

## ■ HOW TO ORDER

|                                                                              | Size                                                                                                       | Dielectric                                         | Capacitance                                                                                                                                                                                                                          | Tolerance                                                                                                             | Rated voltage                                                                                                                                                                                                                                                                                                                                                                             | Termination                                        | Packaging                                                                |
|------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|--------------------------------------------------------------------------|
| General Purpose<br>MLCC<br>Middle & High Voltage<br>MLCC<br>Ultra-small MLCC | Inch (mm) :<br>0201 (0603),<br>0603 (1608),<br>1206 (3216),<br>1808 (4520),<br>1825 (4563),<br>2225 (5763) | N=NP0<br>B=X7R<br>A=X7S<br>S=X6S<br>X=X5R<br>F=Y5V | Two significant digits followed by no. of zeros. And R is in place of decimal point.<br><br>R47=0.47pF<br>0R5=0.5pF<br>1R0=1pF<br>100=10pF<br>101=100pF<br>102=1000pF<br>103=0.01uF<br>104=0.1uF<br>105=1uF<br>106=10uF<br>107=100uF | 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>350=35 Vdc<br>500=50 Vdc<br>101=100 Vdc<br>201=200 Vdc<br>251=250 Vdc<br>501=500 Vdc<br>631=630 Vdc<br>102=1k Vdc<br>152=1.5k Vdc<br>202=2k Vdc<br>252=2.5k Vdc<br>302=3k Vdc<br>402=4k Vdc<br>502=5k Vdc<br>602=6k Vdc | L=Ag/Ni/Sn<br>C=Cu/Ni/Sn                           | B=Bulk<br>C=Bulk cassette<br>T=7" reeled<br>Q=10" reeled<br>G=13" reeled |
|                                                                              |                                                                                                            |                                                    |                                                                                                                                                                                                                                      |                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                           | L=Ag/Ni/Sn<br>C=Cu/Ni/Sn<br>P=Cu/Polymer Ni/Sn     |                                                                          |
|                                                                              |                                                                                                            |                                                    |                                                                                                                                                                                                                                      |                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                           | SH:C=Ag polymer / Ni/Sn<br>SG:C=Cu polymer / Ni/Sn |                                                                          |
|                                                                              |                                                                                                            |                                                    |                                                                                                                                                                                                                                      |                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                           | C=Cu/Ni/Sn                                         |                                                                          |

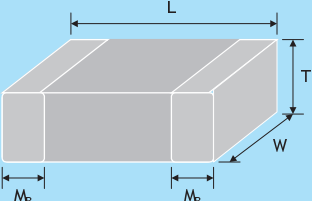
\* The packaging code per each size of reel, please refer to following table "packaging style and quantity".

## ■ PACKAGING STYLE AND QUANTITY

| Size                                      | Thickness (mm)/Symbol |   | Paper tape |          | Plastic tape |          |
|-------------------------------------------|-----------------------|---|------------|----------|--------------|----------|
|                                           |                       |   | 7" reel    | 13" reel | 7" reel      | 13" reel |
| 01005 (0402)                              | 0.20±0.02             | V | 20,000     | -        | -            | -        |
| 0201 (0603)                               | 0.30±0.03             | L | 15,000     | 70,000   | -            | -        |
| 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   |
| 1210 (3225)                               | 1.60+0.30/-0.10       | P | -          | -        | 2,000        | 9,000    |
|                                           | 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    |
| 1808 (4520)                               | 2.50±0.30             | M | -          | -        | 1,000 *      | 6,000    |
|                                           | 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    |
| 1812 (4532)                               | 2.00±0.20             | K | -          | -        | 1,000        | 6,000    |
|                                           | 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    |
| 1825 (4563)<br>2220 (5750)<br>2225 (5763) | 2.80±0.30             | U | -          | -        | 500          | -        |
|                                           | 1.60±0.20             | G | -          | -        | 1,000        | -        |
|                                           | 2.00±0.20             | K | -          | -        | 1,000        | -        |
|                                           | 2.50±0.30             | M | -          | -        | 500          | -        |
|                                           | 2.80±0.30             | U | -          | -        | 500          | -        |

\* 10uF/100V , 500 pieces/Reel

## ■ SINGLE CHIP CAPACITORS

| Outline                                                                           | Size<br>Inch (mm)             | L (mm)                 | W (mm)                 | T (mm)/Symbol           |                  | SolderingMethod *          | M <sub>B</sub> (mm)        |
|-----------------------------------------------------------------------------------|-------------------------------|------------------------|------------------------|-------------------------|------------------|----------------------------|----------------------------|
|  | 01R5 (0402)                   | 0.40±0.02              | 0.20±0.02              | 0.20±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 <sup>#2</sup> | 0.3±0.05 <sup>#2</sup> | 0.3±0.05 <sup>#2</sup>  |                  |                            | 0.15±0.1/-0.05             |
|                                                                                   |                               | 0.6±0.09 <sup>#3</sup> | 0.3±0.09 <sup>#3</sup> | 0.3±0.09 <sup>#3</sup>  |                  |                            |                            |
|                                                                                   | 0402 (1005)                   | 1.00±0.05              | 0.50±0.05              | 0.50±0.05               | N                | R                          | 0.25±0.05/-0.10            |
|                                                                                   |                               |                        |                        | 0.50+0.02/-0.05         | Q                | R                          |                            |
|                                                                                   |                               | 1.00±0.20              | 0.50±0.20              | 0.50±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 <sup>#1</sup> |                  |                            |                            |
|                                                                                   |                               | 0805 (2012)            | 2.00±0.15              | 1.25±0.10               | 0.50±0.10        | H                          |                            |
|                                                                                   | 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                          |                            |
|                                                                                   |                               |                        |                        | 0.80±0.10               | B                | R / W                      |                            |
|                                                                                   | 1206 (3216)                   | 3.20±0.15              | 1.60±0.15              | 0.95±0.10               | C                | R                          | 0.60±0.20<br>(0.5±0.25)*** |
|                                                                                   |                               |                        |                        | 1.25±0.10               | D                | R                          |                            |
|                                                                                   |                               |                        |                        | 1.15±0.15               | J                | R                          |                            |
|                                                                                   |                               | 3.20±0.20              | 1.60±0.20              | 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            |                            |
| 1210 (3225)                                                                       |                               | 3.20±0.30              | 2.50±0.20              | 0.95±0.10               | C                | R                          |                            |
|                                                                                   | 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                |                            |                            |
|                                                                                   |                               |                        | 1.25±0.10              | D                       | R                |                            |                            |
| 1808 (4520)                                                                       | 4.50±0.40<br>(4.5+0.5/-0.3)** | 2.03±0.25              | 1.40±0.15              | F                       | R                | 0.75±0.25<br>(0.5±0.25)*** |                            |
|                                                                                   |                               |                        | 1.60±0.20              | G                       | R                |                            |                            |
|                                                                                   |                               |                        | 2.00±0.20              | K                       | R                |                            |                            |
|                                                                                   |                               |                        | 1.25±0.10              | D                       | R                |                            |                            |
| 1812 (4532)                                                                       | 4.50±0.40<br>(4.5+0.5/-0.3)** | 3.20±0.30              | 1.60±0.20              | G                       | R                | 0.75±0.25<br>(0.5±0.25)*** |                            |
|                                                                                   |                               |                        | 2.00±0.20              | K                       | R                |                            |                            |
|                                                                                   |                               | 3.20±0.40              | 2.50±0.30              | M                       | R                |                            |                            |
|                                                                                   |                               |                        | 2.80±0.30              | U                       | R                |                            |                            |
|                                                                                   | 1825 (4563)                   | 4.60±0.50              | 6.30±0.40              | 1.60±0.20 (G)           |                  |                            | R                          |
| 2211 (5728)                                                                       | 5.70±0.50                     | 2.80±0.30              | 2.00±0.20 (K)          |                         | R                | ≥0.30                      |                            |
| 2220 (5750)                                                                       | 5.70±0.50                     | 5.00±0.40              | 2.50±0.30 (M)          |                         | R                | ≥0.30                      |                            |
| 2225 (5763)                                                                       | 5.70±0.50                     | 6.30±0.40              | 2.80±0.30 (U)          |                         | R                | ≥0.30                      |                            |

\* R = Reflow soldering process ; W = Wave soldering process.

\*\* For 1808\_200~3kV, 1812\_200V~3kV and safety certificated products.

\*\*\* For 1206\_1000V ~3kV, 1808\_200~3kV, 1812\_200~3kV and safety certificated products.

#1 : For 0603/Cap≥10μF or 0603(≤6.3V)/Cap≥4.7μ For 0603(>10V)/Cap>1μF products.

#2 : For 0201/Cap≥0.68μF products. #3 : For 0201/Cap ≥ 1μF products.

The table only for General Purpose Series, Soft termination and others please refer to individual sheet for details

## ■ QUICK PRODUCT INFORMATION

| Series                                   | Dielectric | Size                                                       | Capacitance   | Rated voltage                         | Page |
|------------------------------------------|------------|------------------------------------------------------------|---------------|---------------------------------------|------|
| General Purpose Caps<br>(6.3V~100V)      | NPO        | 0201, 0402, 0603, 0805, 1206, 1210, 1812, 1825, 2220, 2225 | 0.1pF~0.27μF  | 10V, 16V, 25V, 50V, 100V              | 4    |
|                                          | X7R        | 0201, 0402, 0603, 0805, 1206, 1210, 1812, 1825, 2220, 2225 | 100pF~47μF    | 6.3V, 10V, 16V, 25V, 50V, 100V        |      |
|                                          | X6S        | 0402, 0603, 0805, 1206, 1210                               | 0.1μF~100μF   | 6.3V, 10V, 16V, 25V                   |      |
|                                          | X7S        | 0402, 0603, 0805, 1206, 1210                               | 1.0μF~100μF   | 6.3V, 10V, 16V, 25V, 50V, 100V        |      |
|                                          | X5R        | 0201, 0402, 0603, 0805, 1206, 1210                         | 100pF~220μF   | 6.3V, 10V, 16V, 25V, 50V              |      |
|                                          | Y5V        | 0402, 0603, 0805, 1206, 1210, 1812                         | 0.01μF~100μF  | 6.3V, 10V, 16V, 25V, 50V, 100V        |      |
| Middle & High Voltage Caps<br>(200V~3kV) | NPO        | 0603, 0805, 1206, 1210, 1808, 1812, 1825, 2220, 2225       | 0.5pF~0.082μF | 200V, 250V, 500V, 630V, 1kV, 2kV, 3kV | 10   |
|                                          | X7R        | 0603, 0805, 1206, 1210, 1808, 1812, 1825, 2220, 2225       | 100pF~2.2μF   | 200V, 250V, 500V, 630V, 1kV, 2kV, 3kV |      |
|                                          | Y5V        | 0805, 1206, 1210, 1812                                     | 0.01μF~0.68μF | 200V, 250V                            |      |

## FEATURES

- \* A wide selection of sizes is available (0201 to 2225).
- \* High capacitance in given case size.
- \* Capacitor with lead-free termination (pure Tin).

## GENERAL ELECTRICAL DATA

| Dielectric                 | NP0                                                                                                                                                           | X7R                                | X7S                   | X6S                   | X5R                   | Y5V                       |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|-----------------------|-----------------------|-----------------------|---------------------------|
| Size                       | 0201, 0402, 0603, 0805, 1206, 1210, 1812, 1825, 2220, 2225                                                                                                    |                                    |                       |                       |                       |                           |
| Capacitance range          | 0.1pF to 0.27μF                                                                                                                                               | 100pF to 47μF                      | 1μF to 100μF          | 0.1μF to 100μF        | 100pF to 220μF        | 0.01μF to 100μF           |
| Capacitance tolerance      | Cap≤5pF <sup>#1</sup> :<br>A (±0.05pF), B (±0.1pF), C (±0.25pF)<br>5pF<Cap<10pF:<br>C (±0.25pF), D (±0.5pF)<br>Cap≥10pF:<br>F(±1%), G (±2%), J (±5%),K (±10%) | J (±5%),<br>K (±10%),<br>M (±20%)  | K (±10%),<br>M (±20%) | K (±10%),<br>M (±20%) | K (±10%),<br>M (±20%) | M (±20%),<br>Z (-20/+80%) |
| Rated voltage (WVDC)       | 10V, 16V, 25V, 50V, 100V                                                                                                                                      | 4V, 6.3V, 10V, 16V, 25V, 50V, 100V |                       |                       |                       |                           |
| Operating temperature      | -55 to +125°C                                                                                                                                                 |                                    |                       | -55 to +105°C         | -55 to +85°C          | -25 to +85°C              |
| Capacitance characteristic | ±30ppm                                                                                                                                                        | ±15%                               | ±22%                  |                       | ±15%                  | +30/-80%                  |
| Termination                | Ni/Sn (lead-free termination)                                                                                                                                 |                                    |                       |                       |                       |                           |

#1: NP0, 0.1pF product only provide B tolerance

## EXPLANATION OF PART NUMBERS

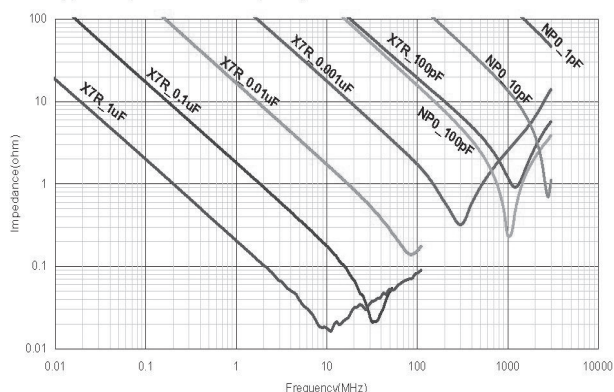
| 1206                                   | F                          | 104                                                 | Z                              | 500                                | C                                | T                                     |
|----------------------------------------|----------------------------|-----------------------------------------------------|--------------------------------|------------------------------------|----------------------------------|---------------------------------------|
| <u>Size (Inch (mm))</u><br>1206 (3216) | <u>Dielectric</u><br>F=Y5V | <u>Capacitance</u><br>104=10x10 <sup>4</sup> =100nF | <u>Tolerance</u><br>Z=-20/+80% | <u>Rated voltage</u><br>500=50 VDC | <u>Termination</u><br>C=Cu/Ni/Sn | <u>Packaging style</u><br>T=7" reeled |

Please refer to page 2 "How to order" for more information.

