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Innovative Service Around the Globe YAGEO

# DATA SHEET

## SURFACE MOUNT MULTILAYER CERAMIC CAPACITORS

Automotive grade

NP0/X7R/X7S

6.3 V TO 2000 V

**0.2 pF to 680nF**

**RoHS compliant & Halogen Free**

YAGEO

Product Specification – September 22, 2026 V.26



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## 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 1
- 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) / 2220 (5750)

### (2) TOLERANCE

| NPO(< 10 pF) | NPO(≥ 10 pF) | X7R/X7S |
|---|---|---|
| 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. 12 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

X7S

### (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/X7S

### (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 x $10^1$ = 120 pF

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## 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.

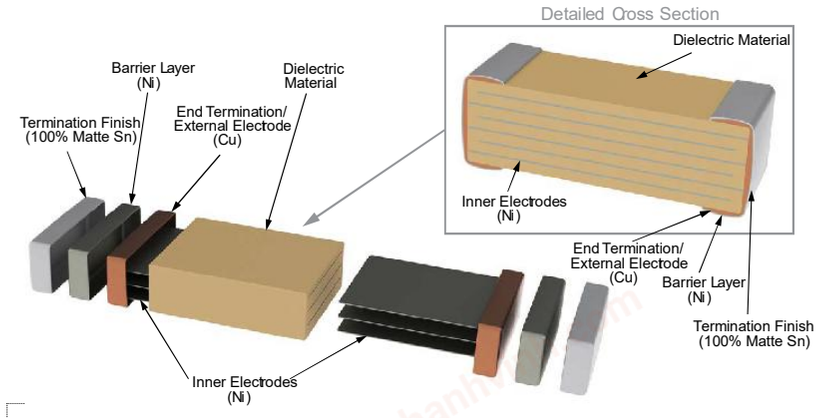



Fig. 1 Surface mounted multilayer ceramic capacitor construction

## DIMENSION

Table 1 For outlines see fig. 2

| TYPE | $L_1$ (mm) | W (mm) | T (MM) | $L_2$ / $L_3$ (mm) min. | $L_2$ / $L_3$ (mm) max. | $L_4$ (mm) 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 | 0.85±0.10<br>1.25±0.20 | | | |
| 1206 | 3.2±0.15 | 1.6±0.15 | 0.6±0.10<br>0.85±0.10 | 0.25 | 0.75 | 1.40 |
| | 3.2±0.30 | 1.6±0.20 | 1.00±0.10<br>1.15±0.10<br>1.25±0.20<br>1.6±0.20 | | | |
| | 3.2±0.30 | 1.6±0.30 | 1.6±0.30 | | | |
| 1210 | 3.2±0.20 | 2.5±0.20 | 0.85±0.10 | 0.25 | 0.85 | 1.40 |
| | 3.2±0.30 | 2.5±0.20 | 1.25±0.20<br>1.6±0.20<br>2.0±0.20 | | | |
| | 3.2±0.40 | 2.5±0.30 | 1.6±0.20(1)<br>2.0±0.30(2)<br>2.5±0.20<br>2.5±0.30 | | | |
| 1808 | 4.5±0.40 | 2.0±0.30 | 1.25±0.20 | 0.25 | 0.75 | 2.20 |
| 1812 | 4.5±0.40 | 3.2±0.30 | 0.85±0.10<br>1.25±0.20<br>1.60±0.20 | 0.25 | 0.75 | 2.20 |
| 2220 | 5.7±0.40 | 5.0±0.30 | 2.0±0.20<br>1.25 ±0.20<br>1.6 ±0.20 | 0.25 | 0.75 | 3.40 |

**NOTE**

(1)(2) NPO, 1210, 630V ~1000V, 4.7nF ~22nF

## OUTLINES

For dimension see Table 1

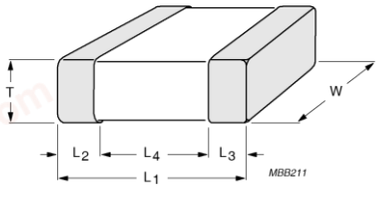



Fig. 2 Surface mounted multilayer ceramic capacitor dimension

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## CAPACITANCE RANGE & THICKNESS FOR NP0

Table 2 Sizes from 0201 to 0805

| CAP. | 0201 | 0402 | 0603 | | | | 0805 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 25 V / 50 V | 25 V / 50 V | 100 V | 25 V / 50 V | 100 V | 200 V / 250 V | 50 V | 100 V | 200 V / 250 V | 500 V | 630 V |
| 0.2 pF | 0.3±0.03 | | | | | | | | | | |
| 0.47 pF | 0.3±0.03 | 0.5±0.05 | 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 | 0.5±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 | 0.5±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 | 0.5±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 | 0.5±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 | 0.5±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 | 0.5±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 | 0.5±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 | 0.5±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 | 0.5±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 | 0.5±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 | 0.5±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 | 0.5±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 | 0.5±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 | 0.5±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 | 0.5±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 | 0.5±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 | 0.6±0.1 | 0.6±0.1 |
| 12 pF | 0.3±0.03 | 0.5±0.05 | 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 | 0.6±0.1 | 0.6±0.1 |
| 15 pF | 0.3±0.03 | 0.5±0.05 | 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 | 0.6±0.1 | 0.6±0.1 |
| 18 pF | 0.3±0.03 | 0.5±0.05 | 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 | 0.6±0.1 | 0.6±0.1 |
| 22 pF | 0.3±0.03 | 0.5±0.05 | 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 | 0.6±0.1 | 0.6±0.1 |
| 27 pF | 0.3±0.03 | 0.5±0.05 | 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 | 0.6±0.1 | 0.6±0.1 |
| 33 pF | 0.3±0.03 | 0.5±0.05 | 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 | 0.6±0.1 | 0.6±0.1 |
| 39 pF | 0.3±0.03 | 0.5±0.05 | 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 | 0.6±0.1 | 0.6±0.1 |
| 47 pF | 0.3±0.03 | 0.5±0.05 | 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 | 0.6±0.1 | 0.6±0.1 |
| 56 pF | 0.3±0.03 | 0.5±0.05 | 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 | 0.6±0.1 | 0.6±0.1 |
| 68 pF | 0.3±0.03 | 0.5±0.05 | 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 | 0.6±0.1 | 0.6±0.1 |
| 82 pF | 0.3±0.03 | 0.5±0.05 | 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 | 0.6±0.1 | 0.6±0.1 |
| 100 pF | 0.3±0.03 | 0.5±0.05 | 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 | 0.6±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

