

DATA SHEET

Class 1, NPO low voltage
10, 16, 25 and 50 V
**Surface mount multilayer
chip capacitors**

Product specification
Supersedes data of 3rd May 2001
File under BCcomponents, BC06

2001 Jun 13

Surface mount multilayer chip capacitors

Class 1, NPO low voltage 10, 16, 25 and 50 V

FEATURES

- Ultra stable class 1 dielectric
- Six standard sizes
- High capacitance per unit volume
- Supplied in tape on reel or bulk in a polythene bag
- For high frequency applications
- Ni-barrier terminations.

APPLICATIONS

- Consumer electronics
- Telecommunications
- Automotive
- Data processing.

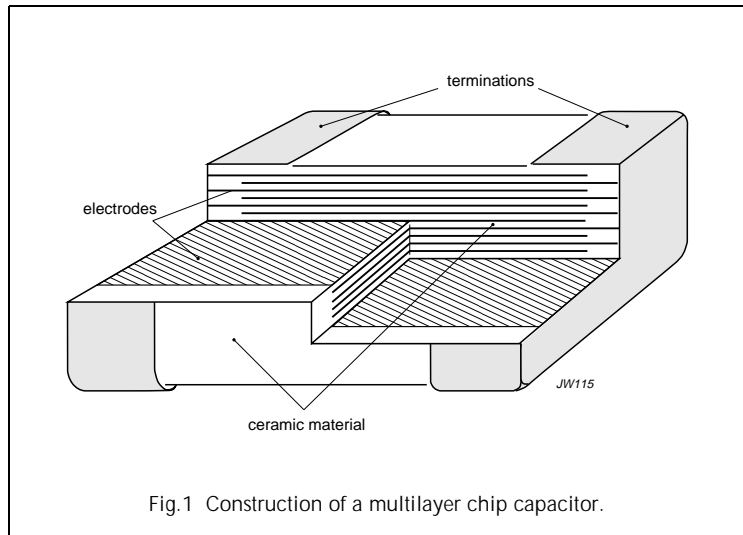
DESCRIPTION

The capacitor consists of a rectangular block of ceramic dielectric in which a number of interleaved precious metal electrodes are contained. This structure gives rise to a high capacitance per unit volume.

The inner electrodes are connected to the two terminations by silver dipping with a barrier layer of plated nickel and finally covered with a layer of plated tin (NiSn). A cross section of the structure is shown in Fig.1.

QUICK REFERENCE DATA

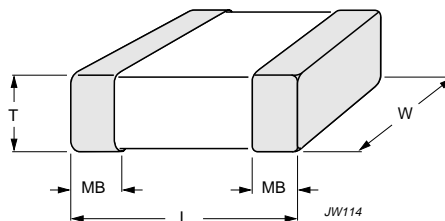
DESCRIPTION	VALUE
Rated voltage U_R (DC)	10 V; 16 V; 25 V; 50 V
Capacitance range, for size code:	
0402	0.5 to 150 pF
0603	0.5 pF to 1 nF
0805	0.5 pF to 1.5 nF
1206	1.5 pF to 3.3 nF
1210	22 pF to 5.6 nF
1812	1 nF to .010 μ F
Tolerance on capacitance:	
$C \geq 10$ pF	$\pm 2\%$; $\pm 5\%$; $\pm 10\%$
$C < 10$ pF	± 0.5 pF; ± 0.25 pF; ± 0.1 pF
Test voltage (DC) for 1 minute	$2.5 \times U_R$
Climatic category (IEC 68)	55/125/56



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MECHANICAL DATA



For dimensions see Table 1.

Fig.2 Component outline.

Physical dimensions

Table 1 Capacitor dimensions; see Fig.2

SIZE CODE	L	W	T		MB
			MIN.	MAX.	
Dimensions in millimetres					
0402	1.0 ±0.05	0.5 ±0.05	0.45	0.55	0.25 +0.05/-0.10
0603	1.6 ±0.10	0.8 ±0.07	0.73	0.87	0.40 ±0.15
0805	2.0 ±0.15	1.25 ±0.15	0.50	1.35	0.50 ±0.20
1206	3.2 ±0.15	1.6 ±0.15	0.50	1.75	0.60 ±0.20
1210	3.2 ±0.30	2.5 ±0.20	0.50	1.80	0.75 ±0.25
1812	4.5 ±0.40	3.2 ±0.30	0.50	1.80	0.75 ±0.25
Dimensions in inches					
0402	0.040 ±0.002	0.020 ±0.002	0.018	0.022	0.010 ±0.006
0603	0.063 ±0.004	0.030 ±0.004	0.029	0.035	0.015 ±0.006
0805	0.080 ±0.006	0.050 ±0.006	0.020	0.053	0.020 ±0.008
1206	0.125 ±0.006	0.063 ±0.006	0.020	0.069	0.025 ±0.008
1210	0.125 ±0.012	0.100 ±0.008	0.020	0.072	0.030 ±0.010
1812	0.180 ±0.015	0.125 ±0.012	0.020	0.072	0.030 ±0.010

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SELECTION CHART FOR 10 AND 16 V

