



# **Multilayer ceramic capacitors**

Chip capacitors, C0G

Date: October 2006

## Ordering code system

  
**B37940**

  
**K**

  
**5**

  
**010**

  
**C**

  
**5**

  
**60**

**Packaging**  
 60  $\triangleq$  cardboard tape, 180-mm reel  
 62  $\triangleq$  blister tape, 180-mm reel  
 70  $\triangleq$  cardboard tape, 330-mm reel  
 72  $\triangleq$  blister tape, 330-mm reel  
 01  $\triangleq$  bulk case

**Decimal place** for cap. values <10 pF, otherwise 0

**Capacitance tolerance**  
 $C_R < 10 \text{ pF}$ : B  $\triangleq \pm 0.1 \text{ pF}$   
                   C  $\triangleq \pm 0.25 \text{ pF}$  (standard for capacitance values  $\leq 4.7 \text{ pF}$ )  
                   D  $\triangleq \pm 0.5 \text{ pF}$  (standard for capacitance values  $\leq 8.2 \text{ pF}$ )  
 $C_R \geq 10 \text{ pF}$ : F  $\triangleq \pm 1\%$   
                   G  $\triangleq \pm 2\%$   
                   J  $\triangleq \pm 5\%$  (standard)  
                   K  $\triangleq \pm 10\%$

**Capacitance, coded**    010  $\triangleq 1 \cdot 10^0 \text{ pF} = 1 \text{ pF}$   
 (example)                100  $\triangleq 10 \cdot 10^0 \text{ pF} = 10 \text{ pF}$   
                                   221  $\triangleq 22 \cdot 10^1 \text{ pF} = 220 \text{ pF}$

| Rated voltage | Rated voltage [VDC] | 50 | 100 | 200 |
|---------------|---------------------|----|-----|-----|
| Code          | 5                   | 1  | 2   |     |

**Termination**            Standard:    K  $\triangleq$  nickel barrier for all case sizes  
                               On request:    J  $\triangleq$  silver-palladium for conductive adhesion: all case sizes

| Type and size            |                                   |
|--------------------------|-----------------------------------|
| Chip size<br>(inch / mm) | Temperature characteristic<br>C0G |
| <b>0402</b> / 1005       | B37920                            |
| <b>0603</b> / 1608       | B37930                            |
| <b>0805</b> / 2012       | B37940                            |
| <b>1206</b> / 3216       | B37871                            |
| <b>1210</b> / 3225       | B37949                            |

## Features

- Good thermal stability
- High insulation resistance
- Low dissipation factor
- Low inductance
- To AEC-Q200



## Applications

- Resonant circuits
- Filter circuits
- Timing elements
- Coupling and filtering, particularly in RF circuits

## Termination

- For soldering: Nickel barrier terminations (Ni)
- For conductive adhesion: Silver-palladium terminations (AgPd) on request

## Options

- Alternative capacitance tolerances available on request

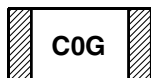
## Delivery mode

- Cardboard and blister tape (blister tape for chip thickness  $\geq 1.2 \pm 0.1$  mm and case size 1210), 180-mm and 330-mm reel available
- Bulk case for case sizes 0402, 0603 (50 V) and 0805 (50 V) on request

## Electrical data

|                                                |               |                            |     |
|------------------------------------------------|---------------|----------------------------|-----|
| Temperature characteristic                     |               | C0G                        |     |
| Climatic category (IEC 60068-1)                |               | 55/125/56                  |     |
| Standard                                       |               | EIA                        |     |
| Dielectric                                     |               | Class 1                    |     |
| Rated voltage                                  | $V_R$         | 50, 100, 200               | VDC |
| Test voltage                                   | $V_{test}$    | $2.5 \cdot V_R/5$ s        | VDC |
| Capacitance range / E series                   | $C_R$         | 1 pF ... 10 nF (E6/E12)    |     |
| Temperature coefficient                        |               | $0 \pm 30 \cdot 10^{-6}/K$ |     |
| Dissipation factor (limit value)               | $\tan \delta$ | $< 1.0 \cdot 10^{-3}$      |     |
| Insulation resistance <sup>1)</sup> at + 25 °C | $R_{ins}$     | $> 10^5$                   | MΩ  |
| Insulation resistance <sup>1)</sup> at +125 °C | $R_{ins}$     | $> 10^4$                   | MΩ  |
| Time constant <sup>1)</sup> at + 25 °C         | $\tau$        | $> 1000$                   | s   |
| Time constant <sup>1)</sup> at +125 °C         | $\tau$        | $> 100$                    | s   |
| Operating temperature range                    | $T_{op}$      | -55 ... +125               | °C  |
| Ageing                                         |               | none                       |     |

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



## Multilayer ceramic capacitors

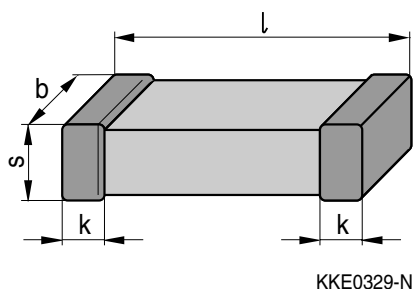
C0G

### Capacitance tolerances

|             | $C_R \leq 4.7 \text{ pF}$            |                       |                      | $5.6 \text{ pF} \leq C_R \leq 8.2 \text{ pF}$ |                                       |                      |
|-------------|--------------------------------------|-----------------------|----------------------|-----------------------------------------------|---------------------------------------|----------------------|
| Code letter | B                                    | C<br>(standard)       | D                    | B                                             | C                                     | D<br>(standard)      |
| Tolerance   | $\pm 0.1 \text{ pF}$<br>(on request) | $\pm 0.25 \text{ pF}$ | $\pm 0.5 \text{ pF}$ | $\pm 0.1 \text{ pF}$<br>(on request)          | $\pm 0.25 \text{ pF}$<br>(on request) | $\pm 0.5 \text{ pF}$ |

|             | $C_R \geq 10 \text{ pF}$                                           |  |                                                                    |  |                 |
|-------------|--------------------------------------------------------------------|--|--------------------------------------------------------------------|--|-----------------|
| Code letter | F                                                                  |  | G                                                                  |  | J<br>(standard) |
| Tolerance   | $\pm 1\%$ (on request for 50 V and 100 V; not available for 200 V) |  | $\pm 2\%$ (on request for 50 V and 100 V; not available for 200 V) |  | $\pm 5\%$       |

### Dimensional drawing

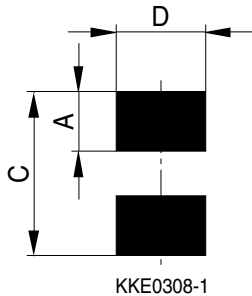


### Dimensions (mm)

| Case size | (inch) | 0402           | 0603           | 0805            | 1206            | 1210            |
|-----------|--------|----------------|----------------|-----------------|-----------------|-----------------|
|           | (mm)   | 1005           | 1608           | 2012            | 3216            | 3225            |
| l         |        | $1.0 \pm 0.10$ | $1.6 \pm 0.15$ | $2.00 \pm 0.20$ | $3.20 \pm 0.20$ | $3.20 \pm 0.30$ |
| b         |        | $0.5 \pm 0.05$ | $0.8 \pm 0.10$ | $1.25 \pm 0.15$ | $1.60 \pm 0.15$ | $2.50 \pm 0.30$ |
| s         |        | $0.5 \pm 0.05$ | $0.8 \pm 0.10$ | 1.30 max.       | 1.30 max.       | 1.70 max.       |
| k         |        | 0.1 – 0.40     | 0.1 – 0.40     | 0.13 – 0.75     | 0.25 – 0.75     | 0.25 – 0.75     |

