

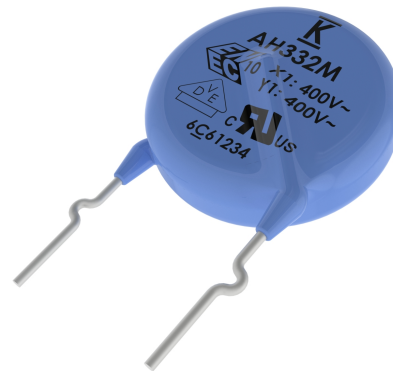
## Safety Standard Recognized, C900, Encapsulated, AH Type, X1 400 VAC/Y1 400 VAC (Industrial Grade)

### Overview

KEMET's 900 series 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 400 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 Y1 requirements, these devices are certified to withstand impulses up to 4 KV (X1) and 8 KV (Y1) respectively. These encapsulated devices also meet the flame test requirements outlined in UL Standard 94V-0.



### Ordering Information

| C9                      | 3                                                                                                                 | 1                         | U          | 101                                         | J                               | V                           | S                                       | D        | A                                                     | A            | 7317                                                |
|-------------------------|-------------------------------------------------------------------------------------------------------------------|---------------------------|------------|---------------------------------------------|---------------------------------|-----------------------------|-----------------------------------------|----------|-------------------------------------------------------|--------------|-----------------------------------------------------|
| Ceramic Series          | Body Diameter                                                                                                     | Lead Spacing <sup>1</sup> | Spec.      | Capacitance Code (pF)                       | Capacitance Tolerance           | Rated Voltage               | Dielectric/Temp. Char.                  | Design   | Lead Config. <sup>2</sup>                             | Failure Rate | Packaging (C-Spec)                                  |
| C9 = Ceramic 900 Series | 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>5 = 12.0 mm<br>6 = 13.0 mm<br>7 = 14.0 mm | 1 = 10.0 mm               | U = Safety | Two significant digits and number of zeroes | J = ±5%<br>K = ±10%<br>M = ±20% | V = X1 400 VAC / Y1 400 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" below |

<sup>1</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 ordered with straight leads (lead configuration ordering code "A"). For nonstandard lead length inquiries, please contact KEMET.

<sup>2</sup> Bulk packaging lead length availability is dependent upon "Lead Configuration." 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      | 20.0 +1.5/-1.0 (straight leads)<br>18.0 +2.0/-0 (preformed leads <sup>1</sup> ) | 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, outside kink and inside kink. See "Lead Configurations" and "Ordering Information" sections of this document for further details.

<sup>2</sup> "Vertical Kink", "Outside Kink" and "Inside 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.

