



## **Model WF-R21C-ESA1 Datasheet**

**IEEE 802.11 1x1 WiFi 5 Wireless LAN**

**and**

**Bluetooth 5.0**

**Combo Module**

[SoC RTL8821CE]

for 802.11a/b/g/n/ac + Bluetooth 5.0

**Version: 1.0**

<Specification may be changed without prior notice>

Sichuan AI-Link Technology Co., Ltd

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

Module Name		WF-R21C-ESA1	
	Designed by	Reviewed by	Approved by
Signature	Qin, Dakai	FAN, Xijun	FENG, Yi
Date	4/25/2022	4/25/2022	4/25/2022

# Model WF-R21C-ESA1

➤ **Compatible WLAN Standards**

IEEE Std. 802.11 a/b/g/n/ac

Bluetooth V2.1/4.2/5.0

➤ **SoC**

RTL8821CE

➤ **Product Size**

12.0mm x16.0mm x1.7mm

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RoHS

# Features

## WLAN

- IEEE 802.11 a/b/g/n/ac compliant
- Support 20MHz, 40MHz bandwidth in 2.4GHz, 5GHz band. Support 20MHz, 40MHz, 80Mhz bandwidth in 5GHz band
- Dual bands 1T1R mode, Dual ANTs
- data rate up to 433.3Mbps with PCIe2.1
- Support STBC, LDPC, TX Beamformer, and RX Beamformer
- IEEE 802.11 d/e/h/i/j/k/mc/r/v/w support
- Security support for WFA WPA/WPA2/WPA3 personal, WPS2.0, WAPI

## Bluetooth

- Compatible with Bluetooth v2.1
- +EDR Support Bluetooth 5.0 system
- Supports BT/BLE dual mode
- Supports BT/Wi-Fi coexistence
- USB 2.0

# Revision Record

Revision	Date	Description	Edited by
V0.1	4/25/2022	Premier Release	<a href="#">Qin, Dakai</a>

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## 1 General Description

### 1.1 System Overview

Model WF-R21C-ESA1 is a highly integrated WiFi module by AI-Link, based on the Realtek SoC RTL8821CE, featuring a 1x1 a/b/g/n/ac dual-band Wi-Fi, and a Bluetooth v5.0 subsystems.

The finely tuned hardware architecture and baseband algorithms provide superlative RF performance, as well as low power consumption. Intelligent MAC design powers a highly efficient offload engine; the hardware supports standard features of higher level of security, performance, and conforms most international regulations, offering the great performance at any time, in any circumstance.

### 1.2 System Properties

Dimension	Typically, 12.0mm x16.0mm x1.7mm
Chipset	Realtek RTL8821CE
Operating Frequency	2.4GHz: 2.412~2.462GHz, 2.402-2.480GHz 5 GHz: 5.150~5.850GHz
Antenna	1x1 IPEX Connector
Operating Voltage	3.3V±10%
PCB Information	4-layers design (0.4+/-0.10mm)
Peripheral Interface	WIFI@PCIE BT@USB
Rate	11b: 1, 2, 5.5 and 11Mbps 11a/g: 6, 9, 12, 18, 24, 36, 48 and 54 Mbps 11n: MCS0~7, up to150Mbps 11ac: MCS0~9, NSS=1, BW=80MHz up to 433.3Mbps
Operating Temperature	-0°C to +70°C
Storage Temperature	-30°C to +85°C

ESD Protection	HBM: 2000V MM: $\pm 100V$ IEC(Contact discharge): $\pm 4000V$ IEC(Air discharge): $\pm 8000V$
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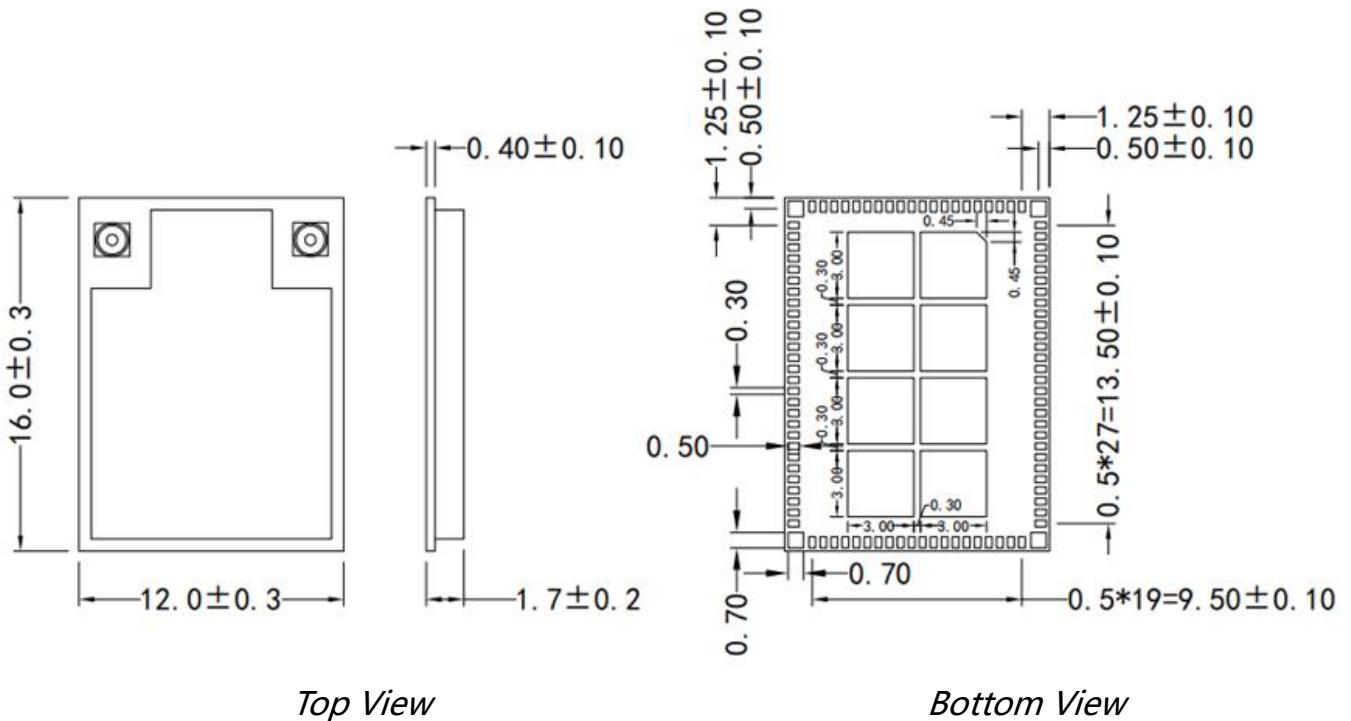
### 1.3 Diagram

