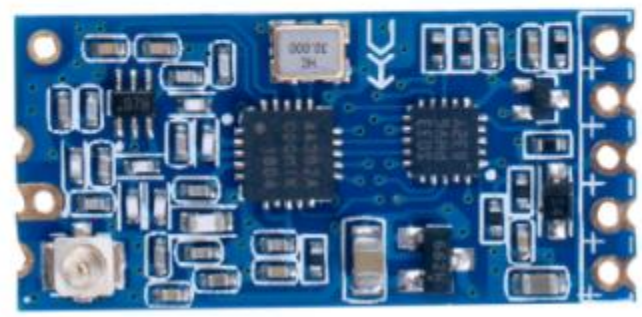
HC 12 SI4463 Module



HC-12 wireless RF UART communication module is a new generation of multi-channel embedded wireless data transmission module. The Radio frequency of 433.4 – 473.0MHz, can be setting a communication channel, step is 400kHz, a total of 100 channels. The module maximum transmit power is 100mW (20dBm), and -116dBm receiver sensitivity air of the 5000bps baud rate, communication distance about 500 meters.

The module adopts a stamped hole encapsulation method, which can be welded. The module size is 27.4mm*13.2mm *4mm (including antenna seat, not including the spring antenna), which is convenient for the customer to be embedded in the application system. The module has a PCB antenna seat ANT1, users can use the coaxial cable, the use of 433MHz band external antenna.

FEATURES:

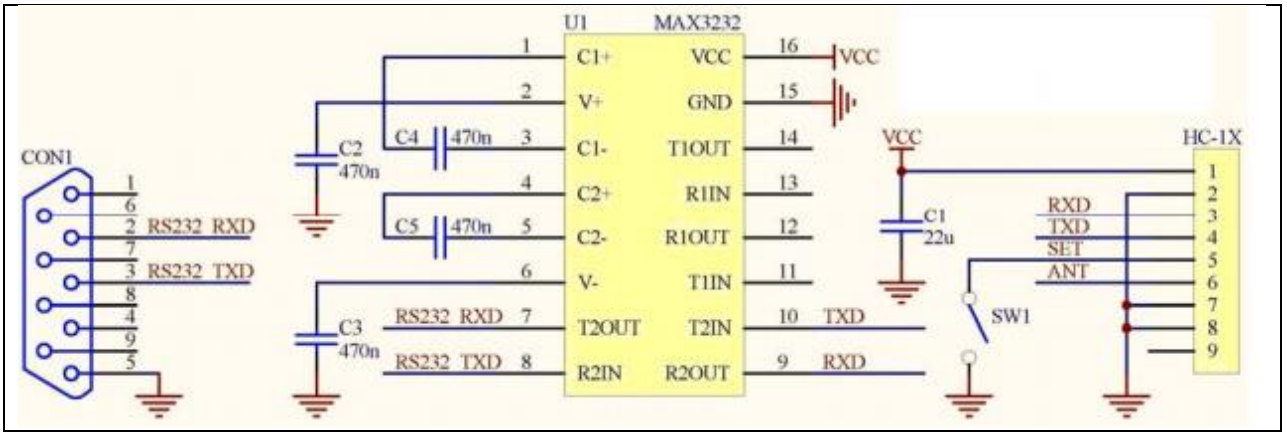
- IEEE 802.15.4g compliant
- Frequency range = 119–1050 MHz
- Receive sensitivity = –126 dBm
- Serial TTL (RX, TX, GND) interface
- Modulation (G)FSK, 4(G)FSK, (G)MSK, OOK
- Max output power +20 dBm
- Low active power consumption 10/13 mA RX, 18 mA TX at +10 dBm

- Ultra low current powerdown modes 30 nA shutdown, 50 nA standby
- Data rate = 100 bps to 1 Mbps
- Fast wake and hop times
- Highly configurable packet handler
- TX and RX 64 byte FIFOs
- Auto frequency control (AFC)
- Automatic gain control (AGC)
- Low BOM
- Low battery detector
- FCC Part 90 Mask D, FCC part 15.247, 15,231, 15,249, ARIB T-108, T-96, T-67, RCR STD-30, China regulatory
- ETSI Class-I Operation with SAW