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## CAPACITANCE RANGE & THICKNESS FOR NP0

Table 3 Sizes from 0402 to 0805 (continued)

| CAP. | 0201 | 0402 | | 0603 | | | 0805 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 25 V / 50 V | 25 V / 50 V | 100 V | 25 V / 50 V | 100 V | 200 V / 250 V | 50 V | 100 V | 200 V / 250 V | 500 V | 630 V |
| 120 pF | 0.3±0.03 | 0.5±0.05 | 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 | 0.6±0.1 | 0.6±0.1 |
| 150 pF | 0.3±0.03 | 0.5±0.05 | 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 | 0.6±0.1 | 0.6±0.1 |
| 180 pF | 0.3±0.03 | 0.5±0.05 | 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 | 0.6±0.1 | 0.6±0.1 |
| 220 pF | 0.3±0.03 | 0.5±0.05 | 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 | 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 | 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 | 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 | 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 | 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 | | | |
| 12 nF | | | | | | | 1.25±0.2 | 1.25±0.2 | | | |
| 15 nF | | | | | | | 1.25±0.2 | 1.25±0.2 | | | |
| 18 nF | | | | | | | 1.25±0.2 | 1.25±0.2 | | | |
| 22 nF | | | | | | | 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

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## CAPACITANCE RANGE & THICKNESS FOR NP0

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 | 630 V* | 1000 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 | 1.25±0.2 | 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 | | 1.25±0.2 | 1.25±0.2 | 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 | | 1.25±0.2 | 1.25±0.2 | 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 | | 1.25±0.2 | 1.25±0.2 | 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 | | 1.25±0.2 | 1.25±0.2 | 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 | | 1.25±0.2 | 1.25±0.2 | 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 | | 1.25±0.2 | 1.25±0.2 | 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 | | 1.25±0.2 | 1.25±0.2 | 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 | | 1.25±0.2 | 1.25±0.2 | 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 | | | 1.25±0.2 | 1.25±0.2 | 1.25±0.2 | 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 | | | 1.25±0.2 | 1.25±0.2 | 1.25±0.2 | 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 | | | 1.25±0.2 | 1.25±0.2 | 1.25±0.2 | 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 | | | 1.25±0.2 | 1.25±0.2 | 1.25±0.2 | 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 | | | 1.25±0.2 | 1.25±0.2 | 1.25±0.2 | 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 | | | 1.25±0.2 | 1.25±0.2 | 1.25±0.2 | 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 | | | 1.25±0.2 | 1.25±0.2 | 1.25±0.2 | 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 | 0.85±0.1 | 1.25±0.2 | | | 1.25±0.2 | 1.25±0.2 | 1.25±0.2 | 1.25±0.2 | | |
| 1.5 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 | | |
| 1.8 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 | 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 | | | 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 | | | 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
3. * : L: 3.2± 0.40 W: 2.5± 0.30

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## CAPACITANCE RANGE & THICKNESS FOR NP0

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 | 630 V* | 1000 V* |
| 3.3 nF | 1.25±0.2 | 1.25±0.2 | 1.25±0.2 | 1.25±0.2 | 1.25±0.2 | | | | | | | | |
| 4.7 nF | 1.25±0.2 | 1.25±0.2 | 1.25±0.2 | 1.25±0.2 | 1.25±0.2 | | | | | | | 1.60±0.2 | 2.0±0.3 |
| 5.6 nF | 1.25±0.2 | 1.25±0.2 | 1.25±0.2 | 1.25±0.2 | 1.25±0.2 | | | | | | | 1.60±0.2 | 2.0±0.3 |
| 6.8 nF | 1.25±0.2 | 1.25±0.2 | 1.25±0.2 | 1.25±0.2 | 1.25±0.2 | | | | | | | 1.60±0.2 | 2.0±0.3 |
| 8.2 nF | 1.25±0.2 | 1.25±0.2 | 1.60±0.2 | 1.60±0.2 | 1.60±0.2 | | | | | | | 1.60±0.2 | 2.0±0.3 |
| 10 nF | 1.25±0.2 | 1.25±0.2 | 1.60±0.2 | 1.60±0.2 | 1.60±0.2 | | | | | | | 1.60±0.2 | 2.5±0.3 |
| 12 nF | 1.60±0.2 | 1.60±0.2 | | | | | | | | | | 1.60±0.2 | 2.5±0.3 |
| 15 nF | 1.60±0.2 | 1.60±0.2 | | | | | | | | | | 1.60±0.2 | 2.5±0.3 |
| 22 nF | 1.60±0.2 | 1.60±0.2 | | | | | | | | | | 2.0±0.2 | 2.5±0.3 |
| 33 nF | 1.60±0.2 | 1.60±0.2 | | | | | | | | | | 2.5±0.3 | 2.5±0.3 |
| 47 nF | 1.60±0.2 | 1.60±0.2 | | | | | | | | | | | |
| 56 nF | 1.60±0.2 | 1.60±0.2 | | | | | | | | | | | |
| 68 nF | 1.60±0.2 | 1.60±0.2 | | | | | | | | | | | |
| 82 nF | 1.60±0.2 | 1.60±0.2 | | | | | | | | | | | |
| 100 nF | 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-12 series is on request
3. * : L: 3.2± 0.40 W: 2.5± 0.30

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## CAPACITANCE RANGE & THICKNESS FOR X7R/X7S

