XY-MBA32A Bluetooth Module

Data sheet

SHENZHEN NEWBIT INFO TECHNOLOGY CO.,LTD

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www.newbitsiot.com

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1 Device Overview

1.1 Description

XY-MBA32A is a powerful, highly flexible, ultra-low power **Bluetooth® 5.1** module based on **ASR Technology ASR5601C**, which has an Arm® Cortex™-M0+ CPU with the floating-point unit running at 64MHz. Built-in 512KB Flash, 96KB SRAM, rich configurable peripheral interfaces, and high-performance low-power Bluetooth RF, transmit power adjustable from -30dBm to +10dBm, receive sensitivity of -98dBm. In addition, the module also integrates a 16MHz crystal oscillator and IPEX port(RF PCB printed antenna), industrial-grade design, a RoHS process, and half-hole pins for easy production processing.

1.2 Key Features

1.2.1 Hardware Features

- Frequency: 2402 MHz ~ 2480 MHz
- Package: 12.8 x17.93mm(Half-hole), 18pins
- Compiles with Bluetooth V5.2, and 125K/500K/1M/2M bps data rates
  - TX: Up to +10dBm transceiver output power
  - RX: -98 dBm sensitivity @ 1 Mbps
    -107dBm@125Kbps
  - Link layer and AES/CCM integrated
- CPU
  - ARM Cortex-M0+ @64MHz
  - Hardware multiplier
- Memory
  - SRAM 96 KB
  - Flash 512 KB
- Power
  - Power supply range: 1.7 V ~ 3.6 V
- Clock and Timer
  - 16 MHz crystal and RC oscillator
  - 32-bit timer
  - 4 32-bit general-purpose timers PWM
  - Watchdog
- Peripherals
  - 18 general-purpose I/Os. Function IO any-route support
  - 5 UARTs with hardware flow control
  - 3 SPIs with master/slave configurable, 2 of them are master and another one is the slave
  - 2 I^2Cs with master/slave configurable
  - I^2S data in the interface
  - Keypad interface
  - Infra-red generator
  - PWM
  - 8-channel 12-bit AUX_ADC
  - Temperature sensor
- DMA
- Frequency deviation: -1KHz(Min.), 10KHz(Typ.),

15KHz(Max.) - Support internal RTC

- Modulation: GFSK

1.2.2 Software Features

- Serial port transparent transmission, no need for any Bluetooth experience
- The connection interval is 20ms in default
- Support AT command to reset the module and get the MAC address
- Support AT command to adjust the Bluetooth connection interval and control different forwarding rates (dynamic power adjustment)
- Support AT command to adjust transmit power, modify broadcast interval, customize broadcast data, modify serial port baud rate, modify module name
- Support full-featured BT5.2 protocol
- Support tailor-made exclusive software to meet customer needs; CPU frequency is up to 64MHz, and interface resources are rich.
- Support OTA(over-the-air) upgrade function for easy maintenance
- Support master-slave integrated function (when the Bluetooth module is connected to the mobile phone, it can also be connected to other Bluetooth devices)
- Support multiple 1 master and 4 slaves connection applications

1.3 Applications

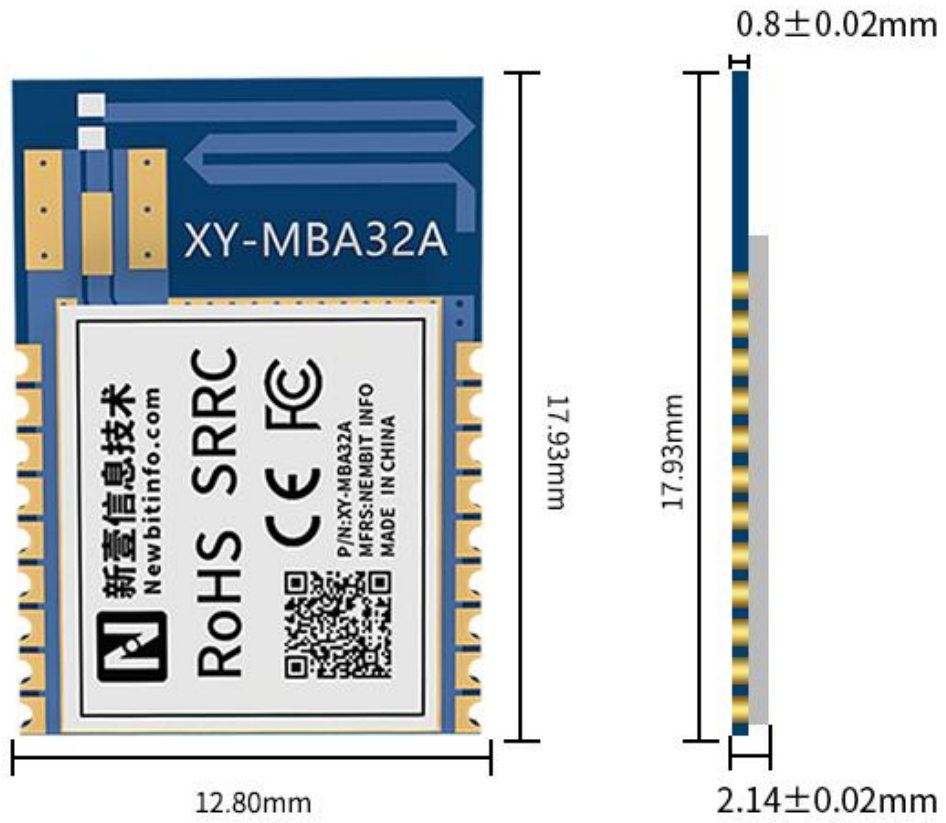
- **IoT**
  - Home automation
  - Sensor networks
  - Building automation
  - Industrial automation
- **Personal area networks**
  - Health/fitness sensor and monitor devices
  - Medical devices
  - Key fobs and wrist watches
- **Interactive entertainment devices**
  - Remote controls
  - Gaming controllers
  - VR/AR
- **Enterprise lighting**
  - Industrial
  - Commercial
  - Retail
- **Beacons**

