Innovative Service Around the Globe YAGEO

DATA SHEET

SURFACE-MOUNT CERAMIC MULTILAYER CAPACITORS

High-Voltage

NP0/X7R

500 V TO 3 KV

0.47 pF to 33 nF

RoHS compliant & Halogen Free

YAGEO

Product Specification – May 10, 2023 V.16

SCOPE

This specification describes High-Voltage NP0/X7R series chip capacitors with lead-free terminations.

APPLICATIONS

PCs, Hard disk, Game PCs
Power supplies
LCD panel
ADSL, Modem

FEATURES

RoHS compliant
Halogen Free compliant
MSL class MSL 1
Soldering is compliant with J-STD-020D

ORDERING INFORMATION - GLOBAL PART NUMBER, PHYCOMP CTC & 12NC

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

YAGEO BRAND ordering code

GLOBAL PART NUMBER (PREFERRED)

CC	XXXX	X	X	XXX	X	X	X	XXX
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

(1) SIZE – INCH BASED (METRIC)

0805 (2012) / 1206 (3216) / 1210 (3225) / 1808 (4520) / 1812 (4532) / 2220 (5750)

(2) TOLERANCE

B = ±0.1pF
C = ±0.25 pF
D = ±0.5 pF
G = ±2%
J = ±5%
K = ±10%
M = ±20%

(3) PACKING STYLE

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 = NP0
X7R = X7R

(5) RATED VOLTAGE

B = 500V	Floating design:
Z = 630V	C = 1KV
	D = 2 KV
	S = 2.5KV
	E = 3 KV

(6) CONTROL CODE

A: Anti-arc coating
B: Standard Type

(7) PROCESS

N = NP0
B = X7R

(8) CAPACITANCE VALUE

2 significant digits+number of zeros
The 3rd digit signifies the multiplying factor, and letter R is decimal point
Example: 121 = 12 x 101 = 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 (NiSn). The terminations are lead-free. A cross section of the structure is shown in Fig.1.

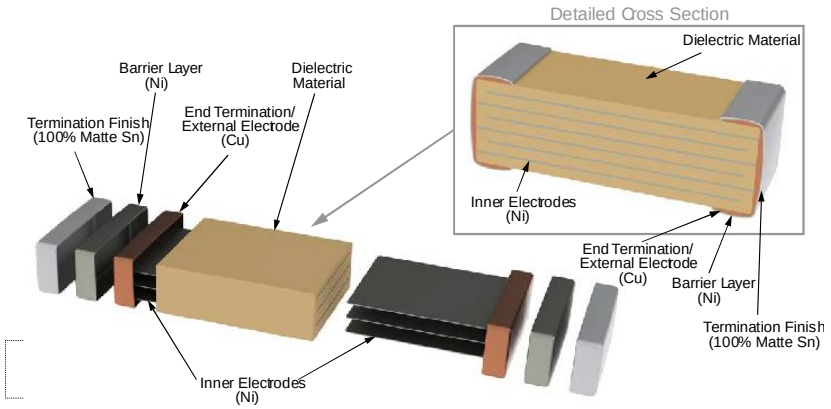

Fig. 1 Surface mounted multilayer ceramic capacitor construction

DIMENSION

Table 1 For outlines see fig.2

TYPE	L_1 (mm)	W (mm)	T (MM)	L_2 / L_3 (mm)		L_4 (mm)
				min.	max.	min.
0805	2.0 ±0.10	1.25 ±0.10	0.60 ±0.10	0.25	0.75	0.70
	2.0 ±0.20	1.25 ±0.20	0.85 ±0.10			
			1.25 ±0.20			
1206	3.2 ±0.15	1.60 ±0.15	0.60 ±0.10	0.25	0.75	1.40
	3.2 ±0.30	1.60 ±0.20	0.85 ±0.10			
			1.25 ±0.20			
			1.60 ±0.20			
1210	3.2 ±0.20	2.50 ±0.20	0.85 ±0.10	0.25	0.75	1.40
	3.2 ±0.30	2.50 ±0.20	1.25 ±0.20			
			1.60 ±0.20			
			2.00 ±0.20			
1808	4.5 ±0.40	2.00 ±0.30	1.25 ±0.20	0.25	0.75	2.20
			1.35 ±0.15			
			1.60 ±0.20			
			2.00 ±0.20			
1812	4.5 ±0.40	3.20 ±0.20	0.85 ±0.10	0.25	0.75	2.20
			1.25 ±0.20			
			1.35 ±0.15			
			1.60 ±0.20			
			2.00 ±0.20			
2220	5.7 ±0.40	5.0 ±0.3.	2.00 ±0.20	0.25	0.75	3.40

