

# Presentation by Megachips at Computex Taipei

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MegaChips Confidential

Preliminary



## <Products and BackGround>

**MegaChips**



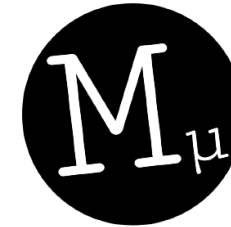
**Wi-Fi HaLow**



## ◆ *MegaChips and Morse Micro*

# MegaChips

- Japan's first semiconductor fabless company.
- Providing total solutions from LSI design and development to production based on our unique analog and digital technologies.
- Manufacture IC and module products using a network of manufacturing partners.



Morse Micro  
**reaching farther™**

- Founded in 2016, in Australia by engineers from a major U.S. telecommunications company.
- Sales globally with offices in the U.S., Taiwan, U.K., India, and China.
- One of only two Wi-Fi HaLow™ RF IC manufactures.

We are [the only manufacturing and sales partner in Japan](#) for ICs manufactured by Morse Micro.

We invested in Morse Micro in September 2022, and have entered into [a strategic partnership](#) for supply and sales activities of semiconductor and module products.

We use Morse Micro's transceiver IC in our module products, and together with Morse Micro, we are proposing high value-added products and solutions for the Japan

## ◆ Wi-Fi HaLow RF module

RF modules for easily implement Wi-Fi HaLow™ communication.

### 1. Supports for access point and station roles

Available as either an access point(AP) and station(STA).

### 2. Simple specifications

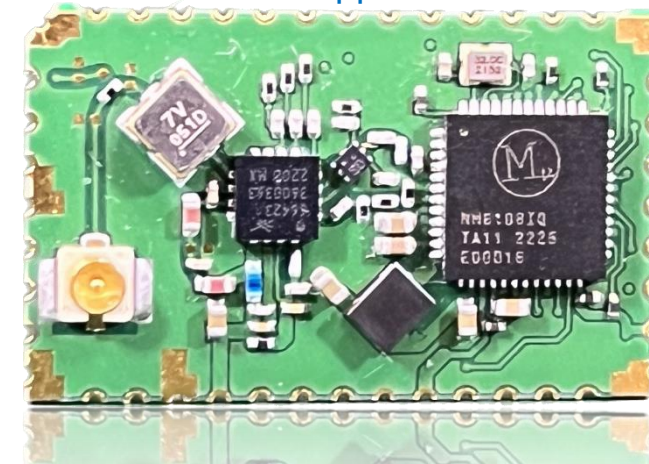
Can be implemented at appropriate cost by installing the minimum functions required for Wi-Fi HaLow communication.

### 3. Technical Standards Conformity Certified

Not required to obtain technical qualification for the final product embedded the module. (ARIB and FCC version available)

