



JNHuaMao Technology Company

Bluetooth 4.0 BLE module

Datasheet

- 2 Professional bluetooth products suppliers.
- 2 Remote control module provider
- 2 data transmission module provider
- 2 PIO state acquisition module provider
- 2 Customizable bluetooth module and bluetooth solutions
- 2 Jinan high and new technology enterprise
- 2 SIG members

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**The most complete, most convenient, the most stable of
Bluetooth data transmission, remote control, PIO
acquisition module**

---- Master and slave role in one

---- Remote control without other MCU

---- The PIO data acquisition without other MCU

13. Product parameters

- Ø BT Version: Bluetooth Specification V4.0 BLE
- Ø Send and receive no bytes limit.
- Ø Working frequency: 2.4GHz ISM band
- Ø Modulation method: GFSK(Gaussian Frequency Shift Keying)
- Ø RF Power: -23dbm, -6dbm, 0dbm, 6dbm, can modify through AT Command AT+POWE.
- Ø Speed: Asynchronous: 6K Bytes
Synchronous: 6K Bytes
- Ø Security: Authentication and encryption
- Ø Service: Central & Peripheral UUID FFE0,FFE1
- Ø Power: +3.3VDC 50mA
- Ø Long range: Open space have 100 Meters with iphone4s
- Ø Power: In sleep mode 400uA~1.5mA, Active mode 8.5mA.
- Ø Working temperature:-5 ~ +65 Centigrade
- Ø Size: HM-10 26.9mm x 13mm x 2.2 mm; HM-11 18*13.5*2.2mm

2. Product overview

Thanks for you choose our products. If you want to know more, www.jnhuamao.cn can help you (Videos, New version datasheet, Module work flow, project Codes, etc.)

HM Bluetooth module use CSR BlueCore or TI CC2540, Master and slave roles in one, transmission version and remote control version and PIO state acquisition functions in one, Support the AT command modify module parameters, Convenient and flexible.

Transmission version can be used to transmit data between two Bluetooth devices.

Remote Control version can be used to Control PIO ports output high or low level without any other MCU.

The PIO state acquisition version can be used to acquisition PIO ports state without any other MUC. (Only support Bluetooth V2.1)

HM-01, HM-02, HM-03, HM-04, HM-05, HM-06, HM-07, HM-08, HM-09 is Bluetooth V2.1 version. Use CSR Chip.

HM-10, HM-11, HM-12 is Bluetooth V4.0 BLE version. Use TI Chip.

HM-01, HM-02, HM-09, HM-10 have same size and same pins.

HM-05, HM-06, HM-07, HM-11 have same size and same pins.

3. Product model









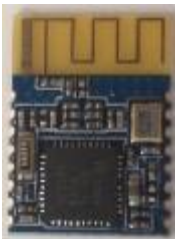

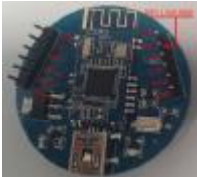
Models	VDD	Size(mm)	Flash	Chip	BT Version
HM-01	3.3V	26.9*13*2.2	8M	BC417143	V2.1+EDR
HM-02	2.5-3.7V	26.9*13*2.2	6M	BC3/BC4	V2.1
HM-03	2.5-3.7V	27.4*12.5*4.3	6M	BC3/BC4	V2.1
HM-04	3.3V	Not for sale			
HM-05	2.5-3.7V	13.5*18.5*2.3	6M	BC3/BC4	V2.1
HM-06	2.5-3.7V	13.5*18.5*2.3	6M	BC3/BC4	V2.1
HM-07	2.5-3.7V	13.5*18.5*2.3	8M		V2.1+EDR
HM-08	3.3V	26.9*13*2.5	8M	Class 1	V2.1+EDR
HM-09	2.5-3.7V	26.9*13*2.2	8M		V2.1+EDR
HM-10	2-3.7V	26.9*13*2.2	256Kb	CC2540/1	V4.0 BLE
HM-11	2.5-3.7V	13.5*18.5*2.2	256Kb	CC2540/1	V4.0 BLE
HM-15	5V	65*32*16	256KB	CC2540	V4.0 BLE