OUTLINES

For dimension see Table 1

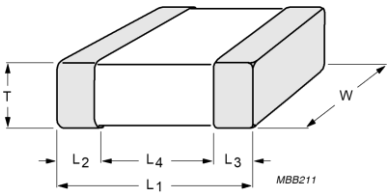

Fig. 2 Surface mounted multilayer ceramic capacitor dimension

CAPACITANCE RANGE & THICKNESS FOR NP0

Table 2 Sizes from 0805 to 1210

CAP.	0805			1206					1210			
	500 V	630 V	1 KV	500 V	630 V	1 KV	2 KV	3 KV	500 V	630 V	1 KV	2 KV
1.0 pF	0.6±0.1	0.6±0.1	0.85±0.1	0.6±0.1	1.25±0.2	0.85±0.1 1.25±0.2	1.25±0.2	1.25±0.2	1.25±0.2	1.25±0.2	1.25±0.2	1.25±0.2
1.2 pF												
1.5 pF												
1.8 pF												
2.2 pF												
2.7 pF												
3.3 pF												
3.9 pF												
4.7 pF												
5.6 pF												
6.8 pF												
8.2 pF												
10 pF												
12 pF												
15 pF												
18 pF												
22 pF												
27 pF												
33 pF												
39 pF												
47 pF						1.25±0.2						
56 pF			1.25±0.2						1.25±0.2			
68 pF												
82 pF												
100 pF												
120 pF												
150 pF												
180 pF												

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 NP0

Table 3 Sizes from 0805 to 1210 (continued)

CAP.	0805			1206					1210			
	500 V	630 V	1 KV	500 V	630 V	1 KV	2 KV	3 KV	500 V	630 V	1 KV	2 KV
220 pF							1.25±0.2					1.25±0.2
270 pF												
330 pF	0.85±0.1	0.85±0.1										
390 pF				0.6±0.1								
470 pF						1.25±0.2				1.25±0.2	1.25±0.2	
560 pF									1.25±0.2			
680 pF	1.25±0.2	1.25±0.2										
820 pF												
1.0 nF				0.85±0.1	1.25±0.2							
1.2 nF												
1.5 nF												
2.2 nF												
2.7 nF												
3.3 nF												
3.9 nF				1.25±0.2								
4.7 nF												
5.6 nF												
6.8 nF												
8.2 nF				1.6±0.2	1.6±0.2							
10 nF												

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 NP0

Table 4 Sizes from 1808 to 1812

CAP.	1808			1812				
	1 KV	2 KV	3 KV	500 V	630 V	1 KV	2 KV	3 KV
0.47 pF								
0.56 pF								
0.68 pF								
0.82 pF								
1.0 pF								
1.2 pF								
1.5 pF								
1.8 pF								
2.2 pF								
2.7 pF								
3.3 pF								
3.9 pF								
4.7 pF								
5.6 pF								
6.8 pF								
8.2 pF								
10 pF								
12 pF								
15 pF								
18 pF								
22 pF								
27 pF								
33 pF			1.6±0.2					
39 pF								
47 pF						1.25±0.2	1.25±0.2	1.25±0.2
56 pF								
68 pF								
82 pF	1.25±0.2	1.25±0.2						
100 pF				1.25±0.2	1.25±0.2			
120 pF								
150 pF								
180 pF								

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 NP0

Table 5 Sizes from 1808 to 1812 (continued)

CAP.	1812							
	1 KV	2 KV	3 KV	500 V	630 V	1 KV	2 KV	3 KV
220 pF	1.25±0.2	1.25±0.2		1.25±0.2	1.25±0.2	1.25±0.2	1.25±0.2	1.25±0.2
270 pF								
330 pF								
390 pF								
470 pF								
560 pF								
680 pF								
820 pF								
1.0 nF								
1.2 nF								
1.5 nF								

