

DATA SHEET

SURFACE-MOUNT CERAMIC MULTILAYER CAPACITORS

General data



PACKING

TAPE AND REEL SPECIFICATIONS

Packing conforms fully with “IEC 60286-3”, “EIA 481-1” and “JIS C0806” industrial standards.

Multilayer Chip Capacitors (MLCCs) are supplied on tape on reel or in bulk case. For MLCCs with a product thickness of <1 mm, paper/PE tape is preferred. MLCCs with a product thickness of ≥ 1 mm, are supplied in embossed blister tape.

For the combination carrier/cover tape no electrostatic behaviour is observed (relative humidity ≥ 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 300 mm/minute.

Table 1 Properties of carrier tape - polycarbonate
8.1/12 MM TAPE WIDTH, 0.2 MM TOLERANCE

Thickness	130 to 360 µm
Tensile strength at break	> 60 MPa
Elongation at break	100 to 150%
Surface resistance	< 10 ¹² Ω/sq.

Table 2 Properties of cover tape - polyester (antistatic)
5.5/9.5 MM TAPE WIDTH, 0.1 MM TOLERANCE

Thickness	62 µm
Breaking force	> 20 N / ≥ 17.6 N
Elongation at break	105 ±60%
Surface resistance	< 10 ¹¹ Ω/sq.

BULK-CASE SPECIFICATION

In accordance with “IEC 60286-6”.

- Reduced costs
 - Storage
 - Transport
 - Machine handling
 - Packing
- Customized labelling (bar codes)

Available component size please see table 3

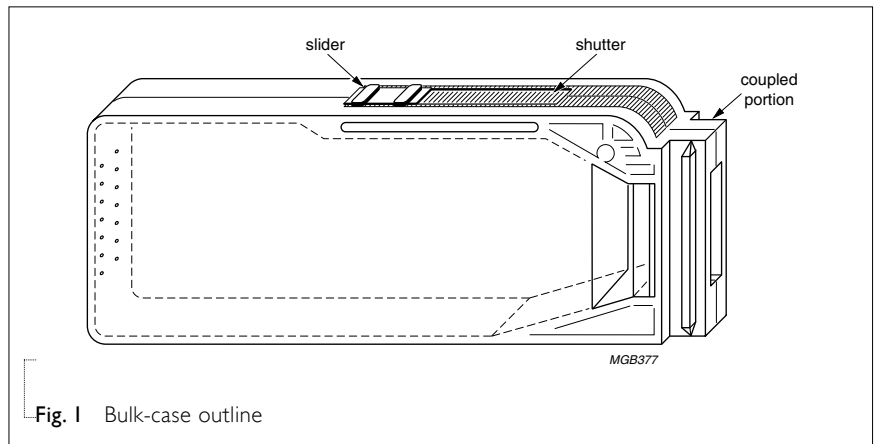


Fig. 1 Bulk-case outline

OUTLINES

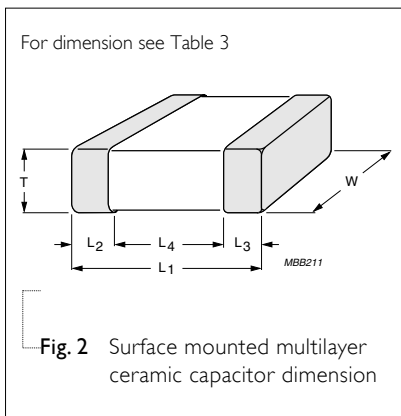


Table 3 Packing quantities for component size; see note 1 and Fig.1

SIZE CODE	L1 (mm)	W (mm)	T (mm)	QUANTITY PER BULK CASE
0402	1.0	0.5	0.5	50,000
0603	1.6	0.8	0.8	15,000
0805	2.0	1.25	0.6	10,000
0805	2.0	1.25	0.85	8,000
0805	2.0	1.25	1.25	5,000

