

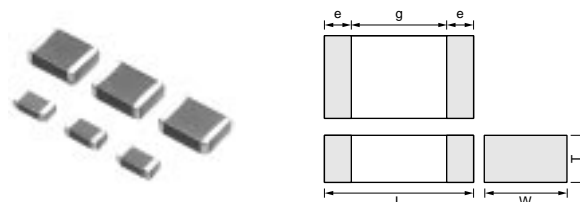
# Chip Monolithic Ceramic Capacitors



## AC250V Type (Which Meet Japanese Low)

### ■ Features

1. Chip monolithic ceramic capacitor for AC line.
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 0.1 uF for connecting lines and 470 to 4700 pF for connecting line to earth.



Part Number	Dimensions (mm)				
	L	W	T	e min.	g min.
<b>GA252D</b>	5.7 ±0.4	2.8 ±0.3	2.0 ±0.3	0.3	3.5
<b>GA255D</b>		5.0 ±0.4			

### ■ Applications

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

### ■ Reference standard

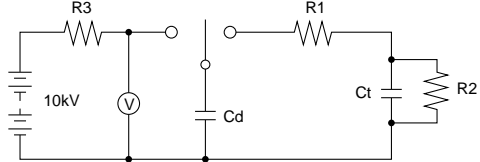
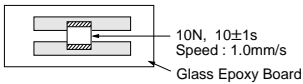
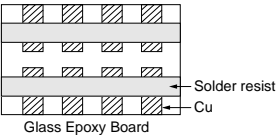
JIS C 5102

JIS C 5150

The standards of the electrical appliance and material safety law of Japan, separated table 4.

Part Number	Rated Voltage (V)	TC Code	Capacitance	Length L (mm)	Width W (mm)	Thickness T (mm)	Electrode g (mm)	Electrode e (mm)
<b>GA252DB3E2471MY02L</b>	AC250 (r.m.s.)	B	470pF +20,-20%	5.7	2.8	2.0	3.5 min.	0.3 min.
<b>GA252DB3E2102MY02L</b>	AC250 (r.m.s.)	B	1000pF +20,-20%	5.7	2.8	2.0	3.5 min.	0.3 min.
<b>GA252DB3E2222MY02L</b>	AC250 (r.m.s.)	B	2200pF +20,-20%	5.7	2.8	2.0	3.5 min.	0.3 min.
<b>GA252DB3E2472MY02L</b>	AC250 (r.m.s.)	B	4700pF +20,-20%	5.7	2.8	2.0	3.5 min.	0.3 min.
<b>GA252DB3E2103MY02L</b>	AC250 (r.m.s.)	B	10000pF +20,-20%	5.7	2.8	2.0	3.5 min.	0.3 min.
<b>GA252DB3E2223MY02L</b>	AC250 (r.m.s.)	B	22000pF +20,-20%	5.7	2.8	2.0	3.5 min.	0.3 min.
<b>GA252DB3E2473MY02L</b>	AC250 (r.m.s.)	B	47000pF +20,-20%	5.7	2.8	2.0	3.5 min.	0.3 min.
<b>GA255DB3E2104MY02L</b>	AC250 (r.m.s.)	B	0.1μF +20,-20%	5.7	5.0	2.0	3.5 min.	0.3 min.

## Specifications and Test Methods

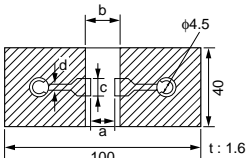
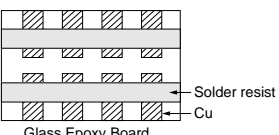
No.	Item	Specification	Test Method						
1	Operating Temperature Range	-25 to +85°C	-						
2	Appearance	No defects or abnormalities.	Visual inspection.						
3	Dimensions	Within the specified dimensions.	Using calipers.						
4	Dielectric Strength	No defects or abnormalities.	<p>No failure shall be observed when voltage as table is applied between the terminations for 60±1 s, provided the charge/discharge current is less than 50mA.</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr style="background-color: #f2f2f2;"> <th style="text-align: center;">Nominal Capacitance</th> <th style="text-align: center;">Test voltage</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;"><math>C \geq 10,000\mu\text{F}</math></td> <td style="text-align: center;">AC575V (r.m.s.)</td> </tr> <tr> <td style="text-align: center;"><math>C &lt; 10,000\mu\text{F}</math></td> <td style="text-align: center;">AC1500V (r.m.s.)</td> </tr> </tbody> </table>	Nominal Capacitance	Test voltage	$C \geq 10,000\mu\text{F}$	AC575V (r.m.s.)	$C < 10,000\mu\text{F}$	AC1500V (r.m.s.)
Nominal Capacitance	Test voltage								
$C \geq 10,000\mu\text{F}$	AC575V (r.m.s.)								
$C < 10,000\mu\text{F}$	AC1500V (r.m.s.)								
5	Insulation Resistance (I.R.)	More than 2,000MΩ	The insulation resistance shall be measured with 500±50V and within 60±5 s of charging.						
6	Capacitance	Within the specified tolerance.	The capacitance/D.F. shall be measured at 20°C at a frequency of 1±0.2kHz and a voltage of 1±0.2V (r.m.s.)						
7	Dissipation Factor (D.F.)	0.025 max.							
8	Capacitance Temperature Characteristics	Cap. Change Within ±10%	<p>The range of capacitance change compared with the 20°C value within -25 to +85°C shall be within the specified range.</p> <p>•Pretreatment Perform a heat treatment at 150 ± 1°C for 60±5 min and then let sit for 24±2 h at room condition.</p>						
9	Discharge Test (Application: Nominal Capacitance C<10,000pF)	Appearance No defects or abnormalities.	<p>As in Fig., discharge is made 50 times at 5 s 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>						
10	Adhesive Strength of Termination	No removal of the terminations or other defects shall occur.	<p>Solder the capacitor to the testing jig (glass epoxy board) shown in Fig.1 using a eutectic solder. Then apply 10N force in the direction of the arrow. The soldering shall be done either with an iron or using the reflow method and shall 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>						
11	Vibration Resistance	Appearance	No defects or abnormalities.						
		Capacitance	Within the specified tolerance.						
	D.F.	0.025 max.	<p>Solder the capacitor to the test jig (glass epoxy board). The capacitor shall 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, shall be traversed in approximately 1 min. This motion shall be applied for a period of 2 h in each 3 mutually perpendicular directions (total of 6 h).</p> 						

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

Continued on the following page.