2 Module default parameter configuration

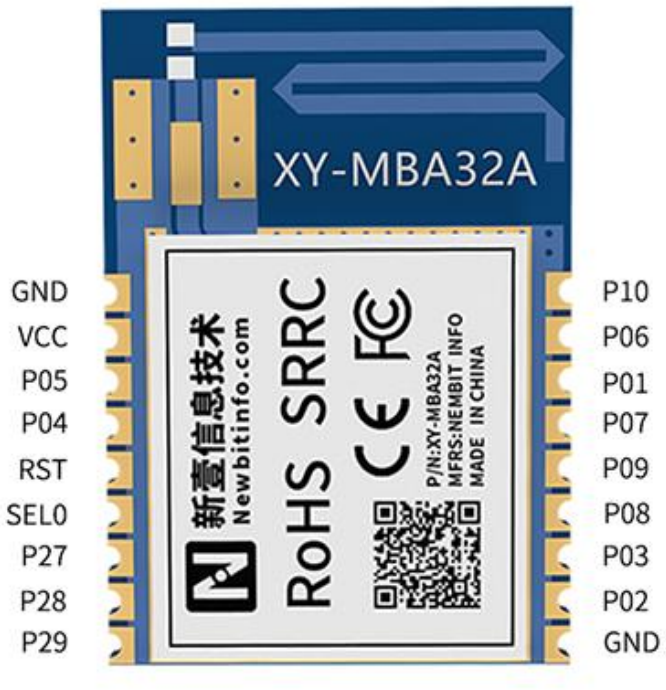
Parameter	Default value
Serial port configuration	115200bps
Module Name	Nbee-(MAC address)
Broadcast interval	200mS
Connection interval	20mS
TX power	0dBm
BLE Read/Write channel	FFF1/FFF2

3 Mechanical Details and Pin Assignment

3.1 Mechanical Details



3.2 Pin Assignment



Pin No.	Pin Name	Chip Pin Name	I/O	Description
Pin1	GND	GND	-	Ground
Pin2	VCC	VCC	-	Power Supply: 2V-3.6V
Pin3	-	P05	I/O	The pin of the burning program
Pin4	-	P04	I/O	The pin of the burning program
Pin5	RES	RST	I	Module Reset, Low Active
Pin6	-	SEL0	I	Burn enable pin
Pin7	-	P27	I/O	Reserve
Pin8	-	P28	I/O	Reserve
Pin9	-	P29	I/O	Reserve

Pin10	GND	GND	-	Module ground
Pin11	TX	P02	O	UART_TX, Data transmit output pin
Pin12	RX	P03	I	UART_RX, Data transmit input pin
Pin13	CDS	P08	O	Low level: The AT command is not recognized, and all data is recognized as transparent data; High level: automatic recognition of AT commands and transparent transmission of data.
Pin14	LINK	P09	O	Connection status indication pin: Low level: Bluetooth is connected, High level: Bluetooth is not connected In the sleep state, this pin fails.
Pin15	WAKE	P07	I	Wake-up pin: It does not sleep by default, and the module sleep function is enabled on the first falling edge. Wake up the module at a low level; go to sleep at a high level.
Pin16	-	P01	I/O	Reserve
Pin17	-	P06	I/O	Reserve
Pin18	-	P10	I/O	Reserve

4 Module Performances

4.1 Data Transmission Rate

Test environment: master-slave module data transmission and reception, use the PC serial port tool to set a single packet of 1KB data, send at intervals of 10ms, the baud rate is 115200bps, the timing is 1-minute data transmission and reception, the measured rate is greater than 10.5KB/S, the specific test conditions are as the following table.

No.	The direction of data transfer	Transmission Duration	Measured transmission rate	Sending and receiving data		Packet Loss Percentage
				Sending	Receiving	
1	The slave sends data to the master	60S	10.55KB/S	648192	648192	0.0000%
2	The slave sends data to the master	60S	10.6583KB/S	655360	654848	0.0781%
3	The slave sends data to the master	60S	10.6667KB/S	655360	655360	0.0000%
4	The slave sends data to the master	60S	10.6583KB/S	655360	654848	0.0781%
5	The slave sends data to the master	60S	10.5417KB/S	648192	647680	0.0790%
6	The slave sends data to the master	60S	10.6750KB/S	656384	655872	0.0780%
7	The slave sends data to the master	60S	10.7000KB/S	657408	657408	0.0000%
8	The slave sends data to the master	60S	10.6667KB/S	655360	655360	0.0000%
9	The slave sends	60S	10.6583KB/S	655360	654848	0.0781%

	data to the master					
10	The slave sends data to the master	60S	10.7000KB/S	657408	657408	0.0000%
11	The master sends data to the slave	60S	10.7012KB/S	657480	657480	0.0000%
12	The master sends data to the slave	60S	10.6500KB/S	654336	654336	0.0000%
13	The master sends data to the slave	60S	10.6917KB/S	657408	656896	0.0779%
14	The master sends data to the slave	60S	10.6750KB/S	656384	655872	0.0780%
15	The master sends data to the slave	60S	10.4167KB/S	640000	640000	0.0000%
16	The master sends data to the slave	60S	10.6583KB/S	655360	654848	0.0781%
17	The master sends data to the slave	60S	10.6750KB/S	656384	655872	0.0780%
18	The master sends data to the slave	60S	10.6667KB/S	655360	655360	0.0000%
19	The master sends data to the slave	60S	10.6583KB/S	655360	654848	0.0781%
20	The master sends data to the slave	60S	10.7167KB/S	658432	658432	0.0000%

4.2 Power Consumption

The following table shows the power consumption data of the module in various states measured with the power supply (supply voltage 3.3V).