Table 5 Sizes from 0201 to 0603

| CAP. | 0201 | | | 0402 | | | | | 0603 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 6.3 V | 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 | 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 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 | | 0.8±0.1 | 0.8±0.1 | 0.8±0.1 | 0.8±0.1 | 0.8±0.1 |
| 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 | 0.8±0.1 | 0.8±0.1 | 0.8±0.1 | 0.8±0.1 | 0.8±0.1 |
| 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 | 0.8±0.1 | 0.8±0.1 | 0.8±0.1 | 0.8±0.1 | 0.8±0.1 |
| 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 | 0.8±0.1 | 0.8±0.1 | 0.8±0.1 | 0.8±0.1 | 0.8±0.1 |
| 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 | 0.8±0.1 | 0.8±0.1 | 0.8±0.1 | 0.8±0.1 | 0.8±0.1 |
| 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 | 0.3±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 |
| 22 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 |
| 33 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 |
| 47 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 |
| 68 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 |
| 100 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 |
| 150 nF | | | | 0.5±0.05 (X7S) | 0.5±0.05 (X7S) | 0.5±0.05 (X7S) | | | 0.8±0.1 | 0.8±0.1 | 0.8±0.1 | 0.8±0.1 | |
| 220 nF | | | | 0.5±0.05 (X7S) | 0.5±0.05 (X7S) | 0.5±0.05 (X7S) | | | 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 | 0.8±0.1 | |
| 470 nF | | | | 0.5±0.05 (X7S) | | | | | 0.8±0.1 | 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 | 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

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## 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<br>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<br>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

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## 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 | 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 |
| 330 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 | 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 | 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 |
| 680 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 | 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 | 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 |
| 2.2 nF | 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 | 1.25±0.2 | 1.25±0.2 | |
| 4.7 nF | 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 | 1.25±0.2 | 1.25±0.2 | |
| 10 nF | 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 | 1.25±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 | 1.25±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

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## 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 9

| DESCRIPTION | | | | | | | | VALUE |
|---|---|---|---|---|---|---|---|---|
| Capacitance range | | | | | | | | 0.2 pF to 680 nF |
| Dissipation factor (D.F.) | | | | | | | | |
| NPO | C < 30 pF | | | | | | | ≤ 1 / ( 400 + 20C ) |
| | C ≥ 30 pF | | | | | | | ≤ 0.1 % |
| X7R/X7S | 0201 | 0402 | 0603 | 0805 | 1206 | 1210 | 1812 | |
| ≤10V | | 100pF to 100nF | 100pF to 680nF | 1nF to 680nF | 220pF to 680nF | 100nF to 680nF | | ≤ 5% |
| | 15nF to 100nF | 150nF to 470nF | | | | | | ⩽ 10% |
| 16V | | 100pF to 22nF | 100pF to 220nF | 1nF to 470nF | 220pF to 680nF | 100nF to 680nF | | ≤ 3.5% |
| | | 27nF to 100nF | 330nF to 680nF | 680nF | | | | ≤ 5% |
| | | 150nF to 220nF | | | | | | ⩽ 10% |
| 25V | 100pF to 470pF | 100pF to 10nF | 100pF to 39nF | 1nF to 180nF | 220pF 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% |
| | | 150nF to 220nF | | | | | | ⩽ 10% |
| 50V | 100pF to 470pF | 100pF to 10nF | 100pF to 39nF | 1nF to 180nF | 220pF to 470nF | 100nF to 680nF | 470nF to 680nF | ≤ 2.5% |
| | 560pF to 1nF | | 47nF to 220nF | 220nF to 470nF | | | | ≤ 3.5% |
| | | 12nF to 100nF | 330nF to 680nF | 560nF to 680nF | 680nF | | | ≤ 5% |
| 100V | | 220pF to 1.5nF | 100pF to 10nF | 1nF to 100nF | 220pF to 470nF | 100nF to 270nF | 470nF to 680nF | ≤ 2.5% |
| | | | 12nF to 100nF | | 560nF to 680nF | 330nF to 680nF | | ≤ 5% |
| 200V/250V | | | | 1nF to 22nF | 220pF 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 $U_r$ (DC) | | | | | | | | |
| NPO (general) | | | | | I.R. ≥ 100 GΩ or I.R. x C ≥ 1000 Ω.F. whichever is less<br>1206/250V to 630V >1nF, 1210/630V & 1KV >1nF<br>I.R. ⩾ 10 GΩ or I.R. x C ⩾ 500 Ω.F. whichever is less | | | |
| X7R (general) | | | | | I.R. ≥ 10 GΩ or I.R. x C ≥ 500 Ω.F. whichever is less<br><br>I.R. x C ≥ 100 Ω.F. :<br>0201 / 6.3V / 15nF to 100nF<br>0603 / 10V to 25V / 560nF to 680nF<br>0603 / 50V / 270nF to 680 nF<br>I.R. X C ≥ 50 Ω.F. :<br>0402 / 10V to 16V / > 100nF | | | |
| X7S (general)<br>0402/10V to 25V/>100nF | | | | | I.R. ≥ 1 GΩ or I.R. x C ≥ 100 Ω.F. whichever is less<br>I.R. X C ≥ 50 Ω.F. | | | |
| Operating temperature range:<br>NP0/X7R/X7S | | | | | –55 °C to +125 °C | | | |

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## SOLDERING RECOMMENDATION

Table 10

| SOLDERING METHOD | SIZE 0201 | 0402 | 0603 | 0805 | 1206 | ≥ 1210 |
|---|---|---|---|---|---|---|
| Reflow | ○ | ○ | ○ | ○ | ○ | ○ |
| Wave | | --- | ○ | ○ | ○ | --- |

## 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 11 Test procedures and requirements

| NO | AEC-Q200 TEST | TEST METHOD | REQUIREMENTS |
|---|---|---|---|
| 4 | Temperature Cycling | Preconditioning, Class II only :<br>150 +0/–10 °C for 1 hour, then keep for<br>24 ±1 hours at room temperature<br><br>1000 cycles with following detail:<br>15 minutes at lower category temperature<br>15 minutes at upper category temperature<br><br>Measurement at least 24 hours after test conclusion. | No visual damage<br><br>ΔC/C<br>NPO: Within ±2.5% or 0.25 pF, whichever is greater<br>X7R/X7S: ±10%<br><br>D.F. meet initial specified value<br><br>IR meet initial specified value |
| 5 | Destructive Physical Analysis | Electrical test not required. | |
| 7 | Biased Humidity | 1. Preconditioning, class 2 only:<br>150 +0/-10 °C /1 hour, then keep for<br>24 ±1 hour at room temp<br>2. Test condition:<br>85 °C, 85% R.H. connected with 100 KΩ resistor, applied 1.5V/$U_r$ (no more than 630V) for 1,000 hours.<br>3. Recovery:<br>NPO: 6 to 24 hours<br>X7R/X7S: 24 ± 4 hours<br>4. Final measure: C. D. I.R.<br>5. Measurement at least 24 hours after test conclusion | No visual damage after recovery<br><br>ΔC/C<br>NPO: Within ±2% or 1 pF, whichever is greater<br>X7R/X7S: ±15%<br><br>D.F.<br>NPO: ≤ 2 x specified value.<br>X7R/X7S:<br>(1) ≤ 16V: ≤ 7% or specified value whichever is greater<br>(2) ≥ 25V: ≤ 5% or specified value whichever is greater<br><br>I.R.<br>The insulation resistance shall greater than 10% of initial spec. |
| 8 | High Temperature | | No visual damage |

