

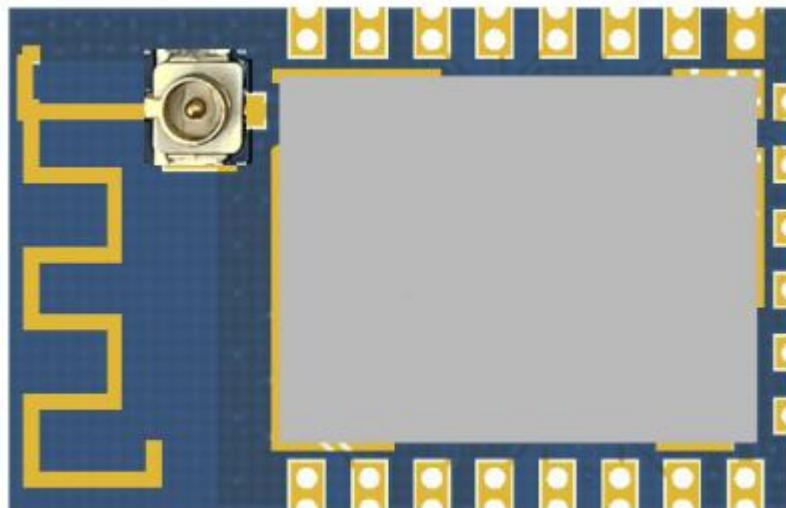


Shenzhen Hi-link Electronic co.,ltd

HLK-B10

Serial port -Bluetooth Transmission Module

User manual



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1. Brief Introduction

HLK-B10 is a single-mode BLE5.0 Bluetooth transmission module developed by Hi-Link Electronics. It integrates Bluetooth radio frequency chip and a small number of peripheral devices, embedded in 32-bit MCU, 500KB flash memory with low power consumption, 64KB SRAM and rich peripheral resources.

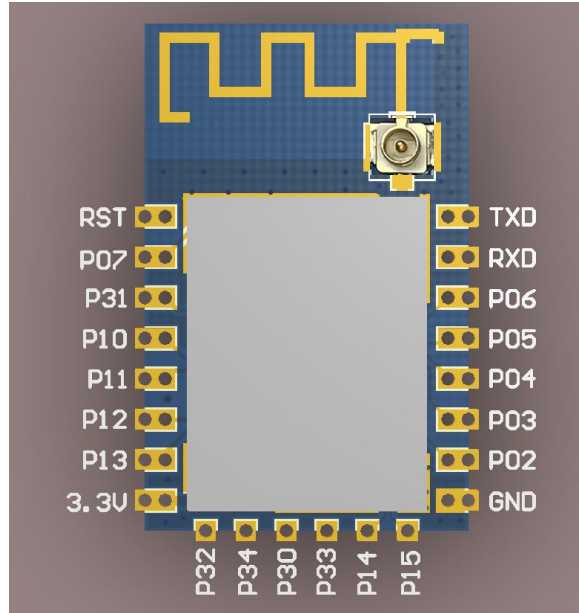
Meet to Bluetooth 5.0 specification, it can be used as Bluetooth slave device and connected by various Bluetooth host devices.

The module's serial port Bluetooth two-way transmission function is very Simple to use. Users do not need to understand the complex Bluetooth protocol stack, just connect the customer's equipment or MCU's serial port to the module, and the module will automatically complete the two-way data transmission between the serial port and Bluetooth, which just like a bridge between the user's MCU serial port and Bluetooth equipment, so that users can quickly and simply use the serial port equipment to realize Bluetooth wireless transmission function.

Support AT command mode, the user can query or set the basic parameters of the module through serial port AT command, such as device name, serial port baud rate and so on.

We develop and provide a wealth of testing tools and using documents, and provide testing APP Demo to facilitate users to quickly start and apply this module. Our company can also provide flexible and rich custom development services according to the specific needs of customers.