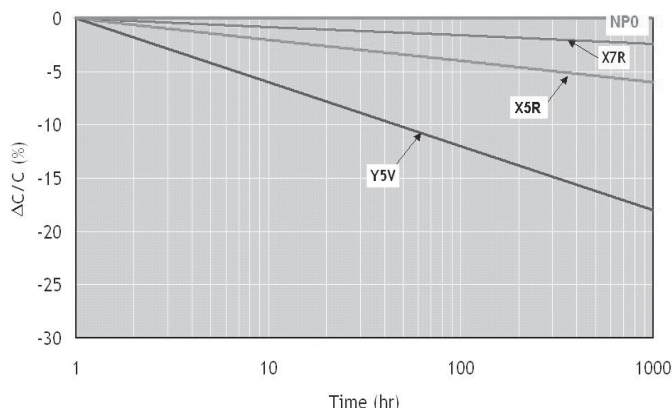
## ELECTRICAL CHARACTERISTICS

### 1) Frequency characteristics

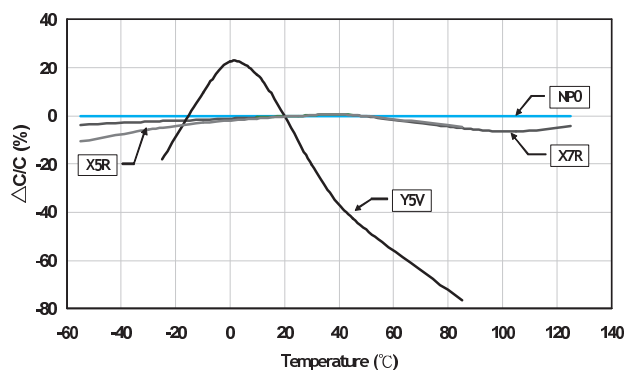
Typical Impedance vs. Frequency



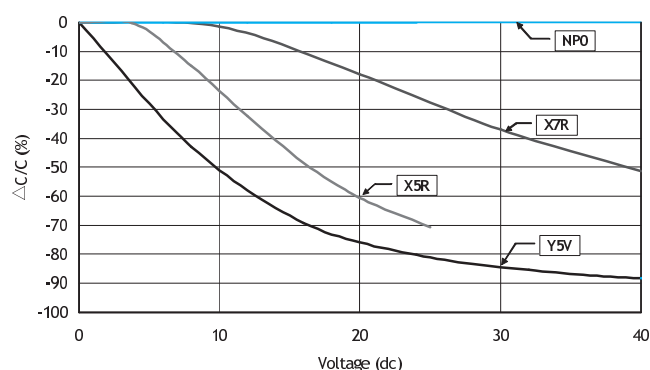
### 2) Capacitance Change - Typical aging rate



### 3) Temperature characteristics of capacitance (TCC)



### 4) DC Bias characteristics



All above typical electronic characteristics are for reference only.  
Please contact with Walsin representative for detail information of any specific item.

## X7R Dielectric

| Dielectric          |               | X7R             |    |    |           |          |    |     |                 |    |    |     |                 |    |    |     |                 |    |    |     |                |           |           |          |     |                |           |           |          |     |          |     |   |
|---------------------|---------------|-----------------|----|----|-----------|----------|----|-----|-----------------|----|----|-----|-----------------|----|----|-----|-----------------|----|----|-----|----------------|-----------|-----------|----------|-----|----------------|-----------|-----------|----------|-----|----------|-----|---|
| Size                |               | 0201            |    |    | 0402      |          |    |     | 0603            |    |    |     | 0805            |    |    |     | 1206            |    |    |     | 1210           |           |           |          |     | 1812           |           | 1825      | 2220     |     | 2225     |     |   |
| Rated Voltage (VDC) |               | 6.3<br>10<br>16 | 25 | 50 | 6.3<br>10 | 16<br>25 | 50 | 100 | 6.3<br>10<br>16 | 25 | 50 | 100 | 6.3<br>10<br>16 | 25 | 50 | 100 | 6.3<br>10<br>16 | 25 | 50 | 100 | 10<br>16<br>25 | 50<br>100 | 50<br>100 | 25<br>50 | 100 | 10<br>16<br>25 | 50<br>100 | 50<br>100 | 25<br>50 | 100 | 25<br>50 | 100 |   |
|                     | 100pF (101)   | L               | L  | L  | N         | N        | N  | N   | S               | S  | S  | S   | B               | B  | B  | B   |                 |    |    |     |                |           |           |          |     |                |           |           |          |     |          |     |   |
|                     | 120pF (121)   | L               | L  | L  | N         | N        | N  | N   | S               | S  | S  | S   | B               | B  | B  | B   |                 |    |    |     |                |           |           |          |     |                |           |           |          |     |          |     |   |
|                     | 150pF (151)   | L               | L  | L  | N         | N        | N  | N   | S               | S  | S  | S   | B               | B  | B  | B   | B               | B  | B  | B   |                |           |           |          |     |                |           |           |          |     |          |     |   |
|                     | 180pF (181)   | L               | L  | L  | N         | N        | N  | N   | S               | S  | S  | S   | B               | B  | B  | B   | B               | B  | B  | B   |                |           |           |          |     |                |           |           |          |     |          |     |   |
|                     | 220pF (221)   | L               | L  | L  | N         | N        | N  | N   | S               | S  | S  | S   | B               | B  | B  | B   | B               | B  | B  | B   | B              |           |           |          |     |                |           |           |          |     |          |     |   |
|                     | 270pF (271)   | L               | L  | L  | N         | N        | N  | N   | S               | S  | S  | S   | B               | B  | B  | B   | B               | B  | B  | B   | B              |           |           |          |     |                |           |           |          |     |          |     |   |
|                     | 330pF (331)   | L               | L  | L  | N         | N        | N  | N   | S               | S  | S  | S   | B               | B  | B  | B   | B               | B  | B  | B   | B              |           |           |          |     |                |           |           |          |     |          |     |   |
|                     | 390pF (391)   | L               | L  | L  | N         | N        | N  | N   | S               | S  | S  | S   | B               | B  | B  | B   | B               | B  | B  | B   | B              |           |           |          |     |                |           |           |          |     |          |     |   |
|                     | 470pF (471)   | L               | L  | L  | N         | N        | N  | N   | S               | S  | S  | S   | B               | B  | B  | B   | B               | B  | B  | B   | B              |           |           |          |     |                |           |           |          |     |          |     |   |
|                     | 560pF (561)   | L               | L  | L  | N         | N        | N  | N   | S               | S  | S  | S   | B               | B  | B  | B   | B               | B  | B  | B   | B              |           |           |          |     |                |           |           |          |     |          |     |   |
|                     | 680pF (681)   | L               | L  | L  | N         | N        | N  | N   | S               | S  | S  | S   | B               | B  | B  | B   | B               | B  | B  | B   | B              |           |           |          |     |                |           |           |          |     |          |     |   |
|                     | 820pF (821)   | L               | L  | L  | N         | N        | N  | N   | S               | S  | S  | S   | B               | B  | B  | B   | B               | B  | B  | B   | B              |           |           |          |     |                |           |           |          |     |          |     |   |
|                     | 1,000pF (102) | L               | L  | L  | N         | N        | N  | N   | S               | S  | S  | S   | B               | B  | B  | B   | B               | B  | B  | B   | B              | C         | C         | C        | C   | C              | D         | D         | K        | K   | K        | K   | K |
|                     | 1,200pF (122) | L               | L  |    | N         | N        | N  | N   | S               | S  | S  | S   | B               | B  | B  | B   | B               | B  | B  | B   | B              | C         | C         | C        | C   | C              | D         | D         | K        | K   | K        | K   | K |
|                     | 1,500pF (152) | L               | L  |    | N         | N        | N  | N   | S               | S  | S  | S   | B               | B  | B  | B   | B               | B  | B  | B   | B              | C         | C         | C        | C   | C              | D         | D         | K        | K   | K        | K   | K |
|                     | 1,800pF (182) | L               | L  |    | N         | N        | N  | N   | S               | S  | S  | S   | B               | B  | B  | B   | B               | B  | B  | B   | B              | C         | C         | C        | C   | C              | D         | D         | K        | K   | K        | K   | K |
|                     | 2,200pF (222) | L               | L  |    | N         | N        | N  | N   | S               | S  | S  | S   | B               | B  | B  | B   | B               | B  | B  | B   | B              | C         | C         | C        | C   | C              | D         | D         | K        | K   | K        | K   | K |
|                     | 2,700pF (272) | L               | L  |    | N         | N        | N  | N   | S               | S  | S  | S   | B               | B  | B  | B   | B               | B  | B  | B   | B              | C         | C         | C        | C   | C              | D         | D         | K        | K   | K        | K   | K |
|                     | 3,300pF (332) | L               | L  |    | N         | N        | N  | N   | S               | S  | S  | S   | B               | B  | B  | B   | B               | B  | B  | B   | B              | C         | C         | C        | C   | C              | D         | D         | K        | K   | K        | K   | K |
|                     | 3,900pF (392) | L               | L  |    | N         | N        | N  | N   | S               | S  | S  | S   | B               | B  | B  | B   | B               | B  | B  | B   | B              | C         | C         | C        | C   | C              | D         | D         | K        | K   | K        | K   | K |
|                     | 4,700pF (472) | L               | L  |    | N         | N        | N  | N   | S               | S  | S  | S   | B               | B  | B  | B   | B               | B  | B  | B   | B              | C         | C         | C        | C   | C              | D         | D         | K        | K   | K        | K   | K |
|                     | 5,600pF (562) | L               | L  |    | N         | N        | N  |     | S               | S  | S  | S   | B               | B  | B  | B   | B               | B  | B  | B   | B              | C         | C         | C        | C   | C              | D         | D         | K        | K   | K        | K   | K |
|                     | 6,800pF (682) | L               |    |    | N         | N        | N  |     | S               | S  | S  | S   | B               | B  | B  | B   | B               | B  | B  | B   | B              | C         | C         | C        | C   | C              | D         | D         | K        | K   | K        | K   | K |
|                     | 8,200pF (822) | L               |    |    | N         | N        | N  |     | S               | S  | S  | S   | B               | B  | B  | B   | B               | B  | B  | B   | B              | C         | C         | C        | C   | C              | D         | D         | K        | K   | K        | K   | K |
|                     | 0.010uF (103) | L               | L  |    | N         | N        | N  |     | S               | S  | S  | S   | B               | B  | B  | B   | B               | B  | B  | B   | B              | C         | C         | C        | C   | C              | D         | D         | K        | K   | K        | K   | K |
|                     | 0.012uF (123) |                 |    |    | N         | N        |    |     | S               | S  | S  | X   | B               | B  | B  | B   | B               | B  | B  | B   | B              | C         | C         | C        | C   | C              | D         | D         | K        | K   | K        | K   | K |
|                     | 0.015uF (153) |                 |    |    | N         | N        |    |     | S               | S  | S  | X   | B               | B  | B  | B   | B               | B  | B  | B   | B              | C         | C         | C        | C   | C              | D         | D         | K        | K   | K        | K   | K |
|                     | 0.018uF (183) |                 |    |    | N         | N        |    |     | S               | S  | S  | X   | B               | B  | B  | B   | B               | B  | B  | B   | B              | C         | C         | C        | C   | C              | D         | D         | K        | K   | K        | K   | K |
|                     | 0.022uF (223) | L               |    |    | N         | N        |    |     | S               | S  | S  | X   | B               | B  | B  | B   | B               | B  | B  | B   | B              | C         | C         | C        | C   | C              | D         | D         | K        | K   | K        | K   | K |
|                     | 0.027uF (273) |                 |    |    | N         | N        |    |     | S               | S  | S  | X   | B               | B  | B  | D   | B               | B  | B  | B   | B              | C         | C         | C        | C   | C              | D         | D         | K        | K   | K        | K   | K |
|                     | 0.033uF (333) |                 |    |    | N         | N        |    |     | S               | S  | X  | X   | B               | B  | B  | D   | B               | B  | B  | B   | B              | C         | C         | C        | C   | C              | D         | D         | K        | K   | K        | K   | K |
|                     | 0.039uF (393) |                 |    |    | N         | N        |    |     | S               | S  | X  | X   | B               | B  | B  | D   | B               | B  | B  | B   | B              | C         | C         | C        | C   | C              | D         | D         | K        | K   | K        | K   | K |
|                     | 0.047uF (473) |                 |    |    | N         | N        |    |     | S               | S  | X  | X   | B               | B  | B  | D   | B               | B  | B  | B   | B              | C         | C         | C        | C   | C              | D         | D         | K        | K   | K        | K   | K |
|                     | 0.056uF (563) |                 |    |    | N         | N        |    |     | S               | S  | X  | X   | B               | B  | B  | D   | B               | B  | B  | B   | B              | C         | C         | C        | C   | C              | D         | D         | K        | K   | K        | K   | K |
|                     | 0.068uF (683) |                 |    |    | N         | N        |    |     | S               | S  | X  | X   | B               | B  | B  | D   | B               | B  | B  | B   | B              | C         | C         | C        | C   | C              | D         | D         | K        | K   | K        | K   | K |
|                     | 0.082uF (823) |                 |    |    | N         | N        |    |     | S               | S  | X  | X   | B               | B  | B  | D   | B               | B  | B  | D   | C              | C         | C         | C        | C   | D              | D         | K         | K        | K   | K        | K   | K |
|                     | 0.10uF (104)  |                 |    |    | N         | N        |    |     | S               | S  | X  | X   | B               | B  | B  | D   | B               | B  | B  | D   | C              | C         | C         | C        | C   | D              | D         | K         | K        | K   | K        | K   | K |
|                     | 0.12uF (124)  |                 |    |    |           |          |    |     | S               | X  |    |     | B               | B  | D  | I   | B               | B  | B  | D   | C              | C         | C         | C        | C   | D              | D         | K         | K        | K   | K        | K   | K |
|                     | 0.15uF (154)  |                 |    |    |           |          |    |     | S               | X  |    |     | D               | D  | D  | I   | C               | C  | C  | G   | C              | C         | C         | C        | D   | D              | D         | K         | K        | K   | K        | K   | K |
|                     | 0.18uF (184)  |                 |    |    |           |          |    |     | S               | X  |    |     | D               | D  | D  | I   | C               | C  | C  | G   | C              | C         | C         | C        | D   | D              | D         | K         | K        | K   | K        | K   | K |
|                     | 0.22uF (224)  |                 |    |    | N         | N        |    |     | S               | X  | X  |     | D               | D  | D  | I   | C               | C  | C  | G   | C              | C         | C         | C        | D   | D              | D         | K         | K        | K   | K        | K   | K |
|                     | 0.27uF (274)  |                 |    |    |           |          |    |     | X               | X  |    |     | D               | D  | I  |     | C               | C  | D  | G   | C              | C         | C         | C        | G   | D              | D         | K         | K        | K   | K        | K   | K |
|                     | 0.33uF (334)  |                 |    |    |           |          |    |     | X               | X  | X  |     | D               | D  | I  |     | C               | C  | D  | G   | C              | C         | C         | D        | G   | D              | D         | K         | K        | K   | K        | K   | K |
|                     | 0.39uF (394)  |                 |    |    |           |          |    |     | X               | X  |    |     | D               | D  | I  |     | C               | J  | P  | G   | C              | C         | C         | D        | M   | D              | D         | K         | K        | K   | K        | K   | K |
|                     | 0.47uF (474)  |                 |    |    | N         |          |    |     | X               | X  | X  |     | D               | D  | I  | I   | J               | J  | P  | G   | C              | C         | C         | D        | M   | D              | D         | K         | K        | K   | K        | K   | K |
|                     | 0.56uF (564)  |                 |    |    |           |          |    |     | X               |    |    |     | D               | D  |    |     | J               | J  | P  | P   | D              | D         | D         | D        | M   | D              | D         | K         | K        | K   | K        | K   | K |
|                     | 0.68uF (684)  |                 |    |    |           |          |    |     | X               |    |    |     | D               | D  |    |     | J               | J  | P  | P   | D              | D         | D         | D        | K   | D              | K         | K         | K        | K   | K        | K   | K |
| 0.82uF (824)        |               |                 |    |    |           |          |    | X   |                 |    |    | D   | D               |    |    | J   | J               | P  | P  | D   | D              | D         | D         | K        | D   | K              | K         | K         | K        | K   | K        | K   |   |
| 1.0uF (105)         |               |                 |    | N  |           |          |    | X   | X               | X  |    | D   | D               | I  |    | J   | J               | P  | P  | D   | D              | D         | D         | K        | D   | K              | K         | K         | K        | K   | K        | K   |   |
| 1.5uF (155)         |               |                 |    |    |           |          |    |     |                 |    |    | I   | I               |    |    | J   | P               |    |    |     |                | K         | G         | M        | M   |                | K         | K         | K        | K   | K        | K   |   |
| 2.2uF (225)         |               |                 |    |    |           |          |    | X   |                 |    |    | I   | I               | I  |    | J   | P               | P  | P  |     |                | K         | G         | M        | M   |                | M         | K         | K        | K   | K        | K   |   |
| 3.3uF (335)         |               |                 |    |    |           |          |    |     |                 |    |    |     |                 |    |    | P   | P               |    |    |     |                | K         | G         | K        |     |                |           | K         | K        | K   | K        | K   |   |
| 4.7uF (475)         |               |                 |    |    |           |          |    | X   |                 |    |    | I   | I               |    |    | P   | P               | P  |    |     |                | K         | K         | K        | M   | M              |           |           | K        | K   | M        | K   |   |
| 6.8uF (685)         |               |                 |    |    |           |          |    |     |                 |    |    |     |                 |    |    |     |                 |    |    |     |                |           |           |          |     |                |           |           | M        | U   | M        |     |   |
| 10uF (106)          |               |                 |    |    |           |          |    |     |                 |    |    | I*  |                 |    |    | P   | P               |    |    |     |                | K         | K         | K        | M   | M              |           |           | U        | U   | U        |     |   |
| 22uF (226)          |               |                 |    |    |           |          |    |     |                 |    |    |     |                 |    |    | P*  |                 |    |    |     |                | M         | M         | M        |     |                |           |           |          |     |          |     |   |
| 47uF (476)          |               |                 |    |    |           |          |    |     |                 |    |    |     |                 |    |    |     |                 |    |    |     |                | M         |           |          |     |                |           |           |          |     |          |     |   |

