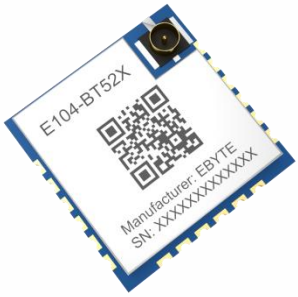
User Manual
E104-BT52 BLE Module Series

DA14531 /DA14535

BLE5.0 /BLE5.3





成都亿佰特电子科技有限公司
Chengdu Ebyte Electronic Technology Co.,Ltd.

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1. Overview

1.1 Introduction

The E104-BT52 series modules, developed by Chengdu Ebit Electronic Technology Co., Ltd. based on the dialog DA1453X chip, support Bluetooth host, slave, master-slave, and observer modes. They use standard AT commands for parameter configuration, making operation simple and fast. They also support low-power broadcasting, transparent data transmission, and over-the-air configuration. They are widely used in smart wearables, home automation, home security, personal healthcare, smart appliances, accessories and remote controls, automotive, lighting, the Industrial Internet, intelligent data acquisition, and intelligent control.

E104-BT52	E104-BT52X	E104-BT52PX	E104-BT52-V5.3	E104-BT52X-V5.3
				

1.2 Features

- Support Bluetooth BLE protocol;
- Support Bluetooth MTU adjustable;
- Support multiple working modes;
- Support automatic broadcasting and automatic connection upon startup ;
- Support IBeacon and normal broadcast switching ;
- Support serial port wake-up (only supported by low-power version) ;
- Support MAC binding connection, the maximum number of binding is 3 devices ;
- Support serial port transparency and format transmission ;
- Support custom 16-bit UUID and 128-bit UUID ;
- Support PCB onboard antenna or IPEX-3 antenna ;
- Support Bluetooth parameter air configuration function ;
- Support ultra-low power sleep;
- Supports multiple masters and multiple slaves, with a maximum of 2 slaves connected;
- Supports transmission power modification.

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1.3 Application Scenario

- Wireless meter reading and wireless sensing;
- Smart home;
- Industrial remote control and telemetry;
- Smart buildings and intelligent architecture ;
- Automated data collection;
- health sensors;
- Smart wearable devices;
- Intelligent robots;
- Wireless sensing;
- Electronic tags;
- Intelligent control;

2 Specifications

2.1 Limit parameters

Table 2-1 Limit parameter table

Main parameters	performance		Remark
	Minimum	Maximum	
Power supply voltage (V)	0	3.6	If the voltage exceeds 3.6V, there is a risk of permanently burning the module.
Blocking power (dBm)	-	10	-
Operating temperature (°C)	-40	+85	Industrial grade

2.2 Working parameters

Table 2-2 Working parameter table

Main parameters	model					Remark
	E104-BT52	E104-BT52X	E104-BT52PX	E104-BT52-V5.3	E104-BT52X-V5.3	
Operating voltage (V)	2.1～3.6 V	2.1～3.6 V	2.1～3.6 V	1.8～3.6 V	1.8～3.6 V	≥3.3V can guarantee output power
Communication level (V)	3.3V					-
Operating temperature	-40 ～ +85℃					Industrial grade

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(℃)						
Operating frequency band (MHz)	2402 ～ 2480MHz					ISM band
Working current (uA/mA)	689uA	689uA	170 mA	770uA	770uA	Connection Status
Sleep current (uA)	2uA	2uA	-	2uA	2uA	
Transmit power (dBm)	-19.5～2.5dBm	-19.5～2.5dBm	20dBm	-18～4dBm	-18～4dBm	Adjustable instructions
Receive sensitivity (dBm)	-94dBm	-94dBm	-97dBm	-94dBm	-94dBm	PHY@1Mbps
Reference distance (m)	90m @2.5dBm	130m @2.5dBm	500m @20dBm	180m @4dBm	250m @4dBm	Clear and open environment, antenna height 2 meters, PHY@1Mbps.
Sleep broadcast current (uA)	10uA	10uA	Not supported	12uA	12uA	The default broadcast interval is 1S
Sleep connection current (uA)	466uA	466uA	Not supported	578uA	578uA	The default broadcast interval is 1S
Wake-up broadcast current (uA)	381uA	381uA	Not supported	320uA	320uA	The default broadcast interval is 1S
Sleep current without broadcast (default)	2uA	2uA	Not supported	2uA	2uA	The default connection interval is 500ms

2.3 Hardware Parameters

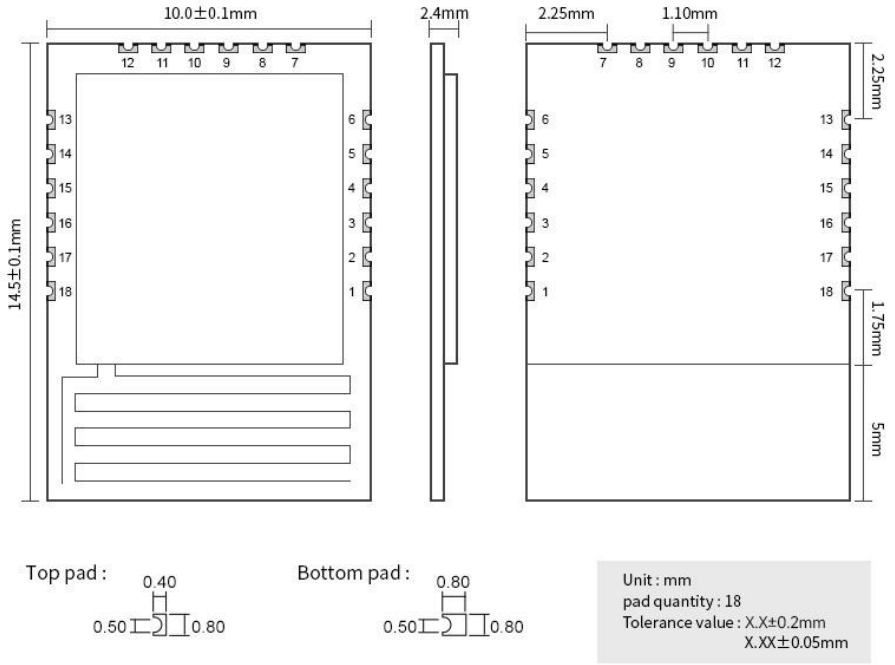
Main parameters	**model**					**Remark**
	E104-BT52	**E104-BT52X**	**E104-BT52PX**	**E104-BT52-V5.3**	**E104-BT52X-V5.3**	
Chip Solutions	DA14531	DA14531	DA14531	DA14535	DA14535	-
Bluetooth protocol	BLE5.0	BLE5.0	BLE5.0	BLE5.3	BLE5.3	-
Communication interface	UART serial port	UART serial port	UART serial port	UART serial port	UART serial port	-
MTU	247 bytes	247 bytes	247 bytes	247 bytes	247 bytes	-
Packaging	SMD	SMD	SMD	SMD	SMD	-
Dimensions	14.5*10mm	10*10mm	16*10mm	14.5*10mm	10*10mm	Error ±0.2mm
RF interface	PCB onboard antenna	IPEX-3 Antenna	IPEX-3 Antenna	PCB onboard antenna	IPEX-3 Antenna	Equivalent impedance is about 50Ω
weight	1.2g	0.4g	0.7g	1.2g	0.4g	Error ±0.1g

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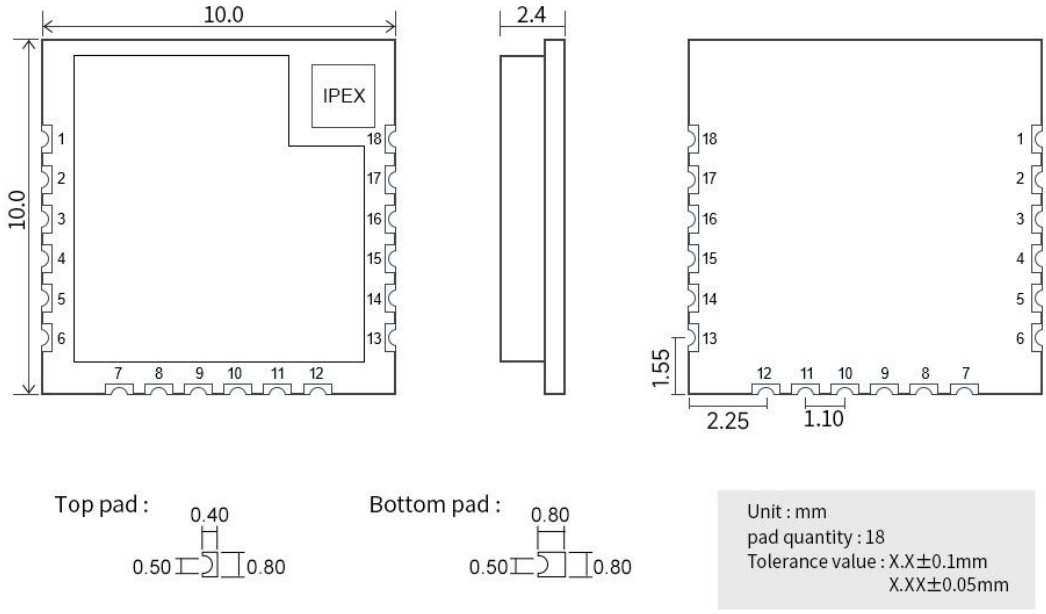
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3 Mechanical dimensions and pin definitions

