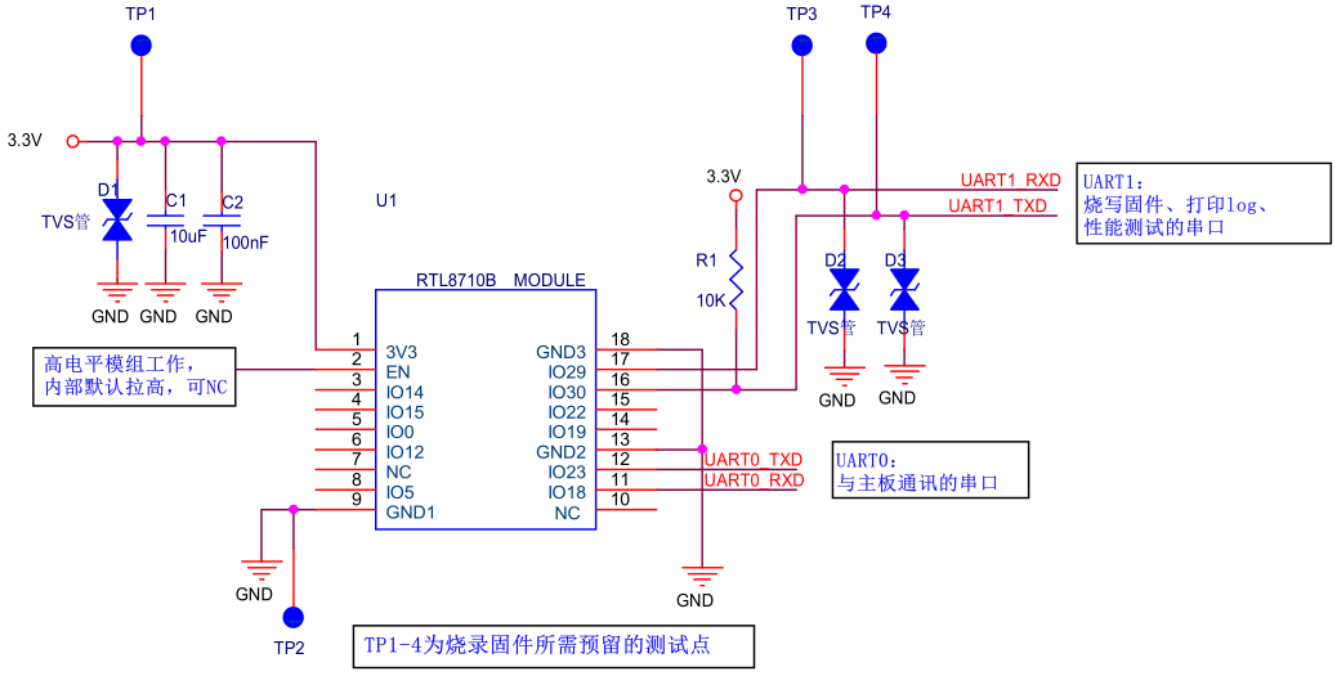
Items	Contents				
Specification	IEEE802.11n HT20				
Mode	BPSK, QPSK, 16QAM, 64QAM and OFDM				
Channel	CH1 to CH13				
Data rate (MCS index)	MCS0/1/2/3/4/5/6/7				
TX Characteristics	Min.	Typ.	Max.	Unit	Remark
1. Power Levels					
1) 14dBm Target (For Each antenna port) @ 2.4G	11	13	15	dBm	
2. Spectrum Mask @ Target Power					
1) at fc +/-11MHz	-	-	-20	dBr	
2) at fc +/-20MHz	-	-	-28	dBr	
3) at fc > +/-30MHz	-	-	-45	dBr	
3. Constellation Error(EVM) @ Target Power					
1) MCS0	-	-34	-5	dB	
2) MCS1	-	-	-10	dB	
3) MCS2	-	-	-13	dB	
4) MCS3	-	-	-16	dB	
5) MCS4	-	-	-19	dB	
6) MCS5	-	-	-22	dB	
7) MCS6	-	-	-25	dB	
8) MCS7	-	-34	-28	dB	
4. Frequency Error					
1) IEEE802.11n HT20 @ 2.4G	-15	-	15	ppm	
RX Characteristics	Min.	Typ.	Max.	Unit	
5. Minimum Input Level Sensitivity(each chain)					
1) MCS0 (PER ≦10%)	-	-92	-88	dBm	
2) MCS1 (PER ≦10%)	-	-89	-85	dBm	
3) MCS2 (PER ≦10%)	-	-87	-83	dBm	
4) MCS3 (PER ≦10%)	-	-84	-80	dBm	
5) MCS4 (PER ≦10%)	-	-80	-76	dBm	
6) MCS5 (PER ≦10%)	-	-76	-72	dBm	
7) MCS6 (PER ≦10%)	-	-74	-70	dBm	
8) MCS7 (PER ≦10%)	-	-73	-69	dBm	
6. Maximum Input Level (PER ≦10%)					
1) IEEE802.11n HT20 @ 2.4G	-20	-	-	dBm	

