Tuya Smart Wi-Fi Module

1. Product Overview

WR3E 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 W302HBI40PI and some extra flashthathas been programed with Wi-Fi network protocol and plenty of software examples.WR3E include a ARM CM4F, WLAN MAC, 1T1R WLAN, maximum frequency reaches 125MHz, 256K SRAM, 1M byte flash and various peripheral resources.

WR3E 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: 3V to 3.6V
✧ 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
  ● +23.31dBm output power in 802.11g Mode
  ● Support SmartConfig function for both Android and IOS devices
  ● On-board PCB antenna
  ● Pass CE, FCC, SRRC certifications
  ● Operating temperature range: -20℃ to 85℃

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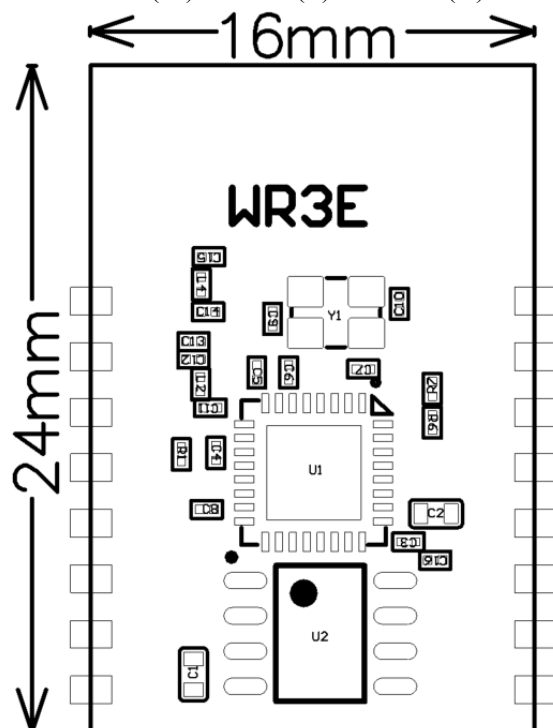
✧ Intelligent Building
✧ Intelligent home, Intelligent household applications
✧ Healthy devices
✧ Industrial wireless control
✧ Baby monitor
✧ Webcam
✧ Intelligent bus

2. Dimensions and Footprint

2.1 Dimensions

WR3E has 2 columns of Pins (2*8).The distance between each Pin is2 mm.

Size of WR3E: 16 mm (W)×24 mm (L) ×3.3 mm (H)

2.2 Pin Definition

Table 1 shows the generalpin attributes of WR3E

Table 1. The typical pin definitionof WR3E

PIN NO.	NAME	TYPE	DISCREPTION
1	NC	/	Dangling don't pick up, in order to compatible with other modules
2	ADC	AI	ADC，Max5V
3	CHIP_EN	I/O	
4	GPIOA_29	I/O	UART_Log_RXD GPIO
5	GPIOA_14	I/O	GPIOA_14，hardware PWM
6	GPIOA_15	I/O	GPIOA_15，hardware PWM
7	GPIOA_22	I/O	GPIOA_22
8	VCC	P	（3.3V）
9	GND	P	
10	GPIOA_0	I/O	GPIOA_0，HardwarePWM
11	GPIOA_30	I/O	UART_Log_TXD GPIO
12	GPIOA_19	I/O	GPIOA_19
13	GPIOA_5	I/O	GPIOA_5，hardware PWM
14	GPIOA_12	I/O	GPIOA_12，hardware PWM
15	RXD	I/O	UART0_RXD
16	TXD	I/O	UART0_TXD

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	3.3	3.6	V
VIL	IO low level input	-0.3	-	VDD*0.25	V
VIH	IO high level input	VDD*0.75	-	VDD	V
VOL	IO low level output	-	-	VDD*0.1	V
VoH	IO high level output	VDD*0.8	-	V	V
Imax	IO drive current	-	-	16	mA
Cpad	Input capacitor	-	2	-	pF

