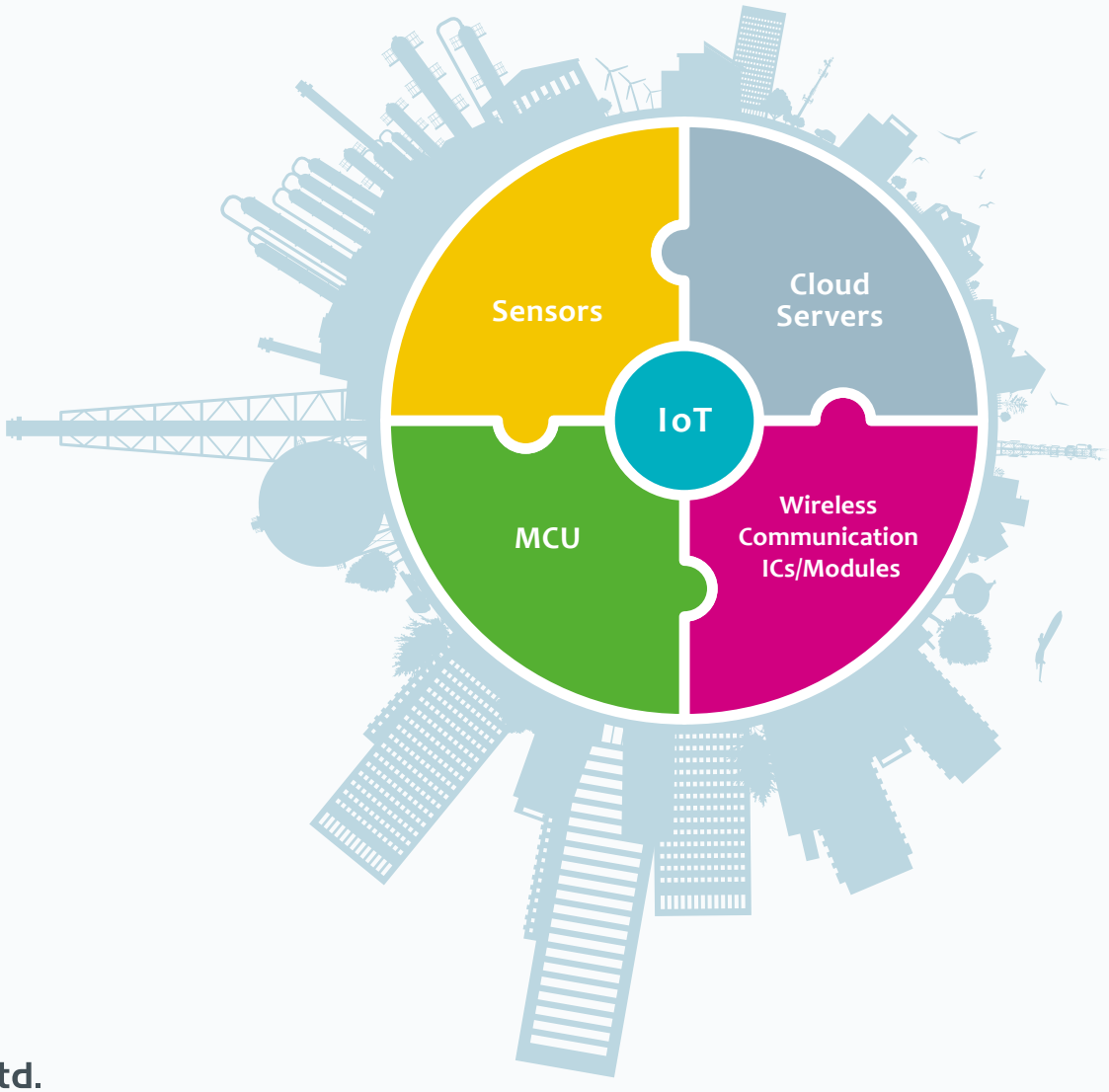
ROHM
SEMICONDUCTOR

Connect with IoT

Start using in just **10** minutes

# ROHM IoT Solutions

Creating novel devices and applications.
Semiconductor solutions that expand the possibilities of IoT.
Supporting manufacturing and contributing to society through innovative technologies.