3.4 IEEE 802.11n HT40 Section: (Only for CPU=125MHz)

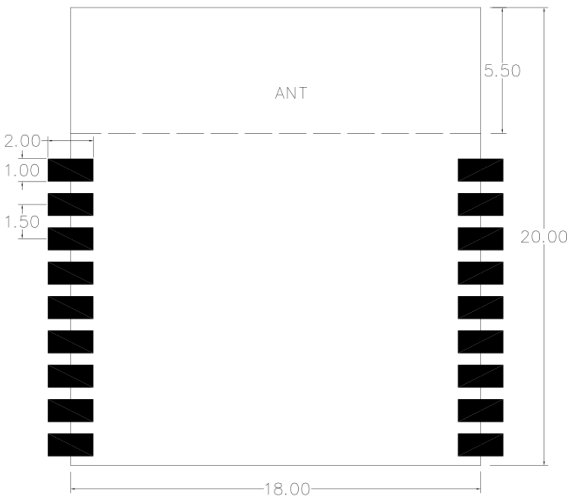
Items	Contents				
Specification	IEEE802.11n HT40				
Mode	BPSK, QPSK, 16QAM, 64QAM and OFDM				
Channel	CH1 to CH13				
Data rate (MCS index)	MCS0/1/2/3/4/5/6/7				
TX Characteristics	Min.	Typ.	Max.	Unit	Remark
1. Power Levels					
1) 14dBm Target (For Each antenna port) @ 2.4G	11	13	15	dBm	
2. Spectrum Mask @ Target Power					
1) at fc +/-11MHz	-	-	-20	dBr	
2) at fc +/-20MHz	-	-	-28	dBr	
3) at fc > +/-30MHz	-	-	-45	dBr	
3. Constellation Error(EVM) @ Target Power					
1) MCS0	-	-33	-5	dB	
2) MCS1	-	-	-10	dB	
3) MCS2	-	-	-13	dB	
4) MCS3	-	-	-16	dB	
5) MCS4	-	-	-19	dB	
6) MCS5	-	-	-22	dB	
7) MCS6	-	-	-25	dB	
8) MCS7	-	-34	-28	dB	
4. Frequency Error					
1) IEEE802.11n HT40 @ 2.4G	-15	-	15	ppm	
RX Characteristics	Min.	Typ.	Max.	Unit	
5. Minimum Input Level Sensitivity(each chain)					
1) MCS0 (PER ≦10%)	-	-90	-86	dBm	
2) MCS1 (PER ≦10%)	-	-86	-82	dBm	
3) MCS2 (PER ≦10%)	-	-83	-79	dBm	
4) MCS3 (PER ≦10%)	-	-81	-77	dBm	
5) MCS4 (PER ≦10%)	-	-77	-73	dBm	
6) MCS5 (PER ≦10%)	-	-72	-68	dBm	
7) MCS6 (PER ≦10%)	-	-71	-67	dBm	
8) MCS7 (PER ≦10%)	-	-69	-65	dBm	
6. Maximum Input Level (PER ≦10%)					
1) IEEE802.11n HT20 @ 2.4G	-20	-	-	dBm	

