E104-BT40 User Manuel

Dual-mode Bluetooth Module V4.2 Protocol



Chengdu Ebyte Electronic Technology Co.,Ltd.

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1. Overview

1.1 Brief Introduction



E104-BT40 module is a serial to dual-mode Bluetooth slave module based on Bluetooth 4.2 + 3.0 version, namely low power consumption Bluetooth BLE and classic Bluetooth SPP Profile, which can freely switch between BLE and Classic Bluetooth, working at 2.4GHz.

The E104-BT40 module uses general AT commands to set parameters, and the operation is simple and fast. The module only supports the Bluetooth slave role.

Through this module, traditional low-end serial devices or MCU-controlled devices can perform wireless data transmission. It is a low cost, simple and reliable data transmission module.

1.2 Features

- Bluetooth Specification V4.2 +3.0 protocol available；
- AT command configuration available;
- Support BLE；
- SPP 3.0；
- GPIO input / output;
- 2-way PWM outputs;
- 249 bytes of serial buffer;
- Effective communication distance over 30 meters;
- Global license-free ISM 2.4GHz frequency band;
- 1 ~ 2Mbps air rate;
- Built-in PCB on board antenna, no external antenna required.

1.3 Application

- Bluetooth wireless data transmission;
- Wireless meter reading and wireless sensing;
- Smart home, industrial control;
- Industrial remote control and telemetry;
- Smart buildings, smart construction;
- Automatic data collection;
- Health sensor;
- Automotive testing equipment;
- Smart robot.

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2. Specification and Parameter

2.1 Limit parameter

Main Parameter	Performance		Note
	Min	Max	
Voltage supply [V]	0	3.6	Voltage over 3.6V will cause permanent damage to module
Blocking power [dBm]	-	10	Chances of burn is slim when modules are used in short distance
Operating temperature [℃]	-40	+85	Industrial grade

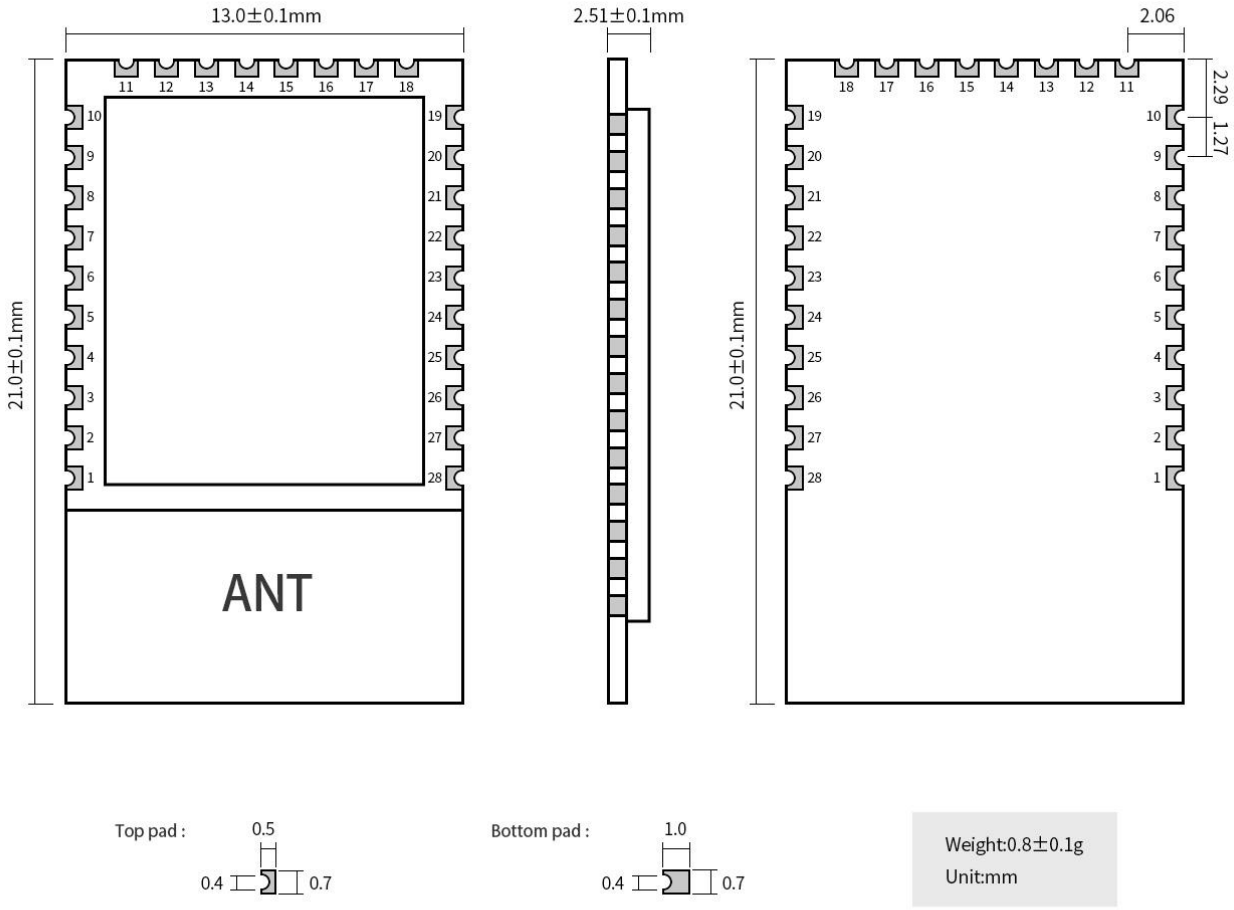
2.2 Operating parameter

Main parameter		Performance			Note
		Min	Typ	Max	
Operating voltage[V]		2.5	3.3	3.6	≥3.3 V ensures output power
Communication level [V]		-	3.3	-	For 5V TTL, it may be at risk of burning down
Operating temperature [℃]		-40	-	+85	
Frequency [MHz]		2400	-	2480	
Power consumption	Idle state （mA）	3.9	-	6	
	BLE connection （mA）	-	3.26	9.2	
	SPP connection （mA）	-	6.78	9.2	
Transmitting power [dBm]		-	3	-	
Receiving sensitivity [dBm]		-	-96	-97	

Main parameter	Description	Note
Reference distance	30m	
Transmission length	SPP 100Bytes BLE 20Bytes	SPP payload 100 bytes BLE payload 20 bytes
Bluetooth protocol	V4.2+V3.0 SPP	
Communication interface	UART	All I / Os of the microcontroller are exported, see the chip manual for details
Package	SMD	
Connector	1.27mm	
Size	21*13mm	
Antenna	PCB	50Ω Impedance

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3. Size and pin definition



Pin No.	Definition	Direction	Function	Description
1	GND	-	Power supply	Power supply reference
2	TXD	Output	Serial data transmission	Module outputs serial data to external
3	RXD	Input	Serial data reception	Module receives external serial data
4	P02	Output	General output IO	User can set output level
5	P03	Output	General output IO	User can set output level①
6	P04	-	-	NC
7	P05	-	-	NC
8	P06	-	-	NC

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9	P07	-	-	NC
10	GND	-	Power supply	Power supply reference
11	P10	Input	General input IO	User can read IO level,internal pull-up
12	P11	Input	General input IO	User can read IO level,internal pull-up
13	PWM2	Output	Output PWM	User configures output PWM wave
14	PWM3	Output	Output PWM	User configures output PWM wave②
15	P33	-	CTS	
16	P34	-	RTS	
17	VCC	-	3.3V	Power supply input
18	GND	-	Power supply	Power supply reference
19	GND	-	Power supply	Power supply reference
20	NC	-	-	
21	NC	-	-	
22	NC	-	-	
23	RST	-	Reset pin	Active low level
24	STATUS	Output	State indicator LED	Bluetooth is not connected: output frequency is 1Hz square wave Bluetooth is connected: Low level
25	MODE	Input	Mode selection	High level: configuration mode ③ Low level: transparent transmission mode
26	DISC	Input	Disconnection	Internal pull-up, valid on falling edge
l27	LINK	Output	Connection state	Bluetooth is not connected: high level Bluetooth is connected: Low level
28	GND	-	Power supply	Power supply reference

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

② The PWM is turned off by default. After setting, the PWM will still be output according to the set parameters after the next power-on;

③ Mode pin switching mode is only valid after connection established.

