E104-BT14 Series

BLE5.4 Low Power Bluetooth to Serial Port Module



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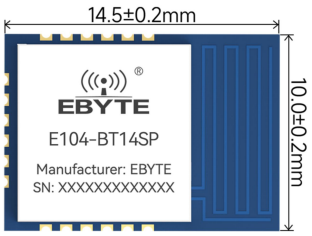
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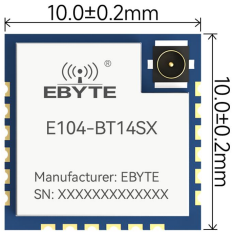
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Chapter 1 Product Overview

1.1 Product Introduction

The E104-BT14 series modules are serial-to-BLE Bluetooth modules based on Bluetooth protocol version 5.4. They support slave role, low-power broadcast, data pass-through, over-the-air configuration, and other functions , and are suitable for smart wearables, home automation, smart appliances, automobiles, lighting, industrial internet, smart data acquisition, smart control and other fields.





1. 2 Features and Functions

- Bluetooth BLE 5.4 Agreement ;
- Bluetooth bag length is adjustable;
- Supports two working modes: configuration and pass-through.
- Supports automatic broadcasting and automatic connection upon power-on ;
- Switching between IBeacon and regular broadcast ;
- Supports transparent serial port transmission ;
- Supports custom 16-bit UUIDs ;
- Supports over-the-air configuration of Bluetooth parameters ;
- Supports ultra-low power sleep mode and synchronous broadcasting;
- Supports transmission power modification , with a maximum transmission power of 9 dBm;
- MTU maximum 247 bytes;
- Supports OTA firmware upgrades ;
- The maximum serial port baud rate supported is 1,000,000 bps .

1.3 Application Scenarios

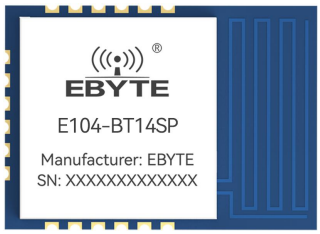
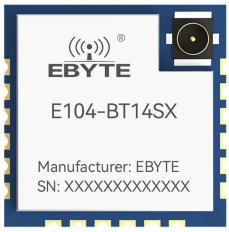
- Smart home ;
- Smart building construction ;
- Automated data acquisition ;
- Health sensors;
- Smart wearable devices ;
- Intelligent robots ;
- Intelligent control;

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Chapter 2 Specifications

2.1 Comparison of Product Selection Parameters

Product Model	E104-BT14SP	E104-BT14SX
Product display image		
Bluetooth standard	BLE5.4	BLE5.4
Operating frequency band	2402～2480MHz	2402～2480MHz
Transmit power	-14～ 9dBm	-14～9dBm
Transmission distance ①	200m	320m
Power supply voltage ②	2.5～5.5V	2.5～5.5V
Emission current ③	≈33mA	≈33mA
Received current ④	≈1.6mA	≈1.6mA
Dormant current ⑤	≈2μA	≈2μA
Wake-up broadcast current⑥	≈1.2mA	≈1.6mA
Dormant broadcast current⑦	≈2μA	≈2μA
Product Dimensions ⑧	10*14.5mm	10*10mm
Antenna type	Onboard PCB antenna	IPEX 3rd generation base
Interface method	stamp perforation	stamp perforation
Operating temperature ⑨	-40～+85℃	-40～+85℃
Product weight ⑩	0.5 g	0.4 g

Note:

(1)Test conditions: Clear and open environment, antenna height 2m.

(2)Power supply voltage: 3.3V is recommended.

(3)Transmitting current: DC 3.3V power supply, instantaneous current.

(4)Received current: Average current when powered by DC 3.3V.

(5)Dormant current: Average current when supplied with DC 3.3V.

(6)Wake-up broadcast current: Power supply DC 3.3V, broadcast period 2000ms, average current.

(7)Sleep broadcast current: Power supply DC 3.3V, broadcast period 1000ms, average current.

(8)Product dimensions: tolerance is ±0.2mm. For detailed dimensions, please see Chapter 3 of this document .

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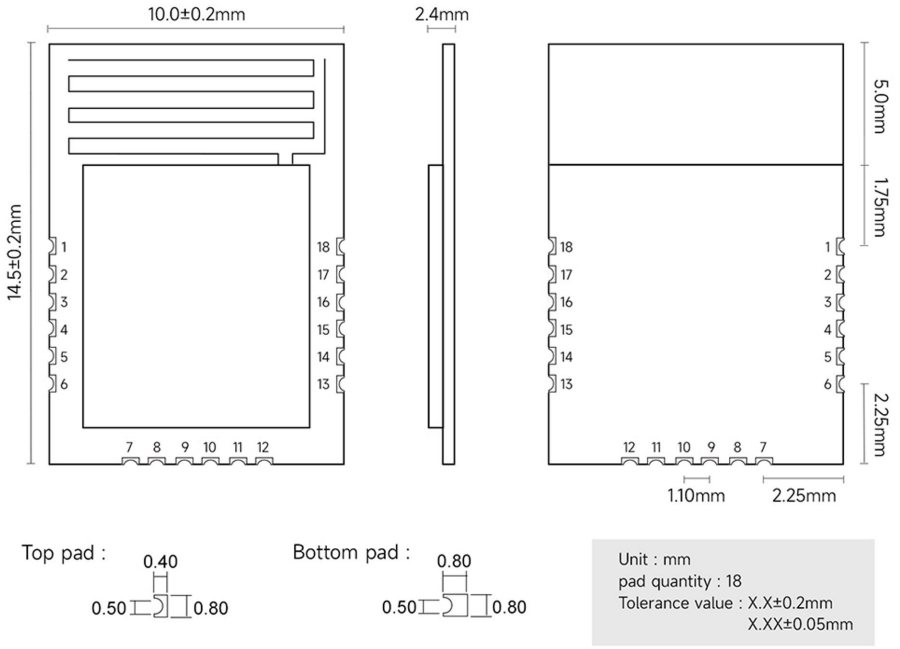
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(9)Operating temperature: Industrial grade standard.

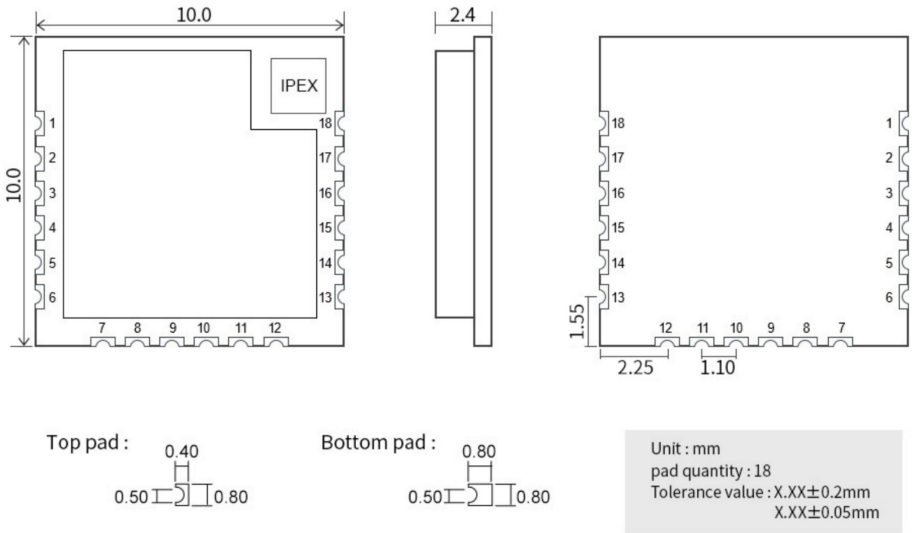
(10)Product weight: error is ±0.1g .

