

# Radial Leaded Multilayer Ceramic Capacitors for General Purpose Class 1, Class 2 and Class 3, 50 V<sub>DC</sub>, 100 V<sub>DC</sub>, 200 V<sub>DC</sub>, 500 V<sub>DC</sub>



## FEATURES

- High capacitance with small size
- High reliability
- Crimp and straight leadstyles
- Material categorization:  
for definitions of compliance please see  
[www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS**  
COMPLIANT

## APPLICATIONS

- Temperature compensation
- Coupling and decoupling

## QUICK REFERENCE DATA

| DESCRIPTION                | VALUE  |      |      |      |           |         |         |        |           |         |
|----------------------------|--------|------|------|------|-----------|---------|---------|--------|-----------|---------|
| Ceramic Class              | 1      |      |      |      | 2         |         |         |        | 3         |         |
| Ceramic Dielectric         | C0G    |      |      |      | X7R       |         |         |        | Y5V       |         |
| Voltage (V <sub>DC</sub> ) | 50     | 100  | 200  | 500  | 50        | 100     | 200     | 500    | 50        | 100     |
| Min. Capacitance (pF)      | 10     | 10   | 33   | 33   | 100       | 100     | 100     | 100    | 10 000    | 10 000  |
| Max. Capacitance (pF)      | 10 000 | 5600 | 3900 | 1800 | 1 000 000 | 560 000 | 220 000 | 47 000 | 1 000 000 | 220 000 |
| Mounting                   | Radial |      |      |      |           |         |         |        |           |         |

## MARKING

Marking indicates capacitance value and tolerance in accordance with "EIA 198" and voltage marks.

## OPERATING TEMPERATURE RANGE

C0G, X7R: - 55 °C to + 125 °C

Y5V: - 30 °C to + 85 °C

## TEMPERATURE CHARACTERISTICS

Class 1: C0G

Class 2: X7R

Class 3: Y5V

## SECTIONAL SPECIFICATIONS

Climatic category (acc. to EN 60058-1)

Class 1 and 2: 55/125/21

Class 3: 30/85/21

## APPROVALS

EIA 198

IEC 60384-9

## DESIGN

- The capacitors consist of a general purpose MLCC
- The lead wires are 0.5 mm and are made of 100 % tinned copper clad steel wire
- The capacitors may be supplied with straight or kinked leads having a lead spacing of 2.5 mm and 5.0 mm
- Coating is made of yellow colored flame retardant epoxy resin in accordance with UL 94 V-0

## CAPACITANCE RANGE

10 pF to 1 µF

## TOLERANCE ON CAPACITANCE

± 5 %, ± 10 %, ± 20 %, + 80 %/- 20 %

## RATED VOLTAGE

50 V<sub>DC</sub>, 100 V<sub>DC</sub>, 200 V<sub>DC</sub>, 500 V<sub>DC</sub>

## TEST VOLTAGE

- 50 V<sub>DC</sub> and 100 V<sub>DC</sub>: 250 % of rated voltage
- 200 V<sub>DC</sub>: 150 % of rated voltage + 100 V<sub>DC</sub>
- 500 V<sub>DC</sub>: 130 % of rated voltage + 100 V<sub>DC</sub>

## INSULATION RESISTANCE AT RATED VOLTAGE

- 50 V<sub>DC</sub> and 100 V<sub>DC</sub>: 100 GΩ or 1000 ΩF, whichever is less at rated voltage within 2 min of charging
- 200 V<sub>DC</sub>, 500 V<sub>DC</sub>, and size 10: 10 GΩ or 100 ΩF, whichever is less at rated voltage within 2 min of charging

## DISSIPATION FACTOR

- Class 1      0.1 % max. when C ≥ 30 pF  
(at 1 MHz; 1 V where C ≤ 1000 pF, and at 1 kHz; 1 V where C > 1000 pF)  
For C < 30 pF: DF = 100/(400 + 20 x C)  
DF = dissipation factor in %;  
C = capacitance value in pF
- Class 2      2.5 % max. (at 1 kHz; 1 V)
- Class 3      5 % max. (at 1 kHz; 1 V)

