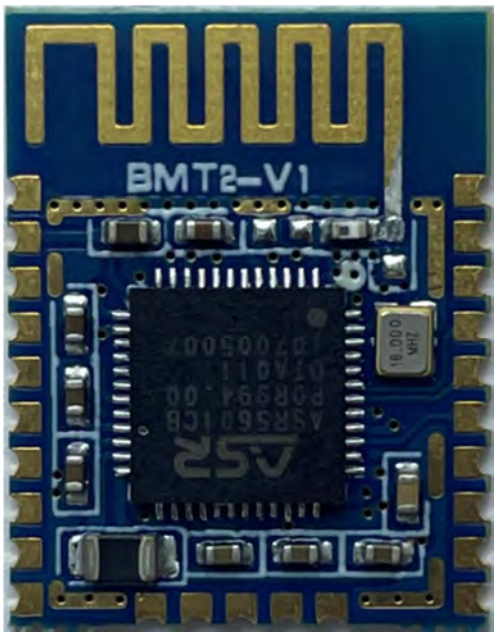
YX-BMA0 Bluetooth Module Datasheet



Version information

Version	Date	Author	Explain
V1.0	2020-10-16	Keys	Initial version
V1.1	2021-05-31	Keys	Fix description error

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catalogue

YX-BMA0 Bluetooth Module Datasheet 1
Version information 2
1. Summary 4
2. Module parameter 5
2.1 parameter 5
4、Antenna: PCB board antenna 5
2.2 Module pin description 7
2.3 YX-BMA0 Dimensions specifications 9
2.4 Module default factory settings 10
2.5 The Service UUID and Characteristic UUID of Module 11
3. Transmission test of mobile phone and module 12
3.1 Communication between module and mobile APP 12
4. Module AT instruction set 14
AT Instruction list 15
4.1 Test AT start 16
4.2 Module reset (restart) 16
4.3 Reset defult (restore factory settings) 16
4.4 Set module broadcast name 17
4.5 Set module broadcast interval 17
4.6 Set module broadcast switch 18
4.7 Setting baud rate of UART 18
4.8 Set the transmission power 20
4.9 Setting module connection parameters 21
4.10 Set the MAC of the module 22
4.11 Setting broadcast packet content of module 22
4.12 Setting the transmission Service UUID of the module 23
4.13 Set the module's transparent Notify eigenvalue (module→APP) 24
4.14 Set the characteristic value of the module's transparent receiving data (Phone APP -> module) 25
4.15 Send transparent data to mobile APP 26
4.16 Receiving data transmitted from mobile phone to MCU 26
4.17 Query module software version 27
4.18 Query module MAC address 27
4.19 Query work state of the module 27
4.20 Query module broadcast name 28
4.21 Query module broadcast interval 28
4.22 Query module broadcast content 28
4.23 Query module UART parameters 29
4.24 Query module transmit power 29
4.25 Query module connection parameters 29
5. PCB design considerations 30

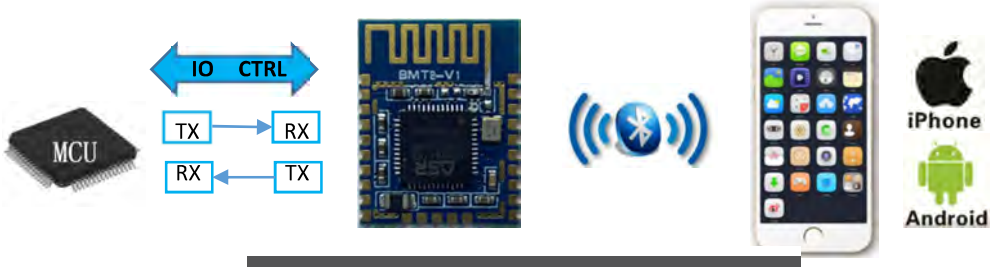
1. Summary

The YX-BMA0 Bluetooth wireless transmission module launched by Macrothings Technology is a Low-Power BLE / SIG mesh RF module based on ASR5601 chip of ASR Company. The module can realize the communication with Bluetooth devices at a very low total material cost, and has the characteristics of low power consumption, small size and strong anti-interference ability.

YX-BMA0 Bluetooth module can realize data transmission with mobile phone, through simple IO control can quickly use BLE technology. As a slave role, the module can be controlled by at command. Through the UART Port, it can set the IO pin status, serial port baud rate, modify the broadcast name of the module, modify the broadcast interval and connection interval and other parameters. Module support app, simple and convenient!

The company also supports customized development.

No need to learn ble development, Making Bluetooth control easier



Communication between module and mobile phone

The module is only used as personal (Device role), and communicates with mobile terminals such as mobile phones

- **Support UART transmission**
- **Support AT instruction set**
- **Support command control module IO status**

2. Module parameter

2.1 parameter

YX-BMA0 The detailed parameters of Bluetooth transmission module are shown in the table below：

Parameters of YX-BMA0 BLE wireless transmission module：	
PCB Dimension layer	1、Layer： 2
	2、Dimensions： 13.7*17.4*1.7mm
	3、Interface： 1.27mm Half hole stamp pin, paste directly to circuit board application
	4、Material: high permittivity and low loss plate for RF
Module features	1、Receiving sensitivity：-96dBm
	2、Operation Voltage： 1.8V-3.6V
	3、Operation Temp：-40℃ — 80℃
	4、Antenna: PCB board antenna
	5、Transmission distance: 30 meters in open sight
	6、Bluetooth version：5.0
	7、Transmission rate: wireless transmission rate up to 1.5KByte/s
	8、Power consumption: working current <10mA
Module software features	1、Support module UART instruction configuration
	2、Power on immediately start, fast connection speed
	3、Support Android 4.3 or above, IOS 7.0 or above, no MFI required
	4、Power off data saving of configuration parameters

