



# WBLC5 Module Datasheet

Device Development > Module > WiFi&BT Dual Mode Module

Version: 20200327

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## 1 产品概述

WBLC5 is a low-power embedded Wi-Fi and BLE module that Tuya has developed. It consists of a highly integrated RF chip (BK7231T) and several peripheral components, with an embedded Wi-Fi network protocol stack and robust library functions. WB3L is embedded with a low-power Arm Cortex-M4 microcontroller unit (MCU), 2 MB flash memory, 256 KB static random-access memory (SRAM), and extensive peripherals. WBLC5 is an RTOS platform that integrates all function libraries of the Wi-Fi MAC and TCP/IP protocols. You can develop embedded Wi-Fi products as required.

### 1.1 Features

- Embedded low-power 32-bit CPU, which can also function as an application processor
- Dominant frequency: 120 MHz
- Working voltage: 3.0 V to 3.6 V
- Peripherals: 3 GPIOs
- Wi-Fi connectivity
  - 802.11 b/g/n
  - Channels 1 to 14 at 2.4 GHz
  - WPA and WPA2 security modes
  - Up to +17 dBm output power in 802.11b mode
  - STA, AP, and STA+AP working modes
  - EZ and AP net pairing modes for Android and iOS devices
  - Monopole antenna with a gain of 4.6 dBi
  - Working temperature: -40°C to +105°C
- BLE connectivity
  - Support for Bluetooth 4.0
  - Maximum output power of +6 dBm
  - Monopole antenna with a gain of 4.6 dBi

### 1.2 Applications

- Intelligent building

- Smart household and home appliances
- Smart socket and light
- Industrial wireless control
- Baby monitor
- Network camera
- Intelligent bus

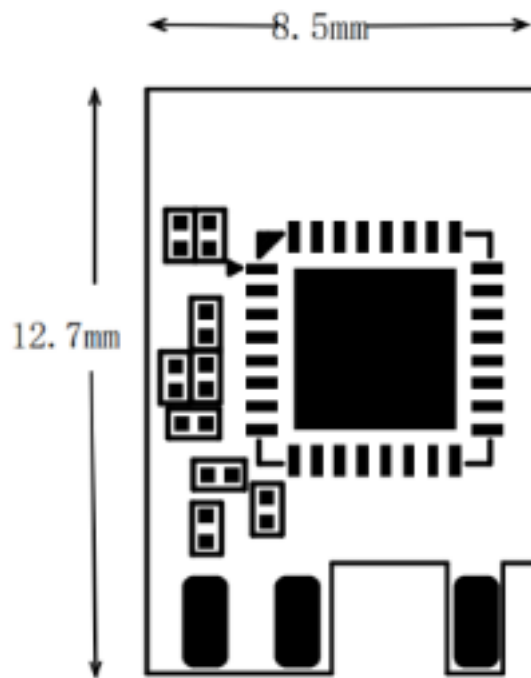
### 1.3 Change History

No.	Date	Change Description	Version After Change
1	2019-11-07	This is the first release.	V1.0.0
2	2019-12-10	Modifying typesetting.	V1.0.1
3	2019-12-24	Update BLE related materials	V1.0.2

## 2 Module Interfaces

### 2.1 Dimensions and Footprint

WB3L has two rows of pins with a  $2\pm 0.1$  mm pin spacing. The WB3L dimensions (W x L x H) are  $8.5\pm 0.35$ mm (W) x  $12.7\pm 0.35$ mm (L) x  $1\pm 0.15$ mm (H).



