



# THE DATASHEET OF CL21C472JBFNNWE

January 2024



# MULTILAYER CERAMIC CAPACITORS

**SAMSUNG**  
ELECTRO-MECHANICS



# MULTILAYER CERAMIC CAPACITORS



## Interactive User Guide

Samsung Electro-Mechanics' MLCC Catalog was produced as an INTERACTIVE PDF that allows transferring to related webpages for better understanding of the content. Click 'HOME,' 'CONTENTS,' OR 'GO BACK TO PAGE' as needed, and it is also possible to 'PRINT' the pages. If you click the icon at the top of the page, it is possible to view a specific page of choice.



By clicking this icon, you can jump directly to the cover page of this catalog.



By clicking this icon, you can jump directly to the Table of Contents.



By clicking this icon, you can jump directly to the previous page.



By clicking this icon, you can set and print pages of your choice.

# C O N T E N T S

**04** Explanation of Ceramic Capacitors

**06** Part Numbering

**09** Reliability Level Description

**10** Normal Capacitors\_Standard

**80** Normal Capacitors\_High Level I

**102** Normal Capacitors\_High Level II

**107** Molded Frame Capacitors (MFC)

**108** Land Side Capacitors (LSC)

**110** High Bending Strength Capacitors

**116** Low Acoustic Noise Capacitors

**120** Low ESL Capacitors

**125** Application Guide

**129** Reliability Test Conditions

**135** Packaging Specifications

**141** Caution/Notice

**162** Disclaimer & Limitation of Use and Applications

**163** Component Sales Offices/Manufacturing Sites



#### ► Explanation of Ceramic Capacitors

Part Numbering  
Reliability Level Description  
Normal Capacitors\_Standard  
Normal Capacitors\_High Level I  
Normal Capacitors\_High Level II

Molded Frame Capacitors (MFC)  
Land Side Capacitors (LSC)  
High Bending Strength Capacitors  
Low Acoustic Noise Capacitors  
Low ESL Capacitors  
Application Guide

Reliability Test Conditions  
Packaging Specifications  
Caution/Notice  
Disclaimer & Limitation of Use and Applications  
Component Sales Offices/  
Manufacturing Sites

# Explanation of Ceramic Capacitors

## Nomal Capacitors

Normal Capacitors

Standard

High Level I

High Level II

Improved Reliability  
(65°C, 90%RH, 1Vr, 500H)

Reinforced Reliability  
(85°C, 85%RH, 1Vr, 1000H)

## Molded Frame Capacitors

Solution for mechanical and thermal stress

## Land Side Capacitors

Lower thickness and space saving

LSC



#### ► Explanation of Ceramic Capacitors

Part Numbering  
Reliability Level Description  
Normal Capacitors\_Standard  
Normal Capacitors\_High Level I  
Normal Capacitors\_High Level II

Molded Frame Capacitors (MFC)  
Land Side Capacitors (LSC)  
High Bending Strength Capacitors  
Low Acoustic Noise Capacitors  
Low ESL Capacitors  
Application Guide

Reliability Test Conditions  
Packaging Specifications  
Caution/Notice  
Disclaimer & Limitation of Use and Applications  
Component Sales Offices/  
Manufacturing Sites

# Explanation of Ceramic Capacitors

## High Bending Strength Capacitors

More Resistant to stress caused by board bending

High-bending  
Strength

## Low Acoustic Noise Capacitors

A solution that effectively reduces audible noise

Low Acoustic  
Noise

## Low ESL Capacitors

Space Saving & High Speed Energy Transfer

Low ESL

# Part Numbering



## 1 SERIES CODE

CL = Multilayer Ceramic Capacitors

## 2 SIZE CODE

| Code | inch/mm     |
|------|-------------|
| R1   | 008004/0201 |
| 02   | 01005/0402  |
| 03   | 0201/0603   |
| 05   | 0402/1005   |

| Code | inch/mm   |
|------|-----------|
| 10   | 0603/1608 |
| 21   | 0805/2012 |
| 31   | 1206/3216 |
| 32   | 1210/3225 |

| Code | inch/mm   |
|------|-----------|
| 42   | 1808/4520 |
| 43   | 1812/4532 |
| 55   | 2220/5750 |
| L5   | 0204/0510 |

| Code | inch/mm   |
|------|-----------|
| L6   | 0304/0610 |
| 01   | 0306/0816 |
| 19   | 0503/1209 |

## 3 DIELECTRIC CODE

Class I (Temperature Compensation)

| Symbol | EIA Code | Operation Temperature Range (°C) | Temperature Coefficient Range (ppm/°C) |
|--------|----------|----------------------------------|----------------------------------------|
| C      | C0G      | -55 ~ +125                       | 0 ± 30                                 |
| G      | X8G      | -55 ~ +150                       | 0 ± 30                                 |

Class II (High Dielectric Constant)

| Symbol | EIA Code | Operation Temperature Range (°C) | Capacitance Change (ΔC %) |
|--------|----------|----------------------------------|---------------------------|
| A      | X5R      | -55 ~ +85                        | ±15                       |
| X      | X6S      | -55 ~ +105                       | ±22                       |
| W      | X6T      | -55 ~ +105                       | -33 ~ +22                 |
| B      | X7R      | -55 ~ +125                       | ±15                       |
| K      | *X7R(S)  | -55 ~ +125                       | ±15                       |
| Y      | X7S      | -55 ~ +125                       | ±22                       |
| Z      | X7T      | -55 ~ +125                       | -33 ~ +22                 |
| F      | Y5V      | -30 ~ +85                        | -82 ~ +22                 |
| M      | X8M      | -55 ~ +150                       | -50 ~ +50                 |
| E      | X8L      | -55 ~ +150                       | -40 ~ +15                 |
| J      | JIS-B    | -25 ~ +85                        | ±10                       |

\* X7R(S) = X7R (DC Bias 0.5Vr TCC)

## 4 CAPACITANCE CODE

Capacitance expressed in pF. 2 significant digits plus number of zeros.  
example) 106=10×10<sup>6</sup>=10,000,000pF

For Values < 10pF, Letter R denotes decimal point  
example) 1R5 = 1.5pF

## 5 CAPACITANCE TOLERANCE CODE

| Code | Tolerance |
|------|-----------|
| N    | ±0.03pF   |
| A    | ±0.05pF   |
| B    | ±0.1pF    |
| C    | ±0.25pF   |

| Code | Tolerance |
|------|-----------|
| H    | + 0.25pF  |
| L    | - 0.25pF  |
| D    | ±0.5pF    |
| F*   | ±1pF      |

| Code | Tolerance |
|------|-----------|
| F    | ±1%       |
| G    | ±2%       |
| J    | ±5%       |
| U    | + 5%      |

| Code | Tolerance |
|------|-----------|
| V    | - 5%      |
| K    | ±10%      |
| M    | ±20%      |
| Z    | -20, +80% |

\* For Values < 10pF, F=±1pF / Values≥10pF, F=±1%



# Part Numbering

| Series | Nominal Capacitance |     |     |     |     |     |     |     |     |     |     |     |
|--------|---------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| E-3    | 1.0                 |     |     |     | 2.2 |     |     |     | 4.7 |     |     |     |
| E-6    | 1.0                 |     | 1.5 |     | 2.2 |     | 3.3 |     | 4.7 |     | 6.8 |     |
| E-12   | 1.0                 | 1.2 | 1.5 | 1.8 | 2.2 | 2.7 | 3.3 | 3.9 | 4.7 | 5.6 | 6.8 | 8.2 |
| E-24   | 1.0                 | 1.2 | 1.5 | 1.8 | 2.2 | 2.7 | 3.3 | 3.9 | 4.7 | 5.6 | 6.8 | 8.2 |
|        | 1.1                 | 1.3 | 1.6 | 2.0 | 2.4 | 3.0 | 3.6 | 4.3 | 5.1 | 6.2 | 7.5 | 9.1 |

## 6 RATED VOLTAGE CODE

| Code | Voltage |
|------|---------|
| S    | 2.5Vdc  |
| R    | 4.0Vdc  |
| Q    | 6.3Vdc  |
| P    | 10Vdc   |

| Code | Voltage |
|------|---------|
| O    | 16Vdc   |
| A    | 25Vdc   |
| L    | 35Vdc   |
| B    | 50Vdc   |

| Code | Voltage |
|------|---------|
| C    | 100Vdc  |
| D    | 200Vdc  |
| E    | 250Vdc  |
| F    | 350Vdc  |

| Code | Voltage |
|------|---------|
| G    | 500Vdc  |
| H    | 630Vdc  |
| I    | 1kVdc   |
| J    | 2kVdc   |
| K    | 3kVdc   |

## 7 THICKNESS CODE

| Size Code (inch/mm) | Code | Thickness | Tolerance  |
|---------------------|------|-----------|------------|
| 01005/0402          | 2    | 0.20      | ±0.02      |
| 0201/0603           | 3    | 0.30      | ±0.03      |
| 0402/1005           | 3    | 0.30      | ±0.03*     |
|                     | 5    | 0.50      | ±0.05      |
| 0603/1608           | 5    | 0.50      | +0.0/-0.1* |
|                     | 8    | 0.80      | ±0.10      |
| 0805/2012           | A    | 0.65      | ±0.10      |
|                     | C    | 0.85      | ±0.10*     |
|                     | C    | 0.85      | ±0.10      |
|                     | M    | 1.15      | ±0.10      |
|                     | F    | 1.25      | ±0.10      |
|                     | Q    | 1.25      | ±0.15      |
|                     | Y    | 1.25      | ±0.20      |
| 1206/3216           | C    | 0.85      | ±0.15      |
|                     | C    | 0.85      | ±0.10*     |
|                     | E    | 1.10      | ±0.15      |
|                     | E    | 1.10      | ±0.10*     |
|                     | P    | 1.15      | ±0.10*     |
|                     | M    | 1.15      | ±0.15      |
|                     | F    | 1.25      | ±0.15      |
|                     | H    | 1.6       | ±0.20      |

| Size Code (inch/mm) | Code | Thickness | Tolerance |
|---------------------|------|-----------|-----------|
| 1210/3225           | C    | 0.85      | ±0.10*    |
|                     | 9    | 0.90      | ±0.10*    |
|                     | F    | 1.25      | ±0.20     |
|                     | S    | 1.35      | ±0.15*    |
|                     | H    | 1.60      | ±0.20     |
|                     | U    | 1.80      | ±0.20*    |
|                     | I    | 2.00      | ±0.20     |
|                     | J    | 2.50      | ±0.20     |
|                     | V    | 2.50      | ±0.30     |
| 1808/4520           | F    | 1.25      | ±0.20     |
|                     | G    | 1.40      | ±0.20     |
|                     | I    | 2.00      | ±0.20     |
| 1812/4532           | F    | 1.25      | ±0.20     |
|                     | H    | 1.60      | ±0.20     |
|                     | I    | 2.00      | ±0.20     |
|                     | J    | 2.50      | ±0.20     |
| 2220/5750           | L    | 3.20      | ±0.30     |
|                     | H    | 1.60      | ±0.20     |
|                     | I    | 2.00      | ±0.20     |
|                     | J    | 2.50      | ±0.20     |
|                     | L    | 3.20      | ±0.30     |

\* Mark is only applicable to "L","Y","F", 12th code in part number.



# Part Numbering

## 8 INNER ELECTRODE/TERMINATION/PLATING CODE

| Code | Thickness division | Inner electrode | Termination  | Plating material |
|------|--------------------|-----------------|--------------|------------------|
| N    | Normal             | Ni              | Cu           | Ni / Sn _100%    |
| G    | Normal             | Cu              | Cu           | Ni / Sn _100%    |
| S    | Normal             | Ni              | Metal Epoxy  | Ni / Sn _100%    |
| C    | Normal             | Ni              | Control Code | Ni / Sn _100%    |
| L    | Low profile        | Ni              | Cu           | Ni / Sn _100%    |
| Y    | Low profile        | Ni              | Metal Epoxy  | Ni / Sn _100%    |
| Z    | Normal             | Ni              | Metal Epoxy  | Ni / Sn _100%    |
| F    | Low profile        | Ni              | Metal Epoxy  | Ni / Sn _100%    |

## 9 PRODUCT CODE OR SIZE CONTROL CODE

N=Normal

A=Array (2-element)

B=Array (4-element)

L=LICC (Low Inductance Ceramic Capacitor)

J=SLIC (Super Low Inductance Capacitor)

(Unit : inch/mm)

| Code | Size | 01005/0402 | 0201/0603 | 0402/1005 | 0603/1608 | 0805/2012 | 1206/3216 |
|------|------|------------|-----------|-----------|-----------|-----------|-----------|
| S    |      | ±0.03      | ±0.05     | ±0.07     | ±0.07     |           | ±0.30     |
| Q    |      | ±0.05      | ±0.07     | ±0.10     | ±0.15     | ±0.15     |           |
| R    |      | ±0.07      | ±0.09     | ±0.15     | ±0.20     | ±0.20     |           |
| U    |      | ±0.09      |           | ±0.20     | ±0.25     | ±0.25     |           |
| Z    |      |            |           | ±0.40     | ±0.30     | ±0.30     |           |
| 9    |      |            |           | ±0.30     |           |           |           |

## 10 CONTROL CODE

N= Reserved for future use

## 11 PACKAGING CODE

| Cardboard Tape (paper) |                                     |
|------------------------|-------------------------------------|
| Code                   | Taping Type                         |
| 8/C/H                  | Normal, 7"reel (Quantity option)    |
| J                      | 1mm Pitch, 7"reel                   |
| Z                      | Chip aligned for horizontal, 7"reel |
| Y                      | Chip aligned for vertical, 7"reel   |
| O                      | Normal, 10"reel                     |
| 3/D/L                  | Normal, 13"reel (Quantity option)   |
| 2                      | 1mm Pitch, 13"reel                  |
| 7                      | Chip aligned for vertical, 13"reel  |

| Embossed Tape (plastic) |                                     |
|-------------------------|-------------------------------------|
| Code                    | Taping Type                         |
| E/G                     | Normal, 7"reel (Quantity option)    |
| R                       | Chip aligned for horizontal, 7"reel |
| W                       | Chip aligned for vertical, 7"reel   |
| S                       | Normal, 10"reel                     |
| F                       | Normal, 13"reel (Quantity option)   |



# Reliability Level Description

| Reliability Level      | Standard                   | High Level I               | High Level II              | AEC-Q200                         |
|------------------------|----------------------------|----------------------------|----------------------------|----------------------------------|
| AEC-Q200               | N/A                        | N/A                        | N/A                        | Guarantee                        |
| Humidity Test          | 40°C, 95%RH,<br>1Vr, 500h  | 65°C, 90%RH,<br>1Vr, 500h  | 85°C, 85%RH,<br>1Vr, 1000h | 85°C, 85%RH,<br>1.3~1.5Vr, 1000h |
| High Temp Load<br>Test | Max. Temp,<br>1.0Vr, 1000h | Max. Temp,<br>1.5Vr, 1000h | Max. Temp,<br>1.5Vr, 1000h | Max. Temp,<br>2Vr, 1000h         |
| Board Flex             | 1mm                        | 1mm                        | 2mm                        | 2mm                              |
| Temp. Cycling          | 5cycle                     | 5cycle                     | 1000cycle                  | 1000cycle                        |

- \* 1. The part marked 'derating' is less than 150% of rated voltage in the durability and operational life test.
- \* 2. perform 2mm bending outgoing test.
- \* 3. Some of the parts are applicable in rated voltage  $\times$  150% or  $\times$  120%. Please refer to individual specifications.
- \* 4. Some of parts are 3mm bending guaranteed. Please refer to individual specifications.

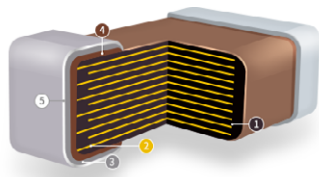


# Normal Capacitors\_Standard

Normal  
Standard

## Features

- A Normal MLCC temporarily charges and reduces noise in electronic circuits, and is the most broadly available chip-type capacitor.
- The product line allows realization of various sizes and a wide range of capacitance.
- It also has the structural capacity to mount chips on a PCB at a high speed.



- ① Ceramic Body
- ② Electrode (Ni/Cu\*)
- ③ Plating (Ni)
- ④ Termination  
(Cu or Cu+Metal Epoxy)
- ⑤ Plating (Sn)

\* Internal Cu electrode is only applied to limited products.

### Wide Selection of Size & Wide Capacitance Range

Products offered with various sizes and a wide range of capacities

### Excellent DC Bias Characteristics

Capacitor with Excellent DC Bias Characteristics

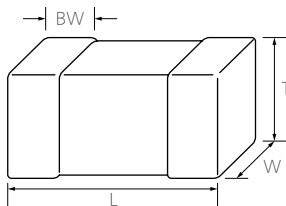
### High Speed Automatic Chip Placement on PCBs

Chip Mountable on PCB at High Speed

## Application

- Smart Phone, PC, HDD/SSD Board, Tablet, Display, Game Machine, DC-DC Converter

## Structure and Dimensions



| Size Code | Dimension (mm) |            |            |           | EIA (inch) |
|-----------|----------------|------------|------------|-----------|------------|
|           | L              | W          | T          | BW        |            |
| 02        | 0.40±0.02      | 0.20±0.02  | 0.20±0.02  | 0.1±0.03  | 01005      |
| 05025     | 0.50±0.025     | 0.25±0.025 | 0.25±0.025 | 0.13±0.04 | 015008     |
| 03        | 0.60±0.03      | 0.30±0.03  | 0.30±0.03  | 0.15±0.05 | 0201       |
|           | 0.60±0.05      | 0.30±0.05  | 0.30±0.05  |           |            |
|           | 0.60±0.09      | 0.30±0.09  | 0.50±0.05  |           |            |
|           | 0.60±0.09      | 0.30±0.09  | 0.30±0.09  |           |            |
| 05        | 1.00±0.05      | 0.50±0.05  | 0.50±0.05  | 0.25±0.10 | 0402       |
|           | 1.00±0.05      | 0.50±0.05  | 0.30±0.03  |           |            |
|           | 1.00±0.05      | 0.50±0.05  | 0.20±0.02  |           |            |
|           | 1.00±0.07      | 0.50±0.07  | 0.50±0.07  |           |            |
|           | 1.00±0.10      | 0.50±0.10  | 0.50±0.10  |           |            |
|           | 1.00±0.10      | 0.50±0.10  | 0.30±0.03  |           |            |
|           | 1.00±0.15      | 0.50±0.15  | 0.50±0.15  |           |            |
|           | 1.00±0.15      | 0.50±0.15  | 0.30±0.03  |           |            |
|           | 1.00±0.20      | 0.50±0.20  | 0.50±0.20  |           |            |
|           | 1.00±0.20      | 0.50±0.25  | 0.70±0.10  |           |            |
|           | 1.00±0.20      | 0.50±0.20  | 0.60±0.20  |           |            |
|           | 1.00±0.20      | 0.50±0.20  | 0.50±0.05  |           |            |
|           | 1.15±0.05      | 0.70±0.05  | 0.70±0.05  |           |            |



# Normal Capacitors\_Standard

| Size Code | Dimension (mm) |           |                 | BW           | EIA (inch) |
|-----------|----------------|-----------|-----------------|--------------|------------|
|           | L              | W         | T               |              |            |
| 10        | 1.60±0.10      | 0.80±0.10 | 0.80±0.10       | 0.30±0.20    | 0603       |
|           | 1.60±0.10      | 0.80±0.10 | 0.50+0.00/-0.10 |              |            |
|           | 1.60±0.15      | 0.80±0.15 | 0.80±0.15       |              |            |
|           | 1.60±0.20      | 0.80±0.20 | 0.80±0.20       |              |            |
|           | 1.60±0.20      | 0.80±0.20 | 0.80±0.20       |              |            |
|           | 1.60±0.20      | 0.80±0.20 | 0.70±0.20       |              |            |
|           | 1.60±0.25      | 0.80±0.25 | 0.70±0.10       |              |            |
|           | 1.60±0.25      | 0.80±0.25 | 0.80±0.25       |              |            |
|           | 1.60±0.30      | 0.80±0.30 | 0.70±0.10       |              |            |
|           | 1.60±0.30      | 0.80±0.30 | 0.80±0.30       |              |            |
|           | 1.60±0.30      | 0.80±0.30 | 0.50±0.30       |              |            |
|           | 1.80±0.10      | 1.00±0.10 | 0.70±0.10       |              |            |
| 21        | 2.00±0.10      | 1.25±0.10 | 0.65±0.10       | 0.5+0.2/-0.3 | 0805       |
|           | 2.00±0.10      | 1.25±0.10 | 0.85±0.10       |              |            |
|           | 2.00±0.10      | 1.25±0.10 | 0.90±0.10       |              |            |
|           | 2.00±0.10      | 1.25±0.10 | 1.25±0.10       |              |            |
|           | 2.00±0.15      | 1.25±0.15 | 0.85±0.10       |              |            |
|           | 2.00±0.15      | 1.25±0.15 | 1.25±0.15       |              |            |
|           | 2.00±0.20      | 1.25±0.20 | 0.70±0.10       |              |            |
|           | 2.00±0.20      | 1.25±0.20 | 0.80±0.10       |              |            |
|           | 2.00±0.20      | 1.25±0.20 | 0.85±0.10       |              |            |
|           | 2.00±0.20      | 1.25±0.20 | 0.90±0.10       |              |            |
|           | 2.00±0.20      | 1.25±0.20 | 1.10±0.10       |              |            |
|           | 2.00±0.20      | 1.25±0.20 | 1.25±0.20       |              |            |
| 31        | 3.20±0.15      | 1.60±0.15 | 0.85±0.15       | 0.50±0.30    | 1206       |
|           | 3.20±0.15      | 1.60±0.15 | 1.25±0.15       |              |            |
|           | 3.20±0.20      | 1.60±0.20 | 0.85±0.10       |              |            |
|           | 3.20±0.20      | 1.60±0.20 | 0.90±0.10       |              |            |
|           | 3.20±0.20      | 1.60±0.20 | 1.15±0.10       |              |            |
|           | 3.20±0.20      | 1.60±0.20 | 1.15±0.15       |              |            |
| 32        | 3.20±0.20      | 1.60±0.20 | 1.60±0.20       | 0.60±0.30    | 1210       |
|           | 3.20±0.30      | 2.50±0.20 | 0.85±0.10       |              |            |
|           | 3.20±0.30      | 2.50±0.20 | 1.25±0.20       |              |            |
|           | 3.20±0.30      | 2.50±0.20 | 1.35±0.15       |              |            |
|           | 3.20±0.30      | 2.50±0.20 | 1.40±0.20       |              |            |
|           | 3.20±0.30      | 2.50±0.20 | 1.60±0.10       |              |            |
|           | 3.20±0.30      | 2.50±0.20 | 1.60±0.20       |              |            |
|           | 3.20±0.30      | 2.50±0.20 | 1.80±0.20       |              |            |
|           | 3.20±0.30      | 2.50±0.20 | 2.50±0.20       |              |            |
|           | 3.20±0.30      | 2.50±0.20 | 2.00±0.20       |              |            |
|           | 3.20±0.40      | 2.50±0.30 | 2.50±0.20       |              |            |
| 43        | 3.20±0.40      | 2.50±0.30 | 2.50±0.30       | 0.80±0.30    | 1812       |
|           | 4.50±0.40      | 3.20±0.30 | 1.60±0.20       |              |            |



# Normal Capacitors\_Standard

## Capacitance Table (COG)

| Category | TCC            | Size Code<br>(inch/mm) | Rated<br>Voltage<br>(Vdc) | Capacitance            |                        |    |     |    |    |     |   |    |     |  |  | Capacitance<br>Range |
|----------|----------------|------------------------|---------------------------|------------------------|------------------------|----|-----|----|----|-----|---|----|-----|--|--|----------------------|
|          |                |                        |                           | pF                     |                        |    |     | nF |    |     |   | uF |     |  |  |                      |
|          |                |                        |                           | 0.1                    | 1                      | 10 | 100 | 1  | 10 | 100 | 1 | 10 | 100 |  |  |                      |
| Normal   | COG<br>(125°C) | 008004/0201            | 16                        | <div><div></div></div> |                        |    |     |    |    |     |   |    |     |  |  | 0.2pF - 56pF         |
|          |                |                        | 25                        | <div><div></div></div> |                        |    |     |    |    |     |   |    |     |  |  | 0.2pF - 56pF         |
|          |                | 01005/0402             | 6.3                       | <div><div></div></div> |                        |    |     |    |    |     |   |    |     |  |  | 100pF - 100pF        |
|          |                |                        | 10                        | <div><div></div></div> |                        |    |     |    |    |     |   |    |     |  |  | 150pF - 150pF        |
|          |                |                        | 16                        | <div><div></div></div> |                        |    |     |    |    |     |   |    |     |  |  | 8.2pF - 150pF        |
|          |                |                        | 25                        | <div><div></div></div> |                        |    |     |    |    |     |   |    |     |  |  | 1pF - 220pF          |
|          |                |                        | 50                        | <div><div></div></div> |                        |    |     |    |    |     |   |    |     |  |  | 100pF - 100pF        |
|          |                |                        | 25                        | <div><div></div></div> |                        |    |     |    |    |     |   |    |     |  |  | 0.2pF - 100pF        |
|          |                | 0201/0603              | 50                        | <div><div></div></div> |                        |    |     |    |    |     |   |    |     |  |  | 1pF - 100pF          |
|          |                |                        | 100                       | <div><div></div></div> |                        |    |     |    |    |     |   |    |     |  |  | 100pF - 100pF        |
|          |                |                        | 0402/1005                 | 16                     | <div><div></div></div> |    |     |    |    |     |   |    |     |  |  |                      |
|          |                | 25                     |                           | <div><div></div></div> |                        |    |     |    |    |     |   |    |     |  |  | 20pF - 1nF           |
|          |                | 50                     |                           | <div><div></div></div> |                        |    |     |    |    |     |   |    |     |  |  | 1pF - 4.7nF          |
|          |                | 100                    |                           | <div><div></div></div> |                        |    |     |    |    |     |   |    |     |  |  | 12pF - 1nF           |
|          |                | 0603/1608              | 16                        | <div><div></div></div> |                        |    |     |    |    |     |   |    |     |  |  | 1nF - 2.2nF          |
|          |                |                        | 25                        | <div><div></div></div> |                        |    |     |    |    |     |   |    |     |  |  | 560pF - 4.7nF        |
|          |                |                        | 50                        | <div><div></div></div> |                        |    |     |    |    |     |   |    |     |  |  | 4.7pF - 5.6nF        |
|          |                |                        | 100                       | <div><div></div></div> |                        |    |     |    |    |     |   |    |     |  |  | 10pF - 3.9nF         |
|          |                |                        | 200                       | <div><div></div></div> |                        |    |     |    |    |     |   |    |     |  |  | 220pF - 220pF        |
|          |                |                        | 250                       | <div><div></div></div> |                        |    |     |    |    |     |   |    |     |  |  | 470pF - 470pF        |
|          |                | 0805/2012              | 25                        | <div><div></div></div> |                        |    |     |    |    |     |   |    |     |  |  | 3.3nF - 10nF         |
|          |                |                        | 50                        | <div><div></div></div> |                        |    |     |    |    |     |   |    |     |  |  | 10pF - 15nF          |
|          |                |                        | 100                       | <div><div></div></div> |                        |    |     |    |    |     |   |    |     |  |  | 12pF - 3.9nF         |
|          |                |                        | 200                       | <div><div></div></div> |                        |    |     |    |    |     |   |    |     |  |  | 18pF - 1nF           |
|          |                |                        | 250                       | <div><div></div></div> |                        |    |     |    |    |     |   |    |     |  |  | 1nF - 10nF           |
|          |                | 1206/3216              | 16                        | <div><div></div></div> |                        |    |     |    |    |     |   |    |     |  |  | 15nF - 120nF         |
|          |                |                        | 25                        | <div><div></div></div> |                        |    |     |    |    |     |   |    |     |  |  | 10nF - 100nF         |
|          |                |                        | 50                        | <div><div></div></div> |                        |    |     |    |    |     |   |    |     |  |  | 10pF - 47nF          |
|          |                |                        | 100                       | <div><div></div></div> |                        |    |     |    |    |     |   |    |     |  |  | 20pF - 22nF          |
|          |                |                        | 200                       | <div><div></div></div> |                        |    |     |    |    |     |   |    |     |  |  | 220pF - 1nF          |
|          |                |                        | 250                       | <div><div></div></div> |                        |    |     |    |    |     |   |    |     |  |  | 2.2nF - 22nF         |
|          |                |                        | 500                       | <div><div></div></div> |                        |    |     |    |    |     |   |    |     |  |  | 10pF - 2.2nF         |
|          |                |                        | 630                       | <div><div></div></div> |                        |    |     |    |    |     |   |    |     |  |  | 10pF - 10nF          |
|          |                |                        | 1000                      | <div><div></div></div> |                        |    |     |    |    |     |   |    |     |  |  | 10pF - 1nF           |
|          |                |                        | 2000                      | <div><div></div></div> |                        |    |     |    |    |     |   |    |     |  |  | 15pF - 100pF         |
|          |                | 1210/3225              | 25                        | <div><div></div></div> |                        |    |     |    |    |     |   |    |     |  |  | 10nF - 10nF          |
|          |                |                        | 50                        | <div><div></div></div> |                        |    |     |    |    |     |   |    |     |  |  | 1.8nF - 22nF         |
|          |                |                        | 100                       | <div><div></div></div> |                        |    |     |    |    |     |   |    |     |  |  | 33nF - 47nF          |
|          |                |                        | 500                       | <div><div></div></div> |                        |    |     |    |    |     |   |    |     |  |  | 680pF - 1.8nF        |
|          |                |                        | 630                       | <div><div></div></div> |                        |    |     |    |    |     |   |    |     |  |  | 1.8nF - 33nF         |
|          |                |                        | 2000                      | <div><div></div></div> |                        |    |     |    |    |     |   |    |     |  |  | 100pF - 100pF        |



# Normal Capacitors\_Standard

Capacitance Table (X5R)

| Category | TCC           | Size Code<br>(inch/mm) | Rated<br>Voltage<br>(Vdc) | Capacitance |   |    |     |    |    |     |   |    |     |  |  | Capacitance<br>Range |
|----------|---------------|------------------------|---------------------------|-------------|---|----|-----|----|----|-----|---|----|-----|--|--|----------------------|
|          |               |                        |                           | pF          |   |    |     | nF |    |     |   | uF |     |  |  |                      |
|          |               |                        |                           | 0.1         | 1 | 10 | 100 | 1  | 10 | 100 | 1 | 10 | 100 |  |  |                      |
| Normal   | X5R<br>(85°C) | 008004/0201            | 6.3                       |             |   |    |     |    |    |     |   |    |     |  |  | 1nF - 10nF           |
|          |               |                        | 4                         |             |   |    |     |    |    |     |   |    |     |  |  | 100nF - 1uF          |
|          |               | 01005/0402             | 6.3                       |             |   |    |     |    |    |     |   |    |     |  |  | 1nF - 1uF            |
|          |               |                        | 10                        |             |   |    |     |    |    |     |   |    |     |  |  | 1nF - 10nF           |
|          |               | 015008/0502            | 6.3                       |             |   |    |     |    |    |     |   |    |     |  |  | 1uF - 1uF            |
|          |               |                        | 4                         |             |   |    |     |    |    |     |   |    |     |  |  | 1uF - 4.9uF          |
|          |               | 0201/0603              | 6.3                       |             |   |    |     |    |    |     |   |    |     |  |  | 15nF - 4.7uF         |
|          |               |                        | 10                        |             |   |    |     |    |    |     |   |    |     |  |  | 2.2nF - 2.2uF        |
|          |               |                        | 16                        |             |   |    |     |    |    |     |   |    |     |  |  | 33nF - 2.2uF         |
|          |               |                        | 25                        |             |   |    |     |    |    |     |   |    |     |  |  | 330pF - 330nF        |
|          |               |                        | 35                        |             |   |    |     |    |    |     |   |    |     |  |  | 100nF - 220nF        |
|          |               | 0302/0805              | 6.3                       |             |   |    |     |    |    |     |   |    |     |  |  | 4.7uF - 4.7uF        |
|          |               |                        | 4                         |             |   |    |     |    |    |     |   |    |     |  |  | 2.2uF - 27uF         |
|          |               | 0402/1005              | 6.3                       |             |   |    |     |    |    |     |   |    |     |  |  | 100nF - 22uF         |
|          |               |                        | 10                        |             |   |    |     |    |    |     |   |    |     |  |  | 100nF - 10uF         |
|          |               |                        | 16                        |             |   |    |     |    |    |     |   |    |     |  |  | 100nF - 4.7uF        |
|          |               |                        | 25                        |             |   |    |     |    |    |     |   |    |     |  |  | 100nF - 4.7uF        |
|          |               |                        | 35                        |             |   |    |     |    |    |     |   |    |     |  |  | 1uF - 2.2uF          |
|          |               |                        | 50                        |             |   |    |     |    |    |     |   |    |     |  |  | 100nF - 100nF        |
|          |               |                        | 0603/1608                 | 4           |   |    |     |    |    |     |   |    |     |  |  |                      |
|          |               | 6.3                    |                           |             |   |    |     |    |    |     |   |    |     |  |  | 1uF - 47uF           |
|          |               | 10                     |                           |             |   |    |     |    |    |     |   |    |     |  |  | 220nF - 22uF         |
|          |               | 16                     |                           |             |   |    |     |    |    |     |   |    |     |  |  | 470nF - 22uF         |
|          |               | 25                     |                           |             |   |    |     |    |    |     |   |    |     |  |  | 100nF - 10uF         |
|          |               | 35                     |                           |             |   |    |     |    |    |     |   |    |     |  |  | 1uF - 10uF           |
|          |               | 50                     |                           |             |   |    |     |    |    |     |   |    |     |  |  | 220nF - 2.2uF        |
|          |               | 0805/2012              | 4                         |             |   |    |     |    |    |     |   |    |     |  |  | 47uF - 100uF         |
|          |               |                        | 6.3                       |             |   |    |     |    |    |     |   |    |     |  |  | 4.7uF - 47uF         |
|          |               |                        | 10                        |             |   |    |     |    |    |     |   |    |     |  |  | 1uF - 47uF           |
|          |               |                        | 16                        |             |   |    |     |    |    |     |   |    |     |  |  | 1uF - 22uF           |
|          |               |                        | 25                        |             |   |    |     |    |    |     |   |    |     |  |  | 1uF - 22uF           |
|          |               |                        | 35                        |             |   |    |     |    |    |     |   |    |     |  |  | 4.7uF - 4.7uF        |
|          |               |                        | 50                        |             |   |    |     |    |    |     |   |    |     |  |  | 1uF - 10uF           |
|          |               | 1206/3216              | 6.3                       |             |   |    |     |    |    |     |   |    |     |  |  | 10uF - 100uF         |
|          |               |                        | 10                        |             |   |    |     |    |    |     |   |    |     |  |  | 10uF - 47uF          |
|          |               |                        | 16                        |             |   |    |     |    |    |     |   |    |     |  |  | 2.2uF - 22uF         |
|          |               |                        | 25                        |             |   |    |     |    |    |     |   |    |     |  |  | 3.3uF - 22uF         |
|          |               |                        | 35                        |             |   |    |     |    |    |     |   |    |     |  |  | 4.7uF - 4.7uF        |
|          |               |                        | 50                        |             |   |    |     |    |    |     |   |    |     |  |  | 1uF - 10uF           |
|          |               |                        | 100                       |             |   |    |     |    |    |     |   |    |     |  |  | 2.2uF - 2.2uF        |
|          |               | 1210/3225              | 6.3                       |             |   |    |     |    |    |     |   |    |     |  |  | 22uF - 220uF         |
|          |               |                        | 10                        |             |   |    |     |    |    |     |   |    |     |  |  | 10uF - 100uF         |
|          |               |                        | 16                        |             |   |    |     |    |    |     |   |    |     |  |  | 10uF - 47uF          |
|          |               |                        | 25                        |             |   |    |     |    |    |     |   |    |     |  |  | 2.2uF - 22uF         |
|          |               |                        | 35                        |             |   |    |     |    |    |     |   |    |     |  |  | 4.7uF - 10uF         |
|          |               |                        | 50                        |             |   |    |     |    |    |     |   |    |     |  |  | 10uF - 10uF          |



# Normal Capacitors\_Standard

## Capacitance Table (X6S)

| Category | TCC            | Size Code<br>(inch/mm) | Rated<br>Voltage<br>(Vdc) | Capacitance |   |    |     |    |    |     |   |    |     |  |  | Capacitance<br>Range |
|----------|----------------|------------------------|---------------------------|-------------|---|----|-----|----|----|-----|---|----|-----|--|--|----------------------|
|          |                |                        |                           | pF          |   |    |     | nF |    |     |   | uF |     |  |  |                      |
|          |                |                        |                           | 0,1         | 1 | 10 | 100 | 1  | 10 | 100 | 1 | 10 | 100 |  |  |                      |
| Normal   | X6S<br>(105°C) | 01005/0402             | 4                         |             |   |    |     |    |    |     |   |    |     |  |  | 100nF - 470nF        |
|          |                |                        | 6.3                       |             |   |    |     |    |    |     |   |    |     |  |  | 10nF - 10nF          |
|          |                | 0201/0603              | 2.5                       |             |   |    |     |    |    |     |   |    |     |  |  | 2.2uF - 2.2uF        |
|          |                |                        | 4                         |             |   |    |     |    |    |     |   |    |     |  |  | 1uF - 2.2uF          |
|          |                |                        | 6.3                       |             |   |    |     |    |    |     |   |    |     |  |  | 100nF - 470nF        |
|          |                |                        | 10                        |             |   |    |     |    |    |     |   |    |     |  |  | 100nF - 220nF        |
|          |                |                        | 25                        |             |   |    |     |    |    |     |   |    |     |  |  | 100nF - 100nF        |
|          |                | 0402/1005              | 2.5                       |             |   |    |     |    |    |     |   |    |     |  |  | 2.2uF - 2.2uF        |
|          |                |                        | 4                         |             |   |    |     |    |    |     |   |    |     |  |  | 2.2uF - 22uF         |
|          |                |                        | 6.3                       |             |   |    |     |    |    |     |   |    |     |  |  | 1uF - 10uF           |
|          |                |                        | 10                        |             |   |    |     |    |    |     |   |    |     |  |  | 1uF - 2.2uF          |
|          |                |                        | 16                        |             |   |    |     |    |    |     |   |    |     |  |  | 1uF - 1uF            |
|          |                |                        | 25                        |             |   |    |     |    |    |     |   |    |     |  |  | 1uF - 2.2uF          |
|          |                | 0603/1608              | 4                         |             |   |    |     |    |    |     |   |    |     |  |  | 10uF - 22uF          |
|          |                |                        | 6.3                       |             |   |    |     |    |    |     |   |    |     |  |  | 4.7uF - 22uF         |
|          |                |                        | 10                        |             |   |    |     |    |    |     |   |    |     |  |  | 2.2uF - 10uF         |
|          |                |                        | 16                        |             |   |    |     |    |    |     |   |    |     |  |  | 1uF - 10uF           |
|          |                |                        | 25                        |             |   |    |     |    |    |     |   |    |     |  |  | 4.7uF - 4.7uF        |
|          |                |                        | 35                        |             |   |    |     |    |    |     |   |    |     |  |  | 2.2uF - 2.2uF        |
|          |                |                        | 50                        |             |   |    |     |    |    |     |   |    |     |  |  | 1uF - 1uF            |
|          |                | 0805/2012              | 2.5                       |             |   |    |     |    |    |     |   |    |     |  |  | 22uF - 22uF          |
|          |                |                        | 4                         |             |   |    |     |    |    |     |   |    |     |  |  | 10uF - 47uF          |
|          |                |                        | 6.3                       |             |   |    |     |    |    |     |   |    |     |  |  | 10uF - 22uF          |
|          |                |                        | 10                        |             |   |    |     |    |    |     |   |    |     |  |  | 10uF - 10uF          |
|          |                |                        | 16                        |             |   |    |     |    |    |     |   |    |     |  |  | 2.2uF - 10uF         |
|          |                |                        | 25                        |             |   |    |     |    |    |     |   |    |     |  |  | 4.7uF - 22uF         |
|          |                | 1206/3216              | 4                         |             |   |    |     |    |    |     |   |    |     |  |  | 47uF - 47uF          |
|          |                |                        | 6.3                       |             |   |    |     |    |    |     |   |    |     |  |  | 22uF - 47uF          |
|          |                |                        | 10                        |             |   |    |     |    |    |     |   |    |     |  |  | 22uF - 22uF          |
|          |                |                        | 16                        |             |   |    |     |    |    |     |   |    |     |  |  | 22uF - 22uF          |
|          |                |                        | 25                        |             |   |    |     |    |    |     |   |    |     |  |  | 10uF - 22uF          |
|          |                | 1210/3225              | 6.3                       |             |   |    |     |    |    |     |   |    |     |  |  | 100uF - 100uF        |
|          |                |                        | 10                        |             |   |    |     |    |    |     |   |    |     |  |  | 47uF - 47uF          |
|          |                |                        | 16                        |             |   |    |     |    |    |     |   |    |     |  |  | 47uF - 47uF          |

## Capacitance Table (X6T)

| Category | TCC            | Size Code<br>(inch/mm) | Rated<br>Voltage<br>(Vdc) | Capacitance |   |    |     |    |    |     |   |    |     |  |  | Capacitance<br>Range |
|----------|----------------|------------------------|---------------------------|-------------|---|----|-----|----|----|-----|---|----|-----|--|--|----------------------|
|          |                |                        |                           | pF          |   |    |     | nF |    |     |   | uF |     |  |  |                      |
|          |                |                        |                           | 0.1         | 1 | 10 | 100 | 1  | 10 | 100 | 1 | 10 | 100 |  |  |                      |
| Normal   | X6T<br>(105°C) | 01005/0402             | 4                         |             |   |    |     |    |    |     |   |    |     |  |  | 470nF - 470nF        |
|          |                | 0201/0603              | 4                         |             |   |    |     |    |    |     |   |    |     |  |  | 2.2uF - 2.2uF        |
|          |                | 0402/1005              | 2.5                       |             |   |    |     |    |    |     |   |    |     |  |  | 2.2uF - 20uF         |



# Normal Capacitors\_Standard

Capacitance Table (X7R)

| Category | TCC            | Size Code<br>(inch/mm) | Rated<br>Voltage<br>(Vdc) | Capacitance |   |    |     |    |    |     |   |    |     |  |  | Capacitance<br>Range |               |
|----------|----------------|------------------------|---------------------------|-------------|---|----|-----|----|----|-----|---|----|-----|--|--|----------------------|---------------|
|          |                |                        |                           | pF          |   |    |     | nF |    |     |   | uF |     |  |  |                      |               |
|          |                |                        |                           | 0.1         | 1 | 10 | 100 | 1  | 10 | 100 | 1 | 10 | 100 |  |  |                      |               |
| Normal   | X7R<br>(125°C) | 01005/0402             | 10                        |             |   |    |     |    |    |     |   |    |     |  |  | 100pF - 1nF          |               |
|          |                |                        | 16                        |             |   |    |     |    |    |     |   |    |     |  |  | 330pF - 330pF        |               |
|          |                | 0201/0603              | 6.3                       |             |   |    |     |    |    |     |   |    |     |  |  |                      | 2.2nF - 10nF  |
|          |                |                        | 10                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 1nF - 100nF   |
|          |                |                        | 16                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 150pF - 10nF  |
|          |                | 0402/1005              | 25                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 120pF - 1.8nF |
|          |                |                        | 6.3                       |             |   |    |     |    |    |     |   |    |     |  |  |                      | 100nF - 1uF   |
|          |                |                        | 10                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 22nF - 470nF  |
|          |                |                        | 16                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 820pF - 220nF |
|          |                |                        | 25                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 560pF - 220nF |
|          |                | 0603/1608              | 50                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 150pF - 100nF |
|          |                |                        | 100                       |             |   |    |     |    |    |     |   |    |     |  |  |                      | 220pF - 220pF |
|          |                |                        | 6.3                       |             |   |    |     |    |    |     |   |    |     |  |  |                      | 470nF - 10uF  |
|          |                |                        | 10                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 220nF - 2.2uF |
|          |                |                        | 16                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 10nF - 1uF    |
|          |                | 0805/2012              | 25                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 4.7nF - 1uF   |
|          |                |                        | 50                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 100pF - 1uF   |
|          |                |                        | 100                       |             |   |    |     |    |    |     |   |    |     |  |  |                      | 1nF - 100nF   |
|          |                |                        | 6.3                       |             |   |    |     |    |    |     |   |    |     |  |  |                      | 10uF - 10uF   |
|          |                |                        | 10                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 680nF - 10uF  |
|          |                | 1206/3216              | 16                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 100nF - 10uF  |
|          |                |                        | 25                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 1nF - 4.7uF   |
|          |                |                        | 50                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 100pF - 1uF   |
|          |                |                        | 100                       |             |   |    |     |    |    |     |   |    |     |  |  |                      | 220pF - 220nF |
|          |                |                        | 200                       |             |   |    |     |    |    |     |   |    |     |  |  |                      | 220pF - 10nF  |
|          |                |                        | 250                       |             |   |    |     |    |    |     |   |    |     |  |  |                      | 1nF - 10nF    |
|          |                |                        | 6.3                       |             |   |    |     |    |    |     |   |    |     |  |  |                      | 10uF - 22uF   |
|          |                |                        | 10                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 1.2uF - 22uF  |
|          |                |                        | 16                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 330nF - 10uF  |
|          |                |                        | 25                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 220nF - 10uF  |
|          |                | 1210/3225              | 35                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 10uF - 10uF   |
|          |                |                        | 50                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 220pF - 10uF  |
|          |                |                        | 100                       |             |   |    |     |    |    |     |   |    |     |  |  |                      | 2.2nF - 2.2uF |
|          |                |                        | 200                       |             |   |    |     |    |    |     |   |    |     |  |  |                      | 470pF - 100nF |
|          |                |                        | 250                       |             |   |    |     |    |    |     |   |    |     |  |  |                      | 33nF - 100nF  |
|          |                |                        | 350                       |             |   |    |     |    |    |     |   |    |     |  |  |                      | 33nF - 33nF   |
|          |                |                        | 500                       |             |   |    |     |    |    |     |   |    |     |  |  |                      | 220pF - 33nF  |
|          |                |                        | 630                       |             |   |    |     |    |    |     |   |    |     |  |  |                      | 330pF - 33nF  |
|          |                |                        | 1000                      |             |   |    |     |    |    |     |   |    |     |  |  |                      | 680pF - 2.2nF |
|          |                |                        | 2000                      |             |   |    |     |    |    |     |   |    |     |  |  |                      | 1nF - 1nF     |
|          |                |                        | 6.3                       |             |   |    |     |    |    |     |   |    |     |  |  |                      | 47uF - 47uF   |
|          |                |                        | 10                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 10uF - 47uF   |
|          |                | 1210/3225              | 16                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 10uF - 22uF   |
|          |                |                        | 25                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 1uF - 22uF    |
|          |                |                        | 35                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 10uF - 10uF   |
|          |                |                        | 50                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 150nF - 10uF  |
|          |                |                        | 100                       |             |   |    |     |    |    |     |   |    |     |  |  |                      | 1uF - 2.2uF   |
|          |                |                        | 250                       |             |   |    |     |    |    |     |   |    |     |  |  |                      | 100nF - 100nF |
|          |                |                        | 500                       |             |   |    |     |    |    |     |   |    |     |  |  |                      | 10nF - 10nF   |
|          |                |                        | 500                       |             |   |    |     |    |    |     |   |    |     |  |  |                      | 10nF - 10nF   |
|          |                | *X7R(S)<br>(125°C)     | 0603/1608                 | 16          |   |    |     |    |    |     |   |    |     |  |  |                      | 10uF - 10uF   |
|          |                |                        | 0805/2012                 | 25          |   |    |     |    |    |     |   |    |     |  |  |                      | 10uF - 10uF   |