4. Product certificate





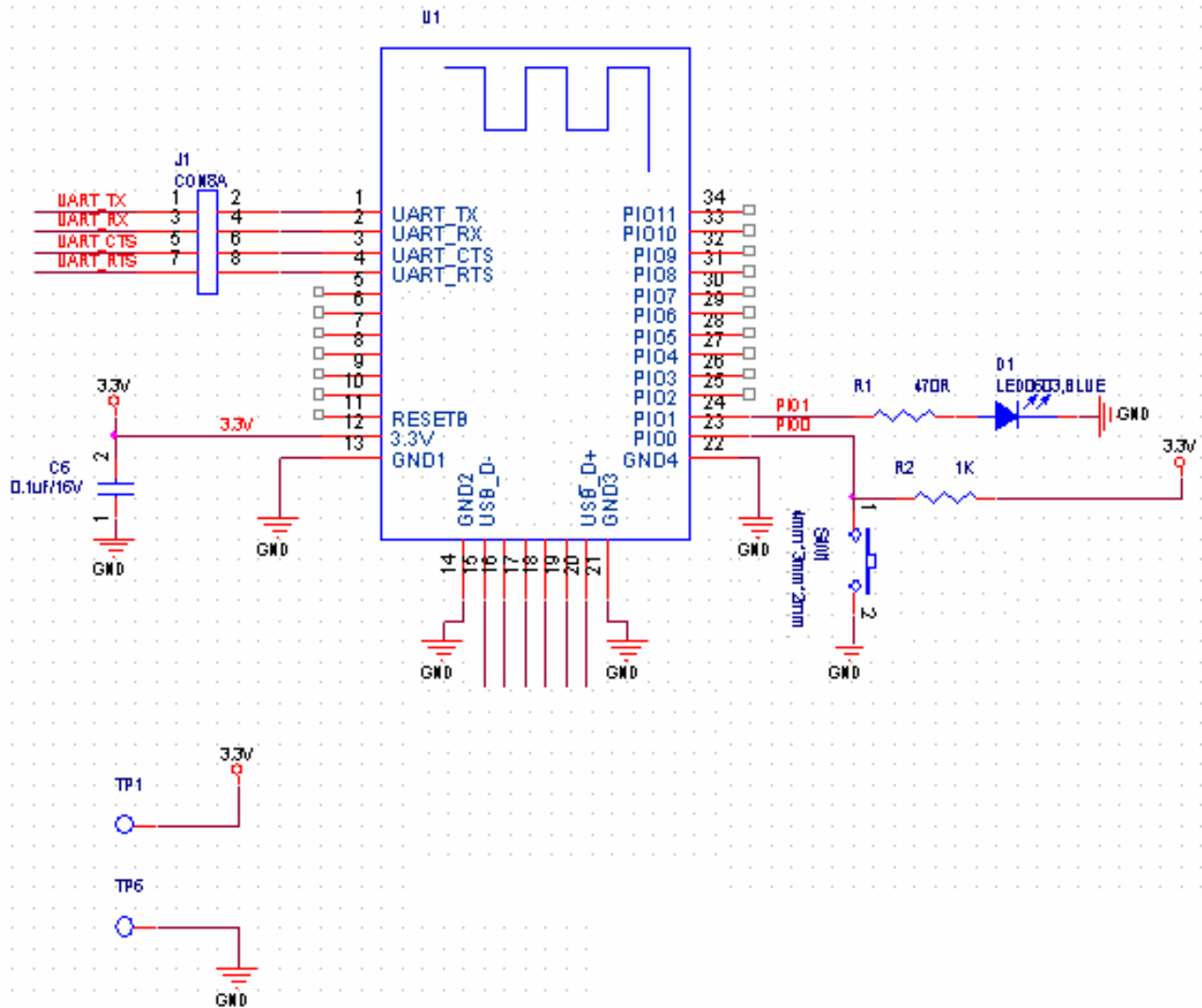
5. Product pictures

			Not for sale	
HM-01 BT 2.1	HM-02 BT 2.1	HM-03 BT 2.1	HM-04 BT 2.1	HM-05 BT 2.1
		Class1 Testing		
HM-06 BT 2.1	HM-07 BT 2.1	HM-08 BT 2.1	HM-09 BT 2.1	HM-10 BLE 4.0
	Dual mode Testing			
HM-11 BLE 4.0	HM-12 HM-13	HM-15 BLE USB Dongle	HMSensor	

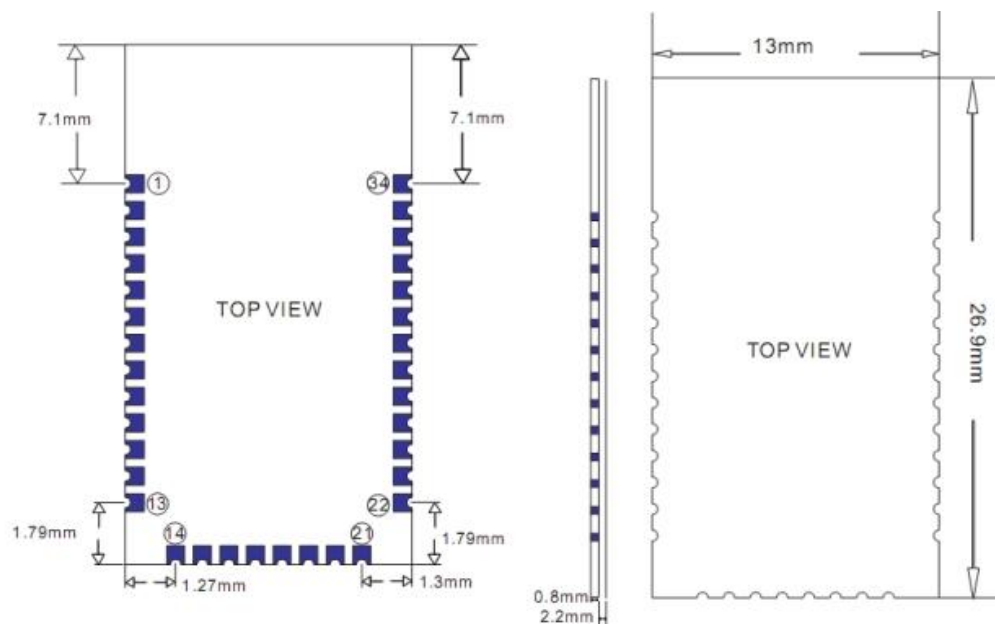
6. Product technical specifications

This document only include Bluetooth BLE 4.0 document, You can goto http://www.inhuamao.cn/bluetooth_en.rar get Bluetooth V2.1 version datasheet. That document include: HM-01, HM-02, HM-03, HM-04, HM-05, HM-06, HM-07, HM-08, HM-09.

