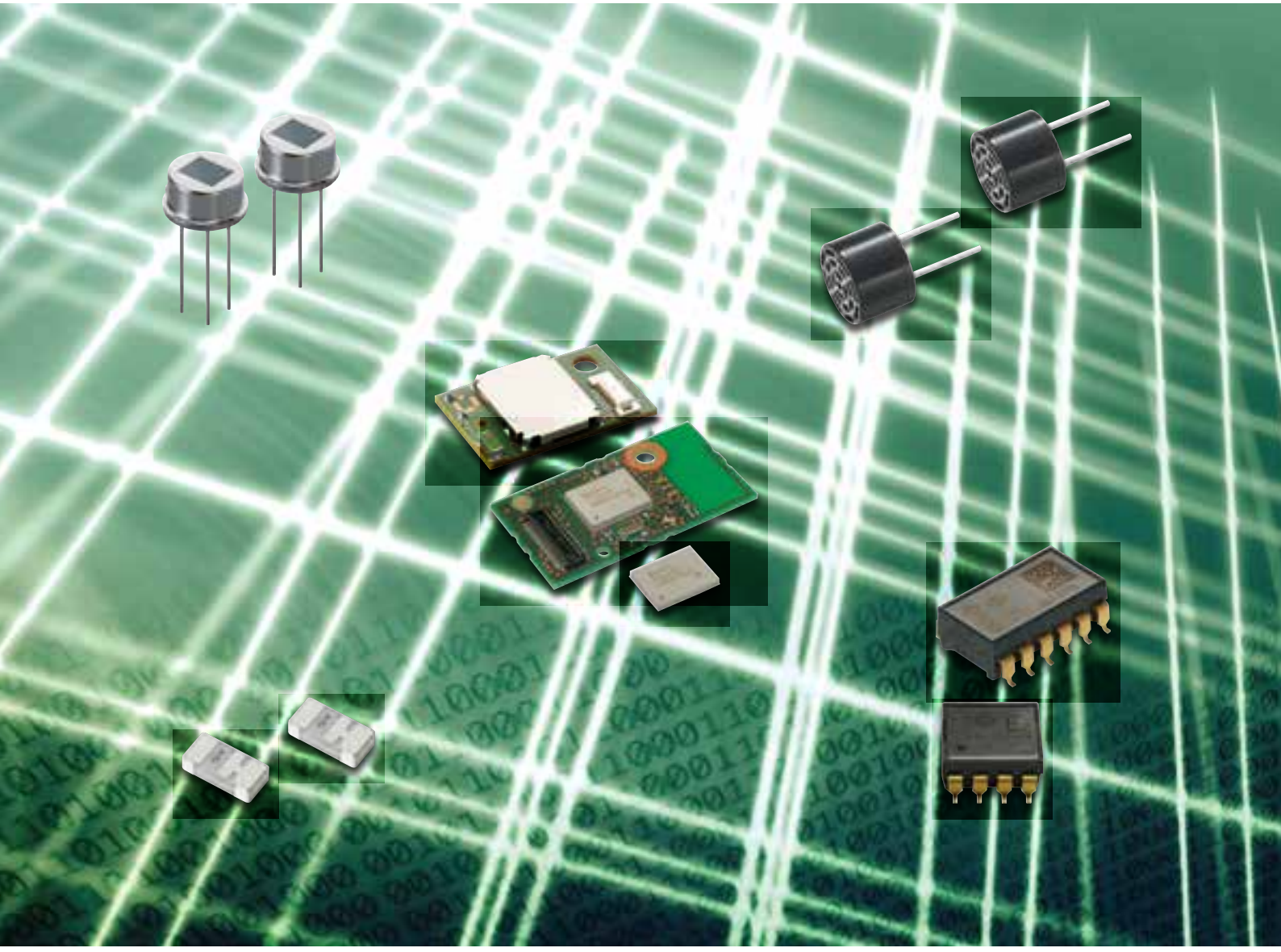
Component Design & Solutions for Sensor Networks

-Smart Buildings, Home, Agriculture, Logistics and Energy Management System-



Innovator in Electronics

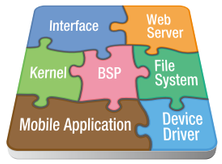
Sensors

Murata has many sensors such as PIR sensors (for human detection), those for a variety of input devices and those for other various purposes. Murata's shock sensors occupy the top market share in the world.

Wireless Communications

Murata provides RF components and also modules for wireless communication applications. Our modules are the top1 in the mobile phone market and feature an extensive range of products such as WLAN, ZigBee and RFID, etc.

Software



Murata has a wealth of development results and actual market performance in software for 3G/Wi-Fi routers for mobile. Meanwhile, the development of device drivers for wireless communication IC, middleware and peripheral control software are all covered in our business scope.

Smart and Comfortable Society with Murata's Wireless Sensor Network

Recently, the concept of smart homes and smart buildings that make use of IT technology to optimize energy consumption and within the home or building is gathering attention.

Smart homes and buildings rely on energy management system (EMS) to perform detailed control of lighting and air conditioning while monitoring power consumption and environmental conditions such as temperature, humidity and lighting using sensors located throughout the home. This sensor network system for smart homes enables easy EMS construction.

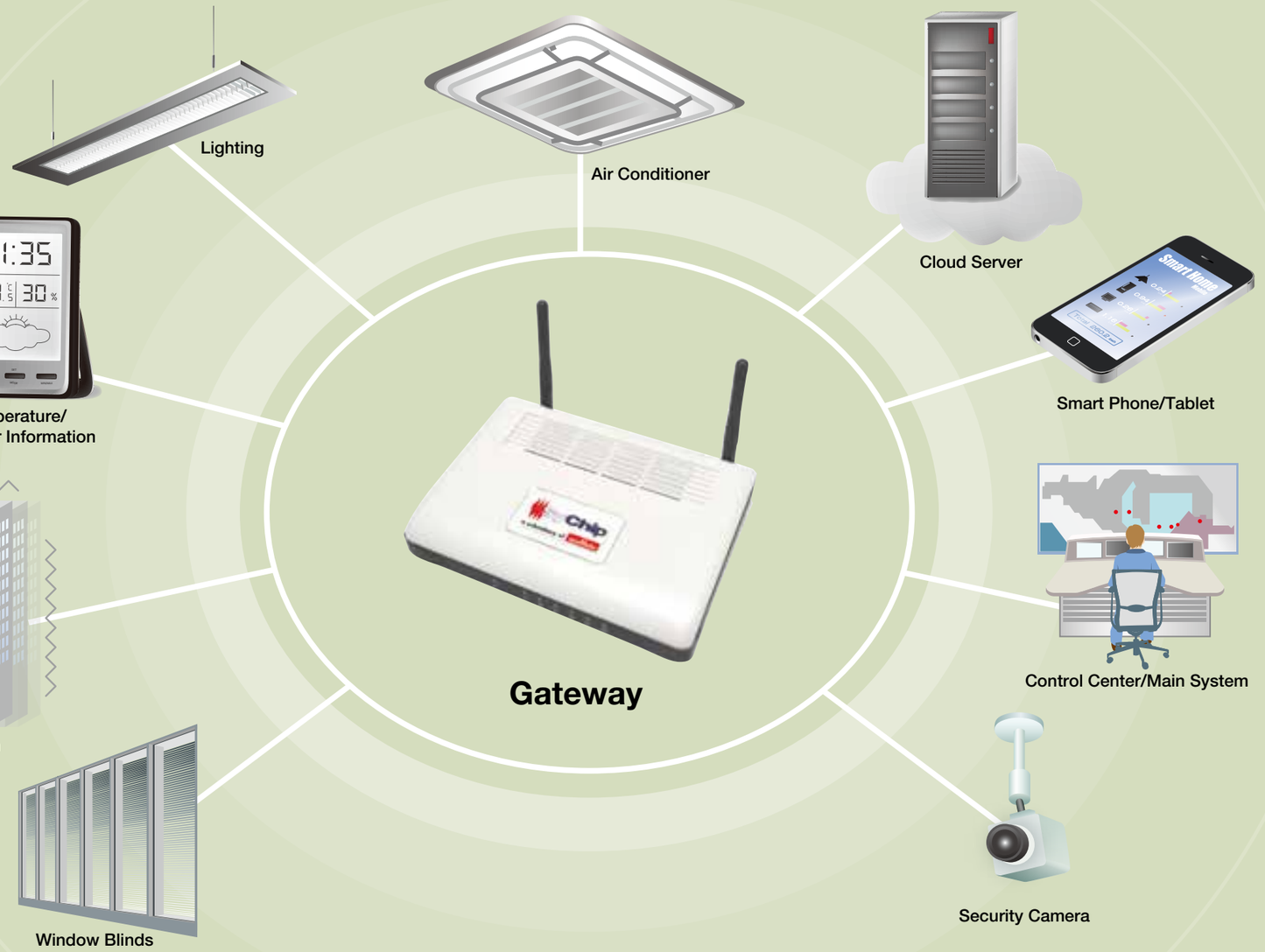
Not only for EMS, this network will be used to achieve automated control without compromising the comfort in our daily life. In a similar way, its expected to expands usage in smart agriculture for efficient and automated cultivation.

