Multilayer Ceramic Capacitors

Series/Type: B37953

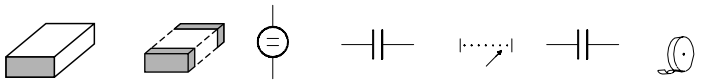
The following products presented in this data sheet are being withdrawn.

Ordering Code	Substitute Product	Date of Withdrawal	Deadline Last Orders	Last Shipments
B37953K5104K062		2008-08-01	2009-07-31	2009-10-31
B37953K5104K072		2008-08-01	2009-07-31	2009-10-31
B37953K5224K062		2008-08-01	2009-07-31	2009-10-31

Ordering Code	Substitute Product	Date of Withdrawal	Deadline Last Orders	Last Shipments
B37953K5224K072		2008-08-01	2009-07-31	2009-10-31
B37953K5334K062		2008-08-01	2009-07-31	2009-10-31
B37953K5334K072		2008-08-01	2009-07-31	2009-10-31
B37953K5474K062		2008-08-01	2009-07-31	2009-10-31
B37953K5474K072		2008-08-01	2009-07-31	2009-10-31
B37956K5474K062		2008-08-01	2009-07-31	2009-10-31
B37956K5474K072		2008-08-01	2009-07-31	2009-10-31
B37956K5105K062		2008-08-01	2009-07-31	2009-10-31
B37956K5105K072		2008-08-01	2009-07-31	2009-10-31

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.

Ordering code system



B37941 K 5 102 K 0 60

Packaging

60 ≙ cardboard tape, 180-mm reel
62 ≙ blister tape, 180-mm reel
70 ≙ cardboard tape, 330-mm reel
72 ≙ blister tape, 330-mm reel
01 ≙ bulk case

Internal coding

Capacitance tolerance

J ≙ ± 5%
K ≙ ±10% (standard)
M ≙ ±20%

Capacitance, coded (example)

102 ≙ 10 · 10^2 pF = 1 nF
104 ≙ 10 · 10^4 pF = 100 nF
223 ≙ 22 · 10^3 pF = 22 nF

Rated voltage

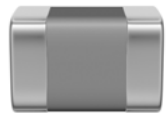
Rated voltage [VDC]	16	25	50	100	200	500
Code	9	0	5	1	2	3

Termination

Standard: K ≙ nickel barrier for all case sizes
On request: J ≙ silver-palladium for conductive adhesion: all case sizes

Type and size	
Chip size (**inch** / mm)	Temperature characteristic X7R
0603 / 1608	B37931
0805 / 2012	B37941
1206 / 3216	B37872
1210 / 3225	B37950
1812 / 4532	B37953
2220 / 5750	B37956

SMD



Features

- High volumetric efficiency
- Non-linear capacitance change
- High insulation resistance
- High pulse strength
- To AEC-Q200

Applications

- Blocking and coupling
- Decoupling
- Interference suppression

Termination

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

Options

- Alternative capacitance tolerances available on request

Delivery mode

- Cardboard and blister tape (blister tape for chip thickness ≥1.2 ±0.1 mm and case sizes ≥1210), 180-mm and 330-mm reel available
- Bulk case for case sizes 0603 (16 V, 25 V, 50 V) and 0805 (50 V)

Electrical data

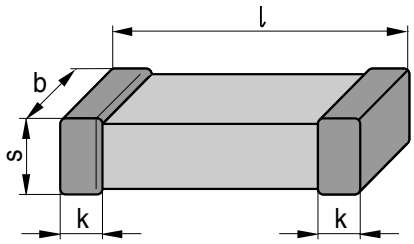
Temperature characteristic		X7R	
Max. relative capacitance change within –55 °C to +125 °C	$\Delta C/C$	±15	%
Climatic category (IEC 60068-1)		55/125/56	
Standard		EIA	
Dielectric		Class 2	
Rated voltage[1)]	V_R	16, 25, 50, 100, 200, 500	VDC
Test voltage	V_{test}	$2.5 \cdot V_R$/5 s	VDC
Capacitance range[2)] / E series	C_R	100 pF … 1 µF (E3/E6)	
Dissipation factor (limit value)	tan δ	$< 25 \cdot 10^{-3}$ $< 35 \cdot 10^{-3}$ for 16 V	
Insulation resistance[3)] at + 25 °C	R_{ins}	$>10^5$	MΩ
Insulation resistance[3)] at +125 °C	R_{ins}	$>10^4$	MΩ
Time constant[3)] at + 25 °C	τ	>1000	s
Time constant[3)] at +125 °C	τ	>100	s
Operating temperature range	T_{op}	–55 … +125	°C
Ageing[4)]		yes	

1) Note: No operation on AC line.
2) See also chapter “HighCV”.
3) For C_R >10 nF the time constant $\tau = C \cdot R_{ins}$ is given.
4) Refer to chapter “General technical information”, “Ageing”.