Tolerances to CECC 32101-801

## Recommended solder pad



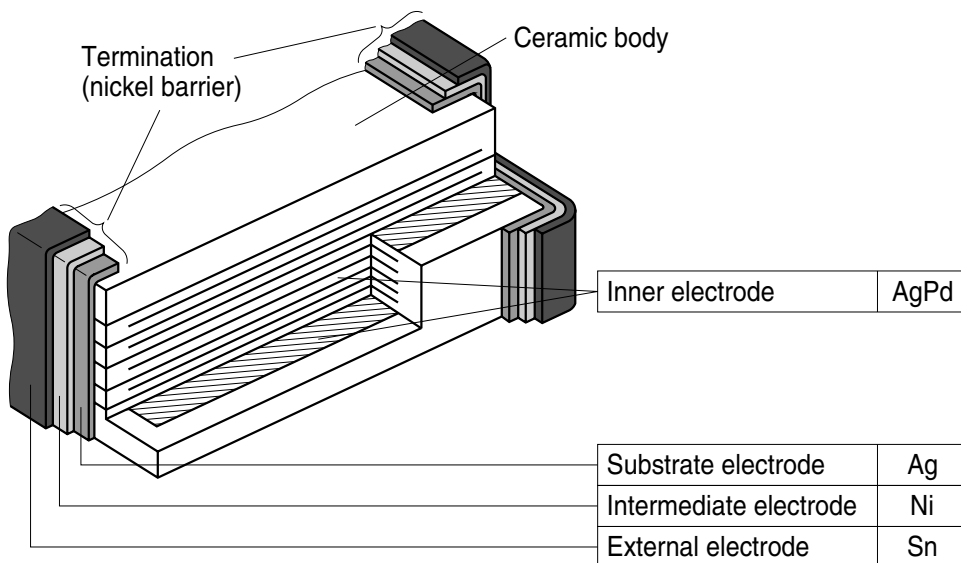
## Recommended dimensions (mm) for reflow soldering

| Case size | (inch/mm) | Type        | A             | C            | D           |
|-----------|-----------|-------------|---------------|--------------|-------------|
| 0402/1005 |           | single chip | 0.35 ... 0.45 | 1.0 ... 1.40 | 0.4 ... 0.6 |
| 0603/1608 |           | single chip | 0.60 ... 0.70 | 1.8 ... 2.20 | 0.6 ... 0.8 |
| 0805/2012 |           | single chip | 0.60 ... 0.70 | 2.2 ... 2.60 | 0.8 ... 1.1 |
| 1206/3216 |           | single chip | 0.80 ... 0.90 | 3.8 ... 4.32 | 1.0 ... 1.4 |
| 1210/3225 |           | single chip | 1.00 ... 1.20 | 4.0 ... 4.80 | 1.8 ... 2.3 |

## Recommended dimensions (mm) for wave soldering

| Case size | (inch/mm) | Type        | A           | C           | D           |
|-----------|-----------|-------------|-------------|-------------|-------------|
| 0603/1608 |           | single chip | 0.8 ... 0.9 | 2.2 ... 2.8 | 0.6 ... 0.8 |
| 0805/2012 |           | single chip | 0.9 ... 1.0 | 2.8 ... 3.2 | 0.8 ... 1.1 |
| 1206/3216 |           | single chip | 1.0 ... 1.1 | 4.2 ... 4.8 | 1.0 ... 1.4 |

## Termination



KKE0484-W



## Multilayer ceramic capacitors

### C0G

#### Product range chip capacitors, C0G

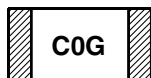
| Size <sup>1)</sup><br>inch<br>mm | 0402<br>1005 |  | 0603<br>1608 |     | 0805<br>2012 |     |     | 1206<br>3216 |     |  | 1210<br>3225 |     |  |
|----------------------------------|--------------|--|--------------|-----|--------------|-----|-----|--------------|-----|--|--------------|-----|--|
| Type                             | B37920       |  | B37930       |     | B37940       |     |     | B37871       |     |  | B37949       |     |  |
| $V_R$ (VDC)                      | 50           |  | 50           | 100 | 50           | 100 | 200 | 50           | 100 |  | 50           | 100 |  |
| $C_R$                            |              |  |              |     |              |     |     |              |     |  |              |     |  |
| 1.0 pF                           |              |  |              |     |              |     |     |              |     |  |              |     |  |
| 1.2 pF                           |              |  |              |     |              |     |     |              |     |  |              |     |  |
| 1.5 pF                           |              |  |              |     |              |     |     |              |     |  |              |     |  |
| 1.8 pF                           |              |  |              |     |              |     |     |              |     |  |              |     |  |
| 2.2 pF                           |              |  |              |     |              |     |     |              |     |  |              |     |  |
| 2.7 pF                           |              |  |              |     |              |     |     |              |     |  |              |     |  |
| 3.3 pF                           |              |  |              |     |              |     |     |              |     |  |              |     |  |
| 3.9 pF                           |              |  |              |     |              |     |     |              |     |  |              |     |  |
| 4.7 pF                           |              |  |              |     |              |     |     |              |     |  |              |     |  |
| 5.6 pF                           |              |  |              |     |              |     |     |              |     |  |              |     |  |
| 6.8 pF                           |              |  |              |     |              |     |     |              |     |  |              |     |  |
| 8.2 pF                           |              |  |              |     |              |     |     |              |     |  |              |     |  |
| 10 pF                            |              |  |              |     |              |     |     |              |     |  |              |     |  |
| 12 pF                            |              |  |              |     |              |     |     |              |     |  |              |     |  |
| 15 pF                            |              |  |              |     |              |     |     |              |     |  |              |     |  |
| 18 pF                            |              |  |              |     |              |     |     |              |     |  |              |     |  |
| 22 pF                            |              |  |              |     |              |     |     |              |     |  |              |     |  |
| 27 pF                            |              |  |              |     |              |     |     |              |     |  |              |     |  |
| 33 pF                            |              |  |              |     |              |     |     |              |     |  |              |     |  |
| 39 pF                            |              |  |              |     |              |     |     |              |     |  |              |     |  |
| 47 pF                            |              |  |              |     |              |     |     |              |     |  |              |     |  |
| 56 pF                            |              |  |              |     |              |     |     |              |     |  |              |     |  |
| 68 pF                            |              |  |              |     |              |     |     |              |     |  |              |     |  |
| 82 pF                            |              |  |              |     |              |     |     |              |     |  |              |     |  |

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

## Product range chip capacitors, C0G

| Size <sup>1)</sup><br>inch<br>mm | 0402<br>1005 |  | 0603<br>1608 |     | 0805<br>2012 |     |     | 1206<br>3216 |     |  | 1210<br>3225 |     |  |
|----------------------------------|--------------|--|--------------|-----|--------------|-----|-----|--------------|-----|--|--------------|-----|--|
| Type                             | B37920       |  | B37930       |     | B37940       |     |     | B37871       |     |  | B37949       |     |  |
| $V_R$ (VDC)                      | 50           |  | 50           | 100 | 50           | 100 | 200 | 50           | 100 |  | 50           | 100 |  |
| $C_R$                            |              |  |              |     |              |     |     |              |     |  |              |     |  |
| 100 pF                           |              |  |              |     |              |     |     |              |     |  |              |     |  |
| 120 pF                           |              |  |              |     |              |     |     |              |     |  |              |     |  |
| 150 pF                           |              |  |              |     |              |     |     |              |     |  |              |     |  |
| 180 pF                           |              |  |              |     |              |     |     |              |     |  |              |     |  |
| 220 pF                           |              |  |              |     |              |     |     |              |     |  |              |     |  |
| 270 pF                           |              |  |              |     |              |     |     |              |     |  |              |     |  |
| 330 pF                           |              |  |              |     |              |     |     |              |     |  |              |     |  |
| 390 pF                           |              |  |              |     |              |     |     |              |     |  |              |     |  |
| 470 pF                           |              |  |              |     |              |     |     |              |     |  |              |     |  |
| 560 pF                           |              |  |              |     |              |     |     |              |     |  |              |     |  |
| 680 pF                           |              |  |              |     |              |     |     |              |     |  |              |     |  |
| 820 pF                           |              |  |              |     |              |     |     |              |     |  |              |     |  |
| 1.0 nF                           |              |  |              |     |              |     |     |              |     |  |              |     |  |
| 1.2 nF                           |              |  |              |     |              |     |     |              |     |  |              |     |  |
| 1.5 nF                           |              |  |              |     |              |     |     |              |     |  |              |     |  |
| 1.8 nF                           |              |  |              |     |              |     |     |              |     |  |              |     |  |
| 2.2 nF                           |              |  |              |     |              |     |     |              |     |  |              |     |  |
| 2.7 nF                           |              |  |              |     |              |     |     |              |     |  |              |     |  |
| 3.3 nF                           |              |  |              |     |              |     |     |              |     |  |              |     |  |
| 3.9 nF                           |              |  |              |     |              |     |     |              |     |  |              |     |  |
| 4.7 nF                           |              |  |              |     |              |     |     |              |     |  |              |     |  |
| 5.6 nF                           |              |  |              |     |              |     |     |              |     |  |              |     |  |
| 6.8 nF                           |              |  |              |     |              |     |     |              |     |  |              |     |  |
| 8.2 nF                           |              |  |              |     |              |     |     |              |     |  |              |     |  |
| 10 nF                            |              |  |              |     |              |     |     |              |     |  |              |     |  |

