

Product for Bonding/AuSn Soldering

GMD Series

This capacitor is compatible to wire bonding mounting by the external electrodes of Au plating.

Features

① Can be mounted by wire bonding and AuSn soldering.

Since the external electrodes are based on the Au plating specification, mounting by wire/die bonding is possible.



② Ideal for mounting in packages, such as optical communication related devices , IC and etc.

Noise can be reduced by eliminating the routing of the wire, and high efficiency can be achieved with a built-in capacitor in the package, such as TO-CAN, IC and etc. by wire bonding mounting.

③ Contributes to the miniaturization of the set.

Murata offers a lineup of small size products, such as the 0603 (0201) and 1005 (0402) in mm (inch).

Specifications

Size	0.6×0.3mm to 1.0×0.5mm
Rated Voltage	DC6.3V to 50V
Capacitance	100pF to 1.0μF
Main Applications	1. Optical communication related equipment 2. Mounting in IC packages



This catalog contains only a portion of the product lineup.
Please refer to the capacitor search tool on the Murata Web site for details.

GMD Series High Dielectric Constant Type Part Number List

■ 0.6×0.3mm **Ultra-compact**

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
0.33mm	25Vdc	X7R	100pF	±10%	GMD033R71E101KA01#	
			120pF	±10%	GMD033R71E121KA01#	
			150pF	±10%	GMD033R71E151KA01#	
			180pF	±10%	GMD033R71E181KA01#	
			220pF	±10%	GMD033R71E221KA01#	
			270pF	±10%	GMD033R71E271KA01#	
			330pF	±10%	GMD033R71E331KA01#	
			390pF	±10%	GMD033R71E391KA01#	
			470pF	±10%	GMD033R71E471KA01#	
			560pF	±10%	GMD033R71E561KA01#	
			680pF	±10%	GMD033R71E681KA01#	
			820pF	±10%	GMD033R71E821KA01#	
			1000pF	±10%	GMD033R71E102KA01#	
			1200pF	±10%	GMD033R71E122KA01#	
			1500pF	±10%	GMD033R71E152KA01#	
		R	100pF	±10%	GMD033R11E101KA01#	
			120pF	±10%	GMD033R11E121KA01#	
			150pF	±10%	GMD033R11E151KA01#	
			180pF	±10%	GMD033R11E181KA01#	
			220pF	±10%	GMD033R11E221KA01#	
			270pF	±10%	GMD033R11E271KA01#	
			330pF	±10%	GMD033R11E331KA01#	
			390pF	±10%	GMD033R11E391KA01#	
			470pF	±10%	GMD033R11E471KA01#	
			560pF	±10%	GMD033R11E561KA01#	
			680pF	±10%	GMD033R11E681KA01#	
			820pF	±10%	GMD033R11E821KA01#	
			1000pF	±10%	GMD033R11E102KA01#	
			1200pF	±10%	GMD033R11E122KA01#	
			1500pF	±10%	GMD033R11E152KA01#	
		B	100pF	±10%	GMD033B11E101KA01#	
			120pF	±10%	GMD033B11E121KA01#	
			150pF	±10%	GMD033B11E151KA01#	
			180pF	±10%	GMD033B11E181KA01#	
			220pF	±10%	GMD033B11E221KA01#	
			270pF	±10%	GMD033B11E271KA01#	
			330pF	±10%	GMD033B11E331KA01#	
			390pF	±10%	GMD033B11E391KA01#	
			470pF	±10%	GMD033B11E471KA01#	
			560pF	±10%	GMD033B11E561KA01#	
	16Vdc	X7R	1800pF	±10%	GMD033R71C182KA11#	
			2200pF	±10%	GMD033R71C222KA11#	
			2700pF	±10%	GMD033R71C272KA11#	
			3300pF	±10%	GMD033R71C332KA11#	
			1800pF	±10%	GMD033R11C182KA11#	
		R	2200pF	±10%	GMD033R11C222KA11#	
			2700pF	±10%	GMD033R11C272KA11#	
			3300pF	±10%	GMD033R11C332KA11#	
			1800pF	±10%	GMD033R11C182KA11#	
			2200pF	±10%	GMD033R11C222KA11#	
			2700pF	±10%	GMD033R11C272KA11#	
		B	1800pF	±10%	GMD033B11C182KA11#	
			2200pF	±10%	GMD033B11C222KA11#	
			2700pF	±10%	GMD033B11C272KA11#	
			3300pF	±10%	GMD033B11C332KA11#	
			1800pF	±10%	GMD033B11C182KA11#	

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
0.33mm	16Vdc	R	3300pF	±10%	GMD033R11C332KA11#	
			1800pF	±10%	GMD033B31C182KA11#	
			2200pF	±10%	GMD033B31C222KA11#	
			2700pF	±10%	GMD033B31C272KA11#	
		X7R	3300pF	±10%	GMD033B31C332KA11#	
			3900pF	±10%	GMD033R71A392KA01#	
			4700pF	±10%	GMD033R71A472KA01#	
			5600pF	±10%	GMD033R71A562KA01#	
			6800pF	±10%	GMD033R71A682KA01#	
			8200pF	±10%	GMD033R71A822KA01#	
			10000pF	±10%	GMD033R71A103KA01#	
	10Vdc	R	3900pF	±10%	GMD033R11A392KA01#	
			4700pF	±10%	GMD033R11A472KA01#	
			5600pF	±10%	GMD033R11A562KA01#	
			6800pF	±10%	GMD033R11A682KA01#	
			8200pF	±10%	GMD033R11A822KA01#	
			10000pF	±10%	GMD033R11A103KA01#	
		B	3900pF	±10%	GMD033B11A392KA01#	
			4700pF	±10%	GMD033B11A472KA01#	
			5600pF	±10%	GMD033B11A562KA01#	
			6800pF	±10%	GMD033B11A682KA01#	
			8200pF	±10%	GMD033B11A822KA01#	
			10000pF	±10%	GMD033B11A103KA01#	
		X5R	56000pF	±10%	GMD033R60J563KE11#	
			68000pF	±10%	GMD033R60J683KE11#	
			82000pF	±10%	GMD033R60J823KE11#	
			0.10μF	±10%	GMD033R60J104KE11#	
		B	56000pF	±10%	GMD033B30J563KE11#	
			68000pF	±10%	GMD033B30J683KE11#	
			82000pF	±10%	GMD033B30J823KE11#	
			0.10μF	±10%	GMD033B30J104KE11#	

■ 1.0×0.5mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
0.55mm	50Vdc	X7R	220pF	±10%	GMD155R71H221KA01#	
			270pF	±10%	GMD155R71H271KA01#	
			330pF	±10%	GMD155R71H331KA01#	
			390pF	±10%	GMD155R71H391KA01#	
			470pF	±10%	GMD155R71H471KA01#	
			560pF	±10%	GMD155R71H561KA01#	
			680pF	±10%	GMD155R71H681KA01#	
			820pF	±10%	GMD155R71H821KA01#	
			1000pF	±10%	GMD155R71H102KA01#	
			1200pF	±10%	GMD155R71H122KA01#	
			1500pF	±10%	GMD155R71H152KA01#	
			1800pF	±10%	GMD155R71H182KA01#	
			2200pF	±10%	GMD155R71H222KA01#	
			2700pF	±10%	GMD155R71H272KA01#	
			3300pF	±10%	GMD155R71H332KA01#	
			3900pF	±10%	GMD155R71H392KA01#	
			4700pF	±10%	GMD155R71H472KA01#	
			220pF	±10%	GMD155R11H221KA01#	

Part number # indicates the package specification code.

GMD Series High Dielectric Constant Type Part Number List

(→ ■ 1.0×0.5mm)

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
0.55mm	50Vdc	R	270pF	±10%	GMD155R11H271KA01#	
			330pF	±10%	GMD155R11H331KA01#	
			390pF	±10%	GMD155R11H391KA01#	
			470pF	±10%	GMD155R11H471KA01#	
			560pF	±10%	GMD155R11H561KA01#	
			680pF	±10%	GMD155R11H681KA01#	
			820pF	±10%	GMD155R11H821KA01#	
			1000pF	±10%	GMD155R11H102KA01#	
			1200pF	±10%	GMD155R11H122KA01#	
			1500pF	±10%	GMD155R11H152KA01#	
			1800pF	±10%	GMD155R11H182KA01#	
			2200pF	±10%	GMD155R11H222KA01#	
			2700pF	±10%	GMD155R11H272KA01#	
			3300pF	±10%	GMD155R11H332KA01#	
			3900pF	±10%	GMD155R11H392KA01#	
			4700pF	±10%	GMD155R11H472KA01#	
		B	220pF	±10%	GMD155B11H221KA01#	
			270pF	±10%	GMD155B11H271KA01#	
			330pF	±10%	GMD155B11H331KA01#	
			390pF	±10%	GMD155B11H391KA01#	
			470pF	±10%	GMD155B11H471KA01#	
			560pF	±10%	GMD155B11H561KA01#	
			680pF	±10%	GMD155B11H681KA01#	
			820pF	±10%	GMD155B11H821KA01#	
			1000pF	±10%	GMD155B11H102KA01#	
			1200pF	±10%	GMD155B11H122KA01#	
			1500pF	±10%	GMD155B11H152KA01#	
			1800pF	±10%	GMD155B11H182KA01#	
			2200pF	±10%	GMD155B11H222KA01#	
			2700pF	±10%	GMD155B11H272KA01#	
			3300pF	±10%	GMD155B11H332KA01#	
			3900pF	±10%	GMD155B11H392KA01#	
			4700pF	±10%	GMD155B11H472KA01#	
	25Vdc	X7R	5600pF	±10%	GMD155R71E562KA01#	
			6800pF	±10%	GMD155R71E682KA01#	
			8200pF	±10%	GMD155R71E822KA01#	
			10000pF	±10%	GMD155R71E103KA01#	
			12000pF	±10%	GMD155R71E123KA01#	
			15000pF	±10%	GMD155R71E153KA01#	
			18000pF	±10%	GMD155R71E183KA01#	
			22000pF	±10%	GMD155R71E223KA01#	
			27000pF	±10%	GMD155R71E273KA11#	
			33000pF	±10%	GMD155R71E333KA11#	
			39000pF	±10%	GMD155R71E393KA11#	
			47000pF	±10%	GMD155R71E473KA11#	
		R	5600pF	±10%	GMD155R11E562KA01#	
			6800pF	±10%	GMD155R11E682KA01#	
			8200pF	±10%	GMD155R11E822KA01#	
			10000pF	±10%	GMD155R11E103KA01#	
			12000pF	±10%	GMD155R11E123KA01#	
			15000pF	±10%	GMD155R11E153KA01#	
			18000pF	±10%	GMD155R11E183KA01#	
			22000pF	±10%	GMD155R11E223KA01#	
			27000pF	±10%	GMD155R11E273KA11#	

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
0.55mm	25Vdc	R	33000pF	±10%	GMD155R11E333KA11#	
			39000pF	±10%	GMD155R11E393KA11#	
			47000pF	±10%	GMD155R11E473KA11#	
		B	5600pF	±10%	GMD155B11E562KA01#	
			6800pF	±10%	GMD155B11E682KA01#	
			8200pF	±10%	GMD155B11E822KA01#	
			10000pF	±10%	GMD155B11E103KA01#	
			12000pF	±10%	GMD155B11E123KA01#	
			15000pF	±10%	GMD155B11E153KA01#	
			18000pF	±10%	GMD155B11E183KA01#	
			22000pF	±10%	GMD155B11E223KA01#	
			27000pF	±10%	GMD155B31E273KA11#	
			33000pF	±10%	GMD155B31E333KA11#	
			39000pF	±10%	GMD155B31E393KA11#	
			47000pF	±10%	GMD155B31E473KA11#	
	16Vdc	X7R	56000pF	±10%	GMD155R71C563KA11#	
			68000pF	±10%	GMD155R71C683KA11#	
			82000pF	±10%	GMD155R71C823KA11#	
			0.10μF	±10%	GMD155R71C104KA11#	
		R	56000pF	±10%	GMD155R11C563KA11#	
			68000pF	±10%	GMD155R11C683KA11#	
			82000pF	±10%	GMD155R11C823KA11#	
			0.10μF	±10%	GMD155R11C104KA11#	
		B	56000pF	±10%	GMD155B31C563KA11#	
			68000pF	±10%	GMD155B31C683KA11#	
			82000pF	±10%	GMD155B31C823KA11#	
			0.10μF	±10%	GMD155B31C104KA11#	
	10Vdc	X5R	0.12μF	±10%	GMD155R61A124KE12#	
			0.15μF	±10%	GMD155R61A154KE12#	
			0.18μF	±10%	GMD155R61A184KE12#	
			0.22μF	±10%	GMD155R61A224KE12#	
			0.27μF	±10%	GMD155R61A274KE11#	
			0.33μF	±10%	GMD155R61A334KE11#	
			0.39μF	±10%	GMD155R61A394KE11#	
			0.47μF	±10%	GMD155R61A474KE11#	
		B	0.12μF	±10%	GMD155B31A124KE12#	
			0.15μF	±10%	GMD155B31A154KE12#	
			0.18μF	±10%	GMD155B31A184KE12#	
			0.22μF	±10%	GMD155B31A224KE12#	
			0.27μF	±10%	GMD155B31A274KE11#	
			0.33μF	±10%	GMD155B31A334KE11#	
			0.39μF	±10%	GMD155B31A394KE11#	
			0.47μF	±10%	GMD155B31A474KE11#	

Part number # indicates the package specification code.

High Frequency High Q Type 1608(in mm)/0603(in inch) Size Min.

GQM Series **High Q**

High Frequency Capacitor Ideal for PA Design of Base Stations

Features

- 1 **Mainly ideal for base stations of mobile communication devices and temperature compensation of related modules.**

This product is ideal for temperature compensation of high frequency circuits, such as resonant circuits, tuning circuits, and impedance matching circuits where the operating characteristics of the device are greatly affected by the capacitance fluctuation.



- 2 **High Q and low ESR in VHF, UHF and microwave frequency bands.**

High Q and low ESR were achieved at a high frequency by adopting ceramic material as the dielectric material which enables an extremely low loss at high frequency, and base metal electrodes as the internal electrodes.



- 3 **Can be used for tight tolerance.**

In addition to standard tolerance, the allowable range of this product is also suitable for the following narrow tolerance.

Capacitance Range	Standard Capacitance Tolerance (Capacitance Tolerance Symbol)	Narrow Capacitance Tolerance (Capacitance Tolerance Symbol)
$\leq 0.9\text{pF}$	$\pm 0.1\text{pF}$ (B)	$\pm 0.05\text{pF}$ (W)
1.0 to 5.0pF	$\pm 0.25\text{pF}$ (C)	$\pm 0.05\text{pF}$ (W), $\pm 0.1\text{pF}$ (B)
5.1 to 9.9pF	$\pm 0.5\text{pF}$ (D)	$\pm 0.05\text{pF}$ (W), $\pm 0.1\text{pF}$ (B), $\pm 0.25\text{pF}$ (C)
$\geq 10\text{pF}$	$\pm 5\%$ (J)	$\pm 2\%$ (G)

Specifications

Size	1.0×0.5mm to 2.8×2.8mm
Rated Voltage	DC50V to 500V
Capacitance	0.1pF to 200pF
Main Applications	Mobile phone base stations



This catalog contains only a portion of the product lineup.
Please refer to the capacitor search tool on the Murata Web site for details.

GQM Series Temperature Compensating Type High Q Part Number List

1.6×0.8mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
0.8mm	250Vdc	C0G	1.0pF	±0.1pF	GQM1875C2E1R0BB12#	
				±0.25pF	GQM1875C2E1R0CB12#	
			1.1pF	±0.1pF	GQM1875C2E1R1BB12#	
				±0.25pF	GQM1875C2E1R1CB12#	
			1.2pF	±0.1pF	GQM1875C2E1R2BB12#	
				±0.25pF	GQM1875C2E1R2CB12#	
			1.3pF	±0.1pF	GQM1875C2E1R3BB12#	
				±0.25pF	GQM1875C2E1R3CB12#	
			1.5pF	±0.1pF	GQM1875C2E1R5BB12#	
				±0.25pF	GQM1875C2E1R5CB12#	
			1.6pF	±0.1pF	GQM1875C2E1R6BB12#	
				±0.25pF	GQM1875C2E1R6CB12#	
			1.8pF	±0.1pF	GQM1875C2E1R8BB12#	
				±0.25pF	GQM1875C2E1R8CB12#	
			2.0pF	±0.1pF	GQM1875C2E2R0BB12#	
				±0.25pF	GQM1875C2E2R0CB12#	
			2.2pF	±0.1pF	GQM1875C2E2R2BB12#	
				±0.25pF	GQM1875C2E2R2CB12#	
			2.4pF	±0.1pF	GQM1875C2E2R4BB12#	
				±0.25pF	GQM1875C2E2R4CB12#	
			2.7pF	±0.1pF	GQM1875C2E2R7BB12#	
				±0.25pF	GQM1875C2E2R7CB12#	
			3.0pF	±0.1pF	GQM1875C2E3R0BB12#	
				±0.25pF	GQM1875C2E3R0CB12#	
			3.3pF	±0.1pF	GQM1875C2E3R3BB12#	
				±0.25pF	GQM1875C2E3R3CB12#	
			3.6pF	±0.1pF	GQM1875C2E3R6BB12#	
				±0.25pF	GQM1875C2E3R6CB12#	
			3.9pF	±0.1pF	GQM1875C2E3R9BB12#	
				±0.25pF	GQM1875C2E3R9CB12#	
			4.0pF	±0.1pF	GQM1875C2E4R0BB12#	
				±0.25pF	GQM1875C2E4R0CB12#	
			4.3pF	±0.1pF	GQM1875C2E4R3BB12#	
				±0.25pF	GQM1875C2E4R3CB12#	
			4.7pF	±0.1pF	GQM1875C2E4R7BB12#	
				±0.25pF	GQM1875C2E4R7CB12#	
			5.0pF	±0.1pF	GQM1875C2E5R0BB12#	
				±0.25pF	GQM1875C2E5R0CB12#	
			5.1pF	±0.25pF	GQM1875C2E5R1CB12#	
				±0.5pF	GQM1875C2E5R1DB12#	
			5.6pF	±0.25pF	GQM1875C2E5R6CB12#	
				±0.5pF	GQM1875C2E5R6DB12#	
			6.0pF	±0.25pF	GQM1875C2E6R0CB12#	
				±0.5pF	GQM1875C2E6R0DB12#	
			6.2pF	±0.25pF	GQM1875C2E6R2CB12#	
				±0.5pF	GQM1875C2E6R2DB12#	
			6.8pF	±0.25pF	GQM1875C2E6R8CB12#	
				±0.5pF	GQM1875C2E6R8DB12#	
			7.0pF	±0.25pF	GQM1875C2E7R0CB12#	
				±0.5pF	GQM1875C2E7R0DB12#	
			7.5pF	±0.25pF	GQM1875C2E7R5CB12#	
				±0.5pF	GQM1875C2E7R5DB12#	

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
0.8mm	250Vdc	C0G	8.0pF	±0.25pF	GQM1875C2E8R0CB12#	
				±0.5pF	GQM1875C2E8R0DB12#	
			8.2pF	±0.25pF	GQM1875C2E8R2CB12#	
				±0.5pF	GQM1875C2E8R2DB12#	
			9.0pF	±0.25pF	GQM1875C2E9R0CB12#	
				±0.5pF	GQM1875C2E9R0DB12#	
			9.1pF	±0.25pF	GQM1875C2E9R1CB12#	
				±0.5pF	GQM1875C2E9R1DB12#	
			10pF	±2%	GQM1875C2E100GB12#	
				±5%	GQM1875C2E100JB12#	
			11pF	±2%	GQM1875C2E110GB12#	
				±5%	GQM1875C2E110JB12#	
			12pF	±2%	GQM1875C2E120GB12#	
				±5%	GQM1875C2E120JB12#	
			13pF	±2%	GQM1875C2E130GB12#	
				±5%	GQM1875C2E130JB12#	
			15pF	±2%	GQM1875C2E150GB12#	
				±5%	GQM1875C2E150JB12#	
			16pF	±2%	GQM1875C2E160GB12#	
				±5%	GQM1875C2E160JB12#	
			18pF	±2%	GQM1875C2E180GB12#	
				±5%	GQM1875C2E180JB12#	
			20pF	±2%	GQM1875C2E200GB12#	
				±5%	GQM1875C2E200JB12#	
			22pF	±2%	GQM1875C2E220GB12#	
				±5%	GQM1875C2E220JB12#	
			24pF	±2%	GQM1875C2E240GB12#	
				±5%	GQM1875C2E240JB12#	
			27pF	±2%	GQM1875C2E270GB12#	
				±5%	GQM1875C2E270JB12#	
			30pF	±2%	GQM1875C2E300GB12#	
				±5%	GQM1875C2E300JB12#	
			33pF	±2%	GQM1875C2E330GB12#	
				±5%	GQM1875C2E330JB12#	
			36pF	±2%	GQM1875C2E360GB12#	
				±5%	GQM1875C2E360JB12#	
			39pF	±2%	GQM1875C2E390GB12#	
				±5%	GQM1875C2E390JB12#	
			43pF	±2%	GQM1875C2E430GB12#	
				±5%	GQM1875C2E430JB12#	
			47pF	±2%	GQM1875C2E470GB12#	
				±5%	GQM1875C2E470JB12#	
0.9mm	100Vdc	C0G	1.0pF	±0.1pF	GQM1885C2A1R0BB01#	
				±0.25pF	GQM1885C2A1R0CB01#	
			1.1pF	±0.1pF	GQM1885C2A1R1BB01#	
				±0.25pF	GQM1885C2A1R1CB01#	
			1.2pF	±0.1pF	GQM1885C2A1R2BB01#	
				±0.25pF	GQM1885C2A1R2CB01#	
			1.3pF	±0.1pF	GQM1885C2A1R3BB01#	
				±0.25pF	GQM1885C2A1R3CB01#	
			1.5pF	±0.1pF	GQM1885C2A1R5BB01#	
				±0.25pF	GQM1885C2A1R5CB01#	
			1.6pF	±0.1pF	GQM1885C2A1R6BB01#	
				±0.25pF	GQM1885C2A1R6CB01#	

Part number # indicates the package specification code.

