

WisGate X Industrial (RAK7437/C)

Datasheet

Overview

Description

RAK7437 WisGate X Industrial is the next-generation ARM platform edition of the RAK WisGate series. It is an ideal product for IoT commercial deployment. With its industrial-grade components, it achieves a high standard of reliability. The **RAK7437/C** supports 8 LoRa channels, multi-backhaul with Ethernet, SFP, and 2.4 G Wi-Fi. Optional LTE, satellite communication, Wi-Fi HaLow, 5G Wi-Fi, 5G NR, and 2.4G LoRa. Additionally, there are four LAN ETH-ports with a switch function.

The **RAK7437/C** runs WisGateOS 2.2, which is based on the latest OpenWRT and accommodates the latest security updates like the newest Linux kernel and latest feature packages. The Web UI is user-friendly and intuitive, with tooltips for better user experience.

The **RAK7437/C** is suited for any use case scenario, be it rapid deployment or customization concerning UI and functionality.

Product Features

Hardware

- IP30 industrial-grade enclosure
- PoE (802.3at)
- 1x 10/100/1000M ETH WAN Port
- 4x 10/100/1000M ETH LAN Ports
- 1x 10/100/1000M SFP Port
- 2x Type-A USB3.0 Ports
- 2x RS485 Ports
- Single LoRa Concentrator for 8 channels(Optional 16 channels with two LoRa Concentrators)
- Backhaul: Ethernet, SFP, 2.4G Wi-Fi, LTE (available with RAK7437C)
- Optional connectivity: Satellite communication, Wi-Fi HaLow, 5G Wi-Fi, 5G NR, and 2.4G LoRa
- Supports DC 9-36 V
- External antenna (upgradable)
- Dying gasp
- Reset button

- 1x USB2.0 Debug port (Type-C connector)

Software

- Built-in Network Server
- OpenVPN
- Software and UI sit on top of OpenWrt
- Full LoRaWAN Stack support with Semtech SX1303
- LoRa Frame filtering (node whitelisting)
- MQTT v3.1 bridging with TLS encryption
- Buffering of LoRa frames in Packet Forwarder mode in case of NS outage (no data loss)
- Listen Before Talk (optional)
- Fine timestamping (optional)

Specifications

Overview

This section presents the block diagram for the **RAK7437/C** that shows the internal architecture of the board and the technical parameters of the product.