E104-BT52&E104-BT52-V5.3



E104-BT52X&E104-BT52X-V5.3



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E104-BT52PX

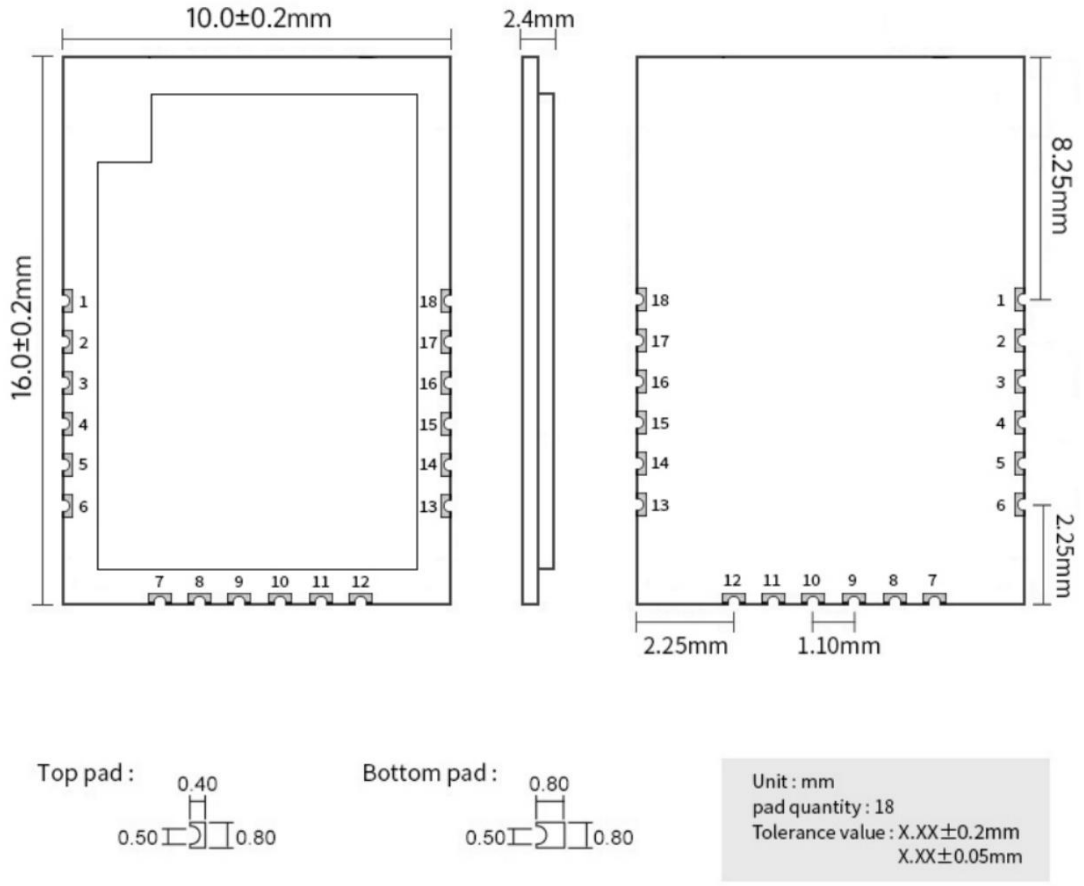


Figure 3-1 Mechanical dimensions and pin definitions

Table 3 Pin Definition Table

Serial number	Pin Name	Pin direction	Pin Function	illustrate
1	GND	Input	Power ground	
2	VL-	--	Low voltage power supply pin	Low voltage power supply pin, users do not need to worry about
3	VCC	Input	Power positive	Power supply positive (short connected to pin 4 "VH+" when in use)
4	VH+	Input	Power positive	Power supply positive (short connected to pin 3 "VCC" when in use)
5	GND	Input	Power ground	
6	GND	Input	Power ground	
7	RST	Input	Reset pin	Low level reset (takes about 500ms to take effect)
8	DIO1	Input	SWDIO	SWDIO, JTAG interface, users do not need to care
9	NC	--	NC	Users don't need to care
10	CLK	Input	SWCLK	SWCLK, JTAG interface, users do not need to care

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11	NC	--	NC	Users don't need to care
12	GND	Input	Power ground	Power ground
13	WKP	Input	Wake-up pin	Wake up: falling edge; Sleep: rising edge.
14	TXD	Output	Serial Port	Serial port output
15	RXD	Input	Serial Port	Serial port input
16	LINK	Output	Connection Status	Bluetooth connection: High level Bluetooth no connection: low level Note:The E104-BT52/E104-BT52X does not have an output in the low-power mode.
17	DATA	Output	data	Data indication pin (not supported by E104-BT52PX) Note: Receiving Bluetooth data: When there is Bluetooth data in the air, the DATA pin will be pulled high when it is sent out through the module's TXD pin. After a frame of data is sent, the pin will be pulled low again. Send Bluetooth data: The DATA pin buffers the BUFF with a size of 1024 bytes after receiving data at the module's RXD pin. As long as there is data in the BUFF that has not been sent out via Bluetooth, the DATA pin will be pulled high and will not be pulled low again until the data in the BUFF is sent. When sending data, the user can frame the data as described above.
18	GND	Input	Power ground	Power ground

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4 Basic Applications

4.1 Recommended circuit

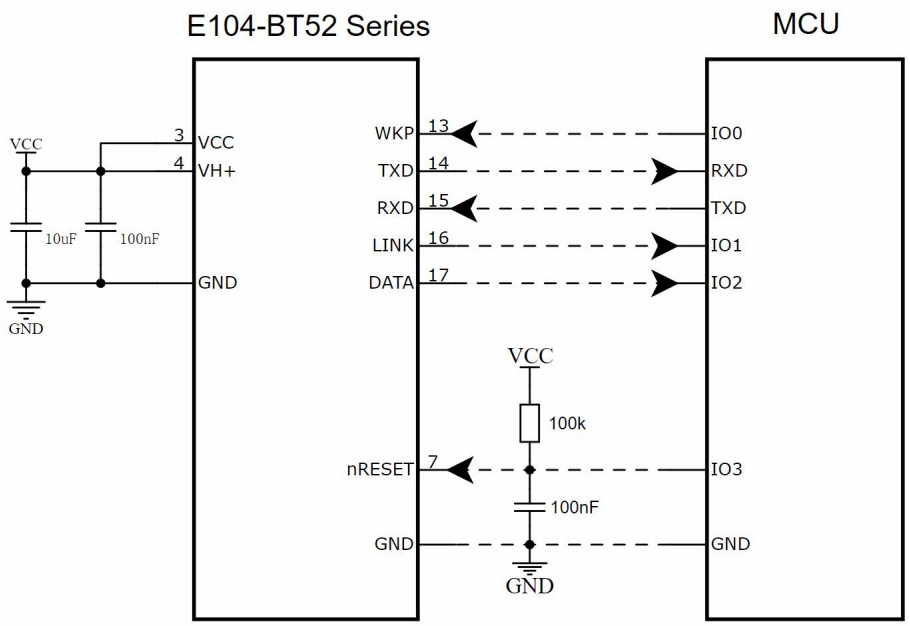


Figure 4-1 Recommended circuit

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5 Function Description

5.1 Role Description

The module supports four roles: master, slave, observer, and master-slave combination.

The host supports connecting to other Bluetooth products from our company. When acting as a host, the module can connect to up to two slaves; when acting as a slave, it can be connected to up to two hosts; when acting as a master-slave, the module can simultaneously connect to one slave and one host. It supports transparent broadcasting and format transmission. It also supports automatic connection.

This module slave can connect with other models of Bluetooth products of our company and support transparent transmission.

The observer is only used to print the broadcast information of BLE devices around the module and cannot be connected.

5.1.1 Host

1. AT+ROLE=1 selects the host role;
2. Command AT+SCAN=1 turns on the host scanning function;
3. Supports multi-master and multi-slave connection. A maximum of 2 slaves can be connected.
4. Prints status information when the host connection status changes. See Status Printing .

5.1.1.1 Host Connection Strategy

Conditional filtering

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

UUID filtering is based on the content filtering configured by AT+UUIDSVR . This filtering condition cannot be turned off. If MAC address filtering is not enabled, the slave will be automatically connected after the MAC address and service UUID match.

If the user needs MAC address filtering, add the MAC address to the device through AT+BONDMAC. After the host scans the slave, if the MAC address and service UUID are the same as those in the binding list, the host automatically connects to the slave device.

Automatic connection

Automatically connect to the slave after the filtering conditions are met .

5.1.2 Slave

1. AT+ROLE=0 selects slave mode
2. AT+ADV=1 configures normal broadcast mode
3. The broadcast switch is configured to be on, and the device automatically enters the broadcast state after power-on. Otherwise, the broadcast state is stopped and the device cannot be discovered.
4. After receiving the host connection request, establish a Bluetooth connection, stop Bluetooth broadcasting, and enter data

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transmission mode.

5. For broadcast data configuration, see 5.5 Broadcast .

5.1.3 Observer

1. Command AT+ROLE=2 to select observation mode (restart to take effect)
2. After receiving the broadcast, the entire content of the broadcast packet will be printed out through the serial port.
3. Observer devices cannot connect to any devices.

The format is as follows:

LEN	MAC	RSSI	Advdata
1 byte	6 bytes	1 byte	No more than 31 bytes

Figure 5.2 - Observer data output format

Note: LEN is the sum of LEN, M AC, RSSI, and broadcast data length.

4. The scanning window and scanning interval are consistent with the scanning parameters.
5. During this period, AT commands are valid.

5.2 Power Mode

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

Note: E104-BT52PX does not support low power mode.

5.2.1 Low power mode

Low-power mode means that after the module enters this mode, the BLE function continues to run, but the module's peripherals except the wake-up pin are turned off. To achieve lower power consumption, you can use AT commands to disable advertising and scanning, disconnect all connections, and set longer advertising intervals, scanning intervals, and connection intervals.

Entering low power:

1. The AT command "AT+SLEEP" immediately enters low power mode;
2. The AT command "AT+ONSLEEP=1" enters low power consumption immediately after power on;
3. Enter low power consumption through the rising edge of pin WKP;

After the module enters low power mode, it outputs "STA: sleep" through the serial port (LOGMSG output is not closed).

Note: In low power mode, serial port output is valid but input is disabled. E104-BT52PX does not support low power mode.

5.2.2 Wake-up mode

The so-called wake-up mode means that the module's peripherals are in normal working state in this mode. After the module wakes up, the output status is "STA: wakeup".

Wake-up method:

1. Wake up immediately through the falling edge of the WKP pin;
2. The serial port RX pin wakes up. The serial port RX pin falls and the low level remains for 50us or more, which will immediately wake up the system.

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5.3 Data transmission mode

The module supports two data transmission modes: data transparent transmission and format transmission.

