



Shenzhen Hi-Link Electronic Co., Ltd.

HLK-B50
Dual Mode Bluetooth Module
User Manual

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Terminology, terminology explanation

Name	Explanatory notes
Transmission	Transparent transmission, forwarding data between Bluetooth and serial port as is
Bluetooth	Bluetooth, a short-range wireless communication technology
BLE	Bluetooth Low Energy, low Power Bluetooth, a new Bluetooth specification with lower power consumption and longer transmission and communication distances
GATT	Low Power Bluetooth (BLE) connections are built on the GATT (Generic Attribute Profile) protocol, a common specification for sending and receiving data on top of a Bluetooth connection
Bluetooth Host	One of the device roles in the Bluetooth connection, the host goes to scan the slave device and initiates the connection to the slave device, etc. Its leading role in the Bluetooth connection
Bluetooth Slave	One of the device roles in a Bluetooth connection, the slave goes to broadcast its own information and passively waits for a connection
Bluetooth Radio	Bluetooth slave devices send broadcasts periodically so that the surrounding host devices can scan and recognize themselves, and the host devices can initiate connections to the slaves based on the scanned slave information
Broadcast interval	Bluetooth slave device to send broadcast interval, the smaller the interval the faster it is scanned but the greater the power consumption, the greater the power consumption is smaller
Connection interval	After two Bluetooth devices establish a connection, the beat of the transmission data, the smaller the interval, the faster the transmission speed, the smaller the delay, but the greater the power consumption
Pair Binding	A mechanism for communication security in Bluetooth technology, which is implemented in the Bluetooth link layer
OTA	Over-the-air upgrade, i.e. firmware upgrade of the module via Bluetooth wireless
Reconnection interval	When the module is the host, when the Bluetooth connection is not connected or disconnected, how long the interval is automatically reconnected
SPP	Bluetooth serial protocol, which is a subset of classic Bluetooth

Table 1 Terminology name explanation table

1 Product function introduction

HLK-B50 is a BLE5.0 dual-mode Bluetooth-serial port pass-through module developed and produced by Hi-Link Electronics, which can support both Bluetooth SPP and GATT pass-through, and various devices with serial ports can use Bluetooth wirelessly to send and receive data simply and quickly through this module.

The basic functions and features are as follows :

- Built-in 32-bit ARM Cortex M3 core with main frequency up to 48MHz
- Fast and stable Bluetooth-serial pass-through with serial baud rate up to 921600
- Master-slave Bluetooth BLE 5.0, can be set as master or slave mode, support binding encryption
- Dual-mode Bluetooth with data transit via GATT or SPP and simultaneous connectivity
- Support A2DP V1.3 and AVRCP V1.6, built-in Audio CODEC
- Built-in lithium battery charging circuit, charging current up to 200mA
- Built-in LDO, adjustable LDO output voltage
- Built-in Watchdog for long and reliable operation
- Wide operating voltage 2.6~4.2V, 3.3V typical
- Rich output pins (UART, I2C, SPI, GPIO, ADC, PWM, I2S, etc.) for flexible and in-depth hardware and software customization development services