C (pF)	10 V						16 V					
	0402	0603	0805	1206	1210	1812	0402	0603	0805	1206	1210	1812
0.5												
1.0												
1.2												
1.5												
1.8												
2.2												
2.7												
3.3												
3.9												
4.7												
5.6												
6.8												
8.2												
10	N ⁽¹⁾						N ⁽¹⁾					
12												
15			A ⁽¹⁾						A ⁽¹⁾			
18												
22												
27												
33		S ⁽¹⁾							S ⁽¹⁾			
39												
47												
56				B ⁽¹⁾						B ⁽¹⁾		
68												
82												
100												
120												
150												
180												
220												
270					C ⁽¹⁾						C ⁽¹⁾	
330												
390												
470												
560												
680			B ⁽¹⁾						B ⁽¹⁾			
820												
1000												
1200												
1500												
1800												
2200												
2700												
3300				C ⁽¹⁾		D ⁽¹⁾			C ⁽¹⁾			D ⁽¹⁾
3900												
4700												
5600												
6800												
8200												
10000												

Note

1. For thickness classification, see "Thickness classification and packaging quantities".

Surface mount multilayer chip capacitors

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Thickness classification and packaging quantities

THICKNESS CLASSIFICATION (mm)	8 mm TAPE WIDTH AMOUNT PER REEL					12 mm TAPE WIDTH AMOUNT PER REEL	
	Ø180 mm; 7"; note 1						
	0402	0603	0805	1206		1210	1812
	PAPER	PAPER	PAPER	PAPER	BLISTER	BLISTER	BLISTER
A = 0.65 +0.05/-0.15	-	-	4000	-	-	-	-
B = 0.85 +0.05/-0.15	-	-	4000	4000	-	-	-
C = 1.00 +0.05/-0.15	-	-	-	-	3000	3000	-
D = 1.20 +0.15/-0.15	-	-	-	-	-	-	1000
S = 0.80 ±0.07	-	4000	-	-	-	-	-
N = 0.50 ±0.05	10000	-	-	-	-	-	-

Note

1. A 13" reel is available on request.

ORDERING INFORMATION FOR 10 AND 16 V

Components may be ordered by using either a simple 14-digit clear text code, or BCcomponents 12NC.

Clear text code

EXAMPLE: 0402N101J100NT

SIZE CODE		DIELECTRIC	CAPACITANCE (pF)	TOLERANCE		VOLTAGE	TECHNOLOGY	PACKAGING
0402	1206	N = COG (NPO)	two significant digits followed by the number of zeros:	B = ±0.1 pF	G = ±2%	100 = 10 V	N = noble metal	T = 7" reel/paper
0603	1210		101 = 100	C = ±0.25 pF	J = ±5%	160 = 16 V		G = 13" reel/paper
0805	1812		102 = 1000 152 = 1500 103 = 10000	D = ±0.50 pF	K = ±10%			P = 7" reel/blister L = 13" reel/blister B = bulk/ polythene bag

Ordering code 12NC

2 2 5 2 X X X X X X

Dielectric and Tolerance

- 00 NPO Ni ±0.1 pF
- 01 NPO Ni ±0.25 pF
- 02 NPO Ni ±0.5 pF
- 03 NPO Ni ±2%
- 04 NPO Ni ±5%
- 05 NPO Ni ±10%
- 07 Y5V Ni ±20%
- 08 Y5V Ni -20/+80%
- 10 X7R Ni ±5%
- 11 X7R Ni ±10%
- 12 X7R Ni ±20%

Size

- 1 0402
- 2 0603
- 3 0805
- 4 1206
- 5 1210
- 6 1808
- 7 1812

Rated voltage

1 10 V	5 100 V
2 16 V	6 200 V
3 25 V	7 500 V
4 50 V	8 1000 V
	9 others

Multiplier

- 1 10
- 2 100
- 3 1 000
- 4 10 000
- 5 100 000
- 6 1 000 000
- 7 others: 10 000 000
NPO: 0.01
- 8 0.10
- 9 1.00

Capacitance (pF)

two significant digits of capacitance value

Packaging

- 0 bulk
- 1 paper: Ø180 mm; 7"
- 2 paper: Ø330 mm; 13"
- 3 blister: Ø180 mm; 7"
- 4 blister: Ø330 mm; 13"

JW129

(1) Refer to chapter "Selection chart for 10 and 16 V".

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SELECTION CHART FOR 25 AND 50 V

C (pF)	25 V						50 V					
	0402	0603	0805	1206	1210	1812	0402	0603	0805	1206	1210	1812
0.5												
1.0												
1.2												
1.5												
1.8												
2.2												
2.7												
3.3												
3.9												
4.7												
5.6												
6.8												
8.2							N ⁽¹⁾					
10												
12	N ⁽¹⁾											
15									A ⁽¹⁾			
18			A ⁽¹⁾									
22												
27												
33								S ⁽¹⁾				
39		S ⁽¹⁾										
47												
56										B ⁽¹⁾		
68				B ⁽¹⁾								
82												
100												
120												
150												
180												
220												
270												
330					C ⁽¹⁾						B ⁽¹⁾	
390												
470												
560												
680										B ⁽¹⁾		
820			B ⁽¹⁾									
1000												
1200												
1500												
1800												
2200												
2700												D ⁽¹⁾
3300				C ⁽¹⁾		D ⁽¹⁾			C ⁽¹⁾			
3900												
4700												
5600												
6800												
8200												
10000												

Note

1. For thickness classification, see "Thickness classification and packaging quantities".

Surface mount multilayer chip capacitors

Class 1, NPO low voltage 10, 16, 25 and 50 V

Thickness classification and packaging quantities

THICKNESS CLASSIFICATION (mm)	8 mm TAPE WIDTH AMOUNT PER REEL					12 mm TAPE WIDTH AMOUNT PER REEL	
	Ø180 mm; 7"; note 1						
	0402	0603	0805	1206		1210	1812
	PAPER	PAPER	PAPER	PAPER	BLISTER	BLISTER	BLISTER
A = 0.65 +0.05/-0.15	-	-	4000	-	-	-	-
B = 0.85 +0.05/-0.15	-	-	4000	4000	-	-	-
C = 1.00 +0.05/-0.15	-	-	-	-	3000	3000	1000
D = 1.20 +0.15/-0.15	-	-	-	-	-	-	1000
S = 0.80 ±0.07	-	4000	-	-	-	-	-
N = 0.50 ±0.05	10000	-	-	-	-	-	-

Note

1. A 13" reel is available on request.

ORDERING INFORMATION FOR 25 AND 50 V

Components may be ordered by using either a simple 14-digit clear text code, or BCcomponents 12NC.

