

## Multilayer ceramic capacitors

Leaded, X7R

**Series/Type:**      **Leaded**

Date: February2009

The following products presented in this data sheet are being withdrawn.

Substitute Products: See [www.epcos.com/withdrawal\\_mlcc](http://www.epcos.com/withdrawal_mlcc)

| Ordering Code   | Substitute Product | Date of Withdrawal | Deadline Last Orders | Last Shipments |
|-----------------|--------------------|--------------------|----------------------|----------------|
| B37987M0225K054 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
| B37987M0225K051 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
| B37987M0225K000 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |



| Ordering Code   | Substitute Product | Date of Withdrawal | Deadline Last Orders | Last Shipments |
|-----------------|--------------------|--------------------|----------------------|----------------|
| B37987M5683K054 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
| B37987M5683K051 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
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| B37987M5104K054 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
| B37987M5104K051 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
| B37987M5104K000 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
| B37987M5154K054 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
| B37987M5154K051 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
| B37987M5154K000 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
| B37981M5332K054 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
| B37981M5332K051 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
| B37987M5224K054 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
| B37987M5224K051 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
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| B37987M5334K054 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
| B37987M5334K051 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
| B37981M5332K000 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
| B37981M5472K054 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
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| B37981M5472K000 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
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| B37987M5474K054 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
| B37987M5474K051 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
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| B37987M1223K054 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
| B37981M5682K051 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
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| B37981M5103K054 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
| B37981M5103K051 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
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| B37987M1333K054 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
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| B37987M1473K054 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
| B37987M1473K051 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
| B37987M1473K000 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |



| Ordering Code   | Substitute Product | Date of Withdrawal | Deadline Last Orders | Last Shipments |
|-----------------|--------------------|--------------------|----------------------|----------------|
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| B37987F1154K054 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
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| B37981M5223K054 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
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| B37981M5223K000 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
| B37981M5333K054 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |



| Ordering Code   | Substitute Product | Date of Withdrawal | Deadline Last Orders | Last Shipments |
|-----------------|--------------------|--------------------|----------------------|----------------|
| B37981M5333K051 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
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| B37987M1683K000 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
| B37987M1104K054 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
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| B37987M1154K054 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
| B37981M5473K054 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
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| B37981M1471K054 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
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| B37981F5333K054 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
| B37981F5333K051 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
| B37981M1222K000 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |



| Ordering Code   | Substitute Product | Date of Withdrawal | Deadline Last Orders | Last Shipments |
|-----------------|--------------------|--------------------|----------------------|----------------|
| B37981M1332K054 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
| B37981M1332K051 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
| B37981M1332K000 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
| B37981M1472K054 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
| B37981F5333K000 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
| B37981F5473K054 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
| B37981F5473K051 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
| B37981F5473K000 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
| B37981F1471K054 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
| B37981M1472K051 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
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| B37981M1682K054 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
| B37981M1682K051 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
| B37981M1682K000 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
| B37987F1683K054 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
| B37987F1683K051 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
| B37981F1471K051 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
| B37981F1471K000 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
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| B37981M1103K051 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
| B37981M1103K000 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
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| B37981F1102K054 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
| B37981F1102K051 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
| B37981F1102K000 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
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| B37981F1152K051 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
| B37981M1153K000 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
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| B37981F1222K054 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
| B37981F1222K051 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
| B37981F1222K000 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
| B37981F1332K054 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
| B37981F1332K051 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |

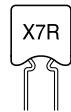


| Ordering Code   | Substitute Product | Date of Withdrawal | Deadline Last Orders | Last Shipments |
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| B37981F1472K054 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
| B37981F1472K051 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
| B37981F1472K000 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
| B37981F1682K054 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
| B37981F1682K051 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
| B37981F1682K000 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
| B37981F1103K054 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
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| B37981F1103K000 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
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| B37981F1153K000 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
| B37981F5332K054 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
| B37981F5332K051 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
| B37981F5332K000 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
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| B37981F5472K000 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
| B37981F5682K054 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |
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| B37984M5105K000 |                    | 2009-06-26         | 2010-06-30           | 2010-12-31     |

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](http://www.epcos.com/sales).

