E104-BT09 User Manual

TLSR8208B BLE5.0 Low Power SMD Bluetooth to Serial Module



Chengdu Ebyte Electronic Technology Co.,Ltd.

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1. Overview

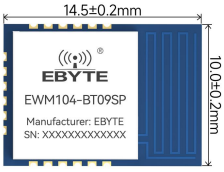
1.1 Introduction

E104-BT09 is a Bluetooth to serial slave module based on Bluetooth protocol version 5.0, small size, low power consumption, working in 2.4GHz band.

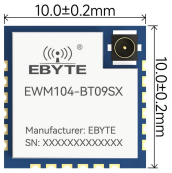
The E104-BT09 module is developed by Chengdu Yibert Electronic Technology Co., Ltd. based on Telink Micro's TLSR8208BER chip. The module uses common AT commands to set up the parameters, which makes the operation simple and fast. The module supports slave role, Bluetooth broadcasting, data passthrough, and over-the-air configuration. The module can be widely used in smart wearable, home automation, home security, personal health care, smart home appliances, accessories and remote control, automotive, lighting, industrial internet, smart data acquisition, intelligent control and other fields. Maximum support baud rate 1000000bps data transmission.



E104-BT09



EWM104-BT09SP



EWM104-BT09SX

1.2 Features

- supports Bluetooth BLE 5.0 protocol;
- supports power-on auto broadcast;
- supports IBeacon and normal broadcast switching;
- supports serial port transparent transmission;
- supports multiple serial port baud rates;
- supports customized 16-bit and 128-bit UUID;
- supports Bluetooth parameter over-the-air configuration function;
- supports AT command configuration and automatic recognition of AT commands in wake-up mode;
- supports transmit power modification, the maximum transmit power is 11.5dBm;
- maximum communication maximum distance up to 150m;
- supports ultra-low power sleep;
- module supports slave role;
- MTU maximum 200 bytes;
- maximum serial port baud rate support 1000000 bps.

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1.3 Application scenario

- wireless meter reading wireless sensing;
- smart home;
- Intelligent Buildings, Smart Buildings;
- automated data collection;
- Health sensors;
- Smart wearables;
- Intelligent robots;
- wireless sensing;
- Intelligent control;

2. Specification

2.1 Limit parameters

Table 2-1 Limit parameter table

Main Parameters	Performances		Remark
	Min	Max	
Power supply voltage (V)	0	4.2	Above 4.2V permanently burns out the module
Blocking power (dBm)	-	0	Low probability of burnout in close proximity
Operating temperature (℃)	-40	+85	Industrial Grade

2.2 Operating parameters

Table 2-2 Working Parameter Table

Main Parameters		Performances			Remark
		Min	Typical	Max	
Operating voltage (V)		2.0	3.3	4.2	≥3.3V guarantees output power,For details, see pin definition
Communication level (V)		-	3.3	-	Risk of burn-in with 5V levels
Operating temperature (℃)		-40	-	+85	Industrial grade design
Operating frequency band (MHz)		2402	-	2480	Supports ISM bands
power wastage	Transmit Current (mA)	-	26.4	-	-
	Receive Current (mA)	-	3.44	-	-
	Sleep current (μA)	-	0.51	-	deep sleep

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Transmit Power (dBm)	-50	0	11.5	-
Receive Sensitivity (dBm)	-	-97	-	Air Rate 1Mbps
Wake-up broadcast current (mA)	-	3.58	-	Default broadcast gap 100ms

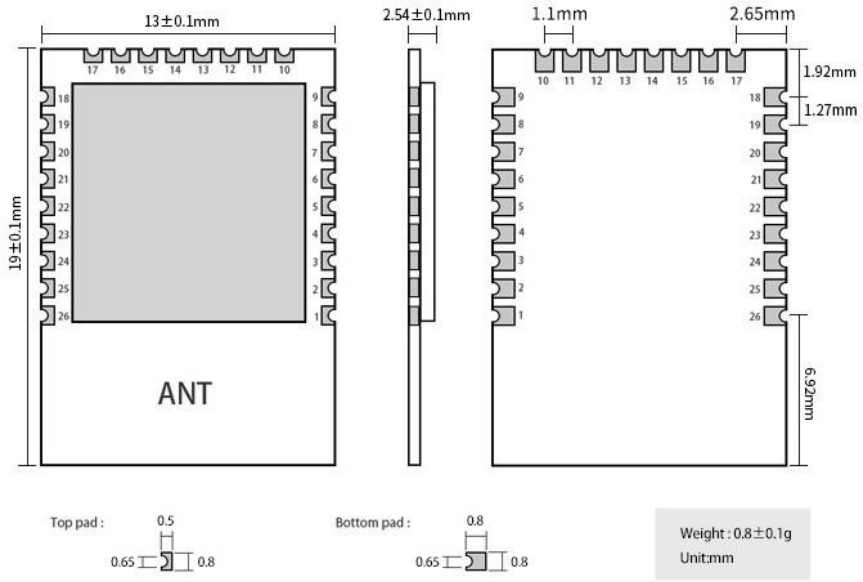
Main Parameters	**Description**	**Remark**
E104-BT09 Reference Distance	150m	Clear and open environment, height 2.0 meters; @11.5dBm; airspeed: 1Mbps
EWM104-BT09SP Reference Distance	120m	
EWM104-BT09SX Reference Distance	200m	Clear open environment, height 2.0 m, antenna gain 2.5dBi,@11.5dBm; Airspeed: 1Mbps
Bluetooth Protocol	BLE5.0	-
RF chip	TLSR8208BER	-
FLASH	128KB	-
SRAM	16KB	-
Communication Interface	UART	-
Package	Patch type	-
E104-BT09 Form factor	13*19mm	-
EWM104-BT09SP Form factor	10.0*14.5mm	-
EWM104-BT09SX Form factor	10.0*10.0mm	-
E104-BT09 RF Interface	On-Board PCB Antenna	Equivalent impedance approx. 50Ω
EWM104-BT09SP RF Interface		
EWM104-BT09SX RF Interface	IPEX 3 generation	
E104-BT09 Weight	0.8g	±0.1g
EWM104-BT09SP/SX Weight	0.5g	±0.1g

3. Mechanical Dimensions and Pin Definitions

E104-BT09：

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E104-BT09:

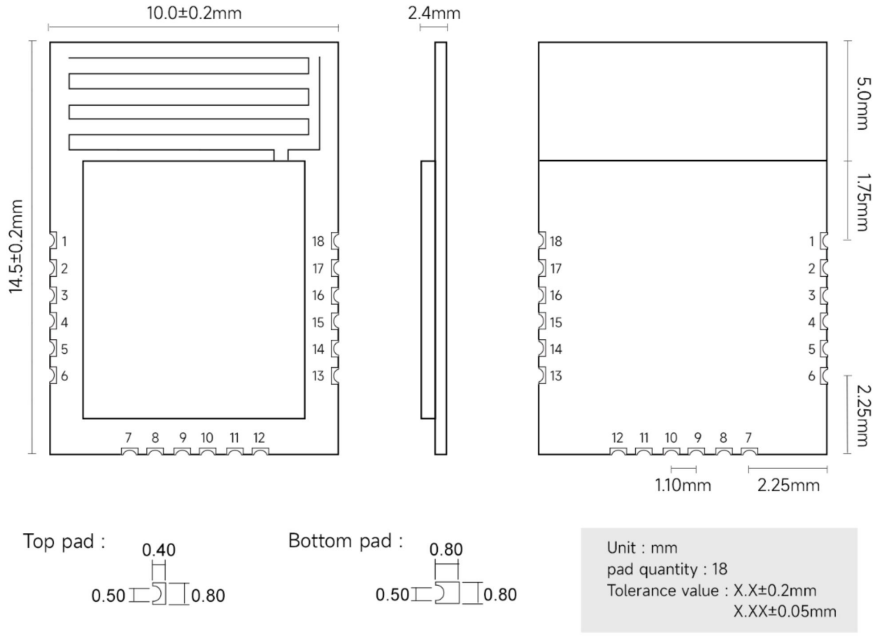
No	Pin Definitions	Chip Pins	Pin orientation	Note
1	GND	GND	-	Module Ground
2	TXD	PD0	Output	Serial Transmit Pin
3	RXD	PD1	Input	Serial Receive Pin
4	NC	PD2	-	-
5	NC	PD4	-	-
6	NC	PD6	-	-
7	NC	PD7	-	-
8	SWS	PA3		Program Download
9	NC	PA7	-	-
10	NC	PB3	-	-
11	RESTORE	PB2	Input	After an internal pull-up, falling edge, and then holding low for at least 5 seconds, all parameters are restored to factory settings and the module is automatically rebooted.
12	GND	DVSS	-	Module Ground
13	WKP	PB4	Input	Default low level, low power consumption mode, serial port can not communicate. Pull high to enter normal working mode, serial port can communicate.
14	VBAT	VBAT	Input	The positive terminal of the power supply supports DC 2.0V ~ 4.2V power supply. When VBAT≤3.3V, the VBAT pin needs to be short-circuited with the AVDD3 pin. When VBAT > 3.3V, the VBAT pin does not need to be shorted with the AVDD3 pin, and the VBAT pin can supply power to the module independently.
15	AVDD3	AVDD3	Input	The positive terminal of the power supply supports DC 2.0V ~ 3.3V power supply. When VBAT≤3.3V, the AVDD3 pin must be short-circuited with the VBAT pin. When VBAT > 3.3V, the

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				AVDD3 pin does not need to be shorted with the VBAT pin.
16	GND	GND	-	Module ground
17	BAT_DET	PB5	Input	Battery voltage detection, see section 6.2.16 for details
18	LINK	PB6	Output	Connection status indicator pin, high level means connected, low level means disconnected
19	NC	PB7	-	-
20	GND	GND	-	Module Ground
21	GND	GND	-	Module Ground
22	NC	PC0	-	-
23	NC	PC1	-	-
24	GND	GND	-	Module Ground
25	GND	GND	-	Module Ground
26	RESET	RESETB	Input	Reset pin, active low, internal pull-up

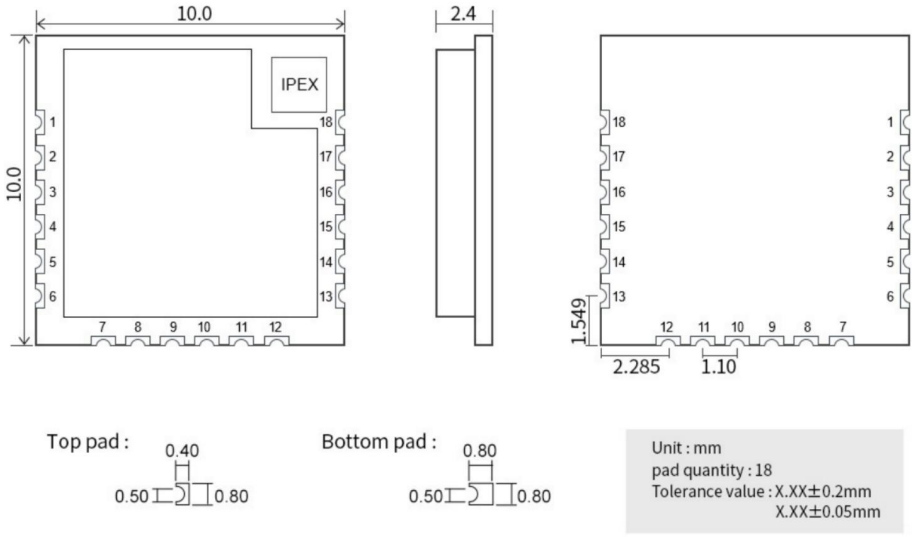
EWM104-BT09SP:



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EWM104-BT09SX:



EWM104-BT09SP/SX Pin Definition:

number	Pin definition	Pin function	Pin direction	explain
1	GND	GND	--	Module Ground
2	PD6	PD6	--	GPIO is reserved so you don't have to worry about it
3	PD7	RESTORE	Input	Internal pull up, keep low level at least 5 seconds, all parameters restore factory Settings and automatically restart the module.
4	SWS	SWS	--	The program download pin, the user does not need to care;
5	PA7	LINK	Output	Connection status indicator pin, high level means connected, low level means disconnected
6	PB2	BAT_DET	Input	Battery voltage detection, see section 6.2.16 for details
7	RESETB	RESET	Input	Reset pin, active low, internal pull-up
8	WKP	WKP	Input	Default low level, low power consumption mode, serial port can not communicate. Pull high to enter normal working mode, serial port can communicate.
9	RXD	RXD	Input	Serial Receive Pin
10	TXD	TXD	Output	Serial Transmit Pin
11	GND	GND	--	Module Ground
12	VBAT	VBAT	--	Power supply positive, 2.0V~4.2V, 3.3V power supply is recommended
13	PB7	PB7	--	GPIO is reserved so you don't have to worry about it