Sensor technology, wireless communication technology, and software. Murata has been ready to provide all the technology that essential to realize the smart life utilizing a wireless sensor network.

Our products contribute your future smart life.

Smart Building Control

-Building Energy Management, Lighting, Air Conditioning, Security, Construction Monitoring-



Pyroelectric Infrared Sensor
P.8

Piezoelectric Shock Sensor
P.9

AMR Magnetic Sensor
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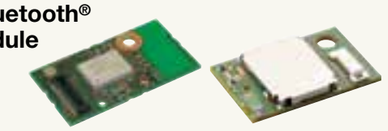
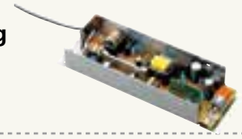
High Accuracy MEMS Sensor
P.12-P.13

W-LAN/Bluetooth® Smart Module
P.18-P.19



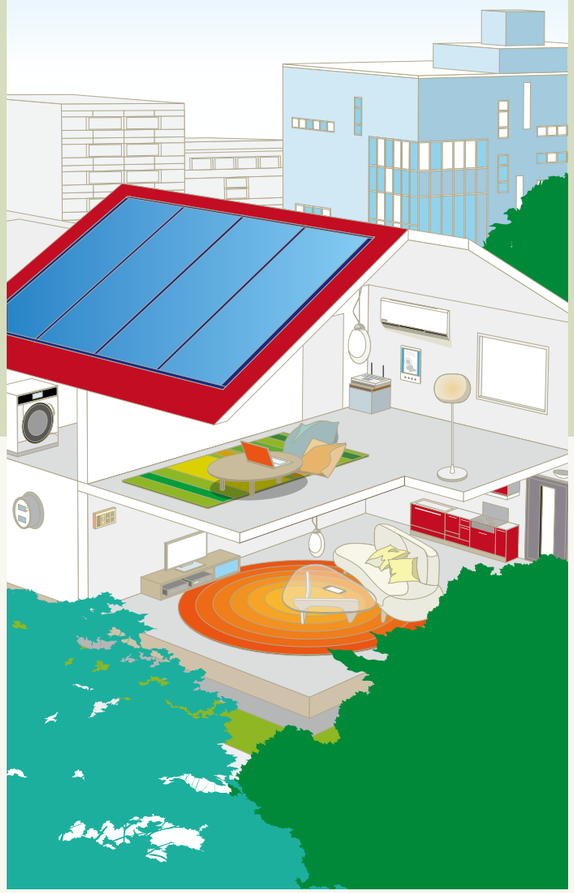
Wireless Network Terminal
P.20-P.21

Power Supply for LED Lighting
P.23



Smart Home Control

-Home Energy Management,
Smart Appliance, Lighting, Security-



Home Security System

Ceiling Light

Cloud Server

Home Appliances

Gateway

Smart Phone/Tablet

Temperature/
Weather Information

Smart Meter

Renewable Energy/Battery/EV

Pyroelectric Infrared Sensor
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Ultrasonic Sensor
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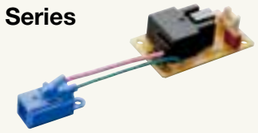
“Ionissimo®” MHM Series Ionizer/Ozonizer
P.14-P.15



W-LAN/Bluetooth® Smart Module
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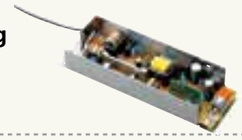


Pyroelectric Infrared Sensor

An extra high sensitivity, new lead type pyroelectric infrared sensor

Murata newly developed less expensive, high sensitivity, high RFI (Radio Frequency Immunity) and high WLI (White Light Immunity) characteristic lead type infrared sensor. IRA-S series have a quite better RFI characteristic for security market to fulfil EN regulation in detector level including peripheral circuitry. Its high sensitivity and high reliability makes a great contribution to ergonomics and energy conservation of appliances.

Features

- Good RFI (Radio Frequency Immunity)
- Good WLI (White Light Immunity)
- Easy human movement detection
- Wide detection area using lens

Applications

- Security system
- Convenience (Early Wake Up) and energy saving

For human detection

For security system

Type	Part Number	Sensitivity (500K, 1Hz, mVpp)	Dimension	Strength/Features
Dual	IRA-S210ST01	4.6	Φ9.2×4.7	•New and cost effective model •High RFI (Radio Frequency Immunity) •For security, automatic ECO switch for display and other appliances
Serial Quad	IRA-S410ST01	7.0		

Piezoelectric Shock Sensor

A new touch sensor that detects vibration

Murata's shock sensor is produced on the basis of piezoelectric principles and can detect the mechanical shock resulting from tapping, as well as the direction, and export the data by means of an electric signal. Murata offers 3 direction-sensing devices, offering excellent performance, as well as operation and control of household appliances.

Applications

- Tapping input
- Vibration detection

0 degree type

Part Number	Size (mm)	Charge Sensitivity (pC/G)	Capacitance (pF)	Resonance Frequency (kHz)	Features
PKGS-00LDP1-R	6.4×2.8×1.20	0.840±15%	770±30%	20	Most sensitive type
PKGS-00GXP1-R	3.8×2.0×1.05	0.350±15%	390±30%	31	Smallest type

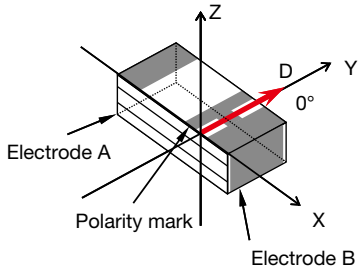
25 degree type

Part Number	Size (mm)	Charge Sensitivity (pC/G)	Capacitance (pF)	Resonance Frequency (kHz)	Features
PKGS-25NBP1-R	3.8×2.0×1.05	0.168±15%	520±30%	44	Most popular type so far
PKGS-25SXAP1-R	3.2×2.0×1.05	0.350±15%	740±30%	27	Smallest type
PKGS-25WXP1-R	2.8×2.0×1.05	0.168±15%	550±30%	44	New smallest type

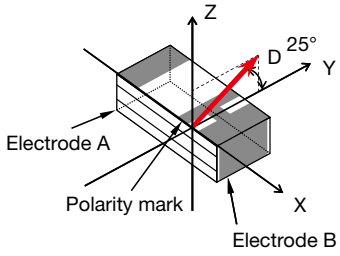
90 degree type

Part Number	Size (mm)	Charge Sensitivity (pC/G)	Capacitance (pF)	Resonance Frequency (kHz)	Features
PKGS-90LDP1-R	6.4×2.8×2.10	0.840±15%	770±30%	20	—

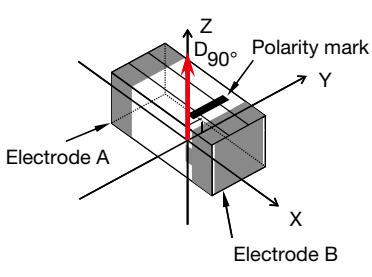
0 degree type



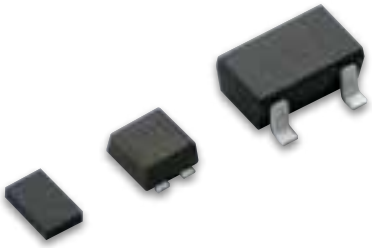
25 degree type



90 degree type



AMR Magnetic Sensor



Broad product portfolio, design flexibility, narrower sensitivity range and higher reliability!

AMR Sensor is a sensing device utilizing the Magneto Resistance effect. Ferromagnetic NiFe alloy thin film is deposited over the IC circuit. Murata can offer more than 30 P/N that support a broad range of applications backed by our experienced design consulting service.

