

# MURATA PRODUCTS Lineup 2016



# 2016 MURATA PRODUCTS Lineup

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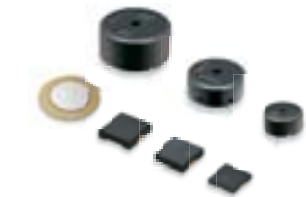
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# Capacitors

The most comprehensive product lineup in the industry, providing ideal solutions, responding to all possible requirements.

## Summary

Using Murata's unique material technology, we offer a variety of capacitors covering a wide range of voltages. Murata also offers technical support that includes design kits and a comprehensive set of software tools to simulate virtually any circuit condition, satisfying the demands of many applications.

## Lineup

- Ceramic Capacitors (SMD, lead type, mold type)
- Polymer Aluminum Electrolytic Capacitors
- Ceramic Trimmer Capacitors ● Supercapacitors (EDLC)



<http://www.murata.com/en-global/products/capacitor>

## WEB Product Search Engine



### 1 Search by part number

The applicable capacitors can be searched by alphanumeric characters.



### 2 Search by specifications

Capacitors can be searched by various specifications, such as the capacitance, rated voltage, and temperature characteristics.



### 3 Search by features

The applicable capacitors can be searched by the shape, maximum operating temperature, applications, benefits, and mounting.



### 4 Search in the lineups

Capacitors applicable to the conditions can be searched from the lineup of each series.



### 5 Cross reference

The Murata part number applicable to the assumed specification can be searched using a competitor's part number for chip monolithic ceramic capacitors.



## Search result

The number of cases applicable to the current search conditions is always displayed in real time.

Click each search condition button to display the menu. The search results will change in real time with the selected conditions.



Clicking the "Current search conditions" opens a menu, and the filtered conditions can be checked.



The results can be sorted by clicking the ▲ button of the search results items.

Clicking the product name opens the details page, and more detailed information can be acquired.

A simple specification sheet can be downloaded without opening the details page.

The icons clearly indicate the status and the features of the product.

## Icons

	For applications that do not require a particular reliability. such as general equipment.
	Powertrain/Safety for Automotive Products used for applications (running, turning, stopping, and safety devices) that particularly concern human life, such as in devices for automobiles.
	Medical-grade products for Implanted Medical Devices These products are intended for use in implanted medical devices such as cardiac pacemakers, cochlear implants, insulin pumps, and gastric electrostimulators. They are suitable for use in non-critical circuits.*1 *1 Non-critical circuits This term refers to circuits in implanted medical devices that are not directly linked to life support, i.e. circuits that will not directly endanger the life of the patient should the functionality of the device be reduced or halted by failure of the circuit.
	AEC-Q200 compliant product
	Safety Standard Certified Product Products that acquired safety standard certification IEC60384-14 and products based on the Electrical Appliance and Material Safety Law of Japan.
	LXW dimension: products of 0.6X0.3 mm or less
	Low dissipation for high frequency By devising ceramic materials and electrode materials, low dissipation is achieved in frequency bands of VHF, UHF, and microwave or beyond.
	Low inductance This capacitor is designed so that the parasitic inductance component (ESL) that the capacitor has on the high frequency side becomes lower.
	Fail safe product This capacitor is designed to prevent failures as much as possible by short mode.
	Product resistant to deflection cracking This capacitor is designed to prevent failures as much as possible by short mode caused by cracking when there is board deflection.
	Product with solder cracking suppression This capacitor is configured with metal terminals and leads connected to the chip. The metal terminals and leads relieve the stress from expansion and contraction of the solder, to suppress solder cracking.
	Product suitable for acoustic noise reduction and low distortion This product suppresses acoustic noise, which occurs when a ceramic capacitor is used, by devising the materials and configuration.
	Product of 10 to 40kV rated voltage
	Over 220 $\mu$ F
	No DC bias characteristics Polymer capacitor is no capacitance change with DC bias due to aluminum oxidized film for dielectric.
	Product for bonding Since gold is used for the external electrodes, the capacitor can be mounted by die bonding/wire bonding.

# Capacitors

## Product Lineup

			Safety standard	Ultra-compact	High Q	Low ESL	Fail safe	Deflecting crack	Soldering crack	Anti-noise	Ultrahigh-voltage	Large Cap	Effective Cap	Bonding	Specific Applications		
General	GRM	P5															
	GRM	P10														For LCD backlight only	
	GA2	P11															
	GA3	P12															
	GJM	P8															
	GMA	P9															
	GMD	P9															
	GQM	P9															
	GRJ	P10															
	GR3	P11															
	GR4	P11															For communication / information devices
	GR7	P11															Limited to camera flashes
	KRM	P12															
	KR3	P13															
	LLA	P8															
	LLL	P7															
	LLM	P8															
	LLR	P8															
	DE1	P20															
	DE2	P20															
	DEJ	P21															
	DHR	P21															
	RDE	P18															
	DHK	P24															
DHS	P23																
ECAS	P24																
Powertrain AEC-Q200	GCM	P13															
	GCD	P15															
	GCE	P15															
	GCG	P16															
	GCJ	P14															
	GC3	P16															
	KCM	P17															
	KC3	P17															
	DE6	P23															
	RCE	P21															
	RH	P22															
Medical Device	GCH	P17														For Implanted Medical Devices	

# Chip Monolithic Ceramic Capacitors For General Purpose

## For General Purpose

### Temperature Compensating Type



GRM

General Ultra-compact

Series	LXW (mm) <Size Code (inch)>	Rated Voltage (Vdc)	Capacitance Range (F)											
			0.1p	1p	10p	100p	1000p	10000p	0.1μ	1μ	10μ	100μ	1000μ	
GRM02	0.4X0.2 <01005>	50			17pF	100pF								
		35				100pF								
		25			18pF	220pF								
		16	0.20pF			220pF								
		10			56pF	220pF								
		6.3			56pF	220pF								
GRM03	0.6X0.3 <0201>	100	0.10pF		15pF									
		50	0.10pF		220pF									
GRM15	1.0X0.5 <0402>	100	0.10pF		100pF									
		50	0.10pF		1000pF									
		10			1200pF	4700pF								
GRM18	1.6X0.8 <0603>	100	0.50pF		1500pF									
		50	0.50pF		10000pF									
		10			5600pF	22000pF								
GRM21	2.0X1.25 <0805>	250		10pF	5600pF									
		200		10pF	5600pF									
		100			100pF	3300pF								
		50			1200pF	47000pF								
		10				56000pF	0.10μF							
GRM31	3.2X1.6 <1206>	2k		10pF	68pF									
		1k		10pF	1000pF									
		630		10pF	4700pF									
		500		10pF	4700pF									
		250			390pF	22000pF								
		200			2700pF	10000pF								
		100			1800pF	22000pF								
		50				12000pF	0.10μF							
		25					0.12μF							
		16					0.12μF							
GRM32	3.2X2.5 <1210>	2k			82pF	220pF								
		1k				1200pF	2200pF							
		630				1200pF	10000pF							
		500				1200pF	10000pF							
		250					27000pF	47000pF						
GRM42	4.5X2.0 <1808>	3.15k		10pF	100pF									
GRM43	4.5X3.2 <1812>	1k				2700pF	4700pF							
		630				12000pF	22000pF							
		500				12000pF	22000pF							
GRM55	5.7X5.0 <2220>	1k				5600pF	10000pF							
		630				27000pF	47000pF							
		500				27000pF	47000pF							

# Capacitors

## High Dielectric Constant Type



GRM

General Ultra-compact

Series	LxW (mm) <Size Code (inch)>	Rated Voltage (Vdc)	Capacitance Range (F)											
			0.1p	1p	10p	100p	1000p	10000p	0.1μ	1μ	10μ	100μ	1000μ	
GRM02	0.4X0.2 <01005>	16				100pF	1000pF							
		10				100pF	10000pF							
		6.3					1000pF	0.10μF						
		4						15000pF	0.10μF					
		2.5								0.10μF				
GRM03	0.6X0.3 <0201>	50				100pF	1500pF							
		35							0.10μF					
		25				100pF			0.10μF					
		16					2200pF	0.10μF						
		10					4700pF	0.22μF						
		6.3					4700pF	0.22μF						
		4								0.22μF				
GRM15	1.0X0.5 <0402>	100				220pF	4700pF							
		50				220pF	0.10μF							
		35							0.22μF	1.0μF				
		25					2200pF	2.2μF						
		16					3300pF	2.2μF						
		10					15000pF	4.7μF						
		6.3							0.10μF	4.7μF				
		4							0.10μF	10μF				
GRM18	1.6X0.8 <0603>	250				220pF	2200pF							
		200				220pF	2200pF							
		100				220pF	0.10μF							
		50				220pF	2.2μF							
		35							2.2μF	4.7μF				
		25					10000pF	10μF						
		16							0.15μF	10μF				
		10							0.33μF	10μF				
		6.3								4.7μF	22μF			
		4								10μF	22μF			
GRM21	2.0X1.25 <0805>	500				1000pF	10000pF							
		250				1000pF	22000pF							
		200				1000pF	22000pF							
		100					10000pF	0.47μF						
		50					10000pF	4.7μF						
		35							2.2μF	10μF				
		25						68000pF	22μF					
		16							0.33μF	22μF				
		10								2.2μF	47μF			
		6.3									10μF	100μF		
		4									10μF	100μF		
GRM31	3.2X1.6 <1206>	1k				470pF	10000pF							
		630				1000pF	22000pF							
		500					15000pF	47000pF						
		250					15000pF	0.10μF						
		200					15000pF	0.10μF						
		100							0.47μF	2.2μF				
		50							0.47μF	10μF				
		35									10μF			
25								0.33μF	22μF					

Continued on the following page. ↗

Series	LXW (mm) <Size Code (inch)>	Rated Voltage (Vdc)	Capacitance Range (F)														
			0.1p	1p	10p	100p	1000p	10000p	0.1μ	1μ	10μ	100μ	1000μ				
GRM31	3.2X1.6 <1206>	16									4.7μF	22μF					
		10										22μF	47μF				
		6.3										22μF	150μF				
		4											47μF	220μF			
		2.5												150μF	220μF		
GRM32	3.2X2.5 <1210>	1k						6800pF	22000pF								
		630						22000pF	47000pF								
		500						68000pF	0.10μF								
		250						68000pF	0.22μF								
		200						68000pF	0.22μF								
		100								1.0μF	4.7μF						
		80									4.7μF						
		63										10μF					
		50									4.7μF	10μF					
		35										10μF					
		25										10μF	22μF				
		16											22μF	47μF			
		10												47μF	100μF		
		6.3												47μF	100μF		
		4													100μF		
GRM43	4.5X3.2 <1812>	1k						33000pF	47000pF								
		630						68000pF	0.10μF								
		500							0.15μF	0.22μF							
		250							0.15μF	0.47μF							
		200							0.15μF	0.47μF							
GRM55	5.7X5.0 <2220>	1k						68000pF	0.10μF								
		630							0.15μF	0.22μF							
		500							0.33μF	0.47μF							
		250							0.33μF	1.0μF							
		200							0.33μF	1.0μF							

### Low ESL Type

#### LW Reversed Type



LLL

General Low ESL

Series	LXW (mm) <Size Code (inch)>	Rated Voltage (Vdc)	Capacitance Range (F)														
			0.1p	1p	10p	100p	1000p	10000p	0.1μ	1μ	10μ	100μ	1000μ				
LLL15	0.5X1.0 <0204>	6.3								0.10μF	0.22μF						
		4									0.47μF	1.0μF					
LLL18	0.8X1.6 <0306>	50						2200pF	4700pF								
		25						10000pF	22000pF								
		16						22000pF	47000pF								
		10							0.10μF	0.22μF							
		4								0.22μF	2.2μF						
LLL1U	0.6X1.0 <02404>	4										4.3μF					
LLL21	1.25X2.0 <0508>	50						10000pF	22000pF								
		25						22000pF	0.10μF								
		16						47000pF	0.22μF								
		10							0.22μF	1.0μF							
		6.3								0.47μF							
		4								1.0μF	2.2μF						
LLL31	1.6X3.2 <0612>	50						10000pF	0.10μF								
		25						47000pF	0.47μF								

Continued on the following page. ↗

## Capacitors

Series	LXW (mm) <Size Code (inch)>	Rated Voltage (Vdc)	Capacitance Range (F)											
			0.1p	1p	10p	100p	1000p	10000p	0.1μ	1μ	10μ	100μ	1000μ	
LLL31	1.6X3.2 <0612>	16								0.22μF	1.0μF			
		10								0.47μF	2.2μF			
		6.3									2.2μF	10μF		

### Controlled ESR Type



LLR

General Low ESL

Series	LXW (mm) <Size Code (inch)>	Rated Voltage (Vdc)	ESR (mΩ)				Capacitance Range
			100	220	470	1000	
LLR18	0.8X1.6 <0306>	4					1.0μF

### 8 Terminal Type



LLA

General Low ESL

Series	LXW (mm) <Size Code (inch)>	Rated Voltage (Vdc)	Capacitance Range (F)											
			0.1p	1p	10p	100p	1000p	10000p	0.1μ	1μ	10μ	100μ	1000μ	
LLA18	1.6X0.8 <0603>	4								0.10μF	2.2μF			
LLA21	2.0X1.25 <0805>	25						10000pF	47000pF					
		16						47000pF	0.22μF					
		10							0.22μF	0.47μF				
		6.3								0.47μF	1.0μF			
		4									1.0μF	4.7μF		
LLA31	3.2X1.6 <1206>	16								0.22μF	1.0μF			
		10									0.47μF	2.2μF		
		6.3										1.0μF	2.2μF	

### 10 Terminal Type



LLM

General Low ESL

Series	LXW (mm) <Size Code (inch)>	Rated Voltage (Vdc)	Capacitance Range (F)												
			0.1p	1p	10p	100p	1000p	10000p	0.1μ	1μ	10μ	100μ	1000μ		
LLM21	2.0X1.25 <0805>	6.3									0.22μF	0.47μF			
		4											1.0μF		
LLM31	3.2X1.6 <1206>	16									0.10μF	0.22μF			
		10											0.47μF		
		6.3												2.2μF	

## High Q Type for High Frequency



GJM

General Ultra-compact High Q

Series	LXW (mm) <Size Code (inch)>	Rated Voltage (Vdc)	Capacitance Range (F)											
			0.1p	1p	10p	100p	1000p	10000p	0.1μ	1μ	10μ	100μ	1000μ	
GJM02	0.4X0.2 <01005>	25	0.20pF			22pF								
GJM03	0.6X0.3 <0201>	50	0.20pF			3.9pF								
		25	0.20pF			33pF								
GJM15	1.0X0.5 <0402>	50	0.10pF			47pF								

## High Q Type for High Frequency and High Power



GQM

General High Q

Series	LxW (mm) <Size Code (inch)>	Rated Voltage (Vdc)	Capacitance Range (F)											
			0.1p	1p	10p	100p	1000p	10000p	0.1μ	1μ	10μ	100μ	1000μ	
GQM15	1.0X0.5 <0402>	200	0.10pF				33pF							
		100				36pF	47pF							
GQM18	1.6X0.8 <0603>	250		1.0pF			47pF							
		100		1.0pF		6.8pF								
		50			7.0pF		100pF							
GQM21	2.0X1.25 <0805>	250		1.0pF			100pF							
		100		1.0pF		18pF								
		50			20pF		100pF							
GQM22	2.8X2.8 <1111>	500		1.0pF		100pF								

## Product for Bonding/AuSn Soldering



GMD

General Ultra-compact Bonding

Series	LxW (mm) <Size Code (inch)>	Rated Voltage (Vdc)	Capacitance Range (F)											
			0.1p	1p	10p	100p	1000p	10000p	0.1μ	1μ	10μ	100μ	1000μ	
GMD03	0.6X0.3 <0201>	25				100pF	1500pF							
		16				1800pF	3300pF							
		10				3900pF	10000pF							
		6.3					56000pF	0.10μF						
GMD15	1.0X0.5 <0402>	50				220pF	4700pF							
		25					5600pF	47000pF						
		16						56000pF	0.10μF					
		10							0.12μF	0.47μF				

## Top & Bottom Electrode Type for Bonding




GMA

General Ultra-compact Bonding

Series	LxW (mm) <Size Code (inch)>	Rated Voltage (Vdc)	Capacitance Range (F)											
			0.1p	1p	10p	100p	1000p	10000p	0.1μ	1μ	10μ	100μ	1000μ	
GMA05	0.5X0.5 <0202>	100				100pF	1000pF							
		25					1500pF	4700pF						
		10						6800pF	22000pF					
		6.3							0.10μF					
GMA08	0.8X0.8 <0303>	100					1500pF	6800pF						
		25						10000pF	22000pF					
		10							33000pF	0.10μF				
		6.3								0.47μF				
GMA0D	0.38X0.38 <015015>	10					1000pF	10000pF						


Capacitors

Resin External Electrode Type

 **GRJ** General Deflecting crack

Series	LXW (mm) <Size Code (inch)>	Rated Voltage (Vdc)	Capacitance Range (F)											
			0.1p	1p	10p	100p	1000p	10000p	0.1μ	1μ	10μ	100μ	1000μ	
GRJ18	1.6X0.8 <0603>	100					1000pF			0.10μF				
		50					1000pF			0.22μF				
		25							47000pF		1.0μF			
		16									0.47μF			
		6.3									2.2μF	4.7μF		
GRJ21	2.0X1.25 <0805>	250					1000pF		22000pF					
		100				220pF				1.0μF				
		50				470pF				1.0μF				
		25								1.0μF	2.2μF			
		16										4.7μF		
		10											10μF	
GRJ31	3.2X1.6 <1206>	1k					470pF		10000pF					
		630					1000pF		22000pF					
		250							15000pF		0.10μF			
		100								0.10μF	1.0μF			
		50								0.10μF		4.7μF		
		25									2.2μF	10μF		
		16									2.2μF	10μF		
		10										10μF	22μF	
GRJ32	3.2X2.5 <1210>	1k					6800pF		22000pF					
		630					22000pF		47000pF					
		250							68000pF		0.22μF			
		100								2.2μF	4.7μF			
		50									4.7μF	10μF		
		25										10μF		
		16											22μF	
		10											22μF	
GRJ43	4.5X3.2 <1812>	1k							33000pF	47000pF				
		630							68000pF	0.10μF				
		250								0.15μF	0.47μF			
GRJ55	5.7X5.0 <2220>	1k							68000pF	0.10μF				
		630								0.15μF	0.22μF			
		250									0.33μF	1.0μF		

For LCD Backlight Inverter Circuit Only

 **GRM** General

Series	LXW (mm) <Size Code (inch)>	Rated Voltage (Vdc)	Capacitance Range (F)											
			0.1p	1p	10p	100p	1000p	10000p	0.1μ	1μ	10μ	100μ	1000μ	
GRM42	4.5X2.0 <1808>	3.15k				5.0pF	47pF							

## High Effective Capacitance & High Ripple Resistance



GR3

General Anti-noise

Series	LXW (mm) <Size Code (inch)>	Rated Voltage (Vdc)	Capacitance Range (F)												
			0.1p	1p	10p	100p	1000p	10000p	0.1μ	1μ	10μ	100μ	1000μ		
GR321	2.0X1.25 <0805>	250						10000pF	22000pF						
GR331	3.2X1.6 <1206>	630						10000pF	15000pF						
		450						10000pF	47000pF						
		250							33000pF	68000pF					
GR332	3.2X2.5 <1210>	630						22000pF	47000pF						
		450							68000pF	0.10μF					
		250								0.10μF	0.15μF				
GR343	4.5X3.2 <1812>	630								68000pF					
		450									0.15μF				
		250										0.22μF	0.33μF		
GR355	5.7X5.0 <2220>	630									0.10μF	0.27μF			
		450										0.22μF	0.56μF		
		250											0.47μF	1.0μF	

## For Ethernet LAN & Primary-secondary Coupling of DC-DC Converters



GR4

General

Series	LXW (mm) <Size Code (inch)>	Rated Voltage (Vdc)	Capacitance Range (F)												
			0.1p	1p	10p	100p	1000p	10000p	0.1μ	1μ	10μ	100μ	1000μ		
GR442	4.5X2.0 <1808>	2k				100pF	1500pF								
GR443	4.5X3.2 <1812>	2k						1800pF	4700pF						
GR455	5.7X5.0 <2220>	2k								10000pF					

## For Camera Flash Units Only



GR7

General

Series	LXW (mm) <Size Code (inch)>	Rated Voltage (Vdc)	Capacitance Range (F)												
			0.1p	1p	10p	100p	1000p	10000p	0.1μ	1μ	10μ	100μ	1000μ		
GR721	2.0X1.25 <0805>	350						10000pF	27000pF						
GR731	3.2X1.6 <1206>	350						10000pF	47000pF						

## Safety Standard Certified

The Electrical Appliance and Material Safety Law of Japan



GA2

General Safety standard

Series	LXW (mm) <Size Code (inch)>	Rated Voltage (V)	Capacitance Range (F)												
			0.1p	1p	10p	100p	1000p	10000p	0.1μ	1μ	10μ	100μ	1000μ		
GA242	4.5X2.0 <1808>	AC250 (r.m.s.)					470pF	1000pF							
GA243	4.5X3.2 <1812>	AC250 (r.m.s.)						2200pF	47000pF						
GA255	5.7X5.0 <2220>	AC250 (r.m.s.)									0.10μF				

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## Capacitors

### Type GF (IEC60384-14 Y2, X1/Y2 Class)



GA3

General

Safety standard

Series	LXW (mm) <Size Code (inch)>	Rated Voltage (V)	Capacitance Range (F)														
			0.1p	1p	10p	100p	1000p	10000p	0.1μ	1μ	10μ	100μ	1000μ				
GA342	4.5X2.0 <1808>	AC250 (r.m.s.)			10pF												
GA352	5.7X2.8 <2211>	AC250 (r.m.s.)				100pF											
GA355	5.7X5.0 <2220>	AC250 (r.m.s.)						1800pF									

### Type GD (IEC60384-14 Y3 Class)



GA3

General

Safety standard

Series	LXW (mm) <Size Code (inch)>	Rated Voltage (V)	Capacitance Range (F)														
			0.1p	1p	10p	100p	1000p	10000p	0.1μ	1μ	10μ	100μ	1000μ				
GA342	4.5X2.0 <1808>	AC250 (r.m.s.)			10pF												
GA343	4.5X3.2 <1812>	AC250 (r.m.s.)						1800pF									

### Type GB (UL, IEC60384-14 X2 Class)



GA3

General

Safety standard

Series	LXW (mm) <Size Code (inch)>	Rated Voltage (V)	Capacitance Range (F)														
			0.1p	1p	10p	100p	1000p	10000p	0.1μ	1μ	10μ	100μ	1000μ				
GA355	5.7X5.0 <2220>	AC250 (r.m.s.)							10000pF								

## Metal Terminal Type

### High Effective Capacitance



KRM

General

Deflecting crack

Soldering crack

Anti-noise

Series	LXW (mm)	Rated Voltage (Vdc)	Capacitance Range (F)													
			0.1p	1p	10p	100p	1000p	10000p	0.1μ	1μ	10μ	100μ	1000μ			
KRM21	2.2X1.25	25										10μF	22μF			
		16											10μF			
KRM31	3.5X1.7	100										1.0μF				
		50											4.7μF			
		35												10μF		
		25												10μF		
	3.6X1.7	50											2.2μF			
	3.7X1.85	100											2.2μF			
KRM55	6.1X5.3	1k								68000pF		0.22μF				
		630									0.15μF		0.47μF			
		250										0.68μF		2.2μF		
		100											4.7μF	22μF		
		63											4.7μF	22μF		
		50											4.7μF	33μF		
		35												10μF	47μF	
25												15μF	68μF			

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High Effective Capacitance & High Ripple Resistance



KR3

- General
- Deflecting crack
- Soldering crack
- Anti-noise

Series	LXW (mm)	Rated Voltage (Vdc)	Capacitance Range (F)											
			0.1p	1p	10p	100p	1000p	10000p	0.1μ	1μ	10μ	100μ	1000μ	
KR355	6.1X5.3	630								0.10μF	0.56μF			
		450								0.22μF	1.2μF			
		250								0.47μF	2.2μF			

# Chip Monolithic Ceramic Capacitors For Automotive

## For Automotive (General Purpose)

Temperature Compensating Type



GCM

- Power-train
- AEC-Q200
- Ultra-compact

Series	LXW (mm) <Size Code (inch)>	Rated Voltage (Vdc)	Capacitance Range (F)												
			0.1p	1p	10p	100p	1000p	10000p	0.1μ	1μ	10μ	100μ	1000μ		
GCM03	0.6X0.3 <0201>	25		1.0pF		100pF									
GCM15	1.0X0.5 <0402>	50		1.0pF		470pF									
GCM18	1.6X0.8 <0603>	100		1.0pF		1500pF									
		50		1.0pF		3900pF									
GCM21	2.0X1.25 <0805>	250				100pF		5600pF							
		100				100pF		3300pF							
		80						15000pF		22000pF					
		63						15000pF		22000pF					
		50					1000pF		22000pF						
GCM31	3.2X1.6 <1206>	1k			10pF		1000pF								
		630			10pF		4700pF								
		250			10pF		15000pF								
		100					1800pF		10000pF						
		80							33000pF						
		63							33000pF						
		50						3900pF		56000pF					
GCM32	3.2X2.5 <1210>	1k				1200pF		2200pF							
		630				1200pF		10000pF							
GCM43	4.5X3.2 <1812>	1k					2700pF		4700pF						
		630						12000pF		22000pF					
GCM55	5.7X5.0 <2220>	1k						5600pF		10000pF					
		630							27000pF		47000pF				

High Dielectric Constant Type



GCM

- Power-train
- AEC-Q200
- Ultra-compact


Series	LXW (mm) <Size Code (inch)>	Rated Voltage (Vdc)	Capacitance Range (F)											
			0.1p	1p	10p	100p	1000p	10000p	0.1μ	1μ	10μ	100μ	1000μ	
GCM03	0.6X0.3 <0201>	25				100pF		1500pF						
		16						2200pF		3300pF				
		10						4700pF		10000pF				

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# Capacitors

Series	LXW (mm) <Size Code (inch)>	Rated Voltage (Vdc)	Capacitance Range (F)											
			0.1p	1p	10p	100p	1000p	10000p	0.1μ	1μ	10μ	100μ	1000μ	
GCM15	1.0X0.5 <0402>	100				220pF	4700pF							
		50				220pF	0.10μF							
		25					10000pF	47000pF						
		16						33000pF	0.22μF					
		10								0.47μF	1.0μF			
GCM18	1.6X0.8 <0603>	100				1000pF	22000pF							
		50				1000pF	0.22μF							
		25						33000pF	1.0μF					
		16							0.10μF	1.0μF				
		6.3									2.2μF			
GCM21	2.0X1.25 <0805>	100					6800pF	1.0μF						
		50						33000pF	1.0μF					
		35								0.68μF	4.7μF			
		25								0.15μF	4.7μF			
		16									0.68μF	4.7μF		
		10										2.2μF	10μF	
		6.3											10μF	22μF
GCM31	3.2X1.6 <1206>	100							0.10μF	2.2μF				
		50								0.33μF	4.7μF			
		25									2.2μF	10μF		
		16										4.7μF	10μF	
		10											10μF	22μF
GCM32	3.2X2.5 <1210>	100											4.7μF	
		50								1.0μF	10μF			
		35											10μF	
		25										4.7μF	10μF	
		10											10μF	22μF
6.3												22μF		
													47μF	

## Resin External Electrode Type



GCJ

Power-train

AEC-Q200

Fail safe

Deflecting crack

Series	LXW (mm) <Size Code (inch)>	Rated Voltage (Vdc)	Capacitance Range (F)											
			0.1p	1p	10p	100p	1000p	10000p	0.1μ	1μ	10μ	100μ	1000μ	
GCJ18	1.6X0.8 <0603>	100					1000pF	0.10μF						
		50					1000pF	0.22μF						
		35							33000pF	68000pF				
		25					1000pF	1.0μF						
		16							10000pF	0.47μF				
		10									0.12μF	0.22μF		
		6.3											2.2μF	4.7μF
GCJ21	2.0X1.25 <0805>	250					1000pF	22000pF						
		100				220pF	1.0μF							
		50				330pF	1.0μF							
		35								0.12μF	0.47μF			
		25					470pF	2.2μF						
		16									0.27μF	4.7μF		
		10										2.2μF	10μF	
GCJ31	3.2X1.6 <1206>	1k					1000pF	10000pF						
		630					1000pF	22000pF						
		250							15000pF	0.10μF				


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Series	LXW (mm) <Size Code (inch)>	Rated Voltage (Vdc)	Capacitance Range (F)												
			0.1p	1p	10p	100p	1000p	10000p	0.1μ	1μ	10μ	100μ	1000μ		
GCJ31	3.2X1.6 <1206>	100							0.10μF	1.0μF					
		50							0.10μF	4.7μF					
		35							0.56μF	1.0μF					
		25							0.10μF	10μF					
		16								1.0μF	10μF				
		10									6.8μF	22μF			
GCJ32	3.2X2.5 <1210>	1k						15000pF	22000pF						
		630						6800pF	47000pF						
		250							68000pF	0.22μF					
		100								2.2μF	4.7μF				
		50									4.7μF	10μF			
		25										4.7μF			
		16											22μF		
GCJ43	4.5X3.2 <1812>	1k						33000pF	47000pF						
		630						33000pF	0.10μF						
		250							0.15μF	0.47μF					
GCJ55	5.7X5.0 <2220>	1k						68000pF	0.10μF						
		630							0.10μF	0.22μF					
		250								0.33μF	1.0μF				

### Specialty Designed Product to Reduce Shorts













Series	LXW (mm) <Size Code (inch)>	Rated Voltage (Vdc)	Capacitance Range (F)											
			0.1p	1p	10p	100p	1000p	10000p	0.1μ	1μ	10μ	100μ	1000μ	
GCD18	1.6X0.8 <0603>	100					1000pF	22000pF						
		50					1000pF	22000pF						
		25						27000pF	47000pF					
GCD21	2.0X1.25 <0805>	100					1000pF	0.10μF						
		50					1000pF	0.10μF						

### Specialty Designed Product to Reduce Shorts & Resin Electrode Product



Series	LXW (mm) <Size Code (inch)>	Rated Voltage (Vdc)	Capacitance Range (F)											
			0.1p	1p	10p	100p	1000p	10000p	0.1μ	1μ	10μ	100μ	1000μ	
GCE18	1.6X0.8 <0603>	100					1000pF	22000pF						
		50					1000pF	22000pF						
		25						27000pF	47000pF					
GCE21	2.0X1.25 <0805>	100					1000pF	0.10μF						
		50					1000pF	0.10μF						

## Capacitors

### Conductivity Adhesive Compatible Type

#### Temperature Compensating Type



GCG



Series	LXW (mm) <Size Code (inch)>	Rated Voltage (Vdc)	Capacitance Range (F)													
			0.1p	1p	10p	100p	1000p	10000p	0.1μ	1μ	10μ	100μ	1000μ			
GCG15	1.0X0.5 <0402>	50				120pF	470pF									
GCG18	1.6X0.8 <0603>	50			10pF				2200pF							
GCG21	2.0X1.25 <0805>	50				100pF				10000pF						

#### High Dielectric Constant Type



GCG



Series	LXW (mm) <Size Code (inch)>	Rated Voltage (Vdc)	Capacitance Range (F)														
			0.1p	1p	10p	100p	1000p	10000p	0.1μ	1μ	10μ	100μ	1000μ				
GCG15	1.0X0.5 <0402>	50				220pF	4700pF										
		25					5600pF	10000pF									
		16						15000pF	0.10μF								
GCG18	1.6X0.8 <0603>	100				1000pF	0.10μF										
		50				220pF	0.22μF										
		25				1000pF	0.47μF										
		16					68000pF	1.0μF									
GCG21	2.0X1.25 <0805>	100						10000pF									
		50						10000pF	0.47μF								
		25						10000pF	1.0μF								
GCG31	3.2X1.6 <1206>	50							0.15μF	0.33μF							
		25							0.15μF	4.7μF							
		16								0.68μF	4.7μF						
GCG32	3.2X2.5 <1210>	25								3.3μF	10μF						

### High Effective Capacitance & High Ripple Resistance



GC3



Series	LXW (mm) <Size Code (inch)>	Rated Voltage (Vdc)	Capacitance Range (F)													
			0.1p	1p	10p	100p	1000p	10000p	0.1μ	1μ	10μ	100μ	1000μ			
GC321	2.0X1.25 <0805>	250						10000pF	22000pF							
GC331	3.2X1.6 <1206>	630						10000pF	15000pF							
		450						10000pF	47000pF							
		250							33000pF	68000pF						
GC332	3.2X2.5 <1210>	630							22000pF	47000pF						
		450							68000pF	0.10μF						
		250								0.10μF	0.15μF					
GC343	4.5X3.2 <1812>	630								68000pF						
		450									0.15μF					
		250									0.22μF	0.33μF				
GC355	5.7X5.0 <2220>	630								0.10μF	0.27μF					
		450									0.22μF	0.56μF				
		250										0.47μF	1.0μF			

## Metal Terminal Type

### High Effective Capacitance



KCM



Series	LXW (mm)	Rated Voltage (Vdc)	Capacitance Range (F)											
			0.1p	1p	10p	100p	1000p	10000p	0.1μ	1μ	10μ	100μ	1000μ	
KCM55	6.1X5.3	100									4.7μF	22μF		
		63									4.7μF	22μF		
		50									4.7μF	33μF		
		35									10μF	47μF		
		25									15μF	68μF		

### High Effective Capacitance & High Ripple Resistance



KC3



Series	LXW (mm)	Rated Voltage (Vdc)	Capacitance Range (F)											
			0.1p	1p	10p	100p	1000p	10000p	0.1μ	1μ	10μ	100μ	1000μ	
KC355	6.1X5.3	630							0.10μF	0.56μF				
		450							0.22μF	1.2μF				
		250							0.47μF	2.2μF				

## Chip Monolithic Ceramic Capacitors For Medical Devices

### For Implanted Medical Devices

#### Temperature Compensating Type



GCH



Series	LXW (mm) <Size Code (inch)>	Rated Voltage (Vdc)	Capacitance Range (F)												
			0.1p	1p	10p	100p	1000p	10000p	0.1μ	1μ	10μ	100μ	1000μ		
GCH15	1.0X0.5 <0402>	50		1.0pF											
GCH18	1.6X0.8 <0603>	100		1.0pF											
		50		1.0pF											
GCH21	2.0X1.25 <0805>	100				100pF									
		50					1000pF								
GCH31	3.2X1.6 <1206>	100						2200pF							
		50							4700pF						

#### High Dielectric Constant Type



GCH



Series	LXW (mm) <Size Code (inch)>	Rated Voltage (Vdc)	Capacitance Range (F)												
			0.1p	1p	10p	100p	1000p	10000p	0.1μ	1μ	10μ	100μ	1000μ		
GCH15	1.0X0.5 <0402>	100					220pF								
		50							220pF						

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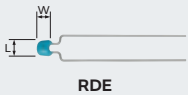
# Capacitors

Series	LXW (mm) <Size Code (inch)>	Rated Voltage (Vdc)	Capacitance Range (F)											
			0.1p	1p	10p	100p	1000p	10000p	0.1μ	1μ	10μ	100μ	1000μ	
GCH15	1.0X0.5 <0402>	25						10000pF	47000pF					
		16							47000pF	0.22μF				
		10								0.10μF				
GCH18	1.6X0.8 <0603>	100					1000pF	0.10μF						
		50					1000pF	0.22μF						
		25						47000pF	1.0μF					
		16							0.10μF	1.0μF				
		10									2.2μF			
		6.3										2.2μF		
GCH21	2.0X1.25 <0805>	100					10000pF	1.0μF						
		50						47000pF	1.0μF					
		35							1.0μF	4.7μF				
		25								0.22μF	4.7μF			
		16								1.0μF	4.7μF			
		10									2.2μF	10μF		
		6.3										10μF		
GCH31	3.2X1.6 <1206>	100						0.10μF	1.0μF					
		50							0.47μF	2.2μF				
		25								2.2μF	4.7μF			
		16									4.7μF	10μF		
		10										10μF		
GCH32	3.2X2.5 <1210>	100								2.2μF				
		50								1.0μF	4.7μF			
		25									4.7μF			
		16										10μF		
		10											22μF	
	6.3											47μF		

## Lead Type Ceramic Capacitors For General Purpose

### Radial Lead Type

#### Temperature Compensating Type



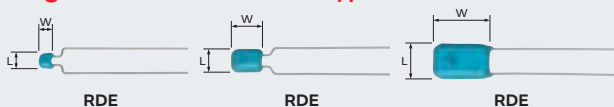
- General
- Deflecting crack
- Soldering crack
- Anti-noise

Series	LXW (mm)	Rated Voltage (Vdc)	Capacitance Range (F)											
			0.1p	1p	10p	100p	1000p	10000p	0.1μ	1μ	10μ	100μ	1000μ	
RDE5C	4.0X3.5	100		1.0pF					1500pF					
		50		1.0pF					3900pF					
	4.5X3.5	100						1800pF	3300pF					
		50							4700pF	22000pF				
	5.0X3.5	100								3300pF				
		50									22000pF			
5.5X4.0	100								3900pF	22000pF				
	50									27000pF	0.10μF			
RDE7U	4.5X3.5	250					100pF	4700pF						
		1k						10pF	1000pF					
	5.5X4.0	630							10pF	4700pF				
		250								6800pF	22000pF			
5.5X5.0	1k							1500pF	2200pF					

Continued on the following page. ↗

Series	LXW (mm)	Rated Voltage (Vdc)	Capacitance Range (F)											
			0.1p	1p	10p	100p	1000p	10000p	0.1μ	1μ	10μ	100μ	1000μ	
RDE7U	5.5X5.0	630						6800pF	10000pF					
		250						33000pF	47000pF					
	7.5X5.5	1k						3300pF	4700pF					
		630						15000pF	22000pF					
	7.5X8.0	1k						6800pF	10000pF					
		630						33000pF	47000pF					
	7.7X13.0	1k								20000pF				
		630									94000pF			

High Dielectric Constant Type



- General
- Deflecting crack
- Soldering crack
- Anti-noise

Series	LXW (mm)	Rated Voltage (Vdc)	Capacitance Range (F)											
			0.1p	1p	10p	100p	1000p	10000p	0.1μ	1μ	10μ	100μ	1000μ	
RDEC7	4.0X3.5	25								0.22μF	1.0μF			
	4.5X3.5	25									2.2μF			
	5.0X3.5	25								0.22μF	2.2μF			
	5.5X4.0	50										4.7μF		
		25										4.7μF	10μF	
	5.5X5.0	100									1.5μF	2.2μF		
		50											10μF	
		25											22μF	
	5.5X7.5	100											4.7μF	
		50											22μF	
25													47μF	
RDED7	5.5X4.0	630						10000pF	15000pF					
		450						10000pF	47000pF					
		250						33000pF	68000pF					
	5.5X5.0	630						22000pF	47000pF					
		450						68000pF	0.10μF					
		250						0.10μF	0.15μF					
	7.5X5.5	630							68000pF					
		450							0.15μF					
		250							0.22μF	0.33μF				
	7.5X7.5	450							0.22μF	0.56μF				
		250							0.47μF	1.0μF				
	7.5X8.0	630						0.10μF	0.27μF					
7.7X12.5	450								1.0μF	1.2μF				
	250									2.2μF				
7.7X13.0	630							0.47μF	0.56μF					
RDER7	4.0X3.5	100				220pF					22000pF			
		50				220pF					0.1μF			
		25									0.1μF			
	4.5X3.5	500					1000pF					10000pF		
		250					1000pF					22000pF		
		100									33000pF		0.47μF	
	5.0X3.5	50									0.15μF		0.47μF	
		100					220pF					0.47μF		
		50					220pF					0.47μF		
	5.5X4.0	25										0.1μF		
		1k					470pF					10000pF		
		630					1000pF					22000pF		
5.5X4.0	500									15000pF		47000pF		
	250									33000pF		0.10μF		

Continued on the following page. ↗

# Capacitors

Series	LxW (mm)	Rated Voltage (Vdc)	Capacitance Range (F)											
			0.1p	1p	10p	100p	1000p	10000p	0.1μ	1μ	10μ	100μ	1000μ	
RDER7	5.5X4.0	100								0.15μF	1.0μF			
		50									0.68μF	2.2μF		
	5.5X5.0	1k						15000pF	22000pF					
		630						33000pF	47000pF					
		500						68000pF	0.10μF					
		250							0.15μF	0.22μF				
	7.5X5.5	50											3.3μF	
		1k						33000pF	47000pF					
		630						68000pF	0.10μF					
		500							0.15μF	0.22μF				
	7.5X7.5	250								0.33μF	0.47μF			
		500								0.33μF	0.47μF			
	7.5X8.0	250									0.68μF	1.0μF		
		1k						68000pF	0.10μF					
7.7X12.5	630							0.15μF	0.22μF					
	500								0.68μF	1.0μF				
7.7X13.0	250											2.2μF		
	1k									0.22μF				
	630											0.47μF		

## Disc Type (Safety Standard Certified Type)



DE2/DE1/DEJ

### Type KY (Basic Insulation Type) - IEC60384-14 X1/Y2 Class

General Safety standard

Series	D (mm)	Rated Voltage (V)	Capacitance Range (F)											
			0.1p	1p	10p	100p	1000p	10000p	0.1μ	1μ	10μ	100μ	1000μ	
DE21X	8.0	AC250 (r.m.s.)			10pF	68pF								
DE2B3	7.0 to 8.0	AC300 (r.m.s.)				100pF	680pF							
	7.0 to 8.0	AC250 (r.m.s.)				100pF	680pF							
DE2E3	7.0 to 10.0	AC300 (r.m.s.)					1000pF	4700pF						
	7.0 to 10.0	AC250 (r.m.s.)					1000pF	4700pF						
DE2F3	14.0	AC300 (r.m.s.)								10000pF				
	14.0	AC250 (r.m.s.)								10000pF				

### Type KX (Reinforced Insulation Type) - IEC60384-14 X1/Y1 Class

General Safety standard

Series	D (mm)	Rated Voltage (V)	Capacitance Range (F)											
			0.1p	1p	10p	100p	1000p	10000p	0.1μ	1μ	10μ	100μ	1000μ	
DE11X	9.0	AC250 (r.m.s.)			10pF	68pF								
DE1B3	7.0 to 8.0	AC300 (r.m.s.)				100pF	680pF							
	7.0 to 8.0	AC250 (r.m.s.)				100pF	680pF							
DE1E3	7.0 to 12.0	AC300 (r.m.s.)					1000pF	4700pF						
	7.0 to 12.0	AC250 (r.m.s.)					1000pF	4700pF						

Continued on the following page. ↗

**The Electrical Appliance and Material Safety Law of Japan**

General Safety standard

Series	D (mm)	Rated Voltage (V)	Capacitance Range (F)											
			0.1p	1p	10p	100p	1000p	10000p	0.1μ	1μ	10μ	100μ	1000μ	
DEJE3	7.0 to 11.0	AC250 (r.m.s.)					1000pF	4700pF						
DEJF3	8.0 to 11.0	AC250 (r.m.s.)					4700pF	10000pF						

**Disc Type (Ultra-high-voltage)**



DHR

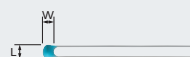
General Deflecting crack Soldering crack Ultrahigh-voltage

Series	D (mm)	Rated Voltage (Vdc)	Capacitance Range (F)											
			0.1p	1p	10p	100p	1000p	10000p	0.1μ	1μ	10μ	100μ	1000μ	
DHR4E	8.0 to 18.0	15k				100pF	1000pF							
	8.0 to 16.0	12k				100pF	1000pF							
	8.0 to 15.0	10k				100pF	1000pF							
DHRB3	8.0 to 18.0	15k				100pF	1000pF							
	8.0 to 16.0	12k				100pF	1000pF							
	8.0 to 15.0	10k				100pF	1000pF							

**Lead Type Ceramic Capacitors For Automotive**

**Powertrain/Safety (AEC-Q200)**

**Temperature Compensating Type**



RCE

Powertrain AEC-Q200 Deflecting crack Soldering crack Anti-noise

Series	LXW (mm)	Rated Voltage (Vdc)	Capacitance Range (F)											
			0.1p	1p	10p	100p	1000p	10000p	0.1μ	1μ	10μ	100μ	1000μ	
RCE5C	3.6X3.5	100		1.0pF				1500pF						
		50		1.0pF				3900pF						
	4.0X3.5	100					1800pF	3300pF						
		50					4700pF	22000pF						
	5.5X4.0	100					3900pF	10000pF						
		50							27000pF	0.10μF				
RCE7U	4.0X3.5	250				100pF	4700pF							
		1k			10pF	1000pF								
	5.5X4.0	630			10pF	4700pF								
		250					6800pF	10000pF						
	5.5X5.0	1k					1500pF	2200pF						
		630					6800pF	10000pF						
	7.5X5.5	1k					3300pF	4700pF						
		630					15000pF	22000pF						
	7.5X8.0	1k					6800pF	10000pF						
		630					33000pF	47000pF						
	7.7X13.0	1k							20000pF					
		630								94000pF				

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# Capacitors

## High Dielectric Constant Type



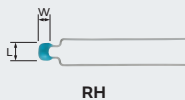
RCE

Power-train
AEC-Q200
Deflecting crack
Soldering crack
Anti-noise

Series	LXW (mm)	Rated Voltage (Vdc)	Capacitance Range (F)												
			0.1p	1p	10p	100p	1000p	10000p	0.1μ	1μ	10μ	100μ	1000μ		
RCEC7	5.5X5.0	100									1.5μF	2.2μF			
	5.5X7.5	100										4.7μF			
RCER7	3.6X3.5	100				220pF				22000pF					
		50				220pF				0.10μF					
		25								0.10μF	0.22μF				
	4.0X3.5	250				1000pF				22000pF					
		100								33000pF	0.33μF				
		50								0.15μF	0.47μF				
	5.5X4.0	25								0.33μF	1.0μF				
		1k				1000pF				10000pF					
		630				1000pF				22000pF					
	5.5X5.0	250								33000pF	0.10μF				
		100								0.15μF	1.0μF				
		50									0.68μF	2.2μF			
		25									1.5μF	4.7μF			
		1k						15000pF	22000pF						
	5.5X7.5	630						33000pF	47000pF						
		250								0.15μF	0.22μF				
		50									3.3μF	4.7μF			
	7.5X5.5	25										10μF			
		25										22μF			
		1k						33000pF	47000pF						
7.5X7.5	630						68000pF	0.10μF							
	250								0.33μF	0.47μF					
	250								0.68μF	1.0μF					
7.5X8.0	1k						68000pF	0.10μF							
	630								0.15μF	0.22μF					
7.5X12.5	250									2.2μF					
7.7X13.0	1k									0.22μF					
	630									0.47μF					

## Powertrain/Safety (AEC-Q200) 150°C Max.

### Temperature Compensating Type



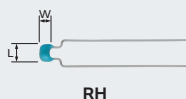
RH

Power-train
AEC-Q200
Deflecting crack
Soldering crack
Anti-noise

Series	LXW (mm)	Rated Voltage (Vdc)	Capacitance Range (F)												
			0.1p	1p	10p	100p	1000p	10000p	0.1μ	1μ	10μ	100μ	1000μ		
RHE5G	3.6X3.5	100				100pF				1500pF					
		50				100pF				3900pF					
	4.0X3.5	100							1800pF	3300pF					
		50							4700pF	10000pF					

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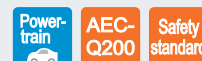
### High Dielectric Constant Type



Series	LXW (mm)	Rated Voltage (Vdc)	Capacitance Range (F)												
			0.1p	1p	10p	100p	1000p	10000p	0.1μ	1μ	10μ	100μ	1000μ		
RHEL8	3.6X3.5	100				220pF			22000pF						
		50				220pF				0.10μF					
		25							0.10μF	0.22μF					
	4.0X3.5	100						33000pF	0.10μF						
		50							0.15μF	0.33μF					
		25								0.33μF	1.0μF				
	5.5X4.0	100							0.15μF	0.22μF					
		50								0.47μF	2.2μF				
		25								1.5μF	4.7μF				
5.5X5.0	50								3.3μF	4.7μF					
	25										10μF				
5.5X7.5	50										10μF				
	25											22μF			

### Safety Standard Certified for Automotive

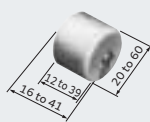
#### Type KJ -IEC60384-14 X1/Y2 Class



Series	D (mm)	Rated Voltage (V)	Capacitance Range (F)												
			0.1p	1p	10p	100p	1000p	10000p	0.1μ	1μ	10μ	100μ	1000μ		
DE6B3	8.0 to 9.0	AC300 (r.m.s.)				100pF		680pF							
DE6E3	7.0 to 12.0	AC300 (r.m.s.)					1000pF		4700pF						

## High Voltage Ceramic Capacitors

### Ultra-high-voltage



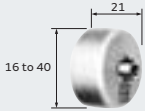
(in mm)



Series	LXW (mm)	Rated Voltage (Vdc)	Capacitance Range (F)												
			0.1p	1p	10p	100p	1000p	10000p	0.1μ	1μ	10μ	100μ	1000μ		
DHS4E	-	40k				140pF		2000pF							
		30k				190pF		2700pF							
		20k				280pF		4000pF							
		15k				370pF		5300pF							
		10k				560pF		8000pF							
DHSF4	-	40k				340pF		2700pF							
		30k				460pF		3600pF							
		20k				600pF		4800pF							

## Capacitors

### High Voltage AC Rated Type



DHK

(in mm)

General

Ultrahigh-voltage

Series	LXW (mm)	Rated Voltage (V)	Capacitance Range (F)												
			0.1p	1p	10p	100p	1000p	10000p	0.1μ	1μ	10μ	100μ	1000μ		
DHK3V	-	AC10k (r.m.s.)				100pF	1000pF								

## Polymer Aluminum Electrolytic Capacitors



ECAS

General

Large Cap

Effective Cap

Series	LXW (mm)	Rated Voltage (Vdc)	Capacitance Range (F)											
			0.1p	1p	10p	100p	1000p	10000p	0.1μ	1μ	10μ	100μ	1000μ	
ECASD	7.3X4.3	16									6.8μF	47μF		
		12.5									10μF	100μF		
		10									10μF	150μF		
		6.3									10μF	330μF		
		4										68μF	330μF	
		2										100μF	560μF	

# Trimmer Capacitors

Trimmer Capacitors are variable capacitance capacitors, used for adjusting characteristics of electronic equipment.