2. Pin Definition



Pin	Symbol	IO type	Function
1	RST	AO	Module reset input pin, Low level efficiency
2	P07	I/O	GPIO7
3	P31	I/O	ADC/CH1
4	P10	I/O	PWM[0](20mA)
5	P11	I/O	Keystroke input pin, Low level efficiency
6	P12	I/O	PWM[2]
7	P13	I/O	PWM[3]
8	3.3V	P	Module power supply 3.3V
9	P32	ADC	Ch2
10	P34	ADC	Ch4
11	P30	ADC	Ch0
12	P33	ADC	Ch3
13	P14	I/O	PWM[4]
14	P15	I/O	PWM[5]

Pin	Symbol	IO type	Function
15	GND	P	Power reference place
16	P02	I/O	State indicate LED output,Low level efficiency
17	P03	I/O	GPIO3
18	P04	I/O	GPIO4
19	P05	I/O	GPIO5
20	P06	I/O	GPIO6
21	RXD	I/O	UART input
22	TXD	I/O	UART output

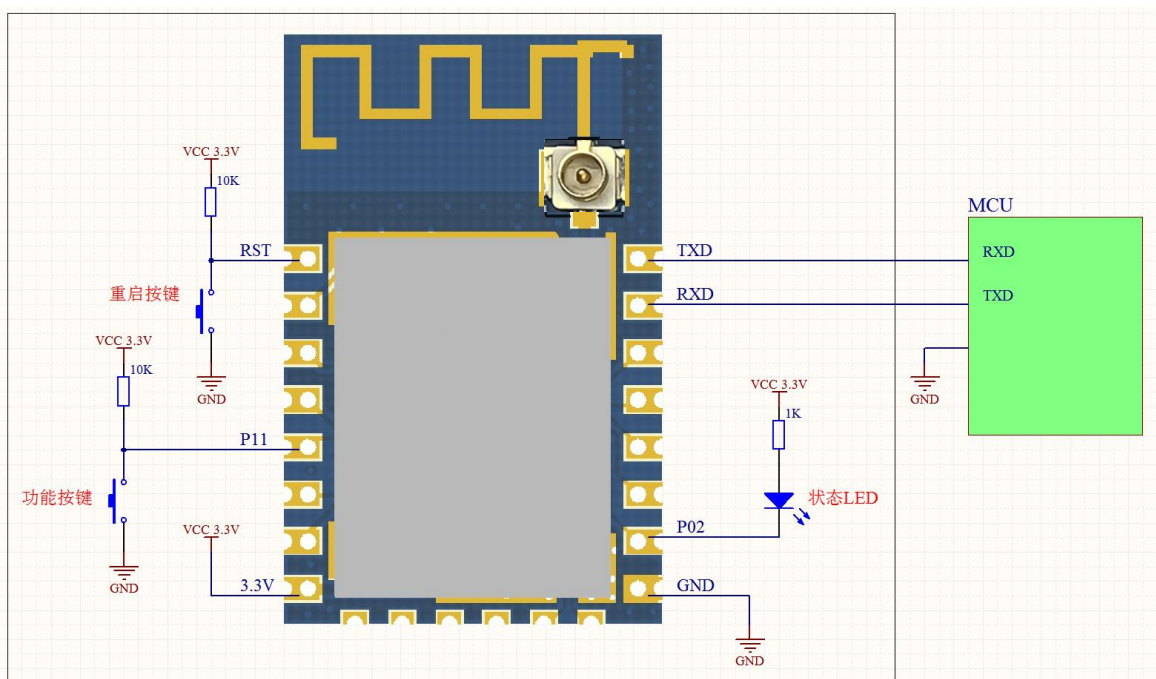
Illustration:

P represents power pin,

I/O represents an input / output pin,

AO represents an analog input and output pin.

3. Typical Application Circuit



4. Basic Functional Description

4.1. Two working states of the module

HLK-B10 module has two working states: transmission mode and AT command mode.

In AT command mode, the command can be sent to the module through serial port to configure the parameters of the module and query the information of the module.

In transmission mode, the module will transmit the serial port data and Bluetooth connection data in two-way.