GQM Series Temperature Compensating Type High Q Part Number List

(→ ■ 1.6×0.8mm)

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
0.9mm	100Vdc	C0G	1.8pF	±0.1pF	GQM1885C2A1R8BB01#	
				±0.25pF	GQM1885C2A1R8CB01#	
			2.0pF	±0.1pF	GQM1885C2A2R0BB01#	
				±0.25pF	GQM1885C2A2R0CB01#	
			2.2pF	±0.1pF	GQM1885C2A2R2BB01#	
				±0.25pF	GQM1885C2A2R2CB01#	
			2.4pF	±0.1pF	GQM1885C2A2R4BB01#	
				±0.25pF	GQM1885C2A2R4CB01#	
			2.7pF	±0.1pF	GQM1885C2A2R7BB01#	
				±0.25pF	GQM1885C2A2R7CB01#	
			3.0pF	±0.1pF	GQM1885C2A3R0BB01#	
				±0.25pF	GQM1885C2A3R0CB01#	
			3.3pF	±0.1pF	GQM1885C2A3R3BB01#	
				±0.25pF	GQM1885C2A3R3CB01#	
			3.6pF	±0.1pF	GQM1885C2A3R6BB01#	
				±0.25pF	GQM1885C2A3R6CB01#	
			3.9pF	±0.1pF	GQM1885C2A3R9BB01#	
				±0.25pF	GQM1885C2A3R9CB01#	
			4.0pF	±0.1pF	GQM1885C2A4R0BB01#	
				±0.25pF	GQM1885C2A4R0CB01#	
			4.3pF	±0.1pF	GQM1885C2A4R3BB01#	
				±0.25pF	GQM1885C2A4R3CB01#	
			4.7pF	±0.1pF	GQM1885C2A4R7BB01#	
				±0.25pF	GQM1885C2A4R7CB01#	
			5.0pF	±0.1pF	GQM1885C2A5R0BB01#	
				±0.25pF	GQM1885C2A5R0CB01#	
			5.1pF	±0.25pF	GQM1885C2A5R1CB01#	
				±0.5pF	GQM1885C2A5R1DB01#	
			5.6pF	±0.25pF	GQM1885C2A5R6CB01#	
				±0.5pF	GQM1885C2A5R6DB01#	
			6.0pF	±0.25pF	GQM1885C2A6R0CB01#	
				±0.5pF	GQM1885C2A6R0DB01#	
			6.2pF	±0.25pF	GQM1885C2A6R2CB01#	
				±0.5pF	GQM1885C2A6R2DB01#	
			6.8pF	±0.25pF	GQM1885C2A6R8CB01#	
				±0.5pF	GQM1885C2A6R8DB01#	
		CK	1.0pF	±0.1pF	GQM1884C2A1R0BB01#	
				±0.25pF	GQM1884C2A1R0CB01#	
			1.1pF	±0.1pF	GQM1884C2A1R1BB01#	
				±0.25pF	GQM1884C2A1R1CB01#	
			1.2pF	±0.1pF	GQM1884C2A1R2BB01#	
				±0.25pF	GQM1884C2A1R2CB01#	
			1.3pF	±0.1pF	GQM1884C2A1R3BB01#	
				±0.25pF	GQM1884C2A1R3CB01#	
			1.5pF	±0.1pF	GQM1884C2A1R5BB01#	
				±0.25pF	GQM1884C2A1R5CB01#	
			1.6pF	±0.1pF	GQM1884C2A1R6BB01#	
				±0.25pF	GQM1884C2A1R6CB01#	
			1.8pF	±0.1pF	GQM1884C2A1R8BB01#	
				±0.25pF	GQM1884C2A1R8CB01#	
			2.0pF	±0.1pF	GQM1884C2A2R0BB01#	
				±0.25pF	GQM1884C2A2R0CB01#	
		CJ	2.2pF	±0.1pF	GQM1883C2A2R2BB01#	
				±0.25pF	GQM1883C2A2R2CB01#	

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
0.9mm	100Vdc	CJ	2.4pF	±0.1pF	GQM1883C2A2R4BB01#	
				±0.25pF	GQM1883C2A2R4CB01#	
			2.7pF	±0.1pF	GQM1883C2A2R7BB01#	
				±0.25pF	GQM1883C2A2R7CB01#	
			3.0pF	±0.1pF	GQM1883C2A3R0BB01#	
				±0.25pF	GQM1883C2A3R0CB01#	
			3.3pF	±0.1pF	GQM1883C2A3R3BB01#	
				±0.25pF	GQM1883C2A3R3CB01#	
			3.6pF	±0.1pF	GQM1883C2A3R6BB01#	
				±0.25pF	GQM1883C2A3R6CB01#	
			3.9pF	±0.1pF	GQM1883C2A3R9BB01#	
				±0.25pF	GQM1883C2A3R9CB01#	
		CH	4.0pF	±0.1pF	GQM1882C2A4R0BB01#	
				±0.25pF	GQM1882C2A4R0CB01#	
			4.3pF	±0.1pF	GQM1882C2A4R3BB01#	
				±0.25pF	GQM1882C2A4R3CB01#	
			4.7pF	±0.1pF	GQM1882C2A4R7BB01#	
				±0.25pF	GQM1882C2A4R7CB01#	
			5.0pF	±0.1pF	GQM1882C2A5R0BB01#	
				±0.25pF	GQM1882C2A5R0CB01#	
			5.1pF	±0.25pF	GQM1882C2A5R1CB01#	
				±0.5pF	GQM1882C2A5R1DB01#	
			5.6pF	±0.25pF	GQM1882C2A5R6CB01#	
				±0.5pF	GQM1882C2A5R6DB01#	
			6.0pF	±0.25pF	GQM1882C2A6R0CB01#	
				±0.5pF	GQM1882C2A6R0DB01#	
			6.2pF	±0.25pF	GQM1882C2A6R2CB01#	
				±0.5pF	GQM1882C2A6R2DB01#	
			6.8pF	±0.25pF	GQM1882C2A6R8CB01#	
				±0.5pF	GQM1882C2A6R8DB01#	
	50Vdc	C0G	7.0pF	±0.25pF	GQM1885C1H7R0CB01#	
				±0.5pF	GQM1885C1H7R0DB01#	
			7.5pF	±0.25pF	GQM1885C1H7R5CB01#	
				±0.5pF	GQM1885C1H7R5DB01#	
			8.0pF	±0.25pF	GQM1885C1H8R0CB01#	
				±0.5pF	GQM1885C1H8R0DB01#	
			8.2pF	±0.25pF	GQM1885C1H8R2CB01#	
				±0.5pF	GQM1885C1H8R2DB01#	
			9.0pF	±0.25pF	GQM1885C1H9R0CB01#	
				±0.5pF	GQM1885C1H9R0DB01#	
			9.1pF	±0.25pF	GQM1885C1H9R1CB01#	
				±0.5pF	GQM1885C1H9R1DB01#	
			10pF	±2%	GQM1885C1H100GB01#	
				±5%	GQM1885C1H100JB01#	
			11pF	±2%	GQM1885C1H110GB01#	
				±5%	GQM1885C1H110JB01#	
			12pF	±2%	GQM1885C1H120GB01#	
				±5%	GQM1885C1H120JB01#	
			13pF	±2%	GQM1885C1H130GB01#	
				±5%	GQM1885C1H130JB01#	
			15pF	±2%	GQM1885C1H150GB01#	
				±5%	GQM1885C1H150JB01#	
			16pF	±2%	GQM1885C1H160GB01#	
				±5%	GQM1885C1H160JB01#	

Part number # indicates the package specification code.

GQM Series Temperature Compensating Type High Q Part Number List

(→ ■ 1.6×0.8mm)

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
0.9mm	50Vdc	COG	18pF	±2%	GQM1885C1H180GB01#	
				±5%	GQM1885C1H180JB01#	
			20pF	±2%	GQM1885C1H200GB01#	
				±5%	GQM1885C1H200JB01#	
			22pF	±2%	GQM1885C1H220GB01#	
				±5%	GQM1885C1H220JB01#	
			24pF	±2%	GQM1885C1H240GB01#	
				±5%	GQM1885C1H240JB01#	
			27pF	±2%	GQM1885C1H270GB01#	
				±5%	GQM1885C1H270JB01#	
			30pF	±2%	GQM1885C1H300GB01#	
				±5%	GQM1885C1H300JB01#	
			33pF	±2%	GQM1885C1H330GB01#	
				±5%	GQM1885C1H330JB01#	
			36pF	±2%	GQM1885C1H360GB01#	
				±5%	GQM1885C1H360JB01#	
			39pF	±2%	GQM1885C1H390GB01#	
				±5%	GQM1885C1H390JB01#	
			43pF	±2%	GQM1885C1H430GB01#	
				±5%	GQM1885C1H430JB01#	
			47pF	±2%	GQM1885C1H470GB01#	
				±5%	GQM1885C1H470JB01#	
			51pF	±2%	GQM1885C1H510GB01#	
				±5%	GQM1885C1H510JB01#	
			56pF	±2%	GQM1885C1H560GB01#	
				±5%	GQM1885C1H560JB01#	
			62pF	±2%	GQM1885C1H620GB01#	
				±5%	GQM1885C1H620JB01#	
			68pF	±2%	GQM1885C1H680GB01#	
				±5%	GQM1885C1H680JB01#	
			75pF	±2%	GQM1885C1H750GB01#	
				±5%	GQM1885C1H750JB01#	
			82pF	±2%	GQM1885C1H820GB01#	
				±5%	GQM1885C1H820JB01#	
			91pF	±2%	GQM1885C1H910GB01#	
				±5%	GQM1885C1H910JB01#	
			100pF	±2%	GQM1885C1H101GB01#	
				±5%	GQM1885C1H101JB01#	
		CH	7.0pF	±0.25pF	GQM1882C1H7R0CB01#	
				±0.5pF	GQM1882C1H7R0DB01#	
			7.5pF	±0.25pF	GQM1882C1H7R5CB01#	
				±0.5pF	GQM1882C1H7R5DB01#	
			8.0pF	±0.25pF	GQM1882C1H8R0CB01#	
				±0.5pF	GQM1882C1H8R0DB01#	
			8.2pF	±0.25pF	GQM1882C1H8R2CB01#	
				±0.5pF	GQM1882C1H8R2DB01#	
			9.0pF	±0.25pF	GQM1882C1H9R0CB01#	
				±0.5pF	GQM1882C1H9R0DB01#	
			9.1pF	±0.25pF	GQM1882C1H9R1CB01#	
				±0.5pF	GQM1882C1H9R1DB01#	
			10pF	±2%	GQM1882C1H100GB01#	
				±5%	GQM1882C1H100JB01#	
			11pF	±2%	GQM1882C1H110GB01#	
				±5%	GQM1882C1H110JB01#	

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
0.9mm	50Vdc	CH	12pF	±2%	GQM1882C1H120GB01#	
				±5%	GQM1882C1H120JB01#	
			13pF	±2%	GQM1882C1H130GB01#	
				±5%	GQM1882C1H130JB01#	
			15pF	±2%	GQM1882C1H150GB01#	
				±5%	GQM1882C1H150JB01#	
			16pF	±2%	GQM1882C1H160GB01#	
				±5%	GQM1882C1H160JB01#	
			18pF	±2%	GQM1882C1H180GB01#	
				±5%	GQM1882C1H180JB01#	
			20pF	±2%	GQM1882C1H200GB01#	
				±5%	GQM1882C1H200JB01#	
			22pF	±2%	GQM1882C1H220GB01#	
				±5%	GQM1882C1H220JB01#	
			24pF	±2%	GQM1882C1H240GB01#	
				±5%	GQM1882C1H240JB01#	
			27pF	±2%	GQM1882C1H270GB01#	
				±5%	GQM1882C1H270JB01#	
			30pF	±2%	GQM1882C1H300GB01#	
				±5%	GQM1882C1H300JB01#	
			33pF	±2%	GQM1882C1H330GB01#	
				±5%	GQM1882C1H330JB01#	
			36pF	±2%	GQM1882C1H360GB01#	
				±5%	GQM1882C1H360JB01#	
			39pF	±2%	GQM1882C1H390GB01#	
				±5%	GQM1882C1H390JB01#	
			43pF	±2%	GQM1882C1H430GB01#	
				±5%	GQM1882C1H430JB01#	
			47pF	±2%	GQM1882C1H470GB01#	
				±5%	GQM1882C1H470JB01#	
			51pF	±2%	GQM1882C1H510GB01#	
				±5%	GQM1882C1H510JB01#	
			56pF	±2%	GQM1882C1H560GB01#	
				±5%	GQM1882C1H560JB01#	
			62pF	±2%	GQM1882C1H620GB01#	
				±5%	GQM1882C1H620JB01#	
			68pF	±2%	GQM1882C1H680GB01#	
				±5%	GQM1882C1H680JB01#	
			75pF	±2%	GQM1882C1H750GB01#	
				±5%	GQM1882C1H750JB01#	
			82pF	±2%	GQM1882C1H820GB01#	
				±5%	GQM1882C1H820JB01#	
			91pF	±2%	GQM1882C1H910GB01#	
				±5%	GQM1882C1H910JB01#	
			100pF	±2%	GQM1882C1H101GB01#	
				±5%	GQM1882C1H101JB01#	

■ 2.0×1.25mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
0.95mm	100Vdc	COG	1.0pF	±0.1pF	GQM2195C2A1R0BB01#	
				±0.25pF	GQM2195C2A1R0CB01#	
			1.1pF	±0.1pF	GQM2195C2A1R1BB01#	

Part number # indicates the package specification code.

GRM Series

GJM Series

GMA Series

GMD Series

GQM Series

GRJ Series

GR3 Series

KRM Series

KR3 Series

LLA Series

LLL Series

LLM Series

LLR Series

⚠Caution/
Notice

GQM Series Temperature Compensating Type High Q Part Number List

(→ ■ 2.0×1.25mm)

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
0.95mm	100Vdc	C0G	1.1pF	±0.25pF	GQM2195C2A1R1CB01#	
				±0.1pF	GQM2195C2A1R2BB01#	
			1.2pF	±0.25pF	GQM2195C2A1R2CB01#	
				±0.1pF	GQM2195C2A1R3BB01#	
			1.3pF	±0.25pF	GQM2195C2A1R3CB01#	
				±0.1pF	GQM2195C2A1R5BB01#	
			1.5pF	±0.25pF	GQM2195C2A1R5CB01#	
				±0.1pF	GQM2195C2A1R6BB01#	
			1.6pF	±0.25pF	GQM2195C2A1R6CB01#	
				±0.1pF	GQM2195C2A1R8BB01#	
			1.8pF	±0.25pF	GQM2195C2A1R8CB01#	
				±0.1pF	GQM2195C2A2R0BB01#	
			2.0pF	±0.25pF	GQM2195C2A2R0CB01#	
				±0.1pF	GQM2195C2A2R2BB01#	
			2.2pF	±0.25pF	GQM2195C2A2R2CB01#	
				±0.1pF	GQM2195C2A2R4BB01#	
			2.4pF	±0.25pF	GQM2195C2A2R4CB01#	
				±0.1pF	GQM2195C2A2R7BB01#	
			2.7pF	±0.25pF	GQM2195C2A2R7CB01#	
				±0.1pF	GQM2195C2A3R0BB01#	
			3.0pF	±0.25pF	GQM2195C2A3R0CB01#	
				±0.1pF	GQM2195C2A3R3BB01#	
			3.3pF	±0.25pF	GQM2195C2A3R3CB01#	
				±0.1pF	GQM2195C2A3R6BB01#	
			3.6pF	±0.25pF	GQM2195C2A3R6CB01#	
				±0.1pF	GQM2195C2A3R9BB01#	
			3.9pF	±0.25pF	GQM2195C2A3R9CB01#	
				±0.1pF	GQM2195C2A4R0BB01#	
			4.0pF	±0.25pF	GQM2195C2A4R0CB01#	
				±0.1pF	GQM2195C2A4R3BB01#	
			4.3pF	±0.25pF	GQM2195C2A4R3CB01#	
				±0.1pF	GQM2195C2A4R7BB01#	
			4.7pF	±0.25pF	GQM2195C2A4R7CB01#	
				±0.1pF	GQM2195C2A5R0BB01#	
			5.0pF	±0.25pF	GQM2195C2A5R0CB01#	
				±0.25pF	GQM2195C2A5R1CB01#	
			5.1pF	±0.5pF	GQM2195C2A5R1DB01#	
				±0.25pF	GQM2195C2A5R6CB01#	
			5.6pF	±0.5pF	GQM2195C2A5R6DB01#	
				±0.25pF	GQM2195C2A6R0CB01#	
			6.0pF	±0.5pF	GQM2195C2A6R0DB01#	
				±0.25pF	GQM2195C2A6R2CB01#	
			6.2pF	±0.5pF	GQM2195C2A6R2DB01#	
				±0.25pF	GQM2195C2A6R8CB01#	
			6.8pF	±0.5pF	GQM2195C2A6R8DB01#	
				±0.25pF	GQM2195C2A7R0CB01#	
			7.0pF	±0.5pF	GQM2195C2A7R0DB01#	
				±0.25pF	GQM2195C2A7R5CB01#	
			7.5pF	±0.5pF	GQM2195C2A7R5DB01#	
				±0.25pF	GQM2195C2A8R0CB01#	
			8.0pF	±0.5pF	GQM2195C2A8R0DB01#	
				±0.25pF	GQM2195C2A8R2CB01#	
			8.2pF	±0.5pF	GQM2195C2A8R2DB01#	
				±0.25pF	GQM2195C2A9R0CB01#	

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
0.95mm	100Vdc	C0G	9.0pF	±0.5pF	GQM2195C2A9R0DB01#	
				±0.25pF	GQM2195C2A9R1CB01#	
			9.1pF	±0.5pF	GQM2195C2A9R1DB01#	
				±2%	GQM2195C2A100GB01#	
			10pF	±5%	GQM2195C2A100JB01#	
				±2%	GQM2195C2A110GB01#	
			11pF	±5%	GQM2195C2A110JB01#	
				±2%	GQM2195C2A120GB01#	
			12pF	±5%	GQM2195C2A120JB01#	
				±2%	GQM2195C2A130GB01#	
			13pF	±5%	GQM2195C2A130JB01#	
				±2%	GQM2195C2A150GB01#	
			15pF	±5%	GQM2195C2A150JB01#	
				±2%	GQM2195C2A160GB01#	
			16pF	±5%	GQM2195C2A160JB01#	
				±2%	GQM2195C2A180GB01#	
			18pF	±5%	GQM2195C2A180JB01#	
		CK	1.0pF	±0.1pF	GQM2194C2A1R0BB01#	
				±0.25pF	GQM2194C2A1R0CB01#	
			1.1pF	±0.1pF	GQM2194C2A1R1BB01#	
				±0.25pF	GQM2194C2A1R1CB01#	
			1.2pF	±0.1pF	GQM2194C2A1R2BB01#	
				±0.25pF	GQM2194C2A1R2CB01#	
			1.3pF	±0.1pF	GQM2194C2A1R3BB01#	
				±0.25pF	GQM2194C2A1R3CB01#	
			1.5pF	±0.1pF	GQM2194C2A1R5BB01#	
				±0.25pF	GQM2194C2A1R5CB01#	
			1.6pF	±0.1pF	GQM2194C2A1R6BB01#	
				±0.25pF	GQM2194C2A1R6CB01#	
			1.8pF	±0.1pF	GQM2194C2A1R8BB01#	
				±0.25pF	GQM2194C2A1R8CB01#	
			2.0pF	±0.1pF	GQM2194C2A2R0BB01#	
				±0.25pF	GQM2194C2A2R0CB01#	
		CJ	2.2pF	±0.1pF	GQM2193C2A2R2BB01#	
				±0.25pF	GQM2193C2A2R2CB01#	
			2.4pF	±0.1pF	GQM2193C2A2R4BB01#	
				±0.25pF	GQM2193C2A2R4CB01#	
			2.7pF	±0.1pF	GQM2193C2A2R7BB01#	
				±0.25pF	GQM2193C2A2R7CB01#	
			3.0pF	±0.1pF	GQM2193C2A3R0BB01#	
				±0.25pF	GQM2193C2A3R0CB01#	
			3.3pF	±0.1pF	GQM2193C2A3R3BB01#	
				±0.25pF	GQM2193C2A3R3CB01#	
			3.6pF	±0.1pF	GQM2193C2A3R6BB01#	
				±0.25pF	GQM2193C2A3R6CB01#	
			3.9pF	±0.1pF	GQM2193C2A3R9BB01#	
				±0.25pF	GQM2193C2A3R9CB01#	
		CH	4.0pF	±0.1pF	GQM2192C2A4R0BB01#	
				±0.25pF	GQM2192C2A4R0CB01#	
			4.3pF	±0.1pF	GQM2192C2A4R3BB01#	
				±0.25pF	GQM2192C2A4R3CB01#	
			4.7pF	±0.1pF	GQM2192C2A4R7BB01#	
				±0.25pF	GQM2192C2A4R7CB01#	
			5.0pF	±0.1pF	GQM2192C2A5R0BB01#	

Part number # indicates the package specification code.