4. Reference Design

4.1 Schematics:



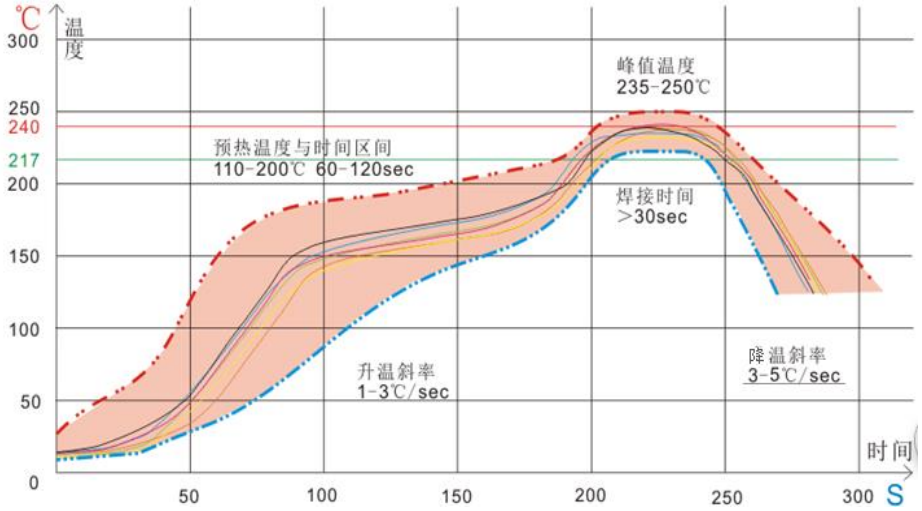
4.2 Layout



Recommend PCB Decal

- 天线：为让模组有良好的射频性能，天线尽量远离金属器件，且将模组天线部分延伸出底板板框外，如上右图。若实在无法做到，请将天线下方底板对应位置镂空。
- 模组底面测试点RF TP用于模组的射频测试，不与底板连接。

5. Reflow Profile Recommendation (Only For SMD Parts)



Explanation for Temperature Changement During Reflow:

1. Ramp Up：Temp：<150℃，Time：60～90s, Ramp up degree 1～3℃/S
2. Pre-Heat ： Temp：150℃~200℃，time：60-120s，Ramp up degree 0.3-0.8
3. Curing：Peak temp 235℃~250℃（Max ＜245℃），time 30-70s。
4. Cooling down：Temp：217℃~170℃，Ramp up degree 3～5℃/S

Solder Past Type: Sn&Ag&Cu Lead-free Solder (SAC305)