4. Quick start

Debug / test recommended software recommended:

- PC serial port tool -SSCOM.exe or AccessPort
- Mobile terminal ble debugging APP BLE-nRF connect Classic Bluetooth-Bluetooth serial assistant

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4.1 Quick start guide.

- The AT command mode is used when the module is not connected. When the connection is established, the module enters transparent transmission mode, the AT command mode can be entered by pulling the MODE pin low, and return to transparent transmission mode by pulling the MODE pin high.
- Set related configuration of the serial tool (default configuration: 115200,8,1, none, none), as shown in the diagram below:

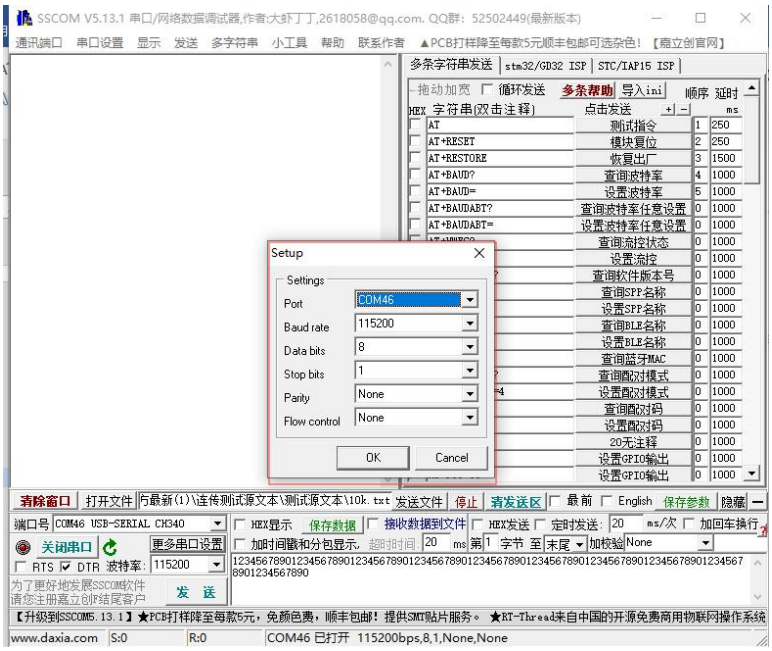


Diagram 4-1-1 SSCOM Parameter configuration

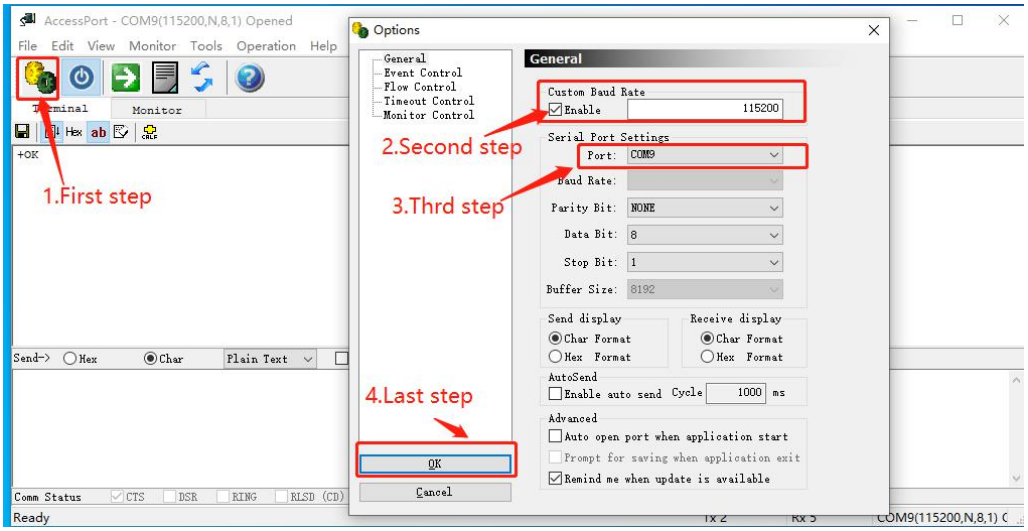


Diagram 4-1-2 AccessPort Parameter configuration, other parameters default

- Send the AT command to configure module according to the instructions shown in the 6.4 instruction diagram and the instructions in section 6.2

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4.2 Configuration over air

- Configuration over air can be used only when BLE role is connected.
- Open the APP “nRF connect”, start scanning the device, find the device "CDEBYTE_BLE" and connect it.