ROHM Co.,Ltd.

Connect with IoT

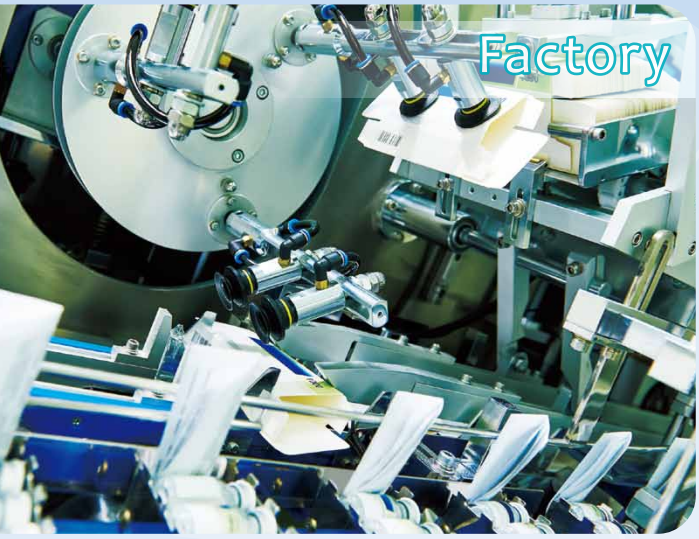
# IoT Initiatives

Achieving IoT, in which a wide range of devices are connected to the Internet, requires sensors for detecting environmental and physical conditions, MCUs for processing sensor information, and networks for transmitting and sharing the data.

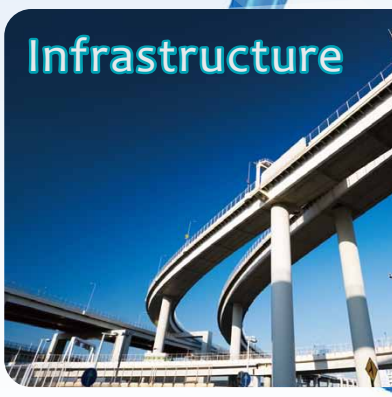
The ROHM Group has been committed to proposing solutions and developing products for constructing sensor networks.

For example, proprietary sensor technologies are used to achieve long-term sensing operation in machine health monitoring and social infrastructure applications. Providing the capability of monitoring and detecting abnormal sensor information will make it possible to prevent breakdowns and accidents before they occur. We also believe that sensor networks will lead to the realization of new systems and applications.

ROHM will continue to leverage its experience, expertise, and technologies to contribute to safer, more comfortable living through IoT.







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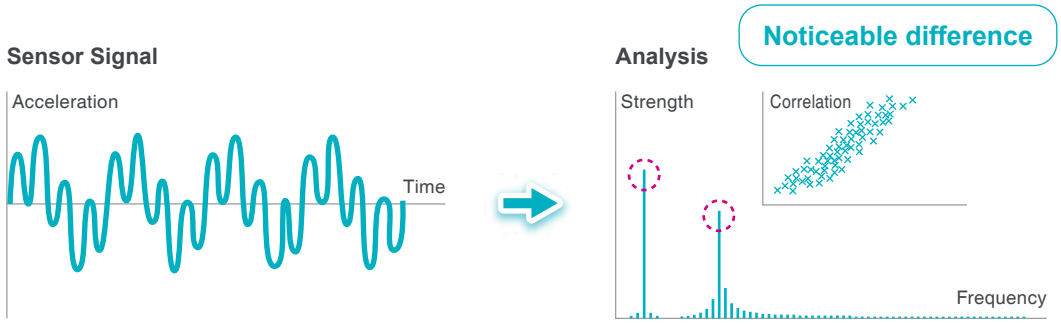
Kionix®

