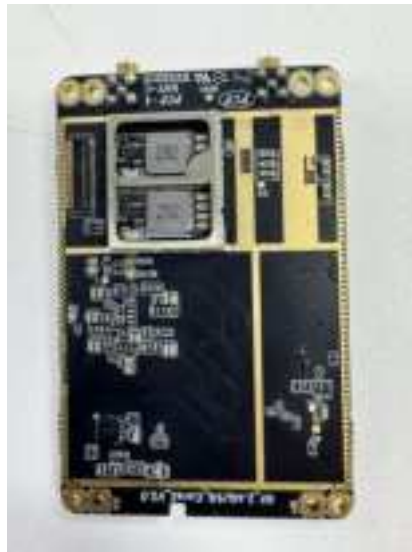


UniRC 7 Pro RF Module product manual



1 Product Introduction

1.1 overview

Using 2.4 band and 5.8G band communication, while using high-power design, the use of dual transmission scheme to ensure the stability of the graph transmission link.

1.2 Basic specification

| sort | specification | Detailed description |
|-------------|--|--|
| hardware | Power | Typical power supply 12V/2A; Support wide voltage 5~16V power input |
| | Configure serial port | UART0, TTL 3.3V, can issue AT command |
| | Communication serial port | COMUART, TTL 3.3V, data transmission |
| | Antenna interface | 2.4Ghz and 5.8Ghz pair of antenna ports; |
| function | Automatic frequency hopping | Support automatic frequency hopping:: 1) Automatically select less interference channel to work, frequency hopping switching screen smooth; 2) Support custom frequency hopping bandwidth range, support custom frequency lock work; 3) Custom transmit power configuration is supported; |
| | Serial port data transmission | Serial port transmission priority is higher than network port priority. |
| | Networking mode | supports star networking, and the maximum support is 32 nodes. |
| | The AT instruction is transmitted through the network port | 1) Support webui transmission mode; 2) Support AT instruction transmission through socket mode. |
| | Upgrade features | Support OTA upgrade |
| Performance | Limit distance | 1) 10KM |
| | reliability | 2) open circuit protection design; 3) With over-temperature protection function, to ensure that the device temperature is too high can enter the protection state, not damaged; |

2.2.2 Connector interface PIN definition

| | | | | |
|----|------------|--------|-----|----------------|
| 1 | DP | USB2.0 | I/O | USB2.0 signal |
| 2 | DM | USB2.0 | I/O | USB2.0 signal |
| 3 | COMUART-RX | 3.3V | I | COMUART signal |
| 4 | COMUART-TX | 3.3V | O | COMUART signal |
| 5 | UART0_RX | 3.3V | I | UART0_RX |
| 6 | UART0_TX | 3.3V | O | UART0_TX |
| 7 | GND | GND | | GND |
| 8 | 12V | 12V | O | 2A |
| 9 | UART1_RX | 3.3V | I | UART1_RX |
| 10 | UART1_TX | 3.3V | O | UART1_TX |
| 11 | KP-BOOT | 2.85V | I | DOWNLOAD START |
| 12 | VBUS-V | 5V | IO | USB POWER |

RX0/TX0: Configure the serial port for transmitting AT instructions

RX1/TX1: Data pass-through, system log, used to print system startup information

USB: Debug configuration interface

3 Electrical characteristics and reliability

3.1 Electrical Characteristics

| Pin | parameters | Typical value |
|------|-----------------|---------------|
| VBAT | V _{in} | 12V |
| | I _{in} | 2A |

3.2 Temperature characteristic

Storage temperature: -40~+85°C

Working environment temperature: 20~+60°C

Working environment humidity: 5%~95%

3.3 ESD protection characteristics

contact: ±6kV (GND)

