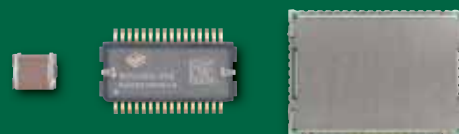


Murata's ceramic electronic components – leading the next generation of automotive electronics.



Automobiles and automotive devices are becoming more intelligent and optimized for the next generation. Telematics, power electronics, and in-vehicle networks are only a few examples of this.

Murata's electronic components contribute to many aspects of automotive evolution, from protective gear and powertrains to information communication. These components evolve along with automobiles to make smaller and more sophisticated in-vehicle electronic devices and modules possible.

Murata's ceramic electronic components are created using high-frequency technology and sensing technology that are grounded in the functional ceramic materials and processing technologies Murata has developed over many years. In addition to helping accomplish downsizing and sophistication, the high reliability of ceramics will contribute much to the future of cars and our automotive society.



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<http://www.murata.com/products/apps/auto/index.html>

Bluetooth is a registered trademark of Bluetooth SIG, Inc. of the United States.
Wi-Fi is a registered trademark or trademark of Wi-Fi Alliance.

Murata Products for Automotive

Capacitors

These products contribute to improvement in the reliability and high efficiency of ECUs with a product group utilizing the features of ceramics, which are excellent in heat resistance and vibration resistance.



Noise Suppression Products

These products provide various noise suppression solutions with a product group utilizing the know-how acquired in the noise suppression field.



Resonators

Murata has achieved advanced high precision oscillating frequencies by replacing the crystal resonator, which makes compactification possible.



Thermistors

Murata offers a lineup of thermistor products to meet the requirements of various applications.



Cars and the Future

An indispensable element in an “omnipresent network society” – Murata technology links people and the ever-evolving automobile.

Ever-evolving automotive technology is no longer confined to the basic vehicle functions of propulsion, steering, and braking. It is now expanding into a variety of disciplines. Remarkable advances in automotive technology, most notably in areas such as telematics, advanced safety features, and environmental compatibility, have led to tremendous evolution in our vehicles and our automotive society since the days when vehicles were merely a means of getting around.

This evolution has been facilitated by electronic components that monitor the vehicle inside and out and exchange information among the components. Murata produces components that are so small and light you wouldn't even notice them on your fingertip and sensors and modules made of materials we have engineered at the molecular level.

We are staking our future potential and the boundless development of automobiles on these small electronic components. With our technology and know-how, Murata will contribute to developing a “ubiquitous network society” preserving the global environment, and creating a future with safer and more comfortable automobiles.



Telematics

Cars and the Future

Safety

Environment

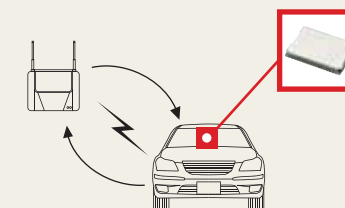
For Telematics

Murata's information communication technology – contributing to automotive telematics.

Murata contributes to the development of mobile communication systems with the technology and know-how we developed for the information communication equipment market and with the high reliability that comes with the outstanding heat and vibration resistance typical of our ceramic components. Automotive telematics achieves the combining of a radio transmission system with the car navigation and security system. Murata's information communication technology is also playing an active role in making such new systems prevalent.

Network on Wheels

Various wireless communication standards are used for information and communications in vehicles. Murata offers a highly reliable connectivity module, making full use of the excellent high frequency portion and high frequency circuit technology.



Connectivity Module

■ On-board Communication Module for Automobiles

Murata has achieved the wireless communication functions required for on-board communications with compact modules, such as Bluetooth®, Wi-Fi™, GPS, FM and others.

For Safety

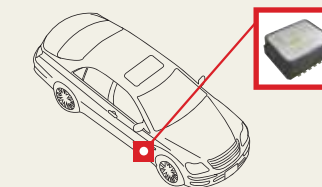
Murata's sensing technology – protecting both people and cars.

Sensing technology provides precision control by electronics, which is essential for the safety systems of vehicles. Murata's electronic components, including various sensors, support a pleasant driving experience with excellent performance by the latest technology and high reliability that can only be provided by ceramics, which can endure severe operating conditions.

3D Autonomic Nervous Structure

This is a sensing technology that promotes improvements in the safety functions and intelligence of vehicles. Only Murata's 3D MEMS technology can provide a reduction of the cross axis, improving reliability of linearity.

In January 2012, VTI Technologies Oy (VTI) joined the Murata Group. Murata's lineup of onboard sensor products has become more substantial with the excellent technology and products of VTI. We can completely satisfy the needs of automobiles.



MEMS Acceleration Sensor

■ For ESC Acceleration Detection

Excellent temperature drift characteristic. Compliant to Quality Standard AEC-Q100 for automobiles.

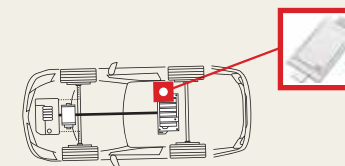
For the Environment

The next generation performance – providing cars for the earth's environment.

Consideration of the global environment is important for the automobile industry. Murata helps reduce CO₂ and conserve energy by developing and supplying electronic components that take advantage of such characteristics of ceramics as compactness and thermal resistance. We are helping to expand the market share of environmentally friendly vehicles such as electric vehicles (EVs) and hybrid electric vehicles (HEVs).

Well-honed Instantaneous Power

Murata's technology is also in high demand in the area of lithium-ion secondary batteries for hybrid vehicles (HEV). Our material and monolithic technology, which are the result of our firm grasp of basic material properties, has produced high-power batteries featuring a unique electrode material and a plate monolithic structure. The high energy density and low internal resistance make it possible to reduce battery size and weight and raise input and output levels.



Lithium Ion Secondary Battery

■ Batteries for Hybrid Vehicles

Supplying power to the electric motor that drives the wheels, featuring reduced size, weight and high input-output levels.

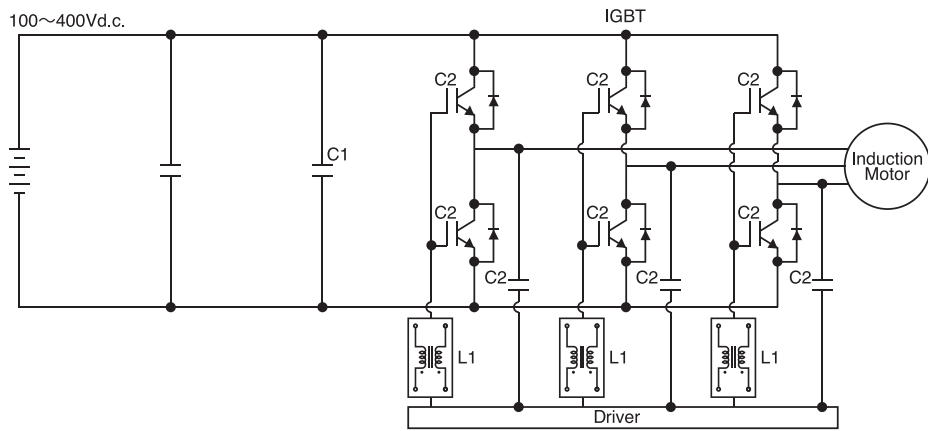
Application Matrix

● Specific Application Products ▲ Products Under Development/Individual Specification Products