Chapter 3 Mechanical Dimensions

E104-BT14SP:



E104-BT14SX:



Serial Number	Pin Definitions	Pin direction	Description
1	GND	-	power ground

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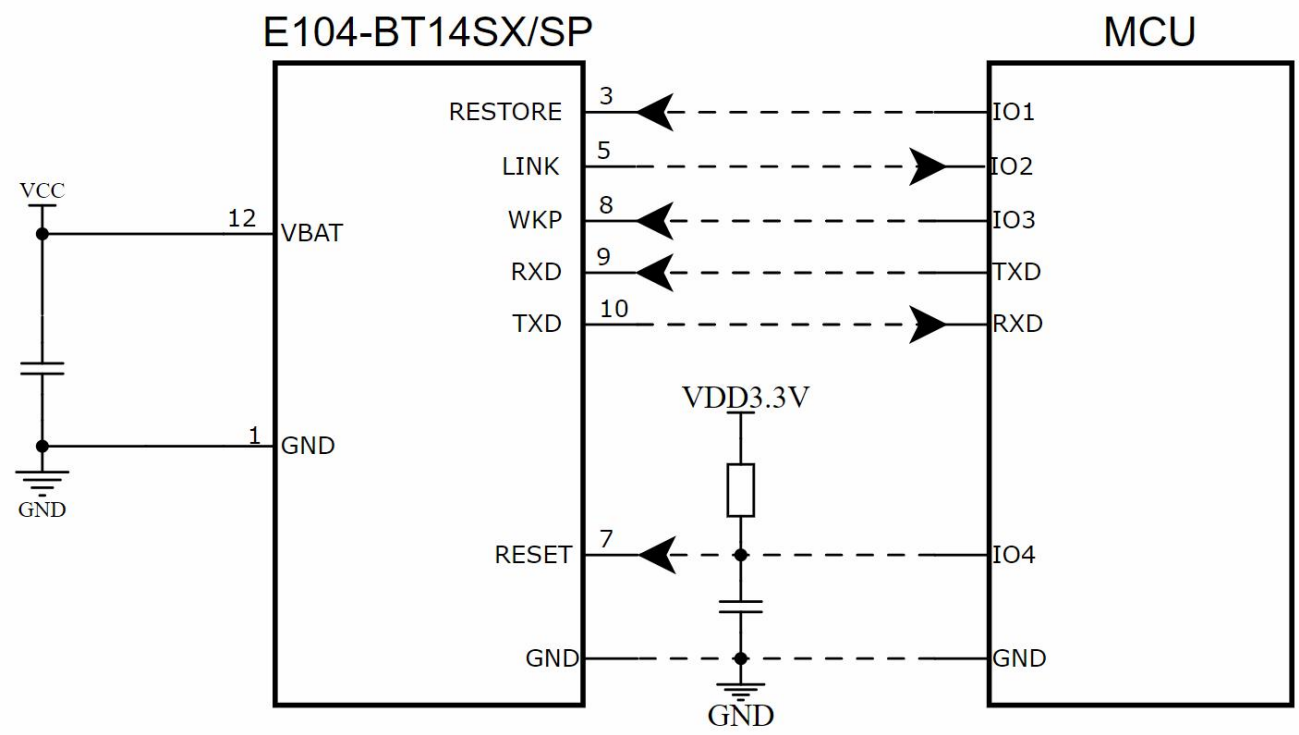
Serial Number	Pin Definitions	Pin direction	Description
2	NC	-	Reserved GPIO, users don't need to worry about it.
3	RESTORE	enter	After the internal pull-up switch is held low for at least 5 seconds, all parameters are reset to factory settings and the module automatically restarts.
4	NC	-	Reserved GPIO, users don't need to worry about it.
5	LINK	Output	Connection status indicator pin: high level indicates connected, low level indicates disconnected.
6	BAT_DET	enter	Battery voltage detection pin
7	RESET	enter	Reset pin, low level reset
8	WKP	enter	The default low level indicates low-power mode, during which serial communication is disabled. Pulling the level high enters normal operating mode, enabling serial communication.
9	RXD	enter	Serial port input
10	TXD	Output	Serial port output
11	GND	-	power ground
12	VBAT	-	Positive power supply, 2.5V~5.5V, 3.3V power supply recommended.
13	NC	-	Reserved GPIO, users don't need to worry about it.
14	NC	-	Reserved GPIO, users don't need to worry about it.
15	NC	-	Reserved GPIO, users don't need to worry about it.
16	NC	-	Reserved GPIO, users don't need to worry about it.
17	NC	-	Reserved GPIO, users don't need to worry about it.
18	GND	-	power ground

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Chapter 4 Basic Applications

4.1 Recommended Circuit



Chapter 5 Functional Description

5.1 Character Description

This module only supports slave roles, and its specific functions are as follows:

1. Slave role: It can connect with other Bluetooth products of our company and supports transparent transmission function, such as: E104-BT07, E104-BT08, EWM104-BT57U, E104-BT02, E104-BT5032A, E104-BT53A3, E104-BT53A1, E104-BT53C3, E104-BT5010A, E104-BT52 series (not compatible with E104-BT52-V5.3).

2. The slave broadcast is enabled by default. It automatically enters broadcast mode upon power-on, and the broadcast name (Complete Local Name) is "E104-BT14".

3. Broadcast data parameter configuration is described in section 5.4.

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5.2 Power Mode

5.2.1 Mode Support

The module supports two power modes: 1. Low power mode; 2. Wake-up mode.

5.2.2 Low Power Mode

Low-power mode refers to the module entering a low-power state, where the BLE function is disabled, and all peripherals (including the serial port) except for the wake-up pin are turned off. Entering low-power mode is done immediately by inputting the AT command "AT+SLEEP=1", and the serial port will output "STATE:Sleep".

5.2.3 Wake-up Mode

Wake-up mode refers to a mode in which the peripherals required by the module are in normal working condition. After the module is woken up, it outputs the status "STATE:Wakeup".
Wake-up method: The WKP pin is connected to a rising edge to trigger wake-up, which will wake up immediately.

5.3 Data Transmission Mode

5.3.1 Transmission Mode

The module supports one data transmission mode: data pass-through communication mode.

5.3.2 Data Transmission

Data pass-through: The transmitting end sends the data received from the serial port to the other device via BLE without any processing; the receiving end sends the data received by BLE out via the serial port without any processing.

5.4 Broadcast Information

5.4.1 General Broadcast Information

Broadcast messages include Advertising and Scan response. Advertising is a broadcast packet sent proactively, and Scan response is a broadcast packet sent in response to a host's scan request. Note: All values in the table below are in hexadecimal.
Advertising

Flags (fixed field)	Length	Manufacturer type flag (fixed	Manufacturer Specific Data

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		field)	
020106	XX	FF	XX (configurable, maximum 26 bytes)
For example: 02 01 06 08 FF 43 44 45 42 59 54 45			

Scan response

Length	UUID list type flag (fixed field)	Complete Local Name
03	03	XX (configurable, e.g., F0FF)
For example: 03 03 F0 FF		
Length	Type flag (fixed field)	Complete Local Name
XX	09	XX (configurable, maximum 20 bytes)
For example: 0A 09 45 31 30 34 2D 42 54 31 34		

5.4.2 iBeacon Broadcast Messages

1. Configure the broadcast data to be iBeacon data and broadcast using the iBeacon broadcast data format.
2. Bluetooth connection is not supported in iBeacon broadcast mode.

