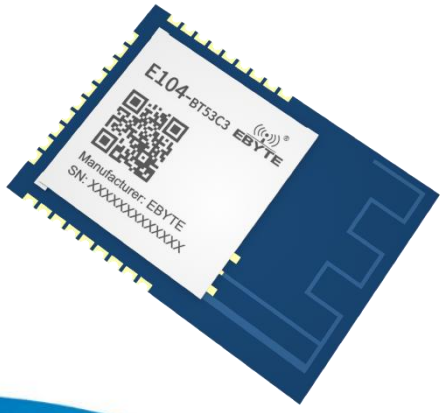
E104-BT53C3 User Manual

BLE5.2 chip type Bluetooth wireless module



Chengdu Ebyte Electronic Technology Co.,Ltd.

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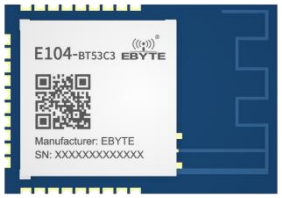
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Chapter 1 Overview

1.1 Introduction



E104-BT53C3 is a serial to BLE Bluetooth module based on Bluetooth protocol version 5.2, with high temperature resistance, small size, low power consumption, long transmission distance, strong anti-interference ability, etc., working in the 2.4GHz band. Ltd. based on Silicon Labs EFR32BG22C224F512IM40-C chip research and development of automotive-grade Bluetooth module, can be used in -40~+125 ℃ environment for a long time, the module uses a common AT command, simple and fast operation

Modules can be widely used in smart wear, home automation, home security, personal health care, smart home appliances, accessories and remote control, automotive, lighting, industrial Internet, intelligent data acquisition, intelligent control and other fields.

1.2 Features

- Support Bluetooth BLE 5.2 protocol;
- Easy to use, no experience with Bluetooth protocol applications required;
- Supports all BLE 5.2 features: 2M physical layer, long-range broadcast, extended broadcast;
- Support BLE single master role, single slave role, master-slave role and Beacon role;
- The module can act as both a master and a slave, and can be connected to other master devices as well as other slave devices.
- Support OTA remote upgrade function;
- Master role supports multiple connections: up to 8 slave devices can be connected simultaneously under a single master role; 7 slave devices can be connected simultaneously under a master-slave role, and can be connected as a slave by another master device at the same time;
- Default 20ms connection interval, fast connection, compatible with our other BLE modules;
- User interface using universal serial port design, hardware flow control support full duplex communication, minimum baud rate support 1200bps, maximum support 921600bps;
- Support serial port or mobile APP to send AT command;
- Support AT command software reset module;
- Support AT command to set connection interval to control different forwarding rate and adjust dynamic power consumption;
- Support AT command to set transmit power, broadcast interval, serial port baud rate, broadcast name, etc.;
- Support AT command to modify the Service UUID from the role;
- 2K serial port cache, serial port receives user MCU data in 244-byte automatic packetization with a timeout of 100 ms;
- High-speed transmission and forwarding, measured up to 50KB/s when the signal is good;
- Supports modified physical layer communication rates: 1M, 2M and LE Coded (125K and 500K);
- Custom broadcast data support from role, up to 26 bytes custom;

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- Extended broadcast packet support from role, up to 251 bytes of customizable extended broadcast;
- Support for setting long range broadcast packets (Long Range/LE_CODED);
- Modules are compatible with other models of our company's modules;
- Sleeping power consumption is as low as about 2uA.

1.3 Application

- Automotive electronics applications
- Intelligent household and industrial sensors, etc
- Smart wear
- Family security
- Personal care
- Smart appliances
- Accessories and remote control
- Intelligent Robot
- Wireless sensing
- Intelligent control
- Petroleum, chemical, metallurgy, etc.

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Chapter II Specification parameters

2.1 Radio frequency parameters

Parameters	Performance		Notes
	Min	Max	
Power Supply (V)	1.8	3.8	Exceeding 3.8V May permanently burn the module
Blocking power (dBm)	-	6	The probability of burning is small when used in close proximity
Working Temperature (℃)	-40	+125	Automotive Grade

2.2 Working parameters

RF Parameters		Performance			Notes
		Min	Typical	Max	
Working voltage (V)		1.8	3.3	3.8	≥3.3V for guaranteed output power
Working voltage (V)		-	3.3	-	Using 5V levels risks burnout
Working Temperature (℃)		-40	-	125	Car gauge level design
Working Frequency (MHz)		2400	-	2480	Support ISM band
Transmitting power (dBm)		-28	0	6	-
功 耗	Emission current (mA)	-	10.5	-	Peak transient current @6dBm
		-	5.3	-	Peak transient current @0dBm
	Receiving current (mA)	-	2.5	-	-
	Sleep current(uA)	-	2	-	-
Receiving sensitivity (dBm)		-	-98.9	-	1 Mbit/s GFSK
Receiving sensitivity (dBm)		-	-96.2	-	2 Mbit/s GFSK
Receiving sensitivity (dBm)		-	-106.7	-	125 Kbit/s GFSK

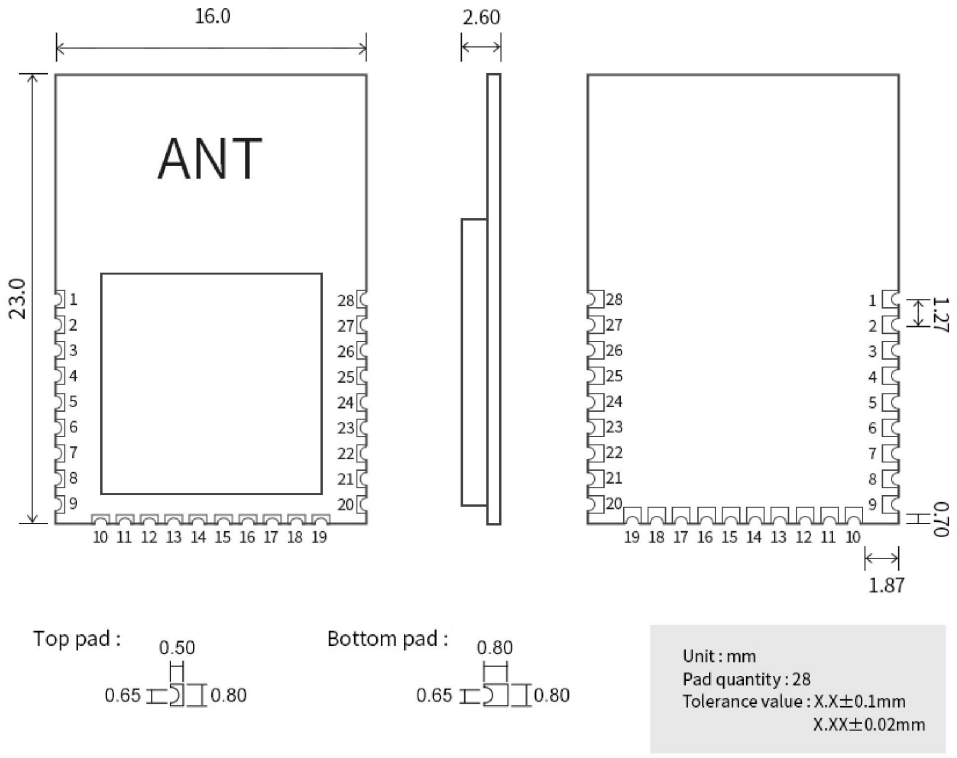
Parameters	Description	Notes
Distance	170m	Clear and open environment, height 1m, @6dBm,airspeed 1Mbps
Crystal Frequency	38.4MHz	-
Bluetooth Protocol	BLE 5.2	-
Communication Interface	UART	-
Packaging method	SMD	-
IC Name	EFR32BG22C224F512IM40-C	-
FLASH	512KB	-

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RAM	32KB	-
Kernel	ARM®Cortex®-M33	-
Dimension	23*16mm	-
Antenna Interface	PCB	Equivalent impedance about 50Ω
Product weight	1.25g	±0.2g

Chapter 3 Mechanical Dimensions and Pin Definition



Pin No.	Name	Function	Notes
1	PB04	I/O	GPIO
2	PB03	I/O	GPIO
3	TXD	O	Module serial port transmitter
4	RXD	I	Receiver side of module serial port
5	PB00	I/O	GPIO
6	PA00	MOD	Mode configuration: the module enters configuration mode when the input is held low for more than 200ms; the module enters pass-through mode when the input is held high for more than 200ms. (This pin has internal pull-up and works in pass-through mode by default)

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7	PA01	SWCLK	Users don't need to care
8	PA02	SWDIO	Users don't need to care
9	PA03	I/O	GPIO
10	PA08	O	Indicates the connection status of the slave (including the Beacon role) Pin outputs low after successful connection Outputs high when the connection is disconnected
11	PA07	O	Indicates host connection status Output low when connection is successful Output high when disconnected
12	PA06	RTS	(Standard hardware flow control Require To Send) Module output signal, when it is high indicates that the module serial port is busy and the MCU is not allowed to send data to the module serial port; when it is low, data can be sent to the module.
13	PA05	CTS	(Standard Hardware Flow Control Clear To Send) Module input signal, when high, indicates that the MCU serial port is busy and the module will not send data to the MCU serial port. indicates that the MCU serial port is busy and the module will not send data to the MCU serial port; when it is low, data can be sent to the MCU.
14	PA04	RESTORE	Internal pull-up. After a falling edge and then holding low for at least 5 seconds, all parameters are restored to factory settings and the module is automatically restarted
15	VCC	I	Positive power supply, 1.71~3.8V, 3.3V recommended
16	PD03	I/O	GPIO
17	PD02	I/O	GPIO
18	PC00	I/O	GPIO
19	PC01	I/O	GPIO
20	PC02	I/O	GPIO
21	PC03	I/O	GPIO
22	PC04	I/O	GPIO
23	PC05	I/O	GPIO
24	PC06	I/O	GPIO
25	PC07	I/O	GPIO
26	RESET	--	Module reset pin, active low, internal pull-up
27	GND	--	Module Ground
28	GND	--	Module Ground

