# Shenzhen Hi-Link Electronic Co.,Ltd

## HLK-RM65 Specification

Version: V1.0 Revision Date: August 11, 2023 

# CONTENTS

# 1. Products

## 1.1. Outline

**HLK-RM65** is a high performance embedded WIFI6 AX3000 module from Hi-Link Electronics, a highly integrated system-on-a-chip wireless network router module using **MT7981B+MT7976C+MT7531A solution, with a theoretical maximum wireless rate of 574Mbps+2402Mbps.**Used for high wireless performance, home entertainment and home automation, etc.

The SoC used is manufactured using an advanced silicon process and integrates a dual-core ARM®Cortex-A53MPCoreTM operating at up to 1.3GHz and more DRAM bandwidth. A variety of peripherals are also included, including SGMII and USB3.0 (host) ports. Two 2.5Gbps HSGMII Ethernet interfaces are also implemented. The MT7981B, combined with the RF chip, provides a dual-band concurrent chipset solution for the WIFI6E AX3000 wireless router platform.

## 1.2. Product Characteristics

- Dual-band (2.4GHz and 5GHz) MIMO 802.11 a/b/g/n/ac/ax RF with bandwidth 20/40/80/160MHz
- Flash/DDR3 Expandable support DDR3/DDR4-2133 2GB/4GB;
- Bandwidth range: 2.4-2.4835 GHz 5.180-5.885 GHz;
- Integrated 2.4GHz/5GHz PA, LNA;
- Wireless connection: I-pex Generation 1 cradle;
- Interface WAN.LAN1.LAN2.LAN3.LAN4.LAN5.USB3.0.
- WAN access method PPPoE, Dynamic IP, Static IP, 3G/4G/5G;
- Static address assignment, virtual servers, port forwarding DMZ hosts;
- Module supply voltage: DC3.3V5A;

# 2. Module Specifications

## 2.1. Flowchart

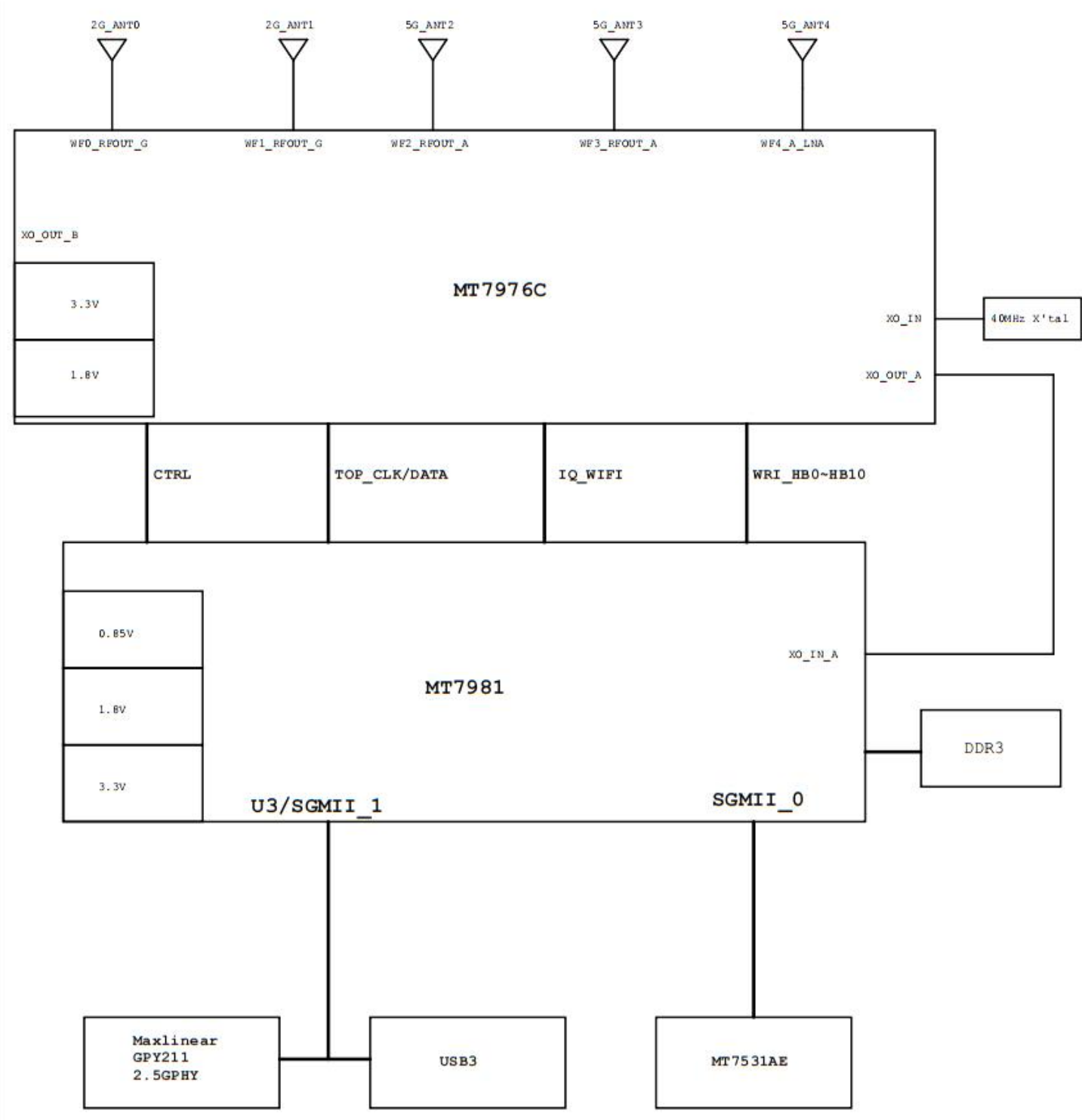



Figure 1.