The hardware architecture for the module is shown in Figure 1. The AI-Link's WF-R21C-ESA1 module Complies with IEEE standards 802.11a/b/g/n/ac; it also supports 1T1R and could reach up to data rate of 433.3 Mbps. Meanwhile, it is also a module of Bluetooth v5.0 and Wi-Fi Dual-band.

## 2 Mechanical Dimensions

### 2.1 Mechanical Outline Drawing

- Typical Dimension (W x L x T): 12.0 mm x16.0mm x1.7mm
- General tolerance:  $\pm 0.2\text{mm}$
- PCB Thickness: 0.4mm (+/-0.10mm)

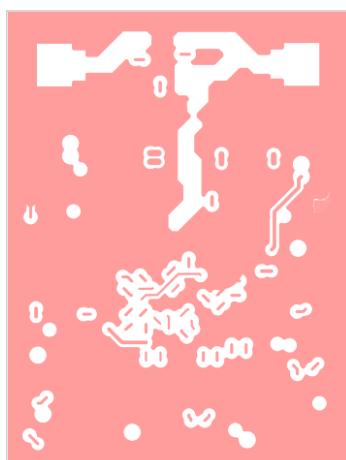


## 2.2 Pin definitions

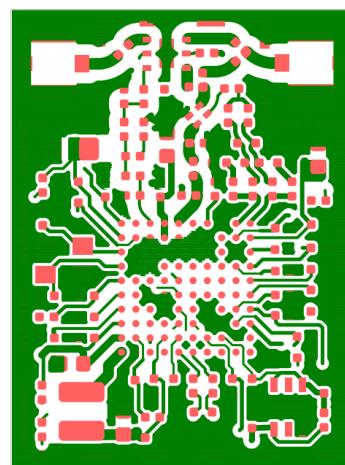
Number	Definition	Function
1~3	NC	NC
4~5	3.3V	3.3V INPUT
6	GND	GND
7	NFC_RF_DIS	NC
8	NFC_INT	NC
9	NFC_CLK	NC
10	NFC_DATA	NC
11	COEX_RXD	GPIO6
12	COEX_TXD	GPIO12
13	COEX3	GPIO7
14~16	NC	NC
17	GND	GND
18~19	NC	NC
20	GND	GND
21~22	NC	NC
23	GND	GND
24	HST_WAKE_DEV	GPIO13
25	NC	NC
26	GND	GND
27	SLP_CLK	External 32.768KHz input
28	WL_DIS_N	Enable pin for WL device(GPIO9)
29	PCIE_WAKEN	PCIe wake signal (active low)
30	PCIE_CLKREQN	PCIe clock request(active low)
31	PCIE_PERSTN	PCIe host indication to reset the device
32	GND	GND
33	PCIE_RCLK_N	PCIe differential Clock input —N

34	PCIE_RCLK_P	PCIe differential Clock input —P
35	GND	GND
36	PCIE_TX_N	PCIe Transmit Data —N
37	PCIE_TX_P	PCIe Transmit Data —P
38	GND	GND
39	PCIE_RX_N	PCIe Receive Data —N
40	PCIE_RX_P	PCIe Receive Data —P
41	GND	GND
42~57	NC	NC
58	PCM_SYNC	PCM_SYNC (input/output) (GPIO2)
59	PCM_IN	PCM_IN (input) (GPIO0)
60	PCM_OUT	PCM_OUT (output) (GPIO1)
61	PCM_CLK	PCM_CLK (input) (GPIO3)
62	GND	GND
63	BT_DIS_N	Enable pin for BT device(GPIO11)
64	BT_LED	BT_LED
65	WL_LED	WL_LED
66	NC	NC
67	HST_WAKE_BT	GPIO13
68	GND	GND
69	USB_DM	USB Serial Differential Data Minus
70	USB_DP	USB Serial Differential Data Plus
71	GND	GND
72~73	3.3V	3.3V INPUT
74~96	GND	GND