1. The letter in cell is expressed the symbol of product thickness.
2. 0402 size, Cap.1.0uF\_6.3V only, 0603 size, Cap.4.7uF\_6.3V only.
3. 0805/10uF/16V & 1206/22uF/16V : "M tolerance"(20%) only

## Y5V Dielectric (0402, 0603, 0805 Size)

| 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         | 0.010uF (103) |      | N  | N  | N  | N  |      | S  | S  | S  | S  |      | A  | A  | A  | A   | B   |
|                     | 0.015uF (153) |      | N  | N  | N  | N  |      | S  | S  | S  | S  |      | A  | A  | A  | A   | B   |
|                     | 0.022uF (223) |      | N  | N  | N  | N  |      | S  | S  | S  | S  |      | A  | A  | A  | A   | B   |
|                     | 0.033uF (333) |      | N  | N  | N  | N  |      | S  | S  | S  | S  |      | A  | A  | A  | A   | B   |
|                     | 0.047uF (473) |      | N  | N  | N  |    |      | S  | S  | S  | S  |      | A  | A  | A  | A   | B   |
|                     | 0.068uF (683) |      | N  | N  | N  |    |      | S  | S  | S  | S  |      | A  | A  | A  | A   | B   |
|                     | 0.10uF (104)  |      | N  | N  | N  |    |      | S  | S  | S  | S  |      | A  | A  | A  | A   | B   |
|                     | 0.15uF (154)  |      | N  | N  |    |    |      | S  | S  | S  | S  |      | A  | A  | A  | A   |     |
|                     | 0.22uF (224)  | N    | N  | N  |    |    | S    | S  | S  | S  | S  |      | A  | A  | A  | A   |     |
|                     | 0.33uF (334)  | N    | N  | N  |    |    |      | S  | S  | S  | X  |      | B  | B  | B  | B   |     |
|                     | 0.47uF (474)  | N    | N  | N  |    |    |      | S  | S  | X  | X  |      | B  | B  | B  | B/D |     |
|                     | 0.68uF (684)  | N    |    |    |    |    |      | S  | X  | X  |    |      | B  | B  | D  | D   |     |
|                     | 1.0uF (105)   | N    | N  |    |    |    |      | S  | X  | X  |    |      | B  | B  | D  | D   |     |
|                     | 1.5uF (155)   |      |    |    |    |    |      | S  |    |    |    |      | D  | D  |    |     |     |
|                     | 2.2uF (225)   |      |    |    |    |    | S    | S  | X  |    |    |      | D  | D  | I  |     |     |
|                     | 3.3uF (335)   |      |    |    |    |    |      |    |    |    |    |      | D  | D  |    |     |     |
|                     | 4.7uF (475)   |      |    |    |    |    | X    | X  |    |    |    |      | D  | D  | I  |     |     |
|                     | 6.8uF (685)   |      |    |    |    |    |      |    |    |    |    |      | I  |    |    |     |     |
|                     | 10uF (106)    |      |    |    |    |    |      |    |    |    |    | I    | I  | I  |    |     |     |
|                     | 22uF (226)    |      |    |    |    |    |      |    |    |    |    | I    | I  |    |    |     |     |

## Y5V Dielectric (1206, 1210, 1812 Size)

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

## X7S Dielectric

| 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* |    |    |    |      |    |    |    |    |  |
| 100uF (107)         |             |      |    |    |    |      |    |    |    |      |    |    |    |     |      |    |    |    | P* |      |    |    |    |    |  |

1. The letter in cell is expressed the symbol of product thickness.
2. The letter in cell with " \* " mark is expressed: "M tolerance"(20%) only

## X5R Dielectric

| Dielectric          |               | X5R  |    |    |    |    |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |    |    |
|---------------------|---------------|------|----|----|----|----|------|----|----|----|----|------|----|----|----|----|------|----|----|----|----|------|----|----|----|----|------|----|----|----|----|----|----|
| Size                |               | 0201 |    |    |    |    | 0402 |    |    |    |    | 0603 |    |    |    |    | 0805 |    |    |    |    | 1206 |    |    |    |    | 1210 |    |    |    |    |    |    |
| Rated Voltage (VDC) |               | 6.3  | 10 | 16 | 25 | 50 | 6.3  | 10 | 16 | 25 | 50 | 6.3  | 10 | 16 | 25 | 50 | 6.3  | 10 | 16 | 25 | 50 | 6.3  | 10 | 16 | 25 | 50 | 6.3  | 10 | 16 | 25 | 50 |    |    |
| Capacitance         | 100pF (101)   | L    | L  | L  | L  | L  |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |    |    |
|                     | 220pF (221)   | L    | L  | L  | L  | L  |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |    |    |
|                     | 470pF (471)   | L    | L  | L  | L  | L  |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |    |    |
|                     | 1000pF (102)  | L    | L  | L  | L  | L  |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |    |    |
|                     | 2200pF (222)  | L    | L  | L  | L  |    |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |    |    |
|                     | 4700pF (472)  | L    | L  | L  | L  |    |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |    |    |
|                     | 0.010μF (103) | L    | L  | L  | 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  |    |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |    |    |
|                     | 0.056μF (563) | L    | L  |    |    |    |      |    |    | N  | N  |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |    |    |
|                     | 0.068μF (683) | L    | L  |    |    |    |      |    |    | N  | N  |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |    |    |
|                     | 0.082μF (823) | L    | L  |    |    |    |      |    |    | N  | N  | N    |    |    |    |    |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |    |    |
|                     | 0.10μF (104)  | L    | L  | L  | L  |    |      |    |    | N  | N  | N    | N  | N  |    |    |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |    |    |
|                     | 0.15μF (154)  |      |    |    |    |    |      |    |    | N  | N  | N    | N  |    |    |    |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |    |    |
|                     | 0.22μF (224)  | L    | L  | L* |    |    |      |    |    | N  | N  | N    | N  | N  |    |    |      |    | X  | X  | X  |      |    |    |    |    |      |    |    |    |    |    |    |
|                     | 0.27uF (274)  |      |    |    |    |    |      |    |    |    |    |      |    | X  | X  | X  |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |    |    |
|                     | 0.33μF (334)  | L*   | 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  |    |    |    |      |    |    |    |    |      |    |    |    |    |    |    |
|                     | 1.0μF (105)   | L*   | L* | L* |    |    |      |    |    | N  | N  | N    | N  | E  | X  | X  | X    | X  | X  |    | D  | D    | D  | I  |    |    |      |    |    |    |    |    |    |
|                     | 1.5μF (155)   |      |    |    |    |    |      |    |    |    |    |      |    |    | X  |    |      |    |    | I  | I  | I    | I  |    |    | J  | J    |    |    |    | K  |    |    |
|                     | 2.2μF (225)   | L*   | L* |    |    |    |      |    |    | N  | N  | E    | E  |    | X  | X  | X    | X  | X  | I  | I  | I    | I  | I  |    | J  | J    | P  | P  |    | K  |    |    |
|                     | 3.3μF (335)   |      |    |    |    |    |      |    |    |    |    |      |    |    | X  | X  |      |    |    | I  | I  | I    | I  |    |    | P  | P    | P  |    |    |    |    |    |
|                     | 4.7μF (475)   |      |    |    |    |    |      |    |    | E* | E* | E*   |    |    | X  | X  | X    | X  |    | I  | I  | I    | I  | I  |    | P  | P    | P  | P  | P  | K  | K  |    |
|                     | 6.8uF (685)   |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |      |    |    |    | P  | P    |    |    |    |    |    |    |
|                     | 10μF (106)    |      |    |    |    |    |      |    |    | E* | E* |      |    |    | X  | X  | X    | X* |    | I  | I  | I    | I  | I  |    | P  | P    | P  | P  | P  | K  | K  | M  |
|                     | 22μF (226)    |      |    |    |    |    |      |    |    |    |    |      |    |    | X* | X* |      |    |    | I  | I* | I*   | I* |    |    | P  | P    | P  | P  |    | M  | M  | M  |
|                     | 47μF (476)    |      |    |    |    |    |      |    |    |    |    |      |    |    | X* |    |      |    |    | I* | I* |      |    |    |    | P  | P    | P* |    |    | M  | M  | M* |
|                     | 100μF (107)   |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |      |    |    | I* |    |      |    |    |    | P  | P    |    |    |    | M* | M* |    |
|                     | 220μF (227)   |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |      |    |    |    | M* | M* |    |

1. The letter in cell is expressed the symbol of product thickness.
2. The letter in cell with "\*" mark is expressed: "M tolerance"(20%) only

## X6S Dielectric

| 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)  |      |    |    |    |      | E* |    |    |      | 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: "M tolerance"(20%) only

## ■ FEATURES

- \* High voltage in a given case size.
- \* High stability and reliability.

## ■ GENERAL ELECTRICAL DATA

| Dielectric                  | NPO                                                                             | X7R                | Y5V                    |
|-----------------------------|---------------------------------------------------------------------------------|--------------------|------------------------|
| Size                        | 0603, 0805, 1206, 1210, 1808, 1812, 1825, 2220, 2225                            |                    | 0805, 1206, 1210, 1812 |
| Capacitance                 | 0.5pF to 0.082μF                                                                | 100pF to 2.2μF     | 0.01μF to 0.68μF       |
| Capacitance tolerance       | Cap≤5pF: C (±0.25pF)<br>5pF<Cap<10pF: D (±0.5pF)<br>Cap≥10pF: J (±5%), K (±10%) | K (±10%), M (±20%) | Z (-20/+80%)           |
| Rated voltage (WVDC)        | 200V to 3kV                                                                     |                    | 200V, 250V             |
| DF/ Q                       | Cap<30pF: Q≥400+20C<br>Cap≥30pF: Q≥1000                                         | ≤2.5%              | ≤5%                    |
| Insulation resistance at Ur | Ur=200~630V: ≥10GΩ or RxC≥100Ω·F whichever is smaller<br>Ur=1000~3000V: ≥10GΩ   |                    |                        |
| Dielectric strength         | 200~300V: ≥2 x WVDC<br>500~999V: ≥1.5 x WVDC<br>1000~3000V: ≥1.2 x WVDC         |                    |                        |
| Operating temperature       | -55 to +125°C                                                                   |                    | -25 to +85°C           |
| Capacitance characteristic  | ±30ppm                                                                          | ±15%               | +30/-80%               |
| Termination                 | Ni/Sn (lead-free termination)                                                   |                    |                        |

## ■ EXPLANATION OF PART NUMBERS

| 1808                    | N                 | 100                          | J                | 202                  | C                  | T                      |
|-------------------------|-------------------|------------------------------|------------------|----------------------|--------------------|------------------------|
| <u>Size (Inch (mm))</u> | <u>Dielectric</u> | <u>Capacitance</u>           | <u>Tolerance</u> | <u>Rated voltage</u> | <u>Termination</u> | <u>Packaging style</u> |
| 1808 (4520)             | N=NPO(C0G)        | 100=10x10 <sup>0</sup> =10pF | J=±5%            | 202=2000 VDC         | C=Cu/Ni/Sn         | T=7" reeled            |

Please refer to page 2 "How to order" for more information.