Capacitance tolerances

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

Dimensional drawing



KKE0329-N

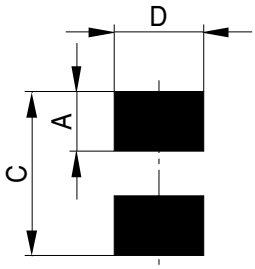
Dimensions (mm)

Case size (inch) (mm)	0603 1608	0805 2012	1206 3216
l	1.6 ±0.15	2.00 ±0.20	3.20 ±0.20
b	0.8 ±0.10	1.25 ±0.15	1.60 ±0.15
s	0.8 ±0.10	1.35 max.	1.30 max.
k	0.1 –0.40	0.13 –0.75	0.25 –0.75

Case size (inch) (mm)	1210 3225	1812 4532	2220 5750
l	3.20 ±0.30	4.50 ±0.30	5.7 ±0.40
b	2.50 ±0.30	3.20 ±0.30	5.0 ±0.40
s	1.70 max.	1.30 max.	1.30 max.
k	0.25 –0.75	0.25 –1.0	0.25 –1.0

Tolerances to CECC 32101-801

Recommended solder pad



KKE0308-1

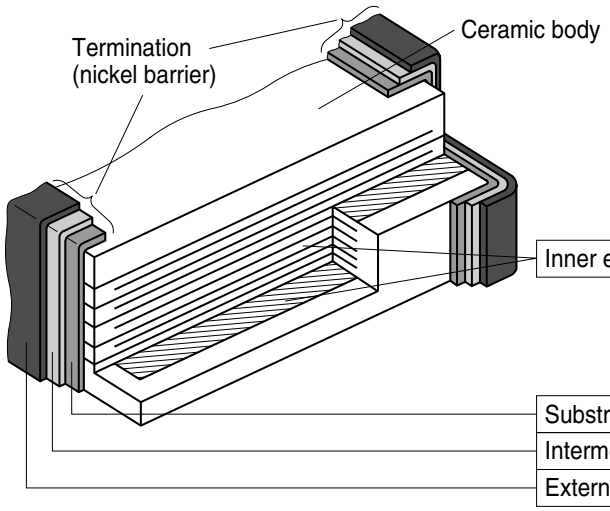
Recommended dimensions (mm) for reflow soldering

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
	1206/3216	single chip	0.8 … 0.9	3.8 … 4.32	1.0 … 1.4
	1210/3225	single chip	1.0 … 1.2	4.0 … 4.8	1.8 … 2.3
	1812/4532	single chip	1.2 … 1.4	5.4 … 6.3	2.3 … 3.0
	2220/5750	single chip	1.4 … 1.6	6.8 … 7.8	3.5 … 4.8

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



	NME	BME
Inner electrode	AgPd	Ni

	NME	BME
Substrate electrode	Ag	Cu
Intermediate electrode	Ni	Ni
External electrode	Sn	Sn

NME: Noble Metal Electrode
BME: Base Metal Electrode

KKE0485-5-E

Product range chip capacitors, X7R

Size[1] **inch** / mm	**0603** 1608				**0805** 2012				
Type	B37931				B37941				
C_R \ V_R (VDC)	16	25	50	100	16	25	50	100	200
100 pF				■					
120 pF[2]									
150 pF				■					
180 pF[2]									
220 pF			■	■					■
270 pF[2]			■						
330 pF			■	■					■
390 pF[2]			■						
470 pF			■	■			■	■	■
560 pF[2]			■				■		
680 pF			■	■			■	■	■
820 pF[2]			■				■		
1.0 nF			■	■			■	■	■
1.2 nF[2]			■				■		
1.5 nF			■	■			■	■	■
1.8 nF[2]			■				■		
2.2 nF			■	■			■	■	■
2.7 nF[2]			■				■		
3.3 nF			■	■			■	■	■
3.9 nF[2]			■				■		
4.7 nF			■	■			■	■	■
5.6 nF[2]			■				■		
6.8 nF			■				■	■	■
8.2 nF[2]			■				■		

1) l × b (inch) / l × b (mm)
2) Non standard types (E 12) on request.

Product range chip capacitors, X7R

Size[1] **inch** / mm	**0603** 1608				**0805** 2012				
Type	B37931				B37941				
C_R \ V_R (VDC)	16	25	50	100	16	25	50	100	200
10 nF									
12 nF[2]									
15 nF									
18 nF[2]									
22 nF									
27 nF[2]									
33 nF									
39 nF[2]									
47 nF									
56 nF[2]									
68 nF			[3]						
82 nF[2]									
100 nF			[3]						
220 nF	[3]	[3]			[3]	[3]	[3]		
330 nF					[3]	[3]	[3]		
470 nF					[3]	[3]	[3]		
1.0 µF					[3]	[3]	[3]		
2.2 µF									

1) l × b (inch) / l × b (mm)
2) Non standard types (E 12) on request.
3) See HighCV product range for specification.

Product range chip capacitors, X7R

Size[1] **inch** / mm	**1206** / 3216					
Type	B37872					
C_R \ V_R (VDC)	16	25	50	100	200	500
100 pF						
120 pF[2]						
150 pF						
180 pF[2]						
220 pF						
270 pF[2]						
330 pF						
390 pF[2]						
470 pF						
560 pF[2]						
680 pF						
820 pF[2]						
1.0 nF						
1.2 nF[2]						
1.5 nF						
1.8 nF[2]						
2.2 nF						
2.7 nF[2]						
3.3 nF						
3.9 nF[2]						
4.7 nF						
5.6 nF[2]						
6.8 nF						
8.2 nF[2]						

1) l × b (inch) / l × b (mm)
2) Non standard types (E 12) on request.

Product range chip capacitors, X7R

Size[1] **inch** / mm	**1206** / 3216					
Type	B37872					
C_R \ V_R (VDC)	16	25	50	100	200	500
10 nF						
12 nF[2]						
15 nF						
18 nF[2]						
22 nF						
27 nF[2]						
33 nF						
39 nF[2]						
47 nF						
56 nF[2]						
68 nF						
82 nF[2]						
100 nF						
220 nF						
330 nF						
470 nF						
1.0 µF	3)	3)	3)			
2.2 µF	3)	3)				

1) l × b (inch) / l × b (mm)
2) Non standard types (E 12) on request.
3) See HighCV product range for specification.