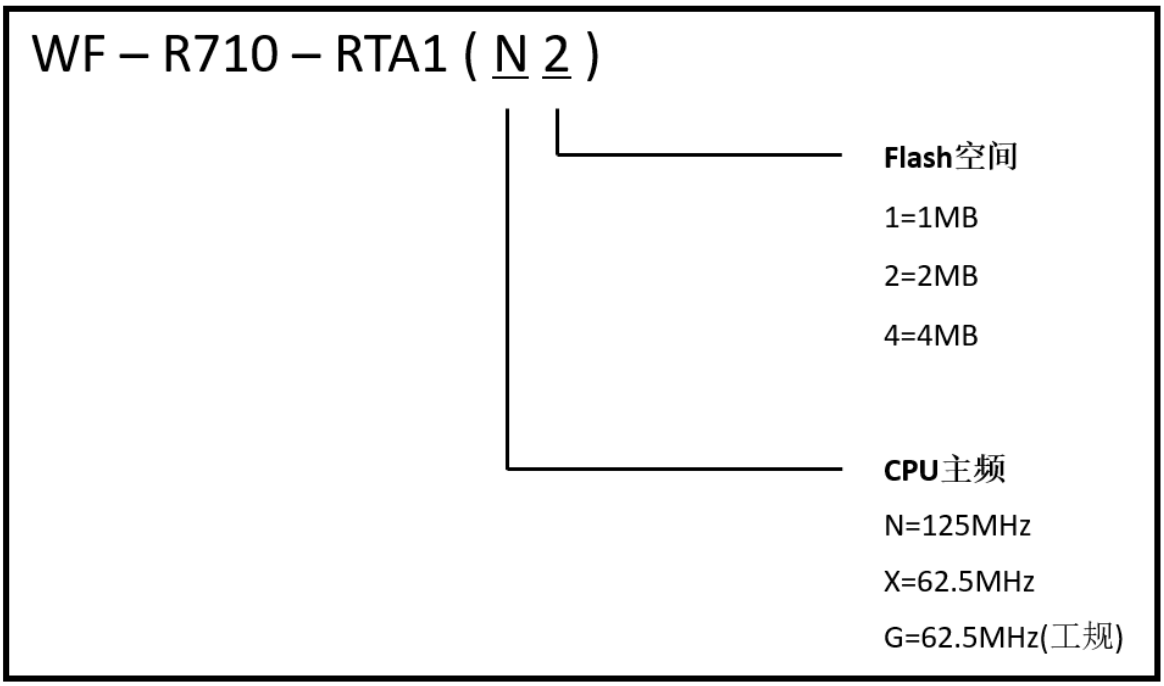
Comment：Due to the WIFI SMD module can only bear 255℃ temp during max 5s curing time , So we promoted to above reflow profile to build end-customer’s SMT assemblies.

6. Key component List

序号	关键件名称	型号	规格/材料	生产者	备注
1	集成电路	RTL8710B		Realtek	
2	PCB	JUI7.820.0336系列	FR-4,2LAY，1MM	英 创 力 胜宏 科翔	
3	晶体振荡器		3225，40MHz	Hosonic TXC 加高 泰晶	
4	Flash		1MB 2MB 4MB	GigaDevice 晶豪 复旦微 芯天下	