## ■ CAPACITANCE RANGE

### Y5V Dielectric 200V to 250V

| DIELECTRIC          |               | Y5V  |     |      |     |      |     |      |     |
|---------------------|---------------|------|-----|------|-----|------|-----|------|-----|
| SIZE                |               | 0805 |     | 1206 |     | 1210 |     | 1812 |     |
| RATED VOLTAGE (VDC) |               | 200  | 250 | 200  | 250 | 200  | 250 | 200  | 250 |
| Capacitance         | 0.010μF (103) | B    | B   | B    | B   | C    | C   | D    | D   |
|                     | 0.015μF (153) | B    | B   | B    | B   | C    | C   | D    | D   |
|                     | 0.022μF (223) | B    | B   | B    | B   | C    | C   | D    | D   |
|                     | 0.033μF (333) | B    | B   | B    | B   | C    | C   | D    | D   |
|                     | 0.047μF (473) | B    | B   | B    | B   | C    | C   | D    | D   |
|                     | 0.068μF (683) | B    | B   | B    | B   | C    | C   | D    | D   |
|                     | 0.10μF (104)  |      |     | B    | B   | C    | C   | D    | D   |
|                     | 0.15μF (154)  |      |     | C    | C   | C    | C   | D    | D   |
|                     | 0.22μF (224)  |      |     |      |     |      |     | D    | D   |
|                     | 0.33μF (334)  |      |     |      |     |      |     | D    | D   |
|                     | 0.47μF (474)  |      |     |      |     |      |     | D    | D   |
|                     | 0.68μF (684)  |      |     |      |     |      |     | D    | D   |

1. The letter in cell is expressed the symbol of product thickness.

## X7R Dielectric 200V to 3kV

| DIELECTRIC          |               | X7R      |          |          |      |          |          |      |      |      |      |          |          |      |            |          |      |            |            |          |          |      |            |      |          |          |      |            |      |          |          |      |            |      |          |          |      |            |      |   |  |
|---------------------|---------------|----------|----------|----------|------|----------|----------|------|------|------|------|----------|----------|------|------------|----------|------|------------|------------|----------|----------|------|------------|------|----------|----------|------|------------|------|----------|----------|------|------------|------|----------|----------|------|------------|------|---|--|
| SIZE                |               | 0603     | 0805     |          | 1206 |          |          |      |      | 1210 |      |          |          | 1808 |            |          | 1812 |            |            |          | 1825     |      |            | 2220 |          |          |      | 2225       |      |          |          |      |            |      |          |          |      |            |      |   |  |
| RATED VOLTAGE (VDC) |               | 200, 250 | 200, 250 | 500, 630 | 1000 | 200, 250 | 500, 630 | 1000 | 1500 | 2000 | 2500 | 200, 250 | 500, 630 | 1000 | 1500, 2000 | 500, 630 | 1000 | 1500, 2000 | 2500, 3000 | 200, 250 | 500, 630 | 1000 | 1500, 2000 | 3000 | 200, 250 | 500, 630 | 1000 | 1500, 2000 | 3000 | 200, 250 | 500, 630 | 1000 | 1500, 2000 | 3000 | 200, 250 | 500, 630 | 1000 | 1500, 2000 | 3000 |   |  |
| Capacitance         | 100pF (101)   | X        | B        | B        | B    |          |          |      |      |      |      | D        | D        | D    | D          |          |      |            |            |          |          |      |            |      |          |          |      |            |      |          |          |      |            |      |          |          |      |            |      |   |  |
|                     | 120pF (121)   | X        | B        | B        | B    |          |          |      |      |      |      | D        | D        | D    | D          |          |      |            |            |          |          |      |            |      |          |          |      |            |      |          |          |      |            |      |          |          |      |            |      |   |  |
|                     | 150pF (151)   | X        | B        | B        | B    | D        | D        | D    | D    | D    | D    | D        | D        | D    | D          | D        | D    | D          | D          |          |          |      |            |      |          |          |      |            |      |          |          |      |            |      |          |          |      |            |      |   |  |
|                     | 180pF (181)   | X        | B        | B        | B    | D        | D        | D    | D    | D    | D    | D        | D        | D    | D          | D        | D    | D          | D          |          |          |      |            |      |          |          |      |            |      |          |          |      |            |      |          |          |      |            |      |   |  |
|                     | 220pF (221)   | X        | B        | B        | B    | D        | D        | D    | D    | D    | D    | D        | D        | D    | D          | D        | D    | D          | D          |          |          |      |            |      |          |          |      |            |      |          |          |      |            |      |          |          |      |            |      |   |  |
|                     | 270pF (271)   | X        | B        | B        | B    | D        | D        | D    | D    | D    | D    | D        | D        | D    | D          | D        | D    | D          | D          |          |          | D    | D          |      |          |          |      |            |      |          |          |      |            |      |          |          |      |            |      |   |  |
|                     | 330pF (331)   | X        | B        | B        | B    | D        | D        | D    | D    | D    | D    | D        | D        | D    | D          | D        | D    | D          | D          | G        |          |      | D          | D    |          |          |      |            |      |          |          |      |            |      |          |          |      |            |      |   |  |
|                     | 390pF (391)   | X        | B        | B        | B    | D        | D        | D    | D    | D    | D    | D        | D        | D    | D          | D        | D    | D          | D          | G        |          |      | D          | D    |          |          |      |            |      |          |          |      |            |      |          |          |      |            |      |   |  |
|                     | 470pF (471)   | X        | B        | B        | B    | D        | D        | D    | D    | D    | D    | D        | D        | D    | D          | D        | D    | D          | D          | G        |          |      | D          | D    |          |          |      |            |      |          |          |      |            |      |          |          |      |            |      |   |  |
|                     | 560pF (561)   | X        | B        | B        | B    | D        | D        | D    | D    | D    | D    | D        | D        | D    | D          | D        | D    | D          | D          | G        |          |      | D          | D    |          |          |      |            |      |          |          |      |            |      |          |          |      |            |      |   |  |
|                     | 680pF (681)   | X        | B        | B        | B    | D        | D        | D    | D    | D    | D    | D        | C        | D    | D          | D        | D    | D          | D          | K        |          |      | D          | D    | K        |          |      |            |      |          |          |      |            |      |          |          |      |            |      |   |  |
|                     | 820pF (821)   | X        | B        | B        | B    | D        | D        | D    | D    | D    | D    | D        | C        | D    | D          | D        | D    | D          | D          | K        |          |      | D          | D    | K        |          |      |            |      |          |          |      |            |      |          |          |      |            |      |   |  |
|                     | 1,000pF (102) | X        | B        | B        | B    | D        | D        | D    | D    | D    | D    | D        | C        | D    | D          | D        | D    | D          | K          | K        | D        | D    | D          | D    | K        | K        | K    | K          | K    | K        | K        | K    | K          | K    | K        | K        | K    | K          | K    | K |  |
|                     | 1,200pF (122) | X        | B        | B        | B    | D        | D        | D    | D    | G    | G    | G        | C        | D    | D          | M        | D    | D          | K          | K        | D        | D    | D          | D    | K        | K        | K    | K          | K    | K        | K        | K    | K          | K    | K        | K        | K    | K          | K    | K |  |
|                     | 1,500pF (152) | X        | B        | B        | D    | D        | D        | D    | D    | G    | G    | G        | C        | D    | D          | M        | D    | D          | K          | K        | D        | D    | D          | D    | K        | K        | K    | K          | K    | K        | K        | K    | K          | K    | K        | K        | K    | K          | K    | K |  |
|                     | 1,800pF (182) | X        | B        | B        | D    | D        | D        | D    | D    | G    | G    | G        | C        | D    | D          | M        | D    | D          | K          | K        | D        | D    | D          | D    | M        | K        | K    | K          | K    | K        | K        | K    | K          | K    | K        | K        | K    | K          | K    | K |  |
|                     | 2,200pF (222) | X        | B        | B        | D    | D        | D        | D    | D    | G    | G    | G        | C        | D    | D          | M        | D    | D          | K          |          | D        | D    | D          | D    | M        | K        | K    | K          | K    | K        | K        | K    | K          | K    | K        | K        | K    | K          | K    | K |  |
|                     | 2,700pF (272) | X        | B        | B        | D    | D        | D        | D    | D    | G    | G    |          | C        | D    | D          | M        | D    | D          | K          |          | D        | D    | D          | D    | M        | K        | K    | K          | K    | K        | K        | K    | K          | K    | K        | K        | K    | K          | K    | K |  |
|                     | 3,300pF (332) | X        | B        | B        | D    | D        | D        | D    | D    | G    | G    |          | C        | D    | D          | M        | D    | D          | K          |          | D        | D    | D          | D    | M        | K        | K    | K          | K    | K        | K        | K    | K          | K    | K        | K        | K    | K          | K    | K |  |
|                     | 3,900pF (392) | X        | B        | B        | D    | D        | D        | D    | D    | G    |      |          | C        | D    | G          | M        | D    | D          | K          |          | D        | D    | D          | K    |          | K        | K    | K          | K    | K        | K        | K    | K          | K    | K        | K        | K    | K          | K    | K |  |
|                     | 4,700pF (472) | X        | B        | D        | D    | D        | D        | D    | D    | G    |      |          | C        | D    | G          | M        | D    | D          | K          |          | D        | D    | D          | K    |          | K        | K    | K          | K    | K        | K        | K    | K          | K    | K        | K        | K    | K          | K    | K |  |
|                     | 5,600pF (562) | X        | D        | D        | D    | D        | D        | D    | D    | G    |      |          | C        | D    | G          | M        | K    | K          | K          |          | D        | D    | D          | M    |          | K        | K    | K          | K    | M        | K        | K    | K          | K    | K        | K        | K    | K          | K    | M |  |
|                     | 6,800pF (682) | X        | D        | D        | D    | D        | D        | D    | D    | G    |      |          | C        | D    | G          | M        | K    | K          | K          |          | D        | D    | D          | M    |          | K        | K    | K          | K    | M        | K        | K    | K          | K    | K        | K        | K    | K          | K    | M |  |
|                     | 8,200pF (822) | X        | D        | D        | D    | D        | D        | D    |      |      |      |          | C        | D    | G          | M        | K    | K          |            |          | D        | D    | D          | M    |          | K        | K    | K          | K    | M        | K        | K    | K          | M    | M        | K        | K    | K          | M    |   |  |
|                     | 0.010μF (103) | X        | D        | D        |      | D        | D        | D    |      |      |      |          | C        | D    | G          |          | K    | K          |            |          | D        | D    | D          | M    |          | K        | K    | K          | K    | M        | K        | K    | K          | M    | K        | K        | K    | M          | K    |   |  |
|                     | 0.012μF (123) |          | D        | D        |      | D        | D        | D    | G    |      |      |          | C        | D    | G          |          | K    | K          |            |          | D        | D    | K          |      |          | K        | K    | K          | M    | U        | K        | K    | K          | M    | U        | K        | K    | K          | M    |   |  |
|                     | 0.015μF (153) |          | D        | D        |      | D        | D        | D    | G    |      |      |          | C        | D    | G          |          | K    | K          |            |          | D        | D    | K          |      |          | K        | K    | K          | M    | U        | K        | K    | K          | M    | U        | K        | K    | K          | M    |   |  |
|                     | 0.018μF (183) |          | D        | D        |      | D        | D        |      |      |      |      |          | C        | D    | G          |          | K    | K          |            |          | D        | D    | M          |      |          | K        | K    | K          | M    | U        | K        | K    | K          | U    | U        | K        | K    | K          | M    |   |  |
|                     | 0.022μF (223) |          | D        | D        |      | D        | D        |      |      |      |      |          | C        | D    | G          |          | K    | K          |            |          | D        | D    | M          |      |          | K        | K    | K          | M    |          | K        | K    | K          | U    |          | K        | K    | K          | M    |   |  |
|                     | 0.027μF (273) |          | D        |          |      | D        | D        |      |      |      |      |          | C        | D    | G          |          | K    | K          |            |          | D        | D    | M          |      |          | K        | K    | K          | U    |          | K        | K    | K          | U    |          | K        | K    | K          | M    |   |  |
|                     | 0.033μF (333) |          | D        |          |      | G        | D        |      |      |      |      |          | C        | D    | G          |          | K    | K          |            |          | D        | D    | M          |      |          | K        | K    | K          | U    |          | K        | K    | K          | U    |          | K        | K    | K          | M    |   |  |
|                     | 0.039μF (393) |          | D        |          |      | G        | D        |      |      |      |      |          | C        | D    | G          |          | K    | K          |            |          | D        | D    | M          |      |          | K        | K    | K          | U    |          | K        | K    | K          | U    |          | K        | K    | K          | U    |   |  |
|                     | 0.047μF (473) |          | D        |          |      | G        | D        |      |      |      |      |          | D        | D    | M          |          | K    | K          |            |          | D        | D    | M          |      |          | K        | K    | K          | U    |          | K        | K    | K          | U    |          | K        | K    | K          | U    |   |  |
| 0.056μF (563)       |               | D        |          |          | G    | D        |          |      |      |      |      | D        | D        | M    |            | K        | K    |            |            | D        | K        | M    |            |      | K        | K        | K    | U          |      | K        | K        | K    | U          |      | K        | K        | K    | U          |      |   |  |
| 0.068μF (683)       |               | D        |          |          | G    |          |          |      |      |      |      | G        | K        | M    |            | K        |      |            |            | D        | K        | M    |            |      | K        | K        | K    |            |      | K        | K        | M    |            |      | K        | K        | K    |            |      |   |  |
| 0.082μF (823)       |               | D        |          |          | G    |          |          |      |      |      |      | G        | K        |      |            | K        |      |            |            | D        | K        | M    |            |      | K        | K        | M    |            |      | K        | K        | M    |            |      | K        | K        | K    |            |      |   |  |
| 0.10μF (104)        |               | D        |          |          | G    |          |          |      |      |      |      | G        | K        |      |            |          |      |            |            | D        | K        | M    |            |      | K        | K        | M    |            |      | K        | K        | M    |            |      | K        | K        | M    |            |      |   |  |
| 0.12μF (124)        |               |          |          |          |      |          |          |      |      |      |      | G        | M        |      |            |          |      |            |            | D        | M        |      |            |      | K        | K        | U    |            |      | K        | K        | M    |            |      | K        | K        | U    |            |      |   |  |
| 0.15μF (154)        |               |          |          |          |      |          |          |      |      |      |      | M        | M        |      |            |          |      |            |            | K        | M        |      |            |      | K        | K        | U    |            |      | K        | K        | U    |            |      | K        | K        | U    |            |      |   |  |
| 0.18μF (184)        |               |          |          |          |      |          |          |      |      |      |      | M        |          |      |            |          |      |            |            | K        | M        |      |            |      | K        | K        | U    |            |      | K        | K        | U    |            |      | K        | K        | U    |            |      |   |  |
| 0.22μF (224)        |               |          |          |          |      |          |          |      |      |      |      | M        |          |      |            |          |      |            |            | K        | M        |      |            |      | K        | K        | U    |            |      | K        | K        | U    |            |      | K        | K        | U    |            |      |   |  |
| 0.27μF (274)        |               |          |          |          |      |          |          |      |      |      |      | M        |          |      |            |          |      |            |            | K        | M        |      |            |      | K        | K        | U    |            |      | K        | K        | U    |            |      | K        | K        | U    |            |      |   |  |
| 0.33μF (334)        |               |          |          |          |      |          |          |      |      |      |      | M        |          |      |            |          |      |            |            | K        | M        |      |            |      | K        | K        | U    |            |      | K        | K        | U    |            |      | K        | K        | U    |            |      |   |  |
| 0.39μF (394)        |               |          |          |          |      |          |          |      |      |      |      | M        |          |      |            |          |      |            |            | K        | M        |      |            |      | K        | K        |      |            |      | K        | K        | U    |            |      | K        | K        | U    |            |      |   |  |
| 0.47μF (474)        |               |          |          |          |      |          |          |      |      |      |      | M        |          |      |            |          |      |            |            | K        | M        |      |            |      | K        | K        |      |            |      | K        | K        |      |            |      | K        | K        |      |            |      |   |  |
| 0.56μF (564)        |               |          |          |          |      |          |          |      |      |      |      | M        |          |      |            |          |      |            |            | M        |          |      |            |      | K        | M        |      |            |      | K        | M        |      |            |      | K        | K        |      |            |      |   |  |
| 0.68μF (684)        |               |          |          |          |      |          |          |      |      |      |      | M        |          |      |            |          |      |            |            | M        |          |      |            |      | K        | M        |      |            |      | K        | M        |      |            |      | K        | K        |      |            |      |   |  |
| 0.82μF (824)        |               |          |          |          |      |          |          |      |      |      |      |          |          |      |            |          |      |            |            | M        |          |      |            |      | K        | U        |      |            |      | K        | U        |      |            |      | K        | M        |      |            |      |   |  |
| 1.0μF (105)         |               |          |          |          |      |          |          |      |      |      |      |          |          |      |            |          |      |            |            | M        |          |      |            |      | K        |          |      |            |      | K        | U        |      |            |      | K        | M        |      |            |      |   |  |
| 1.5μF (155)         |               |          |          |          |      |          |          |      |      |      |      |          |          |      |            |          |      |            |            |          |          |      |            |      | M        |          |      |            |      | M        |          |      |            |      | K        | M        |      |            |      |   |  |
| 2.2μF (225)         |               |          |          |          |      |          |          |      |      |      |      |          |          |      |            |          |      |            |            |          |          |      |            |      | M        |          |      |            |      | M        |          |      |            |      | M        | U        |      |            |      |   |  |

