

## Safety Standard Recognized, C900, Encapsulated, AC Type, X1 400 VAC/Y2 250 VAC (Industrial Grade)

### Overview

KEMET's 900 encapsulated radial leaded ceramic disc capacitors are specifically designed for interference-suppression AC line filtering applications. Having internationally recognized safety certifications, these capacitors are well-suited for applications that require keeping potentially disruptive or damaging line transients and EMI out of susceptible equipment. They are also an ideal solution when needing to suppress line disturbances at the source.

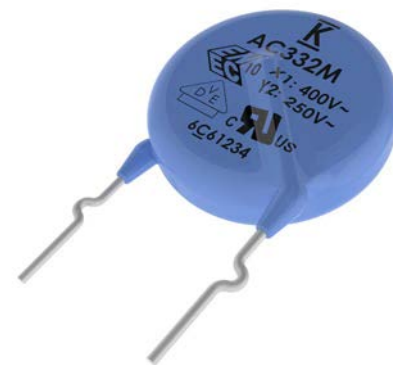
Safety Certified Capacitors are classified as either X and/or Y capacitors. Class X capacitors are primarily used in line-to-line (across-the-line) applications. In this application, there is no danger of electric shock to humans should

the capacitor fail, but could result in a risk of fire. The class Y capacitor is primarily used in line-to-ground (line by-pass) applications. In this application, failure of the capacitor could lead to danger of electric shock.

With a working voltage of 400 VAC in line-to-line (Class X) and 250 VAC in line-to-ground (Class Y) applications, these safety capacitors meet the impulse test criteria outlined in IEC Standard 60384. Meeting subclass X1 and Y2 requirements, these devices are certified to withstand impulses up to 4 KV (X1) and 5 KV (Y2) respectively. These encapsulated devices also meet the flame test requirements outlined in UL Standard 94 V-0.

### Benefits

- Safety standard recognized (IEC 60384-14)
- Reliable operation up to 125°C
- Class X1/Y2
- 5.0 mm, 7.5 mm, and 10 mm lead spacing
- Lead (Pb)-free and RoHS Compliant
- Halogen-free
- Capacitance offerings ranging from 10 pF up to 10 nF
- Available capacitance tolerances of  $\pm 5\%$ ,  $\pm 10\%$ , and  $\pm 20\%$
- High reliability
- Preformed (crimped) or straight lead configurations
- Non-polar device, minimizing installation concerns
- Encapsulation meets flammability standard UL 94 V-0



### Applications

Typical applications include:

- Line-to-line (Class X) filtering
- Line-to-ground (Class Y) filtering
- Antenna coupling
- Primary and secondary coupling (switching power supplies)
- Line disturbances suppression (motors and motor controls, relays, switching power supplies, and invertors)

## Ordering Information

| C9               | 8                                                                                                  | 1                                       | U          | 103                                         | M                               | Y                             | V                                       | D        | A                                                     | A            | 7317                                          |
|------------------|----------------------------------------------------------------------------------------------------|-----------------------------------------|------------|---------------------------------------------|---------------------------------|-------------------------------|-----------------------------------------|----------|-------------------------------------------------------|--------------|-----------------------------------------------|
| Ceramic Series   | Body Diameter                                                                                      | Lead Spacing <sup>1,3</sup>             | Spec.      | Capacitance Code (pF)                       | Capacitance Tolerance           | Rated Voltage                 | Dielectric/Temp. Char.                  | Design   | Lead Configuration <sup>2,3</sup>                     | Failure Rate | Packaging (C-Spec)                            |
| C9 = Ceramic 900 | 0 = 7.0 mm<br>1 = 8.0 mm<br>2 = 9.0 mm<br>3 = 10.0 mm<br>4 = 11.0 mm<br>6 = 13.0 mm<br>8 = 15.0 mm | 5 = 5.0 mm<br>7 = 7.5 mm<br>1 = 10.0 mm | U = Safety | Two significant digits and number of zeroes | J = ±5%<br>K = ±10%<br>M = ±20% | Y = X1 400 VAC/<br>Y2 250 VAC | S = SL<br>Y = Y5P<br>W = Y5U<br>V = Y5V | D = Disc | A = Straight<br>B = Vertical Kink<br>C = Outside Kink | A = N/A      | See "Packaging C-Spec Ordering Options Table" |

<sup>1</sup> Capacitor body diameter will limit available lead spacing and packaging options. See "Dimensions" and "Product Ordering Codes and Ratings" sections of this document to determine availability.

<sup>2</sup> "Vertical Kink" and "Outside Kink" lead configurations cannot be combined with the bulk/20 mm lead length option (WL20). 20 mm lead length is only available on capacitors with straight leads (lead configuration ordering code "A"). For nonstandard lead length inquiries, please contact KEMET.

<sup>3</sup> Bulk packaging lead length availability is dependent upon "Lead Configuration" and "Lead Spacing." See "Dimensions" section of this document to verify availability of a specific lead length option. For nonstandard lead length inquiries, please contact KEMET.

## Packaging C-Spec Ordering Options Table

| Packaging Type | Lead Length (mm) <sup>2,3</sup> | Packaging Ordering Code (C-Spec) |
|----------------|---------------------------------|----------------------------------|
| Ammo Pack      | See Note 5                      | 7317                             |
| Bulk Bag       | 3.0±1.0                         | WL30                             |
|                | 3.5±1.0                         | WL35                             |
|                | 4.0±1.0                         | WL40                             |
|                | 4.5±1.0                         | WL45                             |
|                | 5.0±1.0                         | WL50                             |
|                | 20.0 minimum <sup>4</sup>       | WL20                             |

<sup>1</sup> Preformed (crimped) lead configurations include "Vertical Kink" and "Outside Kink." See "Lead Configurations" and "Ordering Information" sections of this document for further details.

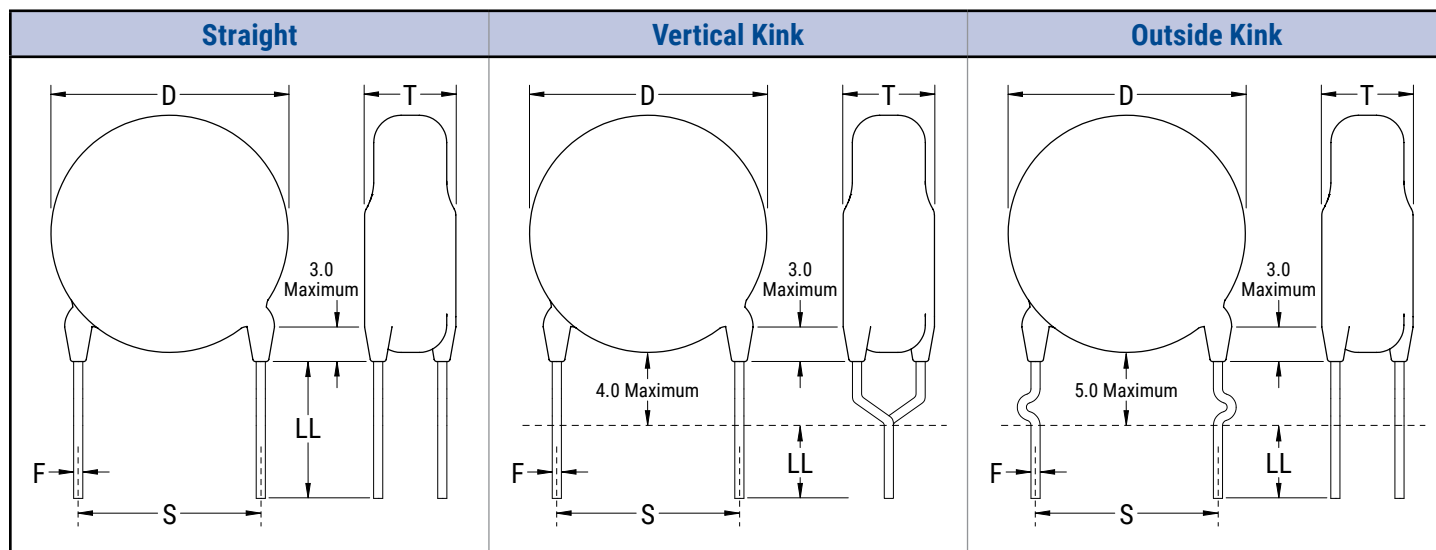
<sup>2</sup> "Vertical Kink" and "Outside Kink" lead configurations cannot be combined with the bulk/20 mm lead length option (WL20). 20 mm lead length is only available on capacitors with straight leads (lead configuration ordering code "A"). For nonstandard lead length inquiries, please contact KEMET.

<sup>3</sup> For nonstandard lead length inquiries, please contact KEMET.

<sup>4</sup> Lead length of 20.0 mm minimum only available for straight leads.

<sup>5</sup> Lead length for ammo pack packaging is defined by the H and H<sub>0</sub> dimensions in Table 3.

