RHF2S024

Home LoRaWAN Gateway
Specifications

V0.4

Document information

Info	Content
Keywords	*RisingHF, LoRaWAN, IOT, Gateway, specifications*
Abstract	This document describes the specifications of the Home RHF2S024

1.   Preface

This document describes the technical specifications and features of the home gateway RHF2S024. RHF2S024 is an 8 channels Smart Home Gateway device designed by Friendcom, which is compatible with LoRaWAN protocol and WiFi IEEE 802.11b/g/n.It can also be used as a WiFi router.

2.   RHF2S024 LoRaWAN Gateway description

RHF2S024 is an IOT gateway based on LoRaWAN and target to LPWAN network. The GW could support LoRaWAN Class A/C protocol and WiFi IEEE 802.11.b/g/n standard. The 2.4G wireless transmission rate up to 150Mbps. Users could connect the GW to Cloud server via WiFi.

This device integrate an high performance CPU MT7688, one pcs of base-band processor SX1301, that it could support 8 multi-SF channel (SF12 to SF7), 1 single-SF channel and 1 GFSK channel. Output power could achieve to 13dBm max. Sensitivity is as low as -142dBm@300bps. With specified payload length and transmit period, one GW could support 10k nodes.

RHF2S024 is a smart, easy installation and high reliability device. Customers could setup a quick LoRaWAN network for their LPWAN application with RHF2S024.

2.1. Functional Block
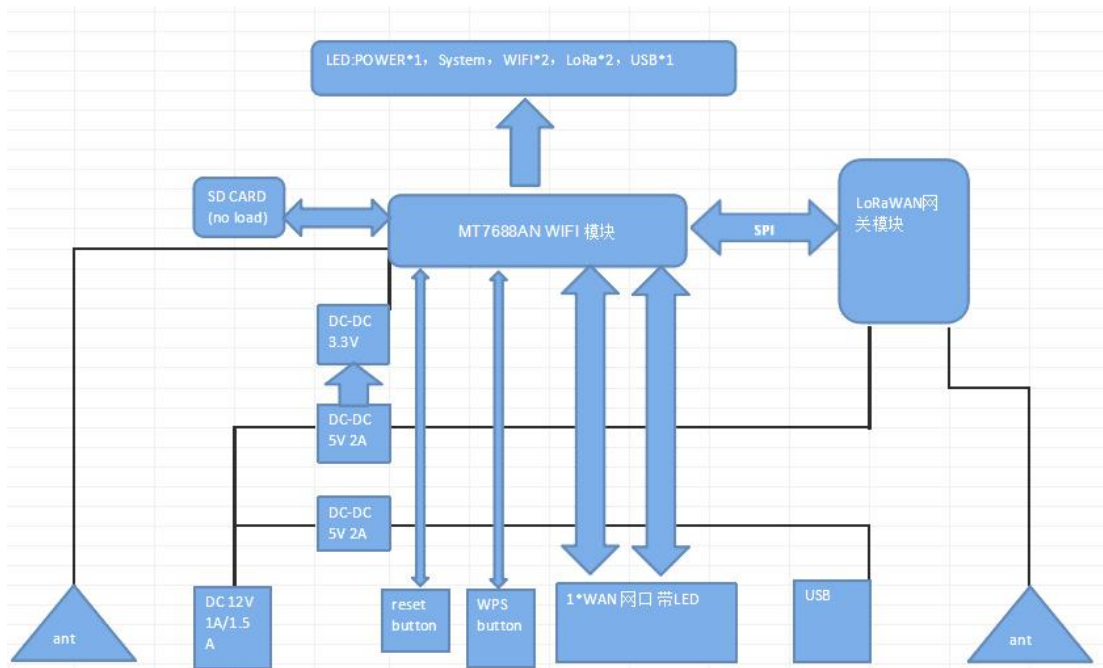
RHF2S024 functional block is shown below.

Figure 2- 1 RHF2S024 functional block

2.2. Product features and application

Features：

✓ LoRaWAN half-duplex operation mode;
✓ Include 8 multi-SF LoRa channel, 1 single-SF LoRa channel, and 1 GFSK channel;
✓ Output power achieve to 3dBm max，receiver sensitivity as low as -142dBm@300bps;
✓ Support LoRaWAN ClassA/C mode;
✓ Support 802.11 b/g/n;
✓ Support 10base-T and 100base-TX;
✓ Support 100m Ethernet cable;

