

# DATA SHEET

## SURFACE MOUNT MULTILAYER CERAMIC CAPACITORS

Automotive grade

NP0/X7R

6.3 V TO 2000 V

0.2 pF to 680nF

RoHS compliant & Halogen Free



**SCOPE**

This specification describes Automotive grade chip capacitors with lead-free terminations and used for automotive equipments.

**APPLICATIONS**

All general purpose applications under normal operation and usage conditions for automotive equipments.

**FEATURES**

- AEC-Q200 qualified
- MSL class: MSL I
- AC series soldering is compliant with J-STD-020D
- High component and equipment reliability
- The capacitors are 100% performed by automatic optical inspection prior to taping.

**ORDERING INFORMATION - GLOBAL PART NUMBER**

All part numbers are identified by the series, size, tolerance, TC material, packing style, voltage, process code, termination and capacitance value.

**GLOBAL PART NUMBER**

**AC** XXXX X X XXX X **B** X XXX  
 (1) (2) (3) (4) (5) (6) (7)

**(1) SIZE – INCH BASED (METRIC)**

0201 (0603) / 0402 (1005) / 0603 (1608) / 0805 (2012) / 1206 (3216)/ 1210 (3225) / 1812 (4532)

**(2) TOLERANCE**

NPO(< 10 pF)	NPO(≥ 10 pF)	X7R
B = ±0.1 pF	F = ±1%	J = ±5%
C = ±0.25 pF	G = ±2%	K = ±10%
D = ±0.5 pF	J = ±5%	M = ±20%

**Note:** Capacitance tolerance ±5% doesn't available for full X7R range, please contact local sale before order.

**(3) PACKING STYLE (SEE TABLE. 9 FOR DETAIL)**

R = Paper/PE taping reel; Reel 7 inch  
 K = Blister taping reel; Reel 7 inch  
 P = Paper/PE taping reel; Reel 13 inch  
 F = Blister taping reel; Reel 13 inch

**(4) TC MATERIAL**

NPO  
 X7R

**(5) RATED VOLTAGE**

5 = 6.3 V	B = 500 V
6 = 10 V	Z = 630 V
7 = 16 V	C = 1000 V
8 = 25 V	D = 2000 V
9 = 50 V	
0 = 100 V	
A = 200 V	
Y = 250 V	

**6) PROCESS**

N = NPO  
 B = X7R

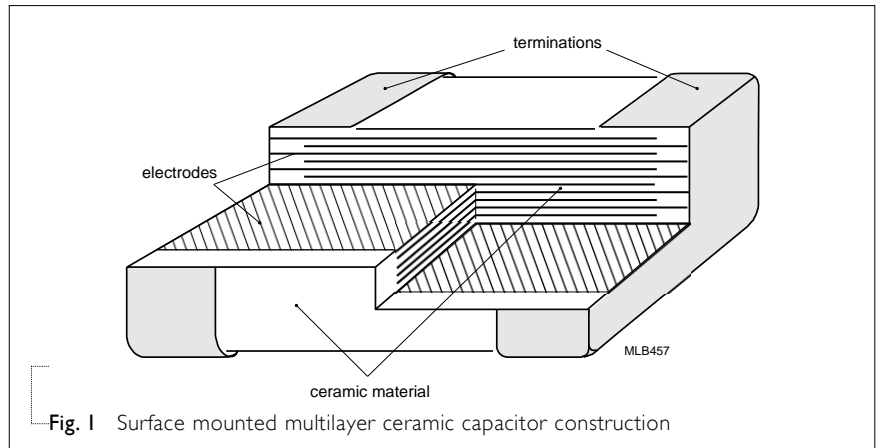
**(7) CAPACITANCE VALUE**

2 significant digits+number of zeros  
 The 3rd digit signifies the multiplying factor, and letter R is decimal point  
 Example: 121 = 12 × 10<sup>1</sup> = 120 pF

**CONSTRUCTION**

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

The inner electrodes are connected to the two end terminations and finally covered with a layer of plated tin (Matte Sn). The terminations are lead-free. A cross section of the structure is shown in Fig.1.

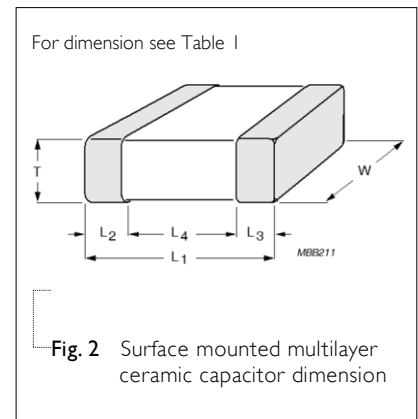


**DIMENSION**

Table I For outlines see fig. 2

TYPE	L <sub>1</sub> (mm)	W (mm)	T (MM)	L <sub>2</sub> / L <sub>3</sub> (mm)		L <sub>4</sub> (mm)
				min.	max.	min.
0201	0.6±0.03	0.3±0.03	0.3±0.03	0.10	0.20	0.20
0402	1.0±0.05	0.5 ±0.05	0.5±0.05	0.15	0.35	0.30
0603	1.6±0.10	0.8±0.10	0.8±0.10	0.20	0.60	0.40
0805	2.0±0.10	1.25±0.10	0.6±0.10	0.25	0.75	0.70
	2.0±0.20	1.25±0.20	1.25±0.20			
1206	3.2±0.30	1.6±0.20	0.6±0.10	0.25	0.75	1.40
			0.85±0.10			
			1.00±0.10			
1210	3.2±0.30	2.5±0.20	0.85±0.10	0.25	0.75	1.40
			1.25±0.20			
			1.6±0.20			
1808	4.5±0.40	2.0±0.30	1.25±0.20	0.25	0.75	2.20
			0.85±0.10			
1812	4.5±0.40	3.2±0.30	1.25±0.20	0.25	0.75	2.20
2020	5.7±0.40	5.0±0.30	2.0±0.20	0.25	0.75	3.40
			1.60±0.20			

