E104-BT20 User Manual

EDR2.1 Bluetooth Serial Communication Module

Chengdu Ebyte Electronic Technology Co.,Ltd.

CONTENTS

1. Overview

1.1 Introduction

E104-BT20 Bluetooth serial communication module is a data transmission module based on Bluetooth Specification V2.1 BR / EDR Bluetooth protocol. The working frequency is 2.4GHz ISM, and the modulation method is GFSK. The module's maximum transmission power is 3dBm. It's packaging method is stamp hole and It has onboard PCB antenna which enable the module to have a 50-meter communication distance.

The E104-BT20 module integrates the transparent transmission function and the master-slave function and it's offers instant access to user. The E104-BT20 supports AT instruction, so users can set parameters such as module master-slave role, serial port baud rate, device name, etc., which is flexible and convenient to use. It also supports point-to-point connection from master to slave module to achieve fast data transmission and the data transmission is stable and efficient. In slave mode, it supports a maximum baud rate of 921600bps. It is a simple and efficient data transmission module that minimizes the developer's work and project development time.

1.2 Features

- Bluetooth Specification V2.1 + EDR protocol;
- BR / EDR master-slave integration available;
- AT instruction configuration available;
- Simple and secure pairing SSP and compatible with PIN pairing;
- SPP transparent transmission;
- High-speed continuous transmission;
- The host connection automatically;
- GPIO input/output control;
- 900 bytes of serial cache
- Effective communication distance 50 meters
- Support license-free global ISM 2.4GHz frequency band;
- Built-in PCB onboard antenna, no external antenna required.

1.3 Applications

- Bluetooth wireless data transmission
- Wireless meter reading and wireless sensing
- Smart home, industrial control
- Industrial remote control and telemetry
- Smart buildings, smart buildings
- Automated data acquisition
- Health sensor
- Automotive testing equipment
- smart robot

2. Parameters

2.1 Limit Parameters

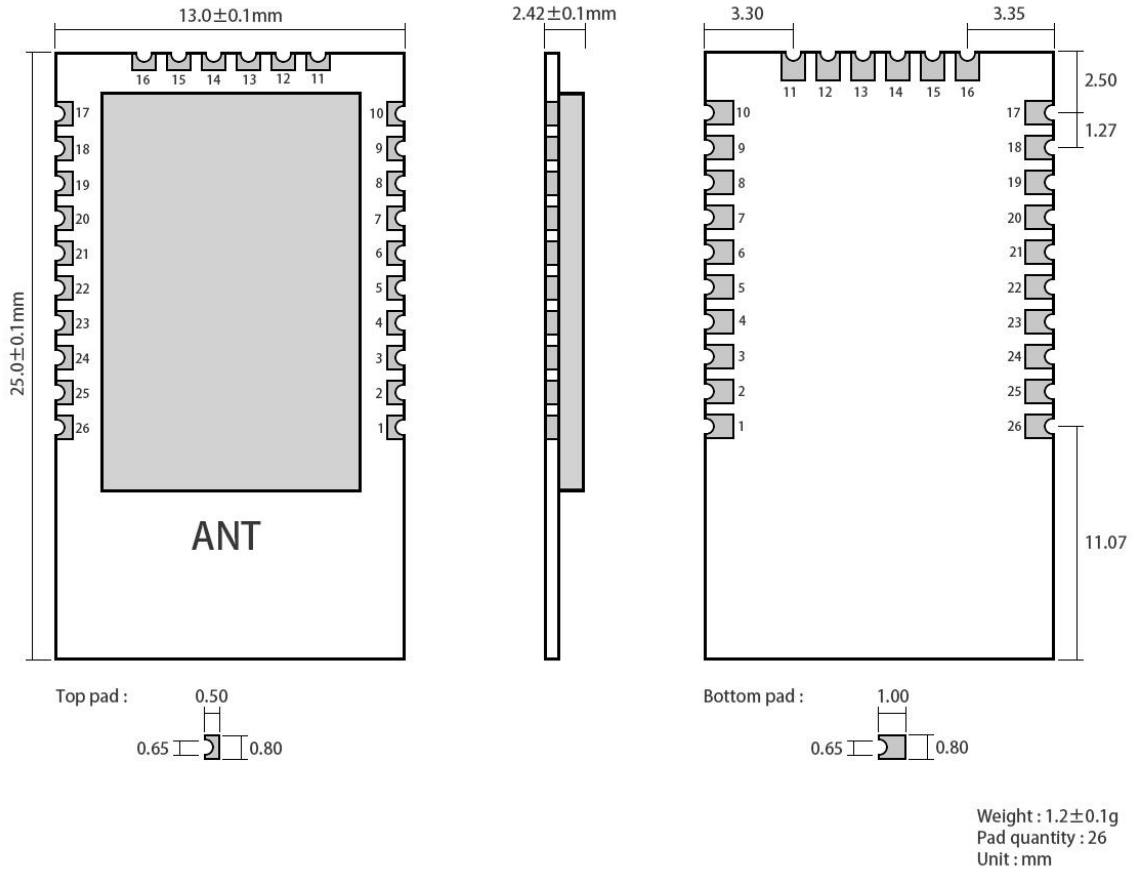
Main Parameters	Value		Remarks
	Min.	Max	
Input Voltage(V)	0	3.6	Permanent damage occurred when voltage is over 3.6V
Blocking Power(dBm)	-	10	Low chance to be damaged for short-distance transceiving
Working Temp.(℃)	0°C	+85	-