\* X7R(S) = X7R (DC Bias 0.5Vr TCC)



# Normal Capacitors\_Standard

## Capacitance Table (X7S)

| Category | TCC            | Size Code<br>(inch/mm) | Rated<br>Voltage<br>(Vdc) | Capacitance |   |    |     |    |    |     |   |    |     |  |  | Capacitance<br>Range |               |               |
|----------|----------------|------------------------|---------------------------|-------------|---|----|-----|----|----|-----|---|----|-----|--|--|----------------------|---------------|---------------|
|          |                |                        |                           | pF          |   |    |     | nF |    |     |   | uF |     |  |  |                      |               |               |
|          |                |                        |                           | 0.1         | 1 | 10 | 100 | 1  | 10 | 100 | 1 | 10 | 100 |  |  |                      |               |               |
| Normal   | X7S<br>(125°C) | 0201/0603              | 10                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 100nF - 100nF |               |
|          |                |                        | 16                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 100nF - 100nF |               |
|          |                | 0603/1608              | 6.3                       |             |   |    |     |    |    |     |   |    |     |  |  |                      |               | 10uF - 10uF   |
|          |                |                        | 25                        |             |   |    |     |    |    |     |   |    |     |  |  |                      |               | 4.7uF - 4.7uF |

## Capacitance Table (X7T)

| Category | TCC            | Size Code<br>(inch/mm) | Rated<br>Voltage<br>(Vdc) | Capacitance |   |    |     |    |    |     |   |    |     |  |  | Capacitance<br>Range |               |
|----------|----------------|------------------------|---------------------------|-------------|---|----|-----|----|----|-----|---|----|-----|--|--|----------------------|---------------|
|          |                |                        |                           | pF          |   |    |     | nF |    |     |   | uF |     |  |  |                      |               |
|          |                |                        |                           | 0.1         | 1 | 10 | 100 | 1  | 10 | 100 | 1 | 10 | 100 |  |  |                      |               |
| Normal   | X7T<br>(125°C) | 0201/0603              | 6.3                       |             |   |    |     |    |    |     |   |    |     |  |  |                      | 220nF - 220nF |
|          |                | 0402/1005              | 4                         |             |   |    |     |    |    |     |   |    |     |  |  |                      | 10uF - 10uF   |
|          |                | 0805/2012              | 6.3                       |             |   |    |     |    |    |     |   |    |     |  |  |                      | 22uF - 22uF   |
|          |                |                        | 25                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 10uF - 10uF   |
|          |                | 1206/3216              | 35                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 10uF - 10uF   |
|          |                |                        | 50                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 10uF - 10uF   |

## Capacitance Table (Y5V)

| Category | TCC           | Size Code<br>(inch/mm) | Rated<br>Voltage<br>(Vdc) | Capacitance |   |    |     |    |    |     |   |    |     |  |  | Capacitance<br>Range |               |               |
|----------|---------------|------------------------|---------------------------|-------------|---|----|-----|----|----|-----|---|----|-----|--|--|----------------------|---------------|---------------|
|          |               |                        |                           | pF          |   |    |     | nF |    |     |   | uF |     |  |  |                      |               |               |
|          |               |                        |                           | 0.1         | 1 | 10 | 100 | 1  | 10 | 100 | 1 | 10 | 100 |  |  |                      |               |               |
| Normal   | Y5V<br>(85°C) | 0402/1005              | 6.3                       |             |   |    |     |    |    |     |   |    |     |  |  |                      | 1uF - 1uF     |               |
|          |               |                        | 10                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 330nF - 470nF |               |
|          |               |                        | 16                        |             |   |    |     |    |    |     |   |    |     |  |  |                      |               | 22nF - 100nF  |
|          |               |                        | 25                        |             |   |    |     |    |    |     |   |    |     |  |  |                      |               | 22nF - 33nF   |
|          |               |                        | 50                        |             |   |    |     |    |    |     |   |    |     |  |  |                      |               | 15nF - 15nF   |
|          |               | 0603/1608              | 6.3                       |             |   |    |     |    |    |     |   |    |     |  |  |                      |               | 2.2uF - 2.2uF |
|          |               |                        | 10                        |             |   |    |     |    |    |     |   |    |     |  |  |                      |               | 2.2uF - 2.2uF |
|          |               |                        | 16                        |             |   |    |     |    |    |     |   |    |     |  |  |                      |               | 100nF - 330nF |
|          |               |                        | 25                        |             |   |    |     |    |    |     |   |    |     |  |  |                      |               | 100nF - 470nF |
|          |               |                        | 50                        |             |   |    |     |    |    |     |   |    |     |  |  |                      |               | 10nF - 100nF  |
|          |               | 0805/2012              | 6.3                       |             |   |    |     |    |    |     |   |    |     |  |  |                      |               | 10uF - 10uF   |
|          |               |                        | 10                        |             |   |    |     |    |    |     |   |    |     |  |  |                      |               | 2.2uF - 4.7uF |
|          |               |                        | 16                        |             |   |    |     |    |    |     |   |    |     |  |  |                      |               | 680nF - 2.2uF |
|          |               |                        | 25                        |             |   |    |     |    |    |     |   |    |     |  |  |                      |               | 100nF - 470nF |
|          |               |                        | 50                        |             |   |    |     |    |    |     |   |    |     |  |  |                      |               | 10nF - 1uF    |
|          |               | 1206/3216              | 10                        |             |   |    |     |    |    |     |   |    |     |  |  |                      |               | 10uF - 10uF   |
|          |               |                        | 16                        |             |   |    |     |    |    |     |   |    |     |  |  |                      |               | 1uF - 4.7uF   |
|          |               |                        | 25                        |             |   |    |     |    |    |     |   |    |     |  |  |                      |               | 1uF - 2.2uF   |
|          |               |                        | 50                        |             |   |    |     |    |    |     |   |    |     |  |  |                      |               | 100nF - 1uF   |
|          |               | 1210/3225              | 16                        |             |   |    |     |    |    |     |   |    |     |  |  |                      |               | 10uF - 10uF   |
|          |               |                        | 25                        |             |   |    |     |    |    |     |   |    |     |  |  |                      |               | 10uF - 10uF   |
|          |               |                        | 35                        |             |   |    |     |    |    |     |   |    |     |  |  |                      |               | 10uF - 10uF   |
|          |               |                        | 50                        |             |   |    |     |    |    |     |   |    |     |  |  |                      |               | 1uF - 1uF     |



# Normal Capacitors\_Standard

## Capacitance Table (\*X7R(S))

| Category          | TCC                | Size Code<br>(inch/mm) | Rated<br>Voltage<br>(Vdc) | Capacitance |   |    |     |   |    |     |   |    |     |   |    |     |  |  |  |  |  | Capacitance<br>Range |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-------------------|--------------------|------------------------|---------------------------|-------------|---|----|-----|---|----|-----|---|----|-----|---|----|-----|--|--|--|--|--|----------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
|                   |                    |                        |                           | pF          |   |    |     |   |    | nF  |   |    |     |   |    | uF  |  |  |  |  |  |                      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                   |                    |                        |                           | 0.1         | 1 | 10 | 100 | 1 | 10 | 100 | 1 | 10 | 100 | 1 | 10 | 100 |  |  |  |  |  |                      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Normal<br>(Epoxy) | *X7R(S)<br>(125°C) | 0201/0603              | 25                        |             |   |    |     |   |    |     |   |    |     |   |    |     |  |  |  |  |  |                      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

\* X7R(S) = X7R (DC Bias 0.5Vr TCC)

## Capacitance Table (X7S)

| Category          | TCC            | Size Code<br>(inch/mm) | Rated<br>Voltage<br>(Vdc) | Capacitance |   |    |     |   |    |     |   |    |     |    |    |     |  |  | Capacitance<br>Range |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |    |
|-------------------|----------------|------------------------|---------------------------|-------------|---|----|-----|---|----|-----|---|----|-----|----|----|-----|--|--|----------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|----|
|                   |                |                        |                           | pF          |   |    |     |   | nF |     |   |    |     | uF |    |     |  |  |                      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |    |
|                   |                |                        |                           | 0.1         | 1 | 10 | 100 | 1 | 10 | 100 | 1 | 10 | 100 | 1  | 10 | 100 |  |  |                      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |    |
| Normal<br>(Epoxy) | X7S<br>(125°C) | 1206/3216              | 100                       |             |   |    |     |   |    |     |   |    |     |    |    |     |  |  |                      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | </ |

## Product Lineup (COG)

Size Code (inch/mm) : 008004/0201

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 0.138                  | 16                     | COG | 0.2pF       | ±0.1pF                   | CLR1C0R2B01INN# |
| 2   | 0.138                  | 16                     | COG | 0.3pF       | ±0.1pF                   | CLR1C0R3B01INN# |
| 3   | 0.138                  | 16                     | COG | 0.4pF       | ±0.1pF                   | CLR1C0R4B01INN# |
| 4   | 0.138                  | 16                     | COG | 0.5pF       | ±0.1pF                   | CLR1C0R5B01INN# |
| 5   | 0.138                  | 16                     | COG | 0.6pF       | ±0.1pF                   | CLR1C0R6B01INN# |
| 6   | 0.138                  | 16                     | COG | 0.7pF       | ±0.1pF                   | CLR1C0R7B01INN# |
| 7   | 0.138                  | 16                     | COG | 0.8pF       | ±0.1pF                   | CLR1C0R8B01INN# |
| 8   | 0.138                  | 16                     | COG | 0.9pF       | ±0.1pF                   | CLR1C0R9B01INN# |
| 9   | 0.138                  | 16                     | COG | 1pF         | ±0.1pF                   | CLR1C010B01INN# |
| 10  | 0.138                  | 16                     | COG | 1pF         | ±0.25pF                  | CLR1C010C01INN# |
| 11  | 0.138                  | 16                     | COG | 1.1pF       | ±0.1pF                   | CLR1C1R1B01INN# |
| 12  | 0.138                  | 16                     | COG | 1.1pF       | ±0.25pF                  | CLR1C1R1C01INN# |
| 13  | 0.138                  | 16                     | COG | 1.2pF       | ±0.1pF                   | CLR1C1R2B01INN# |
| 14  | 0.138                  | 16                     | COG | 1.2pF       | ±0.25pF                  | CLR1C1R2C01INN# |
| 15  | 0.138                  | 16                     | COG | 1.3pF       | ±0.1pF                   | CLR1C1R3B01INN# |
| 16  | 0.138                  | 16                     | COG | 1.3pF       | ±0.25pF                  | CLR1C1R3C01INN# |
| 17  | 0.138                  | 16                     | COG | 1.4pF       | ±0.1pF                   | CLR1C1R4B01INN# |
| 18  | 0.138                  | 16                     | COG | 1.4pF       | ±0.25pF                  | CLR1C1R4C01INN# |
| 19  | 0.138                  | 16                     | COG | 1.5pF       | ±0.1pF                   | CLR1C1R5B01INN# |
| 20  | 0.138                  | 16                     | COG | 1.5pF       | ±0.25pF                  | CLR1C1R5C01INN# |
| 21  | 0.138                  | 16                     | COG | 1.6pF       | ±0.1pF                   | CLR1C1R6B01INN# |
| 22  | 0.138                  | 16                     | COG | 1.6pF       | ±0.25pF                  | CLR1C1R6C01INN# |
| 23  | 0.138                  | 16                     | COG | 1.7pF       | ±0.1pF                   | CLR1C1R7B01INN# |
| 24  | 0.138                  | 16                     | COG | 1.7pF       | ±0.25pF                  | CLR1C1R7C01INN# |
| 25  | 0.138                  | 16                     | COG | 1.8pF       | ±0.1pF                   | CLR1C1R8B01INN# |



# Normal Capacitors\_Standard

Size Code (inch/mm) : 008004/0201

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 26  | 0.138                  | 16                     | COG | 1.8pF       | ±0.25pF                  | CLR1C1R8C01INN# |
| 27  | 0.138                  | 16                     | COG | 1.9pF       | ±0.1pF                   | CLR1C1R9B01INN# |
| 28  | 0.138                  | 16                     | COG | 1.9pF       | ±0.25pF                  | CLR1C1R9C01INN# |
| 29  | 0.138                  | 16                     | COG | 2pF         | ±0.1pF                   | CLR1C020B01INN# |
| 30  | 0.138                  | 16                     | COG | 2pF         | ±0.25pF                  | CLR1C020C01INN# |
| 31  | 0.138                  | 16                     | COG | 2.1pF       | ±0.1pF                   | CLR1C2R1B01INN# |
| 32  | 0.138                  | 16                     | COG | 2.1pF       | ±0.25pF                  | CLR1C2R1C01INN# |
| 33  | 0.138                  | 16                     | COG | 2.2pF       | ±0.1pF                   | CLR1C2R2B01INN# |
| 34  | 0.138                  | 16                     | COG | 2.2pF       | ±0.25pF                  | CLR1C2R2C01INN# |
| 35  | 0.138                  | 16                     | COG | 2.3pF       | ±0.1pF                   | CLR1C2R3B01INN# |
| 36  | 0.138                  | 16                     | COG | 2.3pF       | ±0.25pF                  | CLR1C2R3C01INN# |
| 37  | 0.138                  | 16                     | COG | 2.4pF       | ±0.1pF                   | CLR1C2R4B01INN# |
| 38  | 0.138                  | 16                     | COG | 2.4pF       | ±0.25pF                  | CLR1C2R4C01INN# |
| 39  | 0.138                  | 16                     | COG | 2.5pF       | ±0.1pF                   | CLR1C2R5B01INN# |
| 40  | 0.138                  | 16                     | COG | 2.5pF       | ±0.25pF                  | CLR1C2R5C01INN# |
| 41  | 0.138                  | 16                     | COG | 2.6pF       | ±0.1pF                   | CLR1C2R6B01INN# |
| 42  | 0.138                  | 16                     | COG | 2.6pF       | ±0.25pF                  | CLR1C2R6C01INN# |
| 43  | 0.138                  | 16                     | COG | 2.7pF       | ±0.1pF                   | CLR1C2R7B01INN# |
| 44  | 0.138                  | 16                     | COG | 2.7pF       | ±0.25pF                  | CLR1C2R7C01INN# |
| 45  | 0.138                  | 16                     | COG | 2.8pF       | ±0.1pF                   | CLR1C2R8B01INN# |
| 46  | 0.138                  | 16                     | COG | 2.8pF       | ±0.25pF                  | CLR1C2R8C01INN# |
| 47  | 0.138                  | 16                     | COG | 2.9pF       | ±0.1pF                   | CLR1C2R9B01INN# |
| 48  | 0.138                  | 16                     | COG | 2.9pF       | ±0.25pF                  | CLR1C2R9C01INN# |
| 49  | 0.138                  | 16                     | COG | 3pF         | ±0.1pF                   | CLR1C030B01INN# |
| 50  | 0.138                  | 16                     | COG | 3pF         | ±0.25pF                  | CLR1C030C01INN# |
| 51  | 0.138                  | 16                     | COG | 3.1pF       | ±0.1pF                   | CLR1C3R1B01INN# |
| 52  | 0.138                  | 16                     | COG | 3.1pF       | ±0.25pF                  | CLR1C3R1C01INN# |
| 53  | 0.138                  | 16                     | COG | 3.2pF       | ±0.1pF                   | CLR1C3R2B01INN# |
| 54  | 0.138                  | 16                     | COG | 3.2pF       | ±0.25pF                  | CLR1C3R2C01INN# |
| 55  | 0.138                  | 16                     | COG | 3.3pF       | ±0.1pF                   | CLR1C3R3B01INN# |
| 56  | 0.138                  | 16                     | COG | 3.3pF       | ±0.25pF                  | CLR1C3R3C01INN# |
| 57  | 0.138                  | 16                     | COG | 3.4pF       | ±0.1pF                   | CLR1C3R4B01INN# |
| 58  | 0.138                  | 16                     | COG | 3.4pF       | ±0.25pF                  | CLR1C3R4C01INN# |
| 59  | 0.138                  | 16                     | COG | 3.5pF       | ±0.1pF                   | CLR1C3R5B01INN# |
| 60  | 0.138                  | 16                     | COG | 3.5pF       | ±0.25pF                  | CLR1C3R5C01INN# |
| 61  | 0.138                  | 16                     | COG | 3.6pF       | ±0.1pF                   | CLR1C3R6B01INN# |
| 62  | 0.138                  | 16                     | COG | 3.6pF       | ±0.25pF                  | CLR1C3R6C01INN# |
| 63  | 0.138                  | 16                     | COG | 3.7pF       | ±0.1pF                   | CLR1C3R7B01INN# |
| 64  | 0.138                  | 16                     | COG | 3.7pF       | ±0.25pF                  | CLR1C3R7C01INN# |
| 65  | 0.138                  | 16                     | COG | 3.8pF       | ±0.1pF                   | CLR1C3R8B01INN# |
| 66  | 0.138                  | 16                     | COG | 3.8pF       | ±0.25pF                  | CLR1C3R8C01INN# |
| 67  | 0.138                  | 16                     | COG | 3.9pF       | ±0.1pF                   | CLR1C3R9B01INN# |
| 68  | 0.138                  | 16                     | COG | 3.9pF       | ±0.25pF                  | CLR1C3R9C01INN# |
| 69  | 0.138                  | 16                     | COG | 4pF         | ±0.1pF                   | CLR1C040B01INN# |
| 70  | 0.138                  | 16                     | COG | 4pF         | ±0.25pF                  | CLR1C040C01INN# |



# Normal Capacitors\_Standard

Size Code (inch/mm) : 008004/0201

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 71  | 0.138                  | 16                     | COG | 4.1pF       | ±0.1pF                   | CLR1C4R1B01INN# |
| 72  | 0.138                  | 16                     | COG | 4.1pF       | ±0.25pF                  | CLR1C4R1C01INN# |
| 73  | 0.138                  | 16                     | COG | 4.2pF       | ±0.1pF                   | CLR1C4R2B01INN# |
| 74  | 0.138                  | 16                     | COG | 4.2pF       | ±0.25pF                  | CLR1C4R2C01INN# |
| 75  | 0.138                  | 16                     | COG | 4.3pF       | ±0.1pF                   | CLR1C4R3B01INN# |
| 76  | 0.138                  | 16                     | COG | 4.3pF       | ±0.25pF                  | CLR1C4R3C01INN# |
| 77  | 0.138                  | 16                     | COG | 4.4pF       | ±0.1pF                   | CLR1C4R4B01INN# |
| 78  | 0.138                  | 16                     | COG | 4.4pF       | ±0.25pF                  | CLR1C4R4C01INN# |
| 79  | 0.138                  | 16                     | COG | 4.5pF       | ±0.1pF                   | CLR1C4R5B01INN# |
| 80  | 0.138                  | 16                     | COG | 4.5pF       | ±0.25pF                  | CLR1C4R5C01INN# |
| 81  | 0.138                  | 16                     | COG | 4.6pF       | ±0.1pF                   | CLR1C4R6B01INN# |
| 82  | 0.138                  | 16                     | COG | 4.6pF       | ±0.25pF                  | CLR1C4R6C01INN# |
| 83  | 0.138                  | 16                     | COG | 4.7pF       | ±0.1pF                   | CLR1C4R7B01INN# |
| 84  | 0.138                  | 16                     | COG | 4.7pF       | ±0.25pF                  | CLR1C4R7C01INN# |
| 85  | 0.138                  | 16                     | COG | 4.8pF       | ±0.1pF                   | CLR1C4R8B01INN# |
| 86  | 0.138                  | 16                     | COG | 4.8pF       | ±0.25pF                  | CLR1C4R8C01INN# |
| 87  | 0.138                  | 16                     | COG | 4.9pF       | ±0.1pF                   | CLR1C4R9B01INN# |
| 88  | 0.138                  | 16                     | COG | 4.9pF       | ±0.25pF                  | CLR1C4R9C01INN# |
| 89  | 0.138                  | 16                     | COG | 5pF         | ±0.1pF                   | CLR1C050B01INN# |
| 90  | 0.138                  | 16                     | COG | 5pF         | ±0.25pF                  | CLR1C050C01INN# |
| 91  | 0.138                  | 16                     | COG | 5.1pF       | ±0.1pF                   | CLR1C5R1B01INN# |
| 92  | 0.138                  | 16                     | COG | 5.1pF       | ±0.25pF                  | CLR1C5R1C01INN# |
| 93  | 0.138                  | 16                     | COG | 5.1pF       | ±0.5pF                   | CLR1C5R1D01INN# |
| 94  | 0.138                  | 16                     | COG | 5.2pF       | ±0.1pF                   | CLR1C5R2B01INN# |
| 95  | 0.138                  | 16                     | COG | 5.2pF       | ±0.25pF                  | CLR1C5R2C01INN# |
| 96  | 0.138                  | 16                     | COG | 5.2pF       | ±0.5pF                   | CLR1C5R2D01INN# |
| 97  | 0.138                  | 16                     | COG | 5.3pF       | ±0.1pF                   | CLR1C5R3B01INN# |
| 98  | 0.138                  | 16                     | COG | 5.3pF       | ±0.25pF                  | CLR1C5R3C01INN# |
| 99  | 0.138                  | 16                     | COG | 5.3pF       | ±0.5pF                   | CLR1C5R3D01INN# |
| 100 | 0.138                  | 16                     | COG | 5.4pF       | ±0.1pF                   | CLR1C5R4B01INN# |
| 101 | 0.138                  | 16                     | COG | 5.4pF       | ±0.25pF                  | CLR1C5R4C01INN# |
| 102 | 0.138                  | 16                     | COG | 5.4pF       | ±0.5pF                   | CLR1C5R4D01INN# |
| 103 | 0.138                  | 16                     | COG | 5.5pF       | ±0.1pF                   | CLR1C5R5B01INN# |
| 104 | 0.138                  | 16                     | COG | 5.5pF       | ±0.25pF                  | CLR1C5R5C01INN# |
| 105 | 0.138                  | 16                     | COG | 5.5pF       | ±0.5pF                   | CLR1C5R5D01INN# |
| 106 | 0.138                  | 16                     | COG | 5.6pF       | ±0.1pF                   | CLR1C5R6B01INN# |
| 107 | 0.138                  | 16                     | COG | 5.6pF       | ±0.25pF                  | CLR1C5R6C01INN# |
| 108 | 0.138                  | 16                     | COG | 5.6pF       | ±0.5pF                   | CLR1C5R6D01INN# |
| 109 | 0.138                  | 16                     | COG | 5.7pF       | ±0.1pF                   | CLR1C5R7B01INN# |
| 110 | 0.138                  | 16                     | COG | 5.7pF       | ±0.25pF                  | CLR1C5R7C01INN# |
| 111 | 0.138                  | 16                     | COG | 5.7pF       | ±0.5pF                   | CLR1C5R7D01INN# |
| 112 | 0.138                  | 16                     | COG | 5.8pF       | ±0.1pF                   | CLR1C5R8B01INN# |
| 113 | 0.138                  | 16                     | COG | 5.8pF       | ±0.25pF                  | CLR1C5R8C01INN# |
| 114 | 0.138                  | 16                     | COG | 5.8pF       | ±0.5pF                   | CLR1C5R8D01INN# |
| 115 | 0.138                  | 16                     | COG | 5.9pF       | ±0.1pF                   | CLR1C5R9B01INN# |



# Normal Capacitors\_Standard

Size Code (inch/mm) : 008004/0201

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 116 | 0.138                  | 16                     | COG | 5.9pF       | ±0.25pF                  | CLR1C5R9C01INN# |
| 117 | 0.138                  | 16                     | COG | 5.9pF       | ±0.5pF                   | CLR1C5R9D01INN# |
| 118 | 0.138                  | 16                     | COG | 6pF         | ±0.1pF                   | CLR1C060B01INN# |
| 119 | 0.138                  | 16                     | COG | 6pF         | ±0.25pF                  | CLR1C060C01INN# |
| 120 | 0.138                  | 16                     | COG | 6pF         | ±0.5pF                   | CLR1C060D01INN# |
| 121 | 0.138                  | 16                     | COG | 6.1pF       | ±0.1pF                   | CLR1C6R1B01INN# |
| 122 | 0.138                  | 16                     | COG | 6.1pF       | ±0.25pF                  | CLR1C6R1C01INN# |
| 123 | 0.138                  | 16                     | COG | 6.1pF       | ±0.5pF                   | CLR1C6R1D01INN# |
| 124 | 0.138                  | 16                     | COG | 6.2pF       | ±0.1pF                   | CLR1C6R2B01INN# |
| 125 | 0.138                  | 16                     | COG | 6.2pF       | ±0.25pF                  | CLR1C6R2C01INN# |
| 126 | 0.138                  | 16                     | COG | 6.2pF       | ±0.5pF                   | CLR1C6R2D01INN# |
| 127 | 0.138                  | 16                     | COG | 6.3pF       | ±0.1pF                   | CLR1C6R3B01INN# |
| 128 | 0.138                  | 16                     | COG | 6.3pF       | ±0.25pF                  | CLR1C6R3C01INN# |
| 129 | 0.138                  | 16                     | COG | 6.3pF       | ±0.5pF                   | CLR1C6R3D01INN# |
| 130 | 0.138                  | 16                     | COG | 6.4pF       | ±0.1pF                   | CLR1C6R4B01INN# |
| 131 | 0.138                  | 16                     | COG | 6.4pF       | ±0.25pF                  | CLR1C6R4C01INN# |
| 132 | 0.138                  | 16                     | COG | 6.4pF       | ±0.5pF                   | CLR1C6R4D01INN# |
| 133 | 0.138                  | 16                     | COG | 6.5pF       | ±0.1pF                   | CLR1C6R5B01INN# |
| 134 | 0.138                  | 16                     | COG | 6.5pF       | ±0.25pF                  | CLR1C6R5C01INN# |
| 135 | 0.138                  | 16                     | COG | 6.5pF       | ±0.5pF                   | CLR1C6R5D01INN# |
| 136 | 0.138                  | 16                     | COG | 6.6pF       | ±0.1pF                   | CLR1C6R6B01INN# |
| 137 | 0.138                  | 16                     | COG | 6.6pF       | ±0.25pF                  | CLR1C6R6C01INN# |
| 138 | 0.138                  | 16                     | COG | 6.6pF       | ±0.5pF                   | CLR1C6R6D01INN# |
| 139 | 0.138                  | 16                     | COG | 6.7pF       | ±0.1pF                   | CLR1C6R7B01INN# |
| 140 | 0.138                  | 16                     | COG | 6.7pF       | ±0.25pF                  | CLR1C6R7C01INN# |
| 141 | 0.138                  | 16                     | COG | 6.7pF       | ±0.5pF                   | CLR1C6R7D01INN# |
| 142 | 0.138                  | 16                     | COG | 6.8pF       | ±0.1pF                   | CLR1C6R8B01INN# |
| 143 | 0.138                  | 16                     | COG | 6.8pF       | ±0.25pF                  | CLR1C6R8C01INN# |
| 144 | 0.138                  | 16                     | COG | 6.8pF       | ±0.5pF                   | CLR1C6R8D01INN# |
| 145 | 0.138                  | 16                     | COG | 6.9pF       | ±0.1pF                   | CLR1C6R9B01INN# |
| 146 | 0.138                  | 16                     | COG | 6.9pF       | ±0.25pF                  | CLR1C6R9C01INN# |
| 147 | 0.138                  | 16                     | COG | 6.9pF       | ±0.5pF                   | CLR1C6R9D01INN# |
| 148 | 0.138                  | 16                     | COG | 7pF         | ±0.1pF                   | CLR1C070B01INN# |
| 149 | 0.138                  | 16                     | COG | 7pF         | ±0.25pF                  | CLR1C070C01INN# |
| 150 | 0.138                  | 16                     | COG | 7pF         | ±0.5pF                   | CLR1C070D01INN# |
| 151 | 0.138                  | 16                     | COG | 7.1pF       | ±0.1pF                   | CLR1C7R1B01INN# |
| 152 | 0.138                  | 16                     | COG | 7.1pF       | ±0.25pF                  | CLR1C7R1C01INN# |
| 153 | 0.138                  | 16                     | COG | 7.1pF       | ±0.5pF                   | CLR1C7R1D01INN# |
| 154 | 0.138                  | 16                     | COG | 7.2pF       | ±0.1pF                   | CLR1C7R2B01INN# |
| 155 | 0.138                  | 16                     | COG | 7.2pF       | ±0.25pF                  | CLR1C7R2C01INN# |
| 156 | 0.138                  | 16                     | COG | 7.2pF       | ±0.5pF                   | CLR1C7R2D01INN# |
| 157 | 0.138                  | 16                     | COG | 7.3pF       | ±0.1pF                   | CLR1C7R3B01INN# |
| 158 | 0.138                  | 16                     | COG | 7.3pF       | ±0.25pF                  | CLR1C7R3C01INN# |
| 159 | 0.138                  | 16                     | COG | 7.3pF       | ±0.5pF                   | CLR1C7R3D01INN# |
| 160 | 0.138                  | 16                     | COG | 7.4pF       | ±0.1pF                   | CLR1C7R4B01INN# |



# Normal Capacitors\_Standard

Size Code (inch/mm) : 008004/0201

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 161 | 0.138                  | 16                     | COG | 7.4pF       | ±0.25pF                  | CLR1C7R4C01INN# |
| 162 | 0.138                  | 16                     | COG | 7.4pF       | ±0.5pF                   | CLR1C7R4D01INN# |
| 163 | 0.138                  | 16                     | COG | 7.5pF       | ±0.1pF                   | CLR1C7R5B01INN# |
| 164 | 0.138                  | 16                     | COG | 7.5pF       | ±0.25pF                  | CLR1C7R5C01INN# |
| 165 | 0.138                  | 16                     | COG | 7.5pF       | ±0.5pF                   | CLR1C7R5D01INN# |
| 166 | 0.138                  | 16                     | COG | 7.6pF       | ±0.1pF                   | CLR1C7R6B01INN# |
| 167 | 0.138                  | 16                     | COG | 7.6pF       | ±0.25pF                  | CLR1C7R6C01INN# |
| 168 | 0.138                  | 16                     | COG | 7.6pF       | ±0.5pF                   | CLR1C7R6D01INN# |
| 169 | 0.138                  | 16                     | COG | 7.7pF       | ±0.1pF                   | CLR1C7R7B01INN# |
| 170 | 0.138                  | 16                     | COG | 7.7pF       | ±0.25pF                  | CLR1C7R7C01INN# |
| 171 | 0.138                  | 16                     | COG | 7.7pF       | ±0.5pF                   | CLR1C7R7D01INN# |
| 172 | 0.138                  | 16                     | COG | 7.8pF       | ±0.1pF                   | CLR1C7R8B01INN# |
| 173 | 0.138                  | 16                     | COG | 7.8pF       | ±0.25pF                  | CLR1C7R8C01INN# |
| 174 | 0.138                  | 16                     | COG | 7.8pF       | ±0.5pF                   | CLR1C7R8D01INN# |
| 175 | 0.138                  | 16                     | COG | 7.9pF       | ±0.1pF                   | CLR1C7R9B01INN# |
| 176 | 0.138                  | 16                     | COG | 7.9pF       | ±0.25pF                  | CLR1C7R9C01INN# |
| 177 | 0.138                  | 16                     | COG | 7.9pF       | ±0.5pF                   | CLR1C7R9D01INN# |
| 178 | 0.138                  | 16                     | COG | 8pF         | ±0.1pF                   | CLR1C080B01INN# |
| 179 | 0.138                  | 16                     | COG | 8pF         | ±0.25pF                  | CLR1C080C01INN# |
| 180 | 0.138                  | 16                     | COG | 8pF         | ±0.5pF                   | CLR1C080D01INN# |
| 181 | 0.138                  | 16                     | COG | 8.1pF       | ±0.1pF                   | CLR1C8R1B01INN# |
| 182 | 0.138                  | 16                     | COG | 8.1pF       | ±0.25pF                  | CLR1C8R1C01INN# |
| 183 | 0.138                  | 16                     | COG | 8.1pF       | ±0.5pF                   | CLR1C8R1D01INN# |
| 184 | 0.138                  | 16                     | COG | 8.2pF       | ±0.1pF                   | CLR1C8R2B01INN# |
| 185 | 0.138                  | 16                     | COG | 8.2pF       | ±0.25pF                  | CLR1C8R2C01INN# |
| 186 | 0.138                  | 16                     | COG | 8.2pF       | ±0.5pF                   | CLR1C8R2D01INN# |
| 187 | 0.138                  | 16                     | COG | 8.3pF       | ±0.1pF                   | CLR1C8R3B01INN# |
| 188 | 0.138                  | 16                     | COG | 8.3pF       | ±0.25pF                  | CLR1C8R3C01INN# |
| 189 | 0.138                  | 16                     | COG | 8.3pF       | ±0.5pF                   | CLR1C8R3D01INN# |
| 190 | 0.138                  | 16                     | COG | 8.4pF       | ±0.1pF                   | CLR1C8R4B01INN# |
| 191 | 0.138                  | 16                     | COG | 8.4pF       | ±0.25pF                  | CLR1C8R4C01INN# |
| 192 | 0.138                  | 16                     | COG | 8.4pF       | ±0.5pF                   | CLR1C8R4D01INN# |
| 193 | 0.138                  | 16                     | COG | 8.5pF       | ±0.1pF                   | CLR1C8R5B01INN# |
| 194 | 0.138                  | 16                     | COG | 8.5pF       | ±0.25pF                  | CLR1C8R5C01INN# |
| 195 | 0.138                  | 16                     | COG | 8.5pF       | ±0.5pF                   | CLR1C8R5D01INN# |
| 196 | 0.138                  | 16                     | COG | 8.6pF       | ±0.1pF                   | CLR1C8R6B01INN# |
| 197 | 0.138                  | 16                     | COG | 8.6pF       | ±0.25pF                  | CLR1C8R6C01INN# |
| 198 | 0.138                  | 16                     | COG | 8.6pF       | ±0.5pF                   | CLR1C8R6D01INN# |
| 199 | 0.138                  | 16                     | COG | 8.7pF       | ±0.1pF                   | CLR1C8R7B01INN# |
| 200 | 0.138                  | 16                     | COG | 8.7pF       | ±0.25pF                  | CLR1C8R7C01INN# |
| 201 | 0.138                  | 16                     | COG | 8.7pF       | ±0.5pF                   | CLR1C8R7D01INN# |
| 202 | 0.138                  | 16                     | COG | 8.8pF       | ±0.1pF                   | CLR1C8R8B01INN# |
| 203 | 0.138                  | 16                     | COG | 8.8pF       | ±0.25pF                  | CLR1C8R8C01INN# |
| 204 | 0.138                  | 16                     | COG | 8.8pF       | ±0.5pF                   | CLR1C8R8D01INN# |
| 205 | 0.138                  | 16                     | COG | 8.9pF       | ±0.1pF                   | CLR1C8R9B01INN# |



# Normal Capacitors\_Standard

Size Code (inch/mm) : 008004/0201

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 206 | 0.138                  | 16                     | COG | 8.9pF       | ±0.25pF                  | CLR1C8R9C01INN# |
| 207 | 0.138                  | 16                     | COG | 8.9pF       | ±0.5pF                   | CLR1C8R9D01INN# |
| 208 | 0.138                  | 16                     | COG | 9pF         | ±0.1pF                   | CLR1C090B01INN# |
| 209 | 0.138                  | 16                     | COG | 9pF         | ±0.25pF                  | CLR1C090C01INN# |
| 210 | 0.138                  | 16                     | COG | 9pF         | ±0.5pF                   | CLR1C090D01INN# |
| 211 | 0.138                  | 16                     | COG | 9.1pF       | ±0.1pF                   | CLR1C9R1B01INN# |
| 212 | 0.138                  | 16                     | COG | 9.1pF       | ±0.25pF                  | CLR1C9R1C01INN# |
| 213 | 0.138                  | 16                     | COG | 9.1pF       | ±0.5pF                   | CLR1C9R1D01INN# |
| 214 | 0.138                  | 16                     | COG | 9.2pF       | ±0.1pF                   | CLR1C9R2B01INN# |
| 215 | 0.138                  | 16                     | COG | 9.2pF       | ±0.25pF                  | CLR1C9R2C01INN# |
| 216 | 0.138                  | 16                     | COG | 9.2pF       | ±0.5pF                   | CLR1C9R2D01INN# |
| 217 | 0.138                  | 16                     | COG | 9.3pF       | ±0.1pF                   | CLR1C9R3B01INN# |
| 218 | 0.138                  | 16                     | COG | 9.3pF       | ±0.25pF                  | CLR1C9R3C01INN# |
| 219 | 0.138                  | 16                     | COG | 9.3pF       | ±0.5pF                   | CLR1C9R3D01INN# |
| 220 | 0.138                  | 16                     | COG | 9.4pF       | ±0.1pF                   | CLR1C9R4B01INN# |
| 221 | 0.138                  | 16                     | COG | 9.4pF       | ±0.25pF                  | CLR1C9R4C01INN# |
| 222 | 0.138                  | 16                     | COG | 9.4pF       | ±0.5pF                   | CLR1C9R4D01INN# |
| 223 | 0.138                  | 16                     | COG | 9.5pF       | ±0.1pF                   | CLR1C9R5B01INN# |
| 224 | 0.138                  | 16                     | COG | 9.5pF       | ±0.25pF                  | CLR1C9R5C01INN# |
| 225 | 0.138                  | 16                     | COG | 9.5pF       | ±0.5pF                   | CLR1C9R5D01INN# |
| 226 | 0.138                  | 16                     | COG | 9.6pF       | ±0.1pF                   | CLR1C9R6B01INN# |
| 227 | 0.138                  | 16                     | COG | 9.6pF       | ±0.25pF                  | CLR1C9R6C01INN# |
| 228 | 0.138                  | 16                     | COG | 9.6pF       | ±0.5pF                   | CLR1C9R6D01INN# |
| 229 | 0.138                  | 16                     | COG | 9.7pF       | ±0.1pF                   | CLR1C9R7B01INN# |
| 230 | 0.138                  | 16                     | COG | 9.7pF       | ±0.25pF                  | CLR1C9R7C01INN# |
| 231 | 0.138                  | 16                     | COG | 9.7pF       | ±0.5pF                   | CLR1C9R7D01INN# |
| 232 | 0.138                  | 16                     | COG | 9.8pF       | ±0.1pF                   | CLR1C9R8B01INN# |
| 233 | 0.138                  | 16                     | COG | 9.8pF       | ±0.25pF                  | CLR1C9R8C01INN# |
| 234 | 0.138                  | 16                     | COG | 9.8pF       | ±0.5pF                   | CLR1C9R8D01INN# |
| 235 | 0.138                  | 16                     | COG | 9.9pF       | ±0.1pF                   | CLR1C9R9B01INN# |
| 236 | 0.138                  | 16                     | COG | 9.9pF       | ±0.25pF                  | CLR1C9R9C01INN# |
| 237 | 0.138                  | 16                     | COG | 9.9pF       | ±0.5pF                   | CLR1C9R9D01INN# |
| 238 | 0.138                  | 16                     | COG | 10pF        | ±0.05pF                  | CLR1C100A01INN# |
| 239 | 0.138                  | 16                     | COG | 10pF        | ±0.1pF                   | CLR1C100B01INN# |
| 240 | 0.138                  | 16                     | COG | 10pF        | ±0.25pF                  | CLR1C100C01INN# |
| 241 | 0.138                  | 16                     | COG | 10pF        | ±0.5pF                   | CLR1C100D01INN# |
| 242 | 0.138                  | 16                     | COG | 10pF        | ±5%                      | CLR1C100J01INN# |
| 243 | 0.138                  | 16                     | COG | 12pF        | ±5%                      | CLR1C120J01NNN# |
| 244 | 0.138                  | 16                     | COG | 15pF        | ±5%                      | CLR1C150J01NNN# |
| 245 | 0.138                  | 16                     | COG | 18pF        | ±5%                      | CLR1C180J01NNN# |
| 246 | 0.138                  | 16                     | COG | 22pF        | ±5%                      | CLR1C220J01NNN# |
| 247 | 0.138                  | 16                     | COG | 27pF        | ±5%                      | CLR1C270J01NNN# |
| 248 | 0.138                  | 16                     | COG | 33pF        | ±5%                      | CLR1C330J01NNN# |
| 249 | 0.138                  | 16                     | COG | 36pF        | ±5%                      | CLR1C360J01NNN# |
| 250 | 0.138                  | 16                     | COG | 39pF        | ±5%                      | CLR1C390J01NNN# |



# Normal Capacitors\_Standard

Size Code (inch/mm) : 008004/0201

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 251 | 0.138                  | 16                     | COG | 47pF        | ±5%                      | CLR1C470J01NNN# |
| 252 | 0.138                  | 16                     | COG | 56pF        | ±5%                      | CLR1C560J01NNN# |
| 253 | 0.138                  | 25                     | COG | 0.2pF       | ±0.05pF                  | CLR1C0R2AA1INN# |
| 254 | 0.138                  | 25                     | COG | 0.2pF       | ±0.1pF                   | CLR1C0R2BA1INN# |
| 255 | 0.138                  | 25                     | COG | 0.2pF       | ±0.1pF                   | CLR1C0R2BA1NNN# |
| 256 | 0.138                  | 25                     | COG | 0.3pF       | ±0.05pF                  | CLR1C0R3AA1INN# |
| 257 | 0.138                  | 25                     | COG | 0.3pF       | ±0.1pF                   | CLR1C0R3BA1INN# |
| 258 | 0.138                  | 25                     | COG | 0.3pF       | ±0.1pF                   | CLR1C0R3BA1NNN# |
| 259 | 0.138                  | 25                     | COG | 0.4pF       | ±0.05pF                  | CLR1C0R4AA1INN# |
| 260 | 0.138                  | 25                     | COG | 0.4pF       | ±0.1pF                   | CLR1C0R4BA1INN# |
| 261 | 0.138                  | 25                     | COG | 0.4pF       | ±0.1pF                   | CLR1C0R4BA1NNN# |
| 262 | 0.138                  | 25                     | COG | 0.5pF       | ±0.05pF                  | CLR1C0R5AA1INN# |
| 263 | 0.138                  | 25                     | COG | 0.5pF       | ±0.1pF                   | CLR1C0R5BA1INN# |
| 264 | 0.138                  | 25                     | COG | 0.5pF       | ±0.1pF                   | CLR1C0R5BA1NNN# |
| 265 | 0.138                  | 25                     | COG | 0.6pF       | ±0.05pF                  | CLR1C0R6AA1INN# |
| 266 | 0.138                  | 25                     | COG | 0.6pF       | ±0.1pF                   | CLR1C0R6BA1INN# |
| 267 | 0.138                  | 25                     | COG | 0.6pF       | ±0.1pF                   | CLR1C0R6BA1NNN# |
| 268 | 0.138                  | 25                     | COG | 0.7pF       | ±0.05pF                  | CLR1C0R7AA1INN# |
| 269 | 0.138                  | 25                     | COG | 0.7pF       | ±0.1pF                   | CLR1C0R7BA1INN# |
| 270 | 0.138                  | 25                     | COG | 0.7pF       | ±0.1pF                   | CLR1C0R7BA1NNN# |
| 271 | 0.138                  | 25                     | COG | 0.8pF       | ±0.05pF                  | CLR1C0R8AA1INN# |
| 272 | 0.138                  | 25                     | COG | 0.8pF       | ±0.1pF                   | CLR1C0R8BA1INN# |
| 273 | 0.138                  | 25                     | COG | 0.8pF       | ±0.1pF                   | CLR1C0R8BA1NNN# |
| 274 | 0.138                  | 25                     | COG | 0.9pF       | ±0.05pF                  | CLR1C0R9AA1INN# |
| 275 | 0.138                  | 25                     | COG | 0.9pF       | ±0.1pF                   | CLR1C0R9BA1INN# |
| 276 | 0.138                  | 25                     | COG | 1pF         | ±0.05pF                  | CLR1C010AA1INN# |
| 277 | 0.138                  | 25                     | COG | 1pF         | ±0.1pF                   | CLR1C010BA1INN# |
| 278 | 0.138                  | 25                     | COG | 1pF         | ±0.25pF                  | CLR1C010CA1INN# |
| 279 | 0.138                  | 25                     | COG | 1.1pF       | ±0.05pF                  | CLR1C1R1AA1INN# |
| 280 | 0.138                  | 25                     | COG | 1.1pF       | ±0.1pF                   | CLR1C1R1BA1INN# |
| 281 | 0.138                  | 25                     | COG | 1.1pF       | ±0.25pF                  | CLR1C1R1CA1INN# |
| 282 | 0.138                  | 25                     | COG | 1.2pF       | ±0.05pF                  | CLR1C1R2AA1INN# |
| 283 | 0.138                  | 25                     | COG | 1.2pF       | ±0.1pF                   | CLR1C1R2BA1INN# |
| 284 | 0.138                  | 25                     | COG | 1.2pF       | ±0.25pF                  | CLR1C1R2CA1INN# |
| 285 | 0.138                  | 25                     | COG | 1.3pF       | ±0.05pF                  | CLR1C1R3AA1INN# |
| 286 | 0.138                  | 25                     | COG | 1.3pF       | ±0.1pF                   | CLR1C1R3BA1INN# |
| 287 | 0.138                  | 25                     | COG | 1.3pF       | ±0.25pF                  | CLR1C1R3CA1INN# |
| 288 | 0.138                  | 25                     | COG | 1.4pF       | ±0.05pF                  | CLR1C1R4AA1INN# |
| 289 | 0.138                  | 25                     | COG | 1.4pF       | ±0.1pF                   | CLR1C1R4BA1INN# |
| 290 | 0.138                  | 25                     | COG | 1.4pF       | ±0.25pF                  | CLR1C1R4CA1INN# |
| 291 | 0.138                  | 25                     | COG | 1.5pF       | ±0.05pF                  | CLR1C1R5AA1INN# |
| 292 | 0.138                  | 25                     | COG | 1.5pF       | ±0.1pF                   | CLR1C1R5BA1INN# |
| 293 | 0.138                  | 25                     | COG | 1.5pF       | ±0.25pF                  | CLR1C1R5CA1INN# |
| 294 | 0.138                  | 25                     | COG | 1.6pF       | ±0.05pF                  | CLR1C1R6AA1INN# |
| 295 | 0.138                  | 25                     | COG | 1.6pF       | ±0.1pF                   | CLR1C1R6BA1INN# |