# Specifications and Test Methods

Continued from the preceding page.

No.	Item	Specification	Test Method																		
12	Deflection	No cracking or marking defects shall occur.	<p>Solder the capacitor to the testing jig (glass epoxy board) shown in Fig.2 using a eutectic solder. Then apply a force in the direction shown in Fig. 3. The soldering shall be done either with an iron or using the reflow method and shall be conducted with care so that the soldering is uniform and free of defects such as heat shock.</p>  <table border="1" data-bbox="375 548 885 649"> <thead> <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> </thead> <tbody> <tr> <td>5.7×2.8</td> <td>4.5</td> <td>8.0</td> <td>3.2</td> <td rowspan="2">1.0</td> </tr> <tr> <td>5.7×5.0</td> <td>4.5</td> <td>8.0</td> <td>5.6</td> </tr> </tbody> </table> <p>Fig.2</p>	L×W (mm)	Dimension (mm)				a	b	c	d	5.7×2.8	4.5	8.0	3.2	1.0	5.7×5.0	4.5	8.0	5.6
		L×W (mm)			Dimension (mm)																
a	b		c	d																	
5.7×2.8	4.5	8.0	3.2	1.0																	
5.7×5.0	4.5	8.0	5.6																		
13	Solderability of Termination	75% of the terminations are to be soldered evenly and continuously.	<p>Immerse the capacitor in a solution of ethanol (JIS-K-8101) and rosin (JIS-K-5902) (25% rosin in weight proportion). Immerse in eutectic solder solution for 2±0.5 s at 235±5°C. Immersing speed : 25±2.5mm/s</p>																		
14	Humidity Insulation	Appearance	No marking defects.	<p>The capacitor shall be subjected to 40±2°C, relative humidity of 90 to 98% for 8 h, and then removed in room condition for 16 h until 5 cycles.</p>																	
		Capacitance Change	Within ±15%																		
		D.F.	0.05 max.																		
		I.R.	More than 1,000MΩ																		
		Dielectric Strength	Pass the item No.4.																		
15	Resistance to Soldering Heat	Appearance	No marking defects.	<p>Preheat the capacitor as table. Immerse the capacitor in eutectic solder solution at 260±5°C for 10±1 s. Let sit at room condition for 24±2 h, then measure.</p> <ul style="list-style-type: none"> <li>•Immersing speed : 25±2.5mm/s</li> <li>•Pretreatment</li> </ul> <p>Perform a heat treatment at 150±1.8°C for 60±5 min and then let sit for 24±2 h at room condition.</p> <p>*Preheating</p> <table border="1" data-bbox="941 1243 1452 1332"> <thead> <tr> <th>Step</th> <th>Temperature</th> <th>Time</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>100°C to 120°C</td> <td>1 min</td> </tr> <tr> <td>2</td> <td>170°C to 200°C</td> <td>1 min</td> </tr> </tbody> </table>	Step	Temperature	Time	1	100°C to 120°C	1 min	2	170°C to 200°C	1 min								
		Step	Temperature		Time																
		1	100°C to 120°C		1 min																
		2	170°C to 200°C		1 min																
		Capacitance Change	Within ±10%																		
D.F.	0.025 max.																				
I.R.	More than 2,000MΩ																				
Dielectric Strength	Pass the item No.4.																				
16	Temperature Cycle	Appearance	No marking defects.	<p>Fix the capacitor to the supporting jig (glass epoxy board) shown in Fig.4 using a eutectic solder. Perform the five cycles according to the four heat treatments listed in the following table. Let sit for 24±2 h at room condition, then measure.</p> <table border="1" data-bbox="941 1467 1452 1590"> <thead> <tr> <th>Step</th> <th>Temperature (°C)</th> <th>Time (min)</th> </tr> </thead> <tbody> <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> </tbody> </table> <ul style="list-style-type: none"> <li>•Pretreatment</li> </ul> <p>Perform a heat treatment at 150±1.8°C for 60±5 min and then let sit for 24±2 h at room condition.</p>  <p>Fig.4</p>	Step	Temperature (°C)	Time (min)	1	Min. Operating Temp.±3	30±3	2	Room Temp.	2 to 3	3	Max. Operating Temp.±2	30±3	4	Room Temp.	2 to 3		
		Step	Temperature (°C)		Time (min)																
		1	Min. Operating Temp.±3		30±3																
		2	Room Temp.		2 to 3																
		3	Max. Operating Temp.±2		30±3																
4	Room Temp.	2 to 3																			
Capacitance Change	Within ±7.5%																				
D.F.	0.025 max.																				
I.R.	More than 2,000MΩ																				
Dielectric Strength	Pass the item No.4.																				

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

Continued on the following page. ↗

## Specifications and Test Methods

☐ Continued from the preceding page.

