

WF-R12B-UWD1

AI-Link

Features:

- **Supported WLAN Standard**
 - IEEE Std. 802.11a
 - IEEE Std. 802.11b
 - IEEE Std. 802.11g
 - IEEE Std. 802.11n
 - IEEE Std. 802.11ac
- **Chip Solution**
 - RealtekRTL8812BU-VR
- **Size**
 - 47.0mm x 30.0mm x 6.0mm



Interface	Assemble	Band	Antenna	Power supply
USB	SMD	2.4G/5G	external antenna	3.3V

Sichuan AI-Link Technology Co.,Ltd.

Add: Anzhou,Industrial park,Mianyang,Sichuan

Tel: +86-13881190925

Feedback of customer's Confirmation

We accept the specification after Confirmed

Customer name	Customer signature	Confirmation Date

Please feed back this paper and first paper after your signature by the address,thanks!

ADD: Anzhou,Industrial park,Mianyang,Sichuan

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

Approved	Checked	Designed	Product	WiFi Module
			Model	WF-R12B-UWD1
			Date	2020-02-09

Record of Modification

Version	Date	Main content of modification	Confirm
V1.0	2020/02/09	first edition	QinDaKai

1. Introduction

WF-R12B-UWD1 module design is based on Realtek RTL8812BU-VR solution, The RTL8812BU-VR is a highly integrated single chip which has built in a 2x2 dual-band wireless LAN radio. The Module is a highly integrated MAC/BBP and 2.4/5GHz PA/LNA single chip which supports a 866.7Mbps PHY rate. The Module is designed to support standard-based features in the areas of security, quality of service, and international regulations, giving end users the greatest performance anytime and in any circumstance. This documentation describes the engineering requirements specification.

1.1 RF module Overview

The general HW architecture for the module is shown in Figure 1. This WLAN Module design is based on Realtek RTL8812BU-VR. It is a highly integrated single-chip MIMO(Multiple In Multiple Out) Wireless LAN (WLAN) network interface controller complying with the 802.11 specification over USB interface. It combines a MAC, a 2T2R capable baseband, and RF in a single chip. An intelligent Wi-Fi coexistence algorithm is implemented to provide the best harmonized Wi-Fi performance.

