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**Shenzhen Hi-Link Electronic CO.,Ltd**

# **HLK-RM60 User Manual**

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## 1. Product Introduction

### 1.1. Overview

HLK-RM60 is a high-performance embedded WIFI6 module launched by Hilink Electronics.

The module complies with IEEE standard 802.11a/b/g/n/ac/ax. The module integrates a 2.4G/5.8G radio frequency transceiver with a transmission rate. High characteristics.

### 1.2. Product Features

- Compatible IEEE 802.11 a/b/g/n/ac/ax
- Dedicated high performance 32-bit RISC CPU
- Support 20/40MHz in 2.4G,Support 20/40/80MHZ in 5G
- Support 2.4g/ 5.8 GHz ,Data rate up to 573+1201 Mbps
- Support STA/AP
- Built-in TCP/IP protocol stack
- Support Wireless upgrade (OTA)
- 3.3V Single power supply

## 2. Diagram

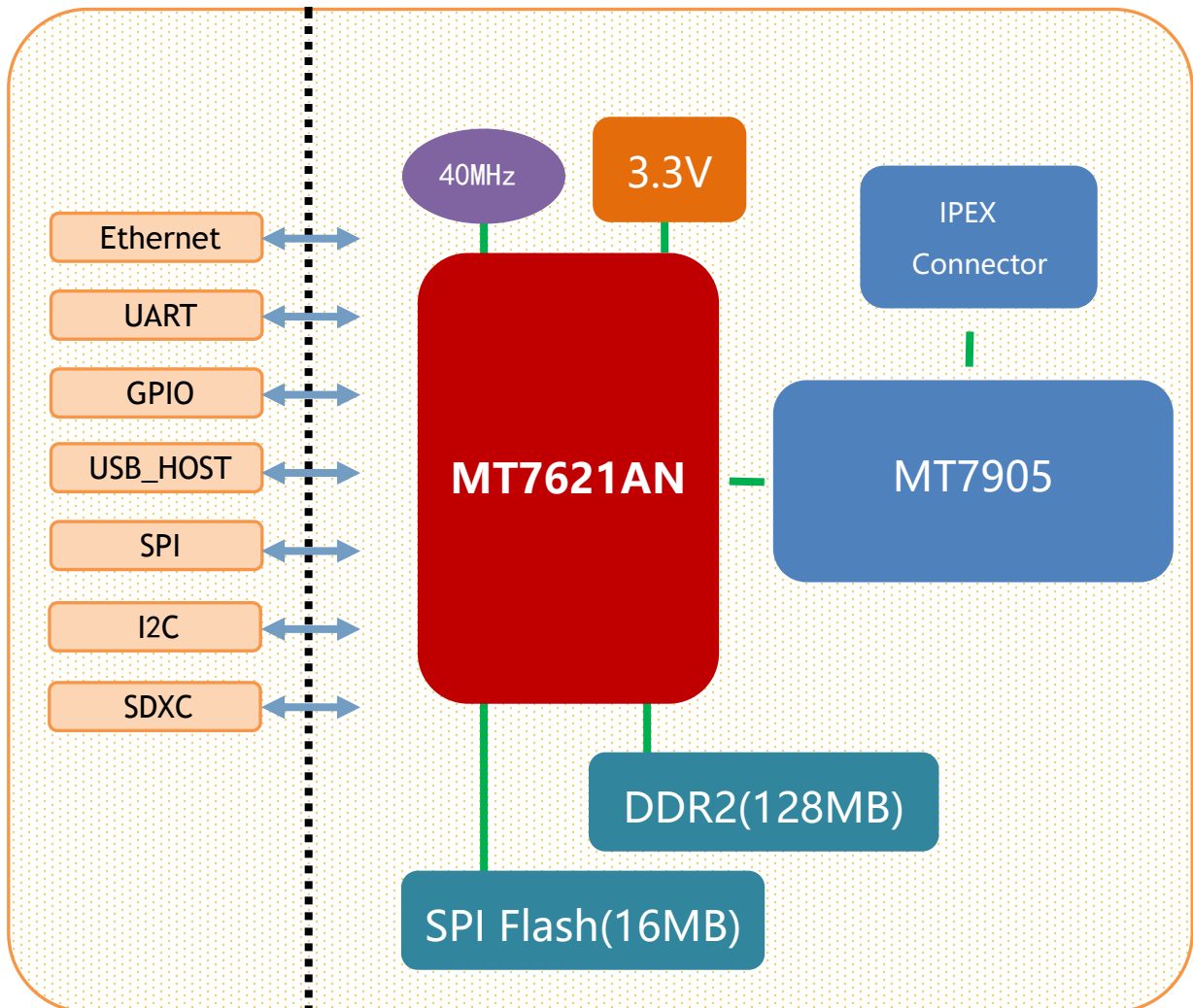


Figure 1 . HLK-RM60 diagram

## 2.1. Specification

| Items          | Parameter   | Notes |
|----------------|---|-------|
| Model Number   | HLK-RM60  |       |
| Main Chipset   | MT7621  |       |
| Kernel         | MIPS1004Kc  |       |
| Main frequency | 880MHz  |       |
| RAM            | DDR2 128MB  |       |
| Flash          | 16MB  |       |
| Temperature    | Ambient temperature: -20°C~60°C                                 |       |
| Humidity       | Using: 10~95% (Non-condensing)<br>Stock: 5~95% (Non-condensing) |       |
| Size           | 90mm×60mm   |       |

## 2.2. Number of interfaces

| Interface          | Quantity                 | Default firmware Support |
|--------------------|--------------------------|--------------------------|
| WiFi Standard      | IEEE 802.11b/g/n/a/ac/ax | Support                  |
| Ethernet Interface | 5* 100M/1000M (Adaptive) | 1*WAN、4*LAN              |
| UART               | 2                        | 2*UART                   |
| SDIO               | 1                        | Not Support              |
| SPI                | 1                        | Not Support              |
| I2C                | 1                        | Not Support              |
| USB3.0             | 1                        | Not Support              |
| USB2.0             | 1                        | Not Support              |

## 2.3. Technical specifications

| Module                       | Model Number                 | HLK-RM60  |                   |
|------------------------------|------------------------------|---|-------------------|
|                              | Package                      | In-line   |                   |
| Wireless parameters          | Wireless standard            | IEEE 802.11 a/b/g/n/ac/ax   |                   |