**OUTLINES**



**CAPACITANCE RANGE & THICKNESS FOR NPO**

**Table 2** Sizes from 0201 to 0805

CAP.	0201		0402		0603		0805		
	25 V / 50 V	25 V / 50 V	25 V / 50 V	100 V	200 V / 250 V	50 V	100 V	200 V / 250 V	
0.2 pF	0.3±0.03								
0.47 pF	0.3±0.03	0.5±0.05	0.8±0.1	0.8±0.1	0.8±0.1	0.6±0.1	0.6±0.1	0.6±0.1	
0.56 pF	0.3±0.03	0.5±0.05	0.8±0.1	0.8±0.1	0.8±0.1	0.6±0.1	0.6±0.1	0.6±0.1	
0.68 pF	0.3±0.03	0.5±0.05	0.8±0.1	0.8±0.1	0.8±0.1	0.6±0.1	0.6±0.1	0.6±0.1	
0.82 pF	0.3±0.03	0.5±0.05	0.8±0.1	0.8±0.1	0.8±0.1	0.6±0.1	0.6±0.1	0.6±0.1	
1.0 pF	0.3±0.03	0.5±0.05	0.8±0.1	0.8±0.1	0.8±0.1	0.6±0.1	0.6±0.1	0.6±0.1	
1.2 pF	0.3±0.03	0.5±0.05	0.8±0.1	0.8±0.1	0.8±0.1	0.6±0.1	0.6±0.1	0.6±0.1	
1.5 pF	0.3±0.03	0.5±0.05	0.8±0.1	0.8±0.1	0.8±0.1	0.6±0.1	0.6±0.1	0.6±0.1	
1.8 pF	0.3±0.03	0.5±0.05	0.8±0.1	0.8±0.1	0.8±0.1	0.6±0.1	0.6±0.1	0.6±0.1	
2.2 pF	0.3±0.03	0.5±0.05	0.8±0.1	0.8±0.1	0.8±0.1	0.6±0.1	0.6±0.1	0.6±0.1	
2.7 pF	0.3±0.03	0.5±0.05	0.8±0.1	0.8±0.1	0.8±0.1	0.6±0.1	0.6±0.1	0.6±0.1	
3.3 pF	0.3±0.03	0.5±0.05	0.8±0.1	0.8±0.1	0.8±0.1	0.6±0.1	0.6±0.1	0.6±0.1	
3.9 pF	0.3±0.03	0.5±0.05	0.8±0.1	0.8±0.1	0.8±0.1	0.6±0.1	0.6±0.1	0.6±0.1	
4.7 pF	0.3±0.03	0.5±0.05	0.8±0.1	0.8±0.1	0.8±0.1	0.6±0.1	0.6±0.1	0.6±0.1	
5.6 pF	0.3±0.03	0.5±0.05	0.8±0.1	0.8±0.1	0.8±0.1	0.6±0.1	0.6±0.1	0.6±0.1	
6.8 pF	0.3±0.03	0.5±0.05	0.8±0.1	0.8±0.1	0.8±0.1	0.6±0.1	0.6±0.1	0.6±0.1	
8.2 pF	0.3±0.03	0.5±0.05	0.8±0.1	0.8±0.1	0.8±0.1	0.6±0.1	0.6±0.1	0.6±0.1	
10 pF	0.3±0.03	0.5±0.05	0.8±0.1	0.8±0.1	0.8±0.1	0.6±0.1	0.6±0.1	0.6±0.1	
12 pF	0.3±0.03	0.5±0.05	0.8±0.1	0.8±0.1	0.8±0.1	0.6±0.1	0.6±0.1	0.6±0.1	
15 pF	0.3±0.03	0.5±0.05	0.8±0.1	0.8±0.1	0.8±0.1	0.6±0.1	0.6±0.1	0.6±0.1	
18 pF	0.3±0.03	0.5±0.05	0.8±0.1	0.8±0.1	0.8±0.1	0.6±0.1	0.6±0.1	0.6±0.1	
22 pF	0.3±0.03	0.5±0.05	0.8±0.1	0.8±0.1	0.8±0.1	0.6±0.1	0.6±0.1	0.6±0.1	
27 pF	0.3±0.03	0.5±0.05	0.8±0.1	0.8±0.1	0.8±0.1	0.6±0.1	0.6±0.1	0.6±0.1	
33 pF	0.3±0.03	0.5±0.05	0.8±0.1	0.8±0.1	0.8±0.1	0.6±0.1	0.6±0.1	0.6±0.1	
39 pF		0.5±0.05	0.8±0.1	0.8±0.1	0.8±0.1	0.6±0.1	0.6±0.1	0.6±0.1	
47 pF		0.5±0.05	0.8±0.1	0.8±0.1	0.8±0.1	0.6±0.1	0.6±0.1	0.6±0.1	
56 pF		0.5±0.05	0.8±0.1	0.8±0.1	0.8±0.1	0.6±0.1	0.6±0.1	0.6±0.1	
68 pF		0.5±0.05	0.8±0.1	0.8±0.1	0.8±0.1	0.6±0.1	0.6±0.1	0.6±0.1	
82 pF		0.5±0.05	0.8±0.1	0.8±0.1	0.8±0.1	0.6±0.1	0.6±0.1	0.6±0.1	
100 pF		0.5±0.05	0.8±0.1	0.8±0.1	0.8±0.1	0.6±0.1	0.6±0.1	0.6±0.1	

**NOTE**

1. Values in shaded cells indicate thickness class in mm
2. Capacitance value of non E-12 series is on request

**CAPACITANCE RANGE & THICKNESS FOR NPO**

**Table 3** Sizes from 0402 to 0805 (continued)

CAP.	0402		0603		0805		
	25 V / 50 V	25 V / 50 V	100 V	200 V / 250 V	50 V	100 V	200 V / 250 V
120 pF	0.5±0.05	0.8±0.1	0.8±0.1	0.8±0.1	0.6±0.1	0.6±0.1	0.6±0.1
150 pF	0.5±0.05	0.8±0.1	0.8±0.1	0.8±0.1	0.6±0.1	0.6±0.1	0.6±0.1
180 pF	0.5±0.05	0.8±0.1	0.8±0.1	0.8±0.1	0.6±0.1	0.6±0.1	0.6±0.1
220 pF	0.5±0.05	0.8±0.1	0.8±0.1	0.8±0.1	0.6±0.1	0.6±0.1	0.85±0.1
270 pF	0.5±0.05	0.8±0.1	0.8±0.1	0.8±0.1	0.6±0.1	0.6±0.1	0.85±0.1
330 pF	0.5±0.05	0.8±0.1	0.8±0.1	0.8±0.1	0.6±0.1	0.6±0.1	0.85±0.1
390 pF	0.5±0.05	0.8±0.1	0.8±0.1	0.8±0.1	0.6±0.1	0.6±0.1	0.85±0.1
470 pF	0.5±0.05	0.8±0.1	0.8±0.1	0.8±0.1	0.6±0.1	0.6±0.1	0.85±0.1
560 pF	0.5±0.05	0.8±0.1	0.8±0.1	0.8±0.1	0.6±0.1	0.85±0.1	0.85±0.1
680 pF	0.5±0.05	0.8±0.1	0.8±0.1	0.8±0.1	0.6±0.1	0.85±0.1	0.85±0.1
820 pF	0.5±0.05	0.8±0.1	0.8±0.1		0.6±0.1	0.85±0.1	0.85±0.1
1.0 nF	0.5±0.05	0.8±0.1	0.8±0.1		0.6±0.1	0.85±0.1	0.85±0.1
1.2 nF		0.8±0.1	0.8±0.1		0.85±0.1	0.85±0.1	
1.5 nF		0.8±0.1	0.8±0.1		0.85±0.1	0.85±0.1	
1.8 nF		0.8±0.1	0.8±0.1		0.85±0.1	0.85±0.1	
2.2 nF		0.8±0.1	0.8±0.1		1.25±0.2	1.25±0.2	
2.7 nF		0.8±0.1			1.25±0.2	1.25±0.2	
3.3 nF		0.8±0.1			1.25±0.2	1.25±0.2	
3.9 nF		0.8±0.1			1.25±0.2	1.25±0.2	
4.7 nF		0.8±0.1			1.25±0.2	1.25±0.2	
5.6 nF		0.8±0.1			1.25±0.2	1.25±0.2	
6.8 nF		0.8±0.1			1.25±0.2	1.25±0.2	
8.2 nF		0.8±0.1			1.25±0.2	1.25±0.2	
10 nF		0.8±0.1			1.25±0.2	1.25±0.2	

**NOTE**

1. Values in shaded cells indicate thickness class in mm
2. Capacitance value of non E-12 series is on request

**CAPACITANCE RANGE & THICKNESS FOR NPO**

Table 4 Sizes from 1206 to 1210

CAP.	1206							1210			
	50 V	100 V	200 V / 250 V	500 V	630 V	1000 V	2000 V	50 V	100 V	200 V / 250 V	500 V
10 pF	0.6±0.1	0.6±0.1	0.6±0.1	0.6±0.1	1.25±0.2	1.25±0.2	1.25±0.2				
12 pF	0.6±0.1	0.6±0.1	0.6±0.1	0.6±0.1	1.25±0.2	1.25±0.2	1.25±0.2				
15 pF	0.6±0.1	0.6±0.1	0.6±0.1	0.6±0.1	1.25±0.2	1.25±0.2	1.25±0.2				
18 pF	0.6±0.1	0.6±0.1	0.6±0.1	0.6±0.1	1.25±0.2	1.25±0.2	1.25±0.2				
22 pF	0.6±0.1	0.6±0.1	0.6±0.1	0.6±0.1	1.25±0.2	1.25±0.2	1.25±0.2				
27 pF	0.6±0.1	0.6±0.1	0.6±0.1	0.6±0.1	1.25±0.2	1.25±0.2	1.25±0.2				
33 pF	0.6±0.1	0.6±0.1	0.6±0.1	0.6±0.1	1.25±0.2	1.25±0.2	1.25±0.2				
39 pF	0.6±0.1	0.6±0.1	0.6±0.1	0.6±0.1	1.25±0.2	1.25±0.2	1.25±0.2				
47 pF	0.6±0.1	0.6±0.1	0.6±0.1	0.6±0.1	1.25±0.2	1.25±0.2	1.25±0.2				
56 pF	0.6±0.1	0.6±0.1	0.6±0.1	0.6±0.1	1.25±0.2	1.25±0.2					
68 pF	0.6±0.1	0.6±0.1	0.6±0.1	0.6±0.1	1.25±0.2	1.25±0.2					
82 pF	0.6±0.1	0.6±0.1	0.6±0.1	0.6±0.1	1.25±0.2	1.25±0.2					
100 pF	0.6±0.1	0.6±0.1	0.6±0.1	0.6±0.1	1.25±0.2	1.25±0.2					
120 pF	0.6±0.1	0.6±0.1	0.6±0.1	0.6±0.1	1.25±0.2	1.25±0.2					
150 pF	0.6±0.1	0.6±0.1	0.6±0.1	0.6±0.1	1.25±0.2	1.25±0.2					
180 pF	0.6±0.1	0.6±0.1	0.6±0.1	0.6±0.1	1.25±0.2	1.25±0.2					
220 pF	0.6±0.1	0.6±0.1	0.6±0.1	0.6±0.1	1.25±0.2	1.25±0.2					
270 pF	0.6±0.1	0.6±0.1	0.6±0.1	0.6±0.1	1.25±0.2						
330 pF	0.6±0.1	0.6±0.1	0.6±0.1	0.6±0.1	1.25±0.2						
390 pF	0.6±0.1	0.6±0.1	0.6±0.1	0.6±0.1	1.25±0.2						
470 pF	0.6±0.1	0.6±0.1	0.6±0.1	0.6±0.1	1.25±0.2						
560 pF	0.6±0.1	0.6±0.1	0.6±0.1	0.6±0.1	1.25±0.2						
680 pF	0.6±0.1	0.6±0.1	0.6±0.1	0.6±0.1	1.25±0.2						
820 pF	0.6±0.1	0.6±0.1	0.85±0.1	0.85±0.1	1.25±0.2						
1.0 nF	0.6±0.1	0.6±0.1	0.85±0.1	0.85±0.1	1.25±0.2			1.25±0.2	1.25±0.2	1.25±0.2	1.25±0.2
1.2 nF	0.6±0.1	0.6±0.1	0.85±0.1					1.25±0.2	1.25±0.2	1.25±0.2	1.25±0.2
1.5 nF	0.6±0.1	0.6±0.1	0.85±0.1					1.25±0.2	1.25±0.2	1.25±0.2	1.25±0.2
1.8 nF	0.6±0.1	0.6±0.1						1.25±0.2	1.25±0.2	1.25±0.2	1.25±0.2
2.2 nF	0.6±0.1	0.6±0.1						1.25±0.2	1.25±0.2	1.25±0.2	
2.7 nF	0.6±0.1	0.6±0.1						1.25±0.2	1.25±0.2	1.25±0.2	