1) l × b (inch) / l × b (mm)



## Multilayer ceramic capacitors

C0G; 0402

### Ordering codes and packing for C0G, 50 VDC, nickel barrier terminations

#### Case size 0402, 50 VDC

| C <sub>R</sub> <sup>1)</sup> | Ordering code <sup>2)</sup> | Chip thickness<br>mm | Cardboard tape,<br>Ø 180-mm reel | Cardboard tape,<br>Ø 330-mm reel |
|------------------------------|-----------------------------|----------------------|----------------------------------|----------------------------------|
|                              |                             |                      | ** $\triangle$ 60                | ** $\triangle$ 70                |
|                              |                             |                      | pcs/reel                         | pcs/reel                         |
| 3.3 pF                       | B37920K5030C3**             | 0.5 $\pm$ 0.05       | 10000                            | 50000                            |
| 3.9 pF                       | B37920K5030C9**             | 0.5 $\pm$ 0.05       | 10000                            | 50000                            |
| 4.7 pF                       | B37920K5040C7**             | 0.5 $\pm$ 0.05       | 10000                            | 50000                            |
| 5.6 pF                       | B37920K5050D6**             | 0.5 $\pm$ 0.05       | 10000                            | 50000                            |
| 6.8 pF                       | B37920K5060D8**             | 0.5 $\pm$ 0.05       | 10000                            | 50000                            |
| 8.2 pF                       | B37920K5080D2**             | 0.5 $\pm$ 0.05       | 10000                            | 50000                            |
| 10 pF                        | B37920K5100J0**             | 0.5 $\pm$ 0.05       | 10000                            | 50000                            |
| 12 pF                        | B37920K5120J0**             | 0.5 $\pm$ 0.05       | 10000                            | 50000                            |
| 15 pF                        | B37920K5150J0**             | 0.5 $\pm$ 0.05       | 10000                            | 50000                            |
| 18 pF                        | B37920K5180J0**             | 0.5 $\pm$ 0.05       | 10000                            | 50000                            |
| 22 pF                        | B37920K5220J0**             | 0.5 $\pm$ 0.05       | 10000                            | 50000                            |
| 27 pF                        | B37920K5270J0**             | 0.5 $\pm$ 0.05       | 10000                            | 50000                            |
| 33 pF                        | B37920K5330J0**             | 0.5 $\pm$ 0.05       | 10000                            | 50000                            |
| 39 pF                        | B37920K5390J0**             | 0.5 $\pm$ 0.05       | 10000                            | 50000                            |
| 47 pF                        | B37920K5470J0**             | 0.5 $\pm$ 0.05       | 10000                            | 50000                            |
| 56 pF                        | B37920K5560J0**             | 0.5 $\pm$ 0.05       | 10000                            | 50000                            |
| 68 pF                        | B37920K5680J0**             | 0.5 $\pm$ 0.05       | 10000                            | 50000                            |
| 82 pF                        | B37920K5820J0**             | 0.5 $\pm$ 0.05       | 10000                            | 50000                            |
| 100 pF                       | B37920K5101J0**             | 0.5 $\pm$ 0.05       | 10000                            | 50000                            |

1) Capacitance values < 3.3 pF and > 100 pF on request.

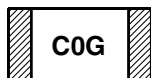
2) The table contains the ordering codes for the standard capacitance tolerance.  
For other available capacitance tolerances see page 4.

## Ordering codes and packing for C0G, 50 VDC, nickel barrier terminations

## Case size 0603, 50 VDC

| C <sub>R</sub> | Ordering code <sup>1)</sup> | Chip thickness<br>mm | Cardboard tape,<br>Ø 180-mm reel | Cardboard tape,<br>Ø 330-mm reel | Bulk case                |
|----------------|-----------------------------|----------------------|----------------------------------|----------------------------------|--------------------------|
|                |                             |                      | ** $\triangle$ 60<br>pcs/reel    | ** $\triangle$ 70<br>pcs/reel    | ** $\triangle$ 01<br>pcs |
| 1.0 pF         | B37930K5010C0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            | 15000                    |
| 1.2 pF         | B37930K5010C2**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            | 15000                    |
| 1.5 pF         | B37930K5010C5**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            | 15000                    |
| 1.8 pF         | B37930K5010C8**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            | 15000                    |
| 2.2 pF         | B37930K5020C2**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            | 15000                    |
| 2.7 pF         | B37930K5020C7**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            | 15000                    |
| 3.3 pF         | B37930K5030C3**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            | 15000                    |
| 3.9 pF         | B37930K5030C9**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            | 15000                    |
| 4.7 pF         | B37930K5040C7**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            | 15000                    |
| 5.6 pF         | B37930K5050D6**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            | 15000                    |
| 6.8 pF         | B37930K5060D8**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            | 15000                    |
| 8.2 pF         | B37930K5080D2**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            | 15000                    |
| 10 pF          | B37930K5100J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            | 15000                    |
| 12 pF          | B37930K5120J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            | 15000                    |
| 15 pF          | B37930K5150J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            | 15000                    |
| 18 pF          | B37930K5180J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            | 15000                    |
| 22 pF          | B37930K5220J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            | 15000                    |
| 27 pF          | B37930K5270J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            | 15000                    |
| 33 pF          | B37930K5330J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            | 15000                    |
| 39 pF          | B37930K5390J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            | 15000                    |
| 47 pF          | B37930K5470J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            | 15000                    |
| 56 pF          | B37930K5560J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            | 15000                    |
| 68 pF          | B37930K5680J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            | 15000                    |
| 82 pF          | B37930K5820J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            | 15000                    |
| 100 pF         | B37930K5101J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            | 15000                    |
| 120 pF         | B37930K5121J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            | 15000                    |
| 150 pF         | B37930K5151J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            | 15000                    |
| 180 pF         | B37930K5181J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            | 15000                    |
| 220 pF         | B37930K5221J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            | 15000                    |
| 270 pF         | B37930K5271J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            | 15000                    |
| 330 pF         | B37930K5331J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            | 15000                    |
| 390 pF         | B37930K5391J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            | 15000                    |
| 470 pF         | B37930K5471J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            | 15000                    |

1) The table contains the ordering codes for the standard capacitance tolerance.  
For other available capacitance tolerances see page 4.