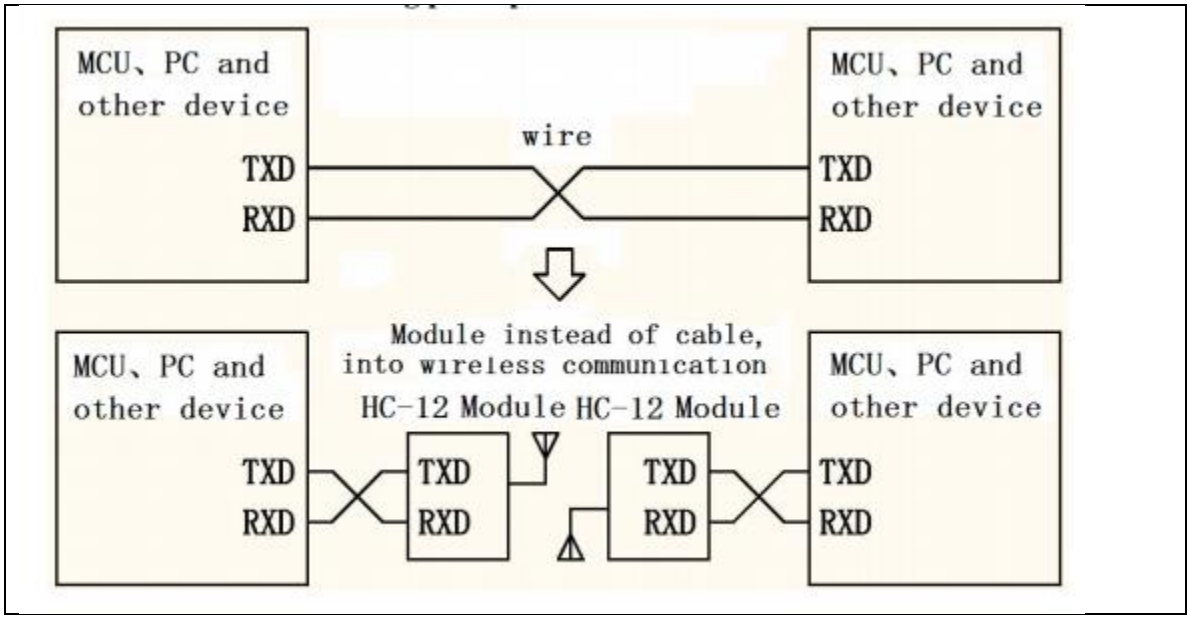
SPECIFICATIONS:

- Long communication distance: About 1000 meters at default setting
- Operating frequency range: 433.4—473.0MHz
- Transmit power: max 20dBm
- Power supply voltage: DC 3.2V ~5.5V

SCHEMATIC DIAGRAM:



- HC-12 wireless RF UART communication module is a new generation of multi channel embedded wireless data transmission module. Radio frequency of 433.4 - 473.0MHz, can be setting communication channel, step is 400kHz, a total of 100 channel.
- The module maximum transmit power is 100mW (20dBm), and -116dBm receiver sensitivity air of the 5000bps baud rate, communication distance about 500 meters. The module adopts a stamp hole encapsulation method, which can be welded.
- The module size is 27.4mm*13.2mm *4mm (including antenna seat, not including the spring antenna), which is convenient for the customer to be embedded in the application system.
- The module has a PCB antenna seat ANT1, users can use the coaxial cable, the use of 433MHz band external antenna. The module also has antenna welding hole ANT2, convenient user welded spring antenna. The user can choose one kind of antenna according to the request.
- The module contains MCU, users do not need to program in addition, just send and receive UART data. The module uses a variety of UART transmission mode, the user can choose according to the requirements of the use of AT command. The four UART modes of FU1, FU2, FU3, FU4, the average operating current is 3.6mA, 80μA, 16mA and 16mA, the maximum operating current is 100mA (full power transmit state).



As shown in the figure above, the HC-12 module is used to replace the physical connection in half duplex communication. On the left side of the device to send UART data to module, the module's RXD port after receiving the UART data, the data automatically transmitted to the air in the way of radio. On the right side of the module can automatically receive, and restore the original left device from the TXD UART data send. From right to left is the same. Module can only work in half duplex state, can not send and receive data at the same time.

