

## Multilayer Chip Capacitors

### C0G/NP0

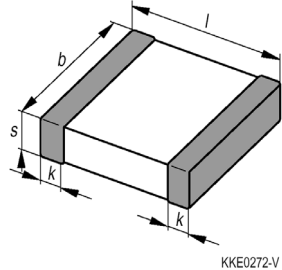
**SMD**

#### Features

- Good thermal stability
- High insulation resistance
- Low dissipation factor
- Low inductance

#### Applications

- Resonant circuits
- Filter circuits
- Timing elements
- Coupling and filtering, particularly in RF circuits



KKE0272-V

#### Terminations

- For soldering:  
Ni barrier terminations
- For conductive adhesion:  
silver palladium

#### Packing

- Blister and cardboard tape, for details refer to chapter on "Taping and Packing", page 14.
- Bulk case for sizes 0402, 0603, for details see page 17.

#### Maximum ratings

Climatic category  
in accordance with IEC 60068-1: 55/125/56

#### Dimensions (mm)

Size inch/ mm	<i>l</i>	<i>b</i>	<i>s</i>	<i>k</i>
<b>0402/</b> 1005	1,0 ± 0,10	0,50 ± 0,05	0,5 ± 0,05	0,10 - 0,30
<b>0603/</b> 1608	1,6 ± 0,15*)	0,80 ± 0,10	0,8 ± 0,10	0,10 - 0,40
<b>0805/</b> 2012	2,0 ± 0,20	1,25 ± 0,15	1,3 max.	0,13 - 0,75
<b>1206/</b> 3216	3,2 ± 0,20	1,60 ± 0,15	1,3 max.	0,25 - 0,75
<b>1210/</b> 3225	3,2 ± 0,30	2,50 ± 0,30	1,7 max.	0,25 - 0,75

Tolerances in acc. with CECC 32101-801

\*) For bulk cases: 1,6 ± 0,1

#### Available capacitance tolerances

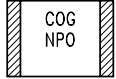
Rated capacitance $C_R$	Tolerance	Symbol
$C_R < 10 \text{ pF}$ :	$\Delta C_R = \pm 0,1 \text{ pF}$	<b>B</b>
	$\Delta C_R = \pm 0,25 \text{ pF}$	<b>C</b>
	$\Delta C_R = \pm 0,5 \text{ pF}$	<b>D</b>
$C_R \geq 10 \text{ pF}$ :	$\Delta C_R / C_R = \pm 1 \%$	<b>F</b>
	$\Delta C_R / C_R = \pm 2 \%$	<b>G</b>
	$\Delta C_R / C_R = \pm 5 \%$	<b>J</b>
	$\Delta C_R / C_R = \pm 10 \%$	<b>K</b>

Standard tolerances in bold print

F and G tolerance not available for 200 V

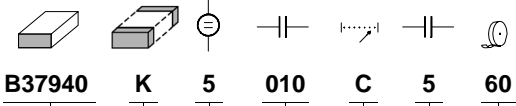
#### Rated voltage value

$V_R = 50 \text{ V}, 100 \text{ V}, 200 \text{ V}$



**Multilayer Chip Capacitors**  
**COG/NPO**

**SMD**



**Packaging**  
 62 = blister tape, reel dia. 180 mm  
 72 = blister tape, reel dia. 330 mm  
 60 = cardboard tape, reel dia. 180 mm  
 70 = cardboard tape, reel dia. 330 mm  
 01 = bulk case

**Decimal place** for cap. values < 10 pF, otherwise 0

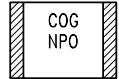
**Capacitance tolerance**  
 (tolerance code in acc. with IEC 62, standard values bold)  
 COG / NPO  
 $C_R < 10 \text{ pF}$ : B =  $\pm 0,1 \text{ pF}$   
**C =  $\pm 0,25 \text{ pF}$**   
 D =  $\pm 0,5 \text{ pF}$   
 $C_R \geq 10 \text{ pF}$ : F =  $\pm 1 \%$   
 G =  $\pm 2 \%$   
**J =  $\pm 5 \%$**   
 K =  $\pm 10 \%$

**Capacitance, coded** 010 = 1 pF 101 = 100 pF 103 = 10 nF 105 = 1  $\mu\text{F}$   
 100 = 10 pF 102 = 1 nF 104 = 100 nF 474 = 470 nF

Rated voltage	Rated voltage [Vdc]	50	100	200
	Code		5	1

**Terminations** Standard: K = silver/nickel/tin for chip sizes 0402, 0603, 0805, 1206, 1210  
 for conductive adhesion: all sizes

