TOPBAND 拓邦

TB1206 Product specification

Revision note

Date	Version	Description
2018-12-18	V1.0	The first version

Shenzhen Topband Co., Ltd.

CONTENT

1.Overview

TB1206 is a low power consumption embedded Wi-Fi module ,developed by the Shenzhen Topband Co., ltd. It consists of a high level of integration of wireless RF chip ESP8266 and small amounts of peripheral components，With built-in wi-fi network protocol stack and rich library functions.TB1206 is embedded ultra-low power consumption of the 32-bit RISC processor，With 16 bits simple model， CPU clock speeds up to 160 MHZ，supports real-time operating system RTOS，Can use up to 80% of the capacity for application programming and development。

TB1206 integrates all wi-fi MAC and complete TCP/IP protocol function library，The user can use the module for networking function added to existing equipment，Also can build an independent network controller ， and develop Wi-Fi product embedded to satisfy his needs。

1.1 Product features

- ■ SOC features
  - ➤Built-in ultra-low power consumption 32-bit MCU ，The main frequency supports 80 MHZ and 160 MHZ，supports RTOS
  - ➤Built-in TCP/IP protocol stack
  - ➤Built-in 1 road 10 bits high precision ADC
- ■ Rich peripheral interfaces
  - ➤2 X UART
  - ➤1 X ADC
  - ➤1 X En
  - ➤1 X Wake up the pin
  - ➤1 X HSPI
  - ➤1 X I2C
  - ➤1 X I2S
  - ➤Most 11 X GPIOs
- ■ Wi-Fi connectivity

➢Supports 802.11 b/g/n.

➢Supports the STA/AP/STA + AP mode

➢Supports WPA/WPA2 security mechanism.

➢Supports WEP/TKIP/AES encryption type.

➢Supports the AT remote upgrade and the clouds OTA upgrade.

➢Supports SmartConfig and AP two types of Matching network (Including Android and iOS devices).

1.2 **Application field**

●Intelligent building

●Smart home

●Intelligent security

● Industrial wireless control

●The baby monitor

● Wise medical

● Wise energy

2.Electrical parameters

2.1 working conditions

Table 2-1 normal working conditions

Parameter	Minimum value	Typical value	Maximum value	Unit	Remark
Working voltage	3.0	3.3	3.6	V	
Working temperature	-20	-	85	℃	
Working humidity	10	-	90	%RH	
Storage temperature	-20	-	85	℃	
Electrostatic	-	-	2	KV	TAMB=25℃

discharge voltage (Human body model)					
Electrostatic discharge voltage (Machine model)	-	-	0.5	KV	TAMB=25℃

2.2 **Power consumption parameters**

Table2-2 power consumption parameters

Mode	Minimum value	Typical values	Maximum values	Unit
Tx802.11b，CCK 11Mbps，POUT=+17dBm	-	170	-	mA
Tx802.11g，OFDM 54 Mbps，POUT =+15dBm	-	140	-	mA
Tx802.11n，MCS7，POUT =+13dBm	-	120	-	mA
Rx 802.11b，length of the packet 1024 byte，-80dBm	-	50	-	mA
Rx 802.11g，length of the packet 1024 byte，-70dBm	-	56	-	mA
Rx 802.11n，length of the packet 1024 byte，-65dBm	-	56	-	mA
Modem-sleep①	-	15	-	mA
Light-sleep②	-	0.9	-	mA
Deep-sleep③	-	20	-	μA
Power outages	-	0.5	-	μA

Note ①: Modem-Sleep mode is used for scenes where the CPU needs to work all the time, such as applied in PWM or I2S and so on. When Wi-Fi keeps connective, and if there is no data transmission, shut down the circuit of Wi-Fi Modem to save power according to 802.11 standard (e.g U-APSD). For example, while it with DTIM3, maintain sleep for 300ms, and receive Beacon package from AP in the awake interval time for 3ms, the current consumption would be 15mA.

Note ②: Light-Sleep mode is used for applications where the CPU is intended to be paused,

like switch of Wi-Fi. When Wi-Fi keeps connective, and if there is no data transmission, turn off the circuit of Wi-Fi Modem and pause CPU to save power according to 802.11 standard (e.g U-APSD). For example, while it with DTIM3, maintain sleep for 300ms, and receive Beacon package from AP in the awake interval time for 3ms, the current consumption would be 0.9mA.

Note ③: Deep-Sleep mode is used for scenes where Wi-Fi needs no to be maintained connective. It takes a long time to send data package once. For example, the sensor that measures temperature at a time per 100 second, whose whole average current consumption would be much less than 1mA when it needs 0.3s-1s to connect AP after awakening per 300 second.

