# APPROVAL SHEET

MULTILAYER CERAMIC CAPACITORS

General Purpose Series (4V to 100V)

0201 to 1812 Sizes

NP0, X7R, Y5V, X6S, X7S & X5R Dielectrics

Halogen Free & RoHS Compliance

COPYRIGHT © WALSIN TECHNOLOGY CORPORATION. ALL RIGHTS RESERVED

*Contents in this sheet are subject to change without prior notice.



Copyright © by Walsin Technology Corporation. | All rights reserved.

## 1. DESCRIPTION

MLCC consists of a conducting material and electrodes. To manufacture a chip-type SMT and achieve miniaturization, high density and high efficiency, ceramic condensers are used.

WTC's MLCC is made by NP0, X7R, X6S, X5R and Y5V dielectric material and which provides product with high electrical precision, stability and reliability.

## 2. FEATURES

a. A wide selection of sizes is available (0201 to 1812).
b. High capacitance in given case size.
c. Capacitor with lead-free termination (pure Tin).

## 3. APPLICATIONS

a. For general digital circuit.
b. For power supply bypass capacitors.
c. For consumer electronics.
d. For telecommunication.

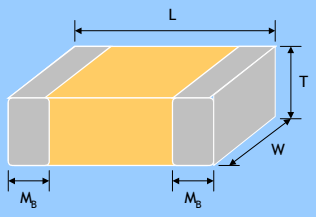
## 4. HOW TO ORDER

| 1206 | B | 104 | K | 500 | C | T |
|---|---|---|---|---|---|---|
| **Size** | **Dielectric** | **Capacitance** | **Tolerance** | **Rated voltage** | **Termination** | **Packaging style** |
| Inch (mm)<br>**0201** (0603)<br>**0402** (1005)<br>**0603** (1608)<br>**0805** (2012)<br>**1206** (3216)<br>**1210** (3225)<br>**1812** (4532) | **N**=NP0<br>(C0G)<br>**B**=X7R<br>**F**=Y5V<br>**X**=X5R<br>**S**=X6S<br>**A**=X7S | Two significant digits followed by no. of zeros. And R is in place of decimal point.<br><br>eg.:<br>0R5=0.5pF<br>1R0=1.0pF<br>104=10x10$^4$<br>=100nF | **A**=±0.05pF<br>**B**=±0.1pF<br>**C**=±0.25pF<br>**D**=±0.5pF<br>**F**=±1%<br>**G**=±2%<br>**J**=±5%<br>**K**=±10%<br>**M**=±20%<br>**Z**=-20/+80% | Two significant digits followed by no. of zeros. And R is in place of decimal point.<br><br>**4R0**=4 VDC<br>**6R3**=6.3 VDC<br>**100**=10 VDC<br>**160**=16 VDC<br>**250**=25 VDC<br>**500**=50 VDC<br>**101**=100 VDC | **C**=Cu/Ni/Sn | **T**=7" reeled<br>**G**=13" reeled |

PSA PASSIVE SYSTEM ALLIANCE
Walsin Technology Corporation
COPYRIGHT © WALSIN TECHNOLOGY CORPORATION. ALL RIGHTS RESERVED.


Copyright © by Walsin Technology Corporation. | All rights reserved.

## 5. EXTERNAL DIMENSIONS

| Outline | Size Inch (mm) | L (mm) | W (mm) | T (mm)/Symbol | | Soldering Method * | $M_B$ (mm) |
|---|---|---|---|---|---|---|---|
|  Fig. 1 The outline of MLCC | 01R5 (0402) | 0.4±0.02 | 0.2±0.02 | 0.2±0.02 | V | R | 0.10±0.03 |
| | 0201 (0603) | 0.6±0.03 | 0.3±0.03 | 0.3±0.03 | L | R | 0.15±0.05 |
| | | 0.6±0.05#2 | 0.3±0.05#2 | 0.3±0.05#2 | | | |
| | | 0.6±0.09#3 | 0.3±0.09#3 | 0.3±0.09#3 | | | 0.15+0.1/-0.05 |
| | 0402 (1005) | 1.00±0.05 | 0.50±0.05 | 0.50±0.05 | N | R | 0.25 |
| | | | | 0.50+0.02/-0.05 | Q | R | +0.05/-0.10 |
| | | 1.00±0.20 | 0.50±0.20 | 0.5±0.20 | E | R | |
| | 0603 (1608) | 1.60±0.10 | 0.80±0.10 | 0.80±0.07 | S | R / W | 0.40±0.15 |
| | | 1.60+0.15/-0.10 | 0.80+0.15/-0.10 | 0.50±0.10 | H | R / W | |
| | | | | 0.80+0.15/-0.10 | X | R / W | |
| | | 1.60±0.20#1 | 0.80±0.20#1 | 0.8±0.20#1 | | | |
| | 0805 (2012) | 2.00±0.15 | 1.25±0.10 | 0.50±0.10 | H | R / W | 0.50±0.20 |
| | | | | 0.60±0.10 | A | R / W | |
| | | | | 0.80±0.10 | B | R / W | |
| | | | | 1.25±0.10 | D | R | |
| | | 2.00±0.20 | 1.25±0.20 | 0.85±0.10 | T | R / W | |
| | | | | 1.25±0.20 | I | R | |
| | 1206 (3216) | 3.20±0.15 | 1.60±0.15 | 0.80±0.10 | B | R / W | 0.60±0.20 (0.5±0.25)*** |
| | | | | 0.95±0.10 | C | R | |
| | | | | 1.25±0.10 | D | R | |
| | | 3.20±0.20 | 1.60±0.20 | 1.15±0.15 | J | R | |
| | | | | 1.60±0.20 | G | R | |
| | | | | 0.85±0.10 | T | R / W | |
| | | 3.20+0.30/-0.10 | 1.60+0.30/-0.10 | 1.60+0.30/-0.10 | P | R | |
| | 1210 (3225) | 3.20±0.30 | 2.50±0.20 | 0.95±0.10 | C | R | 0.75±0.25 |
| | | | | 0.85±0.10 | T | R | |
| | | | | 1.25±0.10 | D | R | |
| | | 3.20±0.40 | 2.50±0.30 | 1.60±0.20 | G | R | |
| | | | | 2.00±0.20 | K | R | |
| | | | | 2.50±0.30 | M | R | |
| | | 3.20±0.60#4 | 2.50±0.50#4 | 2.50±0.50#4 | | | |
| | 1808 (4520) | 4.50±0.40 (4.5+0.5/-0.3)** | 2.03±0.25 | 1.25±0.10 | D | R | 0.75±0.25 (0.5±0.25)*** |
| | | | | 1.40±0.15 | F | R | |
| | | | | 1.60±0.20 | G | R | |
| | | | | 2.00±0.20 | K | R | |
| | 1812 (4532) | 4.50±0.40 (4.5+0.5/-0.3)** | 3.20±0.30 | 1.25±0.10 | D | R | 0.75±0.25 (0.5±0.25)*** |
| | | | | 1.60±0.20 | G | R | |
| | | | | 2.00±0.20 | K | R | |
| | | | 3.20±0.40 | 2.50±0.30 | M | R | |
| | | | | 2.80±0.30 | U | R | |

* R = Reflow soldering process ; W = Wave soldering process.
** For 1808_200V ~3kV, 1812_200V~3kV and safety certificated products.
*** For 1206_1000V ~3kV,1808_200V ~3kV, 1812_200V~3kV and safety certificated products.
#1 : For 0603/Cap≧10μF or 0603/Cap≧4.7μF(≦6.3V) or 0603/Cap>1μF(>10V) products.
#2 : For 0201/Cap≧0.68μF products.
#3 : For 0201/Cap≧1μF products.
#4 : For 1210_100V: Cap > 1μF, 250V: Cap >0. 47μF, 400V~630V: Cap >0.22μF.


Copyright © by Walsin Technology Corporation. | All rights reserved.

## 6. GENERAL ELECTRICAL DATA

| Dielectric | NP0 | X7R | Y5V | X5R | X6S | X7S |
|---|---|---|---|---|---|---|
| Size | 0201, 0402, 0603, 0805, 1206, 1210, 1812 | | | | | |
| Capacitance range* | 0.1pF to 0.1μF | 100pF to 47μF | 0.01μF to 100μF | 100pF to 220μF | 0.1μF to 100μF | 1μF to 100μF |
| Capacitance tolerance** | Cap≤5pF[#1]:<br>A (±0.05pF), B (±0.1pF),<br>C (±0.25pF)<br>5pF<Cap<10pF:<br>C (±0.25pF), D (±0.5pF)<br>Cap≥10pF:<br>F (±1%), G (±2%),<br>J (±5%), K (±10%) | J (±5%),<br>K (±10%),<br>M (±20%) | M (±20%),<br>Z (-20/+80%) | K (±10%),<br>M (±20%) | K (±10%),<br>M (±20%) | K (±10%),<br>M (±20%) |
| Rated voltage (WVDC) | 10V, 16V, 25V, 50V,100V | 6.3V, 10V, 16V, 25V, 50V, 100V | | | | |
| DF(Tan δ)* | Cap<30pF: Q≥400+20C<br>Cap≥30pF: Q≥1000 | Note 1 | | | | |
| Operating temperature | -55 to +125℃ | | -25 to +85℃ | -55 to +85℃ | -55 to +105℃ | -55 to +125℃ |
| Capacitance characteristic | ±30ppm | ±15% | +30/-80% | ±15% | ±22% | ±22% |
| Termination | Ni/Sn (lead-free termination) | | | | | |

#1: NP0, 0.1pF product only provide B tolerance; 0603N0R4 provide B&C tolerance; 0603N0R3 only provide C tolerance.

* Measured at the condition of 30~70% related humidity.

NP0: Apply 1.0±0.2Vrms, 1.0MHz±10% for Cap≤1000pF and 1.0±0.2Vrms, 1.0kHz±10% for Cap>1000pF, 25℃ at ambient temperature

X7R/X6S/X5R/X7S: Please refer to page 13 “Reliability test conditions and requirements” for detail.

Y5V: Apply 1.0±0.2Vrms, 1.0kHz±10%, at 20℃ ambient temperature.

** Preconditioning for Class II MLCC: Perform a heat treatment at 150±10℃ for 1 hour and then leave i n ambient condition for 24±2 hours before measurement.

Note 1:

X7R/X5R/X6S/X7S

| Rated vol. | D.F.≦ | Exception of D.F. ≦ | |
|---|---|---|---|
| ≧100V | ≦2.5% | ≦3% | 1206≧0.47μF |
| | | ≦5% | 0805＞0.1μF;0603≧0.068μF;1206>1μF;1210≧2.2μF;TT s |
| | | ≦10% | 0805＞0.22μF;1210≧3.3μF |
| 50V | ≦2.5% | ≦3% | 0201(50V); 0603≧0.047μF; 0805≧0.18μF;1206≧0.47μF |
| | | ≦5% | 0201≧0.01uF; 1210≧4.7μF |
| | | ≦10% | 0402≧0.012μF;0603>0.1μF; 0805≧1μF;1206≧2.2μF;<br>1210≧10μF; TT series |
| 35V | ≦3.5% | ≦10% | 0603≧1μF;0805≥2.2μF;1206≧2.2μF;1210≧10μF |
| 25V | ≦3.5% | ≦5% | 0201≧0.01μF;0805≧1μF; 1210≧10μF |
| | | ≦7% | 0603≧0.33μF; 1206≧4.7μF |
| | | ≦10% | 0201≧0.1μF;0402≧0.10μF&(0402/X7R≧0.056μF); TT ser<br>0603≧0.47μF; 0805≧2.2μF;1206≧6.8μF; 1210≧22μF |
| | | ≦12.5% | 0402≧0.47μF |
| 16V | ≦3.5% | ≦5% | 0201≧0.01μF;0402≧0.033μF;0603≧0.15μF;<br>0805≧0.68μF;1206≧2.2μF;1210≧4.7μF |
| | | ≦10% | 0201≧0.1uF(0201/X7R≧0.022μF); 0402≧ 0.22uF; 0603≧<br>1206≧4.7μF; 1210≧22μF; TT series |
| 10V | ≦5% | ≦10% | 0201≧0.012μF;0402≧0.33μF(0402/X7R≧0.22μF); TT series<br>0603≧0.33μF; 0805≧2.2μF;1206≧2.2μF;1210≧22μF:01R5 |
| | | ≦15% | 0201≧0.1μF; 0402≧1μF |
| 6.3V | ≦10% | ≦15% | 0201≧0.1μF;0402≧1μF;0603≧10μF; 0805≧4.7μF;<br>1206≧47μF :1210≧100μF; TT series |
| | | ≦20% | 0402≧2.2μF |
| 4V | ≦15% | --- | --- |

Y5V

| Rated vol. | D.F. ≦ | Exception of D.F.≦ | |
|---|---|---|---|
| ≧50V | ≦5% | ≦7% | 0603≧0.1μF; 0805≧0.47μF; 1206≧4.7μF; TT series |
| | | ≦12.5% | 1210≧6.8μF |
| 35V | ≦7% | --- | --- |
| 25V | ≦5% | ≦7% | 0402≧0.047μF;0603≧0.1μF; 0805≧0.33μF;<br>1206≧1μF; 1210≧4.7μF |
| | | ≦9% | 0402≧0.068μF;0603≧0.47μF; 1206≧4.7μF;<br>1210≧22μF; TT series |
| 16V (C<1.0μF) | ≦7% | ≦9% | 0402≧0.068μF; 0603≧0.68μF |
| | | ≦12.5% | 0402≧0.22μF |
| 16V (C≧1.0μF) | ≦9% | ≦12.5% | 0603≧2.2μF; 0805≧3.3μF;1206≧10μF;<br>1210≧22μF; 1812≧47μF; TT series |
| 10V | ≦12.5% | ≦20% | 0402≧0.47μF |
| 6.3V | ≦20% | --- | --- |



Copyright © by Walsin Technology Corporation. | All rights reserved.