**NOTE**

- 1. Values in shaded cells indicate thickness class in mm
- 2. Capacitance value of non E-12 series is on request

**CAPACITANCE RANGE & THICKNESS FOR X7R**

Table 5 Sizes from 0201 to 0603

CAP.	0201		0402				0603					
	25V	50 V	10V	16 V	25 V	50 V	100 V	10V	16 V	25 V	50 V	100 V
100 pF	0.3±0.03	0.3±0.03										
150 pF	0.3±0.03	0.3±0.03										
220 pF	0.3±0.03	0.3±0.03	0.5±0.05	0.5±0.05	0.5±0.05	0.5±0.05	0.5±0.05					
330 pF	0.3±0.03	0.3±0.03	0.5±0.05	0.5±0.05	0.5±0.05	0.5±0.05	0.5±0.05					
470 pF	0.3±0.03	0.3±0.03	0.5±0.05	0.5±0.05	0.5±0.05	0.5±0.05	0.5±0.05					
680 pF	0.3±0.03	0.3±0.03	0.5±0.05	0.5±0.05	0.5±0.05	0.5±0.05	0.5±0.05					
1.0 nF	0.3±0.03	0.3±0.03	0.5±0.05	0.5±0.05	0.5±0.05	0.5±0.05	0.5±0.05	0.8±0.1	0.8±0.1	0.8±0.1	0.8±0.1	0.8±0.1
1.5 nF	0.3±0.03		0.5±0.05	0.5±0.05	0.5±0.05	0.5±0.05	0.5±0.05	0.8±0.1	0.8±0.1	0.8±0.1	0.8±0.1	0.8±0.1
2.2 nF	0.3±0.03		0.5±0.05	0.5±0.05	0.5±0.05	0.5±0.05		0.8±0.1	0.8±0.1	0.8±0.1	0.8±0.1	0.8±0.1
3.3 nF	0.3±0.03		0.5±0.05	0.5±0.05	0.5±0.05	0.5±0.05		0.8±0.1	0.8±0.1	0.8±0.1	0.8±0.1	0.8±0.1
4.7 nF	0.3±0.03		0.5±0.05	0.5±0.05	0.5±0.05	0.5±0.05		0.8±0.1	0.8±0.1	0.8±0.1	0.8±0.1	0.8±0.1
6.8 nF	0.3±0.03		0.5±0.05	0.5±0.05	0.5±0.05	0.5±0.05		0.8±0.1	0.8±0.1	0.8±0.1	0.8±0.1	0.8±0.1
10 nF	0.3±0.03		0.5±0.05	0.5±0.05	0.5±0.05	0.5±0.05		0.8±0.1	0.8±0.1	0.8±0.1	0.8±0.1	0.8±0.1
15 nF			0.5±0.05	0.5±0.05	0.5±0.05	0.5±0.05		0.8±0.1	0.8±0.1	0.8±0.1	0.8±0.1	0.8±0.1
22 nF			0.5±0.05	0.5±0.05	0.5±0.05	0.5±0.05		0.8±0.1	0.8±0.1	0.8±0.1	0.8±0.1	0.8±0.1
33 nF			0.5±0.05	0.5±0.05	0.5±0.05	0.5±0.05		0.8±0.1	0.8±0.1	0.8±0.1	0.8±0.1	0.8±0.1
47 nF			0.5±0.05	0.5±0.05	0.5±0.05	0.5±0.05		0.8±0.1	0.8±0.1	0.8±0.1	0.8±0.1	0.8±0.1
68 nF			0.5±0.05	0.5±0.05	0.5±0.05	0.5±0.05		0.8±0.1	0.8±0.1	0.8±0.1	0.8±0.1	0.8±0.1
100 nF			0.5±0.05	0.5±0.05	0.5±0.05	0.5±0.05		0.8±0.1	0.8±0.1	0.8±0.1	0.8±0.1	0.8±0.1
150 nF								0.8±0.1	0.8±0.1	0.8±0.1	0.8±0.1	
220 nF								0.8±0.1	0.8±0.1	0.8±0.1	0.8±0.1	
330 nF								0.8±0.1	0.8±0.1	0.8±0.1		
470 nF								0.8±0.1	0.8±0.1	0.8±0.1		
680 nF								0.8±0.1	0.8±0.1	0.8±0.1		

**NOTE**

1. Values in shaded cells indicate thickness class in mm
2. Capacitance value of non E-6 series is on request

**CAPACITANCE RANGE & THICKNESS FOR X7R**

Table 6 Size 0805

CAP.	0805						
	10 V	16 V	25 V	50 V	100 V	200 V / 250 V	500 V
1.0 nF	0.85±0.1	0.85±0.1	0.85±0.1	0.85±0.1	0.85±0.1	0.85±0.1	0.85±0.1
1.5 nF	0.85±0.1	0.85±0.1	0.85±0.1	0.85±0.1	0.85±0.1	0.85±0.1	0.85±0.1
2.2 nF	0.85±0.1	0.85±0.1	0.85±0.1	0.85±0.1	0.85±0.1	0.85±0.1	0.85±0.1
3.3 nF	0.85±0.1	0.85±0.1	0.85±0.1	0.85±0.1	0.85±0.1	0.85±0.1	0.85±0.1
4.7 nF	0.85±0.1	0.85±0.1	0.85±0.1	0.85±0.1	0.85±0.1	0.85±0.1	0.85±0.1
6.8 nF	0.85±0.1	0.85±0.1	0.85±0.1	0.85±0.1	0.85±0.1	1.25±0.2	
10 nF	0.85±0.1	0.85±0.1	0.85±0.1	0.85±0.1	0.85±0.1	1.25±0.2	
15 nF	0.85±0.1	0.85±0.1	0.85±0.1	0.85±0.1	0.85±0.1	1.25±0.2	
22 nF	0.85±0.1	0.85±0.1	0.85±0.1	0.85±0.1	0.85±0.1	1.25±0.2	
33 nF	0.85±0.1	0.85±0.1	0.85±0.1	0.85±0.1	1.25±0.2		
47 nF	0.85±0.1	0.85±0.1	0.85±0.1	0.85±0.1	1.25±0.2		
68 nF	0.85±0.1	0.85±0.1	0.85±0.1	0.85±0.1 1.25±0.2	1.25±0.2		
100 nF	0.85±0.1	0.85±0.1	0.85±0.1	0.85±0.1 1.25±0.2	1.25±0.2		
150 nF	0.85±0.1	0.85±0.1	0.85±0.1	1.25±0.2			
220 nF	0.85±0.1	0.85±0.1	0.85±0.1	1.25±0.2			
330 nF	1.25±0.2	1.25±0.2	1.25±0.2	1.25±0.2			
470 nF	1.25±0.2	1.25±0.2	1.25±0.2	1.25±0.2			
680 nF	1.25±0.2	1.25±0.2	1.25±0.2	1.25±0.2			