5.3.1 Data transparent transmission

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

“AT+TRANMD” command setting.

5.3.2 Format Transfer

The so-called format transmission means that the data sent to the module through the serial port and the data transmitted by the module through the serial port must conform to the defined format transmission method before they can be transmitted.

The serial port sends "AT+TRANMD=0" to the device to switch the device to format transmission. The data format is as follows

Slave number	Valid data
1 byte	Max:243 bytes
0~1	

Figure 5 - 3 Format transmission format

- Slave number: 0 to 1 is the target device number. This number is generated by the "STA:connect,1<mac>" message printed by the device after the slave successfully connects to the host.
- If the connection specified by the slave number does not exist, the module directly discards the packet data.

5.4 MAC address binding

The module supports MAC address binding. If the MAC address binding function is enabled, the device will only connect to devices with the added MAC addresses.

5.5 Broadcast

5.5.1 General broadcast information

Broadcast information includes advertising and scan response. Advertising is a broadcast message sent actively, and scan response is a broadcast message replied after receiving a host scan request.

Advertising

Fixed fields	Len	Manufacturer field	Manufa data

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020106	N	0xFF	Configurable, maximum 26 bytes
For example: 020106 < Len > FF < Manufacture data >			

Figure 5.4 - Broadcast data format

Users can only configure the Manufa data field.

V5.3 and later versions can be modified through the AT+DEVMANUF command, but the length <Len> can only be 08, and the first 7 bytes of Manufa data are displayed.

data

Scan response

Len	fixed	UUID	Len	fixed	Device name
0x03	0x03	FFF0	N	0x09	Configurable, maximum 20 bytes
For example: 03 03 FFF0 <len> 09 <Device name>					

Figure 55 Scan - response data format table

Note: This data does not require user configuration.

5.5.2 iBeacon broadcast information

1. The instructions configure UUID, Major, and Minor respectively
2. Command AT+ADV=2 to configure the work in iBeacon broadcast mode and broadcast immediately
3. Bluetooth connection is not supported in iBeacon broadcast mode

Advertising (New)

iBeacon Prefix	UUID	Major	Minor	Tx-Power
9B	16B	2B	2B	1B
For example: 0201061AFF4C000215FDA FDA50693A4E24FB1AFCFC6EB07647825 2775 848F 00				

Figure 56 New ibeacon - data format table

Advertising (old)

iBeacon Prefix	UUID	Major	Minor	Tx-Power
6 B	16B	2B	2B	1B
For example: 1AFF4C000215FDA FDA50693A4E24FB1AFCFC6EB07647825 2775 848F 00				

Figure 57 Old ibeacon - data format table

Note: Starting with software version 7212-1-12 , we've enabled new iBeacon broadcasting rules, with the new version broadcasting being the default. Newly developed products are recommended to use the new version broadcasting for parsing. Support for older versions will be discontinued in the future. For compatibility reasons, we provide the " AT+IBCNVER " command for switching and querying the iBeacon broadcast version. See the AT Command Table for details.

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5.6 Configuration

The module supports two configuration methods: serial port configuration and over-the-air configuration. These two configuration methods are essentially the same. Before over-the-air configuration, you must verify the password AT+AUTH=123456. Only after verification is passed can the module be configured over-the-air. The over-the-air configuration authentication period lasts for the current connection. If the device is disconnected and reconnected, re-authentication is required.

If the module is not connected, it is in configuration mode by default. If the module is connected, you can enter configuration mode by sending "+++".

5.7 UUID Description

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

5.8 Status or event printing

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

state	Print information
Connection successful	\r\n STA:connect\r\n
Disconnection	\r\n STA:disconnect\r\n
System wake-up	\r\n STA:wakeup\r\n
Sleep mode	\r\n STA:sleep\r\n

Figure 5 - 8 Status Printing Table

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6 AT Commands

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

6.1 Instruction Description

- All AT commands are not allowed to be followed by carriage return (\r) or line feed (\n) or any other character
- All AT commands are case-insensitive
- The return result of the AT command ends with \r\n (except for the return HEX)
- Command error response format +ERR=[NUM]. (NUM is ACSII)

6.2 Error Code

NUM	illustrate	Cause of the error	Workaround
1	The instruction does not exist	AT command characters are incorrect	Check AT specified string
2	Parameter length error	1、 The total length of the AT command is incorrect; 2. The data length does not meet the range	Check parameters
3	Invalid parameters	1. The parameter exceeds the value range	Check the parameter values by comparing the instructions

Figure 6.1 - Error code table

6.3 Status Printing

state	Print information	
Connection successful	Slave	\r\nSTA:connect,1,<MAC\r\n
	Host	\r\nSTA:connect,1,<MAC\r\n
Disconnection	Slave	\r\nSTA:disconnect\r\n
	Host	\r\nSTA:disconnect,1\r\n
System wake-up	\r\nSTA:wakeup\r\n	
Sleep mode	\r\nSTA:sleep\r\n	

Figure 62 - Status Printing Table

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6.4 Instruction List

6.4.1 AT test command

instruction	answer
AT	**+OK**
Description: None	

6.4.2 +++ Enter AT command mode

instruction	answer
+++	**enter_at_mode**
Note: When there is no connection, the module is in AT mode by default. There will be no response if this command is sent when there is no connection. If the module is connected, this command needs to be used to enter AT mode.	

6.4.3 AT+EXIT Exit AT command mode

instruction	answer
AT+EXIT	**+OK**
Description: None	

6.4.4 AT+RESET Reset Command

instruction	answer
AT+RESET	**+OK**
Note: Effective immediately	

6.4.5 AT+RESTORE Restore to factory defaults

instruction	answer
AT+RESTORE	**OK**
illustrate: 1、 After the reset is complete, it will automatically restart; 2、 During the factory reset process, any form of reset is prohibited, and power off before the operation is completed is prohibited;	

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6.4.6 AT+BAUD Serial port baud rate

instruction		answer
Query	**AT+BAUD?**	**+OK=[para]**
set up	**AT+BAUD=[para]**	**+OK: Success** **+ERR=[NUM]: Error**
parameter	para (ASCII)	Baud rate (bps)
	0	2400
	1	4800
	2	9600
	3	14400
	4	19200
	5	38400
	6	57600
	7	115200 (default)
	8	230400
	9	460800
	10	1000000
illustrate	Restart to take effect	
Example	Setting: AT+BAUD=7 //Set the baud rate to 115200 Return: +OK	

6.4.7 AT+PARI Serial port check bit

instruction		answer
Query	**AT+PARI?**	**+OK=[para]**
set up	**AT+PARI=[para]**	**+OK: Success** **+ERR=[NUM]: Error**
parameter	para(ASCII)	describe
	0	No inspection (default)
	1	Even parity
illustrate	Restart to take effect, save after power off	
Example	AT+PARI=0	

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6.4.8 AT+DATABIT Serial port data bits

instruction		answer
Query	**AT+DATABITS?**	**+OK=[para]**
set up	**AT+DATABITS=[para]**	**+OK: Success** **+ERR=[NUM]: Error**
parameter	para(ASCII)	describe
	0	5 data bits (reserved in V5.3)
	1	6 data bits (reserved in V5.3)
	2	7 data bits
	3	8 data bits
illustrate	Restart to take effect, save after power off	
Example	AT+PARI=0	

6.4.9 AT+ROLE Bluetooth Role

instruction		answer
Query	**AT+ROLE?**	**+OK=[para]**
set up	**AT+ROLE =[para]**	**+OK: Success** **+ERR=[NUM]: Error**
parameter	Para(ASCII)	describe
	0	Slave (default)
	1	Host
	2	Observer
	3	Master-slave integration
illustrate	Restart to take effect, save after power off	

6.4.10 AT+DEVMANUF Modify the manufacturer name

instruction		answer
Query	**AT+DEVMANUF?**	**+OK=[para]**
set up	**AT+DEVMANUF =[para]**	**+OK: Success** **+ERR=[NUM]: Error**
parameter	para(string): manufacturer name Factory default: CDEBYTE;	
illustrate	1、 Restart to take effect, save after power off 2、 The maximum length of a string is 32 bytes.	

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6.4.11 AT+ADV Broadcast Enable

instruction		answer
Query	**AT+ADV?**	**+OK=[para]**
set up	**AT+ADV=[para]**	**+OK: Success** **+ERR=[NUM]: Error**
parameter	para (ASCII)	describe
	0	Turn off broadcasting
	1	Normal broadcast (default)
	2	iBeacon broadcasting
illustrate	1、 It takes effect immediately (if broadcast is not enabled or the connection is already established, it will take effect next time), and will be saved after power failure. 2、 The slave or master-slave combination supports broadcasting.	

6.4.12 AT+ADVDAT Broadcast data

instruction		answer
Query	**AT+ADVDAT?**	**+OK=[para]**
set up	**AT+ADVDAT=[para]**	**+OK: Success** **+ERR=[NUM]: Error**
parameter	para(HEX): 1. Support ASCII and HEX 2. The length is no more than 26 bytes	
illustrate	1、 It takes effect immediately (if broadcast is not enabled or the connection is already established, it will take effect next time). It is saved after power failure. 2、 Slave or master-slave combination supports broadcasting, and other roles can still be configured;	
Example	Instructions: 41 54 2b 41 44 56 44 41 54 3d 31 32 33 34 35 36 37 38 39 30 ; The broadcast data is: 31 32 33 34 35 36 37 38 39 30	

6.4.13 AT+ADVDATA Broadcast Data

instruction		answer
Query	**AT+ADVDATA?**	**+OK=[para]**
set up	**AT+ADVDATA=[para]**	**+OK: Success** **+ERR=[NUM]: Error**
parameter	1. Support ASCII 2. The length is no more than 26 bytes	
illustrate	1、 It takes effect immediately (if broadcast is not enabled or the connection is already established, it will take effect next time). It is saved after power failure. 2、 Slave or master-slave combination supports broadcasting, and other roles can still be configured; 3、 This instruction is only supported by E104-BT52-V5.3&E104-BT52X-V5.3.	