Clear text code

EXAMPLE: 0402N100J250NT

SIZE CODE		DIELECTRIC	CAPACITANCE	TOLERANCE		VOLTAGE	TECHNOLOGY	PACKAGING
0402	1206	N = COG (NPO)	two significant digits followed by the number of zeros:	B = ±0.1 pF	G = ±2%	250 = 25 V	N = noble metal	T = 7" reel/paper
0603	1210		101 = 100	C = ±0.25 pF	J = ±5%	500 = 50 V		G = 13" reel/paper
0805	1812		102 = 1000 152 = 1500 103 = 10000	D = ±0.50 pF	K = ±10%			P = 7" reel/blister L = 13" reel/blister B = bulk/ polythene bag

Ordering code 12NC

2 2 5 2 X X X X X

Dielectric and Tolerance

- 00 NPO Ni ±0.1 pF
- 01 NPO Ni ±0.25 pF
- 02 NPO Ni ±0.5 pF
- 03 NPO Ni ±2%
- 04 NPO Ni ±5%
- 05 NPO Ni ±10%
- 07 Y5V Ni ±20%
- 08 Y5V Ni -20/+80%
- 10 X7R Ni ±5%
- 11 X7R Ni ±10%
- 12 X7R Ni ±20%

Size

- 1 0402
- 2 0603
- 3 0805
- 4 1206
- 5 1210
- 6 1808
- 7 1812

Rated voltage

1 10 V	5 100 V
2 16 V	6 200 V
3 25 V	7 500 V
4 50 V	8 1000 V
	9 others

Multiplier

- 1 10
- 2 100
- 3 1 000
- 4 10 000
- 5 100 000
- 6 1 000 000
- 7 others: 10 000 000
NPO: 0.01
- 8 0.10
- 9 1.00

Capacitance (pF)

two significant digits of capacitance value

Packaging

- 0 bulk
- 1 paper: Ø180 mm; 7"
- 2 paper: Ø330 mm; 13"
- 3 blister: Ø180 mm; 7"
- 4 blister: Ø330 mm; 13"

JW129

(1) Refer to chapter "Selection chart for 25 and 50 V".

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ELECTRICAL CHARACTERISTICS

Class 1 capacitors; NPO dielectric; NiSn terminations

Unless otherwise stated all electrical values apply at an ambient temperature of 20 ± 1 °C, an atmospheric pressure of 86 to 106 kPa, and a relative humidity of 63 to 67%.

DESCRIPTION	VALUE
Capacitance range, for size code:	
0402	0.5 to 150 pF
0603	0.5 pF to 1 nF
0805	0.5 pF to 1.5 nF
1206	1.5 pF to 3.3 nF
1210	22 pF to 5.6 nF
1812	1 nF to .010 μ F
Tolerance on capacitance:	
C \geq 10 pF	$\pm 2\%$; $\pm 5\%$; $\pm 10\%$
C < 10 pF	± 0.1 pF; ± 0.5 pF; ± 0.25 pF
Q:	
C \geq 30 pF	Q \geq 1000
C < 30 pF	Q \geq 400 + 20C
Insulation resistance after 1 minute at U_R (DC)	100 G Ω min. or 1000 Ω F min., whichever is less
Temperature coefficient	$\pm 30 \times 10^{-6}/K$
Ageing	not applicable

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PACKAGING

Tape on reel

Packaging conforms fully with "IEC 60286-3", "EIA 481-1" and "JIS C0806" industrial standards.

Multilayer Chip Capacitors are supplied on tape on reel or bulk in a polythene bag. For MLCCs with a product thickness of <1 mm, paper tape is preferred. MLCCs with a product thickness of ≥ 1 mm, are supplied in blister tape.

CARRIER TAPE

Polycarbonate.

Table 2 Properties of carrier tape

PARAMETER	WIDTH	
	8.1 ± 0.2 mm	12 ± 0.2 mm
Thickness	190 to 280 μm	240 ± 20 μm
Tensile strength at break	>60 N/mm ²	>60 N/mm ²
Elongation at break	100 to 150%	100 to 150%
Surface resistance	>10 ¹² $\Omega/\text{sq.}$	>10 ¹² $\Omega/\text{sq.}$

COVER TAPE

Polyester (antistatic).

Table 3 Properties of cover tape

PARAMETER	WIDTH	
	5.5 ± 0.1 mm	9.5 ± 0.1 mm
Breaking force	≥ 10.7 N	≥ 17.6 N
Elongation at break	$\geq 63\%$	$\geq 63\%$
Surface resistance	<10 ¹⁰ $\Omega/\text{sq.}$	<10 ¹⁰ $\Omega/\text{sq.}$
Softening point	71 ± 5 °C	71 ± 5 °C
Thickness	62 μm	62 μm

General information

For the combination carrier/cover tape no electrostatic behaviour is observed (relative humidity $\geq 30\%$). The products do not stick to the cover tape.

The technical and thermal properties of polycarbonate tapes are excellent, so there is no change in dimensions as a function of time. The peel off force is very stable as a function of time and temperature, and it is defined as 0.1 to 0.7 N at a peel-off speed of 120 mm/minute.