NOTE

1. Refer to the selection charts in product data for specific values

PAPER/PE TAPE SPECIFICATION

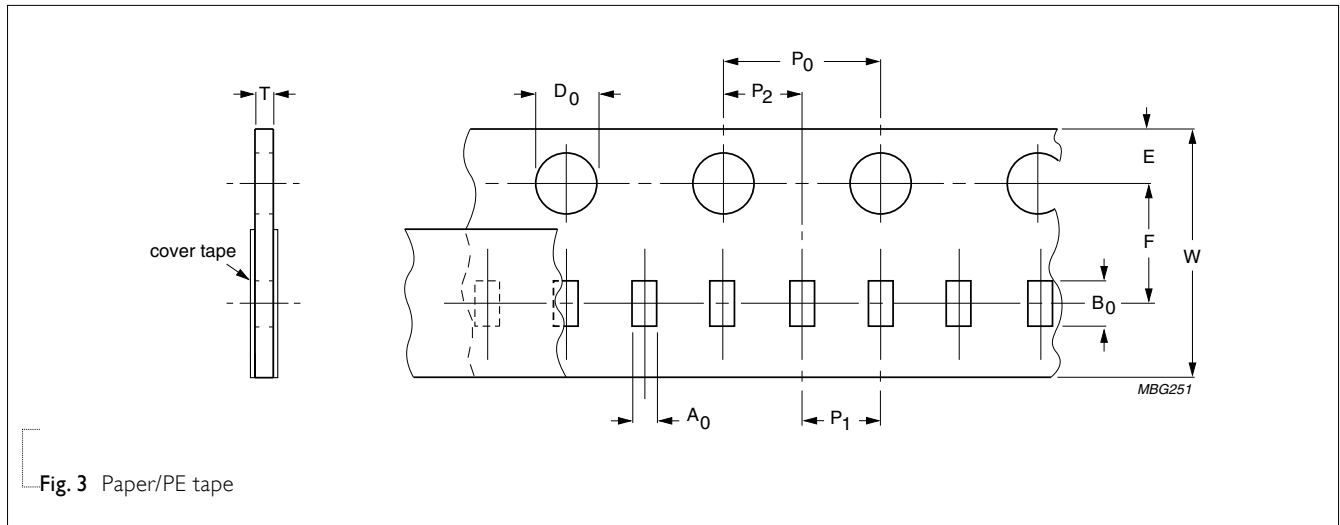


Fig. 3 Paper/PE tape

Table 4 Dimensions of paper/PE tape for relevant chip size; see Fig.3

SIZE CODE	SYMBOL										Unit: mm
	A ₀	B ₀	W	E	F	P ₀ ⁽¹⁾	P ₁	P ₂	ØD ₀	T	
0201	0.37 ±0.03	0.69 ±0.05	8.0 ±0.20	1.75 ±0.05	3.50 ±0.05	4.0 ±0.1	2.0 ±0.05	2.0 ±0.05	1.55 ±0.03	0.42 ±0.05	
0402	0.60 ±0.05	1.10 ±0.05	8.0 ±0.20	1.70 ±0.05	3.50 ±0.05	4.0 ±0.05	2.0 ±0.05	2.0 ±0.05	1.50 +0.1/-0	0.60 ±0.05	
0603	0.95 ±0.05	1.78 ±0.05	8.0 ±0.20	1.70 ±0.05	3.50 ±0.05	4.0 ±0.05	4.0 ±0.05	2.0 ±0.05	1.50 +0.1/-0	0.95 ±0.05	
0805	1.50 ±0.05	2.26 ±0.05	8.0 ±0.20	1.70 ±0.05	3.50 ±0.05	4.0 ±0.05	4.0 ±0.05	2.0 ±0.05	1.50 +0.1/-0	0.95 / 0.75	
1206	1.90 ±0.10	3.50 ±0.10	8.0 ±0.20	1.70 ±0.05	3.5 ±0.05	4.0 ±0.05	4.0 ±0.10	2.0 ±0.05	1.50 +0.1/-0	0.95 / 0.75	
4 × 0402	1.50 ±0.05	2.26 ±0.05	8.0 ±0.20	1.70 ±0.05	3.50 ±0.05	4.0 ±0.05	4.0 ±0.05	2.0 ±0.05	1.50 +0.1/-0	0.95 / 0.75	
4 × 0603	1.90 ±0.10	3.50 ±0.10	8.0 ±0.20	1.70 ±0.05	3.5 ±0.05	4.0 ±0.05	4.0 ±0.10	2.0 ±0.05	1.50 +0.1/-0	0.95 / 0.75	
0508	1.50 ±0.05	2.26 ±0.05	8.0 ±0.20	1.70 ±0.05	3.50 ±0.05	4.0 ±0.05	4.0 ±0.05	2.0 ±0.05	1.50 +0.1/-0	0.95 / 0.75	
0612	1.90 ±0.10	3.50 ±0.10	8.0 ±0.20	1.70 ±0.05	3.5 ±0.05	4.0 ±0.05	4.0 ±0.10	2.0 ±0.05	1.50 +0.1/-0	0.95 / 0.75	