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Example	Command: AT+ADVDATA? Return: +OK=08:FF:43:44:45:42:59:54:45:03:03:F0:FF

6.4.14 AT+ ADVRESP Response Data

instruction		answer
Query	**AT+ ADVRESP ?**	**+OK=[para]**
set up	**AT+ ADVRESP =[para]**	**+OK: Success** **+ERR=[NUM]: Error**
parameter	1. Support ASCII 2. The length is no more than 26 bytes	
illustrate	1、 It takes effect immediately (if broadcast is not enabled or the connection is already established, it will take effect next time). It is saved after power failure. 2、 Slave or master-slave combination supports broadcasting, and other roles can still be configured; 3、 This instruction is only supported by E104-BT52-V5.3&E104-BT52X-V5.3.	
Example	Command: AT+ADVRESP? The response data is: +OK=0F:09:45:31:30:34:2D:42:54:35:32:2D:56:35:2E:33	

6.4.15 AT+ADVINTV Broadcast Interval

instruction		answer
Query	**AT+ADVINTV?**	**+OK=[para]**
set up	**AT+ADVINTV=[para]**	**+OK: Success** **+ERR=[NUM]: Error**
parameter	para(ASCII):20~10240 Default: 1000 (1S)	
illustrate	1、 Take effect immediately (if broadcast is not enabled or if connected, it will take effect next time), save after power off 2、 Slave or master-slave combination supports broadcasting, and other roles can still be configured;	
Example	**AT+ADVINTV=1000**	

6.4.16 AT + IBCNVER iBeacon Broadcast version command

instruction		answer
Query	**AT+IBCNVER?**	**+OK=[para1]**
set up	**AT+IBCNVER=[para]**	**+OK: Success** **+ERR=[NUM]: Error**
parameter	para (ASCII)	describe
	0	Legacy iBeacon broadcasts
	1	New version of iBeacon broadcast (default)
illustrate	1、 The settings will take effect after reboot and will be saved after power off.	

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	2、 The new version of iBeacon broadcasts an iBeacon Prefix field of 9 bytes, while the old version only has 6 bytes. 3、 Software version 7212-1-12 supports this command.
Example	**AT+ADVINTV=1**

6.4.17 AT+IBCNUUID iBeacon UUID Command

instruction		answer
Query	**AT+IBCNUUID?**	**+OK=[para1]**
set up	**AT+IBCNUUID=[para]**	**+OK: Success** **+ERR=[NUM]: Error**
parameter	para(HEX): 16-bit UUID	
illustrate	4、 It takes effect immediately (if broadcast is not enabled or the connection is already established, it will take effect next time), and will be saved after power failure. 5、 Slave or master-slave combination supports broadcasting, and other roles can still be configured;	
Example	Set the iBeacon UUID to "FDA50693A4E24FB1AFCFC6EB07647825" 41 54 2B 49 42 43 4E 55 55 49 44 3DFDA50693A4E24FB1AFCFC6EB07647825	

6.4.18 AT+IBCNUUIDN iBeacon UUID Command

instruction		answer
Query	**AT+IBCNUUIDN?**	**+OK=[para1]**
set up	**AT+IBCNUUIDN=[para]**	**+OK: Success** **+ERR=[NUM]: Error**
parameter	para(ASCII): 16-bit UUID	
illustrate	1、 It takes effect immediately (if broadcast is not enabled or the connection is already established, it will take effect next time), and will be saved after power failure. 2、 Slave or master-slave combination supports broadcasting, and other roles can still be configured; 3、 This instruction is only supported by E104-BT52-V5.3&E104-BT52X-V5.3.	
Example	AT+IBCNUUIDN? +OK=D40703396DA44E50A375BADE13BE6DAA	

6.4.19 AT+MAJOR iBeacon Major Command

instruction		answer
Query	**AT+MAJOR?**	**+OK=[para]**
set up	**AT+MAJOR=[para]**	**+OK: Success** **+ERR=[NUM]: Error**
parameter	para(HEX): 0X0001-0XFFFF Default: 0102	

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illustrate	1、 It takes effect immediately (if broadcast is not enabled or the connection is already established, it will take effect next time), and will be saved after power failure. 2、 Only slaves support broadcasting, other roles can still be configured;
Example	Query : AT+MAJOR? Return: 2B 4F 4B 3D 00 01 0D 0A
	Setup: 41 54 2B 4D 41 4A 4F 52 3D ff ff Return: +OK

6.4.20 AT+MINOR iBeacon Minor Command

instruction		answer
Query	**AT+ MINOR ?**	**+OK=[para]**
set up	**AT+ MINOR =[para]**	**+OK: Success** **+ERR=[NUM]: Error**
parameter	para(ACSII): 0X0001-0XFFFF Default: 0304	
illustrate	1、 It takes effect immediately (if broadcast is not enabled or the connection is already established, it will take effect next time), and will be saved after power failure. 2、 Only slaves support broadcasting, other roles can still be configured;	
Example	Query : AT+MAJOR? Return: 2B 4F 4B 3D 00 01 0D 0A	
	Setup: 41 54 2B 4D 41 4A 4F 52 3D ff ff Return: +OK	

6.4.21 AT+MAJORN iBeacon Major Command

instruction		answer
Query	**AT+MAJORN?**	**+OK=[para]**
set up	**AT+MAJORN=[para]**	**+OK: Success** **+ERR=[NUM]: Error**
parameter	para(ACSII): 0X0001-0XFFFF Default: 0102	
illustrate	1、 It takes effect immediately (if broadcast is not enabled or the connection is already established, it will take effect next time), and will be saved after power failure. 2、 Only slaves support broadcasting, other roles can still be configured; 3、 Commands added after version VXXX 4、 This instruction is only supported by E104-BT52-V5.3&E104-BT52X-V5.3.	
Example	Query : AT+MAJOR N ? Return: =FFFF	

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6.4.22 AT+MINORN iBeacon Minor Command

instruction		answer
Query	**AT+ MINOR N?**	**+OK=[para]**
set up	**AT+ MINOR N=[para]**	**+OK: Success** **+ERR=[NUM]: Error**
parameter	para(ACSII): 0X0001-0XFFFF Default: 0304	
illustrate	1、 It takes effect immediately (if broadcast is not enabled or the connection is already established, it will take effect next time), and will be saved after power failure. 2、 Only slaves support broadcasting, other roles can still be configured; 3、 Commands added after version VXXX 4、 This instruction is only supported by E104-BT52-V5.3&E104-BT52X-V5.3.	
Example	Query : AT+MINOR N ? Return: =FFFF	

6.4.23 AT+IPWR Modify ibeacn tx_power

instruction		answer
Query	**AT+IPWR?**	**+OK=[para]**
set up	**AT+IPWR =[para]**	**+OK: Success** **+ERR=[NUM]: Error**
parameter	para(HEX): 0-0XFF Default: 0	
illustrate	1、 It takes effect immediately (if broadcast is not enabled or the connection is already established, it will take effect next time), and will be saved after power failure. 2、 Only slaves support broadcasting, other roles can still be configured;	

6.4.24 AT+IPWRN Modify ibeacn tx_power

instruction		answer
Query	**AT+IPWRN?**	**+OK=[para]**
set up	**AT+IPWRN=[para]**	**+OK: Success** **+ERR=[NUM]: Error**
parameter	Default: 0	
illustrate	1、 It takes effect immediately (if broadcast is not enabled or the connection is already established, it will take effect next time), and will be saved after power failure. 2、 Only slaves support broadcasting, other roles can still be configured; 3、 This instruction is only supported by E104-BT52-V5.3&E104-BT52X-V5.3.	

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Example	Query : AT+ IPWRN ? Return: +OK=0A
	Setting: AT+IPWRN=0B Return: +OK

6.4.25 AT+ COMPANYID iBeacon Manufacturer ID Command

instruction		answer
Query	**AT+ COMPANYID ?**	**+OK=[para]**
set up	**AT+ COMPANYID =[para]**	**+OK: Success** **+ERR=[NUM]: Error**
parameter	para(ACSII): 0X0001-0XFFFF default:	
illustrate	1、 It takes effect immediately (if broadcast is not enabled or the connection is already established, it will take effect next time), and will be saved after power failure. 2、 Only slaves support broadcasting, other roles can still be configured; 3、 This instruction is only supported by E104-BT52-V5.3&E104-BT52X-V5.3.	
Example		

6.4.26 AT+NAME Broadcast device name

instruction		answer
Query	**AT+NAME?**	**+OK=[para]**
set up	**AT+NAME=[para]**	**+OK: Success** **+ERR=[NUM]: Error**
set up **(Do not save)**	**AT+NAME1=[para]**	
parameter	para(HEX): broadcast device name, The broadcast name should be more than 3 bytes in length, but no more than 20 bytes， Default: E104-BT52-V2.0	
illustrate	1、 Restart to take effect and save after power off; 2、 Only supported by slaves, other roles can still be configured;	

6.4.27 AT+CONINTV Connection gap configuration

instruction		answer
Query	**AT+CONINTV?**	**+OK=[para]**
set up	**AT+CONINTV=[para]**	**+OK: Success** **+ERR=[NUM]: Error**
parameter	[para] (ASCII): connection gap, value range: 10~2500; Default value: 20ms	
illustrate	1. The settings will take effect after restart and will be saved after power off.	

