



Chip Multilayer Ceramic Capacitors for Automotive



2019

EU RoHS Compliant

- All the products in this catalog comply with EU RoHS.
- EU RoHS is "the European Directive 2011/65/EU on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment."
- For more details, please refer to our web page, "Murata's Approach for EU RoHS" (<https://www.murata.com/en-eu/support/compliance/rohs>).

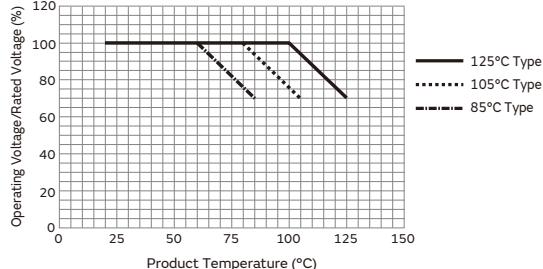
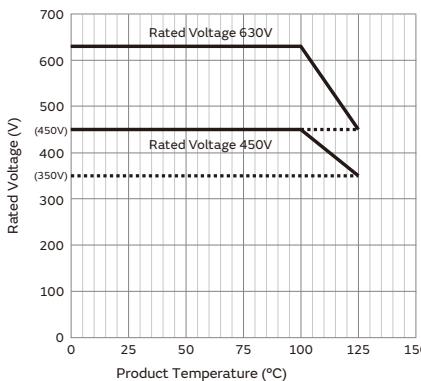
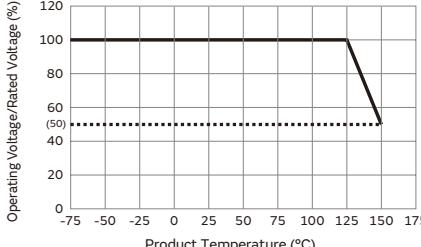
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Please check the MURATA website (<https://www.murata.com/>) if you cannot find a part number in this catalog.

Explanation of Symbols in This Catalog

WEB	Links are provided to the latest information from the PDF version of the catalog, which is available on the web.
General	For applications that do not require the particular reliability such as the general equipment
Info-tainment	Infotainment for Automotive The product for entertainment equipment like car navigations, car audios, and body control equipment like wipers, power windows.
Power-train	Powertrain/Safety for Automotive Product used for applications (running, turning, stopping and safety devices) which particularly concern human life, such as in devices for automobiles.
Medical Device	Medical-grade products for Implanted Medical Devices These products are intended for use in implanted medical devices such as cardiac pacemakers, cochlear implants, insulin pumps and gastric electrostimulators. They are suitable for use in non-critical circuits. *1 *1 Non-critical circuits This term refers to circuits in implanted medical devices that are not directly linked to life support, i.e. circuits that will not directly endanger the life of the patient should the functionality of the device be reduced or halted by failure of the circuit.
AEC-Q200	AEC-Q200 compliant product
Safety standard	Safety Standard Certified Product Products that acquired safety standard certification IEC60384-14 and products based on the Electrical Appliance and Material Safety Law of Japan.
High Q	Low dissipation for high frequency By devising ceramic materials and electrode materials, low dissipation is achieved in frequency bands of VHF, UHF and microwave or beyond.
Low ESL	Low inductance This capacitor is designed so that the parasitic inductance component (ESL) that the capacitor has on the high frequency side becomes lower.
Fail safe	Fail safe product This capacitor is designed to prevent failures as much as possible by short mode.
Deflecting crack	Product resistant to deflection cracking This capacitor is designed to prevent failures as much as possible by short mode caused by cracking when there is board deflection.
Soldering crack	Product with solder cracking suppression This capacitor is configured with metal terminals and leads connected to the chip. The metal terminals and leads relieve the stress from expansion and contraction of the solder, to suppress solder cracking.
Anti-noise	Product suitable for acoustic noise reduction and low distortion This product suppresses acoustic noise, which occurs when a ceramic capacitor is used, by devising the materials and configuration.
Effective Cap	No DC bias characteristics Polymer capacitor is no capacitance change with DC bias due to aluminum oxidized film for dielectric.
EMI Filter	Low-inductance product suitable for noise suppression. This product has extremely low ESL and is suitable for suppression of noise, including high frequencies. This product can also be used as a low-ESL, high-performance bypass capacitor.
Limited to conductive glue mounting	Limited to Conductive Glue Mounting Since silver palladium is used for the external electrodes, the capacitor can be mounted by conductive adhesive.
D1 Derating 1	Derating 1 This product is suitable when a voltage continuously applied to a capacitor in an operating circuit, is used below (derated) the rated voltage of the capacitor. This model guarantees the test conditions in the endurance test, at a rated voltage $\times 100\%$ at the maximum operating temperature. A reliability assurance level equivalent to a common product can be secured, by using this product within the voltage and temperature derated conditions recommended in the figure below. Recommended Conditions of the Derating Operating Voltage and Temperature
	
D2 Derating 2	Derating 2 When the product temperature exceeds 105°C, please use this product within the voltage and temperature derated conditions in the figure below.
	
D3 Derating 3	Derating 3 Please apply the derating curve according to the operating temperature. Please refer to detailed specifications sheet for details.
	Derating 4 When the product temperature exceeds 125°C, please use this product within the voltage and temperature derated conditions in the figure below.
D4 Derating 4	
D5 Derating 5	Derating 5 Please apply the rated voltage derating over 150°C. Please refer to detailed specifications sheet for details.

Selection Guide for Capacitors

Infotainment for automotive	
Info-tainment	SMD
AEC-Q200	Solder mounting
	Chip type
	GRT
	p29

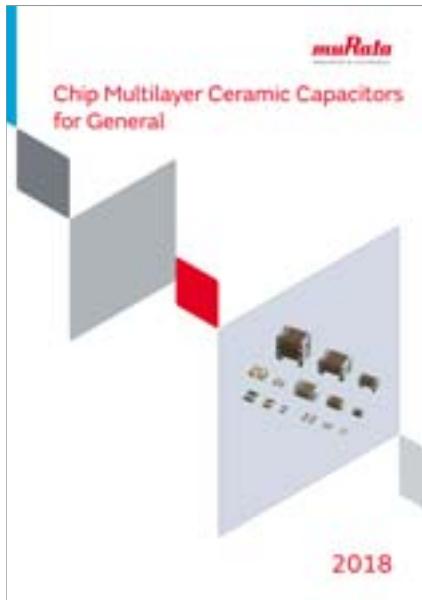
Powertrain/Safety for automotive	
Power-train	SMD
AEC-Q200	Solder mounting
	Chip type
	GCM
	p36
	GC3 Anti-noise
	High effective capacitance & high ripple current
	p43
	GCJ Fall safe Deflecting crack
	Soft termination
	p45
	GCQ High Q
	p50
	GCD Fall safe Deflecting crack
	MLSC design
	p56
	GCE Fall safe Deflecting crack
	Soft termination MLSC design
	p58
	NFM Low ESL EMI Filter
	3 terminals
	p60
	Metal terminal type
	KCM Anti-noise Deflecting crack Soldering crack
	p63
	KC3 Anti-noise Deflecting crack Soldering crack
	High effective capacitance & high ripple current
	p67
	KCA Safety standard Anti-noise Deflecting crack Soldering crack
	p70
Limited to Conductive Glue Mounting	
Limited to conductive glue mounting	Chip type
	GCB Deflecting crack Soldering crack
	Ni plating + Pd plating termination conductive glue mounting
	GCG Deflecting crack Soldering crack
	AgPd termination conductive glue mounting
	p73
Lead type	
	Solder mounting
	RCE Anti-noise Deflecting crack Soldering crack
	RHE Anti-noise Deflecting crack Soldering crack
	150°C operation leaded
	RHS Anti-noise Deflecting crack Soldering crack
	200°C operation leaded
	DE6 Safety standard

Medical-grade products for implanted medical devices	
Medical Device	SMD
	Solder mounting
	Chip type
	GCH
	WEB

For general	
General	SMD
	Solder mounting
	Chip type
	GRM
	WEB
	GRM
	For LCD backlight inverter circuit only
	GR3 Anti-noise
	High effective capacitance & high ripple current
	GRJ Deflecting crack
	Soft termination
	GR4
	For information devices only
	GR7
	For camera flash circuit only
	GJM High Q
	WEB
	GQM High Q
	High power
	GA2 Japanese Safety Standard
	Based on the Electrical Appliance and Material Safety Law of Japan
	GA3 Safety standard
	WEB
	LLL Low ESL
	LW reversed
	LLA Low ESL
	8 terminals
	LLM Low ESL
	10 terminals
	LLR Low ESL
	LW reversed controlled ESR
	NFM Low ESL EMI Filter
	3 terminals
	GJ4 Anti-noise
	Low distortion
	WEB
	On interposer board
	ZRA Anti-noise
	WEB
	ZRB Anti-noise
	WEB
	Metal terminal type
	KRM Anti-noise Deflecting crack Soldering crack
	WEB
	KR3 Anti-noise Deflecting crack Soldering crack
	High effective capacitance & high ripple current
	Resin molding SMD type
	DK1 Safety standard
	WEB
	Polymer Aluminum Electrolytic Capacitors
	ECAS Anti-noise Deflecting crack Effective Cap
	WEB
	ECNS Anti-noise Deflecting crack Effective Cap
	WEB
	Wire bonding mounting
Bonding	Chip type
	GMA Microchip
	WEB
	GMD
	WEB
	Lead type
	Solder mounting
	RDE Anti-noise Deflecting crack Soldering crack
	WEB
	DE1 Safety standard
	X1/Y1 Class certified product
	WEB
	DE2 Safety standard
	X1/Y2 Class certified product
	WEB

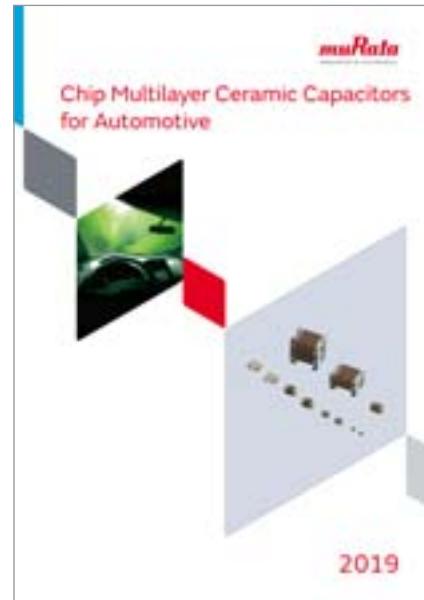
Catalog Information

Catalog relates to a multilayer ceramic capacitor is below.



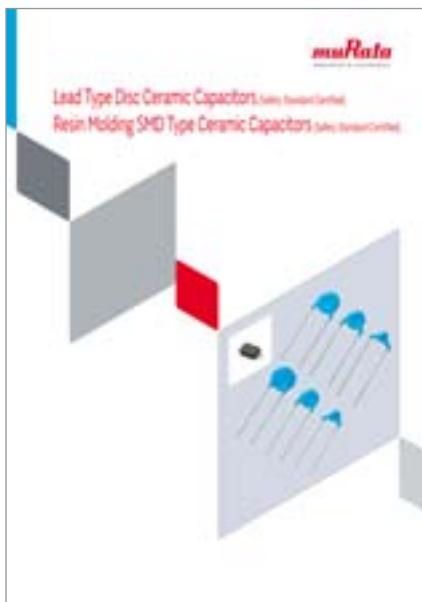
Chip Multilayer Ceramic Capacitors for General

Cat No. C02E-21



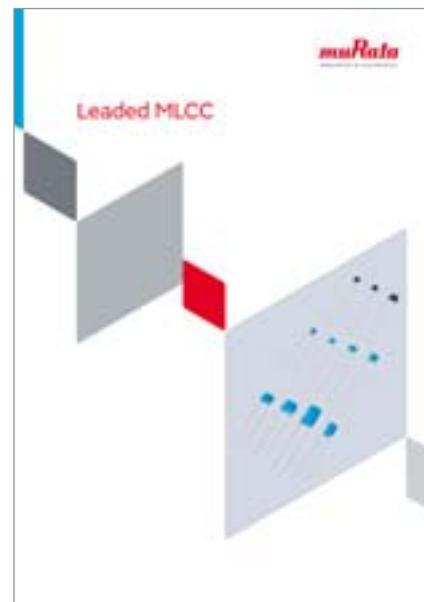
Chip Multilayer Ceramic Capacitors for Automotive

Cat No. C03E-10



Lead Type Disc Ceramic Capacitors (Safety Standard Certified) Resin Molding SMD Type Ceramic Capacitors (Safety Standard Certified)

Cat No. C85E-7



Leaded MLCC

Cat No. C49E-24

● Part Numbering

Chip Multilayer Ceramic Capacitors for Automotive



(Part Number)

GC	M	18	8	R7	1H	102	K	A37	D
①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩

① Product ID

② Series

Product ID	Code	Series
GC	3	High effective capacitance & High allowable ripple current
	D	Specially designed product to reduce shorts
	E	Specially designed product to reduce shorts & resin electrode product
	G	Limited to conductive glue mounting
	J	Soft termination type
	M	For automotive
	Q	High Q Chip Multilayer Ceramic Capacitors for Automotive
GR	T	Meet AEC-Q200 for infotainment
KC	3	Metal terminal type/High effective capacitance & High allowable ripple current
	A	Metal terminal type/ Safety standard certified product
	M	Metal terminal type

③ Chip Dimension (L x W)

Code	Dimension (L x W)	EIA
03	0.6 x 0.3mm	0201
15	1.0 x 0.5mm	0402
18	1.6 x 0.8mm	0603
21	2.0 x 1.25mm	0805
31	3.2 x 1.6mm	1206
32	3.2 x 2.5mm	1210
43	4.5 x 3.2mm	1812
55	5.7 x 5.0mm	2220

⑤ Temperature Characteristics

Temperature Characteristic Codes			Temperature Characteristics			Operating Temperature Range	Capacitance Change Each Temperature (%)						
Code	Public STD Code		Reference Temperature	Temperature Range	Capacitance Change or Temperature Coefficient		-55°C		*4		-10°C		
	Max.	Min.					Max.	Min.	Max.	Min.	Max.	Min.	
5C	COG	EIA	25°C	25 to 125°C	0±30ppm/°C	-55 to 125°C	0.58	-0.24	0.4	-0.17	0.25	-0.11	
5G	X8G	*2	25°C	25 to 150°C	0±30ppm/°C	-55 to 150°C	0.58	-0.24	0.4	-0.17	0.25	-0.11	
7U	U2J	EIA	25°C	25 to 125°C *3	-750±120ppm/°C	-55 to 125°C	8.78	5.04	6.04	3.47	3.84	2.21	
9E	ZLM	*2	20°C	-55 to -40°C	-4700+1000/-2500ppm/°C	-55 to 125°C	-	-	-	-	-	-	
				-40 to 20°C	-5350±750ppm/°C		-	-	-	-	-	-	
				20 to 85°C	-4700±500ppm/°C		-	-	-	-	-	-	
				85 to 125°C	-4700+2000/-1000ppm/°C		-	-	-	-	-	-	
C7	X7S	EIA	25°C	-55 to 125°C	±22%	-55 to 125°C	-	-	-	-	-	-	
C8	X6S	EIA	25°C	-55 to 105°C	±22%	-55 to 105°C	-	-	-	-	-	-	
D7	X7T	EIA	25°C	-55 to 125°C	+22%, -33%	-55 to 125°C	-	-	-	-	-	-	
L8	X8L	*2	25°C	-55 to 150°C	+15%, -40%	-55 to 150°C	-	-	-	-	-	-	
M8	X8M	*2	25°C	-55 to 150°C	+15%, -50%	-55 to 150°C	-	-	-	-	-	-	
R6	X5R	EIA	25°C	-55 to 85°C	±15%	-55 to 85°C	-	-	-	-	-	-	
R7	X7R	EIA	25°C	-55 to 125°C	±15%	-55 to 125°C	-	-	-	-	-	-	
R9	X8R	EIA	25°C	-55 to 150°C	±15%	-55 to 150°C	-	-	-	-	-	-	

*1 Capacitance change is specified with 50% rated voltage applied.

*2 Murata Temperature Characteristic Code.

*3 Rated Voltage 100Vdc max: 25 to 85°C

*4 -25°C (Reference Temperature 20°C) / -30°C (Reference Temperature 25°C)

Continued on the following page. ↗

(Part Number)

GC	M	18	8	R7	1H	102	K	A37	D
1	2	3	4	5	6	7	8	9	10

Continued from the preceding page. ↳

⑥ Rated Voltage

Code	Rated Voltage	
Standard Product	Voltage Derated Product	
OE	-	DC2.5V
OG	-	DC4V
OJ	EC	DC6.3V
1A	ED	DC10V
1C	EE	DC16V
1E	EF	DC25V
YA	EG	DC35V
1H	EH	DC50V
1J	-	DC63V
1K	-	DC80V
2A	EL	DC100V
2E	-	DC250V
2W	LP	DC450V
2J	LQ	DC630V
3A	-	DC1kV
MF	-	X1/Y2: AC250V (Safety Standard Certified Type MF)

⑧ Capacitance Tolerance

Code	Capacitance Tolerance
B	±0.1pF
C	±0.25pF
D	±0.5pF (Less than 10pF)
	±0.5% (10pF and over)
F	±1%
G	±2%
J	±5%
K	±10%
M	±20%
W	±0.05pF

⑨ Individual Specification Code

Expressed by three figures.

⑩ Package

Code	Package
L	ø180mm Embossed Taping
D/W	ø180mm Paper Taping
K	ø330mm Embossed Taping
J	ø330mm Paper Taping

⑦ Capacitance

Expressed by three-digit alphanumerics. The unit is pico-farad (pF). The first and second figures are significant digits, and the third figure expresses the number of zeros that follow the two numbers.

If there is a decimal point, it is expressed by the capital letter "R." In this case, all figures are significant digits.

If any letter, other than "R" is included, this indicates the specific part number is a non-standard part.

Ex.)	Code	Capacitance
	R50	0.50pF
	1R0	1.0pF
	100	10pF
	103	10000pF

Please contact us if you find any part number not provided in this table.

3 Terminal Low ESL Multilayer Ceramic Capacitors



(Part Number)

NF	M	3D	CC	102	R	1H	3	L
1	2	3	4	5	6	7	8	9

①Product ID ②Series

Product ID	Series	
NFM	3 Terminal Low ESL Type	

③Dimensions (LxW)

Code	Dimensions (LxW)	EIA
18	1.6x0.8mm	0603
21	2.0x1.25mm	0805
31	3.2x1.6mm	1206

④Features

Code	Features	
HC	Powertrain/Safety for Automotive	For Signal Lines / For Large Current
HK		For Very Large Current

⑤Capacitance

Expressed by three figures. The unit is in pico-farad (pF). The first and second figures are significant digits, and the third figure expresses the number of zeros that follow the two figures.

⑥Characteristics

Code	Capacitance Temperature Characteristics
C	±22%
R	±15%, +15/-18%

⑦Rated Voltage

Code	Rated Voltage
0J	6.3V
1A	10V
1C	16V
1H	50V
2A	100V

⑧Electrode

Code	Electrode
3	Sn Plating

⑨Packaging

Code	Packaging
L	Embossed Taping (ø180mm Reel)
D	Paper Taping (ø180mm Reel)

Please contact us if you find any part number not provided in this table.

Capacitance Table

How to read the Capacitance Table

L×W (mm)	0.6×0.3		1.0×	
T max. (mm)	0.33		0.5	
Rated Voltage (Vdc)	100	50	25	100
Cap. / TC Code	C0G	C0G	C0G	C0G
1.0pF	p30	p30	p30	p30
2.0pF	p30	p30	p30	p30
3.0pF	p30	p30	p30	p30
4.0pF	p30	p30	p30	p30
5.0pF	p30	p30	p30	p30

The values can be narrowed down in the order of size, rated voltage, and temperature characteristics.

Refers to the page of the part number list. Check the part number list for the applicable product number.

Temperature Characteristics Table

The Table is colored by temperature characteristic codes. Refer to the following Table for the meaning of each code.

Temperature Characteristic Codes		Temperature Characteristics			Operating Temperature Range	Capacitance Change Each Temperature (%)					
Public STD Code		Reference Temperature	Temperature Range	Capacitance Change or Temperature Coefficient		-55°C		*3		-10°C	
Code	Code	Value	Value	Value		Max.	Min.	Max.	Min.	Max.	Min.
C0G	EIA	25°C	25 to 125°C	0±30ppm/°C	-55 to 125°C	0.58	-0.24	0.4	-0.17	0.25	-0.11
X8G	*1	25°C	25 to 150°C	0±30ppm/°C	-55 to 150°C	0.58	-0.24	0.4	-0.17	0.25	-0.11
U2J	EIA	25°C	25 to 125°C *2	-750±120ppm/°C	-55 to 125°C	8.78	5.04	6.04	3.47	3.84	2.21
ZLM	*1	20°C	-55 to -40°C	-4700+1000/-2500ppm/°C	-55 to 125°C	-	-	-	-	-	-
			-40 to 20°C	-5350±750ppm/°C		-	-	-	-	-	-
			20 to 85°C	-4700±500ppm/°C		-	-	-	-	-	-
			85 to 125°C	-4700+2000/-1000ppm/°C		-	-	-	-	-	-
X7S	EIA	25°C	-55 to 125°C	±22%	-55 to 125°C	-	-	-	-	-	-
X6S	EIA	25°C	-55 to 105°C	±22%	-55 to 105°C	-	-	-	-	-	-
X7T	EIA	25°C	-55 to 125°C	+22%, -33%	-55 to 125°C	-	-	-	-	-	-
X8L	*1	25°C	-55 to 150°C	+15%, -40%	-55 to 150°C	-	-	-	-	-	-
X8M	*1	25°C	-55 to 150°C	+15%, -50%	-55 to 150°C	-	-	-	-	-	-
X5R	EIA	25°C	-55 to 85°C	±15%	-55 to 85°C	-	-	-	-	-	-
X7R	EIA	25°C	-55 to 125°C	±15%	-55 to 125°C	-	-	-	-	-	-
X8R	EIA	25°C	-55 to 150°C	±15%	-55 to 150°C	-	-	-	-	-	-

*1 Murata Temperature Characteristic Code.

*2 Rated Voltage 100Vdc max: 25 to 85°C

*3 -25°C (Reference Temperature 20°C) / -30°C (Reference Temperature 25°C)

Capacitance Table

p00 Each number in the Part Number List refers to the page number printed at the bottom of the page.

GRT Series Temperature Compensating Type

p00 ← Part Number List EIA: **COG**

L×W (mm)	0.6×0.3			1.0×0.5			1.6×0.8			2.0×1.25			3.2×1.6				
T max. (mm)	0.33			0.55			0.9			0.6	0.7	1.35	0.95	1.8			
Rated Voltage (Vdc)	100	50	25	100	50	25	100	50	25	25	100	50	100	100	50	25	16
Cap. / TC Code	COG	COG	COG	COG	COG	COG	COG	COG	COG	COG	COG	COG	COG	COG	COG	COG	COG
1.0pF	p30	p30	p30	p30	p30	p31											
2.0pF	p30	p30	p30	p30	p30	p31											
3.0pF	p30	p30	p30	p30	p30	p31											
4.0pF	p30	p30	p30	p30	p30	p31											
5.0pF	p30	p30	p30	p30	p30	p31											
6.0pF	p30	p30	p30	p30	p30	p31											
7.0pF	p30	p30	p30	p30	p30	p31											
8.0pF	p30	p30	p30	p30	p30	p31											
9.0pF	p30	p30	p30	p30	p30	p31											
10pF	p30	p30	p30	p30	p31	p31											
12pF	p30	p30	p30	p30	p31	p31											
15pF	p30	p30	p30	p30	p31	p31											
18pF	p30	p30	p30	p30	p31	p31											
22pF	p30	p30	p30	p30	p31	p31											
27pF	p30	p30	p30	p30	p31	p31											
33pF	p30	p30	p30	p30	p31	p31											
39pF	p30	p30	p30	p30	p31	p31											
47pF	p30	p30	p30	p30	p31	p31											
56pF	p30	p30	p30	p30	p31	p31											
68pF	p30	p30	p30	p30	p31	p31											
82pF	p30	p30	p30	p31	p31	p31											
100pF	p30	p30	p30	p31	p31	p31											
120pF		p30			p31	p31	p31										
150pF		p30	p30		p31	p31	p31										
180pF		p30	p30		p31	p31	p31										
220pF		p30	p30		p31	p31	p31										
270pF		p30			p31	p31	p31										
330pF		p30			p31	p31	p31										
390pF		p30			p31	p31	p31										
470pF		p30			p31	p31	p31										
560pF		p30			p31	p31	p31										
680pF		p30			p31	p31	p31										
820pF		p30			p31	p31	p31										
1000pF		p30			p31	p31	p31										
1200pF						p31	p31	p31									
1500pF						p31	p31	p31									
1800pF							p31		p31	p31							
2200pF							p31			p31	p31						
2700pF							p31				p32						
3300pF							p31				p32						
3900pF							p31					p32					
4700pF							p31	p31				p32					
5600pF							p31	p31				p32					
6800pF							p31	p31				p32					
8200pF							p31	p31				p32					
10000pF							p31	p31				p32					
18000pF												p32	p32				
22000pF												p32	p32				
56000pF													p32				
68000pF													p32				
82000pF													p32				
0.10μF													p32	p32	p32		
0.12μF														p32	p32		

Capacitance Table

p00 Each number in the Part Number List refers to the page number printed at the bottom of the page.

GRT Series High Dielectric Constant Type

p00 ← Part Number List EIA: X6S X7S X5R X7R X7T

L×W (mm)	0.6×0.3												1.0×0.5											
T max. (mm)	0.33												0.35		0.39		0.55							
Rated Voltage (Vdc)	35	25	16	10			6.3			4	6.3	4	10	6.3	2.5	50	35	25						
Cap. / TC Code	X5R	X7R	X6S	X5R	X7S	X6S	X5R	X7R	X7S	X6S	X5R	X7R	X7S	X6S	X5R	X5R	X6S	X7T	X6S	X7T	X7R	X6S	X5R	X7R
100pF				p33																				
150pF	p33	p33	p33																					
220pF			p33																		p33			
330pF			p33																		p33			
470pF	p33	p33	p33																		p33			
680pF			p33																		p33			
1000pF	p33	p33	p33																		p33			
1500pF										p33											p33			
2200pF										p33	p33		p33								p33			
3300pF										p33	p33		p33								p33			
4700pF			p33							p33	p33		p33								p33			
6800pF			p33							p33	p33		p33								p33			
10000pF			p33			p33	p33			p33	p33		p33	p33							p33		p34	
15000pF						p33				p33			p33	p33							p33			
22000pF						p33				p33			p33	p33							p33			
33000pF						p33				p33			p33	p33							p33		p34	
47000pF						p33				p33			p33	p33							p33		p34	
68000pF						p33				p33			p33	p33	p33						p33			
0.10μF	p33		p33	p33	p33	p33		p33	p33	p33		p33	p33	p33	p33	p33	p33				p33		p34	
0.15μF																								
0.22μF										p33			p33	p33	p33						p33	p33		
0.33μF													p33											
0.47μF													p33											
0.68μF																								
1.0μF																				p33	p33	p33	p33	p33
1.5μF																								
2.2μF																								
3.3μF																								
4.7μF																								
6.8μF																								
10μF																								
15μF																								
22μF																								
33μF																								
47μF																								
100μF																								

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Capacitance Table

[p00] Each number in the Part Number List refers to the page number printed at the bottom of the page.

(→ GRT Series High Dielectric Constant Type)

[p00] ← Part Number List EIA: X6S X7S X5R X7R X7T

L×W (mm)	1.0×0.5																							
T max. (mm)	0.55										0.6					0.65			0.7					
Rated Voltage (Vdc)	25	16	10	6.3	4	35	25	16	10	6.3	4	10	6.3	25	16	10	6.3	4	10	6.3				
Cap. / TC Code	X6S	X5R	X7R	X6S	X5R	X7R	X6S	X5R	X7R	X5R	X6S	X6S	X7S	X5R	X5R	X5R	X6S	X5R	X6S	X6S	X5R	X7S	X6S	X7S
100pF																								
150pF																								
220pF																								
330pF																								
470pF																								
680pF																								
1000pF																								
1500pF																								
2200pF																								
3300pF																								
4700pF																								
6800pF																								
10000pF	p34																							
15000pF																								
22000pF	p34																							
33000pF	p34																							
47000pF	p34																							
68000pF	p34																							
0.10μF	p34																							
0.15μF																								
0.22μF	p34	p34	p34	p34	p34						p34	p34	p34											
0.33μF											p34	p34	p34											
0.47μF	p34		p34	p34	p34						p34	p34	p34											
0.68μF											p34	p34	p34											
1.0μF	p34					p34	p34	p34																
1.5μF																								
2.2μF											p34	p34	p34									p34	p34	p34
3.3μF																								
4.7μF																						p34	p34	p34
6.8μF																								
10μF																								
15μF																								
22μF																								
33μF																								
47μF																								
100μF																								

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Capacitance Table

p00 Each number in the Part Number List refers to the page number printed at the bottom of the page.

(→ GRT Series High Dielectric Constant Type)

p00 ← Part Number List EIA: X6S X7S X5R X7R X7T

L×W (mm)	1.0x0.5	1.6x0.8																							
T max. (mm)	0.7	0.9						0.95						1.0											
Rated Voltage (Vdc)	2.5	100	50	35	25	16	6.3	4	25	16	10	2.5	50	35	25	16	10	6.3	4						
Cap. / TC Code	X6S	X7R	X5R	X6S	X5R	X7R	X7R	X5R	X6S	X5R	X5R	X5R	X6S	X5R	X5R	X6S	X5R	X6S	X7T	X6S	X5R	X7T	X6S	X5R	X6S
100pF																									
150pF																									
220pF																									
330pF																									
470pF																									
680pF																									
1000pF																									
1500pF																									
2200pF																									
3300pF	p34																								
4700pF																									
6800pF																									
10000pF	p34																								
15000pF																									
22000pF																									
33000pF																									
47000pF																									
68000pF																									
0.10μF																									
0.15μF																									
0.22μF																									
0.33μF																									
0.47μF																									
0.68μF																									
1.0μF	p34	p34			p34	p34			p34																
1.5μF																									
2.2μF																									
3.3μF																									
4.7μF																									
6.8μF																									
10μF	p34																								
15μF																									
22μF																									
33μF																									
47μF																									
100μF																									

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Capacitance Table

p00 Each number in the Part Number List refers to the page number printed at the bottom of the page.

(→ GRT Series High Dielectric Constant Type)

p00 ← Part Number List EIA: X6S X7S X5R X7R X7T

L×W (mm)	2.0×1.25																3.2× 1.6		
T max. (mm)	0.95		1.35			1.4						1.45						1.8	
Rated Voltage (Vdc)	16	10	100	50	16	50	35	25	16	10	6.3	50	25	16	10	6.3	4	50	
Cap. / TC Code	X5R	X6S	X7R	X7R	X7R	X5R	X6S	X7R	X5R	X7R	X6S	X7R	X5R	X5R	X7S	X7S	X5R	X7T	X6S
100pF																		X7T	
150pF																		X5R	
220pF																		X6S	
330pF																			
470pF																			
680pF																			
1000pF																			
1500pF																			
2200pF																			
3300pF																			
4700pF																			
68000pF																			
0.10μF																			
0.15μF																			
0.22μF																			
0.33μF																			
0.47μF																			
0.68μF																			
1.0μF																			
1.5μF																			
2.2μF																			
3.3μF	p34																		
4.7μF		p35																	
6.8μF			p35	p35															
10μF															p35	p35			
15μF																			
22μF															p35	p35	p35		
33μF															p35	p35	p35		
47μF																	p35	p35	
100μF																			

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Capacitance Table

p00 Each number in the Part Number List refers to the page number printed at the bottom of the page.

(→ GRT Series High Dielectric Constant Type)

p00 ← Part Number List EIA: **X6S** **X7S** **X5R** **X7R** **X7T**

L×W (mm)	3.2×1.6												3.2×2.5															
T max. (mm)	1.8				1.8								1.5				2.2				2.7							
Rated Voltage (Vdc)	25	16	50	35	25	16	10	6.3	25	50	6.3	50	16	10	6.3	X6S	X6S	X5R	X5R	X7R	X6S	X6S	X7S	X5R				
Cap. / TC Code	X6S	X5R	X6S	X5R	X7R	X6S	X5R	X6S	X5R	X6S	X5R	X6S	X5R	X6S	X5R	X6S	X6S	X5R	X5R	X7R	X6S	X6S	X7S	X5R				
100pF																												
150pF																												
220pF																												
330pF																												
470pF																												
680pF																												
1000pF																												
1500pF																												
2200pF																												
3300pF																												
4700pF																												
6800pF																												
10000pF																												
15000pF																												
22000pF																												
33000pF																												
47000pF																												
68000pF																												
0.10μF																												
0.15μF																												
0.22μF																												
0.33μF																												
0.47μF																												
0.68μF																												
1.0μF																												
1.5μF	p35	p35	p35	p35		p35	p35																					
2.2μF					p35	p35																						
3.3μF															p35				p35	p35								
4.7μF																p35				p35	p35							
6.8μF			p35	p35													p35											
10μF			p35	p35														p35										
15μF																			p35									
22μF																				p35								
33μF																					p35							
47μF																						p35	p35	p35				
100μF																									p35	p35		

Capacitance Table

p00 Each number in the Part Number List refers to the page number printed at the bottom of the page.

GCM Series Temperature Compensating Type

p00 ← Part Number List EIA: COG U2J Murata Temperature Characteristic: X8G ZLM

L×W (mm)	0.6×0.3		1.0×0.5		1.6×0.8				2.0×1.25								3.2×1.6					
T max. (mm)	0.33		0.55		0.9				0.7		0.95		1.0		1.4		1.45		0.95		1.0	
Rated Voltage (Vdc)	50	25	50	100	80	50	100	80	50	630	250	80	50	630	250	100	80	1000				
Cap. / TC Code	COG	COG	X8G	COG	U2J	COG	COG	U2J	COG	COG	ZLM	COG	COG	COG	COG	COG	COG	COG	COG	COG	COG	U2J
1.0pF	p37	p37	p37	p37	p38																	
2.0pF	p37	p37	p37	p37	p38																	
3.0pF	p37	p37	p37	p37	p38																	
4.0pF	p37	p37	p37	p37	p38																	
5.0pF	p37	p37	p37	p37	p38																	
6.0pF	p37	p37	p37		p38																	
7.0pF	p37	p37	p37		p38																	
8.0pF	p37	p37	p37		p38																	
9.0pF	p37	p37	p37		p38																	
10pF	p37	p37	p37		p38											p39	p39					
12pF	p37	p37	p37	p37	p38																	
15pF	p37	p37	p37	p37	p38											p39	p39					
18pF	p37	p37	p37	p37	p38																	
22pF	p37	p37	p37	p37	p38											p39	p39					
27pF	p37	p37	p37	p37	p38																	
33pF	p37	p37	p37	p37	p38											p39	p39					
39pF	p37	p37	p37	p37	p38																	
47pF	p37	p37	p37	p37	p38											p39	p39					
56pF	p37	p37	p37	p37	p38																	
68pF	p37	p37	p37	p37	p38											p39	p39					
82pF	p37	p37	p37	p37	p38																	
100pF	p37	p37	p37	p37	p38											p39	p39	p39				
120pF				p37	p37	p38																
150pF				p37	p37	p38										p39	p39	p39				
180pF				p37	p37	p38																
220pF				p37	p37	p38										p39	p39	p39				
270pF				p37	p37	p38																
330pF				p37	p37	p38										p39	p39	p39				
390pF				p37	p38	p38																
470pF				p37	p38	p38										p39	p39	p39				
560pF				p37	p38	p38																
680pF				p37	p38	p38										p39	p39		p39			
820pF				p37	p38	p38																
1000pF				p37	p38	p38	p38		p38							p38			p39	p39		
1100pF																p38						
1200pF																p38						
1300pF																p38						
1500pF																p38			p39			
1800pF																p38	p38	p38				
2200pF																p38	p38	p38				
2700pF																p38	p38	p38				
3300pF																p38	p38	p38				
3900pF																p38	p38	p38				
4700pF																p38						
5600pF																						
6800pF																						
8200pF																						
10000pF																						
12000pF																						
15000pF																						
18000pF																						
22000pF																						
27000pF																						
33000pF																						
39000pF																						
47000pF																						
68000pF																						
82000pF																						
0.10μF																						

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Capacitance Table

[p00] Each number in the Part Number List refers to the page number printed at the bottom of the page.

(→ GCM Series Temperature Compensating Type)

[p00] ← Part Number List EIA: COG U2J Murata Temperature Characteristic: X8G ZLM

L×W (mm)	3.2×1.6												3.2×2.5					4.5×3.2				5.7×5.0		
T max. (mm)	1.0		1.25				1.8						1.0		1.5		2.0		1.5		2.0		1.5	2.0
Rated Voltage (Vdc)	630	1000	630	250	1000	630	250	100	100	630	1000	630	1000	630	1000	1000	630	1000	1000	630	1000	1000	630	
Cap. / TC Code	C0G	U2J	C0G	U2J	C0G	U2J	C0G	U2J	C0G	C0G	C0G	C0G	U2J	U2J	U2J	U2J	U2J	U2J	U2J	U2J	U2J	U2J	U2J	
1.0pF																								
2.0pF																								
3.0pF																								
4.0pF																								
5.0pF																								
6.0pF																								
7.0pF																								
8.0pF																								
9.0pF																								
10pF	p39	p39																						
12pF																								
15pF	p39	p39																						
18pF																								
22pF	p39	p39																						
27pF																								
33pF	p39	p40																						
39pF																								
47pF	p39	p40																						
56pF																								
68pF	p39	p40																						
82pF																								
100pF	p39	p40																						
120pF																								
150pF	p39	p40																						
180pF																								
220pF	p39	p40																						
270pF																								
330pF	p39	p40																						
390pF																								
470pF	p39	p40																						
560pF																								
680pF	p39	p40	p40	p40																				
820pF																								
1000pF	p39	p40												p40	p40									
1100pF																								
1200pF																								
1300pF																								
1500pF	p39	p40																						
1800pF																								
2200pF	p40																							
2700pF																								
3300pF														p40										
3900pF																								
4700pF														p40	p40									
5600pF																								
6800pF														p40										
8200pF																								
10000pF														p40										
12000pF																								
15000pF																								
18000pF																								
22000pF																								
27000pF																								
33000pF																								
39000pF																								
47000pF																								
68000pF																								
82000pF																								
0.10μF																								

Capacitance Table

p00 Each number in the Part Number List refers to the page number printed at the bottom of the page.

