

Requirement of FCC KDB 996369 D03 for module certification:

1.1 List of applicable FCC rules :

The module complies with FCC Part 15.247.

1.2 Summarize the specific operational use conditions:

The module has been certified for Fix/Mobile applications. The host product operating conditions must be such that there is a minimum separation distance of 20 cm (or possibly greater than 20 cm) between the antenna radiating structures and nearby persons. The host manufacturer is obligated to confirm the use conditions of the host product to ensure that distance specified in the instructions is met. In this case the host product is classified as either a mobile device or a fixed device for RF exposure purposes. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

1.3 Limited module procedures:

Not applicable.

1.4 Trace antenna designs:

Not applicable.

1.5 RF exposure considerations:

This equipment complies with FCC's and IC's RF radiation exposure limits set forth for an uncontrolled environment. The antenna(s) used for this transmitter must be installed and operated to provide a separation distance of at least 20 cm from all persons and must not be collocated or operating in conjunction with any other antenna or transmitter. Installers must ensure that 20cm separation distance will be maintained between the device and users.

Note: the OEM product manuals must include a statement in order to alert the users of FCC RF exposure compliance.

1.6 Antennas:

Type	Gain	Impedance	Application	Min Separation
PCB type Antenna	0.85 dBi	50Ω	Fixed	20 cm

The antenna is permanently attached, can't be replaced.

1.7 Label and compliance information:

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 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.

FCC Radiation Exposure Statement

The antennas used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co- located for operating in conjunction with any other antenna or transmitter.

The system integrator must place an exterior label on the outside of the final product housing the YB1120-A Modules. Below is the contents that must be included on this label. OEM Labeling Requirements:

NOTICE: The OEM must make sure that FCC labeling requirements are met. This includes a clearly visible exterior label on the outside of the final product housing that displays the contents shown in below:

Model : YB1120-A
Contains FCC ID : 2BKBY-YBZN1120

1.8 Information on test modes and additional testing requirements:

When testing host product, the host manufacture should follow FCC KDB Publication 996369 D04 Module Integration Guide for testing the host products. The host manufacturer may operate their product during the measurements. In setting up the configurations, if the pairing and call box options for testing does not work, then the host product manufacturer should coordinate with the module manufacturer for access to test mode software. For wireless Bluetooth, the product under test is set into a link/association with a partnering Bluetooth device, as per the normal intended use of the product. To ease testing, the product under test is set to transmit at a high duty cycle, such as by sending a file or streaming some media content. Alternatively, a BT test set may be used. Simultaneously transmitting modules installed in the host should be all active.

1.9 Additional testing, Part 15 Subpart B disclaimer:

The modular transmitter is only FCC authorized for the specific rule parts (FCC Part 15.247) list on the grant, and that 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 when contains digital circuitry

The host integrator installing this module into their product must ensure that the final composite product complies with the FCC requirements by a technical assessment or evaluation to the FCC rules, including the transmitter operation and should refer to guidance in KDB 996369.

YB1120-A dual-mode Bluetooth module

Product manual

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1 Overview

YB1120-A is a dual-mode audio Bluetooth module developed by Yibo Intelligent Company. It has a built-in Bluetooth audio protocol stack and various applications, which can easily realize the interconnection of users' Bluetooth devices, data transmission, voice, music and other applications.

1.1 Functional features

- Built-in 32-bit dual-core DSP, 640KB SRAM on-board
- Built-in dual-channel 24-bit audio DAC and 4-channel 24-bit audio ADC
- Built-in multi-band DRC limiter
- Built-in multi-band EQ configuration adjustment
- Support the audio DAC sampling rate from 8 kHz to 96 kHz
- Support the audio ADC sampling rate of 8 kHz to 48 kHz
- Support for MIC / LINE IN analog audio input
- Support for A2DP, AVCTP, HFP, AVDTP, AVRCP, SPP, I2CAP and other profiles
- Supports the UART communication
- Support for ADC analog signal input and PWM signal output
- Support for the Bluetooth broadcast function
- High-gain PCB onboard antenna
- Maximum + 10 dbm transmit power
- Comply with the Bluetooth V5.3+BR+EDR+BLE specification
- Stamp hole tube foot, welding is easy and reliable
- Ultra-small size: 13x27.2mm
- Flexible software platform for customized services

