

# **RAK310 WIFI Module User Manual**

## FCC STATEMENT

This device complies with part 15 of the FCC rules and Industry Canada Licence-exempt RSS standard(s). Operation is subject to the following 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.

## DÉCLARATION DE LA FCC

Cet appareil est conforme à la section 15 des réglementations de la FCC. Le fonctionnement de l'appareil est sujet aux deux conditions suivantes :

- 1) cet appareil ne doit pas provoquer d'interférences néfastes, et
- 2) cet appareil doit tolérer les interférences reçues, y compris celles qui risquent de provoquer un fonctionnement indésirable.

### Caution:

This device complies with Part 15 of the FCC Rules / Industry Canada licence-exempt RSS standard(s). 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.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

### MPE Reminding

To satisfy FCC / IC RF exposure requirements, a separation distance of 20 cm or more should be maintained between the antenna of this device and persons during device operation.

To ensure compliance, operations at closer than this distance is not recommended.

Les antennes installées doivent être situées de façon à ce que la population ne puisse y être exposée à une distance de moins de 20 cm. Installer les antennes de façon à ce que le personnel ne puisse approcher à 20 cm ou moins de la position centrale de l'antenne.

La FCC des États-Unis stipule que cet appareil doit être en tout temps éloigné d'au moins 20 cm des personnes pendant son fonctionnement.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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The module is only operated from 2412 to 2462 Mhz (not for channel 12 and 13)

## Devices Overview

RAK310x is an ultra-low-power, low-cost module that fully supports of major encryption modes as well as WAPI encryption mode, a Wi-Fi @ module with SDIO interface that supports 802.11b/g/n protocol. The module internally integrates RF station, balun, RF switch, crystal oscillator and power switch circuit, enabling fast hardware design. Plus, maturely powered by WINCE, Linux and Android environments simplifies customer software design.

## Devices Features

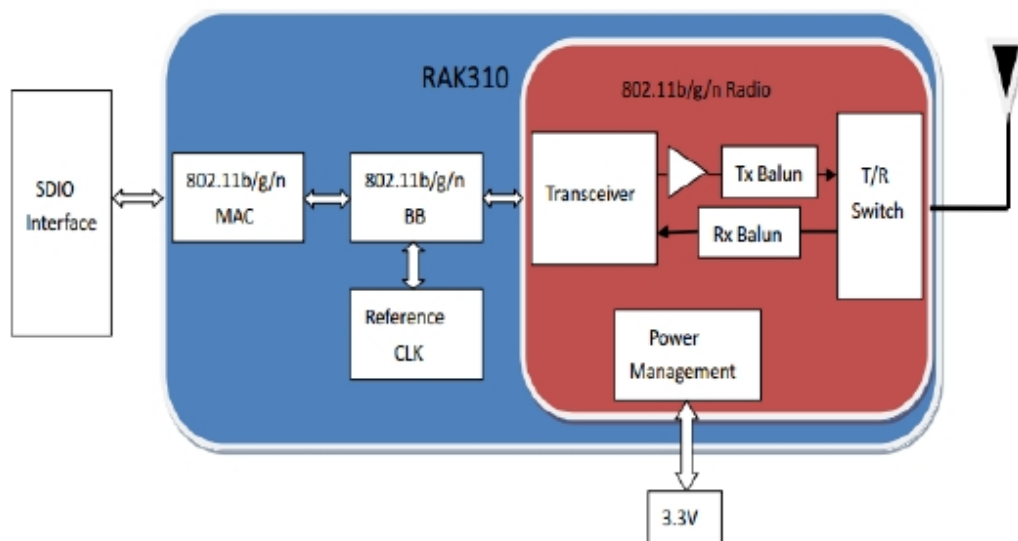
- Support IEEE 802.11b/g/n wireless standards, IEEE 802.11n unifiow, enabling high throughput rate
- Support SDIO 1.0 & 2.0 interfaces
- Reservation for Bluetooth coexist

- Support WEP, WPA/WPA2-PSK, TKIP encryptions
- Infrastructure mode, Ad-Hoc mode
- Support WIFI Direct
- Support WAPI
- Completely WLAN drive under different OS, such as WINCE, Linux and Android
- Power supply: 3.14~3.46V
- Working temperature: -40~+85°C
- Moisture sensitive level (MSL) Level 3
- Package size: 21.34mmx19.05mmx2.5mm

## Key Applications

- Tablet PC
- Medical Device
- Industrial Handset
- Industrial automation and measurement
- WIFI Camera
- Internet-based Consumer electronics, like playing station

## RAK 310Series System Diagram



# 1. Functional Description

## 1.1 Host Interface

- SDIO Interface
  - SDIO 1.0 & 2.0 compatible
  - Support SDIO 1bit, 4bit mode
  - Maximum clock frequency: 50MHz

## 1.2 WLAN

### 1.2.1 MAC

- Comply with IEEE802.11b/g/n standards
- Support WEP, WPA/WPA2-PSK, TKIP, AES encryptions
- Support WPS-PBC

