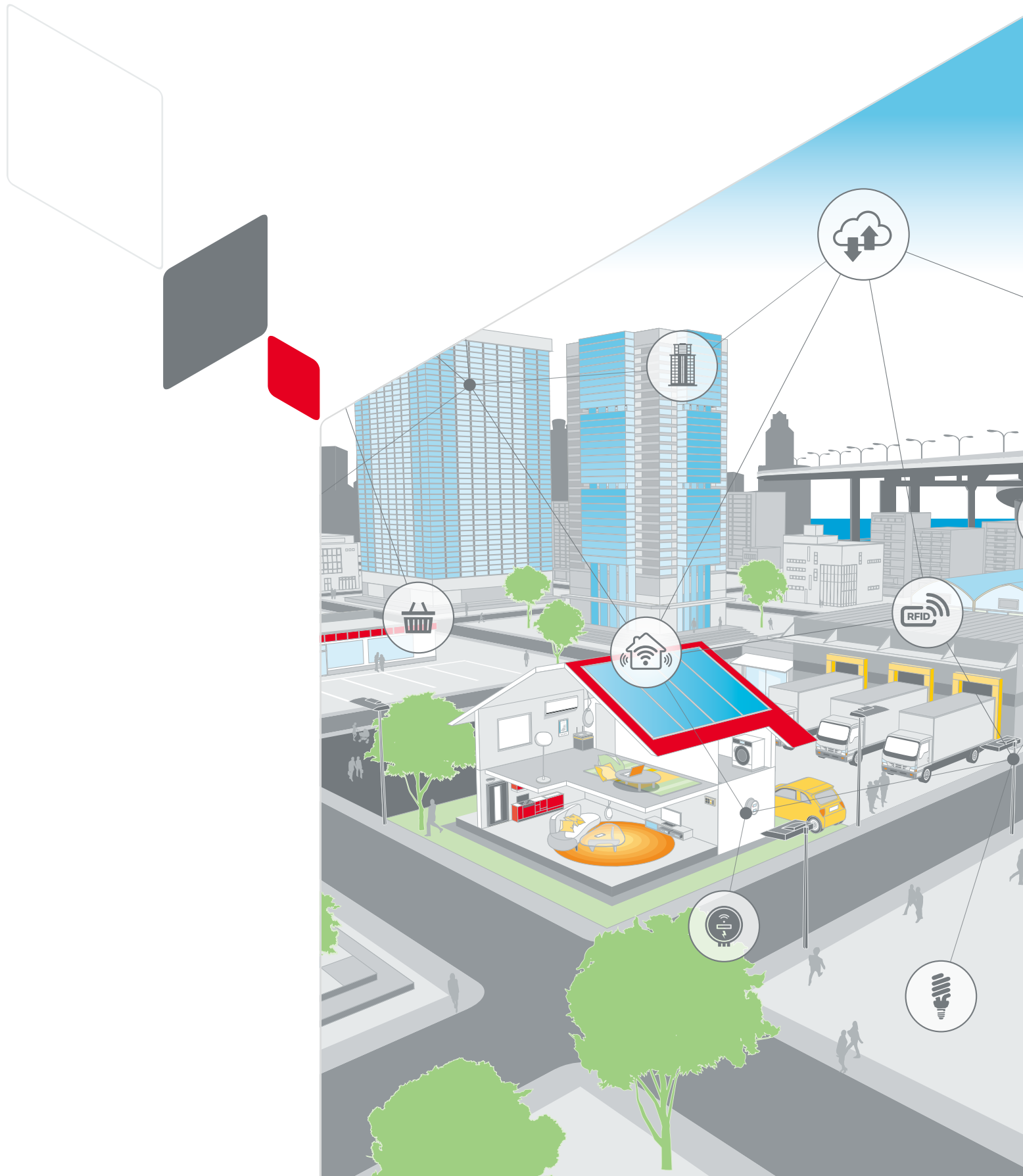
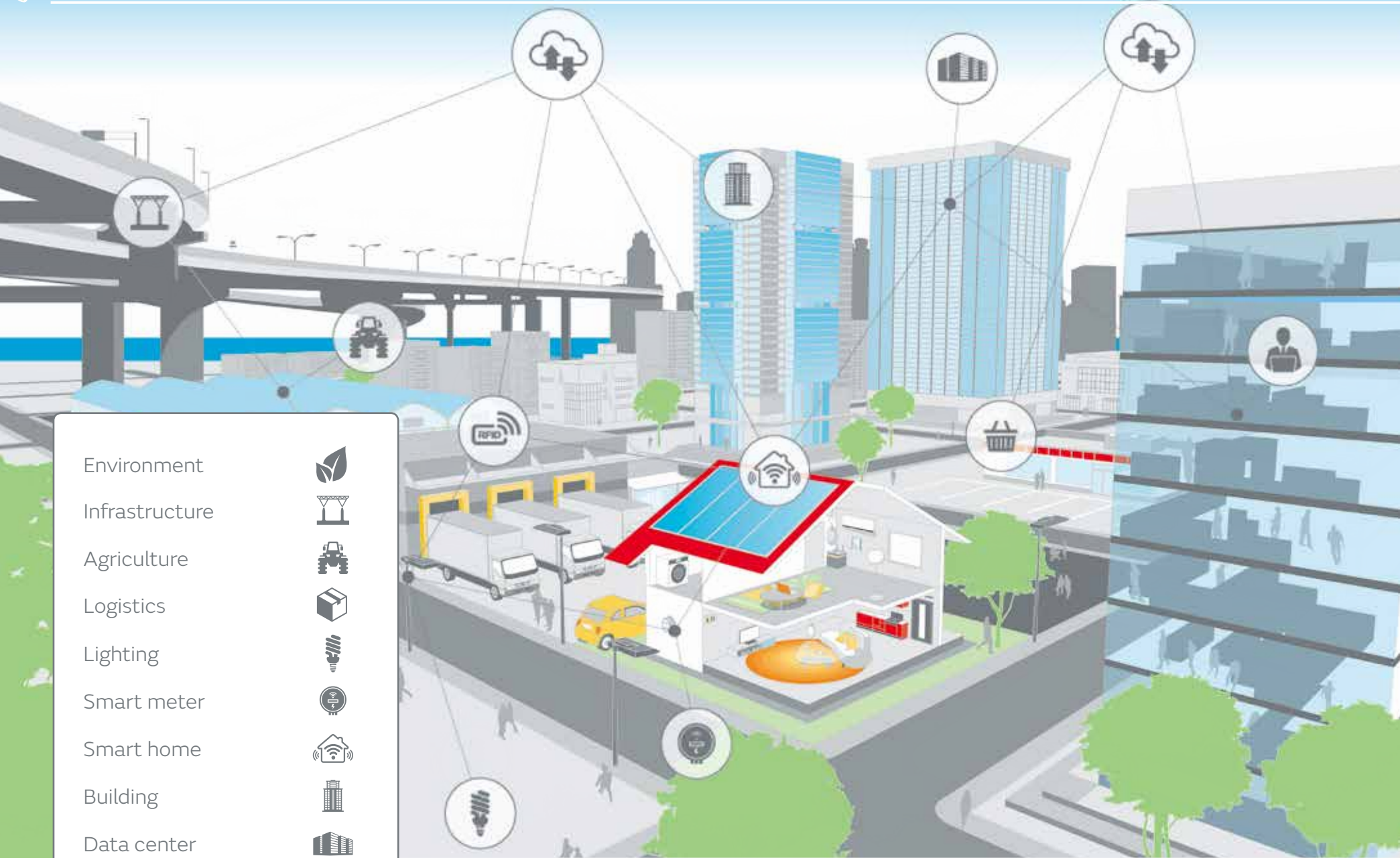


















Solutions for sensor networks

# Enabling IoT applications

*Smart buildings, home, agriculture, logistics & energy management systems*





- Environment 
- Infrastructure 
- Agriculture 
- Logistics 
- Lighting 
- Smart meter 
- Smart home 
- Building 
- Data center 
- Office 
- Retail 
- Cloud 
- Generator 
- Connected port 
- Utilities 
- Hospital 

# A smart & connected society with Murata's wireless sensor network

Connected technology is changing the way we live. Whether at home or at work Murata innovation is contributing to a smarter, productive and more efficient way of life.

Smart homes and buildings rely on energy management systems (EMS) to perform detailed control of lighting and air conditioning. This is achieved whilst monitoring power consumption and environmental conditions - such as temperature, humidity and light levels - using sensors located throughout your home.

The sensor network system for smart homes enables easy EMS construction.

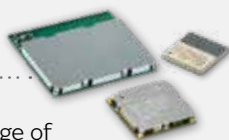
Additionally, this network can be used to achieve automated control without compromising the comfort in our daily life. In a similar way, its expected to expands usage in smart agriculture for efficient and automated cultivation.

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.

**Trademarks acknowledged**  
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Wi-Fi is a registered trademark or trademark of Wi-Fi Alliance in the United States and other countries.  
ZigBee is a registered trademark or trademark of ZigBee Alliance in the United States and other countries.  
LoRa is a trademark of Semtech Corporation.  
Sigfox is a trademark of SIGFOX.  
All other brand names and product names appearing in this document are registered trademarks or trademark of their respective holders.

## Wireless communications

Murata provides RF components and modules for wireless communication applications, offering you an extensive range of products such as Wi-Fi, Bluetooth, LPWA, RFID, and many more.



