

# DATA SHEET

## **Mono-kap<sup>TM</sup> series** **Leaded ceramic multilayer capacitors**

Product specification  
Supersedes data of 24th October 2001  
File under BCcomponents, BC06

2002 Oct 09

Leaded ceramic multilayer capacitors

Mono-kap™ series

FEATURES

- Very high capacitance per unit volume
- Low cost.

APPLICATIONS

These conformally coated radial leaded capacitors are designed for commercial and industrial applications in four dielectrics, NP0 (ultra-stable), X7R (stable) and Z5U, Y5V (general purpose). Applications include timing, coupling/decoupling, signal comparison and biasing. Mono-kap™ capacitors are suitable for automatic insertion equipment.

DESCRIPTION

The basic capacitor construction consists of ceramic dielectric materials processed into a tape with a typical thickness range from 0.025 to 0.076 mm. Metal electrode patterns are applied using a thick film screening process. Multiple layers are stacked and laminated in such a manner that electrodes are alternately exposed when the pattern is cut into individual chip capacitors. The capacitors are fired through a high temperature profile to mature the ceramic and metal into a homogeneous unit.

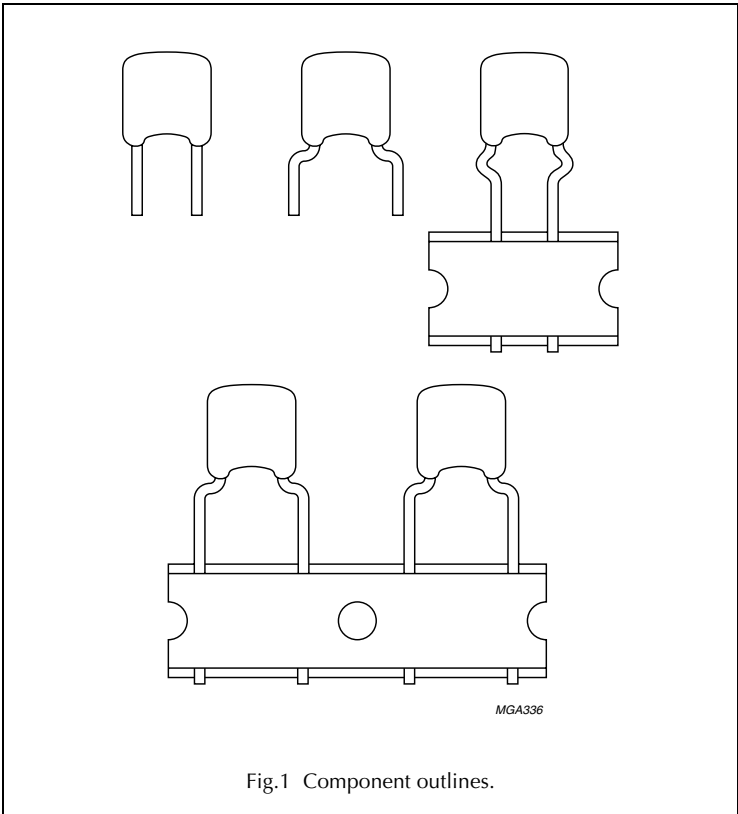


Fig.1 Component outlines.

Metal end terminations are applied and fired to provide electrical connection between the individual layers. Tinned leads are attached using a solder.

Encapsulation consists of a moisture-resistant gold colour conformal epoxy coating that meets the flame requirements of “UL94V-0”.

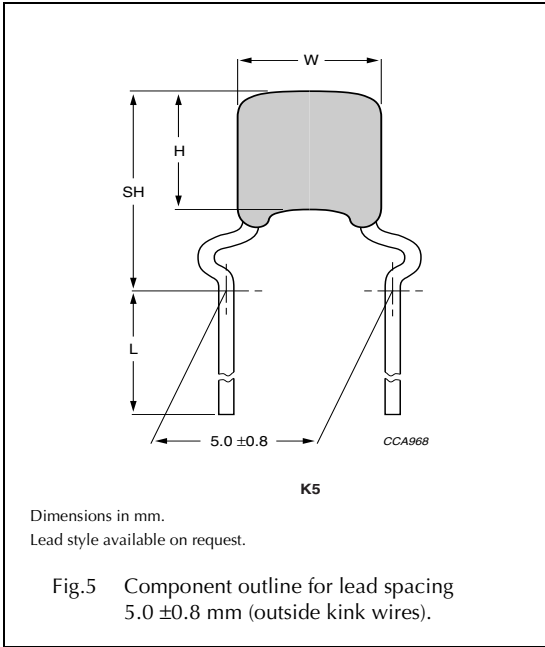
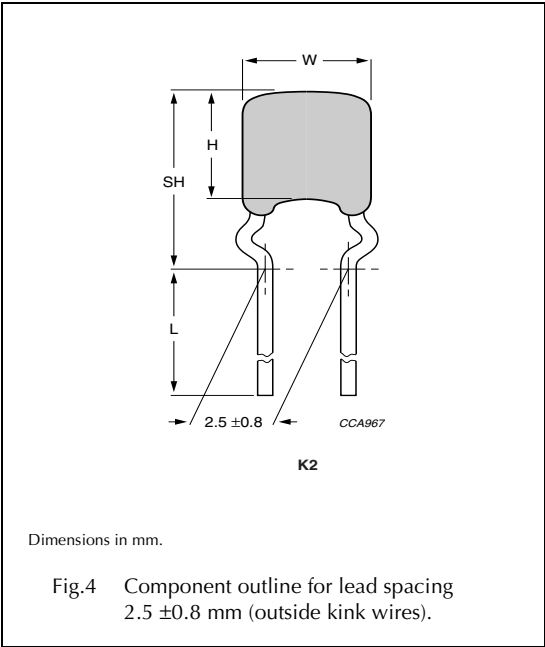
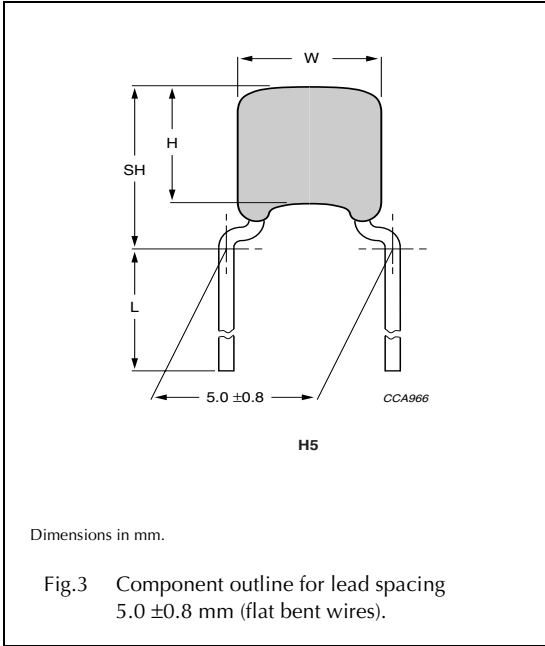
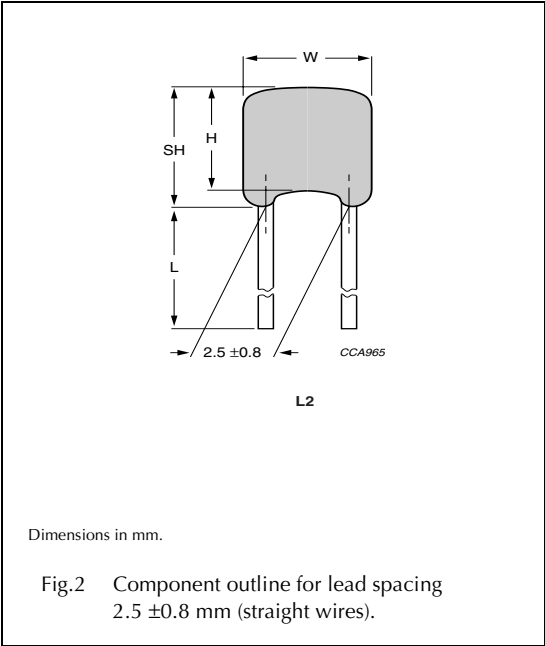
QUICK REFERENCE DATA