## Benefits

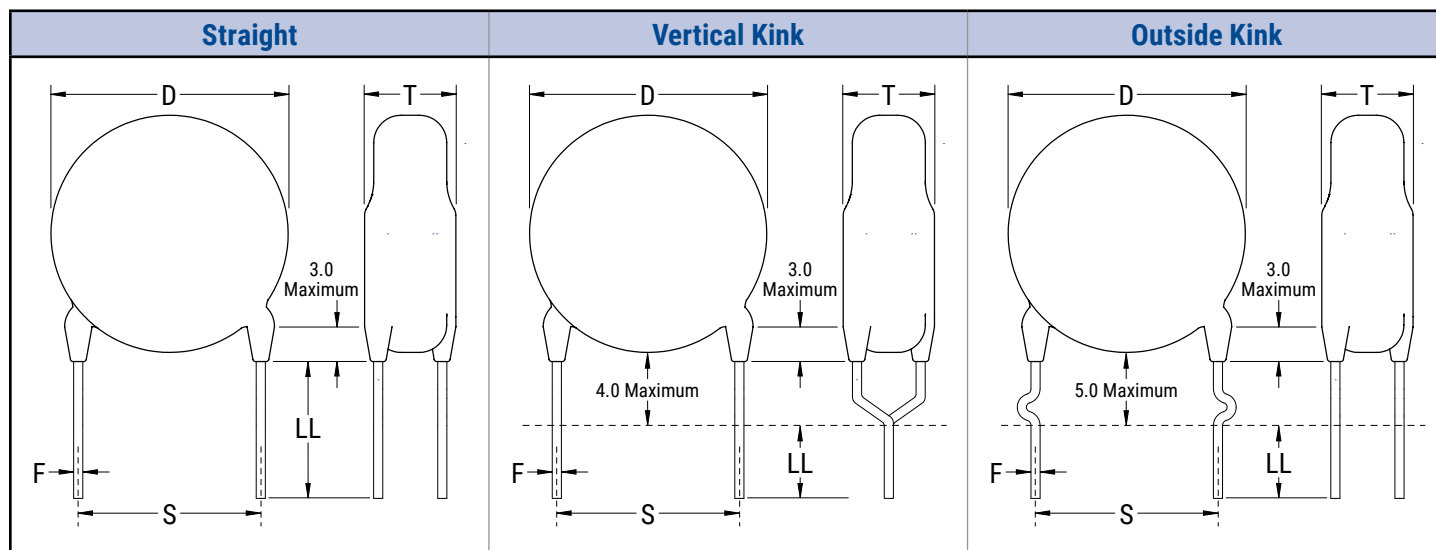
- Safety Standard Recognized (IEC 60384-14)
- Reliable operation up to 125°C
- Class X1/Y1
- 10 mm lead spacing
- Lead (Pb)-free and RoHS Compliant
- Halogen free
- Capacitance offerings ranging from 10 pF up to 10 nF
- Available capacitance tolerances of ±5%, ±10% and ±20%
- High reliability
- Preformed (crimped) or straight lead configurations
- Non-polar device, minimizing installation concerns
- 100% pure matte tin-plated lead finish allowing for excellent solderability
- Encapsulation meets flammability standard UL 94V-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 inverters)

## 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                                             | 10.0                      | ±1.0                   | See Table 1 -<br>"Product Ordering Codes and Ratings" |                | 3.0 maximum   | 0.55±0.1      |
| Vertical Kink (Preformed) | B                                             | 10.0                      | ±1.0                   |                                                       |                |               |               |
| Outside Kink (Preformed)  | C                                             | 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         | 40036417        |
|                 |                              | Y1       | 400 VAC         |                 |
| UL<br>CAN/CSA   | UL 60384-14 and<br>E60384-14 | X1       | 400 VAC         | E356389         |
|                 |                              | Y1       | 400 VAC         |                 |