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Chapter 4 Basic Applications

4.1 Recommended Circuits

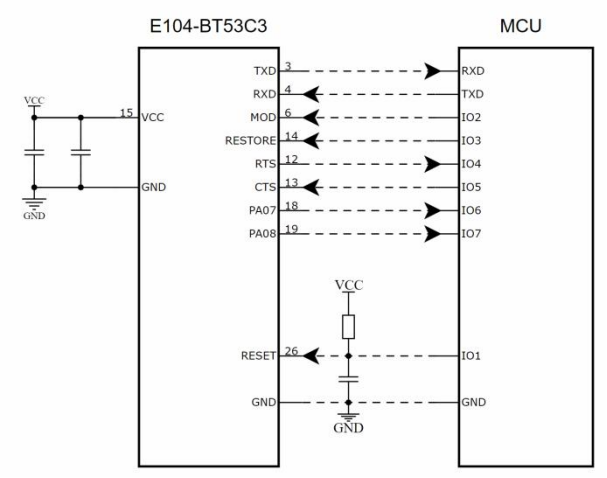


图 4-1 推荐电路

Note: The recommended circuit is the circuit recommendation diagram when the RTS(PA06) and CTS(PA05) pins are used, and the connection can not be made when the RTS(PA06) and CTS(PA05) pins are not used.

Chapter 5 Function Details

5.1 Role description

The module supports the following four roles

1. slave role;
2. master role;
3. slave and master roles;
4. Beacon role;

The factory default is the slave ROLE, and the role is switched through the AT command "AT+ROLE". For details, see 5 AT command. The serial port of the module under the Beacon role is closed every time the module is powered on, and the serial port can be awakened by the rising edge of the CTS pin or the AT command can be sent through the mobile phone APP to configure parameters.

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5.2 Default broadcast data



Details:

LEN.	TYPE	VALUE
2	0x01	0x06
8	0x1B	0x001BB12265112C
3	0x03	0xF0FF
13	0x09	0x434445425954455F42313142

As shown in the figure above, data with lengths of 2, 8, and 3 are broadcast data, indicating the broadcast type, MAC address, and UUID information respectively. Length 13 is the data of the scan response packet, representing the broadcast name (the last 4 bytes are the last two bytes of the MAC address).

5.3 BeaconDefault configuration

1. Company ID:0x4C00
2. Major UUID:0x2775
3. Minor UUID:0x848F
4. RSSI:-48 dBm
5. UUID:0xFDA50693A4E24FB1AFCFC6EB07647825

The serial port of the module in this role is closed by default every time the module is powered on. You can wake up by using the rising edge of the CTS pin.

5.4 Default configuration for the secondary role

1. 1. Device name: CDEBYTE_XXXX(XXXX is the last two bytes of the MAC address of the module).
2. 2. Broadcast interval: 200ms;
3. 3. The connection interval is 20ms to 40ms.
4. 4. The broadcast type is connectable and scannable broadcast.
5. 5. Connection timeout is 2.5 seconds.
6. The UUID is 16 bits by default;

5.5 Module state

1. MODULE POWERUP: The module is started;
2. XX:XX:XX:XX:XX:XX CONNECTD P*X: The connection from the role succeeded. Procedure;
3. XX:XX:XX:XX:XX:XX DISCONNECTED P: Disconnect from the role;
4. XX:XX:XX:XX:XX:XX CONNECTED B: Beacon connection successful;

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5. XX:XX:XX:XX:XX:XX DISCONNECTED B：Beacon disconnect；
6. XX:XX:XX:XX:XX:XX CONNECTD C*Y：The primary role is connected successfully. Procedure；
7. XX:XX:XX:XX:XX:XX DISCONNECTED C：The primary role is disconnected；
8. ALREADY CONNECTED：This device is connected；
9. XX:XX:XX:XX:XX:XX CONNECT TIMEOUT：BLE Host connection to secondary device times out；

The above state can be enabled or disabled by the AT command "AT+ LOGMSG". For details, see section 5 AT Command.

5.6 Configuration

1. A maximum of eight secondary role devices can be connected to a single primary role. A master/slave role can be connected to seven slave devices at the same time, and can be connected to another master device as a slave role；

2. AT+CONNECT command Failed to connect to the device prompt +ERR=3. For the cause, see the command description；

3. Multiple connection Specifies automatic reconnection of multiple devices. When a peer device is disconnected abnormally, the module starts automatic reconnection，

4. Please refer to instructions；

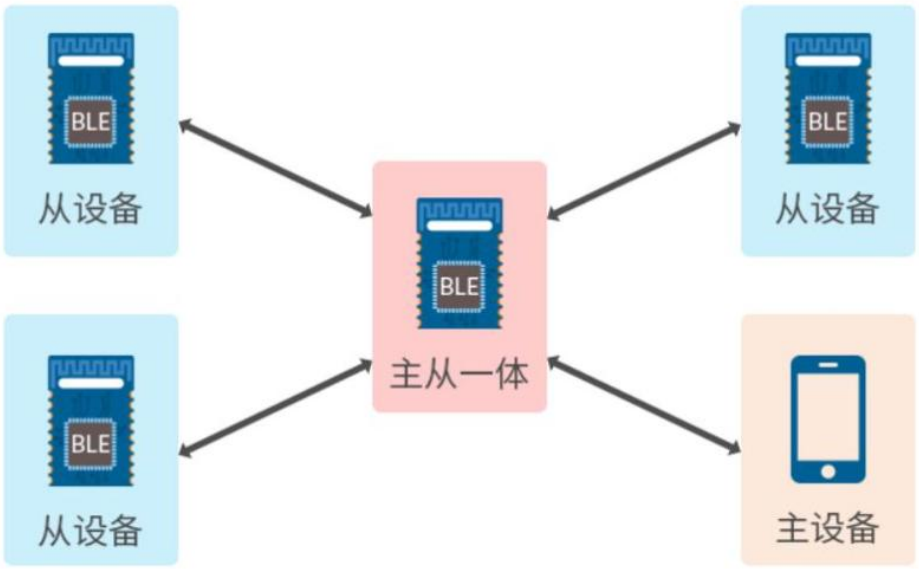
5. In the case of multiple connections, the handle function specified in the AT+TRM_HANDLE command does not save data after a power failure. The device transfers data to the newly connected device by default. If the handle device corresponding to data transfer is disconnected, the handle value of data transfer automatically switches to the last device in the connection list. (The handle value can be XX:XX:XX:XX:XX:XX in the message returned after the connection is successfully established.

6. "CONNECTED P*X" or via the command AT+CONNECT_LIST? Acquired)；

7. Seven. After the user uses the command to actively disconnect the connection with the device that has been set as automatic reconnection, the automatic reconnection fails this time

8. It takes effect after an abnormal disconnect.

Note: Multi-connection data transmission sources are more complex, such as master-slave integration: data may come from the following four devices, so the data packet should contain the data source, otherwise it is impossible to identify which device the data comes from.



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5.7 Configuration Mode

The module supports two configuration modes: serial port configuration and APP configuration. APP configuration, that is, to use the BLE APP configuration module on the phone, you must first verify the password through AT+AUTH, some instructions do not support APP configuration, see 5.3 instruction table for details, and other AT instructions are allowed to use after verification. The authentication period of the APP is set to this connection. If the device is disconnected and reconnected, it needs to be re-authenticated.

1. Which configuration mode the module is in depends on the PA00(MOD) pin level.
2. APP configuration can be configured at any time, regardless of PA00(MOD) pin status.
3. PA00(MOD) pin latches the current state when a valid change is detected. The holding time of each status change is more than 200ms.
4. In configuration mode, the serial port sends the AT command, wait for the serial port to return, and then send the next AT command.

5.8 Automatic update

MTU indicates the data length of BLE single packet. The default value is 247, and the payload length is 244. After the module is successfully connected, the slave initiates the MTU update. If the host accepts and responds, the slave MTU is used. If the host refuses and responds, the master and slave use the MTU of the host.

5.9 Compatibility with other modules of our company

When our other modules are connected to E104-BT53C3, input the MAC address of E104-BT53C3, you need to pay attention to the size end.

Chapter 6 AT Command

When other modules of our company connect to E104-BT53C3, enter the MAC address of E104-BT53C3, and pay attention to the problems of the size end.

6.1 Instruction specification

Instruction type	Instruction format	Deacription
Query instruction	AT+[X]?	This command is used to query the parameters of the setup command.

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Set instruction	AT+[X]=<…>	This command is used to set user - defined parameters.
Execute instruction	AT+[X]	Used for instructions without parameters, such as module reset.