2 Pin definition

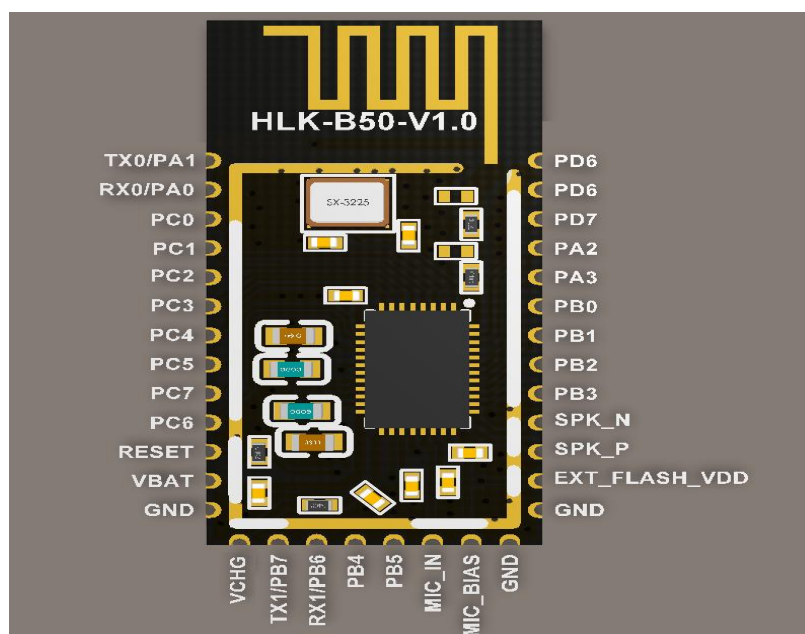


Figure 1 Pin location schematic

Pins	Symbols	IO types	Function
1	TX0	O	Module pass-through serial output
2	RX0	I	Module pass-through serial input
3	PC0	IO	Reserved function, not used
4	PC1	IO	Reserved function, not used
5	PC2	IO	Reserved function, not used
6	PC3	IO	Reserved function, not used
7	PC4	IO	Reserved function, not used
8	PC5	IO	Reserved function, not used
9	PC7	IO	Function button input, internal pull-up, bottom board connected to ground button Short press (0.2~3s): enter AT command mode Long press (8~20s): Restore the default configuration
10	PC6	IO	Reserved function, not used
11	RESET	AI	Reset restart module, active high, not dangling, external 10K pull-down resistor required
12	VBAT	PWR	Power input DC 3.3V, battery powered case connected to the battery
13	GND	GND	Power ground
14	VCHG	AI	Charger input, prohibit use without battery power
15	TX1	O	Burn serial output
16	RX1	I	Burn serial input
17	PB4	IO	Reserved function, not used
18	PB5	IO	Reserved function, not used
19	MIC_IN	AI	Reserved function, not used
20	MIC_BIAS	AO	Reserved function, not used
21	GND	GND	Power ground
22	GND	GND	Power ground
23	EXT_FLAS	AO	Reserved function, not used
24	SPK_N	AO	Reserved function, not used
25	SPK_P	AO	Reserved function, not used
26	PB3	IO	Reserved function, not used
27	PB2	IO	Reserved function, not used
28	PB1	IO	Reserved function, not used
29	PB0	IO	Reserved function, not used
30	PA3	IO	Reserved function, not used

Pins	Symbols	IO types	Function
31	PA2	IO	Reserved function, not used
32	PD7	IO	Reserved function, not used
33	PD6	IO	Bluetooth connection status output, high level: not connected, low level: connected
34	PD6	IO	Bluetooth connection status output, high level: not connected, low level: connected

Table 2 Pin definition table

3 Typical application circuits

The following is the basic application circuit reference of this module, for more functions, please refer to the module manual, or contact our engineers for assistance.

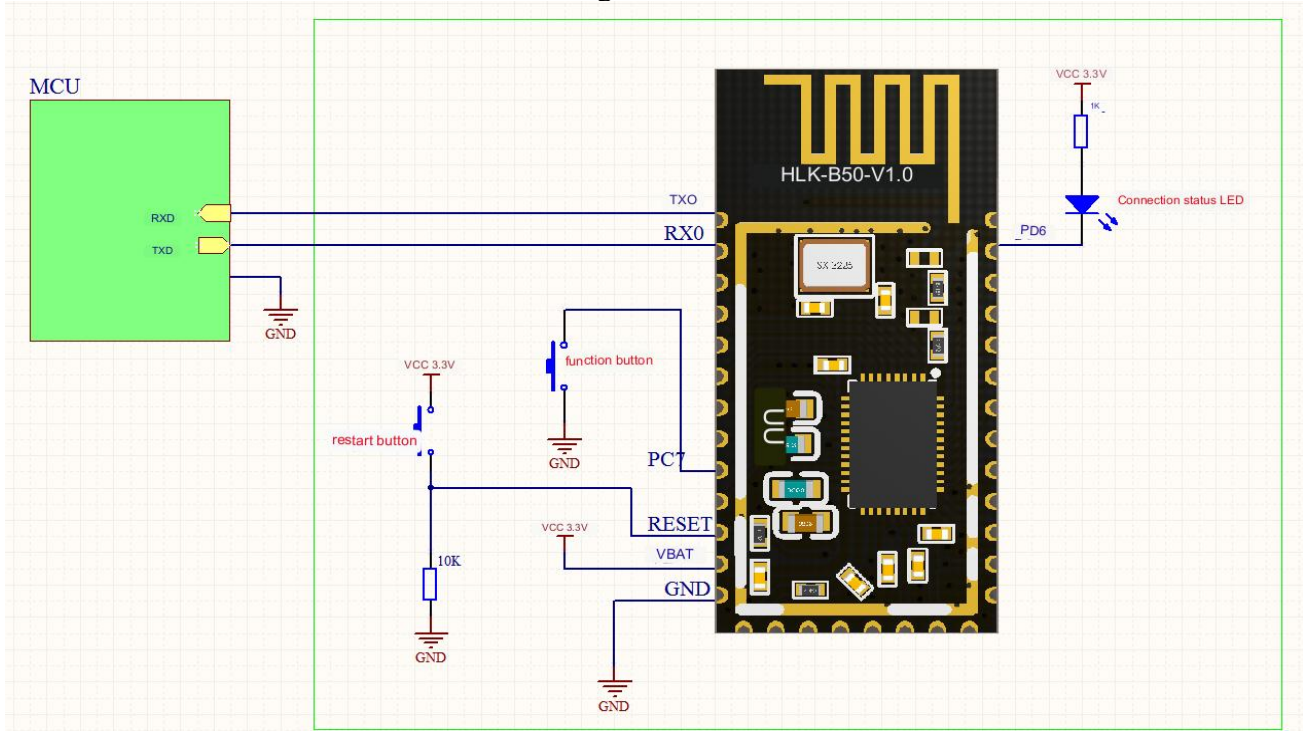


Figure 2 Basic minimum circuit

Note:

1. RESET pin can not be suspended, need to connect 10K pull-down resistor.
2. Metal objects will affect the Bluetooth signal transmission and reception, the use of the module should be as far away as possible from metal objects, PCB design requirements of the module Antenna part of the hollow below can not lay copper.