1.2 Application field

- bluetooth speaker
- smart home
- A Bluetooth music repeater
- Car Bluetooth hands-free
- Health care
- Wireless POS machine
- Portable printer

2. Electrical characteristics

2.1 Basic characteristics

Parameter	Description	Min	TYP	Max	Unit
3V3RF	RF front-end amplifier supply voltage	-0.3	3.3	3.6	V
V BAT	power supply voltage	-0.3	5	5.75	V
RX	RX Input power	-	10	-	dBm
TSTR	Storage temperature range	-40	-	125	°C

Table 1. Absolute maximum value

Parameter	Description	Min	TYP	Max	Unit
3V3RF	RF front-end amplifier supply voltage	3	3.3	3.6	V
V BAT	power supply voltage	4.5	5	5.5	V
TOPR	Operation temperature range	-40	-	85	°C

Table 2. Recommended working conditions

project	Description	Min	TYP	Max	Unit
3V3RF	RF front-end amplifier supply voltage	150	250	350	mA
VBAT	power supply voltage	100	150	200	mA

Table 3. Power consumption characteristics

Wireless standards	Bluetooth BR / EDR / LE	remarks
frequency range	2.402 GHz ~ 2.480 GHz	
transmitting power	10dBm	
antenna	Onboard:, High-gain PCB onboard antenna	

Table 4. Antenna characteristics

2.2 RF performance

Parameter		Min	Typ	Max	Unit	Test Conditions
RF Transmit Power			10		dBm	25°C VBAT=5V 3V3RF =3.3V 2441MHz
RF Power Control Range			18.2		dB	
20dB Bandwidth			950		KHz	
In-band spurious Emissions (BQB Test Mode RF_Tx Power=5dBm)	F=F0±1MHz		-22		dBm	
	F=F0±2MHz		-51		dBm	
	F=F0±3MHz		-55		dBm	
	F=F0+/->3MHz		-55		dBm	

Table 5. RF emission characteristics

Parameter		Min	Typ	Max	Unit	Test Conditions
Sensitivity			-92		dBm	25°C VBAT=5V 3V3RF =3.3V 2441MHz DH5
Co-channel Interference Rejection			10		dB	
Adjacent Channel selectivity C/I	+1MHz		-4		dB	
	-1MHz		-3		dB	
	+2MHz		-39		dB	
	-2MHz		-33		dB	
	+3MHz		-45		dB	
	-3MHz		-28		dB	

Table 6. RF receiving characteristics

2.3 Audio features

Parameter	Mode	Min	Typ	Max	Unit	Test Conditions
Frequency Response		20	–	20K	Hz	1KHz/0dB 10k ohm loading With A-Weighted Filter
Output Swing	Differential		1.7		Vrms	
	Single-ended	–	860	–	mVrms	
THD+N	Differential	–	-70	–	dB	
	Single-ended	–	-70	–	dB	
S/N	Differential		105		dB	
	Single-ended	–	99	–	dB	
Dynamic Range	Differential	–	105		dB	1KHz/-60dB 10k ohm loading With A-Weighted Filter
	Single-ended	–	98	–	dB	
Noise Floor	Differential	–	10	–	uVrms	A-Weighted Filter
	Single-ended		10		uVrms	

Table 7. Audio DAC features

Parameter	Min	Typ	Max	Unit	Test Conditions
Dynamic Range		94		dB	Fsample=44.1kHz, Gain=0dB Fin=1KHz 590mVrms
S/N	–	95	–	dB	Fsample=44.1kHz, Gain=0dB Fin=1KHz 590mVrms
THD+N	–	-75	–	dB	
S/N		76		dB	Fsample=44.1kHz, Gain=18dB Fin=1KHz 75mVrms
THD+N	–	-73	–	dB	

