涂鸦智能
Tuya Smart

Tuya Smart Wi-Fi Module

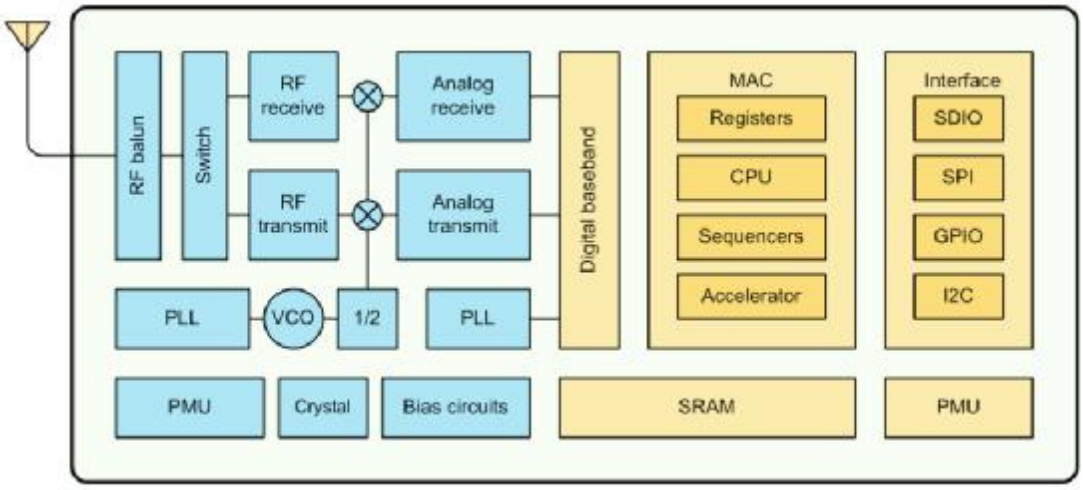
1. Product Overview

TYWE1S is a low power consumption module with built-in Wi-Fi connectivity solution designed by HangZhou Tuya Technology Corporation. The Wi-Fi Module consist a highly integrated wireless radio chip ESP8266EX and extra flash which has been programed with Wi-Fi network protocol and plenty of software examples.TYWE1S also has an 32-bit CPU, 1M byte flash, 36k SRAM and various peripheral resources.

TYWE1S 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.

Figure 1 shows the block diagram of the TYWE1S.

Figure 1. The block diagram of the TYWE1S



1.1 Features

- Integrated low power consumption 32-bit CPU, also known as application processor
- Basic frequency can support both 80MHz and 160MHz
- Supply voltage range: 3V to 3.6V
- Peripherals: 6×GPIOs, 1×UART , 1×ADC
- Wi-Fi connectivity:
- 802.11 b/g/n
- Channel 1 to 11 @ 2.4GHz
- Support WPA/WPA2
- 19dBm output power in 802.11b mode
- Support STA/AP/STA+AP operation mode
- Support Smart Link function for both Android and iOS devices
- Standby power consumption is less than 0.1 mW (DTIM3)
- On-board PCB antenna, or IPEX connector for external antenna

- CE, FCC certified
- Operating temperature range: 0℃ to 70℃ (Commercial grade), -40℃ to 85℃ (Industrial grade)

