



# TuyaSmart Wi-Fi Module

## 1. Product Overview

WR2 is a low power consumption module with built-in Wi-Fi connectivity solution designed by Hangzhou Tuya Information Technology Co., Ltd. The Wi-Fi Module consists of a highly integrated wireless radio chip W302 12E77H2 and some extra flash that has been programmed with Wi-Fi network protocol and plenty of software examples. WR2 include a ARM CM4F, WLAN MAC, 1T1R WLAN, maximum frequency reaches 125MHz, 256K SRAM, 1M byte flash and various peripheral resources.

WR2 is a RTOS platform, embedded with all the Wi-Fi MAC and TCP/IP protocol function examples, users can customize their Wi-Fi product by using these software examples.

### 1.1 Features

- ✧ Integrated low power consumption 32-bit CPU, also known as application processor
- ✧ Basic frequency of the CPU can support 125 MHz
- ✧ Supply voltage range: 3.3V DC
- ✧ Peripherals: 5 GPIO channels, 1 UART, 1 ADC
- ✧ Wi-Fi connectivity:
  - 802.11 B/G/N20/N40
  - Channel 1 to 11 @ 2.4GHz
  - Support WPA/WPA2
  - +20.1dBm output power in 802.11b mode
  - Support SmartConfig function for both Android and IOS devices

- On-board PCB antenna
- Operating temperature range: -20°C to 85°C

## **1.2 Main Application Fields**

- ✧ Intelligent Building
- ✧ Intelligent home, Intelligent household applications
- ✧ Healthy devices
- ✧ Industrial wireless control
- ✧ Baby monitor
- ✧ Webcam
- ✧ Intelligent bus

## 2. Dimensions and Footprint

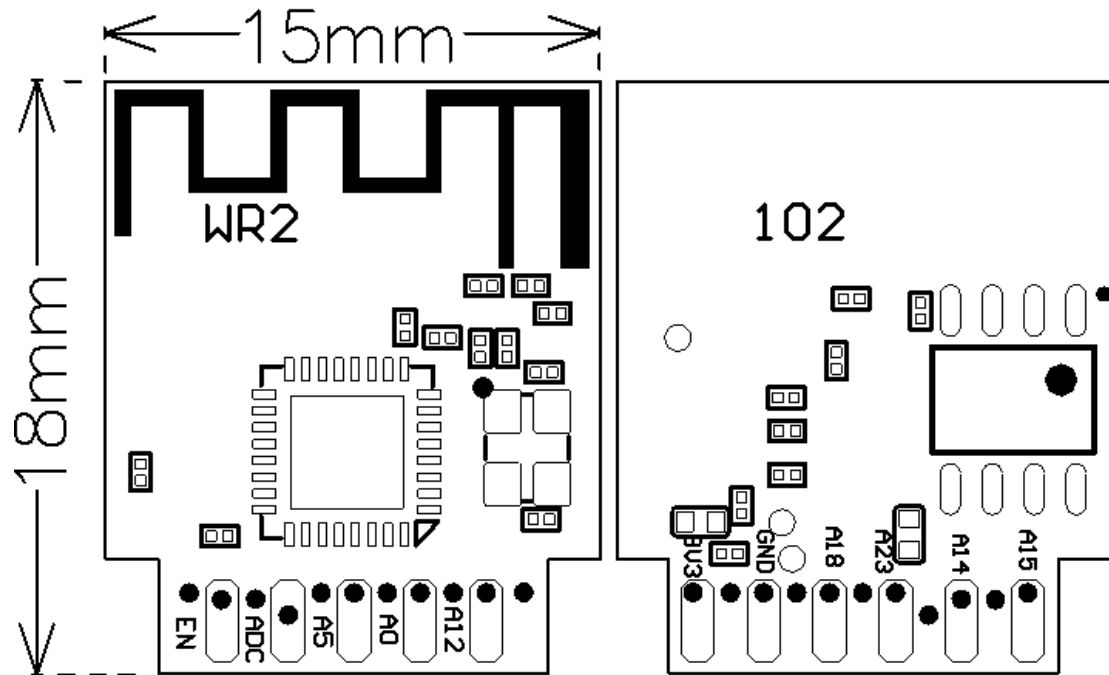
### 2.1 Dimensions

WR2 has 2 columns of Pins. The distance between each Pin is 2 mm.

Size of WR2: 15mm(W)\*18mm(L)\*3.3mm(H)

Figure 2 shows the dimensions of WR2.