2.2 Working Parameters

Main Parameters		Value			Remarks
		Min.	Typical	Max.	
Working Voltage(V)		3.0	3.3	3.6	Voltage above 3.3V can guaranty Max TX power
Tx Electrical Level(V)		-	3.3	-	5V TTL could cause permanent damage
Working Temp (℃)		0℃	-	+70℃	-
Working Frequency (MHz)		2402	-	2480	Support ISM Chanel
Power Consumption	TX Current(mA)	-	72.5	-	-
	RX Current(mA)	-	70	-	-
Max TX Power(dBm)		-	3	-	-
RX Sensitivity(dBm)		-	-89	-	-
Arbitrary IO	VIL/VIH	-/1.75V	-	1.5V/-	-
	VOL/VOH	-/VCC-0.25	-	GNG+0.25/-	-
Connection Current (slave module)		-	54.4	-	mA

Parameters	Value	Remarks
Reference distance	50m	Clear and open environment, antenna height 2.5m
Launch length	300Byte	-
Bluetooth protocol	Bluetooth Specification V2.1+EDR	-
Communication Interface	UART	-
Packaging type	SMD	-
Interface method	1.27mm	-
Dimensions	13*25mm	-
product weight	1.2±0.1g	-
Antenna interface	PCB Antenna	Equivalent impedance about 50Ω

3. Size and pin definition



No	Name	Direction	Function	Remark
1	GND	-	Power Supply Ground	Ground, connected to the power reference ground
2	SWDIO	Input/Output	-	Inputting and outputting data
3	P_LED	-	-	-
4	SWCLK	Input	-	Clock input
5	GPIO1	Suspension	Universal IO	Pin for User configuration
6	GPIO2	Suspension	Universal IO	Pin for User configuration

7	LINK	Output	LED indicator	Module connection indicator Output pin②
8	MOD	Input	modification	Input high level, the module enters configuration mode, input low level, the module enters transparent transmission mode
9	MCU_MODE	Input	-	(This pin has internal pull-down, and works in transparent transmission mode by default)
10	GND	-	Power Supply Ground	High level enters online programming mode, low level is working mode
11	GPIO3	Suspension	Universal IO	Ground, connected to the power reference ground
12	GPIO4	Suspension	Universal IO	Pin for User configuration
13	GPIO5	Suspension	Universal IO	Pin for User configuration
14	GPIO6	Suspension	Universal IO	Pin for User configuration
15	RESETB	Input	Module reset pin (RST)	Pin for User configuration
16	GND	-	Power Supply Ground	The low-level input module enters the hardware reset state, and the high-level input module returns to the normal working state. This function is used for reset operation in emergency
17	GND	-	Power Supply Ground	Ground, connected to the power reference ground
18	VCC	Input	3.3V	Ground, connected to the power reference ground
19	GND	-	Power Supply Ground	Power Supply Input
20	GPIO7	Suspension	Universal IO	Ground, connected to the power reference ground
21	CTS	Input	Hardware flow control	Pin for User configuration
22	STATUS	Output	LED indicator	UART clear transmit input pin
23	TXD	Output	TX Power Ground	Module status indicator Output pin①
24	RTS	Output	Hardware flow control	Module external output serial data
25	RXD	Input	RX Serial Port	UART request send input pin
26	GND	-	Power Supply Ground	Module receives external serial data

Note 1: Following the AT + POLAR setting instruction, the module status indicator output pin defaults to output a high level to light up the LED.

Normal configuration mode (MOD pin is low level, then power on the module, the baud rate is same with the one from last power off., the default value is 9600bps)

Before the host is connected,

Fast flashing: when the master does not record the slave address;

Slow flashing: when recording slave address;

After connecting, two flashes and one stop.

Slave / Slave Loopback

Flashes quickly before connecting;

After connecting, two flashes and one stop;

Power-on configuration mode (set MOD pin high first, then power on the module, baud rate is fixed at 38400bps)

The LED keeps lighting up every 2 seconds for 1 second at whole process.

Note 2: Following AT + POLAR setting instructions, the output pin of the module's connection indicator defaults to light up the LED by outputting a high level.

Before connecting,

The LED is off.