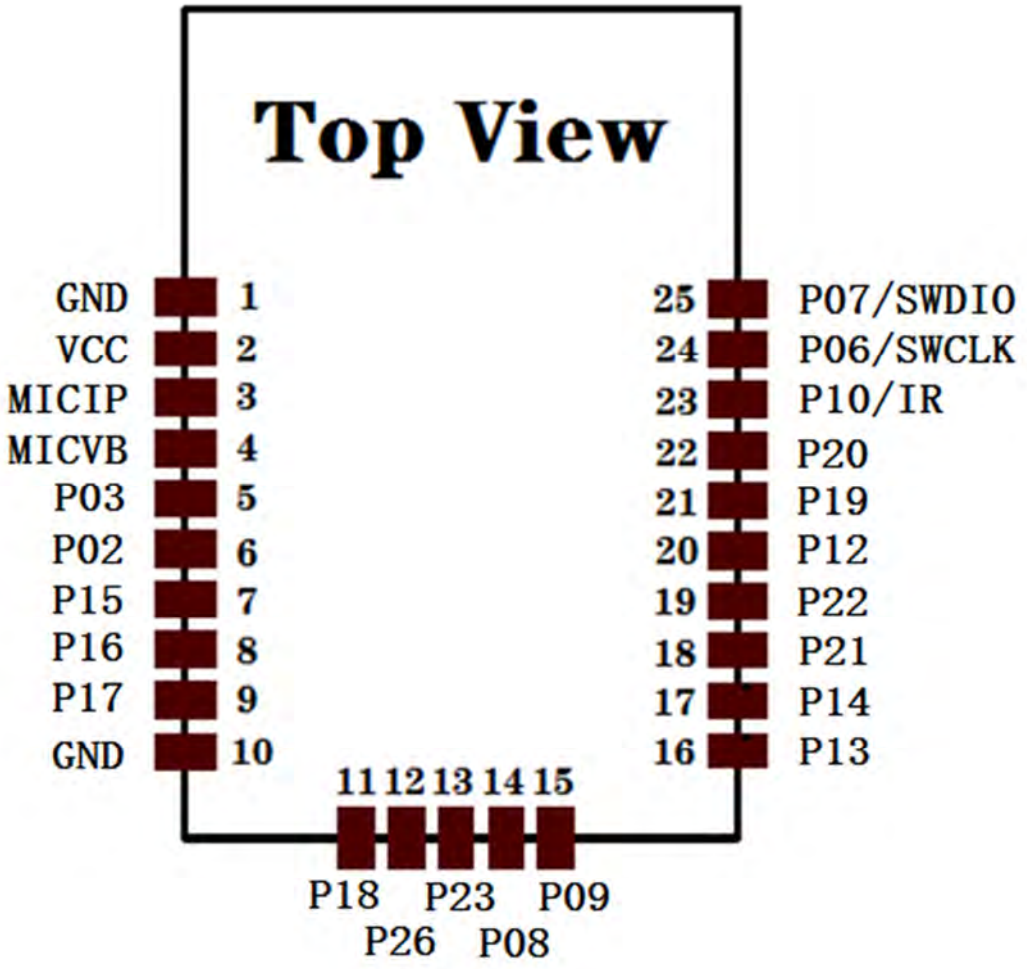
Module electrical characteristics：

Parameter		Condition	Minimum	Normal	Maximum	Unit
Storage temperature			-40		80	℃
Maximum welding temperature		IPC/JEDEC J-STD-020	245	255	260	℃
Operation Voltage		-	1.8	3.3	3.6	V
I/O	VIL/VIH	-	-0.3/0,75VIO	-	0.25VIO/3.6	V
	VOL/VOH	-	N/0.8VIO	-	0.1VIO/N	
	I MIAX	-	-	-	10.0	mA
Electrostatic discharge (manikin)		TAMP=25℃	-	-	2	KV
Electrostatic discharge (machine model)		TAMP=25℃	-	-	0.5	KV

Module Power consumption：

Test conditions	P18 status	Minimum	Normal	Maximum	Unit
Module broadcast, with an interval of 100ms	H	-	736	-	uA
Module broadcast, with an interval of 300ms	H	-	245	-	uA
Module broadcast, with an interval of 500ms	H	-	176	-	uA
Module broadcast, with an interval of 1000ms	H	-	106	-	uA
The module uses default parameters to connect with Android devices	H	-	4	-	mA
The module uses default parameters to connect to IOS devices	H	-	2	-	mA
Continuous operation of the module (sending and receiving data through UART)	L	-	10	-	mA

2.2 Module pin description



Using the cloud sharing YX-BMA0 transmission module, only a few pin functions and usage methods need to be concerned, so that it can directly interact with external serial devices to realize communication between the module and mobile phone.

SN	PIN	Description	Remarks
1	GND	Grounding	
2	VCC	Power	DC：1.8V—3.6V
3	MICIP	MIC interface	Microphone input connector
4	MICVB	MIC interface	Microphone auxiliary power supply
5	P03	GPIO	The reuse function is described in detail below
6	P02	GPIO	The reuse function is described in detail below
7	P15	GPIO	The reuse function is described in detail below
8	P16	GPIO	The reuse function is described in detail below
9	P17	GPIO	The reuse function is described in detail below

10	GND	Grounding	
11	P18	GPIO	Bluetooth broadcast status indication
12	P26	GPIO	Bluetooth connection status indication
13	P23	GPIO	The reuse function is described in detail below
14	P08	GPIO/TXD	Default UART transmitted TXD
15	P09	GPIO/RXD	Default UART transmitted RXD
16	P13	GPIO	The reuse function is described in detail below
17	P14	GPIO	The reuse function is described in detail below
18	P21	GPIO	The reuse function is described in detail below
19	P22	GPIO	The reuse function is described in detail below
20	P12	GPIO	The reuse function is described in detail below
21	P19	GPIO	The reuse function is described in detail below
22	P20	GPIO	The reuse function is described in detail below
23	P10	GPIO	The reuse function is described in detail below
24	P06	GPIO	The reuse function is described in detail below
25	P07	GPIO	The reuse function is described in detail below

explain:

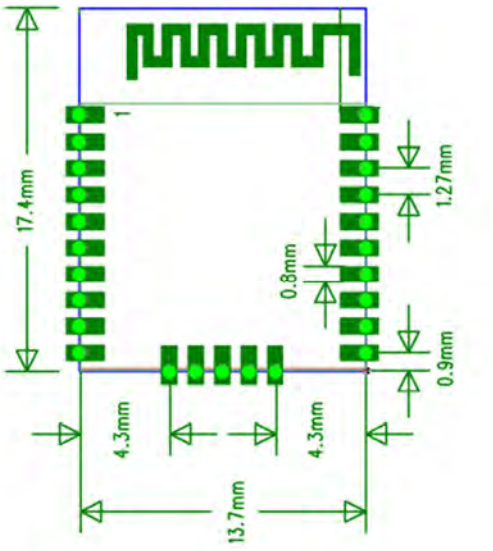
For P08 and p09, the functions of these two pins are locked by the transparent firmware. P18 is used to express the broadcast status of the module. High level indicates that the module is not broadcast and low level indicates that the module is in broadcast; P26 is used to describe the module Bluetooth indicator pin. High level indicates that Bluetooth is not connected, and low level indicates that Bluetooth is connected.