**LEAD CONFIGURATION AND DIMENSIONS** (in millimeters)

| <p><b>L2</b> Component outline for lead spacing 2.5 mm ± 0.8 mm (straight leads)</p> <p><b>H5</b> Component outline for lead spacing 5.0 mm ± 0.8 mm (flat bent leads)</p> <p><b>K2</b> Component outline for lead spacing 2.5 mm ± 0.8 mm (outside kink)</p> <p><b>K5</b> Component outline for lead spacing 5.0 mm ± 0.8 mm (outside kink)</p> |                    |                   |                   |                             |     |     |     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-------------------|-------------------|-----------------------------|-----|-----|-----|
| SIZE CODE                                                                                                                                                                                                                                                                                                                                        | Wb <sub>MAX.</sub> | H <sub>MAX.</sub> | T <sub>MAX.</sub> | MAXIMUM SEATING HEIGHT (SH) |     |     |     |
|                                                                                                                                                                                                                                                                                                                                                  |                    |                   |                   | L2                          | H5  | K2  | K5  |
| 10                                                                                                                                                                                                                                                                                                                                               | 3.6                | 3.6               | 2.3               | 1.6                         | 2.6 | 3.5 | -   |
| 15                                                                                                                                                                                                                                                                                                                                               | 4.0                | 4.0               | 2.6               | 1.6                         | 2.6 | 3.5 | 3.5 |
| 20                                                                                                                                                                                                                                                                                                                                               | 5.0                | 5.0               | 3.2               | 1.6                         | 2.6 | 3.5 | 3.5 |

**Notes**

- Bulk packed types have a standard lead length L = 30 mm ± 5 mm
- The K5 lead style is not available for size 10
- L2 and H5 are preferred styles

**MARKING**

| SIZE 10 AND 15 CAPACITANCE VALUE < 100 pF                                          | SIZE 10 AND 15 CAPACITANCE VALUE ≥ 100 pF                                           | SIZE 20                                                                             |
|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| <p>Vishay logo or BC logo</p> <p>XX: Capacitance code</p> <p>t: Tolerance code</p> | <p>Vishay logo or BC logo</p> <p>XXX: Capacitance code</p> <p>t: Tolerance code</p> | <p>Vishay logo or BC logo</p> <p>XXX: Capacitance code</p> <p>t: Tolerance code</p> |

**Notes**

- The capacitance code indicates actual capacitance in pF when capacitance value < 100 pF
- Two significant digits followed by one digit for the multiplier as given following: 1 = \* 10, 2 = \* 100, 3 = \* 1000, 4 = \* 10 000, 5 = \* 100 000
- The tolerance codes are J = 5 %, K = 10 %, M = 20 % and Z = + 80 %/- 20 %

**ORDERING CODE INFORMATION**

| K                      | 104                                                                                                                                                                                               | K                                                          | 15                                 | X7R                                | F                                                                                                       | 5                     | 3                                         | H                                                   | 5                        |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|------------------------------------|------------------------------------|---------------------------------------------------------------------------------------------------------|-----------------------|-------------------------------------------|-----------------------------------------------------|--------------------------|
| 1                      | 2 3 4                                                                                                                                                                                             | 5                                                          | 6 7                                | 8 9 10                             | 11                                                                                                      | 12                    | 13                                        | 14                                                  | 15                       |
| Product Type           | Capacitance (pF)                                                                                                                                                                                  | Capacitance Tolerance                                      | Size Code                          | T.C. Code                          | Rated Voltage                                                                                           | Lead Diameter         | Packaging / Lead Length                   | Lead Style                                          | Lead Spacing             |
| K = radial leaded MLCC | The first two digits are the significant figures of capacitance and the last digit is a multiplier as follows:<br>0 = * 1<br>1 = * 10<br>2 = * 100<br>3 = * 1000<br>4 = * 10 000<br>5 = * 100 000 | J = ± 5 %<br>K = ± 10 %<br>M = ± 20 %<br>Z = + 80 %/- 20 % | Please refer to relevant datasheet | Please refer to relevant datasheet | F = 50 V <sub>DC</sub><br>H = 100 V <sub>DC</sub><br>K = 200 V <sub>DC</sub><br>L = 500 V <sub>DC</sub> | 5 = 0.50 mm ± 0.05 mm | 3 = bulk<br>T = tape and reel<br>U = ammo | H = flat crimp<br>L = straight<br>K = outside crimp | 2 = 2.5 mm<br>5 = 5.0 mm |