The ROHM Group

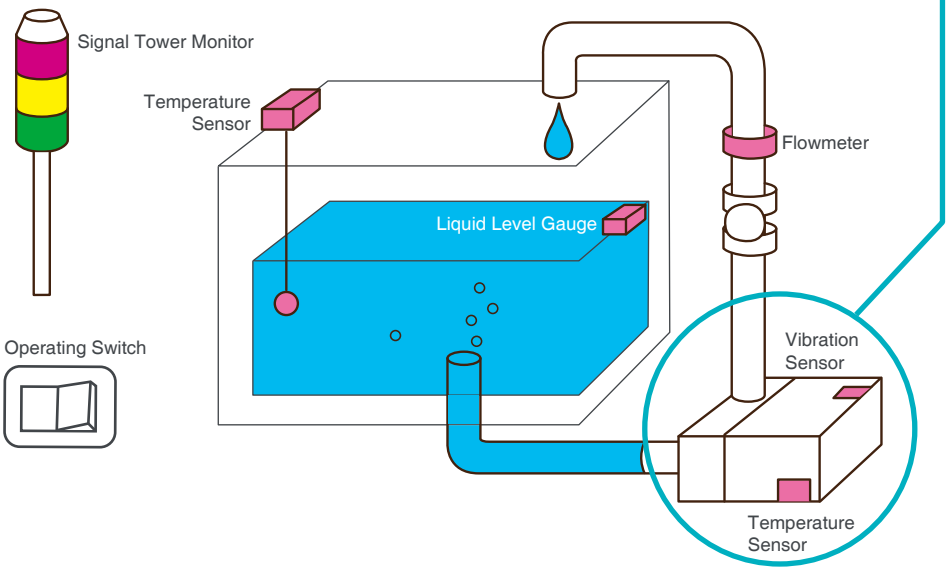
# Connect with IoT

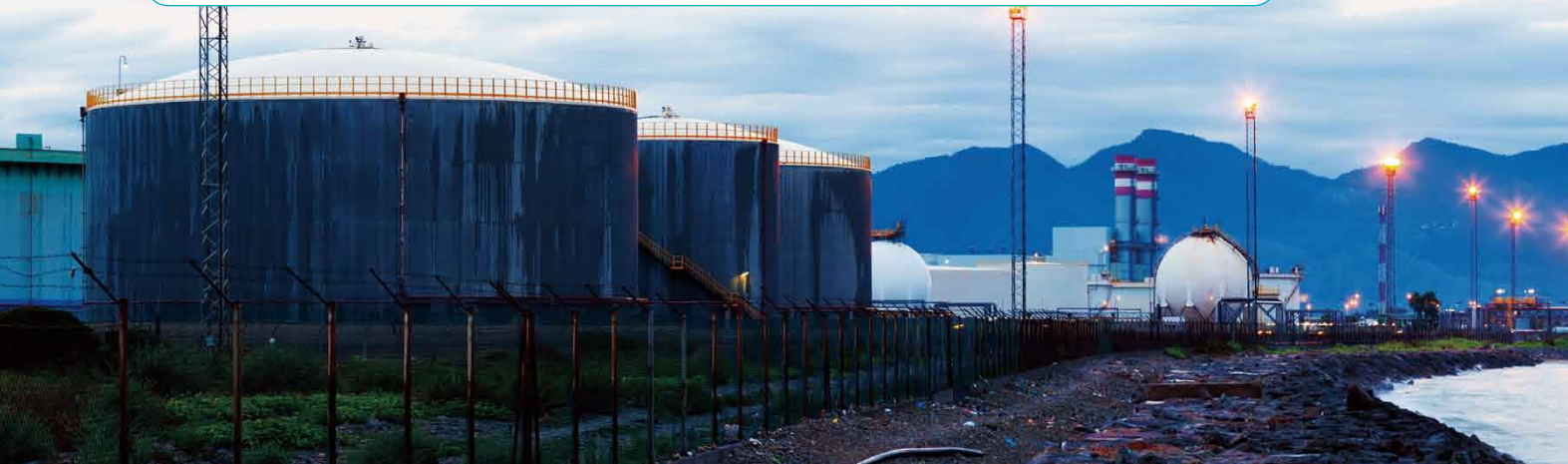
Typically, symptoms arise before a machine breaks down.
In these cases, ROHM believes failures and breakdowns can be prevented through constant monitoring for abnormalities in order to prevent sudden machine stoppages.