Type and size	
Chip size (inch / mm)	Temperature characteristics COG / NPO
<b>0402</b> / 1005	B37920
<b>0603</b> / 1608	B37930
<b>0805</b> / 2012	B37940
<b>1206</b> / 3216	B37871
<b>1210</b> / 3225	B37949



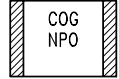
**Electrical characteristics**

Temperature characteristic Standard	COG/NPO EIA
Dielectric	Class 1
Rated voltage $V_R$ Vdc	50/100/200
Climatic category (IEC 68-1)	55/125/56
Temperature range	- 55 ... + 125 °C
Available capacitance values $C_R$ E series	1 pF ... 10 nF E12
Capacitance tolerance (standard in bold print)	$C_R < 10 \text{ pF}$ : $\pm 0,1 \text{ pF}$ $\pm \mathbf{0,25 \text{ pF}}$ $\pm 0,5 \text{ pF}$  $C_R \geq 10 \text{ pF}$ : $\pm 1 \text{ \%}^2$ $\pm 2 \text{ \%}^2$ $\pm \mathbf{5 \text{ \%}}$ $\pm 10 \text{ \%}$
Temperature coefficient (tolerance)	$0 \pm 30 \cdot 10^{-6}/\text{K}$
Voltage test	$2,5 \cdot V_R/5 \text{ s}$
Dissipation factor $\tan \delta$ (limit value)	$< 1,0 \cdot 10^{-3}$
Insulation resistance <sup>1)</sup> at 25 °C 125 °C	$> 10^5 \text{ M}\Omega$ $> 10^4 \text{ M}\Omega$

1) 1 % and 2 % tolerance not for 200 V.

# Multilayer Chip Capacitors

## COG/NPO



**SMD**

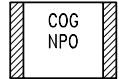
### Product range

	COG/NPO											
Size <sup>1)</sup>	0402		0603		0805			1206			1210	
inch	1005		1608		2012			3216			3225	
mm												
Type	B37920		B37930		B37940			B37871			B37949	
V <sub>R</sub> (Vdc)	50		50		50 100 200			50 100 200			50 200	
1,0 pF	1,0 pF											
1,2 pF												
1,5 pF												
1,8 pF												
2,2 pF	2,0 pF <sup>2)</sup>											
2,7 pF	3,0 pF <sup>2)</sup>											
3,3 pF	4,0 pF <sup>2)</sup>											
3,9 pF	5,0 pF <sup>2)</sup>											
4,7 pF	6,0 pF <sup>2)</sup>											
5,6 pF	7,0 pF <sup>2)</sup>											
6,8 pF	8,0 pF <sup>2)</sup>											
8,2 pF	9,0 pF <sup>2)</sup>											
10 pF												
12 pF												
15 pF												
18 pF												
22 pF												
27 pF												
33 pF												
39 pF												
47 pF												
56 pF												
68 pF												
82 pF												

Chip thickness (s): 0,5 ± 0,1 mm 0,6 ± 0,1 mm 0,8 ± 0,1 mm 1,2 ± 0,1 mm

1) l × b (inch) / l × b (mm)  
 2) Only listed capacitance values available  
 Capacitance values < 1 pF upon request

**Multilayer Chip Capacitors**  
**COG/NPO**



**Product range**

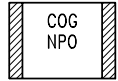
		COG/NPO												
Size <sup>1)</sup> inch mm		0402 1005		0603 1608		0805 2012			1206 3216			1210 3225		
Type		B37920		B37930		B37940			B37871			B37949		
V <sub>R</sub> (Vdc)		50		50		50	100	200	50	100	200	50	100	200
100	pF	■		■		■	■	■	■	■	■			■
120	pF	■		■										
150	pF	■		■		■	■		■	■	■			■
180	pF	■		■		■	■		■	■	■			■
220	pF	■		■		■	■		■	■	■			■
270	pF			■		■	■		■	■	■			
330	pF			■		■	■		■	■	■			■
390	pF			■		■	■		■	■	■			
470	pF			■		■	■		■	■	■			■
560	pF					■	■		■	■	■			
680	pF					■	■		■	■	■			
820	pF													■
1,0	nF					■	■			■	■			■
1,2	nF													
1,5	nF					■	■			■	■			■
1,8	nF													
2,2	nF					■	■		■	■	■			▨
2,7	nF													
3,3	nF								■	■	■			
3,9	nF													
4,7	nF								■	■	■			
5,6	nF													
6,8	nF											■	■	
8,2	nF													
10	nF											■	■	

Chip thickness (s): 0,5 ± 0,1 mm 0,6 ± 0,1 mm 0,8 ± 0,1 mm 1,2 ± 0,1 mm 1,6 ± 0,1 mm