## ORDERING CODES

| DIELECTRIC C0G |                    |                 |                     |                 |                     |                     |
|----------------|--------------------|-----------------|---------------------|-----------------|---------------------|---------------------|
| CAP.<br>(pF)   | 50 V <sub>DC</sub> |                 | 100 V <sub>DC</sub> |                 | 200 V <sub>DC</sub> | 500 V <sub>DC</sub> |
|                | SMALLER SIZE       | NORMAL SIZE     | SMALLER SIZE        | NORMAL SIZE     | NORMAL SIZE         | NORMAL SIZE         |
| 10             | K100#10C0GF5###    | K100#15C0GF5### | K100#10C0GH5###     | K100#15C0GH5### | -                   | -                   |
| 12             | K120#10C0GF5###    | K120#15C0GF5### | K120#10C0GH5###     | K120#15C0GH5### | -                   | -                   |
| 15             | K150#10C0GF5###    | K150#15C0GF5### | K150#10C0GH5###     | K150#15C0GH5### | -                   | -                   |
| 18             | K180#10C0GF5###    | K180#15C0GF5### | K180#10C0GH5###     | K180#15C0GH5### | -                   | -                   |
| 22             | K220#10C0GF5###    | K220#15C0GF5### | K220#10C0GH5###     | K220#15C0GH5### | -                   | -                   |
| 27             | K270#10C0GF5###    | K270#15C0GF5### | K270#10C0GH5###     | K270#15C0GH5### | -                   | -                   |
| 33             | K330#10C0GF5###    | K330#15C0GF5### | K330#10C0GH5###     | K330#15C0GH5### | K330#15C0GK5###     | K330#15C0GL5##5     |
| 39             | K390#10C0GF5###    | K390#15C0GF5### | K390#10C0GH5###     | K390#15C0GH5### | K390#15C0GK5###     | K390#15C0GL5##5     |
| 47             | K470#10C0GF5###    | K470#15C0GF5### | K470#10C0GH5###     | K470#15C0GH5### | K470#15C0GK5###     | K470#15C0GL5##5     |
| 56             | K560#10C0GF5###    | K560#15C0GF5### | K560#10C0GH5###     | K560#15C0GH5### | K560#15C0GK5###     | K560#15C0GL5##5     |
| 68             | K680#10C0GF5###    | K680#15C0GF5### | K680#10C0GH5###     | K680#15C0GH5### | K680#15C0GK5###     | K680#15C0GL5##5     |
| 82             | K820#10C0GF5###    | K820#15C0GF5### | K820#10C0GH5###     | K820#15C0GH5### | K820#15C0GK5###     | K820#15C0GL5##5     |
| 100            | K101#10C0GF5###    | K101#15C0GF5### | K101#10C0GH5###     | K101#15C0GH5### | K101#15C0GK5###     | K101#15C0GL5##5     |
| 120            | K121#10C0GF5###    | K121#15C0GF5### | K121#10C0GH5###     | K121#15C0GH5### | K121#15C0GK5###     | K121#15C0GL5##5     |
| 150            | K151#10C0GF5###    | K151#15C0GF5### | K151#10C0GH5###     | K151#15C0GH5### | K151#15C0GK5###     | K151#15C0GL5##5     |
| 180            | K181#10C0GF5###    | K181#15C0GF5### | K181#10C0GH5###     | K181#15C0GH5### | K181#15C0GK5###     | K181#15C0GL5##5     |
| 220            | K221#10C0GF5###    | K221#15C0GF5### | K221#10C0GH5###     | K221#15C0GH5### | K221#15C0GK5###     | K221#15C0GL5##5     |
| 270            | K271#10C0GF5###    | K271#15C0GF5### | K271#10C0GH5###     | K271#15C0GH5### | K271#15C0GK5###     | K271#15C0GL5##5     |
| 330            | K331#10C0GF5###    | K331#15C0GF5### | K331#10C0GH5###     | K331#15C0GH5### | K331#15C0GK5###     | K331#15C0GL5##5     |
| 390            | K391#10C0GF5###    | K391#15C0GF5### | K391#10C0GH5###     | K391#15C0GH5### | K391#15C0GK5###     | K391#15C0GL5##5     |
| 470            | K471#10C0GF5###    | K471#15C0GF5### | K471#10C0GH5###     | K471#15C0GH5### | K471#15C0GK5###     | K471#20C0GL5##5     |
| 560            | K561#10C0GF5###    | K561#15C0GF5### | K561#10C0GH5###     | K561#15C0GH5### | K561#15C0GK5###     | K561#20C0GL5##5     |
| 680            | K681#10C0GF5###    | K681#15C0GF5### | -                   | K681#15C0GH5### | K681#15C0GK5###     | K681#20C0GL5##5     |
| 820            | K821#10C0GF5###    | K821#15C0GF5### | -                   | K821#15C0GH5### | K821#15C0GK5###     | K821#20C0GL5##5     |
| 1000           | K102#10C0GF5###    | K102#15C0GF5### | -                   | K102#20C0GH5### | K102#20C0GK5###     | K102#20C0GL5##5     |
| 1200           | -                  | K122#15C0GF5### | -                   | K122#20C0GH5### | K122#20C0GK5###     | K122#20C0GL5##5     |
| 1500           | -                  | K152#15C0GF5### | -                   | K152#20C0GH5### | K152#20C0GK5###     | K152#20C0GL5##5     |
| 1800           | -                  | K182#15C0GF5### | -                   | K182#20C0GH5### | K182#20C0GK5###     | K182#20C0GL5##5     |
| 2200           | -                  | K222#15C0GF5### | -                   | K222#20C0GH5### | K222#20C0GK5###     | -                   |
| 2700           | -                  | K272#20C0GF5### | -                   | K272#20C0GH5### | K272#20C0GK5###     | -                   |
| 3300           | -                  | K332#20C0GF5### | -                   | K332#20C0GH5### | K332#20C0GK5###     | -                   |
| 3900           | -                  | K392#20C0GF5### | -                   | K392#20C0GH5### | K392#20C0GK5###     | -                   |
| 4700           | -                  | K472#20C0GF5### | -                   | K472#20C0GH5### | -                   | -                   |
| 5600           | -                  | K562#20C0GF5### | -                   | K562#20C0GH5### | -                   | -                   |
| 6800           | -                  | K682#20C0GF5### | -                   | -               | -                   | -                   |
| 8200           | -                  | K822#20C0GF5### | -                   | -               | -                   | -                   |
| 10 000         | -                  | K103#20C0GF5### | -                   | -               | -                   | -                   |