## 2.3 Product Photos, Example -

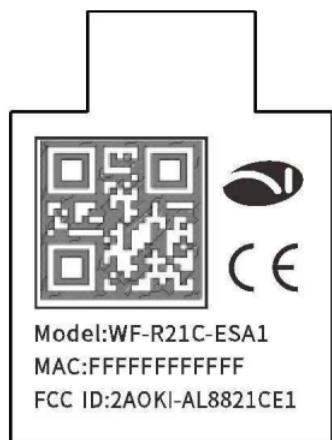


*Bottom View*



*Top View*

## 2.4 Label Information



- 1 1、 Model
- 2 2、 WIFI Mac
- 3 3、 FCC ID

### 3 RF Characteristics

#### 3.1 Wi-Fi Subsystem

Items	Contents	
WLAN Standard	IEEE 802.11a/b/g/n/ac	
Frequency Range	2.400 GHz ~ 2.484 GHz (2.4 GHz) 5.1 GHz~5.9 GHz (5 GHz)	
Channels	CH1 to CH13 @ 2.4G CH36 to CH165 @ 5G	
Modulation Mode	802.11b: DBPSK, DQPSK ,CCK 802.11 a/g/n: BPSK, QPSK, 16QAM, 64QAM 802.11 ac: BPSK, QPSK, 16QAM, 64QAM,256QAM	
Output Power & EVM	Power Value	EVM
	802.11b /11Mbps: 17.0dBm ± 2.0dBm	≤ -10dB
	802.11g /54Mbps: 14dBm ± 2.0dBm	≤ -25dB
	802.11a /54Mbps: 13dBm ± 2.0dBm	≤ -25dB
	802.11n HT20 /MCS7: @2.4G 13 dBm ± 2.0dBm	≤ -28dB
	802.11n HT20 /MCS7: @5G 12 dBm ± 2.0dBm	≤ -28dB
	802.11n HT40 /MCS7: @2.4G 12 dBm ± 2.0dBm	≤ -28dB
	802.11n HT40 /MCS7: @5G 12 dBm ± 2.0dBm	≤ -28dB
	802.11ac VHT20 /MCS8: @5G 11 dBm ± 2.0dBm	≤ -30dB
	802.11ac VHT40 /MCS9: @5G 10 dBm ± 2.0dBm	≤ -32dB
	802.11ac VHT80 /MCS9: @5G 10 dBm ± 2.0dBm	≤ -32dB
Receiver Sensitivity @2.4G PER≤ 10%	Rate Type	Max
	802.11b /11Mbps @2.4G PER≤8%	-79dBm
	802.11g /54Mbps @2.4G	-68dBm
	802.11a /54Mbps @5G	-68dBm

Items	Contents		
@5G PER≤ 10%	802.11n HT20 /MCS7 @2.4G	-67dBm	
	802.11n HT20 /MCS7 @5G	-67dBm	
	802.11n HT40 /MCS7 @2.4G	-64dBm	
	802.11n HT40 /MCS7 @5G	-64dBm	
	802.11ac VHT20 /MCS8 @5G	-60dBm	
	802.11ac VHT40 /MCS9 @5G	-55dBm	
	802.11ac VHT80 /MCS9 @5G	-54dBm	

### 3.2 Bluetooth Subsystem

Items	Contents			
Host Interface	USB			
TX Characteristics				
Channel	BR、EDR:CH0 toCH78			
	LE:CH0 to CH39			
Modulation	GFSK、 $\pi/4$ -DQPSK 、 8PSK			
TX Power	Rate Type	Min(dBm)	Typ(dBm)	Max(dBm)
	1DH5	0		10
	2DH5	0		10
	3DH5	0		10
	1LE	0		10
RX Characteristics				
RX	Rate Type	Min(dBm)	Typ(dBm)	Max(dBm)
	1DH5 (BER<0.1%)		-89	
	2DH5 (BER<0.01%)		-85	
	3DH5 (BER<0.01%)		-83	
	1LE (PER<30.8%)		-92	

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

## 4 Interface

### 4.1 PCIe interface

This module supports PCI Express End Point which is fully compliant with the PCI Express Base Specification Revision 2.0. It supports PCI Express Gen1 (2.5Gbps) and PCI-E Express Gen2 (5.0Gbps) differential bus speed. The PCI Express interface is used for Wi-Fi operations only. The DMA ring and the data structure are controlled by the descriptor based PDMA engine over the PCI Express interface.

### 4.2 USB Interface

The module supports the USB (USB v2.0 specification) device port, Use USB as the host interface for Bluetooth.