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Paper tape specifications

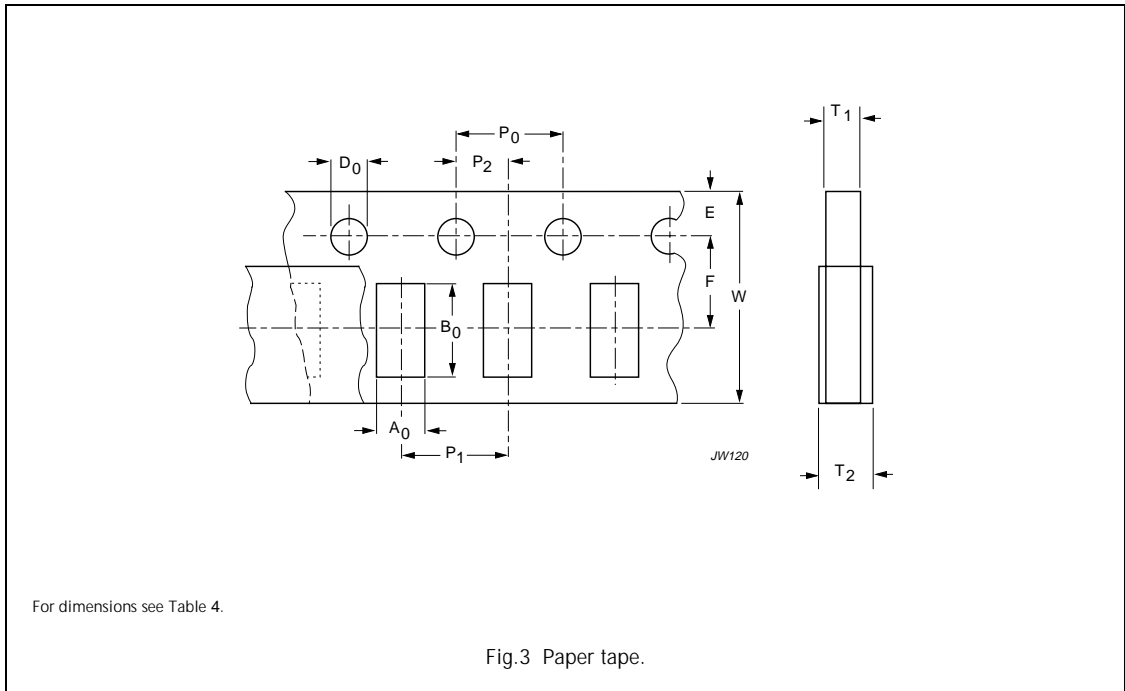


Table 4 Dimensions of paper tape for relevant product size, in millimetres; see Fig.3

SYMBOL	PRODUCT SIZE CODE							
	0402		0603		0805		1206	
	SIZE	TOL.	SIZE	TOL.	SIZE	TOL.	SIZE	TOL.
A ₀	0.62	±0.05	1.10	±0.05	1.65	±0.05	2.0	±0.1
B ₀	1.12	±0.05	1.90	±0.05	2.40	±0.05	3.5	±0.1
W	8.0	±0.2	8.0	±0.3	8.0	±0.2	8.0	±0.2
E	1.75	±0.1	1.75	±0.1	1.75	±0.1	1.75	±0.1
F	3.5	±0.05	3.5	±0.05	3.5	±0.05	3.5	±0.05
D ₀	1.5	+0.1/-0	1.5	+0.1/-0	1.5	+0.1/-0	1.5	+0.1/-0
P ₀ ; note 1	4	±0.05	4	±0.1	4	±0.05	4	±0.05
P ₁	2	±0.05	4	±0.1	4	±0.1	4	±0.1
P ₂	2	±0.05	2	±0.05	2	±0.05	2	±0.05
T _{1 max}	0.6	±0.05	1.05	±0.05	0.95	±0.05	0.95	±0.05
T _{2 max}	0.62	±0.05	1.2	±0.05	0.95	±0.05	0.95	±0.05

