E104-BT07/E104-BT08 Product Specification

BLE5.1 Low Power SMT type Bluetooth to Serial Module





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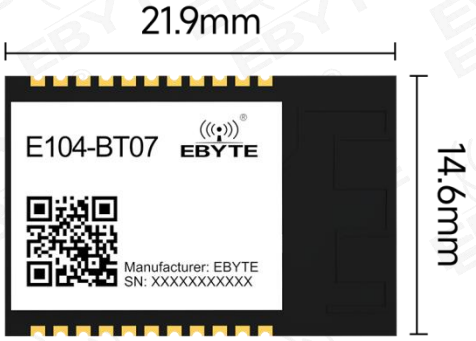
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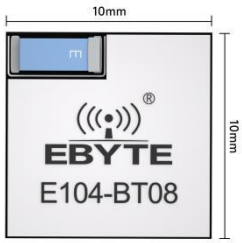
Ⅰ Overview

1.1 Introduction

E104-BT07/E104-BT08 is a serial to BLE Bluetooth module based on Bluetooth protocol version 5.1, small size, low power consumption, working in the 2.4GHz band.

The E104-BT07/E104-BT08 module uses the general AT instruction to set parameters, which is easy and quick to operate. The module supports master-slave integration, and the module supports low-power broadcast, data through transmission and air configuration. The module can be widely used in intelligent wearable, home automation, home security, personal health care, intelligent home appliances, accessories and remote control, automotive, lighting, industrial Internet, intelligent data acquisition, intelligent control and other fields. The maximum support baud rate 1Mbps data transmission.





1.2 Features

- Support for Bluetooth BLE 5.1 protocol;
- Supports adjustable Bluetooth packet length;
- Supports two working modes of configuration and transparent transmission;
- Supports auto-broadcast on power on and auto-connect;
- Supports IBeacon and general broadcast switching;
- Supports MAC binding connection, the maximum number of binding is 1 device;
- Supports for transparent transmission over serial port;
- Supports multiple serial port modes and baud rates;
- Supports custom 16-bit UUID;
- Supports Bluetooth parameter over-the-air configuration function;
- Maximum communication distance:
  E104-BT07 130m (@8dBm、1Mbps)
  E104-BT08 60m (@8dBm、1Mbps)
- Supports ultra-low power sleep, synchronous broadcast;
- Module supports master-slave integration, maximum 1 slave can be connected when acting as a master;
- Supports for transmit power modification, maximum transmit power 8dBm;

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- MTU up to 247bytes;
- Maximum serial port baud rate support 1Mbps.

1.3 Application Scenarios

- Wireless meter reading wireless sensing;
- Smart homes;
- Intelligent buildings, smart buildings;
- Automated data collection;
- Health sensors;
- Smart wearable devices;
- Intelligent robots;
- Wireless sensing;
- Electronic tags;
- Intelligent control;

Ⅱ Specification parameters

2.1 Limit parameters

Table 2-1 Table of limit parameters

Main parameters	Performance		Remarks
	Minimum value	Maximum value	
Supply voltage (V)	1.8	3.6	Permanent module burnout above 3.6V
Blocking Power (dBm)	-	10	The probability of burning is small when used in close proximity
Operating temperature (℃)	-40	+85	Industrial Grade

2.2 Working parameters

Table 2-2 Table of working parameters

Main parameters	Performance			Remarks
	Minimum value	Typical values	Maximum value	
Operating voltage (V)	1.8	3.3	3.6	≥3.3V for guaranteed output power
Communication level (V)	-	3.3	-	Using 5V levels risks burnout
Operating temperature (℃)	-40	-	+85	Industrial grade design
Operating frequency band (MHz)	2402	-	2480	ISM band support

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Power consumption	Emission current (mA)	-	22	-	-
	Receiving current (mA)	-	6.2	-	-
	Sleeping current (μA)	-	0.6	-	Deep hibernation
Transmit Power (dBm)		-20	0	8	-
Receiving Sensitivity (dBm)		-	-99	-	Air rate of 1Mbps
Wake-up broadcast current (default)		-	6.3	-	Unit: mA. Default broadcast gap is 1s
Sleep broadcast current (default)		-	170	-	Unit:uA. Default broadcast gap 1s
Sleep connection current (default)		-	66	-	Unit:uA. Default broadcast gap 1s
Sleep without broadcast current (default)		-	0.6	-	Unit: uA. Default connection gap 500ms

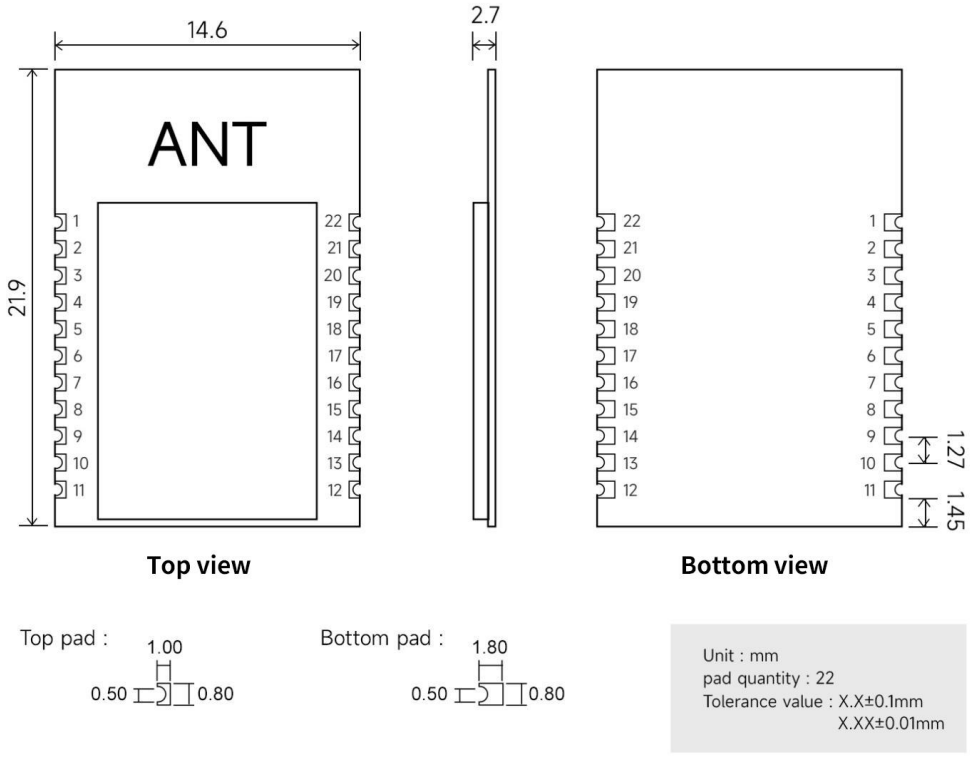
Main parameters	Description	Remarks
Reference Distance	130m(E104-BT07) 60m(E104-BT08)	Clear and open environment, height 2.0m; @8dBm; airspeed: 1Mbps
Bluetooth Protocol	BLE5.1	-
Communication Interface	UART	-
Packaging method	SMD	-
Dimension	21.9*14.6mm (E104-BT07) 10*10mm (E104-BT08)	-
RF Interface	PCB antenna on board (E104-BT07) Ceramic antenna (E104-BT08)	Equivalent impedance about 50Ω
Weight	1.2±0.1g (E104-BT07) 0.5±0.1g (E104-BT08)	-

