Tuya Smart Wi-Fi Module

1. Product Overview

WR4 is a low power consumption module with built-in 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 programed with Wi-Fi network protocol and plenty of software examples.WR4 includea ARM CM4F,WLAN MAC,1T1R WLAN,maximum frequency reaches 125MHz,256K SRAM,2M byte flash and various peripheral resources.

WR4 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 : 3.3V
- ✧ Peripherals: 7 GPIO channels, 2 UART, 1 ADC
- ✧ Wi-Fi connectivity:
  - ● 802.11 B/G/N20/N40
  - ● Channel 1 to 11 @ 2.4GHz
  - ● Support WPA/WPA2
  - ● +24.5 dBm output power
  - ● Support SmartConfig function for both Android and IOS devices

- External IPEX connecter antenna
- Operating temperature range: -20℃ to 85℃

1.2 Main ApplicationFields

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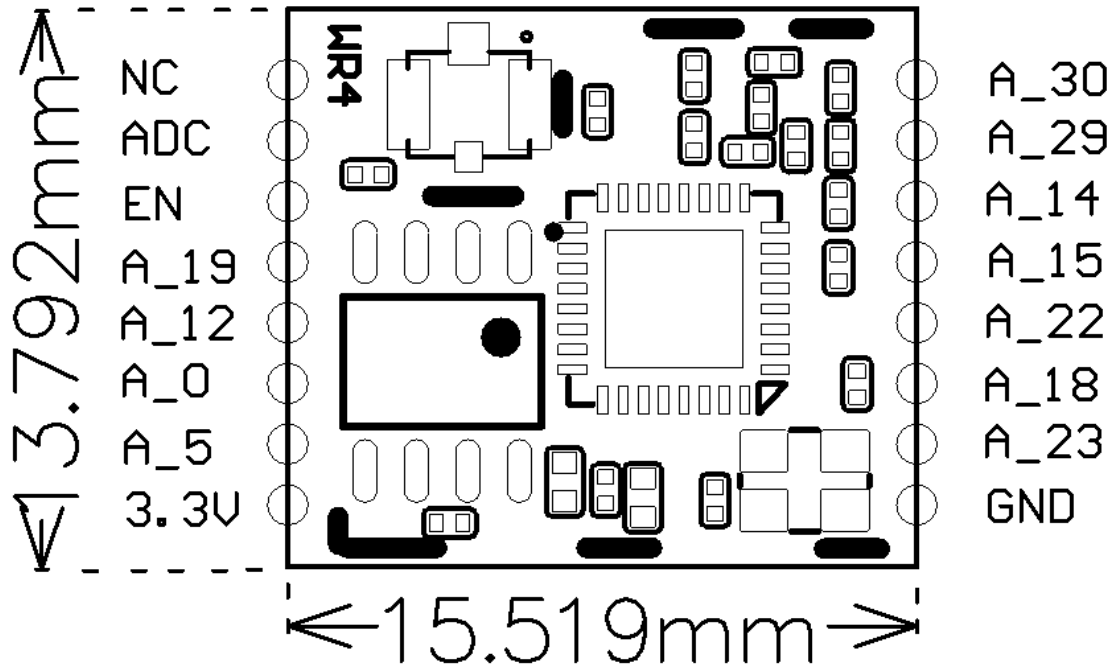✧ Webcam
✧ Intelligent bus

2. Dimensions and Footprint

2.1Dimensions

WR4 has 2 columns of Pins (2*8).The distance between each Pin is 1.5 mm.

Size of WR4: 13.8mm(W)*15.5mm(L)*3.3mm(H)

Figure 2 shows the dimensions of WR4.