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                                     | 4,000 VAC<br>(60±5 seconds at 25°C)                             |                          |           |             |
| Quality Factor (Q)                                                  | 30 pF and above:<br>≥ 1,000<br>Below 30 pF: ≥ 400<br>+(20xC)*   | See "Dissipation Factor" |           |             |
| Dissipation Factor (tanδ) at +25°C <sup>1</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> 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.<br>Char. | KEMET<br>Part Number | Capacitance         | Capacitance<br>Tolerance | Dimensions (mm)               |                                |                  | Lead Spacing      |                   |
|-------------------------------|----------------------|---------------------|--------------------------|-------------------------------|--------------------------------|------------------|-------------------|-------------------|
|                               |                      |                     |                          | Body<br>Diameter<br>(Maximum) | Body<br>Thickness<br>(Maximum) | Lead<br>Diameter | Bulk<br>Packaging | Ammo<br>Packaging |
| SL                            | C901U150JVSD(1)A(2)  | 15 pF               | ±5%                      | 7.0                           | 5.0                            | 0.55 ±0.1        | 10 mm             |                   |
|                               | C901U180JVSD(1)A(2)  | 18 pF               |                          |                               |                                |                  |                   |                   |
|                               | C901U200JVSD(1)A(2)  | 20 pF               |                          |                               |                                |                  |                   |                   |
|                               | C901U220JVSD(1)A(2)  | 22 pF               |                          |                               |                                |                  |                   |                   |
|                               | C901U240JVSD(1)A(2)  | 24 pF               |                          |                               |                                |                  |                   |                   |
|                               | C901U270JVSD(1)A(2)  | 27 pF               |                          |                               |                                |                  |                   |                   |
|                               | C901U300JVSD(1)A(2)  | 30 pF               |                          |                               |                                |                  |                   |                   |
|                               | C901U330JVSD(1)A(2)  | 33 pF               |                          |                               |                                |                  |                   |                   |
|                               | C901U360JVSD(1)A(2)  | 36 pF               |                          |                               |                                |                  |                   |                   |
|                               | C901U390JVSD(1)A(2)  | 39 pF               |                          |                               |                                |                  |                   |                   |
|                               | C911U470JVSD(1)A(2)  | 47 pF               |                          |                               |                                |                  |                   |                   |
|                               | C911U500JVSD(1)A(2)  | 50 pF               |                          |                               |                                |                  |                   |                   |
|                               | C911U510JVSD(1)A(2)  | 51 pF               |                          |                               |                                |                  |                   |                   |
|                               | C911U560JVSD(1)A(2)  | 56 pF               |                          |                               |                                |                  |                   |                   |
|                               | C911U620JVSD(1)A(2)  | 62 pF               |                          |                               |                                |                  |                   |                   |
|                               | C921U680JVSD(1)A(2)  | 68 pF               |                          |                               |                                |                  |                   |                   |
| C921U750JVSD(1)A(2)           | 75 pF                | 9.0                 |                          |                               |                                |                  |                   |                   |
| C921U820JVSD(1)A(2)           | 82 pF                |                     |                          |                               |                                |                  |                   |                   |
| C931U101JVSD(1)A(2)           | 100 pF               | 10.0                |                          |                               |                                |                  |                   |                   |
| Y5P                           | C901U101KVYD(1)A(2)  | 100 pF              | ±10%                     | 7.0                           | 5.0                            | 0.55 ±0.1        | 10 mm             |                   |
|                               | C901U151KVYD(1)A(2)  | 150 pF              |                          |                               |                                |                  |                   |                   |
|                               | C901U221KVYD(1)A(2)  | 220 pF              |                          |                               |                                |                  |                   |                   |
|                               | C901U331KVYD(1)A(2)  | 330 pF              |                          | 8.0                           |                                |                  |                   |                   |
|                               | C911U471KVYD(1)A(2)  | 470 pF              |                          |                               |                                |                  |                   |                   |
|                               | C921U561KVYD(1)A(2)  | 560 pF              |                          |                               |                                |                  |                   |                   |
|                               | C921U681KVYD(1)A(2)  | 680 pF              |                          | 9.0                           |                                |                  |                   |                   |
|                               | C941U102KVYD(1)A(2)  | 1,000 pF            |                          |                               |                                |                  |                   |                   |
| Y5U                           | C911U102MVVD(1)A(2)  | 1,000 pF            | ±20%                     | 8.0                           | 5.0                            | 0.55 ±0.1        | 10 mm             |                   |
|                               | C921U152MVVD(1)A(2)  | 1,500 pF            |                          | 9.0                           |                                |                  |                   |                   |
|                               | C931U222MVVD(1)A(2)  | 2,200 pF            |                          | 10.0                          |                                |                  |                   |                   |
|                               | C951U332MVVD(1)A(2)  | 3,300 pF            |                          | 12.0                          |                                |                  |                   |                   |
|                               | C961U392MVVD(1)A(2)  | 3,900 pF            |                          | 13.0                          |                                |                  |                   |                   |
|                               | C971U472MVVD(1)A(2)  | 4,700 pF            |                          | 14.0                          |                                |                  |                   |                   |
|                               | Y5V                  | C901U102MVVD(1)A(2) |                          | 1,000 pF                      |                                |                  |                   |                   |
| C911U152MVVD(1)A(2)           |                      | 1,500 pF            | 8.0                      |                               |                                |                  |                   |                   |
| C921U222MVVD(1)A(2)           |                      | 2,200 pF            | 9.0                      |                               |                                |                  |                   |                   |
| C941U332MVVD(1)A(2)           |                      | 3,300 pF            | 11.0                     |                               |                                |                  |                   |                   |
| C951U472MVVD(1)A(2)           |                      | 4,700 pF            | 12.0                     |                               |                                |                  |                   |                   |
|                               | KEMET Part Number    | Capacitance         | Capacitance<br>Tolerance | Body Diameter<br>(Maximum)    | Body Thickness<br>(Maximum)    | Lead Diameter    | Lead Spacing      |                   |

(1) 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.)

