

TuYa Smart Wi-Fi Module-TYWE2L

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1. Product Overview

TYWE2L is a low power-consuming built-in Wi-Fi module developed by Hangzhou Tuya Information Technology Co., Ltd. It consists of a highly integrated wireless radio chip (ESP8285) and several peripherals, with a built-in Wi-Fi network protocol stack and robust library functions. TYWE2L also provides a low power-consuming 32-bit CPU, 1 MB flash, 50 KB SRAM, and various peripheral resources. TYWE2L is an RTOS platform that integrates all the function libraries of the Wi-Fi MAC and TCP/IP protocols. Users can develop embedded Wi-Fi products as required based on the function libraries.

Figure 1 shows the schematic diagram of TYWE2L.

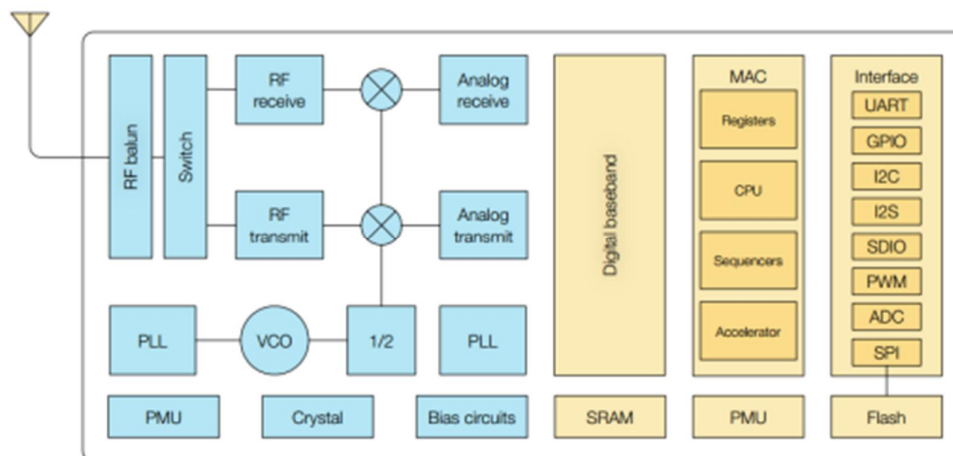


Figure 1 TYWE2L schematic diagram

1.1 Features

Built-in low power-consuming 32-bit CPU, which can also be used as an application processor

- Basic frequency: 80 MHz and 160 MHz supported

≈ Working voltage: 3.0 V to 3.6 V

- ² Peripherals: five GPIOs
- ² Wi-Fi connectivity
 - | 802.11 b/g/n
 - | Channels [1-11@2.4GHz](#)
 - | WPA/WPA2 security mode supported
 - | Up to +20 dBm output power in 802.11b mode
 - | STA/AP/STA+AP working mode supported
 - | SmartConfig and AP network configuration modes supported (for Android and iOS devices)
 - | Onboard PCB antenna
 - | Working temperature: -20°C to +105°C

1.2 Major Application Fields

- ² Intelligent building
- ² Intelligent home and household applications
- ² Intelligent socket and light
- ² Industrial wireless control
- ² Baby monitor
- ² Network camera
- ² Intelligent bus

2. Module Interfaces

2.1 Dimensions and Footprint

TYWE2L provides two rows of pins with the distance of 2.0 mm between every two pins.

TYWE2L dimensions: 3 mm (W) x 15 mm (L) x 17.3 mm (H) (see figure 2)

Figure2 TYLC2 Dimensional

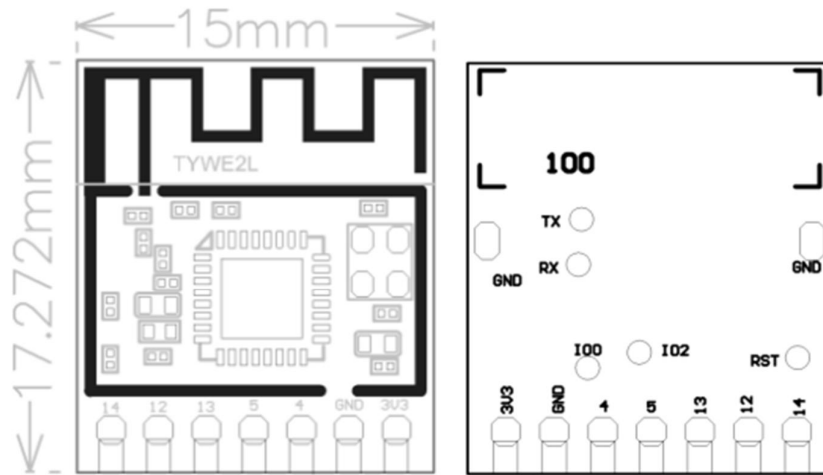


Figure 2 TYWE2L dimensions

2.2 Pin definition

Table 1 describes the interface pins.