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 6 Sizes from 0805 to 1210

CAP.	0805			1206					1210			
	500 V	630 V	1 KV	500 V	630 V	1 KV	2 KV	2.5KV	500 V	630 V	1 KV	2 KV
100 pF												
150 pF												
220 pF												
330 pF			0.85±0.1									
470 pF							1.25±0.2					1.25±0.2
680 pF												
1.0 nF	0.85±0.1	0.85±0.1						1.6±0.2				
1.5 nF						1.25±0.2						
2.2 nF			1.25±0.2	1.25±0.2	1.25±0.2						1.25±0.2	1.60±0.2
3.3 nF												
4.7 nF												
6.8 nF										1.25±0.2		
10 nF		1.25±0.2							1.25±0.2			
15 nF	1.25±0.2											
22 nF					1.60±0.2					1.6±0.2	1.6±0.2	
33 nF				1.60±0.2						2.0±0.2		
47 nF												
68 nF									2.0±0.2			
100 nF												

NOTE

1. Values in shaded cells indicate thickness class in mm
2. Capacitance value of non E-6 series is on request
3. For products with 5% tolerance, please contact local sales force before ordering

CAPACITANCE RANGE & THICKNESS FOR X7R

Table 7 Sizes from 1808 to 1812

CAP.	1808			1812					2020
	1 KV	2 KV	3 KV	500 V	630 V	1 KV	2 KV	3 KV	630 V
100 pF									
150 pF			1.6±0.2						
220 pF									
330 pF		1.35±0.15							
470 pF	1.35±0.15		2.0±0.2					1.6±0.2	
680 pF		1.6±0.2					1.35±0.15		
1.0 nF					1.35±0.2	1.35±0.15			
1.5 nF									
2.2 nF				1.25±0.2					
3.3 nF	1.6±0.2								
4.7 nF									
6.8 nF									
10 nF									
15 nF									
22 nF									
33 nF					1.6±0.2	1.6±0.2			
47 nF									
68 nF					2.0±0.2				
100 nF				1.6±0.2					
150 nF									2.0±0.2
220 nF									
330 nF									
470 nF									
680 nF									
1 µF									

NOTE

1. Values in shaded cells indicate thickness class in mm
2. Capacitance value of non E-6 series is on request
3. For products with 5% tolerance, please contact local sales force before ordering

ELECTRICAL CHARACTERISTICS

NP0/X7R DIELECTRIC CAPACITORS; 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%.

Table 8

DESCRIPTION		VALUE
Capacitance range		0.47 pF to 33 nF
Capacitance tolerance		
NP0	C < 10 pF	±0.25 pF, ±0.5 pF
	C ≥ 10 pF	±2%, ±5%
X7R		±5% (1), ±10%
Dissipation factor (D.F.)		
NP0	C < 30 pF	≤ 1 / (400 + 20C)
	C ≥ 30 pF	≤ 0.1 %
X7R		≤ 2.5 %
Insulation resistance after 1 minute at U_r (DC)		R_{ins} ≥ 10 GΩ or R_{ins} × C ≥ 500 seconds whichever is less R_{ins} × C ≥ 100 Ω.F(2)
Maximum capacitance change as a function of temperature (temperature characteristic/coefficient):		
NP0		±30 ppm/°C
X7R		±15%
Operating temperature range:		
NP0/X7R		–55 °C to +125 °C

NOTE

1. ±5% tolerance of capacitance value isn't available for X7R full product range, please contact local sales force before ordering
2. X7R/0805/≥3.9nF
   X7R/1206/≥12nF
   X7R/1210/≥12nF
   X7R/1808/≥18nF
   X7R/1812/≥27nF
   X7R/2220/≥150nF

HIGH-VOLTAGE NP0

Sample limits (broken lines).
Requirement levels (dotted lines)