Product range chip capacitors, X7R

Size[1)] **inch** mm	**1210** 3225				**1812** 4532	**2220** 5750
Type	B37950				B37953	B37956
V_R (VDC) / C_R	50	100	200	500	50	50
1.0 nF				■		
1.5 nF				■		
2.2 nF				■		
3.3 nF				■		
3.9 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					■	■
1.0 µF						■

1) l × b (inch) / l × b (mm)

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

C_R[1]	Ordering code[2]	Chip thickness	Cardboard tape, ∅ 180-mm reel	Cardboard tape, ∅ 330-mm reel	Bulk case
			** ≙ 60	** ≙ 70	** ≙ 01
		mm	pcs/reel	pcs/reel	pcs
Case size 0603, 16 VDC					
22 nF	B37931K9223K0**	0.8 ±0.1	4000	16000	15000
33 nF	B37931K9333K0**	0.8 ±0.1	4000	16000	15000
47 nF	B37931K9473K0**	0.8 ±0.1	4000	16000	15000
68 nF	B37931K9683K0**	0.8 ±0.1	4000	16000	15000
100 nF	B37931K9104K0**	0.8 ±0.1	4000	16000	15000
Case size 0603, 25 VDC					
10 nF	B37931K0103K0**	0.8 ±0.1	4000	16000	15000
15 nF	B37931K0153K0**	0.8 ±0.1	4000	16000	15000
22 nF	B37931K0223K0**	0.8 ±0.1	4000	16000	15000
33 nF	B37931K0333K0**	0.8 ±0.1	4000	16000	15000
47 nF	B37931K0473K0**	0.8 ±0.1	4000	16000	15000
68 nF	B37931K0683K0**	0.8 ±0.1	4000	16000	15000
100 nF	B37931K0104K0**	0.8 ±0.1	4000	16000	15000

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.

Ordering codes and packing for X7R, 50 VDC, nickel barrier terminations

C_R	Ordering code[1]	Chip thickness	Cardboard tape, ∅ 180-mm reel	Cardboard tape, ∅ 330-mm reel	Bulk case
			** ≙ 60	** ≙ 70	** ≙ 01
		mm	pcs/reel	pcs/reel	pcs
Case size 0603, 50 VDC					
220 pF	B37931K5221K0**	0.8 ±0.1	4000	16000	15000
270 pF[2]	B37931K5271K0**	0.8 ±0.1	4000	16000	15000
330 pF	B37931K5331K0**	0.8 ±0.1	4000	16000	15000
390 pF[2]	B37931K5391K0**	0.8 ±0.1	4000	16000	15000
470 pF	B37931K5471K0**	0.8 ±0.1	4000	16000	15000
560 pF[2]	B37931K5561K0**	0.8 ±0.1	4000	16000	15000
680 pF	B37931K5681K0**	0.8 ±0.1	4000	16000	15000
820 pF[2]	B37931K5821K0**	0.8 ±0.1	4000	16000	15000
1.0 nF	B37931K5102K0**	0.8 ±0.1	4000	16000	15000
1.2 nF[2]	B37931K5122K0**	0.8 ±0.1	4000	16000	15000
1.5 nF	B37931K5152K0**	0.8 ±0.1	4000	16000	15000
1.8 nF[2]	B37931K5182K0**	0.8 ±0.1	4000	16000	15000
2.2 nF	B37931K5222K0**	0.8 ±0.1	4000	16000	15000
2.7 nF[2]	B37931K5272K0**	0.8 ±0.1	4000	16000	15000
3.3 nF	B37931K5332K0**	0.8 ±0.1	4000	16000	15000
3.9 nF[2]	B37931K5392K0**	0.8 ±0.1	4000	16000	15000
4.7 nF	B37931K5472K0**	0.8 ±0.1	4000	16000	15000
5.6 nF[2]	B37931K5562K0**	0.8 ±0.1	4000	16000	15000
6.8 nF	B37931K5682K0**	0.8 ±0.1	4000	16000	15000
8.2 nF[2]	B37931K5822K0**	0.8 ±0.1	4000	16000	15000
10 nF	B37931K5103K0**	0.8 ±0.1	4000	16000	15000
12 nF[2]	B37931K5123K0**	0.8 ±0.1	4000	16000	15000
15 nF	B37931K5153K0**	0.8 ±0.1	4000	16000	15000
18 nF[2]	B37931K5183K0**	0.8 ±0.1	4000	16000	15000
22 nF	B37931K5223K0**	0.8 ±0.1	4000	16000	15000
27 nF[2]	B37931K5273K0**	0.8 ±0.1	4000	16000	15000
33 nF	B37931K5333K0**	0.8 ±0.1	4000	16000	15000
39 nF[2]	B37931K5393K0**	0.8 ±0.1	4000	16000	15000
47 nF	B37931K5473K0**	0.8 ±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.
2) Non standard types (E 12) on request.

Ordering codes and packing for X7R, 100 VDC, nickel barrier terminations

C_R[1)]	Ordering code[2)]	Chip thickness	Cardboard tape, ∅ 180-mm reel	Cardboard tape, ∅ 330-mm reel	Bulk case
			** ≙ 60	** ≙ 70	** ≙ 01
		mm	pcs/reel	pcs/reel	pcs
Case size 0603, 100 VDC					
100 pF	B37931K1101K0**	0.8 ±0.1	4000	16000	–
150 pF	B37931K1151K0**	0.8 ±0.1	4000	16000	–
220 pF	B37931K1221K0**	0.8 ±0.1	4000	16000	–
330 pF	B37931K1331K0**	0.8 ±0.1	4000	16000	–
470 pF	B37931K1471K0**	0.8 ±0.1	4000	16000	–
680 pF	B37931K1681K0**	0.8 ±0.1	4000	16000	–
1.0 nF	B37931K1102K0**	0.8 ±0.1	4000	16000	–
1.5 nF	B37931K1152K0**	0.8 ±0.1	4000	16000	–
2.2 nF	B37931K1222K0**	0.8 ±0.1	4000	16000	–
3.3 nF	B37931K1332K0**	0.8 ±0.1	4000	16000	–
4.7 nF	B37931K1472K0**	0.8 ±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 4.