Application：

✓ M2M，IOT and LPWAN
✓ Wireless sensor network
✓ AMR

✓ Industry 4.0，Industrial monitor
✓ Wireless remote control and monitor
✓ Smart Home, Smart building, Smart community and Smart city;
✓ Wireless alarm and security
✓ environment monitor

2.3. Specifications

Table 2- 1 RHF2S024 Specifications

Item Group	Item	Description
System Configuration	Core	MIPS24KEc
	Basic Frequency	580MHZ
	RAM	1G-bit
	Flash	256M-bit
Communication	10M/100Mbps Interface	Access internet via cable
	2.412-2.462G WIFI	Wireless access
	LoRa 915MHz	

Wireless coverage	WIFI	60M(Open Space)
	LoRa	3km(city environment)
Electrical Specification	Power supply input	DC 12V
	Average Power Consumption	<5W
	2.4G WIFI Output Power	11n HT20: 15±2dBm　　11n HT40: 16±2dBm 11g: 15±2dBm 11b: 13±2dBm
	2.4G WIFI Sensitivity	11n HT20 MCS7 150Mbps: -68dBm@10%PER 11g 54Mbps: -68dBm@10%PER 11b 11Mbps: -85dBm@8%PER
	LoRa Output Power	2±1dBm
	LoRa Sensitivity	-142dBm@SF12,BW=125kHz
LED	POWER LED	Power access indication
	SYSTEM LED	System status indication
	WIFI LED	WIFI link status indication
	LoRa LED	LoRa link status indication
	USB LED	USB link status indication

	RJ45 LED	RJ45 link status indication
External Interface	RJ45	WAN/LAN Automatic switching between different modes
	USB2.0	Local firmware upgrade and data download
	WIFI antenna	5dBi External antenna
	LoRa antenna	0dBi External antenna
	Power interface	12V/1.5A Power supply input
Dimensions Installation	Dimensions	166*105*28.4mm
	Weight	223.2g
	Installation	On the desktop or Fixed on the wall
Operating Range	Operational temperature range	−20 to +50℃
	Storage temperature range	−40 to +85℃

3. Global electrical specifications and reliability

3.1. Electrical specifications

3.1.1. Power Supply

RHF2S024 is equipped with 12V / 1.5 A 5 energy efficiency power adapter, input voltage range of 100 ~ 240Vac; 50/60Hz, output voltage range 11.4 ~ 12.6 V.

3.1.2. Consumption

Table 3-1 RHF2S024 Total Consumption

Item	Value typ/W
Standby	2.4W
Average	4.1W
MAX	5W

3.1.3. Rf Specifications（LoRaWAN）

Conducted Receiver sensitivity and Transmitter output power would be used to evaluate the performance here.

1）Sensitivity

Test condition：32byte payload，PER=10%， +25℃.

Table 3-2 Conducted Receiver sensitivity

Part Number	Bandwidth/kHz	Spreading Factor	Sensitivity/dBm
RHF2S024	125	12	-140
		7	-125
	250	12	-136
		7	-122

2）Output power

Test condition：CW signal，+25℃.

Table 3-3 Output power

Part Number	Parameter	Min	Typ	Max	Unit
RHF2S024	Frequency Range（Tx）	902.5		927.5	MHz
	Frequency Range（Rx）	902.5		927.5	MHz
	Max Output power		2		dBm

3.1.4. Antenna performance

The gateway is equipped with an high efficient omnidirectional antenna.

Resistance   50 Ω

VSWR<3.0@470-510MHZ
VSWR<2.0@868-915MHZ
VSWR<1.8@2.4-2.5GHZ

Gain   0dBi@470-510MHZ
          0dBi@868-915MHZ
          5dBi@2.4-2.5GHZ

Efficiency 470-510MHZ:>35%
           868-915MHZ>60%
           2.4-2.5GHZ:>60%

3.2. Reliability

Environment test

Table 3- 7 Environment test requirement

Item	Test condition	standard	results
Low temperature operation	Temperature: − 20°C Operation mode: working with service connected Test duration: 12 h	JESD22−A1 GB/T 2423	Appearance ok; LoRaWAN RF Performance ok; Function ok;
High temperature operation	Temperature: +50°C Operation mode: working with service connected Test duration: 12 h	JESD22−A1 GB/T 2423	Appearance ok; LoRaWAN RF Performance ok; Function ok;
Low temperature Storage	Temperature: − 40°C Operation mode: no power, no package Test duration: 24 h	JESD22−A1 GB/T 2423	Appearance ok; LoRaWAN RF Performance ok; Function ok;
High temperature Storage	Temperature: +85°C Operation mode: no power, no package Test duration: 24 h	JESD22−A1 GB/T 2423	Appearance ok; LoRaWAN RF Performance ok; Function ok;