Notes:

- Serial configuration ends with carriage return (\r) and line feed (\n) (APP configuration does not bring back car line feed);
- The return result for both configuration modes ends with (\r) and (\n), and is not explained later;
- The serial port baud rate is 115200 by default, 8 data bits, 1 stop bit, and no verification;
- The command parameters are in ASCII format;
- The command error response format +ERR:[NUM], [NUM] see 6.2 Error codes;
- In the AT instruction, <> indicates optional parameters, and [] indicates required parameters; If all parameters of the AT directive are optional, fill in any of the parameters, such as AT+ADV=,,20;
- The instruction section is case insensitive (excluding the "APP Configuration authentication" instruction);
- If the module is in configuration mode or transparent mode, you can configure it using the APP;
- Some commands do not support APP configuration, such as "Set extended broadcast", "AT command send data", "master role scan", "Enable observer" and other AT commands that require serial port coordination;
- All AT commands cannot contain invisible characters such as Spaces and tabs.

6.2 Error code

NUM	Description	Error cause	solution
1	Instruction not present	Input instruction error	Read the 6.3 command sheet, for example, set broadcast parameters, and compare the command "AT+ADV" character by character to prevent typing or word spelling resulting in incorrect characters.
2	Parameter error	Input parameter error	Check the Parameter description of each instruction table in 6.3 Instruction Table.
3	The operation is not allowed or failed	Related functions (such as connection and parameter setting) fail. For example, if the AT+SCAN command is not executed when the module is powered on, run AT+CONNECT=0	Parameter may have been saved, please try again or check "Description" for each instruction table in 3.3 Instruction Table
4	Operation error	The current role does not support this directive	Check the "Description" of each instruction table in 6.3 Instruction Table

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6.3 Command list

6.3.1Test Command

Command	Reply
AT	+OK
Note: Used to test whether the serial port communication is normal.	

6.3.2 Broadcast name

Command		Reply
Inquire	AT+NAME?	+ NAME =[para]
Setting	AT+NAME=[para]	+OK：success +ERR=[NUM]：Error
Parameters	Broadcast name	
Description	Effective immediately, power off save; The length of the broadcast name is not more than 16 bytes; The factory default broadcast name is CDEBYTE_XXXX, which is the last two bytes of the MAC address.	
Example	Query the broadcast name (MAC: 2C:11:65:22:B1:1B) Instruction: AT+NAME? Return: +NAME=CDEBYTE_B11B Set the broadcast name to MY_TEST Instruction: AT+NAME=MY_TEST Return: +OK	

6.3.3 MAC Address

Commmand		Reply
Inquire	AT+MAC?	+ MAC =[para]
Parameters	MAC Address	
Descriptionn	The returned MAC address is a hexadecimal character.	
Example	Assume that the local MAC address is 2C:11:65:22:B1:1B Instruction: AT+MAC? Return: +MAC=2C:11:65:22:B1:1B	

6.3.4 Module characters

Command		Reply
Inquire	AT+ROLE?	+ROLE=[para]

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Setting	AT+ROLE=[para]	+OK：Success +ERR=[NUM]：Error
Parameters	para	Characters
	0	slave, single slave (default)
	1	master, single master
	2	slave and master. Slave and master
	3	Beacon
Description	Restart takes effect, power failure save; Switching the role will clear the list of automatic reconnection devices. Beacon role serial port is off by default and unavailable, can be awakened by CTS pin rise edge).	
Example	Query module role Instruction: AT+ROLE? Return: +ROLE=0 Set the module role to single host Command: AT+ROLE=1 Return: +OK	

6.3.5 Transmitting power

Command		Reply
Inquire	AT+ PWR?	+ PWR =[para]
Setting	AT+ PWR =[para]	+OK：success +ERR=[NUM]：Error
Parameters	The selectable value is-28, -20, -10, -5, -3,0,1,2,4,6	
Description	Effective immediately, power off save; Cannot be set when scanning, observer or connection is enabled, otherwise error code 3 is returned. The actual power may differ slightly from the requested value; The A1 version has a maximum transmit power of 0dBm, and the parameters using this instruction range from -28 to 0dBm.	
Example	Query transmit power Command: AT+PWR? Return: +PWR=0 Set the module transmit power to -5 DBM Command: AT+PWR=-5 Return: +OK	

6.3.6 Broadcast parameter

Command		Reply
Inquire	AT+ADV?	+ ADV =[para1],[para2],[para3]

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Setting	AT+ADV=<para1>,<para2>,<para3>	+OK：success +ERR=[NUM]：Error
Parameters	para1	Broadcast status: 0, off. 1. On;
	para2	Broadcast type:0: cannot connect to broadcast. 1, can connect to the broadcast
	para3	The value ranges from 20 to 10240. The default value is 200ms
description	Effective immediately, power off save; Only slave roles (including single slave, master slave integration, and beacon) can be set. Single master roles cannot be set.	
Example	Query broadcast parameters Instruction: AT+ADV? Return: +ADV=1,1,200 To enable unconnected broadcast with an interval of 500ms, run the following command Instruction: AT+ADV=1,0,500 or AT+ADV=,0,500 (when broadcast is on) Return: +OK Turn off the broadcast (the other two parameters remain unchanged) Instruction: AT+ADV=0,0,500 or AT+ADV=0 Return: +OK	

6.3.7 Customize broadcast data

Command		Reply
Inquire	AT+ADVDATA?	+ ADVDATA =[para1],[para2]
Settings	AT+ADVDATA=[para], <para2>	+OK：success +ERR=[NUM]：Error
Settings (Not saved)	AT+ADVDATA_CUR=[para], <para2>	
Parameters	para1: Data input format (0: ASCII; 1: HEX) para2: User-defined broadcast data	
description	Effective immediately, instruction AT+ADVDATA is saved after power failure, instruction AT+ADVDATA_CUR is not saved after power failure; Return NULL if custom broadcast data is not set. This command is supported only in single-slave roles and master-slave integrated roles. Single-host roles and Beacon roles do not support this command. The data is placed in the custom field of the manufacturer, and the user can customize up to 26 bytes; Use the command "AT+ADVDATA=0" or "AT+ADVDATA=1" to restore the broadcast data to the default broadcast data; For applications that require frequent modification of broadcast data, you are strongly advised to run the AT+ADVDATA_CUR command to prevent Flash parameter modification from affecting the Flash lifetime. The APP configuration completion setting function is not supported.	

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Example	Set the broadcast data to ebyte Command :AT+ADVDATA=ebyte Return :+OK Set the broadcast data to 0x55 0x66 0x77 0x88 0x99 Instruction :AT+ADVDATA=1,5566778899 Return :+OK

6.3.8 telecast (Long Range)

Command		Reply
Inquire	AT+LE_CODED?	+ LE_CODED =[para]
Setting	AT+ LE_CODED =[para]	+OK: success +ERR=[NUM]: Error
Parameters	0: Turn off remote broadcast (default) 1: Enable remote broadcast	
Description	Effective immediately, power off save; After remote broadcasting is enabled, if the command "AT+ADV_EXT" is not used to set user data, the device with the broadcast name is default. The primary role that is in LE CODED physical layer (set by AT+SCAN_PHY) can scan the device and establish a connection. However, set the user to extend the broadcast data will become unscannable and unconnected devices; Beacon role and single master role do not support this directive. Version A1 does not support this directive.	
Example	Query remote broadcast Instruction :AT+LE_CODED? Return :+LE_CODED=0 Turn on telecast Command :AT+LE_CODED=1 Return :+OK	

6.3.9 Extended broadcast

Command		Reply
Inquire	AT+ADV_EXT?	+ ADV_EXT =[para1],[para2]
Setting	AT+ ADV_EXT =[para1],[para2]	+OK: success +ERR=[NUM]: Error
Settings (Not saved)	AT+ ADV_EXT_CUR =[para1],[para2]	+OK: success +ERR=[NUM]: Error
Parameters	para1: Large broadcast data length ranging from 0 to 251 para2: indicates the data timeout period. The value ranges from 1 to 5000	
Description	Take effect immediately, save power failure (except AT+ ADV_EXT_CUR); The user can customize the extended broadcast data to be 251 bytes at most. When enabled, the extended broadcast will become a nameless device, and the module will automatically add the broadcast length	

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	(LEN) and broadcast type (0xFF) to the data front set by the user, and the device will become unconnectable and unscannable. AT+ADV_EXT=0, restore the default extended broadcast; If this parameter has not been set, +ADV_EXT=NULL is returned. Use the AT+ ADV_EXT_CUR command to set custom data. After restart, the data from the last AT+ADV_EXT setting will be used. The APP configuration completion setting function is not supported. The APP configuration completion setting function is not supported.
Example	Set the custom extended broadcast data to 100 bytes and the input timeout time to 5000 ms Instruction :AT+ADV_EXT=100,5000 The previous example is a custom extended broadcast with a length of 100 bytes, and the input timeout is 5000 ms. In Settings Input the specified length of broadcast data (input data length cannot be less than or greater than the length, otherwise the setting fails), and return +OK after reaching the specified length, as shown below. If the specified TIMEOUT period is reached without reaching the specified input length, RECEIVE TIMEOUT is returned. Back: +OK INPUT EXT ADV:100 Serial port send 100 bytes: 1234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890 Return: +OK