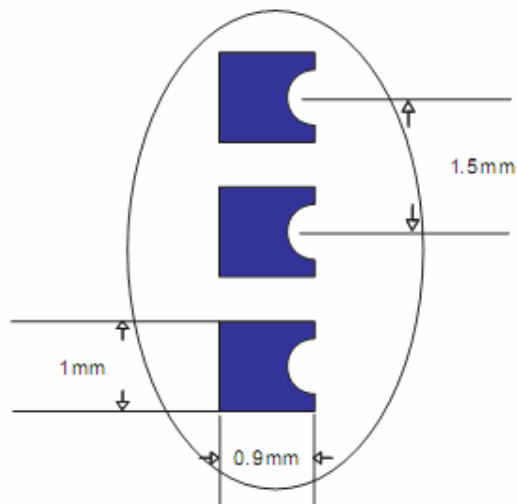
6.1 HM-10 Schematic



6.2 HM-10 Size



6.3 HM-10 package information



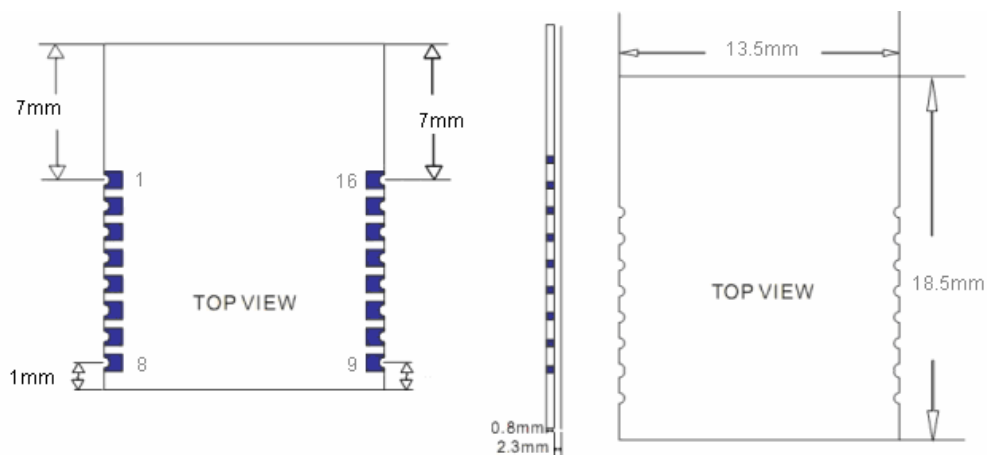
6.4 HM-10 Device Terminal Functions

No	Name	Description
1	UART_TX	UART interface
2	UART_RX	UART interface
3	UART_CTS	UART interface

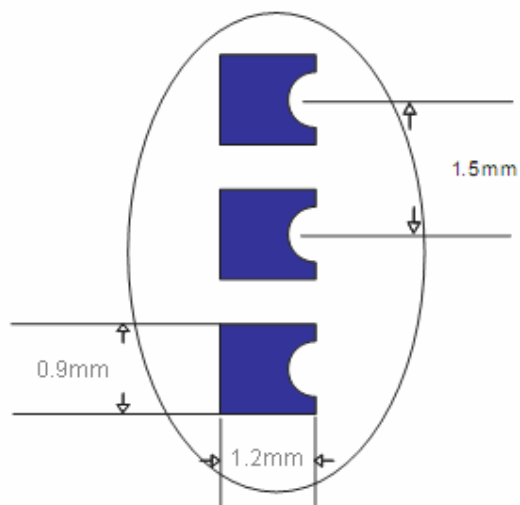
4	UART_RTS	UART interface
5	NC	NC
6	NC	NC
7	NC	NC
8	NC	NC
9	NC	NC
10	NC	NC
11	RESETB	Reset if low >100ms.
12	VCC	3.3V
13	GND	Ground
14	GND	Ground
15	USB_D-	USB interface
16	NC	NC
17	NC	NC
18	NC	NC
19	NC	NC
20	UB_D+	USB interface
21	GND	Ground
22	GND	Ground
23	PIO0	System Key
24	PIO1	System LED
25	PIO2	Programmable input/output line
26	PIO3	Programmable input/output line
27	PIO4	Programmable input/output line
28	PIO5	Programmable input/output line
29	PIO6	Programmable input/output line
30	PIO7	Programmable input/output line
31	PIO8	Programmable input/output line
32	PIO9	Programmable input/output line