Advertising

Flags (fixed field)	Length(length, fixed field)	Manufacturer type flag (fixed field)	Apple Company ID (fixed field)	(Fixed field)	UUID	Major	Minor	Tx Power
02 01 06	1A	FF	4C 00	02 15	XX	XX	XX	XX
For example: 02 01 06 1A FF 4C 00 02 15 E2 C5 6D B5 DF FB 48 D2 B0 60 D0 F5 A7 10 96 E0 00 01 00 01 C5								

5.5 Configuration Method

The module supports two configuration methods: 1. Serial port configuration; 2. Over-the-air configuration.

The two configuration methods are basically the same. The following two points should be noted. For specific operation steps, please refer to section 7.1.

1. Serial port configuration: When the module is powered on and not connected, it is in AT command mode and can be configured directly via serial port. However, after the module is connected to the Bluetooth host, you need to input "+++" on the serial port to enter AT command mode again before you can configure the serial port.

2. Over-the-air configuration: A verification password is required to configure the device, and the configuration period is limited to the current connection. If the device is disconnected and reconnected, re-authentication is required.

5.6 Indicator Pin

Indicator pins are divided into two categories: 1. Connection indicator pins; 2. Data indicator pins.

5.6.1 Connect the indicator pin

The connection indicator pin is PB11 (LINK). PB11 is low by default. When the module is connected, PB11

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becomes high. When the module is disconnected, PB11 returns to low.

5.6.2 Data Indicator Pin

The communication indicator pins are PB6 (RXD) and PB5 (TXD), which will flash when there is information communication on the module's serial port.

5.7 UUID Explanation

Service UUID	Data pass-through communication service		
0xFFF1	Eigenvalue UUID	property	describe
	0xFFF1	NOTIFY/READ	receive data pass-through communication
	0xFFF2	READ/WRITE	Transparent data transmission communication
	0xFFF3	NOTIFY/READ/WRITE	\
Service UUID	OTA upgrade service		
0xFF12	Eigenvalue UUID	property	describe
	0xFF15	READ/WRITE NO RESPONSE	\
	0xFF14	NOTIFY	\
Service UUID	Over-the-air configuration service		
0XFF30	Eigenvalue UUID	property	describe
	0xFF31	WRITE	Send over-the-air configuration settings information
	0xFF32	NOTIFY	Receive over-the-air configuration feedback information

5.8 Status or Event Printing

Status information includes: connected, disconnected, awake, and asleep. The format is as follows (note: \r\n is a carriage return/line feed):

state	Print information
Connection successful	STATE:Connect\r\n
Connection disconnected	STATE: Disconnect\r\n

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System wake-up	STATE:Wakeup\r\n
Sleep mode	STATE:Sleep\r\n

5.9 OTA Upgrade

1. Preparation: E104-BT14SX or E104-BT14SP, USB to UART converter, mobile phone.
2. Connect the module's VCC, GND, RX, and TX pins to the corresponding pins of the USB to UART converter.
3. Prepare the mobile software "AB OTA Demo.APP", which can be downloaded from our company's module website.
4. After downloading and installing the software on your phone, open "AB OTA Demo.APP" and power on the module, as shown in Figure 5.1. First, tap "Serial Number 1," then tap "Serial Number 2." In the input box of "Serial Number 3," enter the module name to filter, and then select the Bluetooth module to be upgraded via OTA. After selecting, wait for several tens of seconds. When the version number in "Serial Number 5" appears, it means that the OTA upgrade service is working properly. At this point, tap "Serial Number 6" to load the firmware to be upgraded (the .fot firmware can be downloaded from our module's official website). Finally, tap "Serial Number 7" to start the upgrade and wait for it to complete. The final upgrade completion is shown in "Serial Number 8."

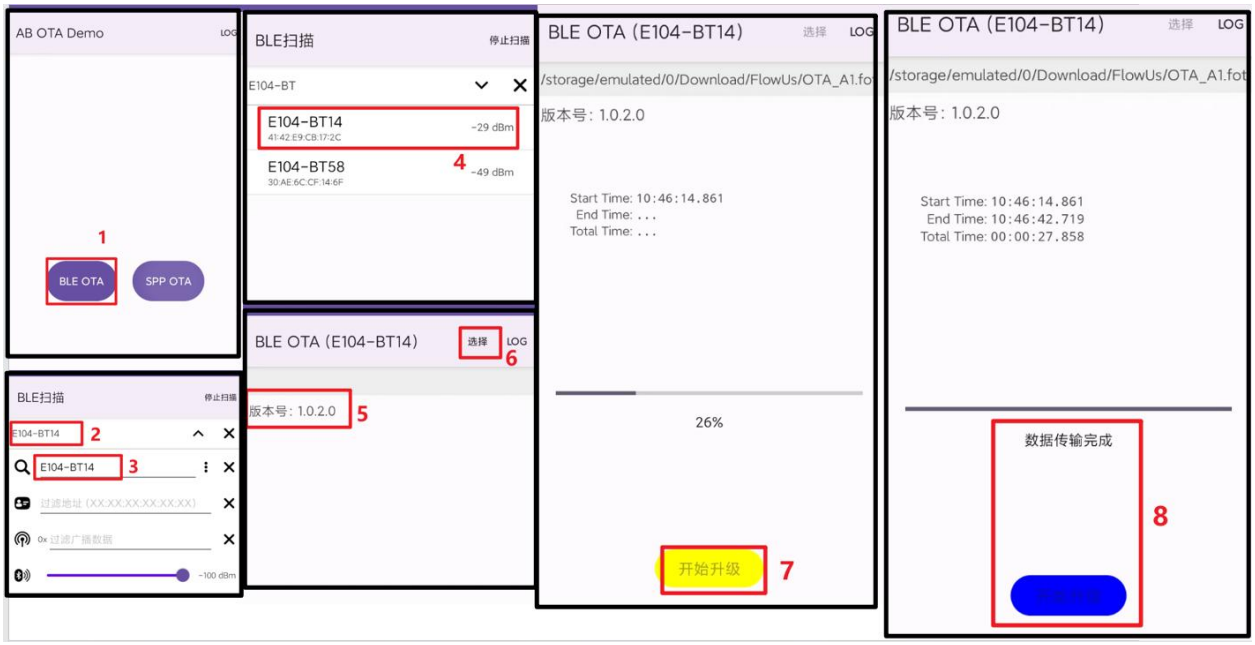


Figure 5.1

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Chapter 6 AT Commands

6.1 Instruction Description

Notice:

1. Before sending operation commands, ensure that the module is in wake-up mode (WKP pin connected to high level), otherwise it will not be able to receive configuration commands;
2. Serial port baud rate 115200, 8N1;
3. All AT commands do not require a carriage return and line feed (\r\n);
4. All AT commands are case-sensitive;
5. The result returned by the AT command ends with a newline character (\r\n);
6. The error response format is "+ERR=[NUM]", see section 6.2 for details.

6.2 Error Code Value Explanation

Error return value	Description	Error reason	Solution
1	The instruction was not found.	Incorrect instruction or the instruction is missing	Check if the AT commands in the manual are correct.
2	Parameter out of range	The parameter exceeds the maximum or minimum setting value.	Check if the maximum or minimum value of the parameter is within the range.
3	Invalid parameters	Invalid parameter value setting	Please enter the parameters specified in the parameters.

6.3 Instruction List

Note: "\r\n" in the table below means "carriage return and line feed".

6.3.1 AT Test Commands

instruction		answer
implement	AT	AT +OK\r\n
Description	Used to test whether the serial port AT commands are working properly.	