**X7R**
**Ordering code system**


| <b>B37981M</b>   |                                   | <b>1</b>                           | <b>101</b>                        | <b>J</b>            | <b>0</b> | <b>54</b>       |         |                 |         |                     |  |                 |         |                 |         |                 |         |  |  |  |  |  |
|--|-----------------------------------|------------------------------------|-----------------------------------|---------------------|----------|-----------------|---------|-----------------|---------|---------------------|--|-----------------|---------|-----------------|---------|-----------------|---------|--|--|--|--|--|
| <b>Type and size</b><br><table border="1"> <thead> <tr> <th>With radial leads<br/>EIA standards</th> <th>Temperature characteristic<br/>X7R</th> </tr> </thead> <tbody> <tr> <td>Lead spacing 2.5 mm</td> <td></td> </tr> <tr> <td>5.5 × 5.0 × 2.5</td> <td>B37981M</td> </tr> <tr> <td>6.5 × 5.0 × 2.5</td> <td>B37987M</td> </tr> <tr> <td>Lead spacing 5.0 mm</td> <td></td> </tr> <tr> <td>5.5 × 5.0 × 2.5</td> <td>B37981F</td> </tr> <tr> <td>6.5 × 5.0 × 2.5</td> <td>B37987F</td> </tr> <tr> <td>9.0 × 7.5 × 2.5</td> <td>B37984M</td> </tr> </tbody> </table> |                                   | With radial leads<br>EIA standards | Temperature characteristic<br>X7R | Lead spacing 2.5 mm |          | 5.5 × 5.0 × 2.5 | B37981M | 6.5 × 5.0 × 2.5 | B37987M | Lead spacing 5.0 mm |  | 5.5 × 5.0 × 2.5 | B37981F | 6.5 × 5.0 × 2.5 | B37987F | 9.0 × 7.5 × 2.5 | B37984M |  |  |  |  |  |
| With radial leads<br>EIA standards   | Temperature characteristic<br>X7R |                                    |                                   |                     |          |                 |         |                 |         |                     |  |                 |         |                 |         |                 |         |  |  |  |  |  |
| Lead spacing 2.5 mm  |                                   |                                    |                                   |                     |          |                 |         |                 |         |                     |  |                 |         |                 |         |                 |         |  |  |  |  |  |
| 5.5 × 5.0 × 2.5  | B37981M                           |                                    |                                   |                     |          |                 |         |                 |         |                     |  |                 |         |                 |         |                 |         |  |  |  |  |  |
| 6.5 × 5.0 × 2.5  | B37987M                           |                                    |                                   |                     |          |                 |         |                 |         |                     |  |                 |         |                 |         |                 |         |  |  |  |  |  |
| Lead spacing 5.0 mm  |                                   |                                    |                                   |                     |          |                 |         |                 |         |                     |  |                 |         |                 |         |                 |         |  |  |  |  |  |
| 5.5 × 5.0 × 2.5  | B37981F                           |                                    |                                   |                     |          |                 |         |                 |         |                     |  |                 |         |                 |         |                 |         |  |  |  |  |  |
| 6.5 × 5.0 × 2.5  | B37987F                           |                                    |                                   |                     |          |                 |         |                 |         |                     |  |                 |         |                 |         |                 |         |  |  |  |  |  |
| 9.0 × 7.5 × 2.5  | B37984M                           |                                    |                                   |                     |          |                 |         |                 |         |                     |  |                 |         |                 |         |                 |         |  |  |  |  |  |
| <b>Rated voltage</b><br>5 (Code) ≙ 50 VDC<br>1 (Code) ≙ 100 VDC  |                                   |                                    |                                   |                     |          |                 |         |                 |         |                     |  |                 |         |                 |         |                 |         |  |  |  |  |  |
| <b>Capacitance, coded (example)</b><br>101 ≙ 10 · 10 <sup>1</sup> pF = 100 pF<br>222 ≙ 22 · 10 <sup>2</sup> pF = 2.2 nF<br>473 ≙ 47 · 10 <sup>3</sup> pF = 47 nF   |                                   |                                    |                                   |                     |          |                 |         |                 |         |                     |  |                 |         |                 |         |                 |         |  |  |  |  |  |
| <b>Capacitance tolerance</b><br><b>K</b> ≙ ±10% (standard for X7R)<br><b>M</b> ≙ ±20%  |                                   |                                    |                                   |                     |          |                 |         |                 |         |                     |  |                 |         |                 |         |                 |         |  |  |  |  |  |
| <b>Internal coding</b>   |                                   |                                    |                                   |                     |          |                 |         |                 |         |                     |  |                 |         |                 |         |                 |         |  |  |  |  |  |
| <b>Packaging</b><br>51 ≙ cardboard tape, reel packing (360-mm reel)<br><b>54 ≙ Ammo packing (standard)</b><br>00 ≙ bulk  |                                   |                                    |                                   |                     |          |                 |         |                 |         |                     |  |                 |         |                 |         |                 |         |  |  |  |  |  |



