1. **Product Overview**

WR2L is a low power-consuming built-in Wi-Fi module developed by Hangzhou Tuya Information Technology Co., Ltd. It consists of a highly integrated radio frequency chip (RTL8710BX) and an external flash chip, with a built-in Wi-Fi network protocol stack and robust library functions. WR2L also contains a low power-consuming ARM CM4F, a WLAN MAC, a 1T1R WLAN, and the maximum basic frequency of 62.5 MHz, and is embedded with a 256 KB SRAM, a 2 MB flash, and robust peripheral resources.

WR2L is an RTOS platform that integrates all the function libraries of the Wi-Fi MAC and TCP/IP protocols. You can develop built-in Wi-Fi products as required.

1.1 Features

Built-in low power-consuming 32-bit CPU functioning as an application processor

✧Working voltage: 3 V to 3.6 V
✧Peripherals: five GPIOs
✧Wi-Fi connectivity
- 802.11 B/G/N20/N40
- Channels 1-11@2.4GHz
- Supports WPA/WPA2 safe modes
- SmartConfig mode (for Android and iOS devices)
- Onboard PCB antenna
- Passing the CE, FCC, and SRRC certification
- Working temperature: –20°C to +105°C

1.2 Major Application Fields
✧Intelligent building
✧Intelligent home and household appliances
✧Healthcare
✧Industrial wireless control
✧Baby monitors
✧Network camera
✧Intelligent bus

2. Module Interfaces

2.1 Dimensions and Pin Layout
WR2L provides two rows of pins with the distance of 2 mm between every two pins.
WR2L dimensions: 15 mm (W) x 17.37 mm (L) x 3 mm (H)

2.2 Pin definition

Table 2.1 describes the common pins.

Table 2.1，WR2L pins description

No.	Symbol	I/OType	Function
1	GPIOA_15	I/O	GPIOA_15, used for hardware PWM
2	GPIOA_14	I/O	GPIOA_14, used for hardware PWM
3	GPIOA_5	I/O	GPIOA_5, used for hardware PWM
4	GPIOA_14	I/O	GPIOA_19
5	GPIOA_12	I/O	GPIOA_12, used for hardware PWM
6	GND	P	Power supply reference ground pin
7	VD33	P	Module power supply pin (3.3 V)

Note: P indicates power-supply pins and I/O indicates input/output pins.

3. Electrical Parameters

3.1 Absolute electrical parameters

Table 3.1,Absolute Parameters

Parameters	Description	Minimum value	Maximum value	Unit
Ts	Storage temperature	–40	125	°C
VDD	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

3.2 Electrical Conditions

Table 3.2 Normal electrical conditions

Parameters	Description	Min	Typ	Max	Unit
Ta	Working temperature	−20	-	105	°C
VDD	Working voltage	3.0	-	3.6	V
VIL	I/O low-level input	−0.3	-	VDD x 0.25	V
VIH	I/O high-level input	VDD x 0.75	-	3.6	V
VOL	I/O low-level output	-	-	VDD x 0.1	V
VOH	I/O high-level output	VDD x 0.8	-	VDD	V
Imax	I/O drive current	-	-	16	mA
Cpad	Input pin capacitance	-	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	+20.09dBm	287	mA
IRF	11g	6Mbps	+23.48dBm	255	mA
IRF	11n-HT20	MCS0	+22.06dBm	244	mA
IRF	11n-HT40	MCS0	+21.35dBm	220	mA

3.4 Wi-Fi RX power consumption

Table 3.4 RX power during constant receiving

Symbol	Mode	Typ	Unit
IRF	CPU sleep	90	mA
IRF	CPU active	120	mA

3.5 Power consumption in operating mode

Table 3.5, Module operating current

Operation Mode	Operating condition, TA=25℃	Typ	Peak	Unit
EZ mode	The module is in the EZ state and the Wi-Fi indicator fast flashes.	115	125	mA
Idle mode	The module is in the connected state and the Wi-Fi indicator is steady on.	60	209	mA
Working mode	The module is in the connected state and the Wi-Fi indicator is steady on.	118	198	mA
Disconnection mode	The module is in the disconnected state and the Wi-Fi indicator is steady off.	34	192	mA

Notes: The peak period is approx. 5us.

The preceding parameter values vary depending on the firmware functions.

4. RF Characteristics

4.1 Basic RF characteristics

Table 4.1,Basic RF characteristics

Parameter	Description
Frequency band	2.412 GHz to 2.462 GHz
Wi-Fi standard	IEEE 802.11b/g/n (channels 1 to 11)
Data transmission rate	11b: 1, 2, 5.5, 11 (Mbit/s) 11g: 6, 9, 12, 18, 24, 36, 48, 54 (Mbit/s) 11n: HT20 MCS0 to MCS7 11n: HT40 MCS0 to MCS7
Antenna type	PCB antenna

4.2Wi-Fi RX sensitivity

Table 4.3,RX Sensitivity

Parameter		Min	Typ	Max	Unit
PER < 8%, RX sensitivity, 802.11b CCK mode	11 Mbit/s	-	–91	-	dBm
PER < 10%, RX sensitivity, 802.11g OFDM mode	54 Mbit/s	-	–75	-	dBm

Version1.0.0

PER < 10%, RX sensitivity, 802.11n OFDM mode	MCS7	-	–72	-	dBm

5.Antenna Information

5.1 Antenna type

Only the onboard PCB antenna is used.

5.2　Antenna interference reduction

When using an onboard PCB antenna on a Wi-Fi module, make sure that the antenna on the module is at least 15 mm away from other metal parts to ensure optimal wireless performance.

6.Packaging information and production guidance

6.1　Production Instructions
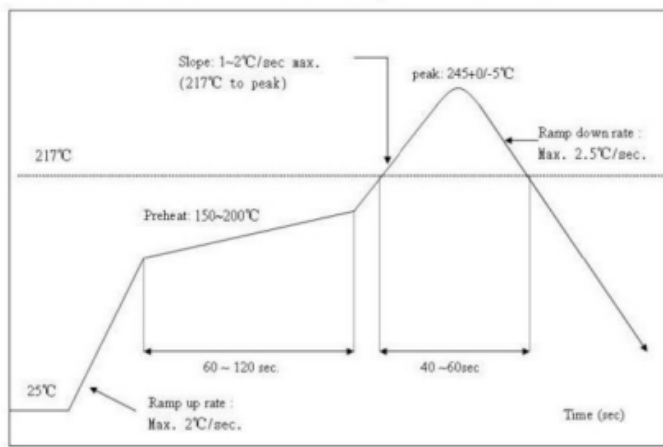
Storage conditions of a delivered module are as follows:

1. The anti-moisture bag must be 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.

Note：

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.

6.2 Recommended Oven Temperature Profile

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

Slope: 1~2℃/sec max. (217℃ to peak)

peak: 245+0/-5℃

217℃

Ramp down rate : Max. 2.5℃/sec.

Preheat: 150~200℃

60 ~ 120 sec.

40 ~60sec

25℃

Ramp up rate : Max. 2℃/sec.

Time (sec)

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 PCB Antenna and maximum gain is 2.0dBi .

This 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.

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-WR2L",or "Contains FCC ID: 2ANDL-WR2L", Any similar wording that expresses the same meaning may be used.