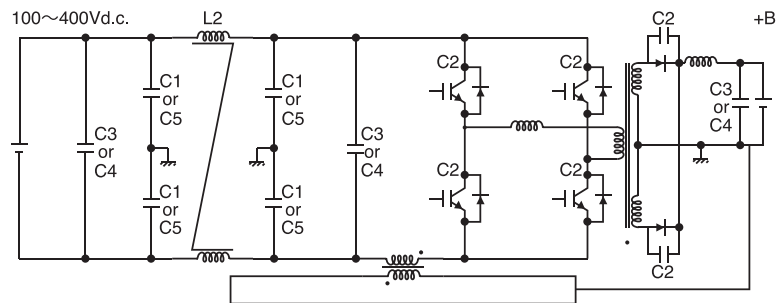
Classifications	Product Name		Series	Page	Powertrain					Safety							Body/Comfort					Information								
					ECU	HEV-EV	AT/CVT	EPS	Cruise Control	ESC/ABS	Air Bag	TPMS	ADAS	HID	LED Lamp	AFS	RKE	Immo- bilizer	Power Window	Air Condi- tioner	Meter	Burglar Alarm	Naviga- tion	Audio	ETC/ DSRC	Connect- ivity	Ethernet			
Ceramic Substrates	Ceramic Multilayer Substrate	Low Temperature Co-fired Ceramic Functional Substrate	LFC	09	●	●	●	●	●	●		●		●	▲	●	●	●							●		▲			
Capacitors	MLCC	General Purpose Products	GRM/GNM	09														●	●	●	●	●	●	●	●	●	●	●		
			GCM	09	●	●	●	●	●		●	●	●	●	●	●	●	●												
		Resin External Electrode Products	GRJ	09																●	●	●	●	●	●	●	●	●	●	●
			GCJ	10	●	●	●	●	●		●	●	●	●	●	●	●	●									●	●		
		Low ESL Type	LLL/LLA/LLM	09																					●	●	●	●		
		High Frequency Type	GJM	09																					●		●	●		
		Specially Designed Product to Reduce Shorts	GCD/GCE	10-11	●	●	●	●	●		●	●	●	●	●	●	●	●												
		Conductivity Adhesive Compatible Type	GCG	10	●	●	●	●			●				●															
		Large Capacitance and High Allowable Ripple Current	GC3	11	●	●	●	●							●															
		Metal Terminal Type	KRM	11				●							●	●														
	KCM		11		●	●					●																			
	For Smoothing of High Voltages	EVC			▲																									
	Lead Type	Safety Standard Certified Type	DE6	11		●																								
General Purpose Products		RPE/RHE	12	●	●	●	●	●		●	●		●	●	●	●	●	●	●	●	●	●								
Trimmer Capacitors		TZ																●				●	●	●	●					
Resistors	PTC Thermistors	Chip Type	PRF	12	●			●	●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		
			PRG	12	●	●	●				●	●		●	●	●	●							●	●					
		Lead Type	PTGL	12	●	●	●							●	●	●								●						
		For Heater	PTW																											
	Trimmer Potentiometers		PVZ	12															●				●	●	●	●	●			
Noise Suppression Products	Capacitor Type	Three-Terminal Capacitors	NFM	13	●	●	●	●	●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		
		LC Combined Type	NFL/NFW/NFA	13																●	●	●	●	●	●	●	●	●		
	Chip Common Mode Choke Coils	For Signal Lines	DLW43SH	14	●	●	●	●	●		●	●	●	●															▲	
			DLM/DLP	14																										
		For Power Lines	PLT10H	14	●	●		●			●										●									
	Chip Ferrite Beads		BLM	13	●	●	●	●	●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		
	Ferrite Cores		FS	14																										
Resonators	Ceramic Resonators		CSTC/CSAC	15	●	●	●	●	●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		
Actuators	Ceramic Actuators	Actuators for Fuel Injection			▲																									
Products for Radio Communication	Antennas	Coil Type	MSA	16														●	▲											
	IF Filters	Ceramic Filters	SFEC	15																					●					
	Discriminators	Ceramic Discriminators	CDSCB	16																				●	●					
	Chip Inductors		LQ	16																				●	●	●	●	●		
	Connectivity Modules		LB	16																					●	●		●		
Sensors	Temperature Sensors	PTC Thermistors	PRF	16	●			●	●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		
	Ultrasonic Sensors	Enclosed Type	MA	16																										
	Angular Rate Sensors	Gyro Sensors	MEV/SCR	17																					●					
	Acceleration Sensors	MEMS Type	SCA					●	●		●																			
		Combined Gyro Sensor and Accelerometer	SCC		●																									
	Ceramic Type	PKGS	17																											
	Pressure Elements	MEMS Type	APS																											
Angle Sensors	Rotary Position Sensors	SV	17																					●	●					
Sound Components	Sounders		PK	17																					●	●	●			
Power Supplies	DC-DC Converters	Non-Isolated Type	MP	18		▲																			●	●				
		Isolated Type	MP	18		●																								
	High Voltage Power Supplies	Ion Generator	MHM	18																										

Circuit Applications

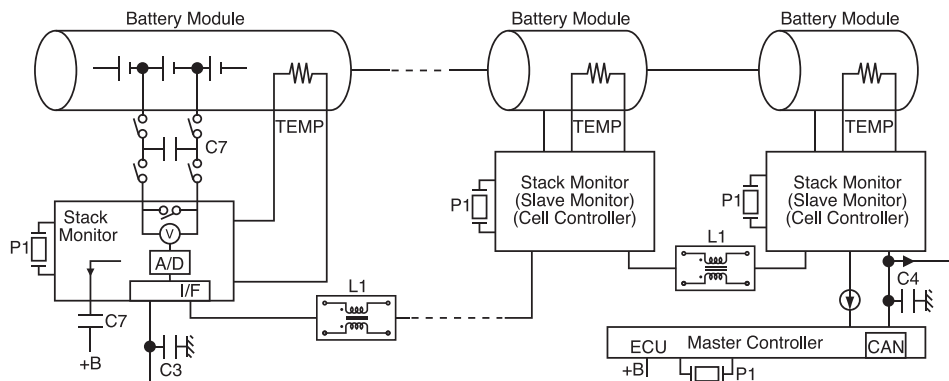
PIM (Power Inverter Module)



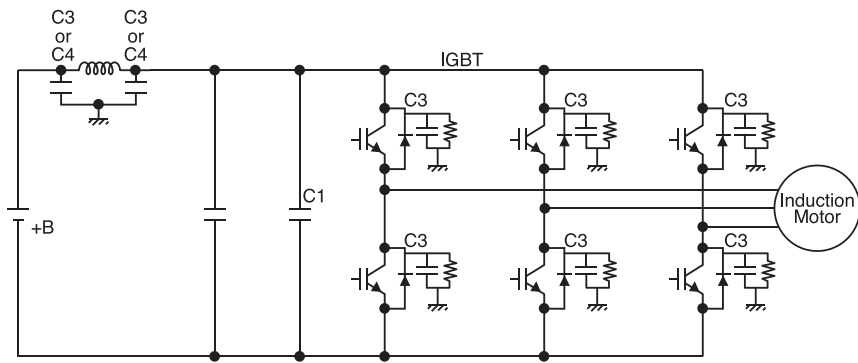
Power Converter (Step Down DC-DC Converter)



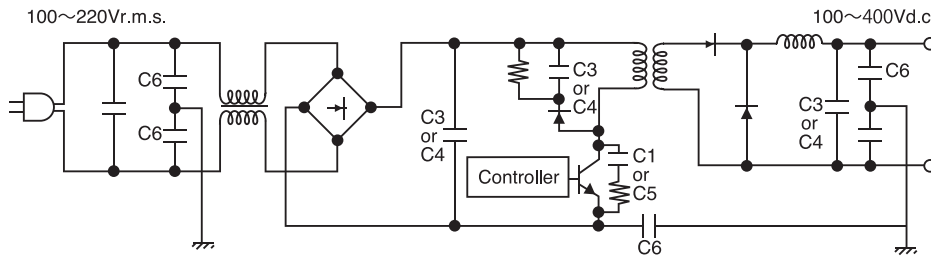
BMS (Battery Management System)



Motor Driver



OBC (On Board Charger)



C1	Metal Terminal Monolithic Ceramic Capacitors (for 250V or more)	KC3 Series/X7T (Under development)
C2	Chip Monolithic Ceramic Capacitors (for 250V or more)	GCM Series/U2J
C3	Chip Monolithic Ceramic Capacitors (Soft Termination Type)	GCJ Series/X7R
C4	Metal Terminal Monolithic Ceramic Capacitors	KCM Series/X7R
C5	Chip Monolithic Ceramic Capacitors (High Allowable Ripple Current Type)	GC3 Series/X7T
C6	Safety Standard Certified Ceramic Capacitors	DE6 Series
C7	Chip Monolithic Ceramic Capacitors	GCM Series
L1	Chip Common Mode Choke Coils for Signal Lines	DLW43SH Series
L2	Chip Common Mode Choke Coils for Power Lines	PLT10H Series
P1	Chip Ceramic Resonators (CERALOCK®)	CSTC Series

Products Lineup

Ceramic Substrates

Low Temperature Co-fired Ceramic Substrates

LFC® substrates provide high reliability under harsh conditions such as high temperatures and strong vibration.