NOTE

1. P₀ pitch tolerance over any 10 pitches is ±0.2 mm
2. 4 × 0402 stands for 0508 array
3. 4 × 0603 stands for 0612 array

BLISTER TAPE SPECIFICATION

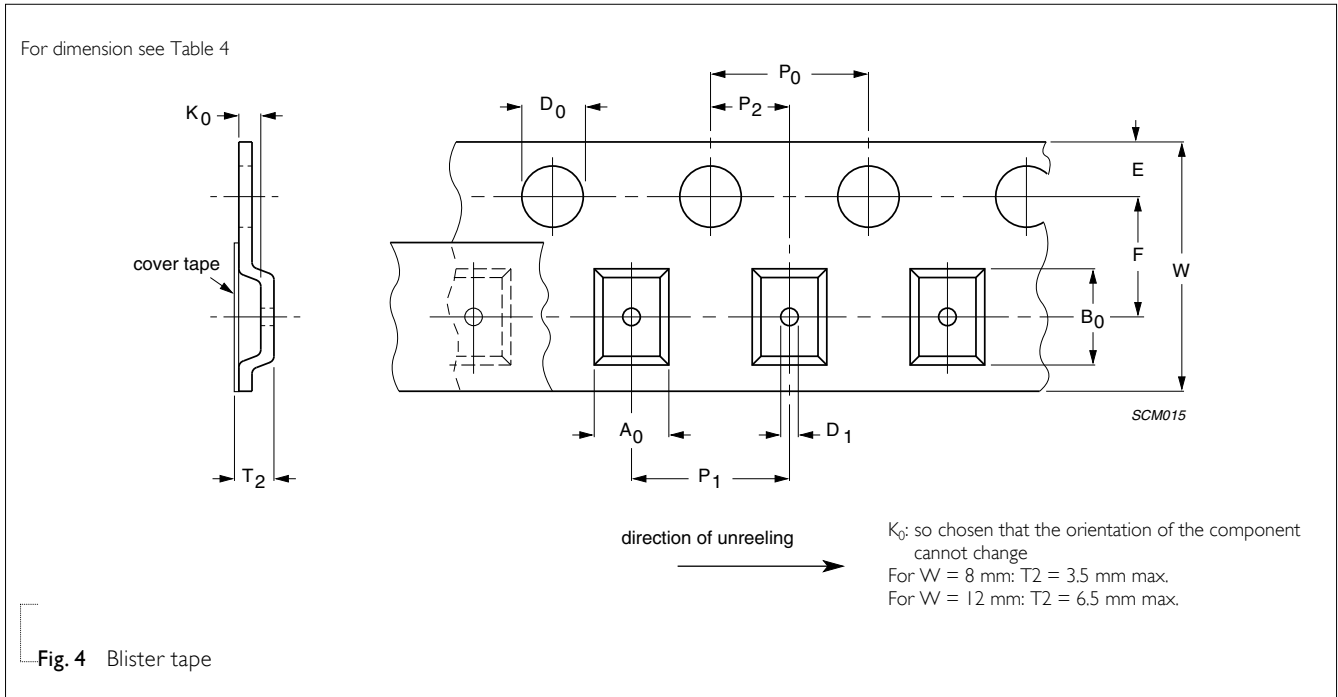


Table 5 Dimensions of blister tape for relevant chip size; see Fig.4

SIZE CODE	SYMBOL											Unit: mm			
	A_0		B_0		K_0		W	E	F	$\text{Ø}D_0$	$\text{Ø}D_1$		$P_0^{(2)}$	P_1	P_2
	Min.	Max.	Min.	Max.	Min.	Max.									
0805	1.29	1.57	2.08	2.39	1.27	1.55	8.1 ± 0.20	1.70 ± 0.1	3.5 ± 0.05	$1.5 +0.1/-0.0$	$1 +0.1/-0.0$	4.0 ± 0.10	4.0 ± 0.10	2.0 ± 0.05	
1206	1.65	2.01	3.30	3.63	1.22	2.03	8.1 ± 0.20	1.70 ± 0.1	3.5 ± 0.05	$1.5 +0.1/-0.0$	$1 +0.1/-0.0$	4.0 ± 0.10	4.0 ± 0.10	2.0 ± 0.05	
1210	2.55	3.02	3.28	3.76	0.78	2.75	8.1 ± 0.20	1.70 ± 0.1	3.5 ± 0.05	$1.5 +0.1/-0.0$	$1 +0.1/-0.0$	4.0 ± 0.10	4.0 ± 0.10	2.0 ± 0.05	
1808	2.10	2.45	4.80	5.45	1.30	2.45	12.1 ± 0.20	1.70 ± 0.1	5.5 ± 0.05	$1.5 +0.1/-0.0$	$1.5 +0.1/-0.0$	4.0 ± 0.10	8.0 ± 0.10	2.0 ± 0.05	
1812	3.24	3.75	4.60	5.20	0.80	2.40	12.1 ± 0.20	1.70 ± 0.1	5.5 ± 0.05	$1.5 +0.1/-0.0$	$1.5 +0.1/-0.0$	4.0 ± 0.10	8.0 ± 0.10	2.0 ± 0.05	
2220	5.12	5.32	5.84	6.04	1.28	1.48	12.0 ± 0.20	1.70 ± 0.1	5.5 ± 0.05	$1.5 +0.1/-0.0$	$1.5 +0.1/-0.0$	4.0 ± 0.10	8.0 ± 0.10	2.0 ± 0.05	

NOTE

1. Typical capacitor displacement in pocket
2. P_0 pitch tolerance over any 10 pitches is $\pm 0.2\text{ mm}$

REEL SPECIFICATION

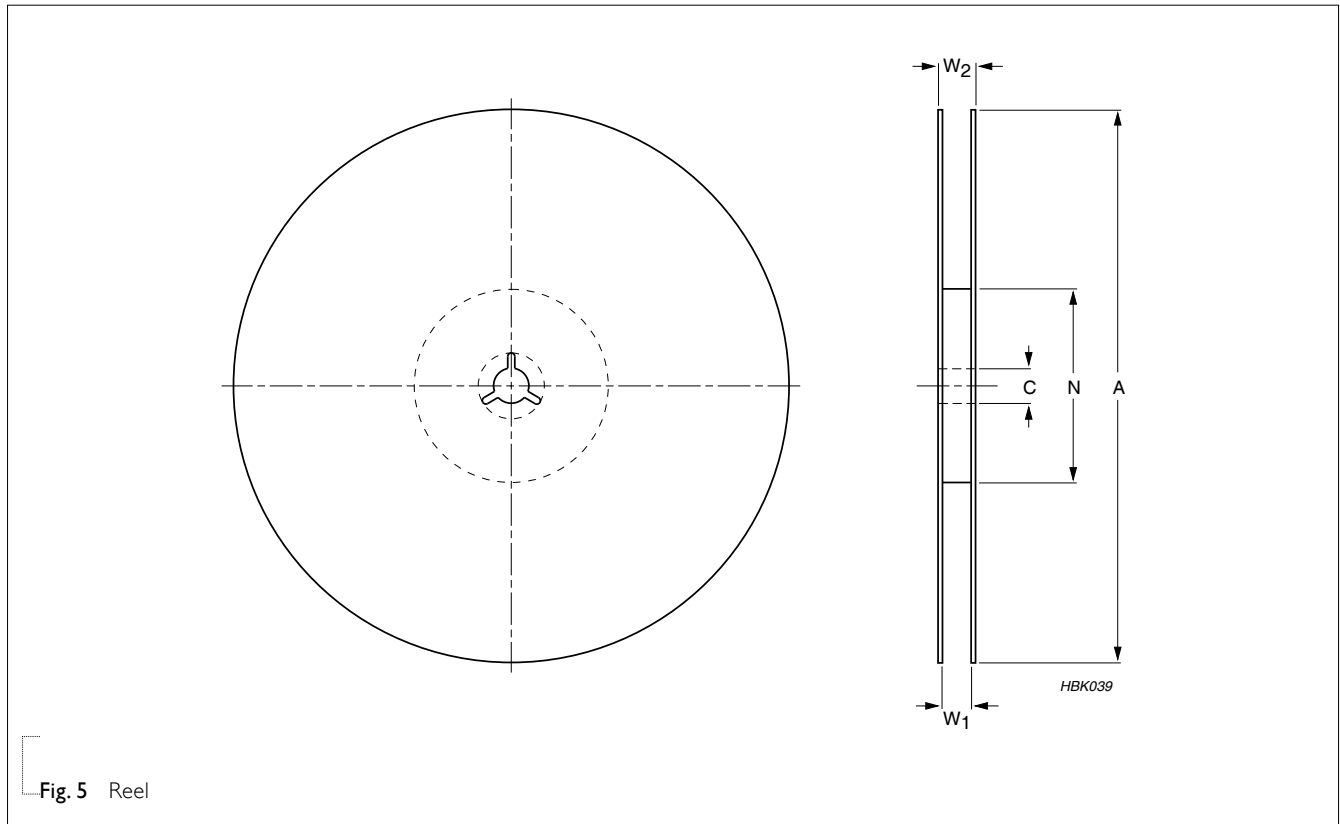


Table 6 Reel dimensions; see Fig.5

TAPE WIDTH	SYMBOL					Unit: mm
	A	N	C	W ₁	W _{2max.}	
8 (Ø178 mm/7")	178 ±1.0	60 ±1.0	13 +0.50/-0.20	9.0 ±0.2	14.4	
8 (Ø330 mm/13")	330 ±1.0	100 ±1.0	13 +0.50/-0.20	9.0 ±0.2	14.4	
12 (Ø178 mm/7")	178 ±1.0	60 ±1.0	13 +0.50/-0.20	13.4 ±1.5	18.4	