1) l × b (inch) / l × b (mm)

# Multilayer Chip Capacitors

## COG/NPO



### Ordering codes for COG/NPO, 50 Vdc, Ni barrier terminations

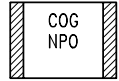
Size	0402/1005	0603/1608	0805/2012	1206/3216	B1210/3225
C <sub>R</sub> <sup>1)</sup>	Ordering code <sup>2)</sup>				
	B37920	B37930	B37940	B37871	B37949
1,0 pF	K5010C060 ▲	K5010C060 ○	K5010C060 ○	K5010C060 ○	
1,2 pF		K5010C260 ○			
1,5 pF		K5010C560 ○	K5010C560 ○	K5010C560 ○	
1,8 pF		K5010C860 ○			
2,2 (2,0) pF	<i>K5020C060</i> ▲	K5020C260 ○	K5020C260 ○	K5020C260 ○	
2,7 (3,0) pF	<i>K5030C060</i> ▲	K5020C760 ○			
3,3 (4,0) pF	<i>K5040C060</i> ▲	K5030C360 ○	K5030C360 ○	K5030C360 ○	
3,9 (5,0) pF	<i>K5050C060</i> ▲	K5030C960 ○			
4,7 (6,0) pF	<i>K5060C060</i> ▲	K5040C760 ○	K5040C760 ○	K5040C760 ○	
5,6 (7,0) pF	<i>K5070C060</i> ▲	K5050C660 ○			
6,8 (8,0) pF	<i>K5080C060</i> ▲	K5060C860 ○	K5060C860 ○	K5060C860 ○	
8,2 (9,0) pF	<i>K5090C060</i> ▲	K5080C260 ○			
10 pF	K5100J060 ▲	K5100J060 ○	K5100J060 ○	K5100J060 ○	
12 pF	K5120J060 ▲	K5120J060 ○			
15 pF	K5150J060 ▲	K5150J060 ○	K5150J060 ○	K5150J060 ○	
18 pF	K5180J060 ▲	K5180J060 ○			
22 pF	K5220J060 ▲	K5220J060 ○	K5220J060 ○	K5220J060 ○	
27 pF	K5270J060 ▲	K5270J060 ○			
33 pF	K5330J060 ▲	K5330J060 ○	K5330J060 ○	K5330J060 ○	
39 pF	K5390J060 ▲	K5390J060 ○			
47 pF	K5470J060 ▲	K5470J060 ○	K5470J060 ○	K5470J060 ○	
56 pF	K5560J060 ▲	K5560J060 ○			
68 pF	K5680J060 ▲	K5680J060 ○	K5680J060 ○	K5680J060 ○	
82 pF	K5820J060 ▲	K5820J060 ○			
100 pF	K5101J060 ▲	K5101J060 ○	K5101J060 ○	K5101J060 ○	
120 pF	K5121J060 ▲	K5121J060 ○			
150 pF	K5151J060 ▲	K5151J060 ○	K5151J060 ○	K5151J060 ○	
180 pF	K5181J060 ▲	K5181J060 ○			
220 pF	K5221J060 ▲	K5221J060 ○	K5221J060 ○	K5221J060 ○	
270 pF		K5271J060 ○			
330 pF		K5331J060 ○	K5331J060 ○	K5331J060 ○	
390 pF		K5391J060 ○			
470 pF		K5471J060 ○	K5471J060 ○	K5471J060 ○	
560 pF					
680 pF			K5681J060 ○	K5681J060 ○	
820 pF					

Chip thickness: ▲: 0,5 ± 0,1 mm    □: 0,6 ± 0,1 mm    ○: 0,8 ± 0,1 mm

1) E12/E24 series available on request. For size 0402 only capacitance values in ( ) available; capacitance values < 1 pF on request.

2) The tables contain the ordering codes for the standard capacitance tolerance:  
 C = ± 0,25 pF for < 10 pF; J = ± 5 % for ≥ 10 pF. Example: B37920K5010C060. For other available capacitance tolerances see page 1

**Multilayer Chip Capacitors**  
**C0G/NP0**



**Ordering codes for C0G/NP0, 50 Vdc, Ni barrier terminations (cont'd)**

Size	0402/1005	0603/1608	0805/2012	1206/3216	1210/3225
C <sub>R</sub> <sup>1)</sup>	Ordering code <sup>2)</sup>				
	B37920	B37930	B37940	B37871	B37949
1,0 nF			K5102J060 □	K5102J060 ○	K5102J062 ○
1,2 nF					
1,5 nF			K5152J060 ○	K5152J060 ○	K5152J062 ○
1,8 nF					
2,2 nF			K5222J062 ◆	K5222J060 ○	K5222J062 ○
2,7 nF					
3,3 nF				K5332J060 ○	K5332J062 ○
3,9 nF					
4,7 nF				K5472J062 ◆	K5472J062 ○
5,6 nF					
6,8 nF					K5682J062 ○
8,2 nF					
10 nF					K5103J062 ◆