Once connected,

The LED light is always on

5. Working Mode

5.1 Configuration mode (module enters AT mode)

There are two configuration modes: **normal configuration mode** and **power-on configuration mode**.

In normal configuration mode, pull the MOD pin low before the module is powered on (the default setting is pull down). After the module is powered on, set the MOD pin high again to enter the AT command mode. The parameters of the serial port are the values successfully set by the user before the last power-off (the default value is 9600bps, 1 stop bit, no parity bit). Now, the user can operate all AT commands; after Bluetooth connection, it will automatically enter the transparent transmission mode. If the user needs to set the MOD pin high again to enter the AT command mode where the module can't receive data from other modules. If the MOD pin is set low, it will exit the AT command mode and return to the transparent transmission mode. After disconnecting, the module is in AT command mode, and user can continue the inquiry/setting operation. If the user forgets the baud rate or gets a module that has been set with certain parameters, user can set the module to enter the power-on configuration mode and reset the baud rate.

NOTE: Some instructions are only available under certain mode, such as: CONNECTED mode or MASTER mode. Details will be given in Chapter 6.

Power-on configuration mode. Setting the MOD pin high and the module will immediately enter the AT command mode after power-on. The status light will keep flashing slowly. In this mode, the module will not enter the connection state. The other parameters are the same as the values saved since the last power-off. After setting the baud rate, restarting the module and entering the normal configuration mode to use the new baud rate. All commands are available except for "AT + LINK", "AT + RNAME", "AT + RSSI", and "AT + DISC" .

5.2 Working Role Changing

The module can be configured into three working roles: master, slave, and loopback. The master role supports the automatic connection function; the slave and slave loopback support passive connection; the slave loopback can receive data from the peer Bluetooth master device and return the data to the peer Bluetooth as is.

Steps to switch module roles:

Firstly, Enter the module's AT instruction mode

Secondly,. Use the serial port debugging assistant, send the AT command "AT + ROLE = <param>", and use the Enter key to change the line. For details, see the AT command section. If the communication is successful, it returns "OK" and the module role is still the original working role.

Thirdly, Set the MOD pin to low level and power on again to enter the normal configuration mode. At this time, the module's working role takes effect.

5.3 MAC address binding

The AT + ROLE = 1 command sets the module to the master working role. AT + CMODE = 0 sets the connection mode to the specified Bluetooth address connection. AT + BIND = [MAC] binds the MAC address. When the module is powered on again, it will try to connect to this address until it succeeds. After disconnecting, it will not initiate a connection. Do not set the bound Bluetooth address to zero which is invalid.

5.4 Status Printing

When Bluetooth is connected or disconnected, the module status information is printed through the serial port, as shown in the following table.

Status	Printed Information
Connection On	+CONNECTED:SUCCESS OK
Connection off	+DISC:SUCCESS OK- Disconnection

5.5 IO Pins

In order to facilitate users to expand the IO port pin functions of the module and diversify the module functions, this module has a total of 8 IOs. Users can configure IO as universal input or output. The output pin can be configured as an output low level or an output high level, and the input pin can be configured as a pull-up or pull-down; please refer to Chapter 6 AT command “AT + PIO”, “AT + MPIO”, “AT + PII "," AT + MPII ", etc.

5.6 Data Transceiving

At baud rate of 115200bps/s or 460800bps/s, the module supports serial port to send 200K files continuously without packet loss.

6. AT Command

6.1 Default Parameters:

Default Parameters	Equipment name	E104-BT20
	version number	Ebyte.com V1.0
	Check Digit	NONE
	Stop bit	1
	Baud rate	9600
	MAC binding address	00:00:00:00:00:00
	Pairing code	1234
	Bluetooth role	Slave

	Connection mode	Specify the Bluetooth address connection mode
	LED drive polarity	Low level
	GPIO pins	Suspended

6.2 AT command Details:

Command format

1. The "AT +" instruction is based on the ASCII character set, and the instruction has a strict format.

< >: The actual instruction does not include these two characters, it is only used to indicate the enclosed, and must be included in the instruction.

2. AT instruction format

<AT + CMD>, <op>, <param1, param2, param3, ...>, <CR> <LF>

<AT + CMD>: **AT +**: command message prefix; **CMD**: command string

<op> Instruction operation character, **=:** Set operation; **?:** Represents a query operation

<param-n>: parameter list of setting operations, all separated by commas

<CR> <LF>: terminator, which means carriage return and line feed, ASCII codes are 0x0a and 0x0d

3. Response message

Query operation **<+ CMD:> <param1, param2, param3 ...> <CR> <LF> <OK> <CR> <LF>**

+: Response message prefix

CMD: command string

(NOTE: The interval symbol between the parameters does not change according to the instruction. The returned Bluetooth address is separated by a colon ':')

Setting operation **<OK> <CR> <LF> —success**, **<FAIL> —failure**

Incorrect command input response format: **<+ ERROR (error code index number)> <CR> <LF>**

<CR> <LF>: terminator, which means carriage return and line feed, ASCII codes are 0x0d and 0x0a

4. The letter in <AT + CMD> command is not case sensitive.

6.2.1 Test Command

Command	Answer	Parameter
AT	OK	None

6.2.2 Module Resetting

Command	Answer	Parameter
AT+RESET	OK	None

NOTE: Before sending this command, please pay attention to the MOD pin status. If MOD is low, it will enter the normal configuration mode, otherwise, it will enter the power-on configuration mode.