GPIO pins are multi-functional multiplexing, which can be set and used by customizing firmware. The multiplexing functions are shown in the table below：

NAME	Func=0	Func=1	Func=2	Func=3	Func=4	Func=5	Func=6	Func=7	Func=8	Func=9
P02	GPIO2	UART0_TXD	SPI0_CS	I2C0_SCL	PWM0	AXIS_0_P	KEY_ROW0	I2S_DI	SWC	
P03	GPIO3	UART0_RXD	SPI0_CLK	I2C0_SDA	PWM1	AXIS_0_N	KEY_ROW1	I2S_MCLK	SWD	
P06	SWC	UART3_TXD	SPI1_CS	I2S_SCLK	PWM4	AXIS_1_P	KEY_COL0	LPUART_TXD	GPIO6	ADC-0
P07	SWD	UART3_RXD	SPI1_CLK	I2S_LRCK	PWM5	AXIS_1_N	KEY_COL1	LPUART_TXD	GPIO7	ADC-1
P08	GPIO8	UART2_TXD	SPI1_TXD	I2S_DI	PWM6	AXIS_2_P	KEY_COL2	USB_DP	NA	ADC-2
P09	GPIO9	UART2_RXD	SPI1_RXD	I2S_MCLK	PWM7	AXIS_2_N	KEY_COL3	USB_DM	NA	ADC-3
P10	GPIO10	UART3_TXD	IR1	I2S_DO	PWM8	UART0_CTS	KEY_ROW4	NA	NA	ADC-4
P11	GPIO11	UART1_TXD	SPI0_CS	I2C1_SCL	PWM9	AXIS_1_N	KEY_ROW4	SWC	NA	ADC-5
P12	GPIO12	UART1_RXD	SPI0_CLK	I2C1_SDA	PWM10	I2S_DO	KEY_ROW5	SWD	NA	ADC-6
P13	GPIO13	UART3_TXD	SPI0_TXD	I2C0_SCL	PWM11	AXIS_0_P	KEY_COL4	LPUART_TXD	NA	ADC-7
P14	GPIO14	UART3_RXD	SPI0_RXD	I2C0_SDA	PWM0	AXIS_0_N	KEY_COL5	LPUART_TXD	NA	ADC-8
P15	GPIO15	UART0_TXD	SPI1_CS	I2S_SCLK	PWM1	AXIS_1_P	KEY_ROW6	USB_DP	NA	ADC-9
P16	GPIO16	UART0_RXD	SPI1_CLK	I2S_LRCK	PWM2	IR0	KEY_ROW7	USB_DM	NA	
P17	GPIO17	UART0_CTS	SPI1_TXD	I2S_DI	PWM3	AXIS_2_P	KEY_COL6	SWC	NA	
P18	GPIO18	UART0_RTS	SPI1_RXD	I2S_MCLK	PWM4	AXIS_2_N	KEY_COL7	SWD	NA	
P19	GPIO19	UART2_TXD	SPI0_CS	I2C0_SCL	PWM5	AXIS_0_P	KEY_ROW8	LPUART_TXD	NA	
P20	GPIO20	UART2_RXD	SPI0_CLK	I2C0_SDA	PWM6	AXIS_0_N	KEY_ROW9	LPUART_TXD	NA	
P21	GPIO21	UART0_TXD	SPI0_TXD	I2C1_SCL	PWM7	AXIS_1_P	KEY_ROW10	NA	NA	ADC-10
P22	GPIO22	UART0_RXD	SPI0_RXD	I2C1_SDA	PWM8	AXIS_1_N	KEY_ROW11	NA	NA	ADC-11
P23	GPIO23	UART1_TXD	SPI1_CS	I2C0_SCL	PWM9	AXIS_2_P	KEY_ROW12	LPUART_TXD	NA	
P26	GPIO26	UART3_RXD	SPI1_RXD	I2C1_SDA	PWM0	I2S_DO	KEY_ROW3	NA	NA	

2.3 YX-BMA0 Dimensions specifications

Customers can download the schematic package and PCB package of the module from Macrothings's network disk or the company's website. The detailed external dimensions of yx-bma0 are as follows：



2.4 Module default factory settings

Macrothings YX-BMA0 transparent transmission module has burned the firmware of Macrothings transparent transmission. In the firmware, the parameters of the module are configured as follows：

Item	Default parameters
Module role	Peripheral（Device）
Module name	YX-BMA0 BLE
Broadcast	100ms
Longest UART Fame	56 Bytes
Module address	Unique MAC address of the module itself
Baud rate of module UART	115200bps， Data bit 8 bit, stop bit 1 bit, no parity
Connection parameters	Connection interval min：6 Connection interval max：8 Latency：0 Timeout：100

Note：

1、 The smaller the broadcast interval of the module, the faster the response speed of APP or module connection will be, but the power consumption will increase accordingly.

2、 The connection parameters of the module affect the communication rate between the module and the mobile phone.

2.5 The Service UUID and Characteristic UUID of Module

The default Service and Characteristic UUID of Bluetooth module are as follows, and users can modify them through AT instruction. If you used the BLE transmission module before your product, you want to replace it with YX-BMA0 Bluetooth module now. In this case, APP does not need to modify it. Only modify UUID of YX-BMA0 Bluetooth module to an adaptive APP through AT instruction. Power off configuration parameters are saved. Power on again does not need to be reconfigured.

