



Multilayer Ceramic Capacitors

Series/Type: B37937, B37947

The following products presented in this data sheet are being withdrawn.

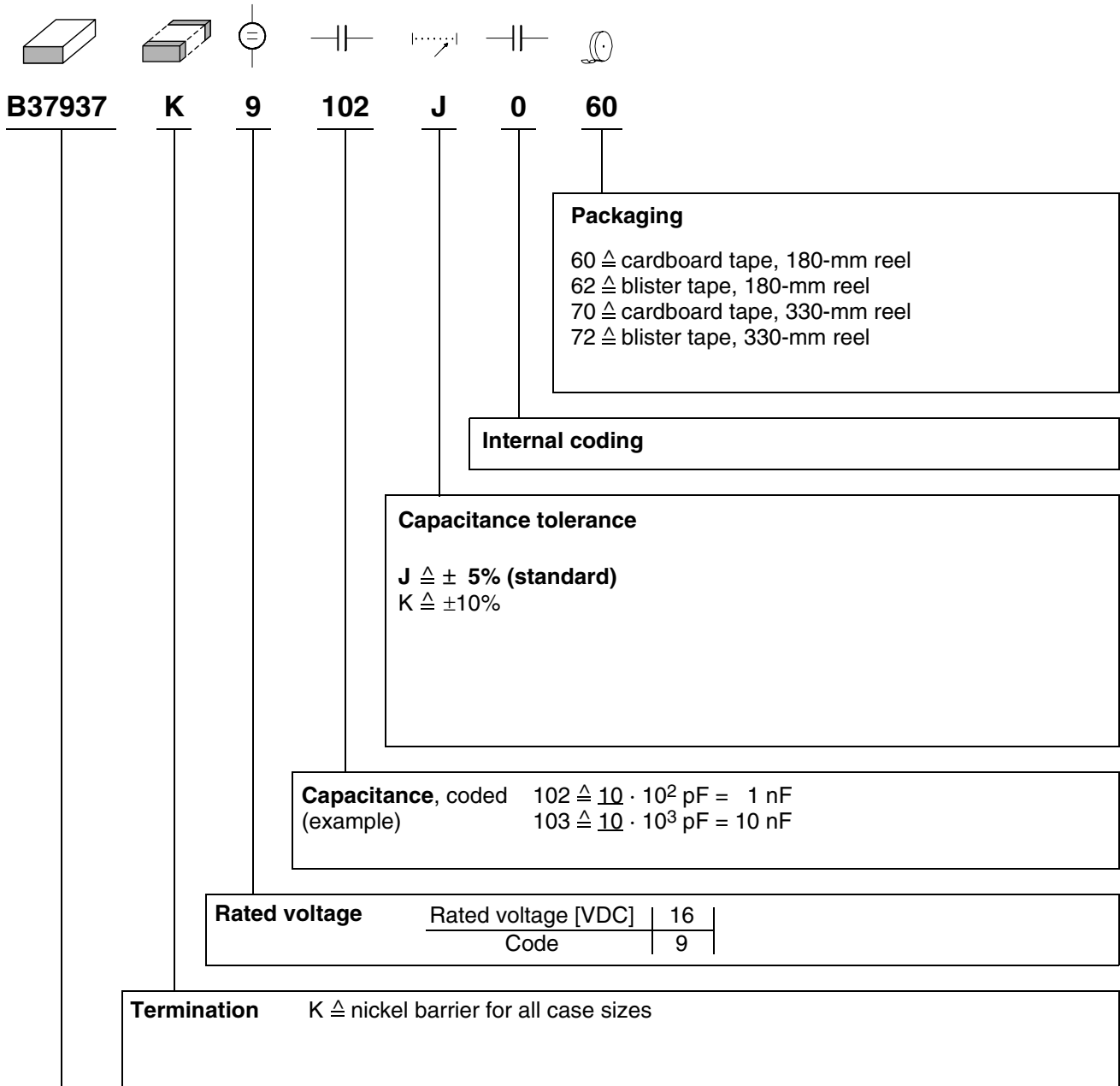
| Ordering Code | Substitute Product | Date of Withdrawal | Deadline Last Orders | Last Shipments |
|-----------------|--------------------|--------------------|----------------------|----------------|
| B37947K9102J060 | | 2007-12-21 | 2008-03-31 | 2008-06-30 |
| B37947K9102J070 | | 2007-12-21 | 2008-03-31 | 2008-06-30 |
| B37947K9152J060 | | 2007-12-21 | 2008-03-31 | 2008-06-30 |