3.Radio frequency characteristics

3.1 Radio frequency (rf) basic characteristics

Table 3-1 rf basic features

Parameter	Instructions	
Working frequency	2.412~2.462GHz	
Wi-Fi standard	IEEE 802.11b/g/n　(Channel 1-11)	
Data transfer rate	802.11b	1，2，5.5，11（Mbps）
	802.11g	6，9，12，18，24，36，48，54（Mbps）
	802.11n	HT20，MCS0~7

3.2 Output power

Max power<20dBm

Table 3-2 output power

Parameter	minimum value	Typical values	Maximum values	Unit
Under 72.2 Mbps，　Output power of the PA	15.5	16.5	17.5	dBm
Under 11b mode，　Output power of the PA	17.5	18.5	19.5	dBm

3.3 The adjacent channel inhibition

Table 3-3 adjacent channel inhibition

parameter	minimum	Typical	Maximum	Unit

	value	values	values	
OFDM，6Mbps	-	37	-	dB
OFDM，54Mbps	-	21	-	dB
HT20，MCS0	-	37	-	dB
HT20， MCS7	-	20	-	dB

3.4 **Receiving sensitivity**

able 3-4 receiving sensitivity

Parameter	Minimum value	Typical values	Maximum values	Unit
DSSS，1Mbps	-	-98	-	dBm
CCK11，Mbps	-	-91	-	dBm
6Mbps（1/2 BPSK）	-	-93	-	dBm
54Mbps（3/4 64-QAM）	-	-75	-	dBm
HT20，MCS7（65 Mbps，72.2 Mbps）	-	-72	-	dBm

4.Module interface

4.1 **Size package**

TB1206 is divided into TB1206-E and TB1206 - P two types depending on the different types of antenna， TB1206 - E size of the appearance is 18 mm (W) x 14.3 mm (L) x 3.5 mm (H)， Its appearance dimensions is as shown in figure 4-1， TB1206 -p appearance size is 18 mm (W) x 21 mm (L) x 3.5 mm (H)， Its appearance dimensions is as shown in figure 4-2。
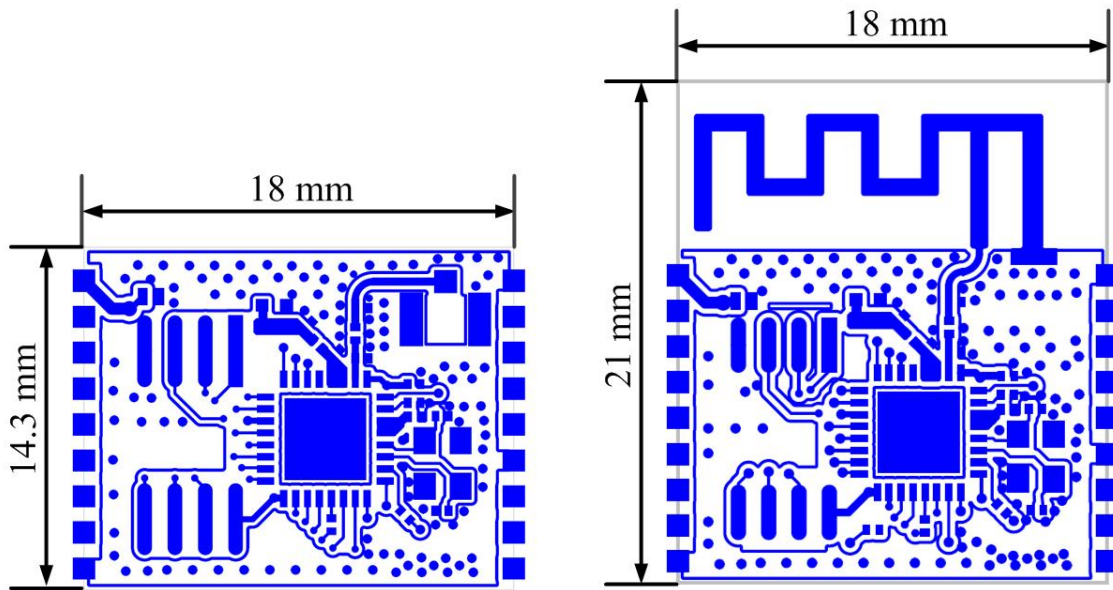
Figure 4-1 TB1206 - E appearance size figure Figure 4-2 TB1206 -p appearance size figure

