



Shenzhen Hi-link Electronic Co.,Ltd

HLK-B11

Serial port -Bluetooth Transmission Module

User manual



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1. Brief Introduction

HLK-B11 is a single-mode ble5.0 Bluetooth transparent module developed and produced by Hailing electronics. It integrates Bluetooth radio frequency chip and a small number of peripheral devices. It is embedded with 32-bit MCU with low power consumption, 500kb flash memory, 64KB SRAM and rich peripheral resources.

In accordance with Bluetooth 5.0 specification, it can be used as a Bluetooth slave device to be connected by various Bluetooth host devices

The module's serial port Bluetooth two-way transparent transmission function is very convenient 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 forwarding between the serial port and Bluetooth, which is the bridge between the user's MCU serial port and Bluetooth equipment, so that users can quickly and simply use the serial port equipment. Realize Bluetooth wireless transmission function on.

It supports at command mode, and can query or set basic parameters of the module through serial at command, such as device name, serial port baud rate, etc.

Our company develops and provides rich testing tools and use documents, and provides app demo for testing, so that users can quickly start to be familiar with and apply this module. Our company can also provide flexible and rich customized development services according to the specific needs of customers.

2. Pin Definition

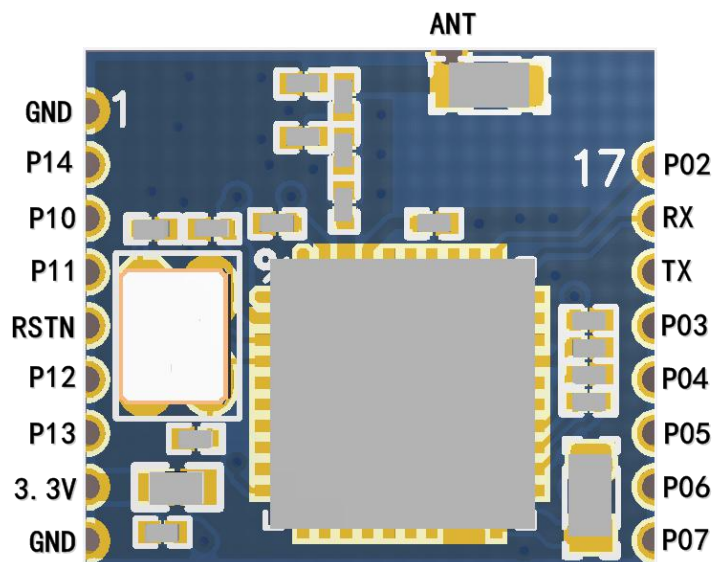


Figure 1 Pin Definition diagram

Pin	Symbol	IO type	Function
1	GND	P	Power reference ground
2	P14	I/O	PWM[4]
3	P10	I/O	PWM[0](20mA)
4	P11	I/O	Key input pin, valid at low level
5	RSTN	AO	Module reset input pin, valid at low level
6	P12	I/O	PWM[2]
7	P13	I/O	PWM[3]
8	3.3V	P	Module power supply 3.3V
9	GND	P	Power reference ground
10	P07	I/O	GPIO7
11	P06	I/O	GPIO6
12	P05	I/O	GPIO5
13	P04	I/O	GPIO4

Pin	Symbol	IO type	Function
14	P03	I/O	GPIO3
15	TXD	I/O	UART Output
16	RXD	I/O	UART Input
17	P02	I/O	Status indication LED output, valid at low level
18	ANT	-	Antenna interface

Table 1 Pin Function list

Note:

P represents power pin,

I/O represents an input / output pin,

AO represents an analog input and output pin.

3. Basic Functional Description

3.1. Two working states of the module

HLK-B11 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.

3.2. Function Keys and Status Indicators

3.2.1. State output pin

The 17th 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 (bright 5s turn off 100ms)	
	Restore default settings, Continuous flash	

Table 2 Status indicator definition

3.2.2. Function key input pin

Module 4 pin P11 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.

3.3. Switching Between Transmission and AT Command Mode

3.3.1. From transmission mode to AT command mode

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

key mode:

Pull down the fourth 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.

3.3.2. 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:

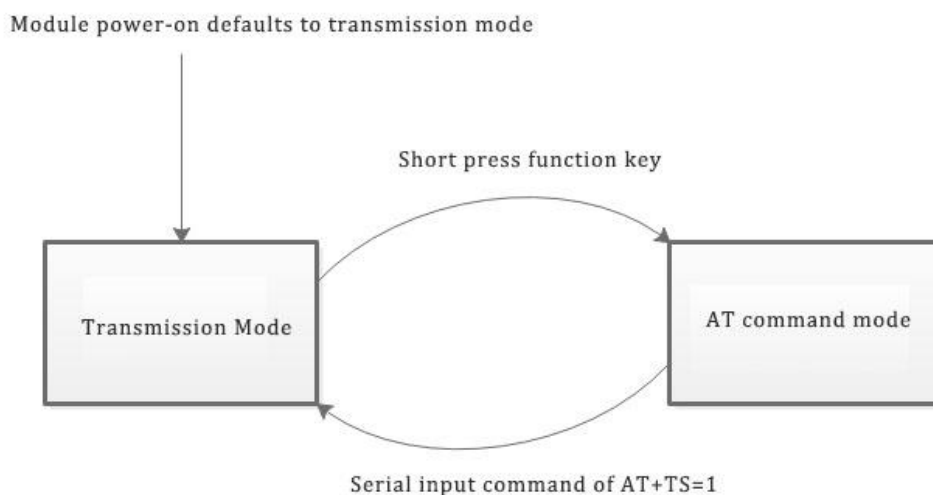


Figure 2 Mode switching logic diagram

4. AT command

4.1. 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

4.2. 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

Table 3 AT Command list

5. Bluetooth Connection Method

As a Bluetooth 5.0 slave device, HLK-B11 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-B11 module through Bluetooth.