1. The letter in cell is expressed the symbol of product thickness.

2. 0805 size, Cap.>0.068uF\_200V only.



| No                                                                      | Item                                             | Test Condition            | Requirements                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  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                                    |      |                        |      |     |       |                                                  |                                                          |                        |                                                                    |                                                                  |      |        |                           |                                           |     |      |             |                                 |        |                        |                                                                          |                                                                               |      |             |             |                                               |      |     |      |                                                                                                    |                       |                      |                                         |                                                                         |                                               |                                                                         |                                                                    |                                                                        |                                                       |      |      |                                                                          |    |      |     |     |            |       |                    |  |      |       |      |                                                         |      |            |     |      |     |     |     |       |      |                                                          |  |  |      |                                                                    |               |      |        |                           |  |  |      |             |               |        |      |                                                                          |     |      |      |             |      |      |     |     |               |                       |                      |                                          |                                                         |                                               |                                                                         |                                                                    |                                       |                                 |
|-------------------------------------------------------------------------|--------------------------------------------------|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------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| 13.                                                                     | Humidity (Damp Heat)<br>Steady State (Continued) |                           | <div>Y5V:</div> <table><thead><tr><th>Rated vol.</th><th>D.F.≤</th><th colspan="2">Exception of D.F.≤</th></tr></thead><tbody><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;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; TT series &amp; Cap≥1μF</td></tr><tr><td>16V(C&lt;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(C≥1.0μF)</td><td>≤12.5%</td><td>≤20%</td><td>0603±2.2μF;0805±3.3μF;1206±10μF;1210±22μF;1812±47μF; TT series &amp; Cap≥1μF</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></tbody></table> <div>*I.R.: ≥10V, 1GΩ or 50 Ω-F whichever is smaller.<br/>Class II (X7R, X7E, X6S, X5R, X7S, Y5V)</div> <table><thead><tr><th>Rated voltage</th><th>Insulation Resistance</th></tr></thead><tbody><tr><td>100V: X7R;1210±3.3μF</td><td rowspan="8">1GΩ or RxC≥10 Ω-F whichever is smaller.</td></tr><tr><td>50V: 0402&gt;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></tbody></table> | Rated vol.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | D.F.≤      | Exception of D.F.≤ |                    | ≥50V | ≤7.5% | ≤10% | 0603±0.1μF;0805±0.47μF;1206±4.7μF | ≤20%        | 1210±6.8μF | 35V                                                      | ≤10% | ---                    | ---  | 25V | ≤7.5% | ≤10%                                             | 0402±0.047μF;0603±0.1μF;0805±0.33μF;1206±1μF; 1210±4.7μF | ≤15%                   | 0402±0.068μF;0603±0.47μF;1206±4.7μF;1210±22μF; TT series & Cap≥1μF | 16V(C<1.0μF)                                                     | ≤10% | ≤12.5% | 0402±0.068μF; 0603±0.68μF |                                           |     | ≤20% | 0402±0.22μF | 16V(C≥1.0μF)                    | ≤12.5% | ≤20%                   | 0603±2.2μF;0805±3.3μF;1206±10μF;1210±22μF;1812±47μF; TT series & Cap≥1μF | 10V                                                                           | ≤20% | ≤30%        | 0402±0.47μF | 6.3V                                          | ≤30% | --- | ---  | Rated voltage                                                                                      | Insulation Resistance | 100V: X7R;1210±3.3μF | 1GΩ or RxC≥10 Ω-F whichever is smaller. | 50V: 0402>0.01μF;0603±1μF;0805±1μF;1206±4.7μF;1210±4.7μF                | 35V:0603±1μF;0805±2.2μF; 1206±2.2μF;1210±10μF | 25V:0201±0.1μF; 0402±0.22μF; 0603±2.2μF;0805±2.2μF; 1206±10μF;1210±10μF | 16V:0201±0.1μF;0402±0.22μF;0603±1μF;0805±2.2μF;1206±10μF;1210±47μF | 10V:0201±47nF;0402±0.47μF;0603±0.47μF; 0805±2.2μF;1206±4.7μF;1210±47μF | 6.3V ; 4V ; TT series ; All X6S/X7S items ; Size≥1812 |      |      |                                                                          |    |      |     |     |            |       |                    |  |      |       |      |                                                         |      |            |     |      |     |     |     |       |      |                                                          |  |  |      |                                                                    |               |      |        |                           |  |  |      |             |               |        |      |                                                 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| Rated vol.                                                              | D.F.≤                                            | Exception of D.F.≤        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               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| ≥50V                                                                    | ≤7.5%                                            | ≤10%                      | 0603±0.1μF;0805±0.47μF;1206±4.7μF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             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|                                                                         |                                                  | ≤20%                      | 1210±6.8μF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    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| 35V                                                                     | ≤10%                                             | ---                       | ---                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           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| 25V                                                                     | ≤7.5%                                            | ≤10%                      | 0402±0.047μF;0603±0.1μF;0805±0.33μF;1206±1μF; 1210±4.7μF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      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|                                                                         |                                                  | ≤15%                      | 0402±0.068μF;0603±0.47μF;1206±4.7μF;1210±22μF; TT series & Cap≥1μF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            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| 16V(C<1.0μF)                                                            | ≤10%                                             | ≤12.5%                    | 0402±0.068μF; 0603±0.68μF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     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|                                                                         |                                                  | ≤20%                      | 0402±0.22μF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   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| 16V(C≥1.0μF)                                                            | ≤12.5%                                           | ≤20%                      | 0603±2.2μF;0805±3.3μF;1206±10μF;1210±22μF;1812±47μF; TT series & Cap≥1μF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      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| 10V                                                                     | ≤20%                                             | ≤30%                      | 0402±0.47μF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   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| 6.3V                                                                    | ≤30%                                             | ---                       | ---                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           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| Rated voltage                                                           | Insulation Resistance                            |                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               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                      |     |      |      |             |      |      |     |     |               |                       |                      |                                          |                                                         |                                               |                                                                         |                                                                    |                                       |                                 |
| 100V: X7R;1210±3.3μF                                                    | 1GΩ or RxC≥10 Ω-F whichever is smaller.          |                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               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                      |     |      |      |             |      |      |     |     |               |                       |                      |                                          |                                                         |                                               |                                                                         |                                                                    |                                       |                                 |
| 50V: 0402>0.01μF;0603±1μF;0805±1μF;1206±4.7μF;1210±4.7μF                |                                                  |                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               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                      |     |      |      |             |      |      |     |     |               |                       |                      |                                          |                                                         |                                               |                                                                         |                                                                    |                                       |                                 |
| 35V:0603±1μF;0805±2.2μF; 1206±2.2μF;1210±10μF                           |                                                  |                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               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                      |     |      |      |             |      |      |     |     |               |                       |                      |                                          |                                                         |                                               |                                                                         |                                                                    |                                       |                                 |
| 25V:0201±0.1μF; 0402±0.22μF; 0603±2.2μF;0805±2.2μF; 1206±10μF;1210±10μF |                                                  |                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               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                      |     |      |      |             |      |      |     |     |               |                       |                      |                                          |                                                         |                                               |                                                                         |                                                                    |                                       |                                 |
| 16V:0201±0.1μF;0402±0.22μF;0603±1μF;0805±2.2μF;1206±10μF;1210±47μF      |                                                  |                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               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                      |     |      |      |             |      |      |     |     |               |                       |                      |                                          |                                                         |                                               |                                                                         |                                                                    |                                       |                                 |
| 10V:0201±47nF;0402±0.47μF;0603±0.47μF; 0805±2.2μF;1206±4.7μF;1210±47μF  |                                                  |                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               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                      |     |      |      |             |      |      |     |     |               |                       |                      |                                          |                                                         |                                               |                                                                         |                                                                    |                                       |                                 |
| 6.3V ; 4V ; TT series ; All X6S/X7S items ; Size≥1812                   |                                                  |                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               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                      |     |      |      |             |      |      |     |     |               |                       |                      |                                          |                                                         |                                               |                                                                         |                                                                    |                                       |                                 |
| 14.                                                                     |                                                  | Humidity (Damp Heat) Load | <div>* Test temp.: 40±2°C<br/>* Humidity: 90~95%RH<br/>* Test time: 500+24/-0 hrs.<br/>* To apply voltage:Rated voltage.(Max.500V)<br/>*Before initial measurement (Class II only): To apply de-gating at 150°C for 1hr then set for 24±2 hrs at room temp.<br/>* Cap. / DF(Q) / I.R. Measurement to be made after de-gating at 150°C for 1hr then set for 24±2 hrs at room temp.</div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <div>* No remarkable damage.<br/>Cap change: NP0: ±7.5% or 0.75pF whichever is larger.<br/>X7R, X7S, X6S, X5R: ≥10V**, within ±12.5%; 6.3V within ±25%;TT series,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: NP0: C≥30pF,Q≥200;C&lt;30pF, Q≥100+10/3C<br/>X7R, X6S, X5R, X7S:</div> <table><thead><tr><th>Rated vol.</th><th>D.F.≤</th><th colspan="2">Exception of D.F.≤</th></tr></thead><tbody><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&gt;0.1μF, 0603±0.068μF; 1206&gt;1μF;1210±2.2μF; TT series</td></tr><tr><td>≤20%</td><td>0805&gt;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±0.01μF;1210±4.7μF</td></tr><tr><td>≤20%</td><td>0402±0.1μF;0603&gt;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="5">25V</td><td rowspan="5">≤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;0603±0.47μF;0805±2.2μF;1206±6.8μF;1210±22μF; TT series</td></tr><tr><td>≤20%</td><td>0402±0.47μF</td></tr><tr><td>≤10%</td><td>0603±0.15μF;0805±0.68μF;1206±2.2μF;1210±4.7μF</td></tr><tr><td>16V</td><td>≤5%</td><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 series</td></tr><tr><td>10V</td><td>≤7.5%</td><td>≤15%</td><td>0201±0.012μF; 0402±0.33μF; 0603±0.33μF;0805±2.2μF;1206±2.2μF; 1210±22μF</td></tr><tr><td></td><td></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></tbody></table> <div>Y5V:</div> <table><thead><tr><th>Rated vol.</th><th>D.F.≤</th><th colspan="2">Exception of D.F.≤</th></tr></thead><tbody><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; TT series &amp; Cap≥1μF</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>25V</td><td>≤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></td><td></td><td>≤15%</td><td>0402±0.068μF;0603±0.47μF;1206±4.7μF;1210±22μF; TT series &amp; Cap≥1μF</td></tr><tr><td>16V (C&lt;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 (C≥1.0μF)</td><td>≤12.5%</td><td>≤20%</td><td>0603±2.2μF;0805±3.3μF;1206±10μF;1210±22μF;1812±47μF; TT series &amp; Cap≥1μF</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></tbody></table> <div>*I.R.: ≥10V, 500MΩ or 25 Ω-F whichever is smaller.<br/>Class II (X7R, X7S, X6S, X5R, Y5V)</div> <table><thead><tr><th>Rated voltage</th><th>Insulation Resistance</th></tr></thead><tbody><tr><td>100V: X7R;1210±3.3μF</td><td rowspan="8">500MΩ or RxC≥5 Ω-F whichever is smaller.</td></tr><tr><td>50V:0402&gt;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</td></tr><tr><td>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></tbody></table> | Rated vol. | D.F.≤              | Exception of D.F.≤ |      | ≥100V | ≤3%  | ≤6%                               | 1206±0.47μF | ≤7.5%      | 0805>0.1μF, 0603±0.068μF; 1206>1μF;1210±2.2μF; TT series | ≤20% | 0805>0.22μF;1210±3.3μF | ≥50V | ≤3% | ≤6%   | 0201(50V);0603±0.047μF; 0805±0.18μF; 1206±0.47μF | ≤10%                                                     | 0201±0.01μF;1210±4.7μF | ≤20%                                                               | 0402±0.1μF;0603>0.1μF; 0805±1μF;1206±2.2μF; 1210±10μF; TT series | 35V  | ≤5%    | ≤20%                      | 0603±1μF; 0805±2.2μF;1206±2.2μF;1210±10μF | 25V | ≤5%  | ≤10%        | 0201±0.01μF;0805±1μF; 1210±10μF | ≤14%   | 0603±0.33μF;1206±4.7μF | ≤15%                                                                     | 0201±0.1μF;0402±0.10μF;0603±0.47μF;0805±2.2μF;1206±6.8μF;1210±22μF; TT series | ≤20% | 0402±0.47μF | ≤10%        | 0603±0.15μF;0805±0.68μF;1206±2.2μF;1210±4.7μF | 16V  | ≤5% | ≤15% | 0201±0.01μF(0201/X7R±0.022μF);0402±0.033μF;0603±0.68μF;0805±2.2μF;1206±4.7μF; 1210±22μF; TT series | 10V                   | ≤7.5%                | ≤15%                                    | 0201±0.012μF; 0402±0.33μF; 0603±0.33μF;0805±2.2μF;1206±2.2μF; 1210±22μF |                                               |                                                                         | ≤20%                                                               | 0201±0.1μF ;0402±1μF; TT series: 01R5                                  | 6.3V                                                  | ≤15% | ≤30% | 0201±0.1μF;0402±1μF;0603±10μF; 0805±4.7μF;1206±47μF;1210±100μF;TT series | 4V | ≤20% | --- | --- | Rated vol. | D.F.≤ | Exception of D.F.≤ |  | ≥50V | ≤7.5% | ≤10% | 0603±0.1μF; 0805±0.47μF;1206±4.7μF; TT series & Cap≥1μF | ≤20% | 1210±6.8μF | 35V | ≤10% | --- | --- | 25V | ≤7.5% | ≤10% | 0402±0.047μF;0603±0.1μF;0805±0.33μF;1206±1μF; 1210±4.7μF |  |  | ≤15% | 0402±0.068μF;0603±0.47μF;1206±4.7μF;1210±22μF; TT series & Cap≥1μF | 16V (C<1.0μF) | ≤10% | ≤12.5% | 0402±0.068μF; 0603±0.68μF |  |  | ≤20% | 0402±0.22μF | 16V (C≥1.0μF) | ≤12.5% | ≤20% | 0603±2.2μF;0805±3.3μF;1206±10μF;1210±22μF;1812±47μF; TT series & Cap≥1μF | 10V | ≤20% | ≤30% | 0402±0.47μF | 6.3V | ≤30% | --- | --- | Rated voltage | Insulation Resistance | 100V: X7R;1210±3.3μF | 500MΩ or RxC≥5 Ω-F whichever is smaller. | 50V:0402>0.01μF;0603±1μF;0805±1μF;1206±4.7μF;1210±4.7μF | 35V:0603±1μF;0805±2.2μF; 1206±2.2μF;1210±10μF | 25V:0201±0.1μF; 0402±0.22μF; 0603±2.2μF;0805±2.2μF; 1206±10μF;1210±10μF | 16V:0201±0.1μF;0402±0.22μF;0603±1μF;0805±2.2μF;1206±10μF;1210±47μF | 10V:0201±47nF;0402±0.47μF;0603±0.47μF | 0805±2.2μF;1206±4.7μF;1210±47μF |
| Rated vol.                                                              | D.F.≤                                            | Exception of D.F.≤        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               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                      |     |      |      |             |      |      |     |     |               |                       |                      |                                          |                                                         |                                               |                                                                         |                                                                    |                                       |                                 |
| ≥100V                                                                   | ≤3%                                              | ≤6%                       | 1206±0.47μF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   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                      |     |      |      |             |      |      |     |     |               |                       |                      |                                          |                                                         |                                               |                                                                         |                                                                    |                                       |                                 |