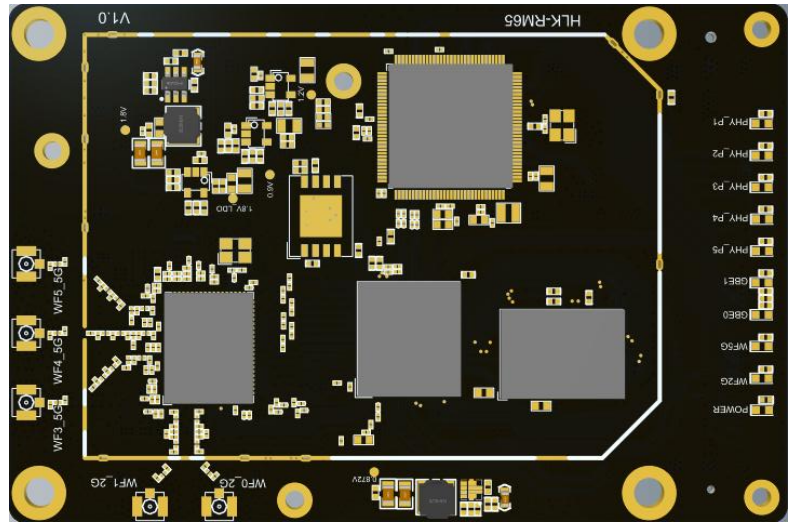
## 2.2. Technical specification

| Module (computer) | Model number | HLK-RM65 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Wireless parameters | Wireless standard | MIMO IEEE 802.11 a/b/g/n/ac/ax | | | | | | | |
| | Frequency range | 2.4-2.4835 GHz | | | | 5.180-5.885 GHz | | | |
| | Firing power | 802.11b: +23±1.5dBm (11M) | | | | 802.11a: +20±1.5dBm (54M) | | | |
| | | 802.11g: +20±2dBm (54M) | | | | 802.11n(20M): +18±2dBm (MCS7) | | | |
| | | 802.11n(20M): +19±2dBm (MCS7) | | | | 802.11n(40M): +18±1.5dBm (MCS7) | | | |
| | | 802.11n(40M): +19±1.5dBm (MCS7) | | | | 801.11ac(20M):+17.5±2dBm (MCS9) | | | |
| | | 801.11ac(20M): +17±2dBm (MCS9) | | | | 801.11ac(40M): +17.5±1.5dBm (MCS9) | | | |
| | | 801.11ac: (40M)+17±1.5dBm (MCS9) | | | | 801.11ac(80M):+17.5±1.5dBm (MCS9) | | | |
| | | 802.11ax(20M): +17±1.5dBm (MCS11) | | | | 802.11ax(20M): +17±1.5dBm (MCS11) | | | |
| | | 802.11ax(40M): +16.5±1.5dBm (MCS11) | | | | 802.11ax(40M): +17±1.5dBm (MCS11) | | | |
| | | | | | | 802.11ax(80M): +17±1.5dBm (MCS11) | | | |
| | | | | | | 802.11ax(160M): +15.5±1.5dBm (MCS11) | | | |
| | Receiver sensitivity | Unit: dBm | ch1 | ch6 | ch13 | Unit: dBm | ch50 | ch114 | ch163 |
| | | 2G BW20: (MCS0) | -93.5 | -93.5 | -93.5 | 5G BW20: (MCS0) | -92.5 | -92.5 | -92.5 |
| | | 2G BW20: (MCS7) | -74.5 | -74 | -74 | 5G BW20: (MCS7) | -73.5 | -73.5 | -73.5 |
| | | 2G BW20: (MCS9) | -68.5 | -68 | -68 | 5G BW20: (MCS9) | -68 | -68 | -68 |
| | | 2G BW20: (MCS11) | -63 | -63 | -63.5 | 5G BW20: (MCS11) | -62 | -62 | -62 |
| | | 2G BW40: (MCS0) | -90.5 | -90.5 | -90.5 | 5G BW160: (MCS0) | -83 | -83 | -83 |
| | | 2G BW40: (MCS7) | -71.5 | -71.5 | -71.5 | 5G BW160: (MCS7) | -64.5 | -64.5 | -64.5 |
| | | 2G BW40: (MCS9) | -65.5 | -65.5 | -65.5 | 5G BW160: (MCS9) | -58.5 | -59 | -59 |
| | | 2G BW40: (MCS11) | -60 | -60 | -60 | 5G BW160: (MCS11) | -53 | -53.5 | -53.5 |
| | Antenna form | External: I-PEX Generation Antenna Mount *5 | | | | | | | |
| Hardware parameters | Storage capacity | DDR3: 256M(2Gbit); Nand Flash: 128M(1Gbit) | | | | | | | |
| | Hardware interface | UART,IIC,GPIO, SPI,USB,PWM | | | | | | | |

| | | | |
|---|---|---|---|
| | Network port | Gigabit Ethernet ports*6: WAN*1, LAN*5 | |
| | USB | Partial foot reuse | USB3.0* |
| | PCIe | | PCIe*1 |
| | SGMII | | 2.5G SGMII*1 |
| | Operating voltage | 3.3V | |
| | Operating Current | Under continuous transmission => average: 2.8A@3.3V (3.3V power supply capacity of 5A or more is recommended)<br>Normal mode => average: 1.27A@3.3 | |
| | IO drive capability | VMax: 12ma | |
| | Temp | Working Temperature: -20℃~80℃ | |
| | Package Size | 60*90mm | |
| | Storage environment | Temperature: 5~40℃, Relative Humidity: 10%~90%R.H. | |
| Software parameter | Wireless Network Type | STA/AP/APClient | |
| | Firmware Upgrade | Web page upgrade, command port upgrade | |
| | Network protocol | IPv4, TCP/UDP | |
| | Software environment | Openwrt | |
| | User configuration | Web Configuration | |

**Table 1: Technical specifications**

## 2.3. Product Pictures



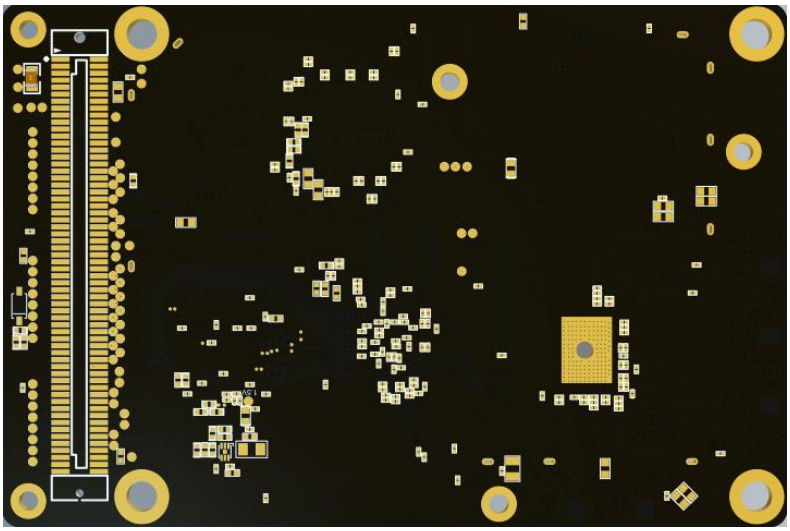



**Figure 2. Module picture**

## 3. Application Areas

- Smart Home;
- Instrumentation;
- Wi-Fi remote monitoring/control;
- Toy field;
- Color LED control;
- Routing Gateway;
- Smart Agriculture;
- Home Routing;
- Intelligent integrated management of fire and security;
- Smart card terminals, wireless POS, handheld devices, etc.