| DESCRIPTION              | VALUE             |                   |                   |                   |                   |                   |                   |                   |
|--------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
|                          | 2252<br>305 ..... | 2252<br>306 ..... | 2252<br>325 ..... | 2252<br>326 ..... | 2252<br>345 ..... | 2252<br>346 ..... | 2252<br>362 ..... | 2252<br>365 ..... |
| Capacitance range        | 10 pF to 6800 pF  |                   | 100 pF to 1.0 µF  |                   | 1000 pF to 1.0 µF |                   | 0.01 to 1.0 µF    |                   |
| Rated DC voltage         | 50 V              | 100 V             | 50 V              | 100 V             | 50 V              | 100 V             | 25 V              | 50 V              |
| Tolerance on capacitance | ±5%               |                   | ±10%              |                   | ±20%              |                   | +80%/−20%         |                   |
| Temperature coefficient  | NP0 (C0G)         |                   | X7R               |                   | Z5U               |                   | Y5V               |                   |

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MECHANICAL DATA



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Physical dimensions

Table 1 Capacitor dimensions and mass; notes 1 and 2

| SIZE<br>CODE | W <sub>max</sub><br>(mm) | H <sub>max</sub><br>(mm) | T <sub>max</sub> <sup>(3)</sup><br>(mm) | MAX. SEATING HEIGHT (SH)<br>(mm) |                 |                 |                 | MASS<br>(g) |
|--------------|--------------------------|--------------------------|-----------------------------------------|----------------------------------|-----------------|-----------------|-----------------|-------------|
|              |                          |                          |                                         | Fig.2                            | Fig.3           | Fig.4           | Fig.5           |             |
| 15           | 4.0<br>(0.15)            | 4.0<br>(0.15)            | 2.5<br>(0.100)                          | 5.58<br>(0.220)                  | 6.50<br>(0.256) | 7.50<br>(0.295) | 7.50<br>(0.295) | ≈0.15       |
| 20           | 5.0<br>(0.20)            | 5.0<br>(0.20)            | 3.2<br>(0.13)                           | 6.58<br>(0.259)                  | 7.50<br>(0.295) | 8.50<br>(0.335) | 8.50<br>(0.335) | ≈0.16       |

Notes

1. Bulk packed products have a standard lead length L ≥ 25.4 mm.
2. Dimensions between the parentheses are in inches.
3. Thickness defined as T.

Marking<sup>(1)</sup> (see Fig.6)

Capacitance code (CCC):

- 10 pF to 99 pF;  
actual value in pF (2 digits only)
- 100 pF and above;  
coded capacitance value  
(same as used in P/N).

Capacitance tolerance (T):

- Standard EIA tolerance.

Material code (M):

- A = NP0 (C0G)
- C = X7R
- E = Z5U
- Y = Y5V.

Voltage code (V):

- 1 = 100 V
- 3 = 25 V
- 5 = 50 V.

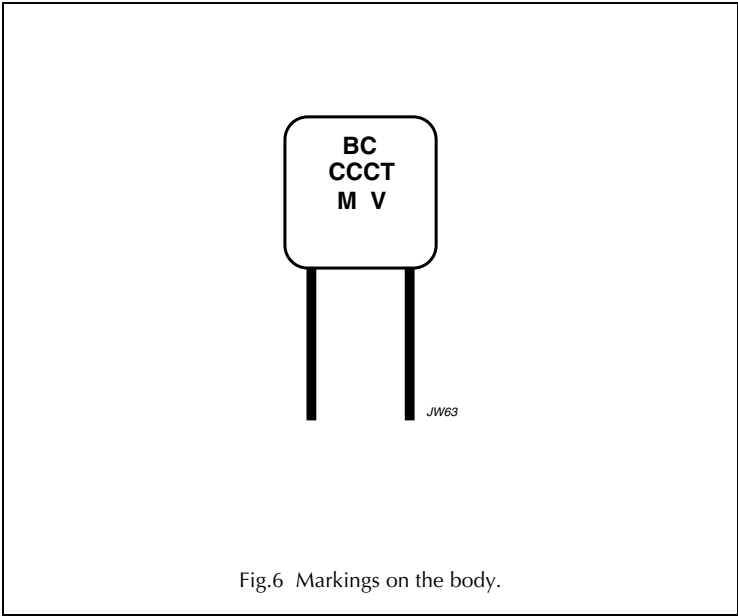


Fig.6 Markings on the body.

(1) 100 pF and above in size code 15 are marked without capacitance tolerance code (T).

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CAPACITANCE RANGE CHARTS

NP0 Dielectric

| CAP.    | SIZE CODE 15 |       | SIZE CODE 20 |       |
|---------|--------------|-------|--------------|-------|
|         | 50 V         | 100 V | 50 V         | 100 V |
| 10 pF   |              |       |              |       |
| 12      |              |       |              |       |
| 15      |              |       |              |       |
| 18      |              |       |              |       |
| 22      |              |       |              |       |
| 27      |              |       |              |       |
| 33      |              |       |              |       |
| 39      |              |       |              |       |
| 47      |              |       |              |       |
| 56      |              |       |              |       |
| 68      |              |       |              |       |
| 82      |              |       |              |       |
| 100     |              |       |              |       |
| 120     |              |       |              |       |
| 150     |              |       |              |       |
| 180     |              |       |              |       |
| 220     |              |       |              |       |
| 270     |              |       |              |       |
| 330     |              |       |              |       |
| 390     |              |       |              |       |
| 470     |              |       |              |       |
| 560     |              |       |              |       |
| 680     |              |       |              |       |
| 820     |              |       |              |       |
| 1 000   |              |       |              |       |
| 1 200   |              |       |              |       |
| 1 500   |              |       |              |       |
| 1 800   |              |       |              |       |
| 2 200   |              |       |              |       |
| 2 700   |              |       |              |       |
| 3 300   |              |       |              |       |
| 3 900   |              |       |              |       |
| 4 700   |              |       |              |       |
| 5 600   |              |       |              |       |
| 6 800   |              |       |              |       |
| 8 200   |              |       |              |       |
| 0.01 µF |              |       |              |       |

X7R Dielectric

| CAP.       | SIZE CODE 15 |       | SIZE CODE 20 |       |
|------------|--------------|-------|--------------|-------|
|            | 50 V         | 100 V | 50 V         | 100 V |
| 100-220 pF |              |       |              |       |
| 270        |              |       |              |       |
| 330        |              |       |              |       |
| 390        |              |       |              |       |
| 470        |              |       |              |       |
| 560        |              |       |              |       |
| 680        |              |       |              |       |
| 820        |              |       |              |       |
| 1 000      |              |       |              |       |
| 1 200      |              |       |              |       |
| 1 500      |              |       |              |       |
| 1 800      |              |       |              |       |
| 2 200      |              |       |              |       |
| 2 700      |              |       |              |       |
| 3 300      |              |       |              |       |
| 3 900      |              |       |              |       |
| 4 700      |              |       |              |       |
| 5 600      |              |       |              |       |
| 6 800      |              |       |              |       |
| 8 200      |              |       |              |       |
| 0.01 µF    |              |       |              |       |
| 0.012      |              |       |              |       |
| 0.015      |              |       |              |       |
| 0.018      |              |       |              |       |
| 0.022      |              |       |              |       |
| 0.027      |              |       |              |       |
| 0.033      |              |       |              |       |
| 0.039      |              |       |              |       |
| 0.047      |              |       |              |       |
| 0.056      |              |       |              |       |
| 0.068      |              |       |              |       |
| 0.082      |              |       |              |       |
| 0.10       |              |       |              |       |
| 0.15       |              |       |              |       |
| 0.22       |              |       |              |       |
| 0.33       |              |       |              |       |
| 0.47       |              |       |              |       |
| 0.68       |              |       |              |       |
| 1.0        |              |       |              |       |