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Ⅲ Mechanical dimensions and pin definition

E104-BT07



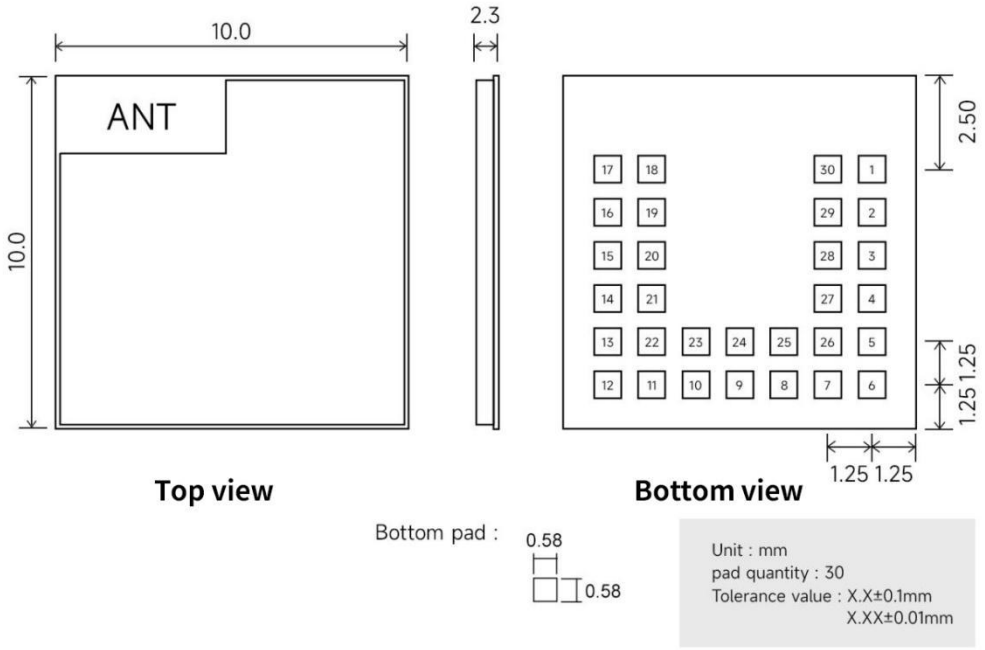
Serial number	Pin Serial Number	Pin Direction	Remarks
1	GND	Power Ground	Power Ground
2	P19	Input/output	General purpose GPIO port
3	P23	Input/output	General purpose GPIO port
4	P24	Input/output	General purpose GPIO port
5	P2	Input	Wake-up pin, wakes up immediately on falling edge
6	P34	Input/output	General purpose GPIO port
7	P33	Input/output	General purpose GPIO port
8	P9	output	Serial send pin, TXD
9	P10	Input	Serial port receiver pin, RXD
10	P31	Input/output	General purpose GPIO port
11	P32	Input/output	Data pin, will go high when there is data interaction
12	GND	Output	Power Ground
13	VDD	Input	Support 1.8-3.6V power supply, ≥3.3V can guarantee the

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			output power
14	P14	Input/output	General purpose GPIO port
15	P11	Input/output	General purpose GPIO port
16	P7	Input/output	LINK pin, SLAVE channel (host receive data channel) is at high level after opening
17	P3	Input/output	General purpose GPIO port
18	P18	Input/output	General purpose GPIO port
19	P17	Input	Restore factory pin, power on and keep 3s low level to restore factory default Settings, can be suspended
20	P16	Input/output	General purpose GPIO port
21	P15	Input/output	General purpose GPIO port
22	GND	Power Ground	Power Ground

E104-BT08



Serial number	Pin Serial Number	Pin Direction	Remark
1	P24	Input/output	General purpose GPIO port
2	P26	Input/output	General purpose GPIO port
3	P32	Output	Data pin, will go high when there is data interaction
4	P33	Input/output	General purpose GPIO port
5	P0	Input/output	General purpose GPIO port

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6	P1	Input/output	General purpose GPIO port
7	P3	Input/output	General purpose GPIO port
8	P7	Output	LINK pin, SLAVE channel (host receive data channel) is at high level after opening
9	P9	output	Serial send pin, TXD
10	P14	Input/output	General purpose GPIO port
11	GND	Power Ground	Power Ground
12	GND	Power Ground	Power Ground
13	VDD	Input	Support 1.8-3.6V power supply, ≥3.3V can guarantee the output power
14	VDD	Input	Support 1.8-3.6V power supply, ≥3.3V can guarantee the output power
15	P15	Input/output	General purpose GPIO port
16	P18	Input/output	General purpose GPIO port
17	RST_N	Input	Reset pin, active low.
18	P20	Input/output	General purpose GPIO port
19	P16	Input/output	General purpose GPIO port
20	P17	Input	Restore factory pin, power on and keep 3s low level to restore factory default Settings, can be suspended
21	GND	Power Ground	Power Ground
22	GND	Power Ground	Power Ground
23	P11	Input/output	General purpose GPIO port
24	P10	Input	Serial port receiver pin, RXD
25	TM	Program Download Mode	High level for program download, low level for normal operation.
26	P2	Input	Wake-up pin, wakes up immediately on falling edge.
27	P34	Input/output	General purpose GPIO port
28	P31	Input/output	General purpose GPIO port
29	P25	Input/output	General purpose GPIO port
30	P23	Input/output	General purpose GPIO port

