Connect with IoT

ROHM IoT Solutions

ROHM SEMICONDUCTOR

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.

ROHM SEMICONDUCTOR

ROHM GROUP LAPIS SEMICONDUCTOR

Kionix®

Adding sensor, control, and network algorithms

IoT Initiatives

Achieving IoT, in which devices are connected to the internet, involves sensors for detecting conditions, MCUs for processing sensor information, and networks for sharing and transmitting data. For many years, ROHM has been working on developing products and proposing solutions for creating sensor networks across the entire ROHM group.For example, one area where IoT is expected to make a significant impact is long-term equipment monitoring for machine health and infrastructure. Analyzing sensor data and creating algorithms to detect abnormalities will make it possible to predict breakdowns and accidents before they occur. We believe that new systems and services such as this will emerge as networks continue to evolve and expand, driving ROHM to leverage its resources and technologies to contribute to meeting the needs of the market and society.

ROHM provides total solutions including **sensors** and **wireless communication** required for IoT

ROHM OPEN SOLUTIONS LAB

ROHM Open Solutions Lab opened this spring as a communications space created with the goal of creating new solutions with customers by utilizing open source hardware and software.

Kyoto Technology Center

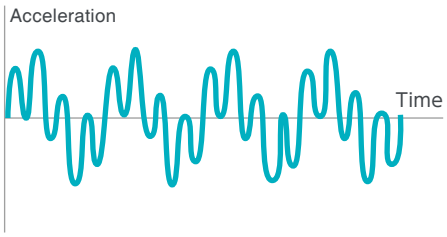
Cloud

Gateway

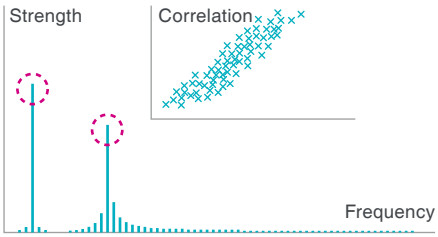
Algorithm-Based Analysis

Detecting abnormalities

Sensor Signal



Frequency Analysis



Detected abnormalities are sent to a gateway to be used for monitoring, operation, prevention, and improvement

ROHM IoT SOLUTIONS LAB Factory Area

A Abnormal Barometric Pressure Detection

Enables monitoring of the current value and changes in atmospheric pressure.

Barometric pressure sensor,
Wi-SUN communication module

B Automatic Dimmer Control

Detects brightness and automatically monitors dimming and lighting conditions.

Ambient light sensor, LED driver

D Color Identification Management

Detects colors and monitaes misuse and status.

Color sensor,
Wi-SUN communication module

C Abnormal Vibration Detection

Monitors operating status. Allows for abnormality detection and predictive management.

Accelerometer, EnOcean® wireless communication module, high performance and ultra-low-power MCU

ROHM IoT SOLUTIONS LAB Home Area

A Lighting Control

Performs indoor/outdoor operation and monitoring of lighting pattern and color temperature.

Wi-SUN communication module

B Presence Detection Control

Detects the presence of people and performs device operation. Supports wireless communication using energy harvesting technology.

EnOcean® wireless module

C Temperature/Humidity Management

Detects the humidity and temperature and monitors the indoor environment.

EnOcean® temperature/humidity sensor modules

D Open/Close Monitoring

Detects the opening/closing of doors and windows and manages status. Monitors door locks and manages indoor traffic.

EnOcean® magnetic contact module

Connect with IoT

Communication using the universal 2.4GHz frequency band

Wi-Fi Module Evaluation Kits

BP359x series

The BP359x series integrates ROHM's BU1805GU system IC and is certified under both the IEEE802.11b/g/n standard and Japan's Radio Law. Pre-tuned wireless characteristics and built-in antenna allow customers to skip radio waves and immediately begin evaluation and development without complicated characteristics adjustment.
In addition, the optimized antenna configuration eliminates the need for high-frequency designs.

UART

- Onboard RS-232C I/O
- USB-UART conversion
- Supports USB BUS power

*BP395D can be used with both BP3591 and BP3599. (When using BP3591 perform startup with the flash memory on BP359D. When using BP3599 perform startup using the flash memory on BP3599.)