*Item No. : MRF61\_A or MRF61\_F*

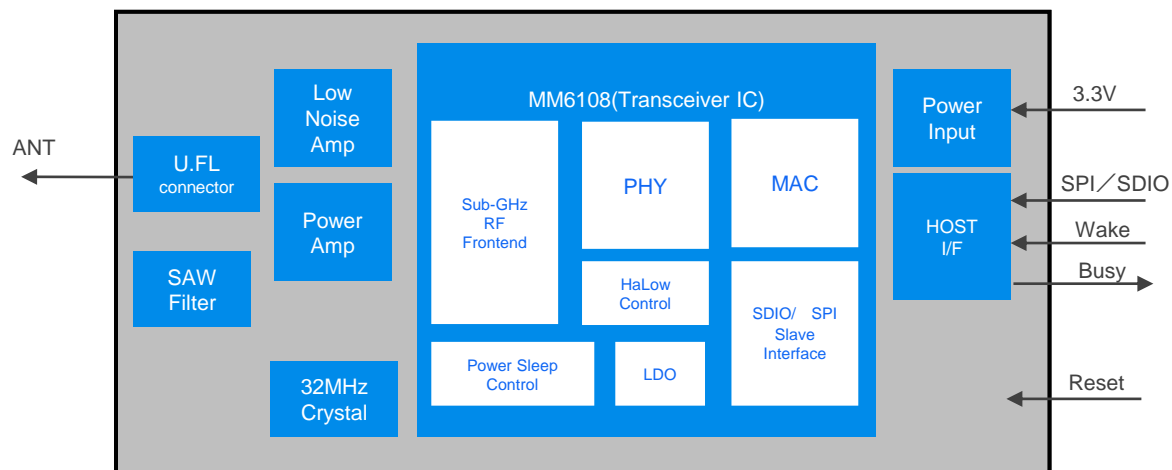
< Product Appearance >



< Module Specification >

|                        |                           |                         |                            |       |
|------------------------|---------------------------|-------------------------|----------------------------|-------|
| Wireless specification | IEEE802.11ah standard     | External size           | W:23mm x D:14mm x H:2.25mm |       |
| On-board RF IC         | Morse Micro MM6108        | Wireless certification  | For Japan                  |       |
|                        |                           | Antenna terminal        | U.FL connector             |       |
| Interface              | SDIO or SPI mode          | Maximum signal strength | 13dbm                      |       |
|                        |                           | Power-supply voltage    | 3.3V D                     |       |
| Physical data rate     | 150k ~ 15Mbps             | Power consumption       | When transmitting 15Mbps   | 118mA |
|                        |                           |                         | When receiving             | 45mA  |
| Range                  | Approx. 1km of visibility |                         | PNM Sleep DTIM10           | 102μA |
| Mounting Method        | Surface mount             | Operating Temperature   | -40℃~85℃                   |       |

< Block diagram >



## ◆ Wi-Fi HaLow MCU on-board module

RF module with MCU(microcontroller) for Wi-Fi HaLow™.

### 1. For station specification

Easy to construct by simply connecting sensor devices to this module.

### 2. Supports cloud service

Since Secure Element IC is equipped for cloud connectivity, provisioning is not required when connecting to AWS, etc.

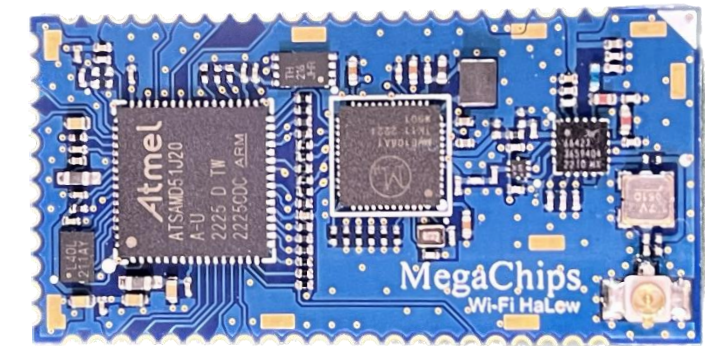
### 3. Development board supported

A development board for on-board MCU is also available.

### 4. Technical Standards Conformity Certified

Not required for customers to obtain technical standards compliance. (FCC version available)