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Ⅳ Basic Applications

4.1 Recommended Circuits

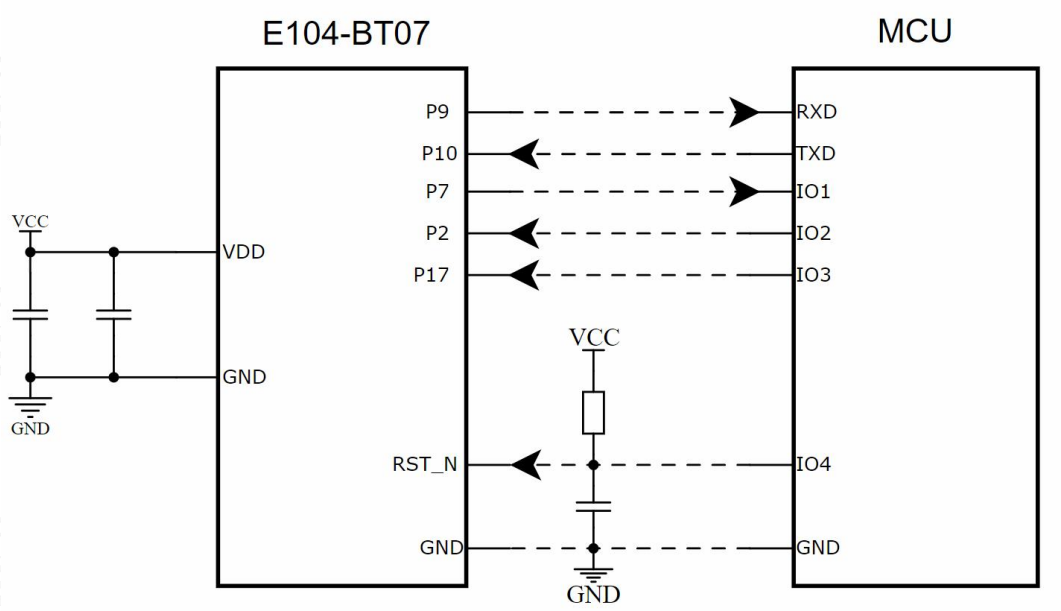


Figure 4-1 E104-BT07 Circuit

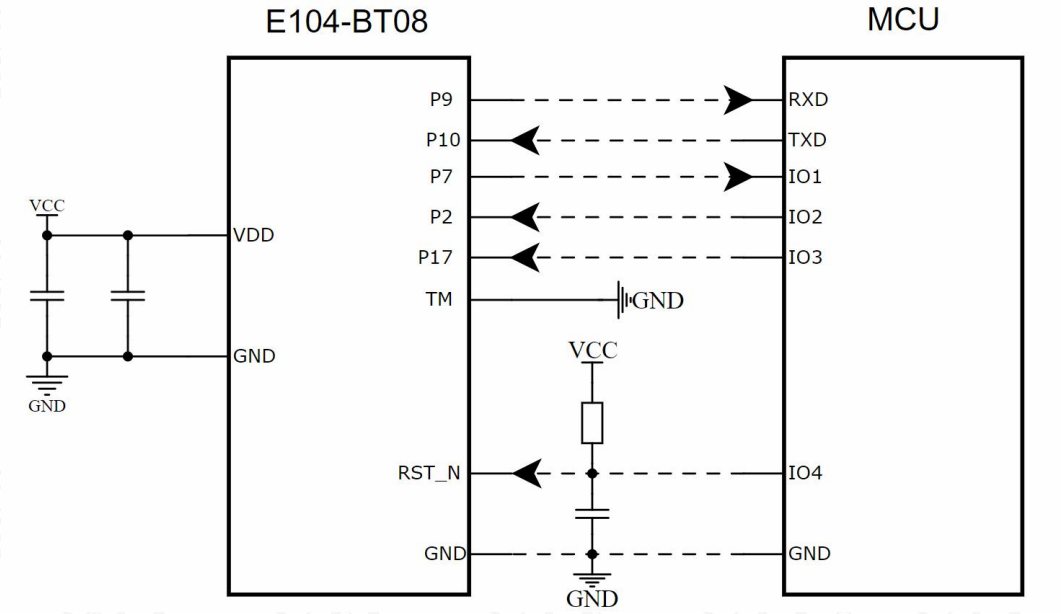


Figure 4-2 E104-BT08 Circuit

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Ⅴ Function Description

5.1 Role Description

The module supports two roles: Master, Slave.

The master supports connecting to other models of our Bluetooth products. The module can connect up to 1 slave when acting as a master. Support transparent transmission broadcast, format transmission. Automatic connection.

The module slave can be connected with other models of our Bluetooth products to support transparent transmission.

5.1.1 Master

1. AT+ROLE=1 to select the master role;
2. The scan function is automatically turned on in master mode;
3. 1 slave can be connected at maximum when it is the master;
4. Print status information when the connection status of the master changes. See Status printing.

5.1.1.1 Host Connection Policy

Conditional Filtering

The device can be configured to filter by bound MAC address and service UUID.

UUID filtering is based on the content filtered by AT+UUUIDSVR configuration, and this filtering over condition cannot be turned off. If MAC address filtering is not enabled, the MAC matches and the service UUID automatically connects to the slave after the service UUID matches.

Users who need MAC address filtering can add MAC addresses to the device through AT+BONDMAC. After the master scans the slave, if it has the same MAC address and service UUID as the binding list, the master automatically connects to the slave device.

Automatic connection

The slave is automatically connected after the condition filter is met.

5.1.2 Slave

1. AT+ROLE=0 to select the slave mode
2. AT+ADV=1 configure normal broadcast mode
3. Broadcast switch configured to be on, power on completion automatically into the broadcast state, otherwise stop broadcast device is not discoverable.

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4. After receiving the host connection request, establish Bluetooth connection to stop Bluetooth broadcasting and enter data transmission mode.
5. Broadcast data configuration see 5.5 Broadcast described.

5.2 Power Mode

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

5.2.1 Low power mode

The low power mode means that the BLE function continues to run after the module enters this mode, turning off the peripherals of the module except the wake-up pins. If lower power consumption is needed, it can be achieved by AT command to turn off broadcast and scan, disconnect all connections, set longer broadcast gap, scan gap and connection gap.

To enter low power consumption:

1. the AT instruction "AT+SLEEP" immediately enters the low-power mode;

After the module enters the low power mode, it outputs "STA: sleep" through the serial port.

Note: In the low-power mode, the serial output is valid and cannot be input.

5.2.2 Wake-up mode

The wake-up mode means that the module is in the normal operating state of the peripherals required by the module in this mode. The module wakes up and outputs the status "STA: wakeup".

Wake-up mode:

1. immediate wake-up via the falling edge of the P2 pin;

5.3 Data transfer mode

The module supports 1 data transmission mode: data transparent transmission.

5.3.1 Data transparent transmission

The so-called data transparent transmission means sending the data received by the serial port, without any processing, to the other device through BLE, and sending the data received by BLE, without any processing, out through the serial port.

Note: When the firmware modules of versions 7452-0-10, 7452-0-11, 7452-1-10 and 7452-1-11 pass through data, the pass through data will end with 0x00. Users should avoid adding the 0x00 correlation number in the pass through data. Firmware versions 7452-0-12, 7452-1-12 and above 7452-0-12, 7452-1-12 will not recognize the pass-through data 0x00 as the data end.

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5.4 MAC address binding

The module supports MAC address binding. If the MAC address binding function is enabled. The device only connects to devices with MAC address added.

5.5 Broadcast

5.5.1 General broadcast information

Broadcast messages include advertising and scan response, advertising is the active broadcast message, scan response is the broadcast message received from the master after scanning request.

Advertising

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

Figure V-4 Broadcast Data Format

The user can only configure the Manufa data field data.

Scan response

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

Figure V-5 Scan Response Data Format Table

Note: This data does not require user configuration.

5.5.2 iBeacon Broadcast Information

1. command to configure broadcast data as iBeacon data
2. command AT+ADV=2 configure to work in iBeacon broadcast mode, broadcast immediately
3. iBeacon broadcast mode does not support Bluetooth connection

Advertising

Fixed	LEN	Fixed	Fixed	Fixed	UUID	Major	Minor	Tx-Power
02 01 06	1A	FF	4C 00	02 15	16B	2B	2B	1B
For example:02 01 06 1A FF 4C 00 02 15 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F 10 33 33 22 22 11								

Figure V-6 ibeacon data format table

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Note: See the AT command table for details.

5.6 Configuration

。The module supports two types of configuration: serial configuration and over-the-air configuration. These two configuration methods are basically the same, the over-the-air configuration must pass the AT+AUTH=123456 authentication password before the module is allowed to use the over-the-air configuration after the authentication is passed. Over-the-air configuration authentication period for this connection, if the device is disconnected and reconnected need to re-authentication.

The module is not connected in configuration mode by default, if the module is connected then you can enter the configuration mode by sending "++++".

5.7 Data Instructions

The module has P7 and P32 pins, where P7 is always on when the slave is connected and goes off when disconnected.P7 is always on when the master is connected and goes off when it is disconnected, depending on the number of connections. P32 is the data pin and will be lit when communicating.