**Figure 1:** image.png

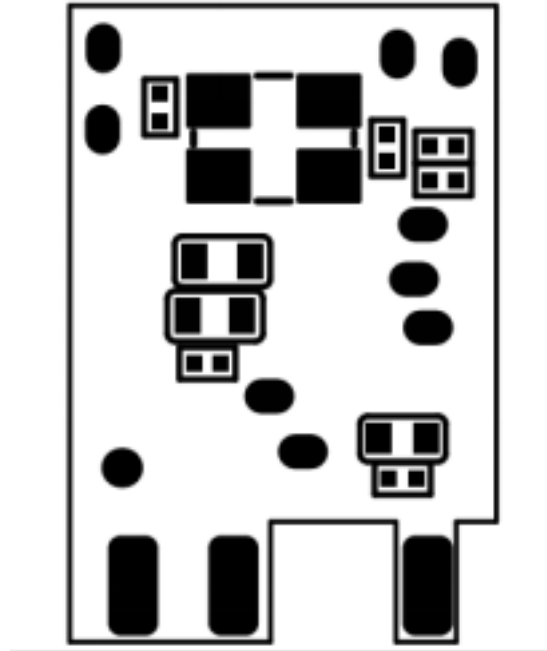


Figure 2: image.png

## 2.2 Interface Pin Definition

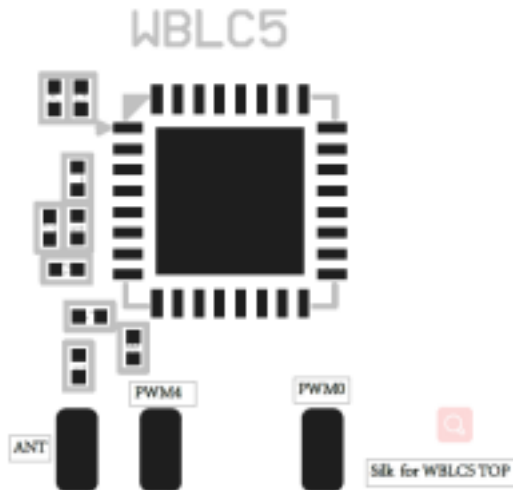
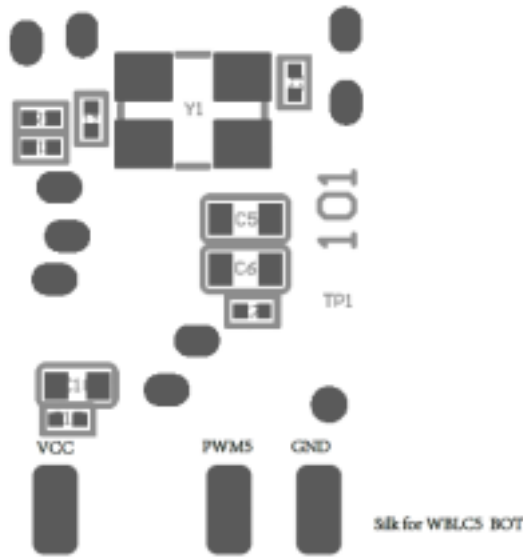


Figure 3: image.png



**Figure 4:** image.png

Pin No.	Symbol	I/O Type	Function
1	ANT	O	External antenna pad pin
2	GND	P	Ground pin
3	PWM4	I/O	Hardware PWM pin, which is connected to the P24 pin on the internal IC
4	PWM5	I/O	Hardware PWM pin, which is connected to the P26 pin on the internal IC
5	PWM0	I/O	Hardware PWM pin, which is connected to the P6 pin on the internal IC
6	VCC	P	Power supply pin (3.3 V)

Note: P indicates a power supply pin, I/O indicates an input/output pin, and AI indicates an analog input pin.

### 2.3 Test Pin Definition

Pin No.	Symbol	I/O Type	Function
TP1	TP1	I/O	RF Test Pin

Note: The test pin is not recommended to use.



### 3 Electrical Parameters

#### 3.1 Absolute Electrical Parameters

Parameter	Description	Minimum Value	Maximum Value	Unit
Ts	Storage temperature	-20	105	°C
VBAT	Power supply voltage	3.0	3.6	V
Static electricity voltage (human body model)	TAMB-25°C	-	2	KV
Static electricity voltage (machine model)	TAMB-25°C	-	0.5	KV

#### 3.2 Working Conditions

Parameter	Description	Minimum Value	Typical Value	Maximum Value	Unit
Ta	Working temperature	-40	-	105	°C
VBAT	Power supply voltage	3.0	3.3	3.6	V

Parameter	Description	Minimum Value	Typical Value	Maximum Value	Unit
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 <sub>max</sub>	I/O drive current	-	-	12	mA

### 3.3 Current consumption during constant transmission and receiving

Working Status	Mode	Rate	TX Power/Receiving	Typical Value	Maximum Value	Unit
TX	11b	11Mb	+17dBm	292	354	mA
TX	11g	54Mbps	+13.5dBm	256	307	mA
TX	11n	MCS7	+13dBm	257	286	mA
RX	11b	11Mbps	Constant receiving	95	102	mA
RX	11g	54Mbps	Constant receiving	98	100	mA
RX	11n	MCS7	Constant receiving	98	100	mA