# 4. Module Pinout

| Chip leg | Pin Description | HLK-RM65 Module Interface Pin Definition | | | | Pin Description | Chip leg |
|---|---|---|---|---|---|---|---|
| | | NO. | Pin Name | NO. | Pin Name | | |
| | Power pin: +3.3V | 1 | VCC | 2 | VCC | Power pin: +3.3V | |
| | Power pin: +3.3V | 3 | VCC | 4 | VCC | Power pin: +3.3V | |
| | Power pin: +3.3V | 5 | VCC | 6 | VCC | Power pin: +3.3V | |
| | GND | 7 | GND | 8 | VCC | Power pin: +3.3V | |
| For MT7531AE Pin 30 | Network port P5/LAN | 9 | ESW_TXVP_D_P5 | 10 | VCC | Power pin: +3.3V | |
| For MT7531AE Pin 31 | Network port P5/LAN | 11 | ESW_TXVN_D_P5 | 12 | GND | GND | |
| For MT7531AE Pin 28 | Network port P5/LAN | 13 | ESW_TXVP_C_P5 | 14 | GND | GND | |
| For MT7531AE Pin 29 | Network port P5/LAN | 15 | ESW_TXVN_C_P5 | 16 | GND | GND | |
| For MT7531AE Pin 25 | Network port P5/LAN | 17 | ESW_TXVP_B_P5 | 18 | GND | GND | |
| For MT7531AE Pin 26 | Network port P5/LAN | 19 | ESW_TXVN_B_P5 | 20 | GND | GND | |
| For MT7531AE Pin 22 | Network port P5/LAN | 21 | ESW_TXVP_A_P5 | 22 | SMI_MDC | MDC | For MT7981B Pin L17 |
| For MT7531AE Pin 23 | Network port P5/LAN | 23 | ESW_TXVN_A_P5 | 24 | SMI_MDIO | MDIO | For MT7981B Pin K17 |
| | GND | 25 | GND | 26 | GND | GND | |
| For MT7531AE Pin 9 | Network port P4/LAN | 27 | ESW_TXVP_D_P4 | 28 | ESW_P1_LED | P1 Status LED | For MT7531AE Pin 81 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| For MT7531AE Pin 10 | Network port P4/LAN | 29 | ESW_TXVN_D_P4 | 30 | ESW_P2_LED | P2 Status LED | For MT7531AE Pin 79 |
| For MT7531AE Pin 7 | Network port P4/LAN | 31 | ESW_TXVP_C_P4 | 32 | ESW_P3_LED | P3 Status LED | For MT7531AE Pin 75 |
| For MT7531AE Pin 8 | Network port P4/LAN | 33 | ESW_TXVN_C_P4 | 34 | ESW_P4_LED | P4 Status LED | For MT7531AE Pin 74 |
| For MT7531AE Pin 4 | Network port P4/LAN | 35 | ESW_TXVP_B_P4 | 36 | ESW_P5_LED | P5 Status LED | For MT7531AE Pin 70 |
| For MT7531AE Pin 5 | Network port P4/LAN | 37 | ESW_TXVN_B_P4 | 38 | PWM0 | PWM **Startup-related*** | For MT7981B Pin D20 |
| For MT7531AE Pin 2 | Network port P4/LAN | 39 | ESW_TXVP_A_P4 | 40 | GPIO_WPS | WPS Features | For MT7981B Pin E17 |
| For MT7531AE Pin 3 | Network port P4/LAN | 41 | ESW_TXVN_A_P4 | 42 | GPIO_RESET | Pull down 1s reset Pull down 8s to restore factory | For MT7981B Pin E18 |
| | GND | 43 | GND | 44 | GND | GND | |
| For MT7531AE Pin 126 | Network port P3/LAN | 45 | ESW_TXVP_D_P3 | 46 | SPI1_MISO | SPI1 | For MT7981B Pin A18 |
| For MT7531AE Pin 127 | Network port P3/LAN | 47 | ESW_TXVN_D_P3 | 48 | SPI1_MOSI | SPI1 | For MT7981B Pin B18 |
| For MT7531AE Pin 123 | Network port P3/LAN | 49 | ESW_TXVP_C_P3 | 50 | SPI1_CLK | SPI1 | For MT7981B Pin A19 |
| For MT7531AE Pin 124 | Network port P3/LAN | 51 | ESW_TXVN_C_P3 | 52 | SPI1_CS | SPI1 | For MT7981B Pin C17 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| For MT7531AE Pin 120 | Network port P3/LAN | 53 | ESW_TXVP_B_P3 | 54 | GND | GND | |
| For MT7531AE Pin 121 | Network port P3/LAN | 55 | ESW_TXVN_B_P3 | 56 | UART0_TXD | Debug port, baud rate 115200 | For MT7981B Pin G17 |
| For MT7531AE Pin 117 | Network port P3/LAN | 57 | ESW_TXVP_A_P3 | 58 | UART0_RXD | Debug port, baud rate 115200 | For MT7981B Pin G16 |
| For MT7531AE Pin 118 | Network port P3/LAN | 59 | ESW_TXVN_A_P3 | 60 | GND | GND | |
| | GND | 61 | GND | 62 | SPI2_CS | SPI2 | For MT7981B Pin V2 |
| For MT7531AE Pin 112 | Network port P2/LAN | 63 | ESW_TXVP_D_P2 | 64 | SPI2_HOLD | SPI2 | For MT7981B Pin U2 |
| For MT7531AE Pin 113 | Network port P2/LAN | 65 | ESW_TXVN_D_P2 | 66 | SPI2_WP | SPI2 | For MT7981B Pin U1 |
| For MT7531AE Pin 109 | Network port P2/LAN | 67 | ESW_TXVP_C_P2 | 68 | SPI2_CLK | SPI2 **Startup-related*** | For MT7981B Pin T2 |
| For MT7531AE Pin 110 | Network port P2/LAN | 69 | ESW_TXVN_C_P2 | 70 | SPI2_MISO | SPI2 | For MT7981B Pin T1 |
| For MT7531AE Pin 106 | Network port P2/LAN | 71 | ESW_TXVP_B_P2 | 72 | SPI2_MOSI | SPI2 | For MT7981B Pin T3 |
| For MT7531AE Pin 107 | Network port P2/LAN | 73 | ESW_TXVN_B_P2 | 74 | SYS_WATCHDOG | | For MT7981B Pin R1 |
| For MT7531AE Pin 103 | Network port P2/LAN | 75 | ESW_TXVP_A_P2 | 76 | GBE_LED1 | | For MT7981B Pin R2 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| For MT7531AE Pin 104 | Network port P2/LAN | 77 | ESW_TXVN_A_P2 | 78 | GBE_LED0 | | For MT7981B Pin M4 |
| | GND | 79 | GND | 80 | SYSRSTB | | For MT7981B Pin N2 |
| For MT7531AE Pin 100 | Network port P1/LAN | 81 | ESW_TXVP_D_P1 | 82 | PCIE_PERESET_N | PCIE reset | For MT7981B Pin N3 |
| For MT7531AE Pin 101 | Network port P1/LAN | 83 | ESW_TXVN_D_P1 | 84 | WF5G_LED | 5G WiFi LED | For MT7981B Pin M2 |
| For MT7531AE Pin 97 | Network port P1/LAN | 85 | ESW_TXVP_C_P1 | 86 | WF2G_LED | 2.4G WiFi LED | For MT7981B Pin M1 |
| For MT7531AE Pin 98 | Network port P1/LAN | 87 | ESW_TXVN_C_P1 | 88 | USB_VBUS | USB_VBUS **Startup-related*** | For MT7981B Pin L3 |
| For MT7531AE Pin 93 | Network port P1/LAN | 89 | ESW_TXVP_B_P1 | 90 | GND | GND | |
| For MT7531AE Pin 94 | Network port P1/LAN | 91 | ESW_TXVN_B_P1 | 92 | USB_DP | USB D+ | For MT7981B Pin K2 |
| For MT7531AE Pin 91 | Network port P1/LAN | 93 | ESW_TXVP_A_P1 | 94 | USB_DM | USB D- | For MT7981B Pin K3 |
| For MT7531AE Pin 92 | Network port P1/LAN | 95 | ESW_TXVN_A_P1 | 96 | GND | GND | |
| | GND | 97 | GND | 98 | PCIE_CKN/NC* | PCIE CLK pin CK -/NC* | For MT7981B Pin H3 |
| For MT7981B Pin M20 | Network port P0/WAN | 99 | ESW_TXVP_D_P0 | 100 | PCIE_CKP/NC* | PCIE CLK pin CK +/NC* | For MT7981B Pin H2 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| For MT7981B Pin M19 | Network port P0/WAN | 101 | ESW_TXVN_D_P0 | 102 | GND | GND | |
| For MT7981B Pin N19 | Network port P0/WAN | 103 | ESW_TXVP_C_P0 | 104 | SSUSB_RXN | USB3.0 | For MT7981B Pin G2 |
| For MT7981B Pin N20 | Network port P0/WAN | 105 | ESW_TXVN_C_P0 | 106 | SSUSB_RXP | USB3.0 | For MT7981B Pin G1 |
| For MT7981B Pin R19 | Network port P0/WAN | 107 | ESW_TXVP_B_P0 | 108 | GND | GND | |
| For MT7981B Pin P19 | Network port P0/WAN | 109 | ESW_TXVN_B_P0 | 110 | SSUSB_TXN | USB3.0 | For MT7981B Pin F1 |
| For MT7981B Pin T20 | Network port P0/WAN | 111 | ESW_TXVP_A_P0 | 112 | SSUSB_TXP | USB3.0 | For MT7981B Pin F2 |
| For MT7981B Pin T19 | Network port P0/WAN | 113 | ESW_TXVN_A_P0 | 114 | GND | GND | |
| | GND | 115 | GND | 116 | GND | GND | |
| | GND | 117 | GND | 118 | VCC | Power pin: +3.3V | |
| | Power pin: +3.3V | 119 | VCC | 120 | VCC | Power pin: +3.3V | |

**Startup-related*: Startup-related pins cannot be pulled up and down during module startup.**

**/NC*:The interface compatible with PCIE of MT7981A scheme is reserved, the MT7981B interface has no function.**

**Table 2. Pin Descriptions**

## Foot Reuse Description

（See the MT7981B datasheet for detailed multiplexing information.）

| Foot order | Function 1 | Function 2 | Function 3 |
|---|---|---|---|
| 104 | SSUSB_RXN | SGMII1 data pin RX - | PCIE_LN0_RXN |
| 106 | SSUSB_RXP | SGMII1 data pin RX + | PCIE_LN0_RXP |
| 110 | SSUSB_TXN | SGMII1 data pin TX - | PCIE_LN0_TXN |
| 112 | SSUSB_TXP | SGMII1 data pin TX + | PCIE_LN0_TXP |
| 68 | SPI2_CLK | UART1_RXD | |
| 72 | SPI2_MOSI | UART1_TXD | |
| 50 | SPI1_CLK | UART2_RXD | |
| 48 | SPI1_MOSI | UART2_TXD | |

| Foot order | Pin Names/Functions | Pin Description | Reuse |
|---|---|---|---|
| USB3.0 | | | |
| 104 | SSUSB_RXN | USB_RXN data pin RX - | **reuse** |
| 106 | SSUSB_RXP | USB_RXP data pin RX + | **reuse** |
| 110 | SSUSB_TXN | USB_TXN data pin TX - | **reuse** |
| 112 | SSUSB_TXP | USB_TXP data pin TX + | **reuse** |
| 92 | USB_DP | USB data pin Data + | |
| 94 | USB_DM | USB data pin Data - | |
| SGMII | | | |
| 104 | SGMII_LN1_RXN | SGMII1 data pin RX - | **reuse** |
| 106 | SGMII_LN1_RXP | SGMII1 data pin RX + | **reuse** |
| 110 | SGMII_LN1_TXN | SGMII1 data pin TX - | **reuse** |
| 112 | SGMII_LN1_TXP | SGMII1 data pin TX + | **reuse** |

**Table 3. Introduction of multifunctional reuse**

## 5. Electrical parameters

| Parameters | Minimal | Typical Case | Maximum | Unit |
|---|---|---|---|---|
| Module supply voltage | 3.1 | 3.3 | 3.5 | V |
| Chip supply voltage | 3.1 | 3.3 | 3.5 | V |
| I/O Voltage | 3.1 | 3.3 | 3..5 | V |
| Average module power consumption | | 4.0 | | W |
| Module Current Peak | | 2.8 | | A |
| Supply Current Requirements | | ≥5 | | A |
| Power supply ripple requirements | | ≤50 | | mV |
| ESD Contact Discharge | - | ±2 | - | KV |
| ESD non-contact discharge | - | ±2 | - | KV |