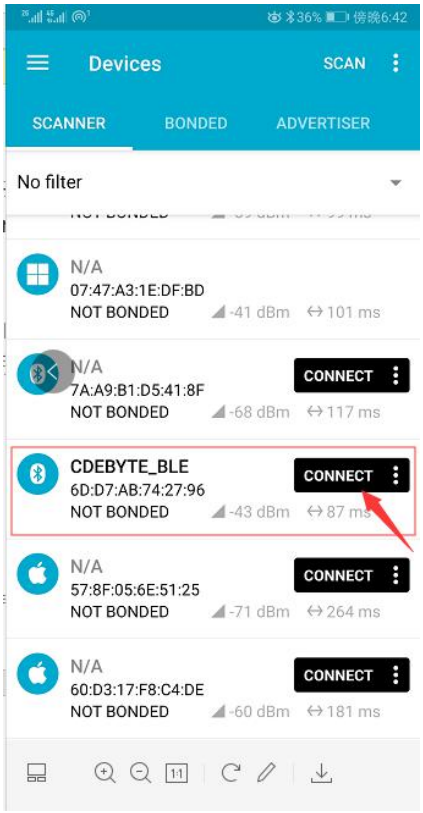


Diagram 4-2 nRF connect scan list diagram

- Open the service UUID of FFIO and open the configuration channel write

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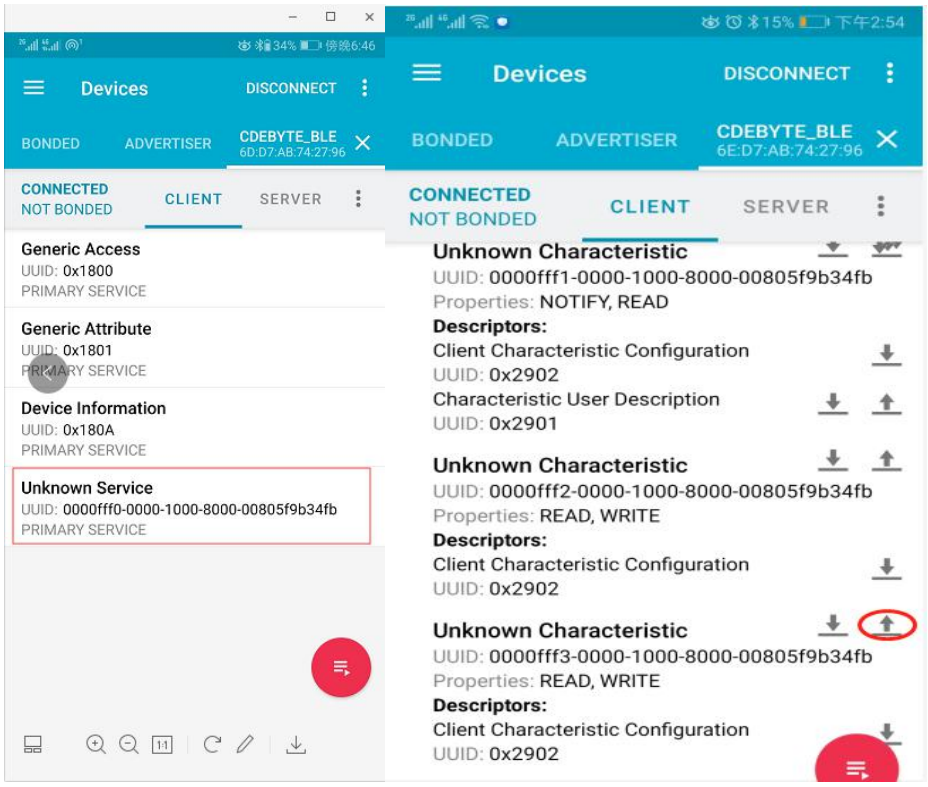


Diagram 4-3 nRF connect Connect and open channel write

- Send authentication command: AT+AUTH=123456, the module returns “0x2B-4F-4B-0D-0A”to indicate that the authentication is successful

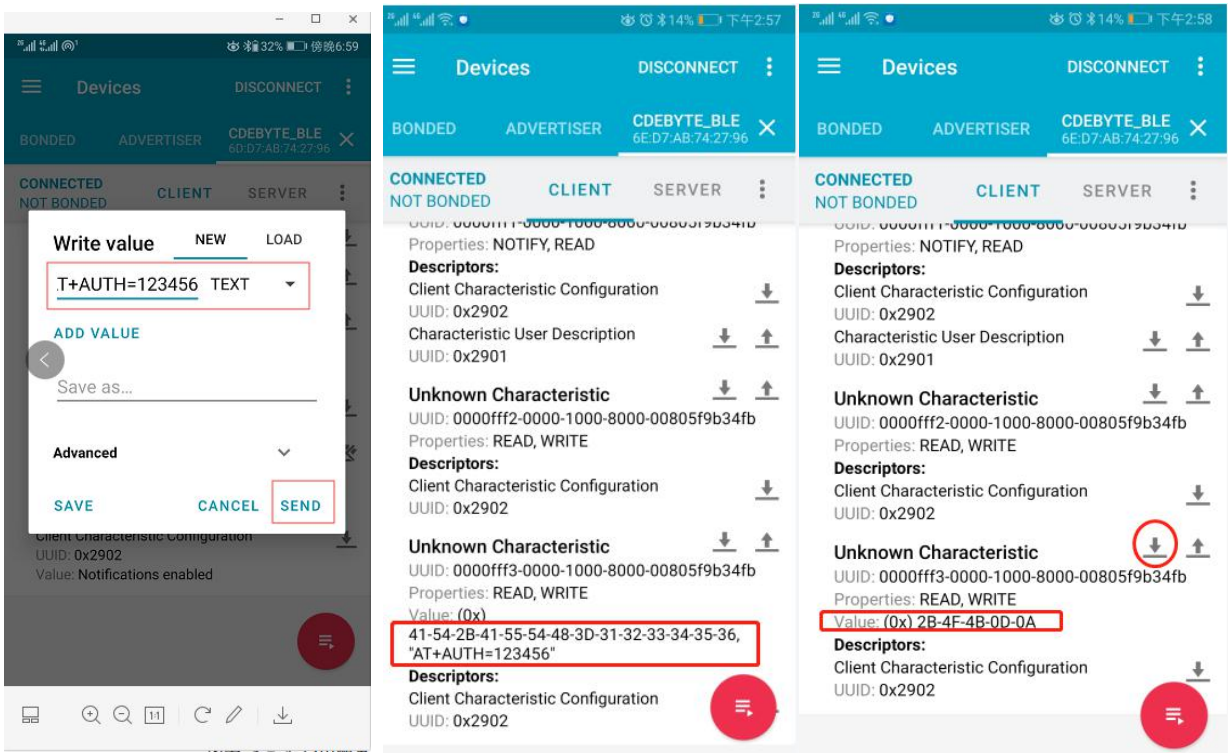


Diagram 4-4 RF connect Aerial configuration process

- Configure the module according to the instructions shown in the instruction diagram in section 6.4 and the instruction description in section 6.2

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- Refer to the instruction diagram in section 6.4 for the returned message format. Some instruction may display several 0x00, which can be ignored.
  When the message returned by an Apple user is too long, such as querying the Bluetooth name, it may only display 22 bytes depending on the APP. In this case, please limit the set value to a reasonable length.

4.3 Data transmission

Module powered on, classic Bluetooth and BLE are both discoverable. Please refer to section 5.2 for data transmission precautions.

Test Conditions:

Use mobile phone as master and module as slave
Serial port tool: SSCOM or AccessPort
Other parameters are default configuration

4.3.1 SPP Data transparent transmission

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

2. Open the Bluetooth serial assistant and search for the Bluetooth name: CDEBYTE_SPP, connect, serial print STA: connect: [mac]