1.2 Main Application Fields

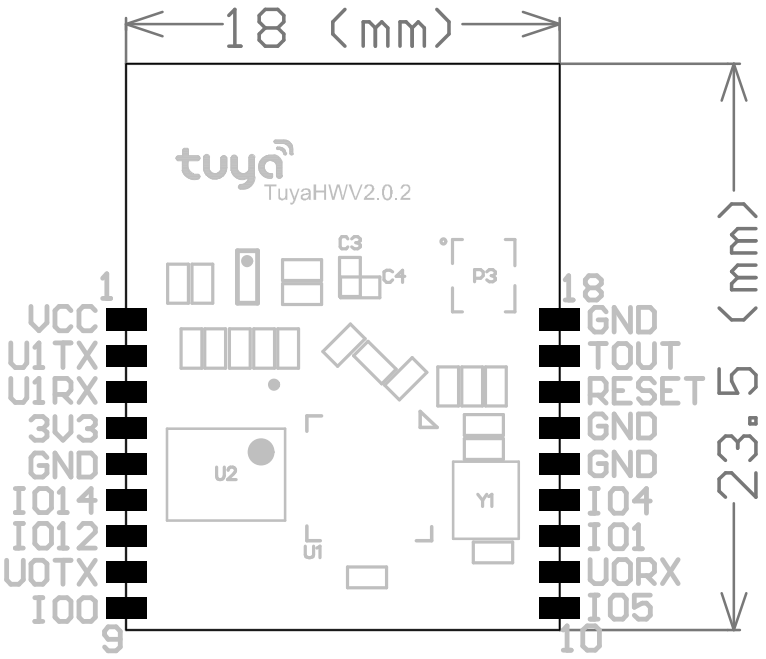
- Intelligent Building
- Intelligent home, Intelligent household applications
- Health care
- Industrial wireless control
- Baby monitor
- Webcam
- Intelligent bus

2. Dimensions and Footprint

2.1 Dimensions

TYWE1S has 2 columns of Pins (2*9). The distance between each Pin is 1.5mm.
Size of TYWE1S: 18mm(W)*23.5mm(L)*4.1mm(H)
Figure 2 shows the dimensions of TYWE1S.

Figure 2. The dimensions of TYWE1S



2.2 Pin Definition

Table 1 shows the general pin attributes of TYWE1S

Table 1. The typical pin definition of TYWE1S

PIN NO.	NAME	TYPE	DESCRIPTION
1	VCC	S	UART1 power (3.3V)
2	U1TX	I/O	UART1_TXD
3	U1RX	I/O	UART1_RXD
4	3V3	S	Supply voltage (3.3V)
5	GND	S	Ground
6	IO14	I/O	GPIO_14
7	IO12	I/O	GPIO_12
8	U0TX	I/O	UART0_TXD(used to print module's internal information)
9	IO0	I/O	GPIO_0(processing during initials, caution when used)
10	IO5	I/O	GPIO_5

11	U0RX	I/O	UART0_RXD(used to print module's internal information)
12	IO1	I/O	GPIO_1(status is uncertain during initials)
13	IO4	I/O	GPIO_4
14	GND	S	Ground
15	GND	S	Ground
16	RESET	I/O	External reset singal(negative level effects)
17	TOUT	AI	ADC terminal
18	GND	S	Ground

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

3. Electrical Characteristics

3.1 Absolute Maximum Ratings

Table 2. Absolute Maximum Ratings

PARAMETERS	DESCRIPTION	MIN	MAX	UNIT
Ts	Storage temperature	-40	125	℃
VDD	Supply voltage	-	3.6	V
Electrostatic release quantity (Human body model)	TAMB-25℃	-	2	KV
Electrostatic release quantity (Machine model)	TAMB-25℃	-	0.5	KV

3.2 Electrical Conditions

Table 3. Electrical Conditions

PARAMETERS	DESCRIPTION	MIN	TYPICAL	MAX	UNIT
Ta	Temperature for Commercial grade	-30	-	70	℃
	Temperature for Industrial grade	-40	-	85	℃
VDD	Supply voltage	3.0	-	3.6	V
V_{IL}	IO negative level input	-0.3	-	3V3*0.25	V
V_{IH}	IO positive level input	3V3*0.75	-	3.6	V
V_{OL}	IO negative level output	-	-	3V3*0.1	V
V_{IH}	IO positive level output	3V3*0.8	-	-	V
I_{max}	IO drive current	-	-	12	mA
C_{pad}	Capacitance of the input pin	-	2	-	pF