GQM Series Temperature Compensating Type High Q Part Number List

(→ ■ 2.0×1.25mm)

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
0.95mm	100Vdc	CH	5.0pF	±0.25pF	GQM2192C2A5R0CB01#	
				±0.25pF	GQM2192C2A5R1CB01#	
				±0.5pF	GQM2192C2A5R1DB01#	
			5.6pF	±0.25pF	GQM2192C2A5R6CB01#	
				±0.5pF	GQM2192C2A5R6DB01#	
			6.0pF	±0.25pF	GQM2192C2A6R0CB01#	
				±0.5pF	GQM2192C2A6R0DB01#	
			6.2pF	±0.25pF	GQM2192C2A6R2CB01#	
				±0.5pF	GQM2192C2A6R2DB01#	
			6.8pF	±0.25pF	GQM2192C2A6R8CB01#	
				±0.5pF	GQM2192C2A6R8DB01#	
			7.0pF	±0.25pF	GQM2192C2A7R0CB01#	
				±0.5pF	GQM2192C2A7R0DB01#	
			7.5pF	±0.25pF	GQM2192C2A7R5CB01#	
				±0.5pF	GQM2192C2A7R5DB01#	
			8.0pF	±0.25pF	GQM2192C2A8R0CB01#	
				±0.5pF	GQM2192C2A8R0DB01#	
			8.2pF	±0.25pF	GQM2192C2A8R2CB01#	
				±0.5pF	GQM2192C2A8R2DB01#	
			9.0pF	±0.25pF	GQM2192C2A9R0CB01#	
				±0.5pF	GQM2192C2A9R0DB01#	
			9.1pF	±0.25pF	GQM2192C2A9R1CB01#	
				±0.5pF	GQM2192C2A9R1DB01#	
			10pF	±2%	GQM2192C2A100GB01#	
				±5%	GQM2192C2A100JB01#	
			11pF	±2%	GQM2192C2A110GB01#	
				±5%	GQM2192C2A110JB01#	
			12pF	±2%	GQM2192C2A120GB01#	
				±5%	GQM2192C2A120JB01#	
			13pF	±2%	GQM2192C2A130GB01#	
				±5%	GQM2192C2A130JB01#	
			15pF	±2%	GQM2192C2A150GB01#	
				±5%	GQM2192C2A150JB01#	
			16pF	±2%	GQM2192C2A160GB01#	
				±5%	GQM2192C2A160JB01#	
			18pF	±2%	GQM2192C2A180GB01#	
				±5%	GQM2192C2A180JB01#	
	50Vdc	C0G	20pF	±2%	GQM2195C1H200GB01#	
				±5%	GQM2195C1H200JB01#	
			22pF	±2%	GQM2195C1H220GB01#	
				±5%	GQM2195C1H220JB01#	
			24pF	±2%	GQM2195C1H240GB01#	
				±5%	GQM2195C1H240JB01#	
			27pF	±2%	GQM2195C1H270GB01#	
				±5%	GQM2195C1H270JB01#	
			30pF	±2%	GQM2195C1H300GB01#	
				±5%	GQM2195C1H300JB01#	
			33pF	±2%	GQM2195C1H330GB01#	
				±5%	GQM2195C1H330JB01#	
			36pF	±2%	GQM2195C1H360GB01#	
				±5%	GQM2195C1H360JB01#	
			39pF	±2%	GQM2195C1H390GB01#	
				±5%	GQM2195C1H390JB01#	
			43pF	±2%	GQM2195C1H430GB01#	
				±5%	GQM2195C1H430JB01#	

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
0.95mm	50Vdc	C0G	43pF	±5%	GQM2195C1H430JB01#	
				±2%	GQM2195C1H470GB01#	
				±5%	GQM2195C1H470JB01#	
			51pF	±2%	GQM2195C1H510GB01#	
				±5%	GQM2195C1H510JB01#	
			56pF	±2%	GQM2195C1H560GB01#	
				±5%	GQM2195C1H560JB01#	
			62pF	±2%	GQM2195C1H620GB01#	
				±5%	GQM2195C1H620JB01#	
			68pF	±2%	GQM2195C1H680GB01#	
				±5%	GQM2195C1H680JB01#	
			75pF	±2%	GQM2195C1H750GB01#	
				±5%	GQM2195C1H750JB01#	
			82pF	±2%	GQM2195C1H820GB01#	
				±5%	GQM2195C1H820JB01#	
			91pF	±2%	GQM2195C1H910GB01#	
				±5%	GQM2195C1H910JB01#	
			100pF	±2%	GQM2195C1H101GB01#	
				±5%	GQM2195C1H101JB01#	
		CH	20pF	±2%	GQM2192C1H200GB01#	
				±5%	GQM2192C1H200JB01#	
			22pF	±2%	GQM2192C1H220GB01#	
				±5%	GQM2192C1H220JB01#	
			24pF	±2%	GQM2192C1H240GB01#	
				±5%	GQM2192C1H240JB01#	
			27pF	±2%	GQM2192C1H270GB01#	
				±5%	GQM2192C1H270JB01#	
			30pF	±2%	GQM2192C1H300GB01#	
				±5%	GQM2192C1H300JB01#	
			33pF	±2%	GQM2192C1H330GB01#	
				±5%	GQM2192C1H330JB01#	
			36pF	±2%	GQM2192C1H360GB01#	
				±5%	GQM2192C1H360JB01#	
			39pF	±2%	GQM2192C1H390GB01#	
				±5%	GQM2192C1H390JB01#	
			43pF	±2%	GQM2192C1H430GB01#	
				±5%	GQM2192C1H430JB01#	
			47pF	±2%	GQM2192C1H470GB01#	
				±5%	GQM2192C1H470JB01#	
			51pF	±2%	GQM2192C1H510GB01#	
				±5%	GQM2192C1H510JB01#	
			56pF	±2%	GQM2192C1H560GB01#	
				±5%	GQM2192C1H560JB01#	
			62pF	±2%	GQM2192C1H620GB01#	
				±5%	GQM2192C1H620JB01#	
			68pF	±2%	GQM2192C1H680GB01#	
				±5%	GQM2192C1H680JB01#	
			75pF	±2%	GQM2192C1H750GB01#	
				±5%	GQM2192C1H750JB01#	
			82pF	±2%	GQM2192C1H820GB01#	
				±5%	GQM2192C1H820JB01#	
			91pF	±2%	GQM2192C1H910GB01#	
				±5%	GQM2192C1H910JB01#	
			100pF	±2%	GQM2192C1H101GB01#	
				±5%	GQM2192C1H101JB01#	

Part number # indicates the package specification code.

GRM Series

GJM Series

GMA Series

GMD Series

GQM Series

GRJ Series

GR3 Series

KRM Series

KR3 Series

LLA Series

LLL Series

LLM Series

LLR Series

⚠Caution/
Notice

GQM Series Temperature Compensating Type High Q Part Number List

(→ ■ 2.0×1.25mm)

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number		T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
0.95mm	50Vdc	CH	100pF	±5%	GQM2192C1H101JB01#		1.0mm	250Vdc	C0G	8.0pF	±0.5pF	GQM2195C2E8R0DB12#	
1.0mm	250Vdc	C0G	1.0pF	±0.1pF	GQM2195C2E1R0BB12#					8.2pF	±0.25pF	GQM2195C2E8R2CB12#	
				±0.25pF	GQM2195C2E1R0CB12#						±0.5pF	GQM2195C2E8R2DB12#	
			1.1pF	±0.1pF	GQM2195C2E1R1BB12#					9.0pF	±0.25pF	GQM2195C2E9R0CB12#	
				±0.25pF	GQM2195C2E1R1CB12#						±0.5pF	GQM2195C2E9R0DB12#	
			1.2pF	±0.1pF	GQM2195C2E1R2BB12#					9.1pF	±0.25pF	GQM2195C2E9R1CB12#	
				±0.25pF	GQM2195C2E1R2CB12#						±0.5pF	GQM2195C2E9R1DB12#	
			1.3pF	±0.1pF	GQM2195C2E1R3BB12#					10pF	±2%	GQM2195C2E100GB12#	
				±0.25pF	GQM2195C2E1R3CB12#						±5%	GQM2195C2E100JB12#	
			1.5pF	±0.1pF	GQM2195C2E1R5BB12#					11pF	±2%	GQM2195C2E110GB12#	
				±0.25pF	GQM2195C2E1R5CB12#						±5%	GQM2195C2E110JB12#	
			1.6pF	±0.1pF	GQM2195C2E1R6BB12#					12pF	±2%	GQM2195C2E120GB12#	
				±0.25pF	GQM2195C2E1R6CB12#						±5%	GQM2195C2E120JB12#	
			1.8pF	±0.1pF	GQM2195C2E1R8BB12#					13pF	±2%	GQM2195C2E130GB12#	
				±0.25pF	GQM2195C2E1R8CB12#						±5%	GQM2195C2E130JB12#	
			2.0pF	±0.1pF	GQM2195C2E2R0BB12#					15pF	±2%	GQM2195C2E150GB12#	
				±0.25pF	GQM2195C2E2R0CB12#						±5%	GQM2195C2E150JB12#	
			2.2pF	±0.1pF	GQM2195C2E2R2BB12#					16pF	±2%	GQM2195C2E160GB12#	
				±0.25pF	GQM2195C2E2R2CB12#						±5%	GQM2195C2E160JB12#	
			2.4pF	±0.1pF	GQM2195C2E2R4BB12#					18pF	±2%	GQM2195C2E180GB12#	
				±0.25pF	GQM2195C2E2R4CB12#						±5%	GQM2195C2E180JB12#	
			2.7pF	±0.1pF	GQM2195C2E2R7BB12#					20pF	±2%	GQM2195C2E200GB12#	
				±0.25pF	GQM2195C2E2R7CB12#						±5%	GQM2195C2E200JB12#	
			3.0pF	±0.1pF	GQM2195C2E3R0BB12#					22pF	±2%	GQM2195C2E220GB12#	
				±0.25pF	GQM2195C2E3R0CB12#						±5%	GQM2195C2E220JB12#	
			3.3pF	±0.1pF	GQM2195C2E3R3BB12#					24pF	±2%	GQM2195C2E240GB12#	
				±0.25pF	GQM2195C2E3R3CB12#						±5%	GQM2195C2E240JB12#	
			3.6pF	±0.1pF	GQM2195C2E3R6BB12#					27pF	±2%	GQM2195C2E270GB12#	
				±0.25pF	GQM2195C2E3R6CB12#						±5%	GQM2195C2E270JB12#	
			3.9pF	±0.1pF	GQM2195C2E3R9BB12#					30pF	±2%	GQM2195C2E300GB12#	
				±0.25pF	GQM2195C2E3R9CB12#						±5%	GQM2195C2E300JB12#	
			4.0pF	±0.1pF	GQM2195C2E4R0BB12#					33pF	±2%	GQM2195C2E330GB12#	
				±0.25pF	GQM2195C2E4R0CB12#						±5%	GQM2195C2E330JB12#	
			4.3pF	±0.1pF	GQM2195C2E4R3BB12#					36pF	±2%	GQM2195C2E360GB12#	
				±0.25pF	GQM2195C2E4R3CB12#						±5%	GQM2195C2E360JB12#	
			4.7pF	±0.1pF	GQM2195C2E4R7BB12#					39pF	±2%	GQM2195C2E390GB12#	
				±0.25pF	GQM2195C2E4R7CB12#						±5%	GQM2195C2E390JB12#	
			5.0pF	±0.1pF	GQM2195C2E5R0BB12#					43pF	±2%	GQM2195C2E430GB12#	
				±0.25pF	GQM2195C2E5R0CB12#						±5%	GQM2195C2E430JB12#	
			5.1pF	±0.25pF	GQM2195C2E5R1CB12#					47pF	±2%	GQM2195C2E470GB12#	
				±0.5pF	GQM2195C2E5R1DB12#						±5%	GQM2195C2E470JB12#	
			5.6pF	±0.25pF	GQM2195C2E5R6CB12#					51pF	±2%	GQM2195C2E510GB12#	
				±0.5pF	GQM2195C2E5R6DB12#						±5%	GQM2195C2E510JB12#	
			6.0pF	±0.25pF	GQM2195C2E6R0CB12#					56pF	±2%	GQM2195C2E560GB12#	
				±0.5pF	GQM2195C2E6R0DB12#						±5%	GQM2195C2E560JB12#	
			6.2pF	±0.25pF	GQM2195C2E6R2CB12#					62pF	±2%	GQM2195C2E620GB12#	
				±0.5pF	GQM2195C2E6R2DB12#						±5%	GQM2195C2E620JB12#	
			6.8pF	±0.25pF	GQM2195C2E6R8CB12#					68pF	±2%	GQM2195C2E680GB12#	
				±0.5pF	GQM2195C2E6R8DB12#						±5%	GQM2195C2E680JB12#	
			7.0pF	±0.25pF	GQM2195C2E7R0CB12#					75pF	±2%	GQM2195C2E750GB12#	
				±0.5pF	GQM2195C2E7R0DB12#						±5%	GQM2195C2E750JB12#	
			7.5pF	±0.25pF	GQM2195C2E7R5CB12#					82pF	±2%	GQM2195C2E820GB12#	
				±0.5pF	GQM2195C2E7R5DB12#						±5%	GQM2195C2E820JB12#	
			8.0pF	±0.25pF	GQM2195C2E8R0CB12#					91pF	±2%	GQM2195C2E910GB12#	

Part number # indicates the package specification code.

GQM Series Temperature Compensating Type High Q Part Number List

(→ ■ 2.0×1.25mm)

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
1.0mm	250Vdc	C0G	91pF	±5%	GQM2195C2E910JB12#	
			100pF	±2%	GQM2195C2E101GB12#	
				±5%	GQM2195C2E101JB12#	

■ 2.8×2.8mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
1.35mm	500Vdc	C0G	1.0pF	±0.1pF	GQM22M5C2H1R0BB01#	
				±0.25pF	GQM22M5C2H1R0CB01#	
			1.1pF	±0.1pF	GQM22M5C2H1R1BB01#	
				±0.25pF	GQM22M5C2H1R1CB01#	
			1.2pF	±0.1pF	GQM22M5C2H1R2BB01#	
				±0.25pF	GQM22M5C2H1R2CB01#	
			1.3pF	±0.1pF	GQM22M5C2H1R3BB01#	
				±0.25pF	GQM22M5C2H1R3CB01#	
			1.5pF	±0.1pF	GQM22M5C2H1R5BB01#	
				±0.25pF	GQM22M5C2H1R5CB01#	
			1.6pF	±0.1pF	GQM22M5C2H1R6BB01#	
				±0.25pF	GQM22M5C2H1R6CB01#	
			1.8pF	±0.1pF	GQM22M5C2H1R8BB01#	
				±0.25pF	GQM22M5C2H1R8CB01#	
			2.0pF	±0.1pF	GQM22M5C2H2R0BB01#	
				±0.25pF	GQM22M5C2H2R0CB01#	
			2.2pF	±0.1pF	GQM22M5C2H2R2BB01#	
				±0.25pF	GQM22M5C2H2R2CB01#	
			2.4pF	±0.1pF	GQM22M5C2H2R4BB01#	
				±0.25pF	GQM22M5C2H2R4CB01#	
			2.7pF	±0.1pF	GQM22M5C2H2R7BB01#	
				±0.25pF	GQM22M5C2H2R7CB01#	
			3.0pF	±0.1pF	GQM22M5C2H3R0BB01#	
				±0.25pF	GQM22M5C2H3R0CB01#	
			3.3pF	±0.1pF	GQM22M5C2H3R3BB01#	
				±0.25pF	GQM22M5C2H3R3CB01#	
			3.6pF	±0.1pF	GQM22M5C2H3R6BB01#	
				±0.25pF	GQM22M5C2H3R6CB01#	
			3.9pF	±0.1pF	GQM22M5C2H3R9BB01#	
				±0.25pF	GQM22M5C2H3R9CB01#	
			4.0pF	±0.1pF	GQM22M5C2H4R0BB01#	
				±0.25pF	GQM22M5C2H4R0CB01#	
			4.3pF	±0.1pF	GQM22M5C2H4R3BB01#	
				±0.25pF	GQM22M5C2H4R3CB01#	
			4.7pF	±0.1pF	GQM22M5C2H4R7BB01#	
				±0.25pF	GQM22M5C2H4R7CB01#	
			5.0pF	±0.1pF	GQM22M5C2H5R0BB01#	
				±0.25pF	GQM22M5C2H5R0CB01#	
			5.1pF	±0.25pF	GQM22M5C2H5R1CB01#	
				±0.5pF	GQM22M5C2H5R1DB01#	
			5.6pF	±0.25pF	GQM22M5C2H5R6CB01#	
				±0.5pF	GQM22M5C2H5R6DB01#	
			6.0pF	±0.25pF	GQM22M5C2H6R0CB01#	
				±0.5pF	GQM22M5C2H6R0DB01#	
			6.2pF	±0.25pF	GQM22M5C2H6R2CB01#	
				±0.5pF	GQM22M5C2H6R2DB01#	

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
1.35mm	500Vdc	C0G	6.8pF	±0.25pF	GQM22M5C2H6R8CB01#	
				±0.5pF	GQM22M5C2H6R8DB01#	
			7.0pF	±0.25pF	GQM22M5C2H7R0CB01#	
				±0.5pF	GQM22M5C2H7R0DB01#	
			7.5pF	±0.25pF	GQM22M5C2H7R5CB01#	
				±0.5pF	GQM22M5C2H7R5DB01#	
			8.0pF	±0.25pF	GQM22M5C2H8R0CB01#	
				±0.5pF	GQM22M5C2H8R0DB01#	
			8.2pF	±0.25pF	GQM22M5C2H8R2CB01#	
				±0.5pF	GQM22M5C2H8R2DB01#	
			9.0pF	±0.25pF	GQM22M5C2H9R0CB01#	
				±0.5pF	GQM22M5C2H9R0DB01#	
			9.1pF	±0.25pF	GQM22M5C2H9R1CB01#	
				±0.5pF	GQM22M5C2H9R1DB01#	
			10pF	±2%	GQM22M5C2H100GB01#	
				±5%	GQM22M5C2H100JB01#	
			11pF	±2%	GQM22M5C2H110GB01#	
				±5%	GQM22M5C2H110JB01#	
			12pF	±2%	GQM22M5C2H120GB01#	
				±5%	GQM22M5C2H120JB01#	
			13pF	±2%	GQM22M5C2H130GB01#	
				±5%	GQM22M5C2H130JB01#	
			15pF	±2%	GQM22M5C2H150GB01#	
				±5%	GQM22M5C2H150JB01#	
			16pF	±2%	GQM22M5C2H160GB01#	
				±5%	GQM22M5C2H160JB01#	
			18pF	±2%	GQM22M5C2H180GB01#	
				±5%	GQM22M5C2H180JB01#	
			20pF	±2%	GQM22M5C2H200GB01#	
				±5%	GQM22M5C2H200JB01#	
			22pF	±2%	GQM22M5C2H220GB01#	
				±5%	GQM22M5C2H220JB01#	
			24pF	±2%	GQM22M5C2H240GB01#	
				±5%	GQM22M5C2H240JB01#	
			27pF	±2%	GQM22M5C2H270GB01#	
				±5%	GQM22M5C2H270JB01#	
			30pF	±2%	GQM22M5C2H300GB01#	
				±5%	GQM22M5C2H300JB01#	
			33pF	±2%	GQM22M5C2H330GB01#	
				±5%	GQM22M5C2H330JB01#	
			36pF	±2%	GQM22M5C2H360GB01#	
				±5%	GQM22M5C2H360JB01#	
			39pF	±2%	GQM22M5C2H390GB01#	
				±5%	GQM22M5C2H390JB01#	
			43pF	±2%	GQM22M5C2H430GB01#	
				±5%	GQM22M5C2H430JB01#	
			47pF	±2%	GQM22M5C2H470GB01#	
				±5%	GQM22M5C2H470JB01#	
			51pF	±2%	GQM22M5C2H510GB01#	
				±5%	GQM22M5C2H510JB01#	
			56pF	±2%	GQM22M5C2H560GB01#	
				±5%	GQM22M5C2H560JB01#	
			62pF	±2%	GQM22M5C2H620GB01#	
				±5%	GQM22M5C2H620JB01#	

Part number # indicates the package specification code.