5.8 UUID Instructions

Service UUID	FFF0 (not configurable)		
Eigenvalue	UUID	Properties	Description
SLAVE CHANNEL	FFF1(not configurable)	read / notify	The slave sends the data and the master receives the data channel.
MAST CHANNEL	FFF2(not configurable)	read / write	Host sends data, slave receives data channel
CONFIG CHANNEL	FFF3(not configurable)	write / notify	Air configuration channel

5.9 Status or event printing

The command ATE1 is configured to enable the status information serial port printing function. The status information includes: connected, disconnected, wake-up, and sleep. The format is as follows:

Status	Print information
Connection successful	\r\n STA:connect\r\n
Disconnection	\r\n disconnect \r\n

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System Wakeup	\r\n STA:wakeup\r\n
Sleep mode	\r\n STA:sleep\r\n

Figure V-8 Status Print Table

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VI AT Command

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

6.1 Instruction Description

- All AT commands do not require a carriage return (\r), line feed (\n)
- All AT commands are case-sensitive
- The return result of the AT instruction ends with \r\n (except return HEX)
- Instruction error response format +ERR=[NUM]. (NUM is ACSII)

6.2 Error Code

NUM	Instructions	Reason for error	Solution
1	Length mismatch	Some parameters have length limits	Check parameter length
2	Over range	The parameter exceeds the maximum limit that can be set	Check the maximum and minimum values of the parameters
3	Parameters not found	Incorrect command format or no parameters	Note whether the equal sign is not written
4	This command is not supported	This command is not supported	Not supported
5	Failed to save flash	Failed to save flash	Persistent possible flash exceptions
6	Illegal parameters	Invalid parameter setting value	Please enter the parameters within the range

Figure VI-1 Error Code Table

6.3 Status Printing

Status	Print information	
Connection successful	Slave	\r\n STA:connect \r\n
	Master	\r\n STA:connect \r\n
Disconnection	Slave	\r\nSTA:disconnect\r\n
	Master	\r\nSTA:disconnect\r\n
System Wakeup	\r\nSTA:wakeup\r\n	
Sleep mode	\r\nSTA:sleep\r\n	

Figure VI-2 Status printout table

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6.4 Command table

6.4.1 AT test command

Instruction	Reply
AT	+OK
Description:None	

6.4.2 +++ Enter AT command mode

Instruction	Reply
+++	enter_at_mode
Description: default in AT mode when there is no connection, no response to send this command when there is no connection; if the module is connected, you need to use this command to enter AT mode	

6.4.3 AT+EXIT Exit AT command mode

Instruction	Reply
AT+EXIT	+OK
Description:None	

6.4.4 AT+RESET reset command

Instruction	Reply
AT+RESET	+OK
Description: Effective immediately	

6.4.5 AT+RESTORE Restore factory command

Instruction	Reply
AT+RESTORE	OK
Description: 1、 Automatic restart after the reset; 2、 During the process of restoring factory settings, any form of reset is prohibited, and power off before the	

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operation is completed;

3、 power on if P17 pin is low for three seconds, appear P7 in high, then restore the factory settings, you need to manually restart

6.4.6 AT+BAUD serial port baud rate

Instruction		Reply
Inquiry	AT+BAUD=?	+OK=[para]
Settings	AT+BAUD=[para]	+OK: Success +ERR=[NUM]: Error
Parameters		

para (ASCII)	Baud rate (bps)
0	1200
1	2400
2	4800
3	9600
4	14400
5	19200
6	28800
7	38400
8	57600
9	76800
10	115200 (Default)
11	230400
12	500000
13	1000000

Description	Restart effective
Example	AT+BAUD=10 Set baud rate to 115200

6.4.7 AT+PARI Serial Port Check Bit

Instruction		Reply
Inquiry	AT+PARI=?	+OK=[para]
Settings	AT+PARI=[para]	+OK: Success +ERR=[NUM]: Error

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Parameters	<table><tr><th>para(ASCII)</th><th>Description</th></tr><tr><td>0</td><td>No test (default)</td></tr><tr><td>1</td><td>Odd calibration</td></tr><tr><td>2</td><td>Even Check</td></tr></table>
Description	Reboot to take effect, power down to save
Example	AT+PARI=0

6.4.8 AT+ROLE Bluetooth role

Instruction		Reply
Inquiry	AT+ROLE=?	+OK=[para]
Settings	AT+ROLE =[para]	+OK：Success +ERR=[NUM]：Error
Parameters	<table><tr><th>Para(ASCII)</th><th>Description</th></tr><tr><td>0</td><td>Slave (default)</td></tr><tr><td>1</td><td>Master</td></tr></table>	
Description	Reboot to take effect, power down to save	

6.4.9 AT+ADV Broadcast Enable

Instruction		Reply
Inquiry	AT+ADV=?	+OK=[para]
Settings	AT+ADV=[para]	+OK：Success +ERR=[NUM]：Error
Parameters	<table><tr><th>para（ASCII）</th><th>Description</th></tr><tr><td>0</td><td>T Turn off broadcasting</td></tr><tr><td>1</td><td>General broadcast (default)</td></tr><tr><td>2</td><td>iBeacon Broadcast</td></tr></table>	
Description	1、 effective immediately (if broadcast is not turned on, or connected, it will take effect next time), power down and save;	
	2、 iBeacon broadcast needs to set broadcast data format	

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6.4.10 AT+ADVDAT Broadcast data

Instruction		Reply
Inquiry	AT+ADVDAT=?	+OK=[para]
Settings	Use HEX: 41 54 2B 41 44 56 44 41 54 3D (length and data)	+OK: Success +ERR=[NUM]: Error
Parameters	para(HEX): 1、Support HEX 2、Length not more than 28 bytes	
Description	1、 Reboot takes effect. Power down to save; 2、 The slave supports broadcasting, other roles can still be configured. 3、 Broadcast data need to fill in the appropriate format content!	
Example	Common broadcast format: leagth (summed after) FF (manufacturer code) (manufacturer code) +MAX (max 26) If HEX input:41 54 2B 41 44 56 44 41 54 3D (AT+ADVDAT=) 1B (length) FF 01 02 (manufacturer custom data as well as manufacturer ID) 03 04 05 06 07 08 09 10 01 02 03 04 05 06 07 08 09 10 01 02 03 04 05 06 (data) Ibeacon broadcast format: leagth (fixed 1A) FF 4c 00 (Apple logo) 02 15 (fixed) +UUUID (16 bytes) + major (two bytes) minor (two bytes) power (1 byte) If HEX input:41 54 2B 41 44 56 44 41 54 3D (AT+ADVDAT=) 1A (length) FF (fixed) 4C 00 (fixed) 02 15 (fixed) 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F 10 (16 bytes UUID) 33 33 (major) 22 22 (minor) 11 (power)	

6.4.11 AT+ADVINTV Broadcast Break

Instruction		Reply
Inquiry	AT+ADVINTV=?	+OK=[para]
Settings	AT+ADVINTV=[para]	+OK: Success +ERR=[NUM]: Error
Parameters	para(ASCII):32~16385 Default: 32 (20ms)	
Description	1、 Restart effective, power down save 2、 broadcast support for slaves, other roles still configurable;	
Example	AT+ADVINTV=32	

6.4.12 AT+NAME Broadcast equipment name

Instruction		Reply
Inquiry	AT+NAME=?	+OK=[para]
Settings	AT+NAME=[para]	+OK: Success