## Notes

- Lead diameter is 0.5 mm
- # 5<sup>th</sup> digit is capacitance tolerance code:  $\pm 5\%$  = J;  $\pm 10\%$  = K
- # 13<sup>th</sup> digit is packaging code: bulk = 3; reel = T; ammo = U
- # 14<sup>th</sup> digit is lead style code: L; H; K (L and H are preferred lead configuration)
- # 15<sup>th</sup> digit is lead spacing code: 2.5 mm = 2; 5.0 mm = 5



| DIELECTRIC X7R |                    |                 |                     |                 |                     |                     |
|----------------|--------------------|-----------------|---------------------|-----------------|---------------------|---------------------|
| CAP.<br>(pF)   | 50 V <sub>DC</sub> |                 | 100 V <sub>DC</sub> |                 | 200 V <sub>DC</sub> | 500 V <sub>DC</sub> |
|                | SMALLER SIZE       | NORMAL SIZE     | SMALLER SIZE        | NORMAL SIZE     | NORMAL SIZE         | NORMAL SIZE         |
| 100            | K101#10X7RF5###    | K101#15X7RF5### | K101#10X7RH5###     | K101#15X7RH5### | K101#15X7RK5###     | K101#15X7RL5##5     |
| 120            | K121#10X7RF5###    | K121#15X7RF5### | K121#10X7RH5###     | K121#15X7RH5### | K121#15X7RK5###     | K121#15X7RL5##5     |
| 150            | K151#10X7RF5###    | K151#15X7RF5### | K151#10X7RH5###     | K151#15X7RH5### | K151#15X7RK5###     | K151#15X7RL5##5     |
| 180            | K181#10X7RF5###    | K181#15X7RF5### | K181#10X7RH5###     | K181#15X7RH5### | K181#15X7RK5###     | K181#15X7RL5##5     |
| 220            | K221#10X7RF5###    | K221#15X7RF5### | K221#10X7RH5###     | K221#15X7RH5### | K221#15X7RK5###     | K221#15X7RL5##5     |
| 270            | K271#10X7RF5###    | K271#15X7RF5### | K271#10X7RH5###     | K271#15X7RH5### | K271#15X7RK5###     | K271#15X7RL5##5     |
| 330            | K331#10X7RF5###    | K331#15X7RF5### | K331#10X7RH5###     | K331#15X7RH5### | K331#15X7RK5###     | K331#15X7RL5##5     |
| 390            | K391#10X7RF5###    | K391#15X7RF5### | K391#10X7RH5###     | K391#15X7RH5### | K391#15X7RK5###     | K391#15X7RL5##5     |
| 470            | K471#10X7RF5###    | K471#15X7RF5### | K471#10X7RH5###     | K471#15X7RH5### | K471#15X7RK5###     | K471#15X7RL5##5     |
| 560            | K561#10X7RF5###    | K561#15X7RF5### | K561#10X7RH5###     | K561#15X7RH5### | K561#15X7RK5###     | K561#15X7RL5##5     |
| 680            | K681#10X7RF5###    | K681#15X7RF5### | K681#10X7RH5###     | K681#15X7RH5### | K681#15X7RK5###     | K681#15X7RL5##5     |
| 820            | K821#10X7RF5###    | K821#15X7RF5### | K821#10X7RH5###     | K821#15X7RH5### | K821#15X7RK5###     | K821#15X7RL5##5     |
| 1000           | K102#10X7RF5###    | K102#15X7RF5### | K102#10X7RH5###     | K102#15X7RH5### | K102#15X7RK5###     | K102#15X7RL5##5     |
| 1200           | K122#10X7RF5###    | K122#15X7RF5### | K122#10X7RH5###     | K122#15X7RH5### | K122#15X7RK5###     | K122#15X7RL5##5     |
| 1500           | K152#10X7RF5###    | K152#15X7RF5### | K152#10X7RH5###     | K152#15X7RH5### | K152#15X7RK5###     | K152#15X7RL5##5     |
| 1800           | K182#10X7RF5###    | K182#15X7RF5### | K182#10X7RH5###     | K182#15X7RH5### | K182#15X7RK5###     | K182#15X7RL5##5     |
| 2200           | K222#10X7RF5###    | K222#15X7RF5### | K222#10X7RH5###     | K222#15X7RH5### | K222#15X7RK5###     | K222#15X7RL5##5     |
| 2700           | K272#10X7RF5###    | K272#15X7RF5### | K272#10X7RH5###     | K272#15X7RH5### | K272#15X7RK5###     | K272#15X7RL5##5     |
| 3300           | K332#10X7RF5###    | K332#15X7RF5### | K332#10X7RH5###     | K332#15X7RH5### | K332#15X7RK5###     | K332#20X7RL5##5     |