UUID	Parameters (Hex)
Service UUID	10190d0c0b0a09080706050403020100
Notify Characteristic UUID	102B0d0c0b0a09080706050403020100
Write Characteristic UUID	112B0d0c0b0a09080706050403020100
AT Characteristic UUID	103A0d0c0b0a09080706050403020100

Service UUID: main service

Notify Characteristic UUID: The UUID sent by the module to the APP. The attribute is Notify

Write Characteristic UUID: APP writes data to Bluetooth module

At characteristic UUID: AT instruction channel. The mobile phone writes at instruction to this UUID channel. The module receives at instruction and returns result through this channel. At present, only I/O control instruction is opened. The property is Write witch response

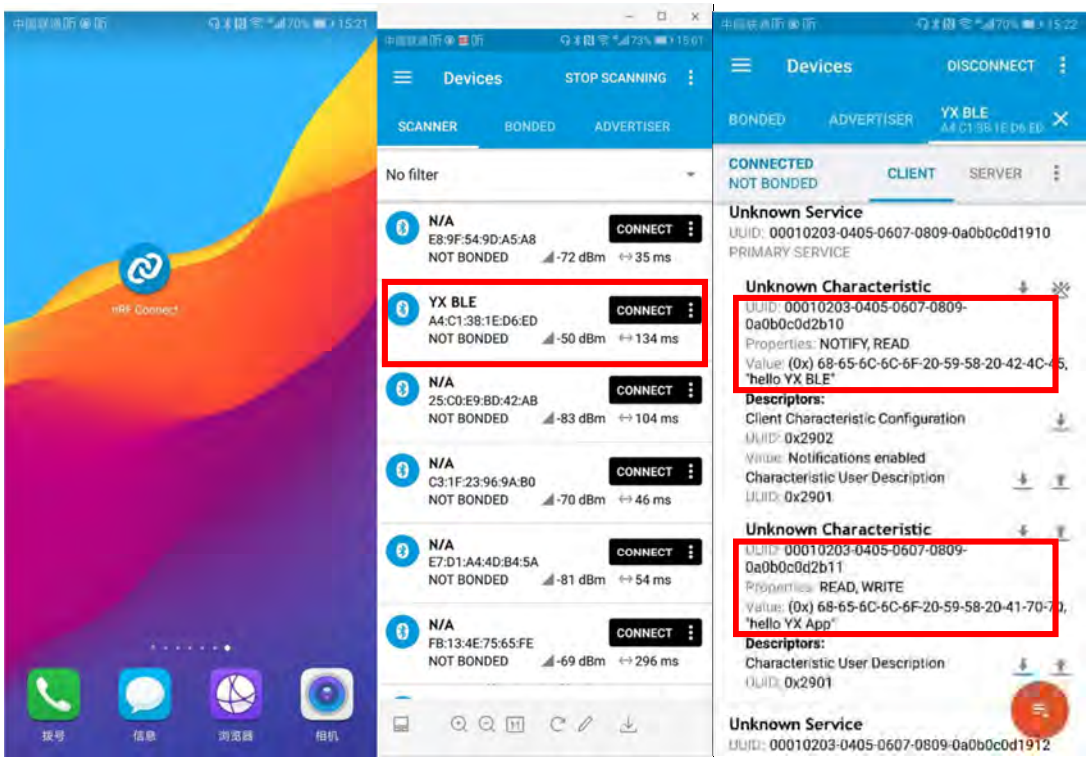
3. Transmission test of mobile phone and module

Macrothings provides a mobile APP for Bluetooth transmission module test, so users can quickly test the transmission module between mobile modules.

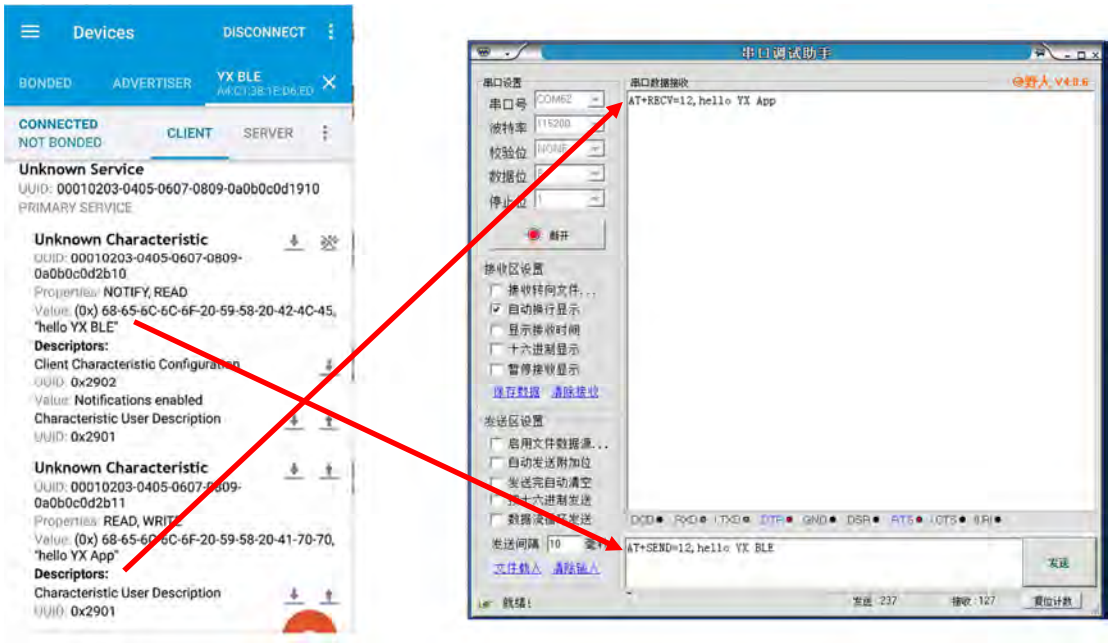
3.1 Communication between module and mobile APP

1、 Download tested phone APP： nRF Connect

2、 After the APP is installed, scan the device and connect to receive and send data.



3、 After successful connection, the mobile terminal can….



In this way, the interactive test between mobile phone and module is realized.