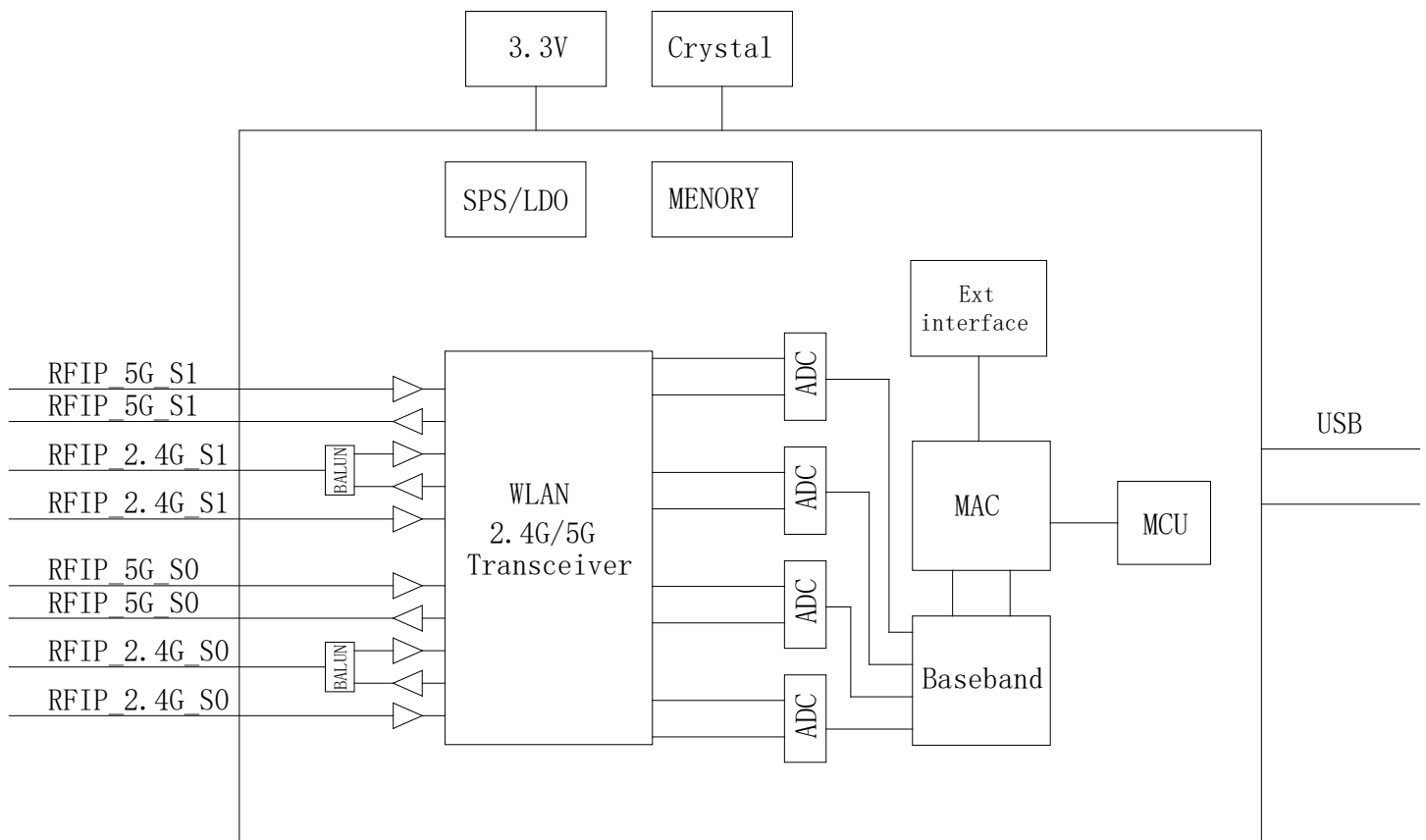


Figure 1 WF-R12B-UWD1 Block Diagram

1.2 Specification reference

This specification is based on additional references listed below.

- _ IEEE Std. 802.11a
- _ IEEE Std. 802.11b
- _ IEEE Std. 802.11g
- _ IEEE Std. 802.11n
- _ IEEE Std. 802.11ac

1.3 System Functions

Table1: General Specification as below:

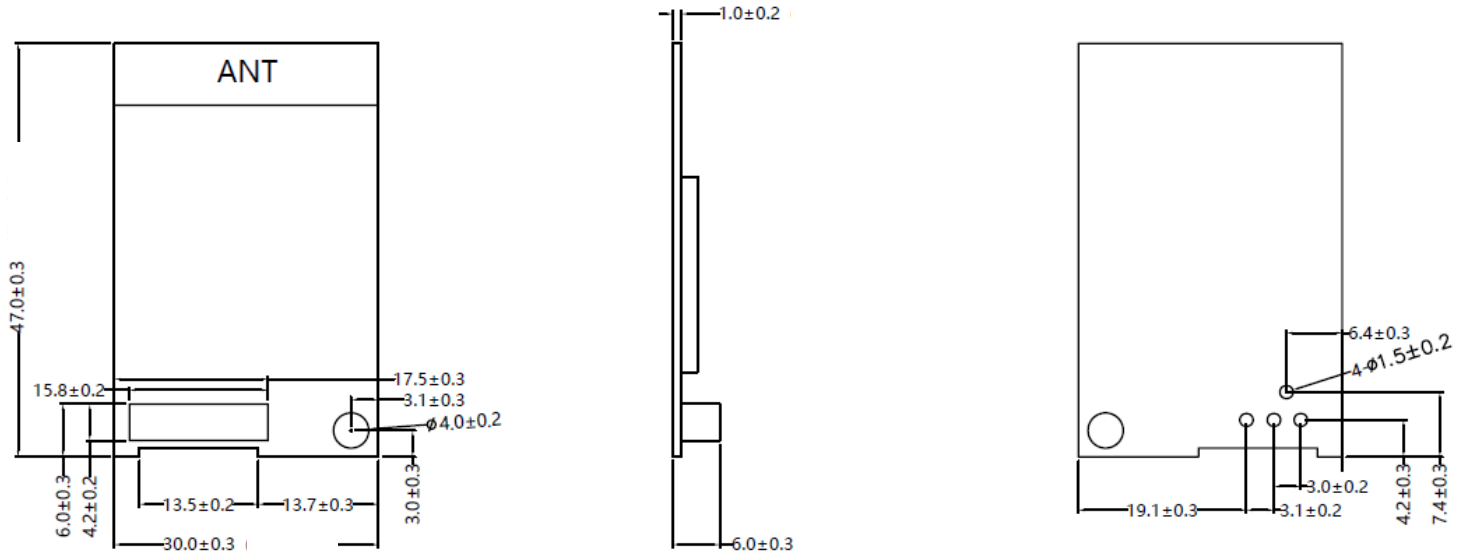
Main Chipset	Realtek RTL8812BU-VR
Operating Frequency	2.4G/5G
WiFi Standard	802.11a/b/g/n/ac (2x2)
Modulation	WIFI:11b: DBPSK, DQPSK and CCK and DSSS 11a/g: BPSK, QPSK, 16QAM, 64QAM and OFDM 11n: BPSK, QPSK, 16QAM, 64QAM and OFDM 11ac: BPSK, QPSK, 16QAM, 64QAM,256QAM and OFDM
Data rates	11b: 1, 2, 5.5 and 11Mbps 11a/g: 6, 9, 12, 18, 24, 36, 48 and 54 Mbps 11n: MCS0~15, up to 300Mbps 11ac: MCS0~9, Nss=2, up to 866.7Mbps
Form factor	10pins
Host Interface	USB 2.0
PCB Stack	4-layers design
Dimension	Typical, 47.0mm x 30.0mm
Antenna	External Antennas Design
Operation Temperature	0°C to +60°C
Storage Temperature	-25°C to +85°C
Operation Voltage	3.3V +/-10%

