

Chip Monolithic Ceramic Capacitors



Safety Standard Certified Type GF (IEC60384-14 Class Y2, X1/Y2)

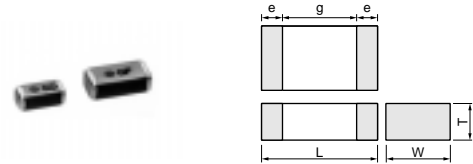
■ Features

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. The 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
6. The low-profile type (thickness: 1.5mm max.) is available. Fit for use on thinner type equipment.

■ 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 charger for Electric Vehicles and Plug-in Hybrid. Only Murata products clearly stipulated as "for Automotive use" on its catalog 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	2.8 ±0.3	1.5 +0, -0.3				
GA355D	5.7 ±0.4	5.0 ±0.4	2.0 +0, -0.3			4.0
GA355Q			1.5 +0, -0.3			

* GA342D1X : 2.0±0.3

■ Standard Certification


	Standard No.	Class	Status of Certification		Rated Voltage
			Size : 4.5×2.0mm	Size : 5.7×2.8mm 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
4.5×2.0mm	—	⊙
5.7×2.8mm and over	⊙	⊙

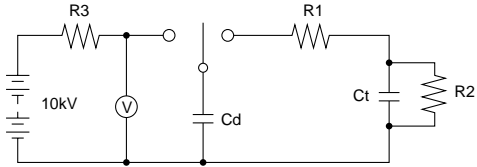
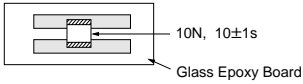
Part Number	Rated Voltage (V)	TC Code (Standard)	Capacitance (pF)	Length L (mm)	Width W (mm)	Thickness T (mm)	Electrode g min. (mm)	Electrode e (mm)
GA342D1XGF100JY02L	AC250 (r.m.s.)	SL (JIS)	10 ±5%	4.5	2.0	2.0	2.5	0.3 min.
GA342D1XGF120JY02L	AC250 (r.m.s.)	SL (JIS)	12 ±5%	4.5	2.0	2.0	2.5	0.3 min.
GA342D1XGF150JY02L	AC250 (r.m.s.)	SL (JIS)	15 ±5%	4.5	2.0	2.0	2.5	0.3 min.
GA342D1XGF180JY02L	AC250 (r.m.s.)	SL (JIS)	18 ±5%	4.5	2.0	2.0	2.5	0.3 min.
GA342D1XGF220JY02L	AC250 (r.m.s.)	SL (JIS)	22 ±5%	4.5	2.0	2.0	2.5	0.3 min.
GA342A1XGF270JW31L	AC250 (r.m.s.)	SL (JIS)	27 ±5%	4.5	2.0	1.0	2.5	0.3 min.
GA342A1XGF330JW31L	AC250 (r.m.s.)	SL (JIS)	33 ±5%	4.5	2.0	1.0	2.5	0.3 min.
GA342A1XGF390JW31L	AC250 (r.m.s.)	SL (JIS)	39 ±5%	4.5	2.0	1.0	2.5	0.3 min.
GA342A1XGF470JW31L	AC250 (r.m.s.)	SL (JIS)	47 ±5%	4.5	2.0	1.0	2.5	0.3 min.
GA342A1XGF560JW31L	AC250 (r.m.s.)	SL (JIS)	56 ±5%	4.5	2.0	1.0	2.5	0.3 min.
GA342A1XGF680JW31L	AC250 (r.m.s.)	SL (JIS)	68 ±5%	4.5	2.0	1.0	2.5	0.3 min.
GA342A1XGF820JW31L	AC250 (r.m.s.)	SL (JIS)	82 ±5%	4.5	2.0	1.0	2.5	0.3 min.
GA342QR7GF101KW01L	AC250 (r.m.s.)	X7R (EIA)	100 ±10%	4.5	2.0	1.5	2.5	0.3 min.
GA342QR7GF151KW01L	AC250 (r.m.s.)	X7R (EIA)	150 ±10%	4.5	2.0	1.5	2.5	0.3 min.
GA342DR7GF221KW02L	AC250 (r.m.s.)	X7R (EIA)	220 ±10%	4.5	2.0	2.0	2.5	0.3 min.
GA342DR7GF331KW02L	AC250 (r.m.s.)	X7R (EIA)	330 ±10%	4.5	2.0	2.0	2.5	0.3 min.
GA342QR7GF471KW01L	AC250 (r.m.s.)	X7R (EIA)	470 ±10%	4.5	2.0	1.5	2.5	0.3 min.
GA352QR7GF471KW01L	AC250 (r.m.s.)	X7R (EIA)	470 ±10%	5.7	2.8	1.5	4.0	0.3 min.
GA342QR7GF681KW01L	AC250 (r.m.s.)	X7R (EIA)	680 ±10%	4.5	2.0	1.5	2.5	0.3 min.