|                              | Frequency Range              | 2.412GHz-2.484GHz   | 5.180GHz-5.825GHz |
|                              | Transmit power               | 802.11b: +20 +/-2dBm (@11Mbps)  |                   |
|                              |                              | 802.11g: +20 +/-2dBm (@54Mbps)  |                   |
|                              |                              | 802.11n: +19 +/-2dBm (@MCS7)  |                   |
|                              |                              | 801.11ac:+17 +/-2dBm (@MCS9)  |                   |
|                              |                              | 802.11ax: +16 +/-2dBm (@MCS11)  |                   |
|                              | 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)   |                              |   |                   |
| 802.11ac: -75.0 dBm (@MCS9)  |                              |   |                   |
| 802.11ax: -73.0 dBm (@MCS11) |                              |   |                   |
| Antenna Type                 | External : 4*I-PEX Connector |   |                   |
| Hardware parameters          | Hardware interface           | UART, IIC, PWM, GPIO, SPI   |                   |
|                              | Network port                 | 5*Full Gigabit Ethernet port  |                   |
|                              | USB                          | 1*USB3.0+1*USB2.0   |                   |
|                              | Work Voltage                 | 3.3V  |                   |
|                              | GPIO Drive capability        | Max: 12ma   |                   |
|                              | Work Current                 | Keep sending=>average: ~800mA,Max: 1000mA<br>In normal mode=>average: ~750mA,Max: 800mA |                   |
|                              | Temperature                  | Operating temperature : -20°C~ +60°C<br>Storage temperature: -40°C~ +85°C               |                   |
|                              | Size                         | 90*60mm   |                   |
| Software parameters          | Wireless network type        | STA/AP  |                   |
|                              | Firmware Upgrade             | Web Upgrade   |                   |
|                              | Network protocol             | IPv4, TCP/UDP   |                   |
|                              | User configuration           | Web configuration   |                   |

Table 1. Technical specifications

## 2.4. Application field

- Smart home;
- Instrumentation;
- Wi-Fi Remote monitoring/control ;
- Toy field;
- Color LED control;
- Intelligent integrated management of fire protection and security;
- Smart card terminals, wireless POS machines, handheld devices, etc.

