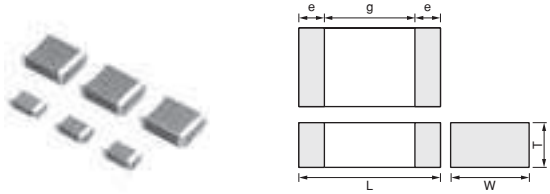
Chip Monolithic Ceramic Capacitors

AC250V Type (Which Meet Japanese Law) GA2 Series

■ Features

1. Chip monolithic ceramic capacitor for AC lines.
2. A new monolithic structure for small, high capacitance capable of operating at high voltage levels.
3. Sn-plated external electrodes realize good solderability.
4. Only for reflow soldering
5. Capacitance 0.01 to 0.1uF for connecting lines and 470 to 4700pF for connecting lines to earth.



Part Number	Dimensions (mm)				
	L	W	T	e min.	g min.
GA242Q	4.5 ±0.3	2.0 ±0.2	1.5 +0, -0.3	0.3	2.5
GA243D	4.5 ±0.4	3.2 ±0.3	2.0 +0, -0.3		
GA243Q			1.5 +0, -0.3		
GA255D	5.7 ±0.4	5.0 ±0.4	2.0 +0, -0.3		3.2

■ Applications

Noise suppression filters for switching power supplies, telephones, facsimiles, modems.

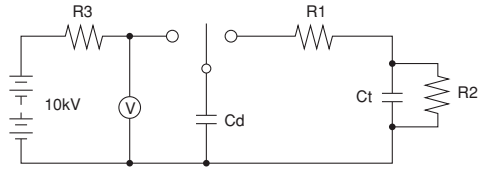
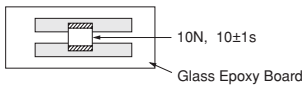
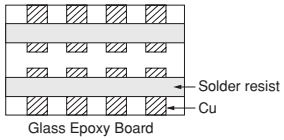
Do not use these products in any Automotive Power train or Safety equipment including Battery chargers for Electric Vehicles and Plug-in Hybrids. Only Murata products clearly stipulated as "for Automotive use" can be used for automobile applications such as Power train and Safety equipment.

■ Reference Standard

GA2 series obtains no safety approval.
This series is based on the standards of the electrical appliance and material safety law of Japan (separated table 4).

Part Number	Rated Voltage	TC Code (Standard)	Capacitance	Length L (mm)	Width W (mm)	Thickness T max. (mm)	Electrode g min.	Electrode e
GA242QR7E2471MW01L	250Vac(r.m.s.)	X7R (EIA)	470pF±20%	4.5	2.0	1.5	2.5mm	0.3mm min.
GA242QR7E2102MW01L	250Vac(r.m.s.)	X7R (EIA)	1000pF±20%	4.5	2.0	1.5	2.5mm	0.3mm min.
GA243QR7E2222MW01L	250Vac(r.m.s.)	X7R (EIA)	2200pF±20%	4.5	3.2	1.5	2.5mm	0.3mm min.
GA243QR7E2332MW01L	250Vac(r.m.s.)	X7R (EIA)	3300pF±20%	4.5	3.2	1.5	2.5mm	0.3mm min.
GA243DR7E2472MW01L	250Vac(r.m.s.)	X7R (EIA)	4700pF±20%	4.5	3.2	2	2.5mm	0.3mm min.
GA243QR7E2103MW01L	250Vac(r.m.s.)	X7R (EIA)	10000pF±20%	4.5	3.2	1.5	2.5mm	0.3mm min.
GA243QR7E2223MW01L	250Vac(r.m.s.)	X7R (EIA)	22000pF±20%	4.5	3.2	1.5	2.5mm	0.3mm min.
GA243DR7E2473MW01L	250Vac(r.m.s.)	X7R (EIA)	47000pF±20%	4.5	3.2	2	2.5mm	0.3mm min.
GA255DR7E2104MW01L	250Vac(r.m.s.)	X7R (EIA)	0.10µF±20%	5.7	5.0	2	3.2mm	0.3mm min.

GA2 Series Specifications and Test Methods

No.	Item		Specifications	Test Method
1	Operating Temperature Range		–55 to +125°C	–
2	Appearance		No defects or abnormalities	Visual inspection
3	Dimensions		Within the specified dimensions	Using calipers and micrometers
4	Dielectric Strength		No defects or abnormalities	No failure should be observed when voltage in the table is applied between the terminations for 60±1 sec., provided the charge/discharge current is less than 50mA. Nominal Capacitance: Test Voltage C≧10,000pF: AC575V (r.m.s.) C<10,000pF: AC1500V (r.m.s.)
5	Insulation Resistance (I.R.)		More than 2,000MΩ	The insulation resistance should be measured with DC500±50V and within 60±5 sec. of charging.
6	Capacitance		Within the specified tolerance	The capacitance/D.F. should be measured at a frequency of 1±0.2kHz and a voltage of AC1±0.2V (r.m.s.).
7	Dissipation Factor (D.F.)		0.025 max.	
8	Capacitance Temperature Characteristics		Cap. Change Within ±15% (Temp. Range: –55 to +125°C)	The capacitance measurement should be made at each step specified in the Table. Step: Temperature (°C) 1: 25±2 2: Min. Operating Temp.±3 3: 25±2 4: Max. Operating Temp.±2 5: 25±2 •Pretreatment Perform a heat treatment at 150$^{+}_{-10}$°C for 60±5 min. and then let sit for 24±2 hrs. at room condition.*
9	Discharge Test (Application: Nominal Capacitance C<10,000pF)	Appearance	No defects or abnormalities	As in Fig., discharge is made 50 times at 5 sec. intervals from the capacitor (Cd) charged at DC voltage of specified.  Ct: Capacitor under test Cd: 0.001μF R1: 1,000Ω R2: 100MΩ R3: Surge resistance
10	Adhesive Strength of Termination		No removal of the terminations or other defects should occur.	Solder the capacitor to the testing jig (glass epoxy board) shown in Fig. 1. Then apply 10N force in the direction of the arrow. The soldering should be done using the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock.  Fig. 1
11	Vibration Resistance	Appearance	No defects or abnormalities	Solder the capacitor to the test jig (glass epoxy board). The capacitor should be subjected to a simple harmonic motion having a total amplitude of 1.5mm, the frequency being varied uniformly between the approximate limits of 10 and 55Hz. The frequency range, from 10 to 55Hz and return to 10Hz, should be traversed in approximately 1 min. This motion should be applied for a period of 2 hrs. in each of 3 mutually perpendicular directions (total of 6 hrs.). 
		Capacitance	Within the specified tolerance	
		D.F.	0.025 max.	

* "Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa

Continued on the following page.

GA2 Series Specifications and Test Methods

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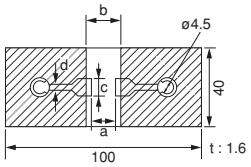
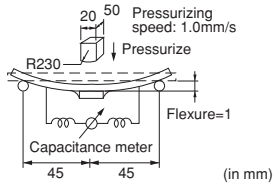
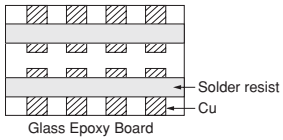
No.	Item		Specifications	Test Method
12	Deflection		No marking defects  Fig. 2 L×W (mm): 4.5×2.0 — a 3.5, b 7.0, c 2.4, d 1.0 L×W (mm): 4.5×3.2 — a 3.5, b 7.0, c 3.7, d 1.0 L×W (mm): 5.7×5.0 — a 4.5, b 8.0, c 5.6, d 1.0	Solder the capacitor to the testing jig (glass epoxy board) shown in Fig. 2. Then apply a force in the direction shown in Fig. 3. The soldering should be done using the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock.  Fig. 3
13	Solderability of Termination		75% of the terminations are to be soldered evenly and continuously.	Immerse the capacitor in a solution of ethanol (JIS-K-8101) and rosin (JIS-K-5902) (25% rosin in weight proportion). Immerse in solder solution for 2±0.5 sec. Immersing speed: 25±2.5mm/s Temp. of solder: 245±5°C Lead Free Solder (Sn-3.0Ag-0.5Cu) 235±5°C H60A or H63A Eutectic Solder
14	Humidity Insulation	Appearance	No marking defects	The capacitor should be subjected to 40±2°C, relative humidity of 90 to 98% for 8 hrs., and then removed in room condition* for 16 hrs. until 5 cycles.
		Capacitance Change	Within ±15%	
		D.F.	0.05 max.	
		I.R.	More than 1,000MΩ	
		Dielectric Strength	In accordance with item No.4	
15	Resistance to Soldering Heat	Appearance	No marking defects	Preheat the capacitor as in table. Immerse the capacitor in solder solution at 260±5°C for 10±1 sec. Let sit at room condition* for 24±2 hrs., then measure. •**Immersing speed**: 25±2.5mm/s •**Pretreatment** Perform a heat treatment at 150^{+0}_{-10}°C for 60±5 min. and then let sit for 24±2 hrs. at room condition.* ✻**Preheating** Step 1: 100 to 120°C, 1 min. Step 2: 170 to 200°C, 1 min.
		Capacitance Change	Within ±10%	
		D.F.	0.025 max.	
		I.R.	More than 2,000MΩ	
		Dielectric Strength	In accordance with item No.4	
16	Temperature Cycle	Appearance	No marking defects	Fix the capacitor to the supporting jig (glass epoxy board) shown in Fig. 4. Perform the 5 cycles according to the 4 heat treatments listed in the following table. Let sit for 24±2 hrs. at room condition,* then measure. Step 1: Min. Operating Temp.±3, 30±3 Step 2: Room Temp., 2 to 3 Step 3: Max. Operating Temp.±2, 30±3 Step 4: Room Temp., 2 to 3 •**Pretreatment** Perform a heat treatment at 150^{+0}_{-10}°C for 60±5 min. and then let sit for 24±2 hrs. at room condition.*  Fig. 4
		Capacitance Change	Within ±15%	
		D.F.	0.05 max.	
		I.R.	More than 2,000MΩ	
		Dielectric Strength	In accordance with item No.4	

* "Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa

Continued on the following page.