Starting module, the default is the transmission mode; there is no affect to the Bluetooth connection state when exit transmission mode into AT mode. The serial port-Bluetooth data transmission is paused, and the data received by the serial port is processed by the current AT instruction. After the transmission is restored, the data transmission will continue.

4.2. Function Keys and Status Indicators

4.2.1. State output pin

The 16th foot of the module P02 is output pin for state LED, When this pin is connected to the LED cathode, the current working status of the module can be displayed through the light and off status of the LED. The LED display status is defined as follows:

AT command mode	Intermittent flash (every 2 fast flash)	
Transmission mode	No connect Bluetooth, slow flash (bright 1s turn off 1s)	
	Connect Bluetooth, Long bright and short off (bright 5s turn off 100ms)	
	Restore default settings, Continuous flash	

4.2.2. Function key input pin

Module 5 pin P 11 for function key input pin. that is ES/Del pin, a key can be connected between this pin and GND,The functions corresponding to different operation of the key are as follows:

Short press (50ms ~ 1s) the module will exit transmission mode. , switch to AT command

mode;

Long press (More than 6s) , release the button when the status LED starts flashing, the module will restore the default settings, and automatically restart.

4.3. Switching Between Transmission and AT Command Mode

4.3.1. From transmission mode to AT command mode

There are two ways to switch the transmission to AT command mode:

key mode:

Pull down the fifth pin 50ms ~ 1s, The module immediately enters the AT command mode.

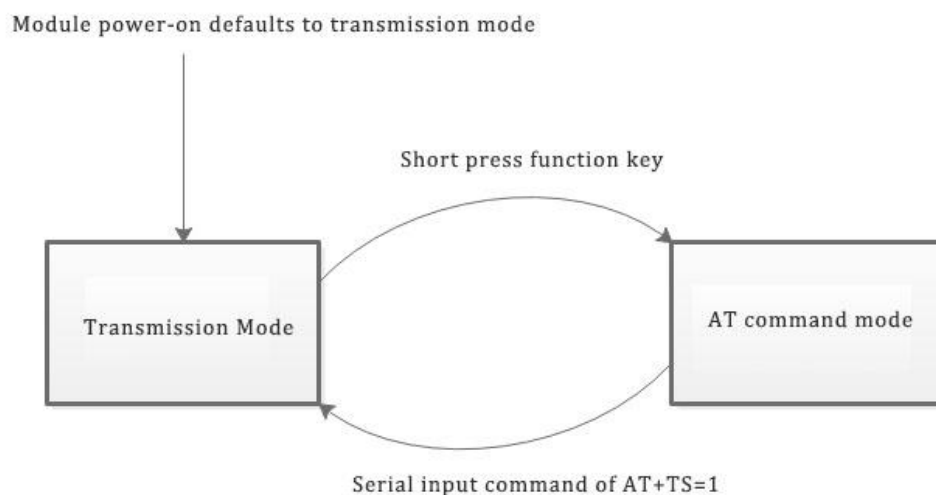
In transmission mode, the serial port receives special format data to automatically exit the transmission:

When you are about to exit transmission mode, the serial port pauses the input 200ms to ensure that the data in the serial port is sent empty, and then enter “+++”, After receiving the reply "a", enter "a" and pause 200ms to ensure that there is no subsequent data input to exit the transmission mode. Do not have any input before and after "+++"and “a”, including "\ r \ n "to avoid fault operation.

4.3.2. From AT instruction mode to transmission mode

Send command: AT+TS=1

The conversion logic for transmission mode and AT command mode is as following:



5. AT command

5.1. AT command format

Format the class command: AT+<x>=<...>

X represents the name of the parameter to set, ...represent Parameter Value

Set a successful return value:	Set return value for failure or format error:
AT+<x>=<...> OK	AT+<x>=<...> ERROR

example:

send out: AT+DEVNAME=HLK-B10

received: AT+DEVNAME=HLK-B10

OK

Query class command format: AT+<x>=?

x represents parameter name of the query, ... represent parameter value.

Returned value :

AT+<x>=?