# 7. CAPACITANCE RANGE

## 7-1. NP0 Dielectric 0201, 0402, 0603, 0805 Sizes

| DIELECTRIC | | NP0 | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SIZE | | 0201 | | | 0402 | | | | | 0603 | | | | | 0805 | | | | | |
| RATED VOLTAGE (VDC) | | 16 | 25 | 50 | 10 | 16 | 25 | 50 | 100 | 10 | 16 | 25 | 50 | 100 | 10 | 16 | 25 | 50 | 100 |
| Capacitance | 0.1pF (0R1) | L | L | L | N | N | N | N | | | | | | | | | | | |
| | 0.2pF (0R2) | L | L | L | N | N | N | N | | | | | | | | | | | |
| | 0.3pF (0R3) | L | L | L | N | N | N | N | | S | S | S | S | | | | | | |
| | 0.4pF (0R4) | L | L | L | N | N | N | N | | S | S | S | S | | | | | | |
| | 0.5pF (0R5) | L | L | L | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A |
| | 0.6pF (0R6) | L | L | L | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A |
| | 0.7pF (0R7) | L | L | L | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A |
| | 0.8pF (0R8) | L | L | L | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A |
| | 0.9pF (0R9) | L | L | L | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A |
| | 1.0pF (1R0) | L | L | L | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A |
| | 1.2pF (1R2) | L | L | L | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A |
| | 1.5pF (1R5) | L | L | L | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A |
| | 1.8pF (1R8) | L | L | L | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A |
| | 2.0pF (2R0) | L | L | L | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A |
| | 2.2pF (2R2) | L | L | L | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A |
| | 2.7pF (2R7) | L | L | L | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A |
| | 3.0pF (3R0) | L | L | L | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A |
| | 3.3pF (3R3) | L | L | L | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A |
| | 3.9pF (3R9) | L | L | L | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A |
| | 4.0pF (4R0) | L | L | L | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A |
| | 4.7pF (4R7) | L | L | L | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A |
| | 5.0pF (5R0) | L | L | L | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A |
| | 5.6pF (5R6) | L | L | L | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A |
| | 6.0pF (6R0) | L | L | L | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A |
| | 6.8pF (6R8) | L | L | L | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A |
| | 7.0pF (7R0) | L | L | L | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A |
| | 8.0pF (8R0) | L | L | L | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A |
| | 8.2pF (8R2) | L | L | L | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A |
| | 9.0pF (9R0) | L | L | L | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A |
| | 10pF (100) | L | L | L | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A |
| | 12pF (120) | L | L | L | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A |
| | 15pF (150) | L | L | L | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A |
| | 18pF (180) | L | L | L | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A |
| | 22pF (220) | L | L | L | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A |
| | 27pF (270) | L | L | L | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A |
| | 33pF (330) | L | L | L | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A |
| | 39pF (390) | L | L | L | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A |
| | 47pF (470) | L | L | L | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A |
| | 56pF (560) | L | L | L | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A |
| | 68pF (680) | L | L | L | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A |
| | 82pF (820) | L | L | L | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A |
| | 100pF (101) | L | L | L | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A |
| | 120pF (121) | L | L | L | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A |
| | 150pF (151) | | L | L | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A |
| | 180pF (181) | | | | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A |
| | 220pF (221) | | | | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A |
| | 270pF (271) | | L | | N | N | N | N | | S | S | S | S | S | A | A | A | A | A |
| | 330pF (331) | | L | | N | N | N | N | | S | S | S | S | S | A | A | A | A | A |
| | 390pF (391) | | L | | N | N | N | N | | S | S | S | S | S | B | B | B | B | B |
| | 470pF (471) | | L | | N | N | N | N | | S | S | S | S | S | B | B | B | B | B |
| | 560pF (561) | | L | | N | N | N | N | | S | S | S | S | S | B | B | B | B | B |
| | 680pF (681) | | | | N | N | N | N | | S | S | S | S | S | B | B | B | B | B |
| | 820pF (821) | | | | N | N | N | N | | S | S | S | S | S | B | B | B | B | B |
| | 1,000pF (102) | | | | N | N | N | N | | S | S | S | S | S | B | B | B | B | B |
| | 1,200pF (122) | | | | | | | | | X | X | X | X | X* | B | B | B | B | B |
| | 1,500pF (152) | | | | | | | | | X | X | X | X | X* | B | B | B | B | B |
| | 1,800pF (182) | | | | | | | | | X | X | X | X | | B | B | B | B | B |
| | 2,200pF (222) | | | | | | | | | X | X | X | X | | B | B | B | B | B |
| | 2,700pF (272) | | | | | | | | | X | X | X | X | | D | D | D | D | D |
| | 3,300pF (332) | | | | | | | | | X | X | X | X | | D | D | D | D | D |
| | 3,900pF (392) | | | | | | | | | X* | X* | X* | X* | | D | D | D | D | D |
| | 4,700pF (472) | | | | | | | | | X* | X* | X* | X* | | D | D | D | D | D |
| | 5,600pF (562) | | | | | | | | | X* | X* | X* | X* | | D | D | D | D | D |
| | 6,800pF (682) | | | | | | | | | X* | X* | X* | X* | | D | D | D | D | D |
| | 8,200pF (822) | | | | | | | | | X* | X* | X* | X* | | D | D | D | D | |
| | 0.010uF (103) | | | | | | | | | X* | X* | X* | X* | | D | D | D | D | |
| | 0.012uF (123) | | | | | | | | | | | | | | T* | T* | T* | T* | |
| | 0.015uF (153) | | | | | | | | | | | | | | T* | T* | T* | T* | |
| | 0.018uF (183) | | | | | | | | | | | | | | D* | D* | D* | D* | |
| | 0.022uF (223) | | | | | | | | | | | | | | D* | D* | D* | D* | |

1. The letter in cell is expressed the symbol of product thickness.
2. The letter in cell with " * " mark is expressed capacitance tolerance "J" (±5%) only.
3. For more information about products with special capacitance or other data, please contact WTC local representative.



Copyright © by Walsin Technology Corporation. | All rights reserved.

## 7-1. NP0 Dielectric 1206, 1210, 1812 Sizes

| DIELECTRIC | | NP0 | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SIZE | | 1206 | | | | | 1210 | | | | | 1812 | | | |
| RATED VOLTAGE (VDC) | | 10 | 16 | 25 | 50 | 100 | 10 | 16 | 25 | 50 | 100 | 16 | 25 | 50 | 100 |
| Capacitance | 1.0pF (1R0) | | | | | | | | | | | | | | |
| | 1.2pF (1R2) | B | B | B | B | B | | | | | | | | | |
| | 1.5pF (1R5) | B | B | B | B | B | | | | | | | | | |
| | 1.8pF (1R8) | B | B | B | B | B | | | | | | | | | |
| | 2.2pF (2R2) | B | B | B | B | B | | | | | | | | | |
| | 2.7pF (2R7) | B | B | B | B | B | | | | | | | | | |
| | 3.3pF (3R3) | B | B | B | B | B | | | | | | | | | |
| | 3.9pF (3R9) | B | B | B | B | B | | | | | | | | | |
| | 4.7pF (4R7) | B | B | B | B | B | | | | | | | | | |
| | 5.6pF (5R6) | B | B | B | B | B | | | | | | | | | |
| | 6.8pF (6R8) | B | B | B | B | B | | | | | | | | | |
| | 8.2pF (8R2) | B | B | B | B | B | | | | | | | | | |
| | 10pF (100) | B | B | B | B | B | C | C | C | C | C | D | D | D | D |
| | 12pF (120) | B | B | B | B | B | C | C | C | C | C | D | D | D | D |
| | 15pF (150) | B | B | B | B | B | C | C | C | C | C | D | D | D | D |
| | 18pF (180) | B | B | B | B | B | C | C | C | C | C | D | D | D | D |
| | 22pF (220) | B | B | B | B | B | C | C | C | C | C | D | D | D | D |
| | 27pF (270) | B | B | B | B | B | C | C | C | C | C | D | D | D | D |
| | 33pF (330) | B | B | B | B | B | C | C | C | C | C | D | D | D | D |
| | 39pF (390) | B | B | B | B | B | C | C | C | C | C | D | D | D | D |
| | 47pF (470) | B | B | B | B | B | C | C | C | C | C | D | D | D | D |
| | 56pF (560) | B | B | B | B | B | C | C | C | C | C | D | D | D | D |
| | 68pF (680) | B | B | B | B | B | C | C | C | C | C | D | D | D | D |
| | 82pF (820) | B | B | B | B | B | C | C | C | C | C | D | D | D | D |
| | 100pF (101) | B | B | B | B | B | C | C | C | C | C | D | D | D | D |
| | 120pF (121) | B | B | B | B | B | C | C | C | C | C | D | D | D | D |
| | 150pF (151) | B | B | B | B | B | C | C | C | C | C | D | D | D | D |
| | 180pF (181) | B | B | B | B | B | C | C | C | C | C | D | D | D | D |
| | 220pF (221) | B | B | B | B | B | C | C | C | C | C | D | D | D | D |
| | 270pF (271) | B | B | B | B | B | C | C | C | C | C | D | D | D | D |
| | 330pF (331) | B | B | B | B | B | C | C | C | C | C | D | D | D | D |
| | 390pF (391) | B | B | B | B | B | C | C | C | C | C | D | D | D | D |
| | 470pF (471) | B | B | B | B | B | C | C | C | C | C | D | D | D | D |
| | 560pF (561) | B | B | B | B | B | C | C | C | C | C | D | D | D | D |
| | 680pF (681) | B | B | B | B | B | C | C | C | C | C | D | D | D | D |
| | 820pF (821) | B | B | B | B | B | C | C | C | C | C | D | D | D | D |
| | 1,000pF (102) | B | B | B | B | B | C | C | C | C | C | D | D | D | D |
| | 1,200pF (122) | B | B | B | B | B | C | C | C | C | C | D | D | D | D |
| | 1,500pF (152) | B | B | B | B | B | C | C | C | C | C | D | D | D | D |
| | 1,800pF (182) | B | B | B | B | B | C | C | C | C | C | D | D | D | D |
| | 2,200pF (222) | B | B | B | B | B | C | C | C | C | C | D | D | D | D |
| | 2,700pF (272) | B | B | B | B | B | C | C | C | C | C | D | D | D | D |
| | 3,300pF (332) | B | B | B | B | B | C | C | C | C | C | D | D | D | D |
| | 3,900pF (392) | B | B | B | B | B | C | C | C | C | C | D | D | D | D |
| | 4,700pF (472) | B | B | B | B | B | C | C | C | C | C | D | D | D | D |
| | 5,600pF (562) | B | B | B | B | B | C | C | C | C | C | D | D | D | D |
| | 6,800pF (682) | C | C | C | C | C | C | C | C | C | C | D | D | D | D |
| | 8,200pF (822) | D | D | D | D | D | C | C | C | C | C | D | D | D | D |
| | 0.010μF (103) | D | D | D | D | D | C | C | C | C | C | D | D | D | D |
| | 0.012μF (123) | P | P | P | P | P | D | D | D | D | D | D | D | D | D |
| | 0.015μF (153) | P | P | P | P | P | D | D | D | D | D | D | D | D | D |
| | 0.018μF (183) | P | P | P | P | P | K | K | K | K | K | D | D | D | D |
| | 0.022μF (223) | P | P | P | P | P | K | K | K | K | K | D | D | D | D |
| | 0.027μF (273) | P | P | P | P | | K | K | K | K | K | D | D | D | D |
| | 0.033μF (333) | P | P | P | P | | K | K | K | K | K | D | D | D | D |
| | 0.039μF (393) | P | P | P | P | | K | K | K | K | K | M | M | M | M |
| | 0.047μF (473) | J* | J* | J* | J* | | K | K | K | K | K | M | M | M | M |
| | 0.056μF (563) | J* | J* | J* | J* | | | | | | | M | M | M | M |
| | 0.068μF (683) | G* | G* | G* | G* | | | | | | | M | M | M | M |
| | 0.082μF (823) | G* | G* | G* | G* | | | | | | | M | M | M | M |
| | 0.1μF (104) | G* | G* | G* | G* | | | | | | | M | M | M | M |

1. The letter in cell is expressed the symbol of product thickness.
2. The letter in cell with " * " mark is expressed capacitance tolerance "J" (±5%) only.
3. For more information about products with special capacitance or other data, please contact WTC local representative.



Copyright © by Walsin Technology Corporation. | All rights reserved.

