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Pi Supply



## Lora Gateway Concentrator Module Kit

RAK831 & FT2232H



RAK831



FT2232H Module



Mini USB



Casing



Antenna



Dupont Line

**RAK831 and FT2232H Lora Gateway Concentrator Module Kit (based on SX1301)**

## **RAK831 LoRA Gateway Module**

The RAK831 is used to achieve a large area of low-cost full coverage IoT integration. It has strong anti-interference, good concealment, and long communication distance

- Brand Name: RAK
- Compatible Brand/Model: None
- Model Number: RAK831
- Type: Lora Gateway Concentrator Module Kit
- Dimension: 80mm\*50mm\*5mm
- Frequency Band: 433MHz/868MHz/915MHz
- Radio Chipset: SX1301

### **Kit Contains**

- RAK831
- FT2232H Module
- Mini USB
- Antenna
- Casing
- Dupont cables

### **LoRa Gateway Frequency Band**

- 433MHz - 435MHz
- 465MHz - 475MHz
- 865MHz - 872MHz
- 902MHz - 928MHz

### **What is RAK831? (LoRa Gateway Module)**

RAK831 is an RF front end of a LoRa gateway. It is able to receive on different frequency channels at the same time and is able to demonstrate the LoRa signal without knowledge of the used spreading factor of the sending node.

With the compact design, this is an ideal modular product that helps you realise the whole LoRa system development. With the USB-SPI converter module FT2232, you can quickly develop software on your computer. You can also integrate the concentrator module into your own production product to realise the LoRa gateway function. This is a very economical way to create a LoRa gateway for a huge variety of applications like Smart Grid, intelligent farming, and other IoT applications.

The RAK831 needs a host system like a Raspberry Pi or WisAP (openWRT based) or WisCam for proper operation. The host processor can be a PS or MCU that will be connected to RAK831 via USB or SPI.

### **Why do we need LoRa gateways?**

Public utilities (gas and other instruments, municipal pipelines, street lamps, landfills), large areas of livestock and agricultural irrigation, extensive layout and harsh weather, hydrology, mountain data collection, mines and remote outdoor operations; they suffer from...

- Insufficient signal coverage - low strength and cannot guarantee data stability.
- Power consumption - It is difficult to have a sustainable power supply in harsh environments.
- Low economic efficiency - Low utilization rate, occupation of network resources, high cost.
- 

### **LPWAN Solution**

LPWAN is a very good solution to the above problems

Complex urban environments can transfer 3 km and open area transmissions can be up to 15 km, penetrating harsh environments to transmit signals.

Sleep/low power mode means power consumption is very low

Supports narrowband data transmission resulting in low cost of network communications.

### **Supports 8 channels (LoRa Gateways create LPWAN IoT Network)**

For example, 7 LoRa Gateway modules can cover the Lower Manhattan area

## **Key Features**

- Based on Semtech SX1301
- Sensitivity down to -142.5 dBm
- Frequency bands 433MHz/868MHz/915MHz
  - 433MHz with 2x SX1255 as Tx/Rx front ends
  - 868/915MHz with 2x SX1257 as Tx/Rx front ends
- USB & SPI interface
- Output power level up to 23 dBm
- Range up to 15 km (Line of Sight)
- RF interface optimised to 50ohm allowing for simple system integration
- Supports 8 channels
- Temperature range from -40 to 85 degrees
- Compact size 80.0 x 50.0 x 5.0mm
- HAL is available form