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14	PC0	PC0	--	GPIO is reserved so you don't have to worry about it
15	PC1	PC1	--	GPIO is reserved so you don't have to worry about it
16	PD2	PD2	--	GPIO is reserved so you don't have to worry about it
17	PD1	PD1	--	GPIO is reserved so you don't have to worry about it
18	GND	GND	--	Module Ground

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4. Basic Applications

4.1 Recommended Circuitry

E104-BT09:

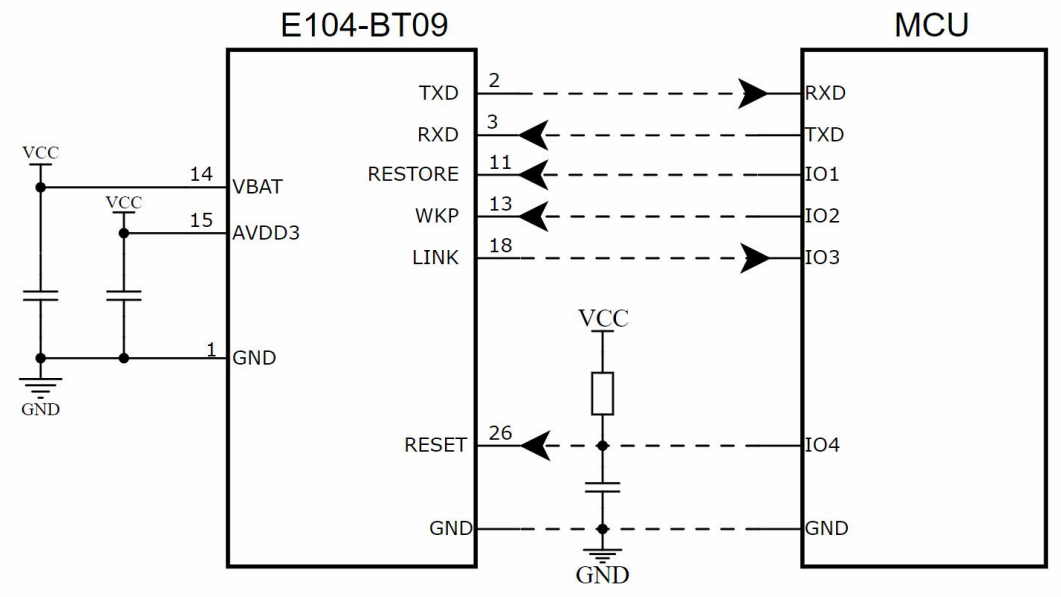
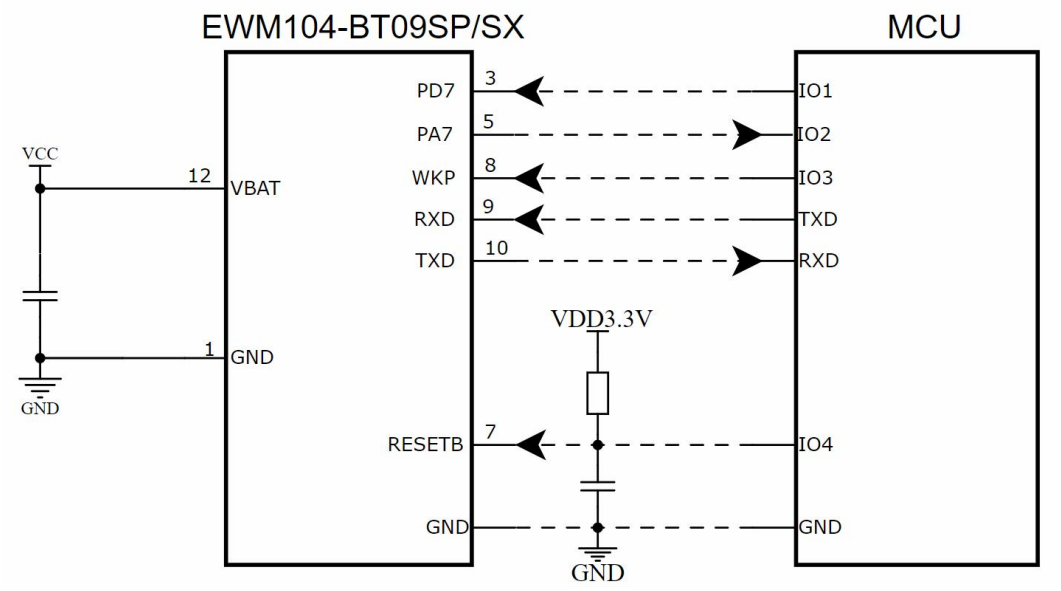


Figure 4-1 Recommended circuit

Note: When VBAT≤3.3V, the VBAT pin needs to be shorted with the AVDD3 pin; When VBAT > 3.3V, the VBAT pin does not need to be shorted with the AVDD3 pin, and the VBAT pin can supply power to the module independently.

EWM104-BT09SP/SX:



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5. Functional Description

5.1 Role Description

Module Support Role: Slave.
The module slave can be connected with other models of our Bluetooth products to support transmissions.

5.1.1 Pragmatic

1. The module only supports slave mode
2. The broadcast switch configuration is on by default, and automatically enters the broadcasting state after power-up is completed, otherwise the stop broadcasting device is undiscoverable.
3. After receiving the host connection request, establish Bluetooth connection and stop Bluetooth broadcasting.
4. Broadcast data configuration see 5.5 broadcast described.

5.2 Role Description

The module supports two power modes: low power mode, and wake-up mode.

5.2.1 Low Power Mode

The so-called low power mode means that the module enters into this mode to turn off the broadcast and disconnect.
Entering low power: PB4 default low level, low power hibernation mode. There is no Bluetooth broadcast in this mode and the serial port cannot communicate.

5.2.2 Wake-up call (computing)

The so-called wake-up mode refers to the module in this mode the module required peripherals in the normal operating state.
Wake-up mode: Wake-up immediately through the rising edge of PB4 pin;

5.3 Data transmission mode

The module supports 1 data transfer mode: passthrough.