## Algorithm-Based Analysis



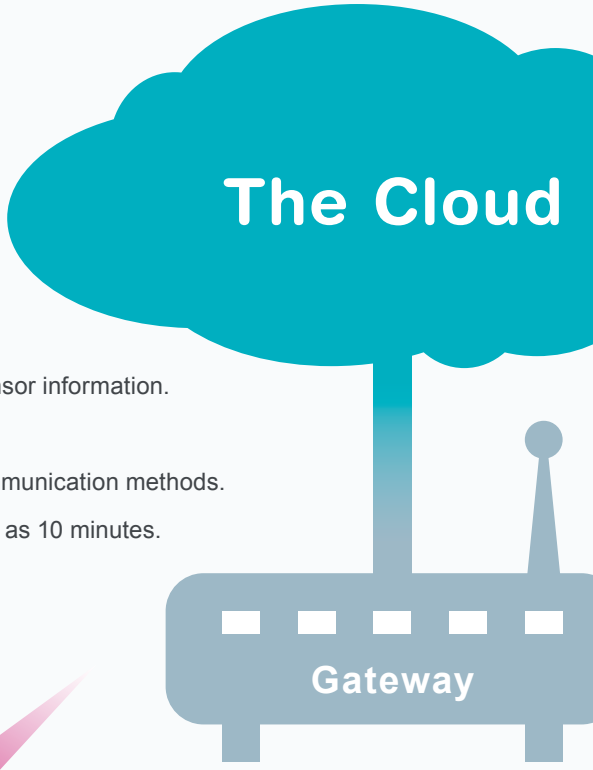

## Monitoring



ROHM Group

# IoT Solutions




When introducing IoT, the first step is to acquire sensor data
from various devices and use a network to collect this data.
However, many challenges exist in collecting, processing, and transmitting sensor information.
ROHM offers a variety of sensors that make it easy to achieve IoT along
with a development kit designed to acquire sensor data utilizing optimized communication methods.
The development kit is designed to implement IoT and can be set up in as little as 10 minutes.

Communication Distance
**up to 500m**

Wi SUN

## Optimized for a Wide Range of Fields

The SensorShield-EVK-001 evaluation kit is capable of long-distance communication with low power consumption, making it suitable for applications requiring transmission over wide spaces such as factories and the outdoors.

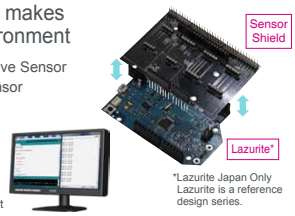
### IoT Solutions

**SensorShield-EVK-001**
**Evaluation Kit**

MOUSER ELECTRONICS · Digi-Key · RS

Arduino-compatible sensor shield makes it easy to configure a sensor environment

- Accelerometer
- Gyroscope
- Geomagnetic
- Pressure Sensor
- 10-Axis Motion Module
- Color Sensor
- Optical Pulse Wave Sensor
- Temperature Sensor
- Ambient Light + Proximity Sensor
- Hall IC




Measurement in Arduino environment

*Lazurite Japan Only
Lazurite is a reference design series.

**BP35C2 USB Dongle**
USB dongle with Wi-SUN compatible firmware


BP35C2 USB Dongle
Operating Temp. Range:
−20°C to +50°C

Surface Mount Wi-SUN Module
**BP35C0 Built In**

- Integrated System IC: ML7416N (LAPIS Semiconductor)
- 920MHz Band Transmission/Reception Type
- ARIB STD-T108 Compliant
- Supply Voltage: 2.6 to 3.6V (Single Power Supply)
- Host CPU I/F: UART
- Operating Temp. Range: −30°C to +85°C

| Frequency | Target Country/Region | SMD Type Part No. | USB Dongle Type Part No. |
|---|---|---|---|
| 920MHz | Japan (ARIB STD-T-108) | BP35C0 | BP35C2 |
| 915MHz | North America (FCC PART 15) | Under Development | Under Development |
| 868MHz | EU, India (ETSI EN 300 220) | Under Development | Under Development |

Each product will support a different frequency based on country/region.