## 7-2. X7R Dielectric 0201, 0402, 0603, 0805 Sizes

| DIELECTRIC | | X7R | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SIZE | | 0201 | | | | | 0402 | | | | | | 0603 | | | | | | 0805 | | | | |
| RATED VOLTAGE (VDC) | | 6.3 | 10 | 16 | 25 | 50 | 6.3 | 10 | 16 | 25 | 50 | 100 | 6.3 | 10 | 16 | 25 | 50 | 100 | 6.3 | 10 | 16 | 25 | 50 | 100 |
| Capacitance | 100pF (101) | | | L | L | L | | N | N | N | N | N | | S | S | S | S | S | | B | B | B | B | B |
| | 120pF (121) | | | L | L | L | | N | N | N | N | N | | S | S | S | S | S | | B | B | B | B | B |
| | 150pF (151) | | | L | L | L | | N | N | N | N | N | | S | S | S | S | S | | B | B | B | B | B |
| | 180pF (181) | | | L | L | L | | N | N | N | N | N | | S | S | S | S | S | | B | B | B | B | B |
| | 220pF (221) | | | L | L | L | | N | N | N | N | N | | S | S | S | S | S | | B | B | B | B | B |
| | 270pF (271) | | | L | L | L | | N | N | N | N | N | | S | S | S | S | S | | B | B | B | B | B |
| | 330pF (331) | | | L | L | L | | N | N | N | N | N | | S | S | S | S | S | | B | B | B | B | B |
| | 390pF (391) | | | L | L | L | | N | N | N | N | N | | S | S | S | S | S | | B | B | B | B | B |
| | 470pF (471) | | | L | L | L | | N | N | N | N | N | | S | S | S | S | S | | B | B | B | B | B |
| | 560pF (561) | | | L | L | L | | N | N | N | N | N | | S | S | S | S | S | | B | B | B | B | B |
| | 680pF (681) | | | L | L | L | | N | N | N | N | N | | S | S | S | S | S | | B | B | B | B | B |
| | 820pF (821) | | | L | L | L | | N | N | N | N | N | | S | S | S | S | S | | B | B | B | B | B |
| | 1,000pF (102) | L | L | L | L | L | | N | N | N | N | N | | S | S | S | S | S | | B | B | B | B | B |
| | 1,200pF (122) | L | L | L | L | | | N | N | N | N | N | | S | S | S | S | S | | B | B | B | B | B |
| | 1,500pF (152) | L | L | L | L | | | N | N | N | N | N | | S | S | S | S | S | | B | B | B | B | B |
| | 1,800pF (182) | L | L | L | L | | | N | N | N | N | N | | S | S | S | S | S | | B | B | B | B | B |
| | 2,200pF (222) | L | L | L | L | | | N | N | N | N | N | | S | S | S | S | S | | B | B | B | B | B |
| | 2,700pF (272) | L | L | L | L | | | N | N | N | N | N | | S | S | S | S | S | | B | B | B | B | B |
| | 3,300pF (332) | L | L | L | L | | | N | N | N | N | N | | S | S | S | S | S | | B | B | B | B | B |
| | 3,900pF (392) | L | L | L | L | | | N | N | N | N | N | | S | S | S | S | S | | B | B | B | B | B |
| | 4,700pF (472) | L | L | L | L | | | N | N | N | N | N | | S | S | S | S | S | | B | B | B | B | B |
| | 5,600pF (562) | L | L | L | L | | | N | N | N | N | | | S | S | S | S | S | | B | B | B | B | B |
| | 6,800pF (682) | L | L | L | | | | N | N | N | N | | | S | S | S | S | S | | B | B | B | B | B |
| | 8,200pF (822) | L | L | L | | | | N | N | N | N | | | S | S | S | S | S | | B | B | B | B | B |
| | 0.010μF (103) | L | L | L | L | | | N | N | N | N | | | S | S | S | S | S | | B | B | B | B | B |
| | 0.012μF (123) | | | | | | | N | N | N | E | | | S | S | S | S | X | | B | B | B | B | B |
| | 0.015μF (153) | | | | | | | N | N | N | E | | | S | S | S | S | X | | B | B | B | B | B |
| | 0.018μF (183) | | | | | | | N | N | N | E | | | S | S | S | S | X | | B | B | B | B | B |
| | 0.022μF (223) | | L | L | | | | N | N | N | E | | | S | S | S | S | X | | B | B | B | B | B |
| | 0.027μF (273) | | | | | | | N | N | N | E | | | S | S | S | S | X | | B | B | B | B | D |
| | 0.033μF (333) | | | | | | | N | N | N | E | | | S | S | S | X | X | | B | B | B | B | D |
| | 0.039μF (393) | | | | | | | N | N | N | E | | | S | S | S | X | X | | B | B | B | B | D |
| | 0.047μF (473) | | | | | | | N | N | N | E | | | S | S | S | X | X | | B | B | B | B | D |
| | 0.056μF (563) | | | | | | | N | N | N | E | | | S | S | S | X | X | | B | B | B | B | D |
| | 0.068μF (683) | | | | | | | N | N | N | E | | | S | S | S | X | X | | B | B | B | B | D |
| | 0.082μF (823) | | | | | | | N | N | N | E | | | S | S | S | X | X | | B | B | B | B | D |
| | 0.10μF (104) | | | | | | N | N | N | N | E | | | S | S | S | X | X | | B | B | B | B | D |
| | 0.12μF (124) | | | | | | | | | | | | | S | S | X | | | | B | B | B | D | I |
| | 0.15μF (154) | | | | | | | | | | | | | S | S | X | | | | D | D | D | D | I |
| | 0.18μF (184) | | | | | | | | | | | | | S | S | X | | | | D | D | D | D | I |
| | 0.22μF (224) | | | | | | N | N | N | N | | | | S | S | X | X | | | D | D | D | D | I |
| | 0.27μF (274) | | | | | | | | | | | | X | X | X | X | | | | D | D | D | I | |
| | 0.33μF (334) | | | | | | | | | | | | X | X | X | X | X | | | D | D | D | I | |
| | 0.39μF (394) | | | | | | | | | | | | X | X | X | X | | | | D | D | D | I | |
| | 0.47μF (474) | | | | | | N | N | | | | | X | X | X | X | X | | | D | D | D | I | I |
| | 0.56μF (564) | | | | | | | | | | | | X | X | X | | | | | D | D | D | | |
| | 0.68μF (684) | | | | | | | | | | | | X | X | X | | | | | D | D | D | | |
| | 0.82μF (824) | | | | | | | | | | | | X | X | X | | | | | D | D | D | | |
| | 1.0μF (105) | | | | | | N | | | | | | X | X | X | X | X | | | D | D | D | I | |
| | 1.5μF (155) | | | | | | | | | | | | | | | | | | | I | I | I | | |
| | 2.2μF (225) | | | | | | | | | | | | X | X | X | | | | I | I | I | I | I | |
| | 3.3μF (335) | | | | | | | | | | | | | | | | | | | | | | | |
| | 4.7μF (475) | | | | | | | | | | | | X | | | | | | I | I | I | I | | |
| | 6.8μF (685) | | | | | | | | | | | | | | | | | | | | | | | |
| | 10μF (106) | | | | | | | | | | | | | | | | | | I | I | I* | | | |
| | 22μF (226) | | | | | | | | | | | | | | | | | | | | | | | |

1. The letter in cell is expressed the symbol of product thickness.
2. The letter in cell with " * " mark is expressed product not in 10% (code "K") tolerance.



Copyright © by Walsin Technology Corporation. | All rights reserved.

## 7-2. X7R Dielectric 1206, 1210, 1812 Sizes

| DIELECTRIC | | X7R | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SIZE | | 1206 | | | | | | | 1210 | | | | | | 1812 | | | | |
| RATED VOLTAGE (VDC) | | 6.3 | 10 | 16 | 25 | 35 | 50 | 100 | 6.3 | 10 | 16 | 25 | 50 | 100 | 10 | 16 | 25 | 50 | 100 |
| Capacitance | 100pF (101) | | | | | | | | | | | | | | | | | | |
| | 120pF (121) | | | | | | | | | | | | | | | | | | |
| | 150pF (151) | | B | B | B | | B | B | | | | | | | | | | | |
| | 180pF (181) | | B | B | B | | B | B | | | | | | | | | | | |
| | 220pF (221) | | B | B | B | | B | B | | | | | | | | | | | |
| | 270pF (271) | | B | B | B | | B | B | | | | | | | | | | | |
| | 330pF (331) | | B | B | B | | B | B | | | | | | | | | | | |
| | 390pF (391) | | B | B | B | | B | B | | | | | | | | | | | |
| | 470pF (471) | | B | B | B | | B | B | | | | | | | | | | | |
| | 560pF (561) | | B | B | B | | B | B | | | | | | | | | | | |
| | 680pF (681) | | B | B | B | | B | B | | | | | | | | | | | |
| | 820pF (821) | | B | B | B | | B | B | | | | | | | | | | | |
| | 1,000pF (102) | | B | B | B | | B | B | | C | C | C | C | C | D | D | D | D | D |
| | 1,200pF (122) | | B | B | B | | B | B | | C | C | C | C | C | D | D | D | D | D |
| | 1,500pF (152) | | B | B | B | | B | B | | C | C | C | C | C | D | D | D | D | D |
| | 1,800pF (182) | | B | B | B | | B | B | | C | C | C | C | C | D | D | D | D | D |
| | 2,200pF (222) | | B | B | B | | B | B | | C | C | C | C | C | D | D | D | D | D |
| | 2,700pF (272) | | B | B | B | | B | B | | C | C | C | C | C | D | D | D | D | D |
| | 3,300pF (332) | | B | B | B | | B | B | | C | C | C | C | C | D | D | D | D | D |
| | 3,900pF (392) | | B | B | B | | B | B | | C | C | C | C | C | D | D | D | D | D |
| | 4,700pF (472) | | B | B | B | | B | B | | C | C | C | C | C | D | D | D | D | D |
| | 5,600pF (562) | | B | B | B | | B | B | | C | C | C | C | C | D | D | D | D | D |
| | 6,800pF (682) | | B | B | B | | B | B | | C | C | C | C | C | D | D | D | D | D |
| | 8,200pF (822) | | B | B | B | | B | B | | C | C | C | C | C | D | D | D | D | D |
| | 0.010μF (103) | | B | B | B | | B | B | | C | C | C | C | C | D | D | D | D | D |
| | 0.012μF (123) | | B | B | B | | B | B | | C | C | C | C | C | D | D | D | D | D |
| | 0.015μF (153) | | B | B | B | | B | B | | C | C | C | C | C | D | D | D | D | D |
| | 0.018μF (183) | | B | B | B | | B | B | | C | C | C | C | C | D | D | D | D | D |
| | 0.022μF (223) | | B | B | B | | B | B | | C | C | C | C | C | D | D | D | D | D |
| | 0.027μF (273) | | B | B | B | | B | B | | C | C | C | C | C | D | D | D | D | D |
| | 0.033μF (333) | | B | B | B | | B | B | | C | C | C | C | C | D | D | D | D | D |
| | 0.039μF (393) | | B | B | B | | B | B | | C | C | C | C | C | D | D | D | D | D |
| | 0.047μF (473) | | B | B | B | | B | B | | C | C | C | C | C | D | D | D | D | D |
| | 0.056μF (563) | | B | B | B | | B | B | | C | C | C | C | C | D | D | D | D | D |
| | 0.068μF (683) | | B | B | B | | B | B | | C | C | C | C | C | D | D | D | D | D |
| | 0.082μF (823) | | B | B | B | | B | D | | C | C | C | C | C | D | D | D | D | D |
| | 0.10μF (104) | | B | B | B | | B | D | | C | C | C | C | C | D | D | D | D | D |
| | 0.12μF (124) | | B | B | B | | B | D | | C | C | C | C | C | D | D | D | D | D |
| | 0.15μF (154) | | C | C | C | | C | G | | C | C | C | C | D | D | D | D | D | D |
| | 0.18μF (184) | | C | C | C | | C | G | | C | C | C | C | D | D | D | D | D | D |
| | 0.22μF (224) | | C | C | C | | C | G | | C | C | C | C | D | D | D | D | D | D |
| | 0.27μF (274) | | C | C | C | | D | G | | C | C | C | C | G | D | D | D | D | D |
| | 0.33μF (334) | | C | C | C | | D | G | | C | C | C | D | G | D | D | D | D | D |
| | 0.39μF (394) | | C | C | J | | P | G | | C | C | C | D | M | D | D | D | D | D |
| | 0.47μF (474) | | J | J | J | | P | G | | C | C | C | D | M | D | D | D | D | K |
| | 0.56μF (564) | | J | J | J | | P | P | | D | D | D | D | M | D | D | D | D | K |
| | 0.68μF (684) | | J | J | J | | P | P | | D | D | D | D | K | D | D | D | K | K |
| | 0.82μF (824) | | J | J | J | | P | P | | D | D | D | D | K | D | D | D | K | K |
| | 1.0μF (105) | | J | J | J | | P | P | | D | D | D | D | K | D | D | D | K | K |
| | 1.5μF (155) | J | J | J | P | | | | | | K | G | M | M | | | | | K |
| | 2.2μF (225) | J | J | J | P | | P | P | | | K | G | M | M | | | | M | M |
| | 3.3μF (335) | | P | P | P | | | | | | K | G | M | | | | | | |
| | 4.7μF (475) | P | P | P | P | | P | | | K | K | K | M | M | | | | | |
| | 6.8μF (685) | | | | | | | | | | | | | | | | | | |
| | 10μF (106) | P | P | P | P | P | | | | K | K | K | M | | | | | | |
| | 22μF (226) | P | P | P* | | | | | | M | M | M | | | | | | | |
| | 47μF (476) | | | | | | | | M | M | | | | | | | | | |
| | 100μF (107) | | | | | | | | | | | | | | | | | | |

1. The letter in cell is expressed the symbol of product thickness.
2. The letter in cell with " * " mark is expressed product not in 10% (code "K") tolerance.



Copyright © by Walsin Technology Corporation. | All rights reserved.

## 7-3. Y5V Dielectric 0402, 0603, 0805 Sizes

| DIELECTRIC | | Y5V | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SIZE | | 0402 | | | | | 0603 | | | | | 0805 | | | | | |
| RATED VOLTAGE (VDC) | | 6.3 | 10 | 16 | 25 | 50 | 6.3 | 10 | 16 | 25 | 50 | 6.3 | 10 | 16 | 25 | 50 | 100 |
| Capacitance | 0.010μF (103) | | N | N | N | N | | S | S | S | S | | A | A | A | A | B |
| | 0.015μF (153) | | N | N | N | N | | S | S | S | S | | A | A | A | A | B |
| | 0.022μF (223) | | N | N | N | N | | S | S | S | S | | A | A | A | A | B |
| | 0.033μF (333) | | N | N | N | N | | S | S | S | S | | A | A | A | A | B |
| | 0.047μF (473) | | N | N | N | | | S | S | S | S | | A | A | A | A | B |
| | 0.068μF (683) | | N | N | N | | | S | S | S | S | | A | A | A | A | B |
| | 0.10μF (104) | | N | N | N | | | S | S | S | S | | A | A | A | A | B |
| | 0.15μF (154) | | N | N | | | | S | S | S | S | | A | A | A | A | |
| | 0.22μF (224) | N | N | N | | | | S | S | S | S | | A | A | A | A | |
| | 0.33μF (334) | N | N | N | | | | S | S | S | X | | B | B | B | B | |
| | 0.47μF (474) | N | N | N | | | | S | S | X | X | | B | B | B | B | |
| | 0.68μF (684) | N | | | | | | S | X | X | | | B | B | D | D | |
| | 1.0μF (105) | N/E | N/E | | | | | S | X | X | | | B | B | D | D | |
| | 1.5μF (155) | | | | | | | S | | | | | D | D | | | |
| | 2.2μF (225) | | | | | | S | S | X | | | | D | D | I | | |
| | 3.3μF (335) | | | | | | | | | | | | D | D | | | |
| | 4.7μF (475) | | | | | | X | X | | | | | D | D | I | | |
| | 6.8μF (685) | | | | | | | | | | | | I | | | | |
| | 10μF (106) | | | | | | | | | | | I | I | I | | | |
| | 22μF (226) | | | | | | | | | | | I | I | | | | |

1. The letter in cell is expressed the symbol of product thickness.
2. For more information about products with special capacitance or other data, please contact WTC local representative.