## Lead Configurations



## Dimensions – Millimeters

| Lead Configuration           | Lead Configuration Ordering Code <sup>1</sup> | S                         | Lead Spacing Tolerance | D                                                        | T              | e              | ØF            |
|------------------------------|-----------------------------------------------|---------------------------|------------------------|----------------------------------------------------------|----------------|----------------|---------------|
|                              |                                               | Lead Spacing <sup>2</sup> |                        | Body Diameter <sup>2</sup>                               | Body Thickness | Lead Meniscus  | Lead Diameter |
| Straight                     | A                                             | 5.0                       | ±0.8                   | See Table 1 -<br>"Product Ordering Codes<br>and Ratings" |                | 3.0<br>maximum | 0.55±0.1      |
|                              |                                               | 7.5                       | ±1.0                   |                                                          |                |                |               |
|                              |                                               | 10.0                      | ±1.0                   |                                                          |                |                |               |
| Vertical Kink<br>(Preformed) | B                                             | 5.0                       | ±0.8                   |                                                          |                |                |               |
|                              |                                               | 7.5                       | ±1.0                   |                                                          |                |                |               |
|                              |                                               | 10.0                      | ±1.0                   |                                                          |                |                |               |
| Outside Kink<br>(Preformed)  | C                                             | 5.0                       | ±0.8                   |                                                          |                |                |               |
|                              |                                               | 7.5                       | ±1.0                   |                                                          |                |                |               |
|                              |                                               | 10.0                      | ±1.0                   |                                                          |                |                |               |

<sup>1</sup> Lead Configuration is identified in the 13th character of the ordering code. See "Lead Configuration" and "Ordering Information" sections of this document for further details.

<sup>2</sup> Body diameter of capacitor will limit available lead spacing and packaging options. See "Product Ordering Codes and Ratings" sections of this document for further details.

## Approval Standard and Certification No.

| Safety Standard | Standard No.                 | Subclass | Working Voltage | Certificate No.          |
|-----------------|------------------------------|----------|-----------------|--------------------------|
| VDE<br>(ENEC)   | IEC 60384-14                 | X1       | 400 VAC         | <a href="#">40036415</a> |
|                 |                              | Y2       | 250 VAC         |                          |
| UL<br>CAN/CSA   | UL 60384-14 and<br>E60384-14 | X1       | 400VAC          | <a href="#">E356389</a>  |
|                 |                              | Y2       | 250VAC          |                          |

These devices are VDE/ENEC and UL recognized for antenna coupling and AC line-to-line (class X) and line-to-ground (class Y) applications per IEC60384-14 and UL 60384-14.

## Environmental Compliance

These devices are Halogen-free and RoHS Compliant. They meet all requirements set forth by both EU and China RoHS directives.



## General Specifications/Performance Characteristics

| Dielectric/Temperature Characteristic                                     | SL                                                               | Y5P                      | Y5U       | Y5V         |
|---------------------------------------------------------------------------|------------------------------------------------------------------|--------------------------|-----------|-------------|
| Operating Temperature Range:                                              | -40°C to +125°C                                                  |                          |           |             |
| Capacitance Change with Reference to +25°C and 0 VDC Applied (TCC):       | -1,000 ~ +350 ppm/°C                                             | ±10%                     | +20%/-55% | ~ +30%/-80% |
| Dielectric Withstanding Voltage (7.5 and 10 mm Lead Spacing) <sup>1</sup> | 2,600 VAC<br>(60 ±5 seconds at 25°C)                             |                          |           |             |
| Dielectric Withstanding Voltage (5 mm Lead Spacing) <sup>1</sup>          | 2,000 VAC<br>(60 ±5 seconds at 25°C)                             |                          |           |             |
| Quality Factor (Q)                                                        | 30 pF and above: ≥ 1,000<br>Below 30 pF: ≥ 400 + (20 x C)*       | See "Dissipation Factor" |           |             |
| Dissipation Factor (tanδ) at +25°C <sup>2</sup>                           | See "Quality Factor"                                             | 2.50%                    | 2.50%     | 5.0%        |
| Insulation Resistance (IR) Limit at +25°C                                 | 10,000 MΩ Minimum<br>(500 VDC applied for 60 ±5 seconds at 25°C) |                          |           |             |

\*C = Nominal capacitance

<sup>1</sup> The distance between the adjacent leads of the component (also referred to as "lead spacing") governs Dielectric Withstanding Voltage (DWV) limit.

<sup>2</sup> Capacitance and Dissipation Factor (DF) measured under the following conditions:

SL: 1 MHz ±100 kHz and 1.0 ±0.2 Vrms

X5P, Y5U, and Y5V: 1 kHz ±50 Hz and 1.0 ±0.2 Vrms

Note: When measuring capacitance, it is important to ensure the set voltage level is held constant. The HP4284 and Agilent E4980 have a feature known as Automatic Level Control (ALC). The ALC feature should be switched to "ON."

**Table 1 – Product Ordering Codes and Ratings**

| Dielectric/<br>Temp. Char. | KEMET<br>Part Number  | Capacitance | Capacitance<br>Tolerance | Dimensions (mm)            |                             |                  | Lead Spacing                    |                   |
|----------------------------|-----------------------|-------------|--------------------------|----------------------------|-----------------------------|------------------|---------------------------------|-------------------|
|                            |                       |             |                          | Body Diameter<br>(Maximum) | Body Thickness<br>(Maximum) | Lead<br>Diameter | Bulk<br>Packaging               | Ammo<br>Packaging |
| SL                         | C90(1)U100JYSD(2)A(3) | 10 pF       | ±5%                      | 7.0                        | 5.0                         | 0.55±0.1         | 5 mm,<br>7.5 mm,<br>or<br>10 mm |                   |
|                            | C90(1)U120JYSD(2)A(3) | 12 pF       |                          |                            |                             |                  |                                 |                   |
|                            | C90(1)U150JYSD(2)A(3) | 15 pF       |                          |                            |                             |                  |                                 |                   |
|                            | C90(1)U180JYSD(2)A(3) | 18 pF       |                          |                            |                             |                  |                                 |                   |
|                            | C90(1)U200JYSD(2)A(3) | 20 pF       |                          |                            |                             |                  |                                 |                   |
|                            | C90(1)U220JYSD(2)A(3) | 22 pF       |                          |                            |                             |                  |                                 |                   |
|                            | C90(1)U240JYSD(2)A(3) | 24 pF       |                          |                            |                             |                  |                                 |                   |
|                            | C90(1)U270JYSD(2)A(3) | 27 pF       |                          |                            |                             |                  |                                 |                   |
|                            | C90(1)U300JYSD(2)A(3) | 30 pF       |                          |                            |                             |                  |                                 |                   |
|                            | C90(1)U330JYSD(2)A(3) | 33 pF       |                          |                            |                             |                  |                                 |                   |
|                            | C90(1)U360JYSD(2)A(3) | 36 pF       |                          |                            |                             |                  |                                 |                   |
|                            | C90(1)U390JYSD(2)A(3) | 39 pF       |                          |                            |                             |                  |                                 |                   |
|                            | C90(1)U470JYSD(2)A(3) | 47 pF       |                          |                            |                             |                  |                                 |                   |
|                            | C90(1)U500JYSD(2)A(3) | 50 pF       |                          |                            |                             |                  |                                 |                   |
|                            | C90(1)U510JYSD(2)A(3) | 51 pF       |                          |                            |                             |                  |                                 |                   |
|                            | C91(1)U560JYSD(2)A(3) | 56 pF       |                          |                            |                             |                  |                                 |                   |
|                            | C91(1)U620JYSD(2)A(3) | 62 pF       |                          |                            |                             |                  |                                 |                   |
|                            | C91(1)U680JYSD(2)A(3) | 68 pF       |                          |                            |                             |                  |                                 |                   |
|                            | C91(1)U750JYSD(2)A(3) | 75 pF       |                          |                            |                             |                  |                                 |                   |
|                            | C92(1)U820JYSD(2)A(3) | 82 pF       |                          |                            |                             |                  |                                 |                   |
| C93(1)U101JYSD(2)A(3)      | 100 pF                | 10.0        |                          |                            |                             |                  |                                 |                   |
|                            |                       |             |                          |                            |                             |                  |                                 |                   |
| Y5P                        | C90(1)U101KYYD(2)A(3) | 100 pF      | ±10%                     | 7.0                        | 5.0                         | 0.55±0.1         | 5 mm,<br>7.5 mm,<br>or<br>10 mm |                   |
|                            | C90(1)U151KYYD(2)A(3) | 150 pF      |                          |                            |                             |                  |                                 |                   |
|                            | C90(1)U221KYYD(2)A(3) | 220 pF      |                          |                            |                             |                  |                                 |                   |
|                            | C90(1)U331KYYD(2)A(3) | 330 pF      |                          |                            |                             |                  |                                 |                   |
|                            | C90(1)U471KYYD(2)A(3) | 470 pF      |                          | 8.0                        |                             |                  |                                 |                   |
|                            | C91(1)U561KYYD(2)A(3) | 560 pF      |                          |                            |                             |                  |                                 |                   |
|                            | C91(1)U681KYYD(2)A(3) | 680 pF      |                          |                            |                             |                  |                                 |                   |
|                            | C92(1)U821KYYD(2)A(3) | 820 pF      |                          |                            |                             |                  |                                 |                   |
| C92(1)U102KYYD(2)A(3)      | 1,000 pF              | 9.0         |                          |                            |                             |                  |                                 |                   |
|                            |                       |             |                          |                            |                             |                  |                                 |                   |
| Y5U                        | C90(1)U102MYWD(2)A(3) | 1,000 pF    | ±20%                     | 7.0                        | 5.0                         | 0.55±0.1         | 5 mm, 7.5 mm, or 10 mm          |                   |
|                            | C92(1)U152MYWD(2)A(3) | 1,500 pF    |                          | 9.0                        |                             |                  |                                 |                   |
|                            | C92(1)U222MYWD(2)A(3) | 2,200 pF    |                          | 11.0                       |                             |                  |                                 |                   |
|                            | C94(1)U332MYWD(2)A(3) | 3,300 pF    |                          | 13.0                       |                             |                  | 7.5 mm or 10 mm                 |                   |
|                            | C96(1)U392MYWD(2)A(3) | 3,900 pF    |                          |                            |                             |                  |                                 |                   |
|                            | C96(1)U472MYWD(2)A(3) | 4,700 pF    |                          |                            |                             |                  |                                 |                   |
|                            |                       |             |                          |                            |                             |                  |                                 |                   |
| Y5V                        | C90(1)U102MYVD(2)A(3) | 1,000 pF    | ±20%                     | 7.0                        | 5.0                         | 0.55±0.1         | 5 mm, 7.5 mm, or 10 mm          |                   |
|                            | C90(1)U152MYVD(2)A(3) | 1,500 pF    |                          |                            |                             |                  |                                 |                   |
|                            | C90(1)U222MYVD(2)A(3) | 2,200 pF    |                          |                            |                             |                  |                                 |                   |
|                            | C92(1)U332MYVD(2)A(3) | 3,300 pF    |                          | 9.0                        |                             |                  |                                 |                   |
|                            | C94(1)U392MYVD(2)A(3) | 3,900 pF    |                          |                            |                             |                  |                                 |                   |
|                            | C94(1)U472MYVD(2)A(3) | 4,700 pF    |                          |                            |                             |                  | 11.0                            |                   |
|                            | C96(1)U682MYVD(2)A(3) | 6,800 pF    |                          |                            |                             |                  |                                 |                   |
|                            | C98(1)U103MYVD(2)A(3) | 10,000 pF   |                          | 15.0                       |                             |                  |                                 |                   |
|                            |                       |             |                          |                            |                             |                  |                                 |                   |
|                            | KEMET Part Number     | Capacitance | Capacitance Tolerance    | Body Diameter<br>(Maximum) | Body Thickness<br>(Maximum) | Lead Diameter    | Lead Spacing                    |                   |