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Notice	1、 The connection timeout must be greater than the connection gap; 2、 The device will not accept or save incorrect parameters. 3、 It is not recommended to modify the host connection gap.
Example	**AT+CONINTV=20** Connection interval 20ms

6.4.28 AT+DISCON Disconnect command

instruction		answer
set up	**AT+DISCON=[para]**	**+OK: Success** **+ERR=[NUM]: Error**
parameter	para(ASCII)	describe
	0~1	Disconnect the specified connection
illustrate	1. Effective immediately. 2. If the connection specified by para is not connected, the module still returns index device no connect	

6.4.29 AT+MAC Local MAC address

instruction		answer
Query	**AT+MAC?**	**+OK=[para]**
parameter	para (HEX): MAC address Example: F0E1D2C3B4A5	
illustrate	-	
Example	Command: AT+MAC? Return: 2B 4F 4B 3D FE 30 EE 50 35 DA Explanation: The local MAC address is FE 30 EE 50 35 DA	

6.4.30 AT+CONINFO Connected device information

instruction		answer
Query	**AT+CONINFO = [Para 0]**	**+OK=[Para 1] : Success** **+ERR=[NUM]:Error**
parameter	Para 0 (ASCII) / describe 0~1 / Connection number	Para 1 (ASCII): connected device role + connected device MAC address + handle for sending data to the connected device
illustrate	The handle for sending data to the connected device is only valid when our device is the host.	
Example	Command: AT+CONNIFO =0	

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6.4.31 AT+BONDMAC Add a bound MAC address

instruction		answer
Query	**AT+BONDMAC?**	**+OK=[sum][[mac] [mac]…]**
set up	**AT+BONDMAC=[mac]**	**+OK Success** **+ERR=[NUM]: Error**
parameter	**sum(HEX):** total number of currently bound MAC addresses; **mac(HEX)** : 6-byte mac address;	
illustrate	1. Take effect immediately and save after power off 2. When no MAC address is bound, no data will be returned.	
Example	Query: AT+BONDMAC? Return: 2 B 4F 4B 3D 03 CC 34 27 1A 0C D4 3D AC 82 16 0F 58 D2 D4 C3 07 0E C4	
	Setup: 41 54 2B 42 4F 4E 44 4D 41 43 3D CC 34 27 1A 0C D4 Return: +OK	

6.4.32 AT+BONDMACN Add a bound MAC address

instruction		answer
Query	**AT+BONDMACN?**	**+OK=[sum][[mac] [mac]…]**
set up	**AT+BONDMACN=[mac]**	**+OK Success** **+ERR=[NUM]: Error**
parameter	**sum(HEX):** total number of currently bound MAC addresses; **mac(HEX)** : 6-byte mac address;	
illustrate	1. Take effect immediately and save after power off 2. When no MAC address is bound, no data will be returned. 3. This instruction is only supported by E104-BT52-V5.3 & E104-BT52X-V5.3.	
Example	Query: AT+BONDMAC? Return: +OK=3 [1] 01:02:03:04:05:06 [2] 01:02:03:04:05:07 [3] 01:02:03:04:05:08	
	Setting: AT+BONDMACN=01:02:03:04:05:08 Return: +OK	

6.4.33 AT+BONDDELN Delete the bound MAC address

instruction		answer
set up	**AT+BONDDELN=[mac]**	**+OK** **+ERR=[NUM]**
parameter	**mac: 6-byte MAC address**	

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illustrate	1、 Takes effect immediately and is saved after power off. 2、 Delete the specified MAC address; 3、 This instruction is only supported by E104-BT52-V5.3&E104-BT52X-V5.3.
	Setting: AT+ BONDDEL N =01:02:03:04:05:08 Return: +OK

6.4.34 AT+BONDDEL Delete the bound MAC address

instruction		answer
set up	**AT+BONDDEL=[mac]**	**+OK** **+ERR=[NUM]**
parameter	**mac: 6-byte MAC address**	
illustrate	4、 Takes effect immediately and is saved after power off. 5、 Delete the specified MAC address;	

6.4.35 AT+SCAN scanning

instruction		answer
Query	**AT+SCAN?**	**+OK=[para]**
set up	**AT+SCAN=[para]**	**+OK: Success** **+ERR=[NUM]: Error**
parameter	para (ASCII)	describe
	0	Turn off scanning
	1	Enable scanning (default)
illustrate	1、 Restart to take effect, save after power off 2、 If the current number of host connections is already the maximum, scanning will no longer be enabled; 3、 Scan enable and disable are effective for roles other than slaves.	

6.4.36 AT+SCANINTV Scan gap

instruction		answer
Query	**AT+SCANINTV?**	**+OK=[para]**
set up	**AT+SCANINTV=[para]**	**+OK: Success** **+ERR=[NUM]: Error**
parameter	para(ASCII):20~6000 Default: 100	
illustrate	1. Restart to take effect, save after power off, 2. The scanning gap should not be smaller than the scanning window 3. The slave device does not support it, but it can still be set	
Example	AT+SCANINTV=120	

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	Scan interval: 120*0.625 = 75ms

6.4.37 AT+SCANWND Scan Window

instruction		answer
Query	**AT+SCANWND?**	**+OK=[para]**
set up	**AT+SCANWND=[para]**	**+OK: Success** **+ERR=[NUM]: Error**
parameter	para(ASCII): 20~65535 Default: 80;	
illustrate	1. Restart to take effect, save after power off, 2. The scanning gap should not be smaller than the scanning window 3. The slave device does not support it, but it can still be set	
Example	AT+SCANWND=20 The scanning window is: 20*0.625 = 12.5ms	

6.4.38 AT+TRANMD Transmission Mode

instruction		answer
Query	**AT+TRANMD?**	**+OK=[para]**
Query	**AT+TRANMD=[para]**	**+OK: Success** **+ERR=[NUM]: Error**
parameter	para (ASCII)	describe
	0	Non-transparent transmission (default)
	1	Transparent transmission
illustrate	1、 Effective immediately. Saved after power off.	

6.4.39 AT+ UUIDSVR128 Set the service 128-bit UUID

instruction		answer
Query	**AT+UUIDSVR128?**	**+OK=[para]**
set up	**AT+UUIDSVR128=[para]**	**+OK: Success** **+ERR=[NUM]: Error**
parameter	para(HEX):00000000000000000000000000000000~FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF	
illustrate	1、 The settings will take effect after restart and will be saved after power off. 2、 The second and third bytes are 16-bit uuids, ranging from 0000~FFFF; 3、 This 128-bit UUID, except for the second and third bytes, is also used as the basic UUID for the slave channel, master channel, and configuration channel. (For a description of UUIDs, refer to "BLUETOOTH SPECIFICATION Version 5.0 | Vol 3, Part B 2.5.1 UUID").	
Example	Set 128-bit UUID: "11 22 33 44 55 66 77 88 99 00 aa bb cc dd ee ff" (HEX)	

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	AT command is (HEX): 61 74 2b 75 75 69 64 73 76 72 31 32 38 3d 11 22 33 44 55 66 77 88 99 00 aa bb cc dd ee ff

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6.4.40 AT+UUIDSVR128N Set the service 128-bit UUID

instruction		answer
Query	**AT+UUIDSVR128N?**	**+OK=[para]**
set up	**AT+UUIDSVR128N=[para]**	**+OK: Success** **+ERR=[NUM]: Error**
parameter	para(HEX): 00000000000000000000000000000000~FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF	
illustrate	1、 The settings will take effect after restart and will be saved after power off. 2、 The second and third bytes are 16-bit uuids, ranging from 0000~FFFF; 3、 This 128-bit UUID, except for the second and third bytes, is also used as the basic UUID for the slave channel, master channel, and configuration channel. (For a description of UUIDs, refer to "BLUETOOTH SPECIFICATION Version 5.0 | Vol 3, Part B 2.5.1 UUID"). 4、 This instruction is only supported by E104-BT52-V5.3&E104-BT52X-V5.3.	
Example	Query: AT+UUIDSVR128N? Return: +OK=FB349B5F8000008000100000F0FF0000	
	Setting: AT+UUIDSVR128N=FB349B5F8000008000100000F0FF0000 Return: +OK	

6.4.41 AT+UUIDSVR Bluetooth Service UUID

instruction		answer
Query	**AT+UUIDSVR?**	**+OK=[para]**
set up	**AT+UUIDSVR=[para]**	**+OK: Success** **+ERR=[NUM]: Error**
parameter	para(HEX):0-FFFF Default: FFF0	
illustrate	1. Restart to take effect. Save after power off. 2. For the host, service UUID is a necessary condition for connection filtering, so when setting the host service UUID, be sure to keep it consistent with that of the slave, otherwise the connection cannot be established.	

6.4.42 AT+UUIDSVRN Bluetooth Service UUID

instruction		answer
Query	**AT+UUIDSVRN?**	**+OK=[para]**
set up	**AT+UUIDSVRN=[para]**	**+OK: Success** **+ERR=[NUM]: Error**
parameter	para(ASCII):0-FFFF Default: FFF0	
illustrate	1. Restart to take effect. Save after power off.	

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	2. For the host, service UUID is a necessary condition for connection filtering, so when setting the host service UUID, be sure to keep it consistent with that of the slave, otherwise the connection cannot be established. 3. This instruction is only supported by E104-BT52-V5.3 & E104-BT52X-V5.3.

6.4.43 AT+UUIDSLAVE SLAVE CHANNEL Characteristic UUID

instruction		answer
Query	**AT+UUIDSLAVE?**	**+OK=[para]**
set up	**AT+UUIDSLAVE= [para]**	**+OK: Success +ERR=[NUM]: Error**
parameter	para(HEX): 0-FFFF Default: FFF1	
illustrate	1、 The settings will take effect after restart and will be saved after power off. 2、 Slave channel. Used for the slave to send data and the host to receive data.	

6.4.44 AT+UUIDSLAVEN SLAVE CHANNEL Feature UUID

instruction		answer
Query	**AT+UUIDSLAVEN?**	**+OK=[para]**
set up	**AT+UUIDSLAVEN=[para]**	**+OK: Success +ERR=[NUM]: Error**
parameter	para(ASCII): 16-bit UUID value range: 0000~FFFF, default: FFF1 128-bit UUID value range: 00000000000000000000000000000000~FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF	
illustrate	1、 Supports 16-bit UUID (default) and 128-bit UUID. 2、 The settings will take effect after restart and will be saved after power off. 3、 Slave channel. Used for the slave to send data and the host to receive data. 4、 This instruction is only supported by E104-BT52-V5.3&E104-BT52X-V5.3.	
example	Set 16-bit UUID: Send: AT+UUIDSLAVEN=FOFF Response: +OK Set 128-bit UUID: Send: AT+UUIDSLAVEN=11223344556677889900AABBCCDDEEFF Response: +OK	

6.4.45 AT+UUIDMAST MAST CHANNEL Feature UUID Command

instruction		answer
Query	**AT+UUIDMAST?**	**+OK=[para]**

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set up	**AT+UUIDMAST=[para]**	**+OK: Success** **+ERR=[NUM]: Error**
parameter	para(HEX): 0-FFFF; Default: FFF2	
illustrate	1、 The settings will take effect after restart and will be saved after power off. 2、 Host channel. The host sends data and the slave receives data.	