3.3 Wi-Fi Transmitting Current Consumption

Table 4. Wi-Fi TX current consumption

PARAMETERS	MODE	RATE	TYPICAL	UNIT
IRF	11b	11Mbps	170	mA
IRF	11g	54Mbps	140	mA
IRF	11n	MCS7	140	mA

3.4 Wi-Fi Receiving Current Consumption

Table 5. Wi-Fi RX current consumption

PARAMETERS	MODE	RATE	TYPICAL	UNIT
I_{RF}	11b	11Mbps	50	mA
I_{RF}	11g	54Mbps	56	mA
I_{RF}	11n	MCS7	56	mA

3.5 Working Mode Current Consumption

Table 6. MCU working current consumption

WORK MODE	CONDITION	TYPICAL	UNIT
Modem-Sleep	CPU is processing, Wi-Fi modem turns off	15	mA
Light-Sleep	CPU stops processing, Wi-Fi modem turns off	0.9	mA
Deep-Sleep	CPU stops processing, Wi-Fi modem turns off, Wi-Fi disconnects	10	μA
Power Off	Power off	0.5	μA

4. WLAN Radio Specification

4.1 Basic Radio Frequency Characteristics

Table 7. Basic Radio frequency characteristics

PARAMETERS	DESCRIPTION
Frequency band	2412MHz - 2462MHz
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
Antenna type	On-board PCB Antenna (Default)
	U.FL RF external antenna (optinal)

4.2 Wi-Fi Transmitting Power

Table 8. Wi-Fi transmitting power

PARAMETERS		MIN	TYPICAL	MAX	UNIT
RF average output power, 802.11b CCK Mode	11M	-	17	-	dBm
RF average output power, 802.11g OFDM Mode	54M	-	15	-	dBm
RF average output power, 802.11n OFDM Mode	MCS7	-	13	-	dBm
The Frequency error		-10	-	10	ppm

4.3 Wi-Fi Receiving Sensitivity

Table 9. 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

Regulatory information for the OEMs and Integrators

The guidelines described within this document are provided to OEM integrators installing Tuya Smart Wi-Fi Module in notebook and tablet PC host platforms. Adherence to these requirements is necessary to meet the conditions of compliance with FCC rules, including RF exposure. When all antenna type and placement guidelines described herein are fulfilled the Tuya Smart Wi-Fi Module may be incorporated into notebook and tablet PC host platforms with no further restrictions. If any of the guidelines described herein are not satisfied it may be necessary for the OEM or integrator to perform additional testing and/or obtain additional approval. The OEM or integrator is responsible to determine the required host regulatory testing and/or obtaining the required host approvals for compliance

. Tuya Smart Wi-Fi Module are intended for OEMs and host integrators only.

. The Tuya Smart Wi-Fi Module must be operated with an access point that has been approved for the country of operation.

. Changes or modification to Tuya Smart Wi-Fi Module by OEMs, integrators or other third parties is not permitted. Any changes or modification to Tuya Smart Wi-Fi Module by OEMs, integrators or other third parties will void authorization to operate

Information to Be Supplied to the End User by the OEM or Integrator

The following regulatory and safety notices must be published in documentation supplied to the end user of the product or system incorporating the Tuya Smart Wi-Fi Module, in compliance with local regulations. Host system must be labeled with "Contains FCC ID: 2AFNLTYWE1S ", FCC ID displayed on label.

The Tuya Smart Wi-Fi Module must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the product. Intel Corporation is not responsible for any radio or television interference caused by unauthorized modification of the devices included with the wireless adapter kit or the substitution or attachment of connecting cables and equipment other than that specified by Intel Corporation. The correction of interference caused by such unauthorized modification, substitution or attachment is the responsibility of the user. Intel Corporation and authorized resellers or distributors are not liable for any damage or violation of government regulations that may arise from the user failing to comply with these guidelines.

This device has been evaluated and shown compliant with the FCC RF Exposure limits under fixed exposure conditions (antennas are greater than 20cm from a person's body)when installed in certain specific configurations.