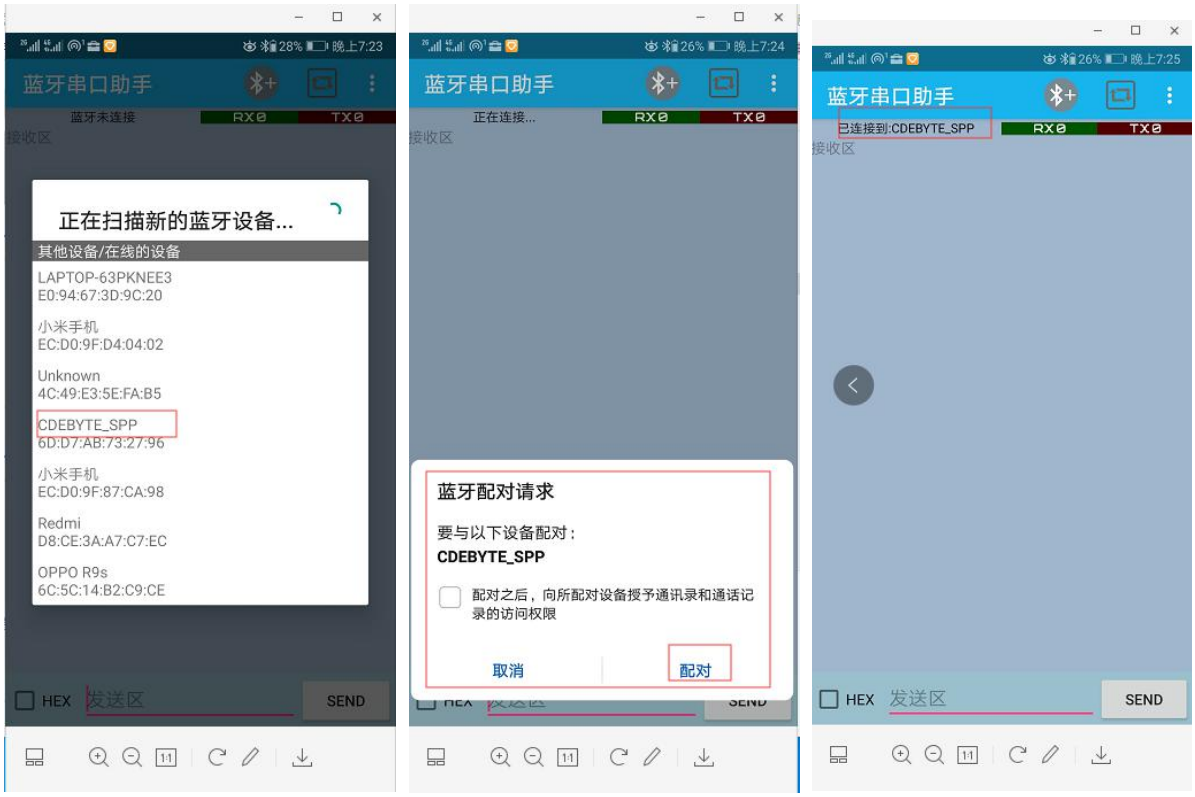


Diagram 4-4 Bluetooth serial APP connection process

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3. Print “STA：connected” after the module is successfully connected, and the LINK pin is low.

4. Mobile phone app or open serial port to start data transparent transmission.

4.3.2 BLE Data transparent transmission

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

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

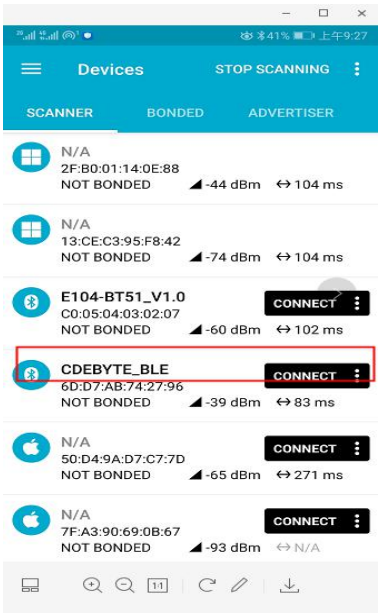


Diagram 4-6 Search for BLE device

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

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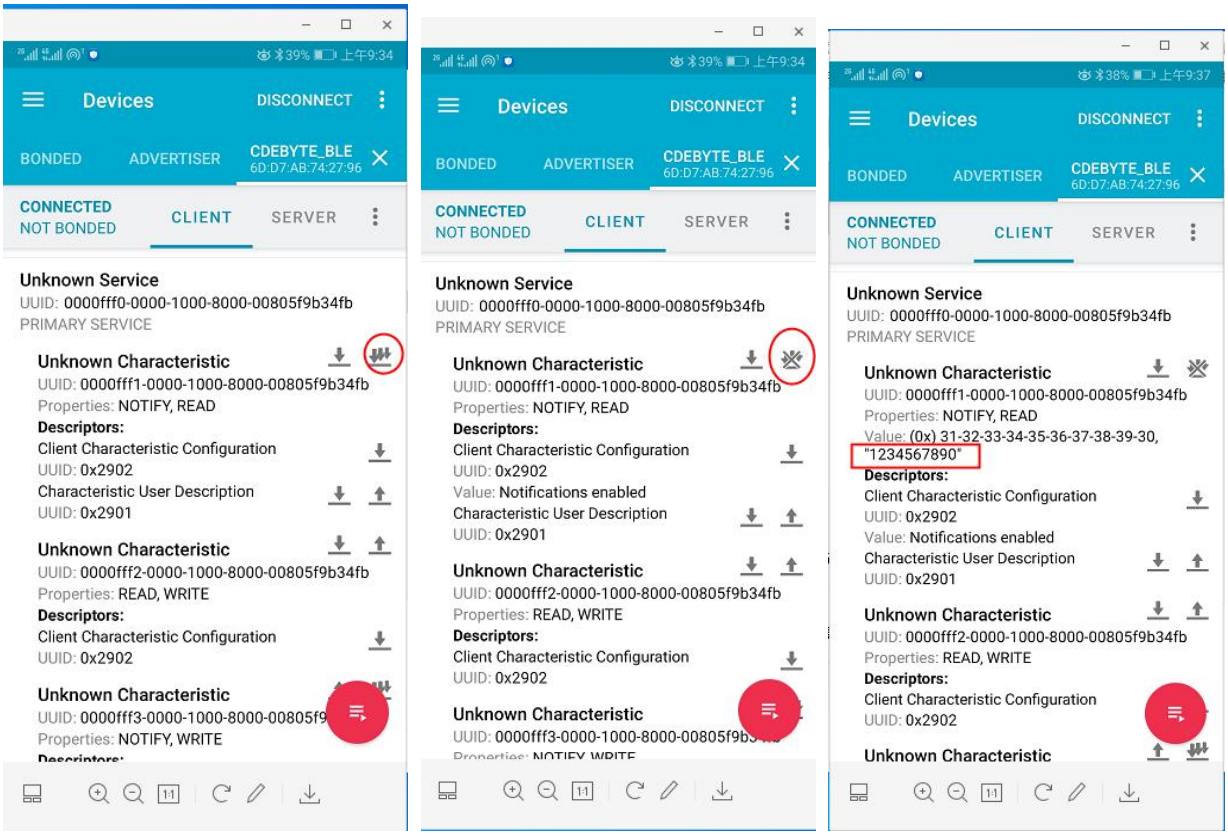


Diagram 4-7 nRF connect Open notifications and receive data

4.nRF connect sends“asdfghjkl”