No.	Item	Specification	Test Method									
17	Humidity (Steady State)	Appearance	No marking defects.									
		Capacitance Change	Within ±15%									
		D.F.	0.05 max.									
		I.R.	More than 1,000MΩ									
		Dielectric Strength	Pass the item No.4.									
			Sit the capacitor at 40±2°C and relative humidity 90 to 95% for 500 <sup>+2</sup> <sub>-3</sub> h. Remove and let sit for 24±2 h at room condition, then measure. •Pretreatment Perform a heat treatment at 150 <sup>±</sup> <sub>-18</sub> °C for 60±5 min and then let sit for 24±2 h at room condition.									
18	Life	Appearance	No marking defects.									
		Capacitance Change	Within ±15%									
		D.F.	0.05 max.									
		I.R.	More than 1,000MΩ									
		Dielectric Strength	Pass the item No.4.									
			Apply voltage and time as Table at 85±2°C. Remove and let sit for 24 ±2 h at room condition, then measure. The charge / discharge current is less than 50mA. <table border="1" style="margin: 10px auto;"> <thead> <tr> <th>Nominal Capacitance</th> <th>Test Time</th> <th>Test voltage</th> </tr> </thead> <tbody> <tr> <td>C≥10,000pF</td> <td>1,000<sup>+4</sup><sub>-8</sub> h</td> <td>AC300V (r.m.s.)</td> </tr> <tr> <td>C&lt;10,000pF</td> <td>1,500<sup>+4</sup><sub>-8</sub> h</td> <td>AC500V (r.m.s.) *</td> </tr> </tbody> </table> * Except that once each hour the voltage is increased to AC1,000V (r.m.s.) for 0.1 s  •Pretreatment Apply test voltage for 60±5 min at test temperature. Remove and let sit for 24±2 h at room condition.	Nominal Capacitance	Test Time	Test voltage	C≥10,000pF	1,000 <sup>+4</sup> <sub>-8</sub> h	AC300V (r.m.s.)	C<10,000pF	1,500 <sup>+4</sup> <sub>-8</sub> h	AC500V (r.m.s.) *
Nominal Capacitance	Test Time	Test voltage										
C≥10,000pF	1,000 <sup>+4</sup> <sub>-8</sub> h	AC300V (r.m.s.)										
C<10,000pF	1,500 <sup>+4</sup> <sub>-8</sub> h	AC500V (r.m.s.) *										
19	Humidity Loading	Appearance	No marking defects.									
		Capacitance Change	Within ±15%									
		D.F.	0.05 max.									
		I.R.	More than 1,000MΩ									
		Dielectric Strength	Pass the item No.4.									
			Apply the rated voltage at 40±2°C and relative humidity 90 to 95% for 500 <sup>+2</sup> <sub>-3</sub> h. Remove and let sit for 24±2 h at room condition, then measure. •Pretreatment Apply test voltage for 60±5 min at test temperature. Remove and let sit for 24±2 h at room condition.									

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

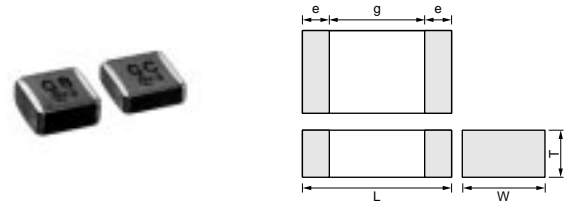
# Chip Monolithic Ceramic Capacitors



## Safety Standard Recognized Type GC (UL, IEC60384-14 Class X1/Y2)

### Features

1. Chip monolithic ceramic capacitor (certified as conforming to safety standards) for AC line.
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. The type GB can be used as an X2-class capacitor.
5. The type GC can be used as an X1-class and Y2-class capacitor.
6. +125 degree C guaranteed.
7. Only for reflow soldering.



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
GA355X			2.7 ±0.3		

### Applications

- Ideal use as Y capacitor or X capacitor for various switching power supply.
- Ideal use as linefilter for MODEM.

### Standard Recognition

	Standard No.	Status of Recognition		Rated Voltage
		Type GB	Type GC	
UL	UL1414	—	◎*	AC250V (r.m.s.)
BSI	EN132400	—	◎	
VDE		◎	◎	
SEV		◎	◎	
SEMKO		◎	◎	
EN132400 Class		X2	X1, Y2	

\* : Line By Pass only

Part Number	Rated Voltage (V)	TC Code	Capacitance (pF)	Length L (mm)	Width W (mm)	Thickness T (mm)	Electrode g (mm)	Electrode e (mm)
GA355DR7GC101KY02L	AC250 (r.m.s.)	X7R	100 +10,-10%	5.7	5.0	2.0	4.0 min.	0.3 min.
GA355DR7GC151KY02L	AC250 (r.m.s.)	X7R	150 +10,-10%	5.7	5.0	2.0	4.0 min.	0.3 min.
GA355DR7GC221KY02L	AC250 (r.m.s.)	X7R	220 +10,-10%	5.7	5.0	2.0	4.0 min.	0.3 min.
GA355DR7GC331KY02L	AC250 (r.m.s.)	X7R	330 +10,-10%	5.7	5.0	2.0	4.0 min.	0.3 min.
GA355DR7GC471KY02L	AC250 (r.m.s.)	X7R	470 +10,-10%	5.7	5.0	2.0	4.0 min.	0.3 min.
GA355DR7GC681KY02L	AC250 (r.m.s.)	X7R	680 +10,-10%	5.7	5.0	2.0	4.0 min.	0.3 min.
GA355DR7GC102KY02L	AC250 (r.m.s.)	X7R	1000 +10,-10%	5.7	5.0	2.0	4.0 min.	0.3 min.
GA355DR7GC152KY02L	AC250 (r.m.s.)	X7R	1500 +10,-10%	5.7	5.0	2.0	4.0 min.	0.3 min.
GA355DR7GC222KY02L	AC250 (r.m.s.)	X7R	2200 +10,-10%	5.7	5.0	2.0	4.0 min.	0.3 min.
GA355DR7GC332KY02L	AC250 (r.m.s.)	X7R	3300 +10,-10%	5.7	5.0	2.0	4.0 min.	0.3 min.
GA355DR7GC472KY02L	AC250 (r.m.s.)	X7R	4700 +10,-10%	5.7	5.0	2.0	4.0 min.	0.3 min.