## 3. Electrical parameters

### 3.1. Working voltage

| Parameter                               | Smallest | Typical | Max | Unit |
|---|----------|---------|-----|------|
| <b>Working voltage</b>                  | 3        | 3.3     | 3.6 | V    |
| <b>I/O Voltage</b>                      | 3        | 3.3     | 3.6 | V    |
| <b>Peak module current</b>              | 1000mA   | 800     |     | mA   |
| <b>Supply current requirements</b>      |          | ≥1500   |     | mA   |
| <b>Power supply ripple requirements</b> |          | ≤50     |     | mV   |

Table 2. Module power supply requirements

## 4. Pin introduction

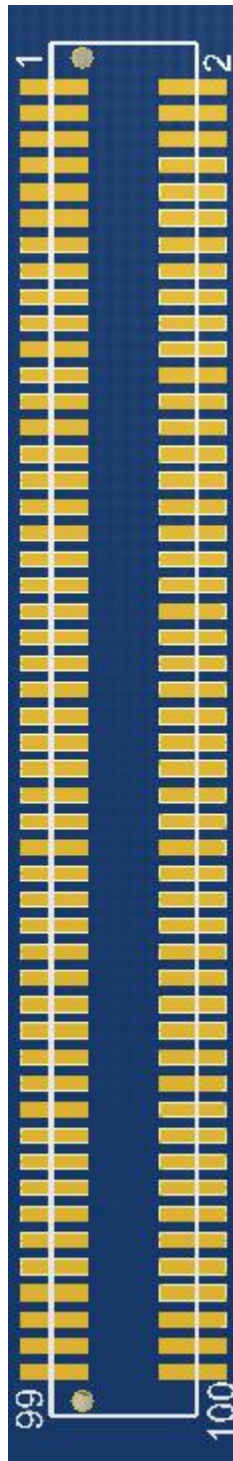


Figure 2. Module pin sorting



Table 3. Module pin sorting

|               |                  |                 |                  |               |                  |
|---------------|------------------|-----------------|------------------|---------------|------------------|
| 1:3.3VD       | 2:GND            | 39:ND_D2        | 40:ESW_TXVN_D_P1 | 77:I2C_SDA    | 78:GND           |
| 3:3.3VD       | 4:GND            | 41:ND_D1        | 42:GND           | 79:NC         | 80:ESW_TXVP_A_P4 |
| 5:3.3VD       | 6:GND            | 43:ND_D0        | 44:ESW_TXVP_A_P2 | 81:WDT_RST_N  | 82:ESW_TXVN_A_P4 |
| 7:3.3VD       | 8: ESW_TXVP_A_P0 | 45:ND_RB_N      | 46:ESW_TXVN_A_P2 | 83:ESW_P4_LED | 84:ESW_TXVP_B_P4 |
| 9:3.3VD       | 10:ESW_TXVN_A_P0 | 47:ND_RE_N      | 48:ESW_TXVP_B_P2 | 85:ESW_P3_LED | 86:ESW_TXVN_B_P4 |
| 11:NC         | 12:ESW_TXVP_B_P0 | 49:ND_CS_N      | 50:ESW_TXVN_B_P2 | 87:ESW_P2_LED | 88:ESW_TXVP_C_P4 |
| 13:SSUSB_TX_P | 14:ESW_TXVN_B_P0 | 51:ND_WP        | 52:ESW_TXVP_C_P2 | 89:ESW_P1_LED | 90:ESW_TXVN_C_P4 |
| 15:SSUSB_TX_N | 16:ESW_TXVP_C_P0 | 53:ND_CLE       | 54:ESW_TXVN_C_P2 | 91:ESW_P0_LED | 92:ESW_TXVP_D_P4 |
| 17:SSUSB_RX_P | 18:ESW_TXVN_C_P0 | 55:ND_WE_N      | 56:ESW_TXVP_D_P2 | 93:3.3VD      | 94:ESW_TXVN_D_P4 |
| 19:SSUSB_RX_N | 20:ESW_TXVP_D_P0 | 57:ND_ALE       | 58:ESW_TXVN_D_P2 | 95:3.3VD      | 96:GND           |
| 21:NC         | 22:ESW_TXVN_D_P0 | 59:NC           | 60:GND           | 97:3.3VD      | 98:GND           |
| 23:USB_D_N    | 24:GND           | 61:USB2.0_DM    | 62:ESW_TXVP_A_P3 | 99:3.3VD      | 100:GND          |
| 25:USB_D_P    | 26:ESW_TXVP_A_P1 | 63:USB2.0_DP    | 64:ESW_TXVN_A_P3 |               |                  |
| 27:NC         | 28:ESW_TXVN_A_P1 | 65:RXD3         | 66:ESW_TXVP_B_P3 |               |                  |
| 29:ND_D7      | 30:ESW_TXVP_B_P1 | 67:TXD3         | 68:ESW_TXVN_B_P3 |               |                  |
| 31:ND_D6      | 32:ESW_TXVN_B_P1 | 69:TXD1         | 70:ESW_TXVP_C_P3 |               |                  |
| 33:ND_D5      | 34:ESW_TXVP_C_P1 | 71:RXD1         | 72:ESW_TXVN_C_P3 |               |                  |
| 35:ND_D4      | 36:ESW_TXVN_C_P1 | 73:D2DB_PORST_N | 74:ESW_TXVP_D_P3 |               |                  |
| 37:ND_D3      | 38:ESW_TXVP_D_P1 | 75:I2C_SCLK     | 76:ESW_TXVN_D_P3 |               |                  |