## 7-3. Y5V Dielectric 1206, 1210, 1812 Sizes

| DIELECTRIC | | Y5V | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SIZE | | 1206 | | | | | | 1210 | | | | | | | 1812 | | | | |
| RATED VOLTAGE (VDC) | | 6.3 | 10 | 16 | 25 | 50 | 100 | 6.3 | 10 | 16 | 25 | 35 | 50 | 100 | 10 | 16 | 25 | 50 | 100 |
| Capacitance | 0.010μF (103) | | B | B | B | B | B | | | | | | | C | | | | | D |
| | 0.015μF (153) | | B | B | B | B | B | | | | | | | C | | | | | D |
| | 0.022μF (223) | | B | B | B | B | B | | | | | | | C | | | | | D |
| | 0.033μF (333) | | B | B | B | B | B | | | | | | | C | | | | | D |
| | 0.047μF (473) | | B | B | B | B | B | | | | | | | C | | | | | D |
| | 0.068μF (683) | | B | B | B | B | B | | | | | | | C | | | | | D |
| | 0.10μF (104) | | B | B | B | B | B | | C | C | C | | C | C | D | D | D | D | D |
| | 0.15μF (154) | | B | B | B | B | C | | C | C | C | | C | C | D | D | D | D | D |
| | 0.22μF (224) | | B | B | B | B | C | | C | C | C | | C | C | D | D | D | D | D |
| | 0.33μF (334) | | B | B | B | B | | | C | C | C | | C | C | D | D | D | D | D |
| | 0.47μF (474) | | B | B | B | B | | | C | C | C | | C | | D | D | D | D | D |
| | 0.68μF (684) | | B | B | B | B | | | C | C | C | | C | | D | D | D | D | D |
| | 1.0μF (105) | | C | C | C | C | | | C | C | C | | C | | D | D | D | D | D |
| | 1.5μF (155) | | C | C | C | | | | C | C | C | | | | D | D | D | D | |
| | 2.2μF (225) | | C | C | C | J | | | C | C | C | | G | | D | D | D | D | |
| | 3.3μF (335) | | J | J | J | | | | C | C | C | | | | D | D | D | D | |
| | 4.7μF (475) | | J | J | J | P | | | C | C | D | | G | | D | D | D | D | |
| | 6.8μF (685) | | J | J | | | | | C | C | D | | K | | D | D | D | D | |
| | 10μF (106) | | J | J | P | | | | D | D | G | K | K | | D | D | D | K | |
| | 22μF (226) | | P | P | | | | | K | K | | | | | | | | | |
| | 47μF (476) | P | | | | | | K | K | | | | | | | M | | | |
| | 100μF (107) | | | | | | | M | | | | | | | | | | | |

1. The letter in cell is expressed the symbol of product thickness.
2. For more information about products with special capacitance or other data, please contact WTC local representative.


Copyright © by Walsin Technology Corporation. | All rights reserved.

## 7-4. X5R Dielectric 0201, 0402, 0603, 0805, 1206, 1210 Sizes

| Dielectric | | X5R | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Size | | 0201 | | | | | 0402 | | | | | | 0603 | | | | | |
| Rated Voltage (VDC) | | 6.3 | 10 | 16 | 25 | 50 | 4 | 6.3 | 10 | 16 | 25 | 50 | 4 | 6.3 | 10 | 16 | 25 | 50 |
| Capacitance | 100pF (101) | | | L | L | L | | | | | | | | | | | | |
| | 120pF (121) | | | L | L | L | | | | | | | | | | | | |
| | 150pF (151) | | | L | L | L | | | | | | | | | | | | |
| | 180pF (181) | | | L | L | L | | | | | | | | | | | | |
| | 220pF (221) | | | L | L | L | | | | | | | | | | | | |
| | 270pF (271) | | | L | L | L | | | | | | | | | | | | |
| | 330pF (331) | | | L | L | L | | | | | | | | | | | | |
| | 390pF (391) | | | L | L | L | | | | | | | | | | | | |
| | 470pF (471) | | | L | L | L | | | | | | | | | | | | |
| | 560pF (561) | | | L | L | L | | | | | | | | | | | | |
| | 680pF (681) | | | L | L | L | | | | | | | | | | | | |
| | 820pF (821) | | | L | L | L | | | | | | | | | | | | |
| | 1,000pF (102) | | L | L | L | L | | | | | | | | | | | | |
| | 1,500pF (152) | | L | L | L | | | | | | | | | | | | | |
| | 2,200pF (222) | | L | L | L | | | | | | | | | | | | | |
| | 2,700pF (272) | | L | L | L | | | | | | | | | | | | | |
| | 3,300pF (332) | | L | L | L | | | | | | | | | | | | | |
| | 4,700pF (472) | | L | L | L | | | | | | | | | | | | | |
| | 6,800pF (682) | | L | L | L | | | | | | | | | | | | | |
| | 0.010μF (103) | L | L | L | L | L | | | | | | | | | | | | |
| | 0.015μF (153) | L | L | | | | | | | | | | | | | | | |
| | 0.022μF (223) | L | L | | | | | | | | | | | | | | | |
| | 0.027μF (273) | L | L | | | | | | | N | | | | | | | | |
| | 0.033μF (333) | L | L | | | | | | | N | | | | | | | | |
| | 0.039μF (393) | L | L | | | | | | | N | | | | | | | | |
| | 0.047μF (473) | L | L | | | | | N | N | N | | | | | | | | |
| | 0.056μF (563) | L | L | | | | | N | N | N | | | | | | | | |
| | 0.068μF (683) | L | L | | | | | N | N | N | | | | | | | | |
| | 0.082μF (823) | L | L | | | | | N | N | N | | | | | | | | |
| | 0.10μF (104) | L | L | L | L | | | N | N | N | N | E | | | | | | |
| | 0.15μF (154) | | | | | | | N | N | N | N | | | | | | | |
| | 0.22μF (224) | L | L | L* | | | | N | N | N | N | N | | X | X | X | X | |
| | 0.27uF (274) | | | | | | | | | | | | | | X | X | X | |
| | 0.33μF (334) | L* | | | | | | N | N | | | | | X | X | X | X | |
| | 0.39μF (394) | | | | | | | | | | | | | | X | X | X | |
| | 0.47μF (474) | L | | | | | | N | N | E | E | E | | X | X | X | X | X |
| | 0.68μF (684) | | | | | | | N | N | | | | | X | X | X | X | |
| | 0.82uF (824) | | | | | | | | | | | | | X | X | X | X | |
| | 1.0μF (105) | L* | L* | L* | | | | N/E | N/E | N | N | E | | X | X | X | X | X |
| | 1.5μF (155) | | | | | | | | | | | | | X | | | | |
| | 2.2μF (225) | L* | L* | | | | | N | N | E | E | | | X | X | X | X | X |
| | 3.3μF (335) | | | | | | | | | | | | | X | X | | | |
| | 4.7μF (475) | | | | | | | E | E | E* | | | | X | X | X | X | |
| | 6.8uF (685) | | | | | | | | | | | | | | | | | |
| | 10μF (106) | | | | | | E* | E* | E* | | | | X | X | X | X | X* | |
| | 22μF (226) | | | | | | | | | | | | X* | X* | X* | | | |
| | 47μF (476) | | | | | | | | | | | | X* | X* | | | | |

| Dielectric | | X5R | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Size | | 0805 | | | | | | 1206 | | | | | | 1210 | | | | | |
| Rated Voltage (VDC) | | 4 | 6.3 | 10 | 16 | 25 | 50 | 4 | 6.3 | 10 | 16 | 25 | 50 | 4 | 6.3 | 10 | 16 | 25 | 35 | 50 |
| Capacitance | 1.0μF (105) | | | D | D | D | I | | | | | | | | | | | | | |
| | 1.5μF (155) | | I | I | I | I | | | | J | J | | | | | K | K | | | |
| | 2.2μF (225) | | I | I | I | I | I | | | J | J | P | P | | | K | K | | | |
| | 3.3μF (335) | | I | I | I | I | | | | P | P | P | | | | | | | | |
| | 4.7μF (475) | | I | I | I | I | I | | P | P | P | P | P | | | K | K | K | | |
| | 6.8uF (685) | | | | | | | | P | P | | | | | | | | | | |
| | 10μF (106) | | I | I | I | I | I | | P | P | P | P | P | | K | K | K | K | M | M |
| | 22μF (226) | | I | I* | I* | I* | | | P | P | P | P | | | M | M | M | M | M | |
| | 47μF (476) | | I* | I* | | | | | P | P | P* | | | | M | M | M | M* | | |
| | 100μF (107) | I* | I* | | | | | | P | | | | | | M* | M* | M* | | | |
| | 220μF (227) | | | | | | | P* | | | | | | M* | M* | | | | | |

1. The letter in cell is expressed the symbol of product thickness.
2. The letter in cell with " * " mark is expressed product not in 10% (code "K") tolerance.



Copyright © by Walsin Technology Corporation. | All rights reserved.

## 7-5. X6S Dielectric 0201, 0402, 0603, 0805, 1206, 1210 Sizes

| Dielectric | | X6S | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Size | | 0201 | | | | 0402 | | | | 0603 | | | | | 0805 | | | | | | 1206 | | | | | 1210 | | | | |
| Rated Voltage (VDC) | | 6.3 | 10 | 16 | 25 | 6.3 | 10 | 16 | 25 | 4 | 6.3 | 10 | 16 | 25 | 4 | 6.3 | 10 | 16 | 25 | 50 | 6.3 | 10 | 16 | 25 | 50 | 6.3 | 10 | 16 | 25 | 50 |
| Capacitance | 0.10μF (104) | L | L | L | L | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0.15μF (154) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0.22μF (224) | L | L* | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0.33μF (334) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0.47μF (474) | | | | | E | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0.68μF (684) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1.0μF (105) | L* | | | | E | E | E | E | | | | | | | | | | | | | | | | | | | | | |
| | 1.5μF (155) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2.2μF (225) | | | | | E | E | E | | | | | X | X | | | | | | | | | | | | | | | | |
| | 3.3μF (335) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 4.7μF (475) | | | | | | | | | | X | X | X | X | | | | | I | I | | | | | | | | | | |
| | 6.8uF (685) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 10μF (106) | | | | | E* | | | | | X* | X* | X* | | I | I | I | I | I | | | | | P | | | | | | |
| | 22μF (226) | | | | | | | | | X* | X* | | | | | I* | I* | I* | | | | P | P* | P | | | | | M | |
| | 47μF (476) | | | | | | | | | | | | | | I* | I* | | | | | P | | | | | M | M | M | | |
| | 100μF (107) | | | | | | | | | | | | | | | | | | | | | | | | | M* | M* | | | |

1. The letter in cell is expressed the symbol of product thickness.
2. The letter in cell with " * " mark is expressed product not in 10% (code "K") tolerance.

## 7-6. X7S Dielectric 0402, 0603, 0805, 1206, 1210 Sizes

| Dielectric | | X7S | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Size | | 0402 | | | | 0603 | | | | 0805 | | | | | 1206 | | | | | 1210 | | | | | | |
| Rated Voltage (VDC) | | 6.3 | 10 | 16 | 25 | 6.3 | 10 | 16 | 25 | 10 | 16 | 25 | 50 | 100 | 6.3 | 10 | 16 | 25 | 50 | 6.3 | 10 | 16 | 25 | 50 | |
| Capacitance | 1.0μF (105) | | E | | | | | | | | | | | I | | | | | | | | | | | |
| | 1.5μF (155) | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2.2μF (225) | E | E | | | | | X | X | | | | | | | | | | | | | | | | |
| | 3.3μF (335) | | | | | | | | | | | | | | | | | | | | | | | | |
| | 4.7μF (475) | | | | | | X | X | | | | | I | | | | | | | | | | | | |
| | 6.8uF (685) | | | | | | | | | | | | | | | | | | | | | | | | |
| | 10μF (106) | | | | | | | | | | I | I | | | | | | | | | | | | | |
| | 22μF (226) | | | | | | | | | | | | | | | | P* | | | | | | | | |
| | 47μF (476) | | | | | | | | | | | | | | P* | | | | | | | | | | |
| | 100μF (107) | | | | | | | | | | | | | | | | | | | M* | | | | | |

1. The letter in cell is expressed the symbol of product thickness.
2. The letter in cell with " * " mark is expressed product not in 10% (code "K") tolerance.


Copyright © by Walsin Technology Corporation. | All rights reserved.

## 8. PACKAGING STYLE AND QUANTITY

| Size | Thickness (mm)/Symbol | | Paper tape | | Plastic tape | |
|---|---|---|---|---|---|---|
| | | | 7" reel | 13" reel | 7" reel | 13" reel |
| 0201 (0603) | 0.30±0.03 | L | 15,000 | 70,000 | - | - |
| | 0.30±0.05 | L | 15,000 | - | - | - |
| | 0.30±0.09 | L | 15,000 | - | - | - |
| 0402 (1005) | 0.50±0.05 | N | 10,000 | 50,000 | - | - |
| | 0.50+0.02/-0.05 | Q | 10,000 | 50,000 | - | - |
| | 0.50±0.20 | E | 10,000 | - | - | - |
| 0603 (1608) | 0.50±0.10 | H | 4,000 | - | - | - |
| | 0.80±0.07 | S | 4,000 | 15,000 | - | - |
| | 0.80+0.15/-0.10 | X | 4,000 | 15,000 | - | - |
| 0805 (2012) | 0.50±0.10 | H | 4,000 | 15,000 | - | - |
| | 0.60±0.10 | A | 4,000 | 15,000 | - | - |
| | 0.80±0.10 | B | 4,000 | 15,000 | - | - |
| | 0.85±0.10 | T | 4,000 | 15,000 | - | - |
| | 1.25±0.10 | D | - | - | 3,000 | 10,000 |
| | 1.25±0.20 | I | - | - | 3,000 | 10,000 |
| 1206 (3216) | 0.80±0.10 | B | 4,000 | 15,000 | - | - |
| | 0.85±0.10 | T | 4,000 | 15,000 | - | - |
| | 0.95±0.10 | C | - | - | 3,000 | 10,000 |
| | 1.15±0.15 | J | - | - | 3,000 | 10,000 |
| | 1.25±0.10 | D | - | - | 3,000 | 10,000 |
| | 1.60±0.20 | G | - | - | 2,000 | 10,000 |
| | 1.60+0.30/-0.10 | P | - | - | 2,000 | 9,000 |
| 1210 (3225) | 0.85±0.10 | T | - | - | 3,000 | 10,000 |
| | 0.95±0.10 | C | - | - | 3,000 | 10,000 |
| | 1.25±0.10 | D | - | - | 3,000 | 10,000 |
| | 1.60±0.20 | G | - | - | 2,000 | - |
| | 2.00±0.20 | K | - | - | 1,000 | 6,000 |
| | 2.50±0.30 | M | - | - | 1,000 | 6,000 |
| 1808 (4520) | 1.25±0.10 | D | - | - | 2,000 | 10,000 |
| | 1.10±0.15 | F | - | - | 2,000 | 10,000 |
| | 1.60±0.20 | G | - | - | 2,000 | 8,000 |
| | 2.00±0.20 | K | - | - | 1,000 | 6,000 |
| 1812 (4532) | 1.25±0.10 | D | - | - | 1,000 | 5,000 |
| | 1.60±0.20 | G | - | - | 1,000 | - |
| | 2.00±0.20 | K | - | - | 1,000 | - |
| | 2.50±0.30 | M | - | - | 500 | 3,000 |
| | 2.80±0.30 | U | - | - | 500 | - |

Unit: pieces



Copyright © by Walsin Technology Corporation. | All rights reserved.

