

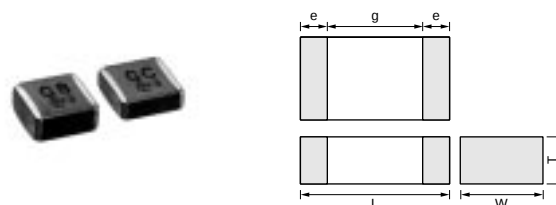
# Chip Monolithic Ceramic Capacitors

**muRata**

## 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 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. The 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.



| Part Number   | Dimensions (mm) |          |          |        |        |
|---------------|-----------------|----------|----------|--------|--------|
|               | L               | W        | T        | e min. | g min. |
| <b>GA355D</b> | 5.7 ±0.4        | 5.0 ±0.4 | 2.0 ±0.3 | 0.3    | 4.0    |

### ■ Applications

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

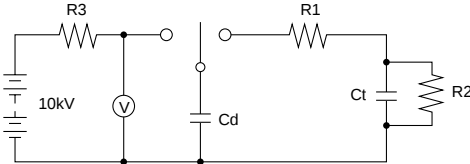
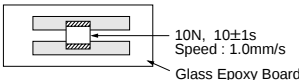
### ■ Standard Recognition

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

\*: Line-By-Pass only

| 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) |
|---------------------------|-------------------|--------------------|------------------|---------------|--------------|------------------|-----------------------|------------------|
| <b>GA355DR7GC101KY02L</b> | AC250 (r.m.s.)    | X7R (EIA)          | 100 ±10%         | 5.7           | 5.0          | 2.0              | 4.0                   | 0.3 min.         |
| <b>GA355DR7GC151KY02L</b> | AC250 (r.m.s.)    | X7R (EIA)          | 150 ±10%         | 5.7           | 5.0          | 2.0              | 4.0                   | 0.3 min.         |
| <b>GA355DR7GC221KY02L</b> | AC250 (r.m.s.)    | X7R (EIA)          | 220 ±10%         | 5.7           | 5.0          | 2.0              | 4.0                   | 0.3 min.         |
| <b>GA355DR7GC331KY02L</b> | AC250 (r.m.s.)    | X7R (EIA)          | 330 ±10%         | 5.7           | 5.0          | 2.0              | 4.0                   | 0.3 min.         |
| <b>GA355DR7GC471KY02L</b> | AC250 (r.m.s.)    | X7R (EIA)          | 470 ±10%         | 5.7           | 5.0          | 2.0              | 4.0                   | 0.3 min.         |
| <b>GA355DR7GC681KY02L</b> | AC250 (r.m.s.)    | X7R (EIA)          | 680 ±10%         | 5.7           | 5.0          | 2.0              | 4.0                   | 0.3 min.         |
| <b>GA355DR7GC102KY02L</b> | AC250 (r.m.s.)    | X7R (EIA)          | 1000 ±10%        | 5.7           | 5.0          | 2.0              | 4.0                   | 0.3 min.         |
| <b>GA355DR7GC152KY02L</b> | AC250 (r.m.s.)    | X7R (EIA)          | 1500 ±10%        | 5.7           | 5.0          | 2.0              | 4.0                   | 0.3 min.         |
| <b>GA355DR7GC222KY02L</b> | AC250 (r.m.s.)    | X7R (EIA)          | 2200 ±10%        | 5.7           | 5.0          | 2.0              | 4.0                   | 0.3 min.         |
| <b>GA355DR7GC332KY02L</b> | AC250 (r.m.s.)    | X7R (EIA)          | 3300 ±10%        | 5.7           | 5.0          | 2.0              | 4.0                   | 0.3 min.         |
| <b>GA355DR7GC472KY02L</b> | AC250 (r.m.s.)    | X7R (EIA)          | 4700 ±10%        | 5.7           | 5.0          | 2.0              | 4.0                   | 0.3 min.         |