## Multilayer ceramic capacitors

C0G; 0603

### Ordering codes and packing for C0G, 100 VDC, nickel barrier terminations

#### Case size 0603, 100 VDC

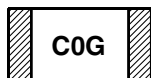
| C <sub>R</sub> | Ordering code <sup>1)</sup> | Chip thickness<br>mm | Cardboard tape,<br>Ø 180-mm reel | Cardboard tape,<br>Ø 330-mm reel | Bulk case                |
|----------------|-----------------------------|----------------------|----------------------------------|----------------------------------|--------------------------|
|                |                             |                      | ** $\triangle$ 60<br>pcs/reel    | ** $\triangle$ 70<br>pcs/reel    | ** $\triangle$ 01<br>pcs |
| 1.0 pF         | B37930K1010C0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            | 15000                    |
| 1.5 pF         | B37930K1010C5**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            | 15000                    |
| 2.2 pF         | B37930K1020C2**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            | 15000                    |
| 3.3 pF         | B37930K1030C3**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            | 15000                    |
| 4.7 pF         | B37930K1040C7**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            | 15000                    |
| 6.8 pF         | B37930K1060D8**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            | 15000                    |
| 10 pF          | B37930K1100J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            | 15000                    |
| 15 pF          | B37930K1150J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            | 15000                    |
| 22 pF          | B37930K1220J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            | 15000                    |
| 33 pF          | B37930K1330J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            | 15000                    |
| 47 pF          | B37930K1470J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            | 15000                    |
| 68 pF          | B37930K1680J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            | 15000                    |
| 100 pF         | B37930K1101J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            | 15000                    |
| 150 pF         | B37930K1151J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            | 15000                    |
| 220 pF         | B37930K1221J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            | 15000                    |

1) The table contains the ordering codes for the standard capacitance tolerance.  
For other available capacitance tolerances see page 4.

## Ordering codes and packing for C0G, 50 VDC, nickel barrier terminations

| Case size 0805, 50 VDC |                             |                |                               |                               |                   |
|------------------------|-----------------------------|----------------|-------------------------------|-------------------------------|-------------------|
| C <sub>R</sub>         | Ordering code <sup>1)</sup> | Chip thickness | Cardboard tape, Ø 180-mm reel | Cardboard tape, Ø 330-mm reel | Bulk case         |
|                        |                             | mm             | ** $\triangle$ 60             | ** $\triangle$ 70             | ** $\triangle$ 01 |
|                        |                             |                | pcs/reel                      | pcs/reel                      | pcs               |
| 1.0 pF                 | B37940K5010C0**             | 0.6 $\pm$ 0.1  | 5000                          | 20000                         | 10000             |
| 1.2 pF                 | B37940K5010C2**             | 0.6 $\pm$ 0.1  | 5000                          | 20000                         | 10000             |
| 1.5 pF                 | B37940K5010C5**             | 0.6 $\pm$ 0.1  | 5000                          | 20000                         | 10000             |
| 1.8 pF                 | B37940K5010C8**             | 0.6 $\pm$ 0.1  | 5000                          | 20000                         | 10000             |
| 2.2 pF                 | B37940K5020C2**             | 0.6 $\pm$ 0.1  | 5000                          | 20000                         | 10000             |
| 2.7 pF                 | B37940K5020C7**             | 0.6 $\pm$ 0.1  | 5000                          | 20000                         | 10000             |
| 3.3 pF                 | B37940K5030C3**             | 0.6 $\pm$ 0.1  | 5000                          | 20000                         | 10000             |
| 3.9 pF                 | B37940K5030C9**             | 0.6 $\pm$ 0.1  | 5000                          | 20000                         | 10000             |
| 4.7 pF                 | B37940K5040C7**             | 0.6 $\pm$ 0.1  | 5000                          | 20000                         | 10000             |
| 5.6 pF                 | B37940K5050D6**             | 0.6 $\pm$ 0.1  | 5000                          | 20000                         | 10000             |
| 6.8 pF                 | B37940K5060D8**             | 0.6 $\pm$ 0.1  | 5000                          | 20000                         | 10000             |
| 8.2 pF                 | B37940K5080D2**             | 0.6 $\pm$ 0.1  | 5000                          | 20000                         | 10000             |
| 10 pF                  | B37940K5100J0**             | 0.6 $\pm$ 0.1  | 5000                          | 20000                         | 10000             |
| 12 pF                  | B37940K5120J0**             | 0.6 $\pm$ 0.1  | 5000                          | 20000                         | 10000             |
| 15 pF                  | B37940K5150J0**             | 0.6 $\pm$ 0.1  | 5000                          | 20000                         | 10000             |
| 18 pF                  | B37940K5180J0**             | 0.6 $\pm$ 0.1  | 5000                          | 20000                         | 10000             |
| 22 pF                  | B37940K5220J0**             | 0.6 $\pm$ 0.1  | 5000                          | 20000                         | 10000             |
| 27 pF                  | B37940K5270J0**             | 0.6 $\pm$ 0.1  | 5000                          | 20000                         | 10000             |
| 33 pF                  | B37940K5330J0**             | 0.6 $\pm$ 0.1  | 5000                          | 20000                         | 10000             |
| 39 pF                  | B37940K5390J0**             | 0.6 $\pm$ 0.1  | 5000                          | 20000                         | 10000             |
| 47 pF                  | B37940K5470J0**             | 0.6 $\pm$ 0.1  | 5000                          | 20000                         | 10000             |
| 56 pF                  | B37940K5560J0**             | 0.6 $\pm$ 0.1  | 5000                          | 20000                         | 10000             |
| 68 pF                  | B37940K5680J0**             | 0.6 $\pm$ 0.1  | 5000                          | 20000                         | 10000             |
| 82 pF                  | B37940K5820J0**             | 0.6 $\pm$ 0.1  | 5000                          | 20000                         | 10000             |
| 100 pF                 | B37940K5101J0**             | 0.6 $\pm$ 0.1  | 5000                          | 20000                         | 10000             |
| 120 pF                 | B37940K5121J0**             | 0.6 $\pm$ 0.1  | 5000                          | 20000                         | 10000             |
| 150 pF                 | B37940K5151J0**             | 0.6 $\pm$ 0.1  | 5000                          | 20000                         | 10000             |
| 180 pF                 | B37940K5181J0**             | 0.6 $\pm$ 0.1  | 5000                          | 20000                         | 10000             |
| 220 pF                 | B37940K5221J0**             | 0.6 $\pm$ 0.1  | 5000                          | 20000                         | 10000             |
| 270 pF                 | B37940K5271J0**             | 0.6 $\pm$ 0.1  | 5000                          | 20000                         | 10000             |
| 330 pF                 | B37940K5331J0**             | 0.6 $\pm$ 0.1  | 5000                          | 20000                         | 10000             |
| 390 pF                 | B37940K5391J0**             | 0.6 $\pm$ 0.1  | 5000                          | 20000                         | 10000             |
| 470 pF                 | B37940K5471J0**             | 0.6 $\pm$ 0.1  | 5000                          | 20000                         | 10000             |

1) The table contains the ordering codes for the standard capacitance tolerance.  
For other available capacitance tolerances see page 4.



## Multilayer ceramic capacitors

C0G; 0805

### Ordering codes and packing for C0G, 50 VDC, nickel barrier terminations

| Case size 0805, 50 VDC |                             |                      |                                  |                                  |                   |
|------------------------|-----------------------------|----------------------|----------------------------------|----------------------------------|-------------------|
| C <sub>R</sub>         | Ordering code <sup>1)</sup> | Chip thickness<br>mm | Cardboard tape,<br>Ø 180-mm reel | Cardboard tape,<br>Ø 330-mm reel | Bulk case         |
|                        |                             |                      | ** $\triangle$ 60                | ** $\triangle$ 70                | ** $\triangle$ 01 |
|                        |                             |                      | pcs/reel                         | pcs/reel                         | pcs               |
| 560 pF                 | B37940K5561J0**             | 0.6 $\pm$ 0.1        | 5000                             | 20000                            | 10000             |
| 680 pF                 | B37940K5681J0**             | 0.6 $\pm$ 0.1        | 5000                             | 20000                            | 10000             |
| 820 pF                 | B37940K5821J0**             | 0.6 $\pm$ 0.1        | 5000                             | 20000                            | 10000             |
| 1.0 nF                 | B37940K5102J0**             | 0.6 $\pm$ 0.1        | 5000                             | 20000                            | 10000             |
| 1.2 nF                 | B37940K5122J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            | —                 |
| 1.5 nF                 | B37940K5152J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            | —                 |
| 1.8 nF                 | B37940K5182J0**             | 1.2 $\pm$ 0.1        | 3000 <sup>2)</sup>               | 12000 <sup>3)</sup>              | —                 |
| 2.2 nF                 | B37940K5222J0**             | 1.2 $\pm$ 0.1        | 3000 <sup>2)</sup>               | 12000 <sup>3)</sup>              | —                 |

1) The table contains the ordering codes for the standard capacitance tolerance.