6.2.3 Restore Default State

Command	Answer	Parameter
AT+RESTORE	OK	None

NOTE: See section 6.1 Default parameters.

6.2.4 Obtain Software Version Numbers

Command	Answer	Parameter
AT+VERSION?	+VERSION:<param]>OK	param:software version number

For Example:

Command: AT + VERSION?

Answer: + VERSION: ebyte.comV1.0

OK

6.2.5Obtain Bluetooth Address

Command	Answer	Parameter
AT+ADDR?	+ADDR:<param>	param:Bluetooth Address

For Example:

Command:AT+ADDR?

Answer: +ADDR:00:00:00:00:00:00

OK

6.2.6 Inquiry/Settings-Device Name

Command	Answer	Parameter
AT+NAME?	OK	param:蓝牙设备名称
AT+NAME=<param>	+NAME :<param>OK	出厂名称: “BT-20”

For Example:

Command:AT+NAME=E104-BT20

Answer:OK

Command:AT+NAME?

Answer:+NAME: E104-BT20

OK

6.2.7 Inquiry/Setting-Bluetooth Role

Command	Answer	Parameter
AT+ROLE?	OK	param: The values are as follows 0—Slave default 1—Master 2—Slave-Loop
AT+ ROLE =<param>	+ ROLE :<param>OK	

The above commands will take effect after restarting.

Module role description:

Slave—Passive connection;

Slave-Loop—Passive connection, receiving data from the peer Bluetooth master device and returning the data to the peer Bluetooth master device as is;

Master role (Master) —In the specified Bluetooth address connection mode, the Bluetooth address that is bound is automatically connected; the Bluetooth address in the pairing list is automatically connected to realize the transparent transmission of data between the master and slave Bluetooth devices.

6.2.8 Inquiry/Set-Serial Port Parameters

Command	Answer	Parameter
AT+UART?	OK	param1: baud rate (bits / s) The values are as follows (decimal): 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400, 460800, 921600 param2: stop bit 0—1 bit 2 to 2 param3: check digit 0—No parity 1—even parity
AT+ UART =<param>	+ UART :< param1>, < param2>,< param3> OK	

		2—odd parity Default setting: 9600,0,0

The above commands will take effect after restarting.

For example:

Setting serial port parameters: 115200, 2 stop bits, even parity

Command:AT+UART=115200,1,2

Answer:OK

Command:AT+UART?

Answer:+UART:115200,1,2

6.2.9 Inquiry/Settings-Connection Mode

Command	Answer	Parameter
AT+CMODE?	OK	param: Specify the Bluetooth address connection mode (The specified Bluetooth address is set by the binding instruction) 1—Any Bluetooth address connection mode 2—Slave-Loop Default connection mode: 0
AT+CMODE=<param>	+ CMODE:<param>OK	

The above commands will take effect after restarting.

6.2.10 Inquiry/Setting-Bind Bluetooth Address

Command	Answer	Parameter
AT+BIND?	OK	param: bind Bluetooth address Bluetooth address binding by default:00:00:00:00:00:00
AT+ BIND =<param>	+ BIND:<param>OK	

Host role, in the specified Bluetooth address connection mode, the bound address is automatically connected. If the default address is zero, the address will not be connected at this time.

for example:

Set binding Bluetooth address: 11: 22: 33: 44: 55: 66

Command: AT + BIND = 11,22,33,44,55,66

Answer: OK

Command: AT + BIND?

Answer: + BIND: 11: 22: 33: 44: 55: 66

OK

6.2.11 Inquiry/Setting-Pairing Code

Command	Answer	Parameter
AT+PSWD?	OK	param: pairing code Default: 1234
AT+ PSWD =<param>	+ PSWD:<param>OK	

6.2.12 Inquiry/Set LED Indication Drive and Connection Status Output Polarity

Command	Answer	Parameter
AT+POLAR?	OK	param1: The values are as follows 0—STATUS PIN output low level LED 1—STATUS PIN output high level light LED param1: The values are as follows 0—LINK PIN output low level light LED 1—LINK PIN output high level light LED Default setting: 0,0
AT+ POLAR = <param1>,<param2>	+ POLAR:<param1>, <param2> OK	

The STATUS pin drives the LED to indicate the module's working status; the LINK pin indicates the connection status.

for example:

Set the STATUS output low to light the LED, and the LINK output high to indicate that the connection was successful.