Mounting Method	Soldering Method	Series	Max. Height	Size (WXL)	Rated Voltage	Operating Temperature Range	Remarks
Surface Mounting	Reflow Soldering Methods	 <b>TZR1</b>	0.9mm max.	1.5X1.7mm	25V	-25 to 85°C	
		 <b>TZY2</b>	1.25mm max.	2.5X3.2mm	25V	-25 to 85°C	
		 <b>TZC3</b>	1.7mm max.	3.2X4.5mm	100V	-25 to 85°C	
		 <b>TZW4</b>	2.6mm max.	4.2X5.2mm	250V	-55 to 125°C	for High Frequency Power
		 <b>TZB4_AA</b>	3.2mm max.	4.0X4.5mm	100V/50V	-25 to 85°C	
		 <b>TZB4_BA</b>	3.2mm max.	4.0X4.5mm	100V/50V	-25 to 85°C	
	Flow Soldering Methods	 <b>TZB4_AB</b>	3.2mm max.	4.0X4.5mm	100V/50V	-25 to 85°C	with Cover Film
		 <b>TZB4_BB</b>	3.2mm max.	4.0X4.5mm	100V/50V	-25 to 85°C	with Cover Film

Please refer to p. 72 for Supercapacitors (EDLC).

## Detailed Catalogs

For more details, please refer to our printed catalogs and the PDF catalogs on our website.



- Chip Monolithic Ceramic Capacitors Cat. No. C02E
- Chip Monolithic Ceramic Capacitors for Automotive Cat. No. C03E
- Safety Standard Certified Ceramic Capacitors/  
High Voltage Ceramic Capacitors Cat. No. C85E
- Ceramic Trimmer Capacitors Cat. No. T13E
- Polymer Aluminum Electrolytic Capacitors Cat. No. C90E
- Radial Lead Type Monolithic Ceramic Capacitors Cat. No. C49E
- High Performance  
Supercapacitors (EDLC) DMF Series Cat. No. O83E
- High Performance  
Supercapacitors (EDLC) DMT Series Cat. No. O84E

# Noise Suppression Products/ EMI Suppression Filters

Broad lineup of Noise Suppression Products and EMI Suppression Filters

## Summary

Using Murata's ceramic processing technology and unique material, we offer a variety of Noise Suppression Products and EMI Suppression Filters.

## Lineup

- EMI (chip and lead type)
- Noise Suppression Products for Automotive
- ESD Protection Devices ● AC Line Filters ● Ferrite Cores



## Noise Suppression Filters (Chip Ferrite Bead)

	Series	Size Code inch (mm)	Max. Rated Current (mA)	Impedance (Ω) at 100MHz						Effective Frequency Range (Hz) (For Reference Only)											
				10		100		1000		10k	100k	1M	10M	100M	1G	10G					
For General Band Noise	Universal Type [ Power Lines / Signal Lines ]	BLM02AX	01005 (0402)	750	10		70	120	240												
		BLM03AX	0201 (0603)	1000	10		80	120	240	600	1000										
		BLM15AX	0402 (1005)	1740	10	30	70	120	220	600	1000										
	For General Signal Lines	BLM03AG	0201 (0603)	-	10		80	70	120	240	600	1000									
		BLM15AG	0402 (1005)	-	10		70	120	220	600	1000										
		BLM18AG	0603 (1608)	-			220	120	150	330	470	600	1000								
		BLM21AG	0805 (2012)	-			220	120	150	330	470	700	900	600	800	1000					
		BLM18TG	0603 (1608)	-			120	220			600	1000									
		BLA2AA (4 circuits array)	0804 (2010)	-			120	220			600	1000									
		BLA31AG (4 circuits array)	1206 (3216)	-	30	60	120	220			600	1000									
		Signal Lines Type	For High Speed Signal Lines	BLM02BX*	01005 (0402)	-			120	150	240										
				BLM03BX	0201 (0603)	-						1800	1000								
				BLM03B	0201 (0603)	-	10	22	33	47	56	75	80	120	240	600	470				
	BLM15B			0402 (1005)	-	5	10	22	33	47	75	120	240	220	470	600	1800	1000			
	BLM18B		0603 (1608)	-	5	10	22	33	47	60	75	140	200	250	330	600	1500	2200	1000	1800	2500
	BLM21B		0805 (2012)	-	5			75	60	120	150	220	300	350	420	470	700	1000	1500	2200	2700
	BLA2AB (4 circuits array)		0804 (2010)	-	10	22	33	47	75	120	220				600	470	1000				
	BLA31BD (4 circuits array)		1206 (3216)	-						120	220				600	470	1000				
	For Digital Interface Lines	BLM18RK	0603 (1608)	-							600	470	1000								
		BLM21RK	0805 (2012)	-							600	470	1000								

\* The derating of rated current is required for some items according to the operating temperature.  
For automotive grade products, please refer to the catalog C51E, "EMI Suppression Filters (for DC)/Chip Inductors for Automotive."

Continued on the following page. ↗

## Noise Suppression Products/EMI Suppression Filters

	Series	Size Code inch (mm)	Max. Rated Current (mA)	Impedance (Ω) at 100MHz			Effective Frequency Range (Hz) (For Reference Only)													
				10	100	1000	10k	100k	1M	10M	100M	1G	10G							
For General Band Noise	Power Lines Type	BLM02PX*	01005 (0402)	1100	10(1.1A)22(0.75A) 60(0.5A) 33(0.55A)															
		BLM03PX*	0201 (0603)	1800	33(1.5A) 22(1.8A) 80(1A)															
		BLM03PG	0201 (0603)	900	33(0.75A) 22(0.9A)															
		BLM15P*	0402 (1005)	3000	33(3A) 80(1.5A/2.3A) 180(1.5A) 220(1.4A) 470(1A) 10(1A) 30(2.2A) 60(1.7A/2.5A) 120(1.3A/2A) 330(1.2A) 600(0.9A)															
		BLM18PG*	0603 (1608)	3000	33(3A) 120(2A) 220(1.4A) 470(1A) 30(1A) 60(0.5A) 180(1.5A) 330(1.2A)															
		BLM21PG*	0805 (2012)	6000	30(4A) 220(2A) 22(6A) 60(3.5A) 120(3A) 330(1.5A)															
		BLM31PG*	1206 (3216)	6000	50(3.5A) 390(2A) 33(6A) 120(3.5A) 600(1.5A)															
		BLM41PG*	1806 (4516)	6000	75(3.5A) 470(2A) 60(6A) 180(3.5A) 1000(1.5A)															
		BLM18SN* (Low DC Resistance Type)	0603 (1608)	8000	22(8A)															
		BLM18KG* (Low DC Resistance Type)	0603 (1608)	6000	30(5A) 70(3.5A) 220(2.2A) 470(1.5A) 26(6A) 100(3A) 120(3A) 330(1.7A) 600(1.3A)															
		BLM18SG* (Low DC Resistance Type)	0603 (1608)	6000	70(4A) 220(2.5A) 26(6A) 120(3A) 330(1.5A)															
		BLE32PN	1220 (3225)	10000	30(10A)															
		For GHz Band Noise	Universal Type [ Power Lines / Signal Lines ]	BLM03EB*	0201 (0603)	600	25(0.6A) 50(0.4A)													
BLM15EG*	0402 (1005)			1500	220(0.7A) 120(1.5A)															
BLM15EX*	0402 (1005)			1800	220(1.3A) 120(1.8A) 330(1.1A) 470(0.95A)															
BLM18EG*	0603 (1608)			2000	120(2A) 330(0.5A) 470(0.5A) 100(2A) 220(2A/1A) 390(0.5A) 600(0.5A)															
BLM18HE*	0603 (1608)			800	1000(0.6A) 600(0.8A) 1500(0.5A)															
Signal Lines Type	BLM03HG		0201 (0603)	-																
	BLM03HD		0201 (0603)	-																
	BLM03HB		0201 (0603)	-																
	BLM15HG		0402 (1005)	-																
	BLM15HD		0402 (1005)	-																
	BLM15HB		0402 (1005)	-																
	BLM18HG		0603 (1608)	-																
	BLM18HD		0603 (1608)	-																
	BLM18HB		0603 (1608)	-																
	BLM18HK		0603 (1608)	-																
	For High-GHz Band Noise		Signal Lines Type	BLM15GG	0402 (1005)	-														
				BLM15GA	0402 (1005)	-														
				BLM18GG	0603 (1608)	-														

## Noise Suppression Filters (Chip 3 Terminal Capacitor)

	Series	Size Code inch (mm)	Max. Rated Current (mA)	Capacitance (F)						Effective Frequency Range (Hz) (For Reference Only)							
				10p	100p	1000p	10000p	0.1μ	1μ	10μ	10k	100k	1M	10M	100M	1G	10G
Signal Lines Type	NFM15CC	0402 (1005)	-														
	NFM18CC	0603 (1608)	-														

\* The derating of rated current is required for some items according to the operating temperature.

For automotive grade products, please refer to the catalog C51E, "EMI Suppression Filters (for DC)/Chip Inductors for Automotive."

Continued on the following page. ↗

## Noise Suppression Products/EMI Suppression Filters

	Series	Size Code inch (mm)	Max. Rated Current (mA)	Capacitance (F)							Effective Frequency Range (Hz) (For Reference Only)									
				10p	100p	1000p	10000p	0.1μ	1μ	10μ	10k	100k	1M	10M	100M	1G	10G			
Signal Lines Type	<b>NFM21CC</b>	0805 (2012)	-			470	2200													
	<b>NFM3DCC</b>	1205 (3212)	-	22	47	100	220	1000	22000											
	<b>NFM41CC</b>	1806 (4516)	-			470	2200													
	<b>NFA31CC</b> (4 circuits array)	1206 (3216)	-	22	47	100	220	1000	22000											
Power Lines Type	<b>NFM15PC</b>	0402 (1005)	2000						47000	0.22	1.0	7.5								
	<b>NFM18PS</b>	0603 (1608)	2000							0.1	0.47	4.3	9.1							
	<b>NFM18PC</b>	0603 (1608)	4000								1.0	0.47								
	<b>NFM21PS</b>	0805 (2012)	4000									0.22	1.0							
	<b>NFM21PC</b>	0805 (2012)	6000									0.1	0.47	2.2						
	<b>NFM3DPC*</b>	1205 (3212)	2000					22000												
	<b>NFM31PC</b>	1206 (3216)	6000																	27
	<b>NFM31KC*</b>	1206 (3216)	10000					10000	22000											
								15000	0.1											
Universal Type [ Power Lines / Signal Lines ]	<b>NFE31PT</b>	1206 (3216)	6000			470	2200													
	<b>NFE61PT</b>	2706 (6816)	2000	22	47	100	220	1500												
									100	360	1000									
									33	68	180	680	4700							

## Noise Suppression Filters (Chip LC/RC Filter)

	Series	Size Code inch (mm)	Max. Rated Current (mA)	Cut-off Frequency (MHz)						Effective Frequency Range (Hz) (For Reference Only)										
				10			100		500	10k	100k	1M	10M	100M	1G	10G				
Signal Lines Type	<b>NFL15ST</b>	0402 (1005)	-						150	200	300	500								
	<b>NFL18ST</b>	0603 (1608)	-				50	70	100	200	300	500								
	<b>NFL18SP</b>	0603 (1608)	-							150	200	300	500							
	<b>NFL21SP</b>	0805 (2012)	-										500							
	<b>NFA18SL</b> (4 circuits array)	0603 (1608)	-	10	20		50	70	100	150	200	300	400							
	<b>NFA18SD</b> (4 circuits array)	0603 (1608)	-										200	400						
	<b>NFA21SL</b> (4 circuits array)	0603 (1608)	-				50			130	180	220	300	350	480					
	<b>NFA21SD</b> (4 circuits array)	0603 (1608)	-										200	180						
	<b>NFW31SP</b>	1206 (3216)	-											280	310					
														200	300	330				
														400						
	<b>NFR21GD</b>	0805 (2012)	-	10	20		50	100	150	200	300	500								
	<b>NFA31GD</b> (4 circuits array)	1206 (3216)	-																	

## Noise Suppression Filters (Chip EMIFIL<sup>®</sup>)

	Series	Size Code inch (mm)	Max. Rated Current (mA)	Impedance (Ω) at 1MHz				Effective Frequency Range (Hz) (For Reference Only)												
				1	10	100	1000	10k	100k	1M	10M	100M	1G	10G						
Signal Lines Type	<b>NFZ5BBW_LN10</b>	2020(5050)	-					2.9	6.7	10	14	22	45	61	140					
								4.5	7.6	17	31	52	97							
Universal Type [ Power Lines / Signal Lines ]	<b>NFZ2HBM_10</b>	1008 (2520)	1200					2.9	6.1	11	24	60								
								1.5	4.4	8.4	17	33								
	<b>NFZ32BW_10*</b>	1210 (3225)	2550					7.4	15	32	70	150	290	620						
								3.6	9.0	21	42	110	220	450	880					
	<b>NFZ32BW_11*</b>	1210 (3225)	2900					6.8	9.8	19	31	65	150							
								3.3	8.4	12	21	52	100							

\* The derating of rated current is required for some items according to the operating temperature.  
For automotive grade products, please refer to the catalog C51E, "EMI Suppression Filters (for DC)/Chip Inductors for Automotive."

## Noise Suppression Products/EMI Suppression Filters

	Series	Size Code inch (mm)	Max. Rated Current (mA)	Impedance (Ω) at 100MHz			Effective Frequency Range (Hz) (For Reference Only)											
				100			1000	10k	100k	1M	10M	100M	1G	10G				
Signal Lines Type	NFZ32SW_10	1210 (3225)	-		300		900											
Universal Type [ Power Lines / Signal Lines ]	NFZ18SM_10	0603 (1608)	1250		120													
	NFZ2MSM_10	0806 (2016)	4000		100	180	300	600										

	Series	Size Code inch (mm)	Max. Rated Current (mA)	Impedance (Ω) at 900MHz			Impedance (Ω) at 1.7GHz			Effective Frequency Range (Hz) (For Reference Only)								
				100			5000	100			5000	10k	100k	1M	10M	100M	1G	10G
Signal Lines Type	NFZ15SQ_10	0402 (1005)	-		1500	4600		1200	1800									
	NFZ15SQ_11	0402 (1005)	-	150	770	2600		900	1450									





## Noise Suppression Filters (Chip Common Mode Choke Coil)

	Series	Size Code inch (mm)	Max. Rated Current (mA)	Common Mode Impedance (Ω) at 10MHz			Effective Frequency Range (Hz) (For Reference Only)												
				100			500	1000	100k	1M	10M	100M	1G	10G					
Signal Lines Type	For Audio Lines	DLM11G	0504 (1210)	-			600												
	For Ultra-High-Speed Signal Lines	DLMOQSN	025020(0605)	-		90													
		DLMONSN	03025 (0806)	-		90													
		DLM11S	0504 (1210)	-		45	90												
		DLPOQSA	025020(0605)	-	15	7	35												
		DLPONSC	03025 (0806)	-		28	90												
		DLPONSN	03025 (0806)	-		35	90												
		DLPONSA	03025 (0806)	-		15	7												
		DLP11SN	0504 (1210)	-		67	90	120	160	240	200	280	330						
		DLP11SA	0504 (1210)	-		35	90												
		DLP11RN	0504 (1210)	-		45													
		DLP11RB	0504 (1210)	-		15	40												
		DLP11TB	0504 (1210)	-		80													
		DLP31S	1206 (3216)	-		120	220	550											
		DLP1NDN (2 circuits array)	05025 (1506)	-		35	90												
		DLP2ADA (2 circuits array)	0804 (2010)	-		35	90												
		DLP2ADN (2 circuits array)	0804 (2010)	-		90	120	160	200	240	280								
		DLP31DN (2 circuits array)	1206 (3216)	-		90	130	200	320	440									
		DLW21S	0805 (2012)	-		90	67	120	180	260	370	490	500	920					
		DLW21H	0805 (2012)	-		90	67	120	180										
DLW31SN	1206 (3216)	-		90	160	260	600	1000	2200										
DLW43SH	1812 (4532)	-																	
Universal Type [ Power Lines / Signal Lines ]	DLW44S*	1515 (4040)	3100		100			250	400	850	2200	1700	2400						
	DLW5AH/DLW5BS*	2014 / 2020 (5036) / (5050)	5000				190	350	500	800	1500	4000	3000						
	DLW5AT*/DLW5BT*	2014 / 2020 (5036) / (5050)	6000		50	110	100	150	230	330	500	1000	1400	850	1100	2700			



























\* The derating of rated current is required for some items according to the operating temperature.  
For automotive grade products, please refer to the catalog C51E, "EMI Suppression Filters (for DC)/Chip Inductors for Automotive."

Continued on the following page. ↗

## Noise Suppression Products/EMI Suppression Filters

	Series	Size Code inch (mm)	Max. Rated Current (mA)	Common Mode Impedance ( $\Omega$ ) at 10MHz			Effective Frequency Range (Hz) (For Reference Only)						
				100	500	1000	100k	1M	10M	100M	1G	10G	
Large Current Type for Automotive Available	 <b>PLT5BP*</b>	2020(5050)	-	100	200	300	500						
	 <b>PLT10H*</b>	-	-	45	100	400	900	1000					

## Noise Suppression Filters (Block Type)

	Series	Height (mm)	Rated Voltage (Vdc)	Rated Current (A)	Effective Frequency Range (Hz) (For Reference Only)						
					10k	100k	1M	10M	100M	1G	10G
Power Lines Type	SMD Type	 <b>BNX022*</b>	3.1	50	10						
		 <b>BNX023*</b>	3.1	100	15						
		 <b>BNX024*</b>	3.5	50	15						
		 <b>BNX025*</b>	3.5	25	15						
		 <b>BNX026*</b>	3.5	50	15						
		 <b>BNX027*</b>	3.5	16	15						
		 <b>BNX028*</b>	3.5	16	15						
		 <b>BNX029*</b>	3.5	6.3	15						
	Lead Type	 <b>BNX002</b>	13 max.	50	10						
		 <b>BNX003</b>	13 max.	150	10						
		 <b>BNX005</b>	13.5 max.	50	15						
		 <b>BNX012*</b>	8.5 max.	50	15						
		 <b>BNX016*</b>	8.5 max.	25	15						

\* The derating of rated current is required for some items according to the operating temperature.

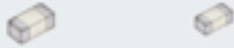
For automotive grade products, please refer to the catalog C51E, "EMI Suppression Filters (for DC)/Chip Inductors for Automotive."

# ESD Protection Devices

Support ESD protection for various kinds of electronic devices.

## Ceramic ESD Protection Devices LXES\_A Series

Applying Murata's original ceramic technology for excellent ESD suppression performance and ultra-small capacitance value.



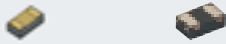
## Silicon ESD Protection Devices LXES\_B Series

Applying accumulated design technology for excellent ESD suppression performance.



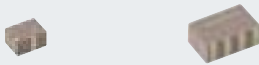
## Silicon ESD Protection Devices LXES\_T Series

Applying accumulated design technology for excellent ESD suppression performance.


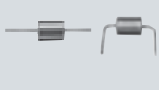


























## ESD Protection Devices with Common Mode Choke Coil LXES\_D Series

Applying Murata's original ceramic technology for excellent ESD suppression performance, small capacitance value, and common mode filter performance.



# Noise Suppression Filters (Lead Type), Others

	Series										Effective Frequency Range (Hz) (For Reference Only)						
											10k	100k	1M	10M	100M	1G	10G
Lead Type EMIFIL®	 BLL18AG	 BL01	 BL02	 BL03	 DSS1	 DSN6	 DSN9(H)	 DSS6	 DST9(H)								
EMIGUARD®	 VFC2H	 VFR3V	 VFS6V	 VFS9V													
AC Line Filters	Common Mode Choke Coil	 PLA10AN	 PLA10AH	 PLH10AN													
	Hybrid Common Mode Choke Coil	 PLY10AN	 PLY10AH	 PLY17BN													
Common Mode Choke Coils	 PLT09H																
Microwave Absorbers	 EA10	 EA20/21/30															
Ferrite Core	 FSRH	 FSRB	 FSRC	 FSSA													

### Detailed Catalogs

For more details, please refer to our printed catalogs and the PDF catalogs on our website.



- SMD/BLOCK Type EMI Suppression Filters EMIFIL® Cat. No. C31E
- EMI Suppression Filters (for DC)/Chip Inductors for Automotive Cat. No. C51E
- EMI Suppression Filters (Lead Type EMIFIL®) Cat. No. C30E
- EMI Suppression Filters (EMIFIL®) for AC Power Lines Cat. No. C09E
- Noise Suppression by EMIFIL® Digital Equipment Application Manual Cat. No. C33E
- Noise Suppression by EMIFIL® Application Guide Application Manual Cat. No. C35E
- Application Manual for Power Supply Noise Suppression and Decoupling for Digital ICs Cat. No. C39E
- Ferrite Core for EMI Suppression Microwave Absorber Cat. No. O63E

# Inductors (Coils)

Broad lineup of Chip Inductors and Power Inductors

## Summary

Murata's chip inductors are optimally designed, making full use of multiple construction techniques, such as the multilayer construction technique, film construction technique, and the wire wound construction technique according to the application, and realized small size and high-performance inductors. We offer an extensive lineup of inductors for power supplies to high frequency.

## Lineup

- RF Inductors
- RF Inductors/For Power Lines
- For Power Lines/General Circuit Inductors



<http://psearch.en.murata.com/inductor/partnumber/>

## WEB Product Search Engine

### 1 Search by part number

The applicable inductors can be searched by alphanumeric characters.



### 2 Search by specifications

Inductors can be searched by various specifications, such as the Inductance, DC Resistance, and Rated Current.



### 3 Search in the lineups

Inductors applicable to the conditions can be searched from the lineup of each series.



### 4 Search by competitor's part number (Cross reference)

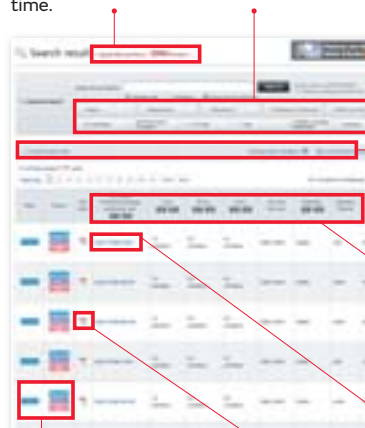
The Murata part number applicable to the assumed specification can be searched by the competitor's part number for the Inductors.



## Search result

The number of cases applicable to the current search conditions is always displayed in real time.

Click each search condition button to display the menu. The search results will change in real time with the selected conditions.



Clicking the "Current search conditions" opens a menu, and the filtered conditions can be checked.

The results can be sorted by clicking the ▲ button of the search results items.

Clicking the product name opens the details page, and more detailed information can be acquired.

The icons clearly indicate the status and the features of the product.

A simple specification sheet can be downloaded without opening the details page.

# RF Inductors

## Film Type LQP Series

The film inductors in the LQP series have a different set of features, since micromachining of the coil patterns is enabled by forming the electrodes using a photolithography technique. The inductors can have smaller sizes and high Q characteristics, while at the same time the series offers a lineup of inductors with inductance values that both deviate minimally and are finely graded. The lineup consists of a wide range of inductors in the 0201/0603 size, which is becoming the mainstream, and in the 01005/0402 size, which is the smallest in the industry, both sizes support the trend toward miniaturized sizes. These inductors are used in the matching and resonance circuits of RF units that require miniaturized sizes, minimal tolerance in inductance, and finely graded inductance levels. They are also used in choke circuits that demand miniaturized sizes and low Rdc.



### Features

- Ultra-miniature size
- High Q value and small size

The feature of the film type is also the Q factor, which is higher than the monolithic method that is adopted by other companies in the same industry. Murata offers the film type in the small 0201/0603 size and the 01005/0402 size. (Figure 1)

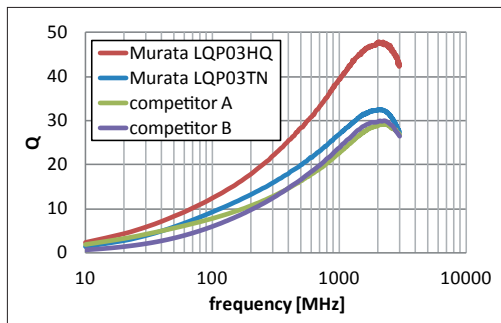


Figure 1: Comparison of Q Characteristics between 0603 Size, LQP03 Series and Monolithic Products of Other Companies (both 10 nH)

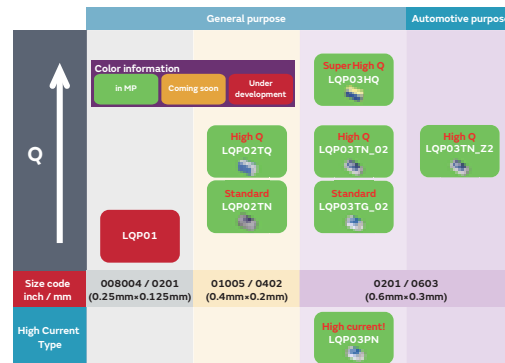


Figure 2: Lineup of Small Products

- Minimal tolerance in inductance, finely graded inductance levels

The tolerance between the monolithic structure and the film structure products of high frequency coils and L value lineup are shown in the following table. Compared with the monolithic type, the position accuracy of the film type is more accurate when forming the coil. Therefore, there is less variation in the L value, which allows for less tolerance and tighter steps.

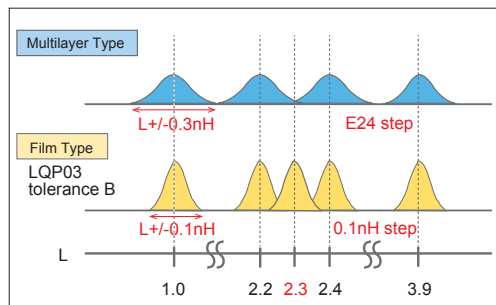


Figure 3: Step and Tolerance of Inductance

### Uses and Applications

- Matching circuits of power amplifiers, RF matching circuits that require small sizes, minimal tolerance in inductance and high Q

Continued on the following page. ↗

**General**

Series	Size Code inch (mm)	Applications	Inductance (H)										Rated Current Range	
			0.1n	1n	10n	100n	1μ	10μ	100μ	1m	10m			
LQP	01005 (0402)	General	0.2nH		39nH									90mA to 990mA
	0201 (0603)	General	0.1nH		270nH									50mA to 1.4A
	0402 (1005)	General	1nH		33nH									60mA to 400mA
	0603 (1608)	General	1.3nH		100nH									50mA to 300mA

**Automotive**

Series	Size Code inch (mm)	Applications	Inductance (H)										Rated Current Range	
			0.1n	1n	10n	100n	1μ	10μ	100μ	1m	10m			
LQP	0201 (0603)	Infotainment	0.6nH		120nH									80mA to 850mA

**Multilayer Type LQG Series**

The multilayer structure of the LQG series enables a smaller shape and lower cost than a wound structure.

While the Q factor is lower than that of the wire wound structure, the multilayer structure provides good overall balance between the L value tolerance, rated current, size, price, and other characteristics, enabling use in a wide range of applications.

The multilayer structure is suitable for various applications such as RF circuit matching, choke, and resonance for mobile communication equipment.

Based on the long market results, this product realizes high reliability to meet automotive market demands.



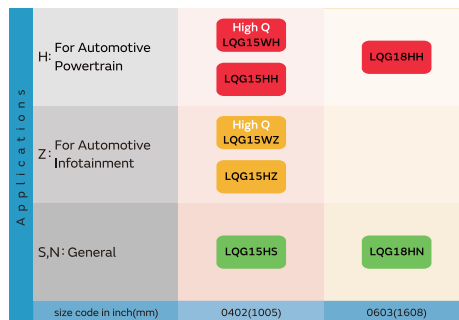
**Features**

- Lineup with a wide range of inductance values
- Higher reliability

**Uses and Applications**

- Matching circuits of RF units, choke circuits

**Selection Tool**



LQG series selection chart

**General**

Series	Size Code inch (mm)	Applications	Inductance (H)										Rated Current Range	
			0.1n	1n	10n	100n	1μ	10μ	100μ	1m	10m			
LQG	0402 (1005)	General	1nH		270nH									110mA to 1A
	0603 (1608)	General	1.2nH		100nH									350mA to 1.1A

**Automotive**

Series	Size Code inch (mm)	Applications	Inductance (H)										Rated Current Range	
			0.1n	1n	10n	100n	1μ	10μ	100μ	1m	10m			
LQG	0402 (1005)	Infotainment	1nH		270nH									110mA to 1.2A
		PowerTrain	1nH		270nH									110mA to 1.2A
	0603 (1608)	PowerTrain	1.2nH		270nH									200mA to 1.1A

# RF Inductors/For Power Lines

## Wire Wound Type LQW Series

The wire wound inductors in the LQW series feature a high Q value. Inductors with high Q values are used in the matching circuits of RF units because their high Q values give them excellent attenuation characteristics inside the pass band of the filters. They are also frequently used in the matching applications of antennas for maintaining the transmission and reception sensitivity of the antennas. Furthermore, since they have low Rdc characteristics, they are also employed in choke circuits in which high current levels flow.



### Features

- Two types of structure are available for various applications (Figure 1)
- Extremely high Q (Quality factor) value

The frequency characteristics of the Q are shown in the graph by structure (wire wound, monolithic) of high frequency coil 1005 size. As shown in Figure 2, the feature of the wire wound type is the very high Q factor compared with the monolithic type.

- Large currents can be supported



	Wound inductor for high frequency	Wound inductor for power lines / general circuits
Structure	 Non-magnetic core	 Magnetic core
Features	Owing to its thick coil wire rather than film type or multilayer type inductors, it gains very high Q values.	The process of winding on a magnetic core enables the gain inductance and impedance efficiently. According to this advantage, this product can be used as a high current, high performance noise filter.
Application	<ul style="list-style-type: none"> <li>RF matching circuits or antenna matching circuits, which require high Q characteristics.</li> </ul>	<ul style="list-style-type: none"> <li>Noise suppression in power lines</li> <li>Radiation noise suppression in audio lines</li> <li>NFC circuits</li> </ul>

Figure 1: Features of Each Wound Inductor

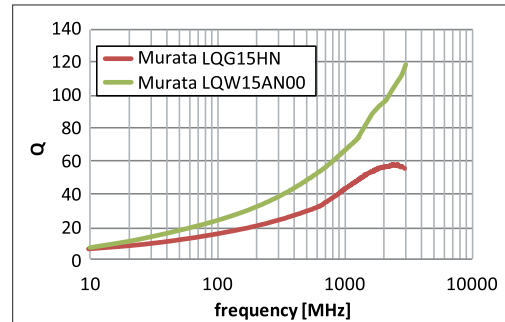
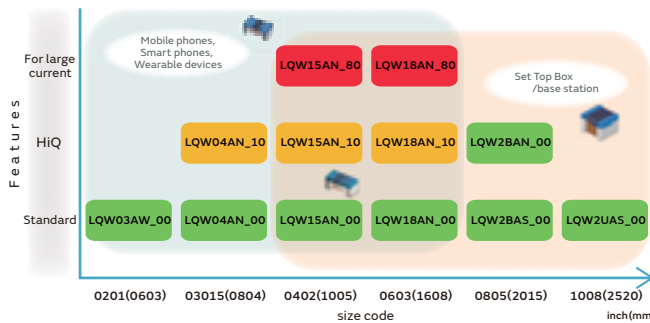


Figure 2: Comparison of Q Characteristics between Monolithic LQG15 Series and Wire Wound LQW15 Series (both 2.7 nH)

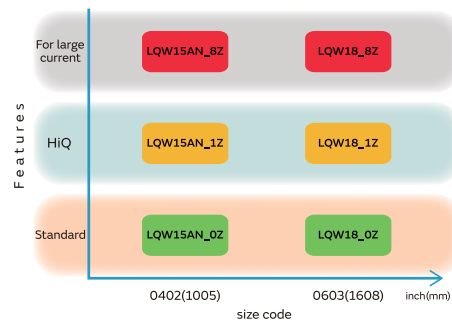
### Uses and Applications

- RF matching circuits requiring Q value characteristics, choke circuits that support large currents levels, antenna matching circuits

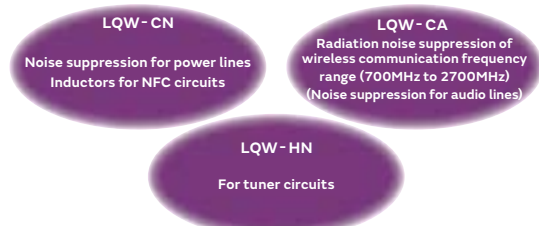
### Selection Tool



Selection chart of non-magnetic core wound inductors for general applications



Selection chart of non-magnetic core wound inductors for automotive applications



Classification of RF circuits non-magnetic core wound inductors

Continued on the following page. ↗

**General**

Series	Size Code inch (mm)	Applications	Inductance (H)										Rated Current Range	
			0.1n	1n	10n	100n	1μ	10μ	100μ	1m	10m			
LQW	0201 (0603)	General		1nH	16nH									230mA to 900mA
	03015 (0804)	General		1.1nH	510nH									140mA to 990mA
	0402 (1005)	General		1.3nH	2000nH									110mA to 3.15A
	0603 (1608)	General		1.6nH	650nH									75mA to 3.2A
	0805 (2012)	General				470nH	2200nH							75mA to 160mA
	0805 (2015)	General		2.7nH	820nH									160mA to 3.8A
	1008 (2520)	General			12nH	4700nH								260mA to 1A
	1206 (3216)	General			8.8nH	100nH								230mA to 750mA

**Automotive**

Series	Size Code inch (mm)	Applications	Inductance (H)										Rated Current Range	
			0.1n	1n	10n	100n	1μ	10μ	100μ	1m	10m			
LQW	0402 (1005)	Infotainment		1.3nH	120nH									110mA to 3.15A
	0603 (1608)	Infotainment		1.6nH	470nH									75mA to 3.2A

# For Power Lines/General Circuit Inductors

## Multilayer Type LQM Series

The monolithic inductor consists of a sintered alternately layered ceramic material and coil conductor. Compared with the wound structure, small sizes/low profiles are possible. Along with the progression of the high frequency of switching frequencies, the required inductance of the monolithic inductor for power inductors where mobile phones are the main market tends to be deteriorating, and cases where the monolithic inductor can be applied are expected to increase further.



**Features**

- Ideal for small size/low profile areas
- Magnetic shielded structure

**Uses and Applications**

- Mobile phones, digital cameras, TVs, HDD, game machines

## Wire Wound Type LQH Series

The wire wound inductor consists of a copper wire spirally wound around the ferrite core. Most wire wound inductors for power circuits are coated with various resins over the copper wire wound around the ferrite core. The purpose of the coating resin is to improve the strength of the product. The merits of using a wire wound product are demonstrated when used in large current areas and high inductance areas. The applicable markets vary from mobile phones to TVs and digital cameras.



**Features**

- Lineup of various sizes
- Can be used for high inductance values, and is ideal for power supply booster circuits.