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		+ERR=[NUM]: Error
Parameters	para(HEX):Broadcast device name. Broadcast name is not larger than 25 bytes	
Description	1、 reboot to take effect, power down to save; 2、 supported only by the slave, other roles can still be configured;	

6.4.13 AT+CONPARAMS Connection Configuration

Instruction		Reply
Inquiry	AT+CONPARAMS=?	+OK=[para],[para],[para]
Settings	AT+CONPARAMS =[para],[para],[para]	+OK: Success +ERR=[NUM]: Error
Parameters	[para1] (ASCII) : connection gap, value range, 6~3200; [para2] (ASCII) : Slave device delay, value range, 0~499; [para3] (ASCII) : parameter exception, value range, 10~3200; Default value:	
Description	Reboot takes effect, power down saves.	
Note	1、 the connection timeout must be greater than the connection gap; 2、 Wrong parameter device will not receive save. 3、 It is not recommended to modify the host connection gap. 4、 Para3*4 > (1 + para2)* para1;	
Example	AT+CONINTV=40,0,200(default)	

6.4.14 AT+DISCON Disconnect command

Instruction		Reply
Inquiry	AT+DISCON=[para]	+OK: Success +ERR=[NUM]: Error
Parameters	para(ASCII): 0 — Description: Disconnect the specified connection	
Note	1、Effective immediately.	

6.4.15 AT+MAC Local MAC address

Instruction		Reply
Inquiry	AT+MAC=?	+OK=[para]
Parameters	para (ASCLL) :MAC address Example: F0E1D2C3B4A5	

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Description	Reboot to take effect, power down to save
Example	Instruction:AT+MAC=010203040506 Return:MAC:010203040506\r\n Explanation: The local MAC address is 06 05 04 03 02 01

6.4.16 AT+BONDMAC Add binding MAC address

Instruction		Reply
Inquiry	AT+BONDMAC=?	+OK=[mac] [mac]
Settings	AT+BONDMAC=[mac]	+OK Success +ERR=[NUM]: Error
Parameters	mac(ASCLL): 6bytes of mac address.	
Description	1、Reboot to take effect, power down to save	
Example	Query: AT+BONDMAC=? Return: MAC:010203040506\r\n Write: AT+BONDMAC=010203040506 Return: +OK\r\n Note: Since the endianness may be different for different modules, adding the binding MAC address AT+BONDMAC=010203040506 May actually be AT+BANDMAC=060504030201	

6.4.17 AT+MTU Set MTU

Instruction		Reply
Inquiry	AT+MTU=?	MTU:%d\r\n
Settings	AT+MTU=[para]	+OK Success +ERR=[NUM]: Error
Parameters	Range:23-247	
Description	1、 Reboot to take effect, power down to save.	

6.4.18 AT+SCANWND Scan Window

Instruction		Reply
Inquiry	AT+SCANWND=?	+OK=[para]
Settings	AT+SCANWND=[para]	+OK: Success +ERR=[NUM]: Error
Parameters	para(ASCII): 40~9999 Default: 1000;	
Description	1、Effective immediately, power down and save.	

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	3、Slave is not supported, but still can be set
Example	AT+SCANWND=20 The scan window is:20*1 = 20ms

6.4.19 AT+UUIDSVR Bluetooth Service UUID

V1.0, V1.1 firmware version instructions:

Instruction		Reply
Inquiry	AT+UUIDSVR=?	+OK=[para]
Settings	AT+UUIDSVR=[para]	+OK: Success +ERR=[NUM]: Error
Parameters	para(HEX):0-FFFF Default: FFF0 Note: Due to Bluetooth protocol restrictions, some UUids cannot be configured. The following parameters cannot be configured in the range of F000 to FFFF, and the rest range is not provided for now: F100, F200, F300, F400, F500, F600, F700, F800, F900, FA00, FB00, FBF0, FC00, FD00, FE00, FF00	
Description	1.Reboot takes effect. Power down to save. 2.For the host, the service UUID is a necessary condition for connection filtering, so be sure to keep the same with the slave when setting the host service UUID, otherwise the connection cannot be established. 3. This parameter only modifies the UUID parameter used in connection, its filtering effect, and does not modify the real service UUID	

Firmware version V1.2 and above:

Instruction		Reply
Inquiry	AT+UUIDSVR=?	+OK=[para]
Settings	AT+UUIDSVR=[para1],[para2]	+OK: Success +ERR=[NUM]: Error
Parameters	para1:0 indicates 16 bits, 1 indicates 128 bits, and the default value is 0 para2: UUID. The default value is FFF0 Note: Due to Bluetooth protocol restrictions, some UUids cannot be configured. The following parameters cannot be configured in the range of F000 to FFFF, and the rest range is not provided for now: F100, F200, F300, F400, F500, F600, F700, F800, F900, FA00, FB00, FBF0, FC00, FD00, FE00, FF00	
Description	1. Restart to take effect. Save after power failure. 2. The service UUID of the host is a prerequisite for connection filtering. Therefore, ensure that the service UUID of the host is the same as that of the slave host. 3. If the para1 is 0, the para1 of AT+UUID_READ and AT+UUID_WRITE must also be set to 0. If the para1 is 1, the para1 of AT+UUID_READ and AT+UUID_WRITE must also be set to 1.	

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6.4.20 AT+UUID_READ UUID of the Bluetooth read channel

Instruction		Reply
Inquiry	AT+UUID_READ=?	+OK=[para]
Settings	AT+UUID_READ=[para1],[para2]	+OK：Success +ERR=[NUM]：Error
Parameters	para1:0 indicates 16 bits, 1 indicates 128 bits, and the default value is 0 para2: UUID. The default value is FFF1	
Description	1. Restart to take effect. Save after power failure. 2. If the para1 is 0, the para1 of AT+UUIDSVR and AT+UUID_WRITE must also be set to 0. If the para1 is 1, the para1 of AT+UUIDSVR and AT+UUID_WRITE must also be set to 1.	

6.4.21 AT+UUID_WRITE UUID of the Bluetooth write channel

Instruction		Reply
Inquiry	AT+UUID_WRITE=?	+OK=[para]
Settings	AT+UUID_WRITE=[para1],[para2]	+OK：Success +ERR=[NUM]：Error
Parameters	para1:0 indicates 16 bits, 1 indicates 128 bits, and the default value is 0 para2: UUID. The default value is FFF2	
Description	1. Restart to take effect. Save after power failure. 2. If the para1 is 0, the para1 of AT+UUIDSVR and AT+UUID_READ must also be set to 0. If the para1 is 1, the para1 of AT+UUIDSVR and AT+UUID_READ must also be set to 1.	

6.4.22 AT+AUTH On-air configuration of authentication passwords

Instruction		Reply
Settings	AT+AUTH =[para]	+OK：Success +ERR=[NUM]：Error
Parameters	para(ASCLL)：6 Byte Password	
Description	1、 This command is only used for over-the-air authentication. 2、 Default password: 123456	
Example	AT+AUTH=123456	

6.4.23 AT+UPAUTH Change over-the-air authentication password

Instruction		Reply
Inquiry	AT+UPAUTH=?	+OK=[para]
Settings	AT+UPAUTH =[para]	+OK：Success

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		+ERR=[NUM]: Error
Parameters	para(ASCLL): 6 Byte Password	
Description	Effective immediately, power down and save.	