<...>

example:

send out: AT+DEVNAME=?

received: AT+DEVNAME=?

HLK-B10

5.2. AT Command list and functional description

Command name	Function	Example
AT+VER	Query module software version number	send out: AT+VER=? received: V1.01(190806)
AT+MAC	Query module MAC address	send out: AT+MAC=? received: 11:22:33:44:55:66

AT+TS	Restore to transmission mode	Send out: AT+TS=1 received: OK
AT+BAUDRATE	Set or query module serial port baud rate Default baud rate: 115200	Send out: AT+BAUDRATE=115200 received: OK Send out: AT+BAUDRATE=? received: 115200
AT+DEVNAME	Set or query the (Bluetooth) name of the module Default: HLK-B10_****	Send out: AT+DEVNAME=test123 received: OK Send out: AT+DEVNAME=? received: test123
AT+LINKS	Query module Bluetooth connection status	Send out: AT+LINKS=? //connecting, MAC with Bluetooth host after comma received: 1, 8B:09:3C:3C:B0:74 //Not connected on received: 0
AT+RECONN	Set to disconnect the module from the current Bluetooth connection	Send out: AT+RECONN=1 received: OK
AT+REBOOT	Restart module	Send out: AT+REBOOT=1 received: OK
AT+DEFAULT	Restore default settings	Send out: AT+DEFAULT=1 received: OK

6. Bluetooth Connection Method

As a Bluetooth 5.0 slave device, HLK-B10 module provides a fff0 service, and Bluetooth data transmission is mainly based on this service. Bluetooth host devices, such as mobile phone APP, connect Bluetooth of the module ,using fff0 service to transmit data between mobile phone and HLK-B10 module through Bluetooth.

UUID	Operation permission	Function definition
0xffff1	Read/Notify	Module sending, APP receiving
0xffff2	Write Without Response	APP send out, Module receiving

When the mobile phone is connected to the module Bluetooth and the mobile phone actively enables the notify attribute, the data sent by the module can be received.

Our company has developed the mobile phone APP side test Demo, and provides the Demo source code to the user, which has the detailed Bluetooth connection and the data sending and sending example, the concrete implementation and the application please refer to the

test Demo program.

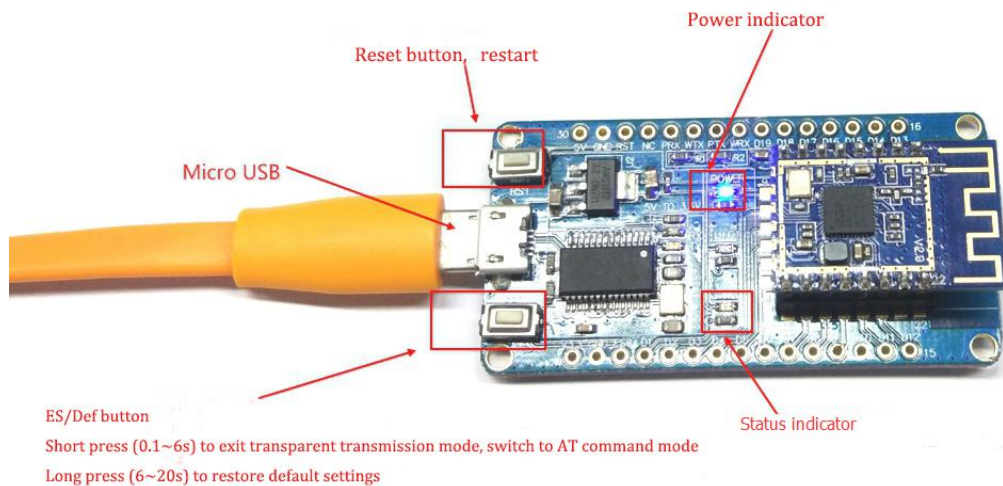
7. Test Tools and Methods

7.1. Test board

Users can choose our special test board to quickly start testing and using the HLK-B10 module.