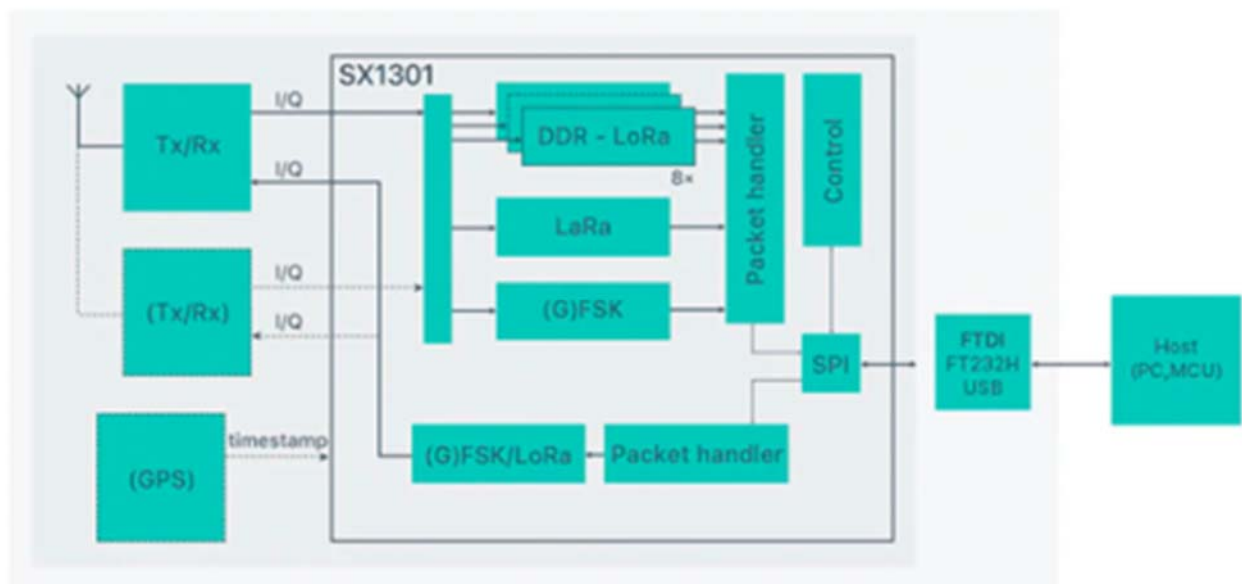
## **LoRaWAN**

LoRaWAN communication protocol can handle node roaming, base station capacity management, node authentication and other cellular technology requirements, and because of its openness, a large number of R&D companies in the world continuously update and improve the LoRaWAN communication protocol.

Due to the high range a star topology can be used. Compared Star and Mesh topology, we can see the advantages of LoRaWAN on the wireless network.

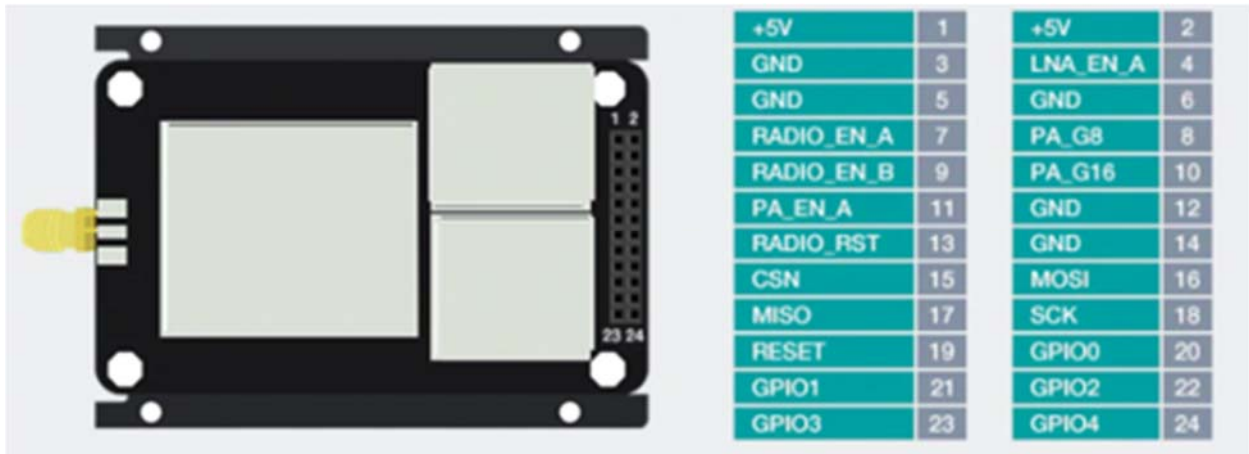
Project	Star	Mesh	Who wins	
			Star	Mesh
Topology reasons	LoRa long distance Single-hop easy to achieve network range	GFSK short range Multi-hop increase network range	⊖	⊖
Hops	Single-hop Node only communicates with the gateway	Multi-hop Relay node needs to be forwarded	🏆	⊗
Delay	Small Real-time controllable	Large The final receiving time is not controllable	🏆	⊗
Energy saving	Good The node is dormant immediately after sending and receiving	Poor Relay node at any time to listen to forward	🏆	⊗
Extended	Easy Increase the gateway can be	Difficult Need to adjust the network structure	🏆	⊗
Reliability	High Timely detection of lost frames and retransmission	Low Any jump failed This information is inaccessible	🏆	⊗
Complexity	Simple No route forwarding	Complex Need to deal with routing forwarding	🏆	⊗
Capacity	Large Increase the gateway that is to increase the broadband	Medium The more nodes, the more bandwidth transmission	🏆	⊗
Covering the blind spot	Increase the gateway The cost is higher	Increase the relay node The cost is low	⊗	🏆