# 9. RELIABILITY TEST CONDITIONS AND REQUIREMENTS

<table>
<tr><th>No.</th><th>Item</th><th>Test Condition</th><th>Requirements</th></tr>
<tr><td>1.</td><td>Visual and Mechanical</td><td>---</td><td>* No remarkable defect.<br>* Dimensions to conform to individual specification sheet.</td></tr>
<tr><td>2.</td><td>Capacitance</td><td>Class I: (NP0)<br>≦1000pF, 1.0±0.2Vrms，1MHz±10%<br>＞1000pF, 1.0±0.2Vrms，1KHz±10%<br>Class II: (X7R, X7E, X6S, X5R,X7S,Y5V)<br>C≦10μF, 1.0±0.2Vrms，1KHz±10% **<br>C＞10μF, 0.5±0.2Vrms，120Hz±20%</td><td>* Shall not exceed the limits given in the detailed spec.</td></tr>
<tr><td>3.</td><td>Q/ D.F. (Dissipation Factor)</td><td>** Test condition: 0.5±0.2Vrms，1KHz±10%<br>X7R:<br>0805=106(6.3V), 0603/475(6.3V)<br>X5R:<br>01R5≧103, 0201≧224 (6.3V,10V,16V)#1,<br>0402≧475 (6.3V,16V), 0402≧225(10V),<br>0603=106 (6.3V,10V),<br>TT18X≧475(10V) , TT15X series<br>X6S:<br>0201≧104 (6.3V,10V#1),<br>0402≧225 (6.3V),<br>0402/475 (10V), 0603/106 (6.3V),<br>X7S:<br>0402/225(6.3V)<br><br>#1 Excluding<br>X5R/0201/105(6.3V);225(10V),<br>X6S/0201/104(10V)<br>(1.0±0.2Vrms，1KHz±10%)<br><br>*Before initial measurement (Class II only):<br>To apply de-aging at 150℃ for 1hr then set for 24±2 hrs at room temp.</td><td>NP0: Cap≥30pF, Q≥1000; Cap<30pF,Q≥400+20C<br>X7R,X5R,X6S,X7S:
<table>
<tr><th>Rated vol.</th><th>D.F.≦</th><th colspan="2">Exception of D.F. ≦</th></tr>
<tr><td rowspan="3">≧100V</td><td rowspan="3">≦2.5%</td><td>≦3%</td><td>1206≧0.47μF</td></tr>
<tr><td>≦5%</td><td>0805＞0.1μF;0603≧0.068μF;1206>1μF;1210≧2.2μF;TT s</td></tr>
<tr><td>≦10%</td><td>0805＞0.22μF;1210≧3.3μF</td></tr>
<tr><td rowspan="3">50V</td><td rowspan="3">≦2.5%</td><td>≦3%</td><td>0201(50V); 0603≧0.047μF; 0805≧0.18μF;1206≧0.47μF</td></tr>
<tr><td>≦5%</td><td>0201≧0.01uF; 1210≧4.7μF</td></tr>
<tr><td>≦10%</td><td>0402≧0.012μF;0603>0.1μF; 0805≧1μF;1206≧2.2μF;<br>1210≧10μF; TT series</td></tr>
<tr><td>35V</td><td>≦3.5%</td><td>≦10%</td><td>0603≧1μF;0805≥2.2μF;1206≧2.2μF;1210≧10μF</td></tr>
<tr><td rowspan="4">25V</td><td rowspan="4">≦3.5%</td><td>≦5%</td><td>0201≧0.01μF;0805≧1μF; 1210≧10μF</td></tr>
<tr><td>≦7%</td><td>0603≧0.33μF; 1206≧4.7μF</td></tr>
<tr><td>≦10%</td><td>0201≧0.1μF;0402≧0.10μF&(0402/X7R≧0.056μF); TT ser<br>0603≧0.47μF; 0805≧2.2μF;1206≧6.8μF; 1210≧22μF</td></tr>
<tr><td>≦12.5%</td><td>0402≧0.47μF</td></tr>
<tr><td rowspan="2">16V</td><td rowspan="2">≦3.5%</td><td>≦5%</td><td>0201≧0.01μF;0402≧0.033μF;0603≧0.15μF;<br>0805≧0.68μF;1206≧2.2μF;1210≧4.7μF</td></tr>
<tr><td>≦10%</td><td>0201≧0.1uF(0201/X7R≧0.022μF); 0402≧ 0.22uF;<br>0603≧0.68μF;0805≧2.2μF;1206≧4.7μF; 1210≧22μF; TT</td></tr>
<tr><td rowspan="2">10V</td><td rowspan="2">≦5%</td><td>≦10%</td><td>0201≧0.012μF;0402≧0.33μF(0402/X7R≧0.22μF); TT series<br>0603≧0.33μF; 0805≧2.2μF;1206≧2.2μF;1210≧22μF:01R5</td></tr>
<tr><td>≦15%</td><td>0201≧0.1μF; 0402≧1μF</td></tr>
<tr><td>6.3V</td><td>≦10%</td><td>≦15%</td><td>0201≧0.1μF;0402≧1μF;0603≧10μF; 0805≧4.7μF;<br>1206≧47μF :1210≧100μF; TT series</td></tr>
<tr><td>4V</td><td>≦15%</td><td>≦20%</td><td>0402≧2.2μF</td></tr>
<tr><td></td><td></td><td>---</td><td>---</td></tr>
</table>
Y5V:
<table>
<tr><th>Rated vol.</th><th>D.F. ≦</th><th colspan="2">Exception of D.F.≦</th></tr>
<tr><td>≧50V</td><td>≦5%</td><td>≦7%</td><td>0603≧0.1μF; 0805≧0.47μF; 1206≧4.7μF; TT series</td></tr>
<tr><td></td><td></td><td>≦12.5%</td><td>1210≧6.8μF</td></tr>
<tr><td>35V</td><td>≦7%</td><td>---</td><td>---</td></tr>
<tr><td rowspan="2">25V</td><td rowspan="2">≦5%</td><td>≦7%</td><td>0402≧0.047μF;0603≧0.1μF; 0805≧0.33μF;<br>1206≧1μF; 1210≧4.7μF</td></tr>
<tr><td>≦9%</td><td>0402≧0.068μF;0603≧0.47μF; 1206≧4.7μF;<br>1210≧22μF; TT series</td></tr>
<tr><td rowspan="2">16V<br>(C<1.0μF)</td><td rowspan="2">≦7%</td><td>≦9%</td><td>0402≧0.068μF; 0603≧0.68μF</td></tr>
<tr><td>≦12.5%</td><td>0402≧0.22μF</td></tr>
<tr><td>16V<br>(C≧1.0μF)</td><td>≦9%</td><td>≦12.5%</td><td>0603≧2.2μF; 0805≧3.3μF;1206≧10μF;<br>1210≧22μF; 1812≧47μF; TT series</td></tr>
<tr><td>10V</td><td>≦12.5%</td><td>≦20%</td><td>0402≧0.47μF</td></tr>
<tr><td>6.3V</td><td>≦20%</td><td>---</td><td>---</td></tr>
</table></td></tr>
<tr><td>4.</td><td>Dielectric Strength</td><td>* To apply voltage (≤100V) 250%.<br>* Duration: 1 to 5 sec.<br>* Charge and discharge current less than 50mA.</td><td>* No evidence of damage or flash over during test.</td></tr>
<tr><td>5.</td><td>Insulation Resistance</td><td>To apply rated voltage for MAX. 120sec.<br><br>*Before initial measurement (Class II only):<br>To apply de-aging at 150℃ for 1hr then set for 24±2 hrs at room temp.</td><td>10GΩ or RxC≧500Ω-F whichever is smaller.<br>Class II (X7R, X7E, X5R,X6S,X7S,Y5V:)
<table>
<tr><th>Rated voltage</th><th>Insulation Resistance</th></tr>
<tr><td>100V: All X7R</td><td rowspan="8">10GΩ or RxC≧100 Ω-F whichever is smaller.</td></tr>
<tr><td>50V:0402>0.01μF;0603≥1μF;0805≥1μF;1206≥4.7μF;1210≥4.7μF</td></tr>
<tr><td>35V:0805≥2.2μF;1206≧2.2μF;1210≧10μF</td></tr>
<tr><td>25V:0402≥1μF;0603≥2.2μF;0805≥2.2μF;1206≥10μF;1210≥10μF</td></tr>
<tr><td>16V: 0201≥0.1μF,0402≥0.22μF;0603≥1μF;<br>0805≥2.2μF;1206≥10μF;1210≥47μF</td></tr>
<tr><td>10V:0201≥47nF;0402≥0.47μF;0603≥0.47μF;0805≥2.2μF;<br>1206≥4.7μF;1210≥47μF</td></tr>
<tr><td>6.3V ; 4V ; TT series; Size≥1812</td></tr>
<tr><td colspan="2"></td></tr>
<tr><th>Rated voltage</th><th>Insulation Resistance</th></tr>
<tr><td>All X6S items, All X7S items</td><td rowspan="10">RxC≧50 Ω-F.</td></tr>
<tr><td>100V: 1210≥3.3μF</td></tr>
<tr><td>50V: 0402≥0.1μF; 0603≥2.2μF; 0805≥10μF;1206≥10μF</td></tr>
<tr><td>35V: 0603≥1μF;</td></tr>
<tr><td>25V: 0201≥0.1μF; 0402≥2.2μF;0603≥10μF; 0805≥10μF;1206≥22μF</td></tr>
<tr><td>16V: 0603≥10μF; 0402≥1μF; 0201≥0.22μF</td></tr>
<tr><td>10V: 0201>0.1μF; 0402≥1μF; 0603≥10μF; 0805≥47μF; TT21>4.7μF</td></tr>
<tr><td>6.3V: 0201≥0.1μF; 0603>4.7μF; 0805≥47μF;1206≥10μF; TT15>1.0μF</td></tr>
<tr><td>4V:0603≥22μF; 0805≥47μF; 1206≥100μF</td></tr>
</table></td></tr>
</table>


Copyright © by Walsin Technology Corporation. | All rights reserved.

<table>
<tr><th>No.</th><th>Item</th><th>Test Condition</th><th>Requirements</th></tr>
<tr><td>6.</td><td>Temperature Coefficient</td><td>With no electrical load.
<table>
<tr><th>T.C.</th><th>Operating Temp</th></tr>
<tr><td>NPO</td><td>-55~125℃ at 25℃</td></tr>
<tr><td>X7R</td><td>-55~125℃ at 25℃</td></tr>
<tr><td>X7S</td><td>-55 ~ 125℃ at 25℃</td></tr>
<tr><td>X5R</td><td>-55~ 85℃ at 25℃</td></tr>
<tr><td>X6S</td><td>-55~105℃ at 25℃</td></tr>
<tr><td>Y5V</td><td>-25~ 85℃ at 20℃</td></tr>
</table>
*Before initial measurement (Class II only):<br>To apply de-aging at 150℃ for 1hr then set for 24± 2 hrs at room temp.<br>* Measurement voltage for Class II:
<table>
<tr><td>01005</td><td>0201</td></tr>
<tr><td>Cap≤0.01μF: 0.5V</td><td>Cap<0.1μF:1V</td></tr>
<tr><td>Cap>0.01μF: 0.2V</td><td>0.1μF≤Cap<1μF: 0.2V</td></tr>
<tr><td></td><td>Cap≥1μF: 0.1V</td></tr>
<tr><td>0402</td><td>0603</td></tr>
<tr><td>Cap<1μF: 1V</td><td>Cap≤1μF: 1V</td></tr>
<tr><td>Cap=1μF: 0.5V</td><td>1μF<Cap≤4.7μF: 0.5V</td></tr>
<tr><td>1μF<Cap<10μF: 0.2V</td><td>Cap>4.7μF: 0.2V</td></tr>
<tr><td>Cap≥10μF: 0.1V</td><td></td></tr>
<tr><td>0805</td><td>1206/1210</td></tr>
<tr><td>Cap<10μF: 1V</td><td>Cap≤10μF: 1V</td></tr>
<tr><td>Cap=10μF: 0.5V</td><td>10μF<Cap≤100μF: 0.5V</td></tr>
<tr><td>Cap>10μF: 0.2V</td><td>Cap>100μF: 0.2V</td></tr>
</table></td><td>
<table>
<tr><th>T.C.</th><th>Capacitance Change</th></tr>
<tr><td>NPO</td><td>Within ±30ppm/℃</td></tr>
<tr><td>X7R</td><td>Within ±15%</td></tr>
<tr><td>X7S</td><td>Within ±22%</td></tr>
<tr><td>X5R</td><td>Within ±15%</td></tr>
<tr><td>X6S</td><td>Within ±22%</td></tr>
<tr><td>Y5V</td><td>Within +30%/-80%</td></tr>
</table></td></tr>
<tr><td>7.</td><td>Adhesive Strength of Termination</td><td>* Pressurizing force：<br>1N (0201) and 5N (≤0603) and 10N (>0603)<br>* Test time: 10±1 sec.</td><td>* No remarkable damage or removal of the terminations.</td></tr>
<tr><td>8.</td><td>Vibration Resistance</td><td>* Vibration frequency: 10~55 Hz/min.<br>* Total amplitude: 1.5mm<br>* Test time: 6 hrs. (Two hrs each in three mutually perpendicular directions.)<br>*Before initial measurement (Class II only):<br>To apply de-aging at 150℃ for 1hr then set for 24± 2 hrs at room temp.<br>*Cap./DF(Q) Measurement to be made after de-aging at 150℃ for 1hr then set for 24±2 hrs at room temp.</td><td>* No remarkable damage.<br>* Cap change and Q/D.F.: To meet initial spec.</td></tr>
<tr><td>9.</td><td>Solderability</td><td>* Solder temperature: 235±5℃<br>* Dipping time: 2±0.5 sec.</td><td>95% min. coverage of all metalized area.</td></tr>
<tr><td>10.</td><td>Bending Test</td><td>* The middle part of substrate shall be pressurized by means of the pressurizing rod at a rate of about 1 mm per second until the deflection becomes 1 mm and then the pressure shall be maintained for 5±1 sec.<br>*Before initial measurement (Class II only):<br>To apply de-aging at 150℃ for 1hr then set for 24± 2 hrs at room temp.<br>* Measurement to be made after keeping at room temp. for 24±2 hrs.</td><td>* No remarkable damage.<br>* Cap change：<br>NP0: within ±5% or 0.5pF whichever is larger<br>X7R, X5R, X6S, X7S: within ±12.5%<br>Y5V: within ±30%<br>(This capacitance change means the change of capacitance under specified flexure of substrate from the capacitance measured before the test.)</td></tr>
<tr><td>11.</td><td>Resistance to Soldering Heat</td><td>* Solder temperature: 260±5℃<br>* Dipping time: 10±1 sec<br>* Preheating: 120 to 150℃ for 1 minute before imme rse the capacitor in a eutectic solder.<br>*Before initial measurement (Class II only): To apply de-aging at 150℃ for 1hr then set for 24±2 hrs at room temp.<br>*Cap. / DF(Q) / I.R. Measurement to be made after de-aging at 150℃ for 1hr then set for 24±2 hrs at room temp.</td><td>* No remarkable damage.<br>* Cap change:<br>NP0: within ±2.5% or 0.25pF whichever is larger<br>X7R, X5R, X6S, X7S: within ±7.5%<br>Y5V: within ±20%<br>* Q/D.F., I.R. and dielectric strength: To meet initial requirements.<br>* 25% max. leaching on each edge.</td></tr>
<tr><td>12.</td><td>Temperature Cycle</td><td>* Conduct the five cycles according to the temperatures and time.
<table>
<tr><th>Step</th><th>Temp. (℃)</th><th>Time (min.)</th></tr>
<tr><td>1</td><td>Min. operating temp. +0/-3</td><td>30±3</td></tr>
<tr><td>2</td><td>Room temp.</td><td>2~3</td></tr>
<tr><td>3</td><td>Max. operating temp. +3/-0</td><td>30±3</td></tr>
<tr><td>4</td><td>Room temp.</td><td>2~3</td></tr>
</table>
*Before initial measurement (Class II only): To apply de-aging at 150℃ for 1hr then set for 24±2 hrs at room temp.<br>* Cap. / DF(Q) / I.R. Measurement to be made after de-aging at 150℃ for 1hr then set for 24±2 hrs at room temp.</td><td>* No remarkable damage.<br>* Cap change：<br>NP0: within ±2.5% or 0.25pF whichever is larger<br>X7R, X5R, X6S, X7S: within ±7.5%<br>Y5V: within ±20%<br>* Q/D.F., I.R. and dielectric strength: To meet initial requirements.</td></tr>
</table>