## GA3 Series Specifications and Test Methods

| No.           | Item                                       |                     | Specifications                                                                                                                                                                                                                                                                                                                               | Test Method                                                                                                                                                                                                                                                                                                                                                                                                                                        |                    |               |             |             |                         |                                            |                    |                                                                                                                                                                                                                                                                                |
|---------------|--------------------------------------------|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|---------------|-------------|-------------|-------------------------|--------------------------------------------|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1             | Operating Temperature Range                |                     | −55 to +125℃                                                                                                                                                                                                                                                                                                                                 | —                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                    |               |             |             |                         |                                            |                    |                                                                                                                                                                                                                                                                                |
| 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 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. <table><tr><th></th><th>Test voltage</th></tr><tr><td>Type GB</td><td>DC1075V</td></tr><tr><td>Type GC/GD/GF</td><td>AC1500V (r.m.s.)</td></tr></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             | Pulse Voltage (Application: Type GD/GF)    |                     | No self healing break downs or flash-overs have taken place in the capacitor.                                                                                                                                                                                                                                                                | 10 impulse of alternating polarity is subjected. (5 impulse for each polarity)<br>The interval between impulse is 60 sec.<br>Applied Voltage : 2.5kV zero to peak                                                                                                                                                                                                                                                                                  |                    |               |             |             |                         |                                            |                    |                                                                                                                                                                                                                                                                                |
| 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                                                                                                                                                                                                                                                                                                               | The capacitance/Q/D.F. should be measured at 20℃ at a frequency of 1±0.2kHz (SL char. : 1±0.2MHz) and a voltage of AC1±0.2V (r.m.s.).<br>•Pretreatment for X7R char.<br>Perform a heat treatment at 150 ±18℃ for 60±5 min. and then let sit for 24±2 hrs. at *room condition.                                                                                                                                                                      |                    |               |             |             |                         |                                            |                    |                                                                                                                                                                                                                                                                                |
| 8             | Dissipation Factor (D.F.) Q                |                     | <table><tr><th>Char.</th><th>Specification</th></tr><tr><td>X7R</td><td>D.F. ≤0.025</td></tr><tr><td>SL</td><td>Q ≥400+20C*2 (C&lt;30pF)<br/>Q ≥1000 (C ≥30pF)</td></tr></table>                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Char.              | Specification | X7R         | D.F. ≤0.025 | SL                      | Q ≥400+20C*2 (C<30pF)<br>Q ≥1000 (C ≥30pF) |                    |                                                                                                                                                                                                                                                                                |
| Char.         | Specification                              |                     |                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                    |               |             |             |                         |                                            |                    |                                                                                                                                                                                                                                                                                |
| X7R           | D.F. ≤0.025                                |                     |                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                    |               |             |             |                         |                                            |                    |                                                                                                                                                                                                                                                                                |
| SL            | Q ≥400+20C*2 (C<30pF)<br>Q ≥1000 (C ≥30pF) |                     |                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                    |               |             |             |                         |                                            |                    |                                                                                                                                                                                                                                                                                |
| 9             | Capacitance Temperature Characteristics    |                     | <table><tr><th>Char.</th><th>Capacitance Change</th></tr><tr><td>X7R</td><td>Within ±15%</td></tr></table> Temperature characteristic guarantee is −55 to +125℃<br><table><tr><th>Char.</th><th>Temperature Coefficient</th></tr><tr><td>SL</td><td>+350 to -1000ppm/℃</td></tr></table> Temperature characteristic guarantee is +20 to +85℃ | Char.                                                                                                                                                                                                                                                                                                                                                                                                                                              | Capacitance Change | X7R           | Within ±15% | Char.       | Temperature Coefficient | SL                                         | +350 to -1000ppm/℃ | The range of capacitance change compared with the 25℃ (SL char. : 20℃) value within −55 to +125℃ should be within the specified range.<br>•Pretreatment for X7R char.<br>Perform a heat treatment at 150 ±18℃ for 60±5 min. and then let sit for 24±2 hrs. at *room condition. |
| Char.         | Capacitance Change                         |                     |                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                    |               |             |             |                         |                                            |                    |                                                                                                                                                                                                                                                                                |
| X7R           | Within ±15%                                |                     |                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                    |               |             |             |                         |                                            |                    |                                                                                                                                                                                                                                                                                |
| Char.         | Temperature Coefficient                    |                     |                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                    |               |             |             |                         |                                            |                    |                                                                                                                                                                                                                                                                                |
| SL            | +350 to -1000ppm/℃                         |                     |                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                    |               |             |             |                         |                                            |                    |                                                                                                                                                                                                                                                                                |
| 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.<br><br>Ct : Capacitor under test   Cd : 0.001μF<br>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 using a eutectic solder. Then apply 10N force in the direction of the arrow. The soldering should be done either with an iron or using the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock.<br><br>Fig. 1 |                    |               |             |             |                         |                                            |                    |                                                                                                                                                                                                                                                                                |