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Z5U Dielectric

| CAP.     | SIZE CODE 15 |       | SIZE CODE 20 |       |
|----------|--------------|-------|--------------|-------|
|          | 50 V         | 100 V | 50 V         | 100 V |
| 1 000 pF |              |       |              |       |
| 1 500    |              |       |              |       |
| 2 200    |              |       |              |       |
| 3 300    |              |       |              |       |
| 4 700    |              |       |              |       |
| 6 800    |              |       |              |       |
| 0.01 µF  |              |       |              |       |
| 0.015    |              |       |              |       |
| 0.022    |              |       |              |       |
| 0.033    |              |       |              |       |
| 0.047    |              |       |              |       |
| 0.068    |              |       |              |       |
| 0.10     |              |       |              |       |
| 0.15     |              |       |              |       |
| 0.22     |              |       |              |       |
| 0.33     |              |       |              |       |
| 0.47     |              |       |              |       |
| 0.68     |              |       |              |       |
| 1.0      |              |       |              |       |

Y5V Dielectric

| CAP.    | SIZE CODE 15 |      | SIZE CODE 20 |      |
|---------|--------------|------|--------------|------|
|         | 25 V         | 50 V | 25 V         | 50 V |
| 0.01 µF |              |      |              |      |
| 0.015   |              |      |              |      |
| 0.022   |              |      |              |      |
| 0.033   |              |      |              |      |
| 0.047   |              |      |              |      |
| 0.068   |              |      |              |      |
| 0.10    |              |      |              |      |
| 0.15    |              |      |              |      |
| 0.22    |              |      |              |      |
| 0.33    |              |      |              |      |
| 0.47    |              |      |              |      |
| 0.68    |              |      |              |      |
| 1.0     |              |      |              |      |

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ORDERING INFORMATION

Components may be ordered by using either a simple 15-digit clear text code, or BCcomponents 12NC.

Clear text code

EXAMPLE: K103K15X7RF53H5

| PRODUCT TYPE | CAPACITANCE (pF)                                                                    | TOLERANCE                                        | SIZE CODE MAX. (mm)                  | DIELECTRIC                     | RATED VOLTAGE                     | LEAD DIMENSIONS, STYLE AND PACKAGING |                                                                    |                                                   |                                    |
|--------------|-------------------------------------------------------------------------------------|--------------------------------------------------|--------------------------------------|--------------------------------|-----------------------------------|--------------------------------------|--------------------------------------------------------------------|---------------------------------------------------|------------------------------------|
|              |                                                                                     |                                                  |                                      |                                |                                   | DIA. (mm)                            | PACKAGING/ LENGTH (mm)                                             | STYLE                                             | SPACING                            |
| K = mono-kap | two significant digits followed by the number of zeros:<br>101 = 100<br>103 = 10000 | J = ±5%<br>K = ±10%<br>M = ±20%<br>Z = +80%/–20% | 15 = 3.8 (.150")<br>20 = 5.0 (.200") | COG (NP0)<br>X7R<br>Z5U<br>Y5V | E = 25 V<br>F = 50 V<br>H = 100 V | 5 = 0.5 (0.020")                     | 3 = bulk, lead length 30 ±5.0 (1.25")<br>T = tape/reel<br>U = ammo | L = straight<br>H = high seat<br>K = outward kink | 2 = 2.5 (.100")<br>5 = 5.0 (.200") |

Ordering code 12NC

2 2 5 2 X X X X X

Dielectric and tolerance

30 NP0 ±5%

31 NP0 ±10%

32 X7R ±10%

33 X7R ±20%

34 Z5U ±20%

35 Z5U –20/+80%

36 Y5V –20/+80%

Rated voltage (DC)

2 25 V

5 50 V

6 100 V

Multiplier

8 0.1

9 1

1 10

2 100

3 1 000

4 10 000

5 100 000

Capacitance (pF)

two significant digits of capacitance value

Size code, lead spacing/style and packaging (1)

JWB218

(1) See Table 2.

Table 2 Size code, lead spacing/style and packaging

| SIZE CODE (mm) | LEAD SPACING (mm) | LEAD STYLE                | BULK        | TAPE/REEL | AMMO |
|----------------|-------------------|---------------------------|-------------|-----------|------|
|                |                   |                           | CODE NUMBER |           |      |
| 15             | 2.5 (.100")       | straight lead (L); note 1 | 00          | 02        | 03   |
|                |                   | outward kink (K)          | 04          | 06        | 07   |
|                | 5.0 (.200")       | high seat (H); note 1     | 08          | 10        | 12   |
| 20             | 2.5 (.100")       | straight lead (L); note 1 | 14          | 16        | 17   |
|                |                   | outward kink (K)          | 18          | 20        | 21   |
|                | 5.0 (.200")       | high seat (H); note 1     | 22          | 24        | 26   |

Note

1. Preferred types.

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**Table 3** Capacitance, rated voltage, mechanical dimensions and ordering information; note 1

| C                       | U <sub>R(DC)</sub><br>(V) | LEAD<br>SPACING | SIZE<br>CODE | CLEAR TEXT CODE                                            | PACKAGING CODE<br>8 <sup>th</sup> AND 9 <sup>th</sup> DIGIT |      |      | CATALOGUE<br>NUMBER <sup>(2)(3)</sup> |
|-------------------------|---------------------------|-----------------|--------------|------------------------------------------------------------|-------------------------------------------------------------|------|------|---------------------------------------|
|                         |                           |                 |              | 13 <sup>th</sup> DIGIT:<br>T = REEL; U = AMMO;<br>3 = BULK | REEL                                                        | AMMO | BULK |                                       |
| NP0 (C0G) ±5% tolerance |                           |                 |              |                                                            |                                                             |      |      |                                       |
| 10 pF                   | 50                        | 5.0             | 15           | K100J15C0GF5.H5                                            | 10                                                          | 12   | 08   | 2252 305..109                         |
|                         |                           | 2.5             |              | K100J15C0GF5.L2                                            | 02                                                          | 03   | 00   | 2252 305..109                         |
|                         | 100                       | 5.0             | 15           | K100J15C0GH5.H5                                            | 10                                                          | 12   | 08   | 2252 306..109                         |
|                         |                           | 2.5             |              | K100J15C0GH5.L2                                            | 02                                                          | 03   | 00   | 2252 306..109                         |
| 12 pF                   | 50                        | 5.0             | 15           | K120J15C0GF5.H5                                            | 10                                                          | 12   | 08   | 2252 305..129                         |
|                         |                           | 2.5             |              | K120J15C0GF5.L2                                            | 02                                                          | 03   | 00   | 2252 305..129                         |
| 15 pF                   | 50                        | 5.0             | 15           | K150J15C0GF5.H5                                            | 10                                                          | 12   | 08   | 2252 305..159                         |
|                         |                           | 2.5             |              | K150J15C0GF5.L2                                            | 02                                                          | 03   | 00   | 2252 305..159                         |
| 18 pF                   | 50                        | 5.0             | 15           | K180J15C0GF5.H5                                            | 10                                                          | 12   | 08   | 2252 305..189                         |
|                         |                           | 2.5             |              | K180J15C0GF5.L2                                            | 02                                                          | 03   | 00   | 2252 305..189                         |
| 22 pF                   | 50                        | 5.0             | 15           | K220J15C0GF5.H5                                            | 10                                                          | 12   | 08   | 2252 305..229                         |
|                         |                           | 2.5             |              | K220J15C0GF5.L2                                            | 02                                                          | 03   | 00   | 2252 305..229                         |
|                         | 100                       | 5.0             | 15           | K220J15C0GH5.H5                                            | 10                                                          | 12   | 08   | 2252 306..229                         |
|                         |                           | 2.5             |              | K220J15C0GH5.L2                                            | 02                                                          | 03   | 00   | 2252 306..229                         |
| 27 pF                   | 50                        | 5.0             | 15           | K270J15C0GF5.H5                                            | 10                                                          | 12   | 08   | 2252 305..279                         |
|                         |                           | 2.5             |              | K270J15C0GF5.L2                                            | 02                                                          | 03   | 00   | 2252 305..279                         |
| 33 pF                   | 50                        | 5.0             | 15           | K330J15C0GF5.H5                                            | 10                                                          | 12   | 08   | 2252 305..339                         |
|                         |                           | 2.5             |              | K330J15C0GF5.L2                                            | 02                                                          | 03   | 00   | 2252 305..339                         |
| 39 pF                   | 50                        | 5.0             | 15           | K390J15C0GF5.H5                                            | 10                                                          | 12   | 08   | 2252 305..399                         |
|                         |                           | 2.5             |              | K390J15C0GF5.L2                                            | 02                                                          | 03   | 00   | 2252 305..399                         |
| 47 pF                   | 50                        | 5.0             | 15           | K470J15C0GF5.H5                                            | 10                                                          | 12   | 08   | 2252 305..479                         |
|                         |                           | 2.5             |              | K470J15C0GF5.L2                                            | 02                                                          | 03   | 00   | 2252 305..479                         |
|                         | 100                       | 5.0             | 15           | K470J15C0GH5.H5                                            | 10                                                          | 12   | 08   | 2252 306..479                         |
|                         |                           | 2.5             |              | K470J15C0GH5.L2                                            | 02                                                          | 03   | 00   | 2252 306..479                         |
| 56 pF                   | 50                        | 5.0             | 15           | K560J15C0GF5.H5                                            | 10                                                          | 12   | 08   | 2252 305..569                         |
|                         |                           | 2.5             |              | K560J15C0GF5.L2                                            | 02                                                          | 03   | 00   | 2252 305..569                         |
| 68 pF                   | 50                        | 5.0             | 15           | K680J15C0GF5.H5                                            | 10                                                          | 12   | 08   | 2252 305..689                         |
|                         |                           | 2.5             |              | K680J15C0GF5.L2                                            | 02                                                          | 03   | 00   | 2252 305..689                         |
| 82 pF                   | 50                        | 5.0             | 15           | K820J15C0GF5.H5                                            | 10                                                          | 12   | 08   | 2252 305..829                         |
|                         |                           | 2.5             |              | K820J15C0GF5.L2                                            | 02                                                          | 03   | 00   | 2252 305..829                         |