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

C_R	Ordering code[1]	Chip thickness mm	Cardboard tape, ∅ 180-mm reel ** ≙ 60 pcs/reel	Cardboard tape, ∅ 330-mm reel ** ≙ 70 pcs/reel	Bulk case ** ≙ 01 pcs
Case size 0805, 25 VDC					
100 nF	B37941K0104K0**	0.8 ±0.1	4000	16000	–
100 nF	B37941K0104K0**	1.25 ±0.1	3000[3]	12000[4]	–
Case size 0805, 50 VDC					
470 pF	B37941K5471K0**	0.6 ±0.1	5000	20000	10000
560 pF[2]	B37941K5561K0**	0.6 ±0.1	5000	20000	10000
680 pF	B37941K5681K0**	0.6 ±0.1	5000	20000	10000
820 pF[2]	B37941K5821K0**	0.6 ±0.1	5000	20000	10000
1.0 nF	B37941K5102K0**	0.6 ±0.1	5000	20000	10000
1.2 nF[2]	B37941K5122K0**	0.6 ±0.1	5000	20000	10000
1.5 nF	B37941K5152K0**	0.6 ±0.1	5000	20000	10000
1.8 nF[2]	B37941K5182K0**	0.6 ±0.1	5000	20000	10000
2.2 nF	B37941K5222K0**	0.6 ±0.1	5000	20000	10000
2.7 nF[2]	B37941K5272K0**	0.6 ±0.1	5000	20000	10000
3.3 nF	B37941K5332K0**	0.6 ±0.1	5000	20000	10000
3.9 nF[2]	B37941K5392K0**	0.6 ±0.1	5000	20000	10000
4.7 nF	B37941K5472K0**	0.6 ±0.1	5000	20000	10000
5.6 nF[2]	B37941K5562K0**	0.6 ±0.1	5000	20000	10000
6.8 nF	B37941K5682K0**	0.6 ±0.1	5000	20000	10000
8.2 nF[2]	B37941K5822K0**	0.6 ±0.1	5000	20000	10000
10 nF	B37941K5103K0**	0.6 ±0.1	5000	20000	10000
12 nF[2]	B37941K5123K0**	0.6 ±0.1	5000	20000	10000
15 nF	B37941K5153K0**	0.6 ±0.1	5000	20000	10000
18 nF[2]	B37941K5183K0**	0.6 ±0.1	5000	20000	10000
22 nF	B37941K5223K0**	0.6 ±0.1	5000	20000	10000
27 nF[2]	B37941K5273K0**	0.6 ±0.1	5000	20000	10000
33 nF	B37941K5333K0**	0.6 ±0.1	5000	20000	10000
39 nF[2]	B37941K5393K0**	0.6 ±0.1	5000	20000	10000
47 nF	B37941K5473K0**	0.6 ±0.1	5000	20000	10000
56 nF[2]	B37941K5563K0**	0.8 ±0.1	4000	16000	–
68 nF	B37941K5683K0**	0.8 ±0.1	4000	16000	–
68 nF	B37941K5683K0**	1.25 ±0.1	3000[3]	12000[4]	–
82 nF[2]	B37941K5823K0**	0.8 ±0.1	4000	16000	–
100 nF	B37941K5104K0**	0.8 ±0.1	4000	16000	–
100 nF	B37941K5104K0**	1.25 ±0.1	3000[3]	12000[4]	–

1) The table contains the ordering codes for the standard capacitance tolerance. For other available capacitance tolerances see page 4.
2) Non standard types (E 12) on request.
3) Blister tape, 180-mm reel, ordering code ** ≙ 62
4) Blister tape, 330-mm reel, ordering code ** ≙ 72

Ordering codes and packing for X7R, 100 and 200 VDC, nickel barrier terminations

C_R[1]	Ordering code[2]	Chip thickness	Cardboard tape, ∅ 180-mm reel	Cardboard tape, ∅ 330-mm reel
			** ≙ 60	** ≙ 70
		mm	pcs/reel	pcs/reel
Case size 0805, 100 VDC				
470 pF	B37941K1471K0**	0.6 ±0.1	5000	20000
680 pF	B37941K1681K0**	0.6 ±0.1	5000	20000
1.0 nF	B37941K1102K0**	0.6 ±0.1	5000	20000
1.5 nF	B37941K1152K0**	0.6 ±0.1	5000	20000
2.2 nF	B37941K1222K0**	0.6 ±0.1	5000	20000
3.3 nF	B37941K1332K0**	0.6 ±0.1	5000	20000
4.7 nF	B37941K1472K0**	0.6 ±0.1	5000	20000
6.8 nF	B37941K1682K0**	0.6 ±0.1	5000	20000
10 nF	B37941K1103K0**	0.6 ±0.1	5000	20000
15 nF	B37941K1153K0**	0.6 ±0.1	5000	20000
22 nF	B37941K1223K0**	0.8 ±0.1	4000	16000
Case size 0805, 200 VDC				
220 pF	B37941K2221K0**	0.8 ±0.1	4000	16000
330 pF	B37941K2331K0**	0.8 ±0.1	4000	16000
470 pF	B37941K2471K0**	0.8 ±0.1	4000	16000
680 pF	B37941K2681K0**	0.8 ±0.1	4000	16000
1.0 nF	B37941K2102K0**	0.8 ±0.1	4000	16000
1.5 nF	B37941K2152K0**	0.8 ±0.1	4000	16000
2.2 nF	B37941K2222K0**	0.8 ±0.1	4000	16000
3.3 nF	B37941K2332K0**	0.8 ±0.1	4000	16000
4.7 nF	B37941K2472K0**	1.2 ±0.1	3000[3]	12000[4]
6.8 nF	B37941K2682K0**	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 4.
3) Blister tape, 180-mm reel, ordering code ** ≙ 62
4) Blister tape, 330-mm reel, ordering code ** ≙ 72