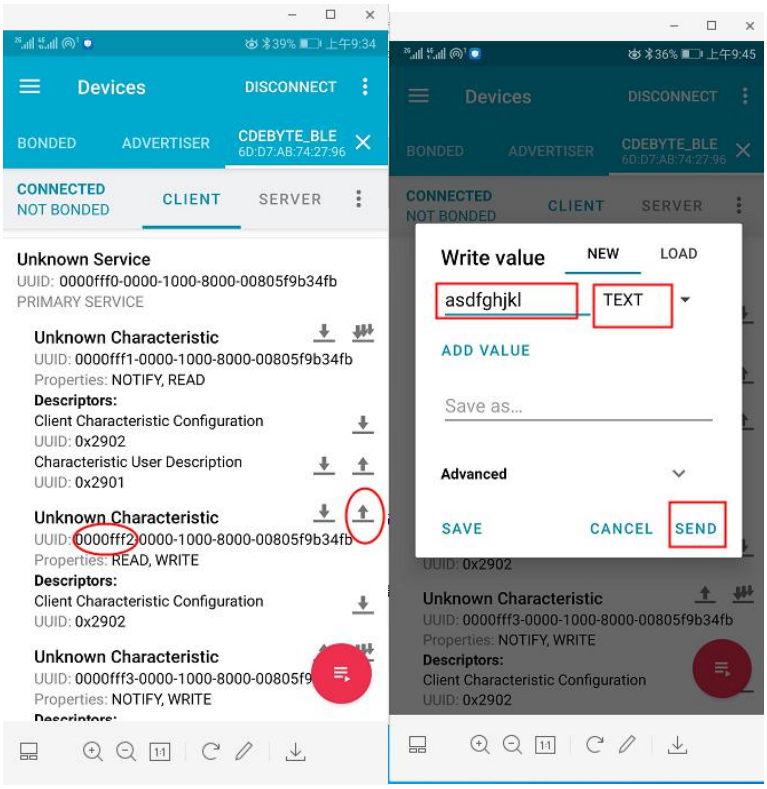


Diagram 4-8 nRF connect Write data and sending

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4.4 Others

The module can receive AT commands after power on for about 120ms.
It takes 1500ms for the module to power on until Bluetooth initialization is complete.
The recommended interval for BLE disconnection and reconnection is 1500ms.

5.Function description

5.1 configuration

The module supports two configuration modes: serial port configuration and air configuration (BLE). Before air configuration, the password must be verified by AT + AUTH = 123456 (initial password) and air configuration is only allowed afterwards. The air configuration authentication cycle is the current connection. If the device is disconnected, re-connection requires re-authentication.

When disconnected, the module is always in configuration mode. The MODE pin is invalid at this time.

After connected successfully, determine whether the module is currently in configuration mode or data transmission mode based on the MODE pin level. When the MODE pin is high level, it is a data transmission mode, and when it is low level, it is a configuration mode.

When the MODE pin detects a valid change, latch the current state. The holding time for each state change is valid for more than 200ms.

5.2 MAC Address binding

Classic Bluetooth supports MAC address binding. For example, enable MAC address binding, the device only connects to the set MAC address.

5.3 Status or event printing

The command AT + LOGMSG configures to enable the serial port printing function of status information, which includes: initialization, connection, disconnection, the format is as follows:

Status	Printing information
Connected	\r\nSTA:connected:[MAC]\r\n
Disconnected	\r\nSTA:disconnected\r\n

5.4 Classic Bluetooth pairing

No.	Pairing mode	Description	AT command

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0	pin code	Pairing code entered by phone	AT+PIN
1	no input output	Pairing request confirmed by phone	-
2	Passkey	passkey entered by Module	AT+PASSKEY
3	confirm	Users confirms by AT instruction after the module displays "confirmation code"	AT+CONFIRM

Pin code pairing requires a mobile phone or computer terminal to enter PIN code, that is, the PIN code (AT + PIN command) set by the module, and the connection can be established only after the input is correct. If the host is a module, the host and the module can set the same PIN code.

No input output pairing, phone confirmation needed only

Passkey pairing: Mobile phone terminal gives 6-bit ASCII code randomly, the module uses AT + PASSKEY command to enter the 6-bit ASCII code to establish a connection.

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

5.5 UUID Description

Service UUID	FFF0		
Eigenvalue	UUID	Attribute	Description
SLAVE CHANNEL	FFF1	read/notify	Slave sends data, master receives data channel
MASTER CHANNEL	FFF2	read/write	Master sends data,slave receives the data channel
CONFIG CHANNEL	FFF3	read/write	Air configuration channel

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

5.6 Package mechanism

Regardless of the baud rate of data transmission, it is recommended to do check retransmit processing at the upper level.

When E104-BT40 module is in BLE mode, serial port can process a maximum of 100 bytes of data packets at a time, packed into a packet of 20 bytes. The data packets sent by the mobile device (Android 5.0 or lower) to the module must be sub-packed (1-20 bytes / packet) and sent. After receiving the data packet, it will be forwarded to the serial port of the module in turn.

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When E104-BT40 module is in SPP mode, serial port can receive and process a maximum of 249 bytes of data packets at a time. The data packet sent by the mobile device to the module, please send it by sub-packaging (1-121 bytes / packet).

Packing interval description:

BLE inserts 20ms every 20 bytes

spp insert 20ms every 100 bytes

6. AT Command

6.1 Default parameters

Baud rate	115200
Flow Control	Off
Any baud rate setting of serial port	Off
SPP name	CDEBYTE_SPP
BLE name	CDEBYTE_BLE
Pairing code	1234
Pairing mode	1（no input output）
Two-way output IO	Low level
Two-way PWM	Off
Enable MAC binding	Off
Bind MAC	FF FF FF FF FF FF
Status printing	Off
Air configuration password	123456
16-bit Service uuid	FFF0①
16-bit Slave channel uuid	FFF1
16-bit Master channel uuid	FFF2

① :128-bit UUID is 00 00 xx xx 00 00 10 00 80 00 00 80 5f 9b 34 fb
xx xx is 16-bit UUID.

6.2 Command description

All AT commands do not need to return (\ r), line feed (\ n)

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

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

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6.3 AT Command error code description

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

NUM	Description	Cause	Solution
-0	Command does not exist	AT Command character error	Check character string
-1	Parameter length error	1、 Parameter total length is too long 2、 parameter length is not enough	According to the AT Command manual, check the parameter length according to the "Description"
-2	Invalid parameter	Parameter does not meet the value range	View parameter value range by referring to instruction
-3	Command exists but does not support the operation	Only command was entered, error example: AT + BAUD Correct example: AT + BAUD?	Compare command and determine operation
-4	Unconnected	Module is not connected	-
-5	Turn off any baud rate setting is not allowed	Turn off the baud rate arbitrarily before setting the baud rate to a value other than the normal baud rate Baud rate is a value other than the normal baud rate before turning off any setting of baud rate	Set the baud rate to normal before turning off any setting of the baud rate
-6	Exceed buffer length	Input AT command and parameter total length is too long	Check AT Command and that the total length of parameter does not exceed 250 bytes
-7	Command invalid now	-	-
-8	Module is connected	This command does not support operation in the connected state	-
-9	No air configuration authentication	Command can be sent after using AT+AUTH Command to authentication	
-10	Air configuration authentication failed	Wrong password	1. Use the correct password 2.Reconfigurate via serial port
-11	Unknown error		-

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6.4 Command list

6.4.1 AT Test command

Command	Response
AT	+OK
Description：No	

6.4.2 AT+RESET Reset command

Command	Response
AT+RESET	+OK
Description：Immediate effect	

6.4.3 AT+RESTORE Restore factory command

Command	Response
AT+RESTORE	+OK
Description： 1. Restart to take effect. After setting successfully, restart immediately; 2.In the process of restoring the factory settings, any kind of reset is prohibited, and the power off is prohibited before the operation is completed.	