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5.3.1 Data passthrough

The so-called data passthrough refers to sending the data received by the serial port, without any processing, to the other device via BLE, and sending the data received by BLE, without any processing, via the serial port.

5.4 Broadcast

5.4.1 General broadcast messages

Broadcast messages include advertisement and scan response. advertisement is a broadcast message sent proactively, and scan response is a broadcast message that replies after receiving a scan request from a host.

dvertising

fixed field	Len	Manufacturer field	Manufa data
020106	N	0xFF	Configurable, up to 26 bytes
For example：020106< Len >FF< Manufa data >			

Figure V4 Broadcast data formats

Users can only configure Manufa data field data.

Scan response

Len	fixed	UUID	Len	fixed	Device name
0x03	0x03	FFF0	N	0x09	Configurable, up to 25 bytes
For example: 0303FFF0<len>09< Device name >					

Figure V5 Scanning Response Data Format Table

Note: This data does not require user configuration.

5.5 Configure

The module supports two configuration methods: serial configuration and over-the-air configuration. These two configuration modes are basically the same, before the air configuration must be through the AT + AUTH = 123456 authentication password, i.e., to the remote configuration service UUID input 123456, the module is allowed to use the air configuration after the authentication is passed. The authentication period for over-the-air configuration is the current connection, and if the device is disconnected and reconnected, it needs to be re-authenticated.

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After the module is in the wake-up state, it is in the configuration mode by default, and can be configured directly through the AT command.

5.6 Data Indication Pin

LINK pin, where a high level on the LINK pin indicates a connection and a low level indicates a disconnection;

5.7 UUID Description

Service UUID	FFF0		
eigenvalue (math.)	UUID	causality	Description
SLAVE CHANNEL	FFF1	read / notify	Slave sends number, host receives data channel.
MAST CHANNEL	FFF2	read / write	Host sends count, slave receives data channel
CONFIG CHANNEL	FFF3	write / notify	Air Configuration Channel

6. AT instruction

Note: Before sending operation commands, first ensure that the module is in wake-up mode, otherwise it will not be able to receive configuration commands.

6.1 AT commandsDescription

All AT commands do not require carriage return (\r) or line feed (\n).
All AT instructions are case sensitive
AT instructions return results ending in \r\n (except return to HEX)
AT instructions are automatically recognized in wake-up mode, and error instructions are transmitted as data.

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6.2 Command chart

6.2.1 AT? Test Command

Command	Respond
AT?	AT
Description: None	

6.2.2 AT+RESET reset command

Command	Respond
AT+RESET	DEVICE_NAME:EBYTEBLE MAC:40050238C1A4
Description: Effective immediately	

6.2.3 AT+FACTORY Restore Factory Command

Command	Respond
AT+FACTORY	DEVICE_NAME:EBYTEBLE MAC:40050238C1A4
Instructions: 1、After resetting, it will restart automatically; 2、During the process of restoring factory settings, any kind of reset is prohibited, and power off is prohibited before the operation is completed; 3、RESTORE pin is low for 5 seconds, then restore the factory settings	

6.2.4 AT+SAVE Save command

Command	Respond
AT+SAVE	DEVICE_NAME:EBYTEBLE MAC:40050238C1A4
Description：Save the setup parameters of the module, such as: Bluetooth name/MAC address, etc. After using this command, the system will automatically software reset and restart, so that the parameters just set up are permanently saved.	

6.2.5 AT+DISCONNECT Disconnect Command

Command	Respond
AT+DISCONNECT	OK+DISCONNECT
Description: Disconnect the module from all external Bluetooth devices, if there is no connection then return the error	

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OK+DISCONNECT=ERROR.

6.2.6 AT+NAME Bluetooth broadcast name

Command		Respond
Query	AT+NAME?	OK+NAME=[para]
Setting	AT+NAME=[para]	OK+NAME
Parameter	para（ASCII）Refers to the Bluetooth broadcast name	
Description	Set the Bluetooth broadcast name, such as the module has been connected, you need to broadcast the next time to take effect, such as permanently save the parameter need to send AT + SAVE, otherwise it is only temporary effect, the default Bluetooth name is EBYTEBLE.	
Example	Send: AT+NAME=ABC Return: OK+NAME Set Bluetooth broadcast name to ABC	

6.2.7 AT+MAC Bluetooth MAC address

Command		Respond
Query	AT+MAC?	OK+MAC=[para]
Setting	AT+MAC=[para]	OK+MAC
Parameter	para（ASCII）Refers to the Bluetooth MAC address	
Description	Set the Bluetooth MAC address, such as permanently save the parameter need to send AT+SAVE, otherwise it is only temporarily effective, set the MAC address of the low bit in the front.	
Example	Send: AT+MAC=001122334455 Return: OK+MAC Set Bluetooth MAC address to 001122334455	

6.2.8 AT+BAUD Serial Baud Rate

Command		Respond
Query	AT+BAUD?	OK+BUAD=[para]
Setting	AT+BAUD=[para]	OK+BUAD

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<table>
<tr><td>Parameter</td><td>
<table>
<tr><td>para（ASCII）,baut(bps)</td></tr>
<tr><td>1200</td></tr>
<tr><td>2400</td></tr>
<tr><td>4800</td></tr>
<tr><td>9600</td></tr>
<tr><td>14400</td></tr>
<tr><td>19200</td></tr>
<tr><td>28800</td></tr>
<tr><td>38400</td></tr>
<tr><td>57600</td></tr>
<tr><td>76800</td></tr>
<tr><td>115200（default）</td></tr>
<tr><td>230400</td></tr>
<tr><td>500000</td></tr>
<tr><td>1000000</td></tr>
</table>
</td></tr>
<tr><td>Description</td><td>Default baud rate 115200. baud rate modification print information may appear part of the messy code, you need to adjust the serial port debugging assistant baud rate to the modified baud rate can be normally displayed and normally send and receive.</td></tr>
<tr><td>Example</td><td>AT+BAUD=9600
OK+BUAD
Set the baud rate to 9600</td></tr>
</table>

6.2.9 AAT+TX_POWER Transmit Power

Command		Respond
Query	AT+TX_POWER?	OK+TX_POWER=[para]
Setting	AT+TX_POWER=[para]	OK+TX_POWER

