

Chip Monolithic Ceramic Capacitors



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

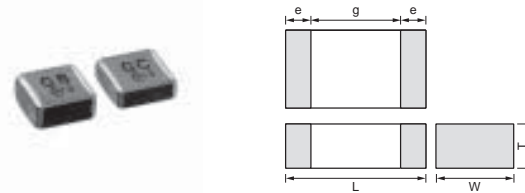
■ Features

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 | EN 60065 IEC 60384-14 | | |

| 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) |
|--------------------|-------------------|--------------------|------------------|---------------|--------------|------------------|-----------------------|------------------|
| GA355DR7GC101KY02L | AC250 (r.m.s.) | X7R (EIA) | 100 ±10% | 5.7 | 5.0 | 2.0 | 4.0 | 0.3 min. |
| GA355DR7GC151KY02L | AC250 (r.m.s.) | X7R (EIA) | 150 ±10% | 5.7 | 5.0 | 2.0 | 4.0 | 0.3 min. |
| GA355DR7GC221KY02L | AC250 (r.m.s.) | X7R (EIA) | 220 ±10% | 5.7 | 5.0 | 2.0 | 4.0 | 0.3 min. |
| GA355DR7GC331KY02L | AC250 (r.m.s.) | X7R (EIA) | 330 ±10% | 5.7 | 5.0 | 2.0 | 4.0 | 0.3 min. |

For General Purpose GRM/GRJ Series

Only for Applications

AC250V Type GA2 Series

Safety Standard Certified GA3 Series

Product Information

Chip Monolithic Ceramic Capacitors



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

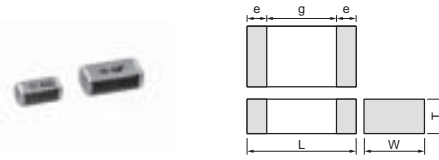
■ Features

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 | | | 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 |
| | UL 60950-1 | — | ⊙ | — | |
| VDE | IEC 60384-14 | X1, Y2 | — | ⊙ | (r.m.s.) |
| 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 (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. |
| 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. |

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| 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) |
|---------------------------|-------------------|--------------------|------------------|---------------|--------------|------------------|-----------------------|------------------|
| 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. |

For General Purpose GRM/GRJ Series

Only for Applications

AC250V Type GA2 Series

Safety Standard Certified GA3 Series

Product Information

Chip Monolithic Ceramic Capacitors



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

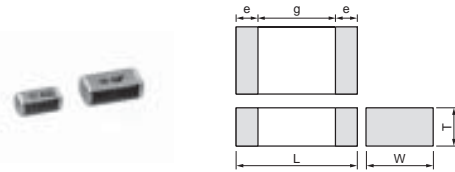
■ Features

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

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 | | |
| 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 | Y3 | AC250V(r.m.s.) |
| SEMKO | IEC 60384-14 EN 60384-14 | | |

Applications

| Size | Switching power supplies | Communication network devices such as a modem |
|---------------------|--------------------------|---|
| 4.5×3.2mm and under | — | ◎ |

