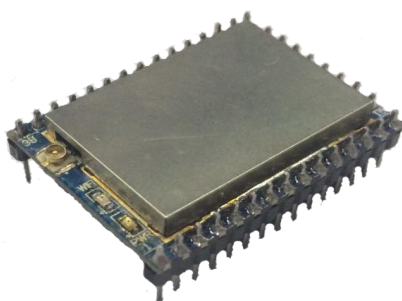




Shenzhen HI-Link Electronic Co.,Ltd

HLK-RM58D User Manual



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1. Product profile

1.1 Overview

HLK-RM58D is a new low-cost embedded UART-WIFI module (serial-Wireless network) developed by Shenzhen Hi-Link co., Ltd

This product is an embedded module based on the serial interface in line with the network standard , built-in TCP/IP protocol stack, can realize the user serial port-wireless network (WIFI) conversion.

Through the HLK-RM58D module, the traditional serial device can transmit its own data through the Internet network without changing any configuration, which provides a complete and fast solution for the user's serial port device to transmit the data through the network.

1.2 Product Characteristics

- Compatible IEEE 802.11 a/b/g/n
- Dedicated high-performance 32-bit RISC CPU
- Support for 20 MHz and 40MHz bandwidth in the 2.4 GHz band
- Single frequency 1T1R mode, data rate up to 150Mbps
- Support for 2.4g/ 5 GHz band, dual frequency 1T1R
- Supporting two working modes of STA/AP
- Built-in TCP/IP protocol stack
- Support for rich AT instructions
- Support for one-click configuration of intelligent networking features
- Support for wireless upgrade (OTA)
- 5V single power supply, low power consumption
- GPIO pins are numerous
- Fast transmission speed of serial port

1.3 Product Packaging

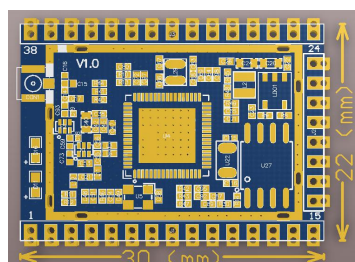


Figure 1 HLK-RM58D encapsulation size

1.4 Technical Specifications

Form 1 Product Technical specifications

Module	model	HLK-RM58D
	package	Plug-in
Wireless parameter	Wireless standard	IEEE 802.11 a/b/g/n
	frequency range	2.412GHz-2.484GHz 5.180GHz-5.825GHz
	transmitting power	802.11b: +16 +/-2dBm (@11Mbps)
		802.11g: +14 +/-2dBm (@54Mbps)
		802.11n: +13 +/-2dBm (@HT20,HT40- MCS7)
		802.11a: +15 +/-2dBm (@HT40,MCS7)
	receiving sensitivity	802.11b: -88.4 dBm (@11Mbps ,CCK)
		802.11g: -75.7dBm (@54Mbps, OFDM)
		802.11n: -73.6dBm (@HT20, MCS7)
		802.11a: -75.0 dBm (@MCS7)
	Antenna form	Outside: patch pad
		External: I-PEX connector
		Built-in: no built-in antenna
Hardware parameters	hardware interface	UART, IIC, PWM, GPIO, SPI
	working voltage	5V
	GPIO drive capability	Max: 16ma
	working current	Continuous send=> Average value: ~100mA,peak value: 120mA In normal mode=> Average: ~100mA,Peak: 110mA
	working temperature	-40°C~80°C
	Storage environment	Temperature: <40°C, The relative humidity: <90%R.H.
Serial transmission	transmission speed	110-921600bps
	TCP Client	2
Software parameters	Wireless network type	STA/AP
	Security mechanism	WEP/WPA-PSK/WPA2-PSK
	Encryption type	WEP64/WEP128/TKIP/AES
	Firmware upgrade	Wireless, uart
	networking protocol	IPv4, TCP/UDP
	User configuration	AT+instruction, smart config