Table 8. Audio ADC features

2.4 ESD protective performance

Parameter	Typ.	Test pin	Reference standard
Human Body Mode	±4KV	All pins	JEDEC EIA/JESD22-A114
Machine Mode	±200V	All pins	JEDEC EIA/JESD22-A115
Charge Device Model	± 1KV	All pins	JEDEC EIA/JESD22-C101F

. Table 9. ESD protection characteristics

3. Hardware introduction

3.1 Functional block diagram

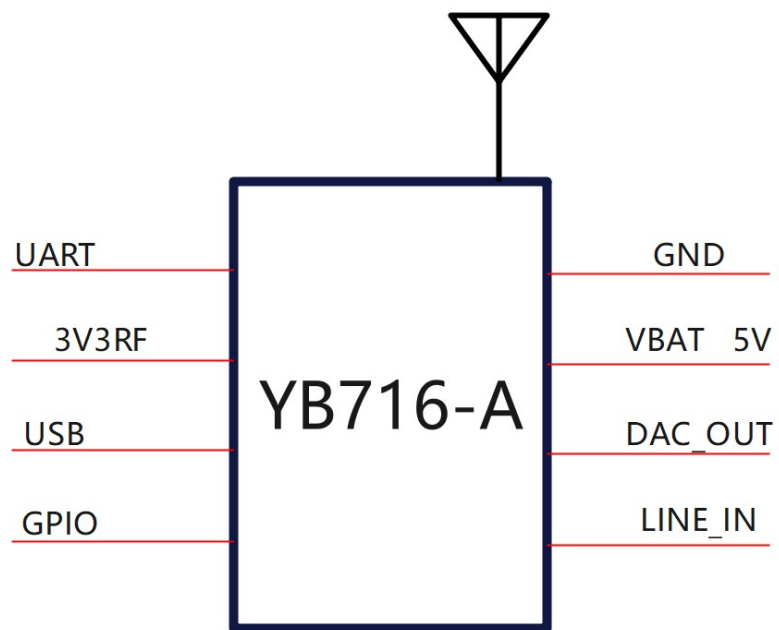


Figure 1. Block diagram of the YB7016-A module

3.2 Module size and pipe foot arrangement

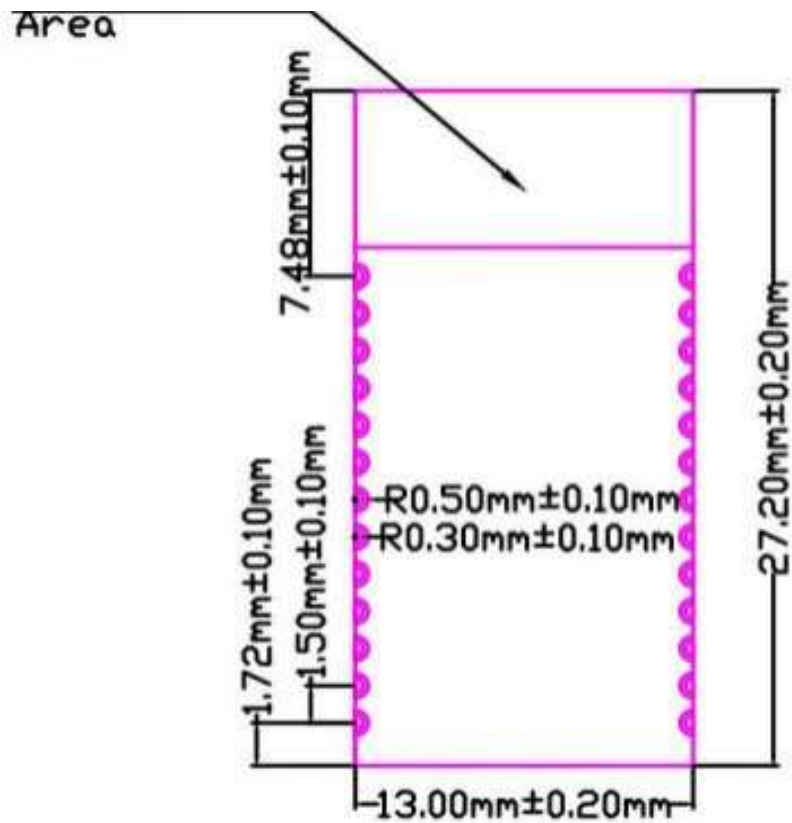


Figure 2. YB 716-A module dimensions diagram (front)