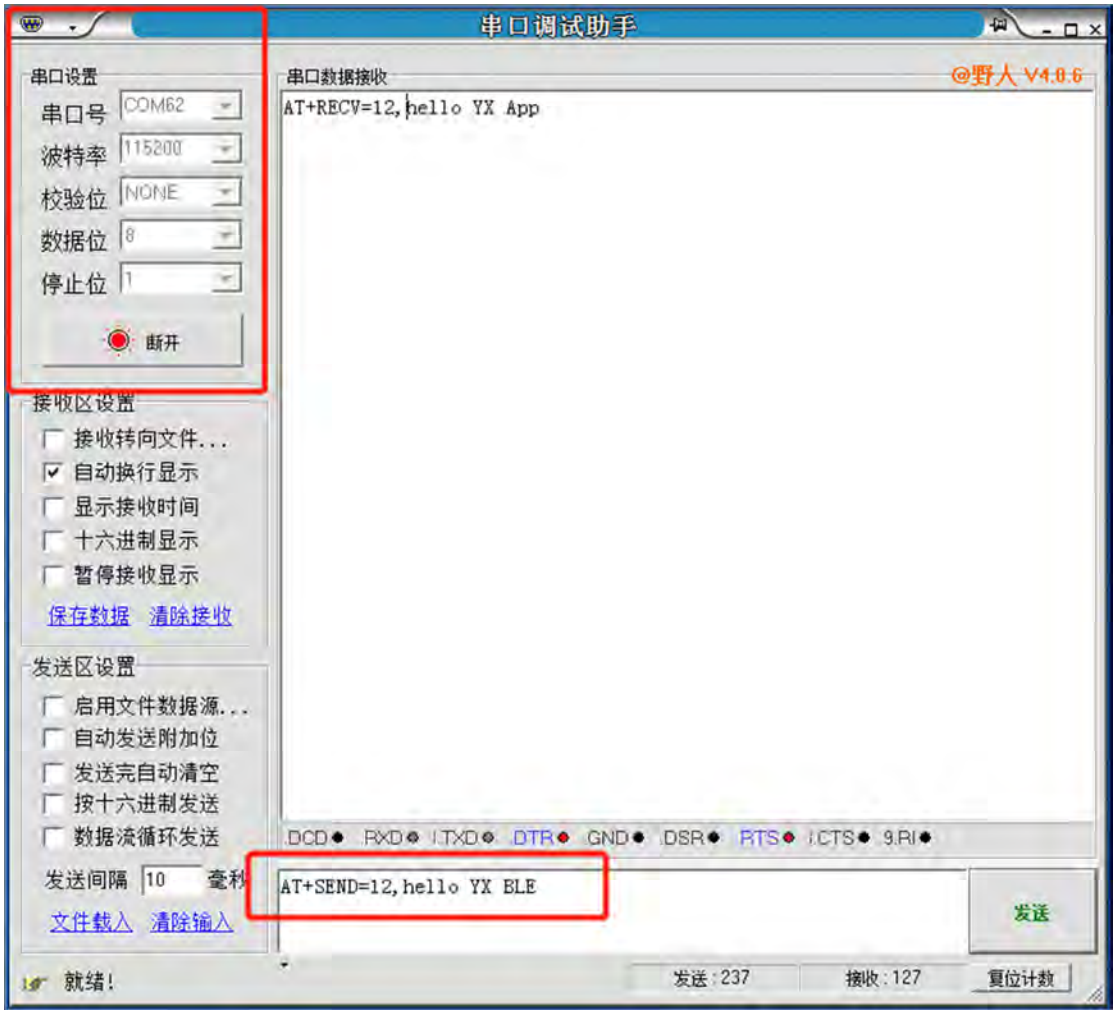
Open source test APP source, users who need to download on the network disk

（ Currently, Nordic official website APP is temporarily used)

4. Module AT instruction set

Macrothings YX-BMA0 Bluetooth transmission module supports AT command to configure it. Users only need to connect the module to PC serial port or mobile phone to send instructions to the module and receive the data that can be returned by the module.

Note: The YX-BMA0 Bluetooth module supports the mobile phone to send instructions to it (users can test it by themselves)。



NOTE:

1. All AT commands do not need to be added and returned (\r), and line change (\n);
2. Note that some AT setting instructions need to be restarted and effective;
3. The return result of the AT instruction ends with \r\n.

AT Instruction list

SN	**AT** Instruction set	Function
1	AT	Test whether the module is normal
2	AT+RST	Reset module
3	AT+RESTORE	The module returns to factory settings
4	AT+NAME=	Set module broadcast name
5	AT+ADV=	Set module broadcast interval
6	AT+EN_ADV=	Set module broadcast switch
7	AT+UART=<bautdrate>	Setting baud rate of UART
8	AT+dBm=	Set the transmission power
9	AT+CONN=Conn_min, Conn_max,Laytency,Timeout	Setting module connection parameters
10	AT+MAC=	Set the MAC of the module
11	AT+ADV_DATA=	Setting broadcast packet content of module
12	AT+ServiceUUID=length,uuid	Setting the transmission Service UUID of the module
13	AT+NotifyChar=length,uuid	Set the module's transparent Notify eigenvalue (Bluetooth module → mobile APP)
14	AT+WriteChar=length,uuid	Set the characteristic value of the module's transparent receiving data (mobile phone APP > Bluetooth module)
15	AT+SEND=length,data	Send transparent data to mobile APP
16	AT+RECV=length,data	Receiving data transmitted from mobile phone to MCU
17	AT+VER?	Query module software version
18	AT+MAC?	Query module MAC address
19	AT+STATE?	Query work state of the module
20	AT+NAME?	Query module broadcast name
21	AT+ADV?	Query module broadcast interval
22	AT+ADV_DATA?	Query module broadcast content
23	AT+UART?	Query module UART parameters
24	AT+dBm?	Query module transmit power
25	AT+CONN?	Query module connection parameters

4.1 Test AT start

Execute the order **AT**	Parameter description: not
	ACK: **AT=OK** It's success
	Example: **AT**
Note: return immediately after instruction execution	

4.2 Module reset (restart)

Execute the order **AT+RST**	Parameter description: not
	ACK: **AT+RST=OK**
	Example: **AT+RST**
Note: the module restarts immediately after the instruction is executed	

4.3 Reset defult (restore factory settings)

Execute the order **AT+RESTORE**	Parameter description: not
	ACK: **AT+RESTORE=OK**
	Example: **AT+RESTORE**
	Note: all parameters are restored to the previous default parameters, that is, the factory settings are restored
Note: after the instruction is executed, the module will reset immediately and then restart automatically	

4.4 Set module broadcast name

Execute the order **AT+NAME=**	Parameter description: Content to be set (within 18byte)
	ACK: **Success：AT+NAME=OK** **Failed：AT+NAME=ERR:01**
	Example： **AT+NAME=YX BLE** **Set the module name to YX BLE**
Note: the instruction will take effect immediately after execution	