GRRM Series

GJM Series

GMA Series

GMD Series

GQM Series

GRJ Series

GR3 Series

KRM Series

KR3 Series

LLA Series

LLL Series

LLM Series

LLR Series

⚠Caution/
Notice

GQM Series Temperature Compensating Type High Q Part Number List

(→ ■ 2.8×2.8mm)

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
1.35mm	500Vdc	C0G	68pF	±2%	GQM22M5C2H680GB01#	
				±5%	GQM22M5C2H680JB01#	
			75pF	±2%	GQM22M5C2H750GB01#	
				±5%	GQM22M5C2H750JB01#	
			82pF	±2%	GQM22M5C2H820GB01#	
				±5%	GQM22M5C2H820JB01#	
			91pF	±2%	GQM22M5C2H910GB01#	
				±5%	GQM22M5C2H910JB01#	
			100pF	±2%	GQM22M5C2H101GB01#	
				±5%	GQM22M5C2H101JB01#	

Resin External Electrode Type

GRJ Series



Deflecting crack

The resin external electrodes prevent the occurrence of cracking caused by deflection stress after board mounting!

Features

1 The resin external electrodes suppress cracks by board deflection.

Cracking of the ceramic element is suppressed by the resin of the external electrodes, which releases the stress.



2 Suppresses the occurrence of cracking caused by deflection stress at the time of board mounting, etc.



Due to the specification of the measuring instrument, measurements can be performed up to 8mm.

3 Ideal for consumer and industrial electronic equipment, etc. where there heat stress, vibration and impact are applied.

Specifications

Size	2.0×1.25mm to 5.7×5.0mm
Rated Voltage	DC6.3V to 1kV
Capacitance	470pF to 47μF
Main Applications	Consumer & Industrial Electronic Equipment



This catalog contains only a portion of the product lineup.
Please refer to the capacitor search tool on the Murata Web site for details.

GRM Series

GJM Series

GMA Series

GMD Series

GQM Series

GRJ Series

GR3 Series

KRM Series

KR3 Series

LLA Series

LLL Series

LLM Series

LLR Series

⚠Caution/
Notice

GRJ Series High Dielectric Constant Type Part Number List

■ 2.0×1.25mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
1.0mm	250Vdc	X7R	1000pF	±10%	GRJ21AR72E102KWJ1#	
			1500pF	±10%	GRJ21AR72E152KWJ1#	
			2200pF	±10%	GRJ21AR72E222KWJ1#	
			3300pF	±10%	GRJ21AR72E332KWJ1#	
			4700pF	±10%	GRJ21AR72E472KWJ1#	
			6800pF	±10%	GRJ21AR72E682KWJ1#	
1.45mm	250Vdc	X7R	10000pF	±10%	GRJ21BR72E103KWJ3#	
			15000pF	±10%	GRJ21BR72E153KWJ3#	
			22000pF	±10%	GRJ21BR72E223KWJ3#	

■ 3.2×1.6mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number		
1.25mm	1000Vdc	X7R	470pF	±10%	GRJ31BR73A471KWJ1#		
			680pF	±10%	GRJ31BR73A681KWJ1#		
			1000pF	±10%	GRJ31BR73A102KWJ1#		
			1500pF	±10%	GRJ31BR73A152KWJ1#		
			2200pF	±10%	GRJ31BR73A222KWJ1#		
			3300pF	±10%	GRJ31BR73A332KWJ1#		
			4700pF	±10%	GRJ31BR73A472KWJ1#		
	630Vdc	X7R	1000pF	±10%	GRJ31BR72J102KWJ1#		
			1500pF	±10%	GRJ31BR72J152KWJ1#		
			2200pF	±10%	GRJ31BR72J222KWJ1#		
			3300pF	±10%	GRJ31BR72J332KWJ1#		
			4700pF	±10%	GRJ31BR72J472KWJ1#		
			6800pF	±10%	GRJ31BR72J682KWJ1#		
			10000pF	±10%	GRJ31BR72J103KWJ1#		
	250Vdc	X7R	15000pF	±10%	GRJ31BR72E153KWJ1#		
			22000pF	±10%	GRJ31BR72E223KWJ1#		
			68000pF	±10%	GRJ31BR72E683KWJ1#		
	1.8mm	1000Vdc	X7R	6800pF	±10%	GRJ31CR73A682KWJ3#	
				10000pF	±10%	GRJ31CR73A103KWJ3#	
		630Vdc	X7R	15000pF	±10%	GRJ31CR72J153KWJ3#	
				22000pF	±10%	GRJ31CR72J223KWJ3#	
		250Vdc	X7R	33000pF	±10%	GRJ31CR72E333KWJ3#	
				47000pF	±10%	GRJ31CR72E473KWJ3#	
				0.10μF	±10%	GRJ31CR72E104KWJ3#	

■ 3.2×2.5mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
1.5mm	1000Vdc	X7R	6800pF	±10%	GRJ32QR73A682KWJ1#	
			10000pF	±10%	GRJ32QR73A103KWJ1#	
	630Vdc	X7R	22000pF	±10%	GRJ32QR72J223KWJ1#	
	250Vdc	X7R	68000pF	±10%	GRJ32QR72E683KWJ1#	
			0.15μF	±10%	GRJ32QR72E154KWJ1#	
2.0mm	1000Vdc	X7R	15000pF	±10%	GRJ32DR73A153KWJ1#	
			22000pF	±10%	GRJ32DR73A223KWJ1#	
	630Vdc	X7R	33000pF	±10%	GRJ32DR72J333KWJ1#	
			47000pF	±10%	GRJ32DR72J473KWJ1#	

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
2.0mm	250Vdc	X7R	0.10μF	±10%	GRJ32DR72E104KWJ1#	
			0.22μF	±10%	GRJ32DR72E224KWJ1#	
2.3mm	100Vdc	X7R	2.2μF	±10%	GRJ32DR72A225KE11#	
				±20%	GRJ32DR72A225ME11#	
2.8mm	50Vdc	X7R	4.7μF	±10%	GRJ32ER71H475KE11#	
				±20%	GRJ32ER71H475ME11#	
		X7S	10μF	±10%	GRJ32EC71H106KE11#	
				±20%	GRJ32EC71H106ME11#	
	25Vdc	X7R	10μF	±10%	GRJ32ER71E106KE11#	
				±20%	GRJ32ER71E106ME11#	
				±20%	GRJ32ER71C226KE11#	
	16Vdc	X7R	22μF	±10%	GRJ32ER71C226KE11#	
				±20%	GRJ32ER71C226ME11#	
				±20%	GRJ32ER71A226KE11#	
	10Vdc	X7R	22μF	±10%	GRJ32ER71A226KE11#	
				±20%	GRJ32ER71A226ME11#	
	6.3Vdc	X7R	47μF	±10%	GRJ32ER70J476KE11#	
				±20%	GRJ32ER70J476ME11#	

■ 4.5×3.2mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
1.5mm	630Vdc	X7R	68000pF	±10%	GRJ43QR72J683KWJ1#	
	250Vdc	X7R	0.15μF	±10%	GRJ43QR72E154KWJ1#	
2.0mm	1000Vdc	X7R	33000pF	±10%	GRJ43DR73A333KWJ1#	
			47000pF	±10%	GRJ43DR73A473KWJ1#	
	630Vdc	X7R	0.10μF	±10%	GRJ43DR72J104KWJ1#	
	250Vdc	X7R	0.22μF	±10%	GRJ43DR72E224KWJ1#	
			0.33μF	±10%	GRJ43DR72E334KWJ1#	
			0.47μF	±10%	GRJ43DR72E474KWJ1#	

■ 5.7×5.0mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
2.0mm	1000Vdc	X7R	68000pF	±10%	GRJ55DR73A683KWJ1#	
			0.10μF	±10%	GRJ55DR73A104KWJ1#	
	630Vdc	X7R	0.15μF	±10%	GRJ55DR72J154KWJ1#	
			0.22μF	±10%	GRJ55DR72J224KWJ1#	
	250Vdc	X7R	0.33μF	±10%	GRJ55DR72E334KWJ1#	
			0.47μF	±10%	GRJ55DR72E474KWJ1#	
			0.68μF	±10%	GRJ55DR72E684KWJ1#	
			1.0μF	±10%	GRJ55DR72E105KWJ1#	

Part number # indicates the package specification code.

High Effective Capacitance & High Allowable Ripple Current

GR3 Series **Anti-noise**

This is a general purpose high ripple resistance product excellent in DC bias characteristics.

Features

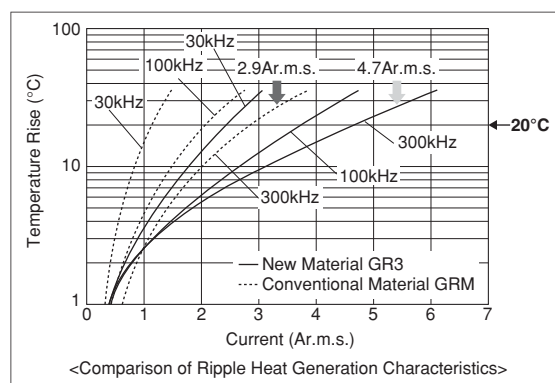
- ① When a DC bias is applied, a capacitance higher than conventional products (X7R characteristics) can be acquired.

About twice the capacitance can be secured when DC200V is applied.



- ② Improved ripple resistance performance compared to conventional products (X7R characteristics).

In the case of a product with a capacitance of 1μF, when the exothermic temperature reaches 20°C at frequency f=300kHz, the amount of resistance of a product with conventional material is 2.9Ar.m.s.; however, the new material is 4.7Ar.m.s..



- ③ This product has a noise reduction effect.

Since dielectric materials which enable a reduction of noise are used, this product is more effective for reducing noise compared to the general purpose GRM series.



Specifications

Size	2.0×1.25mm to 5.7×5.0mm
Rated Voltage	DC250V to 630V
Capacitance	0.01μF to 1.0μF
Main Applications	For PFC (Power Factor Correction) Circuits of Power Supplies, EMI Suppression and Smoothing Circuits



This catalog contains only a portion of the product lineup.
Please refer to the capacitor search tool on the Murata Web site for details.

GRM Series

GJM Series

GMA Series

GMD Series

GQM Series

GRJ Series

GR3 Series

KRM Series

KR3 Series

LLA Series

LLL Series

LLM Series

LLR Series

⚠Caution/
Notice

GR3 Series High Dielectric Constant Type Anti-noise Part Number List

■ 2.0×1.25mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
1.0mm	250Vdc	X7T	10000pF	±10%	GR321AD72E103KW01#	
			15000pF	±10%	GR321AD72E153KW01#	
1.45mm	250Vdc	X7T	22000pF	±10%	GR321BD72E223KW03#	

■ 3.2×1.6mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
1.0mm	450Vdc	X7T	10000pF	±10%	GR331AD72W103KW01#	
			15000pF	±10%	GR331AD72W153KW01#	
	250Vdc	X7T	33000pF	±10%	GR331AD72E333KW01#	
1.25mm	630Vdc	X7T	10000pF	±10%	GR331BD72J103KW01#	
	450Vdc	X7T	22000pF	±10%	GR331BD72W223KW01#	
			33000pF	±10%	GR331BD72W333KW01#	
	250Vdc	X7T	47000pF	±10%	GR331BD72E473KW01#	
1.8mm	630Vdc	X7T	15000pF	±10%	GR331CD72J153KW03#	
	450Vdc	X7T	47000pF	±10%	GR331CD72W473KW03#	
	250Vdc	X7T	68000pF	±10%	GR331CD72E683KW03#	

■ 3.2×2.5mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
1.5mm	630Vdc	X7T	22000pF	±10%	GR332QD72J223KW01#	
	250Vdc	X7T	0.10μF	±10%	GR332QD72E104KW01#	
2.0mm	630Vdc	X7T	33000pF	±10%	GR332DD72J333KW01#	
			47000pF	±10%	GR332DD72J473KW01#	
	450Vdc	X7T	68000pF	±10%	GR332DD72W683KW01#	
			0.10μF	±10%	GR332DD72W104KW01#	
	250Vdc	X7T	0.15μF	±10%	GR332DD72E154KW01#	

■ 4.5×3.2mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
1.5mm	250Vdc	X7T	0.22μF	±10%	GR343QD72E224KW01#	
2.0mm	630Vdc	X7T	68000pF	±10%	GR343DD72J683KW01#	
	450Vdc	X7T	0.15μF	±10%	GR343DD72W154KW01#	
	250Vdc	X7T	0.33μF	±10%	GR343DD72E334KW01#	

■ 5.7×5.0mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
2.0mm	630Vdc	X7T	0.10μF	±10%	GR355DD72J104KW01#	
			0.15μF	±10%	GR355DD72J154KW01#	
	450Vdc	X7T	0.22μF	±10%	GR355DD72W224KW01#	
			0.33μF	±10%	GR355DD72W334KW01#	
			0.47μF	±10%	GR355DD72W474KW01#	
	250Vdc	X7T	0.47μF	±10%	GR355DD72E474KW01#	
			0.68μF	±10%	GR355DD72E684KW01#	
2.7mm	630Vdc	X7T	0.22μF	±10%	GR355XD72J224KW05#	

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
2.7mm	630Vdc	X7T	0.27μF	±10%	GR355XD72J274KW05#	
	450Vdc	X7T	0.56μF	±10%	GR355XD72W564KW05#	
	250Vdc	X7T	1.0μF	±10%	GR355XD72E105KW05#	

Part number # indicates the package specification code.

Metal Terminal Type For General Purpose

KRM Series



Anti-noise

Deflecting crack

Soldering crack

Bonding the metal terminals to external electrodes solves design issues by mounting large size MLCC!

Features

① Bond metal terminals to the external electrodes of chips.

The stress applied to the chip is relieved by the elastic action of the metal terminal.



② Substantially reduces noise, board deflection cracks and soldering cracks.

This product is not damaged even with a board deflection of 6 mm.

Solder cracks do not occur even with 2,000 cycles of heat stress.

● Acoustic Noise is Reduced with Metal Terminals



● Reduces Stress Caused by Board Deflection



● Suppresses Solder Cracks Caused by Heat Stress

Chip Size	Chip Only (5750 (in mm)/2220 (in inch) size)	Metal Terminal Type (5750 (in mm)/2220 (in inch) size)
1000 Cycle	 ↑Solder Crack	
2000 Cycle	 ↑Solder Crack	

Compared with chips only, this product is excellent in solder cracking resistance.

Test Condition: -55 to +125°C, 5min., (Tank)
 Board Used: Glass Epoxy Board (FR-4)

Demonstrates replacement value of low noise capacitors Experience the effectiveness of the KRM Series.

▶ Examples of Noise Countermeasures

GRM Series

GJM Series

GMA Series

GMD Series

GQM Series

GRJ Series

GR3 Series

KRM Series

KR3 Series

LLA Series

LLL Series

LLM Series

LLR Series

⚠Caution/
Notice

③ 2 chips can be stacked.

Realize large capacity by stacking 2 capacitors.

Specifications

Size	2.2×1.25mm to 6.1×5.3mm
Rated Voltage	DC16V to 1kV
Capacitance	0.068μF to 68μF
Main Applications	For smoothing and noise suppression of DC-DC converters

This catalog contains only a portion of the product lineup.
 Please refer to the capacitor search tool on the Murata Web site for details.



<Dimensions>

KRM Series High Dielectric Constant Type Anti-noise Deflecting crack Soldering crack Part Number List

■ 3.5×1.7mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
2.0mm	25Vdc	X5R	10μF	±10%	KRM31FR61E106KH01#	
2.9mm	100Vdc	X7R	1.0μF	±10%	KRM31KR72A105KH01#	
	50Vdc	X7R	4.7μF	±10%	KRM31KR71H475KH01#	
	35Vdc	X6S	10μF	±10%	KRM31KC8YA106KH01#	
	25Vdc	X6S	10μF	±10%	KRM31KC81E106KH01#	

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
5.0mm	25Vdc	X7R	33μF	±20%	KRM55TR71E336MH01#	
6.7mm	100Vdc	X7R	15μF	±20%	KRM55WR72A156MH01#	
	63Vdc	X7R	22μF	±20%	KRM55WR71J226MH01#	
	50Vdc	X7R	33μF	±20%	KRM55WR71H336MH01#	
	35Vdc	X7R	47μF	±20%	KRM55WR7YA476MH01#	
	25Vdc	X7R	47μF	±20%	KRM55WR71E476MH01#	
			68μF	±20%	KRM55WR71E686MH01#	

■ 3.6×1.7mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
2.9mm	50Vdc	X7R	2.2μF	±10%	KRM31KR71H225KH01#	

■ 3.7×1.85mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
2.9mm	100Vdc	X7R	2.2μF	±10%	KRM31KR72A225KH01#	

■ 6.1×5.3mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
3.0mm	1000Vdc	X7R	68000pF	±10%	KRM55LR73A683KH01#	
			0.10μF	±10%	KRM55LR73A104KH01#	
	630Vdc	X7R	0.15μF	±10%	KRM55LR72J154KH01#	
			0.22μF	±10%	KRM55LR72J224KH01#	
	250Vdc	X7R	0.68μF	±10%	KRM55LR72E684KH01#	
			1.0μF	±10%	KRM55LR72E105KH01#	
	100Vdc	X7R	4.7μF	±10%	KRM55LR72A475KH01#	
	63Vdc	X7R	4.7μF	±10%	KRM55LR71J475KH01#	
	50Vdc	X7R	4.7μF	±10%	KRM55LR71H475KH01#	
			10μF	±10%	KRM55LR71H106KH01#	
	35Vdc	X7R	10μF	±10%	KRM55LR7YA106KH01#	
			15μF	±10%	KRM55LR7YA156KH01#	
	25Vdc	X7R	15μF	±10%	KRM55LR71E156KH01#	
3.9mm	100Vdc	X7R	6.8μF	±10%	KRM55QR72A685KH01#	
	63Vdc	X7R	10μF	±10%	KRM55QR71J106KH01#	
	50Vdc	X7R	17μF	±10%	KRM55QR71H176KH01#	
	35Vdc	X7R	17μF	±10%	KRM55QR7YA176KH01#	
			22μF	±10%	KRM55QR7YA226KH01#	
	25Vdc	X7R	22μF	±10%	KRM55QR71E226KH01#	
			33μF	±10%	KRM55QR71E336KH01#	
5.0mm	1000Vdc	X7R	0.15μF	±20%	KRM55TR73A154MH01#	
			0.22μF	±20%	KRM55TR73A224MH01#	
	630Vdc	X7R	0.33μF	±20%	KRM55TR72J334MH01#	
			0.47μF	±20%	KRM55TR72J474MH01#	
	250Vdc	X7R	1.5μF	±20%	KRM55TR72E155MH01#	
			2.2μF	±20%	KRM55TR72E225MH01#	
	100Vdc	X7R	10μF	±20%	KRM55TR72A106MH01#	
	50Vdc	X7R	22μF	±20%	KRM55TR71H226MH01#	
	35Vdc	X7R	22μF	±20%	KRM55TR7YA226MH01#	
			33μF	±20%	KRM55TR7YA336MH01#	

Part number # indicates the package specification code.