Figure 2. The dimensions of WR2



### 2.2 Pin Definition

Table 1 shows the general pin attributes of WR2

Table 2.1 The typical pin definition of WR2

| PIN NO. | NAME     | TYPE | DISCREPTION   |
|---------|----------|------|---|
| 1       | VD33     | P    | Supply voltage (3.3V)   |
| 2       | GPIOA_12 | I/O  | GPIOA_12  |
| 3       | GND      | P    | Ground  |
| 4       | GPIOA_0  | I/O  | GPIOA_0, can not be pull-up while booting, can be used as GPIO while in normal working mode |
| 5       | GPIOA_18 | I/O  | UART0_RXD   |
| 6       | GPIOA_5  | I/O  | GPIOA_5   |
| 7       | GPIOA_23 | I/O  | UART0_TXD   |
| 8       | ADC      | AI   | ADC terminal(input 5V maximally)  |
| 9       | GPIOA_14 | I/O  | GPIOA_14  |
| 10      | CHIP_EN  | I/O  | External reset signal(low level effects)  |

|    |          |     |          |
|----|----------|-----|----------|
| 11 | GPIOA_15 | I/O | GPIOA_15 |
|----|----------|-----|----------|

Note: S: Power supply pins; I/O: Digital input or output pins; AI: Analog input.

### 3. Electrical Characteristics

#### 3.1 Absolute Maximum Ratings

Table 3.1 Absolute Maximum Ratings

| PARAMETERS                                    | DESCRIPTION         | MIN  | MAX | UNIT |
|---|---------------------|------|-----|------|
| Ts  | Storage temperature | -40  | 105 | °C   |
| VDD   | Supply voltage      | -0.3 | 3.6 | V    |
| Static electricity voltage<br>(human model)   | TAMB-25°C           | -    | 2   | KV   |
| Static electricity voltage<br>(machine model) | TAMB-25°C           | -    | 0.5 | KV   |

#### 3.2 Electrical Conditions

Table 3.2. Electrical Conditions

| PARAMETERS       | DESCRIPTION          | MIN      | TYPICAL | MAX      | UNIT |
|------------------|----------------------|----------|---------|----------|------|
| Ta               | Working temperature  | -20      | -       | 85       | °C   |
| VCC              | Working voltage      | 3        | -       | 3.6      | V    |
| VIL              | IO low level input   | -0.3     | -       | VCC*0.25 | V    |
| VIH              | IO high level input  | VCC*0.75 | -       | VCC      | V    |
| VOL              | IO low level output  | -        | -       | VCC*0.1  | V    |
| VoH              | IO high level output | VCC*0.8  | -       | VCC      | V    |
| I <sub>max</sub> | IO drive current     | -        | -       | 16       | mA   |
| C <sub>pad</sub> | Input capacitor      | -        | 2       | -        | pF   |

#### 3.3 Wi-Fi Transmitting Current Consumptions

Table 3.3. Wi-Fi TX current consumption

| PARAMETERS | MODE     | RATE  | Transmitting power | TYPICAL | UNIT |
|------------|----------|-------|--------------------|---------|------|
| IRF        | 11b      | 1Mbps | +20.11dBm          | 287     | mA   |
| IRF        | 11g      | 6Mbps | +20.81dBm          | 255     | mA   |
| IRF        | 11n HT20 | MCS0  | +20.29dBm          | 244     | mA   |
| IRF        | 11n HT40 | MCS0  | +19.09dBm          | 220     | mA   |

### 3.4 Wi-Fi Receiving Current Consumptions

Table 3.4. Wi-Fi RX current consumption

| PARAMETERS | MODE       | TYPICAL | UNIT |
|------------|------------|---------|------|
| IRF        | CPU sleep  | 90      | mA   |
| IRF        | CPU active | 120     | mA   |

### 3.5 Working Mode CurrentConsumptions

Table 3.5 The module working current consumption

| WORK MODE          | AT TA=25°C   | TYPICAL | MAX* | UNIT |
|--------------------|--|---------|------|------|
| EZ Mode            | WR2 is under EZ paring mode, Wi-Fi indicator light flashes quickly | 115     | 130  | mA   |
| Standby Mode       | WR2 is connected, Wi-Fi indicator light is on                      | 50      | 110  | mA   |
| Operation Mode     | WR2 is connected, Wi-Fi indicator light is on                      | 120     | 265  | mA   |
| Disconnection Mode | WR2 is disconnected, Wi-Fi indicator light is off                  | 35      | 90   | mA   |

Note: peak continuous time is about 5us.

The parameter shown above will vary depending on different firmware functions.