|                                                                         |                                                  | ≤7.5%                     | 0805>0.1μF, 0603±0.068μF; 1206>1μF;1210±2.2μF; TT series                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      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                      |     |      |      |             |      |      |     |     |               |                       |                      |                                          |                                                         |                                               |                                                                         |                                                                    |                                       |                                 |
|                                                                         |                                                  | ≤20%                      | 0805>0.22μF;1210±3.3μF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        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                      |     |      |      |             |      |      |     |     |               |                       |                      |                                          |                                                         |                                               |                                                                         |                                                                    |                                       |                                 |
| ≥50V                                                                    | ≤3%                                              | ≤6%                       | 0201(50V);0603±0.047μF; 0805±0.18μF; 1206±0.47μF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              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                      |     |      |      |             |      |      |     |     |               |                       |                      |                                          |                                                         |                                               |                                                                         |                                                                    |                                       |                                 |
|                                                                         |                                                  | ≤10%                      | 0201±0.01μF;1210±4.7μF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        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                      |     |      |      |             |      |      |     |     |               |                       |                      |                                          |                                                         |                                               |                                                                         |                                                                    |                                       |                                 |
|                                                                         |                                                  | ≤20%                      | 0402±0.1μF;0603>0.1μF; 0805±1μF;1206±2.2μF; 1210±10μF; TT series                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              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                      |     |      |      |             |      |      |     |     |               |                       |                      |                                          |                                                         |                                               |                                                                         |                                                                    |                                       |                                 |
| 35V                                                                     | ≤5%                                              | ≤20%                      | 0603±1μF; 0805±2.2μF;1206±2.2μF;1210±10μF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     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                      |     |      |      |             |      |      |     |     |               |                       |                      |                                          |                                                         |                                               |                                                                         |                                                                    |                                       |                                 |
| 25V                                                                     | ≤5%                                              | ≤10%                      | 0201±0.01μF;0805±1μF; 1210±10μF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               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                      |     |      |      |             |      |      |     |     |               |                       |                      |                                          |                                                         |                                               |                                                                         |                                                                    |                                       |                                 |
|                                                                         |                                                  | ≤14%                      | 0603±0.33μF;1206±4.7μF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        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                      |     |      |      |             |      |      |     |     |               |                       |                      |                                          |                                                         |                                               |                                                                         |                                                                    |                                       |                                 |
|                                                                         |                                                  | ≤15%                      | 0201±0.1μF;0402±0.10μF;0603±0.47μF;0805±2.2μF;1206±6.8μF;1210±22μF; TT series                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 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                      |     |      |      |             |      |      |     |     |               |                       |                      |                                          |                                                         |                                               |                                                                         |                                                                    |                                       |                                 |
|                                                                         |                                                  | ≤20%                      | 0402±0.47μF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   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                      |     |      |      |             |      |      |     |     |               |                       |                      |                                          |                                                         |                                               |                                                                         |                                                                    |                                       |                                 |
|                                                                         |                                                  | ≤10%                      | 0603±0.15μF;0805±0.68μF;1206±2.2μF;1210±4.7μF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 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                      |     |      |      |             |      |      |     |     |               |                       |                      |                                          |                                                         |                                               |                                                                         |                                                                    |                                       |                                 |
| 16V                                                                     | ≤5%                                              | ≤15%                      | 0201±0.01μF(0201/X7R±0.022μF);0402±0.033μF;0603±0.68μF;0805±2.2μF;1206±4.7μF; 1210±22μF; TT series                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            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                      |     |      |      |             |      |      |     |     |               |                       |                      |                                          |                                                         |                                               |                                                                         |                                                                    |                                       |                                 |
| 10V                                                                     | ≤7.5%                                            | ≤15%                      | 0201±0.012μF; 0402±0.33μF; 0603±0.33μF;0805±2.2μF;1206±2.2μF; 1210±22μF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       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                      |     |      |      |             |      |      |     |     |               |                       |                      |                                          |                                                         |                                               |                                                                         |                                                                    |                                       |                                 |
|                                                                         |                                                  | ≤20%                      | 0201±0.1μF ;0402±1μF; TT series: 01R5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         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| 6.3V                                                                    | ≤15%                                             | ≤30%                      | 0201±0.1μF;0402±1μF;0603±10μF; 0805±4.7μF;1206±47μF;1210±100μF;TT series                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      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| Rated vol.                                                              | D.F.≤                                            | Exception of D.F.≤        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               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                      |     |      |      |             |      |      |     |     |               |                       |                      |                                          |                                                         |                                               |                                                                         |                                                                    |                                       |                                 |
| ≥50V                                                                    | ≤7.5%                                            | ≤10%                      | 0603±0.1μF; 0805±0.47μF;1206±4.7μF; TT series & Cap≥1μF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       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| 35V                                                                     | ≤10%                                             | ---                       | ---                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           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                      |     |      |      |             |      |      |     |     |               |                       |                      |                                          |                                                         |                                               |                                                                         |                                                                    |                                       |                                 |
| 25V                                                                     | ≤7.5%                                            | ≤10%                      | 0402±0.047μF;0603±0.1μF;0805±0.33μF;1206±1μF; 1210±4.7μF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      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|                                                                         |                                                  | ≤15%                      | 0402±0.068μF;0603±0.47μF;1206±4.7μF;1210±22μF; TT series & Cap≥1μF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            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                      |     |      |      |             |      |      |     |     |               |                       |                      |                                          |                                                         |                                               |                                                                         |                                                                    |                                       |                                 |
| 16V (C<1.0μF)                                                           | ≤10%                                             | ≤12.5%                    | 0402±0.068μF; 0603±0.68μF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     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|                                                                         |                                                  | ≤20%                      | 0402±0.22μF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   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                      |     |      |      |             |      |      |     |     |               |                       |                      |                                          |                                                         |                                               |                                                                         |                                                                    |                                       |                                 |
| 16V (C≥1.0μF)                                                           | ≤12.5%                                           | ≤20%                      | 0603±2.2μF;0805±3.3μF;1206±10μF;1210±22μF;1812±47μF; TT series & Cap≥1μF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      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| 10V                                                                     | ≤20%                                             | ≤30%                      | 0402±0.47μF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   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| 6.3V                                                                    | ≤30%                                             | ---                       | ---                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           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| Rated voltage                                                           | Insulation Resistance                            |                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               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                      |     |      |      |             |      |      |     |     |               |                       |                      |                                          |                                                         |                                               |                                                                         |                                                                    |                                       |                                 |
| 100V: X7R;1210±3.3μF                                                    | 500MΩ or RxC≥5 Ω-F whichever is smaller.         |                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               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                      |     |      |      |             |      |      |     |     |               |                       |                      |                                          |                                                         |                                               |                                                                         |                                                                    |                                       |                                 |
| 50V:0402>0.01μF;0603±1μF;0805±1μF;1206±4.7μF;1210±4.7μF                 |                                                  |                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               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                      |     |      |      |             |      |      |     |     |               |                       |                      |                                          |                                                         |                                               |                                                                         |                                                                    |                                       |                                 |
| 35V:0603±1μF;0805±2.2μF; 1206±2.2μF;1210±10μF                           |                                                  |                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               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                      |     |      |      |             |      |      |     |     |               |                       |                      |                                          |                                                         |                                               |                                                                         |                                                                    |                                       |                                 |
| 25V:0201±0.1μF; 0402±0.22μF; 0603±2.2μF;0805±2.2μF; 1206±10μF;1210±10μF |                                                  |                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               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                      |     |      |      |             |      |      |     |     |               |                       |                      |                                          |                                                         |                                               |                                                                         |                                                                    |                                       |                                 |
| 16V:0201±0.1μF;0402±0.22μF;0603±1μF;0805±2.2μF;1206±10μF;1210±47μF      |                                                  |                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               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                      |     |      |      |             |      |      |     |     |               |                       |                      |                                          |                                                         |                                               |                                                                         |                                                                    |                                       |                                 |
| 10V:0201±47nF;0402±0.47μF;0603±0.47μF                                   |                                                  |                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               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                      |     |      |      |             |      |      |     |     |               |                       |                      |                                          |                                                         |                                               |                                                                         |                                                                    |                                       |                                 |
| 0805±2.2μF;1206±4.7μF;1210±47μF                                         |                                                  |                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               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                      |     |      |      |             |      |      |     |     |               |                       |                      |                                          |                                                         |                                               |                                                                         |                                                                    |                                       |                                 |
| 6.3V ; 4V ; TT series ; All X6S/X7S items ; Size≥1812                   |                                                  |                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               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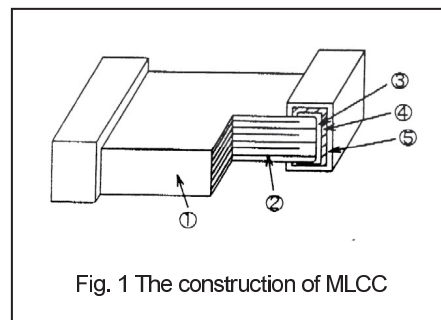
\* This Reliability Test Conditions and Requirements only for General Purpose series, please refer to individual sheet for other products information.