GA2 Series Specifications and Test Methods

Continued from the preceding page.

No.	Item		Specifications	Test Method
17	Humidity (Steady State)	Appearance	No marking defects	Let the capacitor sit at 40±2°C and relative humidity of 90 to 95% for 500$^{+24}_{-0}$hrs. Remove and let sit for 24±2 hrs. at room condition,* then measure. •Pretreatment Perform a heat treatment at 150$^{+0}_{-10}$°C for 60±5 min. and then let sit for 24±2 hrs. at room condition.*
		Capacitance Change	Within ±15%	
		D.F.	0.05 max.	
		I.R.	More than 1,000MΩ	
		Dielectric Strength	In accordance with item No.4	
18	Life	Appearance	No marking defects	Apply voltage and time as in Table at maximum operating temperature ±3°C. Remove and let sit for 24±2 hrs. at room condition,* then measure. The charge / discharge current is less than 50mA. Nominal Capacitance / Test Time / Test Voltage C≧10,000pF: 1,000$^{+48}_{-0}$ hrs. AC300V (r.m.s.) C<10,000pF: 1,500$^{+48}_{-0}$ hrs. AC500V (r.m.s.) ✻ ✻ Except that once each hour the voltage is increased to AC1,000V (r.m.s.) for 0.1 sec. •Pretreatment Apply test voltage for 60±5 min. at test temperature. Remove and let sit for 24±2 hrs. at room condition.*
		Capacitance Change	Within ±20%	
		D.F.	0.05 max.	
		I.R.	More than 1,000MΩ	
		Dielectric Strength	In accordance with item No.4	
19	Humidity Loading	Appearance	No marking defects	Apply the rated voltage at 40±2°C and relative humidity of 90 to 95% for 500$^{+24}_{-0}$hrs. Remove and let sit for 24±2 hrs. at room condition,* then measure. •Pretreatment Apply test voltage for 60±5 min. at test temperature. Remove and let sit for 24±2 hrs. at room condition.*
		Capacitance Change	Within ±15%	
		D.F.	0.05 max.	
		I.R.	More than 1,000MΩ	
		Dielectric Strength	In accordance with item No.4	

* "Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa

Chip Monolithic Ceramic Capacitors

Safety Standard Certified GA3 Series UL, IEC60384-14 Class X1/Y2 Type GC

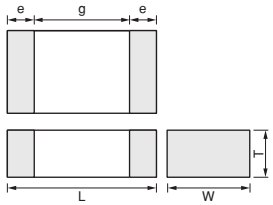
■ Features

1. Chip monolithic ceramic capacitor (certified as conforming to safety standards) for AC lines.
2. A new monolithic structure for small, high capacitance capable of operating at high voltage levels.
3. Compared to lead type capacitors, this new capacitor is greatly downsized and low-profiled to 1/10 or less in volume, and 1/4 or less in height.
4. Type GC can be used as an X1-class and Y2-class capacitor, line-by-pass capacitor of UL1414.
5. +125 degree C guaranteed
6. Only for reflow soldering

■ Applications

1. Ideal for use as Y capacitor or X capacitor for various switching power supplies
2. Ideal for modem applications

Do not use these products in any Automotive Power train or Safety equipment including Battery chargers for Electric Vehicles and Plug-in Hybrids. Only Murata products clearly stipulated as "for Automotive use" can be used for automobile applications such as Power train and Safety equipment.



Part Number	Dimensions (mm)				
	L	W	T	e min.	g min.
GA355D	5.7 ±0.4	5.0 ±0.4	2.0 ±0.3	0.3	4.0

■ Standard Certification

	Standard No.	Class	Rated Voltage
UL	UL1414	Line By-pass	AC250V (r.m.s.)
VDE	IEC 60384-14 EN 60384-14	X1, Y2	
BSI	EN 60065 (14.2) IEC 60384-14 EN 60384-14		
SEMKO	IEC 60384-14 EN 60384-14		
ESTI	IEC 60384-14		

Part Number	Rated Voltage	TC Code (Standard)	Capacitance	Length L (mm)	Width W (mm)	Thickness T max. (mm)	Electrode g min.	Electrode e
GA355DR7GC101KY02L	250Vac(r.m.s.)	X7R (EIA)	100pF±10%	5.7	5.0	2.3	4.0mm	0.3mm min.
GA355DR7GC151KY02L	250Vac(r.m.s.)	X7R (EIA)	150pF±10%	5.7	5.0	2.3	4.0mm	0.3mm min.
GA355DR7GC221KY02L	250Vac(r.m.s.)	X7R (EIA)	220pF±10%	5.7	5.0	2.3	4.0mm	0.3mm min.
GA355DR7GC331KY02L	250Vac(r.m.s.)	X7R (EIA)	330pF±10%	5.7	5.0	2.3	4.0mm	0.3mm min.

Chip Monolithic Ceramic Capacitors

Safety Standard Certified GA3 Series IEC60384-14 Class Y2, X1/Y2 Type GF

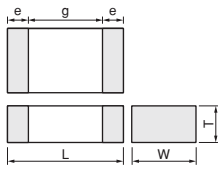
■ Features

1. Available for equipment based on IEC/EN60950 and UL1950. Besides, the GA352/355 types are available for equipment based on IEC/EN60065, UL1492, and UL6500.
2. Type GF can be used as a Y2-class capacitor.
3. A new monolithic structure for small, high capacitance capable of operating at high voltage levels.
4. +125 degree C guaranteed
5. Only for reflow soldering

■ Applications

1. Ideal for use on line filters and couplings for DAA modems without transformers
2. Ideal for use on line filters for information equipment
3. Ideal for use as Y capacitor or X capacitor for various switching power supplies (GA352/355 types only)

Do not use these products in any Automotive Power train or Safety equipment including Battery chargers for Electric Vehicles and Plug-in Hybrids. Only Murata products clearly stipulated as "for Automotive use" can be used for automobile applications such as Power train and Safety equipment.



Part Number	Dimensions (mm)				
	L	W	T	e min.	g min.
GA342A	4.5 ±0.3	2.0 ±0.2	1.0 +0, -0.3	0.3	2.5
GA342D			2.0 ±0.2		
GA342Q			1.5 +0, -0.3		
GA352Q	5.7 ±0.4	2.8 ±0.3	1.5 +0, -0.3		4.0
GA355D		5.0 ±0.4	2.0 +0, -0.3		
GA355Q			1.5 +0, -0.3		

■ Standard Certification

	Standard No.	Class	Status of Certification		Rated Voltage
			Size : 4.5x2.0mm	Size : 5.7x2.8mm and over	
UL	UL1414	X1, Y2	–	◎	AC250V (r.m.s.)
	UL 60950-1	–	◎	–	
VDE	IEC 60384-14	X1, Y2	–	◎	
SEMKO	EN 60384-14	Y2	◎	◎	

Applications

Size	Switching power supplies	Communication network devices such as a modem
4.5x2.0mm	–	◎
5.7x2.8mm and over	◎	◎

