# LPMS-IG1W

### 9-AxisIMU(Inertial Measurement Unit)/AHRS(Pose Measurement)、

### Wi-Fi communication support

The 9-axis IMU sensor LPMS-IG1W detects orientations and acceleration and measures them with high precision. It is possible to communicate with host systems such as PCs and smartphones via Wi-Fi connection. The compact size, high accuracy, waterproof case (IP67), and powerful CPU inside the sensor process data from the gyroscope, accelerometer, and magnetometer, and provide low-drift, high-precision results in real time. It is suitable for industrial environments where highly accurate, low-latency measurements are required.
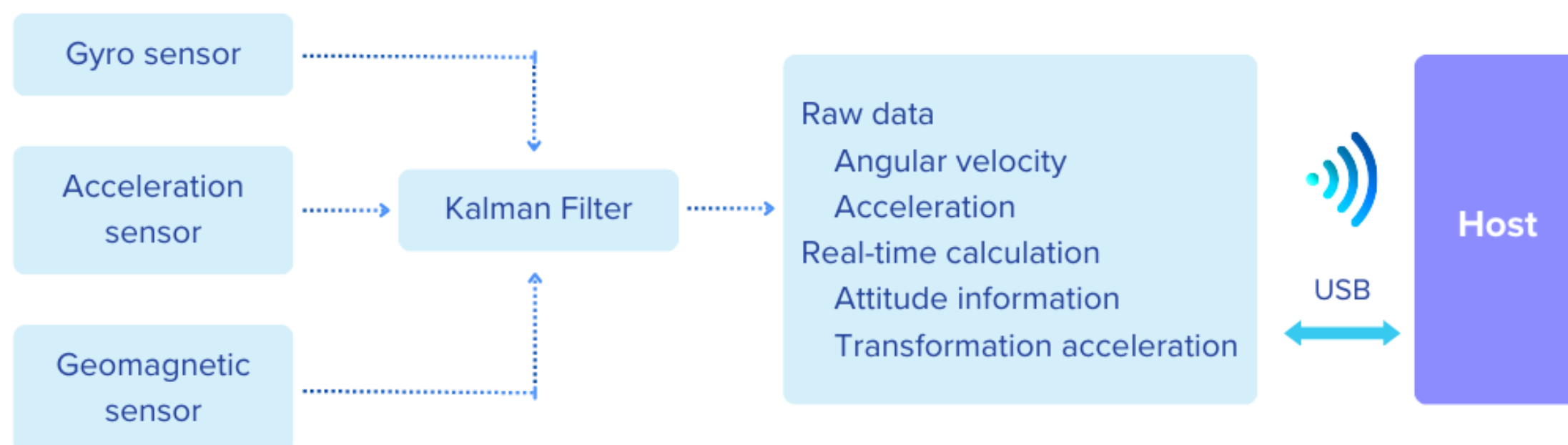
## Key Features

- MEMS 9-axis IMU with sensor fusion function・Equipped with low-noise/low-drift (4°/h) accelerometer

- Equipped with two types of gyro, enabling measurement over a wide range (400 to 2000°/s)

- Pose/linear acceleration calculated in real time inside sensor

- Wi-Fi connection supported・Waterproof (IP67) and shock-resistant up to 10,000G. Suitable for industrial environments.
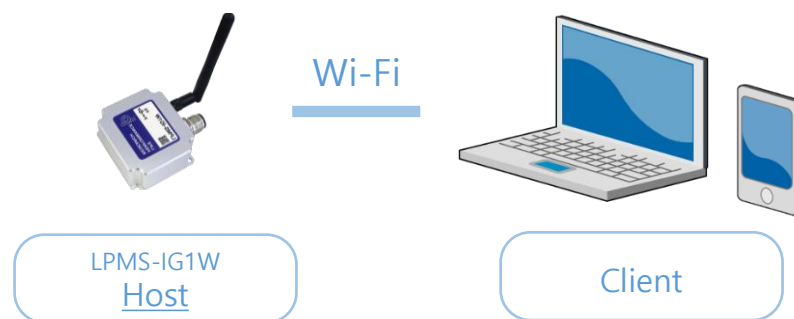
## Application

・Remote-controlled robots, robot arms, etc.