| 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) |
|--------------------|-------------------|--------------------|------------------|---------------|--------------|------------------|-----------------------|------------------|
| GA342D1XGD100JY02L | AC250 (r.m.s.) | SL (JIS) | 10 ±5% | 4.5 | 2.0 | 2.0 | 2.5 | 0.3 min. |
| GA342D1XGD120JY02L | AC250 (r.m.s.) | SL (JIS) | 12 ±5% | 4.5 | 2.0 | 2.0 | 2.5 | 0.3 min. |
| GA342D1XGD150JY02L | AC250 (r.m.s.) | SL (JIS) | 15 ±5% | 4.5 | 2.0 | 2.0 | 2.5 | 0.3 min. |
| GA342D1XGD180JY02L | AC250 (r.m.s.) | SL (JIS) | 18 ±5% | 4.5 | 2.0 | 2.0 | 2.5 | 0.3 min. |
| GA342D1XGD220JY02L | AC250 (r.m.s.) | SL (JIS) | 22 ±5% | 4.5 | 2.0 | 2.0 | 2.5 | 0.3 min. |
| GA342A1XGD270JW31L | AC250 (r.m.s.) | SL (JIS) | 27 ±5% | 4.5 | 2.0 | 1.0 | 2.5 | 0.3 min. |
| GA342A1XGD330JW31L | AC250 (r.m.s.) | SL (JIS) | 33 ±5% | 4.5 | 2.0 | 1.0 | 2.5 | 0.3 min. |
| GA342A1XGD390JW31L | AC250 (r.m.s.) | SL (JIS) | 39 ±5% | 4.5 | 2.0 | 1.0 | 2.5 | 0.3 min. |
| GA342A1XGD470JW31L | AC250 (r.m.s.) | SL (JIS) | 47 ±5% | 4.5 | 2.0 | 1.0 | 2.5 | 0.3 min. |
| GA342A1XGD560JW31L | AC250 (r.m.s.) | SL (JIS) | 56 ±5% | 4.5 | 2.0 | 1.0 | 2.5 | 0.3 min. |
| GA342A1XGD680JW31L | AC250 (r.m.s.) | SL (JIS) | 68 ±5% | 4.5 | 2.0 | 1.0 | 2.5 | 0.3 min. |
| GA342A1XGD820JW31L | AC250 (r.m.s.) | SL (JIS) | 82 ±5% | 4.5 | 2.0 | 1.0 | 2.5 | 0.3 min. |
| GA342QR7GD101KW01L | AC250 (r.m.s.) | X7R (EIA) | 100 ±10% | 4.5 | 2.0 | 1.5 | 2.5 | 0.3 min. |
| GA342QR7GD151KW01L | AC250 (r.m.s.) | X7R (EIA) | 150 ±10% | 4.5 | 2.0 | 1.5 | 2.5 | 0.3 min. |
| GA342QR7GD221KW01L | AC250 (r.m.s.) | X7R (EIA) | 220 ±10% | 4.5 | 2.0 | 1.5 | 2.5 | 0.3 min. |
| GA342QR7GD331KW01L | AC250 (r.m.s.) | X7R (EIA) | 330 ±10% | 4.5 | 2.0 | 1.5 | 2.5 | 0.3 min. |
| GA342QR7GD471KW01L | AC250 (r.m.s.) | X7R (EIA) | 470 ±10% | 4.5 | 2.0 | 1.5 | 2.5 | 0.3 min. |
| GA342QR7GD681KW01L | AC250 (r.m.s.) | X7R (EIA) | 680 ±10% | 4.5 | 2.0 | 1.5 | 2.5 | 0.3 min. |
| GA342QR7GD102KW01L | AC250 (r.m.s.) | X7R (EIA) | 1000 ±10% | 4.5 | 2.0 | 1.5 | 2.5 | 0.3 min. |
| GA342QR7GD152KW01L | AC250 (r.m.s.) | X7R (EIA) | 1500 ±10% | 4.5 | 2.0 | 1.5 | 2.5 | 0.3 min. |
| GA343QR7GD182KW01L | AC250 (r.m.s.) | X7R (EIA) | 1800 ±10% | 4.5 | 3.2 | 1.5 | 2.5 | 0.3 min. |
| GA343QR7GD222KW01L | AC250 (r.m.s.) | X7R (EIA) | 2200 ±10% | 4.5 | 3.2 | 1.5 | 2.5 | 0.3 min. |
| GA343DR7GD472KW01L | AC250 (r.m.s.) | X7R (EIA) | 4700 ±10% | 4.5 | 3.2 | 2.0 | 2.5 | 0.3 min. |

