E104-BT40 Series Module Product Specifications

Dual-mode Bluetooth module　　V4.2 protocol



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Chapter 1 Overview

1.1 Product Introduction

The E104-BT 40 series module is a Bluetooth 4.2+ 3.0 serial-to-dual-mode Bluetooth slave module develop ed by Chengdu Ebit Electronic Technology Co., Ltd. , supporting Bluetooth Low Energy (BLE) and Classic B luetooth SPP Profile . It can switch freely between BLE and Classic Bluetooth and operates in the 2.4 GHz fr equency band.

This series of modules uses common AT commands to set parameters, making operation simple and fast. T he module supports only the Bluetooth slave role, enabling wireless data transmission between traditional low-e nd serial devices or MCU - controlled devices. It is a low-cost, simple, and reliable data transmission module.

E104-BT40	E104-BT40 X
	

1.2 Features

- Support Bluetooth Specification V4.2 + 3.0 protocol ;
- Support AT instruction configuration ;
- Support BLE ;
- Support SMTP 3.0 ;
- G PIO input/output;
- 2-way PWM output ;

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- Serial port buffer 249 bytes ;
- The maximum communication distance can reach 40m
- Supports the global license-free ISM 2.4 GHz frequency band;
- Support 1 ~ 2Mbps air rate ;
- Comes with a PCB onboard antenna, no external antenna required.

1.3 Application Scenario

- Bluetooth wireless data transmission
- Wireless meter reading wireless sensor
- Smart home , industrial control
- Industrial remote control and telemetry
- Smart buildings, smart buildings
- Automated data collection
- Health Sensors
- Automobile testing equipment
- Intelligent robots

Chapter 2 Specifications

2.1 Limit parameters

Main parameters	performance		Remark
	Minimum	Maximum	
Power supply voltage (V)	0	3.6	exceeds 3.6V, there is a risk of burning the module.
Blocking power (dBm)	-	1 0	The probability of burning is lower when used at close range
Operating temperature	- 40	+ 85	Industrial grade

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(°C)			

2.2 Working parameters

Main parameters		performance			Remark
		Minimum	Typical values	Maximum	
Operating voltage (V)		2.5	3.3	3.6	≥ 3.3V can guarantee output power
Communication level (V)		-	3.3	-	Using 5 V TTL will burn out the module
Operating temperature (°C)		- 40	-	+ 85	
Operating frequency band (MHz)		2 400	-	2 480	
Power consumption	Idle state (mA)	3.9	-	6	
	BLE connections (mA)	-	3.26	9.2	
	SPP connection (mA)	-	6.78	9.2	
Transmit power (dBm)		-	3	-	
Receive sensitivity (dBm)		-	- 96	- 97	

2.3 Basic parameters

Main parameters	describe	Remark
Reference distance	30 m	E104-BT40
	40 m	E104-BT40 X
Launch length	S PP 100Bytes B LE 20Bytes	SPP payload 100 bytes BLE payload 2 0 bytes
Bluetooth protocol	V4.2+V3.0 SPP	
Communication interface	UART serial port	All I /O leads of the microcontroller are detailed in the chip manual.
Packaging	SMD	
Interface	Stamp hole 1.27 mm	1.27 mm pitch
Dimensions	21 *13mm	Corresponding model: E104-BT40
	16 *13mm	Corresponding model: E104-BT40 X
Antenna interface	PCB board mounted antenna	Equivalent impedance is about 50Ω , corresponding model: E104-BT40
	IPEX-3 Antenna	Equivalent impedance is about 50Ω , corresponding model:

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		E104-BT40 X

Chapter 3 Mechanical Dimensions and Pin Definitions

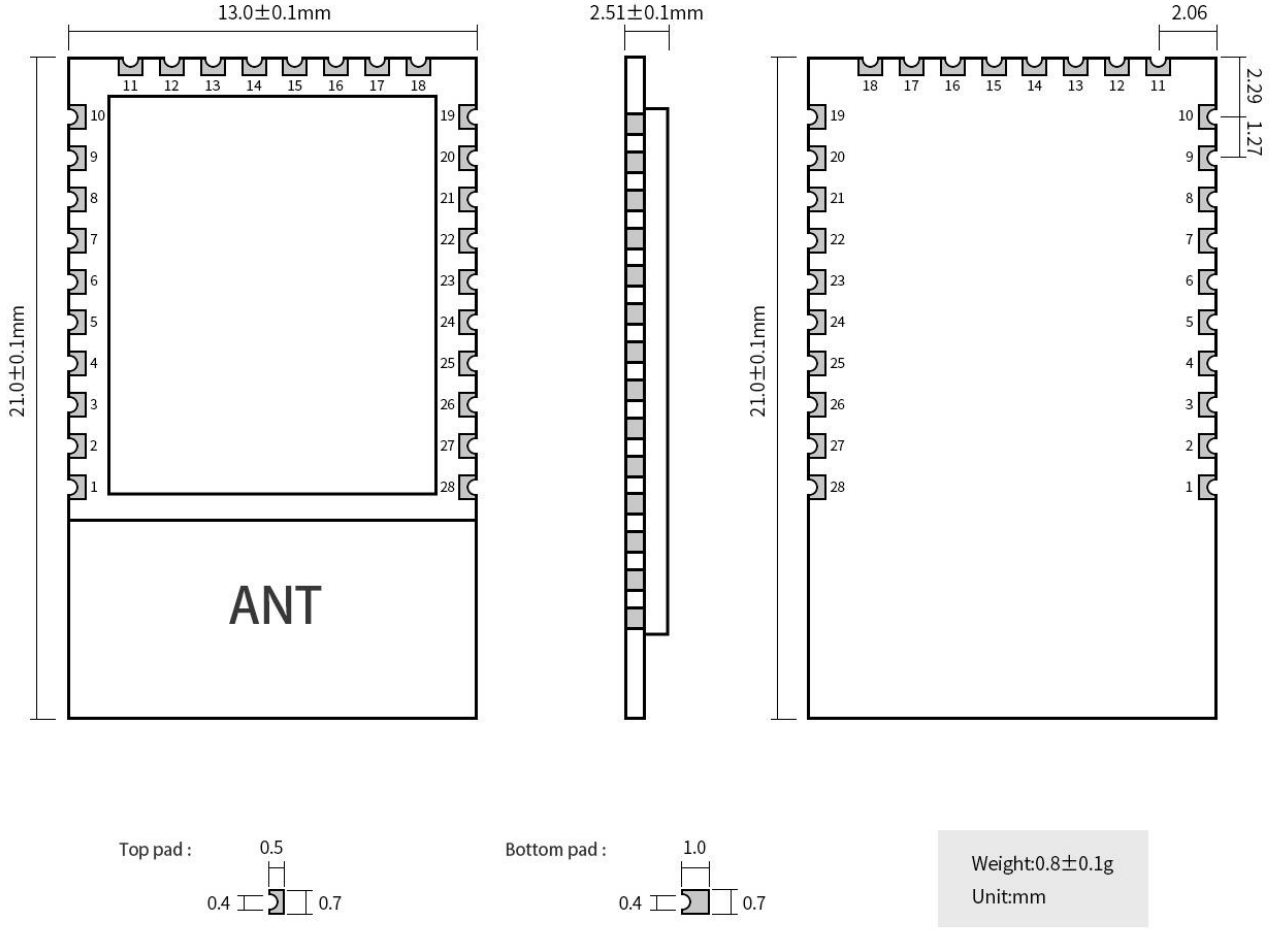


Figure 1 E104-BT40 pin dimensions

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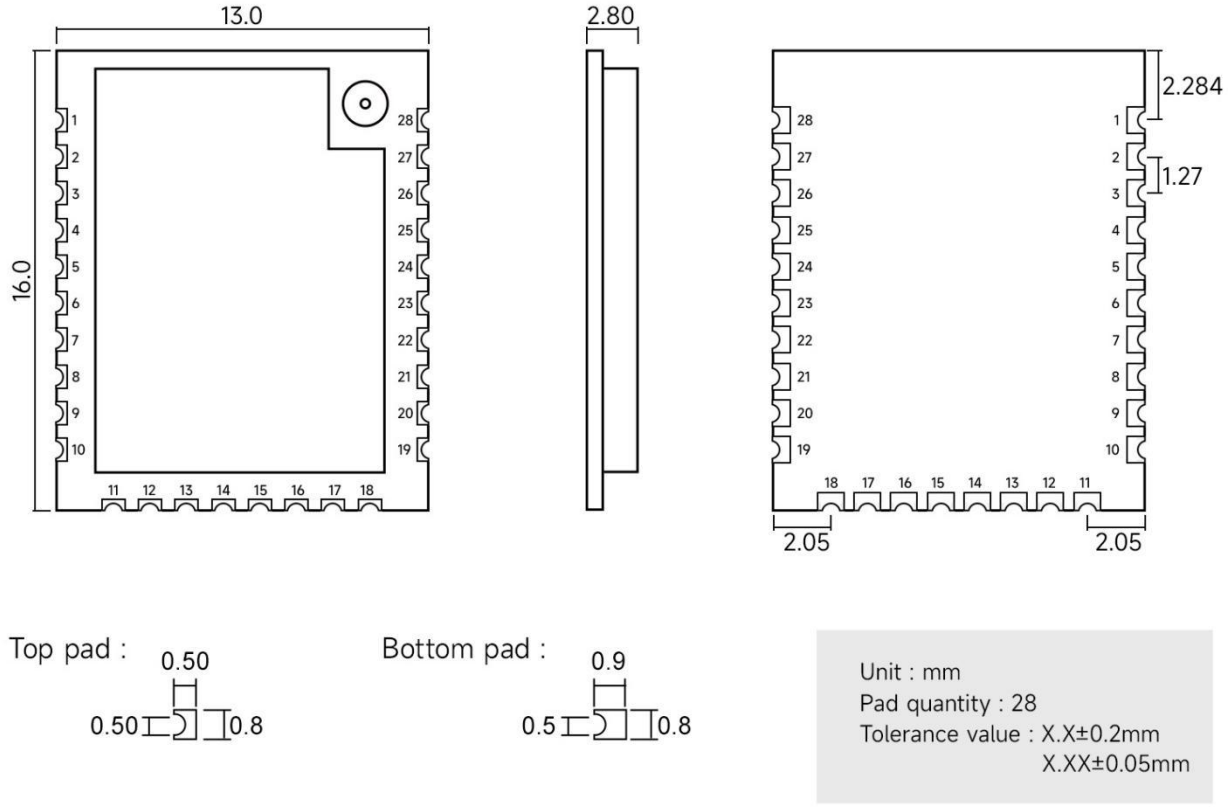


Figure 2 E104-BT40X pin dimensions

The two products only differ in packaging and are pin-compatible. The detailed pinouts are as follows:

Pin number	Pin Definition	Pin direction	Pin Function	illustrate
1	GND	-	Power ground	Power reference ground
2	TXD	Output	Serial port data sending	The module outputs serial port data
3	RXD	enter	Serial port data reception	The module receives external serial port data
4	P02	Output	General purpose output IO	User-settable output levels
5	P03	Output	General purpose output IO	User can set the output level①
6	P04	-	-	NC
7	P05	-	-	NC
8	P06	-	-	NC
9	P07	-	-	NC
10	GND	-	Power ground	Power reference ground
11	P10	enter	General purpose input IO	User can read IO level, internal pull-up

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12	P11	enter	General purpose input IO	User can read IO level, internal pull-up
13	PWM2	Output	Output PWM	User-configured PWM output wave
14	PWM3	Output	Output PWM	User configured output PWM wave②
15	P33	-	CTS	
16	P34	-	RTS	
17	VCC	-	3.3V	Power input
18	GND	-	Power ground	Power reference ground
19	GND	-	Power ground	Power reference ground
20	NC	-	-	
twenty one	NC	-	-	
twenty two	NC	-	-	
twenty three	RST	-	Reset pin	Active low
twenty four	STATUS	Output	Status indicator LED	Bluetooth not connected: output frequency is 1Hz square wave Bluetooth connected: low level
25	MODE	enter	Mode Selection	Low level: Configuration mode ③ High level: transparent transmission mode
26	DISC	enter	Disconnect	Internal pull-up, falling edge valid
27	LINK	Output	Connection Status	Bluetooth not connected: high level Bluetooth connected: low level
28	GND	-	Power ground	Power reference ground

Note:

① The user can configure the output IO to output a low level by default. After setting, the output level will still be based on the set parameters after the next power-on;

② PWM is off by default. After setting, the PWM output will still be based on the set parameters after the next power-on.

③ The MODE pin switching mode is only valid after the connection is established.

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Chapter 4 Quick Use

Recommended software for debugging/testing:

- PC serial port tool - SSCOM.exe or AccessPort
- Mobile BLE debugging APP BLE-nRF connect Classic Bluetooth-Bluetooth Serial Port Assistant

4.1 Quick Start Guide

- When the module is not connected, it is in AT command mode. When a connection is established, the module enters transparent transmission mode. You can enter AT command mode by pulling the MODE pin low and return to transparent transmission mode by pulling the MODE pin high.
- Set the serial port tool related configuration (default configuration: 115200, 8, 1, none, none), as shown below;