6.3.10 Beacon Parameters

Command		Reply
Inquire	AT+BEACON?	+ BEACON =[para1], [para2], [para3], [para4], [para5]
Setting	AT+ BEACON =<para1>, <para2>, <para3>, <para4>, <para5>	+OK：Success +ERR=[NUM]：Error
Parameters	para1:company ID. The default value is 0x4C00 para2:Major UUID. The default is 0x2775 Para3:Minor UUID, 0x848F by default Para4:1 meter distance reference rssi, default -48, range -90~-10 Para5: custom UUID, the default is 0 xfda50693a4e24fb1afcfc6eb07647825	
Description	Take effect immediately. Save power failure.	
Example	Query Beacon parameters Directive :AT+BEACON? Returns: + BEACON = 4 c00, 2775848 F, - 48 FDA50693A4E24FB1AFCFC6EB07647825 Set Beacon parameters Instructions: AT + c00 BEACON = 4, 4, 0102030-48, FDA50693A4E24FB1AFCFC6EB07647825Return:+OK	

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6.3.11Slave role service

Command		Reply
Inquire	AT+SERVICE?	+ SERVICE =<para1>, <para2>, <para3>, <para4>, <para5>, <para6>
Setting	AT+ SERVICE=<para1>, <para2>, <para3>, <para4>, <para5>, <para6>	+OK：succcess +ERR=[NUM]：Error
Parameter	para1:UUID bits (0:16 bits; 1:128 bits) para2: module server UUID (third and fourth bytes), length 4 Para3: indicates the module receive channel UUID (the third and fourth bytes of the 128-bit UUID). The length is 4 Para4: Module send channel UUID (the third and fourth bytes of the 128-bit UUID), length 4 Para5: Wireless AT instruction channel UUID (the third and fourth bytes of the 128-bit UUID), length 4 Para6: 128-bit base UUID (the third and fourth bytes of the base UUID are replaced with the UUID of the preceding parameters to form the actual 128bit UUID of the module). The length is 32	
Description	Restart takes effect, power failure save; This directive is only valid for slave roles (single-slave, master-slave, and Beacon); The base UUID of 0000xxxx-0000-1000-8000-00805F9B34FB is unavailable.	
Example	Example Query the default 16-bit secondary role service Command :AT+SERVICE? Return :+SERVICE=0,FFF0,FFF1,FFF2,FFF3 Example Set the 128-bit slave role service Instruction: the AT + SERVICE = 1000, 1000, 2000, 3000, 4, 9 ECADC240EE5A9E093F3A3B50000406E Return :+OK Example Query the configured 128-bit secondary role service Command :AT+SERVICE? Returns: + SERVICE = 1000, 1000, 2000, 3000, 4, 9 ECADC240EE5A9E093F3A3B50000406E	

6.3.12 Master role scan

Command		Reply
Inquire	AT+SCAN?	+ SCAN=[para1], [para2], [para3]
Setting	AT+ SCAN =[para1], <para2>, <para3>	+OK：success 0 02:83:E1:66:C2:D0 -89 1 9C:19:C2:39:7D:35 -75 …… +ERR=[NUM]：Error
Parameters	para1: Current scanning status. 0: stop. 1: Scanning is being performed para2: indicates the scanning timeout period. The value ranges from 1 to 65535, in seconds	

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	Para3: Whether to display the Bluetooth name, 0: no 1: display (default)
Description	Take effect immediately, power failure does not save; This command takes effect only for the primary role (single master, master slave). Scanning stops automatically when the number of devices reaches 20 or the scanning timeout period is reached. If Observer is already enabled, using this command disables the observer feature.
Example	Example Query scan parameters of the primary role Instruction: AT+SCAN? Return: +SCAN=0,20,1 Set the scanning parameters of the main role (start scanning, do not display the Bluetooth name, scan time 20 seconds) Command: AT+SCAN=1,20,0 Return: +OK

6.3.13 The Master role scans the physical layer

Command		Reply
Inquire	AT+SCAN_PHY?	+ SCAN=[para]
Setting	AT+ SCAN_PHY =[para]	+OK：success +ERR=[NUM]：Error
Parameters	0:1M PHY(default); 1:LE CODED PHY。	
Description	Effective immediately, power off save; If the scanned physical layer of a primary role is set to LE CODED PHY, only secondary devices at the same physical layer can be scanned and connected to only secondary devices at this physical layer. Only the primary role (single-master, master-slave) supports this command.	
Example	Example Query scan parameters of the primary role Command: AT+SCAN_PHY? Return: +SCAN_PHY=0 Set the physical layer scanned by the primary role to LE CODED PHY Command: AT+SCAN_PHY=1 Return: +OK	

6.3.14 Master role linkage

Command		Reply
Setting	AT+ CONNECT=<para1>, <para2>	+OK：Success +ERR=[NUM]：Error
Parameters	para1: Returns the serial number or MAC address in the list according to the "AT+SCAN" command to connect to the specified secondary device. para2: indicates the MAC address.	

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Description	With immediate effect; Connects to a secondary device with a specified MAC address. Parameter 1 is omitted, and only the MAC address to be connected is specified. The connection may fail due to connection TIMEOUT. The connection timeout duration is 10 seconds. After the timeout, C1:02:03:04:05 CONNECT TIMEOUT is displayed. After the connection is successfully established, the last digit of the status message is the handle that the connection is just established, and the current transparent transmission indicates the same handle. A master/slave role can connect to a maximum of seven slave devices, and a single master role can connect to a maximum of eight slave devices. When the number of connections reaches the maximum, +ERR=3 is returned when you run this command again. You need to disconnect an existing device before connecting a new one. After the connection is initiated, wait until the connection is complete (it is best to wait about one second after the connection information is printed, because it takes a certain time for the host to discover services) before initiating the next connection. Otherwise, +ERR=3 is returned. If the primary role exceeds the maximum number of connections or the remote Bluetooth connection has been established with the module, +ERR=3 is directly returned when using this command.
示例	The connect AT+SCAN instruction returns the slave device with serial number 5 in the parameter list Command: AT+CONNECT =5 Back: +OK C1:02:03:04:05 CONNECTD C*1 The specified MAC address of the connection is C1:02:03:04:05 Instruction: AT+ CONNECT=, C1:02:03:04:05 Back: +OK C1:02:03:04:05 CONNECTD C*1

6.3.15 Command sending data

Command		Reply
Setting	AT+SEND=[para1],[para2], <para3>	+OK：success +ERR=[NUM]：Error
Parameters	para1: connection handle value, ranging from 1 to 8 para2: indicates the data length, ranging from 1 to 300 bytes para3: Timeout period for sending data input (The unit ranges from 1 to 5000, ms. The default value is 500ms.)	
Description	With immediate effect; In the following example, if the specified length of sent data is entered within the specified TIMEOUT period, +OK is returned. If the specified input length is not reached after the timeout period, RECEIVE TIMEOUT is returned.	

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	In AT command mode, if BLE data is RECEIVED, the system displays the prefix +RECEIVED:, the first parameter is the handle value, the second parameter is the length of the received data, and 1234567890 is the received data. If it is in transparent mode, the data is printed directly. The APP configuration completion setting function is not supported. The APP configuration completion setting function is not supported.
Example	The connection handle is 1, the data sending (ASCII) is ABCED, and the input timeout is 5000ms Command: AT+SEND=1,5,5000 Back: +OK INPUT BLE DATA:10 The module receives BLE data in AT instruction mode + RECEIVED: 1, 10 BLE DATA 1234567890

6.3.16 Displays connected devices

Command		Reply
Inquire	AT+CONNECT_LIST?	+ CONNECT_LIST =[para1], [para2]
Prameters	para1: Connects the handle para2: MAC address of the remote device	
Description	With immediate effect; Valid in master, master and slave mode; This command is used with AT+TRM_HANDLE. For example, AT+TRM_HANDLE=1 indicates that the primary role sends transparent data to a device whose handle is 1 and MAC address is 2C:11:65:22:B0:F1. The handle value followed by the letter P indicates that the connection is the primary device (mobile phone or primary role module) in the secondary role.	
Example	Displays connected devices Command: AT+CONNECT_LIST? Back: +CNT_LIST= 1P,2C:11:65:22:B0:F1 2, 2 C: but 5:22: AD: 59	

6.3.17 Disconnect

Command		Reply
Setting	AT+DISCON=[para1],[para2]	+OK：Success +ERR=[NUM]：Error
Parameters	para1: current role, 0: single slave role, 1: single master role, 2: master slave role	

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	para2: The handle value to be disconnected can be queried by running the AT command AT+CONNECT_LIST
说明	With immediate effect; Note: Parameter 2 must be used in the correct role (that is, parameter 1 must be the role of the current device). For example, if two slave devices are connected to the primary role, AT+DISCONNECT=1,1 indicates that the primary role disconnects from the slave device with handle 1. AT+DISCON Disconnects all connections.
示例	Disconnect specified connection Instruction: AT+DISCON=1,1 Back: +OK 2C:11:65:22:B0:F1 DISCONNECTD C Disconnect all current connections to the primary role Command: AT+DISCON Back: +OK 2C:11:65:22:B0:F1 DISCONNECTD C 7D:C2:A0:35:4C:21 DISCONNECTD P