Continued on the following page.

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GA352QR7GF681KW01L	AC250 (r.m.s.)	X7R (EIA)	680 ±10%	5.7	2.8	1.5	4.0	0.3 min.
GA342DR7GF102KW02L	AC250 (r.m.s.)	X7R (EIA)	1000 ±10%	4.5	2.0	2.0	2.5	0.3 min.
GA352QR7GF102KW01L	AC250 (r.m.s.)	X7R (EIA)	1000 ±10%	5.7	2.8	1.5	4.0	0.3 min.
GA352QR7GF152KW01L	AC250 (r.m.s.)	X7R (EIA)	1500 ±10%	5.7	2.8	1.5	4.0	0.3 min.
GA355QR7GF182KW01L	AC250 (r.m.s.)	X7R (EIA)	1800 ±10%	5.7	5.0	1.5	4.0	0.3 min.
GA355QR7GF222KW01L	AC250 (r.m.s.)	X7R (EIA)	2200 ±10%	5.7	5.0	1.5	4.0	0.3 min.
GA355QR7GF332KW01L	AC250 (r.m.s.)	X7R (EIA)	3300 ±10%	5.7	5.0	1.5	4.0	0.3 min.
GA355DR7GF472KW01L	AC250 (r.m.s.)	X7R (EIA)	4700 ±10%	5.7	5.0	2.0	4.0	0.3 min.

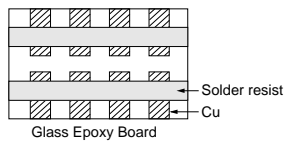
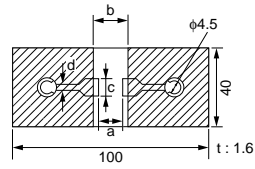
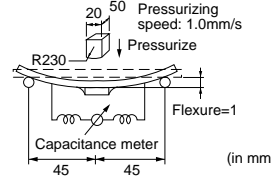
Safety Standard Certified Type GC/GD/GF/GB Specifications and Test Methods