**Uses and Applications**

- Mobile phones, digital cameras, TVs, HDD, game machines

## Chip Inductors -Series Lineup by Chip Size

Size Code	inch (mm)	0603 (1608)	0805 (2012)	0806 (2016)	1008 (2520)	1212 (3030)	1206 (3216)	1210 (3225)	1812 (4532)	1515 (4040)	2020 (5050)	2220 (5750)	2525 (6363)
Multilayer Type (Ferrite Core)		LQM18	LQM21	LQM2M	LQM2H		LQM31	LQM32					
Wire wound Type (Ferrite Core)				LQH2M	LQH2H	LQH3N	LQH31	LQH32	LQH43	LQH44	LQH5B	LQH55	LQH66

Continued on the following page. ↗

## Inductors (Coils)

### General (Multilayer Type LQM Series)

Series	Size Code inch (mm)	Thickness (mm/max.)	Applications	Inductance (H)										Rated Current Range	
				0.1n	1n	10n	100n	1μ	10μ	100μ	1m	10m			
LQM	0603 (1608)	Less than 1.0	General				0.047μH			10μH					15mA to 1.4A
		1.0 to 1.2	General					1μH		3.3μH					1.05A
	0805 (2012)	Less than 1.0	General					0.24μH		2.2μH					600mA to 2.4A
		1.0 to 1.2	General					0.1μH		10μH					15mA to 2.4A
		Greater than 1.2	General						2.7μH		47μH				7mA to 120mA
	0806 (2016)	Less than 1.0	General					0.24μH		2.2μH					1.1A to 2.6A
		1.0 to 1.2	General					0.16μH		4.7μH					1A to 4A
	1008 (2520)	Less than 1.0	General					0.24μH		2.2μH					1.3A to 3A
		1.0 to 1.2	General					0.24μH		4.7μH					800mA to 3.3A
	1206 (3216)	Less than 1.0	General					0.47μH		4.7μH					700mA to 1.4A
1210 (3225)	1.0 to 1.2	General						1μH						1.8A	

### General (Wire Wound Type LQH Series)

Series	Size Code inch (mm)	Thickness (mm/max.)	Applications	Inductance (H)										Rated Current Range	
				0.1n	1n	10n	100n	1μ	10μ	100μ	1m	10m			
LQH	0806 (2016)	Less than 1.0	General					0.33μH		82μH					90mA to 1.13A
	1008 (2520)	1.0 to 1.2	General					0.47μH		100μH					130mA to 2.75A
		Greater than 1.2	General						2.2μH		4.7μH				800mA to 1.25A
	1212 (3030)	1.0 to 1.2	General					0.47μH		250μH					130mA to 2.86A
		Greater than 1.2	General						1μH		100μH				240mA to 2.15A
	1206 (3216)	Greater than 1.2	General				0.054μH		100μH					45mA to 970mA	
	1210 (3225)	Greater than 1.2	General				0.15μH		560μH					40mA to 2.9A	
	1515 (4040)	1.0 to 1.2	General					0.68μH		47μH					380mA to 2.5A
		Greater than 1.2	General					0.51μH		470μH					145mA to 4.5A
	1812 (4532)	Greater than 1.2	General					0.56μH		2400μH					25mA to 3.3A
	2020 (5050)	Greater than 1.2	General					0.47μH		150μH					630mA to 4.6A
	2220 (5750)	Greater than 1.2	General					0.12μH		10000μH					50mA to 6A
	2525 (6363)	Greater than 1.2	General					0.27μH		10000μH					50mA to 6A

### Automotive (Multilayer Type LQM Series)

Series	Size Code inch (mm)	Thickness (mm/max.)	Applications	Inductance (H)										Rated Current Range	
				0.1n	1n	10n	100n	1μ	10μ	100μ	1m	10m			
LQM	0805 (2012)	Less than 1.0	Infotainment					0.47μH		2.2μH					600mA to 1.1A
		1.0 to 1.2	Infotainment					0.47μH		4.7μH					800mA to 1.3A
			PowerTrain							2.2μH					800mA
	0806 (2016)	1.0 to 1.2	Infotainment					0.47μH		4.7μH					1.1A to 1.6A
	1008 (2520)	Less than 1.0	Infotainment						0.56μH						1.5A
		1.0 to 1.2	Infotainment						0.47μH		4.7μH				800mA to 1.8A

Continued on the following page. ↗

## Automotive (Wire Wound Type LQH Series)

Series	Size Code inch (mm)	Thickness (mm/max.)	Applications	Inductance (H)						Rated Current Range				
				0.1n	1n	10n	100n	1μ	10μ		100μ	1m	10m	
LQH	0806 (2016)	Less than 1.0	Infotainment					0.33μH	82μH				150mA to 1.13A	
	1008 (2520)	1.0 to 1.2	Infotainment					0.47μH	22μH				430mA to 2.75A	
	1212 (3030)	1.0 to 1.2	Infotainment					0.47μH	47μH				460mA to 2.86A	
	1206 (3216)	Greater than 1.2	Infotainment			0.054μH		0.88μH					180mA to 920mA	
	1210 (3225)	Greater than 1.2	Infotainment					0.47μH	330μH					60mA to 2.9A
			PowerTrain			0.15μH		22μH						250mA to 2.9A
	1515 (4040)	1.0 to 1.2	Infotainment					0.68μH	47μH				410mA to 2.5A	
	1812 (4532)	Greater than 1.2	Infotainment					1μH	2200μH					30mA to 3.3A
			PowerTrain					1μH	220μH					240mA to 3.3A
2020 (5050)	Greater than 1.2	Infotainment					0.47μH	22μH					1.05A to 4A	

## Effective Use of Power Inductors

The product group of Murata's inductors for power circuits consists of the wire wound type and the monolithic type. For the applications of power inductors, Murata has prepared the "Murata Power Inductor Selection Tool," which can calculate and display the performance of inductors based on actual use conditions.

The application of power inductors greatly contributes to the loss of inductors in the conversion efficiency of a set.

The loss of inductors can also be estimated in the frequency and current values actually used, by using the "Murata Power Inductor Selection Tool." The inductors mounted in sets that increase the conversion efficiency of a power supply to the maximum can easily be selected.

URL: <http://www.murata.com/products/inductor/chip/learn/apply/power>

## Detailed Catalogs

For more details, please refer to our printed catalogs and the PDF catalogs on our website.



- Chip Inductors (Chip Coils)
- EMI Suppression Filters (for DC)/Chip Inductors for Automotive

Cat. No. O05E

Cat. No. C51E

# Resistors

Full lineup for various applications

## Summary

Using Murata's ceramic processing technology and unique material, we offer a series of resistor products.

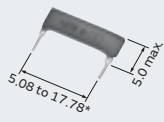
## Lineup

- High Voltage Resistors

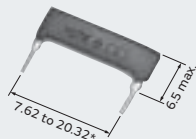


## High Voltage Resistors

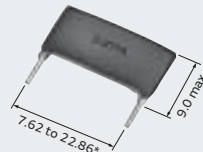
Featuring thick-film resistors, the Murata MHR series of high-voltage resistors is available in compact and thin SIP packages. Variants with small deviations are also available on request.



MHR03 Series



MHR04 Series



MHR06 Series

(in mm)

\*The terminal pitch is an integral multiple of 2.54mm.

Series	Resistance (min.) (MΩ)	Resistance (max.) (MΩ)	Maximum Operating Voltage (Single Use) (kV)	Maximum Operating Voltage (Molded Use) (kV)	Rated Power (W)
MHR03	1	500 to 1000	2 to 8	3 to 14	0.3 to 1.0
MHR04	1	1000	3.5 to 9	10 to 16	0.6 to 1.3
MHR06	1	1000	3.5 to 10	10 to 20	0.8 to 1.6

Resistance 2 element type is also available.  
For resistance value and ratio, please contact us.

# Timing Devices

A stable timing source for microprocessors in various electronic devices

## Summary

Murata's ceramic processing technology and unique piezoelectric material has led to the development of a range of small and thin ceramic timing devices that offer high oscillation frequency and remarkable oscillation tolerance.

## Lineup

- Crystal Units ●Crystal Oscillators
- Ceramic Resonators CERALOCK®



## IC Part Number - Timing Devices Search

Search for Timing Devices by IC part number or search for IC part number by Timing Devices on our website. It is also possible to search by either oscillating frequency or frequency range.

The screenshot shows the SimSurfing website interface. On the left, there is a navigation menu with categories like 'Characteristic search', 'Component performance simulator', and 'Selection tool'. The 'Timing Devices' option is highlighted with a red box. A red arrow points from this box to a search results table on the right, which displays a grid of search results.

<http://www.murata.com/simsurfing/>

## Detailed Catalogs

For more details, please refer to our printed catalogs and the PDF catalogs on our website.



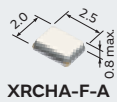
- Ceramic Resonators (CERALOCK®)
- Ceramic Resonator (CERALOCK®) Application Manual
- Crystal Units/Crystal Oscillators

Cat. No. P16E  
Cat. No. P17E  
Cat. No. P79E

# Crystal Units

The Crystal Unit realizes highly accurate frequency-based high-grade quartz crystal elements. We offer a wide lineup including Crystal Units using Murata's proven package technology for small digital devices, automotive, etc.

## For Automotive



XRCHA-F-A

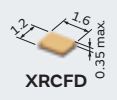


XRCGB-F-A

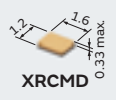
(in mm)

Series	Seal	Frequency (MHz)										Frequency Shift by Temperature (ppm max.)	Operating Temperature Range (°C)								
		1	2	3	4	5	6	7	8	9	10			20	30	40	50	70	100		
XRCHA-F-A	Resin										16.0000±100ppm								24.0000±100ppm	±100	-40 to 125
XRCGB-F-A	Resin										24.0000±30ppm								29.9999±30ppm	±35	-40 to 125
											30.0000±50ppm								48.0000±50ppm	±65	-40 to 125

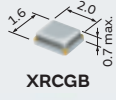
## For Consumer/Industrial



XRCFD



XRCMD



XRCGB



XRCHH



XRCHJ



XRCHA



XRCJH



XRCJK



XRCLH



XRCLK

(in mm)

Series	Seal	Frequency (MHz)										Frequency Shift by Temperature (ppm max.)	Operating Temperature Range (°C)								
		1	2	3	4	5	6	7	8	9	10			20	30	40	50	70	100		
XRCFD	Metal										24.0000±10ppm								31.9999±10ppm	±10	-20 to 70
XRCMD	Metal										32.0000±10ppm								48.0000±10ppm	±10	-20 to 70
XRCGB-F-P	Resin										24.0000±20ppm								32.0000±20ppm	±20	-30 to 85
XRCGB-F-M	Resin										24.0000±30ppm								32.0000±30ppm	±40	-30 to 85
											33.8688±45ppm								50.0000±45ppm	±40	-30 to 85
XRCGB-F-L	Resin										24.0000±100ppm								50.0000±100ppm	±50	-30 to 85
XRCGB-F-Z	Resin										24.0000±100ppm								50.0000±100ppm	±100	-40 to 105
XRCHH	Metal										16.0000±10ppm								52.0000±10ppm	±15	-30 to 85
XRCHJ	Seam										16.0000±10ppm								52.0000±10ppm	±15	-30 to 85
XRCHA-F-L	Resin										16.0000±100ppm								23.9999±100ppm	±100	-30 to 85
											16.0000±100ppm								23.9999±100ppm	±100	-40 to 105
XRCJH	Metal										13.0000±10ppm								52.0000±10ppm	±15	-30 to 85
XRCJK	Seam										12.0000±10ppm								52.0000±10ppm	±15	-30 to 85
XRCLH	Metal										10.0000±10ppm								52.0000±10ppm	±15	-30 to 85
XRCLK	Seam										10.0000±10ppm								52.0000±10ppm	±15	-30 to 85

# Crystal Oscillators

We offer a varied lineup of Crystal Oscillators using highly reliable crystal units, circuit engineering, superior temperature compensation method and measurement fostered by our long experience and activity.

## For Consumer/Industrial

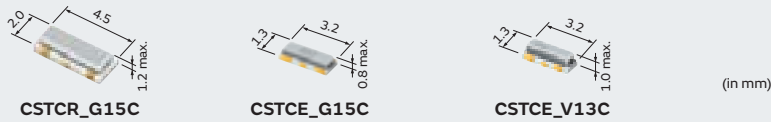


Series	Type	VC Function	Frequency (MHz)							Frequency Shift by Temperature (ppm max.)	Frequency Aging (ppm max./year)	Operating Temperature Range (°C)	
			1	5	10	20	30	40	50				70
XNCHH	TTS27NSC-A7	-	10.0000±1ppm							52.0000±1ppm	±0.5	±1.0	-30 to 85
XNCJH	TTS18NSH-A7	-	10.0000±1ppm							52.0000±1ppm	±0.5	±1.0	-30 to 85
XTCHH	TTS27VSC-A7	●	10.0000±1ppm							52.0000±1ppm	±0.5	±1.0	-30 to 85
XTCJH	TTS18VSH-A7	●	10.0000±1ppm							52.0000±1ppm	±0.5	±1.0	-30 to 85
XTCLH_E	TTS14VSE-A13	●	10.0000±1ppm						40.0000±1ppm		±0.5	±1.0	-30 to 85
XTCLH_J	TTS14VSH	●	10.0000±0.5ppm							52.0000±0.5ppm	±0.2	±0.5	-30 to 85

# Ceramic Resonators CERALOCK®

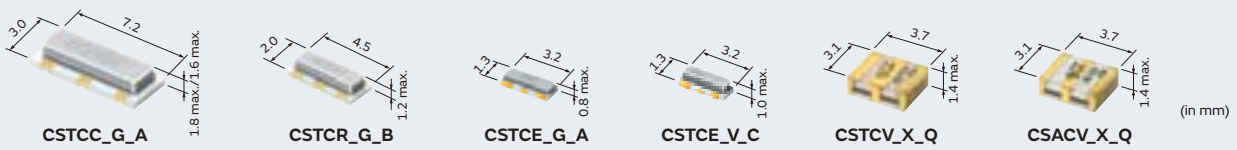
Wide product lineup for automotive and consumer applications with SMD and lead package.

## MHz Chip Type for Automotive (Tight Frequency Tolerance)



Series	Frequency (MHz)											Frequency Shift by Temperature (% max.)	Operating 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%							±0.13	-40 to 125
CSTCE_V13C						14.00±0.1%				20.00±0.1%							±0.13	-40 to 125

## MHz Chip Type for Automotive (Standard Frequency Tolerance)



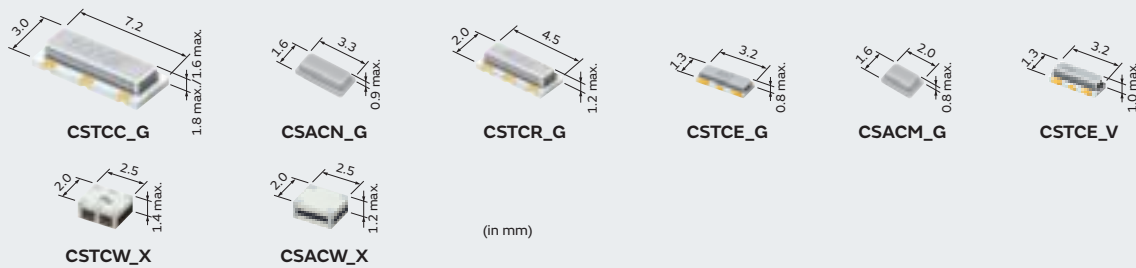
Series	Frequency (MHz)											Frequency Shift by Temperature (% max.)	Operating Temperature Range (°C)					
	1	2	3	4	5	6	7	8	9	10	20			30	40	50	70	100
CSTCC_G_A	2.00±0.5%									3.99±0.5%							±0.4 (15pF) -0.6/+0.3 (47pF)	-40 to 125
CSTCR_G_B		4.00±0.5%								7.99±0.5%							±0.15	-40 to 125
CSTCE_G_A				8.00±0.5%						13.99±0.5%							±0.2	-40 to 125
CSTCE_V_C						14.00±0.5%				20.00±0.5%							±0.15	-40 to 125
CSTCV_X_Q										20.01±0.5%					70.00±0.5%		±0.3	-40 to 125
CSACV_X_Q (No built-in load capacitance)										20.01±0.5%					70.00±0.5%		±0.3	-40 to 125

### MHz Chip Type for Consumer Electronics (Tight Frequency Tolerance)



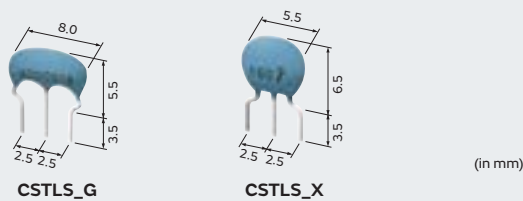
Series	Frequency (MHz)											Frequency Shift by Temperature (% max.)	Operating Temperature Range (°C)					
	1	2	3	4	5	6	7	8	9	10	20			30	40	50	70	100
CSTCR_G15L		4.00±0.1%								7.99±0.1%							±0.08	0 to 70
CSTCE_G15L			8.00±0.1%							13.99±0.1%							±0.08	0 to 70
CSTCE_V13L				14.00±0.1%						20.00±0.1%							±0.08	0 to 70
CSTCW_X11									20.01±0.1%					48.00±0.1%			±0.1	0 to 70

### MHz Chip Type for Consumer Electronics (Standard Frequency Tolerance)



Series	Frequency (MHz)											Frequency Shift by Temperature (% max.)	Operating Temperature Range (°C)					
	1	2	3	4	5	6	7	8	9	10	20			30	40	50	70	100
CSTCC_G	2.00±0.5%									3.99±0.5%							±0.3 (15pF) ±0.4 (47pF)	-20 to 80
CSACN_G (No built-in load capacitance)										6.00±0.5%							-0.25/+0.2	-20 to 85
CSTCR_G		4.00±0.5%								7.99±0.5%							±0.2	-20 to 80
CSTCE_G			8.00±0.5%							13.99±0.5%							±0.2	-20 to 80
CSACM_G (No built-in load capacitance)				8.00±0.5%						12.00±0.5%							-0.25/+0.2	-20 to 85
CSTCE_V									14.00±0.5%					20.00±0.5%			±0.3	-20 to 80
CSTCW_X										20.01±0.5%				70.00±0.5%			±0.2	-20 to 80
CSACW_X (No built-in load capacitance)										20.01±0.5%				70.00±0.5%			±0.2	-20 to 80

### MHz Lead Type for Consumer Electronics (Standard Frequency Tolerance)



Series	Frequency (MHz)											Frequency Shift by Temperature (% max.)	Operating Temperature Range (°C)					
	1	2	3	4	5	6	7	8	9	10	20			30	40	50	70	100
CSTLS_G		3.40±0.5%								10.00±0.5%							±0.2 (15pF) -0.4/+0.2 (47pF)	-20 to 80
CSTLS_X									16.00±0.5%					70.00±0.5%			±0.2	-20 to 80

Timing Devices

# Filters

Broad lineup of Filters for video, audio, RF/Local, Duplexers, and Filters for IF

## Summary

Using Murata's ceramic processing technology and unique material, we offer miniaturized filters with excellent properties for advanced digital audio/visual system and communication equipment.

## Lineup

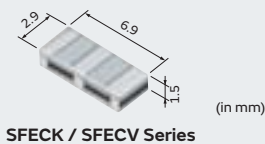
- Ceramic Filters CERAFIL® (Filters, Traps and Discriminators)
- Crystal Filters ● SAW Traps
- SAW Filters for Mobile Communications
- Dielectric Filters GIGAFIL® ● Chip Multilayer LC Filters



## Ceramic Filters CERAFIL®

### CERAFIL® 10.7MHz Chip Type

Small and lightweight filters for IF in communications or AV equipment using unique piezo-electric material.



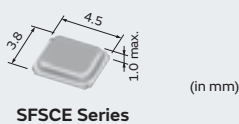
Type	Series	3dB Bandwidth (kHz)		
		E	J	K
		330	150	110
High-reliability Type	SFECK10M7□	-	●	●
Standard Type	SFECV10M7□	-	●	●
Standard Type	SFECV15M0□	●	-	-

□ is filled with the letter designating the required 3dB bandwidth.



Type	Series	3dB Bandwidth (kHz)				
		D	E	F	G	H
		350	330	280	230	180
Standard Type	SFECF10M7□	●	●	●	●	●

□ is filled with the letter designating the required 3dB bandwidth.

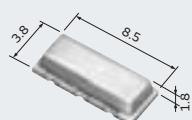


Type	Series	3dB Bandwidth (kHz) min.		
		03	04	05
		±500	±400	±325
Wide Bandwidth	SFSCE10M7WF□□	●	●	●

□ is filled with the letter designating the required 3dB bandwidth.

## CERAFIL® 2.3 to 6.5MHz Chip Type

SFSKA Series has distinctive features such as wide bandwidth and stable filter performance, enabling customers to design smaller products. SFSKB Series is suitable for low frequency range.



SFSKA Series



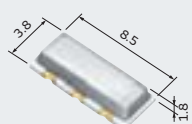
SFSKB Series

(in mm)

Series	Center Frequency (MHz)												3dB Bandwidth (kHz)
	2.3	2.8	3.2	3.8	4.3	4.5	4.8	5.2	5.5	5.7	6.0	6.5	
SFSKA	-	-	-	-	-	●	-	-	●	-	●	●	±60 min.
SFSKB	●	●	●	●	●	-	●	●	-	●	-	-	±75 min.

## Ceramic Traps

The TPSKA Series has distinctive features such as high attenuation and high performance group delay time, enabling customers to design smaller products.



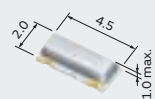
TPSKA Series

(in mm)

Series	Center Frequency (MHz)	Attenuation (dB)
TPSKA	4.500/5.500/6.000/6.500	35 min.

## Ceramic Discriminators

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



CDSCB Series

(in mm)

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.

# Crystal Filters

Our original wafer-thin technology has made it possible to make highly reliable filters in various applications such as radio communication worldwide.



Series	Type	Frequency Range (MHz)	Number of Pole
XDCAF	TM7050F	20 to 80	2
XDCAG	TM7050G	[Fundamental] 70 to 150	4
XDCAH	TM7050H	[3rd overtone]	4

\*Please be sure to consult with our sales representative or engineer if you require other center frequency.

# SAW Traps

Wide pass band width, Highly selective attenuation band, high performance, small size, chip size package



**SAW Filters and SAW Duplexers must be used only in the following equipment:**

Mobile phones, cordless telephones (except automobile telephone), smartphones, tablet PC, PC (including laptop/netPC), game machines, cameras (except for business use and for security), STB, electronic dictionaries, and digital audio instruments.  
Please contact us for other usages.

# SAW Filters for Mobile Communications

## SAW Duplexers

Low loss, high attenuation performance, small size, highly selective pass band, chip size package



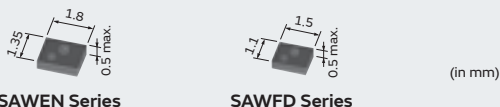
## RF Filters

Low loss, high attenuation performance, small size, highly selective pass band, chip size package

### Single Filter



### Dual Filter



# Dielectric Filters GIGAFIL®

Suitable for cellular base stations and other telecom infrastructure systems.  
Custom parts within the range below are available upon request.



DFYH Series



DFCH Series

	Series	Frequency Range (MHz)						Number of Resonators	Input Power Range
		100	1000	2000	3000	4000	5000		
Duplexers	DFYH		700	2600				5 to 10	1 to 10W*
RF/IF/Local Filter	DFCH	600	3800					2 to 6	1 to 10W*

\*Power depends upon specifications.

Characteristic customization is available. You can contact us also through our website.

# Chip Multilayer LC Filters

Ultra-small and low-profile filters based on ceramic multilayer technology.

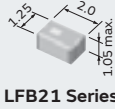
## Band Pass Filters



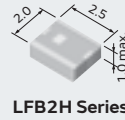
LFB15 Series



LFB18 Series



LFB21 Series



LFB2H Series



LFB31 Series

(in mm)

## Low Pass Filters



LFL15 Series



LFL18 Series



LFL21 Series

(in mm)

### Detailed Catalogs

For more details, please refer to our printed catalogs and the PDF catalogs on our website.



- Ceramic Filters (CERAFIL®)/Crystal Filters Cat. No. P51E
- Ceramic Filters (CERAFIL®)/Crystal Filters Application Manual Cat. No. P11E

# RF Components

Broad lineup of RF Components for RF/Local circuits in communications equipment

## Summary

To enhance the technical advantages of communication equipment, Murata offers miniaturized, sophisticated components to meet the demands of many applications.

## Lineup

- Isolators
- Baluns (Chip Multilayer and Wire Wound/Film type)
- Couplers (Chip Multilayer and Film type)
- Chip Multilayer Hybrid Dividers
- Chip Multilayer Diplexers
- Microwave Coaxial Connectors
- Single Layer Microchip Capacitors
- Thin Film Circuit Substrate RUSUB®



## Isolators

Passing signals in the forward direction and blocking signals in the reverse direction

### For Mobile Phones



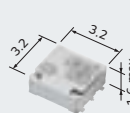
CEG23 Series

Series	Adaptive Frequency Range (MHz)				Size (mm)	Rating Power (W)
	100	1000	2000	3000		
CEG23		700	2600		2.0X2.0X1.0 max.	1.2 max.

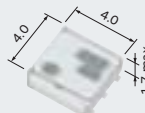
### For Base Stations



CES20 Series



CES30 Series



CES40 Series

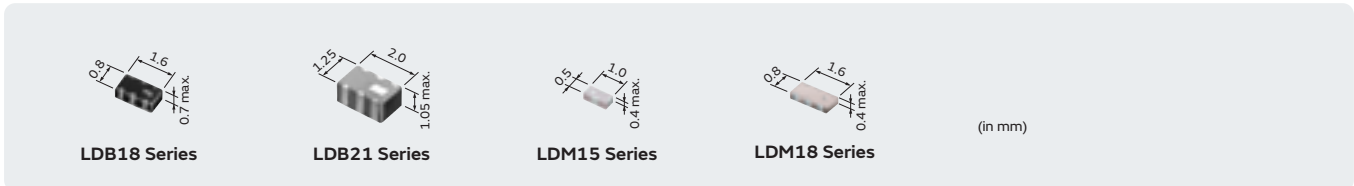
(in mm)

Series	Adaptive Frequency Range (MHz)				Size (mm)	Rating Power (W)
	100	1000	2000	3000		
CES20			1900	2600	3.2X2.5X1.2 max.	5 max.
CES30			1700	2200	3.2X3.2X1.6 max.	5 max.
CES40		800	950		4.0X4.0X1.7 max.	5 max.

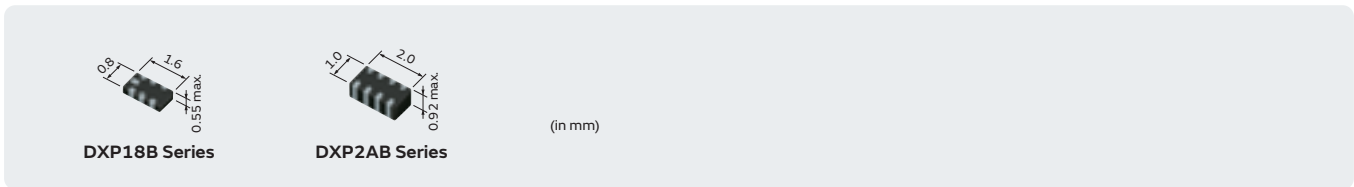
# Baluns

SMD baluns constructed with a copper conductor and ceramic material. Ideal for high-frequency applications. Small-size and low-loss baluns can be customized for balance impedance of 50Ω to 200Ω.

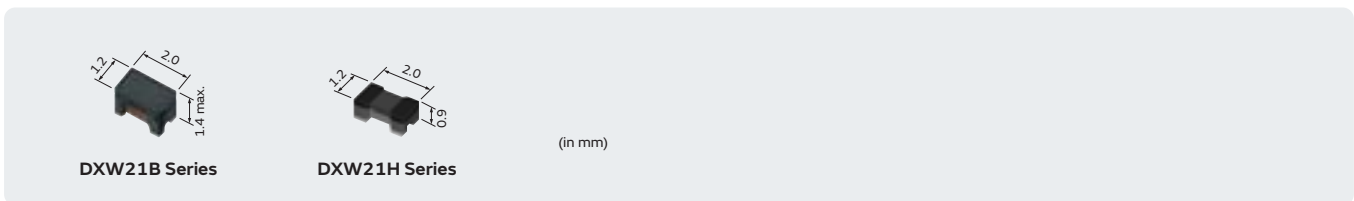
## Chip Multilayer Type



## Film Type



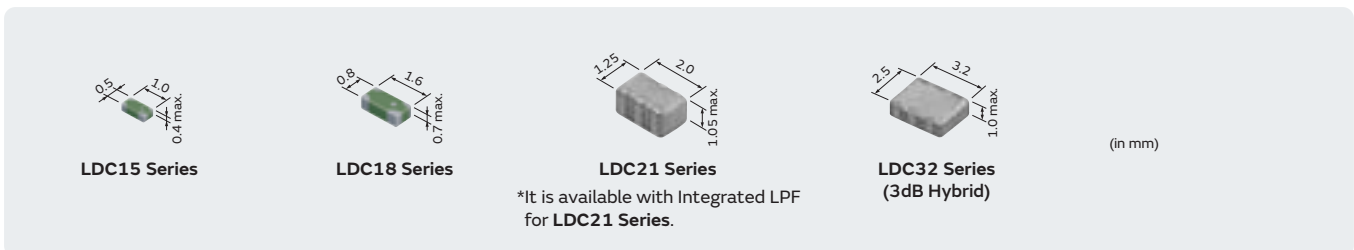
## Wire Wound Type



# Couplers

An ultra-small, low-profile directional coupler based on ceramic multilayer technology. This coupler achieves ultra-small size, low insertion loss, and high isolation.

## Chip Multilayer Type



## Film Type



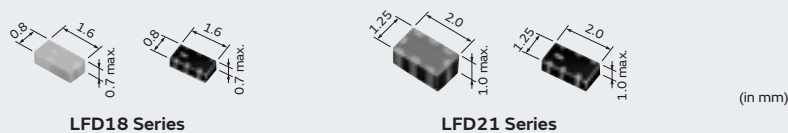
## Chip Multilayer Hybrid Dividers

Power divider with a multilayer low pass filter in an ultra-compact package.



## Chip Multilayer Diplexers

A diplexer branching low and high band.  
Suitable for band-switching for dual-band system.



# Microwave Coaxial Connectors

## Microwave Coaxial Cable Connectors

The mating height is only 1.0mm maximum due to our new mechanical design. Suitable for low profile design.

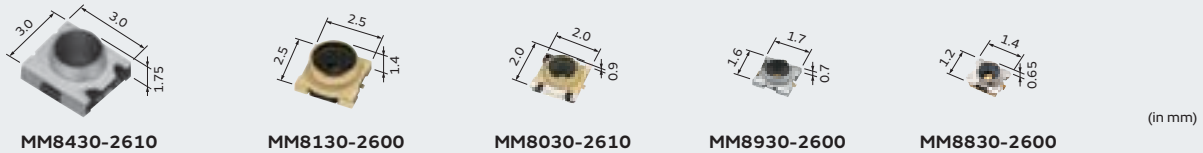


Type	Receptacle Part Number	Rated Voltage (Vrms)	Frequency Rating (GHz)	Temperature Range	VSWR	Cable Number	Mating Height (mm)
HSC	<b>MM4829-2702</b>	30	to 6	-40 to 85°C	1.3 max. (DC to 3GHz)	<b>MXHP32_____</b>	1.2 max.
JSC	<b>MM5829-2700</b>	30	to 12	-40 to 85°C	1.3 max. (DC to 3GHz)	<b>MXJA01_____</b>	1.0 max.
KSC	<b>MM6829-2700</b>	30	to 6	-40 to 85°C	1.3 max. (DC to 3GHz)	<b>MXKGB3_____</b>	0.8 max.
LSC	<b>MM7829-2700</b>	30	to 6	-40 to 85°C	1.3 max. (DC to 3GHz)	<b>MXLAB3_____</b>	0.8 max.

Nominal Impedance: 50Ω

## Microwave Coaxial Connectors with Switch

The coaxial connector with switch is very useful for characteristic measurement in cellular phones and microwave circuits.



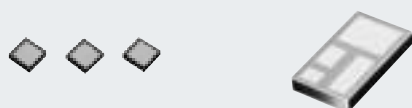
Type	Receptacle Part Number	Rated Voltage (Vrms)	Frequency Rating (GHz)	Temperature Range	VSWR	Standard Measurement Probe Part Number
SWD	<b>MM8430-2610</b>	30	to 6	-40 to 85°C	1.2 max. (DC to 3GHz)	<b>MM126320 MXHS83QE3000</b>
SWF	<b>MM8130-2600</b>	30	to 6	-40 to 85°C	1.2 max. (DC to 3GHz)	<b>MM126320 MXHQ87WJ3000</b>
SWG	<b>MM8030-2610</b>	30	to 11	-40 to 85°C	1.2 max. (DC to 3GHz)	<b>MM126515 MXHQ87PA3000</b>
SWH	<b>MM8930-2600</b>	30	to 6	-40 to 85°C	1.2 max. (DC to 3GHz)	<b>MM126715 MXHQ87PK3000</b>
SWJ	<b>MM8830-2600</b>	30	to 6	-40 to 85°C	1.2 max. (DC to 3GHz)	<b>MM126715 MXHQ87PK3000</b>

Nominal Impedance: 50Ω

# Single Layer Microchip Capacitors

Very reliable performance and excellent frequency characteristics

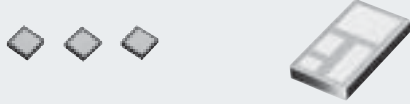
## Temperature Compensation Type



Capacitance Change (Temperature Range)	Series	Size (mm)	Rated Voltage (Vdc)	Capacitance Range at 25°C (pF)					Operating Temperature Range (°C)
				0.1	1	10	100	1000	
0±30ppm/°C (-25 to 85°C)	CLB0A	0.25X0.25	100	0.1					-55 to 125
	CLB0C	0.35X0.25	100	0.2					-55 to 125
	CLB0D	0.38X0.38	100	0.2	0.4				-55 to 125
	CLB05	0.5X0.5	100	0.3	0.6				-55 to 125
	CLB0E	0.55X0.38	100	0.5	0.6				-55 to 125
	CLB0F	0.64X0.64	100	0.3	1.0				-55 to 125
	CLB0G	0.7X0.5	100	0.7	1.0				-55 to 125
	CLB0H	0.71X0.38	100	0.7	0.8				-55 to 125
	CLB0J	0.76X0.76	100	0.4	1.3				-55 to 125
	CLB09	0.9X0.9	100	0.5	1.8				-55 to 125
	CLB1A	1.00X0.64	100	1.1	1.6				-55 to 125
	CLB1B	1.09X0.76	100	1.5	2.0				-55 to 125
	CLB1C	1.27X1.27	100	1.0	3.6				-55 to 125
	CLB1E	1.49X0.9	100	2.0	2.7				-55 to 125
	CLB1G	1.73X1.27	100	3.9	4.7				-55 to 125
	CLB1H	1.78X1.78	100	1.8	6.8				-55 to 125
	CLB2C	2.19X1.27	100	5.1					-55 to 125
	CLB2E	2.29X2.29	100	3.0	10				-55 to 125
	CLB2L	2.95X1.78	100	7.5	10				-55 to 125
	CLB3G	3.71X2.29	100	11	16				-55 to 125
-750±60ppm/°C (-25 to 85°C)	CLB0A	0.25X0.25	100	0.3	0.7				-55 to 125
	CLB0B	0.30X0.25	100	0.8					-55 to 125
	CLB0C	0.35X0.25	100	0.9					-55 to 125
	CLB0D	0.38X0.38	100	0.9	1.6				-55 to 125
	CLB05	0.5X0.5	100	1.0	2.4				-55 to 125
	CLB0E	0.55X0.38	100	1.8	2.4				-55 to 125
	CLB0F	0.64X0.64	100	2.0	4.3				-55 to 125
	CLB0G	0.7X0.5	100	2.7	3.0				-55 to 125
	CLB0H	0.71X0.38	100	2.7					-55 to 125
	CLB0J	0.76X0.76	100	3.0	6.2				-55 to 125
	CLB09	0.9X0.9	100	3.3	6.8				-55 to 125
	CLB1A	1.00X0.64	100	4.7	6.2				-55 to 125
	CLB1B	1.09X0.76	100	6.8	7.5				-55 to 125
	CLB1C	1.27X1.27	100	7.5	15				-55 to 125
	CLB1E	1.49X0.9	100	7.5	9.1				-55 to 125
	CLB1H	1.78X1.78	100	13	15				-55 to 125
CLB2E	2.29X2.29	100	20					-55 to 125	

All Single Layer Microchip Capacitors are produced after receiving an order.

## High Dielectric Constant Type



RF Components

Capacitance Change (Temperature Range)	Series	Size (mm)	Rated Voltage (Vdc)	Capacitance Range at 25°C (pF)					Operating Temperature Range (°C)
				0.1	1	10	100	1000	
±10% (-25 to 85°C)	CLBOA	0.25X0.25	100			5.6   12			-55 to 125
	CLBOB	0.30X0.25	100			13   15			-55 to 125
	CLBOC	0.35X0.25	100			16   18			-55 to 125
	CLBOD	0.38X0.38	100			18   30			-55 to 125
	CLBO5	0.5X0.5	100			22   43			-55 to 125
	CLBOE	0.55X0.38	100			33   43			-55 to 125
	CLBOF	0.64X0.64	100			43   75			-55 to 125
	CLBOG	0.7X0.5	100			47   68			-55 to 125
	CLBOH	0.71X0.38	100			47   56			-55 to 125
	CLBOJ	0.76X0.76	100			68   110			-55 to 125
	CLBO9	0.9X0.9	100			68   130			-55 to 125
	CLB1A	1.00X0.64	100			82   120			-55 to 125
	CLB1C	1.27X1.27	100			160   200			-55 to 125
	CLB1E	1.49X0.9	100			150   160			-55 to 125
	CLB1G	1.73X1.27	100			300			-55 to 125
	CLB1H	1.78X1.78	100			300   430			-55 to 125
CLB2E	2.29X2.29	100			470   620			-55 to 125	
+30, -80% (-25 to 85°C)	CLBOA	0.25X0.25	100			27   33			-55 to 125
	CLBOB	0.30X0.25	100			36   39			-55 to 125
	CLBOC	0.35X0.25	100			43   51			-55 to 125
	CLBOD	0.38X0.38	100			62   82			-55 to 125
	CLBO5	0.5X0.5	100			75   130			-55 to 125
	CLBOE	0.55X0.38	100			91   120			-55 to 125
	CLBOF	0.64X0.64	100			130   220			-55 to 125
	CLBOG	0.7X0.5	100			150   200			-55 to 125
	CLBOH	0.71X0.38	100			130   150			-55 to 125
	CLBOJ	0.76X0.76	100			200   300			-55 to 125
	CLBO9	0.9X0.9	100			200   390			-55 to 125
	CLB1A	1.00X0.64	100			240   360			-55 to 125
+30, -90% (-25 to 85°C)	CLBOA	0.25X0.25	100			36   56			-55 to 125
	CLBOD	0.38X0.38	100			91   150			-55 to 125
	CLBO5	0.5X0.5	100			130   220			-55 to 125
	CLBOF	0.64X0.64	100			220   390			-55 to 125
	CLBOJ	0.76X0.76	100			330   560			-55 to 125
CLBO9	0.9X0.9	100			390   680			-55 to 125	

All Single Layer Microchip Capacitors are produced after receiving an order.

### Detailed Catalogs

For more details, please refer to our printed catalogs and the PDF catalogs on our website.



• High Frequency Single Layer Microchip Capacitors

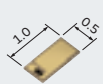
Cat. No. C01E

# Thin Film Circuit Substrate RUSUB®

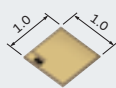
Suitable for photo diode module.

## ■ Features

- RUSUB® technology provides a single-layer capacitor and thin film resistor formed in one chip. It reduces not only the number of parts to build a device, but also the assembly costs. It will also contribute to making a device smaller.
- The single-layer structure makes its self-resonant frequency higher. It allows stable operation even at a high frequency range.
- The short distance between the capacitor and thin film resistor makes the residue inductance smaller and contributes to attenuating unnecessary noise so the device can work at its best characteristics.
- Since it has a gold electrode, it is feasible to be installed inside a module, and it allows wire-bonding with gold wire.
- AuSn pre-coating finish is also available.
- It is very suitable for APD (Avalanche Photo Diode), because the capacitor has a withstanding voltage of 100V.



RUCYT101 Series



RUCYT201 Series

(in mm)

- Six types of standard samples of RUSUB® C+R (Capacitor + Resistor) are available.
- Custom substrate size, capacity, resistance value, and electrode pattern shape is available upon request.

Part Number	Size (mm) (LXWXT)	Capacitance (pF)	Resistance (Ω)	Temperature Characteristics of Capacitance at -25 to 85°C	Capacitor Rated Voltage (V)	Temperature Coefficient of Resistance (ppm/°C)	Resistor Rated Power (mW/mm <sup>2</sup> )
RUCYT101K00009GNTC	1.0X0.5X0.11	100±10%	50±20%	±10%	100	-70±50	100
RUCYT101K00011GNTC	1.0X0.5X0.11	100±10%	100±20%				
RUCYT101K00012GNTC	1.0X0.5X0.11	100±10%	200±20%				
RUCYT201K00010GNTC	1.0X1.0X0.12	200±10%	50±20%				
RUCYT201K00013GNTC	1.0X1.0X0.12	200±10%	100±20%				
RUCYT201K00014GNTC	1.0X1.0X0.12	200±10%	200±20%				

## Detailed Catalogs

For more details, please refer to our printed catalogs and the PDF catalogs on our website.



▪ Thin Film Circuit Substrate (RUSUB®)

Cat. No.M04E

# Sensors

Sensing elements for various applications

## Summary

Using our piezoelectric ceramics and magnetic resistive elements, Murata has developed a range of sensing technologies that can detect heat, infrared, ultrasonic waves, vibration, acceleration, angular velocity, angular rotation, rotation, magnetism, and electrical fields. These products are used in a variety of applications such as white goods, audio/visual electronics, and especially automotive, to name a few, improving the user's experience.

## Lineup

- Infrared Sensors
- Ultrasonic Sensors
- Rotary Sensors
- Magnetic Pattern Recognition Sensors
- AMR Sensors (Magnetic Sensors)
- Shock Sensors
- Accelerometers
- Inclinometers
- Gyro Sensors
- Rotary Position Sensors
- Temperature Sensors (Thermistors)



## Product Pickup

### Magnetic Pattern Recognition Sensors

Magnetic pattern recognition sensors are suitable for differentiation of bank note types and patterns printed with magnetic ink. Murata's magnetic pattern recognition sensors combine InSb (indium antimonide) magnetoresistive elements with a permanent magnet, enabling weak magnetic information to be easily detected. The features of these sensors are wide dynamic range, wide gap characteristic, and high output, enabling detection of either ferromagnetic or magnetic patterns.



BS05 Series



BS05 Series

### Temperature Sensors NTC/PTC Thermistors

NTC/PTC Thermistors are used to detect overheating. Murata offers a variety of thermistor products to meet the demands of various temperatures.



NCP Series



NX Series



PRF Series



PTF Series

For more details on Thermistors, please refer to p. 62.

### Detailed Catalogs

For more details, please refer to our printed catalogs and the PDF catalogs on our website.



- MEMS Sensors & Sensing Elements
- Rotary Position Sensors
- Pyroelectric Infrared Sensors
- NTC Thermistors
- POSISTOR® for Circuit Protection

- Cat. No. S47E
- Cat. No. R51E
- Cat. No. S21E
- Cat. No. R44E
- Cat. No. R90E

## Rotary Position Sensors

The output voltage of contact type rotary position sensors are proportional to the rotational angle of a rotor in potentiometer fashion.



SV Series

## AMR Sensors (Magnetic Sensors)

AMR sensors are switches that are used for opening and shutting detection in products such as cellular phones, notebook PCs, and digital cameras.

You can choose the best product from our wide range of features such as the direction of the magnetic field detection, the package, the sampling period, and the sensitivity standard.



MR Series

## Accelerometers

Accelerometers are based on the company's proprietary 3-D MEMS technology. Accelerometers have excellent performance and reliability in a humid environment and at temperature cycling, making high accuracy acceleration detection possible.



SCA Series

## Gyro Sensors

Gyroscope components and combined sensors (including gyroscope and 3 axes accelerometers) based on the company's proven 3-D MEMS technology and highly integrated electronics. High accuracy and high performance sensors are optimum for navigation systems and motion analysis.



SCC Series





# Thermistors

Facilitate your designs and products utilizing our thermal design and thermistor products.

## Summary

Murata's semi-conductive ceramics and electrode printing technologies, such as PTC and NTC Thermistors, provide vital protection and sensing within electronic equipment. Simulation software tools are also available for your convenience.

## Lineup

- NTC Thermistors for temperature sensor/compensation, inrush current suppression, and automotive
- PTC Thermistors POSISTOR® for overheat sensing, overcurrent protection, inrush current suppression, and automotive



## NTC Thermistors for Temperature Sensor/ Temperature Compensation

### Chip Type

Chip NTC Thermistors have Ni barrier terminations, provide excellent solderability and offer high stability in harsh environments due to their unique inner construction.



NCP02 Series



NCP03 Series



NCP15 Series



NCP18 Series



NCP21 Series

(in mm)

Series	Size Code inch (mm)	Resistance (25°C) (Ω)	B-Constant (25-50°C) (K)	Permissible Operating Current (25°C) (mA)	Rated Electric Power (25°C) (mW)	Typical Dissipation Constant (25°C) (mW/°C)	Operating Temperature Range (°C)
NCP02	01005 (0402)	10k/100k	3380/4250	0.31/0.01	100	1	-40 to 125
NCP03	0201 (0603)	1.0k to 220k	3500 to 4485	0.06 to 9.5	100	1	-40 to 125
NCP15	0402 (1005)	22 to 470k	3100 to 4500	0.04 to 6.7	100	1	-40 to 125
NCP18	0603 (1608)	100 to 470k	3250 to 4500	0.04 to 3.1	100	1	-40 to 125
NCP21	0805 (2012)	220 to 100k	3500 to 4250	0.14 to 3.0	200	2	-40 to 125

Rated Electric Power shows the required electric power that causes the Thermistor's temperature to rise to 125°C by self heating, at ambient temperature of 25°C.