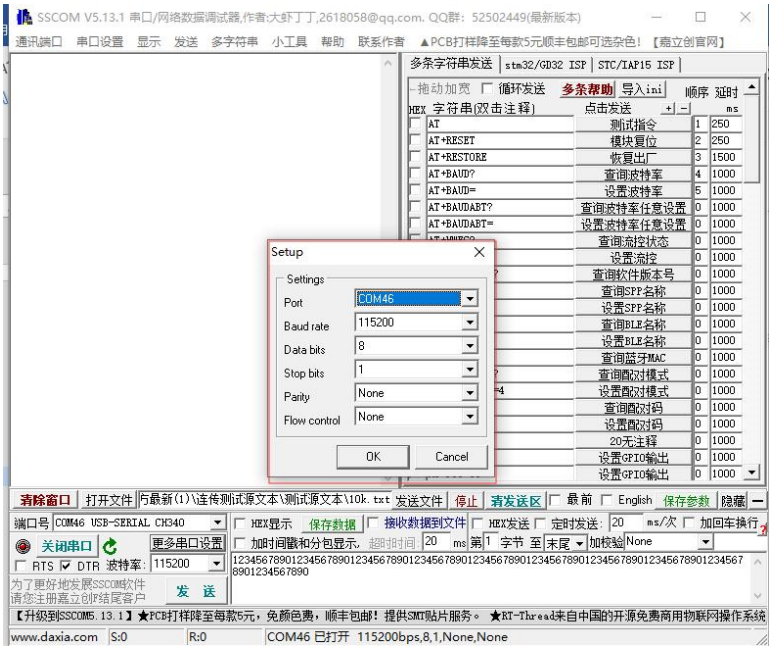


Figure 4-1-1 SSCOM parameter configuration

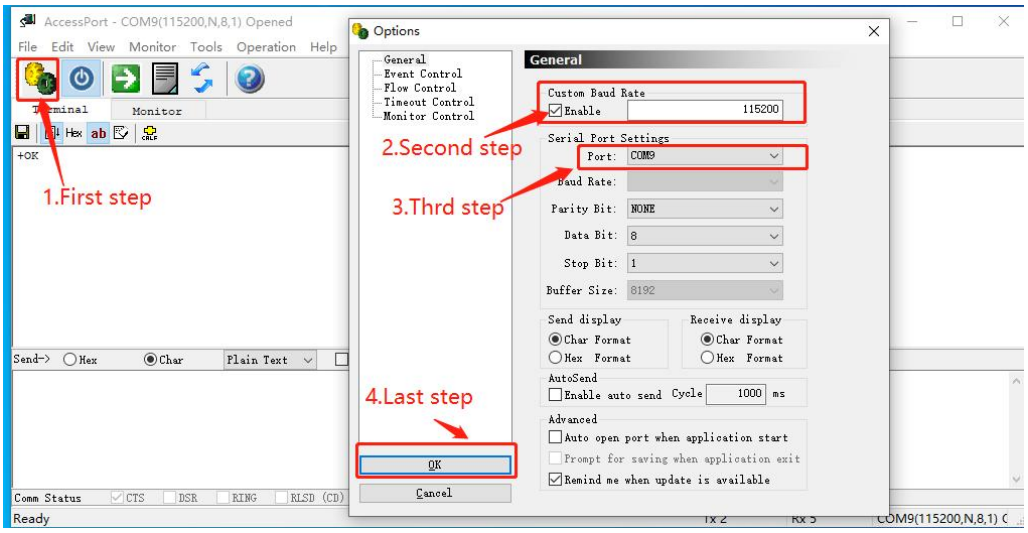


Chart 4-1-2 AccessPort parameter configuration, other parameters are default

- Follow the instructions shown in the instruction table in 6.4 and the instruction instructions in section 6.2 to send AT commands to configure the module.

4.2 Data transmission

When the module is powered on, both classic Bluetooth and BLE are in discoverable state. For details on data transmission, see Section 5.2.

Test conditions:

- Use the mobile phone as the host and the module as the slave
- Serial port tool: SSCOM or AccessPort
- Other parameters are default configurations

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4.2.1 SPP Data Transmission

1. Power on the module and enable serial port printing (AT+LOGMSG=1);

2. Open the Bluetooth Serial Port Assistant, search for the Bluetooth name: CDEBYTE_SPP, connect, and the serial port prints STA:connect:[mac]

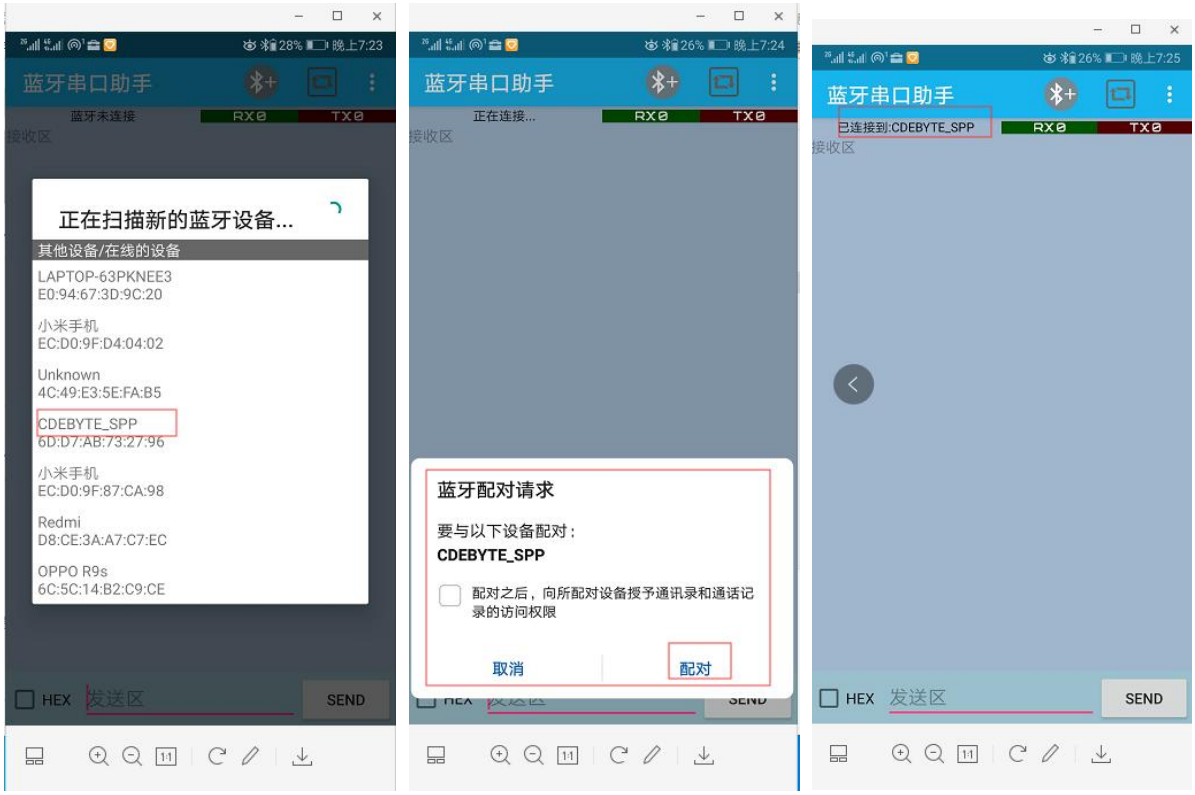


Figure 4-4 Bluetooth serial port APP connection process

3. After the module is successfully connected, it prints "STA: connected" and the LINK pin is low.

4. Use the mobile app or open the serial port to start data transparent transmission.

4.2.2 BLE Data Transmission

1. Power on the module and enable serial port printing (AT+LOGMSG=1);

2. Open nRF connect, search for the Bluetooth name: CDEBYTE_BLE, connect, and the serial port will print STA:connect:[mac]