Figure 2. The dimensions of WR4

2.2 Pin Definition

Table 1 shows the generalpin attributes of WR4

Table 1. The typical pin definitionof WR4

PIN NO.	NAME	TYPE	DISCREPTION
1	NC	/	NC，No Connect
2	ADC	AI	ADC terminal(input 5V maximally)
3	EN	I/O	External reset singal(low level effects)
4	A_19	I/O	GPIOA_19
5	A_12	I/O	GPIOA_12
6	A_0	I/O	GPIOA_0, can not be pull-up while booting, can be used as GPIO while in normal working mode
7	A_5	I/O	GPIOA_15
8	3.3V	I/O	Supply voltage (3.3V)
9	GND	I/O	Ground
10	A_23	I/O	UART0_TXD

11	A_18	I/O	UART0_RXD
12	A_22	I/O	GPIOA_22
13	A_15	I/O	GPIOA_15
14	A_14	I/O	GPIOA_14
15	A_29	I/O	UART_Log_RXD (used to print module's internal information)
16	A_30	I/O	UART_Log_TXD(used to print module's internal information)

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	℃
VCC	Supply voltage	-0.3	3.6	V
Static electricity voltage (human model)	TAMB-25℃	-	2	KV
Static electricity voltage (machine model)	TAMB-25℃	-	0.5	KV

3.2 Electrical Conditions

Table 3.2. Electrical Conditions

PARAMETERS	DESCRIPTION	MIN	TYPICAL	MAX	UNIT
Ta	Working temperature	-20	-	85	℃
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
Imax	IO drive current	-	-	16	mA
Cpad	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	+20.18dBm	287	mA
IRF	11g	6Mbps	+24.17dBm	255	mA
IRF	11n-HT20	MCS0	+23.30dBm	244	mA
IRF	11n-HT40	MCS0	+22.97dBm	220	mA

3.4 Wi-Fi Receiving CurrentConsumptions

Table 3.4. Wi-Fi RX currentconsumption

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 currentconsumption

WORK MODE	AT TA=25℃	TYPICAL	MAX*	UNIT
EZ Mode	WR4 is under EZ paring mode, Wi-Fi indicator light flashes quickly	115	130	mA
Standby Mode	WR4 is connected, Wi-Fi indicator light is on	50	110	mA
Operation Mode	WR4 is connected, Wi-Fi indicator light is on	120	265	mA
Disconnection Mode	WR4 is disconnected, Wi-Fi indicator light is off	35	90	mA

Note: peak continuous time is about 5us.

The parameter shown above will vary dependingon 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/n40/g/b (Terminal 1-11)
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	U.FL RF external connector

4.2 Wi-Fi TransmittingPower

Table 4.2. Wi-Fi transmitting power

PARAMETERS		MIN	TYPICAL	MAX	UNIT
RF peak output power, 802.11b CCK Mode	1M	-	20.18	-	dBm
RF peak output power, 802.11g OFDM Mode	6M	-	21.41	-	dBm
RF peak output power, 802.11n20 OFDM Mode	MCS0	-	22.30	-	dBm
RF peak output power, 802.11n40 OFDM Mode	MCS0	-	21.45	-	dBm
The Frequency error		-10	-	10	ppm

Table 4.3. Wi-Fi Receiving sensitivity

4.3 Wi-Fi Receiving Sensitivity

| The Frequency error		-10	-	10	ppm
RF peak output power, 802.11n OFDM Mode	MCS7	-	13.5	-	dBm
RF peak output power, 802.11g OFDM Mode	54M	-	14.5	-	dBm
RF peak output power, 802.11b CCK Mode	11M	-	17.5	-	dBm
PARAMETERS		MIN	TYPICAL	MAX	UNIT

5. Antenna Information

5.1 Antenna Type

External antenna and the FPC antenna is recommended.