Chip Monolithic Ceramic Capacitors



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

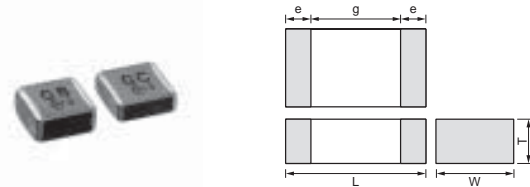
■ Features

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 | | | |

| 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) |
|--------------------|-------------------|--------------------|------------------|---------------|--------------|------------------|-----------------------|------------------|
| GA355QR7GB103KW01L | AC250 (r.m.s.) | X7R (EIA) | 10000 ±10% | 5.7 | 5.0 | 1.5 | 3.0 | 0.3 min. |
| GA355QR7GB153KW01L | AC250 (r.m.s.) | X7R (EIA) | 15000 ±10% | 5.7 | 5.0 | 1.5 | 3.0 | 0.3 min. |
| GA355DR7GB223KW01L | AC250 (r.m.s.) | X7R (EIA) | 22000 ±10% | 5.7 | 5.0 | 2.0 | 3.0 | 0.3 min. |
| GA355ER7GB333KW01L | AC250 (r.m.s.) | X7R (EIA) | 33000 ±10% | 5.7 | 5.0 | 2.5 | 3.0 | 0.3 min. |
| GA355ER7GB473KW01L | AC250 (r.m.s.) | X7R (EIA) | 47000 ±10% | 5.7 | 5.0 | 2.5 | 3.0 | 0.3 min. |
| GA355XR7GB563KW06L | AC250 (r.m.s.) | X7R (EIA) | 56000 ±10% | 5.7 | 5.0 | 2.9 | 3.0 | 0.3 min. |

For General Purpose GRM/GRJ Series

Only for Applications

AC250V Type GA2 Series

Safety Standard Certified GA3 Series

Product Information

GA3 Series Specifications and Test Methods

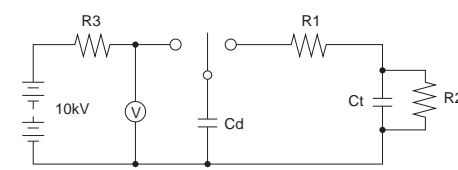
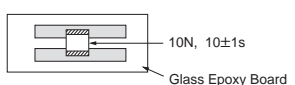
For General Purpose
GRM/GRJ Series