The host system shall have a label showing: Contains FCC ID: 2AFNLTYWE1S

This product adopts the PCB antenna, the antenna gain is 1dBi

When the user selects U.FL RF connector antenna, it requires the a complete the antenna. the kind of antenna that users can be use: 2.4 G RF antenna U.FL. RF connector(antenna type: FPC antenna, Integral antenna）

(The gain of antenna : 1dBi)

5. Antenna Information

5.1 Antenna Type

Antenna can be connected using On-board PCB antenna or an external antenna, the default way is using the On-board PCB antenna.

User can modify the connection mode shown below: (TYWE1S has a resistance--0omh/0402 marked as red)

Figure 3. On-board PCB Antenna configuration

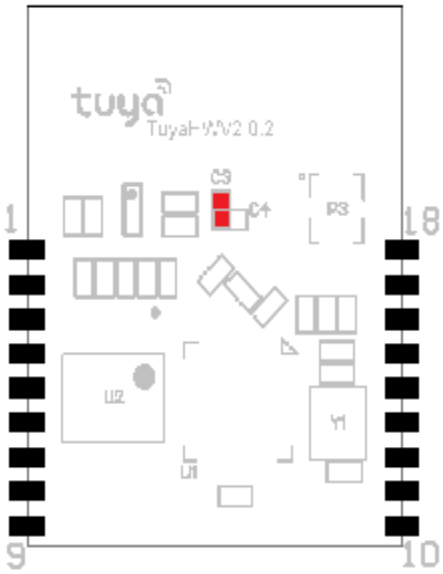
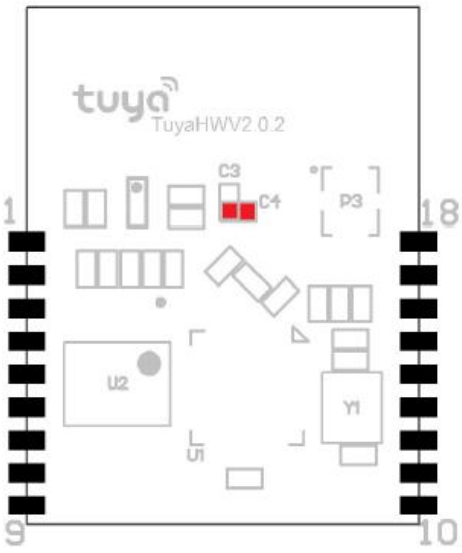


Figure 4. External Antenna configuration



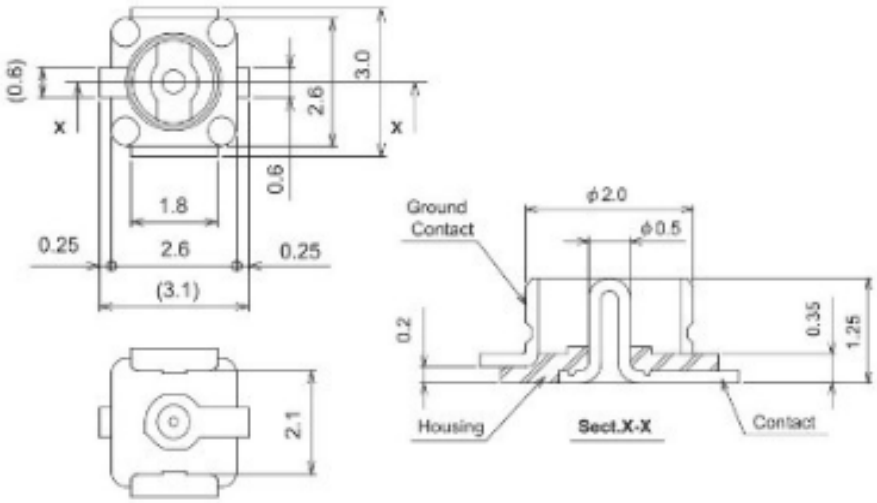
5.2 Reduce Antenna Interference

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.