Note

1. P₀ pitch tolerance over any 10 pitches is ±0.2 mm.

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Blister tape specifications

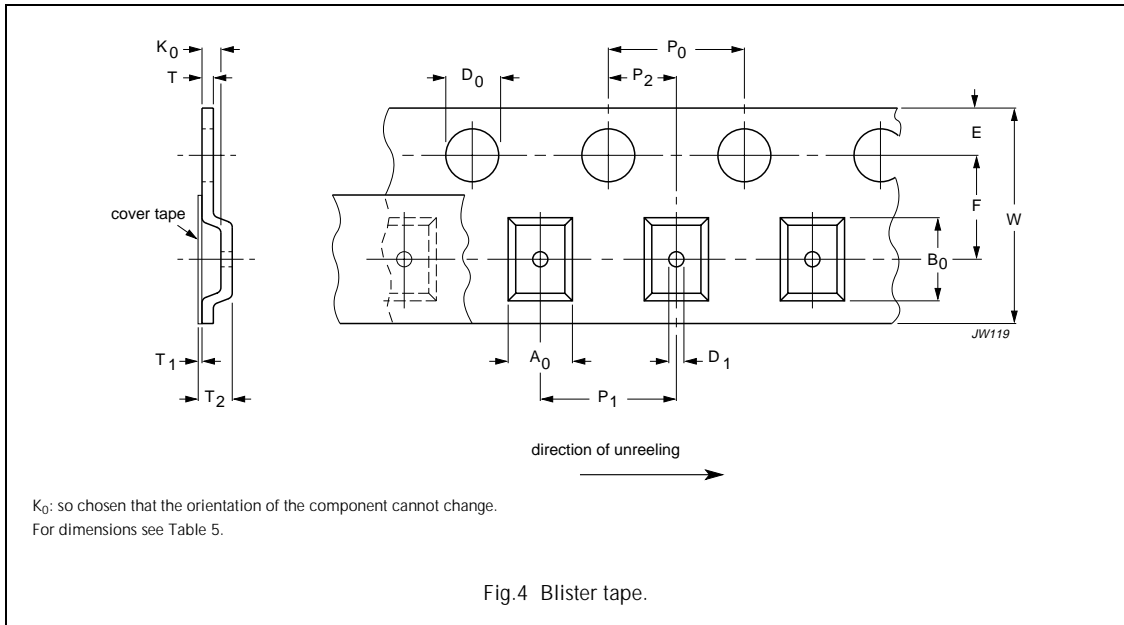


Table 5 Dimensions of blister tape for relevant product size code, in millimetres; see Fig.4

DIMENSION	PRODUCT SIZE CODE				TOLERANCE
	0805	1206	1210	1812	
A_0 nominal clearance; note 1	0.20	0.30	0.30	0.40	–
B_0 nominal clearance; note 1	0.20	0.30	0.30	0.40	–
K_0 minimum clearance; note 1	0.05	0.05	0.05	0.05	–
W	8.0	8.0	8.0	12.0	± 0.3
E	1.75	1.75	1.75	1.75	± 0.1
F	3.5	3.5	3.5	5.5	± 0.05
D_0	1.5	1.5	1.5	1.5	$+0.1/-0.0$
D_1	≥ 1	≥ 1	≥ 1	1.5	$+0.1/-0.0$
P_0 ; note 2	4	4	4	4	± 0.1
P_1	4	4	4	8	± 0.1
P_2	2	2	2	2	± 0.05
T_{max}	0.3	–	–	–	–
T_1 cover tape	0.05	–	–	–	–
T_2	2.0	–	–	–	–

Notes

1. Typical capacitor displacement in pocket.
2. P_0 pitch tolerance over any 10 pitches is ± 0.2 mm.

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Reel specifications

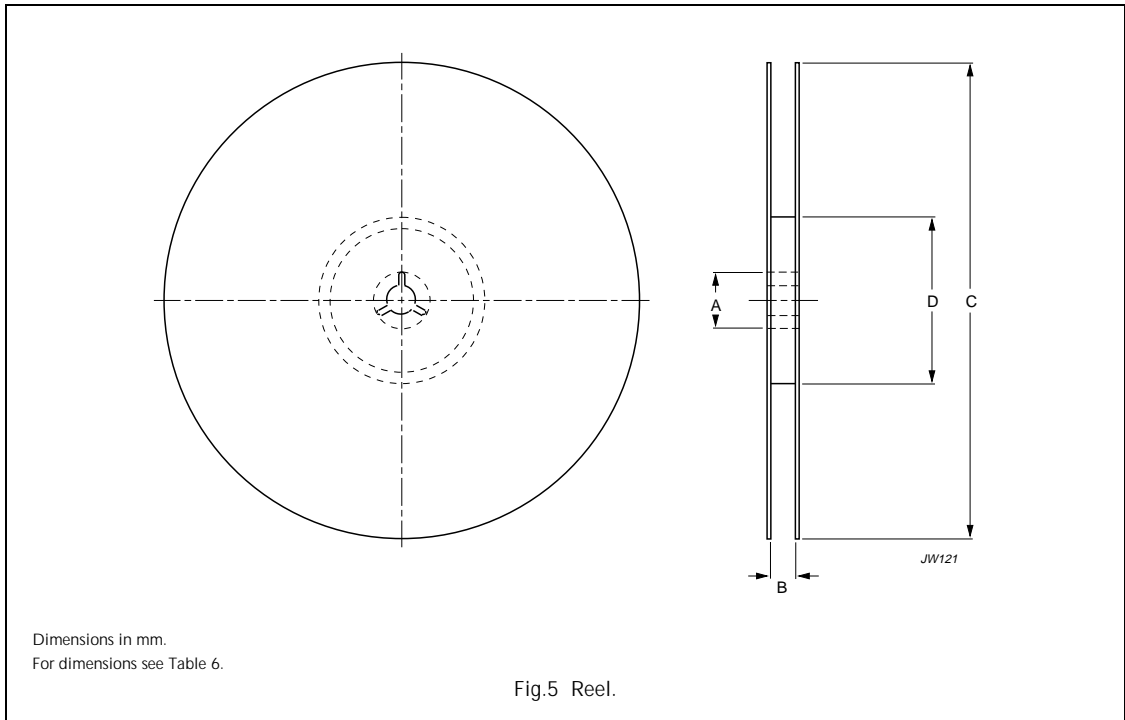


Table 6 Reel dimensions and tape width for relevant chip size; see Fig.5

DIMENSION (mm)	8 mm TAPE WIDTH					12 mm TAPE WIDTH
	Ø180 mm; 7"; note 1					
	0402	0603	0805	1206	1210	1812
A	13.0 ±1.0	13.0 ±1.0	13.0 ±1.0	13.0 ±0.5	13.0 ±1.0	13.0 ±1.0
B	9.0 ±1.0	9.0 ±1.0	9.0 ±1.0	9.0 ±0.5	9.0 ±1.0	13.5 ±1.0
C	178.0 ±1.0	178.0 ±1.0	178.0 ±1.0	178.0 ±1.0	178.0 ±1.0	178.0 ±1.0
D	60.5 ±1.0	60.5 ±1.0	60.5 ±1.0	60.5 ±1.0	60.5 ±1.0	80.0 ±1.0

Note

1. A 13" reel is available on request.

Properties of reel

Material: polystyrene

Surface resistance: $<10^{10} \Omega/\text{sq}$.