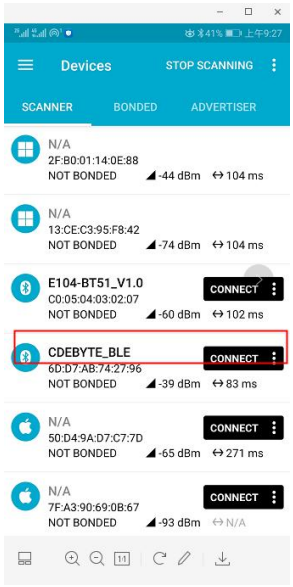


Figure 4-6 Searching for BLE devices

3. Find "Unknown Service", open the notification, and SSCOM sends "1234567890"

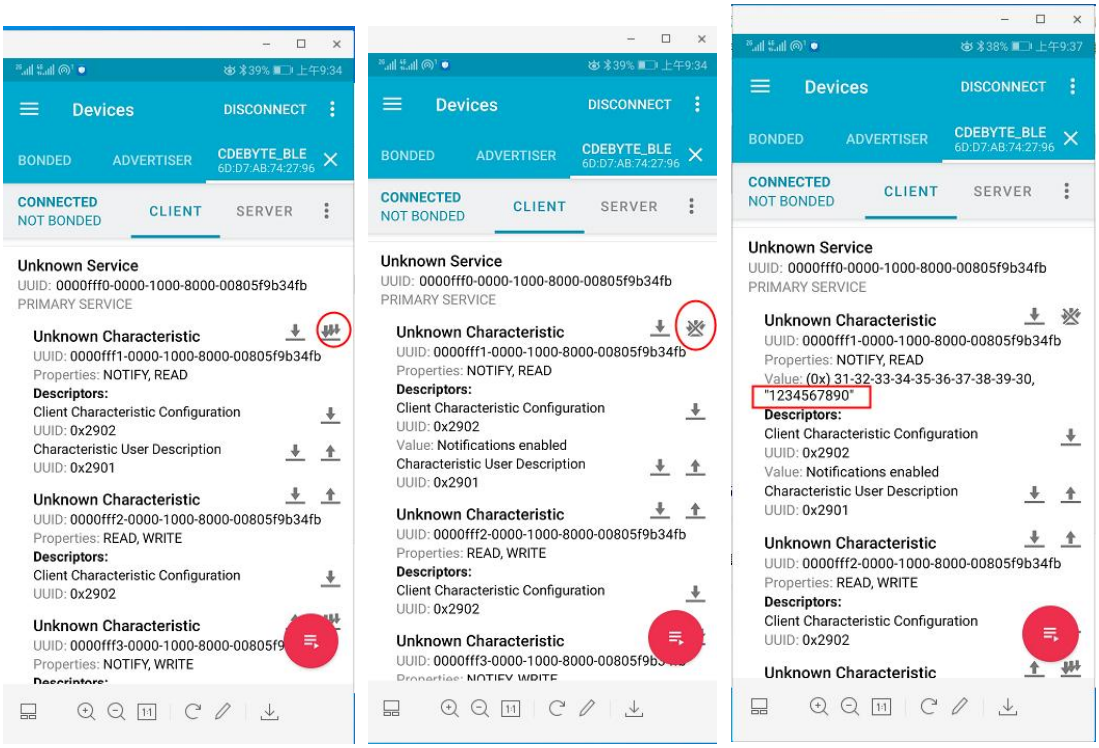


Figure 4-7 RF connect opens notifications and receives data

4.nRF connect sends "asdfghjkl"

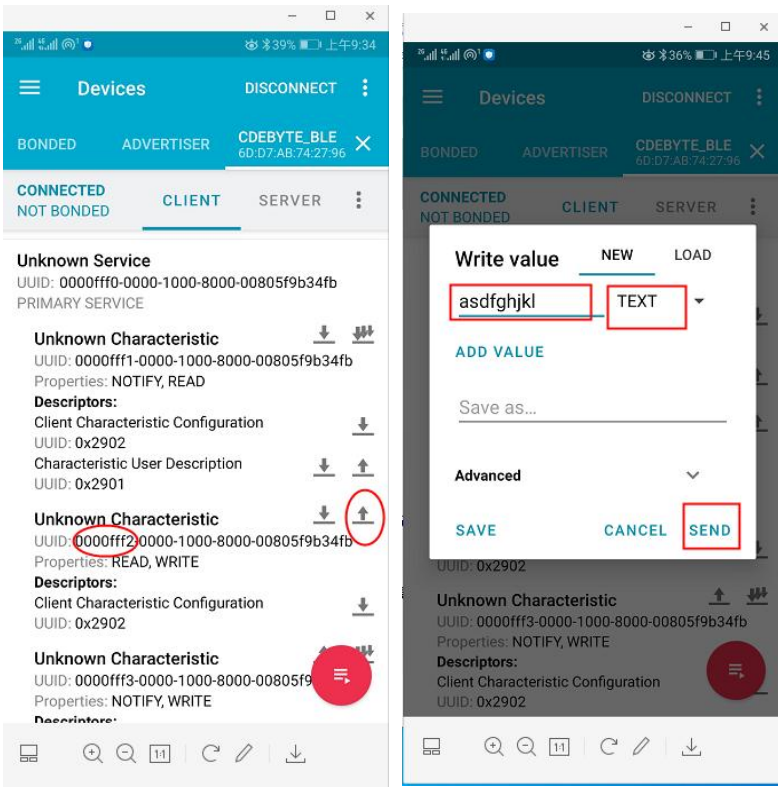


Figure 4-8 n RF connect write data, send

4.3 Other

The module can receive AT commands within 120ms after power-on

It takes 1500ms from powering on the module to completing Bluetooth initialization.

The recommended interval for BLE disconnection and reconnection is 1500ms.

Chapter 5 Functional Description

5.1 Configuration

The module supports only one configuration mode: serial port configuration and air configuration (BLE). When not connected, the module is always in configuration mode. In this case, the MODE pin is invalid.

After the connection is successful, the module is in configuration mode or data transmission mode according to the level of the MODE pin. When the MODE pin is high, it is in data transmission mode, and when it is low, it is in configuration mode.

When the MODE pin detects a valid change, it latches the current state. Each state change is valid for more than 200ms.

5.2 MAC address binding

Classic Bluetooth supports MAC address binding. If MAC address binding is enabled, the device will only connect to devices with the set MAC address .