3.3 Wi-Fi Receiving CurrentConsumptions

Table 3.3. Wi-Fi RX currentconsumption

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

3.4 Working Mode CurrentConsumptions

Table 3.4. The module working currentconsumption

WORK MODE	AT TA=25℃	TYPICAL	MAX*	UNIT
EZ Mode	WR3E is under EZ paring mode, Wi-Fi indicator light flashes quickly	115	125	mA
Standby Mode	WR3E is connected, Wi-Fi indicator light is on	60	209	mA
Operation Mode	WR3E is connected, Wi-Fi indicator light is on	118	198	mA
Disconnection Mode	WR3E is disconnected, Wi-Fi indicator light is off	34	192	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	2412-2462MHz(802.11b/g/n20);2422-2452MHz(802.11n40)
Wi-Fi standard	IEEE 802.11n/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	On-board PCB Antenna

4.2.Wi-Fi TransmittingPower

Table 4.2. Wi-Fi transmitting power

RF output power
802.11b:21.43dBm 802.11g:23.31dBm 802.11n20:22.56dBm 802.11n40:21.55dBm

4.3Wi-Fi Receiving Sensitivity

Table 4.3. 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 connectedusing On-board PCB antenna.

5.2 Reduce Antenna Interference

While using the On-board PCBantenna, 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.

6. Packaging Information And Production Guide

6.1 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.
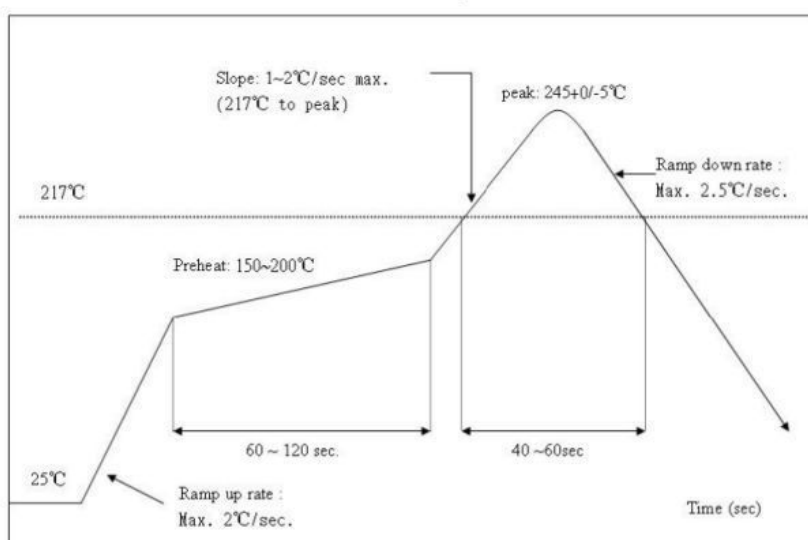✧ Cautions:
    1. All the operators should wear electrostatic ringin the whole process of production.
    2. While operating, water and dirt should not have any contact with the modules.

6.2 Recommended furnace temperature curve

Figure 6.2. PCB Package DrawingRecommended furnace temperature curve

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-WR3E",or "Contains FCC ID: 2ANDL-WR3E",
Any similar wording that expresses the same meaning may be used.

Regulatory Module Integration Instructions
This device complies with part 15.247 of the FCC Rules.
The OEM integrator has to be aware not to provide information to the end user regarding how to install or
remove this RF module in the user's manual of the end product which integrates this module.
The antenna is integral PCB Antenna and maximum gain is 2.5dBi .
This Wi-Fi module has been granted modular approval for mobile applications. OEM integrators
for host products may use the module in their final products without additional FCC certification if they
meet the following conditions. Otherwise, additional FCC approvals must be obtained.

    The host product with the module installed must be evaluated for simultaneous
transmission requirements.
    The user's manual for the host product must clearly indicate the operating requirements
and conditions that must be observed to ensure compliance with current FCC RF exposure guidelines.

    To comply with FCC regulations limiting both maximum RF output power and human
exposure to RF radiation, use this module only with the included onboard antenna.

    The final host / module combination may also need to be evaluated against the FCC Part 15B
criteria for unintentional radiators in order to be properly authorized for operation as a Part 15
digital device.