

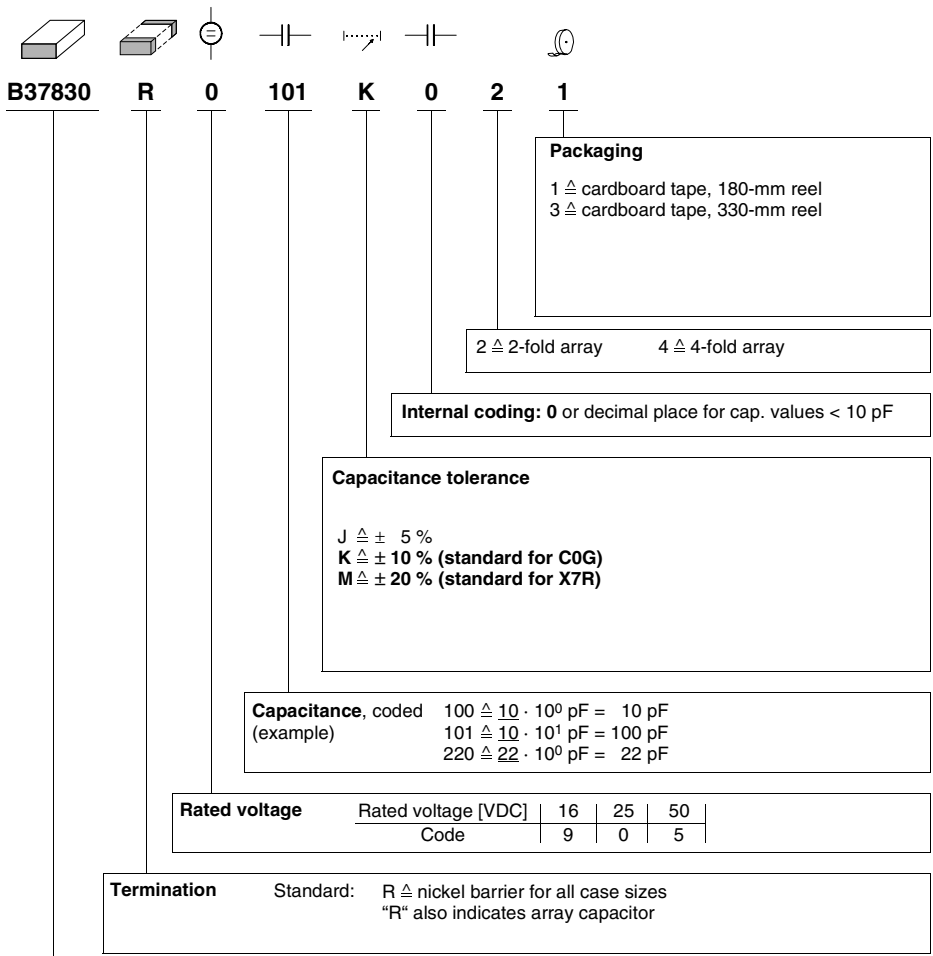


Multilayer Ceramic Capacitors

Array

C0G and X7R

Ordering code system



Type and size			
Chip size (inch / mm)	Temperature characteristic		
	C0G	X7R	
0405 / 1012	B37830	B37831	
0508 / 1220	B37940	B37941	
0612 / 1632	B37871	B37872	



## Multilayer Ceramic Capacitors

Array

X7R

SMD

### Features

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

### Applications

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

### Termination

- For soldering: Nickel-barrier terminations (Ni)

### Options

- Alternative capacitance tolerances available on request

### Delivery mode

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

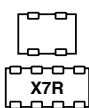
### Electrical data

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

1) Note: No operation on AC line.

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

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



Multilayer Ceramic Capacitors

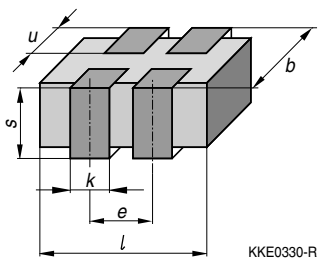
X7R

Capacitance tolerances

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

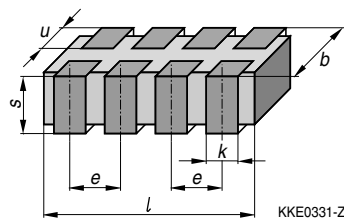
Dimensional drawing

2-fold array (case size 0405)



KKE0330-R

4-fold array (case sizes 0508 and 0612)



KKE0331-Z

Dimensions (mm)