Only for Applications


AC250V Type
GA2 Series

Safety Standard
Certified GA3 Series

Product Information

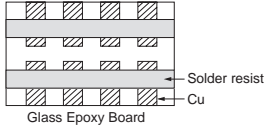
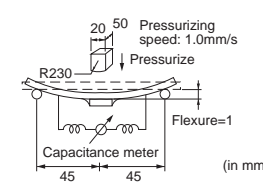
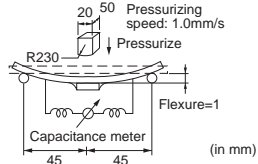
| No. | Item | Specifications | Test Method | | | | | | | | | | | | | | | | | | | | |
|--------------|---|---|---|--------------------|-----|-------------|---------|----------------------------|---------------------|--|---|------|------------------|---|--------------------------|---|------------------------|---|--------------------------|---|------------------------|---|--------------------------|
| 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. <table border="1"> <thead> <tr> <th colspan="2">Test Voltage</th> </tr> </thead> <tbody> <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> </tbody> </table> | Test Voltage | | Type GB | DC1075V | Type GC/GD | AC1500V (r.m.s.) | Type GF | AC2000V (r.m.s.) | | | | | | | | | | | | |
| Test Voltage | | | | | | | | | | | | | | | | | | | | | | | |
| Type GB | DC1075V | | | | | | | | | | | | | | | | | | | | | | |
| Type GC/GD | AC1500V (r.m.s.) | | | | | | | | | | | | | | | | | | | | | | |
| Type GF | AC2000V (r.m.s.) | | | | | | | | | | | | | | | | | | | | | | |
| 5 | Pulse Voltage (Application: Type GD/GF) | No self healing breakdowns or flash-overs have taken place in the capacitor. | 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 | | | | | | | | | | | | | | | | | | | | |
| 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"> <thead> <tr> <th>Char.</th> <th>Specification</th> </tr> </thead> <tbody> <tr> <td>X7R</td> <td>D.F. ≤0.025</td> </tr> <tr> <td rowspan="2">SL</td> <td>Q ≥ 400 + 20C*2 (C < 30pF)</td> </tr> <tr> <td>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) | 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.) | | | | | | | | | | | | | |
| Char. | Specification | | | | | | | | | | | | | | | | | | | | | | |
| X7R | D.F. ≤0.025 | | | | | | | | | | | | | | | | | | | | | | |
| SL | Q ≥ 400 + 20C*2 (C < 30pF) | | | | | | | | | | | | | | | | | | | | | | |
| | Q ≥ 1000 (C ≥ 30pF) | | | | | | | | | | | | | | | | | | | | | | |
| 9 | Capacitance Temperature Characteristics | <table border="1"> <thead> <tr> <th>Char.</th> <th>Capacitance Change</th> </tr> </thead> <tbody> <tr> <td>X7R</td> <td>Within ±15%</td> </tr> </tbody> </table> Temperature characteristic guarantee is -55 to +125°C <table border="1"> <thead> <tr> <th>Char.</th> <th>Temperature Coefficient</th> </tr> </thead> <tbody> <tr> <td>SL</td> <td>+350 to -1000ppm/°C</td> </tr> </tbody> </table> Temperature characteristic guarantee is +20 to +85°C | Char. | Capacitance Change | X7R | Within ±15% | Char. | Temperature Coefficient | SL | +350 to -1000ppm/°C | The capacitance measurement should be made at each step specified in the Table. <table border="1"> <thead> <tr> <th>Step</th> <th>Temperature (°C)</th> </tr> </thead> <tbody> <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> </tbody> </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±10°C for 60±5 min. and then let sit for 24±2 hrs. at room condition.*1 | 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.) |
| Char. | Capacitance Change | | | | | | | | | | | | | | | | | | | | | | |
| X7R | Within ±15% | | | | | | | | | | | | | | | | | | | | | | |
| Char. | Temperature Coefficient | | | | | | | | | | | | | | | | | | | | | | |
| SL | +350 to -1000ppm/°C | | | | | | | | | | | | | | | | | | | | | | |
| 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.) | | | | | | | | | | | | | | | | | | | | | | |
| 10 | Discharge Test (Application: Type GC) | 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 | | | | | | | | | | | | | | | | | | | | |
| | 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. | 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 | | | | | | | | | | | | | | | | | | | | |

*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.

| 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: 15%;">Char.</th> <th style="width: 85%;">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) |  | | | | | | | | | | | | | | | | | | | | |
| | | Char. | Specification | | | | | | | | | | | | | | | | | | | | | | | | | | |
| X7R | D.F. ≤ 0.025 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SL | Q ≥ 400 + 20C*2 (C < 30pF) Q ≥ 1000 (C ≥ 30pF) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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. | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | |  <p style="text-align: center;">Fig. 2</p> <table border="1" style="width: 100%; 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> | 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 | 4.5 | 8.0 | 5.6 |  <p style="text-align: center;">Fig. 3</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 | 4.5 | 8.0 | 5.6 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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 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 border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Step</th> <th>Temperature</th> <th>Time</th> </tr> </thead> <tbody> <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> </tbody> </table> | Step | Temperature | Time | 1 | 100 to 120°C | 1 min. | 2 | 170 to 200°C | 1 min. | | | | | | | | | | | | | | | | | |
| | Step | Temperature | | Time | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | 100 to 120°C | | 1 min. | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2 | 170 to 200°C | | 1 min. | | | | | | | | | | | | | | | | | | | | | | | | | |
| Capacitance Change | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;">Char.</th> <th style="width: 85%;">Capacitance Change</th> </tr> </thead> <tbody> <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> </tbody> </table> | Char. | Capacitance Change | X7R | Within ±10% | SL | Within ±2.5% or ±0.25pF (Whichever is larger) | | | | | | | | | | | | | | | | | | | | | | |
| Char. | Capacitance Change | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| X7R | Within ±10% | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SL | Within ±2.5% or ±0.25pF (Whichever is larger) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| I.R. | More than 1,000MΩ | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dielectric Strength | In accordance with item No.4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

*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. ↗

For General Purpose GRM/GRJ Series

Only for Applications

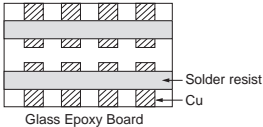
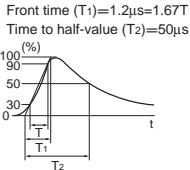
AC250V Type GA2 Series

Safety Standard Certified GA3 Series

Product Information

GA3 Series Specifications and Test Methods

Continued from the preceding page.

