

## Ordering code system

  
**B37830**

  
**R**

  
**0**

  
**101**

  
**K**

  
**0**

  
**2**

  
**1**

**Packaging**  
 1  $\triangleq$  cardboard tape, 180-mm reel  
 3  $\triangleq$  cardboard tape, 330-mm reel

2  $\triangleq$  2-fold array

4  $\triangleq$  4-fold array

**Internal coding:** 0 or decimal place for cap. values < 10 pF

**Capacitance tolerance**  
  
 J  $\triangleq \pm 5\%$   
**K  $\triangleq \pm 10\%$  (standard for C0G)**  
**M  $\triangleq \pm 20\%$  (standard for X7R)**

**Capacitance**, coded     $100 \triangleq 10 \cdot 10^0 \text{ pF} = 10 \text{ pF}$   
 (example)                 $101 \triangleq 10 \cdot 10^1 \text{ pF} = 100 \text{ pF}$   
                                   $220 \triangleq 22 \cdot 10^0 \text{ pF} = 22 \text{ pF}$

| Rated voltage | Rated voltage [VDC] | 16 | 25 | 50 |
|---------------|---------------------|----|----|----|
|               | Code                | 9  | 0  | 5  |

**Termination**                Standard:    R  $\triangleq$  nickel barrier for all case sizes  
                                          "R" also indicates array capacitor

## Type and size

| Chip size<br>(inch / mm) | Temperature characteristic |        |  |
|--------------------------|----------------------------|--------|--|
|                          | C0G                        | X7R    |  |
| <b>0405</b> / 1012       | B37830                     | B37831 |  |
| <b>0508</b> / 1220       | B37940                     | B37941 |  |
| <b>0612</b> / 1632       | B37871                     | B37872 |  |

### Features

- Reduction of mounting time and mounting costs
- Space saving on the PCB

### Applications

- Suitable for electronic circuits with parallel line layout
- Decoupling
- Coupling
- Blocking
- Interference suppression



### Termination

- For soldering: Nickel-barrier terminations (Ni)

### Options

- Alternative capacitance tolerances available on request

### Delivery mode

- Cardboard tape, 180-mm and 330-mm reel available

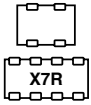
### Electrical data

|                                                |               |                                                      |     |
|------------------------------------------------|---------------|------------------------------------------------------|-----|
| Temperature characteristic                     |               | X7R                                                  |     |
| Climatic category (IEC 60068-1)                |               | 55/125/56                                            |     |
| Standard                                       |               | EIA                                                  |     |
| Dielectric                                     |               | Class 2                                              |     |
| Rated voltage <sup>1)</sup>                    | $V_R$         | 16, 25, 50                                           | VDC |
| Test voltage                                   | $V_{test}$    | $2,5 \cdot V_R/5$ s                                  | VDC |
| Capacitance range                              | $C_R$         | 1 nF ... 22 nF                                       |     |
| Max. relative capacitance change               | $\Delta C/C$  | $\pm 15$                                             | %   |
| Dissipation factor (limit value)               | $\tan \delta$ | $< 25 \cdot 10^{-3}$<br>$< 35 \cdot 10^{-3}$ for 16V |     |
| Insulation resistance <sup>2)</sup> at + 25 °C | $R_{ins}$     | $> 10^5$                                             | MΩ  |
| Insulation resistance <sup>2)</sup> at +125 °C | $R_{ins}$     | $> 10^4$                                             | MΩ  |
| Time constant <sup>2)</sup> at + 25 °C         | $\tau$        | $> 1000$                                             | s   |
| Time constant <sup>2)</sup> at +125 °C         | $\tau$        | $> 100$                                              | s   |
| Operating temperature range                    | $T_{op}$      | -55 ... +125                                         | °C  |
| Ageing <sup>3)</sup>                           |               | yes                                                  |     |

1) Note: No operation on AC line.

2) For  $C_R > 10$  nF the time constant  $\tau = C \cdot R_{ins}$  is given.

3) Refer to chapter "General Technical Information", page 197.