## SX1301 Chip



- Up to -142.5 dBm sensitivity with SX1257 Tx/Rx front end
- 70 dB CW interferer rejection at 1 MHz offset
- Able to operate with negative SNR, CCR up to 9 dB
- Emulates 49x LORA demodulators and 1x (G)FSK demodulator
- Dual digital TX&RX radio front end interfaces
- 10 programmable parallel demodulation paths
- Dynamic data-rate (DDR) adaption
- True antenna diversity or simultaneous dual-band operation
- Any combination of spreading factor and intermediate frequency for up to 8 packets is possible

### Pinout Description



### Parameter

Operating Voltage	DC 5V
Operating Temperature	-40 to 85
Radio Chipset	SX1301
RF Output Power	23dbm

Input Signal	Not more then -13dBm
GPS Receiver	Optional
Receiver Sensitivity	Up to -142.5dBm (@293bps)
SNR Handling	9dB
Control Interface	SPI
Dimension	80mm*50mm*5mm
Firmware	Gateway HAL
Range	up to 15KM

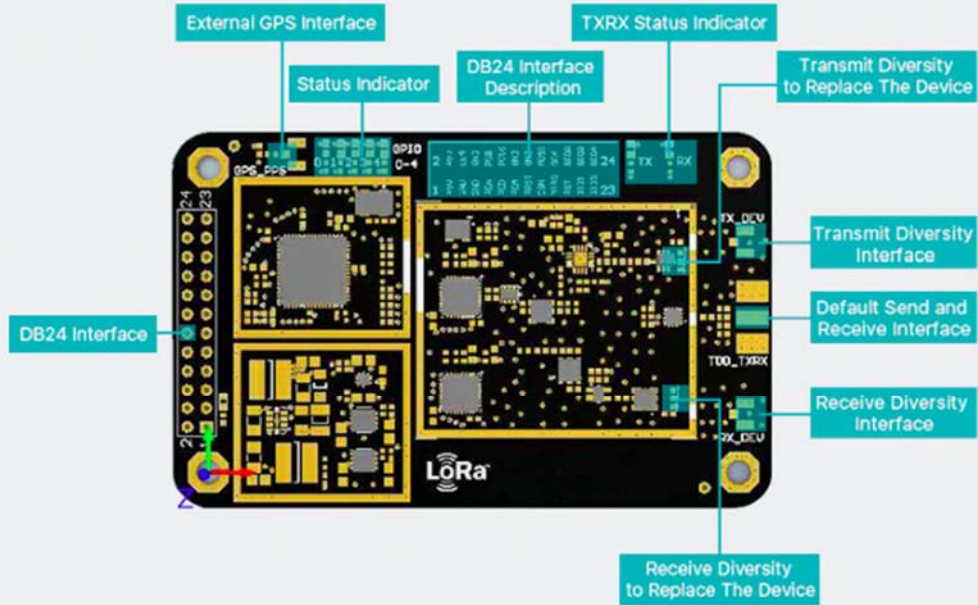
### **Potential applications**

- Wireless Star Networks
- Remote controls
- Smart metering
- Wireless Sensor
- Wireless alarm and security systems
- M2M
- IoT
- Home/Building/Industrial automation