Surface mount multilayer chip capacitors

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Leader/trailer tape specification

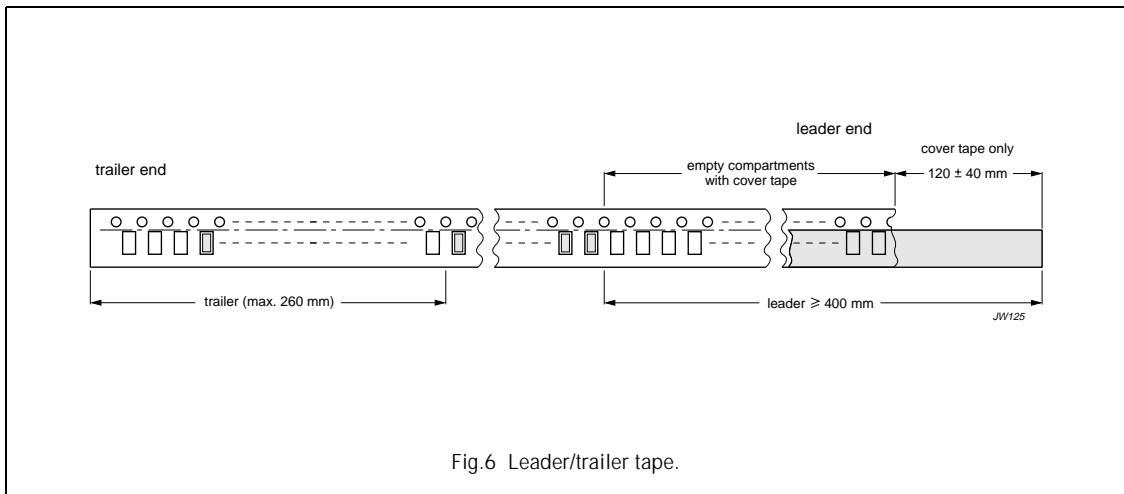


Table 7 Leader/trailer tape data

DESCRIPTION	VALUE
Minimum length of empty compartments at leader end	≥400 mm of which a minimum 240 mm of empty compartments are covered with cover tape and 120 ±40 mm cover tape only
Minimum length of empty compartments at trailer end	208 mm or 260 mm. If the length is 260 mm an extra product is placed at 208 mm to mark this position.

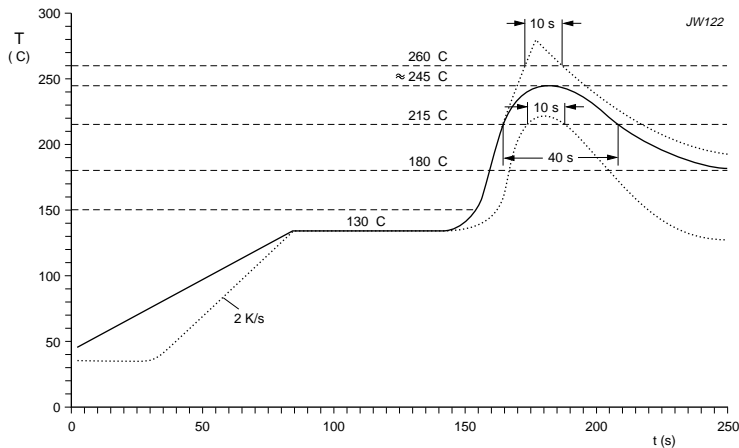
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METHOD OF MOUNTING AND DIMENSIONS OF SOLDER LANDS

For normal use the capacitors may be mounted on printed-circuit boards or ceramic substrates by applying wave soldering, reflow soldering (including vapour phase soldering) or conductive adhesive in accordance with CECC 00802 classification A. For advised soldering profiles see Figs 7, 8 and 9.

An improper combination of soldering, substrate and chip size can lead to a damaging of the component. The risk increases with the chip size and with temperature fluctuations (>100 °C). Therefore, it is advised to use the smallest possible size and follow the dimensional recommendations given in Tables 8 and 9 for reflow and wave soldering. More detailed information is available on request.

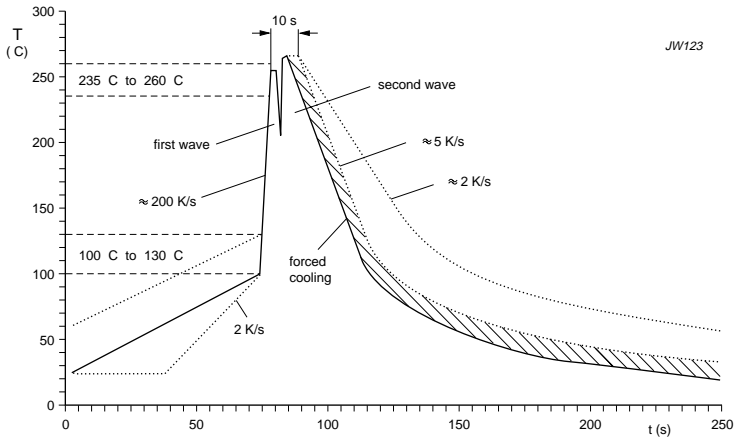


Typical values (solid line).
Process limits (dotted lines).

Fig.7 Reflow soldering.