Part Number	Rated Voltage	TC Code (Standard)	Capacitance	Length L (mm)	Width W (mm)	Thickness T max. (mm)	Electrode g min.	Electrode e
GA342D1XGF100JY02L	250Vac(r.m.s.)	SL (JIS)	10pF±5%	4.5	2.0	2.2	2.5mm	0.3mm min.
GA342D1XGF120JY02L	250Vac(r.m.s.)	SL (JIS)	12pF±5%	4.5	2.0	2.2	2.5mm	0.3mm min.
GA342D1XGF150JY02L	250Vac(r.m.s.)	SL (JIS)	15pF±5%	4.5	2.0	2.2	2.5mm	0.3mm min.
GA342D1XGF180JY02L	250Vac(r.m.s.)	SL (JIS)	18pF±5%	4.5	2.0	2.2	2.5mm	0.3mm min.
GA342D1XGF220JY02L	250Vac(r.m.s.)	SL (JIS)	22pF±5%	4.5	2.0	2.2	2.5mm	0.3mm min.
GA342A1XGF270JW31L	250Vac(r.m.s.)	SL (JIS)	27pF±5%	4.5	2.0	1	2.5mm	0.3mm min.
GA342A1XGF330JW31L	250Vac(r.m.s.)	SL (JIS)	33pF±5%	4.5	2.0	1	2.5mm	0.3mm min.
GA342A1XGF390JW31L	250Vac(r.m.s.)	SL (JIS)	39pF±5%	4.5	2.0	1	2.5mm	0.3mm min.
GA342A1XGF470JW31L	250Vac(r.m.s.)	SL (JIS)	47pF±5%	4.5	2.0	1	2.5mm	0.3mm min.
GA342A1XGF560JW31L	250Vac(r.m.s.)	SL (JIS)	56pF±5%	4.5	2.0	1	2.5mm	0.3mm min.
GA342A1XGF680JW31L	250Vac(r.m.s.)	SL (JIS)	68pF±5%	4.5	2.0	1	2.5mm	0.3mm min.
GA342A1XGF820JW31L	250Vac(r.m.s.)	SL (JIS)	82pF±5%	4.5	2.0	1	2.5mm	0.3mm min.
GA342QR7GF101KW01L	250Vac(r.m.s.)	X7R (EIA)	100pF±10%	4.5	2.0	1.5	2.5mm	0.3mm min.
GA342QR7GF151KW01L	250Vac(r.m.s.)	X7R (EIA)	150pF±10%	4.5	2.0	1.5	2.5mm	0.3mm min.
GA342DR7GF221KW02L	250Vac(r.m.s.)	X7R (EIA)	220pF±10%	4.5	2.0	2.2	2.5mm	0.3mm min.
GA342DR7GF331KW02L	250Vac(r.m.s.)	X7R (EIA)	330pF±10%	4.5	2.0	2.2	2.5mm	0.3mm min.
GA342QR7GF471KW01L	250Vac(r.m.s.)	X7R (EIA)	470pF±10%	4.5	2.0	1.5	2.5mm	0.3mm min.
GA352QR7GF471KW01L	250Vac(r.m.s.)	X7R (EIA)	470pF±10%	5.7	2.8	1.5	4.0mm	0.3mm min.
GA342QR7GF681KW01L	250Vac(r.m.s.)	X7R (EIA)	680pF±10%	4.5	2.0	1.5	2.5mm	0.3mm min.
GA352QR7GF681KW01L	250Vac(r.m.s.)	X7R (EIA)	680pF±10%	5.7	2.8	1.5	4.0mm	0.3mm min.
GA342DR7GF102KW02L	250Vac(r.m.s.)	X7R (EIA)	1000pF±10%	4.5	2.0	2.2	2.5mm	0.3mm min.
GA352QR7GF102KW01L	250Vac(r.m.s.)	X7R (EIA)	1000pF±10%	5.7	2.8	1.5	4.0mm	0.3mm min.

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Part Number	Rated Voltage	TC Code (Standard)	Capacitance	Length L (mm)	Width W (mm)	Thickness T max. (mm)	Electrode g min.	Electrode e
GA352QR7GF152KW01L	250Vac(r.m.s.)	X7R (EIA)	1500pF±10%	5.7	2.8	1.5	4.0mm	0.3mm min.
GA355QR7GF182KW01L	250Vac(r.m.s.)	X7R (EIA)	1800pF±10%	5.7	5.0	1.5	4.0mm	0.3mm min.
GA355QR7GF222KW01L	250Vac(r.m.s.)	X7R (EIA)	2200pF±10%	5.7	5.0	1.5	4.0mm	0.3mm min.
GA355QR7GF332KW01L	250Vac(r.m.s.)	X7R (EIA)	3300pF±10%	5.7	5.0	1.5	4.0mm	0.3mm min.
GA355DR7GF472KW01L	250Vac(r.m.s.)	X7R (EIA)	4700pF±10%	5.7	5.0	2	4.0mm	0.3mm min.

Chip Monolithic Ceramic Capacitors

Safety Standard Certified GA3 Series IEC60384-14 Class Y3 Type GD

■ Features

1. Available for equipment based on IEC/EN60950 and UL1950.
2. Type GD can be used as a Y3-class capacitor.
3. A new monolithic structure for small, high capacitance capable of operating at high voltage levels.
4. +125 degree C guaranteed
5. Only for reflow soldering

■ Applications

1. Ideal for use on line filters and couplings for DAA modems without transformers
2. Ideal for use on line filters for information equipment

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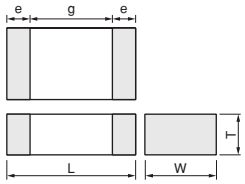


Part Number	Dimensions (mm)				
	L	W	T	e min.	g min.
GA342A	4.5 ±0.3	2.0 ±0.2	1.0 +0, -0.3	0.3	2.5
GA342D			2.0 ±0.2		
GA342Q			1.5 +0, -0.3		
GA343D	4.5 ±0.4	3.2 ±0.3	2.0 +0, -0.3		
GA343Q			1.5 +0, -0.3		

■ Standard Certification

	Standard No.	Class	Rated Voltage
UL	UL 60950-1	–	AC250V(r.m.s.)
SEMKO	IEC 60384-14 EN 60384-14	Y3	

Applications

Size	Switching power supplies	Communication network devices such as a modem
4.5x3.2mm and under	–	◎

Part Number	Rated Voltage	TC Code (Standard)	Capacitance	Length L (mm)	Width W (mm)	Thickness T max. (mm)	Electrode g min.	Electrode e
GA342D1XGD100JY02L	250Vac(r.m.s.)	SL (JIS)	10pF±5%	4.5	2.0	2.2	2.5mm	0.3mm min.
GA342D1XGD120JY02L	250Vac(r.m.s.)	SL (JIS)	12pF±5%	4.5	2.0	2.2	2.5mm	0.3mm min.
GA342D1XGD150JY02L	250Vac(r.m.s.)	SL (JIS)	15pF±5%	4.5	2.0	2.2	2.5mm	0.3mm min.
GA342D1XGD180JY02L	250Vac(r.m.s.)	SL (JIS)	18pF±5%	4.5	2.0	2.2	2.5mm	0.3mm min.
GA342D1XGD220JY02L	250Vac(r.m.s.)	SL (JIS)	22pF±5%	4.5	2.0	2.2	2.5mm	0.3mm min.
GA342A1XGD270JW31L	250Vac(r.m.s.)	SL (JIS)	27pF±5%	4.5	2.0	1	2.5mm	0.3mm min.
GA342A1XGD330JW31L	250Vac(r.m.s.)	SL (JIS)	33pF±5%	4.5	2.0	1	2.5mm	0.3mm min.
GA342A1XGD390JW31L	250Vac(r.m.s.)	SL (JIS)	39pF±5%	4.5	2.0	1	2.5mm	0.3mm min.
GA342A1XGD470JW31L	250Vac(r.m.s.)	SL (JIS)	47pF±5%	4.5	2.0	1	2.5mm	0.3mm min.
GA342A1XGD560JW31L	250Vac(r.m.s.)	SL (JIS)	56pF±5%	4.5	2.0	1	2.5mm	0.3mm min.
GA342A1XGD680JW31L	250Vac(r.m.s.)	SL (JIS)	68pF±5%	4.5	2.0	1	2.5mm	0.3mm min.
GA342A1XGD820JW31L	250Vac(r.m.s.)	SL (JIS)	82pF±5%	4.5	2.0	1	2.5mm	0.3mm min.
GA342QR7GD101KW01L	250Vac(r.m.s.)	X7R (EIA)	100pF±10%	4.5	2.0	1.5	2.5mm	0.3mm min.
GA342QR7GD151KW01L	250Vac(r.m.s.)	X7R (EIA)	150pF±10%	4.5	2.0	1.5	2.5mm	0.3mm min.
GA342QR7GD221KW01L	250Vac(r.m.s.)	X7R (EIA)	220pF±10%	4.5	2.0	1.5	2.5mm	0.3mm min.
GA342QR7GD331KW01L	250Vac(r.m.s.)	X7R (EIA)	330pF±10%	4.5	2.0	1.5	2.5mm	0.3mm min.
GA342QR7GD471KW01L	250Vac(r.m.s.)	X7R (EIA)	470pF±10%	4.5	2.0	1.5	2.5mm	0.3mm min.
GA342QR7GD681KW01L	250Vac(r.m.s.)	X7R (EIA)	680pF±10%	4.5	2.0	1.5	2.5mm	0.3mm min.
GA342QR7GD102KW01L	250Vac(r.m.s.)	X7R (EIA)	1000pF±10%	4.5	2.0	1.5	2.5mm	0.3mm min.
GA342QR7GD152KW01L	250Vac(r.m.s.)	X7R (EIA)	1500pF±10%	4.5	2.0	1.5	2.5mm	0.3mm min.
GA343QR7GD182KW01L	250Vac(r.m.s.)	X7R (EIA)	1800pF±10%	4.5	3.2	1.5	2.5mm	0.3mm min.
GA343QR7GD222KW01L	250Vac(r.m.s.)	X7R (EIA)	2200pF±10%	4.5	3.2	1.5	2.5mm	0.3mm min.
GA343DR7GD472KW01L	250Vac(r.m.s.)	X7R (EIA)	4700pF±10%	4.5	3.2	2	2.5mm	0.3mm min.

