








**Multilayer Ceramic Capacitors** **Chip**  
**X8R**

**Ordering code system**

												
<b>B37541</b>	<b>K</b>	<b>5</b>	<b>102</b>	<b>K</b>	<b>0</b>	<b>60</b>						
			<p><b>Packaging</b></p> <p>60 <math>\triangle</math> cardboard tape, 180-mm reel          62 <math>\triangle</math> blister tape, 180-mm reel          70 <math>\triangle</math> cardboard tape, 330-mm reel          72 <math>\triangle</math> blister tape, 330-mm reel</p>									
			<p><b>Internal coding</b></p>									
			<p><b>Capacitance tolerance</b></p> <p>J <math>\triangle</math> <math>\pm</math> 5 %  <b>K <math>\triangle</math> <math>\pm</math> 10 % (standard)</b>          M <math>\triangle</math> <math>\pm</math> 20 %</p>									
			<p><b>Capacitance, coded</b>    102 <math>\triangle</math> <math>10 \cdot 10^2</math> pF = 1 nF          (example)                    103 <math>\triangle</math> <math>10 \cdot 10^3</math> pF = 10 nF</p>									
			<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: left;"><b>Rated voltage</b></td> <td style="text-align: center;">Rated voltage [VDC]</td> <td style="text-align: center;">50</td> </tr> <tr> <td></td> <td style="text-align: center;">Code</td> <td style="text-align: center;">5</td> </tr> </table>				<b>Rated voltage</b>	Rated voltage [VDC]	50		Code	5
<b>Rated voltage</b>	Rated voltage [VDC]	50										
	Code	5										
			<p><b>Termination</b>    Standard:    K <math>\triangle</math> nickel barrier for all case sizes          On request:    J <math>\triangle</math> silver-palladium for conductive adhesion for all case sizes</p>									

<b>Type and size</b>	
Chip size (inch / mm)	Temperature characteristic X8R
<b>0603</b> / 1608	B37531
<b>0805</b> / 2012	B37541
<b>1206</b> / 3216	B37472
<b>1210</b> / 3225	B37550

**Features**

- Wide temperature range up to 150 °C
- High volumetric efficiency
- Non-linear capacitance change
- High insulation resistance
- High pulse strength


**Applications**

- Automotive
- Blocking
- Coupling
- Decoupling
- Interference suppression

**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 and case size 1210) 180-mm and 330-mm reel available

**Electrical data**

Temperature characteristic		X8R	
Climatic category (IEC 60068-1)		55/150/56	
Standard		EIA	
Dielectric		Class 2	
Rated voltage <sup>1)</sup>	$V_R$	50	VDC
Test voltage	$V_{test}$	$2,5 \cdot V_R/5$ s	VDC
Capacitance range / E series	$C_R$	100 pF ... 150 nF (E6)	
Max. relative capacitance change	$\Delta C/C$	$\pm 15$	%
Dissipation factor (limit value)	$\tan \delta$	$< 25 \cdot 10^{-3}$	
Insulation resistance <sup>2)</sup> at + 25 °C	$R_{ins}$	$> 10^5$	M $\Omega$
Insulation resistance <sup>2)</sup> at +125 °C	$R_{ins}$	$> 10^4$	M $\Omega$
Time constant <sup>2)</sup> at + 25 °C	$\tau$	$> 1000$	s
Time constant <sup>2)</sup> at +125 °C	$\tau$	$> 100$	s
Operating temperature range	$T_{op}$	-55 ... +150	°C
Ageing <sup>3)</sup>		yes	

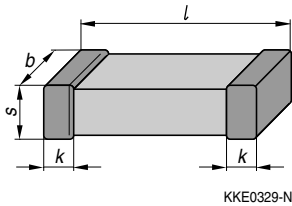
1) Note: No operation on AC line.