4 Basic function description

4.1 Transparent transmission principle

HLK-B50 is a cost-effective dual-mode Bluetooth-serial port pass-through module launched by Hi-link Electronics, designed to enable user devices with serial ports only to use Bluetooth for wireless transmission quickly and easily, with serial port pass-through, the user's product does not need to care about the complex Bluetooth protocol stack and RF circuit, just a simple serial port transceiver, that is, the data can be transmitted directly on the Bluetooth wireless connection.

Transparent transmission is short for transparent transmission, that is, the role of the module is equivalent to the establishment of a transparent transmission pipeline between the serial port and the Bluetooth connection, the data sent by the user in the serial port will be forwarded to the device connected through the Bluetooth, the data sent through the Bluetooth will also be forwarded to the serial port, the whole process of the user does not need to care about the complex Bluetooth connection how to achieve, and HLK-B50 module from the beginning to the end only The HLK-B50 module only carries out the original data handling and forwarding without parsing and processing the data transmitted by the user, so the user can safely and conveniently use this transparent transmission capability.

The principle of Bluetooth-serial pass-through function is shown below, please see <5 Quick Start Guide> for the specific test verification method.

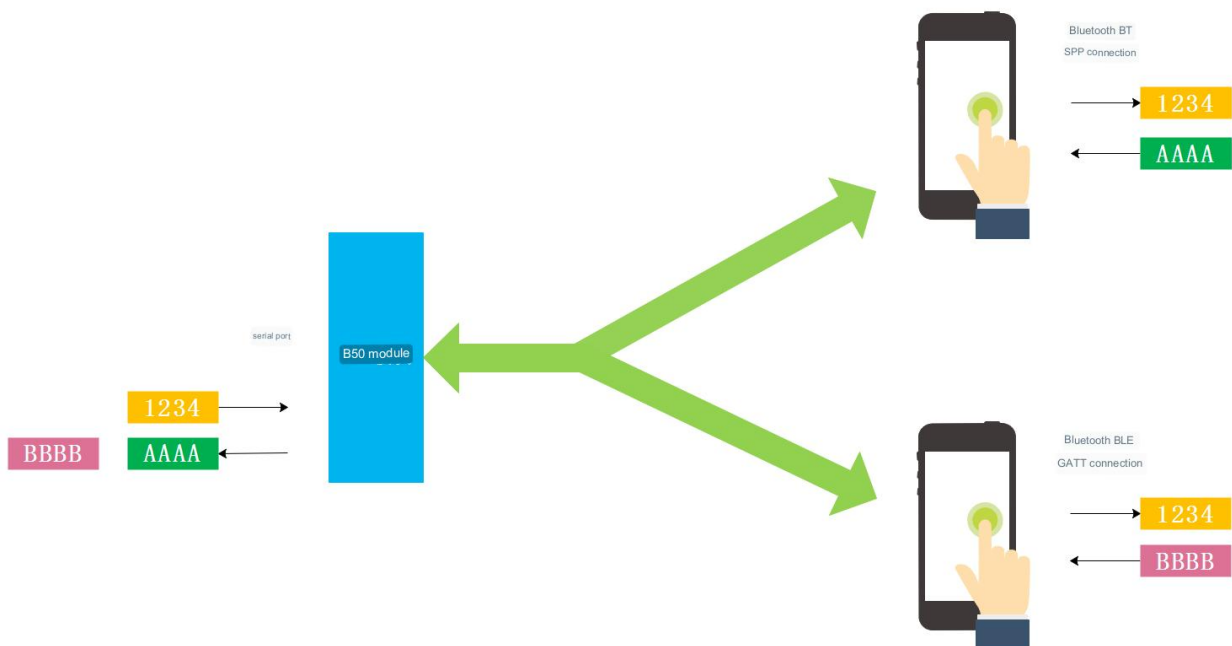


Figure 3 Schematic diagram of the Bluetooth connection pass-through function

This module supports master and slave when using BLE connection, the module can be set not as a master role or slave role. In the master role, the module can actively connect to other slave devices or modules, and in the slave role, it can be connected by other Bluetooth host devices, including other as the master B50 module.

SPP connection and BLE connection can exist at the same time, the data received by the module serial port will be forwarded to each connected Bluetooth device via Bluetooth, and the data sent by each connected Bluetooth device will also be forwarded to the module serial port.