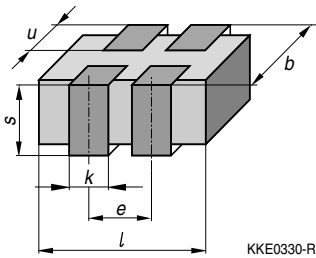


### Capacitance tolerances

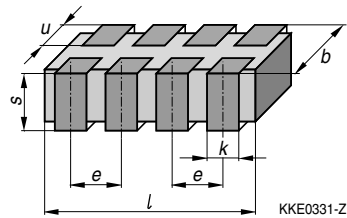
| Code letter | K          | M<br>(standard) |
|-------------|------------|-----------------|
| Tolerance   | $\pm 10\%$ | $\pm 20\%$      |

### Dimensional drawing

2-fold array (case size 0405)



4-fold array (case sizes 0508 and 0612)



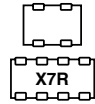
### Dimensions (mm)

| Case size (inch)<br>(mm) | 2-fold array    | 4-fold array    |                 |
|--------------------------|-----------------|-----------------|-----------------|
|                          | 0405<br>1012    | 0508<br>1220    | 0612<br>1632    |
| <i>l</i>                 | $1,37 \pm 0,15$ | $2,0 \pm 0,2$   | $3,2 \pm 0,2$   |
| <i>b</i>                 | $1,0 +0/-0,15$  | $1,25 \pm 0,15$ | $1,6 \pm 0,2$   |
| <i>s</i>                 | 0,70 max.       | $0,85 \pm 0,1$  | $0,85 \pm 0,1$  |
| <i>k</i>                 | $0,36 \pm 0,1$  | $0,3 \pm 0,1$   | $0,4 \pm 0,15$  |
| <i>e</i>                 | 0,64            | $0,5 \pm 0,1$   | $0,8 \pm 0,15$  |
| <i>u</i>                 | $0,2 \pm 0,1$   | $0,2 +0,3/-0,1$ | $0,2 +0,3/-0,1$ |

Tolerances to CECC 32101-801

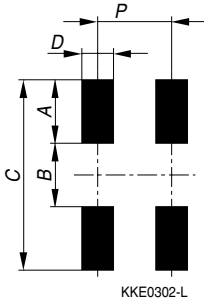
## Multilayer Ceramic Capacitors

**X7R**

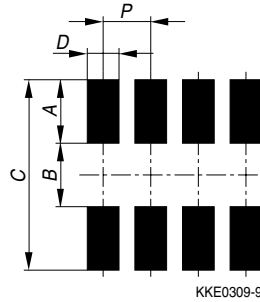


### Recommended solder pad

2-fold array (case size 0405)



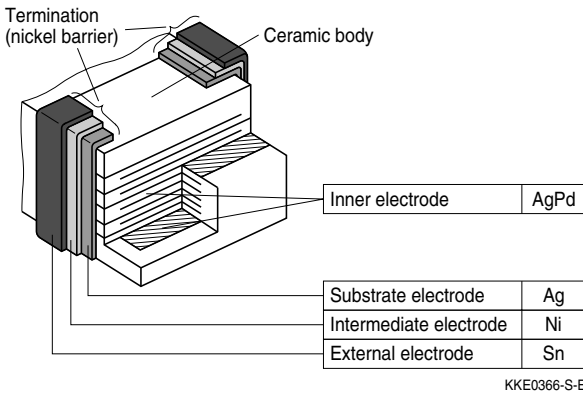
4-fold array (case sizes 0508 and 0612)

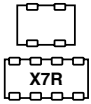


### Maximum dimensions (mm)

| Case size | (inch/mm) | Type         | A    | B    | C    | D    | P    |
|-----------|-----------|--------------|------|------|------|------|------|
|           | 0405/1012 | 2-fold array | 0,55 | 0,28 | 1,38 | 0,40 | 0,64 |
|           | 0508/1220 | 4-fold array | 0,90 | 0,40 | 2,20 | 0,35 | 0,50 |
|           | 0612/1632 | 4-fold array | 1,00 | 1,10 | 3,10 | 0,45 | 0,90 |

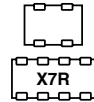
### Termination




**Product range array capacitors**

|                    | X7R           |  |  |               |  |             |
|--------------------|---------------|--|--|---------------|--|-------------|
|                    | 2-fold arrays |  |  | 4-fold arrays |  |             |
| Size <sup>1)</sup> | <b>0405</b>   |  |  | <b>0508</b>   |  | <b>0612</b> |
| inch               | 1012          |  |  | 1220          |  | 1632        |
| mm                 |               |  |  |               |  |             |
| Type               | B37831        |  |  | B37941        |  | B37872      |
| $V_R$ (VDC)        | 16            |  |  | 25            |  | 50          |
| $C_R$              |               |  |  |               |  |             |
| 1,0 nF             |               |  |  |               |  |             |
| 1,5 nF             |               |  |  |               |  |             |
| 2,2 nF             |               |  |  |               |  |             |
| 3,3 nF             |               |  |  |               |  |             |
| 4,7 nF             |               |  |  |               |  |             |
| 6,8 nF             |               |  |  |               |  |             |
| 10 nF              |               |  |  |               |  |             |
| 15 nF              |               |  |  |               |  |             |
| 22 nF              |               |  |  |               |  |             |