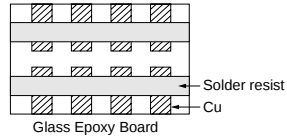
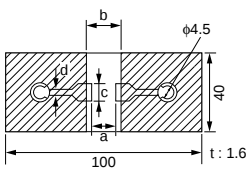
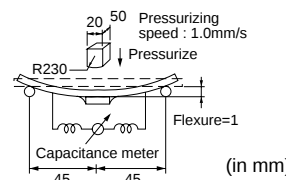
\*1 "Room condition" Temperature : 15 to 35℃, Relative humidity : 45 to 75%, Atmospheric pressure : 86 to 106kPa

\*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                                                                  | Vibration Resistance                                                                                                                                                                 | Appearance                                   | No defects or abnormalities                                                                                                                                                             | <p>Solder the capacitor to the test jig (glass epoxy board).</p> <p>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 3 mutually perpendicular directions (total of 6 hrs.).</p>                                                                                                                                                                                                                                                                                                                                                                                                      |             |                |                                               |             |                |                                                   |   |                |        |   |         |     |     |     |     |         |     |     |     |         |     |     |     |         |     |     |     |
|                                                                     |                                                                                                                                                                                      | Capacitance                                  | Within the specified tolerance                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |             |                |                                               |             |                |                                                   |   |                |        |   |         |     |     |     |     |         |     |     |     |         |     |     |     |         |     |     |     |
|                                                                     |                                                                                                                                                                                      | D.F.<br>Q                                    | <table><tr><th>Char.</th><th>Specification</th></tr><tr><td>X7R</td><td>D.F. ≤0.025</td></tr><tr><td>SL</td><td>Q ≥ 400 + 20C*2 (C &lt; 30pF)<br/>Q ≥ 1000 (C ≥ 30pF)</td></tr></table> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Char.       | Specification  | X7R                                           | D.F. ≤0.025 | SL             | Q ≥ 400 + 20C*2 (C < 30pF)<br>Q ≥ 1000 (C ≥ 30pF) |   |                |        |   |         |     |     |     |     |         |     |     |     |         |     |     |     |         |     |     |     |
| Char.                                                               | Specification                                                                                                                                                                        |                                              |                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |             |                |                                               |             |                |                                                   |   |                |        |   |         |     |     |     |     |         |     |     |     |         |     |     |     |         |     |     |     |
| X7R                                                                 | D.F. ≤0.025                                                                                                                                                                          |                                              |                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |             |                |                                               |             |                |                                                   |   |                |        |   |         |     |     |     |     |         |     |     |     |         |     |     |     |         |     |     |     |
| SL                                                                  | Q ≥ 400 + 20C*2 (C < 30pF)<br>Q ≥ 1000 (C ≥ 30pF)                                                                                                                                    |                                              |                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |             |                |                                               |             |                |                                                   |   |                |        |   |         |     |     |     |     |         |     |     |     |         |     |     |     |         |     |     |     |
| 13                                                                  | Deflection                                                                                                                                                                           | No cracking or marking defects should 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 should be done either with an iron or 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>  <table><tr><th>LxW (mm)</th><th colspan="4">Dimension (mm)</th></tr><tr><th></th><th>a</th><th>b</th><th>c</th><th>d</th></tr><tr><td>4.5×2.0</td><td>3.5</td><td>7.0</td><td>2.4</td><td rowspan="4">1.0</td></tr><tr><td>4.5×3.2</td><td>3.5</td><td>7.0</td><td>3.7</td></tr><tr><td>5.7×2.8</td><td>4.5</td><td>8.0</td><td>3.2</td></tr><tr><td>5.7×5.0</td><td>4.5</td><td>8.0</td><td>5.6</td></tr></table> <p>Fig. 2</p>  <p>Fig. 3</p> | LxW (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 |
|                                                                     |                                                                                                                                                                                      | LxW (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                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |             |                |                                               |             |                |                                                   |   |                |        |   |         |     |     |     |     |         |     |     |     |         |     |     |     |         |     |     |     |
| 75% of the terminations are to be soldered evenly and continuously. |                                                                                                                                                                                      |                                              |                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |             |                |                                               |             |                |                                                   |   |                |        |   |         |     |     |     |     |         |     |     |     |         |     |     |     |         |     |     |     |
| 14                                                                  | Solderability of Termination                                                                                                                                                         |                                              |                                                                                                                                                                                         | <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 sec. at 235±5°C. Immersing speed : 25±2.5mm/s</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |             |                |                                               |             |                |                                                   |   |                |        |   |         |     |     |     |     |         |     |     |     |         |     |     |     |         |     |     |     |
| 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 sec. Let sit at *1room condition for 24±2 hrs., then measure.</p> <ul style="list-style-type: none"><li>•Immersing speed : 25±2.5mm/s</li><li>•Pretreatment for X7R char.</li></ul> <p>Perform a heat treatment at 150 ±18°C for 60±5 min. and then let sit for 24±2 hrs. at *1room condition.</p> <p>*Preheating</p> <table><tr><th>Step</th><th>Temperature</th><th>Time</th></tr><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></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                                                  | <table><tr><th>Char.</th><th>Capacitance Change</th></tr><tr><td>X7R</td><td>Within ±10%</td></tr><tr><td>SL</td><td>Within ±2.5% or ±0.25pF (Whichever is larger)</td></tr></table> | 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                                                                                                                                                         |                                              |                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |             |                |                                               |             |                |                                                   |   |                |        |   |         |     |     |     |     |         |     |     |     |         |     |     |     |         |     |     |     |