2. Mechanical Specification

2.1 Mechanical Outline Drawing

Typical Dimension (L x W): 47.0mm x 30.0mm x 6.0mm

General tolerance: $\pm 0.20\text{mm}$



Remark:

Model No.: WF-R12B-UWD1, WF-R12B-UWD2, WF-R12B-UWD3

The electrical circuit design, layout, components used, internal wiring and functions were identical for all the above models, with only the model WF-R12B-UWD1 and WF-R12B-UWD2 difference on the connector part and model No., WF-R12B-UWD2 and WF-R12B-UWD3 difference on overall dimension and model No.

2.2 Pin definition:

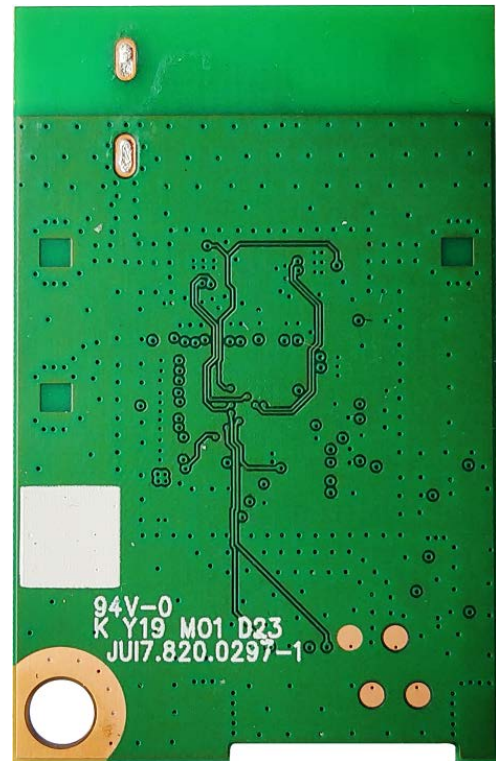


Pin	Define	Description
1	Vcc	3.3V
2	Vcc	3.3V
3	USB DM	USB D-
4	USB DP	USB D+
5	GND	GND
6	WOWn	WL_WAKE_HOST
7	RST	Pdn
8	GND	GND
9	HST_WAKE_WL	HST_WAKE_WL
10	GND	GND

2.3 Product Picture



TOP VIEW



BOTTOM VIEW

Note:

the BT seat in the red box is for future upgrade of the sample.

3. Electrical Specification

This Specification is based-on conductive DVT testing result. The extreme condition include overall temperature (0°C,+25°C,+40°C) and overall voltage (3.0V,3.3V,3.6V).

3.1 IEEE 802.11g/a Section:

Items	Contents				
Specification	IEEE802.11g & IEEE802.11a				
Mode	BPSK, QPSK, 16QAM, 64QAM and OFDM				
Channel	CH1 to CH11 @ 11g CH36 to CH165 @ 11a				
Data rate	6, 9, 12, 18, 24, 36, 48, 54Mbps				
TX Characteristics	Min.	Typ.	Max.	Unit	Remark
1. Power Levels					
1) 14dBm Target (For Each antenna port) @ 11g	-	14.0	-	dBm	54M
2) 14dBm Target (For Each antenna port) @ 11a	-	14.0	-	dBm	54M
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	-	-	-5	dB	
2) 9Mbps	-	-	-8	dB	
3) 12Mbps	-	-	-10	dB	
4) 18Mbps	-	-	-13	dB	
5) 24Mbps	-	-	-16	dB	
6) 36Mbps	-	-	-19	dB	
7) 48Mbps	-	-	-22	dB	
8) 54Mbps	-	-	-25	dB	
4. Frequency Error					
1) IEEE802.11g	-10	-	10	ppm	
2) IEEE802.11a	-10		10	ppm	
RX Characteristics	Min.	Typ.	Max.	Unit	
5. Minimum Input Level Sensitivity(each chain)					
1) 6Mbps (PER ≤10%)	-	-	-82	dBm	
2) 9Mbps (PER ≤10%)	-	-	-81	dBm	
3) 12Mbps (PER ≤10%)	-	-	-79	dBm	
4) 18Mbps (PER ≤10%)	-	-	-77	dBm	
5) 24Mbps (PER ≤10%)	-	-	-74	dBm	
6) 36Mbps (PER ≤10%)	-	-	-70	dBm	
7) 48Mbps (PER ≤10%)	-	-	-66	dBm	
8) 54Mbps (PER ≤10%)	-	-	-65	dBm	
6. Maximum Input Level (PER ≤10%)					
1) IEEE802.11g	-20	-	-	dBm	
2) IEEE802.11a	-20			dBm	