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| C                         | U <sub>R(DC)</sub><br>(V) | LEAD<br>SPACING | SIZE<br>CODE | CLEAR TEXT CODE                                            | PACKAGING CODE<br>8 <sup>th</sup> AND 9 <sup>th</sup> DIGIT |      |      | CATALOGUE<br>NUMBER <sup>(2)(3)</sup> |
|---------------------------|---------------------------|-----------------|--------------|------------------------------------------------------------|-------------------------------------------------------------|------|------|---------------------------------------|
|                           |                           |                 |              | 13 <sup>th</sup> DIGIT:<br>T = REEL; U = AMMO;<br>3 = BULK | REEL                                                        | AMMO | BULK |                                       |
| 100 pF                    | 50                        | 5.0             | 15           | K101J15C0GF5.H5                                            | 10                                                          | 12   | 08   | 2252 305..101                         |
|                           |                           | 2.5             |              | K101J15C0GF5.L2                                            | 02                                                          | 03   | 00   | 2252 305..101                         |
|                           | 100                       | 5.0             | 15           | K101J15C0GH5.H5                                            | 10                                                          | 12   | 08   | 2252 306..101                         |
|                           |                           | 2.5             |              | K101J15C0GH5.L2                                            | 02                                                          | 03   | 00   | 2252 306..101                         |
| 150 pF                    | 50                        | 5.0             | 15           | K151J15C0GF5.H5                                            | 10                                                          | 12   | 08   | 2252 305..151                         |
|                           |                           | 2.5             |              | K151J15C0GF5.L2                                            | 02                                                          | 03   | 00   | 2252 305..151                         |
| 220 pF                    | 50                        | 5.0             | 15           | K221J15C0GF5.H5                                            | 10                                                          | 12   | 08   | 2252 305..221                         |
|                           |                           | 2.5             |              | K221J15C0GF5.L2                                            | 02                                                          | 03   | 00   | 2252 305..221                         |
|                           | 100                       | 5.0             | 15           | K221J15C0GH5.H5                                            | 10                                                          | 12   | 08   | 2252 306..221                         |
|                           |                           | 2.5             |              | K221J15C0GH5.L2                                            | 02                                                          | 03   | 00   | 2252 306..221                         |
| 330 pF                    | 50                        | 5.0             | 15           | K331J15C0GF5.H5                                            | 10                                                          | 12   | 08   | 2252 305..331                         |
|                           |                           | 2.5             |              | K331J15C0GF5.L2                                            | 02                                                          | 03   | 00   | 2252 305..331                         |
| 470 pF                    | 50                        | 5.0             | 15           | K471J15C0GF5.H5                                            | 10                                                          | 12   | 08   | 2252 305..471                         |
|                           |                           | 2.5             |              | K471J15C0GF5.L2                                            | 02                                                          | 03   | 00   | 2252 305..471                         |
|                           | 100                       | 5.0             | 15           | K471J15C0GH5.H5                                            | 10                                                          | 12   | 08   | 2252 306..471                         |
|                           |                           | 2.5             |              | K471J15C0GH5.L2                                            | 02                                                          | 03   | 00   | 2252 306..471                         |
| 680 pF                    | 50                        | 5.0             | 15           | K681J15C0GF5.H5                                            | 10                                                          | 12   | 08   | 2252 305..681                         |
|                           |                           | 2.5             |              | K681J15C0GF5.L2                                            | 02                                                          | 03   | 00   | 2252 305..681                         |
| 1 000 pF                  | 50                        | 5.0             | 15           | K102J15C0GF5.H5                                            | 10                                                          | 12   | 08   | 2252 305..102                         |
|                           |                           | 2.5             |              | K102J15C0GF5.L2                                            | 02                                                          | 03   | 00   | 2252 305..102                         |
|                           | 100                       | 5.0             | 20           | K102J20C0GH5.H5                                            | 24                                                          | 26   | 22   | 2252 306..102                         |
|                           |                           | 2.5             |              | K102J20C0GH5.L2                                            | 16                                                          | 17   | 14   | 2252 306..102                         |
| 1 500 pF                  | 50                        | 5.0             | 15           | K152J15C0GF5.H5                                            | 10                                                          | 12   | 08   | 2252 305..152                         |
| 2 200 pF                  | 50                        | 5.0             | 15           | K222J15C0GF5.H5                                            | 10                                                          | 12   | 08   | 2252 305..222                         |
| 3 300 pF                  | 50                        | 5.0             | 20           | K332J20C0GF5.H5                                            | 24                                                          | 26   | 22   | 2252 305..332                         |
| 4 700 pF                  | 50                        | 5.0             | 20           | K472J20C0GF5.H5                                            | 24                                                          | 26   | 22   | 2252 305..472                         |
| 6 800 pF                  | 50                        | 5.0             | 20           | K682J20C0GF5.H5                                            | 24                                                          | 26   | 22   | 2252 305..682                         |
| <b>X7R ±10% tolerance</b> |                           |                 |              |                                                            |                                                             |      |      |                                       |
| 100 pF                    | 50                        | 5.0             | 15           | K101K15X7RF5.H5                                            | 10                                                          | 12   | 08   | 2252 325..101                         |
|                           |                           | 2.5             |              | K101K15X7RF5.L2                                            | 02                                                          | 03   | 00   | 2252 325..101                         |
|                           | 100                       | 5.0             | 15           | K101K15X7RH5.H5                                            | 10                                                          | 12   | 08   | 2252 326..101                         |
|                           |                           | 2.5             |              | K101K15X7RH5.L2                                            | 02                                                          | 03   | 00   | 2252 326..101                         |
| 150 pF                    | 50                        | 5.0             | 15           | K151K15X7RF5.H5                                            | 10                                                          | 12   | 08   | 2252 325..151                         |
|                           |                           | 2.5             |              | K151K15X7RF5.L2                                            | 02                                                          | 03   | 00   | 2252 325..151                         |
|                           | 100                       | 5.0             | 15           | K151K15X7RH5.H5                                            | 10                                                          | 12   | 08   | 2252 326..151                         |
|                           |                           | 2.5             |              | K151K15X7RH5.L2                                            | 02                                                          | 03   | 00   | 2252 326..151                         |