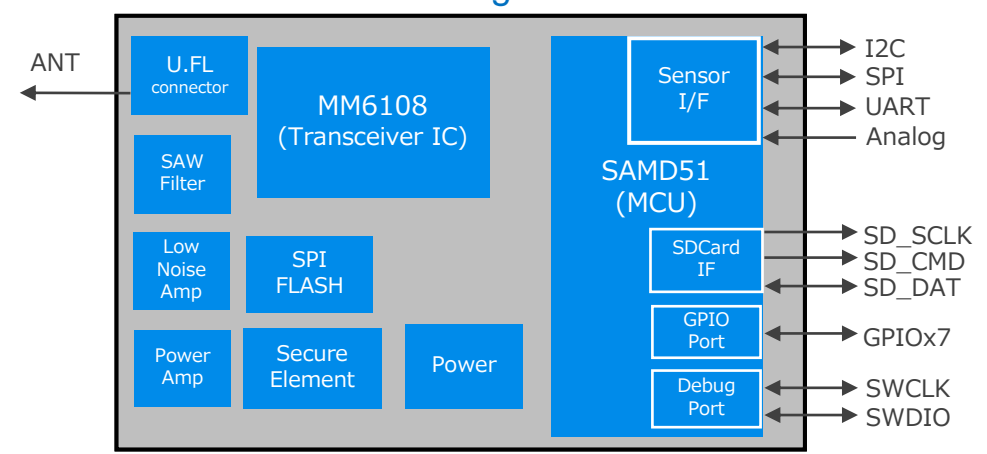
Item No. : MRF61\_A\_MCU



< Module Specification >

|                        |   |                       |                         |                                 |
|------------------------|---|-----------------------|-------------------------|---------------------------------|
| Wireless specification | IEEE802.11ah standard   |                       | External size           | W: 20mm x D: 40mm<br>x H: 1.9mm |
| On-board IC            | Transceiver IC  | MM6108<br>Morse Micro | Wireless certification  | For Japan                       |
|                        | MCU   | SAMD51<br>Micro Chips |                         |                                 |
| Interface              | SDIO, SPI, I2C, I2S, UART, GPIO, ADC, DAC, PWM, COUNTER TCC, USB2.0 |                       | Antenna terminal        | U.FL connector                  |
|                        |   |                       | Secure Element IC       | On-board/Off- board selectable  |
| Physical data rate     | 150k~15Mbps   |                       | Maximum signal strength | 13dbm                           |
| Range                  | Approx. 1km of visibility   |                       | Power-supply voltage    | 3.3V D                          |
| Mounting method        | Surface mount   |                       | Power consumption       | (TBD)                           |
| OS of on-board MCU     | Amazon Free RTOS  |                       | Operating temperature   | -40°C~85°C                      |

< Block diagram >



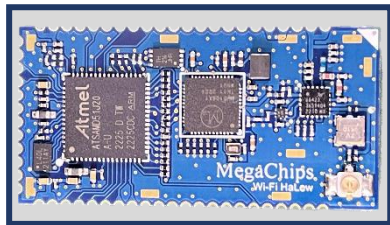


## ◆ Hardware Products

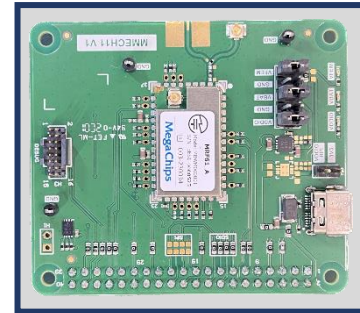
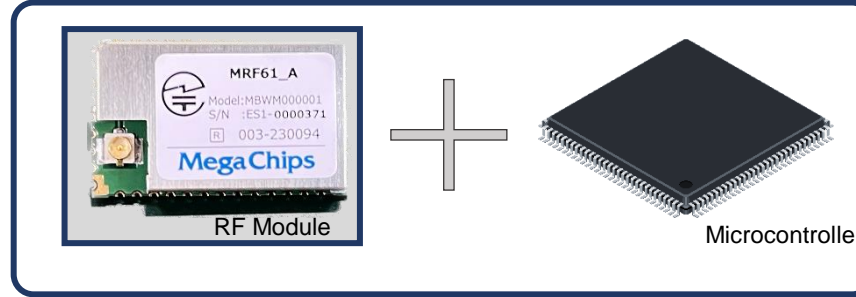
MegaChips  
Development Module