5.3 Status or event printing

The command AT+LOGMSG is used to enable the serial port printing of status information. Status information includes: initialization, connection, and disconnection. The format is as follows:

state	Print information
Connection successful	\r\nSTA:connected:[MAC]\r\n
Disconnection	\r\nSTA:disconnected\r\n

5.4 Classic Bluetooth pairing

Serial number	Pairing Mode	describe	Related AT commands
0	pin code	The phone needs to enter the pairing code	AT+PIN
1	no input output	The phone needs to confirm the pairing request	-
2	Passkey	The module requires a passkey	AT+PASSKEY
3	confirm	After the module displays the "confirmation code",	AT+CONFIRM

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		the user confirms it through the AT command	

Pin code pairing requires entering the PIN code on your phone or computer, which is the PIN code set by the module (AT+PIN command). A connection can only be established after entering it correctly. If the host is a module, the host and the module can set the same PIN code.

No input/output pairing, only mobile phone confirmation is required.

Passkey pairing: The mobile phone randomly gives a 6-digit ASCII code. The module uses the AT+PASSKEY command to input the 6-digit ASCII code to establish a connection.

Confirm the pairing. The mobile phone generates a 6-digit ASCII code and sends it to the module. The module prints +CONFIRM:[6-digit ASCII code] through the serial port. After confirming that they are the same, enter AT+COMFIRM=YES to establish a connection, or AT+COMFIRM=NO to reject the connection request.

5.5 UUID Description

Service UUID	FFF0		
Eigenvalue	UUID	property	describe
SLAVE CHANNEL	FFF1	read/notify	The slave sends data and the host receives data channel
MASTER CHANNEL	FFF2	read/write	The host sends data and the slave receives data channel
CONFIG CHANNEL	FFF3	read/write	Air configuration channel

The 128-bit UUID is 00 00 xx xx 00 00 10 00 80 00 00 80 5f 9b 34 fb xx xx for a 16-bit UUID.

5.6 Packaging mechanism

Regardless of the baud rate of data transmission, it is recommended to perform verification and retransmission processing at the upper layer.

In BLE mode, the E104-BT40X module's serial port can process up to 100 bytes of data at a time, packaged into 20-byte packets. Mobile devices (Android 5.0 and below) must break data packets sent to the module into 1-20-byte packets. Upon receiving the data packets, the module forwards them to the module's serial port.

In SPP mode, the E104-BT40X module's serial port can receive and process a maximum of 249 bytes of data at a time. Please break data packets sent from your mobile device into separate packets (1-121 bytes/packet).

Packing interval description:

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BLE inserts 20ms every 20 bytes

spp inserts 20ms per 100 bytes

Chapter 6 AT Commands

6.1 Default Parameters

Baud rate	115200
Flow Control	closure
Serial port arbitrary baud rate setting	closure
SPP Name	E104-BT40X_SPP
BLE Name	E104-BT40X_BLE
pairing code	1234
Pairing Mode	1 (no input output)
Two output IO	Low level
Two-way PWM	closure
Enable MAC binding	closure
Bind MAC	FF FF FF FF FF FF
Status Printing	closure
Over-the-air configuration password	123456
16-bit Service UUID	FFF0 ①
16-bit Slave channel UUID	FFF1
16-bit Master channel UUID	FFF2

① :128-bit UUID is 00 00 xx xx 00 00 10 00 80 00 00 80 5f 9b 34 fb

xx xx is a 16-digit UUID.

6.2 Command Description

All AT commands do not require carriage return (\r) or line feed (\n)

The return result of AT command ends with \r\n (except HEX return). The response in the command table in Section 6.3

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ends with \r\n.

Command error response format +ERR=[NUM]. (NUM is ASCII)

6.3 AT Command Error Code Description

Error code return format —ERROR (error code index number)

NUM	illustrate	Cause of the error	Workaround
-0	The instruction does not exist	AT command characters are incorrect	Checking Strings
-1	Parameter length error	1、 The total length of the parameters is too long 2、 Parameter length does not meet	According to the AT command manual, check the parameter length according to 'Instructions'
-2	Invalid parameters	The parameter does not meet the value range	Check the parameter value range by referring to the instruction
-3	The command exists but the operation is not supported	Only the command was entered, error example: AT+BAUD Correct example: AT+BAUD?	Check the instructions and confirm the operation
-4	Not connected	The module is not connected	-
-5	Do not allow to disable any baud rate setting	Turn off the baud rate and set the baud rate to a value other than the normal baud rate.	Before turning off the baud rate setting, set the baud rate to the normal baud rate.
-6	Exceeded buffer length	The total length of the input AT command and parameters is too long	Check that the total length of AT commands and parameters does not exceed 250 bytes
-7	The command is invalid at this time	-	-
-8	Module connected	This command does not support operations in the connected state.	-
-9	No over-the-air configuration authentication	Use AT+AUTH command to authenticate before sending commands	
-10	Over-the-air	Incorrect password	1. Use the correct password

	configuration authentication failed		2. Reconfigure via the serial port
-11	Unknown error		-

6.4 Instruction List

6.4.1 AT test command

instruction	answer
AT	+OK
Description: None	

6.4.2 AT+RESET reset command

instruction	answer
AT+RESET	+OK
Note: Effective immediately	

6.4.3 AT+RESTORE restore factory command

instruction	answer
AT+RESTORE	+OK
illustrate: 1、 Restart to take effect. After the setting is successful, restart immediately; 2、 During the factory reset process, any form of reset is prohibited, and power is not turned off before the operation is completed.	

6.4.4 AT+BAUDABT turns on/off any baud rate setting

Instruction		answer
Query	AT+BAUDABT?	+OK=[para]
set up	AT+BAUDABT=[para]	+OK: Success

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		+ERR=[NUM]: Error
parameter	para(ASCII)	describe
	0	Off (default)
	1	Open
illustrate	Take effect immediately and save after power off ; Before turning off any baud rate setting, if the baud rate is not a regular baud rate, you must change it to a regular baud rate and then turn it off ;	
Example	Enable any baud rate setting: AT+BAUDABT=1	

6.4.5 AT+BAUD Serial Port Baud Rate

instruction		answer
Query	AT+BAUD?	+OK=[para]
set up	AT+BAUD=[para]	+OK: Success +ERR=[NUM]:Error

parameter	para(ASCII)	Conventional baud rate (bps)
	0	4800
	1	9600
	2	14400
	3	19200
	4	28800
	5	38400
	6	57600
	7	76800
	8	115200 (default)

Enable arbitrary baud rate settings (off by default):

	para[ASCII]: any integer value between 4800 and 115200, inclusive.
illustrate	Restart to take effect, save after power off
Example	By default: Query: AT+BAUD? Response: +OK=8 Setting: AT+BAUD=1. Set the baud rate to 9600 Response: +OK When any baud rate setting is turned on: Query: AT+BAUD? Response: +OK=9600 Setting: AT+BAUD=9900 Response: +OK=9900

6.4.6 AT+HWFC Flow Control

instruction		answer
Query	AT+HWFC?	+OK=[para]

<table>
<tr><td>set up</td><td colspan="2">AT+HWFC=[para]</td><td>+OK: Success

+ERR=[NUM]: Error</td></tr>
<tr><td>parameter</td><td colspan="2"><table><tr><td>para(ASCII)</td><td>describe</td></tr><tr><td>0</td><td>Off (default)</td></tr><tr><td>1</td><td>Open</td></tr></table></td><td></td></tr>
<tr><td>illustrate</td><td colspan="3">Restart to take effect, save after power off</td></tr>
<tr><td>Example</td><td colspan="3">Enable flow control: AT+HWFC=1</td></tr>
</table>