6.3.2 +++ Enter AT command mode

instruction	answer

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implement	+++	Enter AT mode\r\n
Description	When there is no connection, the system defaults to AT command mode, and sending this command will not result in a response when there is no connection. If the module is already connected, you need to use this command to enter AT command mode.	

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6.3.3 AT+EXIT Exit AT command mode

instruction		answer
implement	AT+EXIT	AT+EXIT Enter transparent mode\r\n
Description	Exit AT command mode and enter transparent transmission mode.	

6.3.4 AT+RESET Reset Command

instruction		answer
implement	AT+RESET	AT+RESET +OK\r\n
Description	Effective immediately.	

6.3.5 AT+RESTORE factory reset command

instruction		answer
implement	AT+RESTORE	AT+RESTORE +OK\r\n
Description	1. Automatic restart after reset; 2. When restoring factory settings, any form of reset is prohibited, and power should not be cut off before the operation is completed.	

6.3.6 AT+PARI Serial Port Parity Bit

instruction		answer
Query	AT+PARI=?	AT+PARI=? PARI:0\r\n
set up	AT+PARI=[para]	AT+PARI=[para] +OK\r\n
parameter	para(ASCII) / describe 0 / No validation (default) 1 / Odd parity 2 / Even parity	
Description	Restart to take effect; save after power failure.	
Example	Send: AT+PARI=0 Received: AT+PARI=0 +OK\r\n	

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6.3.7 AT+BAUD Serial Port Baud Rate

<table>
<tr><th colspan="2">instruction</th><th>answer</th></tr>
<tr><td>Query</td><td>AT+BAUD=?</td><td>AT+BAUD=?
BAUD:10\r\n</td></tr>
<tr><td>set up</td><td>AT+BAUD=[para]</td><td>AT+BAUD=[para]
+OK\r\n</td></tr>
<tr><td>parameter</td><td colspan="2"><table>
<tr><th>para(ASCII)</th><th>Baud rate (bps)</th></tr>
<tr><td>0</td><td>1200</td></tr>
<tr><td>1</td><td>2400</td></tr>
<tr><td>2</td><td>4800</td></tr>
<tr><td>3</td><td>9600</td></tr>
<tr><td>4</td><td>14400</td></tr>
<tr><td>5</td><td>19200</td></tr>
<tr><td>6</td><td>28800</td></tr>
<tr><td>7</td><td>38400</td></tr>
<tr><td>8</td><td>57600</td></tr>
<tr><td>9</td><td>76800</td></tr>
<tr><td>10</td><td>115200 (default)</td></tr>
<tr><td>11</td><td>230400</td></tr>
<tr><td>12</td><td>500000</td></tr>
<tr><td>13</td><td>1000000</td></tr>
</table></td></tr>
<tr><td>Description</td><td colspan="2">Restart to take effect; save after power failure.</td></tr>
<tr><td>Example</td><td colspan="2">Set the baud rate to 115200.
Send: AT+BAUD=10
Receive: AT+BAUD=10
+OK\r\n</td></tr>
</table>

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6.3.8 AT+ADV Broadcast Enable

instruction		answer
Query	AT+ADV=?	AT+ADV=? ADV:[para]\r\n
set up	AT+ADV=[para]	AT+ADV=[para] +OK\r\n
parameter	para(ASCII): 0 disables broadcasting, 1 enables normal broadcasting.	
Description	Takes effect immediately (if broadcasting is not enabled, or if already connected, it will take effect next time), saves upon power failure.	
Example	Enable broadcast Send: AT+ADV=1 Receive: AT+ADV=1 +OK\r\n	

6.3.9 AT+ADVDAT Broadcast Data

instruction		answer
Query	AT+ADVDAT=?	AT+ADVDAT=? ADVDAT:[para]\r\n
set up	AT+ADVDAT=[para]	AT+ADV=[para] +OK\r\n
parameter	para(ASCII): 08 (length) ff ff ff (vendor-defined data and vendor ID) 45 42 59 54 45 (data). The number of para parameters is no more than 28, and the maximum length is 1B.	
Description	Restart to take effect; save after power failure.	
Example	General broadcast: Send: AT+ADVDAT=08 ff 00 01 45 42 59 54 45 Receive: AT+ADVDAT=08 ff 00 01 45 42 59 54 45 +OK\r\n --- iBeacon broadcast: Send: AT+ADVDAT=1a ff 4c 00 02 15 e2 c5 6d b5 df fb 48 d2 b0 60 d0 f5 a7 10 96 e0 00 01 00 01 c5 Receive: AT+ADVDAT=1a ff 4c 00 02 15 e2 c5 6d b5 df fb 48 d2 b0 60 d0 f5 a7 10 96 e0 00 01 00 01 c5 +OK\r\n	

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6.3.10 AT+ADVINTV Broadcast Interval

instruction		answer
Query	AT+ADVINTV=?	AT+ADVINTV=? ADVINTV:800\r\n
set up	AT+ ADVINTV=[para]	AT+ ADVINTV =[para] +OK\r\n
parameter	para(ASCII): 32~16383, default: 800 (500ms).	
Description	Effective immediately, saves upon power failure.	
Example	Set the broadcast interval to 800 (500ms). Send: AT+ADVINTV=800 Receive: AT+ADVINTV=800 +OK\r\n	

6.3.11 AT+NAME Broadcast setting name

instruction		answer
Query	AT+NAME=?	AT+NAME=? NAME:E104-BT14\r\n
set up	AT+NAME=[para]	AT+NAME=[para] +OK\r\n
parameter	para(ASCII): Broadcast device name, the broadcast name is no more than 20 bytes.	
Description	Effective immediately, saves upon power failure.	
Example	Set the broadcast name to E104-BT14 Send: AT+NAME=E104-BT14 Receive: AT+NAME=E104-BT14 +OK\r\n	

6.3.12 AT+DISCON Disconnect command

instruction		answer
implement	AT+DISCON=0	AT+DISCON=0 +OK\r\n
Description	Takes effect immediately. Note: You need to enter AT command mode (send +++) before sending the command.	

6.3.13 AT+MAC Local MAC Address

instruction		answer
Query	AT+MAC=?	AT+MAC=? MAC:[para]\r\n

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parameter	para:xx xx xx xx xx xx (6-byte MAC address, ASCII code)
Example	Send: AT+MAC=? Receive: AT+MAC=? MAC:41 42 2f 87 91 ff\r\n

6.3.14 AT+MTU Setting MTU

instruction		answer
Query	AT+MTU=?	AT+MTU=? MTU:247\r\n
set up	AT+MTU=[para]	AT+MTU=[para] +OK\r\n
parameter	1. para:23-247 (ASCII code). 2. The default value is 247.	
Description	1. Takes effect immediately, saves upon power failure. 2. Payload = MTU - 3 (Opcod occupies one byte, Attribute Handle occupies two bytes). For example, if set to 247, the number of valid bytes for the user should be 244 bytes.	
Example	Set the MTU to 247. Send: AT+MTU=247 Receive: AT + MTU = 247 +OK\r\n	

6.3.15 AT+AUTH Over-the-Air Authentication Password

instruction		answer
set up	AT+AUTH=[para]	AT+AUTH=OK +OK\r\n
parameter	1. para(ASCII): 6-byte password; 2. Passwords must be no more than 6 characters and no less than 6 characters.	
Description	1. This command is only used for over-the-air authentication; the serial port will not respond to this AT command. 2. Default password: 123456.	
Example	Enter the over-the-air configuration authentication password Send: AT+AUTH=123456 Receive: AT+AUTH=OK +OK\r\n	

6.3.16 AT+UPAUTH Change Over-the-Air Authentication Password

instruction	answer

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Query	AT+UPAUTH=?	AT+UPAUTH=? UPAUTH:123456\r\n
set up	AT+UPAUTH=[para]	AT+UPAUTH=[para] +OK\r\n
parameter	para(ASCII): 6-byte password	
Description	Effective immediately, saves data even after power failure.	
Example	Setting an aerial password Send: AT+UPAUTH=123456 Received: AT+UPAUTH=123456 +OK\r\n	

6.3.17 AT+SLEEP: Immediately enter sleep mode.

instruction		answer
implement	AT+SLEEP=1	AT+ SLEEP = 1 STATE:Sleep\r\n
Description	Effective immediately.	