**Application Examples:** IT agriculture, smart factories

**Sensors can be used for**

Communication Distance
**10 to 100m**

Wi Fi

## Control Using a PC

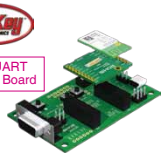
ROHM offers modules that integrate a TCP/IP protocol stack with authentication and encryption (supplicant and WPS), allowing for easy connection with Wi-Fi compatible devices.

### IoT Solutions

**BP359C Evaluation Board**

MOUSER ELECTRONICS · Digi-Key

FCC (North America) and Japan Radio Law certified
Immediately start sensor evaluation and development wireless LAN modules




- Built-In RS-232C I/O
- USB–UART Conversion
- Supports USB Bus Power

Wireless LAN Module Lineup


Only the BP359B is Japan Radio Law certified.

**Application Examples:** Sensor control from a PC or tablet

**Sensors can be used for**

## ROHM Group Sensor Devices

### Motion Sensors

Accelerometer, Gyroscope, Geomagnetic, Pressure

### Environmental Sensors

Color, Pulse, Temperature, Ambient Light, Proximity, Infrared, Hall, Soil

### Sensor I/F

Capacitive Switch, Touch Screen, Motion Detection

Communication Distance
**up to 100m**

enocean alliance
No Wires. No Batteries. No Limits.

## Batteryless EnOcean Kit

EnOcean's ultra-low-power communication device features a wire-free, batteryless design that eliminates the need for regular maintenance (i.e. battery replacement) and allows mounting virtually anywhere. The fact that no wiring is required (for power) makes it suitable for use in hotels, institutions, and places with important (cultural) assets.

### IoT Solutions

#### EDK Series Evaluation Kit

Programming kit ideal for firmware/application development, prototyping, and as a teaching tool

Included Items (i.e. EDK 400J)
- PTM 210J (Switch Module)
- USB 400J (USB Receiver Module)
- PTM 430J (Circuit Board for Switch Module)
- ECO 200 (Electromagnetic Induction Generator Element for Switch Module)
- STM 431J (Temperature Sensor Module)
- STM 400J (Wireless Energy Harvesting Module)*1
- EOP 350 (Programming Board)*2
- USB Cable (for Connecting the EOP 350 to a PC)

*Representative image

*1: The STM 400 in the EDK 400J is mounted on a dedicated board for connecting to the EOP 350.
*2: Used when writing firmware for STM 431J and STM 400J.

Dolphin V4 API (S/W)
Requires purchase of the EDK Series.
- Library files
- Peripheral functions manual
- Sample source code

Dolphin V4 Suite (S/W)
Software bundle that performs program writing, product settings, and chip calibration.

Keil Integrated Development Environment (µVision)
In conjunction with Dolphin V4 API/Suite (S/W), makes it possible to carry out a series of firmware (F/W) development tasks such as original firmware coding, compiling, and writing.

Dolphin View
An evaluation tool for evaluating and analyzing EnOcean® wireless signals.

| Frequency | Target Country/Region | EDK Series |
|---|---|---|
| 928.35MHz | Japan (ARIB STD-T-108) | EDK 400J |
| 868.300MHz | North America (FCC PART 15) | EDK 350U |
| 902.875MHz | EU, India (ETSI EN 300 220) | EDK 350 |

The frequency each product supports will vary depending on country/region

### Application Examples: HEMS, BEMS

Sensors can be used for

Communication Distance
**up to 10m**

Bluetooth®

## Control Using a Smartphone

These ultra-low-power modules integrate peripheral components required for operation, such as antennas, and have received radio certification not only in Japan, but in the US (FCC), Canada (IC), and the EU (CE) as well.