6.4.7 AT+DEVSWVER Software Version Number

instruction		answer
Query	AT+DEVSWVER?	+OK=[para]
parameter	para (ASCII code): device software version Factory default: 7142-2-10	

6.4.8 AT+SPPNAME SPP name

instruction		answer
Query	AT+SPPNAME?	+OK=[para]
set up	AT+ SPPNAME =[para]	+ERR=[NUM]: Error
parameter	para(ASCII code):SPP name Factory default: E104-BT40X_SPP	
illustrate	1. It will take effect after restart or BLE disconnection, and will be saved after power off. 2. The name length is 1 to 32 bytes	

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6.4.9 AT+BLENAME BLE broadcast name

instruction		answer
Query	AT+BLENAME?	+OK=[para]
set up	AT+ BLENAME =[para]	+ERR=[NUM]: Error
parameter	para (ASCII code): BLE broadcast name Factory default: E104-BT40X_BLE	
illustrate	1. It will take effect after restart or BLE disconnection, and will be saved after power off. 2. ASCII code length is 1~20 bytes	

6.4.10 AT+MAC SPP MAC Address

instruction		answer
Query	AT+MAC?	+OK=[para]
parameter	para(HEX):MAC address	
illustrate	Restart immediately after setup is complete Setting the SPP MAC also sets the BLE MAC address. The fourth byte of the BLE MAC address is 1 greater than the SPP address.	
Example	Command: AT+MAC? Response: 2B 4F 4B 3D FE 30 EE 50 35 DA (This is the SPP MAC address) The BLE MAC address is: FE 30 EE 51 35 DA	

6.4.11 AT+PAIRMODE Classic Bluetooth pairing mode

instruction		answer
Query	AT+PAIRMODE?	+OK=[para]
set up	AT+ PAIRMODE =[para]	+OK: Success +ERR=[NUM]: Error

parameter	para(ASCII)	describe
	0	Pin code
	1	No input output (default)
	2	passkey
	3	confirm
illustrate	Restart to take effect, save after power off	
Example	AT+PAIRMODE=0	

6.4.12 AT+PIN Classic Bluetooth pairing code

instruction		answer
Query	AT+PIN?	+OK=[para]
set up	AT+PIN=[para]	+OK: Success +ERR=[NUM]: Error
parameter	para(ASCII): Each value ranges from 1 to 9 Factory default: 1234	
illustrate	1. The next connection will take effect and will be saved after power failure 2. The length is 4 or 6 bytes	
Example	AT+PIN=123456	

6.4.13 AT+P02 P02 Output

instruction		answer
set up	AT+P02=[para]	+OK: Success +ERR=[NUM]:Error
parameter	para(ASCII)	describe
	0	Low level (default)

	1	High level
illustrate	Take effect immediately and save after power off After the next power-on, IO still maintains this level	
Example	Command: AT+P02=1 Response: +OK	

6.4.14 AT+P03 P03 output

instruction		answer
set up	AT+P03=[para]	+OK: Success +ERR=[NUM]:Error
parameter	para(ASCII)	describe
	0	Low level (default)
	1	High level
illustrate	Take effect immediately and save after power off After the next power-on, the IO still maintains the set level	
Example	Command: AT+P03=1 Response: +OK	

6.4.15 AT+P10 P10 Input

instruction		answer
Query	AT+P10?	+OK=[para]
parameter	para(ASCII)	describe
	0	Low level
	1	High level (default)

6.4.16 AT+P11 P11 input

instruction		answer
Query	AT+P11?	+OK=[para]
parameter	para(ASCII)	describe
	0	Low level
	1	High level (default)

6.4.17 AT+PWM2 PWM2 output

instruction		answer
set up	AT+PWM2 =[para]	+OK: Success +ERR=[NUM]:Error
parameter	para:0~100(ASCII) 0 Disable PWM (default)	
illustrate	It takes effect immediately and is saved after power off. The PWM output will still be kept at the next power on.	
Examples	Command: AT+PWM2=0	

	Response: +OK

6.4.18 AT+PWM3 PWM3 output

instruction		answer
set up	AT+PWM3 =[para]	+OK: Success +ERR=[NUM]:Error
parameter	para:0~100(ASCII) 0 Disable PWM (default)	
illustrate	It takes effect immediately and is saved after power off. The PWM output will still be kept at the next power on.	
Examples	Command: AT+PWM3=0 Response: +OK	

6.4.19 AT+DISCON disconnects the current connection

instruction		answer
set up	AT+DISCON	+OK: Success +ERR=[NUM]: Error
illustrate	After a short time, Bluetooth is disconnected	

6.4.20 AT+LOGMSG Running Status Output

instruction		answer
Query	AT+LOGMSG?	+OK=[para]

set up	AT+LOGMSG=[para]	+OK: Success +ERR=[NUM]: Error
parameter	para(ASCII)	describe
	0	Off (default)
	1	Open
illustrate	Take effect immediately and save after power off	
Examples	Command: AT+LOGMSG=1 Response: +OK	

6.4.21 AT+CLOSESPP Close SPP

instruction		answer
set up	AT+CLOSESPP	+OK: Success
illustrate	Effective immediately	

6.4.22 AT + OPENSPP opens SPP

instruction		answer
set up	AT+OPENSPP	+OK: Success
illustrate	Effective immediately	

6.4.23 AT+STATE query Bluetooth status

instruction		answer
Query	AT+STATE?	+OK=[para]
parameter	para(ASCII)	describe
	0	Dual-mode waiting for connection
	1	SPP connected

	2	BLE connected
	3	SPP is closed

6.4.24 AT+BOND Enable Bonding

instruction		answer
Query	AT+BOND?	+OK=[para]
set up	AT+BOND=[para]	+OK: Success +ERR=[NUM]: Error
parameter	para(ASCII)	describe
	0	Binding off (default)
	1	Binding enabled
illustrate	Take effect immediately and save after power off	
Example	Command: AT+BOND=1 Response: +OK	

6.4.25 AT+BONDMAC Bind MAC address

instruction		answer
Query	AT+BONDMAC?	+OK=[para]
set up	AT+ BONDMAC =[para]	+OK: Success +ERR=[NUM]: Error
parameter	Para(HEX): 6-byte MAC address	
illustrate	Take effect immediately and save after power off	

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Example	Command: AT+BONDMAC? Return: 2B 4F 4B 3D CC 34 27 1A 0C D4 Instruction: 41 54 2B 42 4F 4E 44 4D 41 43 3D CC 34 27 1A 0C D4 Return: +OK

6.4.26 AT+PASSKEY Enter pairing key

instruction		answer
set up	AT+ PASSKEY=[para]	+OK: Success +ERR=[NUM]: Error
parameter	Para(ASCII): 6-bit ASCII code	
illustrate	Effective immediately The user serial port receives +PASSKEY and responds with this command	
Example	Command: AT+PASSKEY=123456 Response: +OK	