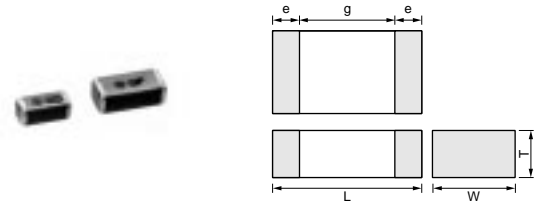
# Chip Monolithic Ceramic Capacitors



## Safety Standard Recognized Type GD (IEC60384-14 Class Y3)

### ■ Features

1. A new monolithic structure for small, high-capacitance capable of operating at high-voltage levels.
2. The type GD can be used as an Y3-class capacitor, and the type GF can be used as an Y2-class capacitor.
3. Available for the equipment based on IEC/EN60950 and UL1950.
4. +125 degree C guaranteed.
5. Only for reflow soldering.



Part Number	Dimensions (mm)				
	L	W	T	e min.	g min.
<b>GA342D</b>	4.5 ±0.3	2.0 ±0.2	2.0 ±0.3	0.3	Type GD : 2.5 Type GF : 3.5
<b>GA343D</b>	4.5 ±0.4	3.2 ±0.3	2.0 ±0.3		
<b>GA352D</b>	5.7 ±0.4	2.8 ±0.3	2.0 ±0.3		
<b>GA355D</b>	5.7 ±0.4	5.0 ±0.4	2.0 ±0.3		

### ■ Applications

- Ideal use on line filter and coupling for transformer-less DAA modem.
- Ideal use on line filter for information equipment.

### ■ Standard Recognition

	Standard No.	Status of Recognition		Rated Voltage
		Type GD	Type GF	
SEMKO	EN132400	☉	☉	AC250V (r.m.s.)
EN132400 Class		Y3	Y2	

Part Number	Rated Voltage (V)	TC Code	Capacitance (pF)	Length L (mm)	Width W (mm)	Thickness T (mm)	Electrode g (mm)	Electrode e (mm)
<b>GA342DR7GD101KW02L</b>	AC250 (r.m.s.)	X7R	100 +10,-10%	4.5	2.0	2.0	2.5 min.	0.3 min.
<b>GA342DR7GD151KW02L</b>	AC250 (r.m.s.)	X7R	150 +10,-10%	4.5	2.0	2.0	2.5 min.	0.3 min.
<b>GA342DR7GD221KW02L</b>	AC250 (r.m.s.)	X7R	220 +10,-10%	4.5	2.0	2.0	2.5 min.	0.3 min.
<b>GA342DR7GD471KW02L</b>	AC250 (r.m.s.)	X7R	470 +10,-10%	4.5	2.0	2.0	2.5 min.	0.3 min.
<b>GA342DR7GD102KW02L</b>	AC250 (r.m.s.)	X7R	1000 +10,-10%	4.5	2.0	2.0	2.5 min.	0.3 min.
<b>GA342DR7GD152KW02L</b>	AC250 (r.m.s.)	X7R	1500 +10,-10%	4.5	2.0	2.0	2.5 min.	0.3 min.
<b>GA343DR7GD182KW01L</b>	AC250 (r.m.s.)	X7R	1800 +10,-10%	4.5	3.2	2.0	2.5 min.	0.3 min.
<b>GA343DR7GD222KW01L</b>	AC250 (r.m.s.)	X7R	2200 +10,-10%	4.5	3.2	2.0	2.5 min.	0.3 min.

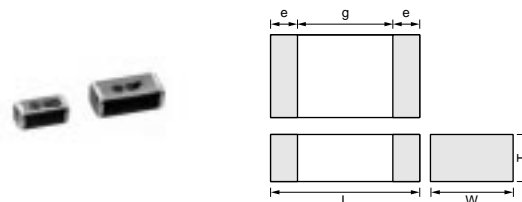
# Chip Monolithic Ceramic Capacitors



## Safety Standard Recognized Type GF (IEC60384-14 Class Y2)

### ■ Features

1. A new monolithic structure for small, high-capacitance capable of operating at high-voltage levels.
2. The type GD can be used as an Y3-class capacitor, and the type GF can be used as an Y2-class capacitor.
3. Available for the equipment based on IEC/EN60950 and UL1950.
4. +125 degree C guaranteed.
5. Only for reflow soldering.



Part Number	Dimensions (mm)				
	L	W	T	e min.	g min.
<b>GA342D</b>	4.5 ±0.3	2.0 ±0.2	2.0 ±0.3	0.3	Type GD : 2.5 Type GF : 3.5
<b>GA343D</b>	4.5 ±0.4	3.2 ±0.3	2.0 ±0.3		
<b>GA352D</b>	5.7 ±0.4	2.8 ±0.3	2.0 ±0.3		
<b>GA355D</b>	5.7 ±0.4	5.0 ±0.4	2.0 ±0.3		

### ■ Applications

- Ideal use on line filter and coupling for transformer-less DAA modem.
- Ideal use on line filter for information equipment.