### IoT Solutions

#### MK71251-xxx-USB-EK USB Dongles

Multiple development tools offered
- GUI tools enables easy setting using a PC
- BLE Tool facilitates development and communication using a smartphone
- Smartphone app Beacon Tool provided for beacon evaluation

MK71251-02B-USB-EK
USB Dongle

BLE TOOL Free
Bluetooth® LSIs control smartphone application

BEACON TOOL Free
Bluetooth® LSIs Smartphone app Beacon Tool provided for beacon evaluation

Google play App Store

### Application Examples: Sensor control using a smartphone

Sensors can be used for

*Bluetooth® is a registered trademark of Bluetooth® SIG

*EnOcean® is a registered trademark of EnOcean® GmbH.

# Sensor Shield

SensorShield-EVK-001

ROHM's sensor shield is an evaluation kit that allows users to combine and operate 10 high-performance sensors. The sensor expansion board supports open MCU platforms such as Arduino Uno and mbed*. A dedicated site offers a variety of materials for download, including manuals and development software, enabling initial set development of modules with sensing and wireless capability.

## Sensor Kit Lineup

| Sensor | Part No. |
|---|---|
| Accelerometer | KX022-1020 |
| Pressure Sensor | BM1383AGLV |
| Geomagnetic | BM1422GMV |
| Gyroscope | New KXG03-EVK-001 |
| 10-Axis Motion Module | New IMU-10DOF-EVK-001 |

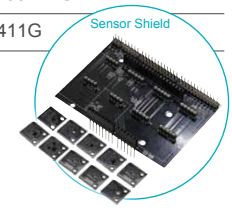
| Sensor | Part No. |
|---|---|
| Color Sensor | BH1745NUC |
| Optical Pulse Wave Sensor | New BH1790GLC-EVK-001 |
| Temperature Sensor | BD1020HFV |
| Ambient Light + Proximity Sensor | RPR-0521RS |
| Hall IC | BD7411G |

A variety of materials (i.e. documents, software) are available for download from ROHM's sensor shield web page.

### Sensor Shield Web Page

http://www.rohm.com/web/global/sensor-shield-support

*Refers to a prototyping MCU board and development environment supplied by ARM.




# Sensor Medal

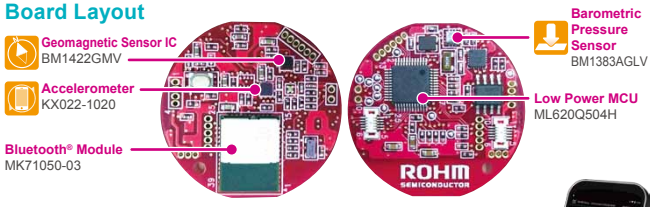
ROHM's Sensor Medal is a wireless sensor evaluation kit that integrates multiple ROHM Group motion sensors. It can instantly detect the wearer's activity or the location/movement of equipment.
The energy efficient design is ideal for IoT devices, while the built-in low-power MCU makes it easy to evaluate sensor data by downloading a dedicated application for smartphones and tablets.

### Application Examples

- Movement/fall detection (acceleration, barometric pressure, gyro)
- Metal detection (geomagnetic field)
- Altitude measurement (barometric pressure)
- Activity monitoring (acceleration, barometric pressure)
- eCompass (geomagnetic field, acceleration)
- Muscular strength measurement (acceleration)

## JAPAN

### Board Layout




### Supporting Materials

Documents: Circuit diagrams, manuals

Software: Evaluation app
Compatible with iOS and Android™ 4.3 or later (Min. screen size: 7in.)
Verified device: 2013 Nexus 7


### Applications

Application and sensor loggers that chronologically display the measurements of each installed sensor are available (software compatible with Android™).
In addition, developing firmware and algorithms makes it possible to achieve a variety of applications by combining the measurements of each sensor.

### Web Page

All required documents and software can be downloaded from ROHM's website.

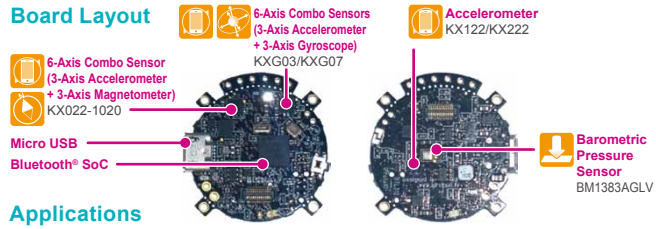
QR Code

URL(Japanese Only)
http://www.rohm.co.jp/web/japan/sensor-medal-support

*Android™ is a registered trademark of Google Inc.