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

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


**Capacitance tolerances**

Code letter	J	K (standard)	M
Tolerance	±5%	±10%	±20%

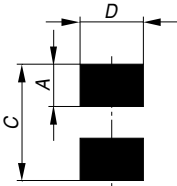
**Dimensional drawing**

**Dimensions (mm)**

Case size (inch) (mm)	0603 1608	0805 2012	1206 3216	1210 3225
<i>l</i>	1,6 ± 0,15	2,0 ± 0,20	3,2 ± 0,20	3,2 ± 0,30
<i>b</i>	0,8 ± 0,10	1,25 ± 0,15	1,6 ± 0,15	2,5 ± 0,30
<i>s</i>	0,8 ± 0,10	1,30 max.	1,30 max.	1,30 max.
<i>k</i>	0,1 – 0,4	0,13 – 0,75	0,25 – 0,75	0,25 – 0,75

Tolerances to CECC 32101-801



Recommended solder pad

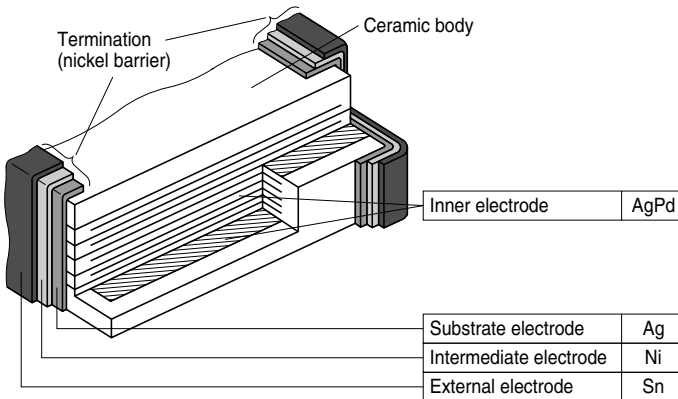


KKE0308-1

Maximum dimensions (mm)

Case size	(inch/mm)	Type	A	C	D
0603	1608	single chip	1,0	3,0	1,0
0805	2012	single chip	1,2	3,4	1,3
1206	3216	single chip	1,2	4,5	1,8
1210	3225	single chip	1,2	4,5	2,8

Termination



KKE0484-W



**Product range chip capacitors**

		X8R							
Size <sup>1)</sup> inch mm	0603 1608		0805 2012		1206 3216		1210 3225		
	B37531		B37541		B37472		B37550		
Type	50		50		50		50		
$V_R$ (VDC)	50		50		50		50		
$C_R$	50		50		50		50		
100 pF									
150 pF									
220 pF									
330 pF									
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									

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

**Multilayer Ceramic Capacitors**
**X8R; 0603 and 0805**
**X8R**
**Ordering codes and packing for X8R, 50 VDC, nickel-barrier terminations**

$C_R^{1)}$	Ordering code <sup>2)</sup>	Chip thickness mm	Cardboard tape, ∅ 180-mm reel	Cardboard tape, ∅ 330-mm reel
			** $\triangle$ 60	** $\triangle$ 70
			pcs/reel	pcs/reel

**Case size 0603, 50 VDC**

100 pF	B37531K5101K0**	0,8 ± 0,1	4000	16000
150 pF	B37531K5151K0**	0,8 ± 0,1	4000	16000
220 pF	B37531K5221K0**	0,8 ± 0,1	4000	16000
330 pF	B37531K5331K0**	0,8 ± 0,1	4000	16000
470 pF	B37531K5471K0**	0,8 ± 0,1	4000	16000
680 pF	B37531K5681K0**	0,8 ± 0,1	4000	16000
1,0 nF	B37531K5102K0**	0,8 ± 0,1	4000	16000
1,5 nF	B37531K5152K0**	0,8 ± 0,1	4000	16000
2,2 nF	B37531K5222K0**	0,8 ± 0,1	4000	16000
3,3 nF	B37531K5332K0**	0,8 ± 0,1	4000	16000
4,7 nF	B37531K5472K0**	0,8 ± 0,1	4000	16000

**Case size 0805, 50 VDC**

470 pF	B37541K5471K0**	0,6 ± 0,1	5000	20000
680 pF	B37541K5681K0**	0,6 ± 0,1	5000	20000
1,0 nF	B37541K5102K0**	0,6 ± 0,1	5000	20000
1,5 nF	B37541K5152K0**	0,6 ± 0,1	5000	20000
2,2 nF	B37541K5222K0**	0,6 ± 0,1	5000	20000
3,3 nF	B37541K5332K0**	0,6 ± 0,1	5000	20000
4,7 nF	B37541K5472K0**	0,6 ± 0,1	5000	20000
6,8 nF	B37541K5682K0**	0,6 ± 0,1	5000	20000
10 nF	B37541K5103K0**	0,6 ± 0,1	5000	20000
15 nF	B37541K5153K0**	0,6 ± 0,1	5000	20000
22 nF	B37541K5223K0**	0,6 ± 0,1	5000	20000

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 72.