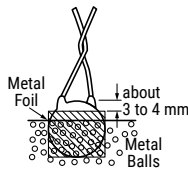
A = Straight

B = Vertical Kink

C = Outside Kink

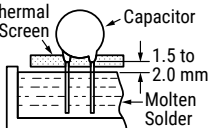
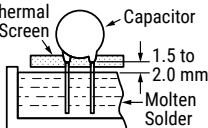
(2) To properly complete ordering code, enter the four-digit numeric or alphanumeric "Packaging C-Spec Ordering Code." See "Dimensions" section of this document, page 2, for available options.

**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 4,000 VAC(rms) is applied between the lead wires for 60 seconds.                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                     |          |             |     |                  |     |                                                                              |                                                                                                                                                           |                                      |                                                                                                                                                                                                                                                                                                    |  |      |             |   |         |   |         |   |         |   |         |   |         |
|                              | 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. 4,000 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 + (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 + (20 x C)<br>C = Nominal capacitance | Y5P, Y5U and Y5V: Capacitance is measured at 1 kHz ±20% and 5 Vrms or less. (20±2°C)<br>SL: Capacitance is measured at 1 MHz ±20% and 1.0±0.2 Vrms (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 + (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 +22%/-56%</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 +22%/-56% | Y5V | Within ~+30%/-80%                                                            | SL                                                                                                                                                        | -1,000 ~+350 ppm°C<br>(+20°C ~+85°C) | A capacitance measurement is made at each step specified: <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 +22%/-56%                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                     |          |             |     |                  |     |                                                                              |                                                                                                                                                           |                                      |                                                                                                                                                                                                                                                                                                    |  |      |             |   |         |   |         |   |         |   |         |   |         |
|                              | 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                                                                                                                                                                                                                                                                                         |                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                     |          |             |     |                  |     |                                                                              |                                                                                                                                                           |                                      |                                                                                                                                                                                                                                                                                                    |  |      |             |   |         |   |         |   |         |   |         |   |         |
|                              |                                                                                                                                                                                                                                                                                                 |                                              | <b>Pre-treatment:</b><br>Capacitor is stored at 85±2°C for 1 hour and then placed at room condition <sup>1</sup> for 24±2 hours before measurement.                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                     |          |             |     |                  |     |                                                                              |                                                                                                                                                           |                                      |                                                                                                                                                                                                                                                                                                    |  |      |             |   |         |   |         |   |         |   |         |   |         |
| 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. One bend immediately followed by a second bend in the opposite direction. |                                                                                     |          |             |     |                  |     |                                                                              |                                                                                                                                                           |                                      |                                                                                                                                                                                                                                                                                                    |  |      |             |   |         |   |         |   |         |   |         |   |         |

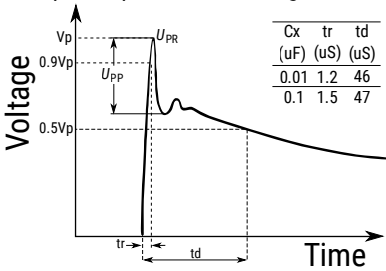
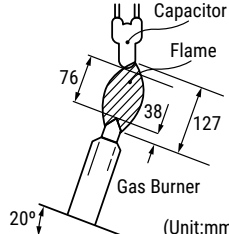
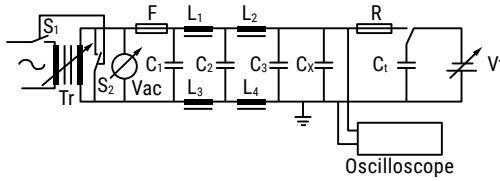
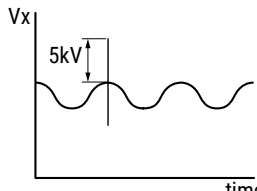
<sup>1</sup> "Room Condition" is defined as follows: Temperature: 15 ~ 35°C/Humidity: 45 ~ 75%/Atmospheric Pressure: 86 ~ 106 kPa.