Wireless LAN Module Lineup

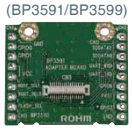
BP3591

BP3595

BP3599

Adapter Boards

BP359D (BP3591/BP3599)



BP359F (BP3595)

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

Wi-Fi Support Page

URL: http://www.rohm.com/web/global/wireless-lan-support

Note: This is product limited to Japan.

enocean

No batteries, wires, or maintenance required

EnOcean® Evaluation Kit

EDK 400J

EnOcean's module is an ultra-low-power wireless communication device that can be installed virtually anywhere, featuring a battery-less design that requires no maintenance.
The lack of wiring allows it to be introduced even in hotels and important cultural institutions. The EDK 400J evaluation kit is a programming kit that facilitates application development.

Bundled Products (i.e. EDK 400J)

- PTM 210J (Switch Module)
- USB 400J (Receiver USB Module)
- PTM 430J (Electronic Circuit Board for Switch Module)
- ECO 200 (Electromagnetic Induction 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)

*Evaluation Kit Contents

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

Dolphin V4 API (S/W)

EDK 400J is available for purchase.

- Library files
- Manual on peripheral functions
- Sample source

Dolphin V4 Suite (S/W)

A software group for performing program writing, device settings, and chip calibration.

Keil integrated development environment (µVision)

Together with Dolphin V4 API/Suite (S/W), allows for series firmware development including original firmware coding, compiling, and writing.

Dolphin View

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

Frequency	Target Country/Region	EDK Series
920MHz	Japan (ARIB STD-T-108)	EDK 400J
902MHz	North America (FCC PART 15)	EDK 350U
868MHz	EU, India (ETSI EN 300 220)	EDK 350

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

Dedicated EnOcean® Site

URL: http://www.rohm.com/web/global/enocean

Registered as a Wi-SUN certified CTBU

Wi-SUN USB Dongle

BP35C2

ROHM's BP35C2 is a USB dongle that integrates the BP35C0 featuring class-leading* reception sensitivity.
The built-in antenna, pre-adjusted wireless characteristics, Radio Law certification, and installed MAC addresses make it possible to easily construct a Wi-SUN environment by simply connecting to the USB port of IoT equipment such as home gateways.

BP35C2 USB Dongle

- Host CPU I/F: USB
- Size: 21.4×49.7×8.5
- Supply voltage: 4.5 to 5.5V (single power supply)
- Operating Temperature: −20 to +50

Onboard Wi-SUN Module BP35C0

- Built-in system LSI: ML7416N
- 920MHz band transceiver type
- Compatible with ARIB STD-T108
- Supply voltage: 2.6 to 3.6V (single power supply)
- Host CPU I/F: UART

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 Planning	Under Planning
868MHz	EU, India (ETSI EN 300 220)	Under Planning	Under Planning

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

Ideal for compact communication equipment such as HEMS controllers and consumer appliances

The BP35C0 is a compact surface-mount Wi-SUN module (utilizing external antenna) equipped with an MCU, 920MHz band radio communication function (RF) featuring class-leading* reception sensitivity, and LAPIS Semiconductor's ML7416N wireless communication IC with large memory capacity optimized for Wi-SUN.
In addition, support for HAN and Wi-SUN B route profile is provided in a class-leading* small 15mm×19mm size, making it ideal for HEMS controllers and home appliances.
Naturally, the dongle conforms to the ARIB STD-T108 standard, ensuring compliance under Japan's Radio Law.

Wi SUN ALLIANCE Advancing seamless connectivity

Note: This is product limited to Japan.