6.4.24 AT+SLEEP Go to sleep command immediately

Instruction		Reply
Settings	AT+SLEEP=[para]	+OK
Parameters	0: normal sleep mode 1: indicates the off mode	
Description	1. It takes effect immediately. 2. Wake up requires a low level for pin P2 3. After the command is written into the off mode, wait 1 second for the sleep to begin 4. Common broadcast hibernation is related to the broadcast gap and reaches the lowest level after the broadcast is turned off 5.The sleep mode supports the receiving of air data. To send data over the serial port, wake up and send the data	

6.4.25 ATE Operational status output

Instruction		Reply
Settings	ATE0	+OK: Success +ERR=[NUM]: Error
	ATE1	+OK: Description +ERR=[NUM]: Error
Parameters		
Description	Effective immediately, power down and save.	

para (ASCII)	Description
0	Close
1	Enabled (default)

6.4.26 AT+PWR Transmitting power

Instruction		Reply
Inquiry	AT+PWR=?	+OK=[para]
Settings	AT+PWR =[para]	+OK: Success +ERR=[NUM]: Error
Parameters		

para(ASCII)	val
0	8 dBm (Defualt)
1	0 dBm

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	2	-5 dBm
	3	-20 dBm
Description	Reboot to take effect, power down to save	

6.4.27 AT+VER Check software version number

Instruction		Reply
Inquiry	AT+VER	+OK=[para]
Settings	/	/
Parameters	Para: Current software version number	
Description	1、 Only support query function	
Example	Send: AT+VER Return: 7452-x-xx	

6.4.28 AT+BOND Bind MAC Enable

Instruction		Reply
Inquiry	AT+BOND=?	+OK=[para]
Settings	AT+BOND =[para]	+OK: Success +ERR=[NUM]: Error
Parameters	para(ASCII)	val
	0	Close
	1	Enable
Description	Reboot to take effect, power down to save	

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Ⅶ Quick Use

Recommended software for debugging/testing:

- PC-side serial port tool - XCOM.exe.
- Mobile side ble debugging APP - nRF connect.

7.1 Configuration Mode Quick Guide

7.1.1 Serial port configuration

- confirm whether the module is currently in configuration mode (if not connected, the module can be configured, if it is connected, the serial port needs to send "++++")
- set the XCOM serial-related configuration (default configuration: 115200, 8, 1, none, no stream empty), as shown in Figure VII 1 XCOM parameters configuration diagram;

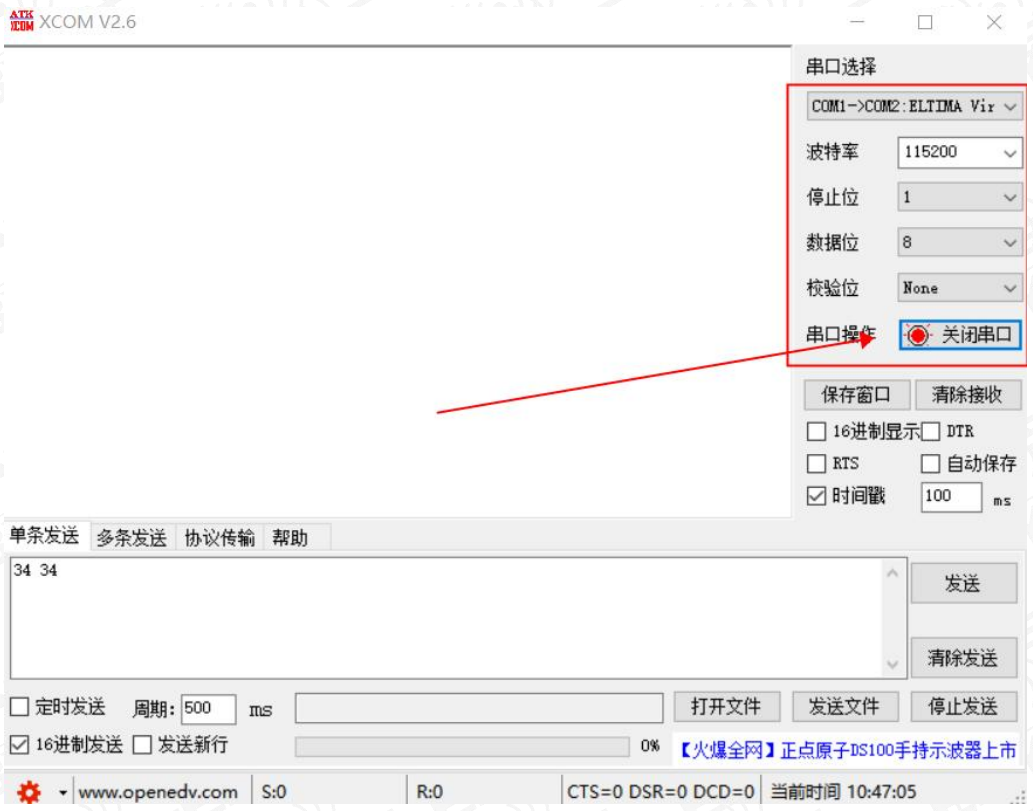


Figure 7 XCOM parameter configuration chart

- Configure the module according to the commands shown in the at command table

7.1.2 Air configuration

- Over-the-air configuration is available only when the module is a slave

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- open the app "nRF connect", start scanning the device and find the "E104-BT07" connection module;



Figure VII 2 nRF connect scan list chart

- Turn on the service of uuid this fff0 and enable the configuration channel notiy.

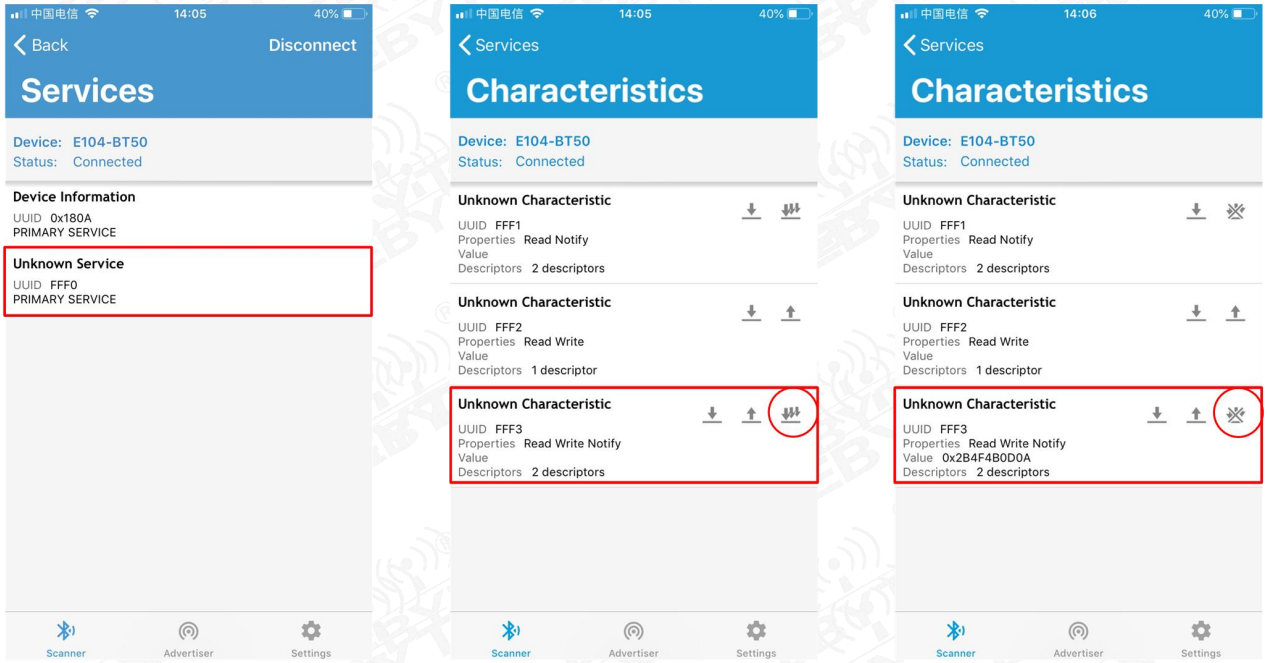


Figure VII 3 nRF connect connection, enable notification

- Send the authentication instruction (at+auth=123456) AT an interval of 50ms, and send the test instruction (AT) again. If the module returns "0x2befeb0d0a", the authentication is successful;