GCM Series High Dielectric Constant Type

p00 ← Part Number List EIA: X7S X7T X7R X8R Murata Temperature Characteristic: X8L X8M

L×W (mm)	0.6×0.3			1.0×0.5						1.6×0.8						2.0×1.25								
T max. (mm)	0.33			0.55						0.6	0.7	0.9						1.0			0.95			
Rated Voltage (Vdc)	25	16	10	100	50	25	16	10	10	100	50	25	16	6.3	6.3	4	100	50	25	16	100	50	35	
Cap. / TC Code	X7R	X7R	X7R	X8L	X7R	X8L	X7R	X7R	X7S	X7S	X7R	X7R	X7R	X7R	X7T	X7T	X7R	X7R	X7R	X7R	X7R	X8L	X7R	
100pF	p41																							
150pF	p41																							
220pF	p41			p41		p41																		
330pF	p41	p41		p41		p41																		
470pF	p41			p41		p41																		
680pF	p41	p41		p41		p41																		
1000pF	p41			p41		p41																		
1500pF	p41			p41		p41																		
2200pF	p41	p41		p41		p41																		
3300pF	p41	p41		p41		p41																		
4700pF			p41	p41		p41																		
6800pF			p41			p41																		
10000pF			p41			p41		p41																
15000pF						p41		p41																
22000pF								p41																
33000pF								p41																
47000pF								p41																
68000pF								p41																
0.10µF								p41																
0.15µF																								
0.22µF																								
0.33µF																								
0.47µF																								
0.68µF																								
1.0µF																								
1.5µF																								
2.2µF																								
4.7µF																								
10µF																								
22µF																								
47µF																								

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Capacitance Table

[p00] Each number in the Part Number List refers to the page number printed at the bottom of the page.

(→ GCM Series High Dielectric Constant Type)

[p00] ← Part Number List

EIA: X7S X7T X7R X8R

Murata Temperature Characteristic: X8L X8M

L×W (mm)	2.0×1.25										3.2×1.6									
T max. (mm)	1.4					1.45					1.25		1.8							
Rated Voltage (Vdc)	35	25	16	10	6.3	100	35	25	16	100	25	100	50	25	16	10	6.3			
Cap. / TC Code	X7S	X8L	X7R	X7R	X7S	X7R	X7S	X8L	X7S	X8L	X7S	X8M	X7S	X7R	X8L	X8L	X7S	X8L	X7R	X7S
100pF																				
150pF																				
220pF																				
330pF																				
470pF																				
680pF																				
1000pF																				
1500pF																				
2200pF																				
3300pF																				
4700pF																				
6800pF																				
10000pF																				
15000pF																				
22000pF																				
33000pF																				
47000pF																				
68000pF																				
0.10μF																				
0.15μF																				
0.22μF																				
0.33μF																				
0.47μF																				
0.68μF																				
1.0μF																				
1.5μF																				
2.2μF	p41																			
4.7μF																				
10μF																				
22μF																				
47μF																				

Continued on the following page. ↗

Capacitance Table

p00 Each number in the Part Number List refers to the page number printed at the bottom of the page.

(→ GCM Series High Dielectric Constant Type)

p00 ← Part Number List EIA: X7S X7T X7R X8R Murata Temperature Characteristic: X8L X8M

L×W (mm)	3.2×1.6	3.2×2.5							
T max. (mm)	1.9	2.2	2.7				2.85		
Rated Voltage (Vdc)	25	100	50	35	25	16	10	6.3	25
Cap. / TC Code	X7S	X8L X7S	X8L X7R X7S	X7S X7R	X7R	X7R X7S	X7R	X8L	X7S
100pF									
150pF									
220pF									
330pF									
470pF									
680pF									
1000pF									
1500pF									
2200pF									
3300pF									
4700pF									
6800pF									
10000pF									
15000pF									
22000pF									
33000pF									
47000pF									
68000pF									
0.10μF									
0.15μF									
0.22μF									
0.33μF									
0.47μF									
0.68μF									
1.0μF									
1.5μF									
2.2μF									
4.7μF		p42 p42	p42						
10μF	p42		p42	p42 p42 p42					
22μF					p42 p42			p42 p42	
47μF						p42 p42			

GC3 Series High Dielectric Constant Type

p00 ← Part Number List EIA: X7T

L×W (mm)	2.0×1.25		3.2×1.6				3.2×2.5			4.5×3.2		5.7×5.0			
T max. (mm)	1.0	1.45	1.0	1.25	1.8	1.5	2.0	1.5	2.0	2.0	2.0	2.0	2.7		
Rated Voltage (Vdc)	250	250	450	250	630	450	250	630	250	630	450	250	250	630	450
Cap. / TC Code	X7T	X7T	X7T	X7T	X7T	X7T	X7T	X7T	X7T	X7T	X7T	X7T	X7T	X7T	X7T
10000pF	p44		p44		p44										
15000pF	p44		p44			p44									
22000pF		p44		p44			p44								
33000pF			p44	p44		p44			p44						
47000pF				p44	p44				p44						
68000pF						p44			p44			p44			
0.10μF							p44	p44				p44			
0.15μF								p44			p44				
0.22μF									p44			p44			
0.33μF										p44		p44			
0.47μF											p44	p44			
0.68μF												p44			
1.0μF													p44		

Capacitance Table

p00 Each number in the Part Number List refers to the page number printed at the bottom of the page.

GCJ Series High Dielectric Constant Type

p00 ← Part Number List EIA: X7S X7R X8R Murata Temperature Characteristic: X8L X8M

L×W (mm)	1.6×0.8												2.0×1.25															
T max. (mm)	0.9												1.0		0.95				1.0		1.45							
Rated Voltage (Vdc)	100		50		35		25		16		10		6.3		100		50		25		16		250		100		50	
Cap. / TC Code	X8L	X8R	X7R	X8L	X8R	X7R	X8L	X8R	X7R	X8L	X7R	X7R	X8L	X8M	X7S	X7R	X7R	X7R	X7R	X7R	X7R	X7R	X7R	X7R	X8L	X7R		
1000pF	p46	p46				p46				p46															p47			
1200pF	p46	p46				p46				p46																		
1500pF	p46	p46				p46				p46															p47			
1800pF	p46	p46				p46				p46																		
2200pF	p46	p46				p46				p46															p47			
2700pF	p46	p46				p46				p46																		
3300pF	p46	p46				p46				p46															p47			
3900pF	p46	p46				p46				p46																		
4700pF	p46	p46				p46	p46			p46															p47			
5600pF	p46	p46				p46				p46																		
6800pF	p46	p46				p46				p46															p47			
8200pF	p46	p46				p46				p46																		
10000pF	p46	p46				p46	p46			p46															p47			
12000pF	p46	p46				p46				p46																		
15000pF	p46	p46				p46				p47															p47			
18000pF	p46	p46				p46				p47																		
22000pF	p46	p46				p46				p47															p47			
27000pF	p46									p47		p47													p47			
33000pF	p46					p46	p46	p46		p47		p47													p47			
39000pF	p46					p46	p46	p46		p47		p47													p47			
47000pF	p46					p46				p47		p47														p47		
56000pF	p46					p46	p46	p46		p47		p47													p47			
68000pF	p46					p46	p46	p46		p47		p47													p47			
82000pF						p46				p46		p47		p47											p47	p47		
0.10μF	p46					p46	p46			p47		p47														p47	p47	
0.12μF						p46				p46		p47		p47														
0.15μF						p46	p46	p46		p46		p47		p47														
0.18μF						p46				p46		p47		p47														
0.22μF						p46	p46	p46		p46		p47	p47	p47												p47		
0.27μF																												
0.33μF																												
0.39μF																												
0.47μF																											p47	
0.56μF																												
0.68μF																												
0.82μF																												
1.0μF																												
1.5μF																												
2.2μF																												
3.3μF																												
4.7μF																												
6.8μF																												
10μF																												
22μF																												
47μF																												

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Capacitance Table

[p00] Each number in the Part Number List refers to the page number printed at the bottom of the page.

(→ GCJ Series High Dielectric Constant Type)

[p00] ← Part Number List

EIA: X7S X7R X8R

Murata Temperature Characteristic: X8L X8M

L×W (mm)	2.0×1.25								3.2×1.6																	
T max. (mm)	1.45				1.5				1.25				1.35				1.8				1.9					
Rated Voltage (Vdc)	35	25	16	10	100	1000	630	250	100	50	25	1000	630	250	100	70	50	35	25	16	10					
Cap. / TC Code	X8L	X8L	X7R	X8L	X7R	X7R	X7S	X7R	X7R	X7R	X7R	X7R	X7R	X7R	X7R	X7R	X7S	X7R	X8L	X7R	X8L	X7R	X8L	X7R	X8L	
1000pF									p48	p48																
1200pF																										
1500pF									p48	p48																
1800pF																										
2200pF									p48	p48																
2700pF																										
3300pF									p48	p48																
3900pF																										
4700pF									p48	p48																
5600pF																										
6800pF										p48																
8200pF																										
10000pF										p48																
12000pF																										
15000pF											p48															
18000pF																										
22000pF											p48															
27000pF																										
33000pF																										
39000pF																										
47000pF																										
56000pF																										
68000pF											p48															
82000pF																										
0.10μF																				p48						
0.12μF	p47	p47																								
0.15μF	p47	p47																								
0.18μF	p47	p47																								
0.22μF	p47	p47																								
0.27μF		p47	p47																							
0.33μF	p47	p47																								
0.39μF		p47	p47																							
0.47μF	p47	p47																								
0.56μF			p47	p47																						
0.68μF		p47	p47																							
0.82μF		p47	p47																							
1.0μF		p47	p47		p47														p48	p48						
1.5μF			p47																							
2.2μF			p47			p48	p48														p48	p48				
3.3μF						p48																				
4.7μF																										
6.8μF																										
10μF																										
22μF																										
47μF																										

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Capacitance Table

[p00] Each number in the Part Number List refers to the page number printed at the bottom of the page.

(→ GCJ Series High Dielectric Constant Type)

[p00] ← Part Number List

EIA: X7S X7R X8R

Murata Temperature Characteristic: X8L X8M

L×W (mm)	3.2×1.6				3.2×2.5								4.5×3.2				5.7×5.0						
T max. (mm)	1.9		2.0		1.5		2.0		2.3		2.8		2.85		1.5		2.0		2.0				
Rated Voltage (Vdc)	10	6.3	25	630	250	1000	630	250	100	50	25	16	6.3	25	630	250	1000	630	250	1000	630	250	
Cap. / TC Code	X7R	X7R	X8L	X7S	X7R	X7R	X7R	X7R	X8L	X7R	X7S	X7R	X7S	X8L	X8R	X7R	X7R	X8L	X7S	X7R	X7R	X7R	X7R
1000pF																							
1200pF																							
1500pF																							
1800pF																							
2200pF																							
2700pF																							
3300pF																							
3900pF																							
4700pF																							
5600pF																							
6800pF		p48																					
8200pF																							
10000pF			p48																				
12000pF																							
15000pF										p48	p48												
18000pF										p48	p48												
22000pF										p48	p48												
27000pF																							
33000pF										p48													
39000pF																							
47000pF										p48													
56000pF																							
68000pF			p48																				
82000pF										p48													
0.10μF											p48												
0.12μF																							
0.15μF			p48																				
0.18μF											p48												
0.22μF																							
0.27μF																							
0.33μF																							
0.39μF																							
0.47μF																							
0.56μF																							
0.68μF																							
0.82μF																							
1.0μF																							
1.5μF																							
2.2μF															p48	p48							
3.3μF																							
4.7μF																							
6.8μF	p48																						
10μF	p48																						
22μF	p48	p48																					
47μF																							

Capacitance Table

p00 Each number in the Part Number List refers to the page number printed at the bottom of the page.

GCQ Series Temperature Compensating Type

p00 ← Part Number List

EIA: COG

L×W (mm)	1.0×0.5
T max. (mm)	0.55
Rated Voltage (Vdc)	50
Cap. / TC Code	C0G
0.10pF	p52
0.20pF	p52
0.30pF	p52
0.40pF	p52
0.50pF	p52
0.60pF	p52
0.70pF	p52
0.80pF	p52
0.90pF	p52
1.0pF	p52
1.1pF	p52
1.2pF	p52
1.3pF	p52
1.4pF	p52
1.5pF	p52
1.6pF	p52
1.7pF	p52
1.8pF	p52
1.9pF	p52
2.0pF	p52
2.1pF	p52
2.2pF	p52
2.3pF	p52
2.4pF	p52
2.5pF	p52
2.6pF	p52
2.7pF	p52
2.8pF	p52
2.9pF	p52
3.0pF	p52
3.1pF	p52
3.2pF	p52
3.3pF	p52
3.4pF	p52
3.5pF	p52
3.6pF	p52
3.7pF	p52
3.8pF	p52
3.9pF	p52
4.0pF	p53
4.1pF	p53
4.2pF	p53
4.3pF	p53
4.4pF	p53
4.5pF	p53
4.6pF	p53
4.7pF	p53
4.8pF	p53
4.9pF	p53
5.0pF	p53
5.1pF	p53
5.2pF	p53
5.3pF	p53
5.4pF	p53
5.5pF	p53

L×W (mm)

T max. (mm)

Rated Voltage (Vdc)

Cap. / TC Code

0.10pF

0.20pF

0.30pF

0.40pF

0.50pF

0.60pF

0.70pF

0.80pF

0.90pF

1.0pF

1.1pF

1.2pF

1.3pF

1.4pF

1.5pF

1.6pF

1.7pF

1.8pF

1.9pF

2.0pF

2.1pF

2.2pF

2.3pF

2.4pF

2.5pF

2.6pF

2.7pF

2.8pF

2.9pF

3.0pF

3.1pF

3.2pF

3.3pF

3.4pF

3.5pF

3.6pF

3.7pF

3.8pF

3.9pF

4.0pF

4.1pF

4.2pF

4.3pF

4.4pF

4.5pF

4.6pF

4.7pF

4.8pF

4.9pF

5.0pF

5.1pF

5.2pF

5.3pF

5.4pF

5.5pF

GCD Series High Dielectric Constant Type

p00 ← Part Number List

EIA: X7S X7R

L×W (mm)	1.6×0.8	2.0×1.25
T max. (mm)	0.9	1.4
Rated Voltage (Vdc)	100 50 25	100 50 16
Cap. / TC Code	X7R X7R X7R	X7R X7R X7S
1000pF	p57 p57	
1200pF	p57 p57	
1500pF	p57 p57	
1800pF	p57 p57	
2200pF	p57 p57	
2700pF	p57 p57	
3300pF	p57 p57	
3900pF	p57 p57	
4700pF	p57 p57	
5600pF	p57 p57	
6800pF	p57 p57	
8200pF	p57 p57	
10000pF	p57 p57	
12000pF	p57 p57	
15000pF	p57 p57	
18000pF	p57 p57	
22000pF	p57 p57	
27000pF		p57 p57 p57
33000pF		p57 p57 p57
39000pF		p57 p57 p57
47000pF		p57 p57 p57
56000pF		p57 p57
68000pF		p57 p57
82000pF		p57 p57
0.10μF		p57 p57
0.47μF		

Capacitance Table

p00 Each number in the Part Number List refers to the page number printed at the bottom of the page.

GCE Series High Dielectric Constant Type

p00 ← Part Number List EIA: X7R

L×W (mm)	1.6×0.8		2.0×1.25		
T max. (mm)	0.9		1.45		
Rated Voltage (Vdc)	100	50	25	100	50
Cap. / TC Code	X7R	X7R	X7R	X7R	X7R
1000pF	p59	p59			
1200pF	p59	p59			
1500pF	p59	p59			
1800pF	p59	p59			
2200pF	p59	p59			
2700pF	p59	p59			
3300pF	p59	p59			
3900pF	p59	p59			
4700pF	p59	p59			
5600pF	p59	p59			
6800pF	p59	p59			
8200pF	p59	p59			
10000pF	p59	p59			
12000pF	p59	p59			
15000pF	p59	p59			
18000pF	p59	p59			
22000pF	p59	p59			
27000pF			p59	p59	p59
33000pF			p59	p59	p59
39000pF			p59	p59	p59
47000pF			p59	p59	p59
56000pF				p59	p59
68000pF				p59	p59
82000pF				p59	p59
0.10μF				p59	p59

NFM Series

p00 ← Part Number List

L×W (mm)	1.6×0.8		2.0×1.25			3.2×1.6	
T max. (mm)	0.7		0.95			1.5	
Rated Voltage (Vdc)	16	6.3	50	16	10	100	50
Cap. / TC Code	-	-	-	-	-	-	-
220pF			p62				
470pF			p62				
1000pF			p62				
2200pF			p62				
10000pF				p62	p62		
15000pF					p62		
22000pF			p62			p62	
0.10μF					p62		p62
0.22μF					p62		
0.47μF					p62		
1.0μF	p62	p62		p62			

KCM Series Temperature Compensating Type

p00 ← Part Number List EIA: COG

L×W (mm)	6.1×5.1			
T max. (mm)	3.1	3.9	5.1	6.6
Rated Voltage (Vdc)	630	630	630	630
Cap. / TC Code	COG	COG	COG	COG
0.015μF	p65			
0.018μF	p65			
0.022μF		p65		
0.027μF		p65		
0.030μF			p65	
0.036μF			p65	
0.044μF				p65
0.054μF				p65

KCM Series High Dielectric Constant Type

p00 ← Part Number List EIA: X7S X7R

L×W (mm)	6.1×5.3												
	3.0				3.9				5.0		6.7		
T max. (mm)	100	63	50	35	25	100	63	50	35	25	50	35	25
	X7R	X7R	X7R	X7R	X7R	X7R	X7R	X7R	X7S	X7R	X7R	X7R	X7S
4.7μF	p66	p66	p66										
6.8μF						p66							
10μF			p66	p66			p66	p66					
15μF				p66	p66								
17μF						p66	p66						
22μF							p66	p66	p66				
33μF								p66		p66			
47μF									p66				
68μF										p66	p66		
100μF												p66	

Capacitance Table

p00 Each number in the Part Number List refers to the page number printed at the bottom of the page.

KC3 Series High Dielectric Constant Type

p00 ← Part Number List EIA: **X7T**

L×W (mm)	6.1×5.3											
T max. (mm)	3.0		3.9		5.0		6.7					
Rated Voltage (Vdc)	630	450	250	630	450	250	630	450	250	630	450	250
Cap. / TC Code	X7T	X7T	X7T	X7T	X7T	X7T	X7T	X7T	X7T	X7T	X7T	X7T
0.10µF	p69											
0.15µF	p69											
0.22µF		p69		p69								
0.27µF			p69									
0.33µF	p69	p69										
0.47µF	p69	p69	p69									
0.56µF				p69	p69					p69		
0.68µF			p69	p69		p69	p69					
1.0µF					p69	p69	p69	p69				
1.2µF										p69	p69	
1.5µF							p69	p69				
2.2µF										p69	p69	

KCA Series Temperature Compensating Type

p00 ← Part Number List EIA: **U2J**

L×W (mm)	6.1×5.3			
T max. (mm)	3.0	3.9	5.0	6.7
Rated Voltage (Vac (r.m.s.))	250	250	250	250
Cap. / TC Code	U2J	U2J	U2J	U2J
100pF	p72			
150pF	p72			
220pF	p72			
330pF	p72			
470pF	p72			
680pF	p72			
1000pF	p72			
1500pF	p72			
2200pF	p72			
3300pF	p72			
4700pF		p72		
6800pF			p72	
10000pF				p72

GCG Series Temperature Compensating Type

p00 ← Part Number List

EIA: **U2J** Murata Temperature Characteristic: **X8G**

L×W (mm)	1.0× 0.5	1.6×0.8	2.0×1.25
T max. (mm)	0.55	0.9	0.7 0.95
Rated Voltage (Vdc)	50	100	50 50
Cap. / TC Code	X8G	X8G U2J X8G	X8G
10pF	p74		p74
12pF	p74		p74
15pF	p74		p74
18pF	p74		p74
22pF	p74		p74
27pF	p74		p74
33pF	p74		p74
39pF	p74		p74
47pF	p74		p74
56pF	p74		p74
68pF	p74		p74
82pF	p74		p74
100pF		p74	p74
120pF	p74	p74	p74
150pF	p74	p74	p74
180pF	p74	p74	p74
220pF	p74	p74	p74
270pF	p74	p74	p74
330pF	p74	p74	p74
390pF	p74	p74	p74
470pF	p74	p74	p74
560pF		p74	p74
680pF	p74		p74
820pF	p74		p74
1000pF	p74	p74	p74
1200pF		p74	p74
1500pF		p74	p74
1800pF		p74	p74
2200pF		p74	p74
2700pF		p74	p74
3300pF		p74	p74
3900pF		p74	p74
4700pF		p74	p74
5600pF		p74	p74
6800pF		p74	p74
8200pF		p74	p74
10000pF		p74	p74

Capacitance Table

[p00] Each number in the Part Number List refers to the page number printed at the bottom of the page.

GCG Series High Dielectric Constant Type

p00 ← Part Number List		EIA: X7S		X7R		X8R		Murata Temperature Characteristic: X8L													
L×W (mm)	1.0×0.5	1.6×0.8								2.0×1.25											
T max. (mm)	0.55	0.9								1.45											
Rated Voltage (Vdc)	50	25		16		100	50		25	16	10	6.3	50	35		25		16	10		
Cap. / TC Code	X8L	X7R	X8L	X7R	X8L	X7R	X8R	X8L	X8R	X7R	X8R	X7R	X7R	X8L	X7R	X8L	X8R	X7R	X8L	X7R	X7R
220pF	p75	p75																			
270pF		p75																			
330pF	p75	p75																			
390pF		p75																			
470pF	p75	p75																			
560pF		p75																			
680pF	p75	p75																			
820pF		p75																			
1000pF	p75	p75					p75														
1200pF		p75					p75		p75												
1500pF	p75	p75					p75		p75												
1800pF		p75					p75														
2200pF	p75	p75					p75		p75												
2700pF		p75					p75		p75												
3300pF	p75	p75					p75		p75												
3900pF		p75					p75		p75												
4700pF	p75	p75					p75		p75												
5600pF			p75	p75			p75		p75												
6800pF			p75	p75			p75		p75												
8200pF			p75	p75			p75		p75												
10000pF			p75	p75			p75		p75												
12000pF							p75														
15000pF							p75	p75	p75		p75										
18000pF							p75	p75	p75												
22000pF							p75	p75	p75		p75										
27000pF							p75	p75	p75												
33000pF							p75	p75	p75		p75										
39000pF							p75	p75	p75												
47000pF							p75	p75	p75		p75										
56000pF							p75	p75													
68000pF							p75	p75													
82000pF							p75														
0.10μF							p75	p75			p75										
0.12μF											p75										
0.15μF								p75	p75	p75		p75									
0.18μF									p75		p76										
0.22μF								p75	p75	p75		p76									
0.27μF																	p76				
0.33μF												p75					p76				
0.39μF												p75					p76				
0.47μF												p75					p76				
0.56μF																	p76				
0.68μF																	p76				
0.82μF																	p76				
1.0μF													p76	p76			p76				
1.2μF														p76	p76		p76				
1.5μF																	p76				
2.2μF																	p76				
3.3μF																					
3.9μF																					
4.7μF																					
6.8μF																					
10μF																					
22μF																					
47μF																					

Continued on the following page. ↗

Capacitance Table

p00 Each number in the Part Number List refers to the page number printed at the bottom of the page.

(→ GCG Series High Dielectric Constant Type)

p00 ← Part Number List		EIA: X7S X7R X8R			Murata Temperature Characteristic: X8L									
L×W (mm)	2.0×1.25	3.2×1.6						3.2×2.5						
T max. (mm)	1.45	1.35			1.9						2.8			
Rated Voltage (Vdc)	6.3	50	25	16	25	16	6.3	50	35	25	16	6.3		
Cap. / TC Code	X8L	X7R	X8R	X7R	X8L	X7R	X8L	X8R	X7S	X8L	X7R	X7S	X8R	X7R
220pF														
270pF														
330pF														
390pF														
470pF														
560pF														
680pF														
820pF														
1000pF														
1200pF														
1500pF														
1800pF														
2200pF														
2700pF														
3300pF														
3900pF														
4700pF														
5600pF														
6800pF														
8200pF														
10000pF														
12000pF														
15000pF														
18000pF														
22000pF														
27000pF														
33000pF														
39000pF														
47000pF														
56000pF														
68000pF														
82000pF														
0.10μF														
0.12μF														
0.15μF														
0.18μF														
0.22μF		p76												
0.27μF														
0.33μF		p76												
0.39μF														
0.47μF														
0.56μF														
0.68μF							p76							
0.82μF								p76						
1.0μF									p76					
1.2μF			p76											
1.5μF			p76	p76										
2.2μF			p76											
3.3μF						p76	p76							
3.9μF							p76							
4.7μF							p76	p76						
6.8μF												p76		
10μF	p76	p76							p76	p76	p76	p76		
22μF									p76			p76		
47μF												p76		

Search Capacitors

Specifications and Test Methods, Package, Chart of Characteristic Data, please refer to the search web page.

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

The screenshot shows a search result for the GRT1555C2A1R0CA02# capacitor. It includes a table of product numbers and their characteristics, a detailed product page with a summary, dimensions, and a chart of characteristic data. A large red arrow points from the top left of the screenshot towards the 'Status and Features Icons' section.

T _{max.}	Rated Voltage	TC Code	Cap.	Tol.	Part Number
0.55mm	100Vdc	COG	1.0pF ±0.25pF	GRT1555C2A1R0CA02#	A1R0CA02#
			2.0pF ±0.25pF	GRT1555C2A1R0CA02#	A2R0CA02#
			3.0pF ±0.25pF	GRT1555C2A1R0CA02#	C3A02#
			4.0pF ±0.25pF	GRT1555C2A1R0CA02#	D4A02#
			5.0pF ±0.25pF	GRT1555C2A1R0CA02#	E5A02#

Status and Features Icons

The status and features of products can be checked at once. When **?** is clicked, a description of each icon will be displayed

Stock Check (Where to buy)

Reference inventory information from agents and web-based companies.

Data Sheet

The product details page can be output in PDF.

How to read part numbers

Describes the meaning of the part number

Series Information

This links to the introduction page of each series.

Detailed Specifications Sheet

- Rated value
- Specifications and Test Methods
- Package
- Caution, Notice
- (Storage, Soldering and Mounting,etc.)

Characteristics Data

The following characteristics data of the main products can be acquired.

- SPICE Netlist (mod type)
- S parameter (S2P type)
- Reliability Test Data *Typical data

- Shape (Dimensions)
- Rated Values

- Specification by Packaging Code/ Minimum Order Quantity
- Weight (1 pc/ø180mm reel)

Chart of Characteristic Data

The main products published characteristic data.

- Frequency characteristics (ESR, Impedance)
- DC bias characteristics
- AC voltage characteristics
- Capacitance - temperature characteristics
- Calorific property by ripple current

Design Tools SimSurfing

The SimSurfing design tools are useful for displaying the graph, downloading CSV data and overwriting the product number graph.

AEC-Q200 Compliant Chip Multilayer Ceramic Capacitors for Infotainment

GRT Series



Capacitor meet AEC-Q200 (Grade2 or Grade3).

Features

① This product has cleared test conditions meet AEC-Q200.

This series is designed for use in Car Multimedia, Car Interior, Car Comfort application and General Electronic equipment. It is not appropriate for use in applications critical to passenger safety and car driving function (e.g. ABS, AIRBAG, etc.). Please use the GCM series in critical applications.

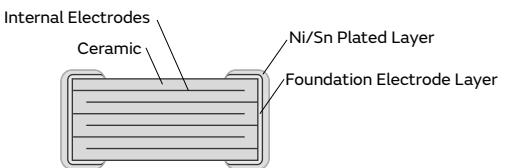
	General Purpose GRM Series Maximum operating temperature: 125°C	AEC-Q200 meted GRT Series Maximum operating temperature: 125°C
Items	Test Method	Test Method
Temperature Cycle	Temperature Cycle: 5 cycles	Temperature Cycle: 1,000 cycles
Humidity Loading	Test temperature: 40±2°C Test humidity: 90 to 95%RH Test time: 500 hours	Test temperature: 85±2°C Test humidity: 80 to 85%RH Test time: 1,000 hours

② Meet AEC-Q200 (Grade2 or Grade3).

105°C product: Grade2.

85°C product: Grade3.

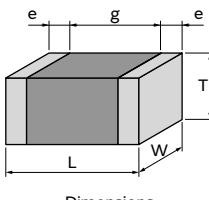
③ Sn plating is applied to the external electrodes; excellent solderability.



<Example of Structure>

Specifications

Size	0.6×0.3mm to 3.2×2.5mm
Rated Voltage	2.5Vdc to 100Vdc
Capacitance	0.50pF to 100μF
Main Applications	Such as Information and Comfort equipment, car navigation, communication module and entertainment system



<Dimensions>

GRT Series Temperature Compensating Type Info-Q200 AEC-Q200 Part Number List

0.6×0.3mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
0.33mm	100Vdc	COG	1.0pF	±0.25pF	GRT0335C2A1R0CA02#	D1
			2.0pF	±0.25pF	GRT0335C2A2R0CA02#	D1
			3.0pF	±0.25pF	GRT0335C2A3R0CA02#	D1
			4.0pF	±0.25pF	GRT0335C2A4R0CA02#	D1
			5.0pF	±0.25pF	GRT0335C2A5R0CA02#	D1
			6.0pF	±0.5pF	GRT0335C2A6R0DA02#	D1
			7.0pF	±0.5pF	GRT0335C2A7R0DA02#	D1
			8.0pF	±0.5pF	GRT0335C2A8R0DA02#	D1
			9.0pF	±0.5pF	GRT0335C2A9R0DA02#	D1
			10pF	±5%	GRT0335C2A100JA02#	D1
			12pF	±5%	GRT0335C2A120JA02#	D1
			15pF	±5%	GRT0335C2A150JA02#	D1
			18pF	±5%	GRT0335C2A180JA02#	D1
			22pF	±5%	GRT0335C2A220JA02#	D1
			27pF	±5%	GRT0335C2A270JA02#	D1
			33pF	±5%	GRT0335C2A330JA02#	D1
			39pF	±5%	GRT0335C2A390JA02#	D1
			47pF	±5%	GRT0335C2A470JA02#	D1
			56pF	±5%	GRT0335C2A560JA02#	D1
			68pF	±5%	GRT0335C2A680JA02#	D1
			82pF	±5%	GRT0335C2A820JA02#	D1
			100pF	±5%	GRT0335C2A101JA02#	D1
50Vdc	COG	COG	1.0pF	±0.25pF	GRT0335C1H1R0CA02#	D1
			2.0pF	±0.25pF	GRT0335C1H2R0CA02#	D1
			3.0pF	±0.25pF	GRT0335C1H3R0CA02#	D1
			4.0pF	±0.25pF	GRT0335C1H4R0CA02#	D1
			5.0pF	±0.25pF	GRT0335C1H5R0CA02#	D1
			6.0pF	±0.5pF	GRT0335C1H6R0DA02#	D1
			7.0pF	±0.5pF	GRT0335C1H7R0DA02#	D1
			8.0pF	±0.5pF	GRT0335C1H8R0DA02#	D1
			9.0pF	±0.5pF	GRT0335C1H9R0DA02#	D1
			10pF	±5%	GRT0335C1H100JA02#	D1
			12pF	±5%	GRT0335C1H120JA02#	D1
			15pF	±5%	GRT0335C1H150JA02#	D1
25Vdc	COG	COG	18pF	±5%	GRT0335C1H180JA02#	D1
			22pF	±5%	GRT0335C1H220JA02#	D1
			27pF	±5%	GRT0335C1H270JA02#	D1
			33pF	±5%	GRT0335C1H330JA02#	D1
			39pF	±5%	GRT0335C1H390JA02#	D1
			47pF	±5%	GRT0335C1H470JA02#	D1
			56pF	±5%	GRT0335C1H560JA02#	D1
			68pF	±5%	GRT0335C1H680JA02#	D1
			82pF	±5%	GRT0335C1H820JA02#	D1
			100pF	±5%	GRT0335C1H101JA02#	D1
			120pF	±5%	GRT0335C1H121JA02#	D1
			150pF	±5%	GRT0335C1H151JA02#	D1
1.0×0.5mm						
0.55mm	100Vdc	COG	1.0pF	±0.25pF	GRT1555C2A1R0CA02#	D1
			2.0pF	±0.25pF	GRT1555C2A2R0CA02#	D1
			3.0pF	±0.25pF	GRT1555C2A3R0CA02#	D1
			4.0pF	±0.25pF	GRT1555C2A4R0CA02#	D1
			5.0pF	±0.25pF	GRT1555C2A5R0CA02#	D1
			6.0pF	±0.5pF	GRT1555C2A6R0DA02#	D1
			7.0pF	±0.5pF	GRT1555C2A7R0DA02#	D1
			8.0pF	±0.5pF	GRT1555C2A8R0DA02#	D1
			9.0pF	±0.5pF	GRT1555C2A9R0DA02#	D1
			10pF	±5%	GRT1555C2A100JA02#	D1
			12pF	±5%	GRT1555C2A120JA02#	D1
			15pF	±5%	GRT1555C2A150JA02#	D1
			18pF	±5%	GRT1555C2A180JA02#	D1
			22pF	±5%	GRT1555C2A220JA02#	D1
			27pF	±5%	GRT1555C2A270JA02#	D1
			33pF	±5%	GRT1555C2A330JA02#	D1
			39pF	±5%	GRT1555C2A390JA02#	D1
			47pF	±5%	GRT1555C2A470JA02#	D1
			56pF	±5%	GRT1555C2A560JA02#	D1
			68pF	±5%	GRT1555C2A680JA02#	D1

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
0.33mm	25Vdc	COG	5.0pF	±0.25pF	GRT0335C1E5R0CA02#	D1
			6.0pF	±0.5pF	GRT0335C1E6R0DA02#	D1
			7.0pF	±0.5pF	GRT0335C1E7R0DA02#	D1
			8.0pF	±0.5pF	GRT0335C1E8R0DA02#	D1
			9.0pF	±0.5pF	GRT0335C1E9R0DA02#	D1
			10pF	±5%	GRT0335C1E100JA02#	D1
			12pF	±5%	GRT0335C1E120JA02#	D1
			15pF	±5%	GRT0335C1E150JA02#	D1
			18pF	±5%	GRT0335C1E180JA02#	D1
			22pF	±5%	GRT0335C1E220JA02#	D1
			27pF	±5%	GRT0335C1E270JA02#	D1
			33pF	±5%	GRT0335C1E330JA02#	D1
			39pF	±5%	GRT0335C1E390JA02#	D1
			47pF	±5%	GRT0335C1E470JA02#	D1
			56pF	±5%	GRT0335C1E560JA02#	D1
			68pF	±5%	GRT0335C1E680JA02#	D1
			82pF	±5%	GRT0335C1E820JA02#	D1
			100pF	±5%	GRT0335C1E101JA02#	D1
			150pF	±5%	GRT0335C1E151JA02#	D1
			180pF	±5%	GRT0335C1E181JA02#	D1
			220pF	±5%	GRT0335C1E221JA02#	D1
			270pF	±5%	GRT0335C1E271JA02#	D1
			330pF	±5%	GRT0335C1E331JA02#	D1
			390pF	±5%	GRT0335C1E391JA02#	D1
			470pF	±5%	GRT0335C1E471JA02#	D1
			560pF	±5%	GRT0335C1E561JA02#	D1
			680pF	±5%	GRT0335C1E681JA02#	D1
			820pF	±5%	GRT0335C1E821JA02#	D1
			1000pF	±5%	GRT0335C1E102JA02#	D1

Part number # indicates the package specification code.