Status	Broadcast/Connection Interval（ms）	Average Current (uA)
Idle	—	16uA
Broadcast	20ms	1.19mA
	200ms	170.51uA
	500ms	82.3uA
	1000ms	49.94uA
	5000ms	24.42uA
Connection	30ms	317.32uA

4.3 Electrical Characteristics

4.3.1 Absolute Maximum Ratings

Parameter	Min	Max	Unit
Storage Temperature	-40	125	℃
VDD	-0.3	3.9	V
Other Pins	-0.2	VDD+0.3≤3.9	V

4.3.2 Recommended operating conditions

Parameter	Min	Recommended Value	Max	Unit
Operating	-40	—	85	℃

Temperature				
VDD	1.7	3.3	3.6	V

5 AT Commands List

Command	Command Description
AT+MAC?<CR><LF>	Query the MAC address
AT+MAC=<MAC><CR><LF>	Set the MAC address of the module
AT+NAME=<string><CR><LF>	Set the device name
AT+NAME?<CR><LF>	Query the device name
AT+ADV=<num><CR><LF>	Set the broadcasting status
AT+ADV? <CR><LF>	Query the broadcasting status
AT+UART=<num><CR><LF>	Set the baud rate
AT+UART?<CR><LF>	Query the baud rate
AT+DISCONN=<num><CR><LF>	Disconnect the Bluetooth connection
AT+SCAN=<num><CR><LF>	Set the status of Bluetooth scanning
AT+CONN=<MAC><CR><LF>	Connect to the device with the specified MAC address
AT+DEV?<CR><LF>	Query the connected device currently
AT+AUTO_MAC=<MAC><CR><LF>	Save the list of MACs that are set to reconnect automatically
AT+AUTO_CFG=X<CR><LF>	Automatic reconnection settings
AT+AUTO_DEL<CR><LF>	Delete the automatic reconnection list
AT+UUIDS=<uuid><CR><LF>	Set the BLE main service channel
AT+UUIDS?<CR><LF>	Query the BLE main service channel
AT+UUIDN=<uuid><CR><LF>	Set the BLE read service channel
AT+UUIDN?<CR><LF>	Query the BLE read service channel
AT+UUIDW=<uuid><CR><LF>	Set the BLE write service channel
AT+UUIDW?<CR><LF>	Query the BLE write service channel
AT+AINTVL=<num><CR><LF>	Modify the broadcasting interval
AT+AINTVL?<CR><LF>	Query the broadcasting interval
AT+VER? <CR><LF>	Query the firmware version
AT+REST=1<CR><LF>	Restore
AT+REBOOT=1<CR><LF>	Set the module to reboot

Remarks:

<CR><LF> is the ASCII code 0x0d and 0x0a；

The serial port prompt for successful power-up or restart(+READY <CR><LF>), the host MCU must receive this message before it can operate instruction and data transmission.

6 AT Commands Specific Description

Query the MAC address

Command Description: Query the address of the Bluetooth module
Read/Write: Read only
Command: AT+MAC? <CR><LF>
Supported parameters: N/A
Setup/Response:

R/W	Command Format	Response	Remarks
R	AT+MAC? <CR><LF>	+MAC: 000102030405<CR><LF>	Return the MAC address: 00:01:02:03:04:05

Set the MAC address of the module

Command Description: Set the MAC address of the Bluetooth module, which will take effect after restarting.
Read/Write: Write only
Command: AT+MAC=<mac><CR><LF>
Supported parameters: 000000000000-FFFFFFFFFFFF
Setup/Response:

R/W	Command Format	Response	Remarks
W	AT+MAC=<mac><CR><LF>	OK<CR><LF>	Setup successfully
		ERROR<CR><LF>	Setup failure

Set the device name

Command Description: Set the device name, which will take effect immediately.
Read/Write:: Write only
Command: AT+NAME=<string><CR><LF>
Supported parameters: User-defined, the total length does not exceed 20 bytes.
Setup/Response:

R/W	Command Format	Response	Remarks
W	AT+NAME=<string><CR><LF>	OK<CR><LF>	Setup successfully
		ERROR<CR><LF>	Setup failure

Query the device name

Command Description: Query the device name
Read/Write: Read only
Command: AT+NAME? <CR><LF>
Supported parameters: NA
Setup/Response:

R/W	Command Format	Response	Remarks
R	AT+NAME? <CR><LF>	+NAME: <string><CR><LF>	<string> is the current BLE device name

Set the broadcasting status

Command Description: Set the Bluetooth broadcast status of the device, which will take effect immediately, and resume broadcasting after reset and restart.
Read/Write: Write only
Command: AT+ADV=<num><CR><LF>
Supported parameters: 0-Turn off broadcasting 1-Turn on broadcasting
Setup/Response:

R/W	Command Format	Response	Remarks
W	AT+ADV=<num><CR><LF>	OK<CR><LF>	Setup successfully
		ERROR<CR><LF>	Setup failure

Query the broadcasting status

Command Description: Get the hardware version of the module
Read/Write: Read only
Command: AT+ADV?<CR><LF>
Supported parameters: N/A
Setup/Response:

R/W	Command Format	Response	Remarks
R	AT+ADV?<CR><LF>	+ADV: X<CR><LF>	X=0 Device broadcast is turned off X=1 Device broadcasting is turned on

Set the baud rate

Command Description: Set the baud rate
Read/Write: Write only
Command: AT+UART=<num><CR><LF>
Supported parameters: 0:9600, 1:14400, 2:19200, 3:38400, 4:57600, 5:115200
Setup/Response:

R/W	Command Format	Response	Remarks
W	AT+UART=<num><CR><LF>	OK<CR><LF>	Setup successfully
		ERROR<CR><LF>	Setup failure

Query the baud rate

Command Description: Query the baud rate
Read/Write: Read only

Command: AT+UART?<CR><LF>
Supported parameters: NA
Setup/Response:

R/W	Command Format	Response	Remarks
R	AT+UART?<CR><LF>	+UART: <num><CR><LF>	0:9600; 1:14400; 2:19200; 3:38400; 4:57600; 5:115200;

Disconnect the Bluetooth connection

Command Description: Get the current working status of the module
Read/Write: Write only
Command: AT+DISCONN=<num><CR><LF>

Supported parameters: 0-Disconnect all connected slave devices
1-Actively disconnect from the host device
Setup/Response:

R/W	Command Format	Response	Remarks
W	AT+DISCONN=<num><CR><LF>	+DISCONN: <num>, <MAC><CR><LF>	This machine is disconnected from the <mac> device.