### Detailed Catalogs

For more details, please refer to our printed catalogs and the PDF catalogs on our website.

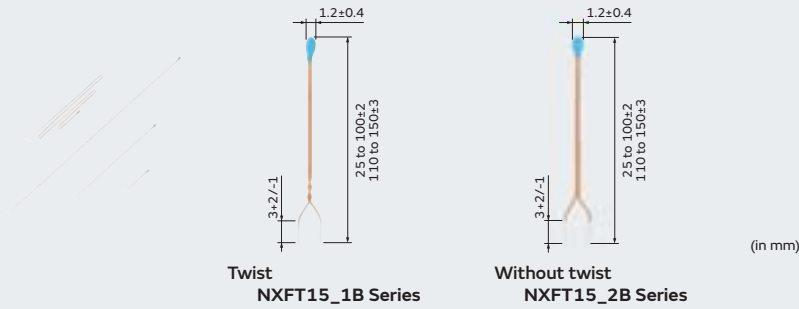


- NTC Thermistors
- POSISTOR® for Circuit Protection

Cat. No. R44E  
Cat. No. R90E

## Thermo String Type

Small flexible lead type NTC Thermistors with a small head and a thin lead wire.

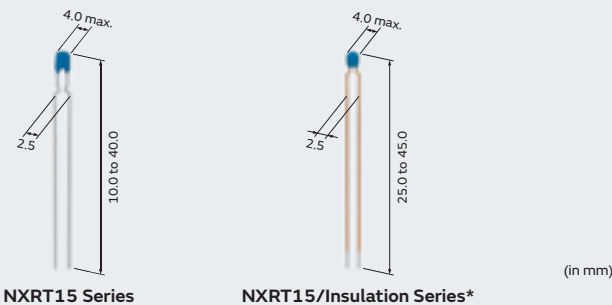


Series	Resistance (25°C) (Ω)	B-Constant (25-50°C) (K)	Operating Current for Sensor (25°C) (mA)	Thermal Time Constant (25°C) (s)	Full Length (mm)	Operating Temperature Range (°C)
<b>NXFT15</b>	10k to 100k	3380 to 4250	0.04 to 0.12	4	25 to 150	-40 to 125

Operating Current for Sensor raises the Thermistor's temperature by 0.1°C.  
There are also items for automotive applications in the NXF Series.

## Lead Type

This product is a thermistor for normal temperature level sensors having self-subsistence due to strong lead strength based on chip NTC.



Series	Resistance (25°C) (Ω)	B-Constant (25-50°C) (K)	Operating Current for Sensor (25°C) (mA)	Thermal Time Constant (25°C) (s)	Full Length (mm)	Operating Temperature Range (°C)
<b>NXRT15</b>	2k to 100k	3380 to 4250	0.04 to 0.27	4	10 to 40	-40 to 125
<b>NXRT15 (Insulation*)</b>	2k to 100k	3380 to 4250	0.05 to 0.36	4	25 to 50	-40 to 125

Operating Current for Sensor raises the Thermistor's temperature by 0.1°C.  
There are also items for automotive applications in the NXR Series.  
\*Insulation: Lead wire insulation type.

# NTC Thermistors for Inrush Current Suppression

Effectively suppresses surge currents that are generated when switching power regulators are turned on.

NT PAN / J Series: NTPAN: 23.0 max., NTPAJ: 20.0 max., 3.5 10.0 max., 10.0

NT PAD / A Series: NTPAD: 16.0 max., NTPAA: 12.0 max., 3.5 10.0 max., 7.5

NT PA5 / 6 / 7 / 9 Series: NTPA9: 11.0 max., NTPA7: 9.0 max., NTPA6: 7.5 max., NTPA5: 6.0 max., 3.5 6.0 max., 5.0

(in mm)

Series	Resistance (25°C) (Ω)	Permissible Max. Current (25°C) (A)	Permissible Max. Current (55°C) (A)	Thermal Time Constant (25°C) (s)	Permissible Electrolytic Capacitor (100V) (μF)	Operating Temperature Range (°C)
NTPAN / J	3 to 10	2.6 to 5.4	2.2 to 4.7	125 to 135	5000 to 8600	-20 to 160
NTPAD / A	2.2 to 16.0	1.7 to 3.7	1.5 to 3.2	65 to 100	1400 to 2700	-20 to 160
NTPA5 / 6 / 7 / 9	4.0 to 22.0	1.0 to 2.5	0.9 to 2.2	20 to 65	346 to 800	-20 to 160

# PTC Thermistors POSISTOR® for Overheat Sensing

## Chip Type

For overheat sensing for power transistors, power diodes, and power ICs in hybrid circuits.

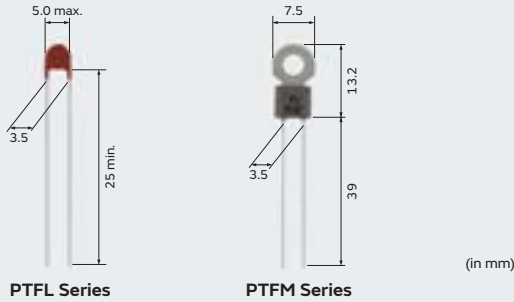


Series	Sensing Temperature Range (°C)										Sensing Temperature Tolerance (°C)	Maximum Voltage (V)	Size Code inch (mm)
	60	70	80	90	100	110	120	130	140	150			
PRF15			●	●	●	●	●	●	●	●	±3/±5	32	0402 (1005)
PRF18	●	●	●	●	●	●	●	●	●	●	±3/±5	32	0603 (1608)
PRF21			●	●	●	●	●	●	●	●	±5	32	0805 (2012)

There are also items for automotive applications in the PRF Series.

## Lead Type

For protecting power transistors, stereo main amplifiers, etc., from overheating, and also for sensing the temperature of other components that may be overheated.

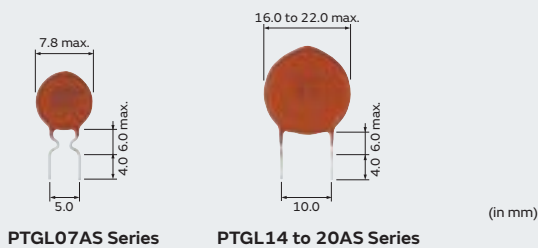


Series	Sensing Temperature Range (TS) (°C)										Maximum Voltage (V)	Resistance (25°C) (max.) (Ω)	Resistance (TS-10°C) (max.) (Ω)	Resistance (TS°C) (min.) (Ω)
	60	70	80	90	100	110	120	130	140	150				
PTF□_471Q	●	●	●	●	●	●					16	100	330	470
PTF□_222Q	●	●	●	●	●	●					16	330	1.5k	2.2k

The blank is filled with type codes. (L: Lead type, M: with lug-terminal)  
Operating Temperature Range is -10 to TS+10°C.

## PTC Thermistors POSISTOR® for Inrush Current Suppression

This series is able to support overcurrent or inrush current issues on the power supply circuit.



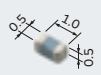
Series	Resistance (25°C) (Ω)	Maximum Voltage (V)	Maximum Inrush Current (Ao-p)	Maximum Charge Energy (J)	Operating Temperature Range (°C)
PTGL07AS	120 to 200	280	5.66 to 8.46	7.8 (105°C)	-40 to 105
PTGL14 to 20AS	33 to 100	280	13 to 39	56.9 to 181.7 (65 to 85°C)	-20 to 85

Maximum Inrush Current shows the maximum inrush current value introduced into the Posistor at operating temperature range.

# PTC Thermistors POSISTOR® for Overcurrent Protection

## Chip Type

Overcurrent Protection device with resettable function suitable for current limiting resistor.



PRG15 Series



PRG18 Series



PRG21 Series

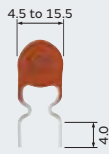
(in mm)

Series	Maximum Voltage (V)	Hold Current (60°C) (mA)	Trip Current (-10°C) (mA)	Maximum Current (A)	Resistance (25°C) (Ω)	Size Code inch (mm)
PRG15	6 to 30	17 to 88	78 to 318	0.6 to 3.5	2.2 to 68	0402 (1005)
PRG18	6 to 30	7 to 220	25 to 850	0.06 to 7.5	2.2 to 470	0603 (1608)
PRG21	6 to 30	30 to 500	110 to 2000	1.1 to 10	0.2 to 22	0805 (2012)

Maximum Current shows typical transformer capacities that can be used. There are also items for automotive applications in the PRG Series.

## Lead Type

Best suited to meet the requirements of power supplies and motor protection. Error-free operation is ensured by rush current.



(in mm)

PTGL Series

\*The Lead shape is an example.

Series	Maximum Voltage (V)	Hold Current (60°C) (mA)	Trip Current (-10°C) (mA)	Maximum Current (A)	Resistance (25°C) (Ω)
PTGL	16	370 to 1200	1040 to 3360	2.0 to 10.0	0.15 to 1.0
	24	80 to 180	320 to 710	2.0	2.2 to 10
	30	122 to 685	240 to 1900	0.7 to 7.0	0.8 to 13
	32	30 to 60	140 to 240	1.5	15 to 47
	51	168 to 592	332 to 1168	1.0 to 5.0	1.2 to 10
	56	90 to 380	240 to 980	1.0 to 2.5	3.3 to 22
	60	88 to 439	175 to 867	1.0 to 5.0	2.2 to 22
	80	50 to 310	135 to 860	0.7 to 5.5	3.7 to 55
	125	30 to 420	75 to 1050	0.3 to 2.0	3.3 to 180
	140	74 to 340	147 to 780	0.5 to 3.5	4.7 to 56
	250	90 to 100	280 to 300	0.5 to 0.6	12 to 39
	265	28 to 300	78 to 830	0.2 to 4.1	6.0 to 180

Maximum Current shows typical transformer capacities that can be used. There are also items for automotive applications in the PTGL Series.

# Power Devices

Eco-friendly and high quality power devices

## Summary

To meet consumer needs Murata offers power supply products and energy devices that can be used with a variety of equipment, such as video equipment, household information appliances, and communication/transfer equipment. Murata provides standard and customized products using highly reliable, Murata-made components utilizing advanced design and high-density packaging technology.

## Lineup

- Micro DC-DC Converters
- DC-DC Converters
- High Voltage Transformers
- High Voltage Power Supplies
- Switching Power Supplies



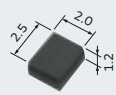
## Micro DC-DC Converters

Murata's micro DC-DC converters are small power modules that utilize a unique ferrite substrate with an embedded power inductor, and incorporate the I/O capacitors onto the same package. Ultra-compact size and superior noise suppression make these devices ideal for cellular/smart phones, tablets, wearable devices, communication applications, and portable products.

### General Buck Converter



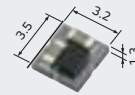
LXDC2HL Series



LXDC2HN Series



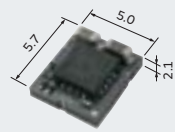
LXDC2UR Series



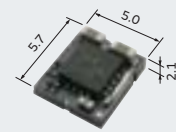
LXDC3EP Series



LXDC2XQ Series



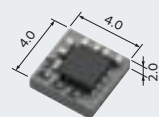
LXDC55F Series



LXDC55K Series

(in mm)

### Boost Converter



LXDC44A Series

(in mm)

### Buck-Boost



LXDC2SC Series

(in mm)

# DC-DC Converters

DC-DC converters are vital to the demands of electronic equipment.

Murata offers DC-DC converters that set the standard for miniaturization, low profile, high efficiency, power-saving, low-noise power supplies. Murata provides standard products and customized products, ultra-low-profile products, and products for FPGA.

## Non-isolated Type



MPDRX3075  
MPDRX3085



MPDRX312S



MPDTY461S  
MPDTY462S



MYGTM01210BZN



MYSSM01806BENL



MYUSP3R303FMP



OKL-T/3-W5N-C



OKL-T/6-W12P-C



OKL2-T/12-W5N-C



OKL2-T/12-W12N2-C



OKL2-T/20-W5N-C  
OKL2-T/20-W5P-C



OKL2-T/20-W12N2-C  
OKL2-T/20-W12P2-C

Part Number	Package	Input Voltage (V)	Nominal Output Power (W)	Output Voltage (V)	Current (A)	Efficiency (%)	Size (mm) LXWXH
MPDRX3075	SMD	6.2 to 13.2	23.6	1.8 to 3.63	6.5	91	17.6X20.2X4.2
MPDRX3085	SMD	6.2 to 13.2	10.7	0.8 to 1.65	6.5	82	17.6X20.2X4.2
MPDRX312S	SMD	3 to 5.5	28.8	0.8 to 1.8	16	86.5	27.8X15.4X4.2
MPDTY461S	SMD	4.5 to 14	94	1.6 to 3.63	26	90.5	33.02X13.46X4.2
MPDTY462S	SMD	4.5 to 14	43	0.75 to 1.65	26	85.5	33.02X13.46X4.2
MYGTM01210BZN	SIL	17 to 40	120	5 to 12	10	97.3	40X40.3X29.2
MYSSM01806BENL	SMD	25 to 40	108	5 to 18	6	96.5	30.2X20.9X12
MYUSP3R303FMP	SMD	3 to 5.5	9.9	0.7 to 3.3	3	94	11X8.5X5.6
OKL-T/3-W5N-C	SMD	2.7 to 5.5	10.9	0.6 to 3.63	3	95.3	12.2X12.2X6.2
OKL-T/6-W12P-C	SMD	4.5 to 14	33	0.591 to 5.5	6	93	12.2X12.2X7.2
OKL2-T/12-W5N-C	SMD	2.4 to 5.5	39.6	0.6 to 3.63	12	94	20.32X11.43X8.55
OKL2-T/12-W12N2-C	SMD	4.5 to 14	60	0.69 to 5.5	12	95	20.32X11.43X8.55
OKL2-T/20-W5N-C	SMD	2.4 to 5.5	66	0.6 to 3.63	20	93.1	33.02X13.46X8.75
OKL2-T/20-W5P-C	SMD	2.4 to 5.5	66	0.6 to 3.63	20	93.1	33.02X13.46X8.75
OKL2-T/20-W12N2-C	SMD	4.5 to 14	100	0.69 to 5.5	20	94	33.02X13.46X8.75
OKL2-T/20-W12P2-C	SMD	4.5 to 14	100	0.69 to 5.5	20	94	33.02X13.46X8.75

These are just a few examples of our large assortment of power products.

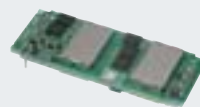
## Isolated Type



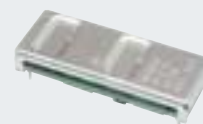
MYBQC01138AZTB



MYBQC01138AZTF



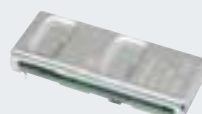
MYBEA01212AZT



MYBEA01212AZTB



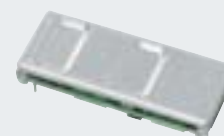
MYBEA01210CZT



MYBEA01210CZTB



MYBEB00520AZT

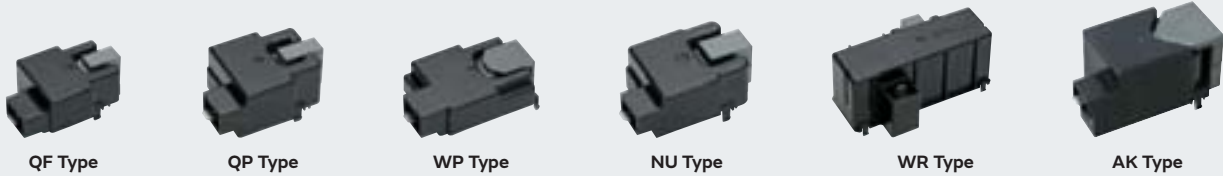


MYBEB01212AZTB

Part Number	Package	Input Voltage (V)	Nominal Output Power (W)	Output Voltage (V)	Current (A)	Efficiency (%)	Isolation Voltage (VDC)	Footprint (Brick)	Size (mm) LXWXH
MYBQC01138AZTB	Insert	48V (36V to 75V)	400	10.6±6%	38	95	1500	1/4	58.4X36.8X14 max.
MYBQC01138AZTF	Insert	48V (36V to 75V)	400	10.6±6%	38	95	1500	1/4	58.4X36.8X17 max.
MYBEA01212AZT	Insert	48V (36V to 75V)	140	12±3%	12	92.5	1500	1/8	58.4X22.8X9 max.
MYBEA01212AZTB	Insert	48V (36V to 75V)	140	12±3%	12	92.5	1500	1/8	58.4X22.8X9 max.
MYBEA01210CZT	Insert	24V (18V to 36V)	120	12±3%	10	93	1500	1/8	58.4X22.8X9 max.
MYBEA01210CZTB	Insert	24V (18V to 36V)	120	12±3%	10	93	1500	1/8	58.4X22.8X9 max.
MYBEB00520AZT	Insert	48V (36V to 75V)	100	5±3%	20	93	1500	1/8	57X22.8X10 max.
MYBEB01212AZTB	Insert	48V (36V to 75V)	100	12±3%	8.3	92	2250	1/8	58X22.8X12.7 max.

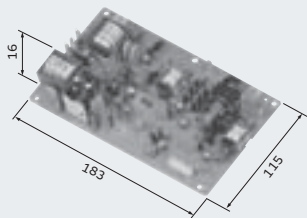
These are just a few examples of our large assortment of power products.

# High Voltage Transformers

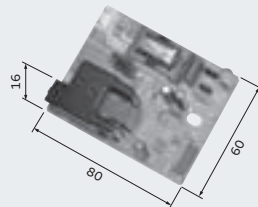


Series	Type	Features	Output Voltage Vout	Output Current Iout	Drive Frequency	Dimensions (mm) LXWXH
MSH	QF	Small Size	Max. 6kV	0.3mA	35 to 70kHz	39X24X13
	QP	Standard	Max. 8.5kV	0.4mA	35 to 70kHz	41X26X16
	WP	Low Profile	Max. 8.5kV	0.4mA	35 to 70kHz	44X27X11
	NU	High Power	Max. 8.5kV	1mA	30 to 70kHz	44X27X17
	WR	High Voltage	Max. 13kV	0.5mA	30 to 70kHz	49X25X27
	AK	High Voltage High Power	Max. 10kV	2mA	20 to 70kHz	27X55X26

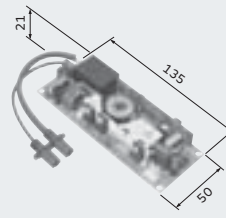
# High Voltage Power Supplies



MPH7000 Series



MPH4000 Series  
(for Air Purifier/Air Conditioner)



MPL3000 Series  
(AC/DC Ballast)

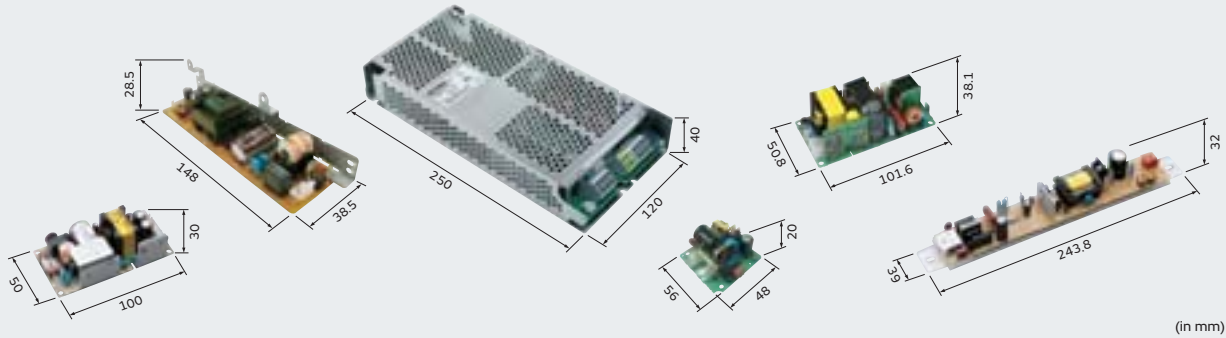
(in. mm)

Series	Input Voltage Vin	Power Supply Type	Output Voltage Vout	Output Current Iout	Adjustable Range	
MPH7000	24V DC	DC Constant Current	(6kV)	250μA	Iout: 200 to 300μA	
		DC Constant Voltage	0.6kV	(1μA)	Vout: 550 to 650kV	
		Switching	DC Constant Current	(-1.5kV)	-3μA	Iout: -2 to -4μA
			DC Constant Voltage	1.5kV	(0.5μA)	Vout: 1.4 to 1.6kV
		AC Constant Voltage	1.5kV rms	(250μA rms)	Vout: 1.3 to 1.7kV rms	
MPH4000 (for Air Purifier/Air Conditioner)	24V DC	DC Constant Voltage	±6kV	±400μA	-	
		DC Constant Current	(±6kV)	±400μA	-	

Series	Applications	Input Voltage Vin	Output Power	Other Specification
MPL3000 (AC/DC Ballast)	Projector	250 to 420V DC	to 350W	For extra-high pressure mercury lamp

For more details on our products, please contact us.

# Switching Power Supplies



Medical Equipment    SOHO Equipment    Industrial and Measurement Equipment    Energy Management Equipment    PBX    LED Lighting

(in mm)

Applications	Input Voltage	Output Voltage	Safety Standard	EMI Standard	Remarks
Medical Equipment	90 to 264V AC	5V 12V 24V 48V	UL, IEC	CISPR	
SOHO Equipment	90 to 264V AC	5V 12V 24V 48V	UL, IEC	CISPR	Models that provide a power-saving standby mode are also available.
Industrial and Measurement Equipment	90 to 264V AC	24V	UL, IEC	VCCI	150W/300W
Energy Management Equipment	60 to 225V AC	3.3V 24V	UL, IEC	VCCI, CISPR	
PBX	90 to 264V AC	12V 48V	UL, IEC	CISPR	Operating Ambient Temperature 80°C
LED Lighting	90 to 264V AC	24V	IEC, PSE	VCCI, CISPR	PWM Dimming, Accepted for DALI, UART

For more details on our products, please contact us.

For Ionizer Modules, please refer to p. 79.

# Energy Devices

Solutions for power lines of low-power devices

## Summary

Murata offers various energy devices that can be used for low-power devices such as portable or wearable devices. Murata's supercapacitor (EDLC), having ultra-low ESR and high reliability, can be used as a small auxiliary power supply for peak power assist or backup. Murata's small energy device is a secondary battery having high-rate charge-discharge characteristics and long cycle life. It can be used as a power supply of low-power devices.

## Lineup

- Supercapacitors (EDLC)
- Small Energy Device (Lithium Ion Battery)



## Supercapacitors (EDLC)

Supercapacitors (EDLC) are energy storage devices with high power density characteristics. Murata has focused its R&D efforts on electrical double layer energy devices, and also established collaboration with the component design and manufacturing firm CAP-XX Limited (CAP-XX). This has led to Murata's development of an Supercapacitor technology resulting in low ESR and high capacitance in a very small package.



DMT3L4R2U224M3DTA0  
DMT334R2S474M3DTA0  
DMF3Z5R5H474M3DTA0



DMF4B5R5G105M3DTA0

(in mm)

Series	Main Part Number	Thickness (mm)	Capacitance (mF)	Rated Voltage (V)	ESR (mΩ)	Operating Temperature (°C)
DMT (General-Purpose Type)	DMT3L4R2U224M3DTA0	2.0	220	4.2	300	-40 to 85
	DMT334R2S474M3DTA0	3.5	470	4.2	130	-40 to 85
DMF (High Peak Power Type)	DMF3Z5R5H474M3DTA0	3.2	470	5.5 (Peak Voltage)	45	-40 to 70
	DMF4B5R5G105M3DTA0	3.7	1000	5.5 (Peak Voltage)	40	-40 to 70

### Detailed Catalogs

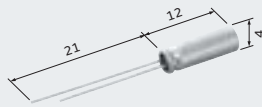
For more details, please refer to our printed catalogs and the PDF catalogs on our website.



- High Performance Supercapacitor (EDLC) DMF Series  
Cat. No. O83E
- High Performance Supercapacitor (EDLC) DMT Series  
Cat. No. O84E

## Small Energy Device (Lithium Ion Battery)

Murata's small energy device is a miniature device with a high energy storage capacity, low ESR, fast charging and discharging and the ability to withstand load fluctuations. It may be used as a secondary battery in the same way as a capacitor. This energy device achieves better charge/discharge characteristics and has an extended service life superior to conventional batteries. Well suited as a power supply for wearable devices or sensor nodes for wireless sensor networks, this device maintains flat voltage characteristics while accommodating a wide range of load characteristics.



(in mm)

UMAC040130A003TA01

Series	Part Number	Nominal Voltage (V)	Charge Voltage (V)	Cut-off Voltage (V)	Nominal Capacity (mAh)	Max. Discharge Current	ESR (mΩ)	Operating Temperature Range (°C)
UMAC (Cylinder Type)	<b>UMAC040130A003TA01</b>	2.3	2.7	1.8	3	30mA (10C)	800	-20 to 70

# Sound Components

Piezoelectric ceramic materials that expand and shrink by applying voltage are used in piezoelectric sound components.

## Summary

Using Murata's unique ceramic material, we offer a variety of piezoelectric sound components.

## Lineup

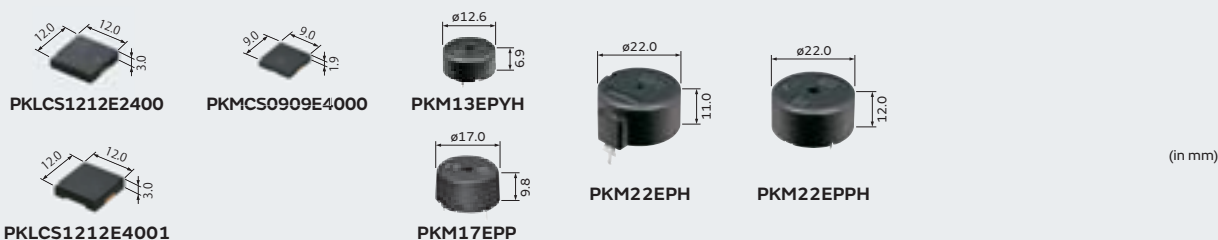
- Piezoelectric Sounders
- Piezoelectric Buzzers
- Piezoelectric Diaphragms



## Piezoelectric Sounders

Low power consumption, lightweight

Suitable for office equipment/home appliances/audio equipment



Drive Type	Mounting Type	Main Part Number	Sound Pressure Level (dB)	Measurement Condition of Sound Pressure Level
External Drive	Surface Mounting Type	PKLCS1212E2400-R1	75 min.	±1.5Vo-p, 2.4kHz, square wave, 10cm
		PKLCS1212E4001-R1	75 min.	±1.5Vo-p, 4.0kHz, square wave, 10cm
		PKMCS0909E4000-R1	65 min.	±1.5Vo-p, 4.0kHz, square wave, 10cm
	Pin Type	PKM13EPYH4000-A0	70 min.	±1.5Vo-p, 4.0kHz, square wave, 10cm
		PKM17EPP-2002-B0	70 min.	±3.0Vo-p, 2.0kHz, square wave, 10cm
		PKM22EPH2001	75 min.	±1.5Vo-p, 2.0kHz, square wave, 10cm
		PKM22EPPH2001-B0	70 min.	±1.5Vo-p, 2.0kHz, square wave, 10cm
PKM22EPPH4007-B0	85 min.	±1.5Vo-p, 4.0kHz, square wave, 10cm		

## Piezoelectric Buzzers

This is a unified piezoelectric sounder connected to a built-in self-drive circuit, and it easily generates sound with only a DC power supply.

Suitable for gas detector alarms/burglar alarms/home-electronic appliances



(in mm)

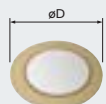
PKB24SPCH

Drive Type	Mounting Type	Main Part Number	Sound Pressure Level (dB)	Measurement Condition of Sound Pressure Level
Self Drive	Pin Type	<b>PKB24SPCH3601-B0</b>	90 min.	12Vdc, 10cm

## Piezoelectric Diaphragms

Low power consumption, lightweight

Suitable for clocks/calculators/digital cameras/burglar alarms and various alarms.



7BB-□□-□

Drive Type	Main Part Number	Plate Size (̸D)
External Drive	<b>7BB-12-9</b>	̸12.0mm
	<b>7BB-15-6</b>	̸15.0mm
	<b>7BB-20-6</b>	̸20.0mm
	<b>7BB-27-4</b>	̸27.0mm

□: Indicates Metal Plate Diameter and Resonant Frequency Type.

### Detailed Catalogs

For more details, please refer to our printed catalogs and the PDF catalogs on our website.



• Piezoelectric Sound Components

Cat. No. C37E

# Wireless Communication Modules

Available for a wide range of applications such as automotive, mobile computing devices, and household appliances.

## Wi-Fi<sup>®</sup> Modules / Bluetooth<sup>®</sup> · Wi-Fi<sup>®</sup> Combo Modules



**■ Features**

Compact, highly efficient and flexible custom-made correspondence

**■ Applications**

Mobile phones, automotive, tablet PC, POS, HT, electric equipment, smart grid, etc.

## Bluetooth<sup>®</sup> Modules / Bluetooth<sup>®</sup> Low Energy Modules



**■ Features**

Compact, highly efficient and flexible custom-made correspondence

**■ Applications**

Mobile phones, automotive, PMP, POS, HT, healthcare, wireless remote control, etc.

# Variable Capacitors

Capacitance value can be adjusted by the tuning voltage.

## LXRW\_V Series



LXRW0YV Series



LXRW19V Series

(in mm)

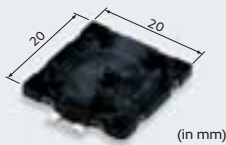
Thin film variable capacitors can carry out the variable of the capacitor by adjusting the tuning voltage. It is designed for use as frequency matching for HF band (13.56MHz).

# Micromechatronics

Utilizing the vibration and deformation properties of piezoelectric materials.

## Microblowers

Tiny air pumps without a motor



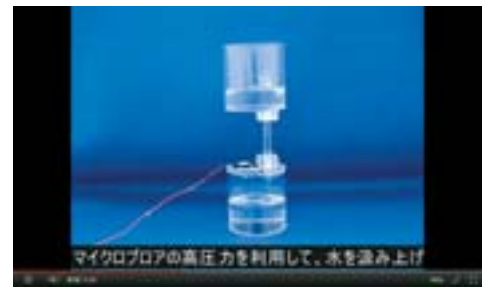
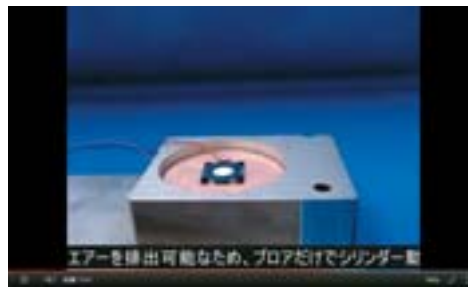
### ■ Features

Microblowers are designed to function as an air pump, using the ultrasonic vibrations of piezoelectric ceramics, which can generate high pressure air from a thin and extremely compact unit.

### ■ Applications

Aroma/diffuser, gas & alcohol sensor, air ionizer, amusement, etc.

Part Number	Size	Air Flow	Static Pressure	Voltage of Operation
MZB1001T02	20(W)X20(L)X1.85(H)mm without the nozzle	≥0.7L/min@15Vp-p	≥1.42kPa@15Vp-p	10 to 20Vp-p



For more details on Microblowers, please refer to our website.

## Piezoelectric Actuators

Quick response and high-accuracy position control.



\*Please contact us for custom specifications.

### ■ Features

Piezoelectric actuators employ piezoelectric ceramics, which are widely used for positioning devices.

# Ceramic Applied Products

Contribution to high integration and miniaturization requirements of the automotive industry and RF modules.

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



LTCC, Low Temperature Co-fired Ceramics, is a multi-layer, glass ceramic substrate that is co-fired with low resistance metal conductors. What makes Murata's LTCC special is our unique "Zero Shrinking Sintering Process," which restricts the ceramic shrinkage to only thickness.

Murata's LTCC multilayer substrates LFC<sup>®</sup> are useful in a wide range of electronic equipment such as substrates for highly reliable electronic control units equipping vehicles and functional substrates for miniaturized high-frequency modules in cellular phones.

### LFC<sup>®</sup> Series

Murata's LFC<sup>®</sup> Series LTCC substrate meets high integration and miniaturization requirements necessary for automotive applications.

### AWG Series

Utilized in low-profile, small outline RF modules, the AWG Series features ultra-thin ceramic tapes, multiple material tape lamination, and enhanced board strength.



Cat.No. N20E

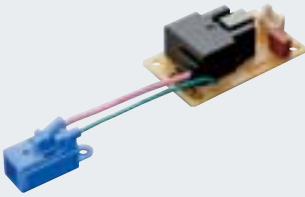
# Ionizer Modules Ionissimo®

High-concentration ion, compact design, ozone control

Ionissimo® is an ionizer module with unprecedented compactness and high efficiency, capable of generating the largest number 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

- A large number of ions will be created by the original structure.
- 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.

### ■ Applications

Air conditioner, air purifier, static eliminator, vacuum cleaner, etc.

Items	MHM305 Type	MHM306 Type	MHM400 Type
Input Voltage (VDC)	+10.8 to 13.2	←	←
Power	0.4W	0.6W	0.6W
Ion Polarity	Negative	←	Positive
Ion Amount	>20000000pcs/cc	←	←
Ozone Level	<0.1mg/H	<1.0mg/H	<0.1mg/H
Operating Temp.	-10 to 50°C	←	←
Operating Humidity	20 to 80%RH (without dewdrop)	←	←

View a demonstration video of Ionizer Modules Ionissimo® on our website.

# Ozonizer Modules Ionissimo®

By using low temperature co-fired ceramic substrate (LTCC) for the discharger ozone will be generated stably.

## MHM Series



### ■ Features

- Ozone will be generated stably.
- MHM501 type can be used under high humidity conditions.
- Small size

### ■ Applications

Refrigerator, vacuum cleaner, dishwasher, clothes washer, etc.

Items	MHM500 Type	MHM501 Type	MHM502 Type
Input Voltage (VDC)	+11 to 13	←	←
Power	1.0W	1.0W (with heater)	6.0W
Ozone Level	<2.5mg/H	<2.5mg/H	<60mg/H
Operating Temp.	-10 to 50°C	←	←
Operating Humidity	20 to 80%RH (without dewdrop)	20 to 95%RH	20 to 85%RH (without dewdrop)

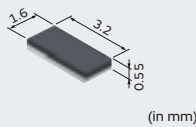
View a demonstration video of Ozonizer Modules Ionissimo® on our website.

# RFID Devices

Built-in IC modules for high functional and robust small RFID tags

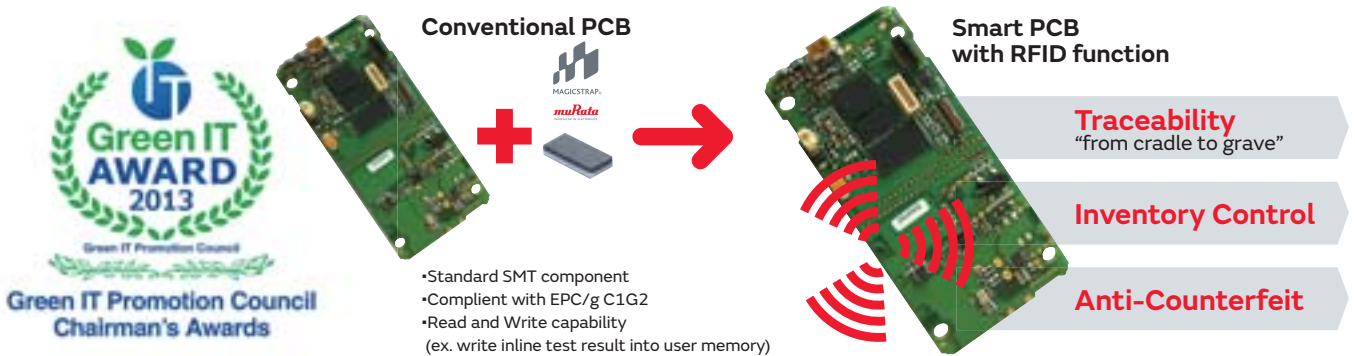
## UHF-band MAGICSTRAP®

### LXMS31 Series



MAGICSTRAP® can be easily assembled by means of reflow soldering and adhesive (electrically conductive or non-conductive). Even if non-conductive adhesive is used, communication will take place when MAGICSTRAP® is bonded onto the antenna, and the RFID tag will function correctly.

MAGICSTRAP® complies with international standard EPC/gC1G2. It is an ultra-miniature (3.2X1.6X0.55mm) robust package with impedance transformation function. MAGICSTRAP® can be bonded onto the antenna over a wide range ( $\pm 500\mu\text{m}$ ). In addition, MAGICSTRAP® supports wide UHF band (860-960MHz) for worldwide use in a single design.

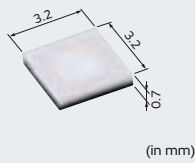


# RFID Devices

Built-in IC modules for high functional and robust small RFID tags

## HF-band MAGICSTRAP®

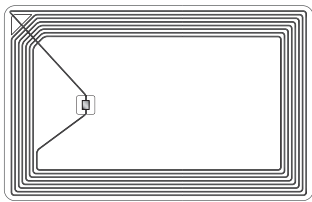
### LXMS33 Series



HF-band MAGICSTRAP® is one of the world's smallest HF-band RFID tags (3.2X3.2X0.7mm).

Murata has applied its proprietary multi-layer circuit board technology and high-frequency module technology, with which the successful miniaturization of an RFID tag to one-tenth the size of an RFID tag composed of plane surface, was achieved.

Furthermore, the new RFID product uses a ceramic module structure that makes it highly resistant to the environment and enables it to achieve stable operation under various environmental conditions.



Horizontal

Miniaturization !



Multi-layer

#### Applications

Small appliance/object tracking, management, certification, authentication, etc.

#### Electrical Characteristics

Read range: 15mm  
(reader/writer output: 200mW, antenna size: 35X54mm)



For more details on RFID Devices, please refer to our website.

# Wireless Power Transmission Modules

## Realization of wireless charging systems

Murata has begun mass production of the capacitive coupling type\* of wireless power transmission modules capable of charging at 10W.

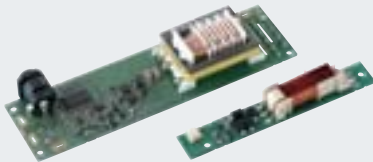
This module makes wireless charging systems a reality. (Wireless charging systems are capable of charging equipment placed on a charging pad without the need for cable connection.)

\*Capacitive coupling system

The capacitive coupling system is a method that involves transmitting energy using the electrical fields generated between these electrodes.

Since the electric field is generated between the electrodes, it is also called an electric field coupling system.

## LXWS Series



### ■ Features

- Wide charging area
- Ease of mounting
- No heat generation in the wireless power transmission area



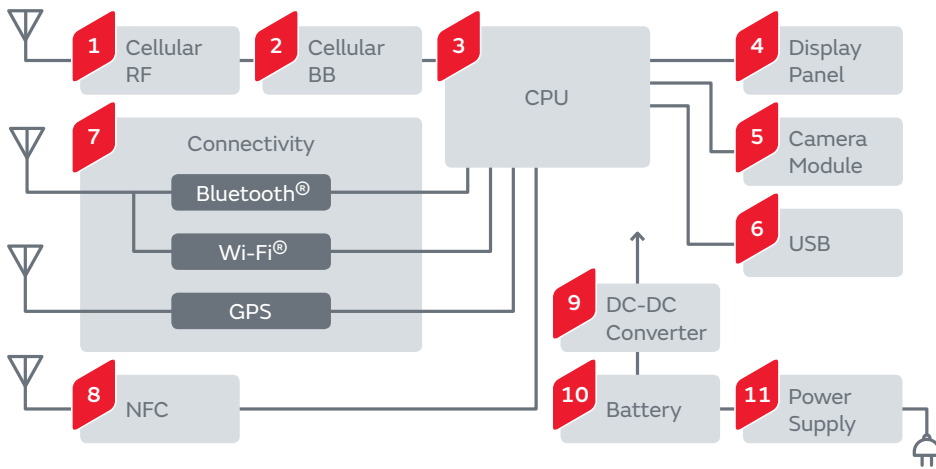
View demonstration videos of Wireless Power Transmission Modules on our website.