PROPERTIES OF REEL

Material: polystyrene

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

THICKNESS CLASSES AND PACKING QUANTITY

Table 7

SIZE CODE	THICKNESS CLASSIFICATION	TAPE WIDTH QUANTITY PER REEL	Ø180 MM / 7 INCH		Ø330 MM / 13 INCH		QUANTITY PER BULK CASE
			Paper/PE	Blister	Paper/PE	Blister	
0201	0.3 ±0.03 mm	8 mm	15,000	---	50,000	---	---
0402	0.5 ±0.05 mm	8 mm	10,000	---	50,000	---	50,000
0603	0.8 ±0.1 mm	8 mm	4,000	---	15,000	---	15,000
0805	0.6 ±0.1 mm	8 mm	4,000	---	20,000	---	10,000
	0.85 ±0.1 mm	8 mm	4,000	---	15,000	---	8,000
	1.25 ±0.2 mm	8 mm	---	3,000	---	10,000	5,000
1206	0.6 ±0.1 mm	8 mm	4,000	---	20,000	---	---
	0.85 ±0.1 mm	8 mm	4,000	---	15,000	---	---
	1.00 / 1.15 ±0.1 mm	8 mm	---	3,000	---	10,000	---
	1.25 ±0.2 mm	8 mm	---	3,000	---	10,000	---
	1.6 ±0.15 mm	8 mm	---	2,500	---	10,000	---
	1.6 ±0.2 mm	8 mm	---	2,000	---	8,000	---
1210	0.6 / 0.7 ±0.1 mm	8 mm	---	4,000	---	15,000	---
	0.85 ±0.1 mm	8 mm	---	4,000	---	10,000	---
	1.15 ±0.1 mm	8 mm	---	3,000	---	10,000	---
	1.15 ±0.15 mm	8 mm	---	3,000	---	10,000	---
	1.25 ±0.2 mm	8 mm	---	3,000	---	---	---
	1.5 ±0.1 mm	8 mm	---	2,000	---	---	---
	1.6 / 1.9 ±0.2 mm	8 mm	---	2,000	---	---	---
	2.0 ±0.2 mm	8 mm	---	2,000 1,000	---	---	---
1808	1.15 ±0.15 mm	12 mm	---	3,000	---	---	---
	1.25 ±0.2 mm	12 mm	---	3,000	---	---	---
	1.35 ±0.15 mm	12 mm	---	2,000	---	---	---
	1.5 ±0.1 mm	12 mm	---	2,000	---	---	---
	1.6 ±0.2 mm	12 mm	---	2,000	---	---	---
	2.0 ±0.2 mm	12 mm	---	2,000	---	---	---
1812	0.6 / 0.85 ±0.1 mm	12 mm	---	2,000	---	---	---
	1.15 ±0.1 mm	12 mm	---	1,000	---	---	---
	1.25 ±0.2 mm	12 mm	---	1,000	---	---	---
	1.5 ±0.1 mm	12 mm	---	1,000	---	---	---
	1.6 ±0.2 mm	12 mm	---	1,000	---	---	---
	2.0 ±0.2 mm	12 mm	---	1,000	---	---	---
	2.5 ±0.2 mm	12 mm	---	500	---	---	---

LEADER/TRAILER TAPE SPECIFICATION

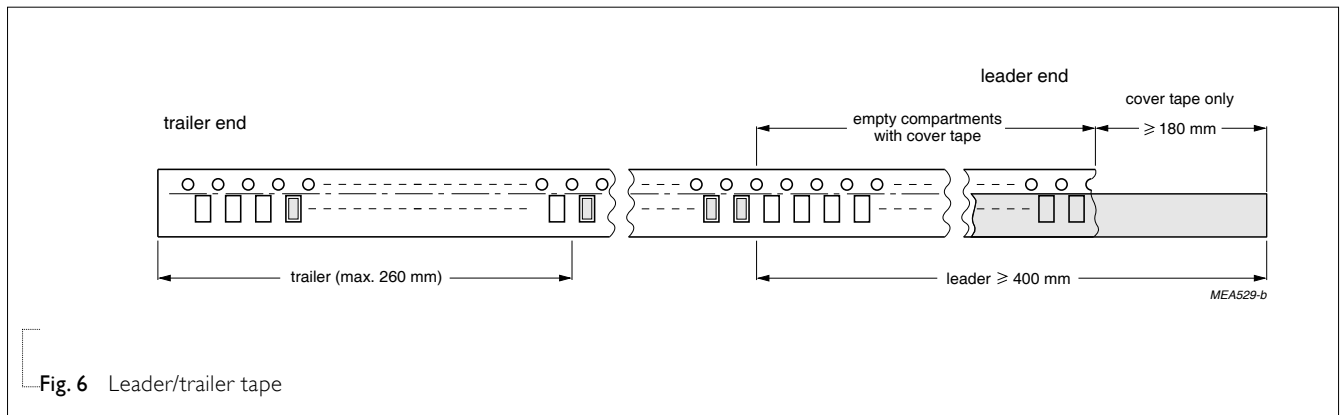


Fig. 6 Leader/trailer tape

Table 8 Leader/trailer tape data

DESCRIPTION	VALUE
Minimum length of empty compartments at leader end	≥ 400 mm of which a minimum 260 mm of empty compartments are covered with cover tape and ≥ 180 mm cover tape only
Minimum length of empty compartments at trailer end	≥ 180 mm

LABELLING

Label examples are shown in Fig. 7

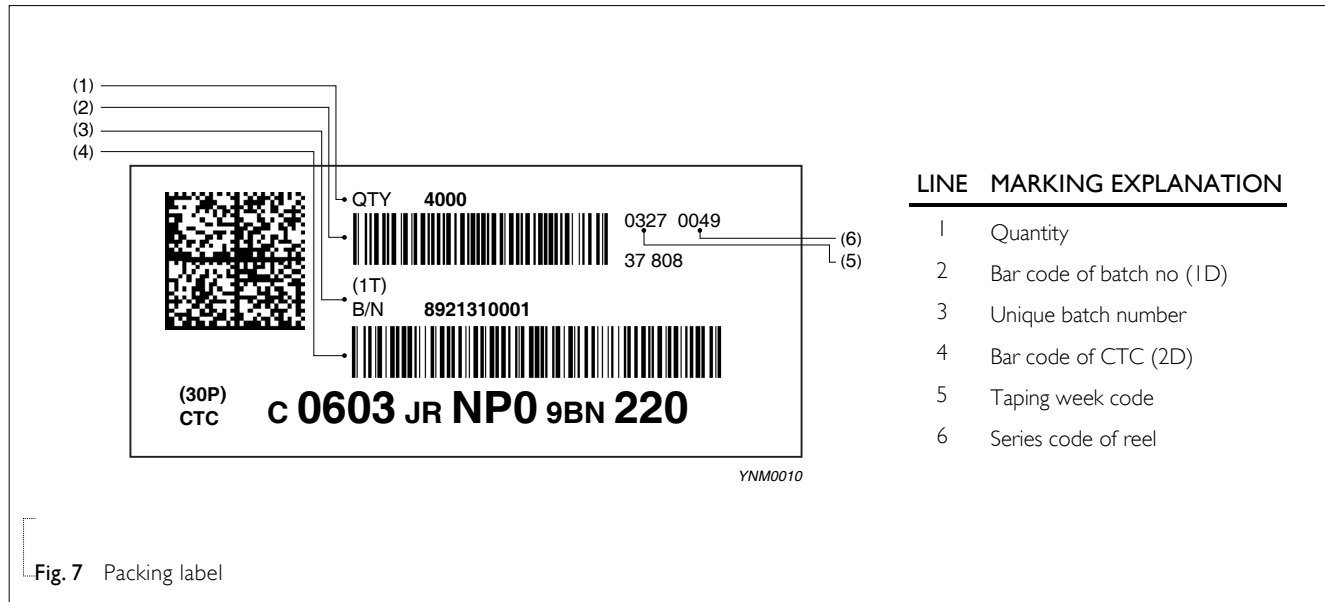


Fig. 7 Packing label

MOUNTING

SOLDERING CONDITIONS

For normal use the capacitors may be mounted on printed-circuit boards or ceramic substrates by applying wave soldering, reflow soldering or conductive adhesive in accordance with *IEC 61760-1* (Standard method for the

specification of surface mounting components). For advised soldering profiles see Figs 8, 9, 10.

