

## DS01825

### LoRaWAN IOT Industrial GW RHF2S025 Specifications

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V0.2



#### Document information

Info	Content
<b>Keywords</b>	<i>RisingHF, LoRaWAN, IOT, Gateway, specifications</i>
<b>Abstract</b>	This document describes the specifications of the Industrial GW RHF2S025.

## Catalog

Catalog.....	2
Figures.....	3
Tables.....	4
1. Preface.....	1
2. RHF2S025 LoRaWAN Gateway description.....	1
2.1. Functional Block.....	1
2.2. Product features and application.....	2
2.3. Specifications.....	2
3. Global electrical specifications and reliability.....	4
3.1. Electrical specifications.....	4
3.1.1. Power Supply.....	4
3.1.2. Consumption.....	4
3.1.3. Rf Specifications (LoRaWAN) .....	4
3.1.4. Antenna performance.....	5
3.1.5. LoRa Power Table.....	6
3.2. Reliability.....	7
3.2.1. EMC and ESD.....	8
4. Mechanical size and package information.....	9
4.1. Mechanical size.....	9
4.2. package information.....	9
4.2.1. Package list.....	9
4.2.2. Package information.....	10
4.3. Order information.....	10
Modifications.....	12

## Figures

Figure 2-1 RHF2S025 functional block.....	1
Figure 4-1 RHF2S025 Mechanical size.....	9
Figure 4-2 RHF2S025 package.....	10
Figure 4-3 package inside.....	10

## Tables

Table 2-1 RHF2S025 Specifications.....	2
Table 3-1 RHF2S025 Total Consumption.....	4
Table 3-2 Conducted Receiver sensitivity.....	4
Table 3-3 Output power.....	5
Table 3-4 Antenna performance.....	6
Table 3-5 CN470 power table.....	6
Table 3-6 EU868/IN865 power table.....	6
Table 3-7 US915/AU915/AS923 power table.....	7
Table 3-8 Environment test requirement.....	7
Table 3-9 Reliability test requirement.....	8
Table 4-1 package list.....	9
Table 4-2 order information.....	10

# 1. Preface

This document describes the technical specifications and features of the industrial gateway RHF2S025.

RHF2S025 LoRaWAN GW is an 8 channels Smart Industrial Gateway device designed by RisingHF, which is compatible with LoRaWAN protocol and WiFi IEEE 802.11b/g/n. It can also be used as a WiFi router.

# 2. RHF2S025 LoRaWAN Gateway description

RHF2S025 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 SX1308, that it could support 8 multi-SF channel (SF12 to SF7), 1 single-SF channel and 1 GFSK channel. Output power could achieve to 25dBm max. Sensitivity is as low as -142dBm@300bps. With specified payload length and transmit period, one GW could support 10k nodes.

RHF2S025 is a smart, easy installation and high reliability device. Customers could setup a quick LoRaWAN network for their LPWAN application with RHF2S025.

## 2.1. Functional Block

RHF2S025 LoRaWAN GW functional block is shown below.