6.3.18 AT+PWR RF Power

instruction		answer
Query	AT+PWR=?	AT+PWR=? PWR:0\r\n
set up	AT+PWR=[para]	AT+PWR=[para] +OK\r\n
parameter	para(ASCII) / Actual RF transmit power: 0 / 9 dBm (default) 1 / 6 dBm 2 / 3 dBm 3 / 0 dBm 4 / -3 dBm 5 / -6 dBm 6 / -9 dBm 7 / -14 dBm	
Description	Restart to take effect; save after power failure.	
Example	Set the RF transmit power to 9dBm Send: AT+PWR=0 Receive: AT+PWR=0 +OK\r\n	

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6.3.19 AT+ADC query for battery voltage

instruction		answer
Query	AT+ADC=?	AT+ADC=? ADC:[para]
parameter	para: Current battery voltage value, in mV.	
Description	Only the query function is supported.	
Example	Query battery voltage value Send: AT+ADC=? Receive: AT+ADC=? ADC: 3289\r\n	

6.3.20 AT+COMPAT Compatible Switch

instruction		answer
Query	AT+COMPAT=?	AT+COMPAT=? COMPAT:0\r\n
set up	AT+COMPAT=[para]	AT+COMPAT=[para] +OK\r\n
parameter	para(ASCII): 0 indicates compatibility is off, 1 indicates compatibility is on , and compatibility is off by default.	
Description	1. The compatibility switch should only be turned on when making a master-slave connection with E104-BT07 and E104-BT-08 ; 2. For detailed operating steps, please refer to the "Quick Start Guide".	
Example	Turn on compatibility switch Send: AT+COMPAT=1 Receive: AT+COMPAT=1 +OK\r\n	

6.3.21 AT+UUID Query or Modify UUID

instruction		answer
Query	AT+UUID=?	AT+UUID=? UUID:0\r\n
set up	AT+UUID=[para]	AT+UUID=[para] +OK\r\n
parameter	para(ASCII): 16-bit UUID.	
Description	1. Read or modify UUID service values; 2. Can be used for Bluetooth slave connection.	
Example	Set the UUID to 0xFFF6 Send: AT+UUID=FFF6	

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	Receive: AT+UUID=FFF6 +OK\r\n

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6.3.22 Use AT+VER to check the software version number

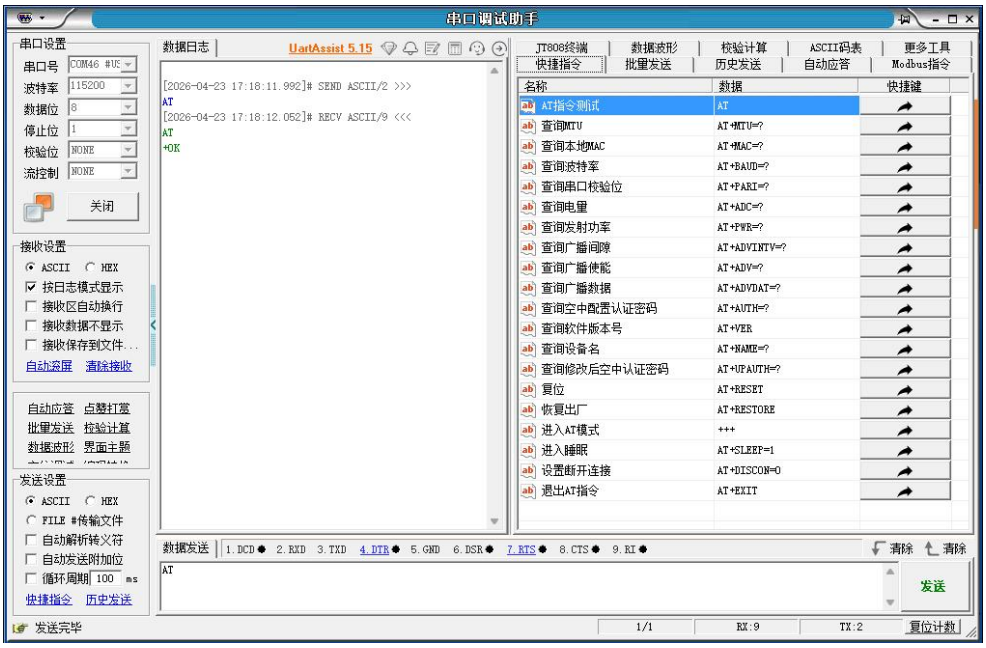
instruction		answer
Query	AT+VER	AT+VER VER:[para]\r\n
parameter	para: Current software version number.	
Description	Only the query function is supported.	
Example	Query software version number Send: AT+VER Receive: AT+VER VER:7567-0-10\r\n	

Chapter 7 Quick Start Guide

7.1 Configuration Module

7.1.1 Serial Port Configuration

1. Items to prepare: E104-BT14SX or E104-BT14SP, USB to UART converter, computer.
2. Connect the module's VCC, GND, RX, and TX pins to the corresponding pins of the USB to UART converter.
3. Connect the converter to the computer. On the computer, use a serial port assistant tool with a baud rate of 115200 to open the serial port and send "AT" to test. The serial port tool prepared for this experiment is "uartassist5.15". As shown in Figure 7.1, after sending "AT", the serial port returns "AT\r\n+OK\r\n". The return from the serial port indicates that the serial port configuration function is normal, and you can configure it according to the AT commands in section 6.3.



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Figure 7.1

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4. Example: As shown in Figure 7.2, the serial port broadcast interval is modified to 250ms (corresponding value is 400).