# Normal Capacitors\_Standard

Size Code (inch/mm) : 008004/0201

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 296 | 0.138                  | 25                     | COG | 1.6pF       | ±0.25pF                  | CLR1C1R6CA1INN# |
| 297 | 0.138                  | 25                     | COG | 1.7pF       | ±0.05pF                  | CLR1C1R7AA1INN# |
| 298 | 0.138                  | 25                     | COG | 1.7pF       | ±0.1pF                   | CLR1C1R7BA1INN# |
| 299 | 0.138                  | 25                     | COG | 1.7pF       | ±0.25pF                  | CLR1C1R7CA1INN# |
| 300 | 0.138                  | 25                     | COG | 1.8pF       | ±0.05pF                  | CLR1C1R8AA1INN# |
| 301 | 0.138                  | 25                     | COG | 1.8pF       | ±0.1pF                   | CLR1C1R8BA1INN# |
| 302 | 0.138                  | 25                     | COG | 1.8pF       | ±0.25pF                  | CLR1C1R8CA1INN# |
| 303 | 0.138                  | 25                     | COG | 1.9pF       | ±0.05pF                  | CLR1C1R9AA1INN# |
| 304 | 0.138                  | 25                     | COG | 1.9pF       | ±0.1pF                   | CLR1C1R9BA1INN# |
| 305 | 0.138                  | 25                     | COG | 1.9pF       | ±0.25pF                  | CLR1C1R9CA1INN# |
| 306 | 0.138                  | 25                     | COG | 2pF         | ±0.05pF                  | CLR1C020AA1INN# |
| 307 | 0.138                  | 25                     | COG | 2pF         | ±0.1pF                   | CLR1C020BA1INN# |
| 308 | 0.138                  | 25                     | COG | 2pF         | ±0.25pF                  | CLR1C020CA1INN# |
| 309 | 0.138                  | 25                     | COG | 2.1pF       | ±0.05pF                  | CLR1C2R1AA1INN# |
| 310 | 0.138                  | 25                     | COG | 2.1pF       | ±0.1pF                   | CLR1C2R1BA1INN# |
| 311 | 0.138                  | 25                     | COG | 2.1pF       | ±0.25pF                  | CLR1C2R1CA1INN# |
| 312 | 0.138                  | 25                     | COG | 2.2pF       | ±0.05pF                  | CLR1C2R2AA1INN# |
| 313 | 0.138                  | 25                     | COG | 2.2pF       | ±0.1pF                   | CLR1C2R2BA1INN# |
| 314 | 0.138                  | 25                     | COG | 2.2pF       | ±0.25pF                  | CLR1C2R2CA1INN# |
| 315 | 0.138                  | 25                     | COG | 2.3pF       | ±0.05pF                  | CLR1C2R3AA1INN# |
| 316 | 0.138                  | 25                     | COG | 2.3pF       | ±0.1pF                   | CLR1C2R3BA1INN# |
| 317 | 0.138                  | 25                     | COG | 2.3pF       | ±0.25pF                  | CLR1C2R3CA1INN# |
| 318 | 0.138                  | 25                     | COG | 2.4pF       | ±0.05pF                  | CLR1C2R4AA1INN# |
| 319 | 0.138                  | 25                     | COG | 2.4pF       | ±0.1pF                   | CLR1C2R4BA1INN# |
| 320 | 0.138                  | 25                     | COG | 2.4pF       | ±0.25pF                  | CLR1C2R4CA1INN# |
| 321 | 0.138                  | 25                     | COG | 2.5pF       | ±0.05pF                  | CLR1C2R5AA1INN# |
| 322 | 0.138                  | 25                     | COG | 2.5pF       | ±0.1pF                   | CLR1C2R5BA1INN# |
| 323 | 0.138                  | 25                     | COG | 2.5pF       | ±0.25pF                  | CLR1C2R5CA1INN# |
| 324 | 0.138                  | 25                     | COG | 2.6pF       | ±0.05pF                  | CLR1C2R6AA1INN# |
| 325 | 0.138                  | 25                     | COG | 2.6pF       | ±0.1pF                   | CLR1C2R6BA1INN# |
| 326 | 0.138                  | 25                     | COG | 2.6pF       | ±0.25pF                  | CLR1C2R6CA1INN# |
| 327 | 0.138                  | 25                     | COG | 2.7pF       | ±0.05pF                  | CLR1C2R7AA1INN# |
| 328 | 0.138                  | 25                     | COG | 2.7pF       | ±0.1pF                   | CLR1C2R7BA1INN# |
| 329 | 0.138                  | 25                     | COG | 2.7pF       | ±0.25pF                  | CLR1C2R7CA1INN# |
| 330 | 0.138                  | 25                     | COG | 2.8pF       | ±0.05pF                  | CLR1C2R8AA1INN# |
| 331 | 0.138                  | 25                     | COG | 2.8pF       | ±0.1pF                   | CLR1C2R8BA1INN# |
| 332 | 0.138                  | 25                     | COG | 2.8pF       | ±0.25pF                  | CLR1C2R8CA1INN# |
| 333 | 0.138                  | 25                     | COG | 2.9pF       | ±0.05pF                  | CLR1C2R9AA1INN# |
| 334 | 0.138                  | 25                     | COG | 2.9pF       | ±0.1pF                   | CLR1C2R9BA1INN# |
| 335 | 0.138                  | 25                     | COG | 2.9pF       | ±0.25pF                  | CLR1C2R9CA1INN# |
| 336 | 0.138                  | 25                     | COG | 3pF         | ±0.05pF                  | CLR1C030AA1INN# |
| 337 | 0.138                  | 25                     | COG | 3pF         | ±0.1pF                   | CLR1C030BA1INN# |
| 338 | 0.138                  | 25                     | COG | 3pF         | ±0.25pF                  | CLR1C030CA1INN# |
| 339 | 0.138                  | 25                     | COG | 3.1pF       | ±0.05pF                  | CLR1C3R1AA1INN# |
| 340 | 0.138                  | 25                     | COG | 3.1pF       | ±0.1pF                   | CLR1C3R1BA1INN# |



# Normal Capacitors\_Standard

Size Code (inch/mm) : 008004/0201

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 341 | 0.138                  | 25                     | COG | 3.1pF       | ±0.25pF                  | CLR1C3R1CA1INN# |
| 342 | 0.138                  | 25                     | COG | 3.2pF       | ±0.05pF                  | CLR1C3R2AA1INN# |
| 343 | 0.138                  | 25                     | COG | 3.2pF       | ±0.1pF                   | CLR1C3R2BA1INN# |
| 344 | 0.138                  | 25                     | COG | 3.2pF       | ±0.25pF                  | CLR1C3R2CA1INN# |
| 345 | 0.138                  | 25                     | COG | 3.3pF       | ±0.05pF                  | CLR1C3R3AA1INN# |
| 346 | 0.138                  | 25                     | COG | 3.3pF       | ±0.1pF                   | CLR1C3R3BA1INN# |
| 347 | 0.138                  | 25                     | COG | 3.3pF       | ±0.25pF                  | CLR1C3R3CA1INN# |
| 348 | 0.138                  | 25                     | COG | 3.4pF       | ±0.05pF                  | CLR1C3R4AA1INN# |
| 349 | 0.138                  | 25                     | COG | 3.4pF       | ±0.1pF                   | CLR1C3R4BA1INN# |
| 350 | 0.138                  | 25                     | COG | 3.4pF       | ±0.25pF                  | CLR1C3R4CA1INN# |
| 351 | 0.138                  | 25                     | COG | 3.5pF       | ±0.05pF                  | CLR1C3R5AA1INN# |
| 352 | 0.138                  | 25                     | COG | 3.5pF       | ±0.1pF                   | CLR1C3R5BA1INN# |
| 353 | 0.138                  | 25                     | COG | 3.5pF       | ±0.25pF                  | CLR1C3R5CA1INN# |
| 354 | 0.138                  | 25                     | COG | 3.6pF       | ±0.05pF                  | CLR1C3R6AA1INN# |
| 355 | 0.138                  | 25                     | COG | 3.6pF       | ±0.1pF                   | CLR1C3R6BA1INN# |
| 356 | 0.138                  | 25                     | COG | 3.6pF       | ±0.25pF                  | CLR1C3R6CA1INN# |
| 357 | 0.138                  | 25                     | COG | 3.7pF       | ±0.05pF                  | CLR1C3R7AA1INN# |
| 358 | 0.138                  | 25                     | COG | 3.7pF       | ±0.1pF                   | CLR1C3R7BA1INN# |
| 359 | 0.138                  | 25                     | COG | 3.7pF       | ±0.25pF                  | CLR1C3R7CA1INN# |
| 360 | 0.138                  | 25                     | COG | 3.8pF       | ±0.05pF                  | CLR1C3R8AA1INN# |
| 361 | 0.138                  | 25                     | COG | 3.8pF       | ±0.1pF                   | CLR1C3R8BA1INN# |
| 362 | 0.138                  | 25                     | COG | 3.8pF       | ±0.25pF                  | CLR1C3R8CA1INN# |
| 363 | 0.138                  | 25                     | COG | 3.9pF       | ±0.05pF                  | CLR1C3R9AA1INN# |
| 364 | 0.138                  | 25                     | COG | 3.9pF       | ±0.1pF                   | CLR1C3R9BA1INN# |
| 365 | 0.138                  | 25                     | COG | 3.9pF       | ±0.25pF                  | CLR1C3R9CA1INN# |
| 366 | 0.138                  | 25                     | COG | 4pF         | ±0.05pF                  | CLR1C040AA1INN# |
| 367 | 0.138                  | 25                     | COG | 4pF         | ±0.1pF                   | CLR1C040BA1INN# |
| 368 | 0.138                  | 25                     | COG | 4pF         | ±0.25pF                  | CLR1C040CA1INN# |
| 369 | 0.138                  | 25                     | COG | 4.1pF       | ±0.05pF                  | CLR1C4R1AA1INN# |
| 370 | 0.138                  | 25                     | COG | 4.1pF       | ±0.1pF                   | CLR1C4R1BA1INN# |
| 371 | 0.138                  | 25                     | COG | 4.1pF       | ±0.25pF                  | CLR1C4R1CA1INN# |
| 372 | 0.138                  | 25                     | COG | 4.2pF       | ±0.05pF                  | CLR1C4R2AA1INN# |
| 373 | 0.138                  | 25                     | COG | 4.2pF       | ±0.1pF                   | CLR1C4R2BA1INN# |
| 374 | 0.138                  | 25                     | COG | 4.2pF       | ±0.25pF                  | CLR1C4R2CA1INN# |
| 375 | 0.138                  | 25                     | COG | 4.3pF       | ±0.05pF                  | CLR1C4R3AA1INN# |
| 376 | 0.138                  | 25                     | COG | 4.3pF       | ±0.1pF                   | CLR1C4R3BA1INN# |
| 377 | 0.138                  | 25                     | COG | 4.3pF       | ±0.25pF                  | CLR1C4R3CA1INN# |
| 378 | 0.138                  | 25                     | COG | 4.4pF       | ±0.05pF                  | CLR1C4R4AA1INN# |
| 379 | 0.138                  | 25                     | COG | 4.4pF       | ±0.1pF                   | CLR1C4R4BA1INN# |
| 380 | 0.138                  | 25                     | COG | 4.4pF       | ±0.25pF                  | CLR1C4R4CA1INN# |
| 381 | 0.138                  | 25                     | COG | 4.5pF       | ±0.05pF                  | CLR1C4R5AA1INN# |
| 382 | 0.138                  | 25                     | COG | 4.5pF       | ±0.1pF                   | CLR1C4R5BA1INN# |
| 383 | 0.138                  | 25                     | COG | 4.5pF       | ±0.25pF                  | CLR1C4R5CA1INN# |
| 384 | 0.138                  | 25                     | COG | 4.6pF       | ±0.05pF                  | CLR1C4R6AA1INN# |
| 385 | 0.138                  | 25                     | COG | 4.6pF       | ±0.1pF                   | CLR1C4R6BA1INN# |



# Normal Capacitors\_Standard

Size Code (inch/mm) : 008004/0201

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 386 | 0.138                  | 25                     | COG | 4.6pF       | ±0.25pF                  | CLR1C4R6CA1INN# |
| 387 | 0.138                  | 25                     | COG | 4.7pF       | ±0.05pF                  | CLR1C4R7AA1INN# |
| 388 | 0.138                  | 25                     | COG | 4.7pF       | ±0.1pF                   | CLR1C4R7BA1INN# |
| 389 | 0.138                  | 25                     | COG | 4.7pF       | ±0.25pF                  | CLR1C4R7CA1INN# |
| 390 | 0.138                  | 25                     | COG | 4.8pF       | ±0.05pF                  | CLR1C4R8AA1INN# |
| 391 | 0.138                  | 25                     | COG | 4.8pF       | ±0.1pF                   | CLR1C4R8BA1INN# |
| 392 | 0.138                  | 25                     | COG | 4.8pF       | ±0.25pF                  | CLR1C4R8CA1INN# |
| 393 | 0.138                  | 25                     | COG | 4.9pF       | ±0.05pF                  | CLR1C4R9AA1INN# |
| 394 | 0.138                  | 25                     | COG | 4.9pF       | ±0.1pF                   | CLR1C4R9BA1INN# |
| 395 | 0.138                  | 25                     | COG | 4.9pF       | ±0.25pF                  | CLR1C4R9CA1INN# |
| 396 | 0.138                  | 25                     | COG | 5pF         | ±0.05pF                  | CLR1C050AA1INN# |
| 397 | 0.138                  | 25                     | COG | 5pF         | ±0.1pF                   | CLR1C050BA1INN# |
| 398 | 0.138                  | 25                     | COG | 5pF         | ±0.1pF                   | CLR1C050BA1NNN# |
| 399 | 0.138                  | 25                     | COG | 5pF         | ±0.25pF                  | CLR1C050CA1INN# |
| 400 | 0.138                  | 25                     | COG | 5.1pF       | ±0.05pF                  | CLR1C5R1AA1INN# |
| 401 | 0.138                  | 25                     | COG | 5.1pF       | ±0.1pF                   | CLR1C5R1BA1INN# |
| 402 | 0.138                  | 25                     | COG | 5.1pF       | ±0.25pF                  | CLR1C5R1CA1INN# |
| 403 | 0.138                  | 25                     | COG | 5.1pF       | ±0.5pF                   | CLR1C5R1DA1INN# |
| 404 | 0.138                  | 25                     | COG | 5.2pF       | ±0.05pF                  | CLR1C5R2AA1INN# |
| 405 | 0.138                  | 25                     | COG | 5.2pF       | ±0.1pF                   | CLR1C5R2BA1INN# |
| 406 | 0.138                  | 25                     | COG | 5.2pF       | ±0.25pF                  | CLR1C5R2CA1INN# |
| 407 | 0.138                  | 25                     | COG | 5.2pF       | ±0.5pF                   | CLR1C5R2DA1INN# |
| 408 | 0.138                  | 25                     | COG | 5.3pF       | ±0.05pF                  | CLR1C5R3AA1INN# |
| 409 | 0.138                  | 25                     | COG | 5.3pF       | ±0.1pF                   | CLR1C5R3BA1INN# |
| 410 | 0.138                  | 25                     | COG | 5.3pF       | ±0.25pF                  | CLR1C5R3CA1INN# |
| 411 | 0.138                  | 25                     | COG | 5.3pF       | ±0.5pF                   | CLR1C5R3DA1INN# |
| 412 | 0.138                  | 25                     | COG | 5.4pF       | ±0.05pF                  | CLR1C5R4AA1INN# |
| 413 | 0.138                  | 25                     | COG | 5.4pF       | ±0.1pF                   | CLR1C5R4BA1INN# |
| 414 | 0.138                  | 25                     | COG | 5.4pF       | ±0.25pF                  | CLR1C5R4CA1INN# |
| 415 | 0.138                  | 25                     | COG | 5.4pF       | ±0.5pF                   | CLR1C5R4DA1INN# |
| 416 | 0.138                  | 25                     | COG | 5.5pF       | ±0.05pF                  | CLR1C5R5AA1INN# |
| 417 | 0.138                  | 25                     | COG | 5.5pF       | ±0.1pF                   | CLR1C5R5BA1INN# |
| 418 | 0.138                  | 25                     | COG | 5.5pF       | ±0.25pF                  | CLR1C5R5CA1INN# |
| 419 | 0.138                  | 25                     | COG | 5.5pF       | ±0.5pF                   | CLR1C5R5DA1INN# |
| 420 | 0.138                  | 25                     | COG | 5.6pF       | ±0.05pF                  | CLR1C5R6AA1INN# |
| 421 | 0.138                  | 25                     | COG | 5.6pF       | ±0.1pF                   | CLR1C5R6BA1INN# |
| 422 | 0.138                  | 25                     | COG | 5.6pF       | ±0.25pF                  | CLR1C5R6CA1INN# |
| 423 | 0.138                  | 25                     | COG | 5.6pF       | ±0.5pF                   | CLR1C5R6DA1INN# |
| 424 | 0.138                  | 25                     | COG | 5.7pF       | ±0.05pF                  | CLR1C5R7AA1INN# |
| 425 | 0.138                  | 25                     | COG | 5.7pF       | ±0.1pF                   | CLR1C5R7BA1INN# |
| 426 | 0.138                  | 25                     | COG | 5.7pF       | ±0.25pF                  | CLR1C5R7CA1INN# |
| 427 | 0.138                  | 25                     | COG | 5.7pF       | ±0.5pF                   | CLR1C5R7DA1INN# |
| 428 | 0.138                  | 25                     | COG | 5.8pF       | ±0.05pF                  | CLR1C5R8AA1INN# |
| 429 | 0.138                  | 25                     | COG | 5.8pF       | ±0.1pF                   | CLR1C5R8BA1INN# |
| 430 | 0.138                  | 25                     | COG | 5.8pF       | ±0.25pF                  | CLR1C5R8CA1INN# |



# Normal Capacitors\_Standard

Size Code (inch/mm) : 008004/0201

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 431 | 0.138                  | 25                     | COG | 5.8pF       | ±0.5pF                   | CLR1C5R8DA1INN# |
| 432 | 0.138                  | 25                     | COG | 5.9pF       | ±0.05pF                  | CLR1C5R9AA1INN# |
| 433 | 0.138                  | 25                     | COG | 5.9pF       | ±0.1pF                   | CLR1C5R9BA1INN# |
| 434 | 0.138                  | 25                     | COG | 5.9pF       | ±0.25pF                  | CLR1C5R9CA1INN# |
| 435 | 0.138                  | 25                     | COG | 5.9pF       | ±0.5pF                   | CLR1C5R9DA1INN# |
| 436 | 0.138                  | 25                     | COG | 6pF         | ±0.05pF                  | CLR1C060AA1INN# |
| 437 | 0.138                  | 25                     | COG | 6pF         | ±0.1pF                   | CLR1C060BA1INN# |
| 438 | 0.138                  | 25                     | COG | 6pF         | ±0.25pF                  | CLR1C060CA1INN# |
| 439 | 0.138                  | 25                     | COG | 6pF         | ±0.5pF                   | CLR1C060DA1INN# |
| 440 | 0.138                  | 25                     | COG | 6.1pF       | ±0.05pF                  | CLR1C6R1AA1INN# |
| 441 | 0.138                  | 25                     | COG | 6.1pF       | ±0.1pF                   | CLR1C6R1BA1INN# |
| 442 | 0.138                  | 25                     | COG | 6.1pF       | ±0.25pF                  | CLR1C6R1CA1INN# |
| 443 | 0.138                  | 25                     | COG | 6.1pF       | ±0.5pF                   | CLR1C6R1DA1INN# |
| 444 | 0.138                  | 25                     | COG | 6.2pF       | ±0.05pF                  | CLR1C6R2AA1INN# |
| 445 | 0.138                  | 25                     | COG | 6.2pF       | ±0.1pF                   | CLR1C6R2BA1INN# |
| 446 | 0.138                  | 25                     | COG | 6.2pF       | ±0.25pF                  | CLR1C6R2CA1INN# |
| 447 | 0.138                  | 25                     | COG | 6.2pF       | ±0.5pF                   | CLR1C6R2DA1INN# |
| 448 | 0.138                  | 25                     | COG | 6.3pF       | ±0.05pF                  | CLR1C6R3AA1INN# |
| 449 | 0.138                  | 25                     | COG | 6.3pF       | ±0.1pF                   | CLR1C6R3BA1INN# |
| 450 | 0.138                  | 25                     | COG | 6.3pF       | ±0.25pF                  | CLR1C6R3CA1INN# |
| 451 | 0.138                  | 25                     | COG | 6.3pF       | ±0.5pF                   | CLR1C6R3DA1INN# |
| 452 | 0.138                  | 25                     | COG | 6.4pF       | ±0.05pF                  | CLR1C6R4AA1INN# |
| 453 | 0.138                  | 25                     | COG | 6.4pF       | ±0.1pF                   | CLR1C6R4BA1INN# |
| 454 | 0.138                  | 25                     | COG | 6.4pF       | ±0.25pF                  | CLR1C6R4CA1INN# |
| 455 | 0.138                  | 25                     | COG | 6.4pF       | ±0.5pF                   | CLR1C6R4DA1INN# |
| 456 | 0.138                  | 25                     | COG | 6.5pF       | ±0.05pF                  | CLR1C6R5AA1INN# |
| 457 | 0.138                  | 25                     | COG | 6.5pF       | ±0.1pF                   | CLR1C6R5BA1INN# |
| 458 | 0.138                  | 25                     | COG | 6.5pF       | ±0.25pF                  | CLR1C6R5CA1INN# |
| 459 | 0.138                  | 25                     | COG | 6.5pF       | ±0.5pF                   | CLR1C6R5DA1INN# |
| 460 | 0.138                  | 25                     | COG | 6.6pF       | ±0.05pF                  | CLR1C6R6AA1INN# |
| 461 | 0.138                  | 25                     | COG | 6.6pF       | ±0.1pF                   | CLR1C6R6BA1INN# |
| 462 | 0.138                  | 25                     | COG | 6.6pF       | ±0.25pF                  | CLR1C6R6CA1INN# |
| 463 | 0.138                  | 25                     | COG | 6.6pF       | ±0.5pF                   | CLR1C6R6DA1INN# |
| 464 | 0.138                  | 25                     | COG | 6.7pF       | ±0.05pF                  | CLR1C6R7AA1INN# |
| 465 | 0.138                  | 25                     | COG | 6.7pF       | ±0.1pF                   | CLR1C6R7BA1INN# |
| 466 | 0.138                  | 25                     | COG | 6.7pF       | ±0.25pF                  | CLR1C6R7CA1INN# |
| 467 | 0.138                  | 25                     | COG | 6.7pF       | ±0.5pF                   | CLR1C6R7DA1INN# |
| 468 | 0.138                  | 25                     | COG | 6.8pF       | ±0.05pF                  | CLR1C6R8AA1INN# |
| 469 | 0.138                  | 25                     | COG | 6.8pF       | ±0.1pF                   | CLR1C6R8BA1INN# |
| 470 | 0.138                  | 25                     | COG | 6.8pF       | ±0.25pF                  | CLR1C6R8CA1INN# |
| 471 | 0.138                  | 25                     | COG | 6.8pF       | ±0.5pF                   | CLR1C6R8DA1INN# |
| 472 | 0.138                  | 25                     | COG | 6.9pF       | ±0.05pF                  | CLR1C6R9AA1INN# |
| 473 | 0.138                  | 25                     | COG | 6.9pF       | ±0.1pF                   | CLR1C6R9BA1INN# |
| 474 | 0.138                  | 25                     | COG | 6.9pF       | ±0.25pF                  | CLR1C6R9CA1INN# |
| 475 | 0.138                  | 25                     | COG | 6.9pF       | ±0.5pF                   | CLR1C6R9DA1INN# |



# Normal Capacitors\_Standard

Size Code (inch/mm) : 008004/0201

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 476 | 0.138                  | 25                     | COG | 7pF         | ±0.05pF                  | CLR1C070AA1INN# |
| 477 | 0.138                  | 25                     | COG | 7pF         | ±0.1pF                   | CLR1C070BA1INN# |
| 478 | 0.138                  | 25                     | COG | 7pF         | ±0.25pF                  | CLR1C070CA1INN# |
| 479 | 0.138                  | 25                     | COG | 7pF         | ±0.5pF                   | CLR1C070DA1INN# |
| 480 | 0.138                  | 25                     | COG | 7.1pF       | ±0.05pF                  | CLR1C7R1AA1INN# |
| 481 | 0.138                  | 25                     | COG | 7.1pF       | ±0.1pF                   | CLR1C7R1BA1INN# |
| 482 | 0.138                  | 25                     | COG | 7.1pF       | ±0.25pF                  | CLR1C7R1CA1INN# |
| 483 | 0.138                  | 25                     | COG | 7.1pF       | ±0.5pF                   | CLR1C7R1DA1INN# |
| 484 | 0.138                  | 25                     | COG | 7.2pF       | ±0.05pF                  | CLR1C7R2AA1INN# |
| 485 | 0.138                  | 25                     | COG | 7.2pF       | ±0.1pF                   | CLR1C7R2BA1INN# |
| 486 | 0.138                  | 25                     | COG | 7.2pF       | ±0.25pF                  | CLR1C7R2CA1INN# |
| 487 | 0.138                  | 25                     | COG | 7.2pF       | ±0.5pF                   | CLR1C7R2DA1INN# |
| 488 | 0.138                  | 25                     | COG | 7.3pF       | ±0.05pF                  | CLR1C7R3AA1INN# |
| 489 | 0.138                  | 25                     | COG | 7.3pF       | ±0.1pF                   | CLR1C7R3BA1INN# |
| 490 | 0.138                  | 25                     | COG | 7.3pF       | ±0.25pF                  | CLR1C7R3CA1INN# |
| 491 | 0.138                  | 25                     | COG | 7.3pF       | ±0.5pF                   | CLR1C7R3DA1INN# |
| 492 | 0.138                  | 25                     | COG | 7.4pF       | ±0.05pF                  | CLR1C7R4AA1INN# |
| 493 | 0.138                  | 25                     | COG | 7.4pF       | ±0.1pF                   | CLR1C7R4BA1INN# |
| 494 | 0.138                  | 25                     | COG | 7.4pF       | ±0.25pF                  | CLR1C7R4CA1INN# |
| 495 | 0.138                  | 25                     | COG | 7.4pF       | ±0.5pF                   | CLR1C7R4DA1INN# |
| 496 | 0.138                  | 25                     | COG | 7.5pF       | ±0.05pF                  | CLR1C7R5AA1INN# |
| 497 | 0.138                  | 25                     | COG | 7.5pF       | ±0.1pF                   | CLR1C7R5BA1INN# |
| 498 | 0.138                  | 25                     | COG | 7.5pF       | ±0.25pF                  | CLR1C7R5CA1INN# |
| 499 | 0.138                  | 25                     | COG | 7.5pF       | ±0.5pF                   | CLR1C7R5DA1INN# |
| 500 | 0.138                  | 25                     | COG | 7.6pF       | ±0.05pF                  | CLR1C7R6AA1INN# |
| 501 | 0.138                  | 25                     | COG | 7.6pF       | ±0.1pF                   | CLR1C7R6BA1INN# |
| 502 | 0.138                  | 25                     | COG | 7.6pF       | ±0.25pF                  | CLR1C7R6CA1INN# |
| 503 | 0.138                  | 25                     | COG | 7.6pF       | ±0.5pF                   | CLR1C7R6DA1INN# |
| 504 | 0.138                  | 25                     | COG | 7.7pF       | ±0.05pF                  | CLR1C7R7AA1INN# |
| 505 | 0.138                  | 25                     | COG | 7.7pF       | ±0.1pF                   | CLR1C7R7BA1INN# |
| 506 | 0.138                  | 25                     | COG | 7.7pF       | ±0.25pF                  | CLR1C7R7CA1INN# |
| 507 | 0.138                  | 25                     | COG | 7.7pF       | ±0.5pF                   | CLR1C7R7DA1INN# |
| 508 | 0.138                  | 25                     | COG | 7.8pF       | ±0.05pF                  | CLR1C7R8AA1INN# |
| 509 | 0.138                  | 25                     | COG | 7.8pF       | ±0.1pF                   | CLR1C7R8BA1INN# |
| 510 | 0.138                  | 25                     | COG | 7.8pF       | ±0.25pF                  | CLR1C7R8CA1INN# |
| 511 | 0.138                  | 25                     | COG | 7.8pF       | ±0.5pF                   | CLR1C7R8DA1INN# |
| 512 | 0.138                  | 25                     | COG | 7.9pF       | ±0.05pF                  | CLR1C7R9AA1INN# |
| 513 | 0.138                  | 25                     | COG | 7.9pF       | ±0.1pF                   | CLR1C7R9BA1INN# |
| 514 | 0.138                  | 25                     | COG | 7.9pF       | ±0.25pF                  | CLR1C7R9CA1INN# |
| 515 | 0.138                  | 25                     | COG | 7.9pF       | ±0.5pF                   | CLR1C7R9DA1INN# |
| 516 | 0.138                  | 25                     | COG | 8pF         | ±0.05pF                  | CLR1C080AA1INN# |
| 517 | 0.138                  | 25                     | COG | 8pF         | ±0.1pF                   | CLR1C080BA1INN# |
| 518 | 0.138                  | 25                     | COG | 8pF         | ±0.25pF                  | CLR1C080CA1INN# |
| 519 | 0.138                  | 25                     | COG | 8pF         | ±0.5pF                   | CLR1C080DA1INN# |
| 520 | 0.138                  | 25                     | COG | 8.1pF       | ±0.05pF                  | CLR1C8R1AA1INN# |



# Normal Capacitors\_Standard

Size Code (inch/mm) : 008004/0201

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 521 | 0.138                  | 25                     | COG | 8.1pF       | ±0.1pF                   | CLR1C8R1BA1INN# |
| 522 | 0.138                  | 25                     | COG | 8.1pF       | ±0.25pF                  | CLR1C8R1CA1INN# |
| 523 | 0.138                  | 25                     | COG | 8.1pF       | ±0.5pF                   | CLR1C8R1DA1INN# |
| 524 | 0.138                  | 25                     | COG | 8.2pF       | ±0.05pF                  | CLR1C8R2AA1INN# |
| 525 | 0.138                  | 25                     | COG | 8.2pF       | ±0.1pF                   | CLR1C8R2BA1INN# |
| 526 | 0.138                  | 25                     | COG | 8.2pF       | ±0.25pF                  | CLR1C8R2CA1INN# |
| 527 | 0.138                  | 25                     | COG | 8.2pF       | ±0.5pF                   | CLR1C8R2DA1INN# |
| 528 | 0.138                  | 25                     | COG | 8.3pF       | ±0.05pF                  | CLR1C8R3AA1INN# |
| 529 | 0.138                  | 25                     | COG | 8.3pF       | ±0.1pF                   | CLR1C8R3BA1INN# |
| 530 | 0.138                  | 25                     | COG | 8.3pF       | ±0.25pF                  | CLR1C8R3CA1INN# |
| 531 | 0.138                  | 25                     | COG | 8.3pF       | ±0.5pF                   | CLR1C8R3DA1INN# |
| 532 | 0.138                  | 25                     | COG | 8.4pF       | ±0.05pF                  | CLR1C8R4AA1INN# |
| 533 | 0.138                  | 25                     | COG | 8.4pF       | ±0.1pF                   | CLR1C8R4BA1INN# |
| 534 | 0.138                  | 25                     | COG | 8.4pF       | ±0.25pF                  | CLR1C8R4CA1INN# |
| 535 | 0.138                  | 25                     | COG | 8.4pF       | ±0.5pF                   | CLR1C8R4DA1INN# |
| 536 | 0.138                  | 25                     | COG | 8.5pF       | ±0.05pF                  | CLR1C8R5AA1INN# |
| 537 | 0.138                  | 25                     | COG | 8.5pF       | ±0.1pF                   | CLR1C8R5BA1INN# |
| 538 | 0.138                  | 25                     | COG | 8.5pF       | ±0.25pF                  | CLR1C8R5CA1INN# |
| 539 | 0.138                  | 25                     | COG | 8.5pF       | ±0.5pF                   | CLR1C8R5DA1INN# |
| 540 | 0.138                  | 25                     | COG | 8.6pF       | ±0.05pF                  | CLR1C8R6AA1INN# |
| 541 | 0.138                  | 25                     | COG | 8.6pF       | ±0.1pF                   | CLR1C8R6BA1INN# |
| 542 | 0.138                  | 25                     | COG | 8.6pF       | ±0.25pF                  | CLR1C8R6CA1INN# |
| 543 | 0.138                  | 25                     | COG | 8.6pF       | ±0.5pF                   | CLR1C8R6DA1INN# |
| 544 | 0.138                  | 25                     | COG | 8.7pF       | ±0.05pF                  | CLR1C8R7AA1INN# |
| 545 | 0.138                  | 25                     | COG | 8.7pF       | ±0.1pF                   | CLR1C8R7BA1INN# |
| 546 | 0.138                  | 25                     | COG | 8.7pF       | ±0.25pF                  | CLR1C8R7CA1INN# |
| 547 | 0.138                  | 25                     | COG | 8.7pF       | ±0.5pF                   | CLR1C8R7DA1INN# |
| 548 | 0.138                  | 25                     | COG | 8.8pF       | ±0.05pF                  | CLR1C8R8AA1INN# |
| 549 | 0.138                  | 25                     | COG | 8.8pF       | ±0.1pF                   | CLR1C8R8BA1INN# |
| 550 | 0.138                  | 25                     | COG | 8.8pF       | ±0.25pF                  | CLR1C8R8CA1INN# |
| 551 | 0.138                  | 25                     | COG | 8.8pF       | ±0.5pF                   | CLR1C8R8DA1INN# |
| 552 | 0.138                  | 25                     | COG | 8.9pF       | ±0.05pF                  | CLR1C8R9AA1INN# |
| 553 | 0.138                  | 25                     | COG | 8.9pF       | ±0.1pF                   | CLR1C8R9BA1INN# |
| 554 | 0.138                  | 25                     | COG | 8.9pF       | ±0.25pF                  | CLR1C8R9CA1INN# |
| 555 | 0.138                  | 25                     | COG | 8.9pF       | ±0.5pF                   | CLR1C8R9DA1INN# |
| 556 | 0.138                  | 25                     | COG | 9pF         | ±0.05pF                  | CLR1C090AA1INN# |
| 557 | 0.138                  | 25                     | COG | 9pF         | ±0.1pF                   | CLR1C090BA1INN# |
| 558 | 0.138                  | 25                     | COG | 9pF         | ±0.25pF                  | CLR1C090CA1INN# |
| 559 | 0.138                  | 25                     | COG | 9pF         | ±0.5pF                   | CLR1C090DA1INN# |
| 560 | 0.138                  | 25                     | COG | 9.1pF       | ±0.05pF                  | CLR1C9R1AA1INN# |
| 561 | 0.138                  | 25                     | COG | 9.1pF       | ±0.1pF                   | CLR1C9R1BA1INN# |
| 562 | 0.138                  | 25                     | COG | 9.1pF       | ±0.25pF                  | CLR1C9R1CA1INN# |
| 563 | 0.138                  | 25                     | COG | 9.1pF       | ±0.5pF                   | CLR1C9R1DA1INN# |
| 564 | 0.138                  | 25                     | COG | 9.2pF       | ±0.05pF                  | CLR1C9R2AA1INN# |
| 565 | 0.138                  | 25                     | COG | 9.2pF       | ±0.1pF                   | CLR1C9R2BA1INN# |



# Normal Capacitors\_Standard

Size Code (inch/mm) : 008004/0201

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 566 | 0.138                  | 25                     | COG | 9.2pF       | ±0.25pF                  | CLR1C9R2CA1INN# |
| 567 | 0.138                  | 25                     | COG | 9.2pF       | ±0.5pF                   | CLR1C9R2DA1INN# |
| 568 | 0.138                  | 25                     | COG | 9.3pF       | ±0.05pF                  | CLR1C9R3AA1INN# |
| 569 | 0.138                  | 25                     | COG | 9.3pF       | ±0.1pF                   | CLR1C9R3BA1INN# |
| 570 | 0.138                  | 25                     | COG | 9.3pF       | ±0.25pF                  | CLR1C9R3CA1INN# |
| 571 | 0.138                  | 25                     | COG | 9.3pF       | ±0.5pF                   | CLR1C9R3DA1INN# |
| 572 | 0.138                  | 25                     | COG | 9.4pF       | ±0.05pF                  | CLR1C9R4AA1INN# |
| 573 | 0.138                  | 25                     | COG | 9.4pF       | ±0.1pF                   | CLR1C9R4BA1INN# |
| 574 | 0.138                  | 25                     | COG | 9.4pF       | ±0.25pF                  | CLR1C9R4CA1INN# |
| 575 | 0.138                  | 25                     | COG | 9.4pF       | ±0.5pF                   | CLR1C9R4DA1INN# |
| 576 | 0.138                  | 25                     | COG | 9.5pF       | ±0.05pF                  | CLR1C9R5AA1INN# |
| 577 | 0.138                  | 25                     | COG | 9.5pF       | ±0.1pF                   | CLR1C9R5BA1INN# |
| 578 | 0.138                  | 25                     | COG | 9.5pF       | ±0.25pF                  | CLR1C9R5CA1INN# |
| 579 | 0.138                  | 25                     | COG | 9.5pF       | ±0.5pF                   | CLR1C9R5DA1INN# |
| 580 | 0.138                  | 25                     | COG | 9.6pF       | ±0.05pF                  | CLR1C9R6AA1INN# |
| 581 | 0.138                  | 25                     | COG | 9.6pF       | ±0.1pF                   | CLR1C9R6BA1INN# |
| 582 | 0.138                  | 25                     | COG | 9.6pF       | ±0.25pF                  | CLR1C9R6CA1INN# |
| 583 | 0.138                  | 25                     | COG | 9.6pF       | ±0.5pF                   | CLR1C9R6DA1INN# |
| 584 | 0.138                  | 25                     | COG | 9.7pF       | ±0.05pF                  | CLR1C9R7AA1INN# |
| 585 | 0.138                  | 25                     | COG | 9.7pF       | ±0.1pF                   | CLR1C9R7BA1INN# |
| 586 | 0.138                  | 25                     | COG | 9.7pF       | ±0.25pF                  | CLR1C9R7CA1INN# |
| 587 | 0.138                  | 25                     | COG | 9.7pF       | ±0.5pF                   | CLR1C9R7DA1INN# |
| 588 | 0.138                  | 25                     | COG | 9.8pF       | ±0.05pF                  | CLR1C9R8AA1INN# |
| 589 | 0.138                  | 25                     | COG | 9.8pF       | ±0.1pF                   | CLR1C9R8BA1INN# |
| 590 | 0.138                  | 25                     | COG | 9.8pF       | ±0.25pF                  | CLR1C9R8CA1INN# |
| 591 | 0.138                  | 25                     | COG | 9.8pF       | ±0.5pF                   | CLR1C9R8DA1INN# |
| 592 | 0.138                  | 25                     | COG | 9.9pF       | ±0.05pF                  | CLR1C9R9AA1INN# |
| 593 | 0.138                  | 25                     | COG | 9.9pF       | ±0.1pF                   | CLR1C9R9BA1INN# |
| 594 | 0.138                  | 25                     | COG | 9.9pF       | ±0.25pF                  | CLR1C9R9CA1INN# |
| 595 | 0.138                  | 25                     | COG | 9.9pF       | ±0.5pF                   | CLR1C9R9DA1INN# |
| 596 | 0.138                  | 25                     | COG | 10pF        | ±0.05pF                  | CLR1C100AA1INN# |
| 597 | 0.138                  | 25                     | COG | 10pF        | ±0.1pF                   | CLR1C100BA1INN# |
| 598 | 0.138                  | 25                     | COG | 10pF        | ±0.1pF                   | CLR1C100BA1NNN# |
| 599 | 0.138                  | 25                     | COG | 10pF        | ±0.25pF                  | CLR1C100CA1INN# |
| 600 | 0.138                  | 25                     | COG | 10pF        | ±0.5pF                   | CLR1C100DA1INN# |
| 601 | 0.138                  | 25                     | COG | 10pF        | ±2%                      | CLR1C100GA1INN# |
| 602 | 0.138                  | 25                     | COG | 10pF        | ±5%                      | CLR1C100JA1INN# |
| 603 | 0.138                  | 25                     | COG | 18pF        | ±5%                      | CLR1C180JA1NNN# |
| 604 | 0.138                  | 25                     | COG | 36pF        | ±5%                      | CLR1C360JA1NNN# |
| 605 | 0.138                  | 25                     | COG | 47pF        | ±5%                      | CLR1C470JA1NNN# |
| 606 | 0.138                  | 25                     | COG | 56pF        | ±5%                      | CLR1C560JA1NNN# |



# Normal Capacitors\_Standard

Size Code (inch/mm) : 01005/0402

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 0.22                   | 6.3                    | COG | 100pF       | ±5%                      | CL02C101JQ2NNN# |
| 2   | 0.22                   | 16                     | COG | 10pF        | ±5%                      | CL02C100JO2ANN# |
| 3   | 0.22                   | 16                     | COG | 10pF        | ±5%                      | CL02C100JO2NNN# |
| 4   | 0.22                   | 16                     | COG | 11pF        | ±5%                      | CL02C110JO2NNN# |
| 5   | 0.22                   | 16                     | COG | 13pF        | ±5%                      | CL02C130JO2NNN# |
| 6   | 0.22                   | 16                     | COG | 16pF        | ±5%                      | CL02C160JO2NNN# |
| 7   | 0.22                   | 16                     | COG | 18pF        | ±5%                      | CL02C180JO2NNN# |
| 8   | 0.22                   | 16                     | COG | 20pF        | ±5%                      | CL02C200JO2NNN# |
| 9   | 0.22                   | 16                     | COG | 22pF        | ±5%                      | CL02C220JO2NNN# |
| 10  | 0.22                   | 16                     | COG | 24pF        | ±5%                      | CL02C240JO2NNN# |
| 11  | 0.22                   | 16                     | COG | 27pF        | ±5%                      | CL02C270JO2NNN# |
| 12  | 0.22                   | 16                     | COG | 30pF        | ±5%                      | CL02C300JO2NNN# |
| 13  | 0.22                   | 16                     | COG | 33pF        | ±5%                      | CL02C330JO2ANN# |
| 14  | 0.22                   | 16                     | COG | 33pF        | ±5%                      | CL02C330JO2NNN# |
| 15  | 0.22                   | 16                     | COG | 36pF        | ±5%                      | CL02C360JO2NNN# |
| 16  | 0.22                   | 16                     | COG | 39pF        | ±5%                      | CL02C390JO2NNN# |
| 17  | 0.22                   | 16                     | COG | 43pF        | ±5%                      | CL02C430JO2NNN# |
| 18  | 0.22                   | 16                     | COG | 47pF        | ±5%                      | CL02C470JO2ANN# |
| 19  | 0.22                   | 16                     | COG | 51pF        | ±5%                      | CL02C510JO2NNN# |
| 20  | 0.22                   | 16                     | COG | 56pF        | ±5%                      | CL02C560JO2NNN# |
| 21  | 0.22                   | 16                     | COG | 62pF        | ±5%                      | CL02C620JO2NNN# |
| 22  | 0.22                   | 16                     | COG | 68pF        | ±5%                      | CL02C680JO2NNN# |
| 23  | 0.22                   | 16                     | COG | 75pF        | ±5%                      | CL02C750JO2NNN# |
| 24  | 0.22                   | 16                     | COG | 82pF        | ±5%                      | CL02C820JO2NNN# |
| 25  | 0.22                   | 16                     | COG | 91pF        | ±5%                      | CL02C910JO2NNN# |
| 26  | 0.22                   | 16                     | COG | 100pF       | ±5%                      | CL02C101JO2NNN# |
| 27  | 0.22                   | 25                     | COG | 10pF        | ±5%                      | CL02C100JA2NNN# |
| 28  | 0.22                   | 25                     | COG | 11pF        | ±5%                      | CL02C110JA2NNN# |
| 29  | 0.22                   | 25                     | COG | 12pF        | ±5%                      | CL02C120JA2NNN# |
| 30  | 0.22                   | 25                     | COG | 13pF        | ±5%                      | CL02C130JA2NNN# |
| 31  | 0.22                   | 25                     | COG | 15pF        | ±5%                      | CL02C150JA2NNN# |
| 32  | 0.22                   | 25                     | COG | 16pF        | ±5%                      | CL02C160JA2NNN# |
| 33  | 0.22                   | 25                     | COG | 18pF        | ±5%                      | CL02C180JA2NNN# |
| 34  | 0.22                   | 25                     | COG | 20pF        | ±5%                      | CL02C200JA2NNN# |
| 35  | 0.22                   | 25                     | COG | 22pF        | ±5%                      | CL02C220JA2NNN# |
| 36  | 0.22                   | 25                     | COG | 24pF        | ±5%                      | CL02C240JA2NNN# |
| 37  | 0.22                   | 25                     | COG | 27pF        | ±5%                      | CL02C270JA2NNN# |
| 38  | 0.22                   | 25                     | COG | 30pF        | ±5%                      | CL02C300JA2NNN# |
| 39  | 0.22                   | 25                     | COG | 33pF        | ±5%                      | CL02C330JA2NNN# |
| 40  | 0.22                   | 25                     | COG | 36pF        | ±5%                      | CL02C360JA2NNN# |
| 41  | 0.22                   | 25                     | COG | 39pF        | ±5%                      | CL02C390JA2NNN# |
| 42  | 0.22                   | 25                     | COG | 43pF        | ±5%                      | CL02C430JA2NNN# |
| 43  | 0.22                   | 25                     | COG | 47pF        | ±5%                      | CL02C470JA2NNN# |
| 44  | 0.22                   | 25                     | COG | 51pF        | ±5%                      | CL02C510JA2NNN# |
| 45  | 0.22                   | 25                     | COG | 56pF        | ±5%                      | CL02C560JA2NNN# |