**NOTE**

1. Values in shaded cells indicate thickness class in mm
2. Capacitance value of non E-6 series is on request



**CAPACITANCE RANGE & THICKNESS FOR X7R**

Table 7 Size 1206

CAP.	1206									
	6.3 V	10V	16V	25V	50 V	100 V	200 V / 250 V	500 V	630 V	1000 V
220 pF								1.25±0.2	1.25±0.2	1.25±0.2
330 pF								1.25±0.2	1.25±0.2	1.25±0.2
470 pF								1.25±0.2	1.25±0.2	1.25±0.2
680 pF								1.25±0.2	1.25±0.2	1.25±0.2
1 nF								1.25±0.2	1.25±0.2	1.25±0.2
2.2 nF								1.25±0.2	1.25±0.2	
4.7 nF								1.25±0.2	1.25±0.2	
10 nF								1.25±0.2	1.25±0.2	
22 nF	0.85±0.1	0.85±0.1	0.85±0.1	0.85±0.1	0.85±0.1	0.85±0.1	1.25±0.2			
33 nF	0.85±0.1	0.85±0.1	0.85±0.1	0.85±0.1	0.85±0.1	0.85±0.1	1.60±0.2			
47 nF	0.85±0.1	0.85±0.1	0.85±0.1	0.85±0.1	0.85±0.1	0.85±0.1	1.60±0.2			
68 nF	0.85±0.1	0.85±0.1	0.85±0.1	0.85±0.1	0.85±0.1	1.25±0.2	1.60±0.2			
100 nF	0.85±0.1	0.85±0.1	0.85±0.1	0.85±0.1	0.85±0.1	1.25±0.2	1.60±0.2			
150 nF	0.85±0.1	0.85±0.1	0.85±0.1	0.85±0.1	1.25±0.2	1.25±0.2				
220 nF	0.85±0.1	0.85±0.1	0.85±0.1	0.85±0.1	1.25±0.2	1.25±0.2				
330 nF	0.85±0.1	0.85±0.1	0.85±0.1	0.85±0.1	1.60±0.2	1.60±0.2				
470 nF	1.00±0.1	1.00±0.1	1.00±0.1	1.00±0.1	1.60±0.2	1.60±0.2				
680 nF	1.15±0.1	1.15±0.1	1.15±0.1	1.60±0.2	1.60±0.2	1.60±0.2				

Table 8 Size 1210

CAP.	1210							1812	
	6.3V	10 V	16 V	25 V	50V	100 V	200 V / 250 V	50V	100V
100 nF	0.85±0.1	0.85±0.1	0.85±0.1	0.85±0.1	0.85±0.1	0.85±0.1	1.25±0.2		
150 nF	0.85±0.1	0.85±0.1	0.85±0.1	0.85±0.1	1.25±0.2	1.25±0.2			
220 nF	0.85±0.1	0.85±0.1	0.85±0.1	0.85±0.1	1.25±0.2	1.25±0.2			
330 nF	0.85±0.1	0.85±0.1	0.85±0.1	0.85±0.1	1.25±0.2	2.0±0.2			
470 nF	1.25±0.2	1.25±0.2	1.25±0.2	1.25±0.2	1.25±0.2	2.0±0.2		1.60±0.2	1.60±0.2
680 nF	1.25±0.2	1.25±0.2	1.25±0.2	1.25±0.2	1.25±0.2	2.0±0.2		1.60±0.2	1.60±0.2

**NOTE**

1. Values in shaded cells indicate thickness class in mm
2. Capacitance value of non E-6 series is on request

**THICKNESS CLASSES AND PACKING QUANTITY**

Table 9

SIZE CODE	THICKNESS CLASSIFICATION	PACKING CODE		TAPE WIDTH	QUANTITY PER REEL			
		7 INCH	13 INCH		Ø180 MM / 7 INCH		Ø330 MM / 13 INCH	
					Paper	Blister	Paper	Blister
<b>0201</b>	0.3 ±0.03 mm	R	P	8 mm	15,000	---	50,000	---
<b>0402</b>	0.5 ±0.05 mm	R	P	8 mm	10,000	---	50,000	---
<b>0603</b>	0.8 ±0.1 mm	R	P	8 mm	4,000	---	15,000	---
<b>0805</b>	0.6 ±0.1 mm	R	P	8 mm	4,000	---	20,000	---
	0.85 ±0.1 mm	R	P	8 mm	4,000	---	15,000	---
	1.25 ±0.2 mm	K	F	8 mm	---	3,000	---	10,000
<b>1206</b>	0.6 ±0.1 mm	R	P	8 mm	4,000	---	20,000	---
	0.85 ±0.1 mm	R	P	8 mm	4,000	---	15,000	---
	1.0/1.15 ±0.1 mm	K	F	8 mm	---	3,000	---	10,000
	1.25 ±0.2 mm	K	F	8 mm	---	3,000	---	10,000
	1.60 ±0.2 mm	K	F	8 mm	---	2,000	---	8,000
<b>1210</b>	0.85 ±0.1 mm	K	F	8 mm	---	4,000	---	10,000
	1.15 ±0.1 mm	K	F	8 mm	---	3,000	---	10,000
	1.25 ±0.2 mm	K	F	8 mm	---	3,000	---	10,000
	2.0 ±0.2 mm	K		8 mm	---	2,000	---	---
	2.5 ±0.2 mm	K		8 mm	---	1,000	---	---
<b>1812</b>	0.6 / 0.85±0.1 mm	K		12 mm	---	2,000	---	---
	1.15±0.1 mm	K		12 mm	---	1,000	---	---
	1.25±0.2 mm	K		12 mm	---	1,000	---	---
	1.6 ±0.2 mm	K		12 mm	---	2,000	---	---