Table 1 TYWE2L interface pins

No.	Symbol	I/O Type	Function
1	14	I/O	GPIO_14
2	12	I/O	GPIO_12
3	13	I/O	GPIO_13
4	5	I/O	GPIO_05
5	4	I/O	GPIO_04
6	GND	P	Power supply reference ground pin
7	3V3	P	Module power supply pin (3.3 V)

Notes: P indicates the power pin; I/O indicates the input/output pin

2.3 Test Pin Definition

Table 2 describes the test pins.

Table 2 TYWE2L test pins

No.	Symbol	I/O Type	Function
-	IO2	I/O	UART1_TXD (module information recording pin)
-	RST	I/O	Reset pin
-	IO0	I/O	IO0 is involved in module startup. If IO0 is disconnected, the module enters the normal running state.

Note: I/O indicates input/output pins.

If IO0 is disconnected, the module enters the normal running state. If IO0 is in low level, the module enters the firmware programming state.

Test pins are not recommended.

3. Electrical Characteristics

3.1 Absolute electrical parameters

Table 3, Absolute electrical characteristics

Parameters	Description	Minimum value	Maximum value	Unit
Ts	Storage temperature	-20	85	°C
VCC	Power supply voltage	-0.3	3.6	V
Static electricity voltage (human model)	TAMB-25°C	-	2	KV

Static electricity voltage (machine model)	TAMB-25°C	-	0.5	KV
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3.2 Electrical conditions

Table 4, Normal electrical conditions

Parameters	Description	Min	Typ	Max	Unit
Ta	Working temperature	-20	-	85	°C
VCC	Working voltage	3.0	3.3	3.6	V
VIL	I/O low-level input	-0.3	-	VCC*0.25	V
VIH	I/O high-level input	VCC*0.75	-	VCC	V
VOL	I/O low-level output	-	-	VCC*0.1	V
VOH	I/O high-level output	VCC*0.8	-	VCC	V
I _{max}	I/O drive current	-	-	12	mA

3.3 Wi-Fi TX power consumption

Table 5 TX power consumption during constant emission

Symbol	Mode	Power	Typ	Unit
IRF	11b	11 Mbit/s	+17 dBm	220
IRF	11g	54 Mbit/s	+15 dBm	110
IRF	11n	MCS7	+13 dBm	100

3.4 Wi-Fi RX power consumption

Table 6 RX power consumption during constant emission

Symbol	Mode	Rate	Typ	Unit
IRF	11b	11 Mbit/s	76	mA
IRF	11g	54 Mbit/s	76	mA
IRF	11n	MCS7	76	mA

3.5 Power consumption in operating mode

Table 7 TYWE2L working current

Working Mode	Working Status(Ta=25°C)	Value	Max	Unit
EZ mode	The module is in EZ status and the Wi-Fi indicator quickly flashes.	80	151	mA
AP mode	The module is in AP status and the Wi-Fi indicator slowly flashes.	90	451	mA
Operation mode	The module is in connected status and the Wi-Fi indicator is steady on.	58.5	411	mA
Disconnection mode	The module is in disconnected status and the Wi-Fi indicator is steady off.	80	430	mA
EZ mode	The module is in EZ status and the Wi-Fi indicator quickly flashes.	80	151	mA

4. RF Features

4.1 Basic RF Features

Table 8, Basic RF features

Parameter	Description
Frequency band	2.412–2.462 GHz
Wi-Fi standard	IEEE 802.11b/g/n (channel 1–11)
Data transmitting rate	11b: 1, 2, 5.5, 11 (Mbit/s) 11g: 6, 9, 12, 18, 24, 36, 48, 54 (Mbit/s) 11n: HT20 MCS0–MCS7
Antenna type	PCB antenna (default)

4.2 Wi-Fi output power

Table 9 TX power during constant emission

Parameter		Min	Typ	Max	Unit
RF average output power, 802.11b CCK mode	1 M	-	20	-	dBm
RF average output power, 802.11g OFDM mode	54 M	-	17	-	dBm
RF average output power, 802.11n OFDM mode	MCS7	-	14	-	dBm
Frequency error		-10	-	10	ppm

4.3 RF RX sensitivity

Table 10 RX Sensitivity

Parameter		Min	Typ	Max	Unit
PER < 8%, RX sensitivity, 802.11b CCK mode	1 M	-	-91	-	dBm
PER < 10%, RX sensitivity, 802.11g OFDM mode	54 M	-	-75	-	dBm
PER < 10%, RX sensitivity, 802.11n OFDM mode	MCS7	-	-72	-	dBm

5. Antenna Information

5.1 Antenna type

TYWE2L uses the onboard PCB antenna.

5.2 Antenna Interference Reduction

To ensure optimal Wi-Fi performance when the Wi-Fi module uses the onboard PCB antenna, it is recommended that there be a space of at least 15 mm between the module antenna and other metal parts.