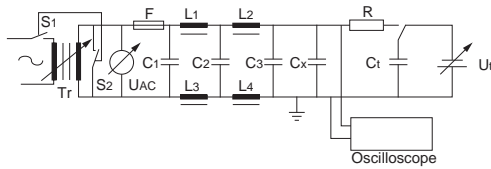
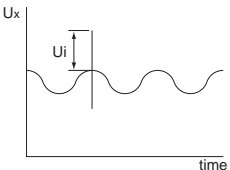
| No. | Item | Specifications | Test Method | | | | | | | | | | | | | | | |
|---------------------|--|--|--|--------------------|------------------|-------------|--|------------------------|--|----|------------|--------|---|------------------------|------|---|------------|--------|
| 16 | Appearance | 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,*1 then measure. <table border="1" style="margin: 10px auto;"> <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 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</p>  <p style="text-align: center;">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 | Char. | Capacitance Change | | | | | | | | | | | | | | | | |
| | X7R | Within ±15% | | | | | | | | | | | | | | | | |
| SL | Within ±2.5% or ±0.25pF (Whichever is larger) | | | | | | | | | | | | | | | | | |
| D.F. Q | Char. | Specification | | | | | | | | | | | | | | | | |
| | X7R | D.F. ≤0.05 | | | | | | | | | | | | | | | | |
| SL | Q≥400+20C*2 (C<30pF) Q≥1000 (C≥30pF) | | | | | | | | | | | | | | | | | |
| I.R. | More than 3,000MΩ | | | | | | | | | | | | | | | | | |
| Dielectric Strength | In accordance with item No.4 | | | | | | | | | | | | | | | | | |
| 17 | Appearance | No marking defects | 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 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±18°C for 60±5 min. and then let sit for 24±2 hrs. at room condition.*1 | | | | | | | | | | | | | | | |
| | Capacitance Change | Char. | | Capacitance Change | | | | | | | | | | | | | | |
| | | X7R | | Within ±15% | | | | | | | | | | | | | | |
| | SL | Within ±5.0% or ±0.5pF (Whichever is larger) | | | | | | | | | | | | | | | | |
| | D.F. Q | Char. | | Specification | | | | | | | | | | | | | | |
| X7R | | D.F. ≤0.05 | | | | | | | | | | | | | | | | |
| SL | Q≥275+5/2C*2 (C<30pF) Q≥350 (C≥30pF) | | | | | | | | | | | | | | | | | |
| I.R. | More than 3,000MΩ | | | | | | | | | | | | | | | | | |
| Dielectric Strength | In accordance with item No.4 | | | | | | | | | | | | | | | | | |
| 18 | Appearance | No marking defects | 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.  <p style="font-size: small;">Front time (T₁)=1.2μs=1.67T Time to half-value (T₂)=50μs</p> | | | | | | | | | | | | | | | |
| | Capacitance Change | Char. | | Capacitance Change | | | | | | | | | | | | | | |
| | | X7R | | Within ±20% | | | | | | | | | | | | | | |
| | SL | Within ±3.0% or ±0.3pF (Whichever is larger) | | | | | | | | | | | | | | | | |
| | D.F. Q | Char. | | Specification | | | | | | | | | | | | | | |
| X7R | | D.F. ≤0.05 | | | | | | | | | | | | | | | | |
| SL | Q≥275+5/2C*2 (C<30pF) Q≥350 (C≥30pF) | | | | | | | | | | | | | | | | | |
| I.R. | More than 3,000MΩ | | | | | | | | | | | | | | | | | |
| Dielectric Strength | In accordance with item No.4 | | | | | | | | | | | | | | | | | |
| 18 | Life | More than 3,000MΩ | Apply voltage as in Table for 1,000 hrs. at 125±2°C, relative humidity 50% max. <table border="1" style="margin: 10px auto;"> <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 0.1 sec.</td> </tr> <tr> <td>GC</td> <td rowspan="3">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>GF</td> </tr> <tr> <td>GD</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 0.1 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. | GF | GD | | | | | | | |
| | | | 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. | | | | | | | | | | | | | | | | | |
| GF | | | | | | | | | | | | | | | | | | |
| GD | | | | | | | | | | | | | | | | | | |
| Dielectric Strength | In accordance with item No.4 | | | | | | | | | | | | | | | | | |