6.4.4 AT+BAUDABT On/Off any baud rate setting

Command		Response
Inquiry	AT+BAUDABT?	+OK=[para]
Setting	AT+BAUDABT=[para]	+OK：Success +ERR=[NUM]：Error
Parameter		
Description	Takes effect immediately, save when power off Before closing any baud rate setting, if the baud rate is not regular, modify it to a regular baud rate and then close	

para(ASCII)	Description
0	Off(Default)
1	On

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Example	Open any baud rate setting：AT+BAUDABT=1

6.4.5 AT+BAUD Serial port baud rate

Command		Response
Query	AT+BAUD?	+OK=[para]
Setting	AT+BAUD=[para]	+OK:Success +ERR=[NUM]:error
Parameter	para(ASCII) / Regular baud rate(bps) 0 / 4800 1 / 9600 2 / 14400 3 / 19200 4 / 28800 5 / 38400 6 / 57600 7 / 76800 8 / 115200(Default) Turn on any baud rate setting (default is off): para [ASCII]: Any integer value between 4800 and 115200, including 4800 and 115200.	
Description	Restart to take effect，save when power off	
Example	Default: Query: AT + BAUD? Response: + OK = 8 Setting: AT + BAUD = 1. Set the baud rate to 9600 Response: + OK When turning on any baud rate setting: Query: AT + BAUD? Response: + OK = 9600 Setting: AT + BAUD = 9900 Response: + OK = 9900	

6.4.6 AT+HWFC Flow control

Command		Response
Query	AT+HWFC?	+OK=[para]
Setting	AT+HWFC=[para]	+OK：Success

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		+ERR=[NUM]：Error
Parameter	<table><tr><th>para(ASCII)</th><th>Description</th></tr><tr><td>0</td><td>Off(Default)</td></tr><tr><td>1</td><td>On</td></tr></table>	
Description	Restart to take effect, save when power off	
Example	Turn on flow control：AT+HWFC=1	

6.4.7 AT+DEVSWVER Software version number

Command		Response
Query	AT+DEVSWVER?	+OK=[para]
Parameter	para(ASCII code):Device software version Factory default：V1.0	

6.4.8 AT+SPPNAME SPP Name

Command		Response
Query	AT+SPPNAME?	+OK=[para]
Setting	AT+ SPPNAME =[para]	+ERR=[NUM]：Error
Parameter	para(ASCII code):SPP name Factory default:CDEBYTE_SPP	
Description	1. It takes effect after restart or BLE disconnect, save when power off 2. The name length is 1~32 bytes	

6.4.9 AT+BLENAME BLE Broadcast name

Command		Response
Query	AT+BLENAME?	+OK=[para]
Setting	AT+ BLENAME =[para]	+ERR=[NUM]：Error
Parameter	para(ASCII code):BLE Broadcast name Factory default:CDEBYTE_BLE	
Description	1、It takes effect after restart or BLE disconnect, save when power off 2、ASCII code length is 1~20 bytes	

6.4.10 AT+MAC SPP MAC Address

Command	Response

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Query	AT+MAC?	+OK=[para]
Parameter	para(HEX):MAC Address	
Description	Restart immediately after setting completed Setting SPP MAC as well as BLE MAC address. The fourth byte of the BLE MAC address is 1 larger than the SPP.	
Example	Command：AT+MAC? Return：2B 4F 4B 3D FE 30 EE 50 35 DA （SPP MAC Address） BLE MAC Address ： FE 30 EE 51 35 DA	

6.4.11 AT+PAIRMODE Classic Bluetooth pairing mode

Command		Response
Query	AT+PAIRMODE?	+OK=[para]
Setting	AT+ PAIRMODE =[para]	+OK:Success +ERR=[NUM]：Error
Parameter		
Description	Restart to take effect, save when power off	
Example	AT+PAIRMODE=0	

para(ASCII)	Description
0	Pin code
1	No input output(Default)
2	passkey
3	confirm

6.4.12 AT+PIN Classic Bluetooth pairing code

Command		Response
Query	AT+PIN?	+OK=[para]
Setting	AT+PIN=[para]	+OK:Success +ERR=[NUM]：Error
Parameter	para(ASCII):The value range of each bit is 1~9 Factory default:1234	
Description	1. The next connection takes effect, save when power off 2.4 or 6 bytes in length	
Example	AT+PIN=123456	

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6.4.13 AT+P02 P02 Output

<table>
<tr><th colspan="2">Command</th><th>Response</th></tr>
<tr><td>Setting</td><td>AT+P02=[para]</td><td>+OK:Success
+ERR=[NUM]:Error</td></tr>
<tr><td>Parameter</td><td colspan="2"><table><tr><th>para(ASCII)</th><th>Description</th></tr><tr><td>0</td><td>Low level(Default)</td></tr><tr><td>1</td><td>High level</td></tr></table></td></tr>
<tr><td>Description</td><td colspan="2">1.Takes effect immediately, save when power off
2.After the next power-on, the IO remains at this level</td></tr>
<tr><td>Example</td><td colspan="2">Command：AT+P02=1
Response：+OK</td></tr>
</table>

6.4.14 AT+P03 P03 Output

<table>
<tr><th colspan="2">Command</th><th>Response</th></tr>
<tr><td>Setting</td><td>AT+P03=[para]</td><td>+OK:Success
+ERR=[NUM]:Error</td></tr>
<tr><td>Parameter</td><td colspan="2"><table><tr><th>para(ASCII)</th><th>Description</th></tr><tr><td>0</td><td>Low level(Default)</td></tr><tr><td>1</td><td>High level</td></tr></table></td></tr>
<tr><td>Description</td><td colspan="2">1.Takes effect immediately, save when power off
2.After the next power-on, the IO remains at the set level</td></tr>
<tr><td>Example</td><td colspan="2">Command：AT+P03=1
Response：+OK</td></tr>
</table>

6.4.15 AT+P10 P10 Input

<table>
<tr><th colspan="2">Command</th><th>Response</th></tr>
<tr><td>Query</td><td>AT+P10?</td><td>+OK=[para]</td></tr>
<tr><td>Parameter</td><td colspan="2"><table><tr><th>para(ASCII)</th><th>Description</th></tr><tr><td>0</td><td>Low level</td></tr><tr><td>1</td><td>High level(Default)</td></tr></table></td></tr>
</table>

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6.4.16 AT+P11 P11 Input

Command		Response
Query	AT+P11?	+OK=[para]
Parameter		

para(ASCII)	Description
0	Low level
1	High level(Default)

6.4.17 AT+PWM2 PWM2 Output

Command		Response
Setting	AT+PWM2 =[para]	+OK:Success +ERR=[NUM]:Error
Parameter	para:0~100(ASCII) 0 turn off PWM(Default)	
Description	Takes effect immediately, save when power off. The parameter output PWM will maintain at the next power-on.	
Example	Command：AT+PWM2=0 Response：+OK	

6.4.18 AT+PWM3 PWM3 Output

Command		Response
Setting	AT+PWM3 =[para]	+OK:Success +ERR=[NUM]:Error
Parameter	para:0~100(ASCII) 0 Turn off PWM(Default)	
Description	Takes effect immediately, save when power off. The parameter output PWM will maintain at the next power-on.	
Example	Command：AT+PWM3=0 Response：+OK	

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6.4.19 AT+DISCON Disconnect the current connection

Command		Response
Setting	AT+DISCON	+OK：Success +ERR=[NUM]：Error
Description	Bluetooth disconnect after a short time	

6.4.20 AT+LOGMSG Running status output

Command		Response
Query	AT+LOGMSG?	+OK=[para]
Setting	AT+LOGMSG=[para]	+OK:Success +ERR=[NUM]：Error
Parameter	para(ASCII): Description 0: Off (Default) 1: On	
Description	Takes effect immediately, save when power off.	
Example	Command：AT+LOGMSG=1 Response：+OK	