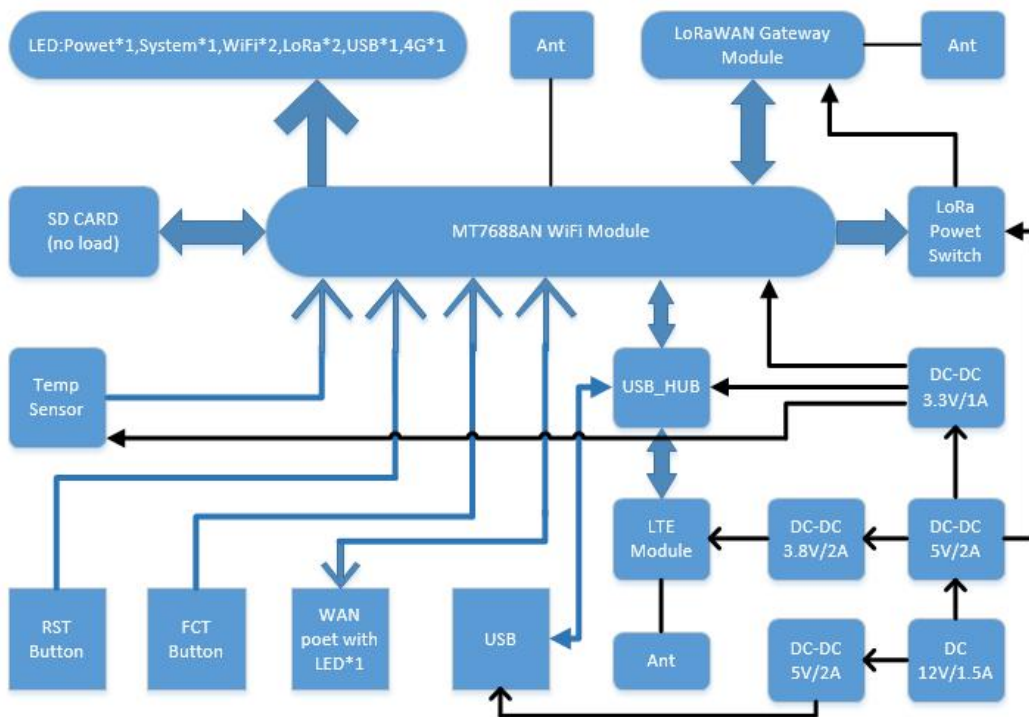


Figure 2-1 RHF2S025 functional block

## 2.2. Product features and application

**Features:**

- ✓ LoRaWAN half-duplex/full-duplex operation mode;
- ✓ Include 8 multi-SF LoRa channels, 1 single-SF LoRa channel, and 1 GFSK channel;
- ✓ Output power achieve to 25dBm 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;
- ✓ Support LTE 4G(optional);
- ✓ 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

**Application:**

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

## 2.3. Specifications

**Table 2- 1 RHF2S025 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
	LTE 4G Interface(optional)	Access internet via Wireless

	2.4-2.4835G WIFI	Wireless access
	470-510MHZ LoRa 868MHz 902-928MHz	
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: 16dBm 11g: 16dBm 11b: 19dBm
	2.4G WIFI Sensitivity	11n HT20 MCS7 150Mbps: -68dBm@10%PER 11g 54Mbps: -68dBm@10%PER 11b 11Mbps: -85dBm@8%PER
	LoRa Output Power	Max: 25dBm
	LoRa Sensitivity	-142dBm@SF12, BW=125kHz
LED	LTE 4G LED(optional)	LTE 4G Module status indication
	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
	LTE 4G antenna(optional)	4dBi External antenna
	SIM card interface(optional)	Support standard SIM card big card (25mm*15mm*0.8mm)
	Power interface	12V/1.5A Power supply input
Dimensions Installation	Dimensions	155*138.5*33.5mm
	Weight	500g
	Installation	On the desktop or Fixed on the wall
Operating Range	Operational temperature range	-20 to +65℃



	Storage temperature range	-40 to +85°C
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### 3. Global electrical specifications and reliability

#### 3.1. Electrical specifications

##### 3.1.1. Power Supply

RHF2S025 is equipped with 12V / 1.5 A 5 energy efficiency power adapter, input voltage range of 90 ~ 264Vac; 50 ~ 60HZ, output voltage range 11.4 ~ 12.6 V.

##### 3.1.2. Consumption

**Table 3-1 RHF2S025 Total Consumption**

Item	Value typ/W
Standby	1.9W
Average	4.3W
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°C.

**Table 3-2 Conducted Receiver sensitivity**

Part Number	Bandwidth/kHz	Spreading Factor	Sensitivity/dBm
RHF2S025-470	125	12	-140
		7	-125
	250	12	-136
		7	-122
	500	12	-133
		7	-119
RHF2S025-868	125	12	-139
		7	-125
	250	12	-136
		7	-122
	500	12	-133
		7	-119
RHF2S025-915	125	12	-139

		7	-125
	250	12	-136
		7	-122
	500	12	-133
		7	-119

### 2) Output power

Test condition: CW signal, +25°C.

**Table 3-3 Output power**

Part Number	Parameter	Min	Typ	Max	Unit
<b>RHF2S025-470</b>	Frequency Range (Tx)	470		510	MHz
	Frequency Range (Rx)	470		490	MHz
	Max Output power		25		dBm
	Output Power Variation	-1.5		1.5	dB
	TX Power Variation Temperature (-40 to 65°C)	-1		1	dB
	TX Frequency Variation Temperature (-40 to 65°C)	-3		3	ppm
	TX Frequency Variation Temperature (-40 to 65°C)	-3		3	ppm
<b>RHF2S025-868</b>	Frequency Range (Rx/Tx)	859		871	MHz
	Max Output power		25		dBm
	Output Power Variation	-1.5		1.5	dB
	TX Power Variation Temperature (-40 to 65°C)	-1.5		1.5	dB
	TX Frequency Variation Temperature (-40 to 65°C)	-3		3	ppm
<b>RHF2S025-915</b>	Frequency Range (Rx/Tx)	900		930	MHz
	Max Output power		25		dBm
	Output Power Variation	-1.5		1.5	dB
	TX Power Variation Temperature (-40 to 65°C)	-1.5		1.5	dB
	TX Frequency Variation Temperature (-40 to 65°C)	-3		3	ppm

### 3.1.4. Antenna performance

The gateway is equipped with an high efficient omnidirectional antenna.