GRT Series Temperature Compensating Type Info-tainment AEC-Q200 Part Number List

(→ 1.0×0.5mm)

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number		
0.55mm	100Vdc	COG	82pF	±5%	GRT1555C2A820JA02#	D1	
			100pF	±5%	GRT1555C2A101JA02#	D1	
	50Vdc		1.0pF	±0.25pF	GRT1555C1H1R0CA02#	D1	
			2.0pF	±0.25pF	GRT1555C1H2R0CA02#	D1	
			3.0pF	±0.25pF	GRT1555C1H3R0CA02#	D1	
			4.0pF	±0.25pF	GRT1555C1H4R0CA02#	D1	
			5.0pF	±0.25pF	GRT1555C1H5R0CA02#	D1	
			6.0pF	±0.5pF	GRT1555C1H6R0DA02#	D1	
			7.0pF	±0.5pF	GRT1555C1H7R0DA02#	D1	
			8.0pF	±0.5pF	GRT1555C1H8R0DA02#	D1	
			9.0pF	±0.5pF	GRT1555C1H9R0DA02#	D1	
25Vdc	COG		10pF	±5%	GRT1555C1H100JA02#	D1	
			12pF	±5%	GRT1555C1H120JA02#	D1	
			15pF	±5%	GRT1555C1H150JA02#	D1	
			18pF	±5%	GRT1555C1H180JA02#	D1	
			22pF	±5%	GRT1555C1H220JA02#	D1	
			27pF	±5%	GRT1555C1H270JA02#	D1	
			33pF	±5%	GRT1555C1H330JA02#	D1	
			39pF	±5%	GRT1555C1H390JA02#	D1	
			47pF	±5%	GRT1555C1H470JA02#	D1	
			56pF	±5%	GRT1555C1H560JA02#	D1	
			68pF	±5%	GRT1555C1H680JA02#	D1	
			82pF	±5%	GRT1555C1H820JA02#	D1	
			100pF	±5%	GRT1555C1H101JA02#	D1	
			120pF	±5%	GRT1555C1H121JA02#	D1	
			150pF	±5%	GRT1555C1H151JA02#	D1	
			180pF	±5%	GRT1555C1H181JA02#	D1	
			220pF	±5%	GRT1555C1H221JA02#	D1	
			270pF	±5%	GRT1555C1H271JA02#	D1	
			330pF	±5%	GRT1555C1H331JA02#	D1	
			390pF	±5%	GRT1555C1H391JA02#	D1	
			470pF	±5%	GRT1555C1H471JA02#	D1	
			560pF	±5%	GRT1555C1H561JA02#	D1	
			680pF	±5%	GRT1555C1H681JA02#	D1	
			820pF	±5%	GRT1555C1H821JA02#	D1	
			1000pF	±5%	GRT1555C1H102JA02#	D1	
25Vdc	COG		10pF	±5%	GRT1555C1E100JA02#	D1	
			12pF	±5%	GRT1555C1E120JA02#	D1	
			15pF	±5%	GRT1555C1E150JA02#	D1	
			18pF	±5%	GRT1555C1E180JA02#	D1	
			22pF	±5%	GRT1555C1E220JA02#	D1	
			27pF	±5%	GRT1555C1E270JA02#	D1	
			33pF	±5%	GRT1555C1E330JA02#	D1	
			39pF	±5%	GRT1555C1E390JA02#	D1	
			47pF	±5%	GRT1555C1E470JA02#	D1	
			56pF	±5%	GRT1555C1E560JA02#	D1	
			68pF	±5%	GRT1555C1E680JA02#	D1	
			82pF	±5%	GRT1555C1E820JA02#	D1	
			100pF	±5%	GRT1555C1E101JA02#	D1	
			120pF	±5%	GRT1555C1E121JA02#	D1	
			150pF	±5%	GRT1555C1E151JA02#	D1	
			180pF	±5%	GRT1555C1E181JA02#	D1	
			220pF	±5%	GRT1555C1E221JA02#	D1	
			270pF	±5%	GRT1555C1E271JA02#	D1	

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number		
0.55mm	25Vdc	COG	330pF	±5%	GRT1555C1E331JA02#	D1	
			390pF	±5%	GRT1555C1E391JA02#	D1	
			470pF	±5%	GRT1555C1E471JA02#	D1	
			560pF	±5%	GRT1555C1E561JA02#	D1	
			680pF	±5%	GRT1555C1E681JA02#	D1	
			820pF	±5%	GRT1555C1E821JA02#	D1	
			1000pF	±5%	GRT1555C1E102JA02#	D1	
			1200pF	±5%	GRT1555C1E122JA02#	D1	
			1500pF	±5%	GRT1555C1H152JA02#	D1	
			1800pF	±5%	GRT1555C1H182JA02#	D1	
50Vdc	COG		2200pF	±5%	GRT1555C1H222JA02#	D1	
			2700pF	±5%	GRT1555C1H272JA02#	D1	
			3300pF	±5%	GRT1555C1H332JA02#	D1	
			3900pF	±5%	GRT1555C1H392JA02#	D1	
			4700pF	±5%	GRT1555C1H472JA02#	D1	
			5600pF	±5%	GRT1555C1H562JA02#	D1	
			6800pF	±5%	GRT1555C1H682JA02#	D1	
			8200pF	±5%	GRT1555C1H822JA02#	D1	
			10000pF	±5%	GRT1555C1H103JA02#	D1	
			12000pF	±5%	GRT1885C1H122JA02#	D1	
25Vdc	COG		1500pF	±5%	GRT1885C1H152JA02#	D1	
			1800pF	±5%	GRT1885C1H182JA02#	D1	
			2200pF	±5%	GRT1885C1H222JA02#	D1	
			2700pF	±5%	GRT1885C1H272JA02#	D1	
			3300pF	±5%	GRT1885C1H332JA02#	D1	
			3900pF	±5%	GRT1885C1H392JA02#	D1	
			4700pF	±5%	GRT1885C1H472JA02#	D1	
			5600pF	±5%	GRT1885C1H562JA02#	D1	
			6800pF	±5%	GRT1885C1H682JA02#	D1	
			8200pF	±5%	GRT1885C1H822JA02#	D1	
25Vdc	COG		10000pF	±5%	GRT1885C1E103JA02#	D1	
			12000pF	±5%	GRT1885C1E122JA02#	D1	
			1500pF	±5%	GRT1885C1E152JA02#	D1	
			4700pF	±5%	GRT1885C1E472JA02#	D1	
			5600pF	±5%	GRT1885C1E562JA02#	D1	
			6800pF	±5%	GRT1885C1E682JA02#	D1	
			8200pF	±5%	GRT1885C1E822JA02#	D1	
			10000pF	±5%	GRT1885C1E103JA02#	D1	

2.0×1.25mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
0.6mm	25Vdc	COG	1800pF	±5%	GRT2165C1E182JA12#	D1
			2200pF	±5%	GRT2165C1E222JA12#	D1
0.7mm	100Vdc	COG	1800pF	±5%	GRT2165C2A182JA02#	D1
			2200pF	±5%	GRT2165C2A222JA02#	D1

Part number # indicates the package specification code.



GRT Series Temperature Compensating Type Info-tainment AEC-Q200 Part Number List

(→ 2.0×1.25mm)

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
0.7mm	100Vdc	COG	2700pF	±5%	GRT2165C2A272JA02#	D1
			3300pF	±5%	GRT2165C2A332JA02#	D1
1.35mm	50Vdc	COG	18000pF	±5%	GRT21B5C1H183JA02#	D1
			22000pF	±5%	GRT21B5C1H223JA02#	D1

3.2×1.6mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
0.95mm	100Vdc	COG	3900pF	±5%	GRT3195C2A392JA02#	D1
			4700pF	±5%	GRT3195C2A472JA02#	D1
			5600pF	±5%	GRT3195C2A562JA02#	D1
			6800pF	±5%	GRT3195C2A682JA02#	D1
			8200pF	±5%	GRT3195C2A822JA02#	D1
			10000pF	±5%	GRT3195C2A103JA02#	D1
			18000pF	±5%	GRT3195C2A183JA02#	D1
			22000pF	±5%	GRT3195C2A223JA02#	D1
1.8mm	100Vdc	COG	0.10µF	±5%	GRT31C5C2A104JA12#	D1
			56000pF	±5%	GRT31C5C1H563JA02#	D1
			68000pF	±5%	GRT31C5C1H683JA02#	D1
			82000pF	±5%	GRT31C5C1H823JA02#	D1
			0.10µF	±5%	GRT31C5C1H104JA02#	D1
	25Vdc	COG	0.10µF	±5%	GRT31C5C1E104JA02#	D1
			0.12µF	±5%	GRT31C5C1E124JA02#	D1
	16Vdc	COG	0.12µF	±5%	GRT31C5C1C124JA02#	D1

GRT Series High Dielectric Constant Type Info-tainment AEC-Q200 Part Number List

0.6×0.3mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
0.33mm	35Vdc	X5R	0.10µF	±10%	GRT033R6YA104KE01#	D1
		X7R	150pF	±10%	GRT033R71E151KE01#	D1
			470pF	±10%	GRT033R71E471KE01#	D1
			1000pF	±10%	GRT033R71E102KE01#	D1
		X6S	150pF	±10%	GRT033C81E151KE01#	D1
			470pF	±10%	GRT033C81E471KE01#	D1
			1000pF	±10%	GRT033C81E102KE01#	D1
			0.10µF	±10%	GRT033C81E104KE01#	D1
	25Vdc	X5R	100pF	±10%	GRT033R61E101KE01#	D1
			150pF	±10%	GRT033R61E151KE01#	D1
			220pF	±10%	GRT033R61E221KE01#	D1
			330pF	±10%	GRT033R61E331KE01#	D1
			470pF	±10%	GRT033R61E471KE01#	D1
			680pF	±10%	GRT033R61E681KE01#	D1
			1000pF	±10%	GRT033R61E102KE01#	D1
			4700pF	±10%	GRT033R61E472KE01#	D1
			6800pF	±10%	GRT033R61E682KE01#	D1
			10000pF	±10%	GRT033R61E103KE01#	D1
	16Vdc	X7S	0.10µF	±10%	GRT033C71C104KE01#	D1
			0.10µF	±10%	GRT033C81C104KE01#	D1
		X6S	10000pF	±10%	GRT033R61C103KE01#	D1
			15000pF	±10%	GRT033R61C153KE01#	D1
			22000pF	±10%	GRT033R61C223KE01#	D1
			33000pF	±10%	GRT033R61C333KE01#	D1
			47000pF	±10%	GRT033R61C473KE01#	D1
			68000pF	±10%	GRT033R61C683KE01#	D1
			0.10µF	±10%	GRT033R61C104KE01#	D1
		10Vdc	10000pF	±10%	GRT033R71A103KE01#	D1
			0.10µF	±10%	GRT033C71A104KE01#	D1
			0.10µF	±10%	GRT033C81A104KE01#	D1
			1500pF	±10%	GRT033R61A152KE01#	D1
			2200pF	±10%	GRT033R61A222KE01#	D1
			3300pF	±10%	GRT033R61A332KE01#	D1
			4700pF	±10%	GRT033R61A472KE01#	D1
			6800pF	±10%	GRT033R61A682KE01#	D1
			10000pF	±10%	GRT033R61A103KE01#	D1
			15000pF	±10%	GRT033R61A153KE01#	D1
	6.3Vdc	X7R	22000pF	±10%	GRT033R70J222KE01#	D1
			33000pF	±10%	GRT033R70J332KE01#	D1
			4700pF	±10%	GRT033R70J472KE01#	D1
			6800pF	±10%	GRT033R70J682KE01#	D1
			10000pF	±10%	GRT033R70J103KE01#	D1
		X7S	0.10µF	±10%	GRT033C70J104KE01#	D1
			2200pF	±10%	GRT033C80J222KE01#	D1
		X6S	3300pF	±10%	GRT033C80J332KE01#	D1

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
0.33mm	4Vdc	X6S	4700pF	±10%	GRT033C80J472KE01#	D1
			6800pF	±10%	GRT033C80J682KE01#	D1
			10000pF	±10%	GRT033C80J103KE01#	D1
			15000pF	±10%	GRT033C80J153KE01#	D1
			22000pF	±10%	GRT033C80J223KE01#	D1
			33000pF	±10%	GRT033C80J333KE01#	D1
			47000pF	±10%	GRT033C80J473KE01#	D1
			68000pF	±10%	GRT033C80J683KE01#	D1
			0.10µF	±10%	GRT033C80J104KE01#	D1
			0.22µF	±10%	GRT033C80J224KE01#	D1
	4Vdc	X6S	0.33µF	±20%	GRT033R60J334ME01#	D1
			0.47µF	±10%	GRT033R60J474KE01#	D1
			68000pF	±10%	GRT033C80G683KE01#	D1
			0.10µF	±10%	GRT033C80G104KE01#	D1
			0.22µF	±20%	GRT033C80G224ME01#	D1
	0.35mm	X5R	1.0µF	±20%	GRT033R60J105ME13#	D1
		X5R	1.0µF	±20%	GRT033R60G105ME13#	D1
0.39mm	10Vdc	X6S	1.0µF	±20%	GRT033C81A105ME13#	D1
		X7T	1.0µF	±20%	GRT033D70J105ME13#	D1
		X6S	1.0µF	±20%	GRT033C80J105ME13#	D1
	6.3Vdc	X7T	1.0µF	±20%	GRT033D70E105ME18#	D1
		X7T	1.0µF	±20%	GRT033D70E105ME18#	D1
		X7T	1.0µF	±20%	GRT033D70E105ME18#	D1

1.0×0.5mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
0.55mm	50Vdc	X7R	220pF	±10%	GRT155R71H221KE01#	D1
			330pF	±10%	GRT155R71H331KE01#	D1
			470pF	±10%	GRT155R71H471KE01#	D1
			680pF	±10%	GRT155R71H681KE01#	D1
			1000pF	±10%	GRT155R71H102KE01#	D1
			1500pF	±10%	GRT155R71H152KE01#	D1
			2200pF	±10%	GRT155R71H222KE01#	D1
			3300pF	±10%	GRT155R71H332KE01#	D1
			4700pF	±10%	GRT155R71H472KE01#	D1
			6800pF	±10%	GRT155R71H682KE01#	D1
			10000pF	±10%	GRT155R71H103KE01#	D1
			15000pF	±10%	GRT155R71H153KE01#	D1
			22000pF	±10%	GRT155R71H223KE01#	D1
			33000pF	±10%	GRT155R71H333KE01#	D1
			47000pF	±10%	GRT155R71H473KE01#	D1
			68000pF	±10%	GRT155R71H683KE01#	D1
	35Vdc	X6S	0.10µF	±10%	GRT155R71H104KE01#	D1
		X5R	0.22µF	±10%	GRT155R71H224KE01#	D1
		X5R	0.47µF	±10%	GRT155R71H474KE01#	D1

Part number # indicates the package specification code.



GRT Series High Dielectric Constant Type Info-tainment AEC Q200 Part Number List

(→ 1.0×0.5mm)

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
0.55mm	25Vdc	X7R	10000pF	±10%	GRT155R71E103KE01#	D1
			22000pF	±10%	GRT155R71E223KE01#	D1
			33000pF	±10%	GRT155R71E333KE01#	D1
			47000pF	±10%	GRT155R71E473KE01#	D1
			0.10µF	±10%	GRT155R71E104KE01#	D1
		X6S	0.22µF	±10%	GRT155C81E224KE01#	D1
			0.47µF	±10%	GRT155R61E474KE01#	D1
	16Vdc	X7R	1.0µF	±10%	GRT155R61E105KE01#	D1
			22000pF	±10%	GRT155R71C103KE01#	D1
			33000pF	±10%	GRT155R71C223KE01#	D1
			47000pF	±10%	GRT155R71C333KE01#	D1
			68000pF	±10%	GRT155R71C683KE01#	D1
		X6S	0.10µF	±10%	GRT155R71C104KE01#	D1
			0.22µF	±10%	GRT155R71C224KE01#	D1
			0.47µF	±10%	GRT155C81C474KE01#	D1
			0.70µF	±10%	GRT155R61C224KE01#	D1
			1.0µF	±10%	GRT155R61C474KE01#	D1
	10Vdc	X7R	0.22µF	±10%	GRT155R71A224KE01#	D1
			0.47µF	±10%	GRT155R71A474KE01#	D1
		X6S	1.0µF	±10%	GRT155C81A105KE01#	D1
		X5R	0.22µF	±10%	GRT155R61A224KE01#	D1
			0.33µF	±10%	GRT155R61A334KE01#	D1
			0.47µF	±10%	GRT155R61A474KE01#	D1
			0.68µF	±10%	GRT155R61A684KE01#	D1
			1.0µF	±10%	GRT155R61A105KE01#	D1
		X6S	2.2µF	±10%	GRT155R61A225KE01#	D1
			22000pF	±10%	GRT155R70J223KE01#	D1
			1.0µF	±10%	GRT155R70J105KE01#	D1
			0.22µF	±10%	GRT155C80J224KE01#	D1
			0.33µF	±10%	GRT155C80J334KE01#	D1
	6.3Vdc	X7R	0.47µF	±10%	GRT155C80J474KE01#	D1
			0.68µF	±10%	GRT155C80J684KE01#	D1
			1.0µF	±10%	GRT155C80J105KE01#	D1
			2.2µF	±10%	GRT155C80J225KE01#	D1
		X6S	0.22µF	±10%	GRT155R60J224KE01#	D1
			0.33µF	±10%	GRT155R60J334KE01#	D1
			0.47µF	±10%	GRT155R60J474KE01#	D1
			0.68µF	±10%	GRT155R60J684KE01#	D1
			1.0µF	±10%	GRT155R60J105KE01#	D1
	0.6mm	X5R	2.2µF	±10%	GRT155R60J225KE01#	D1
			0.22µF	±10%	GRT155R70G105KE01#	D1
			1.0µF	±10%	GRT155R6Y105KE13#	D1
			1.0µF	±10%	GRT155C81E105KE13#	D1
		X6S	1.0µF	±10%	GRT155C81C105KE13#	D1
			1.0µF	±10%	GRT155C71A105KE13#	D1
			4.7µF	±20%	GRT155R60J475ME13#	D1
			4.7µF	±20%	GRT155R60G475ME13#	D1
			4.7µF	±20%	GRT155R61A475ME13#	D1
	0.65mm	X5R	4.7µF	±20%	GRT155C80J475ME13#	D1
		X6S	4.7µF	±20%	GRT155C80J475ME13#	D1
		X7S	2.2µF	±10%	GRT155R61E225KE13#	D1
		X7S	2.2µF	±10%	GRT155C81C225KE13#	D1
		X7T	2.2µF	±10%	GRT155R70J106ME13#	D1
	0.7mm	X5R	2.2µF	±10%	GRT155R61E225KE13#	D1
		X6S	2.2µF	±10%	GRT155C81C225KE13#	D1
		X7S	2.2µF	±10%	GRT155C81C225KE13#	D1
		X7T	2.2µF	±10%	GRT155R70J106ME13#	D1
		X7T	2.2µF	±10%	GRT155R70J106ME13#	D1

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
0.7mm	16Vdc	X5R	2.2µF	±10%	GRT155R61C225KE13#	D1
		X7S	2.2µF	±10%	GRT155C71A225KE13#	D1
		X6S	2.2µF	±10%	GRT155C81A225KE13#	D1
		X7S	2.2µF	±10%	GRT155C70J225KE13#	D1
	2.5Vdc	X6S	10µF	±20%	GRT155C80E106ME13#	D1

1.6×0.8mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
0.9mm	100Vdc	X7R	3300pF	±10%	GRT188R72A332KE01#	D1
			10000pF	±10%	GRT188R72A103KE01#	D1
	50Vdc	X5R	1.0µF	±10%	GRT188R61H105KE13#	D1
	35Vdc	X6S	1.0µF	±10%	GRT188C8YA105KE13#	D1
		X5R	2.2µF	±10%	GRT188R6YA225KE13#	D1
	25Vdc	X7R	0.15µF	±10%	GRT188R71E154KE01#	D1
		X6S	0.22µF	±10%	GRT188R71E224KE01#	D1
			0.47µF	±10%	GRT188R71E474KE13#	D1
		X5R	1.0µF	±10%	GRT188R71E105KE13#	D1
	16Vdc	X7R	0.33µF	±10%	GRT188R71C334KE01#	D1
	4Vdc	X6S	0.47µF	±10%	GRT188R71C474KE01#	D1
			1.0µF	±10%	GRT188R71C105KE13#	D1
	6.3Vdc	X5R	10µF	±20%	GRT188R60J106ME13#	D1
	4Vdc	X6S	1.0µF	±20%	GRT188C80G105ME01#	D1
			4.7µF	±10%	GRT188C80G475KE01#	D1
		X5R	10µF	±20%	GRT188C80G106ME13#	D1
			4.7µF	±10%	GRT188C80G106ME13#	D1
			10µF	±20%	GRT188R60G106ME13#	D1
	2.5Vdc	X5R	4.7µF	±10%	GRT188C81E475KE13#	D1
	10Vdc	X5R	10µF	±10%	GRT188R61A106KE13#	D1
	2.5Vdc	X5R	22µF	±20%	GRT188R60E226ME13#	D1
	1.0mm	X5R	2.2µF	±10%	GRT188R61H225KE13#	D1
	35Vdc	X6S	2.2µF	±10%	GRT188C8YA225KE13#	D1
		X5R	4.7µF	±10%	GRT188R61C475KE13#	D1
		X5R	10µF	±10%	GRT188R61C106KE13#	D1
		X7S	10µF	±10%	GRT188R61A106KE13#	D1
		X7T	10µF	±10%	GRT188D71A106ME13#	D1
	16Vdc	X6S	10µF	±20%	GRT188C81C106ME13#	D1
		X6S	10µF	±20%	GRT188C81A106ME13#	D1
		X5R	22µF	±20%	GRT188R61A226ME13#	D1
		X7T	10µF	±20%	GRT188D70J106ME13#	D1
		X7T	10µF	±20%	GRT188C80J106ME13#	D1
	6.3Vdc	X6S	22µF	±20%	GRT188C80J226ME13#	D1
		X5R	22µF	±20%	GRT188R60J226ME13#	D1
		X7T	22µF	±20%	GRT188R60J226ME13#	D1
		X7T	22µF	±20%	GRT188C80G226ME13#	D1
		X6S	22µF	±20%	GRT188C80G226ME13#	D1

2.0×1.25mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
0.95mm	16Vdc	X5R	3.3µF	±10%	GRT219R61C335KE01#	D1

Part number # indicates the package specification code.

GRT Series High Dielectric Constant Type Part Number List

(→ 2.0×1.25mm)

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
0.95mm	10Vdc	X6S	4.7μF	±10%	GRT219C81A475KE01#	D1
1.35mm	100Vdc	X7R	47000pF	±10%	GRT21BR72A473KE01#	D1
	50Vdc	X7R	0.47μF	±10%	GRT21BR71H474KE01#	D1
			1.0μF	±10%	GRT21BR71H105KE01#	D1
1.4mm	16Vdc	X7R	2.2μF	±10%	GRT21BR71C225KE01#	D1
	50Vdc	X5R	4.7μF	±10%	GRT21BR61H475KE13#	D1
	35Vdc	X6S	4.7μF	±10%	GRT21BC8YA475KE13#	D1
	25Vdc	X7R	2.2μF	±10%	GRT21BR71E225KE13#	D1
		X6S	3.3μF	±10%	GRT21BC81E335KE13#	D1
	16Vdc	X7R	4.7μF	±10%	GRT21BR71C475KE13#	D1
		X6S	3.3μF	±10%	GRT21BC81C335KE13#	D1
	10Vdc	X7R	4.7μF	±10%	GRT21BR71A475KE13#	D1
		X5R	3.3μF	±10%	GRT21BR61A335KE13#	D1
	6.3Vdc	X5R	3.3μF	±10%	GRT21BR60J335KE13#	D1
1.45mm	50Vdc	X7S	4.7μF	±10%	GRT21BC71H475KE13#	D1
	25Vdc	X7S	4.7μF	±10%	GRT21BC71E475KE13#	D1
			10μF	±10%	GRT21BC71E106KE13#	D1
		X5R	22μF	±20%	GRT21BR61E226ME13#	D1
	16Vdc	X7S	10μF	±10%	GRT21BC71C106KE13#	D1
		X5R	22μF	±20%	GRT21BR61C226ME13#	D1
	10Vdc	X7T	22μF	±20%	GRT21BD71A226ME13#	D1
		X6S	22μF	±20%	GRT21BC81A226ME13#	D1
	6.3Vdc	X7T	22μF	±20%	GRT21BD70J226ME13#	D1
		X5R	47μF	±20%	GRT21BR60J476ME13#	D1
	4Vdc	X6S	47μF	±20%	GRT21BC80G476ME13#	D1
		X5R	47μF	±20%	GRT21BR60G476ME13#	D1

3.2×1.6mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
1.25mm	50Vdc	X6S	1.0μF	±10%	GRT31MC81H105KE01#	D1
	25Vdc	X6S	1.5μF	±10%	GRT31MC81E155KE01#	D1
		X5R	1.5μF	±10%	GRT31MR61E155KE01#	D1
	16Vdc	X6S	1.5μF	±10%	GRT31MC81C155KE01#	D1
			6.8μF	±10%	GRT31MC81C685KE01#	D1
		X5R	1.5μF	±10%	GRT31MR61C155KE01#	D1
			6.8μF	±10%	GRT31MR61C685KE01#	D1
	1.8mm	X7R	2.2μF	±10%	GRT31CR71H225KE13#	D1
		X6S	1.5μF	±10%	GRT31CC81H155KE01#	D1
			2.2μF	±10%	GRT31CC81H225KE01#	D1
		X5R	1.5μF	±10%	GRT31CR61H155KE01#	D1
			10μF	±10%	GRT31CR61H106KE01#	D1
	35Vdc	X6S	10μF	±10%	GRT31CC8YA106KE01#	D1
		X5R	10μF	±10%	GRT31CR6YA106KE01#	D1
		X6S	10μF	±10%	GRT31CC81E106KE01#	D1
	25Vdc	X5R	3.3μF	±10%	GRT31CR61E335KE01#	D1
		X6S	22μF	±10%	GRT31CC81C226KE01#	D1
	16Vdc	X5R	47μF	±10%	GRT31CR61A476KE13#	D1
	10Vdc	X5R	47μF	±10%	GRT31CR61A476KE13#	D1
	6.3Vdc	X6S	47μF	±10%	GRT31CC80J476KE13#	D1
		X5R	15μF	±10%	GRT31CR60J156KE01#	D1

3.2×2.5mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
1.5mm	25Vdc	X5R	6.8μF	±10%	GRT32NR61E685KE01#	D1
2.2mm	50Vdc	X6S	3.3μF	±10%	GRT32DC81H335KE01#	D1
		X5R	3.3μF	±10%	GRT32DR61H335KE01#	D1
	6.3Vdc	X5R	33μF	±20%	GRT32DR60J336ME01#	D1
2.7mm	50Vdc	X7R	4.7μF	±10%	GRT32ER71H475KE01#	D1
		X6S	4.7μF	±10%	GRT32EC81H475KE01#	D1
	16Vdc	X6S	47μF	±10%	GRT32EC81C476KE13#	D1
	10Vdc	X6S	47μF	±10%	GRT32EC81A476KE13#	D1
	6.3Vdc	X7R	47μF	±10%	GRT32ER70J476KE13#	D1
		X7S	100μF	±20%	GRT32EC70J107ME13#	D1
	X5R	100μF	±20%	GRT32ER60J107ME13#	D1	

Part number # indicates the package specification code.

muRata

Chip Multilayer Ceramic Capacitors for Automotive

GCM Series



Capacitor for automotive applications such as power train and safety equipment.

Features

1 Ideal for powertrains and safety devices in automotive.

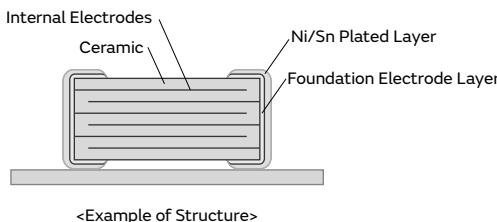
This product can be used for safety devices, such as the drive system control for engine ECU, air bags, and ABS. This product has cleared test conditions more severe than that of general products (GRM Series) even in temperature cycle and humidity load tests.

	General Purpose GRM Series Maximum operating temperature: 125°C	GCM Series for Automotive Maximum operating temperature: 150°C
Items	Test Method	Test Method
Temperature Cycle	Temperature Cycle: 5 cycles	Temperature Cycle: 100 cycles (1,000 cycles for AEC-Q200 conforming products)
Humidity Loading	Test temperature: 40±2°C Test humidity: 90 to 95%RH Test time: 500 hours	Test temperature: 85±2°C Test humidity: 80 to 85%RH Test time: 500 hours (1,000 hours for AEC-Q200 conforming products)

2 Can be used at 125°C and 150°C temperatures.

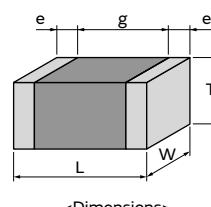
We also offer a lineup for 150°C that can be used in the engine room.

3 Sn plating is applied to the external electrodes; excellent solderability.



Specifications

Size	0.6×0.3mm to 5.7×5.0mm
Rated Voltage	4Vdc to 1000Vdc
Capacitance	0.10pF to 47μF
Main Applications	Safety equipment, such as drive system control, air bags, and ABS of engine ECU



GCM Series Temperature Compensating Type Part Number List

0.6×0.3mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number
0.33mm	50Vdc	COG	1.0pF	±0.25pF	GCM0335C1H1R0CA16#
			2.0pF	±0.25pF	GCM0335C1H2R0CA16#
			3.0pF	±0.25pF	GCM0335C1H3R0CA16#
			4.0pF	±0.25pF	GCM0335C1H4R0CA16#
			5.0pF	±0.25pF	GCM0335C1H5R0CA16#
			6.0pF	±0.5pF	GCM0335C1H6R0DA16#
			7.0pF	±0.5pF	GCM0335C1H7R0DA16#
			8.0pF	±0.5pF	GCM0335C1H8R0DA16#
			9.0pF	±0.5pF	GCM0335C1H9R0DA16#
			10pF	±5%	GCM0335C1H100JA16#
			12pF	±5%	GCM0335C1H120JA16#
			15pF	±5%	GCM0335C1H150JA16#
			18pF	±5%	GCM0335C1H180JA16#
			22pF	±5%	GCM0335C1H220JA16#
			27pF	±5%	GCM0335C1H270JA16#
			33pF	±5%	GCM0335C1H330JA16#
			39pF	±5%	GCM0335C1H390JA16#
			47pF	±5%	GCM0335C1H470JA16#
			56pF	±5%	GCM0335C1H560JA16#
			68pF	±5%	GCM0335C1H680JA16#
			82pF	±5%	GCM0335C1H820JA16#
			100pF	±5%	GCM0335C1H101JA16#
25Vdc	COG	COG	1.0pF	±0.25pF	GCM0335C1E1R0CA16#
			2.0pF	±0.25pF	GCM0335C1E2R0CA16#
			3.0pF	±0.25pF	GCM0335C1E3R0CA16#
			4.0pF	±0.25pF	GCM0335C1E4R0CA16#
			5.0pF	±0.25pF	GCM0335C1E5R0CA16#
			6.0pF	±0.5pF	GCM0335C1E6R0DA16#
			7.0pF	±0.5pF	GCM0335C1E7R0DA16#
			8.0pF	±0.5pF	GCM0335C1E8R0DA16#
			9.0pF	±0.5pF	GCM0335C1E9R0DA16#
			10pF	±5%	GCM0335C1E100JA16#
			12pF	±5%	GCM0335C1E120JA16#
			15pF	±5%	GCM0335C1E150JA16#
			18pF	±5%	GCM0335C1E180JA16#
			22pF	±5%	GCM0335C1E220JA16#
			27pF	±5%	GCM0335C1E270JA16#
			33pF	±5%	GCM0335C1E330JA16#
			39pF	±5%	GCM0335C1E390JA16#
			47pF	±5%	GCM0335C1E470JA16#
			56pF	±5%	GCM0335C1E560JA16#
			68pF	±5%	GCM0335C1E680JA16#
			82pF	±5%	GCM0335C1E820JA16#
			100pF	±5%	GCM0335C1E101JA16#

1.0×0.5mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number
0.55mm	50Vdc	COG	1.0pF	±0.25pF	GCM1555C1H1R0CA16#
			2.0pF	±0.25pF	GCM1555C1H2R0CA16#
			3.0pF	±0.25pF	GCM1555C1H3R0CA16#

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number
0.55mm	50Vdc	COG	0.55mm	50Vdc	COG
			4.0pF	±0.25pF	GCM1555C1H4R0CA16#
			5.0pF	±0.25pF	GCM1555C1H5R0CA16#
			6.0pF	±0.5pF	GCM1555C1H6R0DA16#
			7.0pF	±0.5pF	GCM1555C1H7R0DA16#
			8.0pF	±0.5pF	GCM1555C1H8R0DA16#
			9.0pF	±0.5pF	GCM1555C1H9R0DA16#
			10pF	±5%	GCM1555C1H100JA16#
			12pF	±5%	GCM1555C1H120JA16#
			15pF	±5%	GCM1555C1H150JA16#
			18pF	±5%	GCM1555C1H180JA16#
			22pF	±5%	GCM1555C1H220JA16#
			27pF	±5%	GCM1555C1H270JA16#
			33pF	±5%	GCM1555C1H330JA16#
			39pF	±5%	GCM1555C1H390JA16#
			47pF	±5%	GCM1555C1H470JA16#
			56pF	±5%	GCM1555C1H560JA16#
			68pF	±5%	GCM1555C1H680JA16#
			82pF	±5%	GCM1555C1H820JA16#
			100pF	±5%	GCM1555C1H101JA16#
			330pF	±5%	GCM1555C1H331JA16#
X8G	50Vdc	X8G	1.0pF	±0.25pF	GCM1555G1H1R0CA16#
			2.0pF	±0.25pF	GCM1555G1H2R0CA16#
			3.0pF	±0.25pF	GCM1555G1H3R0CA16#
			4.0pF	±0.25pF	GCM1555G1H4R0CA16#
			5.0pF	±0.25pF	GCM1555G1H5R0CA16#
			12pF	±5%	GCM1555G1H120JA16#
			15pF	±5%	GCM1555G1H150JA16#
			18pF	±5%	GCM1555G1H180JA16#
			22pF	±5%	GCM1555G1H220JA16#
			27pF	±5%	GCM1555G1H270JA16#
			33pF	±5%	GCM1555G1H330JA16#
			39pF	±5%	GCM1555G1H390JA16#
			47pF	±5%	GCM1555G1H470JA16#
			56pF	±5%	GCM1555G1H560JA16#
			68pF	±5%	GCM1555G1H680JA16#
			82pF	±5%	GCM1555G1H820JA16#
			100pF	±5%	GCM1555G1H101JA16#
			120pF	±5%	GCM1555G1H121JA16#
			150pF	±5%	GCM1555G1H151JA16#
			180pF	±5%	GCM1555G1H181JA16#
			220pF	±5%	GCM1555G1H221JA16#
			270pF	±5%	GCM1555G1H271JA16#
			330pF	±5%	GCM1555G1H331JA16#

Part number # indicates the package specification code.



GCM Series Temperature Compensating Type Power-train AEC-Q200 Part Number List

(→ 1.0×0.5mm)

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number
0.55mm	50Vdc	X8G	390pF	±5%	GCM1555G1H391JA16#
			470pF	±5%	GCM1555G1H471JA16#
			560pF	±5%	GCM1555G1H561JA16#
			680pF	±5%	GCM1555G1H681JA16#
			820pF	±5%	GCM1555G1H821JA16#
			1000pF	±5%	GCM1555G1H102JA16#

1.6×0.8mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number
0.9mm	100Vdc	COG	1.0pF	±0.25pF	GCM1885C2A1R0CA16#
			2.0pF	±0.25pF	GCM1885C2A2R0CA16#
			3.0pF	±0.25pF	GCM1885C2A3R0CA16#
			4.0pF	±0.25pF	GCM1885C2A4R0CA16#
			5.0pF	±0.25pF	GCM1885C2A5R0CA16#
			6.0pF	±0.5pF	GCM1885C2A6R0DA16#
			7.0pF	±0.5pF	GCM1885C2A7R0DA16#
			8.0pF	±0.5pF	GCM1885C2A8R0DA16#
			9.0pF	±0.5pF	GCM1885C2A9R0DA16#
			10pF	±5%	GCM1885C2A100JA16#
			12pF	±5%	GCM1885C2A120JA16#
			15pF	±5%	GCM1885C2A150JA16#
			18pF	±5%	GCM1885C2A180JA16#
			22pF	±5%	GCM1885C2A220JA16#
			27pF	±5%	GCM1885C2A270JA16#
			33pF	±5%	GCM1885C2A330JA16#
			39pF	±5%	GCM1885C2A390JA16#
			47pF	±5%	GCM1885C2A470JA16#
			56pF	±5%	GCM1885C2A560JA16#
			68pF	±5%	GCM1885C2A680JA16#
			82pF	±5%	GCM1885C2A820JA16#
			100pF	±5%	GCM1885C2A101JA16#
			120pF	±5%	GCM1885C2A121JA16#
			150pF	±5%	GCM1885C2A151JA16#
			180pF	±5%	GCM1885C2A181JA16#
			220pF	±5%	GCM1885C2A221JA16#
			270pF	±5%	GCM1885C2A271JA16#
			330pF	±5%	GCM1885C2A331JA16#
			390pF	±5%	GCM1885C2A391JA16#
			470pF	±5%	GCM1885C2A471JA16#
			560pF	±5%	GCM1885C2A561JA16#
			680pF	±5%	GCM1885C2A681JA16#
			820pF	±5%	GCM1885C2A821JA16#
			1000pF	±5%	GCM1885C2A102JA16#
			1200pF	±5%	GCM1885C2A122JA16#
			1500pF	±5%	GCM1885C2A152JA16#
U2J	100Vdc	ZLM	1000pF	±5%	GCM1887U2A102JA16#
			1200pF	±5%	GCM1887U2A122JA16#
			1500pF	±5%	GCM1887U2A152JA16#
			1800pF	±5%	GCM1887U2A182JA16#
			2200pF	±5%	GCM1887U2A222JA16#
			2700pF	±5%	GCM1887U2A272JA16#
			3300pF	±5%	GCM1887U2A332JA16#
			3900pF	±5%	GCM1887U2A392JA16#
			4700pF	±5%	GCM1887U2A472JA16#
			5600pF	±5%	GCM1887U2A562JA16#

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number
0.9mm	100Vdc	U2J	3900pF	±5%	GCM1887U2A392JA16#
			4700pF	±5%	GCM1887U2A472JA16#
			5600pF	±5%	GCM1887U2A562JA16#
			6800pF	±5%	GCM1887U2A682JA16#
			8200pF	±5%	GCM1887U2A822JA16#
			10000pF	±5%	GCM1887U2A103JA16#
			1800pF	±5%	GCM1885C1K182JA16#
			2200pF	±5%	GCM1885C1K222JA16#
			2700pF	±5%	GCM1885C1K272JA16#
			3900pF	±5%	GCM1885C1K392JA16#
50Vdc	COG	U2J	1200pF	±5%	GCM1885C1H122JA16#
			1500pF	±5%	GCM1885C1H152JA16#
			1800pF	±5%	GCM1885C1H182JA16#
			2200pF	±5%	GCM1885C1H222JA16#
			2700pF	±5%	GCM1885C1H272JA16#
			3300pF	±5%	GCM1885C1H332JA16#
			3900pF	±5%	GCM1885C1H392JA16#
			4700pF	±5%	GCM1885C1H472JA16#
			5600pF	±5%	GCM1885C1H562JA16#
			6800pF	±5%	GCM1885C1H682JA16#
80Vdc	COG	U2J	8200pF	±5%	GCM1885C1H822JA16#
			10000pF	±5%	GCM1887U1H103JA16#
			1000pF	±5%	GCM1887U1H102JA16#
			1200pF	±5%	GCM1887U1H122JA16#
			1500pF	±5%	GCM1887U1H152JA16#
			1800pF	±5%	GCM1887U1H182JA16#
			2200pF	±5%	GCM1887U1H222JA16#
			2700pF	±5%	GCM1887U1H272JA16#
			3300pF	±5%	GCM1887U1H332JA16#
			3900pF	±5%	GCM1887U1H392JA16#
0.7mm	100Vdc	COG	4700pF	±5%	GCM2165C2A182JA16#
			5600pF	±5%	GCM2165C2A222JA16#
			6800pF	±5%	GCM2165C2A272JA16#
			8200pF	±5%	GCM2165C2A332JA16#
			10000pF	±5%	GCM2165C2A472JA16#
			12000pF	±5%	GCM2165C2A562JA16#
			15000pF	±5%	GCM2165C2A682JA16#
			18000pF	±5%	GCM2165C2A822JA16#
			22000pF	±5%	GCM2165C2A103JA16#
			27000pF	±5%	GCM2165C2A122JA16#
0.95mm	100Vdc	ZLM	1000pF	±10%	GCM2199E2A102MA05#
			1100pF	±20%	GCM2199E2A112MA05#
			1200pF	±10%	GCM2199E2A122KA05#
			1300pF	±20%	GCM2199E2A132KA05#
			1500pF	±10%	GCM2199E2A152KA05#
			1700pF	±20%	GCM2199E2A172KA05#
			1900pF	±10%	GCM2199E2A192KA05#
			2100pF	±20%	GCM2199E2A212KA05#
			2300pF	±10%	GCM2199E2A232KA05#
			2500pF	±20%	GCM2199E2A252KA05#

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number
0.95mm	100Vdc	ZLM	1000pF	±10%	GCM2199E2A102MA05#
			1100pF	±20%	GCM2199E2A112MA05#
			1200pF	±10%	GCM2199E2A122KA05#
			1300pF	±20%	GCM2199E2A132KA05#
			1500pF	±10%	GCM2199E2A152KA05#
			1700pF	±20%	GCM2199E2A172KA05#
			1900pF	±10%	GCM2199E2A192KA05#
			2100pF	±20%	GCM2199E2A212KA05#
			2300pF	±10%	GCM2199E2A232KA05#
			2500pF	±20%	GCM2199E2A252KA05#

Part number # indicates the package specification code.