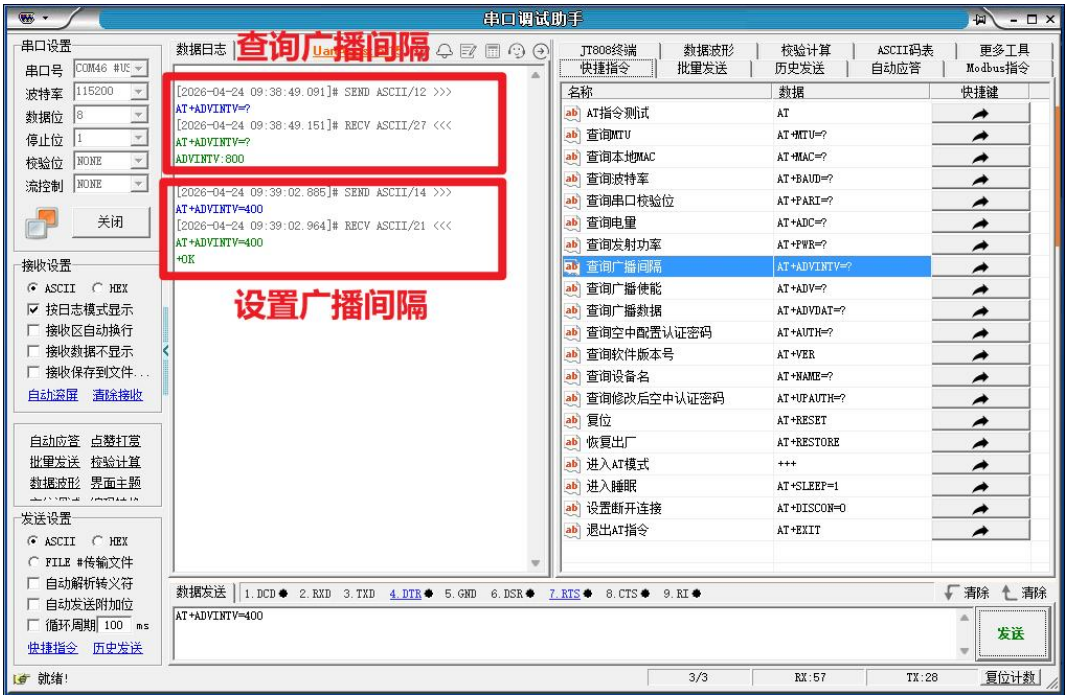


Figure 7.2

7.1.2 In-flight configuration

1. Items to prepare: E104-BT14SX or E104-BT14SP, USB to UART converter, computer, mobile phone.
2. Connect the module's VCC, GND, RX, and TX pins to the corresponding pins of the USB to UART converter.
3. Power on the module, and then use the Bluetooth serial port assistant on your mobile phone. It is recommended to use "nRF Connect". This experiment will use "nRF Connect" for demonstration.
4. As shown in Figure 7.3, open "nRF Connect", then click "Serial Number 1" to enter the Bluetooth broadcast filtering interface. Enter "E104-BT14" in "Serial Number 2" to filter, then click "Serial Number 3" to start scanning broadcasts. Once you find the broadcast signal of module "Serial Number 3", click "Serial Number 5" to connect. Finally, in the interface of "Serial Number 6", find the service with UUID 0xFF30 in "Serial Number 7", click "Serial Number 8" to enable the Notify function, and then click "Serial Number 9" to send the over-the-air configuration authentication password and then perform over-the-air configuration.

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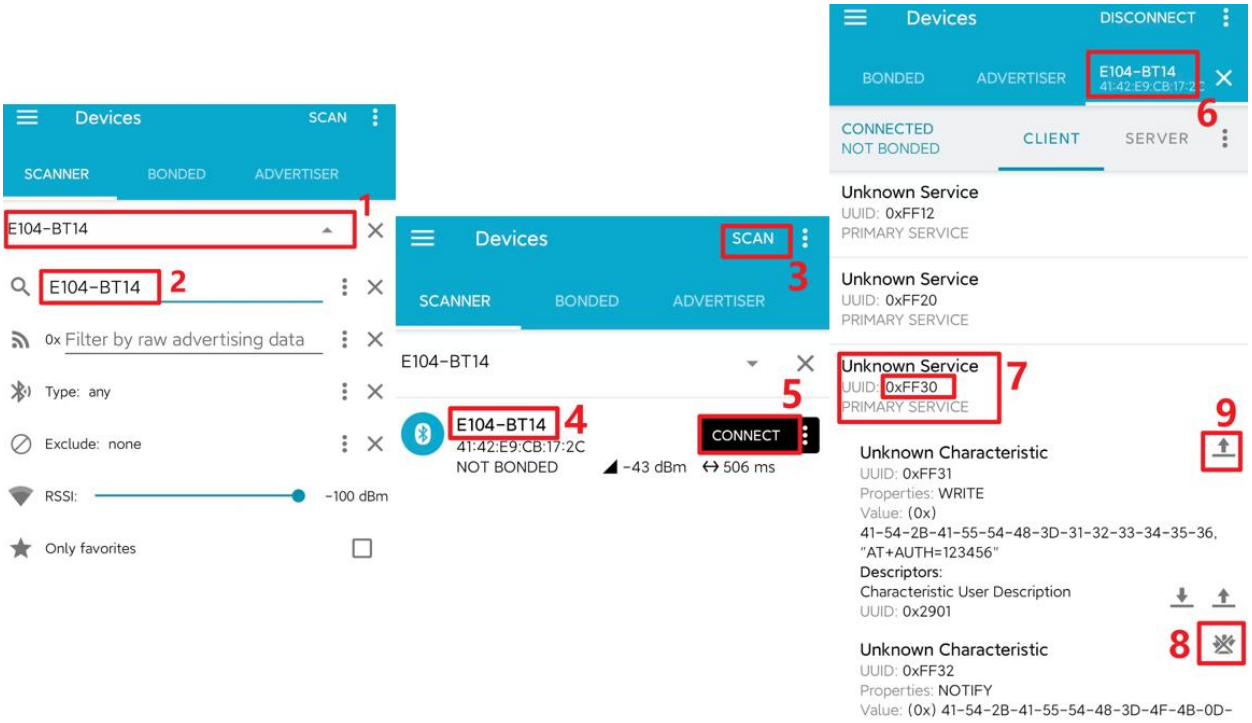
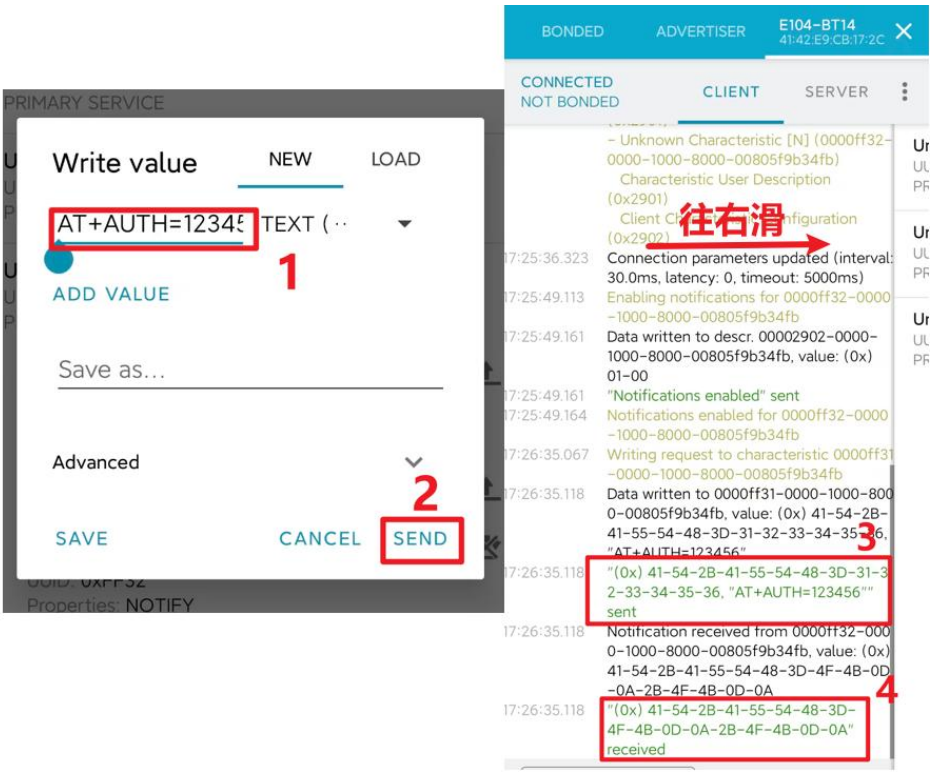


Figure 7.3

5. Over-the-air (OTA) authentication password configuration: First, you need to enter the OTA password verification. As shown in Figure 7.4, select the "TEXT" type to the right of the "Item 1" option box, then enter "AT+AUTH=123456" (default password), and finally click "SEND" in "Item 2". Detailed interactive information can be viewed by swiping to the right. "Item 3" contains the information sent to the Bluetooth module, and "Item 4" is the information returned by the module to the mobile phone after verifying the OTA authentication password is correct (converted to ASCII code "AT+AUTH=OK\r\n+OK\r\n"). Note that if the password is entered incorrectly, there will be no response.