Figure 5.1. recommended antenna size
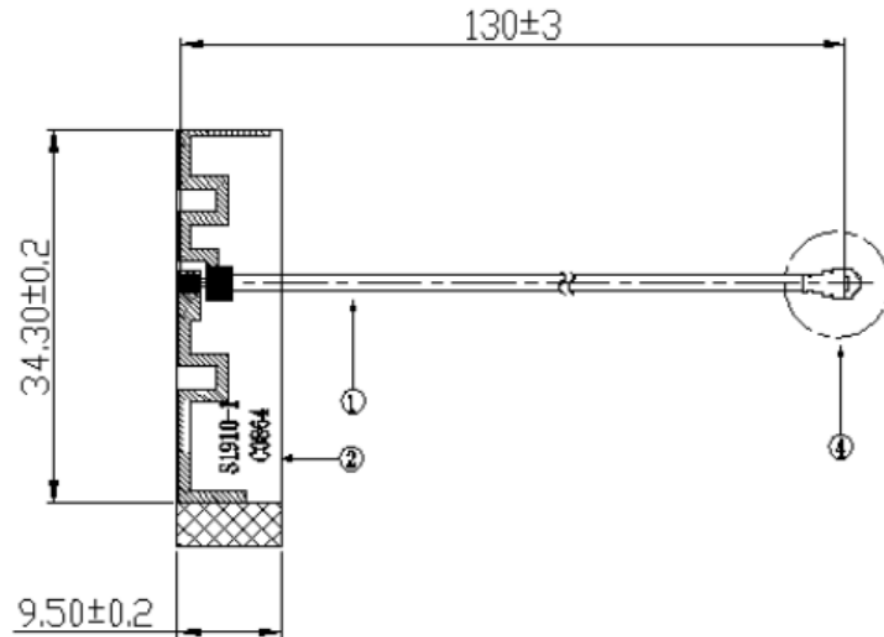
5.2 U.FL RF connector
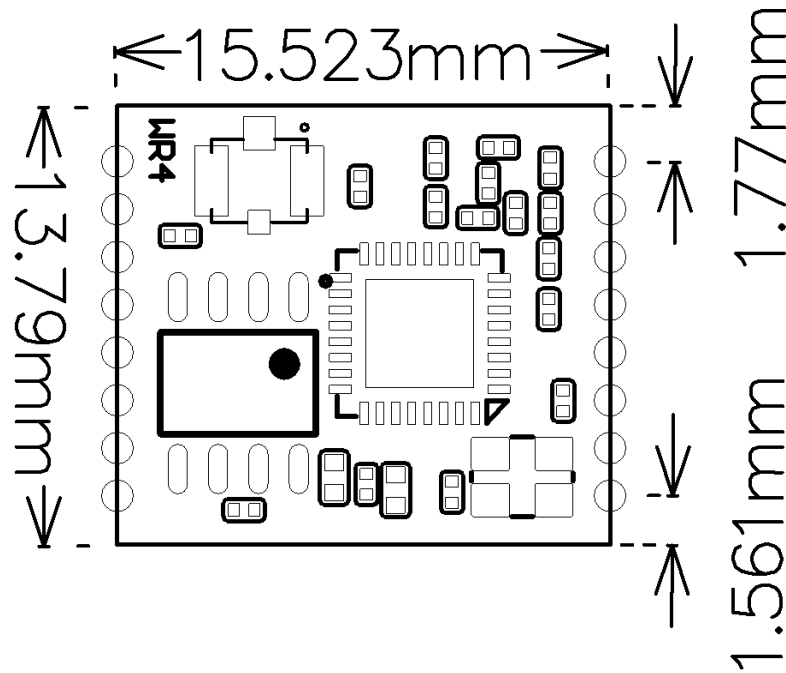
The parameter for U.FL RF connector is shown below:
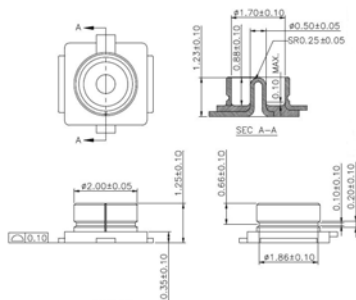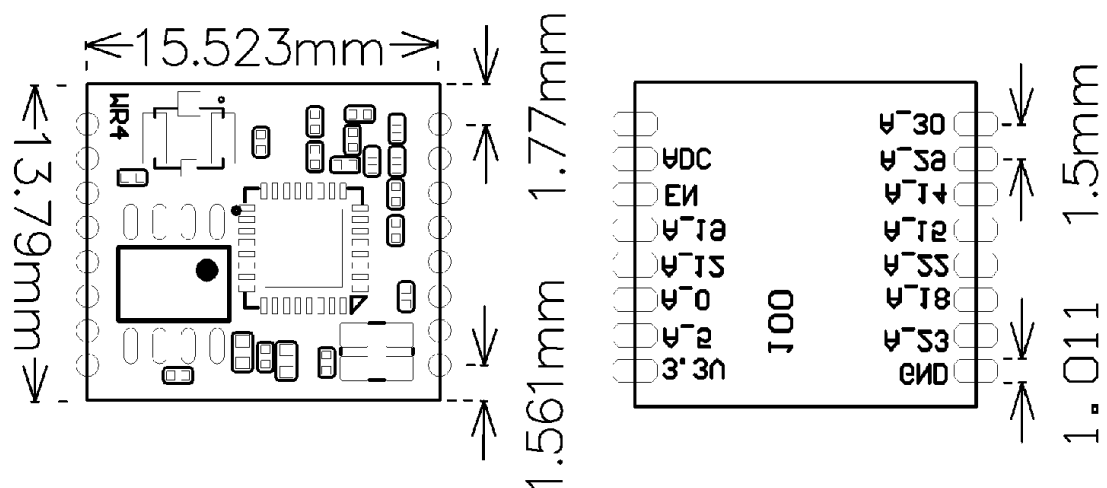
6. Packaging Information And Production Guide