## 4. WLAN Radio Specification

### 4.1 Basic Radio Frequency Characteristics

Table 41. Basic Radio frequency characteristics

| PARAMETERS             | DESCRIPTION   |
|------------------------|---|
| Frequency band         | 2.412GHz to 2.462GHz  |
| Wi-Fi standard         | IEEE 802.11n20/g/b (Terminal 1-11),802.11n40( Terminal 1-7) |
| Data transmitting rate | 11b:1,2,5.5,11(Mbps)  |
|                        | 11g:6,9,12,18,24,36,48,54(Mbps)                             |
|                        | 11n:HT20,MCS0~7   |
|                        | 11n:HT40,MCS0~7   |
| Antenna type           | On-board PCB Antenna  |

### 4.2 Wi-Fi Receiving Sensitivity

Table 4.2. Wi-Fi Receiving sensitivity

| PARAMETERS  |      | MIN | TYPICAL | MAX | UNIT |
|---|------|-----|---------|-----|------|
| PER<8%, Receiving sensitivity, 802.11b CCK Mode   | 11M  | -   | -91     | -   | dBm  |
| PER<10%, Receiving sensitivity, 802.11g OFDM Mode | 54M  | -   | -75     | -   | dBm  |
| PER<10%, Receiving sensitivity, 802.11n OFDM Mode | MCS7 | -   | -72     | -   | dBm  |

## 5. Antenna Information

### 5.1 Antenna Type

Antenna can be connected using On-board PCB antenna by default.

### 5.2 Reduce Antenna Interference

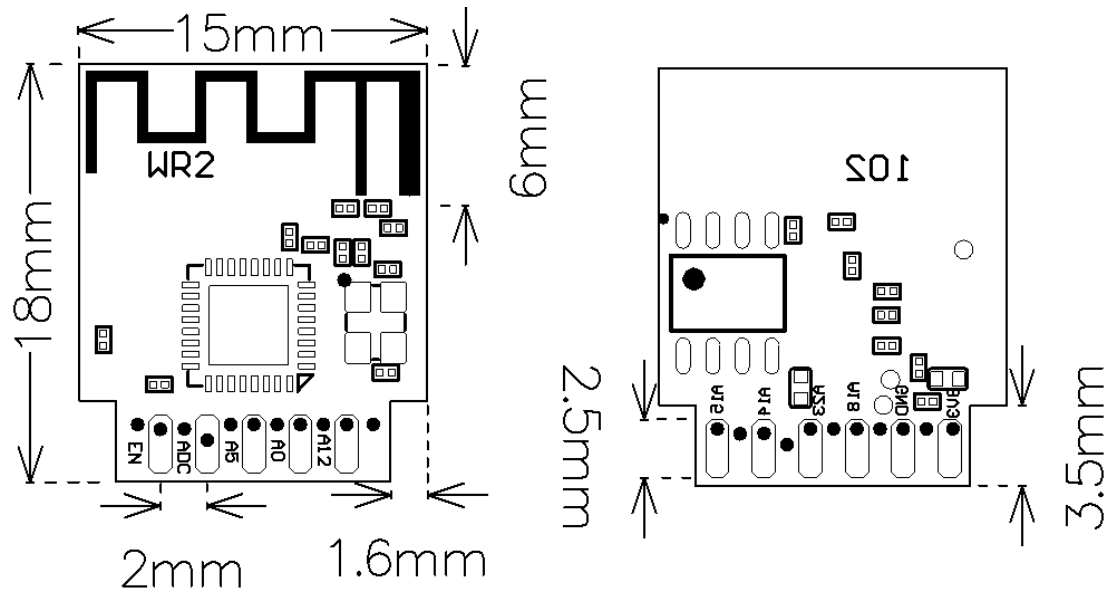
While using the On-board PCB antenna, in order to have the best Wi-Fi performance, it's recommended to keep a minimum 15mm distance between the antenna part and the other metal pieces.

User's own PCBA design is recommended NOT to pass any wire, NOT do copper pour under the region of the module's antenna, to avoid interferences.