Set the status of Bluetooth scanning

Command Description: Set the status of Bluetooth scanning
Read/Write: Write only
Command: AT+SCAN=<num><CR><LF>
Supported parameters: 0-Turn off the scanning function immediately; 1-Turn on the scanning function (the scanning duration is 6S, and the scanning stops after 6S)
Setup/Response:

R/W	Command Format	Response	Remarks
W	AT+SCAN=<num> <CR><LF>	+SCAN:<CR><LF> <MAC> <TYP> <RSSI> <DEVICE	

		NAME><CR><LF> ... +SCAN END<CR><LF>	

Remarks：

Scan nearby Bluetooth devices, and the returned data starts with "+SCAN: <CR><LF>" and ends with "+SCAN END <CR><LF>"; repeat multiple device information in the middle: <mac> <type> <rssi> [name] <CR><LF>, scan device information including: **MAC address, address type, RSSI value, broadcast name**. (Some devices do not have a broadcast name, so the scanned information may only have the MAC address, address type, and RSSI value).

Return: +SCAN: <CR><LF>, indicating THAT THE SCAN code is turned ON.

Return: 001B10F4DA0B 1-35 NBEE<CR><LF>, the device information obtained is the MAC address is 00:1B:10:F4:DA:0B, the ADDRESS type is 1, THE RSSI is -35dbm, and the device name is NBEE.

Return: +SCAN END<CR><LF>, INDICATING THAT THE SCAN code has BEEN STOPPED.

Connect to the device with the specified MAC address

Command Description: Connect to the device with the specified MAC address
Read/Write: Write only
Command: AT+CONN=<MAC><CR><LF>
Supported parameters: 000000000000-FFFFFFFFFFFF
Setup/Response:

R/W	Command Format	Response	Remarks
W	AT+CONN=<MAC><CR><LF>	+CONNECTED:0, <MAC><CR><LF>	Successfully connected to <MAC> target device
		+CONNECT TIMEOUT<CR><LF>	Connection timeout
		ERROR<CR><LF>	The MAC address format is incorrect and the connection failed

Query the connected device currently

Command Description: Query the connected device currently
Read/Write: Read only
Command: AT+DEV?<CR><LF>
Supported parameters: NA

Setup/Response:

R/W	Command Format	Response	Remarks
R	AT+DEV?<CR><LF>	+DEV:<TYP>,<MAC><CR><LF> …	TYP=0 means that the connected device is the main terminal connected device. TYP=1 means that the connected device is a slave-connected device. <MAC> is the MAC address corresponding to the connected device.

Save the list of MACs that are set to reconnect automatically

Command Description: Save the list of MACs that are set to reconnect automatically
Read/Write: Write only
Command: AT+AUTO_MAC=<MAC><CR><LF>
Supported parameters: 000000000000-FFFFFFFFFFFF
Setup/Response:

R/W	Command Format	Response	Remarks
W	AT+AUTO_MAC=<MAC><CR><LF>	OK<CR><LF>	Use the MAC address to automatically connect to a slave device and save it (only the settings are saved, no connection is initiated).
		ERROR<CR><LF>	Setup failure

Automatic reconnection settings

Command Description: Automatic reconnection settings
Read/Write: Write only
Command: AT+AUTO_CFG=<num><CR><LF>
Supported parameters: 0: Turn off automatic reconnection
1: Turn on automatic reconnection
Setup/Response:

R/W	Command Format	Response	Remarks

W	AT+AUTO_CFG=<num><CR><LF>	OK<CR><LF>	Setup successfully
		ERROR<CR><LF>	Setup failure

Delete the automatic reconnection list

Command Description: Delete the automatic reconnection list
Read/Write: Write only
Command: AT+AUTO_DEL<CR><LF>
Supported parameters: N/A
Setup/Response:

R/W	Command Format	Response	Remarks
W	AT+AUTO_DEL<CR><LF>	OK<CR><LF>	Delete all the MAC addresses saved by automatic connection
		ERROR<CR><LF>	Setup failure

Set the BLE main service channel

Command Description: Set up the BLE main service channel, which will take effect after restarting.
Read/Write: Write only
Command Code: AT+UUIDS=<uuid><CR><LF>
Supported parameters: 16-bit or 128-bit UUID
Setup/Response:

R/W	Command Format	Response	Remarks
W	AT+UUIDS=<uuid><CR><LF>	OK<CR><LF>	Setup successfully
		ERROR<CR><LF>	Setup failure

Remarks:

16bit UUID example: FFF0
128bit UUID example: 11223344556677889900112233445566

Query the BLE main service channel

Command Description: Query the BLE main service channel.
Read/Write: Read only
Command: AT+UUIDS?<CR><LF>
Supported parameters: N/A
Setup/Response:

R/W	Command Format	Response	Remarks
R	AT+UUIDS?<CR><LF>	+UUIDS:<uuid><CR><LF>	Take the value of <UUID> UUID in 16bit format or 128bit format

Set the BLE read service channel

Command Description: Set the BLE read service channel
Read/Write: Write only
Command: AT+UUIDN=<uuid><CR><LF>
Supported parameters: 16-bit or 128-bit UUID
Setup/Response:

R/W	Command Format	Response	Remarks
W	AT+UUIDN=<uuid><CR><LF>	OK<CR><LF>	Setup successfully
		ERROR<CR><LF>	Setup failure

Remarks:

16bit UUID example: FFF1
128bit UUID example: 11223344556677889900112233445566

Query the BLE read service channel

Command Description: Query the BLE read service channel
Read/Write: Read only
Command: AT+UUIDN?<CR><LF>
Supported parameters: NA

Setup/Response:

R/W	Command Format	Response	Remarks
R	AT+UUIDN?<CR><LF>	+UUIDN:<uuid><CR><LF>	Take the value of <UUID> UUID in 16bit format or 128bit format

Set the BLE write service channel

Command Description: Set the BLE write service channel, take effect after reboot.
Read/Write: Write only
Command: AT+UUIDW=<uuid><CR><LF>
Supported parameters: 16-bit or 128-bit UUID
Setup/Response:

R/W	Command Format	Response	Remarks
W	AT+UUIDW=<uuid><CR><LF>	OK<CR><LF>	Setup successfully
		ERROR<CR><LF>	Setup failure

Remarks:

16bit UUID example: FFF2
128bit UUID example: 11223344556677889900112233445566

Query the BLE write service channel

Command Description: Query the BLE write service channel.
Read/Write: Write only
Command: AT+UUIDW?<CR><LF>
Supported parameters: N/A
Setup/Response:

R/W	Command Format	Response	Remarks
R	AT+UUIDW?<CR><LF>	+UUIDW:<uuid><CR><LF>	Take the value of <UUID> UUID in 16bit format or 128bit

			format

Modify the broadcasting interval

Command Description: Modify the broadcasting interval.
Read/Write: Write only
Command: AT+AINTVL=<num><CR><LF>
Supported parameters: 20 – 10240ms
Setup/Response:

R/W	Command Format	Response	Remarks
W	AT+AINTVL=<num><CR><LF>	OK<CR><LF>	Setup successfully
		ERROR<CR><LF>	Setup failure

Query the broadcasting interval

Command Description: Query the broadcasting interval.
Read/Write: Read only
Command: AT+AINTVL?
Supported parameters: N/A
Setup/Response:

R/W	Command Format	Response	Remarks
R	AT+AINTVL?	+AINTVL:<num><CR><LF>	The interval is in ms.

Query the firmware version

Command Description: Query the firmware version.

Read/Write: Read only
Command: AT+VER?<CR><LF>
Supported parameters: N/A
Setup/Response:

R/W	Command Format	Response	Remarks
R	AT+VER?<CR><LF>	+VER:V1.0.0<CR><LF>	V1.0.0 is the firmware version.

Restore

Command Description: Restore factory settings, this command takes effect after reboot, MAC address cannot be restored after modification.
Read/Write: Write only
Command: AT+RESET=1<CR><LF>
Supported parameters: 1
Setup/Response:

R/W	Command Format	Response	Remarks
W	AT+RESET=1<CR><LF>	OK<CR><LF>	Setup successfully
		ERROR<CR><LF>	Setup failure

Reboot

Command Description: Reboot.
Read/Write: Write only
Command: AT+REBOOT=1<CR><LF>
Supported parameters: 1
Setup/Response:

R/W	Command Format	Response	Remarks
W	AT+REBOOT=1<CR><LF>	OK<CR><LF>	Setup successfully
		ERROR<CR><LF>	Setup failure

7 BLE Protocol Description (APP Interface)

Transparent transmission data channel【Service UUID: 0xFFF0】

Characteristic values UUID	Executable operations	Default Value	Remarks
0xFFF2	Write	No	The written data will be output from the serial TX port.
0xFFF1	notify	No	Data input from the serial RX port will generate a notification to the mobile device on this channel.

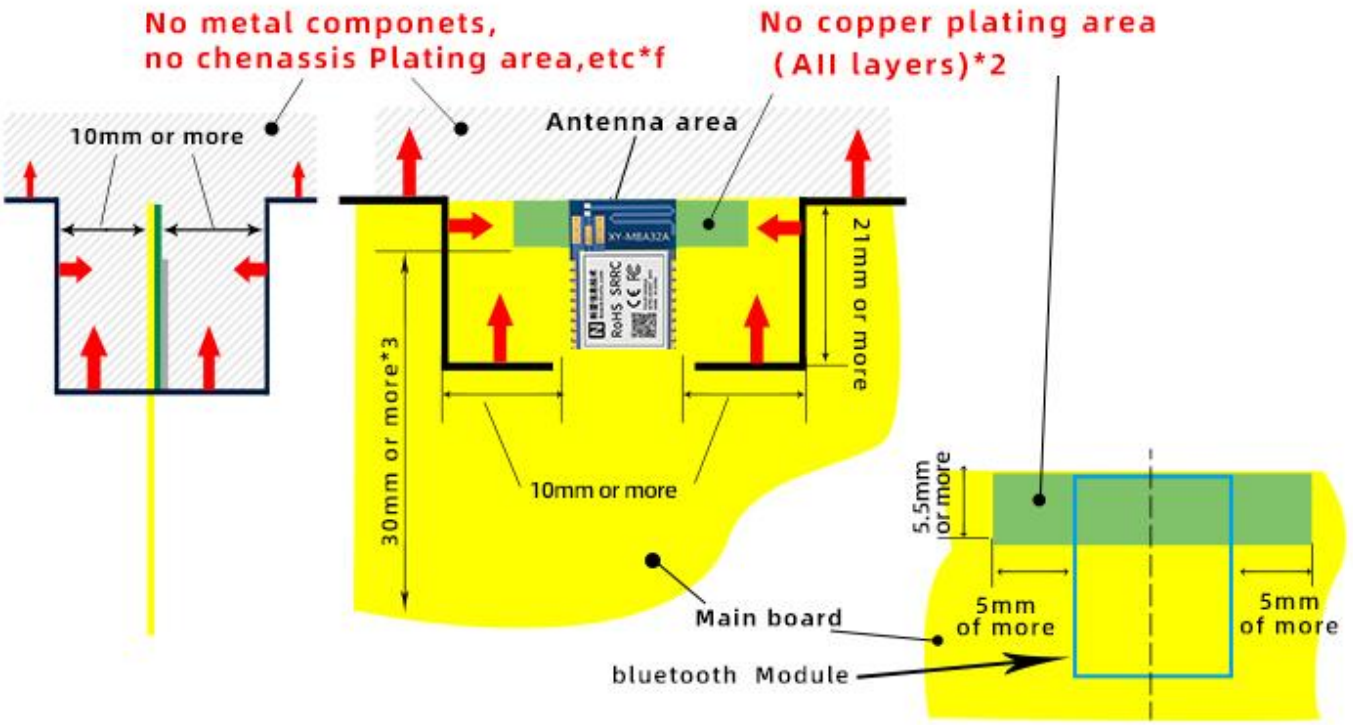
Description:

APP sends data to MCU via 0xFFF2 channel. MCU sends data to APP via 0xFFF1 channel. Users can also customize the read/write channel via AT commands.