### ■ Standard Recognition

	Standard No.	Status of Recognition		Rated Voltage
		Type GD	Type GF	
SEMKO	EN132400	◎	◎	AC250V (r.m.s.)
EN132400 Class		Y3	Y2	

Part Number	Rated Voltage (V)	TC Code	Capacitance (pF)	Length L (mm)	Width W (mm)	Thickness T (mm)	Electrode g (mm)	Electrode e (mm)
<b>GA352DR7GF102KW01L</b>	AC250 (r.m.s.)	X7R	1000 +10,-10%	5.7	2.8	2.0	3.5 min.	0.3 min.
<b>GA355DR7GF222KW01L</b>	AC250 (r.m.s.)	X7R	2200 +10,-10%	5.7	5.0	2.0	3.5 min.	0.3 min.

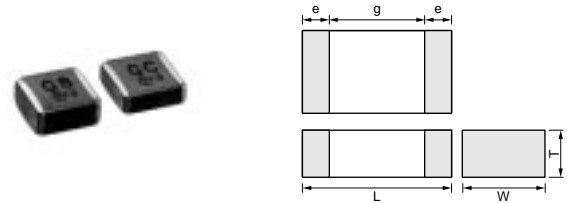
# Chip Monolithic Ceramic Capacitors



## Safety Standard Recognized Type GB (IEC60384-14 Class X2)

### ■ Features

1. Chip monolithic ceramic capacitor (certified as conforming to safety standards) for AC line.
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. The type GB can be used as an X2-class capacitor.
5. The type GC can be used as an X1-class and Y2-class capacitor.
6. +125 degree C guaranteed.
7. Only for reflow soldering.



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
GA355X			2.7 ±0.3		

### ■ Applications

- Ideal use as Y capacitor or X capacitor for various switching power supply.
- Ideal use as linefilter for MODEM.

### ■ Standard Recognition

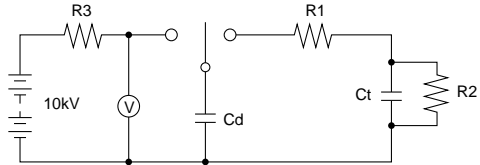
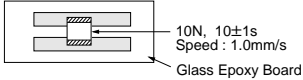
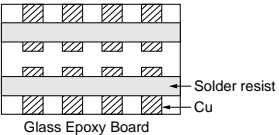
	Standard No.	Status of Recognition		Rated Voltage
		Type GB	Type GC	
UL	UL1414	—	⊙*	AC250V (r.m.s.)
BSI	EN132400	—	⊙	
VDE		⊙	⊙	
SEV		⊙	⊙	
SEMKO		⊙	⊙	
EN132400 Class		X2	X1, Y2	

\* : Line By Pass only

Part Number	Rated Voltage (V)	TC Code	Capacitance (pF)	Length L (mm)	Width W (mm)	Thickness T (mm)	Electrode g (mm)	Electrode e (mm)
GA355DR7GB103KY02L	AC250 (r.m.s.)	X7R	10000 +10,-10%	5.7	5.0	2.0	4.0 min.	0.3 min.
GA355DR7GB153KY02L	AC250 (r.m.s.)	X7R	15000 +10,-10%	5.7	5.0	2.0	4.0 min.	0.3 min.
GA355DR7GB223KY02L	AC250 (r.m.s.)	X7R	22000 +10,-10%	5.7	5.0	2.0	4.0 min.	0.3 min.
GA355XR7GB333KY06L	AC250 (r.m.s.)	X7R	33000 +10,-10%	5.7	5.0	2.7	4.0 min.	0.3 min.



## GA3 Series Specifications and Test Methods

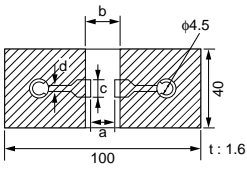
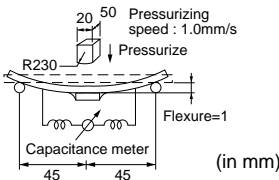
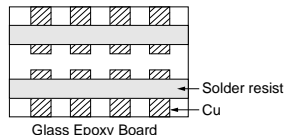
No.	Item	Specification	Test Method						
1	Operating Temperature Range	-55 to +125°C	-						
2	Appearance	No defects or abnormalities.	Visual inspection.						
3	Dimensions	Within the specified dimensions.	Using calipers.						
4	Dielectric Strength	No defects or abnormalities.	No failure shall be observed when voltage as table is applied between the terminations for 60±1 s, provided the charge/discharge current is less than 50mA. <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>Test voltage</th> </tr> </thead> <tbody> <tr> <td>Type GB</td> <td>DC1075V</td> </tr> <tr> <td>Type GC/GD/GF</td> <td>AC1500V (r.m.s.)</td> </tr> </tbody> </table>		Test voltage	Type GB	DC1075V	Type GC/GD/GF	AC1500V (r.m.s.)
	Test voltage								
Type GB	DC1075V								
Type GC/GD/GF	AC1500V (r.m.s.)								
5	Insulation Resistance (I.R.)	More than 6,000MΩ	The insulation resistance shall be measured with 500±50V and within 60±5 s of charging.						
6	Capacitance	Within the specified tolerance.	The capacitance/D.F. shall be measured at 20°C at a frequency of 1±0.2kHz and a voltage of 1±0.2V (r.m.s.)						
7	Dissipation Factor (D.F.)	0.025 max.	•Pretreatment Perform a heat treatment at 150 ± 1.8°C for 60±5 min and then let sit for 24±2 h at room condition.						
8	Capacitance Temperature Characteristics	Cap. Change Within ±15%	The range of capacitance change compared with the 25°C value within -55 to +125°C shall be within the specified range. •Pretreatment Perform a heat treatment at 150 ± 1.8°C for 60±5 min and then let sit for 24±2 h at room condition.						
9	Appearance	No defects or abnormalities.	As in Fig., discharge is made 50 times at 5 s 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						
	I.R.	More than 1,000MΩ							
	Dielectric Strength	Pass the item No.4.							
10	Adhesive Strength of Termination	No removal of the terminations or other defect shall occur.	Solder the capacitor to the testing jig (glass epoxy board) shown in Fig.1 using a eutectic solder. Then apply 10N force in the direction of the arrow. The soldering shall be done either with an iron or using the reflow method and shall be conducted with care so that the soldering is uniform and free of defects such as heat shock.  Fig.1						
11	Appearance	No defects or abnormalities.	Solder the capacitor to the test jig (glass epoxy board). The capacitor shall 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, shall be traversed in approximately 1 min. This motion shall be applied for a period of 2 h in each 3 mutually perpendicular directions (total of 6 h). 						
	Capacitance	Within the specified tolerance.							
	D.F.	0.025 max.							