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, 9 and 10 for reflow and wave soldering. More detailed information is available on request.

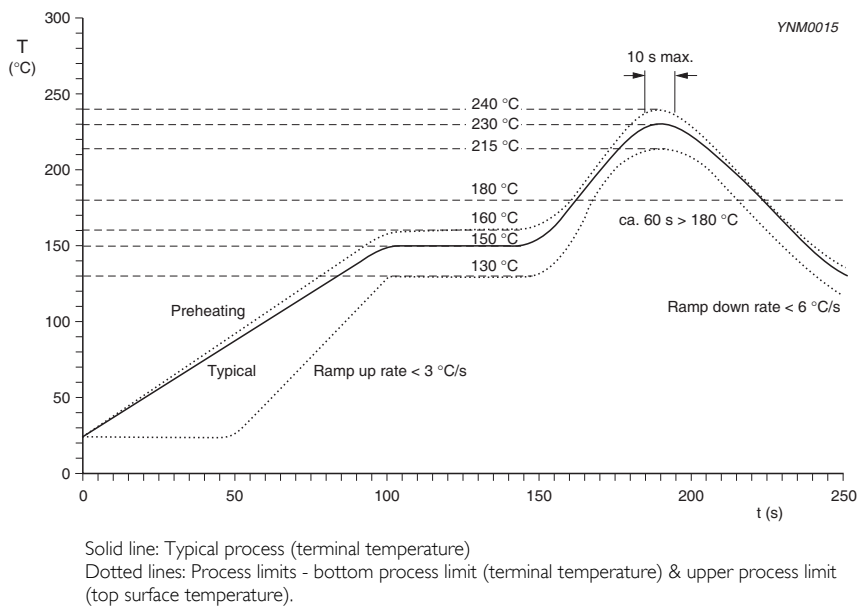


Fig. 8 Infrared soldering, forced gas convection reflow soldering - Temperature/time profile for SnPb solders

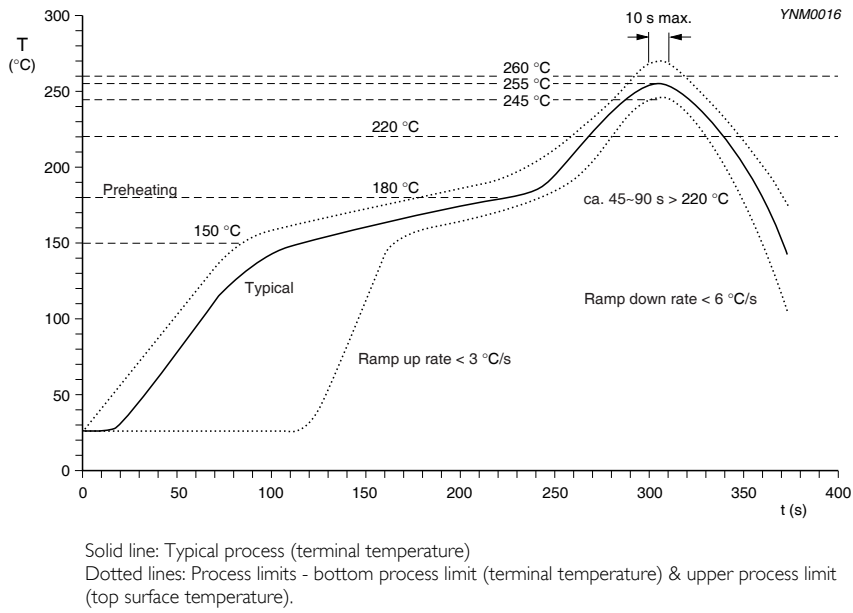


Fig. 9 Infrared soldering, forced gas convection reflow soldering - Temperature/time profile for lead-free SnAgCu solders

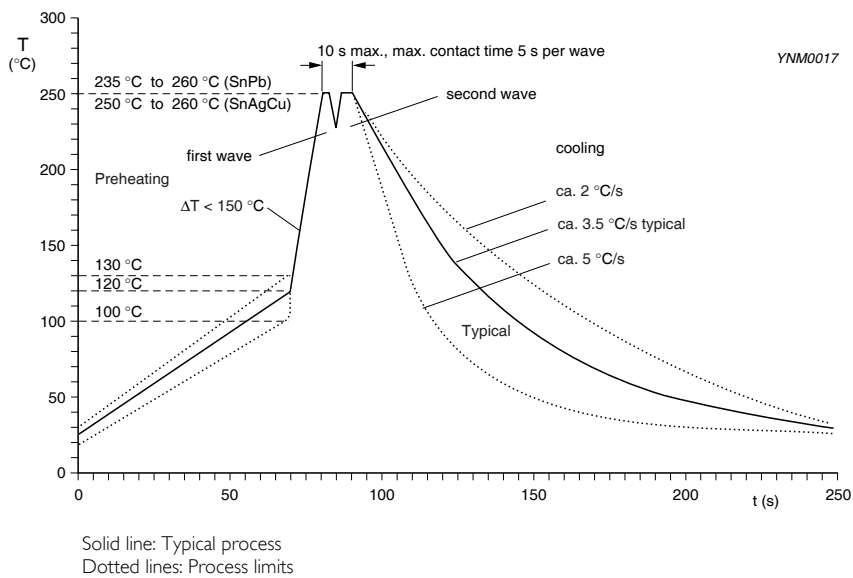


Fig. 10 Double wave soldering for SnPb and lead-free SnAgCu solder - Temperature/time profile (terminal temperature)