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

Table 4 Bluetooth transparent transmission UUID

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.

6. Test Tools and Methods

6.1. Test board

Users can choose our special test board to quickly start testing and using the HLK-B11 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 (For reference only, the matching transit board is needed to transfer):

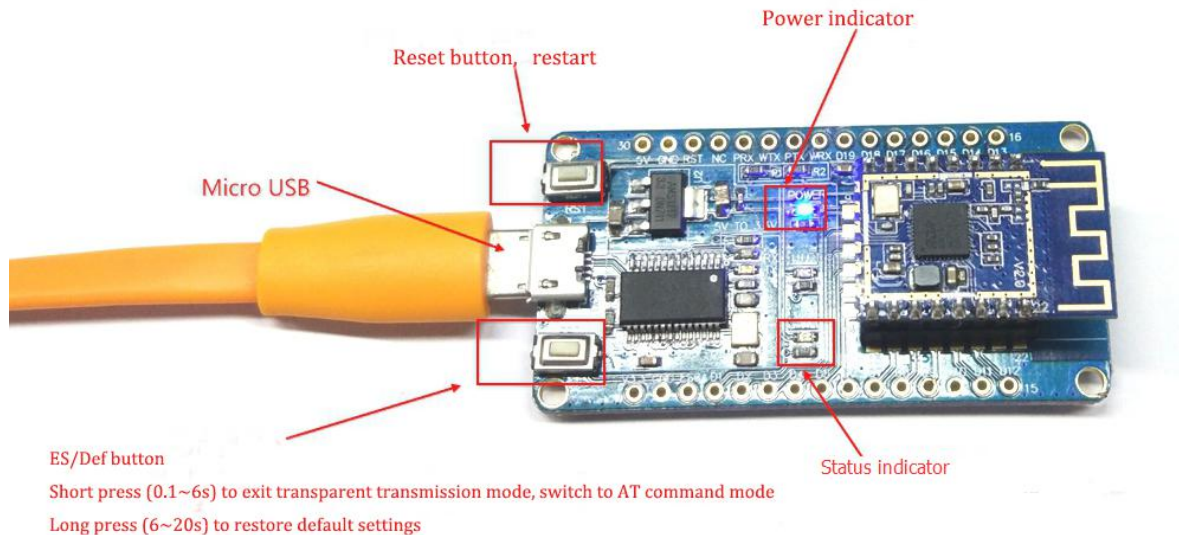


Figure 3 Test board reference diagram

6.2. Transmission test method

HLK-B11 the transmission function logic of the module is as follows:

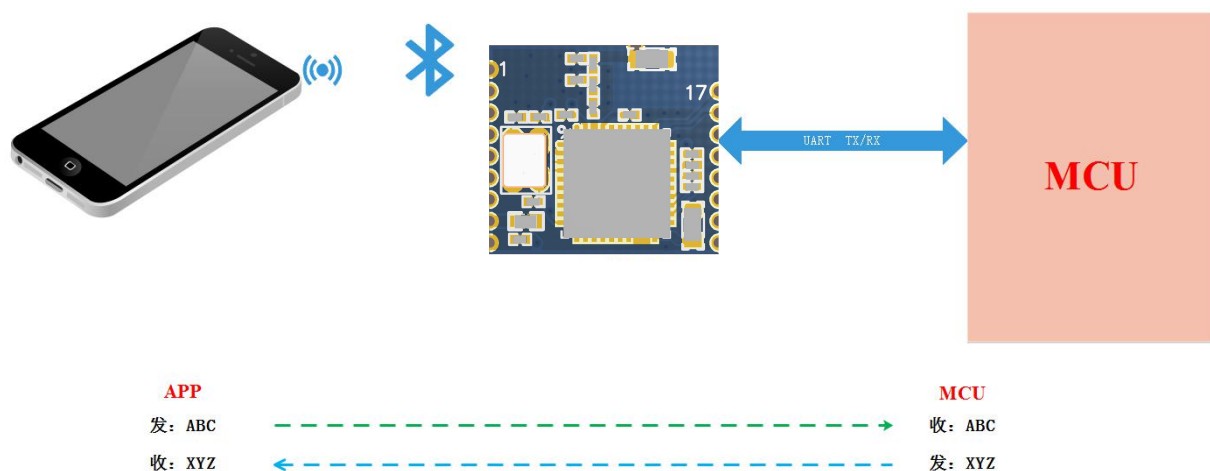


Figure 4 Transparent transmission function renderings

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.

6.3. Data transparent 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 re-scan;



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:



Figure 5 Transparent transmission test renderings

7. Revised Record

Date	Version	Modify content
2020.6.15	1.0	Initial version

8. Technical Support and Contact Information



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