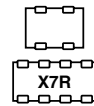
	2-fold array	4-fold array	
Case size (inch) (mm)	0405 1012	0508 1220	0612 1632
<i>l</i>	1,37 ± 0,15	2,0 ± 0,2	3,2 ± 0,2
<i>b</i>	1,0 +0/-0,15	1,25 ± 0,15	1,6 ± 0,2
<i>s</i>	0,70 max.	0,85 ± 0,1	0,85 ± 0,1
<i>k</i>	0,36 ± 0,1	0,3 ± 0,1	0,4 ± 0,15
<i>e</i>	0,64	0,5 ± 0,1	0,8 ± 0,15
<i>u</i>	0,2 ± 0,1	0,2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

Tolerances to CECC 32101-801



Multilayer Ceramic Capacitors

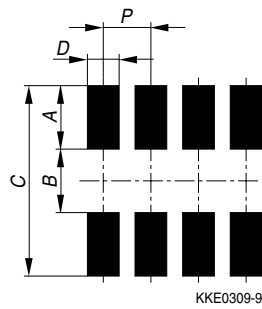
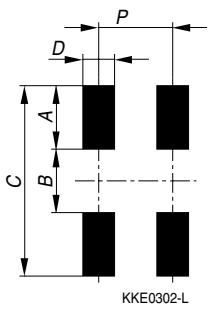
X7R



Recommended solder pad

2-fold array (case size 0405)

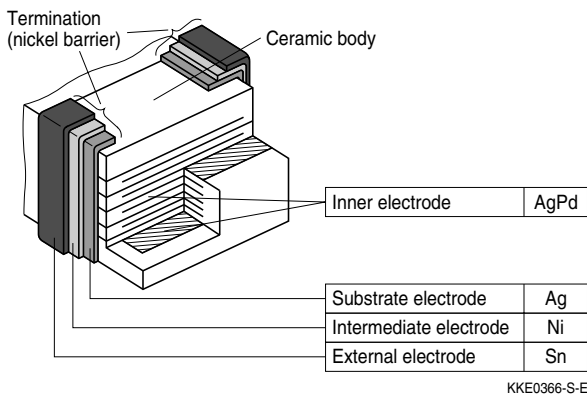
4-fold array (case sizes 0508 and 0612)

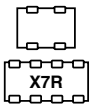


Maximum dimensions (mm)

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

Termination





Multilayer Ceramic Capacitors

X7R

Product range array capacitors

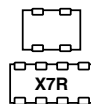
		X7R					
		2-fold arrays		4-fold arrays			
Size <sup>1)</sup>							
inch		<b>0405</b>		<b>0508</b>		<b>0612</b>	
mm		1012		1220		1632	
Type		B37831		B37941		B37872	
$V_R$ (VDC)		16		25		50	
$C_R$							
1,0 nF							
1,5 nF							
2,2 nF							
3,3 nF							
4,7 nF							
6,8 nF							
10 nF							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

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



**Multilayer Ceramic Capacitors**

**X7R; 0405 to 0612**



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

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

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

1,0 nF	B37831R9102M02*	0,6 ± 0,1	5000	20000
2,2 nF	B37831R9222M02*	0,6 ± 0,1	5000	20000
4,7 nF	B37831R9472M02*	0,6 ± 0,1	5000	20000
10 nF	B37831R9103M02*	0,6 ± 0,1	5000	20000

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

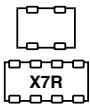
1,0 nF	B37941R0102M04*	0,85 ± 0,1	4000	16000
2,2 nF	B37941R0222M04*	0,85 ± 0,1	4000	16000
4,7 nF	B37941R0472M04*	0,85 ± 0,1	4000	16000
10 nF	B37941R0103M04*	0,85 ± 0,1	4000	16000

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

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

1) Other capacitance values on request.