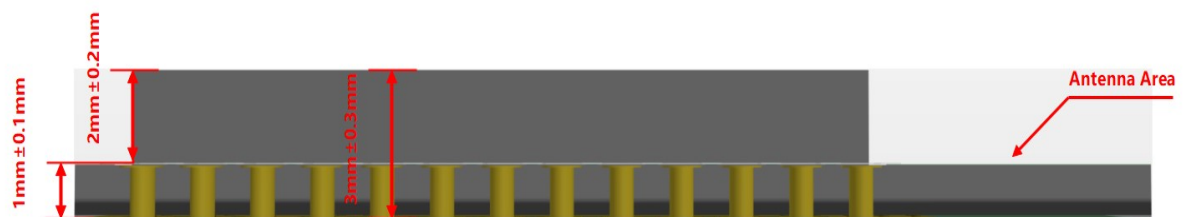


Figure 3. YB 716-A module thickness

3.3 Definition of pipe feet

Pin #	Name	Type	Description
1	UART_TX	I/O	Uart Data Output
2	UART_RX	I/O	Uart Data In put
3	3V3RF	POWER	RF front-end amplifier supply
4	NC	-	
5	GPIO3	I/O	General-purpose input/output
6	GPIO4	I/O	General-purpose input/output
7	GPIO5	I/O	General-purpose input/output
8	USB D M	I/O	USB Negative Data
9	USB D P	I/O	USB Positive Data
10	GPIO6	I/O	General-purpose input/output
11	GPIO7	I/O	General-purpose input/output
12	NC	-	
13	GND	GND	Ground
14	GPIO8	I/O	General-purpose input/output
15	NC	-	
16	GND	GND	Ground
17	AGND	GND	Audio analog ground
18	DACR	A O	Right channel audio output positive
19	DACL	A O	Left channel audio output positive
20	LINEIN_R	A I	Line in R
21	LINEIN_L	A I	Line in L
22	MIC IN_P	I/O	Microphone input positive
23	MIC IN_N	I/O	Microphone input negative
24	VBAT	POWER	System power supply
25	NC	-	
26	GND	GND	Ground