Ordering codes and packing for X7R, 50 VDC, nickel barrier terminations

C_R	Ordering code[1]	Chip thickness mm	Cardboard tape, ∅ 180-mm reel ** ≙ 60 pcs/reel	Cardboard tape, ∅ 330-mm reel ** ≙ 70 pcs/reel
Case size 1206, 50 VDC				
1.0 nF	B37872K5102K0**	0.8 ±0.1	4000	16000
1.2 nF[2]	B37872K5122K0**	0.8 ±0.1	4000	16000
1.5 nF	B37872K5152K0**	0.8 ±0.1	4000	16000
1.8 nF[2]	B37872K5182K0**	0.8 ±0.1	4000	16000
2.2 nF	B37872K5222K0**	0.8 ±0.1	4000	16000
2.7 nF[2]	B37872K5272K0**	0.8 ±0.1	4000	16000
3.3 nF	B37872K5332K0**	0.8 ±0.1	4000	16000
3.9 nF[2]	B37872K5392K0**	0.8 ±0.1	4000	16000
4.7 nF	B37872K5472K0**	0.8 ±0.1	4000	16000
5.6 nF[2]	B37872K5562K0**	0.8 ±0.1	4000	16000
6.8 nF	B37872K5682K0**	0.8 ±0.1	4000	16000
8.2 nF[2]	B37872K5822K0**	0.8 ±0.1	4000	16000
10 nF	B37872K5103K0**	0.8 ±0.1	4000	16000
12 nF[2]	B37872K5123K0**	0.8 ±0.1	4000	16000
15 nF	B37872K5153K0**	0.8 ±0.1	4000	16000
18 nF[2]	B37872K5183K0**	0.8 ±0.1	4000	16000
22 nF	B37872K5223K0**	0.8 ±0.1	4000	16000
27 nF[2]	B37872K5273K0**	0.8 ±0.1	4000	16000
33 nF	B37872K5333K0**	0.8 ±0.1	4000	16000
39 nF[2]	B37872K5393K0**	0.8 ±0.1	4000	16000
47 nF	B37872K5473K0**	0.8 ±0.1	4000	16000
56 nF[2]	B37872K5563K0**	0.8 ±0.1	4000	16000
68 nF	B37872K5683K0**	0.8 ±0.1	4000	16000
82 nF[2]	B37872K5823K0**	0.8 ±0.1	4000	16000
100 nF	B37872K5104K0**	0.8 ±0.1	4000	16000
220 nF	B37872K5224K0**	1.2 ±0.1	3000[3]	12000[4]
330 nF	B37872K5334K0**	1.2 ±0.1	3000[3]	12000[4]
470 nF	B37872K5474K0**	1.2 ±0.1	3000[3]	12000[4]

1) The table contains the ordering codes for the standard capacitance tolerance. For other available capacitance tolerances see page 4.
2) Non standard types (E 12) on request.
3) Blister tape, 180-mm reel, ordering code ** ≙ 62
4) Blister tape, 330-mm reel, ordering code ** ≙ 72

Ordering codes and packing for X7R, 100, 200 and 500 VDC, nickel barrier terminations

C_R[1]	Ordering code[2]	Chip thickness mm	Cardboard tape, ∅ 180-mm reel ** ≙ 60 pcs/reel	Cardboard tape, ∅ 330-mm reel ** ≙ 70 pcs/reel
Case size 1206, 100 VDC				
1.0 nF	B37872K1102K0**	0.8 ±0.1	4000	16000
1.5 nF	B37872K1152K0**	0.8 ±0.1	4000	16000
2.2 nF	B37872K1222K0**	0.8 ±0.1	4000	16000
3.3 nF	B37872K1332K0**	0.8 ±0.1	4000	16000
4.7 nF	B37872K1472K0**	0.8 ±0.1	4000	16000
6.8 nF	B37872K1682K0**	0.8 ±0.1	4000	16000
10 nF	B37872K1103K0**	0.8 ±0.1	4000	16000
15 nF	B37872K1153K0**	0.8 ±0.1	4000	16000
22 nF	B37872K1223K0**	0.8 ±0.1	4000	16000
33 nF	B37872K1333K0**	0.8 ±0.1	4000	16000
47 nF	B37872K1473K0**	0.8 ±0.1	4000	16000
68 nF	B37872K1683K0**	1.2 ±0.1	3000[3]	12000[4]
100 nF	B37872K1104K0**	1.2 ±0.1	3000[3]	12000[4]
Case size 1206, 200 VDC				
820 pF	B37872K2821K0**	0.8 ±0.1	4000	16000
1.0 nF	B37872K2102K0**	0.8 ±0.1	4000	16000
1.5 nF	B37872K2152K0**	0.8 ±0.1	4000	16000
2.2 nF	B37872K2222K0**	0.8 ±0.1	4000	16000
3.3 nF	B37872K2332K0**	0.8 ±0.1	4000	16000
4.7 nF	B37872K2472K0**	0.8 ±0.1	4000	16000
6.8 nF	B37872K2682K0**	0.8 ±0.1	4000	16000
10 nF	B37872K2103K0**	0.8 ±0.1	4000	16000
15 nF	B37872K2153K0**	1.2 ±0.1	3000[3]	12000[4]
22 nF	B37872K2223K0**	1.2 ±0.1	3000[3]	12000[4]
Case size 1206, 500 VDC				
470 pF	B37872K3471K0**	0.8 ±0.1	4000	16000
680 pF	B37872K3681K0**	0.8 ±0.1	4000	16000
1.0 nF	B37872K3102K0**	0.8 ±0.1	4000	16000
1.5 nF	B37872K3152K0**	0.8 ±0.1	4000	16000
2.2 nF	B37872K3222K0**	0.8 ±0.1	4000	16000
3.3 nF	B37872K3332K0**	1.2 ±0.1	3000[3]	12000[4]
4.7 nF	B37872K3472K0**	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 4.
3) Blister tape, 180-mm reel, ordering code ** ≙ 62
4) Blister tape, 330-mm reel, ordering code ** ≙ 72