*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

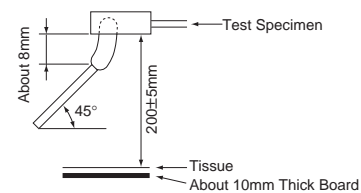
Continued from the preceding page.

| No. | Item | Specifications | Test Method | | | |
|---------------------|------------------------------|---|--|---|----|--------|
| 19 | Appearance | No marking defects | 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 $40\pm 2^{\circ}\text{C}$ and relative humidity of 90 to 95% for $500\pm 2^{\circ}\text{hrs}$. Remove and let sit for 24 ± 2 hrs. at room condition,*1 then measure. •Pretreatment for X7R char. Perform a heat treatment at $150\pm 1^{\circ}\text{C}$ for 60 ± 5 min. and then let sit for 24 ± 2 hrs. at room condition.*1 | | | |
| | Capacitance Change | Char. X7R | | Capacitance Change Within $\pm 15\%$ | | |
| | | SL | | Within $\pm 5.0\%$ or $\pm 0.5\text{pF}$ (Whichever is larger) | | |
| | D.F. Q | Char. X7R | | Specification D.F. ≤ 0.05 | | |
| | | SL | | $Q \geq 275 + 5/2C^{*2}$ ($C < 30\text{pF}$) $Q \geq 350$ ($C \geq 30\text{pF}$) | | |
| I.R. | More than 3,000M Ω | | | | | |
| Dielectric Strength | In accordance with item No.4 | | | | | |
| 20 | Active Flammability | The cheesecloth should not be on fire. | 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 UAC should be maintained for 2 min. after the last discharge. | | | |
| | | |  <p> C1,2 : $1\mu\text{F} \pm 10\%$ C3 : $0.033\mu\text{F} \pm 5\%$ 10kV L1 to 4 : $1.5\text{mH} \pm 20\%$ 16A Rod core choke Ct : $3\mu\text{F} \pm 5\%$ 10kV R : $100\Omega \pm 2\%$ Cx : Capacitor under test UAC : $U_R \pm 5\%$ F : Fuse, Rated 16A UR : Rated Voltage Ut : Voltage applied to Ct </p>  <table border="1" data-bbox="1193 1081 1412 1165"> <thead> <tr> <th>Type</th> <th>Ui</th> </tr> </thead> <tbody> <tr> <td>GD, GB</td> <td>2.5kV</td> </tr> <tr> <td>GC, GF</td> <td>5kV</td> </tr> </tbody> </table> | Type | Ui | GD, GB |
| Type | Ui | | | | | |
| GD, GB | 2.5kV | | | | | |
| GC, GF | 5kV | | | | | |
| 21 | Passive Flammability | The burning time should not exceed 30 sec. The tissue paper should not ignite. | 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. | | | |

*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).

Length of flame : $12\pm 1\text{mm}$
 Gas burner : Length 35mm min.
 Inside Dia. $0.5\pm 0.1\text{mm}$
 Outside Dia. 0.9mm max.
 Gas : Butane gas Purity 95% min.



For General Purpose
GRM/GRJ Series

Only for Applications

AC250V Type
GA2 Series

Safety Standard
Certified GA3 Series

Product Information

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

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