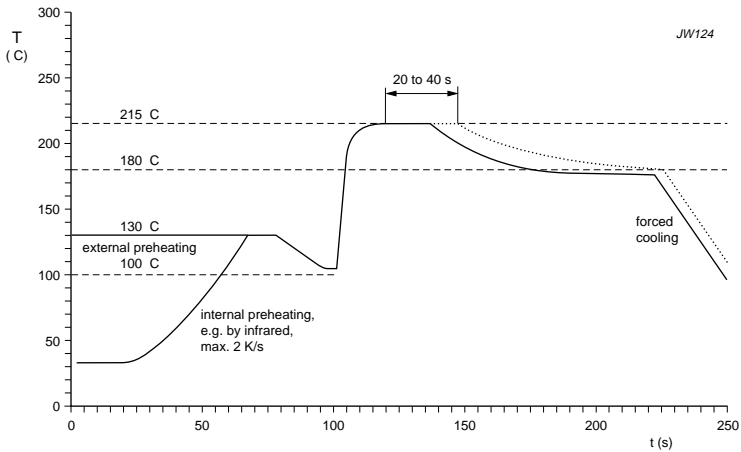
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Typical values (solid line).
 Process limits (dotted lines).
 The capacitors may be soldered twice in accordance with this method if desired.

Fig.8 Double wave soldering.



Typical values (solid line).
 Process limits (dotted line).

Fig.9 Vapour phase soldering.

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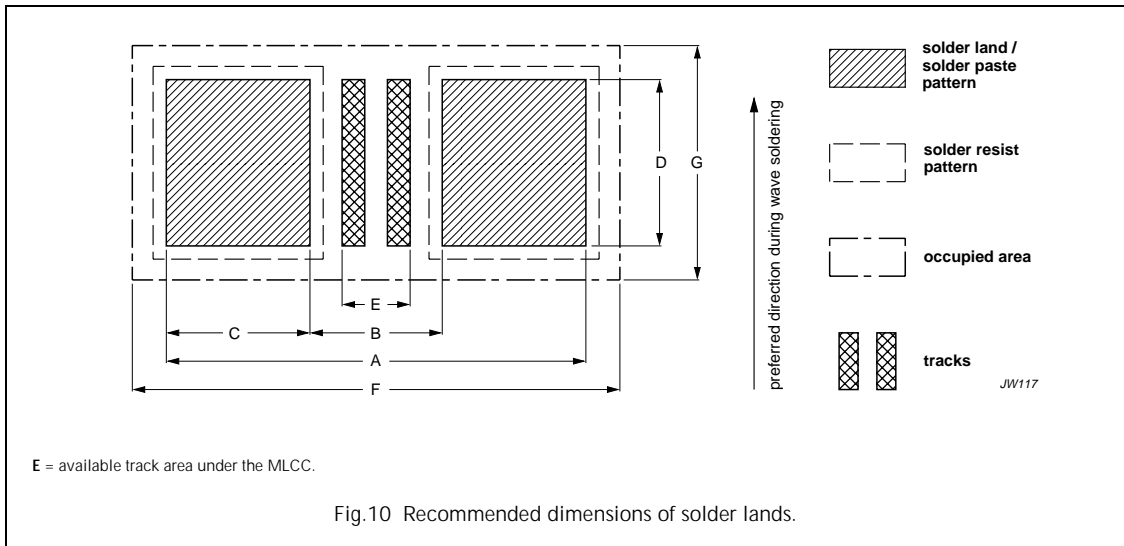


Table 8 Reflow soldering; for dimensions also see Fig.10

SIZE CODE	FOOTPRINT DIMENSIONS (mm)							PROCESSING REMARKS	PLACEMENT ACCURACY (mm)
	A	B	C	D	E	F	G		
0402	1.5	0.5	0.5	0.5	0.10	1.75	0.95	IR or hot plate soldering	±0.15
0603	2.3	0.7	0.8	0.9	0.26	2.7	1.5		±0.15
0603	2.3	0.5	0.9	0.9	0.0	2.7	1.5		±0.25
0805	2.8	0.9	0.95	1.4	0.45	3.2	2.1		±0.25
1206	4.0	2.0	1.0	1.8	1.4	4.4	2.5		±0.25
1210	4.0	2.0	1.0	2.7	1.4	4.4	3.4		±0.25
1808	5.4	3.3	1.05	2.3	2.7	5.8	2.9	ceramic substrate only	±0.25
1812	5.4	3.3	1.05	3.5	2.7	5.8	4.1		±0.25

Table 9 Wave soldering (no dummy tracks allowed for ≥500 V); for dimensions also see Fig.10

SIZE CODE	FOOTPRINT DIMENSIONS (mm)							PROPOSED NUMBER AND DIMENSIONS OF DUMMY TRACKS (mm)	PLACEMENT ACCURACY (mm)
	A	B	C	D	E	F	G		
0603	2.4	1.0	0.7	0.8	0.2	3.0	1.9	1 × (0.2 × 0.8)	±0.10
0603	2.7	0.9	0.9	0.8	0.0	3.2	2.1	1 × (0.3 × 0.8)	±0.25
0805	3.2	1.4	0.9	1.3	0.36	4.1	2.5	1 × (0.3 × 1.3)	±0.15
0805	3.4	1.3	1.05	1.3	0.2	4.3	2.7	1 × (0.2 × 1.3)	±0.25
1206	4.8	2.3	1.25	1.7	1.25	5.9	3.2	3 × (0.25 × 1.7)	±0.25
1210	5.3	2.3	1.5	2.6	1.25	6.3	4.2	3 × (0.25 × 2.6)	±0.25