4.2 Operating modes of the module (pass-through and AT command modes)

The HLK-B50 module has two operating states: pass-through mode and AT command mode.

In AT command mode, you can send AT command to the module through serial port to query and set the parameters of the module.

In the pass-through mode, the module will pass the serial port data and the Bluetooth connection data in both directions.

When the module is started, the default is the pass-through mode. Exiting the pass-through mode to enter AT mode will not affect the Bluetooth connection status, and the serial The data transmission of serial-Bluetooth is suspended and the data received by the serial port is processed by the current AT command; the data transmission will be continued after the transmission is resumed.

In the pass-through mode, input pin 9 PC7 low for a short time (0.5~3s), the module will exit the pass-through and switch to AT command mode.

In AT command mode, sending AT+TS=1 command will exit AT command mode and resume to pass-through mode.

The conversion logic of the pass-through mode and AT command mode is as follows:

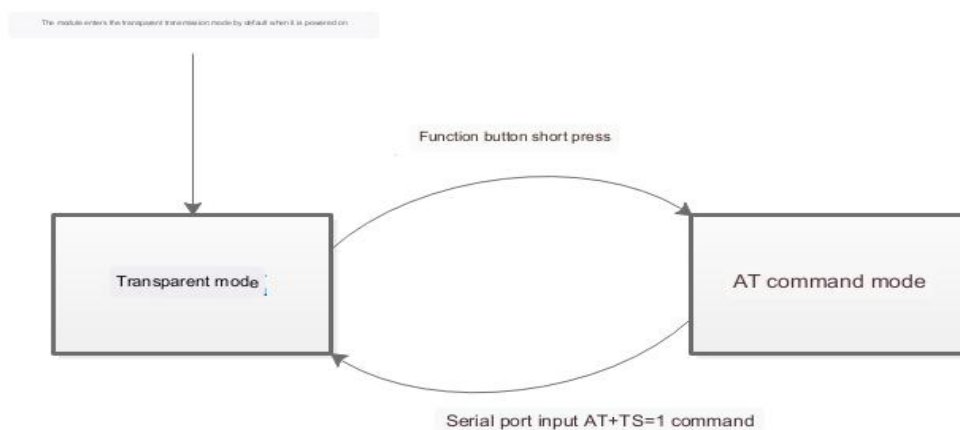


Figure 4 Transmissive mode and AT command mode conversion logic diagram

4.3 Input and output pin function descriptions

Name	Chip pin	Description
Reset button input	RESET	Active high, external 10K pull-down resistor required Input high level module to restart the module
Function button input	PC7	Internal has been pulled up, pull down action; pull low 0.5 to 3 seconds: exit the pass-through switch to AT command mode; Pull down 8~20 seconds: restore factory default settings
Bluetooth connection status output	PD6	High level = not connected, low level = connected, the transmission channel is established; When the pair binding function is enabled, the successful pair encryption means connected

Table 3 Input and output pin function descriptions

4.4 Bluetooth BLE device roles and connectivity

Devices at both ends of a Bluetooth BLE connection have fixed roles, always a host role and a slave role. The different roles define the corresponding operations and responsibilities of the devices.

The host takes the lead role in a Bluetooth connection by scanning the slave broadcast to discover the slave device and initiating and maintaining the connection to the selected slave device (identified by MAC address or Bluetooth name).

The slave broadcasts its own information, such as the device name, and the slave passively waits for a connection request from the host and accepts the request to make a successful Bluetooth connection. This module can be connected to multiple host devices at the same time when it is a slave.

The default mode of B50 module is slave mode, which can be switched by AT+ROLE command.

After two BLE devices establish a Bluetooth connection, they can send data to each other via Bluetooth (GATT).

The Bluetooth GATT service and feature UUID of this module can be modified by the AT command with the following default values:

Service UUID: 0000fff0-0000-1000-8000-00805f9b34fb

Feature UUID	Operation permissions	Function definition
0000fff1-0000-1000-8000-00805f9b34fb	Read/Notify	Module send, APP receive
0000fff2-0000-1000-8000-00805f9b34fb	Write Without Response	APP send, module receive

Table 4 Bluetooth pass-through service UUID default value

You can choose to open the pairing and binding function of Bluetooth connection, after opening, it can increase the security but the operation steps are increased accordingly, it is effective in slave or host mode, the pairing method is PASSKEY ENTRY, 6-digit Ping Code. after opening the binding function, the pairing and binding must be done to send and receive Bluetooth data, the unpaired device cannot transmit data through Bluetooth and the module.

In host mode, you need to set the MAC address of the target slave to be connected, the module will automatically scan and connect to the target slave device after starting, and will automatically reconnect if no slave is found or the connection is disconnected, etc. The interval of automatic reconnection can be set by AT+RECONNI command, the default is 5s, i.e. when it is not connected, it will try to reconnect once every 5 seconds until it is connected.