**PAPER/PE TAPE SPECIFICATION**

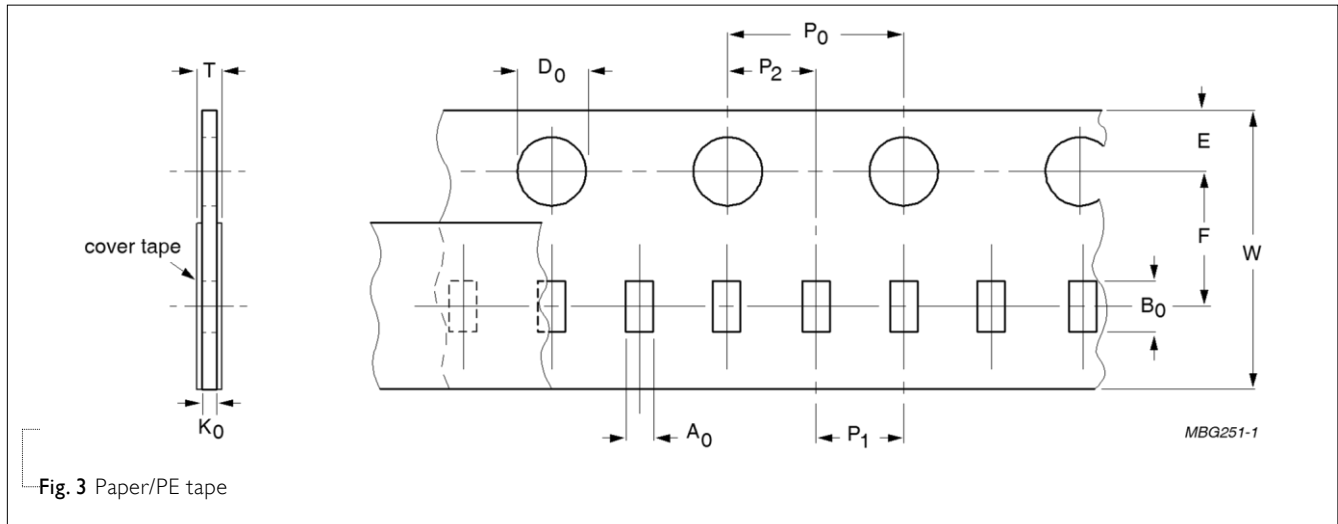


Fig. 3 Paper/PE tape

Table 10 Dimensions of paper/PE tape for relevant chip size; see Fig.3

SIZE	SYMBOL											Unit: mm
CODE	A <sub>0</sub>	B <sub>0</sub>	W	E	F	P <sub>0</sub> <sup>(1)</sup>	P <sub>1</sub>	P <sub>2</sub>	ØD <sub>0</sub>	K <sub>0</sub>	T	
0201	0.39 ± 0.06	0.70 ± 0.06	8.0 ± 0.20	1.75 ± 0.1	3.50 ± 0.05	4.0 ± 0.05	2.0 ± 0.05	2.0 ± 0.05	1.55 ± 0.03	0.38 ± 0.05	(0.47 / 0.55)±0.10	
0402	0.70 ± 0.15	1.21 ± 0.12	8.0 ± 0.20	1.75 ± 0.1	3.50 ± 0.05	4.0 ± 0.05	2.0 ± 0.05	2.0 ± 0.05	1.50 +0.1 /-0	(0.75 / 0.60)±0.10	(0.85 / 0.70)±0.10	
0603	1.05 ± 0.14	1.86 ± 0.13	8.0 ± 0.20	1.75 ± 0.1	3.50 ± 0.05	4.0 ± 0.10	4.0 ± 0.10	2.0 ± 0.05	1.50 +0.1 /-0	(1.05 / 0.95 / 0.75)±0.10	(1.15 / 1.05 / 0.85)±0.10	
0805	1.50 ± 0.15	2.26 ± 0.20	8.0 ± 0.20	1.75 ± 0.1	3.50 ± 0.05	4.0 ± 0.10	4.0 ± 0.10	2.0 ± 0.05	1.50 +0.1 /-0	(1.05 / 0.95 / 0.75)±0.10	(1.15 / 1.05 / 0.85)±0.10	
1206	1.90 ± 0.15	3.50 ± 0.20	8.0 ± 0.20	1.75 ± 0.1	3.50 ± 0.05	4.0 ± 0.10	4.0 ± 0.10	2.0 ± 0.05	1.50 +0.1 /-0	(0.95 / 0.75)±0.10	(1.05 / 0.85)± 0.10	

**NOTE**

I. P<sub>0</sub> pitch tolerance over any 10 pitches is ±0.2 mm

**BLISTER TAPE SPECIFICATION**

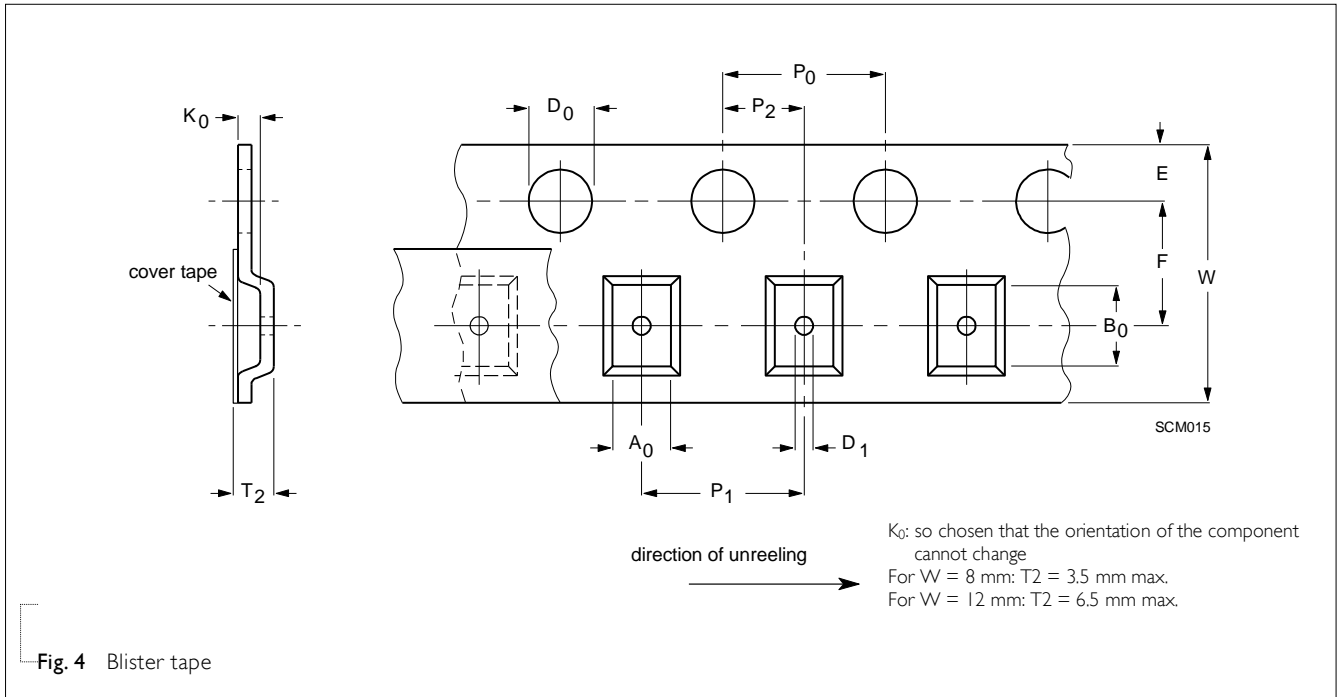


Fig. 4 Blister tape

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

SIZE CODE	SYMBOL												Unit: mm			
	A <sub>0</sub>		B <sub>0</sub>		K <sub>0</sub>		W	E	F	ØD <sub>0</sub>	ØD <sub>1</sub>	P <sub>0</sub> <sup>(2)</sup>	P <sub>1</sub>	P <sub>2</sub>	T <sub>2</sub>	
	Min.	Max.	Min.	Max.	Min.	Max.					Min.				Min.	Max.
0805	1.29	1.65	2.09	2.60	1.25	1.62	8.1 ±0.20	1.75 ±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	1.30	1.67
1206	1.65	2.12	3.30	3.75	1.22	2.15	8.1 ±0.20	1.75 ±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	1.27	2.20
1210	2.55	3.02	3.31	3.88	0.97	2.92	8.1 ±0.20	1.75 ±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	1.02	2.97
1808	2.05	2.55	4.80	5.45	1.30	2.45	12.1 ±0.20	1.75 ±0.1	5.5 ±0.05	1.5 +0.1/-0.0	1.5 +0.1/-0.0	4.0 ±0.10	4.0 ±0.10	2.0 ±0.05	1.35	2.50
1812	3.35	3.75	4.70	5.33	0.70	2.40	12.1 ±0.20	1.75 ±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	0.75	2.45