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Parameter	<table><tr><th>para（ASCII）</th><th>firing power(dBm)</th></tr><tr><td>0</td><td>11.5</td></tr><tr><td>1</td><td>10.2</td></tr><tr><td>2</td><td>9.0</td></tr><tr><td>3</td><td>8.3</td></tr><tr><td>4</td><td>7.0</td></tr><tr><td>5</td><td>5.9</td></tr><tr><td>6</td><td>4.7</td></tr><tr><td>7</td><td>4.0</td></tr><tr><td>8</td><td>2.9</td></tr><tr><td>9</td><td>2.0</td></tr><tr><td>10</td><td>0.6</td></tr><tr><td>11</td><td>-1.2</td></tr><tr><td>12</td><td>-5.0</td></tr><tr><td>13</td><td>-9.3</td></tr><tr><td>14</td><td>-15.0</td></tr><tr><td>15</td><td>-18.4</td></tr><tr><td>16</td><td>-50.0</td></tr></table>
Description	If you permanently save this parameter you need to send AT+SAVE, otherwise it will only take effect temporarily, the default power level is 3.
Example	AT+TX_POWER=4 OK+TX_POWER Set transmit power to 7dBm

6.2.10 AAT+TX_POWER Transmit Power

Command		Respond
Query	AT+ADV_PARAM?	OK+ADV_PARAM=[para]
Setting	AT+ADV_PARAM=[para]	OK+ADV_PARAM
Parameter	<table><tr><th>para（ASCII），Broadcast Interval（ms）</th></tr><tr><td>20</td></tr><tr><td>50</td></tr><tr><td>100</td></tr><tr><td>200</td></tr><tr><td>500</td></tr><tr><td>1000</td></tr><tr><td>2000</td></tr></table>	
Description	Set the Bluetooth broadcast interval of the module, if you permanently save this parameter you need to	

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	send AT+SAVE, otherwise it will only take effect temporarily, the default value is 100ms.
Example	AT+ADV_PARAM=50 OK+ADV_PARAM Set the broadcast interval to 50ms

6.2.11 AAT+TX_POWER Transmit Power

Command		Respond
Query	AT+CON_PARAM?	OK+CON_PARAM=[para]
Setting	AT+CON_PARAM=[para]	OK+CON_PARAM
Parameter	para（ASCII），Bluetooth connection interval(ms) 20 50 100	
Description	Set the Bluetooth connection interval of the module, such as permanently save the parameter need to send AT+SAVE, otherwise it is only temporarily effective, the default value is 20ms.	
Example	AT+CON_PARAM=50 OK+CON_PARAM Set the Bluetooth connection interval to 50ms	

6.2.12 AT+VER? Queries the current software version

Command		Respond
Query	AT+VER?	OK+VER=[para]
Parameter	[para]Refers to the current software version	
Example	AT+VER? +OK+VER=V1.2.3 The current software version is V1.2.3.	

6.2.13 AT+AD Set broadcast data

Command		Respond
Query	AT+AD?	OK+AD=[para]
Setting	AT+AD=[para]	OK+AD
Parameter	[para]Refers to broadcast data, up to 26 bytes.	
Example	AT+AD=1122334455667788990011223344556677889900112233445566 OK+AD Set the current broadcast data to 1122334455667788990011223344556677889900112233445566	

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6.2.14 AT+BEACON Setting the BEACON parameter

Command		Respond
Query	AT+BEACON?	OK+BEACON=[para1],[para2],[para3],[para4]
Setting	AT+BEACON=[para1],[para2],[para3],[para4]	OK+BEACON
Parameter	para1.UUID para2.Major UUID para3.Minor UUID para4.RSSI	
Example	AT+BEACON=112233445566778899001122334455 66,1111,2222,c7 OK+BEACON Set UUID，Major UUID，Minor UUID，RSSI parameters are 112233445566778899001122334455 66,1111,2222,c7	

6.2.15 AT+ADV Toggles Normal and Ibeacon Broadcasts

Command		Respond
setup	AT+ADV=[para]	OK+ADV
Parameter	AT+ADV=0，Turn off the radio. AT+ADV=1，General Broadcasting. AT+ADV=2，Ibeacon Radio. Defaults to normal broadcast.	
Example	AT+ADV=2 OK+ADV	

6.2.16 AT+ADC? reads the voltage value

Command		Respond
Query	AT+ADC?	OK+ADC=[para]
Parameter	[para]Indicates the voltage value	
Description	Read the voltage value of BAT_DET pin, unit mV, the range is related to VBAT, VBAT is greater than 3.2V is 0~3.4V, VBAT is less than 3.2 is 0~VBAT.	
Example	AT+ADC? OK+ADC=788 Current VBAT supply voltage 788mV.	

6.2.17 AT+UUID Set UUID

Command	Respond

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<table>
<tr><td>Inquire service uuid</td><td>AT+UUIDA?</td><td>OK+UUID=A0,FFF0</td></tr>
<tr><td>Inquire slave uuid</td><td>AT+UUIDB?</td><td>OK+UUID=B0,FFF1</td></tr>
<tr><td>Inquire master uuid</td><td>AT+UUIDC?</td><td>OK+UUID=C0,FFF2</td></tr>
<tr><td>Inquire config uuid</td><td>AT+UUIDD?</td><td>OK+UUID=D0,FFF3</td></tr>
<tr><td>setup</td><td colspan="2">AT+UUID=[para1][para2],[para3]</td></tr>
<tr><td>Parameter</td><td colspan="2"><table>
<tr><td>Para1（ASCII）</td><td>Specific UUID</td></tr>
<tr><td>A</td><td>service uuid</td></tr>
<tr><td>B</td><td>slave uuid</td></tr>
<tr><td>C</td><td>master uuid</td></tr>
<tr><td>D</td><td>config uuid</td></tr>
<tr><td>Para2（ASCII）</td><td>UUID Bits</td></tr>
<tr><td>0</td><td>16 bits</td></tr>
<tr><td>1</td><td>128 bits</td></tr>
</table>para3（ASCII）：Corresponding UUID parameters</td></tr>
<tr><td>Example</td><td colspan="2">AT+UUID=B1,11223344556677889900AABBCCDDEEFF
OK+UUID
Set slave UUID 为 11223344556677889900AABBCCDDEEFF</td></tr>
</table>

6.2.18 AT+AUTH Configure authentication password over the air

Command		Respond
setup	AT+AUTH =[para]	OK+AUTH
Parameter	para(ASCLL): 6-byte password	
Description	1、 1. This command is only used for over-the-air authentication. 2、 Default password: 123456	
Example	AT+AUTH=123456 OK+AUTH	

7. Quick use

Recommended software for debugging/testing:

PC side serial port tool - XCOM.exe;.