**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 – 0.5Cu) 245°C ±5°C.                                                                                                                                                                                                                                                                                                                                                                                                                                       |                    |     |             |     |             |     |             |    |                                                |                                                                                                                                                          |                                                                                                                                                                                          |
| Soldering Effect (Non-Preheat) | Appearance                                                                                 | No visual defect                                                                                                                                                                                                                                                                              | <div>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 Temperature: 3.5±0.5 seconds/350°C ±10°C or 10±1 seconds/260°C ±5°C</div> <div></div> <div><b>Pre-treatment:</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>.</div>                                        |                    |     |             |     |             |     |             |    |                                                |                                                                                                                                                          |                                                                                                                                                                                          |
|                                | 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                                                                                                                                                                                                                                                                              | <div>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 seconds/260°C ±5°C</div> <div></div> <div><b>Pre-treatment:</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>.</div> |                    |     |             |     |             |     |             |    |                                                |                                                                                                                                                          |                                                                                                                                                                                          |
|                                | 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. | 90 to 95% humidity at 40°C ±2°C for 500±12 hours.<br><br><b>Post Treatment:</b><br>Capacitor is stored for 1 to 2 hours at room condition <sup>1</sup> . | 90 to 95% humidity at 40°C ±2°C for 500±12 hours with full rated voltage applied.<br><br><b>Post Treatment:</b><br>Capacitor is stored for 1 to 2 hours at room condition <sup>1</sup> . |
|                                |                                                                                            | 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                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                    |     |             |     |             |     |             |    |                                                |                                                                                                                                                          |                                                                                                                                                                                          |
| Q                              | SL: Less than 30 pF: 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                                                                                |                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                    |     |             |     |             |     |             |    |                                                |                                                                                                                                                          |                                                                                                                                                                                          |

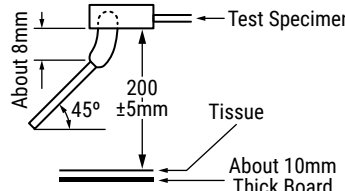
<sup>1</sup> "Room Condition" is defined as follows: Temperature: 15 ~ 35°C/Humidity: 45 ~ 75%/Atmospheric Pressure: 86 ~ 106 kPa.

**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 8 kv impulses prior to life testing.</p>  <table data-bbox="1135 407 1255 501"><tr><th>Cx (uF)</th><th>tr (uS)</th><th>td (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°C throughout the test. The capacitors are subjected to AC 680 Vrms. Each hour the voltage is increased to AC 1,000 Vrms for 0.1 seconds.</p> | Cx (uF)   | tr (uS)        | td (uS)            | 0.01             | 1.2                            | 46                                                                                                                                                                                                                                  | 0.1            | 1.5 | 47      |                 |        |    |                |                |               |   |                 |    |                       |
|                       | Cx (uF)                                                                         | tr (uS)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | td (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="454 900 805 1089"><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>  <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 one time.</p>  <p>Time of exposure to flame: 30 seconds<br/>Length of flame: 12±1 mm<br/>Gas burner length: 35 mm minimum<br/>Inside diameter: 0.5±0.1 mm<br/>Outside diameter: 0.9 mm maximum<br/>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                    |                           |