| No                                                                      | Item                                       | Test Condition                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  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| 15.                                                                     | High Temperature Load (Endurance)          | <p>*Test temp.:<br/>NP0, X7R/X7S: 125±3°C<br/>X6S: 105±3°C<br/>X5R, Y5V: 85±3°C<br/>*Test time: 1000+24/-0 hrs.<br/>*To apply voltage:<br/>(1) 6.3V or C≥10μF or TT series:<br/>150% of rated voltage.<br/>(2) 10V≤Ur&lt;500V<br/>200% of rated voltage.<br/>(3) 500V: 150% of rated voltage.<br/>(4) Ur≥630V:<br/>120% of rated voltage.<br/>(5) 100% of rated voltage for below range.</p> <table><tr><th>Size</th><th>Dielectric</th><th>Rated voltage</th><th>Capacitance range</th></tr><tr><td>0201</td><td>X7R/<br/>X6S/ X5R</td><td>≤10V<br/>≥16V</td><td>C≥0.1μF<br/>C&gt;0.1μF</td></tr><tr><td>0402</td><td>X5R/X7R/ X6S/X7S/<br/>Y5V</td><td>6.3V, 10V,16V,25V</td><td>C≥1.0μF</td></tr><tr><td></td><td></td><td>4V</td><td>C≥2.2μF</td></tr><tr><td>0603</td><td>X5R/X7R/ X6S/X7S</td><td>6.3V,10V<br/>25V,35V</td><td>C≥4.7μF<br/>C≥1.0μF</td></tr><tr><td></td><td></td><td>4V</td><td>C≥4.7μF</td></tr><tr><td>0805</td><td>X5R/X7R/ X6S/X7S</td><td>6.3V<br/>10V~50V</td><td>C≥2.2μF<br/>C≥10μF</td></tr><tr><td>1206</td><td>X5R/X7R/X6S<br/>NP0</td><td>≤6.3V<br/>3000V</td><td>C≥4.7μF<br/>C≥1.5pF</td></tr><tr><td>1210</td><td>X5R/X7R/X6S<br/>X7R</td><td>16V<br/>100V</td><td>C≥4.7μF<br/>C≥3.3μF</td></tr><tr><td>TT15</td><td>X5R</td><td>6.3V</td><td>C &gt;1.0μF</td></tr><tr><td>TT18</td><td>Y5V</td><td>6.3V,10V</td><td>C≥2.2μF</td></tr><tr><td>TT21</td><td>Y5V<br/>X5R/X7R/X6S</td><td>6.3V<br/>≤10V</td><td>C≥10μF<br/>C≥10μF</td></tr><tr><td>TT31</td><td>Y5V</td><td>6.3V</td><td>C≥2.2μF</td></tr></table> <p>**1WV items must follow de-rating conditions<br/>(6)150% of rated voltage for below range.</p> <table><tr><th>Size</th><th>Dielectric</th><th>Rated voltage</th><th>Capacitance</th></tr><tr><td>0201</td><td>X5R/X7R/X6S<br/>X7R</td><td>16V/25V<br/>16V</td><td>C≥0.1μF<br/>C≥0.022μF</td></tr><tr><td>0402</td><td>X5R/X7R/X6S<br/>Y5V</td><td>50V<br/>10~25V</td><td>C≥0.1μF<br/>C≥0.22μF</td></tr><tr><td></td><td></td><td>16V</td><td>C≥0.47μF</td></tr><tr><td>0603</td><td>X7R<br/>X5R/X7R/ X6S/<br/>X7S<br/>Y5V</td><td>50V<br/>10V, 16V, 50V<br/>16V</td><td>C&gt;0.1μF<br/>C≥1.0μF<br/>C≥2.2μF</td></tr><tr><td>0805</td><td>X5R/X7R/ X6S/<br/>X7S<br/>X5R/X7R/X7S<br/>Y5V</td><td>10~50V<br/>50V<br/>100V<br/>16V</td><td>C≥4.7μF<br/>C≥2.2μF<br/>C≥0.47μF<br/>C≥4.7μF</td></tr><tr><td>1206</td><td>X5R/X7R/X6S</td><td>100V</td><td>C&gt;1.0μF</td></tr><tr><td>1210</td><td>X5R/X7R/X6S</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> <p>*Before initial measurement (Class II only): To apply de-aging at 150°C 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°C for 1hr then set for 24±2 hrs at room temp.</p> | Size                                      | Dielectric | Rated voltage | Capacitance range | 0201 | X7R/<br>X6S/ X5R | ≤10V<br>≥16V | C≥0.1μF<br>C>0.1μF | 0402 | X5R/X7R/ X6S/X7S/<br>Y5V | 6.3V, 10V,16V,25V | C≥1.0μF |  |  | 4V | C≥2.2μF | 0603 | X5R/X7R/ X6S/X7S | 6.3V,10V<br>25V,35V | C≥4.7μF<br>C≥1.0μF |  |  | 4V | C≥4.7μF | 0805 | X5R/X7R/ X6S/X7S | 6.3V<br>10V~50V | C≥2.2μF<br>C≥10μF | 1206 | X5R/X7R/X6S<br>NP0 | ≤6.3V<br>3000V | C≥4.7μF<br>C≥1.5pF | 1210 | X5R/X7R/X6S<br>X7R | 16V<br>100V | C≥4.7μF<br>C≥3.3μF | TT15 | X5R | 6.3V | C >1.0μF | TT18 | Y5V | 6.3V,10V | C≥2.2μF | TT21 | Y5V<br>X5R/X7R/X6S | 6.3V<br>≤10V | C≥10μF<br>C≥10μF | TT31 | Y5V | 6.3V | C≥2.2μF | Size | Dielectric | Rated voltage | Capacitance | 0201 | X5R/X7R/X6S<br>X7R | 16V/25V<br>16V | C≥0.1μF<br>C≥0.022μF | 0402 | X5R/X7R/X6S<br>Y5V | 50V<br>10~25V | C≥0.1μF<br>C≥0.22μF |  |  | 16V | C≥0.47μF | 0603 | X7R<br>X5R/X7R/ X6S/<br>X7S<br>Y5V | 50V<br>10V, 16V, 50V<br>16V | C>0.1μF<br>C≥1.0μF<br>C≥2.2μF | 0805 | X5R/X7R/ X6S/<br>X7S<br>X5R/X7R/X7S<br>Y5V | 10~50V<br>50V<br>100V<br>16V | C≥4.7μF<br>C≥2.2μF<br>C≥0.47μF<br>C≥4.7μF | 1206 | X5R/X7R/X6S | 100V | C>1.0μF | 1210 | X5R/X7R/X6S | 50V~100V | C≥2.2μF | 1825<br>2220<br>2225 | X7R | 100V~250V | C≥1.0μF | <p>* No remarkable damage. Cap change: NP0: ±3.0% or ±0.3pF whichever is larger<br/>X7R, X7S, X6S, X5R: ≥10V**, within ±12.5%; 6.3V within ±25%; TT series, 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: NP0: More than 30pF, Q≥350; 10pF≤C&lt;30pF, Q≥275+2.5C; Less than 10pF, Q≥200+10C<br/>X7R, X6S, X5R, X7S:</p> <table><tr><th>Rated vol.</th><th>D.F.≤</th><th>Exception of D.F.≤</th></tr><tr><td>≥100V</td><td>≤3%</td><td>≤6% 1206±0.47μF<br/>≤7.5% 0805&gt;0.1μF, 0603±0.068μF, 1206±1μF;1210±2.2μF; TT series<br/>≤20% 0805&gt;0.22μF;1210±3.3μF</td></tr><tr><td>≥50V</td><td>≤3%</td><td>≤6% 0201(50V);0603±0.047μF; 0805±0.18μF; 1206±0.47μF<br/>≤10% 0201±0.01μF;1210±4.7μF<br/>≤20% 0402±0.1μF;0603&gt;0.1μF; 0805±1μF; 1206±2.2μF;1210±10μF; TT series</td></tr><tr><td>35V</td><td>≤5%</td><td>≤20% 0603±1μF;0805±2.2μF;1206±2.2μF; 1210±10μF<br/>≤10% 0201±0.01μF;0805±1μF; 1210±10μF</td></tr><tr><td>25V</td><td>≤5%</td><td>≤14% 0603±0.33μF;1206±4.7μF<br/>≤15% 0201±0.1μF;0402±0.10μF;0603±0.47μF;0805±2.2μF;1206±6.8μF;1210±22μF; TT series<br/>≤20% 0402±0.47μF</td></tr><tr><td>16V</td><td>≤5%</td><td>≤10% 0603±0.15μF;0805±0.68μF;1206±2.2μF;1210±4.7μF<br/>≤15% 0201±0.01μF(0201/X7R±0.022μF);0402±0.033μF;0603±0.68μF;0805±2.2μF; 1206±4.7μF; 1210±22μF; TT series</td></tr><tr><td>10V</td><td>≤7.5%</td><td>≤15% 0201±0.012μF; 0402±0.33μF(0402/X7R±0.22μF); 0603±0.33μF;0805±2.2μF; 1206±2.2μF; 1210±22μF<br/>≤20% 0201±0.1μF ;0402±1μF; TT series; 01R5</td></tr><tr><td>6.3V</td><td>≤15%</td><td>≤30% 0201±0.1μF;0402±1μF;0603±10μF; 0805±4.7μF;1206±4.7μF;1210±100μF;TT series</td></tr><tr><td>4V</td><td>≤20%</td><td>---</td></tr></table> <p>Y5V:</p> <table><tr><th>Rated vol.</th><th>D.F.≤</th><th>Exception of D.F.≤</th></tr><tr><td>≥50V</td><td>≤7.5%</td><td>≤10% 0603±0.1μF; 0805±0.47μF;1206±4.7μF; TT series &amp; Cap≥1μF<br/>≤12.5% 1210±6.8μF</td></tr><tr><td>35V</td><td>≤10%</td><td>---</td></tr><tr><td>25V</td><td>≤7.5%</td><td>≤10% 0402±0.047μF;0603±0.1μF;0805±0.33μF;1206±1μF; 1210±4.7μF<br/>≤15% 0402±0.068μF;0603±0.47μF;1206±4.7μF;1210±22μF; TT series &amp; Cap≥1μF</td></tr><tr><td>16V(C&lt;1.0μF)</td><td>≤10%</td><td>≤12.5% 0402±0.068μF; 0603±0.68μF<br/>≤20% 0402±0.22μF</td></tr><tr><td>16V(C≥1.0μF)</td><td>≤12.5%</td><td>≤20% 0603±2.2μF;0805±3.3μF;1206±10μF;1210±22μF;1812±47μF;TT series &amp; Cap≥1μF</td></tr><tr><td>10V</td><td>≤20%</td><td>≤30% 0402±0.47μF</td></tr><tr><td>6.3V</td><td>≤30%</td><td>---</td></tr></table> <p>*I.R.: ≥10V, 1GΩ or 50 Ω-F whichever is smaller.<br/>Class II (X7R, X7S, X6S, X5R, Y5V)</p> <table><tr><th>Rated voltage</th><th>Insulation Resistance</th></tr><tr><td>100V: X7R; 1210±3.3μF</td><td rowspan="8">1GΩ or RxC≥10 Ω-F<br/>whichever is smaller.</td></tr><tr><td>50V: 0402&gt;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><tr><td></td></tr></table> | Rated vol. | D.F.≤ | Exception of D.F.≤ | ≥100V | ≤3% | ≤6% 1206±0.47μF<br>≤7.5% 0805>0.1μF, 0603±0.068μF, 1206±1μF;1210±2.2μF; TT series<br>≤20% 0805>0.22μF;1210±3.3μF | ≥50V | ≤3% | ≤6% 0201(50V);0603±0.047μF; 0805±0.18μF; 1206±0.47μF<br>≤10% 0201±0.01μF;1210±4.7μF<br>≤20% 0402±0.1μF;0603>0.1μF; 0805±1μF; 1206±2.2μF;1210±10μF; TT series | 35V | ≤5% | ≤20% 0603±1μF;0805±2.2μF;1206±2.2μF; 1210±10μF<br>≤10% 0201±0.01μF;0805±1μF; 1210±10μF | 25V | ≤5% | ≤14% 0603±0.33μF;1206±4.7μF<br>≤15% 0201±0.1μF;0402±0.10μF;0603±0.47μF;0805±2.2μF;1206±6.8μF;1210±22μF; TT series<br>≤20% 0402±0.47μF | 16V | ≤5% | ≤10% 0603±0.15μF;0805±0.68μF;1206±2.2μF;1210±4.7μF<br>≤15% 0201±0.01μF(0201/X7R±0.022μF);0402±0.033μF;0603±0.68μF;0805±2.2μF; 1206±4.7μF; 1210±22μF; TT series | 10V | ≤7.5% | ≤15% 0201±0.012μF; 0402±0.33μF(0402/X7R±0.22μF); 0603±0.33μF;0805±2.2μF; 1206±2.2μF; 1210±22μF<br>≤20% 0201±0.1μF ;0402±1μF; TT series; 01R5 | 6.3V | ≤15% | ≤30% 0201±0.1μF;0402±1μF;0603±10μF; 0805±4.7μF;1206±4.7μF;1210±100μF;TT series | 4V | ≤20% | --- | Rated vol. | D.F.≤ | Exception of D.F.≤ | ≥50V | ≤7.5% | ≤10% 0603±0.1μF; 0805±0.47μF;1206±4.7μF; TT series & Cap≥1μF<br>≤12.5% 1210±6.8μF | 35V | ≤10% | --- | 25V | ≤7.5% | ≤10% 0402±0.047μF;0603±0.1μF;0805±0.33μF;1206±1μF; 1210±4.7μF<br>≤15% 0402±0.068μF;0603±0.47μF;1206±4.7μF;1210±22μF; TT series & Cap≥1μF | 16V(C<1.0μF) | ≤10% | ≤12.5% 0402±0.068μF; 0603±0.68μF<br>≤20% 0402±0.22μF | 16V(C≥1.0μF) | ≤12.5% | ≤20% 0603±2.2μF;0805±3.3μF;1206±10μF;1210±22μF;1812±47μF;TT series & Cap≥1μF | 10V | ≤20% | ≤30% 0402±0.47μF | 6.3V | ≤30% | --- | Rated voltage | Insulation Resistance | 100V: X7R; 1210±3.3μF | 1GΩ or RxC≥10 Ω-F<br>whichever is smaller. | 50V: 0402>0.01μF; 0603±1μF;0805±1μF;1206±4.7μF;1210±4.7μF | 35V:0603±1μF;0805±2.2μF; 1206±2.2μF;1210±10μF | 25V:0201±0.1μF; 0402±0.22μF; 0603±2.2μF;0805±2.2μF; 1206±10μF;1210±10μF | 16V:0201±0.1μF;0402±0.22μF;0603±1μF;0805±2.2μF;1206±10μF;1210±47μF | 10V:0201±47nF;0402±0.47μF;0603±0.47μF;0805±2.2μF; 1206±4.7μF;1210±47μF | 6.3V ; 4V ; TT series ; All X6S/X7S items; Size≥1812 |  |
| Size                                                                    | Dielectric                                 | Rated voltage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Capacitance range                         |            |               |                   |      |                  |              |                    |      |                          |                   |         |  |  |    |         |      |                  |                     |                    |  |  |    |         |      |                  |                 |                   |      |                    |                |                    |      |                    |             |                    |      |     |      |          |      |     |          |         |      |                    |              |                  |      |     |      |         |      |            |               |             |      |                    |                |                      |      |                    |               |                     |  |  |     |          |      |                                    |                             |                               |      |                                            |                              |                                           |      |           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|                                                                                                                                                                |     |       |                                                                                                                                              |      |      |                                                                                |    |      |     |            |       |                    |      |       |                                                                                   |     |      |     |     |       |                                                                                                                                          |              |      |                                                      |              |        |                                                                              |     |      |                  |      |      |     |               |                       |                       |                                            |                                                           |                                               |                                                                         |                                                                    |                                                                        |                                                      |  |
| 0201                                                                    | X7R/<br>X6S/ X5R                           | ≤10V<br>≥16V                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | C≥0.1μF<br>C>0.1μF                        |            |               |                   |      |                  |              |                    |      |                          |                   |         |  |  |    |         |      |                  |                     |                    |  |  |    |         |      |                  |                 |                   |      |                    |                |                    |      |                    |             |                    |      |     |      |          |      |     |          |         |      |                    |              |                  |      |     |      |         |      |            |               |             |      |                    |                |                      |      |                    |               |                     |  |  |     |          |      |                                    |                             |                               |      |                                            |                              |                                           |      |           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|                                                                                                                                                                |     |       |                                                                                                                                              |      |      |                                                                                |    |      |     |            |       |                    |      |       |                                                                                   |     |      |     |     |       |                                                                                                                                          |              |      |                                                      |              |        |                                                                              |     |      |                  |      |      |     |               |                       |                       |                                            |                                                           |                                               |                                                                         |                                                                    |                                                                        |                                                      |  |
| 0402                                                                    | X5R/X7R/ X6S/X7S/<br>Y5V                   | 6.3V, 10V,16V,25V                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               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                 |      |                          |                   |         |  |  |    |         |      |                  |                     |                    |  |  |    |         |      |                  |                 |                   |      |                    |                |                    |      |                    |             |                    |      |     |      |          |      |     |          |         |      |                    |              |                  |      |     |      |         |      |            |               |             |      |                    |                |                      |      |                    |               |                     |  |  |     |          |      |                                    |                             |                               |      |                                            |                              |                                           |      |           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|                                                                                                                                                                |     |       |                                                                                                                                              |      |      |                                                                                |    |      |     |            |       |                    |      |       |                                                                                   |     |      |     |     |       |                                                                                                                                          |              |      |                                                      |              |        |                                                                              |     |      |                  |      |      |     |               |                       |                       |                                            |                                                           |                                               |                                                                         |                                                                    |                                                                        |                                                      |  |
|                                                                         |                                            | 4V                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              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               |                       |                                            |                                                           |                                               |                                                                         |                                                                    |                                                                        |                                                      |  |
| 0603                                                                    | X5R/X7R/ X6S/X7S                           | 6.3V,10V<br>25V,35V                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             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                 |      |                          |                   |         |  |  |    |         |      |                  |                     |                    |  |  |    |         |      |                  |                 |                   |      |                    |                |                    |      |                    |             |                    |      |     |      |          |      |     |          |         |      |                    |              |                  |      |     |      |         |      |            |               |             |      |                    |                |                      |      |                    |               |                     |  |  |     |          |      |                                    |                             |                               |      |                                            |                              |                                           |      |           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| 0805                                                                    | X5R/X7R/ X6S/X7S                           | 6.3V<br>10V~50V                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 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                 |      |                          |                   |         |  |  |    |         |      |                  |                     |                    |  |  |    |         |      |                  |                 |                   |      |                    |                |                    |      |                    |             |                    |      |     |      |          |      |     |          |         |      |                    |              |                  |      |     |      |         |      |            |               |             |      |                    |                |                      |      |                    |               |                     |  |  |     |          |      |                                    |                             |                               |      |                                            |                              |                                           |      |           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| 1206                                                                    | X5R/X7R/X6S<br>NP0                         | ≤6.3V<br>3000V                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  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                 |      |                          |                   |         |  |  |    |         |      |                  |                     |                    |  |  |    |         |      |                  |                 |                   |      |                    |                |                    |      |                    |             |                    |      |     |      |          |      |     |          |         |      |                    |              |                  |      |     |      |         |      |            |               |             |      |                    |                |                      |      |                    |               |                     |  |  |     |          |      |                                    |                             |                               |      |                                            |                              |                                           |      |           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| 1210                                                                    | X5R/X7R/X6S<br>X7R                         | 16V<br>100V                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     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                 |      |                          |                   |         |  |  |    |         |      |                  |                     |                    |  |  |    |         |      |                  |                 |                   |      |                    |                |                    |      |                    |             |                    |      |     |      |          |      |     |          |         |      |                    |              |                  |      |     |      |         |      |            |               |             |      |                    |                |                      |      |                    |               |                     |  |  |     |          |      |                                    |                             |                               |      |                                            |                              |                                           |      |           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| TT15                                                                    | X5R                                        | 6.3V                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            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| TT18                                                                    | Y5V                                        | 6.3V,10V                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        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               |                       |                                            |                                                           |                                               |                                                                         |                                                                    |                                                                        |                                                      |  |