Ordering codes and packing for X7R, 50, 100, 200 and 500 VDC, nickel barrier terminations

C_R[1]	Ordering code[2]	Chip thickness	Blister tape, ∅ 180-mm reel	Blister tape, ∅ 330-mm reel
			** ≙ 62	** ≙ 72
		mm	pcs/reel	pcs/reel
Case size 1210, 50 VDC				
10 nF	B37950K5103K0**	0.8 ±0.1	4000	16000
22 nF	B37950K5223K0**	0.8 ±0.1	4000	16000
47 nF	B37950K5473K0**	0.8 ±0.1	4000	16000
100 nF	B37950K5104K0**	0.8 ±0.1	4000	16000
220 nF	B37950K5224K0**	1.2 ±0.1	3000	12000
Case size 1210, 100 VDC				
10 nF	B37950K1103K0**	0.8 ±0.1	4000	16000
15 nF	B37950K1153K0**	0.8 ±0.1	4000	16000
22 nF	B37950K1223K0**	0.8 ±0.1	4000	16000
33 nF	B37950K1333K0**	0.8 ±0.1	4000	16000
47 nF	B37950K1473K0**	0.8 ±0.1	4000	16000
68 nF	B37950K1683K0**	0.8 ±0.1	4000	16000
100 nF	B37950K1104K0**	0.8 ±0.1	4000	16000
150 nF	B37950K1154K0**	1.2 ±0.1	3000	12000
Case size 1210, 200 VDC				
3.9 nF	B37950K2392K0**	0.8 ±0.1	4000	16000
4.7 nF	B37950K2472K0**	0.8 ±0.1	4000	16000
6.8 nF	B37950K2682K0**	0.8 ±0.1	4000	16000
10 nF	B37950K2103K0**	0.8 ±0.1	4000	16000
15 nF	B37950K2153K0**	0.8 ±0.1	4000	16000
22 nF	B37950K2223K0**	1.2 ±0.1	3000	12000
33 nF	B37950K2333K0**	1.2 ±0.1	3000	12000
47 nF	B37950K2473K0**	1.6 ±0.1	2000	8000
Case size 1210, 500 VDC				
1.0 nF	B37950K3102K0**	0.8 ±0.1	4000	16000
1.5 nF	B37950K3152K0**	0.8 ±0.1	4000	16000
2.2 nF	B37950K3222K0**	0.8 ±0.1	4000	16000
3.3 nF	B37950K3332K0**	0.8 ±0.1	4000	16000
4.7 nF	B37950K3472K0**	1.2 ±0.1	3000	12000
6.8 nF	B37950K3682K0**	1.2 ±0.1	3000	12000
10 nF	B37950K3103K0**	1.6 ±0.1	2000	8000

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.

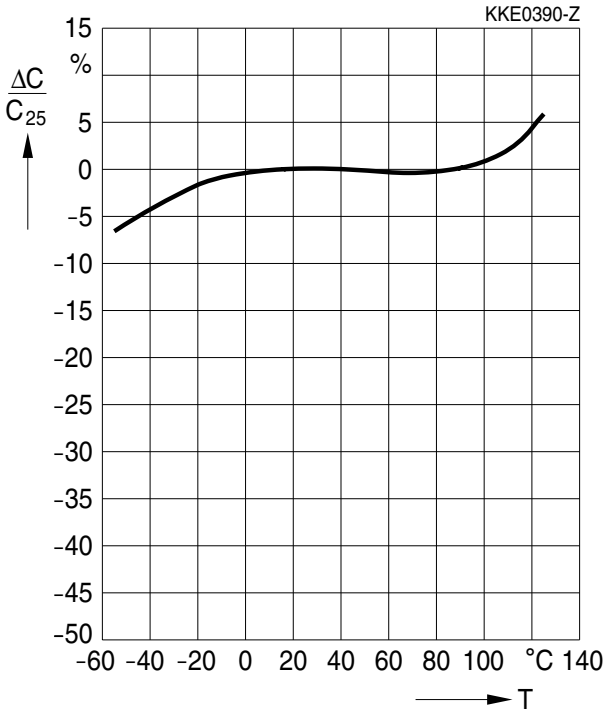
Ordering codes and packing for X7R, 50 VDC, nickel barrier terminations

C_R[1)]	Ordering code[2)]	Chip thickness mm	Blister tape, ∅ 180-mm reel ** ≙ 62 pcs/reel	Blister tape, ∅ 330-mm reel ** ≙ 72 pcs/reel
Case size 1812, 50 VDC				
100 nF	B37953K5104K0**	1.2 ±0.1	1500	5000
220 nF	B37953K5224K0**	1.2 ±0.1	1500	5000
330 nF	B37953K5334K0**	1.2 ±0.1	1500	5000
470 nF	B37953K5474K0**	1.2 ±0.1	1500	5000
Case size 2220, 50 VDC				
470 nF	B37956K5474K0**	1.2 ±0.1	1500	5000
1.0 µF	B37956K5105K0**	1.2 ±0.1	1500	5000