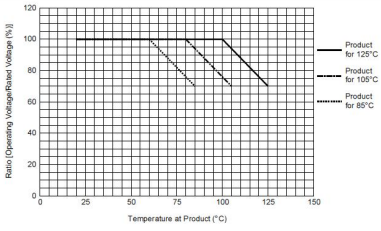

Copyright © by Walsin Technology Corporation. | All rights reserved.

<table>
<tr><th>No.</th><th>Item</th><th>Test Condition</th><th>Requirements</th></tr>
<tr><td>13.</td><td>Humidity (Damp Heat) Steady State</td><td>*Test temp.: 40±2℃<br>*Humidity: 90~95%RH<br>*Test time: 500+24/-0hrs.<br>*Before initial measurement (Class II only): To apply de-aging at 150℃ for 1hr then set for 24±2 hrs at room temp.<br>* Cap. / DF(Q) / I.R. Measurement to be made after de-aging at 150℃ for 1hr then set for 24±2 hrs at room temp.</td><td>
* No remarkable damage.<br>
* Cap change:<br>
NP0: within ±5% or 0.5pF whichever is larger<br>
X7R, X5R, X6S, X7S: ≥10V**,within ±12.5%; ≦6.3V within ±25%;<br>
TT series & C≥ 1uF,within ±25%<br>
**10V: 0603≧4.7μF;0402≧1μF;0201≧0.1μF, within ±25%;<br>
Y5V: ≥10V, within ±30%; ≦6.3V, within +30/-40%<br>
* Q/D.F. value:<br>
NP0: More than 30pF Q≥350, 10pF≤C≤30pF, Q≥275+2.5C<br>
Less than 10pF Q≥200+10C<br>
X7R, X5R, X6S, X7S:
<table>
<tr><th>Rated V</th><th>D.F.≦</th><th>Exception of D.F.≦</th></tr>
<tr><td rowspan="3">≧100V</td><td rowspan="3">≦3%</td><td>≦6%</td><td>1206≧0.47μF</td></tr>
<tr><td>≦7.5%</td><td>0805＞0.1μF, 0603≧0.068μF, 1206>1μF;1210≧2.2μF;TT se</td></tr>
<tr><td>≦20%</td><td>0805＞0.22μF;1210≧3.3μF</td></tr>
<tr><td rowspan="3">≧50V</td><td rowspan="3">≦3%</td><td>≦6%</td><td>0201(50V);0603≧0.047μF; 0805≧0.18μF; 1206≧0.47μF</td></tr>
<tr><td>≦10%</td><td>0201≧0.01uF;1210≧4.7μF</td></tr>
<tr><td>≦20%</td><td>0402≧0.012μF; 0603>0.1μF; 0805≧1μF; 1206≧2.2μF;<br>1210≧10μF; TT series</td></tr>
<tr><td>35V</td><td>≦5%</td><td>≦20%</td><td>0603≧1μF;0805≥2.2μF;1206≧2.2μF;1210≧10μF</td></tr>
<tr><td rowspan="4">25V</td><td rowspan="4">≦5%</td><td>≦10%</td><td>0201≧0.01μF;0805≧1μF; 1210≧10μF</td></tr>
<tr><td>≦14%</td><td>0603≧0.33μF;1206≧4.7μF</td></tr>
<tr><td>≦15%</td><td>0201≧0.1μF;0402≧0.10μF&(0402/X7R≧0.056μF); TT series<br>0603≧0.47μF;0805≧2.2μF;1206≧6.8μF;1210≧22μF</td></tr>
<tr><td>≦20%</td><td>0402≧0.47μF</td></tr>
<tr><td>16V</td><td>≦5%</td><td>≦10%</td><td>0603≧0.15μF;0805≧0.68μF;1206≧2.2μF;1210≧4.7μF</td></tr>
<tr><td rowspan="2">10V</td><td rowspan="2">≦7.5%</td><td>≦15%</td><td>0201≧0.01μF(0201/X7R≧0.022μF);0402≧0.033μF;<br>0603≧0.68μF;0805≧2.2μF;1206≧4.7μF; 1210≧22μF; TT s</td></tr>
<tr><td>≦20%</td><td>0201≧0.1μF ;0402≧1μF; TT series; 01R5</td></tr>
<tr><td>6.3V</td><td>≦15%</td><td>≦30%</td><td>0201≧0.1μF;0402≧1μF;0603≧10μF;<br>0805≧4.7μF;1206≧47μF;1210≧100μF;TT series</td></tr>
<tr><td>4V</td><td>≦20%</td><td>---</td><td>---</td></tr>
</table>
Y5V:
<table>
<tr><th>Rated vol.</th><th>D.F.≦</th><th colspan="2">Exception of D.F.≦</th></tr>
<tr><td rowspan="2">≧50V</td><td rowspan="2">≦7.5%</td><td>≦10%</td><td>0603≧0.1μF; 0805≧0.47μF;<br>1206≧4.7μF</td></tr>
<tr><td>≦20%</td><td>1210≧6.8μF</td></tr>
<tr><td>35V</td><td>≦10%</td><td>---</td><td>---</td></tr>
<tr><td rowspan="2">25V</td><td rowspan="2">≦7.5%</td><td>≦10%</td><td>0402≧0.047μF;0603≧0.1μF;<br>0805≧0.33μF;1206≧1μF; 1210≧4.7μF</td></tr>
<tr><td>≦15%</td><td>0402≧0.068μF;0603≧0.47μF;<br>1206≧4.7μF; 1210≧22μF</td></tr>
<tr><td>16V<br>(C<1.0μF)</td><td>≦10%</td><td>≦12.5%</td><td>0402≧0.068μF; 0603≧0.68μF</td></tr>
<tr><td></td><td></td><td>≦20%</td><td>0402≧0.22μF</td></tr>
<tr><td>16V<br>(C≧1.0μF)</td><td>≦12.5%</td><td>≦20%</td><td>0603≧2.2μF; 0805≧3.3μF;<br>1206≧10μF;1210≧22μF; 1812≧47μF;</td></tr>
<tr><td>10V</td><td>≦20%</td><td>≦30%</td><td>0402≧0.47μF</td></tr>
<tr><td>6.3V</td><td>≦30%</td><td>---</td><td>---</td></tr>
</table>
*I.R.: ≥10V, 1GΩ or 50 Ω-F whichever is smaller.<br>
Class II (X7R, X5R, X6S, X7S, Y5V)
<table>
<tr><th>Rated voltage</th><th>Insulation Resistance</th></tr>
<tr><td>100V: All X7R;1210≥3.3μF</td><td rowspan="6">1GΩ or RxC≧10 Ω-F whichever is smaller.</td></tr>
<tr><td>50V: 0402>0.01μF;0603≥1μF;0805≥1μF;1206≥4.7μF;1210≥4.7μF</td></tr>
<tr><td>35V:0603≥1μF;0805≥2.2μF; 1206≧2.2μF;1210≧10μF</td></tr>
<tr><td>25V:0201≧0.1uF; 0402≥0.22μF; 0603≥2.2μF;0805≥2.2μF;<br>1206≥10μF;1210≥10μF</td></tr>
<tr><td>16V: 0201≧0.1uF;0402≥0.22μF;0603≥1μF;0805≥2.2μF;<br>1206≥10μF;1210≥47μF</td></tr>
<tr><td>10V:0201≥47nF;0402≥0.47μF;0603≥0.47μF;0805≥2.2μF;<br>1206≥4.7μF;1210≥47μF</td></tr>
<tr><td>6.3V ; 4V ; TT series ; All X6S/X7S items; Size≥1812</td><td></td></tr>
</table>
</td></tr>
</table>


Copyright © by Walsin Technology Corporation. | All rights reserved.

<table>
<tr><th>No</th><th>Item</th><th>Test Condition</th><th>Requirements</th></tr>
<tr><td>14</td><td>Humidity (Damp Heat) Load</td><td>*Test temp.：40±2℃<br>*Humidity：90~95%RH<br>*Test time：500+24/-0 hrs.<br>*To apply voltage：<br>Rated voltage (MAX. 500V)<br>*Before initial measurement (Class II only): To apply de-aging at 150℃ for 1hr then set for 24±2 hrs at room temp.<br>* Cap. / DF(Q) / I.R. Measurement to be made after de-aging at 150℃ for 1hr then set for 24±2 hrs at room temp.</td><td>
* No remarkable damage.<br>
Cap change:<br>
NP0: ±7.5% or 0.75pF whichever is larger.<br>
X7R, X5R, X6S, X7S: ≥10V**,within ±12.5%; ≦6.3V within ±25%;<br>
TT series & C≥ 1uF,within ±25%<br>
**10V: 0603≧4.7μF;0402≧1μF;0201≧0.1μF, within ±25%;<br>
Y5V: ≥10V, within ±30%; ≦6.3V, within +30/-40%<br>
Q/D.F. value:<br>
NP0: C≥30pF,Q≥200;C<30pF, Q≥100+10/3C<br>
X7R, X5R, X6S, X7S:
<table>
<tr><th>Rated V</th><th>D.F.≦</th><th>Exception of D.F.≦</th></tr>
<tr><td rowspan="3">≧100V</td><td rowspan="3">≦3%</td><td>≦6%</td><td>1206≧0.47μF</td></tr>
<tr><td>≦7.5%</td><td>0805＞0.1μF, 0603≧0.068μF, 1206>1μF;1210≧2.2μF;TT se</td></tr>
<tr><td>≦20%</td><td>0805＞0.22μF;1210≧3.3μF</td></tr>
<tr><td rowspan="3">≧50V</td><td rowspan="3">≦3%</td><td>≦6%</td><td>0201(50V);0603≧0.047μF; 0805≧0.18μF; 1206≧0.47μF</td></tr>
<tr><td>≦10%</td><td>0201≧0.01uF;1210≧4.7μF</td></tr>
<tr><td>≦20%</td><td>0402≧0.012μF; 0603>0.1μF; 0805≧1μF; 1206≧2.2μF;<br>1210≧10μF; TT series</td></tr>
<tr><td>35V</td><td>≦5%</td><td>≦20%</td><td>0603≧1μF;0805≥2.2μF;1206≧2.2μF;1210≧10μF</td></tr>
<tr><td rowspan="4">25V</td><td rowspan="4">≦5%</td><td>≦10%</td><td>0201≧0.01μF;0805≧1μF; 1210≧10μF</td></tr>
<tr><td>≦14%</td><td>0603≧0.33μF;1206≧4.7μF</td></tr>
<tr><td>≦15%</td><td>0201≧0.1μF;0402≧0.10μF&(0402/X7R≧0.056μF); TT serie<br>0603≧0.47μF;0805≧2.2μF;1206≧6.8μF;1210≧22μF</td></tr>
<tr><td>≦20%</td><td>0402≧0.47μF</td></tr>
<tr><td rowspan="2">16V</td><td rowspan="2">≦5%</td><td>≦10%</td><td>0603≧0.15μF;0805≧0.68μF;1206≧2.2μF;1210≧4.7μF</td></tr>
<tr><td>≦15%</td><td>0201≧0.01μF(0201/X7R≧0.022μF);0402≧0.033μF;<br>0603≧0.68μF;0805≧2.2μF;1206≧4.7μF; 1210≧22μF; TT s</td></tr>
<tr><td rowspan="2">10V</td><td rowspan="2">≦7.5%</td><td>≦15%</td><td>0201≧0.012μF; 0402≧0.33μF(0402/X7R≧0.22μF);<br>0603≧0.33μF;0805≧2.2μF;1206≧2.2μF; 1210≧22μF</td></tr>
<tr><td>≦20%</td><td>0201≧0.1μF ;0402≧1μF; TT series; 01R5</td></tr>
<tr><td>6.3V</td><td>≦15%</td><td>≦30%</td><td>0201≧0.1μF;0402≧1μF;0603≧10μF;<br>0805≧4.7μF;1206≧47μF;1210≧100μF;TT series</td></tr>
<tr><td>4V</td><td>≦20%</td><td>---</td><td>---</td></tr>
</table>
Y5V:
<table>
<tr><th>Rated vol.</th><th>D.F.≦</th><th colspan="2">Exception of D.F.≦</th></tr>
<tr><td rowspan="2">≧50V</td><td rowspan="2">≦7.5%</td><td>≦10%</td><td>0603≧0.1μF; 0805≧0.47μF;1206≧4.7μF</td></tr>
<tr><td>≦20%</td><td>1210≧6.8μF</td></tr>
<tr><td>35V</td><td>≦10%</td><td>---</td><td>---</td></tr>
<tr><td rowspan="2">25V</td><td rowspan="2">≦7.5%</td><td>≦10%</td><td>0402≧0.047μF;0603≧0.1μF;<br>0805≧0.33μF;1206≧1μF; 1210≧4.7μF</td></tr>
<tr><td>≦15%</td><td>0402≧0.068μF;0603≧0.47μF;<br>1206≧4.7μF; 1210≧22μF</td></tr>
<tr><td rowspan="2">16V<br>(C<1.0μF)</td><td rowspan="2">≦10%</td><td>≦12.5%</td><td>0402≧0.068μF; 0603≧0.68μF</td></tr>
<tr><td>≦20%</td><td>0402≧0.22μF</td></tr>
<tr><td>16V<br>(C≧1.0μF)</td><td>≦12.5%</td><td>≦20%</td><td>0603≧2.2μF; 0805≧3.3μF;<br>1206≧10μF;1210≧22μF; 1812≧47μF;</td></tr>
<tr><td>10V</td><td>≦20%</td><td>≦30%</td><td>0402≧0.47μF</td></tr>
<tr><td>6.3V</td><td>≦30%</td><td>---</td><td>---</td></tr>
</table>
*I.R.: ≥10V, 500MΩ or 25 Ω-F whichever is smaller.<br>
Class II (X7R, X5R, X6S, X7S, Y5V)
<table>
<tr><th>Rated voltage</th><th>Insulation Resistance</th></tr>
<tr><td>100V: All X7R;1210≥3.3μF</td><td rowspan="6">500MΩ or RxC≧5 Ω-F whichever is smaller.</td></tr>
<tr><td>50V: 0402>0.01μF;0603≥1μF;0805≥1μF;1206≥4.7μF;1210≥4.7μF</td></tr>
<tr><td>35V:0603≥1μF;0805≥2.2μF; 1206≧2.2μF;1210≧10μF</td></tr>
<tr><td>25V:0201≧0.1uF; 0402≥0.22μF; 0603≥2.2μF;0805≥2.2μF;<br>1206≥10μF;1210≥10μF</td></tr>
<tr><td>16V: 0201≧0.1uF;0402≥0.22μF;0603≥1μF;0805≥2.2μF;<br>1206≥10μF;1210≥47μF</td></tr>
<tr><td>10V:0201≥47nF;0402≥0.47μF;0603≥0.47μF;0805≥2.2μF;<br>1206≥4.7μF;1210≥47μF</td></tr>
<tr><td>6.3V ; 4V ; TT series ; All X6S/X7S items; Size≥1812</td><td></td></tr>
</table>
</td></tr>
</table>