GCM Series Temperature Compensating Type Part Number List

(→ 2.0×1.25mm)

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number
0.95mm	100Vdc	ZLM	1500pF	±20%	GCM2199E2A152MA05#
			6800pF	±5%	GCM2195C1K682JA16#
			8200pF	±5%	GCM2195C1K822JA16#
			10000pF	±5%	GCM2195C1K103JA16#
			12000pF	±5%	GCM2195C1K123JA16#
			15000pF	±5%	GCM2195C1K153JA16#
	80Vdc	COG	12000pF	±5%	GCM2195C1H123JA16#
			15000pF	±5%	GCM2195C1H153JA16#
	50Vdc	COG	10pF	±5%	GCM21A5C2J100JX01#
			15pF	±5%	GCM21A5C2J150JX01#
			22pF	±5%	GCM21A5C2J220JX01#
			33pF	±5%	GCM21A5C2J330JX01#
			47pF	±5%	GCM21A5C2J470JX01#
			68pF	±5%	GCM21A5C2J680JX01#
			100pF	±5%	GCM21A5C2J101JX01#
			150pF	±5%	GCM21A5C2J151JX01#
			220pF	±5%	GCM21A5C2J221JX01#
			330pF	±5%	GCM21A5C2J331JX01#
			470pF	±5%	GCM21A5C2J471JX01#
	250Vdc	COG	10pF	±5%	GCM21A5C2E100JX01#
			15pF	±5%	GCM21A5C2E150JX01#
			22pF	±5%	GCM21A5C2E220JX01#
			33pF	±5%	GCM21A5C2E330JX01#
			47pF	±5%	GCM21A5C2E470JX01#
			68pF	±5%	GCM21A5C2E680JX01#
			100pF	±5%	GCM21A5C2E101JX01#
			150pF	±5%	GCM21A5C2E151JX01#
			220pF	±5%	GCM21A5C2E221JX01#
			330pF	±5%	GCM21A5C2E331JX01#
			470pF	±5%	GCM21A5C2E471JX01#
			680pF	±5%	GCM21A5C2E681JX01#
			1000pF	±5%	GCM21A5C2E102JX01#
			1500pF	±5%	GCM21A5C2E152JX01#
	U2J	U2J	2200pF	±5%	GCM21A5C2E222JX01#
			100pF	±5%	GCM21A7U2E101JX01#
			150pF	±5%	GCM21A7U2E151JX01#
			220pF	±5%	GCM21A7U2E221JX01#
			330pF	±5%	GCM21A7U2E331JX01#
			470pF	±5%	GCM21A7U2E471JX01#
			680pF	±5%	GCM21A7U2E681JX01#
			1000pF	±5%	GCM21A7U2E102JX01#
			1500pF	±5%	GCM21A7U2E152JX01#
			2200pF	±5%	GCM21A7U2E222JX01#
	1.4mm	80Vdc	18000pF	±5%	GCM21B5C1K183JA16#
			22000pF	±5%	GCM21B5C1K223JA16#
		50Vdc	18000pF	±5%	GCM21B5C1H183JA16#
			22000pF	±5%	GCM21B5C1H223JA16#
	1.45mm	630Vdc	680pF	±5%	GCM21B5C2J681JX03#
			1000pF	±5%	GCM21B5C2J102JX03#
			1500pF	±5%	GCM21B5C2J152JX0A#
			2200pF	±5%	GCM21B5C2J222JX0A#
		250Vdc	3300pF	±5%	GCM21B5C2E332JX01#
			4700pF	±5%	GCM21B5C2E472JX01#
			6800pF	±5%	GCM21B5C2E682JX0A#

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number
1.45mm	1.45mm	COG	10000pF	±5%	GCM21B5C2E103JX0A#
			3300pF	±5%	GCM21B7U2E332JX03#
			4700pF	±5%	GCM21B7U2E472JX03#

3.2×1.6mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number
0.95mm	0.95mm	COG	3900pF	±5%	GCM3195C2A392JA16#
			4700pF	±5%	GCM3195C2A472JA16#
			5600pF	±5%	GCM3195C2A562JA16#
			6800pF	±5%	GCM3195C2A682JA16#
			8200pF	±5%	GCM3195C2A822JA16#
	1.0mm	COG	10000pF	±5%	GCM3195C2A103JA16#
			27000pF	±5%	GCM3195C1K273JA16#
			33000pF	±5%	GCM3195C1K333JA16#
			10pF	±5%	GCM31A5C3A100JX01#
			15pF	±5%	GCM31A5C3A150JX01#
1.0mm	1.0mm	COG	22pF	±5%	GCM31A5C3A220JX01#
			33pF	±5%	GCM31A5C3A330JX01#
			47pF	±5%	GCM31A5C3A470JX01#
			68pF	±5%	GCM31A5C3A680JX01#
			100pF	±5%	GCM31A5C3A101JX01#
			150pF	±5%	GCM31A5C3A151JX01#
			220pF	±5%	GCM31A5C3A221JX01#
			330pF	±5%	GCM31A5C3A331JX01#
			470pF	±5%	GCM31A5C3A471JX01#
	U2J	U2J	10pF	±5%	GCM31A7U3A100JX01#
			15pF	±5%	GCM31A7U3A150JX01#
			22pF	±5%	GCM31A7U3A220JX01#
			33pF	±5%	GCM31A7U3A330JX01#
			47pF	±5%	GCM31A7U3A470JX01#
			68pF	±5%	GCM31A7U3A680JX01#
1.4mm	630Vdc	COG	100pF	±5%	GCM31A7U3A101JX01#
			150pF	±5%	GCM31A7U3A151JX01#
			220pF	±5%	GCM31A7U3A221JX01#
			330pF	±5%	GCM31A7U3A331JX01#
			470pF	±5%	GCM31A7U3A471JX01#
			680pF	±5%	GCM31A7U3A680JX01#
			100pF	±5%	GCM31A7U3A101JX01#
			150pF	±5%	GCM31A7U3A151JX01#
			220pF	±5%	GCM31A7U3A221JX01#
			330pF	±5%	GCM31A7U3A331JX01#
1.45mm	1.45mm	COG	10pF	±5%	GCM31A5C2J100JX01#
			15pF	±5%	GCM31A5C2J150JX01#
			22pF	±5%	GCM31A5C2J220JX01#
			33pF	±5%	GCM31A5C2J330JX01#
			47pF	±5%	GCM31A5C2J470JX01#
			68pF	±5%	GCM31A5C2J680JX01#
1.4mm	1.4mm	COG	100pF	±5%	GCM31A5C2J101JX01#
			150pF	±5%	GCM31A5C2J151JX01#
			220pF	±5%	GCM31A5C2J221JX01#
			330pF	±5%	GCM31A5C2J331JX01#
			470pF	±5%	GCM31A5C2J471JX01#
			680pF	±5%	GCM31A5C2J680JX01#
1.45mm	1.45mm	COG	1000pF	±5%	GCM31A5C2J102JX01#
			1500pF	±5%	GCM31A5C2J152JX01#
			2200pF	±5%	GCM31A5C2J222JX01#
			3300pF	±5%	GCM31A5C2J332JX01#
			4700pF	±5%	GCM31A5C2J472JX01#
			6800pF	±5%	GCM31A5C2J682JX01#

Part number # indicates the package specification code.



GCM Series Temperature Compensating Type Power-train AEC-Q200 Part Number List

(→ 3.2×1.6mm)

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number
1.0mm	630Vdc	U2J	33pF	±5%	GCM31A7U2J330JX01#
			47pF	±5%	GCM31A7U2J470JX01#
			68pF	±5%	GCM31A7U2J680JX01#
			100pF	±5%	GCM31A7U2J101JX01#
			150pF	±5%	GCM31A7U2J151JX01#
			220pF	±5%	GCM31A7U2J221JX01#
			330pF	±5%	GCM31A7U2J331JX01#
			470pF	±5%	GCM31A7U2J471JX01#
			680pF	±5%	GCM31A7U2J681JX01#
			1000pF	±5%	GCM31A7U2J102JX01#
1.25mm	1000Vdc	COG	680pF	±5%	GCM31B5C3A681JX01#
			470pF	±5%	GCM31B7U3A471JX01#
			680pF	±5%	GCM31B7U3A681JX01#
		630Vdc	2200pF	±5%	GCM31B5C2J222JX01#
			3300pF	±5%	GCM31B7U2J332JX01#
		250Vdc	6800pF	±5%	GCM31B7U2E682JX01#
			10000pF	±5%	GCM31B7U2E103JX01#
1.8mm	1000Vdc	COG	1000pF	±5%	GCM31C5C3A102JX03#
		U2J	1000pF	±5%	GCM31C7U3A102JX03#
	630Vdc	COG	3300pF	±5%	GCM31C5C2J332JX03#
			4700pF	±5%	GCM31C5C2J472JX03#
		U2J	4700pF	±5%	GCM31C7U2J472JX03#
	250Vdc	COG	15000pF	±5%	GCM31C5C2E153JX03#
			22000pF	±5%	GCM31C5C2E223JX03#
	100Vdc	COG	68000pF	±5%	GCM31C5C2A683JE02#
			82000pF	±5%	GCM31C5C2A823JE02#
			0.10μF	±5%	GCM31C5C2A104JE02#
50Vdc	COG	68000pF	±5%	GCM31C5C1H683JA16#	
			82000pF	±5%	GCM31C5C1H823JA16#
			0.10μF	±5%	GCM31C5C1H104JA16#

3.2×2.5mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number
1.0mm	630Vdc	U2J	1500pF	±5%	GCM32A7U2J152JX01#
			2200pF	±5%	GCM32A7U2J222JX01#
1.5mm	1000Vdc	U2J	1500pF	±5%	GCM32Q7U3A152JX01#
			6800pF	±5%	GCM32Q7U2J682JX01#
2.0mm	1000Vdc	U2J	2200pF	±5%	GCM32D7U3A222JX01#
			10000pF	±5%	GCM32D7U2J103JX01#

4.5×3.2mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number
1.5mm	1000Vdc	U2J	3300pF	±5%	GCM43Q7U3A332JX01#
2.0mm	1000Vdc	U2J	4700pF	±5%	GCM43D7U3A472JX01#
			15000pF	±5%	GCM43D7U2J153JX01#
			22000pF	±5%	GCM43D7U2J223JX01#

5.7×5.0mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number
1.5mm	1000Vdc	U2J	6800pF	±5%	GCM55Q7U3A682JX01#
2.0mm	1000Vdc	U2J	10000pF	±5%	GCM55D7U3A103JX01#
			630Vdc	±5%	GCM55D7U2J333JX01#
			47000pF	±5%	GCM55D7U2J473JX01#

GCM Series High Dielectric Constant Type Part Number List

0.6×0.3mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number
0.33mm	25Vdc	X7R	100pF	±10%	GCM033R71E101KA03#
			150pF	±10%	GCM033R71E151KA03#
			220pF	±10%	GCM033R71E221KA03#
			330pF	±10%	GCM033R71E331KA03#
			470pF	±10%	GCM033R71E471KA03#
			680pF	±10%	GCM033R71E681KA03#
			1000pF	±10%	GCM033R71E102KA03#
			1500pF	±10%	GCM033R71E152KA03#
			2200pF	±10%	GCM033R71E222KE02#
			3300pF	±10%	GCM033R71E332KE02#
			330pF	±10%	GCM033R71C331KA03#
			680pF	±10%	GCM033R71C681KA03#
			2200pF	±10%	GCM033R71C222KA55#
			3300pF	±10%	GCM033R71C332KA55#
			4700pF	±10%	GCM033R71A472KA03#
			6800pF	±10%	GCM033R71A682KA03#
			10000pF	±10%	GCM033R71A103KA03#

1.0×0.5mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number
0.55mm	100Vdc	X7R	220pF	±10%	GCM155R72A221KA37#
			330pF	±10%	GCM155R72A331KA37#
			470pF	±10%	GCM155R72A471KA37#
			680pF	±10%	GCM155R72A681KA37#
			1000pF	±10%	GCM155R72A102KA37#
			1500pF	±10%	GCM155R72A152KA37#
			2200pF	±10%	GCM155R72A222KA37#
			3300pF	±10%	GCM155R72A332KA37#
			4700pF	±10%	GCM155R72A472KA37#
			33000pF	±10%	GCM155L8EH333KE07# D4
			47000pF	±10%	GCM155L8EH473KE07# D4
			68000pF	±10%	GCM155L8EH683KE07# D4
			0.10µF	±10%	GCM155L8EH104KE07# D4
			220pF	±10%	GCM155R71H221KA37#
			330pF	±10%	GCM155R71H331KA37#
			470pF	±10%	GCM155R71H471KA37#
			680pF	±10%	GCM155R71H681KA37#
			1000pF	±10%	GCM155R71H102KA37#
			1500pF	±10%	GCM155R71H152KA37#
			2200pF	±10%	GCM155R71H222KA37#
			3300pF	±10%	GCM155R71H332KA37#
			4700pF	±10%	GCM155R71H472KA37#
			6800pF	±10%	GCM155R71H682KA55#
			10000pF	±10%	GCM155R71H103KA55#
			15000pF	±10%	GCM155R71H153KA55#
			22000pF	±10%	GCM155R71H223KA55#
			33000pF	±10%	GCM155R71H333KE02#
			47000pF	±10%	GCM155R71H473KE02#
			68000pF	±10%	GCM155R71H683KE02#
			0.10µF	±10%	GCM155R71H104KE02#

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number
0.55mm	25Vdc	X8L	0.10µF	±10%	GCM155L81E104KE02#
			10000pF	±10%	GCM155R71E103KA37#
			15000pF	±10%	GCM155R71E153KA55#
			22000pF	±10%	GCM155R71E223KA55#
			33000pF	±10%	GCM155R71E333KA55#
			47000pF	±10%	GCM155R71E473KA55#
			33000pF	±10%	GCM155R71C333KA37#
			47000pF	±10%	GCM155R71C473KA37#
			68000pF	±10%	GCM155R71C683KA55#
			0.10µF	±10%	GCM155R71C104KA55#
			0.15µF	±10%	GCM155R71C154KE02#
			0.22µF	±10%	GCM155R71C224KE02#
			0.47µF	±10%	GCM155C71A474KE36#
			0.68µF	±10%	GCM155C71A684KE38#
			1.0µF	±10%	GCM155C71A105KE38#

1.6×0.8mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number
0.9mm	100Vdc	X7R	6800pF	±10%	GCM188R72A682KA37#
			10000pF	±10%	GCM188R72A103KA37#
			15000pF	±10%	GCM188R72A153KA37#
			22000pF	±10%	GCM188R72A223KA37#
			0.22µF	±10%	GCM188R71H224KA64#
			0.25µF	±10%	GCM188R71E224KA55#
			0.47µF	±10%	GCM188R71E474KA64#
			1.0µF	±10%	GCM188R71E105KA64#
			0.33µF	±10%	GCM188R71C334KA37#
			0.47µF	±10%	GCM188R71C474KA55#
			1.0µF	±10%	GCM188R71C105KA64#
			2.2µF	±10%	GCM188R70J225KE22#
			4Vdc	±20%	GCM188D70G106ME36#
			10µF	±20%	GCM188D70G106ME36#

2.0×1.25mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number
0.95mm	100Vdc	X7R	33000pF	±10%	GCM219R72A333KA37#
			0.33µF	±10%	GCM219R71H334KA55#
			0.47µF	±10%	GCM219R71E474KA55#
			1.0µF	±10%	GCM219R71C105KA37#
			47000pF	±10%	GCM21BR72A473KA37#
			68000pF	±10%	GCM21BR72A683KA37#
			0.10µF	±10%	GCM21BR72A104KA37#
			0.22µF	±10%	GCM21BR71H224KA37#
			0.47µF	±10%	GCM21BR71H474KA55#
			1.0µF	±10%	GCM21BR71H105KA03#
			2.2µF	±10%	GCM21BL8EG225KE07# D4
			0.68µF	±10%	GCM21BR7YEA684KA55#
			1.0µF	±10%	GCM21BR7YEA105KA55#
			1.5µF	±10%	GCM21BR7YEA155KA54#
			2.2µF	±10%	GCM21BC7YEA225KE02#

Part number # indicates the package specification code.

GCM Series High Dielectric Constant Type Part Number List

(→ 2.0×1.25mm)

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
1.4mm	25Vdc	X8L	1.5μF	±10%	GCM21BL8EF155KA07#	D4
		X7R	0.33μF	±10%	GCM21BR71E334KA37#	
			0.68μF	±10%	GCM21BR71E684KA55#	
			1.0μF	±10%	GCM21BR71E105KA56#	
			1.5μF	±10%	GCM21BR71E155KA54#	
			2.2μF	±10%	GCM21BR71E225KA73#	
	16Vdc	X7R	2.2μF	±10%	GCM21BR71C225KA64#	
			4.7μF	±10%	GCM21BR71C475KA73#	
	10Vdc	X7R	2.2μF	±10%	GCM21BR71A225KA37#	
			10μF	±10%	GCM21BR71A106KE22#	
		X7S	4.7μF	±10%	GCM21BC71A475KA73#	
	6.3Vdc	X7R	10μF	±10%	GCM21BR70J106KE22#	
1.45mm	100Vdc	X7S	1.0μF	±10%	GCM21BC72A105KE36#	
	35Vdc	X8L	4.7μF	±10%	GCM21BL8EG475KE08#	D4
		X7S	4.7μF	±10%	GCM21BC7YA475KE36#	
	25Vdc	X8L	4.7μF	±10%	GCM21BL8EF475KE08#	D4
		X7S	4.7μF	±10%	GCM21BC71E475KE36#	
	16Vdc	X8M	10μF	±10%	GCM21BM8EE106KE08#	D4
		X7S	10μF	±10%	GCM21BC71C106KE36#	

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
2.85mm	25Vdc	X8L	22μF	±10%	GCM32EL8EF226KE08#	D4
		X7S	22μF	±10%	GCM32EC71E226KE36#	

3.2×1.6mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
1.25mm	100Vdc	X7R	0.22μF	±10%	GCM31MR72A224KA37#	
	25Vdc	X8L	1.0μF	±10%	GCM31ML81E105KA37#	
1.8mm	100Vdc	X8L	2.2μF	±10%	GCM31CL8EL225KE07#	D4
		X7S	2.2μF	±10%	GCM31CC72A225KE02#	
	50Vdc	X8L	1.0μF	±10%	GCM31CL81H105KA55#	
		X7R	2.2μF	±10%	GCM31CR71H225KA55#	
		X7S	4.7μF	±10%	GCM31CC71H475KA03#	
	25Vdc	X8R	1.0μF	±10%	GCM31CR91E105KA37#	
		X7R	4.7μF	±10%	GCM31CR71E475KA55#	
	16Vdc	X7R	4.7μF	±10%	GCM31CR71C475KA37#	
			10μF	±10%	GCM31CR71C106KA64#	
		X7R	22μF	±10%	GCM31CR71A226KE02#	
	10Vdc	X7R	22μF	±20%	GCM31CR70J226ME23#	
	6.3Vdc	X7R	22μF	±20%	GCM31CR71E106KA03#	
1.9mm	25Vdc	X7S	10μF	±10%	GCM31CC71E106KA03#	

3.2×2.5mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
2.2mm	100Vdc	X8L	4.7μF	±10%	GCM32DL8EL475KE07#	D4
		X7S	4.7μF	±10%	GCM32DC72A475KE02#	
2.7mm	50Vdc	X8L	10μF	±10%	GCM32EL8EH106KA07#	D4
		X7R	4.7μF	±10%	GCM32ER71H475KA55#	
		X7S	10μF	±10%	GCM32EC71H106KA03#	
	35Vdc	X7S	10μF	±10%	GCM32EC7YA106KA03#	
	25Vdc	X7R	10μF	±10%	GCM32ER71E106KA57#	
	16Vdc	X7R	22μF	±20%	GCM32ER71C226ME19#	
	10Vdc	X7R	22μF	±20%	GCM32ER71A226ME12#	
		X7S	47μF	±10%	GCM32EC71A476KE02#	
	6.3Vdc	X7R	47μF	±20%	GCM32ER70J476ME19#	

Part number # indicates the package specification code.

High Effective Capacitance & High Ripple Current Chip Multilayer Ceramic Capacitors for Automotive

GC3 Series

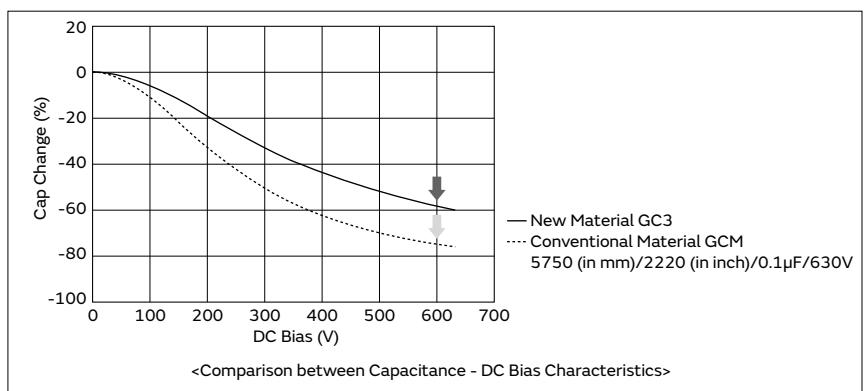


This is a high ripple resistance product for automotive excellent in DC bias characteristics.

Features

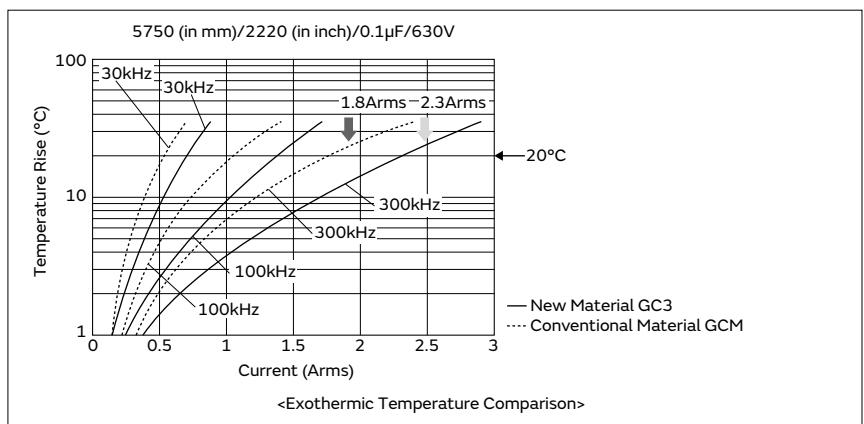
- When a DC bias is applied, a capacitance higher than conventional products (X7R characteristics) can be acquired.

When DC600V is applied, about twice the capacitance can be secured.



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

In the case of a product with a capacitance of $0.1\mu F$, when the exothermic temperature reaches $20^\circ C$ at frequency $f=300kHz$, the amount of resistance of a product with conventional material is 1.8Arms; however, the new material is 2.3Arms.

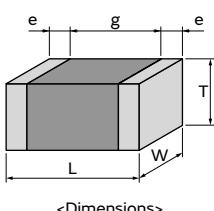


- This product has a noise reduction effect.

Since dielectric materials that enable a reduction of noise are used, this product is more effective for reducing noise compared to the GCM series for automotive.

Specifications

Size	2.0×1.25mm to 5.7×5.0mm
Rated Voltage	250Vdc to 630Vdc
Capacitance	10000pF to $1.0\mu F$
Main Applications	For PFC (Power Factor Correction) Circuits of Power Supplies, EMI Suppression and Smoothing Circuits of automotive



GC3 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	X7T	10000pF	±10%	GC321AD72E103KX01#
			15000pF	±10%	GC321AD72E153KX01#
1.45mm	250Vdc	X7T	22000pF	±10%	GC321BD72E223KX03#

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number
2.7mm	250Vdc	X7T	1.0μF	±10%	GC355XD72E105KX05#

3.2×1.6mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number
1.0mm	450Vdc	X7T	10000pF	±10%	GC331AD72W103KX01#
			15000pF	±10%	GC331AD72W153KX01#
1.25mm	250Vdc	X7T	33000pF	±10%	GC331AD72E333KX01#
			450Vdc	±10%	GC331BD72J103KX01#
	450Vdc	X7T	22000pF	±10%	GC331BD72W223KX01#
			33000pF	±10%	GC331BD72W333KX01#
1.8mm	250Vdc	X7T	47000pF	±10%	GC331BD72E473KX01#
	630Vdc	X7T	15000pF	±10%	GC331CD72J153KX03#
	450Vdc	X7T	47000pF	±10%	GC331CD72W473KX03#
	250Vdc	X7T	68000pF	±10%	GC331CD72E683KX03#

3.2×2.5mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number
1.5mm	630Vdc	X7T	22000pF	±10%	GC332QD72J223KX01#
			250Vdc	±10%	GC332QD72E104KX01#
2.0mm	630Vdc	X7T	33000pF	±10%	GC332DD72J333KX01#
			47000pF	±10%	GC332DD72J473KX01#
	450Vdc	X7T	68000pF	±10%	GC332DD72W683KX01#
			0.10μF	±10%	GC332DD72W104KX01#
	250Vdc	X7T	0.15μF	±10%	GC332DD72E154KX01#

4.5×3.2mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number
1.5mm	250Vdc	X7T	0.22μF	±10%	GC343QD72E224KX01#
2.0mm	630Vdc	X7T	68000pF	±10%	GC343DD72J683KX01#
	450Vdc	X7T	0.15μF	±10%	GC343DD72W154KX01#
	250Vdc	X7T	0.33μF	±10%	GC343DD72E334KX01#

5.7×5.0mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number
2.0mm	630Vdc	X7T	0.10μF	±10%	GC355DD72J104KX01#
			0.15μF	±10%	GC355DD72J154KX01#
	450Vdc	X7T	0.22μF	±10%	GC355DD72W224KX01#
			0.33μF	±10%	GC355DD72W334KX01#
			0.47μF	±10%	GC355DD72W474KX01#
	250Vdc	X7T	0.47μF	±10%	GC355DD72E474KX01#
			0.68μF	±10%	GC355DD72E684KX01#
2.7mm	630Vdc	X7T	0.22μF	±10%	GC355XD72J224KX05#

Part number # indicates the package specification code.

Soft Termination Chip Multilayer Ceramic Capacitors for Automotive

GCJ Series



Power-train
AEC-Q200
Fail-safe
Deflecting crack

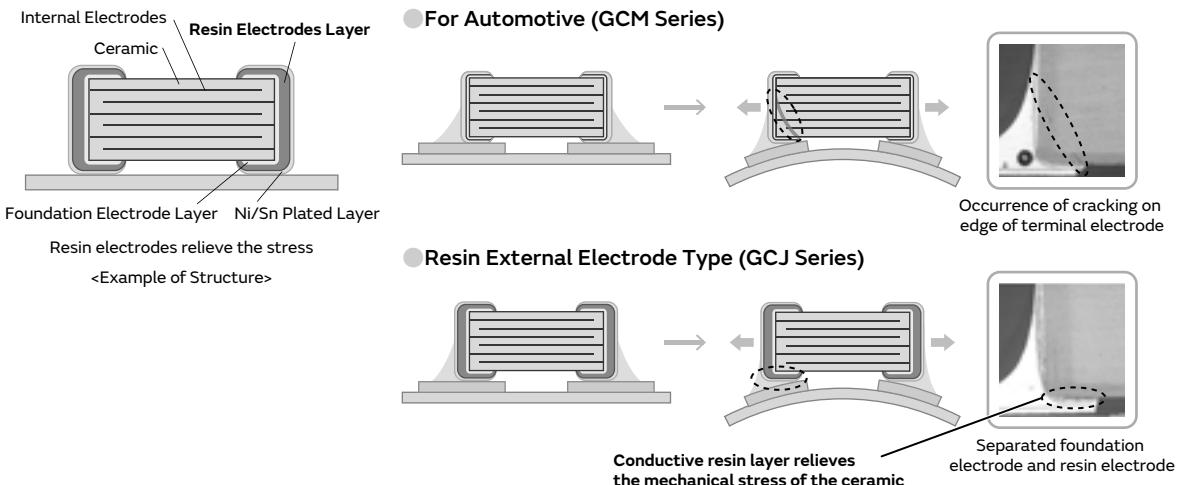
WEB

Cracking caused by flexing stress after board mounting is minimized due to resin external electrodes!

Features

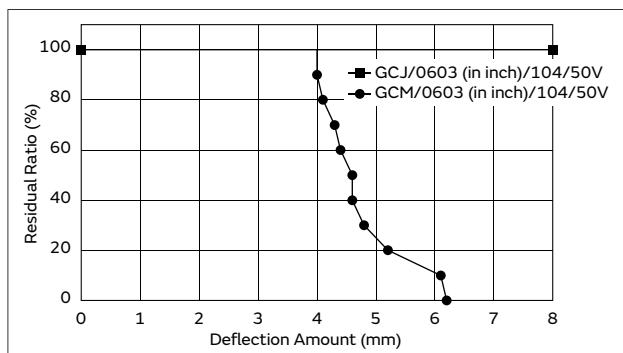
1 The resin external electrodes suppress cracks by board deflection.

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



Note: Cracks may occur in the capacitor body if excessive stress beyond the "guaranteed range of board bending strength (*)" provided in the specifications is applied. Capacitors with cracks in them may cause a drop in insulation resistance, which could lead to a short circuit.
(*) For details on the guaranteed range of board bending strength, check the "Detailed Specification Sheet" on the Product Details Page.

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



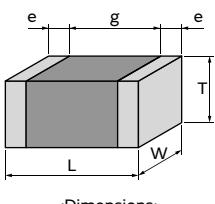
Products shall be judged to be defective if the change in capacitance has exceeded $\pm 12.5\%$.
The measurement specification is 8mm max.

3 Ideal for automotive.

The products conform to the AEC-Q200.

Specifications

Size	1.6×0.8mm to 5.7×5.0mm
Rated Voltage	6.3Vdc to 1000Vdc
Capacitance	220pF to 47μF
Main Applications	Battery Lines and Powertrains for automotive



GCJ Series High Dielectric Constant Type Power-train AEC-Q200 Fail-safe Deflecting crack Part Number List

1.6×0.8mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
0.9mm	100Vdc	X8L	0.10µF	±10%	GCJ188L8EL104KA07#	D4
		X8R	1000pF	±10%	GCJ188R92A102KA01#	
			1200pF	±10%	GCJ188R92A122KA01#	
			1500pF	±10%	GCJ188R92A152KA01#	
			1800pF	±10%	GCJ188R92A182KA01#	
			2200pF	±10%	GCJ188R92A222KA01#	
			2700pF	±10%	GCJ188R92A272KA01#	
			3300pF	±10%	GCJ188R92A332KA01#	
			3900pF	±10%	GCJ188R92A392KA01#	
			4700pF	±10%	GCJ188R92A472KA01#	
			5600pF	±10%	GCJ188R92A562KA01#	
			6800pF	±10%	GCJ188R92A682KA01#	
			8200pF	±10%	GCJ188R92A822KA01#	
			10000pF	±10%	GCJ188R92A103KA01#	
			12000pF	±10%	GCJ188R92A123KA01#	
			15000pF	±10%	GCJ188R92A153KA01#	
			18000pF	±10%	GCJ188R92A183KA01#	
			22000pF	±10%	GCJ188R92A223KA01#	
			27000pF	±10%	GCJ188R92A273KA01#	
			33000pF	±10%	GCJ188R92A333KA01#	
			39000pF	±10%	GCJ188R92A393KA01#	
			47000pF	±10%	GCJ188R92A473KA01#	
			56000pF	±10%	GCJ188R92A563KA01#	
			68000pF	±10%	GCJ188R92A683KA01#	
		X7R	1000pF	±10%	GCJ188R72A102KA01#	
			1200pF	±10%	GCJ188R72A122KA01#	
			1500pF	±10%	GCJ188R72A152KA01#	
			1800pF	±10%	GCJ188R72A182KA01#	
			2200pF	±10%	GCJ188R72A222KA01#	
			2700pF	±10%	GCJ188R72A272KA01#	
			3300pF	±10%	GCJ188R72A332KA01#	
			3900pF	±10%	GCJ188R72A392KA01#	
			4700pF	±10%	GCJ188R72A472KA01#	
			5600pF	±10%	GCJ188R72A562KA01#	
			6800pF	±10%	GCJ188R72A682KA01#	
			8200pF	±10%	GCJ188R72A822KA01#	
			10000pF	±10%	GCJ188R72A103KA01#	
			12000pF	±10%	GCJ188R72A123KA01#	
			15000pF	±10%	GCJ188R72A153KA01#	
			18000pF	±10%	GCJ188R72A183KA01#	
			22000pF	±10%	GCJ188R72A223KA01#	
			27000pF	±10%	GCJ188R72A273KA01#	
			33000pF	±10%	GCJ188R72A333KA01#	
			39000pF	±10%	GCJ188R72A393KA01#	
			47000pF	±10%	GCJ188R72A473KA01#	
			56000pF	±10%	GCJ188R72A563KA01#	
			68000pF	±10%	GCJ188R72A683KA01#	
		X8L	0.15µF	±10%	GCJ188L8EH154KA07#	D4
			0.22µF	±10%	GCJ188L8EH224KA07#	D4
		X8R	4700pF	±10%	GCJ188R91H472KA01#	
			10000pF	±10%	GCJ188R91H103KA01#	
			0.10µF	±10%	GCJ188R91H104KA01#	
			0.12µF	±10%	GCJ188R91H124KA01#	
			0.15µF	±10%	GCJ188R91H154KA01#	
			0.18µF	±10%	GCJ188R91H184KA01#	
			0.22µF	±10%	GCJ188R91H224KA01#	
		X7R	1000pF	±10%	GCJ188R71H102KA01#	

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
0.9mm	50Vdc	X7R	1200pF	±10%	GCJ188R71H122KA01#	
			1500pF	±10%	GCJ188R71H152KA01#	
			1800pF	±10%	GCJ188R71H182KA01#	
			2200pF	±10%	GCJ188R71H222KA01#	
			2700pF	±10%	GCJ188R71H272KA01#	
			3300pF	±10%	GCJ188R71H332KA01#	
			3900pF	±10%	GCJ188R71H392KA01#	
			4700pF	±10%	GCJ188R71H472KA01#	
			5600pF	±10%	GCJ188R71H562KA01#	
			6800pF	±10%	GCJ188R71H682KA01#	
			8200pF	±10%	GCJ188R71H822KA01#	
			10000pF	±10%	GCJ188R71H103KA01#	
			12000pF	±10%	GCJ188R71H123KA01#	
			15000pF	±10%	GCJ188R71H153KA01#	
			18000pF	±10%	GCJ188R71H183KA01#	
			22000pF	±10%	GCJ188R71H223KA01#	
			33000pF	±10%	GCJ188R71H333KA12#	
			39000pF	±10%	GCJ188R71H393KA12#	
			47000pF	±10%	GCJ188R71H473KA12#	
			56000pF	±10%	GCJ188R71H563KA12#	
			68000pF	±10%	GCJ188R71H683KA12#	
			82000pF	±10%	GCJ188R71H823KA12#	
			0.10µF	±10%	GCJ188R71H104KA12#	
			0.15µF	±10%	GCJ188R71H154KA01#	
			0.22µF	±10%	GCJ188R71H224KA01#	
		X8L	33000pF	±10%	GCJ188L8YA333KA01#	
			39000pF	±10%	GCJ188L8YA393KA01#	
			56000pF	±10%	GCJ188L8YA563KA01#	
			68000pF	±10%	GCJ188L8YA683KA01#	
		X8L	33000pF	±10%	GCJ188L81E333KA01#	
			39000pF	±10%	GCJ188L81E393KA01#	
			56000pF	±10%	GCJ188L81E563KA01#	
			68000pF	±10%	GCJ188L81E683KA01#	
			82000pF	±10%	GCJ188L81E823KA01#	
			0.15µF	±10%	GCJ188L81E154KA01#	
			0.18µF	±10%	GCJ188L81E184KA01#	
			0.22µF	±10%	GCJ188L81E224KA01#	
		X8R	0.33µF	±10%	GCJ188R91E334KA01#	
			0.39µF	±10%	GCJ188R91E394KA01#	
			0.47µF	±10%	GCJ188R91E474KA01#	
		X7R	1000pF	±10%	GCJ188R71E102KA01#	
			1200pF	±10%	GCJ188R71E122KA01#	
			1500pF	±10%	GCJ188R71E152KA01#	
			1800pF	±10%	GCJ188R71E182KA01#	
			2200pF	±10%	GCJ188R71E222KA01#	
			2700pF	±10%	GCJ188R71E272KA01#	
			3300pF	±10%	GCJ188R71E332KA01#	
			3900pF	±10%	GCJ188R71E392KA01#	
			4700pF	±10%	GCJ188R71E472KA01#	
			5600pF	±10%	GCJ188R71E562KA01#	
			6800pF	±10%	GCJ188R71E682KA01#	
			8200pF	±10%	GCJ188R71E822KA01#	
			10000pF	±10%	GCJ188R71E103KA01#	
			12000pF	±10%	GCJ188R71E123KA01#	

Part number # indicates the package specification code.