**Table 4. Electrical parameters**

## 6. Pin Definitions

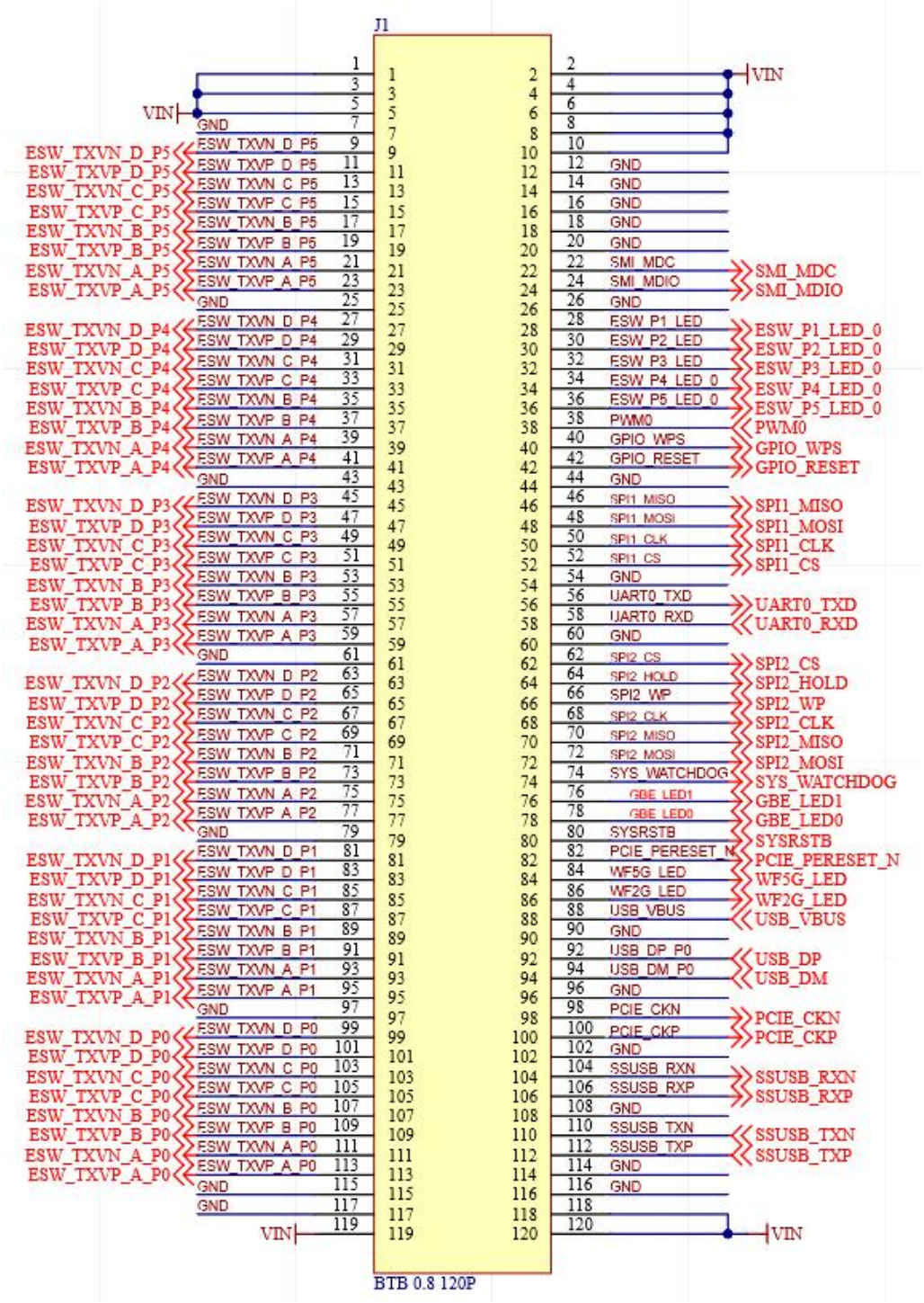



**Figure 3. Module Interface Definition**

*Description:*

*1，GPIO drive capacity 12mA.*

*2，Certain functions need to be realized in conjunction with the appropriate software.*