Tolerance: +/-2dBm

※Total Max. Power = WLAN0 Max. Power + WLAN1 Max. Power + 3dBm

3.2 IEEE 802.11b Section:

Items	Contents				
Specification	IEEE802.11b				
Mode	DBPSK, DQPSK and CCK and DSSS				
Channel	CH1 to CH11				
Data rate	1, 2, 5.5, 11Mbps				
TX Characteristics	Min.	Typ.	Max.	Unit	Remark
1. Power Levels(Calibrated)					
1) 16dBm Target (For Each antenna port)	-	16.0	-	dBm	11M
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	-	-	-10	dB	
2) 2Mbps	-	-	-10	dB	
3) 5.5Mbps	-	-	-10	dB	
4) 11Mbps	-	-20	-10	dB	
4. Frequency Error	-10	-	10	ppm	
RX Characteristics	Min.	Typ.	Max.	Unit	
5. Minimum Input Level Sensitivity(each chain)					
1) 1Mbps (FER $\leq$ 8%)	-		-76	dBm	
2) 2Mbps (FER $\leq$ 8%)	-		-76	dBm	
3) 5.5Mbps (FER $\leq$ 8%)	-		-76	dBm	
4) 11Mbps (FER $\leq$ 8%)	-		-76	dBm	
6. Maximum Input Level (FER $\leq$ 8%)	-8	-	-	dBm	

Tolerance: +/-2dBm

※Total Max. Power = WLAN0 Max. Power + WLAN1 Max. Power + 3dBm

3.3 IEEE 802.11n HT20 Section:

Items	Contents				
Specification	IEEE802.11n HT20 @ 2.4G IEEE802.11n HT20 @ 5G				
Mode	BPSK, QPSK, 16QAM, 64QAM and OFDM				
Channel	CH1 to CH11 @ 2.4G CH36 to CH165 @ 5G				
Data rate (MCS index)	MCS0/1/2/3/4/5/6/7/8/9/10/11/12/13/14/15				
TX Characteristics	Min.	Typ.	Max.	Unit	Remark
1. Power Levels					
1) 12dBm Target (For Each antenna port) @ 2.4G	-	12.0	-	dBm	mcs7
2) 12dBm Target (For Each antenna port) @ 5G	-	12.0	-	dBm	mcs7
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	-	-	-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	-	-	-28	dB	
4. Frequency Error					
1) IEEE802.11n HT20 @ 2.4G	-10	-	10	ppm	
2) IEEE802.11n HT20 @ 5G	-10	-	10	ppm	
RX Characteristics	Min.	Typ.	Max.	Unit	
5. Minimum Input Level Sensitivity(each chain)					
1) MCS0 (PER ≤ 10%)	-	-	-82	dBm	
2) MCS1 (PER ≤ 10%)	-	-	-79	dBm	
3) MCS2 (PER ≤ 10%)	-	-	-77	dBm	
4) MCS3 (PER ≤ 10%)	-	-	-74	dBm	
5) MCS4 (PER ≤ 10%)	-	-	-70	dBm	
6) MCS5 (PER ≤ 10%)	-	-	-66	dBm	
7) MCS6 (PER ≤ 10%)	-	-	-65	dBm	
8) MCS7 (PER ≤ 10%)	-	-	-64	dBm	
6. Maximum Input Level (PER ≤ 10%)					
1) IEEE802.11n HT20 @ 2.4G	-20	-	-	dBm	
2) IEEE802.11n HT20 @ 5G	-30	-	-	dBm	