6.4.46 AT+UUIDMASTN MAST CHANNEL Feature UUID Command

instruction		answer
Query	**AT+UUIDMAST?**	**+OK=[para]**
set up	**AT+UUIDMAST=[para]**	**+OK: Success** **+ERR=[NUM]: Error**
parameter	para(ASCII): 16-bit UUID value range: 0000~FFFF, default: FFF2 128-bit UUID value range: 00000000000000000000000000000000~FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF	
illustrate	1、 Supports 16-bit UUID (default) and 128-bit UUID. 2、 The settings will take effect after restart and will be saved after power off. 3、 Host channel. The host sends data and the slave receives data. 4、 This instruction is only supported by E104-BT52-V5.3&E104-BT52X-V5.3.	
example	Set 16-bit UUID: Send: AT+UUIDSLAVEN=FOFF Response: +OK Set 128-bit UUID: Send: AT+UUIDSLAVEN=11223344556677889900AABBCCDDEEFF Response: +OK	

6.4.47 AT+AUTH Air Configuration Authentication Password

instruction		answer
set up	**AT+AUTH =[para]**	**+OK: Success** **+ERR=[NUM]: Error**
parameter	para(HEX): 6-byte password	
illustrate	1. This command is only used for air authentication. 2. Default password : 123456	
Example	AT+AUTH=123456	

6.4.48 AT+UPAUTH Modify the air authentication password

instruction		answer
Query	**AT+UPAUTH?**	**+OK=[para]**

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set up	**AT+UPAUTH =[para]**	**+OK: Success** **+ERR=[NUM]: Error**
parameter	para(HEX): 6-byte password	
illustrate	Take effect immediately. Save after power off	

6.4.49 AT+ONSLEEP Power-on sleep

instruction		answer
Query	**AT+ONSLEEP?**	**+OK=[para]**
set up	**AT+ONSLEEP =[para]**	**+OK: Success** **+ERR=[NUM]: Error**
parameter	para (ASCII)	describe
	0	Off (default)
	1	Open
illustrate	It takes effect immediately and is saved after power failure. The E104-BT52PX does not support this command.	

6.4.50 AT+SLEEP Enter sleep mode immediately

instruction		answer
set up	**AT+SLEEP**	**+OK**
parameter	none	
illustrate	Effective immediately. The E104-BT52PX does not support this command.	

6.4.51 AT+LOGMSG Running status output

instruction		answer
Query	**AT+LOGMSG?**	**+OK=[para]**
set up	**AT+LOGMSG =[para]**	**+OK: Success** **+ERR=[NUM]: Error**
parameter	para (ASCII)	describe
	0	Off (default)
	1	Open
illustrate	It takes effect immediately and is saved after power failure.	

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6.4.52 AT+PWR Transmit power

Note: The transmit power of E104-BT52, E104-BT52X, E104-BT52-5.3, and E104-BT52X-5.3 can be set via commands. The transmit power of E104-BT52PX cannot be set and remains at 20dBm.

instruction		answer	
Query	**AT+PWR?**	**+OK=[para]**	
set up	**AT+PWR =[para]**	**+OK: Success** **+ERR=[NUM]: Error**	
parameter	para(ASCII)	Power value (BT52V2.0)	Power value (BT52V5.3)
	0	2.5 dBm	4dBm
	1	1.5 dBm	2.5 dBm
	2	0 dBm (default)	0 dBm (default)
	3	-2 dBm	-2.5 dBm
	4	-5 dBm	-6 dBm
	5	-7 dBm	-9 dBm
	6	-13.5 dBm	-12 dBm
	7	-19.5 dBm	-18 dBm
illustrate	Restart to take effect, save after power off		

6.4.53 AT+MTU Set Bluetooth single packet length

instruction		answer
Query	AT+MTU?	+OK=[para]
set up	AT+MTU=[para]	+OK: Success +ERR=[NUM]: Error
parameter	Para MTU value. Minimum 23, maximum 244.	
illustrate	1. Restart to take effect, save after power off 2. Due to the existence of the control byte, when MTU = 247 is set, only 244 bytes can be sent per packet .	

6.4.54 AT+VER Query software version number

instruction		answer
Query	AT+VER?	+OK=[para]
parameter	Para: Current software version number	
illustrate	1、 Only query function is supported. 2、 Software version 7212-1-12 supports this command	
Example	Send: AT + VER? Return: +OK =7212-1-12	

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7 Quick Use

Recommended software for debugging/testing:

- PC serial port tool - XCOM.exe;
- Mobile ble debugging app - nRF connect.

7.1 Configuration Mode Quick Start Guide

7.1.1 Serial Port Configuration

- Confirm whether the module is currently in configuration mode (if it is not connected, the module can be configured. If it is connected, the serial port needs to send "+++"
- Set the XCOM string configuration (default configuration: 115200, 8, 1, none, no flow), as shown in Figure 7-1 - XCOM parameter configuration diagram ;

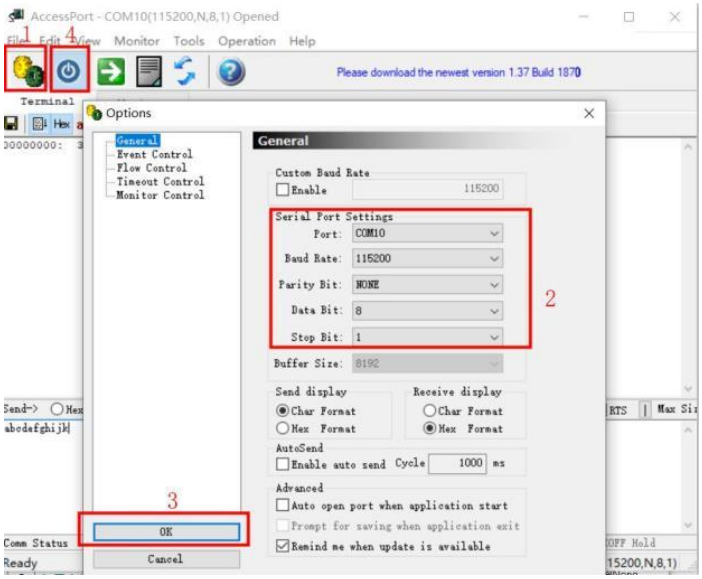


Figure 7.1 SSCOM - parameter configuration diagram

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

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7.1.2 Over-the-air configuration

- Over-the-air configuration is only available when the module is a slave.
- Open the "nRF connect" app, start scanning devices, and find the "E104-BT52" connection module;



Figure 7.2 - nRF connect scan list

- Open the service of uuid fff0 and enable the configuration channel notification;

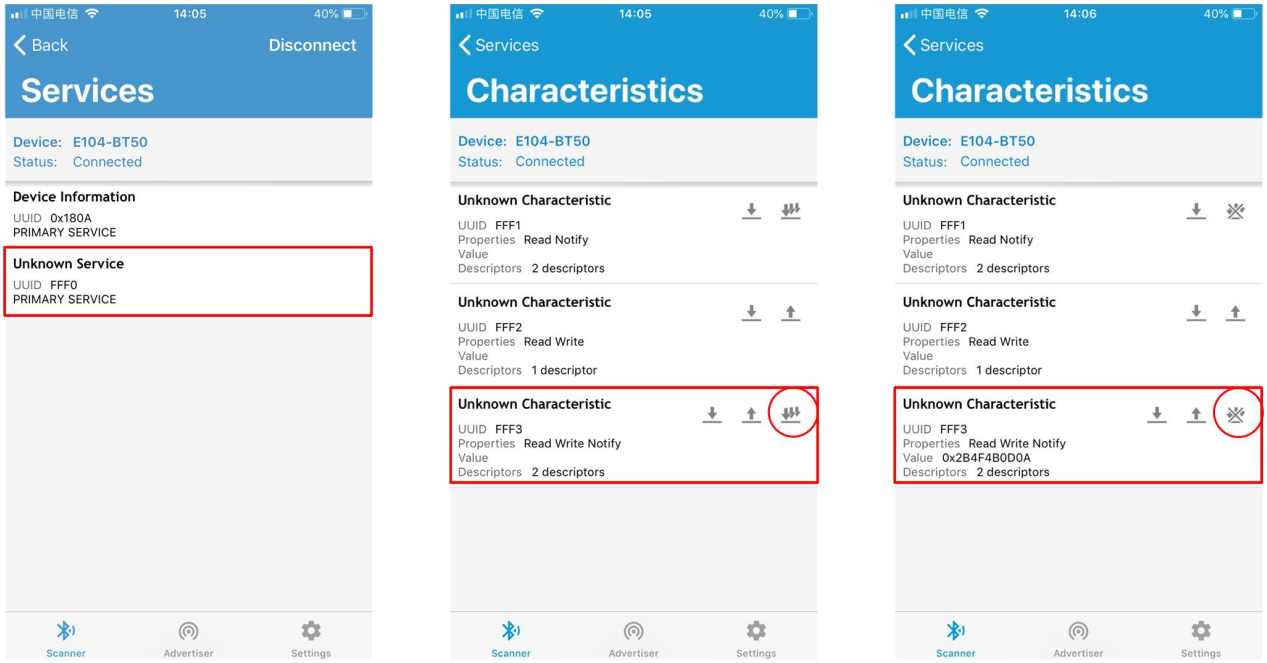


Figure 7.3 - nRF connect connection and enable notification

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- Send the authentication command (at+auth=123456), and the module returns "0x2b4f4b0d0a" to indicate successful authentication;

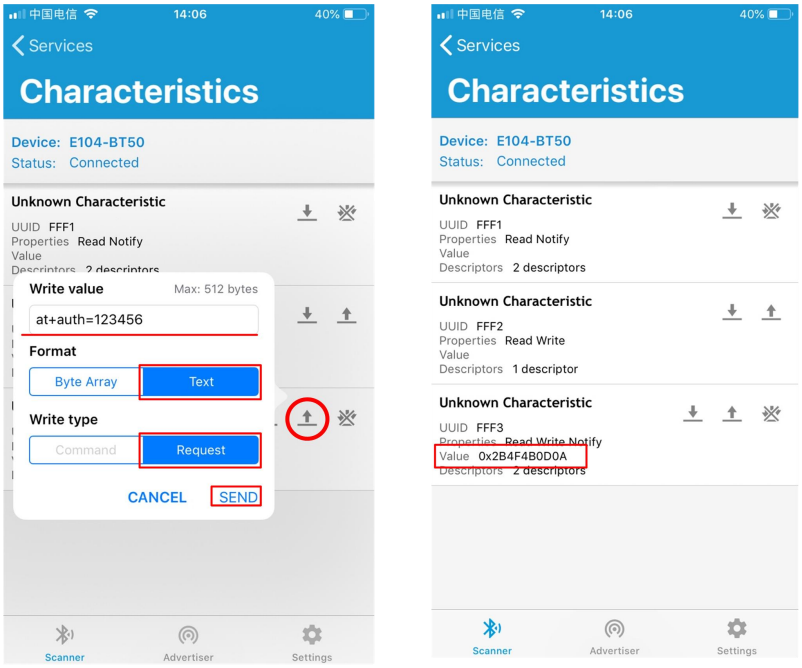


Figure 74 Over- - the -air configuration authentication diagram

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

7.2 Data Transmission

For details about data transmission, refer to 5.3 Data Transmission Mode .