. Table 10 Definition of YB1120-A tube feet

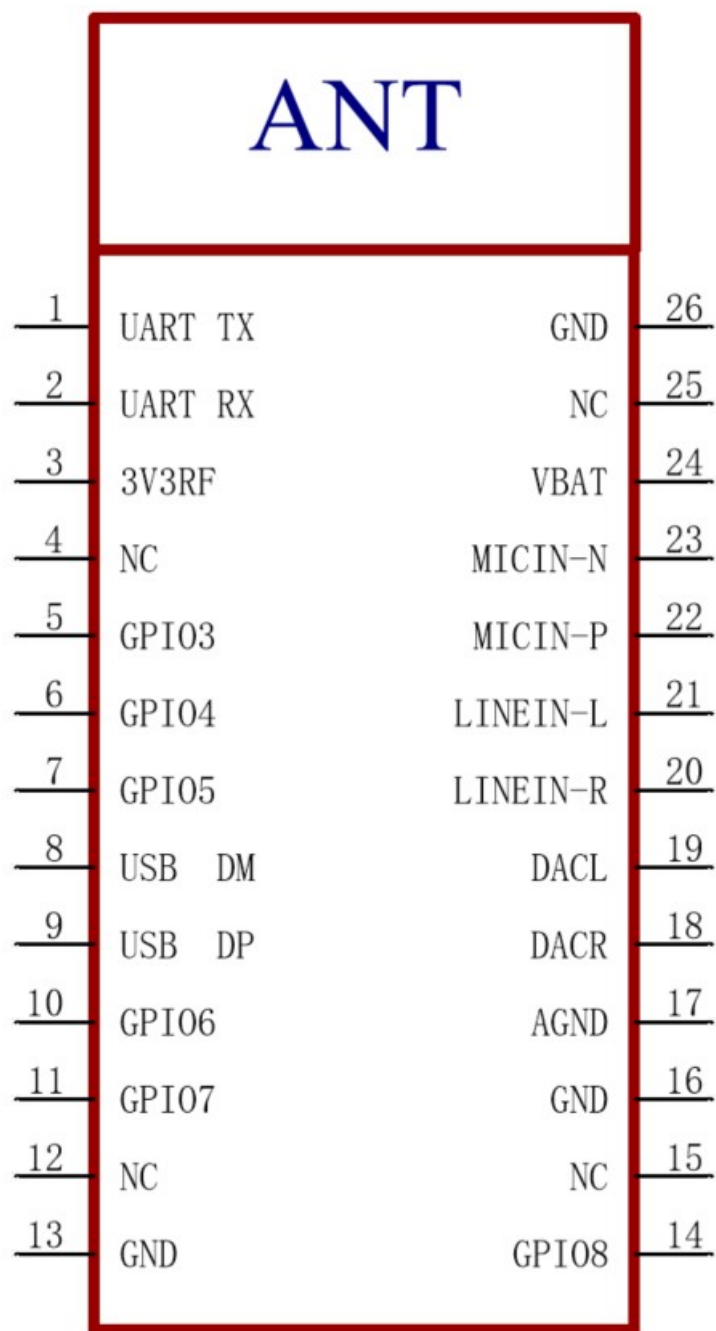


Figure 4. YB 716-A module tube pin diagram

3.4 Reference circuit

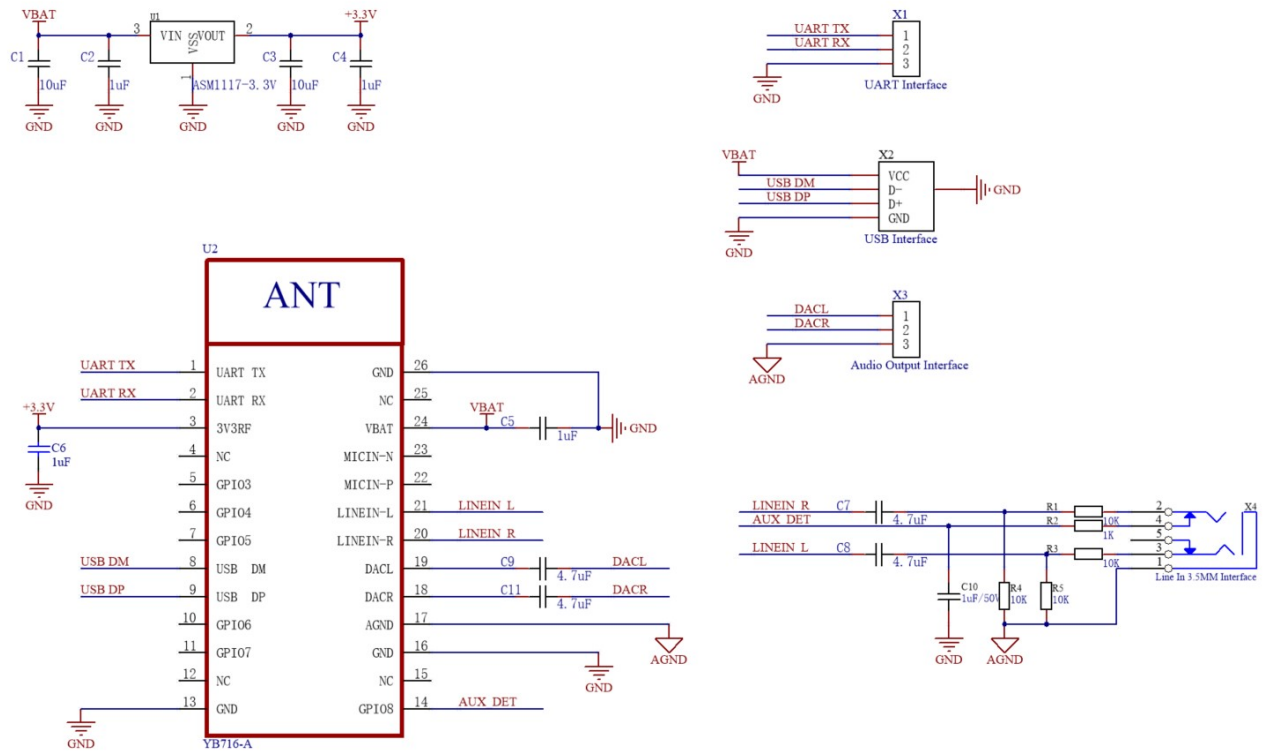