| Ordering Code | Substitute Product | Date of Withdrawal | Deadline Last Orders | Last Shipments |
|-----------------|--------------------|--------------------|----------------------|----------------|
| B37947K9152J070 | | 2007-12-21 | 2008-03-31 | 2008-06-30 |
| B37947K9222J062 | | 2007-12-21 | 2008-03-31 | 2008-06-30 |
| B37947K9222J072 | | 2007-12-21 | 2008-03-31 | 2008-06-30 |
| B37947K9472J062 | | 2007-12-21 | 2008-03-31 | 2008-06-30 |
| B37947K9472J072 | | 2007-12-21 | 2008-03-31 | 2008-06-30 |
| B37937K9561J060 | | 2007-12-21 | 2008-03-31 | 2008-06-30 |
| B37937K9561J070 | | 2007-12-21 | 2008-03-31 | 2008-06-30 |
| B37937K9681J060 | | 2007-12-21 | 2008-03-31 | 2008-06-30 |
| B37937K9681J070 | | 2007-12-21 | 2008-03-31 | 2008-06-30 |
| B37937K9102J060 | | 2007-12-21 | 2008-03-31 | 2008-06-30 |
| B37937K9102J070 | | 2007-12-21 | 2008-03-31 | 2008-06-30 |
| B37947K9103G* | | 2007-10-26 | 2008-01-31 | 2008-04-30 |
| B37947K9103F* | | 2007-10-26 | 2008-01-31 | 2008-04-30 |
| B37947K9682G* | | 2007-10-26 | 2008-01-31 | 2008-04-30 |
| B37947K9562J* | | 2007-10-26 | 2008-01-31 | 2008-04-30 |
| B37937K9227J* | | 2007-10-26 | 2008-01-31 | 2008-04-30 |
| B37937K9222G* | | 2007-10-26 | 2008-01-31 | 2008-04-30 |
| B37937K9182J* | | 2007-10-26 | 2008-01-31 | 2008-04-30 |
| B37947K9682J072 | | 2007-10-26 | 2008-01-31 | 2008-04-30 |
| B37947K9682J062 | | 2007-10-26 | 2008-01-31 | 2008-04-30 |
| B37947K9332J072 | | 2007-10-26 | 2008-01-31 | 2008-04-30 |
| B37947K9332J062 | | 2007-10-26 | 2008-01-31 | 2008-04-30 |
| B37947K9103J072 | | 2007-10-26 | 2008-01-31 | 2008-04-30 |
| B37947K9103J062 | | 2007-10-26 | 2008-01-31 | 2008-04-30 |
| B37937K9222J070 | | 2007-10-26 | 2008-01-31 | 2008-04-30 |
| B37937K9222J060 | | 2007-10-26 | 2008-01-31 | 2008-04-30 |
| B37937K9152J070 | | 2007-10-26 | 2008-01-31 | 2008-04-30 |
| B37937K9152J060 | | 2007-10-26 | 2008-01-31 | 2008-04-30 |

For further information please contact your nearest EPCOS sales office, which will also support you in selecting a suitable substitute. The addresses of our worldwide sales network are presented at www.epcos.com/sales.

Ordering code system



| Type and size | |
|-----------------------|---------------------------------|
| Chip size (inch / mm) | Temperature characteristic CPPS |
| 0603 / 1608 | B37937 |
| 0805 / 2012 | B37947 |


Features

- Replacement of PPS film capacitors
- Class 1 characteristic with high capacitance values
- High insulation resistance
- Excellent DC characteristic
- Excellent temperature characteristic
- No piezoelectric effects
- No ageing effects


Applications

- Wireless communication
- Loop filter
- PLL filter
- Telecom (mobile phones, Bluetooth, ADSL/XDSL)
- Automotive (keyless entry)

Termination

- For soldering: Nickel barrier terminations (Ni)

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), 180-mm and 330-mm reel available