1.5 Pins introduction

Table 2 Module pin interface

Pin	Network Name	Type	Explanation
1	GND	Ground	Ground
2	GPIO0	I/O	ES0 pin, pull down 1 second, serial 0 into AT command mode ;Pull down ≥ 8 seconds, restore factory default parameter settings
3	NC		NC
4	UART_RXD1	I	Serial port 1 receiving
5	UART_TXD1	O	Serial port 1 sending
6	NC		NC
7	NC		NC
8	NC		NC
9	NC		NC
10	NC		NC
11	NC		NC
12	NC		NC
13	NC		NC
14	NC		NC
15	NC		NC
16	NC		
17	NC		NC
18	NC		NC
19	NC		NC
20	NC		NC
21	NC		NC
22	NC		NC
23	NC		NC
24	VCC_5V	P	External power supply pin 1: 5V @ 500mA
25	GND	GND	Ground
26	VDD_3V3	P	External power supply foot 2: 3.3V @ 500mA External power pin: 3.3V @ 200mA

27	NC		NC
28	NC		NC
29	NC		NC
30	SYS_RST_N	I	Module reset, low level effective, reset time $\geq 500\text{ms}$
31	NC		NC
32	UART_TXD0	O	Serial 0 output
33	UART_RXD0	I	Serial 0 input
34	NC		NC
35	NC		NC
36	GPIO33	I/O	Wifi indicator light
37	ANT	I/O	2.4G antenna, optional, default unavailable
38	GND	Ground	Ground

1.6 Interface definitions

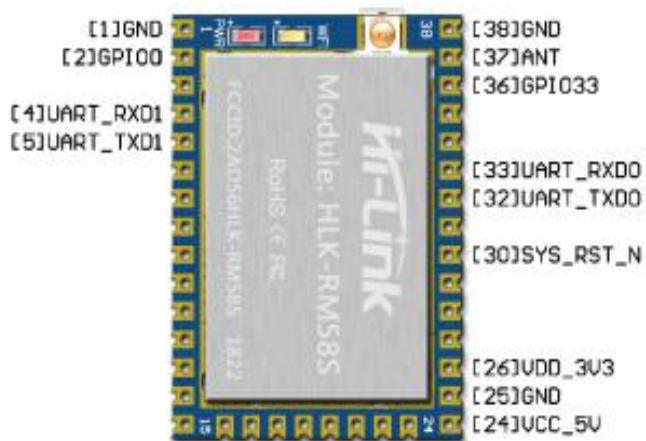
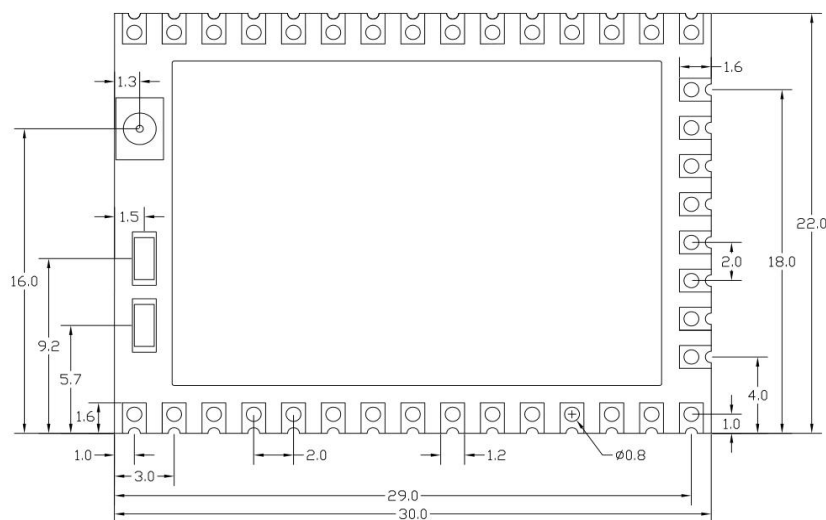


Figure 2 Module interface definition

1.7 Mechanical dimensions



Unit: mm (mm)

Figure 3 Module detail dimensions

2. Functional Description

HLK-RM58D supports serial port to WIFI STA, serial to WIFI AP mode.