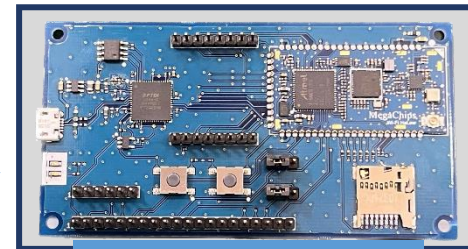
RF Module



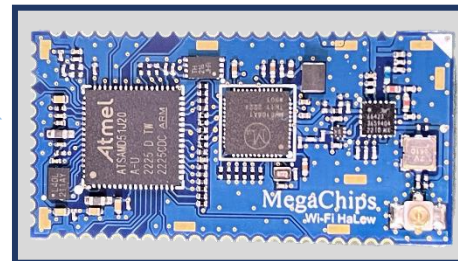
RF + MCU Module



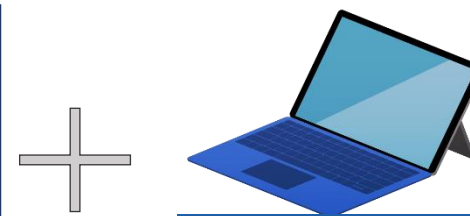
Raspberry Pi HAT



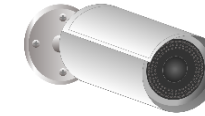
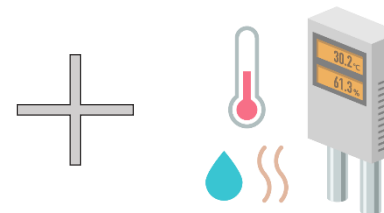
Development Board



Raspberry Pi



Development Kit



Available to build stations by connecting Microcontroller and cameras, etc.



Evaluation Kit

For development

Available to build stations easily by connecting sensors, etc.



## < Usecase in Japan >

**MegaChips**



**Wi-Fi HaLow**



## ◆ Use case example ①

### ② Complement unreachable distance of 2.4GHz Wi-Fi

By utilizing Wi-Fi HaLow...

Since Wi-Fi HaLow can reach approximately 1km, repeaters are not required, and it has high diffraction performance against walls and obstacles, it **can supplement blind spots in the factory** that other communications, including 2.4GHz Wi-Fi, cannot reach.

Expanding the communication range by using Wi-Fi HaLow.

→ **Cost reduction** by reducing the number of repeaters.





## ◆ Use case example ②

### ① Replacement of LTE with HaLow

By utilizing Wi-Fi HaLow...

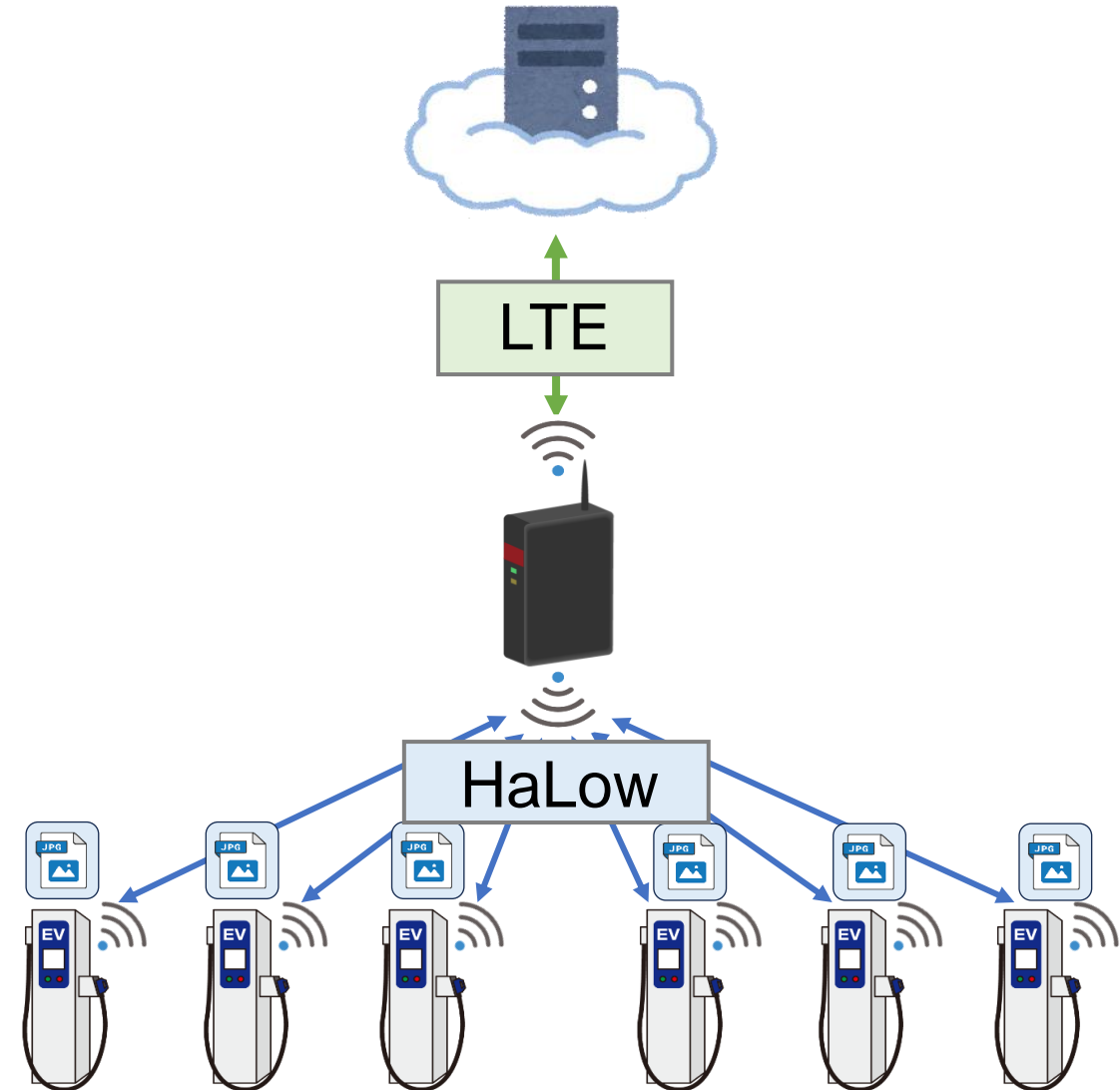
It is possible to **reduce running costs** by **replacing communication** with devices within a certain range **with Wi-Fi HaLow** and uploading data to the cloud, etc. in batches by using LTE.