### 3.4 Working Current

Working Mode	Working Status (Ta = 25°C)	Average Value	Maximum Value	Unit
EZ	The module is in EZ mode, and the Wi-Fi indicator blinks quickly.	106	386	mA
AP	The module is in AP mode, and the Wi-Fi indicator blinks slowly.	98	405	mA
Connected	The module is connected to the network, and the Wi-Fi indicator is steady on.	58	138	mA
Disconnected	The module is disconnected from the network, and the Wi-Fi indicator is steady off.	40	210	mA

## 4 RF Features

### 4.1 Basic RF Features

Parameter	Description
Frequency band	2.412~2.484GHz
Wi-Fi standard	IEEE 802.11b/g/n(channels1-14)
Data transmission rate	11b:1,2,5.5, 11 (Mbps); 11g:6,9,12,18,24,36,48,54(Mbps); 11n: HT20 MCS0~7; HT40 MCS0~7
Antenna type	PCB antenna with a gain of 1.2 dBi

### 4.2 发射性能

#### TX 连续发送性能

参数项	最小值	典型值	最大值	单位
RF 平均输出功率, 802.11b CCK Mode 11M	-	16	-	dBm
RF 平均输出功率, 802.11g OFDM Mode 54M	-	14	-	dBm
RF 平均输出功率, 802.11n OFDM Mode MCS7	-	12	-	dBm
频率误差	-10	-	10	ppm

### 4.3 接收性能

#### RX 灵敏度

参数项	最小值	典型值	最大值	单位
PER<8%, RX 灵敏度, 802.11b DSSS Mode 11M	-	-85	-	dBm
PER<10%, RX 灵敏度, 802.11g OFDM Mode 54M	-	-72	-	dBm
PER<10%, RX 灵敏度, 802.11n OFDM Mode MCS7	-	-68	-	dBm
PER<10%, RX 灵敏度, BT 1M MCS7	-	-95	-	dBm

## 5 天线信息

### 5.1 天线类型

选用外接单极子天线。

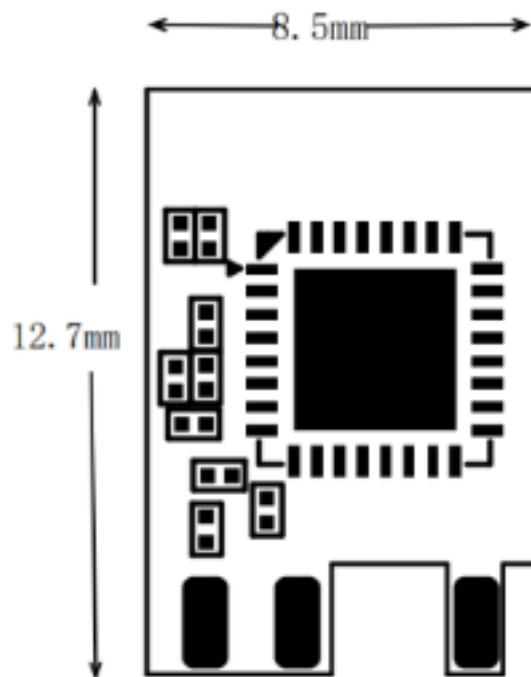
### 5.2 降低天线干扰

尽量使的天线可以远离大的元器件。

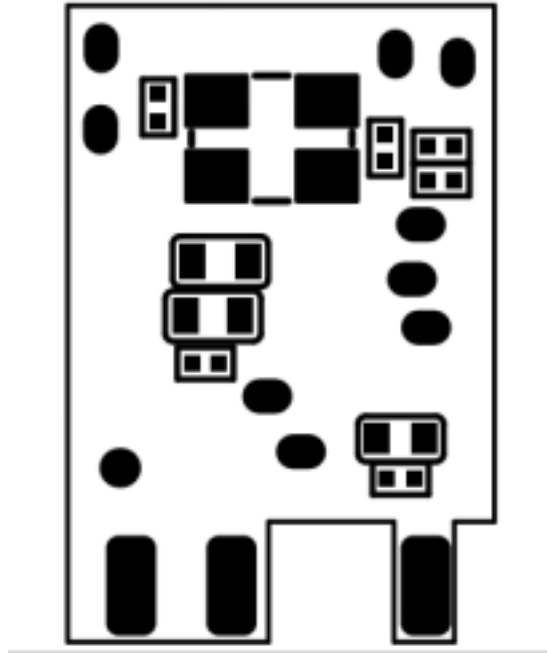
## 6 封装信息及生产指导

### 6.1 机械尺寸

PCB 尺寸大小:  $8.5 \pm 0.35\text{mm}$  (W)  $\times$   $12.7 \pm 0.35\text{mm}$  (L)  $\times$   $1 \pm 0.15\text{mm}$  (H)。