2.1 Serial to WIFI STA

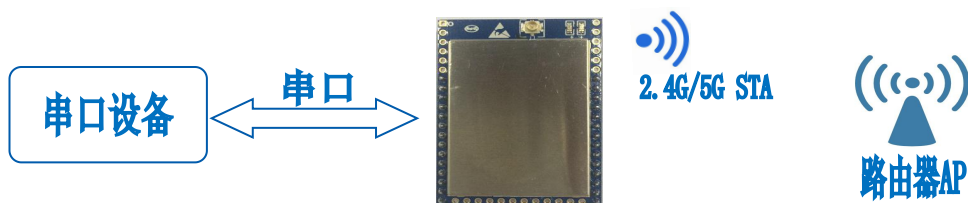


Figure 4 Module as STA

The module converts the serial port data into wifi data to achieve the purpose of networking.

2.2 Serial to WIFI AP

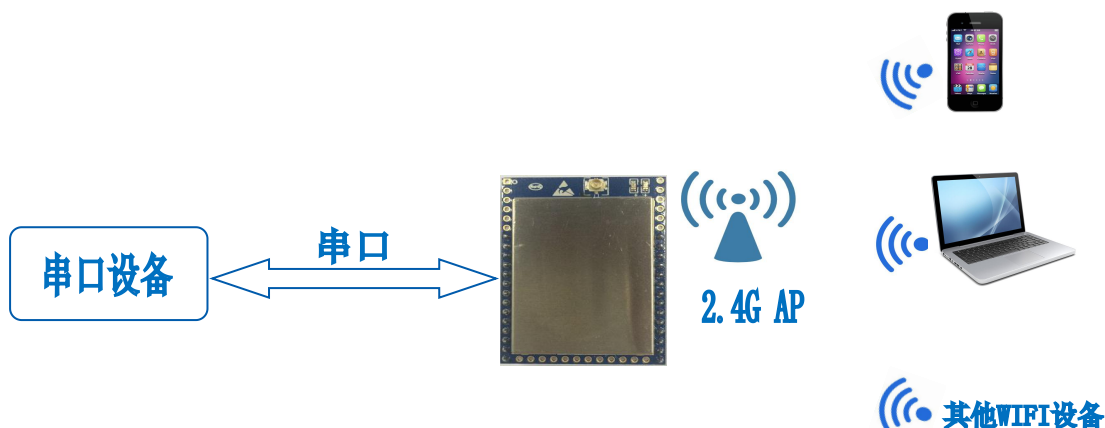


Figure 5 module work as ap

In AP mode, mobile phone, PC or other wifi devices can be connected to RM58S module through wifi, and serial port devices can transmit data through RM58S module and other wifi devices.

2.3 Serial port working state conversion

After the HLK-RM58D is powered on, the default mode is transmission mode. By pulling down the pin ES0 (GPIO0) to enter at instruction mode longer than 50ms, the module will process the received data as at instructions, send at instructions to let the module into transparent mode, After the network connection, the data received by the serial port will be transmitted as transparent data.