(1) To properly complete ordering code, insert the one-digit numeric code to reflect required lead spacing: (Note that select capacitance values and packaging options may limit lead spacing availability. See table above to verify availability.)

5 = 5.0 mm

7 = 7.5 mm

1 = 10.0 mm

(2) To properly complete ordering code, insert the one-digit character code to reflect the required lead configuration: (See "Lead Configuration" section of this document, page 2, for further details.)

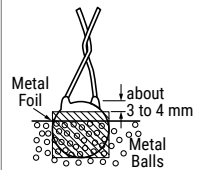
A = Straight

B = Vertical Kink

C = Outside Kink

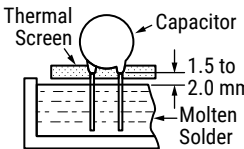
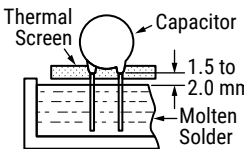
(3) To properly complete ordering code, enter the four-digit numeric or alphanumeric "Packaging C-Spec Ordering Code." See "Dimensions" section of this document, page 2, for available options.

**Table 2 – Performance & Reliability: Test Methods and Conditions**

| Item                         |                                                                                                                                                                                                                                                                                                 | Specification                                | Test Method                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                     |          |             |     |                  |     |                                                                                |                                                                                                                                                                                     |                                      |                                                                                                                                                                                                                                                                                                            |  |      |             |   |          |   |          |   |          |   |          |   |          |
|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|----------|-------------|-----|------------------|-----|--------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|------|-------------|---|----------|---|----------|---|----------|---|----------|---|----------|
| Operating Temperature Range  |                                                                                                                                                                                                                                                                                                 | -40°C to +125°C                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                     |          |             |     |                  |     |                                                                                |                                                                                                                                                                                     |                                      |                                                                                                                                                                                                                                                                                                            |  |      |             |   |          |   |          |   |          |   |          |   |          |
| Dielectric Strength          | Between lead wires                                                                                                                                                                                                                                                                              | No failures                                  | The capacitor shall not be damaged when voltage is applied between the lead wires for 60 seconds.<br>2,000 VAC (rms) – 5.0 mm lead spacing<br>2,600 VAC (rms) – 7.5 and 10 mm lead spacing                                                                                                                                                                                                                                                                                                                                               |                                                                                     |          |             |     |                  |     |                                                                                |                                                                                                                                                                                     |                                      |                                                                                                                                                                                                                                                                                                            |  |      |             |   |          |   |          |   |          |   |          |   |          |
|                              | Body Insulation                                                                                                                                                                                                                                                                                 | No failures                                  | The terminals (leads) of the capacitor shall be connected together. A metal foil is tightly wrapped around the body of the capacitor at a distance of about 3 to 4 mm from each terminal. The capacitor is then inserted into a container filled with metal balls approximately 1 mm in diameter. 2,600 VAC (rms) is applied for 60 seconds between the capacitor lead wires and metal balls.                                                                                                                                            |  |          |             |     |                  |     |                                                                                |                                                                                                                                                                                     |                                      |                                                                                                                                                                                                                                                                                                            |  |      |             |   |          |   |          |   |          |   |          |   |          |
| Insulation Resistance (IR)   |                                                                                                                                                                                                                                                                                                 | 10,000 MΩ minimum                            | The insulation resistance shall be measured with 500 ±50 VDC applied after 60 ±5 seconds of charging.                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                     |          |             |     |                  |     |                                                                                |                                                                                                                                                                                     |                                      |                                                                                                                                                                                                                                                                                                            |  |      |             |   |          |   |          |   |          |   |          |   |          |
| Capacitance                  |                                                                                                                                                                                                                                                                                                 | Within specified tolerance                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                     |          |             |     |                  |     |                                                                                |                                                                                                                                                                                     |                                      |                                                                                                                                                                                                                                                                                                            |  |      |             |   |          |   |          |   |          |   |          |   |          |
| Dissipation Factor (DF) or Q | <table><tr><th>Temperature Characteristics</th><th>Specification</th></tr><tr><td>Y5P, Y5U</td><td>DF ≤ 2.5%</td></tr><tr><td>Y5V</td><td>DF ≤ 5.0%</td></tr><tr><td>SL</td><td>≥ 30 pF: Q ≥ 1,000<br/>&lt; 30 pF: Q ≥ 400<br/>+(20 x C)<br/>C = Nominal capacitance</td></tr></table>          |                                              | Temperature Characteristics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Specification                                                                       | Y5P, Y5U | DF ≤ 2.5%   | Y5V | DF ≤ 5.0%        | SL  | ≥ 30 pF: Q ≥ 1,000<br>< 30 pF: Q ≥ 400<br>+(20 x C)<br>C = Nominal capacitance | Y5P, Y5U, and Y5V: Capacitance is measured at 1 kHz ±20% and 5 V <sub>rms</sub> or less (20 ±2°C)<br>SL: Capacitance is measured at 1 MHz ±20% and 1.0 ±0.2 V <sub>rms</sub> (25°C) |                                      |                                                                                                                                                                                                                                                                                                            |  |      |             |   |          |   |          |   |          |   |          |   |          |
|                              | Temperature Characteristics                                                                                                                                                                                                                                                                     | Specification                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                     |          |             |     |                  |     |                                                                                |                                                                                                                                                                                     |                                      |                                                                                                                                                                                                                                                                                                            |  |      |             |   |          |   |          |   |          |   |          |   |          |
|                              | Y5P, Y5U                                                                                                                                                                                                                                                                                        | DF ≤ 2.5%                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                     |          |             |     |                  |     |                                                                                |                                                                                                                                                                                     |                                      |                                                                                                                                                                                                                                                                                                            |  |      |             |   |          |   |          |   |          |   |          |   |          |
|                              | Y5V                                                                                                                                                                                                                                                                                             | DF ≤ 5.0%                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                     |          |             |     |                  |     |                                                                                |                                                                                                                                                                                     |                                      |                                                                                                                                                                                                                                                                                                            |  |      |             |   |          |   |          |   |          |   |          |   |          |
| SL                           | ≥ 30 pF: Q ≥ 1,000<br>< 30 pF: Q ≥ 400<br>+(20 x C)<br>C = Nominal capacitance                                                                                                                                                                                                                  |                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                     |          |             |     |                  |     |                                                                                |                                                                                                                                                                                     |                                      |                                                                                                                                                                                                                                                                                                            |  |      |             |   |          |   |          |   |          |   |          |   |          |
|                              |                                                                                                                                                                                                                                                                                                 |                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                     |          |             |     |                  |     |                                                                                |                                                                                                                                                                                     |                                      |                                                                                                                                                                                                                                                                                                            |  |      |             |   |          |   |          |   |          |   |          |   |          |
|                              |                                                                                                                                                                                                                                                                                                 |                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                     |          |             |     |                  |     |                                                                                |                                                                                                                                                                                     |                                      |                                                                                                                                                                                                                                                                                                            |  |      |             |   |          |   |          |   |          |   |          |   |          |
|                              |                                                                                                                                                                                                                                                                                                 |                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                     |          |             |     |                  |     |                                                                                |                                                                                                                                                                                     |                                      |                                                                                                                                                                                                                                                                                                            |  |      |             |   |          |   |          |   |          |   |          |   |          |
| Temperature Characteristics  | <table><tr><th>Temperature Characteristics</th><th>Capacitance Change</th></tr><tr><td>Y5P</td><td>Within ±10%</td></tr><tr><td>Y5U</td><td>Within +20%/-55%</td></tr><tr><td>Y5V</td><td>Within ~+30%/-80%</td></tr><tr><td>SL</td><td>-1,000 ~+350 ppm°C<br/>(+20°C ~+85°C)</td></tr></table> |                                              | Temperature Characteristics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Capacitance Change                                                                  | Y5P      | Within ±10% | Y5U | Within +20%/-55% | Y5V | Within ~+30%/-80%                                                              | SL                                                                                                                                                                                  | -1,000 ~+350 ppm°C<br>(+20°C ~+85°C) | A capacitance measurement is made at each step specified:<br><table><tr><th>Step</th><th>Temperature</th></tr><tr><td>1</td><td>+20 ±2°C</td></tr><tr><td>2</td><td>-25 ±2°C</td></tr><tr><td>3</td><td>+20 ±2°C</td></tr><tr><td>4</td><td>+85 ±2°C</td></tr><tr><td>5</td><td>+20 ±2°C</td></tr></table> |  | Step | Temperature | 1 | +20 ±2°C | 2 | -25 ±2°C | 3 | +20 ±2°C | 4 | +85 ±2°C | 5 | +20 ±2°C |
|                              | Temperature Characteristics                                                                                                                                                                                                                                                                     | Capacitance Change                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                     |          |             |     |                  |     |                                                                                |                                                                                                                                                                                     |                                      |                                                                                                                                                                                                                                                                                                            |  |      |             |   |          |   |          |   |          |   |          |   |          |
|                              | Y5P                                                                                                                                                                                                                                                                                             | Within ±10%                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                     |          |             |     |                  |     |                                                                                |                                                                                                                                                                                     |                                      |                                                                                                                                                                                                                                                                                                            |  |      |             |   |          |   |          |   |          |   |          |   |          |
|                              | Y5U                                                                                                                                                                                                                                                                                             | Within +20%/-55%                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                     |          |             |     |                  |     |                                                                                |                                                                                                                                                                                     |                                      |                                                                                                                                                                                                                                                                                                            |  |      |             |   |          |   |          |   |          |   |          |   |          |
|                              | Y5V                                                                                                                                                                                                                                                                                             | Within ~+30%/-80%                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                     |          |             |     |                  |     |                                                                                |                                                                                                                                                                                     |                                      |                                                                                                                                                                                                                                                                                                            |  |      |             |   |          |   |          |   |          |   |          |   |          |
|                              | SL                                                                                                                                                                                                                                                                                              | -1,000 ~+350 ppm°C<br>(+20°C ~+85°C)         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                     |          |             |     |                  |     |                                                                                |                                                                                                                                                                                     |                                      |                                                                                                                                                                                                                                                                                                            |  |      |             |   |          |   |          |   |          |   |          |   |          |
|                              | Step                                                                                                                                                                                                                                                                                            | Temperature                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                     |          |             |     |                  |     |                                                                                |                                                                                                                                                                                     |                                      |                                                                                                                                                                                                                                                                                                            |  |      |             |   |          |   |          |   |          |   |          |   |          |
| 1                            | +20 ±2°C                                                                                                                                                                                                                                                                                        |                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                     |          |             |     |                  |     |                                                                                |                                                                                                                                                                                     |                                      |                                                                                                                                                                                                                                                                                                            |  |      |             |   |          |   |          |   |          |   |          |   |          |
| 2                            | -25 ±2°C                                                                                                                                                                                                                                                                                        |                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                     |          |             |     |                  |     |                                                                                |                                                                                                                                                                                     |                                      |                                                                                                                                                                                                                                                                                                            |  |      |             |   |          |   |          |   |          |   |          |   |          |
| 3                            | +20 ±2°C                                                                                                                                                                                                                                                                                        |                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                     |          |             |     |                  |     |                                                                                |                                                                                                                                                                                     |                                      |                                                                                                                                                                                                                                                                                                            |  |      |             |   |          |   |          |   |          |   |          |   |          |
| 4                            | +85 ±2°C                                                                                                                                                                                                                                                                                        |                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                     |          |             |     |                  |     |                                                                                |                                                                                                                                                                                     |                                      |                                                                                                                                                                                                                                                                                                            |  |      |             |   |          |   |          |   |          |   |          |   |          |
| 5                            | +20 ±2°C                                                                                                                                                                                                                                                                                        |                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                     |          |             |     |                  |     |                                                                                |                                                                                                                                                                                     |                                      |                                                                                                                                                                                                                                                                                                            |  |      |             |   |          |   |          |   |          |   |          |   |          |
|                              |                                                                                                                                                                                                                                                                                                 |                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                     |          |             |     |                  |     |                                                                                |                                                                                                                                                                                     |                                      |                                                                                                                                                                                                                                                                                                            |  |      |             |   |          |   |          |   |          |   |          |   |          |
|                              |                                                                                                                                                                                                                                                                                                 |                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                     |          |             |     |                  |     |                                                                                |                                                                                                                                                                                     |                                      |                                                                                                                                                                                                                                                                                                            |  |      |             |   |          |   |          |   |          |   |          |   |          |
|                              |                                                                                                                                                                                                                                                                                                 |                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                     |          |             |     |                  |     |                                                                                |                                                                                                                                                                                     |                                      |                                                                                                                                                                                                                                                                                                            |  |      |             |   |          |   |          |   |          |   |          |   |          |
| Terminal Strength            | Tensile                                                                                                                                                                                                                                                                                         | Lead wire or capacitor body shall not break. | With the termination in its normal position, the specimen is held by its body in such a manner that the axis of the termination is vertical; a tensile force of 10 N is applied to the termination in the direction of its axis and acting in a direction away from the body of the specimen.                                                                                                                                                                                                                                            |                                                                                     |          |             |     |                  |     |                                                                                |                                                                                                                                                                                     |                                      |                                                                                                                                                                                                                                                                                                            |  |      |             |   |          |   |          |   |          |   |          |   |          |
|                              | Bending                                                                                                                                                                                                                                                                                         | Lead wire or capacitor body shall not break. | With the termination in its normal position, the specimen is held by its body in such a manner that the axis of the termination is vertical; a mass force of 5 N is then suspended from the end of the termination. The body of the specimen is then inclined within a period of 2 to 3 seconds, through an angle of approximately 90° in the vertical plane and then resumed to its initial position over the same period of time. This operation constitutes one bend immediately followed by a second bend in the opposite direction. |                                                                                     |          |             |     |                  |     |                                                                                |                                                                                                                                                                                     |                                      |                                                                                                                                                                                                                                                                                                            |  |      |             |   |          |   |          |   |          |   |          |   |          |