4.2 **Pin definition**

TB1206 pin map is as shown in figure 4-3，Pin function description table is as shown in table 4-1。

Figure 4-3 module pin map

Table 4-1 module pin function specification table

Pin	Name	type	Functional specifications
1	VCC	P	3.3 V power supply (VDD)
2	EN	I	enabled pin of outside of Chip needs to be pulled high for normal work
3	IO14	I/O	GPIO14；HSPI_CLK
4	IO12	I/O	GPIO12；HSPI_MISO

6

5	IO13	I/O	GPIO13；HSPI_MOSI；UART0_CTS
6	IO15	I/O	GPIO15；MTDO；HSPICS；UART0_RTS
7	IO2	I/O	GPIO2；UART1_TXD
8	IO0	I/O	GPIO0；SPI_CS2
9	GND	P	GND
10	IO4	I/O	GPIO4
11	RXD	I/O	GPIO3；Can be used as UART Rx when copying Flash content
12	TXD	I/O	GPIO1；Can be used as UART Tx when copying Flash content
13	GND	P	GND
14	IO5	I/O	GPIO5
15	RST	I	An external reset signal (effective low level)，Reset module
16	ADC	I	A/D conversion pin
17	IO16	I/O	Deep sleep wake up
18	GND	P	GND

TB1206 supports UART Downloading mode and Flash Booting mode，in different work mode，Pin is defined as shown in table 4-2。

Table 4-2 pin mode

Model	GPIO15	GPIO0	GPIO2
UART Downloading mode	Low	Low	High
Flash Boot mode	Low	High	High

5.Antenna information

5.1 Type of antenna

TB1206 -E is for the IPX antenna specifications，TB1206 - P is for a PCB antenna specifications。

5.2 Reduce the antenna interference

When using PCB antenna on Wi-Fi module，In order to ensure the optimization of

Wi-Fi performance，Suggested that the module antenna part and other metal components at least above 16 mm distance。

　　User PCB don't route or has no copper in antenna area，So as not to affect the antenna performance。

5.3 **An external antenna connector**

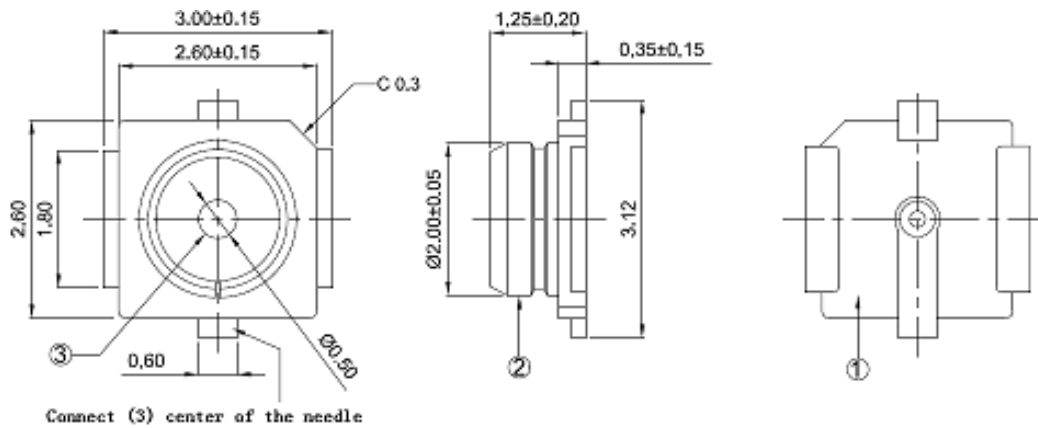External antenna connector size is as shown in figure 5-1.

Figure 5-1 external antenna connector size chart

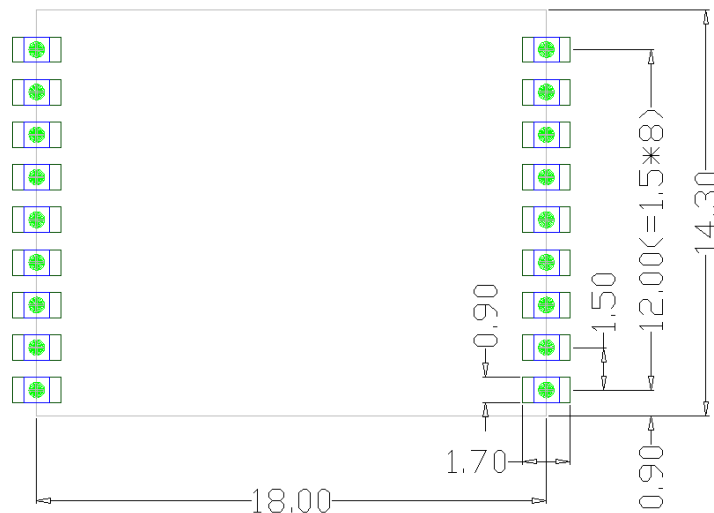## 6.Encapsulates information and production guidance