# Leaded ceramic multilayer capacitors

## Mono-kap™ series

| C        | U <sub>R(DC)</sub><br>(V) | LEAD<br>SPACING | SIZE<br>CODE | CLEAR TEXT CODE                                            | PACKAGING CODE<br>8 <sup>th</sup> AND 9 <sup>th</sup> DIGIT |      |      | CATALOGUE<br>NUMBER <sup>(2)/(3)</sup> |
|----------|---------------------------|-----------------|--------------|------------------------------------------------------------|-------------------------------------------------------------|------|------|----------------------------------------|
|          |                           |                 |              | 13 <sup>th</sup> DIGIT:<br>T = REEL; U = AMMO;<br>3 = BULK | REEL                                                        | AMMO | BULK |                                        |
| 220 pF   | 50                        | 5.0             | 15           | K221K15X7RF5.H5                                            | 10                                                          | 12   | 08   | 2252 325..221                          |
|          |                           | 2.5             |              | K221K15X7RF5.L2                                            | 02                                                          | 03   | 00   | 2252 325..221                          |
|          | 100                       | 5.0             | 15           | K221K15X7RH5.H5                                            | 10                                                          | 12   | 08   | 2252 326..221                          |
|          |                           | 2.5             |              | K221K15X7RH5.L2                                            | 02                                                          | 03   | 00   | 2252 326..221                          |
| 330 pF   | 50                        | 5.0             | 15           | K331K15X7RF5.H5                                            | 10                                                          | 12   | 08   | 2252 325..331                          |
|          |                           | 2.5             |              | K331K15X7RF5.L2                                            | 02                                                          | 03   | 00   | 2252 325..331                          |
| 470 pF   | 50                        | 5.0             | 15           | K471K15X7RF5.H5                                            | 10                                                          | 12   | 08   | 2252 325..471                          |
|          |                           | 2.5             |              | K471K15X7RF5.L2                                            | 02                                                          | 03   | 00   | 2252 325..471                          |
|          | 100                       | 5.0             | 15           | K471K15X7RH5.H5                                            | 10                                                          | 12   | 08   | 2252 326..471                          |
|          |                           | 2.5             |              | K471K15X7RH5.L2                                            | 02                                                          | 03   | 00   | 2252 326..471                          |
| 680 pF   | 50                        | 5.0             | 15           | K681K15X7RF5.H5                                            | 10                                                          | 12   | 08   | 2252 325..681                          |
|          |                           | 2.5             |              | K681K15X7RF5.L2                                            | 02                                                          | 03   | 00   | 2252 325..681                          |
| 1 000 pF | 50                        | 5.0             | 15           | K102K15X7RF5.H5                                            | 10                                                          | 12   | 08   | 2252 325..102                          |
|          |                           | 2.5             |              | K102K15X7RF5.L2                                            | 02                                                          | 03   | 00   | 2252 325..102                          |
|          | 100                       | 5.0             | 15           | K102K15X7RH5.H5                                            | 10                                                          | 12   | 08   | 2252 326..102                          |
|          |                           | 2.5             |              | K102K15X7RH5.L2                                            | 02                                                          | 03   | 00   | 2252 326..102                          |
| 1 500 pF | 50                        | 5.0             | 15           | K152K15X7RF5.H5                                            | 10                                                          | 12   | 08   | 2252 325..152                          |
|          |                           | 2.5             |              | K152K15X7RF5.L2                                            | 02                                                          | 03   | 00   | 2252 325..152                          |
| 2 200 pF | 50                        | 5.0             | 15           | K222K15X7RF5.H5                                            | 10                                                          | 12   | 08   | 2252 325..222                          |
|          |                           | 2.5             |              | K222K15X7RF5.L2                                            | 02                                                          | 03   | 00   | 2252 325..222                          |
|          | 100                       | 5.0             | 15           | K222K15X7RH5.H5                                            | 10                                                          | 12   | 08   | 2252 326..222                          |
|          |                           | 2.5             |              | K222K15X7RH5.L2                                            | 02                                                          | 03   | 00   | 2252 326..222                          |
| 3 300 pF | 50                        | 5.0             | 15           | K332K15X7RF5.H5                                            | 10                                                          | 12   | 08   | 2252 325..332                          |
|          |                           | 2.5             |              | K332K15X7RF5.L2                                            | 02                                                          | 03   | 00   | 2252 325..332                          |
| 4 700 pF | 50                        | 5.0             | 15           | K472K15X7RF5.H5                                            | 10                                                          | 12   | 08   | 2252 325..472                          |
|          |                           | 2.5             |              | K472K15X7RF5.L2                                            | 02                                                          | 03   | 00   | 2252 325..472                          |
|          | 100                       | 5.0             | 15           | K472K15X7RH5.H5                                            | 10                                                          | 12   | 08   | 2252 326..472                          |
|          |                           | 2.5             |              | K472K15X7RH5.L2                                            | 02                                                          | 03   | 00   | 2252 326..472                          |
| 6 800 pF | 50                        | 5.0             | 15           | K682K15X7RF5.H5                                            | 10                                                          | 12   | 08   | 2252 325..682                          |
|          |                           | 2.5             |              | K682K15X7RF5.L2                                            | 02                                                          | 03   | 00   | 2252 325..682                          |
| 0.01 µF  | 50                        | 5.0             | 15           | K103K15X7RF5.H5                                            | 10                                                          | 12   | 08   | 2252 325..103                          |
|          |                           | 2.5             |              | K103K15X7RF5.L2                                            | 02                                                          | 03   | 00   | 2252 325..103                          |
|          | 100                       | 5.0             | 15           | K103K15X7RH5.H5                                            | 10                                                          | 12   | 08   | 2252 326..103                          |
|          |                           | 2.5             |              | K103K15X7RH5.L2                                            | 02                                                          | 03   | 00   | 2252 326..103                          |
| 0.015 µF | 50                        | 5.0             | 15           | K153K15X7RF5.H5                                            | 10                                                          | 12   | 08   | 2252 325..153                          |
|          |                           | 2.5             |              | K153K15X7RF5.L2                                            | 02                                                          | 03   | 00   | 2252 325..153                          |