**Figure 5:** image.png



**Figure 6:** image.png

## 6.2 PCB 封装图-插针

WBLC5 模块选用插入焊接。插件尺寸如下图所示：



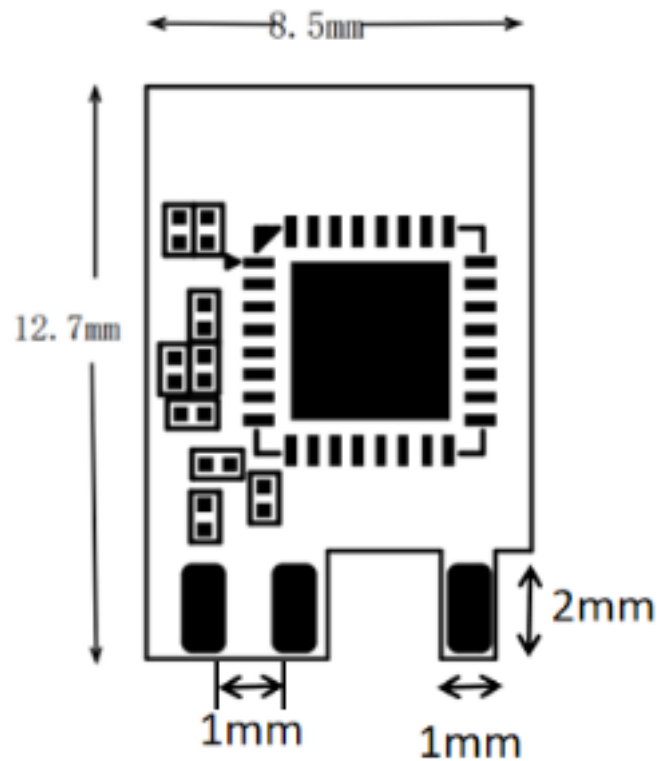


Figure 7: image.png

### 6.3 生产指南

1. 涂鸦出厂的邮票口封装模块必须由 SMT 机器贴片，并且拆开包装烧录固件后必须 24 小时内完成贴片，否则要重新抽真空包装，贴片前要对模块进行烘烤。A.SMT 贴片所需仪器或设备：a) 回流焊贴片机；b)AOI 检测仪；c) 口径 6-8mm 吸嘴；B. 烘烤所需仪器或设备：a) 柜式烘烤箱；b) 防静电耐高温托盘；c) 防静电耐高温手套；
2. 涂鸦出厂的模块存储条件如下：A. 防潮袋必须储存在温度 < 30°C、湿度 < 70%RH 的环境中。B. 干燥包装的产品，保质期为从包装密封之日起 6 个月的时间。C. 密封包装内装有湿度指示卡：