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

Continued on the following page. ↗

## GA3 Series Specifications and Test Methods

Continued from the preceding page.

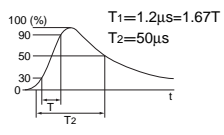
No.	Item	Specification	Test Method																							
12	Deflection	No cracking or marking defects shall occur.	Solder the capacitor to the testing jig (glass epoxy board) shown in Fig.2 using a eutectic solder. Then apply a force in the direction shown in Fig. 3. The soldering shall be done either with an iron or using the reflow method and shall be conducted with care so that the soldering is uniform and free of defects such as heat shock.																							
		 <table border="1" style="margin: 10px auto; border-collapse: collapse;"> <thead> <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> </thead> <tbody> <tr> <td>4.5×2.0</td> <td>3.5</td> <td>7.0</td> <td>2.4</td> <td rowspan="4" style="text-align: center; vertical-align: middle;">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> </tbody> </table> <p style="text-align: center;">Fig.2</p>		L×W (mm)	Dimension (mm)				a	b	c	d	4.5×2.0	3.5	7.0	2.4	1.0	4.5×3.2	3.5	7.0	3.7	5.7×2.8	4.5	8.0	3.2	5.7×5.0
L×W (mm)	Dimension (mm)																									
	a	b	c	d																						
4.5×2.0	3.5	7.0	2.4	1.0																						
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5.7×2.8	4.5	8.0	3.2																							
5.7×5.0	4.5	8.0	5.6																							
			 <p style="text-align: center;">Fig.3</p>																							
13	Solderability of Termination	75% of the terminations is 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 eutectic solder solution for 2±0.5 s at 235±5°C. Immersing speed : 25±2.5mm/s																							
14	Resistance to Soldering Heat	Appearance	No marking defects.																							
		Capacitance Change	Within ±10%																							
		I.R.	More than 1,000MΩ																							
		Dielectric Strength	Pass the item No.4.																							
			Preheat the capacitor as table. Immerse the capacitor in eutectic solder solution at 260±5°C for 10±1 s. Let sit at room condition for 24±2 h, then measure. •Immersing speed : 25±2.5mm/s •Pretreatment Perform a heat treatment at 150 ± 18°C for 60±5 min and then let sit for 24±2 h at room condition.  *Preheating																							
			<table border="1" style="margin: 10px auto; border-collapse: collapse;"> <thead> <tr> <th>Step</th> <th>Temperature</th> <th>Time</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>100°C to 120°C</td> <td>1 min.</td> </tr> <tr> <td>2</td> <td>170°C to 200°C</td> <td>1 min.</td> </tr> </tbody> </table>	Step	Temperature	Time	1	100°C to 120°C	1 min.	2	170°C to 200°C	1 min.														
Step	Temperature	Time																								
1	100°C to 120°C	1 min.																								
2	170°C to 200°C	1 min.																								
15	Temperature Cycle	Appearance	No marking defects.																							
		Capacitance Change	Within ±15%																							
		D.F.	0.05 max.																							
		I.R.	More than 3,000MΩ																							
		Dielectric Strength	Pass the item No.4.																							
			Fix the capacitor to the supporting jig (glass epoxy board) shown in Fig.4 using a eutectic solder. Perform the five cycles according to the four heat treatments listed in the following table. Let sit for 24±2 h at room condition, then measure.																							
			<table border="1" style="margin: 10px auto; border-collapse: collapse;"> <thead> <tr> <th>Step</th> <th>Temperature (°C)</th> <th>Time (min)</th> </tr> </thead> <tbody> <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> </tbody> </table> <p>•Pretreatment Perform a heat treatment at 150 ± 18°C for 60±5 min and then let sit for 24±2 h at room condition.</p>	Step	Temperature (°C)	Time (min)	1	Min. Operating Temp.±3	30±3	2	Room Temp.	2 to 3	3	Max. Operating Temp.±2	30±3	4	Room Temp.	2 to 3								
Step	Temperature (°C)	Time (min)																								
1	Min. Operating Temp.±3	30±3																								
2	Room Temp.	2 to 3																								
3	Max. Operating Temp.±2	30±3																								
4	Room Temp.	2 to 3																								
			 <p style="text-align: center;">Fig.4</p>																							
16	Humidity (Steady State)	Appearance	No marking defects.																							
		Capacitance Change	Within ±15%																							
		D.F.	0.05 max.																							
		I.R.	More than 3,000MΩ																							
		Dielectric Strength	Pass the item No.4.																							
			Sit the capacitor at 40±2°C and relative humidity 90 to 95% for 500±12 h. Remove and let sit for 24±2 h at room condition, then measure.																							