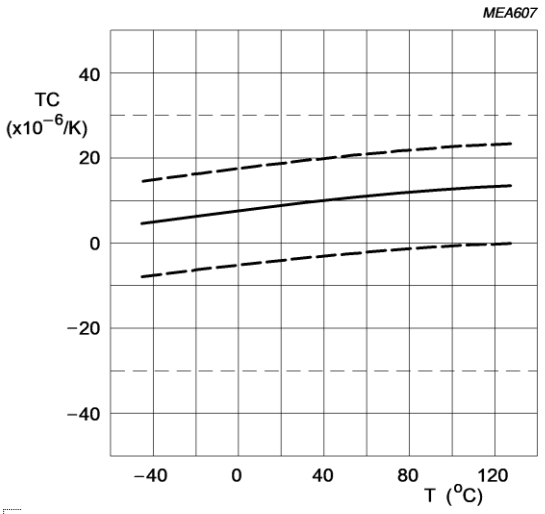

Fig. 3 Typical temperature coefficient as a function of temperature

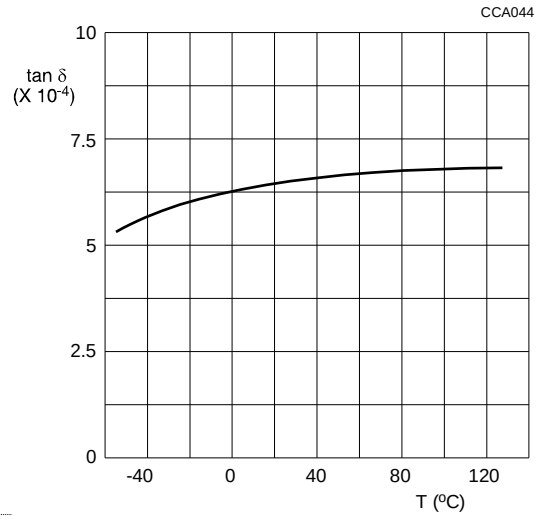

Fig. 4 Typical tan δ as a function of temperature

HIGH-VOLTAGE X7R

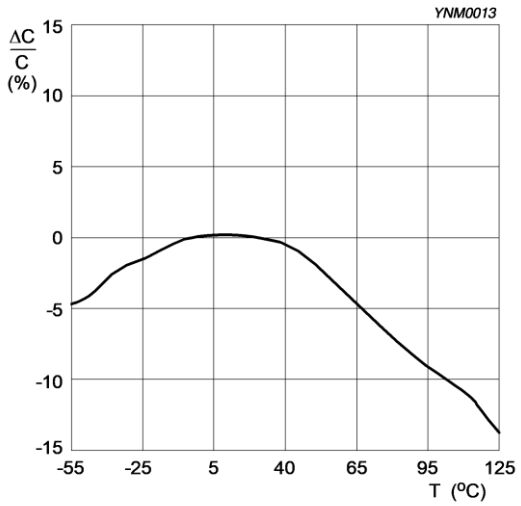

Fig. 5 Typical capacitance change as a function of temperature

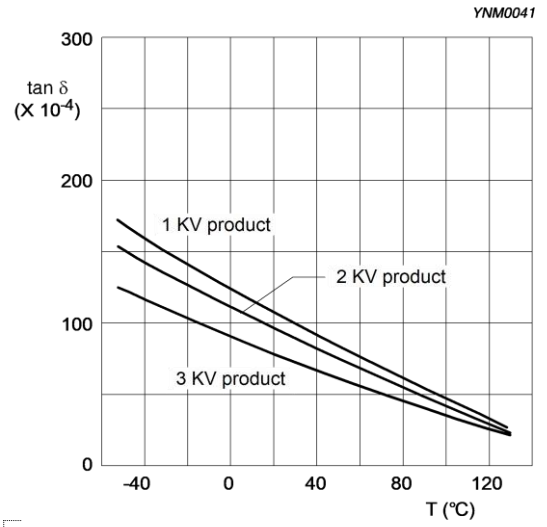

Fig. 6 Typical tan δ as a function of temperature

SOLDERING RECOMMENDATION

Table 9

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

TESTS AND REQUIREMENTS

Table 10 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	NP0: 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 X7R: f = 1 KHz for C ≤ 10 µF, measuring at voltage 1 V_{rms} at 20 °C	Within specified tolerance
Dissipation Factor (D.F.)		4.5.2	NP0: 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 X7R: f = 1 KHz for C ≤ 10 µF, measuring at voltage 1 V_{rms} at 20 °C	In accordance with specification
Insulation Resistance		4.5.3	U_r ≥ 500 V: At 500 V for 1 minute	In accordance with specification