| TT21                                                                    | Y5V<br>X5R/X7R/X6S                         | 6.3V<br>≤10V                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    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                 |      |                          |                   |         |  |  |    |         |      |                  |                     |                    |  |  |    |         |      |                  |                 |                   |      |                    |                |                    |      |                    |             |                    |      |     |      |          |      |     |          |         |      |                    |              |                  |      |     |      |         |      |            |               |             |      |                    |                |                      |      |                    |               |                     |  |  |     |          |      |                                    |                             |                               |      |                                            |                              |                                           |      |           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| TT31                                                                    | Y5V                                        | 6.3V                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            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               |                       |                                            |                                                           |                                               |                                                                         |                                                                    |                                                                        |                                                      |  |
| 0201                                                                    | X5R/X7R/X6S<br>X7R                         | 16V/25V<br>16V                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  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                 |      |                          |                   |         |  |  |    |         |      |                  |                     |                    |  |  |    |         |      |                  |                 |                   |      |                    |                |                    |      |                    |             |                    |      |     |      |          |      |     |          |         |      |                    |              |                  |      |     |      |         |      |            |               |             |      |                    |                |                      |      |                    |               |                     |  |  |     |          |      |                                    |                             |                               |      |                                            |                              |                                           |      |           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| 0402                                                                    | X5R/X7R/X6S<br>Y5V                         | 50V<br>10~25V                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   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               |                       |                                            |                                                           |                                               |                                                                         |                                                                    |                                                                        |                                                      |  |
| 0603                                                                    | X7R<br>X5R/X7R/ X6S/<br>X7S<br>Y5V         | 50V<br>10V, 16V, 50V<br>16V                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     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                 |      |                          |                   |         |  |  |    |         |      |                  |                     |                    |  |  |    |         |      |                  |                 |                   |      |                    |                |                    |      |                    |             |                    |      |     |      |          |      |     |          |         |      |                    |              |                  |      |     |      |         |      |            |               |             |      |                    |                |                      |      |                    |               |                     |  |  |     |          |      |                                    |                             |                               |      |                                            |                              |                                           |      |           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| 0805                                                                    | X5R/X7R/ X6S/<br>X7S<br>X5R/X7R/X7S<br>Y5V | 10~50V<br>50V<br>100V<br>16V                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    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| 1206                                                                    | X5R/X7R/X6S                                | 100V                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            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| 1210                                                                    | X5R/X7R/X6S                                | 50V~100V                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        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| 1825<br>2220<br>2225                                                    | X7R                                        | 100V~250V                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       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| Rated vol.                                                              | D.F.≤                                      | Exception of D.F.≤                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              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| ≥100V                                                                   | ≤3%                                        | ≤6% 1206±0.47μF<br>≤7.5% 0805>0.1μF, 0603±0.068μF, 1206±1μF;1210±2.2μF; TT series<br>≤20% 0805>0.22μF;1210±3.3μF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                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| ≥50V                                                                    | ≤3%                                        | ≤6% 0201(50V);0603±0.047μF; 0805±0.18μF; 1206±0.47μF<br>≤10% 0201±0.01μF;1210±4.7μF<br>≤20% 0402±0.1μF;0603>0.1μF; 0805±1μF; 1206±2.2μF;1210±10μF; TT series                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    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               |                       |                                            |                                                           |                                               |                                                                         |                                                                    |                                                                        |                                                      |  |
| 35V                                                                     | ≤5%                                        | ≤20% 0603±1μF;0805±2.2μF;1206±2.2μF; 1210±10μF<br>≤10% 0201±0.01μF;0805±1μF; 1210±10μF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          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| 25V                                                                     | ≤5%                                        | ≤14% 0603±0.33μF;1206±4.7μF<br>≤15% 0201±0.1μF;0402±0.10μF;0603±0.47μF;0805±2.2μF;1206±6.8μF;1210±22μF; TT series<br>≤20% 0402±0.47μF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           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               |                       |                                            |                                                           |                                               |                                                                         |                                                                    |                                                                        |                                                      |  |
| 16V                                                                     | ≤5%                                        | ≤10% 0603±0.15μF;0805±0.68μF;1206±2.2μF;1210±4.7μF<br>≤15% 0201±0.01μF(0201/X7R±0.022μF);0402±0.033μF;0603±0.68μF;0805±2.2μF; 1206±4.7μF; 1210±22μF; TT series                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  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| 10V                                                                     | ≤7.5%                                      | ≤15% 0201±0.012μF; 0402±0.33μF(0402/X7R±0.22μF); 0603±0.33μF;0805±2.2μF; 1206±2.2μF; 1210±22μF<br>≤20% 0201±0.1μF ;0402±1μF; TT series; 01R5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    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| 6.3V                                                                    | ≤15%                                       | ≤30% 0201±0.1μF;0402±1μF;0603±10μF; 0805±4.7μF;1206±4.7μF;1210±100μF;TT series                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  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| 4V                                                                      | ≤20%                                       | ---                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             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| Rated vol.                                                              | D.F.≤                                      | Exception of D.F.≤                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              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               |                       |                                            |                                                           |                                               |                                                                         |                                                                    |                                                                        |                                                      |  |
| ≥50V                                                                    | ≤7.5%                                      | ≤10% 0603±0.1μF; 0805±0.47μF;1206±4.7μF; TT series & Cap≥1μF<br>≤12.5% 1210±6.8μF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               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| 35V                                                                     | ≤10%                                       | ---                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             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               |                       |                                            |                                                           |                                               |                                                                         |                                                                    |                                                                        |                                                      |  |
| 25V                                                                     | ≤7.5%                                      | ≤10% 0402±0.047μF;0603±0.1μF;0805±0.33μF;1206±1μF; 1210±4.7μF<br>≤15% 0402±0.068μF;0603±0.47μF;1206±4.7μF;1210±22μF; TT series & Cap≥1μF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        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               |                       |                                            |                                                           |                                               |                                                                         |                                                                    |                                                                        |                                                      |  |
| 16V(C<1.0μF)                                                            | ≤10%                                       | ≤12.5% 0402±0.068μF; 0603±0.68μF<br>≤20% 0402±0.22μF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            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| 16V(C≥1.0μF)                                                            | ≤12.5%                                     | ≤20% 0603±2.2μF;0805±3.3μF;1206±10μF;1210±22μF;1812±47μF;TT series & Cap≥1μF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    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| 10V                                                                     | ≤20%                                       | ≤30% 0402±0.47μF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                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| 6.3V                                                                    | ≤30%                                       | ---                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             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| Rated voltage                                                           | Insulation Resistance                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 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               |                       |                                            |                                                           |                                               |                                                                         |                                                                    |                                                                        |                                                      |  |
| 100V: X7R; 1210±3.3μF                                                   | 1GΩ or RxC≥10 Ω-F<br>whichever is smaller. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 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               |                       |                                            |                                                           |                                               |                                                                         |                                                                    |                                                                        |                                                      |  |
| 50V: 0402>0.01μF; 0603±1μF;0805±1μF;1206±4.7μF;1210±4.7μF               |                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 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               |                       |                                            |                                                           |                                               |                                                                         |                                                                    |                                                                        |                                                      |  |
| 35V:0603±1μF;0805±2.2μF; 1206±2.2μF;1210±10μF                           |                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 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| 25V:0201±0.1μF; 0402±0.22μF; 0603±2.2μF;0805±2.2μF; 1206±10μF;1210±10μF |                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 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               |                       |                                            |                                                           |                                               |                                                                         |                                                                    |                                                                        |                                                      |  |
| 16V:0201±0.1μF;0402±0.22μF;0603±1μF;0805±2.2μF;1206±10μF;1210±47μF      |                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 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| 10V:0201±47nF;0402±0.47μF;0603±0.47μF;0805±2.2μF; 1206±4.7μF;1210±47μF  |                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 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               |                       |                                            |                                                           |                                               |                                                                         |                                                                    |                                                                        |                                                      |  |
| 6.3V ; 4V ; TT series ; All X6S/X7S items; Size≥1812                    |                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 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               |                       |                                            |                                                           |                                               |                                                                         |                                                                    |                                                                        |                                                      |  |
| 16.                                                                     | ESR                                        | For RF Series only, refer to data sheet.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        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               |                       |                                            |                                                           |                                               |                                                                         |                                                                    |                                                                        |                                                      |  |

\* This Reliability Test Conditions and Requirements only for General Purpose series, please refer to individual sheet for other products information.

## ■ Constructions

| No. | Name             | NP0                      | NPO/X7R/X7S/X6S/X5R/Y5V |
|-----|------------------|--------------------------|-------------------------|
| ①   | Ceramic material | BaTiO <sub>3</sub> based |                         |
| ②   | Inner electrode  | AgPd alloy               | Ni                      |
| ③   | Inner layer      | Ag                       | Cu                      |
| ④   | Termination      | Middle layer             | Ni                      |
| ⑤   |                  | Outer layer              | Sn                      |



## ■ 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.

## ■ 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<sub>2</sub> within oven are recommended.