## 7. Description of the test substrate

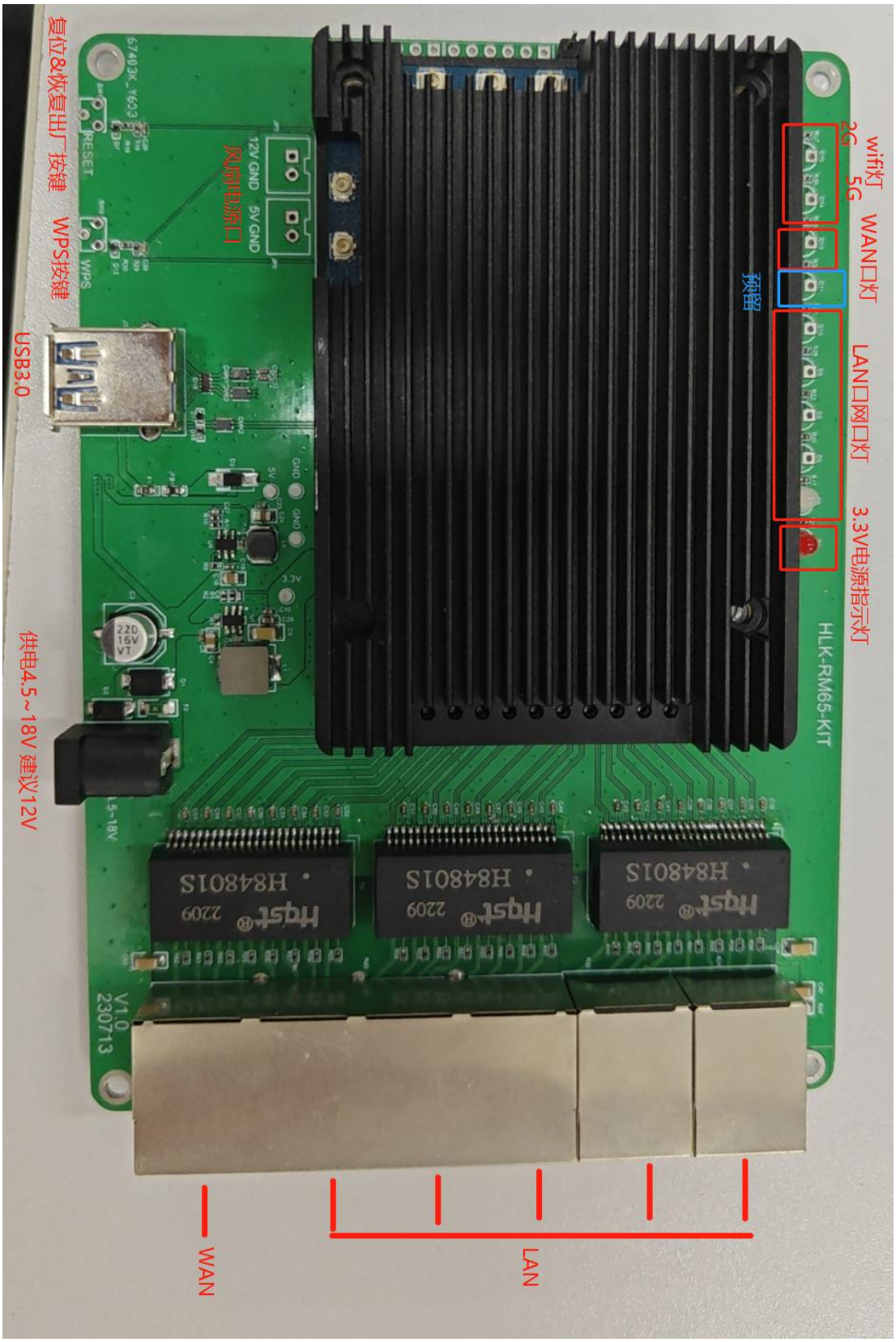


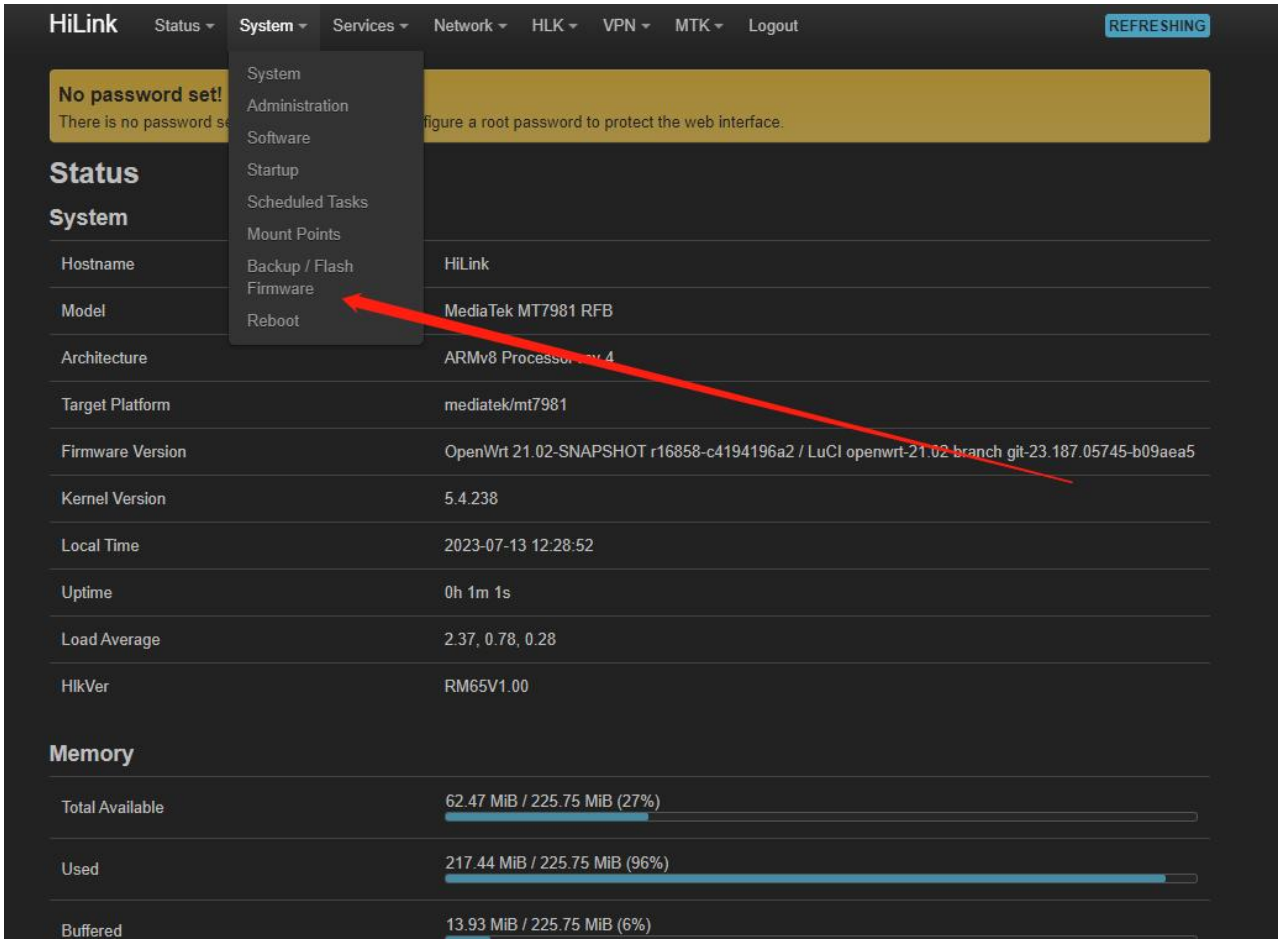

**Figure 4. Illustration of the test base plate**

# 8. Software upgrade instructions

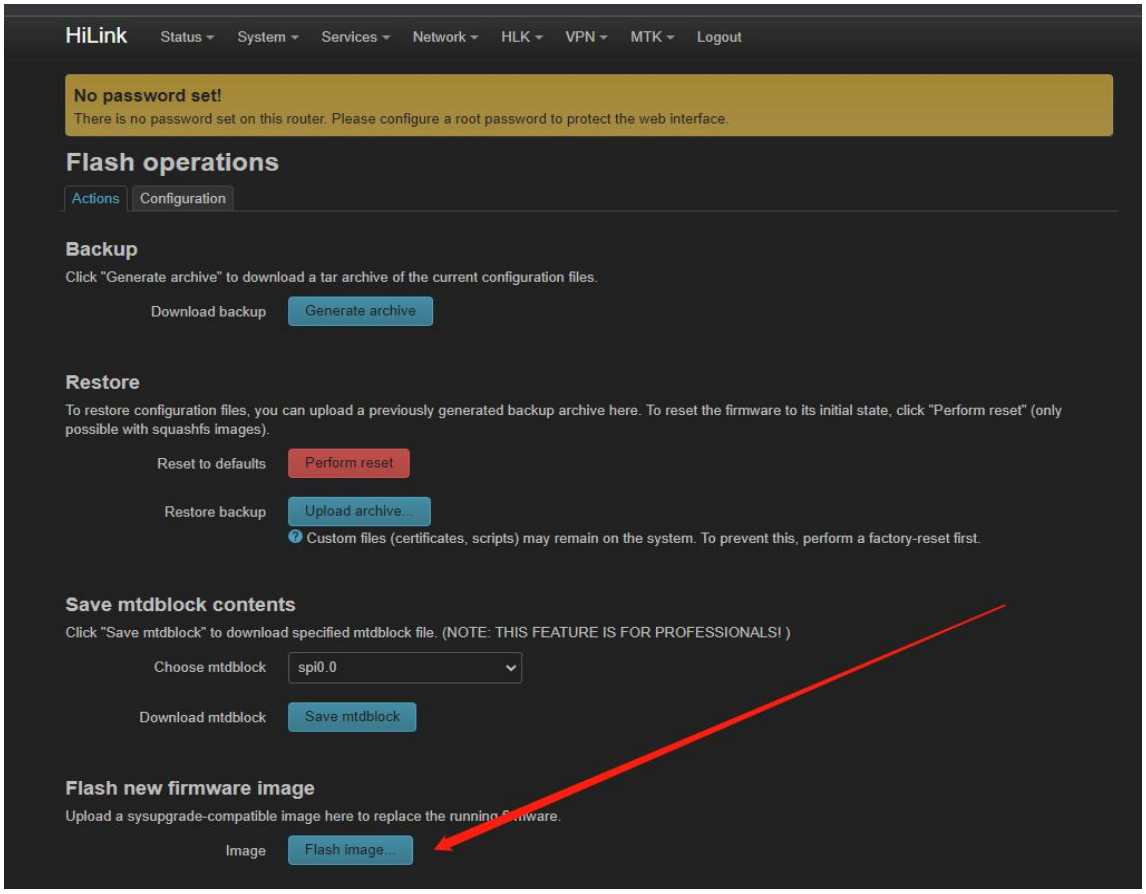
1、Module start LAN into the web page background 192.168.16.254;

2、Default user name is root and password is empty;

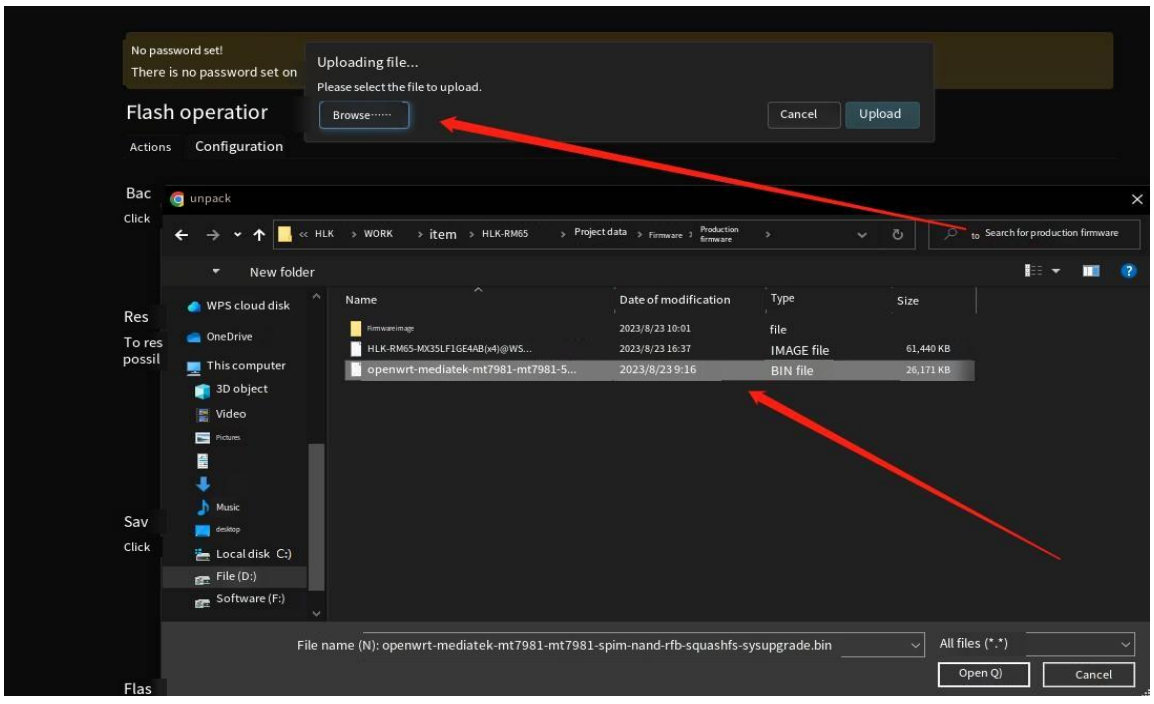
3、Click "System" and select "Backup and Upgrade";