**Pre-treatment:** 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:

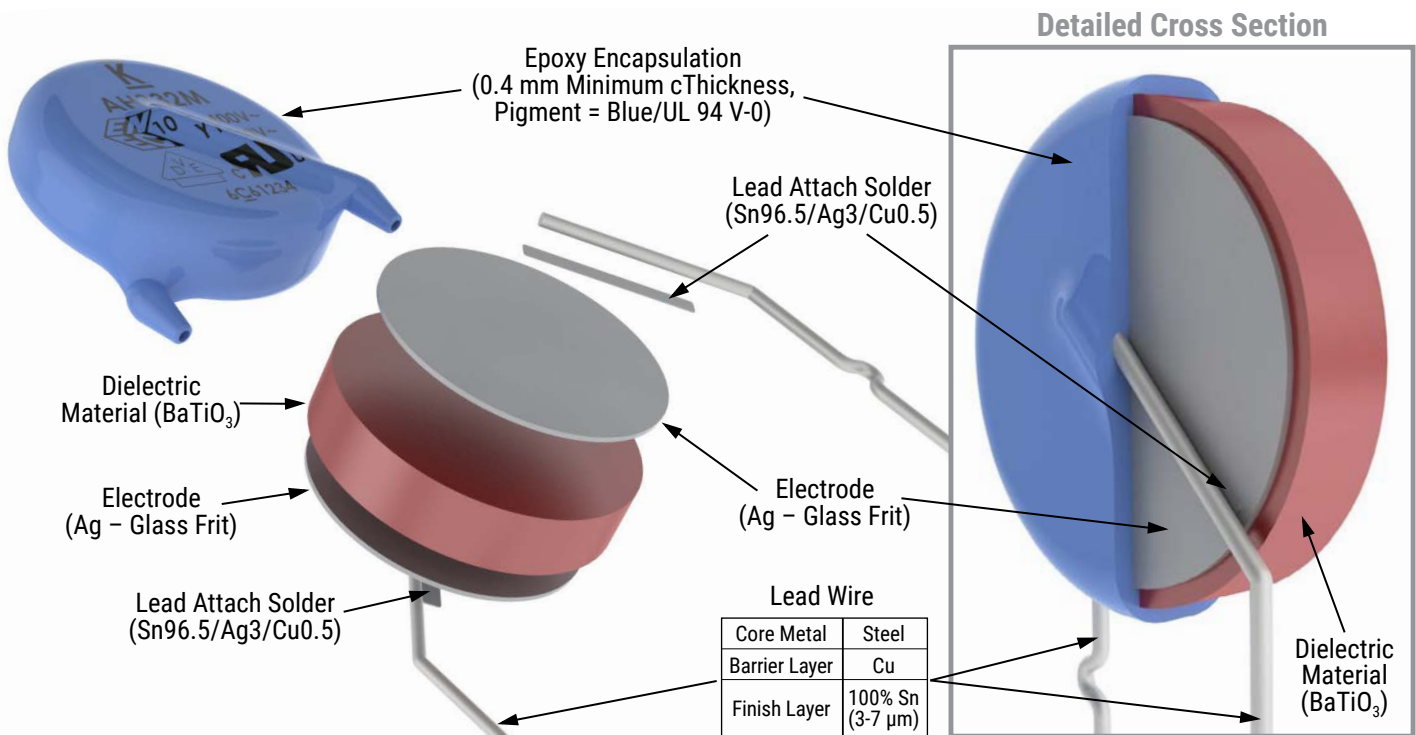
- Temperature of iron-tip: 400°C maximum
- Soldering iron wattage: 50 W maximum
- Soldering time: 3.5 seconds maximum