<sup>1</sup> "Room Condition" is defined as follows: Temperature: 15 ~ 35°C/Humidity: 45 ~ 75%/Atmospheric Pressure: 86 ~ 106 kPa.

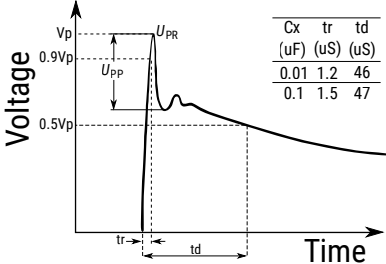
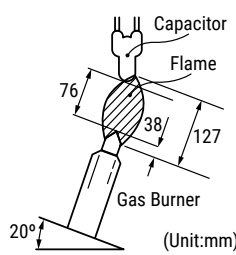
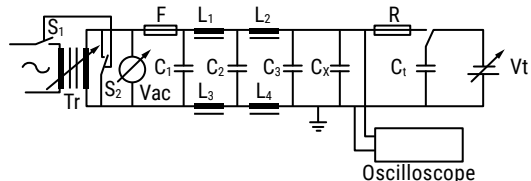
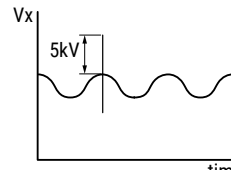
**Table 2 – Performance & Reliability: Test Methods and Conditions cont'd**