4.5 Set module broadcast interval

Execute the order **AT+ADV=**	Parameter description: Broadcast interval parameters
	ACK: **Success：AT+ADV=OK** **Failed：AT+ADV=ERR:02**
	Example： **AT+ADV=160** **It indicates that the broadcasting interval is set to** **160*0.625ms=100ms** **The range is from 0x0020 to 0x3800**
Note: the instruction will take effect immediately after execution	

4.6 Set module broadcast switch

Execute the order **AT+EN_ADV=**	Parameter description: Broadcast enable switch, 1 means to turn on broadcast, 0 means to turn off broadcast
	ACK: **Starts broadcasting: AT+EN_ADV=On** **Stop broadcasting: AT+EN_ADV=Off** **Failed：AT+EN_ADV=ERR:03**
	Example： **AT+ EN_ADV =1** 1 means to turn on the broadcast
Note: the module takes effect immediately after the instruction is executed	

4.7 Setting baud rate of UART

Execute the order **AT+UART=** **<baudrate>**	Parameter description: bautdrate: 9600, 19200, 115200
	ACK: **Success：AT+UART=OK** **Failed：AT+UART=ERR:04**
	Example： **AT+UART=115200 Set the UART baud rate to 115200**
	Note: the default baud rate of the module is 115200bps 8-n-1
Note: after the instruction is executed, it needs to be restarted to take effect	

The UART of YX-BMA0 module receives 56Byte at most at one time, and the module exceeding 56Byte will be abandoned automatically and will not be transmitted through. Under the default connection parameters, the module and the mobile phone are transmitted through each other. When transmitting data, the rate shall be controlled within a reasonable range according to the

following two situations::

① In the case of 9600 baud rate, one packet of data is sent every 50ms, and 40Byte is sent for each packet;

② In case of baud rate 115200, a packet of data is sent every 30ms, and 40Byte is sent for each packet;

Both of the above are measured data. When users debug the products, they need to control the data rate reasonably.

4.8 Set the transmission power

<table>
<tr><td>Execute the order
AT+dBm=</td><td>Parameter description:
Transmit power to be set
<table>
<tr><td>Set value</td><td>Power value （dBm）</td><td>Set value</td><td>Power value （dBm）</td></tr>
<tr><td>0</td><td>Max (+10dBm)</td><td>5</td><td>-2dBm</td></tr>
<tr><td>1</td><td>+6dBm</td><td>6</td><td>-4dBm</td></tr>
<tr><td>2</td><td>+4dBm</td><td>7</td><td>-12dBm</td></tr>
<tr><td>3</td><td>+2dBm</td><td>8</td><td>-20dBm</td></tr>
<tr><td>4</td><td>0dBm</td><td>9</td><td>-25dBm</td></tr>
</table></td></tr>
<tr><td></td><td>ACK:
Success：AT+dBm=OK
Failed：AT+dBm=ERR:05</td></tr>
<tr><td></td><td>Example：
AT+dBm=2</td></tr>
<tr><td colspan="2">Note: the instruction will take effect immediately after execution</td></tr>
</table>

4.9 Setting module connection parameters

Execute the order **AT+CONN=Conn_min,Conn_max,** **Laytency,Timeout**	Parameter description: Conn_min:min conn parameters (8-10000) Conn_max:max conn parameters (8-10000) Laytency：time delay (0-4) Timeout: overtime, unit is ms
	ACK: **Success：AT+CONN=OK** **Failed：AT+CONN=ERR:06**
	Example： AT+CONN=20,40,0,1000 Set the module's:Conn_min：20 Conn_max：40 Laytency：0 Timeout：1000
Note: after the instruction is executed, the module needs to restart and take effect	

UUID	Default factory parameters	description
Connection interval min	6	The setting of module connection parameters will affect the ACK speed of mobile APP connecting Bluetooth module. Generally speaking, the smaller the connection parameters are, the faster the ACK speed is.
Connection interval max	8	
Latency	0	
Timeout	10	

In general, it is not necessary to use this command, and the default connection parameters are the best.

4.10 Set the MAC of the module

Execute the order **AT+MAC=**	Function description: Set the MAC of the module
	ACK: **Success：AT+MAC=OK** **Failed：AT+MAC=ERR:07**
	Example: AT+MAC=D5257864BFA0 Note:The set MAC address cannot be 0 or 1 of all
Note: after the instruction is executed, the module needs to restart and take effect	

4.11 Setting broadcast packet content of module

Execute the order **AT+ADV_DATA=**	Function description: In the Bluetooth broadcast of the device, the data packet allows the module to carry the user's data when broadcasting. In addition, if the application scenario does not need to be connected and has a small amount of data, the user can transfer the data to the mobile app or the host. The maximum length is 23 bytes. **The default parameter is the Bluetooth address of 0x00 + 0x00 + 6 bytes.**
	ACK: **Success：AT+ADV_DATA=OK** **Failed：AT+ADV_DATA=ERR:08**
	Example: AT+ADV_DATA=1234567890 Set the broadcast content to 0123456789
Note: effective immediately after execution	

4.12 Setting the transmission Service UUID of the module

Execute the order **AT+ServiceUUID=length,uuid**	Function description: length：**UUID has two lengths. If UUID is two bytes, it is 2; If UUID is 16 bytes, it is 16.** **uuid: the specific UUID value**
	ACK: **Success：AT+ServiceUUID=OK** **Failed：AT+ServiceUUID=ERR:09**
	Example: 1、AT+ServiceUUID=16,112233445566778899OOAABBCCEEDDFF Change the service UUID to: 112233445566778899OOAABBCCEEDDFF 2、 AT+ServiceUUID=2,FFF0 Change the service UUID to FFF0
Note: the restart will take effect after execution. If the service UUID is 16 bytes, the characteristic value is also 16 bytes.	

Note: the current version only supports 16 byte UUID

4.13 Set the module's transparent Notify eigenvalue (module→APP)

Execute the order **AT+NotifyChar=** **length,uuid**	Function description: length: UUID has two lengths. If UUID is two bytes, it is 2; If UUID is 16 bytes, it is 16. uuid: the specific UUID value. This eigenvalue is the channel sent by Bluetooth module to mobile app. The attribute of this eigenvalue is notification. If you need to replace the previous Bluetooth module, please make sure that the eigenvalue attribute sent by the previous Bluetooth module to the mobile app is notification. If it is indication, it is not suitable.
	ACK: **Success：AT+NotifyChar=OK** **Failed：AT+NotifyChar=ERR:10**
	Example： 1、AT+NotifyChar=16,11223344556677889900AABBCC EEDDFF Change the characteristic value UUID to： 11223344556677889900AABBCCEEDDFF 2、 AT+NotifyChar =2,FFF1 Change the characteristic value UUID to FFF1
Note: after execution, restart will take effect. If UUID is 16 bytes, the eigenvalue will also be 16 bytes.	