Tolerance: +/-2dBm

※Total Max. Power = WLAN0 Max. Power + WLAN1 Max. Power + 3dBm

3.4 IEEE 802.11n HT40 Section:

Items	Contents				
Specification	IEEE802.11n HT20 @ 2.4G IEEE802.11n HT20 @ 5G				
Mode	BPSK, QPSK, 16QAM, 64QAM and OFDM				
Channel	CH3 to CH11 @ 2.4G CH38 to CH163 @ 5G				
Data rate (MCS index)	MCS0/1/2/3/4/5/6/7/8/9/10/11/12/13/14/15				
TX Characteristics	Min.	Typ.	Max.	Unit	Remark
1. Power Levels (Calibrated)					
1) 12dBm Target (For Each antenna port) @ 2.4G	-	12.0	-	dBm	mcs7
2) 12dBm Target (For Each antenna port) @ 5G	-	12.0	-	dBm	mcs7
2. Spectrum Mask @ Target Power					
1) at fc +/-21MHz	-	-	-20	dBr	
2) at fc +/-40MHz	-	-	-28	dBr	
3) at fc > +/-60MHz	-	-	-45	dBr	
3. Constellation Error(EVM) @ Target Power					
1) MCS0	-	-	-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	-	-	-28	dB	
4. Frequency Error					
1) IEEE802.11n HT20 @ 2.4G	-10	-	10	ppm	
2) IEEE802.11n HT20 @ 5G	-10	-	10	ppm	
RX Characteristics	Min.	Typ.	Max.	Unit	
5. Minimum Input Level Sensitivity(each chain)					
1) MCS0 (PER ≤ 10%)	-	-	-79	dBm	
2) MCS1 (PER ≤ 10%)	-	-	-76	dBm	
3) MCS2 (PER ≤ 10%)	-	-	-74	dBm	
4) MCS3 (PER ≤ 10%)	-	-	-71	dBm	
5) MCS4 (PER ≤ 10%)	-	-	-67	dBm	
6) MCS5 (PER ≤ 10%)	-	-	-63	dBm	
7) MCS6 (PER ≤ 10%)	-	-	-62	dBm	
8) MCS7 (PER ≤ 10%)	-	-	-61	dBm	
6. Maximum Input Level(PER ≤ 10%)					
1) IEEE802.11n HT20 @ 2.4G	-20	-	-	dBm	
2) IEEE802.11n HT20 @ 5G	-20	-	-	dBm	

Tolerance: +/-2dBm

※Total Max. Power = WLAN0 Max. Power + WLAN1 Max. Power + 3dBm

3.5 IEEE 802.11ac Section:

Items	Contents					
Specification	IEEE802.11ac					
Mode	BPSK, QPSK, 16QAM, 64QAM ,256QAM and OFDM					
Channel	CH36 to CH165 VHT20 CH38 to CH163 VHT40 CH42 to CH155 VHT80					
Data rate (MCS index)	MCS0/1/2/3/4/5/6/7/8/9					
TX Characteristics	Min.	Typ.	Max.			Unit Remark
1. Power Levels (Calibrated)						
1) 12dBm Target (20M For Each antenna port)	-	12.0	-			dBm mcs7
2) 12dBm Target (40M For Each antenna port)	-	12.0	-			dBm mcs7
3) 10dBm Target (80M For Each antenna port)	-	10.0	-			dBm mcs7
2. Spectrum Mask @ Target Power						
1) at fc +/-11MHz /20MHz/30MHz	-	-	-20			dBr
2) at fc +/-21MHz /40MHz/60MHz	-	-	-28			dBr
3) at fc +/-41MHz /80MHz/120MHz	-	-	-40			dBr
3. Constellation Error(EVM) @ Target Power						
1) MCS0	-	-	-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	-	-	-27			dB
9) MCS8			-30			dB
10) MCS9			-32			dB
4. Frequency Error	-10	-	10			ppm
RX Characteristics	Min.	Typ.	Max.			Unit
5. Minimum Input Level Sensitivity(each chain)			VHT20	VHT40	VHT80	
1) MCS0 (PER $\leq 10\%$)	-	-	-82	-79	-76	dBm
2) MCS1 (PER $\leq 10\%$)	-	-	-79	-76	-73	dBm
3) MCS2 (PER $\leq 10\%$)	-	-	-77	-74	-71	dBm
4) MCS3 (PER $\leq 10\%$)	-	-	-74	-71	-68	dBm
5) MCS4 (PER $\leq 10\%$)	-	-	-70	-67	-64	dBm
6) MCS5 (PER $\leq 10\%$)	-	-	-66	-63	-60	dBm
7) MCS6 (PER $\leq 10\%$)	-	-	-65	-62	-59	dBm
8) MCS7 (PER $\leq 10\%$)	-	-	-64	-61	-58	dBm
9) MCS8 (PER $\leq 10\%$)	-	-	-59	-56	-53	dBm
10) MCS9 (PER $\leq 10\%$)	-	-		-54	-51	dBm
6. Maximum Input Level(PER $\leq 10\%$)	-30	-	-			dBm