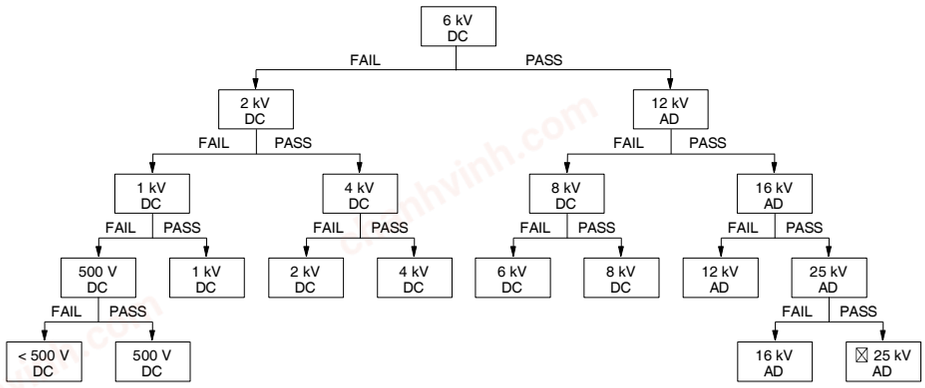
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| NO | AEC-Q200 TEST | TEST METHOD | REQUIREMENTS |
|---|---|---|---|
| | Operational Life | 1. Preconditioning, class 2 only:<br>150 +0/-10 °C /1 hour, then keep for<br>24 ±1 hour at room temp<br>Temperature: 125 °C<br>Specified stress voltage applied for 1,000 hours:<br>Applied 2.0 x Ur for 6.3V to 100V *<br>High voltage series follows with below<br>stress condition:<br>Applied 1.5 x Ur for 200V, 250V series<br>Applied 1.3 x Ur for 500V, 630V series<br>Applied 1.2 x Ur for 1KV, 2KV, 3KV series<br>Measurement at least 24 hours after test conclusion.<br><br>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 and then the requirement shall be met.<br>* Note : Applied 1.5 x Ur for 6.3V to 100V<br>0402/X7S/10V~25V/>100nF<br>0402/X7R/50V/>10nF<br>0603/X7R/25V/>220nF; 0603/X7R/50V/220nF<br>0603/X7R/100V/≥100nF<br>0805/X7R/100V/≥ 470nF | ΔC/C<br>NPO: Within ±2% or 1 pF, whichever is greater<br>X7R/X7S: ±15%<br><br>D.F.<br>NPO: ≤ 2 x specified value.<br>X7R/X7S:<br>(1) ≤ 16V: ≤ 7% or specified value whichever is greater<br>(2) ≥ 25V: ≤ 5% or specified value whichever is greater<br><br>IR<br>NPO: ≥ 4,000 MΩ or IR x $C_r$ ≥ 40Ω.F. whichever is less<br>X7R/X7S: ≥ 1,000 MΩ or IRx $C_r$ ≥ 50Ω.F. whichever is less *<br>* IRx Cr ≥ 5Ω.F.<br>0402/10V-16V/>100nF<br>* IRx Cr ≥ 10Ω.F.<br>0603/25V/>220nF |
| 9 | External Visual | Any applicable method using × 10 magnification | In accordance with specification |
| 10 | Physical Dimension | Verify physical dimensions to the applicable device specification. | In accordance with specification |
| 13 | Mechanical Shock | Three shocks in each direction shall be applied along the three mutually perpendicular axes of the test specimen<br>(18 shocks)<br>Peak value: 100 g's<br>Duration: 6 ms<br>Velocity change: 12.3 ft/s<br>Waveform: Half-sin | ΔC/C<br>NPO: Within ±0.5% or 0.5 pF, whichever is greater<br>X7R/X7S: ±10%<br><br>D.F.<br>Within initial specified value<br><br>IR<br>Within initial specified value |
| 14 | Vibration | 5 g's for 20 minutes, 12 cycles each of 3 orientations.<br>Test from 10-2000 Hz. | ΔC/C<br>NP0: Within ±0.5% or 0.5 pF, whichever is greater<br>X7R/X7S: ±10%<br><br>D.F: meet initial specified value<br><br>IR meet initial specified value |

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| NO | AEC-Q200 TEST | TEST METHOD | REQUIREMENTS |
|---|---|---|---|
| 15 | Resistance to Soldering Heat | Preconditioning, class II only : 150 +0/–10 °C for 1 hour, then keep for 24 ±1 hours at room temperature<br>Follow MIL-STD-202 method 210 condition k, time above 217 deg-C , 60s to 150s. | Dissolution of the end face plating shall not exceed 25% of the length of the edge concerned |
| | | | ΔC/C<br>NPO: Within ±1% or 0.5 pF, whichever is greater.<br>X7R/X7S: ±10% |
| | | | D.F. within initial specified value |
| | | | IR within initial specified value |
| 17 | ESD | Per AEC-Q200-002 | A component passes a voltage level if all components stressed at that voltage level pass. |
| | | <br>Note: Classify the components according to the highest ESD voltage level survived during ESD testing.<br>**Fig. 4** Passive component HBM ESD test flow diagram<br>(DC = Direct Contact Discharge, AD = Air Discharge) | |
| 18 | Solderability | 1. J-STD-002 Method B1, coating durability category 2. Preheat at 155°C for 4 hours. After preheating, immerse the capacitor in a solution of ethanol and rosin. Immerse in eutectic solder solution for 5+0/-0.5 seconds at 245± 5°C.<br>2. J-STD-002 Method D, Coating Durability Category 2.<br>3. Should be placed into steam aging. After preheating, immerse the capacitor in a solution of Ethanol and rosin. Immerse in eutectic solder solution for 30 seconds at 260± 5°C. | The solder should cover over 95% of the critical area of each termination. |