33	PIO10	Programmable input/output line
34	PIO11	Programmable input/output line

6.5 HM-11 Size



6.6 HM-11 Package information



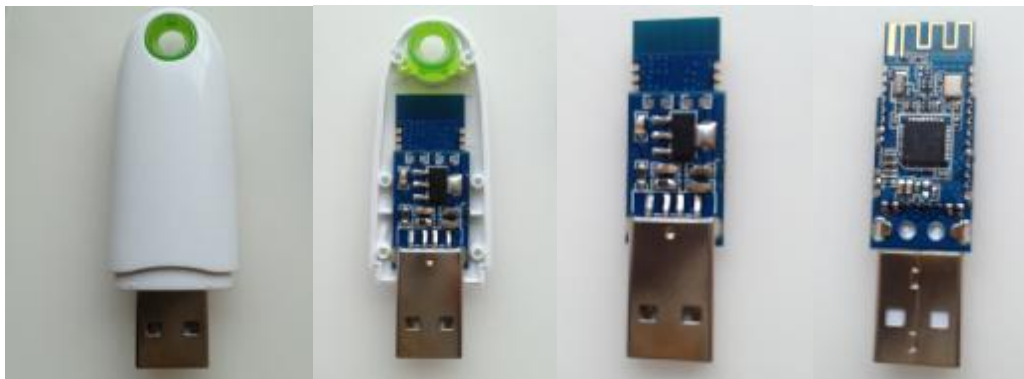
6.7 HM-11 Device Terminal Functions

No	Name	Description
1	UART_RTS	UART interface
2	UART_TX	UART interface

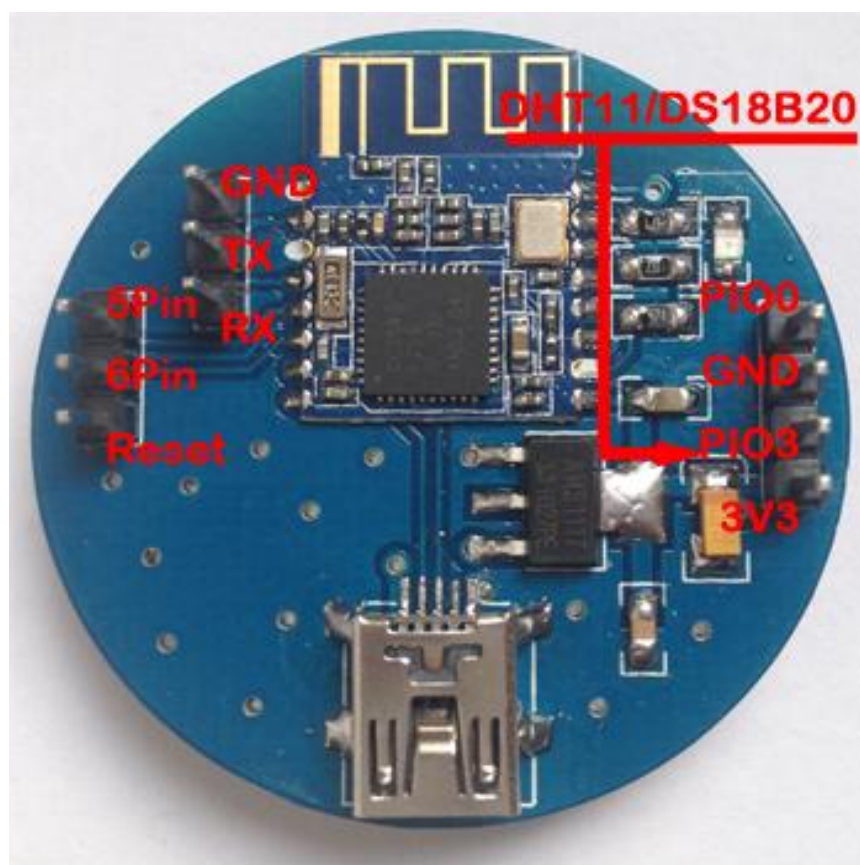
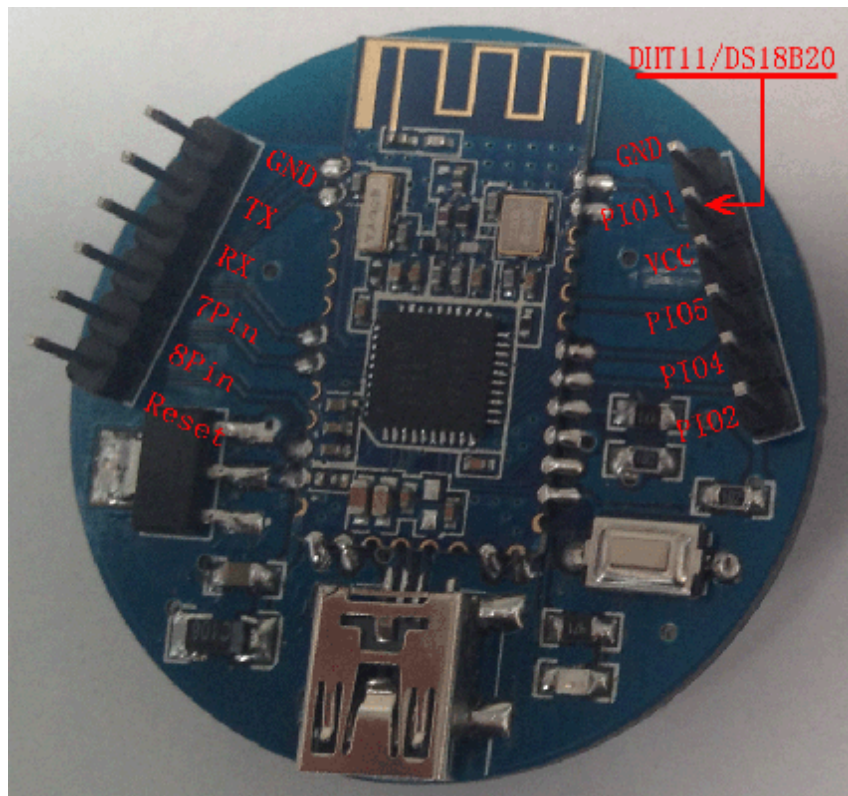
3	UART_CTS	UART interface
4	UART_RX	UART interface
5	NC	NC
6	NC	NC
7	NC	NC
8	NC	NC
9	VCC	V3.3
10	NC	NC or VCC
11	RESETB	Reset if low <100ms
12	GND	Ground
13	PIO3	Programmable input/output line
14	PIO2	Programmable input/output line
15	PIO1	System LED
16	PIO0	System KEY

6.8 HM-15

HM-15 is based HM-10, a real USB interface.