1)  $l \times b$  (inch) /  $l \times b$  (mm)



## Multilayer Ceramic Capacitors

### X7R; 0405 to 0612

#### Ordering codes and packing for X7R, 16, 25 and 50 VDC, nickel-barrier terminations

| $C_R^{1)}$ | Ordering code <sup>2)</sup> | Chip thickness | Cardboard tape,<br>Ø 180-mm reel | Cardboard tape,<br>Ø 330-mm reel |
|------------|-----------------------------|----------------|----------------------------------|----------------------------------|
|            |                             | mm             | $* \triangleq 1$                 | $* \triangleq 3$                 |
|            |                             |                | pcs/reel                         | pcs/reel                         |

#### Case size 0405, 16 VDC, 2-fold arrays

|        |                 |               |      |       |
|--------|-----------------|---------------|------|-------|
| 1,0 nF | B37831R9102M02* | $0,6 \pm 0,1$ | 5000 | 20000 |
| 2,2 nF | B37831R9222M02* | $0,6 \pm 0,1$ | 5000 | 20000 |
| 4,7 nF | B37831R9472M02* | $0,6 \pm 0,1$ | 5000 | 20000 |
| 10 nF  | B37831R9103M02* | $0,6 \pm 0,1$ | 5000 | 20000 |

#### Case size 0508, 25 VDC, 4-fold arrays

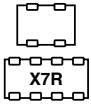
|        |                 |                |      |       |
|--------|-----------------|----------------|------|-------|
| 1,0 nF | B37941R0102M04* | $0,85 \pm 0,1$ | 4000 | 16000 |
| 2,2 nF | B37941R0222M04* | $0,85 \pm 0,1$ | 4000 | 16000 |
| 4,7 nF | B37941R0472M04* | $0,85 \pm 0,1$ | 4000 | 16000 |
| 10 nF  | B37941R0103M04* | $0,85 \pm 0,1$ | 4000 | 16000 |

#### Case size 0612, 50 VDC, 4-fold arrays

|        |                 |                |      |       |
|--------|-----------------|----------------|------|-------|
| 1,0 nF | B37872R5102M04* | $0,85 \pm 0,1$ | 4000 | 16000 |
| 1,5 nF | B37872R5152M04* | $0,85 \pm 0,1$ | 4000 | 16000 |
| 2,2 nF | B37872R5222M04* | $0,85 \pm 0,1$ | 4000 | 16000 |
| 3,3 nF | B37872R5332M04* | $0,85 \pm 0,1$ | 4000 | 16000 |
| 4,7 nF | B37872R5472M04* | $0,85 \pm 0,1$ | 4000 | 16000 |
| 6,8 nF | B37872R5682M04* | $0,85 \pm 0,1$ | 4000 | 16000 |
| 10 nF  | B37872R5103M04* | $0,85 \pm 0,1$ | 4000 | 16000 |
| 15 nF  | B37872R5153M04* | $0,85 \pm 0,1$ | 4000 | 16000 |
| 22 nF  | B37872R5223M04* | $0,85 \pm 0,1$ | 4000 | 16000 |

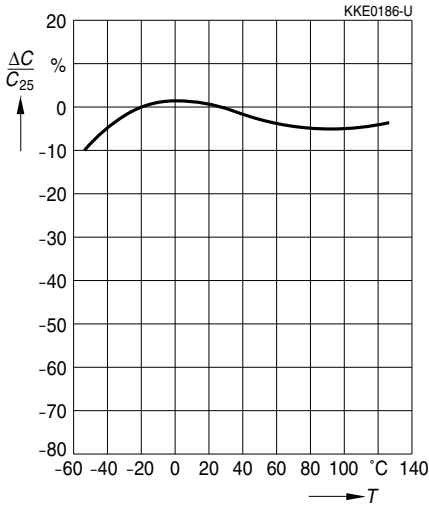
1) Other capacitance values on request.