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	<p>No failure should be observed when voltage in table is applied between the terminations for 60±1 sec., provided the charge/discharge current is less than 50mA.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="2" style="text-align: center;">Test Voltage</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Type GB</td> <td style="text-align: center;">DC1075V</td> </tr> <tr> <td style="text-align: center;">Type GC/GD</td> <td style="text-align: center;">AC1500V (r.m.s.)</td> </tr> <tr> <td style="text-align: center;">Type GF</td> <td style="text-align: center;">AC2000V (r.m.s.)</td> </tr> </tbody> </table>	Test Voltage		Type GB	DC1075V	Type GC/GD	AC1500V (r.m.s.)	Type GF	AC2000V (r.m.s.)												
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5	Pulse Voltage (Application: Type GD/GF)	No self healing breakdowns or flash-overs have taken place in the capacitor.	<p>10 impulse of alternating polarity is subjected. (5 impulse for each polarity) The interval between impulse is 60 sec. Applied Pulse: 1.2/50µs Applied Voltage: 2.5kVo-p</p>																				
6	Insulation Resistance (I.R.)	More than 6,000MΩ	The insulation resistance should be measured with DC500±50V and within 60±5 sec. of charging.																				
7	Capacitance	Within the specified tolerance																					
8	Dissipation Factor (D.F.) Q	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: center;">Char.</th> <th style="text-align: center;">Specification</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">X7R</td> <td style="text-align: center;">D.F. ≤ 0.025</td> </tr> <tr> <td style="text-align: center;">SL</td> <td style="text-align: center;">Q ≥ 400 + 20C*2 (C < 30pF) Q ≥ 1000 (C ≥ 30pF)</td> </tr> </tbody> </table>	Char.	Specification	X7R	D.F. ≤ 0.025	SL	Q ≥ 400 + 20C*2 (C < 30pF) Q ≥ 1000 (C ≥ 30pF)	<p>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.)</p>														
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9	Capacitance Temperature Characteristics	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: center;">Char.</th> <th style="text-align: center;">Capacitance Change</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">X7R</td> <td style="text-align: center;">Within ±15%</td> </tr> </tbody> </table> <p>Temperature characteristic guarantee is -55 to +125°C</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: center;">Char.</th> <th style="text-align: center;">Temperature Coefficient</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">SL</td> <td style="text-align: center;">+350 to -1000ppm/°C</td> </tr> </tbody> </table> <p>Temperature characteristic guarantee is +20 to +85°C</p>	Char.	Capacitance Change	X7R	Within ±15%	Char.	Temperature Coefficient	SL	+350 to -1000ppm/°C	<p>The capacitance measurement should be made at each step specified in Table.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: center;">Step</th> <th style="text-align: center;">Temperature (°C)</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">25±2 (20±2 for SL char.)</td> </tr> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">Min. Operating Temp. ±3</td> </tr> <tr> <td style="text-align: center;">3</td> <td style="text-align: center;">25±2 (20±2 for SL char.)</td> </tr> <tr> <td style="text-align: center;">4</td> <td style="text-align: center;">Max. Operating Temp. ±2</td> </tr> <tr> <td style="text-align: center;">5</td> <td style="text-align: center;">25±2 (20±2 for SL char.)</td> </tr> </tbody> </table> <p>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[±]1°C for 60±5 min. and then let sit for 24±2 hrs. at room condition*1.</p>	Step	Temperature (°C)	1	25±2 (20±2 for SL char.)	2	Min. Operating Temp. ±3	3	25±2 (20±2 for SL char.)	4	Max. Operating Temp. ±2	5	25±2 (20±2 for SL char.)
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10	Appearance	No defects or abnormalities	<p>As in Fig., discharge is made 50 times at 5 sec. intervals from the capacitor (Cd) charged at DC voltage of specified.</p>  <p style="text-align: center;">Ct: Capacitor under test Cd: 0.001µF R1: 1,000Ω R2: 100MΩ R3: Surge resistance</p>																				
	I.R.	More than 1,000MΩ																					
	Dielectric Strength	In accordance with item No.4																					
11	Adhesive Strength of Termination	No removal of the terminations or other defect should occur.	<p>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.</p>  <p style="text-align: center;">Fig. 1</p>																				

*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).

Safety Standard Certified Type GC/GD/GF/GB Specifications and Test Methods

Continued from the preceding page.

No.	Item	Specifications	Test Method																											
12	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																												
12	D.F. Q	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 20%;">Char.</th> <th style="width: 80%;">Specification</th> </tr> </thead> <tbody> <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> </tbody> </table>	Char.	Specification	X7R	D.F. ≤ 0.025	SL	Q ≥ 400 + 20C*2 (C < 30pF) Q ≥ 1000 (C ≥ 30pF)																						
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13	Deflection	No marking defects	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.																											
		 <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th rowspan="2">LxW (mm)</th> <th colspan="4">Dimension (mm)</th> <th rowspan="2">1.0</th> </tr> <tr> <th>a</th> <th>b</th> <th>c</th> <th>d</th> </tr> </thead> <tbody> <tr> <td>4.5x2.0</td> <td>3.5</td> <td>7.0</td> <td>2.4</td> <td></td> </tr> <tr> <td>4.5x3.2</td> <td>3.5</td> <td>7.0</td> <td>3.7</td> <td></td> </tr> <tr> <td>5.7x2.8</td> <td>4.5</td> <td>8.0</td> <td>3.2</td> <td></td> </tr> <tr> <td>5.7x5.0</td> <td>4.5</td> <td>8.0</td> <td>5.6</td> <td></td> </tr> </tbody> </table> <p style="text-align: center;">Fig. 2</p>		LxW (mm)	Dimension (mm)				1.0	a	b	c	d	4.5x2.0	3.5	7.0	2.4		4.5x3.2	3.5	7.0	3.7		5.7x2.8	4.5	8.0	3.2		5.7x5.0	4.5
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			 <p style="text-align: center;">Fig. 3</p>																											
14	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																											
15	Appearance	No marking defects	Preheat the capacitor as 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±10°C for 60±5 min. and then let sit for 24±2 hrs. at room condition*1.																											
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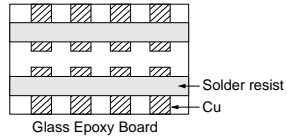
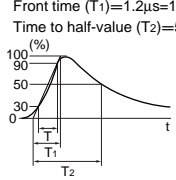
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Continued on the following page. ↗

Safety Standard Certified Type GC/GD/GF/GB Specifications and Test Methods

Continued from the preceding page.