6.9 HM-Sensor



7. System function

How to wake up module from sleep mode?

There are two ways to wake up module from sleep mode.

7.1 Send “I am iron man, I am iron man, I am iron man I am iron.....” string.

Yes, that is a joke, in sleep mode, you can send a long string (Length > 80 or more), that string can made module wake up, and you will receive “OK+WAKE” string through UART. That string can't include any AT commands.

7.2 Long press system KEY ≥ 1000 ms.

After wake up module, you can send and receive AT commands.

How to let module into sleep mode?

In discoverable mode, send “AT+SLEEP” string through UART, if all is okay, module will return “OK+SLEEP” string and into sleep mode.

System KEY function (PIO0)

Press if Low > 1000ms:

7.3.1 If Module is in sleep mode

Module will wake up immediately, if AT+NOTI value is “1”, module will send “OK+WAKE” string through UART.

7.3.2 If Module has already connected to remote device

Module will disconnect from remote device.

7.3.3 If Module is standby mode

Module will reset to default configuration. Then restart.

System LED function (PIO1)

In sleep mode, LED has turned off.

If AT+PIO10 is setup

Unconnected status: Output High 500 ms, Low 500 ms

Connected status: Output High

If AT+PIO11 is setup

Unconnected status: Output Low.

Connected status: Output High.

System work Mode

A) Mode 0(Transmission mode):

When not connected, through the AT command configuration module, connection, only for serial data transmission.

B) Mode 1(PIO acquisition mode):

When not connected, through the AT command configuration module, connection, a) serial data transmission. b) Control of the PIO2,3 output state(HM-11 has none). c) The acquisition of PIO4 ~ 11 input state(HM-11 only PIO2,3).

C) Mode 2(Remote control mode):

When not connected, through the AT command configuration module, connection, a) serial data transmission. b) Control of the PIO2~11 output state(HM-11 only PIO2,3).

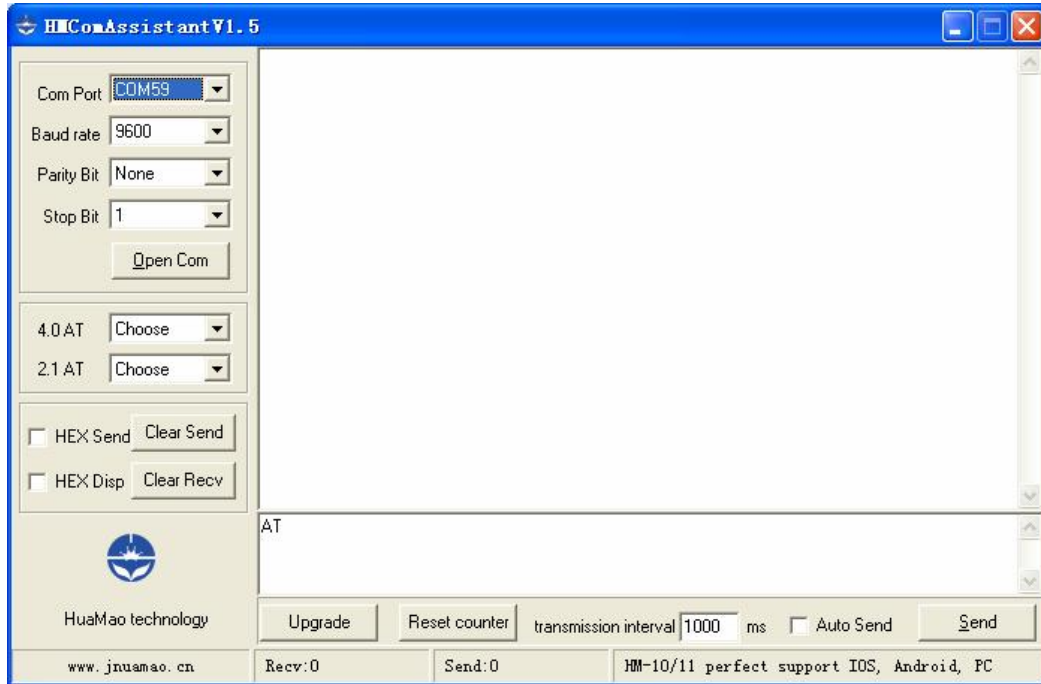
8 AT Commands

Factory default setting:

Name: HMSoft; Baud: 9600, N, 8, 1; Pin code: 000000; transmit Version.

AT Command format:

Uppercase AT command format. string format, without any other symbol. (e.g. \r or \n).



On Transmit version: Only accept AT Command from UART interface when Bluetooth device is not connected with remote device.