2) The table contains the ordering codes for the standard capacitance tolerance.  
For other available capacitance tolerances see page 102.

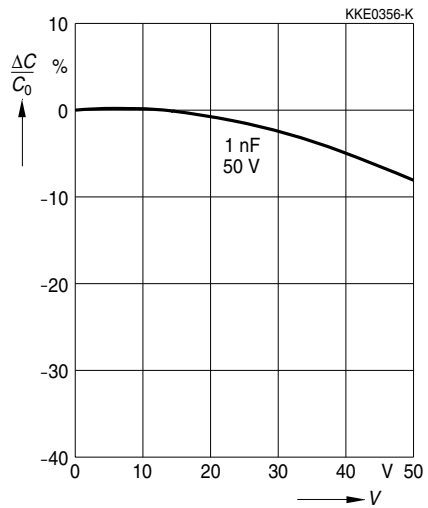


### Typical characteristics

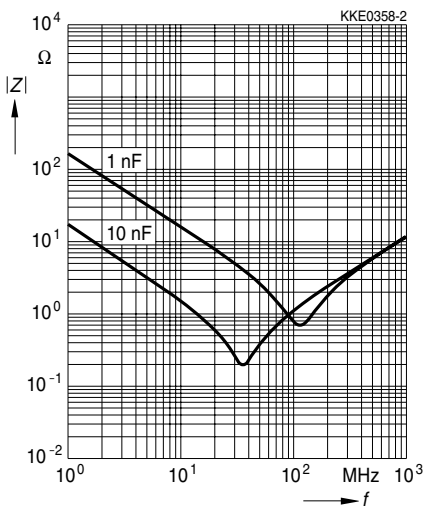
Capacitance change  $\Delta C/C_{25}$  versus temperature  $T$



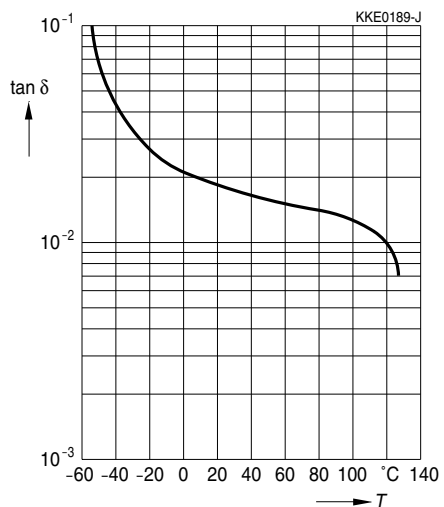
Capacitance change  $\Delta C/C_0$  versus superimposed DC voltage  $V$

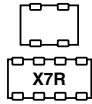


Impedance  $|Z|$  versus frequency  $f$



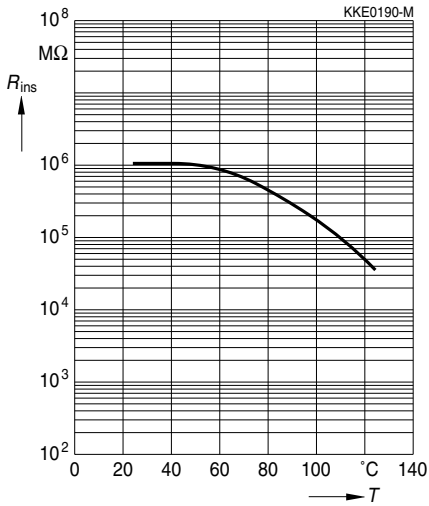
Dissipation factor  $\tan \delta$  versus temperature  $T$



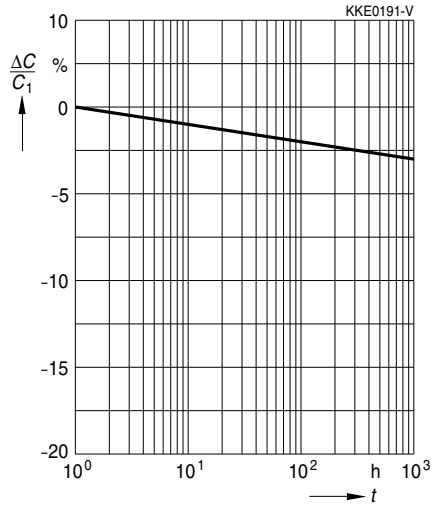


### Typical characteristics

Insulation resistance  $R_{\text{ins}}$  versus temperature  $T$



Capacitance change  $\Delta C/C_1$  versus time  $t$





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