**Features**

- High volumetric efficiency
- Non-linear capacitance change
- High insulation resistance
- High pulse strength

**Applications**

- Blocking
- Coupling and decoupling
- Interference suppression

**Termination**

- Parallel wire leads, iron-nickel, tinned
- Crimped leads
- Non-standard lead lengths on request

**Marking**

- Rated capacitance, tolerance, manufacturer's logo, ceramic material, voltage

**Options**

- Alternative capacitance values and tolerances available on request

**Delivery mode**

- Cardboard tape in Ammo packing (standard)
- Cardboard tape on 360-mm reel or bulk on request

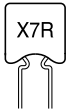
**Electrical data**

|                                     |  |                           |                             |                  |
|-------------------------------------|--|---------------------------|-----------------------------|------------------|
| Temperature characteristic          |  |                           | X7R                         |                  |
| Max. relative capacitance change    | within $-55 \dots +125 \text{ }^\circ\text{C}$ | $\Delta\text{C}/\text{C}$ | $\pm 15$                    | %                |
| Climatic category                   | (IEC 60068-1)                                  |                           | 55/125/56                   |                  |
| Standard                            |  |                           | EIA                         |                  |
| Dielectric                          |  |                           | Class 2                     |                  |
| Rated voltage <sup>1)</sup>         |  | $V_R$                     | 50, 100                     | VDC              |
| Test voltage                        |  | $V_{\text{rest}}$         | $2.5 \cdot V_R/5 \text{ s}$ | VDC              |
| Capacitance range / E series        |  | $C_R$                     | 470 pF ... 1 $\mu\text{F}$  |                  |
| Dissipation factor                  | (limit value)                                  | $\tan \delta$             | $< 25 \cdot 10^{-3}$        |                  |
| Insulation resistance <sup>2)</sup> | (at $+25 \text{ }^\circ\text{C}$ )             | $R_{\text{ins}}$          | $> 10^5$                    | M $\Omega$       |
| Insulation resistance <sup>2)</sup> | (at $+125 \text{ }^\circ\text{C}$ )            | $R_{\text{ins}}$          | $> 10^4$                    | M $\Omega$       |
| Time constant <sup>2)</sup>         | (at $+25 \text{ }^\circ\text{C}$ )             | $\tau$                    | $> 1000$                    | s                |
| Time constant <sup>2)</sup>         | (at $+125 \text{ }^\circ\text{C}$ )            | $\tau$                    | $> 100$                     | s                |
| Operating temperature range         |  | $T_{\text{op}}$           | $-55 \dots +125$            | $^\circ\text{C}$ |
| Ageing <sup>3)</sup>                |  |                           | yes                         |                  |

1) Note: No operation on AC line.

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

3) Refer to chapter "General technical information", "Ageing".