### 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

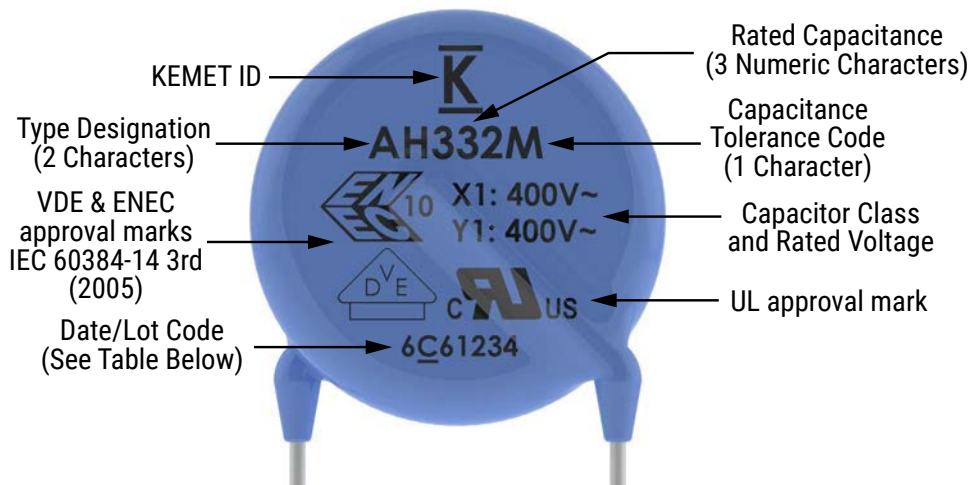
## Construction



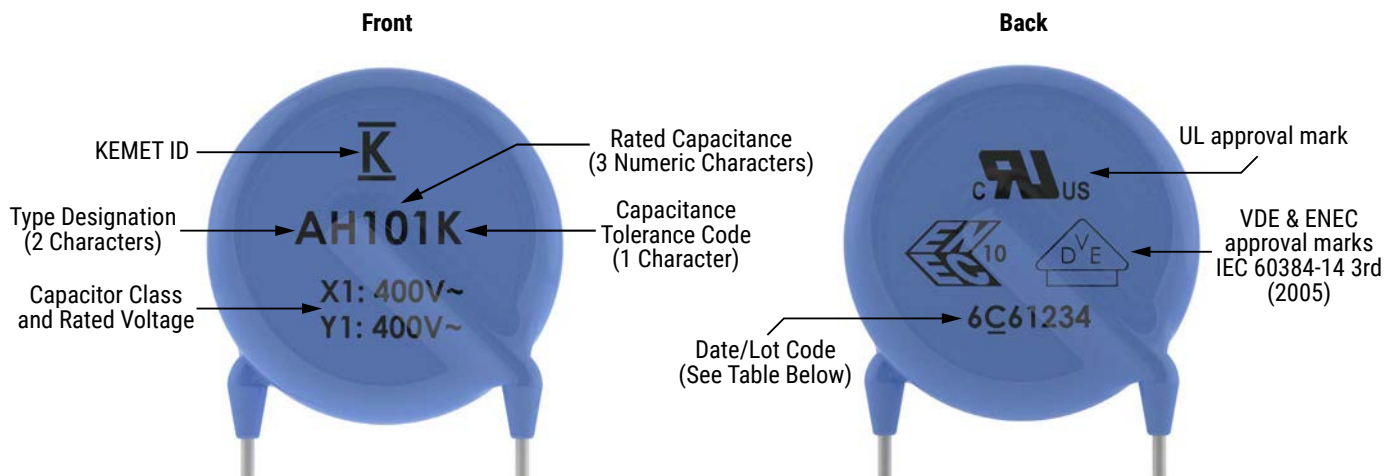
## Marking

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

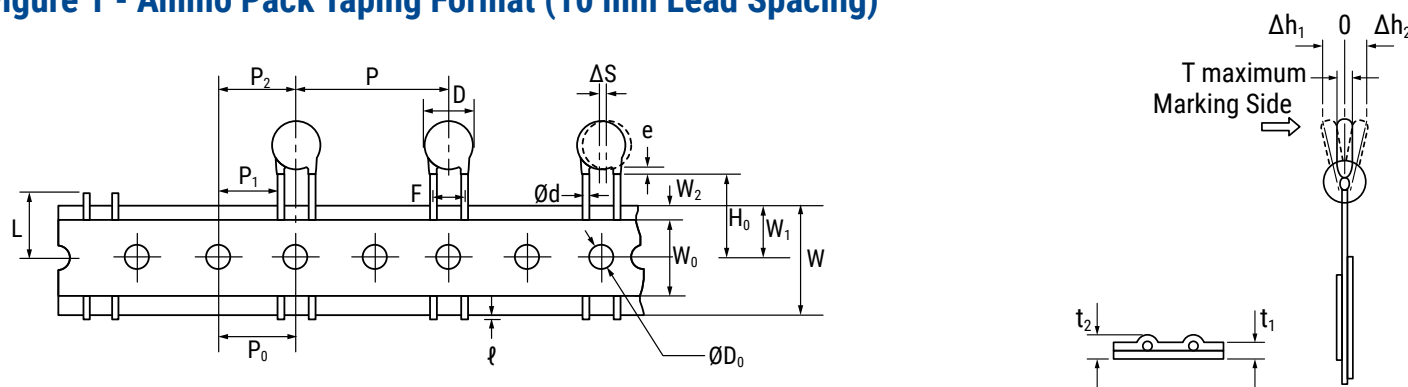
| 6                                        | C                              | 6                                                                                          | 1234                        |
|------------------------------------------|--------------------------------|--------------------------------------------------------------------------------------------|-----------------------------|
| 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 no. |