Metal Terminal Type High Effective Capacitance & High Allowable Ripple Current

KR3 Series



Anti-noise

Deflecting crack

Soldering crack

Bonding the metal terminals to external electrodes solves design issues by mounting large size MLCC!

Features

① Bond metal terminals to the external electrodes of chips.

The stress applied to the chip is relieved by the elastic action of the metal terminal.

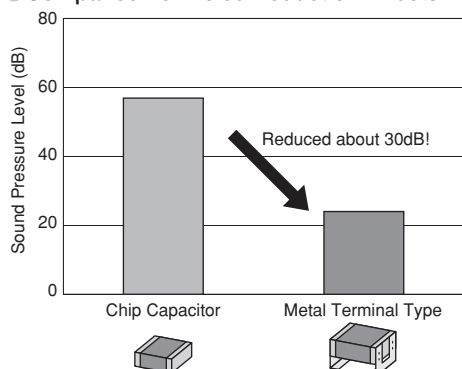


② Substantially reduces noise, board deflection cracks and soldering cracks.

This product is not damaged even with a board deflection of 6 mm.

Solder cracks do not occur even with 2,000 cycles of heat stress.

● Comparison of Noise Reduction Effects



Evaluation Items: 5750 (in mm)/2220 (in inch) size/DC630V/220nF
Test Method: DC50V, AC10Vp-p/3kHz
Test Board: Glass Epoxy Board (T: 1.6mm)
Test Quantity: 3pc
Distance Between Microphone and Board: 3mm

Note: Results Using Murata's Evaluation Board

● Reduces Stress Caused by Board Deflection



No damage, even with 6 mm board deflection!!

● Suppresses Solder Cracks Caused by Heat Stress

Chip Size	Chip Only (5750 (in mm)/2220 (in inch) size)		Metal Terminal Type (5750 (in mm)/2220 (in inch) size)	
1000 Cycle				
2000 Cycle				

Compared with chips only, this product is excellent in solder cracking resistance.

Test Condition: -55 to +125°C, 5min., (Tank)
Board Used: Glass Epoxy Board (FR-4)

③ Adopted Low Dielectric Constant Materials

Improved effective capacity and ripple resistant performance, compared to conventional products (X7R characteristics).



Specifications

Size	6.1×5.3mm
Rated Voltage	DC250V to 630V
Capacitance	0.1μF to 2.2μF
Main Applications	For DC-DC converters of general electronic equipment

This catalog contains only a portion of the product lineup.
 Please refer to the capacitor search tool on the Murata Web site for details.



GRM Series

GJM Series

GMA Series

GMD Series

GQM Series

GRJ Series

GR3 Series

KRM Series

KR3 Series

LLA Series

LLL Series

LLM Series

LLR Series

⚠Caution/
Notice

KR3 Series High Dielectric Constant Type **Anti-noise** **Deflecting crack** **Soldering crack** **Part Number List**

■ 6.1×5.3mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
3.0mm	630Vdc	X7T	0.10μF	±10%	KR355LD72J104KH01#	
			0.15μF	±10%	KR355LD72J154KH01#	
	450Vdc	X7T	0.22μF	±10%	KR355LD72W224KH01#	
			0.33μF	±10%	KR355LD72W334KH01#	
			0.47μF	±10%	KR355LD72W474KH01#	
	250Vdc	X7T	0.47μF	±10%	KR355LD72E474KH01#	
			0.68μF	±10%	KR355LD72E684KH01#	
3.9mm	630Vdc	X7T	0.22μF	±10%	KR355QD72J224KH01#	
			0.27μF	±10%	KR355QD72J274KH01#	
	450Vdc	X7T	0.56μF	±10%	KR355QD72W564KH01#	
	250Vdc	X7T	1.0μF	±10%	KR355QD72E105KH01#	
5.0mm	450Vdc	X7T	0.68μF	±20%	KR355TD72W684MH01#	
			1.0μF	±20%	KR355TD72W105MH01#	
	250Vdc	X7T	1.5μF	±20%	KR355TD72E155MH01#	
6.7mm	630Vdc	X7T	0.47μF	±20%	KR355WD72J474MH01#	
			0.56μF	±20%	KR355WD72J564MH01#	
	450Vdc	X7T	1.2μF	±20%	KR355WD72W125MH01#	
	250Vdc	X7T	2.2μF	±20%	KR355WD72E225MH01#	

8-Terminal Low ESL Type

LLA Series



8-Terminal Type Low ESL Capacitor Ideal for Power Supply Decoupling of High-speed Operation IC

Features

① Ultra-low ESL

Since the equivalent series inductance (ESL) is very low with excellent high frequency characteristics due to the design structure, this capacitor is ideal for power supply decoupling of high-speed operation IC.



<Effectiveness of Cancelling Out Inductance by Mutual Inductance>



<Effectiveness of Suppressing Inductance when Mounting a Multi-terminal Capacitor>

The inductance for the boards also becomes lower, not only the capacitor.

② A maximum operating temperature up to 125°C.

This product is applicable to high temperatures (X7* characteristics); however, Murata also offers numerous thin type products, which are ideal as decoupling capacitors on IC package.

Specifications

Size	1.6×0.8mm to 3.2×1.6mm
Rated Voltage	DC4V to 25V
Capacitance	0.01μF to 4.7μF
Main Applications	Application processor/CPU/GPU



This catalog contains only a portion of the product lineup.
Please refer to the capacitor search tool on the Murata Web site for details.

LLA Series High Dielectric Constant Type Low ESL Part Number List

■ 1.6×0.8mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
0.55mm	4Vdc	X7S	0.10μF	±20%	LLA185C70G104MA01#	
			0.22μF	±20%	LLA185C70G224MA01#	
			0.47μF	±20%	LLA185C70G474MA01#	
			2.2μF	±20%	LLA185C70G225ME16#	

■ 2.0×1.25mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
0.55mm	25Vdc	X7R	10000pF	±20%	LLA215R71E103MA14#	
			22000pF	±20%	LLA215R71E223MA14#	
	16Vdc	X7R	47000pF	±20%	LLA215R71C473MA14#	
			0.10μF	±20%	LLA215R71C104MA14#	
	10Vdc	X7R	0.22μF	±20%	LLA215R71A224MA14#	
	6.3Vdc	X7R	0.47μF	±20%	LLA215R70J474MA14#	
	4Vdc	X7S	1.0μF	±20%	LLA215C70G105MA14#	
			4.7μF	±20%	LLA215C70G475ME19#	
0.95mm	25Vdc	X7R	10000pF	±20%	LLA219R71E103MA01#	
			22000pF	±20%	LLA219R71E223MA01#	
			47000pF	±20%	LLA219R71E473MA01#	
	16Vdc	X7R	0.10μF	±20%	LLA219R71C104MA01#	
			0.22μF	±20%	LLA219R71C224MA01#	
	10Vdc	X7R	0.47μF	±20%	LLA219R71A474MA01#	
	6.3Vdc	X7R	1.0μF	±20%	LLA219R70J105MA01#	
	4Vdc	X7S	2.2μF	±20%	LLA219C70G225MA01#	

■ 3.2×1.6mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
0.55mm	16Vdc	X7R	0.22μF	±20%	LLA315R71C224MA14#	
	10Vdc	X7R	0.47μF	±20%	LLA315R71A474MA14#	
	6.3Vdc	X7R	1.0μF	±20%	LLA315R70J105MA14#	
			2.2μF	±20%	LLA315R70J225MA14#	
0.95mm	16Vdc	X7R	0.47μF	±20%	LLA319R71C474MA01#	
	10Vdc	X7R	1.0μF	±20%	LLA319R71A105MA01#	
1.25mm	16Vdc	X7R	1.0μF	±20%	LLA31MR71C105MA01#	
	10Vdc	X7R	2.2μF	±20%	LLA31MR71A225MA01#	

LW Reversed Low ESL Type

LLL Series



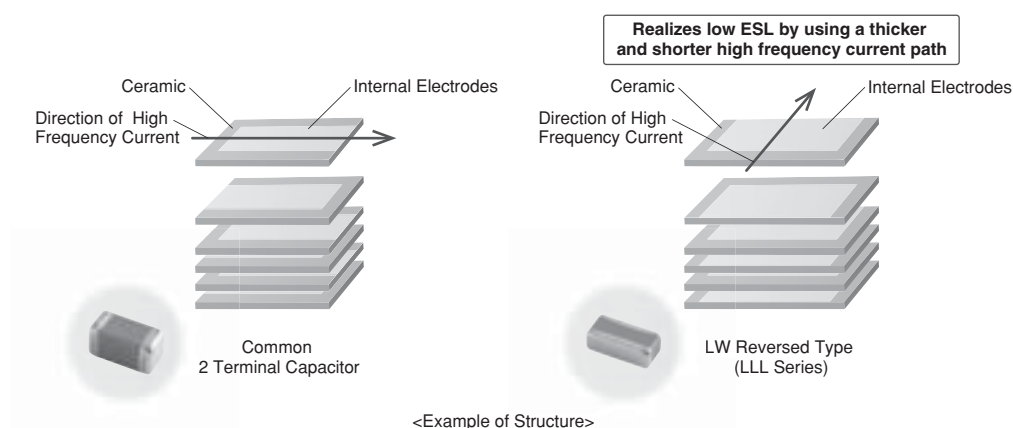
Low
ESL

This low ESL capacitor is ideal for power supply decoupling of high-speed operation electronic equipment.

Features

1 Low ESL

Since the equivalent series inductance (ESL) is low and excellent in high frequency characteristics, this capacitor is suitable for power supply decoupling of high-speed operation electronic equipment.

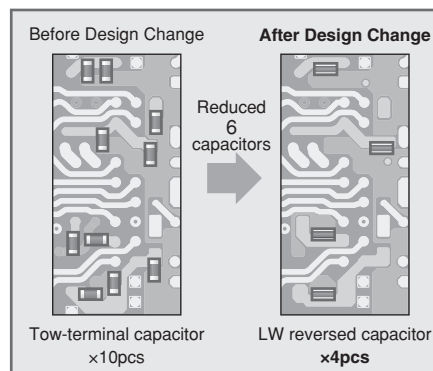


2 Contributes to a reduction in the number of components.

The number of components can be reduced by using low ESL capacitors, while maintaining functions equivalent to general purpose capacitors (GRM Series).

Murata proposes the use of the LLL series to reduce the number of components and high costs. Simulation is also possible.

Proposal for Cost Reductions

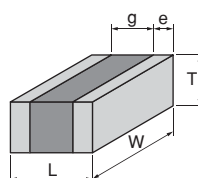


3 A maximum operating temperature up to 125°C.

We also offer an abundant lineup of X7* characteristics that can be used in high temperature locations, such as IC packages.

Specifications

Size	0.5×1.0mm to 1.6×3.2mm
Rated Voltage	DC2.5V to 50V
Capacitance	2,200pF to 10μF
Main Applications	Application processor/CPU/GPU



<Dimensions>

This catalog contains only a portion of the product lineup.
Please refer to the capacitor search tool on the Murata Web site for details.

LLL Series High Dielectric Constant Type Low ESL Part Number List

0.5×1.0mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
0.35mm	6.3Vdc	X6S	0.10μF	±20%	LLL153C80J104ME01#	
			0.22μF	±20%	LLL153C80J224ME14#	
	4Vdc	X7S	0.47μF	±20%	LLL153C70G474ME17#	
		X6S	1.0μF	±20%	LLL153C80G105ME21#	

0.6×1.0mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
0.45mm	4Vdc	X5R	4.3μF	±20%	LLL1U4R60G435ME22#	

0.8×1.6mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
0.5mm	25Vdc	X7R	10000pF	±20%	LLL185R71E103MA11#	
	16Vdc	X7R	22000pF	±20%	LLL185R71C223MA11#	
			47000pF	±20%	LLL185R71C473MA11#	
	10Vdc	X7R	0.10μF	±20%	LLL185R71A104MA11#	
	4Vdc	X7S	0.22μF	±20%	LLL185C70G224MA11#	
0.55mm	4Vdc	X7S	2.2μF	±20%	LLL185C70G225ME01#	
0.6mm	50Vdc	X7R	2200pF	±20%	LLL185R71H222MA01#	
			4700pF	±20%	LLL185R71H472MA01#	
	25Vdc	X7R	10000pF	±20%	LLL185R71E103MA01#	
			22000pF	±20%	LLL185R71E223MA01#	
	16Vdc	X7R	47000pF	±20%	LLL185R71C473MA01#	
	10Vdc	X7R	0.10μF	±20%	LLL185R71A104MA01#	
			0.22μF	±20%	LLL185R71A224MA01#	
	4Vdc	X7S	0.47μF	±20%	LLL185C70G474MA01#	

1.25×2.0mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
0.5mm	50Vdc	X7R	10000pF	±20%	LLL215R71H103MA11#	
	25Vdc	X7R	22000pF	±20%	LLL215R71E223MA11#	
	16Vdc	X7R	47000pF	±20%	LLL215R71C473MA11#	
			0.10μF	±20%	LLL215R71C104MA11#	
	10Vdc	X7R	0.22μF	±20%	LLL215R71A224MA11#	
	6.3Vdc	X7R	0.47μF	±20%	LLL215R70J474MA11#	
	4Vdc	X7S	1.0μF	±20%	LLL215C70G105MA11#	
0.7mm	50Vdc	X7R	10000pF	±20%	LLL216R71H103MA01#	
			22000pF	±20%	LLL216R71H223MA01#	
	25Vdc	X7R	47000pF	±20%	LLL216R71E473MA01#	
			0.10μF	±20%	LLL216R71E104MA01#	
	10Vdc	X7R	0.22μF	±20%	LLL216R71A224MA01#	
0.95mm	16Vdc	X7R	0.22μF	±20%	LLL219R71C224MA01#	
	10Vdc	X7R	0.47μF	±20%	LLL219R71A474MA01#	
			1.0μF	±20%	LLL219R71A105MA01#	
	4Vdc	X7S	2.2μF	±20%	LLL219C70G225MA01#	

1.6×3.2mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number			
0.5mm	50Vdc	X7R	10000pF	±20%	LLL315R71H103MA11#			
			22000pF	±20%	LLL315R71H223MA11#			
	25Vdc	X7R	47000pF	±20%	LLL315R71E473MA11#			
			0.10μF	±20%	LLL315R71E104MA11#			
	16Vdc	X7R	0.22μF	±20%	LLL315R71C224MA11#			
	10Vdc	X7R	0.47μF	±20%	LLL315R71A474MA11#			
0.8mm	50Vdc	X7R	10000pF	±20%	LLL317R71H103MA01#			
			22000pF	±20%	LLL317R71H223MA01#			
			47000pF	±20%	LLL317R71H473MA01#			
	25Vdc	X7R	0.10μF	±20%	LLL317R71E104MA01#			
	16Vdc	X7R	0.22μF	±20%	LLL317R71C224MA01#			
			0.47μF	±20%	LLL317R71C474MA01#			
	10Vdc	X7R	1.0μF	±20%	LLL317R71A105MA01#			
	6.3Vdc	X7R	2.2μF	±20%	LLL317R70J225MA01#			
1.25mm	50Vdc	X7R	0.10μF	±20%	LLL31MR71H104MA01#			
			25Vdc	X7R	0.22μF	±20%	LLL31MR71E224MA01#	
					0.47μF	±20%	LLL31MR71E474MA01#	
	16Vdc	X7R	1.0μF	±20%	LLL31MR71C105MA01#			
	10Vdc	X7R	2.2μF	±20%	LLL31MR71A225MA01#			
	6.3Vdc	X7R	4.7μF	±20%	LLL31MR70J475MA01#			
X5R			10μF	±20%	LLL31MR60J106ME01#			

10-Terminal Low ESL Type

LLM Series



Low
ESL

10-Terminal Type Low ESL Capacitor Ideal for Power Supply Decoupling of High-speed Operation IC

Features

① This is the lowest ESL LW reversed type capacitor.

Since the equivalent series inductance (ESL) of this product is even lower than the LLA series (8-terminal product) with excellent high frequency characteristics, this capacitor is ideal for power supply decoupling of high-speed operation IC.



<Effectiveness of Cancelling Out Inductance by Mutual Inductance>



<Effectiveness of Suppressing Inductance when Mounting a Multi-terminal Capacitor>

The inductance for the boards also becomes lower, not only the capacitor.

② A maximum operating temperature up to 125°C.

This product is applicable to high temperatures (X7* characteristics); however, Murata also offers numerous thin type products, which are ideal as decoupling capacitors on IC package.

Specifications

Size	2.0×1.25mm to 3.2×1.6mm
Rated Voltage	DC4V to 16V
Capacitance	0.1μF to 2.2μF
Main Applications	Application processor/CPU/GPU



This catalog contains only a portion of the product lineup.
Please refer to the capacitor search tool on the Murata Web site for details.

LLM Series High Dielectric Constant Type Part Number List

■ 2.0×1.25mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
0.55mm	6.3Vdc	X7R	0.22μF	±20%	LLM215R70J224MA11#	
			0.47μF	±20%	LLM215R70J474MA11#	
	4Vdc	X7S	1.0μF	±20%	LLM215C70G105MA11#	

■ 3.2×1.6mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
0.55mm	16Vdc	X7R	0.10μF	±20%	LLM315R71C104MA11#	
			0.22μF	±20%	LLM315R71C224MA11#	
	10Vdc	X7R	0.47μF	±20%	LLM315R71A474MA11#	
	6.3Vdc	X7R	2.2μF	±20%	LLM315R70J225MA11#	

ESR Controlled Low ESL Type

LLR Series



Low
ESL

ESR Controlled Type Low ESL Capacitors Equipped with Anti-resonance Control Function

Features

① Reduces Anti-resonance

This capacitor is controlled so that the equivalent series resistance (ESR) becomes slightly higher, and is effective in reducing the anti-resonance that occurs when capacitor arrays are used.



② Lineup of capacitors with ESR values from 100 to 1,000mΩ.

According to the conditions of the anti-resonance, the most suitable ESR value can be selected from 4 types.

③ Low ESL

This ESR controlled type capacitor has excellent high frequency characteristics, with low equivalent series inductance (ESL). This is also ideal as a decoupling component.

Specifications

Size	0.8×1.6mm
Rated Voltage	DC4V
Capacitance	1.0μF
Main Applications	Network processor/ASIC/PMIC



This catalog contains only a portion of the product lineup.
Please refer to the capacitor search tool on the Murata Web site for details.

GRM Series

GJM Series

GMA Series

GMD Series

GQM Series

GRJ Series

GR3 Series

KRM Series

KR3 Series

LLA Series

LLL Series

LLM Series

LLR Series

⚠Caution/
Notice

LLR Series High Dielectric Constant Type Part Number List

■ 0.8×1.6mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
0.55mm	4Vdc	X7S	1.0μF	±20%	LLR185C70G105ME01#	
				±20%	LLR185C70G105ME03#	
				±20%	LLR185C70G105ME05#	
				±20%	LLR185C70G105ME07#	

Part number # indicates the package specification code.

⚠Caution/Notice

⚠Caution

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GRM Series

GJM Series

GMA Series

GMD Series

GQM Series

GRJ Series

GR3 Series

KRM Series

KR3 Series

LLA Series

LLL Series

LLM Series

LLR Series

⚠Caution/
Notice

⚠Caution

■ Storage and Operation Conditions

1. The performance of chip monolithic ceramic capacitors may be affected by the storage conditions.

1-1. Store the capacitors in the following conditions:

Room Temperature of +5°C to +40°C and
a Relative Humidity of 20% to 70%.

(1) Sunlight, dust, rapid temperature changes,
corrosive gas atmosphere, or high temperature
and humidity conditions during storage may affect
solderability and packaging performance.

Therefore, please maintain the storage
temperature and humidity. Use the product within
six months, as prolonged storage may cause
oxidation of the electrodes.

(2) Please confirm solderability before using after six
months. Store the capacitors without opening the
original bag. Even if the storage period is short, do
not exceed the specified atmospheric conditions.

1-2. Corrosive gas can react with the termination
(external) electrodes or lead wires of capacitors, and
result in poor solderability. Do not store the
capacitors in an atmosphere consisting of corrosive
gas (e.g., hydrogen sulfide, sulfur dioxide, chlorine,
ammonia gas, etc.).