Electrical data

| | | | |
|--|---------------|----------------------------|-----|
| Temperature characteristic | | C0G | |
| Climatic category (IEC 60068-1) | | 55/125/56 | |
| Standard | | EIA | |
| Dielectric | | Class 1 | |
| Rated voltage | V_R | 16 | VDC |
| Test voltage | V_{test} | $2.5 \cdot V_R/5$ s | VDC |
| Capacitance range / E series | C_R | 560 pF ... 10 nF (E6) | |
| Temperature coefficient | | $0 \pm 30 \cdot 10^{-6}/K$ | |
| Dissipation factor (limit value) | $\tan \delta$ | $< 1.0 \cdot 10^{-3}$ | |
| Insulation resistance ¹⁾ at + 25 °C | R_{ins} | $> 10^5$ | MΩ |
| Insulation resistance ¹⁾ at +125 °C | R_{ins} | $> 10^4$ | MΩ |
| Time constant ¹⁾ at + 25 °C | τ | > 1000 | s |
| Time constant ¹⁾ at +125 °C | τ | > 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.



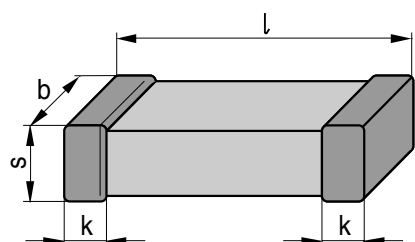
Multilayer ceramic capacitors

CPPS

Capacitance tolerances

| | | |
|-------------|-----------------|------|
| Code letter | J (standard) | K |
| Tolerance | ±5% | ±10% |

Dimensional drawing



KKE0329-N

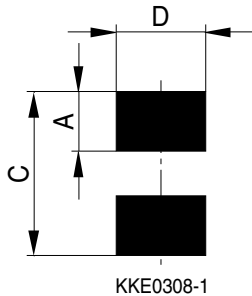
Dimensions (mm)

| Case size | (inch) | 0603 | 0805 |
|-----------|--------|-----------|------------|
| | (mm) | 1608 | 2012 |
| l | | 1.6 ±0.15 | 2.00 ±0.20 |
| b | | 0.8 ±0.10 | 1.25 ±0.15 |
| s | | 0.8 ±0.10 | 1.30 max. |
| k | | 0.1 –0.40 | 0.13 –0.75 |

Tolerances to CECC 32101-801



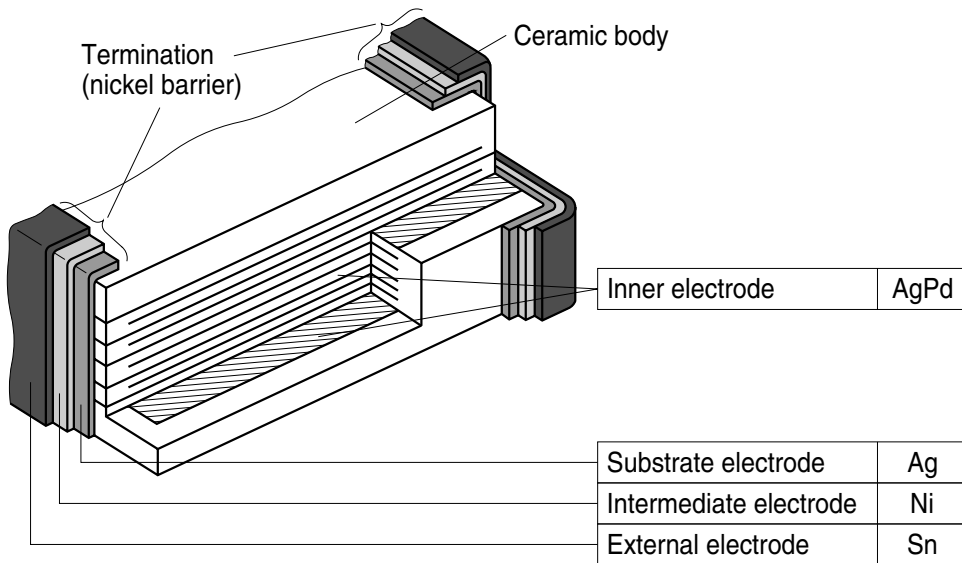
Recommended solder pad



Recommended dimensions (mm) for reflow soldering

| Case size (inch/mm) | Type | A | C | D |
|---------------------|-------------|-------------|-------------|-------------|
| 0603/1608 | single chip | 0.6 ... 0.7 | 1.8 ... 2.2 | 0.6 ... 0.8 |
| 0805/2012 | single chip | 0.6 ... 0.7 | 2.2 ... 2.6 | 0.8 ... 1.1 |