# Normal Capacitors\_Standard

Size Code (inch/mm) : 01005/0402

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number      |
|-----|------------------------|------------------------|-----|-------------|--------------------------|------------------|
| 46  | 0.22                   | 25                     | COG | 62pF        | ±5%                      | CL02C620JA2NINN# |
| 47  | 0.22                   | 25                     | COG | 68pF        | ±5%                      | CL02C680JA2NINN# |
| 48  | 0.22                   | 25                     | COG | 75pF        | ±5%                      | CL02C750JA2NINN# |
| 49  | 0.22                   | 25                     | COG | 82pF        | ±5%                      | CL02C820JA2NINN# |
| 50  | 0.22                   | 25                     | COG | 91pF        | ±5%                      | CL02C910JA2NINN# |
| 51  | 0.22                   | 25                     | COG | 100pF       | ±5%                      | CL02C101JA2NINN# |
| 52  | 0.22                   | 25                     | COG | 220pF       | ±5%                      | CL02C221JA2NINN# |
| 53  | 0.22                   | 50                     | COG | 100pF       | ±5%                      | CL02C101JB2NINN# |

Size Code (inch/mm) : 0201/0603

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number      |
|-----|------------------------|------------------------|-----|-------------|--------------------------|------------------|
| 1   | 0.33                   | 25                     | COG | 0.2pF       | ±0.1pF                   | CL03C0R2BA3GNN#  |
| 2   | 0.33                   | 25                     | COG | 0.5pF       | ±0.1pF                   | CL03C0R5BA3GNN#  |
| 3   | 0.33                   | 25                     | COG | 0.5pF       | ±0.25pF                  | CL03C0R5CA3GNN#  |
| 4   | 0.33                   | 25                     | COG | 1pF         | ±0.1pF                   | CL03C010BA3GNN#  |
| 5   | 0.33                   | 25                     | COG | 1pF         | ±0.25pF                  | CL03C010CA3GNN#  |
| 6   | 0.33                   | 25                     | COG | 1.2pF       | ±0.1pF                   | CL03C1R2BA3GNN#  |
| 7   | 0.33                   | 25                     | COG | 1.2pF       | ±0.25pF                  | CL03C1R2CA3GNN#  |
| 8   | 0.33                   | 25                     | COG | 1.5pF       | ±0.25pF                  | CL03C1R5CA3GNN#  |
| 9   | 0.33                   | 25                     | COG | 1.8pF       | ±0.25pF                  | CL03C1R8CA3GNN#  |
| 10  | 0.33                   | 25                     | COG | 2.2pF       | ±0.1pF                   | CL03C2R2BA3GNN#  |
| 11  | 0.33                   | 25                     | COG | 2.2pF       | ±0.25pF                  | CL03C2R2CA3GNN#  |
| 12  | 0.33                   | 25                     | COG | 2.7pF       | ±0.25pF                  | CL03C2R7CA3GNN#  |
| 13  | 0.33                   | 25                     | COG | 3pF         | ±0.1pF                   | CL03C030BA3GNN#  |
| 14  | 0.33                   | 25                     | COG | 4.7pF       | ±0.25pF                  | CL03C4R7CA3GNN#  |
| 15  | 0.33                   | 25                     | COG | 5pF         | ±0.25pF                  | CL03C050CA3GNN#  |
| 16  | 0.33                   | 25                     | COG | 5.6pF       | ±0.25pF                  | CL03C5R6CA3GNN#  |
| 17  | 0.33                   | 25                     | COG | 6pF         | ±0.5pF                   | CL03C060DA3GNN#  |
| 18  | 0.33                   | 25                     | COG | 6.8pF       | ±0.25pF                  | CL03C6R8CA3GNN#  |
| 19  | 0.33                   | 25                     | COG | 6.8pF       | ±0.5pF                   | CL03C6R8DA3GNN#  |
| 20  | 0.33                   | 25                     | COG | 9pF         | ±0.25pF                  | CL03C090CA3GNN#  |
| 21  | 0.33                   | 25                     | COG | 10pF        | ±5%                      | CL03C100JA3GNN#  |
| 22  | 0.33                   | 25                     | COG | 10pF        | ±5%                      | CL03C100JA3NINN# |
| 23  | 0.33                   | 25                     | COG | 11pF        | ±5%                      | CL03C110JA3GNN#  |
| 24  | 0.33                   | 25                     | COG | 11pF        | ±5%                      | CL03C110JA3NINN# |
| 25  | 0.33                   | 25                     | COG | 12pF        | ±5%                      | CL03C120JA3GNN#  |
| 26  | 0.33                   | 25                     | COG | 12pF        | ±5%                      | CL03C120JA3NINN# |
| 27  | 0.33                   | 25                     | COG | 13pF        | ±5%                      | CL03C130JA3GNN#  |
| 28  | 0.33                   | 25                     | COG | 15pF        | ±5%                      | CL03C150JA3NINN# |
| 29  | 0.33                   | 25                     | COG | 16pF        | ±5%                      | CL03C160JA3GNN#  |
| 30  | 0.33                   | 25                     | COG | 18pF        | ±5%                      | CL03C180JA3GNN#  |



# Normal Capacitors\_Standard

Size Code (inch/mm) : 0201/0603

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 31  | 0.33                   | 25                     | COG | 18pF        | ±5%                      | CL03C180JA3NNN# |
| 32  | 0.33                   | 25                     | COG | 20pF        | ±5%                      | CL03C200JA3GNN# |
| 33  | 0.33                   | 25                     | COG | 20pF        | ±5%                      | CL03C200JA3NNN# |
| 34  | 0.33                   | 25                     | COG | 22pF        | ±5%                      | CL03C220JA3GNN# |
| 35  | 0.33                   | 25                     | COG | 22pF        | ±5%                      | CL03C220JA3NNN# |
| 36  | 0.33                   | 25                     | COG | 24pF        | ±5%                      | CL03C240JA3GNN# |
| 37  | 0.33                   | 25                     | COG | 27pF        | ±5%                      | CL03C270JA3GNN# |
| 38  | 0.33                   | 25                     | COG | 27pF        | ±5%                      | CL03C270JA3NNN# |
| 39  | 0.33                   | 25                     | COG | 30pF        | ±5%                      | CL03C300JA3GNN# |
| 40  | 0.33                   | 25                     | COG | 30pF        | ±5%                      | CL03C300JA3NNN# |
| 41  | 0.33                   | 25                     | COG | 33pF        | ±5%                      | CL03C330JA3NNN# |
| 42  | 0.33                   | 25                     | COG | 39pF        | ±5%                      | CL03C390JA3NNN# |
| 43  | 0.33                   | 25                     | COG | 47pF        | ±5%                      | CL03C470JA3NNN# |
| 44  | 0.33                   | 25                     | COG | 56pF        | ±5%                      | CL03C560JA3NNN# |
| 45  | 0.33                   | 25                     | COG | 68pF        | ±5%                      | CL03C680JA3NNN# |
| 46  | 0.33                   | 25                     | COG | 82pF        | ±5%                      | CL03C820JA3NNN# |
| 47  | 0.33                   | 25                     | COG | 100pF       | ±5%                      | CL03C101JA3NNN# |
| 48  | 0.33                   | 50                     | COG | 1pF         | ±0.1pF                   | CL03C010BB3GNN# |
| 49  | 0.33                   | 50                     | COG | 1.2pF       | ±0.1pF                   | CL03C1R2BB3GNN# |
| 50  | 0.33                   | 50                     | COG | 2pF         | ±0.1pF                   | CL03C020BB3GNN# |
| 51  | 0.33                   | 50                     | COG | 2.7pF       | ±0.1pF                   | CL03C2R7BB3GNN# |
| 52  | 0.33                   | 50                     | COG | 3.3pF       | ±0.1pF                   | CL03C3R3BB3GNN# |
| 53  | 0.33                   | 50                     | COG | 10pF        | ±5%                      | CL03C100JB3GNN# |
| 54  | 0.33                   | 50                     | COG | 10pF        | ±5%                      | CL03C100JB3NNN# |
| 55  | 0.33                   | 50                     | COG | 12pF        | ±5%                      | CL03C120JB3NNN# |
| 56  | 0.33                   | 50                     | COG | 15pF        | ±5%                      | CL03C150JB3NNN# |
| 57  | 0.33                   | 50                     | COG | 22pF        | ±5%                      | CL03C220JB3NNN# |
| 58  | 0.33                   | 50                     | COG | 27pF        | ±5%                      | CL03C270JB3GNN# |
| 59  | 0.33                   | 50                     | COG | 27pF        | ±5%                      | CL03C270JB3NNN# |
| 60  | 0.33                   | 50                     | COG | 33pF        | ±5%                      | CL03C330JB3NNN# |
| 61  | 0.33                   | 50                     | COG | 39pF        | ±2%                      | CL03C390GB3NNN# |
| 62  | 0.33                   | 50                     | COG | 39pF        | ±5%                      | CL03C390JB3NNN# |
| 63  | 0.33                   | 50                     | COG | 47pF        | ±5%                      | CL03C470JB3NNN# |
| 64  | 0.33                   | 50                     | COG | 100pF       | ±5%                      | CL03C101JB3NNN# |
| 65  | 0.33                   | 100                    | COG | 100pF       | ±5%                      | CL03C101JC3NNN# |



# Normal Capacitors\_Standard

Size Code (inch/mm) : 0402/1005

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 0.55                   | 16                     | COG | 1nF         | ±5%                      | CL05C102JO5NNN# |
| 2   | 0.55                   | 16                     | COG | 100pF       | ±5%                      | CL05C101JO5NNN# |
| 3   | 0.55                   | 16                     | COG | 220pF       | ±5%                      | CL05C221JO5NNN# |
| 4   | 0.55                   | 25                     | COG | 1nF         | ±5%                      | CL05C102JA5NFN# |
| 5   | 0.55                   | 25                     | COG | 20pF        | ±5%                      | CL05C200JA5NNN# |
| 6   | 0.55                   | 25                     | COG | 22pF        | ±5%                      | CL05C220JA5NNN# |
| 7   | 0.55                   | 25                     | COG | 27pF        | ±5%                      | CL05C270JA5NNN# |
| 8   | 0.55                   | 25                     | COG | 56pF        | ±5%                      | CL05C560JA5NNN# |
| 9   | 0.55                   | 25                     | COG | 82pF        | ±5%                      | CL05C820JA5NNN# |
| 10  | 0.55                   | 25                     | COG | 180pF       | ±5%                      | CL05C181JA5NNN# |
| 11  | 0.55                   | 25                     | COG | 560pF       | ±5%                      | CL05C561JA5NNN# |
| 12  | 0.55                   | 50                     | COG | 1nF         | ±5%                      | CL05C102JB5NNN# |
| 13  | 0.55                   | 50                     | COG | 1pF         | ±0.25pF                  | CL05C010CB5NNN# |
| 14  | 0.55                   | 50                     | COG | 3.3pF       | ±0.25pF                  | CL05C3R3CB5NNN# |
| 15  | 0.55                   | 50                     | COG | 3.9pF       | ±0.25pF                  | CL05C3R9CB5NNN# |
| 16  | 0.55                   | 50                     | COG | 4.7pF       | ±0.25pF                  | CL05C4R7CB5NNN# |
| 17  | 0.55                   | 50                     | COG | 5pF         | ±0.25pF                  | CL05C050CB5NNN# |
| 18  | 0.55                   | 50                     | COG | 6.8pF       | ±0.25pF                  | CL05C6R8CB5NNN# |
| 19  | 0.55                   | 50                     | COG | 8.2pF       | ±0.25pF                  | CL05C8R2CB5NNN# |
| 20  | 0.55                   | 50                     | COG | 9pF         | ±0.25pF                  | CL05C090CB5NNN# |
| 21  | 0.55                   | 50                     | COG | 9pF         | ±0.5pF                   | CL05C090DB5NNN# |
| 22  | 0.55                   | 50                     | COG | 10pF        | ±0.5pF                   | CL05C100DB5NNN# |
| 23  | 0.55                   | 50                     | COG | 10pF        | ±5%                      | CL05C100JB5NCN# |
| 24  | 0.55                   | 50                     | COG | 10pF        | ±5%                      | CL05C100JB5NFN# |
| 25  | 0.55                   | 50                     | COG | 10pF        | ±5%                      | CL05C100JB5NNN# |
| 26  | 0.55                   | 50                     | COG | 11pF        | ±5%                      | CL05C110JB5NNN# |
| 27  | 0.55                   | 50                     | COG | 12pF        | ±5%                      | CL05C120JB5NCN# |
| 28  | 0.55                   | 50                     | COG | 12pF        | ±5%                      | CL05C120JB5NNN# |
| 29  | 0.55                   | 50                     | COG | 13pF        | ±5%                      | CL05C130JB5NCN# |
| 30  | 0.55                   | 50                     | COG | 15pF        | ±5%                      | CL05C150JB5NCN# |
| 31  | 0.55                   | 50                     | COG | 15pF        | ±5%                      | CL05C150JB5NNN# |
| 32  | 0.55                   | 50                     | COG | 16pF        | ±5%                      | CL05C160JB5NCN# |
| 33  | 0.55                   | 50                     | COG | 17pF        | ±5%                      | CL05C170JB5NNN# |
| 34  | 0.55                   | 50                     | COG | 18pF        | ±2%                      | CL05C180GB5NNN# |
| 35  | 0.55                   | 50                     | COG | 18pF        | ±5%                      | CL05C180JB5NCN# |
| 36  | 0.55                   | 50                     | COG | 18pF        | ±5%                      | CL05C180JB5NFN# |
| 37  | 0.55                   | 50                     | COG | 18pF        | ±5%                      | CL05C180JB5NNN# |
| 38  | 0.55                   | 50                     | COG | 19pF        | ±5%                      | CL05C190JB5NNN# |
| 39  | 0.55                   | 50                     | COG | 22pF        | ±5%                      | CL05C220JB5NCN# |
| 40  | 0.55                   | 50                     | COG | 22pF        | ±5%                      | CL05C220JB5NFN# |



# Normal Capacitors\_Standard

Size Code (inch/mm) : 0402/1005

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 41  | 0.55                   | 50                     | COG | 22pF        | ±5%                      | CL05C220JB5NNN# |
| 42  | 0.55                   | 50                     | COG | 24pF        | ±5%                      | CL05C240JB5NCN# |
| 43  | 0.55                   | 50                     | COG | 24pF        | ±5%                      | CL05C240JB5NNN# |
| 44  | 0.55                   | 50                     | COG | 27pF        | ±5%                      | CL05C270JB5NCN# |
| 45  | 0.55                   | 50                     | COG | 27pF        | ±5%                      | CL05C270JB5NNN# |
| 46  | 0.55                   | 50                     | COG | 30pF        | ±5%                      | CL05C300JB5NCN# |
| 47  | 0.55                   | 50                     | COG | 33pF        | ±5%                      | CL05C330JB5NCN# |
| 48  | 0.55                   | 50                     | COG | 33pF        | ±5%                      | CL05C330JB5NFN# |
| 49  | 0.55                   | 50                     | COG | 33pF        | ±5%                      | CL05C330JB5NNN# |
| 50  | 0.55                   | 50                     | COG | 36pF        | ±5%                      | CL05C360JB5NNN# |
| 51  | 0.55                   | 50                     | COG | 39pF        | ±5%                      | CL05C390JB5NCN# |
| 52  | 0.55                   | 50                     | COG | 39pF        | ±5%                      | CL05C390JB5NNN# |
| 53  | 0.55                   | 50                     | COG | 43pF        | ±5%                      | CL05C430JB5NNN# |
| 54  | 0.55                   | 50                     | COG | 47pF        | ±5%                      | CL05C470JB5NCN# |
| 55  | 0.55                   | 50                     | COG | 47pF        | ±5%                      | CL05C470JB5NFN# |
| 56  | 0.55                   | 50                     | COG | 47pF        | ±5%                      | CL05C470JB5NNN# |
| 57  | 0.55                   | 50                     | COG | 56pF        | ±5%                      | CL05C560JB5NNN# |
| 58  | 0.55                   | 50                     | COG | 62pF        | ±5%                      | CL05C620JB5NCN# |
| 59  | 0.55                   | 50                     | COG | 62pF        | ±5%                      | CL05C620JB5NNN# |
| 60  | 0.55                   | 50                     | COG | 68pF        | ±5%                      | CL05C680JB5NCN# |
| 61  | 0.55                   | 50                     | COG | 68pF        | ±5%                      | CL05C680JB5NFN# |
| 62  | 0.55                   | 50                     | COG | 68pF        | ±5%                      | CL05C680JB5NNN# |
| 63  | 0.55                   | 50                     | COG | 75pF        | ±5%                      | CL05C750JB5NNN# |
| 64  | 0.55                   | 50                     | COG | 82pF        | ±5%                      | CL05C820JB5NCN# |
| 65  | 0.55                   | 50                     | COG | 82pF        | ±5%                      | CL05C820JB5NNN# |
| 66  | 0.55                   | 50                     | COG | 91pF        | ±5%                      | CL05C910JB5NNN# |
| 67  | 0.55                   | 50                     | COG | 100pF       | ±5%                      | CL05C101JB5NCN# |
| 68  | 0.55                   | 50                     | COG | 100pF       | ±5%                      | CL05C101JB5NFN# |
| 69  | 0.55                   | 50                     | COG | 100pF       | ±5%                      | CL05C101JB5NNN# |
| 70  | 0.55                   | 50                     | COG | 120pF       | ±5%                      | CL05C121JB5NNN# |
| 71  | 0.55                   | 50                     | COG | 130pF       | ±5%                      | CL05C131JB5NNN# |
| 72  | 0.55                   | 50                     | COG | 150pF       | ±5%                      | CL05C151JB5NFN# |
| 73  | 0.55                   | 50                     | COG | 150pF       | ±5%                      | CL05C151JB5NNN# |
| 74  | 0.55                   | 50                     | COG | 160pF       | ±5%                      | CL05C161JB5NNN# |
| 75  | 0.55                   | 50                     | COG | 180pF       | ±5%                      | CL05C181JB5NNN# |
| 76  | 0.55                   | 50                     | COG | 200pF       | ±5%                      | CL05C201JB5NNN# |
| 77  | 0.55                   | 50                     | COG | 220pF       | ±5%                      | CL05C221JB5NFN# |
| 78  | 0.55                   | 50                     | COG | 220pF       | ±5%                      | CL05C221JB5NNN# |
| 79  | 0.55                   | 50                     | COG | 270pF       | ±5%                      | CL05C271JB5NNN# |
| 80  | 0.55                   | 50                     | COG | 330pF       | ±5%                      | CL05C331JB5NFN# |



# Normal Capacitors\_Standard

Size Code (inch/mm) : 0402/1005

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 81  | 0.55                   | 50                     | COG | 330pF       | ±5%                      | CL05C331JB5NNN# |
| 82  | 0.55                   | 50                     | COG | 390pF       | ±5%                      | CL05C391JB5NCN# |
| 83  | 0.55                   | 50                     | COG | 390pF       | ±5%                      | CL05C391JB5NNN# |
| 84  | 0.55                   | 50                     | COG | 470pF       | ±5%                      | CL05C471JB5NNN# |
| 85  | 0.55                   | 50                     | COG | 680pF       | ±5%                      | CL05C681JB5NFN# |
| 86  | 0.55                   | 50                     | COG | 680pF       | ±5%                      | CL05C681JB5NNN# |
| 87  | 0.55                   | 50                     | COG | 820pF       | ±5%                      | CL05C821JB5NNN# |
| 88  | 0.55                   | 100                    | COG | 1nF         | ±5%                      | CL05C102JC5NNN# |
| 89  | 0.55                   | 100                    | COG | 12pF        | ±5%                      | CL05C120JC5NNN# |
| 90  | 0.55                   | 100                    | COG | 15pF        | ±5%                      | CL05C150JC5NNN# |
| 91  | 0.55                   | 100                    | COG | 18pF        | ±5%                      | CL05C180JC5NNN# |
| 92  | 0.55                   | 100                    | COG | 27pF        | ±5%                      | CL05C270JC5NNN# |
| 93  | 0.55                   | 100                    | COG | 30pF        | ±5%                      | CL05C300JC5NNN# |
| 94  | 0.55                   | 100                    | COG | 33pF        | ±5%                      | CL05C330JC5NNN# |
| 95  | 0.55                   | 100                    | COG | 39pF        | ±5%                      | CL05C390JC5NNN# |
| 96  | 0.55                   | 100                    | COG | 47pF        | ±5%                      | CL05C470JC5NNN# |
| 97  | 0.55                   | 100                    | COG | 68pF        | ±5%                      | CL05C680JC5NNN# |
| 98  | 0.55                   | 100                    | COG | 82pF        | ±5%                      | CL05C820JC5NNN# |
| 99  | 0.55                   | 100                    | COG | 100pF       | ±5%                      | CL05C101JC5NNN# |
| 100 | 0.55                   | 100                    | COG | 220pF       | ±5%                      | CL05C221JC5NNN# |
| 101 | 0.65                   | 50                     | COG | 4.7nF       | ±5%                      | CL05C472JB5NRN# |

Size Code (inch/mm) : 0603/1608

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 0.90                   | 16                     | COG | 1nF         | ±5%                      | CL10C102J08NNN# |
| 2   | 0.90                   | 16                     | COG | 1.8nF       | ±5%                      | CL10C182J08NNN# |
| 3   | 0.90                   | 16                     | COG | 2.2nF       | ±5%                      | CL10C222J08NNN# |
| 4   | 0.90                   | 25                     | COG | 1nF         | ±5%                      | CL10C102JA8NFN# |
| 5   | 0.90                   | 25                     | COG | 1nF         | ±5%                      | CL10C102JA8NNN# |
| 6   | 0.90                   | 25                     | COG | 2.2nF       | ±5%                      | CL10C222JA8NNN# |
| 7   | 0.90                   | 25                     | COG | 3.3nF       | ±5%                      | CL10C332JA8NNN# |
| 8   | 0.90                   | 25                     | COG | 3.9nF       | ±5%                      | CL10C392JA8NNN# |
| 9   | 0.90                   | 25                     | COG | 4.7nF       | ±5%                      | CL10C472JA8NNN# |
| 10  | 0.90                   | 25                     | COG | 560pF       | ±5%                      | CL10C561JA8NNN# |
| 11  | 0.90                   | 25                     | COG | 680pF       | ±5%                      | CL10C681JA8NNN# |
| 12  | 0.90                   | 25                     | COG | 820pF       | ±5%                      | CL10C821JA8NNN# |
| 13  | 0.90                   | 50                     | COG | 1nF         | ±5%                      | CL10C102JB8NFN# |
| 14  | 0.90                   | 50                     | COG | 1nF         | ±5%                      | CL10C102JB8NNN# |
| 15  | 0.90                   | 50                     | COG | 1.2nF       | ±5%                      | CL10C122JB8NFN# |



# Normal Capacitors\_Standard

Size Code (inch/mm) : 0603/1608

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 16  | 0.90                   | 50                     | COG | 1.2nF       | ±5%                      | CL10C122JB8NNN# |
| 17  | 0.90                   | 50                     | COG | 1.5nF       | ±5%                      | CL10C152JB8NFN# |
| 18  | 0.90                   | 50                     | COG | 1.5nF       | ±5%                      | CL10C152JB8NNN# |
| 19  | 0.90                   | 50                     | COG | 1.8nF       | ±5%                      | CL10C182JB8NFN# |
| 20  | 0.90                   | 50                     | COG | 1.8nF       | ±5%                      | CL10C182JB8NNN# |
| 21  | 0.90                   | 50                     | COG | 2.2nF       | ±5%                      | CL10C222JB8NFN# |
| 22  | 0.90                   | 50                     | COG | 2.2nF       | ±5%                      | CL10C222JB8NNN# |
| 23  | 0.90                   | 50                     | COG | 2.7nF       | ±5%                      | CL10C272JB8NFN# |
| 24  | 0.90                   | 50                     | COG | 2.7nF       | ±5%                      | CL10C272JB8NNN# |
| 25  | 0.90                   | 50                     | COG | 3.3nF       | ±5%                      | CL10C332JB8NFN# |
| 26  | 0.90                   | 50                     | COG | 3.3nF       | ±5%                      | CL10C332JB8NNN# |
| 27  | 0.90                   | 50                     | COG | 4.7nF       | ±5%                      | CL10C472JB8NNN# |
| 28  | 0.90                   | 50                     | COG | 4.7pF       | ±0.1pF                   | CL10C472JB8NNN# |
| 29  | 0.90                   | 50                     | COG | 5.6nF       | ±5%                      | CL10C562JB8NNN# |
| 30  | 0.90                   | 50                     | COG | 5.6pF       | ±0.1pF                   | CL10C562JB8NNN# |
| 31  | 0.90                   | 50                     | COG | 10pF        | ±1%                      | CL10C100JB8NNN# |
| 32  | 0.90                   | 50                     | COG | 10pF        | ±5%                      | CL10C100JB8NCF# |
| 33  | 0.90                   | 50                     | COG | 10pF        | ±5%                      | CL10C100JB8NFF# |
| 34  | 0.90                   | 50                     | COG | 10pF        | ±5%                      | CL10C100JB8NNN# |
| 35  | 0.90                   | 50                     | COG | 11pF        | ±5%                      | CL10C110JB8NNN# |
| 36  | 0.90                   | 50                     | COG | 12pF        | ±5%                      | CL10C120JB8NFF# |
| 37  | 0.90                   | 50                     | COG | 12pF        | ±5%                      | CL10C120JB8NNN# |
| 38  | 0.90                   | 50                     | COG | 13pF        | ±5%                      | CL10C130JB8NNN# |
| 39  | 0.90                   | 50                     | COG | 14pF        | ±5%                      | CL10C140JB8NNN# |
| 40  | 0.90                   | 50                     | COG | 15pF        | ±5%                      | CL10C150JB8NCF# |
| 41  | 0.90                   | 50                     | COG | 15pF        | ±5%                      | CL10C150JB8NFF# |
| 42  | 0.90                   | 50                     | COG | 15pF        | ±5%                      | CL10C150JB8NNN# |
| 43  | 0.90                   | 50                     | COG | 18pF        | ±5%                      | CL10C180JB8NFF# |
| 44  | 0.90                   | 50                     | COG | 18pF        | ±5%                      | CL10C180JB8NNN# |
| 45  | 0.90                   | 50                     | COG | 20pF        | ±5%                      | CL10C200JB8NCF# |
| 46  | 0.90                   | 50                     | COG | 20pF        | ±5%                      | CL10C200JB8NFF# |
| 47  | 0.90                   | 50                     | COG | 20pF        | ±5%                      | CL10C200JB8NNN# |
| 48  | 0.90                   | 50                     | COG | 22pF        | ±5%                      | CL10C220JB8NCF# |
| 49  | 0.90                   | 50                     | COG | 22pF        | ±5%                      | CL10C220JB8NFF# |
| 50  | 0.90                   | 50                     | COG | 22pF        | ±5%                      | CL10C220JB8NNN# |
| 51  | 0.90                   | 50                     | COG | 24pF        | ±5%                      | CL10C240JB8NCF# |
| 52  | 0.90                   | 50                     | COG | 25pF        | ±5%                      | CL10C250JB8NNN# |
| 53  | 0.90                   | 50                     | COG | 27pF        | ±5%                      | CL10C270JB8NCF# |
| 54  | 0.90                   | 50                     | COG | 27pF        | ±5%                      | CL10C270JB8NFF# |
| 55  | 0.90                   | 50                     | COG | 27pF        | ±5%                      | CL10C270JB8NNN# |



# Normal Capacitors\_Standard

Size Code (inch/mm) : 0603/1608

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 56  | 0.90                   | 50                     | COG | 30pF        | ±5%                      | CL10C300JB8NCN# |
| 57  | 0.90                   | 50                     | COG | 33pF        | ±5%                      | CL10C330JB8NFN# |
| 58  | 0.90                   | 50                     | COG | 33pF        | ±5%                      | CL10C330JB8NNN# |
| 59  | 0.90                   | 50                     | COG | 39pF        | ±5%                      | CL10C390JB8NCN# |
| 60  | 0.90                   | 50                     | COG | 43pF        | ±5%                      | CL10C430JB8NNN# |
| 61  | 0.90                   | 50                     | COG | 47pF        | ±5%                      | CL10C470JB8NCN# |
| 62  | 0.90                   | 50                     | COG | 47pF        | ±5%                      | CL10C470JB8NFN# |
| 63  | 0.90                   | 50                     | COG | 47pF        | ±5%                      | CL10C470JB8NNN# |
| 64  | 0.90                   | 50                     | COG | 51pF        | ±5%                      | CL10C510JB8NNN# |
| 65  | 0.90                   | 50                     | COG | 56pF        | ±5%                      | CL10C560JB8NFN# |
| 66  | 0.90                   | 50                     | COG | 56pF        | ±5%                      | CL10C560JB8NNN# |
| 67  | 0.90                   | 50                     | COG | 62pF        | ±5%                      | CL10C620JB8NNN# |
| 68  | 0.90                   | 50                     | COG | 68pF        | ±5%                      | CL10C680JB8NCN# |
| 69  | 0.90                   | 50                     | COG | 68pF        | ±5%                      | CL10C680JB8NFN# |
| 70  | 0.90                   | 50                     | COG | 68pF        | ±5%                      | CL10C680JB8NNN# |
| 71  | 0.90                   | 50                     | COG | 82pF        | ±5%                      | CL10C820JB8NFN# |
| 72  | 0.90                   | 50                     | COG | 91pF        | ±5%                      | CL10C910JB8NCN# |
| 73  | 0.90                   | 50                     | COG | 91pF        | ±5%                      | CL10C910JB8NNN# |
| 74  | 0.90                   | 50                     | COG | 100pF       | ±5%                      | CL10C101JB8NCN# |
| 75  | 0.90                   | 50                     | COG | 100pF       | ±5%                      | CL10C101JB8NFN# |
| 76  | 0.90                   | 50                     | COG | 100pF       | ±5%                      | CL10C101JB8NNN# |
| 77  | 0.90                   | 50                     | COG | 110pF       | ±5%                      | CL10C111JB8NNN# |
| 78  | 0.90                   | 50                     | COG | 120pF       | ±5%                      | CL10C121JB8NCN# |
| 79  | 0.90                   | 50                     | COG | 120pF       | ±5%                      | CL10C121JB8NFN# |
| 80  | 0.90                   | 50                     | COG | 120pF       | ±5%                      | CL10C121JB8NNN# |
| 81  | 0.90                   | 50                     | COG | 150pF       | ±5%                      | CL10C151JB8NCN# |
| 82  | 0.90                   | 50                     | COG | 150pF       | ±5%                      | CL10C151JB8NFN# |
| 83  | 0.90                   | 50                     | COG | 150pF       | ±5%                      | CL10C151JB8NNN# |
| 84  | 0.90                   | 50                     | COG | 160pF       | ±5%                      | CL10C161JB8NNN# |
| 85  | 0.90                   | 50                     | COG | 180pF       | ±5%                      | CL10C181JB8NFN# |
| 86  | 0.90                   | 50                     | COG | 180pF       | ±5%                      | CL10C181JB8NNN# |
| 87  | 0.90                   | 50                     | COG | 200pF       | ±5%                      | CL10C201JB8NFN# |
| 88  | 0.90                   | 50                     | COG | 200pF       | ±5%                      | CL10C201JB8NNN# |
| 89  | 0.90                   | 50                     | COG | 220pF       | ±5%                      | CL10C221JB8NCN# |
| 90  | 0.90                   | 50                     | COG | 220pF       | ±5%                      | CL10C221JB8NFN# |
| 91  | 0.90                   | 50                     | COG | 220pF       | ±5%                      | CL10C221JB8NNN# |
| 92  | 0.90                   | 50                     | COG | 240pF       | ±5%                      | CL10C241JB8NNN# |
| 93  | 0.90                   | 50                     | COG | 270pF       | ±5%                      | CL10C271JB8NFN# |
| 94  | 0.90                   | 50                     | COG | 270pF       | ±5%                      | CL10C271JB8NNN# |
| 95  | 0.90                   | 50                     | COG | 330pF       | ±5%                      | CL10C331JB8NCN# |



# Normal Capacitors\_Standard

Size Code (inch/mm) : 0603/1608

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 96  | 0.90                   | 50                     | COG | 330pF       | ±5%                      | CL10C331JB8NFN# |
| 97  | 0.90                   | 50                     | COG | 330pF       | ±5%                      | CL10C331JB8NNN# |
| 98  | 0.90                   | 50                     | COG | 360pF       | ±5%                      | CL10C361JB8NNN# |
| 99  | 0.90                   | 50                     | COG | 390pF       | ±5%                      | CL10C391JB8NFN# |
| 100 | 0.90                   | 50                     | COG | 430pF       | ±5%                      | CL10C431JB8NFN# |
| 101 | 0.90                   | 50                     | COG | 430pF       | ±5%                      | CL10C431JB8NNN# |
| 102 | 0.90                   | 50                     | COG | 470pF       | ±5%                      | CL10C471JB8NCN# |
| 103 | 0.90                   | 50                     | COG | 470pF       | ±5%                      | CL10C471JB8NFN# |
| 104 | 0.90                   | 50                     | COG | 470pF       | ±5%                      | CL10C471JB8NNN# |
| 105 | 0.90                   | 50                     | COG | 510pF       | ±5%                      | CL10C511JB8NNN# |
| 106 | 0.90                   | 50                     | COG | 560pF       | ±5%                      | CL10C561JB8NFN# |
| 107 | 0.90                   | 50                     | COG | 560pF       | ±5%                      | CL10C561JB8NNN# |
| 108 | 0.90                   | 50                     | COG | 620pF       | ±5%                      | CL10C621JB8NNN# |
| 109 | 0.90                   | 50                     | COG | 680pF       | ±5%                      | CL10C681JB8NFN# |
| 110 | 0.90                   | 50                     | COG | 680pF       | ±5%                      | CL10C681JB8NNN# |
| 111 | 0.90                   | 50                     | COG | 750pF       | ±5%                      | CL10C751JB8NNN# |
| 112 | 0.90                   | 50                     | COG | 820pF       | ±5%                      | CL10C821JB8NFN# |
| 113 | 0.90                   | 100                    | COG | 1nF         | ±5%                      | CL10C102JC8NNN# |
| 114 | 0.90                   | 100                    | COG | 3.9nF       | ±5%                      | CL10C392JC8NNN# |
| 115 | 0.90                   | 100                    | COG | 10pF        | ±5%                      | CL10C100JC8NNN# |
| 116 | 0.90                   | 100                    | COG | 12pF        | ±5%                      | CL10C120JC8NNN# |
| 117 | 0.90                   | 100                    | COG | 18pF        | ±5%                      | CL10C180JC8NNN# |
| 118 | 0.90                   | 100                    | COG | 39pF        | ±5%                      | CL10C390JC8NNN# |
| 119 | 0.90                   | 100                    | COG | 47pF        | ±5%                      | CL10C470JC8NNN# |
| 120 | 0.90                   | 100                    | COG | 68pF        | ±5%                      | CL10C680JC8NNN# |
| 121 | 0.90                   | 100                    | COG | 100pF       | ±5%                      | CL10C101JC8NNN# |
| 122 | 0.90                   | 100                    | COG | 150pF       | ±5%                      | CL10C151JC8NNN# |
| 123 | 0.90                   | 100                    | COG | 220pF       | ±5%                      | CL10C221JC8NFN# |
| 124 | 0.90                   | 100                    | COG | 270pF       | ±5%                      | CL10C271JC8NNN# |
| 125 | 0.90                   | 100                    | COG | 330pF       | ±5%                      | CL10C331JC8NNN# |
| 126 | 0.90                   | 100                    | COG | 470pF       | ±5%                      | CL10C471JC8NFN# |
| 127 | 0.90                   | 100                    | COG | 470pF       | ±5%                      | CL10C471JC8NNN# |
| 128 | 0.90                   | 200                    | COG | 220pF       | ±10%                     | CL10C221KD8NNN# |
| 129 | 0.90                   | 200                    | COG | 220pF       | ±5%                      | CL10C221JD8NNN# |
| 130 | 0.90                   | 250                    | COG | 470pF       | ±5%                      | CL10C471JE8NFN# |
| 131 | 0.90                   | 250                    | COG | 470pF       | ±5%                      | CL10C471JE8NNN# |



# Normal Capacitors\_Standard

Size Code (inch/mm) : 0805/2012

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 0.75                   | 25                     | COG | 3.9nF       | ±5%                      | CL21C392JAANNN# |
| 2   | 0.75                   | 50                     | COG | 1nF         | ±5%                      | CL21C102JBANNN# |
| 3   | 0.75                   | 50                     | COG | 10pF        | ±5%                      | CL21C100JBANFN# |
| 4   | 0.75                   | 50                     | COG | 11pF        | ±5%                      | CL21C110JBANNN# |
| 5   | 0.75                   | 50                     | COG | 13pF        | ±5%                      | CL21C130JBANNN# |
| 6   | 0.75                   | 50                     | COG | 14pF        | ±5%                      | CL21C140JBANNN# |
| 7   | 0.75                   | 50                     | COG | 15pF        | ±5%                      | CL21C150JBANFN# |
| 8   | 0.75                   | 50                     | COG | 16pF        | ±5%                      | CL21C160JBANNN# |
| 9   | 0.75                   | 50                     | COG | 20pF        | ±5%                      | CL21C200JBANNN# |
| 10  | 0.75                   | 50                     | COG | 22pF        | ±5%                      | CL21C220JBANFN# |
| 11  | 0.75                   | 50                     | COG | 22pF        | ±5%                      | CL21C220JBANNN# |
| 12  | 0.75                   | 50                     | COG | 24pF        | ±5%                      | CL21C240JBANNN# |
| 13  | 0.75                   | 50                     | COG | 25pF        | ±5%                      | CL21C250JBANNN# |
| 14  | 0.75                   | 50                     | COG | 33pF        | ±5%                      | CL21C330JBANFN# |
| 15  | 0.75                   | 50                     | COG | 36pF        | ±5%                      | CL21C360JBANNN# |
| 16  | 0.75                   | 50                     | COG | 39pF        | ±5%                      | CL21C390JBANFN# |
| 17  | 0.75                   | 50                     | COG | 39pF        | ±5%                      | CL21C390JBANNN# |
| 18  | 0.75                   | 50                     | COG | 43pF        | ±5%                      | CL21C430JBANNN# |
| 19  | 0.75                   | 50                     | COG | 47pF        | ±5%                      | CL21C470JBANFN# |
| 20  | 0.75                   | 50                     | COG | 47pF        | ±5%                      | CL21C470JBANNN# |
| 21  | 0.75                   | 50                     | COG | 51pF        | ±5%                      | CL21C510JBANNN# |
| 22  | 0.75                   | 50                     | COG | 62pF        | ±5%                      | CL21C620JBANNN# |
| 23  | 0.75                   | 50                     | COG | 68pF        | ±5%                      | CL21C680JBANFN# |
| 24  | 0.75                   | 50                     | COG | 75pF        | ±5%                      | CL21C750JBANNN# |
| 25  | 0.75                   | 50                     | COG | 91pF        | ±5%                      | CL21C910JBANNN# |
| 26  | 0.75                   | 50                     | COG | 100pF       | ±10%                     | CL21C101KBANFN# |
| 27  | 0.75                   | 50                     | COG | 100pF       | ±5%                      | CL21C101JBANFN# |
| 28  | 0.75                   | 50                     | COG | 100pF       | ±5%                      | CL21C101JBANNN# |
| 29  | 0.75                   | 50                     | COG | 110pF       | ±5%                      | CL21C111JBANNN# |
| 30  | 0.75                   | 50                     | COG | 130pF       | ±5%                      | CL21C131JBANNN# |
| 31  | 0.75                   | 50                     | COG | 150pF       | ±5%                      | CL21C151JBANFN# |
| 32  | 0.75                   | 50                     | COG | 150pF       | ±5%                      | CL21C151JBANNN# |
| 33  | 0.75                   | 50                     | COG | 160pF       | ±5%                      | CL21C161JBANNN# |
| 34  | 0.75                   | 50                     | COG | 180pF       | ±5%                      | CL21C181JBANNN# |
| 35  | 0.75                   | 50                     | COG | 200pF       | ±5%                      | CL21C201JBANNN# |
| 36  | 0.75                   | 50                     | COG | 220pF       | ±5%                      | CL21C221JBANFN# |
| 37  | 0.75                   | 50                     | COG | 220pF       | ±5%                      | CL21C221JBANNN# |
| 38  | 0.75                   | 50                     | COG | 240pF       | ±5%                      | CL21C241JBANNN# |
| 39  | 0.75                   | 50                     | COG | 270pF       | ±5%                      | CL21C271JBANFN# |
| 40  | 0.75                   | 50                     | COG | 270pF       | ±5%                      | CL21C271JBANNN# |



# Normal Capacitors\_Standard

Size Code (inch/mm) : 0805/2012

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 41  | 0.75                   | 50                     | COG | 300pF       | ±5%                      | CL21C301JBANNN# |
| 42  | 0.75                   | 50                     | COG | 330pF       | ±5%                      | CL21C331JBANFN# |
| 43  | 0.75                   | 50                     | COG | 360pF       | ±5%                      | CL21C361JBANNN# |
| 44  | 0.75                   | 50                     | COG | 390pF       | ±5%                      | CL21C391JBANNN# |
| 45  | 0.75                   | 50                     | COG | 430pF       | ±5%                      | CL21C431JBANNN# |
| 46  | 0.75                   | 50                     | COG | 470pF       | ±5%                      | CL21C471JBANFN# |
| 47  | 0.75                   | 50                     | COG | 510pF       | ±5%                      | CL21C511JBANNN# |
| 48  | 0.75                   | 50                     | COG | 560pF       | ±5%                      | CL21C561JBANFN# |
| 49  | 0.75                   | 50                     | COG | 680pF       | ±5%                      | CL21C681JBANNN# |
| 50  | 0.75                   | 100                    | COG | 1nF         | ±5%                      | CL21C102JCANNN# |
| 51  | 0.75                   | 100                    | COG | 12pF        | ±5%                      | CL21C120JCANNN# |
| 52  | 0.75                   | 100                    | COG | 18pF        | ±5%                      | CL21C180JCANNN# |
| 53  | 0.75                   | 100                    | COG | 27pF        | ±5%                      | CL21C270JCANNN# |
| 54  | 0.75                   | 100                    | COG | 30pF        | ±5%                      | CL21C300JCANNN# |
| 55  | 0.75                   | 100                    | COG | 33pF        | ±5%                      | CL21C330JCANFN# |
| 56  | 0.75                   | 100                    | COG | 47pF        | ±5%                      | CL21C470JCANNN# |
| 57  | 0.75                   | 100                    | COG | 56pF        | ±5%                      | CL21C560JCANNN# |
| 58  | 0.75                   | 100                    | COG | 68pF        | ±5%                      | CL21C680JCANNN# |
| 59  | 0.75                   | 100                    | COG | 100pF       | ±5%                      | CL21C101JCANFN# |
| 60  | 0.75                   | 100                    | COG | 100pF       | ±5%                      | CL21C101JCANNN# |
| 61  | 0.75                   | 100                    | COG | 270pF       | ±5%                      | CL21C271JCANNN# |
| 62  | 0.75                   | 100                    | COG | 330pF       | ±5%                      | CL21C331JCANNN# |
| 63  | 0.95                   | 25                     | COG | 6.8nF       | ±5%                      | CL21C682JACNNN# |
| 64  | 0.95                   | 50                     | COG | 1nF         | ±5%                      | CL21C102JBCNFN# |
| 65  | 0.95                   | 50                     | COG | 12pF        | ±5%                      | CL21C120JBCNNN# |
| 66  | 0.95                   | 50                     | COG | 33pF        | ±5%                      | CL21C330JBCNNN# |
| 67  | 0.95                   | 50                     | COG | 620pF       | ±5%                      | CL21C621JBCNNN# |
| 68  | 0.95                   | 50                     | COG | 680pF       | ±5%                      | CL21C681JBCNFN# |
| 69  | 0.95                   | 50                     | COG | 750pF       | ±5%                      | CL21C751JBCNNN# |
| 70  | 0.95                   | 50                     | COG | 910pF       | ±5%                      | CL21C911JBCNNN# |
| 71  | 0.95                   | 100                    | COG | 470pF       | ±5%                      | CL21C471JCCNFN# |
| 72  | 0.95                   | 100                    | COG | 560pF       | ±5%                      | CL21C561JCCNNN# |
| 73  | 0.95                   | 100                    | COG | 680pF       | ±5%                      | CL21C681JCCNNN# |
| 74  | 0.95                   | 200                    | COG | 18pF        | ±5%                      | CL21C180JDCNCN# |
| 75  | 0.95                   | 200                    | COG | 20pF        | ±5%                      | CL21C200JDCNCN# |
| 76  | 0.95                   | 200                    | COG | 22pF        | ±5%                      | CL21C220JDCNCN# |
| 77  | 0.95                   | 200                    | COG | 24pF        | ±5%                      | CL21C240JDCNCN# |
| 78  | 0.95                   | 200                    | COG | 33pF        | ±5%                      | CL21C330JDCNCN# |
| 79  | 0.95                   | 200                    | COG | 33pF        | ±5%                      | CL21C330JDCNNN# |
| 80  | 0.95                   | 200                    | COG | 36pF        | ±5%                      | CL21C360JDCNCN# |