Test conditions:

- Configure one module as the master and one module as the slave according to the AT command table configuration mode quick start guide ;
- Test software: XCOM.
- Other parameters are default settings.

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7.2.1 Data Transmission

1. Power on the module. Enable logmsg printing on both the master and slave devices (at+logmsg=1).
2. Set the master-slave module to transparent transmission mode (AT+TRANMD=1).
3. After a successful connection, the host prints "sta: connecte 0 616263646564"; the slave prints "sta: connecte 0 616263646566". The LINK pin is high. This is shown in Figure 7-5 , which shows the host automatically connecting after power-on - , and Figure - 7-6, which shows the slave automatically connecting after power-on . The value before the MAC address in the host's printed information is the slave handle in the host, and the first byte of the format transmission comes from this .



Figure 75 - : Host automatically connects and prints when powered on

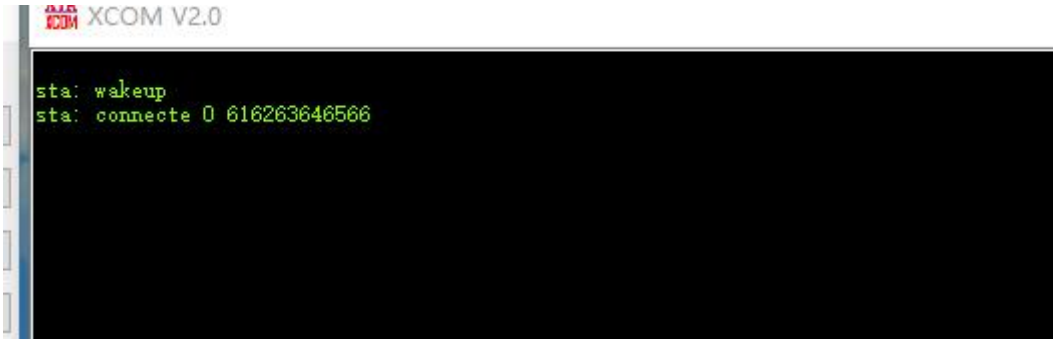


Figure 76 - Automatic connection and printing diagram after power on of the machine

4. The host sends data "0123456789" to the slave, and the slave receives data "0123456789" (as shown in Figure 7 - 7 Host data transparent transmission diagram);
5. The slave sends the data "abcdefghijk" to the master, and the master receives the data as "abcdefghijk" (as shown in Figure - 7, Master Data Transmission Diagram).

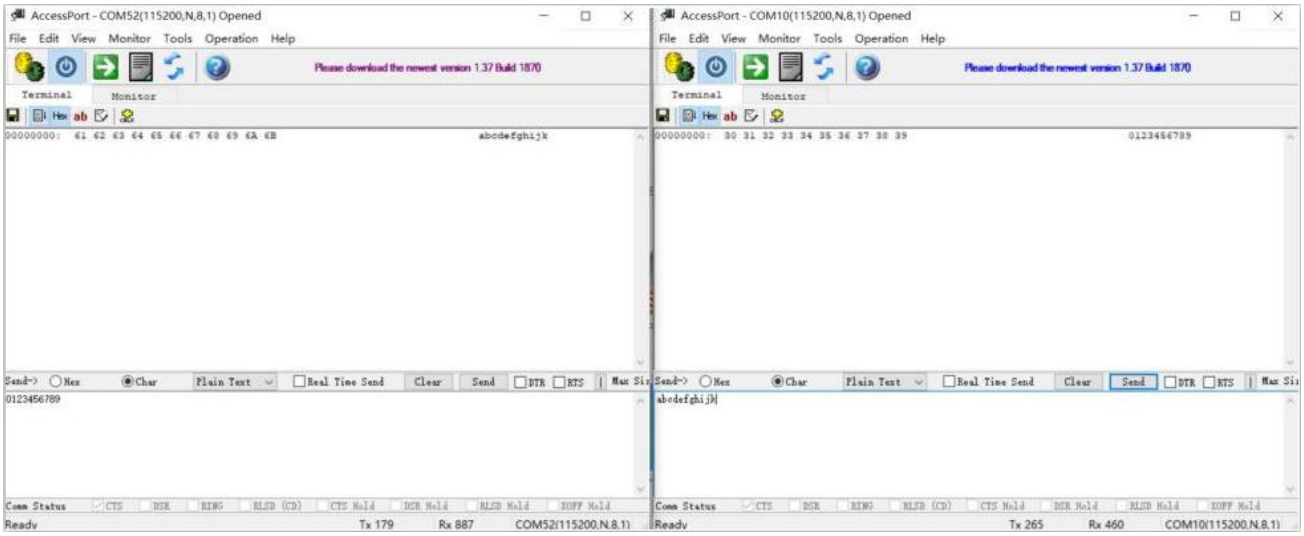


Figure 7 - Host data transparent transmission diagram

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7.2.2 Format Transmission

1. Same as 7.2.1 Data Transmission Step 1;
2. Set to format transmission (default format transmission, set command "AT+TRANMD=0")
3. Same as step 3 of 7.2.1 Data Transmission ;
6. 0 123456789" (ASCII) to the slave . The format of the data package is "00 30 31 32 33 34 35 36 37 38 39" (HEX). At this time, the data received by the slave is " 0 123456789" ("30 31 32 33 34 35 36 37 38 39").

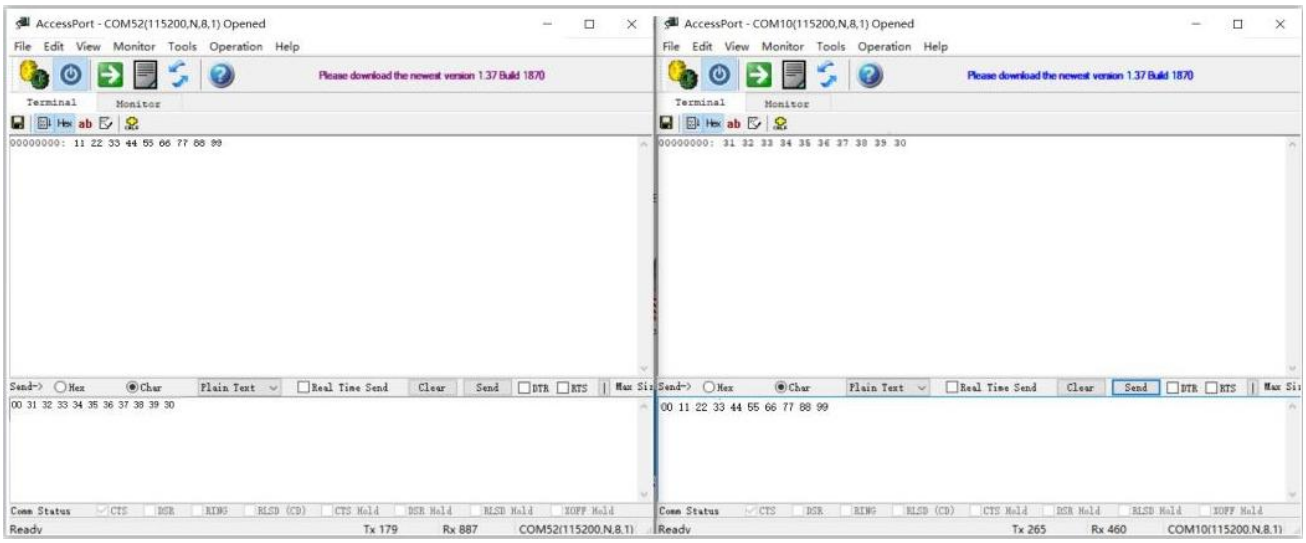


Figure 7 - 8 format transmission - Master-slave sending data to slave

7. The slave sends data "11 22 33 44 55 66 77 88 99" (hex) to the host, and the host receives the data "11 22 33 44 55 66 77 88 99" (HEX). As long as the format transmission is turned on, the first byte is the send IDX. The master and slave can use different transmission modes, but the input needs to meet the transmission rules.

   For details about data transmission, refer to 5.3 Data Transmission Mode .

Test conditions:

- Configure one module as the master and one module as the slave according to the AT command table configuration mode quick start guide ;
- Test software: XCOM.
- Other parameters are default settings.