| 3900           | K392#10X7RF5###    | K392#15X7RF5### | K392#10X7RH5###     | K392#15X7RH5### | K392#15X7RK5###     | K392#20X7RL5##5     |
| 4700           | K472#10X7RF5###    | K472#15X7RF5### | K472#10X7RH5###     | K472#15X7RH5### | K472#15X7RK5###     | K472#20X7RL5##5     |
| 5600           | K562#10X7RF5###    | K562#15X7RF5### | K562#10X7RH5###     | K562#15X7RH5### | K562#15X7RK5###     | K562#20X7RL5##5     |
| 6800           | K682#10X7RF5###    | K682#15X7RF5### | K682#10X7RH5###     | K682#15X7RH5### | K682#15X7RK5###     | K682#20X7RL5##5     |
| 8200           | K822#10X7RF5###    | K822#15X7RF5### | K822#10X7RH5###     | K822#15X7RH5### | K822#15X7RK5###     | K822#20X7RL5##5     |
| 10 000         | K103#10X7RF5###    | K103#15X7RF5### | K103#10X7RH5###     | K103#15X7RH5### | K103#15X7RK5###     | K103#20X7RL5##5     |
| 12 000         | K123#10X7RF5###    | K123#15X7RF5### | -                   | K123#15X7RH5### | K123#15X7RK5###     | K123#20X7RL5##5     |
| 15 000         | K153#10X7RF5###    | K153#15X7RF5### | -                   | K153#15X7RH5### | K153#15X7RK5###     | K153#20X7RL5##5     |
| 18 000         | K183#10X7RF5###    | K183#15X7RF5### | -                   | K183#15X7RH5### | K183#15X7RK5###     | K183#20X7RL5##5     |
| 22 000         | K223#10X7RF5###    | K223#15X7RF5### | -                   | K223#15X7RH5### | K223#15X7RK5###     | K223#20X7RL5##5     |
| 27 000         | K273#10X7RF5###    | K273#15X7RF5### | -                   | K273#20X7RH5### | K273#20X7RK5###     | K273#20X7RL5##5     |
| 33 000         | K333#10X7RF5###    | K333#15X7RF5### | -                   | K333#20X7RH5### | K333#20X7RK5###     | K333#20X7RL5##5     |
| 39 000         | K393#10X7RF5###    | K393#15X7RF5### | -                   | K393#20X7RH5### | K393#20X7RK5###     | K393#20X7RL5##5     |
| 47 000         | K473#10X7RF5###    | K473#15X7RF5### | -                   | K473#20X7RH5### | K473#20X7RK5###     | K473#20X7RL5##5     |
| 56 000         | K563#10X7RF5###    | K563#15X7RF5### | -                   | K563#20X7RH5### | K563#20X7RK5###     | -                   |
| 68 000         | K683#10X7RF5###    | K683#15X7RF5### | -                   | K683#20X7RH5### | K683#20X7RK5###     | -                   |
| 82 000         | K823#10X7RF5###    | K823#15X7RF5### | -                   | K823#20X7RH5### | K823#20X7RK5###     | -                   |
| 100 000        | K104#10X7RF5###    | K104#15X7RF5### | -                   | K104#20X7RH5### | K104#20X7RK5###     | -                   |
| 150 000        | -                  | K154#20X7RF5### | -                   | K154#20X7RH5### | K154#20X7RK5###     | -                   |
| 220 000        | -                  | K224#20X7RF5### | -                   | K224#20X7RH5### | K224#20X7RK5###     | -                   |
| 330 000        | -                  | K334#20X7RF5### | -                   | K334#20X7RH5### | -                   | -                   |
| 470 000        | -                  | K474#20X7RF5### | -                   | K474#20X7RH5### | -                   | -                   |
| 560 000        | -                  | K564#20X7RF5### | -                   | K564#20X7RH5### | -                   | -                   |
| 680 000        | -                  | K684#20X7RF5### | -                   | -               | -                   | -                   |
| 1 000 000      | -                  | K105#20X7RF5### | -                   | -               | -                   | -                   |