Open-close detection

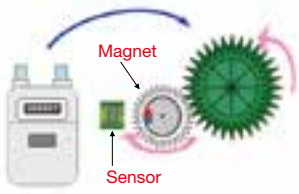
Part Number	Sensitivity (m T)	Size (mm)	Features	Applications
MRMS20★ Series	0.5 to 2.5	2.9×2.8×1.1	Std. performance, Compact package	Std. open-close, position detection Low-speed rotation detection
MRMS50★ Series		1.45×1.45×0.55	Std. performance, Ultra compact package	
MRMS60★ Series		1.0×1.6×0.37	Std. performance, Ultra thin leadless package	

Flow metering by rotation detection

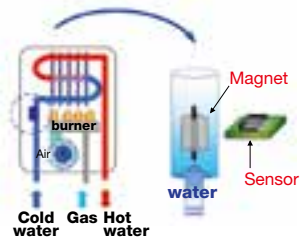
Part Number	Sensitivity (m T)	Size (mm)	Features	Applications
MRSS29D	0.8 to 2.5	2.9×2.8×1.1	High voltage operation (3.5 to 30V) High speed detection High temp. operation (to 100°C) Built-in voltage regulator	Flow metering for industrial equipments
MRUS72S	0.5 to 2.5	1.5×1.8×0.8	Low voltage low power operation Very low current consumption Built-in temp. compensation circuit	Flow metering for battery powered equipments -Gas meter -Water meter -Flow meter
MRUS74S	1.0 to 2.5 (Hon)			
MRUS72X	1.5<		2-axis (XY plane) magnetic field sensing Low voltage low power operation Very low current consumption Built-in temp. compensation circuit	
MRUS74X	1.0<			

For water meter

For gas meter



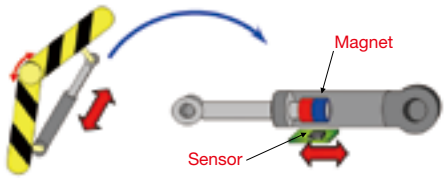
For water boiler



Cylinder control by position detection

Part Number	Sensitivity (m T)	Size (mm)	Features	Applications
MRSS27H	0.8 to 2.2	2.9×2.8×1.1	High voltage operation (3.5 to 30V) High speed detection High temp. operation (to 100°C) Built-in voltage regulator	Position, proximity detection and high-speed rotation detection for industrial equipments
MRMS541D	1.0 to 2.5	1.45×1.45×0.55	High accuracy, high-speed type (Typ. 2kHz) Built-in temp. compensation circuit Ultra compact flat lead package	
MRUS73C New	Out1 [L->H] 2.8 max. Out1 [H->L] 1.4 min. Out2 [L->H] 3.0 max. Out1 [H->L] 1.6 min.	1.5×1.8×0.8	2-output type High accuracy, high-speed detection Built-in temp. compensation circuit Low voltage low power operation	

For cylinder control



Ultrasonic Sensor

Low-price solution for distance detection

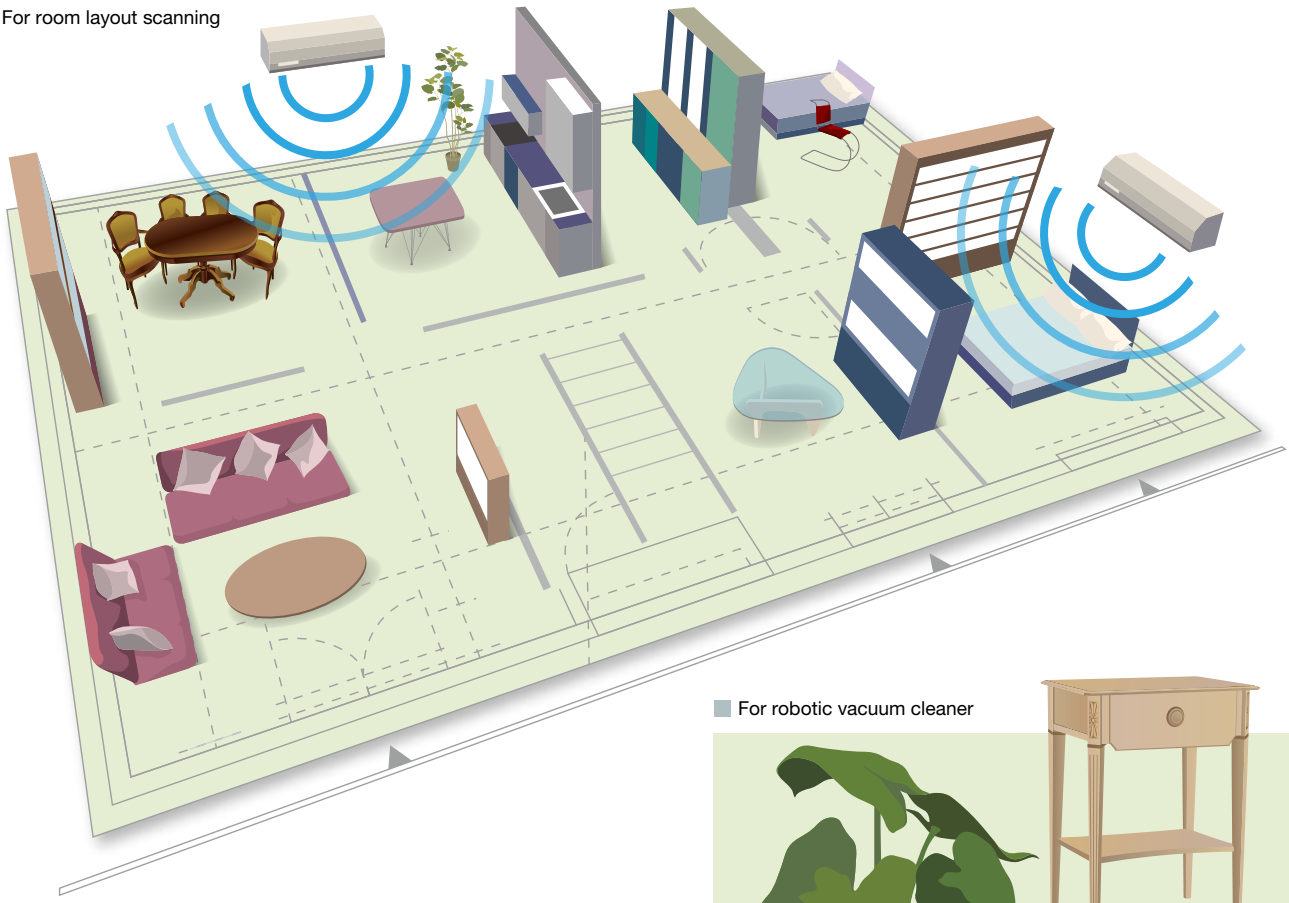
Small and lightweight, mainly used for short-distance range detection and home security.

Applications

- Ranging distance
- Room layout scanning

Type	Using Method	Part Number	Driving Frequency (kHz)	Diameter (mm)	Capacitance (pF)	Directivity (degree, typ.)	Sound Pressure Level	Sensitivity	Max. Input Voltage
Open type	Transmitter	MA40S4S	40	9.9±0.3	2550±20%	80	120dB typ. (0db=0.02mPa)	—	20Vp-p Continuous signal
	Receiver	MA40S4R	40	9.9±0.3	2550±20%	80	—	-63dB typ. (0db=10V/Pa)	—
Drip proof	Dual use	MA58AF14-0N	58	14±0.1	1400±20%	75×35	—	—	120Vp-p (less than 20 pulses, interval more than 60ms)

For room layout scanning



For robotic vacuum cleaner

High Accuracy MEMS Sensor

Murata Electronics Oy innovates, designs and manufactures tiny MEMS solutions. We offer a wide range of products based on the company's proprietary 3D MEMS technology.