## EU / India

### Board Layout




### Applications

Python/C/C++/C# and other programming education

### Web Page

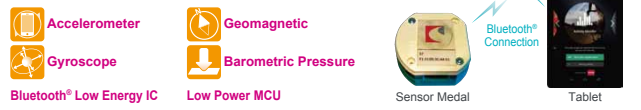
Technical details, Software download, Where to buy :

QR Code

URL
https://www.iprotoxi.fi/index.php/services/iprotoxi-aistin-blue

## North America

### Embedded Devices




### Web Page

All information is available on the below websites.

QR Code

URL
http://www.kionix.com/iot-evaluation-and-development-kit

## Online Distributors

(Single units available for purchase)

MOUSER ELECTRONICS

QR Code

URL：http://www.mouser.com/

Digi-Key ELECTRONICS

QR Code

URL：http://www.digikey.com/

RS

QR Code

URL：http://www.rs-components.com/

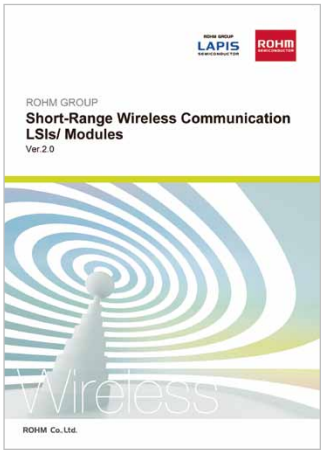
# ROHM IoT Catalogs

In addition to this ROHM IoT Solutions pamphlet, Short-Range Wireless Communication LSIs/Modules and Sensor Catalogs are offered.


## Sensor Catalog

Contains detailed information on ROHM Group sensor products.

The broad lineup ranges from environmental sensors that can quickly detect ambient conditions to motion sensors capable of accurately detecting the orientation and movement of objects.




## Short-Range Wireless Communication LSIs/Modules

Includes product lineups and detailed descriptions.

ROHM offers a wide variety of short-range wireless communication ICs and modules covering the Sub-GHz to 2.4GHz bands, allowing users to select the ideal product/protocol (i.e. IEEE802.15.4, specified low power wireless, Bluetooth®) based on set requirements.




## ROHM Sales Offices

Contact us for further information about the products.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Santa Clara** | +1-408-720-1900 | **Germany** | +49-2154-921-0 | **Dalian** | +86-411-8230-8549 | **India** | +91-80-4125-0811 |
| **Atlanta** | +1-770-754-5972 | **Stuttgart** | +49-711-7272370 | **Shanghai** | +86-21-6072-8612 | **Kyoto** | +81-75-365-1218 |
| **Boston** | +1-978-371-0382 | **France** | +33 (0) 1 40 60 87 30 | **Shenzhen** | +86-755-8307-3008 | **Yokohama** | +81-45-476-2121 |
| **Chicago** | +1-847-368-1006 | **United Kingdom** | +44-1-908-272400 | **Hong Kong** | +852-2740-6262 | | |
| **Denver** | +1-303-708-0908 | **Oulu** | +358-400-726124 | **Taiwan** | +886-2-2500-6956 | | |
| **Detroit** | +1-248-348-9920 | **Spain** | +34-9375-24320 | **Singapore** | +65-6436-5100 | | |
| **San Diego** | +1-858-625-3600 | **Hungary** | +36-1-950-5859 | **Philippines** | +63-2-807-6872 | | |
| **Mexico** | +52-33-3123-2001 | **Russia** | +74 95 739 4174 | **Thailand** | +66-2-254-4890 | | |
| **Brazil** | +55-11-3539-6320 | **Seoul** | +82-2-8182-700 | **Malaysia** | +60-3-7931-8155 | | |



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