| Item                           |                                                                          | Specification                                                                                                                                                                                                                                                                                 | Test Method                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                    |     |             |     |             |     |             |    |                                                |                                                                                                                                                             |                                                                                                                                                                                             |
|--------------------------------|--------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-----|-------------|-----|-------------|-----|-------------|----|------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Solderability                  |                                                                          | Lead wire should have a uniform coating of solder in the axial direction and over 3/4 of its circumference.                                                                                                                                                                                   | The lead wire of the capacitor is dipped into molten solder for 5 ±0.5 seconds. The depth of immersion is up to 1.5 mm (+5/-0 mm) from the root of lead wires.<br>Solder Temperature: lead-free solder (Sn-3Ag – 0.5 Cu) 245°C ±5°C.                                                                                                                                                                                                                                                                                                                                                                                                                |                    |     |             |     |             |     |             |    |                                                |                                                                                                                                                             |                                                                                                                                                                                             |
| Soldering Effect (Non-Preheat) | Appearance                                                               | No visual defect                                                                                                                                                                                                                                                                              | <p>As shown in the figure below, the lead wires are immersed in molten solder up to 1.5 mm (+5/-0 mm) from the end of the epoxy meniscus (root of lead wire).<br/>Duration/Solder Temp: 3.5 ±0.5 seconds/350°C ±10°C or 10 ±1 seconds/260°C ±5°C</p>  <p><b>Pretreatment:</b> Capacitor is stored at 85°C ±2°C for 1 hour and then placed at room condition<sup>1</sup> for 24 ±2 hours before initial measurements.<br/><b>Post-treatment:</b> Capacitor is stored for 1 to 2 hours at room condition<sup>1</sup>.</p>                                           |                    |     |             |     |             |     |             |    |                                                |                                                                                                                                                             |                                                                                                                                                                                             |
|                                | IR                                                                       | 1,000 MΩ                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                    |     |             |     |             |     |             |    |                                                |                                                                                                                                                             |                                                                                                                                                                                             |
|                                | Dielectric Strength                                                      | Per item 1                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                    |     |             |     |             |     |             |    |                                                |                                                                                                                                                             |                                                                                                                                                                                             |
|                                | Capacitance                                                              | Y5P, Y5U, and Y5V: within ±10%<br>SL: within ±2.5% or ±0.25 pF, whichever is larger                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                    |     |             |     |             |     |             |    |                                                |                                                                                                                                                             |                                                                                                                                                                                             |
| Soldering Effect (Preheat)     | Appearance                                                               | No visual defect                                                                                                                                                                                                                                                                              | <p>Capacitor is stored at 120°C +0/-5°C for 60 +0/-5 seconds. Then, as shown in the figure below, the lead wires are immersed in molten solder up to 1.5 mm (+5/-0mm) from the end of the epoxy meniscus (root of lead wire).<br/>Duration/Solder Temperature 7.5+0/-1 second/260°C ±5°C.</p>  <p><b>Pretreatment:</b> Capacitor is stored at 85°C ±2°C for 1 hour and then placed at room condition<sup>1</sup> for 24 ±2 hours before initial measurements.<br/><b>Post-treatment:</b> Capacitor is stored for 1 to 2 hours at room condition<sup>1</sup>.</p> |                    |     |             |     |             |     |             |    |                                                |                                                                                                                                                             |                                                                                                                                                                                             |
|                                | IR                                                                       | 1,000 MΩ                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                    |     |             |     |             |     |             |    |                                                |                                                                                                                                                             |                                                                                                                                                                                             |
|                                | Dielectric Strength                                                      | Per item 1                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                    |     |             |     |             |     |             |    |                                                |                                                                                                                                                             |                                                                                                                                                                                             |
|                                | Capacitance                                                              | Y5P, Y5U, and Y5V: within ±10%<br>SL: within ±2.5% or ±0.25 pF, whichever is larger                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                    |     |             |     |             |     |             |    |                                                |                                                                                                                                                             |                                                                                                                                                                                             |
| Biased Humidity                | Appearance                                                               | No visual defect                                                                                                                                                                                                                                                                              | Steady State Humidity:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Load Humidity:     |     |             |     |             |     |             |    |                                                |                                                                                                                                                             |                                                                                                                                                                                             |
|                                | Capacitance                                                              | <table><tr><th>Temperature Characteristics</th><th>Capacitance Change</th></tr><tr><td>Y5P</td><td>Within ±10%</td></tr><tr><td>Y5U</td><td>Within ±20%</td></tr><tr><td>Y5V</td><td>Within ±30%</td></tr><tr><td>SL</td><td>Within ±2.5% or ±0.25 pF, whichever is larger.</td></tr></table> | Temperature Characteristics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Capacitance Change | Y5P | Within ±10% | Y5U | Within ±20% | Y5V | Within ±30% | SL | Within ±2.5% or ±0.25 pF, whichever is larger. | <p>90 to 95% humidity at 40°C ±2°C for 500 ±12 hours.</p> <p><b>Post-treatment:</b> Capacitor is stored for 1 to 2 hours at room condition<sup>1</sup>.</p> | <p>90 to 95% humidity at 40°C ±2°C for 500 ±12 hours with full rated voltage applied.</p> <p><b>Post-treatment:</b> Capacitor is stored for 1 to 2 hours at room condition<sup>1</sup>.</p> |
|                                |                                                                          | Temperature Characteristics                                                                                                                                                                                                                                                                   | Capacitance Change                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                    |     |             |     |             |     |             |    |                                                |                                                                                                                                                             |                                                                                                                                                                                             |
|                                |                                                                          | Y5P                                                                                                                                                                                                                                                                                           | Within ±10%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                    |     |             |     |             |     |             |    |                                                |                                                                                                                                                             |                                                                                                                                                                                             |
|                                |                                                                          | Y5U                                                                                                                                                                                                                                                                                           | Within ±20%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                    |     |             |     |             |     |             |    |                                                |                                                                                                                                                             |                                                                                                                                                                                             |
|                                | Y5V                                                                      | Within ±30%                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                    |     |             |     |             |     |             |    |                                                |                                                                                                                                                             |                                                                                                                                                                                             |
|                                | SL                                                                       | Within ±2.5% or ±0.25 pF, whichever is larger.                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                    |     |             |     |             |     |             |    |                                                |                                                                                                                                                             |                                                                                                                                                                                             |
| DF                             | Y5P and Y5U: 5.0% maximum<br>Y5V: 7.5% maximum<br>SL: Less than 30 pF:   |                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                    |     |             |     |             |     |             |    |                                                |                                                                                                                                                             |                                                                                                                                                                                             |
| Q                              | Q ≥ 100 +10 × C/3<br>More than 30 pF: Q ≥ 200<br>C = Nominal capacitance |                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                    |     |             |     |             |     |             |    |                                                |                                                                                                                                                             |                                                                                                                                                                                             |
| IR                             | Y5P, Y5V, and Y5U: 3,000 MΩ minimum<br>SL: 1,000 MΩ minimum              |                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                    |     |             |     |             |     |             |    |                                                |                                                                                                                                                             |                                                                                                                                                                                             |
| Dielectric Strength            | No failures                                                              |                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                    |     |             |     |             |     |             |    |                                                |                                                                                                                                                             |                                                                                                                                                                                             |

<sup>1</sup> "Room Condition" is defined as follows: Temperature: 15 ~ 35°C/Humidity: 45 ~ 75%/Atmospheric Pressure: 86 ~ 106 kPa.



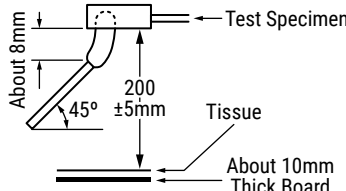
**Table 2 – Performance & Reliability: Test Methods and Conditions cont'd**

| Item                  |                                                                                  | Specification                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Test Method                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |           |                |                    |                  |                                |                                                                                                                                                                                                                                     |                |     |         |                 |        |    |                |                |               |   |                 |    |                       |
|-----------------------|----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|----------------|--------------------|------------------|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-----|---------|-----------------|--------|----|----------------|----------------|---------------|---|-----------------|----|-----------------------|
| High Temperature Life | Appearance                                                                       | No visual defect                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <p>Impulse Voltage: Each individual capacitor is subjected to three 5 kv impulses prior to life testing.</p>  <table data-bbox="1141 396 1248 491"><tr><th>Cx</th><th>tr</th><th>td</th></tr><tr><th>(uF)</th><th>(uS)</th><th>(uS)</th></tr><tr><td>0.01</td><td>1.2</td><td>46</td></tr><tr><td>0.1</td><td>1.5</td><td>47</td></tr></table> <p>Capacitors are placed in a circulating air oven for a period of 1,000 hours. The air in the oven is maintained at a temperature of 125°C ±2 throughout the test. The capacitors are subjected to AC 425 V<sub>rms</sub><sup>1</sup>. Each hour the voltage is increased to AC 1,000 V<sub>rms</sub> for 0.1 seconds.</p> | Cx        | tr             | td                 | (uF)             | (uS)                           | (uS)                                                                                                                                                                                                                                | 0.01           | 1.2 | 46      | 0.1             | 1.5    | 47 |                |                |               |   |                 |    |                       |
|                       | Cx                                                                               | tr                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | td        |                |                    |                  |                                |                                                                                                                                                                                                                                     |                |     |         |                 |        |    |                |                |               |   |                 |    |                       |
|                       | (uF)                                                                             | (uS)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | (uS)      |                |                    |                  |                                |                                                                                                                                                                                                                                     |                |     |         |                 |        |    |                |                |               |   |                 |    |                       |
|                       | 0.01                                                                             | 1.2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 46        |                |                    |                  |                                |                                                                                                                                                                                                                                     |                |     |         |                 |        |    |                |                |               |   |                 |    |                       |
| 0.1                   | 1.5                                                                              | 47                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |           |                |                    |                  |                                |                                                                                                                                                                                                                                     |                |     |         |                 |        |    |                |                |               |   |                 |    |                       |
| Capacitance Change    | Y5P, Y5V, and Y5U: within ±20%<br>SL: within ±3 or ±0.3 pF, whichever is larger. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |           |                |                    |                  |                                |                                                                                                                                                                                                                                     |                |     |         |                 |        |    |                |                |               |   |                 |    |                       |
| IR                    | 3,000 MΩ minimum<br>SL: 1,000 MΩ minimum                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |           |                |                    |                  |                                |                                                                                                                                                                                                                                     |                |     |         |                 |        |    |                |                |               |   |                 |    |                       |
| Dielectric Strength   | No failures                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |           |                |                    |                  |                                |                                                                                                                                                                                                                                     |                |     |         |                 |        |    |                |                |               |   |                 |    |                       |
| Flame Test            |                                                                                  | <p>The capacitor flame extinguishes as follows:</p> <table data-bbox="454 890 805 1079"><thead><tr><th>Cycle</th><th>Time</th></tr></thead><tbody><tr><td>1 ~ 4</td><td>30 seconds maximum</td></tr><tr><td>5</td><td>60 seconds maximum</td></tr></tbody></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Cycle                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Time      | 1 ~ 4          | 30 seconds maximum | 5                | 60 seconds maximum             | <p>The capacitor is exposed to a flame for 15 seconds and then removed for 15 seconds. This test is repeated for 5 cycles.</p>  <p>(Unit:mm)</p> |                |     |         |                 |        |    |                |                |               |   |                 |    |                       |
| Cycle                 | Time                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |           |                |                    |                  |                                |                                                                                                                                                                                                                                     |                |     |         |                 |        |    |                |                |               |   |                 |    |                       |
| 1 ~ 4                 | 30 seconds maximum                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |           |                |                    |                  |                                |                                                                                                                                                                                                                                     |                |     |         |                 |        |    |                |                |               |   |                 |    |                       |
| 5                     | 60 seconds maximum                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |           |                |                    |                  |                                |                                                                                                                                                                                                                                     |                |     |         |                 |        |    |                |                |               |   |                 |    |                       |
| Active Flammability   | The cheesecloth should not ignite.                                               | <p>The capacitors are individually wrapped in at least one, but not more than two, complete layers of cheesecloth. They are then subjected to 20 discharges. The interval between successive discharges is 5 seconds. The VAC is maintained for 2 minutes after the last discharge.</p>  <p>Oscilloscope</p> <table data-bbox="849 1442 1516 1646"><tr><td>C<sub>1,2</sub></td><td>1 μF ±10%</td><td>C<sub>3</sub></td><td>0.033 μF ±5% 10 kV</td></tr><tr><td>L<sub>1-4</sub></td><td>1.5 Mh ±20% 16A Rod core choke</td><td>Cx</td><td>Test capacitor</td></tr><tr><td>R</td><td>100 ±2%</td><td>V<sub>AC</sub></td><td>VR ±5%</td></tr><tr><td>Ct</td><td>3 μF ±5% 10 kV</td><td>V<sub>R</sub></td><td>Rated Voltage</td></tr><tr><td>F</td><td>Fuse, Rated 10A</td><td>Vt</td><td>Voltage applied to Ct</td></tr></table>  | C <sub>1,2</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 1 μF ±10% | C <sub>3</sub> | 0.033 μF ±5% 10 kV | L <sub>1-4</sub> | 1.5 Mh ±20% 16A Rod core choke | Cx                                                                                                                                                                                                                                  | Test capacitor | R   | 100 ±2% | V <sub>AC</sub> | VR ±5% | Ct | 3 μF ±5% 10 kV | V <sub>R</sub> | Rated Voltage | F | Fuse, Rated 10A | Vt | Voltage applied to Ct |
| C <sub>1,2</sub>      | 1 μF ±10%                                                                        | C <sub>3</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 0.033 μF ±5% 10 kV                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |           |                |                    |                  |                                |                                                                                                                                                                                                                                     |                |     |         |                 |        |    |                |                |               |   |                 |    |                       |
| L <sub>1-4</sub>      | 1.5 Mh ±20% 16A Rod core choke                                                   | Cx                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Test capacitor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |                |                    |                  |                                |                                                                                                                                                                                                                                     |                |     |         |                 |        |    |                |                |               |   |                 |    |                       |
| R                     | 100 ±2%                                                                          | V <sub>AC</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | VR ±5%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |           |                |                    |                  |                                |                                                                                                                                                                                                                                     |                |     |         |                 |        |    |                |                |               |   |                 |    |                       |
| Ct                    | 3 μF ±5% 10 kV                                                                   | V <sub>R</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Rated Voltage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |                |                    |                  |                                |                                                                                                                                                                                                                                     |                |     |         |                 |        |    |                |                |               |   |                 |    |                       |
| F                     | Fuse, Rated 10A                                                                  | Vt                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Voltage applied to Ct                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |           |                |                    |                  |                                |                                                                                                                                                                                                                                     |                |     |         |                 |        |    |                |                |               |   |                 |    |                       |