For other available capacitance tolerances see page 4.

2) Blister tape, 180-mm reel, ordering code \*\*  $\triangle$  62

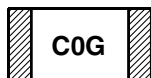
3) Blister tape, 330-mm reel, ordering code \*\*  $\triangle$  72

# Ordering codes and packing for C0G, 100 VDC, nickel barrier terminations

## Case size 0805, 100 VDC

| C <sub>R</sub> | Ordering code <sup>1)</sup> | Chip thickness<br>mm | Cardboard tape,<br>Ø 180-mm reel | Cardboard tape,<br>Ø 330-mm reel |
|----------------|-----------------------------|----------------------|----------------------------------|----------------------------------|
|                |                             |                      | ** $\triangle$ 60                | ** $\triangle$ 70                |
|                |                             |                      | pcs/reel                         | pcs/reel                         |
| 1.0 pF         | B37940K1010C0**             | 0.6 $\pm$ 0.1        | 5000                             | 20000                            |
| 1.2 pF         | B37940K1010C2**             | 0.6 $\pm$ 0.1        | 5000                             | 20000                            |
| 1.5 pF         | B37940K1010C5**             | 0.6 $\pm$ 0.1        | 5000                             | 20000                            |
| 1.8 pF         | B37940K1010C8**             | 0.6 $\pm$ 0.1        | 5000                             | 20000                            |
| 2.2 pF         | B37940K1020C2**             | 0.6 $\pm$ 0.1        | 5000                             | 20000                            |
| 2.7 pF         | B37940K1020C7**             | 0.6 $\pm$ 0.1        | 5000                             | 20000                            |
| 3.3 pF         | B37940K1030C3**             | 0.6 $\pm$ 0.1        | 5000                             | 20000                            |
| 3.9 pF         | B37940K1030C9**             | 0.6 $\pm$ 0.1        | 5000                             | 20000                            |
| 4.7 pF         | B37940K1040C7**             | 0.6 $\pm$ 0.1        | 5000                             | 20000                            |
| 5.6 pF         | B37940K1050D6**             | 0.6 $\pm$ 0.1        | 5000                             | 20000                            |
| 6.8 pF         | B37940K1060D8**             | 0.6 $\pm$ 0.1        | 5000                             | 20000                            |
| 8.2 pF         | B37940K1080D2**             | 0.6 $\pm$ 0.1        | 5000                             | 20000                            |
| 10 pF          | B37940K1100J0**             | 0.6 $\pm$ 0.1        | 5000                             | 20000                            |
| 12 pF          | B37940K1120J0**             | 0.6 $\pm$ 0.1        | 5000                             | 20000                            |
| 15 pF          | B37940K1150J0**             | 0.6 $\pm$ 0.1        | 5000                             | 20000                            |
| 18 pF          | B37940K1180J0**             | 0.6 $\pm$ 0.1        | 5000                             | 20000                            |
| 22 pF          | B37940K1220J0**             | 0.6 $\pm$ 0.1        | 5000                             | 20000                            |
| 27 pF          | B37940K1270J0**             | 0.6 $\pm$ 0.1        | 5000                             | 20000                            |
| 33 pF          | B37940K1330J0**             | 0.6 $\pm$ 0.1        | 5000                             | 20000                            |
| 39 pF          | B37940K1390J0**             | 0.6 $\pm$ 0.1        | 5000                             | 20000                            |
| 47 pF          | B37940K1470J0**             | 0.6 $\pm$ 0.1        | 5000                             | 20000                            |
| 56 pF          | B37940K1560J0**             | 0.6 $\pm$ 0.1        | 5000                             | 20000                            |
| 68 pF          | B37940K1680J0**             | 0.6 $\pm$ 0.1        | 5000                             | 20000                            |
| 82 pF          | B37940K1820J0**             | 0.6 $\pm$ 0.1        | 5000                             | 20000                            |
| 100 pF         | B37940K1101J0**             | 0.6 $\pm$ 0.1        | 5000                             | 20000                            |
| 120 pF         | B37940K1121J0**             | 0.6 $\pm$ 0.1        | 5000                             | 20000                            |
| 150 pF         | B37940K1151J0**             | 0.6 $\pm$ 0.1        | 5000                             | 20000                            |
| 180 pF         | B37940K1181J0**             | 0.6 $\pm$ 0.1        | 5000                             | 20000                            |
| 220 pF         | B37940K1221J0**             | 0.6 $\pm$ 0.1        | 5000                             | 20000                            |
| 270 pF         | B37940K1271J0**             | 0.6 $\pm$ 0.1        | 5000                             | 20000                            |
| 330 pF         | B37940K1331J0**             | 0.6 $\pm$ 0.1        | 5000                             | 20000                            |
| 390 pF         | B37940K1391J0**             | 0.6 $\pm$ 0.1        | 5000                             | 20000                            |
| 470 pF         | B37940K1471J0**             | 0.6 $\pm$ 0.1        | 5000                             | 20000                            |

1) The table contains the ordering codes for the standard capacitance tolerance.  
For other available capacitance tolerances see page 4.



## Multilayer ceramic capacitors

C0G; 0805

### Ordering codes and packing for C0G, 100 VDC, nickel barrier terminations

#### Case size 0805, 100 VDC

| C <sub>R</sub> | Ordering code <sup>1)</sup> | Chip thickness<br>mm | Cardboard tape,<br>Ø 180-mm reel | Cardboard tape,<br>Ø 330-mm reel |
|----------------|-----------------------------|----------------------|----------------------------------|----------------------------------|
|                |                             |                      | ** $\triangleq$ 60               | ** $\triangleq$ 70               |
|                |                             |                      | pcs/reel                         | pcs/reel                         |
| 560 pF         | B37940K1561J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 680 pF         | B37940K1681J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 820 pF         | B37940K1821J0**             | 1.2 $\pm$ 0.1        | 3000 <sup>3)</sup>               | 12000 <sup>4)</sup>              |
| 1.0 nF         | B37940K1102J0**             | 1.2 $\pm$ 0.1        | 3000 <sup>3)</sup>               | 12000 <sup>4)</sup>              |

### Ordering codes and packing for C0G, 200 VDC, nickel barrier terminations

#### Case size 0805, 200 VDC

| C <sub>R</sub> <sup>2)</sup> | Ordering code <sup>1)</sup> | Chip thickness<br>mm | Cardboard tape,<br>Ø 180-mm reel | Cardboard tape,<br>Ø 330-mm reel |
|------------------------------|-----------------------------|----------------------|----------------------------------|----------------------------------|
|                              |                             |                      | ** $\triangleq$ 60               | ** $\triangleq$ 70               |
|                              |                             |                      | pcs/reel                         | pcs/reel                         |
| 2.2 pF                       | B37940K2020C2**             | 0.6 $\pm$ 0.1        | 5000                             | 20000                            |
| 3.3 pF                       | B37940K2030C3**             | 0.6 $\pm$ 0.1        | 5000                             | 20000                            |
| 4.7 pF                       | B37940K2040C7**             | 0.6 $\pm$ 0.1        | 5000                             | 20000                            |
| 6.8 pF                       | B37940K2060D8**             | 0.6 $\pm$ 0.1        | 5000                             | 20000                            |
| 10 pF                        | B37940K2100J0**             | 0.6 $\pm$ 0.1        | 5000                             | 20000                            |
| 15 pF                        | B37940K2150J0**             | 0.6 $\pm$ 0.1        | 5000                             | 20000                            |
| 22 pF                        | B37940K2220J0**             | 0.6 $\pm$ 0.1        | 5000                             | 20000                            |
| 33 pF                        | B37940K2330J0**             | 0.6 $\pm$ 0.1        | 5000                             | 20000                            |
| 47 pF                        | B37940K2470J0**             | 0.6 $\pm$ 0.1        | 5000                             | 20000                            |
| 68 pF                        | B37940K2680J0**             | 0.6 $\pm$ 0.1        | 5000                             | 20000                            |
| 100 pF                       | B37940K2101J0**             | 0.6 $\pm$ 0.1        | 5000                             | 20000                            |
| 150 pF                       | B37940K2151J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 220 pF                       | B37940K2221J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 330 pF                       | B37940K2331J0**             | 1.2 $\pm$ 0.1        | 3000 <sup>3)</sup>               | 12000 <sup>4)</sup>              |

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 4.