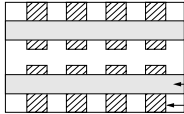
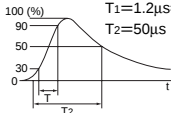
\*1 "Room condition" Temperature : 15 to 35°C, Relative humidity : 45 to 75%, Atmospheric pressure : 86 to 106kPa

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

Continued on the following page. 

## GA3 Series Specifications and Test Methods

Continued from the preceding page.

| No.       | Item                                                                                                                                                                            | Specifications               | Test Method                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                    |                    |             |                                                                                                          |                        |                                                                                                        |    |            |        |   |                        |      |   |            |        |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|--------------------|-------------|----------------------------------------------------------------------------------------------------------|------------------------|--------------------------------------------------------------------------------------------------------|----|------------|--------|---|------------------------|------|---|------------|--------|
| 16        | Temperature Cycle                                                                                                                                                               | Appearance                   | No marking defects                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                    |                    |             |                                                                                                          |                        |                                                                                                        |    |            |        |   |                        |      |   |            |        |
|           |                                                                                                                                                                                 | Capacitance Change           | <table><tr><th>Char.</th><th>Capacitance Change</th></tr><tr><td>X7R</td><td>Within ±15%</td></tr><tr><td>SL</td><td>Within ±2.5% or ±0.25pF (Whichever is larger)</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Char.              | Capacitance Change | X7R         | Within ±15%                                                                                              | SL                     | Within ±2.5% or ±0.25pF (Whichever is larger)                                                          |    |            |        |   |                        |      |   |            |        |
|           |                                                                                                                                                                                 |                              | Char.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Capacitance Change |                    |             |                                                                                                          |                        |                                                                                                        |    |            |        |   |                        |      |   |            |        |
|           |                                                                                                                                                                                 | X7R                          | Within ±15%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                    |                    |             |                                                                                                          |                        |                                                                                                        |    |            |        |   |                        |      |   |            |        |
|           |                                                                                                                                                                                 | SL                           | Within ±2.5% or ±0.25pF (Whichever is larger)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                    |                    |             |                                                                                                          |                        |                                                                                                        |    |            |        |   |                        |      |   |            |        |
| D.F.<br>Q | <table><tr><th>Char.</th><th>Specification</th></tr><tr><td>X7R</td><td>D.F. ≤0.05</td></tr><tr><td>SL</td><td>Q ≥400+20C*2 (C&lt;30pF)<br/>Q ≥1000 (C ≥30pF)</td></tr></table> | Char.                        | Specification                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | X7R                | D.F. ≤0.05         | SL          | Q ≥400+20C*2 (C<30pF)<br>Q ≥1000 (C ≥30pF)                                                               |                        |                                                                                                        |    |            |        |   |                        |      |   |            |        |
|           | Char.                                                                                                                                                                           | Specification                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                    |                    |             |                                                                                                          |                        |                                                                                                        |    |            |        |   |                        |      |   |            |        |
| X7R       | D.F. ≤0.05                                                                                                                                                                      |                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                    |                    |             |                                                                                                          |                        |                                                                                                        |    |            |        |   |                        |      |   |            |        |
| SL        | Q ≥400+20C*2 (C<30pF)<br>Q ≥1000 (C ≥30pF)                                                                                                                                      |                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                    |                    |             |                                                                                                          |                        |                                                                                                        |    |            |        |   |                        |      |   |            |        |
| I.R.      | More than 3,000MΩ                                                                                                                                                               |                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                    |                    |             |                                                                                                          |                        |                                                                                                        |    |            |        |   |                        |      |   |            |        |