**Power pin description:**

| No. | Name  | Type | Function description              | Default function |
|-----|-------|------|-----------------------------------|------------------|
| 1   | 3.3VD | P    | 3.3V Input, Current $\geq$ 1500mA | Power Supply     |
| 3   |       |      |                                   |                  |
| 5   |       |      |                                   |                  |
| 7   |       |      |                                   |                  |
| 9   |       |      |                                   |                  |
| 93  |       |      |                                   |                  |
| 95  |       |      |                                   |                  |
| 97  |       |      |                                   |                  |
| 99  |       |      |                                   |                  |
| 2   |       |      |                                   |                  |
| 4   |       |      |                                   |                  |
| 6   |       |      |                                   |                  |
| 11  |       |      |                                   |                  |
| 21  |       |      |                                   |                  |
| 24  |       |      |                                   |                  |
| 42  |       |      |                                   |                  |
| 60  |       |      |                                   |                  |
| 78  |       |      |                                   |                  |
| 96  |       |      |                                   |                  |
| 98  |       |      |                                   |                  |
| 100 |       |      |                                   |                  |

**USB3.0 Interface Description :**

|    |            |     |                                |        |
|----|------------|-----|--------------------------------|--------|
| 13 | SSUSB_TX_P | I/O | USB3.0                         | USB3.0 |
| 15 | SSUSB_TX_N |     |                                |        |
| 17 | SSUSB_RX_P |     |                                |        |
| 19 | SSUSB_RX_N |     |                                |        |
| 23 | USB_D_N    | I/O | USB 3.0 Interface HS/FS/LS Pin |        |
| 25 | USB_D_P    |     |                                |        |

**SPI Interface Description:**

|    |         |     |          |         |
|----|---------|-----|----------|---------|
| 29 | ND_D7   | I/O | SPI_HOLD | GPIO#40 |
| 31 | ND_D6   |     | SPI_WP   | GPIO#39 |
| 33 | ND_D5   |     | SPI_MOSI | GPIO#38 |
| 35 | ND_D4   |     | SPI_MISO | GPIO#37 |
| 47 | ND_RE_N |     | SPI_CLK  | GPIO#36 |
| 55 | ND_WE_N |     | SPI_CS1  | GPIO#35 |
| 49 | ND_CS_N |     | SPI_CS0  | GPIO#34 |

**SDIO Interface Description:**

|    |         |     |          |         |
|----|---------|-----|----------|---------|
| 51 | ND_WP   | I/O | SD_WP    | GPIO#41 |
| 45 | ND_RB_N |     | SD_CLK   | GPIO#42 |
| 57 | ND_ALE  |     | SD_CMD   | GPIO#44 |
| 53 | ND_CLE  |     | SD_CD    | GPIO#43 |
| 43 | ND_D0   |     | SD_DATA0 | GPIO#45 |
| 41 | ND_D1   |     | SD_DATA1 | GPIO#46 |
| 39 | ND_D2   |     | SD_DATA2 | GPIO#47 |
| 37 | ND_D3   |     | SD_DATA3 | GPIO#48 |

**USB2.0 Interface :**

|    |           |     |                  |                  |
|----|-----------|-----|------------------|------------------|
| 61 | USB2.0_DM | I/O | Usb2.0 Interface | Usb2.0 Interface |
| 63 | USB2.0_DP |     |                  |                  |

**Serial Interface:**

|    |      |   |             |          |
|----|------|---|-------------|----------|
| 65 | RXD3 | I | RXD3/GPIO#8 | Serial 3 |
| 67 | TXD3 | O | TXD3/GPIO#7 |          |
| 69 | TXD1 | O | TXD1/GPIO#1 | Serial 1 |
| 71 | RXD1 | I | RXD1/GPIO#2 |          |

**Reset pin:**

|    |              |   |                                |              |
|----|--------------|---|--------------------------------|--------------|
| 73 | D2DB_PORST_N | I | Hardware reset pin, active low | System reset |
|----|--------------|---|--------------------------------|--------------|

**I2C Interface:**

|    |             |     |                 |        |
|----|-------------|-----|-----------------|--------|
| 75 | 75:I2C_SCLK | I/O | I2C_SCLK/GPIO#3 | GPIO#3 |
| 77 | 77:I2C_SDA  |     | I2C_SDA/GPIO#4  | GPIO#4 |