3) Blister tape, 180-mm reel, ordering code \*\*  $\triangleq$  62

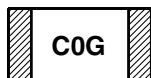
4) Blister tape, 330-mm reel, ordering code \*\*  $\triangleq$  72

## Ordering codes and packing for C0G, 50 VDC, nickel barrier terminations

## Case size 1206, 50 VDC

| C <sub>R</sub> | Ordering code <sup>1)</sup> | Chip thickness<br>mm | Cardboard tape,<br>Ø 180-mm reel | Cardboard tape,<br>Ø 330-mm reel |
|----------------|-----------------------------|----------------------|----------------------------------|----------------------------------|
|                |                             |                      | ** $\triangle$ 60                | ** $\triangle$ 70                |
|                |                             |                      | pcs/reel                         | pcs/reel                         |
| 1.0 pF         | B37871K5010C0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 1.2 pF         | B37871K5010C2**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 1.5 pF         | B37871K5010C5**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 1.8 pF         | B37871K5010C8**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 2.2 pF         | B37871K5020C2**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 2.7 pF         | B37871K5020C7**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 3.3 pF         | B37871K5030C3**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 3.9 pF         | B37871K5030C9**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 4.7 pF         | B37871K5040C7**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 5.6 pF         | B37871K5050D6**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 6.8 pF         | B37871K5060D8**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 8.2 pF         | B37871K5080D2**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 10 pF          | B37871K5100J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 12 pF          | B37871K5120J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 15 pF          | B37871K5150J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 18 pF          | B37871K5180J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 22 pF          | B37871K5220J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 27 pF          | B37871K5270J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 33 pF          | B37871K5330J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 39 pF          | B37871K5390J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 47 pF          | B37871K5470J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 56 pF          | B37871K5560J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 68 pF          | B37871K5680J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 82 pF          | B37871K5820J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 100 pF         | B37871K5101J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 120 pF         | B37871K5121J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 150 pF         | B37871K5151J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 180 pF         | B37871K5181J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 220 pF         | B37871K5221J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 270 pF         | B37871K5271J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 330 pF         | B37871K5331J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 390 pF         | B37871K5391J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 470 pF         | B37871K5471J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |

1) The table contains the ordering codes for the standard capacitance tolerance.  
For other available capacitance tolerances see page 4.



## Multilayer ceramic capacitors

### C0G; 1206

#### Ordering codes and packing for C0G, 50 VDC, nickel barrier terminations

##### Case size 1206, 50 VDC

| C <sub>R</sub> | Ordering code <sup>1)</sup> | Chip thickness<br>mm | Cardboard tape,<br>Ø 180-mm reel | Cardboard tape,<br>Ø 330-mm reel |
|----------------|-----------------------------|----------------------|----------------------------------|----------------------------------|
|                |                             |                      | ** $\triangleq$ 60               | ** $\triangleq$ 70               |
|                |                             |                      | pcs/reel                         | pcs/reel                         |
| 560 pF         | B37871K5561J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 680 pF         | B37871K5681J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 820 pF         | B37871K5821J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 1.0 nF         | B37871K5102J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 1.2 nF         | B37871K5122J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 1.5 nF         | B37871K5152J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 1.8 nF         | B37871K5182J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 2.2 nF         | B37871K5222J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 2.7 nF         | B37871K5272J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 3.3 nF         | B37871K5332J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 3.9 nF         | B37871K5392J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 4.7 nF         | B37871K5472J0**             | 1.2 $\pm$ 0.1        | 3000 <sup>2)</sup>               | 12000 <sup>3)</sup>              |
| 5.6 nF         | B37871K5562J0**             | 1.2 $\pm$ 0.1        | 3000 <sup>2)</sup>               | 12000 <sup>3)</sup>              |

1) The table contains the ordering codes for the standard capacitance tolerance.  
For other available capacitance tolerances see page 4.

2) Blister tape, 180-mm reel, ordering code \*\*  $\triangleq$  62

3) Blister tape, 330-mm reel, ordering code \*\*  $\triangleq$  72

# Ordering codes and packing for C0G, 100 VDC, nickel barrier terminations

## Case size 1206, 100 VDC

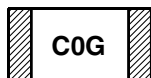
| C <sub>R</sub> | Ordering code <sup>1)</sup> | Chip thickness<br>mm | Cardboard tape,<br>Ø 180-mm reel | Cardboard tape,<br>Ø 330-mm reel |
|----------------|-----------------------------|----------------------|----------------------------------|----------------------------------|
|                |                             |                      | ** $\triangleq$ 60               | ** $\triangleq$ 70               |
|                |                             |                      | pcs/reel                         | pcs/reel                         |
| 1.0 pF         | B37871K1010C0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 1.5 pF         | B37871K1010C5**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 2.2 pF         | B37871K1020C2**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 3.3 pF         | B37871K1030C3**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 4.7 pF         | B37871K1040C7**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 6.8 pF         | B37871K1060D8**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 10 pF          | B37871K1100J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 15 pF          | B37871K1150J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 22 pF          | B37871K1220J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 33 pF          | B37871K1330J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 47 pF          | B37871K1470J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 68 pF          | B37871K1680J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 100 pF         | B37871K1101J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 150 pF         | B37871K1151J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 220 pF         | B37871K1221J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 330 pF         | B37871K1331J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 470 pF         | B37871K1471J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 680 pF         | B37871K1681J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 1.0 nF         | B37871K1102J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 1.5 nF         | B37871K1152J0**             | 0.8 $\pm$ 0.1        | 4000                             | 16000                            |
| 2.2 nF         | B37871K1222J0**             | 1.2 $\pm$ 0.1        | 3000 <sup>2)</sup>               | 12000 <sup>3)</sup>              |

1) The table contains the ordering codes for the standard capacitance tolerance.

For other available capacitance tolerances see page 4.

2) Blister tape, 180-mm reel, ordering code \*\*  $\triangleq$  62

3) Blister tape, 330-mm reel, ordering code \*\*  $\triangleq$  72



## Multilayer ceramic capacitors

### C0G; 1210

#### Ordering codes and packing for C0G, 50 VDC, nickel barrier terminations

##### Case size 1210, 50 VDC

| C <sub>R</sub> | Ordering code <sup>1)</sup> | Chip thickness<br>mm | Blister tape,<br>Ø 180-mm reel | Blister tape,<br>Ø 330-mm reel |
|----------------|-----------------------------|----------------------|--------------------------------|--------------------------------|
|                |                             |                      | ** $\triangleq$ 62             | ** $\triangleq$ 72             |
|                |                             |                      | pcs/reel                       | pcs/reel                       |
| 1.0 nF         | B37949K5102J0**             | 0.8 $\pm$ 0.1        | 4000                           | 16000                          |
| 1.5 nF         | B37949K5152J0**             | 0.8 $\pm$ 0.1        | 4000                           | 16000                          |
| 2.2 nF         | B37949K5222J0**             | 0.8 $\pm$ 0.1        | 4000                           | 16000                          |
| 3.3 nF         | B37949K5332J0**             | 0.8 $\pm$ 0.1        | 4000                           | 16000                          |
| 4.7 nF         | B37949K5472J0**             | 0.8 $\pm$ 0.1        | 4000                           | 16000                          |
| 6.8 nF         | B37949K5682J0**             | 0.8 $\pm$ 0.1        | 4000                           | 16000                          |
| 10 nF          | B37949K5103J0**             | 1.2 $\pm$ 0.1        | 3000                           | 12000                          |