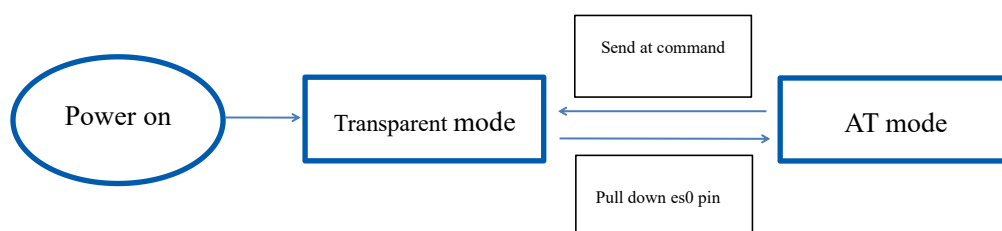


Figure 6 Serial port mode conversion

2.4 Serial port-network data conversion

2.4.1 Module as TCP Server

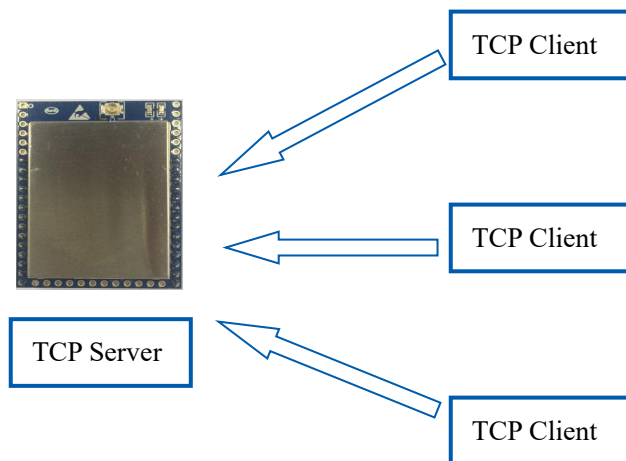


Figure 7 TCP Server

In this mode, the module listens to the specified port, waits for TCP Client connection, and after the connection, all TCP data is directly sent to the serial port end, and the data of the serial port end is sent to all TCP Client ends. When the module is used as the TCP server, the most supporting two TCP clients are connected to the TCP server.

2.4.2 Module as TCP Client

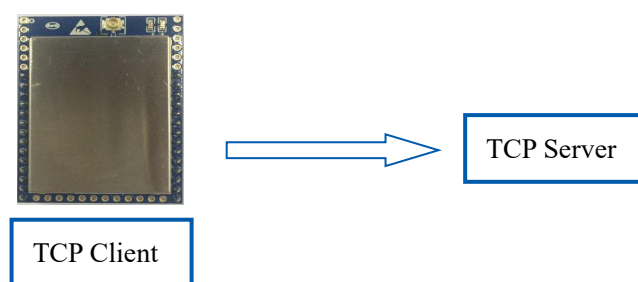


Figure 8 TCP Client

In this mode, the module will actively connect to the specified IP, port, all the data sent from the TCP Server end is sent directly to the serial port, and the data from the serial port to the TCP Server side. Abnormal network disconnection can result in active re-connection of the module.

2.4.3 Module as UDP Server

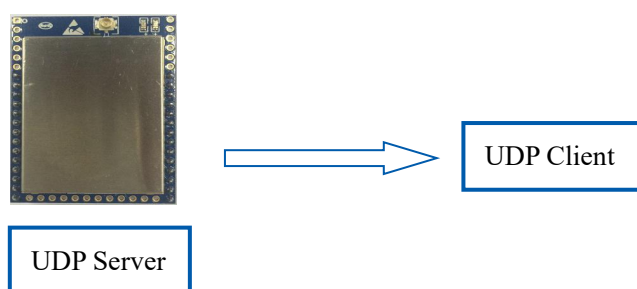


Figure 9. UDP Server

In this mode, the module opens the local designated port, once it receives the data sent to the port, the module sends the data to the serial port and records the remote ip, port. The module only records the remote information on the last connection, and the data sent by the serial port is sent directly to the recorded remote ip, port.

2.4.4 Module as UDP Client

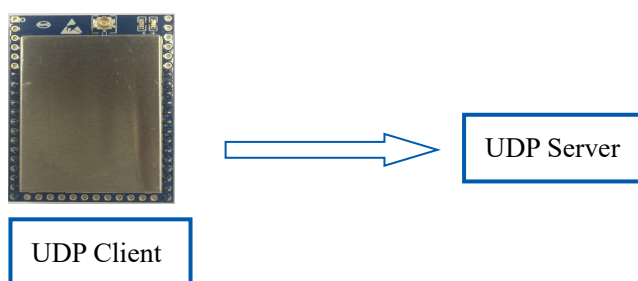


Figure 10. UDP Client

In this mode, the module sends the serial port data directly to the specified ip, port, and the data returned from the server will be sent to the serial port.

2.6 Application areas

- ◆ Smart home;
- ◆ Instruments and instruments;
- ◆ Wi-Fi remote monitoring / control;
- ◆ Toy field;
- ◆ Color LED control;
- ◆ Fire protection, security intelligent integrated management;
- ◆ Smart card terminals, wireless POS machines, handheld devices and so on.