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

Continued on the following page. ↗

## GA3 Series Specifications and Test Methods

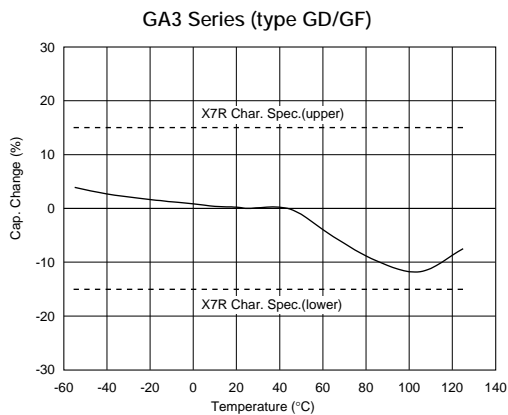
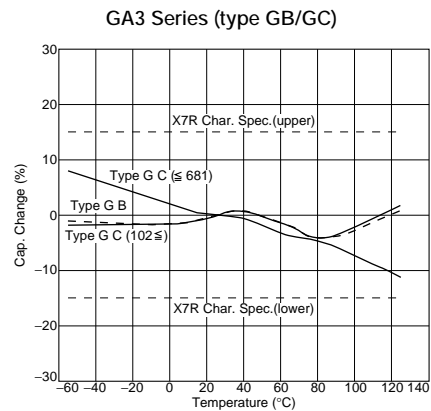
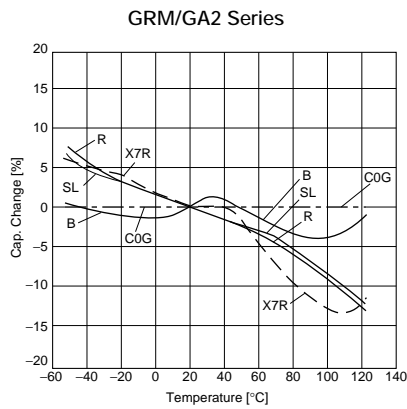
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No.	Item	Specification	Test Method						
17	Appearance	No marking defects.	<p>Impulse Voltage</p> <p>Each individual capacitor shall be subjected to a 2.5kV (Type GC/GF:5kV) Impulses (the voltage value means zero to peak) for three times. Then the capacitors are applied to life test.</p>  <p>Apply voltage as Table for 1,000 h at <math>125 \pm 2^\circ\text{C}</math>, relative humidity 50% max.</p> <table border="1"> <thead> <tr> <th>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 0.1s.</td> </tr> <tr> <td>GC GD GF</td> <td>AC425V (r.m.s.), except that once each hour the voltage is increased to AC1,000V (r.m.s.) for 0.1s.</td> </tr> </tbody> </table>	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 0.1s.	GC GD GF	AC425V (r.m.s.), except that once each hour the voltage is increased to AC1,000V (r.m.s.) for 0.1s.
	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 0.1s.							
	GC GD GF	AC425V (r.m.s.), except that once each hour the voltage is increased to AC1,000V (r.m.s.) for 0.1s.							
	Capacitance Change	Within $\pm 20\%$							
D.F.	0.05 max.								
I.R.	More than 3,000M $\Omega$								
Dielectric Strength	Pass the item No.4.								
18	Appearance	No marking defects.	<p>Apply the rated voltage at <math>40 \pm 2^\circ\text{C}</math> and relative humidity 90 to 95% for <math>500 \pm 24</math> h. Remove and let sit for <math>24 \pm 2</math> h at room condition, then measure.</p>						
	Capacitance Change	Within $\pm 15\%$							
	D.F.	0.05 max.							
	I.R.	More than 3,000M $\Omega$							
	Dielectric Strength	Pass the item No.4.							

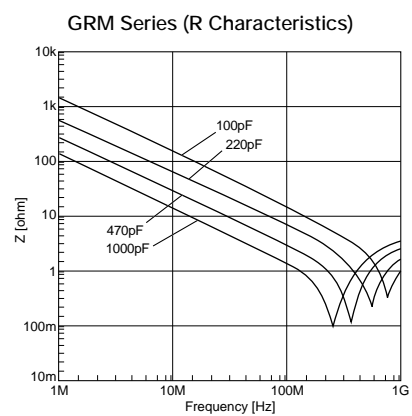
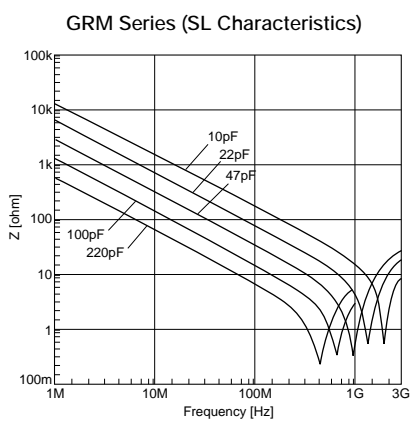
"Room condition" Temperature : 15 to 35°C, Relative humidity : 45 to 75%, Atmosphere pressure : 86 to 106kPa

# GRM/GA2/GA3 Series Data (Typical Example)

## ■ Capacitance-Temperature Characteristics



## ■ Impedance-Frequency Characteristics



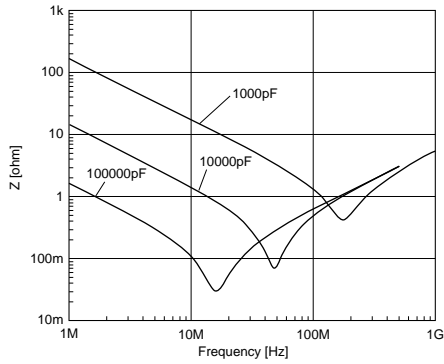
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## GRM/GA2/GA3 Series Data (Typical Example)