**Network port P0 System reset:**

|    |               |  |                 |  |
|----|---------------|--|-----------------|--|
| 8  | ESW_TXVP_A_P0 |  | PORT0 Interface | Network port 0 , Please leave it in the air if you don;t need it |
| 10 | ESW_TXVN_A_P0 |  |                 |  |
| 12 | ESW_TXVP_B_P0 |  |                 |  |
| 14 | ESW_TXVN_B_P0 |  |                 |  |
| 16 | ESW_TXVP_C_P0 |  |                 |  |
| 18 | ESW_TXVN_C_P0 |  |                 |  |
| 20 | ESW_TXVP_D_P0 |  |                 |  |
| 22 | ESW_TXVN_D_P0 |  |                 |  |

**Network port P1 Interface:**

|    |               |  |                 |   |
|----|---------------|--|-----------------|---|
| 26 | ESW_TXVP_A_P1 |  | PORT1 Interface | Network port 1, Please leave it in the air if you don;t need it |
| 28 | ESW_TXVN_A_P1 |  |                 |   |
| 30 | ESW_TXVP_B_P1 |  |                 |   |
| 32 | ESW_TXVN_B_P1 |  |                 |   |
| 34 | ESW_TXVP_C_P1 |  |                 |   |
| 36 | ESW_TXVN_C_P1 |  |                 |   |
| 38 | ESW_TXVP_D_P1 |  |                 |   |
| 40 | ESW_TXVN_D_P1 |  |                 |   |

**Network port P2 Interface:**

|    |               |  |                 |   |
|----|---------------|--|-----------------|---|
| 44 | ESW_TXVP_A_P2 |  | PORT2 Interface | Network port 2, Please leave it in the air if you don;t need it |
| 46 | ESW_TXVN_A_P2 |  |                 |   |
| 48 | ESW_TXVP_B_P2 |  |                 |   |
| 50 | ESW_TXVN_B_P2 |  |                 |   |
| 52 | ESW_TXVP_C_P2 |  |                 |   |
| 54 | ESW_TXVN_C_P2 |  |                 |   |
| 56 | ESW_TXVP_D_P2 |  |                 |   |
| 58 | ESW_TXVN_D_P2 |  |                 |   |

**Network port P3 Interface:**

|    |               |  |                 |   |
|----|---------------|--|-----------------|---|
| 62 | ESW_TXVP_A_P3 |  | PORT3 Interface | Network port 3, Please leave it in the air if you don't need it |
| 64 | ESW_TXVN_A_P3 |  |                 |   |
| 66 | ESW_TXVP_B_P3 |  |                 |   |
| 68 | ESW_TXVN_B_P3 |  |                 |   |
| 70 | ESW_TXVP_C_P3 |  |                 |   |
| 72 | ESW_TXVN_C_P3 |  |                 |   |
| 74 | ESW_TXVP_D_P3 |  |                 |   |
| 76 | ESW_TXVN_D_P3 |  |                 |   |

**Network port P4 Interface:**

|    |               |  |                 |   |
|----|---------------|--|-----------------|---|
| 80 | ESW_TXVP_A_P4 |  | PORT4 Interface | Network port 4, Please leave it in the air if you don't need it |
| 82 | ESW_TXVN_A_P4 |  |                 |   |
| 84 | ESW_TXVP_B_P4 |  |                 |   |
| 86 | ESW_TXVN_B_P4 |  |                 |   |
| 88 | ESW_TXVP_C_P4 |  |                 |   |
| 90 | ESW_TXVN_C_P4 |  |                 |   |
| 92 | ESW_TXVP_D_P4 |  |                 |   |
| 94 | ESW_TXVN_D_P4 |  |                 |   |

**Watchdog reset Pin:**

|    |           |   |                          |         |
|----|-----------|---|--------------------------|---------|
| 81 | WDT_RST_N | I | Function pin, active low | GPIO#18 |
|----|-----------|---|--------------------------|---------|

**Network port indicator pin:**

|    |            |     |  |                                      |
|----|------------|-----|--|--------------------------------------|
| 83 | ESW_P4_LED | I/O | Active low, drive capability 4ma           | Network port P4 connection indicator |
| 85 | ESW_P3_LED |     | High level effective, drive capability 4ma | Network port P3 connection indicator |
| 87 | ESW_P2_LED |     | Active low, drive capability 4ma           | Network port P2 connection indicator |
| 89 | ESW_P1_LED |     | Active low, drive capability 4ma           | Network port P1 connection indicator |
| 91 | ESW_P0_LED |     | Active low, drive capability 4ma           | Network port P0 connection indicator |