FOOTPRINT DIMENSIONS

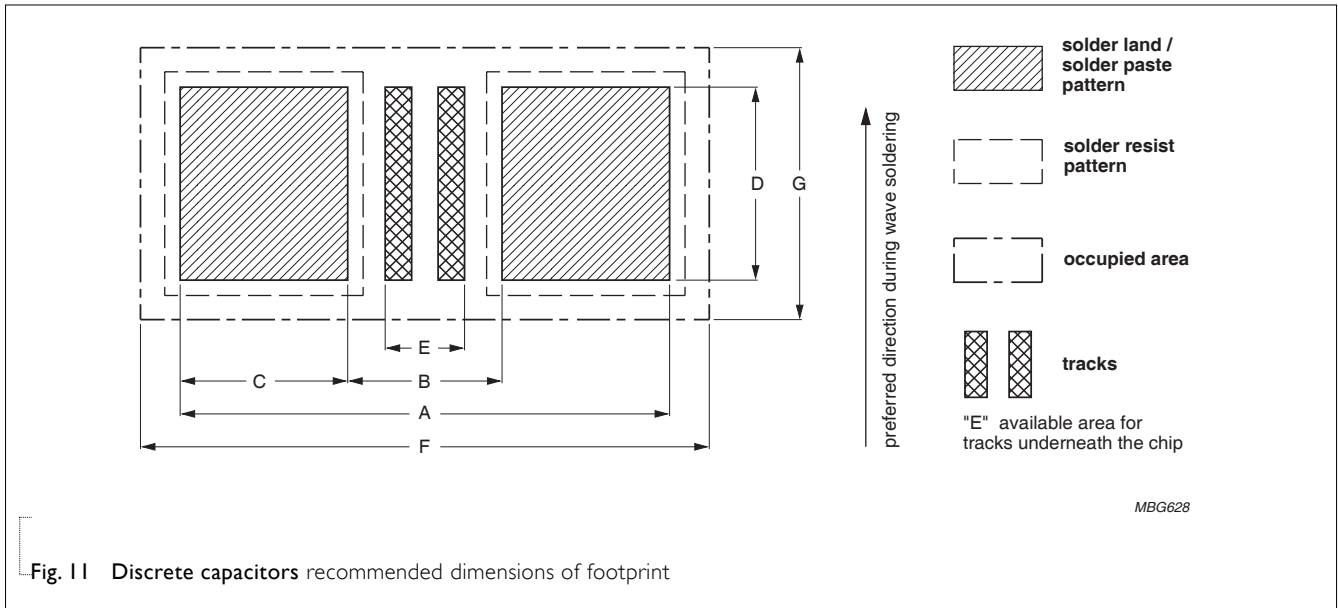


Fig. 11 Discrete capacitors recommended dimensions of footprint

Table 9 Reflow soldering; for footprint dimensions see Fig. 11

SIZE	FOOTPRINT DIMENSIONS							Unit: mm
CODE	A	B	C	D	E	F	G	Processing remarks
0201	0.8 ±0.20	0.25 ±0.05	0.28 ±0.07	0.3 ±0.10	---	---	---	
0402	1.5 ±0.15	0.5 ±0.15	0.5 ±0.15	0.5 ±0.15	0.10 ±0.15	1.75 ±0.15	0.95 ±0.15	
0603	2.3 ±0.15	0.7 ±0.15	0.8 ±0.15	0.9 ±0.15	0.26 ±0.15	2.7 ±0.15	1.5 ±0.15	
0603	2.3 ±0.25	0.5 ±0.25	0.9 ±0.25	0.9 ±0.25	0.0 ±0.25	2.7 ±0.25	1.5 ±0.25	IR or hot plate soldering
0805	2.8 ±0.25	0.9 ±0.25	0.95 ±0.25	1.4 ±0.25	0.45 ±0.25	3.2 ±0.25	2.1 ±0.25	
1206	4.0 ±0.25	2.0 ±0.25	1.0 ±0.25	1.8 ±0.25	1.4 ±0.25	4.4 ±0.25	2.5 ±0.25	
1210	4.0 ±0.25	2.0 ±0.25	1.0 ±0.25	2.7 ±0.25	1.4 ±0.25	4.4 ±0.25	3.4 ±0.25	
1808	5.4 ±0.25	3.3 ±0.25	1.05 ±0.25	2.3 ±0.25	2.7 ±0.25	5.8 ±0.25	2.9 ±0.25	
1812	5.4 ±0.25	3.3 ±0.25	1.05 ±0.25	3.5 ±0.25	2.7 ±0.25	5.8 ±0.25	4.1 ±0.25	Ceramic substrate only
2220	6.6 ±0.25	4.5 ±0.25	1.05 ±0.25	5.3 ±0.25	3.9 ±0.25	7.0 ±0.25	5.9 ±0.25	

Table 10 Wave soldering (no dummy tracks allowed for ≥ 500 V); for footprint dimensions see Fig. 11

SIZE	FOOTPRINT DIMENSIONS							Unit: mm
CODE	A	B	C	D	E	F	G	Number & dimensions to dummy tracks
0603	2.4 ±0.10	1.0 ±0.10	0.7 ±0.10	0.8 ±0.10	0.2 ±0.10	3.0 ±0.10	1.9 ±0.10	1 × (0.2 × 0.8)
0603	2.7 ±0.25	0.9 ±0.25	0.9 ±0.25	0.8 ±0.25	0.0 ±0.25	3.2 ±0.25	2.1 ±0.25	1 × (0.3 × 0.8)
0805	3.2 ±0.15	1.4 ±0.15	0.9 ±0.15	1.3 ±0.15	0.36 ±0.15	4.1 ±0.15	2.5 ±0.15	1 × (0.3 × 1.3)
0805	3.4 ±0.25	1.3 ±0.25	1.05 ±0.25	1.3 ±0.25	0.2 ±0.25	4.3 ±0.25	2.7 ±0.25	1 × (0.2 × 1.3)
1206	4.8 ±0.25	2.3 ±0.25	1.25 ±0.25	1.7 ±0.25	1.25 ±0.25	5.9 ±0.25	3.2 ±0.25	3 × (0.25 × 1.7)