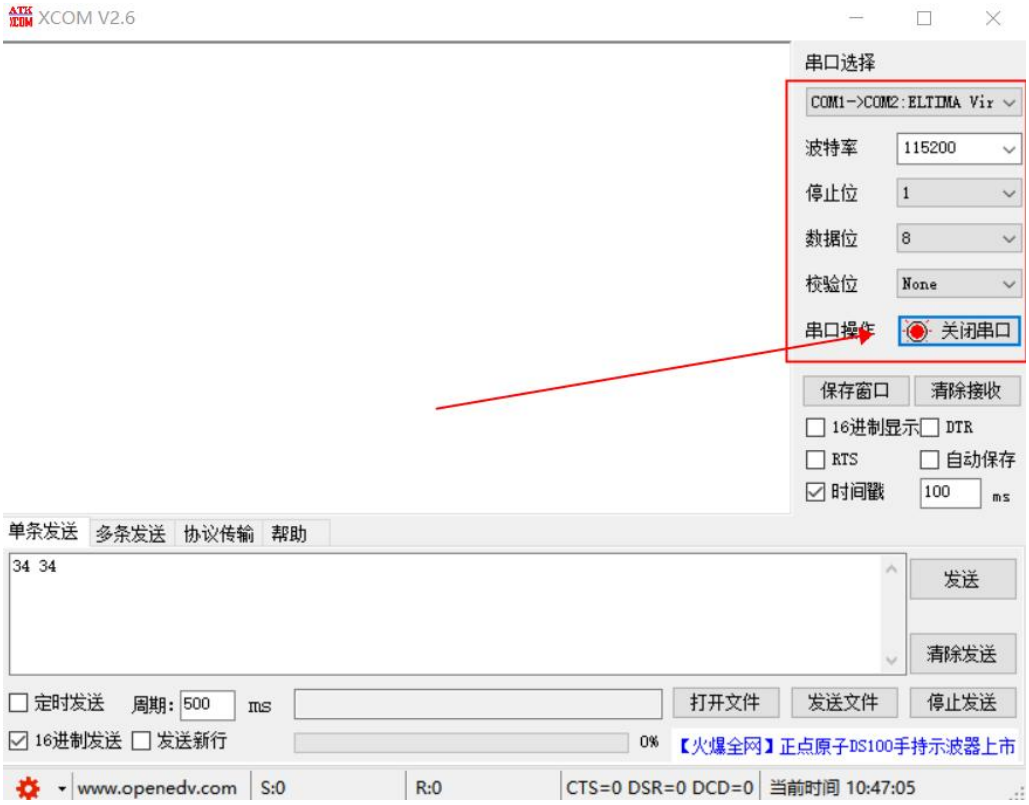
Mobile phone side ble debugging APP - nRF connect.

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7.1 Configuration Mode Quick Start Guide

7.1.1 Serial Port Configuration

set XCOM string related configuration (default configuration: 115200, 8, 1, none, no flow control), such as Figure VII-1 XCOM parameter configuration diagram;



follows the instructions shown in the AT command table to configure the module;

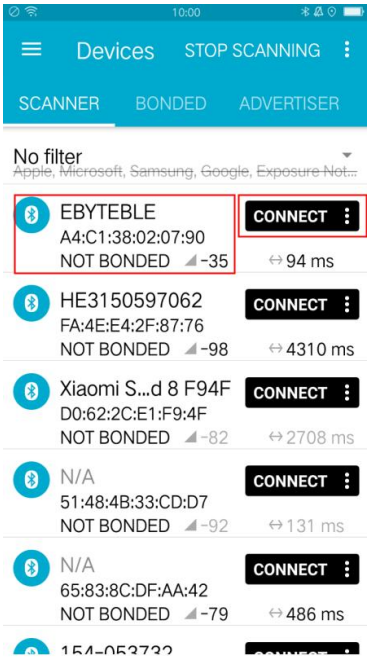
7.1.2 Air configuration

Over-the-air configuration can only be used if the module is a slave.

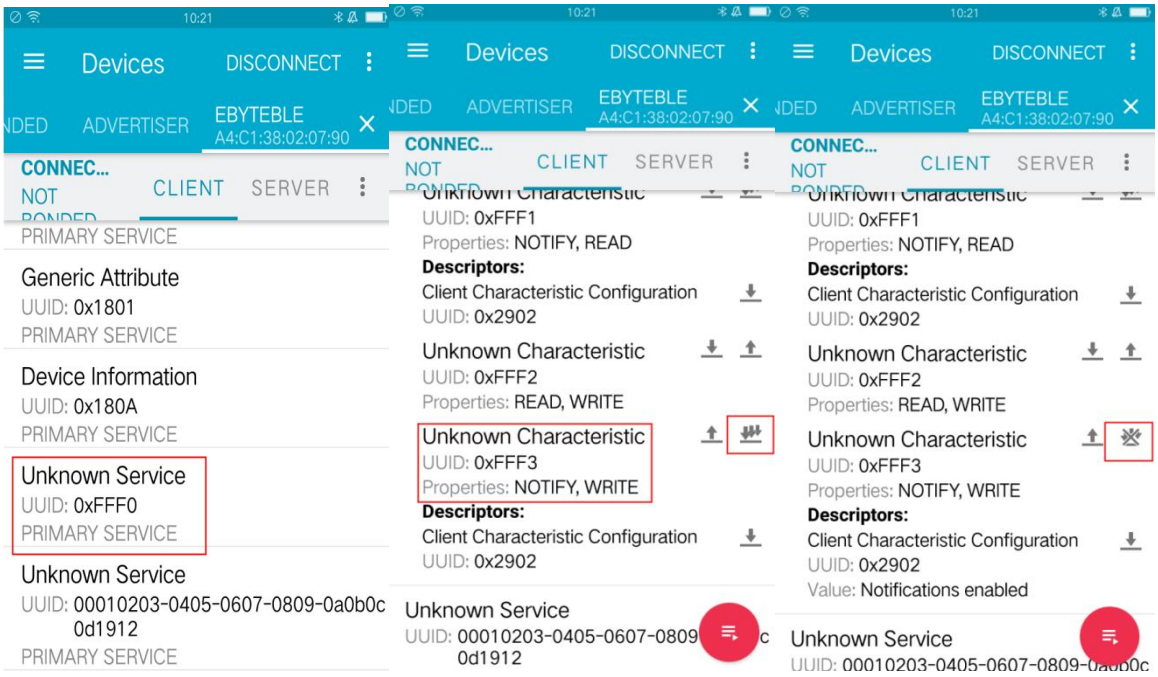
Open the app "nRF connect", start scanning for devices and find the "EBYTEBLE" connection module;