GCJ Series High Dielectric Constant Type Power-train AEC Q200 Fail-safe Deflecting crack Part Number List

(→ 1.6×0.8mm)

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
0.9mm	25Vdc	X7R	15000pF	±10%	GCJ188R71E153KA01#	
			18000pF	±10%	GCJ188R71E183KA01#	
			22000pF	±10%	GCJ188R71E223KA01#	
			27000pF	±10%	GCJ188R71E273KA01#	
			33000pF	±10%	GCJ188R71E333KA01#	
			39000pF	±10%	GCJ188R71E393KA01#	
			47000pF	±10%	GCJ188R71E473KA01#	
			56000pF	±10%	GCJ188R71E563KA12#	
			68000pF	±10%	GCJ188R71E683KA12#	
			82000pF	±10%	GCJ188R71E823KA12#	
			0.10µF	±10%	GCJ188R71E104KA12#	
			0.12µF	±10%	GCJ188R71E124KA01#	
			0.15µF	±10%	GCJ188R71E154KA01#	
			0.18µF	±10%	GCJ188R71E184KA12#	
			0.22µF	±10%	GCJ188R71E224KA12#	
			1.0µF	±10%	GCJ188R71E105KA01#	
16Vdc	X8L	0.22µF	±10%	GCJ188L81C224KA01#		
		X7R	27000pF	±10%	GCJ188R71C273KA01#	
			33000pF	±10%	GCJ188R71C333KA01#	
			39000pF	±10%	GCJ188R71C393KA01#	
			47000pF	±10%	GCJ188R71C473KA01#	
			56000pF	±10%	GCJ188R71C563KA01#	
			68000pF	±10%	GCJ188R71C683KA01#	
			82000pF	±10%	GCJ188R71C823KA01#	
			0.10µF	±10%	GCJ188R71C104KA01#	
			0.12µF	±10%	GCJ188R71C124KA01#	
			0.15µF	±10%	GCJ188R71C154KA01#	
			0.18µF	±10%	GCJ188R71C184KA01#	
			0.22µF	±10%	GCJ188R71C224KA01#	
			0.27µF	±10%	GCJ188R71C274KA01#	
			0.33µF	±10%	GCJ188R71C334KA01#	
			0.39µF	±10%	GCJ188R71C394KA12#	
			0.47µF	±10%	GCJ188R71C474KA12#	
10Vdc	X7R	0.22µF	±10%	GCJ188R71A224KA01#		
6.3Vdc	X7R	2.2µF	±10%	GCJ188R70J225KE01#		
1.0mm	6.3Vdc	X8L	3.3µF	±10%	GCJ188L8EC335KE08#	D4
		X8M	4.7µF	±10%	GCJ188M8EC475KE08#	D4
		X7S	3.3µF	±10%	GCJ188C70J335KE02#	
			4.7µF	±10%	GCJ188C70J475KE02#	

2.0×1.25mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
0.95mm	100Vdc	X7R	27000pF	±10%	GCJ219R72A273KA01#	
			33000pF	±10%	GCJ219R72A333KA01#	
			39000pF	±10%	GCJ219R72A393KA01#	
			0.33µF	±10%	GCJ219R71H334KA12#	
			0.47µF	±10%	GCJ219R71E334KA01#	
			0.68µF	±10%	GCJ219R71C684KA01#	
			0.82µF	±10%	GCJ219R71C824KA01#	
			1.0µF	±10%	GCJ219R71C105KA01#	
			1000pF	±10%	GCJ21AR72E102KXJ1#	
			1000pF	±10%	GCJ21AR72E103KXJ3#	
			15000pF	±10%	GCJ21AR72E153KXJ3#	
			22000pF	±10%	GCJ21AR72E223KXJ3#	
			33000pF	±10%	GCJ21AR72E332KXJ3#	
			47000pF	±10%	GCJ21AR72E472KXJ1#	
			68000pF	±10%	GCJ21AR72E682KXJ1#	
1.0mm	250Vdc	X7R	1000pF	±10%	GCJ21AR72E102KXJ1#	
			15000pF	±10%	GCJ21AR72E153KXJ3#	
			22000pF	±10%	GCJ21AR72E223KXJ3#	
			33000pF	±10%	GCJ21AR72E332KXJ3#	
			47000pF	±10%	GCJ21AR72E472KXJ1#	
			68000pF	±10%	GCJ21AR72E682KXJ1#	
			10000pF	±10%	GCJ21BR72E103KXJ3#	
			15000pF	±10%	GCJ21BR72E153KXJ3#	
			22000pF	±10%	GCJ21BR72E223KXJ3#	
			33000pF	±10%	GCJ21BR72E332KXJ3#	
			47000pF	±10%	GCJ21BR72E472KXJ1#	
			68000pF	±10%	GCJ21BR72E682KXJ1#	
			10000pF	±10%	GCJ21BL81H823KA01#	
			0.10µF	±10%	GCJ21BL81H104KA01#	
			0.47µF	±10%	GCJ21BL8EH474KA07#	D4
1.45mm	250Vdc	X7R	0.22µF	±10%	GCJ21BR71H224KA01#	
			0.47µF	±10%	GCJ21BR71H474KA12#	
			1.0µF	±10%	GCJ21BR71H105KA01#	
			0.12µF	±10%	GCJ21BL8YA124KA01#	
			0.15µF	±10%	GCJ21BL8YA154KA01#	
			0.18µF	±10%	GCJ21BL8YA184KA01#	
			0.22µF	±10%	GCJ21BL8YA224KA01#	
			0.33µF	±10%	GCJ21BL8YA334KA01#	
			0.47µF	±10%	GCJ21BL8YA474KA01#	
			0.12µF	±10%	GCJ21BL81E124KA01#	
			0.15µF	±10%	GCJ21BL81E154KA01#	
			0.18µF	±10%	GCJ21BL81E184KA01#	
			0.22µF	±10%	GCJ21BL81E224KA01#	
			0.27µF	±10%	GCJ21BL81E274KA01#	
			0.33µF	±10%	GCJ21BL81E334KA01#	
2.0×1.25mm	25Vdc	X8L	0.12µF	±10%	GCJ21BL81E124KA01#	
			0.15µF	±10%	GCJ21BL81E154KA01#	
			0.18µF	±10%	GCJ21BL81E184KA01#	
			0.22µF	±10%	GCJ21BL81E224KA01#	
			0.27µF	±10%	GCJ21BL81E274KA01#	
			0.33µF	±10%	GCJ21BL81E334KA01#	
			0.39µF	±10%	GCJ21BL81E394KA01#	
			0.47µF	±10%	GCJ21BL81E474KA01#	
			0.68µF	±10%	GCJ21BL81E684KA01#	
			0.82µF	±10%	GCJ21BL81E824KA01#	
			1.0µF	±10%	GCJ21BL81E105KA01#	
			0.27µF	±10%	GCJ21BR71E274KA01#	
			0.39µF	±10%	GCJ21BR71E394KA01#	
			0.56µF	±10%	GCJ21BR71E564KA12#	
			0.68µF	±10%	GCJ21BR71E684KA12#	
			0.82µF	±10%	GCJ21BR71E824KA12#	
			1.0µF	±10%	GCJ21BR71E105KA12#	
2.0×1.25mm	16Vdc	X8L	1.5µF	±10%	GCJ21BR71E155KA01#	
			2.2µF	±10%	GCJ21BR71E225KA01#	
			3.3µF	±10%	GCJ21BR71E334KA01#	
			4.7µF	±10%	GCJ21BR71E474KA01#	
			0.56µF	±10%	GCJ21BL81C564KA01#	
			0.68µF	±10%	GCJ21BL81C684KA01#	
			0.82µF	±10%	GCJ21BL81C824KA01#	
			1.0µF	±10%	GCJ21BL81C105KA01#	
			0.27µF	±10%	GCJ21BR71C274KA01#	
			0.33µF	±10%	GCJ21BR71C334KA01#	
			0.39µF	±10%	GCJ21BR71C394KA01#	
			0.47µF	±10%	GCJ21BR71C474KA01#	
			0.56µF	±10%	GCJ21BR71C564KA01#	
			1.0µF	±10%	GCJ21BR71C105KA01#	

Part number # indicates the package specification code.



GCJ Series High Dielectric Constant Type Part Number List

(→ 2.0×1.25mm)

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number
1.45mm	16Vdc	X7R	2.2μF	±10%	GCJ21BR71C225KA13#
			4.7μF	±10%	GCJ21BR71C475KA01#
	10Vdc	X7R	2.2μF	±10%	GCJ21BR71A225KA01#
			10μF	±10%	GCJ21BR71A106KE01#
1.5mm	100Vdc	X7S	1.0μF	±10%	GCJ21BC72A105KE02#

3.2×1.6mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number
1.25mm	1000Vdc	X7R	1000pF	±10%	GCJ31BR73A102KXJ1#
			1500pF	±10%	GCJ31BR73A152KXJ1#
			2200pF	±10%	GCJ31BR73A222KXJ1#
			3300pF	±10%	GCJ31BR73A332KXJ1#
			4700pF	±10%	GCJ31BR73A472KXJ1#
	630Vdc	X7R	1000pF	±10%	GCJ31BR72J102KXJ1#
			1500pF	±10%	GCJ31BR72J152KXJ1#
			2200pF	±10%	GCJ31BR72J222KXJ1#
			3300pF	±10%	GCJ31BR72J332KXJ1#
			4700pF	±10%	GCJ31BR72J472KXJ1#
			6800pF	±10%	GCJ31BR72J682KXJ1#
	250Vdc	X7R	10000pF	±10%	GCJ31BR72J103KXJ1#
			15000pF	±10%	GCJ31BR72E153KXJ1#
			22000pF	±10%	GCJ31BR72E223KXJ1#
	1.35mm	X7R	68000pF	±10%	GCJ31BR72E683KXJ1#
			0.15μF	±10%	GCJ31MR72A154KA01#
			0.18μF	±10%	GCJ31MR72A184KA01#
	50Vdc	X7R	0.22μF	±10%	GCJ31MR72A224KA01#
			0.47μF	±10%	GCJ31MR71H474KA01#
			0.56μF	±10%	GCJ31MR71H564KA12#
			0.68μF	±10%	GCJ31MR71H684KA12#
			0.82μF	±10%	GCJ31MR71H824KA12#
	25Vdc	X7R	1.0μF	±10%	GCJ31MR71H105KA12#
			2.2μF	±10%	GCJ31MR71E225KA12#
	1.8mm	X7R	3.3μF	±10%	GCJ31MR71E335KA12#
			6800pF	±10%	GCJ31CR73A682KXJ3#
		X7R	10000pF	±10%	GCJ31CR73A103KXJ3#
			15000pF	±10%	GCJ31CR72J153KXJ3#
		X7R	22000pF	±10%	GCJ31CR72J223KXJ3#
			33000pF	±10%	GCJ31CR72E333KXJ3#
			47000pF	±10%	GCJ31CR72E473KXJ3#
		X7S	0.10μF	±10%	GCJ31CR72E104KXJ3#
			1.0μF	±10%	GCJ31CL8EL105KA07# D4
			2.2μF	±10%	GCJ31CC72A225KE01#
	50Vdc	X7R	1.5μF	±10%	GCJ31CR71H155KA12#
			2.2μF	±10%	GCJ31CR71H225KA12#
			4.7μF	±10%	GCJ31CC71H475KA01#
	35Vdc	X8L	0.56μF	±10%	GCJ31CL8YA564KA01#
			0.68μF	±10%	GCJ31CL8YA684KA01#
			0.82μF	±10%	GCJ31CL8YA824KA01#
			1.0μF	±10%	GCJ31CL8YA105KA01#
	25Vdc	X7R	4.7μF	±10%	GCJ31CR71E475KA12#
	16Vdc	X8L	3.3μF	±10%	GCJ31CL81C335KA01#

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number
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1.9mm	16Vdc	X8L	4.7μF	±10%	GCJ31CL81C475KA01#
10Vdc	X7R	3.3μF	±10%	GCJ31CR71C335KA01#	
		4.7μF	±10%	GCJ31CR71C475KA01#	
		10μF	±10%	GCJ31CR71C106KA15#	
		22μF	±10%	GCJ31CR71A226KE01#	
10Vdc	X8L	22μF	±10%	GCJ31CL8ED226KE07# D4	
6.3Vdc	X7R	6.8μF	±10%	GCJ31CR71A685KA13#	
		10μF	±10%	GCJ31CR71A106KA13#	
		22μF	±10%	GCJ31CR71A226KE01#	
		22μF	±10%	GCJ31CR70J226KE01#	
25Vdc	X8L	10μF	±10%	GCJ31CL8EF106KA08# D4	
2.0mm	X7S	10μF	±10%	GCJ31CC71E106KA15#	

3.2×2.5mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number
1.5mm	630Vdc	X7R	6800pF	±10%	GCJ32QR72J682KXJ1#
			10000pF	±10%	GCJ32QR72J103KXJ1#
	250Vdc	X7R	68000pF	±10%	GCJ32QR72E683KXJ1#
			0.15μF	±10%	GCJ32QR72E154KXJ1#
2.0mm	1000Vdc	X7R	15000pF	±10%	GCJ32DR73A153KXJ1#
			22000pF	±10%	GCJ32DR73A223KXJ1#
	630Vdc	X7R	15000pF	±10%	GCJ32DR72J153KXJ1#
			22000pF	±10%	GCJ32DR72J223KXJ1#
2.3mm	1000Vdc	X7R	33000pF	±10%	GCJ32DR72J333KXJ1#
			47000pF	±10%	GCJ32DR72J473KXJ1#
	250Vdc	X7R	0.10μF	±10%	GCJ32DR72E104KXJ1#
			0.22μF	±10%	GCJ32DR72E224KXJ1#
2.8mm	100Vdc	X8L	2.2μF	±10%	GCJ32DL8EL225KA07# D4
			2.2μF	±10%	GCJ32DR72A225KA01#
			4.7μF	±10%	GCJ32DC72A475KE01#
	50Vdc	X7R	4.7μF	±10%	GCJ32ER71H475KA12#
2.5Vdc	X7S	10μF	±10%	GCJ32EC71H106KA01#	
	X8L	4.7μF	±10%	GCJ32EL81E475KA01#	
	X8R	6.8μF	±10%	GCJ32ER91C106KE01#	
	X7R	22μF	±10%	GCJ32ER71C226KE01#	
6.3Vdc	X7R	47μF	±10%	GCJ32ER70J476KE01#	
2.85mm	25Vdc	X8L	22μF	±10%	GCJ32EL8EF226KE08# D4
			22μF	±10%	GCJ32EC71E226KE02#

4.5×3.2mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number
1.5mm	630Vdc	X7R	68000pF	±10%	GCJ43QR72J683KXJ1#
250Vdc	X7R	0.15μF	±10%	GCJ43QR72E154KXJ1#	
2.0mm	1000Vdc	X7R	33000pF	±10%	GCJ43DR73A333KXJ1#
630Vdc	X7R	33000pF	±10%	GCJ43DR72J333KXJ1#	
		47000pF	±10%	GCJ43DR72J473KXJ1#	
		0.10μF	±10%	GCJ43DR72J104KXJ1#	
		0.22μF	±10%	GCJ43DR72E224KXJ1#	
250Vdc	X7R	0.33μF	±10%	GCJ43DR72E334KXJ1#	

Part number # indicates the package specification code.

GCJ Series High Dielectric Constant Type Part Number List

(→ 4.5×3.2mm)

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
2.0mm	250Vdc	X7R	0.47μF	±10%	GCJ43DR72E474KXJ1#	

5.7×5.0mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
2.0mm	1000Vdc	X7R	68000pF	±10%	GCJ55DR73A683KXJ1#	
			0.10μF	±10%	GCJ55DR73A104KXJ1#	
	630Vdc	X7R	0.10μF	±10%	GCJ55DR72J104KXJ1#	
			0.15μF	±10%	GCJ55DR72J154KXJ1#	
			0.22μF	±10%	GCJ55DR72J224KXJ1#	
	250Vdc	X7R	0.33μF	±10%	GCJ55DR72E334KXJ1#	
			0.47μF	±10%	GCJ55DR72E474KXJ1#	
			0.68μF	±10%	GCJ55DR72E684KXJ1#	
			1.0μF	±10%	GCJ55DR72E105KXJ1#	

High Q Chip Multilayer Ceramic Capacitors for Automotive

GCQ Series



AEC-Q200

High Q

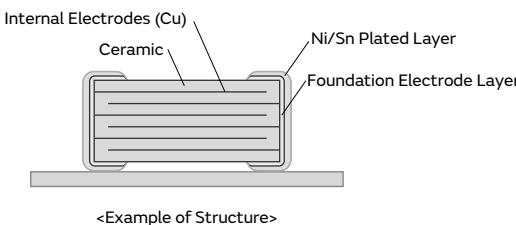


This product improves the high frequency characteristics and contributes to a reduction of power consumption by the High Q and low ESR. Capacitor for automotive applications such as power train and safety equipment.

Features

① High Q and Low ESR were achieved at a "high frequency," which is ideal for matching applications.

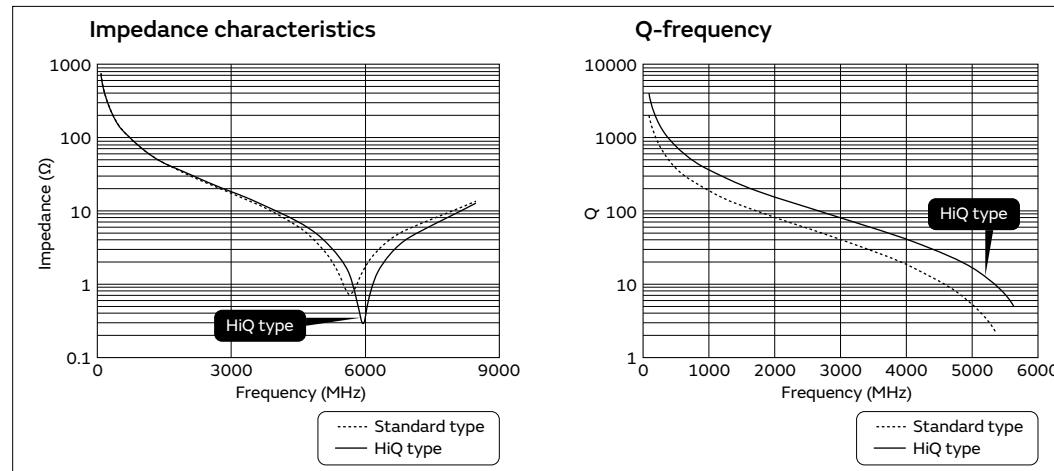
High Q and Low ESR were achieved at a high frequency, by adopting a ceramic material with extremely low loss at a high frequency as the dielectric material, and copper for the internal electrodes. This product is ideal for matching applications.



<Example of Structure>

② This is a High Q capacitor for V2X, ADAS, and automotive communication applications which conform to AEC-Q200.

The self-resonant frequency of 5.9 GHz (for 2.2 pF products) is ideal for the DC-CUT in DSRC IEEE821.11p.



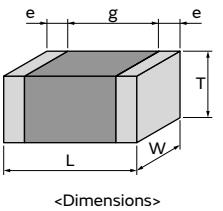
③ Can be used for tight tolerance.

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

Capacitance Range	Standard Capacitance Tolerance (Capacitance Tolerance Symbol)	Narrow Capacitance Tolerance (Capacitance Tolerance Symbol)
to 0.9pF	±0.1pF (B)	±0.05pF (W)
1 to 5pF	±0.25pF (C)	±0.05pF (W), ±0.1pF (B)
5.1 to 9.9pF	±0.5pF (D)	±0.05pF (W), ±0.1pF (B), ±0.25pF (C)
10pF~	±5% (J)	±2% (G)

Specifications

Size	1.0×0.5mm
Rated Voltage	50Vdc
Capacitance	0.10pF to 47μF
Main Applications	DC cut in the 5.9GHz of V2X applications, and RF matching RF matching in the other automotive communication applications



GCQ Series Temperature Compensating Type Power-train AEC-Q200 Part Number List

1.0×0.5mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number
0.55mm	50Vdc	C0G	0.10pF	±0.05pF	GCQ1555C1HR10WB01#
				±0.1pF	GCQ1555C1HR10BB01#
			0.20pF	±0.05pF	GCQ1555C1HR20WB01#
				±0.1pF	GCQ1555C1HR20BB01#
			0.30pF	±0.05pF	GCQ1555C1HR30WB01#
				±0.1pF	GCQ1555C1HR30BB01#
			0.40pF	±0.05pF	GCQ1555C1HR40WB01#
				±0.1pF	GCQ1555C1HR40BB01#
			0.50pF	±0.05pF	GCQ1555C1HR50WB01#
				±0.1pF	GCQ1555C1HR50BB01#
			0.60pF	±0.05pF	GCQ1555C1HR60WB01#
				±0.1pF	GCQ1555C1HR60BB01#
			0.70pF	±0.05pF	GCQ1555C1HR70WB01#
				±0.1pF	GCQ1555C1HR70BB01#
			0.80pF	±0.05pF	GCQ1555C1HR80WB01#
				±0.1pF	GCQ1555C1HR80BB01#
			0.90pF	±0.05pF	GCQ1555C1HR90WB01#
				±0.1pF	GCQ1555C1HR90BB01#
			1.0pF	±0.05pF	GCQ1555C1H1R0WB01#
				±0.1pF	GCQ1555C1H1R0BB01#
				±0.25pF	GCQ1555C1H1R0CB01#
			1.1pF	±0.05pF	GCQ1555C1H1R1WB01#
				±0.1pF	GCQ1555C1H1R1BB01#
				±0.25pF	GCQ1555C1H1R1CB01#
			1.2pF	±0.05pF	GCQ1555C1H1R2WB01#
				±0.1pF	GCQ1555C1H1R2BB01#
				±0.25pF	GCQ1555C1H1R2CB01#
			1.3pF	±0.05pF	GCQ1555C1H1R3WB01#
				±0.1pF	GCQ1555C1H1R3BB01#
				±0.25pF	GCQ1555C1H1R3CB01#
			1.4pF	±0.05pF	GCQ1555C1H1R4WB01#
				±0.1pF	GCQ1555C1H1R4BB01#
				±0.25pF	GCQ1555C1H1R4CB01#
			1.5pF	±0.05pF	GCQ1555C1H1R5WB01#
				±0.1pF	GCQ1555C1H1R5BB01#
				±0.25pF	GCQ1555C1H1R5CB01#
			1.6pF	±0.05pF	GCQ1555C1H1R6WB01#
				±0.1pF	GCQ1555C1H1R6BB01#
				±0.25pF	GCQ1555C1H1R6CB01#
			1.7pF	±0.05pF	GCQ1555C1H1R7WB01#
				±0.1pF	GCQ1555C1H1R7BB01#
				±0.25pF	GCQ1555C1H1R7CB01#
			1.8pF	±0.05pF	GCQ1555C1H1R8WB01#
				±0.1pF	GCQ1555C1H1R8BB01#
				±0.25pF	GCQ1555C1H1R8CB01#
			1.9pF	±0.05pF	GCQ1555C1H1R9WB01#
				±0.1pF	GCQ1555C1H1R9BB01#
				±0.25pF	GCQ1555C1H1R9CB01#
			2.0pF	±0.05pF	GCQ1555C1H2R0WB01#
				±0.1pF	GCQ1555C1H2R0BB01#
				±0.25pF	GCQ1555C1H2R0CB01#
			2.1pF	±0.05pF	GCQ1555C1H2R1WB01#

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number
0.55mm	50Vdc	COG	2.1pF	±0.1pF	GCQ1555C1H2R1BB01#
				±0.25pF	GCQ1555C1H2R1CB01#
			2.2pF	±0.05pF	GCQ1555C1H2R2WB01#
				±0.1pF	GCQ1555C1H2R2BB01#
				±0.25pF	GCQ1555C1H2R2CB01#
			2.3pF	±0.05pF	GCQ1555C1H2R3WB01#
				±0.1pF	GCQ1555C1H2R3BB01#
				±0.25pF	GCQ1555C1H2R3CB01#
			2.4pF	±0.05pF	GCQ1555C1H2R4WB01#
				±0.1pF	GCQ1555C1H2R4BB01#
				±0.25pF	GCQ1555C1H2R4CB01#
			2.5pF	±0.05pF	GCQ1555C1H2R5WB01#
				±0.1pF	GCQ1555C1H2R5BB01#
				±0.25pF	GCQ1555C1H2R5CB01#
			2.6pF	±0.05pF	GCQ1555C1H2R6WB01#
				±0.1pF	GCQ1555C1H2R6BB01#
				±0.25pF	GCQ1555C1H2R6CB01#
			2.7pF	±0.05pF	GCQ1555C1H2R7WB01#
				±0.1pF	GCQ1555C1H2R7BB01#
				±0.25pF	GCQ1555C1H2R7CB01#
			2.8pF	±0.05pF	GCQ1555C1H2R8WB01#
				±0.1pF	GCQ1555C1H2R8BB01#
				±0.25pF	GCQ1555C1H2R8CB01#
			2.9pF	±0.05pF	GCQ1555C1H2R9WB01#
				±0.1pF	GCQ1555C1H2R9BB01#
				±0.25pF	GCQ1555C1H2R9CB01#
			3.0pF	±0.05pF	GCQ1555C1H3ROWB01#
				±0.1pF	GCQ1555C1H3R0BB01#
				±0.25pF	GCQ1555C1H3R0CB01#
			3.1pF	±0.05pF	GCQ1555C1H3R1WB01#
				±0.1pF	GCQ1555C1H3R1BB01#
				±0.25pF	GCQ1555C1H3R1CB01#
			3.2pF	±0.05pF	GCQ1555C1H3R2WB01#
				±0.1pF	GCQ1555C1H3R2BB01#
				±0.25pF	GCQ1555C1H3R2CB01#
			3.3pF	±0.05pF	GCQ1555C1H3R3WB01#
				±0.1pF	GCQ1555C1H3R3BB01#
				±0.25pF	GCQ1555C1H3R3CB01#
			3.4pF	±0.05pF	GCQ1555C1H3R4WB01#
				±0.1pF	GCQ1555C1H3R4BB01#
				±0.25pF	GCQ1555C1H3R4CB01#
			3.5pF	±0.05pF	GCQ1555C1H3R5WB01#
				±0.1pF	GCQ1555C1H3R5BB01#
				±0.25pF	GCQ1555C1H3R5CB01#
			3.6pF	±0.05pF	GCQ1555C1H3R6WB01#
				±0.1pF	GCQ1555C1H3R6BB01#
				±0.25pF	GCQ1555C1H3R6CB01#
			3.7pF	±0.05pF	GCQ1555C1H3R7WB01#
				±0.1pF	GCQ1555C1H3R7BB01#
				±0.25pF	GCQ1555C1H3R7CB01#
			3.8pF	±0.05pF	GCQ1555C1H3R8WB01#
				±0.1pF	GCQ1555C1H3R8BB01#
				±0.25pF	GCQ1555C1H3R8CB01#
			3.9pF	±0.05pF	GCQ1555C1H3R9WB01#

Part number # indicates the package specification code.

GCQ Series Temperature Compensating Type Part Number List

(→ 1.0×0.5mm)

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number
0.55mm	50Vdc	COG	3.9pF	±0.1pF	GCQ1555C1H3R9WB01#	0.55mm	50Vdc	COG	5.5pF	±0.5pF	GCQ1555C1H5R5DB01#
				±0.25pF	GCQ1555C1H3R9CB01#				5.6pF	±0.05pF	GCQ1555C1H5R6WB01#
			4.0pF	±0.05pF	GCQ1555C1H4R0WB01#					±0.1pF	GCQ1555C1H5R6BB01#
				±0.1pF	GCQ1555C1H4R0BB01#					±0.25pF	GCQ1555C1H5R6CB01#
				±0.25pF	GCQ1555C1H4R0CB01#					±0.5pF	GCQ1555C1H5R6DB01#
			4.1pF	±0.05pF	GCQ1555C1H4R1WB01#				5.7pF	±0.05pF	GCQ1555C1H5R7WB01#
				±0.1pF	GCQ1555C1H4R1BB01#					±0.1pF	GCQ1555C1H5R7BB01#
				±0.25pF	GCQ1555C1H4R1CB01#					±0.25pF	GCQ1555C1H5R7CB01#
			4.2pF	±0.05pF	GCQ1555C1H4R2WB01#					±0.5pF	GCQ1555C1H5R7DB01#
				±0.1pF	GCQ1555C1H4R2BB01#				5.8pF	±0.05pF	GCQ1555C1H5R8WB01#
				±0.25pF	GCQ1555C1H4R2CB01#					±0.1pF	GCQ1555C1H5R8BB01#
			4.3pF	±0.05pF	GCQ1555C1H4R3WB01#					±0.25pF	GCQ1555C1H5R8CB01#
				±0.1pF	GCQ1555C1H4R3BB01#					±0.5pF	GCQ1555C1H5R8DB01#
				±0.25pF	GCQ1555C1H4R3CB01#				5.9pF	±0.05pF	GCQ1555C1H5R9WB01#
			4.4pF	±0.05pF	GCQ1555C1H4R4WB01#					±0.1pF	GCQ1555C1H5R9BB01#
				±0.1pF	GCQ1555C1H4R4BB01#					±0.25pF	GCQ1555C1H5R9CB01#
				±0.25pF	GCQ1555C1H4R4CB01#					±0.5pF	GCQ1555C1H5R9DB01#
			4.5pF	±0.05pF	GCQ1555C1H4R5WB01#				6.0pF	±0.05pF	GCQ1555C1H6R0WB01#
				±0.1pF	GCQ1555C1H4R5BB01#					±0.1pF	GCQ1555C1H6R0BB01#
				±0.25pF	GCQ1555C1H4R5CB01#					±0.25pF	GCQ1555C1H6R0CB01#
			4.6pF	±0.05pF	GCQ1555C1H4R6WB01#					±0.5pF	GCQ1555C1H6R0DB01#
				±0.1pF	GCQ1555C1H4R6BB01#				6.1pF	±0.05pF	GCQ1555C1H6R1WB01#
				±0.25pF	GCQ1555C1H4R6CB01#					±0.1pF	GCQ1555C1H6R1BB01#
			4.7pF	±0.05pF	GCQ1555C1H4R7WB01#					±0.25pF	GCQ1555C1H6R1CB01#
				±0.1pF	GCQ1555C1H4R7BB01#					±0.5pF	GCQ1555C1H6R1DB01#
				±0.25pF	GCQ1555C1H4R7CB01#				6.2pF	±0.05pF	GCQ1555C1H6R2WB01#
			4.8pF	±0.05pF	GCQ1555C1H4R8WB01#					±0.1pF	GCQ1555C1H6R2BB01#
				±0.1pF	GCQ1555C1H4R8BB01#					±0.25pF	GCQ1555C1H6R2CB01#
				±0.25pF	GCQ1555C1H4R8CB01#					±0.5pF	GCQ1555C1H6R2DB01#
			4.9pF	±0.05pF	GCQ1555C1H4R9WB01#				6.3pF	±0.05pF	GCQ1555C1H6R3WB01#
				±0.1pF	GCQ1555C1H4R9BB01#					±0.1pF	GCQ1555C1H6R3BB01#
				±0.25pF	GCQ1555C1H4R9CB01#					±0.25pF	GCQ1555C1H6R3CB01#
			5.0pF	±0.05pF	GCQ1555C1H5R0WB01#					±0.5pF	GCQ1555C1H6R3DB01#
				±0.1pF	GCQ1555C1H5R0BB01#				6.4pF	±0.05pF	GCQ1555C1H6R4WB01#
				±0.25pF	GCQ1555C1H5R0CB01#					±0.1pF	GCQ1555C1H6R4BB01#
			5.1pF	±0.05pF	GCQ1555C1H5R1WB01#					±0.25pF	GCQ1555C1H6R4CB01#
				±0.1pF	GCQ1555C1H5R1BB01#					±0.5pF	GCQ1555C1H6R4DB01#
				±0.25pF	GCQ1555C1H5R1CB01#				6.5pF	±0.05pF	GCQ1555C1H6R5WB01#
				±0.5pF	GCQ1555C1H5R1DB01#					±0.1pF	GCQ1555C1H6R5BB01#
			5.2pF	±0.05pF	GCQ1555C1H5R2WB01#					±0.25pF	GCQ1555C1H6R5CB01#
				±0.1pF	GCQ1555C1H5R2BB01#					±0.5pF	GCQ1555C1H6R5DB01#
				±0.25pF	GCQ1555C1H5R2CB01#				6.6pF	±0.05pF	GCQ1555C1H6R6WB01#
				±0.5pF	GCQ1555C1H5R2DB01#					±0.1pF	GCQ1555C1H6R6BB01#
			5.3pF	±0.05pF	GCQ1555C1H5R3WB01#					±0.25pF	GCQ1555C1H6R6CB01#
				±0.1pF	GCQ1555C1H5R3BB01#					±0.5pF	GCQ1555C1H6R6DB01#
				±0.25pF	GCQ1555C1H5R3CB01#				6.7pF	±0.05pF	GCQ1555C1H6R7WB01#
				±0.5pF	GCQ1555C1H5R3DB01#					±0.1pF	GCQ1555C1H6R7BB01#
			5.4pF	±0.05pF	GCQ1555C1H5R4WB01#					±0.25pF	GCQ1555C1H6R7CB01#
				±0.1pF	GCQ1555C1H5R4BB01#					±0.5pF	GCQ1555C1H6R7DB01#
				±0.25pF	GCQ1555C1H5R4CB01#				6.8pF	±0.05pF	GCQ1555C1H6R8WB01#
				±0.5pF	GCQ1555C1H5R4DB01#					±0.1pF	GCQ1555C1H6R8BB01#
			5.5pF	±0.05pF	GCQ1555C1H5R5WB01#					±0.25pF	GCQ1555C1H6R8CB01#
				±0.1pF	GCQ1555C1H5R5BB01#					±0.5pF	GCQ1555C1H6R8DB01#
				±0.25pF	GCQ1555C1H5R5CB01#				6.9pF	±0.05pF	GCQ1555C1H6R9WB01#

Part number # indicates the package specification code.