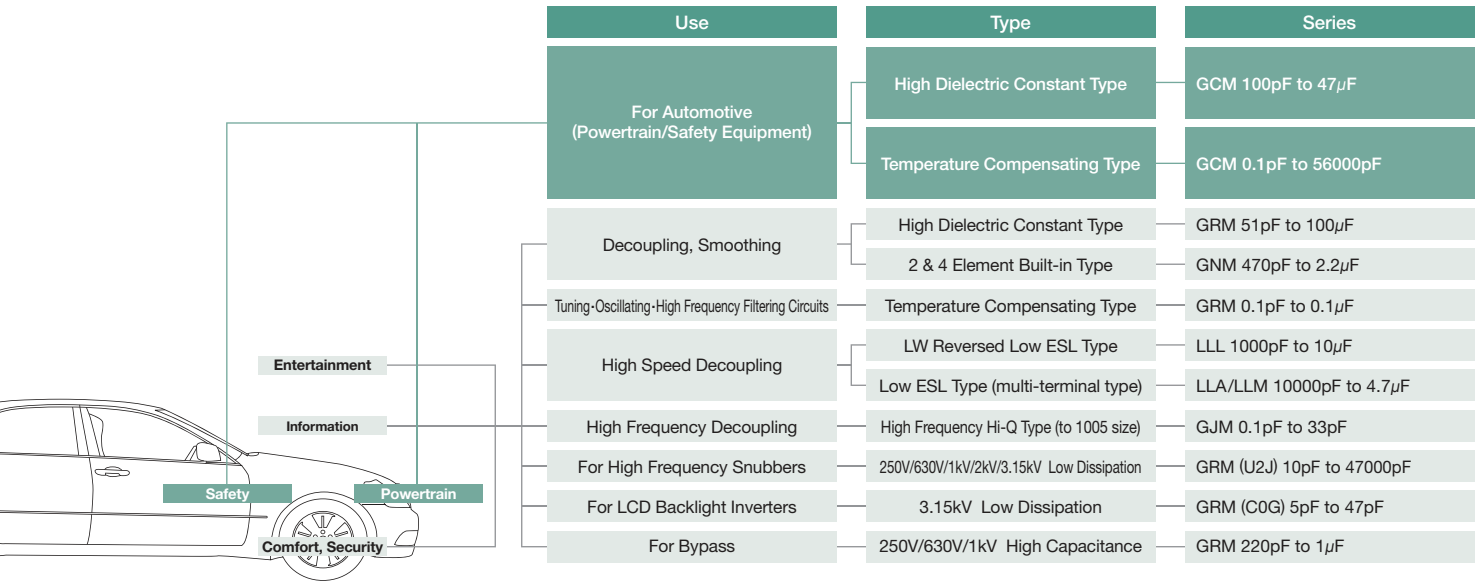


*Application examples that utilize LFC Substrates ABS, TCU, EPS *Other RF Modules

Characteristics	Ceramic Composition	Bulk Density (g)	Flexural Strength (MPa)	Thermal Expansion Co-efficient	Dielectric Constant
	CaO-Al ₂ O ₃ -SiO ₂ -B ₂ O ₃ +Al ₂ O ₃	2.9/cm ³	270 min.	5.5×10 ⁻⁶ /°C	7.7 (1MHz)
	Temperature Coefficient (TCC)	Dielectric Loss	Thermal Conductivity (W)	Insulation Resistance between Layers (Ω)	Breakdown Voltage (kV)
	110ppm/°C max.	6×10 ⁻⁴ (1MHz)/5×10 ⁻³ (10GHz)	2.5/m·K	10 ¹⁰ min.	5 (300μm) min.

Ceramic Capacitors

Chip Monolithic Ceramic Capacitors



The GRM series for general electronic equipment can be used in equipment in the fields of comfort, security, information and entertainment.

Resin External Electrode Products



Prevents cracking by deflection stress after mounting on boards. A silver conductive resin is used between the foundation electrode Cu and the tin-nickel of the external electrode, to improve the board bending resistance.

Series	TC Code	L×W (mm) <Size Code (inch)>	Rated Voltage (Vdc)	Capacitance Range (F)										Operating Temperature Range (°C)			
				0.1p	1p	10p	100p	1000p	0.01μ	0.1μ	1μ	10μ	100μ		1000μ		
GRJ21	X7R	2.0×1.25 <0805>	250					1000pF	0.022μF								
GRJ31			1k					470pF	4700pF								
		GRJ32	3.2×1.6 <1206>	630					1000pF	0.022μF							
250									0.015μF	0.10μF							
GRJ43		3.2×2.5 <1210>	1k						6800pF	0.022μF							
			630							0.022μF	0.047μF						
GRJ44		4.5×3.2 <1812>	250							0.068μF	0.22μF						
			1k							0.033μF	0.047μF						
GRJ55		5.7×5.0 <2220>	630							0.068μF	0.10μF						
			250								0.15μF	0.47μF					
											0.068μF	0.10μF					
											0.15μF	0.22μF					
											0.33μF	1.0μF					

Continued on the following page.

Series	TC Code	LxW (mm) <Size Code (inch)>	Rated Voltage (Vdc)	Capacitance Range (F)										Operating Temperature Range (°C)			
				0.1p	1p	10p	100p	1000p	0.01μ	0.1μ	1μ	10μ	100μ		1000μ		
GCJ18	X7R	1.6x0.8 <0603>	100					1000pF	0.022μF							-55 to +125	
			50					1000pF	0.10μF								
			25					1000pF	0.22μF								
			16						0.01μF	0.47μF							
			10							0.12μF	0.22μF						
GCJ21	X7R	2.0x1.25 <0805>	250					1000pF	0.022μF								
			100				220pF	0.10μF									
			50				330pF	0.47μF									
			25				470pF	1.0μF									
			16							0.27μF	2.2μF						
GCJ31	X7R	3.2x1.6 <1206>	10									2.2μF					
			1k					1000pF	0.01μF								
			630					1000pF	0.022μF								
			250						0.015μF	0.10μF							
			100				100pF	0.047μF									
GCJ32	X7R	3.2x2.5 <1210>	50						0.10μF	2.2μF							
			25						0.10μF	4.7μF							
			16							1.0μF	4.7μF						
			10								6.8μF	10μF					
			1k					6800pF	0.022μF								
GCJ43	X7R	4.5x3.2 <1812>	630					6800pF	0.047μF								
			250						0.068μF	0.22μF							
			100									2.2μF					
			50									4.7μF					
			25										10μF				
GCJ55	X7R	5.7x5.0 <2220>	1k						0.033μF	0.047μF							
			630						0.033μF	0.10μF							
			250							0.15μF	0.47μF						
GCJ55	X7R	5.7x5.0 <2220>	1k						0.068μF	0.10μF							
			630						0.068μF	0.22μF							
			250							0.33μF	1.0μF						

Conductivity Adhesive Compatible Type



This is a conductivity adhesive compatible product. This product consists of AgPd external electrodes, and can be mounted with a conductive adhesive in the power trains and safety equipment of automobiles.

Series	LxW (mm) <Size Code (inch)>	Rated Voltage (Vdc)	Capacitance Range (F)											
			0.1p	1p	10p	100p	1000p	0.01μ	0.1μ	1μ	10μ	100μ	1000μ	
GCG15	1.0x0.5 <0402>	50					220pF	4700pF						
		25						5600pF	0.01μF					
		16							0.015μF	0.10μF				
GCG18	1.6x0.8 <0603>	50			10pF				0.022μF					
		16							0.15μF	0.22μF				
GCG21	2.0x1.25 <0805>	50				100pF			0.047μF					
		25								0.33μF				
		16								0.33μF	0.82μF			
GCG31	3.2x1.6 <1206>	16								1.0μF	4.7μF			

Specially Designed Product to Reduce Shorts



This is a series design configured product. It reduces shorting caused by deflection stress and heat shock.

Series	LxW (mm) <Size Code (inch)>	Rated Voltage (Vdc)	Capacitance Range (F)											
			0.1p	1p	10p	100p	1000p	0.01μ	0.1μ	1μ	10μ	100μ	1000μ	
GCD18	1.6x0.8 <0603>	100					1000pF	4700pF						
		50					1000pF	0.022μF						
GCD21	2.0x1.25 <0805>	100					1000pF	0.012μF						
		50					1000pF	0.10μF						

Specially Designed Product to Reduce Shorts + Resin Electrode Products



The external electrodes of conductive resin suppress cracking.
Even though cracking occurs, the risk of shorting is reduced by the series design configuration.