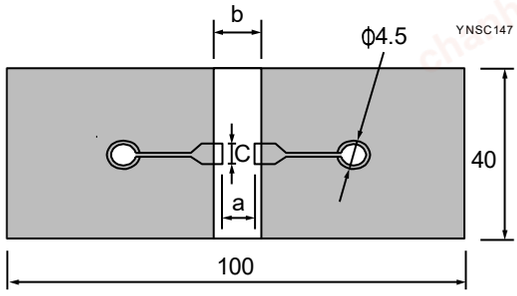
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<table>
<tr><td rowspan="5">19</td><td rowspan="5">Electrical Characterization</td><td>Capacitance</td><td>NPO:<br>f = 1 MHz for C ≤ 1nF, measuring at voltage 1 $V_{rms}$ at 25 °C<br>f = 1±0.1 KHz for C > 1nF,<br>measuring at voltage 1±0.2 $V_{rms}$ at 25 °C<br>X7R/X7S:<br>At 25 °C, 24 hours after annealing<br>f = 1±0.1 KHz, measuring at voltage 1±0.2 $V_{rms}$ at 25 °C</td><td>Within specified tolerance</td></tr>
<tr><td>Dissipation Factor (D.F.)</td><td>NPO:<br>f = 1 MHz for C ≤ 1nF, measuring at voltage 1 $V_{rms}$ at 25 °C<br>f = 1±0.1 KHz for C > 1nF,<br>measuring at voltage 1±0.2 $V_{rms}$ at 25°C<br>X7R/X7S:<br>At 25 °C, 24 hours after annealing<br>f = 1±0.1 KHz, measuring at voltage 1±0.2 $V_{rms}$ at 25 °C</td><td>In accordance with specification on Table 9</td></tr>
<tr><td>Insulation Resistance (I.R.)</td><td>At $U_r$ (DC) for 1 minute</td><td>In accordance with specification on Table 9</td></tr>
<tr><td>Temperature coefficient</td><td>Capacitance shall be measured by the steps shown in the following table.<br>The capacitance change should be measured after 5 min at each specified temperature stage.<br><table><tr><td>Step</td><td>Temperature(°C)</td></tr><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></table><br>(1) NPO<br>Temperature Coefficient shall be calculated from the formula as below<br>Temp, Coefficient = $\frac{C2-C1}{C1\times\Delta T}\times 10^6$ [ppm/°C]<br>C1: Capacitance at step c<br>C2: Capacitance at 125°C<br>ΔT: 100°C (=125°C -25°C)<br>(2) X7R/X7S<br>Capacitance Change shall be calculated from the formula as below<br>$\Delta C = \frac{C2-C1}{C1}\times 100\%$<br>C1: Capacitance at step c<br>C2: Capacitance at step b or d</td><td>ΔC/C<br>NPO: ±30ppm /°C<br><br>X7R: ±15%<br>X7S: ± 22%</td></tr>
<tr><td>Voltage Proof</td><td>1. Specified stress voltage applied for 1~5 seconds<br>2. Ur ≤ 100 V: series applied 2.5 Ur<br>3. 100 V < Ur ≤ 200 V series applied (1.5 Ur + 100)<br>4. 200 V < Ur ≤ 500 V series applied (1.3 Ur + 100)<br>5. Ur > 500 V: 1.3 Ur<br>6. Ur ≥ 1000 V: 1.2 Ur<br>Charge/Discharge current is less than 50 mA</td><td>No breakdown or flashover</td></tr>
</table>

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<table>
<tr>
<td>21</td>
<td>Board Flex</td>
<td>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.<br>Part should be mounted using the following soldering reflow profile.<br>Conditions:<br>NPO:<br>Bending 3 mm at a rate of 1 mm/s, radius jig 340 mm<br>X7R/X7S:<br>Bending 2 mm at a rate of 1 mm/s, radius jig 340 mm<br><br>Test Substrate:<br>

unit: mm</td>
<td>No visual damage<br><br>ΔC/C<br>NPO: Within ±1% or 0.5 pF, whichever is greater<br>X7R/X7S: ±10%<br><br>
<table>
<tr><th></th><th colspan="3">Dimension(mm)</th></tr>
<tr><th>Type</th><th>a</th><th>b</th><th>c</th></tr>
<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>
</table>
</td>
</tr>
<tr>
<td>22</td>
<td>Terminal Strength</td>
<td>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.<br>This force shall be applied for 60+1 seconds.<br>Also the force shall be applied gradually as not to apply a shock to the component being tested.<br>* Apply 2N force for 0402 size.<br>* Apply 1N force for 0201 size.</td>
<td>Magnification of 20X or greater may be employed for inspection of the mechanical integrity of the device body, terminals and body/terminal junction.<br>Before, during and after the test, the device shall comply with all electrical requirements stated in this specification.</td>
</tr>
</table>

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## THICKNESS CLASSES AND PACKING QUANTITY

Table 12

| SIZE CODE | THICKNESS CLASSIFICATION | PACKING CODE | | TAPE WIDTH | QUANTITY PER REEL | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Ø180 MM / 7 INCH | | Ø330 MM / 13 INCH | |
| | | 7 INCH | 13 INCH | | Paper | Blister | Paper | Blister |
| 0201 | 0.3 ±0.03 mm | R | P | 8 mm | 15,000 | --- | 50,000 | --- |
| 0402 | 0.5 ±0.05 mm | R | P | 8 mm | 10,000 | --- | 50,000 | --- |
| 0603 | 0.8 ±0.1 mm | R | P | 8 mm | 4,000 | --- | 15,000 | --- |
| 0805 | 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 |
| 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 | --- |
| | 1.0/1.15 ±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 |
| 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 |
| | 1.25 ±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 | --- | --- |
| 1812 | 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 | --- | --- |