# Normal Capacitors\_Standard

Size Code (inch/mm) : 0805/2012

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 81  | 0.95                   | 200                    | COG | 47pF        | ±5%                      | CL21C470JDCNNN# |
| 82  | 0.95                   | 200                    | COG | 51pF        | ±5%                      | CL21C510JDCNCN# |
| 83  | 0.95                   | 200                    | COG | 56pF        | ±5%                      | CL21C560JDCNCN# |
| 84  | 0.95                   | 200                    | COG | 100pF       | ±5%                      | CL21C101JDCNCN# |
| 85  | 0.95                   | 200                    | COG | 100pF       | ±5%                      | CL21C101JDCNFN# |
| 86  | 0.95                   | 200                    | COG | 100pF       | ±5%                      | CL21C101JDCNNN# |
| 87  | 0.95                   | 200                    | COG | 120pF       | ±5%                      | CL21C121JDCNNN# |
| 88  | 0.95                   | 200                    | COG | 150pF       | ±5%                      | CL21C151JDCNNN# |
| 89  | 0.95                   | 200                    | COG | 220pF       | ±5%                      | CL21C221JDCNFN# |
| 90  | 0.95                   | 200                    | COG | 220pF       | ±5%                      | CL21C221JDCNNN# |
| 91  | 1.35                   | 25                     | COG | 3.3nF       | ±5%                      | CL21C332JAFNNN# |
| 92  | 1.35                   | 25                     | COG | 4.7nF       | ±5%                      | CL21C472JAFNNN# |
| 93  | 1.35                   | 25                     | COG | 8.2nF       | ±5%                      | CL21C822JAFNNN# |
| 94  | 1.35                   | 25                     | COG | 10nF        | ±5%                      | CL21C103JAFNNN# |
| 95  | 1.35                   | 50                     | COG | 1.2nF       | ±5%                      | CL21C122JBFNNN# |
| 96  | 1.35                   | 50                     | COG | 1.5nF       | ±5%                      | CL21C152JBFNFN# |
| 97  | 1.35                   | 50                     | COG | 1.8nF       | ±5%                      | CL21C182JBFNNN# |
| 98  | 1.35                   | 50                     | COG | 2nF         | ±5%                      | CL21C202JBFNNN# |
| 99  | 1.35                   | 50                     | COG | 2.2nF       | ±5%                      | CL21C222JBFNFN# |
| 100 | 1.35                   | 50                     | COG | 2.2nF       | ±5%                      | CL21C222JBFNNN# |
| 101 | 1.35                   | 50                     | COG | 2.7nF       | ±5%                      | CL21C272JBFNNN# |
| 102 | 1.35                   | 50                     | COG | 3.9nF       | ±5%                      | CL21C392JBFNNN# |
| 103 | 1.35                   | 50                     | COG | 4.7nF       | ±5%                      | CL21C472JBFNCN# |
| 104 | 1.35                   | 50                     | COG | 4.7nF       | ±5%                      | CL21C472JBFNFN# |
| 105 | 1.35                   | 50                     | COG | 4.7nF       | ±5%                      | CL21C472JBFNNN# |
| 106 | 1.35                   | 50                     | COG | 5.6nF       | ±5%                      | CL21C562JBFNNN# |
| 107 | 1.35                   | 50                     | COG | 6.8nF       | ±5%                      | CL21C682JBFNNN# |
| 108 | 1.35                   | 50                     | COG | 8.2nF       | ±5%                      | CL21C822JBFNNN# |
| 109 | 1.35                   | 50                     | COG | 10nF        | ±5%                      | CL21C103JBFNFN# |
| 110 | 1.35                   | 50                     | COG | 10nF        | ±5%                      | CL21C103JBFNNN# |
| 111 | 1.35                   | 50                     | COG | 15nF        | ±5%                      | CL21C153JBFNNN# |
| 112 | 1.35                   | 100                    | COG | 1nF         | ±5%                      | CL21C102JCFNNN# |
| 113 | 1.35                   | 100                    | COG | 2.2nF       | ±5%                      | CL21C222JCFNNN# |
| 114 | 1.35                   | 100                    | COG | 3.3nF       | ±5%                      | CL21C332JCFNNN# |
| 115 | 1.35                   | 100                    | COG | 3.9nF       | ±5%                      | CL21C392JCFNNN# |
| 116 | 1.35                   | 200                    | COG | 1nF         | ±5%                      | CL21C102JDFNFN# |
| 117 | 1.35                   | 200                    | COG | 1nF         | ±5%                      | CL21C102JDFNNN# |
| 118 | 1.35                   | 250                    | COG | 1nF         | ±5%                      | CL21C102JEFNFN# |
| 119 | 1.35                   | 250                    | COG | 1nF         | ±5%                      | CL21C102JEFNNN# |
| 120 | 1.35                   | 250                    | COG | 2.2nF       | ±5%                      | CL21C222JEFNNN# |
| 121 | 1.45                   | 250                    | COG | 10nF        | ±5%                      | CL21C103JEYNNN# |



# Normal Capacitors\_Standard

Size Code (inch/mm) : 1206/3216

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 1.00                   | 50                     | COG | 1.2nF       | ±5%                      | CL31C122JBCNNN# |
| 2   | 1.00                   | 50                     | COG | 1.5nF       | ±5%                      | CL31C152JBCNNN# |
| 3   | 1.00                   | 50                     | COG | 1.8nF       | ±5%                      | CL31C182JBCNNN# |
| 4   | 1.00                   | 50                     | COG | 2.2nF       | ±5%                      | CL31C222JBCNNN# |
| 5   | 1.00                   | 50                     | COG | 10pF        | ±5%                      | CL31C100JBCNNN# |
| 6   | 1.00                   | 50                     | COG | 12pF        | ±5%                      | CL31C120JBCNNN# |
| 7   | 1.00                   | 50                     | COG | 15pF        | ±5%                      | CL31C150JBCNNN# |
| 8   | 1.00                   | 50                     | COG | 18pF        | ±5%                      | CL31C180JBCNNN# |
| 9   | 1.00                   | 50                     | COG | 20pF        | ±5%                      | CL31C200JBCNNN# |
| 10  | 1.00                   | 50                     | COG | 22pF        | ±5%                      | CL31C220JBCNNN# |
| 11  | 1.00                   | 50                     | COG | 27pF        | ±5%                      | CL31C270JBCNNN# |
| 12  | 1.00                   | 50                     | COG | 30pF        | ±5%                      | CL31C300JBCNNN# |
| 13  | 1.00                   | 50                     | COG | 39pF        | ±5%                      | CL31C390JBCNNN# |
| 14  | 1.00                   | 50                     | COG | 51pF        | ±5%                      | CL31C510JBCNNN# |
| 15  | 1.00                   | 50                     | COG | 56pF        | ±5%                      | CL31C560JBCNNN# |
| 16  | 1.00                   | 50                     | COG | 75pF        | ±5%                      | CL31C750JBCNNN# |
| 17  | 1.00                   | 50                     | COG | 82pF        | ±5%                      | CL31C820JBCNNN# |
| 18  | 1.00                   | 50                     | COG | 100pF       | ±5%                      | CL31C101JBCNFN# |
| 19  | 1.00                   | 50                     | COG | 120pF       | ±5%                      | CL31C121JBCNNN# |
| 20  | 1.00                   | 50                     | COG | 180pF       | ±5%                      | CL31C181JBCNNN# |
| 21  | 1.00                   | 50                     | COG | 220pF       | ±5%                      | CL31C221JBCNNN# |
| 22  | 1.00                   | 50                     | COG | 270pF       | ±5%                      | CL31C271JBCNNN# |
| 23  | 1.00                   | 50                     | COG | 330pF       | ±5%                      | CL31C331JBCNNN# |
| 24  | 1.00                   | 50                     | COG | 390pF       | ±5%                      | CL31C391JBCNNN# |
| 25  | 1.00                   | 50                     | COG | 560pF       | ±5%                      | CL31C561JBCNNN# |
| 26  | 1.00                   | 50                     | COG | 680pF       | ±5%                      | CL31C681JBCNNN# |
| 27  | 1.00                   | 50                     | COG | 820pF       | ±5%                      | CL31C821JBCNNN# |
| 28  | 1.00                   | 100                    | COG | 1.5nF       | ±5%                      | CL31C152JCCNNN# |
| 29  | 1.00                   | 100                    | COG | 2.2nF       | ±5%                      | CL31C222JCCNNN# |
| 30  | 1.00                   | 100                    | COG | 20pF        | ±5%                      | CL31C200JCCNNN# |
| 31  | 1.00                   | 100                    | COG | 22pF        | ±5%                      | CL31C220JCCNNN# |
| 32  | 1.00                   | 100                    | COG | 27pF        | ±5%                      | CL31C270JCCNNN# |
| 33  | 1.00                   | 100                    | COG | 47pF        | ±5%                      | CL31C470JCCNNN# |
| 34  | 1.00                   | 100                    | COG | 150pF       | ±5%                      | CL31C151JCCNNN# |
| 35  | 1.00                   | 100                    | COG | 220pF       | ±5%                      | CL31C221JCCNNN# |



# Normal Capacitors\_Standard

Size Code (inch/mm) : 1206/3216

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 36  | 1.00                   | 100                    | COG | 270pF       | ±5%                      | CL31C271JCCNNN# |
| 37  | 1.00                   | 100                    | COG | 330pF       | ±5%                      | CL31C331JCCNNN# |
| 38  | 1.00                   | 100                    | COG | 470pF       | ±5%                      | CL31C471JCCNNN# |
| 39  | 1.00                   | 100                    | COG | 560pF       | ±5%                      | CL31C561JCCNNN# |
| 40  | 1.00                   | 100                    | COG | 680pF       | ±5%                      | CL31C681JCCNNN# |
| 41  | 1.00                   | 200                    | COG | 220pF       | ±5%                      | CL31C221JDCNFN# |
| 42  | 1.00                   | 200                    | COG | 220pF       | ±5%                      | CL31C221JDCNNN# |
| 43  | 1.30                   | 630                    | COG | 1nF         | ±5%                      | CL31C102JHMLNN# |
| 44  | 1.40                   | 25                     | COG | 10nF        | ±5%                      | CL31C103JAFNNN# |
| 45  | 1.40                   | 50                     | COG | 3.3nF       | ±5%                      | CL31C332JBFNNN# |
| 46  | 1.40                   | 50                     | COG | 3.9nF       | ±5%                      | CL31C392JBFNNN# |
| 47  | 1.40                   | 50                     | COG | 4.7nF       | ±5%                      | CL31C472JBFNFN# |
| 48  | 1.40                   | 200                    | COG | 1nF         | ±5%                      | CL31C102JDFNNN# |
| 49  | 1.40                   | 500                    | COG | 10pF        | ±5%                      | CL31C100JGFNNN# |
| 50  | 1.40                   | 500                    | COG | 22pF        | ±5%                      | CL31C220JGFNNN# |
| 51  | 1.40                   | 500                    | COG | 33pF        | ±5%                      | CL31C330JGFNNN# |
| 52  | 1.40                   | 500                    | COG | 39pF        | ±5%                      | CL31C390JGFNNN# |
| 53  | 1.40                   | 500                    | COG | 47pF        | ±5%                      | CL31C470JGFNFN# |
| 54  | 1.40                   | 500                    | COG | 47pF        | ±5%                      | CL31C470JGFNNN# |
| 55  | 1.40                   | 500                    | COG | 68pF        | ±5%                      | CL31C680JGFNNN# |
| 56  | 1.40                   | 500                    | COG | 100pF       | ±5%                      | CL31C101JGFNFN# |
| 57  | 1.40                   | 500                    | COG | 100pF       | ±5%                      | CL31C101JGFNNN# |
| 58  | 1.40                   | 500                    | COG | 120pF       | ±5%                      | CL31C121JGFNNN# |
| 59  | 1.40                   | 500                    | COG | 150pF       | ±5%                      | CL31C151JGFNNN# |
| 60  | 1.40                   | 500                    | COG | 180pF       | ±5%                      | CL31C181JGFNFN# |
| 61  | 1.40                   | 500                    | COG | 180pF       | ±5%                      | CL31C181JGFNNN# |
| 62  | 1.40                   | 500                    | COG | 220pF       | ±5%                      | CL31C221JGFNFN# |
| 63  | 1.40                   | 500                    | COG | 220pF       | ±5%                      | CL31C221JGFNNN# |
| 64  | 1.40                   | 500                    | COG | 270pF       | ±5%                      | CL31C271JGFNNN# |
| 65  | 1.40                   | 500                    | COG | 390pF       | ±5%                      | CL31C391JGFNFN# |
| 66  | 1.40                   | 500                    | COG | 390pF       | ±5%                      | CL31C391JGFNNN# |
| 67  | 1.40                   | 500                    | COG | 470pF       | ±5%                      | CL31C471JGFNFN# |
| 68  | 1.40                   | 500                    | COG | 470pF       | ±5%                      | CL31C471JGFNNN# |
| 69  | 1.40                   | 500                    | COG | 560pF       | ±5%                      | CL31C561JGFNFN# |
| 70  | 1.40                   | 500                    | COG | 560pF       | ±5%                      | CL31C561JGFNNN# |
| 71  | 1.40                   | 630                    | COG | 10pF        | ±5%                      | CL31C100JHFNFN# |
| 72  | 1.40                   | 630                    | COG | 10pF        | ±5%                      | CL31C100JHFNNN# |
| 73  | 1.40                   | 630                    | COG | 15pF        | ±5%                      | CL31C150JHFNFN# |
| 74  | 1.40                   | 630                    | COG | 15pF        | ±5%                      | CL31C150JHFNNN# |
| 75  | 1.40                   | 630                    | COG | 22pF        | ±5%                      | CL31C220JHFNFN# |
| 76  | 1.40                   | 630                    | COG | 22pF        | ±5%                      | CL31C220JHFNNN# |
| 77  | 1.40                   | 630                    | COG | 27pF        | ±5%                      | CL31C270JHFNNN# |
| 78  | 1.40                   | 630                    | COG | 33pF        | ±5%                      | CL31C330JHFNFN# |
| 79  | 1.40                   | 630                    | COG | 33pF        | ±5%                      | CL31C330JHFNNN# |
| 80  | 1.40                   | 630                    | COG | 47pF        | ±5%                      | CL31C470JHFNFN# |



# Normal Capacitors\_Standard

Size Code (inch/mm) : 1206/3216

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 81  | 1.40                   | 630                    | COG | 47pF        | ±5%                      | CL31C470JHFNNN# |
| 82  | 1.40                   | 630                    | COG | 68pF        | ±5%                      | CL31C680JHFNNN# |
| 83  | 1.40                   | 630                    | COG | 100pF       | ±5%                      | CL31C101JHFNFN# |
| 84  | 1.40                   | 630                    | COG | 100pF       | ±5%                      | CL31C101JHFNNN# |
| 85  | 1.40                   | 630                    | COG | 120pF       | ±5%                      | CL31C121JHFNNN# |
| 86  | 1.40                   | 630                    | COG | 150pF       | ±5%                      | CL31C151JHFNFN# |
| 87  | 1.40                   | 630                    | COG | 150pF       | ±5%                      | CL31C151JHFNNN# |
| 88  | 1.40                   | 630                    | COG | 180pF       | ±5%                      | CL31C181JHFNNN# |
| 89  | 1.40                   | 630                    | COG | 220pF       | ±5%                      | CL31C221JHFNFN# |
| 90  | 1.40                   | 630                    | COG | 220pF       | ±5%                      | CL31C221JHFNNN# |
| 91  | 1.40                   | 630                    | COG | 270pF       | ±5%                      | CL31C271JHFNNN# |
| 92  | 1.40                   | 630                    | COG | 330pF       | ±5%                      | CL31C331JHFNFN# |
| 93  | 1.40                   | 630                    | COG | 330pF       | ±5%                      | CL31C331JHFNNN# |
| 94  | 1.40                   | 630                    | COG | 390pF       | ±5%                      | CL31C391JHFNNN# |
| 95  | 1.40                   | 630                    | COG | 470pF       | ±5%                      | CL31C471JHFNFN# |
| 96  | 1.40                   | 630                    | COG | 470pF       | ±5%                      | CL31C471JHFNNN# |
| 97  | 1.40                   | 1000                   | COG | 10pF        | ±5%                      | CL31C100JIFNNN# |
| 98  | 1.40                   | 1000                   | COG | 22pF        | ±5%                      | CL31C220JIFNFN# |
| 99  | 1.40                   | 1000                   | COG | 22pF        | ±5%                      | CL31C220JIFNNN# |
| 100 | 1.40                   | 1000                   | COG | 33pF        | ±5%                      | CL31C330JIFNFN# |
| 101 | 1.40                   | 1000                   | COG | 33pF        | ±5%                      | CL31C330JIFNNN# |
| 102 | 1.40                   | 1000                   | COG | 47pF        | ±5%                      | CL31C470JIFNFN# |
| 103 | 1.40                   | 1000                   | COG | 47pF        | ±5%                      | CL31C470JIFNNN# |
| 104 | 1.40                   | 1000                   | COG | 68pF        | ±5%                      | CL31C680JIFNFN# |
| 105 | 1.40                   | 1000                   | COG | 68pF        | ±5%                      | CL31C680JIFNNN# |
| 106 | 1.40                   | 1000                   | COG | 100pF       | ±5%                      | CL31C101JIFNFN# |
| 107 | 1.40                   | 1000                   | COG | 100pF       | ±5%                      | CL31C101JIFNNN# |
| 108 | 1.40                   | 1000                   | COG | 150pF       | ±5%                      | CL31C151JIFNNN# |
| 109 | 1.80                   | 16                     | COG | 15nF        | ±5%                      | CL31C153JOHNNN# |
| 110 | 1.80                   | 16                     | COG | 120nF       | ±5%                      | CL31C124JOHNNN# |
| 111 | 1.80                   | 25                     | COG | 39nF        | ±5%                      | CL31C393JAHNNN# |
| 112 | 1.80                   | 25                     | COG | 47nF        | ±5%                      | CL31C473JAHNNN# |
| 113 | 1.80                   | 25                     | COG | 100nF       | ±5%                      | CL31C104JAHNNN# |
| 114 | 1.80                   | 50                     | COG | 6.8nF       | ±5%                      | CL31C682JBHNNN# |
| 115 | 1.80                   | 50                     | COG | 22nF        | ±5%                      | CL31C223JBHNNN# |
| 116 | 1.80                   | 50                     | COG | 27nF        | ±5%                      | CL31C273JBHNNN# |
| 117 | 1.80                   | 50                     | COG | 33nF        | ±5%                      | CL31C333JBHNNN# |
| 118 | 1.80                   | 50                     | COG | 47nF        | ±5%                      | CL31C473JBHNNN# |
| 119 | 1.80                   | 100                    | COG | 3.9nF       | ±5%                      | CL31C392JCHNNN# |
| 120 | 1.80                   | 100                    | COG | 10nF        | ±5%                      | CL31C103JCHNNN# |
| 121 | 1.80                   | 100                    | COG | 22nF        | ±5%                      | CL31C223JCHNNN# |
| 122 | 1.80                   | 250                    | COG | 2.2nF       | ±5%                      | CL31C222JEHNNN# |
| 123 | 1.80                   | 250                    | COG | 3.9nF       | ±5%                      | CL31C392JEHNNN# |
| 124 | 1.80                   | 250                    | COG | 4.7nF       | ±5%                      | CL31C472JEHNNN# |
| 125 | 1.80                   | 250                    | COG | 5.6nF       | ±5%                      | CL31C562JEHNNN# |



# Normal Capacitors\_Standard

Size Code (inch/mm) : 1206/3216

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 126 | 1.80                   | 250                    | COG | 6.8nF       | ±5%                      | CL31C682JEHNNN# |
| 127 | 1.80                   | 250                    | COG | 8.2nF       | ±5%                      | CL31C822JEHNNN# |
| 128 | 1.80                   | 250                    | COG | 22nF        | ±5%                      | CL31C223JEHNNN# |
| 129 | 1.80                   | 500                    | COG | 1nF         | ±5%                      | CL31C102JGHNFN# |
| 130 | 1.80                   | 500                    | COG | 2.2nF       | ±5%                      | CL31C222JGHNNN# |
| 131 | 1.80                   | 500                    | COG | 680pF       | ±5%                      | CL31C681JGHNFN# |
| 132 | 1.80                   | 500                    | COG | 680pF       | ±5%                      | CL31C681JGHNNN# |
| 133 | 1.80                   | 500                    | COG | 820pF       | ±5%                      | CL31C821JGHNNN# |
| 134 | 1.80                   | 630                    | COG | 1nF         | ±5%                      | CL31C102JHHNFN# |
| 135 | 1.80                   | 630                    | COG | 1nF         | ±5%                      | CL31C102JHHNNN# |
| 136 | 1.80                   | 630                    | COG | 1.2nF       | ±5%                      | CL31C122JHHNNN# |
| 137 | 1.80                   | 630                    | COG | 1.5nF       | ±5%                      | CL31C152JHHNFN# |
| 138 | 1.80                   | 630                    | COG | 1.5nF       | ±5%                      | CL31C152JHHNNN# |
| 139 | 1.80                   | 630                    | COG | 1.8nF       | ±5%                      | CL31C182JHHNNN# |
| 140 | 1.80                   | 630                    | COG | 2.2nF       | ±5%                      | CL31C222JHHNFN# |
| 141 | 1.80                   | 630                    | COG | 2.2nF       | ±5%                      | CL31C222JHHNNN# |
| 142 | 1.80                   | 630                    | COG | 2.7nF       | ±5%                      | CL31C272JHHNNN# |
| 143 | 1.80                   | 630                    | COG | 3.3nF       | ±5%                      | CL31C332JHHNFN# |
| 144 | 1.80                   | 630                    | COG | 3.3nF       | ±5%                      | CL31C332JHHNNN# |
| 145 | 1.80                   | 630                    | COG | 10nF        | ±5%                      | CL31C103JHHNNN# |
| 146 | 1.80                   | 630                    | COG | 680pF       | ±5%                      | CL31C681JHHNFN# |
| 147 | 1.80                   | 630                    | COG | 680pF       | ±5%                      | CL31C681JHHNNN# |
| 148 | 1.80                   | 630                    | COG | 820pF       | ±5%                      | CL31C821JHHNNN# |
| 149 | 1.80                   | 1000                   | COG | 1nF         | ±5%                      | CL31C102JIHNNN# |
| 150 | 1.80                   | 1000                   | COG | 180pF       | ±5%                      | CL31C181JIHNNN# |
| 151 | 1.80                   | 1000                   | COG | 220pF       | ±5%                      | CL31C221JIHNFN# |
| 152 | 1.80                   | 1000                   | COG | 220pF       | ±5%                      | CL31C221JIHNNN# |
| 153 | 1.80                   | 1000                   | COG | 270pF       | ±5%                      | CL31C271JIHNNN# |
| 154 | 1.80                   | 1000                   | COG | 330pF       | ±5%                      | CL31C331JIHNNN# |
| 155 | 1.80                   | 1000                   | COG | 470pF       | ±5%                      | CL31C471JIHNFN# |
| 156 | 1.80                   | 1000                   | COG | 470pF       | ±5%                      | CL31C471JIHNNN# |
| 157 | 1.80                   | 2000                   | COG | 15pF        | ±5%                      | CL31C150JHNNN#  |
| 158 | 1.80                   | 2000                   | COG | 47pF        | ±5%                      | CL31C470JHNNN#  |
| 159 | 1.80                   | 2000                   | COG | 100pF       | ±5%                      | CL31C101JHNNN#  |



# Normal Capacitors\_Standard

Size Code (inch/mm) : 1210/3225

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 1.45                   | 25                     | COG | 10nF        | ±5%                      | CL32C103JAFNNN# |
| 2   | 1.45                   | 50                     | COG | 1.8nF       | ±5%                      | CL32C182JBFNNN# |
| 3   | 1.45                   | 50                     | COG | 3.3nF       | ±5%                      | CL32C332JBFNNN# |
| 4   | 1.45                   | 50                     | COG | 4.7nF       | ±5%                      | CL32C472JBFNNN# |
| 5   | 1.45                   | 50                     | COG | 6.8nF       | ±5%                      | CL32C682JBFNNN# |
| 6   | 1.45                   | 500                    | COG | 680pF       | ±5%                      | CL32C681JGFNNN# |
| 7   | 1.45                   | 2000                   | COG | 100pF       | ±5%                      | CL32C101JJFNNN# |
| 8   | 1.80                   | 50                     | COG | 11nF        | ±5%                      | CL32C113JBHNNN# |
| 9   | 1.80                   | 50                     | COG | 22nF        | ±5%                      | CL32C223JBHNNN# |
| 10  | 1.80                   | 500                    | COG | 1.8nF       | ±5%                      | CL32C182JGHNNN# |
| 11  | 1.80                   | 630                    | COG | 1.8nF       | ±5%                      | CL32C182JHHNNN# |
| 12  | 2.70                   | 100                    | COG | 33nF        | ±5%                      | CL32C333JCJNNN# |
| 13  | 2.70                   | 100                    | COG | 47nF        | ±5%                      | CL32C473JCJNNN# |
| 14  | 2.70                   | 630                    | COG | 8.2nF       | ±5%                      | CL32C822JHJNNN# |
| 15  | 2.70                   | 630                    | COG | 22nF        | ±5%                      | CL32C223JHJNNN# |
| 16  | 2.70                   | 630                    | COG | 27nF        | ±5%                      | CL32C273JHJNNN# |
| 17  | 2.70                   | 630                    | COG | 33nF        | ±5%                      | CL32C333JHJNNN# |

## Product Lineup (X5R)

Size Code (inch/mm) : 008004/0201

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 0.138                  | 6.3                    | X5R | 1nF         | ±20%                     | CLR1A102MQ1NNN# |
| 2   | 0.138                  | 6.3                    | X5R | 10nF        | ±20%                     | CLR1A103MQ1NNN# |

Size Code (inch/mm) : 01005/0402

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 0.22                   | 4                      | X5R | 100nF       | ±20%                     | CL02A104MR2NNN# |
| 2   | 0.22                   | 4                      | X5R | 220nF       | ±20%                     | CL02A224MR2NNN# |
| 3   | 0.22                   | 6.3                    | X5R | 100nF       | ±10%                     | CL02A104KQ2NNN# |
| 4   | 0.22                   | 6.3                    | X5R | 100nF       | ±20%                     | CL02A104MQ2NNN# |
| 5   | 0.22                   | 6.3                    | X5R | 10nF        | ±10%                     | CL02A103KQ2NNN# |
| 6   | 0.22                   | 6.3                    | X5R | 1nF         | ±10%                     | CL02A102KQ2NNN# |
| 7   | 0.22                   | 6.3                    | X5R | 2.2nF       | ±10%                     | CL02A222KQ2NNN# |
| 8   | 0.22                   | 6.3                    | X5R | 220nF       | ±20%                     | CL02A224MQ2NNN# |
| 9   | 0.22                   | 6.3                    | X5R | 470nF       | ±20%                     | CL02A474MQ2NNN# |
| 10  | 0.22                   | 10                     | X5R | 10nF        | ±10%                     | CL02A103KP2NNN# |
| 11  | 0.22                   | 10                     | X5R | 1nF         | ±10%                     | CL02A102KP2NNN# |
| 12  | 0.25                   | 6.3                    | X5R | 1uF         | ±20%                     | CL02A105MQ2NQN# |
| 13  | 0.25                   | 6.3                    | X5R | 470nF       | ±20%                     | CL02A474MQ2NQN# |



# Normal Capacitors\_Standard

Size Code (inch/mm) : 015008/0502

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 0.275                  | 6.3                    | X5R | 1uF         | ±20%                     | CLR5A105MQ2CNN# |

Size Code (inch/mm) : 0201/0603

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 0.33                   | 6.3                    | X5R | 1uF         | ±20%                     | CL03A105MQ3CNN# |
| 2   | 0.33                   | 6.3                    | X5R | 15nF        | ±10%                     | CL03A153KQ3NNN# |
| 3   | 0.33                   | 6.3                    | X5R | 22nF        | ±10%                     | CL03A223KQ3NNN# |
| 4   | 0.33                   | 6.3                    | X5R | 47nF        | ±10%                     | CL03A473KQ3NNN# |
| 5   | 0.33                   | 6.3                    | X5R | 68nF        | ±10%                     | CL03A683KQ3NNN# |
| 6   | 0.33                   | 6.3                    | X5R | 100nF       | ±10%                     | CL03A104KQ3NNN# |
| 7   | 0.33                   | 6.3                    | X5R | 100nF       | ±20%                     | CL03A104MQ3NNN# |
| 8   | 0.33                   | 6.3                    | X5R | 220nF       | ±10%                     | CL03A224KQ3NNN# |
| 9   | 0.33                   | 6.3                    | X5R | 220nF       | ±20%                     | CL03A224MQ3NNN# |
| 10  | 0.33                   | 6.3                    | X5R | 470nF       | ±10%                     | CL03A474KQ3NNN# |
| 11  | 0.33                   | 6.3                    | X5R | 470nF       | ±10%                     | CL03A474KQ3ZNN# |
| 12  | 0.33                   | 6.3                    | X5R | 470nF       | ±20%                     | CL03A474MQ3NNN# |
| 13  | 0.33                   | 10                     | X5R | 2.2nF       | ±10%                     | CL03A222KP3NNN# |
| 14  | 0.33                   | 10                     | X5R | 4.7nF       | ±10%                     | CL03A472KP3NNN# |
| 15  | 0.33                   | 10                     | X5R | 10nF        | ±10%                     | CL03A103KP3NNN# |
| 16  | 0.33                   | 10                     | X5R | 47nF        | ±10%                     | CL03A473KP3NNN# |
| 17  | 0.33                   | 10                     | X5R | 100nF       | ±10%                     | CL03A104KP3NNN# |
| 18  | 0.33                   | 10                     | X5R | 100nF       | ±20%                     | CL03A104MP3NNN# |
| 19  | 0.33                   | 10                     | X5R | 220nF       | ±10%                     | CL03A224KP3NNN# |
| 20  | 0.33                   | 10                     | X5R | 470nF       | ±10%                     | CL03A474KP3NNN# |
| 21  | 0.33                   | 16                     | X5R | 100nF       | ±10%                     | CL03A104KQ3NNN# |
| 22  | 0.33                   | 16                     | X5R | 100nF       | ±20%                     | CL03A104MQ3NNN# |
| 23  | 0.33                   | 25                     | X5R | 4.7nF       | ±10%                     | CL03A472KA3NNN# |
| 24  | 0.33                   | 25                     | X5R | 10nF        | ±10%                     | CL03A103KA3NNN# |
| 25  | 0.33                   | 25                     | X5R | 22nF        | ±10%                     | CL03A223KA3NNN# |
| 26  | 0.33                   | 25                     | X5R | 100nF       | ±10%                     | CL03A104KA3NNN# |
| 27  | 0.33                   | 25                     | X5R | 100nF       | ±20%                     | CL03A104MA3NNN# |
| 28  | 0.33                   | 35                     | X5R | 100nF       | ±10%                     | CL03A104KL3NNN# |
| 29  | 0.35                   | 4                      | X5R | 1uF         | ±20%                     | CL03A105MR3CSN# |
| 30  | 0.35                   | 6.3                    | X5R | 1uF         | ±10%                     | CL03A105KQ3CSN# |
| 31  | 0.35                   | 6.3                    | X5R | 1uF         | ±20%                     | CL03A105MQ3CSN# |
| 32  | 0.35                   | 6.3                    | X5R | 1uF         | ±20%                     | CL03A105MQ3ISN# |
| 33  | 0.35                   | 6.3                    | X5R | 1uF         | ±20%                     | CL03A105MQ3NSN# |
| 34  | 0.35                   | 6.3                    | X5R | 2.2uF       | ±20%                     | CL03A225MQ3CSN# |
| 35  | 0.35                   | 10                     | X5R | 1uF         | ±10%                     | CL03A105KP3NSN# |
| 36  | 0.35                   | 10                     | X5R | 1uF         | ±20%                     | CL03A105MP3ISN# |
| 37  | 0.35                   | 10                     | X5R | 1uF         | ±20%                     | CL03A105MP3NSN# |
| 38  | 0.39                   | 4                      | X5R | 3.7uF       | ±20%                     | CL03A375MR3DRN# |
| 39  | 0.39                   | 6.3                    | X5R | 1uF         | ±20%                     | CL03A105MQ3DRN# |
| 40  | 0.39                   | 6.3                    | X5R | 1.9uF       | ±20%                     | CL03A195MQ3DRN# |



# Normal Capacitors\_Standard

Size Code (inch/mm) : 0201/0603

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 41  | 0.39                   | 6.3                    | X5R | 2.2uF       | ±20%                     | CL03A225MQ3CR6# |
| 42  | 0.39                   | 6.3                    | X5R | 2.2uF       | ±20%                     | CL03A225MQ3CRN# |
| 43  | 0.39                   | 6.3                    | X5R | 2.2uF       | ±20%                     | CL03A225MQ3IRN# |
| 44  | 0.39                   | 6.3                    | X5R | 3uF         | ±20%                     | CL03A305MQ3CRN# |
| 45  | 0.39                   | 6.3                    | X5R | 3.9uF       | ±20%                     | CL03A395MQ3CRN# |
| 46  | 0.39                   | 6.3                    | X5R | 4.7uF       | ±20%                     | CL03A475MQ3CRN# |
| 47  | 0.39                   | 10                     | X5R | 2.2uF       | ±10%                     | CL03A225KP3CRN# |
| 48  | 0.39                   | 10                     | X5R | 2.2uF       | ±20%                     | CL03A225MP3CRN# |
| 49  | 0.39                   | 10                     | X5R | 2.2uF       | ±20%                     | CL03A225MP3IRN# |
| 50  | 0.39                   | 10                     | X5R | 330nF       | ±10%                     | CL03A334KP3ZRN# |
| 51  | 0.39                   | 16                     | X5R | 1uF         | ±20%                     | CL03A105MO3IRN# |
| 52  | 0.39                   | 16                     | X5R | 1uF         | ±20%                     | CL03A105MO3NRN# |
| 53  | 0.39                   | 25                     | X5R | 220nF       | ±10%                     | CL03A224KA3NRN# |
| 54  | 0.39                   | 25                     | X5R | 220nF       | ±10%                     | CL03A224KA3ZRN# |
| 55  | 0.39                   | 25                     | X5R | 330nF       | ±10%                     | CL03A334KA3NRN# |
| 56  | 0.39                   | 25                     | X5R | 330nF       | ±10%                     | CL03A334KA3ZRN# |
| 57  | 0.39                   | 35                     | X5R | 220nF       | ±10%                     | CL03A224KL3NRN# |
| 58  | 0.55                   | 4                      | X5R | 4.9uF       | ±20%                     | CL03A495MR5D65# |
| 59  | 0.55                   | 6.3                    | X5R | 4.7uF       | ±20%                     | CL03A475MQ5C65# |
| 60  | 0.55                   | 6.3                    | X5R | 4.7uF       | ±20%                     | CL03A475MQ5D65# |
| 61  | 0.55                   | 16                     | X5R | 2.2uF       | ±20%                     | CL03A225MO5C65# |

Size Code (inch/mm) : 0402/1005

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 0.33                   | 6.3                    | X5R | 1uF         | ±10%                     | CL05A105KQ3LNN# |
| 2   | 0.33                   | 6.3                    | X5R | 2.2uF       | ±20%                     | CL05A225MQ3LRN# |
| 3   | 0.33                   | 6.3                    | X5R | 4.7uF       | ±20%                     | CL05A475MQ3JUD# |
| 4   | 0.35                   | 6.3                    | X5R | 4.7uF       | ±20%                     | CL05A475MQ3LUN# |
| 5   | 0.50                   | 6.3                    | X5R | 10uF        | ±20%                     | CL05A106MQ4N68# |
| 6   | 0.50                   | 10                     | X5R | 10uF        | ±20%                     | CL05A106MP5C64# |
| 7   | 0.55                   | 4                      | X5R | 2.2uF       | ±20%                     | CL05A225MR5NNN# |
| 8   | 0.55                   | 6.3                    | X5R | 1uF         | ±10%                     | CL05A105KQ5NNN# |
| 9   | 0.55                   | 6.3                    | X5R | 1uF         | ±20%                     | CL05A105MQ5NNN# |
| 10  | 0.55                   | 6.3                    | X5R | 1uF         | ±5%                      | CL05A105JQ5NNN# |
| 11  | 0.55                   | 6.3                    | X5R | 2.2uF       | ±10%                     | CL05A225KQ5NNN# |
| 12  | 0.55                   | 6.3                    | X5R | 2.2uF       | ±20%                     | CL05A225MQ5NNN# |
| 13  | 0.55                   | 6.3                    | X5R | 100nF       | ±10%                     | CL05A104KQ5NNN# |
| 14  | 0.55                   | 6.3                    | X5R | 220nF       | ±10%                     | CL05A224KQ5NNN# |
| 15  | 0.55                   | 6.3                    | X5R | 330nF       | ±10%                     | CL05A334KQ5NNN# |
| 16  | 0.55                   | 6.3                    | X5R | 330nF       | ±20%                     | CL05A334MQ5NNN# |
| 17  | 0.55                   | 6.3                    | X5R | 470nF       | ±10%                     | CL05A474KQ5NNN# |
| 18  | 0.55                   | 10                     | X5R | 1uF         | ±10%                     | CL05A105KP5NFN# |
| 19  | 0.55                   | 10                     | X5R | 1uF         | ±10%                     | CL05A105KP5NNN# |
| 20  | 0.55                   | 10                     | X5R | 2.2uF       | ±10%                     | CL05A225KP5NNN# |



# Normal Capacitors\_Standard

Size Code (inch/mm) : 0402/1005

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 21  | 0.55                   | 10                     | X5R | 2.2uF       | ±20%                     | CL05A225MP5NNN# |
| 22  | 0.55                   | 10                     | X5R | 100nF       | ±10%                     | CL05A104KP5NNN# |
| 23  | 0.55                   | 10                     | X5R | 150nF       | ±10%                     | CL05A154KP5NNN# |
| 24  | 0.55                   | 10                     | X5R | 220nF       | ±10%                     | CL05A224KP5NNN# |
| 25  | 0.55                   | 10                     | X5R | 220nF       | ±20%                     | CL05A224MP5NNN# |
| 26  | 0.55                   | 10                     | X5R | 470nF       | ±10%                     | CL05A474KP5NNN# |
| 27  | 0.55                   | 16                     | X5R | 1uF         | ±10%                     | CL05A105K05NFN# |
| 28  | 0.55                   | 16                     | X5R | 1uF         | ±10%                     | CL05A105K05NNN# |
| 29  | 0.55                   | 16                     | X5R | 4.2uF       | ±10%                     | CL05A425K05LUN# |
| 30  | 0.55                   | 16                     | X5R | 4.7uF       | ±20%                     | CL05A475M05LUN# |
| 31  | 0.55                   | 16                     | X5R | 100nF       | ±10%                     | CL05A104K05NNN# |
| 32  | 0.55                   | 16                     | X5R | 100nF       | ±20%                     | CL05A104M05NNN# |
| 33  | 0.55                   | 16                     | X5R | 100nF       | ±5%                      | CL05A104J05NNN# |
| 34  | 0.55                   | 16                     | X5R | 220nF       | ±10%                     | CL05A224K05NNN# |
| 35  | 0.55                   | 16                     | X5R | 470nF       | ±10%                     | CL05A474K05NNN# |
| 36  | 0.55                   | 25                     | X5R | 1uF         | ±10%                     | CL05A105KA5NNN# |
| 37  | 0.55                   | 25                     | X5R | 2.2uF       | ±20%                     | CL05A225MA5JUN# |
| 38  | 0.55                   | 25                     | X5R | 100nF       | ±10%                     | CL05A104KA5NFN# |
| 39  | 0.55                   | 25                     | X5R | 100nF       | ±10%                     | CL05A104KA5NNN# |
| 40  | 0.55                   | 25                     | X5R | 220nF       | ±10%                     | CL05A224KA5NNN# |
| 41  | 0.55                   | 25                     | X5R | 330nF       | ±10%                     | CL05A334KA5NNN# |
| 42  | 0.55                   | 25                     | X5R | 470nF       | ±10%                     | CL05A474KA5NNN# |
| 43  | 0.57                   | 6.3                    | X5R | 2.2uF       | ±10%                     | CL05A225KQ5NSN# |
| 44  | 0.57                   | 6.3                    | X5R | 2.2uF       | ±20%                     | CL05A225MQ5NSN# |
| 45  | 0.57                   | 6.3                    | X5R | 2.2uF       | ±20%                     | CL05A225MQ5ZSN# |
| 46  | 0.57                   | 10                     | X5R | 2.2uF       | ±10%                     | CL05A225KP5NSN# |
| 47  | 0.57                   | 10                     | X5R | 2.2uF       | ±20%                     | CL05A225MP5NSN# |
| 48  | 0.60                   | 4                      | X5R | 4.7uF       | ±20%                     | CL05A475MR5NQN# |
| 49  | 0.60                   | 16                     | X5R | 2.2uF       | ±10%                     | CL05A225K05NQN# |
| 50  | 0.60                   | 16                     | X5R | 2.2uF       | ±20%                     | CL05A225M05NQN# |
| 51  | 0.60                   | 25                     | X5R | 1uF         | ±10%                     | CL05A105KA5NFQ# |
| 52  | 0.60                   | 25                     | X5R | 1uF         | ±10%                     | CL05A105KA5NQN# |
| 53  | 0.65                   | 4                      | X5R | 18uF        | ±20%                     | CL05A186MR5DRN# |
| 54  | 0.65                   | 4                      | X5R | 20uF        | ±20%                     | CL05A206MR5DRN# |
| 55  | 0.65                   | 6.3                    | X5R | 4.7uF       | ±10%                     | CL05A475KQ5NRN# |
| 56  | 0.65                   | 6.3                    | X5R | 4.7uF       | ±20%                     | CL05A475MQ5NRN# |
| 57  | 0.65                   | 6.3                    | X5R | 6uF         | ±20%                     | CL05A605MQ5DRN# |
| 58  | 0.65                   | 6.3                    | X5R | 9uF         | ±20%                     | CL05A905MQ5DRN# |
| 59  | 0.65                   | 6.3                    | X5R | 10uF        | ±20%                     | CL05A106MQ5NRN# |
| 60  | 0.65                   | 6.3                    | X5R | 15uF        | ±20%                     | CL05A156MQ5Z64# |
| 61  | 0.65                   | 10                     | X5R | 4.7uF       | ±10%                     | CL05A475KP5NRN# |
| 62  | 0.65                   | 10                     | X5R | 4.7uF       | ±20%                     | CL05A475MP5NRN# |
| 63  | 0.65                   | 10                     | X5R | 10uF        | ±20%                     | CL05A106MP5Z64# |
| 64  | 0.65                   | 35                     | X5R | 1uF         | ±10%                     | CL05A105KL5NRN# |
| 65  | 0.70                   | 4                      | X5R | 10uF        | ±20%                     | CL05A106MR5NUN# |



# Normal Capacitors\_Standard

Size Code (inch/mm) : 0402/1005

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 66  | 0.70                   | 4                      | X5R | 22uF        | ±20%                     | CL05A226MR5QUN# |
| 67  | 0.70                   | 4                      | X5R | 23uF        | ±20%                     | CL05A236MR5DUN# |
| 68  | 0.70                   | 6.3                    | X5R | 10uF        | ±20%                     | CL05A106MQ5NUN# |
| 69  | 0.70                   | 6.3                    | X5R | 22uF        | ±20%                     | CL05A226MQ5CUN# |
| 70  | 0.70                   | 10                     | X5R | 4.7uF       | ±20%                     | CL05A475MP5NUN# |
| 71  | 0.70                   | 10                     | X5R | 10uF        | ±20%                     | CL05A106MP5IUN# |
| 72  | 0.70                   | 16                     | X5R | 4.7uF       | ±20%                     | CL05A475MO5NUN# |
| 73  | 0.70                   | 25                     | X5R | 2.2uF       | ±10%                     | CL05A225KA5NUN# |
| 74  | 0.70                   | 25                     | X5R | 2.2uF       | ±20%                     | CL05A225MA5NUN# |
| 75  | 0.70                   | 25                     | X5R | 4.7uF       | ±20%                     | CL05A475MA5NUN# |
| 76  | 0.70                   | 35                     | X5R | 2.2uF       | ±20%                     | CL05A225ML5NUN# |
| 77  | 0.80                   | 4                      | X5R | 27uF        | ±20%                     | CL05A276MR6DUN# |
| 78  | 0.80                   | 10                     | X5R | 10uF        | ±20%                     | CL05A106MP68UN# |
| 79  | 0.80                   | 10                     | X5R | 10uF        | ±20%                     | CL05A106MP6NUN# |
| 80  | 1.00                   | 6.3                    | X5R | 10uF        | ±20%                     | CL05A106MQ5N3U# |

Size Code (inch/mm) : 0603/1608

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 0.50                   | 6.3                    | X5R | 2.2uF       | ±10%                     | CL10A225KQ5LNN# |
| 2   | 0.50                   | 6.3                    | X5R | 4.7uF       | ±10%                     | CL10A475KQ5LNN# |
| 3   | 0.50                   | 10                     | X5R | 2.2uF       | ±10%                     | CL10A225KP5LNN# |
| 4   | 0.50                   | 10                     | X5R | 4.7uF       | ±10%                     | CL10A475KP5LNN# |
| 5   | 0.50                   | 16                     | X5R | 2.2uF       | ±10%                     | CL10A225KQ5LNN# |
| 6   | 0.50                   | 25                     | X5R | 2.2uF       | ±10%                     | CL10A225KA5LNN# |
| 7   | 0.65                   | 16                     | X5R | 10uF        | ±20%                     | CL10A106MOAFZN# |
| 8   | 0.65                   | 25                     | X5R | 10uF        | ±20%                     | CL10A106MAAFZN# |
| 9   | 0.65                   | 25                     | X5R | 10uF        | ±20%                     | CL10A106MAAIZN# |
| 10  | 0.65                   | 35                     | X5R | 4.7uF       | ±10%                     | CL10A475KLAFZN# |
| 11  | 0.80                   | 6.3                    | X5R | 22uF        | ±20%                     | CL10A226MQ7LUN# |
| 12  | 0.80                   | 10                     | X5R | 22uF        | ±20%                     | CL10A226MP7LUN# |
| 13  | 0.80                   | 16                     | X5R | 22uF        | ±20%                     | CL10A226MO79ZN# |
| 14  | 0.80                   | 16                     | X5R | 22uF        | ±20%                     | CL10A226MO7FZN# |
| 15  | 0.80                   | 16                     | X5R | 22uF        | ±20%                     | CL10A226MO7JZN# |
| 16  | 0.90                   | 6.3                    | X5R | 1uF         | ±10%                     | CL10A105KQ8NNN# |
| 17  | 0.90                   | 6.3                    | X5R | 2.2uF       | ±10%                     | CL10A225KQ8N3N# |
| 18  | 0.90                   | 6.3                    | X5R | 2.2uF       | ±10%                     | CL10A225KQ8NNN# |
| 19  | 0.90                   | 6.3                    | X5R | 4.7uF       | ±10%                     | CL10A475KQ8NFN# |
| 20  | 0.90                   | 6.3                    | X5R | 4.7uF       | ±10%                     | CL10A475KQ8NNN# |
| 21  | 0.90                   | 6.3                    | X5R | 4.7uF       | ±20%                     | CL10A475MQ8NNN# |
| 22  | 0.90                   | 6.3                    | X5R | 10uF        | ±10%                     | CL10A106KQ8NNN# |
| 23  | 0.90                   | 6.3                    | X5R | 10uF        | ±20%                     | CL10A106MQ8NNN# |
| 24  | 0.90                   | 6.3                    | X5R | 22uF        | ±20%                     | CL10A226MQ7NRN# |
| 25  | 0.90                   | 10                     | X5R | 1uF         | ±10%                     | CL10A105KP8NNN# |