Series	L×W (mm) <Size Code (inch)>	Rated Voltage (Vdc)	Capacitance Range (F)											
			0.1p	1p	10p	100p	1000p	0.01μ	0.1μ	1μ	10μ	100μ	1000μ	
GCE18	1.6×0.8 <0603>	100					1000pF	4700pF						
		50					1000pF	0.022μF						
GCE21	2.0×1.25 <0805>	100					1000pF	0.012μF						
		50					1000pF	0.10μF						

Large Capacitance and High Allowable Ripple Current



A capacitance higher than a conventional product (X7R Char.) can be acquired when applying a DC voltage.
The ripple resistance performance was improved compared with a conventional product (X7R Char.). This is a low noise product.

Series	TC Code	L×W (mm) <Size Code (inch)>	Rated Voltage (Vdc)	Capacitance Range (F)										Operating Temperature Range (°C)	
				0.1p	1p	10p	100p	1000p	0.01μ	0.1μ	1μ	10μ	100μ		1000μ
GC321	X7T	2.0×1.25 <0805>	250						0.01μF	0.022μF					
GC331			3.2×1.6 <1206>	630						0.01μF	0.015μF				
		450							0.01μF	0.047μF					
GC332		3.2×2.5 <1210>	630						0.033μF	0.068μF					
			450						0.022μF	0.047μF					
GC343		4.5×3.2 <1812>	250							0.10μF	0.15μF				
			630							0.068μF					
GC355		5.7×5.0 <2220>	450								0.15μF				
			250							0.22μF	0.33μF				
GC355		5.7×5.0 <2220>	630							0.10μF	0.27μF				
	450								0.22μF	0.56μF					
		250							0.47μF	1.0μF					

Metal Terminal Type



This product has high reliability against heat and mechanical impact.
Stacking two capacitors reduces the mounting space and achieves a large capacitance.

Series	TC Code	L×W (mm)	Rated Voltage (Vdc)	Capacitance Range (F)										Operating Temperature Range (°C)		
				0.1p	1p	10p	100p	1000p	0.01μ	0.1μ	1μ	10μ	100μ		1000μ	
KCM55	X7R	6.1×5.3	100								4.7μF	15μF				
			63								10μF	22μF				
			50								10μF	22μF				
			35								17μF	33μF				
			25								22μF	47μF				
KRM55			X7R	6.1×5.3	100								4.7μF	15μF		
					63								10μF	22μF		
					50								10μF	22μF		
					25								22μF	47μF		

Lead Type Ceramic Capacitors

Safety Standard Certified for Automotive



This is an IEC60384-14 Class X1/Y2 certified product (basic insulation).
The X1, Y2 class products satisfy the safety standards of UL/ENEC (VDE).

Series	TC Code	D (mm)	Rated Voltage (V)	Capacitance Range (F)										Operating Temperature Range (°C)
				0.1p	1p	10p	100p	1000p	0.01μ	0.1μ	1μ	10μ	100μ	
DE6B3	B	8 to 9	AC250 (r.m.s.)				100pF	680pF						
DE6E3	E	7 to 12	AC250 (r.m.s.)					1000pF	4700pF					

Lead Type Monolithic Ceramic Capacitors



This is a general purpose lead type monolithic ceramic capacitor.
The lead wires can be provided in Cu or CP as required, as a product that can be mounted by welding.

Series	TC Code	L×W (mm)	Rated Voltage (Vdc)	Capacitance Range (F)											Operating Temperature Range (°C)					
				0.1p	1p	10p	100p	1000p	0.01μ	0.1μ	1μ	10μ	100μ	1000μ						
RPE□C	CA/C0G	5.0×3.5*1	100	1pF	1500pF										-55 to +125					
			50	1pF	0.01μF															
RHE5G	X8G	4.0×3.5	100			100pF	1000pF										-55 to +150			
			50			100pF	1500pF													
RPER3/R7	R/X7R	5.0×3.5*1	100				220pF	0.047μF										-55 to +125		
			50				220pF	2.2μF												
			25						0.47μF	1.0μF										
RHEL8	X8L	4.0×3.5	100				1000pF	0.022μF										-55 to +150		
			50				1000pF	0.10μF												
		5.7×4.5	100						0.033μF	0.10μF										
			50							0.15μF	1.5μF									
6.0×5.5	6.0×8.0	50								2.2μF	4.7μF									
		50										10μF								

*1: Some parts will be different depending on capacitance and lead form.

Thermistors/Resistors

PTC Thermistors (POSISTOR®) Chip Type



Optimal for overheat detection at heat generation areas including power transistors, power diodes and power ICs.

Series	Sensing Temperature (°C)	Max. Voltage (V)	Operating Temperature Range (°C)
PRF	+65 to +145*	32	-40 to +150

*The line-up contains nine models in 10°C increments. Detection precision: ±5°C (±3°C models are also available).

Optimal for over-current protection for various circuits including those for car navigation.

Series	Sensing Temperature (°C)	Max. Voltage (V)	Operating Temperature Range (°C)
PRG	±20	16 to 20	-40 to +105

PTC Thermistors (POSISTOR®) Lead Type



Optimal for over-current protection for various circuits including those for car navigation.

Series	Resistance Tolerance (%)	Operating Temperature Range (°C)	Max. Voltage (V)
PTGL□S	±10	-40 to +125	16 to 140
	±20	-30 to +85	

Trimmer Potentiometers



Optimal for flicker adjustment of LCD modules, power adjustment for optical pick-up and adjustment of reception or transmission output for various RF circuits.

Series	Type	Size (mm)	Effective Rotation Angle	Rated Electric Power (W)	TCR (ppm/°C)
PVZ2A□C04	Low Profile	2	240±10°	0.05	500
PVZ3G□C01		3	230±10°	0.1	500

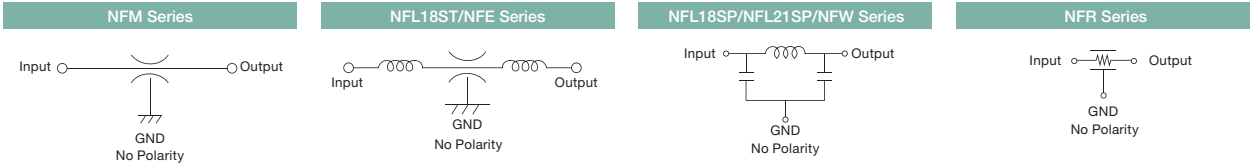
Noise Suppression Products

Chip EMIFIL®

NFM□□H/NFE□□H Series: for powertrains and safety equipment
NFM/NFA/NFL/NFE/NFW/NFR Series: for comfort, accessory and information equipment



Equipment Circuit



Powertrain, Safety Equipment

Series	Type	Operating Temperature Range (°C)	Size Code Inch (mm)	Capacitance (pF)	Rated Voltage (Vdc)	Rated Current (mA)
NFM□□H NFE□□H	Capacitor Type (NFM□□H)	-55 to +125	0805 (2012) / 1206 (3216)	22 to 470000	10 to 100	700 to 2000
	LC Combined Type Large Current (NFE□□H)	-55 to +125	2706 (6816)	33 to 3300	100	2000

Comfort, Accessory, Information Equipment

Series	Type	Operating Temperature Range (°C)	Size Code Inch (mm)	Capacitance (pF)	Rated Voltage (Vdc)	Rated Current (mA)	Cut-off Frequency (MHz)	Resistance (Ω)
NFM NFA NFL NFE NFW NFR	Capacitor Type (NFM□□C/NFA)	-55 to +125 (NFM) -40 to +85 (NFA)	0603 (1608) to 1806 (4516)	22 to 22000	16 to 100	200 to 2000	—	—
	LC Combined Type (NFL/NFA/NFW)	-55 to +125 (NFL18/21,NFA) -40 to +85 (NFL,NFW)	0402 (1005) to 1206 (3216)	—	6.3 to 25	20 to 300	10 to 500	—
	LC Combined Type for Large Current (NFE)	-40 to +85 (NFE31) -25 to +85 (NFE61)	1206 (3216) to 2706 (6816)	22 to 4700	25 to 50	2000 to 6000	—	—
	Capacitor Type for Large Current (NFM□□P)	-55 to +125*	0603 (1608) to 2220 (5750)	0.022 to 4.7μF	6.3 to 100	2000 to 100000	—	—
	RC Combined Type (NFR/NFA)	-40 to +85	0805 (2012) to 1206 (3216)	10 to 100	6 to 50	15 to 50	—	6.8 to 100

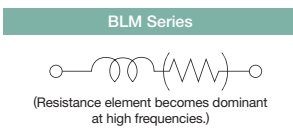
*Some products may not fulfill the temperature ranges above.