<sup>1</sup> "Room Condition" is defined as follows: Temperature: 15 ~ 35°C/Humidity: 45 ~ 75%/Atmospheric Pressure: 86 ~ 106 kPa.



**Table 2 – Performance & Reliability: Test Methods and Conditions cont'd**

| Item                 |                                                                                                                                                                                                             | Specification                                                                                                                                                                                                         | Test Method                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                    |         |            |           |             |          |             |  |  |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|---------|------------|-----------|-------------|----------|-------------|--|--|
| Passive Flammability |                                                                                                                                                                                                             | <p>The burning time should not exceed 30 seconds.</p> <p>The tissue paper should not ignite.</p>                                                                                                                      | <p>The capacitor under test is held into a flame and in a position which best promotes burning. Each specimen is exposed to the flame once.</p>  <p>Time of exposure to flame: 30 seconds</p> <p>Length of flame: 12 ±1 mm</p> <p>Gas burner length: 35 mm minimum</p> <p>Inside diameter: 0.5 ±0.1 mm</p> <p>Outside diameter: 0.9 mm maximum</p> <p>Gas butane gas purity: 95% minimum</p> |                    |         |            |           |             |          |             |  |  |
| Temperature Cycle    | Appearance                                                                                                                                                                                                  | No visual defect                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                    |         |            |           |             |          |             |  |  |
|                      | Capacitance                                                                                                                                                                                                 | <table><tr><th>Temperature Characteristics</th><th>Capacitance Change</th></tr><tr><td>SL</td><td>Within ±5%</td></tr><tr><td>Y5P</td><td>Within ±10%</td></tr><tr><td>Y5U, Y5V</td><td>Within ±20%</td></tr></table> | Temperature Characteristics                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Capacitance Change | SL      | Within ±5% | Y5P       | Within ±10% | Y5U, Y5V | Within ±20% |  |  |
|                      |                                                                                                                                                                                                             | Temperature Characteristics                                                                                                                                                                                           | Capacitance Change                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                    |         |            |           |             |          |             |  |  |
|                      |                                                                                                                                                                                                             | SL                                                                                                                                                                                                                    | Within ±5%                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                    |         |            |           |             |          |             |  |  |
|                      | Y5P                                                                                                                                                                                                         | Within ±10%                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                    |         |            |           |             |          |             |  |  |
|                      | Y5U, Y5V                                                                                                                                                                                                    | Within ±20%                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                    |         |            |           |             |          |             |  |  |
| DF/Q                 | <table><tr><td>SL</td><td>≥ 30 pF: Q ≥ 350<br/>&lt; 30 pF: Q ≥ 275<br/>+5/2C<br/>C = Nominal capacitance</td></tr><tr><td>Y5P</td><td>DF ≤ 5%</td></tr><tr><td>Y5U, Y5V</td><td>DF ≤ 7.5%</td></tr></table> | SL                                                                                                                                                                                                                    | ≥ 30 pF: Q ≥ 350<br>< 30 pF: Q ≥ 275<br>+5/2C<br>C = Nominal capacitance                                                                                                                                                                                                                                                                                                                                                                                                       | Y5P                | DF ≤ 5% | Y5U, Y5V   | DF ≤ 7.5% |             |          |             |  |  |
|                      | SL                                                                                                                                                                                                          | ≥ 30 pF: Q ≥ 350<br>< 30 pF: Q ≥ 275<br>+5/2C<br>C = Nominal capacitance                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                    |         |            |           |             |          |             |  |  |
|                      | Y5P                                                                                                                                                                                                         | DF ≤ 5%                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                    |         |            |           |             |          |             |  |  |
| Y5U, Y5V             | DF ≤ 7.5%                                                                                                                                                                                                   |                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                    |         |            |           |             |          |             |  |  |
| IR                   | 3,000 MΩ minimum<br>SL: 1,000 MΩ minimum                                                                                                                                                                    |                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                    |         |            |           |             |          |             |  |  |
| Dielectric Strength  | No failures                                                                                                                                                                                                 |                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                    |         |            |           |             |          |             |  |  |

The capacitor is subjected to 5 temperature cycles.

### Temperature Cycle

| Step | Temperature (°C) | Dwell Time (minutes) | Transition Time (minutes) |
|------|------------------|----------------------|---------------------------|
| 1    | -40 +0/-3        | 30                   | 3                         |
| 2    | Room temperature | 3                    |                           |
| 3    | 125 +3/-0        | 30                   |                           |
| 4    | Room temperature | 3                    |                           |

**Pretreatment:** Capacitor shall be stored at 85 ±2 for 1 hour then placed at room condition<sup>1</sup> for 24 ±2 hours.

**Post-treatment:** Capacitor is stored for 1 to 2 hours at room condition<sup>1</sup>.

<sup>1</sup> "Room Condition" is defined as follows: Temperature: 15 ~ 35°C/Humidity: 45 ~ 75%/Atmospheric Pressure: 86 ~ 106 kPa.

## Soldering and Mounting Information

### Soldering:

When soldering this product to a PCB/PWB, do not exceed the solder heat resistance specification of the capacitor. Subjecting this product to excessive heating could reflow the solder joint between the lead and ceramic element and/or may result in thermal shocks that can crack the ceramic element.

When soldering these capacitors with a soldering iron, it should be performed under the following conditions:

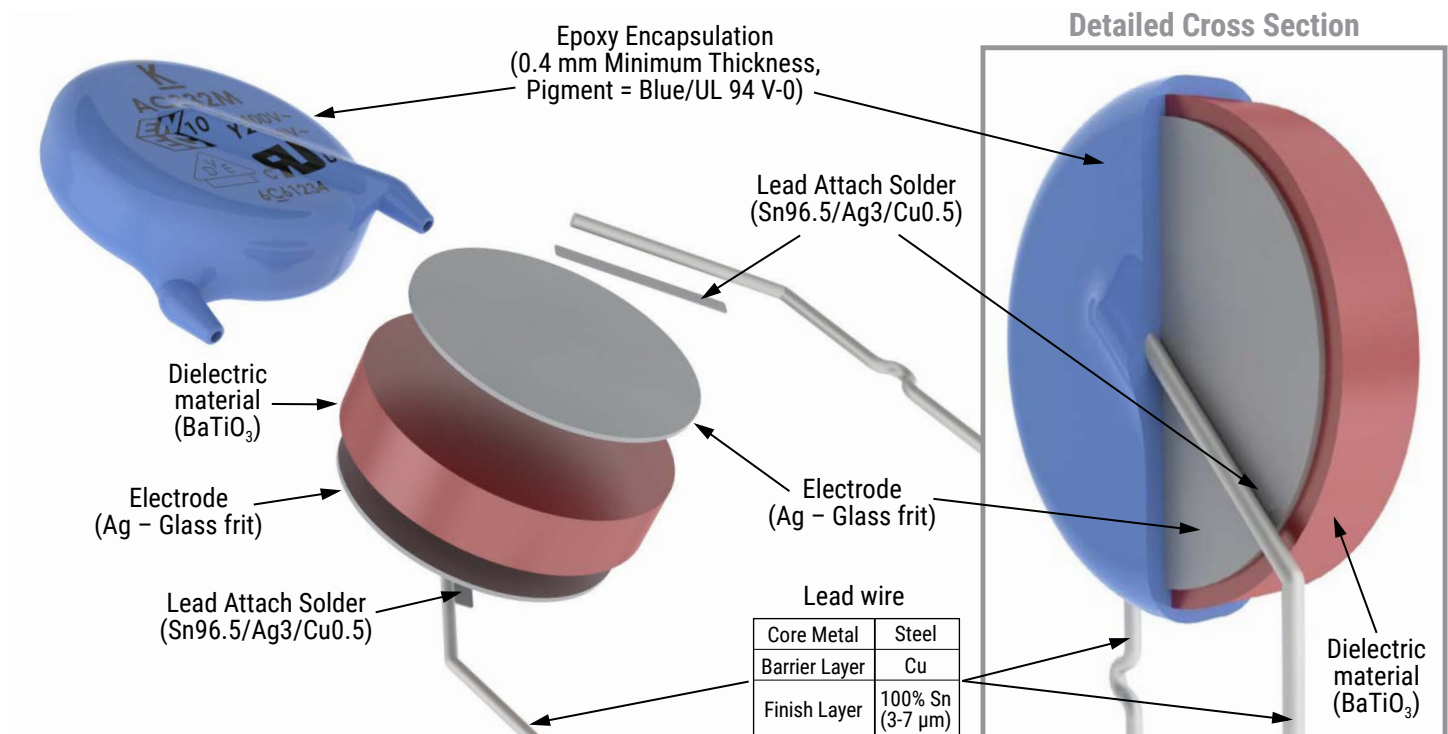
- Temperature of iron-tip: 400°C maximum
- Soldering iron wattage: 50 W maximum
- Soldering time: 3.5 seconds maximum

### Cleaning (ultrasonic cleaning):

To perform ultrasonic cleaning, observe the following conditions:

- Rinse bath capacity: output of 20 watts per liter or less
- Rinsing time: 5 minute maximum
- Do not vibrate the PCB/PWB directly
- Excessive ultrasonic cleaning may lead to fatigue destruction of the lead wires

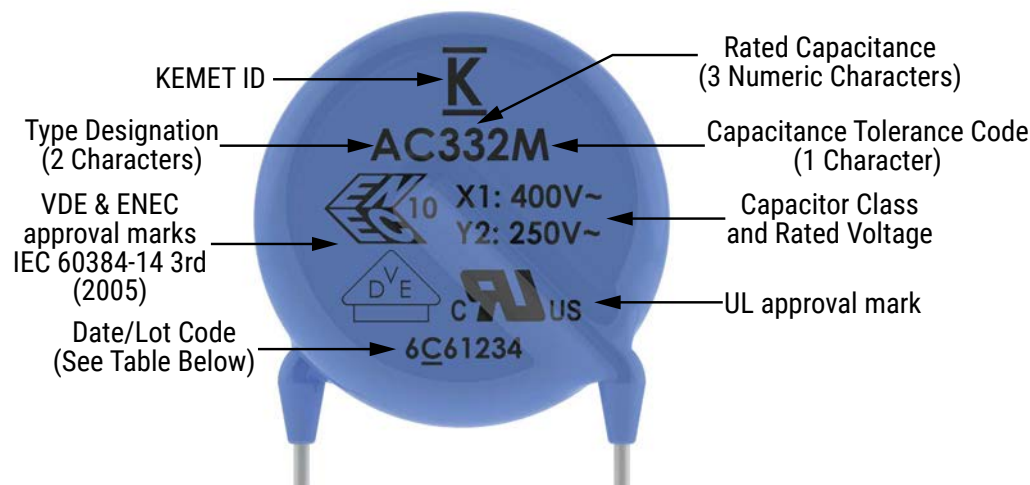
## Construction



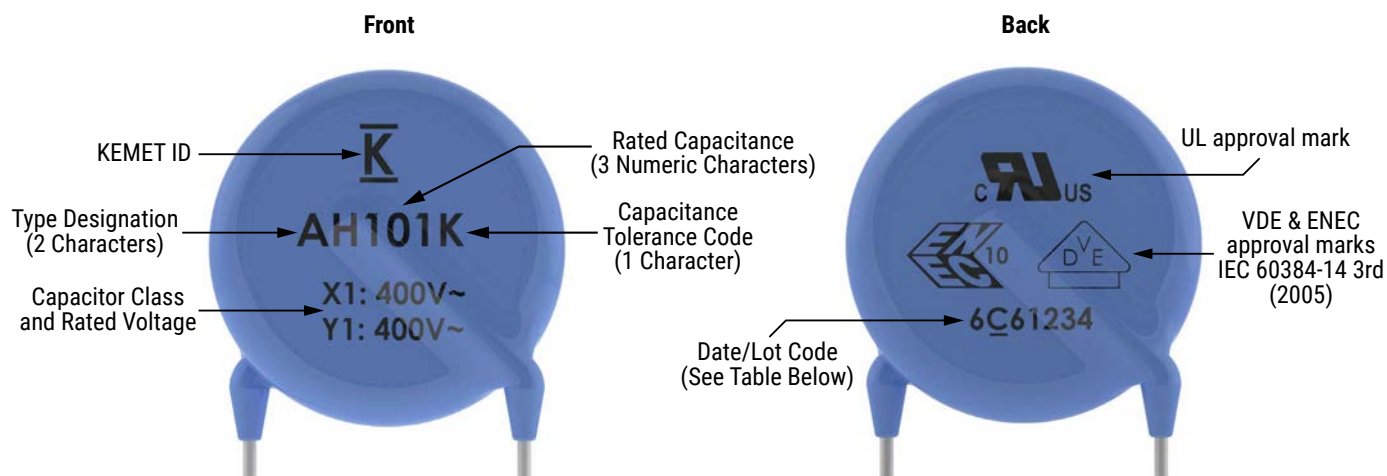
## Marking

These capacitors shall be stamped or laser marked with KEMET's trademark, type designation, capacitor class, rated voltage, rated capacitance, and capacitance tolerance codes. In addition, all devices are marked with the recognized approval mark and a date/lot code for traceability. Marking will be supplied either on one side or both sides of the encapsulated capacitor body. All marking shall be legible to allow for clear identification of the component. Marking appears in legible contrast. Illustrated below is an example of the marking format and content. (Two-sided marking is limited to capacitors with body diameters  $\leq 8.0$  mm)

### Single Sided



### Double Sided



#### Date/Lot Code Explanation

| 6                                        | C                              | 6                                                                                          | 1234                           |
|------------------------------------------|--------------------------------|--------------------------------------------------------------------------------------------|--------------------------------|
| Last digit of year,<br>e.g.,<br>6 = 2016 | Manufacturing<br>Location Code | Manufacturing<br>Month:<br>1-9 = Jan - Sept<br>A = October<br>N = November<br>D = December | Last 4 digits of<br>lot number |

## Packaging Quantities

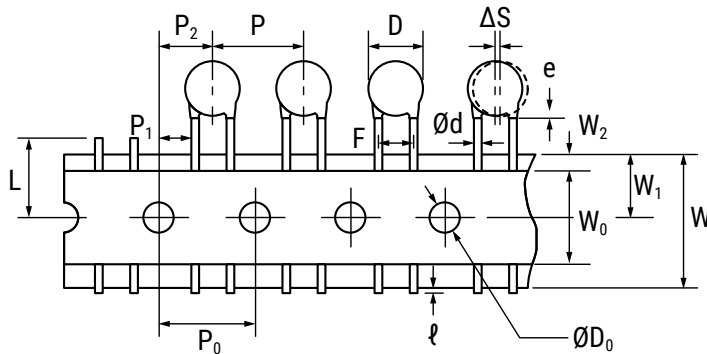
| Capacitor<br>Body Diameter<br>(mm) | Body Diameter<br>Code <sup>1</sup> | Bulk Bag<br>(Loose) | Ammo Pack (Carrier Tape)                     |       |                  |
|------------------------------------|------------------------------------|---------------------|----------------------------------------------|-------|------------------|
|                                    |                                    |                     | Component pitch on carrier tape <sup>2</sup> |       |                  |
|                                    |                                    |                     | 12.7 mm                                      | 15 mm | 25.4 mm          |
| 7.0                                | 0                                  | 500 pieces/bag      | 1,000 pieces/box                             |       |                  |
| 8.0                                | 1                                  |                     |                                              |       |                  |
| 9.0                                | 2                                  |                     |                                              |       |                  |
| 10.0                               | 3                                  |                     |                                              |       |                  |
| 11.0                               | 4                                  |                     |                                              |       |                  |
| 12.0                               | 5                                  |                     |                                              |       |                  |
| 13.0                               | 6                                  |                     |                                              |       |                  |
| 14.0                               | 7                                  |                     |                                              |       |                  |
| 15.0                               | 8                                  |                     |                                              |       |                  |
|                                    |                                    |                     |                                              |       | 1,000 pieces/box |
|                                    |                                    |                     |                                              |       | 500 pieces/box   |

<sup>1</sup> The "Body Diameter Code" is located in the third character position of the ordering code. This code identifies the maximum diameter of the capacitor body in millimeters. For more information regarding the ordering code, see "Ordering Information" section of this document.