・IoT applications such as abnormal vibration detection

・VR/AR tracking systems

・AGV navigation systems



Gyro sensor → Kalman Filter

Acceleration sensor → Kalman Filter

Geomagnetic sensor → Kalman Filter

Raw data
  Angular velocity
  Acceleration
Real-time calculation
  Attitude information
  Transformation acceleration

→ USB → Host

## Two types of connection methods

### 1 Without Wi-Fi router

Connection example

Wi-Fi

LPMS-IG1W
Host

Client
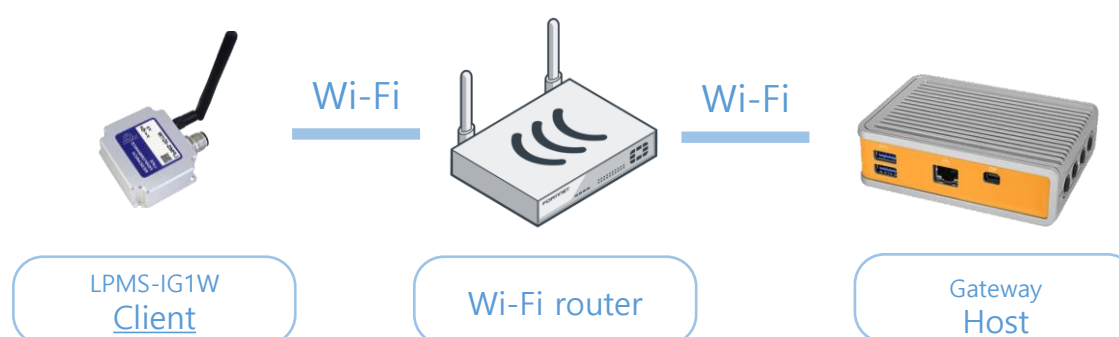
LPMS-IG1W becomes a Wi-Fi hotspot, and can be directly connected without a Wi-Fi router

### 2 With Wi-Fi router

Connection example

Wi-Fi      Wi-Fi

LPMS-IG1W
Client

Wi-Fi router

Gateway
Host

If there is a Wi-Fi network, data can be sent via MQTT

**Data Acquisition method** — Data can be acquired via socket communication or MQTT
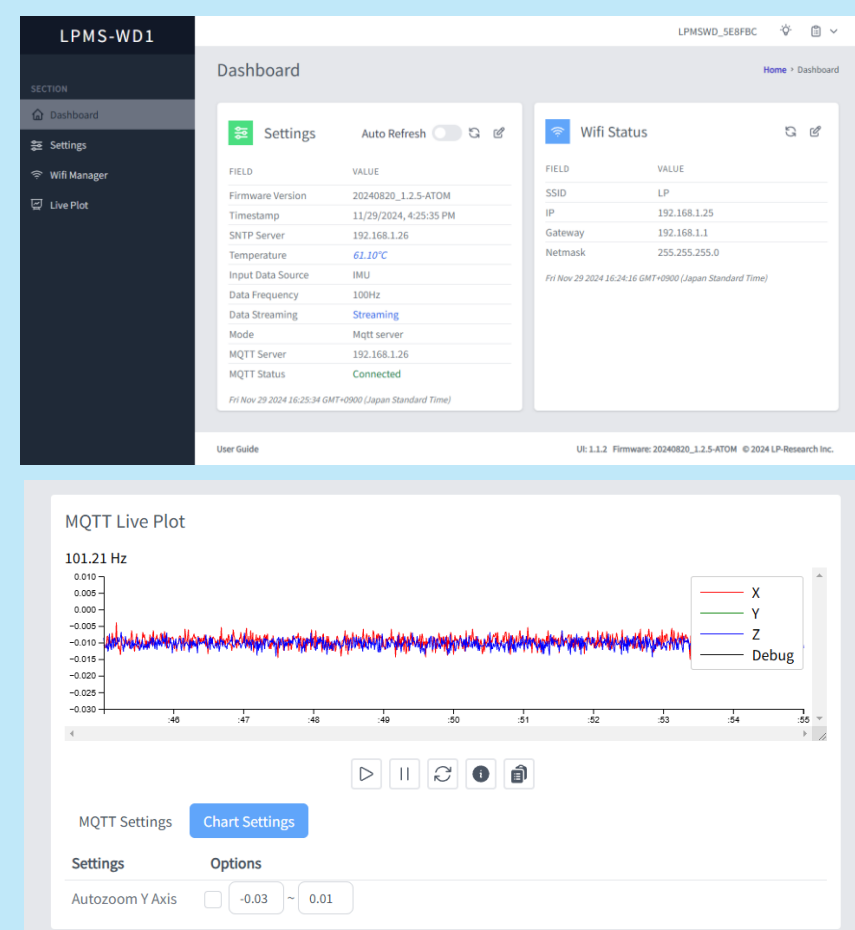
## Check sensor data and change settings remotely.