TEST	TEST METHOD		PROCEDURE	REQUIREMENTS
Temperature Coefficient		4.6	Capacitance shall be measured by the steps shown in the following table. The capacitance change should be measured after 5 min at each specified temperature stage. (1) NP0: Temperature Coefficient shall be calculated from the formula as below Temp, Coefficient = $\frac{C2 - C1}{C1 \times \Delta T} \times 10^6$ [ppm/°C] C1: Capacitance at step c C2: Capacitance at 125°C ΔT: 100°C (=125°C -25°C) (2) X7R: Capacitance Change shall be calculated from the formula as below $\Delta C = \frac{C2 - C1}{C1} \times 100\%$ C1: Capacitance at step c C2: Capacitance at step b or d	NP0: Δ C/C: ±30ppm X7R: Δ C/C: ±15%
Adhesion	IEC 60384-21/22	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
Bending Strength		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 5 mm	No visible damage ΔC/C NP0: within ±1% or 0.5 pF, whichever is greater X7R: ±10%

Step	Temperature(°C)
a	25±2
b	Lower temperature±3°C
c	25±2
d	Upper Temperature±2°C
e	25±2

TEST	TEST METHOD	PROCEDURE	REQUIREMENTS
Resistance to Soldering Heat	4.9	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 NP0: within ±0.5% or 0.5 pF, whichever is greater X7R: ±10% D.F. within initial specified value R_{ins} within initial specified value
Solderability	4.10	Preheated to a temperature of 80 °C to 140 °C and maintained for 30 seconds to 60 seconds. 1. Temperature: 235±5°C / Dipping time: 2 ±0.5 s 2. Temperature: 245±5°C / Dipping time: 3 ±0.5 s (lead free)Depth of immersion: 10mm	The solder should cover over 95% of the critical area of each termination
Rapid Change of Temperature	IEC 60384-21/22 4.11	Preconditioning; 150 +0/–10 °C for 1 hour, then keep for 24 ±1 hours at room temperature 5 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 NP0: within ±1% or 1 pF, whichever is greater X7R: ±15% D.F. meet initial specified value R_{ins} meet initial specified value
Damp Heat	4.13	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. Damp heat test: 500 ±12 hours at 40 ±2 °C; 90 to 95% R.H. 4. Recovery: NP0: 6 to 24 hours X7R: 24 ±2 hours 5. Final measure: C, D, IR 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 preconditioned according to *"IEC 60384 4.1"* and then the requirement shall be met.	No visual damage after recovery ΔC/C NP0: within ±2% or 1 pF, whichever is greater X7R: ±15% D.F. NP0: ≤ 2 × specified value X7R: ≥ 25 V: ≤ 5% R_{ins} NP0: ≥ 2,500 MΩ or $R_{ins} \times C_r \geq 25s$ whichever is less X7R: ≥ 500 MΩ or $R_{ins} \times C_r \geq 25s$ whichever is less

TEST	TEST METHOD	PROCEDURE	REQUIREMENTS
Endurance	IEC 60384-21/22 4.14	1. Preconditioning, X7R 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 Endurance test: Temperature: NP0/X7R: 125 °C Specified stress voltage applied for 1,000 hours. High-Voltage series follows the stress conditions below: 3. Recovery time: 24 ±2 hours 4. Final measure: C, D, IR 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 preconditioned according to *"IEC 60384 4.1"* and then the requirement shall be met.	No visual damage ΔC/C NP0: within ±2% or 1 pF, whichever is greater X7R: ±15% D.F. NP0: ≤ 2 × specified value X7R: ≥ 25 V: ≤ 5% R_{ins} NP0: ≥ 4,000 MΩ or $R_{ins} \times C_r \geq$ 40s whichever is less X7R: ≥ 1,000 MΩ or $R_{ins} \times C_r \geq$ 50s whichever is less
Voltage Proof		Specified stress voltage applied for 1~5 seconds Ur = 500 V series applied (1.3 Ur + 100) Ur > 500 V: 1.3 Ur Ur ≥ 1KV: 1.2 Ur Charge/Discharge current less than 50mA	No breakdown or flashover