|           | Dielectric Strength                                                                                                                                                             | In accordance with item No.4 | <p>Fix the capacitor to the supporting jig (glass epoxy board) shown in Fig. 4 using a eutectic solder.</p> <p>Perform the 5 cycles according to the 4 heat treatments listed in the following table.</p> <p>Let sit for 24±2 hrs. at *room condition, then measure.</p> <table><tr><th>Step</th><th>Temperature (°C)</th><th>Time (min.)</th></tr><tr><td>1</td><td>Min. Operating Temp.±3</td><td>30±3</td></tr><tr><td>2</td><td>Room Temp.</td><td>2 to 3</td></tr><tr><td>3</td><td>Max. Operating Temp.±2</td><td>30±3</td></tr><tr><td>4</td><td>Room Temp.</td><td>2 to 3</td></tr></table> <p>•Pretreatment for X7R char.</p> <p>Perform a heat treatment at 150 ±<sub>1.8</sub>°C for 60±5 min. and then let sit for 24±2 hrs. at *room condition.</p> <div><p>Solder resist<br/>Cu<br/>Glass Epoxy Board</p></div> <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                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                    |                    |             |                                                                                                          |                        |                                                                                                        |    |            |        |   |                        |      |   |            |        |
| 17        | Humidity (Steady State)                                                                                                                                                         | Appearance                   | No marking defects                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                    |                    |             |                                                                                                          |                        |                                                                                                        |    |            |        |   |                        |      |   |            |        |
|           |                                                                                                                                                                                 | Capacitance Change           | <table><tr><th>Char.</th><th>Capacitance Change</th></tr><tr><td>X7R</td><td>Within ±15%</td></tr><tr><td>SL</td><td>Within ±5.0% or ±0.5pF (Whichever is larger)</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Char.              | Capacitance Change | X7R         | Within ±15%                                                                                              | SL                     | Within ±5.0% or ±0.5pF (Whichever is larger)                                                           |    |            |        |   |                        |      |   |            |        |
|           |                                                                                                                                                                                 |                              | Char.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Capacitance Change |                    |             |                                                                                                          |                        |                                                                                                        |    |            |        |   |                        |      |   |            |        |
|           |                                                                                                                                                                                 | X7R                          | Within ±15%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                    |                    |             |                                                                                                          |                        |                                                                                                        |    |            |        |   |                        |      |   |            |        |
|           |                                                                                                                                                                                 | SL                           | Within ±5.0% or ±0.5pF (Whichever is larger)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                    |                    |             |                                                                                                          |                        |                                                                                                        |    |            |        |   |                        |      |   |            |        |
| D.F.<br>Q | <table><tr><th>Char.</th><th>Specification</th></tr><tr><td>X7R</td><td>D.F. ≤0.05</td></tr><tr><td>SL</td><td>Q ≥275+5/2C*2 (C&lt;30pF)<br/>Q ≥350 (C ≥30pF)</td></tr></table> | Char.                        | Specification                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | X7R                | D.F. ≤0.05         | SL          | Q ≥275+5/2C*2 (C<30pF)<br>Q ≥350 (C ≥30pF)                                                               |                        |                                                                                                        |    |            |        |   |                        |      |   |            |        |
|           | Char.                                                                                                                                                                           | Specification                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                    |                    |             |                                                                                                          |                        |                                                                                                        |    |            |        |   |                        |      |   |            |        |
| X7R       | D.F. ≤0.05                                                                                                                                                                      |                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                    |                    |             |                                                                                                          |                        |                                                                                                        |    |            |        |   |                        |      |   |            |        |
| SL        | Q ≥275+5/2C*2 (C<30pF)<br>Q ≥350 (C ≥30pF)                                                                                                                                      |                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                    |                    |             |                                                                                                          |                        |                                                                                                        |    |            |        |   |                        |      |   |            |        |
| I.R.      | More than 3,000MΩ                                                                                                                                                               |                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                    |                    |             |                                                                                                          |                        |                                                                                                        |    |            |        |   |                        |      |   |            |        |
|           | Dielectric Strength                                                                                                                                                             | In accordance with item No.4 | <p>Let the capacitor sit at 40±2°C and relative humidity of 90 to 95% for 500±12 hrs.</p> <p>Remove and let sit for 24±2 hrs. at *room condition, then measure.</p> <p>•Pretreatment for X7R char.</p> <p>Perform a heat treatment at 150 ±<sub>1.8</sub>°C for 60±5 min. and then let sit for 24±2 hrs. at *room condition.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                    |                    |             |                                                                                                          |                        |                                                                                                        |    |            |        |   |                        |      |   |            |        |