### The LPMS-IG1W can host web pages

・This product can host web pages on its own
・Devices on the same network as this product or via a web browser can access it

### Remote data confirmation, modification, and operation

・Measurement data from this product can be confirmed in real-time graphs from the hosted web page
・ The connection status and temperature of this product can also be confirmed
・ Various settings such as the type of data to be acquired and measurement frequency can be changed remotely
・ Sensor commands such as the calibration initialization command can also be executed

### Example of how it will look in the browser (the screen is still under development)

**LPMS-WD1**                                              LPMSWD_5E8FBC

**Dashboard**                                         Home › Dashboard

SECTION

⌂ Dashboard

⚙ Settings          **Settings**   Auto Refresh ⦿ ↻ ☰       **Wifi Status**   ↻ ☰

📶 Wifi Manager

📈 Live Plot        FIELD              VALUE                  FIELD      VALUE

Firmware Version   20240820_1.2.5-ATOM    SSID       LP

Timestamp          11/29/2024, 4:25:35 PM IP         192.168.1.25

SNTP Server        192.168.1.26           Gateway    192.168.1.1

Temperature        61.10°C                Netmask    255.255.255.0

Input Data Source  IMU

Data Frequency     100Hz          Fri Nov 29 2024 16:24:16 GMT+0900 (Japan Standard Time)

Data Streaming     Streaming

Mode               Mqtt server

MQTT Server        192.168.1.26

MQTT Status        Connected

Fri Nov 29 2024 16:25:34 GMT+0900 (Japan Standard Time)

User Guide                        UI: 1.1.1  Firmware: 20240820_1.2.5-ATOM  © 2024 LP-Research Inc.

**MQTT Live Plot**

101.21 Hz

[live plot: X, Y, Z, Debug]