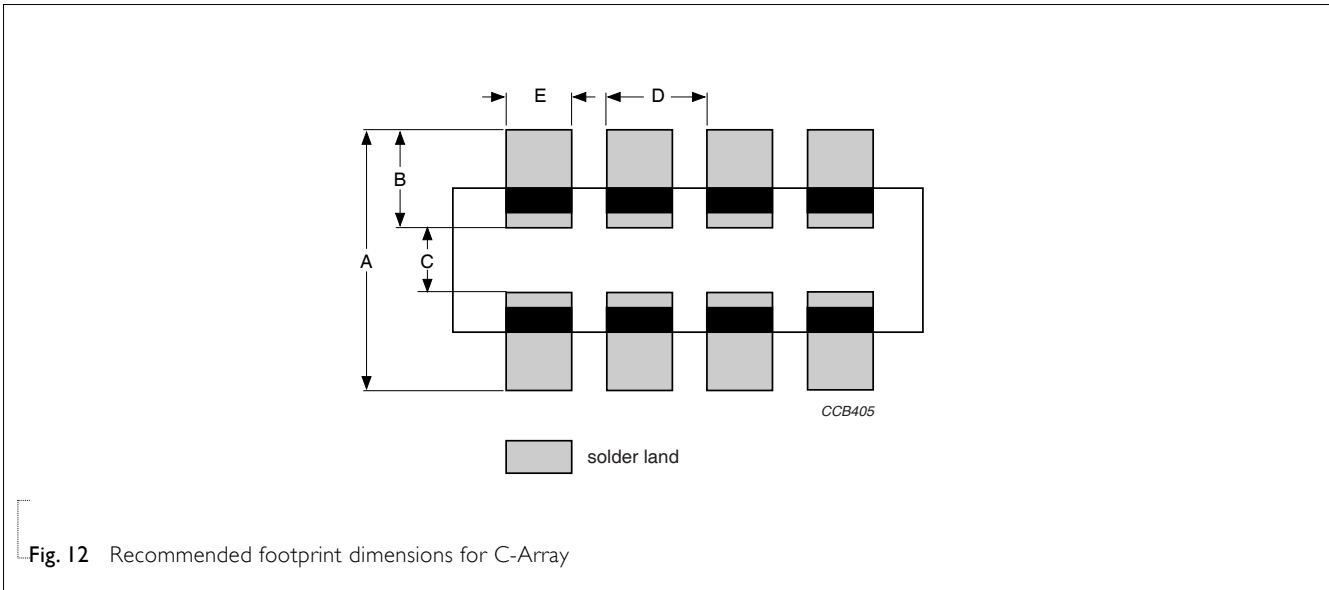


Fig. 12 Recommended footprint dimensions for C-Array

Table 11 C-Array footprint dimensions; see Fig.12

SIZE CODE	FOOTPRINT DIMENSIONS					Unit: mm
	A	B	C	D	E	
0405 (2 x 0402)	1.4 ±0.15	0.4 ±0.05	0.6 ±0.05	0.64	0.35 ±0.05	
0508 (4 x 0402)	1.65 ±0.15	0.55 ±0.05	0.55 ±0.05	0.5	0.25 ±0.05	
0612 (4 x 0603)	2.54 ±0.15	0.89 ±0.10	0.76 ±0.10	0.80 ±0.10	0.45 ±0.10	

TESTS AND REQUIREMENTS

Table 12 Test procedures and requirements

TEST	TEST METHOD	PROCEDURE	REQUIREMENTS
Mounting	IEC 60384-21/22	4.3 The capacitors may be mounted on printed-circuit boards or ceramic substrates	No visible damage
Visual inspection and dimension check		4.4 Any applicable method using × 10 magnification	In accordance with specification
Capacitance		4.5.1 Class 1: f = 1 MHz for C ≤ 1 nF, measuring at voltage 1 V _{rms} at 20 °C f = 1 KHz for C > 1 nF, measuring at voltage 1 V _{rms} at 20 °C Class 2: f = 1 KHz for C ≤ 10 μF, measuring at voltage 1 V _{rms} at 20 °C f = 120 Hz for C > 10 μF, measuring at voltage 0.5 V _{rms} at 20 °C	Within specified tolerance
Dissipation factor (D.F.)		4.5.2 Class 1: f = 1 MHz for C ≤ 1 nF, measuring at voltage 1 V _{rms} at 20 °C f = 1 KHz for C > 1 nF, measuring at voltage 1 V _{rms} at 20 °C Class 2: f = 1 KHz for C ≤ 10 μF, measuring at voltage 1 V _{rms} at 20 °C f = 120 Hz for C > 10 μF, measuring at voltage 0.5 V _{rms} at 20 °C	In accordance with specification
Insulation resistance		4.5.3 At U _r (DC) for 1 minute	In accordance with specification
Temperature coefficient		4.6 Class 1: Between minimum and maximum temperature NP0: -55 °C to +125 °C Normal Temperature: 20 °C	<General purpose series> ΔC/C: Class 1: NP0: ±30 ppm/°C
Temperature characteristic		Class 2: Between minimum and maximum temperature X5R: -55 °C to +85 °C X7R: -55 °C to +125 °C Y5V: -30 °C to +85 °C Normal Temperature: 20 °C	<General purpose series> Class 2: X5R/X7R: ±15% Y5V: 22% to -82% <High Capacitance series> Class 2: X5R/X7R: ±15% Y5V: 22% to -82%
Adhesion		4.7 A force applied for 10 seconds to the line joining the terminations and in a plane parallel to the substrate	Force size ≥ 0603: 5N size = 0402: 2.5N size = 0201: 1N

TEST	TEST METHOD	PROCEDURE	REQUIREMENTS
Bond strength of plating on end face	IEC 60384-21/22	4.8 Mounting in accordance with IEC 60384-22 paragraph 4.3 Conditions: bending 1 mm at a rate of 1 mm/s, radius jig 340 mm	No visible damage <General purpose series> $\Delta C/C$ Class 1: NP0: within $\pm 1\%$ or 0.5 pF, whichever is greater Class2: X5R/X7R/Y5V: $\pm 10\%$ <High Capacitance series> $\Delta C/C$ Class2: X5R/X7R/Y5V: $\pm 10\%$
		4.9 Precondition: 150 ± 10 °C for 1 hour, then keep for 24 ± 1 hours at room temperature Preheating: for size ≤ 1206 : 120 °C to 150 °C for 1 minute Preheating: for size > 1206 : 100 °C to 120 °C for 1 minute and 170 °C to 200 °C for 1 minute Solder bath temperature: 260 ± 5 °C Dipping time: 10 ± 0.5 seconds Recovery time: 24 ± 2 hours	Dissolution of the end face plating shall not exceed 25% of the length of the edge concerned <General purpose series> $\Delta C/C$ Class 1: NP0: within $\pm 0.5\%$ or 0.5 pF, whichever is greater Class2: X5R/X7R: $\pm 10\%$ Y5V: $\pm 20\%$ <High Capacitance series> $\Delta C/C$ Class2: X5R/X7R: $\pm 10\%$ Y5V: $\pm 20\%$ D.F. within initial specified value R_{ins} within initial specified value
Solderability	4.10	Preheated the temperature of 80 °C to 140 °C and maintained for 30 seconds to 60 seconds. Test conditions for lead containing solder alloy Temperature: 235 ± 5 °C Dipping time: 2 ± 0.2 seconds Depth of immersion: 10 mm Alloy Composition: 60/40 Sn/Pb Number of immersions: 1 Test conditions for leadfree containing solder alloy Temperature: 245 ± 5 °C Dipping time: 3 ± 0.3 seconds Depth of immersion: 10 mm Alloy Composition: SAC305 Number of immersions: 1	The solder should cover over 95% of the critical area of each termination