3. AT Instructions

Instruction format: in AT instruction mode, the system can be configured through the AT instructions of the serial port. The command format is as follows:

at+[command]=[value],[value],[value].....

All commands begin with "at" and "\" r" end. If the command is not encapsulated in this format, it will not be processed and will return a different return value depending on the command module.

For example:“at+ver=?”

Module will return: HLK-RM58D (V1.00 (Nov 30 2017))

Query instruction format:

at+[command]=?

3.1 Query current module version: at ver

Grammatical rules:

Command type	grammar	Return and description
EO	at+ver=?	at+ver=HLK-RM58D(V1.00(Nov 30 2017)); current version

3.2 Local port operation:at+REBT

Command Type	Grammar	Return and description
EO	at+CLport=8080	at+CLport=8080 Ok

		Description: set the local port to port 8080
	at+CLport=? 8080	Description: query local port

3.3 Set up serial Port:at+uart

Command Type	Grammar	Return and description
EO	at+uart=115200,8,n,1	at+uart=115200,8,n,1 Ok Description: Set up serial Port parameters
Query Command	at+uart=?	at+uart=? 115200,8,n,1 Description: query serial port parameters

3.4 Set up DHCP:at+dhcpc

Command Type	Grammar	Return and description
EO	at+dhcpc=1	at+dhcpc=1 ok
Query Command	at+dhcpc=?	at+dhcpc=? 1 Description: 1: dhcp mode, 0: static ip

3.5 Set up wifi connection mode:at+netmode

Command Type	Grammar	Return and description
EO	at+netmode=3	at+netmode=3 Ok Description: set the module to ap mode
Query Command	at+netmode=?	at+netmode=? 3 Description: 2: sta mode , 3:ap mode

3.6 Set up tcp connection mode:at+mode

Command Type	Grammar	Return and description
EO	at+mode=client	at+mode=client Ok Description: set the module to client mode
Query Command	at+mode=?	at+mode=? client Description: client: server:

3.7 Set up remote IP when modules work as client:at+remoteip

Command Type	Grammar	Return and description
EO	at+remoteip=192.168.11.102	at+remoteip=192.168.11.102 ok Description: set the remote ip of the mode
Query Command	at+remoteip=?	at+remoteip=? 192.168.11.102 Description: query remote ip

3.8 Set up remote port when module act as client:at+remoteport

Command Type	Grammar	Return and description
EO	at+remoteport=1234	at+remoteport=1234 ok Description: set the remote port of the mode
Query Command	at+remoteport=?	at+remoteport=? 1234 Description: query remote port

3.9 Set parameter submission: at net_commit

Command Type	Grammar	Return and description
EO	at+net_commit=1	at+net_commit=1 Ok Description: submit setup parameters

3.10 system restart: at reconn

Command Type	Grammar	Return and description
EO	at+reconn=1	at+reconn=1 Description: system restart

3.11 set the module's ssid and password: at wifi_conf

Command Type	Grammar	Return and description
EO	at+wifi_conf=HI-LINK_5FE8,none,12345678	at+wifi_conf=HI-LINK_5FE8,none,12345678 ok Description: set the ssid and password of the module
Query Command	at+wifi_conf=?	at+wifi_conf=? HI-LINK_5FE8,none,12345678 Description: Query the ssid and password of the module

3.12 set up socket connection Protocol: at remotepro

Command Type	Grammar	Return and description
EO	at+remotepro=tcp	at+remotepro=tcp ok Description: set the module socket protocol to tcp
Query Command	at+remotepro=?	at+remotepro=? tcp Description: query module socket connection protocol

3.13 set network connection parameters: at net_ip

Command Type	Grammar	Return and description
EO	at+net_ip=192.168.16.254,255.255.255.0,192.168.16.254	at+net_ip=192.168.16.254,255.255.255.0,192.168.16.254 ok Description: set the ip,gateway,dns of the module
Query Command	at+net_ip=?	at+net_ip=? 192.168.16.254,255.255.255.0,192.168.16.254 Description: query module ip,gateway,dns