Copyright © by Walsin Technology Corporation. | All rights reserved.

<table>
<tr><th>No</th><th>Item</th><th>Test Condition</th><th>Requirements</th></tr>
<tr><td>15.</td><td>High Temperature Load (Endurance)</td><td>
*Test temp. :<br>
NP0, X7R/X7E/X7S: 125±3℃<br>
X6S: 105±3℃<br>
X5R, Y5V: 85±3℃<br>
*To apply voltage:<br>
(1) ≦6.3V or C≧10μF or TT series: 150% of rated voltage.<br>
(2) 10V≦Ur<500V: 200% of rated voltage.<br>
(3) 500V: 150% of rated voltage.<br>
(4) Ur≧630V: 120% of rated voltage.<br>
(5) 100% of rated voltage for below range.
<table>
<tr><th>Size</th><th>Dielectric</th><th>Rated voltage</th><th>Capacitance range</th></tr>
<tr><td rowspan="2">0201</td><td rowspan="2">X5R/X7R/X6S</td><td>≦10V</td><td>C≧0.1μF</td></tr>
<tr><td>≧16V</td><td>C>0.1μF</td></tr>
<tr><td>0402</td><td>X5R/X7R/ X6S/X7S/Y5V</td><td>6.3V,10V 16V,25V</td><td>C≧1.0μF</td></tr>
<tr><td rowspan="3">0603</td><td rowspan="3">X5R/X7R/ X6S/X7S</td><td>4V</td><td>C≧22μF</td></tr>
<tr><td>6.3V,10V</td><td>C≧4.7μF</td></tr>
<tr><td>25V,35V</td><td>C≧1.0μF</td></tr>
<tr><td rowspan="3">0805</td><td rowspan="3">X5R/X7R/ X6S/X7S</td><td>4V</td><td>C≧47μF</td></tr>
<tr><td>6.3V</td><td>C≧22μF</td></tr>
<tr><td>10V~50V</td><td>C≧10μF</td></tr>
<tr><td rowspan="2">1206</td><td>X5R/X7R/X6S</td><td>≦6.3V</td><td>C≧47μF</td></tr>
<tr><td>NP0</td><td>3000V</td><td>C≧1.5pF</td></tr>
<tr><td rowspan="2">1210</td><td>X5R/X7R/X6S</td><td>16V</td><td>C≧47μF</td></tr>
<tr><td>X7R</td><td>100V</td><td>C≧3.3μF</td></tr>
<tr><td>TT15</td><td>X5R</td><td>6.3V</td><td>C >1.0μF</td></tr>
<tr><td>TT18</td><td>Y5V</td><td>6.3V,10V</td><td>C≧2.2μF</td></tr>
<tr><td rowspan="2">TT21</td><td>Y5V</td><td>6.3V</td><td>C≧10μF</td></tr>
<tr><td>X5R/X7R/X6S</td><td>≦10V</td><td>C≧10μF</td></tr>
<tr><td>TT31</td><td>Y5V</td><td>6.3V</td><td>C≧22μF</td></tr>
</table>
**1WV items must follow de-rating conditions<br>
(6) 150% of rated voltage for below range.
<table>
<tr><th>Size</th><th>Dielectric</th><th>Rated voltage</th><th>Capacitance</th></tr>
<tr><td>0201</td><td>X5R/X7R/X6</td><td>16V/25V</td><td>C≧0.1μF</td></tr>
<tr><td rowspan="4">0402</td><td>X7R</td><td>16V</td><td>C≧0.022μF</td></tr>
<tr><td rowspan="2">X5R/X7R/X6S</td><td>50V</td><td>C≧0.1μF</td></tr>
<tr><td>10~25V</td><td>C≧0.22μF</td></tr>
<tr><td>Y5V</td><td>16V</td><td>C≧0.47μF</td></tr>
<tr><td rowspan="3">0603</td><td>X7R</td><td>50V</td><td>C>0.1μF</td></tr>
<tr><td>X5R/X7R/ X6S/X7S</td><td>10V,16V, 50V</td><td>C≧1.0μF</td></tr>
<tr><td>Y5V</td><td>16V</td><td>C≧2.2μF</td></tr>
<tr><td rowspan="4">0805</td><td>X5R/X7R/ X6S/X7S</td><td>10~50V</td><td>C≧4.7μF</td></tr>
<tr><td rowspan="3">X5R/X7R/X7S</td><td>50V</td><td>C≧2.2μF</td></tr>
<tr><td>100V</td><td>C≧0.47μF</td></tr>
<tr><td>Y5V</td><td>16V</td><td>C≧4.7μF</td></tr>
<tr><td>1206</td><td>X5R/X7R/X6</td><td>100V</td><td>C>1.0μF</td></tr>
<tr><td>1210</td><td>X5R/X7R/X6</td><td>50V~100V</td><td>C≧2.2μF</td></tr>
<tr><td>1825<br>2220<br>2225</td><td>X7R</td><td>100V~250V</td><td>C≧1.0μF</td></tr>
</table>
*Test time: 1000+24/-0 hrs.<br>
*Before initial measurement (Class II only): To apply de-aging at 150℃ for 1hr then set for 24±2 hrs at room temp.<br>
* Cap. / DF(Q) / I.R. Measurement to be made after de-aging at 150℃ for 1hr then set for 24±2 hrs at room temp.<br>
** De-rating conditions:<br>


</td><td>
* No remarkable damage.<br>
Cap change:<br>
NP0: ±3.0% or ±0.3pF whichever is larger<br>
X7R, X5R, X6S, X7S: ≥10V**,within ±12.5%; ≦6.3V within ±25%;<br>
TT series & C≥ 1uF,within ±25%<br>
**10V: 0603≧4.7μF;0402≧1μF;0201≧0.1μF, within ±25%;<br>
Y5V: ≥10V, within ±30%; ≦6.3V, within +30/-40%<br>
Q/D.F. value:<br>
NP0: More than 30pF, Q≥350<br>
10pF≤C<30pF, Q≥275+2.5C<br>
Less than 10pF, Q≥200+10C<br>
X7R, X5R, X6S, X7S:
<table>
<tr><th>Rated V</th><th>D.F.≦</th><th colspan="2">Exception of D.F.≦</th></tr>
<tr><td rowspan="3">≧100V</td><td rowspan="3">≦3%</td><td>≦6%</td><td>1206≧0.47μF</td></tr>
<tr><td>≦7.5%</td><td>0805＞0.1μF, 0603≧0.068μF, 1206>1μF;1210≧2.2μF;TT se</td></tr>
<tr><td>≦20%</td><td>0805＞0.22μF;1210≧3.3μF</td></tr>
<tr><td rowspan="3">≧50V</td><td rowspan="3">≦3%</td><td>≦6%</td><td>0201(50V);0603≧0.047μF; 0805≧0.18μF; 1206≧0.47μF</td></tr>
<tr><td>≦10%</td><td>0201≧0.01uF;1210≧4.7μF</td></tr>
<tr><td>≦20%</td><td>0402≧0.012μF; 0603>0.1μF; 0805≧1μF; 1206≧2.2μF; 1210≧10μF; TT series</td></tr>
<tr><td>35V</td><td>≦5%</td><td>≦20%</td><td>0603≧1μF;0805≥2.2μF;1206≧2.2μF;1210≧10μF</td></tr>
<tr><td rowspan="4">25V</td><td rowspan="4">≦5%</td><td>≦10%</td><td>0201≧0.01μF;0805≧1μF; 1210≧10μF</td></tr>
<tr><td>≦14%</td><td>0603≧0.33μF;1206≧4.7μF</td></tr>
<tr><td>≦15%</td><td>0201≧0.1μF;0402≧0.10μF&(0402/X7R≧0.056μF); TT series :0603≧0.47μF;0805≧2.2μF;1206≧6.8μF;1210≧22μF</td></tr>
<tr><td>≦20%</td><td>0402≧0.47μF</td></tr>
<tr><td rowspan="3">16V</td><td rowspan="3">≦5%</td><td>≦10%</td><td>0603≧0.15μF;0805≧0.68μF;1206≧2.2μF;1210≧4.7μF</td></tr>
<tr><td>≦15%</td><td>0201≧0.01μF(0201/X7R≧0.022μF);0402≧0.033μF; 0603≧0.68μF;0805≧2.2μF;1206≧4.7μF; 1210≧22μF; TT s</td></tr>
<tr><td rowspan="2">≦15%</td><td>0201≧0.012μF; 0402≧0.33μF(0402/X7R≧0.22μF); 0603≧0.33μF;0805≧2.2μF;1206≧2.2μF; 1210≧22μF</td></tr>
<tr><td>10V</td><td>≦7.5%</td><td>≦20%</td><td>0201≧0.1μF ;0402≧1μF; TT series; 01R5</td></tr>
<tr><td>6.3V</td><td>≦15%</td><td>≦30%</td><td>0201≧0.1μF;0402≧1μF;0603≧10μF; 0805≧4.7μF;1206≧47μF;1210≧100μF;TT series</td></tr>
<tr><td>4V</td><td>≦20%</td><td>---</td><td>---</td></tr>
</table>
Y5V:
<table>
<tr><th>Rated vol.</th><th>D.F.≦</th><th colspan="2">Exception of D.F.≦</th></tr>
<tr><td>≧50V</td><td>≦7.5%</td><td>≦10%</td><td>0603≧0.1μF; 0805≧0.47μF;1206≧4.7μF</td></tr>
<tr><td>≦20%</td><td>1210≧6.8μF</td></tr>
<tr><td>35V</td><td>≦10%</td><td>---</td><td>---</td></tr>
<tr><td rowspan="2">25V</td><td rowspan="2">≦7.5%</td><td>≦10%</td><td>0402≧0.047μF;0603≧0.1μF; 0805≧0.33μF;1206≧1μF; 1210≧4.7μF</td></tr>
<tr><td>≦15%</td><td>0402≧0.068μF;0603≧0.47μF; 1206≧4.7μF; 1210≧22μF</td></tr>
<tr><td rowspan="2">16V (C<1.0μF)</td><td rowspan="2">≦10%</td><td>≦12.5%</td><td>0402≧0.068μF; 0603≧0.68μF</td></tr>
<tr><td>≦20%</td><td>0402≧0.22μF</td></tr>
<tr><td>16V (C≧1.0μF)</td><td>≦12.5%</td><td>≦20%</td><td>0603≧2.2μF; 0805≧3.3μF; 1206≧10μF;1210≧22μF; 1812≧47μF;</td></tr>
<tr><td>10V</td><td>≦20%</td><td>≦30%</td><td>0402≧0.47μF</td></tr>
<tr><td>6.3V</td><td>≦30%</td><td>---</td><td>---</td></tr>
</table>
*I.R.: ≥10V, 1GΩ or 50 Ω-F whichever is smaller.<br>
Class II (X7R, X5R, X6S, X7S, Y5V)
<table>
<tr><th>Rated voltage</th><th>Insulation Resistance</th></tr>
<tr><td>100V: All X7R;1210≥3.3μF</td><td rowspan="7">1GΩ or RxC ≧10 Ω-F whichever is smaller.</td></tr>
<tr><td>50V: 0402>0.01μF;0603≥1μF;0805≥1μF;1206≥4.7μF;1210≥4.7μF</td></tr>
<tr><td>35V:0603≥1μF;0805≥2.2μF; 1206≧2.2μF;1210≧10μF</td></tr>
<tr><td>25V:0201≧0.1μF; 0402≥0.22μF; 0603≥2.2μF;0805≥2.2μF; 1206≥10μF;1210≥10μF</td></tr>
<tr><td>16V: 0201≧0.1μF;0402≥0.22μF;0603≥1μF;0805≥2.2μF; 1206≥10μF;1210≥47μF</td></tr>
<tr><td>10V:0201≥47nF;0402≥0.47μF;0603≥0.47μF;0805≥2.2μF; 1206≥4.7μF;1210≥47μF</td></tr>
<tr><td>6.3V ; 4V ; TT series ; All X6S/X7S items; Size≥1812</td></tr>
</table>
</td></tr>
</table>



Copyright © by Walsin Technology Corporation. | All rights reserved.