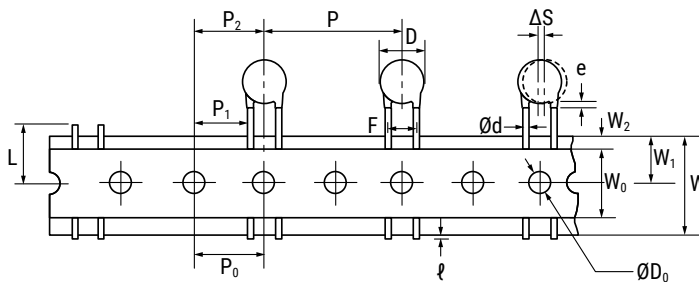
<sup>2</sup> For details regarding component pitch on carrier tape, see "Ammo Pack Taping Format" and "Ammo Pack Taping Specifications" sections of this document.

## Figure 1 - Ammo Pack Taping Format

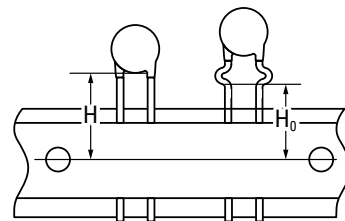
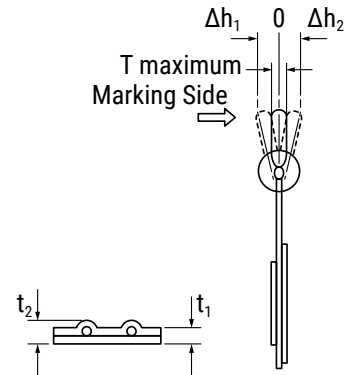
### 5 mm and 7.5 mm Lead Spacing:



### 10 mm Lead Spacing:



### For All Lead Spacing:



**Table 3 – Ammo Pack Taping Specifications**

| Lead Spacing                             |                | 5 mm                                                               |                        | 7.5 mm   |                        | 10 mm    |                        |
|------------------------------------------|----------------|--------------------------------------------------------------------|------------------------|----------|------------------------|----------|------------------------|
| Lead Style                               |                | Straight                                                           | Preformed <sup>1</sup> | Straight | Preformed <sup>1</sup> | Straight | Preformed <sup>1</sup> |
| Item                                     | Symbol         | Dimensions (mm)                                                    |                        |          |                        |          |                        |
| Lead Spacing                             | F              | 5.0+0.8/-0.2                                                       |                        | 7.5±1.0  |                        | 10.0±1.0 |                        |
| Component Pitch                          | P              | 12.7                                                               |                        | 15.0     |                        | 25.4±2   |                        |
| Sprocket Hole Pitch                      | P <sub>0</sub> | 12.7±0.3                                                           |                        | 15.0±0.3 |                        | 12.7±0.3 |                        |
| Sprocket Hole Center to Component Center | P <sub>2</sub> | 6.35±1.5                                                           |                        | 7.5±1.5  |                        | 12.7±1.5 |                        |
| Sprocket Hole Center to Lead Center      | P <sub>1</sub> | 3.75±1.0                                                           |                        | 3.75±1.0 |                        | 7.7±1.5  |                        |
| Body Diameter                            | D              | See "Product Ordering Codes and Ratings" section of this document. |                        |          |                        |          |                        |
| Component Alignment (side/side)          | ΔS             | 0±2.0                                                              |                        |          |                        |          |                        |
| Carrier Tape Width                       | W              | 18.0+1.0/-0.5                                                      |                        |          |                        |          |                        |
| Sprocket Hole Position                   | W <sub>1</sub> | 9.0±0.5                                                            |                        |          |                        |          |                        |

<sup>1</sup> Prefromed (crimped) lead configurations include vertical kink and outside kink. See "Lead Configurations" and "Ordering Information" sections of this document for further details.

<sup>2</sup> Also referred to as "lead length" in this document.

**Table 3 – Ammo Pack Taping Specifications cont'd**

| Lead Spacing                                                            |                 | 5 mm                                                                                                  |                        | 7.5 mm         |                        | 10 mm          |                        |
|-------------------------------------------------------------------------|-----------------|-------------------------------------------------------------------------------------------------------|------------------------|----------------|------------------------|----------------|------------------------|
| Lead Style                                                              |                 | Straight                                                                                              | Preformed <sup>1</sup> | Straight       | Preformed <sup>1</sup> | Straight       | Preformed <sup>1</sup> |
| Item                                                                    | Symbol          | Dimensions (mm)                                                                                       |                        |                |                        |                |                        |
| Height to Seating Plane <sup>2</sup><br>(preformed leads <sup>1</sup> ) | H <sub>0</sub>  | N/A                                                                                                   | 18.0 +2.0/-0           | N/A            | 18.0 +2.0/-0           | N/A            | 18.0 +2.0/-0           |
| Height to Seating Plane <sup>2</sup><br>(straight leads)                | H               | 20.0 +1.5/-1.0                                                                                        | N/A                    | 20.0 +1.5/-1.0 | N/A                    | 20.0 +1.5/-1.0 | N/A                    |
| Lead Protrusion                                                         | ℓ               | 2.0 maximum                                                                                           |                        |                |                        |                |                        |
| Diameter of Sprocket Hole                                               | D <sub>0</sub>  | 4.0±0.2                                                                                               |                        |                |                        |                |                        |
| Lead Diameter                                                           | φd              | 0.55±0.1                                                                                              |                        |                |                        |                |                        |
| Carrier Tape Thickness                                                  | t <sub>1</sub>  | 0.6±0.3                                                                                               |                        |                |                        |                |                        |
| Total Thickness (Carrier Tape,<br>Hold-Down Tape and Lead)              | t <sub>2</sub>  | 1.5 maximum                                                                                           |                        |                |                        |                |                        |
| Component Alignment (front/<br>back )                                   | Δh <sub>1</sub> | 2.0 maximum                                                                                           |                        |                |                        |                |                        |
|                                                                         | Δh <sub>2</sub> |                                                                                                       |                        |                |                        |                |                        |
| Cut Out Length                                                          | L               | 11.0 maximum                                                                                          |                        |                |                        |                |                        |
| Hold-Down Tape Width                                                    | W <sub>0</sub>  | 11.0 minimum                                                                                          |                        | 11.5 minimum   |                        |                |                        |
| Hold-Down Tape Position                                                 | W <sub>2</sub>  | 3.0 maximum                                                                                           |                        | 1.5±1.5        |                        |                |                        |
| Coating Extension on Leads<br>(meniscus)                                | e               | 3.0 maximum for straight lead; not to exceed the bend for preformed <sup>1</sup> lead configurations. |                        |                |                        |                |                        |
| Body Thickness                                                          | T               | See "Product Ordering Codes and Ratings" section of this document.                                    |                        |                |                        |                |                        |

<sup>1</sup> Prefromed (crimped) lead configurations include vertical kink and outside kink. See "Lead Configurations" and "Ordering Information" sections of this document for further details.

<sup>2</sup> Also referred to as "lead length" in this document.

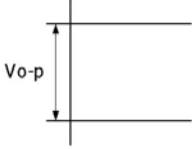
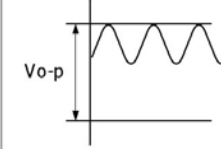
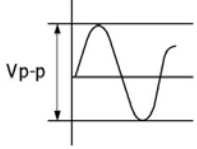
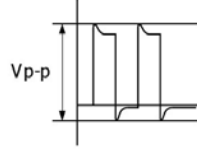
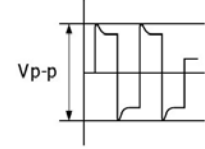
## Application Notes:

### Storage and Operating Conditions:

The Insulating coating of these devices does not form an air and moisture tight seal. Avoid exposure to moisture and do not use or store these devices in a corrosive atmosphere, especially where chloride gas, sulfide gas, acid, alkali, salt or the like are present. Before cleaning, bonding or molding these devices, it is important to verify that your process does not affect product quality and performance. KEMET recommends testing and evaluating the performance of a cleaned, bonded or molded product prior to implementing and/or qualifying any of these processes. Store the capacitors where the temperature and relative humidity do not exceed 40 degrees centigrade and 70% respectively. For optimum solderability, capacitor stock should be used promptly, preferably within 6 months of receipt.

### Working Voltage:

Application voltage (Vp-p or Vo-p) must not exceed the voltage rating of the capacitor. Irregular voltages can be generated for a transient period of time when voltage is initially applied and/or removed from a circuit. It is important to choose a capacitor with a voltage rating greater than or equal to these irregular voltages.

| Voltage                | DC Voltage                                                                        | DC+AC Voltage                                                                     | AC Voltage                                                                        | Pulse Voltage (1)                                                                   | Pulse Voltage (2)                                                                   |
|------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Positional Measurement |  |  |  |  |  |

**Operating Temperature and Self-Generating Heat:**

The surface temperature of a capacitor should be kept below the upper limit of its rated operating temperature range. Be sure to take into account the heat generated by the capacitor itself. When the capacitor is used in a high-frequency current, pulse current or similar current, it may self-generate heat due to dielectric loss. Temperature rise due to self-generated heating should not exceed 20°C (while operated at an atmosphere temperature of 25°C).

**Handling - Vibration and Impact:**

Do not expose these devices or their leads to excessive shock or vibration during use.

**FAILURE TO FOLLOW THE ABOVE CAUTIONS MAY RESULT, WORST CASE, IN A SHORT CIRCUIT AND CAUSE FUMING OR PARTIAL DISPERSION WHEN THE PRODUCT IS USED.**



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Although all product-related warnings, cautions and notes must be observed, the customer should not assume that all safety measures are indicated or that other measures may not be required.

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