Chip Monolithic Ceramic Capacitors

Safety Standard Certified GA3 Series IEC60384-14 Class X2 Type GB

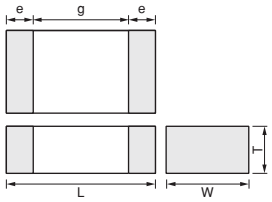
■ Features

1. Type GB can be used as an X2-class capacitor.
2. Chip monolithic ceramic capacitor (certified as conforming to safety standards) for AC lines.
3. A new monolithic structure for small, high capacitance capable of operating at high voltage levels.
4. Compared to lead type capacitors, this new capacitor is greatly downsized and low-profiled to 1/10 or less in volume, and 1/4 or less in height.
5. +125 degree C guaranteed
6. Only for reflow soldering

■ Applications

Ideal for use as X capacitor for various switching power supplies

Do not use these products in any Automotive Power train or Safety equipment including Battery chargers for Electric Vehicles and Plug-in Hybrids. Only Murata products clearly stipulated as "for Automotive use" can be used for automobile applications such as Power train and Safety equipment.



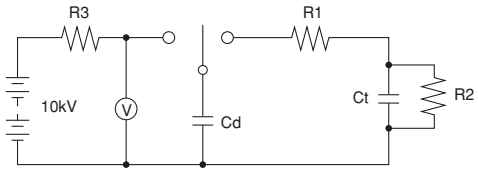
Part Number	Dimensions (mm)				
	L	W	T	e min.	g min.
GA355Q	5.7 ±0.4	5.0 ±0.4	1.5 +0,-0.3	0.3	3.0
GA355D			2.0 +0,-0.3		
GA355E			2.5 +0,-0.3		
GA355X			2.9 +0,-0.4		

■ Standard Certification

	Standard No.	Class	Rated Voltage
VDE	IEC 60384-14 EN 60384-14	X2	AC250V (r.m.s.)
SEMKO			
ESTI	IEC 60384-14		

Part Number	Rated Voltage	TC Code (Standard)	Capacitance	Length L (mm)	Width W (mm)	Thickness T max. (mm)	Electrode g min.	Electrode e
GA355QR7GB103KW01L	250Vac(r.m.s.)	X7R (EIA)	10000pF±10%	5.7	5.0	1.5	3.0mm	0.3mm min.
GA355QR7GB153KW01L	250Vac(r.m.s.)	X7R (EIA)	15000pF±10%	5.7	5.0	1.5	3.0mm	0.3mm min.
GA355DR7GB223KW01L	250Vac(r.m.s.)	X7R (EIA)	22000pF±10%	5.7	5.0	2	3.0mm	0.3mm min.
GA355ER7GB333KW01L	250Vac(r.m.s.)	X7R (EIA)	33000pF±10%	5.7	5.0	2.5	3.0mm	0.3mm min.
GA355ER7GB473KW01L	250Vac(r.m.s.)	X7R (EIA)	47000pF±10%	5.7	5.0	2.5	3.0mm	0.3mm min.
GA355XR7GB563KW06L	250Vac(r.m.s.)	X7R (EIA)	56000pF±10%	5.7	5.0	2.9	3.0mm	0.3mm min.

GA3 Series Specifications and Test Methods

<table>
<tr><th>No.</th><th colspan="2">Item</th><th>Specifications</th><th>Test Method</th></tr>
<tr><td>1</td><td colspan="2">Operating Temperature Range</td><td>–55 to +125°C</td><td>–</td></tr>
<tr><td>2</td><td colspan="2">Appearance</td><td>No defects or abnormalities</td><td>Visual inspection</td></tr>
<tr><td>3</td><td colspan="2">Dimensions</td><td>Within the specified dimensions</td><td>Using calipers and micrometers</td></tr>
<tr><td>4</td><td colspan="2">Dielectric Strength</td><td>No defects or abnormalities</td><td>No failure should be observed when voltage in the table is applied between the terminations for 60±1 sec., provided the charge/discharge current is less than 50mA.
<table><tr><th></th><th>Test Voltage</th></tr><tr><td>Type GB</td><td>DC1075V</td></tr><tr><td>Type GC/GD</td><td>AC1500V (r.m.s.)</td></tr><tr><td>Type GF</td><td>AC2000V (r.m.s.)</td></tr></table></td></tr>
<tr><td>5</td><td colspan="2">Pulse Voltage (Application: Type GD/GF)</td><td>No self healing breakdowns or flash-overs have taken place in the capacitor.</td><td>10 impulses of alternating polarity are subjected.
(5 impulses for each polarity)
The interval between impulses is 60 sec.
Applied Pulse: 1.2/50μs
Applied Voltage: 2.5kVo-p</td></tr>
<tr><td>6</td><td colspan="2">Insulation Resistance (I.R.)</td><td>More than 6,000MΩ</td><td>The insulation resistance should be measured with DC500±50V and within 60±5 sec. of charging.</td></tr>
<tr><td>7</td><td colspan="2">Capacitance</td><td>Within the specified tolerance</td><td rowspan="2">The capacitance/Q/D.F. should be measured at a frequency of 1±0.2kHz (SL char.: 1±0.2MHz) and a voltage of AC1±0.2V (r.m.s.).</td></tr>
<tr><td>8</td><td colspan="2">Dissipation Factor (D.F.)
Q</td><td><table><tr><th>Char.</th><th>Specification</th></tr><tr><td>X7R</td><td>D.F.≦0.025</td></tr><tr><td>SL</td><td>Q≧400+20C*2 (C<30pF)
Q≧1000 (C≧30pF)</td></tr></table></td></tr>
<tr><td>9</td><td colspan="2">Capacitance Temperature Characteristics</td><td><table><tr><th>Char.</th><th>Capacitance Change</th></tr><tr><td>X7R</td><td>Within ±15%</td></tr></table>Temperature characteristic guarantee is –55 to +125°C
<table><tr><th>Char.</th><th>Temperature Coefficient</th></tr><tr><td>SL</td><td>+350 to –1000ppm/°C</td></tr></table>Temperature characteristic guarantee is +20 to +85°C</td><td>The capacitance measurement should be made at each step specified in the Table.
<table><tr><th>Step</th><th>Temperature (°C)</th></tr><tr><td>1</td><td>25±2 (20±2 for SL char.)</td></tr><tr><td>2</td><td>Min. Operating Temp.±3</td></tr><tr><td>3</td><td>25±2 (20±2 for SL char.)</td></tr><tr><td>4</td><td>Max. Operating Temp.±2</td></tr><tr><td>5</td><td>25±2 (20±2 for SL char.)</td></tr></table>SL char. :
The capacitance should be measured at even 85°C between step 3 and step 4.
•Pretreatment for X7R char.
Perform a heat treatment at 150$^{+18}_{-0}$°C for 60±5 min. and then let sit for 24±2 hrs. at room condition.*1</td></tr>
<tr><td rowspan="3">10</td><td rowspan="3">Discharge Test (Application: Type GC)</td><td>Appearance</td><td>No defects or abnormalities</td><td rowspan="3">As in Fig., discharge is made 50 times at 5 sec. intervals from the capacitor (Cd) charged at DC voltage of specified.
 

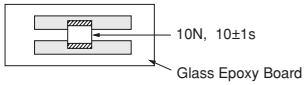
Ct: Capacitor under test Cd: 0.001μF
R1: 1,000Ω R2: 100MΩ R3: Surge resistance</td></tr>
<tr><td>I.R.</td><td>More than 1,000MΩ</td></tr>
<tr><td>Dielectric Strength</td><td>In accordance with item No.4</td></tr>
<tr><td>11</td><td colspan="2">Adhesive Strength of Termination</td><td>No removal of the terminations or other defect should occur.</td><td>Solder the capacitor to the testing jig (glass epoxy board) shown in Fig. 1.
Then apply 10N force in the direction of the arrow. The soldering should be done using the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock.
 

Fig. 1</td></tr>
</table>

*1 "Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa
*2 "C" expresses nominal capacitance value (pF).

Continued on the following page.

GA3 Series Specifications and Test Methods

Continued from the preceding page.