4.14 Set the characteristic value of the module's transparent receiving data (Phone APP -> module)

Execute the order **AT+WriteChar=length,uuid**	Function description: length: UUID has two lengths. If UUID is two bytes, it is 2; If UUID is 16 bytes, it is 16. uuid: the specific UUID value. This eigenvalue is the channel sent by Bluetooth module to mobile app. This eigenvalue is the channel for mobile app to send data to Bluetooth module. The attribute of this eigenvalue is: write
	ACK: **Success：AT+WriteChar=OK** **Failed：AT+WriteChar=ERR:11**
	Example： 1、AT+WriteChar=16,11223344556677889900AABBCC EEDDFF Change the characteristic value UUID to： 112233445566778899OOAABBCCEEDDFF 2、 AT+WriteChar =2,FFF2 Change the characteristic value UUID to FFF2
Note: after execution, restart will take effect. If UUID is 16 bytes, the eigenvalue will also be 16 bytes.	

4.15 Send transparent data to mobile APP

Execute the order **AT+SEND=** **length,data**	Function description: length: at present, the maximum length is 20 bytes, which cannot exceed 20 bytes. data: binary string.
	ACK: **Success：AT+SEND=OK** **Failed：AT+SEND=ERR:12**
	Example： 1、AT+SEND=4,abcd
Note: return immediately after execution.	

4.16 Receiving data transmitted from mobile phone to MCU

Execute the order **AT+RECV=** **length,data**	Function description: length: at present, the maximum length is 20 bytes, which cannot exceed 20 bytes. data: binary string.
	ACK: **not**
	Example： 1、AT+RECV=4,abcd
Note: return immediately after execution.	

4.17 Query module software version

Execute the order **AT+VER?**	Parameter description: not
	ACK: **AT+VER**=1.0.0
	Example: AT+VER?
Note: return immediately after instruction execution	

4.18 Query module MAC address

Execute the order **AT+MAC?**	Parameter description: not
	ACK: **AT+MAC**=AABBCCDDXXXX
	Example: AT+MAC?
Note: return immediately after instruction execution	

4.19 Query work state of the module

Execute the order **AT+STATE?**	Parameter description: not
	ACK: **AT+STATE**=advertising : Broadcast status **AT+STATE**=connected : Connection status
	Example: AT+STATE?
Note: return immediately after instruction execution	

4.20 Query module broadcast name

Execute the order **AT+NAME?**	Parameter description: not
	ACK: **AT+NAME**=YX BLE
	Example: **AT+NAME?**
Note: return immediately after instruction execution	

4.21 Query module broadcast interval

Execute the order **AT+ADV?**	Parameter description: not
	ACK: **AT+ADV=160** Broadcast interval：160*0.625ms=100ms
	Example: **AT+ADV?**
Note: return immediately after instruction execution	

4.22 Query module broadcast content

Execute the order **AT+ADV_DATA?**	Parameter description: not
	ACK: **AT+ADV_DATA**=XXX **XXX Return to the broadcast content of setting module**
	Example: **AT+ADV_DATA?**
Note: return immediately after instruction execution	

4.23 Query module UART parameters

Execute the order **AT+UART?**	Parameter description: not
	ACK: **AT+UART**=115200 115200 The current baud rate of the module is 115200
	Example: AT+UART?
Note: return immediately after instruction execution	

4.24 Query module transmit power

Execute the order **AT+dBm?**	Parameter description: not
	ACK: **AT+dBm=0**
	Example: AT+dBm?
Note: return immediately after instruction execution	

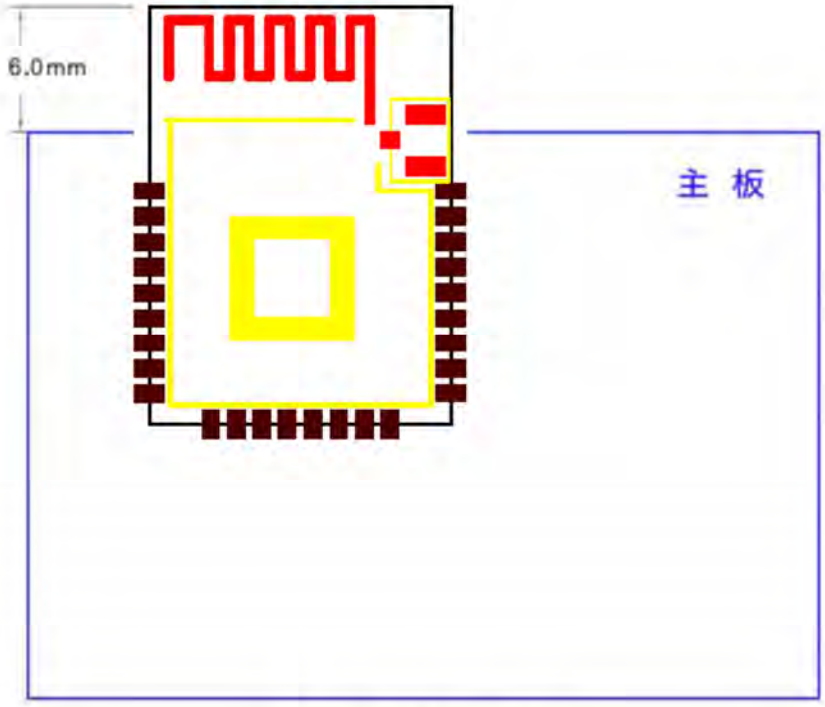
4.25 Query module connection parameters

Execute the order **AT+CONN?**	Parameter description: not
	ACK: **AT+CONN**=20, 40, 0, 200 Set the module's:Conn_min: 20 Conn_max: 40 Laytency: 0 Timeout: 200
	Example: AT+CONN?
Note: return immediately after instruction execution	