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16	Temperature Cycle	Appearance	No marking defects															
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			<p>Fix the capacitor to the supporting jig (glass epoxy board) shown in Fig. 4.</p> <p>Perform the 5 cycles according to the 4 heat treatments listed in the following table.</p> <p>Let sit for 24\pm2 hrs. at room condition^{*1}, then measure.</p> <table border="1" style="width: 100%; border-collapse: collapse; margin: 10px 0;"> <thead> <tr> <th style="width: 15%;">Step</th> <th style="width: 55%;">Temperature ($^{\circ}\text{C}$)</th> <th style="width: 30%;">Time (min.)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Min. Operating Temp.± 3</td> <td>30\pm3</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\pm3</td> </tr> <tr> <td>4</td> <td>Room Temp.</td> <td>2 to 3</td> </tr> </tbody> </table> <p>•Pretreatment for X7R char. Perform a heat treatment at 150\pm1$^{\circ}\text{C}$ for 60\pm5 min. and then let sit for 24\pm2 hrs. at room condition^{*1}.</p> <div style="text-align: center;">  <p style="font-size: small;">Solder resist Cu Glass Epoxy Board</p> </div> <p style="text-align: center;">Fig. 4</p>	Step	Temperature ($^{\circ}\text{C}$)	Time (min.)	1	Min. Operating Temp. ± 3	30 \pm 3	2	Room Temp.	2 to 3	3	Max. Operating Temp. ± 2	30 \pm 3	4	Room Temp.	2 to 3
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			<p>Before this test, the test shown in the following is performed.</p> <p>-Item 11 Adhesive Strength of Termination (applied force is 5N)</p> <p>-Item 13 Deflection</p> <p>Let the capacitor sit at 40\pm2$^{\circ}\text{C}$ and relative humidity of 90 to 95% for 500\pm24 hrs.</p> <p>Remove and let sit for 24\pm2 hrs. at room condition^{*1}, then measure.</p> <p>•Pretreatment for X7R char. Perform a heat treatment at 150\pm1$^{\circ}\text{C}$ for 60\pm5 min. and then let sit for 24\pm2 hrs. at room condition^{*1}.</p>															
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			<p>Before this test, the test shown in the following is performed.</p> <p>-Item 11 Adhesive Strength of Termination (apply force is 5N)</p> <p>-Item 13 Deflection</p> <p>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.</p> <div style="text-align: center;">  <p style="font-size: x-small;">Front time (T₁)=1.2μs=1.67T Time to half-value (T₂)=50μs</p> </div> <p>Apply voltage as Table for 1,000 hrs. at 125\pm2$^{\circ}\text{C}$, relative humidity 50% max.</p> <table border="1" style="width: 100%; border-collapse: collapse; margin: 10px 0;"> <thead> <tr> <th style="width: 10%;">Type</th> <th>Applied Voltage</th> </tr> </thead> <tbody> <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</td> <td rowspan="2">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> <tr> <td>GD</td> </tr> <tr> <td>GF</td> <td></td> </tr> </tbody> </table> <p>Let sit for 24\pm2 hrs. at room condition^{*1}, then measure.</p> <p>•Pretreatment for X7R char. Perform a heat treatment at 150\pm1$^{\circ}\text{C}$ for 60\pm5 min. and then let sit for 24\pm2 hrs. at room condition^{*1}.</p>	Type	Applied Voltage	GB	AC312.5V (r.m.s.), except that once each hour the voltage is increased to AC1,000V (r.m.s.) for 0.1 sec.	GC	AC425V (r.m.s.), except that once each hour the voltage is increased to AC1,000V (r.m.s.) for 0.1 sec.	GD	GF							
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*1 "Room condition" Temperature: 15 to 35 $^{\circ}\text{C}$, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa

*2 "C" expresses nominal capacitance value (pF).

Continued on the following page.