Chip Ferrite Beads

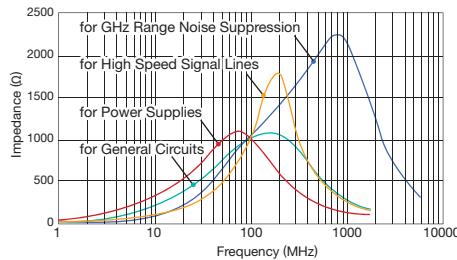
BLM_SH Series: for powertrains and safety equipment
BLM_SN/BLA Series: for comfort, accessory and information equipment



Equipment Circuit

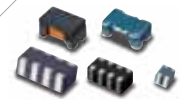


Impedance-Frequency Characteristics [1000Ω (at 100MHz)]



Series	Use	Operating Temperature Range (°C)	Size Code Inch (mm)	Impedance (Ω)	Rated Current (mA)
BLM	for General Circuits	-55 to +125	01005 (0402) to 1206 (3216)	10 to 1000 (at 100MHz)	100 to 1000
	for High Speed Signal Lines		0201 (0603) to 0805 (2012)	5 to 2700 (at 100MHz)	50 to 700
	for Power Supplies		0201 (0603) to 1806 (4516)	10 to 1000 (at 100MHz)	750 to 6000
	for GHz Range Noise Suppression		0402 (1005) to 0603 (1608)	140 to 2700 (at 1GHz)	50 to 2000

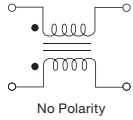
Chip Common Mode Choke Coils (For Signal Lines)



DLW31SH: for powertrains and safety devices
DLP/DLW/DLM Series: for comfort, accessory and information equipment

Equipment Circuit

DLW/DLP/DLM Series



Power Train, Safety Equipment

Series	Use	Operating Temperature Range (°C)	Size Code Inch (mm)	Common Mode Impedance (Ω)	Common Mode Inductance (μH)	Rated Current (mA)	Rated Voltage (Vdc)
DLW31SH	for High Speed Differential Signal Lines	-40 to +125	1206 (3216)	2200 (at 100MHz)	—	80	32
DLW43SH	for High Speed Differential Signal Lines	-40 to +125	1812 (4532)	—	11 to 100	170 to 360	50

Comfort, Security, Information, Accessory Equipment

·Reliability Reference Separate Conformity Parts

Series	Use	Operating Temperature Range (°C)	Size Code Inch (mm)	Common Mode Impedance (Ω)	Rated Current (mA)	Rated Voltage (Vdc)
DLP DLW DLM	for High Speed Differential Signal Lines (DLP/DLW)*	-40 to +85	03025 (0806) to 1206 (3216)	67 to 2200 (at 100MHz)	60 to 400	5 to 50
	for DC Power Lines (DLW)	-25 to +85	2014 (5036) to 2020 (5050)	100 to 4000 (at 100MHz)	200 to 6000	50
	for Audio Signal Lines (DLM)	-40 to +85	0504 (1210)	600 (at 100MHz)	100	5

*Characteristics impedance matched models and array-type models with two built-in circuits are also available.

Chip Common Mode Choke Coils (For Power Lines)

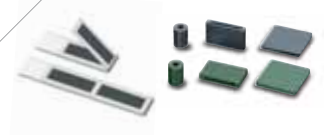


Ideal for suppressing common mode noise generated from on-board motors, onboard class-D audio amplifiers, onboard navigation and common power lines.

Series	Operating Temperature Range (°C)	H×W×D (mm)	Common Mode Impedance (Ω)	Rated Current (A)
PLT10H	-55 to +125	9.4×12.9×6.6	400 to 1000	6 to 10

Ferrite Cores

Coated type with a 50μm thin film coating that prevents scattering.
Thin type sandwich core (split type) provides prevention effectiveness if cracking should occur.



Type	Line-up	Frequency (MHz)
Coating Core	Workable with all line-ups	Several 10 to Several 100
Thin Type Sandwich Core	Length of Core 10, 15, 20, 22, 29mm	

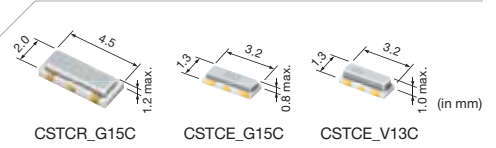
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Ceramic Resonators CERALOCK®

MHz Chip Type for Automotive (Tight Frequency Tolerance)

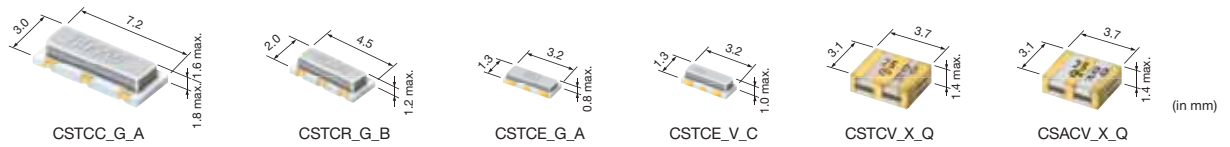
An ideal tight frequency tolerance is achieved for CAN-BUS.
This product can be mounted with Pb free soldering (Sn-Ag-Cu).



Series	Frequency Range (MHz)										Temperature Stability (%)	Temperature Range (°C)						
	1	2	3	4	5	6	7	8	9	10			20	30	40	50	70	100
CSTCR_G15C				4.00±0.1%							7.99±0.1%						±0.13	-40 to +125
CSTCE_G15C								8.00±0.1%					13.99±0.1%					
CSTCE_V13C										14.00±0.1%				20.00±0.1%				

MHz Chip Type for Automotive (Standard Frequency Tolerance)

This product can be mounted with Pb free soldering (Sn-Ag-Cu).

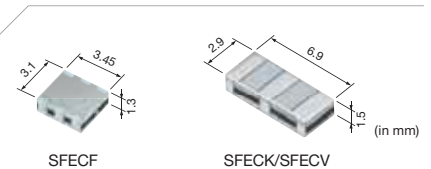


Series	Frequency Range (MHz)										Temperature Stability (%)	Temperature Range (°C)						
	1	2	3	4	5	6	7	8	9	10			20	30	40	50	70	100
CSTCC_G_A	2.00±0.5%										3.99±0.5%						±0.4 (15pF) -0.6/+0.3 (47pF)	-40 to +125
CSTCR_G_B				4.00±0.5%							7.99±0.5%							
CSTCE_G_A								8.00±0.5%					13.99±0.5%					
CSTCE_V_C										14.00±0.5%				20.00±0.5%				
CSTCV_X_Q														20.01±0.5%		70.00±0.5%		
CSACV_X_Q (No built-in load capacitance)														20.01±0.5%		70.00±0.5%		

Products for Radio Communication

CERAFIL® 10.7MHz Chip Type

Compact and lightweight filter for IF circuits adapting the piezoelectric function of ceramic.

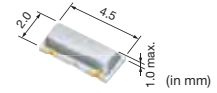


Series	Type	3dB Bandwidth (kHz)						
		D	E	F	G	H	J	K
SFEFC10M7□	Standard Type	●	●	●	●	●	—	—
SFECK10M7□	High-reliability Type	—	—	—	—	—	●	●
SFEVC10M7□	Standard Type	—	—	—	—	—	●	●
SFEVC15M0□	Standard Type	—	●	—	—	—	—	—

□ is filled in with a letter denoting 3dB bandwidth.

Ceramic Discriminators

In combination with ICs, this type obtains stable demodulation characteristics in a wide bandwidth.



CDSCB

Series	Center Frequency
CDSCB	10.700MHz±30kHz

Recommended part number depends on IC specifications. Please contact us with the IC part number to be applied.

Chip Inductors

This product is ideal for the chokes of high frequency circuits, such as impedance matching, PA, etc. of antennas and surface wave filters.