PIN FUNCTION:

Pin	Definition	I/O	Description
1	VCC		Power pin, the requirements of 3.2V to 5.5V DC power supply, the supply current is not less than 200mA.（Note: If the module is to work for a long time in the transmit state, it is recommended that the power supply voltage of more than 4.5V when connected to a 1N4007 diode, to avoid the module built-in LDO fever.）
2	GND		Ground
3	RXD	input, with pull up resistor to internal power supply	UART input, 3.3V TTL level, internal 1K resistor in series
4	TXD	Output, with pull up resistor to external VCC	UART output, 3.3V TTL level, internal 1K resistor in series
5	SET	input, internal 10K pull up resistor	Parameter setting pin, the low level is effective, internal 1K resistor in series
6	ANT	RF input/output	433MHz antenna pin
7	GND		Ground
8	GND		Ground
9	NC		NC
ANT1	ANT	RF input/output	IPEX20279-001E-03 antenna seat
ANT2	ANT	RF input/output	433MHz spring antenna welding hole

COMMAND MODE:

AT command is used to set the parameters of the module and switch the function of the module. At the same time, the parameters and functions of the modification, power off will not be lost.

⑴ **To enter into the AT command mode:**

- The first entry way - the normal use (already on the power), the fifth pin "SET" set the low level. Second entry way - power off, the fifth pin "SET" connect to ground (low level), then power on.
- These two ways can make the module into the AT command mode, release ("SET" pin is not connected to the low level) then exit the command mode. After exiting the AT command mode, if you change the function of the module, you will be cut to the corresponding functional status. Second ways to fix the 9600, N, 1 of the UART format into the command mode.

2. AT :

Test command

Example： Send the module command “AT”, module returns “OK”

3. AT+Bxxxx:

Change the UART baud rate command. Can set the baud rate of 1200bps, 2400bps, 4800bps, 9600bps, 19200bps, 38400bps, 57600bps and 115200bps. Factory defaults to 9600bps.

4. AT+Cxxx:

Change the channel of the wireless communication, from 001 to 127 (more than 100 after the wireless channel, communication distance is not guaranteed). The default value of the wireless channel is 001, and the working frequency is 433.4MHz. The step of the channel is 400KHz, the frequency of channel 100 is 473.0MHz.

5. AT+FUx:

Change module UART transmission mode, there are FU1, FU2, FU3 and FU4 four modes. Module default mode is FU3, the UART transmission mode of the two module must be set to the same as the normal communication. Please see the above "wireless UART transmission" section of the introduction.

6. AT+Px:

Set the transmit power level of the module, the x is 1-8, the module corresponding transmit power is as follows:

X value	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
transmit power (dBm)	**-1**	**2**	**5**	**8**	**11**	**14**	**17**	**20**

Default setting is 8, the transmit power is the biggest, the communication distance is the most distant. In general, the transmit power per drop 6~10dB, communication distance will be reduced by half.

7. AT+Ry:

Acquisition module of the individual parameters. y for B, C, F, P in any of the letters, respectively: baud rate, communication channel, transmission mode, transmit power.

8. AT+RX :

Get all parameters of the module. In order to return to the UART transmission mode, UART baud rate, communication channel, transmit power and other information.

9. AT+Uxxx:

Set the data bits, parity bits and stop bits of UART communication. In the parity check bit, N represents the non parity check, O represents the odd parity check, E represents the even

parity check. Stop, 1 on behalf of the 1 stop bit, 2 on behalf of the 2 stop, 3 on behalf of the 1.5 stop bit.

10. AT+V :

Query module firmware version information, return the official website address and firmware version.

11. AT+SLEEP :

After receiving the command, the module enters the sleep mode when exiting AT command mode, the operating current is about 22μA, and the module can not carry on the UART data transmission. Once again into the AT command mode state, the module automatically exit the sleep mode.

12. AT+DEFAULT :

The UART baud rate, UART communication channel, transmission mode restore factory default.

APPLICATIONS:

- Hobby projects
- Engineering applications
- Robotics
- Mobile Phone Accessories
- Servers
- Computer Peripherals
- Sports and Leisure Equipment
- USB Dongles