# Normal Capacitors\_Standard

Size Code (inch/mm) : 0603/1608

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 26  | 0.90                   | 10                     | X5R | 2.2uF       | ±10%                     | CL10A225KP8NNN# |
| 27  | 0.90                   | 10                     | X5R | 2.2uF       | ±20%                     | CL10A225MP8NNN# |
| 28  | 0.90                   | 10                     | X5R | 3.3uF       | ±10%                     | CL10A335KP8NFN# |
| 29  | 0.90                   | 10                     | X5R | 3.3uF       | ±10%                     | CL10A335KP8NNN# |
| 30  | 0.90                   | 10                     | X5R | 4.7uF       | ±10%                     | CL10A475KP8NFN# |
| 31  | 0.90                   | 10                     | X5R | 4.7uF       | ±10%                     | CL10A475KP8NNN# |
| 32  | 0.90                   | 10                     | X5R | 10uF        | ±10%                     | CL10A106KP8NFN# |
| 33  | 0.90                   | 10                     | X5R | 10uF        | ±10%                     | CL10A106KP8NNN# |
| 34  | 0.90                   | 10                     | X5R | 10uF        | ±20%                     | CL10A106MP8NFN# |
| 35  | 0.90                   | 10                     | X5R | 220nF       | ±10%                     | CL10A224KP8NNN# |
| 36  | 0.90                   | 16                     | X5R | 1uF         | ±10%                     | CL10A105K08NNN# |
| 37  | 0.90                   | 16                     | X5R | 1uF         | ±20%                     | CL10A105M08NNN# |
| 38  | 0.90                   | 16                     | X5R | 2.2uF       | ±10%                     | CL10A225K08N3N# |
| 39  | 0.90                   | 16                     | X5R | 2.2uF       | ±10%                     | CL10A225K08NFN# |
| 40  | 0.90                   | 16                     | X5R | 2.2uF       | ±10%                     | CL10A225K08NNN# |
| 41  | 0.90                   | 16                     | X5R | 4.7uF       | ±10%                     | CL10A475K08NFN# |
| 42  | 0.90                   | 16                     | X5R | 4.7uF       | ±20%                     | CL10A475M08NNN# |
| 43  | 0.90                   | 16                     | X5R | 470nF       | ±10%                     | CL10A474K08NNN# |
| 44  | 0.90                   | 25                     | X5R | 1uF         | ±10%                     | CL10A105KA8NFN# |
| 45  | 0.90                   | 25                     | X5R | 1uF         | ±10%                     | CL10A105KA8NNN# |
| 46  | 0.90                   | 25                     | X5R | 2.2uF       | ±10%                     | CL10A225KA8NNN# |
| 47  | 0.90                   | 25                     | X5R | 100nF       | ±10%                     | CL10A104KA8NNN# |
| 48  | 0.90                   | 25                     | X5R | 470nF       | ±10%                     | CL10A474KA8NNN# |
| 49  | 0.90                   | 35                     | X5R | 1uF         | ±10%                     | CL10A105KL8NNN# |
| 50  | 0.90                   | 35                     | X5R | 2.2uF       | ±10%                     | CL10A225KL8NNN# |
| 51  | 0.90                   | 50                     | X5R | 1uF         | ±10%                     | CL10A105KB8NNN# |
| 52  | 0.90                   | 50                     | X5R | 1uF         | ±20%                     | CL10A105MB8NNN# |
| 53  | 0.90                   | 50                     | X5R | 220nF       | ±10%                     | CL10A224KB8NNN# |
| 54  | 0.90                   | 50                     | X5R | 470nF       | ±10%                     | CL10A474KB8NNN# |
| 55  | 0.95                   | 6.3                    | X5R | 10uF        | ±20%                     | CL10A106MQ8NQN# |
| 56  | 0.95                   | 10                     | X5R | 10uF        | ±20%                     | CL10A106MP8NFS# |
| 57  | 0.95                   | 16                     | X5R | 4.7uF       | ±10%                     | CL10A475K08NQN# |
| 58  | 0.95                   | 16                     | X5R | 10uF        | ±10%                     | CL10A106K08NQN# |
| 59  | 0.95                   | 25                     | X5R | 4.7uF       | ±10%                     | CL10A475KA8NQN# |
| 60  | 0.95                   | 25                     | X5R | 4.7uF       | ±20%                     | CL10A475MA8NQN# |
| 61  | 1.00                   | 4                      | X5R | 47uF        | ±20%                     | CL10A476MR8NRN# |
| 62  | 1.00                   | 6.3                    | X5R | 22uF        | ±10%                     | CL10A226KQ8NRN# |
| 63  | 1.00                   | 6.3                    | X5R | 22uF        | ±20%                     | CL10A226MQ8N3R# |
| 64  | 1.00                   | 6.3                    | X5R | 22uF        | ±20%                     | CL10A226MQ8NFR# |
| 65  | 1.00                   | 6.3                    | X5R | 22uF        | ±20%                     | CL10A226MQ8NRN# |
| 66  | 1.00                   | 6.3                    | X5R | 22uF        | ±20%                     | CL10A226MQ8QRN# |
| 67  | 1.00                   | 6.3                    | X5R | 47uF        | ±20%                     | CL10A476MQ8Q3R# |
| 68  | 1.00                   | 6.3                    | X5R | 47uF        | ±20%                     | CL10A476MQ8QRN# |
| 69  | 1.00                   | 10                     | X5R | 22uF        | ±20%                     | CL10A226MP8NRN# |
| 70  | 1.00                   | 25                     | X5R | 10uF        | ±20%                     | CL10A106MA8IRN# |



# Normal Capacitors\_Standard

Size Code (inch/mm) : 0603/1608

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 71  | 1.00                   | 25                     | X5R | 10uF        | ±20%                     | CL10A106MA8NRN# |
| 72  | 1.00                   | 25                     | X5R | 10uF        | ±20%                     | CL10A106MA8ZRN# |
| 73  | 1.00                   | 35                     | X5R | 4.7uF       | ±10%                     | CL10A475KL8NRN# |
| 74  | 1.00                   | 35                     | X5R | 10uF        | ±20%                     | CL10A106ML8NRN# |
| 75  | 1.00                   | 50                     | X5R | 4.7uF       | ±10%                     | CL10A475KB86RN# |
| 76  | 1.05                   | 6.3                    | X5R | 22uF        | ±20%                     | CL10A226MQ8NUN# |
| 77  | 1.05                   | 10                     | X5R | 22uF        | ±20%                     | CL10A226MP8NUN# |
| 78  | 1.10                   | 4                      | X5R | 47uF        | ±20%                     | CL10A476MR8NZN# |

Size Code (inch/mm) : 0805/2012

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 0.80                   | 6.3                    | X5R | 47uF        | ±20%                     | CL21A476MQ7LRN# |
| 2   | 0.80                   | 10                     | X5R | 10uF        | ±10%                     | CL21A106KP7LQN# |
| 3   | 0.80                   | 25                     | X5R | 22uF        | ±20%                     | CL21A226MA7FUN# |
| 4   | 0.90                   | 6.3                    | X5R | 47uF        | ±20%                     | CL21A476MQ8LRN# |
| 5   | 0.95                   | 6.3                    | X5R | 4.7uF       | ±10%                     | CL21A475KQCLNN# |
| 6   | 0.95                   | 6.3                    | X5R | 10uF        | ±10%                     | CL21A106KQCLNN# |
| 7   | 0.95                   | 6.3                    | X5R | 10uF        | ±10%                     | CL21A106KQCLRN# |
| 8   | 0.95                   | 6.3                    | X5R | 10uF        | ±20%                     | CL21A106MQCLNN# |
| 9   | 0.95                   | 6.3                    | X5R | 22uF        | ±10%                     | CL21A226KQCLRN# |
| 10  | 0.95                   | 6.3                    | X5R | 22uF        | ±20%                     | CL21A226MQCLRN# |
| 11  | 0.95                   | 6.3                    | X5R | 47uF        | ±20%                     | CL21A476MQCLRN# |
| 12  | 0.95                   | 10                     | X5R | 2.2uF       | ±10%                     | CL21A225KPCLNN# |
| 13  | 0.95                   | 10                     | X5R | 4.7uF       | ±10%                     | CL21A475KPCLNN# |
| 14  | 0.95                   | 10                     | X5R | 10uF        | ±10%                     | CL21A106KPCLQN# |
| 15  | 0.95                   | 10                     | X5R | 10uF        | ±10%                     | CL21A106KPCLRN# |
| 16  | 0.95                   | 10                     | X5R | 22uF        | ±10%                     | CL21A226KPCLRN# |
| 17  | 0.95                   | 10                     | X5R | 22uF        | ±20%                     | CL21A226MPCLRN# |
| 18  | 0.95                   | 16                     | X5R | 1uF         | ±10%                     | CL21A105KOCLNN# |
| 19  | 0.95                   | 16                     | X5R | 2.2uF       | ±10%                     | CL21A225KOCLNN# |
| 20  | 0.95                   | 16                     | X5R | 4.7uF       | ±10%                     | CL21A475KOCLRN# |
| 21  | 0.95                   | 16                     | X5R | 10uF        | ±10%                     | CL21A106KOCL3R# |
| 22  | 0.95                   | 16                     | X5R | 10uF        | ±10%                     | CL21A106KOCLRN# |
| 23  | 0.95                   | 16                     | X5R | 22uF        | ±20%                     | CL21A226MOCLRN# |
| 24  | 0.95                   | 25                     | X5R | 1uF         | ±10%                     | CL21A105KACLNN# |
| 25  | 0.95                   | 25                     | X5R | 2.2uF       | ±10%                     | CL21A225KACLNN# |
| 26  | 0.95                   | 25                     | X5R | 4.7uF       | ±10%                     | CL21A475KACLRN# |
| 27  | 0.95                   | 25                     | X5R | 10uF        | ±10%                     | CL21A106KACLNN# |
| 28  | 0.95                   | 35                     | X5R | 4.7uF       | ±10%                     | CL21A475KLCLQN# |
| 29  | 0.95                   | 50                     | X5R | 1uF         | ±10%                     | CL21A105KBCLNN# |
| 30  | 1.00                   | 6.3                    | X5R | 47uF        | ±20%                     | CL21A476MQ9LRN# |
| 31  | 1.00                   | 50                     | X5R | 2.2uF       | ±10%                     | CL21A225KB9LNN# |
| 32  | 1.20                   | 6.3                    | X5R | 33uF        | ±20%                     | CL21A336MQELRN# |
| 33  | 1.35                   | 6.3                    | X5R | 4.7uF       | ±10%                     | CL21A475KQFNNN# |
| 34  | 1.35                   | 6.3                    | X5R | 4.7uF       | ±20%                     | CL21A475MQFNNN# |
| 35  | 1.35                   | 6.3                    | X5R | 10uF        | ±10%                     | CL21A106KQFNFN# |



# Normal Capacitors\_Standard

Size Code (inch/mm) : 0805/2012

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number      |
|-----|------------------------|------------------------|-----|-------------|--------------------------|------------------|
| 36  | 1.35                   | 6.3                    | X5R | 10uF        | ±10%                     | CL21A106KQFNNN#  |
| 37  | 1.35                   | 6.3                    | X5R | 10uF        | ±20%                     | CL21A106MQFNNN#  |
| 38  | 1.35                   | 10                     | X5R | 1uF         | ±10%                     | CL21A105KPFNNNN# |
| 39  | 1.35                   | 10                     | X5R | 2.2uF       | ±10%                     | CL21A225KPFNNNN# |
| 40  | 1.35                   | 10                     | X5R | 3.3uF       | ±10%                     | CL21A335KPFNNNN# |
| 41  | 1.35                   | 10                     | X5R | 4.7uF       | ±10%                     | CL21A475KPFNNNN# |
| 42  | 1.35                   | 10                     | X5R | 4.7uF       | ±20%                     | CL21A475MPFNNN#  |
| 43  | 1.35                   | 10                     | X5R | 10uF        | ±10%                     | CL21A106KPFNNNN# |
| 44  | 1.35                   | 10                     | X5R | 10uF        | ±20%                     | CL21A106MPFNNN#  |
| 45  | 1.35                   | 16                     | X5R | 2.2uF       | ±10%                     | CL21A225KOFNNNN# |
| 46  | 1.35                   | 16                     | X5R | 4.7uF       | ±10%                     | CL21A475KOFNNNN# |
| 47  | 1.35                   | 16                     | X5R | 10uF        | ±10%                     | CL21A106KOFNNNN# |
| 48  | 1.35                   | 16                     | X5R | 10uF        | ±20%                     | CL21A106MOFNNN#  |
| 49  | 1.35                   | 25                     | X5R | 2.2uF       | ±10%                     | CL21A225KAFNFN#  |
| 50  | 1.35                   | 25                     | X5R | 2.2uF       | ±10%                     | CL21A225KAFNNN#  |
| 51  | 1.35                   | 25                     | X5R | 4.7uF       | ±20%                     | CL21A475MAFNNN#  |
| 52  | 1.35                   | 25                     | X5R | 10uF        | ±10%                     | CL21A106KAFN3N#  |
| 53  | 1.35                   | 50                     | X5R | 2.2uF       | ±10%                     | CL21A225KBFNNN#  |
| 54  | 1.40                   | 6.3                    | X5R | 10uF        | ±20%                     | CL21A106MQQNNN#  |
| 55  | 1.40                   | 6.3                    | X5R | 22uF        | ±10%                     | CL21A226KQQNFN#  |
| 56  | 1.40                   | 6.3                    | X5R | 22uF        | ±10%                     | CL21A226KQQNNN#  |
| 57  | 1.40                   | 6.3                    | X5R | 22uF        | ±20%                     | CL21A226MQQN3N#  |
| 58  | 1.40                   | 6.3                    | X5R | 22uF        | ±20%                     | CL21A226MQQNNN#  |
| 59  | 1.40                   | 10                     | X5R | 22uF        | ±20%                     | CL21A226MPQNNN#  |
| 60  | 1.40                   | 16                     | X5R | 10uF        | ±10%                     | CL21A106KQQNFN#  |
| 61  | 1.40                   | 16                     | X5R | 10uF        | ±10%                     | CL21A106KQQNNN#  |
| 62  | 1.40                   | 25                     | X5R | 4.7uF       | ±10%                     | CL21A475KAQN3N#  |
| 63  | 1.40                   | 25                     | X5R | 4.7uF       | ±10%                     | CL21A475KAQNFN#  |
| 64  | 1.40                   | 25                     | X5R | 4.7uF       | ±10%                     | CL21A475KAQNNN#  |
| 65  | 1.40                   | 25                     | X5R | 4.7uF       | ±20%                     | CL21A475MAQNNN#  |
| 66  | 1.40                   | 25                     | X5R | 22uF        | ±20%                     | CL21A226MAQNFN#  |
| 67  | 1.40                   | 50                     | X5R | 2.2uF       | ±10%                     | CL21A225KBQNNN#  |
| 68  | 1.40                   | 50                     | X5R | 4.7uF       | ±10%                     | CL21A475KBQNNN#  |
| 69  | 1.45                   | 4                      | X5R | 47uF        | ±20%                     | CL21A476MRYNNN#  |
| 70  | 1.45                   | 4                      | X5R | 100uF       | ±20%                     | CL21A107MRYNNN#  |
| 71  | 1.45                   | 6.3                    | X5R | 47uF        | ±20%                     | CL21A476MQYN3N#  |
| 72  | 1.45                   | 6.3                    | X5R | 47uF        | ±20%                     | CL21A476MQYNNN#  |
| 73  | 1.45                   | 16                     | X5R | 22uF        | ±20%                     | CL21A226MOYNNN#  |
| 74  | 1.45                   | 25                     | X5R | 10uF        | ±10%                     | CL21A106KAYN3N#  |
| 75  | 1.45                   | 25                     | X5R | 10uF        | ±10%                     | CL21A106KAYNFN#  |
| 76  | 1.45                   | 25                     | X5R | 10uF        | ±10%                     | CL21A106KAYNNN#  |
| 77  | 1.45                   | 25                     | X5R | 10uF        | ±20%                     | CL21A106MAYNNN#  |
| 78  | 1.45                   | 25                     | X5R | 22uF        | ±20%                     | CL21A226MAYNNN#  |
| 79  | 1.45                   | 50                     | X5R | 10uF        | ±10%                     | CL21A106KBYQNN#  |



# Normal Capacitors\_Standard

Size Code (inch/mm) : 1206/3216

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 0.95                   | 16                     | X5R | 3.3uF       | ±10%                     | CL31A335KOCLNN# |
| 2   | 0.95                   | 16                     | X5R | 4.7uF       | ±10%                     | CL31A475KOCLNN# |
| 3   | 0.95                   | 16                     | X5R | 10uF        | ±10%                     | CL31A106KOCLNN# |
| 4   | 0.95                   | 16                     | X5R | 22uF        | ±10%                     | CL31A226KOCLFN# |
| 5   | 0.95                   | 16                     | X5R | 22uF        | ±10%                     | CL31A226KOCLNN# |
| 6   | 0.95                   | 16                     | X5R | 22uF        | ±20%                     | CL31A226MOCLFN# |
| 7   | 0.95                   | 16                     | X5R | 22uF        | ±20%                     | CL31A226MOCLNN# |
| 8   | 0.95                   | 25                     | X5R | 4.7uF       | ±10%                     | CL31A475KACLNN# |
| 9   | 0.95                   | 25                     | X5R | 10uF        | ±10%                     | CL31A106KACLNN# |
| 10  | 1.00                   | 35                     | X5R | 4.7uF       | ±10%                     | CL31A475KL9LNN# |
| 11  | 1.00                   | 50                     | X5R | 1uF         | ±10%                     | CL31A105KB9LNN# |
| 12  | 1.00                   | 50                     | X5R | 2.2uF       | ±10%                     | CL31A225KB9LNN# |
| 13  | 1.00                   | 50                     | X5R | 4.7uF       | ±10%                     | CL31A475KB9LNN# |
| 14  | 1.00                   | 100                    | X5R | 2.2uF       | ±10%                     | CL31A225KC9LNN# |
| 15  | 1.25                   | 10                     | X5R | 10uF        | ±10%                     | CL31A106KPPLNN# |
| 16  | 1.80                   | 6.3                    | X5R | 10uF        | ±10%                     | CL31A106KQHNNN# |
| 17  | 1.80                   | 6.3                    | X5R | 10uF        | ±20%                     | CL31A106MQHNNN# |
| 18  | 1.80                   | 6.3                    | X5R | 22uF        | ±10%                     | CL31A226KQHNNN# |
| 19  | 1.80                   | 6.3                    | X5R | 22uF        | ±20%                     | CL31A226MQHNNN# |
| 20  | 1.80                   | 6.3                    | X5R | 47uF        | ±10%                     | CL31A476KQHNNN# |
| 21  | 1.80                   | 6.3                    | X5R | 47uF        | ±20%                     | CL31A476MQHNNN# |
| 22  | 1.80                   | 6.3                    | X5R | 100uF       | ±20%                     | CL31A107MQHNNN# |
| 23  | 1.80                   | 10                     | X5R | 10uF        | ±10%                     | CL31A106KPHNNN# |
| 24  | 1.80                   | 10                     | X5R | 22uF        | ±10%                     | CL31A226KPHNNN# |
| 25  | 1.80                   | 10                     | X5R | 22uF        | ±20%                     | CL31A226MPHNNN# |
| 26  | 1.80                   | 10                     | X5R | 47uF        | ±20%                     | CL31A476MPHNFN# |
| 27  | 1.80                   | 10                     | X5R | 47uF        | ±20%                     | CL31A476MPHNNN# |
| 28  | 1.80                   | 16                     | X5R | 2.2uF       | ±10%                     | CL31A225KOHNNN# |
| 29  | 1.80                   | 16                     | X5R | 3.3uF       | ±10%                     | CL31A335KOHNNN# |
| 30  | 1.80                   | 16                     | X5R | 4.7uF       | ±10%                     | CL31A475KOHNNN# |
| 31  | 1.80                   | 16                     | X5R | 4.7uF       | ±20%                     | CL31A475MOHNNN# |
| 32  | 1.80                   | 16                     | X5R | 10uF        | ±10%                     | CL31A106KOHNNN# |
| 33  | 1.80                   | 16                     | X5R | 10uF        | ±20%                     | CL31A106MOHNNN# |
| 34  | 1.80                   | 16                     | X5R | 22uF        | ±10%                     | CL31A226KOHNFN# |
| 35  | 1.80                   | 16                     | X5R | 22uF        | ±10%                     | CL31A226KOHNNN# |
| 36  | 1.80                   | 16                     | X5R | 22uF        | ±20%                     | CL31A226MOHNNN# |
| 37  | 1.80                   | 25                     | X5R | 3.3uF       | ±10%                     | CL31A335KAHNNN# |
| 38  | 1.80                   | 25                     | X5R | 4.7uF       | ±10%                     | CL31A475KAHNNN# |
| 39  | 1.80                   | 25                     | X5R | 10uF        | ±10%                     | CL31A106KAHNFN# |
| 40  | 1.80                   | 25                     | X5R | 10uF        | ±10%                     | CL31A106KAHNNN# |
| 41  | 1.80                   | 25                     | X5R | 10uF        | ±20%                     | CL31A106MAHNNN# |
| 42  | 1.80                   | 25                     | X5R | 22uF        | ±10%                     | CL31A226KAHNNN# |
| 43  | 1.80                   | 25                     | X5R | 22uF        | ±20%                     | CL31A226MAHNNN# |
| 44  | 1.80                   | 50                     | X5R | 4.7uF       | ±10%                     | CL31A475KBHNNN# |
| 45  | 1.80                   | 50                     | X5R | 10uF        | ±10%                     | CL31A106KBHNNN# |
| 46  | 1.80                   | 50                     | X5R | 10uF        | ±20%                     | CL31A106MBHNNN# |
| 47  | 1.90                   | 6.3                    | X5R | 100uF       | ±20%                     | CL31A107MQKNNN# |



# Normal Capacitors\_Standard

Size Code (inch/mm) : 1210/3225

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 0.95                   | 16                     | X5R | 10uF        | ±10%                     | CL32A106KOCLNN# |
| 2   | 0.95                   | 16                     | X5R | 22uF        | ±20%                     | CL32A226MOCLNN# |
| 3   | 1.70                   | 16                     | X5R | 22uF        | ±10%                     | CL32A226KOTFNN# |
| 4   | 1.70                   | 16                     | X5R | 22uF        | ±20%                     | CL32A226MOTLNN# |
| 5   | 1.70                   | 25                     | X5R | 10uF        | ±10%                     | CL32A106KATLNN# |
| 6   | 2.00                   | 25                     | X5R | 10uF        | ±10%                     | CL32A106KAULNN# |
| 7   | 2.00                   | 35                     | X5R | 4.7uF       | ±10%                     | CL32A475KLULNN# |
| 8   | 2.00                   | 35                     | X5R | 10uF        | ±10%                     | CL32A106KLULNN# |
| 9   | 2.20                   | 10                     | X5R | 10uF        | ±10%                     | CL32A106KPINNN# |
| 10  | 2.70                   | 6.3                    | X5R | 22uF        | ±10%                     | CL32A226KQJNNN# |
| 11  | 2.70                   | 6.3                    | X5R | 22uF        | ±20%                     | CL32A226MQJNNN# |
| 12  | 2.70                   | 6.3                    | X5R | 47uF        | ±10%                     | CL32A476KQJNNN# |
| 13  | 2.70                   | 6.3                    | X5R | 47uF        | ±20%                     | CL32A476MQJNNN# |
| 14  | 2.70                   | 10                     | X5R | 22uF        | ±10%                     | CL32A226KPJNNN# |
| 15  | 2.70                   | 10                     | X5R | 22uF        | ±20%                     | CL32A226MPJNNN# |
| 16  | 2.70                   | 10                     | X5R | 47uF        | ±10%                     | CL32A476KPJNNN# |
| 17  | 2.70                   | 16                     | X5R | 10uF        | ±10%                     | CL32A106KQJNNN# |
| 18  | 2.70                   | 16                     | X5R | 10uF        | ±20%                     | CL32A106MOJNNN# |
| 19  | 2.70                   | 16                     | X5R | 22uF        | ±10%                     | CL32A226KOJNFN# |
| 20  | 2.70                   | 16                     | X5R | 22uF        | ±10%                     | CL32A226KOJNNN# |
| 21  | 2.70                   | 16                     | X5R | 22uF        | ±20%                     | CL32A226MOJNNN# |
| 22  | 2.70                   | 16                     | X5R | 47uF        | ±10%                     | CL32A476KOJNNN# |
| 23  | 2.70                   | 16                     | X5R | 47uF        | ±20%                     | CL32A476MOJNNN# |
| 24  | 2.70                   | 25                     | X5R | 10uF        | ±10%                     | CL32A106KAJNNN# |
| 25  | 2.70                   | 25                     | X5R | 22uF        | ±10%                     | CL32A226KAJNFN# |
| 26  | 2.70                   | 25                     | X5R | 22uF        | ±10%                     | CL32A226KAJNNN# |
| 27  | 2.70                   | 25                     | X5R | 22uF        | ±20%                     | CL32A226MAJNNN# |
| 28  | 2.70                   | 50                     | X5R | 10uF        | ±10%                     | CL32A106KBJNNN# |
| 29  | 2.70                   | 50                     | X5R | 10uF        | ±20%                     | CL32A106MBJNNN# |
| 30  | 2.80                   | 6.3                    | X5R | 100uF       | ±20%                     | CL32A107MQVNNN# |
| 31  | 2.80                   | 6.3                    | X5R | 150uF       | ±20%                     | CL32A157MQVNNN# |
| 32  | 2.80                   | 6.3                    | X5R | 220uF       | ±20%                     | CL32A227MQVNNN# |
| 33  | 2.80                   | 10                     | X5R | 100uF       | ±20%                     | CL32A107MPVNNN# |



# Normal Capacitors\_Standard

## Product Lineup (X6S)

Size Code (inch/mm) : 01005/0402

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 0.22                   | 4                      | X6S | 100nF       | ±20%                     | CL02X104MR2NNN# |
| 2   | 0.22                   | 4                      | X6S | 470nF       | ±20%                     | CL02X474MR2NNN# |
| 3   | 0.22                   | 6.3                    | X6S | 10nF        | ±10%                     | CL02X103KQ2NNN# |

Size Code (inch/mm) : 0201/0603

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 0.22                   | 4                      | X6S | 1uF         | ±20%                     | CL03X105MR2LRN# |
| 2   | 0.33                   | 6.3                    | X6S | 100nF       | ±10%                     | CL03X104KQ3NNN# |
| 3   | 0.33                   | 6.3                    | X6S | 220nF       | ±10%                     | CL03X224KQ3NNN# |
| 4   | 0.33                   | 6.3                    | X6S | 220nF       | ±20%                     | CL03X224MQ3NNN# |
| 5   | 0.33                   | 6.3                    | X6S | 470nF       | ±10%                     | CL03X474KQ3NNN# |
| 6   | 0.33                   | 25                     | X6S | 100nF       | ±10%                     | CL03X104KA3NNN# |
| 7   | 0.35                   | 4                      | X6S | 1uF         | ±20%                     | CL03X105MR3CSN# |
| 8   | 0.39                   | 2.5                    | X6S | 2.2uF       | ±20%                     | CL03X225MS3NRN# |
| 9   | 0.39                   | 4                      | X6S | 1uF         | ±20%                     | CL03X105MR3NRN# |
| 10  | 0.39                   | 4                      | X6S | 2.2uF       | ±20%                     | CL03X225MR3NRN# |

Size Code (inch/mm) : 0402/1005

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 0.33                   | 10                     | X6S | 1uF         | ±20%                     | CL05X105MP3JQN# |
| 2   | 0.55                   | 6.3                    | X6S | 1uF         | ±10%                     | CL05X105KQ5NFN# |
| 3   | 0.55                   | 6.3                    | X6S | 1uF         | ±10%                     | CL05X105KQ5NNN# |
| 4   | 0.55                   | 10                     | X6S | 1uF         | ±10%                     | CL05X105KP5NNN# |
| 5   | 0.57                   | 2.5                    | X6S | 2.2uF       | ±20%                     | CL05X225MS5NSN# |
| 6   | 0.57                   | 6.3                    | X6S | 2.2uF       | ±20%                     | CL05X225MQ5NSN# |
| 7   | 0.60                   | 25                     | X6S | 1uF         | ±10%                     | CL05X105KA5NQN# |
| 8   | 0.70                   | 4                      | X6S | 4.7uF       | ±20%                     | CL05X475MR5NUN# |
| 9   | 0.70                   | 6.3                    | X6S | 4.7uF       | ±20%                     | CL05X475MQ5NUN# |
| 10  | 0.70                   | 6.3                    | X6S | 10uF        | ±20%                     | CL05X106MQ5IUN# |
| 11  | 0.70                   | 25                     | X6S | 2.2uF       | ±20%                     | CL05X225MA5NUN# |
| 12  | 0.80                   | 4                      | X6S | 22uF        | ±20%                     | CL05X226MR6NUN# |



# Normal Capacitors\_Standard

Size Code (inch/mm) : 0603/1608

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 0.90                   | 4                      | X6S | 10uF        | ±10%                     | CL10X106KR8NNN# |
| 2   | 0.90                   | 6.3                    | X6S | 4.7uF       | ±10%                     | CL10X475KQ8NNN# |
| 3   | 0.90                   | 6.3                    | X6S | 4.7uF       | ±20%                     | CL10X475MQ8NNN# |
| 4   | 0.90                   | 6.3                    | X6S | 10uF        | ±20%                     | CL10X106MQ8NNN# |
| 5   | 0.90                   | 10                     | X6S | 2.2uF       | ±10%                     | CL10X225KP8NNN# |
| 6   | 0.90                   | 16                     | X6S | 1uF         | ±10%                     | CL10X105K08NNN# |
| 7   | 0.90                   | 50                     | X6S | 1uF         | ±10%                     | CL10X105KB8NNN# |
| 8   | 0.95                   | 16                     | X6S | 4.7uF       | ±10%                     | CL10X475K08NFQ# |
| 9   | 0.95                   | 16                     | X6S | 4.7uF       | ±10%                     | CL10X475K08NQN# |
| 10  | 1.00                   | 4                      | X6S | 22uF        | ±20%                     | CL10X226MR8QRN# |
| 11  | 1.00                   | 6.3                    | X6S | 22uF        | ±20%                     | CL10X226MQ8QRN# |
| 12  | 1.00                   | 10                     | X6S | 10uF        | ±20%                     | CL10X106MP8NFR# |
| 13  | 1.00                   | 10                     | X6S | 10uF        | ±20%                     | CL10X106MP8NRN# |
| 14  | 1.00                   | 16                     | X6S | 4.7uF       | ±10%                     | CL10X475K08NRN# |
| 15  | 1.00                   | 16                     | X6S | 10uF        | ±20%                     | CL10X106M08NRN# |
| 16  | 1.00                   | 25                     | X6S | 4.7uF       | ±10%                     | CL10X475KA8NRN# |
| 17  | 1.00                   | 35                     | X6S | 2.2uF       | ±10%                     | CL10X225KL8NRN# |
| 18  | 1.05                   | 4                      | X6S | 22uF        | ±20%                     | CL10X226MR8NUN# |

Size Code (inch/mm) : 0805/2012

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 0.95                   | 2.5                    | X6S | 22uF        | ±20%                     | CL21X226MSCLRN# |
| 2   | 0.95                   | 6.3                    | X6S | 10uF        | ±10%                     | CL21X106KQCLRN# |
| 3   | 0.95                   | 10                     | X6S | 10uF        | ±10%                     | CL21X106KPCLRN# |
| 4   | 1.35                   | 4                      | X6S | 10uF        | ±20%                     | CL21X106MRFNNN# |
| 5   | 1.35                   | 16                     | X6S | 2.2uF       | ±10%                     | CL21X225KOFNNN# |
| 6   | 1.40                   | 4                      | X6S | 22uF        | ±20%                     | CL21X226MRQNFN# |
| 7   | 1.40                   | 4                      | X6S | 22uF        | ±20%                     | CL21X226MRQNNN# |
| 8   | 1.40                   | 6.3                    | X6S | 10uF        | ±10%                     | CL21X106KQQNNN# |
| 9   | 1.40                   | 6.3                    | X6S | 22uF        | ±20%                     | CL21X226MQQNFN# |
| 10  | 1.40                   | 6.3                    | X6S | 22uF        | ±20%                     | CL21X226MQQNNN# |
| 11  | 1.40                   | 16                     | X6S | 10uF        | ±10%                     | CL21X106KQQNNN# |
| 12  | 1.40                   | 16                     | X6S | 10uF        | ±20%                     | CL21X106MOQNNN# |
| 13  | 1.40                   | 25                     | X6S | 4.7uF       | ±10%                     | CL21X475KAQNNN# |
| 14  | 1.45                   | 4                      | X6S | 22uF        | ±20%                     | CL21X226MRYNNN# |
| 15  | 1.45                   | 4                      | X6S | 47uF        | ±20%                     | CL21X476MRYNNN# |
| 16  | 1.45                   | 10                     | X6S | 10uF        | ±10%                     | CL21X106KPYNNN# |
| 17  | 1.45                   | 25                     | X6S | 10uF        | ±10%                     | CL21X106KAYNNN# |
| 18  | 1.45                   | 25                     | X6S | 10uF        | ±10%                     | CL21X106KAYQNN# |



# Normal Capacitors\_Standard

Size Code (inch/mm) : 1206/3216

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 1.80                   | 4                      | X6S | 47uF        | ±20%                     | CL31X476MRHNNN# |
| 2   | 1.80                   | 6.3                    | X6S | 22uF        | ±10%                     | CL31X226KQHNNN# |
| 3   | 1.80                   | 6.3                    | X6S | 47uF        | ±10%                     | CL31X476KQHNNN# |
| 4   | 1.80                   | 6.3                    | X6S | 47uF        | ±20%                     | CL31X476MQHNFN# |
| 5   | 1.80                   | 10                     | X6S | 22uF        | ±10%                     | CL31X226KPHN3N# |
| 6   | 1.80                   | 16                     | X6S | 22uF        | ±10%                     | CL31X226KOHN3N# |
| 7   | 1.80                   | 16                     | X6S | 22uF        | ±10%                     | CL31X226KOHNNN# |
| 8   | 1.80                   | 25                     | X6S | 10uF        | ±10%                     | CL31X106KAHNNN# |
| 9   | 1.80                   | 25                     | X6S | 22uF        | ±10%                     | CL31X226KAHN3N# |
| 10  | 1.80                   | 25                     | X6S | 22uF        | ±10%                     | CL31X226KAHNF3# |

Size Code (inch/mm) : 1210/3225

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 2.70                   | 10                     | X6S | 47uF        | ±10%                     | CL32X476KPJNNN# |
| 2   | 2.80                   | 6.3                    | X6S | 100uF       | ±20%                     | CL32X107MQVNNN# |

## Product Lineup (X6T)

Size Code (inch/mm) : 01005/0402

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 0.22                   | 4                      | X6T | 470nF       | ±20%                     | CL02W474MR2NNN# |

Size Code (inch/mm) : 0201/0603

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 0.39                   | 4                      | X6T | 2.2uF       | ±20%                     | CL03W225MR3CRN# |

Size Code (inch/mm) : 0402/1005

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 0.22                   | 2.5                    | X6T | 2.2uF       | ±20%                     | CL05W225MS2LUN# |
| 2   | 0.70                   | 2.5                    | X6T | 20uF        | ±20%                     | CL05W206MS5CUN# |



# Normal Capacitors\_Standard

## Product Lineup (Y5V)

Size Code (inch/mm) : 0402/1005

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 0.55                   | 6.3                    | Y5V | 1uF         | -20/+80%                 | CL05F105ZQ5NNN# |
| 2   | 0.55                   | 10                     | Y5V | 330nF       | -20/+80%                 | CL05F334ZP5NNN# |
| 3   | 0.55                   | 10                     | Y5V | 470nF       | -20/+80%                 | CL05F474ZP5NNN# |
| 4   | 0.55                   | 16                     | Y5V | 22nF        | -20/+80%                 | CL05F223ZO5NNN# |
| 5   | 0.55                   | 16                     | Y5V | 33nF        | -20/+80%                 | CL05F333ZO5NNN# |
| 6   | 0.55                   | 16                     | Y5V | 47nF        | -20/+80%                 | CL05F473ZO5NNN# |
| 7   | 0.55                   | 16                     | Y5V | 100nF       | -20/+80%                 | CL05F104ZO5NNN# |
| 8   | 0.55                   | 25                     | Y5V | 22nF        | -20/+80%                 | CL05F223ZA5NNN# |
| 9   | 0.55                   | 25                     | Y5V | 33nF        | -20/+80%                 | CL05F333ZA5NNN# |
| 10  | 0.55                   | 50                     | Y5V | 15nF        | -20/+80%                 | CL05F153ZB5NNN# |

Size Code (inch/mm) : 0603/1608

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 0.90                   | 6.3                    | Y5V | 2.2uF       | -20/+80%                 | CL10F225ZQ8NNN# |
| 2   | 0.90                   | 10                     | Y5V | 2.2uF       | -20/+80%                 | CL10F225ZP8NNN# |
| 3   | 0.90                   | 16                     | Y5V | 100nF       | -20/+80%                 | CL10F104ZO8NNN# |
| 4   | 0.90                   | 16                     | Y5V | 330nF       | -20/+80%                 | CL10F334ZO8NNN# |
| 5   | 0.90                   | 25                     | Y5V | 100nF       | -20/+80%                 | CL10F104ZA8NNN# |
| 6   | 0.90                   | 25                     | Y5V | 150nF       | -20/+80%                 | CL10F154ZA8NNN# |
| 7   | 0.90                   | 25                     | Y5V | 330nF       | -20/+80%                 | CL10F334ZA8NNN# |
| 8   | 0.90                   | 25                     | Y5V | 470nF       | -20/+80%                 | CL10F474ZA8NNN# |
| 9   | 0.90                   | 50                     | Y5V | 10nF        | -20/+80%                 | CL10F103ZB8NNN# |
| 10  | 0.90                   | 50                     | Y5V | 22nF        | -20/+80%                 | CL10F223ZB8NNN# |
| 11  | 0.90                   | 50                     | Y5V | 33nF        | -20/+80%                 | CL10F333ZB8NNN# |
| 12  | 0.90                   | 50                     | Y5V | 39nF        | -20/+80%                 | CL10F393ZB8NNN# |
| 13  | 0.90                   | 50                     | Y5V | 68nF        | -20/+80%                 | CL10F683ZB8NNN# |
| 14  | 0.90                   | 50                     | Y5V | 100nF       | -20/+80%                 | CL10F104ZB8NNN# |



# Normal Capacitors\_Standard

Size Code (inch/mm) : 0805/2012

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 0.75                   | 16                     | Y5V | 680nF       | -20/+80%                 | CL21F684ZOANNN# |
| 2   | 0.75                   | 25                     | Y5V | 100nF       | -20/+80%                 | CL21F104ZAANNN# |
| 3   | 0.75                   | 25                     | Y5V | 220nF       | -20/+80%                 | CL21F224ZAANNN# |
| 4   | 0.75                   | 50                     | Y5V | 10nF        | -20/+80%                 | CL21F103ZBANNN# |
| 5   | 0.75                   | 50                     | Y5V | 22nF        | -20/+80%                 | CL21F223ZBANNN# |
| 6   | 0.75                   | 50                     | Y5V | 47nF        | -20/+80%                 | CL21F473ZBANNN# |
| 7   | 0.75                   | 50                     | Y5V | 100nF       | -20/+80%                 | CL21F104ZBANNN# |
| 8   | 0.95                   | 25                     | Y5V | 330nF       | -20/+80%                 | CL21F334ZACNNN# |
| 9   | 0.95                   | 25                     | Y5V | 470nF       | -20/+80%                 | CL21F474ZACNNN# |
| 10  | 0.95                   | 50                     | Y5V | 100nF       | ±20%                     | CL21F104MBCNNN# |
| 11  | 0.95                   | 50                     | Y5V | 150nF       | -20/+80%                 | CL21F154ZBCNNN# |
| 12  | 0.95                   | 50                     | Y5V | 220nF       | -20/+80%                 | CL21F224ZBCNNN# |
| 13  | 1.35                   | 6.3                    | Y5V | 10uF        | -20/+80%                 | CL21F106ZQFNNN# |
| 14  | 1.35                   | 10                     | Y5V | 2.2uF       | -20/+80%                 | CL21F225ZPFNNN# |
| 15  | 1.35                   | 10                     | Y5V | 3.3uF       | -20/+80%                 | CL21F335ZPFNNN# |
| 16  | 1.35                   | 10                     | Y5V | 4.7uF       | -20/+80%                 | CL21F475ZPFNNN# |
| 17  | 1.35                   | 16                     | Y5V | 2.2uF       | -20/+80%                 | CL21F225ZOFNNN# |
| 18  | 1.35                   | 50                     | Y5V | 1uF         | -20/+80%                 | CL21F105ZBFNNN# |
| 19  | 1.35                   | 50                     | Y5V | 330nF       | -20/+80%                 | CL21F334ZBFNNN# |

Size Code (inch/mm) : 1206/3216

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 1.00                   | 16                     | Y5V | 1uF         | -20/+80%                 | CL31F105ZOCNNN# |
| 2   | 1.00                   | 16                     | Y5V | 2.2uF       | -20/+80%                 | CL31F225ZOCNNN# |
| 3   | 1.00                   | 25                     | Y5V | 1uF         | -20/+80%                 | CL31F105ZACNNN# |
| 4   | 1.00                   | 50                     | Y5V | 100nF       | -20/+80%                 | CL31F104ZBCNNN# |
| 5   | 1.00                   | 50                     | Y5V | 220nF       | -20/+80%                 | CL31F224ZBCNNN# |
| 6   | 1.00                   | 50                     | Y5V | 330nF       | -20/+80%                 | CL31F334ZBCNNN# |
| 7   | 1.00                   | 50                     | Y5V | 470nF       | -20/+80%                 | CL31F474ZBCNNN# |
| 8   | 1.40                   | 10                     | Y5V | 10uF        | -20/+80%                 | CL31F106ZPFNNN# |
| 9   | 1.40                   | 16                     | Y5V | 3.3uF       | -20/+80%                 | CL31F335ZOFNNN# |
| 10  | 1.40                   | 16                     | Y5V | 4.7uF       | -20/+80%                 | CL31F475ZOFNNN# |
| 11  | 1.40                   | 25                     | Y5V | 2.2uF       | -20/+80%                 | CL31F225ZAFNNN# |
| 12  | 1.40                   | 50                     | Y5V | 1uF         | -20/+80%                 | CL31F105ZBFNNN# |
| 13  | 1.80                   | 10                     | Y5V | 10uF        | -20/+80%                 | CL31F106ZPHNNN# |



# Normal Capacitors\_Standard

Size Code (inch/mm) : 1210/3225

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 1.45                   | 50                     | Y5V | 1uF         | -20/+80%                 | CL32F105ZBFNNN# |
| 2   | 1.50                   | 25                     | Y5V | 10uF        | -20/+80%                 | CL32F106ZASLNN# |
| 3   | 1.60                   | 35                     | Y5V | 10uF        | -20/+80%                 | CL32F106ZLGNNN# |
| 4   | 1.80                   | 16                     | Y5V | 10uF        | -20/+80%                 | CL32F106ZOHNNN# |
| 5   | 1.80                   | 25                     | Y5V | 10uF        | -20/+80%                 | CL32F106ZAHNNN# |
| 6   | 1.80                   | 35                     | Y5V | 10uF        | -20/+80%                 | CL32F106ZLHNNN# |

## Product Lineup (X7R)

Size Code (inch/mm) : 01005/0402

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 0.22                   | 10                     | X7R | 1nF         | ±10%                     | CL02B102KP2NNN# |
| 2   | 0.22                   | 10                     | X7R | 100pF       | ±10%                     | CL02B101KP2NNN# |
| 3   | 0.22                   | 10                     | X7R | 120pF       | ±10%                     | CL02B121KP2NNN# |
| 4   | 0.22                   | 10                     | X7R | 220pF       | ±10%                     | CL02B221KP2NNN# |
| 5   | 0.22                   | 10                     | X7R | 470pF       | ±10%                     | CL02B471KP2NNN# |
| 6   | 0.22                   | 16                     | X7R | 330pF       | ±10%                     | CL02B331K02NNN# |

Size Code (inch/mm) : 0201/0603

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 0.33                   | 6.3                    | X7R | 4.7nF       | ±10%                     | CL03B472KQ3NNN# |
| 2   | 0.33                   | 6.3                    | X7R | 10nF        | ±10%                     | CL03B103KQ3NNN# |
| 3   | 0.33                   | 10                     | X7R | 1.5nF       | ±10%                     | CL03B152KP3NNN# |
| 4   | 0.33                   | 10                     | X7R | 3.3nF       | ±10%                     | CL03B332KP3NNN# |
| 5   | 0.33                   | 10                     | X7R | 6.8nF       | ±10%                     | CL03B682KP3NNN# |
| 6   | 0.33                   | 10                     | X7R | 10nF        | ±10%                     | CL03B103KP3NNN# |
| 7   | 0.33                   | 16                     | X7R | 1nF         | ±10%                     | CL03B102K03NNN# |
| 8   | 0.33                   | 16                     | X7R | 10nF        | ±10%                     | CL03B103K03NNN# |
| 9   | 0.33                   | 16                     | X7R | 150pF       | ±10%                     | CL03B151K03NNN# |
| 10  | 0.33                   | 16                     | X7R | 220pF       | ±10%                     | CL03B221K03NNN# |
| 11  | 0.33                   | 16                     | X7R | 270pF       | ±10%                     | CL03B271K03NNN# |
| 12  | 0.33                   | 16                     | X7R | 470pF       | ±10%                     | CL03B471K03NNN# |
| 13  | 0.33                   | 16                     | X7R | 560pF       | ±10%                     | CL03B561K03NNN# |
| 14  | 0.33                   | 16                     | X7R | 820pF       | ±10%                     | CL03B821K03NNN# |
| 15  | 0.33                   | 25                     | X7R | 1nF         | ±10%                     | CL03B102KA3NNN# |
| 16  | 0.33                   | 25                     | X7R | 1nF         | ±5%                      | CL03B102JA3NNN# |
| 17  | 0.33                   | 25                     | X7R | 150pF       | ±10%                     | CL03B151KA3NNN# |
| 18  | 0.33                   | 25                     | X7R | 220pF       | ±10%                     | CL03B221KA3NNN# |
| 19  | 0.33                   | 25                     | X7R | 330pF       | ±10%                     | CL03B331KA3NNN# |
| 18  | 0.33                   | 25                     | X7R | 470pF       | ±10%                     | CL03B471KA3NNN# |
| 21  | 0.33                   | 25                     | X7R | 680pF       | ±10%                     | CL03B681KA3NNN# |