1-3. Due to moisture condensation caused by rapid
humidity changes, or the photochemical change
caused by direct sunlight on the terminal electrodes
and/or the resin/epoxy coatings, the solderability and
electrical performance may deteriorate. Do not store
capacitors under direct sunlight or in high humidity
conditions.

■ Rating

1. Temperature Dependent Characteristics

1. The electrical characteristics of a capacitor can change
with temperature.

1-1. For capacitors having larger temperature
dependency, the capacitance may change with
temperature changes.

The following actions are recommended in order to
ensure suitable capacitance values.

(1) Select a suitable capacitance for the operating
temperature range.

(2) The capacitance may change within the rated
temperature.

When you use a high dielectric constant type
capacitor in a circuit that needs a tight (narrow)
capacitance tolerance (e.g., a time-constant
circuit), please carefully consider the temperature
characteristics, and carefully confirm the various
characteristics in actual use conditions and the
actual system.

[Typical Temperature Characteristics X7R (R7)]

Sample: 0.1μF, Rated Voltage 50VDC



[Typical Temperature Characteristics X5R (R6)]

Sample: 22μF, Rated Voltage 4VDC



2. Measurement of Capacitance

1. Measure capacitance with the voltage and frequency
specified in the product specifications.

1-1. The output voltage of the measuring equipment may
decrease occasionally when capacitance is high.
Please confirm whether a prescribed measured
voltage is impressed to the capacitor.

1-2. The capacitance values of high dielectric constant
type capacitors change depending on the AC voltage
applied. Please consider the AC voltage
characteristics when selecting a capacitor to be used
in an AC circuit.

Continued from the preceding page.

3. Applied Voltage

1. Do not apply a voltage to the capacitor that exceeds the rated voltage as called out in the specifications.
 - 1-1. Applied voltage between the terminals of a capacitor shall be less than or equal to the rated voltage.
 - (1) When AC voltage is superimposed on DC voltage, the zero-to-peak voltage shall not exceed the rated DC voltage.
When AC voltage or pulse voltage is applied, the peak-to-peak voltage shall not exceed the rated DC voltage.
 - (2) Abnormal voltages (surge voltage, static electricity, pulse voltage, etc.) shall not exceed the rated DC voltage.

Typical Voltage Applied to the DC Capacitor

DC Voltage	DC Voltage+AC	AC Voltage	Pulse Voltage
			

(E: Maximum possible applied voltage.)

- 1-2. Influence of over voltage
Over voltage that is applied to the capacitor may result in an electrical short circuit caused by the breakdown of the internal dielectric layers.
The time duration until breakdown depends on the applied voltage and the ambient temperature.
2. Use a safety standard certified capacitor in a power supply input circuit (AC filter), as it is also necessary to consider the withstand voltage and impulse withstand voltage defined for each device.

4. Type of Applied Voltage and Self-heating Temperature

1. Confirm the operating conditions to make sure that no large current is flowing into the capacitor due to the continuous application of an AC voltage or pulse voltage.
When a DC rated voltage product is used in an AC voltage circuit or a pulse voltage circuit, the AC current or pulse current will flow into the capacitor; therefore check the self-heating condition.
Please confirm the surface temperature of the capacitor so that the temperature remains within the upper limits of the operating temperature, including the rise in temperature due to self-heating. When the capacitor is used with a high-frequency voltage or pulse voltage, heat may be generated by dielectric loss.
<Applicable to Rated Voltage of less than 100VDC>
 - 1-1. The load should be contained to the level such that when measuring at atmospheric temperature of 25°C, the product's self-heating remains below 20°C and the surface temperature of the capacitor in the actual circuit remains within the maximum operating temperature.

[Example of Temperature Rise (Heat Generation) in Chip Monolithic Ceramic Capacitors in Contrast to Ripple Current]

Sample: R (R1) characteristics 10μF,
Rated voltage: DC10V



⚠Caution

Continued from the preceding page.

<Applicable to Temperature Characteristics X7R (R7), X7T (D7) beyond Rated Voltage of 200VDC>

1-2. The load should be contained so that the self-heating of the capacitor body remains below 20°C, when measuring at an ambient temperature of 25°C. In addition, use a K thermocouple of $\phi 0.1\text{mm}$ with less heat capacity when measuring, and measure in a condition where there is no effect from the radiant heat of other components or air flow caused by convection. Excessive generation of heat may cause deterioration of the characteristics and reliability of the capacitor. (Absolutely do not perform measurements while the cooling fan is operating, as an accurate measurement may not be performed.)

<Applicable to Temperature Characteristics U2J (7U), C0G (5C) beyond Rated Voltage of 200VDC>

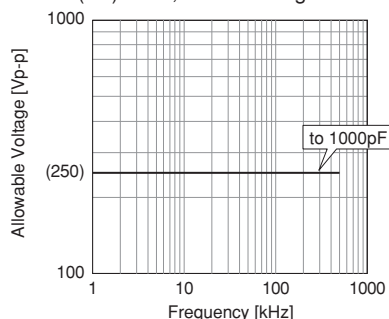
1-3. Since the self-heating is low in the low loss series, the allowable power becomes extremely high compared to the common X7R (R7) characteristics. However, when a load with self-heating of 20°C is applied at the rated voltage, the allowable power may be exceeded. When the capacitor is used in a high-frequency voltage circuit of 1kHz or more, the frequency of the applied voltage should be less than 500kHz sine wave (less than 100kHz for a product with rated voltage of DC3.15kV), to limit the voltage load so that the load remains within the derating shown in the following figure. In the case of non-sine wave, high-frequency components exceeding the fundamental frequency may be included. In such a case, please contact Murata. The excessive generation of heat may cause deterioration of the characteristics and reliability of the capacitor. (Absolutely do not perform measurements while the cooling fan is operating, as an accurate measurement may not be performed.)

The temperature of the surface of capacitor: 125°C or less (including self-heating)

C0G (5C) char., Rated Voltage: DC200V



C0G (5C) char., Rated Voltage: DC250V



C0G (5C) char., Rated Voltage: DC500V



C0G (5C) char., Rated Voltage: DC630V



C0G (5C) char., Rated Voltage: DC1kV

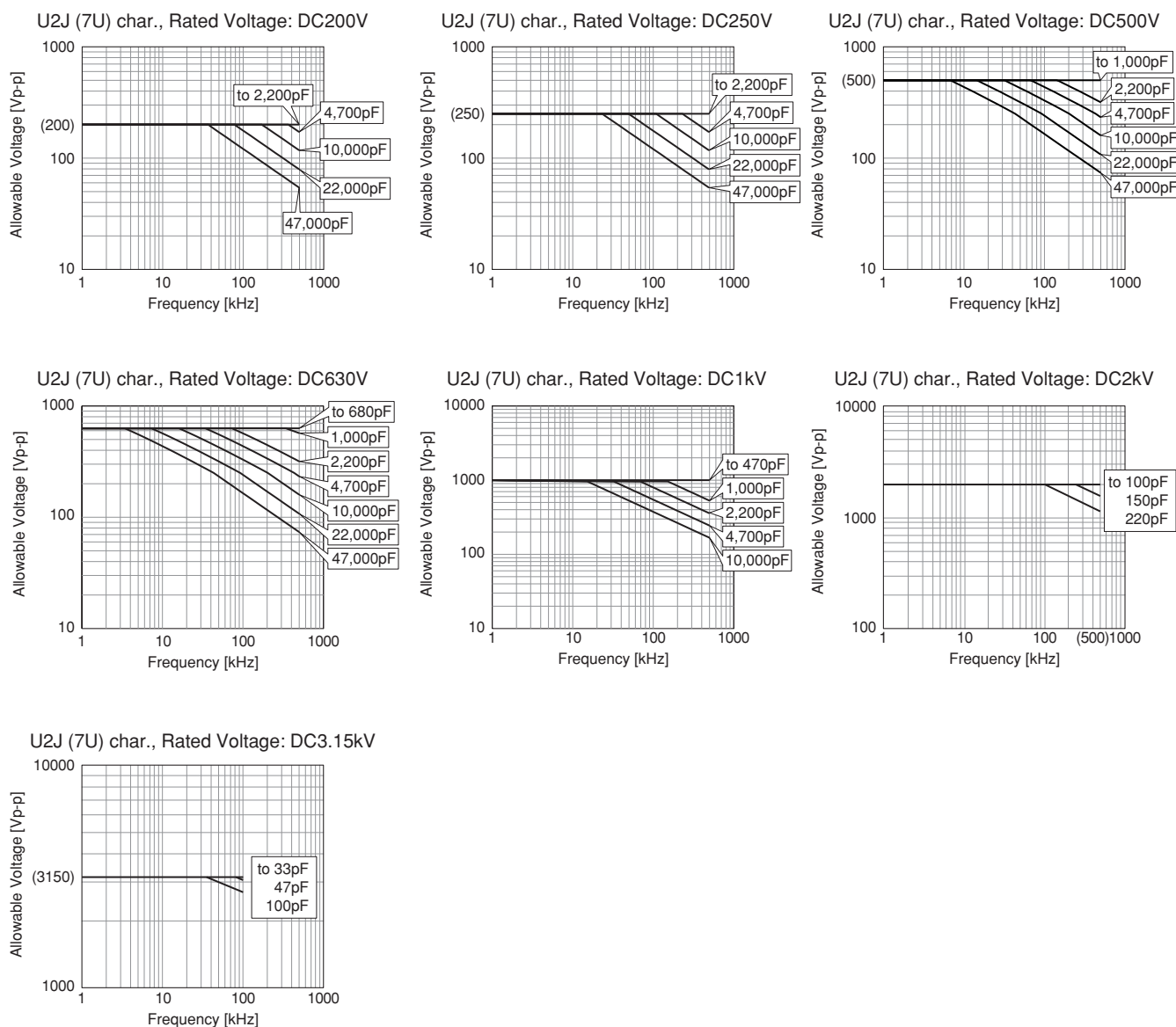


The sine-wave frequency VS allowable voltage

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The temperature of the surface
of capacitor: 125°C or less (including self-heating)



The sine-wave frequency VS allowable voltage

<Design Tool>

• Simsurfing

Simsurfing is a web application to display the characteristics charts and download the characteristics data of our products. The frequency characteristics, temperature characteristics, bias characteristics etc. can be checked.

(Address: <http://www.murata.com/simsurfing/>)

• Medium Voltage Ceramic Capacitor Selection Tool

The selection tool "Murata Medium Voltage Capacitors Selection Tool by Voltage Form" is installed in the above SimSurfing, where the usability of the preferred medium voltage ceramic capacitors can be determined according to the application including automobiles.

By using this tool, the preferred products* can be checked by specifications, such as the power, voltage, and fundamental frequency of the voltage waveform to be input into the capacitor.

*Supported Series

Temperature characteristics U2J (7U), C0G (5C) of GRM/DC200V or more

⚠Caution

Continued from the preceding page.

5. DC Voltage and AC Voltage Characteristics

1. The capacitance value of a high dielectric constant type capacitor changes depending on the DC voltage applied. Please consider the DC voltage characteristics when a capacitor is selected for use in a DC circuit.

1-1. The capacitance of ceramic capacitors may change sharply depending on the applied voltage (see figure).

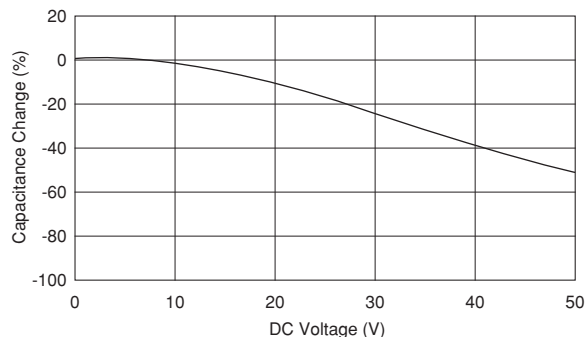
Please confirm the following in order to secure the capacitance.

- (1) Determine whether the capacitance change caused by the applied voltage is within the allowed range.
- (2) In the DC voltage characteristics, the rate of capacitance change becomes larger as voltage increases, even if the applied voltage is below the rated voltage. When a high dielectric constant type capacitor is used in a circuit that requires a tight (narrow) capacitance tolerance (e.g., a time constant circuit), please carefully consider the voltage characteristics, and confirm the various characteristics in actual operating conditions in an actual system.

2. The capacitance values of high dielectric constant type capacitors changes depending on the AC voltage applied. Please consider the AC voltage characteristics when selecting a capacitor to be used in an AC circuit.

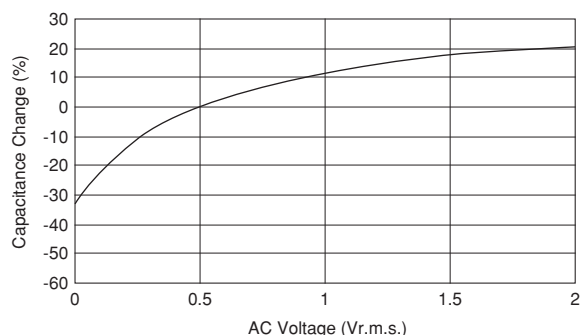
[DC Voltage Characteristics]

Sample: X7R (R7) Characteristics 0.1μF,
Rated Voltage 50VDC



[AC Voltage Characteristics]

Sample: X7R (R7) Characteristics 10μF,
Rated Voltage 6.3VDC



6. Capacitance Aging

1. The high dielectric constant type capacitors have the characteristic in which the capacitance value decreases with the passage of time.

When you use high dielectric constant type capacitors in a circuit that needs a tight (narrow) capacitance tolerance (e.g., a time-constant circuit), please carefully consider the characteristics of these capacitors, such as their aging, voltage, and temperature characteristics. In addition, check capacitors using your actual appliances at the intended environment and operating conditions.

[Example of Change Over Time (Aging Characteristics)]

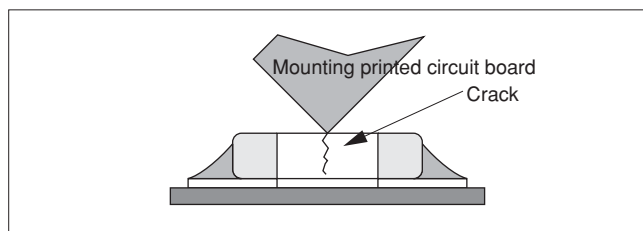
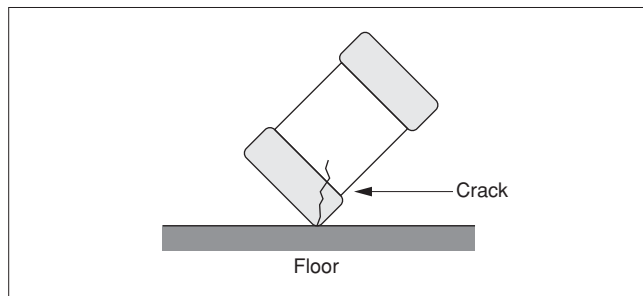


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7. Vibration and Shock

- Please confirm the kind of vibration and/or shock, its condition, and any generation of resonance.
Please mount the capacitor so as not to generate resonance, and do not allow any impact on the terminals.
- Mechanical shock due to being dropped may cause damage or a crack in the dielectric material of the capacitor.
Do not use a dropped capacitor because the quality and reliability may be deteriorated.
- When printed circuit boards are piled up or handled, the corner of another printed circuit board should not be allowed to hit the capacitor, in order to avoid a crack or other damage to the capacitor.

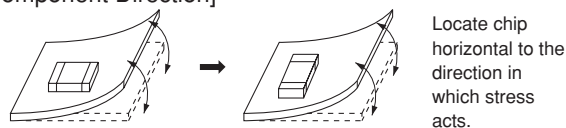


■ Soldering and Mounting

1. Mounting Position

- Confirm the best mounting position and direction that minimizes the stress imposed on the capacitor during flexing or bending the printed circuit board.
 - Choose a mounting position that minimizes the stress imposed on the chip during flexing or bending of the board.

[Component Direction]

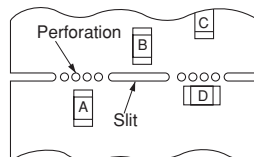


[Chip Mounting Close to Board Separation Point]

It is effective to implement the following measures, to reduce stress in separating the board.

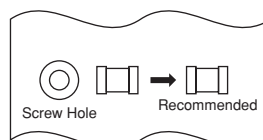
It is best to implement all of the following three measures; however, implement as many measures as possible to reduce stress.

Contents of Measures	Stress Level
(1) Turn the mounting direction of the component parallel to the board separation surface.	$A > D$
(2) Add slits in the board separation part.	$A > B$
(3) Keep the mounting position of the component away from the board separation surface.	$A > C$



[Mounting Capacitors Near Screw Holes]

When a capacitor is mounted near a screw hole, it may be affected by the board deflection that occurs during the tightening of the screw. Mount the capacitor in a position as far away from the screw holes as possible.



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⚠Caution

☐ Continued from the preceding page.

2. Information before Mounting

1. Do not re-use capacitors that were removed from the equipment.
2. Confirm capacitance characteristics under actual applied voltage.
3. Confirm the mechanical stress under actual process and equipment use.
4. Confirm the rated capacitance, rated voltage and other electrical characteristics before assembly.
5. Prior to use, confirm the solderability of capacitors that were in long-term storage.
6. Prior to measuring capacitance, carry out a heat treatment for capacitors that were in long-term storage.
7. The use of Sn-Zn based solder will deteriorate the reliability of the MLCC.

Please contact our sales representative or product engineers on the use of Sn-Zn based solder in advance.

8. We have also produced a DVD which shows a summary of our opinions, regarding the precautions for mounting. Please contact our sales representative to request the DVD.

3. Maintenance of the Mounting (pick and place) Machine

1. Make sure that the following excessive forces are not applied to the capacitors.
 - 1-1. In mounting the capacitors on the printed circuit board, any bending force against them shall be kept to a minimum to prevent them from any bending damage or cracking. Please take into account the following precautions and recommendations for use in your process.
 - (1) Adjust the lowest position of the pickup nozzle so as not to bend the printed circuit board.
 - (2) Adjust the nozzle pressure within a static load of 1N to 3N during mounting.
2. Dirt particles and dust accumulated between the suction nozzle and the cylinder inner wall prevent the nozzle from moving smoothly. This imposes greater force upon the chip during mounting, causing cracked chips. Also, the locating claw, when worn out, imposes uneven forces on the chip when positioning, causing cracked chips. The suction nozzle and the locating claw must be maintained, checked, and replaced periodically.



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4-1. Reflow Soldering

- When sudden heat is applied to the components, the mechanical strength of the components will decrease because a sudden temperature change causes deformation inside the components. In order to prevent mechanical damage to the components, preheating is required for both the components and the PCB. Preheating conditions are shown in table 1. It is required to keep the temperature differential between the solder and the components surface (ΔT) as small as possible.
- Solderability of tin plating termination chips might be deteriorated when a low temperature soldering profile where the peak solder temperature is below the melting point of tin is used. Please confirm the solderability of tin plated termination chips before use.
- When components are immersed in solvent after mounting, be sure to maintain the temperature difference (ΔT) between the component and the solvent within the range shown in table 1.

Table 1

Part Number	Temperature Differential
GJM/GQM/GR3/GRJ/GRM/KRM/LLL/LLR Series 02/03/15/18/21/31 sizes LLL Series 1U size	$\Delta T \leq 190^\circ\text{C}$
GR3/GRJ/GRM/KR3/KRM Series 32/43/55 sizes LLA/LLM Series 18/21/31 sizes GQM Series 22 size	$\Delta T \leq 130^\circ\text{C}$

Recommended Conditions

	Pb-Sn Solder		Lead Free Solder
	Reflow	Vapor Reflow	
Peak Temperature	230 to 250°C	230 to 240°C	240 to 260°C
Atmosphere	Air	Saturated vapor of inactive solvent	Air or N ₂

Pb-Sn Solder: Sn-37Pb

Lead Free Solder: Sn-3.0Ag-0.5Cu

4. Optimum Solder Amount for Reflow Soldering

- Overly thick application of solder paste results in a excessive solder fillet height. This makes the chip more susceptible to mechanical and thermal stress on the board and may cause the chips to crack.
- Too little solder paste results in a lack of adhesive strength on the outer electrode, which may result in chips breaking loose from the PCB.
- Make sure the solder has been applied smoothly to the end surface to a height of 0.2mm* min.

Inverting the PCB

Make sure not to impose any abnormal mechanical shocks to the PCB.