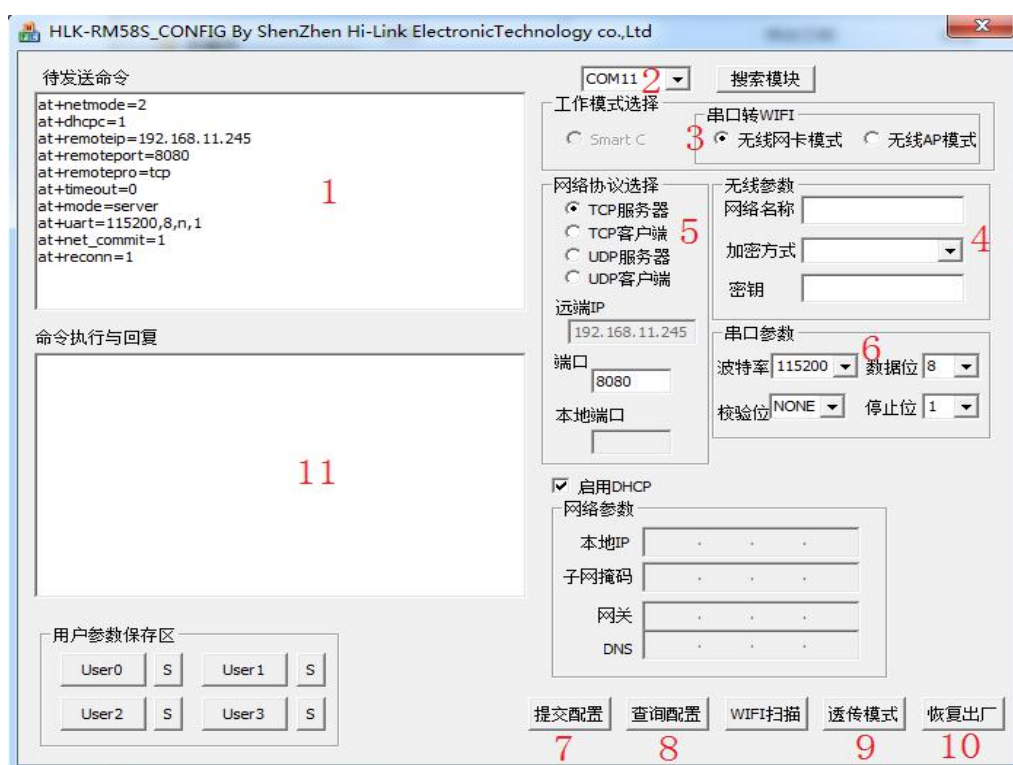
3.14 query STA mode network connection status: at wifi_ConState

Command Type	Grammar	Return and description
Query Command	at+wifi_ConState=?	at+wifi_ConState=? Disconnected Description: in sta mode, the module wifi is not connected, and the Connected indicates that the network is connected

3.15 query module MAC address: at Get_MAC

Command Type	Grammar	Return and description
Query Command	at+Get_MAC=? 40:D6:3C:15:5F:E8	at+Get_MAC=? 40:D6:3C:15:5F:E8 Description: query module mac address

3.18 Configuration Software Description



The screenshot shows the HLK-RM58S_CONFIG software interface. The window title is "HLK-RM58S_CONFIG By ShenZhen Hi-Link ElectronicTechnology co.,Ltd".

Annotations on the interface:

- 1**: Points to the "待发送命令" (Command to be sent) text area, which contains AT commands: at+netmode=2, at+dhcpc=1, at+remoteip=192.168.11.245, at+remoteport=8080, at+remoteport=tcp, at+timeout=0, at+mode=server, at+uart=115200,8,n,1, at+net_commit=1, at+reconn=1.
- 2**: Points to the "COM11" dropdown menu.
- 3**: Points to the "工作模式选择" (Work mode selection) section, which includes "串口转WIFI" (Serial to WIFI) and "无线网卡模式" (Wireless network card mode).
- 4**: Points to the "网络名称" (Network name) input field.
- 5**: Points to the "网络协议选择" (Network protocol selection) section, which includes "TCP服务器" (TCP server), "TCP客户端" (TCP client), "UDP服务器" (UDP server), and "UDP客户端" (UDP client).
- 6**: Points to the "串口参数" (Serial port parameters) section, which includes "波特率" (Baud rate), "数据位" (Data bits), "校验位" (Parity), and "停止位" (Stop bits).
- 7**: Points to the "提交配置" (Submit configuration) button.
- 8**: Points to the "查询配置" (Query configuration) button.
- 9**: Points to the "透传模式" (Transparent mode) button.
- 10**: Points to the "恢复出厂" (Restore factory) button.
- 11**: Points to the "命令执行与回复" (Command execution and response) text area.

Other visible elements include "远端IP" (Remote IP) set to 192.168.11.245, "端口" (Port) set to 8080, "本地端口" (Local port), "用户参数保存区" (User parameter save area) with User0, User1, User2, and User3, and "启用DHCP" (Enable DHCP) checked.

Figure 11. Serial port configuration interface

- 1: command window to be sent
- 2: serial port number selection
- 3: mode selection
- 4:wifi name and password
- 5: network protocol selection
- 6: serial port parameters
- 7: commit configuration
- 8: query configuration
- 9: enter transparent mode
- 10: restore factory setting
- 11: serial return command

4. Upgrade Introduction

The upgrade of HLK-RM58D module can be carried out through serial port or network, and the appropriate upgrade method can be selected according to the field environment.

4.1 Introduction of Serial Port Upgrade Method

In the upgrade folder there is a img file, upgrade software mainly read the files inside to upgrade; There are three files in the img folder, where HLK-RM58D.img and HLK-RM58D (b.1.00.1 20180611182552). Img file contents are the same, only file names are different, HLK-RM58D (b.1.00.120180611182552). Txt records the default parameter for this firmware; HLK-RM58D (b.1.00.120180611182) 552) "is the firmware version number, when the module runs this firmware query version number and this version number the same, each firmware has a unique version number, automatically generated by the compilation system; When there is a new firmware to upgrade, the three files can be overwritten.

Figure 12. Serial port is upgrading

4.2 Introduction to Network upgrade methods

In order to realize the network upgrade of the module, it is necessary to connect the line module through wifi, and then to upgrade the data transmission according to the ip of the module.

4.2.1 Router Connection

Modules that need to be upgraded can be configured and connected to routers through serial port configuration tools, or ap mode can be used.

4.2.2 Lookup module ip

Because you need to input the ip, of the module when upgrading, you can go to the router to find the corresponding ip, of the module or use HLK-RM58D_Discover to search the corresponding ip. for the module in the local area network.

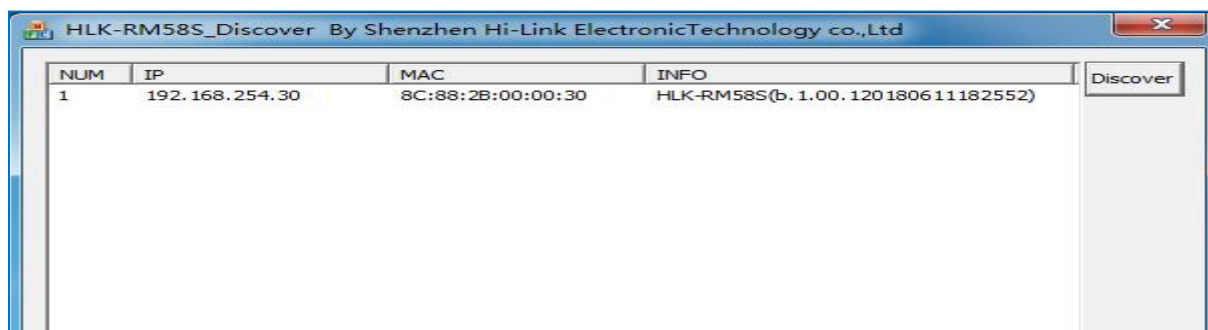


Figure 13. Lookup module ip

4.2.3 Program upgrades

Enter the module's ip address on the software HLK-RM58D_wifi.exe, and then enter:

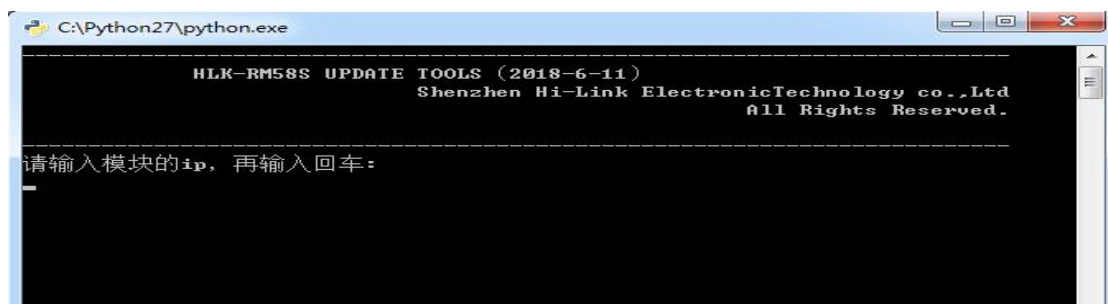


Figure 14. Open upgrade interface

Appears as shown in the figure to indicate that the upgrade is in progress

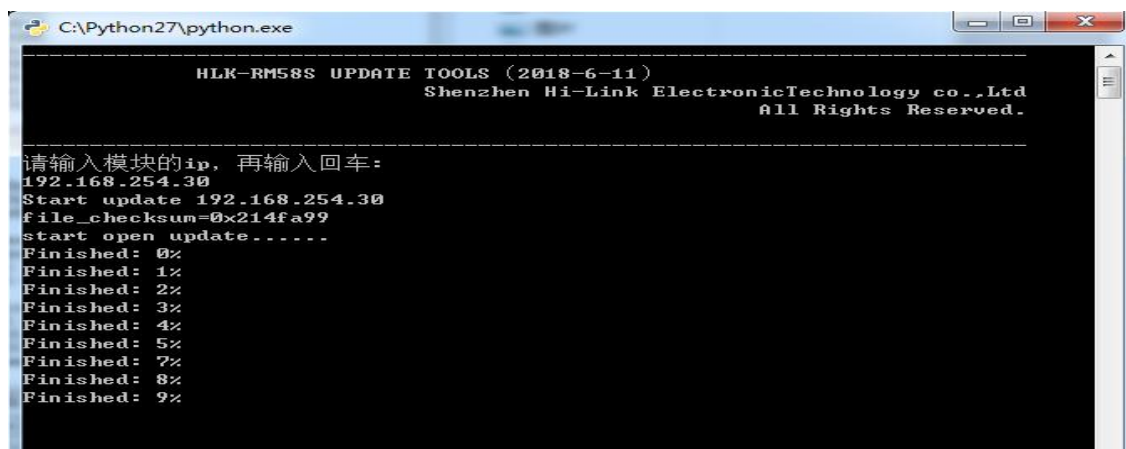


Figure 15. Upgrade in progress

Update finish!The words indicate success in the upgrade



Figure 16. Upgrade completed

(if your computer turns on a dual network card, you may not be able to upgrade and you will need to shut down a network card, if it is generated by the installation virtual machine.)

5. Restoration of factory setting method

Press the ES0 button on the base plate for 6 seconds to restore the factory setting.

6. The meaning of WIFI indicator LED

The module flashes through the led indicator in different modes, so that it can quickly and conveniently know the running state of the module. The WiFi indicator LED of the module has the following main states:

1.Periodic triflashes: modules in sta mode but not connected to target ap hotspots

2.Periodic four flashes: the module is in ap mode, but does not indicate whether a sta client device is connected to it

3, irregular flash: module wifi has been connected to the target ap hot spot, module led will flash quickly when there is data transmission.

7. Appendix A document revision

版本号	修订范围	日期
V1.21	Power supply changed from 3.3v to 5v	
V1.22	Add upgrade function description	