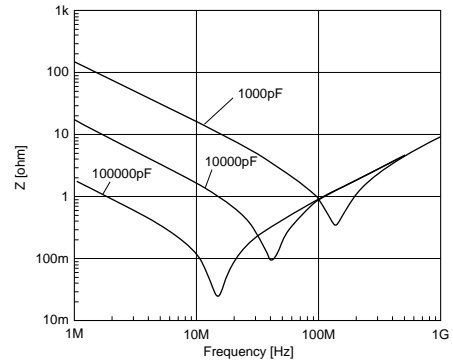
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### Impedance-Frequency Characteristics

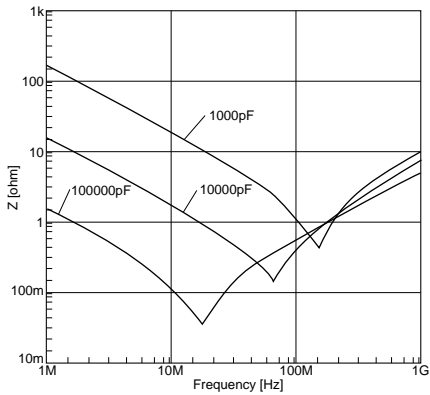
GRM Series (X7R Char. 250V)



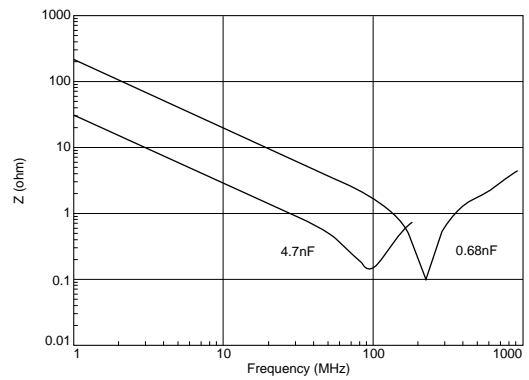
GRM Series (B/X7R Char. 630V)



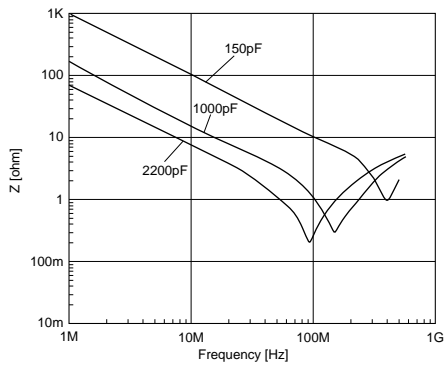
GA2 Series



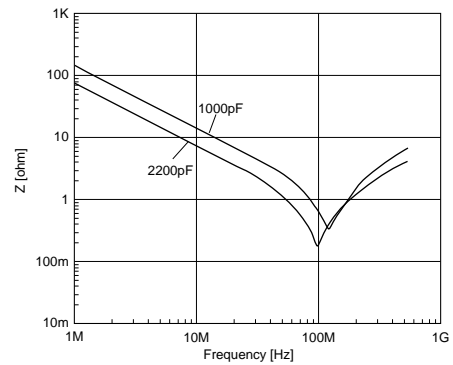
GA3 Series (Type GC)



GA3 Series (Type GD)



GA3 Series (Type GF)



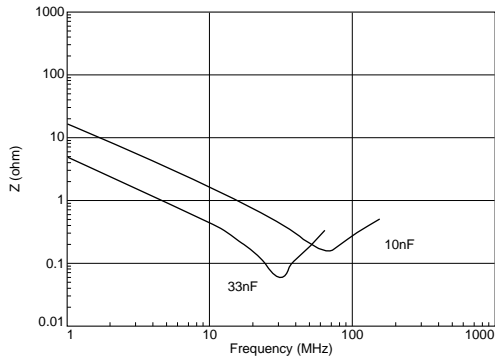
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# GRM/GA2/GA3 Series Data (Typical Example)

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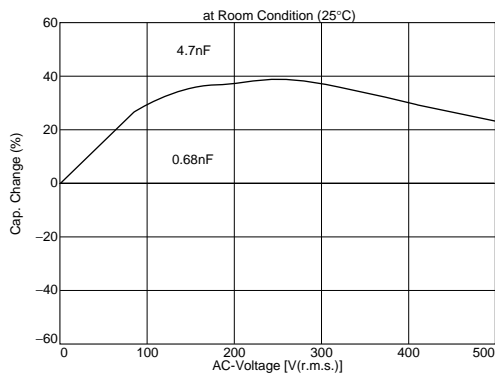
## ■ Impedance-Frequency Characteristics

GA3 Series (Type GB)

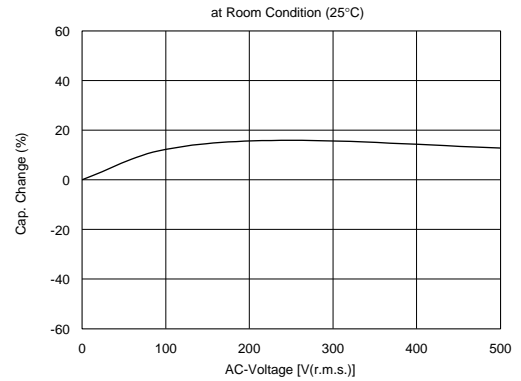


## ■ Capacitance-AC Voltage Characteristics

GA3 Series (Type GC)



GA3 Series (Type GD/GF)



GA3 Series (Type GB)