Features

- Robust MEMS technology
  · Field proven reliability and high performance in very demanding applications
- Good offset stability over temperature and time
- High accuracy in demanding applications
  (High temperature variation, high vibration environment, etc.)
- Excellent mechanical shock endurance
  · Can withstand high impact/dropping

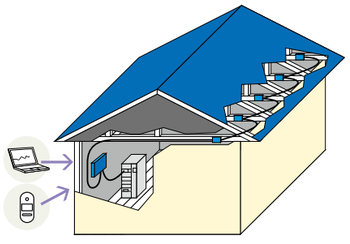
Inclinometers

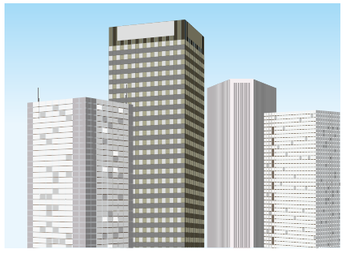
Recommended Product	Features	Benefits	Strengths, Selling Arguments
SCA100T Series	Analog output 2 axis inclinometer	Accuracy ±0.5 degree over operating temperature	•Good performance in vibrating environment •High offset accuracy over temperature and time •High mechanical shock endurance •Competitive price
SCA103T Series	Analog output 1 axis inclinometer	Accuracy ±0.1 degree over operating temperature	
SCA61T Series		Accuracy ±0.5 degree over operating temperature	

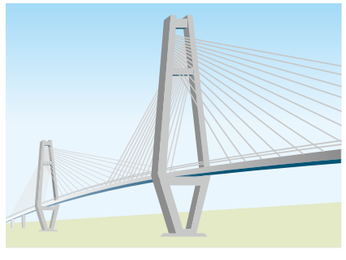
Applications

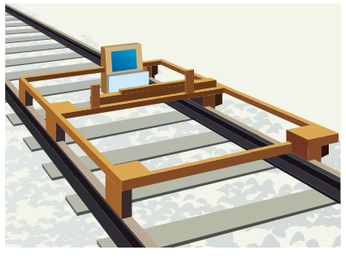
- Structure monitoring
  · SCA103T-D04
- Geotechnical probes
  (ground movement measurement devices)
  · SCA103T-D04
- Railway track monitoring
  · SCA103T-D04, SCA1000-N1000070

For construction monitoring (Distortion, Abnormal Vibration, etc.)









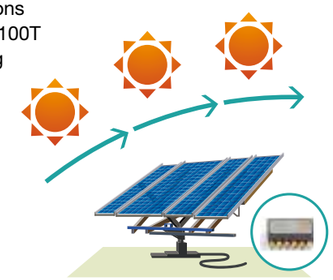
Inclinometers

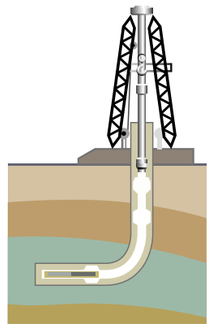
Recommended Product	Features	Benefits	Strengths, Selling Arguments
SCA100T Series	Analog output 2 axis inclinometer module	Accuracy ±0.5 degree over operating temperature	•High offset accuracy over temperature and time •Competitive price
SCA121T Series			

Applications

- Solar tracker systems
  · SCA121T
- Wheel alignment service stations
  · SCA103T, SCL1700, SCA100T
- Platform and boom lift leveling
  · SCA100T, SCA121T

For solar tracking system





Relative position information of the arm tip is very important for excavators. Based on the gradient information from one axis detected by inclinometers, the relative position of the bucket can be calculated.

Accelerometers & Gyros

Recommended Product	Features	Benefits	Strengths, Selling Arguments
SCA3100 Series	Digital SPI 3 axis accelerometer for inclinometer	Reliability, references	•Good performance in vibration environment •High offset accuracy over temperature and time •High mechanical shock endurance •Competitive price
SCC1300 Series	Digital SPI 1 axis gyro & 3 axis accelerometer	• Combined sensor • Reduced PCB size	
SCR1100 Series	1 axis gyro		

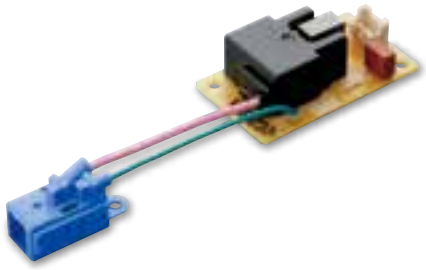
Applications

- Precision agriculture products help to minimize farming costs and maximize yields.
  Solutions provide even sub 10cm accuracy and automated control.
- Agricultural GPS aided navigation/auto steering
  · Sensor aided navigation (simple IMU: yaw gyro, lat & long accel)
  · Tilt compensation
  · Improved GPS antenna location accuracy (roll gyro)
- Top systems require full 6DOF IMU
- Measurement range typically: ±100°/s and ±2g

Murata benefits & advantages:
  · Gyro performance: bias stability, low noise, accuracy
  · Accel performance: offset stability over temp

For agricultural robot

“Ionissimo®” MHM Series
Small, Low-Voltage Ionizer



Today, the emphasis on health improvement and disease prevention is higher than ever, and there is a growing interest in ways of eliminating odor, germs and mold in the home and office.
Additionally, equipment production sites are becoming ever denser and more crowded, and there is a growing need for static elimination in order to prevent defects caused by static electricity. To respond to these needs, Murata has stepped up its development, production and sales of ion generating elements and small modules integrated with these elements.

Features

- High ion output
  Optimization of module structure has made high ion output possible.
- Low driving voltage
  –4.3kV (Typical)
- Small size
  Our original structural design and circuit design technologies have enabled us to develop a small-sized product.
- Other
  Adjustable ozone output enables customization for specific applications.
- In addition to home electronics, this product may be used for a variety of other needs, including automotive, production line, home care and nursing, interior, and pet-related needs.

Part Number	Ion Species	Amount of Ozone Generation*	Functions
MHM305	Negative	0.1mg/H	Air purification, skin moisturizing, static electricity removal
MHM306	Negative	1.0mg/H	Air purification, skin moisturizing, deodorizing Elimination of bacteria/odor/mold
MHM400	Positive	0.1mg/H	Static electricity removal

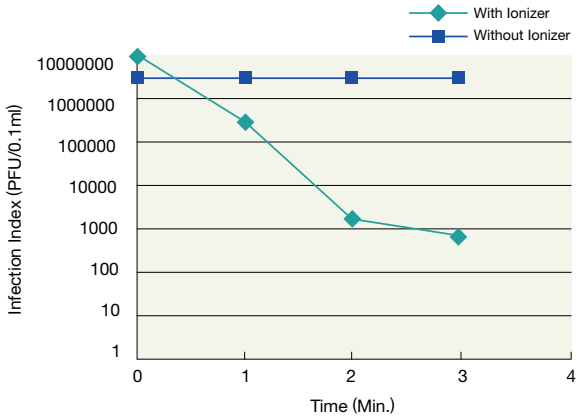
*Maximum amount. It can be customized based on request.

For washing machine

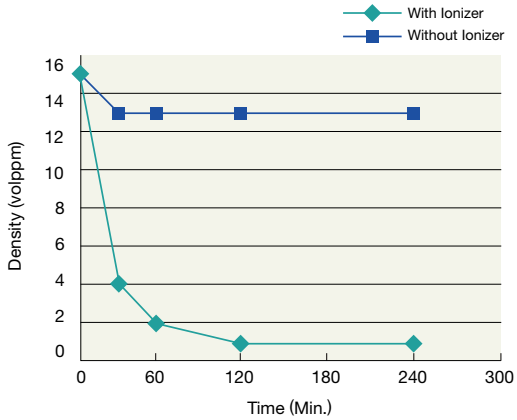
For air purifier

For vacuum cleaner

Sterilizing Influenza Virus (HK A H 3 N2)



Deodorizing Test for Formaldehyde



“Ionissimo®” MHM Series
Small, Low-Voltage Ozonizer

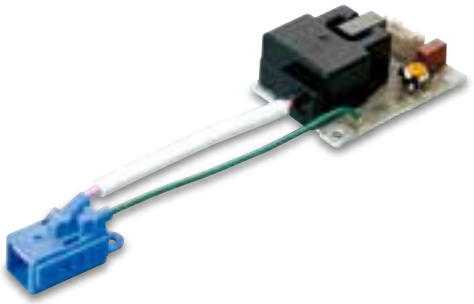
What is an “Ozonizer”?

Surface discharge is made by AC high voltage applied between the top and bottom of the dielectric substrate.

The discharge makes Ozone from Oxygen molecules around electrode.

$O_2+O=O_3$

The Ozonizer module will ozonize Oxygen molecules efficiently utilizing the above principle.