**Notes**

- Lead diameter is 0.5 mm
- # 5<sup>th</sup> digit is capacitance tolerance code:  $\pm 10\%$  = K;  $\pm 20\%$  = M
- # 13<sup>th</sup> digit is packaging code: bulk = 3; reel = T; ammo = U
- # 14<sup>th</sup> digit is lead style code: L; H; K (L and H are preferred lead configuration)
- # 15<sup>th</sup> digit is lead spacing code: 2.5 mm = 2; 5.0 mm = 5

| <b>DIELECTRIC Y5V</b> |                    |                 |                     |
|-----------------------|--------------------|-----------------|---------------------|
| CAP.<br>(pF)          | 50 V <sub>DC</sub> |                 | 100 V <sub>DC</sub> |
|                       | SMALLER SIZE       | NORMAL SIZE     | NORMAL SIZE         |
| 10 000                | K103Z10Y5VF5###    | K103Z15Y5VF5### | K103Z15Y5VH5###     |
| 15 000                | K153Z10Y5VF5###    | K153Z15Y5VF5### | K153Z15Y5VH5###     |
| 22 000                | K223Z10Y5VF5###    | K223Z15Y5VF5### | K223Z15Y5VH5###     |
| 33 000                | K333Z10Y5VF5###    | K333Z15Y5VF5### | K333Z15Y5VH5###     |
| 47 000                | K473Z10Y5VF5###    | K473Z15Y5VF5### | K473Z15Y5VH5###     |
| 68 000                | K683Z10Y5VF5###    | K683Z15Y5VF5### | K683Z15Y5VH5###     |
| 100 000               | K104Z10Y5VF5###    | K104Z15Y5VF5### | K104Z15Y5VH5###     |
| 150 000               | K154Z10Y5VF5###    | K154Z15Y5VF5### | K154Z20Y5VH5###     |
| 220 000               | -                  | K224Z15Y5VF5### | K224Z20Y5VH5###     |
| 330 000               | -                  | K334Z20Y5VF5### | -                   |
| 470 000               | -                  | K474Z20Y5VF5### | -                   |
| 680 000               | -                  | K684Z20Y5VF5### | -                   |
| 1 000 000             | -                  | K105Z20Y5VF5### | -                   |