Air: ±8kV

4 RF Characteristics

| Operating frequency band | Max transmit power (tolerance $\pm 2\text{db}$) | bandwidth | modulation |
|--------------------------|---|-----------|------------|
| 2400~2483.5Mhz | 25dBm | 10MHz | QPSK |
| 5725-5850Mhz | 19dBm | 10MHz | QPSK |

Index of sensitivity

| | | |
|-----------------------------|-------------------------|----------------------|
| Sensitivity (access) | 2.4Ghz band (2441.5Mhz) | 10MHz -103dBm |
| sensitivity (BLER < =3%) | 2.4Ghz band (2441.5Mhz) | 10MHz -91dBm(10Mbps) |
| Sensitivity (access) | 5.8Ghz band (5750Mhz) | 10MHz -103dBm |
| sensitivity (BLER < =3%) | 5.8Ghz band (5750Mhz) | 10MHz -91dBm(10Mbps) |

The Module is designed to comply with the FCC statement. FCC ID is 2BN81UNIRC7PRORFMD. The host system using Module, should have label indicated it contain modular's FCC ID: 2BN81UNIRC7PRORFMD. This radio module must not installed to collocate and operating simultaneously with other radios in host system additional testing and equipment authorization may be required to operating simultaneously with other radio. The Module and its antenna must not be co-located or operating in conjunction with any other transmitter or antenna within a host device.

The modular must be installed in the host that assign by Company name: Siyi Technology (Shenzhen) Co.,Ltd., Model no.: UniRC 7 Pro RF Module if other host types used would need further evaluation and possible C2PC if they are not significantly similar to the one tested The WIFI Module is designed for a compact PCB design. It should be installed and operated with host or other minimum distance of 20 centimeters between the radiator and your body." To comply with FCC regulations limiting both maximum RF output power and human exposure to RF radiation, the maximum antenna gain including cable loss in a mobile-only exposure condition must not exceed 4.07 dBi in the 2.4G band, 4.91 dBi in the 5.8G band and 6.98 dBi in the 5.8G band. The module uses Omnidirectional Antenna, Directional Antenna(Rod-shaped) and Directional Antenna(Double-layer board), these antennas are sold with the module.

Notice to OEM integrator

The end user manual shall include all required regulatory information/warning as show in this manual. The OEM integrator is responsible for testing their end-product for any additional compliance requirements required with this module installed. If the final product contains circuits of other FCC PART 15 Subparts, the final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed The intended use is generally not for the general public. It is generally for industry/commercial use. The connector is within the transmitter enclosure and can only be accessed by disassembly of the transmitter that is not normally required, the user has no access to the connector. Installation must be controlled. Installation requires special training.

This device complies with Part 15 of the FCC Rules.

This equipment should be installed and operated with a minimum distance of 20 cm between the radiator and your body.

2.4G:

Antenna type: Omnidirectional Antenna

The max antenna gain (in dBi):

Antenna 1: 4.07 dBi

Antenna 2: 4.07 dBi

5.8G:

Antenna type: Directional Antenna(Rod-shaped):

The max antenna gain (in dBi):

Antenna 1: 4.91 dBi

Antenna 2: 4.91 dBi

Antenna type: Directional Antenna(Double-layer board):

The max antenna gain (in dBi):

Antenna 1: 6.98 dBi

Antenna 2: 6.98 dBi

2.2

This module has been assessed against the following FCC rule parts: CFR 47 FCC Part 15 C (15.247. DTS) and CFR 47 FCC Part 15 E (NII). It is applicable to the modular transmitter

2.3

This radio transmitter UniRC 7 Pro RF Module has been approved by Federal Communications Commission to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

The concrete contents to check are the following three points.

1)Maximum antenna gains are shown in item 2.7 below.

2)Should be installed so that the end user cannot modify the antenna

3)Feed line should be designed in 50ohm

Fine-tuning of return loss etc. can be performed using a matching network.

The antenna shall not be accessible for modification or change by the end user.

2.4

The module complies with FCC Part 15.247 / Part 15.407 and apply for Single module approval.