#### Ordering codes and packing for C0G, 100 VDC, nickel barrier terminations

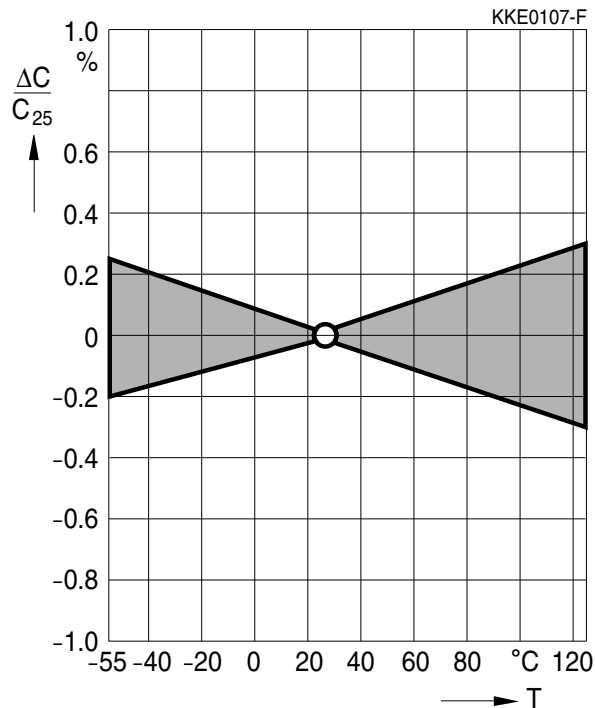
##### Case size 1210, 100 VDC

| C <sub>R</sub> | Ordering code <sup>1)</sup> | Chip thickness<br>mm | Blister tape,<br>Ø 180-mm reel | Blister tape,<br>Ø 330-mm reel |
|----------------|-----------------------------|----------------------|--------------------------------|--------------------------------|
|                |                             |                      | ** $\triangleq$ 62             | ** $\triangleq$ 72             |
|                |                             |                      | pcs/reel                       | pcs/reel                       |
| 1.0 nF         | B37949K1102J0**             | 0.8 $\pm$ 0.1        | 4000                           | 16000                          |
| 1.5 nF         | B37949K1152J0**             | 0.8 $\pm$ 0.1        | 4000                           | 16000                          |
| 2.2 nF         | B37949K1222J0**             | 0.8 $\pm$ 0.1        | 4000                           | 16000                          |
| 3.3 nF         | B37949K1332J0**             | 0.8 $\pm$ 0.1        | 4000                           | 16000                          |
| 4.7 nF         | B37949K1472J0**             | 1.2 $\pm$ 0.1        | 3000                           | 12000                          |
| 6.8 nF         | B37949K1682J0**             | 1.2 $\pm$ 0.1        | 3000                           | 12000                          |

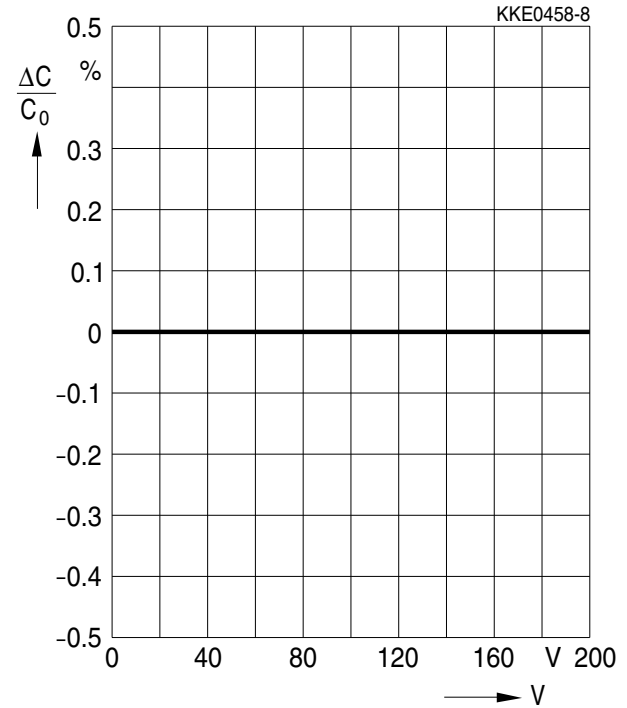
1) The table contains the ordering codes for the standard capacitance tolerance.  
For other available capacitance tolerances see page 4.

### Typical characteristics<sup>1)</sup>

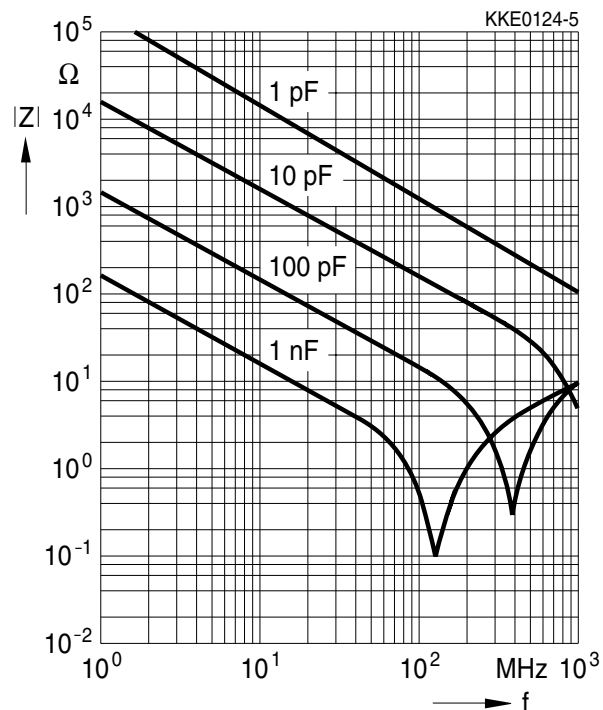
Capacitance change  $\Delta C/C_{25}$  versus temperature  $T$  (tolerance range  $\pm 0.2\%$ )



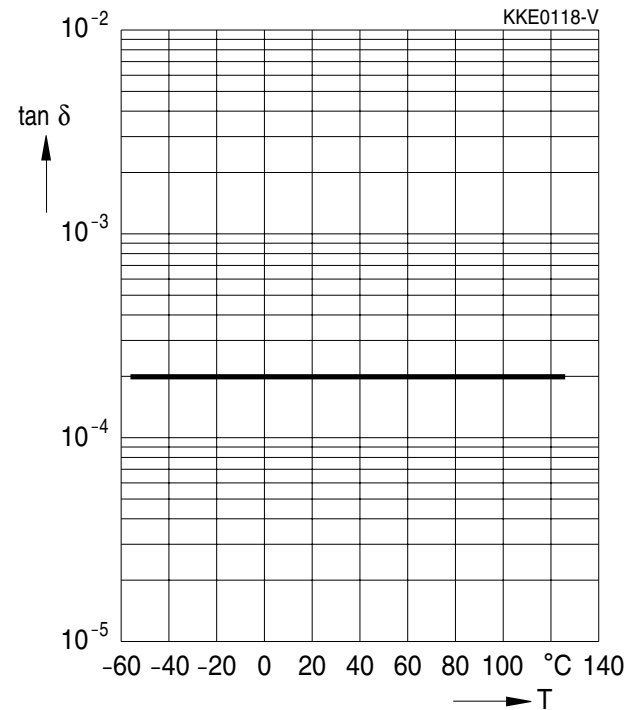
Capacitance change  $\Delta C/C_0$  versus superimposed DC voltage  $V$



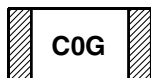
Impedance  $|Z|$  versus frequency  $f$



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



1) For more detailed information on frequency behavior and characteristics see [www.epcos.com/mlcc\\_impedance](http://www.epcos.com/mlcc_impedance).