Block Diagram

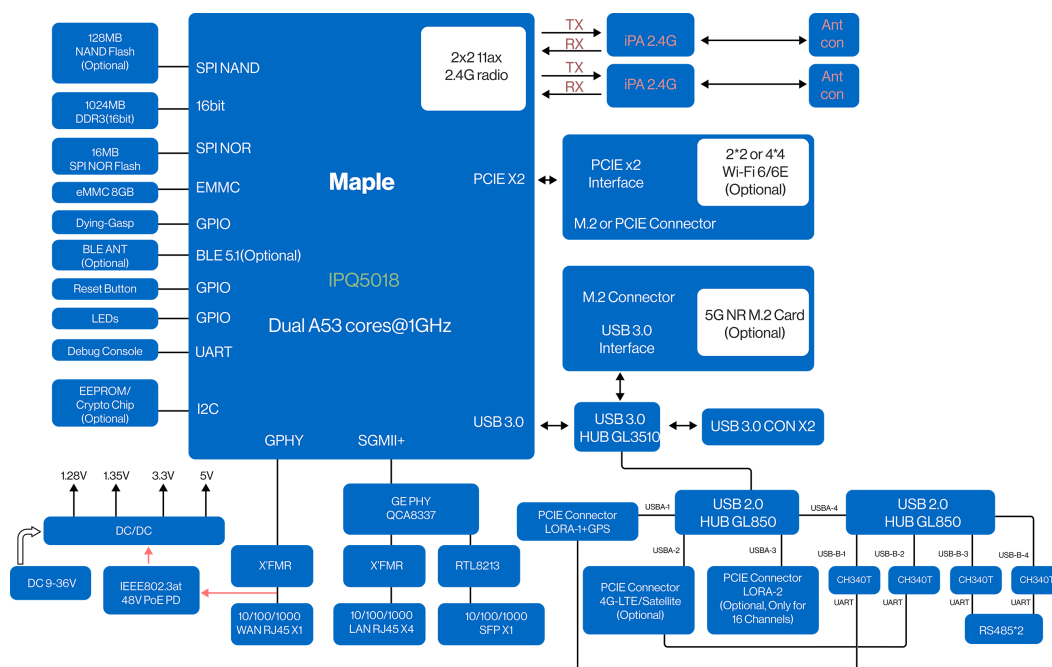


Figure 1: RAK7437 WisGate X Industrial with LTE

Main Specifications

Feature	Specifications
Computing	IPQ5018 Dual cores A53 @ 1 GHz, DDR3 RAM 1 GB

Feature	Specifications
Wi-Fi feature	Frequency: 2.4 GHz (802.11b/g/n/ac/ax) 2x2 MIMO RX Sensitivity: -95 dBm (Min) TX Power: 20 dBm (Max) Operation channels: 2.4 GHz: 1-13
LoRa feature	SX1303 mPCIe card 8 Channels RX Sensitivity: -139 dBm (Min) TX Power: 27 dBm (Max) Listen Before Talk
Frequency	EU868/IN865/RU864/US915/AU915/KR920/AS923/EU433/CN470
Cellular feature (available with RAK7437C)	Supports Quectel EG95-E/EG95-NA/EC25-E/EC25-AU/EC25-J (IoT/M2M-optimized LTE Cat 4 Module) EG95-E for EMEA Region (Europe, Middle East, and Africa) - LTE FDD: B1/B3/B7/B8/B20/B28A - WCDMA: B1/B8 - GSM/EDGE: B3/B8 EG95-NA for North America Region - LTE FDD: B2/B4/B5/B12/B13 - WCDMA: B2/B4/B5 EC25-E for South Korea, Thailand, India - LTE-FDD: B1/B3/B5/B7/B8/B20 - LTE-TDD: B38/B40/B41 - WCDMA: B1/B5/B8 - GSM: B3/B8 EC25-AU for Latin America, Australia, and New Zealand Region - LTE-FDD: B1/B2/B3/B4/B5/B7/B8/B28 - LTE-TDD: B40 - WCDMA: B1/B2/B5/B8 - GSM/EDGE: B2/B3/B5/B8 EC25-J for Japan - LTE-FDD: B1/B3/B8/B18/B19/B26 - LTE-TDD: B41 - WCDMA: B1/B6/B8/B19
Power supply	PoE (IEEE 802.3at) - 42~57 V DC DC 9-36 V
ETH	1x WAN RJ45 (10/100/1000 M) 4x LAN RJ45 (10/100/1000 M) 1x SFP (10/100/1000M)
Antenna	LoRa: 1 RP-SMA connector LTE: 2 SMA connectors 2.4G Wi-Fi: RP-SMA connectors
Ingress protection	IP30

Feature	Specifications
Enclosure material	Aluminum
Operating temperature	55°C for PoE input 45°C for DC connector input
Operating humidity	0 to 95% RH non-condensing
Installation method	Table or wall mounting

Hardware

The hardware specification covers the interfacing of the **RAK7437/C** and its corresponding functionalities. It also presents the parameters and the standard values of the gateway.

RF Specifications

Wi-Fi Radio Specifications

Feature	Specifications
Wireless standard	IEEE 802.11b/g/n/ac/ax
Operating frequency	ISM band: 2.412~2.472 GHz
Operation channels	2.4 GHz: 1-13

Feature	Specifications
Transmit power (the max power may be different depending on local regulations) - per chain	802.11b 19 dBm @ 1 Mbps 19 dBm @ 11 Mbps 802.11g 18 dBm @ 6 Mbps 16 dBm @ 54 Mbps 802.11n (2.4 G) 18 dBm @ MCS0 (HT20) 16 dBm @ MCS7 (HT20) 17 dBm @ MCS0 (HT40) 15 dBm @ MCS7 (HT40) 802.11ac (2.4G) 18 dBm @ VHT20_MCS0 15 dBm @ VHT20_MCS9 17 dBm @ VHT40_MCS0 15 dBm @ VHT40_MCS9 802.11ax (2.4G) 18 dBm @ HE20_MCS0 14 dBm @ HE20_MCS11 17 dBm @ HE40_MCS0 13 dBm @ HE40_MCS11

Feature	Specifications
Receiver sensitivity (typical)	802.11b -95 dBm @ 1 Mbps -88 dBm @ 11 Mbps 802.11g -90 dBm @ 6 Mbps -75 dBm @ 54 Mbps 802.11n (2.4G) -89 dBm @ MCS0(HT20) -72 dBm @ MCS7(HT20) -86 dBm @ MCS0(HT40) -68 dBm @ MCS7(HT40) 802.11ac (2.4G) -86 dBm @ VHT20_MCS0 -62 dBm @ VHT20_MCS9 -85 dBm @ VHT40_MCS0 -61 dBm @ VHT40_MCS9 802.11ax (2.4G) -89 dBm @ HE20_MCS0 -58 dBm @ HE20_MCS11 -87 dBm @ HE40_MCS0 -56 dBm @ HE40_MCS11

LoRa Radio Specifications

Feature	Specifications
Operating frequency	EU868/IN865/RU864/US915/AU915/KR920/AS923/EU433/CN470
Transmit power	27 dBm (Max)
Receiver sensitivity	-139 dBm (Min)