*ROHM October 2017 study

Wi-SUN-certified CTBU

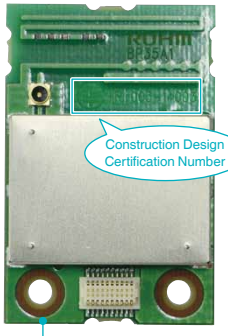
MCU-Equipped RF Module

BP35A1

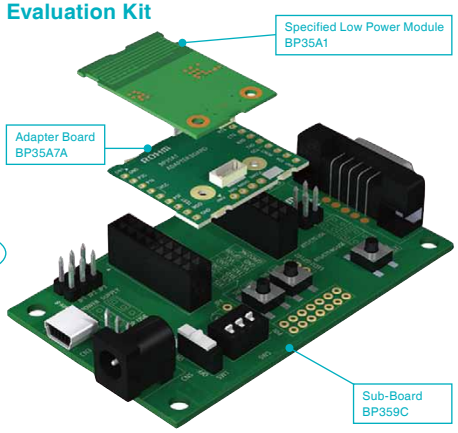
The BP35A1 is a 920MHz specified low power wireless module that supports Wi-SUN (Wireless Smart Utility Network). Incorporating a 32bit high power MCU enables adoption in a variety of HEMS devices.
In addition, the user-friendly module is Radio Law certified (Japan) and includes firmware is compatible with the Wi-SUN standard ideal for IoT/M2M/HEMS/BEMS equipment. It is also registered as a CTBU (Certified Test Bed Unit) recognized by the Wi-SUN Alliance as a reference standard, playing the role of a reference unit for Wi-SUN communication.

BP35A1

- Onboard RS-232C I/O
- USB-UART conversion
- Supports USB BUS power



Evaluation Kit



Note: This is product limited to Japan.

*ROHM October 2017 study

ROHM GROUP
LAPIS SEMICONDUCTOR

coreStaff DIRECT

Wireless Communication/ MCU Evaluation Kits

Lineups other than wireless communication devices offered, including sensor-equipped modules and MCU boards

USB type enables immediate evaluation via PC

Bluetooth® USB Dongle

MK71251-02B-USB-EK

We offer tools for evaluating and developing applications using LAPIS Semiconductor's Bluetooth® module. In addition to a smartphone application (BLE Tool) that facilitates the development of communication devices with a smartphone, GUI tools for easy PC settings, and USB-type evaluation boards that enable immediate development using a PC, we contribute to customer development with a serial communication SDK, beacon SDK, and Beacon Tool smartphone application optimized for beacon development.

MK71251-02B-USB-EK (USB Dongle)

MK71251-02B-USB-EK (USB Dongle) are also compliant with the radio laws in the US (FCC), Canada (IC), and the EU (CE).
And even in wearables and other products expected to be adopted overseas, it will be possible to broadcast radio waves as in Japan.

Numerous Development Support Tools

The BLE TOOL smartphone app for Bluetooth® low energy control enables easy verification of Bluetooth® low energy device communication. In addition to 7 standard Bluetooth® SIG profiles*1 and services, users can perform evaluation and communication demos of LAPIS Semiconductor's original VSSPP (serial port profile) and VSP (acceleration profile).

BLE TOOL
Free
Bluetooth® LSIs
Control Smartphone Application

*1: HRP, HTP, BLP, GLP, ESS, BAS, DIS

Using the BEACON TOOL smartphone app for Bluetooth® low energy beacons makes it possible to evaluate the beacon device functionality of the MK71251-02B. In addition to evaluating beacon packet reception and display, operations such as updating of the iBeacon application code wirelessly using the OAU*2 function can be verified.

BEACON TOOL
Free
Bluetooth® LSIs
Beacon Evaluation Smartphone Application

*2: Over the Air Update: wireless update function

Download on the App Store
ANDROID APP ON Google play

Integrates the industry's smallest SMD module BP35C0

BP35C0-Equipped Adapter Board

BP35C0-T01

ROHM's BP35C0-T01 evaluation board with built-in compact Wi-SUN compatible general-purpose module (BP35C0) supports connection to the BP359C.
Wi-SUN firmware is installed in the MCU, and the board has achieved certification under Japan's Radio Law in an industry-small* form factor (15mm×19mm), making it ideal for compact communication equipment such as HEMS controllers and consumer appliances utilizing Wi-SUN.

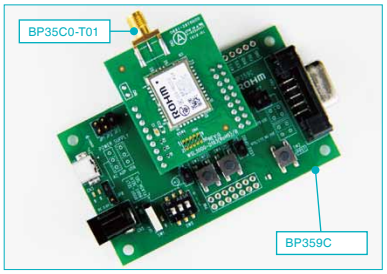
BP35C0-T01

Adapter board equipped with BP35C0

BP359C

Conversion board for UART I/F

- Onboard RS-232C I/O
- USB-UART conversion
- Supports USB BUS power



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

Wi-SUN Board Page (Japanese)
URL: http://micro.rohm.com/jp/download_support/wi-sun/

Note: This is product limited to Japan.