On Remote version: Can accept AT Command from UART interface when Bluetooth Device is not connected with remote device, Also can accept AT Command from remote Bluetooth device when connected that.

On PIO collection version: Only accept AT Command from UART interface when Bluetooth device is not connected with remote device.

Bluetooth V2.1 version Command is not here, please download datasheet from http://www.jnuamao.cn/Bluetooth_en.rar

1. Test Command

Send	Receive	Parameter
AT	OK OK+LOST	None

If Module is not connected to remote device will receive: "OK"

If Module has connected, module will disconnected from remote device, if "AT + NOTI" is setup to 1, will receive: "OK+LOST"

2. Query module address

Send	Receive	Parameter
AT+ADDR?	OK+ADDR:MAC Address	None

3. Query/Set Advertising interval

Send	Receive	Parameter
AT+ADVI?	OK+ Get:[Para]	None
AT+ADVI[Para]	OK+ Set:[Para]	Para: 0 ~ 1 0: 100ms 1: 1285ms Default: 0

The maximum 1285ms recommendations form the IOS system. That is to say, 1285ms is apple allowed, but in response to scan and connected all the time will be long.

This command is added since V517 version.

4. Query battery information

Send	Receive	Parameter
AT+BATT?	OK+BATT:[Para]	Para: 000~100

There has three ways to get battery information:

- a. Before establishing a connection, Send “AT+BATT?” through UART.
- b. After established a connection, In Mode 1 or 2, remote side send “AT+BATT?”
- c. Battery information has included in scan response data package, one hour update once. You can use Android or IOS discovery module, when module has been discovered, you can get it from scan result array.
Data format is three bytes: 0x02, 0x16, [battery byte].

5. Query/Set Bit format

Send	Receive	Parameter
AT+BIT7?	OK+Get:[para1]	Para1: bit7 switch.
AT+BIT7[para1]	OK+Set:[para1]	0-----Not compatible

		1-----Compatible Default: 0
--	--	--------------------------------

This command is used only for compatible uses 7 data bits, 2 stop bit device.

6. Query/Set baud rate

Send	Receive	Parameter
AT+BAUD?	OK+Get:[para1]	Para1: Baud rate No.
AT+BAUD[para1]	OK+Set:[para1]	0-----9600 1-----19200 2-----38400 3-----57600 4-----115200 5-----4800 6-----2400 7-----1200 8-----230400 Default: 0(9600)

e.g.

Query baud:

Send: AT+BAUD?

Receive: OK+Get:0

Setup baud:

Send: AT+BAUD1

Receive: OK+Set:1

Note: If setup to Value 7, After next power on, module will not support any AT Commands, until PIO0 is pressed, Module will change Baud to 9600.

7. Query/Set Characteristic

Send	Receive	Parameter
AT+CHAR?	OK+Get:[para1]	Para1: 0x0001~0xFFFE
AT+CHAR[para1]	OK+Set:[para1]	Default: 0xFFE1

e.g. change characteristic value to 0xAAA0

Send: AT+CHAR0xAAA0

Recv: OK+Set:0xAAA0

8. Clear Last Connected device address

Send	Receive	Parameter
AT+CLEAR	OK+CLEAR	None

Notice: Only Central role is used.

9. Try connect to last succeeded device

Send	Receive	Parameter
AT+CONNL	OK+CONN[Para1]	Para1: L, E, F, N L: Connecting E: Connect error F: Connect Fail N: No Address

Notice: Only Central role is used.

If remote device has already connected to other device or shut down, "OK+CONN" will received after about 10 seconds.

10. Try connect an address

Send	Receive	Parameter
AT+CON[Para1]	OK+CONN[Para2]	Para1: Address Like: 0017EA090909 Para2: A, E, F A: Connecting E: Connect error F: Connect Fail

Notice: Only central role is used.

If remote device has already connected to other device or shut down, "OK+CONN" will received after about 10 Seconds.

e.g.

Try to connect an device which MAC address is 00:17:EA:09:09:09

Send: AT+CON0017EA090909

May receive a reply:

OK+CONNA ===== Accept request, connecting
 OK+CONNE ===== Connect error
 OK+CONN ===== Connected, if AT+NOT11 is setup
 OK+CONNF ===== Connect Failed, After 10 seconds

11. Query PIO04~PIO11 input(output) state

Send	Receive	Parameter
AT+COL??	OK+ Col:[Para1]	Para1: 0x00~0xFF

Para1 is a byte, has 8 bits, bit 7 ~ bit 0 is map to the PIO4 ~ PIO11.

This command is added since V515 version.

12. Query/Set PIO collection rate

Send	Receive	Parameter
AT+CYC??	OK+ Get:[para1]	Para1: 00~99 Unit: seconds Default: 10
AT+CYC[para1]	OK+ Set:[para1]	

In mode 1, when PIO state is change, module will send OK+Col:[xx] to UART or remote side. This command is set send interval.

This command is added since V515 version.

13. Query/Set filter of HM modules

Send	Receive	Parameter
AT+FILT?	OK+ Get:[para1]	Para1: 0, 1 1: Only find HM Modules 0: Will find all BLE modules Default: 0
AT+FILT[para1]	OK+ Set:[para1]	

14. System Help Information

Send	Receive	Parameter
AT+HELP?	Help Information	None

15. Query/Set Module work type

Send	Receive	Parameter
AT+IMME?	OK+ Get:[para1]	Para1: 0, 1
AT+IMME[para1]	OK+ Set:[para1]	1: When module is powered on, only respond the AT Command, don't do anything. until AT + START is received, or can use AT+CON,AT+CONNL 0: When power on, work immediately Default: 0

This command is only used for Central role.