**Ordering codes and packing for X8R, 50 VDC, nickel-barrier terminations**

$C_R^{1)}$	Ordering code <sup>2)</sup>	Chip thickness mm	Cardboard tape, Ø 180-mm reel	Cardboard tape, Ø 330-mm reel
			** $\triangle$ 60	** $\triangle$ 70
			pcs/reel	pcs/reel

**Case size 1206, 50 VDC**

1,0 nF	B37472K5102K0**	0,8 ± 0,1	4000	16000
1,5 nF	B37472K5152K0**	0,8 ± 0,1	4000	16000
2,2 nF	B37472K5222K0**	0,8 ± 0,1	4000	16000
3,3 nF	B37472K5332K0**	0,8 ± 0,1	4000	16000
4,7 nF	B37472K5472K0**	0,8 ± 0,1	4000	16000
6,8 nF	B37472K5682K0**	0,8 ± 0,1	4000	16000
10 nF	B37472K5103K0**	0,8 ± 0,1	4000	16000
15 nF	B37472K5153K0**	0,8 ± 0,1	4000	16000
22 nF	B37472K5223K0**	0,8 ± 0,1	4000	16000
33 nF	B37472K5333K0**	0,8 ± 0,1	4000	16000
47 nF	B37472K5473K0**	0,8 ± 0,1	4000	16000
68 nF	B37472K5683K0**	1,2 ± 0,1	3000 <sup>3)</sup>	12000 <sup>4)</sup>
100 nF	B37472K5104K0**	1,2 ± 0,1	3000 <sup>3)</sup>	12000 <sup>4)</sup>
			Blister tape, Ø 180-mm reel	Blister tape, Ø 330-mm reel
			** $\triangle$ 62	** $\triangle$ 72
			pcs/reel	pcs/reel

**Case size 1210, 50 VDC**

10 nF	B37550K5103K0**	0,8 ± 0,1	4000	16000
15 nF	B37550K5153K0**	0,8 ± 0,1	4000	16000
22 nF	B37550K5223K0**	0,8 ± 0,1	4000	16000
33 nF	B37550K5333K0**	0,8 ± 0,1	4000	16000
47 nF	B37550K5473K0**	0,8 ± 0,1	4000	16000
68 nF	B37550K5683K0**	0,8 ± 0,1	4000	16000
100 nF	B37550K5104K0**	0,8 ± 0,1	4000	16000
150 nF	B37550K5154K0**	1,2 ± 0,1	3000	12000

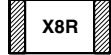
1) Other capacitance values on request.

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

For other available capacitance tolerances see page 72.

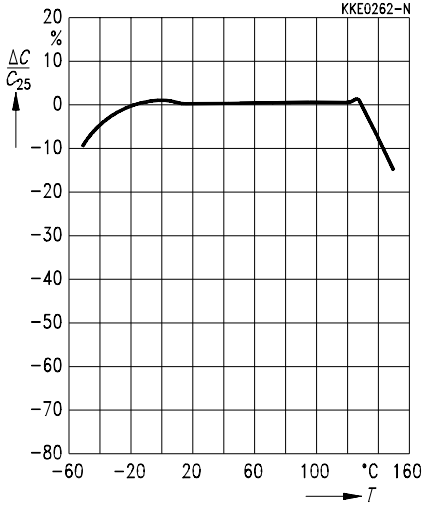
3) Blister tape, 180-mm reel, ordering code \*\*  $\triangle$  62