## 5 Electrical Current Consumption

### 5.1 Current Consumption

Description	Value	Unit
2.4GHz-Band TX CCK, 1Mbps	514	mA
2.4GHz-Band TX OFDM, 6Mbps	326	mA
2.4GHz-Band TX HT20, MCS0	322	mA
2.4GHz-Band TX HT40, MCS0	321	mA
5GHz-Band TX OFDM, 6Mbps	315	mA
5GHz-Band TX HT20, MCS0	310	mA
5GHz-Band TX HT40, MCS0	313	mA

*\*Note:*

*[1] Results are measured provided VDD33 is 3.3V. TX power is measured at the antenna port. The temperature is 25oC.*

*[2] The duty cycle for TX/RX measurement is 100%.*

*[3] The chip variation is +/- 25%.*

## 6 Software Information

### 6.1 RF Driver

*Win7\_MP\_Kit RTL11ac\_8821CE\_PCIE\_v12.00\_20210325(40015)*

### 6.2 Normal Driver

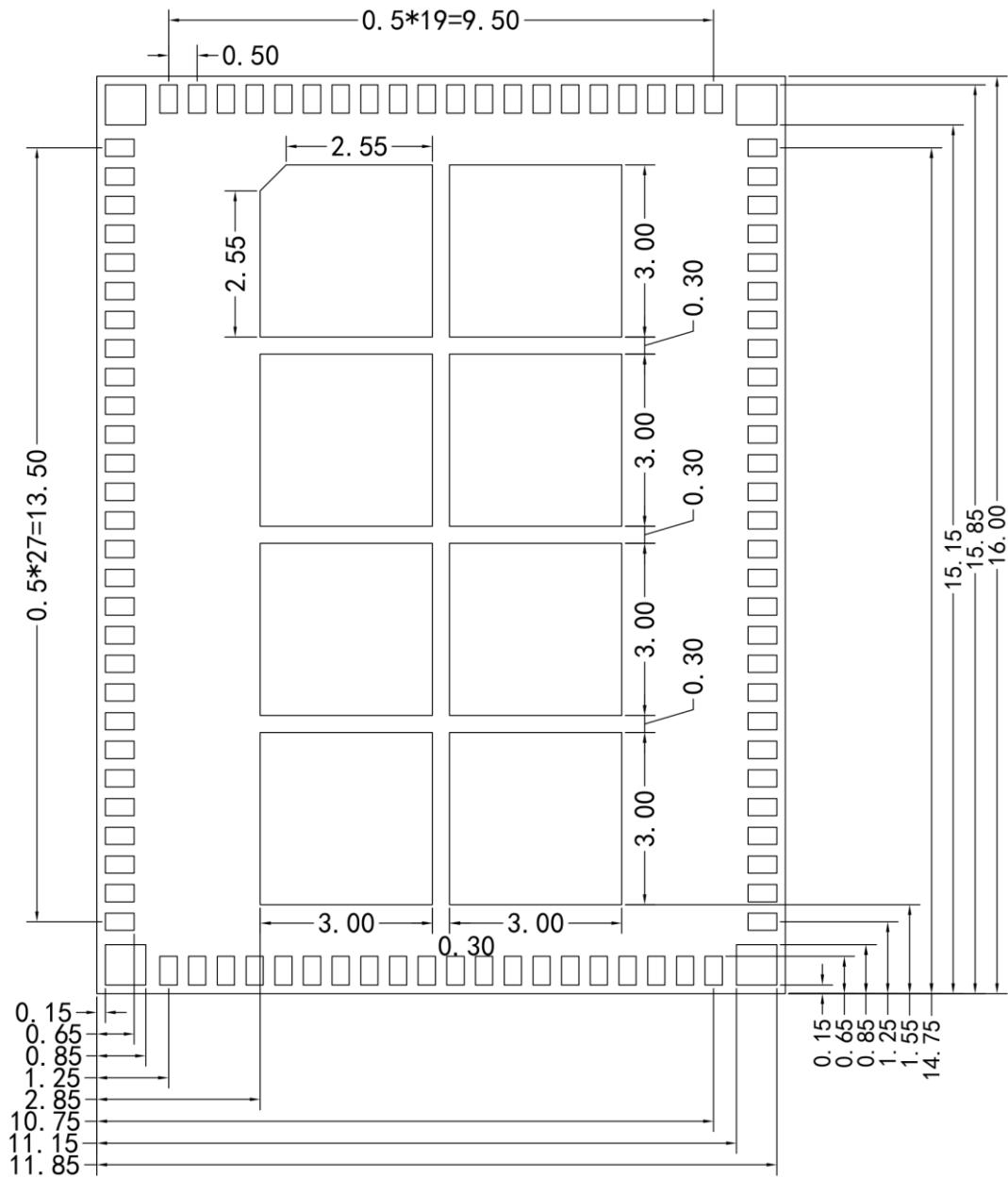
*RTBlueR\_Windows10\_FilterDriver\_1037.3000\_0130.2021\_new\_L*

*\*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.*

## 7 Reference Design

### 7.1 Recommend PCB Layout Decal



*\*Note:*

*Mainboard PIN3 (WiFi ant) shall be designed in strict accordance with the reference design dimensions, and a clearance of 0.3mm (only top surface) shall be made around the pad to ensure the isolation of RF and GND parts.*