16. Query/Set Module iBeacon switch

Send	Receive	Parameter
AT+IBEA?	OK+Get:[para1]	Para1: 0, 1
AT+IBEA[para1]	OK+Set:[para1]	0: Turn off iBeacon 1: Turn on iBeacon Default: 0

iBeacon UUID is: 74278BDA-B644-4520-8F0C-720EAF059935.

This command is added since V517 version.

17. Query/Set Module iBeacon Marjor version

Send	Receive	Parameter
AT+MARJ?	OK+Get:[para1]	Para1: 0x0001, 0xFFFE
AT+MARJ[para1]	OK+Set:[para1]	Default: 0xFFE0

E.g. Change marjor version to 0x0102

Send: AT+MARJ0x0102, if all is okay, module will send back OK+Set: 0x0102

This command is added since V517 version.

18. Query/Set Module iBeacon minor

Send	Receive	Parameter
AT+MINO?	OK+Get:[para1]	Para1: 0x0001, 0xFFFE
AT+MINO[para1]	OK+Set:[para1]	Default: 0xFFE1

This command is added since V517 version.

19. Query/Set Module Work Mode

Send	Receive	Parameter
AT+MODE?	OK+Get:[para1]	Para1: 0, 1, 2
AT+MODE[para1]	OK+Set:[para1]	0: Transmission Mode 1: PIO collection Mode + Mode 0 2: Remote Control Mode + Mode 0 Default: 0

Mode 0:

Before establishing a connection, you can use the AT command configuration module through UART.

After established a connection, you can send data to remote side from each other.

Mode 1:

Before establishing a connection, you can use the AT command configuration module through UART.

After established a connection, you can send data to remote side. Remote side can do fellows:

Send AT command configuration module.

Collect PIO04 to the PIO11 pins input state of HM-10.

Collect PIO03 pins input state of HM-11.

Remote control PIO2, PIO3 pins output state of HM-10.

Remote control PIO2 pin output state of HM-11.

Send data to module UART port (not include any AT command and per package must less than 20 bytes).

Mode 2:

Before establishing a connection, you can use the AT command configuration module through UART.

After established a connection, you can send data to remote side. Remote side can do fellows:

Send AT command configuration module.

Remote control PIO2 to PIO11 pins output state of HM-10.

Remote control PIO2, PIO3 pins output state of HM-11.

Send data to module UART port (not include any AT command and per package must less than 20 bytes).

20. Query/Set Notify information

Send	Receive	Parameter
AT+NOTI?	OK+Get:[para1]	Para1: 0, 1
AT+NOTI[para1]	OK+Set:[para1]	0: Don't Notify 1: Notify Default: 0

If this value is set to 1, when link ESTABLISHED or LOSTED module will send OK+CONN or OK+LOST string through UART.

21. Query/Set Module name

Send	Receive	Parameter
AT+NAME ?	OK+NAME[para1]	Para1: module name, Max length is 12.
AT+NAME[para1]	OK+Set[para1]	Default: HMSoft

e.g.

change module name to bill_gates

Send: AT+NAMEbill_gates

Receive: OK+SetName:bill_gates

22. Query/Set Parity bit

Send	Receive	Parameter
Query: AT+PARI?	OK+Get:[para1]	None
Set: AT+PARI[para1]	OK+Set:[para1]	Para1: 0,1,2 0:None 1:EVEN 2:ODD Default: 0 (None)

23. Query/Set PIO1 output status (System LED)

Send	Receive	Parameter
AT+PIO1?	OK+Get:[para1]	Para1: 0, 1
AT+ PIO1 [para1]	OK+Set:[para1]	0: Unconnected Output 500ms High 500ms Low, Connected output High. 1: Unconnected output Low, Connected output High. Default: 0

24. Query/Set PIO pins output high or low (Only this time, when module next power on, this value is not be used)

Send	Receive	Parameter
AT+PIO[para1]?	OK+PIO:[para1][para2]	Para1: 2~B
AT+PIO[para1][para2]	OK+PIO:[para1][para2]	Para2: 0, 1 HM-11 only has 4 pins. Para1 is which PIO pin you want to Query/Set Value: 2,3,4,5,6,7,8,9,A,B. Para2 is Query or setup

		value. 0 is low and 1 is high
--	--	----------------------------------

e.g.

Query PIO2

Send: AT+PIO2?

Setup PIO2 output high

Send: AT+PIO21

Receive: OK+PIO21

25. Query/Set Pin Code

Send	Receive	Parameter
AT+PASS?	OK+Get:[para1]	Para1 is Pin Code, 000000~999999 Default: 000000
AT+PIN[para1]	OK+Set:[para1]	

e.g.

Query Pin Code

Send: AT+PIN?

Receive: OK+PIN:000000

Setup Pin Code 008888

Send: AT+PIN008888

Receive: OK+Set:008888

26. Query/Set Module Power

Send	Receive	Parameter
AT+POWE?	OK+Get:[para1]	None
AT+POWE [para1]	OK+Set:[para1]	Para: 0 ~ 3 0: -23dbm 1: -6dbm 2: 0dbm 3: 6dbm Default: 2

27. Query/Set Module sleep type

Send	Receive	Parameter
AT+PWRM?	OK+Get:[para1]	None
AT+PWRM[para1]	OK+Set:[para1]	Para1: 0~1 0:Auto sleep 1:don't auto sleep Default: 1

Only support peripheral role.