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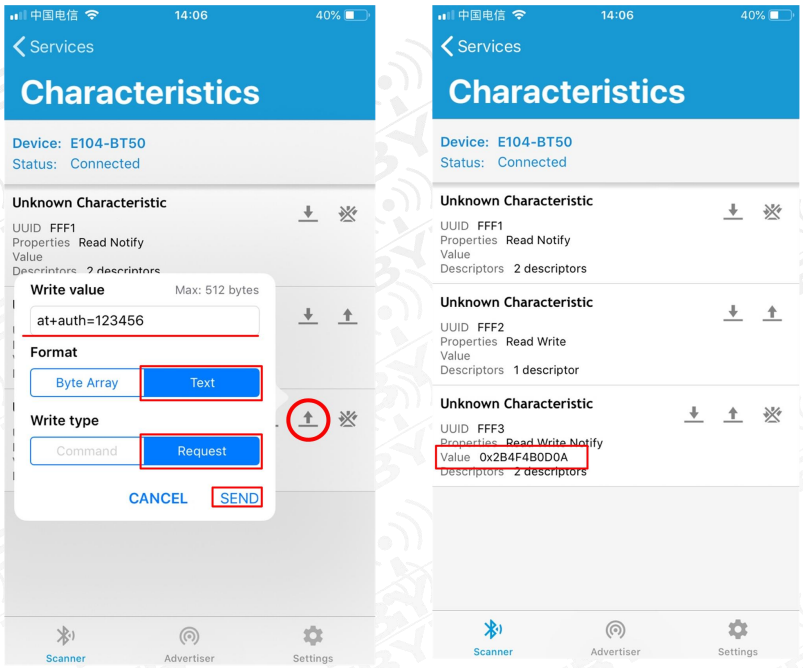


Figure VII 4 Air Configuration Certification Chart

- Configure the module according to the instructions shown in the 6.4 instruction table;

7.2 Data Transmission

See 5.3 Data Transmission Modes for descriptions related to data transmission.

Test conditions:

- Configure one module as a master and one module as a slave as described in the AT Command Table Configuration Mode Quick Use Guide;
- Test software: XCOM.
- Other parameters are configured by default.

7.2.1 Transparent data transmission

1. The module is powered on. Master-slave enable return (ATE1);
2. Modify 1 module to host (enter AT+ROLE=1) and reboot (enter AT+RESET)
3. Print "\r\n STA:connect:%d\r\n" after successful connection of the master; print \r\n STA:connect\r\n" for the slave. the LINK pin is high. as shown in Figure 7 5 Master power-on auto-connect printout, and Figure 7 6 Slave power-on auto-connect printout diagram shown.

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图表 七- 5 主机上电自动连接打印图



Figure VII 6 Slave power-up auto-connect print chart

4. The host sends data "0123456789" to the slave, and the slave receives data "0123456789" (as shown in Figure VII 7 Host data transmission diagram);
5. The slave sends the data "abcdefghijk" to the host, and the host receives the data "abcdefghijk" (as shown in Figure VII.7 Host data transmission diagram);

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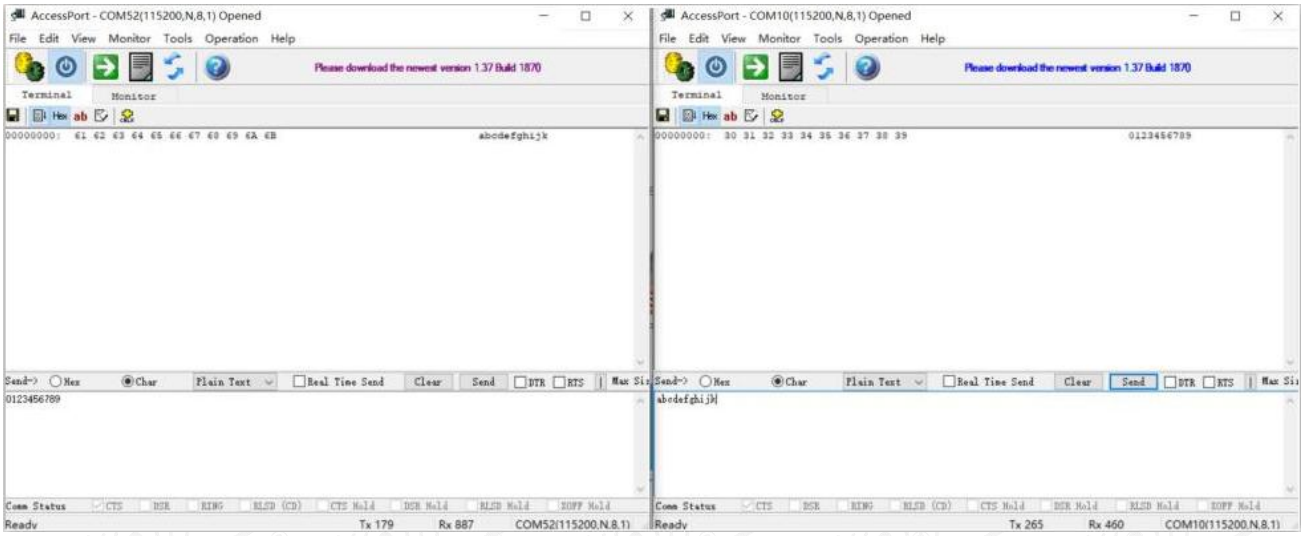


Figure VII 7 Host Data Transparency Chart

Ⅷ Frequently Asked Questions

8.1 Unsatisfactory transmission distance

- when there is a linear communication barrier, the communication distance will be attenuated accordingly;
- temperature, humidity, and co-channel interference, which can lead to higher communication packet loss rates;
- absorption and reflection of radio waves by the ground, and poorer test results close to the ground;
- sea water has a very strong ability to absorb radio waves, so the seaside test effect is poor;
- antenna near a metal object, or placed in a metal shell, the signal attenuation will be very serious;
- wrong setting of power register, too high setting of air rate (the higher the air rate, the closer the distance);
- low voltage of power supply at room temperature is lower than the recommended value, the lower the voltage the less power is generated;
- Use antenna and module match poorly or the antenna itself quality problems.

8.2 Module is vulnerable to damage

- Please check the power supply to ensure that it is between the recommended supply voltages, as exceeding the maximum can cause permanent damage to the module;
- please check the power supply stability, the voltage should not fluctuate significantly and frequently;
- please ensure that the installation and use process anti-static operation, high frequency devices electrostatic sensitivity;
- Please ensure that the installation and use process should not be too high humidity, some components are humidity-sensitive devices;
- If there is no special demand is not recommended to use in too high, too low temperature.