| 18        | Life                                                                                                                                                                            | Appearance                   | No marking defects                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                    |                    |             |                                                                                                          |                        |                                                                                                        |    |            |        |   |                        |      |   |            |        |
|           |                                                                                                                                                                                 | Capacitance Change           | <table><tr><th>Char.</th><th>Capacitance Change</th></tr><tr><td>X7R</td><td>Within ±20%</td></tr><tr><td>SL</td><td>Within ±3.0% or ±0.3pF (Whichever is larger)</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Char.              | Capacitance Change | X7R         | Within ±20%                                                                                              | SL                     | Within ±3.0% or ±0.3pF (Whichever is larger)                                                           |    |            |        |   |                        |      |   |            |        |
|           |                                                                                                                                                                                 |                              | Char.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Capacitance Change |                    |             |                                                                                                          |                        |                                                                                                        |    |            |        |   |                        |      |   |            |        |
|           |                                                                                                                                                                                 | X7R                          | Within ±20%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                    |                    |             |                                                                                                          |                        |                                                                                                        |    |            |        |   |                        |      |   |            |        |
|           |                                                                                                                                                                                 | SL                           | Within ±3.0% or ±0.3pF (Whichever is larger)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                    |                    |             |                                                                                                          |                        |                                                                                                        |    |            |        |   |                        |      |   |            |        |
| D.F.<br>Q | <table><tr><th>Char.</th><th>Specification</th></tr><tr><td>X7R</td><td>D.F. ≤0.05</td></tr><tr><td>SL</td><td>Q ≥275+5/2C*2 (C&lt;30pF)<br/>Q ≥350 (C ≥30pF)</td></tr></table> | Char.                        | Specification                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | X7R                | D.F. ≤0.05         | SL          | Q ≥275+5/2C*2 (C<30pF)<br>Q ≥350 (C ≥30pF)                                                               |                        |                                                                                                        |    |            |        |   |                        |      |   |            |        |
|           | Char.                                                                                                                                                                           | Specification                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                    |                    |             |                                                                                                          |                        |                                                                                                        |    |            |        |   |                        |      |   |            |        |
| X7R       | D.F. ≤0.05                                                                                                                                                                      |                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                    |                    |             |                                                                                                          |                        |                                                                                                        |    |            |        |   |                        |      |   |            |        |
| SL        | Q ≥275+5/2C*2 (C<30pF)<br>Q ≥350 (C ≥30pF)                                                                                                                                      |                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                    |                    |             |                                                                                                          |                        |                                                                                                        |    |            |        |   |                        |      |   |            |        |
| I.R.      | More than 3,000MΩ                                                                                                                                                               |                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                    |                    |             |                                                                                                          |                        |                                                                                                        |    |            |        |   |                        |      |   |            |        |
|           | Dielectric Strength                                                                                                                                                             | In accordance with item No.4 | <p>Impulse Voltage</p> <p>Each individual capacitor should 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> <div><p>T<sub>1</sub>=1.2μs=1.67T<br/>T<sub>2</sub>=50μs</p></div> <p>Apply voltage as Table for 1,000 hrs. at 125 ±<sub>2</sub>°C, relative humidity 50% max.</p> <table><tr><th>Type</th><th>Applied voltage</th></tr><tr><td>GB</td><td>AC312.5V (r.m.s.), except that once each hour the voltage is increased to AC1,000V (r.m.s.) for 0.1 sec.</td></tr><tr><td>GC</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>GD</td></tr><tr><td>GF</td></tr></table> <p>Let sit for 24±2 hrs. at *room condition, then measure.</p> <p>•Pretreatment for X7R char.</p> <p>Perform a heat treatment at 150 ±<sub>1.8</sub>°C for 60±5 min. and then let sit for 24±2 hrs. at *room condition.</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         |        |   |                        |      |   |            |        |
| 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        |                                                                                                                                                                                 |                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                    |                    |             |                                                                                                          |                        |                                                                                                        |    |            |        |   |                        |      |   |            |        |