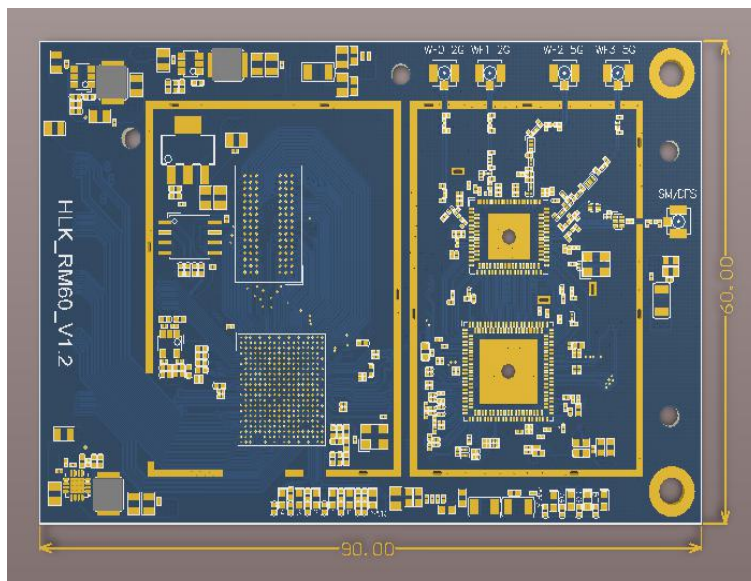
Other Pins :

|    |    |  |                 |                 |
|----|----|--|-----------------|-----------------|
| 59 | NC |  | Hang in the air | Hang in the air |
| 79 | NC |  | Hang in the air | Hang in the air |
| 27 | NC |  | Hang in the air | Hang in the air |

Remark:

I, I-Input; O-Output; I/O-Number I/O; P-Power。NC Hang in the air。

## 5. Size



Unit: (mm)

Figure 3 Size

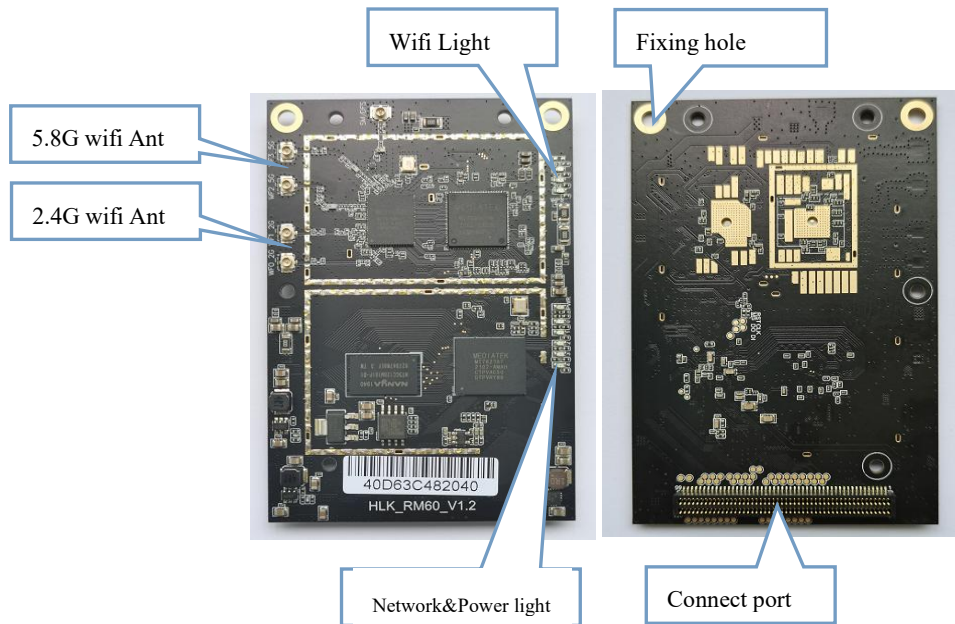


Figure 4 Module interface description

## 6. Indicator light description

2G/5Gwifi indicator light: After turning on the wifi function, the module wifi indicator will flash, after turning off the wifi indicator, the module' s wifi indicator will go out.

Pwr indicator: power indicator, always on when power on.

Network port indicator: After plugging in the network cable, the corresponding LED indicator will flash.

## 7. Pin function description

D2DB\_PORST\_N: Hardware reset pin, Pull down time  $\geq 100\text{ms}$

WDT\_RST\_N: Software reset pin, Pull down time  $\geq 6000\text{ms}$ , The system will be restarted

## 8. Enter the configuration web interface

Connect the computer's network port and the module's LAN port, open the computer browser, enter 192.168.16.254, and you will enter the web login interface, enter the user name: root, password: admin, and then click the Login button to enter the configuration interface.