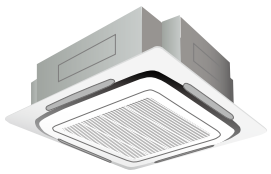
Features

- Murata ozonizer module can create large amounts of ozone efficiently with original device structure.
- Ozone density will be duty cycled controlled.
- Intermittent operation can save power consumption of the ozonizer module.
- The Ozonizer module can have a longer life than the needle type.

Part Number	Ion Species	Amount of Ozone Generation	Functions
MHM500	Negative Positive	2.5mg/H*	Air purification, deodorizing Elimination of bacteria/odor/mold

*Maximum amount. It can be customized based on request.

For air conditioner

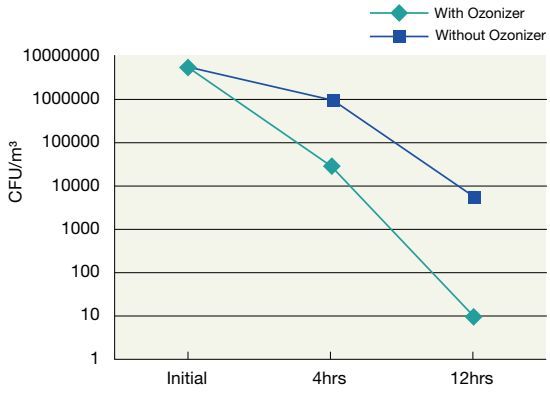


For hood

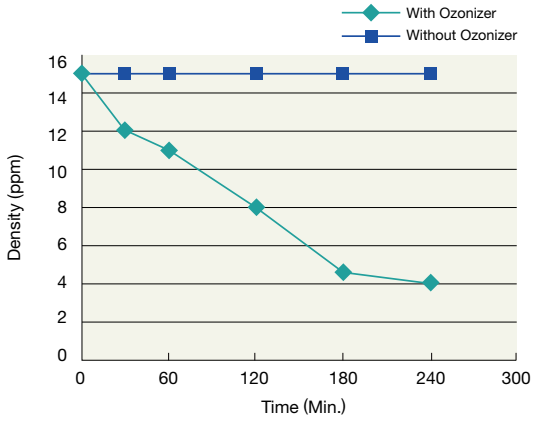
For dishwasher

For refrigerator

Sterilizing Test Data in Refrigerator Colon Bacillus



Deodorizing Test for Hydrogen Sulfide (H2S)



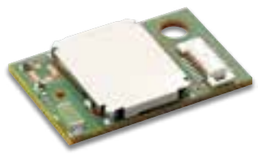
Why Choose Murata for Wireless Networks?

Our technologies provide various cutting-edge product lineups and our many achievements establish competitive advantages in the wireless network market.

Your smart life contains Murata technology.

Line-up

W-LAN Smart Module



Bluetooth® Smart Module

ZigBee® for Smart Lighting

PIR sensor

Ultrasonic sensor

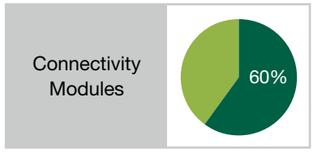
AMR sensor

Huge Achievement for Wireless and Sensor

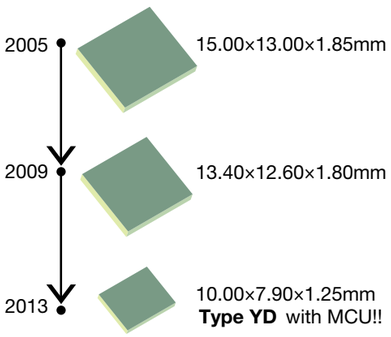
Product Shipment (Since 2003 to 2012)

- **Connectivity Modules**
  More than 10.9 billion !!
- **Sensors**
  More than 10.6 billion !!

Market Share



World's Smallest



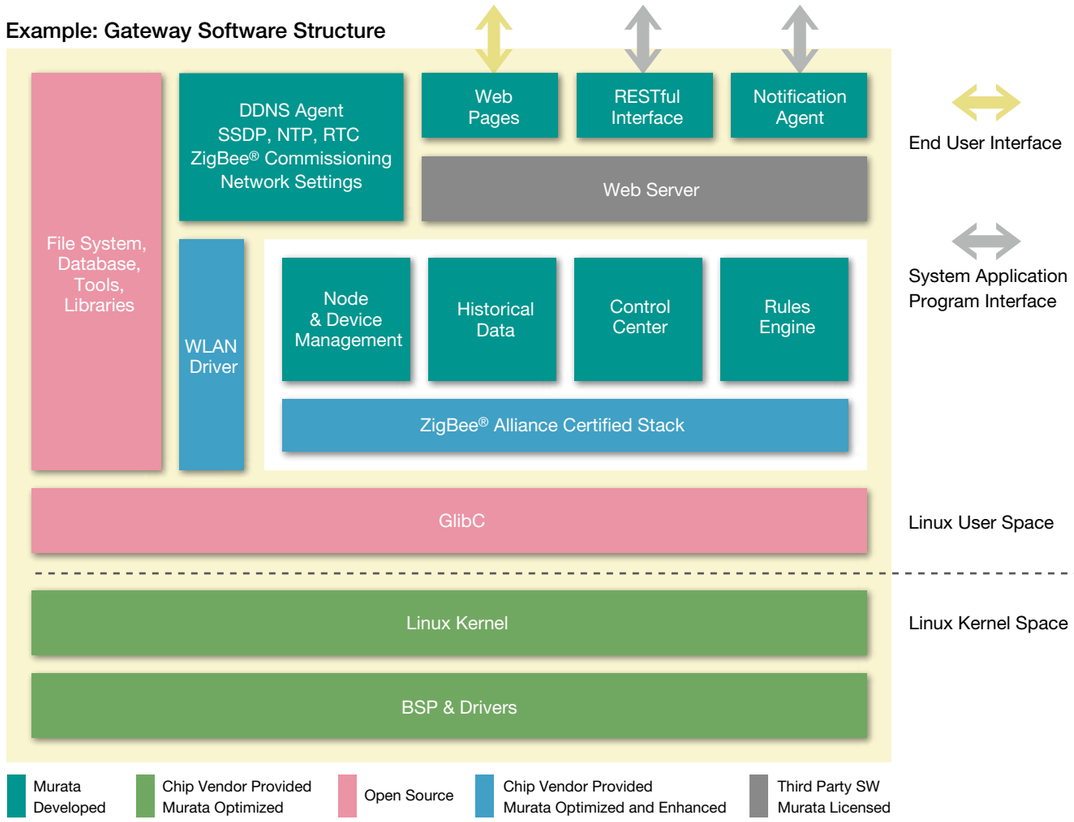
High Quality/Easy to Integrate

- Accurately evaluated according to each required regulation
- Easy to integrate with your existing system by simple structure hardware and software

Software Support

Software customized for secure control and conversion of data is required to suit various customers' needs in development of wireless communication equipment. We provide a high quality software package that matches various capabilities in a small footprint, promising a reduced load on your development resources.

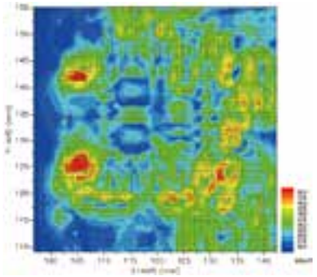
Example: Gateway Software Structure



EMC Support with EMC Lab

Because almost all devices related to the "internet of things" market have a communication function, it is necessary to comply with the technical standards stipulated by law in various countries such as CCC and CE and part of that standard includes EMC issues.

Murata has our own EMC lab stocked with state-of-the-art equipment; professional engineers are working along with the development of our own products with less noise and also supporting customers to reduce noise in customers' products.



W-LAN Smart Module

Murata is a market leader in W-LAN modules for embedded systems, providing high-quality and high-performance modules for high volume production all year round. Wireless modules are easy to assemble, thus significantly reducing customer's design time. Meanwhile, a variety of low-power products for sensor networks are also provided.