**NOTE**

1. Typical capacitor displacement in pocket
2. P<sub>0</sub> pitch tolerance over any 10 pitches is ±0.2 mm

**REEL SPECIFICATION**

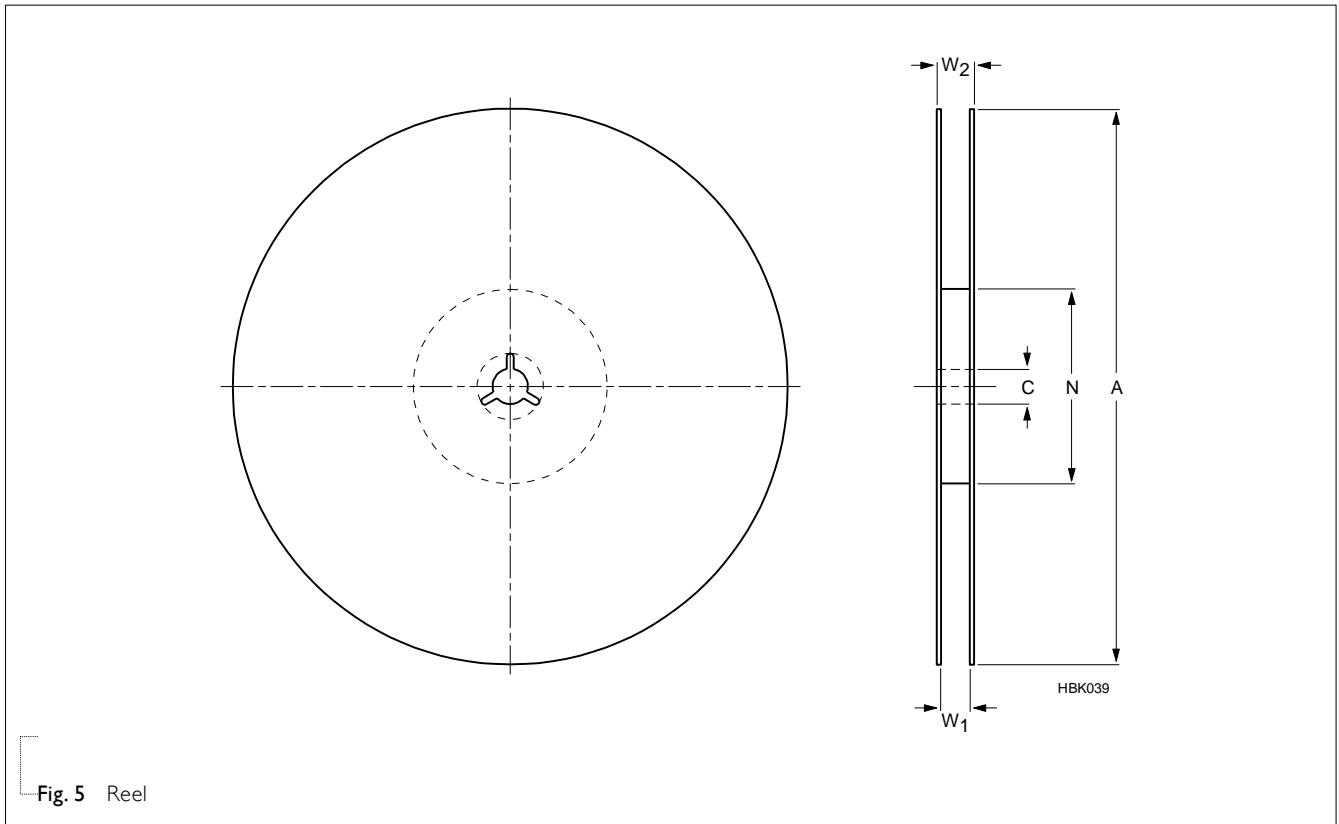


Fig. 5 Reel

Table 12 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	9.4 ±1.5	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:  $<10^{10}$  X/sq.

**ELECTRICAL CHARACTERISTICS****NP0/X7R DIELECTRIC CAPACITORS; NI/SIN TERMINATIONS**

Unless otherwise specified, all test and measurements shall be made under standard atmospheric conditions for testing as given in 5.3 of IEC 60068-1:

- Temperature: 15 °C to 35 °C
- Relative humidity: 25% to 75%
- Air pressure: 86 kPa to 106 kPa

Before the measurements are made, the capacitor shall be stored at the measuring temperature for a time sufficient to allow the entire capacitor to reach this temperature.

The period as prescribed for recovery at the end of a test is normally sufficient for this purpose.

Table 13

DESCRIPTION		VALUE						
Capacitance range		0.2 pF to 680 nF						
Dissipation factor (D.F.)								
NP0	C < 30 pF	≤ 1 / ( 400 + 20C )						
	C ≥ 30 pF	≤ 0.1 %						
X7R	0201	0402	0603	0805	1206	1210	1812	
≤10V		220pF to 100nF	1nF to 680nF	1nF to 680nF	22nF to 680nF	100nF to 680nF		≤ 5%
16V		220pF to 22nF	1nF to 220nF	1nF to 470nF	22nF to 680nF	100nF to 680nF		≤ 3.5%
		27nF to 100nF	470nF to 680nF	680nF				≤ 5%
25V	100pF to 470pF	220pF to 10nF	1nF to 39nF	1nF to 180nF	22nF to 680nF	100nF to 680nF		≤ 2.5%
		12nF to 27nF	47nF to 220nF	220nF				≤ 3.5%
	560pF to 10nF	33nF to 100nF	330nF to 680nF	330nF to 680nF				≤ 5%
50V	100pF to 470nF	220pF to 10nF	1nF to 39nF	1nF to 180nF	22nF to 470nF	100nF to 680nF	470nF to 680nF	≤ 2.5%
	560pF to 1nF		47nF to 220nF	220nF to 470nF				≤ 3.5%
		12nF to 100nF		680nF	680nF			≤ 5%
100V		220pF to 1.5nF	1nF to 10nF	1nF to 100nF	22nF to 470nF	100nF to 270nF	470nF to 680nF	≤ 2.5%
			12nF to 100nF		560nF to 680nF	330nF to 680nF		≤ 5%
250V				1nF to 22nF	22nF to 100nF	100nF		≤ 2.5%
500V				1nF to 4.7nF	220pF to 10nF			≤ 2.5%
630V					220pF to 10nF			≤ 2.5%
1KV					220pF to 1nF			≤ 2.5%
Insulation resistance after 1 minute at U <sub>r</sub> (DC)								
General (NP0)		I.R. ≥ 100 GΩ or I.R. × C ≥ 1000Ω.F. whichever is less						
General (X7R)		I.R. ≥ 10 GΩ or I.R. × C ≥ 500Ω.F. whichever is less						
0603 / 25V/ 330nF to 680nF		I.R. × C ≥ 100 Ω.F.						
Operating temperature range:								
NP0/X7R		-55 °C to +125 °C						

**SOLDERING RECOMMENDATION**

Table 14

SOLDERING METHOD	SIZE 0201	0402	0603	0805	1206	≥ 1210
Reflow	Reflow only	≥ 0.1 μF	≥ 1.0 μF	≥ 2.2 μF	≥ 4.7 μF	Reflow only
Reflow/Wave		< 0.1 μF	< 1.0 μF	< 2.2 μF	< 4.7 μF	---

**SOLDERING CONDITIONS**

The lead free MLCCs are able to stand the reflow soldering conditions as below:

- Temperature: above 220 °C
- Endurance: 95 to 120 seconds
- Cycles: 3 times

The test of "soldering heat resistance" is carried out in accordance with the schedule of "MIL-STD-202G-method 210F", "The robust construction of chip capacitors allows them to be completely immersed in a solder bath of 260 °C for 10 seconds". Therefore, it is possible to mount MLCCs on one side of a PCB and other discrete components on the reverse (mixed PCBs). Surface Mount Capacitors are tested for solderability at 245 °C during 2 seconds. The test condition for no leaching is 260°C for 30 seconds.

**TESTS AND REQUIREMENTS**

Table 15 Test procedures and requirements

NO	AEC-Q200 TEST	TEST METHOD	REQUIREMENTS
1	High Temperature Exposure	Unpowered ; 1000hours @ T=150 °C Measurement at 24±2 hours after test conclusion.	No visual damage
			ΔC/C NPO: Within ±2.5% or 0.25 pF, whichever is greater X7R: Within ±10%
			D.F.: within initial specified value
			IR: within initial specified value
2	Temperature Cycling	Preconditioning: 150 +0/-10 °C for 1 hour, then keep for 24 ±1 hours at room temperature  1000 cycles with following detail: 30 minutes at lower category temperature 30 minutes at upper category temperature  Recovery time 24 ±2 hours	No visual damage
			ΔC/C NPO: Within ±2.5% or 0.25 pF, whichever is greater X7R: ±10%
			D.F. meet initial specified value
			IR meet initial specified value
3	Destructive Physical Analysis	Electrical test not required.	