Tolerance: +/-2dBm

※Total Max. Power = WLAN0 Max. Power + WLAN1 Max. Power + 3dBm

4. Wireless Specification

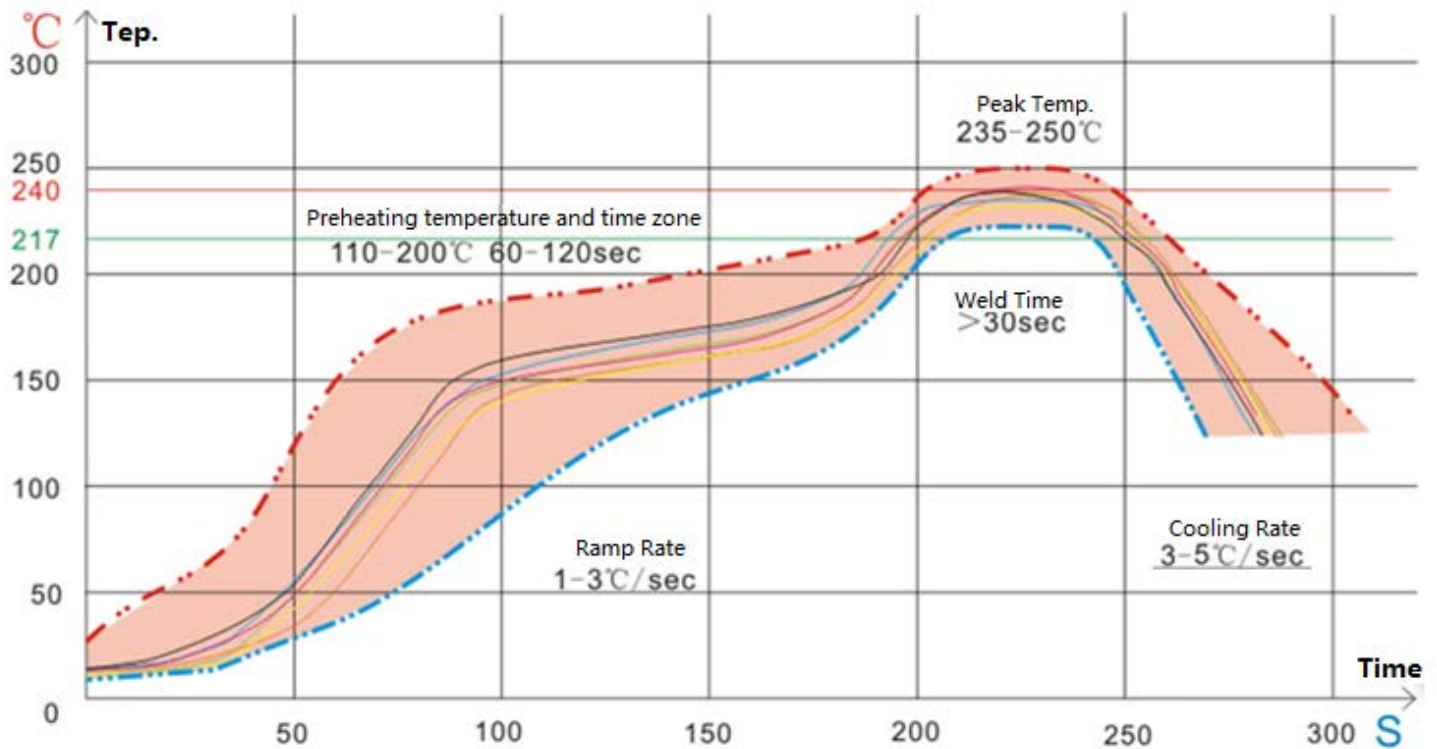
2.4G WiFi	Specification(FCC Rule: FCC Part15.247)
Type of Modulation:	802.11b: DSSS (CCK, DQPSK, DBPSK) 802.11g: OFDM (64QAM, 16QAM, QPSK, BPSK) 802.11n (HT20/HT40): OFDM (64QAM, 16QAM, QPSK, BPSK)
Operating Frequency:	802.11b/g/n(HT20): 2412MHz to 2462MHz 802.11n(HT40): 2422MHz to 2452MHz
Channel Number:	802.11b/g/11n(HT20): 11 Channels 802.11n(HT40): 7 Channels
Channels Step:	Channels with 5MHz step
Bandwidth:	20MHz, 40MHz
Max Conducted Power:	14.84dBm
Peak Spectrum Density:	$\leq 8\text{dBm}$
Spurious Emission:	Peak $\leq 74\text{dBuV/m}$ Average $\leq 54\text{dBuV/m}$