## 8 RF Connector Dimension

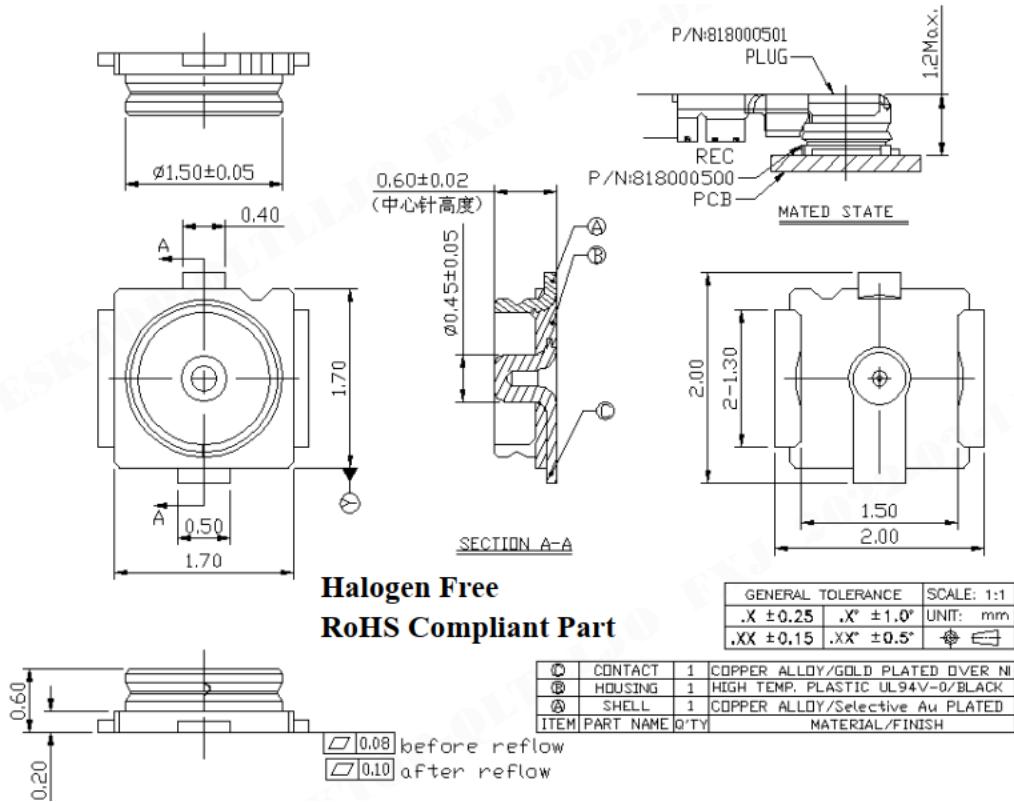
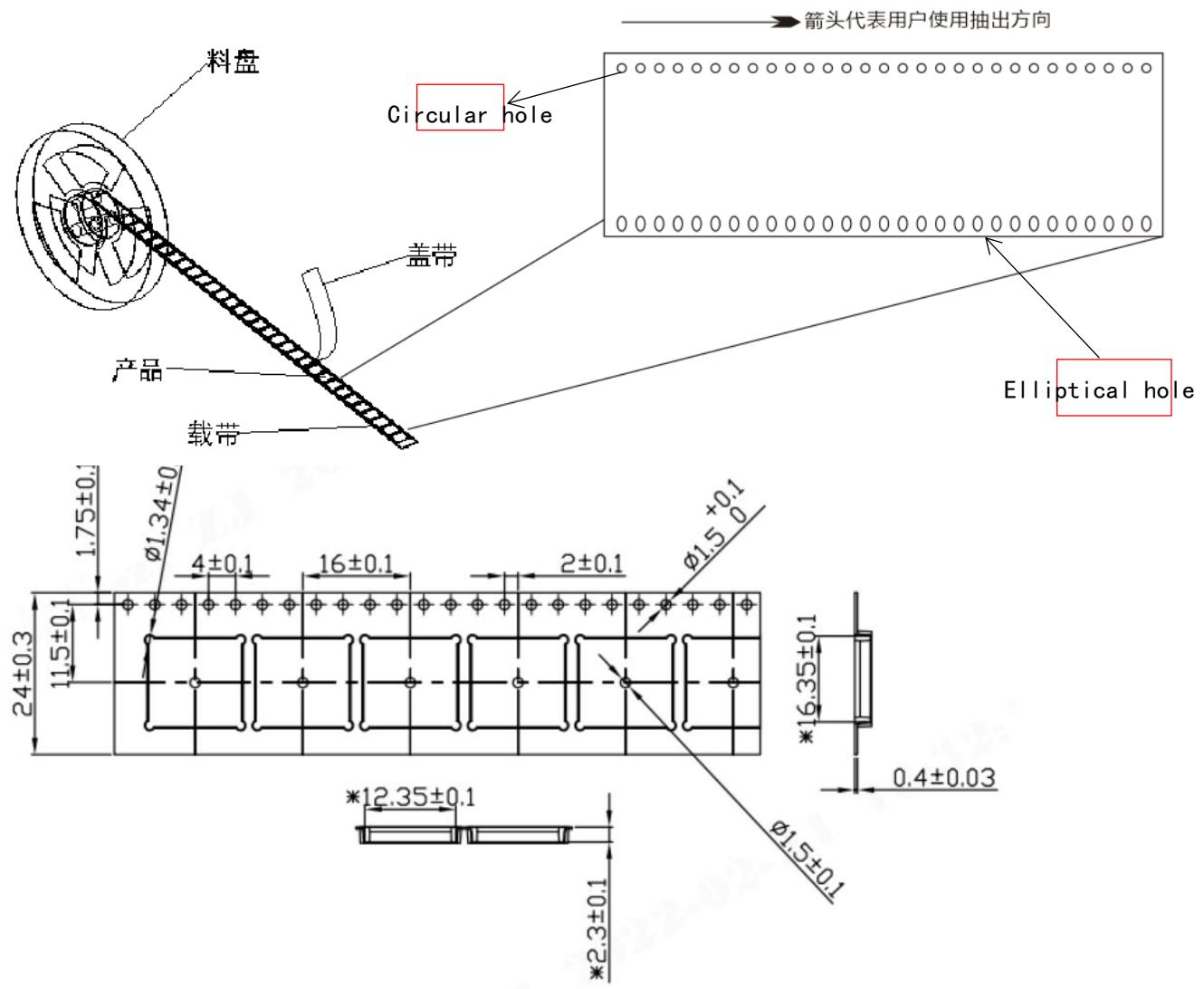