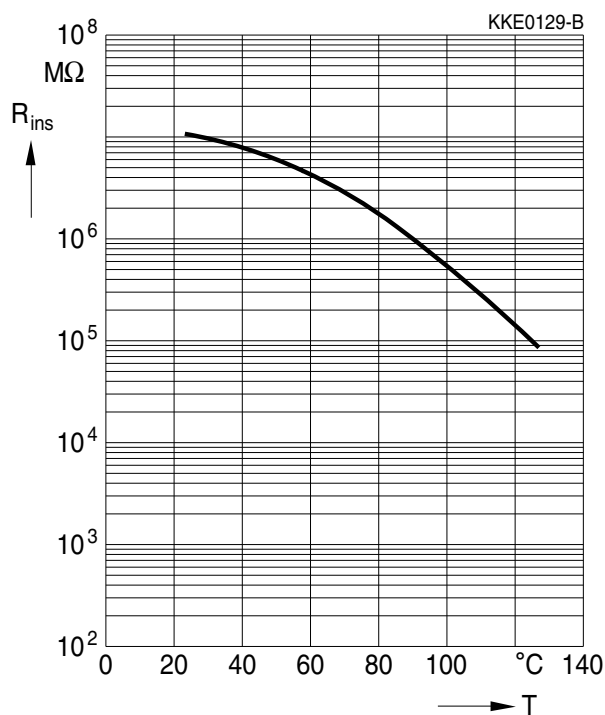


## Multilayer ceramic capacitors

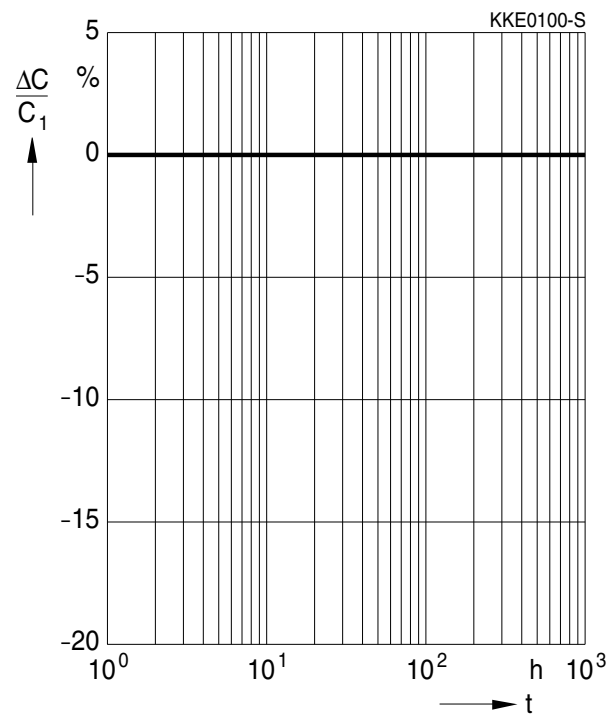
C0G

### Typical characteristics<sup>1)</sup>

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



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



1) For more detailed information on frequency behavior and characteristics see [www.epcos.com/mlcc\\_impedance](http://www.epcos.com/mlcc_impedance).

## Multilayer ceramic capacitors

### Cautions and warnings

#### Notes on the selection of ceramic capacitors

In the selection of ceramic capacitors, the following criteria must be considered:

1. Depending on the application, ceramic capacitors used to meet high quality requirements should at least satisfy the specifications to AEC-Q200. They must meet quality requirements going beyond this level in terms of ruggedness (e.g. mechanical, thermal or electrical) in the case of critical circuit configurations and applications (e.g. in safety-relevant applications such as ABS and airbag equipment or durable industrial goods).
2. At the connection to the battery or power supply (e.g. clamp 15 or 30 in the automobile) and at positions with stranding potential, to reduce the probability of short circuits following a fracture, two ceramic capacitors must be connected in series and/or a ceramic capacitor with integrated series circuit should be used. The MLSC from EPCOS contains such a series circuit in a single component.
3. Ceramic capacitors with the temperature characteristics Z5U and Y5V do not satisfy the requirements to AEC-Q200 and are mechanically and electrically less rugged than C0G or X7R/X8R ceramic capacitors. In applications that must satisfy high quality requirements, therefore, these capacitors should not be used as discrete components (see the chapter "Effects on mechanical, thermal and electrical stress", point 1.4).
4. For ESD protection, preference should be given to the use of multilayer varistors (MLV) (see the chapter "Effects on mechanical, thermal and electrical stress", point 1.4).
5. An application-specific derating or continuous operating voltage must be considered in order to cushion (unexpected) additional stresses (see the chapter "Reliability").

#### The following should be considered in circuit board design

1. If technically feasible in the application, preference should be given to components having an optimal geometrical design.
2. At least FR4 circuit board material should be used.
3. Geometrically optimal circuit boards should be used, ideally those that cannot be deformed.
4. Ceramic capacitors must always be placed a sufficient minimum distance from the edge of the circuit board. High bending forces may be exerted there when the panels are separated and during further processing of the board (such as when incorporating it into a housing).
5. Ceramic capacitors should always be placed parallel to the possible bending axis of the circuit board.
6. No screw connections should be used to fix the board or to connect several boards. Components should not be placed near screw holes. If screw connections are unavoidable, they must be cushioned (for instance by rubber pads).

## Multilayer ceramic capacitors

### Cautions and warnings

#### **The following should be considered in the placement process**

1. Ensure correct positioning of the ceramic capacitor on the solder pad.
2. Caution when using casting, injection-molded and molding compounds and cleaning agents, as these may damage the capacitor.
3. Support the circuit board and reduce the placement forces.
4. A board should not be straightened (manually) if it has been distorted by soldering.
5. Separate panels with a peripheral saw, or better with a milling head (no dicing or breaking).
6. Caution in the subsequent placement of heavy or leaded components (e.g. transformers or snap-in components): danger of bending and fracture.
7. When testing, transporting, packing or incorporating the board, avoid any deformation of the board not to damage the components.
8. Avoid the use of excessive force when plugging a connector into a device soldered onto the board.
9. Ceramic capacitors must be soldered only by the mode (reflow or wave soldering) permissible for them (see the chapter "Soldering directions").
10. When soldering the most gentle solder profile feasible should be selected (heating time, peak temperature, cooling time) in order to avoid thermal stresses and damage.
11. Ensure the correct solder meniscus height and solder quantity.
12. Ensure correct dosing of the cement quantity.
13. Ceramic capacitors with an AgPd external termination are not suited for the lead-free solder process: they were developed only for conductive adhesion technology.

This listing does not claim to be complete, but merely reflects the experience of EPCOS AG.

## Multilayer ceramic capacitors

### Important notes

The following applies to all products named in this publication:

1. Some parts of this publication contain **statements about the suitability of our products for certain areas of application**. These statements are based on our knowledge of typical requirements that are often placed on our products in the areas of application concerned. We nevertheless expressly point out **that such statements cannot be regarded as binding statements about the suitability of our products for a particular customer application**. As a rule, EPCOS is either unfamiliar with individual customer applications or less familiar with them than the customers themselves. For these reasons, it is always ultimately incumbent on the customer to check and decide whether an EPCOS product with the properties described in the product specification is suitable for use in a particular customer application.
2. We also point out that **in individual cases, a malfunction of passive electronic components or failure before the end of their usual service life cannot be completely ruled out in the current state of the art, even if they are operated as specified**. In customer applications requiring a very high level of operational safety and especially in customer applications in which the malfunction or failure of a passive electronic component could endanger human life or health (e.g. in accident prevention or life-saving systems), it must therefore be ensured by means of suitable design of the customer application or other action taken by the customer (e.g. installation of protective circuitry or redundancy) that no injury or damage is sustained by third parties in the event of malfunction or failure of a passive electronic component.
3. **The warnings, cautions and product-specific notes must be observed.**
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