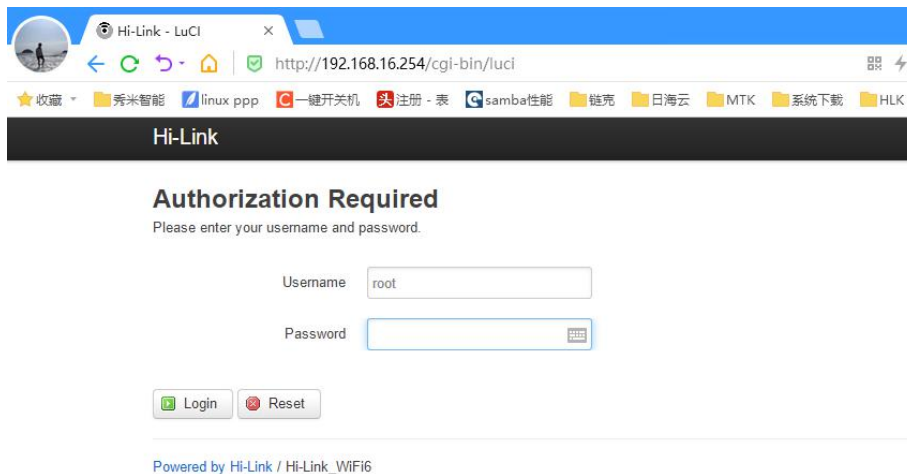


Figure 5.Log in Web

Enter the configuration interface:

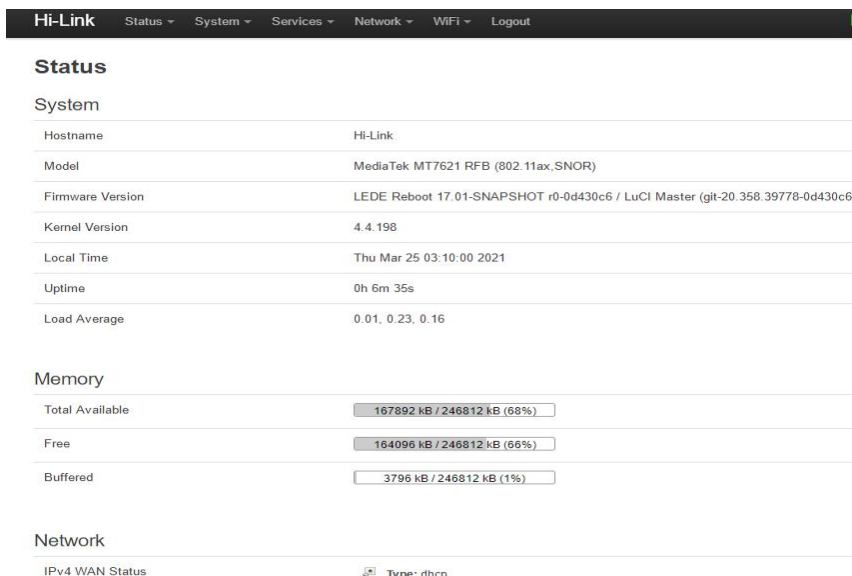


Figure 6 Status Page



## 9. Set the wifi name

After entering the web configuration interface, click WIFI, select WIFI configuration, enter the wifi configuration interface

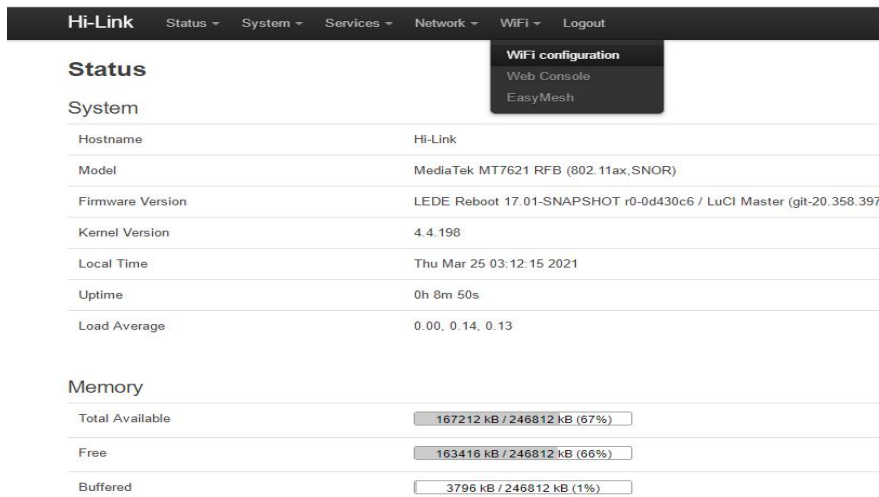


Figure 7 Enter the wifi setting interface

In this interface, you can see the WiFi name and mac address of 2.4g and 5.8g, click the config button to enter the corresponding configuration interface