Figure 2: The dimensions of the connector

I-PEX, P/N: 818000500 (Unit: mm)

## 9 Package, Storage & Disposal

### 9.1 Packaging Information:



1. The product placement direction, label pasting position, and packaging should follow the schematic diagram;
2. Each roll contains 1600 products, and each small box contains 1 roll. The large box contains a total of 8 small boxes, with a total of 12800 products per box;
3. Outer box size: 370mm \* 300mm \* 370mm, small box size: 360mm \* 360mm \* 37mm;
4. Place 2 bags of 2g desiccant and 1 6-color humidity card in the vacuum bag;
5. Other matters not covered shall be executed according to the customer's packaging requirements.

## 9.2 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: -30~85°C;
- Humidity: 20%~75%;
- Humidity sensitivity grade: MSL 3
- Container Requirement: products shall be placed in a container well-functioning as an electrostatic shielding.

## 8.3 Disposal

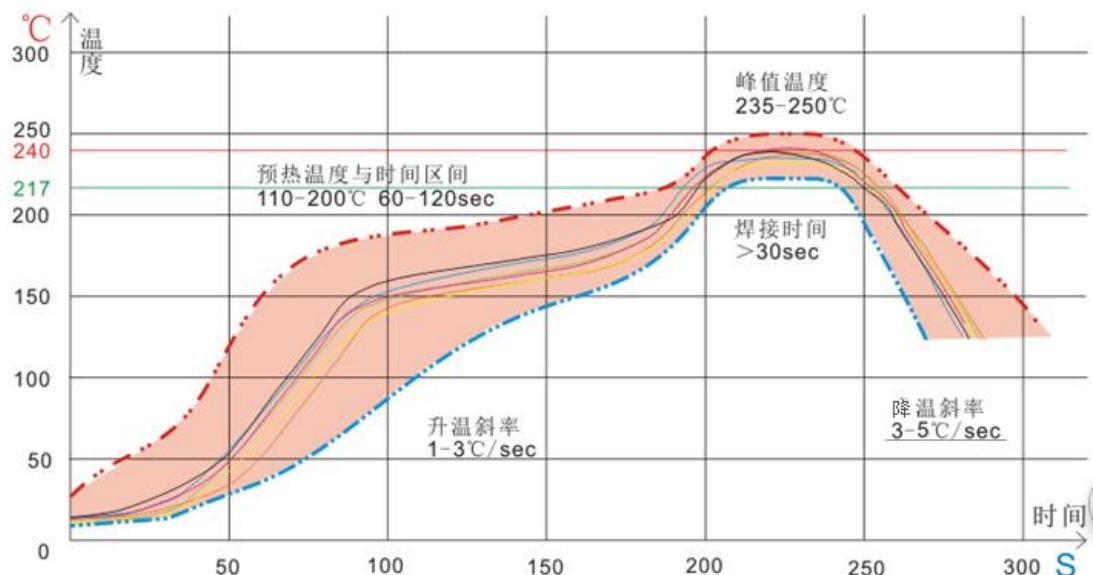
The waste disposal of this product and the package should comply with the applicable local/regional /state/ international regulations.

## 10 Appendix

Key Components List

N O.	Name	Model	Specification	Manufacturer
1	IC	RTL8821CE		Realtek

## 11 Refelow Standard Condition



Heating zone: temperature: < 150 °C, time: between 60 and 90 seconds, the slope is controlled between 1 ~ 3 °C / S.

Preheating constant temperature zone: temperature: 150 °C ~ 200 °C, time: between 60-120 seconds, slope between 0.3-0.8.

Reflow soldering area: peak temperature 235 °C ~ 250 °C  
(recommended peak temperature < 245 °C), time 30-70 seconds.

Cold area: temperature: 217 °C ~ 170 °C, slope between 3 ~ 5 °C / S.  
The solder is lead-free solder in tin-silver copper alloys/Sn&Ag&Cu  
Lead-free solder (SAC305).

## 12 Certification Information:

1

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## **CE DOC**

Hereby, Sichuan AI-Link Technology Co., Ltd. declares that the radio equipment type WF-R21C-ESA1 is in compliance with Directive 2014/53/EU. The full text of the EU declaration of conformity is available at the following internet address:  
<http://www.ailinkiot.com>

### **CE warning**

RF exposure information: The Maximum Permissible Exposure (MPE) level has been calculated based on a distance of 20cm between the device and the human body. To maintain compliance with RF exposure requirement, use product that maintain a 20cm distance between the device and human body.