**Surface mount multilayer
chip capacitors****Class 1, NPO low voltage
10, 16, 25 and 50 V**

TEST CONDITIONS IN STATIC SOLDER BATH

PARAMETER	DESCRIPTION
Solderability	
95% covered with smooth and bright solder coating	CECC requirement: 235 ±5 °C for 2 ±0.5 s
	IEC requirement: 215 ±3 °C for 3 ±0.3 s
Resistance to leaching	
10% of the metallization of the edges of the head face may be missing (inner electrodes are not visible)	260 ±5 °C for 30 ±1 s

Surface mount multilayer chip capacitors

Class 1, NPO low voltage 10, 16, 25 and 50 V

TESTS AND REQUIREMENTS

Table 10 Test procedures and requirements

TEST	PROCEDURE	REQUIREMENTS
Visual and mechanical		no visible damage dimensions in accordance with specification
Capacitance	$C \leq 1000 \text{ pF}$, $1.0 \pm 0.2 V_{\text{rms}}$; $f = 1 \text{ MHz} \pm 10\%$ $C > 1000 \text{ pF}$, $1.0 \pm 0.2 V_{\text{rms}}$; $f = 1 \text{ kHz} \pm 10\%$	shall not exceed the limits given in the detailed specification
Q value	$C \leq 1000 \text{ pF}$, $1.0 \pm 0.2 V_{\text{rms}}$; $f = 1 \text{ MHz} \pm 10\%$ $C > 1000 \text{ pF}$, $1.0 \pm 0.2 V_{\text{rms}}$; $f = 1 \text{ kHz} \pm 10\%$	$\geq 30 \text{ pF}$: $Q \geq 1000$ $< 30 \text{ pF}$: $Q \geq 400 + 20C$
Dielectric strength	250% of rated voltage for 1 to 5 s, charge and discharge current less than 50 mA	no visible damage or flash-over during test
Insulation resistance	at U_R (DC) for max. 60 s \pm 5 s	100 G Ω min. or 1000 Ω F min., whichever is less
Temperature coefficient	with no electrical load: -55 to 125 °C at $T_{\text{amb}} = 25 \text{ °C}$	$30 \times 10^{-6}/\text{°C}$
Bending test	the middle part of the substrate shall be pressurized by means of the pressurizing rod at a rate of about 1 mm per second until the deflection becomes 1 mm and then the pressure shall be maintained for 5 \pm 1s measurement after 24 \pm 2 hours at room temperature	no visible damage $\Delta C/C$: ± 5.0 max. or $\pm 0.5 \text{ pF}$ max., whichever is greater this capacitance change means the change of capacitance under specified flexure of substrate from the capacitance measured before the test
Solderability	230 \pm 5 °C for 2 \pm 0.5 s; solder: SN63A	95% min. coverage of entire metallized area
Resistance to soldering heat	260 \pm 5 °C for 10 \pm 1 s; solder: SN63A; measurement after 24 \pm 2 hours at room temperature	no visible damage $\Delta C/C$: $\pm 2.5\%$ max. or $\pm 0.25 \text{ pF}$ max., whichever is greater DF, R_{ins} and dielectric strength to meet initial requirements 10% max. leaching on each edge
Temperature cycle	-55 to 125 °C; 5 cycles in the following sequence: -55 °C -3/+0 for 30 \pm 3 minutes; room temperature for 2 to 3 minutes; 125 °C +3/-0 for 30 \pm 3 minutes; room temperature for 2 to 3 minutes measurement after 24 \pm 2 hours at room temperature	no visible damage $\Delta C/C$: $\pm 2.5\%$ max. or $\pm 0.25 \text{ pF}$ max., whichever is greater DF, R_{ins} and dielectric strength to meet initial requirements

Surface mount multilayer chip capacitors

Class 1, NPO low voltage 10, 16, 25 and 50 V

TEST	PROCEDURE	REQUIREMENTS
Humidity test (damp heat steady state)	40 ±2 °C; 90 to 95% RH for 1000 +24/-0 hours U _R applied; measurement after 24 ±2 hours at room temperature	no visual damage ΔC/C: ±2.0% max. or ±1 pF max., whichever is greater Q: ≥ 30 pF Q ≥ 350 10 pF ≤ C < 30 pF, Q ≥ 275 + 2.5C < 10 pF, Q ≥ 200 + 10C R _{ins} : 10 GΩ min. or 100 ΩF min. whichever is less
Humidity load (damp heat)	40 ±2 °C; 90 to 95% RH for 1000 +24/-0 hours U _R applied; measurement after 24 ±2 hours at room temperature	no visual damage ΔC/C: 7.5% max. or ±0.75 pF max., whichever is greater Q: ≥ 30 pF, Q ≥ 200 C < 30 pF, Q ≥ 100 + 10/3C R _{ins} : 500 MΩ min. or 25 ΩF min. whichever is less
Adhesive strength of termination	pressurizing force 1 kg (10 N) for 10 ±1 s	no visible damage
Vibration resistance	frequency: 10 to 55 to 10 Hz/min.; total amplitude: 1.5 mm test time: 6 hours (2 hours each in 3 mutually perpendicular directions)	no visible damage or removal of the terminations
High temperature load (endurance)	125 ±3 °C; 200% of rated voltage for 1000 +24/-0 hours; measurement after 24 ±2 hours at room temperature	no visual damage ΔC/C: ±2% max. or 1 pF max., whichever is greater Q: ≥ 30 pF, Q ≥ 350 10 pF ≤ C < 30 pF, Q ≥ 275 + 2.5C C < 10 pF, Q ≥ 200 + 10C R _{ins} : 1 GΩ min. or 50 ΩF min. whichever is less