Termination



KKE0484-W



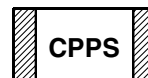
Multilayer ceramic capacitors

CPPS

Product range for CPPS chip capacitors

| Size ¹⁾ inch mm | 0603 1608 | | 0805 2012 | |
|----------------------------------|--------------|--|--------------|--|
| Type | B37937 | | B37947 | |
| V_R (VDC) | 16 | | 16 | |
| C_R | | | | |
| 560 pF | | | | |
| 680 pF | | | | |
| 1.0 nF | | | | |
| 1.5 nF | | | | |
| 2.2 nF | | | | |
| 3.3 nF | | | | |
| 4.7 nF | | | | |
| 6.8 nF | | | | |
| 10 nF | | | | |

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


Ordering codes and packing for CPPS capacitors, 16 VDC, nickel barrier terminations

| C_R ¹⁾ | Ordering code ²⁾ | Chip thickness mm | Cardboard tape, Ø 180-mm reel | Cardboard tape, Ø 330-mm reel |
|---------------------|-----------------------------|----------------------|----------------------------------|----------------------------------|
| | | | ** \triangleq 60 | ** \triangleq 70 |
| | | | pcs/reel | pcs/reel |

Case size 0603, 16 VDC

| | | | | |
|--------|-----------------|----------|------|-------|
| 560 pF | B37937K9561J0** | 0.8 ±0.1 | 4000 | 16000 |
| 680 pF | B37937K9681J0** | 0.8 ±0.1 | 4000 | 16000 |
| 1.0 nF | B37937K9102J0** | 0.8 ±0.1 | 4000 | 16000 |
| 1.5 nF | B37937K9152J0** | 0.8 ±0.1 | 4000 | 16000 |
| 2.2 nF | B37937K9222J0** | 0.8 ±0.1 | 4000 | 16000 |

Case size 0805, 16 VDC

| | | | | |
|--------|-----------------|----------|--------------------|---------------------|
| 1.0 nF | B37947K9102J0** | 0.6 ±0.1 | 5000 | 20000 |
| 1.5 nF | B37947K9152J0** | 0.8 ±0.1 | 4000 | 16000 |
| 2.2 nF | B37947K9222J0** | 1.2 ±0.1 | 3000 ³⁾ | 12000 ⁴⁾ |
| 3.3 nF | B37947K9332J0** | 1.2 ±0.1 | 3000 ³⁾ | 12000 ⁴⁾ |
| 4.7 nF | B37947K9472J0** | 1.2 ±0.1 | 3000 ³⁾ | 12000 ⁴⁾ |
| 6.8 nF | B37947K9682J0** | 1.2 ±0.1 | 3000 ³⁾ | 12000 ⁴⁾ |
| 10 nF | B37947K9103J0** | 1.2 ±0.1 | 3000 ³⁾ | 12000 ⁴⁾ |

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 168.

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

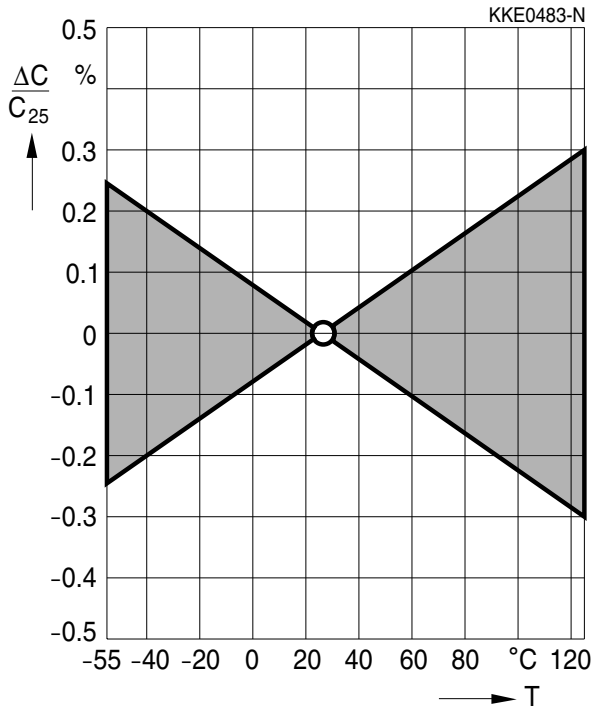
4) Blister tape, 330-mm reel, ordering code ** \triangleq 72