Type YD/ZD

Features

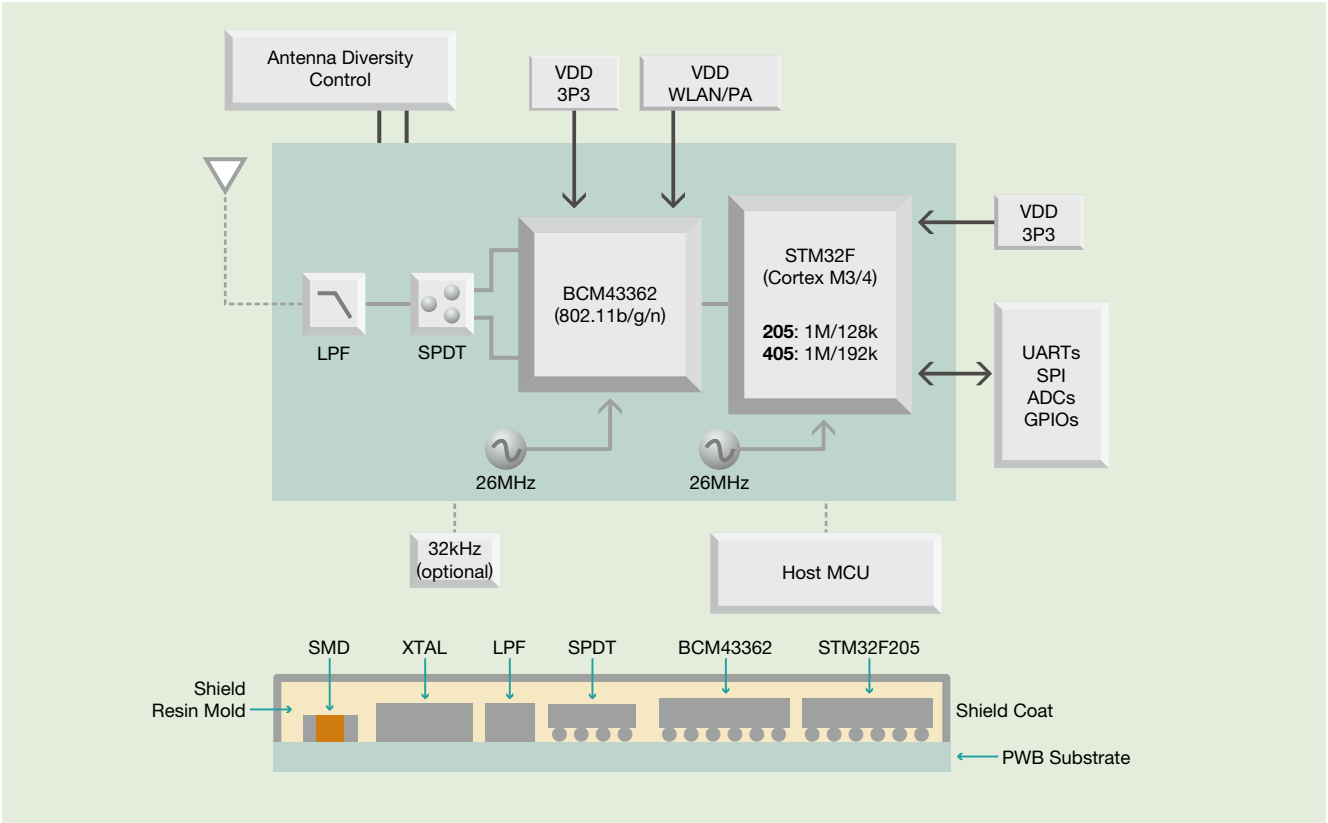
- Highly integrated
- FCC/CE compliant
- Stand-alone complete W-LAN 11b/g module
  - · CPU, W-LAN function and stack (TCP/IP, Supplicant) are embedded.
- Serial interface
  - · Easy to control with simple command

Applications

- Home and building automation
  - · Lighting control
  - · HVAC (Heating, Ventilation, Air-conditioning)
- EMS (Energy management system)
- Simple sensor network
- Home security
- Healthcare/fitness

Product Specifications

- WLAN chipset
  - · Broadcom BCM43362, 802.11b/g/n
- MCU chipset: **STM32F205** (Type YD)
  STM32F405 (Type ZD)
  - · ARM Cortex-M3/4 processor
  - · ROM: 1MB, **RAM: 128kB** (Type YD)
  - · ROM: 1MB, **RAM: 192kB** (Type ZD)
- Size: 10×7.9×1.25 (max.) (mm)
- Shield resin mold. FCC certified (Plan)
- Software
  - · Web server
  - · WiFi STA and Soft AP modes
  - · Network stack
- WEP, WPA-PSK, WPA2-PSK
- Diverse peripheral interfaces:
  - · UARTs/USB/SPI/GPIOs/ADCs



Bluetooth® Smart Module

Bluetooth® low energy (BLE) is an ultra-low power communication technology that enables months to years of operation with a button battery. Widespread adoption is expected in various fields such as health management, fitness and home networks.

In addition, BLE has also been adopted as a communication method by the Continua® Health Alliance, a non-profit organization of leading healthcare and technology industry companies.

Type VZ

Features

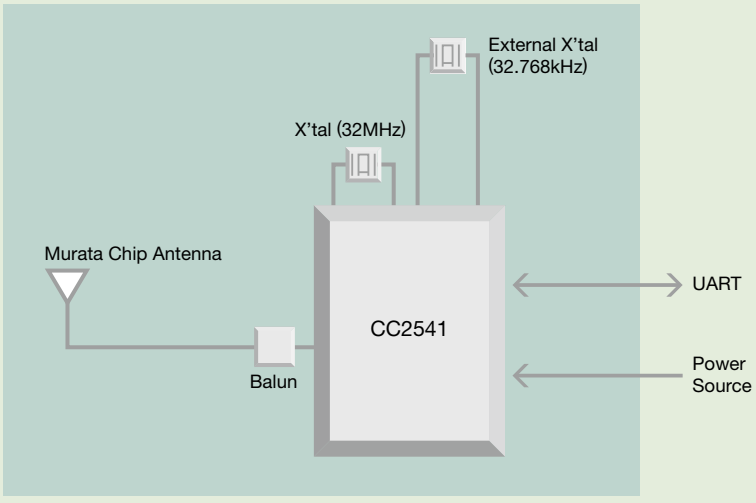
- All protocol stacks required for Bluetooth® low-energy communication are built in, including various healthcare profiles. The module can also be easily controlled from the 8-bit or 16-bit CPUs often used in embedded devices.
- Simple commands can be transmitted to the module via a UART interface, enabling easy communication with smartphones and other devices that support Bluetooth® SMART Ready.
- The module has already acquired various certifications (Radio Act and Bluetooth® Qualification), helping to greatly reduce customers' development costs.

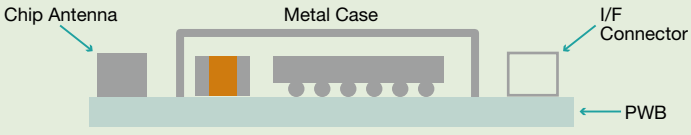
Applications

- Healthcare products
  Pedometer, Weight scale, Blood Pressure Monitor, Thermometer
- Remote control

Product Specifications

- Chipset: Texas Instruments CC2540
- Size: 20.5×13.0×2.4 (max.) (mm)
- Output Power: 0dBm typ.
- Interface: UART
- Operating Voltage: 2.2 to 3.4V
- Operating Temperature: -10 to +50 deg.C
- Protocol Stack: BB, LL, L2CAP, GAP, SMP, ATT, GATT, Sample Profile
- Embedded X'tal, DC/DC Conv., Antenna, BtoB Connector





Wireless Network Terminal

Utilizing the technology of both hardware and software Murata has accumulated, we provide a variety of wireless terminals such as Gateway and Sensor node that optimize the construction of systems for smart buildings and smart homes. In addition, Murata offers the best solution to help you realize your vision.