4.5 Bluetooth SPP connection

Devices that do not support Bluetooth BLE can establish a connection and transmit data through the traditional Bluetooth SPP protocol and module.

5 Quick start guide

5.1 Debug base board for testing

In order to enable users to quickly start verification and debugging of the module, we have developed a special B50 test base board, which is recommended for the first time when using the module.

The test base board is directly powered by USB and comes with USB to serial function. After connecting to the computer through USB cable, you can connect to the serial port of the module through USB to serial port, no need to connect additional serial cable, easy to use.

5.2 Quickly verify Bluetooth serial pass-through functionality

Our company has developed a special cell phone Bluetooth pass-through test APP for this module, so that users can use it. please refer to "HLK-B50 Bluetooth pass-through module cell phone APP instructions" for APP introduction and usage instructions.

Using the module test base and cell phone Bluetooth pass-through test APP, you can immediately start to test and verify the serial-Bluetooth pass-through function of the module.

The specific test operation procedure is as follows:

Connect the module to the test base correctly, and connect the test base to the computer via USB cable.

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

Open the transmission test APP on the cell phone, the APP will automatically search the surrounding Bluetooth devices and display the list.

The default name of the B50 module is HLK_B50_**** and the suffix is The default name of the B50 module is HLK_B50__B50__, with the last four digits of the MAC address.

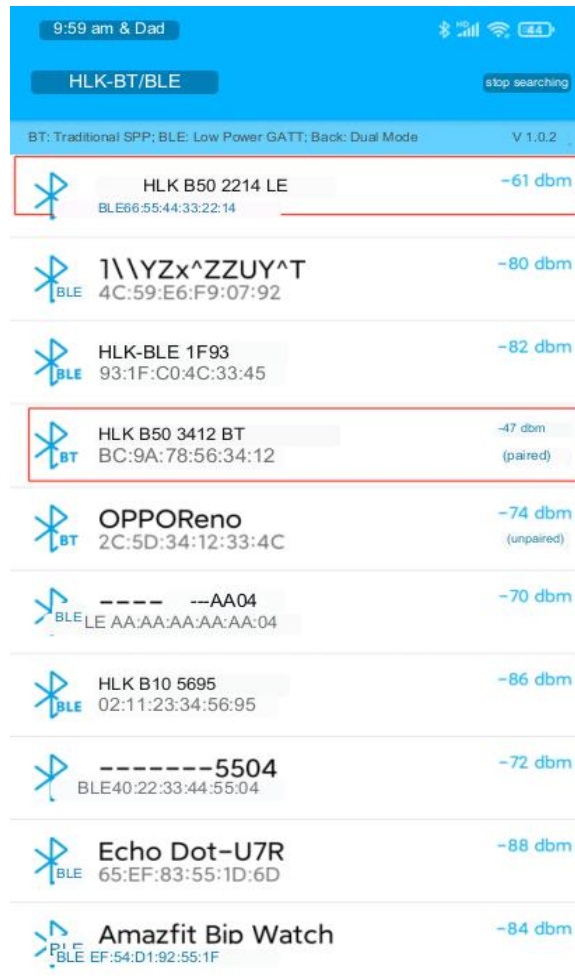


Figure 5 Diagram of the transmission test tool

After the APP is successfully connected to the module, the connection status LED on the test base will turn on, that is, it is connected.

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

Send data to the module from the pass-through test APP on the cell phone, the sent content will be received by the module as it is and output to the serial port of the module, in The received data can be seen in the serial port debugging tool on the computer, and the effect is as follows:

Module serial port

Mobile App side

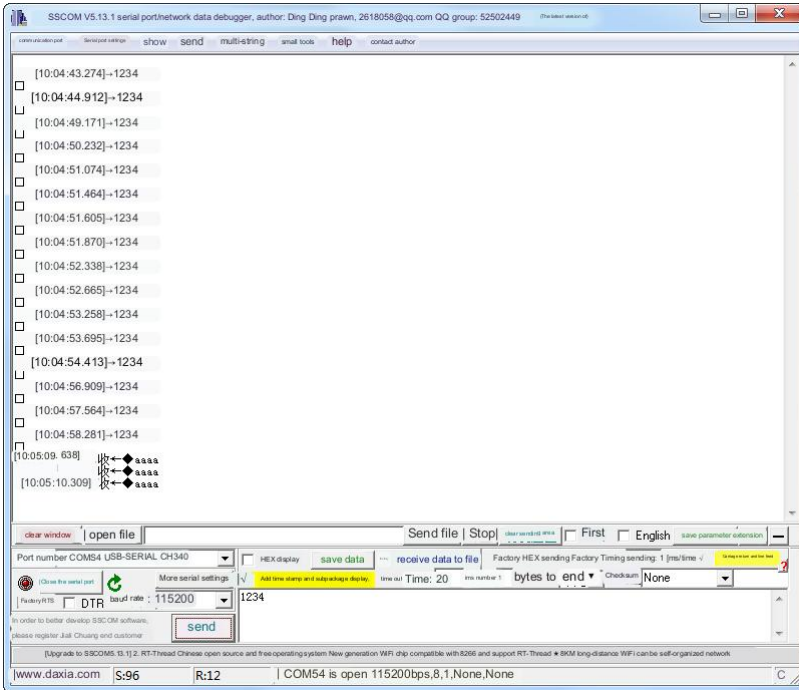


Figure 6 Serial port and APP pass-through data testing

6 AT command

6.1 AT command format description

All AT command contents are in ASCII string format, and commands end with a carriage return newline character.

