

HM-10 BLE 4.0 Bluetooth Module



Introduction

The HM-10 is a small 3.3v SMD Bluetooth 4.0 BLE module based on the TI CC2540 or CC2541 Bluetooth SOC (System On Chip). The HM-10 is made by Jinan Huamao and is one of many Bluetooth devices they produce including the HM-11 which is operationally the same as the HM-10 but has a smaller footprint with fewer pins broken out.

There are 2 versions of the HM-10; the HM-10C and the HM-10S



HM-10C



HM-10S

The HM-10C does not have the pads along the bottom (the USB connections) and has 26 pads instead of 34 which makes it a little cheaper to produce. There may be other differences (such as the type of crystal used) due to the date of manufacture. Operationally the two are the same though.

HM-10 Basic specs

- +2.5v to +3.3v
- Requires up to 50mA
- Uses around 9mA when in an active state
- Use 50-200uA when asleep
- RF power: -23dbm, -6dbm, 0dbm, 6dbm
- Bluetooth version 4.0 BLE
- Default baud rate for the serial connection is 9600
- Default PIN is 000000
- Default name is HMSoft
- Based on the CC2540 or the CC2541 chip

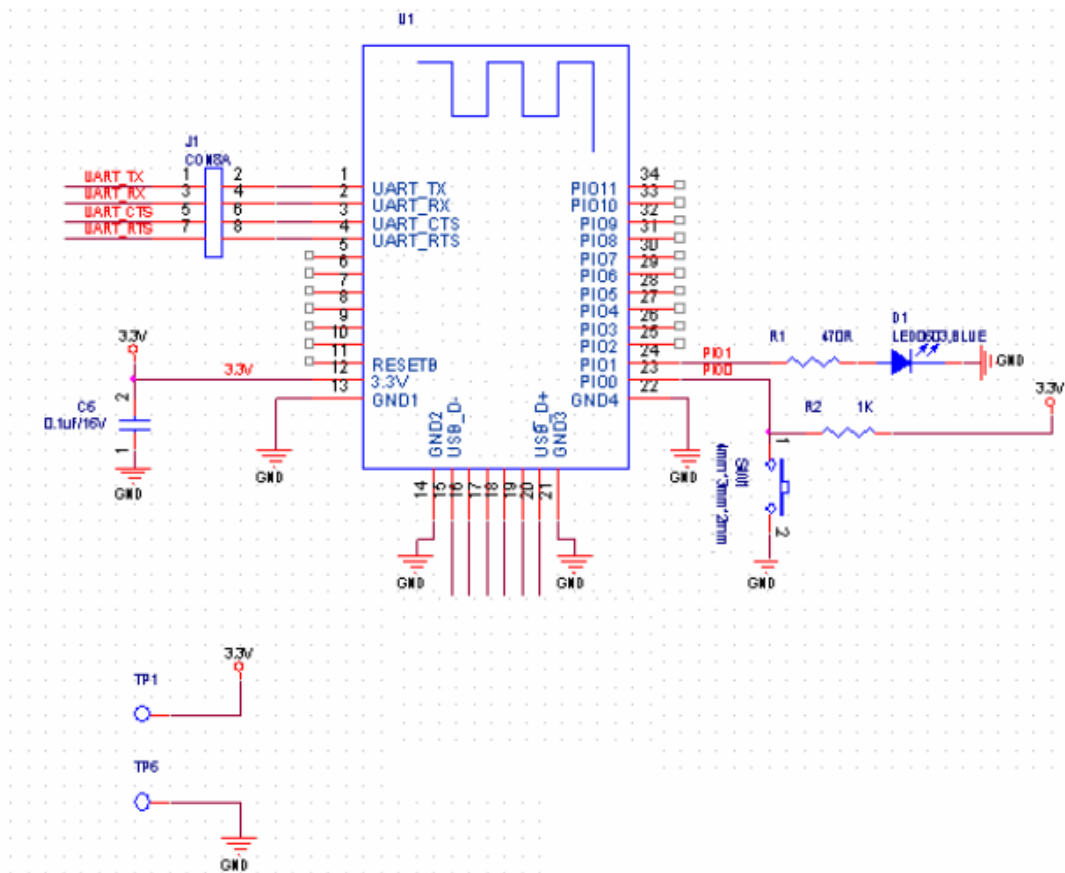
The latest HM-10s all appear to be the CC2541 chip. This is the same as the CC2540 except it is lower power and has a shorter range. The CC254x is based on the 8051 and runs at 32MHz.

The HM-10 has become a very popular Bluetooth 4 BLE module for use with the Arduino. In part due to the standard UART serial connection that makes it fairly straightforward to connect to an Arduino. The UART layer is a good thing and a bad thing, it allows ease of use but it hides the BLE layer so you have no control over the actual BLE side of things. The HM-10 is Bluetooth version 4.0 only. This means it cannot connect to Bluetooth 2/2.1 modules such as the HC-06 and HC-05.