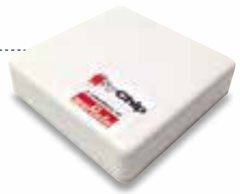
Smart Building

Full function gateway
SHGC100

- Interface: 802.11b/g/n, Ethernet, ZigBee®,* EnOcean®, RS232/RS485, Micro SD
- Function: Embedded Linux, Web server, Transparent data transmission for different interface, Historical data storage, Scheduler, Binding sensor node, Powered by AC adapter

Mini gateway
SHGC200

- Interface: 802.11b/g/n, Ethernet, ZigBee®*
- Function: Embedded Linux, Web server, Transparent data transmission for different interface, WPS, Powered by micro USB



Touch panel
Type-AAK

- Interface: ZigBee®*
- Function: Remote ON/OFF switch, Scene select, Dimmer

Smart plug
Type-AAH

- Interface: ZigBee®*
- Function: Remote ON/OFF, Power Measurement

Smart Home

Temperature/Humidity sensor node
Type-AAL

- Interface: ZigBee®*
- Function: Temperature and humidity data detection, Powered by Type-AA battery

PIR sensor node
Type-AAM

- Interface: ZigBee®*
- Function: Motion detection, Powered by Type-AA battery

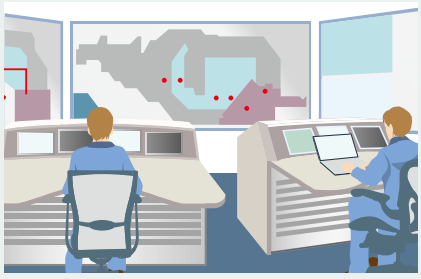
IR adapter
Type-AAx

Coming Soon

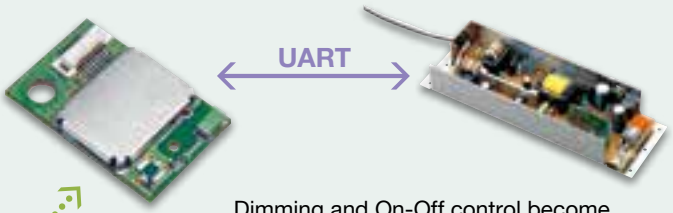
- Interface: ZigBee®*
- Function: Control Air conditioner and TV, Learning IR code, Powered by Type-AA battery

*ZigBee Home Automation Profile Compliant

Smart LED Lighting Control System



Control center/Main system



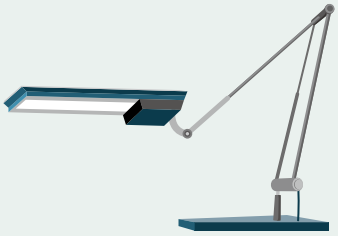
Dimming and On-Off control become more efficient with Murata's LED power supplies.
They also support digital interface for control wirelessly.

ZigBee®*

ZigBee®*

ZigBee®*

Gateway
We can control all the lighting through Gateway.



Individually control task lighting and ambient lighting wirelessly.

ZigBee®*

ZigBee®*

Wi-Fi®

Sensor node
By utilizing sensors, automatically control lighting according to the movement of people and objects.

Touch panel
Switch also controlled wirelessly. We can set wherever we like without considering wiring.

Tablet PC, Smart phone

63% Power Consumption Reduced

The power consumption was reduced by 63% by using this lighting system. It is already installed in Murata's Tokyo office.

*ZigBee Light Link Profile Compliant

Switching Power Supply for LED Lighting (LED Ballast) Series

Wireless dimming and switching on and off of LED lighting devices requires the power supply circuit driving the LED devices to coordinate with the wireless circuit. Murata has developed a power supply module that can be directly coupled with the wireless transmission module to help develop seamless lighting systems.

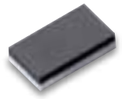
Features

- Constant current LED driver
- Wide range AC input (100 to 242V)
- Varied ballast line-up
- Primary-Secondary isolation structure
- Meets safety standard PSE & EN61347
- PWM, DALI dimming interface (MPA1948 Series)
- Highly compatible with human/ temperature/illuminance/etc. sensing with UART/ ZigBee® interface point (MPA1948 Series)

Model	MPA1954 Series						MPA1948 Series			
Features	Low cost version for under 25W application						Intelligent power supply suitable for task ambient lighting system			
Operating Temperature Range	-10 to +50°C									
Storage Temperature Range	-20 to +60°C									
Input Voltage Range	AC 100 to 242V									
Operating Input Voltage Range	AC 90 to 267V									
Input Frequency	50/60Hz									
Number of Output Ports	1ch									
Load Voltage	30 to 50V				30 to 45V		30 to 50V			
Part Number	MPA 1954A	MPA 1954B	MPA 1954C	MPA 1954D	MPA 1954E	MPA 1954F	MPA 1948A	MPA 1948B	MPA 1948C	MPA 1948D
Output Current	270mA	350mA	440mA	500mA	530mA	560mA	700mA	600mA	500mA	425mA
Output Wattage	13.5W	17.5W	22W	25W	23.9W	25.2W	35W	30W	25W	21.3W
Output Current Ripple	40mAp-p or less						Output Current×20%p-p or less			
Control System (Dimming Range)	None						PWM (5 to 100%) DALI (1 to 100%) UART (1 to 100%)			
Lifetime	> 50,000 hours									
Efficiency	80%typ.									
Harmonic Current	JIS C 61000-3-2 Class C, IEC61000-3-2 Class C									
EMI	VCCI, CISPR15, CISPR22 Class B									
Safety Standard	PSE EN61347									
Case Size (L×W×H)	243×40×32mm						224×70×35mm			

RFID

Murata's unique multi-layered circuit RF technology enabled "one of the world smallest RFID tag". MAGICSTRAP® has a robust package with built-in IC compliant with industry standard.



MAGICSTRAP®

Features

- Small size
- Includes RF function into LTCC
- Both HF and UHF band

Construction Diagram

MAGICSTRAP® for item level tagging

	LXMS21NCNH-147	LXMS33HCNG-134
Appearance		
Standard	ISO/IEC 18000-6 Type C, EPC/g C1G2	ISO15693
Frequency Band	UHF	HF
Size	2.0×1.2mm	3.2×3.2mm
Thickness	0.6mm max.	0.7mm max.
Read Range	10mm max.	50mm max.
IC	NXP G2iM	NXP SLIX

Contents subject to change without notice.

Use Case !

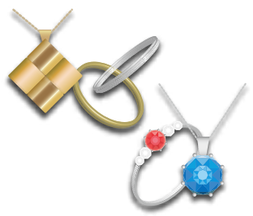
■ Tool management

■ Anti-counterfeit

■ Auto counting

■ Verification

■ Authentification



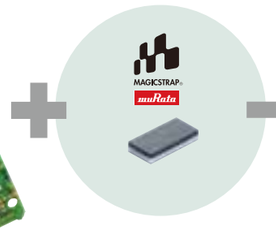
MAGICSTRAP® for life-cycle management

	LXMS31ACNA series	LXMS31ACMD series
Appearance		
Standard	ISO/IEC 18000-6 Type-C, EPC/g C1G2	
Frequency Band	UHF	
Size	3.2×1.6mm	
Thickness	0.7mm max.	
Read Range	5m max. with external antenna	7m max. with external antenna
IC	NXP G2XM	Impinj Monza4QT

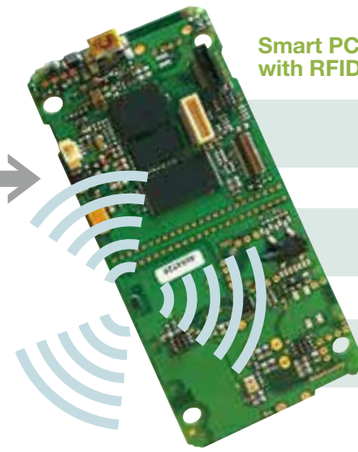
Contents subject to change without notice.

Use Case !

Conventional PCB



Smart PCB with RFID function



- Standard SMT component
- Compliant with EPC/g C1G2
- Read and write capability
  (ex. write inline test result into user memory)

Traceability
"from cradle to grave"

Inventory control

Anti-counterfeit

RFID-Reader/Writer

■ Assembly

■ Test

■ Shipment

■ Maintenance/Service

■ Repair

■ Recycle

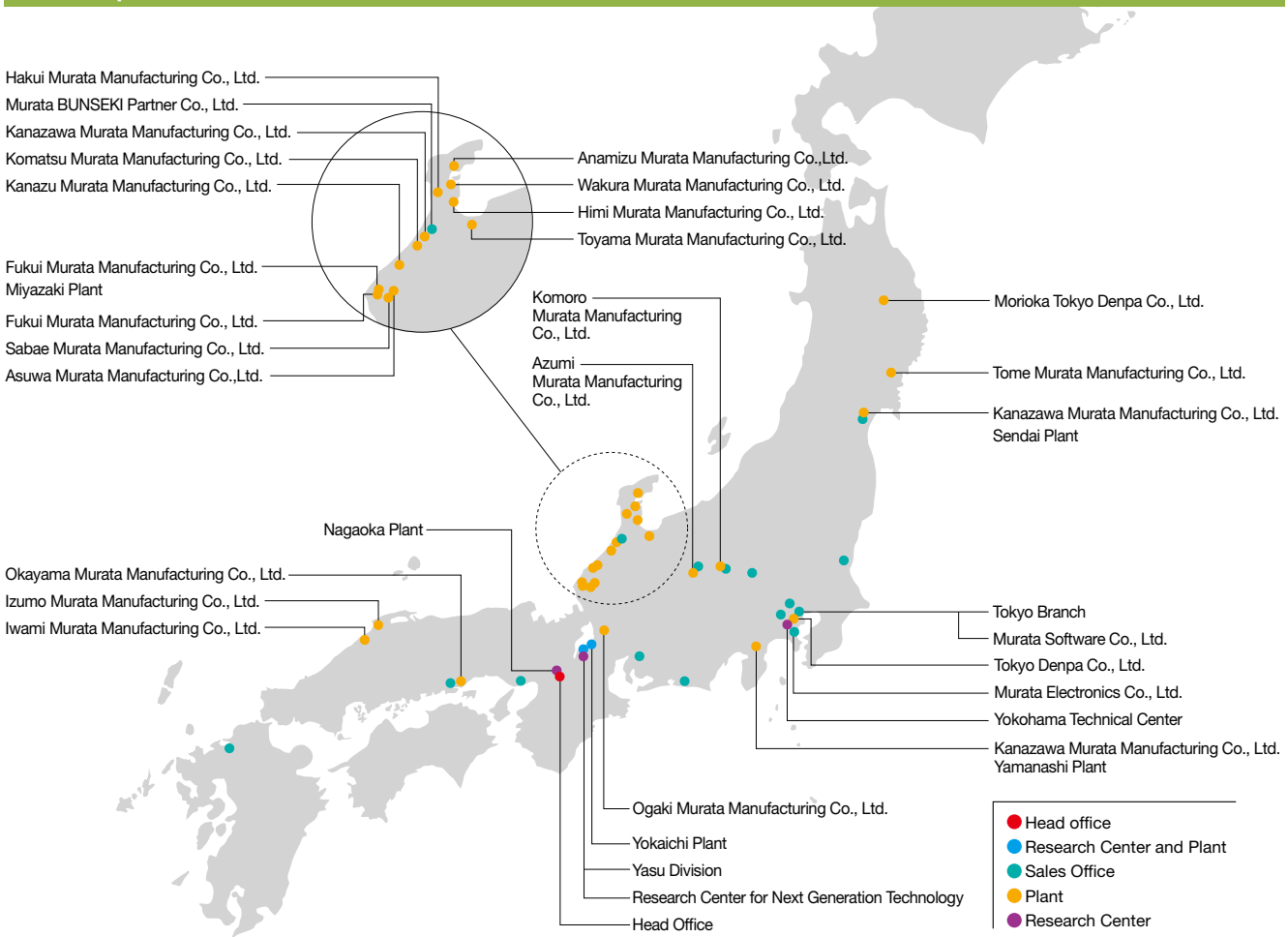
Inside Factory Management | **After Market**

Contents subject to change without notice.

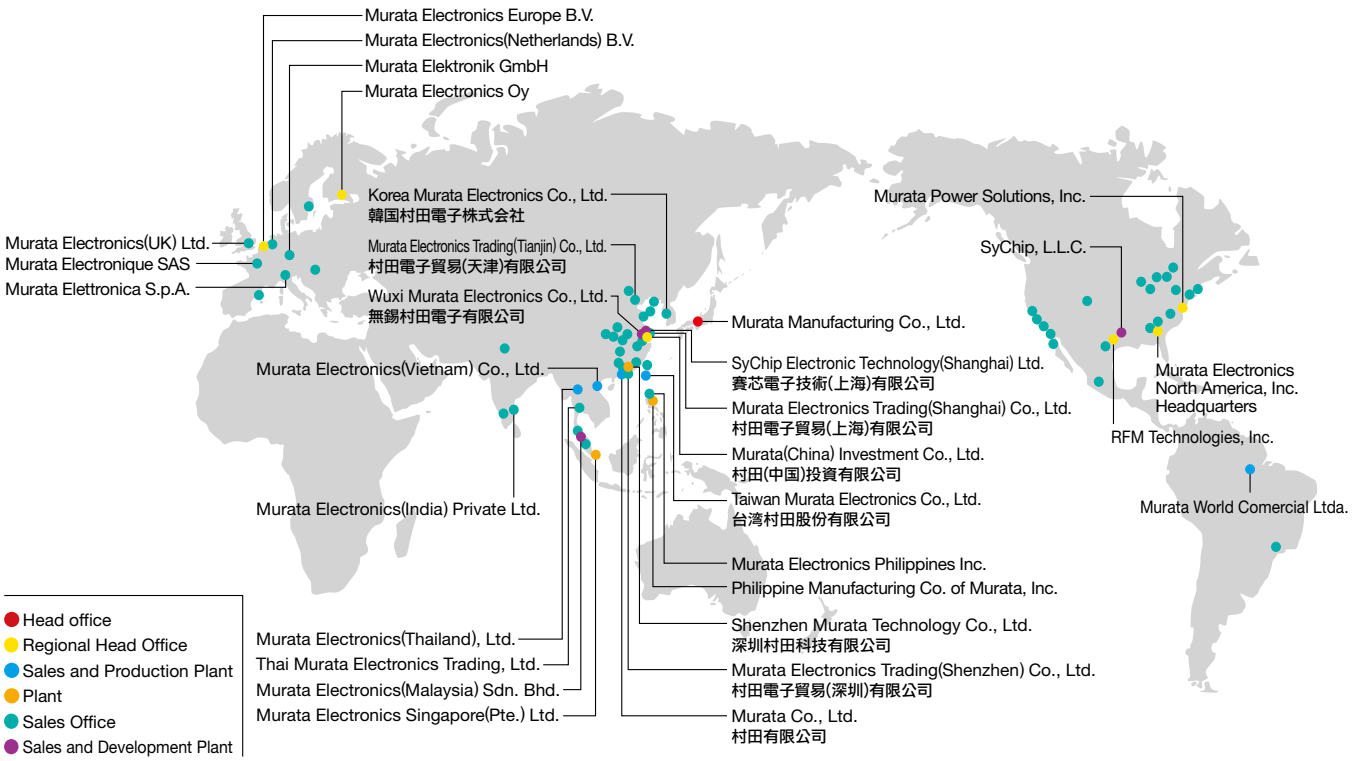
Network

Our production bases contribute to the development of society's electronics change bases to locations.

Global Expansion of Murata's Overseas Offices



Murata's production centers should contribute to local community development in Japan



⚠ Note:

1. Export Control
   <For customers outside Japan>
   No Murata products should be used or sold, through any channels, for use in the design, development, production, utilization, maintenance or operation of, or otherwise contribution to (1) any weapons (Weapons of Mass Destruction [nuclear, chemical or biological weapons or missiles] or conventional weapons) or (2) goods or systems specially designed or intended for military end-use or utilization by military end-users.
   <For customers in Japan>
   For products which are controlled items subject to the “Foreign Exchange and Foreign Trade Law” of Japan, the export license specified by the law is required for export.
2. Please contact our sales representatives or product engineers before using the products in this catalog for the applications listed below, which require especially high reliability for the prevention of defects which might directly damage a third party's life, body or property, or when one of our products is intended for use in applications other than those specified in this catalog.
   ① Aircraft equipment ② Aerospace equipment
   ③ Undersea equipment ④ Power plant equipment
   ⑤ Medical equipment ⑥ Transportation equipment (vehicles, trains, ships, etc.)
   ⑦ Traffic signal equipment ⑧ Disaster prevention / crime prevention equipment
   ⑨ Data-processing equipment ⑩ Application of similar complexity and/or reliability requirements to the applications listed above
3. Product specifications in this catalog are as of August 2013. They are subject to change or our products in it may be discontinued without advance notice. Please check with our sales representatives or product engineers before ordering. If there are any questions, please contact our sales representatives or product engineers.
4. This catalog has only typical specifications.Therfore, please review our product specifications or consult the approval sheet for product specifications before ordering. Especially, please read rating and ⚠CAUTION (for storage, operating, rating, soldering, mounting and handling) in them to prevent smoking and/or burning, etc.
5. You are able to read a detailed specification in the website of Search Engine (http://search.murata.co.jp/) or catalog library (http://www.murata.com/products/catalog/) before to require our product specification or to transact the approval sheet for product specification.
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7. No ozone depleting substances (ODS) under the Montreal Protocol are used in our manufacturing process.

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