# Memo

# Application Guides



# Smart Phones



## 1 Cellular RF

<p>Chip Multilayer Diplexers LFD Series</p>	<p>SAW Duplexers SAY Series</p>	<p>SAW Filters SAF Series</p>	<p>Chip Multilayer LC Filters</p>
<p>Chip Multilayer Hybrid Baluns LDB/LDM Series</p>	<p>Chip Multilayer Hybrid Dividers LDD Series</p>	<p>High-Frequency Matching Transformers SMST Series</p>	<p>Microwave Coaxial Connectors</p>
<p>Isolators CEG23 Series</p>	<p>Micro DC-DC Converters LXDC Series</p>	<p>Chip Inductors (Chip Coils) LQW/LQP Series</p>	
<p>Trimmer Capacitors TZY2 Series</p>	<p>ESD Protection Devices LXES Series</p>	<p>Thermistors NCP/PRF Series</p>	

## 2 Cellular BB

<p>Micro DC-DC Converters LXDC Series</p>
<p>3 Terminal Capacitors NFM Series</p>
<p>Chip Common Mode Choke Coils DLW/DLP Series</p>
<p>Thermistors NCP/PRF Series</p>

## 3 CPU

<p>Crystal Units XRCGB Series</p>	<p>Chip Ferrite Beads BLM Series</p>	<p>3 Terminal Capacitors NFM Series</p>	<p>Thermistors NCP/PRF Series</p>
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## 4 Display Panel


<p>Micro DC-DC Converters LXDC Series</p>	<p>Ceramic Resonators CERALOCK® CSTCE Series</p>	<p>EMI Suppression Filters EMIFIL® NFA Series</p>
<p>Chip Common Mode Choke Coils DLW/DLP Series</p>	<p>ESD Protection Devices LXES Series</p>	
<p>Thermistors NCP/PRF Series</p>		


## 5 Camera Module


<p>Micro DC-DC Converters LXDC Series</p>	<p>Supercapacitors (EDLC) DMF Series</p>
<p>Monolithic Ceramic Capacitors for Medium Voltage GR7 Series</p>	<p>Actuators</p>
<p>Chip Ferrite Beads BLM Series</p>	<p>ESD Protection Devices LXES Series</p>
<p>Thermistors NCP/PRF Series</p>	


**6** USB

Micro DC-DC Converters LXDC Series 


Chip Common Mode Choke Coils DLW/DLP Series 


Chip Ferrite Beads BLM Series 


ESD Protection Devices LXES Series 


Thermistors NCP/PRF Series 


**7** Connectivity


Bluetooth® Modules 


Wi-Fi® Modules 


Bluetooth® - Wi-Fi® Combo Modules 


SAW Filters SAF Series 


Chip Multilayer LC Filters 

Chip Multilayer Hybrid Baluns LDB/LDM Series 


Microwave Coaxial Connectors 


Micro DC-DC Converters LXDC Series 


ESD Protection Devices LXES Series 


Thermistors NCP/PRF Series 


**8** NFC


NFC Antennas FLAN Series 


Crystal Units XRCGB Series 

Chip Ferrite Beads BLM Series 


Chip Inductors (Chip Coils) LQM/LQH Series 


Trimmer Capacitors TZY2 Series 


Variable Capacitors LXRW Series 


ESD Protection Devices LXES Series 

**9** DC-DC Converter

Micro DC-DC Converters LXDC Series 

Metal Terminal Type Monolithic Ceramic Capacitors KRM Series 


Polymer Aluminum Electrolytic Capacitors ECAS Series 


Thermistors NCP/PRF Series 


**10** Battery


Thermistors NCP/PRF/PRG Series 


**11** Power Supply













Wireless Power Transmission Modules 

Monolithic Ceramic Capacitors for Medium Voltage GR/GA Series 

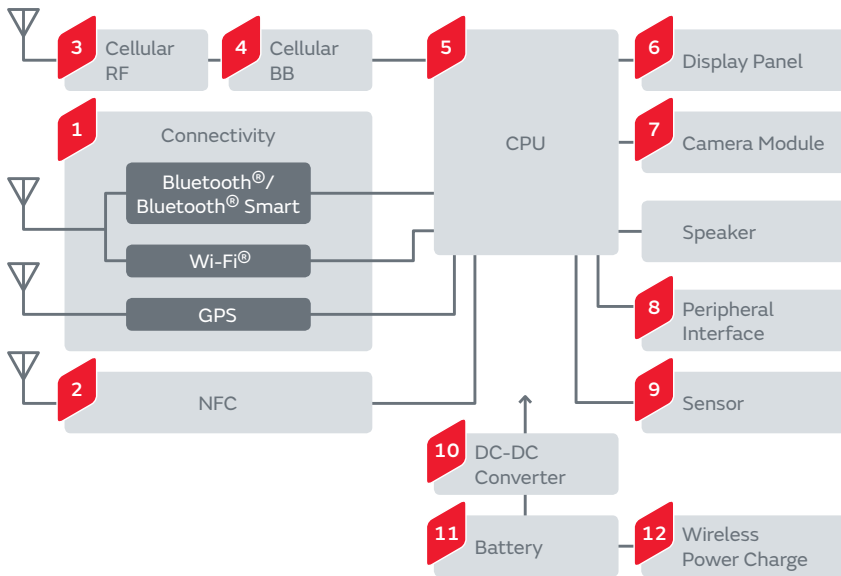
Chip Inductors (Chip Coils) LQM/LQH Series 

Medium High Voltage Ceramic Capacitors DEA/DES Series 

Safety Standard Certified Ceramic Capacitors Type KX/KY 

General Purpose	Monolithic Ceramic Capacitors	GRM/GJM Series	High Frequency Filter Circuit	
	Monolithic Ceramic Capacitors	GRM Series	Coupling/Decoupling/For Step-up	
	Resin External Electrode Monolithic Ceramic Capacitors	GRJ Series	Coupling/Decoupling/For Step-up	
	Polymer Aluminum Electrolytic Capacitors	ECAS Series	Smoothing/Transient Backup	
	Chip Inductors (Chip Coils)	LQW/LQP/LQG Series	High Frequency Circuit-Impedance Matching/Resonance	
	Chip Inductors (Chip Coils)	LQM/LQH Series	Voltage Conversion	
	Chip Ferrite Beads	BLM Series	Noise Suppression	
	3 Terminal Capacitors	NFM/NFE Series	Noise Suppression	
	Chip Common Mode Choke Coils	DLW/DLP Series	Noise Suppression	
	Microwave Absorbers	EA Series	Noise Suppression	
	Ferrite Cores	FS Series	Noise Suppression	
	Thin Type Sandwich Cores	FSSA Series	Noise Suppression	

# Wearable Devices



## 1 Connectivity

<b>Bluetooth® Modules</b>  <b>SAW Filters SAF Series</b>  <b>Microwave Coaxial Connectors with Switch SWH Type</b>  <b>Crystal Units XRCGB/XRCPB Series</b> 	<b>Wi-Fi® Modules</b>  <b>Chip Multilayer LC Filters</b>  <b>Microwave Coaxial Cable Connectors JSC Type</b>  <b>Crystal Units XRCMD/XRCFD Series</b>  <b>Thermistors NCP/PRF Series</b> 	<b>Bluetooth® - Wi-Fi® Combo Modules</b>  <b>Chip Multilayer Hybrid Baluns LDB/LDM Series</b>  <b>Micro DC-DC Converters LXDC Series</b>  <b>ESD Protection Devices LXES Series</b>  
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## 2 NFC

<b>NFC Antennas FLAN Series</b>  <b>Crystal Units XRCGB/XRCPB Series</b> 	<b>Micro DC-DC Converters LXDC Series</b>  <b>Crystal Units XRCMD/XRCFD Series</b>  <b>Chip Inductors (Chip Coils) LQM/LQH/LQB Series</b>  <b>Trimmer Capacitors TZY2 Series</b>  <b>ESD Protection Devices LXES Series</b> 
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## 3 Cellular RF

<b>Chip Multilayer Diplexers LFD Series</b>  <b>Chip Multilayer Hybrid Baluns LDB/LDM Series</b>  <b>Isolators CEG23 Series</b> 	<b>SAW Duplexers SAY Series</b>  <b>Chip Multilayer Hybrid Dividers LDD Series</b>  <b>Micro DC-DC Converters LXDC Series</b> 	<b>SAW Filters SAF Series</b>  <b>High-Frequency Matching Transformers SMST Series</b>  <b>ESD Protection Devices LXES Series</b> 	<b>Chip Multilayer LC Filters</b>  <b>Microwave Coaxial Connectors</b>  <b>Thermistors NCP/PRF Series</b> 
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## 4 Cellular BB

<b>Micro DC-DC Converters LXDC Series</b>  <b>Thermistors NCP/PRF Series</b> 
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**5 CPU**

Crystal Units  
XRCGB/XRCPB Series

Crystal Units  
XRCMD/XRCFD Series

Thermistors  
NCP/PRF Series

**6 Display Panel**

Micro DC-DC Converters  
LXDC Series

Ceramic Resonators CERALOCK®  
CSTCW Series

Ceramic Resonators CERALOCK®  
CSACM Series

Crystal Units  
XRCGB/XRCPB Series

Crystal Units  
XRCMD/XRCFD Series

ESD Protection Devices  
LXES Series

Thermistors  
NCP/PRF Series

**7 Camera Module**

Micro DC-DC Converters  
LXDC Series

Monolithic Ceramic Capacitors  
for Medium Voltage  
GR7 Series

Supercapacitors (EDLC)  
DMF Series

Actuators

ESD Protection Devices  
LXES Series

Thermistors  
NCP/PRF Series

**8 Peripheral Interface**

Micro DC-DC Converters  
LXDC Series

Ceramic Resonators CERALOCK®  
CSTCW Series

Crystal Units  
XRCGB/XRCPB Series

Crystal Units  
XRCMD/XRCFD Series

Chip Common Mode Choke Coils  
DLW/DLP Series

ESD Protection Devices  
LXES Series

Thermistors  
NCP/PRF Series

**9 Sensor**

Proximity and  
Illuminance Sensors  
LT Series

Pressure Sensors  
ZPA Series

Shock Sensors  
PKGS Series

Thermistors  
NCP/PRF Series

**10 DC-DC Converter**

Micro  
DC-DC Converters  
LXDC Series

Metal Terminal Type  
Monolithic Ceramic Capacitors  
KRM Series

Polymer Aluminum  
Electrolytic Capacitors  
ECAS Series

Thermistors  
NCP Series

**11 Battery**

Small Energy Devices  
UMAC Series

Thermistors  
NCP/PRF/PRG Series

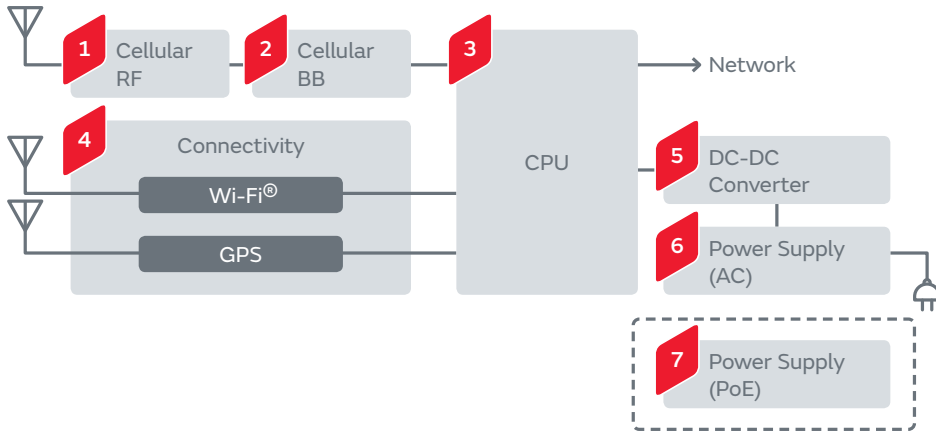
**12 Wireless Power Charge**

Low ESL  
Monolithic Ceramic Capacitors  
LLL Series

Thermistors  
NCP/PRF Series

General Purpose	Monolithic Ceramic Capacitors	GRM/GJM Series	High Frequency Filter Circuit	
	Monolithic Ceramic Capacitors	GRM Series	Coupling/Decoupling/For Step-up	
	Resin External Electrode Monolithic Ceramic Capacitors	GRJ Series	Coupling/Decoupling/For Step-up	
	Polymer Aluminum Electrolytic Capacitors	ECAS Series	Smoothing/Transient Backup	
	Supercapacitors (EDLC)	DMF/DMT Series	Power Line/Battery Peak Assist	
	Chip Inductors (Chip Coils)	LQW/LQP/LQG Series	High Frequency Circuit-Impedance Matching/Resonance	
	Chip Inductors (Chip Coils)	LQM/LQH Series	Voltage Conversion	
	Chip Ferrite Beads	BLM Series	Noise Suppression	
	3 Terminal Capacitors	NFM/NFE Series	Noise Suppression	
	Chip LC Fiter	NFA Series	Noise Suppression	
	Chip Common Mode Choke Coils	DLW/DLP Series	Noise Suppression	
	Microwave Absorbers	EA Series	Noise Suppression	
	Ferrite Cores	FS Series	Noise Suppression	
	Thin Type Sandwich Cores	FSSA Series	Noise Suppression	
	Piezoelectric Sounders	PKMCS Series	Sound component	
Piezoelectric Diaphragms	7BB Series	Sound component		

# Base Stations



## 1 Cellular RF

<p>Chip Multilayer Diplexers LFD Series</p>	<p>Duplexers DFYH Series</p>	<p>Dielectric Filters GIGAFIL® DFCH Series</p>	<p>Chip Multilayer Hybrid Baluns LDB/LDM Series</p>
<p>Chip Multilayer Hybrid Couplers LDC Series</p>	<p>Isolators CES Series</p>	<p>Chip Inductors (Chip Coils) LQW/LQP Series</p>	<p>Trimmer Capacitors TZY2 Series</p>
	<p>ESD Protection Devices LXES Series</p>	<p>Thermistors PRF Series</p>	

## 2 Cellular BB

<p>3 Terminal Capacitors NFM Series</p>
<p>Chip Common Mode Choke Coils DLW/DLP Series</p>
<p>Thermistors PRF Series</p>

## 3 CPU

<p>Crystal Units XRCGB Series</p>	<p>Chip Ferrite Beads BLM Series</p>
<p>3 Terminal Capacitors NFM Series</p>	<p>Thermistors PRF Series</p>

## 4 Connectivity

<p>Wi-Fi® Modules</p>	<p>Chip Multilayer LC Filters</p>	<p>Chip Multilayer Hybrid Baluns LDB/LDM Series</p>
<p>Micro DC-DC Converters LXDC Series</p>	<p>ESD Protection Devices LXES Series</p>	<p>Thermistors PRF Series</p>

## 5 DC-DC Converter

<p>DC-DC Converters MYB Series</p>	<p>DC-DC Converters OKL Series</p>	<p>Micro DC-DC Converters LXDC Series</p>
<p>Metal Terminal Type Monolithic Ceramic Capacitors KRM Series</p>	<p>Polymer Aluminum Electrolytic Capacitors ECAS Series</p>	<p>Thermistors PRF Series</p>

## 6 Power Supply (AC)

<p>Monolithic Ceramic Capacitors for Medium Voltage GR/GA Series</p>	<p>Medium High Voltage Ceramic Capacitors DEA/DES Series</p>
<p>Safety Standard Certified Ceramic Capacitors Type KX/KY</p>	<p>Chip Inductors (Chip Coils) LQM/LQH Series</p>

**7 Power Supply (PoE)**

Monolithic Ceramic Capacitors for Medium Voltage GR/GA Series



Medium High Voltage Ceramic Capacitors DEA/DES Series



Metal Terminal Type Monolithic Ceramic Capacitors KRM Series



Crystal Units XRCGB Series



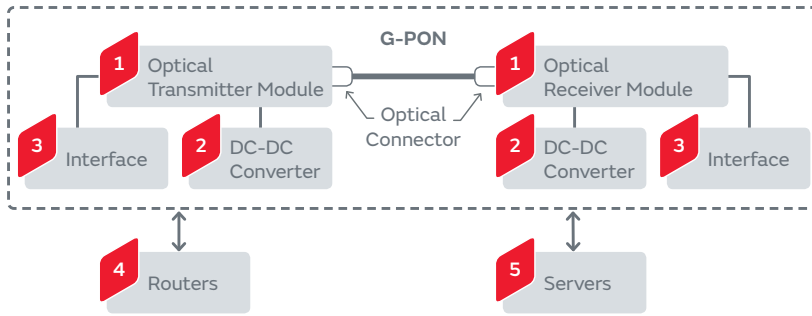
Chip Inductors (Chip Coils) LQM/LQH Series



General Purpose

Monolithic Ceramic Capacitors	GRM/GJM Series	High Frequency Filter Circuit	
Monolithic Ceramic Capacitors	GRM Series	Coupling/Decoupling/For Step-up	
Resin External Electrode Monolithic Ceramic Capacitors	GRJ Series	Coupling/Decoupling/For Step-up	
Polymer Aluminum Electrolytic Capacitors	ECAS Series	Smoothing/Transient Backup	
Chip Inductors (Chip Coils)	LQW/LQP/LQG Series	High Frequency Circuit-Impedance Matching/Resonance	
Chip Inductors (Chip Coils)	LQM/LQH Series	Voltage Conversion	
Chip Ferrite Beads	BLM Series	Noise Suppression	
3 Terminal Capacitors	NFM/NFE Series	Noise Suppression	
Chip Common Mode Choke Coils	DLW/DLP Series	Noise Suppression	
Microwave Absorbers	EA Series	Noise Suppression	
Ferrite Cores	FS Series	Noise Suppression	
Thin Type Sandwich Cores	FSSA Series	Noise Suppression	

# G-PON



## 1 Optical Transmitter Module/Optical Receiver Module

Monolithic Ceramic Capacitors  
(Top & Bottom Electrode  
Type for Bonding)  
GMA Series



Single Layer Microchip Capacitors  
CLB Series



Monolithic Ceramic Capacitors  
(Compatible to Bonding  
/AuSn Soldering)  
GMD Series



Thin Film Circuit Substrate RUSUB®  
RUCYT Series



## 2 DC-DC Converter

DC-DC Converters  
MYB Series



DC-DC Converters  
OKL Series



Micro DC-DC Converters  
LXDC Series



Polymer Aluminum Electrolytic Capacitors  
ECAS Series



Thermistors  
PRF Series



## 3 Interface

Low ESL Monolithic Ceramic Capacitors  
LLL/LLA/LLM Series



Crystal Units  
XRCGB Series



Chip Common Mode Choke Coils  
DLW/DLP Series



ESD Protection Devices  
LXES Series



## 4 Routers

Low ESL Monolithic  
Ceramic Capacitors  
LLL/LLA/LLM Series



Medium High Voltage  
Ceramic Capacitors  
DEA/DES Series



Monolithic Ceramic Capacitors  
(Compatible to Bonding/AuSn Soldering)  
GMD Series



Supercapacitors (EDLC)  
DMT Series



Monolithic Ceramic Capacitors  
for Medium Voltage  
GR/GA Series



Monolithic Ceramic Capacitors  
(Top & Bottom Electrode  
Type for Bonding)  
GMA Series



Crystal Units  
XRCGB Series



Chip Common Mode Choke Coils  
DLW/DLP Series



## 5 Servers

Shock Sensors  
PKGS Series



Supercapacitors (EDLC)  
DMT Series



Polymer Aluminum  
Electrolytic Capacitors  
ECAS Series

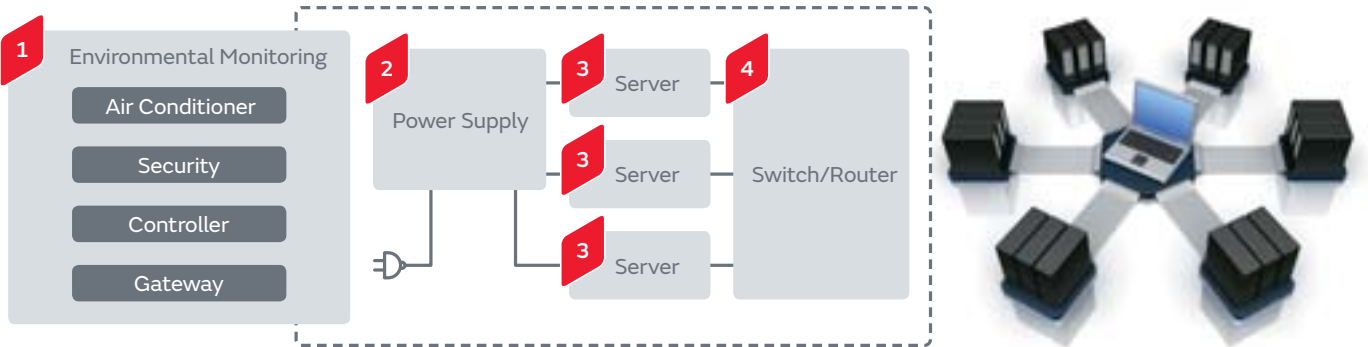


Crystal Units  
XRCGB Series



General Purpose	Monolithic Ceramic Capacitors	GRM/GJM Series	High Frequency Filter Circuit	
	Monolithic Ceramic Capacitors	GRM Series	Coupling/Decoupling/For Step-up	
	Resin External Electrode Monolithic Ceramic Capacitors	GRJ Series	Coupling/Decoupling/For Step-up	
	Polymer Aluminum Electrolytic Capacitors	ECAS Series	Smoothing/Transient Backup	
	Chip Inductors (Chip Coils)	LQW/LQP/LQG Series	High Frequency Circuit-Impedance Matching/Resonance	
	Chip Inductors (Chip Coils)	LQM/LQH Series	Voltage Conversion	
	Chip Ferrite Beads	BLM Series	Noise Suppression	
	3 Terminal Capacitors	NFM/NFE Series	Noise Suppression	
	Chip Common Mode Choke Coils	DLW/DLP Series	Noise Suppression	
	Microwave Absorbers	EA Series	Noise Suppression	
	Ferrite Cores	FS Series	Noise Suppression	
	Thin Type Sandwich Cores	FSSA Series	Noise Suppression	
	Small Energy Devices	UMAC Series	Battery Backup	

# Data Center



### 1 Environmental Monitoring

- Wi-Fi® Modules
- Sub-GHz Modules
- AMR Sensors (Magnetic Sensors) MR Series
- Pressure Sensors ZPA Series
- Shock Sensors PKGS Series
- Thermistors NCP Series

### 2 Power Supply

- 3-phase PFC Converters MPA Series
- DC-DC Converters for High Voltage Direct Current (HVDC) MPA Series

### 3 Server

- Shock Sensors PKGS Series
- Isolated DC-DC Converters MYB Series
- Non-isolated DC-DC Converters OKL/MPDR/MPDT Series
- Supercapacitors (EDLC) DMT Series
- Polymer Aluminum Electrolytic Capacitors ECAS Series
- Crystal Units XRCGB Series

### 4 Switch/Router

- Isolated DC-DC Converters MYB Series
- Non-isolated DC-DC Converters OKL/MPDR/MPDT Series
- Low ESL Monolithic Ceramic Capacitors LLL/LLA/LLM Series
- Monolithic Ceramic Capacitors for Medium Voltage GR/GA Series
- Medium High Voltage Ceramic Capacitors DEA/DES Series
- Monolithic Ceramic Capacitors (Top & Bottom Electrode Type for Bonding) GMA Series
- Monolithic Ceramic Capacitors (Compatible to Bonding /AuSn Soldering) GMD Series
- Crystal Units XRCGB Series
- Supercapacitors (EDLC) DMT Series
- Chip Common Mode Choke Coils DLW/DLP Series

General Purpose	Monolithic Ceramic Capacitors	GRM/GJM Series	High Frequency Filter Circuit	
	Monolithic Ceramic Capacitors	GRM Series	Coupling/Decoupling/For Step-up	
	Resin External Electrode Monolithic Ceramic Capacitors	GRJ Series	Coupling/Decoupling/For Step-up	
	Polymer Aluminum Electrolytic Capacitors	ECAS Series	Smoothing/Transient Backup	
	Chip Inductors (Chip Coils)	LQW/LQP/LQG Series	High Frequency Circuit-Impedance Matching/Resonance	
	Chip Inductors (Chip Coils)	LQM/LQH Series	Voltage Conversion	
	Chip Ferrite Beads	BLM Series	Noise Suppression	
	3 Terminal Capacitors	NFM/NFE Series	Noise Suppression	
	Chip Common Mode Choke Coils	DLW/DLP Series	Noise Suppression	
	Microwave Absorbers	EA Series	Noise Suppression	
	Ferrite Cores	FS Series	Noise Suppression	
	Thin Type Sandwich Cores	FSSA Series	Noise Suppression	
	Small Energy Devices	UMAC Series	Battery Backup	

# Automotive

## Powertrain/Safety

1

ECU

2

AT

3

Auxiliary Motors

4

TPMS

5

ABS/ESC

6

Headlamp

7

EPS

8

Fuel Injection System



## 1 ECU

Low Temperature Co-fired Ceramics (LTCC) Ceramic Multilayer Substrates LFC®



Metal Terminal Type Monolithic Ceramic Capacitors KCM Series



Monolithic Ceramic Capacitors GCM/GCJ Series



Monolithic Ceramic Capacitors for Conductive Glue Mounting GCG Series



Radial Lead Type Monolithic Ceramic Capacitors RH Series



Ceramic Resonators CERALOCK® CSTCE/CSTCR Series



Crystal Units XRCHA-F-A Series



Accelerometers SCA Series



Gyro Sensors SCC Series



Thermistors PRF/PTG Series

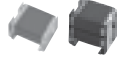


## 2 AT

Low Temperature Co-fired Ceramics (LTCC) Ceramic Multilayer Substrates LFC®



Metal Terminal Type Monolithic Ceramic Capacitors KCM Series



Ceramic Resonators CERALOCK® CSTCE/CSTCR Series



Crystal Units XRCHA-F-A Series



Accelerometers SCA Series



Thermistors PRF/PTG Series

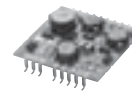


## 3 Auxiliary Motors

Low Temperature Co-fired Ceramics (LTCC) Ceramic Multilayer Substrates LFC®



DC-DC Converters



Metal Terminal Type Monolithic Ceramic Capacitors KCM Series



Radial Lead Type Monolithic Ceramic Capacitors RH Series



Ceramic Resonators CERALOCK® CSTCE/CSTCR Series



Large Current Common Mode Choke Coils PLT10HH Series



Thermistors PRF/PTG Series



## 4 TPMS

Shock Sensors PKGS Series



Ceramic Filters CERAFIL® SFECF Series



Ceramic Discriminators CDSCB Series



Ceramic Resonators CERALOCK® CSTCE/CSTCR Series



Crystal Units XRCHA-F-A Series




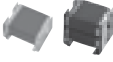







Pressure Sensor Elements



Thermistors PRF Series




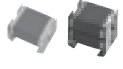


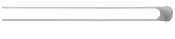






**5 ABS/ESC**

<p>Low Temperature Co-fired Ceramics (LTCC) Ceramic Multilayer Substrates LFC®</p> 	<p>Metal Terminal Type Monolithic Ceramic Capacitors KCM Series</p> 	<p>Monolithic Ceramic Capacitors GCM/GCJ Series</p> 	<p>Monolithic Ceramic Capacitors for Conductive Glue Mounting GCG Series</p> 	<p>Ceramic Resonators CERALOCK® CSTCE/CSTCR Series</p> 
<p>Crystal Units XRCHA-F-A Series</p> 	<p>Accelerometers SCA Series</p> 	<p>Gyro Sensors SCC Series</p> 	<p>Thermistors for Conductive Glue Mounting NCG18 Series</p> 	


**6 Headlamp**


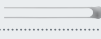






<p>Monolithic Ceramic Capacitors GCM/GCJ Series</p> 	<p>Monolithic Ceramic Capacitors for Conductive Glue Mounting GCG Series</p> 
<p>Ceramic Resonators CERALOCK® CSTCE/CSTCR Series</p> 	<p>Crystal Units XRCHA-F-A Series</p> 
<p>Thermistors for Conductive Glue Mounting NCG18 Series</p> 	

**7 EPS**

<p>Low Temperature Co-fired Ceramics (LTCC) Ceramic Multilayer Substrates LFC®</p> 	<p>Metal Terminal Type Monolithic Ceramic Capacitors KCM Series</p> 	<p>Monolithic Ceramic Capacitors GCM/GCJ Series</p> 
<p>Monolithic Ceramic Capacitors for Conductive Glue Mounting GCG Series</p> 	<p>Radial Lead Type Monolithic Ceramic Capacitors RCE Series</p> 	<p>Ceramic Resonators CERALOCK® CSTCE/CSTCR Series</p> 
<p>Crystal Units XRCHA-F-A Series</p> 	<p>Thermistors for Conductive Glue Mounting NCG18 Series</p> 	<p>Accelerometers SCA Series</p> 
<p>Gyro Sensors SCC Series</p> 	<p>Thermistors PRF/PTG Series</p> 	

**8 Fuel Injection System**

<p>Radial Lead Type Monolithic Ceramic Capacitors RPF Series</p> 
--

General Purpose (High Reliability)	Monolithic Ceramic Capacitors	GCM Series	Coupling/Decoupling		150°C
	Radial Lead Type Monolithic Ceramic Capacitors	RCE Series	Noise Suppression/Decoupling		125°C
	Radial Lead Type Monolithic Ceramic Capacitors	RH Series	Noise Suppression/Decoupling		150°C
	Chip Inductors (Chip Coils)	LQH32CH Series	Voltage Conversion		105°C
	Chip Inductors (Chip Coils)	LQG15HH Series	Impedance Matching/Choke		125°C
	Chip Ferrite Beads	BLM_SH Series	Noise Suppression		125°C
	3 Terminal Capacitors	NFM_H/NFE_H Series	Noise Suppression		125°C
	Chip Common Mode Choke Coils	DLW31SH/DLW43SH Series	Common Mode Noise Suppression		125°C

105°C 105°C max. 125°C 125°C max. 150°C 150°C max.

## HEV/PHEV/EV

1

Charger

2

BMS

3

Electrically-Driven Compressor

4

Electric Pump

5

Inverter

6

DC-DC Converter



### 1 Charger

Metal Terminal Type Monolithic Ceramic Capacitors KCM Series

Monolithic Ceramic Capacitors GCM/GCJ Series

Safety Standard Certified Ceramic Capacitors Type KJ

Ceramic Resonators CERALOCK® CSTCE Series

Crystal Units XRCHA-F-A Series

Large Current Common Mode Choke Coils PLT10HH Series

Thermistors PRF/PTG Series

### 2 BMS

DC-DC Converters

Metal Terminal Type Monolithic Ceramic Capacitors KCM Series

Monolithic Ceramic Capacitors GCM/GCJ Series

Monolithic Ceramic Capacitors for Conductive Glue Mounting GCG Series

Ceramic Resonators CERALOCK® CSTCE Series

Crystal Units XRCHA-F-A Series

Thermistors PRF/PTG Series

### 3 Electrically-driven Compressor

Metal Terminal Type Monolithic Ceramic Capacitors KCM Series

Monolithic Ceramic Capacitors GCM/GCJ Series

Monolithic Ceramic Capacitors for Conductive Glue Mounting GCG Series

Thermistors PRF/PTG Series

### 4 Electric Pump

Metal Terminal Type Monolithic Ceramic Capacitors KCM Series

Monolithic Ceramic Capacitors GCM/GCJ Series

Monolithic Ceramic Capacitors for Conductive Glue Mounting GCG Series

Large Current Common Mode Choke Coils PLT10HH Series

Thermistors PRF/PTG Series

### 5 Inverter

Metal Terminal Type Monolithic Ceramic Capacitors KCM Series

Monolithic Ceramic Capacitors GCM/GCJ Series

Monolithic Ceramic Capacitors for Conductive Glue Mounting GCG Series

Radial Lead Type Monolithic Ceramic Capacitors RH Series

Large Current Common Mode Choke Coils PLT10HH Series

Thermistors PRF/PTG Series

### 6 DC-DC Converter

Metal Terminal Type Monolithic Ceramic Capacitors KCM Series

Monolithic Ceramic Capacitors GCM/GCJ Series

Monolithic Ceramic Capacitors for Conductive Glue Mounting GCG Series

Ceramic Resonators CERALOCK® CSTCE/CSTCR Series

Crystal Units XRCHA-F-A Series

Large Current Common Mode Choke Coils PLT10HH Series

Thermistors PRF/PTG Series

General Purpose (High Reliability)	Monolithic Ceramic Capacitors	GCM Series	Coupling/Decoupling		150°C
	Radial Lead Type Monolithic Ceramic Capacitors	RCE Series	Noise Suppression/Decoupling		125°C
	Radial Lead Type Monolithic Ceramic Capacitors	RH Series	Noise Suppression/Decoupling		150°C
	Chip Inductors (Chip Coils)	LQH32CH Series	Voltage Conversion		105°C
	Chip Inductors (Chip Coils)	LQG15HH Series	Impedance Matching/Choke		125°C
	Chip Ferrite Beads	BLM_SH Series	Noise Suppression		125°C
	3 Terminal Capacitors	NFM_H/NFE_H Series	Noise Suppression		125°C
	Chip Common Mode Choke Coils	DLW31SH/DLW43SH Series	Common Mode Noise Suppression		125°C

105°C 105°C max. 125°C 125°C max. 150°C 150°C max.

## Information/Comfort/Accessory

1 Navigation/  
Infotainment

2 RKE

3 Meter/HUD

4 Power Seat/  
Power Mirror

5 Parking Assist



### 1 Navigation/Infotainment

Rotary Position Sensors  
SV Series



Accelerometers  
SCA Series



Supercapacitors (EDLC)  
DMT Series



Ceramic Filters CERAFIL®  
SFECF Series



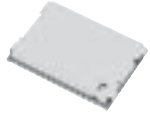
Ceramic Discriminators  
CDSCB Series



Piezoelectric Sounders  
PKLCS Series



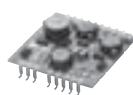
Bluetooth® Modules



Wi-Fi® Modules



DC-DC Converters



Ceramic Resonators CERALOCK®  
CSTCE/CSTCR Series



Crystal Units  
XRCHA-F-A Series



Thermistors  
PRF/PRG/PTG Series



### 2 RKE

Supercapacitors (EDLC)  
DMT Series



Small Energy Devices  
UMAC Series



Ceramic Filters CERAFIL®  
SFECF Series



Ceramic Discriminators  
CDSCB Series



Ceramic Resonators CERALOCK®  
CSTCE/CSTCR Series



Crystal Units  
XRCHA-F-A Series



Piezoelectric Diaphragms  
7BB Series



### 3 Meter/HUD

Rotary Position Sensors  
SV Series



DC-DC Converters



Ceramic Resonators CERALOCK®  
CSTCE/CSTCR Series



Crystal Units  
XRCHA-F-A Series



Piezoelectric Sounders  
PKM/PKLCS Series



Thermistors  
PRF/PTG Series



### 4 Power Seat/Power Mirror

Piezoelectric Sounders  
PKLCS Series



Ceramic Resonators CERALOCK®  
CSTCE/CSTCR Series



Crystal Units  
XRCHA-F-A Series



Thermistors  
PRF/PTG Series



### 5 Parking Assist

Ultrasonic Sensors  
MA Series



Accelerometers  
SCA Series



Supercapacitors (EDLC)  
DMT Series



Piezoelectric Sounders  
PKM/PKLCS Series



Ceramic Resonators CERALOCK®  
CSTCE/CSTCR Series



Crystal Units  
XRCHA-F-A Series



Thermistors  
PRF/PTG Series



### General Purpose

Monolithic Ceramic Capacitors

GRT Series

Coupling/Decoupling



Monolithic Ceramic Capacitors for Medium Voltage

GRM Series

For Snubber



Radial Lead Type Monolithic Ceramic Capacitors

RCE Series

Noise Suppression/Decoupling



Chip Inductors (Chip Coils)

LQM/LQH Series

Voltage Conversion



Chip Ferrite Beads

BLM Series

Noise Suppression



EMI Suppression Filters EMIFIL®

NFM/NFA/NFL/NFE/NFW/NFR Series

Noise Suppression



Chip Common Mode Choke Coils

DLW Series

Common Mode Noise Suppression



Ferrite Cores

FS Series

Noise Suppression



# Bike/EV Bike

## Electromotive

1 Charger/Battery

2 Inverter

3 DC-DC Converter

## Electric Installation

4 Accelerometer for Fuel Cut

5 Headlamp

6 Fuel Injection System

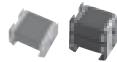


## 1 Charger/Battery

Lithium Ion Storage Modules



Metal Terminal Type Monolithic Ceramic Capacitors KCM Series



Monolithic Ceramic Capacitors GCM/GCJ Series



Safety Standard Certified Ceramic Capacitors Type KJ



Ceramic Resonators CERALOCK® CSTCE Series



Crystal Units XRCHA-F-A Series



Large Current Common Mode Choke Coils PLT10HH Series



Thermistors PRF/PTG Series



## 2 Inverter

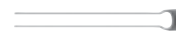
Monolithic Ceramic Capacitors GCM/GCJ Series



Monolithic Ceramic Capacitors for Conductive Glue Mounting GCG Series



Radial Lead Type Monolithic Ceramic Capacitors RH Series



Large Current Common Mode Choke Coils PLT10HH Series



Thermistors PRF/PTG Series

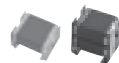


## 3 DC-DC Converter

DC-DC Converters



Metal Terminal Type Monolithic Ceramic Capacitors KCM Series



Monolithic Ceramic Capacitors GCM/GCJ Series



Monolithic Ceramic Capacitors for Conductive Glue Mounting GCG Series



Ceramic Resonators CERALOCK® CSTCE/CSTCR Series



Crystal Units XRCHA-F-A Series



Large Current Common Mode Choke Coils PLT10HH Series











Thermistors PRF/PTG Series








General Purpose (High Reliability)	Monolithic Ceramic Capacitors	GCM Series	Coupling/Decoupling		150°C
	Radial Lead Type Monolithic Ceramic Capacitors	RCE Series	Noise Suppression/Decoupling		125°C
	Radial Lead Type Monolithic Ceramic Capacitors	RH Series	Noise Suppression/Decoupling		150°C
	Chip Inductors (Chip Coils)	LQH32CH Series	Voltage Conversion		105°C
	Chip Inductors (Chip Coils)	LQG15HH Series	Impedance Matching/Choke		125°C
	Chip Ferrite Beads	BLM_SH Series	Noise Suppression		125°C
	3 Terminal Capacitors	NFM_H/NFE_H Series	Noise Suppression		125°C
	Chip Common Mode Choke Coils	DLW31SH/DLW43SH Series	Common Mode Noise Suppression		125°C

105°C 105°C max. 125°C 125°C max. 150°C 150°C max.

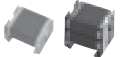





**4 Accelerometer for Fuel Cut**



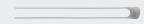




Metal Terminal Type Monolithic Ceramic Capacitors KCM Series 	Monolithic Ceramic Capacitors GCM/GCJ Series 	Monolithic Ceramic Capacitors for Conductive Glue Mounting GCG Series 
Ceramic Resonators CERALOCK® CSTCE/CSTCR Series 	Crystal Units XRCHA-F-A Series 	Accelerometers SCA Series 
Gyro Sensors SCC Series 	Thermistors for Conductive Glue Mounting NCG18 Series 	

**5 Headlamp**

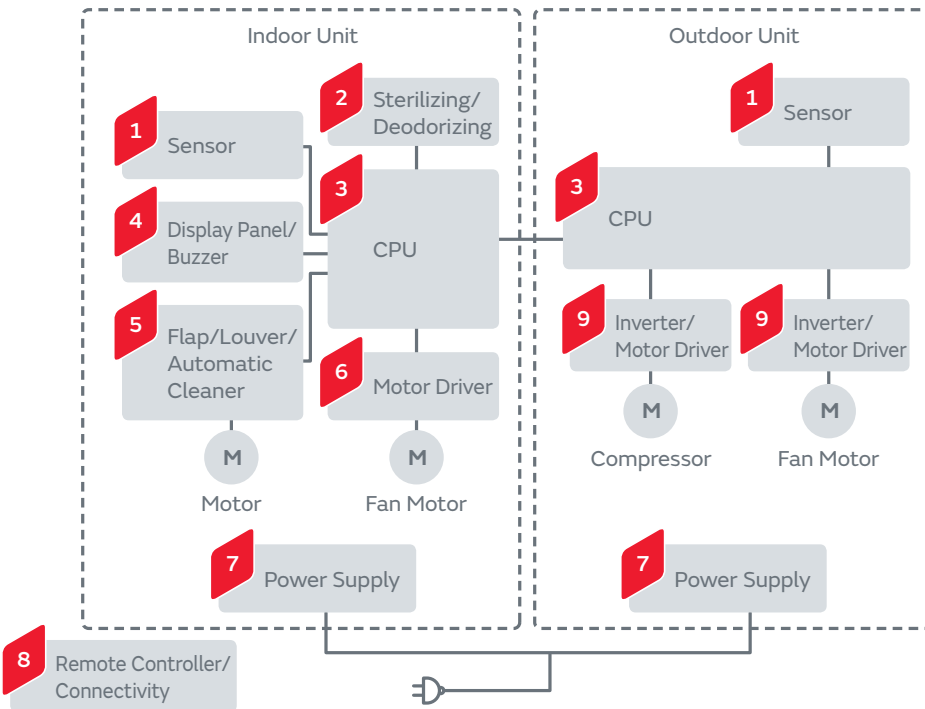
Monolithic Ceramic Capacitors GCM/GCJ Series 	Monolithic Ceramic Capacitors for Conductive Glue Mounting GCG Series 
Ceramic Resonators CERALOCK® CSTCE/CSTCR Series 	Crystal Units XRCHA-F-A Series 
Thermistors for Conductive Glue Mounting NCG18 Series 	

**6 Fuel Injection System**

Metal Terminal Type Monolithic Ceramic Capacitors KCM Series 	Monolithic Ceramic Capacitors GCM/GCJ Series 	Monolithic Ceramic Capacitors for Conductive Glue Mounting GCG Series 
Ceramic Resonators CERALOCK® CSTCE/CSTCR Series 	Crystal Units XRCHA-F-A Series 	Thermistors PRF/PTG Series 

General Purpose	Monolithic Ceramic Capacitors	GRT Series	Coupling/Decoupling	
	Monolithic Ceramic Capacitors for Medium Voltage	GRM Series	For Snubber	
	Radial Lead Type Monolithic Ceramic Capacitors	RCE Series	Noise Suppression/Decoupling	
	Chip Inductors (Chip Coils)	LQM/LQH Series	Voltage Conversion	
	Chip Ferrite Beads	BLM Series	Noise Suppression	
	EMI Suppression Filters EMIFIL®	NFM/NFA/NFL/NFE/NFW/NFR Series	Noise Suppression	
	Chip Common Mode Choke Coils	DLW Series	Common Mode Noise Suppression	
	Ferrite Cores	FS Series	Noise Suppression	

# Air Conditioner



### 1 Sensor

- Pyroelectric Infrared Sensors IRA Series
- Ultrasonic Sensors MA Series
- Thermistors NCP/NXR/PRF Series

### 2 Sterilizing/Deodorizing

- Ionizer Modules Ionissimo® MHM300 Series
- Ozonizer Modules Ionissimo® MHM500 Series
- High Voltage Power MPH4602 Series
- High Voltage Resistors MHR Series

### 3 CPU

- Ceramic Resonators CERALOCK® CSTLS/CSTCE/CSTCR Series

### 4 Display Panel/Buzzer

- Ceramic Resonators CERALOCK® CSTLS/CSTCE/CSTCR Series
- Piezoelectric Sounders PKM/PKLC Series

### 5 Flap/Louver/Automatic Cleaner

- Rotary Position Sensors SV Series

### 6 Motor Driver

- Thermistors NCP/NXR/PRF Series

### 7 Power Supply

- Monolithic Ceramic Capacitors for Medium Voltage GR/GA Series
- Medium High Voltage Ceramic Capacitors DEA/DES Series
- Safety Standard Certified Ceramic Capacitors Type KX/KY
- Thermistors NTP/PTG Series

**8 Remote Controller/Connectivity**

Bluetooth® Modules



Wi-Fi® Modules



Sub-GHz Modules



Microwave Coaxial Connectors



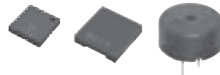
Micro DC-DC Converters LXDC Series



Ceramic Resonators CERALOCK® CSTLS/CSTCE/CSTCR Series



Piezoelectric Sounders PKMCS/PKLCs/PKM Series



Chip Inductors (Chip Coils) LQB Series



**9 Inverter/Motor Driver**

Ceramic Resonators CERALOCK® CSTLS/CSTCE/CSTCR Series



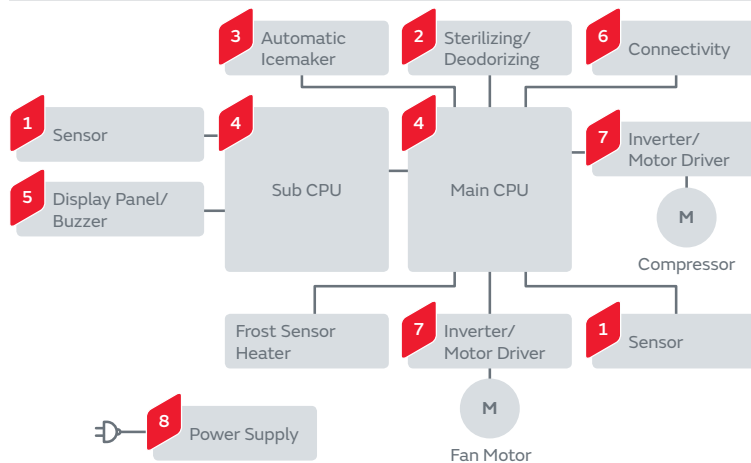
Thermistors NCP/NXR/PRF Series



General Purpose

Monolithic Ceramic Capacitors	GRM/GJM Series	High Frequency Filter Circuit	
Monolithic Ceramic Capacitors	GRM Series	Coupling/Decoupling/For Step-up	
Resin External Electrode Monolithic Ceramic Capacitors	GRJ Series	Coupling/Decoupling/For Step-up	
Polymer Aluminum Electrolytic Capacitors	ECAS Series	Smoothing/Transient Backup	
Chip Inductors (Chip Coils)	LQW/LQP/LQG Series	High Frequency Circuit-Impedance Matching/Resonance	
Chip Inductors (Chip Coils)	LQM/LQH Series	Voltage Conversion	
Chip Ferrite Beads	BLM Series	Noise Suppression	
3 Terminal Capacitors	NFM/NFE Series	Noise Suppression	
Chip Common Mode Choke Coils	DLW/DLP Series	Noise Suppression	
Microwave Absorbers	EA Series	Noise Suppression	
Ferrite Cores	FS Series	Noise Suppression	
Thin Type Sandwich Cores	FSSA Series	Noise Suppression	
Small Energy Devices	UMAC Series	Battery Backup	

# Refrigerator



### 1 Sensor

Pyroelectric Infrared Sensors IRA Series      Thermistors NCP/NXR/PRF Series

### 2 Sterilizing/Deodorizing

Ionizer Modules Ionissimo® MHM300 Series      Ozonizer Modules Ionissimo® MHM500 Series

High Voltage Power MPH4602 Series      High Voltage Resistors MHR Series      Microblowers

### 3 Automatic Icemaker

Microblowers

### 5 Display Panel/Buzzer

Ceramic Resonators CERALOCK® CSTLS/CSTCE/CSTCR Series      Piezoelectric Sounders PKM/PKLCs Series