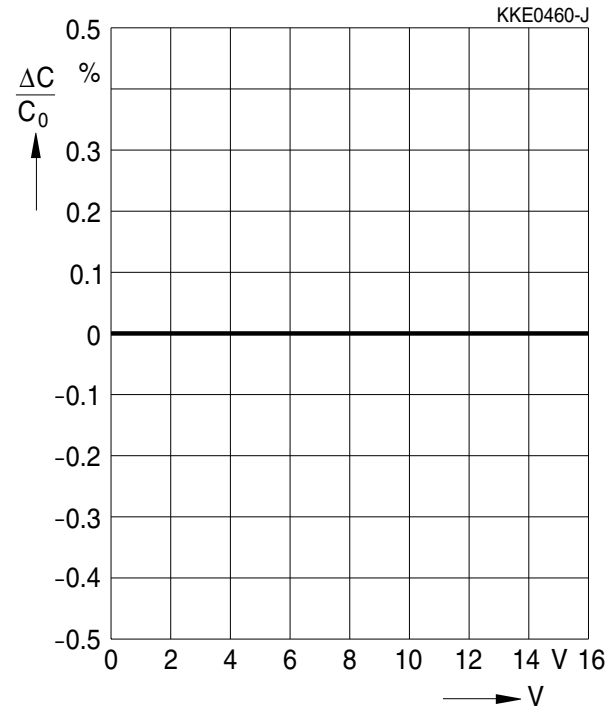
Multilayer ceramic capacitors
CPPS

Typical characteristics¹⁾

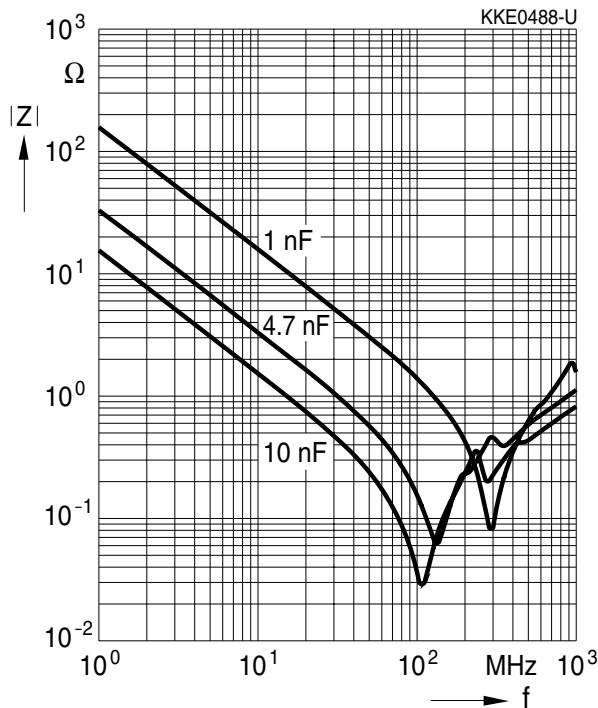
Capacitance change $\Delta C/C_{25}$ versus temperature T (tolerance range $\pm 0.3\%$)