6.3.19Delete automatic reconnection

Command		Reply
Setting	AT+ DEV_DEL=[para]	+OK：Success +ERR=[NUM]：Error
Parameters	para:MAC address, for example, C2:01:02:03:04:05	
Description	Restart takes effect, power failure save; AT+DEV_DEL=ALL Deletes all reconnected devices. Deleting a reconnected device does not affect the current connection status. The entered MAC address does not exist in the automatic reconnection list. Error code 3 is returned.	
Example	Example Delete the device whose MAC address is C2:01:02:03:04:05 Command: AT+DEV_DEL=C2:01:02:03:04:05 Return: +OK Delete all reconnected devices Command: AT+DEV_DEL=ALL Return: +OK	

6.3.20 Specified transmission device

Command		Reply
Inquire	AT+TRM_HANDLE?	+OK=[para]

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Setting	AT+ TRM_HANDLE =[para]	+OK：Success +ERR=[NUM]：Error
Parameters	The value ranges from 1 to 8	
Description	Takes effect immediately. Power failure is not saved Only the primary role (single primary role, master/slave role) supports this command A maximum of eight values exist. That is, a module is connected to eight devices, and each handle corresponds to a device. If the handle corresponding to the entered parameter does not exist, error code 4 is returned.	
Example	Querying the current data transparent handle(without any connection) Instruction: AT+TRM_HANDLE? Return: +OK=NULL Set a device with a handle of 1 to transmit data (use the AT+CONNECT_LIST command to get the handle value of the device to be transparently transmitted) Command: AT+TRM_HANDLE=1 Return: +OK	

6.3.21 Observer function

Command		Reply
Inquire	AT+OBSERVER?	+ OBSERVER =[para1],[para2], [para3], [para4], [para5],[para6]
Setting	AT+ OBSERVER =[para1],<para2>,<para3>, <para4>,<para5>, <para6>	+OK：success +ERR=[NUM]：error
Parameters	para1: 0: disable (default). 1: Open ordinary observer; 2: Enable scan extension broadcast observer. para2: indicates the filtering policy bit 0: indicates the MAC address bit 1: indicates the broadcast name(128-bit UUID are not available) bit 2: indicates the RSSI value bit 3: indicates the vendor ID bit 4 to 7: Reserved para3: indicates a 6-byte MAC address para4: indicates the broadcast name para5: Values less than RSSI are filtered para6: indicates the 2-byte vendor ID	
description	Take effect immediately, power failure does not save; To enable the extended broadcast observer mode, you must set the host scanning physical layer to LE CODED PHY by running AT+SCAN_PHY. Otherwise, the command only returns +OK but will not start. In observer mode, the surrounding broadcast from the device is listened to, but not every	

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	broadcast can be listened to, this is because the observer itself switches channels at the end of each scan interval, the device does not receive any broadcast, and also depends on the number of surrounding devices and signal strength (RSSI); This command supports only the primary role (single master, master slave). If the Primary Role Scan function is being used, this command stops the primary role scan function. After this function is enabled, scan and print information about peripheral secondary devices. If you need to stop sending "AT+OBSERVER=0", you can do so. Enable Scan extended broadcast observer. Primary PHY indicates the primary physical layer, Secondary PHY indicates the secondary physical layer, and SID indicates the authentication ID. The APP configuration completion setting function is not supported. The APP configuration completion setting function is not supported.
Example	Query the observer enablement status Instruction: AT+OBSERVER? Return: +OK=0 The common observer function was enabled Instruction: AT+OBSERVER=1 Return: +OK MAC:C1:01:02:03:04:05, RSSI:-50, ADV/RSP: 0E095246737461725F3434353536370EFF524601C00340FF000098256926

6.3.18 Automatic reconnection

Command		Reply
Inquire	AT+AUTO_CNT?	+ AUTO_CNT =[para1],[para2]
Setting	AT+ AUTO_CNT =[para1], <para2>	+OK：success +ERR=[NUM]：Error
Parameters	Para1:0: disables automatic reconnection, 1: enables automatic reconnection. Para2(Optional): Adds device MAC to the auto reconnection list. If this parameter is set, auto reconnection is disabled or enabled based on the value set in parameter 1. Other devices in the auto reconnection list are not affected by this command. The default value is NULL.	
Description	Restart takes effect, power failure save; The slave device disconnected by using the "AT+DISCON" command will not be automatically reconnected this time. The automatic reconnection function can be restored under the following conditions: Use the command again to connect the slave device Restart module Disable BLE and then enable BLE (use the command "AT+SLEEP=,0" to disable BLE, then use the command "AT+SLEEP=,1" to enable BLE) After the BLE function is disabled with the command "AT+SLEEP=, 0", the module will not	

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	automatically reconnect. After BLE is enabled again, the automatic reconnection function will be resumed. If the MAC address of the remote slave device is changed, the automatic reconnection function of this module fails.
Example	Example Query the list of reconnected devices Instruction: AT+AUTO_CNT? Return: +OK=NULL Enable automatic reconnection and set the reconnection device MAC C2:01:02:03:04:05 Instruction: AT+AUTO_CNT=1,C2:01:02:03:04:05 Return: +OK Enable automatic reconnection for all devices in the automatic reconnection list Command: AT+AUTO_CNT=1 Return: +OK Disable automatic reconnection for devices with MAC C2:01:02:03:04:05 Instruction: AT+AUTO_CNT=0,C2:01:02:03:04:05 Return: +OK

6.3.22 Slave physical layer rate

Command		Reply
Inquire	AT+PHY?	+PHY =[para]
Setting	AT+PHY=[para]	+OK：Succes +ERR=[NUM]：Error
Parameters	para: The value ranges from 1 to 15 1:1 M PHY (default) 2:2 M PHY 4:125K Coded PHY 8:500K Coded PHY This instruction can set multiple PHYs, parameters using the concept of bitfields. Simple conversion method, such as the preferred 1M PHY and 2M PHY, the sum of the corresponding parameters can be used as the parameter, that is, AT+PHY=3.	
Descrition	Take effect immediately, power failure does not save; This parameter takes effect in the secondary role. If it is connected to a mobile phone, it takes effect when the mobile phone turns on the notification.	
Example	The preferred physical layer for querying connections Instruction: AT+PHY? Return: +OK=1 Set 2M PHY as preferred Instruction: AT+PHY=2 Return: +OK	

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6.3.23 Serial baud rate

Command		Reply
Inquire	AT+BAUD?	+BAUD =[para]
Setting	AT+BAUD=[para]	+OK：Success +ERR=[NUM]：Error
Parameters	para:Serial port baud rate. valuableness: 1200,2400,4800,9600,14400,19200,38400,57600,115200,230400,460800,921600。默认值 115200。	
Description	Restart takes effect, power failure save.	
Example	Example Query the baud rate of the current serial port Instruction: AT+BAUD? Return: +BAUD=115200 Example Set the baud rate of the serial port to 9600 Command: AT+BAUD=9600 Return: +OK	

6.3.24 Connection interval

Command		Reply
inquire	AT+CONN_INTERVAL?	+ CONN_INTERVAL =[para]
Setting	AT+ CONN_INTERVAL = [para]	+OK：Success +ERR=[NUM]：Error
Parameters	para: connection interval. The value ranges from 6 to 3200. Connection interval = the value x 1.25, in ms. The default is 20ms.	
Description	Effective immediately, power off save; When connecting to the mobile phone, the recommended connection interval is not less than 20ms; The longer the connection interval, the longer the update time. The larger the connection interval, the slower the data forwarding and the lower the dynamic power consumption.	
Example	Query connection interval Command: AT+CONN_INTERVAL? Return: +OK=16 Set the connection interval to 100ms. 100 divided by 1.25=80 Command: AT+CONN_INTERVAL=80 Return: +OK	

6.3.25 APP configuration authentication

Command		Reply
Setting	AT+AUTH =[para]	+OK：success

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		+ERR=[NUM]: Error
Parameters	The value contains 6 characters, ranging from 0 to 9. The default value is 123456	
description	The single connection is valid. Authentication is required after reconnection. After the mobile phone and other devices are connected to the module, this command can be sent through the configuration channel. After the successful return, all AT commands can be used through the configuration channel. This command only supports the use of mobile APP; This instruction must be capitalized.	
example	APP configuration authentication Instruction: AT+AUTH=123456 Return: +OK	

6.3.26 The APP configures the authentication password

Command		Reply
Inquire	AT+UP_AUTH?	+ UP_AUTH =[para]
Setting	AT+UP_AUTH =[para]	+OK: Success +ERR=[NUM]: error
parameters	The value is a fixed length of 6. The default value is 123456.	
Description	Effective immediately, power off save; Only serial port configuration is supported.	
Example	Example Query the air configuration authentication Instruction: AT+UP_AUTH? Return: +OK=123456 Change the air configuration authentication password Command: AT+UP_AUTH=392578 Return: +OK	

6.3.27 Status output

Command		reply
Inquire	AT+LOGMSG?	+ OK =[para]
Setting	AT+LOGMSG =[para]	+OK: success +ERR=[NUM]: error
Parameters	0: The status display is off 1: Status display enabled (default)	
description	Take effect immediately. Save power failure.	
Example	Query the current status output function Instruction: AT+LOGMSG? Return: +OK=1 Set output to off state Instruction: AT+LOGMSG=0 Return: +OK	