# Leaded ceramic multilayer capacitors

## Mono-kap™ series

| C                         | U <sub>R(DC)</sub><br>(V) | LEAD<br>SPACING | SIZE<br>CODE | CLEAR TEXT CODE                                            | PACKAGING CODE<br>8 <sup>th</sup> AND 9 <sup>th</sup> DIGIT |      |      | CATALOGUE<br>NUMBER <sup>(2)</sup> / <sub>(3)</sub> |
|---------------------------|---------------------------|-----------------|--------------|------------------------------------------------------------|-------------------------------------------------------------|------|------|-----------------------------------------------------|
|                           |                           |                 |              | 13 <sup>th</sup> DIGIT:<br>T = REEL; U = AMMO;<br>3 = BULK | REEL                                                        | AMMO | BULK |                                                     |
| 0.022 µF                  | 50                        | 5.0             | 15           | K223K15X7RF5.H5                                            | 10                                                          | 12   | 08   | 2252 325..223                                       |
|                           |                           | 2.5             |              | K223K15X7RF5.L2                                            | 02                                                          | 03   | 00   | 2252 325..223                                       |
|                           | 100                       | 5.0             | 20           | K223K20X7RH5.H5                                            | 24                                                          | 26   | 22   | 2252 326..223                                       |
|                           |                           | 2.5             |              | K223K20X7RH5.L2                                            | 16                                                          | 17   | 14   | 2252 326..223                                       |
| 0.033 µF                  | 50                        | 5.0             | 15           | K333K15X7RF5.H5                                            | 10                                                          | 12   | 08   | 2252 325..333                                       |
|                           |                           | 2.5             |              | K333K15X7RF5.L2                                            | 02                                                          | 03   | 00   | 2252 325..333                                       |
| 0.047 µF                  | 50                        | 5.0             | 15           | K473K15X7RF5.H5                                            | 10                                                          | 12   | 08   | 2252 325..473                                       |
|                           |                           | 2.5             |              | K473K15X7RF5.L2                                            | 02                                                          | 03   | 00   | 2252 325..473                                       |
|                           | 100                       | 5.0             | 20           | K473K20X7RH5.H5                                            | 24                                                          | 26   | 22   | 2252 326..473                                       |
|                           |                           | 2.5             |              | K473K20X7RH5.L2                                            | 16                                                          | 17   | 14   | 2252 326..473                                       |
| 0.068 µF                  | 50                        | 5.0             | 15           | K683K15X7RF5.H5                                            | 10                                                          | 12   | 08   | 2252 325..683                                       |
|                           |                           | 2.5             |              | K683K15X7RF5.L2                                            | 02                                                          | 03   | 00   | 2252 325..683                                       |
| 0.1 µF                    | 50                        | 5.0             | 15           | K104K15X7RF5.H5                                            | 10                                                          | 12   | 08   | 2252 325..104                                       |
|                           |                           | 2.5             |              | K104K15X7RF5.L2                                            | 02                                                          | 03   | 00   | 2252 325..104                                       |
|                           | 100                       | 5.0             | 20           | K104K20X7RH5.H5                                            | 24                                                          | 26   | 22   | 2252 326..104                                       |
|                           |                           | 2.5             |              | K104K20X7RH5.L2                                            | 16                                                          | 17   | 14   | 2252 326..104                                       |
| 0.15 µF                   | 50                        | 5.0             | 20           | K154K20X7RF5.H5                                            | 24                                                          | 26   | 22   | 2252 325..154                                       |
| 0.22 µF                   | 50                        | 5.0             | 20           | K224K20X7RF5.H5                                            | 24                                                          | 26   | 22   | 2252 325..224                                       |
| 0.47 µF                   | 50                        | 5.0             | 20           | K474K20X7RF5.H5                                            | 24                                                          | 26   | 22   | 2252 325..474                                       |
| 1.00 µF                   | 50                        | 5.0             | 20           | K105K20X7RF5.H5                                            | 24                                                          | 26   | 22   | 2252 325..105                                       |
| <b>Z5U ±20% tolerance</b> |                           |                 |              |                                                            |                                                             |      |      |                                                     |
| 0.01 µF                   | 50                        | 5.0             | 15           | K103M15Z5UF5.H5                                            | 10                                                          | 12   | 08   | 2252 345..103                                       |
|                           |                           | 2.5             |              | K103M15Z5UF5.L2                                            | 02                                                          | 03   | 00   | 2252 345..103                                       |
|                           | 100                       | 5.0             | 15           | K103M15Z5UH5.H5                                            | 10                                                          | 12   | 08   | 2252 346..103                                       |
|                           |                           | 2.5             |              | K103M15Z5UH5.L2                                            | 02                                                          | 03   | 00   | 2252 346..103                                       |
| 0.022 µF                  | 50                        | 5.0             | 15           | K223M15Z5UF5.H5                                            | 10                                                          | 12   | 08   | 2252 345..223                                       |
|                           |                           | 2.5             |              | K223M15Z5UF5.L2                                            | 02                                                          | 03   | 00   | 2252 345..223                                       |
| 0.047 µF                  | 50                        | 5.0             | 15           | K473M15Z5UF5.H5                                            | 10                                                          | 12   | 08   | 2252 345..473                                       |
|                           |                           | 2.5             |              | K473M15Z5UF5.L2                                            | 02                                                          | 03   | 00   | 2252 345..473                                       |
| 0.1 µF                    | 50                        | 5.0             | 15           | K104M15Z5UF5.H5                                            | 10                                                          | 12   | 08   | 2252 345..104                                       |
|                           |                           | 2.5             |              | K104M15Z5UF5.L2                                            | 02                                                          | 03   | 00   | 2252 345..104                                       |
|                           | 100                       | 5.0             | 20           | K104M20Z5UH5.H5                                            | 24                                                          | 26   | 22   | 2252 346..104                                       |
|                           |                           | 2.5             |              | K104M20Z5UH5.L2                                            | 16                                                          | 17   | 14   | 2252 346..104                                       |
| 0.15 µF                   | 50                        | 5.0             | 15           | K154M15Z5UF5.H5                                            | 10                                                          | 12   | 08   | 2252 345..154                                       |
|                           |                           | 2.5             |              | K154M15Z5UF5.L2                                            | 02                                                          | 03   | 00   | 2252 345..154                                       |
| 0.22 µF                   | 50                        | 5.0             | 15           | K224M15Z5UF5.H5                                            | 10                                                          | 12   | 08   | 2252 345..224                                       |
|                           |                           | 2.5             |              | K224M15Z5UF5.L2                                            | 02                                                          | 03   | 00   | 2252 345..224                                       |

# Leaded ceramic multilayer capacitors

## Mono-kap™ series

| C                             | U <sub>R(DC)</sub><br>(V) | LEAD<br>SPACING | SIZE<br>CODE | CLEAR TEXT CODE                                            | PACKAGING CODE<br>8 <sup>th</sup> AND 9 <sup>th</sup> DIGIT |      |      | CATALOGUE<br>NUMBER <sup>(2)</sup> / <sub>(3)</sub> |
|-------------------------------|---------------------------|-----------------|--------------|------------------------------------------------------------|-------------------------------------------------------------|------|------|-----------------------------------------------------|
|                               |                           |                 |              | 13 <sup>th</sup> DIGIT:<br>T = REEL; U = AMMO;<br>3 = BULK | REEL                                                        | AMMO | BULK |                                                     |
| 0.33 µF                       | 50                        | 5.0             | 20           | K334M20Z5UF5.H5                                            | 24                                                          | 26   | 22   | 2252 345..334                                       |
| 0.47 µF                       | 50                        | 5.0             | 20           | K474M20Z5UF5.H5                                            | 24                                                          | 26   | 22   | 2252 345..474                                       |
| 0.68 µF                       | 50                        | 5.0             | 20           | K684M20Z5UF5.H5                                            | 24                                                          | 26   | 22   | 2252 345..684                                       |
| 1.0 µF                        | 50                        | 5.0             | 20           | K105M20Z5UF5.H5                                            | 24                                                          | 26   | 22   | 2252 345..105                                       |
| <b>Y5V +80/-20% tolerance</b> |                           |                 |              |                                                            |                                                             |      |      |                                                     |
| 0.1 µF                        | 25                        | 5.0             | 15           | K104Z15Y5VE5.H5                                            | 10                                                          | 12   | 08   | 2252 362..104                                       |
|                               |                           | 2.5             |              | K104Z15Y5VE5.L2                                            | 02                                                          | 03   | 00   | 2252 362..104                                       |
|                               | 50                        | 5.0             | 15           | K104Z15Y5VF5.H5                                            | 10                                                          | 12   | 08   | 2252 365..104                                       |
|                               |                           | 2.5             |              | K104Z15Y5VF5.L2                                            | 02                                                          | 03   | 00   | 2252 365..104                                       |
| 0.22 µF                       | 25                        | 5.0             | 15           | K224Z15Y5VE5.H5                                            | 10                                                          | 12   | 08   | 2252 362..224                                       |
|                               |                           | 2.5             |              | K224Z15Y5VE5.L2                                            | 02                                                          | 03   | 00   | 2252 362..224                                       |
|                               | 50                        | 5.0             | 15           | K224Z15Y5VF5.H5                                            | 10                                                          | 12   | 08   | 2252 365..224                                       |
|                               |                           | 2.5             |              | K224Z15Y5VF5.L2                                            | 02                                                          | 03   | 00   | 2252 365..224                                       |
| 0.47 µF                       | 25                        | 5.0             | 20           | K474Z20Y5VE5.H5                                            | 24                                                          | 26   | 22   | 2252 362..474                                       |
|                               |                           | 2.5             |              | K474Z20Y5VE5.L2                                            | 16                                                          | 17   | 14   | 2252 362..474                                       |
|                               | 50                        | 5.0             | 20           | K474Z20Y5VF5.H5                                            | 24                                                          | 26   | 22   | 2252 365..474                                       |
|                               |                           | 2.5             |              | K474Z20Y5VF5.L2                                            | 16                                                          | 17   | 14   | 2252 365..474                                       |
| 1.0 µF                        | 25                        | 5.0             | 20           | K105Z20Y5VE5.H5                                            | 24                                                          | 26   | 22   | 2252 362..105                                       |
|                               |                           | 2.5             |              | K105Z20Y5VE5.L2                                            | 16                                                          | 17   | 14   | 2252 362..105                                       |
|                               | 50                        | 5.0             | 20           | K105Z20Y5VF5.H5                                            | 24                                                          | 26   | 22   | 2252 365..105                                       |
|                               |                           | 2.5             |              | K105Z20Y5VF5.L2                                            | 16                                                          | 17   | 14   | 2252 365..105                                       |