Resistance 50 Ω

**Table 3-4 Antenna performance**

	WiFi	LoRa		LTE 4G	
		470MHz	868MHz/915MHz	CN	USA and EU
VSWR	<1.9	<1.7	<2.9	<3.5	<3.7
Gain(dBi)	6	2	3.5	4	0.5
Efficiency	50%	70%	85%	80%	50%

### 3.1.5. LoRa Power Table

1) CN470

**Table 3-5 CN470 power table**

CN470	Power	DIG	MIX	PA
0	-2	3	8	0
1	1	3	10	0
2	3	3	12	0
3	4	3	15	0
4	5	0	15	0
5	8	3	8	1
6	10	0	8	1
7	14	0	13	1
8	15	3	8	2
9	17	3	9	2
10	19	0	8	2
11	20	0	9	2
12	21	0	10	2
13	23	0	14	2
14	24	3	10	3
15	25	0	9	3

2) EU868/IN865

**Table 3-6 EU868/IN865 power table**

EU868	Power	DIG	MIX	PA
0	-1	0	8	1
1	2	0	10	1
2	5	0	12	1
3	6	0	8	2
4	8	0	9	2
5	9	0	10	2
6	11	0	11	2

7	12	0	12	2
8	14	0	13	2
9	15	0	8	3
10	17	0	9	3
11	18	0	10	3
12	20	0	11	3
13	22	0	12	3
14	23	0	13	3
15	24	0	15	3

### 3) US915/AU915/AS923

**Table 3-7 US915/AU915/AS923 power table**

US915	Power	DIG	MIX	PA
0	-2	0	15	0
1	1	0	8	1
2	4	0	10	1
3	6	0	12	1
4	7	0	13	1
5	8	0	8	2
6	10	0	9	2
7	11	0	10	2
8	13	0	11	2
9	14	0	12	2
10	15	0	15	2
11	17	0	8	3
12	19	0	9	3
13	20	0	10	3
14	22	0	12	3
15	24	0	14	3

## 3.2. Reliability

### Environment test

**Table 3-8 Environment test requirement**

Item	Test condition	standard	results
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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: +65°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;

### 3.2.1. EMC and ESD

RHF2S025 is a high reliability industrial gateway device, which is based on IEC 61000-4 standard for ESD test, rapid pulse swarm anti-interference test, wave surge anti-interference test, etc.

**Table 3-9 Reliability test requirement**

Item	Standard	Test condition
ESD	IEC 61000-4-2	Air Discharge:10kV Contact Discharge:6kV Positive/Negative
EFT/Burst	IEC 61000-4-4	AC power port:1k(peak) 5/50ns Tr/Th 5KHZ Repetition Freq.
surge	IEC 61000-4-5	Common mode: 3kV Differential mode: 3kV Positive/Negative