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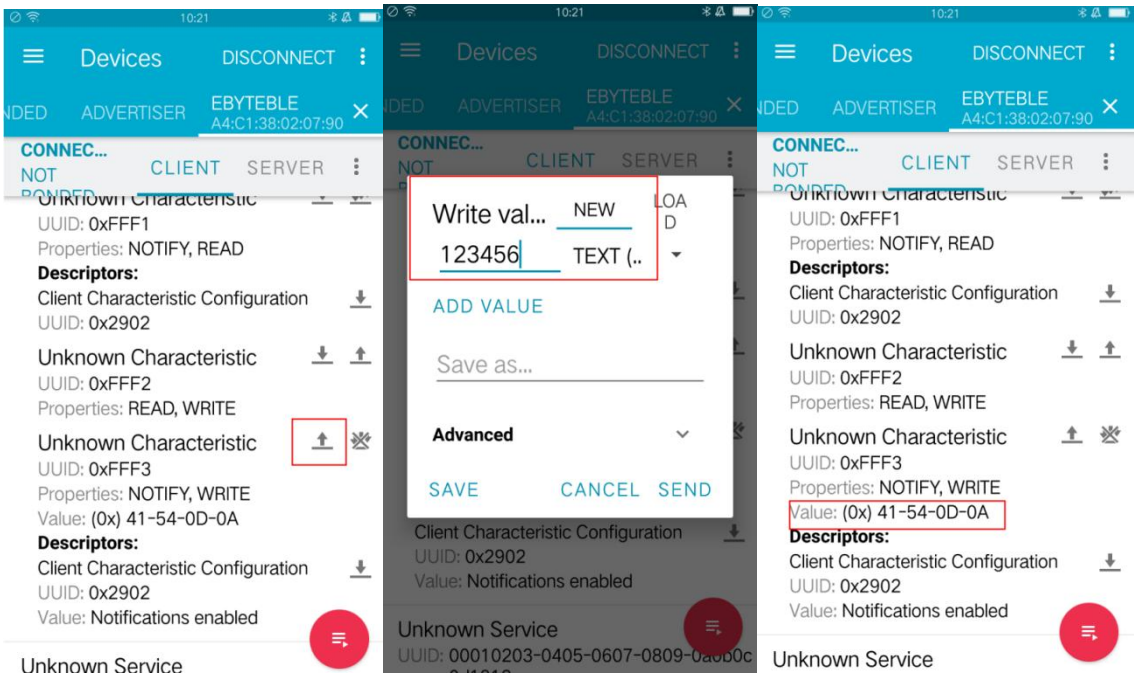


turn on the service for uuid this fff0, enable configuration channel notiy;



Sending the authentication password "123456", the module returns "0x2befeb0d0a" to indicate successful authentication;

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configures the module according to the instructions shown in 6.4 Command Table;

7.2 Data transmission

For data transfer related instructions see the description in 5.3 Data Transfer Modes.

Test conditions:

Prepare to support host mode module 1 (in the example, we use our E104-BT08).

Test software: XCOM.

Other parameters are configured by default.

7.2.1 Air configuration

1. Power up the master and slave modules;
2. Modify module 1 to be the master (input AT+ROLE=1) and reboot (input AT+RESET).
3. After successful connection, the master prints "\r\n STA:connect:0\r\n"; the slave does not print any information; the LINK pin is high, as shown in Fig. 7.5 Host power-on automatic connection printout

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4. The host sends the data "123456" to the slave, and the slave receives the data as "123456" (as shown in Figure VII.7 Data Passthrough Diagram);

5. The slave sends the data "ABCDEFG" to the host, and the host receives the data "ABCDEFG" (as shown in Figure VII.7 Passthrough Diagram);



8. Common problems

8.1 Unsatisfactory transmission distance

- When there are linear communication barriers, the communication distance will decay accordingly;
- Temperature, humidity, and co-channel interference, which will lead to higher communication packet loss rate;
- The ground absorbs and reflects radio waves, and the test results are poorer near the ground;
- seawater has a strong ability to absorb radio waves, so the effect of the seaside test is poor;

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- Metal objects near the antenna, or placed in a metal shell, the signal attenuation will be very serious;
- Wrong power register setting, air rate setting is too high (the higher the air rate, the closer the distance);
- Low voltage of power supply at room temperature is lower than the recommended value, the lower the voltage the lower the hair power;
- The use of antenna and module matching degree is poor or the antenna itself quality problems.

8.2 Modules are fragile

- Please check the power supply to ensure that it is between the recommended supply voltages, if it exceeds the maximum value it will cause permanent damage to the module;
- Please check the power supply stability, the voltage can not be substantial frequent fluctuations;
- Please ensure that the installation and use process anti-static operation, high-frequency device electrostatic sensitivity;
- Please ensure that the installation and use of the process of humidity should not be too high, part of the components for humidity-sensitive devices;
- If there is no special demand is not recommended to be used at too high or too low a temperature.

8.3 BER is too high

- Near the same frequency signal interference, away from the source of interference or modify the frequency and channel to avoid interference;
- Unsatisfactory power supply may also cause garbled code, be sure to ensure the reliability of the power supply;
- Extension cords, feeder cords of poor quality or too long, can also cause high BER.