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6.3.28 Sleep pattern

Command		reply
inquire	AT+SLEEP?	+ OK =[para1],[para2]
setting	AT+SLEEP=<para1>,<para2>	+ERR=[NUM]:error
parameters	para1: module serial port function switch (0, off; 1, open) para2: Module BLE function switch (0, off; 1, open)	
Description	After the serial port is closed, the power consumption can be significantly reduced. After the serial port function is closed, wake up the serial port by raising the edge of the CTS pin. Turn off BLE, if the module is connected, disconnect all connections and turn off the broadcast; If the module is in the active role (single host or master/slave) and the automatic connection function is enabled, the module does not reconnect automatically after BLE is disabled. Turn off BLE to still use the relevant BLE instructions; After the serial port is closed, the function pins are still valid.	
Example	The module enters the minimum sleep state (turn off the serial port and BLE). Instruction :AT+SLEEP=0,0 Return :+OK Module Bluetooth Silence (BLE off only) Instruction :AT+SLEEP=1,0 Return :+OK Module Bluetooth Low power operation (only turn off serial port) Instruction :AT+SLEEP=0,1 Return :+OK	

6.3.29 Turn on/off the watchdog

command		reply
inquire	AT+WDOG?	+ WDOG =[para]
setting	AT+WDOG =[para]	+OK：success +ERR=[NUM]：error
parameters	0: The watchdog function is disabled 1: Watchdog function enabled (default)	
description	Restart takes effect, power failure save; After the watchdog is disabled, the overall power consumption of the module is reduced by 2 to 3uA.	
example	Example Query the watchdog status Command: AT+WDOG? Return +OK =1 Set to turn off watchdog Instruction: AT+WDOG=0 Return to +OK	

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6.3.30Module soft reset

Command		Reply
Command	AT+RESET	+OK
Description	The module software resets after a delay of 100ms.	

6.3.31 factory data reset

Command		Reply
Command	AT+RESTORE	+OK
Description	After the setting is complete, the software resets after the module delays 100ms; During the process of restoring factory Settings, do not reset in any form, do not power off before the operation is completed;	

6.3.32 Firmware version

Command		reply
Inquire	AT+VERSION?	+VERSION=[para]
Parameters	para: indicates the firmware version number	
Description	The last two digits of the firmware version indicate the version number.	
Example	Example Query the version A1 Instruction: AT+VERSION? Return: +OK=7413-0-10 Example Query the A3 version Instruction: AT+VERSION? Return: +OK=7413-1-10	

6.3.33 Scan Filter Name

Command		reply
Inquire	AT+SCANCMP?	+SCANCMP=<para1>,<para2>
Set	AT+SCANCMP=<para1>,<para2>	+OK
Parameters	<para1>: Filter Enable Switch 0: Off (default) 1: On <para2>: Set filter name (no more than 20 characters)	
Description	Effective immediately. Data is saved upon power loss.	
Example	Instruction: AT+SCANCMP=1,BT-53 Response: +OK	

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Chapter 7 Mobile APP test transparent transmission function

The BLE APP for mobile can be downloaded in the App Store and App Marketplace. Open the App Store or Marketplace, search for nRF Connect, download and install it to test. This document uses the IOS version of nRF Connect as an example.



The module is connected to the computer through the USB to serial port tool, if there is a backboard, it is directly connected to the computer, and check the computer port number used (steps: win10 desktop right click Start -> Device Manager -> Port).

Open the serial port debugging tool and set the correct port number and baud rate. The factory default serial port parameters of the module are baud rate 115200 BPS, data bit 8, check bit none, and stop bit 1.

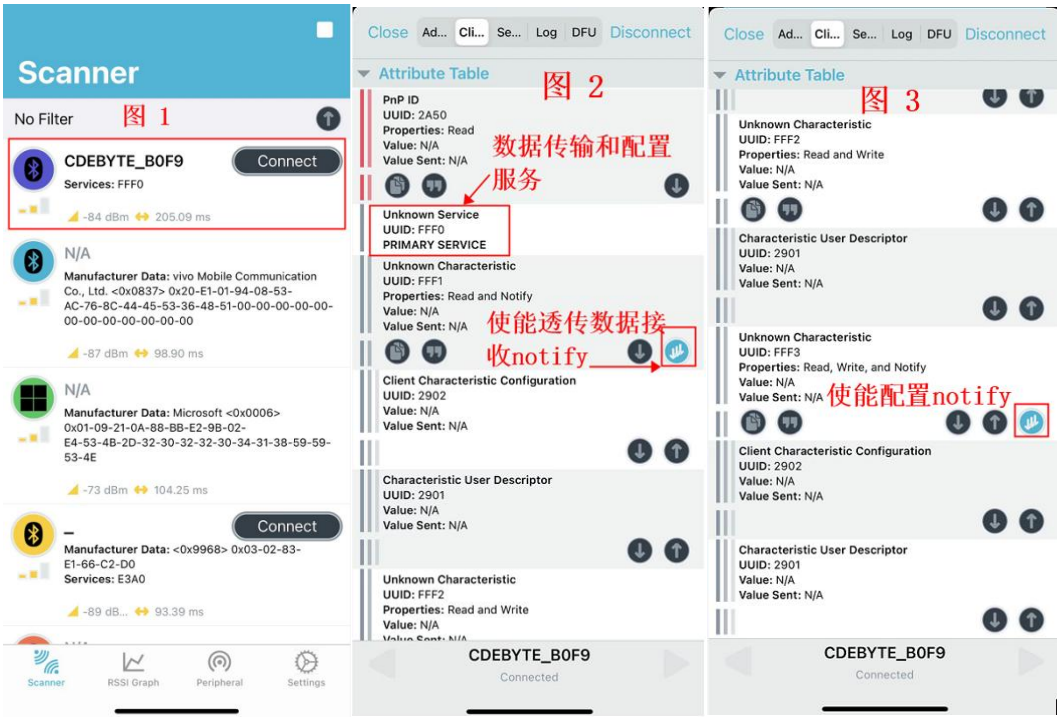


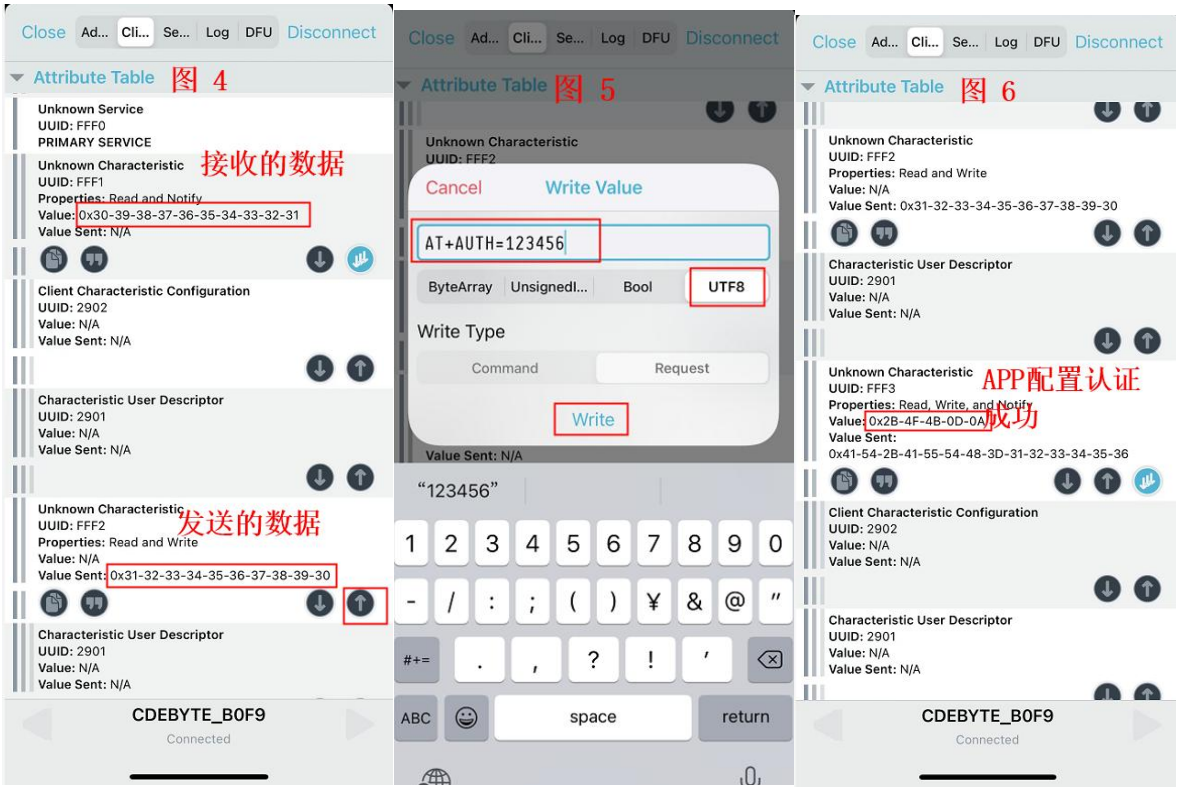
Open nRF Connect, search for the Bluetooth device with the Bluetooth name beginning with CDEBYTE_ and connect it. After the connection is successful, Disconnect will be displayed in the upper right corner of the phone, indicating that it is connected. Swipe left and right on the phone interface, you will see the service list and log information, and the serial port debugging assistant will print the connection information. For example, XX:XX:XX:XX:XX:XX CONNECTD P*1, find the data transmission and configuration Service in the service list, enable

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the notify of receiving and configuring instructions, and then you can communicate with the module for data transmission and AT instructions.