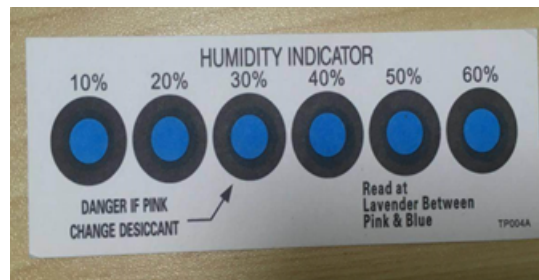


Figure 8: 图片 10

3. 涂鸦出厂的模块需要烘烤，湿度指示卡及烘烤的几种情况如下所述：A. 拆封时如果湿度指示卡读值 30%、40%、50% 色环均为蓝色，需要对模块进行持续烘烤 2 小时；B. 拆封时如果湿度指示卡读取到 30% 色环变为粉色，需要对模块进行持续烘烤 4 小时；C. 拆封时如果湿度指示卡读取到 30%、40% 色环变为粉色，需要对模块进行持续烘烤 6 小时；D. 拆封时如果湿度指示卡读取到 30%、40%、50% 色环变为粉色，需要对模块进行持续烘烤 12 小时；
4. 烘烤参数如下：A. 烘烤温度： $125\pm 5^{\circ}\text{C}$ ；B. 报警温度设定： $130^{\circ}\text{C}$ ；C. 自然条件下冷却  $< 36^{\circ}\text{C}$  后，即可进行 SMT 贴片；D. 干燥次数：1 次；E. 若烘烤后超过 12 小时没有焊接，请再次进行烘烤；
5. 如果拆封时间超过 3 个月，禁止使用 SMT 工艺焊接此批次模块，因为此 PCB 为沉金工艺，超过 3 个月后焊盘氧化严重，SMT 贴片时极有可能导致虚焊、漏焊，由此带来的种种问题我司不承担相应责任；
6. SMT 贴片前，请对模块进行 ESD（静电放电、静电释放）保护；
7. 为了确保回流焊合格率，首次贴片请抽取 10% 产品进行目测、AOI 检测，以确保炉温控制、器件吸附方式、摆放方式的合理性；之后的批量生产建议每小时抽取 5-10 片进行目测、AOI 检测。