### Notes

1. For maximum thickness refer to Table 1.
2. 8<sup>th</sup> and 9<sup>th</sup> digit of the catalogue number to be completed with the packaging code.
3. Packaging codes refer to straight leads for F = 2.5 mm and flat bent leads for F = 5.0 mm.  
Other styles available on request.

# Leaded ceramic multilayer capacitors

## Mono-kap™ series

### ELECTRICAL CHARACTERISTICS

**Table 4** Electrical data for NP0, X7R, Z5U and Y5V

The capacitors meet the essential requirements of "IEC 60384-8", "IEC 60384-9" and "EIA 198".

Unless stated otherwise all electrical values apply at an ambient temperature of  $25 \pm 3$  °C, at barometric pressures of 650 to 800 mm of mercury, and relative humidity not to exceed 75%.

| DESCRIPTION                                                                                       | VALUE                                                                                                                      |
|---------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| <b>Capacitors with temperature coefficient NP0</b>                                                |                                                                                                                            |
| Capacitance range:<br>at 1 MHz, 1 V; where $C \leq 1000$ pF<br>at 1 kHz, 1 V; where $C > 1000$ pF | 10 to 1000 pF<br>1200 pF to 5600 pF                                                                                        |
| Tolerance on the capacitance                                                                      | $\pm 5\%$ ; $\pm 10\%$                                                                                                     |
| Rated DC voltage                                                                                  | 50 and 100 V                                                                                                               |
| Dielectric strength                                                                               | 250% of rated voltage                                                                                                      |
| Insulation resistance at rated voltage                                                            | 100 000 M $\Omega$ or 1000 M $\Omega \times \mu\text{F}$ , whichever is less at rated voltage within 2 minutes of charging |
| Temperature coefficient of the capacitance                                                        | $0 \times 10^{-6}/\text{K}$                                                                                                |
| Tolerance on the temperature coefficient                                                          | $\pm 30 \times 10^{-6}/\text{K}$                                                                                           |
| Dissipation factor:<br>at 1 MHz, 1 V; where $C \leq 30$ pF<br>at 1 kHz, 1 V; where $C > 30$ pF    | $< \frac{1}{(400 + 20 \times C)}$<br>$< 15 \times 10^{-4}$                                                                 |
| Operating temperature range                                                                       | -55 to +125 °C                                                                                                             |
| Storage temperature range                                                                         | 25 $\pm$ 15 °C                                                                                                             |
| <b>Capacitors with temperature coefficient X7R</b>                                                |                                                                                                                            |
| Capacitance range at 1 kHz, 1 V                                                                   | 100 pF to 0.22 $\mu\text{F}$                                                                                               |
| Tolerance on the capacitance                                                                      | $\pm 10\%$ ; $\pm 20\%$                                                                                                    |
| Maximum capacitance variation with respect to capacitance value at 25 °C                          | $\pm 15\%$                                                                                                                 |
| Rated DC voltage                                                                                  | 50 and 100 V                                                                                                               |
| Dielectric strength                                                                               | 250% of rated voltage                                                                                                      |
| Insulation resistance at rated voltage                                                            | 100 000 M $\Omega$ or 1000 M $\Omega \times \mu\text{F}$ , whichever is less at rated voltage within 2 minutes of charging |
| Dissipation factor at 1 kHz, 1 V                                                                  | $\leq 2.5\%$                                                                                                               |
| Operating temperature range                                                                       | -55 to +125 °C                                                                                                             |
| Storage temperature range                                                                         | 25 $\pm$ 15 °C                                                                                                             |
| Ageing                                                                                            | typical 1% per time decade                                                                                                 |

## Leaded ceramic multilayer capacitors

## Mono-kap™ series

| DESCRIPTION                                                              | VALUE                                                                                                             |
|--------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| <b>Capacitors with temperature coefficient Z5U</b>                       |                                                                                                                   |
| Capacitance range at 1 kHz, 0.5 V                                        | 1000 pF to 1.0 $\mu$ F                                                                                            |
| Tolerance on the capacitance                                             | $\pm 20\%$ ; $+80\%/-20\%$                                                                                        |
| Maximum capacitance variation with respect to capacitance value at 25 °C | $-56\%/+22\%$                                                                                                     |
| Rated DC voltage                                                         | 50 and 100 V                                                                                                      |
| Dielectric strength                                                      | 250% of rated voltage                                                                                             |
| Insulation resistance at rated voltage                                   | 10000 M $\Omega$ or 1000 M $\Omega \times \mu$ F, whichever is less at rated voltage within 2 minutes of charging |
| Dissipation factor at 1 kHz, 0.5 V                                       | $\leq 4\%$                                                                                                        |
| Operating temperature range                                              | 10 to 85 °C                                                                                                       |
| Storage temperature range                                                | 25 $\pm$ 15 °C                                                                                                    |
| Ageing                                                                   | typical 6% per time decade                                                                                        |
| <b>Capacitors with temperature coefficient Y5V</b>                       |                                                                                                                   |
| Capacitance range at 1 kHz, 1 V                                          | 0.01 to 1.0 $\mu$ F                                                                                               |
| Tolerance on the capacitance                                             | $+80\%/-20\%$                                                                                                     |
| Maximum capacitance variation with respect to capacitance value at 25 °C | $-82\%/+22\%$                                                                                                     |
| Rated DC voltage                                                         | 25 and 50 V                                                                                                       |
| Dielectric strength                                                      | 250% of rated voltage                                                                                             |
| Insulation resistance at rated voltage                                   | 10000 M $\Omega$ or 1000 M $\Omega \times \mu$ F, whichever is less at rated voltage within 2 minutes of charging |
| Dissipation factor at 1 kHz, 1 V                                         | $\leq 5\%$                                                                                                        |
| Operating temperature range                                              | 10 to 85 °C                                                                                                       |
| Storage temperature range                                                | 25 $\pm$ 15 °C                                                                                                    |
| Ageing                                                                   | typical 6% per time decade                                                                                        |