28. Restore all setup value to factory setup

Send	Receive	Parameter
AT+RENEW	OK+RENEW	None

29. Restart module

Send	Receive	Parameter
AT+RESET	OK+RESET	None

30. Query/Set Master and Slaver Role

Send	Receive	Parameter
AT+ROLE?	OK+Get:[para1]	Para1: 0, 1
AT+ROLE[para1]	OK+Set:[para1]	0: Peripheral 1: Central Default: 0

31. Query RSSI Value

Send	Receive	Parameter
AT+RSSI?	OK+RSSI:[para1]	None

Require: AT+MODE value > 0

This command only used by Remote device query when connected.

32. Query Last Connected Device Address

Send	Receive	Parameter
AT+RADD?	OK+RADD:MAC Address	None

33. Query/Set Module Sensor work interval

Send	Receive	Parameter
AT+RAT??	OK+Get:[para1]	Para1: 00~99
AT+RAT[para1]	OK+Set:[para1]	0:Save when connected 1:Don't Save Default: 0 Unit: minute

Note: This command is only use for HMSensor

34. Query/Set Stop bit

Send	Receive	Parameter
AT+STOP?	OK+Get:[para1]	None
AT+STOP[para1]	OK+Set:[para1]	Para1:0, 1 0: One stop bit 1: Two stop bit Default: 0 (One stop bit)

35. Work immediately

Send	Receive	Parameter
AT+START	OK+START	None

This command is only used when AT+IMME1 is setup.

36. Query Module into sleep mode

Send	Receive	Parameter
AT+SLEEP	OK+SLEEP	None

Only support Peripheral role.

37. Query/Set Module save connected address parameter

Send	Receive	Parameter
AT+SAVE?	OK+Get:[para1]	None
AT+SAVE[para1]	OK+Set:[para1]	Para1: 0~1 0:Save when connected 1:Don't Save Default: 0

38. Query/Set sensor type on module PIO11(HM-11 is PIO3)

Send	Receive	Parameter
AT+SENS?	OK+Get:[para1]	Para1: 0, 1, 2
AT+SENS[para1]	OK+Set:[para1]	0: None 1: DHT11 2: DS18B20 Default: 0

Note: This command is use for HMSensor.

39. Query/Set Module Sensor Temperature and humidity(if has a sensor)

Send	Receive	Parameter
AT+TEHU?	OK+Get:[para1][para2]	Para1: 000~120 Para2: 000~100

Note: This command is use for HMSensor.

This value is added into scan response data package.

Data format is 0x02,0x17, [Temperature],[humidity], you can add this into your program.

40. Query/Set module connect remote device timeout value

Send	Receive	Parameter
AT+TCON?	OK+TCON:[para1]	None
AT+TCON[para1]	OK+Set:[para1]	Para1 is timeout value. when time is up module will not connect this address anymore, then enter search mode. Para1 allowed value: 000000~999999 Unit is ms. Default: 000000 Connect forever

This value is only used for Central Role, when module has Last Connected address.

41. Query/Set Module Bond Mode

Send	Receive	Parameter
AT+TYPE?	OK+Get:[para1]	None
AT+TYPE[para1]	OK+Set:[para1]	Para1: 0~2 0:Not need PIN Code 1:Bond not need PIN 2:Bond with PIN Default: 0

Important: If your module version is less than V515, please don't use this command. Under android 4.3 AT+TYPE1 is same to AT+TYPE2.

42. Query/Set service UUID

Send	Receive	Parameter
AT+UUID?	OK+Get:[para1]	Para1: 0x0001~0xFFFE
AT+UUID[para1]	OK+Set:[para1]	Default: 0xFFE0

e.g. Change UUID value to 0xAAA0

Send: AT+UUID0xAAA0

Recv: OK+Set:0xAAA0

43. Query/Set UART sleep type

Send	Receive	Parameter
AT+UART?	OK+Get:[para1]	Para1: 0~1
AT+UART[para1]	OK+Set:[para1]	0: When module into sleep mode, you can wake up module through UART. 1: When module into sleep mode, shutdown UART too.

		Default: 0xFFE0
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Note: This command is only use for HMSensor.

44. Query Software Version

Send	Receive	Parameter
AT+VERR?	Version Information	None
AT+VERS?		

Resource:

Bluetooth Module 2.1 datasheet:

http://www.jnhuamao.cn/Bluetooth_en.zip

Bluetooth Module 4.0 datasheet:

http://www.jnhuamao.cn/Bluetooth40_en.zip

Bluetooth Module 4.0 USB Dongle

http://www.jnhuamao.cn/HMDongle40_en.zip

Bluetooth 2.1 Com Assistant for android:

<http://www.jnhuamao.cn/HMComAssistant.rar>

Bluetooth 4.0 Com Assistant for android 4.3:

<http://www.jnhuamao.cn/HMBLEComAssistant.rar>

Bluetooth 4.0 IOS Code:

http://www.jnhuamao.cn/HMSoft_iso7.zip

http://www.jnhuamao.cn/HMSoft_iso7.zip