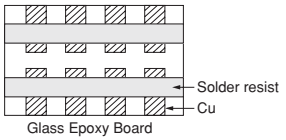
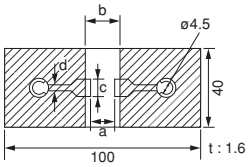
<table>
<tr><th>No.</th><th colspan="2">Item</th><th>Specifications</th><th>Test Method</th></tr>
<tr><td rowspan="3">12</td><td rowspan="3">Vibration Resistance</td><td>Appearance</td><td>No defects or abnormalities</td><td rowspan="3">Solder the capacitor to the test jig (glass epoxy board).
The capacitor should be subjected to a simple harmonic motion having a total amplitude of 1.5mm, the frequency being varied uniformly between the approximate limits of 10 and 55Hz. The frequency range, from 10 to 55Hz and return to 10Hz, should be traversed in approximately 1 min. This motion should be applied for a period of 2 hrs. in each of 3 mutually perpendicular directions (total of 6 hrs.).
 
</td></tr>
<tr><td>Capacitance</td><td>Within the specified tolerance</td></tr>
<tr><td>D.F.
Q</td><td><table><tr><th>Char.</th><th>Specification</th></tr><tr><td>X7R</td><td>D.F.≦0.025</td></tr><tr><td>SL</td><td>Q≧400+20C*2 (C<30pF)
Q≧1000 (C≧30pF)</td></tr></table></td></tr>
<tr><td>13</td><td colspan="2">Deflection</td><td>No marking defects
 

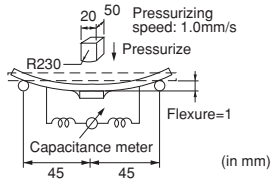
Fig. 2
<table><tr><th rowspan="2">L×W (mm)</th><th colspan="4">Dimension (mm)</th></tr><tr><th>a</th><th>b</th><th>c</th><th>d</th></tr><tr><td>4.5×2.0</td><td>3.5</td><td>7.0</td><td>2.4</td><td rowspan="4">1.0</td></tr><tr><td>4.5×3.2</td><td>3.5</td><td>7.0</td><td>3.7</td></tr><tr><td>5.7×2.8</td><td>4.5</td><td>8.0</td><td>3.2</td></tr><tr><td>5.7×5.0</td><td>4.5</td><td>8.0</td><td>5.6</td></tr></table></td><td>Solder the capacitor to the testing jig (glass epoxy board) shown in Fig. 2.
Then apply a force in the direction shown in Fig. 3. The soldering should be done using the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock.
 

Fig. 3</td></tr>
<tr><td>14</td><td colspan="2">Solderability of Termination</td><td>75% of the terminations are to be soldered evenly and continuously.</td><td>Immerse the capacitor in a solution of ethanol (JIS-K-8101) and rosin (JIS-K-5902) (25% rosin in weight proportion).
Immerse in solder solution for 2±0.5 sec.
Immersing speed: 25±2.5mm/s
Temp. of solder: 245±5°C Lead Free Solder (Sn-3.0Ag-0.5Cu)
235±5°C H60A or H63A Eutectic Solder</td></tr>
<tr><td rowspan="4">15</td><td rowspan="4">Resistance to Soldering Heat</td><td>Appearance</td><td>No marking defects</td><td rowspan="4">Preheat the capacitor as in table. Immerse the capacitor in solder solution at 260±5°C for 10±1 sec. Let sit at room condition*1 for 24±2 hrs., then measure.
•Immersing speed: 25±2.5mm/s
•Pretreatment for X7R char.
Perform a heat treatment at 150$^{+}_{-}{}^{18}$°C for 60±5 min. and then let sit for 24±2 hrs. at room condition.*1

*Preheating<table><tr><th>Step</th><th>Temperature</th><th>Time</th></tr><tr><td>1</td><td>100 to 120°C</td><td>1 min.</td></tr><tr><td>2</td><td>170 to 200°C</td><td>1 min.</td></tr></table></td></tr>
<tr><td>Capacitance Change</td><td><table><tr><th>Char.</th><th>Capacitance Change</th></tr><tr><td>X7R</td><td>Within ±10%</td></tr><tr><td>SL</td><td>Within ±2.5% or ±0.25pF
(Whichever is larger)</td></tr></table></td></tr>
<tr><td>I.R.</td><td>More than 1,000MΩ</td></tr>
<tr><td>Dielectric Strength</td><td>In accordance with item No.4</td></tr>
</table>

*1 "Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa
*2 "C" expresses nominal capacitance value (pF).

Continued on the following page.

GA3 Series Specifications and Test Methods

Continued from the preceding page.

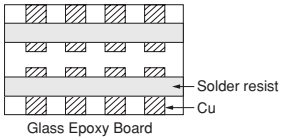
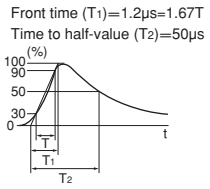
<table>
<tr><th>No.</th><th colspan="2">Item</th><th>Specifications</th><th>Test Method</th></tr>
<tr><td rowspan="5">16</td><td rowspan="5">Temperature Cycle</td><td>Appearance</td><td>No marking defects</td><td rowspan="5">Fix the capacitor to the supporting jig (glass epoxy board) shown in Fig. 4.
Perform the 5 cycles according to the 4 heat treatments listed in the following table.
Let sit for 24±2 hrs. at room condition,*1 then measure.
<table><tr><th>Step</th><th>Temperature (°C)</th><th>Time (min.)</th></tr><tr><td>1</td><td>Min. Operating Temp.±3</td><td>30±3</td></tr><tr><td>2</td><td>Room Temp.</td><td>2 to 3</td></tr><tr><td>3</td><td>Max. Operating Temp.±2</td><td>30±3</td></tr><tr><td>4</td><td>Room Temp.</td><td>2 to 3</td></tr></table>•Pretreatment for X7R char.
Perform a heat treatment at 150 $^{+1}_{-0}$°C for 60±5 min. and then let sit for 24±2 hrs. at room condition.*1
 

Fig. 4</td></tr>
<tr><td>Capacitance Change</td><td><table><tr><th>Char.</th><th>Capacitance Change</th></tr><tr><td>X7R</td><td>Within ±15%</td></tr><tr><td>SL</td><td>Within ±2.5% or ±0.25pF (Whichever is larger)</td></tr></table></td></tr>
<tr><td>D.F.
Q</td><td><table><tr><th>Char.</th><th>Specification</th></tr><tr><td>X7R</td><td>D.F.≦0.05</td></tr><tr><td>SL</td><td>Q≧400+20C*2 (C<30pF)
Q≧1000 (C≧30pF)</td></tr></table></td></tr>
<tr><td>I.R.</td><td>More than 3,000MΩ</td></tr>
<tr><td>Dielectric Strength</td><td>In accordance with item No.4</td></tr>
<tr><td rowspan="5">17</td><td rowspan="5">Humidity (Steady State)</td><td>Appearance</td><td>No marking defects</td><td rowspan="5">Before this test, the test shown in the following is performed.
·Item 11 Adhesive Strength of Termination (applied force is 5N)
·Item 13 Deflection

Let the capacitor sit at 40±2°C and relative humidity of 90 to 95% for 500 $^{+24}_{-0}$ hrs.
Remove and let sit for 24±2 hrs. at room condition,*1 then measure.
•Pretreatment for X7R char.
Perform a heat treatment at 150 $^{+1}_{-0}$°C for 60±5 min. and then let sit for 24±2 hrs. at room condition.*1</td></tr>
<tr><td>Capacitance Change</td><td><table><tr><th>Char.</th><th>Capacitance Change</th></tr><tr><td>X7R</td><td>Within ±15%</td></tr><tr><td>SL</td><td>Within ±5.0% or ±0.5pF (Whichever is larger)</td></tr></table></td></tr>
<tr><td>D.F.
Q</td><td><table><tr><th>Char.</th><th>Specification</th></tr><tr><td>X7R</td><td>D.F.≦0.05</td></tr><tr><td>SL</td><td>Q≧275+5/2C*2 (C<30pF)
Q≧350 (C≧30pF)</td></tr></table></td></tr>
<tr><td>I.R.</td><td>More than 3,000MΩ</td></tr>
<tr><td>Dielectric Strength</td><td>In accordance with item No.4</td></tr>
<tr><td rowspan="5">18</td><td rowspan="5">Life</td><td>Appearance</td><td>No marking defects</td><td rowspan="5">Before this test, the test shown in the following is performed.
·Item 11 Adhesive Strength of Termination (apply force is 5N)
·Item 13 Deflection

Impulse Voltage
Each individual capacitor should be subjected to a 2.5kV (Type GC/GF: 5kV) Impulse (the voltage value means zero to peak) for three times. Then the capacitors are applied to life test.
 