Figure 5. YB 716-A module reference circuit

4 The PCB design

4.1 Recommended disc size

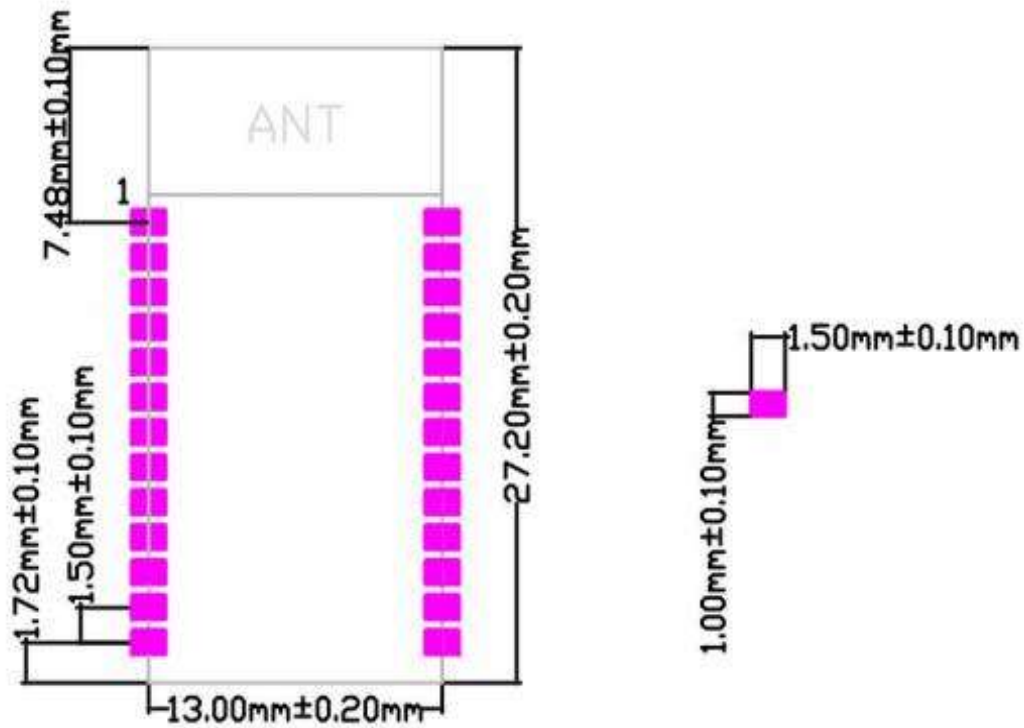
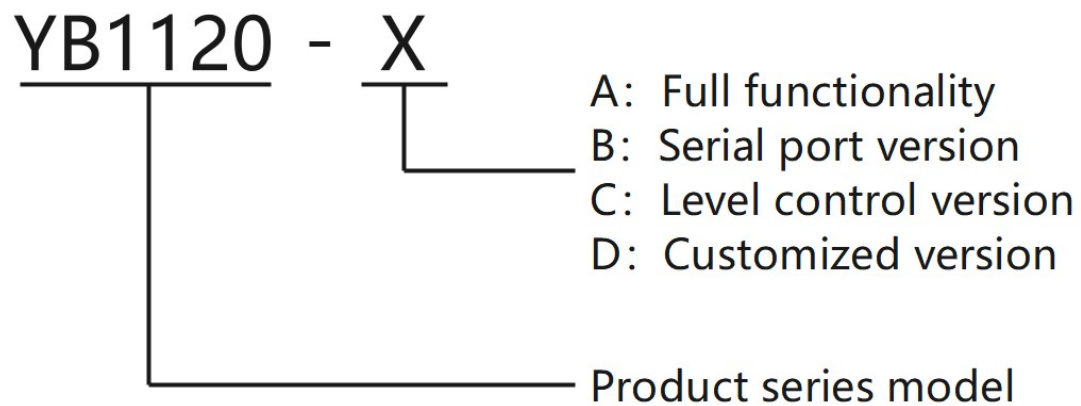