GCQ Series Temperature Compensating Type Power-train AEC-Q200 Part Number List

(→ 1.0×0.5mm)

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number
0.55mm	50Vdc	COG	6.9pF	±0.1pF	GCQ1555C1H6R9BB01#	0.55mm	50Vdc	COG	8.2pF	±0.5pF	GCQ1555C1H8R2DB01#
				±0.25pF	GCQ1555C1H6R9CB01#				8.3pF	±0.05pF	GCQ1555C1H8R3WB01#
				±0.5pF	GCQ1555C1H6R9DB01#					±0.1pF	GCQ1555C1H8R3BB01#
			7.0pF	±0.05pF	GCQ1555C1H7R0WB01#					±0.25pF	GCQ1555C1H8R3CB01#
				±0.1pF	GCQ1555C1H7R0BB01#					±0.5pF	GCQ1555C1H8R3DB01#
				±0.25pF	GCQ1555C1H7R0CB01#				8.4pF	±0.05pF	GCQ1555C1H8R4WB01#
				±0.5pF	GCQ1555C1H7R0DB01#					±0.1pF	GCQ1555C1H8R4BB01#
			7.1pF	±0.05pF	GCQ1555C1H7R1WB01#					±0.25pF	GCQ1555C1H8R4CB01#
				±0.1pF	GCQ1555C1H7R1BB01#					±0.5pF	GCQ1555C1H8R4DB01#
				±0.25pF	GCQ1555C1H7R1CB01#				8.5pF	±0.05pF	GCQ1555C1H8R5WB01#
				±0.5pF	GCQ1555C1H7R1DB01#					±0.1pF	GCQ1555C1H8R5BB01#
			7.2pF	±0.05pF	GCQ1555C1H7R2WB01#					±0.25pF	GCQ1555C1H8R5CB01#
				±0.1pF	GCQ1555C1H7R2BB01#					±0.5pF	GCQ1555C1H8R5DB01#
				±0.25pF	GCQ1555C1H7R2CB01#				8.6pF	±0.05pF	GCQ1555C1H8R6WB01#
				±0.5pF	GCQ1555C1H7R2DB01#					±0.1pF	GCQ1555C1H8R6BB01#
			7.3pF	±0.05pF	GCQ1555C1H7R3WB01#					±0.25pF	GCQ1555C1H8R6CB01#
				±0.1pF	GCQ1555C1H7R3BB01#					±0.5pF	GCQ1555C1H8R6DB01#
				±0.25pF	GCQ1555C1H7R3CB01#				8.7pF	±0.05pF	GCQ1555C1H8R7WB01#
				±0.5pF	GCQ1555C1H7R3DB01#					±0.1pF	GCQ1555C1H8R7BB01#
			7.4pF	±0.05pF	GCQ1555C1H7R4WB01#					±0.25pF	GCQ1555C1H8R7CB01#
				±0.1pF	GCQ1555C1H7R4BB01#					±0.5pF	GCQ1555C1H8R7DB01#
				±0.25pF	GCQ1555C1H7R4CB01#				8.8pF	±0.05pF	GCQ1555C1H8R8WB01#
				±0.5pF	GCQ1555C1H7R4DB01#					±0.1pF	GCQ1555C1H8R8BB01#
			7.5pF	±0.05pF	GCQ1555C1H7R5WB01#					±0.25pF	GCQ1555C1H8R8CB01#
				±0.1pF	GCQ1555C1H7R5BB01#					±0.5pF	GCQ1555C1H8R8DB01#
				±0.25pF	GCQ1555C1H7R5CB01#				8.9pF	±0.05pF	GCQ1555C1H8R9WB01#
				±0.5pF	GCQ1555C1H7R5DB01#					±0.1pF	GCQ1555C1H8R9BB01#
			7.6pF	±0.05pF	GCQ1555C1H7R6WB01#					±0.25pF	GCQ1555C1H8R9CB01#
				±0.1pF	GCQ1555C1H7R6BB01#					±0.5pF	GCQ1555C1H8R9DB01#
				±0.25pF	GCQ1555C1H7R6CB01#				9.0pF	±0.05pF	GCQ1555C1H9R0WB01#
				±0.5pF	GCQ1555C1H7R6DB01#					±0.1pF	GCQ1555C1H9R0BB01#
			7.7pF	±0.05pF	GCQ1555C1H7R7WB01#					±0.25pF	GCQ1555C1H9R0CB01#
				±0.1pF	GCQ1555C1H7R7BB01#					±0.5pF	GCQ1555C1H9R0DB01#
				±0.25pF	GCQ1555C1H7R7CB01#				9.1pF	±0.05pF	GCQ1555C1H9R1WB01#
				±0.5pF	GCQ1555C1H7R7DB01#					±0.1pF	GCQ1555C1H9R1BB01#
			7.8pF	±0.05pF	GCQ1555C1H7R8WB01#					±0.25pF	GCQ1555C1H9R1CB01#
				±0.1pF	GCQ1555C1H7R8BB01#					±0.5pF	GCQ1555C1H9R1DB01#
				±0.25pF	GCQ1555C1H7R8CB01#				9.2pF	±0.05pF	GCQ1555C1H9R2WB01#
				±0.5pF	GCQ1555C1H7R8DB01#					±0.1pF	GCQ1555C1H9R2BB01#
			7.9pF	±0.05pF	GCQ1555C1H7R9WB01#					±0.25pF	GCQ1555C1H9R2CB01#
				±0.1pF	GCQ1555C1H7R9BB01#					±0.5pF	GCQ1555C1H9R2DB01#
				±0.25pF	GCQ1555C1H7R9CB01#				9.3pF	±0.05pF	GCQ1555C1H9R3WB01#
				±0.5pF	GCQ1555C1H7R9DB01#					±0.1pF	GCQ1555C1H9R3BB01#
			8.0pF	±0.05pF	GCQ1555C1H8R0WB01#					±0.25pF	GCQ1555C1H9R3CB01#
				±0.1pF	GCQ1555C1H8R0BB01#					±0.5pF	GCQ1555C1H9R3DB01#
				±0.25pF	GCQ1555C1H8R0CB01#				9.4pF	±0.05pF	GCQ1555C1H9R4WB01#
				±0.5pF	GCQ1555C1H8R0DB01#					±0.1pF	GCQ1555C1H9R4BB01#
			8.1pF	±0.05pF	GCQ1555C1H8R1WB01#					±0.25pF	GCQ1555C1H9R4CB01#
				±0.1pF	GCQ1555C1H8R1BB01#					±0.5pF	GCQ1555C1H9R4DB01#
				±0.25pF	GCQ1555C1H8R1CB01#				9.5pF	±0.05pF	GCQ1555C1H9R5WB01#
				±0.5pF	GCQ1555C1H8R1DB01#					±0.1pF	GCQ1555C1H9R5BB01#
			8.2pF	±0.05pF	GCQ1555C1H8R2WB01#					±0.25pF	GCQ1555C1H9R5CB01#
				±0.1pF	GCQ1555C1H8R2BB01#					±0.5pF	GCQ1555C1H9R5DB01#
				±0.25pF	GCQ1555C1H8R2CB01#				9.6pF	±0.05pF	GCQ1555C1H9R6WB01#

Part number # indicates the package specification code.

GCQ Series Temperature Compensating Type Part Number List

(→ 1.0×0.5mm)

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number
0.55mm	50Vdc	COG	9.6pF	±0.1pF	GCQ1555C1H9R6BB01#
				±0.25pF	GCQ1555C1H9R6CB01#
				±0.5pF	GCQ1555C1H9R6DB01#
			9.7pF	±0.05pF	GCQ1555C1H9R7WB01#
				±0.1pF	GCQ1555C1H9R7BB01#
				±0.25pF	GCQ1555C1H9R7CB01#
				±0.5pF	GCQ1555C1H9R7DB01#
			9.8pF	±0.05pF	GCQ1555C1H9R8WB01#
				±0.1pF	GCQ1555C1H9R8BB01#
				±0.25pF	GCQ1555C1H9R8CB01#
				±0.5pF	GCQ1555C1H9R8DB01#
			9.9pF	±0.05pF	GCQ1555C1H9R9WB01#
				±0.1pF	GCQ1555C1H9R9BB01#
				±0.25pF	GCQ1555C1H9R9CB01#
				±0.5pF	GCQ1555C1H9R9DB01#
			10pF	±2%	GCQ1555C1H100GB01#
				±5%	GCQ1555C1H100JB01#
			11pF	±2%	GCQ1555C1H110GB01#
				±5%	GCQ1555C1H110JB01#
			12pF	±2%	GCQ1555C1H120GB01#
				±5%	GCQ1555C1H120JB01#
			13pF	±2%	GCQ1555C1H130GB01#
				±5%	GCQ1555C1H130JB01#
			15pF	±2%	GCQ1555C1H150GB01#
				±5%	GCQ1555C1H150JB01#
			16pF	±2%	GCQ1555C1H160GB01#
				±5%	GCQ1555C1H160JB01#
			18pF	±2%	GCQ1555C1H180GB01#
				±5%	GCQ1555C1H180JB01#
			20pF	±2%	GCQ1555C1H200GB01#
				±5%	GCQ1555C1H200JB01#
			22pF	±1%	GCQ1555C1H220FB01#
				±2%	GCQ1555C1H220GB01#
				±5%	GCQ1555C1H220JB01#
			24pF	±1%	GCQ1555C1H240FB01#
				±2%	GCQ1555C1H240GB01#
				±5%	GCQ1555C1H240JB01#
			27pF	±1%	GCQ1555C1H270FB01#
				±2%	GCQ1555C1H270GB01#
				±5%	GCQ1555C1H270JB01#
			30pF	±1%	GCQ1555C1H300FB01#
				±2%	GCQ1555C1H300GB01#
				±5%	GCQ1555C1H300JB01#
			33pF	±1%	GCQ1555C1H330FB01#
				±2%	GCQ1555C1H330GB01#
				±5%	GCQ1555C1H330JB01#
			36pF	±1%	GCQ1555C1H360FB01#
				±2%	GCQ1555C1H360GB01#
				±5%	GCQ1555C1H360JB01#
			39pF	±1%	GCQ1555C1H390FB01#
				±2%	GCQ1555C1H390GB01#
				±5%	GCQ1555C1H390JB01#
			43pF	±1%	GCQ1555C1H430FB01#
				±2%	GCQ1555C1H430GB01#

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number
0.55mm	50Vdc	COG	43pF	±5%	GCQ1555C1H430JB01#
				±1%	GCQ1555C1H470FB01#
				±2%	GCQ1555C1H470GB01#
			47pF	±5%	GCQ1555C1H470JB01#

Part number # indicates the package specification code.

MLSC Design Chip Multilayer Ceramic Capacitors for Automotive

GCD Series



Power-
train

AEC-
Q200

Fail
safe

Deflecting
crack

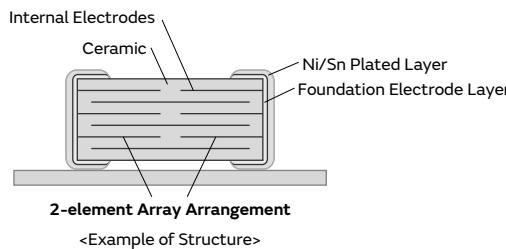
WEB

Prevents momentary dielectric breakdown by a 2-element array structure!

Features

1 Prevents momentary dielectric breakdown by a 2-element array structure!

This product consists of 2 elements arranged in 1 capacitor. It is structured so that even when 1 element is shorted, the other capacitor element will not short.

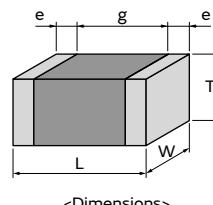


2 This AEC-Q200 conforming product is ideal for the battery lines of automotive.

Space can be reduced in battery lines where 2 capacitors are arranged in an array.

Specifications

Size	1.6×0.8mm to 2.0×1.25mm
Rated Voltage	16Vdc to 100Vdc
Capacitance	1000pF to 0.50μF
Main Applications	Battery Lines and Powertrains for automotive



GCD Series High Dielectric Constant Type Part Number List

1.6×0.8mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
0.9mm	100Vdc	X7R	1000pF	±10%	GCD188R72A102KA01#	
			1200pF	±10%	GCD188R72A122KA01#	
			1500pF	±10%	GCD188R72A152KA01#	
			1800pF	±10%	GCD188R72A182KA01#	
			2200pF	±10%	GCD188R72A222KA01#	
			2700pF	±10%	GCD188R72A272KA01#	
			3300pF	±10%	GCD188R72A332KA01#	
			3900pF	±10%	GCD188R72A392KA01#	
			4700pF	±10%	GCD188R72A472KA01#	
			5600pF	±10%	GCD188R72A562KA01#	
			6800pF	±10%	GCD188R72A682KA01#	
			8200pF	±10%	GCD188R72A822KA01#	
			10000pF	±10%	GCD188R72A103KA01#	
			12000pF	±10%	GCD188R72A123KA01#	
			15000pF	±10%	GCD188R72A153KA01#	
			18000pF	±10%	GCD188R72A183KA01#	
			22000pF	±10%	GCD188R72A223KA01#	
	50Vdc	X7R	1000pF	±10%	GCD188R71H102KA01#	
			1200pF	±10%	GCD188R71H122KA01#	
			1500pF	±10%	GCD188R71H152KA01#	
			1800pF	±10%	GCD188R71H182KA01#	
			2200pF	±10%	GCD188R71H222KA01#	
			2700pF	±10%	GCD188R71H272KA01#	
			3300pF	±10%	GCD188R71H332KA01#	
			3900pF	±10%	GCD188R71H392KA01#	
			4700pF	±10%	GCD188R71H472KA01#	
			5600pF	±10%	GCD188R71H562KA01#	
			6800pF	±10%	GCD188R71H682KA01#	
			8200pF	±10%	GCD188R71H822KA01#	
			10000pF	±10%	GCD188R71H103KA01#	
			12000pF	±10%	GCD188R71H123KA01#	
	25Vdc	X7R	27000pF	±10%	GCD188R71E273KA01#	
			33000pF	±10%	GCD188R71E333KA01#	
			39000pF	±10%	GCD188R71E393KA01#	
			47000pF	±10%	GCD188R71E473KA01#	

2.0×1.25mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
1.4mm	100Vdc	X7R	27000pF	±10%	GCD21BR72A273KA01#	
			33000pF	±10%	GCD21BR72A333KA01#	
			39000pF	±10%	GCD21BR72A393KA01#	
			47000pF	±10%	GCD21BR72A473KA01#	
			56000pF	±10%	GCD21BR72A563KA01#	
			68000pF	±10%	GCD21BR72A683KA01#	
			82000pF	±10%	GCD21BR72A823KA01#	
			0.10µF	±10%	GCD21BR72A104KA01#	
			27000pF	±10%	GCD21BR71H273KA01#	
			50Vdc	X7R		

Part number # indicates the package specification code.

Soft Termination MLSC Design Chip Multilayer Ceramic Capacitors for Automotive

GCE Series

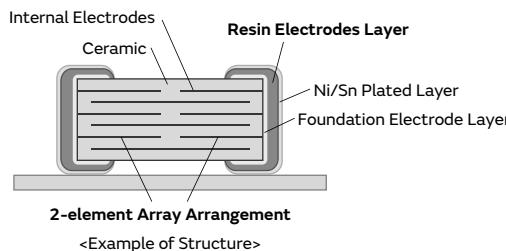


Further improved safety performance with a combination of a 2-element array structure & resin external electrodes!

Features

1 Avoid instantaneous dielectric breakdown with the 2-element array structure

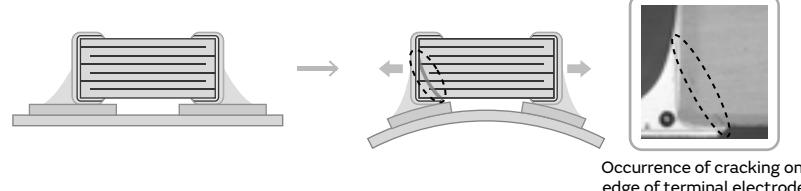
This product is configured with 2 elements arranged in one capacitor. Even if one element short circuits, the other element in the capacitor does not short.



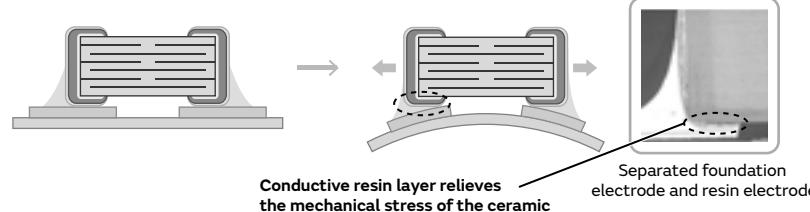
2 Provides additional safety performance in combination with resin electrodes

Adopting resin electrodes as the external electrodes will suppress the occurrence of cracking in the capacitor by mechanical stress.

For Automotive (GCM Series)



Fail Safe Design (GCE Series)



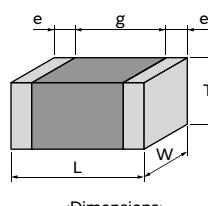
Note: Cracks may occur in the capacitor body if excessive stress beyond the "guaranteed range of board bending strength (*)" provided in the specifications is applied. Capacitors with cracks in them may cause a drop in insulation resistance, which could lead to a short circuit.
(*) For details on the guaranteed range of board bending strength, check the "Detailed Specification Sheet" on the Product Details Page.

3 Ideal for battery lines of on-board applications

Space can be reduced for battery lines, when 2 capacitors are configured in an array.

Specifications

Size	1.6×0.8mm to 2.0×1.25mm
Rated Voltage	25Vdc to 100Vdc
Capacitance	220pF to 0.10μF
Main Applications	For automotive, Battery lines, power trains



GCE Series High Dielectric Constant Type Part Number List

1.6×0.8mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
0.9mm	100Vdc	X7R	1000pF	±10%	GCE188R72A102KA01#	
			1200pF	±10%	GCE188R72A122KA01#	
			1500pF	±10%	GCE188R72A152KA01#	
			1800pF	±10%	GCE188R72A182KA01#	
			2200pF	±10%	GCE188R72A222KA01#	
			2700pF	±10%	GCE188R72A272KA01#	
			3300pF	±10%	GCE188R72A332KA01#	
			3900pF	±10%	GCE188R72A392KA01#	
			4700pF	±10%	GCE188R72A472KA01#	
			5600pF	±10%	GCE188R72A562KA01#	
			6800pF	±10%	GCE188R72A682KA01#	
			8200pF	±10%	GCE188R72A822KA01#	
			10000pF	±10%	GCE188R72A103KA01#	
			12000pF	±10%	GCE188R72A123KA01#	
			15000pF	±10%	GCE188R72A153KA01#	
			18000pF	±10%	GCE188R72A183KA01#	
			22000pF	±10%	GCE188R72A223KA01#	
	50Vdc	X7R	1000pF	±10%	GCE188R71H102KA01#	
			1200pF	±10%	GCE188R71H122KA01#	
			1500pF	±10%	GCE188R71H152KA01#	
			1800pF	±10%	GCE188R71H182KA01#	
			2200pF	±10%	GCE188R71H222KA01#	
			2700pF	±10%	GCE188R71H272KA01#	
			3300pF	±10%	GCE188R71H332KA01#	
			3900pF	±10%	GCE188R71H392KA01#	
			4700pF	±10%	GCE188R71H472KA01#	
			5600pF	±10%	GCE188R71H562KA01#	
			6800pF	±10%	GCE188R71H682KA01#	
			8200pF	±10%	GCE188R71H822KA01#	
			10000pF	±10%	GCE188R71H103KA01#	
			12000pF	±10%	GCE188R71H123KA01#	
			15000pF	±10%	GCE188R71H153KA01#	
			18000pF	±10%	GCE188R71H183KA01#	
			22000pF	±10%	GCE188R71H223KA01#	
	25Vdc	X7R	27000pF	±10%	GCE188R71E273KA01#	
			33000pF	±10%	GCE188R71E333KA01#	
			39000pF	±10%	GCE188R71E393KA01#	
			47000pF	±10%	GCE188R71E473KA01#	

2.0×1.25mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
1.45mm	100Vdc	X7R	27000pF	±10%	GCE21BR72A273KA01#	
			33000pF	±10%	GCE21BR72A333KA01#	
			39000pF	±10%	GCE21BR72A393KA01#	
			47000pF	±10%	GCE21BR72A473KA01#	
			56000pF	±10%	GCE21BR72A563KA01#	
			68000pF	±10%	GCE21BR72A683KA01#	
			82000pF	±10%	GCE21BR72A823KA01#	
			0.10μF	±10%	GCE21BR72A104KA01#	
50Vdc	X7R		27000pF	±10%	GCE21BR71H273KA01#	

Part number # indicates the package specification code.

3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for Automotive

NFM Series

**Power-train****AEC-Q200****Low ESL****EMI Filter****WEB**

This is the most suitable Low ESL capacitors for noise measurement and power decoupling of power train and safety equipment.

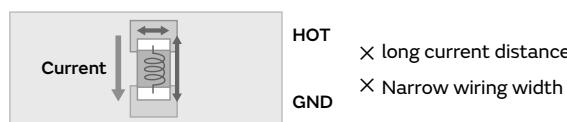
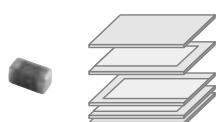
Features

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.

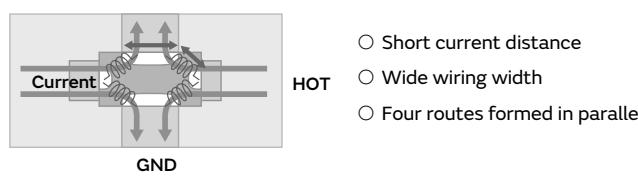
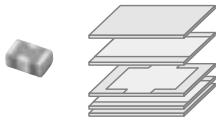
- 2-terminal Capacitor

Realizes Ultra low ESL by using a extremely shorter high frequency current path



× long current distance
× Narrow wiring width

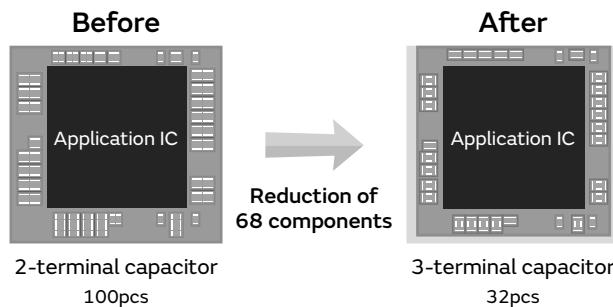
- 3-terminal capacitor



- Short current distance
- Wide wiring width
- Four routes formed in parallel

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 2-terminal capacitor.



3 Contributes to noise suppression

Example of noise suppression effect

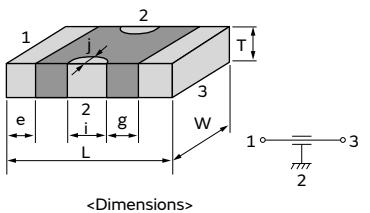
WEB

4 Compliance with AEC-Q200

Use of 3-terminal low-ESL chip multilayer ceramic capacitors to decouple processor power supplies has recently surged in the automotive market due to demand for high performance processors and smaller electronics. This has accompanied the increase in high-functioning multitasking onboard equipment such as advanced driver assistance systems (ADAS), preventative safety systems for automated vehicles, and in-vehicle infotainment (IVI) systems.

Specifications

Size	1.6×0.8mm to 3.2×1.6mm
Rated Voltage	6.3Vdc to 100Vdc
Capacitance	220pF to 1.0μF
Main Applications	Safety equipment, Drive system control, Information and Comfort equipment



GRT Series

GCM Series

GC3 Series

GCJ Series

GCD Series

GCE Series

NMF Series

KCM Series

KC3 Series

KCA Series

GCG Series

△Caution /Notice

NFM Series Part Number List

1.6×0.8mm

T max.	Rated Voltage	Cap.	Tol.	Part Number	
0.7mm	16Vdc	1.0μF	±20%	NFM18HC105C1C3#	
	6.3Vdc	1.0μF	±20%	NFM18HC105COJ3#	

2.0×1.25mm

T max.	Rated Voltage	Cap.	Tol.	Part Number	
0.95mm	50Vdc	220pF	±20%	NFM21HC221R1H3#	
		470pF	±20%	NFM21HC471R1H3#	
		1000pF	±20%	NFM21HC102R1H3#	
		2200pF	±20%	NFM21HC222R1H3#	
		22000pF	±20%	NFM21HC223R1H3#	
	16Vdc	1.0μF	±20%	NFM21HC105R1C3#	
		0.10μF	±20%	NFM21HC104R1A3#	
		0.22μF	±20%	NFM21HC224R1A3#	
		0.47μF	±20%	NFM21HC474R1A3#	

3.2×1.6mm

T max.	Rated Voltage	Cap.	Tol.	Part Number	
1.5mm	100Vdc	10000pF	±20%	NFM31HK103R2A3#	D3
		10000pF	±20%	NFM31HK103R1H3#	D3
		15000pF	±20%	NFM31HK153R1H3#	D3
		22000pF	±20%	NFM31HK223R1H3#	D3
		0.10μF	±20%	NFM31HK104R1H3#	

Metal Terminal Type Multilayer Ceramic Capacitors for Automotive

KCM Series

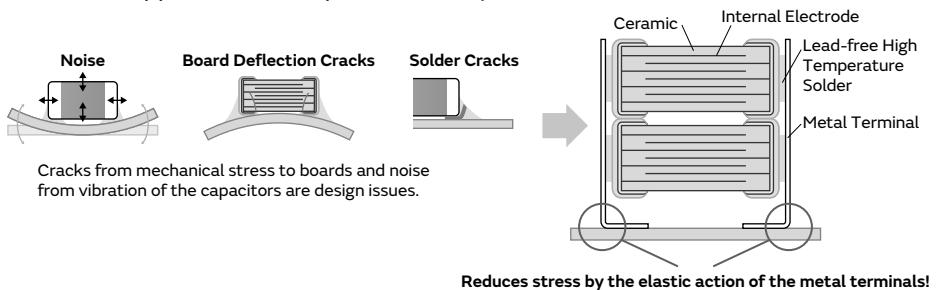


Bonding the metal terminals to external electrodes solves design issues by mounting large size MLCC!

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.

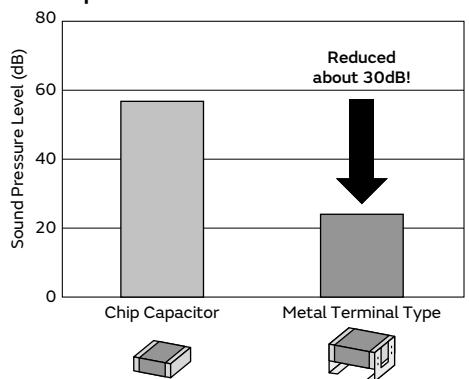


2 Substantially reduces noise, board deflection cracks and soldering cracks.

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.

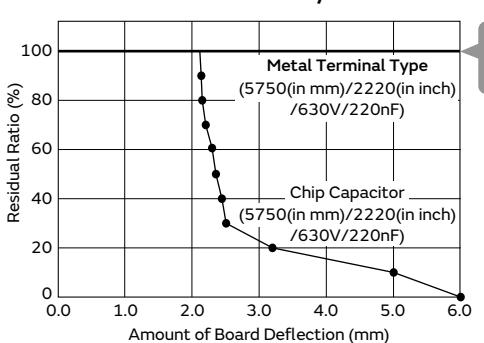
Comparison of Noise Reduction Effects



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: 5mm

Note: Results Using Murata's Evaluation Board

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 Cycles		
2000 Cycles		

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

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

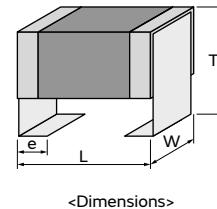
GRT Series
 GCM Series
 GC3 Series
 GCJ Series
 GCQ Series
 GCD Series
 GCE Series
 NMF Series
 KCM Series
 KC3 Series
 KCA Series
 GCG Series
 KC3 Series
 /Notice

③ 2 chips can be stacked.

Realize large capacity by stacking 2 capacitors.

Specifications

Size	6.1×5.1mm to 6.1×5.3mm
Rated Voltage	25Vdc to 630Vdc
Capacitance	0.015μF to 100μF
Main Applications	For drive system control of engine ECU For other drive system controls and safety devices



KCM Series Temperature Compensating Type Part Number List

6.1×5.1mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
3.1mm	630Vdc	COG	0.015μF	±5%	KCM55L5C2J153JDL1#	
			0.018μF	±5%	KCM55L5C2J183JDL1#	
3.9mm	630Vdc	COG	0.022μF	±5%	KCM55R5C2J223JDL1#	
			0.027μF	±5%	KCM55R5C2J273JDL1#	
5.1mm	630Vdc	COG	0.030μF	±5%	KCM55T5C2J303JDL1#	
			0.036μF	±5%	KCM55T5C2J363JDL1#	
6.6mm	630Vdc	COG	0.044μF	±5%	KCM55V5C2J443JDL2#	
			0.054μF	±5%	KCM55V5C2J543JDL2#	

Part number # indicates the package specification code.

muRata

KCM Series High Dielectric Constant Type Power- train AEC- Q200 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	100Vdc	X7R	4.7μF	±10%	KCM55LR72A475KH01#	
	63Vdc	X7R	4.7μF	±10%	KCM55LR71J475KH01#	
	50Vdc	X7R	4.7μF	±10%	KCM55LR71H475KH01#	
			10μF	±10%	KCM55LR71H106KH01#	
	35Vdc	X7R	10μF	±10%	KCM55LR7YA106KH01#	
			15μF	±10%	KCM55LR7YA156KH01#	
			25μF	±10%	KCM55LR71E156KH01#	
3.9mm	100Vdc	X7R	6.8μF	±10%	KCM55QR72A685KH01#	
			10μF	±10%	KCM55QR72A106KH01#	
	63Vdc	X7R	10μF	±10%	KCM55QR71J106KH01#	
	50Vdc	X7R	17μF	±10%	KCM55QR71H176KH01#	
			17μF	±10%	KCM55QR7YA176KH01#	
	35Vdc	X7R	22μF	±10%	KCM55QR7YA226KH01#	
			33μF	±10%	KCM55QR71E336KH01#	
			X7S	±10%	KCM55QC71E476KH13#	
5.0mm	50Vdc	X7R	22μF	±20%	KCM55TR71H226MH01#	
	35Vdc	X7R	33μF	±20%	KCM55TR7YA336MH01#	
6.7mm	100Vdc	X7R	15μF	±20%	KCM55WR72A156MH01#	
			22μF	±20%	KCM55WR72A226MH01#	
	63Vdc	X7R	22μF	±20%	KCM55WR71J226MH01#	
	50Vdc	X7R	33μF	±20%	KCM55WR71H336MH01#	
			47μF	±20%	KCM55WR7YA476MH01#	
	35Vdc	X7R	47μF	±20%	KCM55WR71E476MH01#	
			68μF	±20%	KCM55WR71E686MH01#	
			X7S	±20%	KCM55WC71E107MH13#	

Part number # indicates the package specification code.

High Effective Capacitance & High Allowable Ripple Current Metal Terminal Type Multilayer Ceramic Capacitors for Automotive

KC3 Series

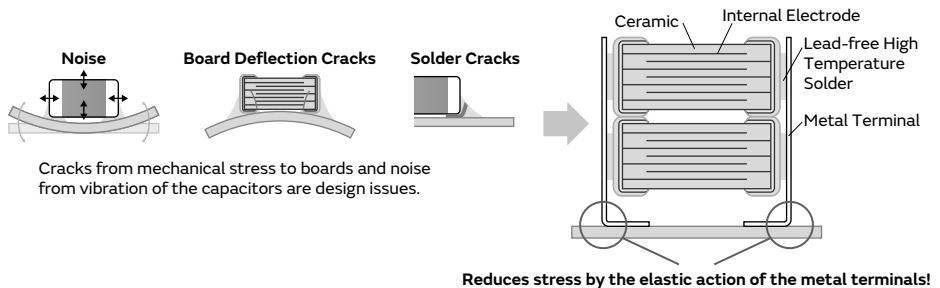


Bonding the metal terminals to external electrodes solves design issues by mounting large size MLCC!

Features

1 Bond Metal Terminals to External Electrodes of Chips

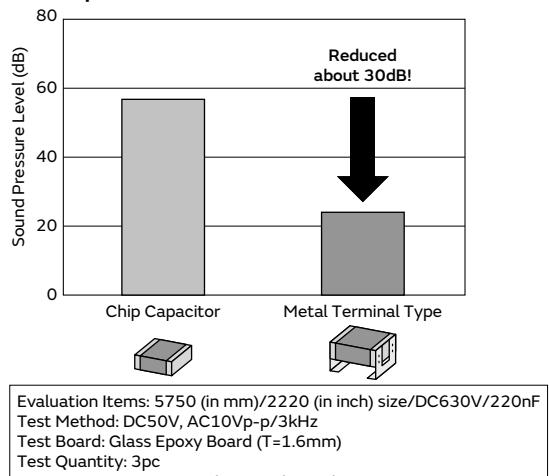
This product has high resistance to heat and mechanical impact and greatly reduces acoustic noise of boards by ceramics.



2 Stacking of Chips

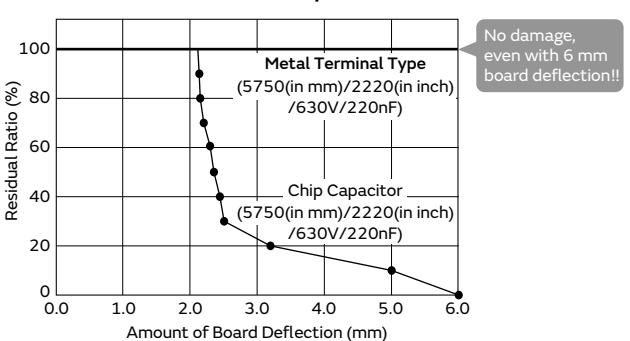
Achieve high capacity by stacking 2 capacitors.

Comparison of Noise Reduction Effects



Note: Results Using Murata's Evaluation Board

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 Cycles		
2000 Cycles		

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

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

GRT Series

GCM Series

GC3 Series

GCJ Series

GCQ Series

GCD Series

GCE Series

NMF Series

KCM Series

KC3 Series

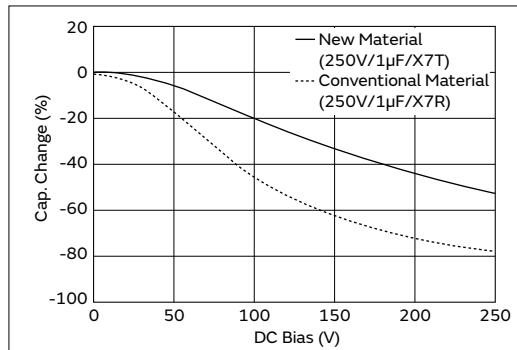
KCA Series

GCG Series

Caution /Notice

3 Adopted Low Dielectric Constant Materials

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

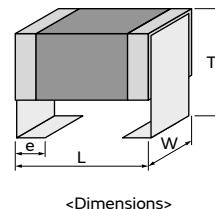


4 2 chips can be stacked

Realize large capacity by stacking 2 capacitors.

Specifications

Size	6.1×5.3mm
Rated Voltage	250Vdc to 630Vdc
Capacitance	0.10μF to 2.2μF
Main Applications	For drive system control of engine ECU For other drive system controls and safety devices



KC3 Series High Dielectric Constant Type Part Number List

6.1×5.3mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
3.0mm	630Vdc	X7T	0.10µF	±10%	KC355LD72J104KH01#	
			0.15µF	±10%	KC355LD72J154KH01#	
			0.33µF	±10%	KC355LD7LQ334KV01#	D2
			0.47µF	±10%	KC355LD7LQ474KV01#	D2
	450Vdc	X7T	0.22µF	±10%	KC355LD72W224KH01#	
			0.33µF	±10%	KC355LD72W334KH01#	
			0.47µF	±10%	KC355LD72W474KH01#	
			0.68µF	±10%	KC355LD7LP684KV01#	D2
	250Vdc	X7T	0.47µF	±10%	KC355LD72E474KH01#	
			0.68µF	±10%	KC355LD72E684KH01#	
3.9mm	630Vdc	X7T	0.22µF	±10%	KC355QD72J224KH01#	
			0.27µF	±10%	KC355QD72J274KH01#	
			0.56µF	±10%	KC355QD7LQ564KV01#	D2
	450Vdc	X7T	0.56µF	±10%	KC355QD72W564KH01#	
			1.0µF	±10%	KC355QD7LP105KV01#	D2
	250Vdc	X7T	1.0µF	±10%	KC355QD72E105KH01#	
	5.0mm	630Vdc	0.68µF	±20%	KC355TD7LQ684MV01#	D2
			1.0µF	±20%	KC355TD7LQ105MV01#	D2
		450Vdc	0.68µF	±20%	KC355TD72W684MH01#	
			1.0µF	±20%	KC355TD72W105MH01#	
	250Vdc	X7T	1.5µF	±20%	KC355TD72E155MH01#	
6.7mm	630Vdc	X7T	0.47µF	±20%	KC355WD72J474MH01#	
			0.56µF	±20%	KC355WD72J564MH01#	
			1.2µF	±20%	KC355WD7LQ125MV01#	D2
	450Vdc	X7T	1.2µF	±20%	KC355WD72W125MH01#	
			2.2µF	±20%	KC355WD7LP225MV01#	D2
	250Vdc	X7T	2.2µF	±20%	KC355WD72E225MH01#	

Part number # indicates the package specification code.

Safety Standard Certified Metal Terminal Type Multilayer Ceramic Capacitors for Automotive

KCA Series



WEB

For Automotive IEC60384-14 X1/Y2 Class Certified Product (Basic insulation product)

Features

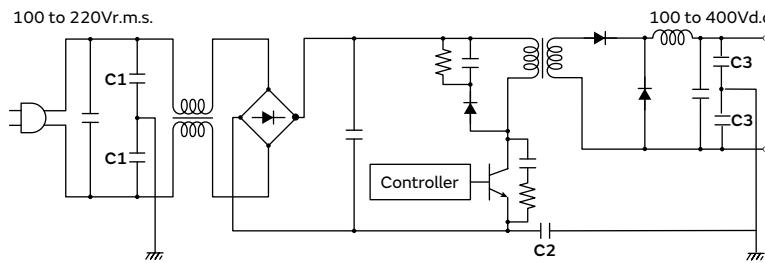
① IEC60384-14 certified product: Rated voltage AC250V (r.m.s.).

Please download Safety Standard Certification (Type MF: X1,Y2) from Web site.

② Best suitable for class Y2 capacitors.

AC250V (r.m.s.)-rated voltage, withstand voltage of AC2000V (r.m.s.) guaranteed for 60 seconds.

● OBC (On Board Charger)

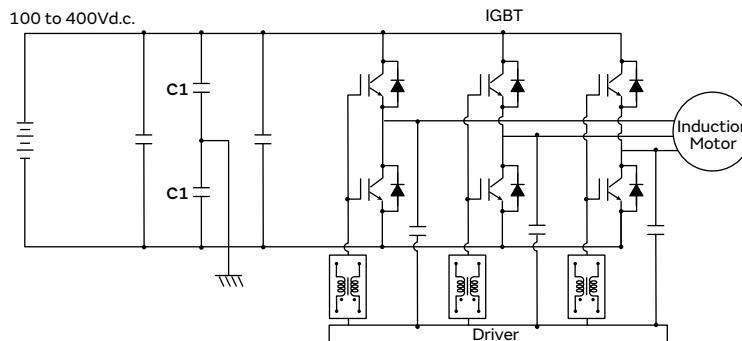


No.	Application
C1	Y Cap (Primary)
C2	Primary-Secondary Coupling
C3	Y Cap (Secondary)

③ Best suitable for DC input common mode noise filters.

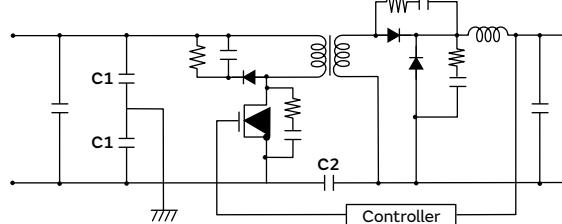
DC630V-rated voltage, withstand voltage of DC2700V guaranteed for 60 seconds.

● Inverter



No.	Application
C1	Common mode noise filters

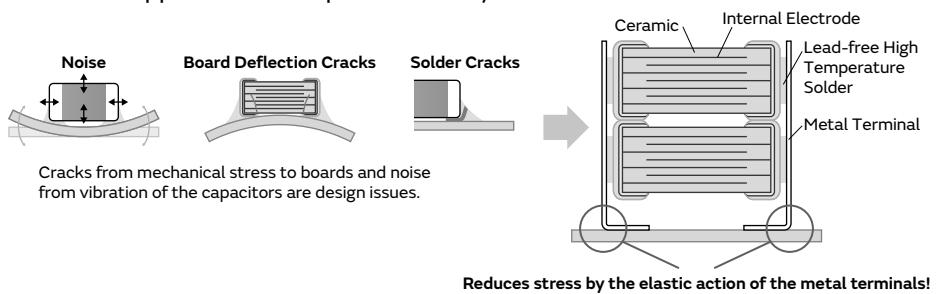
● DC-DC Converter



No.	Application
C1	Common mode noise filters
C2	Primary-Secondary Coupling

4 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.