6.1 Mechanical Dimensions

Figure 6.1. Top view of the module

6.2PCBRecommended 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 withtemperature< 30℃ and

humidity< 85% RH.

   2. The expiration date is 6 months since the dry packaging products was sealed.

✧ Cautions:

    1. All the operators should wear electrostatic ringin 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 6.3. PCB Package DrawingRecommended furnace temperature curve

Refer to IPC/JEDEC standard ; Peak Temperature : <250°C ; Number of Times: ≤2 times ;
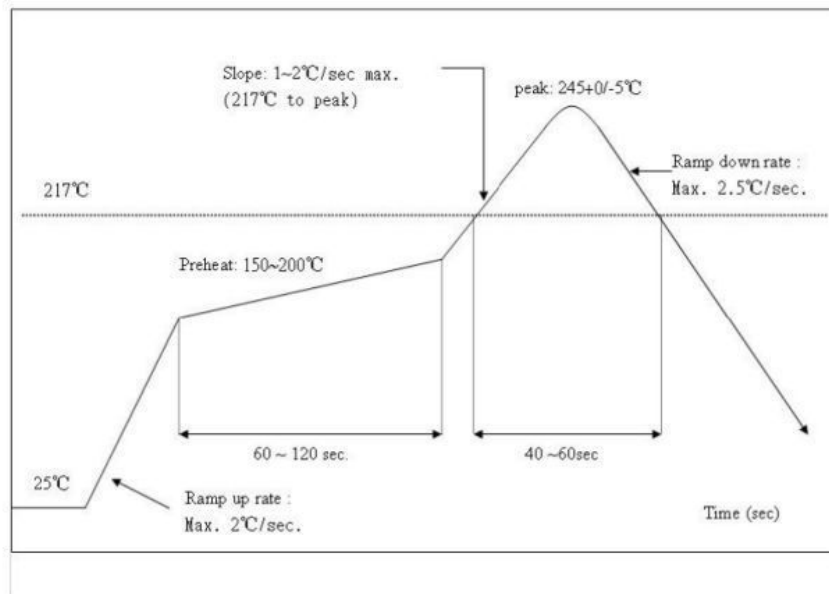
FCC Statement

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-WR4",or "Contains FCC ID: 2ANDL-WR4", Any similar wording that expresses the same meaning may be used.