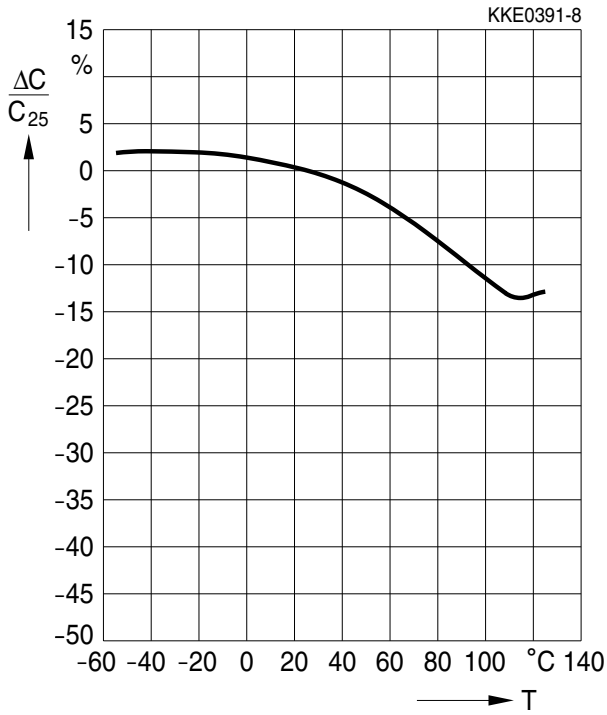
1) Other capacitance values on request.
2) The table contains the ordering codes for the standard capacitance tolerance. For other available capacitance tolerances see page 4.

Typical characteristics[1)]

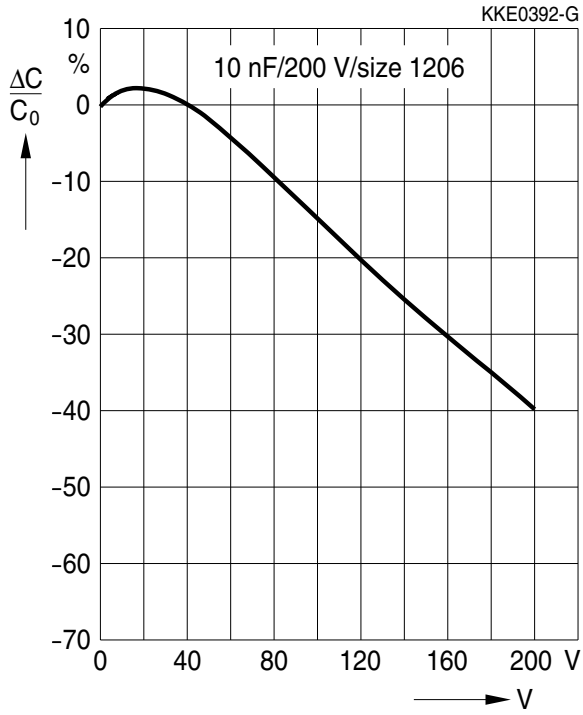
Capacitance change $\Delta C/C_{25}$ versus temperature T for NME



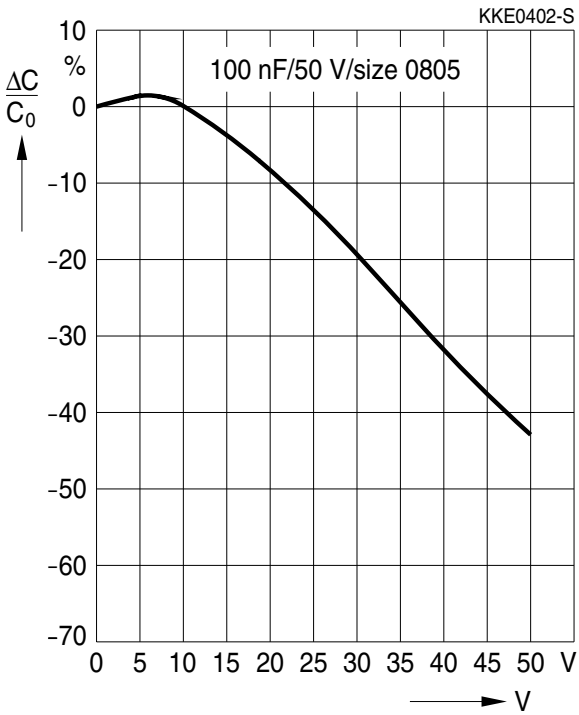
Capacitance change $\Delta C/C_{25}$ versus temperature T for BME



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



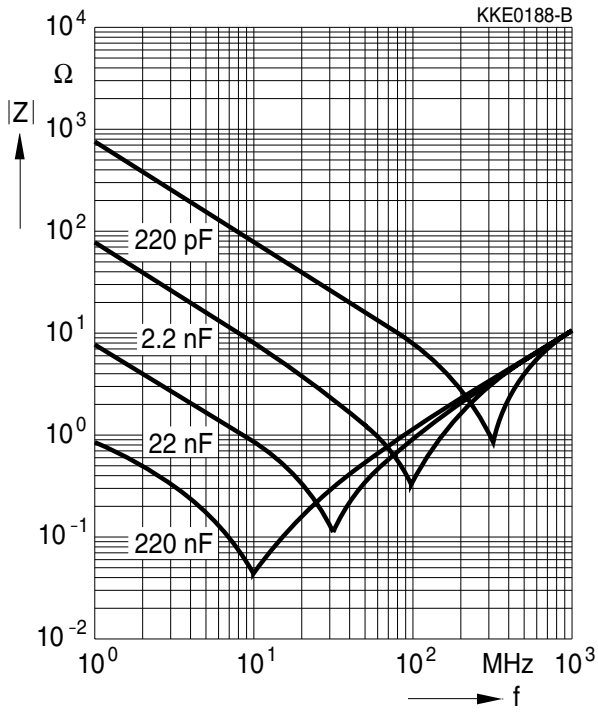
Capacitance change $\Delta C/C_0$ versus superimposed DC voltage V for BME