Apply voltage as in Table for 1,000 hrs. at 125 $^{+2}_{-0}$°C, relative humidity 50% max.
<table><tr><th>Type</th><th>Applied Voltage</th></tr><tr><td>GB</td><td>AC312.5V (r.m.s.), except that once each hour the voltage is increased to AC1,000V (r.m.s.) for 0.1 sec.</td></tr><tr><td>GC
GF
GD</td><td>AC425V (r.m.s.), except that once each hour the voltage is increased to AC1,000V (r.m.s.) for 0.1 sec.</td></tr></table>Let sit for 24±2 hrs. at room condition,*1 then measure.
•Pretreatment for X7R char.
Perform a heat treatment at 150 $^{+1}_{-0}$°C for 60±5 min. and then let sit for 24±2 hrs. at room condition.*1</td></tr>
<tr><td>Capacitance Change</td><td><table><tr><th>Char.</th><th>Capacitance Change</th></tr><tr><td>X7R</td><td>Within ±20%</td></tr><tr><td>SL</td><td>Within ±3.0% or ±0.3pF (Whichever is larger)</td></tr></table></td></tr>
<tr><td>D.F.
Q</td><td><table><tr><th>Char.</th><th>Specification</th></tr><tr><td>X7R</td><td>D.F.≦0.05</td></tr><tr><td>SL</td><td>Q≧275+5/2C*2 (C<30pF)
Q≧350 (C≧30pF)</td></tr></table></td></tr>
<tr><td>I.R.</td><td>More than 3,000MΩ</td></tr>
<tr><td>Dielectric Strength</td><td>In accordance with item No.4</td></tr>
</table>

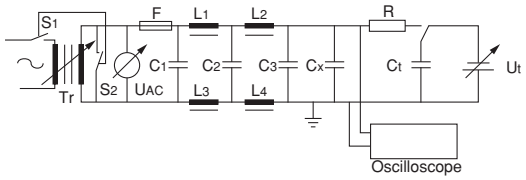
*1 "Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa
*2 "C" expresses nominal capacitance value (pF).

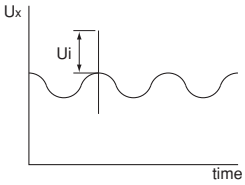
Continued on the following page.

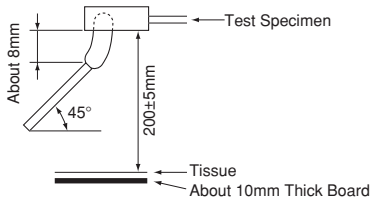
GA3 Series Specifications and Test Methods

Continued from the preceding page.

<table>
<tr><th>No.</th><th colspan="2">Item</th><th>Specifications</th><th>Test Method</th></tr>
<tr><td rowspan="4">19</td><td rowspan="4">Humidity Loading</td><td>Appearance</td><td>No marking defects</td><td rowspan="4">Before this test, the test shown in the following is performed.
·Item 11 Adhesive Strength of Termination (apply force is 5N)
·Item 13 Deflection

Apply the rated voltage at 40±2°C and relative humidity of 90 to 95% for 500$^{+24}_{0}$hrs. Remove and let sit for 24±2 hrs. at room condition,*1 then measure.
•Pretreatment for X7R char.
Perform a heat treatment at 150$^{+0}_{-10}$°C for 60±5 min. and then let sit for 24±2 hrs. at room condition.*1</td></tr>
<tr><td>Capacitance Change</td><td><table><tr><th>Char.</th><th>Capacitance Change</th></tr><tr><td>X7R</td><td>Within ±15%</td></tr><tr><td>SL</td><td>Within ±5.0% or ±0.5pF
(Whichever is larger)</td></tr></table></td></tr>
<tr><td>D.F.
Q</td><td><table><tr><th>Char.</th><th>Specification</th></tr><tr><td>X7R</td><td>D.F.≦0.05</td></tr><tr><td>SL</td><td>Q≧275+5/2C*2 (C<30pF)
Q≧350 (C≧30pF)</td></tr></table></td></tr>
<tr><td>I.R.</td><td>More than 3,000MΩ</td></tr>
<tr><td>20</td><td colspan="2">Active Flammability</td><td>The cheesecloth should not be on fire.</td><td>The capacitor should be individually wrapped in at least one but not more than two complete layers of cheesecloth. The capacitor should be subjected to 20 discharges. The interval between successive discharges should be 5 sec. The U_{AC} should be maintained for 2 min. after the last discharge.
 

$C_{1,2}$: 1μF±10% C_3 : 0.033μF±5% 10kV
$L_{1\ to\ 4}$: 1.5mH±20% 16A Rod core choke
C_t : 3μF±5% 10kV R : 100Ω±2%
C_x : Capacitor under test U_{AC} : U_R±5%
F : Fuse, Rated 16A U_R : Rated Voltage
U_t : Voltage applied to C_t
 

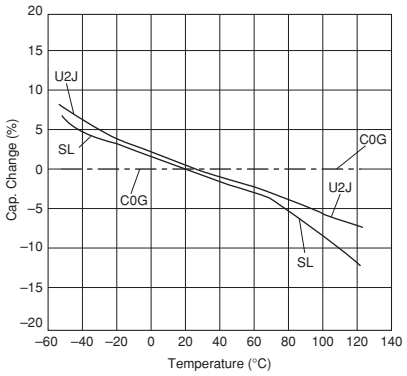
<table><tr><th>Type</th><th>Ui</th></tr><tr><td>GD, GB</td><td>2.5kV</td></tr><tr><td>GC, GF</td><td>5kV</td></tr></table></td></tr>
<tr><td>21</td><td colspan="2">Passive Flammability</td><td>The burning time should not exceed 30 sec.
The tissue paper should not ignite.</td><td>The capacitor under test should be held in the flame in the position which best promotes burning. Each specimen should be exposed to the flame only once. Time of exposure to flame: 30 sec.
Length of flame : 12±1mm
Gas burner : Length 35mm min.
Inside Dia. 0.5±0.1mm
Outside Dia. 0.9mm max.
Gas : Butane gas Purity 95% min.
 
</td></tr>
</table>

*1 "Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa
*2 "C" expresses nominal capacitance value (pF).

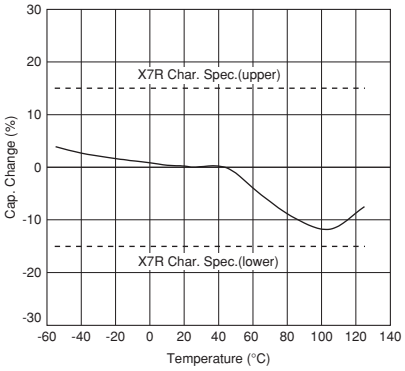
GRM/GRJ/GR3/GR4/GR7/GA2/GA3 Series Reference Data (Typical Example)

■ Capacitance - Temperature Characteristics

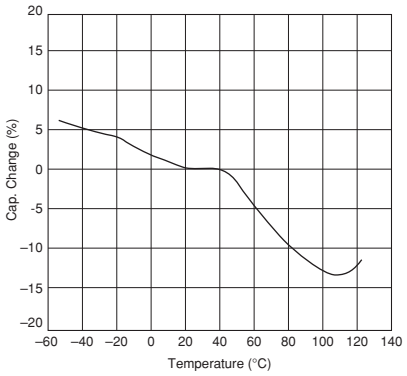
C0G/U2J/SL Characteristics



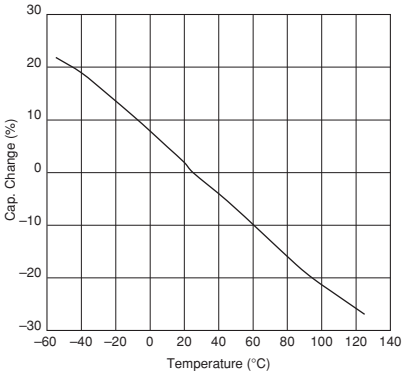
X7R Characteristics



GR4 Series

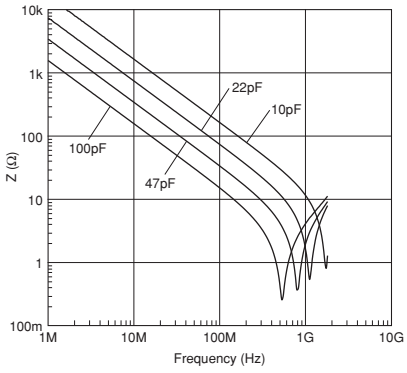


X7T Characteristics

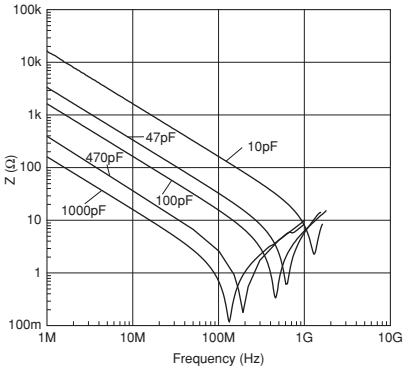


■ Impedance - Frequency Characteristics

GRM Series (C0G Char. 250V)



GRM Series (C0G Char. 630V)



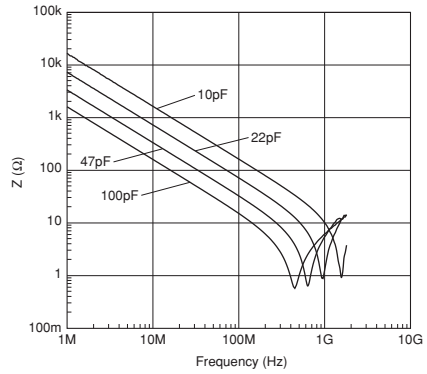
Continued on the following page.