### **FCC regulatory conformance**

#### **FCC ID: 2AOKI-AL8821CE1**

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.
- (2) This device must accept any interference received, including interference that may cause undesired operation.

**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

NOTE: Unauthorized changes will result in loss of device operating privileges.

## RF Exposure

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

The module is limited to installation in mobile or fixed applications. Separate approval is required for all other operating configurations, including portable configuration with respect to Part 2.1093 and different antenna configurations.

## **Unauthorized modifications could void the user's authority to operate the equipment.**

This radio transmitter operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Frequency range	Manufacturer	Peak gain	Impedance	Antenna type
2400-2483.5MHz	Shenzhen Yishengbang Technology Co., LTD	2.96Bi	50Ω	FPC Antenna
2412-2462MHz	Shenzhen Yishengbang Technology Co., LTD	2.96Bi	50Ω	FPC Antenna
5150-5250MHz	Shenzhen Yishengbang Technology Co., LTD	3.09dBi	50Ω	FPC Antenna
5250-5350MHz	Shenzhen Yishengbang Technology Co., LTD	3.78dBi	50Ω	FPC Antenna
5470-5725MHz	Shenzhen Yishengbang Technology Co., LTD	3.95dBi	50Ω	FPC Antenna
5725-5850MHz	Shenzhen Yishengbang Technology Co., LTD	4.12dBi	50Ω	FPC Antenna

## **ORIGINAL EQUIPMENT MANUFACTURER (OEM) NOTES**

OEM must certify the final end product to comply with unintentional radiators (FCC Sections 07 and 15.109) before declaring compliance of the final product to Part 15 of the FCC rules and regulations. Integration into devices that are directly or indirectly connected to AC lines must add with Class II Permissive Change.

The OEM must comply with the FCC labeling requirements. If the module's label is not visible when installed, then an additional permanent label must be applied on the outside of the finished product which states: "Contains transmitter module FCC ID: 2AOKI-AL8821CE1". Additionally, the following statement should be included on the label and in the final product's user manual: "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 interferences, and
- (2) this device must accept any interference received, including interference that may cause undesired operation."

The module is limited to installation in mobile or fixed applications. Separate approval is required for all other operating configurations, including portable configuration with respect to Part 2.1093 and different antenna configurations. A module or modules can only be used without additional authorizations if they have been tested and granted under the same intended end-use operational conditions, including simultaneous transmission operations. When they have not been tested and granted in this manner, additional testing and/or FCC application filing may be required. The most straightforward approach to address additional testing conditions is to have the grantee responsible for the certification of at least one of the modules submit a permissive change application. When having a module grantee file a permissive change is not practical or feasible, the following guidance provides some additional options for host manufacturers. Integrations using modules where additional testing and/or FCC application filing(s) may be required are:

- (A) a module used in devices requiring additional RF exposure compliance information (e.g., MPE evaluation or SAR testing); (B) limited and/or split modules not meeting all of the module requirements; and (C) simultaneous transmissions for independent collocated transmitters not previously granted together.

This Module is full modular approval, it is limited to OEM installation ONLY. Integration into devices that are directly or indirectly connected to AC lines must add with Class II Permissive Change. (OEM) Integrator has to assure compliance of the entire end product include the integrated Module.

Additional measurements (15B) and/or equipment authorizations (e.g. Verification) may need to be addressed depending on co-location or simultaneous transmission issues if applicable. (OEM) Integrator is reminded to assure that these installation instructions will not be made available to the end user.

## Requirement per KDB996369 D03

### 2.2 List of applicable FCC rules

List the FCC rules that are applicable to the modular transmitter. These are the rules that specifically establish the bands of operation, the power, spurious emissions, and operating fundamental frequencies. DO NOT list compliance to unintentional-radiator rules (Part 15 Subpart B) since that is not a condition of a module grant that is extended to a host manufacturer. See also Section 2.10 below concerning the need to notify host manufacturers that further testing is required.<sup>3</sup>

Explanation: This module meets the requirements of FCC part 15C(15.247), Part 15E(15.407).

### 2.3 Summarize the specific operational use conditions

Describe use conditions that are applicable to the modular transmitter, including for example any limits on antennas, etc. For example, if point-to-point antennas are used that require reduction in power or compensation for cable loss, then this information must be in the instructions. If the use condition limitations extend to professional users, then instructions must state that this information also extends to the host manufacturer's instruction manual. In addition, certain information may also be needed, such as peak gain per frequency band and minimum gain, specifically for master devices in 5 GHz DFS bands.

Explanation: The module has the trace antenna designs, and the antenna use a permanently attached antenna which is unique, The designed antenna meets the hardware module's requirements via the connection between ipex connector and module.

### 2.4 Limited module procedures

If a modular transmitter is approved as a "limited module," then the module manufacturer is responsible for approving the host environment that the limited module is used with. The manufacturer of a limited module must describe, both in the filing and in the installation instructions, the alternative means that the limited module manufacturer uses to verify that the host meets the necessary requirements to satisfy the module limiting conditions.

A limited module manufacturer has the flexibility to define its alternative method to address the conditions that limit the initial approval, such as: shielding, minimum signaling amplitude, buffered modulation/data inputs, or power supply regulation. The alternative method could include that the limited module manufacturer reviews detailed test data or host designs prior to giving the host manufacturer approval.