6.1 **Mechanical dimensions**

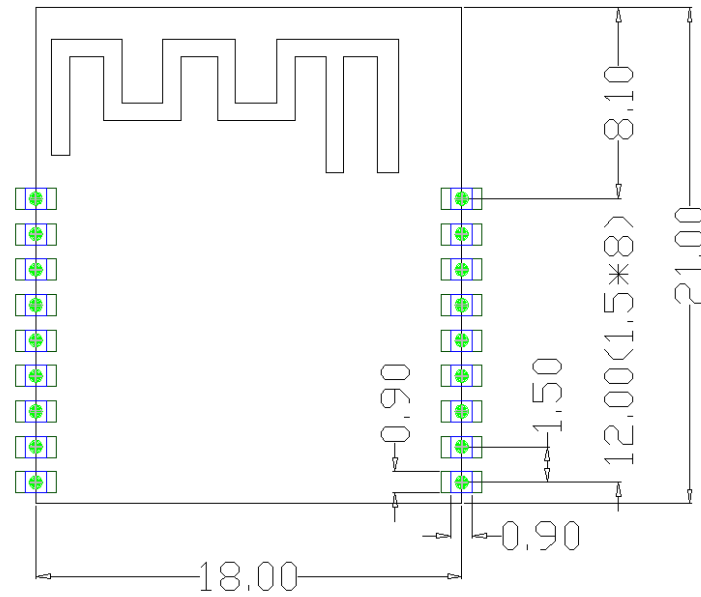Figure 6-1 TB1206 - E mechanical size chart
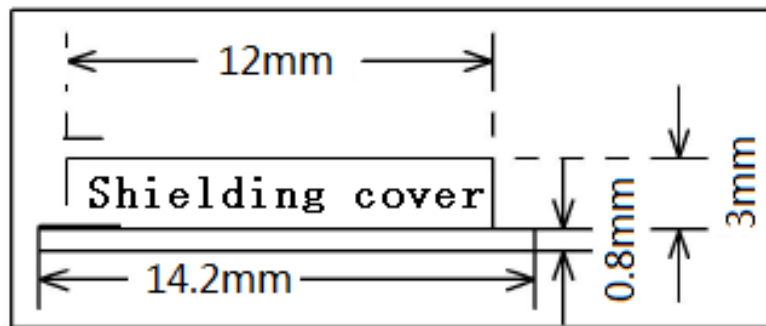
Figure 6-2 TB1206 -p mechanical size chart

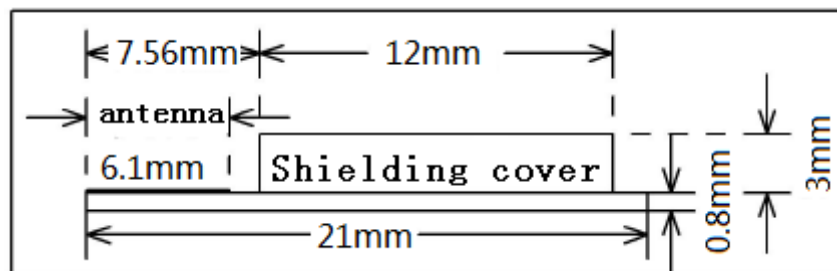Figure 6-3 TB1206 - E side view

Figure 6-4 TB1206 - P side view

6.2 **Production guide**

Factory module storage conditions is as follow：must be SMT by SMT machine，And must finish SMT in 24 hours of open the packaging and copying firmware，Otherwise, it needs to be vacuum-packed again，baking module Before SMT。

■ SMT need instruments

9

➢Reflow soldering SMT machine

➢AOI monitor

➢6-8 mm diameter suction nozzle

■ Baking need equipment

➢Cabinet baking box

➢Antistatic, high temperature resistant tray

➢Antistatic high temperature resistant gloves

Factory module storage conditions is as follow：

■ Moisture bag must be stored in temperature < 30 ℃，Environment humidity < 85% RH。

■ Dry packaging products，The shelf life should be 6 months from the date of packing seal。

■ In the whole process of production， Operators must wear electrostatic ring for each station。