6.4.21 AT+CLOSESPP Close SPP

Command		Response
Setting	AT+CLOSESPP	+OK：Success
Description	Takes effect immediately	

6.4.22 AT+OPENSPP Open SPP

Command		Response
Setting	AT+OPENSPP	+OK：Success
Description	Takes effect immediately	

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6.4.23 AT+STATE Query Bluetooth state

Command		Response
Query	AT+STATE?	+OK=[para]
Parameters		

para(ASCII)	Description
0	Dual mode waiting for connection
1	SPP connected
2	BLE connected
3	SPP closed

6.4.24 AT+BOND Binding enable

Command		Response
Query	AT+BOND?	+OK=[para]
Setting	AT+BOND=[para]	+OK:Success +ERR=[NUM]：Error
Parameter		

para(ASCII)	Description
0	Binding off(Default)
1	Binding on

Description	Takes effect immediately, save when power off.
Example	Command：AT+BOND=1 Response：+OK

6.4.25 AT+BONDMAC Binding MAC Address

Command		Response
Query	AT+BONDMAC?	+OK=[para]
Setting	AT+ BONDMAC =[para]	+OK:Success +ERR=[NUM]：Error
Parameter	Para(HEX):6bytes MAC address	
Description	Takes effect immediately, save when power off.	
Example	Command：AT+BONDMAC？ Return：2B 4F 4B 3D CC 34 27 1A 0C D4	

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

6.4.26 AT+PASSKEY Enter pairing key

Command		Response
Setting	AT+ PASSKEY=[para]	+OK:Success +ERR=[NUM]：Error
Parameter	Para(ASCII):6-bit ASCII code	
Description	Takes effect immediately User serial port receives + PASSKEY, use this command to respond	
Example	Command：AT+PASSKEY=123456 Response：+OK	

6.4.27 AT+CONFIRM Classic Bluetooth password verification

Command		Response
Setting	AT+ CONFIRM=[para]	+OK:Success +ERR=[NUM]：Error
Parameter	Para(ASCII code): YES or NO	
Description	Takes effect immediately User serial port receives+CONFIRM, use this command to respond	
Example	Command：AT+CONFIRM=YES Response：AT+CONFIRM=NO	

6.4.28 AT+AUTH Air configuration password verification

Command		Response
Setting	AT+ AUTH=[para]	+OK:Success +ERR=[NUM]：Error
Parameter	Para(ASCII):6-bit ASCII code	
Description	This command is only used for air verification Default password：123456	
Example	Command：AT+AUTH=123456 Response：+OK	

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6.4.29 AT+UPDAUTH Reset authentication password

Command		Response
Setting	AT+ UPDAUTH =[para]	+OK:Success +ERR=[NUM]：Error
Parameter	Para(ASCII):6-bit ASCII code	
Description	The next authentication takes effect, save when power off	
Example	AT+ UPDAUTH=abcdef	

6.4.30 AT+UUID Query UUID

Command		Response
Query	AT+UUID?	+OK=[para1],[para2],[para3],[para4]
Parameter	para(ASCII): para1:SERVER UUID; para2:SLAVE CHANNEL Characteristic UUID; para3: MASTER CHANNEL Characteristic UUID; para3:Air configuration channel Characteristic UUID.	

6.4.31 AT+UUIDSVR Bluetooth service UUID

Command		Response
Setting	AT+ UUIDSVR=[para]	+OK:Success +ERR=[NUM]：Error
Parameter	Para (ASCII): UUID value. The value ranges from 1 to 65535, and each ASCII code ranges from 1 to 9.	
Description	Restart takes effect, save when power off	
Example	0xFFF0AT + UUIDSVR = 65520, that is, the service UUID is 0xFFF0	

6.4.32 AT+UUIDCHARA1 SLAVE CHANNEL Characteristic UUID

Command		Response
Setting	AT+ UUIDCHARA1=[para]	+OK:Success +ERR=[NUM]：Error
Parameter	Para(ASCII):UUID value. The value ranges from 1 to 65535, and each ASCII code ranges from 1 to 9.	
Description	1.Restart takes effect, save when power off	

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	2.Slave channel. Used to send data from the slave and the master to receive the data.
Example	AT+UUIDCHARA1=65521, that is, the slave channel characteristic UUID value is set to 0xFFF1

6.4.33 AT+ UUIDCHARA2 MASTER CHANNEL Characteristic UUID

Command		Response
Setting	AT+ UUIDCHARA2=[para]	+OK:Success +ERR=[NUM]：Error
Parameter	Para(ASCII):UUID value. The value ranges from 1 to 65535, and each ASCII code ranges from 1 to 9.	
Description	1.Restart takes effect, save when power off 2.Master channel. Used to send data from the master and the slave to receive data.	
Example	AT+UUIDCHARA2=65522, that is, the master channel characteristic UUID is set to 0xFFF2	

7. Hardware design

- It is recommended to use a DC stabilized power supply. The power supply ripple factor is as small as possible, and the module needs to be reliably grounded;
- Please pay attention to the correct connection of the positive and negative poles of the power supply. Reverse connection may cause permanent damage to the module;
- Please check the power supply to ensure it is within the recommended voltage otherwise when it exceeds the maximum value the module will be permanently damaged;
- Please check the stability of the power supply, the voltage can not be fluctuated frequently;
- When designing current supply circuit, 30% margin is recommended to be remained so as to ensure long-term stable operation of the whole module;
- The module should be as far away as possible from the power supply, transformers, high-frequency wiring and other parts with large electromagnetic interference;
- High-frequency digital routing, high-frequency analog routing, and power routing must be avoided under the module. If it is necessary to pass through the module, assume that the module is soldered to the Top Layer, and the copper is spread on the Top Layer of the module contact part(well grounded), it must be close to the digital part of the module and routed in the Bottom Layer;
- Assuming the module is soldered or placed over the Top Layer, it is wrong to randomly route over the Bottom Layer or other layers, which will affect the module's spurs and receiving sensitivity to varying degrees;
- It is assumed that there are devices with large electromagnetic interference around the module that will greatly affect the performance. It is recommended to keep them away from the module according to the strength of the interference. If necessary, appropriate isolation and shielding can be done;
- Assume that there are traces with large electromagnetic interference (high-frequency digital, high-frequency analog, power traces) around the module that will greatly affect the performance of the module. It is recommended to stay away from the module according to the strength of the interference. If necessary, appropriate isolation and shielding can be done;
- If the communication line uses level, 1k-5.1k resistor must be connected in series(not recommended, there is a risk of damage)
- Try to stay from some physical layers such as TTL protocol at 2.4GHz , for example: USB3.0;

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- The antenna installation structure has a great impact on the performance of the module. Be sure to keep the antenna exposed, preferably vertically. When the module is installed inside the case, a high-quality antenna extension cable can be used to extend the antenna to the outside of the case;
- The module must not be installed inside metal shield, which will greatly reduce the transmission distance.

8. FAQ

8.1 Communication range is too short

- The communication distance will be affected when obstacle exists.
- Data lose rate will be affected by temperature, humidity and co-channel interference.
- The ground will absorb and reflect wireless radio wave, so the performance will be poor when testing near ground.
- Seawater has great ability in absorbing wireless radio wave, so performance will be poor when testing near the sea.
- The signal will be affected when the antenna is near metal object or put in a metal case.
- Power register was set incorrectly, air data rate is set as too high (the higher the air data rate, the shorter the distance).
- When the power supply at room temperature is lower than the recommended low voltage, the lower the voltage is, the lower the transmitting power is.
- The use of the antenna and the module is poorly matched or the quality of the antenna itself is defective.