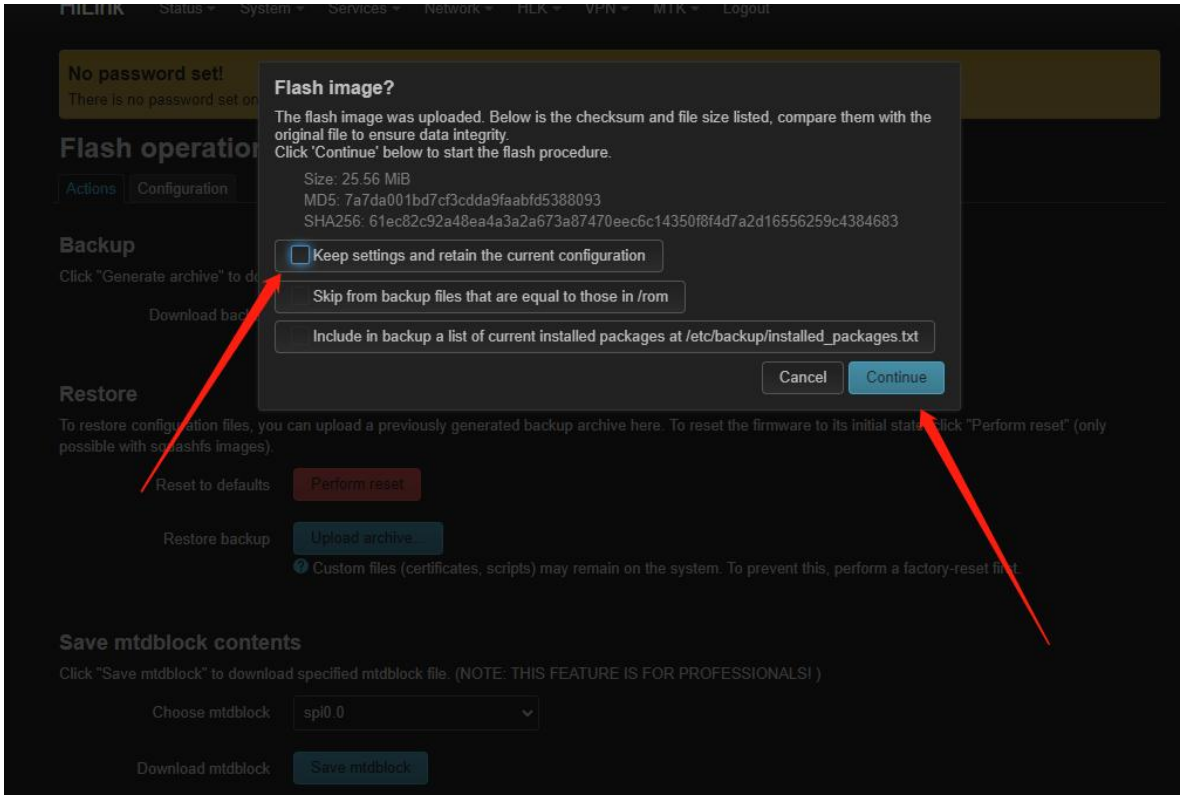
4、Select to brush the firmware;




5、Select the firmware that needs to be upgraded;

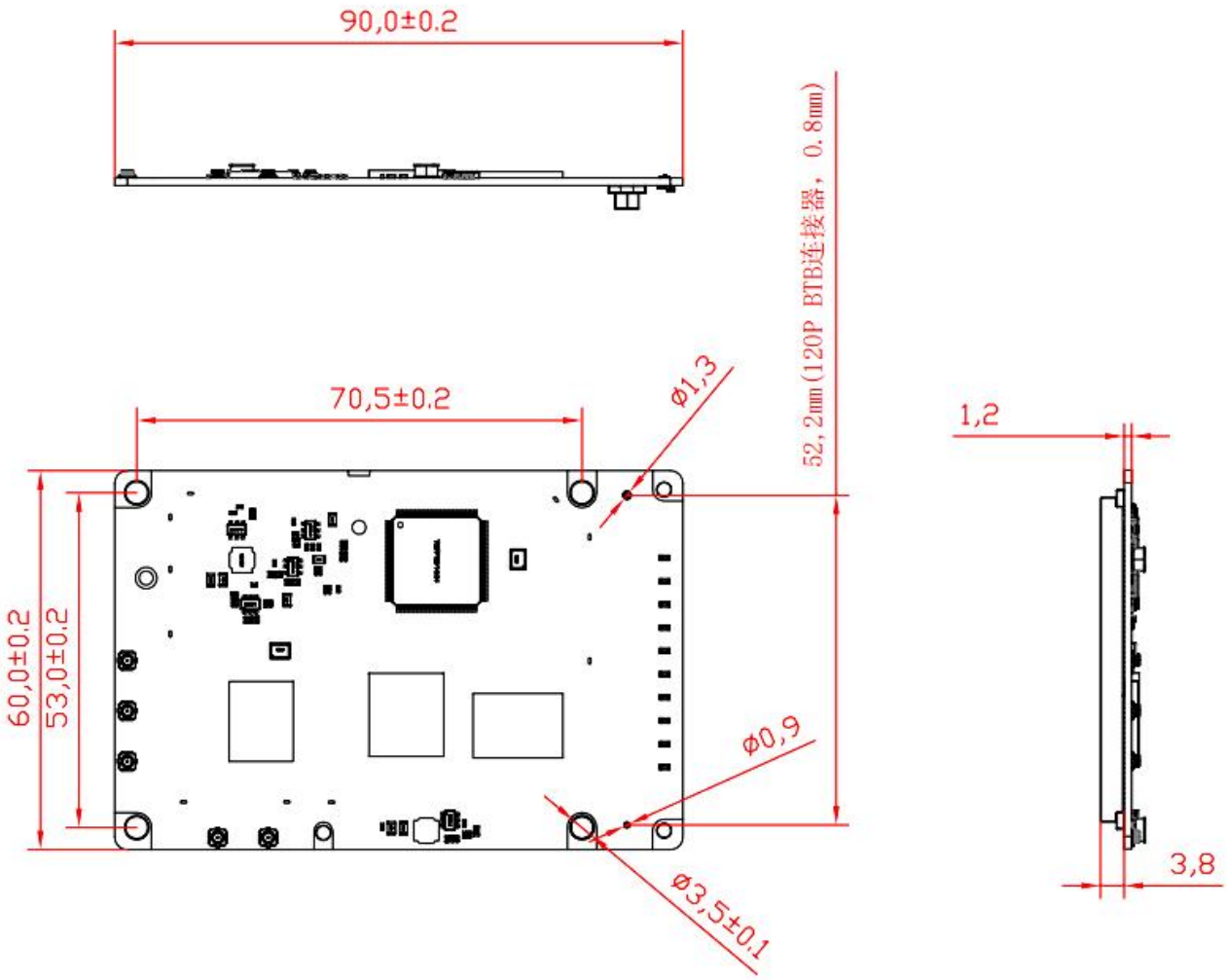


6、After uploading the firmware, cancel all the boxes, click upload, and wait for the module to reboot automatically after upgrading successfully.