Voltage	NPO	X7R
500/630V	1.3 x Ur	1.2 x Ur
≥ 1KV	1.2 x Ur	1.1 x Ur

THICKNESS CLASSES AND PACKING QUANTITY

Table 11

SIZE CODE	THICKNESS CLASSIFICATION	PACKING CODE. 7 INCH	PACKING CODE. 13 INCH	TAPE WIDTH QUANTITY PER REEL	Ø180 MM / 7 INCH Paper	Ø180 MM / 7 INCH Blister	Ø330 MM / 13 INCH Paper	Ø330 MM / 13 INCH Blister	QUANTITY PER BULK CASE
0805	0.6 ±0.1 mm	R	P	8 mm	4,000	---	20,000	---	10,000
	0.85 ±0.1 mm	R	P	8 mm	4,000	---	15,000	---	8,000
	1.00 ±0.1 mm	K	F	8 mm	---	3,000	---	10,000	---
	1.25 ±0.2 mm	K	F	8 mm	---	3,000	---	10,000	5,000
1206	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	---	---
	1.00 / 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	---
	1.6 ±0.2 mm	K	F	8 mm	---	2,000	---	8,000	---
1210	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	---
	1.15 ±0.15 mm	K	F	8 mm	---	3,000	---	10,000	---
	1.25 ±0.2 mm	K		8 mm	---	3,000	---	---	---
	1.5 ±0.1 mm	K		8 mm	---	2,000	---	---	---
	1.6±0.2 mm	K		8 mm	---	2,000	---	---	---
	2.0 ±0.2 mm	K		8 mm	---	2,000 1,000	---	---	---
	2.5 ±0.2 mm	K		8 mm	---	1,000 500	---	---	---
1808	1.15 ±0.15 mm	K		12 mm	---	3,000	---	---	---
	1.25 ±0.2 mm	K		12 mm	---	3,000	---	---	---
	1.35 ±0.15 mm	K		12 mm	---	2,000	---	---	---
	1.5 ±0.1 mm	K		12 mm	---	2,000	---	---	---
	1.6 ±0.2 mm	K		12 mm	---	2,000	---	---	---
	2.0 ±0.2 mm	K		12 mm	---	2,000	---	---	---
1812	0.6 / 0.85 ±0.1 mm	K		12 mm	---	2,000	---	---	---
	1.15 ±0.1 mm	K		12 mm	---	1,000	---	---	---
	1.15 ±0.15 mm	K		12 mm	---	1,000	---	---	---
	1.25 ±0.2 mm	K		12 mm	---	1,000	---	---	---
	1.35 ±0.15 mm	K		12 mm	---	1,000	---	---	---
	1.5 ±0.1 mm	K		12 mm	---	1,000	---	---	---
	1.6 ±0.2 mm	K		12 mm	---	1,000	---	---	---
	2.0 ±0.2 mm	K		12 mm	---	1,000	---	---	---
	2.5 ±0.2 mm	K		12 mm	---	500	---	---	---
2220	2.0 ±0.2 mm	K		12 mm	---	1000	---	---	---