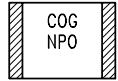
Chip thickness: □: 0,6 ± 0,1 mm    ○: 0,8 ± 0,1 mm    ◆: 1,2 ± 0,1 mm

1) E12/E24 series available on request

2) The tables contain the ordering codes for the standard capacitance tolerance:  
C = ± 0,25 pF for < 10 pF; J = ± 5 % for ≥ 10 pF. Example: B37940K5102J060  
For other available capacitance tolerances see page 1

# Multilayer Chip Capacitors

## COG/NPO



### Ordering codes for COG/NPO, 100 Vdc, Ni barrier terminations

Size	0805/2012	1206/3216	Size	1206/3216	1210/3225
C <sub>R</sub>	Ordering code <sup>1)</sup> B37940      B37871		C <sub>R</sub>	Ordering code <sup>1)</sup> B37871      B37949	
1,0 pF	K1010C060	□ K1010C060	1,2 nF		
1,2 pF			1,5 nF	K1152J060	○ K1152J060
1,5 pF	K1010C560	□ K1010C560	1,8 nF		
1,8 pF			2,2 nF	K1222J062	◆ K1222J060
2,2 pF	K1020C260	□ K1020C260	2,7 nF		
2,7 pF			3,3 nF		○ K1332J060
3,3 pF	K1030C360	□ K1030C360	3,9 nF		
3,9 pF			4,7 nF		◆ K1472J062
4,7 pF	K1040C760	□ K1040C760	5,6 nF		
5,6 pF			6,8 nF		◆ K1682J062
6,8 pF	K1060C860	□ K1060C860			
8,2 pF					
10 pF	K1100J060	□ K1100J060			
12 pF					
15 pF	K1150J060	□ K1150J060			
18 pF					
22 pF	K1220J060	□ K1220J060			
27 pF					
33 pF	K1330J060	□ K1330J060			
39 pF					
47 pF	K1470J060	□ K1470J060			
56 pF					
68 pF	K1680J060	□ K1680J060			
82 pF					
100 pF	K1101J060	□ K1101J060			
120 pF					
150 pF	K1151J060	□ K1151J060			
180 pF					
220 pF	K1221J060	□ K1221J060			
270 pF					
330 pF	K1331J060	□ K1331J060			
390 pF					
470 pF	K1471J060	□ K1471J060			
560 pF					
680 pF	K1681J060	○ K1681J060			
820 pF					
1,0 nF	K1102J062	◆ K1102J060			

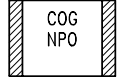
Chip thickness: □: 0,6 ± 0,1 mm    ○: 0,8 ± 0,1 mm    ◆: 1,2 ± 0,1 mm

1) The tables contain the ordering codes for the standard capacitance tolerance:  
 C = ± 0,25 pF for < 10 pF; J = ± 5% for ≥ 10 pF. Example: B37940K1010C060  
 For other available capacitance tolerances see page 1



## Multilayer Chip Capacitors

### C0G/NP0

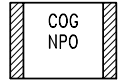


#### Ordering codes for C0G/NP0, 200 Vdc, Ni barrier terminations

Size	0805/2012	1206/3216	1210/3225		
C <sub>R</sub>	Ordering code <sup>1)</sup>				
	B37940	B37871	B37949		
1,0 pF		K2010C060 ○			
1,2 pF					
1,5 pF		K2010C560 ○			
1,8 pF					
2,2 pF	K2020C260 □	K2020C260 ○			
2,7 pF					
3,3 pF	K2030C360 □	K2030C360 ○			
3,9 pF					
4,7 pF	K2040C760 □	K2040C760 ○			
5,6 pF					
6,8 pF	K2060C860 □	K2060C860 ○			
8,2 pF					
10 pF	K2100J060 □	K2100J060 ○			
12 pF					
15 pF	K2150J060 □	K2150J060 ○			
18 pF					
22 pF	K2220J060 □	K2220J060 ○			
27 pF					
33 pF	K2330J060 □	K2330J060 ○			
39 pF					
47 pF	K2470J060 □	K2470J060 ○			
56 pF					
68 pF	K2680J060 □	K2680J060 ○			
82 pF					
100 pF	K2101J060 □	K2101J060 ○	K2101J062 ○		
120 pF					
150 pF		K2151J060 ○	K2151J062 ○		
180 pF					
220 pF		K2221J060 ○	K2221J062 ○		
270 pF					
330 pF		K2331J060 ○	K2331J062 ○		
390 pF					
470 pF		K2471J060 ○	K2471J062 ○		
560 pF					
680 pF		K2681J062 ◆	K2681J062 ○		
820 pF					