5.3 U.FL RF Connector

Figure 5 shows the physical parameter of the U.FL RF connector.

Figure 5. The physical parameter of the U.FL RF connector



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The host system shall have a label showing: Contains FCC ID: 2AFNLTYWE1S

This product adopts the PCB antenna, the antenna gain is 1dBi, more details is in chapter 4.

When the user selects U.FL RF connector antenna, it requires the a complete the antenna. the kind of antenna that users can be use: 2.4 G RF antenna U.FL. RF connector(antenna type: FPC antenna, Integral antenna）

(The gain of antenna : 1dBi)

6. Packaging Information And Production Guide

6.1 Mechanical Dimensions

Figure 6. Top view of the module

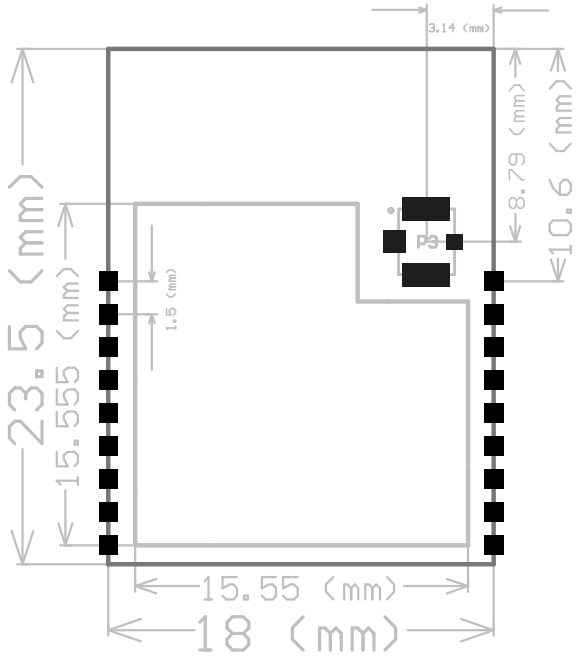
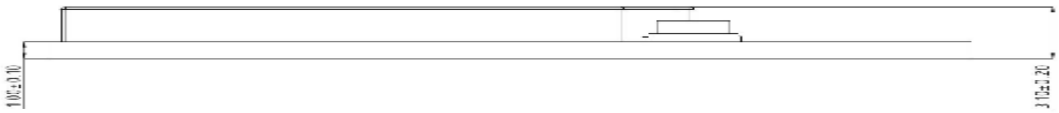
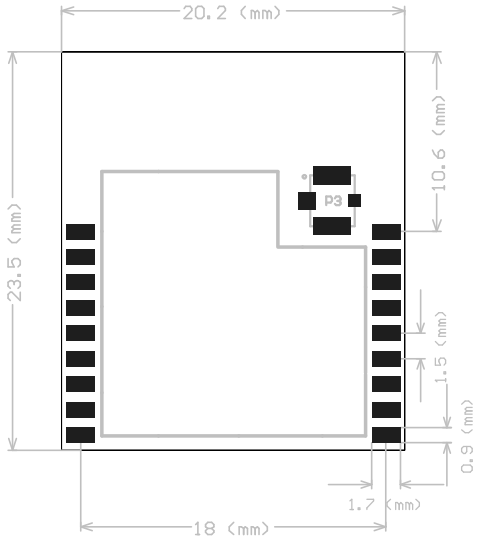


Figure 7. Side view of the module



6.2 PCB Recommended Package

Figure 8. PCB Package 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 < 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 ring in the whole process of production.

2. While operating, water and dirt should not have any contact with the modules.

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 and your body.

Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.
This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
The availability of some specific channels and/or operational frequency bands are country dependent and are firmware programmed at the factory to match the intended destination.
The firmware setting is not accessible by the end user.
The final end product must be labelled in a visible area with the following:
“Contains Transmitter Module 2AFNLTYWE1S”