GRM/GRJ/GR3/GR4/GR7/GA2/GA3 Series Reference Data (Typical Example)

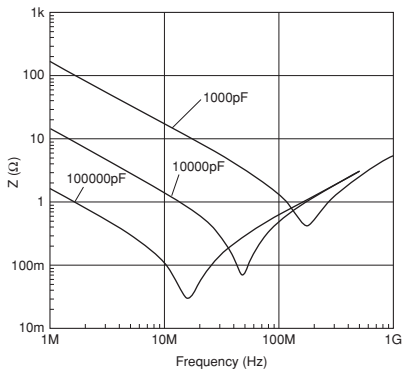
Continued from the preceding page.

■ Impedance - Frequency Characteristics

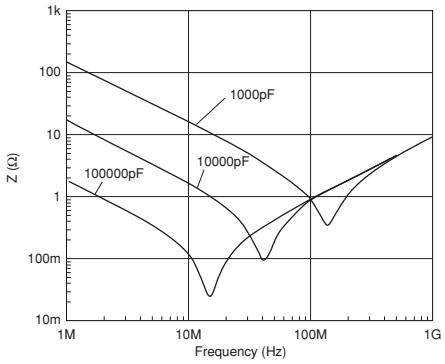
GRM Series (C0G Char. 1kV)



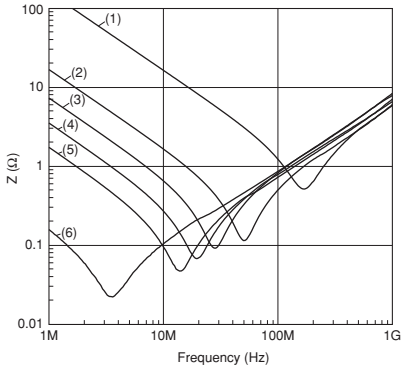
GRM Series (X7R Char. 250V)



GRM Series (X7R Char. 630V)

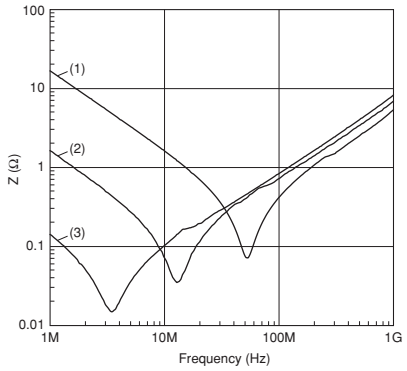


GRJ Series (X7R Char. 250V)



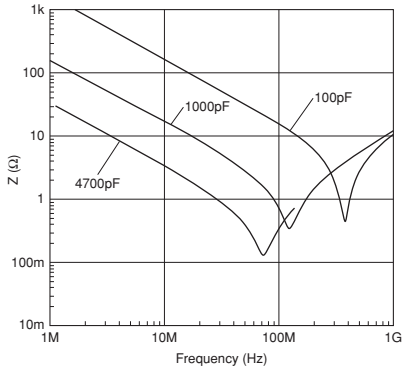
(1) GRJ21AR72E102KWJ1D
(2) GRJ21BR72E103KWJ3L
(3) GRJ31BR72E223KWJ1L
(4) GRJ31CR72E473KWJ3L
(5) GRJ31CR72E104KWJ3L
(6) GRJ55DR72E105KWJ1L

GR3 Series (X7T Char. 250V)

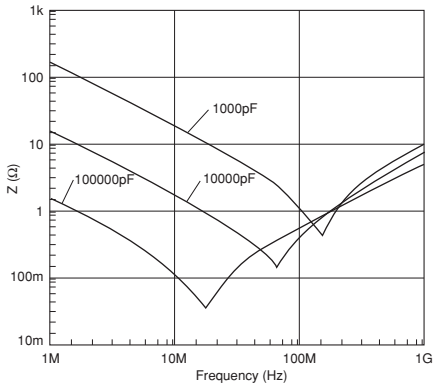


(1) GR321AD72E103KW01D
(2) GR332QD72E104KW01L
(3) GR355XD72E105KW05L

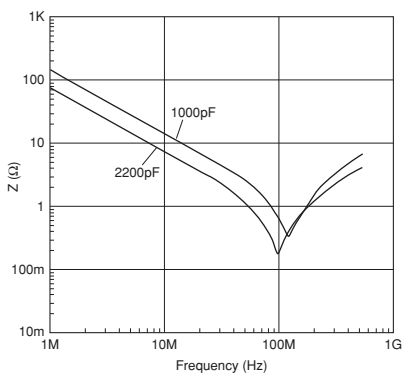
GR4 Series



GA2 Series



GA3 Series (Type GF)



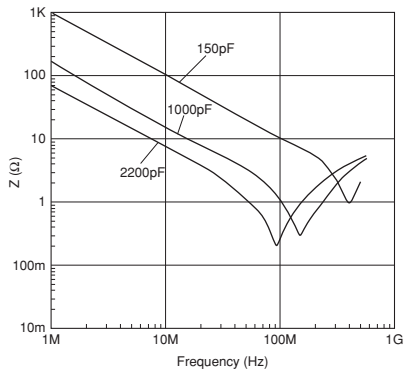
Continued on the following page.

GRM/GRJ/GR3/GR4/GR7/GA2/GA3 Series Reference Data (Typical Example)

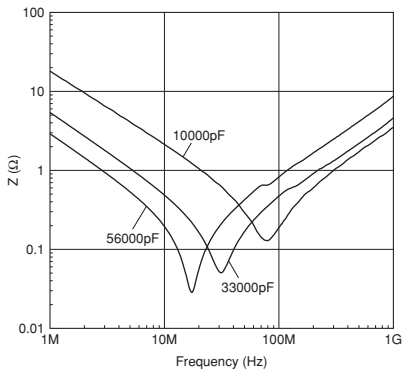
Continued from the preceding page.

■ Impedance - Frequency Characteristics

GA3 Series (Type GD)

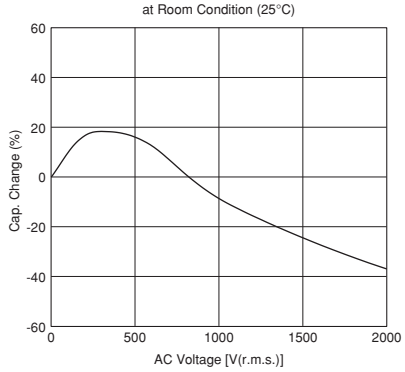


GA3 Series (Type GB)

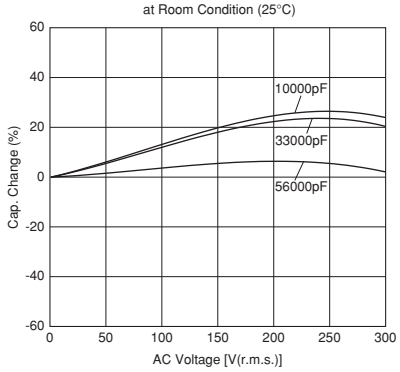


■ Capacitance - AC Voltage Characteristics

GA3 Series (Type GF/GD, X7R Char.)

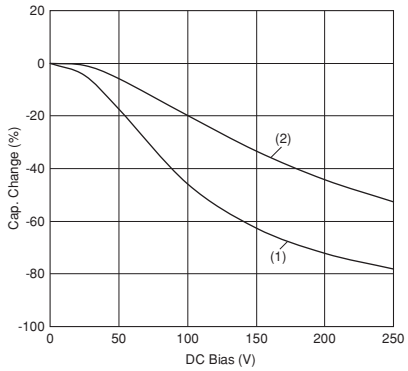


GA3 Series (Type GB)



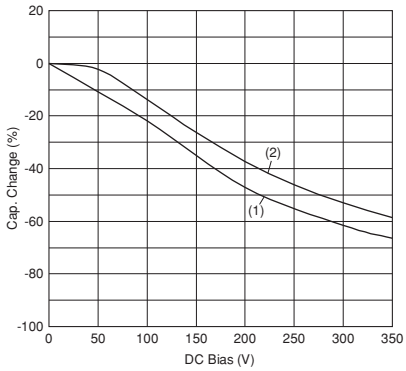
■ Capacitance - DC Bias Characteristics

GRM/GR3 Series



(1) GRM55DR72E105KW01L
(2) GR355XD72E105KW05L

GR7 Series



(1) GR721AW0BB103KW01D
GR721AW0BB153KW01D
GR721BW0BB223KW03L
GR731AW0BB223KW01D
GR721BW0BB273KW03L
GR731AW0BB273KW01D
GR731AW0BB333KW01D

(2) GR731AW0BB103KW01D
GR731AW0BB153KW01D
GR731BW0BB223KW01L
GR731BW0BB333KW01L
GR731CW0BB473KW03L

Package

Taping is the standard packaging method.