6.4.27 AT+CONFIRM Classic Bluetooth Password Verification

instruction		answer
set up	AT+ CONFIRM=[para]	+OK: Success +ERR=[NUM]: Error
parameter	Para(ASCII code): YES or NO	
illustrate	Effective immediately	

	The user serial port receives +CONFIRM and responds with this command
Example	Command: AT+CONFIRM=YES Reply: AT+CONFIRM=NO

6.4.28 AT+AUTH Air Configuration Password Authentication

instruction		answer
set up	AT+ AUTH=[para]	+OK: Success +ERR=[NUM]: Error
parameter	Para(ASCII): 6-bit ASCII code	
illustrate	This command is only used for air certification Default password: 123456	
Example	Command: AT+AUTH=123456 Response: +OK	

6.4. 29 AT+UPDAUTH Reset authentication password

instruction		answer
set up	AT+UPDAUTH=[para]	+OK: Success +ERR=[NUM]: Error
parameter	Para(ASCII): 6-bit ASCII code	
illustrate	The next authentication will take effect and will be saved after power failure	

Example	AT+UPDAUTH=abcdef

6.4.30 AT+UUID Query UUID

instruction		answer
Query	AT+UUID?	+OK=[para1],[para2],[para3],[para4]
parameter	para(ASCII): para1:SERVER UUID; para2:SLAVE CHANNEL characteristic UUID; para3: MASTER CHANNEL characteristic UUID; para3: Over-the-air configuration channel characteristic UUID	

6.4.31 AT+UUIDSVR Bluetooth Service UUID

instruction		answer
set up	AT+ UUIDSVR=[para]	+OK: Success +ERR=[NUM]: Error
parameter	Para(ASCII): UUID value. The value range is 1 to 65535, and each ASCII code is 1 to 9.	
illustrate	Restart to take effect, save after power off	
Example	AT+UUIDSVR=65520, that is, the service UUID is 0xFFF0	

6.4.32 AT+UUIDCHARA1 SLAVE CHANNEL Characteristic UUID

instruction		answer
set up	AT+ UUIDCHARA1=[para]	+OK: Success

		+ERR=[NUM]: Error
parameter	Para(ASCII): UUID value. The value range is 1 to 65535, and each ASCII code is 1 to 9.	
illustrate	1. Restart to take effect, save after power off 2. Slave channel: used for the slave to send data and the host to receive data.	
Example	AT+UUIDCHARA1=65521, that is, the slave channel characteristic UUID value is set to 0xFFF1	

6.4.33 AT+ UUIDCHARA2 MASTER CHANNEL Characteristic UUID

instruction		answer
set up	AT+ UUIDCHARA2=[para]	+OK: Success +ERR=[NUM]: Error
parameter	Para(ASCII): UUID value. The value range is 1 to 65535, and each ASCII code is 1 to 9.	
illustrate	1. Restart to take effect, save after power off 2. Host channel: used for the host to send data and the slave to receive data.	
Example	AT+UUIDCHARA2=65522, that is, the host channel characteristic UUID is set to 0xFFF2	

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Chapter 7 Hardware Design

- It is recommended to use a DC regulated power supply to power the module. The power ripple coefficient should be as small as possible and the module must be reliably grounded.
- Please pay attention to the correct connection of the positive and negative poles of the power supply. Reverse connection may cause permanent damage to the module.
- Please check the power supply to ensure that it is within the recommended power supply voltage. Exceeding the maximum value may cause permanent damage to the module.
- Please check the power supply stability, the voltage should not fluctuate greatly or frequently;
- When designing the power supply circuit for the module, it is often recommended to retain more than 30% margin, which is conducive to long-term stable operation of the entire machine;
- The module should be kept as far away as possible from power supplies, transformers, high-frequency wiring and other parts with large electromagnetic interference;
- High-frequency digital traces, high-frequency analog traces, and power traces must avoid the bottom of the module. If they must pass under the module, assuming the module is soldered to the top layer, lay ground copper on the top layer of the module contact area (all copper is laid and well grounded). They must be close to the digital part of the module and routed on the bottom layer .
- If the module is soldered or placed on the top layer, it is also wrong to randomly route the wires on the bottom layer or other layers, which will affect the module's spurious emission and receiving sensitivity to varying degrees .
- If there are devices with large electromagnetic interference around the module, it will greatly affect the performance of the module. It is recommended to keep them away from the module according to the intensity of the interference. If possible, appropriate isolation and shielding can be performed.
- If there are traces with strong electromagnetic interference around the module (high-frequency digital, high-frequency analog, power supply traces), it will greatly affect the module's performance. It is recommended to keep them away from the module according to the intensity of the interference. If possible, appropriate isolation and shielding can be performed.
- If the communication line uses a 5V level, a 1k-5.1k resistor must be connected in series (not recommended, there is still a risk of damage) ;
- Try to stay away from some TTL protocols whose physical layer is also 2.4GHz, such as USB3.0;
- The antenna installation structure has a significant impact on the module's performance. Make sure the antenna is exposed, preferably pointing vertically upward. When the module is installed inside the housing, use a high-quality

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antenna extension cable to extend the antenna to the outside of the housing.

- The antenna must not be installed inside a metal shell, as this will significantly reduce the transmission distance.

Chapter 8 Frequently Asked Questions

8.1 Transmission distance is not ideal

- When there is a straight-line communication obstacle, the communication distance will be reduced accordingly ;
- Temperature, humidity, and co-channel interference can increase the communication packet loss rate ;
- The ground absorbs and reflects radio waves, so the test results are poor when close to the ground ;
- Seawater has a strong ability to absorb radio waves, so the test results at the seaside are poor ;
- If there are metal objects near the antenna, or if it is placed in a metal shell, the signal attenuation will be very serious ;
- The power register is set incorrectly or the air rate is set too high ;
- The power supply voltage is lower than the recommended value at room temperature. The lower the voltage, the lower the power output .
- The antenna used does not match the module well or the antenna itself may have quality issues.

8.2 Module is easily damaged

- Please check the power supply to ensure that it is within the recommended power supply voltage. Exceeding the maximum value may cause permanent damage to the module .
- Please check the power supply stability, the voltage should not fluctuate greatly or frequently ;
- Please ensure anti-static operation during installation and use, as high-frequency components are sensitive to static electricity ;
- Please ensure that the humidity is not too high during installation and use, as some components are humidity sensitive .
- If there is no special requirement, it is not recommended to use it at too high or too low temperatures.

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8.3 Bit Error Rate Too High

- There is interference from the same frequency signal nearby. Move away from the interference source or change the frequency or channel to avoid interference.
- An unsatisfactory power supply may also cause garbled characters, so the reliability of the power supply must be ensured;
- Poor quality or excessive length of extension cables or feeders can also cause a high bit error rate.