Figure 6. YB1120-A package size reference

4.2 Module installation method

SMT surface mount installation.

4.3 Model Description



4.4 PCB layout Notes

Bluetooth works at the frequency of 2.4GHz, so the influence of various factors on wireless sending and receiving should be avoided. Attention should be paid to the following points:

1. The part of the product enclosure avoids metal, and if the enclosure is metal, an external antenna should be considered.
2. The internal metal screws of the product should be kept away from the RF part of the module.
3. The module should be placed around the motherboard, with the antenna part on the side or corner. Copper or wiring is not allowed in the motherboard area below the module antenna.

5 The reflux parameters are recommended

The reflux parameters can refer to the following settings:

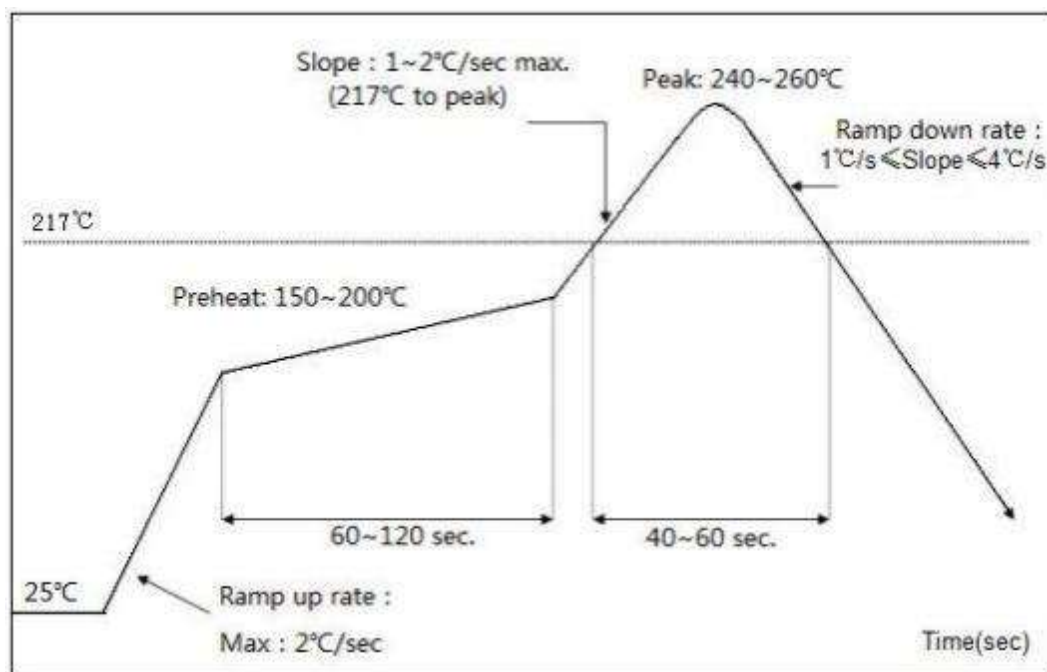


Figure 6. Return recommendation curve

Temperature range	Time	Key parameters
Preheat zone (<150°C)	60-120S	Ramp up rate: ≤2S
Uniform temperature zone (150-200°C)	60-120S	Ramp up rate: <1S
Recirculation zone (>217°C)	40-60S	Peak :240-260°C
Cooling zone	Ramp down rate :1°C/s ≤Slope ≤4°C/s	

Table 11. Recommended reflux parameters