Chip thickness: □: 0,6 ± 0,1 mm ○: 0,8 ± 0,1 mm ◆: 1,2 ± 0,1 mm

1) The tables contain the ordering codes for the standard capacitance tolerance:  
 C = ± 0,25 pF for < 10 pF; J = ± 5 % for ≥ 10 pF. Example: B37940K2010C060  
 For other available capacitance tolerances see page 1



**Multilayer Chip Capacitors**  
**COG/NPO**



**Ordering codes for COG/NPO, 200 Vdc, Ni barrier terminations (cont'd)**

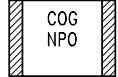
Size	0805/2012	1206/3216	1210/3225		
C <sub>R</sub>	Ordering code <sup>1)</sup>				
	B37940	B37871	B37949		
1,0 nF		K2102J062 ◆	K2102J062 ○		
1,2 nF					
1,5 nF			K2152J062 ◆		
1,8 nF					
2,2 nF			K2222J062 ●		

Chip thickness: ○: 0,8 ± 0,1 mm ◆: 1,2 ± 0,1 mm ●: 1,6 ± 0,1 mm

1) The tables contain the ordering codes for the standard capacitance tolerance:  
C = ± 0,25 pF for < 10 pF; J = ± 5% for ≥ 10 pF. Example: B37871K2102J062  
For other available capacitance tolerances see page 1

# Multilayer Chip Capacitors

## COG/NP0



### Ordering codes for COG/NP0, 50 Vdc, Ni barrier terminations, bulk case packing

Size	0402/1005	0603/1608		
C <sub>R</sub> <sup>1)</sup>	Ordering code <sup>2)</sup>			
	B37930	B37920		
1,0 pF	K5010C001 ▲	K5010C001 ○		
1,2 pF		K5010C201 ○		
1,5 pF		K5010C501 ○		
1,8 pF		K5010C801 ○		
2,2 (2,0) pF	K5020C001 ▲	K5020C201 ○		
2,7 (3,0) pF	K5030C001 ▲	K5020C701 ○		
3,3 (4,0) pF	K5040C001 ▲	K5030C301 ○		
3,9 (5,0) pF	K5050C001 ▲	K5030C901 ○		
4,7 (6,0) pF	K5060C001 ▲	K5040C701 ○		
5,6 (7,0) pF	K5070C001 ▲	K5050C601 ○		
6,8 (8,0) pF	K5080C001 ▲	K5060C801 ○		
8,2 (9,0) pF	K5090C001 ▲	K5080C201 ○		
10 pF	K5100J001 ▲	K5100J001 ○		
12 pF	K5120J001 ▲	K5120J001 ○		
15 pF	K5150J001 ▲	K5150J001 ○		
18 pF	K5180J001 ▲	K5180J001 ○		
22 pF	K5220J001 ▲	K5220J001 ○		
27 pF	K5270J001 ▲	K5270J001 ○		
33 pF	K5330J001 ▲	K5330J001 ○		
39 pF	K5390J001 ▲	K5390J001 ○		
47 pF	K5470J001 ▲	K5470J001 ○		
56 pF	K5560J001 ▲	K5560J001 ○		
68 pF	K5680J001 ▲	K5680J001 ○		
82 pF	K5820J001 ▲	K5820J001 ○		
100 pF	K5101J001 ▲	K5101J001 ○		
120 pF	K5121J001 ▲	K5121J001 ○		
150 pF	K5151J001 ▲	K5151J001 ○		
180 pF	K5181J001 ▲	K5181J001 ○		
220 pF	K5221J001 ▲	K5221J001 ○		
270 pF		K5271J001 ○		
330 pF		K5331J001 ○		
390 pF		K5391J001 ○		
470 pF		K5471J001 ○		

Chip thickness: ○: 0,8 ± 0,1 mm ▲: 10,5 ± 0,1 mm

1) E12/E24 series available on request


2) The tables contain the ordering codes for the standard capacitance tolerance:  
C = ± 0,25 pF for < 10 pF; J = ± 5% for ≥ 10 pF. Example: B37930K5010C001