Command: AT + POLAR = 0,1

Answer: OK

Command: AT + POLAR?

Answer: + POLAR: 0,1

OK

6.2.13 Set GPIO single port output

Command	Answer	Parameter
AT+ PIO =<param1>, <param2>	OK	param1: GPIO port number (decimal number) param2: GPIO port output level 0—low 1—high

For Example:

1.GPIO1 pin output high level

Command: AT + PIO = 1,1

Answer: OK

2.GPIO1 pin output low level

Command: AT + PIO = 1,0

Answer: OK

6.2.14 Setting GPIO multi-port output

Command	Answer	Parameter
AT+ MPIO =<param>	OK	param1: GPIO port sequence mask combination (one byte-decimal number)

The module provides users with 7 IO port, GPIO1 ~ GPIO7, users can use to expand the input and output ports. The multi-port output setting sets all pins to output mode.

GPIO serial number mask = (1 << GPIO serial number)

GPIO serial number mask combination = (GPIO serial number mask 1 | GPIO serial number mask 2 | ……)

Such as:

GPIO1 mask = (1 << 1) = 0x02

GPIO5 mask = (1 << 5) = 0x20

GPIO1 and GPIO5 mask combination = (0x010x20) = 0x22

for example:

1. GPIO1 and GPIO5 output high level, and the rest output low level

Command: AT + MPIO = 21

Answer: OK

2. GPIO3 outputs high level and the rest outputs low level

Command: AT + MPIO = 08

Answer: OK

3. GPIO7 outputs high level and the rest outputs low level

Command: AT + MPIO = 80

Answer: OK

4.All pins output low level

Command: AT + MPIO = 00

Answer: OK

6.2.15 Setting single GPIO input

Command	Answer	Parameter
AT+ PII =<param1>, <param2>	OK	param1: GPIO port number (decimal number) param2: GPIO port input 0—pull up 1—Drop down

6.2.16 Setting single multiple GPIO input

Command	Answer	Parameter
AT+ MPII =<param>	OK	param: GPIO port sequence mask combination (hexadecimal number)

The multi-port input setting sets all pins to input mode.

for example:

1. GPIO1 and GPIO5 pull-down inputs, and the remaining pull-up inputs

Command: AT + MPII = 22

Answer: OK

2. GPIO3 outputs high level and the rest outputs low level

Command: AT + MPIO = 08

Answer: OK

3. GPIO7 outputs high level and the rest outputs low level

Command: AT + MPIO = 80

Answer: OK

4.All pins output low level

Command: AT + MPIO = 00

Answer: OK

6.2.17 Querying GPIO Port Status

Command	Answer	Parameter
AT+MPIO?	+ MPIO:<param>OK	param: GPIO port value (8bits) param [bit 0] is invalid param [bit 1] = GPIO1 ... param [bit 7] = GPIO7 If GPIOX is output 0—low 1—high If GPIOX is input 0—pull up 1—Drop down

The module provides users with IO port resources, a total of 8, GPIO0 ~ GPIO7, users can use to expand input and output ports.

6.2.18 Remove all authenticated devices from the Bluetooth pairing list

Command	Answer	Parameter
AT+RMAAD	OK	None

For Example:

Command:AT+RMAAD

Answer:OK

6.2.19 Removes the specified authenticated device from the Bluetooth pairing list

Command	Answer	Parameter
AT+RMSAD=<param>	OK—Success FAIL—Failed	param: Bluetooth device address

For Example:

Delete the device with Bluetooth address 11: 22: 33: 44: 55: 66 from the pairing list. The input Bluetooth address cannot be zero, otherwise the command format is wrong.

Command: AT + RMSAD = 11: 22: 33: 44: 55: 66

Answer: OK—Successfully deleted

Or FAIL—No Bluetooth device with address 11: 22: 33: 44: 55: 66 exists in the pairing list

6.2.20 Find the specified authenticated device from the Bluetooth pairing list

Command	Answer	Parameter
AT+FSAD=<param>	OK—Success FAIL—Failed	param: Bluetooth device address

For Example:

Find the Bluetooth device with the address 11: 22: 33: 44: 55: 66 from the pairing list. The input Bluetooth address cannot be zero, otherwise the command format is wrong.

Command: AT + FSAD = 11,22,33,44,55,66

Answer: OK—A Bluetooth device with the address 11: 22: 33: 44: 55: 66 exists in the pairing list.

Or FAIL—The Bluetooth device with the address 11: 22: 33: 44: 55: 66 does not exist in the pairing list.

6.2.21Inquiring the number of authenticated devices in the Bluetooth pairing list

Command	Answer	Parameter
AT+ADCN?	+ ADCN:<param>OK	param: number of devices in the pairing list

For Example:

Command: AT + ADCN?