## 9. Mechanical dimensions

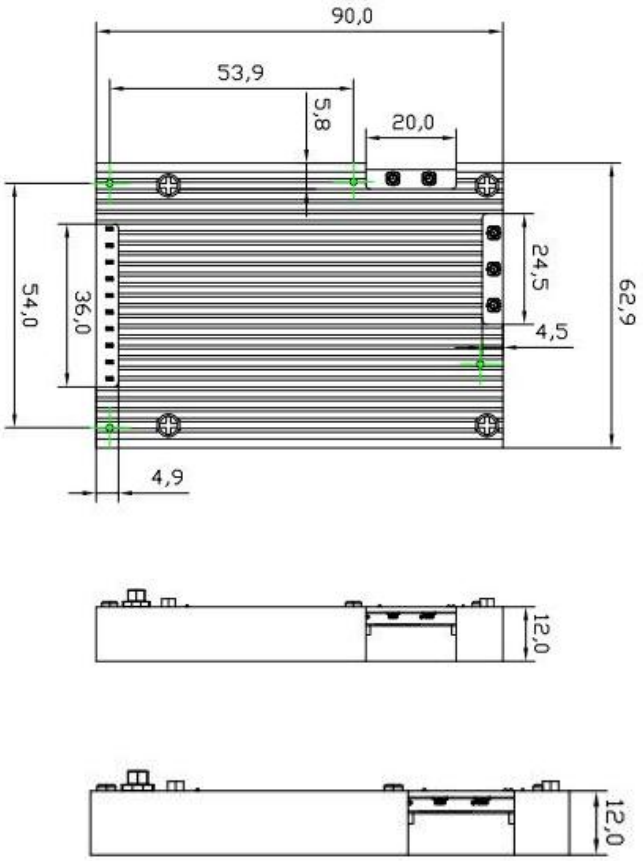
### Single Module Size

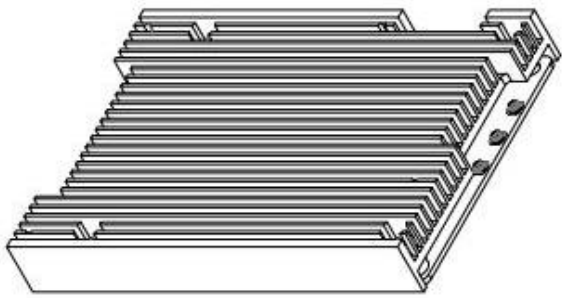



Unit: millimeters (mm)

**Figure 5. Module Size**

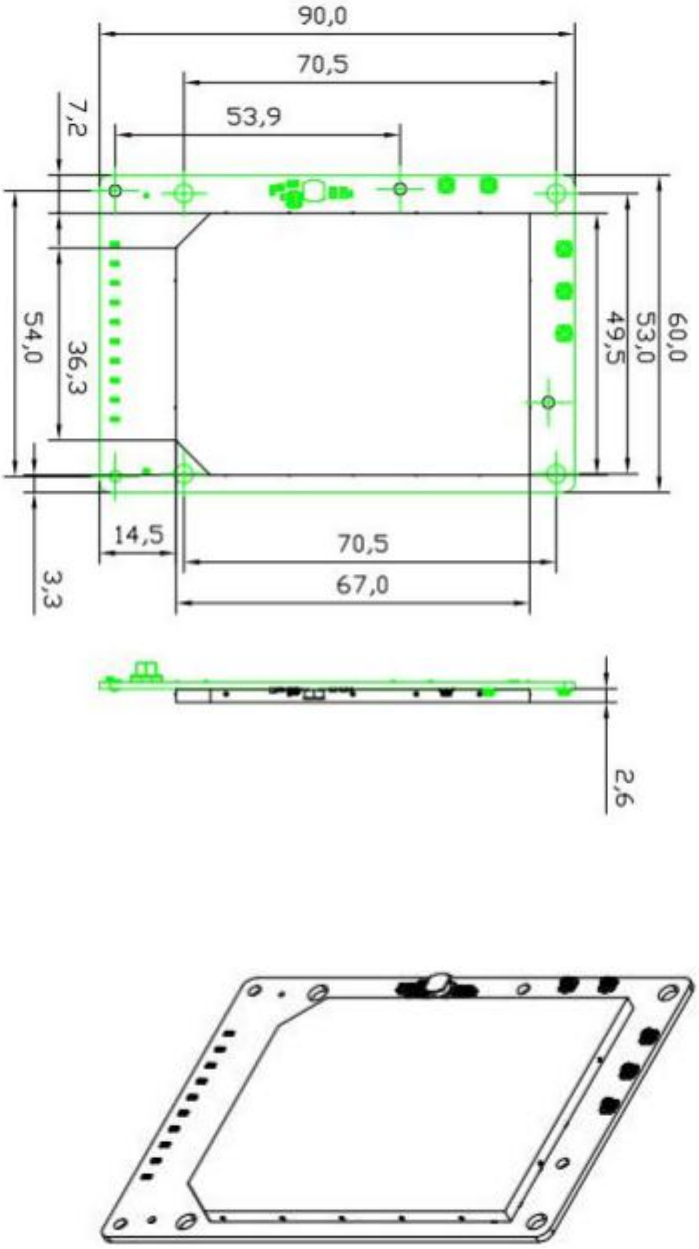
# Radiator shield separated size (default use)



Unit: millimeters (mm)

**Figure 6. Separated Radiator Dimensions**




Unit: millimeters (mm)

**Figure7. Separated Shield Dimensions**

## Shield Size

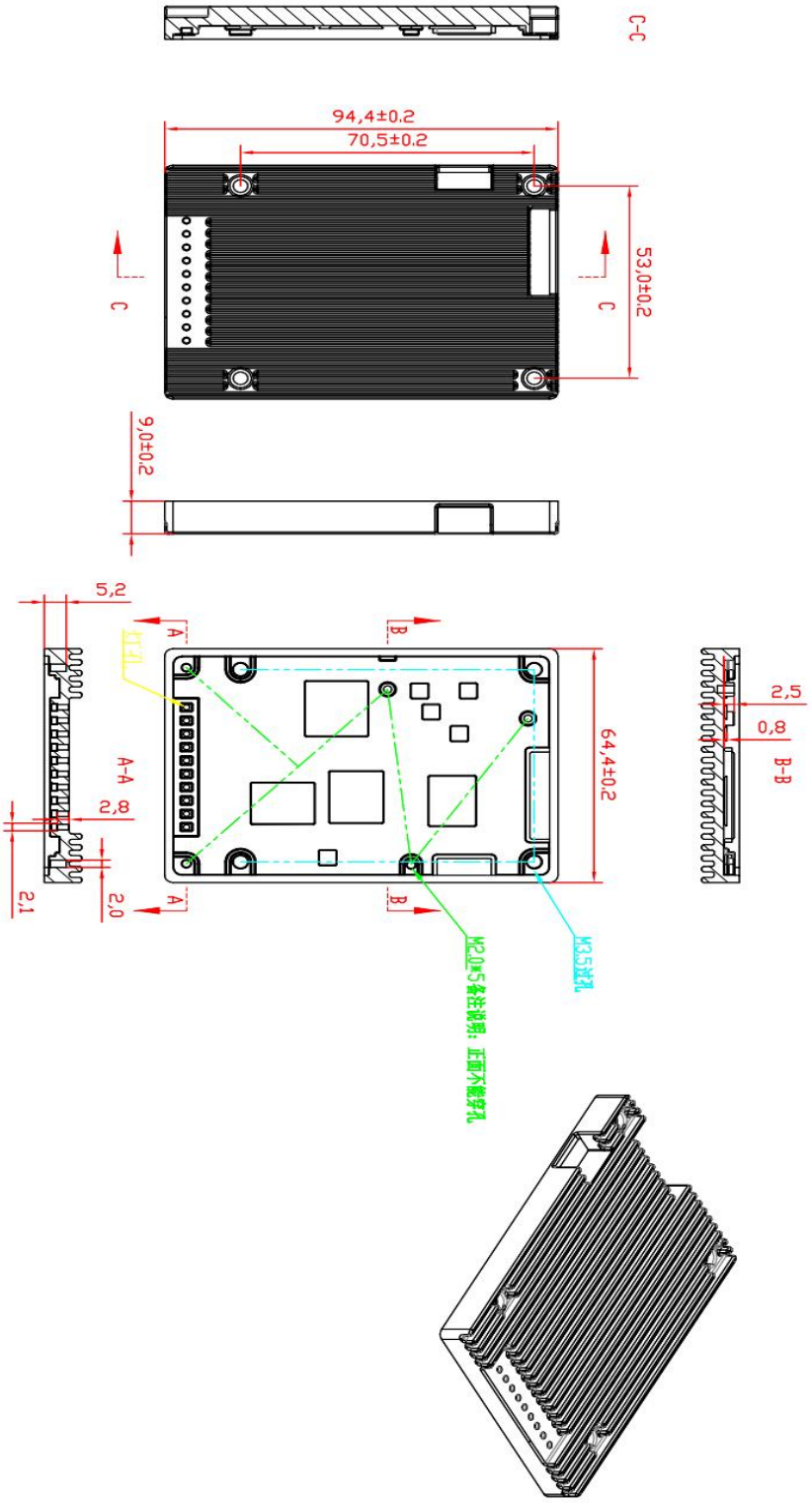
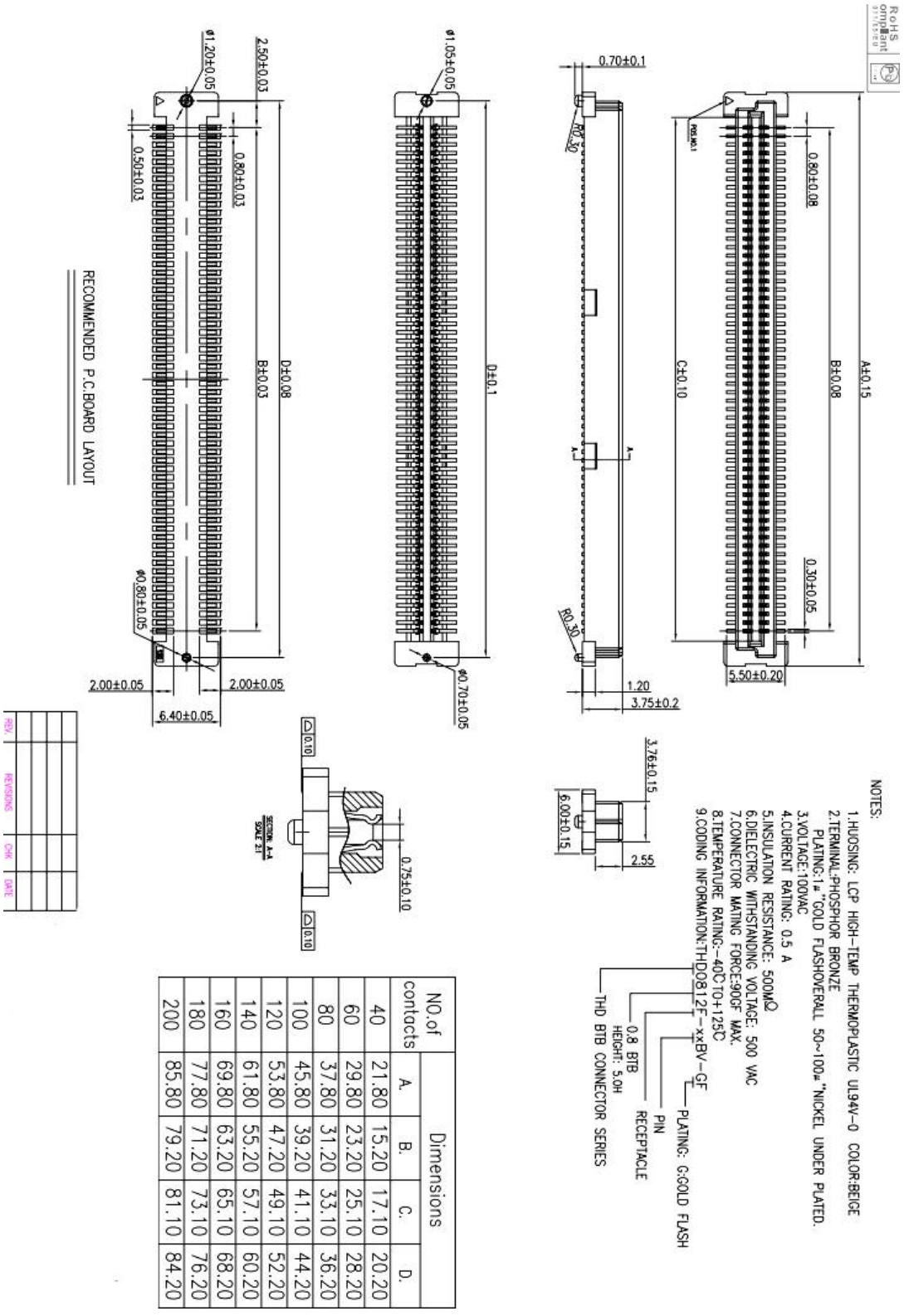