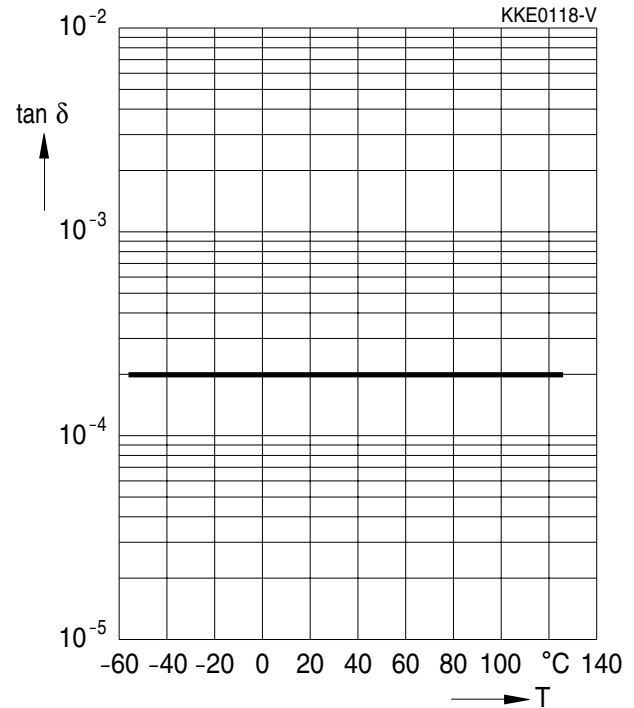
Capacitance change $\Delta C/C_0$ versus superimposed DC voltage V



Impedance |Z| versus frequency f



Dissipation factor $\tan \delta$ versus temperature T

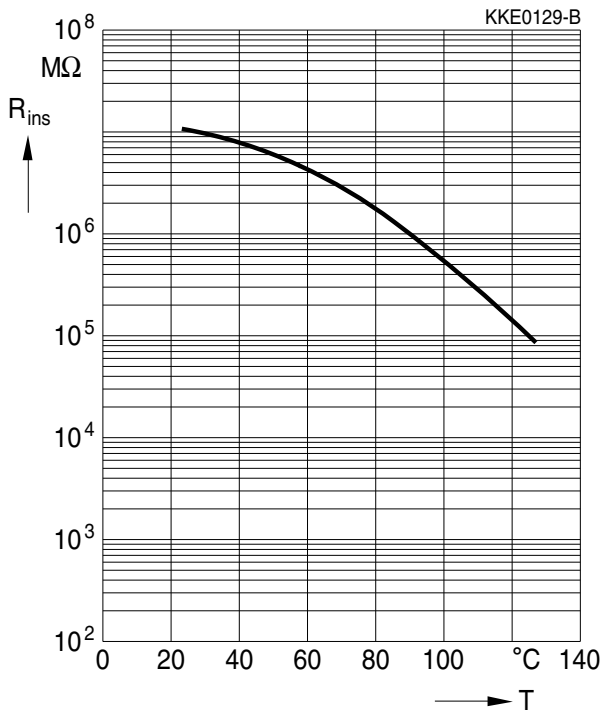


1) For more detailed information on frequency behavior and characteristics see www.epcos.com/mlcc_impedance.

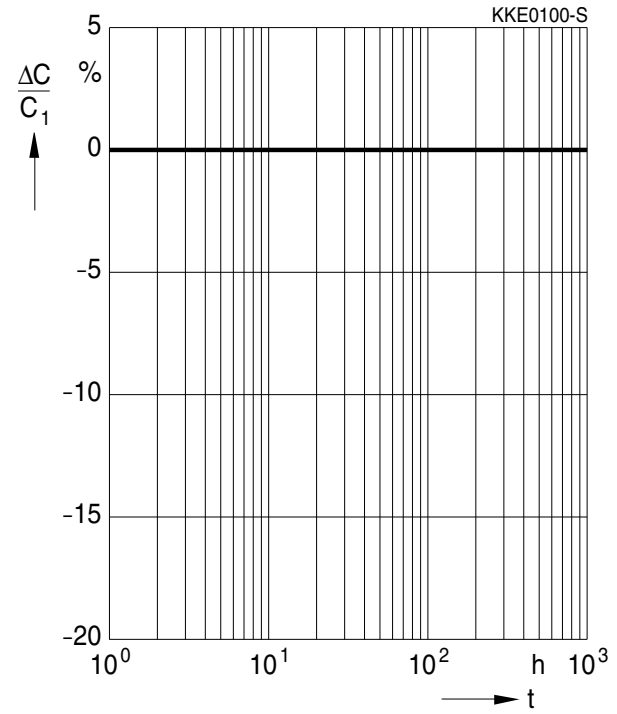


Typical characteristics¹⁾

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.

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.