Answer: + ADCN: 0

OK—No Bluetooth devices in the pairing list

6.2.22 Get the recently used Bluetooth certified device address

Command	Answer	Parameter
AT+MRAD?	+ MRAD:<param>OK	param: the address of the recently connected Bluetooth device

for example:

Command: AT + MRAD?

Answer: + MRAD: 00: 00: 00: 00: 00: 00

OK—No Bluetooth connection has been established recently

6.2.23 Inquiring peer RSSI signal strength (valid in connected state)

Command	Answer	Parameter
AT+RSSI?	+ RSSI:<param>OK	param: signal strength

Only valid after the module has established a connection.

for example:Command:AT+RSSI?

Answer:+RSSI:-26

OK

6.2.24 Disconnect (available when connected)

Command	Answer	Parameter
AT+DISC	+ DISC: SUCCESS OK—Disconnect successfully	None

6.2.25 Connect device (available as host role)

Command	Answer	Parameter
AT+LINK=<param>	OK—success FAIL—Failure	param: remote device Bluetooth address

Use the AT command to establish a connection with the slave under the master role.

for example:

Establish a connection with the slave Bluetooth device: 11: 22: 33: 44: 55: 66

Command:AT+LINK=11,22,33,44,55,66

Answer:+CONNECTED SUCCESS

OK

6.2.26 Inquiring Bluetooth module working status

Command	Answer	Parameter
AT+STATE?	+ STATE:<param>OK	param:Module working status “READY” “PAIRABLE” “AUTO CONNECT” “CONNECTED” “DISCONNECTED” “UNKNOWN”

For Example:

Command:AT+STATE?

Answer:+ STATE:PAIRABLE

OK—Waiting to be connected

6.2.27 Inquiring/Set: Inquiring scan, page scan parameters

Command	Answer	Parameter
AT+PISCAN?	OK	param1: query interval param2: query duration param3: paging interval param4: paging duration The above parameters are all decimal numbers Default (ms): 768, 256, 768, 256
AT+PISCAN=<param1> ,<param2>,<param3>, <param4>	+ PISCAN:<param1>, <param2>,<param3>, <param4> OK	

Query time interval (cannot be odd, otherwise error code 1 is returned), paging interval ranges from 18 to 4096, query duration and paging duration ranges from 17 to 4096, and the query interval must be greater than or equal to For query duration, the paging interval must also be greater than or equal to the paging duration (otherwise an error code 1 is returned).

for example:

Take the default value as an example

Command:AT+PISCAN=768,256, 768, 256

Answer:OK

Command:AT+PISCAN?

+PISCAN:768,256,768,256

OK

6.2.28 Obtaining the remote Bluetooth name (valid in the connected state)

Command	Answer	Parameter
AT+ RNAME?	+ RNAME:<param>OK	param:Remote Bluetooth name

For Example:

Take the default value as an example

Command:AT+RNAME?

Answer:+RNAME:HUAWEI P10

OK

6.3 AT Command error code description

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

Error code index number(Decimal)	Description

0	AT command error
1	Parameter format error
2	Device name is too long (more than 40 bytes)
3	Device name length is zero
4	Bluetooth role is invalid
5	Invalid baud rate
6	Stop digit is invalid
7	Check digit is invalid
8	Invalid connection mode
9	The pairing code is longer than 16 bytes
10	Pairing code length is zero
11	Drive polarity parameter is out of range
12	GPIO port number is out of range
13	Output status or up-down parameters are out of range
14	MPI0, MPII parameters exceed one byte (length is zero)
15	Bluetooth address is longer than 12 bytes
16	Bluetooth address is 0
17	Authentication device does not exist in the pairing list
18	Query scan and page scan parameters are out of range
19	Power-on configuration mode does not support connection-related instructions
20	No connection established

7. Quick Use

7.1 Enter AT command mode

Connect the Bluetooth module E104-BT20 to the USB interface of the PC, and open the serial port debugging assistant on the PC side to debug the module.

First, the AT test instruction. After ensuring that the MOD pin is set low (the default is low), the module is powered on, and then the MOD pin is set high to enter the AT instruction mode. When sending the command, the serial port debugging assistant should select "enter key line feed" and set the serial port parameter baud rate 9600bps, 1 stop bit, no parity check. If the command AT is sent, it returns OK. Then the module successfully enters the AT instruction mode and can use other AT instructions.

7.2 Auto Connection

Module default parameters: Specify connection mode, slave role, baud rate 9600bps, 1 stop bit, no parity. When the module is powered on, it is a slave role. Enter the AT command mode and send "AT + ADDR?" To query the Bluetooth module address to facilitate the host connection.