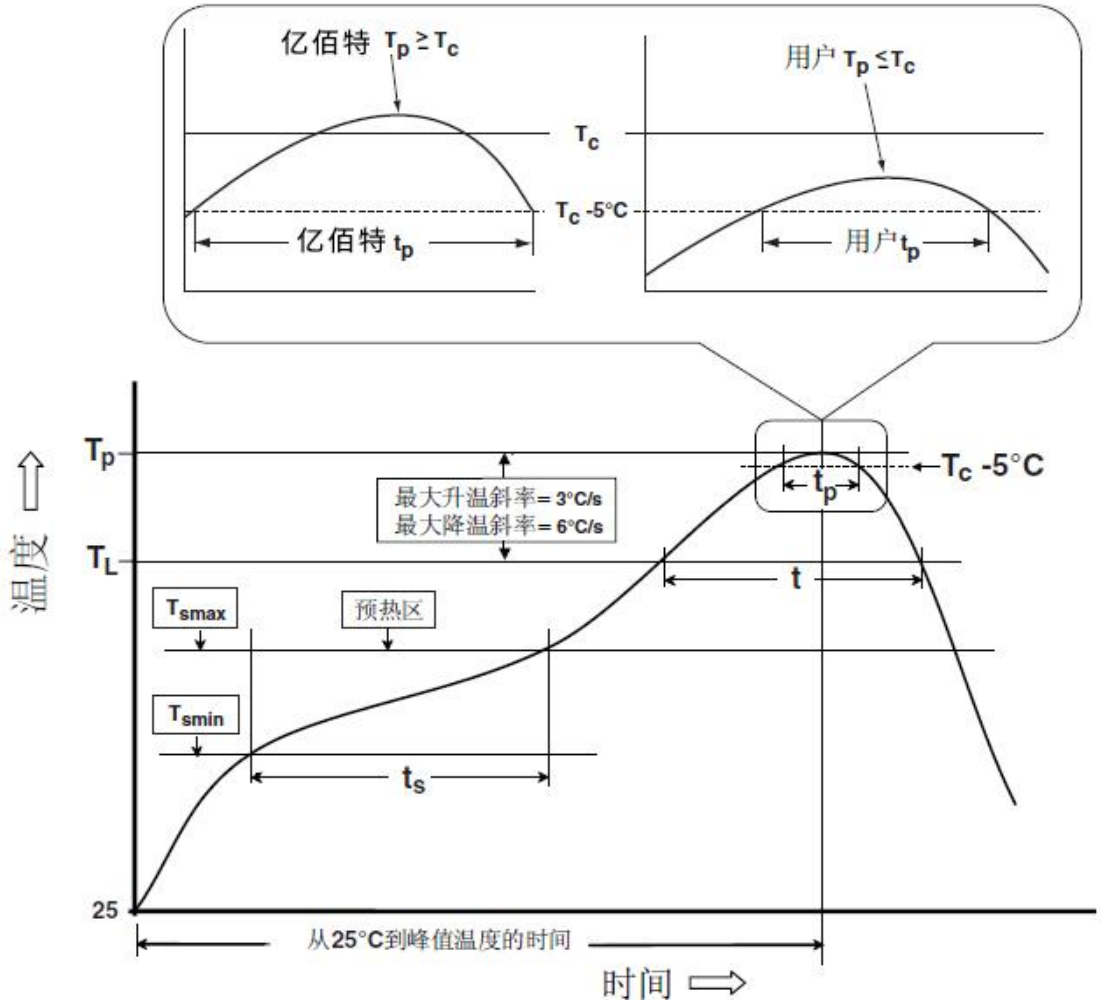
Chapter 9 Welding Operation Instructions

9.1 Reflow Temperature

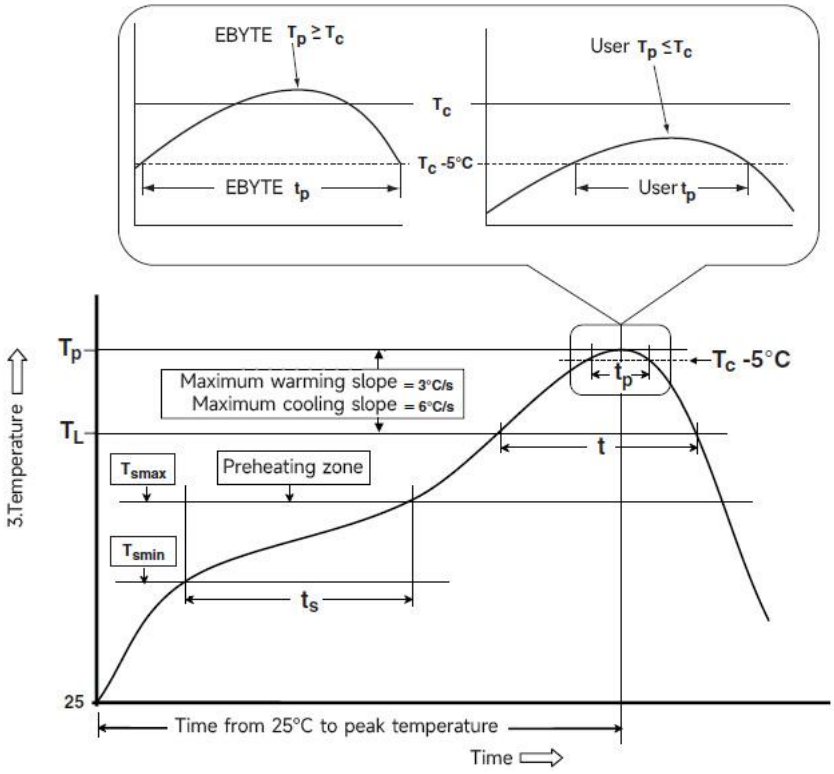
Reflow profile characteristics		Leaded process assembly	Lead-free process assembly
Preheating /keeping warm	Minimum temperature (Tsmin)	100℃	150℃
	Maximum temperature (T smax)	150℃	200℃
	Time (T smin ~T smin)	60-120 seconds	60-120 seconds
Heating slope (TL ~ Tp)		3℃/second, maximum	3℃/second, maximum
Liquidus temperature (TL)		183℃	217℃
T L above the holding time		60 to 90 seconds	60 to 90 seconds
Package peak temperature Tp		Users must not exceed the temperature indicated on the product's "Moisture Sensitivity" label.	Users must not exceed the temperature indicated on the product's "Moisture Sensitivity" label.
The time (T p) within 5°C of the specified classification temperature (Tc) is shown in the figure below.		20 seconds	30 seconds
Cooling slope (Tp~ TL)		6℃/second, maximum	6℃/second, maximum
Time from room temperature to peak temperature		6 minutes, the longest	8 minutes, the longest
※The peak temperature (Tp) tolerance of the temperature curve is defined as the upper limit of the user			

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9.2 Reflow Oven Curve



Chapter 10 Bulk Packaging Methods



Revision History

Version	Revision Date	Revision Notes	Maintainer
1.0	2019-11-28	Initial version	Li Kai
1.1	2019-11-29	Format Adjustment	Ren
1.2	2025-8-7	New models	Hao

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