7. Part Number and Ordering Information

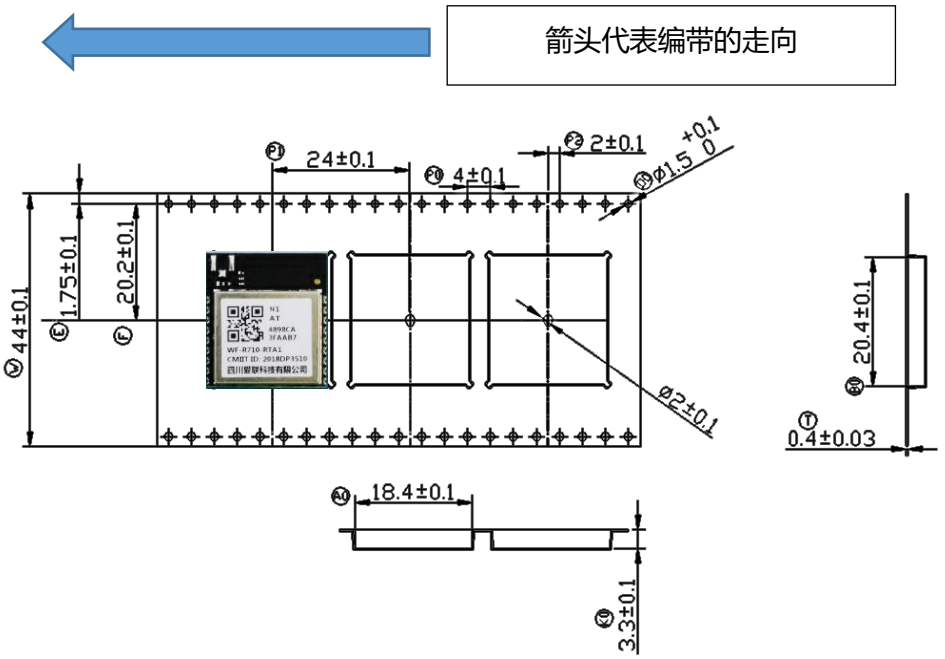
7.1 Part Number

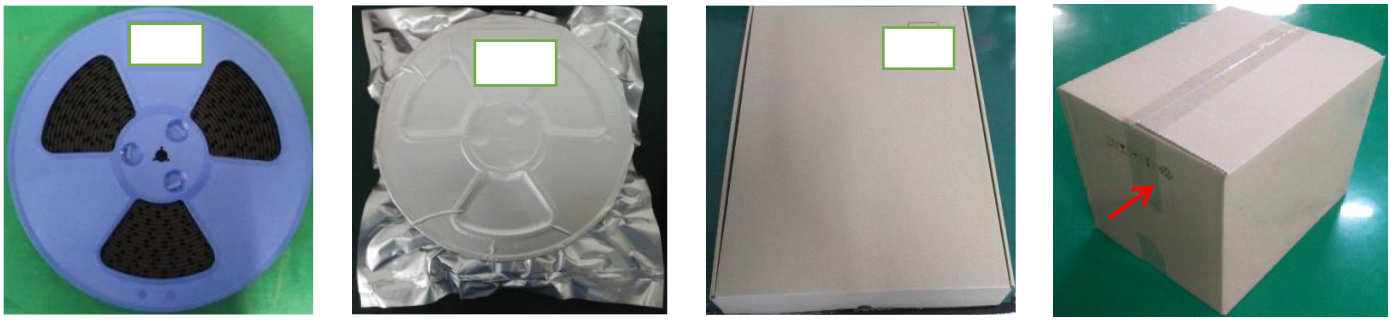


7.2 Ordering Information

订购料号	CPU 主频	内置 Flash	最小包装
WF-R710-RTA1(N1)	125MHz	1MB	650pcs/Reel
WF-R710-RTA1(N2)	125MHz	2MB	650pcs/Reel
WF-R710-RTA1(N4)	125MHz	4MB	650pcs/Reel
WF-R710-RTA1(X1)	62.5MHz	1MB	650pcs/Reel
WF-R710-RTA1(X2)	62.5MHz	2MB	650pcs/Reel
WF-R710-RTA1(X4)	62.5MHz	4MB	650pcs/Reel
WF-R710-RTA1(G1)	62.5MHz	1MB	650pcs/Reel
WF-R710-RTA1(G2)	62.5MHz	2MB	650pcs/Reel
WF-R710-RTA1(G4)	62.5MHz	4MB	650pcs/Reel

8. Packaging Information:





物料标签	
供方名称：	四川爱联科技有限公司
物料名称：	
物料编码：	
采购订单：	
数　　量：	
发货日期：	
RoHS	

内盒标签（载带、铝箔袋、内盒通用）

物料标签	
供方名称：	四川爱联科技有限公司
物料名称：	
物料编码：	
采购订单：	
数　　量：	
发货日期：	
净重/毛重：	KG/　　KG
RoHS	

外箱标签

1、产品放置方向、标签粘贴位置、包装按示意图进行；
2、每卷放650只产品，每小盒放1卷，大箱共5装个小盒，产品数量共3250只/箱;
3、外箱尺寸：370mm*300mm*370mm，小盒尺寸：355mm*355mm*55mm;
4、真空包内放置2g干燥剂2袋，6色湿度卡1张;
5、其它未尽事宜按客户的包装要求执行。

9. 认证信息

本产品属于**完整的非独立操作使用的无线电发射模块，**请在贵司设备标签或说明书中标明如下信息：

本设备包含型号核准代码为：CMIIT ID：2018DP3510　的无线电发射模块。