5G WiFi	Specification(FCC Rule: FCC Part15.407)			
Type of Modulation:	802.11a: OFDM(64QAM, 16QAM, QPSK, BPSK) 802.11n: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)			
Operating Frequency:	802.11b/g/n(HT20): 2412MHz to 2462MHz 802.11n(HT40): 2422MHz to 2452MHz			
Channel Number:	802.11b/g/11n(HT20): 11 Channels 802.11n(HT40): 7 Channels			
Channels Step:	Channels with 5MHz step			
Operation Frequency:	Band	Mode	Frequency Range(MHz)	Number of channels
	UNII Band I	802.11a/n(HT20)/ac(HT20)	5180-5240	4
		802.11n(HT40)/ac(HT40)	5190-5230	2
		802.11ac(HT80)	5210	1
	UNII Band II-A	802.11a/n(HT20)/ac(HT20)	5260-5320	4
		802.11n(HT40)/ac(HT40)	5270-5310	2
		802.11ac(HT80)	5290	1
	UNII Band II-C	802.11a/n(HT20)/ac(HT20)	5500-5700	11
		802.11n(HT40)/ac(HT40)	5510-5670	5
		802.11ac(HT80)	5530, 5610MHz	2
	UNII Band III	802.11a/n(HT20)/ac(HT20)	5745-5825	5
		802.11n(HT40)/ac(HT40)	5755-5795	2
		802.11ac(HT80)	5775	1
Bandwidth:	20MHz, 40MHz, 80MHz			
Max Conducted Power:	14.96dBm			
Peak Spectrum Density:	5.84dBm			
Spurious Emission:	See test report			
DFS Function:	Slave without radar detection			

5. Software Requirements

The driver supports the following operating systems: Linux, Microsoft Windows XP, Vista and Win7.
Mfg. software tool is MP_Kit_RTL11ac_8822BU_USB_v0.57_20170322(BETA).
WF-R12B-UWD1 module has a 32-bit RISC MCU that handles Wi-Fi, and an ARM Cortex-R4 MCU that could offload data frame processing in Wi-Fi host driver.

6. Reflow Standard Condition



Temperature rising zone: temperature: $<150^{\circ}\text{C}$, time: 60~90 seconds, slope control between $1\sim 3^{\circ}\text{C/S}$.

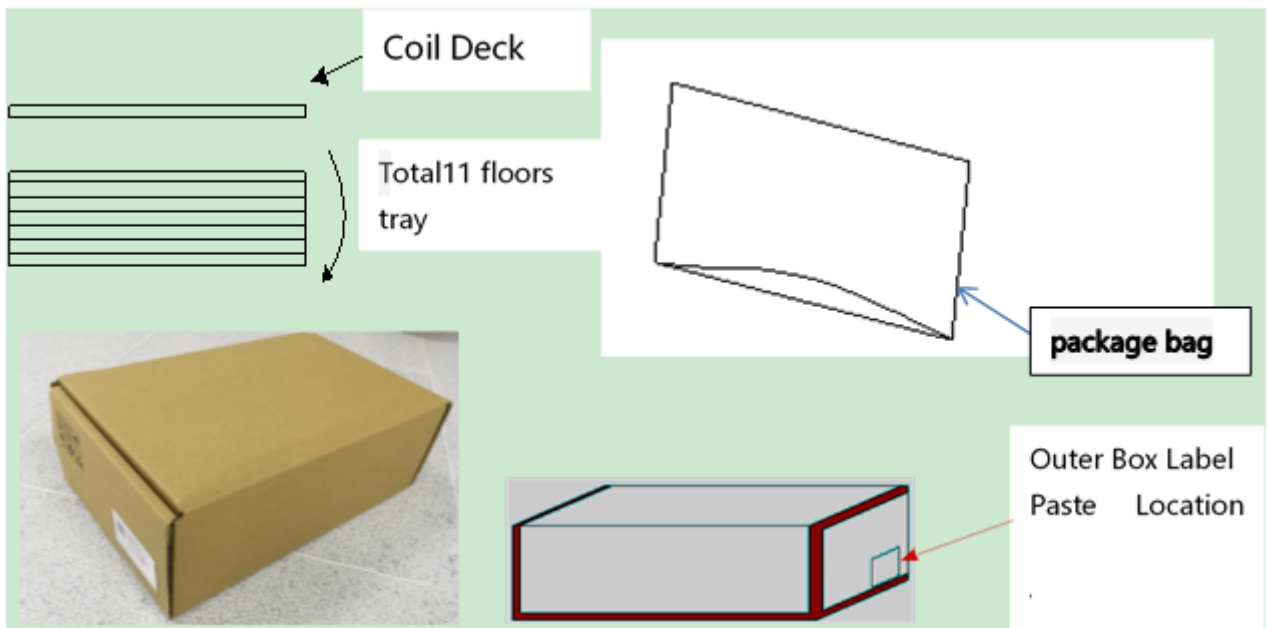
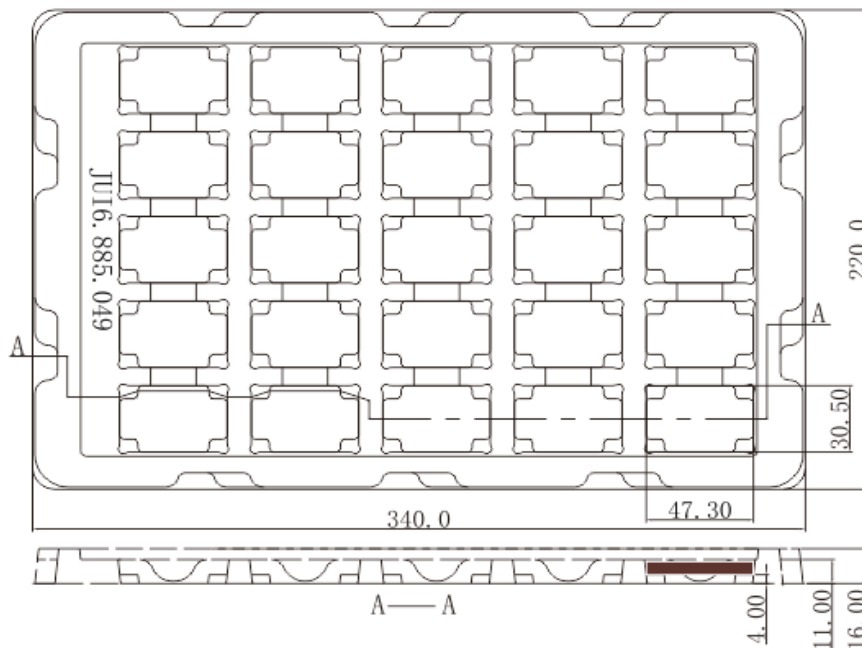
Preheating constant temperature zone: temperature: $150^{\circ}\text{C}\sim 200^{\circ}\text{C}$, time: 60-120 seconds, slope between 0.3-0.8.