## 4. Mechanical size and package information

### 4.1. Mechanical size

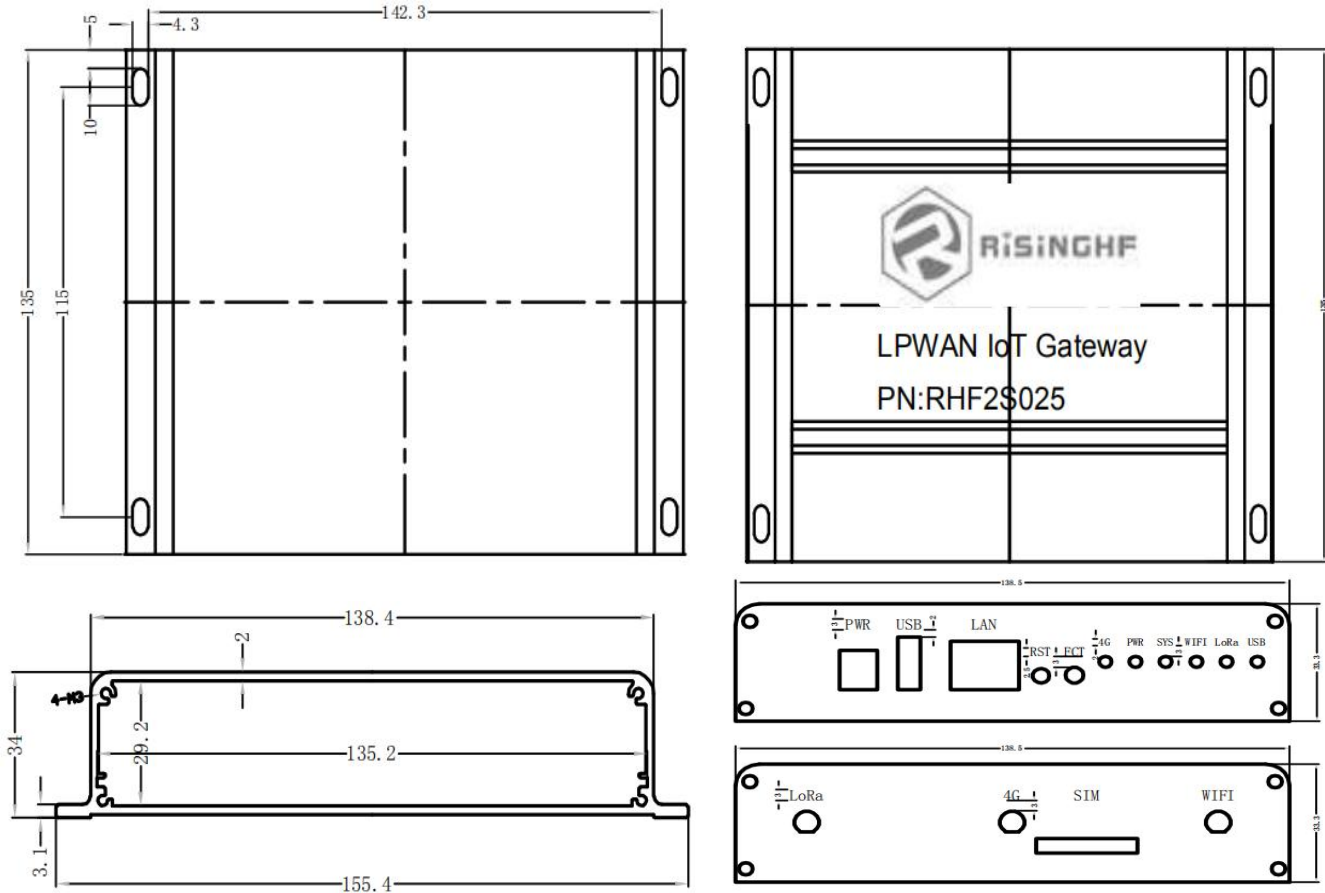


Figure 4-1 RHF2S025 Mechanical size

### 4.2. package information

#### 4.2.1. Package list

Table 4-1 package list

Material	PN	Qty
RHF2S025	RHF2S025-xxx	1
Adapter	12V/1.5A	1
WiFi antenna	high efficiency antenna	1
LoRa antenna	high efficiency antenna	1
LTE 4G antenna(optional)	high efficiency antenna	1

## 4.2.2. Package information



Figure 4-2 RHF2S025 package



Figure 4-3 package inside

## 4.3. Order information

RHF2S025 include several part number, different part number would be used in different band and area, please contact with [sales@risinghf.com](mailto:sales@risinghf.com) for detailed information.

Table 4-2 order information

Order	Product Series	PN	Band@Uplink	Band@Downlink	descriptions
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1	RHF2S025AH8	RHF2S025AH8-470	470MHz~490MHz	470MHz~510MHz	No LTE/half-duplex
		RHF2S025AH8-868	859MHz~871MHz	859MHz~871MHz	No LTE/half-duplex
		RHF2S025AH8-915	900MHz~930MHz	900MHz~930MHz	No LTE/half-duplex
2	RHF2S025BH8	RHF2S025BH8-470	470MHz~490MHz	470MHz~510MHz	LTE/half-duplex
		RHF2S025BH8-868	859MHz~871MHz	859MHz~871MHz	LTE/half-duplex
		RHF2S025BH8-915	900MHz~930MHz	900MHz~930MHz	LTE/half-duplex
3	RHF2S025AF8	RHF2S025AF8-470	470MHz~490MHz	500MHz~510MHz	No LTE/full-duplex
		RHF2S025AF8-AL1	470.2MHz~476.6MHz	483.8MHz~490.2MHz	No LTE/full-duplex
		RHF2S025AF8-915	902MHz~915MHz	923MHz~928MHz	No LTE/full-duplex
4	RHF2S025BF8	RHF2S025BF8-470	470MHz~490MHz	500MHz~510MHz	LTE/full-duplex
		RHF2S025BF8-AL1	470.2MHz~476.6MHz	483.8MHz~490.2MHz	LTE/full-duplex
		RHF2S025BF8-915	902MHz~915MHz	923MHz~928MHz	LTE/full-duplex



## Modifications

V0.2 2019-04-01

- 1 Change homepage image
- 2 Change gateway operating temperature range

V0.1 2019-03-18

- + Create draft.

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