2.5

Trace antenna designs: applicable.

Any deviation(s) from the defined parameters of the antenna trace, as described by the instructions, require that the host product manufacturer must notify the module grantee that they wish to change the antenna trace design. in this case, a Class II permissive change application is required to be filed by the grantee, or the host manufacturer can take responsibility through the change in FCC ID (new application) procedure followed by a Class II permissive change application.

The device must be professionally installed.

The intended use is generally not for the general public.

It is generally for industry/commercial use.

The connector is within the transmitter enclosure and can only be accessed by disassembly of the transmitter that is not normally required.

The user has no access to the connector.

Installation must be controlled.

installation requires special training.

2.6

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator & your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

2.7

The following antennas have been certified for use with this module.

Only antennas of the same type with equal or lower gain may also be used with this module.

Other types of antennas and/or higher gain antennas may require the additional authorization for operation. The installer should use unique antenna connector and Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device. The manufacturer of module will inform installer to meet with the FCC part 15.203 in the warning part.

Antenna Specification list below:

2.8

Please notice that if the FCC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as "Contains FCC ID: 2BN8IUNIRC7PRORFMD"; any similar wording that expresses the same meaning may be used.

2.4G Customize

| Antenna | Frequency(MHz) | Antenna Type | MAX Antenna Gain (dBi) |
|---------|--------------------------|-------------------------|------------------------|
| 1 | 2406.5 MHz to 2476.5 MHz | Omnidirectional Antenna | 4.07 |
| 2 | 2406.5 MHz to 2476.5 MHz | Omnidirectional Antenna | 4.07 |

5.8G Customize

| Antenna | Frequency(MHz) | Antenna Type | MAX Antenna Gain (dBi) |
|---------|--------------------------|---|------------------------|
| 1 | 5734.5 MHz to 5839.5 MHz | Directional Antenna(Rod-shaped) | 4.91 |
| 2 | 5734.5 MHz to 5839.5 MHz | Directional Antenna(Rod-shaped) | 4.91 |
| 3 | 5734.5 MHz to 5839.5 MHz | Directional Antenna(Double-layer board) | 6.98 |
| 4 | 5734.5 MHz to 5839.5 MHz | Directional Antenna(Double-layer board) | 6.98 |

2.9

Testing of the host product with all the transmitters installed - referred to as the composite investigation test- is recommended, to verify that the host product meets all the applicable FCC rules. The radio spectrum is to be investigated with all the transmitters in the final host product functioning to determine that no emissions exceed the highest limit permitted for any one individual transmitter as required by Section 2.947(f). The host manufacturer is responsible to ensure that when their product operates as intended it does not have any emissions present that are out of compliance that were not present when the transmitters were tested individually. If the modular transmitter has been fully tested by the module grantee on the required number of channels, modulation types, and modes, it should not be necessary for the host installer to

re-test all the available transmitter modes or settings. It is recommended that the host product manufacturer, installing the modular transmitter, perform some investigative measurements to confirm that the resulting composite system does not exceed the spurious emissions limits or band edge limits (e.g., where a different antenna may be causing additional emissions). The testing should check for emissions that may occur due to the intermixing of emissions with the other transmitters, digital circuitry, or due to physical properties of the host product (enclosure). This investigation is especially important when integrating multiple modular transmitters where the certification is based on testing each of them in a stand-alone configuration.

2.10

Any company of the host device which install this modular should perform the test of radiated & conducted emission and spurious emission etc. according to FCC Part 15C: 15.247 and 15.209 & 15.207, part 15 E 15.407 class B requirement, only if the test result comply with FCC part 15C: 15.247 and 15.209 & 15.207 part 15 E 15.407, 15B class B requirement. Then the host can be sold legally.

The host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification, If the grantee markets their product as being Part 15 Subpart B compliant (when it also contains unintentional-radiator digital circuitry), then the grantee shall provide a notice stating that the final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.