6. Packaging Information and Production Instructions

6.1 Mechanical Dimensions

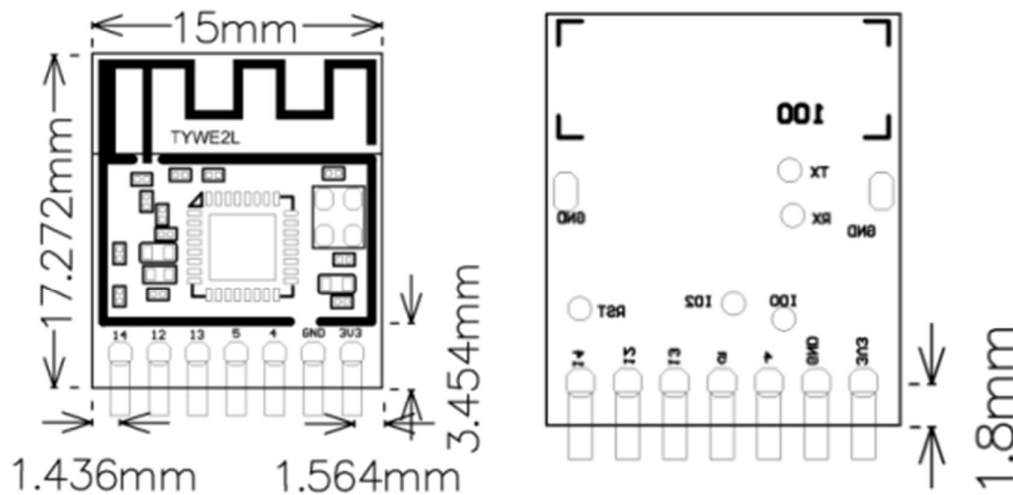


Figure 3 TYWE2L front view and rear view



Figure 4 TYWE2L side view

Note: PCB frame tolerance ± 0.15 mm, PCB depth tolerance ± 0.1 mm

6.2 Production Instructions

Storage conditions of a delivered module are as follows:

1. The anti-moisture bag is placed in an environment where the temperature is under 30°C and the relative humidity is under 85%.

2. The shelf life of a dry-packaged product is six months from the date when the product is packaged and sealed.

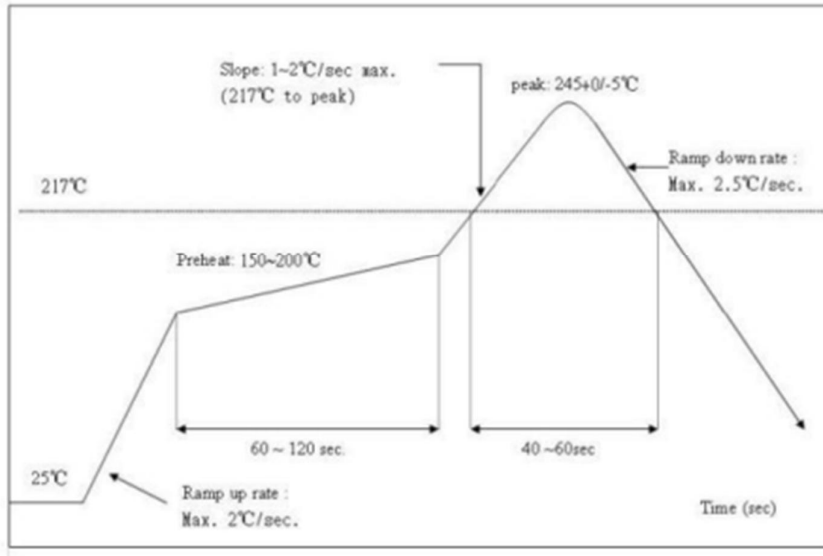
Precautions:

1. Throughout the production process, each involved operator must wear an electrostatic ring.

2. During the operation, strictly protect the module from water and strains.

6.3 Recommended Oven Temperature Profile

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



7.Certification

FCC Statement

This device is intended only for OEM integrators under the following conditions:1) The antenna must be installed such that 20 cm is maintained between the antenna and user.2) The transmitter module may not be co-located with any other transmitter or antenna.

Module Antenna Type: 2.4GHz onboard PCB PIFA Antenna, 2.5dBi peak gain.

15.19

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. (2) This device must accept any interference received, including interference that may cause undesired operation.

15.21

Note: The grantee is not responsible for any changes or modifications not expressly approved by the party responsible for compliance. Such modifications could void the user's authority to operate the equipment.

15.105(b)

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular

installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

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.

The user's manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. In cases where the manual is provided only in a form other than paper, such as on a computer disk or over the Internet, the information required by this section may be included in the manual in that alternative form, provided the user can reasonably be expected to have the capability to access information in that form. Any modifications made to the module will void the Grant of Certification, this module is limited to OEM installation only and must not be sold to end-users, end-user has no manual instructions to remove or install the device, only software or operating procedure shall be placed in the end-user operating manual of final products.

RF 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 of 20 cm between the radiator and your body.