## 6. Packaging Information And Production Guide

### 6.1 Mechanical Dimensions

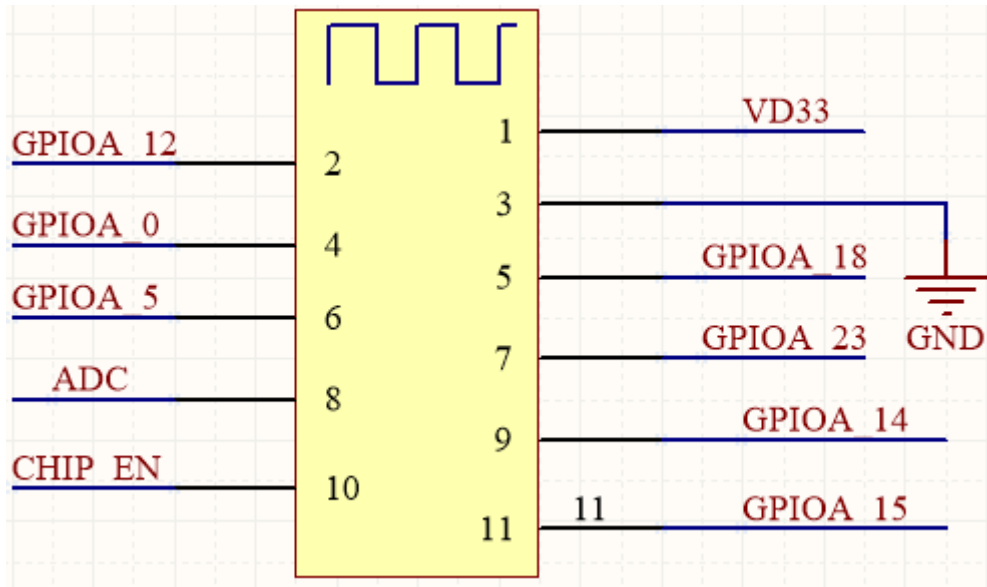
Figure 6.1 Top view of the module



### 6.2 PCB Recommended Package

Figure 6.2 PCB schematic Drawing





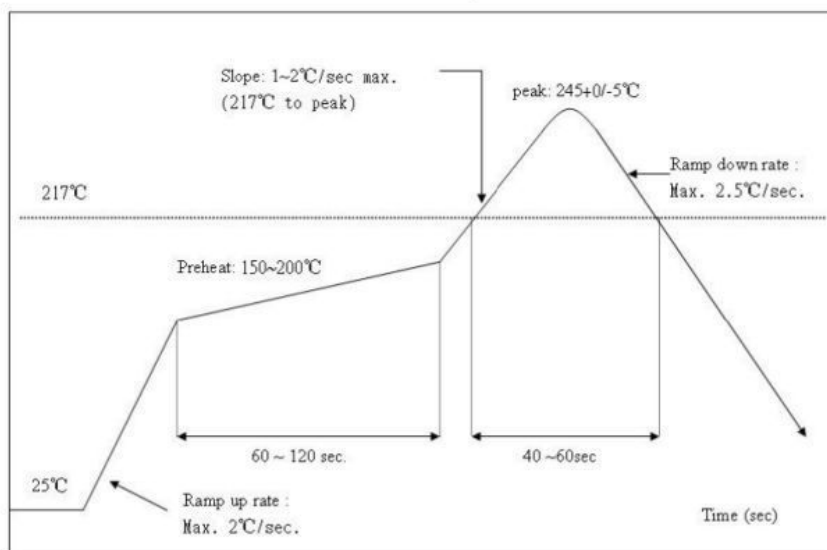
### 6.3 Production Guide

- ◇ The storage for the delivered module should meet the following condition:
  1. The anti-moisture bag should be kept in the environment with temperature <math>< 30^{\circ}\text{C}</math> and humidity <math>< 85\% \text{ RH}</math>.
  2. The expiration date is 6 months since the dry packaging products was sealed.
- ◇ Cautions:
  1. All the operators should wear electrostatic ring in the whole process of production.
  2. While operating, water and dirt should not have any contact with the modules.

### 6.4 Recommended furnace temperature curve

Figure 6.4. PCB Package Drawing Recommended furnace temperature curve

Refer to IPC/JEDEC standard ; Peak Temperature : <math>< 250^{\circ}\text{C}</math> ; Number of Times:  $\leq 2$  times ;



#### FCC Statement

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

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.

#### FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment .This equipment should be installed and operated with minimum distance 20cm between the radiator& your body.

#### FCC Label Instructions:

The outside of final products that contains this module device must display a label referring to the enclosed module. This exterior label can use wording such as: "Contains Transmitter Module FCC ID:2ANDL-WR2",or "Contains FCC ID:2ANDL-WR2", Any similar wording that expresses the same meaning may be used.

Hereby, Hangzhou Tuya Information Technology Co.,Ltd , declares that this Wi-Fi Module is In compliance with the essential requirements and other relevant provisions of Directive 2014/53/EU.

This equipment should be installed and operated with a minimum distance of 20cm between the radiator and your body.

#### Environment friendly disposal



You can help protect the environment!

Please remember to respect the local regulations: hand in the non-working electrical equipments to an appropriate waste disposal centre.