## Energy devices

Murata provides energy device solutions for IoT applications as follows;

- Micro batteries



## Sensors

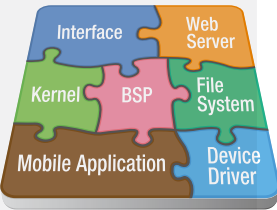
We offer an extensive range of sensors for IoT applications such as;

- PIR
- MEMS
- Ultrasonic

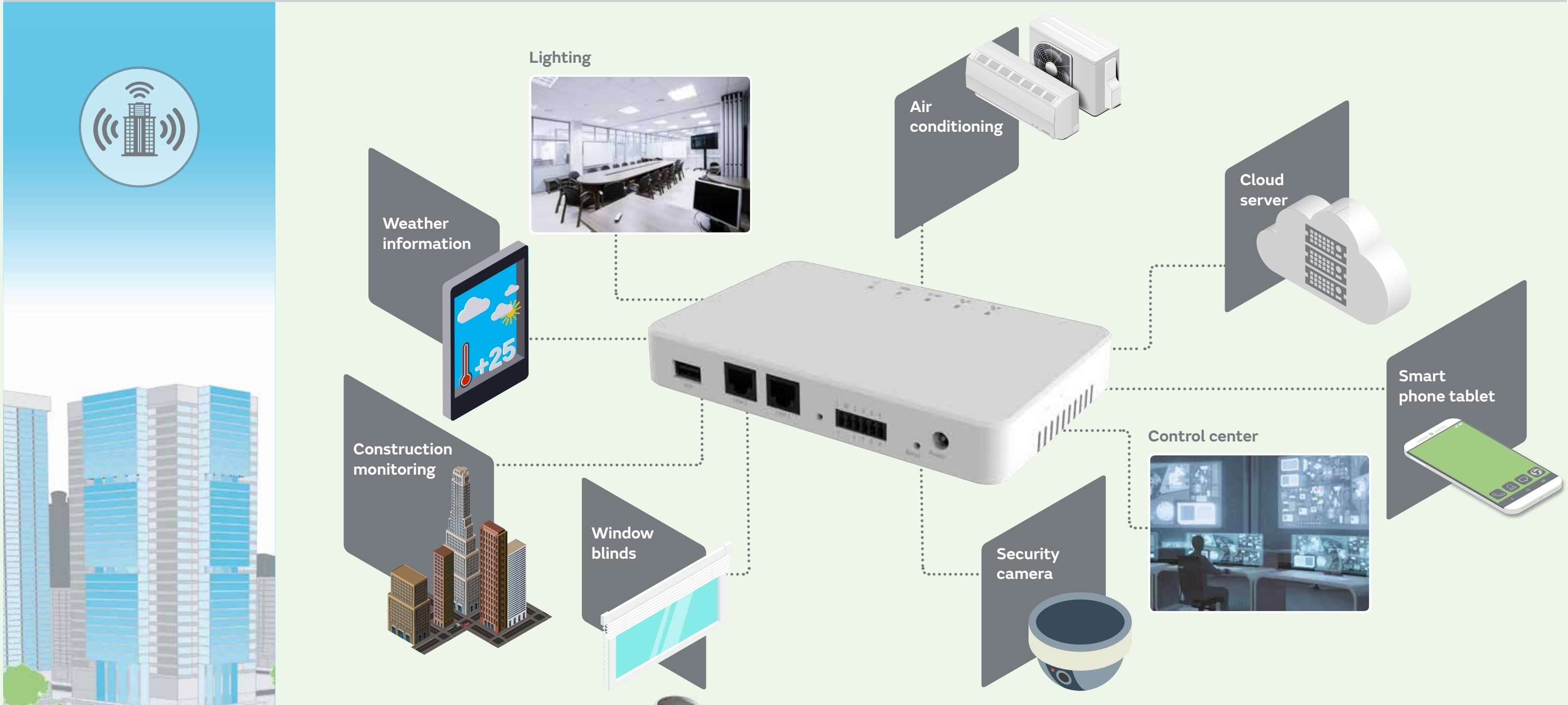


## Software

For enabling IoT applications, you can rely on Murata's wealth of experience and expertise in developing software solutions for your IoT gateway, node devices, cloud connectivity, etc. We also develop wireless device drivers, peripheral device control software and middleware.







Smart building control

- BEM (Building Energy Management)
- Lighting
- Air conditioning
- Security
- Construction monitoring

PG

8

Pyroelectric infrared sensor

PG

9

AMR magnetic sensor

PG

10-11

High accuracy MEMS sensor

PG

13-15

Wi-Fi/Bluetooth/LPWA module

PG

16-17

Micro battery

PG

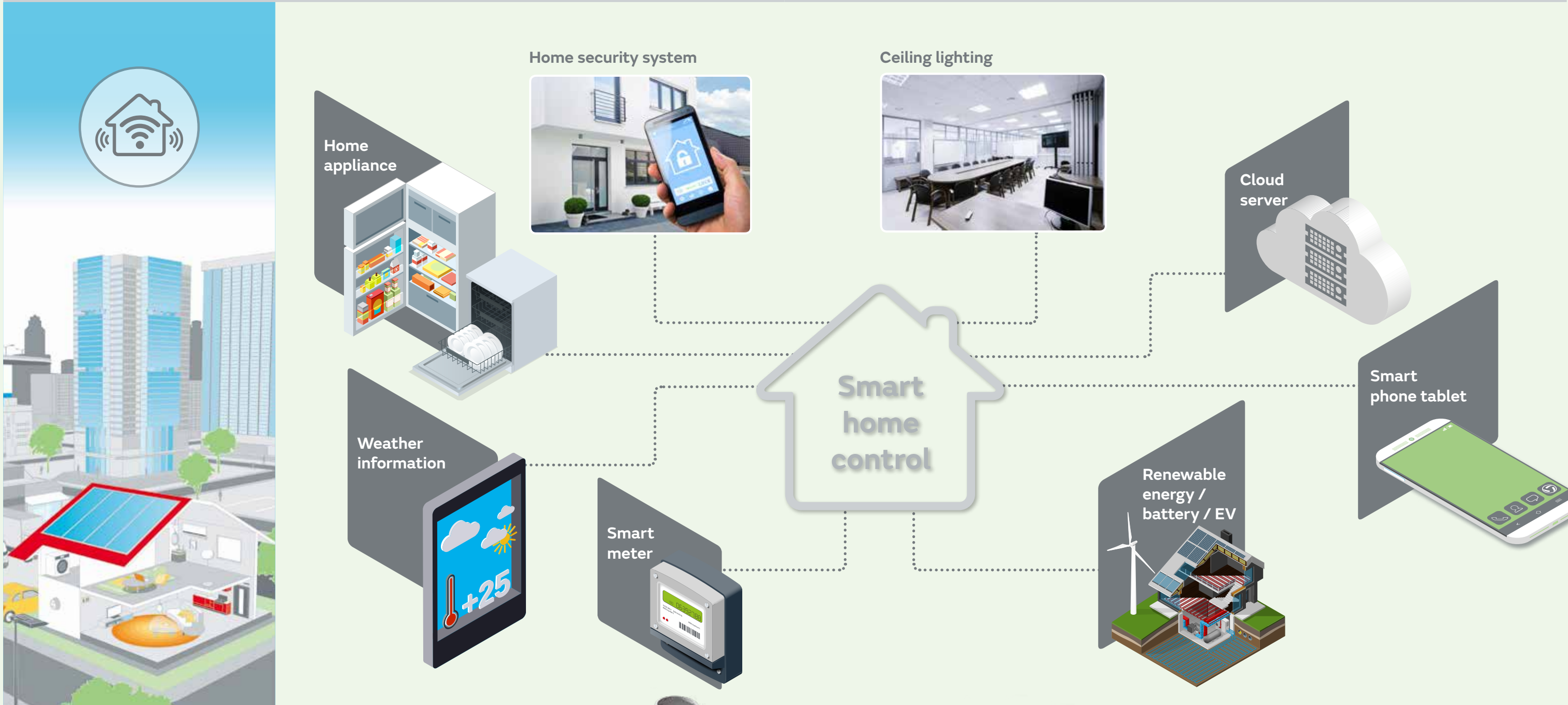
22-23

Isolated DC-DC converters for PoE

PG

24

Power supply for LED lighting



Smart home control

- HEMS (Home Energy Management Systems)
- Smart appliances
- Lighting
- Security

PG

8

Pyroelectric infrared sensor

PG

9

AMR magnetic sensor

PG

12

Ultrasonic sensor

PG

13-15

Wi-Fi/Bluetooth/LPWA module

PG

16-17

Micro battery

PG

20-21

Ionissimo® MHM series Ionizer/Ozonizer

PG

24

Power supply for LED lighting



## Pyroelectric infrared sensor

### Extra high sensitivity, lead-type pyroelectric infrared sensor

Our newly developed low-cost, high-sensitivity, high-RFI (Radio Frequency Immunity) and high-WLI (White Light Immunity) characteristic lead-type pyroelectric infrared sensor. The IRA-S series has an improved RFI

characteristic for the security market to comply with EN regulation for detection levels, such as peripheral circuitry. Its high sensitivity and high reliability make a great contribution to ergonomics and energy conservation for a wide range of appliances.



#### Features

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

#### Applications

- Security systems

Type	Part number	Sensitivity (500K, 1Hz, mVpp)	Dimensions (mm)	Benefits
Dual	<b>IRA-S210ST01</b>	4.6	ø9.2x4.7	<ul style="list-style-type: none"> <li>New and cost effective model</li> <li>High RFI (Radio Frequency Immunity)</li> <li>For security, automatic ECO switch for display and other appliance</li> </ul>
Serial quad	<b>IRA-S410ST01</b>	7.0		

### Security system applications



PIR Sensor



# AMR magnetic sensor

## Design flexibility, narrower sensitivity range and higher reliability

The AMR series consists of sensors that include an IC to detect changes in the magnetic resistance of a magneto resistive element that is effected by an external magnetic field. This is achieved

from a ferromagnetic NiFe alloy thin film that is deposited over the IC circuit. We offer more than 30 models that support a broad range of applications backed by our experienced design consulting service.



### Open-close detection

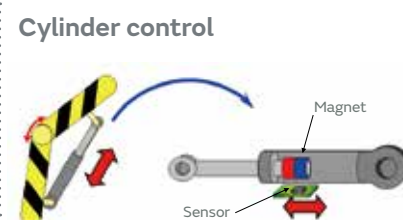
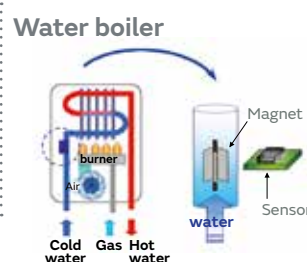
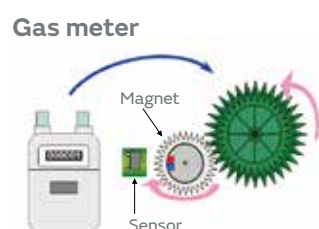
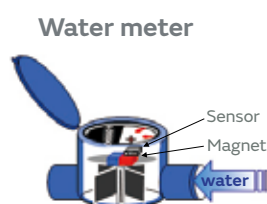
Part number	Sensitivity (m T)	Dimensions (mm)	Features	Applications
<b>MRMS20 series</b>	0.5 to 2.5	2.9x2.8x1.1	<ul style="list-style-type: none"> <li>Std. performance, compact package</li> </ul>	<ul style="list-style-type: none"> <li>Std. open-close, position detection</li> <li>Low-speed rotation detection</li> </ul>

### Flow metering by rotation detection

Part number	Sensitivity (m T)	Dimensions (mm)	Features	Applications
<b>MRSS29DR-001</b>	1.2 to 3.2	2.9x2.8x1.1	<ul style="list-style-type: none"> <li>High voltage operation (3.5 to 30V)</li> <li>High speed detection (Typ. 5kHz)</li> <li>Built-in voltage regulator</li> </ul>	<ul style="list-style-type: none"> <li>Flow metering for industrial equipment</li> </ul>

### Cylinder control by position detection

Part number	Sensitivity (m T)	Dimensions (mm)	Features	Applications
<b>MRMS541D</b>	1.0 to 2.5	1.45x1.45x0.55	<ul style="list-style-type: none"> <li>High accuracy, high-speed type (Typ. 2kHz)</li> <li>Built-in temp. compensation circuit</li> </ul>	<ul style="list-style-type: none"> <li>Position, proximity detection</li> <li>High-speed rotation detection for industrial equipment</li> </ul>
<b>MRMS543M-001</b>	(Hon) 1.5 to 3.0	1.45x1.45x0.55	<ul style="list-style-type: none"> <li>High accuracy, high-speed detection (Typ. 1kHz)</li> <li>Built-in temp. compensation circuit</li> <li>Low voltage, low power operation</li> </ul>	





# High accuracy MEMS sensor

3D MEMS technology enables higher performance at lower cost.

**G**yroscope components and combined sensors (including gyroscope and accelerometer) are based on our proven 3D MEMS technology and highly integrated electronics.

Industrial gyroscopes offer a performance level that has typically been available

only for expensive module products. Sensing elements and the measuring circuitry are assembled into a pre-molded plastic dual-in-line (DIL) package, protected with silicon gel and covered with a stainless steel lid. All products are RoHS compatible and suitable for lead-free reflow soldering.



### Features

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

**For construction monitoring**  
(Distortion, abnormal vibration, etc.)



### Inclinometers

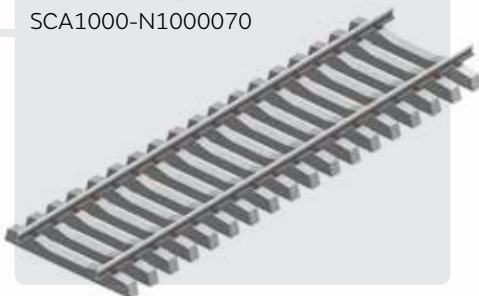
Recommended product	Product description	Accuracy	Features
<b>SCA100T</b>	Analog output 2 axis inclinometer	Accuracy $\pm 0.5$ degree over operating temperature	<ul style="list-style-type: none"> <li>■ Good performance in vibrating environment</li> <li>■ High offset accuracy over temperature and time</li> <li>■ High mechanical shock endurance</li> <li>■ Cost effective</li> </ul>
<b>SCA103T</b>	Analog output 1 axis inclinometer	Accuracy $\pm 0.1$ degree over operating temperature	
<b>SCA61T</b>		Accuracy $\pm 0.5$ degree over operating temperature	

### Applications

#### Structural health monitoring

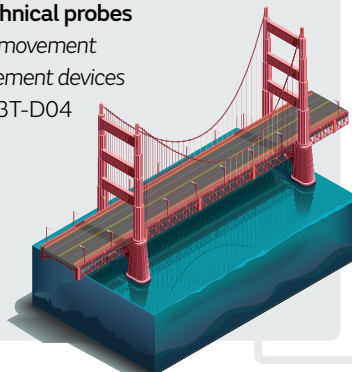
##### Railway track monitoring

SCA103T-D04,  
SCA1000-N1000070



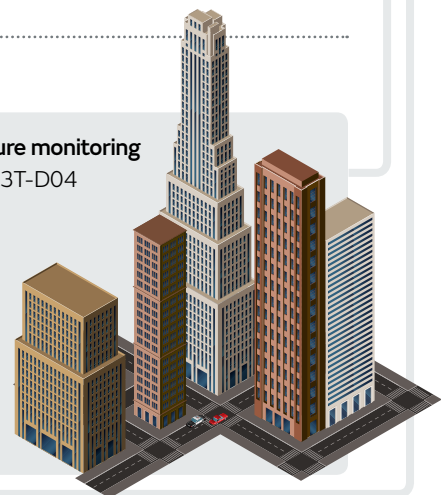
##### Geotechnical probes

Ground movement  
measurement devices  
SCA103T-D04



##### Structure monitoring

SCA103T-D04



## Inclinometers

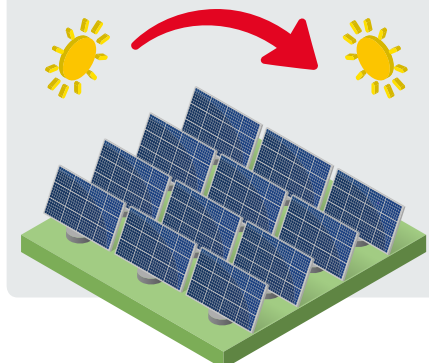
Recommended product	Product description	Accuracy	Features
<b>SCA100T</b>	Analog output 2 axis inclinometer	Accuracy $\pm 0.5$ degree over operating temperature	<ul style="list-style-type: none"> <li>High offset accuracy over temperature and time</li> <li>Cost effective</li> </ul>

## Applications

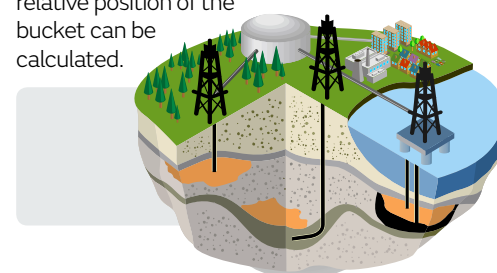
### Levelling

- Solar tracker systems**  
SCA100T
- Wheel alignment service stations**  
SCA103T, SCA100T
- Platform and boom lift leveling**  
*Digital levels and scales*  
SCA103T, SCA100T, SCA61T

**Solar tracker systems**  
SCA100T



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

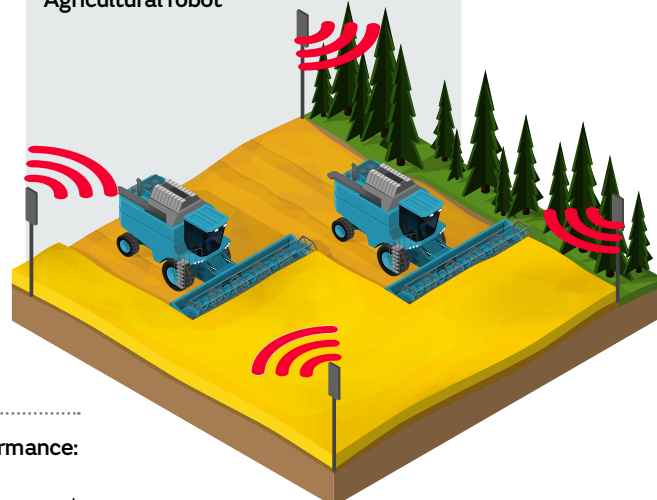
Recommended product	Product description	Benefits	Features
<b>SCA3300</b>	Digital SPI 3 axis accelerometer for inclination measurement	<ul style="list-style-type: none"> <li>Reliability</li> </ul>	<ul style="list-style-type: none"> <li>Good performance vibrating environment</li> <li>High offset accuracy over temperature and time</li> </ul>
<b>SCC2000</b>	Digital SPI 1 axis gyro & 3 axis accelerometer (X or Z axis)	<ul style="list-style-type: none"> <li>Combined sensor</li> <li>Reduced PCB size</li> </ul>	<ul style="list-style-type: none"> <li>High mechanical shock endurance</li> <li>Competitive price</li> <li>Self diagnostic features</li> </ul>

## Applications

### Moving machines

- Precision agriculture products help to minimize farming costs and maximize yields.**
- Precision agriculture**  
SCC2000 Series, SCA3300
- Construction machines (excavators, wheel loaders, bull-dozers...)**  
SCC2000 Series, SCA3300
- Material handling equipment**  
SCC2000 Series, SCA3300

**Agricultural robot**



## Murata benefits & advantages:

- Gyroscope performance:**
  - Bias stability
  - Low noise
  - Accuracy
- Accelerometer performance:**
  - Low noise
  - Offset stability over temperature
  - Good performance in vibrating environment



## Ultrasonic sensor

### Low-cost solution for distance detection

Small and lightweight, ideally suited for short-distance range detection and home security.

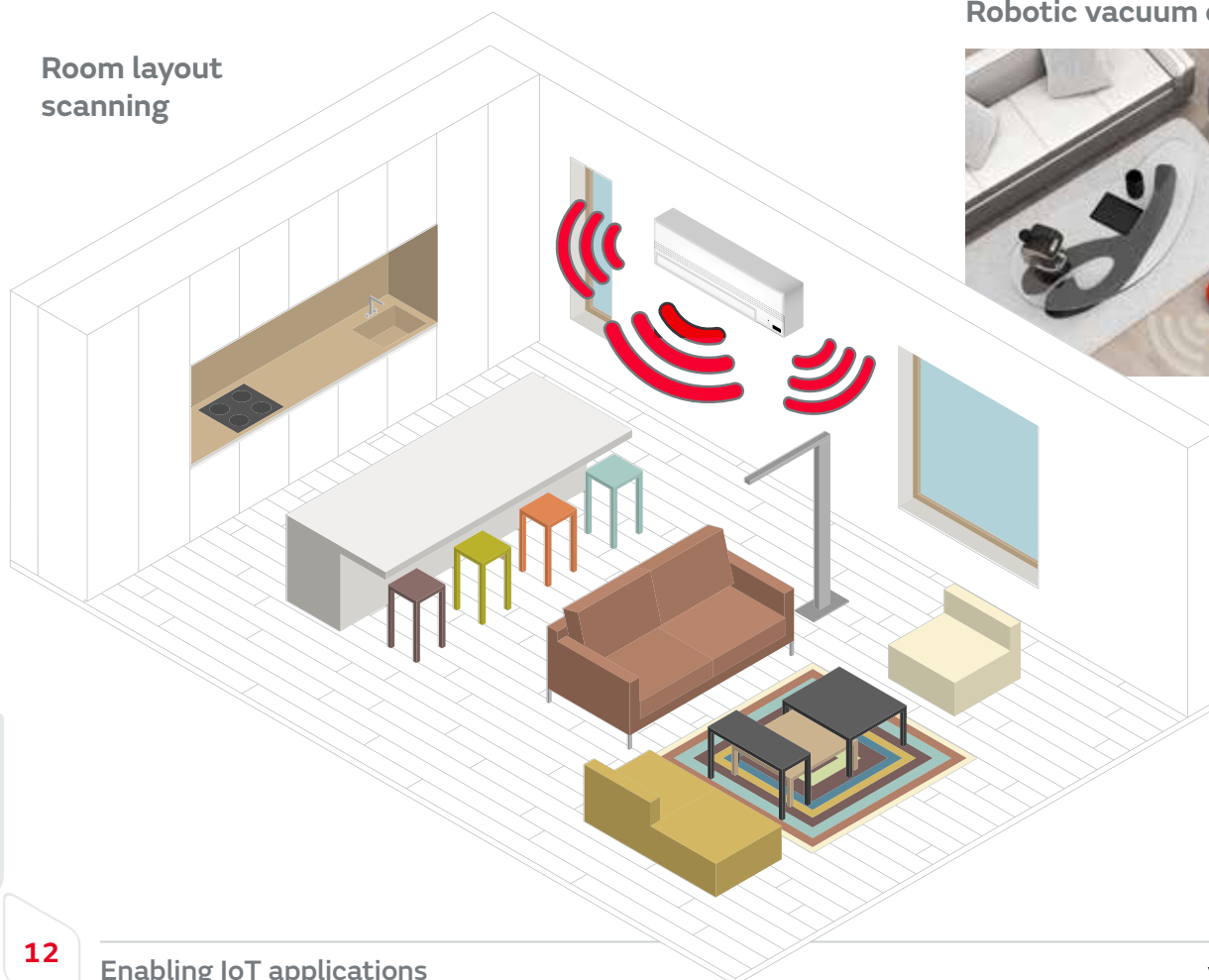
#### Applications

- Robotics (consumer use)
- 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		9.9±0.3	2550±20%		—	-63dB typ. (0db=10V/Pa)	—
SMD type	—	MA40H1S-R		5.2x5.2x 1.15±0.1	4500±20%		95dB min. (0dB=20uPa)	-65dB min. (0dB=1V/Pa)	7.2V p-p (at 40kHz, Square wave)

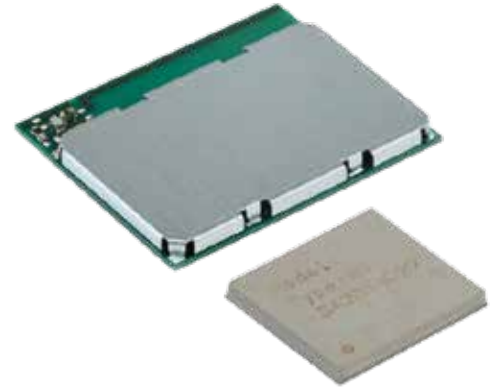
#### Room layout scanning



#### Robotic vacuum cleaner



# Wi-Fi smart module



**M**urata is market leader in Wi-Fi modules for embedded systems, providing superior quality and high-performance modules for high volume production. Murata's wireless modules

will streamline your assembly operations, thus significantly reducing customer's design time. Additionally, we offer a variety of low-power products for sensor networks.

## Type 1HD

### Features

- **Highly integrated**
- **FCC/IC/CE/TELEC compliant**
- **Stand-alone complete Wi-Fi 11b/g/n module**
  - CPU, Wi-Fi function and stack (TCP/IP, Supplicant) are embedded.

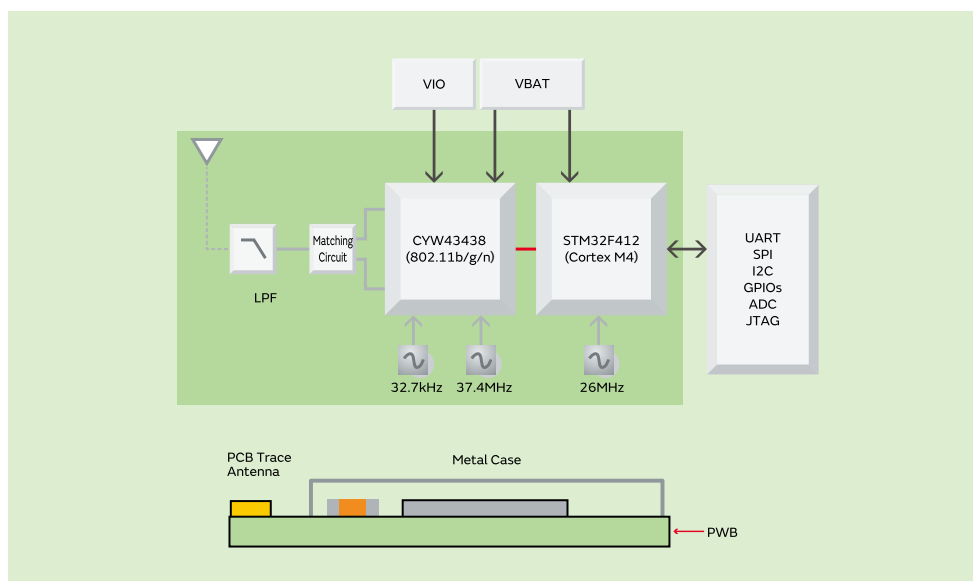
### Applications

- **Home and building automation**
  - Lighting control
  - Heating, Ventilation, Air-conditioning
- **EMS (Energy Management System)**
- **Simple sensor network**
- **Home security**
- **Healthcare & fitness**

### Product specifications

- **Wi-Fi chipset**
  - Cypress CYW43438, 802.11b/g/n
- **MCU chipset: STM32F412**
  - ARM Cortex-M4 processor
  - ROM: 1MB, RAM: 256kB
- **Size: 21.0x17.5x2.3 (max.) (mm)**
- **Metal can shield FCC/CA/CE/TELEC certified**
- **Software**
  - Web server
  - Wi-Fi STA and Soft AP modes
  - Network stack
- **WEP, WPA-PSK, WPA2-PSK**
- **Diverse peripheral interfaces:**
  - UART/SPI/I2C/GPIOs/JTAG

### Block diagram

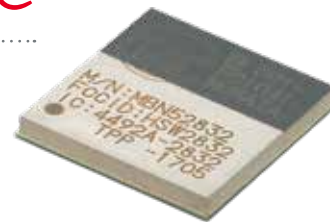




# Bluetooth low energy module

**B**LE is an ultra-low power communication technology that enables up to years of operation with a button battery. Widespread adoption is expected in fields such as health management, fitness and home

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



## Type MBN52832

### Features

- Powerful MCU core with large RAM and flash for user application
  - ARM Cortex M4; 64K RAM; 512K flash
- Low power consumption
  - TX 7mA @ 3.5dBm (DCDC mode)
  - RX 6mA (DCDC mode)
- Rich peripheral interface – 20 GPIO ports
- Very small size
  - 7.4 x 7.0 x 0.9mm (max)
- Fully certified
  - FCC (US), IC (Canada), ETSI (EU), TELEC (Japan)
  - BT SIG Certificate
- Support both on-board and external antenna version
  - On-board PCB pattern antenna
  - External patch antenna
  - External dipole antenna

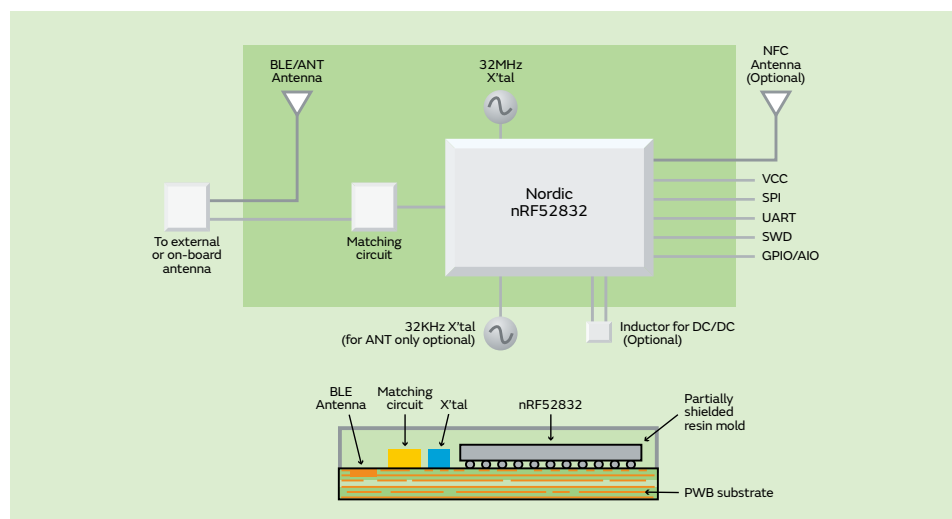
### Product specifications

- Chipset: nRF52832 Bluetooth LE IC
- Dimension: 7.4 x 7.0 x 0.9mm
- Package: LGA.
- Antenna: on-board or external
- Max output power: +4dBm (LDO mode)
- Interfaces: UART, SPI, 20 GPIO, 5ADC, SWD, PWM, I2C
- Operating voltage: 1.7V-3.6V
- Operating temperature range: -40 °C to 85 °C
- OTA firmware upgrade
- RoHS compliant
- Regulatory certificate: FCC/IC/ETSI/TELEC
- Bluetooth SIG qualification

### Applications

- Proximity services
- Building automation
- Medical/Healthcare
- Beacon

### Block diagram



## LPWA module

**L**PWA stands for Low-Power Wide Area wireless technology. LPWA wireless technology enables the IoT (Internet of Things) applications, which usually require lower power consumption and longer range coverage. Although the data transfer rates are comparatively slower than

existing wireless communication technologies such as Wi-Fi, Bluetooth, mobile network, etc., LPWA technology is predicted to be widely used in the IoT and M2M as it enables lower consumption of connected devices. Murata have several solutions, LoRa, Sigfox, CAT-M1, NB-IoT.



### Type ABZ

#### Features

- **Compact and low cost**
- **Battery life**
  - 10 years
- **Long range**
  - 10km
- **Pre-certified radio regulatory approvals**
  - 868 & 915 MHz spectrum

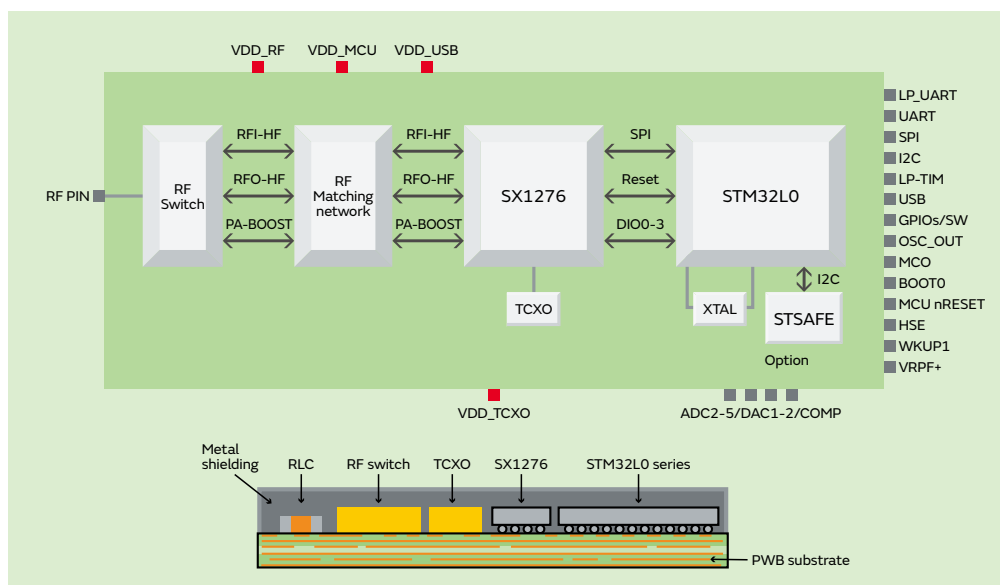
#### Applications

- Smart metering
- Wearable
- Tracking
- M2M
- IoT edge nodes

#### Product specifications

- **RF/BB chipset:** SX1276
- **MCU chipset:** STM32L0 series
  - CPU: Cortex M0+
  - RAM: 20KB
  - Flash: 192KB
- **Peripheral interfaces:** UART/SPI/I2C/GPIOs/ADC
- **Radio certification (Plan) :** FCC, IC, CE (R&TTE)
- **Module size:** 12.5 x 11.6 x 1.76mm
- **Package:** Metal shielding
- **Frequencies:** EU / US / India / Pacific
- **Operating temp:** -40 to +85 °C
- **Supply voltage:** 2.2V – 3.6V
- **RF transmit power:** +14dBm / +20dBm (with PA boost)
- **RF sensitivity:** -135dBm
- **Frequency band:** 860MHz-930MHz

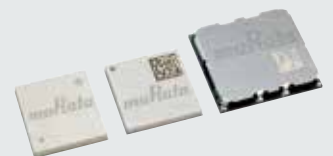
#### Block diagram



#### Other LPWA solutions

NB-IoT: 1RX, 1SS

Cat-M1/NB-IoT: 1SC





## Micro battery

Murata offers a wide range of primary micro batteries with high performance and reliability, taking

advantage of 40+ years technology development and manufacturing expertise.



### Coin manganese dioxide lithium batteries (CR batteries)

- Wide range of CR batteries including heat-resistant type and high drain type
- High voltage, high energy density and excellent self-discharge performance
- Acquisition of ISO/TS16949 certification

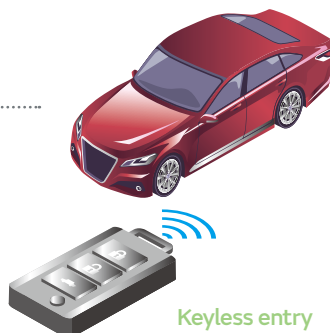
Battery types	CR (Standard)	New CR (Extended temperature)	CR (Heat-resistant)	New CR (High drain)
Nominal voltage	3.0 (V)	3.0 (V)	3.0 (V)	3.0 (V)
Operating temp.	-30 to +70 (°C)	-40 to +85 (°C)	-40 to +125 (°C)	-30 to +70 (°C)
Nominal capacity	30-1000 (mAh)	220-2000 (mAh)	210-1000 (mAh)	200-500 (mAh)
Diameter	12.5-24.5 (mm)	20.0-36.5 (mm)	20.0-24.5 (mm)	20.0-24.5 (mm)
Thickness	1.6-7.7 (mm)	3.2-7.7 (mm)	3.2-7.7 (mm)	3.2-5.0 (mm)
Weight	0.67-11 (g)	3.0-20 (g)	3.1-11 (g)	3.0-6.2 (g)
Max plus discharge*1	30mA	30mA*2	30mA	50mA

\*1 50% depth of discharge battery's maximum pulse discharge current over 2V for 3s (23°C)

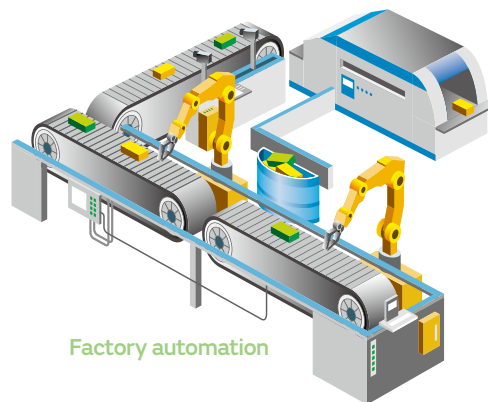
\*2 CR3677X max plus discharge is 80mA

### Applications

- Tire pressure monitoring system
- Keyless entry/Smart key
- Factory automation
- Smart meters
- Tracking devices
- Sensors



Keyless entry



Factory automation

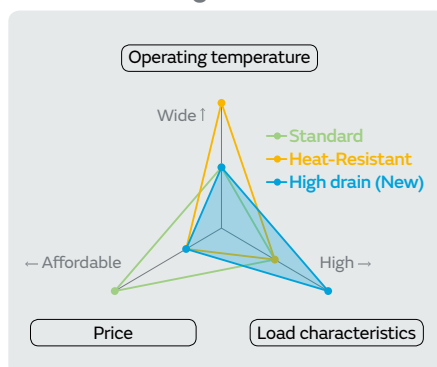
### New products

In response to the expansion of IoT applications and increasing demand for small, reliable power sources, Murata developed two types of coin manganese dioxide lithium batteries; High drain type and Extended temperature type.

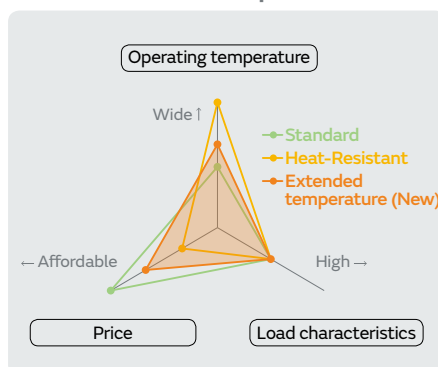


### Coin manganese dioxide lithium batteries selection guide

#### High drain

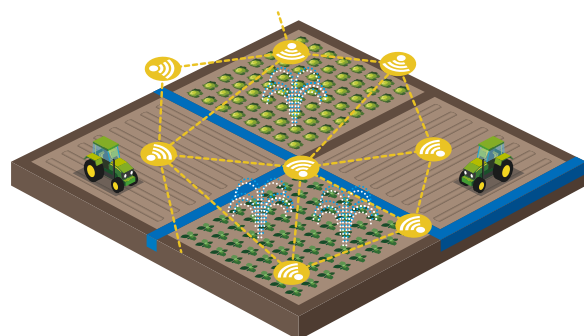


#### Extended temperature



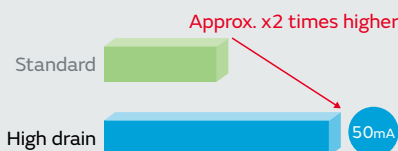
## High drain

Excellent high-current discharge performance to support LPWA data transmission



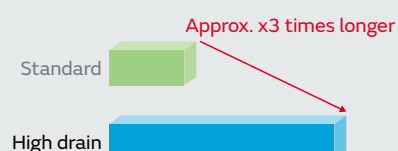
Tracking devices

### Max. pulse discharge current



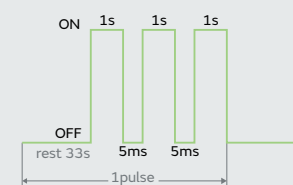
\*50% depth of discharge battery's maximum pulse discharge current over 2V for 3s (23°C)

### Discharge time (45mA pulse discharge)



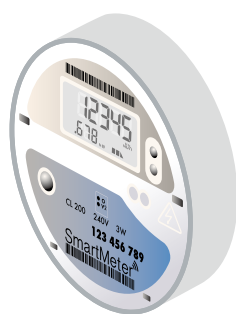
\*Pulse discharge condition: 45mA x 3s, 33s off, 2V cut off (23°C)

### Pulse discharge condition: LPWA



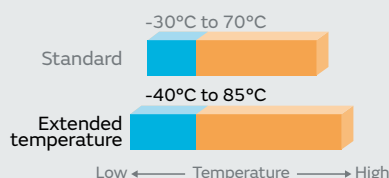
## Extended temperature

Recommend for automotive and outdoor devices

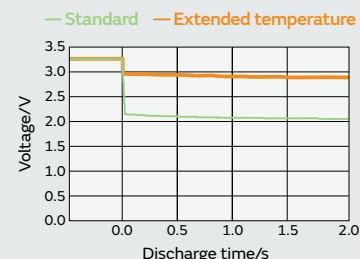


Smart meters

### Operating temperature



### Voltage comparison after 85°C storage



## Silver oxide batteries (SR batteries)

Murata is the world's number one supplier of SR batteries, and was the first to manufacture mercury-free silver oxide batteries, providing excellent stable discharge characteristics.

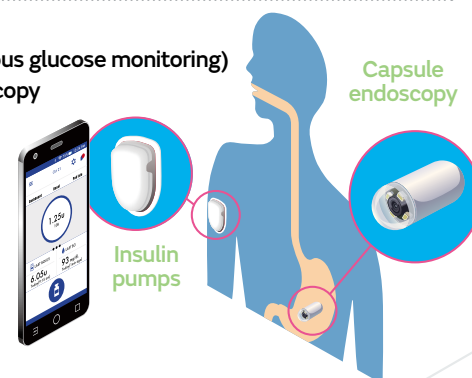
Battery types	SR Silver oxide batteries	LR Alkaline manganese batteries
Nominal voltage	1.55 (V)	1.5 (V)
Nominal capacity	20-160 (mAh)	45-120 (mAh)
Diameter	6.8-11.6 (mm)	7.9-11.6 (mm)
Thickness	2.1-5.4 (mm)	3.05-5.4 (mm)
Weight	0.31-2.17 (g)	0.6-2.0 (g)
Operating temp.	-10 to +60 (°C)	-10 to +60 (°C)

## Alkaline manganese batteries (LR batteries)

- High safety with unique technologies to prevent leakage and swelling
- Excellent high-drain pulse discharge characteristics

## Applications

- Insulin pumps
- CGM (Continuous glucose monitoring)
- Capsule endoscopy



## RFID technology

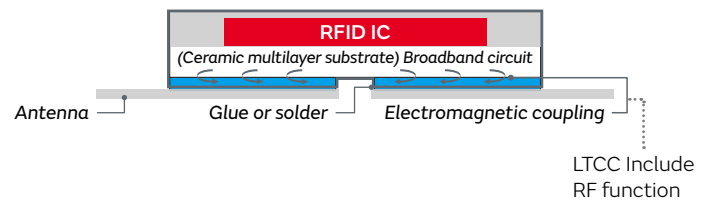
Our unique multi-layered circuit RF technology enabled "one of the world's smallest RFID tag". MAGICSTRAP® has a robust package with built-in IC compliant with industry standards.



### Features

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

### Construction diagram



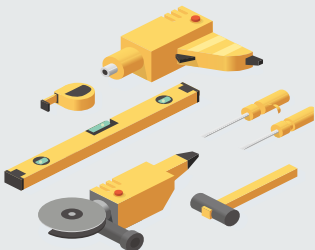
### MAGICSTRAP® for item level tagging

	LXMS21NCNH-147	LXMS33HCNG-134	LXMS33HCNK-171
Appearance			
Standard	ISO18000-63 and EPC Global Gen2 (v1.2.0)	ISO15693 NFC forum type 5	ISO14443 type A NFC forum type 2
Frequency band	UHF (865-928MHz)	HF (13.56MHz)	
Size	2.0 x 1.25mm	3.2x3.2mm	3.2x3.2mm
Thickness	0.55mm max.	0.7mm max.	0.75mm max.
Read range (typ)	10mm (500mW reader)	20mm (200mW reader)	15mm (200mW reader)
IC	NXP G2iM	NXP ICODE SLIX	NXP NTAG210

Contents subject to change without notice

### Applications

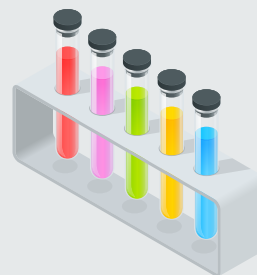
#### Tool management



#### Anti-counterfeit / Authentication



#### Auto counting




#### Verification





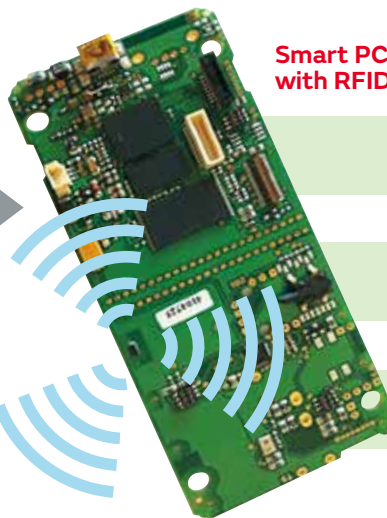
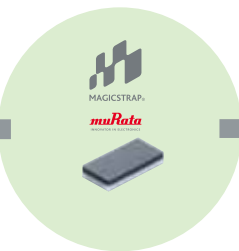
# MAGICSTRAP® for sensor networks

## MAGICSTRAP® for life-cycle management

	LXMS21ACMF-183	LXMS21ACNP-184
Appearance		
RFID standard	ISO18000-63 and EPC Global Gen2v2	ISO18000-63 and EPC Global Gen2 (v1.2.0)
Frequency	UHF (865-928MHz)	
Size	2.0x1.25mm	
Thickness	0.5mm max	
Read range (typ)	9m with external antenna (4W EIRP)	7m with external antenna (4W EIRP)
IC	impinj monza® R6	NXP UCODE 7xm

Contents subject to change without notice

### 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

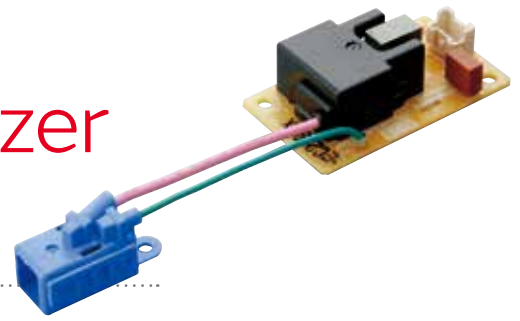
### RFID-Reader/Writer



Contents subject to change without notice.

# Small, high efficiency ionizer

## Ionissimo® MHM series



Today, the emphasis on health improvement and disease prevention is higher than ever. In related application areas, there is growing demand for ways to eliminate germs, mold and odors in the

home and office.

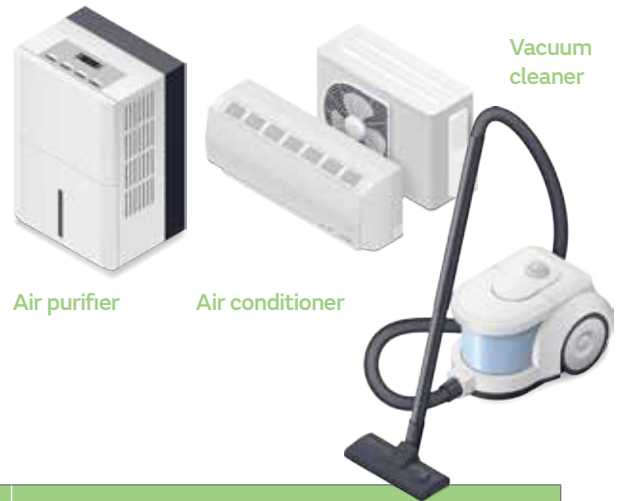
Additionally, equipment production sites are becoming ever denser and more crowded, leading to a growing need for static elimination in order to prevent

defects caused by static electricity. To respond to these needs, we have expanded our development and production 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.
- **Customizable**  
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:**
  - Production line
  - Home care and nursing
  - Interior/Household pet related needs

### Applications

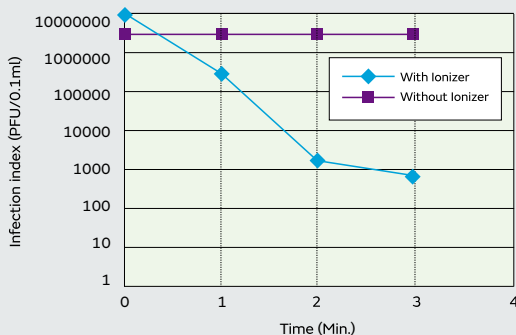


### Inclinometers

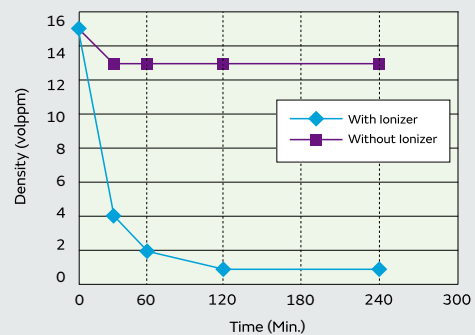
Part number	Ion type	Amount of Ozone generation*	Functions
MHM305	Negative	0.1mg/H	Skin moisturizing, static electricity removal, air purification
MHM306	Negative	1.0mg/H	Air purification, skin moisturizing, deodorizing elimination of bacteria/odor/mold
MHM400	Positive	0.1mg/H	Static electricity removal

\*Typical value under the condition 20°C/50%RH

Sterilizing influenza virus (HK A H 3 N2)

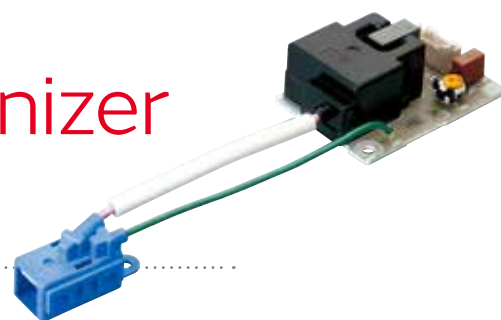


Deodorizing test for formaldehyde



# Small, high efficiency ozonizer

## Ionissimo® MHM series



### 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 the electrode.  $O_2 + O = O_3$  The ozonizer module will ozonize oxygen molecules efficiently utilizing this principle.

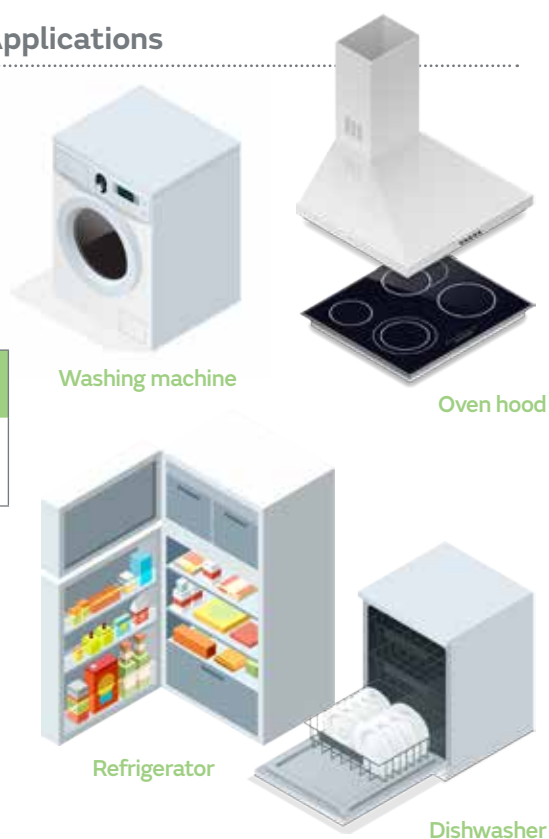
### Features

- Our unique design is capable of creating large amounts of ozone with high efficiency.
- 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.

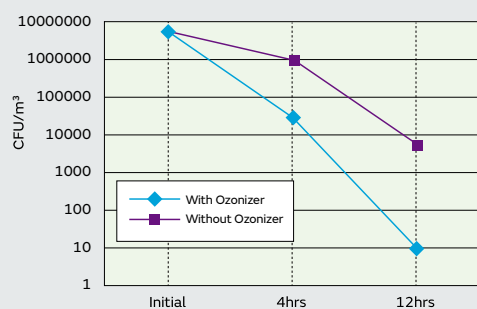
Part number	Ion type	Amount of Ozone generation*	Functions
<b>MHM500</b>	Negative Positive	2.5mg/H	Air purification; deodorizing; elimination of bacteria, odor & mold

\*Typical value under the condition 20°C/50%RH

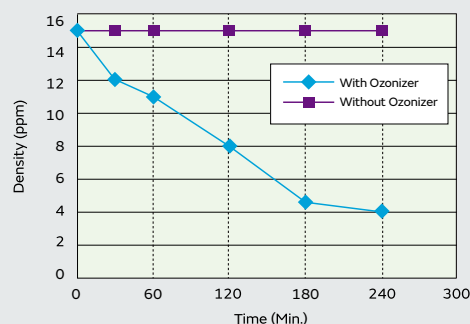
### Applications



Sterilizing test data in refrigerator colon bacillus



Deodorizing test for hydrogen sulfide (H2S)



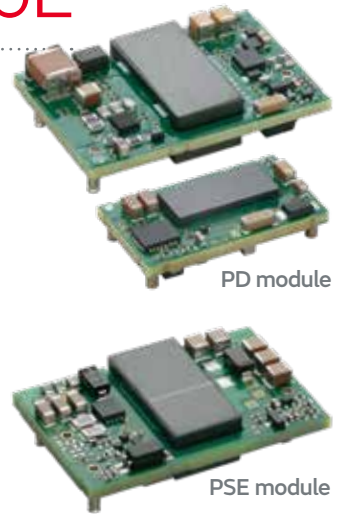


# Isolated DC-DC converters for PoE

An increasing number of network devices are utilizing PoE to eliminate the need for installing AC power supplies and in order to reduce wiring.

The expanding functionality and sophistication of these network devices is driving the need for miniaturization of the power supply section. The combination of these trends has led to Murata's

development of the MYBSP series DC-DC converters. Incorporating hardware classification protocol functions that conform to the IEEE802.3af and at PoE communication standard, the product utilizes a sheet-type transformer resulting in a miniaturized design with high dielectric strength.



### Features

- Compliant to IEEE 802.3af or IEEE 802.3at
- Small and low profile SMD type
- Available at Ta=+85°C
- Low EMI
- 2250Vdc input-output isolation
- Fewer values of external capacitor

### Applications

- Conference system
- LED lighting
- IP phone
- Security camera
- Biometric authentication
- Wireless access point
- Digital signage



Security camera

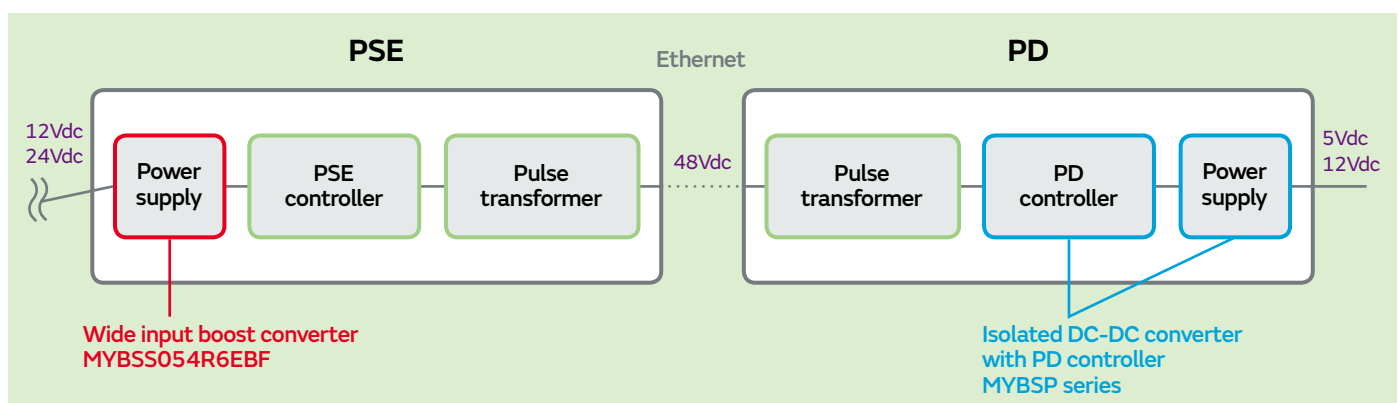


Wireless access point



Digital signage

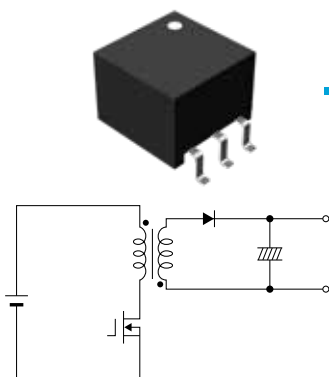
### Power modules in PoE



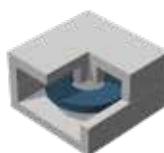
## Small and low profile

### Discrete solution

Traditional transformer



Sheet-type transformer

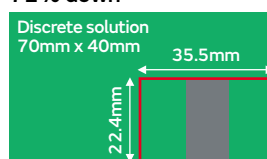


### Murata PoE modules



High efficiency  
Smaller and thinner size  
Available at  $T_a=85^{\circ}\text{C}$

72% down

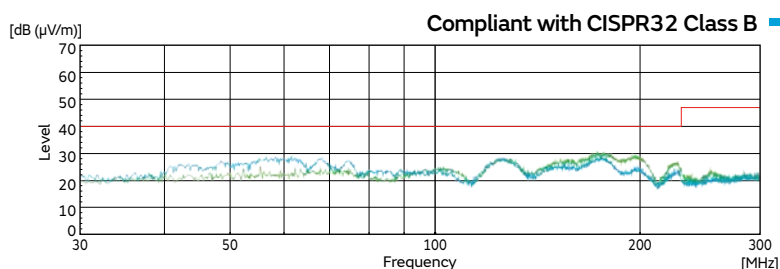


#### Benefits

- Reduce PCB space
- Lower profile

## Low noise

### Radiation noise

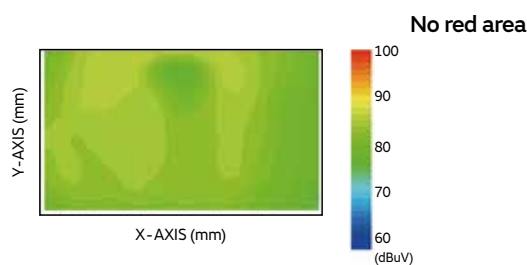


No additional components  
for EMI suppression

#### Benefits

- Efficient use of PCB space
- Reduce time to market
- Lower total cost

### Near magnetic field noise



## Lineup

			Size	Product name	Output	Power
PD module	PoE		26 x 14.8 x 6.8 mm	MYBSP00502ABF	5V/2A	10W
				MYBSP01201ABF	12V/1A	12W
	PoE+ 25.5W		35.5 x 22.4 x 10 mm	MYBSP0055AABF	5V/5.1A	25.5W
				MYBSP0122BABF	12V/2.125A	25.5W
PSE module	Boost-up for PoE+		35.5 x 22.4 x 10.55 mm	MYBSS054R6EBF	54V/0.6A	30W

# Switching power supply for LED lighting

## LED Ballast series

**W**ireless dimming and switching on and off 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 drive
- Wide range AC input (100 to 242V)
- Varied ballast line-up
- Primary-Secondary isolation structure
- Meets safety standard PSE
- PWM, DALI dimming interface (MPA1948 Series)
- Highly compatible with human/temperature/illuminance/etc. sensing with UART/ZigBee interface point (MPA1948 Series)

Model	MPA1948A	MPA1960A	MPA1967A	MPA1968A
Features	Intelligent power supply suitable for ambient lighting system			
Operating temp. range	-10 to 50°C			
Storage temp. range	-20 to 55°C			
Rated input voltage	AC100/242V			
Rated input voltage range	AC90 to 267V			
Input frequency	50/60Hz			
Number of output channels	1			
Output voltage range	30 - 50V		10 - 25V	30 - 50V
Output current <sup>1</sup>	700mA	1,400mA	1,050mA	
Output power	up to 35W	up to 70W	up to 25W	up to 50W
Output current ripple	20% of maximum output current or less			
Control interface (dimming range)	PWM (5 to 100%), DALI (1 to 100%), UART (1 to 100%)			
Lifetime	50,000 hr or more	40,000 hr or more	50,000 hr or more	
Efficiency	83.8% typ.	86.2% typ.	82.0% typ.	86.1% typ.
Harmonic current	JIS C 61000-3-2 class C, EN 61000-3-2 class C			
EMI	VCCI, CISPR15, CISPR22 class B			
Safety standard <sup>2</sup>	PSE			
Dimensions	224x70x35mm	234x85x35mm	224x70x35mm	234x85x35mm

# Software and certification support

As the market leading supplier of wireless communications modules manufacturer, our experienced engineers provide high quality technical and software support from our numerous offices located around the world. Wireless, sensors, embedded OS such as Linux and RTOS are just a few of the architectures installed in various areas,

such as consumer goods, industrial equipment, and smart factories. For all these applications and more, we focus on your problems and design challenges in order to provide the optimal solution for the data communications between the device drivers, cloud servers and the operating application. Furthermore, your time-to-market and engineering

costs will be reduced by our verification and certification support with official wireless test beds. We are confident that you will be satisfied with our technical support.

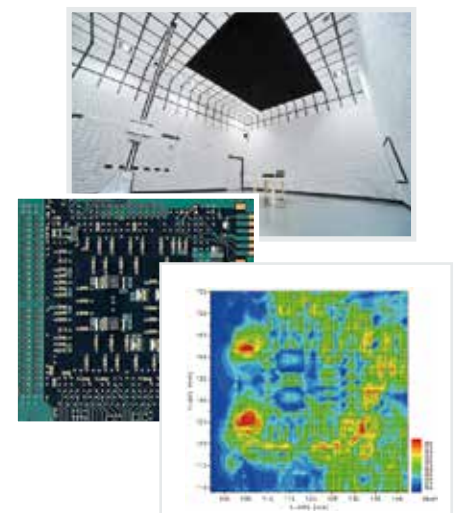
\*Linux is a registered trademark or a trademark of Linus Torvalds in the United States of America and other countries.



## EMC support with EMC lab

Because almost all devices related to "internet of things" applications 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.

We have our own EMC lab stocked with state-of-the-art equipment. Our highly skilled engineers are working to develop unique products with less noise and also to support our customers in reducing noise in their own products.





# Wireless services

Our wireless services capabilities include module design, low power and battery operated sensor nodes, gateways/border routers, so ware development for both embedded and application so ware, and more. We go beyond thinking about just the modules, to identify the optimal approach and platform for the complete end-to-end solution.



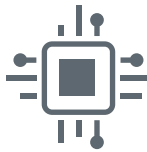
Wireless and IoT systems, software, sub-assemblies, and turnkey products



- Device Comm/Wi-Fi, BLE, FHSS, 802.15.4, USB
- Network synchronization, routing, and control
- Topology/point-to-multipoint, mesh
- Native and web application
- Test framework dev and automation
- Secure and encrypted wireless network access



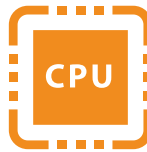
- Conceptual design
- CAD
- Regulatory compliance (CE, UL, FCC, IC, ETSI)
- Integrated antenna design and characterization
- Enclosure and cable design validation (CAE, IP)
- Environmental & reliability test and certification



- Interface with application SW
- BSP and device driver dev
- RTOS (Linux, Android, Windows)
- Wired and wireless comms
- Signal processing and algorithms
- Most IC microprocessor (MCU) suppliers



- Logging and reporting
- Test automation, verification, and validation
- Device connectivity (HTTP, Modbus TCP, SNMP, MQTT, etc.)
- User interface design and development
- Standalone and web services for cloud integration
- System design for platforms (AWS IoT, ThingWorx, M2X)



- Electrical design/senors, RF, MCU, battery
- Platform and board bring up
- Integration, simulation, and verification
- Board layout and schematics
- Sensors/signal conditioning
- Carrier board and module design

# Design support tool "SimSurfing"

This is the latest tool to get the electrical characteristics for Capacitors, Inductors, and EMI Suppression Filters, and to simulate Thermistors' behavior.



## Characteristics viewer

You can easily search and download the following data for Multilayer Ceramic Capacitors, Polymer Capacitors, EMI Suppression Filters (Three-terminal Capacitors, Ferrite Beads) and Power/RF Inductors.

## Components performance simulator

You can search by the simulation on simple circuits for Thermistors.

## Selection tool

You can select Medium voltage Capacitors and Power Inductors according to conditions of use.

\*Medium voltage: Rated Voltage 250V and over

## Search tool

You can search the Murata timing device (CERALOCK® and crystal units) that is most suitable for your IC and access information about the recommended circuit constant setting.

If you register as 'my Murata' user (<https://my.murata.com/en/web/mymurata/>), you can use enhanced SimSurfing.

## Usage example of "Multilayer Ceramic Capacitors"

### 1 Select the products

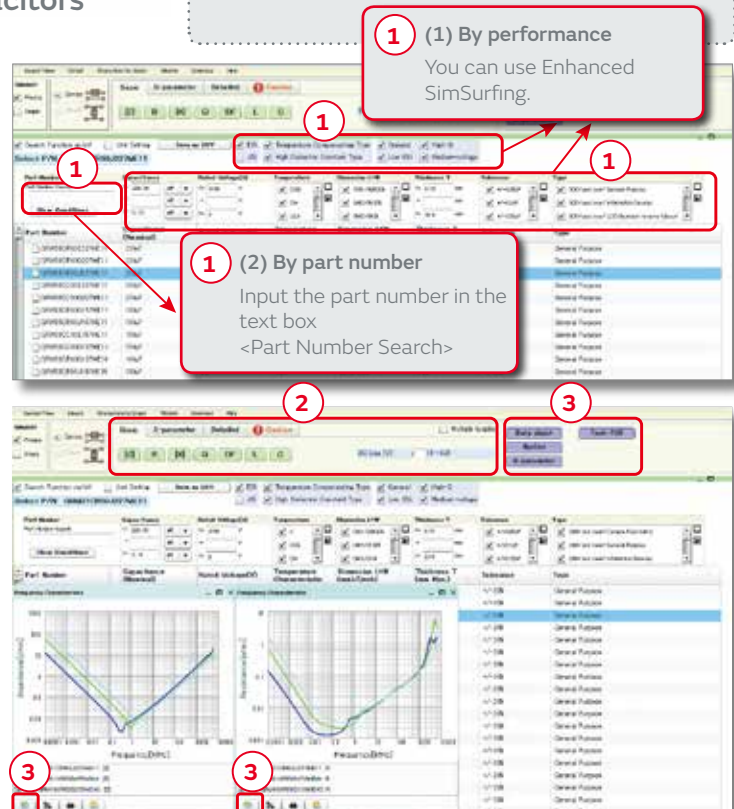
- (1) By performance/type
- (2) By part number

### 2 Show graph

- Click each button on each tab of [Basic], [S-parameter] and [Detailed].

### 3 Data download

- Click each purple button in this area
- Click "CSV output" button.



# my Murata

## Find what you need, when you need it

The new 'my Murata' portal is designed to respond to your individual needs. This space acts as a conference room in which you and Murata can meet.

Focused on products and solutions, this service provides you with the information you need - quickly. Our aim is to help you feel like you have a Murata salesman or engineer at your side.



New Murata web service registration  
only portal site

**Get your login credentials at:**  
<https://my.murata.com/en/>



### Get the latest product information

You can find out about the latest ceramic capacitor product lines, updated regularly as well as some unreleased product information, exclusively available on 'my Murata'. Plus much more...



### 'my Murata' knowledge exchange

To get feedback from the engineering community post your questions onto the 'Forum' which is provided to allow customers with similar experiences to exchange ideas and knowledge through discussions with Murata engineers. Find product specifications, mounting know-how, noise suppressions solutions, plus much more...



### Enhanced design tool

Simulate the characteristics of Murata products using the enhanced version of our 'SimSurfing' software available on the 'my Murata' portal.



## Notes





# Global locations

For details please visit [www.murata.com](http://www.murata.com)



## 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 Undersea equipment
- ③ Medical equipment
- ④ Traffic signal equipment
- ⑤ Data-processing equipment
- ⑥ Aerospace equipment
- ⑦ Power plant equipment
- ⑧ Transportation equipment (vehicles, trains, ships, etc.)
- ⑨ Disaster prevention / crime prevention equipment
- ⑩ Application of similar complexity and/or reliability requirements to the applications listed above

3 Product specifications in this catalog are as of October 2018. 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 Please read rating and CAUTION (for storage, operating, rating, soldering, mounting and handling) in this catalog to prevent smoking and/or burning, etc.

5 This catalog has only typical specifications. Therefore, please approve our product specifications or transact the approval sheet for product specifications before ordering.

6 Please note that unless otherwise specified, we shall assume no responsibility whatsoever for any conflict or dispute that may occur in connection with the effect of our and/or a third party's intellectual property rights and other related rights in consideration of your use of our products and/or information described or contained in our catalogs. In this connection, no representation shall be made to the effect that any third parties are authorized to use the rights mentioned above under licenses without our consent.

7 No ozone depleting substances (ODS) under the Montreal Protocol are used in our manufacturing process.