**Notes**

- Lead diameter is 0.5 mm
- Tolerance is + 80 %/- 20 %
- # 13<sup>th</sup> digit is packaging code: bulk = 3; reel = T; ammo = U
- # 14<sup>th</sup> digit is lead style code: L; H; K (L and H are preferred lead configuration)
- # 15<sup>th</sup> digit is lead spacing code: 2.5 mm = 2; 5.0 mm = 5

**TAPING AND PACKAGING**
**LABELLING**

Each reel is provided with a label showing the following details:

Manufacturer, K style, capacitance, tolerance, batch number, quantity of components, rated voltage, dielectric.

On special request other designations can be shown.

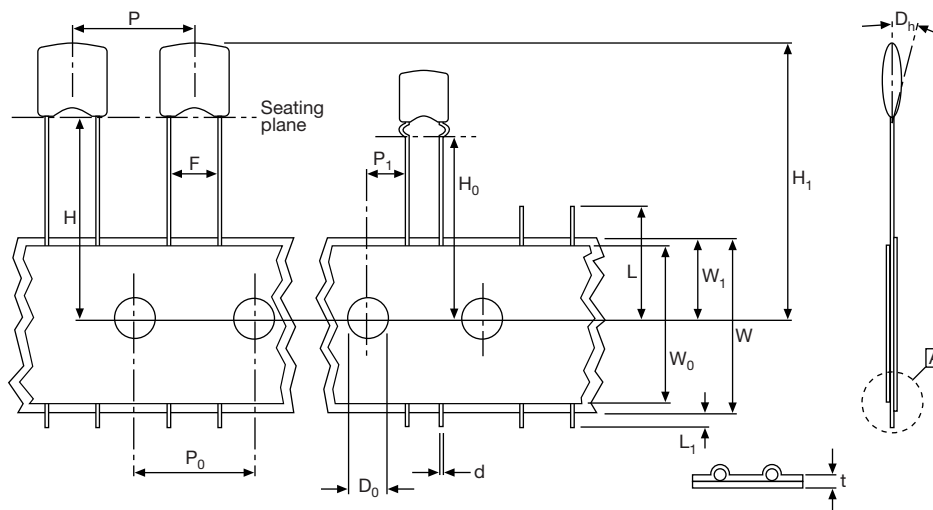
For example:



| <b>PACKAGING QUANTITIES AND BOX DIMENSIONS</b> |            |                                   |                               |
|------------------------------------------------|------------|-----------------------------------|-------------------------------|
| PACKAGING                                      | SIZE CODE  | SMALLEST PACKAGING QUANTITY (SPQ) | BOX DIMENSIONS L x W x H (mm) |
| Tape on reel                                   | 10, 15     | 4000                              | 370 x 370 x 60                |
|                                                | 20         | 3000                              |                               |
| Ammopack                                       | 10, 15, 20 | 2500                              | 335 x 290 x 50                |
| Bulk <sup>(1)</sup>                            | 10, 15, 20 | 5000                              | 245 x 120 x 65                |