### 4 CPU

Ceramic Resonators CERALOCK® CSTLS/CSTCE/CSTCR Series

### 6 Connectivity

Bluetooth® Modules      Wi-Fi® Modules      Sub-GHz Modules

Microwave Coaxial Connectors      Micro DC-DC Converters LXDC Series      Chip Inductors (Chip Coils) LQB Series

### 7 Inverter/Motor Driver

Thermistors NCP/NXR/PRF Series

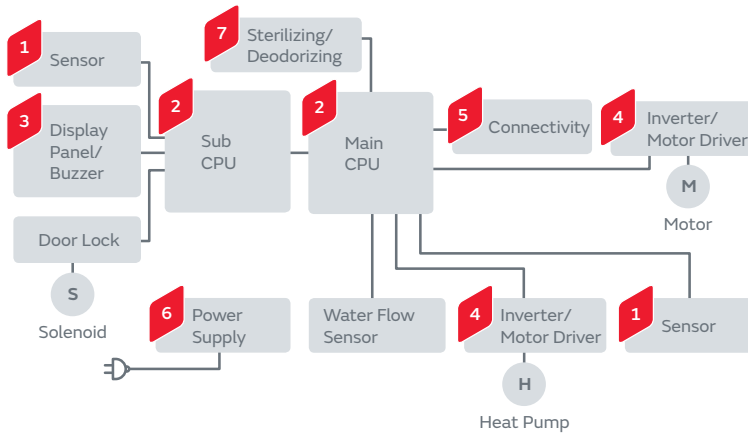
### 8 Power Supply

Monolithic Ceramic Capacitors for Medium Voltage GR/GA Series      Medium High Voltage Ceramic Capacitors DEA/DES Series

Safety Standard Certified Ceramic Capacitors Type KX/KY      Thermistors NTP/PTG Series

General Purpose	Monolithic Ceramic Capacitors	GRM/GJM Series	High Frequency Filter Circuit	
	Monolithic Ceramic Capacitors	GRM Series	Coupling/Decoupling/For Step-up	
	Resin External Electrode Monolithic Ceramic Capacitors	GRJ Series	Coupling/Decoupling/For Step-up	
	Polymer Aluminum Electrolytic Capacitors	ECAS Series	Smoothing/Transient Backup	
	Chip Inductors (Chip Coils)	LQW/LQP/LQG Series	High Frequency Circuit-Impedance Matching/Resonance	
	Chip Inductors (Chip Coils)	LQM/LQH Series	Voltage Conversion	
	Chip Ferrite Beads	BLM Series	Noise Suppression	
	3 Terminal Capacitors	NFM/NFE Series	Noise Suppression	
	Chip Common Mode Choke Coils	DLW/DLP Series	Noise Suppression	
	Microwave Absorbers	EA Series	Noise Suppression	
	Ferrite Cores	FS Series	Noise Suppression	
	Thin Type Sandwich Cores	FSSA Series	Noise Suppression	
	Small Energy Devices	UMAC Series	Battery Backup	

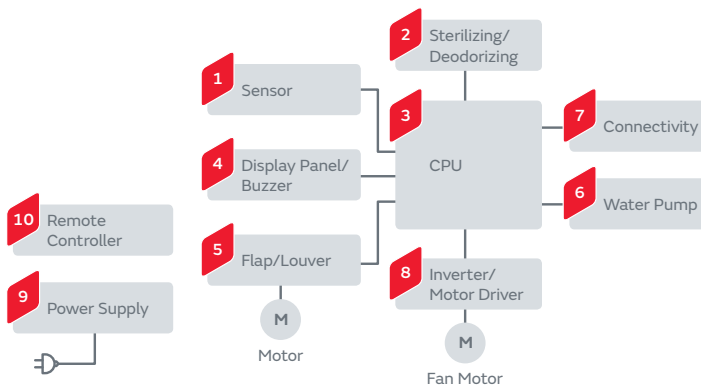
# Washing Machine



<b>1 Sensor</b> Thermistors NCP/NXR/PRF Series 	<b>2 CPU</b> Ceramic Resonators CERALOCK® CSTLS/CSTCE/CSTCR Series 	<b>3 Display Panel/Buzzer</b> Rotary Position Sensors SV Series Ceramic Resonators CERALOCK® CSTLS/CSTCE/CSTCR Series Piezoelectric Sounders PKM Series 
<b>4 Inverter/Motor Driver</b> Thermistors NCP/NXR/PRF Series 	<b>5 Connectivity</b> Bluetooth® Modules Wi-Fi® Modules Sub-GHz Modules Microwave Coaxial Connectors Micro DC-DC Converters LXDC Series Chip Inductors (Chip Coils) LQB Series 	
<b>6 Power Supply</b> Monolithic Ceramic Capacitors for Medium Voltage GR/GA Series Medium High Voltage Ceramic Capacitors DEA/DES Series Safety Standard Certified Ceramic Capacitors Type KX/KY Thermistors NTP/PTG Series 		<b>7 Sterilizing/Deodorizing</b> Ozonizer Modules Ionissimo® MHM500 Series High Voltage Power MPH4602 Series 

General Purpose	Monolithic Ceramic Capacitors	GRM/GJM Series	High Frequency Filter Circuit	
	Monolithic Ceramic Capacitors	GRM Series	Coupling/Decoupling/For Step-up	
	Resin External Electrode Monolithic Ceramic Capacitors	GRJ Series	Coupling/Decoupling/For Step-up	
	Polymer Aluminum Electrolytic Capacitors	ECAS Series	Smoothing/Transient Backup	
	Chip Inductors (Chip Coils)	LQM/LQP/LQG Series	High Frequency Circuit-Impedance Matching/Resonance	
	Chip Inductors (Chip Coils)	LQM/LQH Series	Voltage Conversion	
	Chip Ferrite Beads	BLM Series	Noise Suppression	
	3 Terminal Capacitors	NFM/NFE Series	Noise Suppression	
	Chip Common Mode Choke Coils	DLW/DLP Series	Noise Suppression	
	Microwave Absorbers	EA Series	Noise Suppression	
	Ferrite Cores	FS Series	Noise Suppression	
	Thin Type Sandwich Cores	FSSA Series	Noise Suppression	
	Small Energy Devices	UMAC Series	Battery Backup	

# Air Purifier



### 1 Sensor

Pyroelectric Infrared Sensors  
IRA Series

Ultrasonic Sensors  
MA Series

Thermistors  
NCP/NXR/PRF Series

### 2 Sterilizing/Deodorizing

Ionizer Modules  
Ionissimo®  
MHM300 Series

Ozonizer Modules  
Ionissimo®  
MHM500 Series

High Voltage Power  
MPH4602 Series

High Voltage  
Resistors  
MHR Series

### 3 CPU

Micro DC-DC Converters  
LXDC Series

Ceramic Resonators CERALOCK®  
CSTLS/CSTCE/CSTCR Series

### 4 Display Panel/Buzzer

Ceramic Resonators CERALOCK®  
CSTLS/CSTCE/CSTCR Series

Piezoelectric Sounders  
PKM/PK LCS Series

### 5 Flap/Louver

Rotary Position Sensors  
SV Series

### 6 Water Pump

Microblowers

### 8 Inverter/Motor Driver

Thermistors  
NCP/NXR/PRF Series

### 7 Connectivity

Bluetooth®  
Modules

Wi-Fi®  
Modules

Sub-GHz Modules

Microwave  
Coaxial Connectors

Chip Inductors  
(Chip Coils)  
LQB Series

Micro DC-DC Converters  
LXDC Series

### 9 Power Supply

Monolithic Ceramic Capacitors  
for Medium Voltage  
GR/GA Series

Medium High Voltage  
Ceramic Capacitors  
DEA/DES Series

Safety Standard Certified  
Ceramic Capacitors  
Type KX/KY

AC Line Filters  
PLA/PLY Series

Thermistors  
NTP/PTG Series

### 10 Remote Controller

Micro DC-DC Converters  
LXDC Series

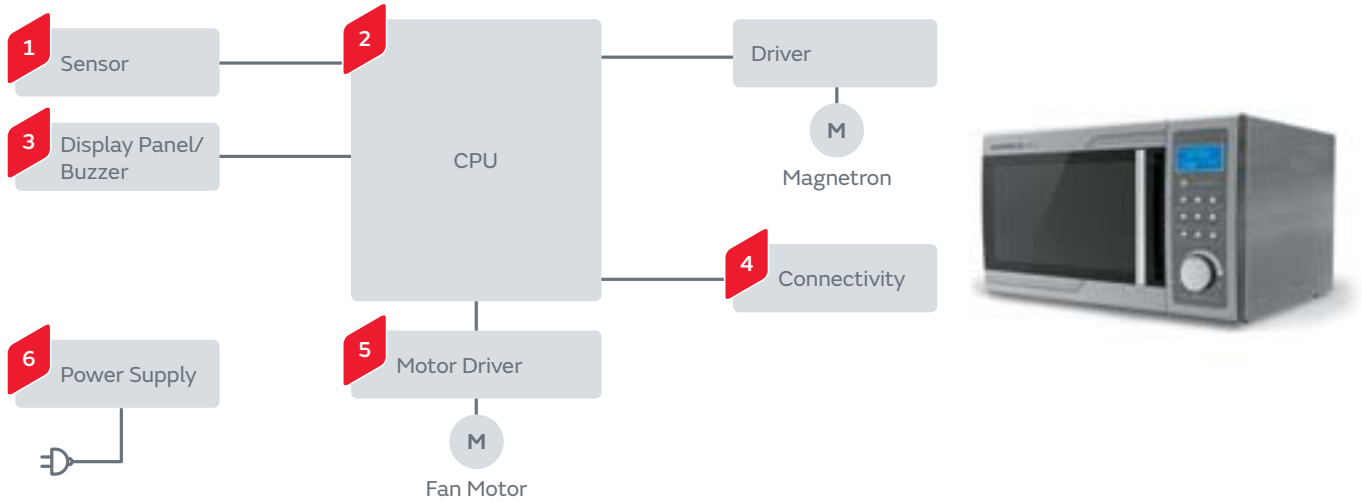
Ceramic Resonators CERALOCK®  
CSTLS/CSTCE/CSTCR Series

Piezoelectric Sounders  
PKMCS/PK LCS/PKM Series

## General Purpose

Monolithic Ceramic Capacitors	GRM/GJM Series	High Frequency Filter Circuit	
Monolithic Ceramic Capacitors	GRM Series	Coupling/Decoupling/For Step-up	
Resin External Electrode Monolithic Ceramic Capacitors	GRJ Series	Coupling/Decoupling/For Step-up	
Polymer Aluminum Electrolytic Capacitors	ECAS Series	Smoothing/Transient Backup	
Chip Inductors (Chip Coils)	LQW/LQP/LQG Series	High Frequency Circuit-Impedance Matching/Resonance	
Chip Inductors (Chip Coils)	LQM/LQH Series	Voltage Conversion	
Chip Ferrite Beads	BLM Series	Noise Suppression	
3 Terminal Capacitors	NFM/NFE Series	Noise Suppression	
Chip Common Mode Choke Coils	DLW/DLP Series	Noise Suppression	
Microwave Absorbers	EA Series	Noise Suppression	
Ferrite Cores	FS Series	Noise Suppression	
Thin Type Sandwich Cores	FSSA Series	Noise Suppression	
Small Energy Devices	UMAC Series	Battery Backup	

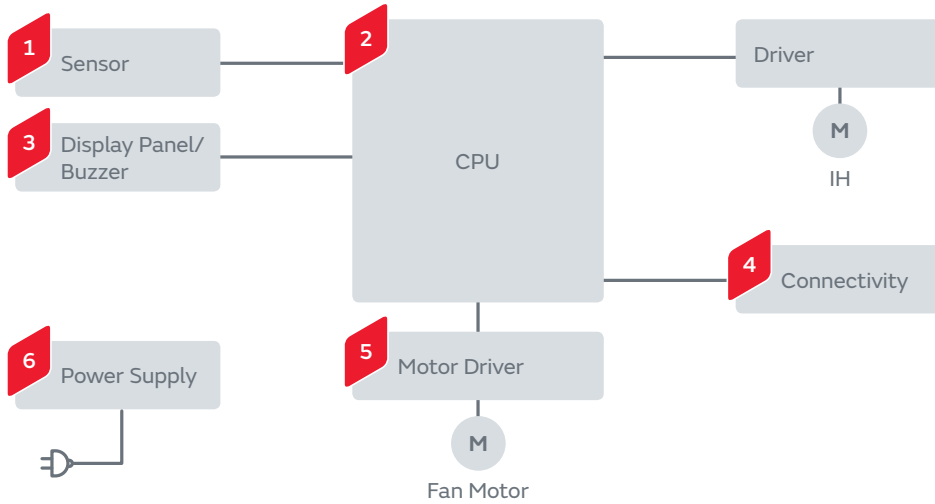
# Microwave Oven



<b>1 Sensor</b> Thermistors NCP/NXR/PRF Series 	<b>2 CPU</b> Ceramic Resonators CERALOCK® CSTLS/CSTCE/CSTCR Series 	<b>4 Connectivity</b> Bluetooth® Modules    Wi-Fi® Modules    Sub-GHz Modules  Microwave Coaxial Connectors    Micro DC-DC Converters LXDC Series  Chip Inductors (Chip Coils) LQB Series 	
<b>3 Display Panel/Buzzer</b> Ceramic Resonators CERALOCK® CSTLS/CSTCE/CSTCR Series    Piezoelectric Sounders PKM/PKLC Series 		<b>6 Power Supply</b> Monolithic Ceramic Capacitors for Medium Voltage GR/GA Series    Medium High Voltage Ceramic Capacitors DEA/DES Series    Safety Standard Certified Ceramic Capacitors Type KX/KY    Thermistors NTP/PTG Series 	
<b>5 Motor Driver</b> Thermistors NCP/NXR/PRF Series 			

General Purpose	Monolithic Ceramic Capacitors	GRM/GJM Series	High Frequency Filter Circuit	
	Monolithic Ceramic Capacitors	GRM Series	Coupling/Decoupling/For Step-up	
	Resin External Electrode Monolithic Ceramic Capacitors	GRJ Series	Coupling/Decoupling/For Step-up	
	Polymer Aluminum Electrolytic Capacitors	ECAS Series	Smoothing/Transient Backup	
	Chip Inductors (Chip Coils)	LQW/LQP/LQG Series	High Frequency Circuit-Impedance Matching/Resonance	
	Chip Inductors (Chip Coils)	LQM/LQH Series	Voltage Conversion	
	Chip Ferrite Beads	BLM Series	Noise Suppression	
	3 Terminal Capacitors	NFM/NFE Series	Noise Suppression	
	Chip Common Mode Choke Coils	DLW/DLP Series	Noise Suppression	
	Microwave Absorbers	EA Series	Noise Suppression	
	Ferrite Cores	FS Series	Noise Suppression	
	Thin Type Sandwich Cores	FSSA Series	Noise Suppression	
	Small Energy Devices	UMAC Series	Battery Backup	

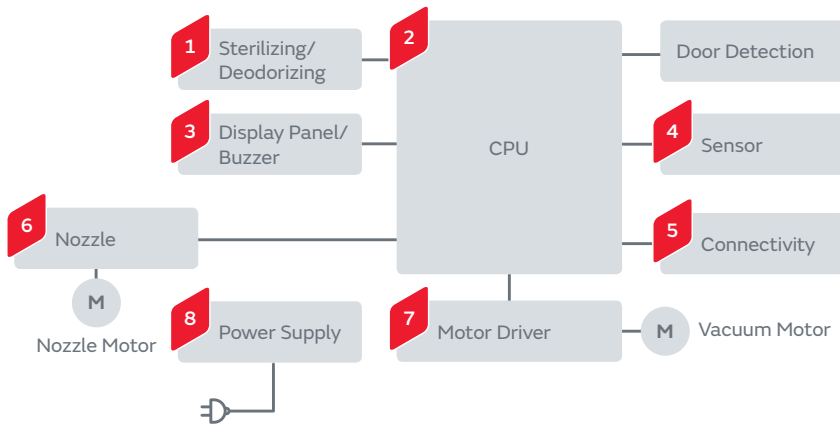
# IH Rice Cooker



<b>1 Sensor</b> Thermistors NCP/NXR/PRF Series 	<b>3 Display Panel/Buzzer</b> Ceramic Resonators CERALOCK® CSTLS/CSTCE/CSTCR Series  Piezoelectric Sounders PKM/PKLCS Series 	<b>4 Connectivity</b> Bluetooth® Modules Wi-Fi® Modules Sub-GHz Modules Microwave Coaxial Connectors Micro DC-DC Converters LXDC Series Chip Inductors (Chip Coils) LQB Series 		
<b>2 CPU</b> Ceramic Resonators CERALOCK® CSTLS/CSTCE/CSTCR Series 	<b>6 Power Supply</b> Monolithic Ceramic Capacitors for Medium Voltage GR/GA Series Medium High Voltage Ceramic Capacitors DEA/DES Series Safety Standard Certified Ceramic Capacitors Type KX/KY Thermistors NTP/PTG Series 			

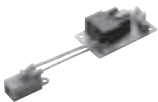
General Purpose	Monolithic Ceramic Capacitors	GRM/GJM Series	High Frequency Filter Circuit	
	Monolithic Ceramic Capacitors	GRM Series	Coupling/Decoupling/For Step-up	
	Resin External Electrode Monolithic Ceramic Capacitors	GRJ Series	Coupling/Decoupling/For Step-up	
	Polymer Aluminum Electrolytic Capacitors	ECAS Series	Smoothing/Transient Backup	
	Chip Inductors (Chip Coils)	LQW/LQP/LQG Series	High Frequency Circuit-Impedance Matching/Resonance	
	Chip Inductors (Chip Coils)	LQM/LQH Series	Voltage Conversion	
	Chip Ferrite Beads	BLM Series	Noise Suppression	
	3 Terminal Capacitors	NFM/NFE Series	Noise Suppression	
	Chip Common Mode Choke Coils	DLW/DLP Series	Noise Suppression	
	Microwave Absorbers	EA Series	Noise Suppression	
	Ferrite Cores	FS Series	Noise Suppression	
	Thin Type Sandwich Cores	FSSA Series	Noise Suppression	
	Small Energy Devices	UMAC Series	Battery Backup	

# Vacuum Cleaner



## 1 Sterilizing/Deodorizing

Ionizer Modules  
Ionissimo®  
MHM300 Series



Ozonizer Modules  
Ionissimo®  
MHM500 Series



High Voltage  
Resistors  
MHR Series



## 2 CPU

Ceramic Resonators CERALOCK®  
CSTLS/CSTCE/CSTCR Series



## 3 Display Panel/Buzzer

Ceramic Resonators CERALOCK®  
CSTLS/CSTCE/CSTCR Series



Piezoelectric Sounders  
PKM/PKLS Series



## 4 Sensor

Ultrasonic Sensors  
MA Series



Thermistors  
NCP Series



## 5 Connectivity

Bluetooth® Modules



Wi-Fi® Modules



Sub-GHz Modules



Microwave  
Coaxial Connectors



Micro DC-DC Converters  
LXDC Series



Chip Inductors  
(Chip Coils)  
LQB Series



## 6 Nozzle

Thermistors  
PTG Series



## 7 Motor Driver

Thermistors  
NCP/NXR/PRF Series



## 8 Power Supply

Monolithic Ceramic Capacitors  
for Medium Voltage  
GR/GA Series



Medium High Voltage  
Ceramic Capacitors  
DEA/DES Series



Safety Standard Certified  
Ceramic Capacitors  
Type KX/KY

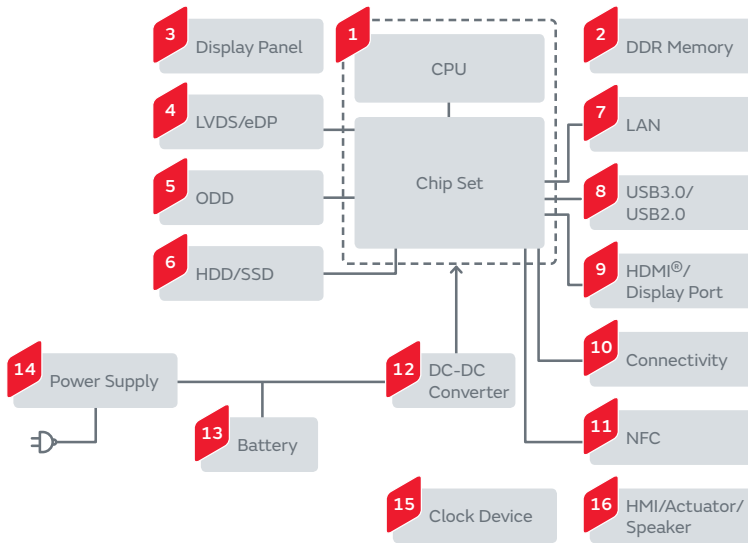


Thermistors  
NTP/PTG Series



General Purpose	Monolithic Ceramic Capacitors	GRM/GJM Series	High Frequency Filter Circuit	
	Monolithic Ceramic Capacitors	GRM Series	Coupling/Decoupling/For Step-up	
	Resin External Electrode Monolithic Ceramic Capacitors	GRJ Series	Coupling/Decoupling/For Step-up	
	Polymer Aluminum Electrolytic Capacitors	ECAS Series	Smoothing/Transient Backup	
	Chip Inductors (Chip Coils)	LQW/LQP/LQG Series	High Frequency Circuit-Impedance Matching/Resonance	
	Chip Inductors (Chip Coils)	LQM/LQH Series	Voltage Conversion	
	Chip Ferrite Beads	BLM Series	Noise Suppression	
	3 Terminal Capacitors	NFM/NFE Series	Noise Suppression	
	Chip Common Mode Choke Coils	DLW/DLP Series	Noise Suppression	
	Microwave Absorbers	EA Series	Noise Suppression	
	Ferrite Cores	FS Series	Noise Suppression	
	Thin Type Sandwich Cores	FSSA Series	Noise Suppression	
	Small Energy Devices	UMAC Series	Battery Backup	

# Tablet Terminators



### 1 CPU/Chip Set

- Micro DC-DC Converters LXDC Series
- Low ESL Monolithic Ceramic Capacitors LLL/LLA/LLM Series
- Polymer Aluminum Electrolytic Capacitors ECAS Series
- Crystal Units XRCGB Series
- Chip Ferrite Beads BLM Series
- 3 Terminal Capacitors NFM Series
- Thermistors NCP/PRF Series

### 2 DDR Memory

- Micro DC-DC Converters LXDC Series
- Polymer Aluminum Electrolytic Capacitors ECAS Series
- Chip Ferrite Beads BLM Series

### 3 Display Panel

- Metal Terminal Type Monolithic Ceramic Capacitors KRM Series
- Ceramic Resonators CERALOCK® CSTCE/CSTCR Series
- Power Inductors LQH Series
- Thermistors PRF/PRG Series

### 4 LVDS/eDP

- Chip Common Mode Choke Coils DLW/DLP Series
- ESD Protection Devices LXES Series
- Thermistors NCP/PRF Series

### 6 HDD/SSD

- Shock Sensors PKGS Series
- Micro DC-DC Converters LXDC Series
- Polymer Aluminum Electrolytic Capacitors ECAS Series
- Supercapacitors (EDLC) DMT Series
- Actuators PALHRS Series
- Crystal Units XRCGB Series
- Thermistors NCP/PRF Series

### 5 ODD

- Ceramic Resonators CERALOCK® CSTCW Series
- Crystal Units XRCGB Series
- Thermistors NCP Series

### 7 LAN

- Monolithic Ceramic Capacitors for Medium Voltage GR4 Series
- Chip Common Mode Choke Coils DLW/DLP Series











### 8 USB3.0/USB2.0

- Micro DC-DC Converters LXDC Series
- Polymer Aluminum Electrolytic Capacitors ECAS Series
- Crystal Units XRCGB Series
- Chip Common Mode Choke Coils DLW/DLP Series
- Chip Ferrite Beads BLM Series
- ESD Protection Devices LXES Series
- Thermistors PRG Series

### 9 HDMI®/Display Port

- Chip Common Mode Choke Coils DLW/DLP Series
- ESD Protection Devices LXES Series
- Thermistors PRG Series









**10 Connectivity**

Bluetooth® Modules 	Wi-Fi® Modules 	Bluetooth® - Wi-Fi® Combo Modules 	SAW Filters SAF Series 	Chip Multilayer LC Filters 
Chip Multilayer Hybrid Baluns LDB/LDM Series 	Microwave Coaxial Connectors 	Microwave Coaxial Connectors with Switch 	Micro DC-DC Converters LXDC Series 	ESD Protection Devices LXES Series 



**11 NFC**

NFC Antennas FLAN Series 	Micro DC-DC Converters LXDC Series 	Crystal Units XRCGB Series 	Chip Ferrite Beads BLM Series 
Chip Inductors (Chip Coils) LQM/LQH/LQB Series 	Trimmer Capacitors TZY2 Series 	Variable Capacitors LXRW Series 	ESD Protection Devices LXES Series 


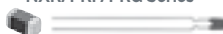
**14 Power Supply**

Micro DC-DC Converters LXDC Series 	Wireless Power Transmission Modules 
Monolithic Ceramic Capacitors for Medium Voltage GR/GA Series 	Medium High Voltage Ceramic Capacitors DEA/DES Series 
Safety Standard Certified Ceramic Capacitors Type KX/KY 	Ceramic Resonators CERALOCK® CSTCE/CSTCR Series 
Chip Common Mode Choke Coils DLW/DLP Series 	Thermistors NCP/NTP/PRF Series 

**12 DC-DC Converter**

Micro DC-DC Converters LXDC Series 
Thermistors NCP/PRF Series 
Metal Terminal Type Monolithic Ceramic Capacitors KRM Series 
Polymer Aluminum Electrolytic Capacitors ECAS Series 




**13 Battery**














Ceramic Resonators CERALOCK® CSTCE/CSTCR Series 
Thermistors NXR/PRF/PRG Series 

**15 Clock Device**

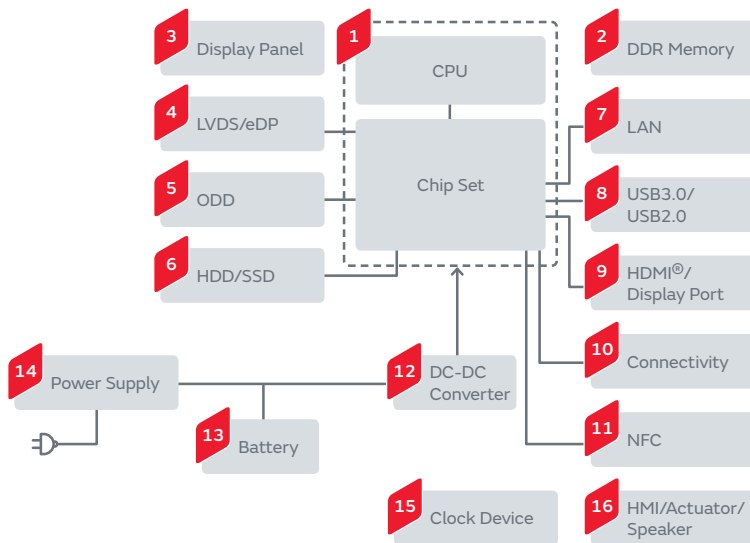
Ceramic Resonators CERALOCK® CSTCE/CSTCR Series 	Crystal Units XRCGB Series 
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**16 HMI/Actuator/Speaker**

Pyroelectric Infrared Sensors IRS Series 	Ultrasonic Sensors MA Series 	ESD Protection Devices LXES Series 
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General Purpose	Monolithic Ceramic Capacitors	GRM/GJM Series	High Frequency Filter Circuit	
	Monolithic Ceramic Capacitors	GRM Series	Coupling/Decoupling/For Step-up	
	Resin External Electrode Monolithic Ceramic Capacitors	GRJ Series	Coupling/Decoupling/For Step-up	
	Polymer Aluminum Electrolytic Capacitors	ECAS Series	Smoothing/Transient Backup	
	Chip Inductors (Chip Coils)	LQW/LQP/LQG Series	High Frequency Circuit-Impedance Matching/Resonance	
	Chip Inductors (Chip Coils)	LQM/LQH Series	Voltage Conversion	
	Chip Ferrite Beads	BLM Series	Noise Suppression	
	3 Terminal Capacitors	NFM/NFE Series	Noise Suppression	
	Chip Common Mode Choke Coils	DLW/DLP Series	Noise Suppression	
	Microwave Absorbers	EA Series	Noise Suppression	
	Ferrite Cores	FS Series	Noise Suppression	
	Thin Type Sandwich Cores	FSSA Series	Noise Suppression	
	Small Energy Devices	UMAC Series	Battery Backup	

# Notebook Computers



## 1 CPU/Chip Set

Micro DC-DC Converters LXDC Series 	Low ESL Monolithic Ceramic Capacitors LLL/LLA/LLM Series 
Polymer Aluminum Electrolytic Capacitors ECAS Series 	Crystal Units XRCGB Series  Chip Ferrite Beads BLM Series 
3 Terminal Capacitors NFM Series 	Thermistors NCP/PRF Series 

## 2 DDR Memory

Micro DC-DC Converters LXDC Series 	Polymer Aluminum Electrolytic Capacitors ECAS Series 	Chip Ferrite Beads BLM Series 
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## 3 Display Panel

Metal Terminal Type Monolithic Ceramic Capacitors KRM Series 	Ceramic Resonators CERALOCK® CSTCE/CSTCR Series 	Power Inductors LQH Series 	Thermistors PRF/PRG Series 
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## 4 LVDS/eDP

Chip Common Mode Choke Coils DLW/DLP Series 	ESD Protection Devices LXES Series 	Thermistors NCP/PRF Series 
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## 5 ODD

Ceramic Resonators CERALOCK® CSTCW Series 	Crystal Units XRCGB Series 	Thermistors NCP Series 
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## 6 HDD/SSD

Shock Sensors PKGS Series 	Micro DC-DC Converters LXDC Series 	Polymer Aluminum Electrolytic Capacitors ECAS Series 
Supercapacitors (EDLC) DMT Series 	Actuators PALHRS Series 	Crystal Units XRCGB Series  Thermistors NCP/PRF Series 

## 8 USB3.0/USB2.0

Micro DC-DC Converters LXDC Series 	Polymer Aluminum Electrolytic Capacitors ECAS Series 	Crystal Units XRCGB Series 
Chip Common Mode Choke Coils DLW/DLP Series 	Chip Ferrite Beads BLM Series 	ESD Protection Devices LXES Series  Thermistors PRG Series 

## 7 LAN

Monolithic Ceramic Capacitors for Medium Voltage GR4 Series 	Chip Common Mode Choke Coils DLW/DLP Series 
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## 9 HDMI®/Display Port

Chip Common Mode Choke Coils DLW/DLP Series 	ESD Protection Devices LXES Series 	Thermistors PRG Series 
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**10 Connectivity**

Bluetooth® Modules 	Wi-Fi® Modules 	Bluetooth® - Wi-Fi® Combo Modules 	SAW Filters SAF Series 	Chip Multilayer LC Filters 
Chip Multilayer Hybrid Baluns LDB/LDM Series 	Microwave Coaxial Connectors 	Microwave Coaxial Connectors with Switch 	Micro DC-DC Converters LXDC Series 	ESD Protection Devices LXES Series 


**11 NFC**

NFC Antennas FLAN Series 	Micro DC-DC Converters LXDC Series 	Crystal Units XRCGB Series 	Chip Ferrite Beads BLM Series 	Chip Inductors (Chip Coils) LQM/LQH/LQB Series 	Trimmer Capacitors TZY2 Series 	Variable Capacitors LXRW Series 	ESD Protection Devices LXES Series 
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**12 DC-DC Converter**

Micro DC-DC Converters LXDC Series 	Thermistors NCP/PRF Series 	Metal Terminal Type Monolithic Ceramic Capacitors KRM Series 	Polymer Aluminum Electrolytic Capacitors ECAS Series 
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**13 Battery**

Ceramic Resonators CERALOCK® CSTCE/CSTCR Series 	Thermistors NXR/PRF/PRG Series 
--	---




**14 Power Supply**














Micro DC-DC Converters LXDC Series 	Wireless Power Transmission Modules 	Monolithic Ceramic Capacitors for Medium Voltage GR/GA Series 	Medium High Voltage Ceramic Capacitors DEA/DES Series 
Safety Standard Certified Ceramic Capacitors Type KX/KY 	Ceramic Resonators CERALOCK® CSTCE/CSTCR Series 	Chip Common Mode Choke Coils DLW/DLP Series 	Thermistors NCP/NTP/PRF Series 

**15 Clock Device**

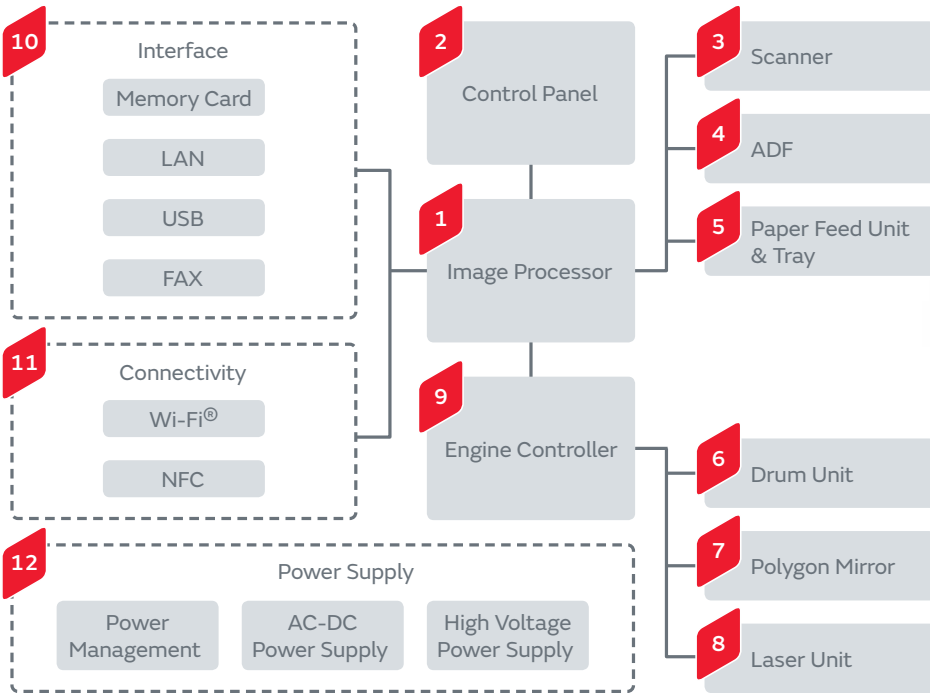
Ceramic Resonators CERALOCK® CSTCE/CSTCR Series 	Crystal Units XRCGB Series 
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**16 HMI/Actuator/Speaker**

Pyroelectric Infrared Sensors IRS Series 	Ultrasonic Sensors MA Series 	ESD Protection Devices LXES Series 
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<b>General Purpose</b>	Monolithic Ceramic Capacitors	GRM/GJM Series	High Frequency Filter Circuit	
	Monolithic Ceramic Capacitors	GRM Series	Coupling/Decoupling/For Step-up	
	Resin External Electrode Monolithic Ceramic Capacitors	GRJ Series	Coupling/Decoupling/For Step-up	
	Polymer Aluminum Electrolytic Capacitors	ECAS Series	Smoothing/Transient Backup	
	Chip Inductors (Chip Coils)	LQW/LQP/LQG Series	High Frequency Circuit-Impedance Matching/Resonance	
	Chip Inductors (Chip Coils)	LQM/LQH Series	Voltage Conversion	
	Chip Ferrite Beads	BLM Series	Noise Suppression	
	3 Terminal Capacitors	NFM/NFE Series	Noise Suppression	
	Chip Common Mode Choke Coils	DLW/DLP Series	Noise Suppression	
	Microwave Absorbers	EA Series	Noise Suppression	
	Ferrite Cores	FS Series	Noise Suppression	
	Thin Type Sandwich Cores	FSSA Series	Noise Suppression	
	Small Energy Devices	UMAC Series	Battery Backup	

# MFP (Multi Function Printer/Product/Peripheral)



## 1 Image Processor

<p>Isolated DC-DC Converters MYB Series</p>	<p>Non-isolated DC-DC Converters OKL/MPDR/MPDT Series</p>	<p>Micro DC-DC Converters LXDC Series</p>	<p>Low ESL Monolithic Ceramic Capacitors LLL/LLA/LLM Series</p>	<p>Polymer Aluminum Electrolytic Capacitors ECAS Series</p>
	<p>AMR Sensors (Magnetic Sensors) MR Series</p>	<p>Crystal Units XRCGB Series</p>	<p>Thermistors NCP/PRF Series</p>	

## 2 Control Panel

<p>Rotary Position Sensors SV Series</p>	<p>Micro DC-DC Converters LXDC Series</p>	<p>Metal Terminal Type Monolithic Ceramic Capacitors KRM Series</p>
<p>Polymer Aluminum Electrolytic Capacitors ECAS Series</p>	<p>Piezoelectric Sounders PKMCS/PKLCs/PKM Series</p>	<p>Chip Common Mode Choke Coils DLW/DLP Series</p>
	<p>Thermistors NCP/PRF Series</p>	

## 3 Scanner

<p>Supercapacitors (EDLC) DMT Series</p>	<p>Ultrasonic Sensors MA Series</p>
--	---

## 4 ADF

<p>Ultrasonic Sensors MA Series</p>	<p>Accelerometers SCA Series</p>
<p>Rotary Position Sensors SV Series</p>	

## 5 Paper Feed Unit & Tray

<p>AMR Sensors (Magnetic Sensors) MR Series</p>	<p>Rotary Position Sensors SV Series</p>
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## 6 Drum Unit

Thermistors  
NCP/PRF Series



## 7 Polygon Mirror

Accelerometers  
SCA Series



## 8 Laser Unit

Thermistors  
NCP/PRF Series



## 9 Engine Controller

Monolithic Ceramic Capacitors  
for Medium Voltage  
GR/GA Series



Medium High Voltage  
Ceramic Capacitors  
DEA/DES Series



Shock Sensors  
PKGS Series



Ceramic Resonators CERALOCK®  
CSTCE/CSTCR Series



Crystal Units  
XRCGB Series



Large Current  
Common Mode Choke Coils  
PLT10HH Series



Thermistors  
PRF/PTG Series



## 10 Interface

Polymer Aluminum  
Electrolytic Capacitors  
ECAS Series



Crystal Units  
XRCGB Series



Chip Common Mode Choke Coils  
DLW/DLP Series



ESD Protection Devices  
LXES Series



Thermistors  
PRF Series



## 11 Connectivity

Wi-Fi® Modules



NFC Antennas  
FLAN Series



Micro DC-DC Converters  
LXDC Series



Ceramic Resonators CERALOCK®  
CSTCE/CSTCR Series



Crystal Units  
XRCGB Series



Chip Inductors (Chip Coils)  
LQB Series



ESD Protection Devices  
LXES Series



## 12 Power Supply

Micro DC-DC Converters  
LXDC Series



Monolithic Ceramic Capacitors  
for Medium Voltage  
GR/GA Series



Medium High Voltage  
Ceramic Capacitors  
DEA/DES Series



Safety Standard Certified  
Ceramic Capacitors  
Type KX/KY



AC Line Filters  
PLA/PLH/PLY Series



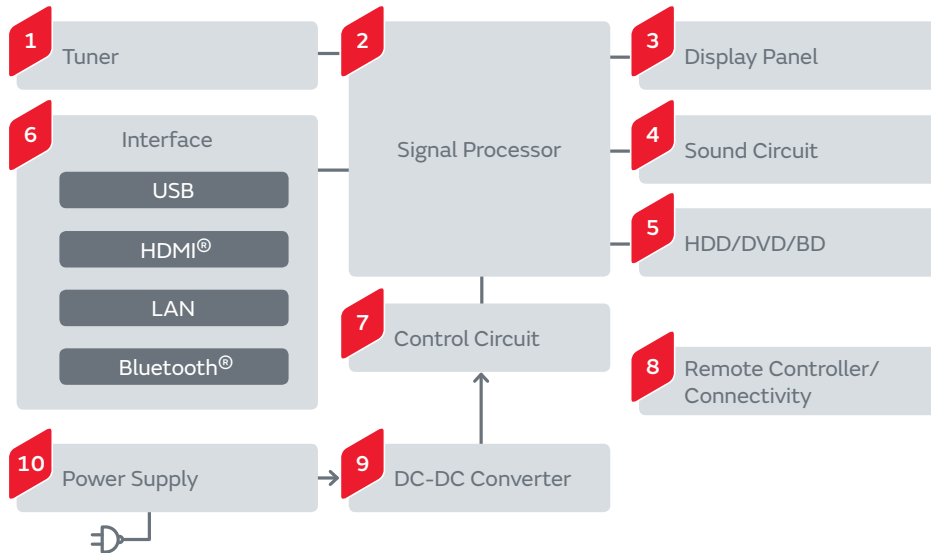
High Voltage Power Supplies  
MPH Series



General Purpose

Monolithic Ceramic Capacitors	GRM/GJM Series	High Frequency Filter Circuit	
Monolithic Ceramic Capacitors	GRM Series	Coupling/Decoupling/For Step-up	
Resin External Electrode Monolithic Ceramic Capacitors	GRJ Series	Coupling/Decoupling/For Step-up	
Polymer Aluminum Electrolytic Capacitors	ECAS Series	Smoothing/Transient Backup	
Chip Inductors (Chip Coils)	LQWLQP/LQG Series	High Frequency Circuit-Impedance Matching/Resonance	
Chip Inductors (Chip Coils)	LQM/LQH Series	Voltage Conversion	
Chip Ferrite Beads	BLM Series	Noise Suppression	
3 Terminal Capacitors	NFM/NFE Series	Noise Suppression	
Chip Common Mode Choke Coils	DLW/DLP Series	Noise Suppression	
Microwave Absorbers	EA Series	Noise Suppression	
Ferrite Cores	FS Series	Noise Suppression	
Thin Type Sandwich Cores	FSSA Series	Noise Suppression	
Small Energy Devices	UMAC Series	Battery Backup	