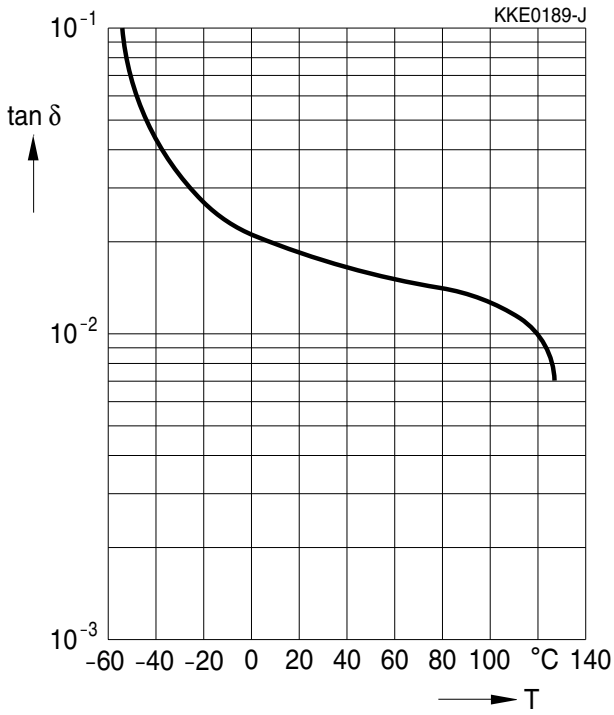
1) For more detailed information on frequency behavior and characteristics see www.epcos.com/mlcc_impedance.

Typical characteristics[1)]

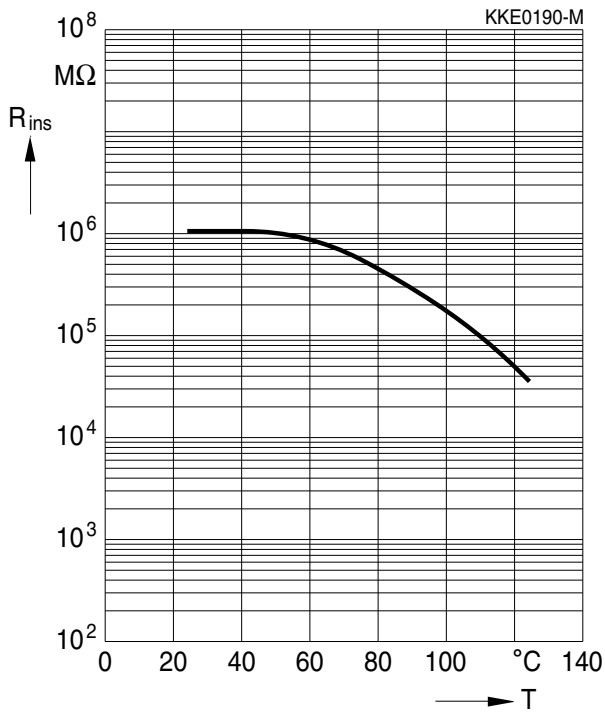
Impedance |Z| versus frequency f



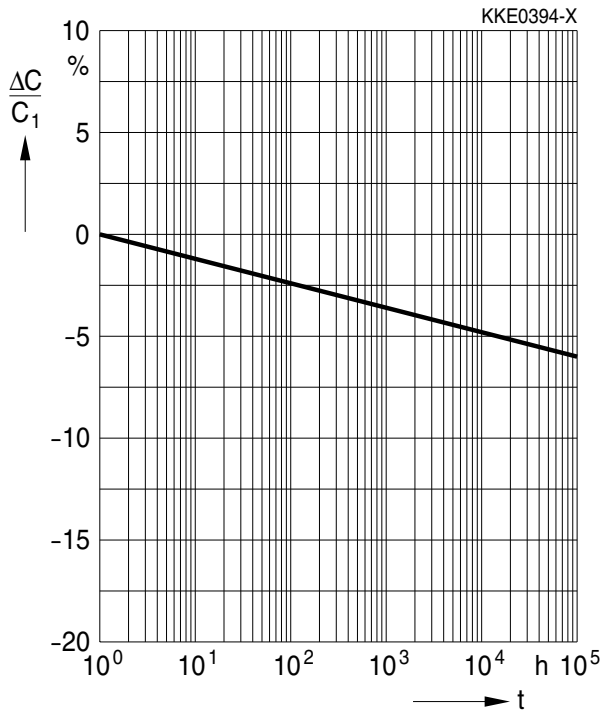
Dissipation factor tan δ versus temperature T



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.

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).

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.

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**.
4. In order to satisfy certain technical requirements, **some of the products described in this publication may contain substances subject to restrictions in certain jurisdictions (e.g. because they are classed as "hazardous")**. Useful information on this will be found in our Material Data Sheets on the Internet (www.epcos.com/material). Should you have any more detailed questions, please contact our sales offices.
5. We constantly strive to improve our products. Consequently, **the products described in this publication may change from time to time**. The same is true of the corresponding product specifications. Please check therefore to what extent product descriptions and specifications contained in this publication are still applicable before or when you place an order.

   We also **reserve the right to discontinue production and delivery of products**. Consequently, we cannot guarantee that all products named in this publication will always be available.
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