8 Mounting Suggestion

You can refer to the following references for the mounting design of the module with an onboard antenna (XY-MBD58B with PCB antenna).

Recommended module mounting example:

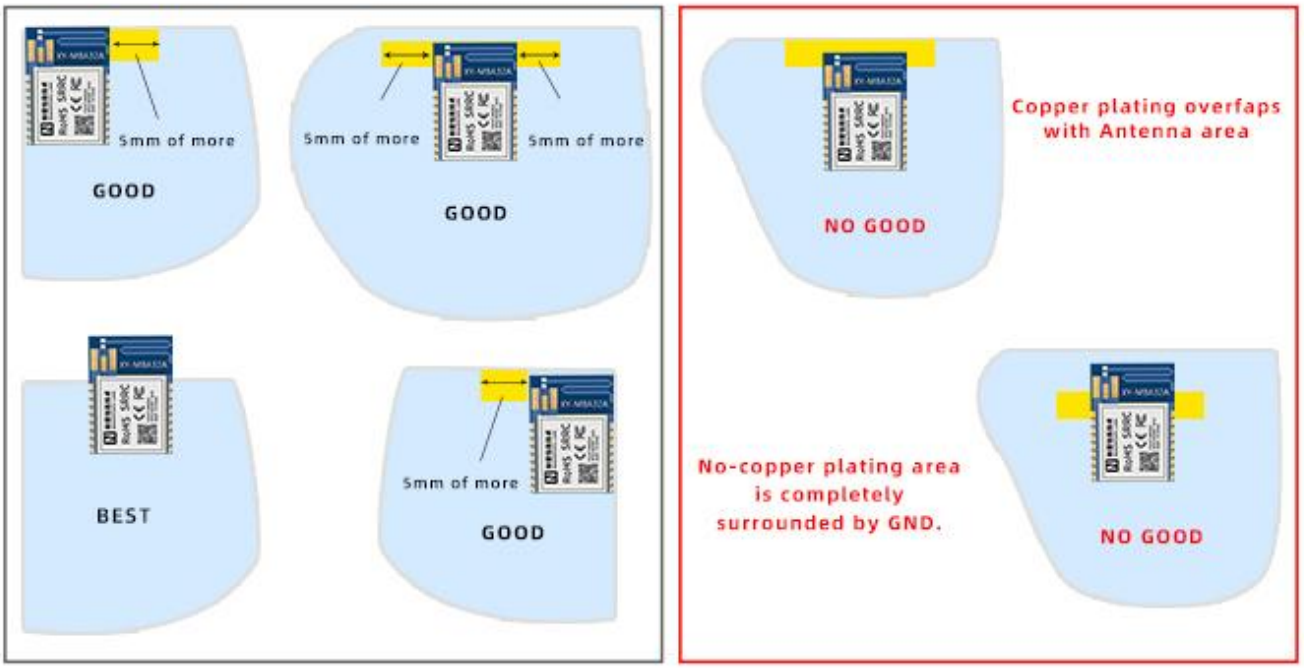


- Please do not place any metal components in blue shaded space (*1), such as signal line and metal chassis as possible except for the mainboard while mounting the components in *1 space on the mainboard is allowed except for no copper plating area (*2).
- (*2) This area is a routing prohibited area on the mainboard. Please do not place any copper on any layer.
- (*3) Characteristics may deteriorate when the GND pattern length is less than 30mm. It should be as 30 mm or more as possible.
- For the best Bluetooth range performance, the antenna area of the module shall extend 3 mm outside the edge of the mainboard, or 3 mm outside the edge of a ground plane.

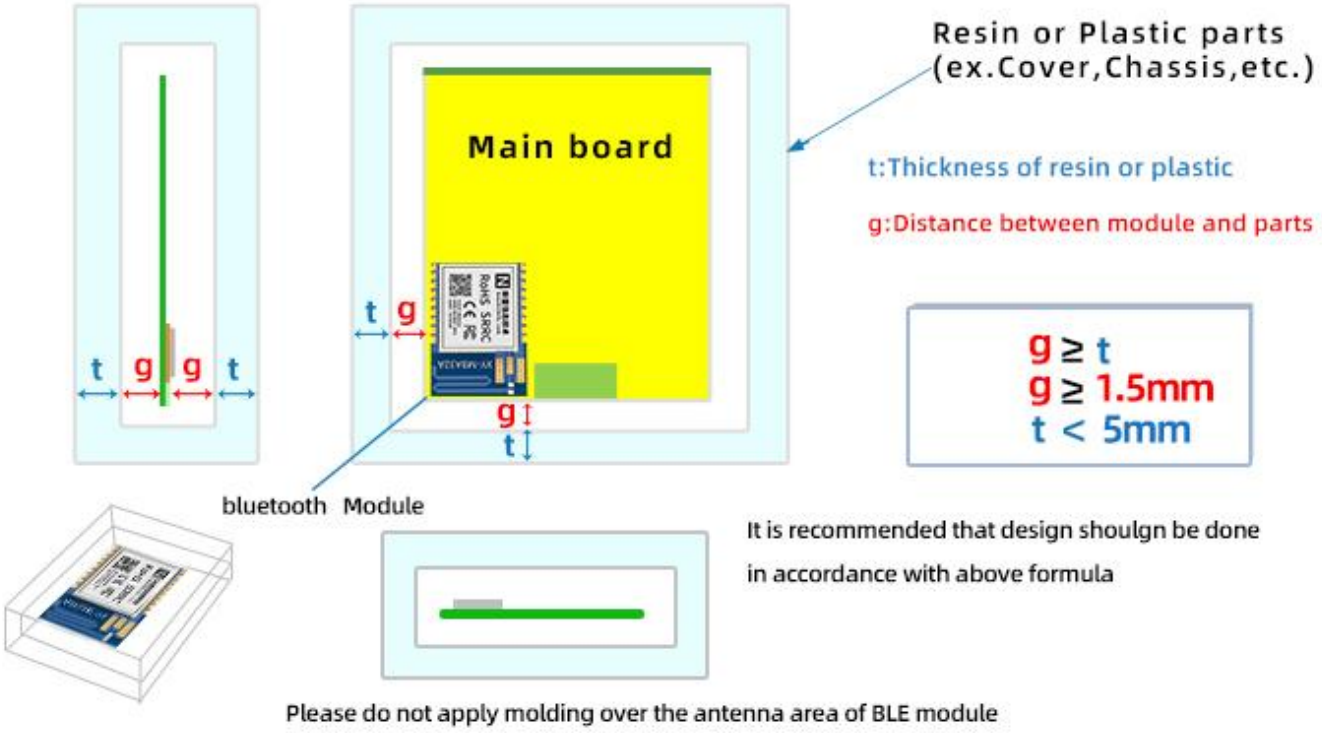
The ground plane shall be at least 5 mm from the edge of the antenna area of the module.