8.2 Module is easy to damage

- Please check the power supply and ensure it is within the recommended range. Voltage higher than the peak will lead to a permanent damage to the module.
- Please check the stability of power supply and ensure the voltage not to fluctuate too much.
- Please make sure anti-static measures are taken when installing and using, high frequency devices have electrostatic susceptibility.
- Please ensure the humidity is within limited range for some parts are sensitive to humidity.
- Please avoid using modules under too high or too low temperature.

8.3 Bit error rate is too high

- When there are co-channel signal interference nearby, be away from interference sources or modify frequency and channel to avoid interference;
- Unfavorable power supply may cause code error. Make sure that the power supply is reliable.
- The quality of extension cables and feeders is poor or too long can also cause high bit error rate.

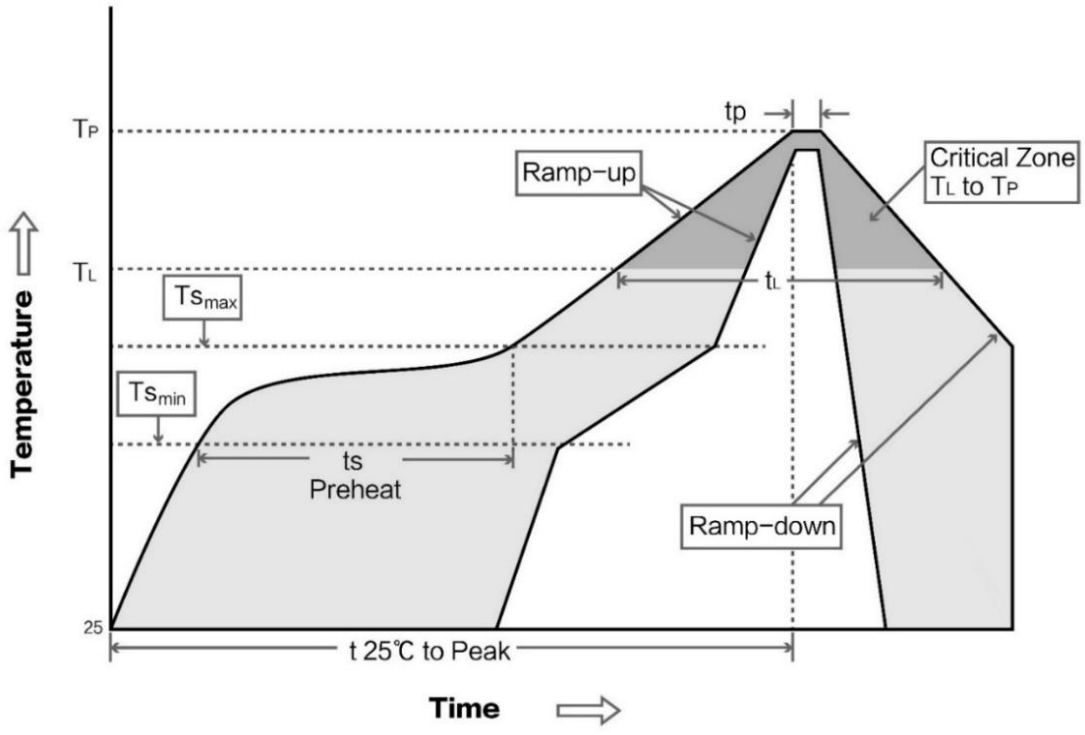
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9. Welding operation guidance

9.1 Reflow Soldering Temperature

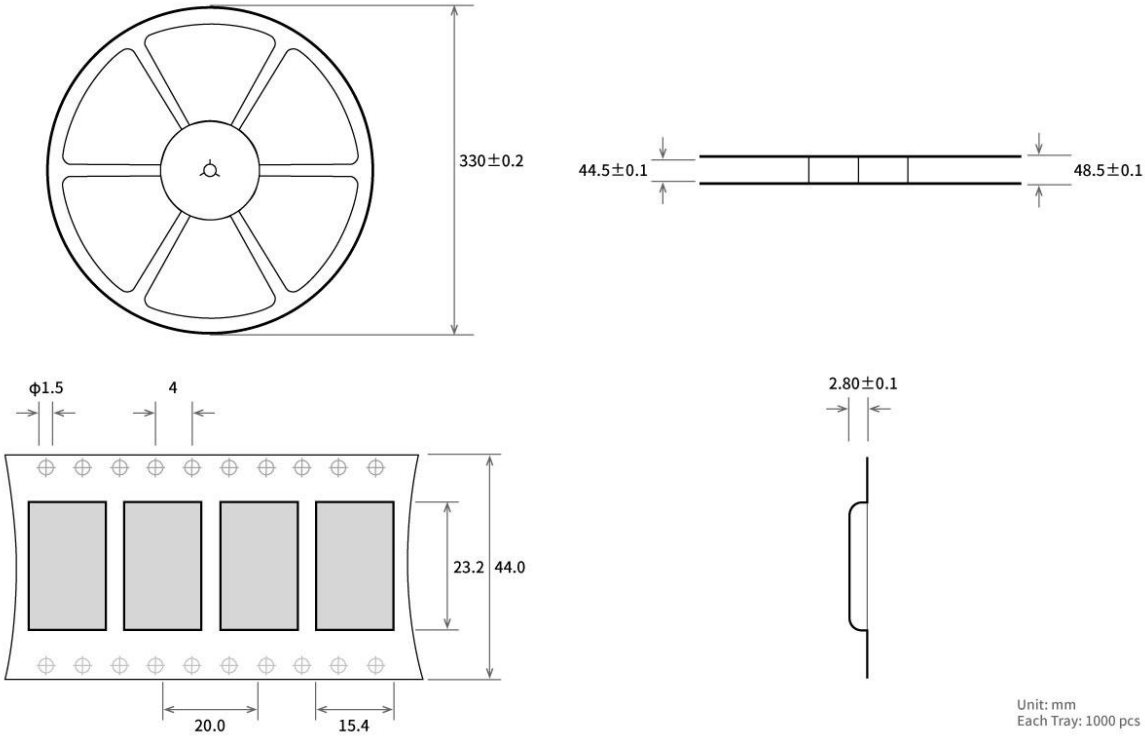
Profile Feature	Curve feature	Sn-Pb Assembly	Pb-Free Assembly
Solder Paste	Solder paste	Sn63/Pb37	Sn96.5/Ag3/Cu0.5
Preheat Temperature min （Tsmin）	Minimum preheating temperature	100℃	150℃
Preheat temperature max (Tsmax)	Maximum preheating temperature	150℃	200℃
Preheat Time (Tsmin to Tsmax)(ts)	Preheating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

9.2 Reflow Soldering Curve



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10. Batch packaging



Revision history

Version	Date	Description	Issued by
1.0	2019-11-28	Initial version	Li Kai
1.1	2019-11-29	Format adjustment	Ren

About us

Sales hotline: 4000-330-990 Tel: 028-61399028

Support: support@cdebyte.com Website: www.ebyte.com

Address: Innovation Center B333~D347, 4# XI-XIN road, High-tech district (west), Chengdu, Sichuan, China

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