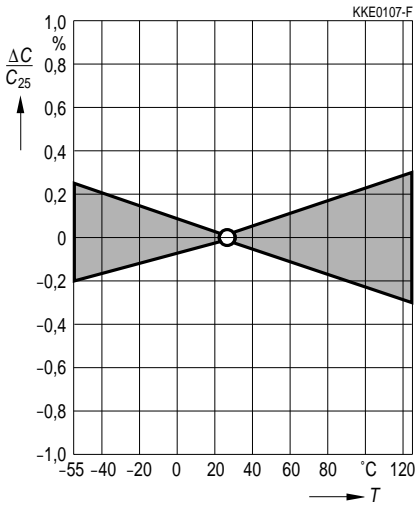
For other available capacitance tolerances see page 1

**Multilayer Chip Capacitors**  
**COG/NPO**

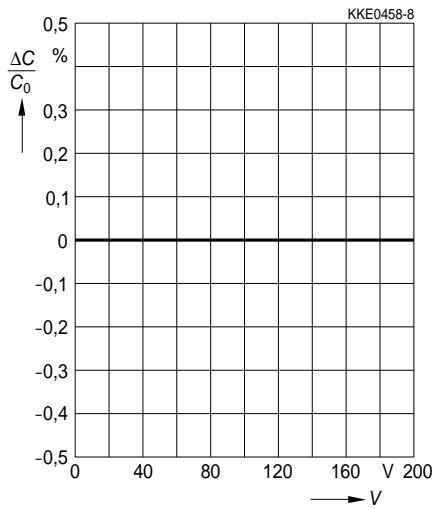


**Characteristics (typical)**

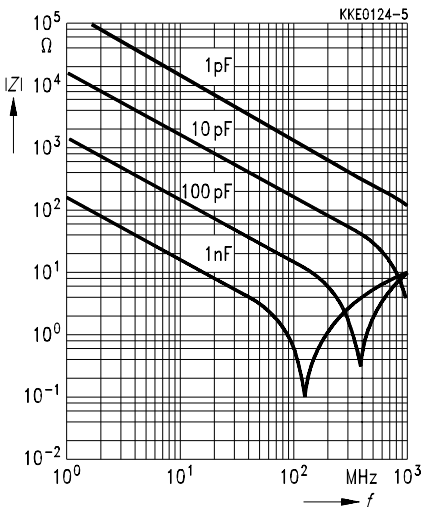
Capacitance change  $\Delta C/C_{25}$  versus temperature  $T$  (tolerance range )



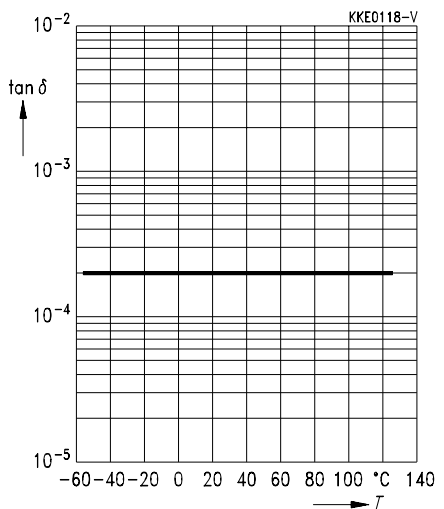
Capacitance change  $\Delta C/C_0$  versus superimposed dc voltage  $V$