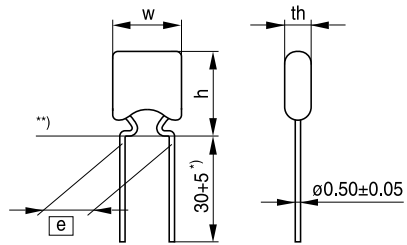
## Multilayer ceramic capacitors

X7R

### Capacity tolerance

|             |              |       |
|-------------|--------------|-------|
| Code letter | K (standard) | M     |
| Tolerance   | ±10 %        | ±20 % |

### Dimensional drawing



<sup>\*)</sup> Lead length for bulk packaging

<sup>\*\*)</sup> Seating plane to IEC 600717

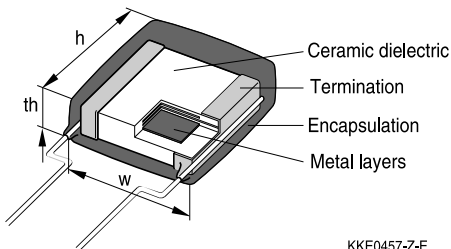
KKE0456-R-E

### Dimensions (mm)

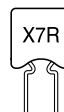
|            | Lead spacing $e = 2.5 +0.6/-0.1$ mm |         |
|------------|-------------------------------------|---------|
| Type       | B37981M                             | B37987M |
|            |                                     |         |
| $h_{max}$  | 5.5                                 | 6.0     |
| $w_{max}$  | 5.0                                 | 5.0     |
| $th_{max}$ | 2.5                                 | 2.5     |

|            | Lead spacing $e = 5.0 +0.6/-0.1$ mm |         |         |
|------------|-------------------------------------|---------|---------|
| Type       | B37981F                             | B37987F | B37984M |
|            |                                     |         |         |
| $h_{max}$  | 5.5                                 | 6.5     | 9.0     |
| $w_{max}$  | 5.0                                 | 5.0     | 7.5     |
| $th_{max}$ | 2.5                                 | 2.5     | 2.5     |

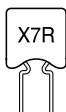
### Termination



KKE0457-Z-E


**Product range for leaded capacitors, X7R**

| Lead spacing                          | 2.5 mm          |     |                 |    |     |
|---------------------------------------|-----------------|-----|-----------------|----|-----|
|                                       |                 |     |                 |    |     |
| h x w x th                            | 5.5 × 5.0 × 2.5 |     | 6.5 × 5.0 × 2.5 |    |     |
| Type                                  | B37981M         |     | B37987M         |    |     |
| C <sub>R</sub> \ V <sub>R</sub> (VDC) | 50              | 100 | 25              | 50 | 100 |
| 470 pF                                |                 |     |                 |    |     |
| 680 pF                                |                 |     |                 |    |     |
| 1.0 nF                                |                 |     |                 |    |     |
| 1.5 nF                                |                 |     |                 |    |     |
| 2.2 nF                                |                 |     |                 |    |     |
| 3.3 nF                                |                 |     |                 |    |     |
| 4.7 nF                                |                 |     |                 |    |     |
| 6.8 nF                                |                 |     |                 |    |     |
| 10 nF                                 |                 |     |                 |    |     |
| 15 nF                                 |                 |     |                 |    |     |
| 22 nF                                 |                 |     |                 |    |     |
| 33 nF                                 |                 |     |                 |    |     |
| 47 nF                                 |                 |     |                 |    |     |
| 68 nF                                 |                 |     |                 |    |     |
| 100 nF                                |                 |     |                 |    |     |
| 150 nF                                |                 |     |                 |    |     |
| 220 nF                                |                 |     |                 |    |     |
| 330 nF                                |                 |     |                 |    |     |
| 470 nF                                |                 |     |                 |    |     |
| 2.2 μF                                |                 |     |                 |    |     |