No need to contract with provider.

→ **Reduction of fixed fees.**

Extended communication range in mountains, tunnels, underground and etc.

→ **Usable even outside of LTE service area.**



## ◆ Use case example ③

### ③ Long-distance image transmission · remote control

By utilizing Wi-Fi HaLow...

Work instruction can be sent remotely not directly going to the sites if it is in communication range. Multiple heavy machineries perform automated construction, and the situation of the sites can be checked with images from office.

Long-distance image transmission and remote control for monitoring from remote locations.

→ Reduce labor costs and system costs.



## ◆ Use case example ④

### ④ Communication through voice and image

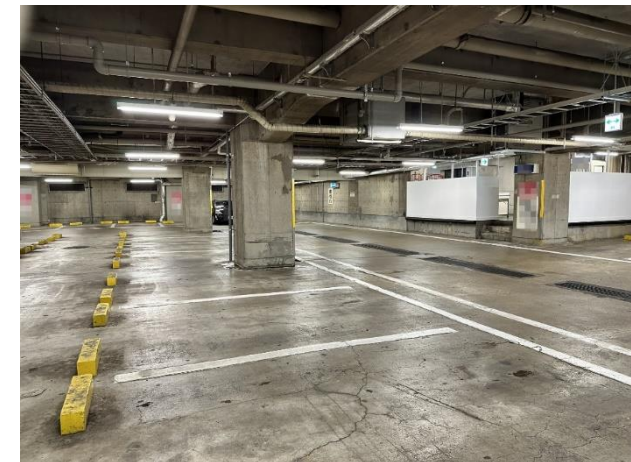
By utilizing Wi-Fi HaLow...

It enables communication in places where **LTE cannot be used**, such as **tunnels** and **underground parking**.

This is intended for use by workers during construction and maintenance.

Using Wi-Fi HaLow communication devices at tunnels and underground parking.

- Increased worker efficiency.
- Introducing automated robots.