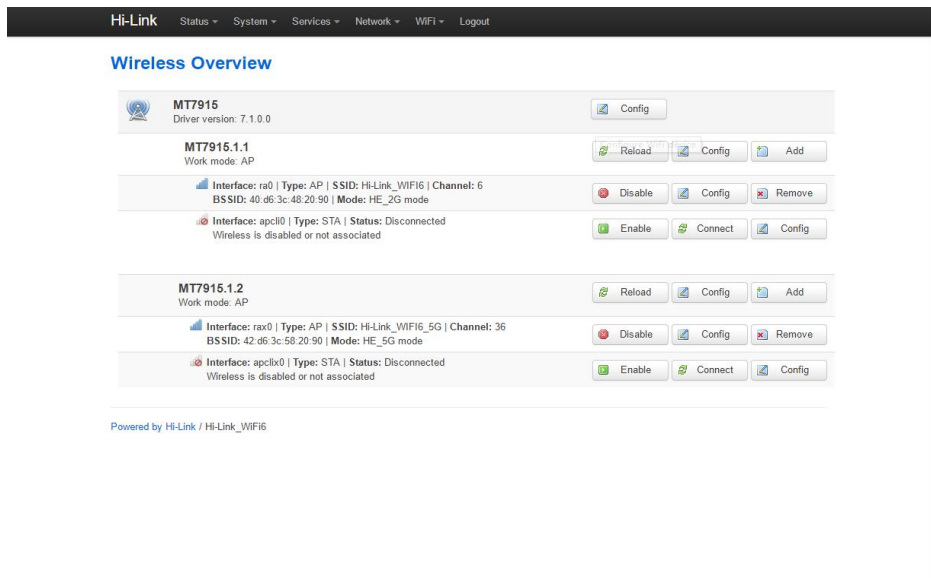


Figure 8 Wifi Status page

After clicking the config button, you will enter the configuration interface of the corresponding ssid and password

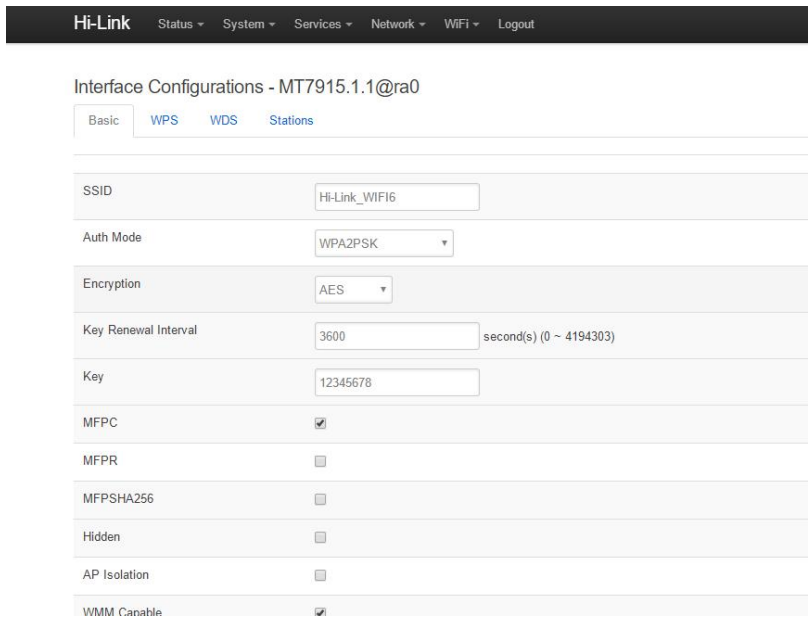


Figure 9 Wifi Setting Page

After the configuration is completed, click the following button to make the configured information take effect.

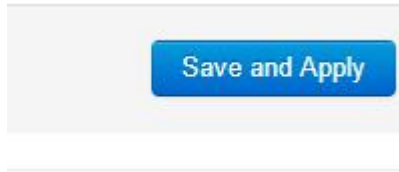


Figure 10 Save Button

## Appendix A Document revision history

| Version | Revision scope   | Date     |
|---------|------------------|----------|
| V1.0    | Original Version | 20210508 |
|         |                  |          |
|         |                  |          |
|         |                  |          |