- All module GND pins MUST be connected to mainboard GND. Place GND vias close to module GND pads as possible. Unused PCB area on a surface layer can be flooded with copper but place GND vias regularly to connect copper flood to the inner GND plane. If GND floods the copper underside the module then connects with GND vias to the inner GND plane.
- Even when the above-mentioned condition is satisfied, communication performance may be significantly deteriorated depending on the structure of the product. Bluetooth range performance is degraded if a module is placed in the middle of the mainboard.
- For mainboard layout:
  - Avoid running any signal line below the module whenever possible.
  - No ground plane below the antenna.
  - If possible, cut off the portion of the main board below the antenna.

Other modules mounting example:



Placement of resin or plastic parts:



Placement of metal parts

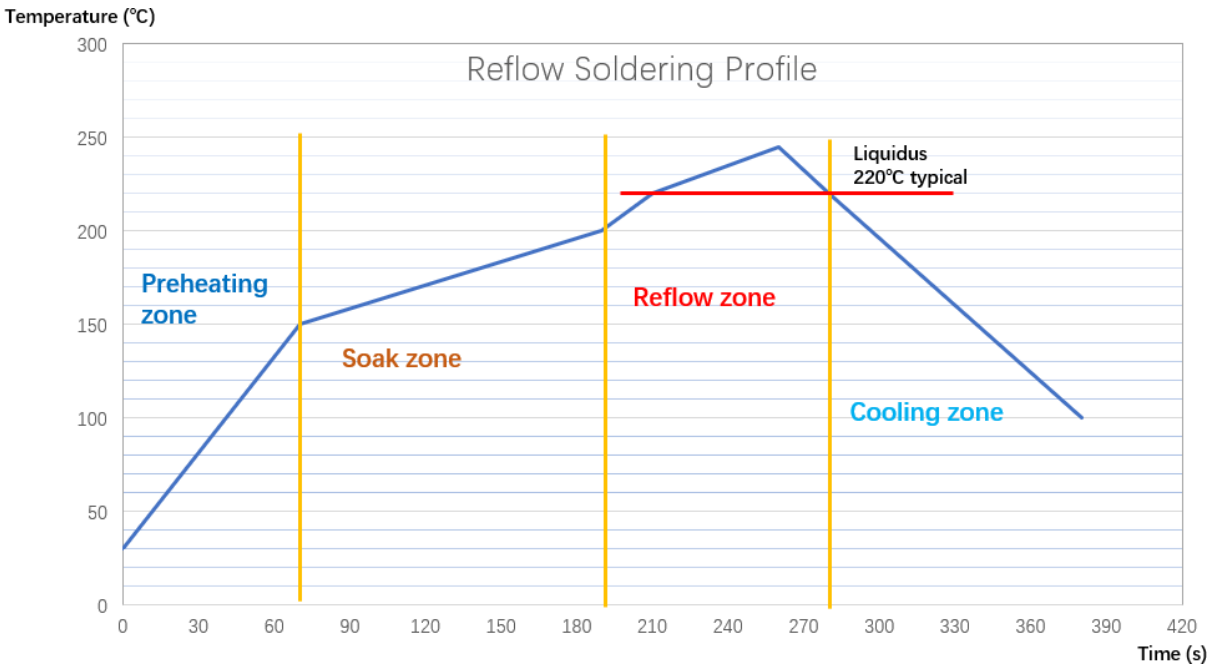
- The minimum safe distance for metal parts without seriously compromising the antenna (tuning) is 40 mm top/bottom and 30 mm left or right.
- Metal close to the module antenna (bottom, top, left, right, any direction) will have degradation on the antenna performance. The amount of that degradation is entirely system-dependent, meaning you will need to perform some testing with your host application.
- Any metal closer than 20 mm will begin to significantly degrade performance (S11, gain, radiation efficiency).
- You should test the range with a mock-up (or actual prototype) of the product to assess the effects of enclosure height (and materials, whether metal or plastic).

9 Cautions

9.1 Reflow Soldering

Reflow soldering is a vitally important step in the SMT process. The temperature curve associated with the reflow is an essential parameter to control to ensure the correct connection of parts. The parameters of certain components will also directly impact the temperature curve selected for this step in the process.

9.2 Temperature-Time Profile for Reflow Soldering:



i. The standard reflow profile has four zones: ①**preheat,** ②**soak,** ③**reflow, and** ④**cooling**. The profile describes the ideal temperature curve of the top layer of the PCB.

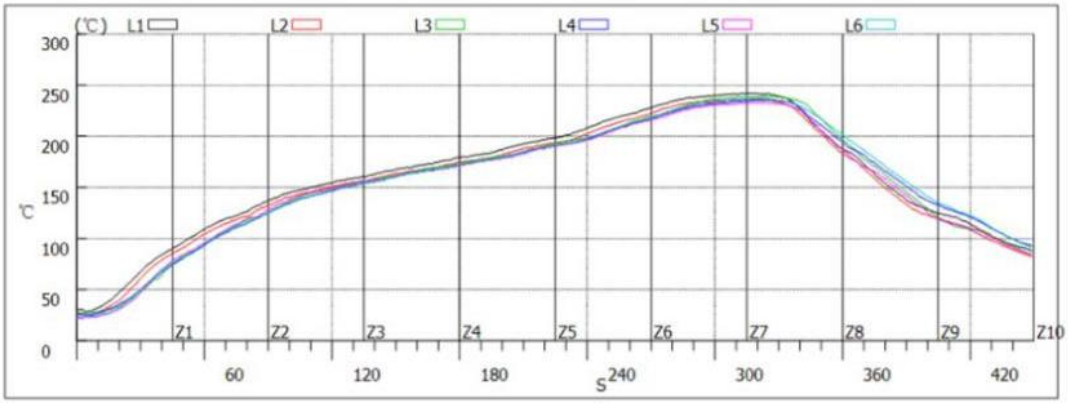
ii. During reflow, modules should not be above 260°C and not for more than 30 seconds.