\*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                  | Humidity Loading                                    | Appearance         | No marking defects |                                              | Apply the rated voltage at 40±2℃ and relative humidity of 90 to 95% for 500 <sup>±2</sup> <sub>4</sub> hrs. Remove and let sit for 24±2 hrs. at *1room condition, then measure.<br>•Pretreatment for X7R char.<br>Perform a heat treatment at 150 <sup>±1</sup> <sub>0</sub> ℃ for 60±5 min. and then let sit for 24±2 hrs. at *1room condition. |
|                     |                                                     | Capacitance Change | Char.              | Capacitance Change                           |                                                                                                                                                                                                                                                                                                                                                  |
|                     |                                                     |                    | X7R                | Within ±15%                                  |                                                                                                                                                                                                                                                                                                                                                  |
|                     |                                                     |                    | SL                 | Within ±5.0% or ±0.5pF (Whichever is larger) |                                                                                                                                                                                                                                                                                                                                                  |
|                     |                                                     | D.F.<br>Q          | Char.              | Specification                                |                                                                                                                                                                                                                                                                                                                                                  |
|                     |                                                     |                    | X7R                | D.F. ≤0.05                                   |                                                                                                                                                                                                                                                                                                                                                  |
| SL                  | Q≥275+5/2C* <sup>2</sup> (C<30pF)<br>Q≥350 (C≥30pF) |                    |                    |                                              |                                                                                                                                                                                                                                                                                                                                                  |
| I.R.                | More than 3,000MΩ                                   |                    |                    |                                              |                                                                                                                                                                                                                                                                                                                                                  |
| 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).