**Note**

- <sup>(1)</sup> SPQ contains one or a multiple of poly-bags, 1000 units per bag

**CAPACITORS ON TAPE**


| PARAMETER                                         | SYMBOL         | DIMENSIONS          |                       |
|---------------------------------------------------|----------------|---------------------|-----------------------|
|                                                   |                | mm                  | INCH                  |
| Cut-off length                                    | L              | ≤ 11.0              | ≤ 0.443               |
| Lead end protrusion                               | L <sub>1</sub> | ≤ 1.0               | ≤ 0.039               |
| Height to seating plane (straight leads)          | H              | ≥ 18.0              | ≥ 0.709               |
| Height to seating plane (crimp leads)             | H <sub>0</sub> | 16.0 ± 0.5          | 0.630 ± 0.020         |
| Top of component height                           | H <sub>1</sub> | ≤ 32                | ≤ 1.26                |
| Body inclination                                  | Δh             | 0.0 ± 1.0           | 0.000 ± 0.039         |
| Carrier tape width                                | W              | 18.0 + 1.0/- 0.5    | 0.709 + 0.039/- 0.020 |
| Hold down tape width                              | W <sub>0</sub> | 15.0 REF.           | 0.591 REF.            |
| Sprocket hole position                            | W <sub>1</sub> | 9.00 + 0.075/- 0.50 | 0.354 + 0.030/- 0.020 |
| Lead space                                        | F              | 2.50 + 0.60/- 0.40  | 0.100 + 0.024/- 0.016 |
|                                                   |                | 5.00 + 0.60/- 0.40  | 0.200 + 0.024/- 0.016 |
| Sprocket hole pitch                               | P <sub>0</sub> | 12.70 ± 0.3         | 0.500 ± 0.012         |
| Sprocket hole center to lead center at F = 2.5 mm | P <sub>1</sub> | 5.08 ± 0.7          | 0.200 ± 0.028         |
| Sprocket hole center to lead center at F = 5 mm   |                | 3.85 ± 0.7          | 0.150 ± 0.028         |
| Sprocket hole diameter                            | D <sub>0</sub> | 4.00 ± 0.30         | 0.157 ± 0.012         |
| Overall tape thickness                            | t              | ≤ 0.90              | ≤ 0.035               |
| Wire lead diameter                                | d              | 0.50 ± 0.05         | 0.020 ± 0.002         |
| Taping pitch                                      | P              | 12.7 REF.           | 0.50 REF.             |

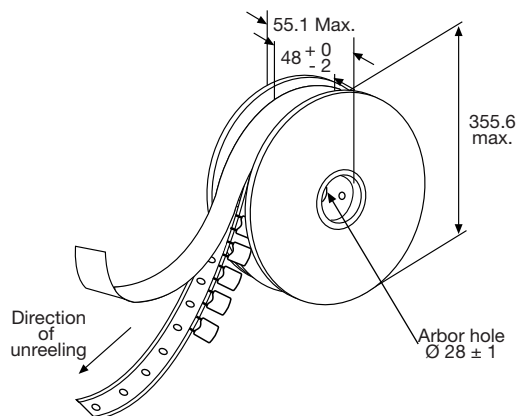
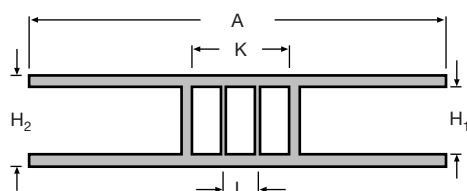
**REEL DATA**

A maximum of 0.5 % of the total number of capacitors per reel may be missing.

A maximum of 1 consecutive vacant positions is followed by 6 consecutive components.

Tape begins and ends with a minimum of 4 empty positions (50 mm tape).

Maximum of 5 splicers per reel.

**REEL**

**REEL DIMENSIONS**


| REEL SIZE      |                |  | (mm)       |
|----------------|----------------|--|------------|
| A              | Outer diameter |  | 355.6 max. |
| L              | Hole diameter  |  | 28 ± 1.5   |
| K              | Core diameter  |  | 90         |
| H <sub>1</sub> | Internal width |  | 48 + 0/- 2 |
| H <sub>2</sub> | External width |  | 55 max.    |

**AMMOPACK DATA**

A maximum of 0.5 % of the total number of capacitors per box may be missing.

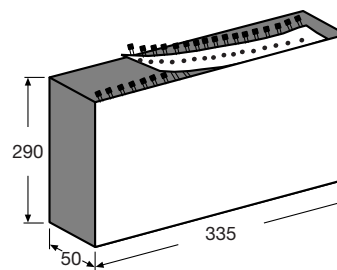
A maximum of 2 consecutive vacant positions is followed by 6 consecutive components.

Tape begins and ends with a minimum of 4 empty positions (50 mm tape).

Maximum of 5 splicers per reel.

The cumulative pitch tolerance over 20 consecutive units is not to exceed ± 1.0 mm.

Lead space (F) shall be measured at (3.6 ± 0.5) mm from the capacitor seating plane.

**AMMOPACK**

**RELATED DOCUMENTS**

|                     |                                                                        |
|---------------------|------------------------------------------------------------------------|
| General Information | <a href="http://www.vishay.com/doc?45163">www.vishay.com/doc?45163</a> |
|---------------------|------------------------------------------------------------------------|



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