Leaded ceramic multilayer capacitors

Mono-kap™ series

PACKAGING

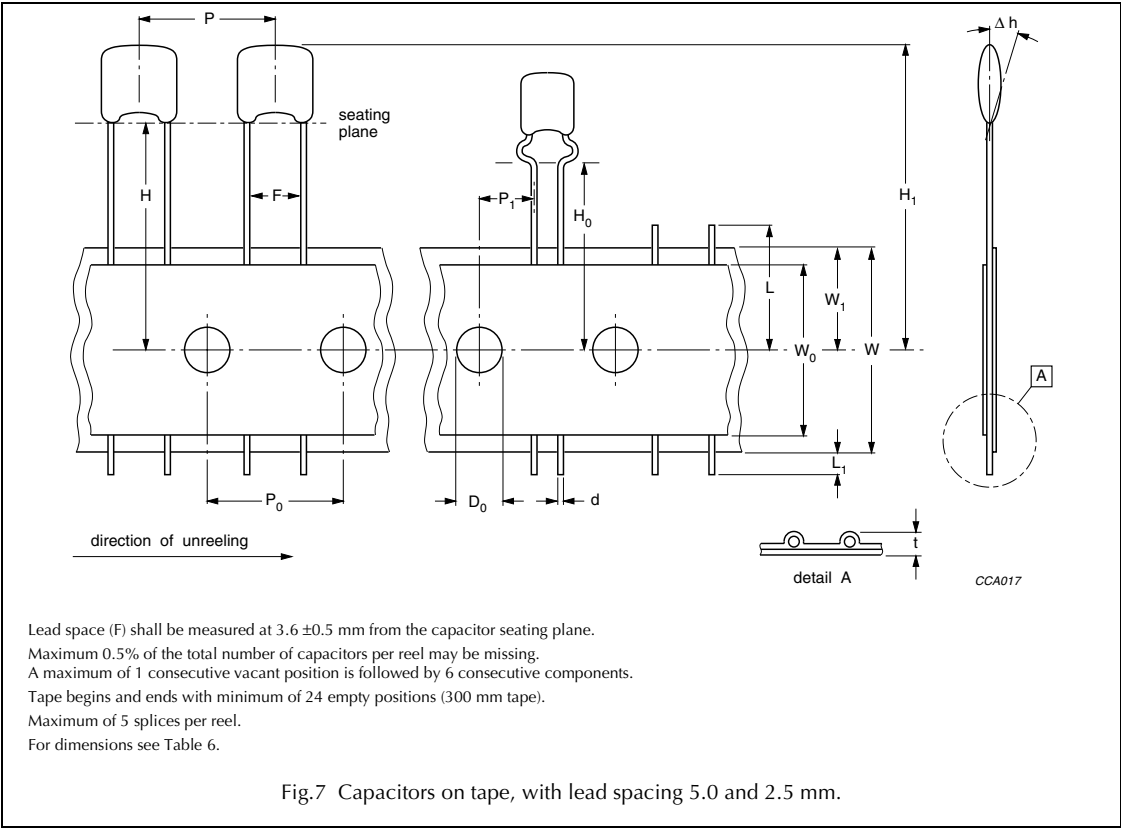
Table 5 Packaging quantities and box dimensions

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

Note

1. SPQ contains 1 or a multiple of poly-bags, 1000 units per bag.

Capacitors on tape, lead spacing 5.0 and 2.5 mm



# Leaded ceramic multilayer capacitors

## Mono-kap™ series

**Table 6** Dimensions of tape; see Fig.7

| SYMBOL         | PARAMETER                                      | DIMENSIONS      |                     |
|----------------|------------------------------------------------|-----------------|---------------------|
|                |                                                | mm              | inch                |
| L              | cut off length                                 | ≤11             | ≤0.443              |
| L <sub>1</sub> | lead end protrusion                            | ≤1              | ≤0.039              |
| H              | height to seating plane (straight leads)       | ≥18             | ≥0.709              |
| H <sub>0</sub> | height to seating plane (formed leads)         | 16 ±0.5         | 0.630 ±0.020        |
| H <sub>1</sub> | top of component height                        | ≤32             | ≤1.260              |
| Δh             | body inclination                               | 0.0 ±1.0        | 0 ±0.039            |
| W              | carrier tape width                             | 18 +1.0/−0.5    | 0.709 +0.039/−0.020 |
| W <sub>0</sub> | hold down tape width                           | 15 ref.; note 1 | 0.591 ref.; note 1  |
| W <sub>1</sub> | sprocket hole position                         | 9 +0.075/−0.5   | 0.354 +0.030/−0.020 |
| F              | 1e lead space; note 2                          | 2.5 +0.6/−0.4   | 0.100 +0.024/−0.016 |
|                | 2e lead space; note 2                          | 5.0 +0.6/−0.4   | 0.200 +0.024/−0.016 |
| P <sub>0</sub> | sprocket hole pitch                            | 12.7 ±0.3       | 0.500 ±0.012        |
| P <sub>1</sub> | 1e sprocket hole centre to lead centre; note 2 | 5.08 ±0.7       | 0.200 ±0.028        |
|                | 2e sprocket hole centre to lead centre; note 2 | 3.85 ±0.7       | 0.150 ±0.028        |
| D <sub>0</sub> | sprocket hole diameter                         | 4 ±0.3          | 0.157 ±0.012        |
| t              | overall tape thickness                         | ≤0.9            | ≤0.035              |
| d              | wire lead diameter                             | 0.5 ±0.05       | 0.02 ±0.002         |
| P              | taping pitch                                   | 12.7 ref.       | 0.500 ref.          |

### Notes

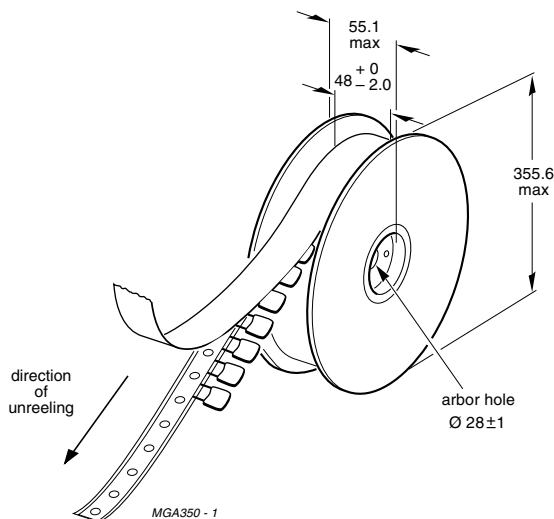
1. Tape width of 6 mm (0.236 inches) permissible.
2. e = 2.54 mm.



# **Leaded ceramic multilayer capacitors**

## **Mono-kap™ series**

### REEL AND DATA



Dimensions in mm.

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

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

Tape begins and ends with minimum of 24 empty positions (300 mm tape).

Maximum of 5 splices per reel.

Cumulative pitch tolerance over 20 consecutive units not to exceed  $\pm 1.0$  mm.

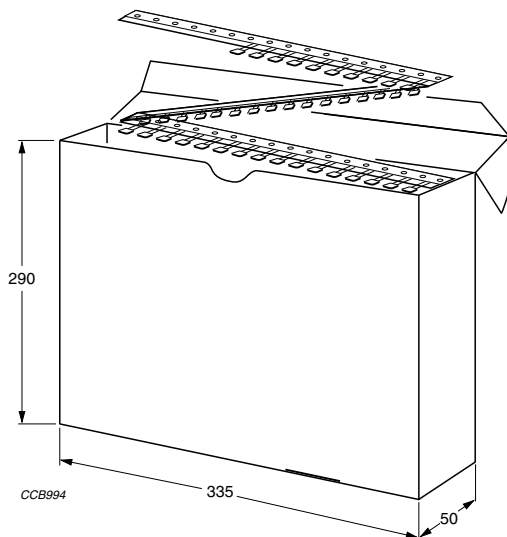
Lead space (F) shall be measured at  $3.6 \pm 0.5$  mm from the capacitor seating plane.

Fig.8 Reel with capacitors on tape.

## Leaded ceramic multilayer capacitors

## Mono-kap™ series

### AMMOPACK DATA



Dimensions in mm.

Maximum 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 minimum of 24 empty positions (300 mm tape).

Maximum of 5 splices per box.

Cumulative pitch tolerance over 20 consecutive units not to exceed  $\pm 1.0$  mm.

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

Fig.9 Ammopack with capacitors on tape.