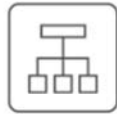




## Interface resources



## Where are we use?



Wireless Star Networks



Remote Control



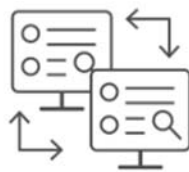
Smart Metering



Wireless Sensors



Wireless Alarm and Security Systems



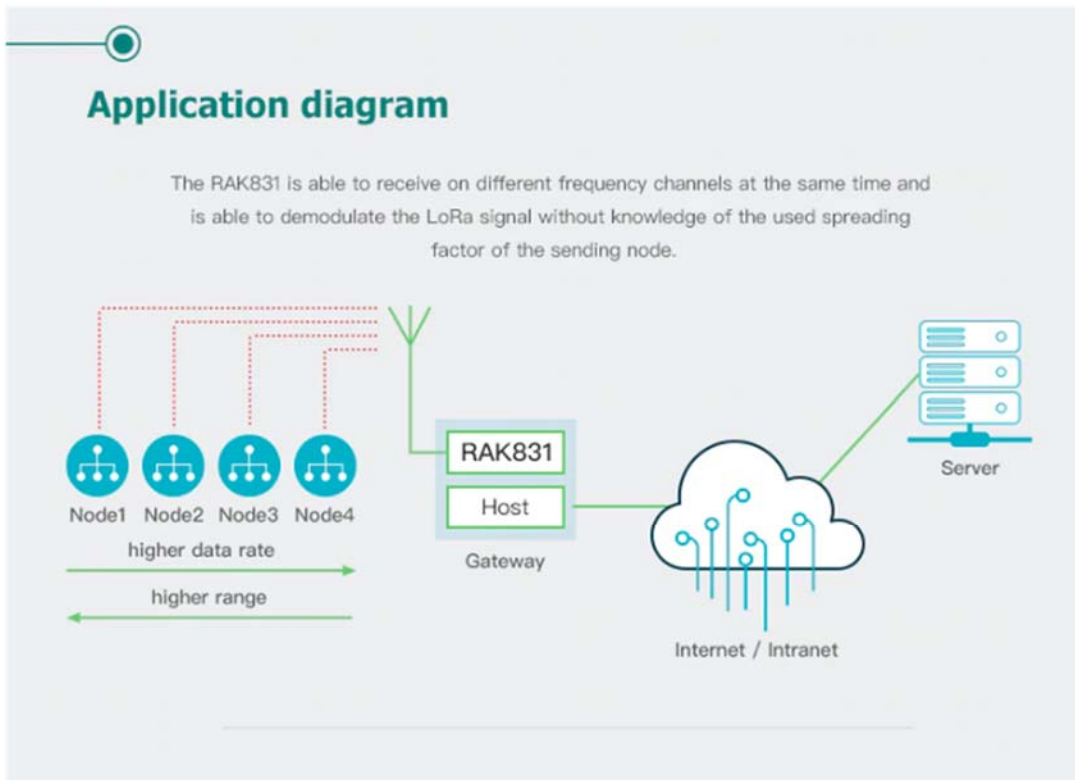
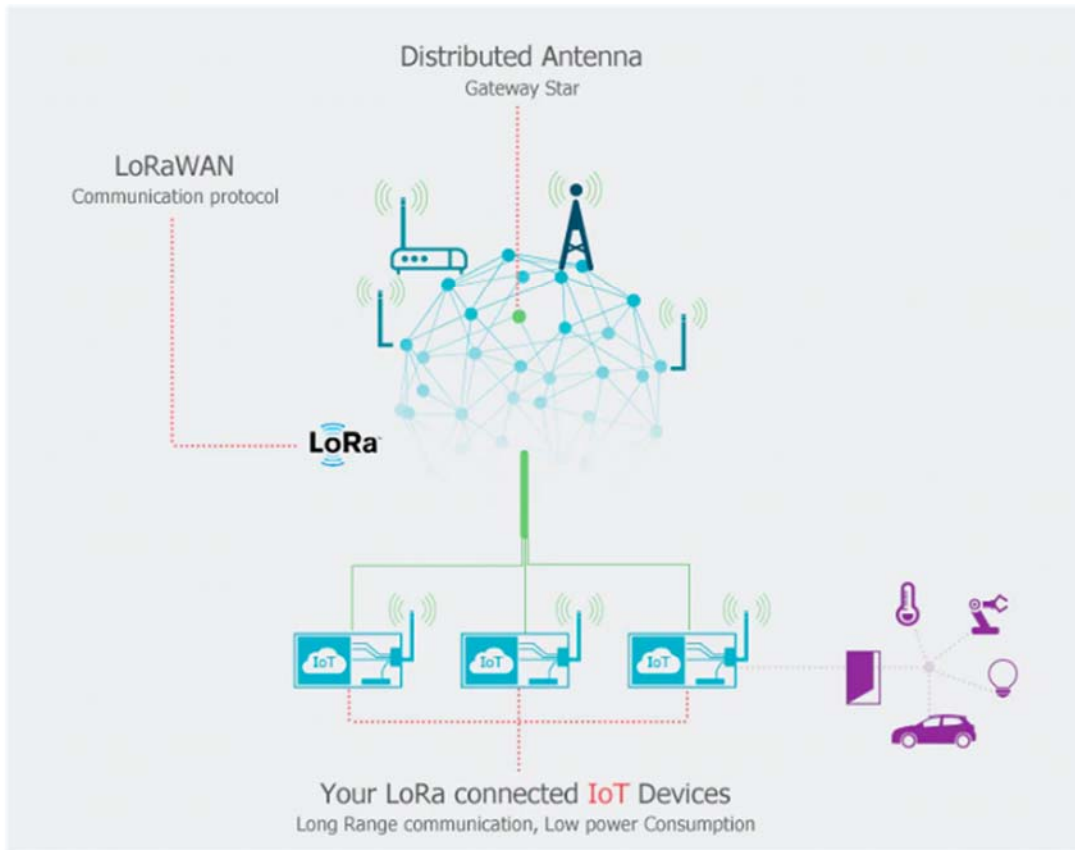
M2M



IoT



Home-, Building-, Industrial automation



# LoRa Gateway Module — Base on SX1301

## RAK831

To Achieve a Large Area of IoT Low-cost Full Coverage

433MHz

470MHz

868MHz

915MHz



Strong  
Anti-interference



Good  
Concealment



Long  
Communication distance

## What is RAK831? (LoRa Gateway Module)

RAK831 is a RF front end of a LoRa™ gateway. It is able to receive on different frequency channels at the same time and is able to demodulate the LoRa™ signal without knowledge of the used spreading factor of the sending node.



With the compact design, This is a ideal modular products to help you realize the whole Lora system development. With the USB-SPI converter module FT2232, you can quickly to make the software development in your PC. But also, you can integrate the concentrator module to your production product to realize the Lora gateway function. This is very economic way to address for a huge variety of applications like Smart Grid, Intelligent Farm, intelligent Farm and Other IoT applications.

The RAK831 needs a host system like Raspberry Pi or WisAP(OpenWRT based) or WisCam for proper operation. The host processor can be a PC or MCU that will be connected to RAK831 via USB or SPI.

## Support 8 Channels (LoRa Gateways create LPWAN IoT network)



For example, 7 LoRa Gateway modules can cover the Lower Manhattan area