▷  ❚❚  ↻  ⓘ  🗐

MQTT Settings   **Chart Settings**

Settings        Options

Autozoom Y Axis    ☐   -0.03  ~  0.01

LP-RESEARCH Inc.#201 Re-Flat, 3-10-4, Motoazabu, Minato-ku, Tokyo, 106-0046

Email: sales@lp-research.com Web: https://www.lp-research.com

## Sensor Specifications

| Part number | **LPMS-IG1W** |
|---|---|
| Interface | Wi-Fi + USB |
| Weight | 115g |
| Size | 51×45×24mm |
| Static orientation stability | #1: 4 °/hour, #2: 6 °/hour |
| Orientation range | 360° about all axes |
| Resolution | < 0.01° |
| Accuracy | < 0. 3° (static), < 1° RMS (dynamic) |
| Accelerometer | 3-axis, ±20 / ±40 / ±80 / ±160 m/s2, 16 bits |
| Gyroscope (2 types installed) | Gyro #1: 3-axis, ± 400 dps, 24 bit; Gyro #2: 3-axis, ± 1000 / ± 2000 dps, 16 bit |
| Magnetometer | 3-axis, ± 4 / ± 8 / ± 12 / ± 16 gauss, 16 bits |
| Gyro-noise density | #1: 0.002 dps/√Hz, #2: 0.004 dps/√Hz |
| Data output format | Raw data / Euler angle /Quaternion |
| Data output rate | 5 ~ 500 Hz |
| *Power consumption | 0.85W (0.07A@12V) |
| Power supply | 5 V ~ 36 V DC |
| Temperature range | -20 ~ +80°C |
| Connector | M12 connector |
| Case material | Aluminum, waterproof (IP67) |
| Wi-Fi information | Maximum transmission distance: 10 ~ 30m (※1), Wi-Fi frequency band: 2.4GHz, Communication protocol: TCP/IP I MQTT, Wi-Fi output frequency: MQTT 5~200Hz, Socket 5~500Hz |
| Software | Windows C++ library, Java library for Android, LPMS Control (Data analysis software), Open Motion Analysis Toolkit (OpenMAT) for Windows |

※1: The communication range may change depending on the usage environment.

\* Performance parameters are measured at **+25°C**. Other temperatures may result in varying reference values.
※Please refer to the product manual for more detailed specifications.