**Multilayer ceramic capacitors**
**X7R**
**Product range for leaded capacitors, X7R**

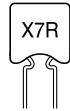
| Lead spacing                          | 5.0 mm          |     |                 |     |                 |
|---------------------------------------|-----------------|-----|-----------------|-----|-----------------|
|                                       |                 |     |                 |     |                 |
| h x w x th                            | 5.5 × 5.0 × 2.5 |     | 6.5 × 5.0 × 2.5 |     | 9.0 × 7.5 × 2.5 |
| Type                                  | B37981F         |     | B37987F         |     | B37984M         |
| C <sub>R</sub> \ V <sub>R</sub> (VDC) | 50              | 100 | 50              | 100 | 50              |
| 470 pF                                |                 |     |                 |     |                 |
| 680 pF                                |                 |     |                 |     |                 |
| 1.0 nF                                |                 |     |                 |     |                 |
| 1.5 nF                                |                 |     |                 |     |                 |
| 2.2 nF                                |                 |     |                 |     |                 |
| 3.3 nF                                |                 |     |                 |     |                 |
| 4.7 nF                                |                 |     |                 |     |                 |
| 6.8 nF                                |                 |     |                 |     |                 |
| 10 nF                                 |                 |     |                 |     |                 |
| 15 nF                                 |                 |     |                 |     |                 |
| 22 nF                                 |                 |     |                 |     |                 |
| 33 nF                                 |                 |     |                 |     |                 |
| 47 nF                                 |                 |     |                 |     |                 |
| 68 nF                                 |                 |     |                 |     |                 |
| 100 nF                                |                 |     |                 |     |                 |
| 150 nF                                |                 |     |                 |     |                 |
| 220 nF                                |                 |     |                 |     |                 |
| 680 nF                                |                 |     |                 |     |                 |
| 1.0 μF                                |                 |     |                 |     |                 |

**Ordering codes and packing for X7R, 25 VDC, lead spacing 2.5 mm**

| C <sub>R</sub> | Ordering code | Ammo packing      | Reel packing      | Bulk              |
|----------------|---------------|-------------------|-------------------|-------------------|
|                |               | ** $\triangle$ 54 | ** $\triangle$ 51 | ** $\triangle$ 00 |
|                | pcs.          | pcs./reel         | pcs.              |                   |

**B37987M, 25 VDC**

|        |                 |      |      |      |
|--------|-----------------|------|------|------|
| 2.2 μF | B37987M0225K0** | 2500 | 2500 | 2000 |
|--------|-----------------|------|------|------|


**Ordering codes and packing for X7R, 50 VDC, lead spacing 2.5 mm**

| C <sub>R</sub>         | Ordering code   | Ammo packing      | Reel packing      | Bulk              |
|------------------------|-----------------|-------------------|-------------------|-------------------|
|                        |                 | ** $\triangle$ 54 | ** $\triangle$ 51 | ** $\triangle$ 00 |
|                        |                 | pcs.              | pcs./reel         | pcs.              |
| <b>B37981M, 50 VDC</b> |                 |                   |                   |                   |
| 3.3 nF                 | B37981M5332K0** | 2500              | 2500              | 2000              |
| 4.7 nF                 | B37981M5472K0** | 2500              | 2500              | 2000              |
| 6.8 nF                 | B37981M5682K0** | 2500              | 2500              | 2000              |
| 10 nF                  | B37981M5103K0** | 2500              | 2500              | 2000              |
| 15 nF                  | B37981M5153K0** | 2500              | 2500              | 2000              |
| 22 nF                  | B37981M5223K0** | 2500              | 2500              | 2000              |
| 33 nF                  | B37981M5333K0** | 2500              | 2500              | 2000              |
| 47 nF                  | B37981M5473K0** | 2500              | 2500              | 2000              |
| 100 nF                 | B37981M5104K0** | 2500              | 2500              | 2000              |

**B37987M, 50 VDC**

|        |                 |      |      |      |
|--------|-----------------|------|------|------|
| 68 nF  | B37987M5683K0** | 2500 | 2500 | 2000 |
| 100 nF | B37987M5104K0** | 2500 | 2500 | 2000 |
| 150 nF | B37987M5154K0** | 2500 | 2500 | 2000 |
| 220 nF | B37987M5224K0** | 2500 | 2500 | 2000 |
| 330 nF | B37987M5334K0** | 2500 | 2500 | 2000 |
| 470 nF | B37987M5474K0** | 2500 | 2500 | 2000 |