*ROHM October 2017 study

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Digi-Key ELECTRONICS
MOUSER ELECTRONICS

Integrated support provided, from design and coding to evaluation and ROM code writing

On-Chip Debug Emulator

uEASE/nanoEASE

LAPIS Semiconductor's program development support system consists of hardware and software tools that actively support program development. The software tools feature a user-friendly graphical user interface (GUI) that facilitate operation, making it possible to perform tasks more efficiently - from program creation and build (object creation) to debugging.

MCU with On-Chip Debugger uEASE

uEASE is a standard on-chip emulator that supports all LAPIS Semiconductor 8bit/16bit flash MCUs.
Size: 50.0 (D) × 90.0 (W) × 17.0mm (H) Weight: 50g

MCU with On-Chip Debugger nanoEASE

nanoEASE, which supports LAPIS Semiconductor 8bit/16bit flash MCUs (generate an internal voltage) that operate from a single power supply, is a more compact on-chip debug emulator than uEASE.
Size: 50.0 (D) × 60.0 (W) × 7.0mm (H) Weight: 15g

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MOUSER ELECTRONICS

ROHM Group MCUs for IoT

Low Power Microcontrollers

LAPIS Semiconductor's low-power MCUs achieve class-leading* performance by leveraging original low power technologies cultivated over many years.
For IoT, high performance a CMOS MCUs equipped with a proprietary 16bit RISC-type U16 core and 32bit ARM® Cortex®−M0+ are available. Other lineups are offered to meet diverse customer needs, including 'tough' MCUs strong against noise and high-temperature environments.

High Performance Ultra-Low Power 16bit MCUs ML620Q503H/ML620Q504H

These high performance 16bit CMOS MCUs integrate a proprietary RISC-type 16bit CPU U16 core. LAPIS Semiconductor was able to improve upon the low power technology of its 8bit U8 Core MCUs while increasing processing power. In addition, current consumption is reduced by optimally combining 3 power down modes, and the broad range of peripherals supports a variety of system requirements.

High Performance Ultra-Low Power 32bit MCUs ML630Q464/ML630Q466

32bit MCUs ideal for USB data loggers in cold chain applications. Built-in USB2.0, PDF generation function, and LCD driver makes it possible to safely store and transfer log data.

High Performance Low Power 'Tough' MCUs ML62Q1000 series

High performance 16bit CMOS MCUs utilizing an original U16 Core. This series inherits the superior noise immunity and high temperature characteristics of LAPIS Semiconductor's market-proven 'tough' MCUs. Superior processing performance with abundant peripherals is achieved while maintaining low power consumption. The lineup includes general-purpose high performance types with program memory ranging from 16KB to 256KB as well as models that integrate an LCD driver.

*ROHM October 2017 study

ROHM offers complete solutions,

Including Sensors › **Wireless Communication** › **Gateways** › **Cloud**

required for IoT

Cloud

Gateway

Proposed collaborations

We can provide proposals regarding device development in response to customer demands. We also offer optimal IoT solutions, including sensors, MCUs, and wireless communication, based on system proposals in collaboration with leading manufacturers.

System Gateway

Wireless Module

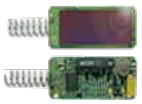
MCU

Sensing

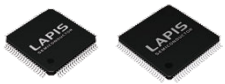
Sensing & Wireless







	Wi Fi	IEEE 802.15.4	Bluetooth	Wi SUN	enocean
Frequency Band:	2.4GHz	2.4GHz	2.4GHz	Broadband 900MHz band / Narrow Band 426/429MHz	920MHz band
Communication Distance:	Several tens of meters or more	Tens of meters	Approx. 10m	Approx. 500m / Hundreds of meters	Approx. 100m
Communication Speed:	72Mbps	250Mbps	1Mbps	50kbps and up / Up to 9,600bps	125kbps