[Standard Conditions for Reflow Soldering]



[Allowable Reflow Soldering Temperature and Time]



In the case of repeated soldering, the accumulated soldering time must be within the range shown above.



⚠Caution

Continued from the preceding page.

4-2. Flow Soldering

- Do not apply flow soldering to chips not listed in table 2.

Table 2

Part Number	Temperature Differential
GR3/GRM Series 18/21/31 sizes GQM Series 18/21 sizes LLL Series 21/31 sizes GRJ Series Rated Voltage 250VDC or more 18/21/31 sizes	$\Delta T \leq 150^\circ\text{C}$

- When sudden heat is applied to the components, the mechanical strength of the components will decrease because a sudden temperature change causes deformation inside the components. In order to prevent mechanical damage to the components, preheating is required for both of the components and the PCB. Preheating conditions are shown in table 2. It is required to keep the temperature differential between the solder and the components surface (ΔT) as low as possible.
- Excessively long soldering time or high soldering temperature can result in leaching of the outer electrodes, causing poor adhesion or a reduction in capacitance value due to loss of contact between the electrodes and end termination.
- When components are immersed in solvent after mounting, be sure to maintain the temperature differential (ΔT) between the component and solvent within the range shown in the table 2.

Recommended Conditions

	Pb-Sn Solder	Lead Free Solder
Preheating Peak Temperature	90 to 110°C	100 to 120°C
Soldering Peak Temperature	240 to 250°C	250 to 260°C
Atmosphere	Air	Air

Pb-Sn Solder: Sn-37Pb

Lead Free Solder: Sn-3.0Ag-0.5Cu

5. Optimum Solder Amount for Flow Soldering

- The top of the solder fillet should be lower than the thickness of the components. If the solder amount is excessive, the risk of cracking is higher during board bending or any other stressful condition.

[Standard Conditions for Flow Soldering]



[Allowable Flow Soldering Temperature and Time]



In the case of repeated soldering, the accumulated soldering time must be within the range shown above.



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4-3. Correction of Soldered Portion

When sudden heat is applied to the capacitor, distortion caused by the large temperature difference occurs internally, and can be the cause of cracks. Capacitors also tend to be affected by mechanical and thermal stress depending on the board preheating temperature or the soldering fillet shape, and can be the cause of cracks. Please refer to "1. PCB Design" or "3. Optimum solder amount" for the solder amount and the fillet shapes.

1. Correction with a Soldering Iron

- 1-1. In order to reduce damage to the capacitor, be sure to preheat the capacitor and the mounting board. Preheat to the temperature range shown in Table 3. A hot plate, hot air type preheater, etc. can be used for preheating.
- 1-2. After soldering, do not allow the component/PCB to cool down rapidly.
- 1-3. Perform the corrections with a soldering iron as quickly as possible. If the soldering iron is applied too long, there is a possibility of causing solder leaching on the terminal electrodes, which will cause deterioration of the adhesive strength and other problems.

2. Correction with Spot Heater

Compared to local heating with a soldering iron, hot air heating by a spot heater heats the overall component and board, therefore, it tends to lessen the thermal shock. In the case of a high density mounted board, a spot heater can also prevent concerns of the soldering iron making direct contact with the component.

- 2-1. If the distance from the hot air outlet of the spot heater to the component is too close, cracks may occur due to thermal shock. To prevent this problem, follow the conditions shown in Table 4.

- 2-2. In order to create an appropriate solder fillet shape, it is recommended that hot air be applied at the angle shown in Figure 1.

3. Optimum solder amount when re-working with a soldering iron

- 3-1. In the case of sizes smaller than 0603, (GJM/GQM/GR3/GRJ/GRM Series, 03/15/18 sizes), the top of the solder fillet should be lower than $\frac{2}{3}$ of the thickness of the component or 0.5mm, whichever is smaller. In the case of 0805 and larger sizes, (GJM/GQM/GR3/GRJ/GRM Series, 21/22/31/32/43/55 sizes), the top of the solder fillet should be lower than $\frac{2}{3}$ of the thickness of the component. If the solder amount is excessive, the risk of cracking is higher during board bending or under any other stressful condition.

Table 3

Part Number	Temperature of Soldering Iron Tip	Preheating Temperature	Temperature Differential (ΔT)	Atmosphere
GJM/GQM/GR3/GRJ/GRM Series 03/15/18/21/31 sizes	350°C max.	150°C min.	$\Delta T \leq 190^\circ\text{C}$	Air
GRJ/GRM Series 32/43/55 sizes GQM Series 22 size	280°C max.	150°C min.	$\Delta T \leq 130^\circ\text{C}$	Air

*Applicable for both Pb-Sn and Lead Free Solder.

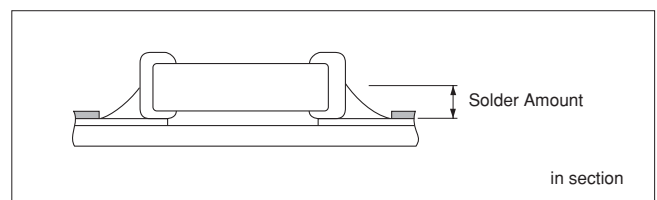
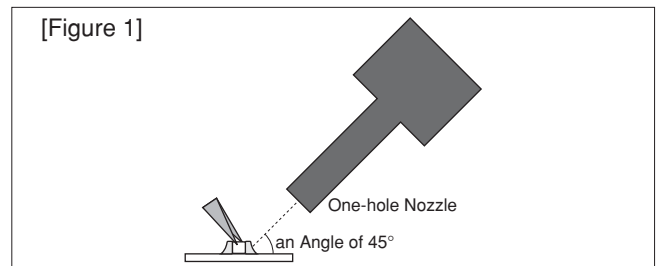
Pb-Sn Solder: Sn-37Pb

Lead Free Solder: Sn-3.0Ag-0.5Cu

Table 4

Distance	5mm or more
Hot Air Application Angle	45° *Figure 1
Hot Air Temperature Nozzle Outlet	400°C max.
Application Time	Less than 10 seconds (1206 (3216 in mm) size or smaller)
	Less than 30 seconds (1210 (3225 in mm) size or larger)

[Figure 1]



⚠Caution

Continued from the preceding page.

- 3-2. A soldering iron with a tip of $\phi 3\text{mm}$ or smaller should be used. It is also necessary to keep the soldering iron from touching the components during the re-work.
- 3-3. Solder wire with $\phi 0.5\text{mm}$ or smaller is required for soldering.

<Applicable to KR3/KRM Series>

4. For the shape of the soldering iron tip, refer to the figure on the right.

Regarding the type of solder, use a wire diameter of $\phi 0.5\text{mm}$ or less (rosin core wire solder).

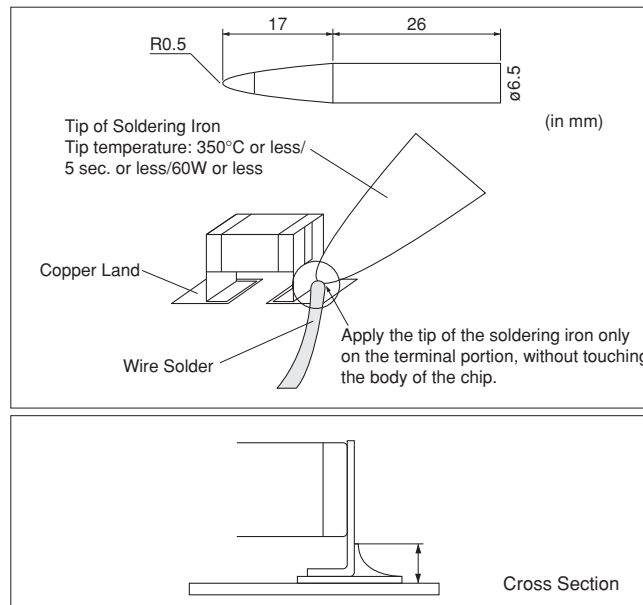
4-1. How to Apply the Soldering Iron

Apply the tip of the soldering iron against the lower end of the metal terminal.

- 1) In order to prevent cracking caused by sudden heating of the ceramic device, do not touch the ceramic base directly.
- 2) In order to prevent deviations and dislocating of the chip, do not touch the junction of the chip and the metal terminal, and the metal portion on the outside directly.

4-2. Appropriate Amount of Solder

The amount of solder for corrections by soldering iron, should be lower than the height of the lower side of the chip.



5. Washing

Excessive ultrasonic oscillation during cleaning can cause the PCBs to resonate, resulting in cracked chips or broken solder joints. Take note not to vibrate PCBs.

6. Electrical Test on Printed Circuit Board

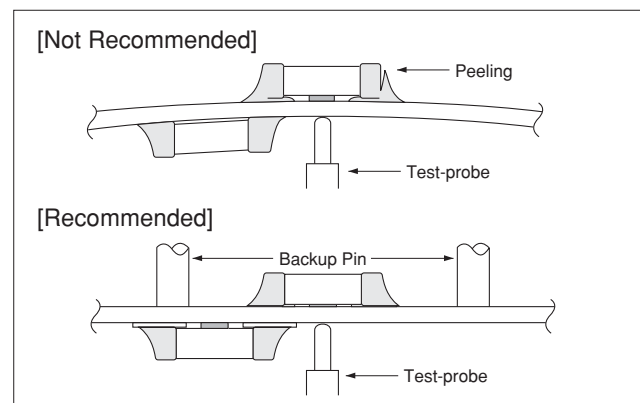
1. Confirm position of the backup pin or specific jig, when inspecting the electrical performance of a capacitor after mounting on the printed circuit board.

- 1-1. Avoid bending the printed circuit board by the pressure of a test-probe, etc.

The thrusting force of the test probe can flex the PCB, resulting in cracked chips or open solder joints.

Provide backup pins on the back side of the PCB to prevent warping or flexing. Install backup pins as close to the test-probe as possible.

- 1-2. Avoid vibration of the board by shock when a test-probe contacts a printed circuit board.



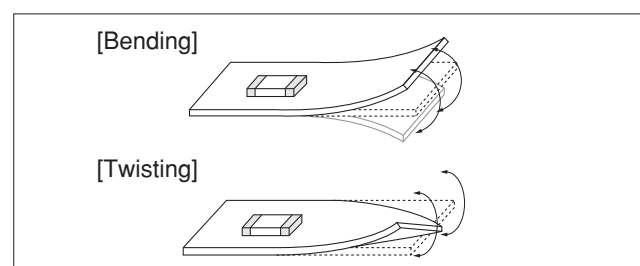
7. Printed Circuit Board Cropping

1. After mounting a capacitor on a printed circuit board, do not apply any stress to the capacitor that causes bending or twisting the board.

- 1-1. In cropping the board, the stress as shown at right may cause the capacitor to crack.

Cracked capacitors may cause deterioration of the insulation resistance, and result in a short.

Avoid this type of stress to a capacitor.



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2. Check the cropping method for the printed circuit board in advance.

2-1. Printed circuit board cropping shall be carried out by using a jig or an apparatus (Disk separator, router type separator, etc.) to prevent the mechanical stress that can occur to the board.

Board Separation Method	Hand Separation Nipper Separation	(1) Board Separation Jig	Board Separation Apparatus	
			(2) Disk Separator	(3) Router Type Separator
Level of stress on board	High	Medium	Medium	Low
Recommended	×	△*	△*	○
Notes	Hand and nipper separation apply a high level of stress. Use another method.	- Board handling - Board bending direction - Layout of capacitors	- Board handling - Layout of slits - Design of V groove - Arrangement of blades - Controlling blade life	Board handling

* When a board separation jig or disk separator is used, if the following precautions are not observed, a large board deflection stress will occur and the capacitors may crack. Use router type separator if at all possible.

(1) Example of a suitable jig

[In the case of Single-side Mounting]

An outline of the board separation jig is shown as follows. Recommended example: Stress on the component mounting position can be minimized by holding the portion close to the jig, and bend in the direction towards the side where the capacitors are mounted. Not recommended example: The risk of cracks occurring in the capacitors increases due to large stress being applied to the component mounting position, if the portion away from the jig is held and bent in the direction opposite the side where the capacitors are mounted.

[Outline of Jig]



Recommended	Not Recommended

[In the case of Double-sided Mounting]

Since components are mounted on both sides of the board, the risk of cracks occurring can not be avoided with the above method.

Therefore, implement the following measures to prevent stress from being applied to the components.
(Measures)

- (1) Consider introducing a router type separator.
If it is difficult to introduce a router type separator, implement the following measures. (Refer to item 1. Mounting Position)
- (2) Mount the components parallel to the board separation surface.
- (3) When mounting components near the board separation point, add slits in the separation position near the component.
- (4) Keep the mounting position of the components away from the board separation point.

⚠Caution

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(2) Example of a Disk Separator

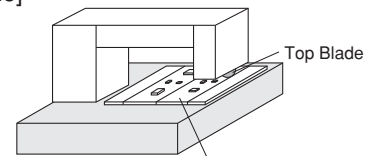
An outline of a disk separator is shown as follows.
 As shown in the Principle of Operation, the top blade and bottom blade are aligned with the V-grooves on the printed circuit board to separate the board.

In the following case, board deflection stress will be applied and cause cracks in the capacitors.

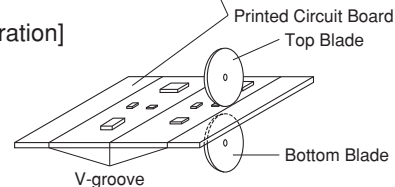
- (1) When the adjustment of the top and bottom blades are misaligned, such as deviating in the top-bottom, left-right or front-rear directions
- (2) The angle of the V groove is too low, depth of the V groove is too shallow, or the V groove is misaligned top-bottom

IF V groove is too deep, it is possible to brake when you handle and carry it. Carefully design depth of the V groove with consideration about strength of material of the printed circuit board.

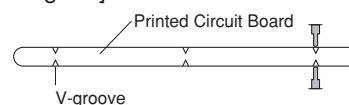
[Outline of Machine]

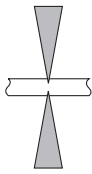
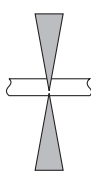
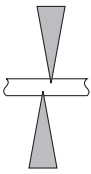


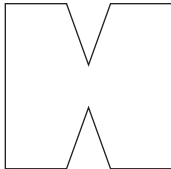
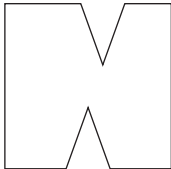
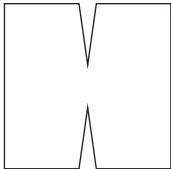
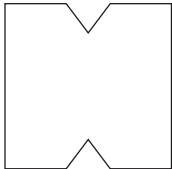
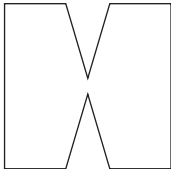
[Principle of Operation]



[Cross-section Diagram]



Recommended	Not Recommended		
	Top-bottom Misalignment	Left-right Misalignment	Front-rear Misalignment
 Top Blade Bottom Blade	 Top Blade Bottom Blade	 Top Blade Bottom Blade	 Top Blade Bottom Blade

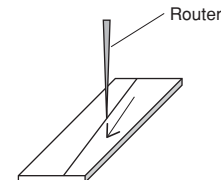
Example of Recommended V-groove Design	Not Recommended			
	Left-right Misalignment	Low-Angle	Depth too Shallow	Depth too Deep
				

(3) Example of Router Type Separator

The router type separator performs cutting by a router rotating at a high speed. Since the board does not bend in the cutting process, stress on the board can be suppressed during board separation.

When attaching or removing boards to/from the router type separator, carefully handle the boards to prevent bending.

[Outline Drawing]



Continued on the following page. ↗

Continued from the preceding page.

8. Assembly

1. Handling

If a board mounted with capacitors is held with one hand, the board may bend. Firmly hold the edges of the board with both hands when handling.

If a board mounted with capacitors is dropped, cracks may occur in the capacitors.

Do not use dropped boards, as there is a possibility that the quality of the capacitors may be impaired.

2. Attachment of Other Components

2-1. Mounting of Other Components

Pay attention to the following items, when mounting other components on the back side of the board after capacitors have been mounted on the opposite side. When the bottom dead point of the suction nozzle is set too low, board deflection stress may be applied to the capacitors on the back side (bottom side), and cracks may occur in the capacitors.

- After the board is straightened, set the bottom dead point of the nozzle on the upper surface of the board.
- Periodically check and adjust the bottom dead point.



2-2. Inserting Components with Leads into Boards

When inserting components (transformers, IC, etc.) into boards, bending the board may cause cracks in the capacitors or cracks in the solder.

Pay attention to the following.

- Increase the size of the holes to insert the leads, to reduce the stress on the board during insertion.
- Fix the board with backup pins or a dedicated jig before insertion.
- Support below the board so that the board does not bend. When using multiple backup pins on the board, periodically confirm that there is no difference in the height of each backup pin.



2-3. Attaching/Removing Sockets

When the board itself is a connector, the board may bend when a socket is attached or removed. Plan the work so that the board does not bend when a socket is attached or removed.



2-4. Tightening Screws

The board may be bent, when tightening screws, etc. during the attachment of the board to a shield or chassis.

Pay attention to the following items before performing the work.

- Plan the work to prevent the board from bending.
- Use a torque screwdriver, to prevent over-tightening of the screws.
- The board may bend after mounting by reflow soldering, etc. Please note, as stress may be applied to the chips by forcibly flattening the board when tightening the screws.



Continued on the following page. ➤

⚠Caution

☐ Continued from the preceding page.

<Applicable to GMA or GMD Series>

9. Die Bonding/Wire Bonding

1. Die Bonding of Capacitors

1-1. Use the following materials for the Brazing alloys:

Au-Sn (80/20) 300 to 320 °C in N₂ atmosphere

1-2. Mounting

- (1) Control the temperature of the substrate so it matches the temperature of the brazing alloy.
- (2) Place the brazing alloy on the substrate and place the capacitor on the alloy. Hold the capacitor and gently apply the load. Be sure to complete the operation within 1 minute.

2. Wire Bonding

2-1. Wire

Gold wire: 25 micro m (0.001 inch) diameter

2-2. Bonding

- (1) Thermo compression, ultrasonic ball bonding.
- (2) Required stage temperature: 150 to 200 °C
- (3) Required wedge or capillary weight: 0.2N to 0.5N
- (4) Bond the capacitor and base substrate or other devices with gold wire.

■ Other

1. Under Operation of Equipment

- 1-1. Do not touch a capacitor directly with bare hands during operation in order to avoid the danger of an electric shock.
- 1-2. Do not allow the terminals of a capacitor to come in contact with any conductive objects (short-circuit). Do not expose a capacitor to a conductive liquid, including any acid or alkali solutions.
- 1-3. Confirm the environment in which the equipment will operate is under the specified conditions. Do not use the equipment under the following environments.
 - (1) Being spattered with water or oil.
 - (2) Being exposed to direct sunlight.
 - (3) Being exposed to ozone, ultraviolet rays, or radiation.
 - (4) Being exposed to toxic gas (e.g., hydrogen sulfide, sulfur dioxide, chlorine, ammonia gas, etc.)
 - (5) Any vibrations or mechanical shocks exceeding the specified limits.
 - (6) Moisture condensing environments.
- 1-4. Use damp proof countermeasures if using under any conditions that can cause condensation.

2. Other

2-1. In an Emergency

- (1) If the equipment should generate smoke, fire, or smell, immediately turn off or unplug the equipment. If the equipment is not turned off or unplugged, the hazards may be worsened by supplying continuous power.
- (2) In this type of situation, do not allow face and hands to come in contact with the capacitor or burns may be caused by the capacitor's high temperature.

2-2. Disposal of Waste

When capacitors are disposed of, they must be burned or buried by an industrial waste vendor with the appropriate licenses.

2-3. Circuit Design

(1) Addition of Fail Safe Function

Capacitors that are cracked by dropping or bending of the board may cause deterioration of the insulation resistance, and result in a short. If the circuit being used may cause an electrical shock, smoke or fire when a capacitor is shorted, be sure to install fail-safe functions, such as a fuse, to prevent secondary accidents.

- (2) Capacitors used to prevent electromagnetic interference in the primary AC side circuit, or as a connection/insulation, must be a safety standard certified product, or satisfy the contents stipulated in the Electrical Appliance and Material Safety Law. Install a fuse for each line in case of a short.
- (3) The GJM, GMA, GMD, GQM, GR3, GRJ, GRM, KR3, KRM, LLA, LLL, LLM and LLR series are not safety standard certified products.

2-4. Remarks

Failure to follow the cautions may result, worst case, in a short circuit and smoking when the product is used.

The above notices are for standard applications and conditions. Contact us when the products are used in special mounting conditions.