Set another module to enter the AT command mode, set the baud rate of the serial tool to 9600bps, and send the command "AT + ROLE = 1". If successful, it will return OK. Assume that the slave address is 11: 22: 33: 44: 55: 66, because the default mode is "Specify Bluetooth connection mode", you only need to set the binding Bluetooth address to the slave's Bluetooth address to automatically connect the slave, Send the command "AT + BIND = 11,22,33,44,55,66". If it returns OK, the setting is successful. Restart the module. At this time, the module as the master has taken effect. After the host is powered on, it will automatically establish a connection with the slave.

8. Notice for Hardware

- It is recommended to use DC stabilized power supply. The power supply ripple factor should be as small as possible, and the module should be reliably grounded.
- Please ensure that the positive and negative poles of the power supply are properly connected. If the reverse connection is made, the module may be permanently damaged.
- Please ensure the power supply voltage is within the working voltage range. If the maximum voltage is exceeded, the module will be permanently damaged.
- Please check the stability of the power supply, and the voltage cannot be fluctuated frequently;
- When designing the power supply circuit for the module, it is recommended to reserve more than 30% of the margin to achieve long-term stable operation of the system;
- The installation location of 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 avoid module locations. If the wiring must pass under the module, assuming that the module is soldered to the Top Layer, the area where the module is in contact with the Top Layer should be covered with copper (all copper is well grounded), and the area must be close to the digital

part of the module and routed in the Bottom Layer;

- If the module is soldered or placed in the Top Layer, it is wrong to randomly route on the Bottom Layer or other layers, which will affect the spurs and receiving sensitivity of the module to varying degrees;
- If there is a device with large electromagnetic interference around the module, it will greatly affect the performance of the module. It is recommended to maintain the distance from the module according to the strength of the interference. If circumstances permit, it is recommended to do proper isolation and shielding;
- If there are wirings with large electromagnetic interference around the module (such as high frequency digital, high frequency analog, power line), the performance of the module will be greatly affected. It is recommended to do proper isolation and shielding;
- If the communication line uses 5V level, it must be connected in series with a 1k-5.1k resistor (not recommended, there is still risk of damage);
- Try to keep away from some physical layers that also use the 2.4GHz TTL protocol, such as: USB3.0 as much as possible to avoid electromagnetic interference to other devices;
- The antenna installation has a great influence on the performance of the module. Make sure that the antenna is exposed and preferably vertical. When the module is installed inside the casing, it is recommended to use a good antenna extension cable to extend the antenna to the outside of the casing;
- The antenna must not be installed inside the metal case, which will greatly reduce the transmission distance.

9. FAQ

9.1 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.
- Sea water 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).
- The power supply low voltage under room temperature is lower than recommend ones, the lower the voltage, the lower the transmitting power.
- Due to antenna quality or poor matching between antenna and module.

9.2 Module is easy to damage

- Please check the power supply source, ensure it is 2.0V~3.6V, voltage higher than 3.6V will damage the module.
- Please check the stability of power source, the voltage cannot fluctuate too much.
- Please make sure antistatic measure are taken when installing and using, high frequency devices have electrostatic susceptibility.
- Please ensure the humidity is within limited range, some parts are sensitive to humidity.
- Please avoid using modules under too high or too low temperature.

9.3 BER (Bit Error Rate) is high

- There are co-channel signal interference nearby, please be away from interference sources or modify frequency and channel to avoid interference;
- Poor power supply may cause messy code. Make sure that the power supply is reliable.
- The extension line and feeder quality are poor or too long, so the bit error rate is high;