**Figure 8. Shield Cover Dimensions**

Unit: millimeters (mm)

BTB Connector (120P 0.8mm Female) Dimensions




| NO.of contacts | Dimensions | | | |
|---|---|---|---|---|
| | A. | B. | C. | D. |
| 40 | 21.80 | 15.20 | 17.10 | 20.20 |
| 60 | 29.80 | 23.20 | 25.10 | 28.20 |
| 80 | 37.80 | 31.20 | 33.10 | 36.20 |
| 100 | 45.80 | 39.20 | 41.10 | 44.20 |
| 120 | 53.80 | 47.20 | 49.10 | 52.20 |
| 140 | 61.80 | 55.20 | 57.10 | 60.20 |
| 160 | 69.80 | 63.20 | 65.10 | 68.20 |
| 180 | 77.80 | 71.20 | 73.10 | 76.20 |
| 200 | 85.80 | 79.20 | 81.10 | 84.20 |

**Figure 9. BTB Connector Specification**

Unit: millimeters (mm)

## Appendix A Document Revision Log

| Version Number | Scope of revision | Date |
|---|---|---|
| V1.0 | Initial version. | August 23, 2023 |
| V1.1 | Added specification of shielding heat dissipation dimensions. | September 21, 2023 |
| V1.2 | Modified the foot position description. | January 17, 2024 |
| | | |

KDB 996369 D03 statements

2.2 List of applicable FCC rules:

The module complies with FCC Part 15.247, FCC Part 15.407.

FCC ID: 2AD56HLK-RM65 on User manual and on the external of the packaging.

2.3 Summarize the specific operational use conditions

When installed in smart terminal products, the host manufacturer must negotiate with the module manufacturer on the final installation method in the system. The host manufacturer installing this module into their product must ensure that the final compost product complies with the FCC requirements by a technical assessment or evaluation to the FCC rules, including the transmitter operation. The host manufacturer has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module. The end user manual shall include all required regulatory information warning as show in this manual.

The module should be installed and operated with minimum distance 20cm between the radiator & your body. and if RF exposure statement or module layout is changed, then the host product manufacturer required to take responsibility of the module through a change in FCC ID or new application. The FCC ID of the module cannot be used on the final product. In these circumstances, the host manufacturer will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization. When the host is a portable device, it is necessary to take a SAR test with your set mounting this module. Class ll permissive change application is necessary using the SAR report. And an application for a Class ll permissive change from a Mobile equipment

to a Portable equipment is also required.

Note) Portable equipment: Equipment for which the spaces between human body and antenna are used within 20cm. Mobile equipment: Equipment used at position in which the spaces between human body and antenna exceeded 20cm.

1. According to the following requirements of the power supply DCV, power up, about seconds to complete the initial.
2. iPhone / Android mobile phone WiFi function to open, search to the corresponding Wireless network adapter name (name can be changed according to customer production requirements), click the name of the WiFi and select the connection.
3. open application software (need to install the company's specific application software development application software interface can be customized according to customer's product requirements).

2.4 Limited module procedures

The module is not a limited module.

2.5 Trace antenna designs

Not applicable

2.6 RF exposure considerations

The module complies with FCC radiation exposure limits set forth for an uncontrolled environment. The module should be installed and operated with minimum distance 20cmbetween the radiator & your body.

2.7 Antennas

This module has been approved to operate with the antenna types listed below, with the maximum permissible gain indicated. The module antenna requires professional installation, and the antenna type cannot be changed. The gain cannot exceed 4.69dBi.

| Frequency band | Antenna Type | Antenna Max. Gain |
|---|---|---|
| 2400-2500MHz | Dipole Antenna | 3.76 dBi |
| 5150-5850MHz | Dipole Antenna | 4.69 dBi |

2.8 Label and compliance information

The host system using this module, should have label in a visible area indicated the following texts: “Contains FCC ID: 2AD56HLK-RM65

2.9 Information on test modes and additional testing requirements

When testing host product, the host manufacture should follow FCC KDB Publication 996369 D04 Module Integration Guide for testing the host products. The host manufacturer may operate their product during the measurements. In setting up the configurations, if the pairing and call box options for testing does not work, then the host product manufacturer should coordinate with the module manufacturer for access to test mode software.

The module has been certified for Potable applications. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter

2.10 Additional testing, Part 15 Subpart B disclaimer

The module without unintentional-radiator digital circuity, so the module does not require an evaluation by FCC Part 15 Subpart B. The host should be evaluated by the FCC Subpart B.

2.11 Note EMI Considerations

host manufacture is recommended to use D04 Module Integration Guide recommending as "best practice" RF design engineering testing and evaluation in case non-linear interactions generate additional non-compliant limits due to module placement to host components or properties

2.12 How to make changes

This module is stand-alone modular. If the end product will involve the Multiple simultaneously transmitting condition or different operational conditions for a stand-alone modular transmitter in a host, host manufacturer have to consult with module manufacturer for the installation method in end system. According to the KDB 996369 D02 Q&A Q12, that a host manufacture only needs to do an evaluation (i.e., no C2PC required when no emission exceeds the limit of any individual device (including unintentional radiators) as a composite. The host manufacturer must fix any failure.

For USA: The frequency stability of all transmission frequencies of U-NII-1,U-NII 2A, U-NII 2C and U-NII-3 meets the requirements of 47 CFR FCC Part15.407(g), and the manufacturer declares that their transmission is maintained at Band U-NII-1, U-NII 2A, U-NII 2C and U-NII-3.