PAPER/PE TAPE SPECIFICATION

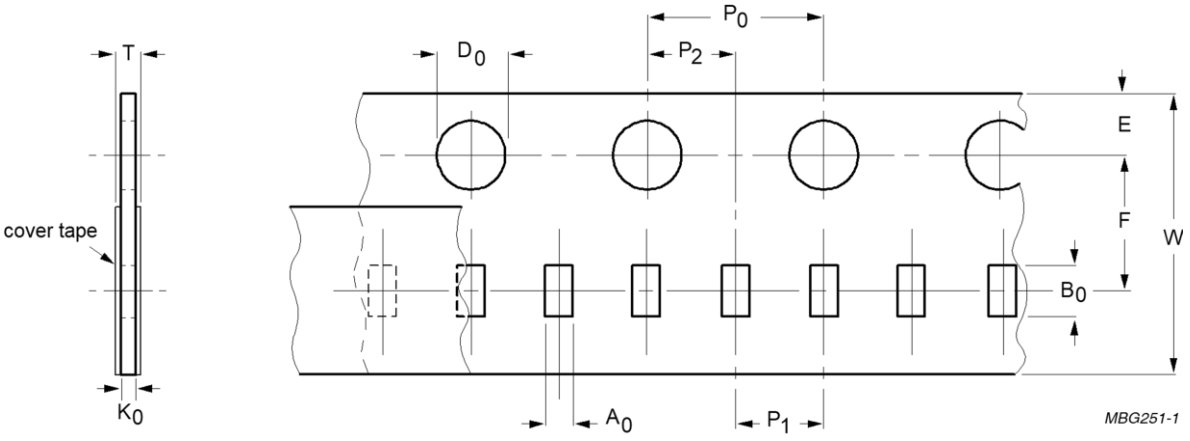

Fig. 7 Paper/PE tape

Table 12 Dimensions of paper/PE tape for relevant chip size; see Fig.3

Unit: mm

SIZE CODE	SYMBOL A_0	B_0	W	E	F	P_0 (1)	P_1	P_2	$\varnothing D_0$	K_0	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

1. P_0 pitch tolerance over any 10 pitches is ±0.2 mm

BLISTER TAPE SPECIFICATION

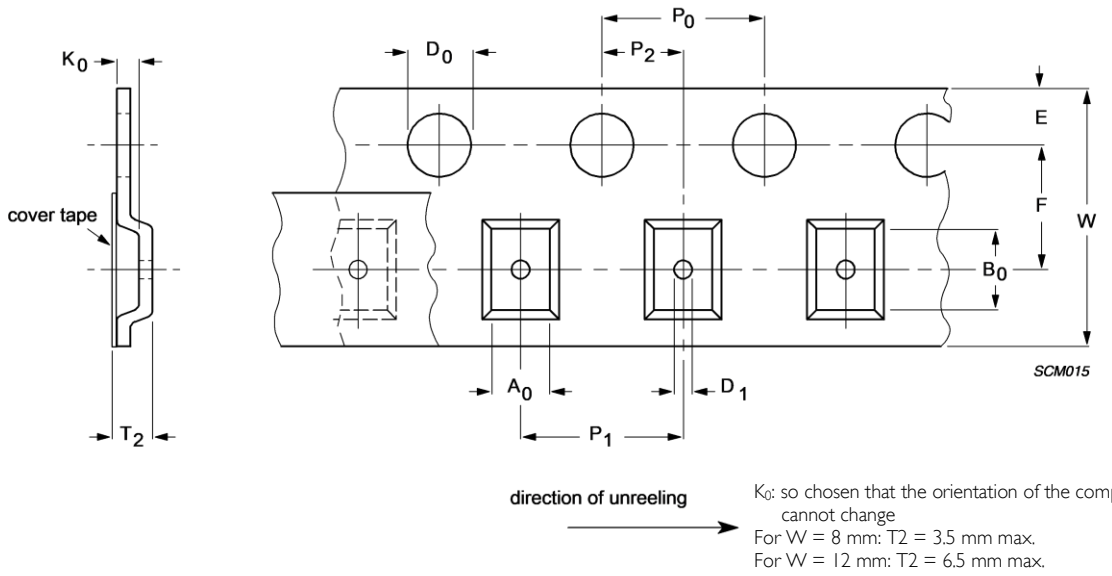

Fig. 8 Blister tape

Table 13 Dimensions of blister tape for relevant chip size; see Fig.8

SIZE CODE	SYMBOL															Unit: mm
	A_0		B_0		K_0		W	E	F	$\varnothing D_0$	$\varnothing D_1$	P_0 (2)	P_1	P_2	T2	
	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
2220	5.12	5.32	5.84	6.04	1.28	1.48	12.0 ±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	1.33	1.53