### 1.2.2 Baseband Processor

- Support DSSS (1, 2Mbps), CCK(1, 2, 5.5, 11Mbps), OFDM (6, 9, 12, 18, 24, 36, 48, 54Mbps), HT20 (MCS0 - MCS7)
- Adopt Orthogonal Frequency Division Multiplexing (OFDM) technology, combining with BPSK, QPSK, 16-QAM and 64-QAM; 802.11b with CCK and DSSS modulation technology

### 1.2.3 Internal Frequency

- Internally integrate 26MHz high-accuracy reference clock, simplifying clock circuit design

### 1.2.4 Power Management

- Internally integrate power management module, supporting 5 power working states: OFF state, HOST-OFF state, SLEEP state, WAKE-UP state, ON state
- Internally power supply switch: with external 3.3V main power supply only, switching to internal power management module to supply, and performing management

### 1.2.5 RF Circuit

- Internally integrate power amplifier, transceiver, transceiving balun and RF switch
- Externally connect RF part to antenna through u.FL interface
- Highly integrated RF circuit greatly simplifies RF design, without need to concern the RF circuit of Wi-Fi part

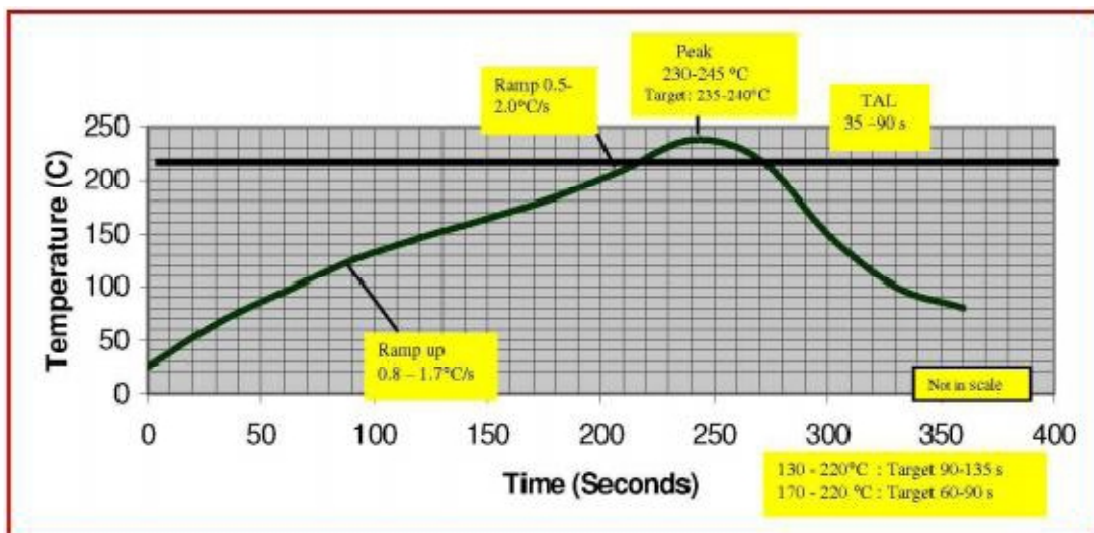
## Manufacture Guidance

The label contained the FCC ID will be installed on the module as below method.



And the module will be installed on the main board as the method below.

The Figure shows the temperature graph when manufacture by reflow soldering method.



Note: as shown in the above figure, it is based on the SAC305 lead-free tin paste (3% silver, 0.5% copper). Alpha OM-338 lead-free cleaning-free flux is recommended. This figure is mainly used for guidance. The entire process time is subject to thermal pad number of assembly board and device Intensity.

The final view:



This radio transmitter (identify the device by certification number, or model number if Category II) has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Gain of antenna: 3.5dBi max.

Type of antenna: Omni-directional

Impedance of antenna: 50ohm

Le présent émetteur radio (identifier le dispositif par son numéro de certification ou son numéro de modèle s'il fait partie du matériel de catégorie II) a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

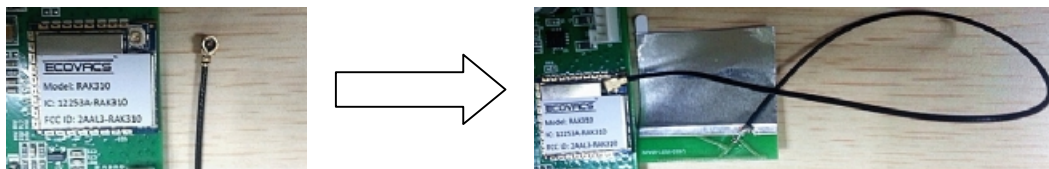
Gain d'antenne: 3.5dBi maximal

Type d'antenne: 50 ohm, Omni-directionnel

## The Information of Antenna

The model number of antenna is WA-P-LALB-02-001.

The external antenna is connected to the module through u.FL interface with the u.FL coaxial cable.