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8.3 BER is too high

- nearby interference with the same frequency signal, away from the source of interference or modify the frequency, channel to avoid interference;
- unsatisfactory power supply may also cause garbled code, be sure to ensure the reliability of the power supply;
- Poor quality or too long extension cable or feeder line may also cause high BER.

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Ⅸ Welding work instruction

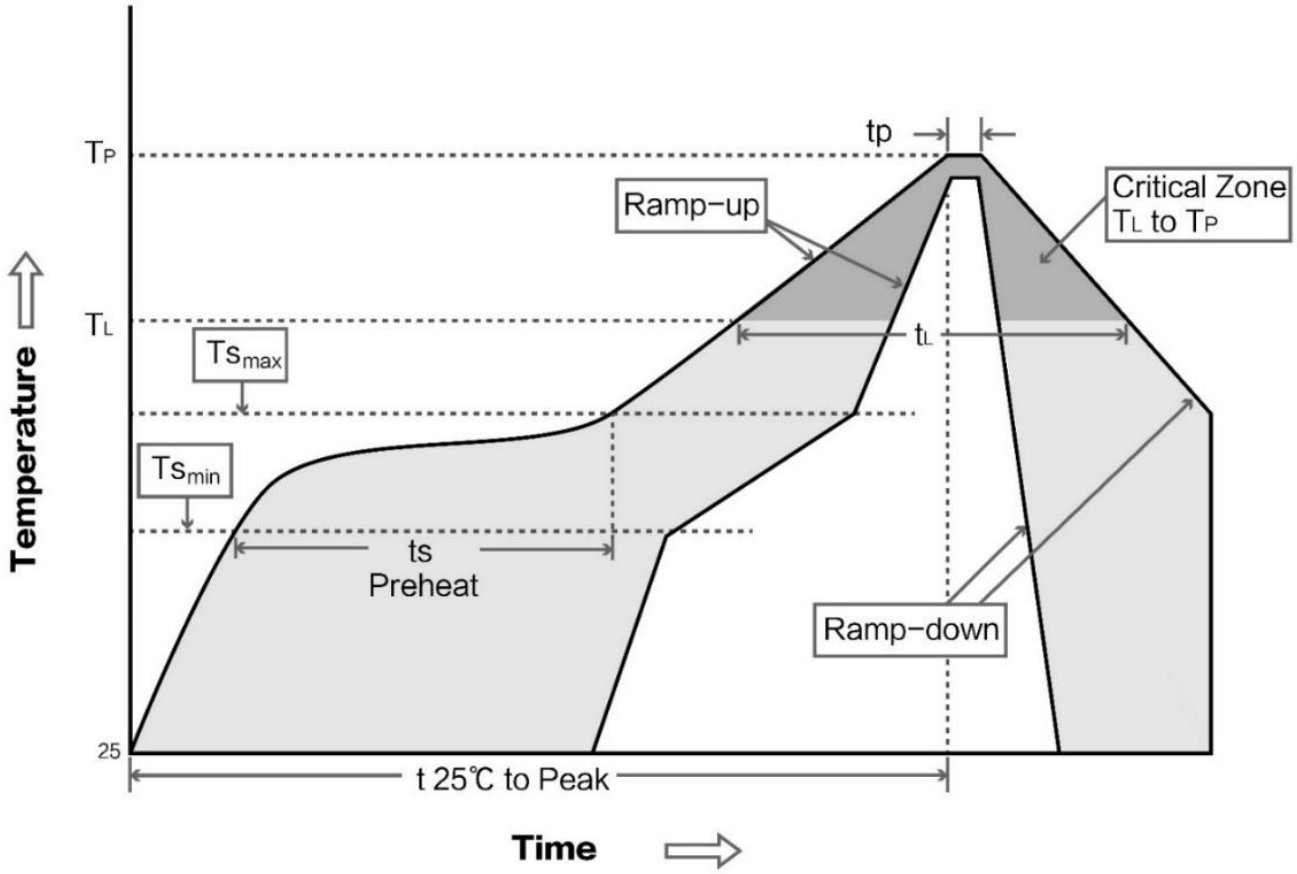
9.1 Reflow Temperature

Profile Feature	Curve characteristics	Sn-Pb Assembly	Pb-Free Assembly
Solder Paste	Solder Paste	Sn63/Pb37	Sn96.5/Ag3/Cu0.5
Preheat Temperature min （Tsmin）	Minimum preheating temperature	100℃	150℃
Preheat temperature max (Tsmax)	Maximum preheating temperature	150℃	200℃
Preheat Time (Tsmin to Tsmax)(ts)	Preheat time	60-120 sec	60-120 sec
Average ramp-up rate(Tsmax to Tp)	Average rise rate	3℃/second max	3℃/second max
Liquidous Temperature (TL)	Liquid phase temperature	183℃	217℃
Time（tL）Maintained Above（TL）	Time above the liquid phase line	60-90 sec	30-90 sec
Peak temperature（Tp）	Peak temperature	220-235℃	230-250℃
Aveage ramp-down rate（Tp to Tsmax）	Average drop rate	6℃/second max	6℃/second max
Time 25℃ to peak temperature	Time from 25° C to peak temperature	6 minutes max	8 minutes max

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9.2 Reflow Profile



X Related Models

Product Model	Chip	Frequency Hz	Emission Powerd Bm	Communication Interface	Support protocol BLE	Product size mm	Antenna	Features
E72-2G4M05S1B	CC2640	2.4G	5	I/O	4.2	17.5*28.7	PCB/IPX	Hardware Resources Secondary Development
E73-2G4M04S1A	nRF52810	2.4G	4	I/O	4.2/5.0	17.5*28.7	PCB/IPX	Hardware Resources Secondary Development
E73-2G4M04S1B	nRF52832	2.4G	4	I/O	4.2/5.0	17.5*28.7	PCB/IPX	Hardware Resources Secondary

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								Development
E73-2G4M08S1C	nRF52840	2.4G	8	I/O	4.2/5.0	13*18	Ceramic antenna	Hardware Resources Secondary Development
E73-2G4M04S1D	nRF51822	2.4G	4	I/O	4.2	17.5*28.7	PCB/IPX	Hardware Resources Secondary Development
E104-BT01	CC2541	2.4G	0	I/O	4.0	14*22	PCB	Hardware Resources Secondary Development
E104-BT02	DA14580	2.4G	0	TTL	4.2	14*22	PCB	Industry's Lowest Power Consumption High-speed 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	Revision Date	Revision Notes	Maintaining people
1.0	2023-06-30	Initial Version	Bin
1.1	2023-09-06	error corrected	Bin
1.2	2023-09-21	error corrected	Bin
1.3	2023-11-13	error corrected	Bin
1.4	2023-11-28	error corrected	Bin
1.5	2023-11-29	error corrected	Bin
1.6	2023-12-28	error corrected	Bin
1.7	2024-03-01	Content revision	Bin
1.8	2024-03-29	Content revision	Bin
1.9	2024-04-01	Content revision	Bin
2.0	2024-07-01	Content revision	Bin
2.1	2024-07-12	Content revision	Bin
2.2	2024-07-24	Content revision	Bin
2.3	2026-10-08	Content revision	Chi

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