Select optimum conditions for operation as they determine the reliability of the product after assembly. The data herein are given in typical values, not guaranteed ratings.

■ Rating

1. Operating Temperature

1. The operating temperature limit depends on the capacitor.

- 1-1. Do not apply temperatures exceeding the upper operating temperature.

It is necessary to select a capacitor with a suitable rated temperature that will cover the operating temperature range.

It is also necessary to consider the temperature distribution in equipment and the seasonal temperature variable factor.

- 1-2. Consider the self-heating factor of the capacitor.

The surface temperature of the capacitor shall be the upper operating temperature or less when including the self-heating factors.

2. Atmosphere Surroundings (gaseous and liquid)

1. Restriction on the operating environment of capacitors.

- 1-1. Capacitors, when used in the above, unsuitable,

operating environments may deteriorate due to the corrosion of the terminations and the penetration of moisture into the capacitor.

- 1-2. The same phenomenon as the above may occur when the electrodes or terminals of the capacitor are subject to moisture condensation.

- 1-3. The deterioration of characteristics and insulation resistance due to the oxidization or corrosion of terminal electrodes may result in breakdown when the capacitor is exposed to corrosive or volatile gases or solvents for long periods of time.

3. Piezo-electric Phenomenon

1. When using high dielectric constant type capacitors in AC or pulse circuits, the capacitor itself vibrates at specific frequencies and noise may be generated. Moreover, when the mechanical vibration or shock is added to the capacitor, noise may occur.

■ Soldering and Mounting

1. PCB Design

1. Notice for Pattern Forms

- 1-1. Unlike leaded components, chip components are susceptible to flexing stresses since they are mounted directly on the substrate. They are also more sensitive to mechanical and thermal stresses than leaded components. Excess solder fillet height can multiply these stresses and cause chip cracking. When designing substrates, take land patterns and dimensions into consideration to eliminate the possibility of excess solder fillet height.

- 1-2. There is a possibility of chip cracking caused by PCB expansion/contraction with heat, because stress on a chip is different depending on PCB material and structure. When the thermal expansion coefficient greatly differs between the board used for mounting and the chip, it will cause cracking of the chip due to the thermal expansion and contraction. When capacitors are mounted on a fluorine resin printed circuit board or on a single-layered glass epoxy board, it may also cause cracking of the chip for the same reason.

Pattern Forms

	Prohibited	Correct
Placing Close to Chassis		
Placing of Chip Components and Leaded Components		
Placing of Leaded Components after Chip Component		
Lateral Mounting		

Continued on the following page. ➤

Notice

Continued from the preceding page.

2. Land Dimensions

- 2-1. Chip capacitors can be cracked due to the stress of PCB bending, etc. if the land area is larger than needed and has an excess amount of solder. Please refer to the land dimensions in table 1 for flow soldering, table 2 for reflow soldering, table 3 for reflow soldering for LLA Series, table 4 for reflow soldering for LLM Series. Please confirm the suitable land dimension by evaluating of the actual SET / PCB.



Table 1 Flow Soldering Method

Part Number	Dimensions	Chip (L×W)	a	b	c
GQM/GR3/GRJ/GRM Series 18 size		1.6×0.8	0.6 to 1.0	0.8 to 0.9	0.6 to 0.8
GQM/GR3/GRJ/GRM Series 21 size		2.0×1.25	1.0 to 1.2	0.9 to 1.0	0.8 to 1.1
GR3/GRJ/GRM Series 31 size		3.2×1.6	2.2 to 2.6	1.0 to 1.1	1.0 to 1.4
LLL Series 21 size		1.25×2.0	0.4 to 0.7	0.5 to 0.7	1.4 to 1.8
LLL Series 31 size		1.6×3.2	0.6 to 1.0	0.8 to 0.9	2.6 to 2.8

Flow soldering can only be used for products with a chip size from 1.6x0.8mm to 3.2x1.6mm.

(in mm)

Table 2 Reflow Soldering Method

Part Number	Dimensions	Chip (L×W)	a	b	c
GJM/GRM Series 02 size		0.4×0.2	0.16 to 0.2	0.12 to 0.18	0.2 to 0.23
GJM/GRM Series 03 size		0.6×0.3	0.2 to 0.3	0.2 to 0.35	0.2 to 0.4
GJM/GRM Series 15 size		1.0×0.5 (within ±0.10)	0.3 to 0.5	0.35 to 0.45	0.4 to 0.6
		1.0×0.5 (±0.15/±0.20)	0.4 to 0.6	0.4 to 0.5	0.5 to 0.7
GQM/GR3/GRJ/GRM Series 18 size		1.6×0.8 (within ±0.10)	0.6 to 0.8	0.6 to 0.7	0.6 to 0.8
		1.6×0.8 (±0.15/±0.20)	0.7 to 0.9	0.7 to 0.8	0.8 to 1.0
GQM Series 21 size		2.0×1.25	1.0 to 1.2	0.6 to 0.7	0.8 to 1.1
GR3/GRJ/GRM Series 21 size		2.0×1.25 (within ±0.10)	1.2	0.6	1.25
		2.0×1.25 (±0.15)	1.2	0.6 to 0.8	1.2 to 1.4
		2.0×1.25 (±0.20)	1.0 to 1.4	0.6 to 0.8	1.2 to 1.4
GR3/GRJ/GRM Series 31 size		3.2×1.6 (within ±0.20)	1.8 to 2.0	0.9 to 1.2	1.5 to 1.7
		3.2×1.6 (±0.30)	1.9 to 2.1	1.0 to 1.3	1.7 to 1.9
GR3/GRJ/GRM Series 32 size		3.2×2.5	2.0 to 2.4	1.0 to 1.2	1.8 to 2.3
GR3/GRJ/GRM Series 43 size		4.5×3.2	3.0 to 3.5	1.2 to 1.4	2.3 to 3.0
GR3/GRJ/GRM Series 55 size		5.7×5.0	4.0 to 4.6	1.4 to 1.6	3.5 to 4.8
LLL Series 15 size		0.5×1.0	0.15 to 0.2	0.2 to 0.25	0.7 to 1.0
LLL Series 1U size		0.6×1.0	0.20 to 0.25	0.25 to 0.35	0.7 to 1.0
LLL/LLR Series 18 size		0.8×1.6	0.2 to 0.3	0.3 to 0.4	1.4 to 1.6
LLL Series 21 size		1.25×2.0	0.4 to 0.5	0.4 to 0.5	1.4 to 1.8
LLL Series 31 size		1.6×3.2	0.6 to 0.8	0.6 to 0.7	2.6 to 2.8
GQM Series 22 size		2.8×2.8	2.2 to 2.5	0.8 to 1.0	1.9 to 2.3

(in mm)

<Applicable to Part Number KR3/KRM>

Part Number	Dimensions	Chip (L×W)	a	b	c
KRM Series 21 size		2.0×1.25	1.0 to 1.2	0.6 to 0.7	0.8 to 1.1
KRM Series 31 size		3.2×1.6	2.2 to 2.4	0.8 to 0.9	1.0 to 1.4
KR3/KRM Series 55 size		5.7×5.0	2.6	2.7	5.6

(in mm)

Continued on the following page. ➤

Continued from the preceding page.

[Land for LLA Series]



[Land for LLM Series]



Table 3 LLA Series Reflow Soldering Method

Part Number	Dimensions	Chip (L×W)	a	b	c	p
LLA Series 18 size		1.6×0.8	0.3 to 0.4	0.25 to 0.35	0.15 to 0.25	0.4
LLA Series 21 size		2.0×1.25	0.5 to 0.7	0.35 to 0.6	0.2 to 0.3	0.5
LLA Series 31 size		3.2×1.6	0.7 to 0.9	0.4 to 0.7	0.3 to 0.4	0.8

(in mm)

Table 4 LLM Series Reflow Soldering Method

Part Number	Dimensions	Chip (L×W)	a	b, b'	c, c'	d	e	f	p
LLM Series 21 size		2.0×1.25	0.6 to 0.8	(0.3 to 0.5)	0.3	2.0 to 2.6	1.3 to 1.8	1.4 to 1.6	0.5
LLM Series 31 size		3.2×1.6	1.0	(0.3 to 0.5)	0.4	3.2 to 3.6	1.6 to 2.0	2.6	0.8

$$b=(c-e)/2, b'=(d-f)/2$$

(in mm)

<Applicable to beyond Rated Voltage of 250VDC>

2-2. Dimensions of Slit (Example)

Preparing the slit helps flux cleaning and resin coating on the back of the capacitor.

However, the length of the slit design should be as short as possible to prevent mechanical damage in the capacitor.

A longer slit design might receive more severe mechanical stress from the PCB.

Recommended slit design is shown in the Table.



L×W	d	e
1.6×0.8	—	—
2.0×1.25	—	—
3.2×1.6	1.0 to 2.0	3.2 to 3.7
3.2×2.5	1.0 to 2.0	4.1 to 4.6
4.5×2.0	1.0 to 2.8	3.6 to 4.1
4.5×3.2	1.0 to 2.8	4.8 to 5.3
5.7×2.8	1.0 to 4.0	4.4 to 4.9
5.7×5.0	1.0 to 4.0	6.6 to 7.1

(in mm)

Continued on the following page. ➤

Notice

Continued from the preceding page.

3. Board Design

When designing the board, keep in mind that the amount of strain which occurs will increase depending on the size and material of the board.

[Relationship with amount of strain to the board thickness, length, width, etc.]

$$\epsilon = \frac{3PL}{2Ewh^2}$$

Relationship between load and strain

ϵ : Strain on center of board (μst)
 L : Distance between supporting points (mm)
 w : Board width (mm)
 h : Board thickness (mm)
 E : Elastic modulus of board ($\text{N/m}^2=\text{Pa}$)
 Y : Deflection (mm)
 P : Load (N)



When the load is constant, the following relationship can be established.

- As the distance between the supporting points (L) increases, the amount of strain also increases.
→Reduce the distance between the supporting points.
 - As the elastic modulus (E) decreases, the amount of strain increases.
→Increase the elastic modulus.
 - As the board width (w) decreases, the amount of strain increases.
→Increase the width of the board.
 - As the board thickness (h) decreases, the amount of strain increases.
→Increase the thickness of the board.
- Since the board thickness is squared, the effect on the amount of strain becomes even greater.

2. Adhesive Application

- Thin or insufficient adhesive can cause the chips to loosen or become disconnected during flow soldering. The amount of adhesive must be more than dimension c , shown in the drawing at right, to obtain the correct bonding strength.

The chip's electrode thickness and land thickness must also be taken into consideration.

- Low viscosity adhesive can cause chips to slip after mounting. The adhesive must have a viscosity of $5000\text{Pa} \cdot \text{s}$ (500ps) min. (at 25°C).

3. Adhesive Coverage

Size (L×W) (in mm)	Adhesive Coverage*
1.6×0.8	0.05mg min.
2.0×1.25	0.1mg min.
3.2×1.6	0.15mg min.

*Nominal Value



3. Adhesive Curing

- Insufficient curing of the adhesive can cause chips to disconnect during flow soldering and causes deterioration in the insulation resistance between the outer electrodes due to moisture absorption. Control curing temperature and time in order to prevent insufficient hardening.

Continued on the following page. ➤

☐ Continued from the preceding page.

4. Flux for Reflow and Flow Soldering

1. An excessive amount of flux generates a large quantity of flux gas, which can cause a deterioration of solder ability, so apply flux thinly and evenly throughout. (A foaming system is generally used for flow soldering.)
2. Flux containing too high a percentage of halide may cause corrosion of the outer electrodes unless there is sufficient cleaning. Use flux with a halide content of 0.1% max.

3. Do not use strong acidic flux.

4. Do not use water-soluble flux.*

(*Water-soluble flux can be defined as non-rosin type flux including wash-type flux and non-wash-type flux.)

5. Flow Soldering

- Set temperature and time to ensure that leaching of the outer electrode does not exceed 25% of the chip end area as a single chip (full length of the edge A-B-C-D shown at right) and 25% of the length A-B shown as mounted on substrate.

[As a Single Chip]



[As Mounted on Substrate]



6. Washing

1. Please evaluate the capacitor using actual cleaning equipment and conditions to confirm the quality, and select the solvent for cleaning.
2. Unsuitable cleaning solvent may leave residual flux or other foreign substances, causing deterioration of electrical characteristics and the reliability of the capacitors.

3. Select the proper cleaning conditions.

3-1. Improper cleaning conditions (excessive or insufficient) may result in deterioration of the performance of the capacitors.

7. Coating

1. A crack may be caused in the capacitor due to the stress of the thermal contraction of the resin during curing process.
The stress is affected by the amount of resin and curing contraction.
Select a resin with low curing contraction.
The difference in the thermal expansion coefficient between a coating resin or a molding resin and the capacitor may cause the destruction and deterioration of the capacitor such as a crack or peeling, and lead to the deterioration of insulation resistance or dielectric breakdown.
Select a resin for which the thermal expansion coefficient is as close to that of the capacitor as possible.
A silicone resin can be used as an under-coating to buffer against the stress.

2. Select a resin that is less hygroscopic.

Using hygroscopic resins under high humidity conditions may cause the deterioration of the insulation resistance of a capacitor.

An epoxy resin can be used as a less hygroscopic resin.

Continued on the following page. ☐

Notice

Continued from the preceding page.

■ Other

1. Transportation

1. The performance of a capacitor may be affected by the conditions during transportation.
 - 1-1. The capacitors shall be protected against excessive temperature, humidity, and mechanical force during transportation.
 - (1) Climatic condition
 - low air temperature: -40°C
 - change of temperature air/air: -25°C/+25°C
 - low air pressure: 30 kPa
 - change of air pressure: 6 kPa/min.
 - (2) Mechanical condition

Transportation shall be done in such a way that the boxes are not deformed and forces are not directly passed on to the inner packaging.
 - 1-2. Do not apply excessive vibration, shock, or pressure to the capacitor.
 - (1) When excessive mechanical shock or pressure is applied to a capacitor, chipping or cracking may occur in the ceramic body of the capacitor.
 - (2) When the sharp edge of an air driver, a soldering iron, tweezers, a chassis, etc. impacts strongly on the surface of the capacitor, the capacitor may crack and short-circuit.
 - 1-3. Do not use a capacitor to which excessive shock was applied by dropping, etc.
 A capacitor dropped accidentally during processing may be damaged.

2. Characteristics Evaluation in the Actual System

1. Evaluate the capacitor in the actual system, to confirm that there is no problem with the performance and specification values in a finished product before using.
2. Since a voltage dependency and temperature dependency exists in the capacitance of high dielectric type ceramic capacitors, the capacitance may change depending on the operating conditions in the actual system. Therefore, be sure to evaluate the various characteristics, such as the leakage current and noise absorptivity, which will affect the capacitance value of the capacitor.
3. In addition, voltages exceeding the predetermined surge may be applied to the capacitor by the inductance in the actual system. Evaluate the surge resistance in the actual system as required.

Qualified Standards

The products listed here have been produced by ISO 9001 certified factory.

Plant
Fukui Murata Mfg. Co., Ltd.
Izumo Murata Mfg. Co., Ltd.
Okayama Murata Mfg. Co., Ltd.
Murata Electronics Singapore (Pte.) Ltd.
Beijing Murata Electronics Co., Ltd.
Wuxi Murata Electronics Co., Ltd.

MEMO

[illegible]

Design assistant tool: SimSurfing

SimSurfing

MLCC is now available !

Design assistant tool "SimSurfing" has been updated and you can now find and view any kind of characteristics of MLCCs.

Available function for MLCCs:

- ① Products search
- ② View frequency characteristics (S parameters, Z, R, X, Q, DF, L, C)
DC bias can be applied to available part number.
- ③ DC voltage bias characteristics (absolute capacitance/change rate)
- ④ Temperature characteristics (absolute capacitance/change rate)
- ⑤ AC voltage bias characteristics (absolute capacitance/change rate)
- ⑥ Download SPICE netlist/S parameter



If you register members only engineers portal site "my Murata", you can use the Enhanced SimSurfing.

Member Registration
<https://my.murata.com/>

1 Select the Products

- (1) By part number
- (2) By specification

2 View characteristics

By clicking buttons in this area with part number selected, you can view any electrical characteristics chart.

3 Data download

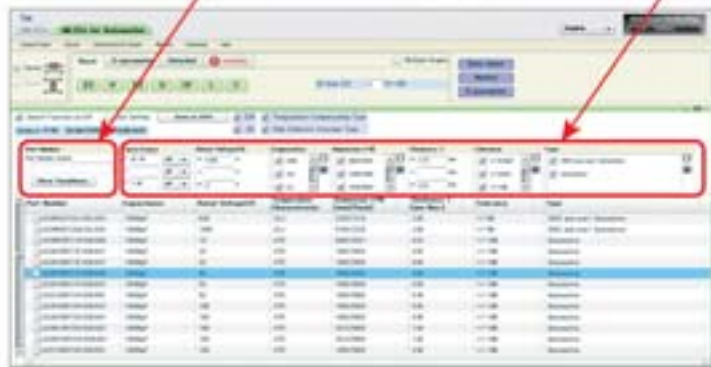
You can download SPICE netlist and S parameter files (S2P)

1

(1) Search by part number

1

(2) Search by specification



Added the capacitor finder tool for middle and high voltage capacitor which are capable for specified voltage waveform.

These images are captured at August/2014. Be sure that this software will be updated frequently.

<http://ds.murata.com/software/simsurfing/en-us/mlcc/>

Capacitor Website Introduction

muRata

Search for Capacitors

Global

Murata capacitors can be searched.

1 Search by part number

2 Search by specifications

3 Search by features

4 Search in the lineups

5 Cross reference

1 Search by part number <http://psearch.murata.com/capacitor/partnumber/>

The applicable capacitors can be searched by alphanumeric characters. Although the alternative symbol "#" is used for the package specification code, you can also enter the full package specification code to search the part number including the package specification code.

2 Search by specifications <http://psearch.murata.com/capacitor/spec/>

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

Basic specifications

Applicable products can be searched by any value and specified range. To support the entry, the minimum and maximum values of the product applicable to the conditions selected in the other items will be displayed.

Add detailed specifications

Setting the conditions particular to the SMD, mold and lead, enables you to search the product with a more detailed specification.

3 Search by features <http://psearch.murata.com/capacitor/feature/>

The applicable capacitors can be searched by the Shape, Maximum operating temperature, Applications, Benefits, and Mounting.

Select the conditions of the following items to search for a product.

- "Shape"
- "Maximum operating temperature"
- "Applications"
- "Benefits"
- "Mounting"

4 Search in the lineups <http://psearch.murata.com/capacitor/lineup/>

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

The features and applications of the series can also be checked in the Series page.

Capacitance chart in Series page



5 Cross reference <http://cross-reference.murata.com/capacitor/crossreference/index.cfm>

The screenshot shows the cross-reference search form. It includes a search bar, a 'Search' button, and a text input field for entering a competitor's part number.

The Murata part number applicable to the assumed specification can be searched by the competitor's part number of the 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 current narrowed down 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.

Global Locations

For details please visit www.murata.com



⚠ Note

1 Export Control

For customers outside Japan:

No Murata products should be used or sold, through any channels, for use in the design, development, production, utilization, maintenance or operation of, or otherwise contribution to (1) any weapons (Weapons of Mass Destruction [nuclear, chemical or biological weapons or missiles] or conventional weapons) or (2) goods or systems specially designed or intended for military end-use or utilization by military end-users.

For customers in Japan:

For products which are controlled items subject to the "Foreign Exchange and Foreign Trade Law" of Japan, the export license specified by the law is required for export.

2 Please contact our sales representatives or product engineers before using the products in this catalog for the applications listed below, which require especially high reliability for the prevention of defects which might directly damage a third party's life, body or property, or when one of our products is intended for use in applications other than those specified in this catalog.

- ① Aircraft equipment
- ② Aerospace equipment
- ③ Undersea equipment
- ④ Power plant equipment
- ⑤ Medical equipment
- ⑥ Transportation equipment (vehicles, trains, ships, etc.)
- ⑦ Traffic signal equipment
- ⑧ Disaster prevention / crime prevention equipment
- ⑨ Data-processing equipment
- ⑩ Application of similar complexity and/or reliability requirements to the applications listed above

3 Product specifications in this catalog are as of August 2014. They are subject to change or our products in it may be discontinued without advance notice. Please check with our sales representatives or product engineers before ordering. If there are any questions, please contact our sales representatives or product engineers.

4 Please read rating and ⚠CAUTION (for storage, operating, rating, soldering, mounting and handling) in this catalog to prevent smoking and/or burning, etc.

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

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

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

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