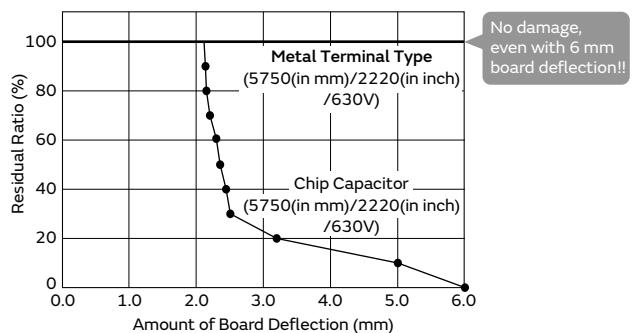


5 Substantially reduces board deflection cracks and soldering cracks.

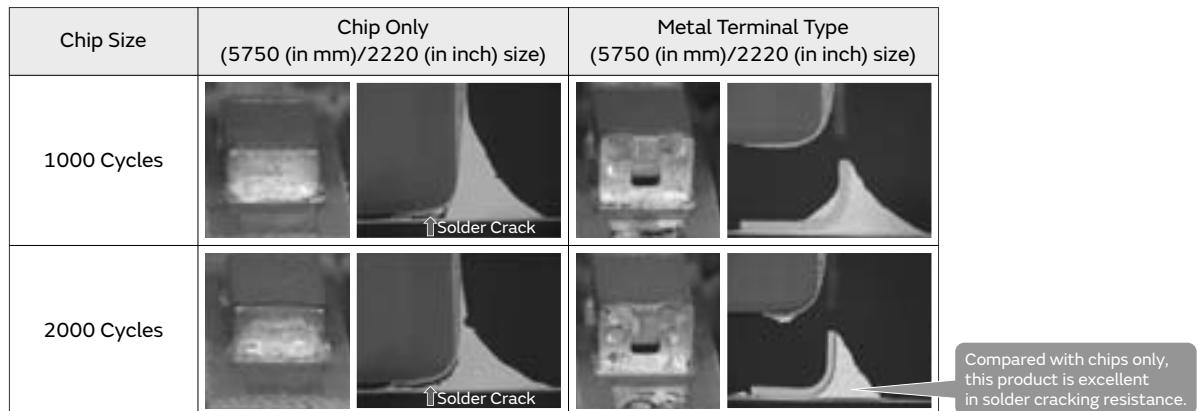
This product is not damaged even with a board deflection of 6 mm.

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

Reduces Stress Caused by Board Deflection



Suppresses Solder Cracks Caused by Heat Stress

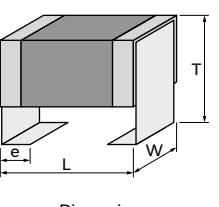


6 2 chips can be stacked.

Realize large capacity by stacking 2 capacitors.

Specifications

Size	6.1×5.1mm
Rated Voltage	250Vac (r.m.s.)
Capacitance	100pF to 10000pF
Main Applications	Battery chargers, Inverter, DC-DC converters



KCA Series Temperature Compensating Type Power-train AEC-Q200 Anti-noise Deflecting crack Soldering crack Safety standard Part Number List

6.1×5.1mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
3.0mm	250Vac(r.m.s.)	U2J	100pF	±10%	KCA55L7UMF101KL01#	
			150pF	±10%	KCA55L7UMF151KL01#	
			220pF	±10%	KCA55L7UMF221KL01#	
			330pF	±10%	KCA55L7UMF331KL01#	
			470pF	±10%	KCA55L7UMF471KL01#	
			680pF	±10%	KCA55L7UMF681KL01#	
			1000pF	±10%	KCA55L7UMF102KL01#	
			1500pF	±10%	KCA55L7UMF152KL01#	
			2200pF	±10%	KCA55L7UMF222KL01#	
			3300pF	±10%	KCA55L7UMF332KL01#	
3.9mm	250Vac(r.m.s.)	U2J	4700pF	±10%	KCA55Q7UMF472KL01#	
5.0mm	250Vac(r.m.s.)	U2J	6800pF	±20%	KCA55T7UMF682ML01#	
6.7mm	250Vac(r.m.s.)	U2J	10000pF	±20%	KCA55W7UMF103ML01#	

Part number # indicates the package specification code.

AgPd Termination Conductive Glue Mounting Chip Multilayer Ceramic Capacitors for Automotive

GCG Series

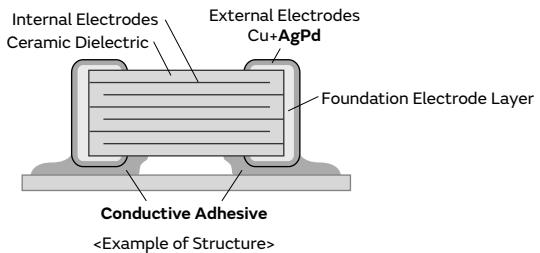


Improved mechanical and thermal strength by adopting AgPd external electrodes, which can be mounted with a conductive glue!

Features

① Limited to Conductive Glue Mounting

This capacitor can be mounted with a conductive adhesive* in powertrains and safety devices of automotive.



② Adopted AgPd external electrodes

Adopted AgPd, which is excellent in bonding strength with a conductive adhesive.

③ Compatible up to 150°C

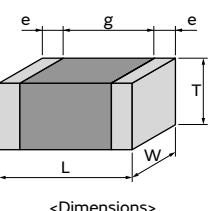
This capacitor lineup with X8L and X8R characteristics can be used in high temperature environments, such as in ABS and transmission control.

* This product is for use exclusively with conductive glue mounting. It cannot be used with any mounting methods other than conductive glue mounting.

Using solder to mount the product can result in insufficient wetting, insufficient bonding strength, and/or leaching of the Ag/Pd External Electrodes (terminations), which can cause quality problems such as the chip coming loose.

Specifications

Size	1.0×0.5mm to 3.2×2.5mm
Rated Voltage	6.3Vdc to 100Vdc
Capacitance	1.0pF to 47μF
Main Applications	For automotive, power trains, sensors



GCG Series Temperature Compensating Type Power-train AEC-Q200 Deflecting crack Soldering crack Limited to conductive glue mounting Part Number List

1.0×0.5mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number
0.55mm	50Vdc	X8G	120pF	±5%	GCG1555G1H121JA01#
			150pF	±5%	GCG1555G1H151JA01#
			180pF	±5%	GCG1555G1H181JA01#
			220pF	±5%	GCG1555G1H221JA01#
			270pF	±5%	GCG1555G1H271JA01#
			330pF	±5%	GCG1555G1H331JA01#
			390pF	±5%	GCG1555G1H391JA01#
			470pF	±5%	GCG1555G1H471JA01#

1.6×0.8mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number
0.9mm	100Vdc	X8G	10pF	±5%	GCG1885G2A100JA01#
			12pF	±5%	GCG1885G2A120JA01#
			15pF	±5%	GCG1885G2A150JA01#
			18pF	±5%	GCG1885G2A180JA01#
			22pF	±5%	GCG1885G2A220JA01#
			27pF	±5%	GCG1885G2A270JA01#
			33pF	±5%	GCG1885G2A330JA01#
			39pF	±5%	GCG1885G2A390JA01#
			47pF	±5%	GCG1885G2A470JA01#
			56pF	±5%	GCG1885G2A560JA01#
			68pF	±5%	GCG1885G2A680JA01#
			82pF	±5%	GCG1885G2A820JA01#
			100pF	±5%	GCG1885G2A101JA01#
			120pF	±5%	GCG1885G2A121JA01#
			150pF	±5%	GCG1885G2A151JA01#
			180pF	±5%	GCG1885G2A181JA01#
			220pF	±5%	GCG1885G2A221JA01#
			270pF	±5%	GCG1885G2A271JA01#
			330pF	±5%	GCG1885G2A331JA01#
			390pF	±5%	GCG1885G2A391JA01#
			470pF	±5%	GCG1885G2A471JA01#
			560pF	±5%	GCG1885G2A561JA01#
			680pF	±5%	GCG1885G2A681JA01#
			820pF	±5%	GCG1885G2A821JA01#
			1000pF	±5%	GCG1885G2A102JA01#
U2J	50Vdc	X8G	1000pF	±5%	GCG1887U2A102JA01#
			1200pF	±5%	GCG1887U2A122JA01#
			1500pF	±5%	GCG1887U2A152JA01#
			1800pF	±5%	GCG1887U2A182JA01#
			2200pF	±5%	GCG1887U2A222JA01#
			2700pF	±5%	GCG1887U2A272JA01#
			3300pF	±5%	GCG1887U2A332JA01#
			3900pF	±5%	GCG1887U2A392JA01#
			4700pF	±5%	GCG1887U2A472JA01#
			5600pF	±5%	GCG1887U2A562JA01#
50Vdc	X8G	X8G	6800pF	±5%	GCG1887U2A682JA01#
			8200pF	±5%	GCG1887U2A822JA01#
			10000pF	±5%	GCG1887U2A103JA01#
					GCG1885G1H100JA01#

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number
0.9mm	50Vdc	X8G	12pF	±5%	GCG1885G1H120JA01#
			15pF	±5%	GCG1885G1H150JA01#
			18pF	±5%	GCG1885G1H180JA01#
			22pF	±5%	GCG1885G1H220JA01#
			27pF	±5%	GCG1885G1H270JA01#
			33pF	±5%	GCG1885G1H330JA01#
			39pF	±5%	GCG1885G1H390JA01#
			47pF	±5%	GCG1885G1H470JA01#
			56pF	±5%	GCG1885G1H560JA01#
			68pF	±5%	GCG1885G1H680JA01#
			82pF	±5%	GCG1885G1H820JA01#
			100pF	±5%	GCG1885G1H101JA01#
			120pF	±5%	GCG1885G1H121JA01#
			150pF	±5%	GCG1885G1H151JA01#
			180pF	±5%	GCG1885G1H181JA01#
			220pF	±5%	GCG1885G1H221JA01#
			270pF	±5%	GCG1885G1H271JA01#
			330pF	±5%	GCG1885G1H331JA01#
			390pF	±5%	GCG1885G1H391JA01#
			470pF	±5%	GCG1885G1H471JA01#
			560pF	±5%	GCG1885G1H561JA01#
			680pF	±5%	GCG1885G1H681JA01#
			820pF	±5%	GCG1885G1H821JA01#
			1000pF	±5%	GCG1885G1H102JA01#
			1200pF	±5%	GCG1885G1H122JA01#
			1500pF	±5%	GCG1885G1H152JA01#
			1800pF	±5%	GCG1885G1H182JA01#
			2200pF	±5%	GCG1885G1H222JA01#

2.0×1.25mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number
0.7mm	50Vdc	X8G	1000pF	±5%	GCG2165G1H102JA01#
			1200pF	±5%	GCG2165G1H122JA01#
			1500pF	±5%	GCG2165G1H152JA01#
			1800pF	±5%	GCG2165G1H182JA01#
			2200pF	±5%	GCG2165G1H222JA01#
			2700pF	±5%	GCG2165G1H272JA01#
			3300pF	±5%	GCG2165G1H332JA01#
			3900pF	±5%	GCG2165G1H392JA01#
			4700pF	±5%	GCG2165G1H472JA01#
					GCG2195G1H562JA01#
0.95mm	50Vdc	X8G	5600pF	±5%	GCG2195G1H562JA01#
			6800pF	±5%	GCG2195G1H682JA01#
			8200pF	±5%	GCG2195G1H822JA01#
			10000pF	±5%	GCG2195G1H103JA01#

Part number # indicates the package specification code.

GCG 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	X8L	220pF	±10%	GCG155L81H221KA02#
			330pF	±10%	GCG155L81H331KA02#
			470pF	±10%	GCG155L81H471KA02#
			680pF	±10%	GCG155L81H681KA02#
			1000pF	±10%	GCG155L81H102KA02#
			1500pF	±10%	GCG155L81H152KA02#
			2200pF	±10%	GCG155L81H222KA02#
			3300pF	±10%	GCG155L81H332KA02#
			4700pF	±10%	GCG155L81H472KA02#
		X7R	220pF	±10%	GCG155R71H221KA01#
			270pF	±10%	GCG155R71H271KA01#
			330pF	±10%	GCG155R71H331KA01#
			390pF	±10%	GCG155R71H391KA01#
			470pF	±10%	GCG155R71H471KA01#
			560pF	±10%	GCG155R71H561KA01#
			680pF	±10%	GCG155R71H681KA01#
			820pF	±10%	GCG155R71H821KA01#
			1000pF	±10%	GCG155R71H102KA01#
			1200pF	±10%	GCG155R71H122KA01#
25Vdc	25Vdc	X8L	1500pF	±10%	GCG155L81E562KA01#
			2200pF	±10%	GCG155L81E682KA01#
			3200pF	±10%	GCG155L81E822KA01#
			4700pF	±10%	GCG155L81E103KA01#
		X7R	5600pF	±10%	GCG155R71E562KA01#
			6800pF	±10%	GCG155R71E682KA01#
			8200pF	±10%	GCG155R71E822KA01#
			10000pF	±10%	GCG155R71E103KA01#
16Vdc	16Vdc	X8L	15000pF	±10%	GCG155L81C153KA01#
			18000pF	±10%	GCG155L81C183KA01#
			22000pF	±10%	GCG155L81C223KA01#
			27000pF	±10%	GCG155L81C273KA01#
			33000pF	±10%	GCG155L81C333KA01#
			39000pF	±10%	GCG155L81C393KA01#
			47000pF	±10%	GCG155L81C473KA01#
		X7R	15000pF	±10%	GCG155R71C153KA01#
			18000pF	±10%	GCG155R71C183KA01#
			22000pF	±10%	GCG155R71C223KA01#
			27000pF	±10%	GCG155R71C273KA01#
			33000pF	±10%	GCG155R71C333KA01#
			39000pF	±10%	GCG155R71C393KA01#
			47000pF	±10%	GCG155R71C473KA01#
			56000pF	±10%	GCG155R71C563KA01#
			68000pF	±10%	GCG155R71C683KA01#
			0.10μF	±10%	GCG155R71C104KA01#
			0.15μF	±10%	GCG155R71C154KA01#
			0.18μF	±10%	GCG155R71C184KA01#
			0.22μF	±10%	GCG155R71C224KA01#
25Vdc	25Vdc	X8R	0.15μF	±10%	GCG188R92A102KA01#
			0.22μF	±10%	GCG188R92A222KA01#
			0.33μF	±10%	GCG188R92A332KA01#
		X7R	0.39μF	±10%	GCG188R92A392KA01#
			0.47μF	±10%	GCG188R92A472KA01#
			0.12μF	±10%	GCG188R92A473KA01#

1.6×0.8mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number
0.9mm	100Vdc	X8R	1000pF	±10%	GCG188R92A102KA01#
			1200pF	±10%	GCG188R92A122KA01#
			1500pF	±10%	GCG188R92A152KA01#
			1800pF	±10%	GCG188R92A182KA01#
			2200pF	±10%	GCG188R92A222KA01#
			2700pF	±10%	GCG188R92A272KA01#
			3300pF	±10%	GCG188R92A332KA01#
			3900pF	±10%	GCG188R92A392KA01#
			4700pF	±10%	GCG188R92A472KA01#
			5600pF	±10%	GCG188R92A562KA01#
		X8R	6800pF	±10%	GCG188R92A682KA01#
			8200pF	±10%	GCG188R92A822KA01#
			10000pF	±10%	GCG188R92A103KA01#
			12000pF	±10%	GCG188R92A123KA01#
			15000pF	±10%	GCG188R92A153KA01#
			18000pF	±10%	GCG188R92A183KA01#
			22000pF	±10%	GCG188R92A223KA01#
			27000pF	±10%	GCG188R92A273KA01#
			33000pF	±10%	GCG188R92A333KA01#
			39000pF	±10%	GCG188R92A393KA01#
50Vdc	50Vdc	X8L	0.15μF	±10%	GCG188L8EH154KA07#
			0.22μF	±10%	GCG188L8EH224KA07#
		X8R	1200pF	±10%	GCG188R91H122KA03#
			1500pF	±10%	GCG188R91H152KA03#
			2200pF	±10%	GCG188R91H222KA03#
		X7R	2700pF	±10%	GCG188R91H272KA03#
			3300pF	±10%	GCG188R91H332KA03#
			3900pF	±10%	GCG188R91H392KA03#
			4700pF	±10%	GCG188R91H472KA03#
			5600pF	±10%	GCG188R91H562KA03#
16Vdc	16Vdc	X8L	6800pF	±10%	GCG188R91H682KA03#
			8200pF	±10%	GCG188R91H822KA03#
			10000pF	±10%	GCG188R91H103KA03#
			15000pF	±10%	GCG188R91H153KA03#
			22000pF	±10%	GCG188R91H223KA03#
		X7R	33000pF	±10%	GCG188R91H333KA03#
			39000pF	±10%	GCG188R91H393KA03#
			47000pF	±10%	GCG188R91H473KA03#
			6800pF	±10%	GCG188R91H682KA03#
			8200pF	±10%	GCG188R91H822KA03#
25Vdc	25Vdc	X8R	10000pF	±10%	GCG188R91H103KA03#
			15000pF	±10%	GCG188R91H153KA03#
			22000pF	±10%	GCG188R91H223KA03#
			33000pF	±10%	GCG188R91H333KA03#
			47000pF	±10%	GCG188R91H473KA03#
		X7R	0.10μF	±10%	GCG188R91H104KA01#
			0.12μF	±10%	GCG188R91H124KA01#
			0.15μF	±10%	GCG188R91H154KA01#
			0.18μF	±10%	GCG188R91H184KA01#
			0.22μF	±10%	GCG188R91H224KA01#
25Vdc	25Vdc	X8R	0.15μF	±10%	GCG188R71H154KA01#
			0.22μF	±10%	GCG188R71H224KA01#
		X7R	0.12μF	±10%	GCG188R71E124KA12#

Part number # indicates the package specification code.



GCG Series High Dielectric Constant Type Part Number List

(→ 1.6×0.8mm)

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
0.9mm	25Vdc	X7R	0.15μF	±10%	GCG188R71E154KA12#	
			0.18μF	±10%	GCG188R71E184KA12#	
			0.22μF	±10%	GCG188R71E224KA12#	
	16Vdc	X8L	0.15μF	±10%	GCG188L81C154KA01#	
			0.22μF	±10%	GCG188L81C224KA01#	
			1.0μF	±10%	GCG188L8EE105KA07#	D4
	10Vdc	X7R	1.0μF	±10%	GCG188R71C105KA01#	
		X7S	2.2μF	±10%	GCG188C71A225KE01#	
	6.3Vdc	X7R	2.2μF	±10%	GCG188R70J225KE01#	

2.0×1.25mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
1.45mm	50Vdc	X8L	1.0μF	±10%	GCG21BL8EH105KA07#	D4
		X7R	0.15μF	±10%	GCG21BR71H154KA01#	
			0.18μF	±10%	GCG21BR71H184KA01#	
			0.22μF	±10%	GCG21BR71H224KA01#	
			0.33μF	±10%	GCG21BR71H334KA01#	
			0.47μF	±10%	GCG21BR71H474KA01#	
	35Vdc	X8L	1.0μF	±10%	GCG21BL8EG684KA07#	D4
			0.68μF	±10%	GCG21BL8EG105KA07#	D4
		X7R	1.0μF	±10%	GCG21BR7YA684KA01#	
			0.68μF	±10%	GCG21BR7YA105KA01#	
	25Vdc	X8L	0.33μF	±10%	GCG21BL81E334KA01#	
		X8R	0.68μF	±10%	GCG21BR91E684KE01#	
			1.0μF	±10%	GCG21BR91E105KE01#	
		X7R	0.27μF	±10%	GCG21BR71E274KA01#	
			0.33μF	±10%	GCG21BR71E334KA01#	
			0.39μF	±10%	GCG21BR71E394KA01#	
			0.47μF	±10%	GCG21BR71E474KA01#	
			0.56μF	±10%	GCG21BR71E564KA01#	
			0.68μF	±10%	GCG21BR71E684KA01#	
			0.82μF	±10%	GCG21BR71E824KA01#	
			1.0μF	±10%	GCG21BR71E105KA12#	
	16Vdc	X8L	0.33μF	±10%	GCG21BL81C334KA01#	
			0.39μF	±10%	GCG21BL81C394KA01#	
			0.47μF	±10%	GCG21BL81C474KA01#	
			0.56μF	±10%	GCG21BL81C564KA01#	
			0.68μF	±10%	GCG21BL81C684KA01#	
			0.82μF	±10%	GCG21BL81C824KA01#	
	10Vdc	X7R	4.7μF	±10%	GCG21BR71C475KA12#	
		X7R	10μF	±10%	GCG21BR71A106KE01#	
	6.3Vdc	X8L	10μF	±10%	GCG21BL8EC106KE07#	D4
		X7R	10μF	±10%	GCG21BR70J106KE01#	

3.2×1.6mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
1.35mm	50Vdc	X8R	0.22μF	±10%	GCG31MR91H224KA03#	
			0.33μF	±10%	GCG31MR91H334KA03#	
	25Vdc	X7R	1.2μF	±10%	GCG31MR71E125KA01#	

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
1.35mm	25Vdc	X7R	1.5μF	±10%	GCG31MR71E155KA01#	
			2.2μF	±10%	GCG31MR71E225KA12#	
			1.0μF	±10%	GCG31ML81C105KA01#	
	16Vdc	X8L	1.5μF	±10%	GCG31ML81C155KA01#	
			3.3μF	±10%	GCG31CR71E335KA01#	
			3.9μF	±10%	GCG31CR71E395KA01#	
	16Vdc	X8R	4.7μF	±10%	GCG31CR71E475KA01#	
			3.3μF	±10%	GCG31CL81C335KA01#	
			4.7μF	±10%	GCG31CL81C475KA01#	
	6.3Vdc	X7R	0.68μF	±10%	GCG31CR91C684KA01#	
	6.3Vdc	X7R	1.0μF	±10%	GCG31CR91C105KA01#	
		X7R	22μF	±10%	GCG31CR70J226KE01#	

3.2×2.5mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
2.8mm	50Vdc	X8L	10μF	±10%	GCG32EL8EH106KA07#	D4
		X7S	10μF	±10%	GCG32EC71H106KA01#	
35Vdc	X8L	10μF	±10%	GCG32EL8EG106KA07#	D4	
		X7S	10μF	±10%	GCG32EC7YA106KA01#	
25Vdc	X8L	22μF	±10%	GCG32EL8EF226KE07#	D4	
		X7R	10μF	±10%	GCG32ER71E106KA12#	
	X7S	22μF	±10%	GCG32EC71E226KE01#		
		X7R	6.8μF	±10%	GCG32ER91C685KE01#	
16Vdc	X8R	10μF	±10%	GCG32ER91C106KE01#		
		X7R	47μF	±10%	GCG32ER70J476KE01#	

Part number # indicates the package specification code.

⚠Caution/Notice

WEB 

Target series: GRT, GCM, GC3, GCJ, GCQ, GCD, GCE, NFM, KCM, KC3, KCA, GCG

⚠Caution

Notice

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⚠ Caution

Storage and Operation Conditions

1. The performance of chip multilayer ceramic capacitors (henceforth just "capacitors") may be affected by the storage conditions.

Please use them promptly after delivery.

1-1. Maintain appropriate storage for the capacitors using the following conditions:

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

High temperature and humidity conditions and/or prolonged storage may cause deterioration of the packaging materials. If more than six months have elapsed since delivery, check packaging, mounting, etc. before use.

In addition, this may cause oxidation of the electrodes.

If more than one year has elapsed since delivery, also check the solderability before use.

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

<Applicable to GCG Series>

1-4. After unpacking, immediately reseal, or store in a desiccator containing a desiccant.

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.

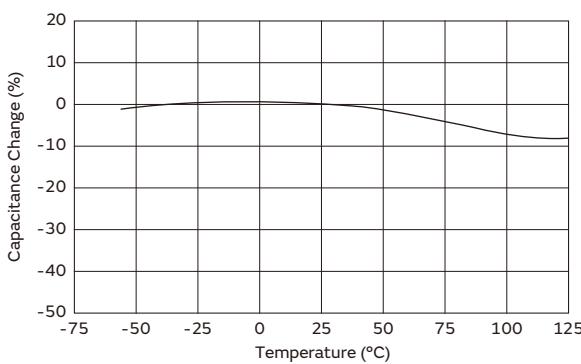
(1) Select a suitable capacitance for the operating temperature range.

(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.

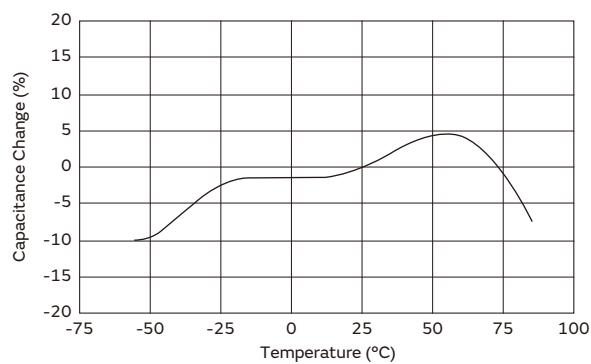
[Example of Temperature Characteristics X7R(R7)]

Sample: 0.1μF, Rated Voltage 50VDC



[Example of 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 on the following page. ↗

⚠ Caution

Continued from the preceding page. ↳

3. Applied Voltage and Applied Current

1. Do not apply a voltage to the capacitor that exceeds the rated voltage as called out in the specifications.

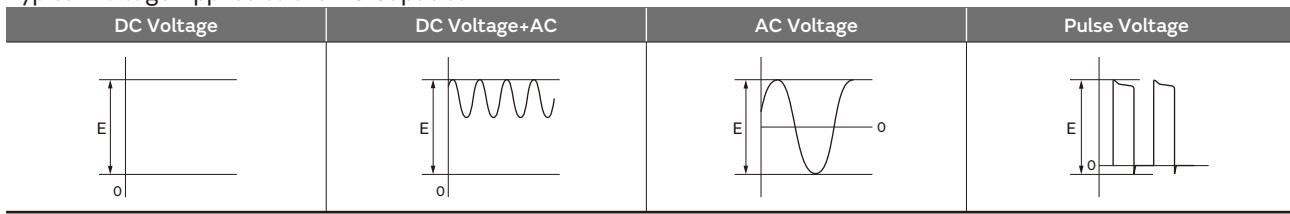
1-1. Applied voltage between the terminals of a capacitor shall be less than or equal to the rated voltage.

(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



(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.

<Applicable to NFM Series>

3. The capacitors also have rated currents.

The current flowing between the terminals of a capacitor shall be less than or equal to the rated current. Using the capacitor beyond this range could lead to excessive heat.

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.

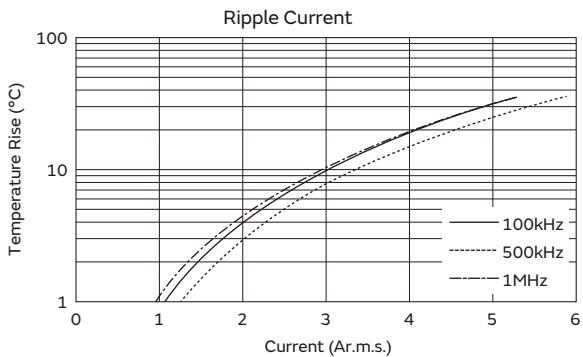
Please confirm the surface temperature of the capacitor so that the temperature remains within the upper limits of the operating temperature, including the rise in temperature due to self-heating. When the capacitor is used with a high-frequency voltage or pulse voltage, heat may be generated by dielectric loss.

<Applicable to Rated Voltage of less than 100VDC>

1-1. The load should be contained so that the self-heating of the capacitor body remains below 20°C, when measuring at an ambient temperature of 25°C.

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

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



Continued on the following page. ↳

⚠Caution

Continued from the preceding page. ↴

<Applicable to Temperature Characteristics X7R(R7), X7T(D7) beyond Rated Voltage of 250VDC>

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 Ø0.1mm 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.)

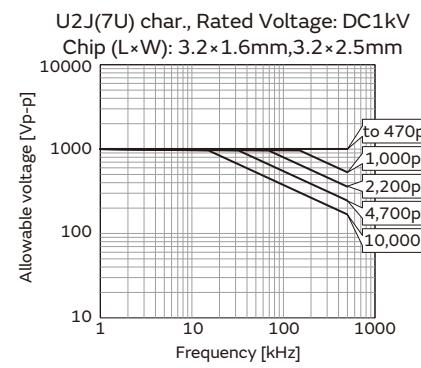
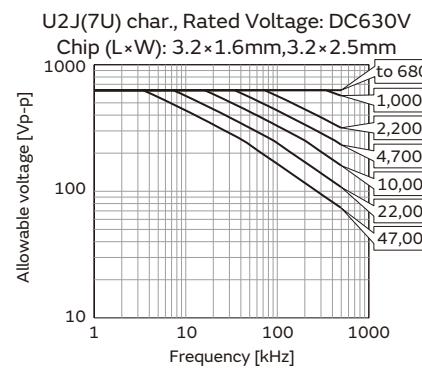
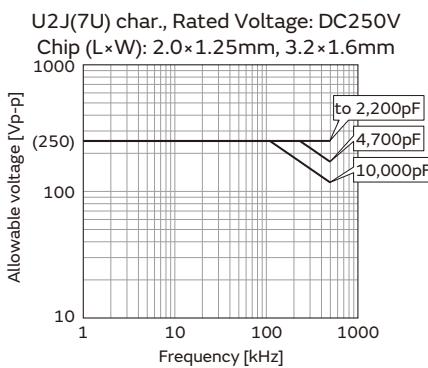
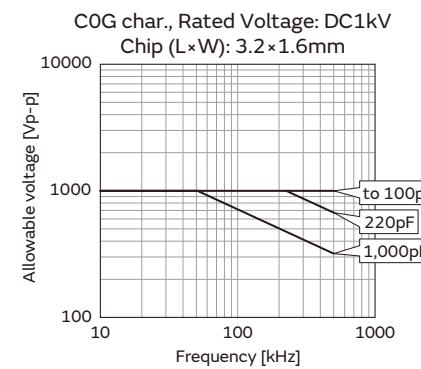
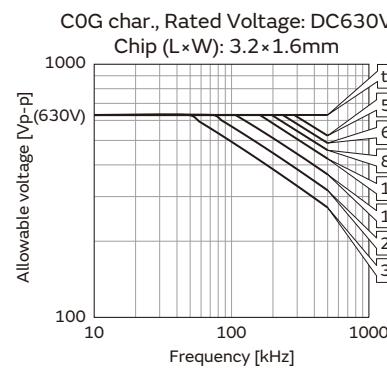
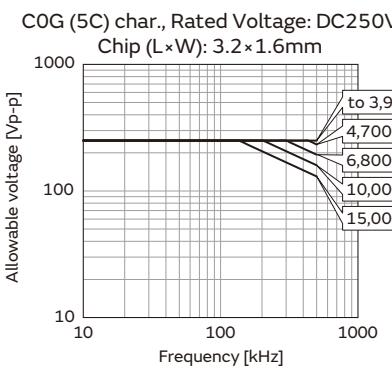
<Applicable to Temperature Characteristics U2J(7U), C0G(5C) beyond Rated Voltage of 250VDC>

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.)

[Sine-wave frequency VS allowable voltage]

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



Continued on the following page. ↗

⚠ 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 the actual operating conditions of the 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.

6. Capacitance Aging

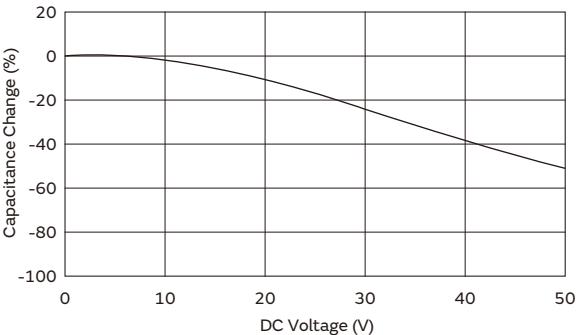
1. The high dielectric constant type capacitors have the characteristics in which the capacitance value decreases with the passage of time.

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 DC Voltage Characteristics]

Sample: R(R1) Characteristics 0.1 μ F,

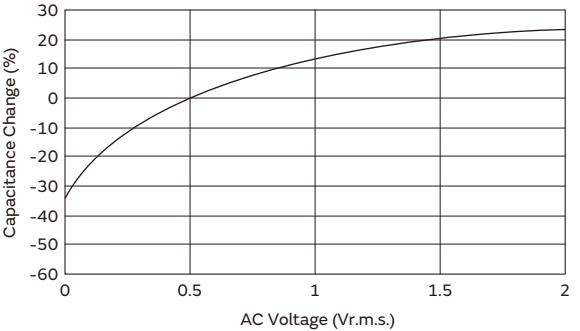
Rated Voltage 50VDC



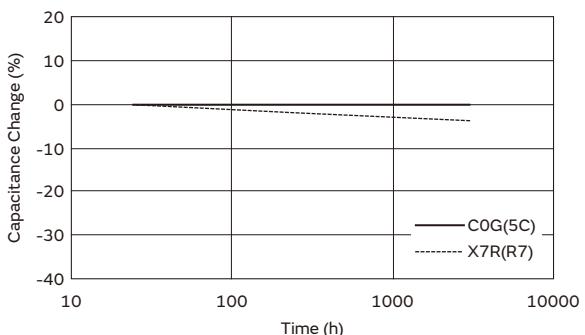
[Example of AC Voltage Characteristics]

Sample: X7R(R7) Characteristics 10 μ F,

Rated Voltage 6.3VDC



[Example of Change Over Time (Aging Characteristics)]



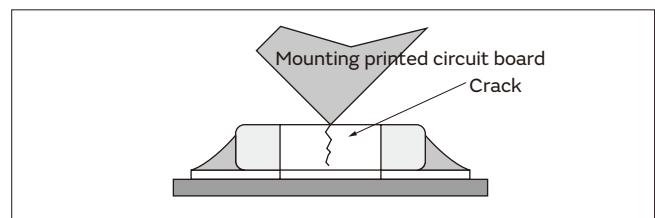
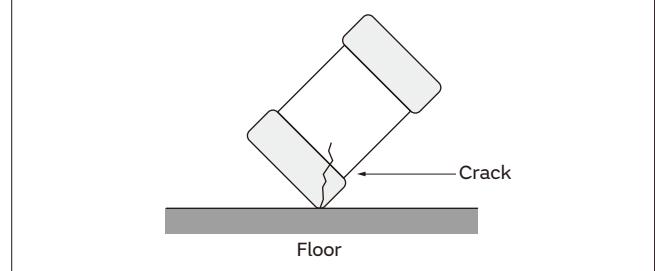
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⚠ Caution

Continued from the preceding page. ↩

7. Vibration and Shock

1. 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.
2. 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.
3. 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

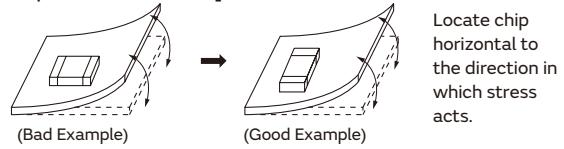
1. Mounting Position

1. Confirm the best mounting position and direction that minimizes the stress imposed on the capacitor during flexing or bending the printed circuit board.
- 1-1. Choose a mounting position that minimizes the stress imposed on the chip during flexing or bending of the board.

<Applicable to NFM Series>

2. If you mount the capacitor near components that generate heat, take note of the heat from the other components and carefully check the self-heating of the capacitor before using.
If there is significant heat radiation from other components, it could lower the insulation resistance of the capacitor or produce excessive heat.

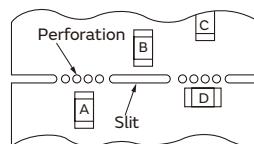
[Component Direction]



[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 *1
(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

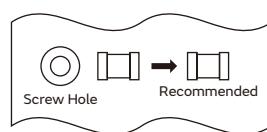


*1 A > D is valid when stress is added vertically to the perforation as with Hand Separation.

If a Cutting Disc is used, stress will be diagonal to the PCB, therefore A > D is invalid.

[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

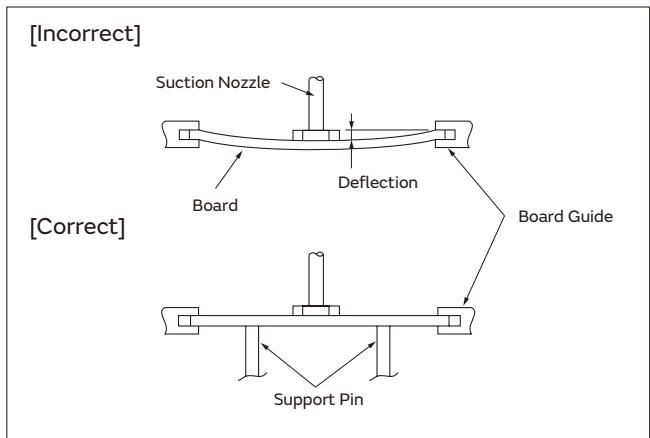
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2. Information before Mounting

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 recommendations, 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. Check the mounting in the actual device under actual use conditions ahead of time.
 - 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 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. Dirt particles and dust accumulated in the suction nozzle and suction mechanism prevent the nozzle from moving smoothly. This creates excessive force on the capacitor 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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Caution

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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.
- 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

Series	Chip Dimension Code (L/W)	Temperature Differential
GRT/GCM/GC3/GCD/GCE/GCJ/NFM	03/15/18/21/31	$\Delta T \leq 190^{\circ}\text{C}$
GRT/GCM/GCJ	32/43/55	$\Delta T \leq 170^{\circ}\text{C}$
KCM/KC3/KCA	55	$\Delta T \leq 130^{\circ}\text{C}$

Recommended Conditions

	Pb-Sn Solder	Lead Free Solder
Peak Temperature	230 to 250°C	240 to 260°C
Atmosphere	Air	Air or N ₂

Pb-Sn Solder: Sn-37Pb

Lead Free Solder: Sn-3.0Ag-0.5Cu

- When a capacitor is mounted at a temperature lower than the peak reflow temperature recommended by the solder manufacturer, the following quality problems can occur. Consider factors such as the placement of peripheral components and the reflow temperature setting to prevent the capacitor's reflow temperature from dropping below the peak temperature specified. Be sure to evaluate the mounting situation beforehand and verify that none of the following problems occur.