## Packaging Quantities

| Capacitor<br>Body Diameter (mm) | Body Diameter Code <sup>1</sup> | Bulk Bag<br>(Loose) | Ammo Pack (Carrier Tape)                     |
|---------------------------------|---------------------------------|---------------------|----------------------------------------------|
|                                 |                                 |                     | Component pitch on carrier tape <sup>2</sup> |
|                                 |                                 |                     | 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                               |                     |                                              |
| 13.0                            | 6                               |                     | 500 pieces/box                               |
| 14.0                            | 7                               |                     |                                              |
| 15.0                            | 8                               |                     |                                              |

<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 (10 mm Lead Spacing)****Table 3 – Ammo Pack Taping Specifications**

| Lead Spacing                                                         |                 | 10 mm                                                                                                 |                        |
|----------------------------------------------------------------------|-----------------|-------------------------------------------------------------------------------------------------------|------------------------|
| Lead Style                                                           |                 | Straight                                                                                              | Preformed <sup>1</sup> |
| Item                                                                 | Symbol          | Dimensions (mm)                                                                                       |                        |
| Lead Spacing                                                         | F               | 10.0±1.0                                                                                              |                        |
| Component Pitch                                                      | P               | 25.4±2                                                                                                |                        |
| Sprocket Hole Pitch                                                  | P <sub>0</sub>  | 12.7±0.3                                                                                              |                        |
| Sprocket Hole Center to Component Center                             | P <sub>2</sub>  | 12.7±1.5                                                                                              |                        |
| Sprocket Hole Center to Lead Center                                  | P <sub>1</sub>  | 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                                                                                              |                        |
| Height to Seating Plane <sup>2</sup> (preformed leads <sup>1</sup> ) | H <sub>0</sub>  | N/A                                                                                                   | 18.0 +2.0/-0           |
| Height to Seating Plane <sup>2</sup> (straight leads)                | H               | 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, Hold-Down Tape and Lead)              | t <sub>2</sub>  | 1.5 maximum                                                                                           |                        |
| Component Alignment (front/back)                                     | Δh <sub>1</sub> | 2.0 maximum                                                                                           |                        |
|                                                                      | Δh <sub>2</sub> | 2.0 maximum                                                                                           |                        |
| Cut Out Length                                                       | L               | 11.0 maximum                                                                                          |                        |
| Hold-Down Tape Width                                                 | W <sub>0</sub>  | 11.0 minimum                                                                                          |                        |
| Hold-Down Tape Position                                              | W <sub>2</sub>  | 1.5±1.5                                                                                               |                        |
| Coating Extension on Leads (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> 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> Also referred to as "lead length" in this document.

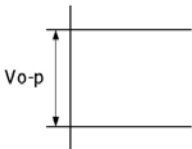
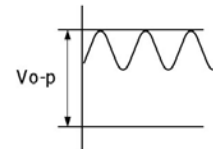
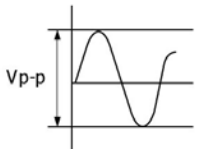
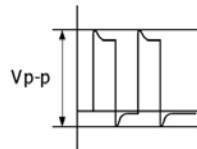
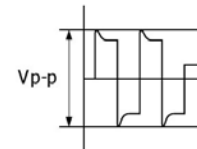
## Application Notes:

### 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 ( $V_{p-p}$  or  $V_{o-p}$ ) 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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### Disclaimer

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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.