Series	Type	Size Code Inch (mm)	Inductance (nH)	Rated Current (mA)
LQW04A	Wire Wound Type	03015 (0804)	1.1 to 33	140 to 990
LQW15A		0402 (1005)	1.3 to 120	110 to 1200
LQW18A		0603 (1608)	2.2 to 470	75 to 1400
LQG15H	Monolithic Type	0402 (1005)	1.0 to 270	110 to 300
LQG18H		0603 (1608)	1.2 to 100	300 to 500

Connectivity Modules

This product can be used for communication in Bluetooth®, Wi-Fi™, GPS, FM and others.



Sensors

PTC Thermistors (POSISTOR®) Chip Type

Optimal for overheat detection at heat generation areas including power transistors, power diodes and power ICs.

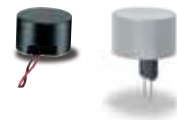


Series	Sensing Temperature (°C)	Max. Voltage (V)	Operating Temperature Range (°C)
PRF	+65 to +145*	32	-40 to +150

*The line-up contains nine models in 10°C increments. Detection precision: ±5°C (±3°C models are also available.)

Ultrasonic Sensors

Measures the distance between the car and the object behind it when backing up to park. Has a flat orientation, being wide horizontally and narrow vertically.



Series	Type	Using Method	Nominal Frequency (kHz)	Sensitivity (dB)	Sound Pressure Level (dB)	Directivity (deg.)	Size (mm)
MA40MF14	Water Proof Type	Dual Use	40	-87 min.	103 min.	110°×50° typ.	ø14
Series	Type	Using Method	Nominal Frequency (kHz)	Capacitance (pF)	Overall Sensitivity (Vop)	Directivity (deg.)	Size (mm)
MA58AF14	Water Proof Type	Dual Use	58	1400 typ.	2.0 typ.	75°×35° typ.	ø14

The detection distance and resolution vary according to the circuit to be used.

Gyro Sensors

For direction and position detection of automobiles.



Part Number	Supply Voltage (Vdc)	Angular Velocity (deg./sec.)	Output (Vdc)	Scale Factor (mV/deg./sec.)	Offset Drift (deg./sec.)	Operating Temperature Range (°C)	Weight (g)
MEV-50C-R	4.75 to 5.25	±70	2.5	25	6 max.	-40 to +85	0.3 max.
MEV-50D-R	4.75 to 5.25	±70	2.5	25	6 max.	-40 to +85	0.35 max.

Shock Sensors

Used to detect tire revolutions to save battery power in TPMS, and used in acceleration sensors for airbag subsensors to detect collisions.



Part Number	Inclination Angle of Primary Axis (deg.)	Electric Charge Sensitivity	Insulation Resistance (MΩ)	Resonant Frequency (kHz)	Capacitance (pC)	Operating Temperature Range (°C)	Size (mm)
PKGS-25TA-R	25	0.205pC/G	500 min.	39 typ.	240	-40 to +125	4.8×2.3×1.3
PKGS-00TAV-R	0	0.80mV/G	500 min.	39 typ.	245		
PKGS-45TAV-R1	45	0.77mV/G	500 min.	37 typ.	195		

Rotary Position Sensors

Angle detection: feedback sensor for motor actuators, etc. Position detection: replaces limit switches
Switching: replaces rotary switches Variable resistance: works as a low-profile, long-life variable resistor



Series	Total Resistance (kΩ)	Linearity (%)	Effective Electric Rotational Angle (°)	Operating Temperature Range (°C)	Rotational Life (Cycle)
SV01 Series	10	2	333.3	-40 to +85	1M
SV03 Series	10	2	333.3	-40 to +125	30k

Sound Components

Piezoelectric Sounders

Sound components to generate acknowledgment tone in instrumental panel, power slide door alarm, ultrasonic sonar operation alert and other alarm sounds.



Series	Type	Features
PKLCS	SMD Type	Super-compact and low-profiled, workable with automatic mounting and reflow soldering
PKM_EPP(H)	Pin Type	General-purpose products, low frequency (2kHz) products and high sound pressure products are in the line-up
PKM13EPYH	Pin Type	Small and low-profiled, workable with automatic insertion

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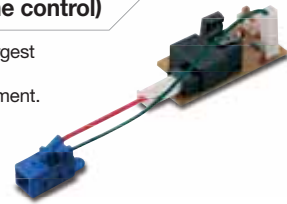
Products for Power Supply

Ionizer Modules Ionissimo® (High-concentration ion, compact design, ozone control)

Ionissimo® is an ionizer module with unprecedented compactness and high efficiency, capable of generating the largest amount of ions in the industry* owing to Murata's own high-voltage technology and structural design.

The ion generator is connected to the driving power supply for modularization and ease of incorporating into equipment.

*Surveyed by Murata (as of March 2011)



MHM Series

- Features**
- Ion is generated at low voltage (-2.0kV) with high efficiency, resulting in high ion concentration.
 - Compact equipment may be designed due to small ionizer element and driving power supply.
 - Ozone amounts may be optimized for specific applications by controlling the generation of ozone without changing the number of ions.

DC-DC Converters

Used for power supplies of all circuits and actuators in the car navigation system including digital signal processing circuit, VICS circuit, DVD driver, HDD driver and tuner circuit. It is also fully customizable for LCD driver power supply, as well as for backlight LED power supply.



For Automobiles / Various Product Catalogs <http://www.murata.com/products/apps/auto/catalog/index.html>



Chip Monolithic Ceramic Capacitors for Automotive

Cat.No.C03E



Radial Lead Type Monolithic Ceramic Capacitors

Cat.No.C49E



On-Board Type (DC) EMI Suppression Filters (EMIFIL®) for Automotive

Cat.No.C50E



Ceramic Resonators (CERALOCK®)

Cat.No.P16E



Low Temperature Co-fired Ceramics (LTCC) Multi-layer Module Boards

Cat.No.N20E

Corporate Activities

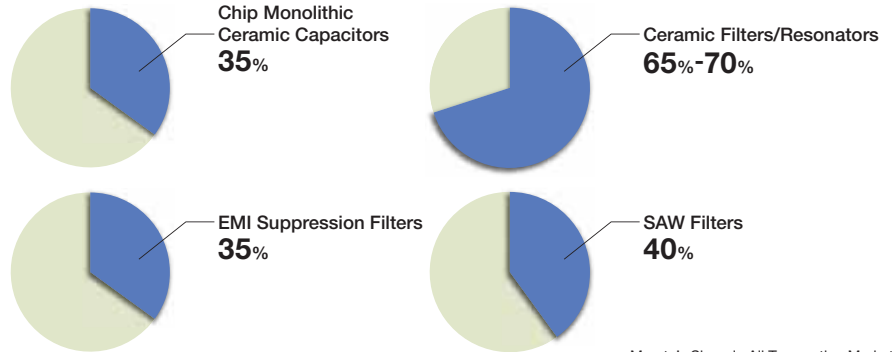
» Value for Market

Providing a network to link the world, and solutions without borders.

Murata's electronic components are used throughout the world in fields ranging from home intelligent appliances to industrial electronics and car electronics. The production and supply of these components is supported by a global network consisting of production and sales offices in over a dozen countries. By this worldwide network, Murata is actively involved in a borderless and far-reaching effort to turn even more ideas into reality.

Murata's globally accepted electronic components

For all of its leading products, Murata maintains a market share that is one of the highest in the world. Murata's electronic components play an important role inside many types of devices around the world.

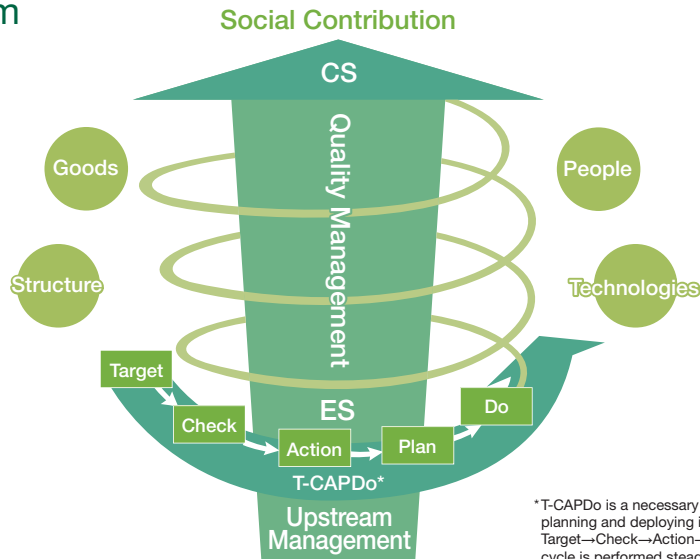


·Murata's Share in All Transaction Markets

» Quality Management System

Continuous Improvement of the Quality Management System.