Interfaces

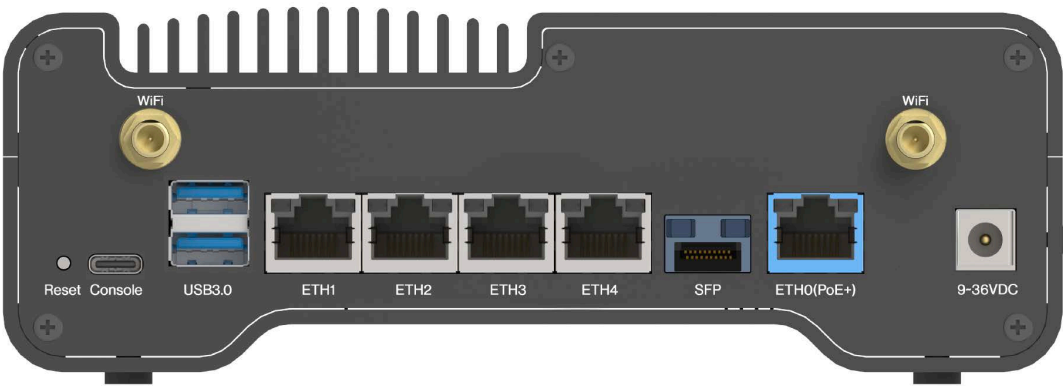


Figure 2: RAK7437 WisGate X Industrial interfaces 1



Figure 3: RAK7437 WisGate X Industrial interfaces 2

- The function of the Reset Key is as follows:
 - Short Press: Restart the gateways
 - Long press (5s and above): Restore factory settings.
- LEDs status description:

LEDs	Status indication description
LED 1 (PWR)	Power indicator - The LED is on when device power is on
LED 2 (2.4 G Fi-Wi)	AP Mode: - ON - The AP is up - Flicker - Data receiving and sending STA Mode: - ON - Connected - Flicker - Data receiving and sending - Slow flicker - Disconnected
LED 3 (LoRa 1)	ON - LoRa 1 is working OFF - LoRa 1 is not working Flicker - Packet receiving and sending
LED 4 (LoRa 2)	Not connected

LEDs	Status indication description
LED 5 (LTE)	ON - Voice is working Fast flicker (125 ms High / 125 ms Low) - Ongoing data transfer Slow Flicker (1800 ms High / 200 ms Low) - Network searching Slow flicker (200 ms High / 1800 ms Low) - Idle
LED 6 (5G NR)	ON - Voice is working Fast flicker (125 ms High / 125 ms Low) - Ongoing data transfer Slow Flicker (1800 ms High / 200 ms Low) - Network searching Slow flicker (200 ms High / 1800 ms Low) - Idle
LED 7 (Satellite communication)	ON - Transmit OFF - Receive
LED 8 (5G Wi-Fi)	ON - Connected Flicker - Data receiving and sending Slow flicker - Disconnected
LED 9 (SFP)	ON - Linkup OFF - Linkdown Flicker - Data transmitting and receiving

Software

Firmware

The firmware sits on OpenWRT. There is a Web UI for easy configuration and management of the device, as well as the possibility for SSH2 management. The WisGateOS 2 supports the feature to install extensions (WireGuard, Custom Logo, Breathing Light, and more). More information about the Extensions can be found at [WisGateOS2 Extensions](#).

Model	Firmware version	Source
RAK7437/C WisGate X Industrial	WisGateOS2	Download

Software Features

LoRa	Network	Management
Gateway OTA management	Wi-Fi AP mode	WisDM
LoRa packet forward (Packet forwarder, Basics Station)	Wi-Fi Client mode	SSH2, NTP
Frequency band setup	LTE APN setup	Firmware update
Country code setup	802.1q	Web UI

LoRa	Network	Management
TX power setup	Uplink backup	LoRa packet forwarder
Data logger	DHCP Server/Client	Built-in network server
Location setup	Firewall	MQTT bridge
Statistic		OpenVPN, Ping Watch Dog
Supports classes A, B, and C		
Server address and port setup		

Models/Bundles

Part number	8 channel SX1303	Cat4 Cellular	2.4 GHz Wi-Fi
RAK7437-XYZ	√		√
RAK7437C-XYZ	√	√	√

Note: Backhaul communication with Wi-Fi HaLow, Satellite Communication, 5G Wi-Fi, or 5G NR can be customized per request.

Certification

FCC:

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 interference received, including interference that may cause undesired operation.

FCC Caution:

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

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 interference to 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.

FCC RF 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 a minimum distance of 20cm between the radiator and any part of your body.

ISED:

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

1. This device may not cause interfere
2. This device must accept any interference, including interference that may cause undesired operation of the device.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

1. L'appareil ne doit pas produire de brouillage;
2. L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

This equipment complies with IC RSS-102 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 and any part of your body.

Pour se conformer aux exigences de conformité CNR 102 RF exposition, une distance de séparation d'au moins 20 cm doit être maintenue entre l'antenne de cet appareil et toutes les personnes.