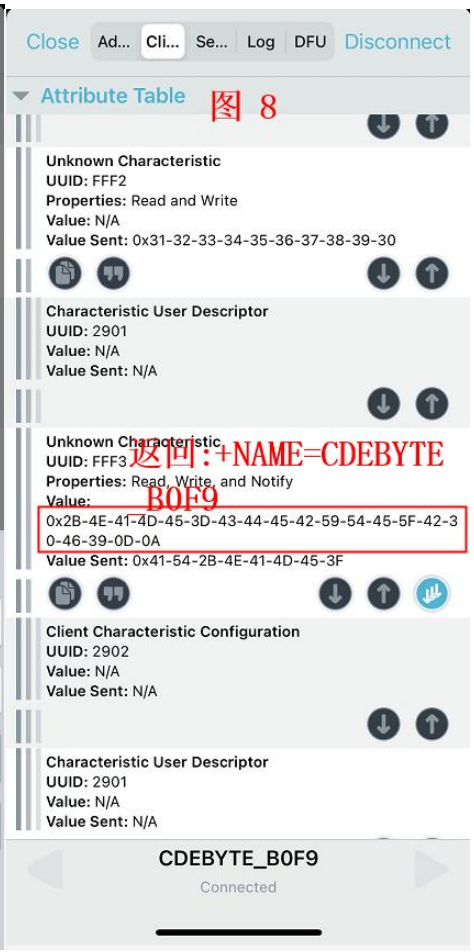




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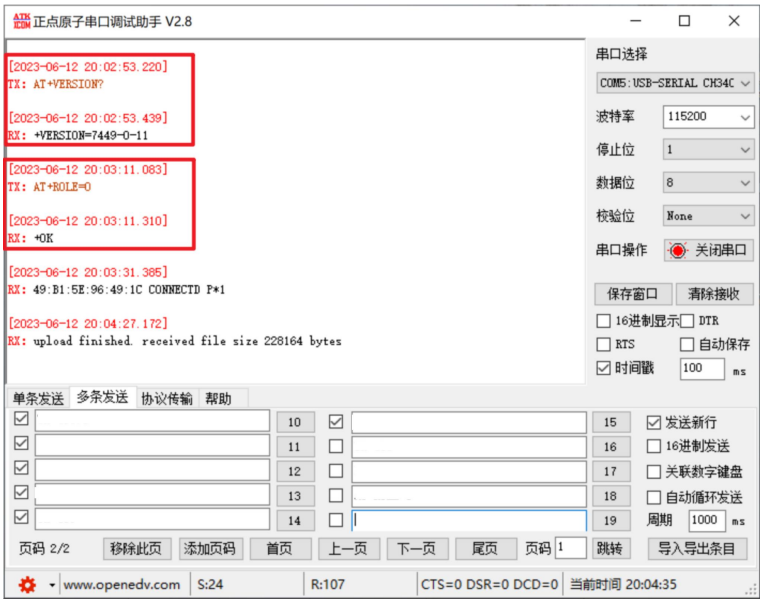
Chapter 8 OTA upgrade function

Preparation:

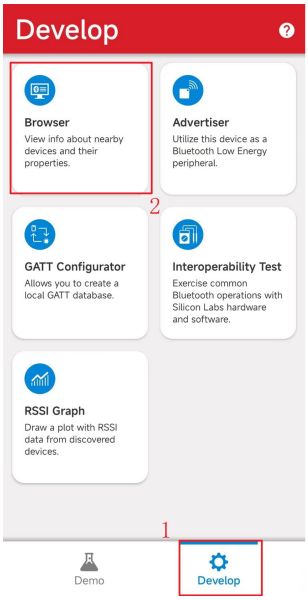
1. Download OTA upgrade package, which includes firmware upgrade APP and latest firmware.
2. Install EFR Connect

【OTA Upgrade Package】OTA upgrade tools & firmware

8.1 Connect the serial port and send AT+VERSION? Query the current firmware version number of the module and send AT+ROLE=0 to configure the module in slave mode.



8.2 Open the EFR Connect software downloaded from the official website, click "Develop", and click "Browser".

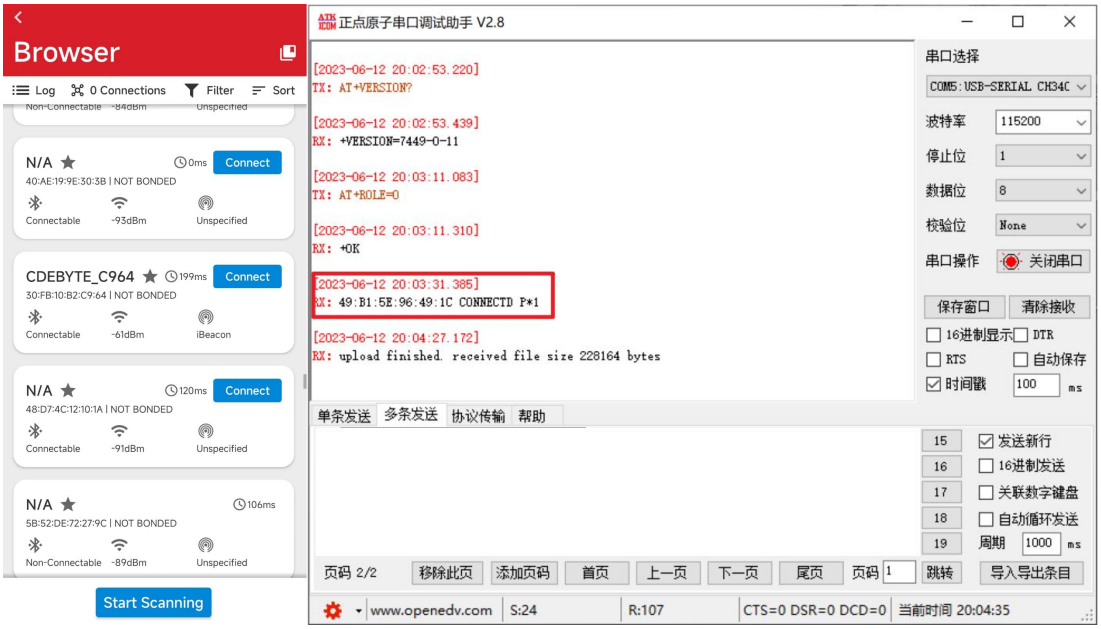


8.3 Locate the Bluetooth module to be upgraded and click "Connect". The serial debugging assistant will print the

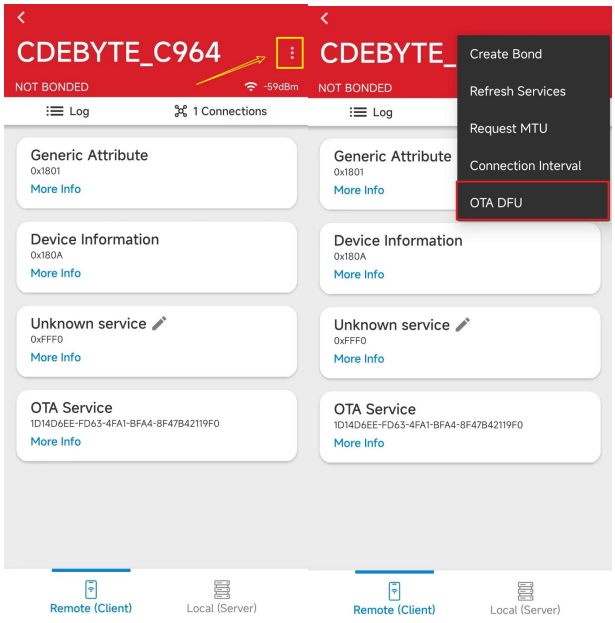
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connection successfully.



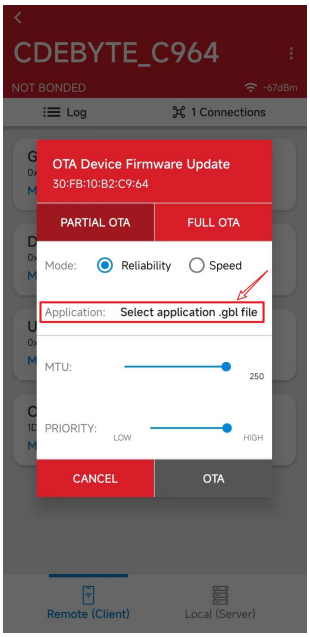
8.4 Click the feature list box in the top right corner and click "OTA DFU".



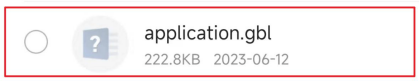
8.5Click the filename to the right of Application

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8.6 Select the firmware provided by the official website, and print "upload finished. received file size 228164 bytes" by the serial debugging assistant.