Murata continuously improves the effectiveness and efficiency of the quality management system, with all functions at all levels improving continuously in synch with each other. All personnel ensure that the quality of their work improves in an upward spiral, and in this way we provide quality that satisfies our customers.



*T-CAPDo is a necessary improvement step when planning and deploying improvement activities. Target→Check→Action→Plan→Do cycle is performed steadily and deftly.

ISO9001 and ISO/TS16949

For a company with global business operations, it is important to meet a single global standard of product quality.

All Murata Group plants inside and outside Japan have received certification under the international quality management standard ISO9001. Of these plants, 11 supplying the automotive industry have also been certified as meeting the ISO/TS16949 quality management standard, a stricter international standard specific to the automotive industry.

Gaining International Standards Certification for Quality Management As May 2012

Plants/Subsidiaries	Registration Standard	Plants/Subsidiaries	Registration Standard
Murata Manufacturing Co., Ltd., Yokaichi Plant	ISO9001 ISO/TS16949	Asuwa Electronics Industries, Ltd.	ISO9001
Murata Manufacturing Co., Ltd., Yasu Plant	ISO9001	Anamizu Electronics Industries, Ltd.	ISO9001
Fukui Murata Manufacturing Co., Ltd.	ISO9001 ISO/TS16949	Murata Electronics (Thailand), Ltd. (Thailand)	ISO9001 ISO/TS16949
Toyama Murata Manufacturing Co., Ltd.	ISO9001 ISO/TS16949	Murata Electronics Singapore (Pte.) Ltd. (Singapore)	ISO9001 ISO/TS16949
Kanazawa Murata Manufacturing Co., Ltd.	ISO9001 ISO/TS16949	Wuxi Murata Electronics Co., Ltd. (Wuxi, China)	ISO9001 ISO/TS16949
Himi Murata Manufacturing Co., Ltd.	ISO9001 ISO/TS16949	Beijing Murata Electronics Co., Ltd. (Beijing, China)	ISO9001
Hakui Murata Manufacturing Co., Ltd.	ISO9001 ISO/TS16949	Shenzhen Murata Technology Co., Ltd. (China)	ISO9001
Sabae Murata Manufacturing Co., Ltd.	ISO9001	Taiwan Murata Electronics Co., Ltd. (Taiwan)	ISO9001
Ogaki Murata Manufacturing Co., Ltd.	ISO9001 ISO/TS16949	Murata Electronics (Malaysia) Sdn. Bhd. (Malaysia)	ISO9001
Izumo Murata Manufacturing Co., Ltd.	ISO9001 ISO/TS16949	Murata Electronics (UK) Ltd. (UK)	ISO9001
Okayama Murata Manufacturing Co., Ltd.	ISO9001	Murata Electronics (Netherlands) B.V. (Netherlands)	ISO9001
Azumi Murata Manufacturing Co., Ltd.	ISO9001 ISO/TS16949	Murata Elettronica S.p.A. (Italy)	ISO9001
Tome Murata Manufacturing Co., Ltd.	ISO9001 ISO/TS16949	Murata Electronique S.A.S (France)	ISO9001
Iwami Murata Manufacturing Co., Ltd.	ISO9001	Murata Electronics North America Inc. (Smyrna, Rockmart)	ISO9001
Komatsu Murata Manufacturing Co., Ltd.	ISO9001		
Kanazu Murata Manufacturing Co., Ltd.	ISO9001 ISO/TS16949		
Wakura Murata Manufacturing Co., Ltd.	ISO9001		

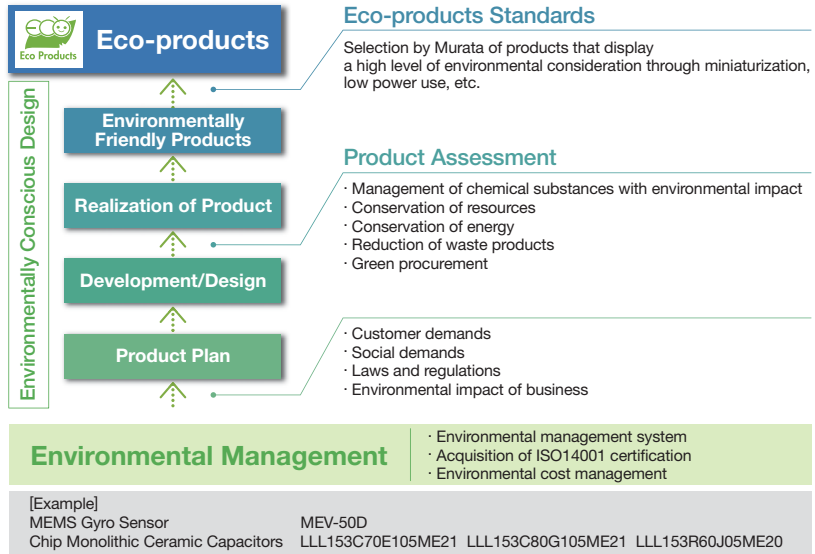
Please inquire us about details on certified products.

Environment

Continuing Our Quest for Harmony with the Environment
- In All Our Corporate Activities, Including Development, Design and Production -

We assess the impact of our products on the environment from the development and design stages, to ensure that every product we offer our customers takes the environment into consideration. We classify products that go even further towards contributing to reduced environmental impact as "Eco-friendly Products" and we are working to create a wider range of these products.

Eco-products



Global Multi-site ISO14001 Certification

Murata had acquired ISO14001 certification for all its production plants in Japan and overseas, and all non-manufacturing sites in Japan (Murata Head Office, Tokyo branch and sales offices) by the end of fiscal 2006. We had concentrated on integrating systems, and in March 2007, we completed switching individual certification of the 34 domestic Group business sites to ISO14001 multi-site certification. Since then, we have implemented an integrated environmental management system from design and development to production and sales, and also applied improvements that proved successful in one plant or office to other plants or offices, so as to improve the environmental performance of the entire Murata Group.

Since fiscal 2007 we have also promoted multi-site integration of overseas production plants. In fiscal 2008, Wuxi Murata Electronics Co., Ltd., China was included within the scope of a multi-site certification, and in fiscal 2009, Shenzhen Murata Technology Co., Ltd. was also included.

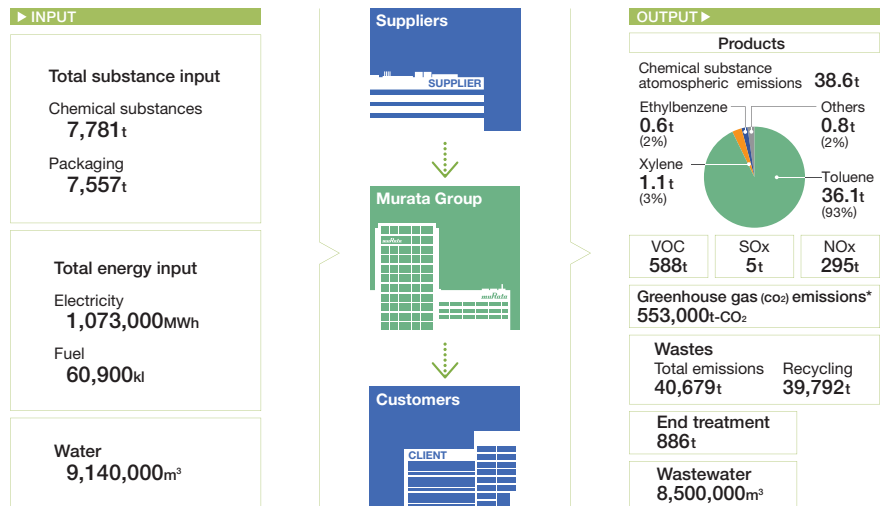
In March 2010, we integrated the environmental management systems of all our domestic business sites and overseas production plants. By building a global environmental management system, we have further enhanced our governance as a Group, and enabled the implementation of more efficient and highly effective environmental activities.