The settings are not lost after power down, and all settings are made to take effect after reboot.

Query class command:

Send	Answer
AT+<CMD>=?\r\n	Query successfully: AT+<CMD>=<val>\r\n OK\r\n Or query failure: AT+<CMD>=<val>\r\n ERROR\r\n

Set-up class command:

Send	Answer
AT+<CMD>=<val>\r\n	Set up successfully: AT+<CMD>=<val>\r\n OK\r\n Or set up failure: AT+<CMD>=<val>\r\n ERROR\r\n

\r\n stands for ASCII code: 0x0D 0x0A

6.2 List and description of AT commands

No	Command name	Description	Parameter range	Example	
1	VER	Software version number	Read only	Send AT+VER=?	Answer AT+VER=1.03(20092421) OK
2	MAC	MAC address	Read only	Send AT+MAC=?	Answer AT+MAC=112233445501 OK
3	DEFAULT	Restore the default configuration	1	Send AT+DEFAULT=1	Answer AT+DEFAULT=1 OK
4	REBOOT	Reboot module	1	Send AT+REBOOT=1	Answer AT+REBOOT=1 OK
5	TS	Restore pass-through mode	1	Send AT+TS=1	Answer AT+TS=1 OK
6	NAME	Module bluetooth name	Maximum 18 characters Default value: HLK_B50_****_LE	Send AT+NAME=?	Answer AT+NAME=HLK_B50 OK
				Send AT+NAME=ble_1234	Answer AT+NAME=ble_1234 OK

7	BAND	Serial port baud rate	1200,2400,4800,9600,14400,19200,38400,57600,115200,230400,460800,921600 Default value: 115200	Send AT+BAND=?	Answer AT+BAND=115200 OK
				Send AT+BAND=230400	Answer AT+BAND=230400 OK
8	CONNI	Bluetooth connection interval	6 ~ 3200,unit 1.25ms, i.e. 7.5~4000ms, Default value: 24 The smaller the transceiver, the faster the power consumption; the larger the transceiver, the slower the delay, the lower the power consumption	Send AT+CONNI=?	Answer AT+CONNI=24 OK
				Send AT+CONNI=8	Answer AT+CONNI=8 OK
9	ADVI	Bluetooth broadcast interval	Unit 625us Recommended value: 80,160,320,800,1600,3200 Default value: 800	Send AT+ADVI=?	Answer AT+ADVI=800 OK
				Send AT+ADVI=1600	Answer AT+ADVI=1600 OK
10	ADVDATA	Customized broadcast data	Hexadecimal number, the number of characters is a multiple of 2, up to 52 hexadecimal numbers Default value: none	Send AT+ADVDATA=?	Answer AT+ADVDATA=03FF1A1B OK
				Send AT+ADVDATA=68696C696E6B	Answer AT+ADVDATA=68696C696E6B OK
11	ROLE	BLE roles for modules	1 Slave 2 Master Default value: 1	Send AT+ROLE=?	Answer AT+ROLE=1 OK
				Send AT+ROLE=2	Answer AT+ROLE=2 OK
12	ENCRYPT	Pair binding enable	0 No pairing required 1 Pairing required Default value: 0	Send AT+ENCRYPT=?	Answer AT+ENCRYPT=0 OK
				Send AT+ENCRYPT=1	Answer AT+ENCRYPT=1 OK
13	PINCODE	Matching code	6-digit integer Default value: 000000	Send AT+PINCODE=?	Answer AT+PINCODE=000000 OK
				Send AT+PINCODE=123456	Answer AT+PINCODE=123456 OK