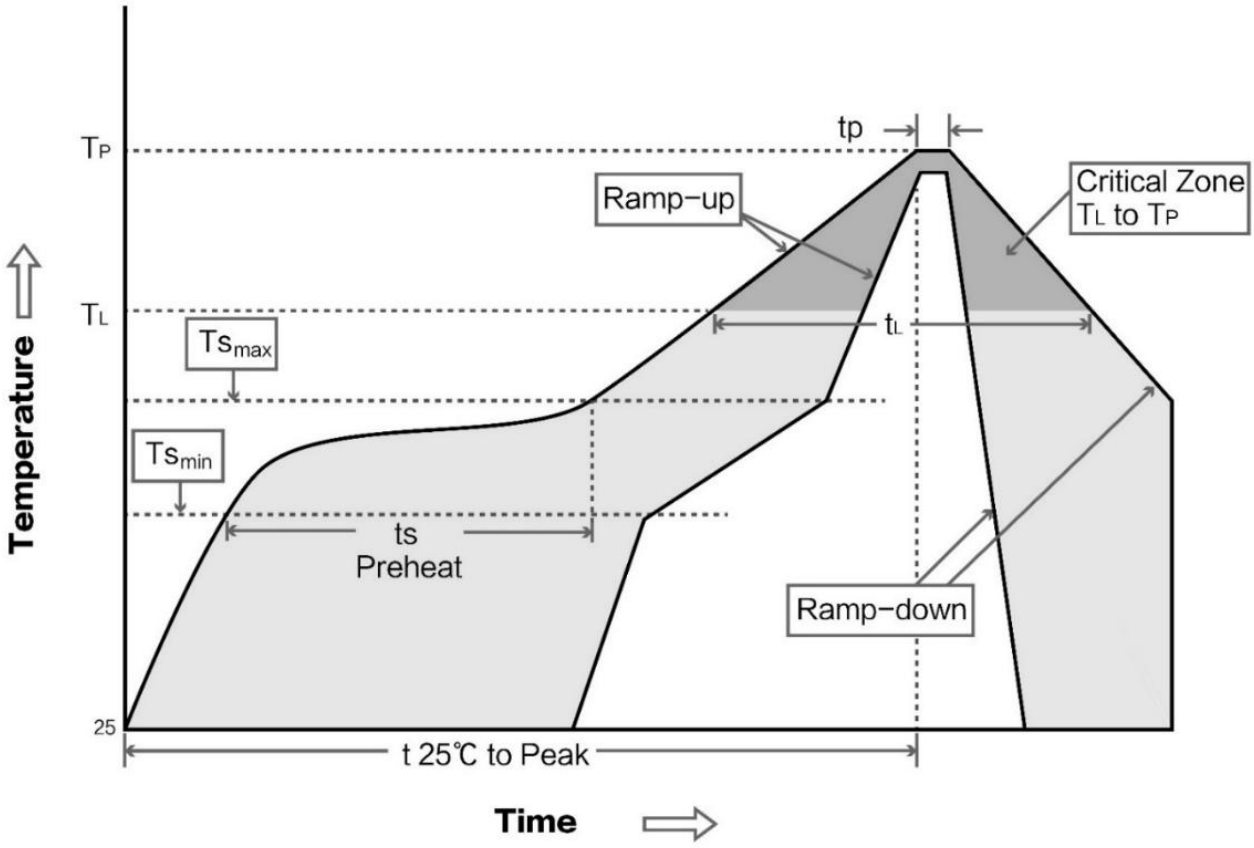
The clock waveform on the SPI is not standard: Check whether there is interference on the SPI line or the SPI bus line should not be too long.

10. Soldering Guidance

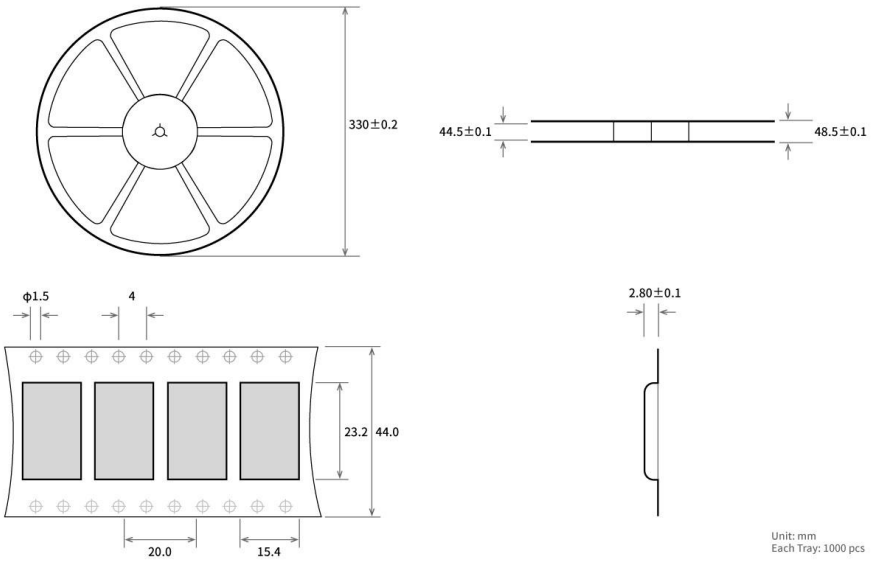
10.1 Reflow Soldering Temperature

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

10.2 Reflow soldering curve



11. Package for Buck Order



Revision History

Version	Date	Description	Issued by
1.0	2019-7-29	Initial version	-
1.1	2019-8-14	AT command name modification	-
1.2	2019-8-23	Format revision	Lyl
1.3	2019-8-23	Content modification	YXD
1.4	2019-11-14	Content modification	Ren
1.5	2019-12-11	Content modification	Ren
1.6	2020-04-22		Ren

About us

Website: www.ebyte.com Sales: info@cdebyte.com Support: support@cdebyte.com
Tel: +86-28-61399028 Ext. 812 Fax: +86-28-64146160
Address: Innovation Center B333~D347, 4# XI-XIN road,High-tech district (west), Chengdu, Sichuan, China

Chengdu Ebyte Electronic Technology Co.,Ltd.