DATASHEET

Wi-Fi HaLow Sub-GHz Wireless Module
MM610X-001

FC TKZMM610X-001

IC 9938A-MM610X001

OCAF23Y1010TH

CE

Description

MM610X-001 is a Wi-Fi HaLow Sub-GHz wireless module based on the Morse Micro® MM6108 RF SOC. HaLow is a low-power, long-range version of the IEEE 802.11 Wi-Fi standard, designed for IoT applications.

The module operates below 1 gigahertz (GHz) and offers longer range and lower power connectivity. It complies with the Wi-Fi Alliance 802.11ah specification and is Wi-Fi CERTIFIED HaLow™. It provides excellent RF performance, with high sensitivity, selectivity, and blocking performance. The module also features a U.FL connector for an external Sub-GHz antenna.

It offers various IO interfaces including UART, SDIO, SPI, I2C, and GPIOs for PWM and switch functions. The module supports communication up to 2 kilometers Line of Sight (LOS), making it suitable for both indoor and outdoor IoT applications.

The MM610X-001 module delivers a UDP throughput of 20Mbps, offering superior capacity compared to other long-distance wireless IoT solutions. Its PHY data rate is 32.5Mbps. The module is certified with FCC, IC, CE, TELEC, NCC, and RCM.

In summary, the MM610X-001 module provides reliable and long-range connectivity for IoT applications, with excellent RF performance, versatile IO interfaces, and high throughput capabilities.

22mm

17mm

Wi-Fi CERTIFIED HaLow™ for IoT

Features
- Sub-1 GHz spectrum operation
- Narrow band OFDM channels
- Several device power saving modes
- Native IP support
- Latest Wi-Fi® security

Benefits
- Long range: approximately 1 km
- Penetration through walls and other obstacles
- Supports coin cell battery devices for months or years
- No need for proprietary hubs or gateways

Wi-Fi HaLow 11ah related reading:

Discover Wi-Fi CERTIFIED HaLow - Wi-Fi Alliance

IEEE 802.11ah - Wikipedia

For more detailed information, please contact our sales team: sales@asiarf.com / +886 2 2940 7880

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Content

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Features

Protocol

- 802.11ah OFDM PHY supporting future WFA HaLow certification
- BPSK & QPSK, 16-QAM & 64-QAM Modulation
- Automatic frequency & gain control
- Packet detect & channel equalization
- Forward Error Correction (FEC) coding & decoding
- Supports Modulation and Coding Scheme (MCS) levels MCS 0-7 and MCS 10
- Supports 1 MHz duplicate mode
- Supports optional Traveling Pilot
- 11ah MAC supporting future WFA HaLow certification
- Support for STA and AP roles
- Listen-Before-Talk (LBT) access with energy detect
- 11 power save
- 11 fragmentation and defragmentation
- Power-Saving Target Wake Time (TWT) support for long battery life
- Automatic and manual MCS rate selection

Radio Operation

- Single-stream max data rate of 32.5 Mbps (MCS=7, 64-QAM, 8MHz channel, 4 uSec GI)
- Radio supporting worldwide Sub-1 GHz frequency bands
- Frequency Range: 850-950 MHz
- Channel width options of 1/2/4/8 MHz

Transmitter Performance

- Tx output power (dBm): +21 dBm (Typical) MCS0

RF Interface

- External antenna connector

Power Consumption

- 37 mA RX current @ Listen
- 40 mA RX current @ Active Receive

Power Management Unit (PMU) for various modes of operation

- Power-down (interrupt driven wake)
- Hibernate mode (internal / external wake)
- Target Wake Time mode
- Active Receive / Transmit mode

Integrated DC-DC converter supports a wide supply voltage, from 1.8V to 3.6V

Regulatory Certifications

- CE/FCC/IC/TELEC/RCM/NCC
- ESD: HBM 2KV / MM 200V, Latch-up: 150mA
- Halogen-free / RoHS 2.0 / Reach Annex 14 & 17

Certifications

- CE/FCC/IC/TELEC/RCM/NCC
- FCC ID: TKZMM610X-001
- IC ID: 9968A-MM610X001;

Operating Range

- 0-3.6V for VBATT and VDDFEM. 1.8-3.6V for VDDIO -40 to +85℃

Dimensions

- 22 mm x 17.0 mm x 2.0 mm (module)

Security

- AES encryption engine
- Hardware support for SHA1 and SHA2 hash functions (SHA-256, SHA-384, SHA-512)
- WPA3 including protected management frames (PMF)
- Opportunistic Wireless Encryption (OWE)

Additional information

- Weight : 0.005 kg

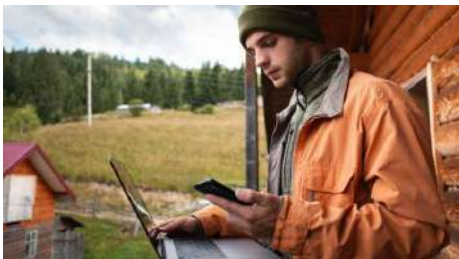**For more detailed information, please contact our sales team: sales@asiarf.com / +886 2 2940 7880**

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Features

MCU Peripherals

- 12-bit 1 Msps SAR ADC
- 12 × GPIO
- 3 × UART, 1 x SPI, 1 x I2C
- 2 × 16-bit Timer/Counter
- 1 × 32-bit Timer/Counter
- 32-bit Real Time Counter
- 24-bit Low Energy Timer for waveform generation

- 2 × Watchdog Timer
- Power Management Unit for power state switching
- SDIO 2.0 compliant slave interface
- SDIO 2.0 Default Speed (DS) at 25MHz
- SDIO 2.0 High Speed (HS) at 50MHz
- Support for both 1-bit and 4-bit data mode
- Support for SPI mode operation

Applications

Rural Internet Enhancement

Smart / Precision Agriculture

Energy Remote Sensor/Control

Improvements in Robotic Efficiency

Industrial 4.0

Smart Healthcare

- Surveillance Cameras and Sensors
- Low-power Sensor Networks
- Asset Tracking and Management
- Building Access Control & Security
- Connected Toys and Games

- Agricultural and Farm Networks
- Proximity Sensors
- Smart Home Automation
- Appliances
- Smart Signs and Kiosks

- Vehicle-to-Vehicle Communications
- Biometric IDs and Keypads
- Intelligent Lighting Controls
- Wi-Fi to Wi-Fi HaLow Bridges
- Smart City Networks

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