TEST	TEST METHOD	PROCEDURE	REQUIREMENTS
Rapid change of temperature	IEC 60384-21/22 4.11	<p>Preconditioning: 150 +0/-10 °C for 1 hour, then keep for 24 ±1 hours at room temperature</p> <p>5 cycles with following detail: 30 minutes at lower category temperature 30 minutes at upper category temperature</p> <p>Recovery time 24 ±2 hours</p>	<p>No visual damage</p> <hr/> <p><General purpose series></p> <p>ΔC/C</p> <p>Class 1: NP0: within ±1% or 1 pF, whichever is greater</p> <p>Class2: X5R/X7R: ±15% Y5V: ±20%</p> <hr/> <p><High Capacitance series></p> <p>ΔC/C</p> <p>Class2: X5R/X7R: ±15% Y5V: ±20%</p> <hr/> <p>D.F. meet initial specified value R_{ins} meet initial specified value</p>
Damp heat with U _r load	4.13	<ol style="list-style-type: none"> Preconditioning, class 2 only: 150 +0/-10 °C /1 hour, then keep for 24 ±1 hour at room temp Initial measure: Spec: refer initial spec C, D, IR Damp heat test: 500 ±12 hours at 40 ±2 °C; 90 to 95% R.H. 1.0 U_r applied Recovery: Class 1: 6 to 24 hours Class 2: 24 ±2 hours Final measure: C, D, IR <p>P.S. If the capacitance value is less than the minimum value permitted, then after the other measurements have been made the capacitor shall be precondition according to "IEC 60384 4.1" and then the requirement shall be met.</p>	<p>No visual damage after recovery</p> <hr/> <p><General purpose series></p> <p>ΔC/C</p> <p>Class 1: NP0: within ±2% or 1 pF, whichever is greater</p> <p>Class2: X5R/X7R: ±15%; Y5V: ±30%</p> <p>D.F.</p> <p>Class 1: NP0: ≤ 2 × specified value</p> <p>Class2: X5R/X7R: ≤ 16V: ≤ 7% ≥ 25V: ≤ 5% Y5V: ≤ 15%</p> <p>R_{ins}</p> <p>Class 1: NP0: ≥ 2,500 MΩ or R_{ins} × C_r ≥ 25s whichever is less</p> <p>Class2: X5R/X7R/Y5V: ≥ 500 MΩ or R_{ins} × C_r ≥ 25s whichever is less</p> <hr/> <p><High Capacitance series></p> <p>ΔC/C</p> <p>Class2: X5R/X7R: ±20%; Y5V: ±30%</p> <p>D.F.</p> <p>Class2: 2 × initial value max</p> <p>R_{ins}</p> <p>Class2: 500 MΩ or R_{ins} × C_r ≥ 25s, whichever is less</p>

TEST	TEST METHOD	PROCEDURE	REQUIREMENTS
Endurance	IEC 60384-21/22 4.14	<p>1. Preconditioning, class 2 only: 150 +0/-10 °C /1 hour, then keep for 24 ±1 hour at room temp</p> <p>2. Initial measure: Spec: refer initial spec C, D, IR</p> <p>3. Endurance test: Temperature: NP0/X7R: 125 °C X5R/Y5V: 85 °C Specified stress voltage applied for 1,000 hours: Applied 2.0 × U_r for general product Applied 1.5 × U_r for high cap. product High voltage series follows with below stress condition: Applied 1.3 × U_r for 500V series Applied 1.2 × U_r for 1KV, 2KV, 3KV series</p> <p>4. Recovery time: 24 ±2 hours</p> <p>5. Final measure: C, D, IR</p> <p>P.S. If the capacitance value is less than the minimum value permitted, then after the other measurements have been made the capacitor shall be precondition according to "IEC 60384 4.1" and then the requirement shall be met.</p>	<p>No visual damage</p> <hr/> <p><General purpose series></p> <p>ΔC/C</p> <p>Class 1: NP0: within ±2% or 1 pF, whichever is greater</p> <p>Class 2: X5R/X7R: ±15%; Y5V: ±30%</p> <p>D.F.</p> <p>Class 1: NP0: ≤ 2 × specified value</p> <p>Class 2: X5R/X7R: ≤ 16V: ≤ 7% ≥ 25V: ≤ 5%</p> <p>Y5V: ≤ 15%</p> <p>R_{ins}</p> <p>Class 1: NP0: ≥ 4,000 MΩ or R_{ins} × C_r ≥ 40s whichever is less</p> <p>Class 2: X5R/X7R/Y5V: ≥ 1,000 MΩ or R_{ins} × C_r ≥ 50s whichever is less</p> <p><High Capacitance series></p> <p>ΔC/C</p> <p>Class 2: X5R/X7R: ±20%; Y5V: ±30%</p> <p>D.F.</p> <p>Class 2: 2 × initial value max</p> <p>R_{ins}</p> <p>Class 2: 1,000 MΩ or R_{ins} × C_r ≥ 50s, whichever is less</p>
Voltage proof	IEC 60384-1 4.6	<p>Specified stress voltage applied for 1 minute</p> <p>U_r ≤ 100 V: series applied 2.5 U_r 100 V < U_r ≤ 200 V series applied (1.5 U_r + 100) 200 V < U_r ≤ 500 V series applied (1.3 U_r + 100) U_r > 500 V: 1.3 U_r</p> <p>I: 7.5 mA</p>	No breakdown or flashover

REVISION HISTORY

REVISION	DATE	CHANGE NOTIFICATION	DESCRIPTION
Version 17	Nov. 12, 2012	-	- Thickness classes and Packing quantity updated
Version 16	Oct 05, 2012	-	- Thickness classes and Packing quantity updated
Version 15	Mar 09, 2011	-	- Packing quantity added
Version 14	Feb 18, 2011	-	- 0201 PE tape specifications added
Version 13	Sep 15, 2010	-	- Dimensions of blister tape updated
Version 12	Sep 18, 2009	-	- PE tape specifications updated
Version 11	Sep 07, 2009	-	- PE tape specifications added
Version 10	Jun 12, 2009	-	- Paper tape specifications updated
Version 9	Apr 03, 2009	-	- Change to dual brand datasheet - Label definition updated - Reflow soldering for Sn/Pb chart updated - Reflow soldering for lead free (Pb-free) chart added - Double wave soldering chart updated - Tests and requirements updated
Version 8	Apr 11, 2006	-	- Taping quality improved
Version 7	Jul 10, 2003	-	- Company logo updated - Taping specification updated - Label definition updated
Version 6	May 30, 2001	-	- Converted to Phycomp brand