Specification	Value
Temperature Increase Rate	<2.5°C/s
Temperature Decrease Rate	Free air cooling
Preheat Temperature	0-150°C
Preheat Period (Typical)	40-90s
Soak Temp Increase Rate	0.4-1°C/s
Soak Temperature	150-200°C
Soak Period	60-120s
Liquidus Temperature (SAC305)	220°C
Time Above Liquidous	45-90s
Reflow Temperature	230-250°C
Absolute Peak Temperature	260°C

9.3 Example of Newbit SMT reflow soldering:

Zones setting (℃)

Zones	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Top	120	140	165	170	180	190	210	240	255	245	0	0	0	0
Bottom	120	140	165	170	180	190	210	240	255	245	0	0	0	0



TCS	Peak(℃)	Peak difference	Peak at time(s)	190(℃)time above	Preheat(50-150℃)		Soak(150-200℃)		Reflow(220-260℃)		Liquid phase (220℃) time(s)	Cooling(260-100℃)	
					Slope	Time(s)	Slope	Time(s)	Slope	Time(s)		Slope	Time(s)
Line1	242.25	9.25	318	152	1.14	88	0.42	119	0.65	62	85	-1.39	115
Line2	236.75		310	140	1.06	94	0.42	119	0.91	44	74	-1.34	119
Line3	239.25		322	145	1.11	90	0.41	122	0.78	51	76	-1.45	110
Line4	235.75		324	139	1.05	95	0.42	118	0.78	51	70	-1.38	116
Line5	233		321	135	1.10	91	0.41	122	0.89	45	65	-1.44	111
Line6	237.25		321	146	1.05	95	0.42	118	0.82	49	75	-1.34	119

Note: Please be careful of the amount of solder paste. The module may be lifted due to excess solder.

9.4 Usage Condition Notes

iii. Follow the conditions written in this specification, especially the recommended condition ratings about the power supply applied to this product.

iv. The supply voltage has to be free of AC ripple voltage (for example from a battery or a low noise regulator output). For noisy supply voltages, provide a decoupling circuit (for example a ferrite in series connection and a bypass capacitor to the ground of at least 47uF directly at the module).

v. Take measures to protect the unit against static electricity. If pulses or other transient loads (a large load applied in a short time) are applied to the products, check and evaluate their operation before assembly on the final products.

vi. The supply voltage should not be exceedingly high or reversed. It should not carry noise and/or spikes.

vii. This product is away from other high-frequency circuits.

viii. Keep this product away from heat. Heat is the major cause of decreasing the life of these products.

ix. Avoid assembly and use of the target equipment in conditions where the products' the temperature may exceed the maximum tolerance.

x. This product should not be mechanically stressed when installed.

xi. Do not use dropped products.

xii. Do not touch, damage, or soil the pin2s.

xiii. Pressing on parts of the metal shield or fastening objects to the metal shield will cause damage.

9.5 Storage Notes

xiv. The module should not be stressed mechanically during storage.

xv. Do not store these products under the following conditions or the performance characteristics of the product, such as RF performance will be adversely affected:

1. Storage in salty air or an environment with a high concentration of corrosive gas
2. Storage in direct sunlight
3. Storage in an environment where the temperature may be outside the range specified
4. Storage of the products for more than one year after the date of the delivery storage period

xvi. Keep this product away from water, poisonous gas, and corrosive gas.

xvii. This product should not be stressed or shocked when transported.

10 Revision History

Revision	Description of changes	Approved	Revision Date
V1.0	Initial Release	Allen	2021.11.05
V1.1	Adding Recommended Circuits	Allen	2022.04.25

Notes:

Due to the continuous improvement of the hardware and software of the product, this document may be changed without further notice, and the latest version of the document shall prevail in the end.

For the latest information, please go to the website: www.newbitsiot.com to download, or contact us.

Important Note:

In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for re - evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

Radiation Exposure Statement:

This module support BT(2402-2480MHz) which compliance with part 15.249 and apply for single module approval .
The module is limited to OEM installation only.
The OEM integrator is responsible for ensuring that the end-user has no manual instruction to remove or install module.
OEM integrator shall equipped the antenna to compliance with antenna requirement part 15.203& 15.204 and must not be co-located or operating in conjunction with any other antenna or transmitters. And OEM host shall implement a Class II Permissive Change (C2PC) or a new FCC ID to demonstrate complied with FCC standard.
The OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed.
The final end product must be labelled in a visible area with the following: “Contains FCC ID:2A8QD-XYMBA32A”

ANT

The antenna is PCB antenna, and is permanent connection antenna. the antenna is -0.68dBi,This antenna is permanently paired with a product to sell. (Only antennas of the same type and with equal or less gains as shown below may be used with the The Bluetooth module. Other types of antennas and/or higher gain antennas may require additional uthorization for operation)

Module operation instructions

1. According to the following requirements of the power supply, power up, about 3 seconds to to complete the initial。
2. Iphone/Android mobile phone BT function to open, search to the corresponding Bluetooth module name (name can be changed according to customer production requirements), click the name of the BT and select the connection.
3. open application software (need to install the company's specific application software development, application software interface can be customized according to customer's product requirements), click on the interface to see the scene。

12 Contact Us

The contents of this data sheet are subject to change without prior notice for further improvement. Newbit team reserves all the rights for the final explanation.

Please contact Newbit sales team or visit www.newbitsiot.com for more related information if needed.

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FCC Statement

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.

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.

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.

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