9. Welding instructions

9.1 Reflow temperature

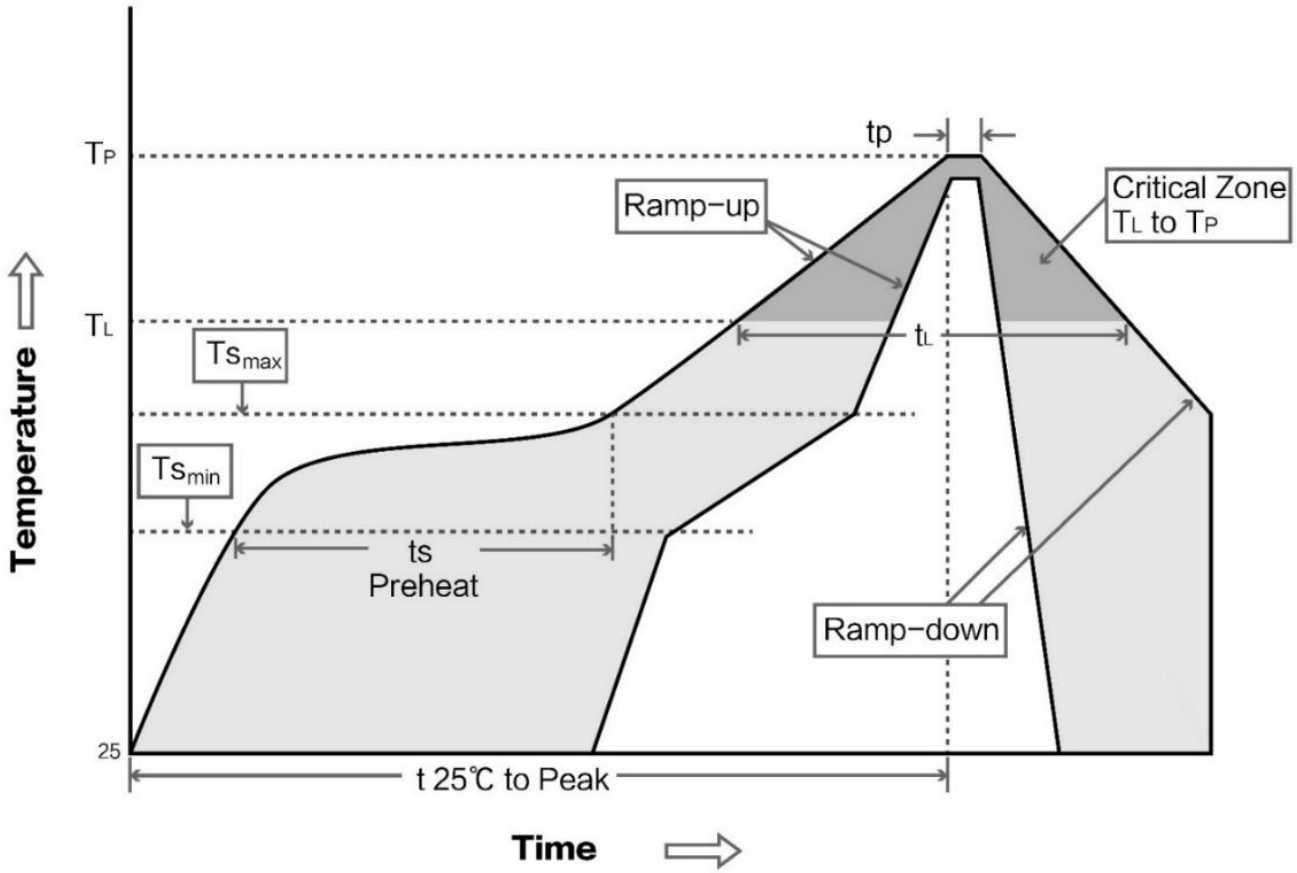
Profile Feature	Curve Characteristics	Sn-Pb Assembly	Pb-Free Assembly
Solder Paste	Solder Paste	Sn63/Pb37	Sn96.5/Ag3/Cu0.5
Preheat Temperature min （Tsmin）	Minimum Preheat Temperature	100℃	150℃
Preheat temperature max (Tsmax)	Maximum Preheat Temperature	150℃	200℃
Preheat Time (Tsmin to Tsmax)(ts)	Preheat Time	60-120 sec	60-120 sec
Average ramp-up rate(Tsmax to Tp)	Average Rise Rate	3℃/second max	3℃/second max
Liquidous Temperature (TL)	Liquid phase	183℃	217℃

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	temperature		
Time（tL）Maintained Above（TL）	Time above liquid phase line	60-90 sec	30-90 sec
Peak temperature（Tp）	Peak temperature	220-235℃	230-250℃
Aveage ramp-down rate（Tp to Tsmax）	Average rate of descent	6℃/second max	6℃/second max
Time 25℃ to peak temperature	Time from 25°C to peak temperature	6 minutes max	8 minutes max

9.2 Reflow Profile



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10. Related Models

SKU	Chip solution	Working Frequency Hz	Emission power dBm	Communications interface	Supported Protocols BLE	Product Size mm	Antenna form	Functional Features
E72-2G4M05S1B	CC2640	2.4G	5	I/O	4.2	17.5*28.7	PCB/IPX	Hardware Resources
E73-2G4M04S1A	nRF52810	2.4G	4	I/O	4.2/5.0	17.5*28.7	PCB/IPX	Secondary Development
E73-2G4M04S1B	nRF52832	2.4G	4	I/O	4.2/5.0	17.5*28.7	PCB/IPX	Hardware Resources
E73-2G4M08S1C	nRF52840	2.4G	8	I/O	4.2/5.0	13*18	Ceramic antenna	Secondary Development
E73-2G4M04S1D	nRF51822	2.4G	4	I/O	4.2	17.5*28.7	PCB/IPX	Hardware Resources
E104-BT01	CC2541	2.4G	0	I/O	4.0	14*22	PCB	Secondary Development
E104-BT02	DA14580	2.4G	0	TTL	4.2	14*22	PCB	Hardware Resources
E72-2G4M04S2B	CC2640	2.4G	2	TTL	4.2	14*23	PCB/IPX	Secondary Development
E104-2G4U04A	CC2540	2.4G	0	USB	4.0	18*59	PCB	Hardware Resources
E104-BT5010A	nRF52810	2.4G	0	UART	5.0	11.5 * 16	陶瓷天线	Secondary Development

Revision history

Version	Date	Clarification	Person
1.0	2023-09-13	Original	Bin
1.1	2023-10-12	Content revision	Bin
1.2	2024-01-19	Content revision	Bin
1.3	2024-03-20	Content revision	Bin
1.4	2024-03-26	Content revision	Bin
1.5	2024-11-05	Fixed restore factory Settings instruction	Bin
1.6	2024-11-13	Content revision	Bin
1.7	2024-12-06	EWM104-BT09SP/SX added	Bin
1.8	2025-02-06	Content revision	Bin

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