ISO 14001 Certification Status: <http://www.murata.com/corporate/csr/ecology/management/iso.html>

The materials that make up Murata products contain many chemical substances, and Murata is therefore working to reduce the volume of these substances used through strict and proper management.

Although the electronic components manufactured by Murata are small, the types of chemical substances used during production are numerous and their volume, as well as that of energy used, is not small. We therefore prioritize the reduction of emissions of CO₂ and chemical substances used in production into the atmosphere or water.

Management of Substances with Environmental Impact



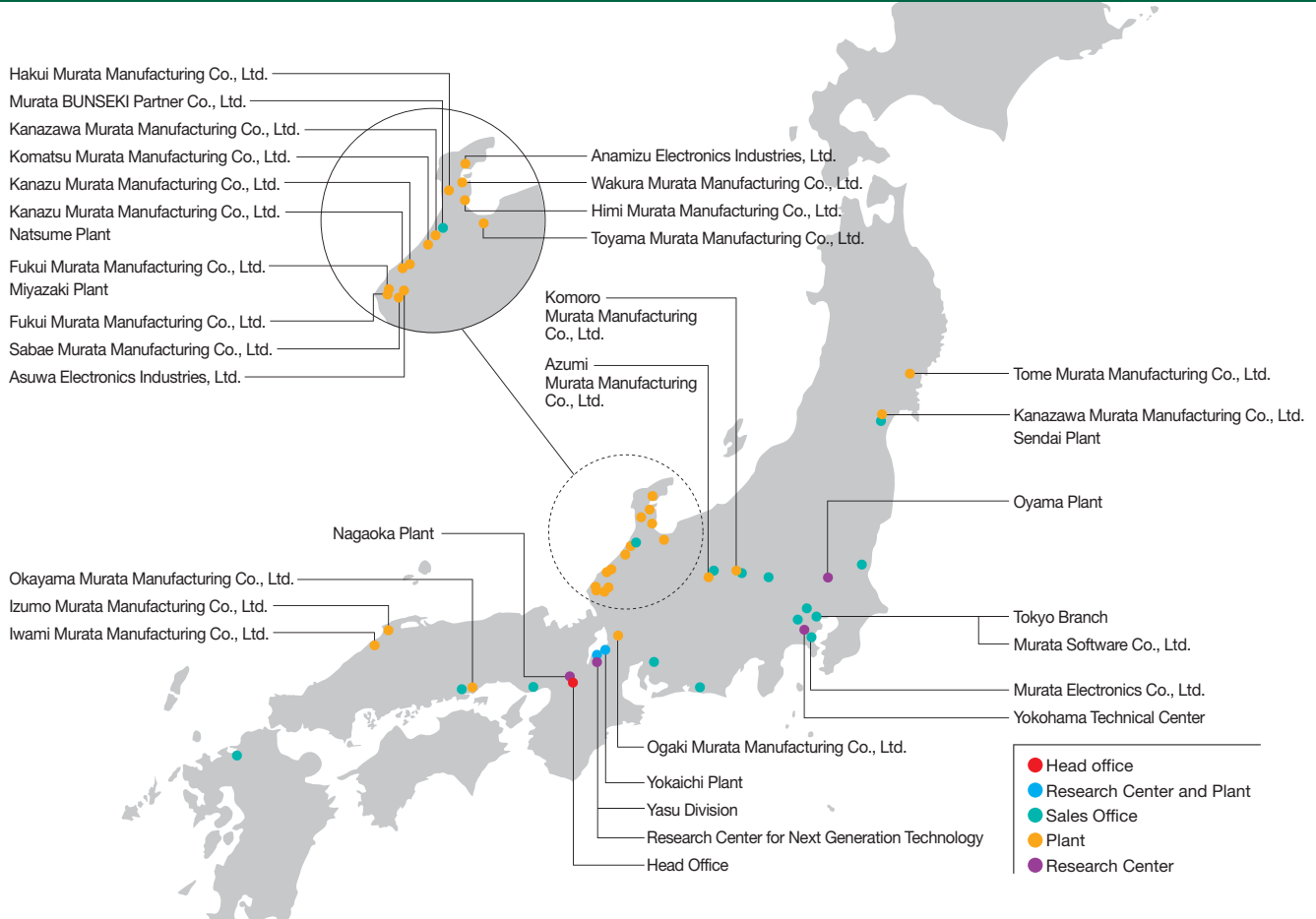
*Beginning this fiscal year, GHG Protocol (2005) coefficients for each country are used for CO₂ emissions from electricity purchased at overseas plants.

The shown data in this chart is the data gained from April, 2011 in March, 2012.

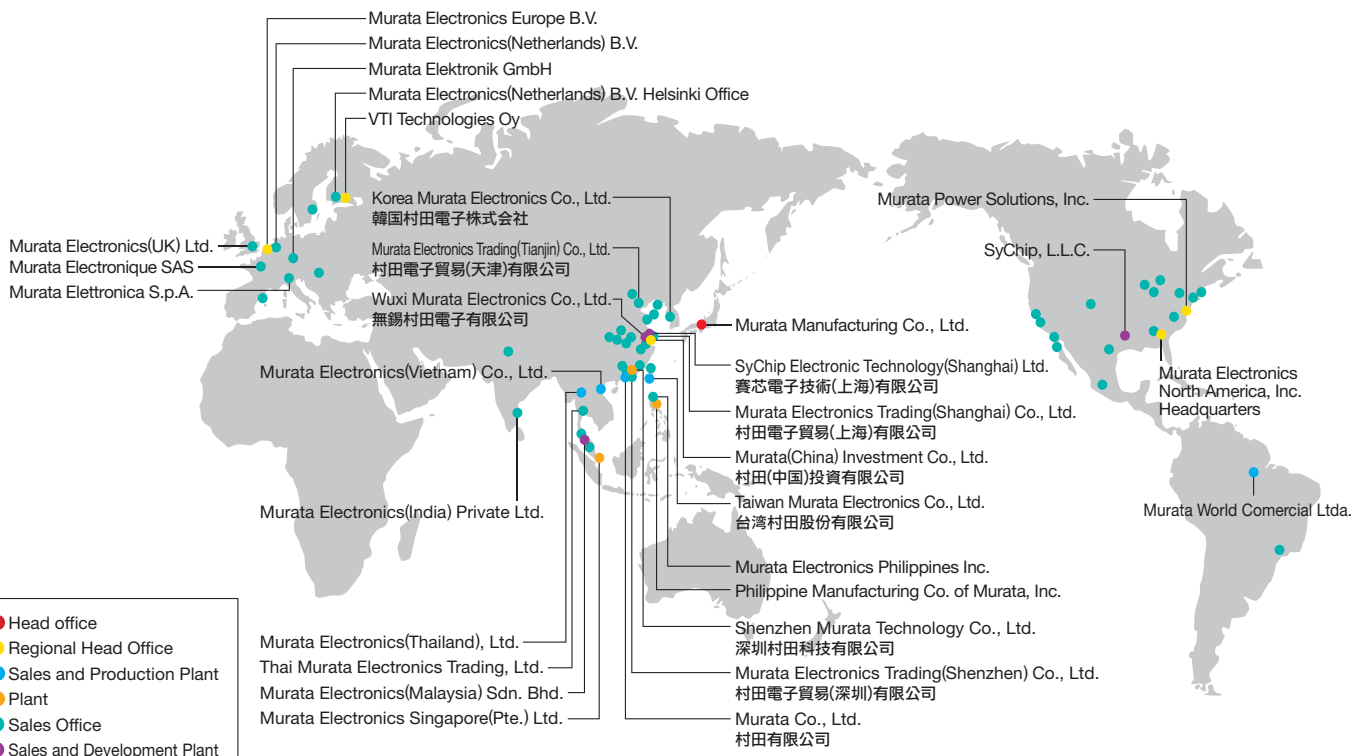
Network

Our production bases contribute to the development of electronics society as local regions grow.

Global Expansion of Murata's Overseas Offices



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



Car and future



⚠ 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 September 2012. 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. Therefore, 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.

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* Murata Manufacturing Co., Ltd.**

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Head Office
1-10-1, Higashi Kotari, Nagaokakyo-shi, Kyoto 617-8555, Japan
Phone: 81-75-951-9111

International Division
3-29-12, Shibuya, Shibuya-ku, Tokyo 150-0002, Japan
Phone: 81-3-5469-6123 Fax: 81-3-5469-6155 E-mail: intl@murata.co.jp

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