Reflow soldering zone: peak temperature $235^{\circ}\text{C} \sim 250^{\circ}\text{C}$ (recommended peak temperature $<245^{\circ}\text{C}$), time 30-70 seconds.

Cooling zone: temperature: $217^{\circ}\text{C} \sim 170^{\circ}\text{C}$, slope between $3 \sim 5^{\circ}\text{C} / \text{S}$.

The solder is tin-silver-copper alloy lead-free solder / Sn & Ag & Cu Lead-free solder (SAC305).

7、Packaging Information:



A) 产品放置方向、标签粘贴位置、包装按示意图进行

The direction of placement of the product, the location of the label and the packaging according to the schematic diagram

B) 真空包装内放入 2 包 2g 干燥剂和一张湿度卡

Place 2 packs of 2 g desiccant and 1 humidity card in vacuum pack

C) 产品数量每层 25 只, 250 只/箱 CC

Product quantity 25, 250 / box per floor ;

D) 外箱尺寸: 240mm*385mm*140mm

Box size: 240mm * 385mm * 140mm;

E) 其它未尽事宜按照客户包装要求执行

Other outstanding matters performed according to customer packaging requirements.

8 FCC Statement

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-WFR12BUWD1**" 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.

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.*

5G band I (5150-5350MHz) indoor use only.

9 Federal Communication Commission Interference 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. 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 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. 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. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

10. Conditions of use

Please keep the antenna away from metal and horn interference sources.

11. Antenna specification

	Antenna Project Code	Antenna Gain (dBi)	Cable Length (Unit: cm)	Part No.
Walsin RF Device	Metal Antenna	2.4G WiFi Ant1: 4.51dBi	10cm	RFMTA370610IMLB701
			15cm	RFMTA370615IMLB701
			20cm	RFMTA370620IMLB702
			25cm	RFMTA370625IMLB701
		Ant2: 4.93dBi	27cm	RFMTA370627IMLB701
			30cm	RFMTA370630IMLB702
			35cm	RFMTA370635IMLB702
			40cm	RFMTA370640IMLB701
		5G WiFi: Ant1: 4.78dBi	45cm	RFMTA370645IMLB701
			50cm	RFMTA370650IMLB701
			55cm	RFMTA370655IMLB702
			60cm	RFMTA370660IMLB702
		Ant2: 4.94dBi		

Antenna Type Code	Antenna Project Code	Max Antenna Gain(dBi)	Cable Length (Unit: cm)	Part No.	Remark
Walsin RF Device	Metal Antenna1	2.4G Peak Gain: 1.72dBi	10cm	SLK-T3010-L-XI-B	Series Number15
		5G Peak Gain: 2.57dBi	60cm	SLK-T3010-L-XI-B	Series Number16

The main difference between antennas is the cable length of the antennas. The antenna is installed in the plastic shell or metal shell of the host along with the module.

12. Product label, label location

As shown in the figure below:

