INNOVATOR IN ELECTRONICS

Shaping the future of

Healthcare & medical

Latest technologies for all healthcare and medical applications

Contents:

Electronics in healthcare

Electronics are permeating more and more into the healthcare sector, and electronics technology advances continue to enhance the functionality of healthcare equipment.

Murata is at the cutting edge of these electronics advancements and is a key provider of technologies which will help to shape the future of healthcare around the world. Apart from our standard products, which are present in almost any electronic equipment you use, Murata has developed new, innovative products specifically for healthcare applications. In this brochure we outline just a few of these innovations.

BCG (Ballistocardiography) node
Size 8.37cm x 4.07cm x 1.76cm

Please note that Murata does not support the usage of Murata's standard products for safety-critical applications that require especially high reliability.

Please don't hesitate to contact us if you have any questions or concerns.

MEMS HR sensor node

Non-contact heart rate and other cardiac measurement parameters

Electronic BCG (Ballistocardiography) module with accelerometer signal processing and algorithm in the on-board micro controller

Wifi enabled

Features

- A continuous contactless patient monitoring concept when in the bed
- Heart rate (HR), heart rate variability (HRV), respiration rate (RR) and bed occupancy detection can be utilized to analyze for example stress and relaxation index and sleep quality
- Opens new possibilities in patient monitoring and elderly care in hospitals, assisted living and at home.

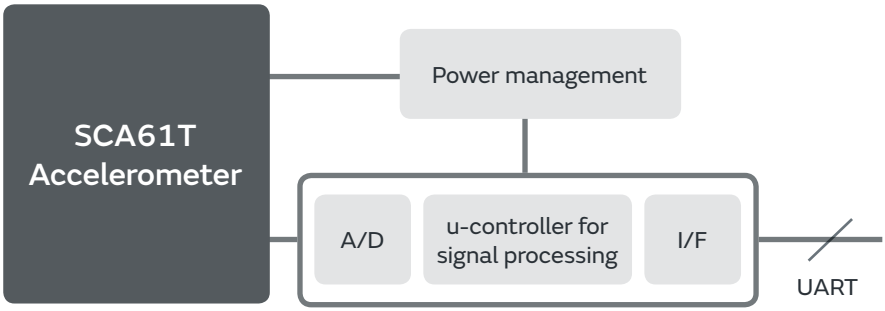
Benefits

- Safety
- Efficiency
- Responsiveness

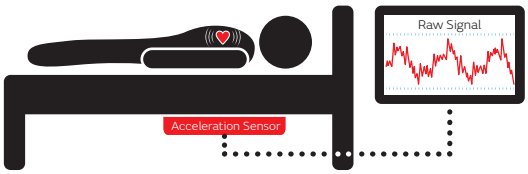
Learn about MEMS sensors

http://www.murata.com/en-eu/products/sensor

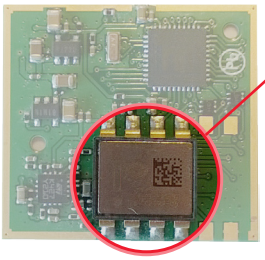
Block diagram

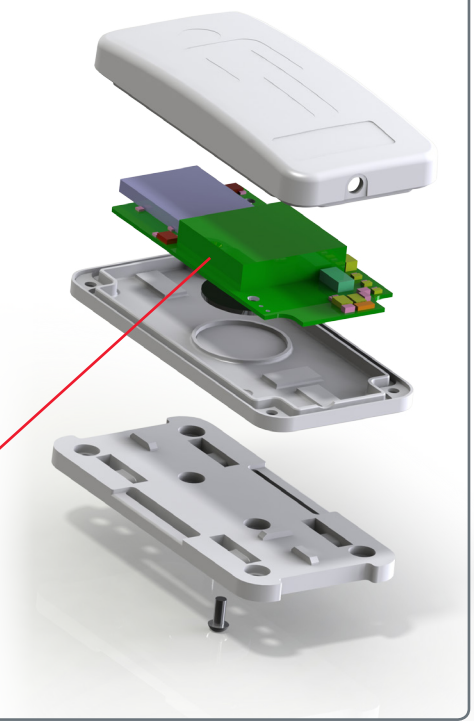


Heart rate, respiration rate & bed occupancy



MEMS BCG module





MEMS sensors

High accuracy, low-power consumption

Murata is a leading supplier of acceleration, inclination and angular motion sensor solutions for healthcare applications.

Medical sensors increase the intelligence of life supporting devices, and they can be used in new types of patient monitoring applications that allow patients to lead more independent lives. Detecting signals triggered by symptoms helps optimize medication and prevent serious attacks of illness.

Murata's unique MEMS design, which combines single crystal silicon and glass, ensures exceptional reliability, unprecedented accuracy and excellent stability over time. The power requirements of these medical sensors are extremely low, which gives them a significant advantage in small battery-operated devices.

As the leading supplier of activity sensors for pacemakers Murata also offers a wide range of pressure sensors, accelerometers, inclinometers and gyroscopes for various demanding medical and healthcare applications. Device developers and manufacturers of many existing and emerging healthcare applications have been able to reach their power and size requirements thanks to Murata's MEMS technology.

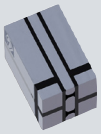
Learn more online

http://www.murata.com/en-eu/products/sensor

Sensor Elements (Dies)

Vertical Accelerometer Elements

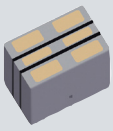
SCG12S and SCG14S



- Size 3mm x 2.12mm x 1.95 or 1.25mm
- Various measuring ranges possible (1 - 12g)
- Proven capacitive 3D-MEMS Technology

Horizontal Accelerometer Elements

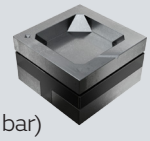
SCG10X and SCG10Z



- Size SCG10X: 2.55mm x 2.95mm x 1.91mm
- Size SCG10Z: 1.50mm x 1.70mm x 1.83mm
- Various measuring ranges possible (1 - 12g)
- Proven capacitive 3D-MEMS Technology

Pressure Sensor Elements

SCB10H



- Size 1.4mm x 1.4mm x 0.85mm
- High pressure shock survival (> 200 bar)
- Various pressure ranges possible (1.2 - 25 bar)
- Proven capacitive 3D-MEMS technology
- Operates at near vacuum applications

Sensor Modules

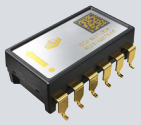
Accelerometer

Digital 1-, 2- or 3-axis Accelerometers

- Excellent accuracy
- Excellent stability over temperature
- Ranges: ± 2g, ± 6g

Inclinometer

Analog 1- or 2-axis Inclinometers



- Excellent accuracy
- Excellent stability over temperature
- Ranges: ± 15 °, ± 30 °, ± 90 °

Gyroscope

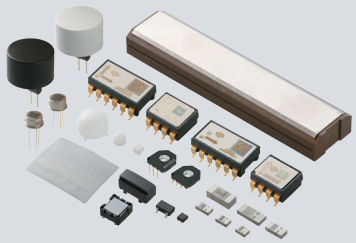
1-axis Angular Rate Sensors

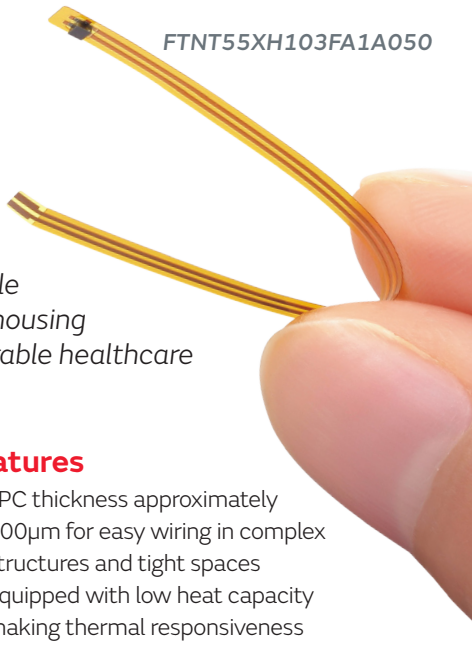
- Excellent accuracy
- Excellent stability and noise performance
- Ranges: ± 100 °/s , ± 300 °/s

Sensors

Sensor product lineup

- Pyroelectric Infrared Sensors
- Ultrasonic Sensors
- Magnetic Pattern Recognition Sensors
- Magnetic Switches (AMR Sensors)
- Shock Sensors
- Angular Rate Sensors
- Rotary Position Sensors
- MEMS Sensors





Low profile, flexible with excellent responsiveness

NEW

Easily routed in complex designs the flexible film temperate sensor is ideal for sensing housing temperatures of compact devices as wearable healthcare products, smartphone and tablets.

This range of surface-mounted NTC temperature sensors are packaged on a flexible printed circuit (FPC) film and measuring at 50.00 x 3.17 x 0.55 mm in size. The FTNT55XH103FA1A050 can measure temperatures in the range of -40 to + 125 degrees C and has an accuracy, at 25 degrees C of +/- 0.4 degrees C. Resistance at 25 degrees C is 10 k ohm +/- 1%.

The film temperature sensor has been granted 4 patents including 1 basic patent and 3 peripheral patents.

Features

- FPC thickness approximately 100µm for easy wiring in complex structures and tight spaces
- Equipped with low heat capacity making thermal responsiveness excellent

Learn more online

http://www.murata.com/en-eu/products/sensor

Thermistors

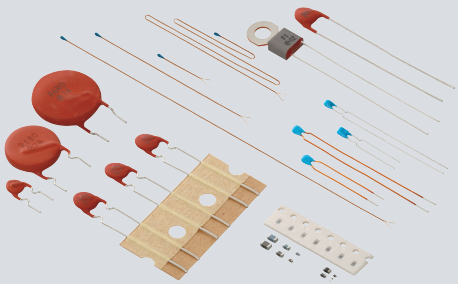
The tightest temperature tolerance chips and lead types covering inrush current suppression, temperature compensation, overcurrent and overheat sensing.

Learn more online

http://www.murata.com/en-eu/products/thermistor

Product lineup

- **PTC & NTC Thermistor**
  For overcurrent protection & temperature sensor / temperature compensation
- **Chip NTC Thermistor**
  For temperature sensor / temperature compensation
- **Chip PTC Thermistor Line-up**
  For overheat sensing / overcurrent protection
- **PTC Thermistor lead type**



Connectivity modules

Low-power reliable connectivity for healthcare devices

Healthcare devices are increasingly connected to each other and the web. Use a Murata module for proven RF excellence.

Murata RF modules make it easy for you to build connectivity into most devices, even those where space is limited and power consumption needs to stay low.

With **BLE (Bluetooth® Low Energy)** devices as small as 4.8 x 5.8 x 1.0mm, wireless communication has never been easier to design in.

Features

- Support BLE (Bluetooth® Low Energy), Bluetooth®, WiFi®, and other wireless standards
- Combo-modules available (Bluetooth®/WiFi®, etc.)
- Easy to design in
- Antenna matching supported

Applications

- E-health / home monitoring
- Connectivity of healthcare appliances like blood pressure meter, glucose meter, etc.

Small Size

Murata RF modules are small enough to suit even the most space-constrained applications with sizes from 4.8 x 5.8 x 1.0mm.

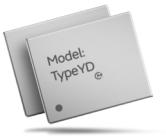
Footprint

Height

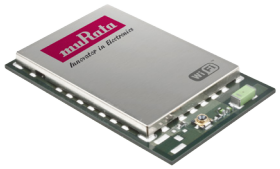
Learn more online

http://wireless.murata.com/eng/products/wireless-connectivity-platforms.html

Wi-Fi™ *802.11b/g/n Murata WICED module portfolio*

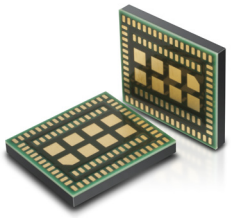


Product	Murata P/N	Chipset	Processor	WLAN	Op. Temp	Size (mm)	Host Interface	Antenna	Cert.	Grade
Type 1FX	LBWA1KL1FX-875	BCM43364	N/A	802.11b/g/n	-20°C to +75°C	6.95 x 5.15 x 1.1	SDIO	External	No	Consumer
Type YD	LBWA1ZVYDZ-679 (WICED SW)	Broadcom® BCM43362	STM32 ARM® Cortex®-M3	802.11b/g/n	-40°C to +85°C	10.0 x 7.9 x 1.25	UART/SPI	External	Yes	Consumer
	LBWA1ZVYDZ-682 (Ayla SW)									
	LBWA1ZVYDZ-739 (Murata SW)									
Type ZD	LBWA1ZVZDZ-681	Broadcom® BCM43362	STM32 ARM® Cortex®-M4	802.11b/g/n	-40°C to +85°C	10.0 x 7.9 x 1.25	UART/SPI	External	TBD	Consumer
Type ZX	LBWA17DZX6-705	Broadcom® BCM43362	N/A	802.11b/g/n	-40°C to +85°C	7.0 x 6.0 x 1.2	SDIO	External	No	Consumer
Type YD-Certified	LBWB1ZZYDZ-713 (WICED SW)	Broadcom® BCM43362	STM32 ARM® Cortex®-M3	802.11b/g/n	-40°C to +85°C	33.0 x 18.0 x 2.5	UART/SPI(MCU)	External	Yes	Consumer
	LBWB1ZZYDZ-683 (Ayla SW)									
	LBWB1ZZYDZ-740 (Murata SW)									



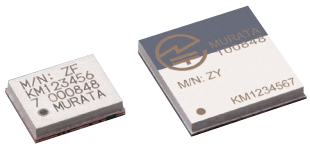
Wi-Fi™ - Broadcom® chip set *2.4GHz IEEE 802.11b/g/n radio technology*

Product	Murata P/N	Chipset	Processor	WLAN	Op. Temp	Size (mm)	Host Interface	Antenna	Cert.	Grade
SN8000	88-00153-00	Broadcom® BCM43362	N/A	802.11b/g/n	-40°C to +85°C	24.0 x 11.4 x 1.9	SDIO/SPI	On Board or U.FL Connector	Yes	Industrial
	88-00153-02									
SN820X	88-00158-00	Broadcom® BCM43362	STM32 ARM® Cortex®-M3	802.11b/g/n	-40°C to +85°C	30.5 x 19.4 x 2.8	UART/SPI	On Board or U.FL Connector	Yes	Industrial
	88-00158-02									



Wi-Fi™ *802.11a/b/g/n with Bluetooth 4.0™ for Linux™ & Android platforms*

Product	Murata P/N	Chipset	WLAN	BT	Clock	Op. Temp	Size (mm)	Host Interface	Antenna	Cert.
Type ZP	LBEH5HMZPC	BCM4339	802.11 a/b/g/n,ac	BT®+BLE®	X'tal	-20°C to +75°C	7.8 x 7.42 x 1.0	SDIO(Wi-Fi™), UART(BT®)	External	No
Type 1BW	LBEH5DU1BW	Broadcom® BCM43340	802.11 a/b/g/n	BT®+BLE®	Internal X'tal	-20°C to +75°C	8.0 x 7.5 x 1.33	SDIO(Wi-Fi™) + UART(BT®)	External	No
Type 1DX	LBEE5KL1DX-875	BCM4343W	802.11b/g/n	EDR & BLE® v4.1	Internal X'tal	-20°C to +75°C	6.95 x 5.15 x 1.1	SDIO(Wi-Fi™) + UART(BT®)	External	Yes
Type XR	LBEP5CLXRC-701	TI WiLink™ 8 WL1801	802.11b/g/n	No	External	-40°C to +85°C	9.9 x 8.8 x 1.3	SDIO(Wi-Fi™)	External	No
Type WT	LBEP5CLWTC-601 (WLAN Only)	TI WiLink™ 8 WL1831	802.11b/g/n	v4.0 (BLE®+EDR)	Internal X'tal	-40°C to +85°C	9.9 x 8.8 x 1.3	SDIO(Wi-Fi™), UART(BT®)	External	No
	LBEP5CLWTC-631 (WLAN + BT + BLE)									
Type WM	LBEP5CLWMC-603 (WLAN Only)	TI WiLink™ 8 WL1833	802.11a/b/g/n	v4.0 (BLE®+EDR)	Internal X'tal	-40°C to +85°C	9.9 x 8.8 x 1.3	SDIO(Wi-Fi™), UART(BT®)	External	No
	LBEP5CLWMC-633 (WLAN + BT + BLE)									



Bluetooth SMART® modules

Product	Freq	Murata P/N	Power Class	Version	Output Power	Op. Temp	Size (mm)	Host Interface	Antenna	Cert.
Type VZ	2.4GHz	LBCA2ZZVZZ-721 (Central Device)	Class 3	BLE®	-2dBm	-10°C to +60°C	20.0 x 13.0 x 24	UART	On Board	Yes
		LBCA2ZZVZZ-722 (Peripheral Device)								
Type WS	2.4GHz	LBCA2ZXWSE-723 (Central Device)	Class 3	BLE®	-2dBm	-10°C to +60°C	10.4 x 7.7 x 1.8	UART	External	Yes
		LBCA2ZXWSE-724 (Peripheral Device)								
Type ZF	2.4GHz	LBCA2BZZFZ	Class 3	BLE® v4.1	0dBm	-20°C to +85°C	5.4 x 4.4 x 1.0	UART	External	No
Type ZY	2.4GHz	LBCA2HNZYZ-711	Class 3	BLE® v4.1	0dBm	-20°C to +85°C	7.4 x 7.0 x 1.0	UART	Internal	Yes
Type 1BX	2.4GHz	LBMA15Q1BX	Class 1	BT®+BLE®	13dBm (Max)	-30°C to +85°C	5.0 x 4.5 x 1.0	UART	External	No

AC-DC front-end power supplies

Medical approved

Custom products also available for medical applications

Selection table

Series	Convection Cooling	Forced Air 250LFM	Input Voltage (Vac)	Output Voltage (V)	Efficiency
MVAC400	250W	400W	90-264	12V/24V/50V	93%
MVAC250	170W	250W	90-264	12V/24V/50V	93%
NEW **MVAD160**	110W	160W	90-264	12V/24V/48V	93%
MVAB120	75W	120W	90-264	12V/24V/28V/48V	91%
MVAD065	65W	65W	90-264	12V/24V/48V	90%
MVAD040	40W	40W	90-264	12V/24V/48V	89%

Features

- Universal input 90-264Vac
- Active power-factor correction
- Up to 250W natural convection cooling
- -20°C to +70°C full power operating temp.
- Class B conducted EMC
- Aux isolated 12V@1A fan output
- MVAC 250/400: 10W 5V standby power
- MVAD040/065: less than 0.3W at no load
- 2 x MOPP (Primary-Secondary)
- 1 x MOPP (Secondary-Chassis/Earth Enclosure

Quality/Safety

- 60601 (3rd edition) MOPP, 60950 safety approval
- 2 year warranty

Applications

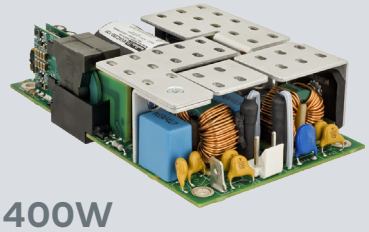
- Mains-powered medical equipment

MVAC Series

3”x5”

250W

80 PLUS GOLD

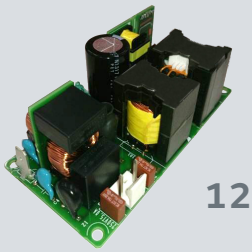


400W

MVAD Series

2”x4”

40W



120W

65W

MVAD160 Series

NEW

160W

Learn more online

http://power.murata.com/en/products/ac-dc-power-supplies.html

DC-DC converters

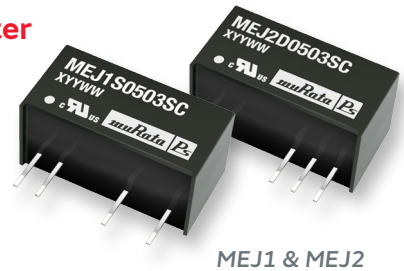
Low power modules

Learn more online

http://power.murata.com/en/products/dc-dc-converters.html

Compact 1W & 2W DC-DC converter complies with UL60601-1

Industry standard, pin compatible 1W and 2W converters maintaining high levels of efficiency at light loads.



MEJ1 & MEJ2

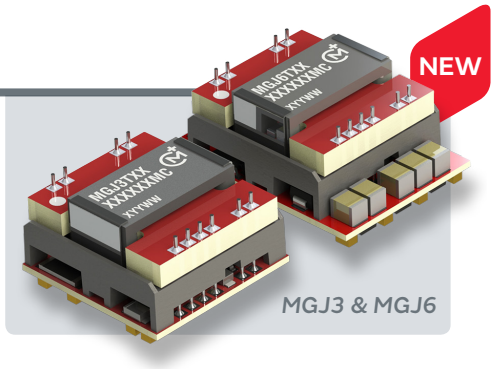
Features

- High efficiency across the full load range
- Op. temp. range: -40º to 85º
- Encapsulated: superior thermal performance
- 72-79% typical efficiency
- 3.5 - 5% typical load regulation
- ANSI AAMI ES60601-1 recognition
- UL60950

Selection table

Series	Isolation	Input voltage	Output voltage	Efficiency	Power rating
MEJ1	5200Vdc	3.3/5/12/15/24V	3.3/5/9/12/15V	69-78%	1W
MEJ2	5200Vdc	3.3/5/12/15V	3.3/5/9/12/15V	70-82%	2W

NEW



MGJ3 & MGJ6

Configurable output voltage, high isolation DC-DC converters

With configurable triple output voltages of +15V, +5V and +5V, the MGJ series of DC-DC converters is ideal for powering gate drives for IGBTs and Mosfets (standard, SiC) in bridge circuits . The MGJ series is characterised for high isolation and common mode dv/dt requirements. A disable/frequency synchronisation pin simplifies EMC filter design.

Features

- 3 outputs configurable for all gate drive applications: +15V/-5V, +15V/-10V & +20V/-5V outputs
- ANSI/AAMI ES60601-1 pending
- Reinforced insulation to UL60950 pending
- Characterised dv/dt immunity
- Characterised partial discharge immunity
- Ultra-low coupling capacitance 15pF
- Operation to 105°C

Configurations

Function	IGBT	SIC	MOSFET
15V Output	+15V	+20V	+15V
15V (0V reference) 5VA output	0V		0V
15VA (0V reference) 5VB output		0V	-5V
5VB (0V reference)	-10V	-5V	

NEW

Selection table

	Output 1			Output 2			Output 3		
	Rated Output Voltage (V)	Rated Output Current (mA)	Output Power (W)	Rated Output Voltage (V)	Rated Output Current (mA)	Output Power (W)	Rated Output Voltage (V)	Rated Output Current (mA)	Output Power (W)
MGJ3T05150505MC	15	120	1.8	5	120	0.6	5	120	0.6
MGJ3T12150505MC	15	120	1.8	5	120	0.6	5	120	0.6
MGJ3T24150505MC	15	120	1.8	5	120	0.6	5	120	0.6
MGJ6T05150505MC	15	240	3.6	5	240	1.2	5	240	1.2
MGJ6T12150505MC	15	240	3.6	5	240	1.2	5	240	1.2
MGJ6T24150505MC	15	240	3.6	5	240	1.2	5	240	1.2

Inductors

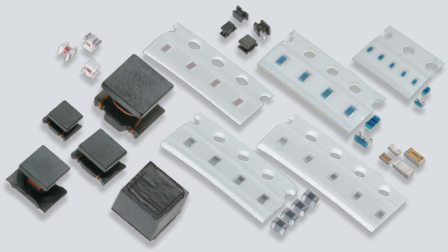
Learn more online
http://www.murata.com/en-eu/products/inductor

Murata chip inductors feature compact size and high-performance. The unique coil and case structures give them low DC resistance and outstanding high-frequency characteristics.

Murata offers a broad variety of products for different applications.
The diverse lineup offers the customer a choice of the types of inductors and characteristics optimal for the circuit in question.

Product line-up

- **Inductors for Power Circuits (Power and Choke)**
- **RF Inductors**



Power inductors

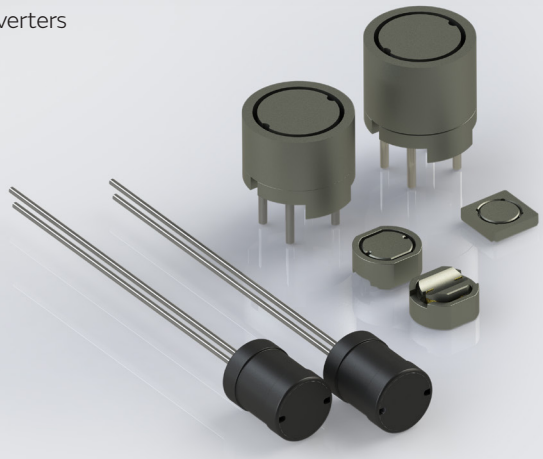
Inductors are passive components and are required in all noise-sensitive electronic power circuits. Magnetic inductors are not restricted by application.

Whether you need to reduce noise or protect vital components, we can offer a wide range of products to suit your requirements, having developed over 1,200 highly advanced and optimized inductor and transformer solutions. With an emphasis on miniaturization, reliability and ease of handling, our inductors, current transformers and common mode chokes are available in a variety of styles including bobbin, radial, axial and surface mount.

Learn more online
http://www.murata-ps.com/en/products/magnetics.html

Product line-up

- **Inductors/Common Mode Chokes**
  - AC and DC Powerline filtering
  - Magnetically shielded inductors for EMI sensitive applications
  - Energy storage in power converters
- **Transformers**
  - Pulse
  - Current sense



Power inductors

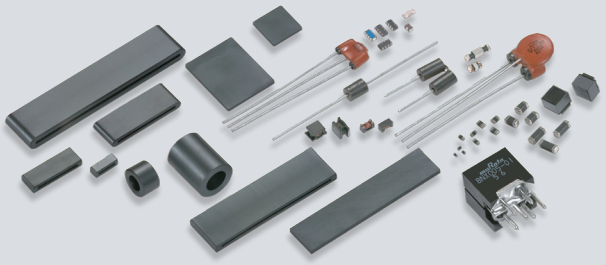
EMI Noise suppression

Using Murata's ceramic processing technology and unique material, we offer a variety of Noise Suppression Products and EMI Suppression Filters. Murata also offers technical support and guidance based on many years of experience operating in the field of noise suppression.

Learn more online
http://www.murata.com/en-eu/products/emc

Product line-up

- **EMI Suppression Filters**
- **Microwave Absober**
- **AC Line Filter**
- **ESD Protection Devices**
- **Ferrite Core**



EMI suppression filters

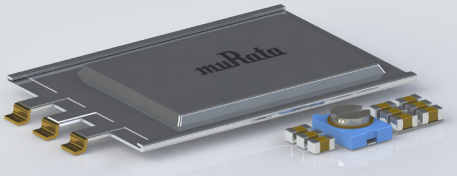
Capacitors

Murata offers the No. 1 most abundant lineup in the industry, responding to all possible needs, and proposing ideal solutions. Continuing to evolve as the world's No.1 manufacturer of monolithic ceramic capacitor

Learn more online
http://www.murata.com/en-eu/products/capacitor

Product line-up

- **Monolithic ceramic capacitors**
- **High voltage capacitors**
- **PAC (Polymer aluminum electrolytic capacitors)**
- **Film capacitors**
- **EDLC (Electrical double layer capacitors)**
- **Safety capacitors**
- **Trimmer capacitors**
- **Single layer microchip capacitor**



EDLC, GRM, ZRB, TZC3

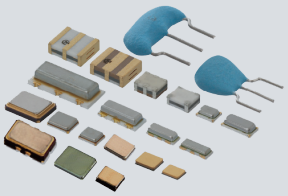
Timing Devices

Learn more online
http://www.murata.com/en-eu/products/timingdevice

Ceramic resonators (CERALOCK®) are made of high stability piezo-electric ceramics that function as a mechanical resonator.
With the advance of the IC technology, various equipment may be controlled by a single LSI integrated circuit, such as the one-chip microprocessor.

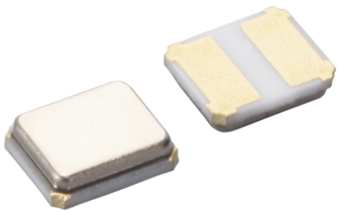
Product line-up

- **Ceramic resonators**
- **Ceramic filters**
- **Crystal units**
- **Crystal oscillators**
- **Piezoelectric sound components**



Timing devices

Crystal units



Since 2009, Murata's crystal unit has offered a compelling balance of value and accuracy, in an innovative 2016 package. Such features are ideal for size and cost conscience consumer, and communication applications.

Features

Small size
- 2016* size for 24MHz to 48MHz
- 2520* size for 16MHz to 24MHz

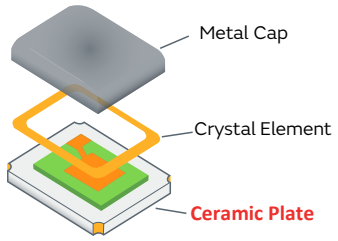
*2016 = 2.0mm x 1.6mm package size
*2520 = 2.5mm x 2.0mm package size

Frequency Tolerance
- Available +/-20ppm* for Consumer
- Available +/-100ppm* for Automotive

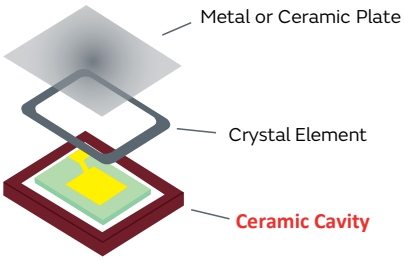
Economical & robust design
- Simple structure using Murata's proven package technology
- Particle screening process for enhanced reliability

RoHS Compliant & Pb Free

Murata Crystal Unit



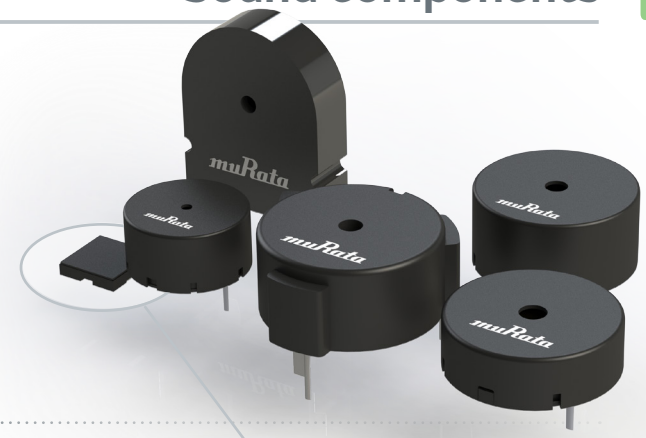
Conventional Crystal Unit

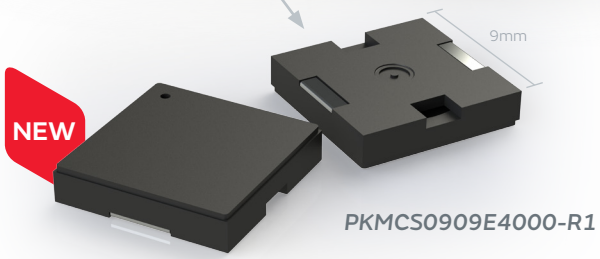


Learn more online
http://www.murata.com/en-eu/products/timingdevice/crystalu

Sound components

Piezoelectric sound components utilize natural oscillation of piezoelectric ceramics. They are widely used in the applications from healthcare to consumer products.





PKMCS0909E4000-R1

Ultra compact light and low power SMD piezoelectric sounder suits portable healthcare devices

The smallest and lightest surface mount piezoelectric sounder available. Occupying significantly less surface area, and with a combined weight and area reduction of 44% compared to other similar products.

Specifications	
Sound pressure level	65dB min
Measure condition of sound pressure level	±1.5 Vo-p, 4.0kHz, square wave, 10cm
Maximum input voltage	±12.5Vo-p max
Operating temperature range	-40 to +85ºC
Storage temperature range	-40 to +85ºC
Drive type	External-drive

Features

- Small, thin and lightweight
- 9.0mm x 9.0mm x 1.9mm
  - 44% reduction of its predecessor
- Low power consumption 6.0Mv
- Noiseless - piezo base enables minimum impact on surrounding circuitry by not getting any electrical noise

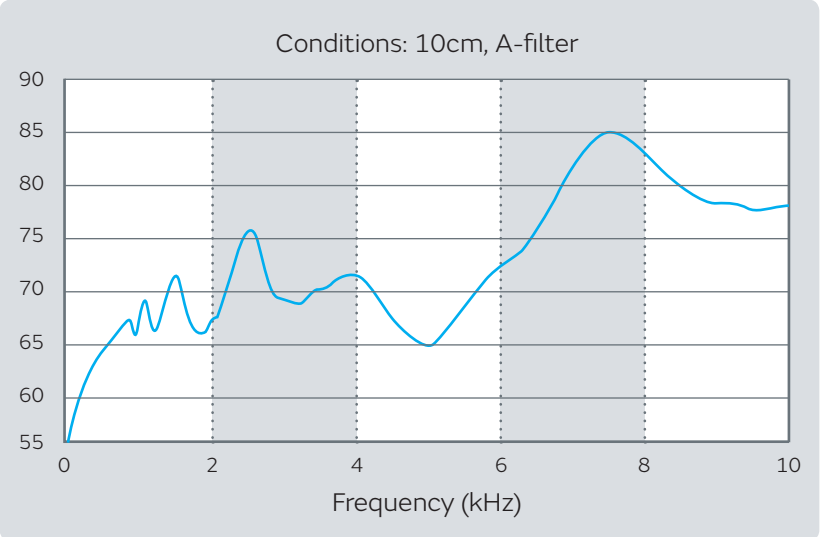
Applications

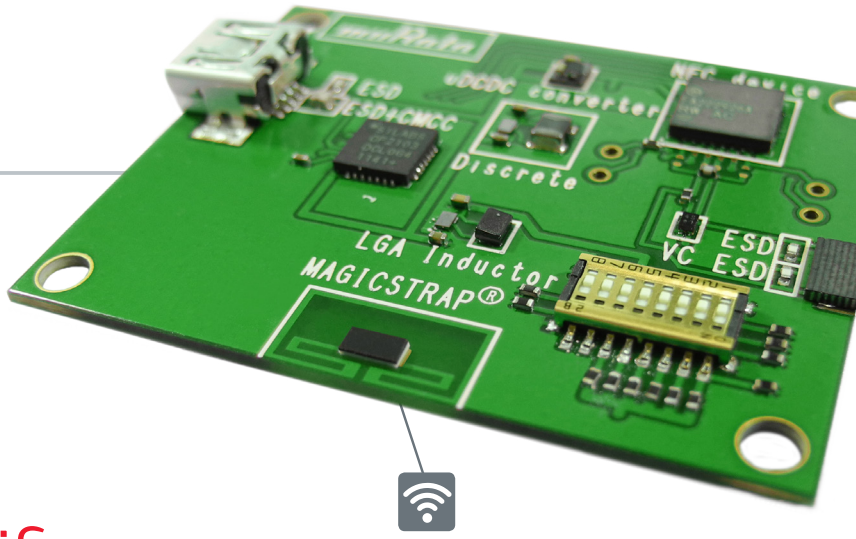
- Healthcare: Blood glucose meters, thermometers, etc.
- Consumer: Remote controls, mobile printers, digital cameras, etc.

Learn more online

http://www.murata.com/en-eu/products/sound

Frequency Characteristics of Sound Pressure Level





MAGICSTRAP®

Track, trace, & verify

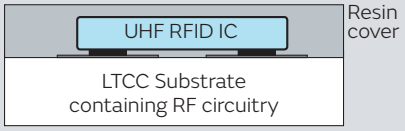
with ultra-miniature UHF RFID tags

Whether your focus is on anti-counterfeiting, inventory management, or process control, MAGICSTRAP® offers you an integrated solution with a tag size which can meet the challenges of almost any application.

At only 2.0 x 1.2 (LXMS21) and 3.2 x 1.6 (LXMS31), the **MAGICSTRAP®** UHF IC module is one of the smallest in the world. It can be mounted onto, or embedded into, a wide variety of materials even in non-electronic products, and can be surface-mounted directly onto your PCB for use in medical electronics.

In association with partner companies offering hardware & software solutions, we are able to provide a fully integrated system that gives you massive read/write functionality all built around an unbelievably small module.

Construction



Features

- RF circuitry incorporated in LTCC substrate
- Read range:
  - Up to 2cm using the component alone*
  - Up to 7m with external antenna
- Can be mounted on many surfaces
- Can be embedded into many materials
- Small SMD: 2.0 x 1.2 (LXMS21) and 3.2 x 1.6 (LXMS31)
- Complies with EPCglobal C1G2, ISO 18000-6C

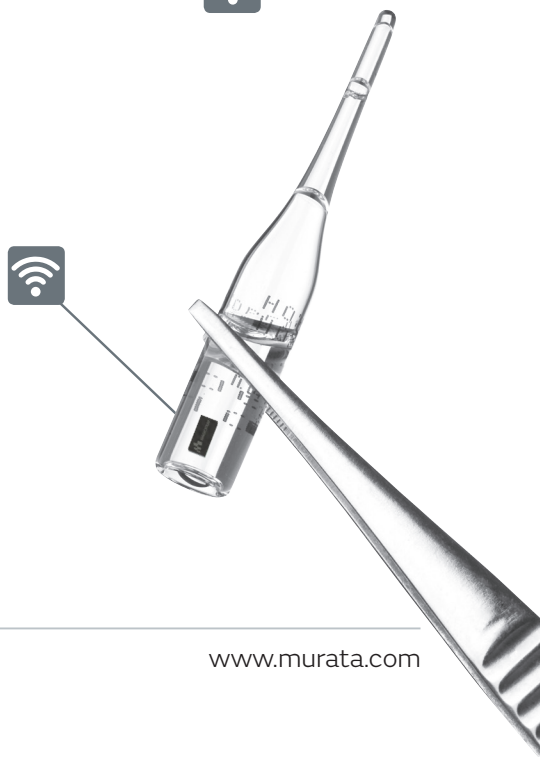
**Loop type antenna for reader/writer is required*

Applications

- Anti-counterfeit
- Process control/traceability of medical electronics
- Tracking/tracing PCBs
- Inventory management in healthcare institutions
- Probe tracking

Small Size

2.0 x 1.2 (LXMS21) or
3.2 x 1.6 (LXMS31),
surface-mounted device



Learn more online

http://www.murata.com/en-eu/products/rfid

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 make you will 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

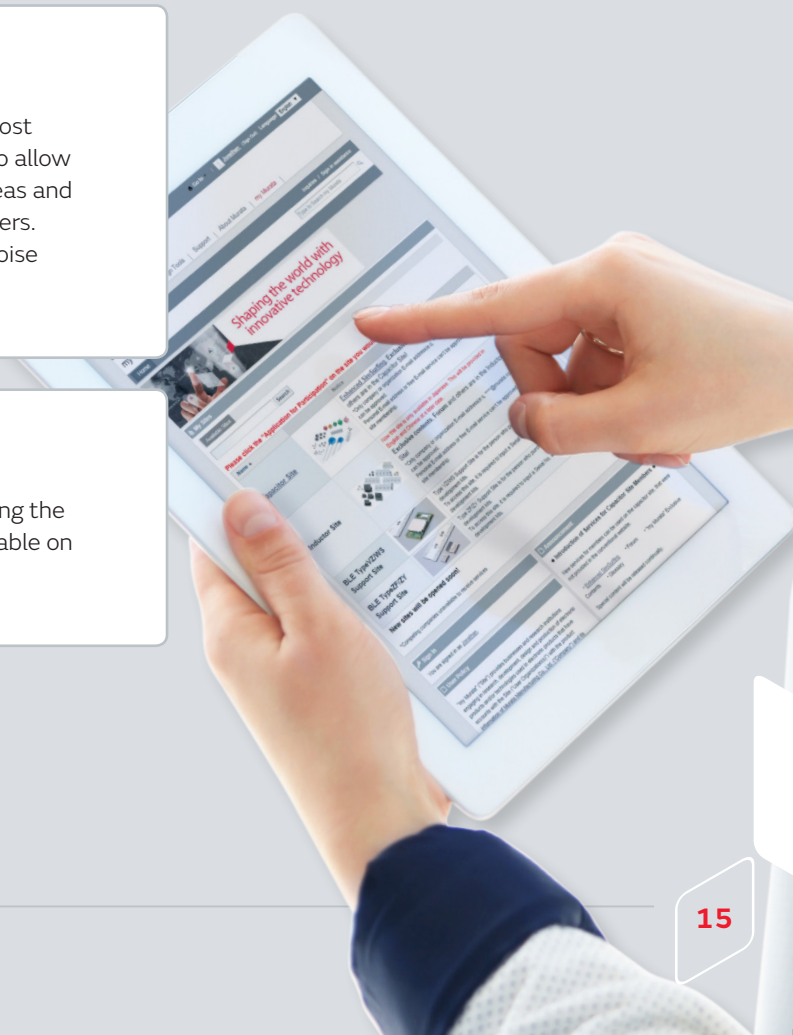
You can find out about the latest ceramic capacitor product lines, updated regularly as well as some unreleased product information, exclusively available on 'my Murata'. Plus much more...

'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.



Global locations

For details please visit 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. *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 specifi cations in this catalog are as of March 2014. 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.

Murata Manufacturing Co., Ltd.

www.murata.com

muRata
INNOVATOR IN ELECTRONICS