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Figure 7.4

6. After the over-the-air configuration authentication password is correct, you can send AT commands to configure the module or query its parameters. For example, if you want to query the transmission power, click "Serial Number 9" in Figure 7.3 again and send "AT+PWR=?" (Note that you should change it to TEXT data beforehand). Finally, you can view the detailed interactive information interface as shown in Figure 7.5.



Figure 7.5

7.2 Quick Start Guide for Pass-through Function

1. Items to prepare: E104-BT14SX or E104-BT14SP, USB to UART converter, computer, mobile phone.
2. Connect the module's VCC, GND, RX, and TX pins to the corresponding pins of the USB to UART converter.
3. Connect the converter to the computer, and use a serial port assistant tool on the computer with a baud rate of 115200 to open the serial port.
4. When using a Bluetooth serial port assistant on your mobile device, we recommend using "nRF Connect". This experiment will use "nRF Connect" for demonstration.
5. Connect the Bluetooth slave module using the “nRF Connect” software: As shown in Figure 7.3, open “nRF Connect”, then click “Serial Number 1” to enter the Bluetooth broadcast filtering interface. Enter “E104-BT14” in “Serial Number 2” to filter, then click “Serial Number 3” to start scanning broadcasts. Once you find the broadcast signal of the “Serial Number 3” module, click “Serial Number 5” to connect and wait for the connection to succeed.
6. Sending information from the mobile phone to the Bluetooth module (transparent transmission): As shown in Figure 7.6, click "Serial Number 1" to select the service with UUID 0xFF20, then click "Serial Number 2" to open Notify, and finally click "Serial Number 3" to send any information. The information is transmitted to the Bluetooth slave module without any processing.

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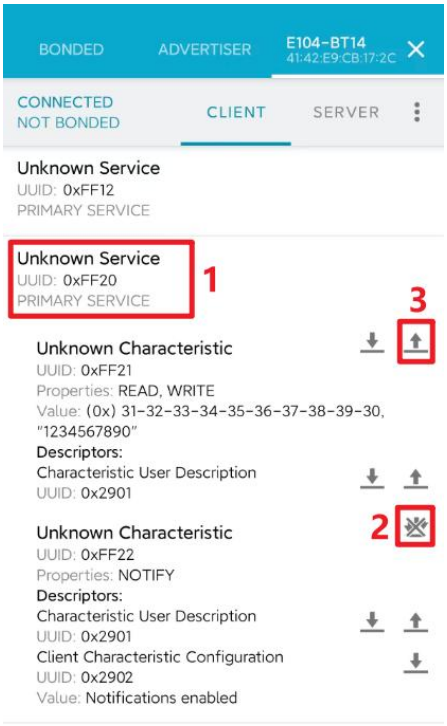


Figure 7.6

7. Example: The mobile phone sends "1234567890" to the Bluetooth slave module, and the Bluetooth slave module prints the received information through the serial port.

Click "Serial Number 3" in Figure 7.6 to send, and you will be redirected to the sending interface shown in Figure 7.7. Select "Serial Number 1" in Figure 7.7 as TEXT, edit the information to be sent in "Serial Number 2" (the example information to be sent is "1234567890"), and finally click "SEND" in "Serial Number 3". Finally, as shown in "Serial Number 1" in Figure 7.8, the serial port interface receives the transparent information "1234567890".

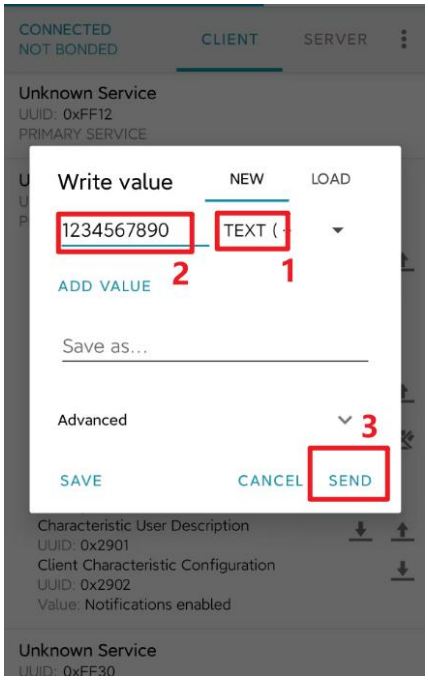


Figure 7.7

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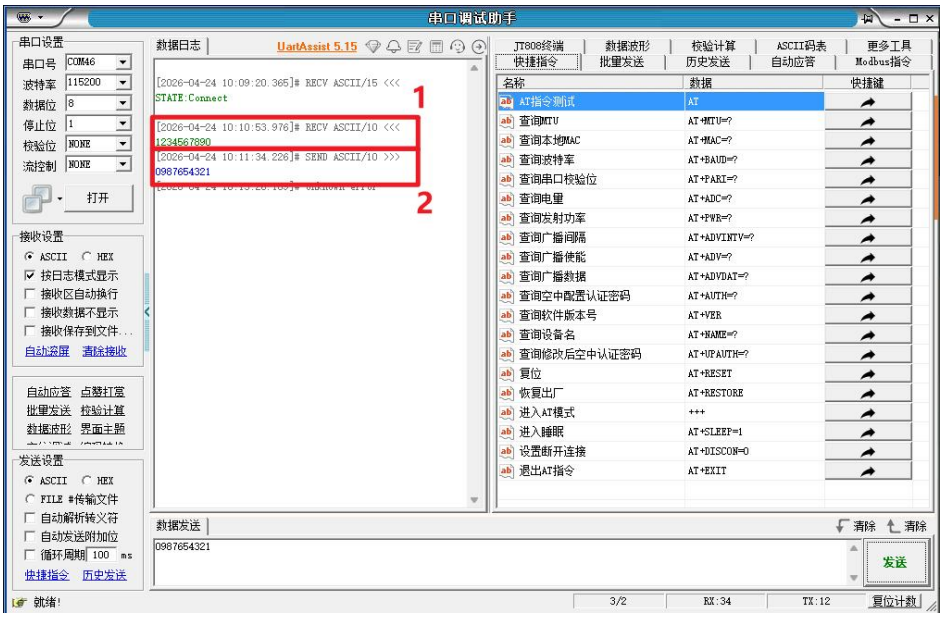


Figure 7.8

8. Example: The Bluetooth slave module sends "0987654321" to the mobile phone via the serial port, and the mobile phone receives the information through "nRF Connect".

As shown in Figure 7.8, the serial port sends "0987654321". After successful transmission, see "Sequence No. 2" in Figure 7.8. Then, open the detailed interactive information interface of "nRF Connect" (by swiping the screen to the right), as shown in Figure 7.9. The mobile phone receives the transparent information "0987654321" from the Bluetooth slave module.