■ Minimum Quantity Guide

Part Number		Dimensions (mm)			Quantity (pcs.) ø180mm Reel	
		L	W	T	Paper Tape	Embossed Tape
250Vdc min. For General Purpose & Only for Applications	GRM18	1.6	0.8	0.8	4,000	-
	GRJ21/GRM21/GR321/GR721	2.0	1.25	1.0	4,000	-
				1.25	-	3,000
	GRJ31/GRM31/GR331/GR731	3.2	1.6	1.0	4,000	-
				1.25	-	3,000
				1.6	-	2,000
	GRJ32/GRM32/GR332	3.2	2.5	1.0	4,000	-
				1.25	-	3,000
				1.5	-	2,000
				2.0	-	1,000
	GRM42/GR442	4.5	2.0	1.0	-	3,000
				1.5	-	2,000
	GRJ43/GRM43/GR343/GR443	4.5	3.2	1.5	-	1,000
				2.0	-	1,000
				2.5	-	500
	GRM55	5.7	5.0	1.5	-	1,000
	GRJ55/GRM55/GR355/GR455	5.7	5.0	2.0	-	1,000
	GR355	5.7	5.0	2.7	-	500
AC250V	GA242	4.5	2.0	1.5	-	2,000
	GA243	4.5	3.2	1.5	-	1,000
				2.0	-	1,000
	GA255	5.7	5.0	2.0	-	1,000
Safety Std. Certification	GA342	4.5	2.0	1.0	-	3,000
				1.5	-	2,000
				2.0	-	2,000
	GA343	4.5	3.2	1.5	-	1,000
				2.0	-	1,000
	GA352	5.7	2.8	1.5	-	1,000
	GA355	5.7	5.0	1.5	-	1,000
				2.0	-	1,000
				2.5	-	500
				2.7	-	500
				2.9	-	500

Continued on the following page.

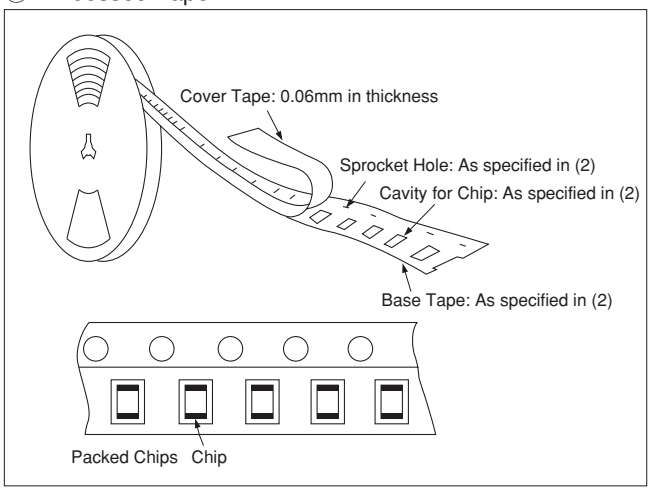
Package

Continued from the preceding page.

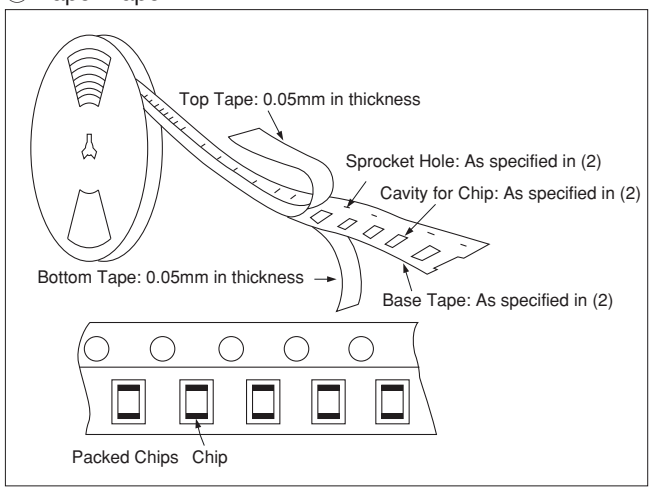
■ Tape Carrier Packaging

(1) Appearance of Taping

① Embossed Tape



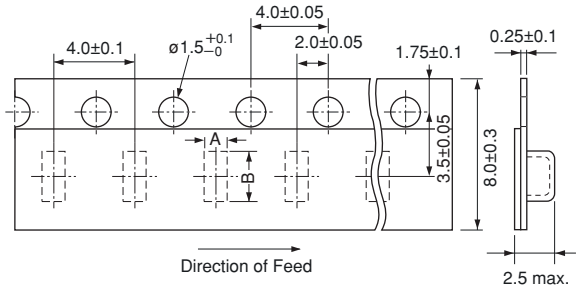
② Paper Tape



(2) Dimensions of Tape

① Embossed Tape

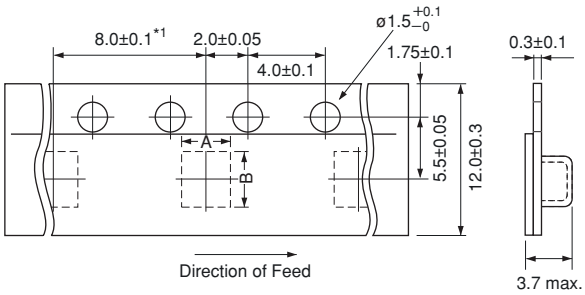
8mm width, 4mm pitch Tape



Part Number	A*	B*
GRJ21/GRM21/GR321/GR721 (T≦1.25mm)	1.45	2.25
GRJ31/GRM31/GR331/GR731 (T≦1.25mm)	2.0	3.6
GRJ32/GRM32/GR332 (T≦1.25mm)	2.9	3.6

*Nominal Value

12mm width, 8mm/4mm pitch Tape



Part Number	A*	B*
GRM42/GR442/GA242/GA342	2.5	5.1
GRJ43/GRM43/GR343/GR443/GA243/GA343	3.6	4.9
GA352	3.2	6.1
GRJ55/GRM55/GR355/GR455/GA255/GA355	5.4	6.1

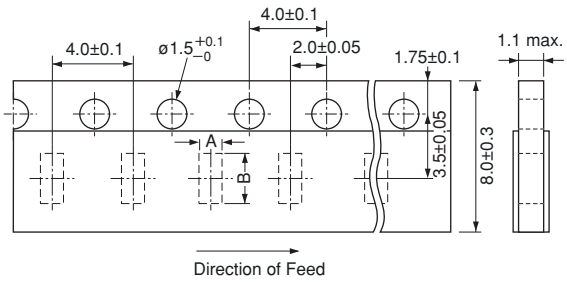
*1 4.0±0.1mm in case of GRM42/GR442/GA242/GA342

*Nominal Value

(in mm)

② Paper Tape

8mm width, 4mm pitch Tape



Part Number	A*	B*
GRM18	1.05	1.85
GRJ21/GRM21/GR321/GR721 (T=1.0mm)	1.45	2.25
GRM31/GR331/GR731 (T=1.0mm)	2.0	3.6
GRM32 (T=1.0mm)	2.9	3.6

*Nominal Value

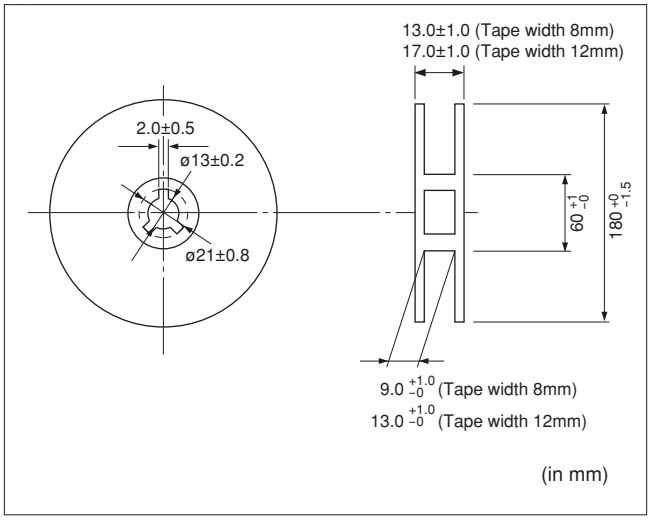
(in mm)

Continued on the following page.

Package

Continued from the preceding page.

(3) Dimensions of Reel



(4) Taping Method

① Tapes for capacitors are wound clockwise. The sprocket holes are to the right as the tape is pulled toward the user.

② Part of the leader and part of the empty tape should be attached to the end of the tape as shown at right.

③ The top tape or cover tape and base tape are not attached at the end of the tape for a minimum of 5 pitches.

④ Missing capacitors number within 0.1% of the number per reel or 1 pc, whichever is greater, and are not continuous.

⑤ The top tape or cover tape and bottom tape should not protrude beyond the edges of the tape and should not cover sprocket holes.

⑥ Cumulative tolerance of sprocket holes, 10 pitches: ±0.3mm.

⑦ Peeling off force: 0.1 to 0.6N in the direction shown at right.