# Televisions



## 1 Tuner

Microchip Transformers (Baluns)  
DXP18B Series



Chip Inductors (Chip Coils)  
LQW Series



Crystal Units  
XRCGB Series



ESD Protection Devices  
LXES Series



## 2 Signal Processor

Polymer Aluminum  
Electrolytic Capacitors  
ECAS Series



Ceramic Resonators CERALOCK®  
CSTCE/CSTCR Series



Crystal Units  
XRCGB Series



3 Terminal Capacitors  
NFM Series



Thermistors  
NCP/PRF Series



## 3 Display Panel

DC-DC Converters  
OKL Series



Metal Terminal Type  
Monolithic Ceramic Capacitors  
KRM Series



Polymer Aluminum Electrolytic Capacitors  
ECAS Series



Chip Common Mode Choke Coils  
DLW/DLP Series



Power Inductors  
LQH Series



Rotary Position Sensors  
SV Series



Thermistors  
NCP/PRF Series



## 5 HDD/DVD/BD

Shock Sensors  
PKGS Series



Polymer Aluminum Electrolytic Capacitors  
ECAS Series



Ceramic Resonators CERALOCK®  
CSTCE Series



Crystal Units  
XRCGB Series



Thermistors  
NCP/PRF Series



## 4 Sound Circuit

Chip Common Mode Choke Coils  
DLW/DLP Series



## 6 Interface

Bluetooth® Modules



Bluetooth® Smart Modules



Polymer Aluminum Electrolytic Capacitors  
ECAS Series



Ceramic Resonators CERALOCK®  
CSTCE/CSTCR Series



Crystal Units  
XRCGB Series



Chip Common Mode Choke Coils  
DLW/DLP Series



ESD Protection Devices  
LXES Series



Thermistors  
PRG Series



## 7 Control Circuit

Bluetooth® Modules



Pyroelectric Infrared Sensors  
IRS Series



Micro DC-DC Converters  
LXDC Series



Ceramic Resonators CERALOCK®  
CSTCE/CSTCR Series



## 8 Remote Controller/Connectivity

Bluetooth® Modules



Wi-Fi® Modules



Bluetooth® Smart Modules



Shock Sensors  
PKGS Series



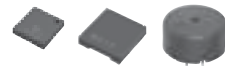
Micro DC-DC Converters  
LXDC Series



Ceramic Resonators CERALOCK®  
CSTCE/CSTCR Series



Piezoelectric Sounders  
PKMCS/PKLCS/PKM Series



ESD Protection Devices  
LXES Series



Chip Inductors (Chip Coils)  
LQB Series



## 9 DC-DC Converter

Micro DC-DC Converters  
LXDC Series



Metal Terminal Type Monolithic Ceramic Capacitors  
KRM Series



Polymer Aluminum Electrolytic Capacitors  
ECAS Series



Power Inductors  
LQH Series



Thermistors  
NCP/PRF Series



## 10 Power Supply

Monolithic Ceramic Capacitors  
for Medium Voltage  
GR/GA Series



Medium High Voltage  
Ceramic Capacitors  
DEA/DES Series



Safety Standard Certified  
Ceramic Capacitors  
Type KX/KY



AC Line Filters  
PLA/PLY Series



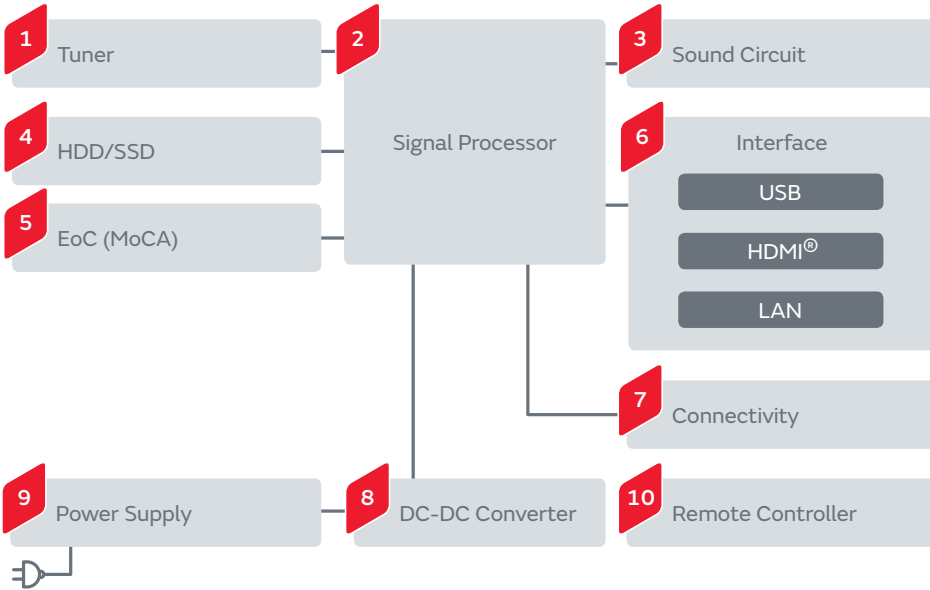
Thermistors  
NCP/NTP/PRF/PTG Series



General Purpose

Monolithic Ceramic Capacitors	GRM/GJM Series	High Frequency Filter Circuit	
Monolithic Ceramic Capacitors	GRM Series	Coupling/Decoupling/For Step-up	
Resin External Electrode Monolithic Ceramic Capacitors	GRJ Series	Coupling/Decoupling/For Step-up	
Polymer Aluminum Electrolytic Capacitors	ECAS Series	Smoothing/Transient Backup	
Chip Inductors (Chip Coils)	LQW/LQP/LQG Series	High Frequency Circuit-Impedance Matching/Resonance	
Chip Inductors (Chip Coils)	LQM/LQH Series	Voltage Conversion	
Chip Ferrite Beads	BLM Series	Noise Suppression	
3 Terminal Capacitors	NFM/NFE Series	Noise Suppression	
Chip Common Mode Choke Coils	DLW/DLP Series	Noise Suppression	
Microwave Absorbers	EA Series	Noise Suppression	
Ferrite Cores	FS Series	Noise Suppression	
Thin Type Sandwich Cores	FSSA Series	Noise Suppression	

# Set-top Box



### 1 Tuner

- Crystal Units XRCGB Series
- Chip Inductors (Chip Coils) LQW Series
- ESD Protection Devices LXES Series

### 2 Signal Processor

- Polymer Aluminum Electrolytic Capacitors ECAS Series
- Ceramic Resonators CERALOCK® CSTCE/CSTCR Series
- Crystal Units XRCGB Series
- 3 Terminal Capacitors NFM Series

### 3 Sound Circuit

- Chip Common Mode Choke Coils DLW/DLP Series

### 4 HDD/SSD

- Shock Sensors PKGS Series
- Polymer Aluminum Electrolytic Capacitors ECAS Series
- Ceramic Resonators CERALOCK® CSTCE Series
- Crystal Units XRCGB Series
- Supercapacitors (EDLC) DMT Series
- Thermistors NCP/PRF Series

### 5 EoC (MoCA)

- Duplexers DFYH Series
- Chip Multilayer LC Filters LF Series
- Chip Multilayer Hybrid Baluns LDB/LDM Series
- Ceramic Resonators CERALOCK® CSTCE/CSTCR Series

### 6 Interface

- Polymer Aluminum Electrolytic Capacitors ECAS Series
- Ceramic Resonators CERALOCK® CSTCE/CSTCR Series
- Crystal Units XRCGB Series
- Chip Common Mode Choke Coils DLW/DLP Series
- ESD Protection Devices LXES Series
- Thermistors PRG Series

Application Guides Set-top Box

**7** Connectivity

Wi-Fi® Modules

Microwave Coaxial Connectors

Microwave Coaxial Connectors with Switch

Micro DC-DC Converters LXDC Series

Ceramic Resonators CERALOCK® CSTCE/CSTCR Series

Chip Inductors (Chip Coils) LQB Series

ESD Protection Devices LXES Series

**8** DC-DC Converter

DC-DC Converters OKL Series

Micro DC-DC Converters LXDC Series

Metal Terminal Type Monolithic Ceramic Capacitors KRM Series

Polymer Aluminum Electrolytic Capacitors ECAS Series

Power Inductors LQH Series

Thermistors NCP/PRF Series

**9** Power Supply

Monolithic Ceramic Capacitors for Medium Voltage GR/GA Series

Medium High Voltage Ceramic Capacitors DEA/DES Series

Safety Standard Certified Ceramic Capacitors Type KX/KY

AC Line Filters PLA/PLY Series

Thermistors NCP/NTP/PRF/PTG Series

**10** Remote Controller

Micro DC-DC Converters LXDC Series

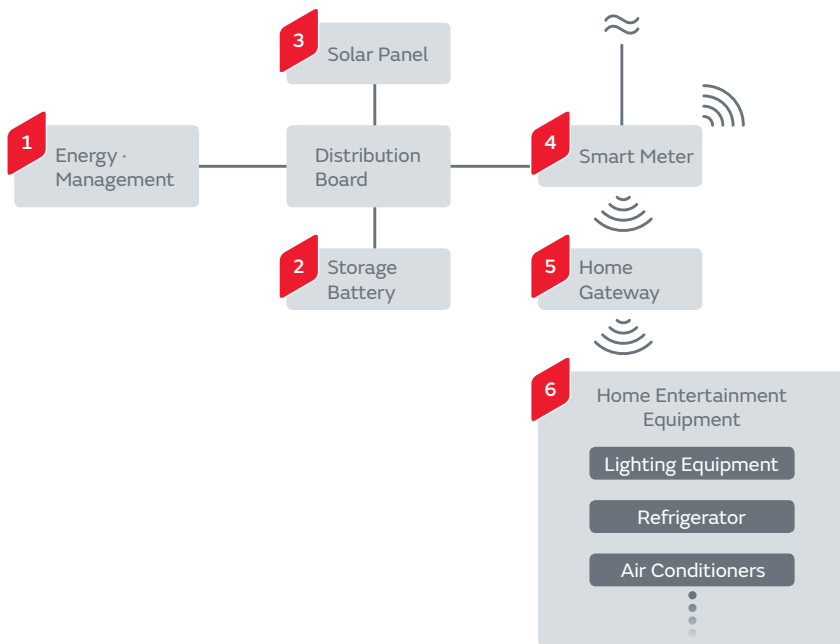
Ceramic Resonators CERALOCK® CSTCE/CSTCR Series

Piezoelectric Sounders PKMCS/PKLCS/PKM Series

Trimmer Capacitors TZY2 Series

General Purpose	Monolithic Ceramic Capacitors	GRM/GJM Series	High Frequency Filter Circuit	
	Monolithic Ceramic Capacitors	GRM Series	Coupling/Decoupling/For Step-up	
	Resin External Electrode Monolithic Ceramic Capacitors	GRJ Series	Coupling/Decoupling/For Step-up	
	Polymer Aluminum Electrolytic Capacitors	ECAS Series	Smoothing/Transient Backup	
	Chip Inductors (Chip Coils)	LQW/LQP/LQG Series	High Frequency Circuit-Impedance Matching/Resonance	
	Chip Inductors (Chip Coils)	LQM/LQH Series	Voltage Conversion	
	Chip Ferrite Beads	BLM Series	Noise Suppression	
	3 Terminal Capacitors	NFM/NFE Series	Noise Suppression	
	Chip Common Mode Choke Coils	DLW/DLP Series	Noise Suppression	
	Microwave Absorbers	EA Series	Noise Suppression	
	Ferrite Cores	FS Series	Noise Suppression	
	Thin Type Sandwich Cores	FSSA Series	Noise Suppression	
	Small Energy Devices	UMAC Series	Battery Backup	

# HEMS



## 1 Energy · Management

Ceramic Resonators CERALOCK® CSTCE/CSTCR Series



Crystal Units XRCGB Series



### Topics



### Introduction of Examples as Energy System

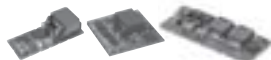
<http://www.murata.com/en-global/about/newsroom/news/product/power/2013/0426>

## 2 Storage Battery

Isolated DC-DC Converters MYB Series



Non-isolated DC-DC Converters OKL/MPDR/MPDT Series



Monolithic Ceramic Capacitors for Medium Voltage GR/GA Series



Medium High Voltage Ceramic Capacitors DEA/DES Series



Safety Standard Certified Ceramic Capacitors Type KX/KY



Thermistors NCP/NTP/PRF/PRG/PTG Series



Micro DC-DC Converters LXDC Series



Small Energy Devices UMAC Series



## 3 Solar Panel

Isolated DC-DC Converters MYB Series



Non-isolated DC-DC Converters OKL/MPD Series



Monolithic Ceramic Capacitors for Medium Voltage GR/GA Series



Micro DC-DC Converters LXDC Series



Supercapacitors (EDLC) DMT Series



## 4 Smart Meter

Chip Multilayer LC Filters LF Series



Chip Multilayer Hybrid Baluns LDB/LDM Series



Wi-Fi® Modules



Sub-GHz Modules



Isolated DC-DC Converters MYB Series



Non-isolated DC-DC Converters OKL/MPD Series



Supercapacitors (EDLC) DMF/DMT Series



Monolithic Ceramic Capacitors for Medium Voltage GR4 Series



Medium High Voltage Ceramic Capacitors DEA/DES Series



Safety Standard Certified Ceramic Capacitors Type KX/KY



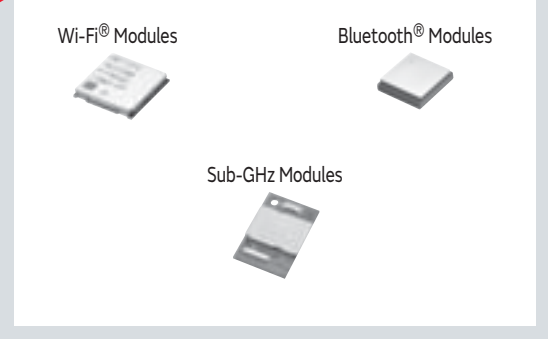
Crystal Units XRCGB Series



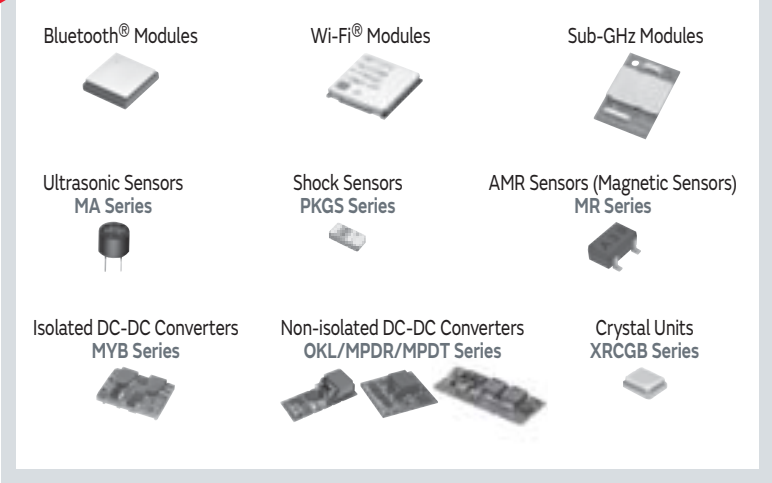
Piezoelectric Sounders PKMCS/PKLCS/PKM Series



**5 Home Gateway**

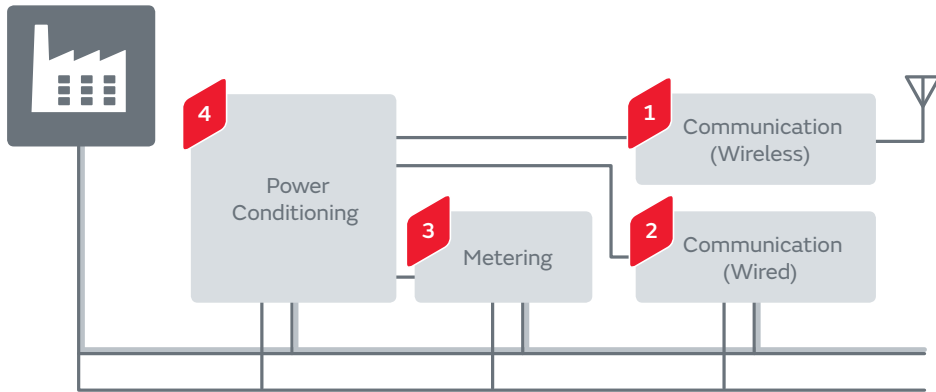


**6 Home Entertainment Equipment**



General Purpose	Monolithic Ceramic Capacitors	GRM/GJM Series	High Frequency Filter Circuit	
	Monolithic Ceramic Capacitors	GRM Series	Coupling/Decoupling/For Step-up	
	Resin External Electrode Monolithic Ceramic Capacitors	GRJ Series	Coupling/Decoupling/For Step-up	
	Polymer Aluminum Electrolytic Capacitors	ECAS Series	Smoothing/Transient Backup	
	Chip Inductors (Chip Coils)	LQW/LQP/LQG Series	High Frequency Circuit-Impedance Matching/Resonance	
	Chip Inductors (Chip Coils)	LQM/LQH Series	Voltage Conversion	
	Chip Ferrite Beads	BLM Series	Noise Suppression	
	3 Terminal Capacitors	NFM/NFE Series	Noise Suppression	
	Chip Common Mode Choke Coils	DLW/DLP Series	Noise Suppression	
	Microwave Absorbers	EA Series	Noise Suppression	
	Ferrite Cores	FS Series	Noise Suppression	
	Thin Type Sandwich Cores	FSSA Series	Noise Suppression	

# Smartmeter



## 1 Communication (Wireless)

<p>Wi-Fi® Modules</p>	<p>Sub-GHz Modules</p>	<p>Chip Multilayer LC Filters LF Series</p>
<p>Chip Multilayer Hybrid Baluns LDB/LDM Series</p>	<p>Microwave Coaxial Connectors</p>	<p>Microwave Coaxial Connectors with Switch</p>
<p>RFID Modules with I<sup>2</sup>C Interface MAGICSTRAP® LXMS Series</p>	<p>ESD Protection Devices LXES Series</p>	<p>Thermistors NCP/PRF/PRG Series</p>

## 2 Communication (Wired)

<p>Chip Inductors (Chip Coils) LQW/LQP/LQG Series</p>	<p>Monolithic Ceramic Capacitors for Medium Voltage GR3/GR4 Series</p>
<p>Medium High Voltage Ceramic Capacitors DEA/DES Series</p>	<p>Safety Standard Certified Ceramic Capacitors Type KX/KY</p>
<p>Radial Lead Type Monolithic Ceramic Capacitors RDE Series</p>	<p>Thermistors NCP/PRF/PRG Series</p>
<p>Ceramic Resonators CERALOCK® CSTCE/CSTCR Series</p>	<p>Crystal Units XRCGB Series</p>
<p>ESD Protection Devices LXES Series</p>	<p>SAW Filters SF/RF Series</p>



















## 3 Metering

<p>Chip Common Mode Choke Coils DLW/DLP Series</p>	<p>Thermistors NCP/PRF/PRG Series</p>	<p>Ceramic Resonators CERALOCK® CSTCE/CSTCR Series</p>
	<p>Crystal Units XRCGB Series</p>	

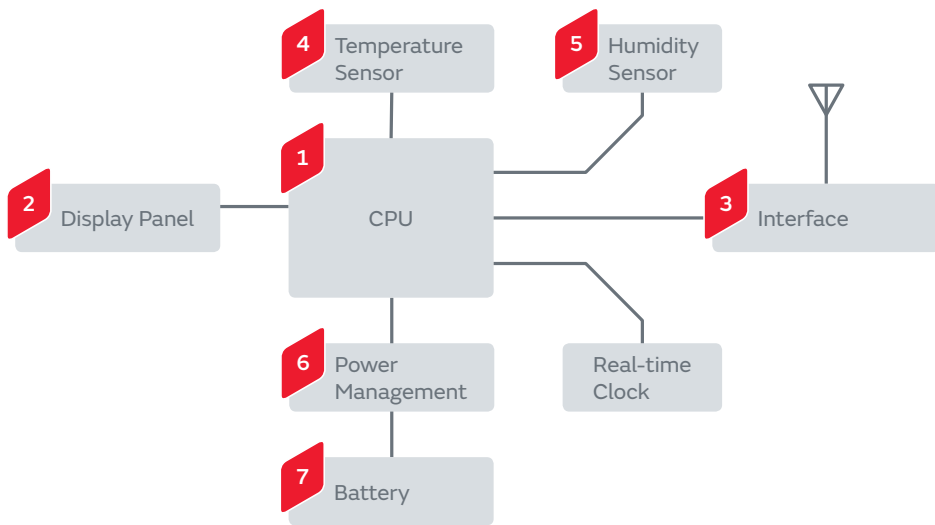
## 4 Power Conditioning

<p>Non-isolated DC-DC Converters OKL/MPD Series</p>	<p>Monolithic Ceramic Capacitors for Medium Voltage GR3/GR4 Series</p>	<p>Medium High Voltage Ceramic Capacitors DEA/DES Series</p>	<p>Safety Standard Certified Ceramic Capacitors Type KX/KY</p>	<p>Radial Lead Type Monolithic Ceramic Capacitors RDE Series</p>
<p>Chip Inductors (Chip Coils) LQH Series</p>	<p>AC Line Filters PLA Series</p>	<p>Thermistors NCP/PRF/PRG Series</p>	<p>Polymer Aluminum Electrolytic Capacitors ECAS Series</p>	<p>Supercapacitors (EDLC) DMF/DMT Series</p>
<p>Micro DC-DC Converters LXDC Series</p>				

General Purpose

Monolithic Ceramic Capacitors	GRM/GJM Series	High Frequency Filter Circuit	
Monolithic Ceramic Capacitors	GRM Series	Coupling/Decoupling/For Step-up	
Resin External Electrode Monolithic Ceramic Capacitors	GRJ Series	Coupling/Decoupling/For Step-up	
Polymer Aluminum Electrolytic Capacitors	ECAS Series	Smoothing/Transient Backup	
Chip Inductors (Chip Coils)	LQW/LQP/LQG Series	High Frequency Circuit-Impedance Matching/Resonance	  
Chip Inductors (Chip Coils)	LQM/LQH Series	Voltage Conversion	 
Chip Ferrite Beads	BLM Series	Noise Suppression	
3 Terminal Capacitors	NFM/NFE Series	Noise Suppression	 
Chip Common Mode Choke Coils	DLW/DLP Series	Noise Suppression	 
Microwave Absorbers	EA Series	Noise Suppression	
Ferrite Cores	FS Series	Noise Suppression	
Thin Type Sandwich Cores	FSSA Series	Noise Suppression	
Small Energy Devices	UMAC Series	Battery Backup	

# Thermostat



## 1 CPU

Low ESL Monolithic Ceramic Capacitors LLL/LLA/LLM Series



Polymer Aluminum Electrolytic Capacitors ECAS Series



Ceramic Resonators CERALOCK® CSTCE/CSTCR Series



Crystal Units XRCGB Series



Thermistors NCP/PRF Series



## 2 Display Panel

Metal Terminal Type Monolithic Ceramic Capacitors KRM Series



Polymer Aluminum Electrolytic Capacitors ECAS Series



Thermistors NCP/PRF Series



## 3 Interface

Wi-Fi® Modules



Micro DC-DC Converters LXDC Series



Ceramic Resonators CERALOCK® CSTCE/CSTCR Series



Crystal Units XRCGB Series



Chip Inductors (Chip Coils) LQM/LQH/LQB Series



ESD Protection Devices LXES Series



## 4 Temperature Sensor

Thermistors NCP/NTP/PRF/PRG/PTG Series



Ceramic Resonators CERALOCK® CSTCE/CSTCR Series



Crystal Units XRCGB Series



Chip Inductors (Chip Coils) LQM/LQH/LQB Series



## 5 Humidity Sensor

Thermistors NCP/NTP/PRF/PRG/PTG Series



Ceramic Resonators CERALOCK® CSTCE/CSTCR Series



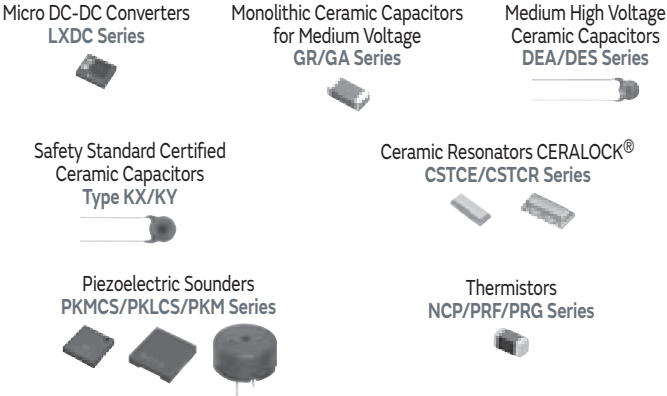
Crystal Units XRCGB Series



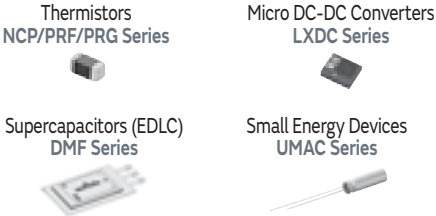
Chip Inductors (Chip Coils) LQM/LQH/LQB Series



**6 Power Management**



**7 Battery**



General Purpose

Monolithic Ceramic Capacitors	GRM/GJM Series	High Frequency Filter Circuit	
Monolithic Ceramic Capacitors	GRM Series	Coupling/Decoupling/For Step-up	
Resin External Electrode Monolithic Ceramic Capacitors	GRJ Series	Coupling/Decoupling/For Step-up	
Polymer Aluminum Electrolytic Capacitors	ECAS Series	Smoothing/Transient Backup	
Chip Inductors (Chip Coils)	LQW/LQP/LQG Series	High Frequency Circuit-Impedance Matching/Resonance	
Chip Inductors (Chip Coils)	LQM/LQH Series	Voltage Conversion	
Chip Ferrite Beads	BLM Series	Noise Suppression	
3 Terminal Capacitors	NFM/NFE Series	Noise Suppression	
Chip Common Mode Choke Coils	DLW/DLP Series	Noise Suppression	
Microwave Absorbers	EA Series	Noise Suppression	
Ferrite Cores	FS Series	Noise Suppression	
Thin Type Sandwich Cores	FSSA Series	Noise Suppression	

# Human Detection



## 1 Microcontroller

Low ESL Monolithic Ceramic Capacitors LLL/LLA/LLM Series



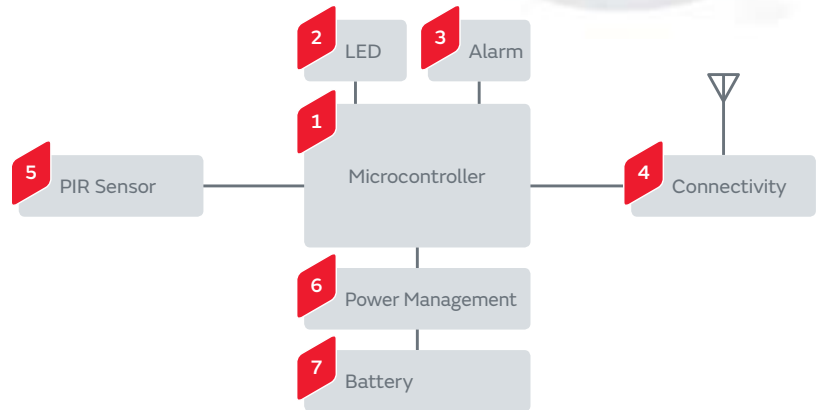
Polymer Aluminum Electrolytic Capacitors ECAS Series



Crystal Units XRCGB Series



Thermistors NCP/PRF Series



## 2 LED

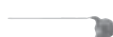
Supercapacitors (EDLC) DMF Series



Monolithic Ceramic Capacitors for Medium Voltage GR/GA Series



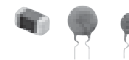
Medium High Voltage Ceramic Capacitors DEA/DES Series



Safety Standard Certified Ceramic Capacitors Type KX/KY



Thermistors NCP/NTP/PRF/PRG/PTG Series



AC Line Filters PLA/PLH/PLY Series



## 3 Alarm

Piezoelectric Sounders PKMCS/PKLCs/PKM Series



## 4 Connectivity

Wi-Fi® Modules



Micro DC-DC Converters LXDC Series



Ceramic Resonators CERALOCK® CSTCE/CSTCR Series



Crystal Units XRCGB Series



Chip Inductors (Chip Coils) LQM/LQH/LQB Series



ESD Protection Devices LXES Series



## 5 PIR Sensor

Pyroelectric Infrared Sensors IRA Series



## 6 Power Management

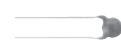
Micro DC-DC Converters LXDC Series



Monolithic Ceramic Capacitors for Medium Voltage GR/GA Series



Medium High Voltage Ceramic Capacitors DEA/DES Series



Safety Standard Certified Ceramic Capacitors Type KX/KY



Ceramic Resonators CERALOCK® CSTCE/CSTCR Series



Chip Common Mode Choke Coils DLW/DLP Series



Thermistors NCP/PRF/PRG Series



## 7 Battery

Small Energy Devices UMAC Series



Micro DC-DC Converters LXDC Series

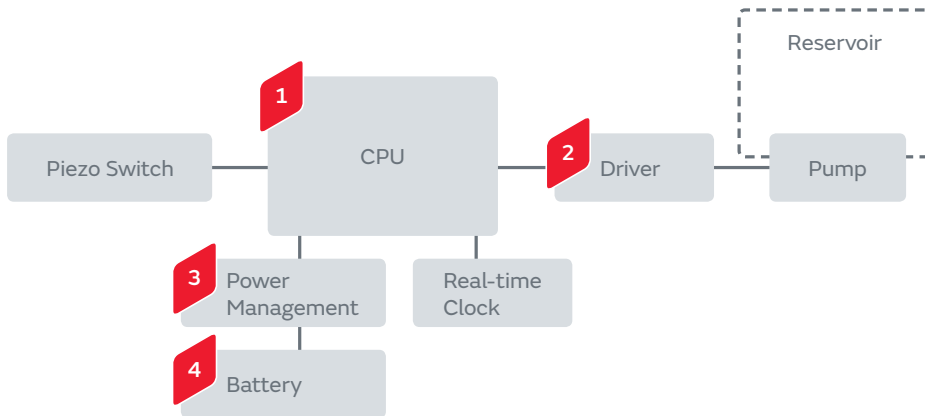


Thermistors NCP/PRF/PRG Series



Monolithic Ceramic Capacitors	GRM/GJM Series	High Frequency Filter Circuit	
Monolithic Ceramic Capacitors	GRM Series	Coupling/Decoupling/For Step-up	
Resin External Electrode Monolithic Ceramic Capacitors	GRJ Series	Coupling/Decoupling/For Step-up	
Polymer Aluminum Electrolytic Capacitors	ECAS Series	Smoothing/Transient Backup	
Chip Inductors (Chip Coils)	LQW/LQP/LQG Series	High Frequency Circuit-Impedance Matching/Resonance	
Chip Inductors (Chip Coils)	LQM/LQH Series	Voltage Conversion	
Chip Ferrite Beads	BLM Series	Noise Suppression	
3 Terminal Capacitors	NFM/NFE Series	Noise Suppression	
Chip Common Mode Choke Coils	DLW/DLP Series	Noise Suppression	
Microwave Absorbers	EA Series	Noise Suppression	
Ferrite Cores	FS Series	Noise Suppression	
Thin Type Sandwich Cores	FSSA Series	Noise Suppression	

# Air Dispenser



## 1 CPU

Low ESL Monolithic Ceramic Capacitors  
LLL/LLA/LLM Series



Polymer Aluminum Electrolytic Capacitors  
ECAS Series



Ceramic Resonators CERALOCK®  
CSTCE/CSTCR Series



Crystal Units  
XRCGB Series



Thermistors  
NCP/PRF Series



## 2 Driver

Thermistors  
NCP/NXRT/NTP/PRF Series



## 3 Power Management

Micro DC-DC Converters  
LXDC Series



Monolithic Ceramic Capacitors for Medium Voltage  
GR/GA Series



Medium High Voltage Ceramic Capacitors  
DEA/DES Series



Safety Standard Certified Ceramic Capacitors  
Type KX/KY



Ceramic Resonators CERALOCK®  
CSTCE/CSTCR Series



Thermistors  
NCP/NTP/PRF Series



## 4 Battery

Supercapacitors (EDLC)  
DMT Series



Thermistors  
NXRT/PRF/PRG Series

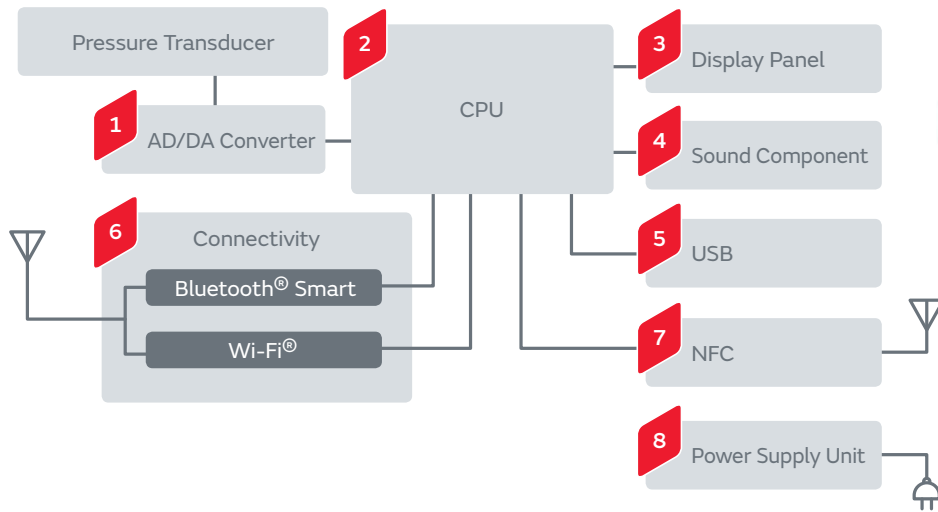


Small Energy Devices  
UMAC Series



General Purpose	Monolithic Ceramic Capacitors	GRM/GJM Series	High Frequency Filter Circuit	
	Monolithic Ceramic Capacitors	GRM Series	Coupling/Decoupling/For Step-up	
	Resin External Electrode Monolithic Ceramic Capacitors	GRJ Series	Coupling/Decoupling/For Step-up	
	Polymer Aluminum Electrolytic Capacitors	ECAS Series	Smoothing/Transient Backup	
	Chip Inductors (Chip Coils)	LQW/LQP/LQG Series	High Frequency Circuit-Impedance Matching/Resonance	
	Chip Inductors (Chip Coils)	LQM/LQH Series	Voltage Conversion	
	Chip Ferrite Beads	BLM Series	Noise Suppression	
	3 Terminal Capacitors	NFM/NFE Series	Noise Suppression	
	Chip Common Mode Choke Coils	DLW/DLP Series	Noise Suppression	
	Microwave Absorbers	EA Series	Noise Suppression	
	Ferrite Cores	FS Series	Noise Suppression	
	Thin Type Sandwich Cores	FSSA Series	Noise Suppression	

# Blood Pressure Monitor



### 1 AD/DA Converter

Chip Ferrite Beads BLM Series	Thermistors NCP Series

### 2 CPU

Ceramic Resonators CERALOCK® CSTCR-G/CSTCE-G/CSTCE-V Series	Thermistors NCP/NXR Series

### 3 Display Panel

3 Terminal Capacitors NFM/NFE Series	Chip Ferrite Beads BLM Series	Thermistors NCP Series

### 4 Sound Component

Piezoelectric Sounders PKMCS/PKLCs/PKM Series

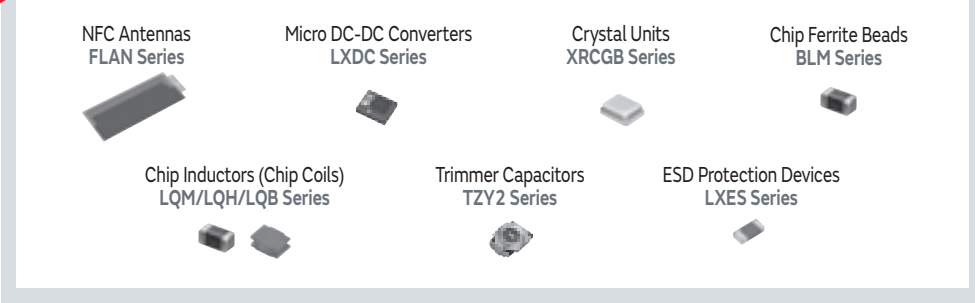
### 5 USB

Micro DC-DC Converters LXDC Series	Ceramic Resonators CERALOCK® CSTCR-G-L/CSTCE-G-L/CSTCE-V-L/CSTCW-X Series	Crystal Units XRCGB Series	ESD Protection Devices LXES Series	Thermistors PRG Series

### 6 Connectivity

ESD Protection Devices LXES Series	Micro DC-DC Converters LXDC Series	Bluetooth® Smart Modules	Wi-Fi® Modules
Ceramic Resonators CERALOCK® CSTCR-G-L/CSTCE-G-L/CSTCE-V-L/CSTCW-X Series		Crystal Units XRCGB Series	Thermistors PRG Series

7 NFC



8 Power Supply Unit



General Purpose	Monolithic Ceramic Capacitors	GRM/GJM Series	High Frequency Filter Circuit	
	Monolithic Ceramic Capacitors	GRM Series	Coupling/Decoupling/For Step-up	
	Resin External Electrode Monolithic Ceramic Capacitors	GRJ Series	Coupling/Decoupling/For Step-up	
	Polymer Aluminum Electrolytic Capacitors	ECAS Series	Smoothing/Transient Backup	
	Chip Inductors (Chip Coils)	LQW/LQP/LQG Series	High Frequency Circuit-Impedance Matching/Resonance	
	Chip Inductors (Chip Coils)	LQM/LQH Series	Voltage Conversion	
	Chip Ferrite Beads	BLM Series	Noise Suppression	
	3 Terminal Capacitors	NFM/NFE Series	Noise Suppression	
	Chip Common Mode Choke Coils	DLW/DLP Series	Noise Suppression	
	Microwave Absorbers	EA Series	Noise Suppression	
	Ferrite Cores	FS Series	Noise Suppression	
	Thin Type Sandwich Cores	FSSA Series	Noise Suppression	
	Supercapacitors (EDLC)	DMT Series	Power Line/Battery Peak Assist	
Small Energy Devices	UMAC Series	Battery Backup		

# Thermometer



**1 Temperature Detection**

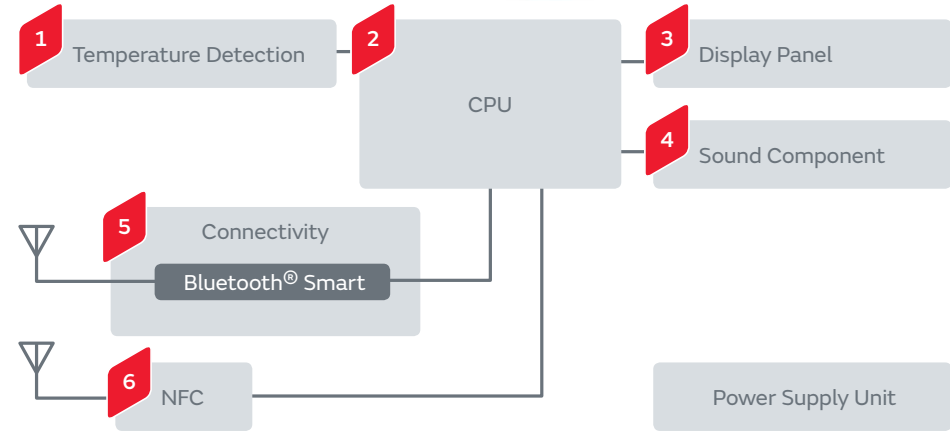
Thermistors  
NXR Series

**2 CPU**

Ceramic Resonators CERALOCK®  
CSTCR-G/CSTCE-G/CSTCE-V Series

**3 Display Panel**

Thermistors  
NCP Series



**4 Sound Component**

Piezoelectric Sounders  
PKMCS/PKLCs/PKM Series

Piezoelectric Diaphragms  
7BB Series

**5 Connectivity**

Bluetooth® Smart Modules

**6 NFC**

NFC Antennas  
FLAN Series

Micro DC-DC Converters  
LXDC Series

Crystal Units  
XRCGB Series

Chip Ferrite Beads  
BLM Series

Chip Inductors (Chip Coils)  
LQM/LQH/LQB Series

Trimmer Capacitors  
TZY2 Series

ESD Protection Devices  
LXES Series

General Purpose	Monolithic Ceramic Capacitors	GRM/GJM Series	High Frequency Filter Circuit	
	Monolithic Ceramic Capacitors	GRM Series	Coupling/Decoupling/For Step-up	
	Resin External Electrode Monolithic Ceramic Capacitors	GRJ Series	Coupling/Decoupling/For Step-up	
	Polymer Aluminum Electrolytic Capacitors	ECAS Series	Smoothing/Transient Backup	
	Chip Inductors (Chip Coils)	LQWLQP/LQG Series	High Frequency Circuit-Impedance Matching/Resonance	
	Chip Inductors (Chip Coils)	LQM/LQH Series	Voltage Conversion	
	Chip Ferrite Beads	BLM Series	Noise Suppression	
	3 Terminal Capacitors	NFM/NFE Series	Noise Suppression	
	Chip Common Mode Choke Coils	DLW/DLP Series	Noise Suppression	
	Microwave Absorbers	EA Series	Noise Suppression	
	Ferrite Cores	FS Series	Noise Suppression	
	Thin Type Sandwich Cores	FSSA Series	Noise Suppression	
	Small Energy Devices	UMAC Series	Battery Backup	

# Blood Glucose Meter



## 1 AD/DA Converter

Chip Ferrite Beads  
BLM Series

Thermistors  
NCP Series



## 2 CPU

Ceramic Resonators CERALOCK®  
CSTCR-G/L/CSTCE-G/L/CSTCE-V Series

Thermistors  
NCP/NXR Series



## 5 USB

Ceramic Resonators CERALOCK®  
CSTCR-G-L/CSTCE-G-L/CSTCE-V-L/CSTCW-X Series



Crystal Units  
XRCGB Series



Thermistors  
PRG Series



## 6 Connectivity

Bluetooth® Smart Modules



Wi-Fi® Modules



Crystal Units  
XRCGB Series



Ceramic Resonators CERALOCK®  
CSTCR-G-L/CSTCE-G-L/CSTCE-V-L/CSTCW-X Series



Thermistors  
PRG Series



General Purpose

Monolithic Ceramic Capacitors

GRM/GJM Series

High Frequency Filter Circuit



Monolithic Ceramic Capacitors

GRM Series

Coupling/Decoupling/For Step-up



Resin External Electrode Monolithic Ceramic Capacitors

GRJ Series

Coupling/Decoupling/For Step-up



Polymer Aluminum Electrolytic Capacitors

ECAS Series

Smoothing/Transient Backup



Chip Inductors (Chip Coils)

LQW/LQP/LQG Series

High Frequency Circuit-Impedance Matching/Resonance



Chip Inductors (Chip Coils)

LQM/LQH Series

Voltage Conversion



Chip Ferrite Beads

BLM Series

Noise Suppression



3 Terminal Capacitors

NFM/NFE Series

Noise Suppression



Chip Common Mode Choke Coils

DLW/DLP Series

Noise Suppression



Microwave Absorbers

EA Series

Noise Suppression



Ferrite Cores

FS Series

Noise Suppression



Thin Type Sandwich Cores

FSSA Series

Noise Suppression



Supercapacitors (EDLC)