The antenna is installed inside the host unit and the final user can not install the antenna themselves. The module and antenna are installed with a distance over 20cm from the user during use.

The WA-P-LALB-02-001 can compliance with the RAK310 module.

### Electrical Specification

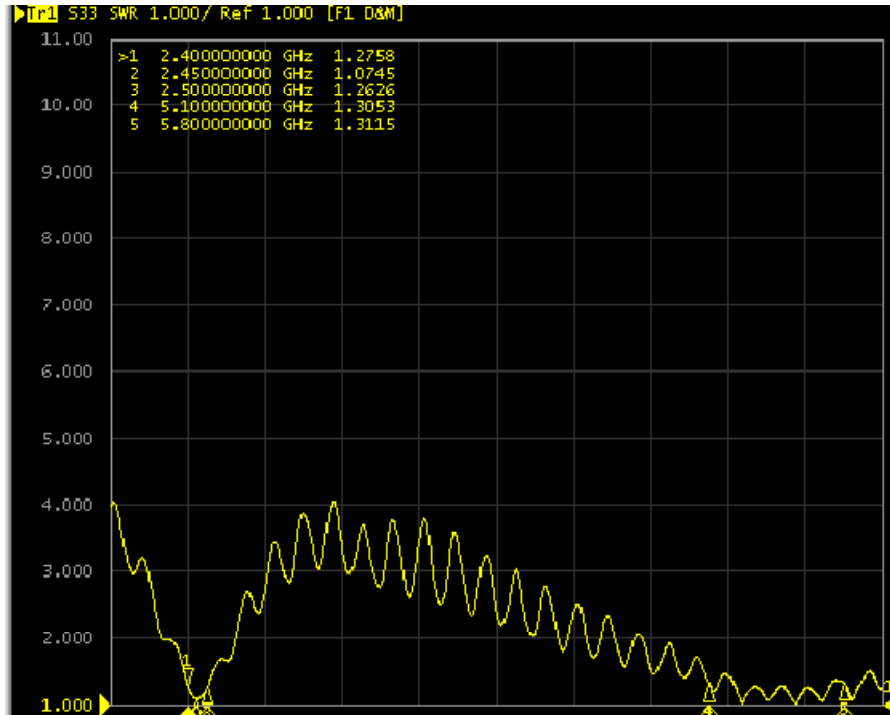
#### VSWR Measuring Method

1. A 50Ωcoaxial cable is connected to the antenna. Then this cable is connected to a network analyzer to measure the VSWR
2. Keeping this jig away from metal at least 20cm

#### Measurement frequency points and VSWR value

Frequency (Unit MHz)	2400	2450	2500	5100	5800	
VSWR	Main	1.28	1.08	1.26	1.31	1.31





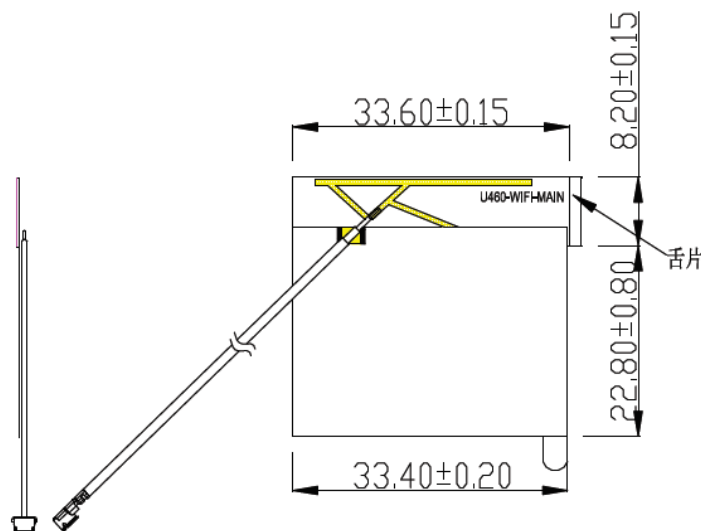
### Efficiency and Gain

Antenna gain is marked (dBi) and is based on STANDARD HORN antenna. The data shows Peak Gain and Average Gain.

Frequency (MHz)	2400.0	2450.0	2500.0	5250.0	5725.0
Efficiency (%)	42.1%	45.0%	41.5%	36.8%	35.3%
Average Gain (dB)	-3.8	-3.5	-3.8	-4.3	-4.5
Gain (dBi)	3.3	3.1	3.5	3.5	3.7

### Mechanical Specification

Cable length: 200±2mm Connector: 1.13 Technova (7.000AC-000-1RB)



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## The Information of FCC ID

The FCC ID of the module will be contented in the host unit.



Robotic Housekeeper (3G+Wi-Fi)

Model: F588

Input: 14.5V DC 0.75A

Charging Dock: CH1205B

Battery: 12VDC, 2500mAh, Ni-MH

Producing date: 11/2012

User Name: ××××××0001



Contains FCC ID: 2AAL3-RAK310.

Contains IC:12253A- RAK310

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