4. Mechanical size and package information
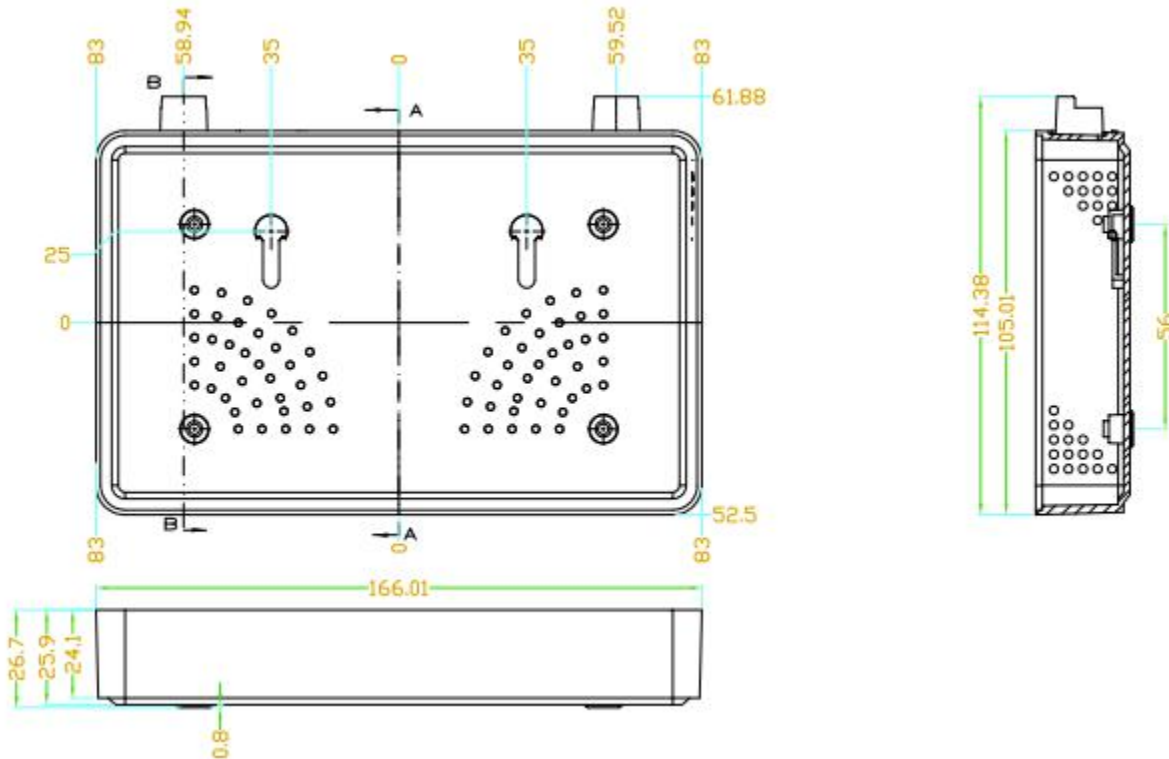
4.1. Mechanical size

Figure 4-1 RHF2S024 Mechanical size

4.2. package information

4.2.1. Package list

Table 4-1 package list

Material	PN	Qty
RHF2S024	RHF2S024-xxx	1
Adapter	12/1.5A	1

4.3. Order information

RHF2S024 include several part number, different part number would be used in different band and area, please contact with sales@risinghf.com for detailed information.

Table 4- 2 order information

PN	descriptions
RHF2S024	902.5-927.5MHz

FCC Warning

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any inte rference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interferenceto radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the
interference by one or more of the following measures:
- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator and your body.

Modifications

V0.4 2017-08-25

     + Add Package information

V0.3 2017-08-07

     + Add EU868/IN865/US915/AU915/AS923 Specification parameters and ordering information

     + Update with some error modifications

V0.2 2017-08-04

     + Add Power consumption parameters

V0.1 2017-06-20

     + Create draft.

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