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## PAPER/PE TAPE SPECIFICATION

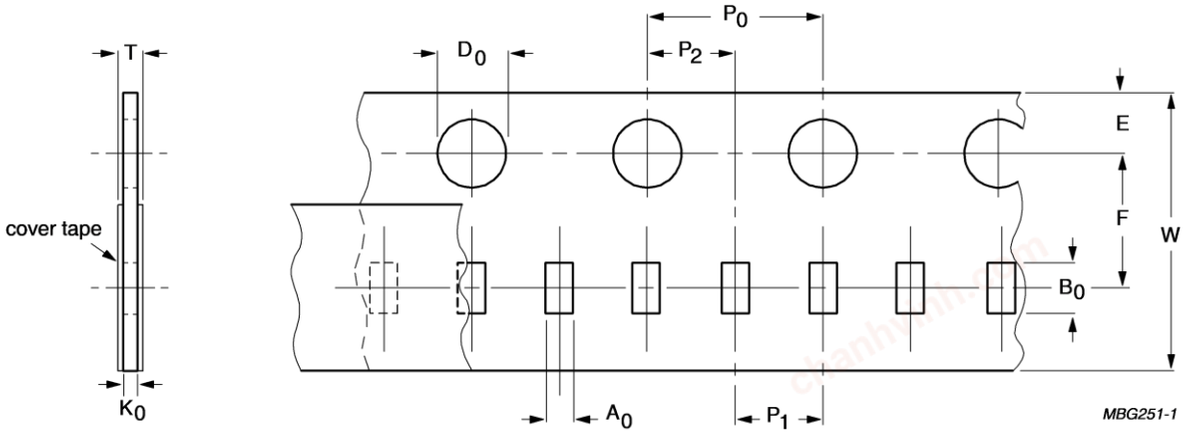



Fig. 5 Paper/PE tape

Table 13 Dimensions of paper/PE tape for relevant chip size; see Fig.5

Unit: mm

| SIZE CODE | SYMBOL A0 | B0 | W | E | F | P0 (1) | P1 | P2 | ØD0 | K0 | 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

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## BLISTER TAPE SPECIFICATION

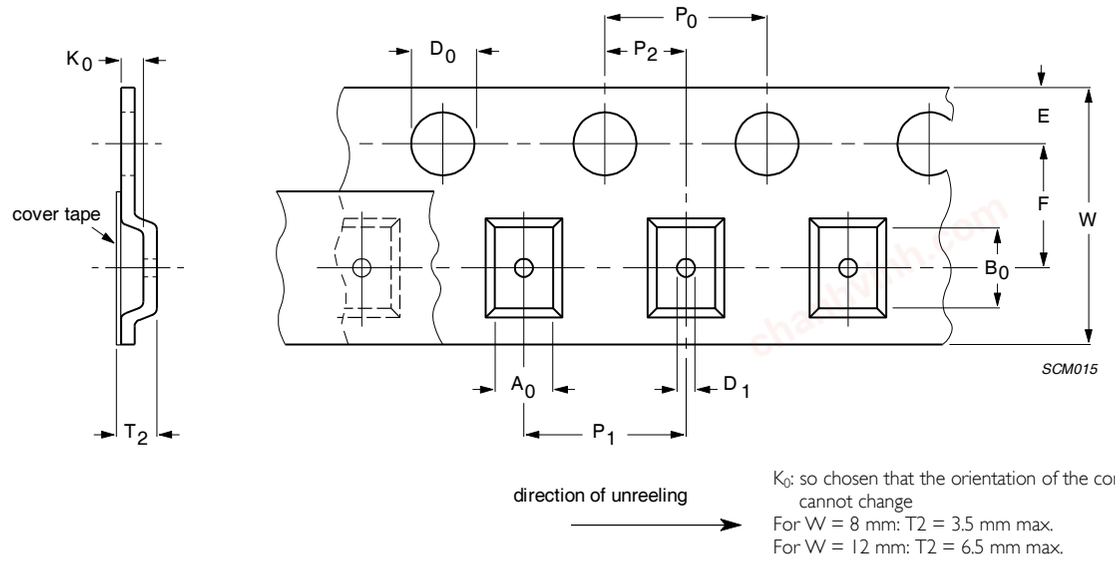



Fig. 6 Blister tape

Table 14 Dimensions of blister tape for relevant chip size; see Fig.6

| 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 |

**NOTE**

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

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## REEL SPECIFICATION

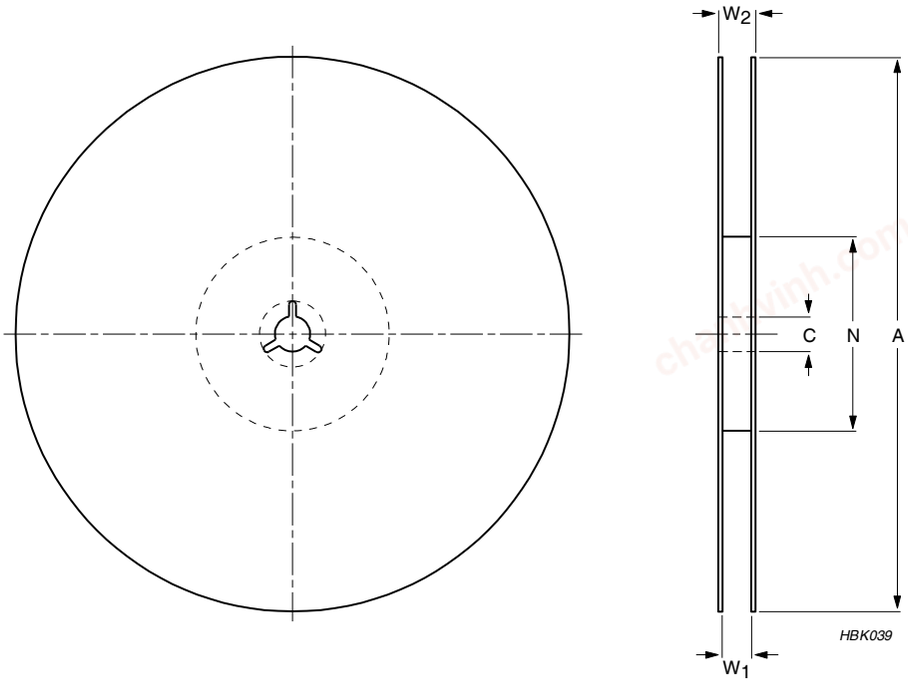



Fig. 7 Reel

Table15 Reel dimensions; see Fig.7

| 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.