- Drop in solder wettability
- Solder voids
- Possible occurrence of whiskering
- Drop in bonding strength
- Drop in self-alignment properties
- Possible occurrence of tombstones and/or shifting on the land patterns of the circuit board

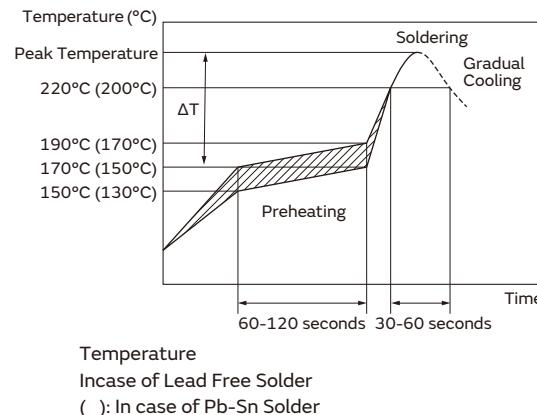
- Optimum Solder Amount for Reflow Soldering

- 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.

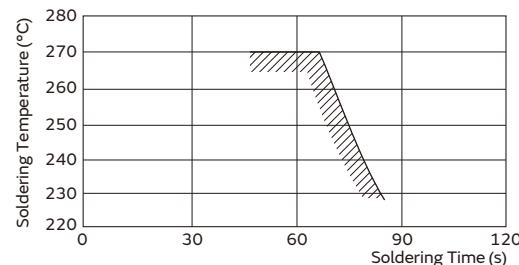
Inverting the PCB

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

[Example of Temperature 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.

- Too little solder paste results in a lack of adhesive strength on the termination, which may result in chips breaking loose from the PCB.

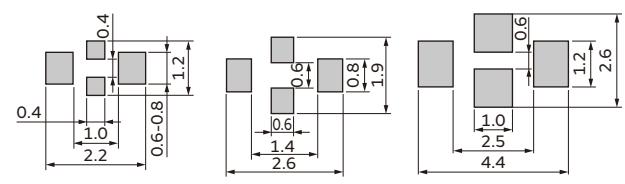
- Please confirm that solder has been applied smoothly to the termination.

<Applicable to NFM Series>

[Guideline of solder paste thickness]

100-150μm: NFM21HC/31HK

NFM18HC NFM21HC NFM31HK



Continued on the following page. ↗

Caution

Continued from the preceding page. ↵

4-2. Flow Soldering

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

Table 2

Series	Chip Dimension Code (L/W)	Temperature Differential
GRT/GCM/GC3/GCD (Except for characteristics of X8L(L8), X8G(5G), CHA(OC), X8R(R9))		
GCJ (Rated Voltage 250VDC or more)	18/21/31	$\Delta T \leq 150^\circ\text{C}$
NFM		

- 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 terminations, causing poor adhesion or a reduction in capacitance value due to loss of contact between the inner electrodes and terminations.
- 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

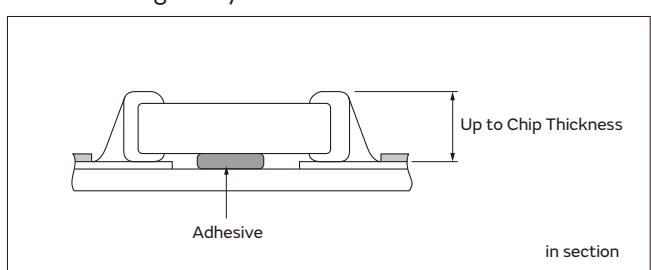
	Pb-Sn Solder	Lead Free Solder
Preheating Peak Temperature	90 to 110°C	100 to 120°C 140 to 160°C (NFM)
Soldering Peak Temperature	240 to 250°C	250 to 260°C
Atmosphere	Air	Air or N ₂

Pb-Sn Solder: Sn-37Pb

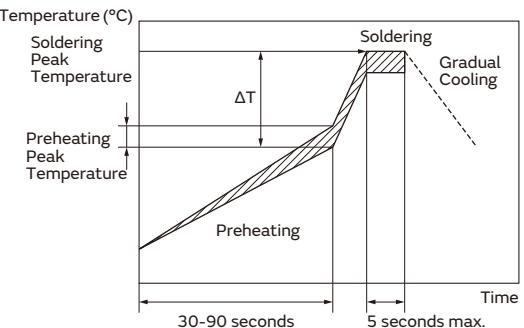
Lead Free Solder: Sn-3.0Ag-0.5Cu

5. Optimum Solder Amount for Flow Soldering

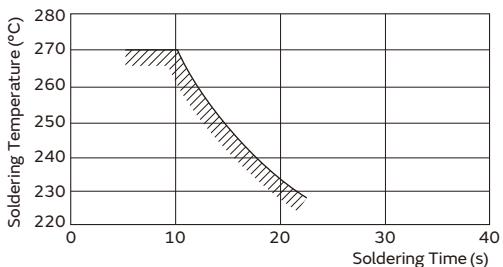
- The top of the solder fillet should be lower than the thickness of the components. If the solder amount is excessive, the risk of cracking is higher during board bending or any other stressful condition.



[Example of Temperature 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.

Caution

Continued from the preceding page. ↳

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.

Table 3

Series	Chip Dimension Code (L/W)	Temperature of Soldering Iron Tip	Preheating Temperature	Temperature Differential (ΔT)	Atmosphere
GRT/GCM/GC3/GCD/GCE/GCJ	03/15/18/21/31	350°C max.	150°C min.	$\Delta T \leq 190^\circ\text{C}$	Air
GRT/GCM/GCJ	32/43/55	280°C max.	150°C min.	$\Delta T \leq 130^\circ\text{C}$	Air
NFM	21/31	350°C max.	150°C min.	$\Delta T \leq 190^\circ\text{C}$	Air

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

Pb-Sn Solder: Sn-37Pb

Lead Free Solder: Sn-3.0Ag-0.5Cu

*Please manage ΔT in the temperature of soldering iron and the preheating temperature.

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. If the solder amount is excessive, the risk of cracking is higher during board bending or any other stressful condition.

Too little solder amount results in a lack of adhesive strength on the outer electrode termination, which may result in chips breaking loose from the PCB. Please confirm that solder has been applied smoothly and rising to the end surface of the chip.

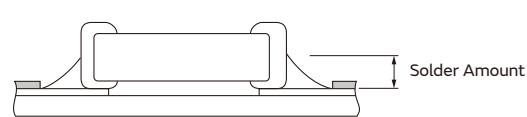
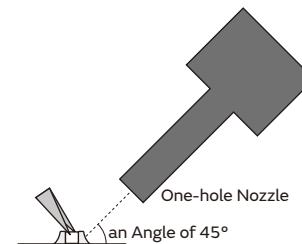
1-2. After soldering, do not allow the component/PCB to cool down rapidly.

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.

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 (3216M) size or smaller)
	Less than 30 seconds (1210 (3225M) size or larger)

[*Figure 1]



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⚠ Caution

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- 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 KCM/KC3/KCA 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).

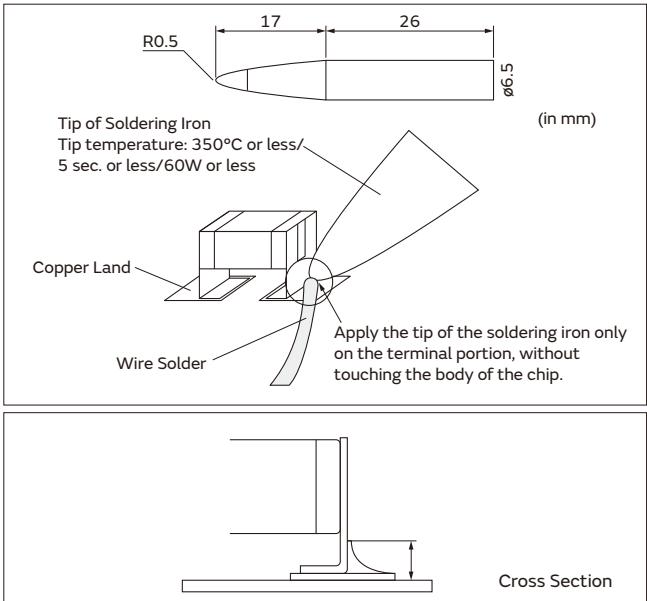
4-1. How to Apply the Soldering Iron

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. Before starting your production process, test your cleaning equipment/process to insure it does not degrade the capacitors.

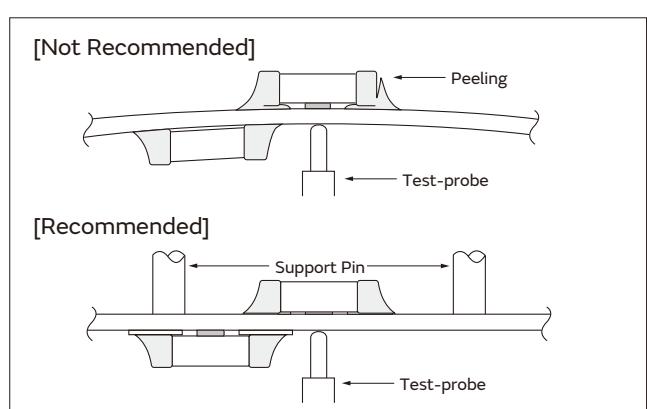
6. Electrical Test on Printed Circuit Board

1. Confirm position of the support 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 support pins on the back side of the PCB to prevent warping or flexing. Install support 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.

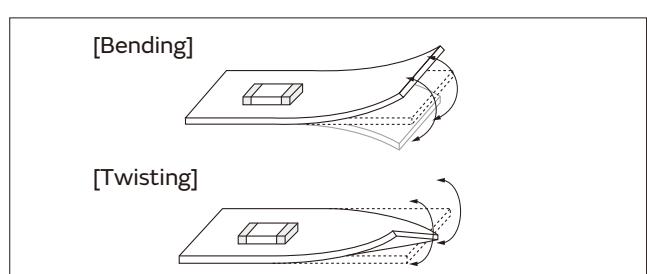


7. Printed Circuit Board Cropping

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.

Avoid this type of stress to a capacitor.



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Caution

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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 (Disc separator, router type separator, etc.) to prevent the mechanical stress that can occur to the board.

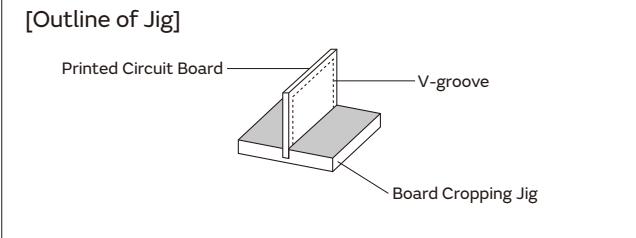
Board Separation Method	Hand Separation Nipper Separation	(1) Board Separation Jig	Board Separation Apparatus	
			(2) Disc Separator	(3) Router Type Separator
Level of stress on board	High	Medium	Medium	Low
Recommended	×	△*	△*	○
Notes	Hand and nipper separation apply a high level of stress. Use another method.	<ul style="list-style-type: none"> • Board handling • Board bending direction • Layout of capacitors 	<ul style="list-style-type: none"> • Board handling • Layout of slits • Design of V groove • Arrangement of blades • Controlling blade life 	Board handling

* When a board separation jig or disc 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.



Hand Separation

Recommended	Not Recommended
<p>Printed Circuit Board</p> <p>Components</p> <p>Load Point</p> <p>Direction of Load</p>	<p>Printed Circuit Board</p> <p>Components</p> <p>Load Point</p> <p>Direction of Load</p>

[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.

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Caution

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(2) Example of a Disc Separator

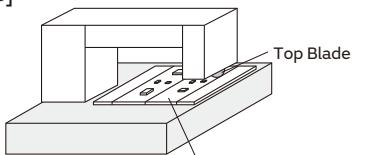
An outline of a disc separator is shown as follows. As shown in the Principle of Operation, the top blade and bottom blade are aligned with the V-grooves on the printed circuit board to separate the board.

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

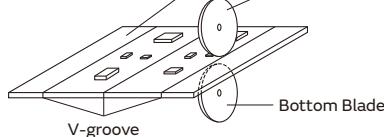
- (1) When the adjustment of the top and bottom blades are misaligned, such as deviating in the top-bottom, left-right or front-rear directions
- (2) The angle of the V groove is too low, depth of the V groove is too shallow, or the V groove is misaligned top-bottom

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.

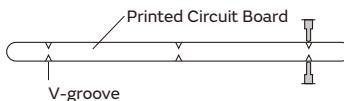
[Outline of Machine]



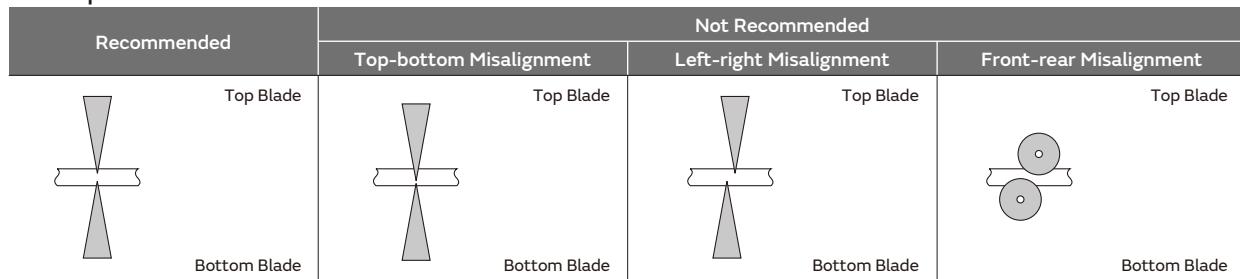
[Principle of Operation]



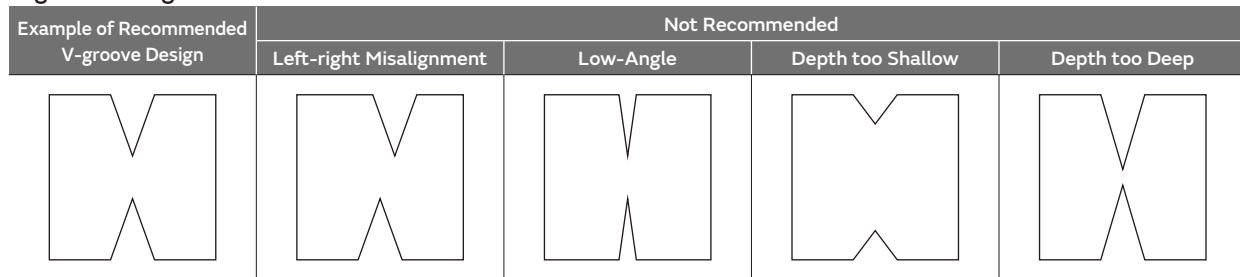
[Cross-section Diagram]



Disc Separator



V-groove Design

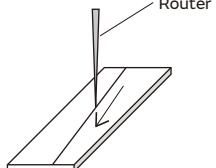


(3) Example of Router Type Separator

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. ↩

⚠ Caution

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.

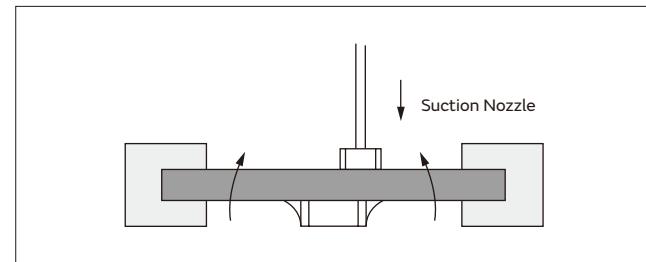
Do not use dropped boards, as there is a possibility that the quality of the capacitors may be impaired.

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.

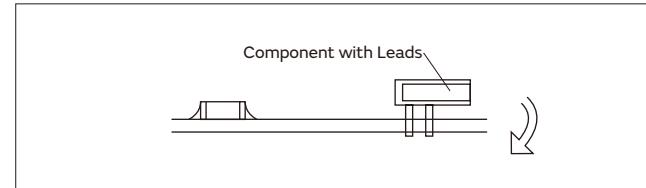


2-2. Inserting Components with Leads into Boards

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

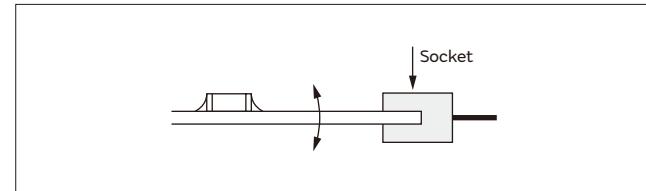
Pay attention to the following.

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



2-3. Attaching/Removing Sockets and/or Connectors

Insertion and removal of sockets and connectors, etc., might cause the board to bend. Please insure that the board does not warp during insertion and removal of sockets and connectors, etc., or the bending may damage mounted components on the board.

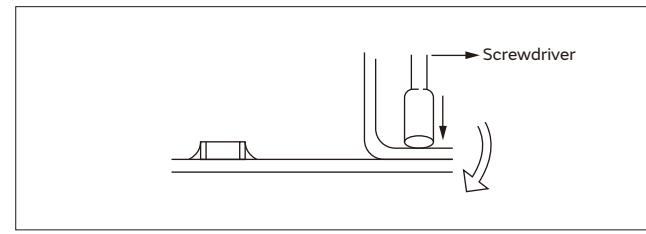


2-4. Tightening Screws

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 GCG Series>

9. Selection of Conductive Adhesive, Mounting Process, and Bonding Strength

The acquired bonding strength may change greatly depending on the conductive adhesive to be used.

Be sure to confirm if the desired performance can be acquired in the assumed mounting process with the conductive adhesive to be used.

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.

10. Moisture Proof Process

In order to prevent the occurrence of migration, perform a moisture proof process, such as applying a resin coating or enclosing with a dry inert gas.

11. Application

This product is limited to conductive glue mounting. When performing solder mounting, contact Murata in advance.

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 GC3, GCD, GCE, GCG, GCJ, GCM, KC3, KCM, and NFM series are not safety standard certified products.

2-4. Test Condition for AC Withstanding Voltage

(1) Test Equipment

Test equipment for AC withstand voltage should be made with equipment capable of creating a wave similar to a 50/60Hz sine wave.

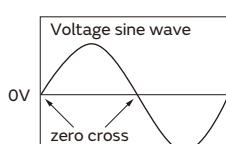
(2) Voltage Applied Method

The capacitor's lead or terminal should be firmly connected to the output of the withstand voltage test equipment, and then the voltage should be raised from near zero to the test voltage.

If the test voltage is applied directly to the capacitor without raising it from near zero, it should be applied with the zero cross. *At the end of the test time, the test voltage should be reduced to near zero, and then capacitor's lead or terminals should be taken off the output of the withstand voltage test equipment.

If the test voltage applied directly to the capacitor without raising it from near zero, surge voltage may occur and cause a defect.

*ZERO CROSS is the point where voltage sine wave passes 0V. - See the figure at right -



Continued on the following page. ↗

Notice

Continued from the preceding page. ↗

2-5. 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 not exceed the maximum operating temperature including self-heating.

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.

1-3. If you are replacing by smaller capacitors, you should not only consider the Land size change but also consider changing the Wiring Width, Wiring direction, and copper foil thickness because the risk of chip cracking is increased with just a Land size change.

<Applicable to NFM Series>

1-4. Because noise is suppressed by shunting unwanted high-frequency components to the ground, when designing a land for the NFM series, design the ground pattern to be as large as possible in order to better bring out this characteristic.

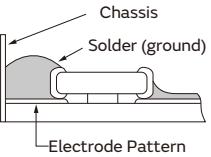
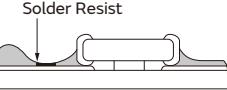
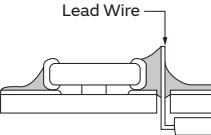
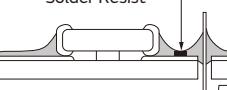
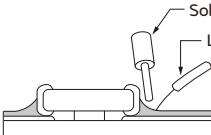
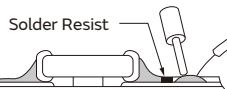
As shown in the figure below, noise countermeasures can be made more effective by using a via to connect the ground pattern on the chip mounting surface to a larger ground pattern on the inner layer.

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Notice

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Pattern Forms

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

2. Land Dimensions

2-1. Please refer to the land dimensions in table 1 for flow soldering, table 2 for reflow soldering.

Please confirm the suitable land dimension by evaluating of the actual SET / PCB.

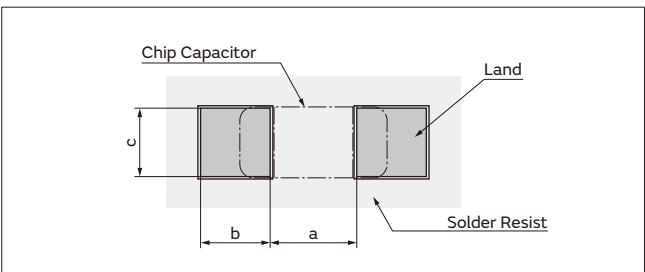


Table 1 Flow Soldering Method

Series	Chip Dimension Code (L/W)	Chip (L×W)	a	b	c
GRT/GCM/GC3/GCD/GCJ (Rated Voltage: above 250VDC (for GCJ alone))	18	1.6×0.8	0.6 to 1.0	0.8 to 0.9	0.6 to 0.8
	21	2.0×1.25	1.0 to 1.2	0.9 to 1.0	0.8 to 1.1
	31	3.2×1.6	2.2 to 2.6	1.0 to 1.1	1.0 to 1.4

Flow soldering can only be used for products with a chip size from 1.6×0.8mm to 3.2×1.6mm.

(in mm)

Table 2 Reflow Soldering Method

Series	Chip Dimension Code (L/W)	Chip (L×W)	a	b	c
GRT/GCM/GC3/ GCD/GCE/GCJ	03	0.6×0.3	0.2 to 0.3	0.2 to 0.35	0.2 to 0.4
	15	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
	18	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
	21	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
	31	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
32		3.2×2.5	2.0 to 2.4	1.0 to 1.2	1.8 to 2.3
43		4.5×3.2	3.0 to 3.5	1.2 to 1.4	2.3 to 3.0
55		5.7×5.0	4.0 to 4.6	1.4 to 1.6	3.5 to 4.8

(in mm)

Continued on the following page. ↗

Notice

Continued from the preceding page. ↗

<Applicable to Part Number KCM/KC3/KCA>

Series	Chip Dimension Code (L/W)	Body Size (L×W)	a	b	c
KCM/KC3 (Except 5C)	55	6.1×5.3	2.6 to 3.2	2.4 to 2.7	5.5 to 5.6
KCM (5C only)	55	6.1×5.1	3.2 to 4.0	2.0 to 2.4	5.5 to 5.7
KCA	55	6.1×5.1	3.2 to 4.0	2.0 to 2.4	5.5 to 5.7

(in mm)

<Applicable to beyond Rated Voltage of 200VDC>

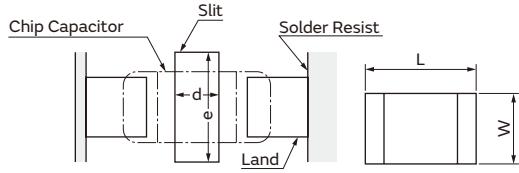
2-2. Dimensions of Slit (Example)

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)

<Applicable to NFM Series>

■ Land Pattern + Solder Resist ■ Land Pattern ■ Solder Resist (in mm)

Series	Land Dimensions		
NFM21HC	● Reflow Soldering	NFM18HC Small diameter thru hole ø0.2-ø0.3	NFM21HC Small diameter thru hole ø0.4
NFM31HK	● Reflow Soldering	Chip mounting side NFM31HK*1 Small diameter thru hole ø0.4 10mm or more (in case of 10A) 1.0 1.4 2.5 4.4 1.0 1.6 1.2 2.6 3.0	Chip mounting side NFM31HK*1 Small diameter thru hole ø0.4 10mm or more (in case of 10A) 1.0 1.4 2.5 4.4 1.0 1.6 1.2 2.6 3.0

*1 For large current design, width of signal land pattern should be wider not less than 1mm per 1A (1mm/A). For example, in case of 10A, signal land pattern width should be 10mm or more. (1mm/A*10A=10mm)

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Notice

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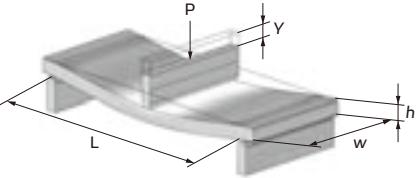
3. Board Design

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.

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

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 (N/m²=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. Item to be confirmed for Flow soldering

If you want to temporarily attach the capacitor to the board using an adhesive agent before soldering the capacitor, first be sure that the conditions are appropriate for affixing the capacitor. If the dimensions of the land, the type of adhesive, the amount of coating, the contact surface area, the curing temperature, or other conditions are inappropriate, the characteristics of the capacitor may deteriorate.

1. Selection of Adhesive

1-1. Depending on the type of adhesive, there may be a decrease in insulation resistance. In addition, there is a chance that the capacitor might crack from contractile stress due to the difference in the contraction rate of the capacitor and the adhesive.

1-2. If there is not enough adhesive, the contact surface area is too small, or the curing temperature or curing time are inadequate, the adhesive strength will be insufficient and the capacitor may loosen or become disconnected during transportation or soldering. If there is too much adhesive, for example if it overflows onto the land, the result could be soldering defects, loss of electrical connection, insufficient curing, or slippage after the capacitor is mounted. Furthermore, if the curing temperature is too high or the curing time is too long, not only will the adhesive

strength be reduced, but solderability may also suffer due to the effects of oxidation on the terminations (outer electrodes) of the capacitor and the land surface on the board.

(1) Selection of Adhesive

Epoxy resins are a typical class of adhesive.

To select the proper adhesive, consider the following points.

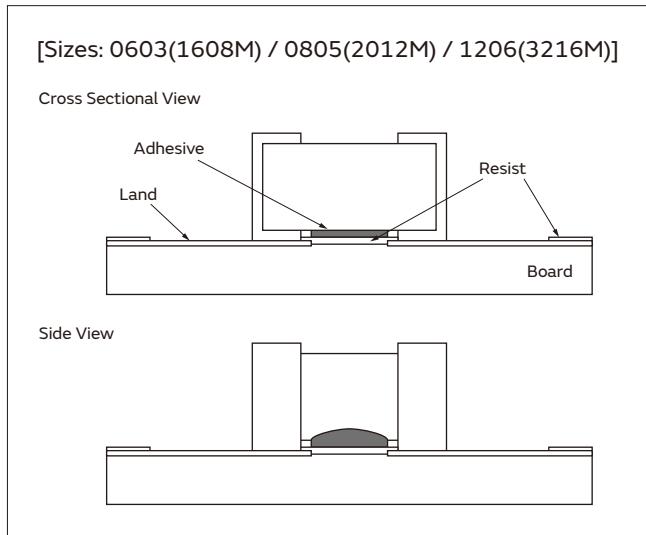
- 1) There must be enough adhesive strength to prevent the component from loosening or slipping during the mounting process.
- 2) The adhesive strength must not decrease when exposed to moisture during soldering.
- 3) The adhesive must have good coatability and shape retention properties.
- 4) The adhesive must have a long pot life.
- 5) The curing time must be short.
- 6) The adhesive must not be corrosive to the exterior of the capacitor or the board.
- 7) The adhesive must have good insulation properties.
- 8) The adhesive must not emit toxic gases or otherwise be harmful to health.
- 9) The adhesive must be free of halogenated compounds.

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Notice

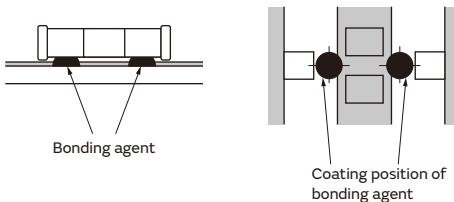
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- (2) Use the following illustration as a guide to the amount of adhesive to apply.



<Applicable to NFM Series>

[Sizes: 1206 (3216M)]



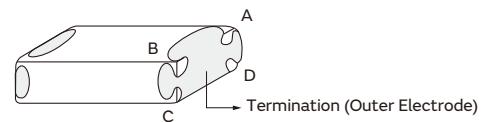
2. Flux

- 2-1. An excessive amount of flux generates a large quantity of flux gas, which can cause a deterioration of solderability, so apply flux thinly and evenly throughout. (A foaming system is generally used for flow soldering.)
- 2-2. Flux containing too high a percentage of halide may cause corrosion of the terminations unless there is sufficient cleaning. Use flux with a halide content of 0.1% max.
- 2-3. Strong acidic flux can corrode the capacitor and degrade its performance.
Please check the quality of capacitor after mounting.

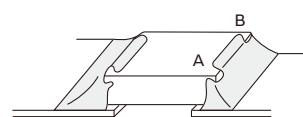
3. Leaching of the terminations

- Set temperature and time to ensure that leaching of the termination 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]



3. Reflow Soldering

- The flux in the solder paste contains halogen-based substances and organic acids as activators.
Strong acidic flux can corrode the capacitor and degrade its performance.
Please check the quality of capacitor after mounting.

Continued on the following page. ↗

Notice

Continued from the preceding page. ↵

4. 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 may leave residual flux or other foreign substances, causing deterioration of electrical characteristics and the reliability of the capacitors.

5. 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.

3. The halogen system substance and organic acid are included in coating material, and a chip corrodes by the kind of Coating material.

Do not use strong acid type.

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.

<Applicable to NFM Series>

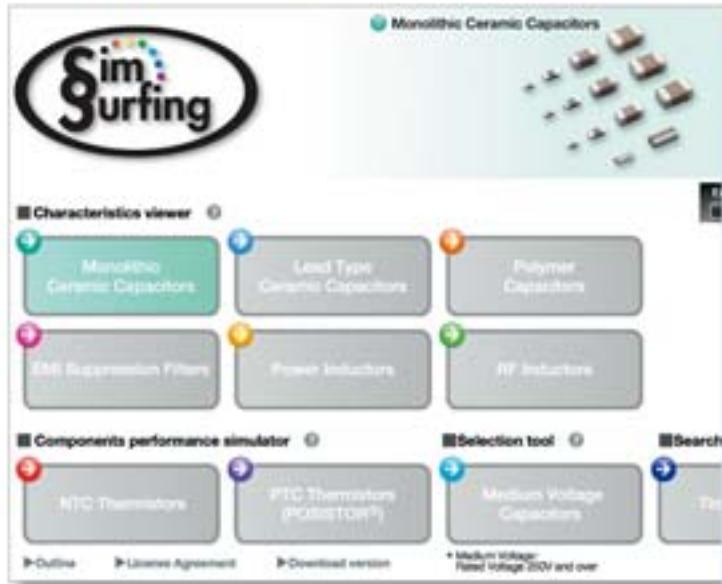
4. The effects of noise suppression can vary depending on the usage conditions, including differences in the circuit or IC to be used, the type of noise, the shape of the pattern to be mounted, and the mounting location. Be sure to verify the effect on the actual device in advance.

MEMO

Design Support Tool "SimSurfing"

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

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



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

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

Selection tool
 You can select Medium voltage Capacitors and Power Inductors according to conditions of use.
 * Medium voltage: Rated Voltage 250V and over

Search tool
 You can search the Murata timing device (CERALOCK® and crystal units) that is most suitable for your IC and access information about the recommended circuit constant setting.
 If you register as a "my Murata" user (<https://my.murata.com/en/web/mymurata/>), you can use Enhanced SimSurfing.

■ Usage example of "Multilayer Ceramic Capacitors"

1 Select the products

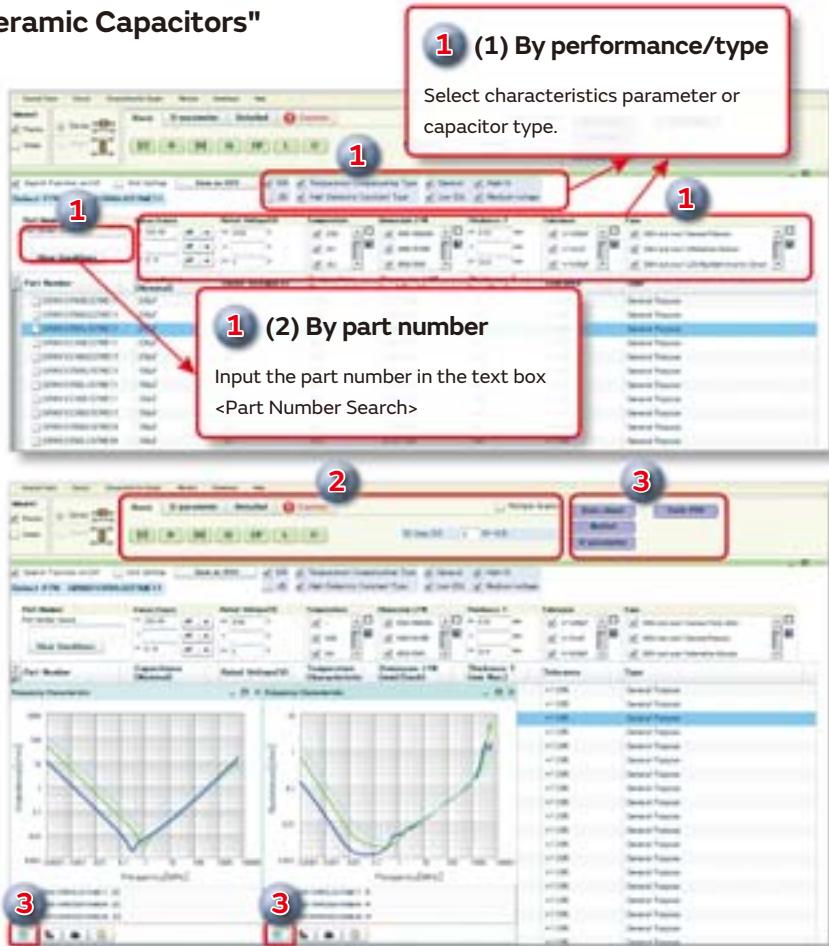
- (1) By performance/type
- (2) By part number

2 Show graph

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

3 Data download

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



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

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

Web page Introduction

muRata Product Search



①

Search by Part Number

<https://psearch.en.murata.com/capacitor/partnumber/>

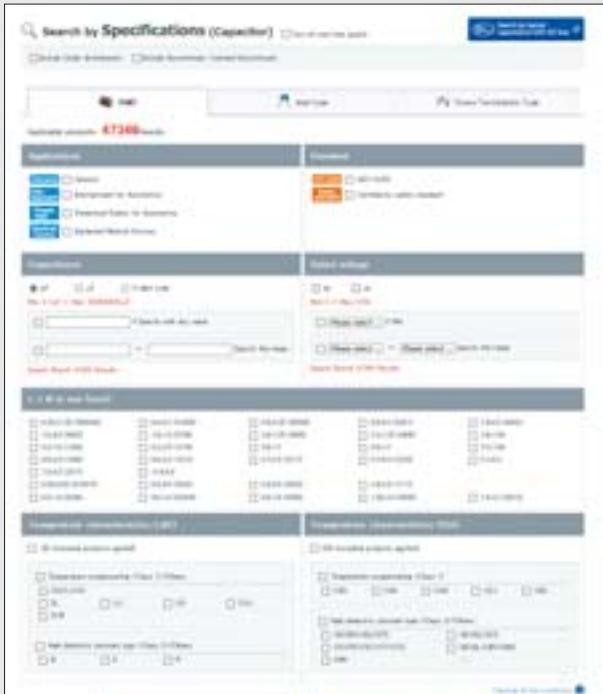


You can search for capacitors by specifying the alphanumeric characters in the part number. The packing codes shown contain the substitute character "#". If you enter the official packing code, part numbers that contain that packing code will be matched.

②

Search by Specifications

<https://psearch.en.murata.com/capacitor/spec/smd/>



You can search for SMD, lead type, or screw termination type capacitors by indicating specifications such as application, capacitance, rated voltage, or temperature characteristics.

You can narrow your search by entering values of ranges, and by specifying product characteristics.

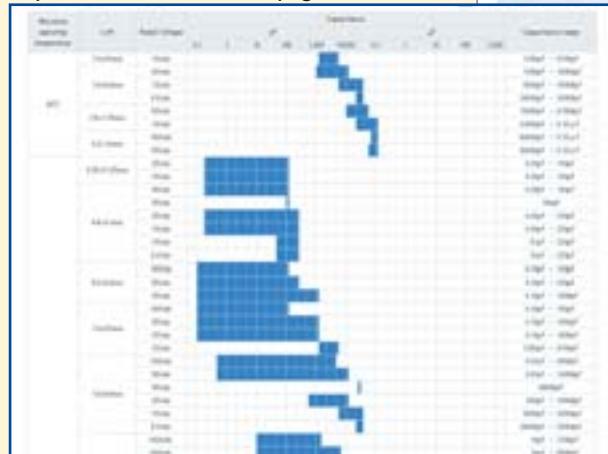
The items for narrowing searches are linked, so specifying one condition causes selectable options for the other items to allow input only of conditions that match the relevant part numbers.

3 Search in the Lineups <https://psearch.en.murata.com/capacitor/lineup/>

You can search for capacitors by specifying the series lineup.

You can also confirm items such as characteristics and applications on each series page.

Capacitance chart in Series page.



[Search result]

- Compares the characteristics of the checked part numbers.
- Displays the number of hits for the current search conditions in real time.
- Clicking on each search condition button brings up a menu, allowing you to narrow the search results to match the selected condition in real time.
- Click "Current search terms" to display a menu, from which you can confirm the current conditions for narrowing the search results.
- Click the ▲ mark for each item to switch between ascending and descending display.
- Click a product name to display a details page listing more in-depth information (→ P22).
- You can download detailed spec sheets.
- Icons enable you to check the status and characteristics of products at a glance.

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 October 2019. 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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