**Ordering codes and packing for X7R, 50 VDC, lead spacing 5.0 mm**

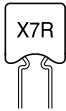
| C <sub>R</sub> | Ordering code | Ammo packing      | Reel packing      | Bulk              |
|----------------|---------------|-------------------|-------------------|-------------------|
|                |               | ** $\triangle$ 54 | ** $\triangle$ 51 | ** $\triangle$ 00 |
|                |               | pcs.              | pcs./reel         | pcs.              |

**B37981F, 50 VDC**

|        |                 |      |      |      |
|--------|-----------------|------|------|------|
| 3.3 nF | B37981F5332K0** | 2500 | 2500 | 2000 |
| 4.7 nF | B37981F5472K0** | 2500 | 2500 | 2000 |
| 6.8 nF | B37981F5682K0** | 2500 | 2500 | 2000 |
| 10 nF  | B37981F5103K0** | 2500 | 2500 | 2000 |
| 15 nF  | B37981F5153K0** | 2500 | 2500 | 2000 |
| 22 nF  | B37981F5223K0** | 2500 | 2500 | 2000 |
| 33 nF  | B37981F5333K0** | 2500 | 2500 | 2000 |
| 47 nF  | B37981F5473K0** | 2500 | 2500 | 2000 |

**B37984M, 50 VDC**

|             |                 |      |      |      |
|-------------|-----------------|------|------|------|
| 680 nF      | B37984M5684K0** | 2000 | 2000 | 2000 |
| 1.0 $\mu$ F | B37984M5105K0** | 2000 | 2000 | 2000 |


**Multilayer ceramic capacitors**
**X7R**
**Ordering codes and packing for X7R, 50 VDC, lead spacing 5.0 mm**

| C <sub>R</sub> | Ordering code | Ammo packing      | Reel packing      | Bulk              |
|----------------|---------------|-------------------|-------------------|-------------------|
|                |               | ** $\triangle$ 54 | ** $\triangle$ 51 | ** $\triangle$ 00 |
|                |               | pcs.              | pcs./reel         | pcs.              |

**B37987F, 50 VDC**

|        |                 |      |      |      |
|--------|-----------------|------|------|------|
| 68 nF  | B37987F5683K0** | 2500 | 2500 | 2000 |
| 100 nF | B37987F5104K0** | 2500 | 2500 | 2000 |
| 150 nF | B37987F5154K0** | 2500 | 2500 | 2000 |
| 220 nF | B37987F5224K0** | 2500 | 2500 | 2000 |

**Ordering codes and packing for X7R, 100 VDC, lead spacing 2.5 mm**

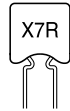
| C <sub>R</sub> | Ordering code | Ammo packing      | Reel packing      | Bulk              |
|----------------|---------------|-------------------|-------------------|-------------------|
|                |               | ** $\triangle$ 54 | ** $\triangle$ 51 | ** $\triangle$ 00 |
|                |               | pcs.              | pcs./reel         | pcs.              |

**B37981M, 100 VDC**

|        |                 |      |      |      |
|--------|-----------------|------|------|------|
| 470 pF | B37981M1471K0** | 2500 | 2500 | 2000 |
| 680 pF | B37981M1681K0** | 2500 | 2500 | 2000 |
| 1.0 nF | B37981M1102K0** | 2500 | 2500 | 2000 |
| 1.5 nF | B37981M1152K0** | 2500 | 2500 | 2000 |
| 2.2 nF | B37981M1222K0** | 2500 | 2500 | 2000 |
| 3.3 nF | B37981M1332K0** | 2500 | 2500 | 2000 |
| 4.7 nF | B37981M1472K0** | 2500 | 2500 | 2000 |
| 6.8 nF | B37981M1682K0** | 2500 | 2500 | 2000 |
| 10 nF  | B37981M1103K0** | 2500 | 2500 | 2000 |
| 15 nF  | B37981M1153K0** | 2500 | 2500 | 2000 |