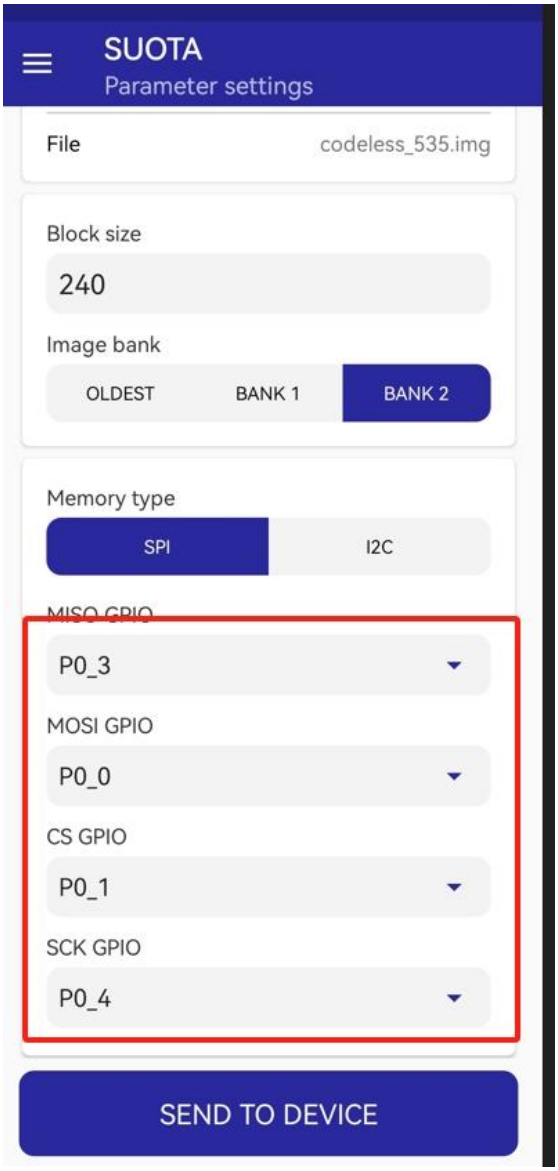
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7.3 OTA Upgrade

7.3.1 Preparation

- Download the SUOTA app: Renesas Bluetooth® Low Energy Mobile Application Suite | Renesas .
- Upgrade firmware: xxx.img.
- The APP configuration is as follows:



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8 Frequently Asked Questions

8.1 The transmission distance is not ideal

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

8.2 Modules are easily damaged

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

8.3 The bit error rate is too high

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

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9 Welding Operation Instructions

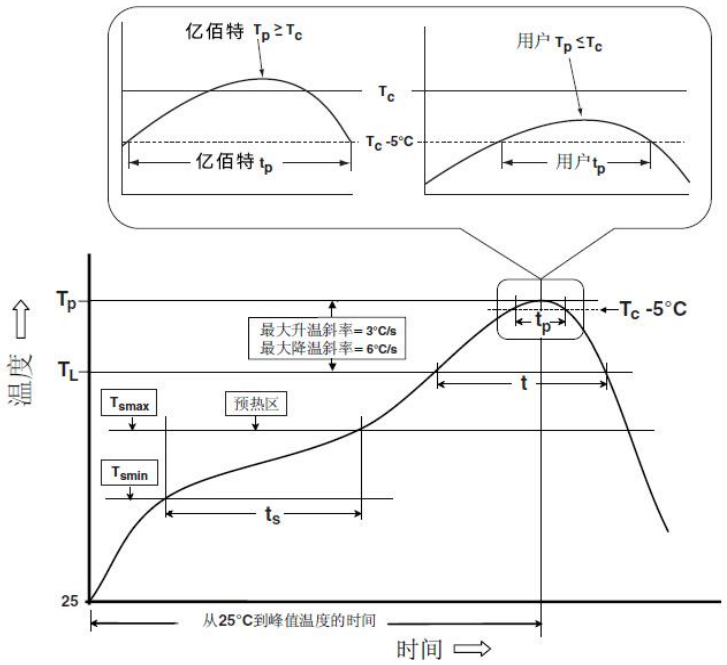
9.1 Reflow Temperature

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

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9.2 Reflow Oven Curve



10 Related Models

Product Model	Chip Solutions	Operating frequency Hz	emission power dBm	Communication interface	Support Agreement B LE	Product size mm	antenna form	Features
E72-2G4M05S1B	C C2640	2.4G	5	I/O	4.2	17.5* 28.7	P CB/IPX	Hardware resources Secondary development
E73-2G4M04S1A	n RF52810	2.4G	4	I/O	4.2/5.0	17.5* 28.7	P CB/IPX	Hardware resources Secondary development
E73-2G4M04S1B	n RF52832	2.4G	4	I/O	4.2/5.0	17.5 * 28.7	P CB/IPX	Hardware resources Secondary development
E73-2G4M08S1C	n RF52840	2.4G	8	I/O	4.2/5.0	1 3 * 18	P CB/IPX	Hardware resources Secondary development

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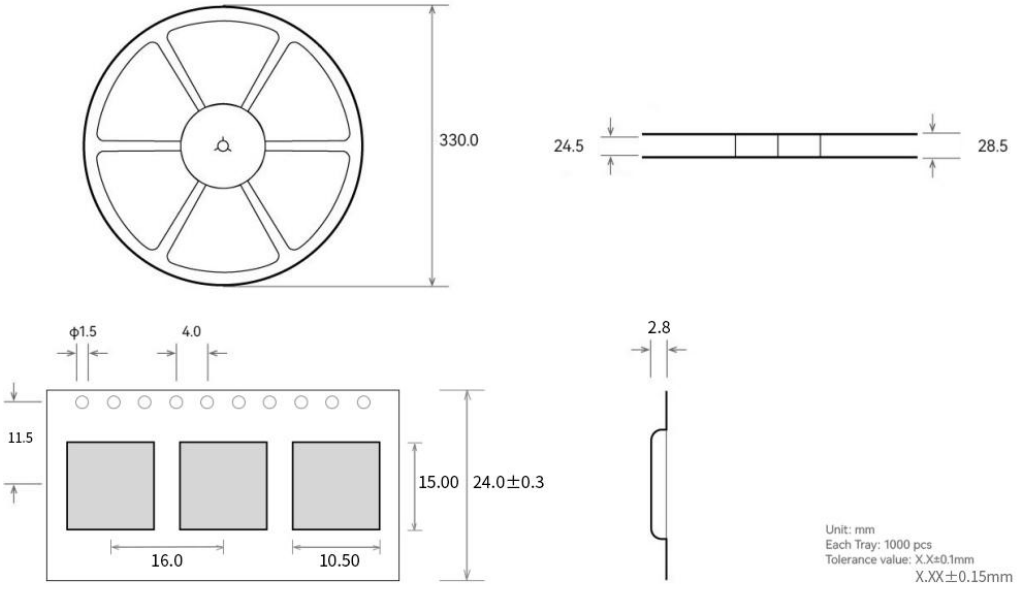
E73-2G4M04S1D	n RF51822	2.4G	4	I/O	4.2	1 7.5 * 28.7	P CB/IPX	Hardware resources Secondary development
E104-BT01	CC2541	2.4G	0	I/O	4.0	14*22	P CB	Hardware resources Secondary development
E104-BT02	DA14580	2.4G	0	TTL	4.2	14*22	P CB	The industry's lowest power consumption High-speed continuous transmission sniffing
E72-2G4M04S2B	C C2640	2.4G	2	TTL	4.2	14*2 3	P CB/IPX	Built-in ARM dual-core Multi-role mode
E104-2G4U04A	C C2540	2.4G	0	USB	4.0	1 8 * 59	P CB	Dongle Protocol Analyzer
E104-BT5010A	nRF52810	2.4G	0	UART	5.0	1 1.5 * 16	Ceramic antenna	Low power consumption, transparent transmission

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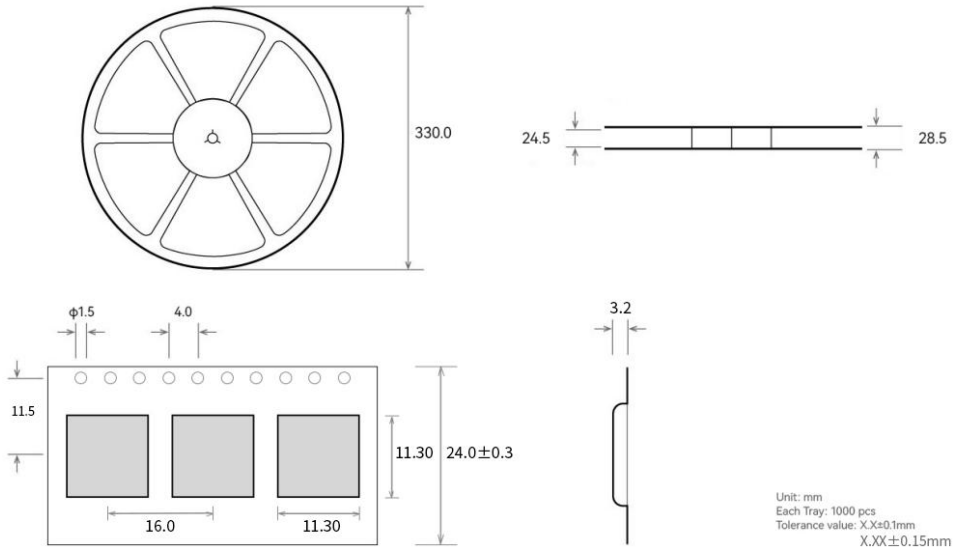
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11 Bulk packaging method

E104-BT52&E104-BT52-V5.3



E104-BT52X&E104-BT52X-V5.3



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12 Revision History

Version	Revision Date	Revision Notes	Maintainer
1.0	2022-10-12	Merger Manual	Bin
1.1	2023-03-30	Error Correction	Bin
1.2	2023-05-09	Error Correction	Bin
1.3	2023-09-13	Error Correction	Bin
1.4	2024-03-28	Error Correction	Bin
1.5	2024-04-22	Error Correction	Bin
1.6	2024-06-18	Error Correction	Bin
1.7	2024-08-07	Modify the broadcast device name size limit	Bin
1.8	2024-12-04	Newly added E104-BT52PX	Bin
1.9	2025-02-06	Error Correction	Bin
2.0	2025-8-21	New models	Hao
2.1	2025-11-26	Error Correction	Bin
2.2	2025-12-22	Error Correction	Hao
2.3	2026-01-09	Error Correction	Bin
2.4	2026-03-31	Error Correction	Bin
2.5	2026-07-20	Error Correction	Bin

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