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## MOUNTING

### SOLDER REPAIRS

Conventional solder repairs are carried out with a soldering iron as shown as Tab.9 . The tip of the soldering iron should not directly touch the chip component to avoid thermal shock on the interface between termination and body during mounting, repairing or de-mounting processes. Ensure the termination solder has melted before removing the chip component.

Table 16 Recommended soldering iron condition

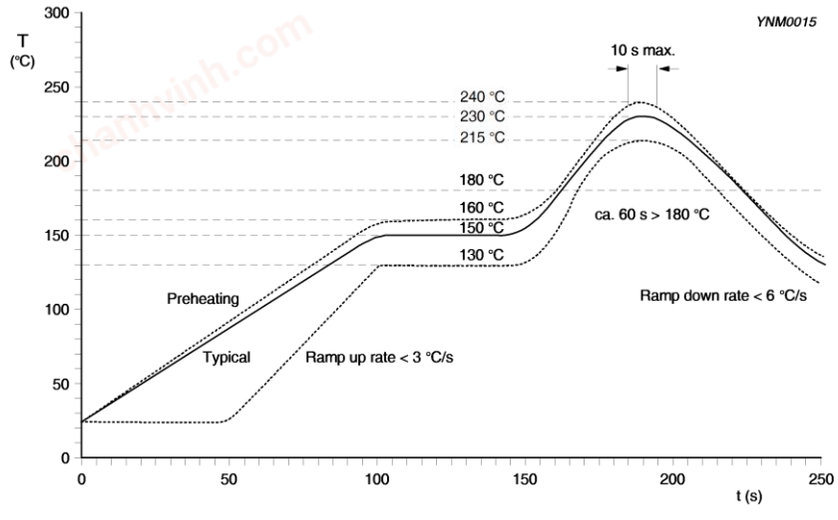
| SIZE | Temp(°C) | DURATION (SEC.) | PREHEATING TEMP(°C) | ATMOSPHERE |
|---|---|---|---|---|
| 0201/0402/0603/0805/1206 | 350 max. | 3 max. | 150 min. | air |
| 1210/1808/1812/2220 | 280 max. | 3 max. | 150 min. | air |

### 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.

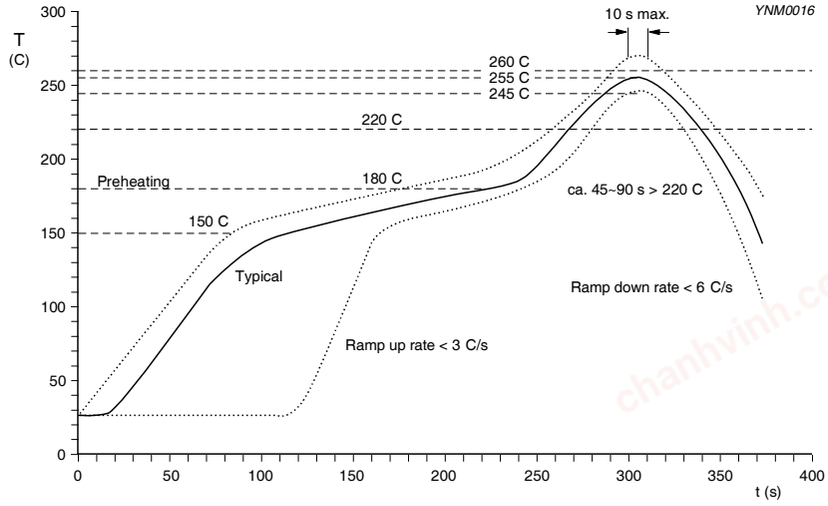



Solid line: Typical process (terminal temperature)
Dotted lines: Process limits - bottom process limit (terminal temperature) & upper process limit (top surface temperature).

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

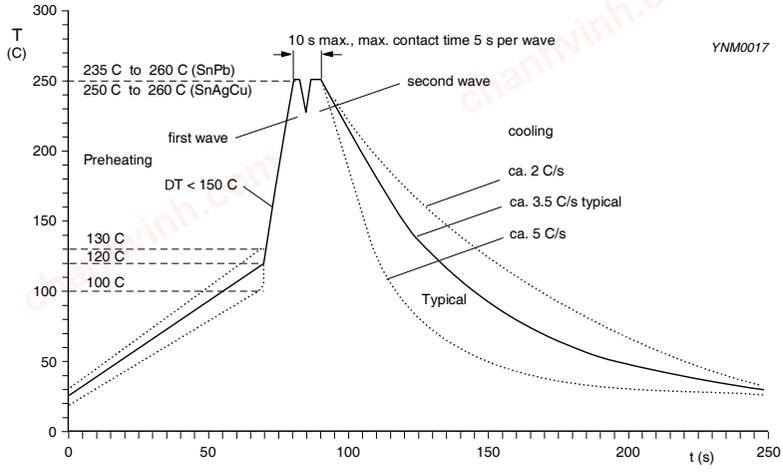
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Solid line: Typical process (terminal temperature)
Dotted lines: Process limits - bottom process limit (terminal temperature) & upper process limit (top surface temperature).