DMT Series

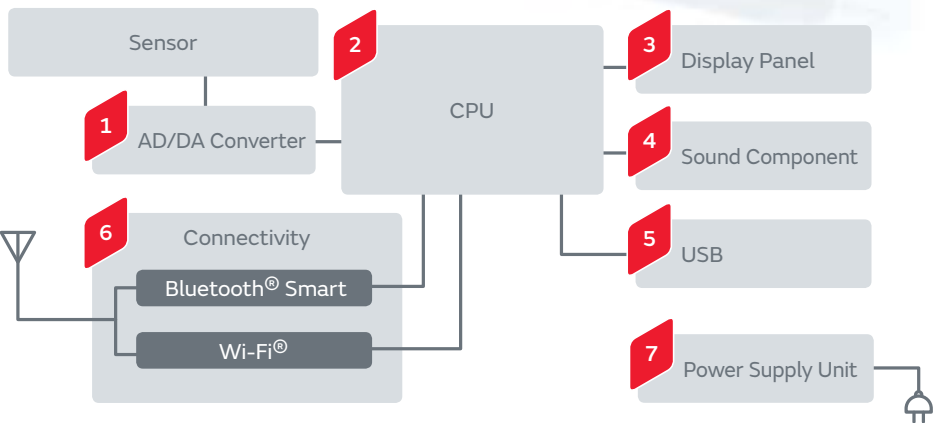
Power Line/Battery Peak Assist



Small Energy Devices

UMAC Series

Battery Backup



## 3 Display Panel

3 Terminal Capacitors  
NFM Series



Chip Ferrite Beads  
BLM Series

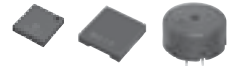


Thermistors  
NCP Series



## 4 Sound Component

Piezoelectric Sounders  
PKMCS/PKLCS/PKM Series



Piezoelectric Diaphragms  
7BB Series



## 7 Power Supply Unit

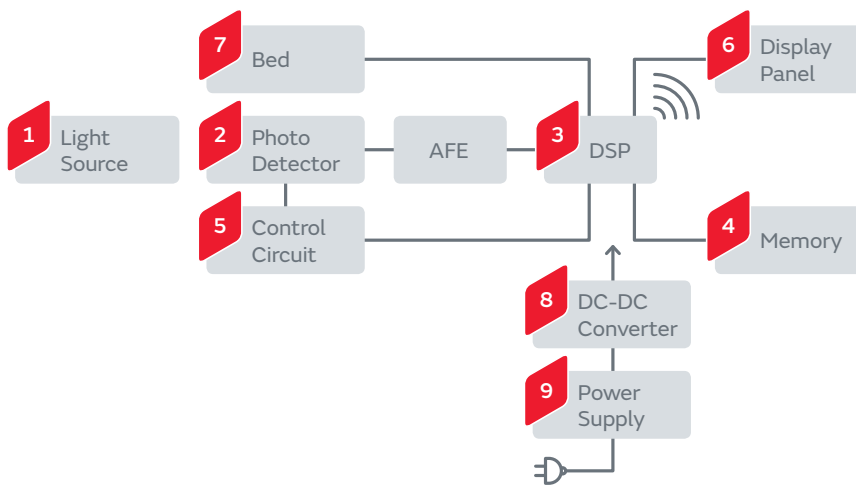
Thermistors  
NCP Series



Thermistors  
PRF/PRG Series



# Diagnostic Imaging Apparatus



## 1 Light Source

High Voltage Ceramic Capacitors  
DHS/DHK Series



## 2 Photo Detector

Thermistors  
NCP/PRF Series



## 3 DSP

Ceramic Resonators CERALOCK®  
CSTLS/CSTCE/CSTCR Series



Crystal Units  
XRCGB Series



## 4 Memory

Isolated DC-DC Converters  
MYB Series



Non-isolated DC-DC Converters  
OKL/MPDR/MPDT/MYS Series



Micro DC-DC Converters  
LXDC Series



Supercapacitors (EDLC)  
DMT Series



Small Energy Devices  
UMAC Series

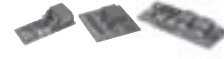


## 5 Control Circuit

Isolated DC-DC Converters  
MYB Series



Non-isolated DC-DC Converters  
OKL/MPDR/MPDT Series



Micro DC-DC Converters  
LXDC Series



Ceramic Resonators CERALOCK®  
CSTCE/CSTCR Series



## 6 Display Panel

Metal Terminal Type  
Monolithic Ceramic Capacitors  
KRM Series



Ceramic Resonators  
CERALOCK®  
CSTCE/CSTCR Series



Thermistors  
PRF/PRG Series



## 7 Bed

Inclinometers  
SCA100T/103T Series



## 8 DC-DC Converter

Micro DC-DC Converters  
LXDC Series



Metal Terminal Type  
Monolithic Ceramic Capacitors  
KRM Series



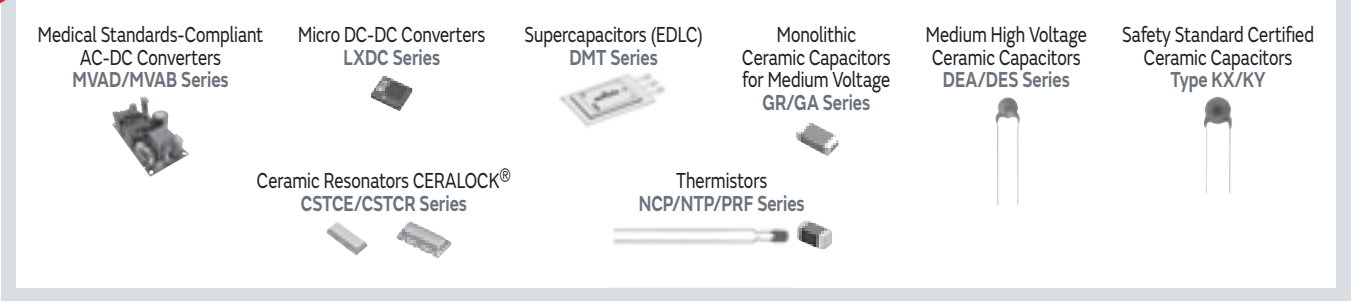
Polymer Aluminum  
Electrolytic Capacitors  
ECAS Series



Thermistors  
NCP/PRF Series

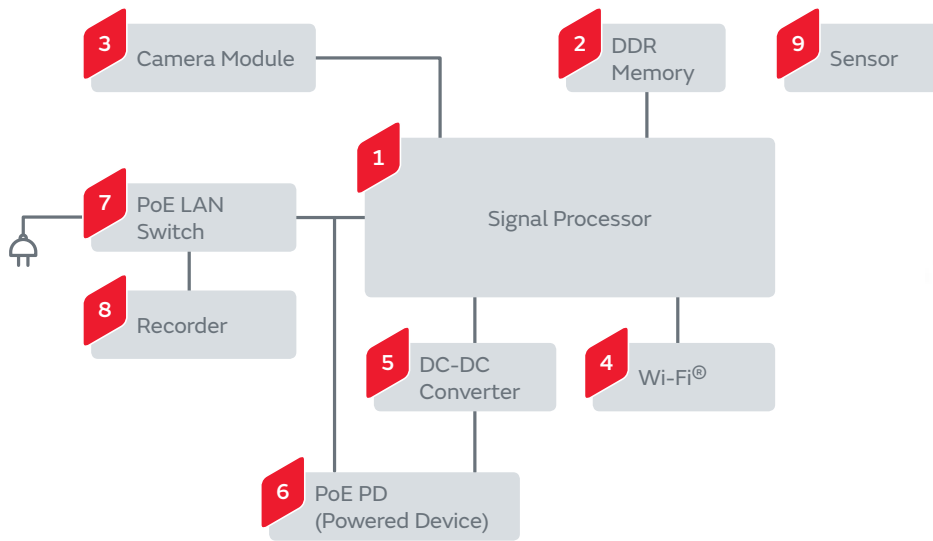


**9 Power Supply**

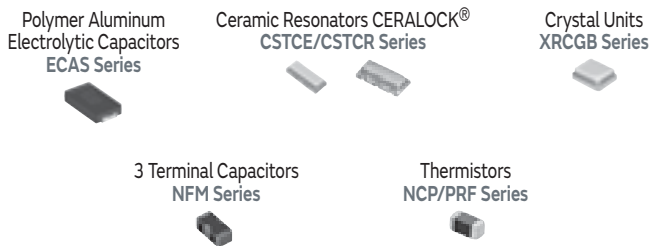


General Purpose	Monolithic Ceramic Capacitors	GRM/GJM Series	High Frequency Filter Circuit	
	Monolithic Ceramic Capacitors	GRM Series	Coupling/Decoupling/For Step-up	
	Resin External Electrode Monolithic Ceramic Capacitors	GRJ Series	Coupling/Decoupling/For Step-up	
	Polymer Aluminum Electrolytic Capacitors	ECAS Series	Smoothing/Transient Backup	
	Chip Inductors (Chip Coils)	LQW/LQP/LQG Series	High Frequency Circuit-Impedance Matching/Resonance	
	Chip Inductors (Chip Coils)	LQM/LQH Series	Voltage Conversion	
	Chip Ferrite Beads	BLM Series	Noise Suppression	
	3 Terminal Capacitors	NFM/NFE Series	Noise Suppression	
	Chip Common Mode Choke Coils	DLW/DLP Series	Noise Suppression	
	Microwave Absorbers	EA Series	Noise Suppression	
	Ferrite Cores	FS Series	Noise Suppression	
	Thin Type Sandwich Cores	FSSA Series	Noise Suppression	

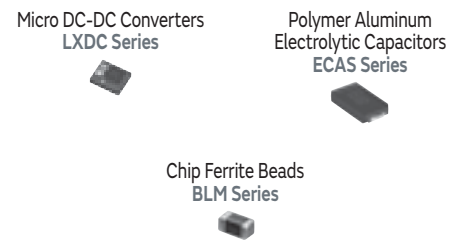
# Security Camera



## 1 Signal Processor



## 2 DDR Memory



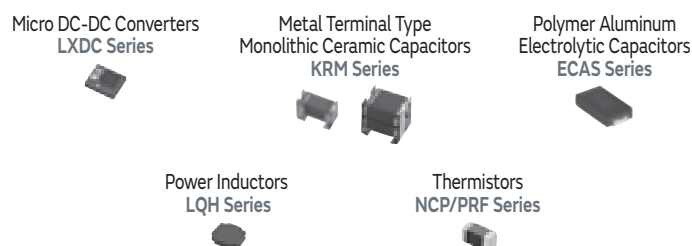
## 3 Camera Module



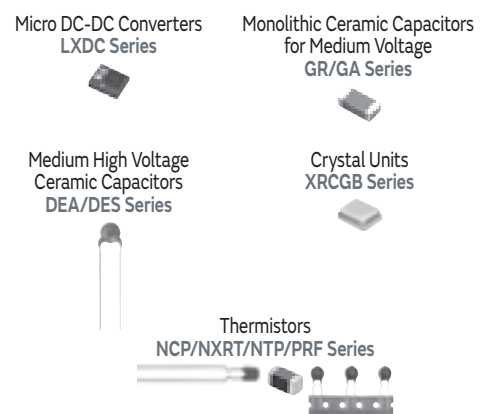
## 4 Wi-Fi



## 5 DC-DC Converter



## 6 PoE PD (Powered Device)



**7 PoE LAN Switch**

Micro DC-DC Converters LXDC Series

Monolithic Ceramic Capacitors for Medium Voltage GR/GA Series

Medium High Voltage Ceramic Capacitors DEA/DES Series

Safety Standard Certified Ceramic Capacitors Type KX/KY

Metal Terminal Type Monolithic Ceramic Capacitors KRM Series

Crystal Units XRCGB Series

Thermistors NCP/NXRT/NTP/PRF Series

**8 Recorder**

Shock Sensors PKGS Series

Polymer Aluminum Electrolytic Capacitors ECAS Series

Ceramic Resonators CERALOCK® CSTCE Series

Crystal Units XRCGB Series

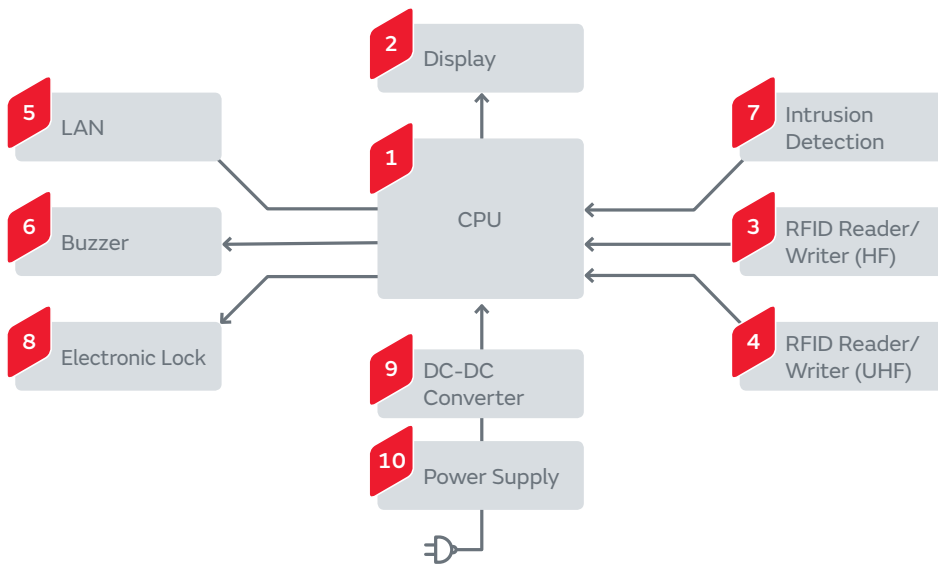
Thermistors NCP/PRF Series

**9 Sensor**

Pyroelectric Infrared Sensors IRA Series

General Purpose	Monolithic Ceramic Capacitors	GRM/GJM Series	High Frequency Filter Circuit	
	Monolithic Ceramic Capacitors	GRM Series	Coupling/Decoupling/For Step-up	
	Resin External Electrode Monolithic Ceramic Capacitors	GRJ Series	Coupling/Decoupling/For Step-up	
	Polymer Aluminum Electrolytic Capacitors	ECAS Series	Smoothing/Transient Backup	
	Chip Inductors (Chip Coils)	LQW/LQP/LQG Series	High Frequency Circuit-Impedance Matching/Resonance	
	Chip Inductors (Chip Coils)	LQM/LQH Series	Voltage Conversion	
	Chip Ferrite Beads	BLM Series	Noise Suppression	
	3 Terminal Capacitors	NFM/NFE Series	Noise Suppression	
	Chip Common Mode Choke Coils	DLW/DLP Series	Noise Suppression	
	Microwave Absorbers	EA Series	Noise Suppression	
	Ferrite Cores	FS Series	Noise Suppression	
	Thin Type Sandwich Cores	FSSA Series	Noise Suppression	
	Small Energy Devices	UMAC Series	Battery Backup	

# Entrance and Exit Management System



<p><b>1 CPU</b></p> <p>Non-isolated DC-DC Converters OKL/MPDR/MPDT Series</p> <p>Ceramic Resonators CERALOCK® CSTLS/CSTCE/CSTCR Series</p> <p>Crystal Units XRCGB Series</p>	<p><b>2 Display</b></p> <p>Micro DC-DC Converters LXDC Series</p> <p>Ceramic Resonators CERALOCK® CSTCE Series</p> <p>ESD Protection Devices LXES Series</p> <p>Thermistors NCP/PRF Series</p>	<p><b>3 RFID Reader/Writer (HF)</b></p> <p>Supercapacitors (EDLC) DMT Series</p> <p>Crystal Units XRCGB Series</p>	
<p><b>4 RFID Reader/Writer (UHF)</b></p> <p>Supercapacitors (EDLC) DMT Series</p> <p>Crystal Units XRCGB Series</p>	<p><b>5 LAN</b></p> <p>Polymer Aluminum Electrolytic Capacitors ECAS Series</p> <p>Crystal Units XRCGB Series</p> <p>ESD Protection Devices LXES Series</p> <p>Thermistors PRG Series</p>		
<p><b>6 Buzzer</b></p> <p>Piezoelectric Sounders PKMCS/PKLCs/PKM Series</p>	<p><b>7 Intrusion Detection</b></p> <p>Pyroelectric Infrared Sensors IRA Series</p> <p>Ultrasonic Sensors MA Series</p> <p>AMR Sensors (Magnetic Sensors) MR Series</p>		<p><b>8 Electronic Lock</b></p> <p>Supercapacitors (EDLC) DMT Series</p>

**9 DC-DC Converter**

Micro DC-DC Converters  
LXDC Series



Thermistors  
NCP/PRF Series



Polymer Aluminum  
Electrolytic Capacitors  
ECAS Series



Metal Terminal Type  
Monolithic Ceramic Capacitors  
KRM Series



**10 Power Supply**

Micro DC-DC Converters  
LXDC Series



Monolithic Ceramic Capacitors  
for Medium Voltage  
GR/GA Series



Medium High Voltage  
Ceramic Capacitors  
DEA/DES Series



Safety Standard Certified  
Ceramic Capacitors  
Type KX/KY



Ceramic Resonators CERALOCK®  
CSTCE/CSTCR Series



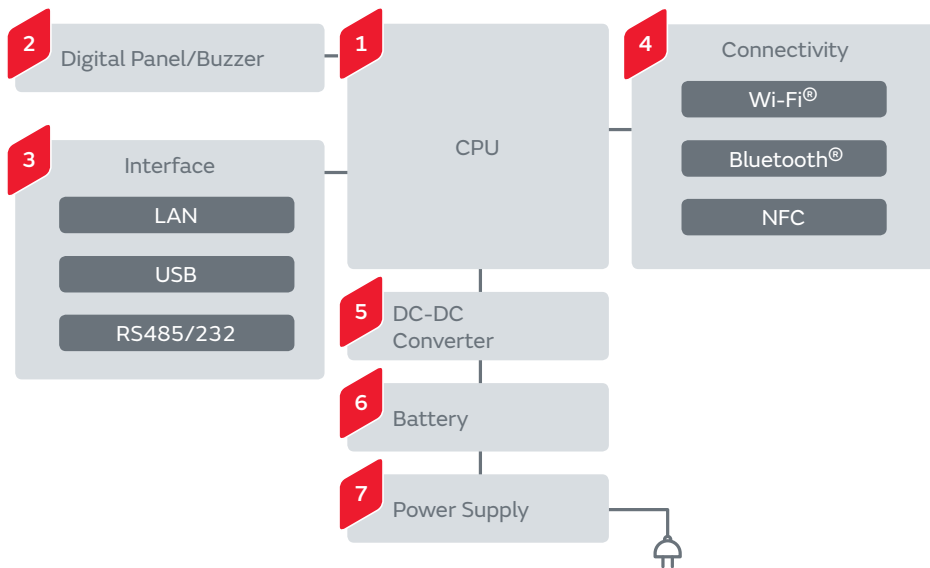
Thermistors  
NCP/NTP/PRF Series



General Purpose

Monolithic Ceramic Capacitors	GRM/GJM Series	High Frequency Filter Circuit	
Monolithic Ceramic Capacitors	GRM Series	Coupling/Decoupling/For Step-up	
Resin External Electrode Monolithic Ceramic Capacitors	GRJ Series	Coupling/Decoupling/For Step-up	
Polymer Aluminum Electrolytic Capacitors	ECAS Series	Smoothing/Transient Backup	
Chip Inductors (Chip Coils)	LQW/LQP/LQG Series	High Frequency Circuit-Impedance Matching/Resonance	
Chip Inductors (Chip Coils)	LQM/LQH Series	Voltage Conversion	
Chip Ferrite Beads	BLM Series	Noise Suppression	
3 Terminal Capacitors	NFM/NFE Series	Noise Suppression	
Chip Common Mode Choke Coils	DLW/DLP Series	Noise Suppression	
Microwave Absorbers	EA Series	Noise Suppression	
Ferrite Cores	FS Series	Noise Suppression	
Thin Type Sandwich Cores	FSSA Series	Noise Suppression	

# Electronic POS



### 1 CPU

- Supercapacitors (EDLC) DMT Series
- ESD Protection Devices LXES Series
- Micro DC-DC Converters LXDC Series

### 3 Interface

- Polymer Aluminum Electrolytic Capacitors ECAS Series
- Crystal Units XRCGB Series
- Chip Common Mode Choke Coils DLW/DLP Series
- ESD Protection Devices LXES Series
- Thermistors PRG Series

### 2 Digital Panel/Buzzer

- Metal Terminal Type Monolithic Ceramic Capacitors KCM Series
- Ceramic Resonators CERALOCK® CSTCE/CSTCR Series
- Power Inductors LQH Series
- Thermistors PRF/PRG Series
- Piezoelectric Sounders PKMCS/PKLCS/PKM Series
- Piezoelectric Buzzers PKB Series

### 4 Connectivity

- Bluetooth® Modules
- Bluetooth® - Wi-Fi® Combo Modules
- Bluetooth® Smart Modules
- Wi-Fi® Modules
- NFC Antennas FLAN Series

### 5 DC-DC Converter

- Micro DC-DC Converters LXDC Series
- Metal Terminal Type Monolithic Ceramic Capacitors KRM Series
- Polymer Aluminum Electrolytic Capacitors ECAS Series
- Power Inductors LQH Series
- Thermistors NCP/PRF Series

### 6 Battery

- Thermistors NCP/PRF/PRG Series

**7 Power Supply**

Monolithic Ceramic Capacitors for Medium Voltage GR/GA Series



Medium High Voltage Ceramic Capacitors DEA/DES Series



Safety Standard Certified Ceramic Capacitors Type KX/KY



AC Line Filters PLA/PLY Series

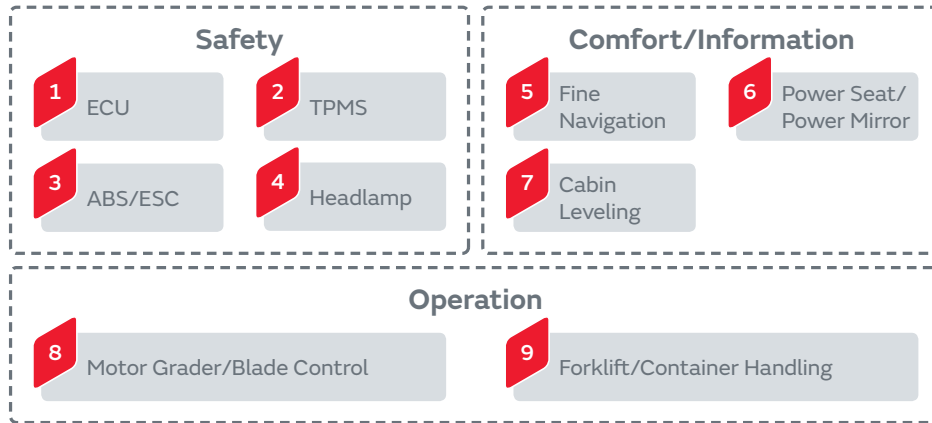


Thermistors NCP/NTP/PRF/PTG Series



General Purpose	Monolithic Ceramic Capacitors	GRM/GJM Series	High Frequency Filter Circuit	
	Monolithic Ceramic Capacitors	GRM Series	Coupling/Decoupling/For Step-up	
	Resin External Electrode Monolithic Ceramic Capacitors	GRJ Series	Coupling/Decoupling/For Step-up	
	Polymer Aluminum Electrolytic Capacitors	ECAS Series	Smoothing/Transient Backup	
	Chip Inductors (Chip Coils)	LQW/LQP/LQG Series	High Frequency Circuit-Impedance Matching/Resonance	
	Chip Inductors (Chip Coils)	LQM/LQH Series	Voltage Conversion	
	Chip Ferrite Beads	BLM Series	Noise Suppression	
	3 Terminal Capacitors	NFM/NFE Series	Noise Suppression	
	Chip Common Mode Choke Coils	DLW/DLP Series	Noise Suppression	
	Microwave Absorbers	EA Series	Noise Suppression	
	Ferrite Cores	FS Series	Noise Suppression	
	Thin Type Sandwich Cores	FSSA Series	Noise Suppression	
Small Energy Devices	UMAC Series	Battery Backup		

# Heavy Duty Vehicles



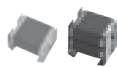
## Safety

### 1 ECU

Low Temperature Co-fired Ceramics (LTCC) Ceramic Multilayer Substrates LFC®



Metal Terminal Type Monolithic Ceramic Capacitors KCM Series



Monolithic Ceramic Capacitors for Conductive Glue Mounting GCG Series



Radial Lead Type Monolithic Ceramic Capacitors RH/RCE Series



Ceramic Resonators CERALOCK® CSTCE/CSTCR Series



Accelerometers SCA Series



Gyro Sensors SCC Series



Thermistors PRF/PTG Series



### 2 TPMS

Shock Sensors PKGS Series



Ceramic Filters CERAFIL® SFECF Series



Ceramic Discriminators CDSCB Series



Ceramic Resonators CERALOCK® CSTCE/CSTCR Series



Crystal Units XRCHA-F-A Series



Pressure Sensor Elements



Thermistors PRF Series



### 4 Headlamp

Monolithic Ceramic Capacitors GCM/GCJ Series



Monolithic Ceramic Capacitors for Conductive Glue Mounting GCG Series



Ceramic Resonators CERALOCK® CSTCE/CSTCR Series



Crystal Units XRCHA-F-A Series



Thermistors for Conductive Glue Mounting NCG18 Series

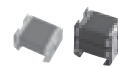


### 3 ABS/ESC

Low Temperature Co-fired Ceramics (LTCC) Ceramic Multilayer Substrates LFC®



Metal Terminal Type Monolithic Ceramic Capacitors KCM Series



Monolithic Ceramic Capacitors GCM/GCJ Series



Monolithic Ceramic Capacitors for Conductive Glue Mounting GCG Series



Ceramic Resonators CERALOCK® CSTCE/CSTCR Series



Crystal Units XRCHA-F-A Series



Accelerometers SCA Series



Gyro Sensors SCC Series



Thermistors for Conductive Glue Mounting NCG18 Series



Comfort/Information

5 Fine Navigation

Accelerometers  
SCA Series



Gyro Sensors  
SCC Series



MEMS Gyro Sensors  
SCR Series



6 Power Seat/Power Mirror

Piezoelectric Sounders  
PKLCS Series



Ceramic Resonators CERALOCK®  
CSTCE/CSTCR Series



Crystal Units  
XRCHA-F-A Series



Thermistors  
PRF/PTG Series



7 Cabin Leveling

Accelerometers  
SCA Series



Gyro Sensors  
SCC Series



Operation

8 Motor Grader/Blade Control

Accelerometers  
SCA Series



Gyro Sensors  
SCC Series



MEMS Gyro Sensors  
SCR Series



9 Forklift/Container Handling

Accelerometers  
SCA Series



General Purpose

Monolithic Ceramic Capacitors

GRM Series

Coupling/Decoupling



Monolithic Ceramic Capacitors

GCM/GCJ Series

Powertrain/Safety



Monolithic Ceramic Capacitors for Medium Voltage

GRM Series

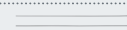
For Snubber



Radial Lead Type Monolithic Ceramic Capacitors

RCE Series

Noise Suppression/Decoupling



Chip Inductors (Chip Coils)

LQM/LQH Series

Voltage Conversion



Chip Ferrite Beads

BLM Series

Noise Suppression



EMI Suppression Filters EMIFIL®

NFM/NFA/NFL/NFE/NFW/NFR Series

Noise Suppression



Chip Common Mode Choke Coils

DLW Series

Common Mode Noise Suppression



Ferrite Cores

FS Series

Noise Suppression



General Purpose (High Reliability)

Monolithic Ceramic Capacitors

GCM Series

Coupling/Decoupling



150°C

Radial Lead Type Monolithic Ceramic Capacitors

RCE Series

Noise Suppression/Decoupling



125°C

Radial Lead Type Monolithic Ceramic Capacitors

RH Series

Noise Suppression/Decoupling



150°C

Chip Inductors (Chip Coils)

LQH32CH Series

Voltage Conversion



105°C

Chip Inductors (Chip Coils)

LQG15HH Series

Impedance Matching/Choke



125°C

Chip Ferrite Beads

BLM\_SH Series

Noise Suppression



125°C

3 Terminal Capacitors

NFM\_H/NFE\_H Series

Noise Suppression



125°C

Chip Common Mode Choke Coils

DLW31SH/DLW43SH Series

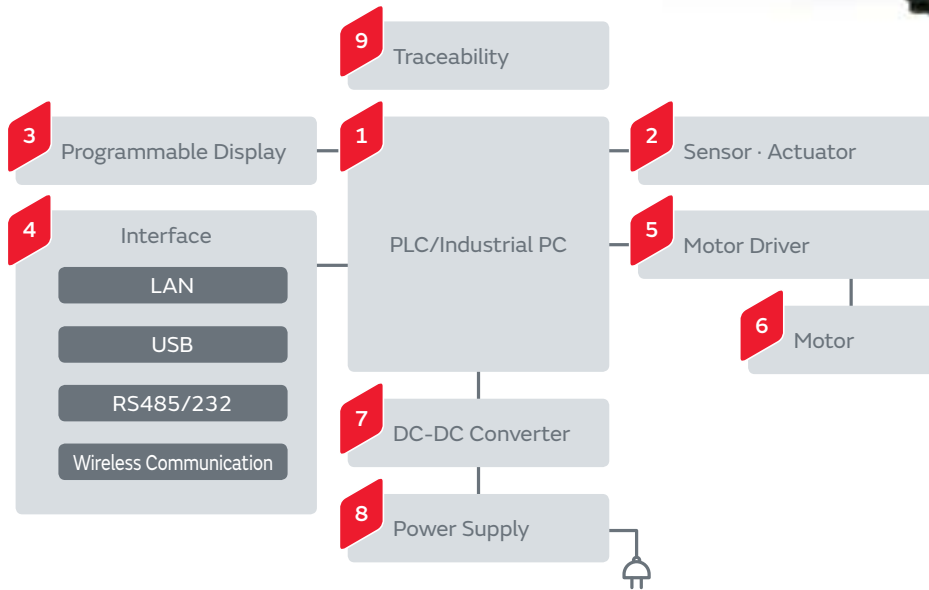
Common Mode Noise Suppression



125°C

105°C 105°C max. 125°C 125°C max. 150°C 150°C max.

# Industrial Automation



## 1 PLC/Industrial PC

Polymer Aluminum Electrolytic Capacitors ECAS Series



3 Terminal Capacitors NFM Series



Crystal Units XRCGB Series



Supercapacitors (EDLC) DMT Series



Chip Ferrite Beads BLM Series



Thermistors NCP/PRF Series



## 2 Sensor · Actuator

Pyroelectric Infrared Sensors IRA Series



AMR Sensors (Magnetic Sensors) MR Series



## 3 Programmable Display

Micro DC-DC Converters LXDC Series



Power Inductors LQH Series



Ceramic Resonators CERALOCK® CSTCE/CSTCR Series



Supercapacitors (EDLC) DMT Series



Crystal Units XRCGB Series



Chip Common Mode Choke Coils DLW/DLP Series



## 5 Motor Driver

Monolithic Ceramic Capacitors for Medium Voltage GR/GA Series



Ceramic Resonators CERALOCK® CSTCE/CSTCR Series



Large Current Common Mode Choke Coils PLT10HH Series



Medium High Voltage Ceramic Capacitors DEA/DES Series



Crystal Units XRCGB Series



Thermistors PRF/PTG Series



## 4 Interface

Polymer Aluminum Electrolytic Capacitors ECAS Series



ESD Protection Devices LXES Series



Crystal Units XRCGB Series



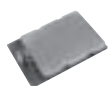
Thermistors PRG Series



Chip Common Mode Choke Coils DLW/DLP Series



Wireless Communication Modules based on the ISA100 Wireless™ standard



**6 Motor**

Crystal Units  
XRCGB Series



Rotary Sensors



**7 DC-DC Converter**

Isolated DC-DC Converters  
MYB Series



Non-isolated DC-DC Converters  
OKL/MPD/MYS Series



Micro DC-DC Converters  
LXDC Series



Metal Terminal Type  
Monolithic Ceramic Capacitors  
KRM Series



Polymer Aluminum  
Electrolytic Capacitors  
ECAS Series



Power Inductors  
LQH Series



Thermistors  
NCP/PRF Series



**8 Power Supply**

Micro DC-DC Converters  
LXDC Series



Monolithic Ceramic Capacitors  
for Medium Voltage  
GR/GA Series



Medium High Voltage  
Ceramic Capacitors  
DEA/DES Series



Safety Standard Certified  
Ceramic Capacitors  
Type KX/KY



Ceramic Resonators  
CERALOCK®  
CSTCE/CSTCR Series



Thermistors  
NCP/NTP/PRF Series



**9 Traceability**

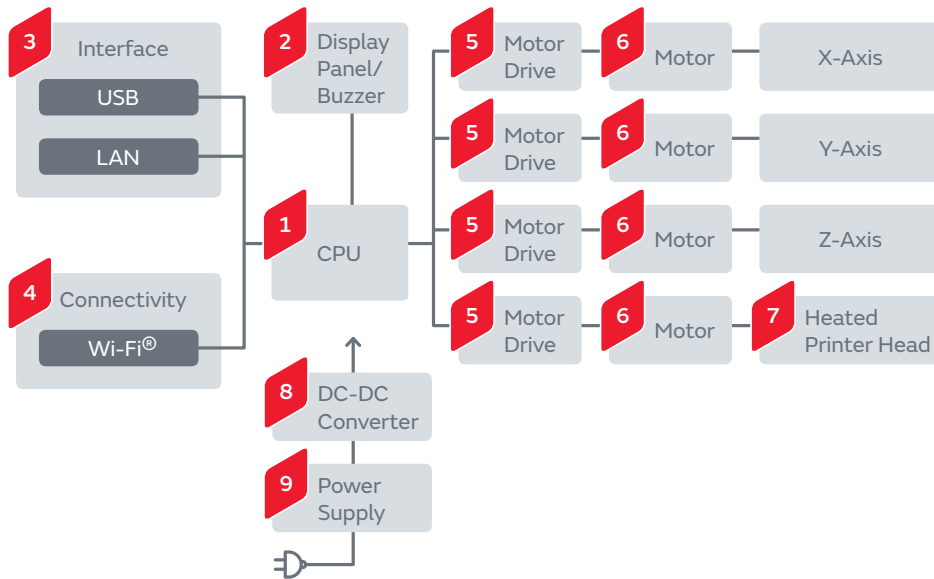
Supercapacitors (EDLC)  
DMT Series



General Purpose

Monolithic Ceramic Capacitors	GRM/GJM Series	High Frequency Filter Circuit	
Monolithic Ceramic Capacitors	GRM Series	Coupling/Decoupling/For Step-up	
Resin External Electrode Monolithic Ceramic Capacitors	GRJ Series	Coupling/Decoupling/For Step-up	
Polymer Aluminum Electrolytic Capacitors	ECAS Series	Smoothing/Transient Backup	
Chip Inductors (Chip Coils)	LQW/LQP/LQG Series	High Frequency Circuit-Impedance Matching/Resonance	
Chip Inductors (Chip Coils)	LQM/LQH Series	Voltage Conversion	
Chip Ferrite Beads	BLM Series	Noise Suppression	
3 Terminal Capacitors	NFM/NFE Series	Noise Suppression	
Chip Common Mode Choke Coils	DLW/DLP Series	Noise Suppression	
Microwave Absorbers	EA Series	Noise Suppression	
Ferrite Cores	FS Series	Noise Suppression	
Thin Type Sandwich Cores	FSSA Series	Noise Suppression	
Small Energy Devices	UMAC Series	Battery Backup	

# 3D Printer



## 1 CPU

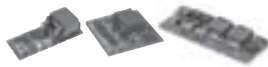
Isolated DC-DC Converters  
MYB Series



Polymer Aluminum  
Electrolytic Capacitors  
ECAS Series



Non-isolated DC-DC Converters  
OKL/MPDR/MPDT Series



Crystal Units  
XRCGB Series



Ceramic Resonators CERALOCK®  
CSTLS/CSTCE/CSTCR Series



Thermistors  
NCP/PRF Series

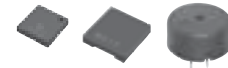


## 2 Display Panel/Buzzer

Ceramic Resonators CERALOCK®  
CSTLS/CSTCE/CSTCR Series



Piezoelectric Sounders  
PKMCS/PKLCs/PKM Series



## 3 Interface

Polymer Aluminum  
Electrolytic Capacitors  
ECAS Series



Crystal Units  
XRCGB Series



Chip Common Mode Choke Coils  
DLW/DLP Series



ESD Protection Devices  
LXES Series



Thermistors  
PRG Series



## 4 Connectivity

Wi-Fi® Modules



Micro DC-DC Converters  
LXDC Series



Ceramic Resonators CERALOCK®  
CSTCE/CSTCR Series



Crystal Units  
XRCGB Series



Chip Inductors (Chip Coils)  
LQB Series



ESD Protection Devices  
LXES Series

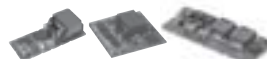


## 5 Motor Drive

Isolated DC-DC Converters  
MYB Series



Non-isolated DC-DC Converters  
OKL/MPDR/MPDT Series



Monolithic Ceramic Capacitors  
for Medium Voltage  
GR/GA Series



Medium High Voltage  
Ceramic Capacitors  
DEA/DES Series



Ceramic Resonators CERALOCK®  
CSTCE/CSTCR Series



Crystal Units  
XRCGB Series



Large Current  
Common Mode Choke Coils  
PLT10HH Series



Thermistors  
PRF/PTG Series



**6 Motor**

Crystal Units  
XRCGB Series



**7 Heated Printer Head**

Thermistors  
NCP/PRF Series



**8 DC-DC Converter**

Micro DC-DC Converters  
LXDC Series



Metal Terminal Type  
Monolithic Ceramic Capacitors  
KRM Series



Polymer Aluminum  
Electrolytic Capacitors  
ECAS Series



Thermistors  
NCP/PRF Series



**9 Power Supply**

Micro DC-DC Converters  
LXDC Series



Monolithic Ceramic Capacitors  
for Medium Voltage  
GR/GA Series



Medium High Voltage  
Ceramic Capacitors  
DEA/DES Series



Safety Standard Certified  
Ceramic Capacitors  
Type KX/KY



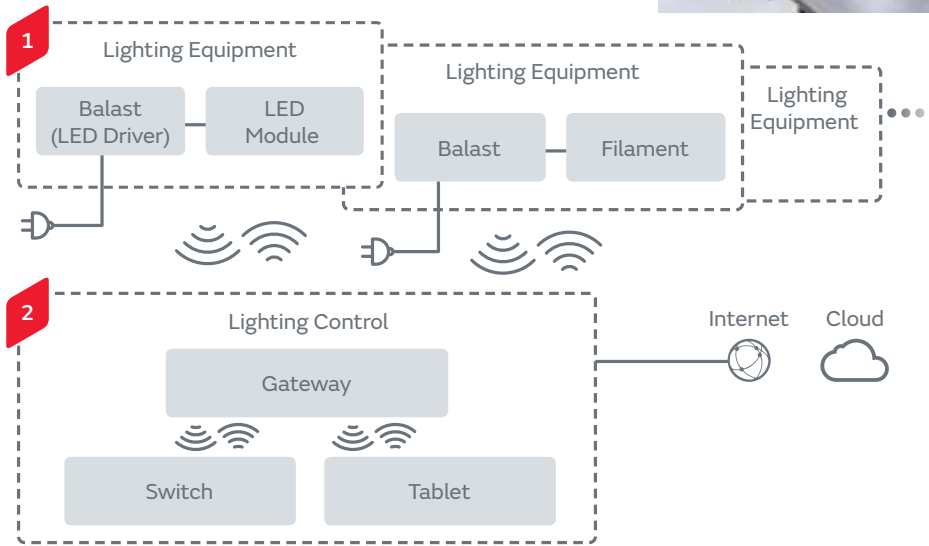
Thermistors  
NCP/NTP/PRF/PRG Series



General Purpose

Monolithic Ceramic Capacitors	GRM/GJM Series	High Frequency Filter Circuit	
Monolithic Ceramic Capacitors	GRM Series	Coupling/Decoupling/For Step-up	
Resin External Electrode Monolithic Ceramic Capacitors	GRJ Series	Coupling/Decoupling/For Step-up	
Polymer Aluminum Electrolytic Capacitors	ECAS Series	Smoothing/Transient Backup	
Chip Inductors (Chip Coils)	LQW/LQP/LQG Series	High Frequency Circuit-Impedance Matching/Resonance	
Chip Inductors (Chip Coils)	LQM/LQH Series	Voltage Conversion	
Chip Ferrite Beads	BLM Series	Noise Suppression	
3 Terminal Capacitors	NFM/NFE Series	Noise Suppression	
Chip Common Mode Choke Coils	DLW/DLP Series	Noise Suppression	
Microwave Absorbers	EA Series	Noise Suppression	
Ferrite Cores	FS Series	Noise Suppression	
Thin Type Sandwich Cores	FSSA Series	Noise Suppression	
Small Energy Devices	UMAC Series	Battery Backup	

# Lighting



## 1 Lighting Equipment

<p>Ballast for LED Lighting</p>	<p>Monolithic Ceramic Capacitors for Medium Voltage GR/GA Series</p>	<p>Medium High Voltage Ceramic Capacitors DEA/DES Series</p>	<p>Safety Standard Certified Ceramic Capacitors Type KX/KY</p>
<p>Wi-Fi® Modules</p>	<p>Sub-GHz Modules</p>	<p>Thermistors NCP/NTP/PRF/PRG/PTG Series</p>	<p>AC Line Filters PLA/PLH/PLY Series</p>

## 2 Lighting Control

<p>Wi-Fi® Modules</p>	<p>Sub-GHz Modules</p>	<p>Pyroelectric Infrared Sensors IRA Series</p>	<p>Ceramic Resonators CERALOCK® CSTLS/CSTCE/CSTCR Series</p>	<p>SAW Filters SF/RF Series</p>
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General Purpose	Monolithic Ceramic Capacitors	GRM/GJM Series	High Frequency Filter Circuit	
	Monolithic Ceramic Capacitors	GRM Series	Coupling/Decoupling/For Step-up	
	Resin External Electrode Monolithic Ceramic Capacitors	GRJ Series	Coupling/Decoupling/For Step-up	
	Polymer Aluminum Electrolytic Capacitors	ECAS Series	Smoothing/Transient Backup	
	Chip Inductors (Chip Coils)	LQW/LQP/LQG Series	High Frequency Circuit-Impedance Matching/Resonance	
	Chip Inductors (Chip Coils)	LQM/LQH Series	Voltage Conversion	
	Chip Ferrite Beads	BLM Series	Noise Suppression	
	3 Terminal Capacitors	NFM/NFE Series	Noise Suppression	
	Chip Common Mode Choke Coils	DLW/DLP Series	Noise Suppression	
	Microwave Absorbers	EA Series	Noise Suppression	
	Ferrite Cores	FS Series	Noise Suppression	
	Thin Type Sandwich Cores	FSSA Series	Noise Suppression	
	Small Energy Devices	UMAC Series	Battery Backup	

# Memo

# Design Support Tool "SimSurfing"

<http://www.murata.com/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 Monolithic 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 a "my Murata" user (<https://my.murata.com/en/web/mymurata/>), you can use Enhanced SimSurfing.

## ■ Usage example of "Monolithic Ceramic Capacitors"

### 1 Select the products

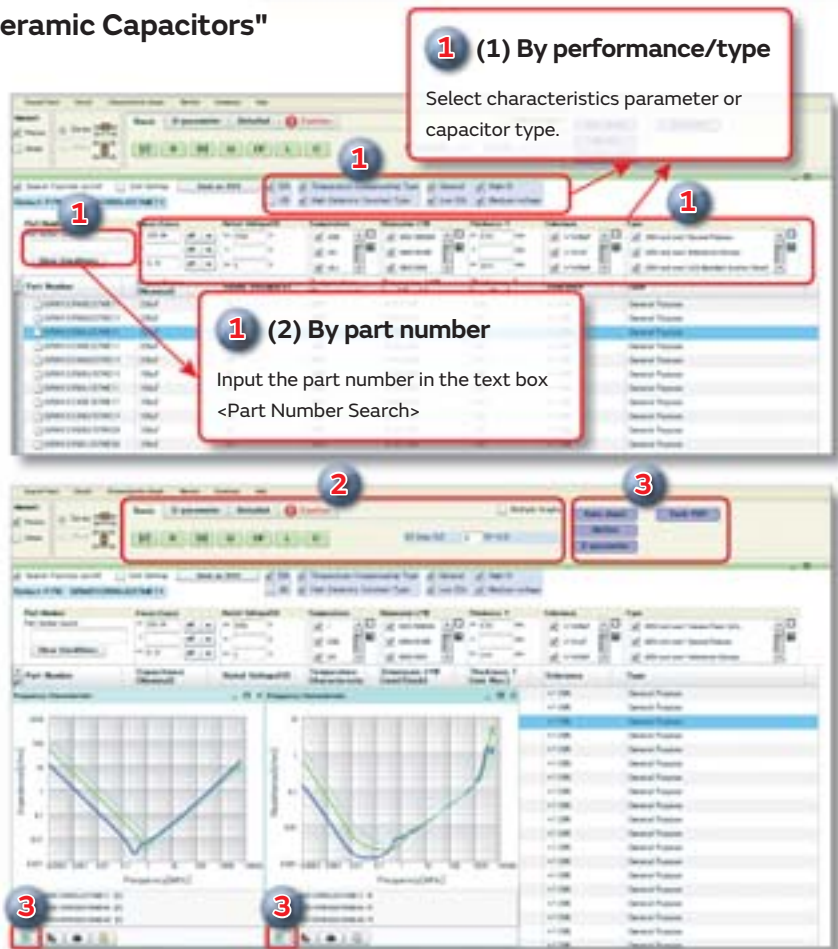
- (1) By performance/type
- (2) By part number

### 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.



**1 (1) By performance/type**  
Select characteristics parameter or capacitor type.

**1 (2) By part number**  
Input the part number in the text box <Part Number Search>

**2**  
Click each button on each tab of [Basic], [S-parameter] and [Detailed].

**3**  
Click each purple button in this area. Click "CSV output" button.

\* Images are as of October 2015. Be assured that this software will be updated frequently.

<http://www.murata.com/simsurfing/>

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# Global Locations

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



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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.

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- 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

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Murata Manufacturing Co., Ltd.

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INNOVATOR IN ELECTRONICS