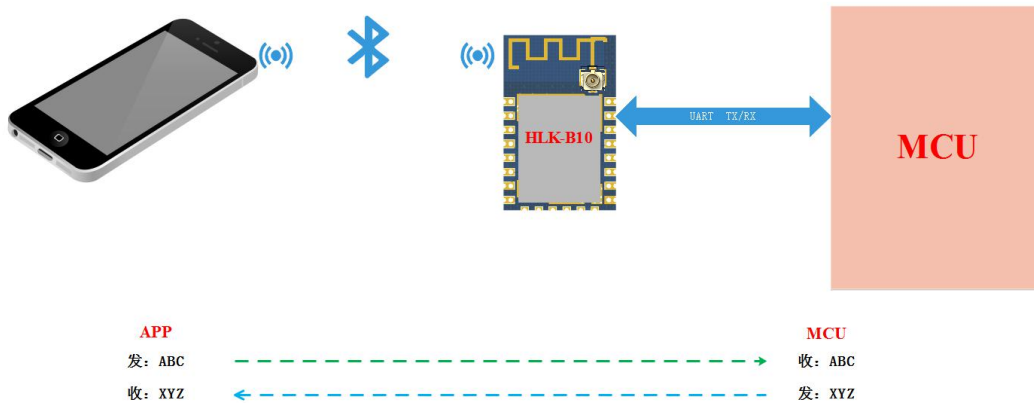
The test board is directly powered by USB, which is provided with a USB to serial port function. After the computer is connected through a USB cable, the serial port of the module can be connected through a USB to serial port, and the serial port of the module is not required to be additionally connected, so that the device is convenient to use.

The appearance layout and function description of the test board are as follows:



7.2. Transmission test method

HLK-B10 the transmission function logic of the module is as follows:



When the mobile phone APP and the module establish the Bluetooth connection, the data sent in the mobile phone APP is forwarded to the serial port of the module as it is, and the data sent to the module serial port will be forwarded to the mobile phone APP as it is.

7.3. An example of data Transmission Test between Serial Port and Mobile phone

APP

Connect the module to the test board correctly and connect the module to the computer through USB cable;

Open the corresponding serial port with the serial port debugging tool on the computer;



Turn on the transmission test on the mobile phone APP, Click the Bluetooth device name corresponding to the module to connect, If it does not appear, the drop-down interface can be rescan;

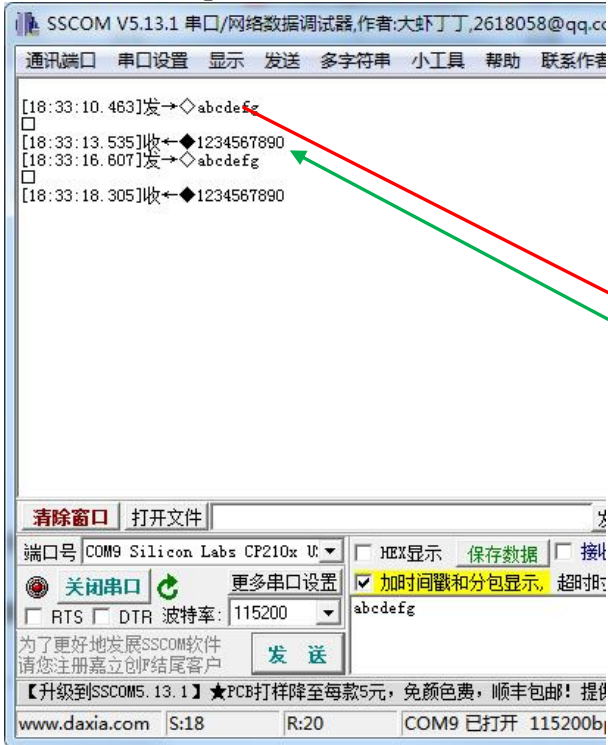
设备列表	
HLK-B10_5566 11:22:33:44:55:66 preParse: 0201060303F0FF0D09484C4B2D4231305F353536360D08484C4B2D4231305F35353636 536360D08484C4B2D4231305F35353636 postParse: @Len = 02, @Type = 0x01 -> 06 @Len = 03, @Type = 0x03 -> F0 FF @Len = 0D, @Type = 0x09 -> HLK-B10_5566 @Len = 0D, @Type = 0x08 -> HLK-B10_5566	Rssi: -35
NULL 73:15:2C:24:46:98 preParse: 02011A0AFF4C001005131C6B847D postParse: @Len = 02, @Type = 0x01 -> 1A @Len = 0A, @Type = 0xFF -> 4C 00 10 05 13 1C 6B 84 7D	Rssi: -77
NULL 29:4F:AE:01:3B:E7 preParse: 1EFF06000109200254832C736015134263BC7F13A791F8C00C1B913C7BADF8 postParse: @Len = 1E, @Type = 0xFF -> 06 00 01 09 20 02 54 83 2C 73 60 15 13 42 63 BC 7F 13 A7 91 F8 C0 0C 1B 91 3C 7B AD F8	Rssi: -78
NULL 50:C6:63:6B:31:A6 preParse: 0201060AFF4C001005071822F030 postParse: @Len = 02, @Type = 0x01 -> 06 @Len = 0A, @Type = 0xFF -> 4C 00 10 05 07 18 22 F0 30	Rssi: -82