Impedance  $|Z|$  versus frequency  $f$



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

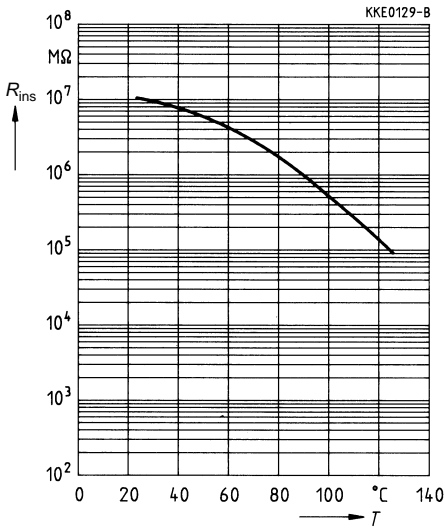


**Multilayer Chip Capacitors**  
**COG/NP0**

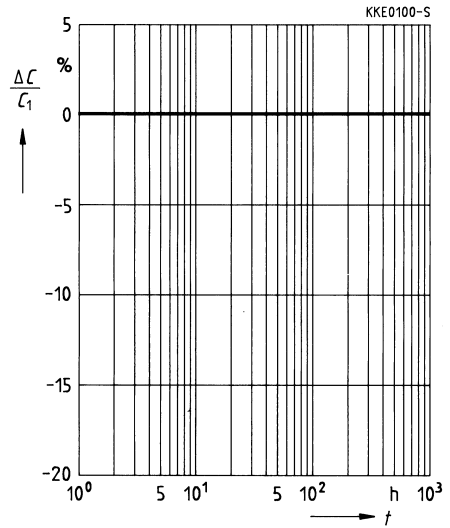


**SMD**

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



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



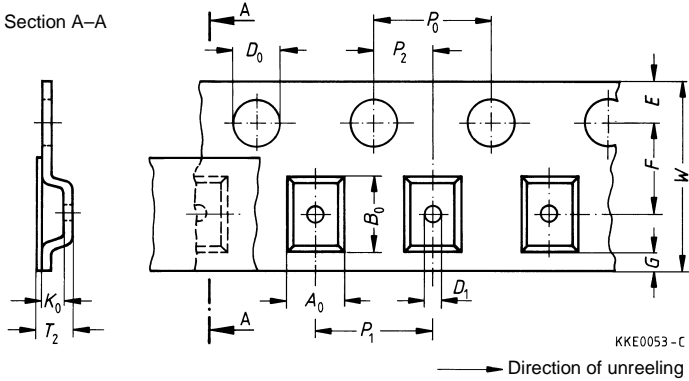
## Multilayer Chip Capacitors

### Taping and Packing C0G/NP0

#### 1 Taping of chip capacitors

##### 1.1 Blister tape (taping in accordance with IEC 60286-3)

Section A-A



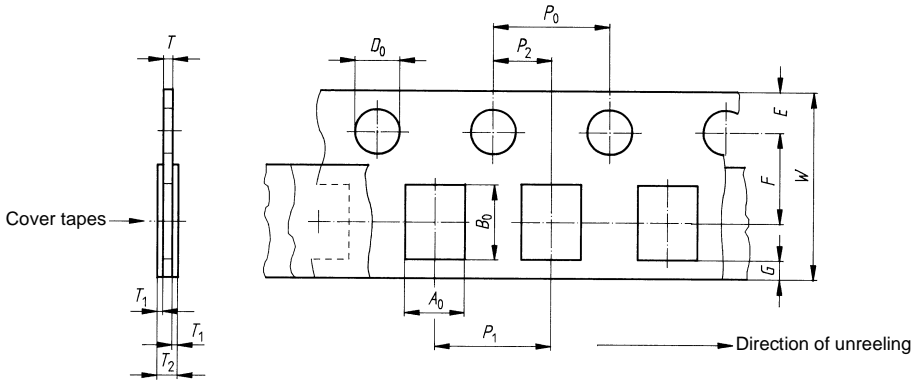
Dimensions (mm)	Size (8-mm tape)			Tolerance
	0805/2012	1206/3216	1210/3225	
$A_0 \times B_0$	1,6 × 2,4	1,9 × 3,5	2,8 × 3,5	± 0,2
$K_0$	0,7 ; 0,9; 1,3 (standard)			max.
$T_2$	2,5			max.
$D_0$	1,5			+ 0,1/ - 0
$D_1$	1,0			min.
$P_0$	4,0			± 0,1 <sup>1)</sup>
$P_2$	2,0			± 0,05
$P_1$	4,0			± 0,1
$W$	8,0			± 0,3
$E$	1,75			± 0,1
$F$	3,5			± 0,05
$G$	0,75			min.

1) ≤ 0,2 mm over 10 hole spaces

## Multilayer Chip Capacitors

### Taping and Packing C0G/NP0

#### 1.2 Cardboard tape (taping in accordance with IEC 60286-3)



KKE0063-J

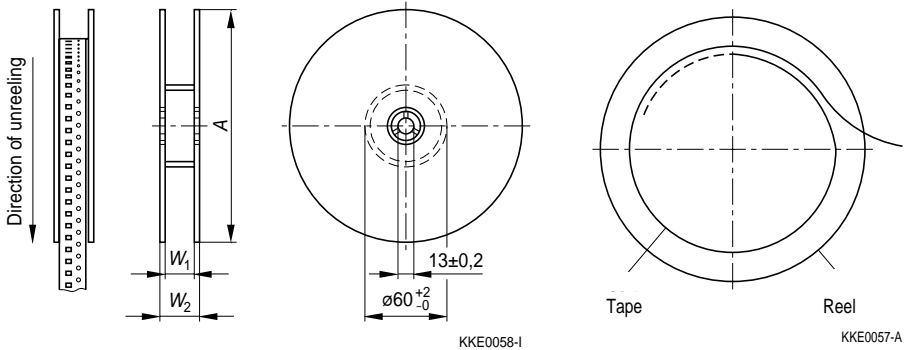
Dimensions (mm)	Size (8-mm tape)				Tolerance
	0402/1005	0603/1608	0805/2012	1206/3216	
$A_0 \times B_0$	0,6 × 1,15	0,95 × 1,8	1,50 × 2,30	2,0 × 3,6	± 0,2
$T$	0,6	0,7; 0,9 (standard)			max.
$T_2$	0,7	0,9	1,1		max.
$D_0$	1,5	1,5			± 0,1
$P_0$	4,0	4,0			± 0,1 <sup>1)</sup>
$P_2$	2,0	2,0			± 0,05
$P_1$	2,0	4,0			± 0,1
$W$	8,0	8,0			± 0,3
$E$	1,75	1,75			± 0,1
$F$	3,5	3,5			± 0,05
$G$	0,75	0,75			min.