**B37987M, 100 VDC**

|        |                 |      |      |      |
|--------|-----------------|------|------|------|
| 22 nF  | B37987M1223K0** | 2500 | 2500 | 2000 |
| 33 nF  | B37987M1333K0** | 2500 | 2500 | 2000 |
| 47 nF  | B37987M1473K0** | 2500 | 2500 | 2000 |
| 68 nF  | B37987M1683K0** | 2500 | 2500 | 2000 |
| 100 nF | B37987M1104K0** | 2500 | 2500 | 2000 |
| 150 nF | B37987M1154K0** | 2500 | 2500 | 2000 |



**Ordering codes and packing for X7R, 100 VDC, lead spacing 5.0 mm**

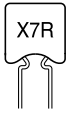
| C <sub>R</sub> | Ordering code | Ammo packing      | Reel packing      | Bulk              |
|----------------|---------------|-------------------|-------------------|-------------------|
|                |               | ** $\triangle$ 54 | ** $\triangle$ 51 | ** $\triangle$ 00 |
|                |               | pcs.              | pcs./reel         | pcs.              |

**B37981F, 100 VDC**

|        |                 |      |      |      |
|--------|-----------------|------|------|------|
| 470 pF | B37981F1471K0** | 2500 | 2500 | 2000 |
| 680 pF | B37981F1681K0** | 2500 | 2500 | 2000 |
| 1.0 nF | B37981F1102K0** | 2500 | 2500 | 2000 |
| 1.5 nF | B37981F1152K0** | 2500 | 2500 | 2000 |
| 2.2 nF | B37981F1222K0** | 2500 | 2500 | 2000 |
| 3.3 nF | B37981F1332K0** | 2500 | 2500 | 2000 |
| 4.7 nF | B37981F1472K0** | 2500 | 2500 | 2000 |
| 6.8 nF | B37981F1682K0** | 2500 | 2500 | 2000 |
| 10 nF  | B37981F1103K0** | 2500 | 2500 | 2000 |
| 15 nF  | B37981F1153K0** | 2500 | 2500 | 2000 |

**B37987F, 100 VDC**

|        |                 |      |      |      |
|--------|-----------------|------|------|------|
| 22 nF  | B37987F1223K0** | 2500 | 2500 | 2000 |
| 33 nF  | B37987F1333K0** | 2500 | 2500 | 2000 |
| 47 nF  | B37987F1473K0** | 2500 | 2500 | 2000 |
| 68 nF  | B37987F1683K0** | 2500 | 2500 | 2000 |
| 100 nF | B37987F1104K0** | 2500 | 2500 | 2000 |
| 150 nF | B37987F1154K0** | 2500 | 2500 | 2000 |