Low Power MCU

Motion Sensors


Acceleration


Gyroscope


Geomagnetic


Pressure

Sensor I/F


Capacitive Switch


Touchscreen


Human Presence

Environmental Sensors

Color


Optical Heart Rate


Temperature


Ambient Light


Proximity


Infrared


Hall


Soil

Sensor evaluation kit featuring wireless communication

Sensor Evaluation Kit

Ideal for initial module development using sensors and radio

Sensor Evaluation Kit

SensorShield-EVK-002

This sensor shield is an evaluation kit designed to be used in combination with ROHM's high-performance sensor modules. The sensor expansion board supports open platforms such as Arduino Uno and mbed*. And various documents and software are available for download from the dedicated sensor shield page. Ideal for prototyping and initial set development.

Broad Sensor Lineup

Sensor	Part No.
Accelerometer	KX224-1053
Geomagnetic Sensor	BM1422AGMV
Pressure Sensor	BM1383AGLV
Color Sensor	BH1747NUC
Temperature Sensor	BD1020HFV
3-in-1 Ambient Light+ Proximity Sensor	RPR-0521RS
Hall IC	BD7411G
Optical Sensor for Heart Rate Monitor	BH1790GLC/BH1792GLC
Additional Sensor Modules (Sold Separately)	
6-Axis Combo Sensor (Accelerometer+Magnetometer)	☆ KMX62-1031
Accelerometers	☆ KXTJ3-1057/KX124-1051/KX126-1063
6-Axis Combo Sensor (Accelerometer+Gyro)	☆ KXG07-1080
10-Axis Motion Module	☆ KX123/BM1383AGLV/BM1422AGMV/KXG07

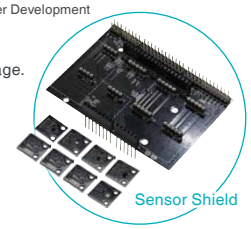
☆: Under Development

Various documents and software can be downloaded from the dedicated sensor shield page.

Sensor Shield Page

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

*: Refers to an MCU board for prototyping and programming environment supplied by ARM.



Sensor Shield

Provides wireless capability and instantaneous sensing with smartphones and tablets

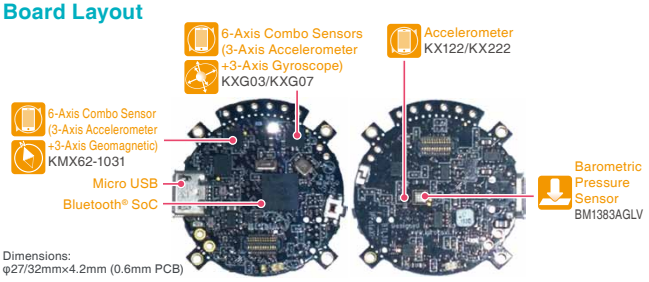
ROHM Sensor Medal

SensorMedal-EVK-001

ROHM's sensor medal is a wireless sensor evaluation kit that integrates ROHM group motion sensors. It can instantly detect the wearer's activity as well as the location/movement of equipment. In addition, the energy-saving design makes it ideal for IoT applications. And the built-in 16bit low power MCU facilitates evaluation of sensor data using an app on a smartphone or tablet.

North America or EU/India

Board Layout



Dimensions: φ27/32mm×4.2mm (0.6mm PCB)

Web Page Kionix IoT Evaluation Kit: Frequency 868MHz (North America)

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

All information is available on the below websites.

QR Code

Web Page Part No. BTL3X3/BTL4X1: Frequency 915MHz (EU/India)

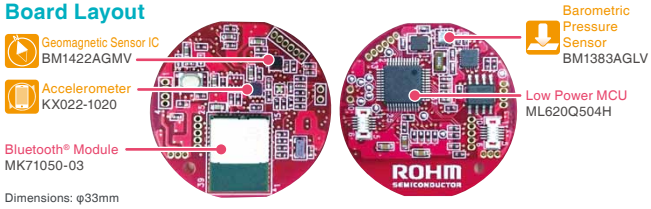
URL: https://www.iprotoxi.fi/index.php/services/iprotoxi-aistin-blue

Technical details, Software download, Where to buy.

QR Code

Japan

Board Layout



Dimensions: φ33mm

Applications

Applications and sensor loggers that chronologically display the data of each sensor are available. The software is compatible with Android™.