1) ≤ 0,2 mm over 10 hole spaces

## Multilayer Chip Capacitors

### Taping and Packing C0G/NP0

#### 1.3 Reel packaging



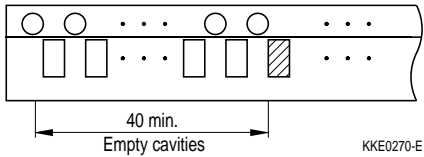
#### 8-mm tape

Dimensions	180-mm tape reel	330-mm tape reel
A	180 - 3/+ 0	330 ± 2,0
W <sub>1</sub>	8,4 + 1,5/- 0	8,4 + 1,5/- 0
W <sub>2</sub>	14,4 max.	14,4 max.

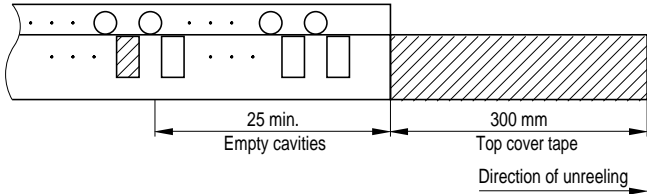
#### 12-mm tape

Dimensions	180-mm tape reel	330-mm tape reel
A	180 - 3/+ 0	330 ± 2,0
W <sub>1</sub>	12,4 + 1,5/- 0	12,4 + 1,5/- 0
W <sub>2</sub>	18,4 max.	18,4 max.

#### Tape end (Trailer)



#### Leader part

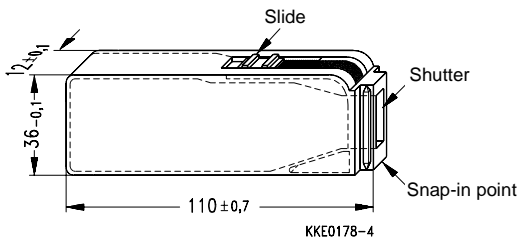


KKE0289-Q



### 1.4 Bulk case packing

Part of our standard chip range is also available in bulk cases.



Packing units:

Chip size	pcs
0402	70000
0603	15000

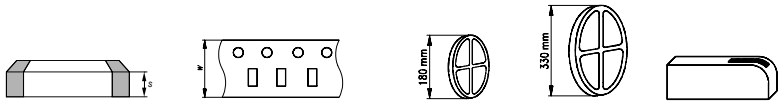
Advantages of bulk case packaging:

- Environmentally compatible material; considerably less packaging material (1/30 of blister packing)
- Small package sizes (110 × 36 × 12) mm with appropriately low storage requirements
- Can be used several times (less waste)
- No standstill-times during production, since packages can be refilled or replaced while component mounting is in progress
- High component placement reliability if the bulk feeder is used

## Multilayer Chip Capacitors

### Taping and Packing C0G/NP0

#### 1.5 Packing units for chip capacitors



Size inch/mm	Thickness s	Tape		Packing units (in 1000 pcs)		
		Cardboard Width <i>W</i>	Blister Width <i>W</i>	Reel 180 mm dia.	330 mm dia.	Bulk case
0402/1005	0,5	8 mm	–	10,0	–	70,0
0603/1608	0,8	8 mm	–	4,0	16,0	15,0
0805/2012	0,6	8 mm	–	5,0	20,0	–
	0,8	8 mm	–	4,0	16,0	–
	1,2	–	8 mm	3,0	12,0	–
1206/3216	0,6	8 mm	–	4,0	16,0	–
	0,8	8 mm	–	4,0	16,0	–
	1,2	–	8 mm	3,0	12,0	–
1210/3225	0,6	–	8 mm	4,0	16,0	–
	0,8	–	8 mm	4,0	16,0	–
	1,2	–	8 mm	3,0	12,0	–
	1,6	–	8 mm	2,0	8,0	–

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