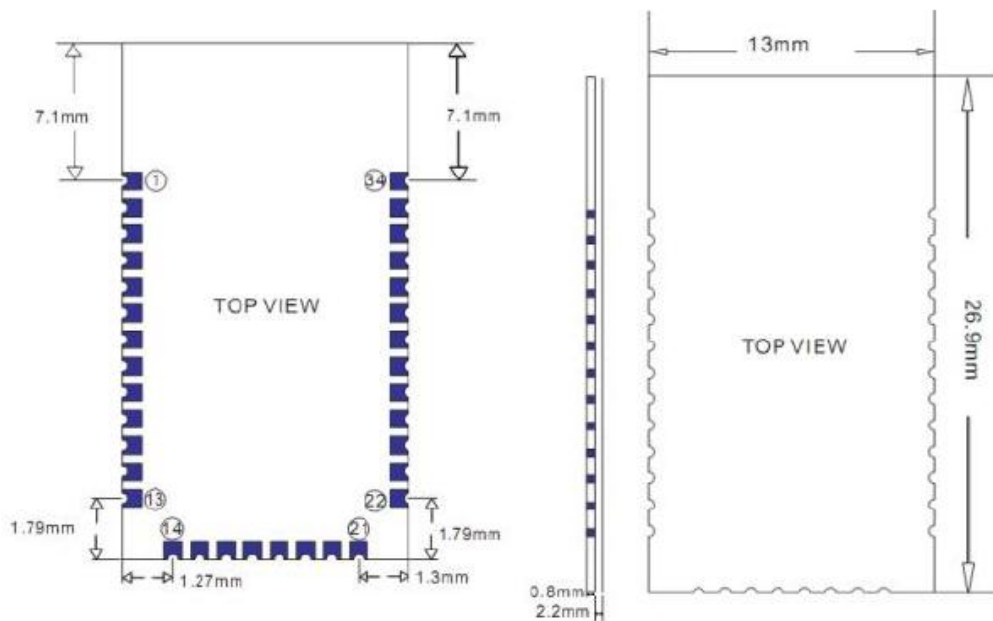
The HM-10 is controlled via AT commands which are sent over the serial UART connection. There are a host of commands, some simple, some more complex, and these are covered later.

Product technical specifications

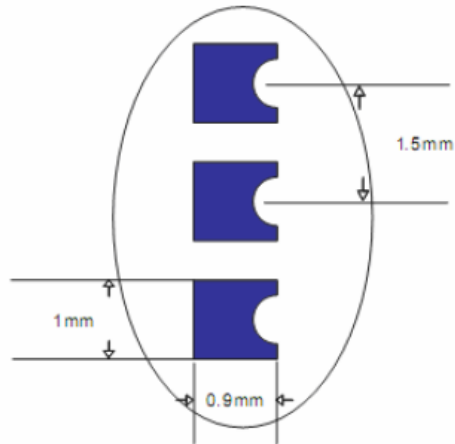
- HM-10 Schematic



- HM-10 Size



- **HM-10 package information**



- **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

System LED and System KEY

- System KEY function (PIO0)

Press if high > 100ms:

- If Module role is Master

Unconnected status: Clear last connected remote device address information.

Connected status: Disconnect.

- If Module role is Slave

Unconnected status: None.

Connected status: Disconnect.

- System LED function (PIO1)

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.

- **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.

1. Test Command

Send	Receive	Parameter
AT	OK	None

2. Query/Set baud rate

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

e.g.

Query baud:

Send: AT+BAUD?

Receive: OK+Get:0

Setup baud:

Send: AT+BAUD1

Receive: OK+Set:1

3. 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)

3. 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)
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4. Query/Set Module Work Mode

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

In mode 2, all data receive from UART or remote device will be handled and send to each other.

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

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

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

7. Query/Set Module name

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

e.g.
 change module name to bill_gates
 Send: AT+NAMEbill_gates
 Receive: OK+SetName:bill_gates

8. Restore all setup value to factory setup

Send	Receive	Parameter
AT+RENEW	OK+RENEW	None

9. Reset module

Send	Receive	Parameter
AT+RESET	OK+RESET	None

10. Query/Set Master and Slaver Role

Send	Receive	Parameter
AT+ROLE?	OK+ROLE:[para1]	Para1: M, S M: Master S: Slaver Default: S
AT+ROLE[para1]	OK+Set:[para1]	

11. Query/Set Pin Code

Send	Receive	Parameter
AT+PASS?	OK+PASS:[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

12. Clear Last Connected device address

Send	Receive	Parameter
AT+CLEAR	OK+CLEAR	None

Notice: Only Master role is used.

13. Query Software Version

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

14. System Help Information

Send	Receive	Parameter
AT+HELP?	Help Information	None

15. Query Last Connected Device Address

Send	Receive	Parameter

AT+RADD?	OK+RADD:MAC Address	None
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16. Query module address

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

17. Query/Set Module work type

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

This command is only used for Master Role.

18. Work immediately

Send	Receive	Parameter
AT+WORK	OK+WORK	None

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

19. 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: 0000~9999 Unit is second. Default: 0000 Connect forever
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This value is only used for Master Role, when module has Last Connected address.

20. Query/Set Module Bond Mode

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

21. Query RSSI Value

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

This command only used by Remote device query when connected.

22. Switch Remote Control Mode to Transmission Mode(Only this time)

Send	Receive	Parameter
AT+START	OK+START	None

This command is used to change Remote Control Mode or PIO Collection Mode into Transmission state this time.

23. 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

24. Query/Set Notify information

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