14	SCANMODE	Connection scanning method in host mode	0 Connect via MAC address 1 Connection via bluetooth name Default value: 0	Send AT+SCANMODE=?	Answer AT+SCANMODE=0 OK
				Send AT+SCANMODE=1	Answer AT+SCANMODE=1 OK
15	PEERMAC	MAC address of the slave that is automatically de-connected when the module is the host	MAC address, 12 hexadecimal digits	Send AT+PEERMAC=?	Answer AT+PEERMAC=AAB BCC000001 OK
				Send AT+PEERMAC=AA BBCC000001	Answer AT+PEERMAC=AAB BCC000001 OK
16	PEERNAME	Bluetooth name of the slave that automatically goes to the connection when the module is the master	Maximum 18 characters	Send AT+PEERNAME=?	Answer AT+PEERNAME=H LK_B50 OK
				Send AT+PEERNAME=bl e_1234	Answer AT+PEERNAME=bl e_1234 OK
17	AUTHPWG	Access codes for OTA and over-the-air configurations	Maximum 8 characters Default value: HiLink	Send AT+AUTHPWG=?	Answer AT+AUTHPWG=HiLi nk OK
				Send AT+AUTHPWG=686 86868	Answer AT+AUTHPWG=6868 6868 OK
18	RECONNI	Bluetooth auto reconnect interval when module does host	Integer, unit: s 0: represents only one connection attempt at startup, no reconnection 1 ~ 60: automatically reconnect after a specified number of seconds after the connection is disconnected Default value: 5	Send AT+RECONNI=?	Answer AT+RECONNI=0 OK
				Send AT+RECONNI=10	Answer AT+RECONNI=10 OK
19	UUIDS	Bluetooth transmissions service UUID	32 hexadecimal numbers Default value: 0000fff000001000800000805f9b34fb	Send AT+UUIDS=0000fff000001000800000805f9b34fb	Answer AT+UUIDS=0000fff000001000800000805f9b34fb OK
				Send AT+UUIDS=0000fff100001000800000805f9b34fb	Answer AT+UUIDS=0000fff100001000800000805f9b34fb OK
20	UIDR	Read feature UUID in pass-through service (sent by module, received by APP)	32 hexadecimal numbers Default value: 0000fff100001000800000805f9b34fb		

21	UUIDW	Write feature UUID in pass-through service (sent by APP, received by module)	32 hexadecimal numbers Default value: 0000fff200001000800000805f9b34fb									
22	DISCONN	Proactively disconnect all current bluetooth connections to the module	1	<table border="1"> <tr> <th>Send</th> <th>Answer</th> </tr> <tr> <td>AT+DISCONN=1</td> <td>AT+DISCONN=1 OK</td> </tr> </table>	Send	Answer	AT+DISCONN=1	AT+DISCONN=1 OK				
Send	Answer											
AT+DISCONN=1	AT+DISCONN=1 OK											
23	ADVEN	Module bluetooth broadcast enable	0 Disable Bluetooth broadcasting for the module 1 Enables Bluetooth broadcasting for the module Default value: 1 When disabled, the module cannot be scanned by cell phones or other Bluetooth hosts	<table border="1"> <tr> <th>Send</th> <th>Answer</th> </tr> <tr> <td>AT+ADVEN=?</td> <td>AT+ADVEN=0 OK</td> </tr> <tr> <th>Send</th> <th>Answer</th> </tr> <tr> <td>AT+ADVEN=1</td> <td>AT+ADVEN=1 OK</td> </tr> </table>	Send	Answer	AT+ADVEN=?	AT+ADVEN=0 OK	Send	Answer	AT+ADVEN=1	AT+ADVEN=1 OK
Send	Answer											
AT+ADVEN=?	AT+ADVEN=0 OK											
Send	Answer											
AT+ADVEN=1	AT+ADVEN=1 OK											
24	BTNAME	Module BT legacy bluetooth name	Maximum 20 characters Default value: HLK_B50_****_BT	<table border="1"> <tr> <th>Send</th> <th>Answer</th> </tr> <tr> <td>AT+BTNAME=?</td> <td>AT+BTNAME=HLK_B50 OK</td> </tr> <tr> <th>Send</th> <th>Answer</th> </tr> <tr> <td>AT+BTNAME=ble_1234</td> <td>AT+BTNAME=ble_1234 OK</td> </tr> </table>	Send	Answer	AT+BTNAME=?	AT+BTNAME=HLK_B50 OK	Send	Answer	AT+BTNAME=ble_1234	AT+BTNAME=ble_1234 OK
Send	Answer											
AT+BTNAME=?	AT+BTNAME=HLK_B50 OK											
Send	Answer											
AT+BTNAME=ble_1234	AT+BTNAME=ble_1234 OK											
25	BTMODE	SPP and GATT mode settings, dual-mode or single-mode	0: SPP+GATT 1: SPP 2: BLE Default value: 0	<table border="1"> <tr> <th>Send</th> <th>Answer</th> </tr> <tr> <td>AT+BTMODE=?</td> <td>AT+BTMODE=0 OK</td> </tr> <tr> <th>Send</th> <th>Answer</th> </tr> <tr> <td>AT+BTMODE=1</td> <td>AT+BTMODE=1 OK</td> </tr> </table>	Send	Answer	AT+BTMODE=?	AT+BTMODE=0 OK	Send	Answer	AT+BTMODE=1	AT+BTMODE=1 OK
Send	Answer											
AT+BTMODE=?	AT+BTMODE=0 OK											
Send	Answer											
AT+BTMODE=1	AT+BTMODE=1 OK											
26	BTMAC	BT legacy blue MAC address (not the same as BLE MAC)	Read only	<table border="1"> <tr> <th>Send</th> <th>Answer</th> </tr> <tr> <td>AT+BTMAC=?</td> <td>AT+BTMAC=112233445501 OK</td> </tr> </table>	Send	Answer	AT+BTMAC=?	AT+BTMAC=112233445501 OK				
Send	Answer											
AT+BTMAC=?	AT+BTMAC=112233445501 OK											