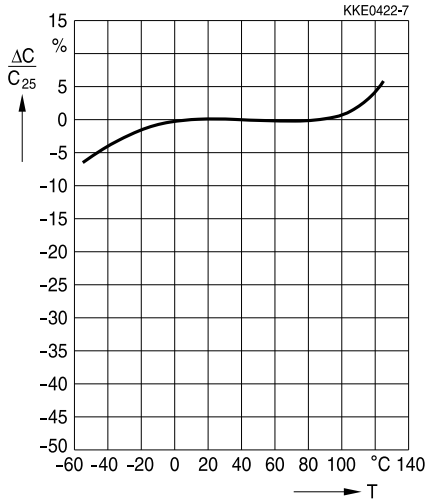


Multilayer ceramic capacitors

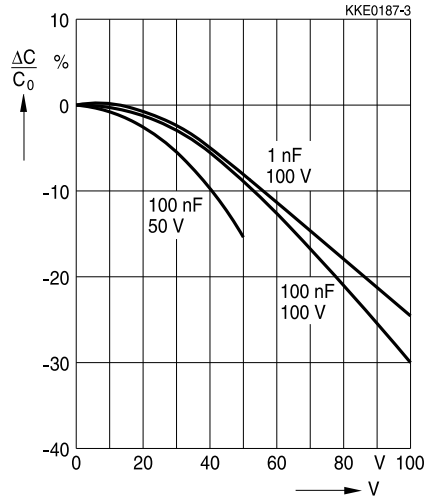
X7R

Typical characteristics

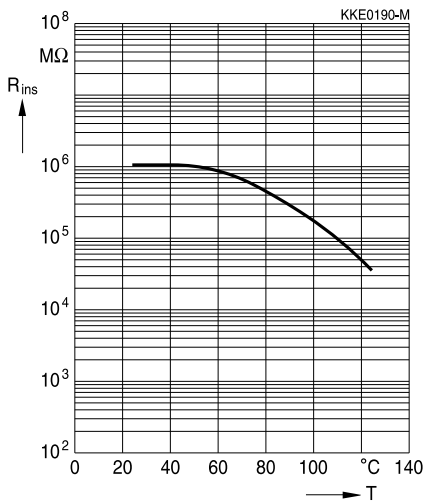
Capacitance change  $\Delta C/C_{25}$  versus temperature T



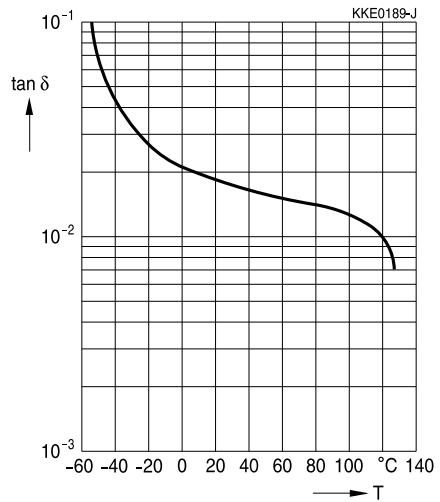
Capacitance change  $\Delta C/C_0$  versus superimposed DC voltage V

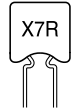


Insulation resistance  $R_{ins}$  versus temperature T



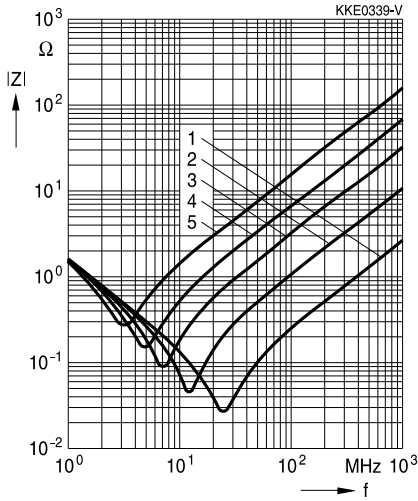
Dissipation factor  $\tan \delta$  versus temperature T





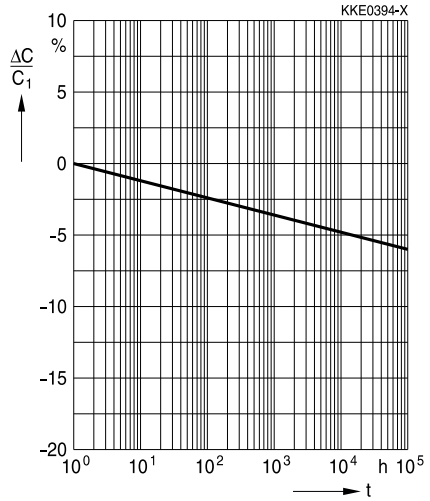
**Typical characteristics**

Impedance  $|Z|$  versus frequency  $f$



- 1: SMD chip capacitor
- 2: 1.5 mm lead length
- 3: 5.0 mm lead length
- 4: 10.0 mm lead length
- 5: 20.0 mm lead length

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





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The following applies to all products named in this publication:







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