NOTE

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

REEL SPECIFICATION

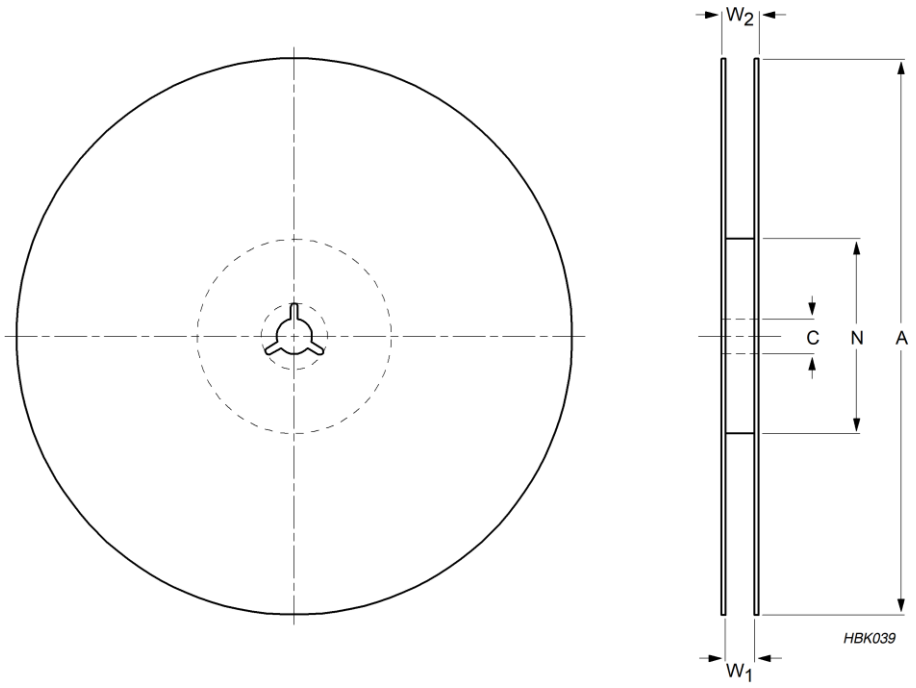

Fig. 9 Reel

Table14 Reel dimensions; see Fig.9

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: $<10^{10}$ Ω/sq.

REVISION HISTORY

REVISION	DATE	CHANGE NOTIFICATION	DESCRIPTION
Version 16	May 10, 2023	-	- Add NP0/1206/2.2nF to 10nF/500V to 630V
Version 15	Dec. 15, 2021	-	- I.R. Spec. updated X7R/0805/≥3.9nF X7R/1206/≥12nF X7R/1210/≥12nF X7R/1808/≥18nF X7R/1812/≥27nF X7R/2220/≥150nF
Version 14	Oct. 26, 2021	-	- Add 500V/630V
Version 13	Feb. 28, 2021	-	- Add NPO/1206/0.47pF to 10pF with 0.85 mm
Version 12	Dec. 01, 2020	-	- Add X7R/0805/1.5nF to 3.3nF/1KV. NPO/0805/ 56pF to 82pF/1KV
Version 11	Jul. 13, 2018	-	- Add NPO/1206/10pF to 47pF/3KV
Version 10	Mar. 7, 2017	-	- 0805 L4 spec updated
Version 9	Jan. 16, 2017	-	- Product range updated
Version 8	Oct. 12, 2015	-	- Product range updated
Version 7	May 21, 2014	-	- Product range updated
Version 6	Jun. 17, 2012	-	- Product range updated
Version 5	Sep 25, 2012	-	- Product range updated
Version 4	Aug 08, 2011	-	- Product range updated
Version 3	Jan 19, 2011	-	- Dimension updated - Add NP0 0805 1KV
Version 2	Feb 02, 2010	-	- Change to dual brand datasheet that describe High-Voltage NP0/X7R series with RoHS compliant - Replace the high voltage part of pdf files: UP-NP0X7R_HV_1K-to-4KV_1 and UY-NP0X7R_HV_1K-to-4KV_1 - Description of "Halogen Free compliant" added - Product range updated - Define global part number - Test method and procedure updated
Version 1	Sep 30, 2005	-	- Thickness revised
Version 0	Sep 12, 2005	-	- New

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