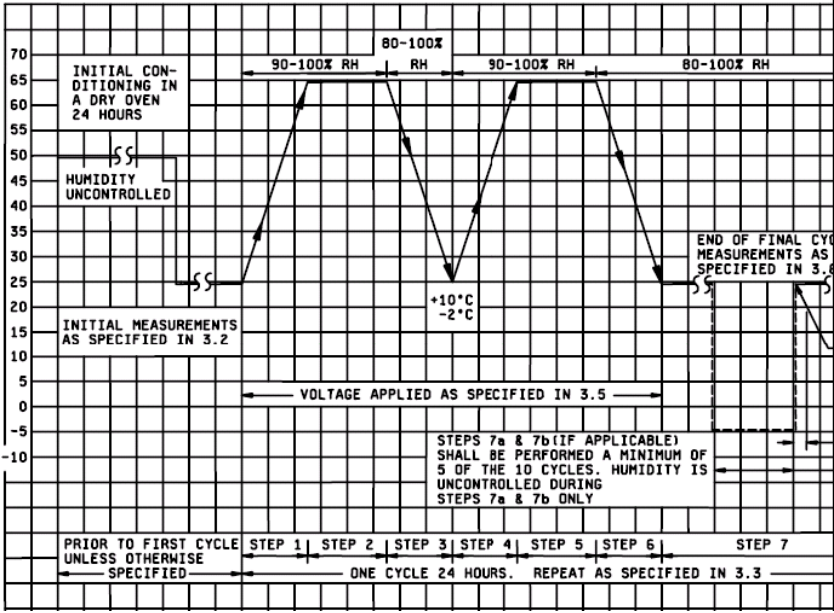
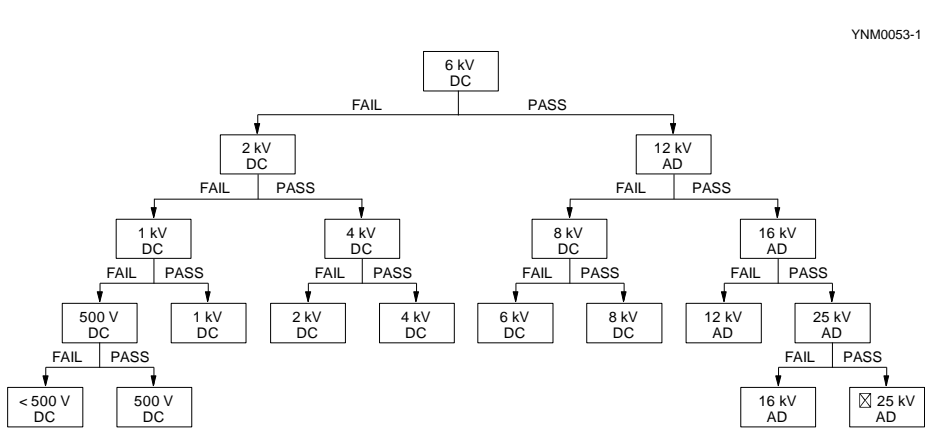
NO	AEC-Q200 TEST	TEST METHOD	REQUIREMENTS
4	Moisture Resistance	<p>T=24 hrs/per cycle; 10 continuous cycles unpowered. Measurement at 24 ±2 hours after test condition.</p> 	<p>No visual damage</p> <p>ΔC/C NPO: Within ±3% or 3 pF, whichever is greater X7R: ±15%</p> <p>D.F. Within initial specified value</p> <p>IR Meet initial specified value</p>
5	Biased Humidity	<ol style="list-style-type: none"> <li>Preconditioning, class 2 only: 150 +0/-10 °C /1 hour, then keep for 24 ±1 hour at room temp</li> <li>Initial measure: Spec. refer to initial spec. C. D. I.R. Note: Series with 100 KΩ</li> <li>Test condition: 85 °C, 85% R.H. connected with 100 KΩ resistor, applied 1.5V/U<sub>r</sub> (no more than 630V) for 1,000 hours.</li> <li>Recovery: NPO: 6 to 24 hours X7R: 24 ±2 hours</li> <li>Final measure: C. D. I.R.</li> </ol>	<p>No visual damage after recovery</p> <p>ΔC/C NPO: Within ±2% or 1 pF, whichever is greater X7R: ±15%</p> <p>D.F. NPO: ≤ 2 × specified value. X7R: (1) ≤ 16V: ≤ 7% or specified value whichever is greater (2) ≥ 25V: ≤ 5% or specified value whichever is greater</p> <p>I.R. The insulation resistance shall greater than 10% of initial spec.</p>

Fig. 6 Moisture resistant

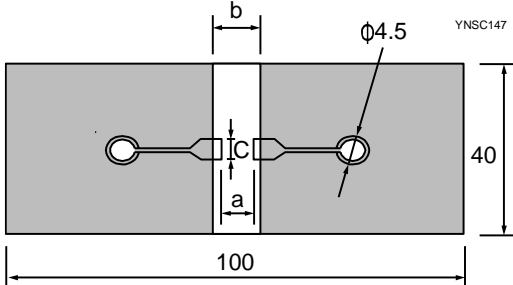


NO	AEC-Q200 TEST	TEST METHOD	REQUIREMENTS
6	High Temperature Operational Life	1. Preconditioning, class 2 only: 150 +0/-10 °C /1 hour, then keep for 24 ±1 hour at room temp 2. Initial measure: Spec: refer to initial spec C, D, IR 3. Endurance test: Temperature: 125 °C Specified stress voltage applied for 1,000 hours: Applied 2.0 × Ur for general products * High voltage series follows with below stress condition: Applied 1.5 × Ur for 200V, 250V series Applied 1.3 × Ur for 500V, 630V series Applied 1.2 × Ur for 1KV, 2KV, 3KV series Recovery time: 24 ±2 hours Final measure: C, D, IR Note: If the capacitance value is less than the minimum value permitted, then after the other measurements have been made the capacitor shall be preconditioned according to "IEC 60384 4.1" and then the requirement shall be met. * Applied 1.5 × Ur 0402/X7R/50V/>10nF 0603/X7R/25V/>220nF; 0603/X7R/50V/220nF 0603/X7R/100V/≥100nF 0805/X7R/100V/≥ 470nF	No visual damage
			$\Delta C/C$ NPO: Within ±2% or 1 pF, whichever is greater X7R: ±15%
			D.F. NPO: ≤ 2 × specified value. X7R: (1) ≤ 16V: ≤ 7% or specified value whichever is greater (2) ≥ 25V: ≤ 5% or specified value whichever is greater
			IR NPO: ≥ 4,000 MΩ or IR × Cr ≥ 40Ω.F. whichever is less X7R: ≥ 1,000 MΩ or IR × Cr ≥ 50Ω.F. whichever is less * * IR × Cr ≥ 10Ω.F. 0603/25V/>220nF
7	External Visual	Any applicable method using × 10 magnification	In accordance with specification
8	Physical Dimension	Verify physical dimensions to the applicable device specification.	In accordance with specification
9	Mechanical Shock	Three shocks in each direction shall be applied along the three mutually perpendicular axes of the test specimen (18 shocks) Peak value: 1,500 g's Duration: 0.5 ms Velocity change: 15.4 ft/s Waveform: Half-sin	$\Delta C/C$ NPO: Within ±0.5% or 0.5 pF, whichever is greater X7R: ±10%
			D.F. Within initial specified value
			IR Within initial specified value
10	Vibration	5 g's for 20 minutes, 12 cycles each of 3 orientations. Test from 10-2000 Hz.	$\Delta C/C$ NPO: Within ±0.5% or 0.5 pF, whichever is greater X7R: ±10%
			D.F: meet initial specified value
			IR meet initial specified value

NO	AEC-Q200 TEST	TEST METHOD	REQUIREMENTS
11	Resistance to Soldering Heat	Precondition: 150 +0/-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  ΔC/C NPO: Within ±1% or 0.5 pF, whichever is greater. X7R: ±10%  D.F. within initial specified value  IR within initial specified value
12	Thermal Shock	1. Preconditioning, class 2 only: 150 +0/-10 °C /1 hour, then keep for 24±1 hour at room temp 2. Initial measure: Spec: refer to initial spec C, D, IR 3. Rapid change of temperature test: -55 °C to +125 °C; 300 cycles 15 minutes at -55°C ; 15 minutes at 125 °C 4. Recovery time: NPO: 6 to 24 hours X7R: 24±2 hours 5. Final measure: C, D, IR	No visual damage  ΔC/C NPO: Within ±1% or 1 pF, whichever is greater  X7R: ±15%  D.F: meet initial specified value  IR meet initial specified value
13	ESD	Per AEC-Q200-002   <p style="text-align: right;">YNM0053-1</p> <p>Note: Classify the components according to the highest ESD voltage level survived during ESD testing.</p> <p><b>Fig. 7</b> Passive component HBM ESD test flow diagram (DC = Direct Contact Discharge, AD = Air Discharge)</p>	A component passes a voltage level if all components stressed at that voltage level pass.

NO	AEC-Q200 TEST	TEST METHOD	REQUIREMENTS
14	Solderability	1. Preheat at 155°C for 4 hours. After preheating, immerse the capacitor in a solution of ethanol and rosin (25% rosin in weight proportion). Immerse in eutectic solder solution for 5+0/-0.5 seconds at 235±5°C. 2. Should be placed into steam aging for 8 hours±15 minutes. After preheating, immerse the capacitor in a solution of ethanol and rosin (25% rosin in weight proportion). Immerse in eutectic solder solution for 5+0/-0.5 seconds at 235±5°C. 3. Should be placed into steam aging for 8 hours±15 minutes. After preheating, immerse the capacitor in a solution of Ethanol and rosin (25% rosin in weight proportion). Immerse in eutectic solder solution for 120±5 seconds at 260±5°C.	The solder should cover over 95% of the critical area of each termination.
15	Electrical Characterization	Capacitance NPO: f = 1 MHz for C ≤ 1nF, measuring at voltage 1 V <sub>rms</sub> at 25 °C f = 1 KHz for C > 1nF, measuring at voltage 1 V <sub>rms</sub> at 25 °C X7R: At 25 °C, 24 hours after annealing f = 1 KHz, measuring at voltage 1 V <sub>rms</sub> at 25 °C	Within specified tolerance
		Dissipation Factor (D.F.) NPO: f = 1 MHz for C ≤ 1nF, measuring at voltage 1 V <sub>rms</sub> at 25 °C f = 1 KHz for C > 1nF, measuring at voltage 1 V <sub>rms</sub> at 25 °C X7R: At 25 °C, 24 hours after annealing f = 1 KHz, measuring at voltage 1 V <sub>rms</sub> at 25 °C	In accordance with specification on Table 13
		Insulation Resistance (I.R.) At U <sub>r</sub> (DC) for 1 minute	In accordance with specification on Table 13