When the connection is successful, the module's state LED becomes connected;

At this time, the data can be sent to the module serial port in the serial port debugging tool on the computer, and the sending content will be received and displayed by the mobile phone APP as it is;

Send data to the module from the penetration test APP on the mobile phone, and the sent content will be received by the module as it is and output to the module serial port. The received data can be seen in the serial port debugging tool on the computer, and the effect is shown in the following figure:

Module serial port



Mobile phone end



8. Revised Record

Date	Version	Modify content
2019.8.12	1.0	Initial version

9. Technical Support and Contact Information



SHENZHEN HI-LINK ELECTRONIC CO.,LRD

ADD : 3F,Cai Yue Building West, No.24 Liu Xian Avenue, Long Hua district,

Shenzhen 518131

TEL: 0755-23152658/83575155;

WEB: www.hlktech.com



2.2 List of applicable FCC rules

FCC Part 15.247

2.6 RF exposure considerations

This module certified that complies with RF exposure requirement under 5mm RF distance.

2.8 Label and compliance information

FCC ID label on the final system must be labeled with "Contains FCC ID: 2AD56HLK-B10" or "Contains transmitter module FCC ID: 2AD56HLK-B10".

2.9 Information on test modes and additional testing requirements

Contact ShenZhen HaiLingKe Electronic co.,Ltd will provide stand-alone modular transmitter test mode. Additional testing and certification may be necessary when multiple modules are used in a host.

2.10 Additional testing, Part 15 Subpart B disclaimer

To ensure compliance with all non-transmitter functions the host manufacturer is responsible for ensuring compliance with the module(s) installed and fully operational. For example, if a host was previously authorized as an unintentional radiator under the Supplier's Declaration of Conformity procedure without a transmitter certified module and a module is added, the host manufacturer is responsible for ensuring that the after the module is installed and operational the host continues to be compliant with the Part 15B unintentional radiator requirements. Since this may depend on the details of how the module is integrated with the host, ShenZhen HaiLingKe Electronic co.,Ltd shall provide guidance to the host manufacturer for compliance with the Part 15B requirements.

FCC Warning

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

NOTE 1: This product has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This product generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this product does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

NOTE 2: Any changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. End users must follow the specific operating instructions for satisfying RF exposure compliance.

Note 1: This module certified that complies with RF exposure requirement under 5mm RF distance. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Note 2: Any modifications made to the module will void the Grant of Certification, this module is limited to OEM installation only and must not be sold to end-users, end-user has no manual instructions to remove or install the device, only software or operating procedure shall be placed in the end-user operating manual of final products.

Note 3: The module may be operated only with the antenna with which it is authorized. Any antenna that is of the same type and of equal or less directional gain as an antenna that is authorized with the intentional radiator may be marketed with, and used with, that intentional radiator.