Web Page ROHM Sensor Medal: Frequency 920MHz(Japan)

URL: http://www.rohm.co.jp/web/japan/sensor-medal-support

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

QR Code

Note: Android™ is a registered trademark of Google Inc.

Online Distributors

Available for purchase in single units

Digi-Key ELECTRONICS

URL: http://www.digikey.com/

QR Code

Digi-Key Corporation focuses on providing customers with superior service, which includes product selection and availability, on-time delivery, and responsiveness. Using leading-edge processes and state-of-the-art technologies, Digi-Key serves a global customer base from its 600,000 square foot facility in Thief River Falls, Minnesota, USA.

MOUSER ELECTRONICS

URL: http://www.mouser.com/

QR Code

Mouser Electronics is a worldwide leading authorized distributor of semiconductors and electronic components for over 500 industry leading suppliers. We specialize in the rapid introduction of new products and technologies for design engineers and buyers. Our extensive product offering includes semiconductors, interconnects, passives, and electromechanical components.

coreStaff DIRECT

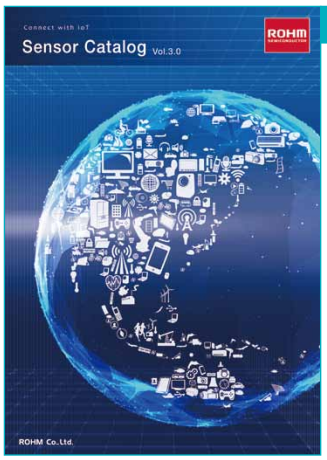
URL: https://www.corestaffamerica.com/

QR Code

CoreStaff Co., Ltd. is one of the largest and acknowledged electronic component distributor in Japan. CoreStaff specializes in importing, exporting, and sales of semiconductors and integrated circuits of various electronic manufacturers. We own and operate our own warehouse, as we are also one of Japan's largest stocking distributor with over 100,000 items in stock.

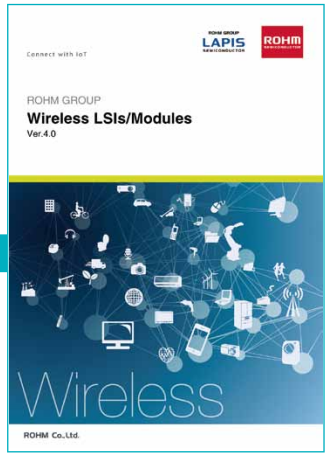
ROHM IoT Catalogs

In addition to this IoT brochure, we offer catalogs on our broad portfolio of sensors, wireless ICs/modules, and low power MCUs.



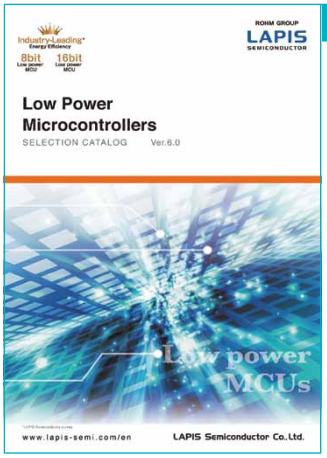
Sensor Catalog

Here we introduce the ROHM Group's broad portfolio of sensors, from motion sensors capable of accurately detecting the movement and orientation of objects to environmental sensors designed to quickly sense ambient conditions. Also included are interfaces for analyzing, amplifying, and processing sensor output signals.



Wireless LSIs/Modules

The ROHM Group's wireless communication ICs and modules are described in detail. The broad lineup covers the sub-GHz to 2.4GHz bands, allowing users to select the ideal protocol based on set requirements, from IEEE802.15.4 and Bluetooth® to even the newest standards such as LPWA.



Low Power Microcontrollers

ROHM Group company LAPIS Semiconductor achieves class-leading* performance by leveraging proprietary low-power technology. As such, they have been widely adopted in a variety of markets, including home appliances, industrial equipment, and infrastructure. The wide lineup includes both high performance types and low power 'tough' MCUs ranging from 8bit to 32bit, making it possible to meet a variety of application needs.

*LAPIS Semiconductor October 2017 study

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	+81-75-365-1077
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		
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