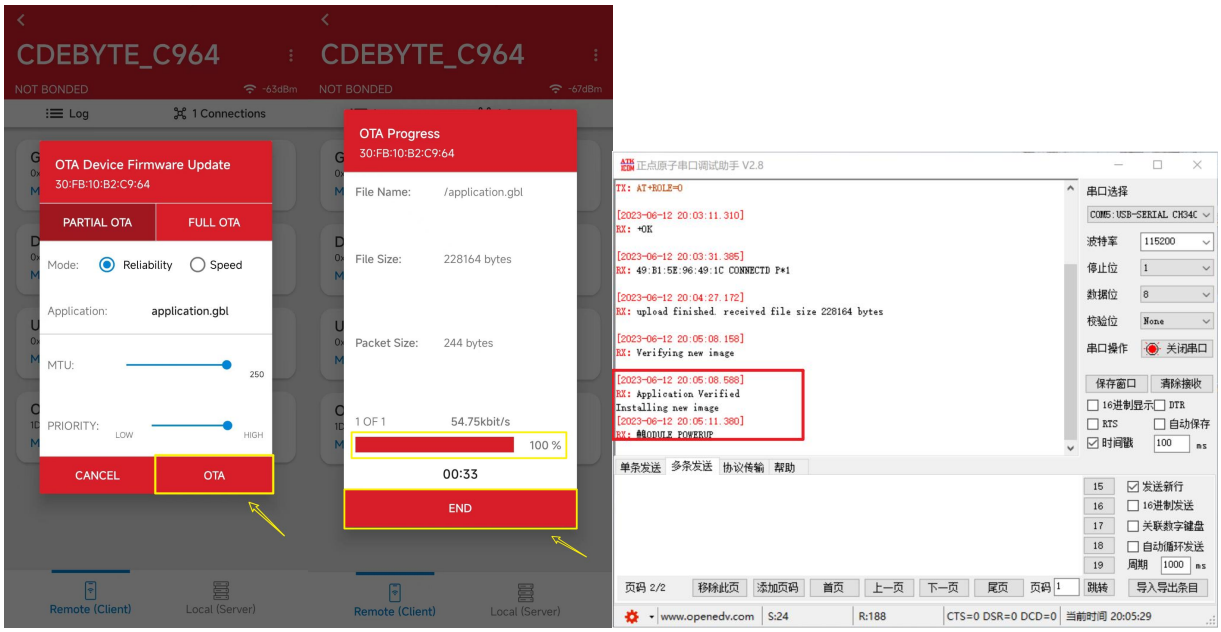


8.7 Click OTA to start firmware upgrade. After the progress is updated to 100%, click END, and the serial debugging

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assistant will print the firmware loading information, the module will be restarted, and the firmware update is completed.



Chapter 9 Hardware design

- It is recommended that the DC voltage regulated power supply be used to power the module. The ripple coefficient of the power supply is as small as possible, and the module must be grounded reliably;
- Pay attention to the correct connection of the positive and negative terminals of the power supply, such as reverse connection may cause permanent damage to the module;
- Check the power supply to ensure that the power supply voltage is within the recommended value. If it exceeds the maximum value, the module may be permanently damaged;
- Check the stability of the power supply and ensure that the voltage does not fluctuate greatly and frequently;
- In the design of the power supply circuit for the module, it is often recommended to retain more than 30% of the margin, and the whole machine is conducive to long-term stable work;
- The module should be far away from the parts with high electromagnetic interference, such as the power supply, transformer, and high-frequency cable;
- The high-frequency digital cables, high-frequency analog cables, and power cables must be routed away from under the module. If you must pass under the module, assume that the module is welded to the Top Layer. Lay copper (all copper and well grounded) on the Top Layer of the contact part of the module close to the digital part of the module and route the cables at the Bottom Layer;
- It is also wrong to assume that the module is welded or placed on the Top Layer, and random wiring in the Bottom Layer or other layers will affect the module's spurious and receiving sensitivity to varying degrees;
- Assuming that there are devices with large electromagnetic interference around the module, the performance of the module will be greatly affected. According to the intensity of the interference, it is recommended to stay away from the module. If the situation permits, appropriate isolation and shielding can be done;
- Assuming that there is a large electromagnetic interference around the module (high frequency digital, high frequency

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analog, power supply wiring) will also greatly affect the performance of the module, according to the strength of the interference, it is recommended to stay away from the module, if the situation allows for appropriate isolation and shielding;

- Try to stay away from TTL protocols with some physical layers of 2.4GHz, such as USB3.0;
- The antenna installation structure has a great impact on the module performance. It is necessary to ensure that the antenna is exposed, preferably vertically upward. When the module is installed inside the housing, the antenna can be extended to the outside of the housing using a high-quality antenna extension cable;
- The antenna must not be installed in the metal shell, which will greatly reduce the transmission distance.

Chapter 10 FAQ

10.1 Transmission distance is not ideal

- When there is a linear communication barrier, the communication distance will be attenuated accordingly;
- Temperature, humidity, and the same frequency interference will cause the communication packet loss rate to increase;
- The ground absorbs and reflects radio waves, and the test effect near the ground is poor;
- Sea water has a strong ability to absorb radio waves, so the seaside test effect is poor;
- If there are metal objects near the antenna, or placed in a metal shell, the signal attenuation will be very serious;
- Power register setting error, air speed setting too high (the higher the air speed, the closer the distance);
- At room temperature, the power supply low voltage is lower than the recommended value, and the lower the voltage, the smaller the power;
- The matching degree between the antenna and the module is poor or the quality of the antenna itself is wrong.

10.2 Module easy to damage

- Check the power supply to ensure that the power supply voltage is within the recommended value. If it exceeds the maximum value, the module may be permanently damaged;
- Check the stability of the power supply and ensure that the voltage does not fluctuate greatly and frequently;
- Ensure that the installation and use of high-frequency devices are ESD sensitive;
- Ensure that the humidity is not too high during installation and use. Some components are humidity sensitive;
- If there is no special need, it is not recommended to use at too high or too low temperatures.

10.3 The bit error rate is too high

- If there is interference from the same frequency signal nearby, stay away from the interference source or modify the frequency and channel to avoid interference;
- The power supply is not ideal may also cause garbled code, must ensure the reliability of the power supply;
- Extension wire, feeder quality is poor or too long, will also cause high bit error rate。

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Chapter 11 welding operation instruction

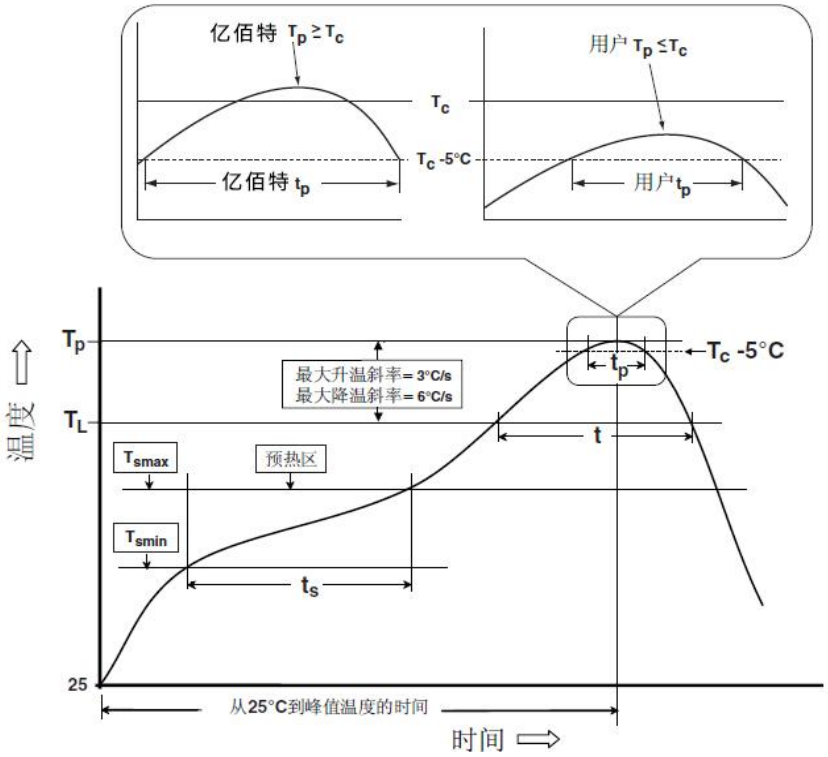
11.1 Reflow temperature

Reflow curve characteristics		Have lead craft assembly	Lead-free process assembly
Preheating/holding	Minimum temperature (Tsmin)	100℃	150℃
	Maximum temperature (Tsmax)	150℃	200℃
	Time (Tsmin~Tsmin)	60-120 秒	60-120 秒
Warming slope (TL~Tp)		3℃/second, Max	3℃/second, Max
Liquid phase temperature (TL)		183℃	217℃
TL above hold time		60~90second	60~90second
Package peak temperature Tp		Users should not exceed the temperature indicated on the "Moisture Sensitivity" label of the product.	Users should not exceed the temperature indicated on the "Moisture Sensitivity" label of the product.
The time (Tp) within the specified stage temperature (Tc) of 5 ° C is shown in the figure below		20s	30s
Cooling slope (Tp~TL)		6 ° C/s, maximum	6 ° C/s, maximum
The time from room temperature to peak temperature		Six minutes, the longest	8 minutes, the longest
※The peak temperature (Tp) tolerance definition of the temperature curve is the user's upper limit			

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11.2 Reflow welding diagram



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Chapter 12 Related Models

Product No.	IC	Frequency Hz	Power dBm	Interface	protocal BLE	Size mm	Interface	Functions
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 Development
E73-2G4M08S1C	nRF52840	2.4G	8	I/O	4.2/5.0	13*18	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 serial 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, transmissive

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Revise History

Version	Revise data	Revise description	Maintaining people
1.0	2023-5-5	Initial version	Bin
1.1	2024-07-25	Error correction	Bin
1.2	2026-02-05	New instruction: AT + SCANCMP	Bin

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