# Normal Capacitors\_Standard

Size Code (inch/mm) : 0402/1005

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 0.33                   | 16                     | X7R | 100nF       | ±10%                     | CL05B104K03LNN# |
| 2   | 0.55                   | 6.3                    | X7R | 100nF       | ±10%                     | CL05B104KQ5NNN# |
| 3   | 0.55                   | 6.3                    | X7R | 470nF       | ±10%                     | CL05B474KQ5NNN# |
| 4   | 0.55                   | 10                     | X7R | 22nF        | ±10%                     | CL05B223KP5NNN# |
| 5   | 0.55                   | 10                     | X7R | 27nF        | ±10%                     | CL05B273KP5NNN# |
| 6   | 0.55                   | 10                     | X7R | 47nF        | ±10%                     | CL05B473KP5NNN# |
| 7   | 0.55                   | 10                     | X7R | 68nF        | ±10%                     | CL05B683KP5NNN# |
| 8   | 0.55                   | 10                     | X7R | 82nF        | ±10%                     | CL05B823KP5NNN# |
| 9   | 0.55                   | 10                     | X7R | 100nF       | ±10%                     | CL05B104KP5NFN# |
| 10  | 0.55                   | 10                     | X7R | 100nF       | ±10%                     | CL05B104KP5NNN# |
| 11  | 0.55                   | 10                     | X7R | 100nF       | ±20%                     | CL05B104MP5NNN# |
| 12  | 0.55                   | 10                     | X7R | 220nF       | ±10%                     | CL05B224KP5NNN# |
| 13  | 0.55                   | 10                     | X7R | 470nF       | ±10%                     | CL05B474KP5NNN# |
| 14  | 0.55                   | 16                     | X7R | 8.2nF       | ±10%                     | CL05B822K05NNN# |
| 15  | 0.55                   | 16                     | X7R | 10nF        | ±10%                     | CL05B103K05NCN# |
| 16  | 0.55                   | 16                     | X7R | 10nF        | ±10%                     | CL05B103K05NFN# |
| 17  | 0.55                   | 16                     | X7R | 10nF        | ±10%                     | CL05B103K05NNN# |
| 18  | 0.55                   | 16                     | X7R | 10nF        | ±5%                      | CL05B103J05NNN# |
| 19  | 0.55                   | 16                     | X7R | 22nF        | ±10%                     | CL05B223K05NFN# |
| 20  | 0.55                   | 16                     | X7R | 22nF        | ±10%                     | CL05B223K05NNN# |
| 21  | 0.55                   | 16                     | X7R | 22nF        | ±5%                      | CL05B223J05NNN# |
| 22  | 0.55                   | 16                     | X7R | 27nF        | ±10%                     | CL05B273K05NNN# |
| 23  | 0.55                   | 16                     | X7R | 33nF        | ±10%                     | CL05B333K05NFN# |
| 24  | 0.55                   | 16                     | X7R | 33nF        | ±10%                     | CL05B333K05NNN# |
| 25  | 0.55                   | 16                     | X7R | 33nF        | ±5%                      | CL05B333J05NNN# |
| 26  | 0.55                   | 16                     | X7R | 47nF        | ±10%                     | CL05B473K05NFN# |
| 27  | 0.55                   | 16                     | X7R | 47nF        | ±10%                     | CL05B473K05NNN# |
| 28  | 0.55                   | 16                     | X7R | 47nF        | ±5%                      | CL05B473J05NNN# |
| 29  | 0.55                   | 16                     | X7R | 68nF        | ±10%                     | CL05B683K05NNN# |
| 30  | 0.55                   | 16                     | X7R | 100nF       | ±10%                     | CL05B104K05NFN# |
| 31  | 0.55                   | 16                     | X7R | 100nF       | ±10%                     | CL05B104K05NNN# |
| 32  | 0.55                   | 16                     | X7R | 100nF       | ±20%                     | CL05B104M05NNN# |
| 33  | 0.55                   | 16                     | X7R | 100nF       | ±5%                      | CL05B104J05NNN# |
| 34  | 0.55                   | 16                     | X7R | 220nF       | ±10%                     | CL05B224K05NFN# |
| 35  | 0.55                   | 16                     | X7R | 220nF       | ±10%                     | CL05B224K05NNN# |
| 36  | 0.55                   | 16                     | X7R | 820pF       | ±10%                     | CL05B821K05NNN# |
| 37  | 0.55                   | 25                     | X7R | 1.5nF       | ±10%                     | CL05B152KA5NNN# |
| 38  | 0.55                   | 25                     | X7R | 3.3nF       | ±5%                      | CL05B332JA5NNN# |
| 39  | 0.55                   | 25                     | X7R | 4.7nF       | ±10%                     | CL05B472KA5NFN# |
| 40  | 0.55                   | 25                     | X7R | 4.7nF       | ±10%                     | CL05B472KA5NNN# |
| 41  | 0.55                   | 25                     | X7R | 5.6nF       | ±10%                     | CL05B562KA5NNN# |
| 42  | 0.55                   | 25                     | X7R | 6.8nF       | ±10%                     | CL05B682KA5NNN# |
| 43  | 0.55                   | 25                     | X7R | 8.2nF       | ±10%                     | CL05B822KA5NNN# |
| 44  | 0.55                   | 25                     | X7R | 10nF        | ±10%                     | CL05B103KA5NFN# |
| 45  | 0.55                   | 25                     | X7R | 10nF        | ±10%                     | CL05B103KA5NNN# |



# Normal Capacitors\_Standard

Size Code (inch/mm) : 0402/1005

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 46  | 0.55                   | 25                     | X7R | 18nF        | ±10%                     | CL05B183KA5NNN# |
| 47  | 0.55                   | 25                     | X7R | 22nF        | ±10%                     | CL05B223KA5NNN# |
| 48  | 0.55                   | 25                     | X7R | 47nF        | ±10%                     | CL05B473KA5NNN# |
| 49  | 0.55                   | 25                     | X7R | 100nF       | ±10%                     | CL05B104KA5NNN# |
| 50  | 0.55                   | 25                     | X7R | 100nF       | ±10%                     | CL05B104KA5SNN# |
| 51  | 0.55                   | 25                     | X7R | 560pF       | ±10%                     | CL05B561KA5NNN# |
| 52  | 0.55                   | 50                     | X7R | 1nF         | ±10%                     | CL05B102KB5NCN# |
| 53  | 0.55                   | 50                     | X7R | 1nF         | ±10%                     | CL05B102KB5NFN# |
| 54  | 0.55                   | 50                     | X7R | 1nF         | ±10%                     | CL05B102KB5NNN# |
| 55  | 0.55                   | 50                     | X7R | 1nF         | ±5%                      | CL05B102JB5NNN# |
| 56  | 0.55                   | 50                     | X7R | 1.2nF       | ±5%                      | CL05B122JB5NNN# |
| 57  | 0.55                   | 50                     | X7R | 1.5nF       | ±10%                     | CL05B152KB5NNN# |
| 58  | 0.55                   | 50                     | X7R | 1.5nF       | ±5%                      | CL05B152JB5NNN# |
| 59  | 0.55                   | 50                     | X7R | 1.8nF       | ±10%                     | CL05B182KB5NNN# |
| 60  | 0.55                   | 50                     | X7R | 2.2nF       | ±10%                     | CL05B222KB5NFN# |
| 61  | 0.55                   | 50                     | X7R | 2.2nF       | ±10%                     | CL05B222KB5NNN# |
| 62  | 0.55                   | 50                     | X7R | 2.2nF       | ±5%                      | CL05B222JB5NNN# |
| 63  | 0.55                   | 50                     | X7R | 2.7nF       | ±10%                     | CL05B272KB5NNN# |
| 64  | 0.55                   | 50                     | X7R | 3.3nF       | ±10%                     | CL05B332KB5NFN# |
| 65  | 0.55                   | 50                     | X7R | 3.3nF       | ±10%                     | CL05B332KB5NNN# |
| 66  | 0.55                   | 50                     | X7R | 3.9nF       | ±10%                     | CL05B392KB5NNN# |
| 67  | 0.55                   | 50                     | X7R | 4.7nF       | ±10%                     | CL05B472KB5NFN# |
| 68  | 0.55                   | 50                     | X7R | 4.7nF       | ±10%                     | CL05B472KB5NNN# |
| 69  | 0.55                   | 50                     | X7R | 4.7nF       | ±5%                      | CL05B472JB5NNN# |
| 70  | 0.55                   | 50                     | X7R | 5.6nF       | ±10%                     | CL05B562KB5NFN# |
| 71  | 0.55                   | 50                     | X7R | 5.6nF       | ±10%                     | CL05B562KB5NNN# |
| 72  | 0.55                   | 50                     | X7R | 6.8nF       | ±10%                     | CL05B682KB5NNN# |
| 73  | 0.55                   | 50                     | X7R | 6.8nF       | ±5%                      | CL05B682JB5NNN# |
| 74  | 0.55                   | 50                     | X7R | 8.2nF       | ±10%                     | CL05B822KB5NNN# |
| 75  | 0.55                   | 50                     | X7R | 10nF        | ±10%                     | CL05B103KB5NFN# |
| 76  | 0.55                   | 50                     | X7R | 10nF        | ±10%                     | CL05B103KB5NNN# |
| 77  | 0.55                   | 50                     | X7R | 15nF        | ±10%                     | CL05B153KB5NNN# |
| 78  | 0.55                   | 50                     | X7R | 22nF        | ±10%                     | CL05B223KB5NNN# |
| 79  | 0.55                   | 50                     | X7R | 100nF       | ±10%                     | CL05B104KB5NFN# |
| 80  | 0.55                   | 50                     | X7R | 100nF       | ±10%                     | CL05B104KB5NNN# |
| 81  | 0.55                   | 50                     | X7R | 150pF       | ±10%                     | CL05B151KB5NNN# |
| 82  | 0.55                   | 50                     | X7R | 180pF       | ±10%                     | CL05B181KB5NNN# |
| 83  | 0.55                   | 50                     | X7R | 220pF       | ±10%                     | CL05B221KB5NNN# |
| 84  | 0.55                   | 50                     | X7R | 220pF       | ±5%                      | CL05B221JB5NNN# |
| 85  | 0.55                   | 50                     | X7R | 300pF       | ±10%                     | CL05B301KB5NNN# |
| 86  | 0.55                   | 50                     | X7R | 330pF       | ±10%                     | CL05B331KB5NNN# |
| 87  | 0.55                   | 50                     | X7R | 330pF       | ±5%                      | CL05B331JB5NNN# |
| 88  | 0.55                   | 50                     | X7R | 390pF       | ±10%                     | CL05B391KB5NNN# |
| 89  | 0.55                   | 50                     | X7R | 470pF       | ±10%                     | CL05B471KB5NFN# |
| 90  | 0.55                   | 50                     | X7R | 470pF       | ±10%                     | CL05B471KB5NNN# |
| 91  | 0.55                   | 50                     | X7R | 560pF       | ±5%                      | CL05B561JB5NNN# |
| 92  | 0.55                   | 50                     | X7R | 680pF       | ±10%                     | CL05B681KB5NNN# |
| 93  | 0.55                   | 50                     | X7R | 680pF       | ±5%                      | CL05B681JB5NNN# |



# Normal Capacitors\_Standard

Size Code (inch/mm) : 0603/1608

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 0.90                   | 6.3                    | X7R | 1uF         | ±10%                     | CL10B105KQ8NNN# |
| 2   | 0.90                   | 6.3                    | X7R | 2.2uF       | ±10%                     | CL10B225KQ8NFN# |
| 3   | 0.90                   | 6.3                    | X7R | 2.2uF       | ±10%                     | CL10B225KQ8NNN# |
| 4   | 0.90                   | 6.3                    | X7R | 470nF       | ±10%                     | CL10B474KQ8NNN# |
| 5   | 0.90                   | 6.3                    | X7R | 680nF       | ±10%                     | CL10B684KQ8NNN# |
| 6   | 0.90                   | 10                     | X7R | 1uF         | ±10%                     | CL10B105KP8NFN# |
| 7   | 0.90                   | 10                     | X7R | 1uF         | ±10%                     | CL10B105KP8NNN# |
| 8   | 0.90                   | 10                     | X7R | 2.2uF       | ±10%                     | CL10B225KP8NFN# |
| 9   | 0.90                   | 10                     | X7R | 2.2uF       | ±10%                     | CL10B225KP8NNN# |
| 10  | 0.90                   | 10                     | X7R | 220nF       | ±10%                     | CL10B224KP8NFN# |
| 11  | 0.90                   | 10                     | X7R | 220nF       | ±5%                      | CL10B224JP8NNN# |
| 12  | 0.90                   | 10                     | X7R | 330nF       | ±10%                     | CL10B334KP8NNN# |
| 13  | 0.90                   | 10                     | X7R | 470nF       | ±10%                     | CL10B474KP8NNN# |
| 14  | 0.90                   | 16                     | X7R | 1uF         | ±10%                     | CL10B105K08NFN# |
| 15  | 0.90                   | 16                     | X7R | 1uF         | ±10%                     | CL10B105K08NNN# |
| 16  | 0.90                   | 16                     | X7R | 1uF         | ±10%                     | CL10B105K08SFN# |
| 17  | 0.90                   | 16                     | X7R | 1uF         | ±10%                     | CL10B105K08ZFN# |
| 18  | 0.90                   | 16                     | X7R | 10nF        | ±10%                     | CL10B103K08NNN# |
| 19  | 0.90                   | 16                     | X7R | 15nF        | ±10%                     | CL10B153K08NNN# |
| 20  | 0.90                   | 16                     | X7R | 22nF        | ±10%                     | CL10B223K08NNN# |
| 21  | 0.90                   | 16                     | X7R | 27nF        | ±10%                     | CL10B273K08NNN# |
| 22  | 0.90                   | 16                     | X7R | 33nF        | ±10%                     | CL10B333K08NFN# |
| 23  | 0.90                   | 16                     | X7R | 39nF        | ±10%                     | CL10B393K08NNN# |
| 24  | 0.90                   | 16                     | X7R | 47nF        | ±10%                     | CL10B473K08NFN# |
| 25  | 0.90                   | 16                     | X7R | 47nF        | ±10%                     | CL10B473K08NNN# |
| 26  | 0.90                   | 16                     | X7R | 47nF        | ±5%                      | CL10B473J08NNN# |
| 27  | 0.90                   | 16                     | X7R | 56nF        | ±10%                     | CL10B563K08NNN# |
| 28  | 0.90                   | 16                     | X7R | 82nF        | ±10%                     | CL10B823K08NNN# |
| 29  | 0.90                   | 16                     | X7R | 100nF       | ±10%                     | CL10B104K08NFN# |
| 30  | 0.90                   | 16                     | X7R | 100nF       | ±10%                     | CL10B104K08NNN# |
| 31  | 0.90                   | 16                     | X7R | 150nF       | ±10%                     | CL10B154K08NFN# |
| 32  | 0.90                   | 16                     | X7R | 150nF       | ±10%                     | CL10B154K08NNN# |
| 33  | 0.90                   | 16                     | X7R | 220nF       | ±10%                     | CL10B224K08NFN# |
| 34  | 0.90                   | 16                     | X7R | 220nF       | ±10%                     | CL10B224K08NNN# |
| 35  | 0.90                   | 16                     | X7R | 220nF       | ±10%                     | CL10B224K08SFN# |
| 36  | 0.90                   | 16                     | X7R | 220nF       | ±5%                      | CL10B224J08NNN# |
| 37  | 0.90                   | 16                     | X7R | 220nF       | ±5%                      | CL10B224J08SFN# |
| 38  | 0.90                   | 16                     | X7R | 330nF       | ±10%                     | CL10B334K08NFN# |
| 39  | 0.90                   | 16                     | X7R | 330nF       | ±10%                     | CL10B334K08NNN# |
| 40  | 0.90                   | 16                     | X7R | 470nF       | ±10%                     | CL10B474K08NFN# |
| 41  | 0.90                   | 16                     | X7R | 470nF       | ±10%                     | CL10B474K08NNN# |
| 42  | 0.90                   | 16                     | X7R | 680nF       | ±10%                     | CL10B684K08NFN# |
| 43  | 0.90                   | 25                     | X7R | 1uF         | ±10%                     | CL10B105KA8NFN# |
| 44  | 0.90                   | 25                     | X7R | 1uF         | ±10%                     | CL10B105KA8NNN# |
| 45  | 0.90                   | 25                     | X7R | 1uF         | ±10%                     | CL10B105KA8ZFN# |



# Normal Capacitors\_Standard

Size Code (inch/mm) : 0603/1608

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 46  | 0.90                   | 25                     | X7R | 4.7nF       | ±10%                     | CL10B472KA8NNN# |
| 47  | 0.90                   | 25                     | X7R | 10nF        | ±10%                     | CL10B103KA8NFN# |
| 48  | 0.90                   | 25                     | X7R | 10nF        | ±10%                     | CL10B103KA8NNN# |
| 49  | 0.90                   | 25                     | X7R | 22nF        | ±10%                     | CL10B223KA8NFN# |
| 50  | 0.90                   | 25                     | X7R | 27nF        | ±10%                     | CL10B273KA8NNN# |
| 51  | 0.90                   | 25                     | X7R | 47nF        | ±10%                     | CL10B473KA8NFN# |
| 52  | 0.90                   | 25                     | X7R | 56nF        | ±10%                     | CL10B563KA8NNN# |
| 53  | 0.90                   | 25                     | X7R | 68nF        | ±10%                     | CL10B683KA8NNN# |
| 54  | 0.90                   | 25                     | X7R | 100nF       | ±10%                     | CL10B104KA8NFN# |
| 55  | 0.90                   | 25                     | X7R | 100nF       | ±10%                     | CL10B104KA8NNN# |
| 56  | 0.90                   | 25                     | X7R | 100nF       | ±5%                      | CL10B104JA8NNN# |
| 57  | 0.90                   | 25                     | X7R | 150nF       | ±10%                     | CL10B154KA8NFN# |
| 58  | 0.90                   | 25                     | X7R | 220nF       | ±10%                     | CL10B224KA8NFN# |
| 59  | 0.90                   | 25                     | X7R | 220nF       | ±10%                     | CL10B224KA8NNN# |
| 60  | 0.90                   | 25                     | X7R | 220nF       | ±10%                     | CL10B224KA8SFN# |
| 61  | 0.90                   | 25                     | X7R | 470nF       | ±10%                     | CL10B474KA8NFN# |
| 62  | 0.90                   | 25                     | X7R | 470nF       | ±10%                     | CL10B474KA8NNN# |
| 63  | 0.90                   | 25                     | X7R | 470nF       | ±10%                     | CL10B474KA8SNN# |
| 64  | 0.90                   | 50                     | X7R | 1nF         | ±10%                     | CL10B102KB8NCN# |
| 65  | 0.90                   | 50                     | X7R | 1nF         | ±10%                     | CL10B102KB8NFN# |
| 66  | 0.90                   | 50                     | X7R | 1nF         | ±10%                     | CL10B102KB8NNN# |
| 67  | 0.90                   | 50                     | X7R | 1nF         | ±10%                     | CL10B102KB8SFN# |
| 68  | 0.90                   | 50                     | X7R | 1nF         | ±5%                      | CL10B102JB8NFN# |
| 69  | 0.90                   | 50                     | X7R | 1.2nF       | ±10%                     | CL10B122KB8NFN# |
| 70  | 0.90                   | 50                     | X7R | 1.2nF       | ±10%                     | CL10B122KB8NNN# |
| 71  | 0.90                   | 50                     | X7R | 1.5nF       | ±10%                     | CL10B152KB8NFN# |
| 72  | 0.90                   | 50                     | X7R | 1.5nF       | ±10%                     | CL10B152KB8NNN# |
| 73  | 0.90                   | 50                     | X7R | 1.5nF       | ±10%                     | CL10B152KB8SFN# |
| 74  | 0.90                   | 50                     | X7R | 1.8nF       | ±10%                     | CL10B182KB8NFN# |
| 75  | 0.90                   | 50                     | X7R | 2nF         | ±10%                     | CL10B202KB8NNN# |
| 76  | 0.90                   | 50                     | X7R | 2.2nF       | ±10%                     | CL10B222KB8NFN# |
| 77  | 0.90                   | 50                     | X7R | 2.2nF       | ±10%                     | CL10B222KB8NNN# |
| 78  | 0.90                   | 50                     | X7R | 2.2nF       | ±10%                     | CL10B222KB8SFN# |
| 79  | 0.90                   | 50                     | X7R | 2.2nF       | ±10%                     | CL10B222KB8ZNN# |
| 80  | 0.90                   | 50                     | X7R | 2.7nF       | ±10%                     | CL10B272KB8NFN# |
| 81  | 0.90                   | 50                     | X7R | 2.7nF       | ±10%                     | CL10B272KB8NNN# |
| 82  | 0.90                   | 50                     | X7R | 2.7nF       | ±10%                     | CL10B272KB8SFN# |
| 83  | 0.90                   | 50                     | X7R | 2.7nF       | ±5%                      | CL10B272JB8NNN# |
| 84  | 0.90                   | 50                     | X7R | 3.3nF       | ±10%                     | CL10B332KB8NFN# |
| 85  | 0.90                   | 50                     | X7R | 3.3nF       | ±10%                     | CL10B332KB8NNN# |
| 86  | 0.90                   | 50                     | X7R | 3.3nF       | ±20%                     | CL10B332MB8NNN# |
| 87  | 0.90                   | 50                     | X7R | 3.9nF       | ±10%                     | CL10B392KB8NFN# |
| 88  | 0.90                   | 50                     | X7R | 3.9nF       | ±10%                     | CL10B392KB8NNN# |
| 89  | 0.90                   | 50                     | X7R | 4.7nF       | ±10%                     | CL10B472KB8NFN# |
| 90  | 0.90                   | 50                     | X7R | 4.7nF       | ±10%                     | CL10B472KB8NNN# |



# Normal Capacitors\_Standard

Size Code (inch/mm) : 0603/1608

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 91  | 0.90                   | 50                     | X7R | 4.7nF       | ±10%                     | CL10B472KB8SFN# |
| 92  | 0.90                   | 50                     | X7R | 4.7nF       | ±10%                     | CL10B472KB8ZNN# |
| 93  | 0.90                   | 50                     | X7R | 5.6nF       | ±10%                     | CL10B562KB8NFN# |
| 94  | 0.90                   | 50                     | X7R | 5.6nF       | ±10%                     | CL10B562KB8NNN# |
| 95  | 0.90                   | 50                     | X7R | 5.6nF       | ±5%                      | CL10B562JB8NNN# |
| 96  | 0.90                   | 50                     | X7R | 6.8nF       | ±10%                     | CL10B682KB8NFN# |
| 97  | 0.90                   | 50                     | X7R | 6.8nF       | ±10%                     | CL10B682KB8NNN# |
| 98  | 0.90                   | 50                     | X7R | 6.8nF       | ±5%                      | CL10B682JB8NNN# |
| 99  | 0.90                   | 50                     | X7R | 8.2nF       | ±10%                     | CL10B822KB8NFN# |
| 100 | 0.90                   | 50                     | X7R | 10nF        | ±10%                     | CL10B103KB8NFN# |
| 101 | 0.90                   | 50                     | X7R | 10nF        | ±10%                     | CL10B103KB8NNN# |
| 102 | 0.90                   | 50                     | X7R | 10nF        | ±10%                     | CL10B103KB8ZNN# |
| 103 | 0.90                   | 50                     | X7R | 10nF        | ±20%                     | CL10B103MB8NCN# |
| 104 | 0.90                   | 50                     | X7R | 10nF        | ±20%                     | CL10B103MB8NNN# |
| 105 | 0.90                   | 50                     | X7R | 10nF        | ±5%                      | CL10B103JB8NFN# |
| 106 | 0.90                   | 50                     | X7R | 12nF        | ±10%                     | CL10B123KB8NNN# |
| 107 | 0.90                   | 50                     | X7R | 15nF        | ±10%                     | CL10B153KB8NFN# |
| 108 | 0.90                   | 50                     | X7R | 15nF        | ±10%                     | CL10B153KB8NNN# |
| 109 | 0.90                   | 50                     | X7R | 15nF        | ±10%                     | CL10B153KB8SFN# |
| 110 | 0.90                   | 50                     | X7R | 18nF        | ±5%                      | CL10B183JB8NNN# |
| 111 | 0.90                   | 50                     | X7R | 20nF        | ±10%                     | CL10B203KB8NNN# |
| 112 | 0.90                   | 50                     | X7R | 22nF        | ±10%                     | CL10B223KB8NFN# |
| 113 | 0.90                   | 50                     | X7R | 22nF        | ±10%                     | CL10B223KB8NNN# |
| 114 | 0.90                   | 50                     | X7R | 22nF        | ±10%                     | CL10B223KB8SFN# |
| 115 | 0.90                   | 50                     | X7R | 22nF        | ±5%                      | CL10B223JB8NFN# |
| 116 | 0.90                   | 50                     | X7R | 27nF        | ±10%                     | CL10B273KB8NNN# |
| 117 | 0.90                   | 50                     | X7R | 33nF        | ±10%                     | CL10B333KB8NFN# |
| 118 | 0.90                   | 50                     | X7R | 33nF        | ±10%                     | CL10B333KB8NNN# |
| 119 | 0.90                   | 50                     | X7R | 33nF        | ±10%                     | CL10B333KB8SFN# |
| 120 | 0.90                   | 50                     | X7R | 39nF        | ±10%                     | CL10B393KB8NNN# |
| 121 | 0.90                   | 50                     | X7R | 47nF        | ±10%                     | CL10B473KB8NFN# |
| 122 | 0.90                   | 50                     | X7R | 47nF        | ±10%                     | CL10B473KB8NNN# |
| 123 | 0.90                   | 50                     | X7R | 47nF        | ±10%                     | CL10B473KB8SFN# |
| 124 | 0.90                   | 50                     | X7R | 47nF        | ±10%                     | CL10B473KB8ZNN# |
| 125 | 0.90                   | 50                     | X7R | 47nF        | ±5%                      | CL10B473JB8NNN# |
| 126 | 0.90                   | 50                     | X7R | 56nF        | ±10%                     | CL10B563KB8SFN# |
| 127 | 0.90                   | 50                     | X7R | 68nF        | ±10%                     | CL10B683KB8NFN# |
| 128 | 0.90                   | 50                     | X7R | 68nF        | ±10%                     | CL10B683KB8NNN# |
| 129 | 0.90                   | 50                     | X7R | 82nF        | ±10%                     | CL10B823KB8NFN# |
| 130 | 0.90                   | 50                     | X7R | 100nF       | ±10%                     | CL10B104KB8NFN# |
| 131 | 0.90                   | 50                     | X7R | 100nF       | ±10%                     | CL10B104KB8NNN# |
| 132 | 0.90                   | 50                     | X7R | 100nF       | ±10%                     | CL10B104KB8SFN# |
| 133 | 0.90                   | 50                     | X7R | 100nF       | ±10%                     | CL10B104KB8ZNN# |
| 134 | 0.90                   | 50                     | X7R | 100nF       | ±20%                     | CL10B104MB8NFN# |
| 135 | 0.90                   | 50                     | X7R | 100nF       | ±20%                     | CL10B104MB8NNN# |



# Normal Capacitors\_Standard

Size Code (inch/mm) : 0603/1608

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 136 | 0.90                   | 50                     | X7R | 100nF       | ±5%                      | CL10B104JB8NNN# |
| 137 | 0.90                   | 50                     | X7R | 100pF       | ±10%                     | CL10B101KB8NFN# |
| 138 | 0.90                   | 50                     | X7R | 120pF       | ±10%                     | CL10B121KB8NNN# |
| 139 | 0.90                   | 50                     | X7R | 150pF       | ±10%                     | CL10B151KB8NNN# |
| 140 | 0.90                   | 50                     | X7R | 200pF       | ±10%                     | CL10B201KB8NNN# |
| 141 | 0.90                   | 50                     | X7R | 220nF       | ±10%                     | CL10B224KB8NFN# |
| 142 | 0.90                   | 50                     | X7R | 220nF       | ±10%                     | CL10B224KB8NNN# |
| 143 | 0.90                   | 50                     | X7R | 220nF       | ±10%                     | CL10B224KB8SFN# |
| 144 | 0.90                   | 50                     | X7R | 220nF       | ±10%                     | CL10B224KB8ZNN# |
| 145 | 0.90                   | 50                     | X7R | 220pF       | ±10%                     | CL10B221KB8NFN# |
| 146 | 0.90                   | 50                     | X7R | 220pF       | ±10%                     | CL10B221KB8NNN# |
| 147 | 0.90                   | 50                     | X7R | 220pF       | ±5%                      | CL10B221JB8NNN# |
| 148 | 0.90                   | 50                     | X7R | 330pF       | ±10%                     | CL10B331KB8NFN# |
| 149 | 0.90                   | 50                     | X7R | 330pF       | ±10%                     | CL10B331KB8NNN# |
| 150 | 0.90                   | 50                     | X7R | 330pF       | ±5%                      | CL10B331JB8NNN# |
| 151 | 0.90                   | 50                     | X7R | 390pF       | ±10%                     | CL10B391KB8NNN# |
| 152 | 0.90                   | 50                     | X7R | 470pF       | ±10%                     | CL10B471KB8NFN# |
| 153 | 0.90                   | 50                     | X7R | 470pF       | ±10%                     | CL10B471KB8NNN# |
| 154 | 0.90                   | 50                     | X7R | 470pF       | ±5%                      | CL10B471JB8NNN# |
| 155 | 0.90                   | 50                     | X7R | 510pF       | ±10%                     | CL10B511KB8NNN# |
| 156 | 0.90                   | 50                     | X7R | 560pF       | ±5%                      | CL10B561JB8NNN# |
| 157 | 0.90                   | 50                     | X7R | 680pF       | ±10%                     | CL10B681KB8NFN# |
| 158 | 0.90                   | 50                     | X7R | 680pF       | ±5%                      | CL10B681JB8NNN# |
| 159 | 0.90                   | 100                    | X7R | 1nF         | ±10%                     | CL10B102KC8NFN# |
| 160 | 0.90                   | 100                    | X7R | 1nF         | ±10%                     | CL10B102KC8NNN# |
| 161 | 0.90                   | 100                    | X7R | 1.5nF       | ±10%                     | CL10B152KC8NNN# |
| 162 | 0.90                   | 100                    | X7R | 3.3nF       | ±10%                     | CL10B332KC8NNN# |
| 163 | 0.90                   | 100                    | X7R | 4.7nF       | ±10%                     | CL10B472KC8NNN# |
| 164 | 0.90                   | 100                    | X7R | 10nF        | ±10%                     | CL10B103KC8NNN# |
| 165 | 0.90                   | 100                    | X7R | 100nF       | ±10%                     | CL10B104KC8NNN# |
| 166 | 0.95                   | 6.3                    | X7R | 4.7uF       | ±10%                     | CL10B475KQ8NFB# |
| 167 | 0.95                   | 6.3                    | X7R | 4.7uF       | ±10%                     | CL10B475KQ8NQN# |
| 168 | 0.95                   | 6.3                    | X7R | 4.7uF       | ±20%                     | CL10B475MQ8NQN# |
| 169 | 0.95                   | 50                     | X7R | 1uF         | ±10%                     | CL10B105KB8NQN# |
| 170 | 1.00                   | 6.3                    | X7R | 10uF        | ±20%                     | CL10B106MQ8NFB# |
| 171 | 1.00                   | 6.3                    | X7R | 10uF        | ±20%                     | CL10B106MQ8NRN# |



# Normal Capacitors\_Standard

Size Code (inch/mm) : 0805/2012

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 0.75                   | 16                     | X7R | 100nF       | ±10%                     | CL21B104KOANNN# |
| 2   | 0.75                   | 16                     | X7R | 150nF       | ±10%                     | CL21B154KOANNN# |
| 3   | 0.75                   | 16                     | X7R | 180nF       | ±10%                     | CL21B184KOANNN# |
| 4   | 0.75                   | 25                     | X7R | 1nF         | ±10%                     | CL21B102KAANFN# |
| 5   | 0.75                   | 25                     | X7R | 10nF        | ±10%                     | CL21B103KAANNN# |
| 6   | 0.75                   | 50                     | X7R | 1nF         | ±10%                     | CL21B102KBANFN# |
| 7   | 0.75                   | 50                     | X7R | 1nF         | ±10%                     | CL21B102KBANNN# |
| 8   | 0.75                   | 50                     | X7R | 1nF         | ±5%                      | CL21B102JBANFN# |
| 9   | 0.75                   | 50                     | X7R | 1.2nF       | ±10%                     | CL21B122KBANNN# |
| 10  | 0.75                   | 50                     | X7R | 2nF         | ±10%                     | CL21B202KBANNN# |
| 11  | 0.75                   | 50                     | X7R | 2.2nF       | ±10%                     | CL21B222KBANFN# |
| 12  | 0.75                   | 50                     | X7R | 2.2nF       | ±10%                     | CL21B222KBANNN# |
| 13  | 0.75                   | 50                     | X7R | 2.2nF       | ±5%                      | CL21B222JBANNN# |
| 14  | 0.75                   | 50                     | X7R | 2.7nF       | ±10%                     | CL21B272KBANNN# |
| 15  | 0.75                   | 50                     | X7R | 3.3nF       | ±5%                      | CL21B332JBANNN# |
| 16  | 0.75                   | 50                     | X7R | 3.9nF       | ±10%                     | CL21B392KBANNN# |
| 17  | 0.75                   | 50                     | X7R | 4.7nF       | ±10%                     | CL21B472KBANFN# |
| 18  | 0.75                   | 50                     | X7R | 4.7nF       | ±10%                     | CL21B472KBANNN# |
| 19  | 0.75                   | 50                     | X7R | 5.6nF       | ±10%                     | CL21B562KBANFN# |
| 20  | 0.75                   | 50                     | X7R | 5.6nF       | ±10%                     | CL21B562KBANNN# |
| 21  | 0.75                   | 50                     | X7R | 5.6nF       | ±5%                      | CL21B562JBANNN# |
| 22  | 0.75                   | 50                     | X7R | 6.8nF       | ±10%                     | CL21B682KBANFN# |
| 23  | 0.75                   | 50                     | X7R | 8.2nF       | ±10%                     | CL21B822KBANNN# |
| 24  | 0.75                   | 50                     | X7R | 10nF        | ±10%                     | CL21B103KBANFN# |
| 25  | 0.75                   | 50                     | X7R | 10nF        | ±10%                     | CL21B103KBANNN# |
| 26  | 0.75                   | 50                     | X7R | 10nF        | ±20%                     | CL21B103MBANNN# |
| 27  | 0.75                   | 50                     | X7R | 15nF        | ±10%                     | CL21B153KBANFN# |
| 28  | 0.75                   | 50                     | X7R | 15nF        | ±5%                      | CL21B153JBANNN# |
| 29  | 0.75                   | 50                     | X7R | 18nF        | ±10%                     | CL21B183KBANNN# |
| 30  | 0.75                   | 50                     | X7R | 20nF        | ±10%                     | CL21B203KBANNN# |
| 31  | 0.75                   | 50                     | X7R | 22nF        | ±10%                     | CL21B223KBANFN# |
| 32  | 0.75                   | 50                     | X7R | 22nF        | ±10%                     | CL21B223KBANNN# |
| 33  | 0.75                   | 50                     | X7R | 22nF        | ±5%                      | CL21B223JBANNN# |
| 34  | 0.75                   | 50                     | X7R | 27nF        | ±10%                     | CL21B273KBANNN# |
| 35  | 0.75                   | 50                     | X7R | 33nF        | ±10%                     | CL21B333KBANFN# |
| 36  | 0.75                   | 50                     | X7R | 39nF        | ±10%                     | CL21B393KBANNN# |
| 37  | 0.75                   | 50                     | X7R | 100pF       | ±10%                     | CL21B101KBANFN# |
| 38  | 0.75                   | 50                     | X7R | 180pF       | ±10%                     | CL21B181KBANNN# |
| 39  | 0.75                   | 50                     | X7R | 200pF       | ±10%                     | CL21B201KBANNN# |
| 40  | 0.75                   | 50                     | X7R | 220pF       | ±10%                     | CL21B221KBANFN# |
| 41  | 0.75                   | 50                     | X7R | 300pF       | ±10%                     | CL21B301KBANNN# |
| 42  | 0.75                   | 50                     | X7R | 330pF       | ±5%                      | CL21B331JBANNN# |
| 43  | 0.75                   | 50                     | X7R | 470pF       | ±10%                     | CL21B471KBANFN# |
| 44  | 0.75                   | 50                     | X7R | 470pF       | ±5%                      | CL21B471JBANNN# |
| 45  | 0.75                   | 50                     | X7R | 510pF       | ±10%                     | CL21B511KBANNN# |



# Normal Capacitors\_Standard

Size Code (inch/mm) : 0805/2012

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 46  | 0.75                   | 50                     | X7R | 680pF       | ±10%                     | CL21B681KBANFN# |
| 47  | 0.75                   | 100                    | X7R | 1nF         | ±10%                     | CL21B102KCANNN# |
| 48  | 0.75                   | 100                    | X7R | 1nF         | ±5%                      | CL21B102JCANNN# |
| 49  | 0.75                   | 100                    | X7R | 1.5nF       | ±10%                     | CL21B152KCANNN# |
| 50  | 0.75                   | 100                    | X7R | 2.2nF       | ±10%                     | CL21B222KCANFN# |
| 51  | 0.75                   | 100                    | X7R | 4.7nF       | ±10%                     | CL21B472KCANFN# |
| 52  | 0.75                   | 100                    | X7R | 6.8nF       | ±10%                     | CL21B682KCANFN# |
| 53  | 0.75                   | 100                    | X7R | 6.8nF       | ±10%                     | CL21B682KCANNN# |
| 54  | 0.75                   | 100                    | X7R | 10nF        | ±10%                     | CL21B103KCANFN# |
| 55  | 0.75                   | 100                    | X7R | 10nF        | ±10%                     | CL21B103KCANNN# |
| 56  | 0.75                   | 100                    | X7R | 220pF       | ±10%                     | CL21B221KCANFN# |
| 57  | 0.75                   | 100                    | X7R | 270pF       | ±10%                     | CL21B271KCANNN# |
| 58  | 0.75                   | 100                    | X7R | 330pF       | ±10%                     | CL21B331KCANNN# |
| 59  | 0.95                   | 16                     | X7R | 270nF       | ±10%                     | CL21B274KOCNNN# |
| 60  | 0.95                   | 16                     | X7R | 330nF       | ±10%                     | CL21B334KOCNNN# |
| 61  | 0.95                   | 25                     | X7R | 100nF       | ±10%                     | CL21B104KACNFN# |
| 62  | 0.95                   | 25                     | X7R | 100nF       | ±10%                     | CL21B104KACNNN# |
| 63  | 0.95                   | 25                     | X7R | 100nF       | ±20%                     | CL21B104MACNNN# |
| 64  | 0.95                   | 25                     | X7R | 120nF       | ±10%                     | CL21B124KACNNN# |
| 65  | 0.95                   | 25                     | X7R | 120nF       | ±5%                      | CL21B124JACNNN# |
| 66  | 0.95                   | 50                     | X7R | 1nF         | ±10%                     | CL21B102KBCNNN# |
| 67  | 0.95                   | 50                     | X7R | 2.2nF       | ±10%                     | CL21B222KBCNNN# |
| 68  | 0.95                   | 50                     | X7R | 10nF        | ±10%                     | CL21B103KBCNNN# |
| 69  | 0.95                   | 50                     | X7R | 10nF        | ±5%                      | CL21B103JBCNNN# |
| 70  | 0.95                   | 50                     | X7R | 47nF        | ±10%                     | CL21B473KBCNFN# |
| 71  | 0.95                   | 50                     | X7R | 47nF        | ±10%                     | CL21B473KBCNNN# |
| 72  | 0.95                   | 50                     | X7R | 47nF        | ±20%                     | CL21B473MBCNNN# |
| 73  | 0.95                   | 50                     | X7R | 56nF        | ±10%                     | CL21B563KBCNNN# |
| 74  | 0.95                   | 50                     | X7R | 68nF        | ±10%                     | CL21B683KBCNFN# |
| 75  | 0.95                   | 50                     | X7R | 68nF        | ±5%                      | CL21B683JBCNNN# |
| 76  | 0.95                   | 50                     | X7R | 82nF        | ±10%                     | CL21B823KBCNNN# |
| 77  | 0.95                   | 50                     | X7R | 100nF       | ±10%                     | CL21B104KBCNFN# |
| 78  | 0.95                   | 50                     | X7R | 100nF       | ±10%                     | CL21B104KBCNNN# |
| 79  | 0.95                   | 50                     | X7R | 100nF       | ±10%                     | CL21B104KBCSFN# |
| 80  | 0.95                   | 50                     | X7R | 100nF       | ±5%                      | CL21B104JBCNFN# |
| 81  | 0.95                   | 100                    | X7R | 15nF        | ±10%                     | CL21B153KCCNNN# |
| 82  | 0.95                   | 200                    | X7R | 1nF         | ±10%                     | CL21B102KDCNFN# |
| 83  | 0.95                   | 200                    | X7R | 1nF         | ±5%                      | CL21B102JDCNNN# |
| 84  | 0.95                   | 200                    | X7R | 1.8nF       | ±10%                     | CL21B182KDCNNN# |
| 85  | 0.95                   | 200                    | X7R | 2.2nF       | ±10%                     | CL21B222KDCNFN# |
| 86  | 0.95                   | 200                    | X7R | 4.7nF       | ±10%                     | CL21B472KDCNNN# |
| 87  | 0.95                   | 200                    | X7R | 10nF        | ±10%                     | CL21B103KDCNFN# |
| 88  | 0.95                   | 200                    | X7R | 10nF        | ±10%                     | CL21B103KDCNNN# |
| 89  | 0.95                   | 200                    | X7R | 220pF       | ±10%                     | CL21B221KDCNFN# |
| 90  | 0.95                   | 200                    | X7R | 470pF       | ±10%                     | CL21B471KDCNFN# |



# Normal Capacitors\_Standard

Size Code (inch/mm) : 0805/2012

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 91  | 0.95                   | 250                    | X7R | 1nF         | ±10%                     | CL21B102KECSFN# |
| 92  | 0.95                   | 250                    | X7R | 1nF         | ±10%                     | CL21B102KECSNN# |
| 93  | 1.35                   | 10                     | X7R | 1uF         | ±10%                     | CL21B105KPFNNN# |
| 94  | 1.35                   | 10                     | X7R | 1uF         | ±20%                     | CL21B105MPFNNN# |
| 95  | 1.35                   | 10                     | X7R | 2.2uF       | ±10%                     | CL21B225KPFNNN# |
| 96  | 1.35                   | 10                     | X7R | 3.3uF       | ±10%                     | CL21B335KPFNNN# |
| 97  | 1.35                   | 10                     | X7R | 4.7uF       | ±10%                     | CL21B475KPFN3N# |
| 98  | 1.35                   | 10                     | X7R | 4.7uF       | ±10%                     | CL21B475KPFNFN# |
| 99  | 1.35                   | 10                     | X7R | 680nF       | ±10%                     | CL21B684KPFNNN# |
| 100 | 1.35                   | 16                     | X7R | 1uF         | ±10%                     | CL21B105KOFNFN# |
| 101 | 1.35                   | 16                     | X7R | 1uF         | ±10%                     | CL21B105KOFNNN# |
| 102 | 1.35                   | 16                     | X7R | 1uF         | ±10%                     | CL21B105KOFSFN# |
| 103 | 1.35                   | 16                     | X7R | 1uF         | ±20%                     | CL21B105MOFNNN# |
| 104 | 1.35                   | 16                     | X7R | 2.2uF       | ±10%                     | CL21B225KOFNFN# |
| 105 | 1.35                   | 16                     | X7R | 2.2uF       | ±10%                     | CL21B225KOFNNN# |
| 106 | 1.35                   | 16                     | X7R | 4.7uF       | ±10%                     | CL21B475KOFNFN# |
| 107 | 1.35                   | 16                     | X7R | 4.7uF       | ±10%                     | CL21B475KOFZFN# |
| 108 | 1.35                   | 16                     | X7R | 220nF       | ±10%                     | CL21B224KOFNNN# |
| 109 | 1.35                   | 16                     | X7R | 470nF       | ±10%                     | CL21B474KOFNFN# |
| 110 | 1.35                   | 16                     | X7R | 470nF       | ±10%                     | CL21B474KOFNNN# |
| 111 | 1.35                   | 16                     | X7R | 680nF       | ±10%                     | CL21B684KOFNFN# |
| 112 | 1.35                   | 16                     | X7R | 680nF       | ±5%                      | CL21B684JOFNNN# |
| 113 | 1.35                   | 25                     | X7R | 1uF         | ±10%                     | CL21B105KAFN3N# |
| 114 | 1.35                   | 25                     | X7R | 1uF         | ±10%                     | CL21B105KAFNFN# |
| 115 | 1.35                   | 25                     | X7R | 1uF         | ±10%                     | CL21B105KAFNNN# |
| 116 | 1.35                   | 25                     | X7R | 1uF         | ±10%                     | CL21B105KAFSFN# |
| 117 | 1.35                   | 25                     | X7R | 1uF         | ±20%                     | CL21B105MAFNNN# |
| 118 | 1.35                   | 25                     | X7R | 1.5uF       | ±10%                     | CL21B155KAFNFN# |
| 119 | 1.35                   | 25                     | X7R | 2.2uF       | ±10%                     | CL21B225KAFNFN# |
| 120 | 1.35                   | 25                     | X7R | 2.2uF       | ±10%                     | CL21B225KAFZNN# |
| 121 | 1.35                   | 25                     | X7R | 2.2uF       | ±20%                     | CL21B225MAFNNN# |
| 122 | 1.35                   | 25                     | X7R | 3.3uF       | ±10%                     | CL21B335KAFNFN# |
| 123 | 1.35                   | 25                     | X7R | 4.7uF       | ±10%                     | CL21B475KAFNFN# |
| 124 | 1.35                   | 25                     | X7R | 4.7uF       | ±10%                     | CL21B475KAFNNN# |
| 125 | 1.35                   | 25                     | X7R | 4.7uF       | ±10%                     | CL21B475KAFZF6# |
| 126 | 1.35                   | 25                     | X7R | 4.7uF       | ±10%                     | CL21B475KAFZFN# |
| 127 | 1.35                   | 25                     | X7R | 4.7uF       | ±20%                     | CL21B475MAFNNN# |
| 128 | 1.35                   | 25                     | X7R | 100nF       | ±10%                     | CL21B104KAFNNN# |
| 129 | 1.35                   | 25                     | X7R | 220nF       | ±10%                     | CL21B224KAFNFN# |
| 130 | 1.35                   | 25                     | X7R | 220nF       | ±10%                     | CL21B224KAFNNN# |
| 131 | 1.35                   | 25                     | X7R | 220nF       | ±20%                     | CL21B224MAFNNN# |
| 132 | 1.35                   | 25                     | X7R | 220nF       | ±5%                      | CL21B224JAFNNN# |
| 133 | 1.35                   | 25                     | X7R | 470nF       | ±10%                     | CL21B474KAFNFN# |
| 134 | 1.35                   | 25                     | X7R | 470nF       | ±10%                     | CL21B474KAFNNN# |
| 135 | 1.35                   | 25                     | X7R | 470nF       | ±10%                     | CL21B474KAFSFN# |