## < Experiment Introduction >

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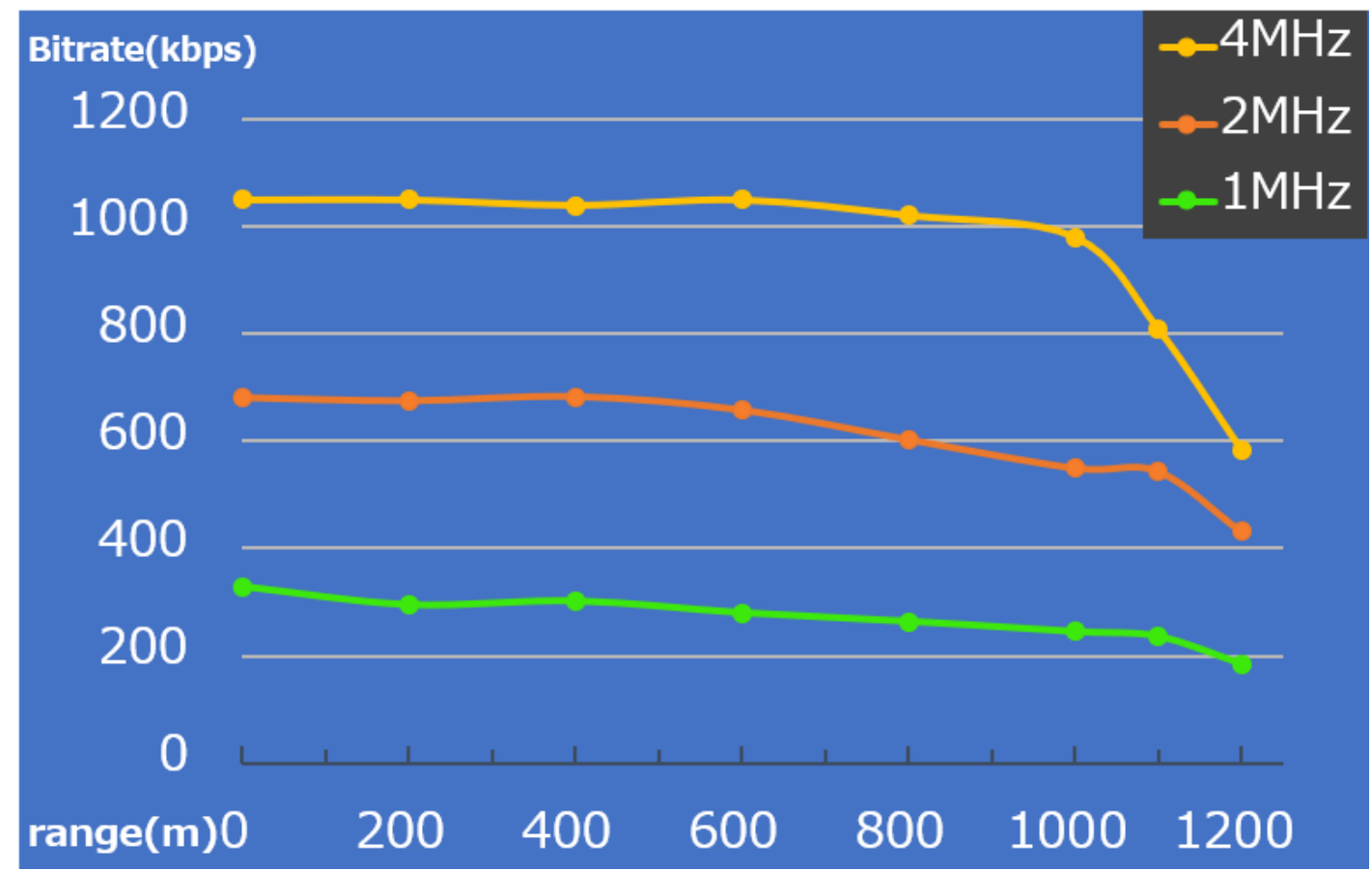
**Wi-Fi HaLow**



## ◆ Measurement results at Riverside



Bitrate change by distance



Antenna Height : 4m  
Distance : 10~1000m  
Communication protocol : UDP



# MegaChips