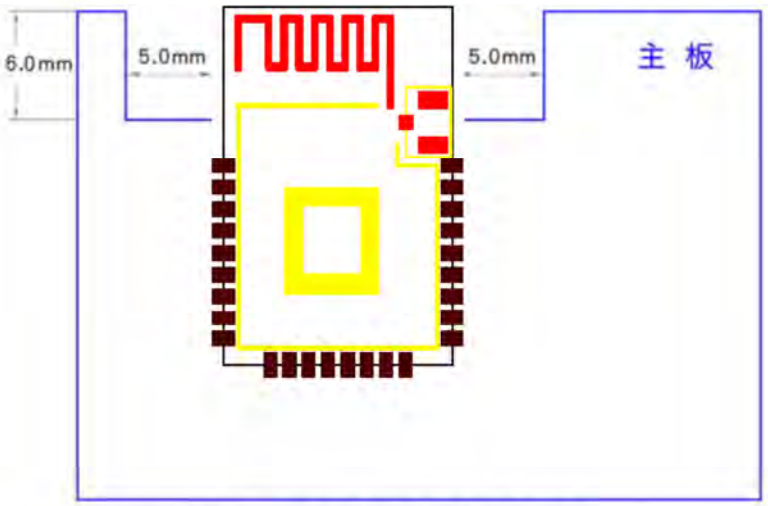
5. PCB design considerations

The module can be welded to the PCB board. In order to get the best RF performance of the terminal product, please pay attention to the placement of the module and antenna on the bottom board.

It is recommended that the module should be placed along the edge of PCB board, and the antenna should be placed outside the board frame or along the edge of the board and the bottom should be hollowed out. The antenna area should not be coated with copper and should not be wired as far as possible. Refer to the following：



方案 1：天线在板框外



方案 2：天线沿板边放置且下方挖空

Disclaimers

Shenzhen Macrothings Technology Co., Ltd. does not guarantee that this document is the latest user manual of the product. The company may modify the product specifications and product description at any time without prior notice. Our company reserves the right to change the products without prior notice, and we are not responsible for the results caused by their use or application. For the latest product manual, please visit our official website or consult our company.

FCC Statement

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.

Any Changes or modifications 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.

The Type S 5.0 BLE Module is designed to comply with the FCC statement. FCC ID is WUI-BLELED50. The host system using Type S 5.0 BLE Module Module, should have label indicated it contain modular's FCC ID： WUI-BLELED50 . This radio module must not installed to colocate and operating simultaneously with other radios in host system additional testing and equipment authorization may be required to operating simultaneously with other radio.

The Type S 5.0 BLE Module and its antenna must not be co-located or operating in conjunction with any other transmitter or antenna within a host device.

Notice to OEM integrator

The end user manual shall include all required regulatory information/warning as show in this manual. The OEM integrator is responsible for testing their end-product for any additional compliance requirements required with this module installed.

The OEM can use metal antennas or IPEX antennas, and the antenna gain is less than 6dBi for this module.

The device must be professionally installed

The intended use is generally not for the general public.lt is generally for industry/commercial use. The connector is within the transmitter enclosure and can only be accessed by disassembly of the transmitter that is not nomally required, the user has no access to the connector.Installation must be controlled. Installation requires special training.

This device complies with Part 15, Part 15.247 of the FCC Rules.

RF warning for portable device:

The device has been evaluated to meet general RF exposure requirement. The devicecan be used in portable exposure condition without restriction.

ISED Statement:

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada’s licence-exempt RSS(s). Operation is subject to the following two conditions:
1.This device may not cause interference.
2.This device must accept any interference, including interference that may cause undesired operation of the device.
The device has been evaluated to meet general RF exposure requirement. The devicecan be used in portable exposure condition without restriction.

The Type S 5.0 BLE Module is designed to comply with the ISED statement. IC is 7297A-BLELED50. The host system using Type S 5.0 BLE Module Module, should have label indicated it contain modular’s IC：7297A-BLELED50 . This radio module must not installed to colocate and operating simultaneously with other radios in host system additional testing and equipment authorization may be required to operating simultaneously with other radio.
Notice to OEM integrator
The end user manual shall include all required regulatory information/warning as show in this manual. The OEM integrator is responsible for testing their end-product for any additional compliance requirements required with this module installed.
The device must be professionally installed
The OEM can use metal antennas or IPEX antennas, and the antenna gain is less than 6dBi for this module. The intended use is generally not for the general public.lt is generally for industry/commercial use. The connector is within the transmitter enclosure and can only be accessed by disassembly of the transmitter that is not nomally required, the user has no access to the connector.Installation must be controlled. Installation requires special training.

Cet appareil contient des émetteurs/récepteurs exempts de licence qui sont conformes aux RSS exemptés de licence d'Innovation, Sciences et Développement économique Canada. L'exploitation est soumise aux deux conditions suivantes :
1.Cet appareil ne peut pas provoquer d'interférences.
2.Cet appareil doit accepter toute interférence, y compris les interférences susceptibles de provoquer un fonctionnement indésirable de l'appareil.
L'appareil a été évalué pour répondre aux exigences générales d'exposition aux RF. L'appareil peut être utilisé dans des conditions d'exposition portable sans restriction.

Le module BLE de type S 5.0 est conçu pour se conformer à la déclaration ISDE. IC est 7297A-BLELED50. Le système hôte utilisant le module de module BLE de type S 5.0 doit avoir une étiquette indiquant qu'il contient l'IC：7297A-BLELED50 du modulaire. Ce module radio ne doit pas être installé pour colocaliser et fonctionner simultanément avec d'autres radios dans le système hôte. Des tests supplémentaires et une autorisation d'équipement peuvent être nécessaires pour fonctionner simultanément avec d'autres radios.
Avis à l'intégrateur OEM

Le manuel de l'utilisateur final doit inclure toutes les informations/avertissements réglementaires requis, comme indiqué dans ce manuel. L'intégrateur OEM est chargé de tester son produit final pour toute exigence de conformité supplémentaire requise avec ce module installé.
L'appareil doit être installé par un professionnel
L'utilisation prévue n'est généralement pas destinée au grand public. Elle est généralement destinée à un usage industriel/commercial. Le connecteur se trouve à l'intérieur du boîtier du transmetteur et n'est accessible qu'en démontant le transmetteur qui n'est pas normalement requis, l'utilisateur n'a pas accès au connecteur. L'installation doit être contrôlée. L'installation nécessite une formation spéciale.