NO	AEC-Q200 TEST	TEST METHOD	REQUIREMENTS												
15	Electrical Characterization	<p>Capacitance shall be measured by the steps shown in the following table.</p> <p>The capacitance change should be measured after 5 min at each specified temperature stage.</p> <table border="1" data-bbox="533 501 984 734"> <thead> <tr> <th>Step</th> <th>Temperature(°C)</th> </tr> </thead> <tbody> <tr> <td>a</td> <td>25±2</td> </tr> <tr> <td>b</td> <td>Lower temperature±3°C</td> </tr> <tr> <td>c</td> <td>25±2</td> </tr> <tr> <td>d</td> <td>Upper Temperature±2°C</td> </tr> <tr> <td>e</td> <td>25±2</td> </tr> </tbody> </table> <p>(1) NPO Temperature Coefficient shall be calculated from the formula as below  <math display="block">\text{Temp. Coefficient} = \frac{C2 - C1}{C1 \times \Delta T} \times 10^6 \text{ [ppm/°C]}</math>                     C1: Capacitance at step c                      C2: Capacitance at 125°C                      ΔT: 100°C (=125°C -25°C)</p> <p>(2) X7R Capacitance Change shall be calculated from the formula as below  <math display="block">\Delta C = \frac{C2 - C1}{C1} \times 100\%</math>                     C1: Capacitance at step c                      C2: Capacitance at step b or d</p>	Step	Temperature(°C)	a	25±2	b	Lower temperature±3°C	c	25±2	d	Upper Temperature±2°C	e	25±2	<p>ΔC/C NPO: ±30ppm /°C</p> <p>X7R: ±15%</p>
		Step	Temperature(°C)												
a	25±2														
b	Lower temperature±3°C														
c	25±2														
d	Upper Temperature±2°C														
e	25±2														
Voltage Proof	No breakdown or flashover														

NO	AEC-Q200 TEST	TEST METHOD	REQUIREMENTS																																			
16	Board Flex	<p>Part mounted on a 100mm × 40mm FR4 PCB board, which is 1.6±0.2 mm thick and has a layer-thickness 35µm±10 µm. Part should be mounted using the following soldering reflow profile.</p> <p>Conditions:</p> <p>NPO: Bending 3 mm at a rate of 1 mm/s, radius jig 340 mm</p> <p>X7R: Bending 2 mm at a rate of 1 mm/s, radius jig 340 mm</p> <p>Test Substrate:</p>  <p style="text-align: right;">unit: mm</p>	<p>ΔC/C</p> <p>NPO: Within ±1% or 0.5 pF, whichever is greater</p> <p>X7R: ±10%</p> <table border="1" data-bbox="1152 607 1437 1025"> <thead> <tr> <th rowspan="2">Type</th> <th colspan="3">Dimension(mm)</th> </tr> <tr> <th>a</th> <th>b</th> <th>c</th> </tr> </thead> <tbody> <tr> <td>0201</td> <td>0.3</td> <td>0.9</td> <td>0.3</td> </tr> <tr> <td>0402</td> <td>0.4</td> <td>1.5</td> <td>0.5</td> </tr> <tr> <td>0603</td> <td>1.0</td> <td>3.0</td> <td>1.2</td> </tr> <tr> <td>0805</td> <td>1.2</td> <td>4.0</td> <td>1.65</td> </tr> <tr> <td>1206</td> <td>2.2</td> <td>5.0</td> <td>1.65</td> </tr> <tr> <td>1210</td> <td>2.2</td> <td>5.0</td> <td>2.0</td> </tr> <tr> <td>1808</td> <td>3.5</td> <td>7.0</td> <td>3.7</td> </tr> </tbody> </table>	Type	Dimension(mm)			a	b	c	0201	0.3	0.9	0.3	0402	0.4	1.5	0.5	0603	1.0	3.0	1.2	0805	1.2	4.0	1.65	1206	2.2	5.0	1.65	1210	2.2	5.0	2.0	1808	3.5	7.0	3.7
Type	Dimension(mm)																																					
	a	b	c																																			
0201	0.3	0.9	0.3																																			
0402	0.4	1.5	0.5																																			
0603	1.0	3.0	1.2																																			
0805	1.2	4.0	1.65																																			
1206	2.2	5.0	1.65																																			
1210	2.2	5.0	2.0																																			
1808	3.5	7.0	3.7																																			
17	Terminal Strength	<p>With the component mounted on a PCB obtained with the device to be tested, apply a 17.7N (1.8Kg) force to the side of a device being tested.</p> <p>This force shall be applied for 60+1 seconds.</p> <p>Also the force shall be applied gradually as not to apply a shock to the component being tested.</p> <p>* Apply 2N force for 0402 size.</p> <p>* Apply 1N force for 0201 size.</p>	<p>Magnification of 20X or greater may be employed for inspection of the mechanical integrity of the device body, terminals and body/terminal junction.</p> <p>Before, during and after the test, the device shall comply with all electrical requirements stated in this specification.</p>																																			
18	Beam Load Test	<p>Place the part in the beam load fixture. Apply a force until the part breaks or the minimum acceptable force level required in the user specification(s) is attained.</p>	<p>≤ 0805</p> <p>Thickness &gt; 0.5mm: 20N</p> <p>Thickness ≤ 0.5mm: 8N</p> <p>≥ 1206</p> <p>Thickness ≥ 1.25 mm: 54N</p> <p>Thickness &lt; 1.25 mm: 15N</p>																																			

## REVISION HISTORY

REVISION	DATE	CHANGE NOTIFICATION	DESCRIPTION
Version 17	Jan. 14, 2022	-	- Add 1206/NPO/2000V/10pF to 47pF
Version 16	Nov. 17, 2021	-	- Add 1206/X7R/500V to 1000V/220pF to 1nF
Version 15	Oct. 12, 2021	-	- Add 0603/NPO/25V/50V/2.7nF to 10nF - I.R. for NPO change to " I.R. $\geq$ 100 G $\Omega$ or I.R. $\times$ C $\geq$ 1000 $\Omega$ .F. whichever is less"
Version 14	Aug. 09, 2021	-	- Add 1206/NPO/1kV/10pF to 220pF 1206/X7R/1kV/1nF
Version 13	Jun. 08, 2021	-	- Move out "Array" and "High Cap" to individual specification Add 0603 NPO 50V/100V 1.2nF to 2.2nF 0402 X7R 50V 15nF to 100nF 0603 X7R 25V 330nF to 680nF 0603 X7R 50V 150nF to 220nF 0603 X7R 100V 68nF to 100nF
Version 12	Feb. 26, 2021	-	- Add 0201/ X7R/ 50V / 100 pF to 1nF 0603/ X7R/ 16V / 680nF to 1 $\mu$ F 0603/ X7R/ 25V / 150nF / 220nF/ 1 $\mu$ F 1210/ X7R/ 50V / 4.7 $\mu$ F
Version 11	Jun. 29, 2018	-	- Add 0201 NPO 25V/ 50V, 0.2pF to 33pF, Add 0402 NPO 50V 270pF to 1nF, Add 0805 X7R 25V 2.2uF
Version 10	May. 2, 2018	-	- Add 0603 NPO 100V 820pF to 1nF, - Add 0805 NPO 50V to 100V, 1.2nF to 10nF, - Add 0805 X7R 16V 2.2uF, 50V 680nF to 1uF, - Add 1206 X7R 100V 330nF to 2.2uF, 250V 33nF to 100nF
Version 9	Mar. 22, 2018	-	- Add 0402 X7R 100nF 25~50V
Version 8	Nov. 22, 2017	-	- Add X7R/0201/25V/100pF~10nF
Version 7	Jul. 7, 2017	-	- Add X7R/0805/330nF to 470nF/50V, X7R/1206/10uF/6.3V
Version 6	Mar. 31, 2017	-	- Add NPO/0603/1nF/50V, X7R/0603/1uF/10V, X7R/0603/470nF/16V, X7R/0603/220nF/25V
Version 5	Nov. 15, 2016	-	- Add Soldering Condition
Version 4	Jun. 14, 2016	-	- Add X7R/0805/2.2uF/10V and NPO/1206/1.2nF to 1.5nF/250V
Version 3	Jul. 21, 2015	-	- Tests and Requirements update
Version 2	Jul. 17, 2014	-	- Tests and Requirements update
Version 1	Apr. 19, 2013	-	- Capacitance range update
Version 0	Dec. 25, 2012	-	- New