## External dimensions
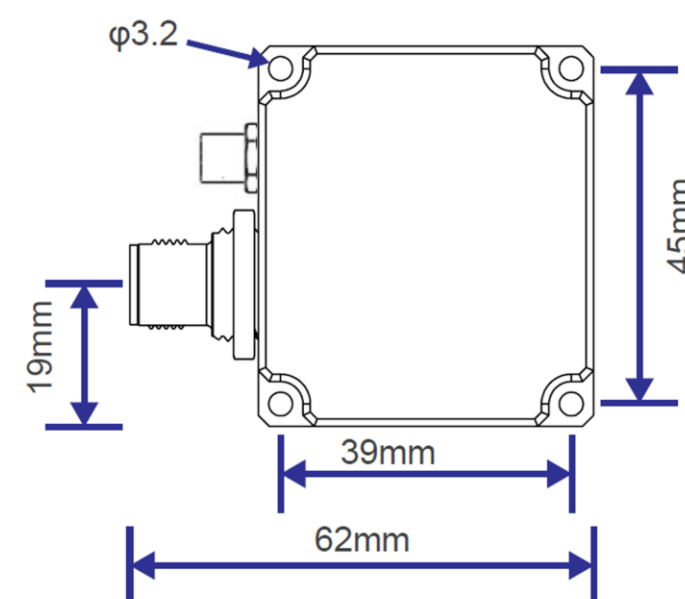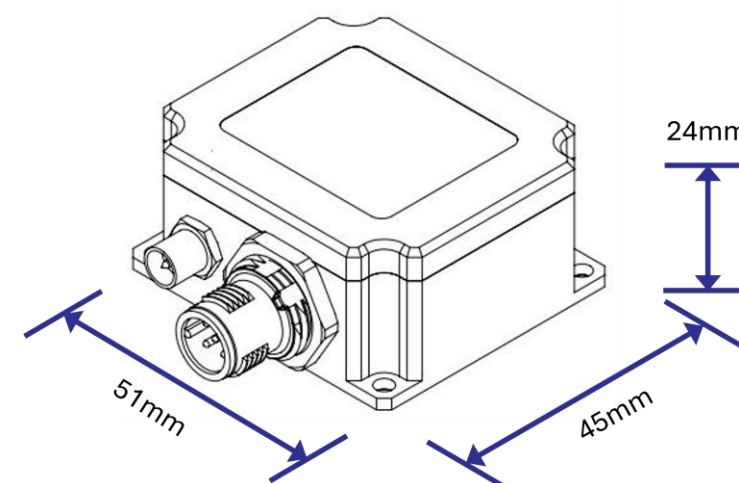


## LPMS-IG1W High-precision gyroscope (#1) Allan variance graph
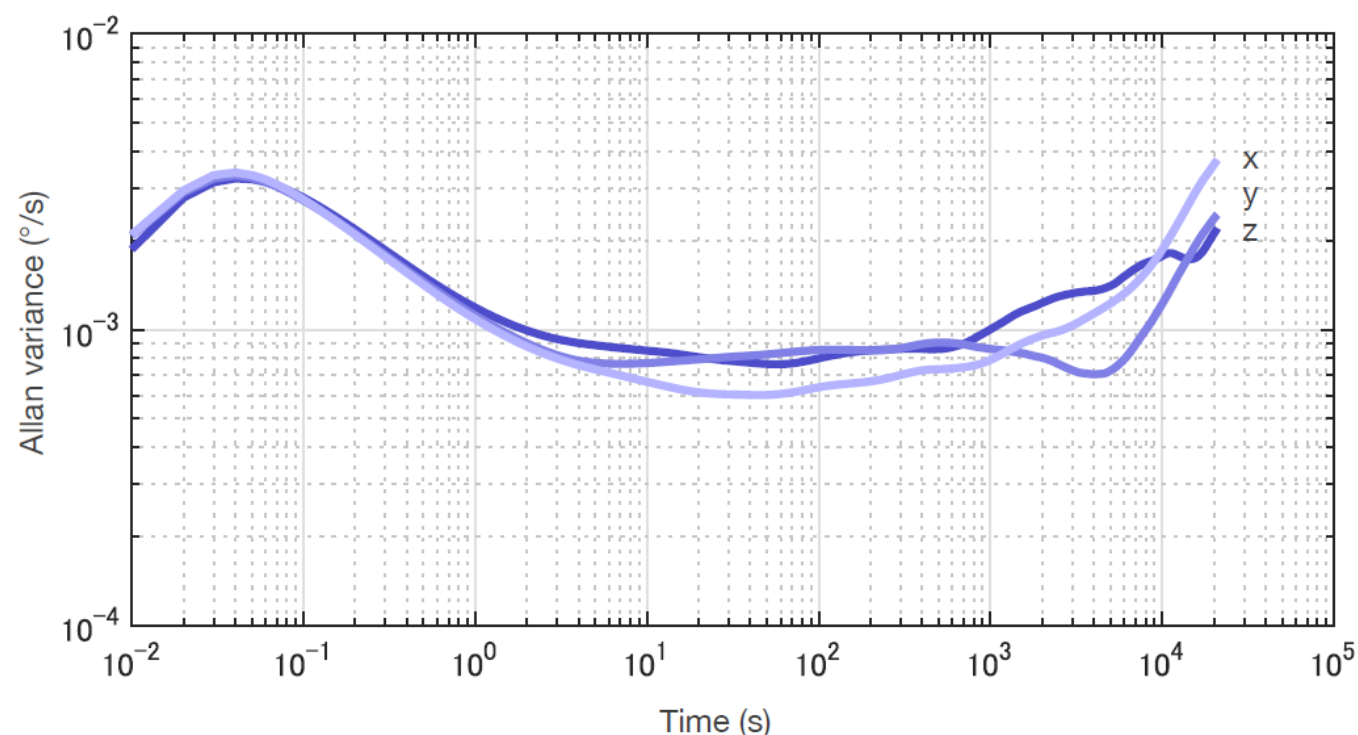


## Package

- LPMS-IG1W sensor× 1
- Antenna× 1
- Instruction Manual× 1
- Cable (included USB connector) × 1
- Warranty (1 year)