#### 6.4 推荐炉温曲线

请根据回流焊曲线图进行直插上件，峰值温度  $245^{\circ}\text{C}$ ，回流焊温度曲线如下图所示：

### DIP Type Product Pass Wavesolder Graph

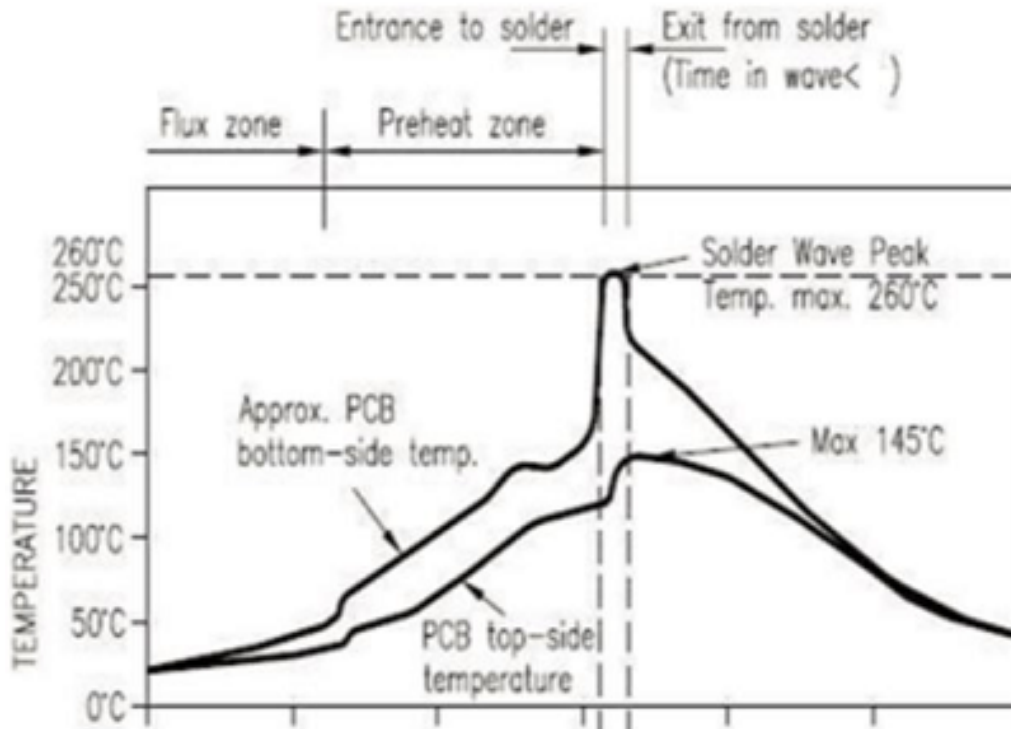


Figure 9: image.png

## 6.5 储存条件

	<b>CAUTION</b> <b>This bag contains</b> <b>MOISTURE-SENSITIVE DEVICES</b>	<b>LEVEL</b> <div style="border: 1px solid black; padding: 5px; display: inline-block;"> <b>3</b> </div>
	if Blank, see adjacent bar code label	
1. Calculated shelf life in sealed bag: 12 months at < 40°C and < 90% relative humidity (RH)		
2. Peak package body temperature: <u>260</u> °C <small>if Blank, see adjacent bar code label</small>		
3. After bag is opened, devices that will be subjected to reflow solder or other high temperature process must		
a) Mounted within: <u>168</u> hrs. of factory conditions <small>if Blank, see adjacent bar code label</small>		
≤ 30°C/60%RH, OR		
b) Stored at <10% RH		
4. Devices require bake, before mounting, if:		
a) Humidity Indicator Card is > 10% when read at 23 ± 5°C		
b) 3a or 3b not met.		
5. If baking is required, devices may be baked for 48 hrs. at 125 ± 5°C		
Note: If device containers cannot be subjected to high temperature or shorter bake times are desired, reference IPC/JEDEC J-STD-033 for bake procedure		
Bag Seal Date: _____ <small>if Blank, see adjacent bar code label</small>		
Note: Level and body temperature defined by IPC/JEDEC J-STD-020		

Figure 10: 图片 12

## 7 模块 MOQ 与包装信息

产品型号	MOQ (pcs)	出货包装方式	每个卷盘存放模块数 (pcs)	每箱包装卷盘数 (盘)
WBLC5	4000	载带卷盘	1000	4

## 8 附录—声明

### **Appendix: Statement Federal Communications Commission (FCC) Declaration of Conformity**

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this 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. 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.

**Radiation Exposure Statement**  
This equipment complies with FCC radiation exposure limits set forth for an uncontrolled rolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator and your body.

**Important Note**  
This radio module must not installed to co-locate and operating simultaneously with other radios in host system except in accordance with FCC multi-transmitter product procedures. Additional testing and equipment authorization may be required to operating simultaneously with other radio. 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 host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. The final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed. The end user manual shall include all required regulatory information/warning as shown in this manual, including: This product must be installed and operated with a minimum

distance of 20 cm between the radiator and user body. **红色字体警告语仅适用于完整性模块。不带天线，带标准天线接口和不带屏蔽罩的限制性模块不得使用。** This device have got a FCC ID: 2ANDL-XXXXXX.The final end product must be labeled in a visible area with the following: “Contains Transmitter Module FCC ID:2ANDL-XXXXXX” This device is intended only for OEM integrators under the following conditions: 1)The antenna must be installed such that 20cm is maintained between the antenna and users, and 2) The transmitter module may not be co-located with any other transmitter or antenna. As long as 2 conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed. **蓝色字体警告语适用限制性模块：不带天线，带标准天线接口和不带屏蔽罩的模块** The RF module is considered as a limited modular transmitter according to FCC rules.Even though the RF module get a FCC ID, the host product manufacturer can not use the FCC ID on the final product directly.In these circumstances, the host product manufacturer integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining the FCC authorization by a Class II permissive change application or a new application. **Declaration of Conformity**  
**European notice**

Hereby, Hangzhou Tuya Information Technology Co., Ltd declares that this module product is in compliance with essential requirements and other relevant provisions of Directive 2014/53/EU,2011/65/EU.A copy of the Declaration of conformity can be found at <https://www.tuya.com>

**Figure 11:** image.png



**Figure 12:** image.png

Hereby, Hangzhou Tuya Information Technology Co., Ltd declares that this module product is in compliance with essential requirements and other relevant provisions of Directive 2014/53/EU,2011/65/EU.A copy of the Declaration of conformity can be found at <https://www.tuya.com>

**Figure 13:** image.png




**Figure 14:** image.png

This product must not be disposed of as normal household waste, in accordance with EU directive for waste electrical and electronic equipment (WEEE- 2012/19/EU). Instead, it should be disposed of by returning it to the point of sale, or to a municipal recycling collection point.

**Figure 15:** image.png

The device could be used with a separation distance of 20cm to the human body. The device is restricted to indoor use only when operating in the 5150 to 5350 MHz frequency range. (Only for 5G WIFI)





AT	BE	BG	HR	CY	CZ	DK
EE	FI	FR	DE	EL	HU	IE
IT	LV	LT	LU	MT	NL	PL
PT	RO	SK	SI	ES	SE	UK

**Figure 16:** image.png