# APPENDIXES

## ◙ Tape & reel dimensions

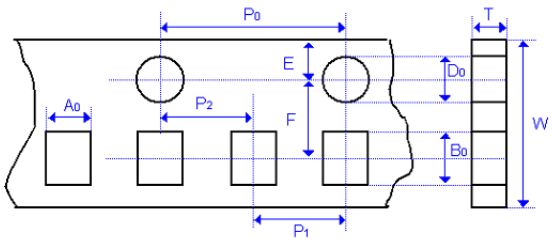



Fig. 2 The dimension of paper tape

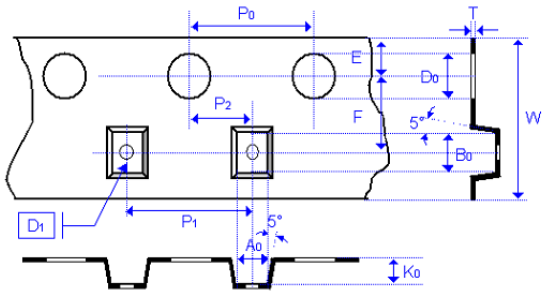



Fig. 3 The dimension of plastic tape

| Size | 0201 | 0402 | 0603 | 0805 | | | 1206 | | | 1210 | | | 1808 | 1812 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Thickness | L | N,E | S,H,X | A,H | B,T | D,I | B,T | C,J,D | G,P | T | C,D,G,K | M | D,F, G,K | D,F, G,K | M,U |
| $A_0$ | 0.39 +/-0.07 | 0.70 +/-0.2 | 1.05 +/-0.30 | 1.50 +/-0.20 | 1.50 +/-0.20 | < 1.80 | 1.90 +/-0.50 | < 2.00 | <2.30 | < 3.05 | < 3.05 | < 3.20 | < 2.50 | < 3.90 | < 3.90 |
| $B_0$ | 0.69 +/-0.07 | 1.20 +/-0.2 | 1.80 +/-0.30 | 2.30 +/-0.20 | 2.30 +/-0.20 | < 2.70 | 3.50 +/-0.50 | < 3.70 | < 4.00 | < 3.80 | < 3.80 | <3.95 | < 5.30 | < 5.30 | < 5.30 |
| T | ≦0.50 | ≦0.80 | ≦1.20 | ≦1.15 | ≦1.30 | 0.23 +/-0.1 | ≦1.30 | 0.23 +/-0.1 | 0.23 +/-0.1 | 0.23 +/-0.1 | 0.23 +/-0.1 | 0.23 +/-0.1 | 0.25 +/-0.1 | 0.25 +/-0.1 | 0.25 +/-0.1 |
| $K_0$ | - | - | - | - | - | < 2.50 | - | < 2.50 | < 2.50 | < 1.50 | < 2.50 | < 3.20 | < 2.50 | < 2.50 | < 3.50 |
| W | 8.00 +/-0.10 | 8.00 +/-0.10 | 8.00 +/-0.10 | 8.00 +/-0.10 | 8.00 +/-0.10 | 8.00 +/-0.20 | 8.00 +/-0.10 | 8.00 +/-0.20 | 8.00 +/-0.20 | 8.00 +/-0.20 | 8.00 +/-0.20 | 8.00 +/-0.20 | 12.00 +/-0.20 | 12.00 +/-0.20 | 12.00 +/-0.20 |
| $P_0$ | 4.00 +/-0.10 | 4.00 +/-0.10 | 4.00 +/-0.10 | 4.00 +/-0.10 | 4.00 +/-0.10 | 4.00 +/-0.10 | 4.00 +/-0.10 | 4.00 +/-0.10 | 4.00 +/-0.10 | 4.00 +/-0.10 | 4.00 +/-0.10 | 4.00 +/-0.10 | 4.00 +/-0.10 | 4.00 +/-0.10 | 4.00 +/-0.10 |
| $10xP_0$ | 40.00 +/-0.10 | 40.00 +/-0.10 | 40.00 +/-0.20 | 40.00 +/-0.20 | 40.00 +/-0.20 | 40.00 +/-0.20 | 40.00 +/-0.20 | 40.00 +/-0.20 | 40.00 +/-0.20 | 40.00 +/-0.20 | 40.00 +/-0.20 | 40.00 +/-0.20 | 40.00 +/-0.20 | 40.00 +/-0.20 | 40.00 +/-0.20 |
| $P_1$ | 2.00 +/-0.05 | 2.00 +/-0.05 | 4.00 +/-0.10 | 4.00 +/-0.10 | 4.00 +/-0.10 | 4.00 +/-0.10 | 4.00 +/-0.10 | 4.00 +/-0.10 | 4.00 +/-0.10 | 4.00 +/-0.10 | 4.00 +/-0.10 | 4.00 +/-0.10 | 4.00 +/-0.10 | 8.00 +/-0.10 | 8.00 +/-0.10 |
| $P_2$ | 2.00 +/-0.05 | 2.00 +/-0.05 | 2.00 +/-0.05 | 2.00 +/-0.05 | 2.00 +/-0.05 | 2.00 +/-0.05 | 2.00 +/-0.05 | 2.00 +/-0.05 | 2.00 +/-0.05 | 2.00 +/-0.05 | 2.00 +/-0.05 | 2.00 +/-0.05 | 2.00 +/-0.10 | 2.00 +/-0.10 | 2.00 +/-0.10 |
| $D_0$ | 1.55 +/-0.05 | 1.55 +/-0.05 | 1.55 +/-0.05 | 1.55 +/-0.05 | 1.55 +/-0.05 | 1.50 +0.1/-0 | 1.55 +/-0.05 | 1.50 +0.1/-0 | 1.50 +0.1/-0 | 1.50 +0.1/-0 | 1.50 +0.1/-0 | 1.50 +0.1/-0 | 1.50 +0.1/-0 | 1.50 +0.1/-0 | 1.50 +0.1/-0 |
| $D_1$ | - | - | - | - | - | 1.00 +/-0.10 | - | 1.00 +/-0.10 | 1.00 +/-0.10 | 1.00 +/-0.10 | 1.00 +/-0.10 | 1.00 +/-0.10 | 1.50 +/-0.10 | 1.50 +/-0.10 | 1.50 +/-0.10 |
| E | 1.75 +/-0.05 | 1.75 +/-0.05 | 1.75 +/-0.05 | 1.75 +/-0.05 | 1.75 +/-0.05 | 1.75 +/-0.10 | 1.75 +/-0.05 | 1.75 +/-0.10 | 1.75 +/-0.10 | 1.75 +/-0.10 | 1.75 +/-0.10 | 1.75 +/-0.10 | 1.75 +/-0.10 | 1.75 +/-0.10 | 1.75 +/-0.10 |
| F | 3.50 +/-0.05 | 3.50 +/-0.05 | 3.50 +/-0.05 | 3.50 +/-0.05 | 3.50 +/-0.05 | 3.50 +/-0.05 | 3.50 +/-0.05 | 3.50 +/-0.05 | 3.50 +/-0.05 | 3.50 +/-0.05 | 3.50 +/-0.05 | 3.50 +/-0.05 | 5.50 +/-0.10 | 5.50 +/-0.10 | 5.50 +/-0.10 |

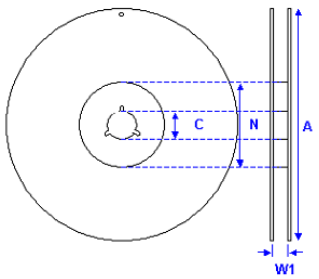


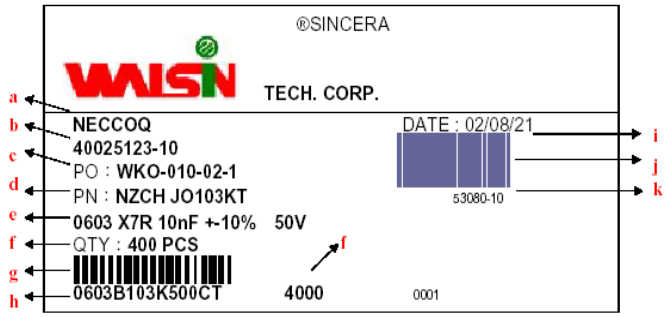

Fig. 4 The dimension of reel

| Size | 0201, 0402, 0603, 0805, 1206, 1210 | | | 1812 |
|---|---|---|---|---|
| Reel size | 7” | 10” | 13” | 7” |
| C | 13.0+0.5/-0.2 | 13.0+0.5/-0.2 | 13.0+0.5/-0.2 | 13.0+0.5/-0.2 |
| $W_1$ | 8.4+1.5/-0 | 8.4+1.5/-0 | 8.4+1.5/-0 | 12.4+2.0/-0 |
| A | 178.0±1.0 | 250.0±1.0 | 330.0±1.0 | 178.0±1.0 |
| N | 60.0+1.0/-0 | 100.0±1.0 | 100±1.0 | 60.0+1.0/-0 |



Copyright © by Walsin Technology Corporation. | All rights reserved.

## Description of customer label




| |
|---|
| a. Customer name |
| b. WTC order series and item number |
| c. Customer P/O |
| d. Customer P/N |
| e. Description of product |
| f. Quantity |
| g. Bar code including quantity & WTC P/N or customer |
| h. WTC P/N |
| i. Shipping date |
| j. Order bar code including series and item numbers |
| k. Serial number of label |

## Constructions

| No. | Name | | NPO, X7R, X5R, X6S, X7S, Y5V |
|---|---|---|---|
| ① | Ceramic material | | $BaTiO_3$ based |
| ② | Inner electrode | | Ni |
| ③ | Termination | Inner layer | Cu |
| ④ | | Middle layer | Ni |
| ⑤ | | Outer layer | Sn |

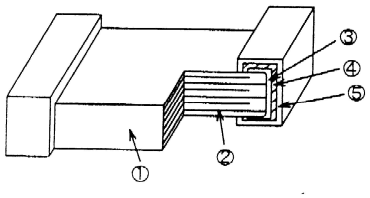



Fig. 5 The construction of MLCC

## Storage and handling conditions

(1) To store products at 5 to 40°C ambient temperature and 20 to 70%. related humidity conditions.

(2) The product is recommended to be used within one year after shipment. Check solderability in case of shelf life extension is needed.

Cautions:

a. The corrosive gas reacts on the terminal electrodes of capacitors, and results in the poor solderability. Do not store the capacitors in the ambience of corrosive gas (e.g., hydrogen sulfide, sulfur dioxide, chlorine, ammonia gas etc.)

b. In corrosive atmosphere, solderability might be degraded, and silver migration might occur to cause low reliability.

c. Due to the dewing by rapid humidity change, or the photochemical change of the terminal electrode by direct sunlight, the solderability and electrical performance may deteriorate. Do not store capacitors under direct sunlight or dewing condition. To store products on the shelf and avoid exposure to moisture.



Copyright © by Walsin Technology Corporation. | All rights reserved.

## Recommended soldering conditions

The lead-free termination MLCCs are not only to be used on SMT against lead-free solder paste, but also suitable against lead-containing solder paste. If the optimized solder joint is requested, increasing soldering time, temperature and concentration of $N_2$ within oven are recommended.

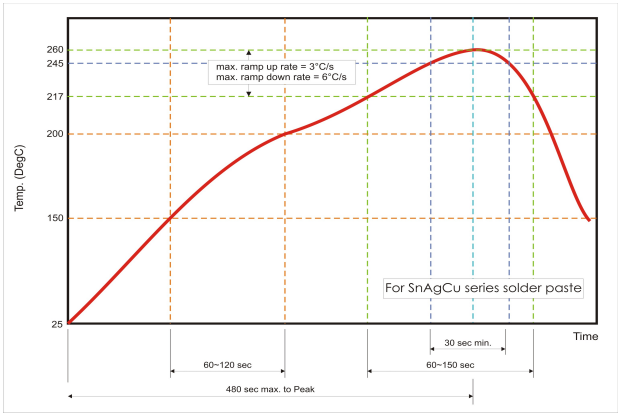



Fig. 6 Recommended reflow soldering profile for SMT process with SnAgCu series solder paste.

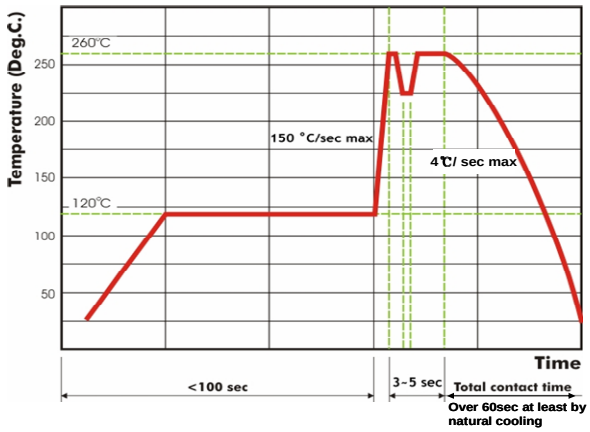



Fig. 7 Recommended wave soldering profile for SMT process with SnAgCu series solder.

華新科技股份有限公司 智慧財產權所有 翻印必究
PSA PASSIVE SYSTEM ALLIANCE
Walsin Technology Corporation
COPYRIGHT © WALSIN TECHNOLOGY CORPORATION. ALL RIGHTS RESERVED.



Copyright © by Walsin Technology Corporation. | All rights reserved.

# Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

Walsin:

0402N1R2C500LT 0402N1R5C500LT 0402N3R3C500LT 0402N4R7C500LT 0402N5R6C500LT 0402N220G500LT 0402N470G500LT 0402N151J500LT 0603N1R0C500LT 0603N330G500LT 0603N120J500LT 0603N180J500LT 0603N101J500LT 0402B471K500CT 0402B102K500CT 0402B152K500CT 0402B222K500CT 0402B392K500CT 0402B103K500CT 0402B103K250CT 0402B103K160CT 0402B123K160CT 0603B103K500CT 0402N101J500CT 0402N150J500CT 0402N330J500CT 0402N8R0D500LT 0402N2R2C500LT 0402N100J500LT 0402N330J500LT 0402N5R6C500CT 0603N1R0C500CT 0402N100J500CT 0603N150F500CT 0402N220G500CT 0603N120J500CT 0402N2R2C500CT 1206B104K500CT 1206B105K500CT 1206B103K500CT 0805B102K500CT 1206B475K250CT 0603N510F500LT 0603N180J500CT