■ When operating, prevent module from touching water or dirt。

6.3 **Reflow soldering temperature curve**

Recommend the use of lead-free soldering， Reflow soldering less than 2 times.。

Reflow soldering temperature curve are shown in figure 6-5 below.
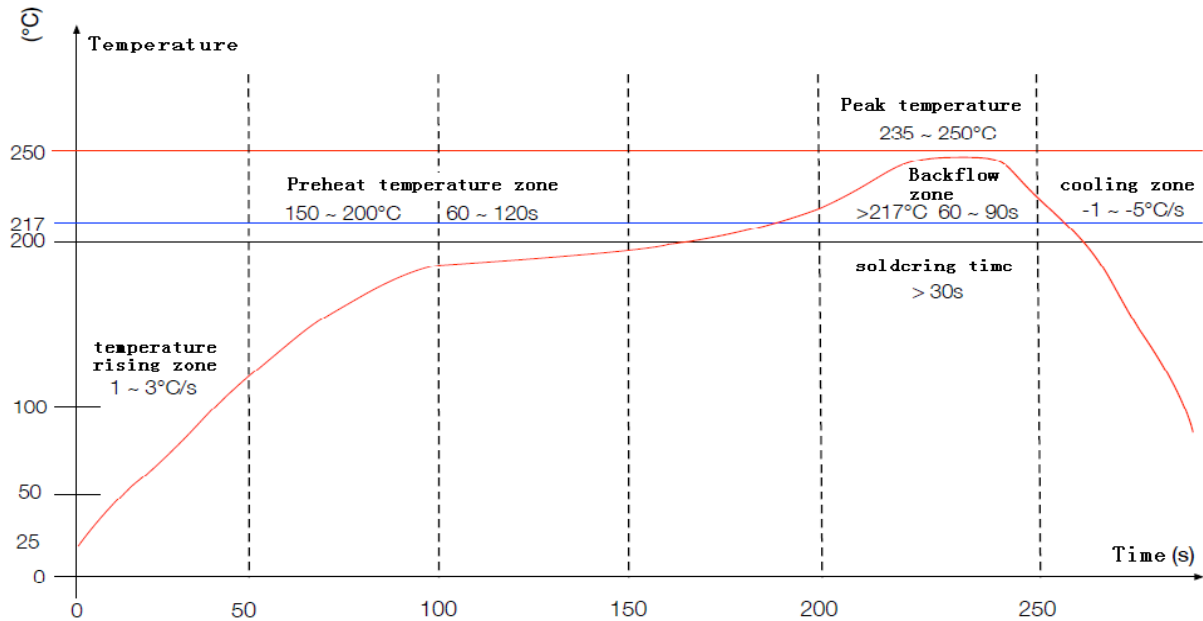
Ramp to Reflow-temperature:25～150°C time：60～90s temperature riseing ramp rate:1～3°C/s.

Preheat temperature zone- temperature:150～200°C time：60-120s.

Reflow soldering area-temperature: greater than217°C time：60-90s; Peak temperature：235～250°C time：30～70s.

cooling zone- temperature: Peak temperature～180°C, temperature Cooling down ramp rate:-1～-5 °C/s.

solder-tin silver copper alloy Lead-free solder (SAC305)

Figure 6-5 reflow soldering temperature curve

6.4 **Peripheral wiring advice**

The TB1206 integrates high-speed GPIO and peripheral interfaces，This can cause severe switching noise。If some applications require higher power consumption and EMI characteristics，It is recommended to connect resistance of 10~100 ohms in series on digital I/O line。This prevents too much impact when switching the power supply，and make the signal smooth，It also prevents the release of static electricity (ESD) to a certain extent.

Appendix - design information

■ Espressif ESP8266 resources

➤ESP8266 quick start guide.

➤ESP8266 SDK start guide.

➤ESP8266 SDK.

➤ESP8266 download tool.

➢ESP8266 official BBS.

➢ESP8266 resources collection.

FCC Compliance

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.

Warning: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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 ina 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.

"This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment, This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body." This module is designed to comply with the FCC statement, FCC ID is: 2ADDWTB1206. The host system using this module, should have label in a visible area indicated the following texts: "Contains FCC ID: 2ADDWTB1206".

The host will Satisfy Class I or Class Ⅱ permissive change based this module FCC ID

Manufacture: Shenzhen Topband Co., Ltd.

Manufacture address: Topband Industrial Park, Liyuan Industrial Zone, Shiyan Town, Bao'An District, Shenzhen, Guangdong, China, 518108

Importer: XXXXXX
Importer address: XXXXXXXX