This limited module procedure is also applicable for RF exposure evaluation when it is necessary to demonstrate compliance in a specific host. The module manufacturer must state how control of the product into which the modular transmitter will be installed will be maintained such that full compliance of the product is always ensured. For additional hosts other than the specific host originally granted with a limited module, a Class II permissive change is required on the module grant to register the additional host as a specific host also approved with the module.

Explanation: The module is not a limited module.

### 2.5 Trace antenna designs

For a modular transmitter with trace antenna designs, see the guidance in Question 11 of KDB Publication 996369 D02 FAQ – Modules for Micro-Strip Antennas and traces. The integration information shall include for the TCB review the integration instructions for the following aspects:

layout of trace design, parts list (BOM), antenna, connectors, and isolation requirements.

- a) Information that includes permitted variances (e.g., trace boundary limits, thickness, length, width, shape(s), dielectric constant, and impedance as applicable for each type of antenna);
- b) Each design shall be considered a different type (e.g., antenna length in multiple(s) of frequency, the wavelength, and antenna shape (traces in phase) can affect antenna gain and must be considered);
- c) The parameters shall be provided in a manner permitting host manufacturers to design the printed circuit (PC) board layout;
- d) Appropriate parts by manufacturer and specifications;
- e) Test procedures for design verification; and
- f) Production test procedures for ensuring compliance.

The module grantee shall provide a notice that any deviation(s) from the defined parameters of the antenna trace, as described by the instructions, require that the host product manufacturer must notify the module grantee that they wish to change the antenna trace design. In this case, a Class II permissive change application is required to be filed by the grantee, or the host manufacturer can take responsibility through the change in FCC ID (new application) procedure followed by a Class II permissive change application.

Explanation: Yes, The module with trace antenna designs, and this manual has been shown the layout of trace design, antenna, connectors, and isolation requirements.

## **2.6 RF exposure considerations**

It is essential for module grantees to clearly and explicitly state the RF exposure conditions that permit a host product manufacturer to use the module. Two types of instructions are required for RF exposure information: (1) to the host product manufacturer, to define the application conditions (mobile, portable – xx cm from a person's body); and (2) additional text needed for the host product manufacturer to provide to end users in their end-product manuals. If RF exposure statements and use conditions are not provided, then the host product manufacturer is required to take responsibility of the module through a change in FCC ID (new application).

Explanation: This module complies with FCC RF radiation exposure limits set forth for an uncontrolled environment, This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body." This module is designed to comply with the FCC statement, FCC ID is: 2AOKI-AL8821CE1.

## **2.7 Antennas**

A list of antennas included in the application for certification must be provided in the instructions. For modular transmitters approved as limited modules, all applicable professional installer instructions must be included as part of the information to the host product manufacturer. The antenna list shall also identify the antenna types (monopole, PIFA, dipole, etc. (note that for example an "omni-directional antenna" is not considered to be a specific "antenna type")).

For situations where the host product manufacturer is responsible for an external connector, for example with an RF pin and antenna trace design, the integration instructions shall inform the installer that unique antenna connector must be used on the Part 15 authorized transmitters used in the host product. The module manufacturers shall provide a list of acceptable unique connectors.

Explanation: The module has the trace antenna designs, and the antenna use a permanently attached antenna which is unique, The designed antenna meets the hardware module's requirements via the connection between ipex connector and module.

## **2.8 Label and compliance information**

Grantees are responsible for the continued compliance of their modules to the FCC rules. This includes advising host product manufacturers that they need to provide a physical or e-label stating "Contains FCC ID" with their finished product. See Guidelines for Labeling and User Information for RF Devices – KDB Publication 784748.

Explanation: The host system using this module, should have label in a visible area indicated the following texts: "Contains FCC ID: 2AOKI-AL8821CE1"

## **2.9 Information on test modes and additional testing requirements**

Additional guidance for testing host products is given in KDB Publication 996369 D04 Module Integration Guide. Test modes should take into consideration different operational conditions for a stand-alone modular transmitter in a host, as well as for multiple simultaneously transmitting modules or other transmitters in a host product.

The grantee should provide information on how to configure test modes for host product evaluation for different operational conditions for a stand-alone modular transmitter in a host, versus with multiple, simultaneously transmitting modules or other transmitters in a host.

Grantees can increase the utility of their modular transmitters by providing special means, modes, or instructions that simulates or characterizes a connection by enabling a transmitter. This can greatly simplify a host manufacturer's determination that a module as installed in a host complies with FCC requirements.

Explanation: Top band can increase the utility of our modular transmitters by providing instructions that simulates or characterizes a connection by enabling a transmitter.

## **2.10 Additional testing, Part 15 Subpart B disclaimer**

The grantee should include a statement that the modular transmitter is only FCC authorized for the specific rule parts (i.e., FCC transmitter rules) listed on the grant, and that the 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. If the grantee markets their product as being Part 15 Subpart B compliant (when it also contains unintentional-radiator digital circuitry), then the grantee shall provide a notice stating that the final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.

Explanation: The module without unintentional-radiator digital circuitry, so the module does not require an evaluation by FCC Part 15 Subpart B. The host should be evaluated by the FCC Subpart B.