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

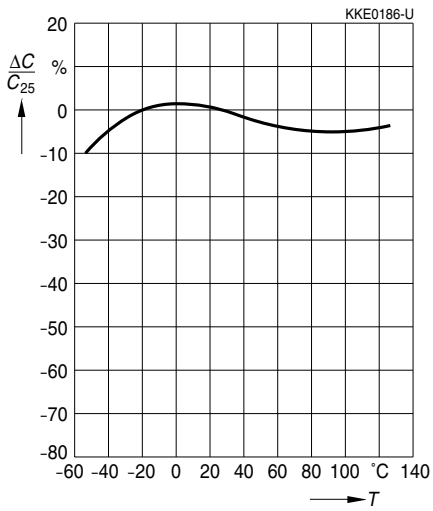


Multilayer Ceramic Capacitors

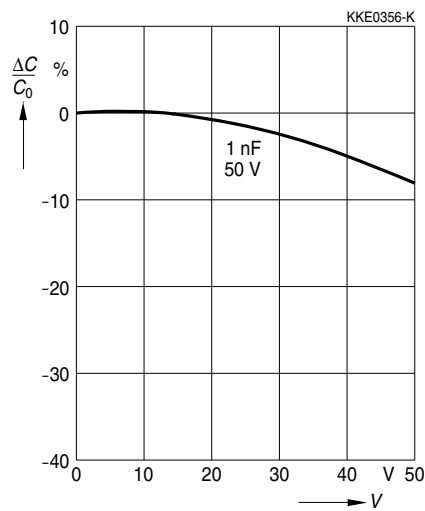
X7R

Typical characteristics

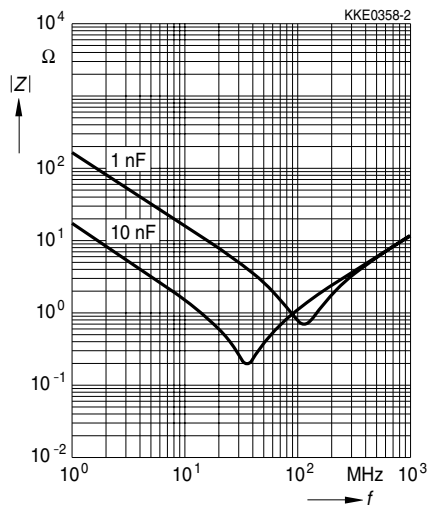
Capacitance change  $\Delta C/C_{25}$  versus temperature  $T$



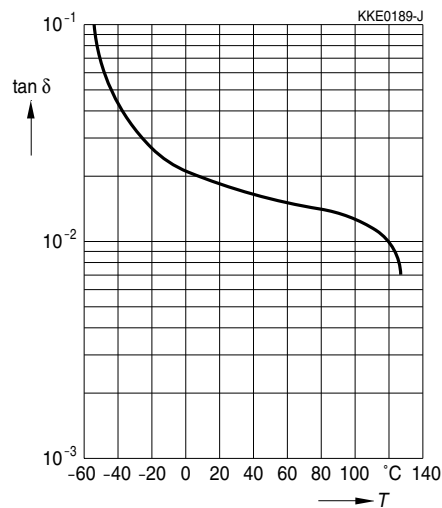
Capacitance change  $\Delta C/C_0$  versus superimposed DC voltage  $V$



Impedance  $|Z|$  versus frequency  $f$



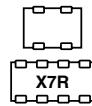
Dissipation factor  $\tan \delta$  versus temperature  $T$





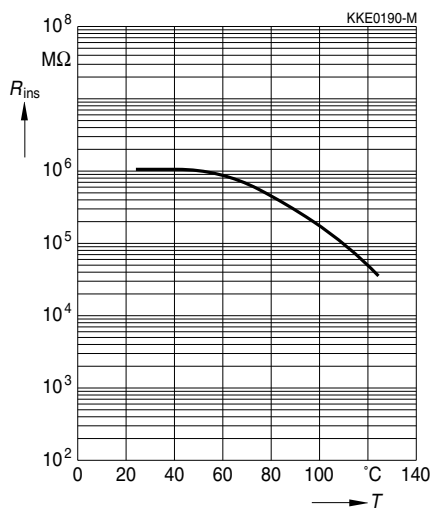
Multilayer Ceramic Capacitors

X7R

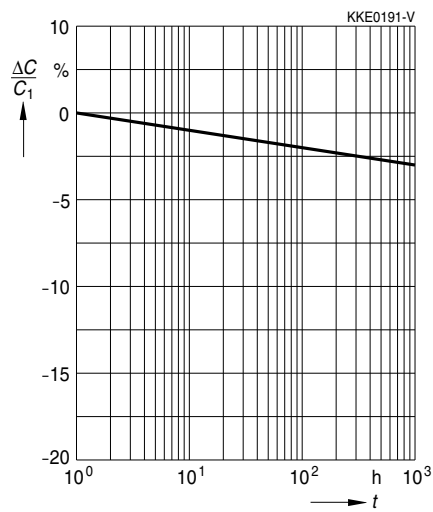


Typical characteristics

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



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





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**Unternehmenskommunikation, Postfach 80 17 09, 81617 München, DEUTSCHLAND**

**☎ ++49 89 636 09, FAX (0 89) 636-2 26 89**

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