Figure 7.9

Chapter 8 Frequently Asked Questions

8.1 Transmission distance is not ideal

- When there are obstacles in line-of-sight communication, the communication distance will be reduced accordingly ;

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- Temperature, humidity, and co-channel interference can all lead to increased packet loss rates in communications .
- The ground absorbs and reflects radio waves, and the test results are poor when the ground is close to the ground .
- Seawater has a strong ability to absorb radio waves, so testing results are poor at the seaside .
- If there are metal objects near the antenna, or if it is placed inside a metal casing, the signal attenuation will be very severe .
- Power register settings are incorrect; air speed is set too high (the higher the air speed, the shorter the distance) .
- At room temperature, the power supply voltage is lower than the recommended value; the lower the voltage, the lower the power output .
- The antenna may be poorly matched with the module or have quality issues.

8.2 Module is easily damaged .

- Please check the power supply and ensure it is within the recommended voltage range. Exceeding the maximum value will cause permanent damage to the module .
- Please check the power supply stability; the voltage should not fluctuate significantly or frequently .
- Please ensure anti-static operation during installation and use, as high-frequency devices are sensitive to electrostatic discharge .
- Please ensure that the humidity is not too high during installation and use, as some components are humidity-sensitive .
- Unless there are special requirements, it is not recommended to use it at excessively high or low temperatures.

8.3 Too high error rate

- If there is interference from a co-channel signal nearby, move away from the source of interference or change the frequency or channel to avoid the interference.
- An inadequate power supply can also cause garbled characters, so it is essential to ensure the reliability of the power supply.
- Poor quality or excessive length of extension lines or feeders can also lead to a high bit error rate.

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Chapter 9 Welding Operation Instructions

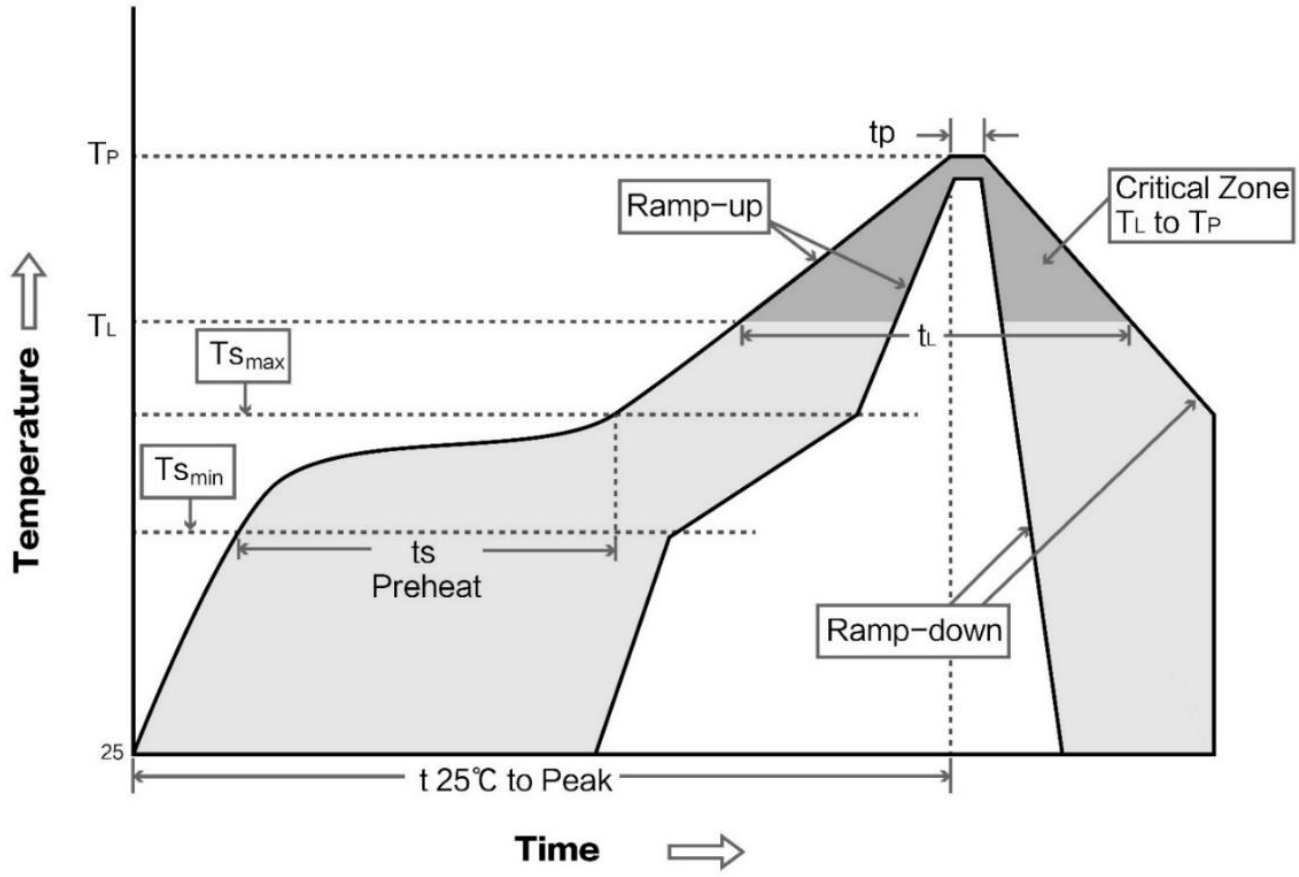
9.1 Reflow soldering temperature

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 preheating temperature	100 ℃	150 ℃
Preheat temperature max (Tsmax)	Maximum preheating temperature	150 ℃	200 ℃
Preheat Time (Tsmin to Tsmax)(ts)	preheating time	60-120 sec	60-120 sec
Average ramp-up rate(Tsmax to Tp)	Average rate of ascent	3 ℃ /second max	3 ℃ /second max
Liquidous Temperature (TL)	Liquid phase temperature	183 ℃	217 ℃
Time(tL)Maintained Above(TL)	Time above the liquidus 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	from 25 ℃ to peak temperature	6 minutes max	8 minutes max

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9.2 Reflow Soldering Profile



Chapter 10 Related Models

Product Model	Chip solutions	Operating frequency Hz	emission power dBm	Communication interface	Support Agreement BLE	Product Dimensions mm	antenna form	Features
E72-2G4M05S1B	CC2640	2.4G	5	I/O	4.2	17.5*28.7	PCB/IPX	Hardware resources Secondary development
E73-2G4M04S1A	nRF52810	2.4G	4	I/O	4.2/5.0	17.5*28.7	PCB/IPX	Hardware resources Secondary development
E73-2G4M04S1B	nRF52832	2.4G	4	I/O	4.2/5.0	17.5*28.7	PCB/IPX	Hardware resources Secondary

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								development
E73-2G4M08S1C	nRF52840	2.4G	8	I/O	4.2/5.0	13*18	Ceramic antenna	Hardware resources Secondary development
E73-2G4M04S1D	nRF51822	2.4G	4	I/O	4.2	17.5*28.7	PCB/IPX	Hardware resources Secondary development
E104-BT01	CC2541	2.4G	0	I/O	4.0	14*22	PCB	Hardware resources Secondary development
E104-BT02	DA14580	2.4G	0	TTL	4.2	14*22	PCB	Industry's lowest power consumption High-speed continuous transmission sniffing
E72-2G4M04S2B	CC2640	2.4G	2	TTL	4.2	14*23	PCB/IPX	Built-in ARM dual-core Multi-role mode
E104-2G4U04A	CC2540	2.4G	0	USB	4.0	18*59	PCB	Dongle Protocol Analyzer
E104-BT5010A	nRF52810	2.4G	0	UART	5.0	11.5 * 16	Ceramic antenna	Low power consumption, transparent transmission

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Revision History

Version	Revision Date	Revision Notes	maintainer
V 1.0	2026-06-03	Initial version	Bin

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