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

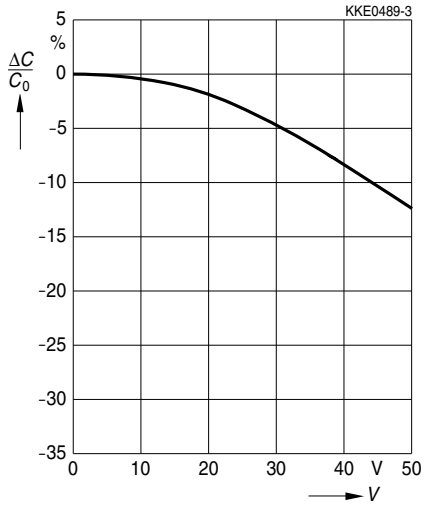


**Typical characteristics**

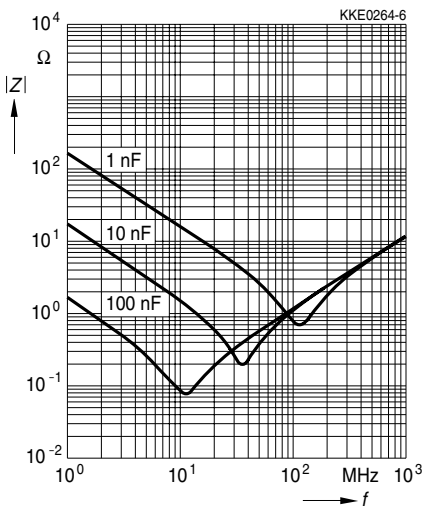
Capacitance change  $\Delta C/C_{25}$  versus temperature  $T$



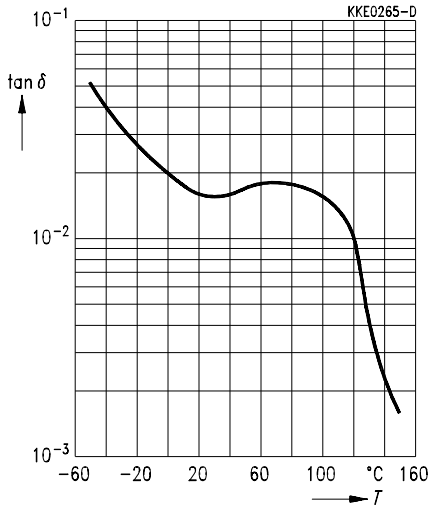
Capacitance change  $\Delta C/C_0$  versus superimposed DC voltage  $V$



Impedance  $|Z|$  versus frequency  $f$



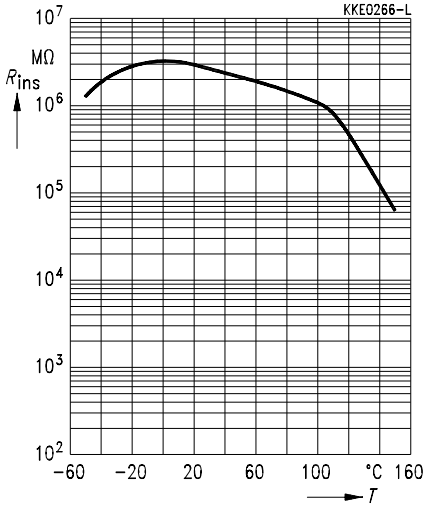
Dissipation factor  $\tan \delta$  versus temperature  $T$



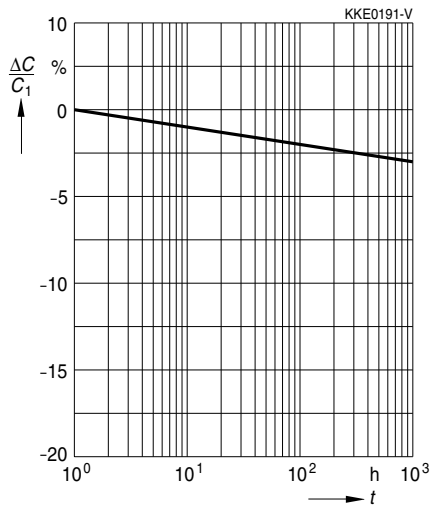


**Typical characteristics**

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



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



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