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




Solid line: Typical process
Dotted lines: Process limits

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

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## FOOTPRINT DIMENSIONS

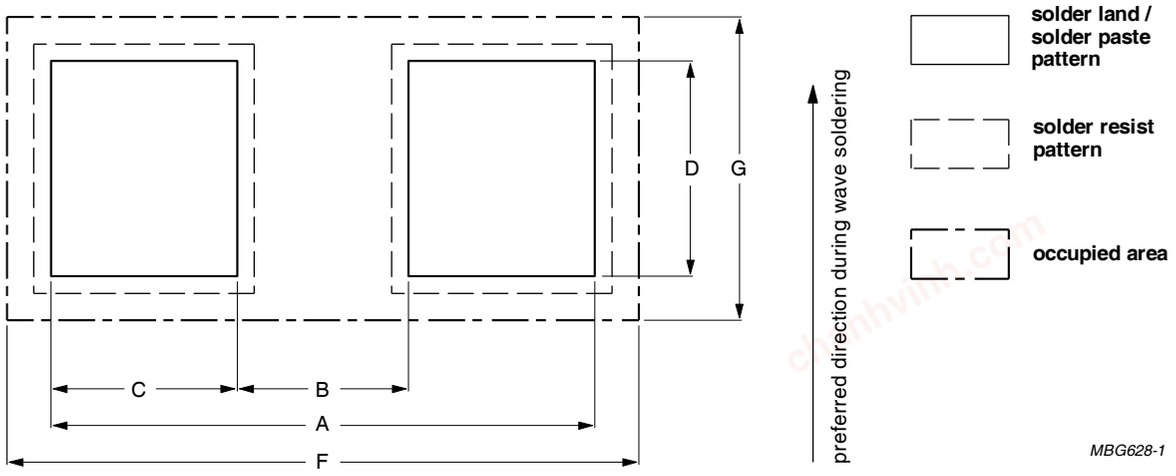



Fig. 11 **Discrete capacitors** recommended dimensions of footprint

Table 17 Reflow soldering; for footprint dimensions see Fig.11

| SIZE | FOOTPRINT DIMENSIONS | | | | | | Unit: mm |
|---|---|---|---|---|---|---|---|
| CODE | A | B | C | D | F | G | Processing remarks |
| 0201 | 0.8 ±0.20 | 0.25 ±0.05 | 0.28 ±0.07 | 0.3 ±0.10 | --- | --- | IR or hot plate soldering |
| 0402 | 1.5 ±0.15 | 0.5 ±0.15 | 0.5 ±0.15 | 0.5 ±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 | 2.7 ±0.15 | 1.5 ±0.15 | |
| 0805 | 2.8 ±0.25 | 0.9 ±0.25 | 0.95 ±0.25 | 1.4 ±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 | 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 | 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 | 5.8 ±0.25 | 2.9 ±0.25 | Ceramic substrate only |
| 1812 | 5.4 ±0.25 | 3.3 ±0.25 | 1.05 ±0.25 | 3.5 ±0.25 | 5.8 ±0.25 | 4.1 ±0.25 | |
| 2220 | 6.6 ±0.25 | 4.5 ±0.25 | 1.05 ±0.25 | 5.3 ±0.25 | 7.0 ±0.25 | 5.9 ±0.25 | |

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## REVISION HISTORY

| REVISION | DATE | CHANGE NOTIFICATION | DESCRIPTION |
|---|---|---|---|
| Version 26 | Sep 22, 2026 | - | - Correction thickness of X7R, 1206, 200/250V, 33nF |
| Version 25 | Jan. 21, 2026 | - | - Add NPO, 0402, 100V, 0.47pF to 220pF;<br>- Add NPO, 0805, 50V to 100V, 12nF to 22nF;<br>- Add NPO, 1206, 50V to 100V, 3.3nF to 100nF;<br>- Add NPO, 1210, 1000V, 33nF;<br>- Add X7R, 0201, 6.3V, 15nF to 100nF;<br>- Add X7S, 0402, 10V, 470nF;<br>- Add X7R, 0603, 50V, 330nF to 680nF; |
| Version 24 | Oct. 14, 2025 | - | - Add NPO, 1206, 1.2nF to 10nF, 250V to 500V<br>- Add NPO, 0201, 39pF to 220pF, 25V to 50V |
| Version 23 | Jun. 4, 2025 | - | - Add NPO, 1210, 630V to 1000V, 15nF |
| Version 22 | Jan. 14, 2025 | - | - Revise AEC-Q200 test condition to version E. |
| Version 21 | May 21, 2024 | - | - Add 1206/NPO/630V/1.2nF to 10nF;<br>- Add 1210/NPO/630V/4.7nF to 33nF;<br>- Add 1210/NPO/1000V/4.7nF to 22nF; |
| Version 20 | Jan. 20, 2024 | - | - Add 0402/X7R/100pF to 150pF/10V to 50V;<br>- Add 0603/X7R/100pF to 680pF/10V to 100V;<br>- Add 1206/X7R/220pF to 10nF/6.3V to 250V; |
| Version 19 | Jul. 08, 2022 | - | - Add 0805/NPO/500V 10pF to 470pF<br>- Add 0805/NPO/630V 10pF to 180pF<br>- Add 1210/NPO/50V~500V/47pF to 820pF |
| Version 18 | Apr. 16, 2022 | - | - Add 0402/X7S/10V~16V/150nF~220nF |
| 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<br>- I.R. for NPO change to " I.R. ≥ 100 GΩ or I.R. × C ≥ 1000Ω.F. whichever is less" |
| Version 14 | Aug. 09, 2021 | - | - Add 1206/NPO/1kV/10pF to 220pF<br>1206/X7R/1kV/1nF |
| Version 13 | Jun. 08, 2021 | - | - Move out "Array" and "High Cap" to individual specification<br>Add 0603 NPO 50V/100V 1.2nF to 2.2nF<br>0402 X7R 50V 15nF to 100nF<br>0603 X7R 25V 330nF to 680nF<br>0603 X7R 50V 150nF to 220nF<br>0603 X7R 100V 68nF to 100nF |
| Version 12 | Feb. 26, 2021 | | - Add 0201/ X7R/ 50V / 100 pF to 1nF<br>0603/ X7R/ 16V / 680nF to 1μF<br>0603/ X7R/ 25V / 150nF / 220nF/ 1μF<br>1210/ X7R/ 50V / 4.7μF |
| 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,<br>- Add 0805 NPO 50V to 100V, 1.2nF to 10nF,<br>- Add 0805 X7R 16V 2.2uF, 50V 680nF to 1uF,<br>- Add 1206 X7R 100V 330nF to 2.2uF, 250V 33nF to 100nF |

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## REVISION HISTORY

| REVISION | DATE | CHANGE NOTIFICATION | DESCRIPTION |
|---|---|---|---|
| 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 |

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