Table 5 AT command list and description

7 Wireless setup and query via bluetooth

You can check and set the parameters of the module through Bluetooth wireless in the cell phone APP, please refer to "HLK-B50 Bluetooth Transparent Module Please refer to the "HLK-B50 Bluetooth Transparent Module Mobile Phone APP Instructions" for detailed operation.

8 OTA Function

The firmware of the module can be upgraded wirelessly via Bluetooth in the cell phone APP, please refer to "HLK-B50 Bluetooth Transparent Module Mobile Phone APP Instructions for use".

FCC Caution:

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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.

IMPORTANT NOTE:

NOTE: This equipment 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 equipment 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 equipment 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.

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

The modular transmitter must comply with any applicable RF exposure requirements (as defined §2.1091 and §2.1093,) in its final configuration, per KDB996369 D03.

OEM/Integrators Installation Manual

List of applicable FCC rules This module has been tested and found to comply with part 15.247 requirements for Modular Approval.

Summarize the specific operational use conditions This module can support both Bluetooth SPP and GATT pass-through, and various devices with serial ports can use Bluetooth wirelessly to send and receive data simply and quickly through this module. The input voltage to the module should be nominally 3.3 VDC, typical value 3.3VDC and the ambient temperature of the module should not exceed 85 °C.

Limited module procedures N/A

Trace antenna designs N/A

Antennas The module of FR5082DM has a PCB antenna, and the maximum gain is 2.5dBi.

Label and compliance information When the module is installed in the host device, the FCC ID label must be visible through a window on the final device or it must be visible when an access panel, door or cover is easily re-moved. If not, a second label must be placed on the outside of the final device that contains the following text: Contains Transmitter Module

FCC ID: 2AD56HLK-B50, the FCC ID can be used only when all FCC ID compliance requirements are met.

Information on test modes and additional testing requirements

- a) The modular transmitter has been fully tested by the module grantee on the required number of channels, modulation types, and modes, it should not be necessary for the host installer to re-test all the available transmitter modes or settings. It is recommended that the host product manufacturer, installing the modular transmitter, perform some investigative measurements to confirm that the resulting composite system does not exceed the spurious emissions limits or band edge limits (e.g., where a different antenna may be causing additional emissions).
- b) The testing should check for emissions that may occur due to the intermixing of emissions with the other transmitters, digital circuitry, or due to physical properties of the host product (enclosure). This investigation is especially important when integrating multiple modular transmitters where the certification is based on testing each of them in a stand-alone configuration. It is important to note that host product manufacturers should not assume that because the modular transmitter is certified that they do not have any responsibility for final product compliance.
- c) If the investigation indicates a compliance concern the host product manufacturer is obligated to mitigate the issue. Host products using a modular transmitter are subject to all the applicable individual technical rules as well as to the general conditions of operation in Sections 15.5, 15.15, and 15.29 to not cause interference. The operator of the host product will be obligated to stop operating the device until the interference has been corrected.

Additional testing, Part 15 Subpart B disclaimer

The final host / module combination need to be evaluated against the FCC Part 15B criteria for unintentional radiators in order to be properly authorized for operation as a Part15 digital device. The host integrator installing this module into their product must ensure that the final composite product complies with the FCC requirements by a technical assessment or evaluation to the FCC rules, including the transmitter operation and should refer to guidance in KDB 996369. For host products with certified modular transmitter, the frequency range of investigation of the composite system is specified by rule in Sections 15.33(a)(1) through (a)(3), or the range applicable to the digital device, as shown in Section 15.33(b)(1), whichever is the higher frequency range of investigation. When testing the host product, all the transmitters must be operating. The transmitters can be enabled by using publicly available drivers and turned on, so the transmitters are active. In certain conditions it might be appropriate to use a technology-specific call box (test set) where accessory devices or drivers are not available. When testing for emissions from the unintentional radiator, the transmitter shall be placed in the receive mode or idle mode, if possible. If receive mode only is not possible then, the radio shall be passive (preferred) and/or active scanning. In these cases, this would need to enable activity on the communication BUS (i.e., PCIe, SDIO, USB) to ensure the unintentional radiator circuitry is enabled. Testing laboratories may need to add attenuation or filters depending on the signal strength of any active beacons (if applicable) from the enabled radio(s). See ANSI C63.4, ANSI C63.10 and ANSI C63.26 for further general testing details.