# Normal Capacitors\_Standard

Size Code (inch/mm) : 0805/2012

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number      |
|-----|------------------------|------------------------|-----|-------------|--------------------------|------------------|
| 136 | 1.35                   | 25                     | X7R | 470nF       | ±20%                     | CL21B474MAFNNN#  |
| 137 | 1.35                   | 25                     | X7R | 470nF       | ±5%                      | CL21B474JAFNNN#  |
| 138 | 1.35                   | 50                     | X7R | 1uF         | ±10%                     | CL21B105KBFN3T#  |
| 139 | 1.35                   | 50                     | X7R | 1uF         | ±10%                     | CL21B105KBFNFN#  |
| 140 | 1.35                   | 50                     | X7R | 1uF         | ±10%                     | CL21B105KBFNNN#  |
| 141 | 1.35                   | 50                     | X7R | 1uF         | ±10%                     | CL21B105KBFN3FN# |
| 142 | 1.35                   | 50                     | X7R | 1uF         | ±10%                     | CL21B105KBFZFN#  |
| 143 | 1.35                   | 50                     | X7R | 1uF         | ±20%                     | CL21B105MBFNNN#  |
| 144 | 1.35                   | 50                     | X7R | 68nF        | ±10%                     | CL21B683KBFNNN#  |
| 145 | 1.35                   | 50                     | X7R | 82nF        | ±10%                     | CL21B823KBFNNN#  |
| 146 | 1.35                   | 50                     | X7R | 100nF       | ±10%                     | CL21B104KBFNNN#  |
| 147 | 1.35                   | 50                     | X7R | 100nF       | ±20%                     | CL21B104MBFNNN#  |
| 148 | 1.35                   | 50                     | X7R | 120nF       | ±10%                     | CL21B124KBFNNN#  |
| 149 | 1.35                   | 50                     | X7R | 150nF       | ±10%                     | CL21B154KBFNFN#  |
| 150 | 1.35                   | 50                     | X7R | 150nF       | ±10%                     | CL21B154KBFNNN#  |
| 151 | 1.35                   | 50                     | X7R | 220nF       | ±10%                     | CL21B224KBFNFN#  |
| 152 | 1.35                   | 50                     | X7R | 220nF       | ±10%                     | CL21B224KBFNNN#  |
| 153 | 1.35                   | 50                     | X7R | 330nF       | ±10%                     | CL21B334KBFNFN#  |
| 154 | 1.35                   | 50                     | X7R | 330nF       | ±10%                     | CL21B334KBFNNN#  |
| 155 | 1.35                   | 50                     | X7R | 330nF       | ±20%                     | CL21B334MBFNNN#  |
| 156 | 1.35                   | 50                     | X7R | 470nF       | ±10%                     | CL21B474KBFNFN#  |
| 157 | 1.35                   | 50                     | X7R | 470nF       | ±10%                     | CL21B474KBFNNN#  |
| 158 | 1.35                   | 50                     | X7R | 680nF       | ±10%                     | CL21B684KBFNNN#  |
| 159 | 1.35                   | 100                    | X7R | 22nF        | ±10%                     | CL21B223KCFNNN#  |
| 160 | 1.35                   | 100                    | X7R | 33nF        | ±10%                     | CL21B333KCFNNN#  |
| 161 | 1.35                   | 100                    | X7R | 47nF        | ±10%                     | CL21B473KCFNNN#  |
| 162 | 1.35                   | 100                    | X7R | 68nF        | ±10%                     | CL21B683KCFNNN#  |
| 163 | 1.35                   | 100                    | X7R | 100nF       | ±10%                     | CL21B104KCFNNN#  |
| 164 | 1.35                   | 100                    | X7R | 100nF       | ±10%                     | CL21B104KCFN3FN# |
| 165 | 1.35                   | 100                    | X7R | 220nF       | ±10%                     | CL21B224KCFN3FN# |
| 166 | 1.35                   | 250                    | X7R | 4.7nF       | ±10%                     | CL21B472KEFN3FN# |
| 167 | 1.35                   | 250                    | X7R | 10nF        | ±10%                     | CL21B103KEFN3FN# |
| 168 | 1.40                   | 6.3                    | X7R | 10uF        | ±10%                     | CL21B106KQQNFN#  |
| 169 | 1.40                   | 6.3                    | X7R | 10uF        | ±10%                     | CL21B106KQQNNN#  |
| 170 | 1.40                   | 10                     | X7R | 10uF        | ±10%                     | CL21B106KPQNFN#  |
| 171 | 1.40                   | 10                     | X7R | 10uF        | ±10%                     | CL21B106KPQNNN#  |
| 172 | 1.40                   | 16                     | X7R | 10uF        | ±10%                     | CL21B106KQQNFN#  |
| 173 | 1.40                   | 16                     | X7R | 10uF        | ±10%                     | CL21B106KQQNNN#  |



# Normal Capacitors\_Standard

Size Code (inch/mm) : 1206/3216

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 1.00                   | 10                     | X7R | 1.2uF       | ±10%                     | CL31B125KPCNNN# |
| 2   | 1.00                   | 16                     | X7R | 330nF       | ±10%                     | CL31B334KOCNNN# |
| 3   | 1.00                   | 16                     | X7R | 470nF       | ±10%                     | CL31B474KOCNNN# |
| 4   | 1.00                   | 16                     | X7R | 680nF       | ±10%                     | CL31B684KOCNNN# |
| 5   | 1.00                   | 25                     | X7R | 220nF       | ±10%                     | CL31B224KACNFN# |
| 6   | 1.00                   | 25                     | X7R | 220nF       | ±10%                     | CL31B224KACNNN# |
| 7   | 1.00                   | 25                     | X7R | 330nF       | ±10%                     | CL31B334KACNNN# |
| 8   | 1.00                   | 50                     | X7R | 1nF         | ±10%                     | CL31B102KBCNNN# |
| 9   | 1.00                   | 50                     | X7R | 1.5nF       | ±10%                     | CL31B152KBCNNN# |
| 10  | 1.00                   | 50                     | X7R | 2.7nF       | ±10%                     | CL31B272KBCNNN# |
| 11  | 1.00                   | 50                     | X7R | 3.3nF       | ±10%                     | CL31B332KBCNNN# |
| 12  | 1.00                   | 50                     | X7R | 6.8nF       | ±10%                     | CL31B682KBCNNN# |
| 13  | 1.00                   | 50                     | X7R | 8.2nF       | ±10%                     | CL31B822KBCNNN# |
| 14  | 1.00                   | 50                     | X7R | 10nF        | ±10%                     | CL31B103KBCNFN# |
| 15  | 1.00                   | 50                     | X7R | 10nF        | ±20%                     | CL31B103MBCNNN# |
| 16  | 1.00                   | 50                     | X7R | 33nF        | ±5%                      | CL31B333JBCNNN# |
| 17  | 1.00                   | 50                     | X7R | 47nF        | ±10%                     | CL31B473KBCNNN# |
| 18  | 1.00                   | 50                     | X7R | 47nF        | ±5%                      | CL31B473JBCNNN# |
| 19  | 1.00                   | 50                     | X7R | 68nF        | ±10%                     | CL31B683KBCNNN# |
| 20  | 1.00                   | 50                     | X7R | 100nF       | ±10%                     | CL31B104KBCNFN# |
| 21  | 1.00                   | 50                     | X7R | 100nF       | ±10%                     | CL31B104KBCNNN# |
| 22  | 1.00                   | 50                     | X7R | 100nF       | ±20%                     | CL31B104MBCNNN# |
| 23  | 1.00                   | 50                     | X7R | 150nF       | ±10%                     | CL31B154KBCNNN# |
| 24  | 1.00                   | 50                     | X7R | 220pF       | ±10%                     | CL31B221KBCNNN# |
| 25  | 1.00                   | 50                     | X7R | 330pF       | ±10%                     | CL31B331KBCNNN# |
| 26  | 1.00                   | 50                     | X7R | 390pF       | ±5%                      | CL31B391JBCNNN# |
| 27  | 1.00                   | 50                     | X7R | 560pF       | ±10%                     | CL31B561KBCNNN# |
| 28  | 1.00                   | 50                     | X7R | 680pF       | ±10%                     | CL31B681KBCNNN# |
| 29  | 1.00                   | 100                    | X7R | 2.2nF       | ±10%                     | CL31B222KCCNNN# |
| 30  | 1.00                   | 100                    | X7R | 3.3nF       | ±10%                     | CL31B332KCCNNN# |
| 31  | 1.00                   | 100                    | X7R | 10nF        | ±10%                     | CL31B103KCCNFN# |
| 32  | 1.00                   | 100                    | X7R | 15nF        | ±10%                     | CL31B153KCCNNN# |
| 33  | 1.00                   | 100                    | X7R | 22nF        | ±10%                     | CL31B223KCCNFN# |
| 34  | 1.00                   | 100                    | X7R | 22nF        | ±10%                     | CL31B223KCCNNN# |
| 35  | 1.00                   | 100                    | X7R | 33nF        | ±10%                     | CL31B333KCCNNN# |
| 36  | 1.00                   | 200                    | X7R | 1nF         | ±10%                     | CL31B102KDCNNN# |
| 37  | 1.00                   | 200                    | X7R | 2.2nF       | ±10%                     | CL31B222KDCNFN# |
| 38  | 1.00                   | 200                    | X7R | 10nF        | ±10%                     | CL31B103KDCNFN# |
| 39  | 1.00                   | 200                    | X7R | 470pF       | ±10%                     | CL31B471KDCNNN# |
| 40  | 1.25                   | 25                     | X7R | 1uF         | ±10%                     | CL31B105KAPLNN# |
| 41  | 1.25                   | 350                    | X7R | 33nF        | ±10%                     | CL31B333KFESNN# |
| 42  | 1.40                   | 16                     | X7R | 1uF         | ±10%                     | CL31B105KOFNFN# |
| 43  | 1.40                   | 16                     | X7R | 1uF         | ±10%                     | CL31B105KOFNNN# |
| 44  | 1.40                   | 16                     | X7R | 1uF         | ±20%                     | CL31B105MOFNNN# |
| 45  | 1.40                   | 16                     | X7R | 1.5uF       | ±10%                     | CL31B155KOFNNN# |



# Normal Capacitors\_Standard

Size Code (inch/mm) : 1206/3216

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 46  | 1.40                   | 50                     | X7R | 220nF       | ±10%                     | CL31B224KBFNFN# |
| 47  | 1.40                   | 50                     | X7R | 220nF       | ±10%                     | CL31B224KBFNNN# |
| 48  | 1.40                   | 50                     | X7R | 220nF       | ±20%                     | CL31B224MBFNNN# |
| 49  | 1.40                   | 50                     | X7R | 270nF       | ±10%                     | CL31B274KBFNNN# |
| 50  | 1.40                   | 50                     | X7R | 330nF       | ±10%                     | CL31B334KBFNFN# |
| 51  | 1.40                   | 50                     | X7R | 330nF       | ±10%                     | CL31B334KBFNNN# |
| 52  | 1.40                   | 50                     | X7R | 330nF       | ±5%                      | CL31B334JBFNNN# |
| 53  | 1.40                   | 100                    | X7R | 100nF       | ±10%                     | CL31B104KCFNFN# |
| 54  | 1.40                   | 100                    | X7R | 100nF       | ±10%                     | CL31B104KCFNNN# |
| 55  | 1.40                   | 100                    | X7R | 100nF       | ±5%                      | CL31B104JCFNNN# |
| 56  | 1.40                   | 200                    | X7R | 33nF        | ±10%                     | CL31B333KDFNNN# |
| 57  | 1.40                   | 500                    | X7R | 1nF         | ±10%                     | CL31B102KGFNFN# |
| 58  | 1.40                   | 500                    | X7R | 1nF         | ±10%                     | CL31B102KGFNNN# |
| 59  | 1.40                   | 500                    | X7R | 1.5nF       | ±10%                     | CL31B152KGFNFN# |
| 60  | 1.40                   | 500                    | X7R | 1.5nF       | ±10%                     | CL31B152KGFNNN# |
| 61  | 1.40                   | 500                    | X7R | 2.2nF       | ±10%                     | CL31B222KGFNFN# |
| 62  | 1.40                   | 500                    | X7R | 3.3nF       | ±10%                     | CL31B332KGFNFN# |
| 63  | 1.40                   | 500                    | X7R | 4.7nF       | ±10%                     | CL31B472KGFNFN# |
| 64  | 1.40                   | 500                    | X7R | 6.8nF       | ±10%                     | CL31B682KGFNNN# |
| 65  | 1.40                   | 500                    | X7R | 10nF        | ±10%                     | CL31B103KGFNFN# |
| 66  | 1.40                   | 500                    | X7R | 220pF       | ±10%                     | CL31B221KGFNNN# |
| 67  | 1.40                   | 500                    | X7R | 470pF       | ±10%                     | CL31B471KGFNNN# |
| 68  | 1.40                   | 500                    | X7R | 680pF       | ±10%                     | CL31B681KGFNNN# |
| 69  | 1.40                   | 630                    | X7R | 1nF         | ±10%                     | CL31B102KHFNFN# |
| 70  | 1.40                   | 630                    | X7R | 1nF         | ±10%                     | CL31B102KHFSFN# |
| 71  | 1.40                   | 630                    | X7R | 1.5nF       | ±10%                     | CL31B152KHFNFN# |
| 72  | 1.40                   | 630                    | X7R | 2.2nF       | ±10%                     | CL31B222KHFNFN# |
| 73  | 1.40                   | 630                    | X7R | 2.2nF       | ±10%                     | CL31B222KHFSFN# |
| 74  | 1.40                   | 630                    | X7R | 3.3nF       | ±10%                     | CL31B332KHFSFN# |
| 75  | 1.40                   | 630                    | X7R | 4.7nF       | ±10%                     | CL31B472KHFNFN# |
| 76  | 1.40                   | 630                    | X7R | 4.7nF       | ±10%                     | CL31B472KHFNNN# |
| 77  | 1.40                   | 630                    | X7R | 4.7nF       | ±10%                     | CL31B472KHFSFN# |
| 78  | 1.40                   | 630                    | X7R | 6.8nF       | ±10%                     | CL31B682KHFNFN# |
| 79  | 1.40                   | 630                    | X7R | 10nF        | ±10%                     | CL31B103KHFNFN# |
| 80  | 1.40                   | 630                    | X7R | 10nF        | ±10%                     | CL31B103KHFNNN# |
| 81  | 1.40                   | 630                    | X7R | 10nF        | ±10%                     | CL31B103KHFSFN# |
| 82  | 1.40                   | 630                    | X7R | 330pF       | ±10%                     | CL31B331KHFNNN# |
| 83  | 1.40                   | 630                    | X7R | 470pF       | ±10%                     | CL31B471KHFNNN# |
| 84  | 1.40                   | 630                    | X7R | 680pF       | ±10%                     | CL31B681KHFNNN# |
| 85  | 1.40                   | 1000                   | X7R | 1nF         | ±10%                     | CL31B102KIFNFN# |
| 86  | 1.40                   | 1000                   | X7R | 1nF         | ±10%                     | CL31B102KIFNNN# |
| 87  | 1.40                   | 1000                   | X7R | 1.5nF       | ±10%                     | CL31B152KIFNFN# |
| 88  | 1.40                   | 1000                   | X7R | 2.2nF       | ±10%                     | CL31B222KIFNFN# |
| 89  | 1.40                   | 1000                   | X7R | 2.2nF       | ±10%                     | CL31B222KIFNNN# |
| 90  | 1.40                   | 1000                   | X7R | 680pF       | ±10%                     | CL31B681KIFNNN# |



# Normal Capacitors\_Standard

Size Code (inch/mm) : 1206/3216

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 91  | 1.80                   | 6.3                    | X7R | 10uF        | ±10%                     | CL31B106KQHNFN# |
| 92  | 1.80                   | 6.3                    | X7R | 10uF        | ±10%                     | CL31B106KQHNNN# |
| 93  | 1.80                   | 6.3                    | X7R | 22uF        | ±10%                     | CL31B226KQHNNN# |
| 94  | 1.80                   | 10                     | X7R | 4.7uF       | ±10%                     | CL31B475KPHNFN# |
| 95  | 1.80                   | 10                     | X7R | 4.7uF       | ±10%                     | CL31B475KPHNNN# |
| 96  | 1.80                   | 10                     | X7R | 10uF        | ±10%                     | CL31B106KPHN3N# |
| 97  | 1.80                   | 10                     | X7R | 10uF        | ±10%                     | CL31B106KPHNFN# |
| 98  | 1.80                   | 10                     | X7R | 10uF        | ±10%                     | CL31B106KPHNNN# |
| 99  | 1.80                   | 10                     | X7R | 22uF        | ±10%                     | CL31B226KPHNFN# |
| 100 | 1.80                   | 10                     | X7R | 22uF        | ±10%                     | CL31B226KPHNNN# |
| 101 | 1.80                   | 10                     | X7R | 22uF        | ±20%                     | CL31B226MPHNNN# |
| 102 | 1.80                   | 16                     | X7R | 2.2uF       | ±10%                     | CL31B225KOHNFN# |
| 103 | 1.80                   | 16                     | X7R | 2.2uF       | ±10%                     | CL31B225KOHNNN# |
| 104 | 1.80                   | 16                     | X7R | 2.2uF       | ±20%                     | CL31B225MOHNNN# |
| 105 | 1.80                   | 16                     | X7R | 3.3uF       | ±10%                     | CL31B335KOHNFN# |
| 106 | 1.80                   | 16                     | X7R | 3.3uF       | ±10%                     | CL31B335KOHNNN# |
| 107 | 1.80                   | 16                     | X7R | 4.7uF       | ±10%                     | CL31B475KOHNFN# |
| 108 | 1.80                   | 16                     | X7R | 4.7uF       | ±10%                     | CL31B475KOHNNN# |
| 109 | 1.80                   | 16                     | X7R | 10uF        | ±10%                     | CL31B106KOHNFN# |
| 110 | 1.80                   | 16                     | X7R | 10uF        | ±10%                     | CL31B106KOHNNN# |
| 111 | 1.80                   | 16                     | X7R | 10uF        | ±10%                     | CL31B106KOHZFN# |
| 112 | 1.80                   | 16                     | X7R | 10uF        | ±20%                     | CL31B106MOHNNN# |
| 113 | 1.80                   | 25                     | X7R | 1uF         | ±10%                     | CL31B105KAHNFN# |
| 114 | 1.80                   | 25                     | X7R | 1uF         | ±10%                     | CL31B105KAHNNN# |
| 115 | 1.80                   | 25                     | X7R | 1uF         | ±20%                     | CL31B105MAHNNN# |
| 116 | 1.80                   | 25                     | X7R | 1uF         | ±5%                      | CL31B105JAHNNN# |
| 117 | 1.80                   | 25                     | X7R | 2.2uF       | ±10%                     | CL31B225KAHNFN# |
| 118 | 1.80                   | 25                     | X7R | 2.2uF       | ±10%                     | CL31B225KAHNNN# |
| 119 | 1.80                   | 25                     | X7R | 4.7uF       | ±10%                     | CL31B475KAHNFN# |
| 120 | 1.80                   | 25                     | X7R | 4.7uF       | ±10%                     | CL31B475KAHNNN# |
| 121 | 1.80                   | 25                     | X7R | 10uF        | ±10%                     | CL31B106KAHNFN# |
| 122 | 1.80                   | 25                     | X7R | 10uF        | ±10%                     | CL31B106KAHNNN# |
| 123 | 1.80                   | 25                     | X7R | 10uF        | ±10%                     | CL31B106KAHSFN# |
| 124 | 1.80                   | 25                     | X7R | 680nF       | ±10%                     | CL31B684KAHNNN# |
| 125 | 1.80                   | 35                     | X7R | 10uF        | ±10%                     | CL31B106KLHNFN# |
| 126 | 1.80                   | 35                     | X7R | 10uF        | ±10%                     | CL31B106KLHNNN# |
| 127 | 1.80                   | 35                     | X7R | 10uF        | ±10%                     | CL31B106KLHSFN# |
| 128 | 1.80                   | 50                     | X7R | 1uF         | ±10%                     | CL31B105KBHNFN# |
| 129 | 1.80                   | 50                     | X7R | 1uF         | ±10%                     | CL31B105KBHNNN# |
| 130 | 1.80                   | 50                     | X7R | 1uF         | ±10%                     | CL31B105KBHSNN# |
| 131 | 1.80                   | 50                     | X7R | 2.2uF       | ±10%                     | CL31B225KBHNFN# |
| 132 | 1.80                   | 50                     | X7R | 2.2uF       | ±10%                     | CL31B225KBHNNN# |
| 133 | 1.80                   | 50                     | X7R | 4.7uF       | ±10%                     | CL31B475KBHN3N# |
| 134 | 1.80                   | 50                     | X7R | 4.7uF       | ±10%                     | CL31B475KBHNFN# |
| 135 | 1.80                   | 50                     | X7R | 4.7uF       | ±10%                     | CL31B475KBHNNN# |



# Normal Capacitors\_Standard

Size Code (inch/mm) : 1206/3216

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number      |
|-----|------------------------|------------------------|-----|-------------|--------------------------|------------------|
| 136 | 1.80                   | 50                     | X7R | 4.7uF       | ±10%                     | CL31B475KBHZFN#  |
| 137 | 1.80                   | 50                     | X7R | 10uF        | ±10%                     | CL31B106KBHNNFN# |
| 138 | 1.80                   | 50                     | X7R | 10uF        | ±10%                     | CL31B106KBHNNNN# |
| 139 | 1.80                   | 50                     | X7R | 470nF       | ±10%                     | CL31B474KBHNNFN# |
| 140 | 1.80                   | 50                     | X7R | 470nF       | ±10%                     | CL31B474KBHNNNN# |
| 141 | 1.80                   | 50                     | X7R | 470nF       | ±20%                     | CL31B474MBHNNNN# |
| 142 | 1.80                   | 100                    | X7R | 1uF         | ±10%                     | CL31B105KCHNFN#  |
| 143 | 1.80                   | 100                    | X7R | 1uF         | ±10%                     | CL31B105KCHNNNN# |
| 144 | 1.80                   | 100                    | X7R | 1uF         | ±10%                     | CL31B105KCHSFN#  |
| 145 | 1.80                   | 100                    | X7R | 1uF         | ±10%                     | CL31B105KCHSNN#  |
| 146 | 1.80                   | 100                    | X7R | 2.2uF       | ±10%                     | CL31B225KCHSFN#  |
| 147 | 1.80                   | 100                    | X7R | 2.2uF       | ±10%                     | CL31B225KCHSNN#  |
| 148 | 1.80                   | 100                    | X7R | 470nF       | ±10%                     | CL31B474KCHSFN#  |
| 149 | 1.80                   | 200                    | X7R | 100nF       | ±10%                     | CL31B104KDHNNFN# |
| 150 | 1.80                   | 250                    | X7R | 33nF        | ±10%                     | CL31B333KEHNNNN# |
| 151 | 1.80                   | 250                    | X7R | 47nF        | ±10%                     | CL31B473KEHNNNN# |
| 152 | 1.80                   | 250                    | X7R | 47nF        | ±10%                     | CL31B473KEHSFN#  |
| 153 | 1.80                   | 250                    | X7R | 100nF       | ±10%                     | CL31B104KEHNNFN# |
| 154 | 1.80                   | 250                    | X7R | 100nF       | ±10%                     | CL31B104KEHNNNN# |
| 155 | 1.80                   | 250                    | X7R | 100nF       | ±10%                     | CL31B104KEHSFN#  |
| 156 | 1.80                   | 500                    | X7R | 22nF        | ±10%                     | CL31B223KGHNNNN# |
| 157 | 1.80                   | 500                    | X7R | 33nF        | ±10%                     | CL31B333KGHNNFN# |
| 158 | 1.80                   | 500                    | X7R | 33nF        | ±10%                     | CL31B333KGHNNNN# |
| 159 | 1.80                   | 630                    | X7R | 22nF        | ±10%                     | CL31B223KHNNFN#  |
| 160 | 1.80                   | 630                    | X7R | 22nF        | ±10%                     | CL31B223KHNNNN#  |
| 161 | 1.80                   | 630                    | X7R | 22nF        | ±10%                     | CL31B223KHHSFN#  |
| 162 | 1.80                   | 630                    | X7R | 33nF        | ±10%                     | CL31B333KHNNFN#  |
| 163 | 1.80                   | 630                    | X7R | 33nF        | ±10%                     | CL31B333KHHSFN#  |
| 164 | 1.80                   | 2000                   | X7R | 1nF         | ±10%                     | CL31B102KJHNNNN# |



# Normal Capacitors\_Standard

Size Code (inch/mm) : 1210/3225

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 1.45                   | 25                     | X7R | 1uF         | ±10%                     | CL32B105KAFNNN# |
| 2   | 1.45                   | 50                     | X7R | 150nF       | ±10%                     | CL32B154KBFNNN# |
| 3   | 1.45                   | 50                     | X7R | 470nF       | ±10%                     | CL32B474KBFNNN# |
| 4   | 1.45                   | 500                    | X7R | 10nF        | ±10%                     | CL32B103KGFNNN# |
| 5   | 1.80                   | 50                     | X7R | 1uF         | ±10%                     | CL32B105KBHNNN# |
| 6   | 1.80                   | 50                     | X7R | 1uF         | ±20%                     | CL32B105MBHNNN# |
| 7   | 2.00                   | 16                     | X7R | 10uF        | ±10%                     | CL32B106KOULNN# |
| 8   | 2.00                   | 25                     | X7R | 10uF        | ±10%                     | CL32B106KAUL3N# |
| 9   | 2.00                   | 25                     | X7R | 10uF        | ±10%                     | CL32B106KAULNN# |
| 10  | 2.00                   | 35                     | X7R | 10uF        | ±10%                     | CL32B106KLULNN# |
| 11  | 2.00                   | 50                     | X7R | 4.7uF       | ±10%                     | CL32B475KBUYFN# |
| 12  | 2.00                   | 50                     | X7R | 4.7uF       | ±10%                     | CL32B475KBUYNN# |
| 13  | 2.20                   | 10                     | X7R | 10uF        | ±10%                     | CL32B106KPINNN# |
| 14  | 2.20                   | 25                     | X7R | 2.2uF       | ±10%                     | CL32B225KAINNN# |
| 15  | 2.70                   | 10                     | X7R | 22uF        | ±10%                     | CL32B226KPJNNN# |
| 16  | 2.70                   | 10                     | X7R | 47uF        | ±10%                     | CL32B476KPJNNN# |
| 17  | 2.70                   | 10                     | X7R | 47uF        | ±20%                     | CL32B476MPJNNN# |
| 18  | 2.70                   | 100                    | X7R | 1uF         | ±10%                     | CL32B105KCJNNN# |
| 19  | 2.70                   | 100                    | X7R | 1uF         | ±10%                     | CL32B105KCJSNN# |
| 20  | 2.70                   | 100                    | X7R | 2.2uF       | ±10%                     | CL32B225KCJSFN# |
| 21  | 2.70                   | 100                    | X7R | 2.2uF       | ±10%                     | CL32B225KCJSNN# |
| 22  | 2.70                   | 16                     | X7R | 10uF        | ±10%                     | CL32B106KOJNNN# |
| 23  | 2.70                   | 16                     | X7R | 22uF        | ±10%                     | CL32B226KOJNFN# |
| 24  | 2.70                   | 16                     | X7R | 22uF        | ±10%                     | CL32B226KOJNNN# |
| 25  | 2.70                   | 16                     | X7R | 22uF        | ±20%                     | CL32B226MOJNNN# |
| 26  | 2.70                   | 25                     | X7R | 10uF        | ±10%                     | CL32B106KAJNFN# |
| 27  | 2.70                   | 25                     | X7R | 10uF        | ±10%                     | CL32B106KAJNNN# |
| 28  | 2.70                   | 25                     | X7R | 22uF        | ±10%                     | CL32B226KAJNFN# |
| 29  | 2.70                   | 25                     | X7R | 22uF        | ±10%                     | CL32B226KAJNNN# |
| 30  | 2.70                   | 250                    | X7R | 100nF       | ±10%                     | CL32B104KEJNNN# |
| 31  | 2.70                   | 35                     | X7R | 10uF        | ±10%                     | CL32B106KLJNNN# |
| 32  | 2.70                   | 50                     | X7R | 2.2uF       | ±10%                     | CL32B225KBJNNN# |
| 33  | 2.70                   | 50                     | X7R | 4.7uF       | ±10%                     | CL32B475KBJN3N# |
| 34  | 2.70                   | 50                     | X7R | 4.7uF       | ±10%                     | CL32B475KBJNFN# |
| 35  | 2.70                   | 50                     | X7R | 4.7uF       | ±10%                     | CL32B475KBJNNN# |
| 36  | 2.70                   | 50                     | X7R | 10uF        | ±10%                     | CL32B106KBJNFN# |
| 37  | 2.70                   | 50                     | X7R | 10uF        | ±10%                     | CL32B106KBJNNN# |
| 38  | 2.70                   | 6.3                    | X7R | 47uF        | ±20%                     | CL32B476MQJNNN# |
| 39  | 2.80                   | 50                     | X7R | 4.7uF       | ±10%                     | CL32B475KBVZNN# |



# Normal Capacitors\_Standard

## Product Lineup (X7S)

Size Code (inch/mm) : 0201/0603

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 0.33                   | 10                     | X7S | 100nF       | ±10%                     | CL03Y104KP3NNN# |
| 2   | 0.33                   | 16                     | X7S | 100nF       | ±10%                     | CL03Y104K03NNN# |

Size Code (inch/mm) : 0603/1608

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 1.00                   | 6.3                    | X7S | 10uF        | ±20%                     | CL10Y106MQ8NFR# |

Size Code (inch/mm) : 0805/2012

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 1.35                   | 25                     | X7S | 4.7uF       | ±10%                     | CL21Y475KAFNNN# |

## Product Lineup (X7T)

Size Code (inch/mm) : 0201/0603

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 0.33                   | 6.3                    | X7T | 220nF       | ±10%                     | CL03Z224KQ3NNN# |

Size Code (inch/mm) : 0402/1005

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 0.70                   | 4                      | X7T | 10uF        | ±20%                     | CL05Z106MR5NUN# |

Size Code (inch/mm) : 0805/2012

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 1.40                   | 6.3                    | X7T | 22uF        | ±20%                     | CL21Z226MQQNNN# |
| 2   | 1.45                   | 25                     | X7T | 10uF        | ±10%                     | CL21Z106KAYQNN# |



# Normal Capacitors\_Standard

## Product Lineup (X7R(S) (DC Bias 0.5vr TCC))

Size Code (inch/mm) : 0603/1608

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC                           | Capacitance | Capacitance<br>Tolerance | Part Number     | Remarks |
|-----|------------------------|------------------------|-------------------------------|-------------|--------------------------|-----------------|---------|
| 1   | 1.00                   | 16                     | X7R(S)<br>(DC Bias 0.5vr TCC) | 10uF        | ±20%                     | CL10K106M08NRN# |         |

Size Code (inch/mm) : 0805/2012

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC                           | Capacitance | Capacitance<br>Tolerance | Part Number     | Remarks |
|-----|------------------------|------------------------|-------------------------------|-------------|--------------------------|-----------------|---------|
| 1   | 1.45                   | 25                     | X7R(S)<br>(DC Bias 0.5vr TCC) | 10uF        | ±10%                     | CL21K106KAYQNN# |         |

Size Code (inch/mm) : 0805/2012

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC                           | Capacitance | Capacitance<br>Tolerance | Part Number     | Remarks       |
|-----|------------------------|------------------------|-------------------------------|-------------|--------------------------|-----------------|---------------|
| 1   | 1.45                   | 25                     | X7R(S)<br>(DC Bias 0.5vr TCC) | 10uF        | ±10%                     | CL21K106KAY6NN# | Normal(Epoxy) |

## Product Lineup (X7S)

Size Code (inch/mm) : 1206/3216

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     | Remarks       |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|---------------|
| 1   | 1.90                   | 100                    | X7S | 4.7uF       | ±10%                     | CL31Y475KCK6NN# | Normal(Epoxy) |

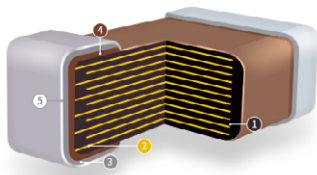


# Normal Capacitors\_High Level I

Normal  
High Level I

## Features

- A High level I MLCC is a chip-type capacitor suitable for industrial applications, with greater reliability than a general MLCC
- It has improved the moisture resistance characteristics.
- In the outgoing inspection, proceed with the bending strength evaluation strengthen.



- ① Ceramic Body
- ② Electrode (Ni/Cu\*)
- ③ Plating (Ni)
- ④ Termination (Cu or Cu+Metal Epoxy)
- ⑤ Plating (Sn)

High Level I

Improved Reliability  
(65°C, 90%RH, 1Vr, 500H)

High Level II

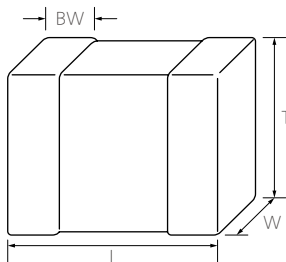
Reinforced Reliability  
(85°C, 85%RH, 1Vr, 1000H)

\* Internal Cu electrode is only applied to limited products.

## Application

- Server, Network, Base station, Solar Inverter, DC-DC Converter

## Structure and Dimensions



| Size Code | Dimension (mm) |           |           |              | EIA (inch) |
|-----------|----------------|-----------|-----------|--------------|------------|
|           | L              | W         | T         | BW           |            |
| 03        | 0.60±0.03      | 0.30±0.03 | 0.30±0.03 | 0.15±0.05    | 0603       |
|           | 0.60±0.09      | 0.30±0.09 | 0.30±0.09 |              |            |
| 05        | 1.00±0.05      | 0.50±0.05 | 0.50±0.05 | 0.25±0.10    | 0402       |
|           | 1.00±0.10      | 0.50±0.10 | 0.50±0.10 |              |            |
|           | 1.00±0.15      | 0.50±0.15 | 0.50±0.15 |              |            |
|           | 1.00±0.20      | 0.50±0.20 | 0.50±0.20 |              |            |
| 10        | 1.60±0.10      | 0.80±0.10 | 0.80±0.10 | 0.30±0.20    | 0603       |
|           | 1.60±0.15      | 0.80±0.15 | 0.80±0.15 |              |            |
|           | 1.60±0.20      | 0.80±0.20 | 0.80±0.20 |              |            |
|           | 1.60±0.25      | 0.80±0.25 | 0.80±0.25 |              |            |
| 21        | 2.00±0.10      | 1.25±0.10 | 0.65±0.10 | 0.5+0.2/-0.3 | 0805       |
|           | 2.00±0.10      | 1.25±0.10 | 0.85±0.10 |              |            |
|           | 2.00±0.10      | 1.25±0.10 | 1.25±0.10 |              |            |
|           | 2.00±0.15      | 1.25±0.15 | 1.25±0.15 |              |            |
|           | 2.00±0.20      | 1.25±0.20 | 1.25±0.20 |              |            |
| 31        | 3.20±0.15      | 1.60±0.15 | 0.85±0.15 | 0.50±0.30    | 1206       |
|           | 3.20±0.15      | 1.60±0.15 | 1.25±0.15 |              |            |
|           | 3.20±0.20      | 1.60±0.20 | 1.60±0.20 |              |            |
|           | 3.20±0.30      | 1.60±0.20 | 1.60±0.20 |              |            |
|           | 3.20±0.30      | 1.60±0.30 | 1.60±0.30 |              |            |
| 32        | 3.20±0.30      | 2.50±0.20 | 1.80±0.20 | 0.60±0.30    | 1210       |
|           | 3.20±0.30      | 2.50±0.20 | 2.00±0.20 |              |            |
|           | 3.20±0.30      | 2.50±0.20 | 2.50±0.20 |              |            |
|           | 3.20±0.40      | 2.50±0.30 | 2.50±0.30 |              |            |



# Normal Capacitors\_High Level I

## Capacitance Table (COG)

| Category        | TCC            | Size Code<br>(inch/mm) | Rated<br>Voltage<br>(Vdc) | Capacitance |   |    |     |    |    |     |   |    |     |   |    | Capacitance<br>Range |               |
|-----------------|----------------|------------------------|---------------------------|-------------|---|----|-----|----|----|-----|---|----|-----|---|----|----------------------|---------------|
|                 |                |                        |                           | pF          |   |    |     | nF |    |     |   | uF |     |   |    |                      |               |
|                 |                |                        |                           | 0.1         | 1 | 10 | 100 | 1  | 10 | 100 | 1 | 10 | 100 | 1 | 10 | 100                  |               |
| High<br>Level I | COG<br>(125°C) | 008004/0201            | 16                        |             |   |    |     |    |    |     |   |    |     |   |    |                      | 0.2pF - 10pF  |
|                 |                |                        | 25                        |             |   |    |     |    |    |     |   |    |     |   |    |                      | 0.2pF - 10pF  |
|                 |                | 01005/0402             | 6.3                       |             |   |    |     |    |    |     |   |    |     |   |    |                      | 100pF - 100pF |
|                 |                |                        | 16                        |             |   |    |     |    |    |     |   |    |     |   |    |                      | 10pF - 100pF  |
|                 |                |                        | 25                        |             |   |    |     |    |    |     |   |    |     |   |    |                      | 10pF - 100pF  |
|                 |                |                        | 50                        |             |   |    |     |    |    |     |   |    |     |   |    |                      | 100pF - 100pF |
|                 |                | 0201/0603              | 25                        |             |   |    |     |    |    |     |   |    |     |   |    |                      | 0.2pF - 100pF |
|                 |                |                        | 50                        |             |   |    |     |    |    |     |   |    |     |   |    |                      | 0.5pF - 47pF  |
|                 |                | 0402/1005              | 16                        |             |   |    |     |    |    |     |   |    |     |   |    |                      | 27pF - 1nF    |
|                 |                |                        | 25                        |             |   |    |     |    |    |     |   |    |     |   |    |                      | 0.1pF - 1nF   |
|                 |                |                        | 50                        |             |   |    |     |    |    |     |   |    |     |   |    |                      | 0.1pF - 1nF   |
|                 |                |                        | 100                       |             |   |    |     |    |    |     |   |    |     |   |    |                      | 12pF - 220pF  |
|                 |                | 0603/1608              | 16                        |             |   |    |     |    |    |     |   |    |     |   |    |                      | 1nF - 2.2nF   |
|                 |                |                        | 25                        |             |   |    |     |    |    |     |   |    |     |   |    |                      | 560pF - 10nF  |
|                 |                |                        | 50                        |             |   |    |     |    |    |     |   |    |     |   |    |                      | 1pF - 5.6nF   |
|                 |                |                        | 100                       |             |   |    |     |    |    |     |   |    |     |   |    |                      | 1.2pF - 4.7nF |
|                 |                |                        | 200                       |             |   |    |     |    |    |     |   |    |     |   |    |                      | 220pF - 220pF |
|                 |                |                        | 250                       |             |   |    |     |    |    |     |   |    |     |   |    |                      | 470pF - 470pF |
|                 |                | 0805/2012              | 25                        |             |   |    |     |    |    |     |   |    |     |   |    |                      | 3.3nF - 10nF  |
|                 |                |                        | 50                        |             |   |    |     |    |    |     |   |    |     |   |    |                      | 10pF - 15nF   |
|                 |                |                        | 100                       |             |   |    |     |    |    |     |   |    |     |   |    |                      | 12pF - 3.9nF  |
|                 |                |                        | 200                       |             |   |    |     |    |    |     |   |    |     |   |    |                      | 18pF - 1nF    |
|                 |                |                        | 250                       |             |   |    |     |    |    |     |   |    |     |   |    |                      | 10pF - 2.2nF  |
|                 |                |                        | 630                       |             |   |    |     |    |    |     |   |    |     |   |    |                      | 10pF - 470pF  |
|                 |                |                        | 1206/3216                 | 16          |   |    |     |    |    |     |   |    |     |   |    |                      | 15nF - 120nF  |
|                 |                | 25                     |                           |             |   |    |     |    |    |     |   |    |     |   |    | 10nF - 100nF         |               |
|                 |                | 50                     |                           |             |   |    |     |    |    |     |   |    |     |   |    | 10pF - 100nF         |               |
|                 |                | 100                    |                           |             |   |    |     |    |    |     |   |    |     |   |    | 20pF - 33nF          |               |
|                 |                | 200                    |                           |             |   |    |     |    |    |     |   |    |     |   |    | 68pF - 1nF           |               |
|                 |                | 250                    |                           |             |   |    |     |    |    |     |   |    |     |   |    | 2.2nF - 8.2nF        |               |
|                 |                | 500                    |                           |             |   |    |     |    |    |     |   |    |     |   |    | 10pF - 2.2nF         |               |
|                 |                | 630                    |                           |             |   |    |     |    |    |     |   |    |     |   |    | 10pF - 10nF          |               |
|                 |                | 1000                   |                           |             |   |    |     |    |    |     |   |    |     |   |    | 10pF - 1nF           |               |
|                 |                | 2000                   |                           |             |   |    |     |    |    |     |   |    |     |   |    | 15pF - 100pF         |               |
|                 |                | 1210/3225              | 25                        |             |   |    |     |    |    |     |   |    |     |   |    |                      | 10nF - 10nF   |
|                 |                |                        | 50                        |             |   |    |     |    |    |     |   |    |     |   |    |                      | 1.8nF - 22nF  |
|                 |                |                        | 100                       |             |   |    |     |    |    |     |   |    |     |   |    |                      | 33nF - 47nF   |
|                 |                |                        | 500                       |             |   |    |     |    |    |     |   |    |     |   |    |                      | 680pF - 1.8nF |
|                 |                |                        | 630                       |             |   |    |     |    |    |     |   |    |     |   |    |                      | 8.2nF - 33nF  |
|                 |                |                        | 1000                      |             |   |    |     |    |    |     |   |    |     |   |    |                      | 10nF - 22nF   |
|                 |                |                        | 2000                      |             |   |    |     |    |    |     |   |    |     |   |    |                      | 100pF - 100pF |



# Normal Capacitors\_High Level I

Capacitance Table (X5R)

| Category        | TCC           | Size Code<br>(inch/mm) | Rated<br>Voltage<br>(Vdc) | Capacitance |   |    |     |    |    |     |    |    |     |  |  | Capacitance<br>Range |
|-----------------|---------------|------------------------|---------------------------|-------------|---|----|-----|----|----|-----|----|----|-----|--|--|----------------------|
|                 |               |                        |                           | pF          |   |    |     | nF |    |     | uF |    |     |  |  |                      |
|                 |               |                        |                           | 0.1         | 1 | 10 | 100 | 1  | 10 | 100 | 1  | 10 | 100 |  |  |                      |
| High<br>Level I | X5R<br>(85°C) | 008004/0201            | 6.3                       |             |   |    |     |    |    |     |    |    |     |  |  | 10nF - 10nF          |
|                 |               | 01005/0402             | 4                         |             |   |    |     |    |    |     |    |    |     |  |  | 100nF - 100nF        |
|                 |               |                        | 6.3                       |             |   |    |     |    |    |     |    |    |     |  |  | 1nF - 100nF          |
|                 |               |                        | 10                        |             |   |    |     |    |    |     |    |    |     |  |  | 1nF - 10nF           |
|                 |               |                        | 25                        |             |   |    |     |    |    |     |    |    |     |  |  | 10nF - 10nF          |
|                 |               | 0201/0603              | 4                         |             |   |    |     |    |    |     |    |    |     |  |  | 220nF - 220nF        |
|                 |               |                        | 6.3                       |             |   |    |     |    |    |     |    |    |     |  |  | 2.2nF - 2.2uF        |
|                 |               |                        | 10                        |             |   |    |     |    |    |     |    |    |     |  |  | 1.5nF - 220nF        |
|                 |               |                        | 16                        |             |   |    |     |    |    |     |    |    |     |  |  | 1.2nF - 100nF        |
|                 |               |                        | 25                        |             |   |    |     |    |    |     |    |    |     |  |  | 100pF - 100nF        |
|                 |               |                        | 35                        |             |   |    |     |    |    |     |    |    |     |  |  | 100nF - 100nF        |
|                 |               | 0402/1005              | 2.5                       |             |   |    |     |    |    |     |    |    |     |  |  | 4.7uF - 4.7uF        |
|                 |               |                        | 4                         |             |   |    |     |    |    |     |    |    |     |  |  | 680nF - 22uF         |
|                 |               |                        | 6.3                       |             |   |    |     |    |    |     |    |    |     |  |  | 1nF - 10uF           |
|                 |               |                        | 10                        |             |   |    |     |    |    |     |    |    |     |  |  | 1nF - 10uF           |
|                 |               |                        | 16                        |             |   |    |     |    |    |     |    |    |     |  |  | 1nF - 2.2uF          |
|                 |               |                        | 25                        |             |   |    |     |    |    |     |    |    |     |  |  | 1nF - 2.2uF          |
|                 |               |                        | 35                        |             |   |    |     |    |    |     |    |    |     |  |  | 1uF - 1uF            |
|                 |               |                        | 50                        |             |   |    |     |    |    |     |    |    |     |  |  | 1nF - 100nF          |
|                 |               | 0603/1608              | 4                         |             |   |    |     |    |    |     |    |    |     |  |  | 4.7uF - 47uF         |
|                 |               |                        | 6.3                       |             |   |    |     |    |    |     |    |    |     |  |  | 330nF - 22uF         |
|                 |               |                        | 10                        |             |   |    |     |    |    |     |    |    |     |  |  | 150nF - 22uF         |
|                 |               |                        | 16                        |             |   |    |     |    |    |     |    |    |     |  |  | 220nF - 10uF         |
|                 |               |                        | 25                        |             |   |    |     |    |    |     |    |    |     |  |  | 100nF - 10uF         |
|                 |               |                        | 35                        |             |   |    |     |    |    |     |    |    |     |  |  | 1uF - 4.7uF          |
|                 |               |                        | 50                        |             |   |    |     |    |    |     |    |    |     |  |  | 220nF - 2.2uF        |
|                 |               | 0805/2012              | 2.5                       |             |   |    |     |    |    |     |    |    |     |  |  | 100uF - 100uF        |
|                 |               |                        | 4                         |             |   |    |     |    |    |     |    |    |     |  |  | 22uF - 100uF         |
|                 |               |                        | 6.3                       |             |   |    |     |    |    |     |    |    |     |  |  | 1.5uF - 100uF        |
|                 |               |                        | 10                        |             |   |    |     |    |    |     |    |    |     |  |  | 330nF - 47uF         |
|                 |               |                        | 16                        |             |   |    |     |    |    |     |    |    |     |  |  | 330nF - 22uF         |
|                 |               |                        | 25                        |             |   |    |     |    |    |     |    |    |     |  |  | 470nF - 22uF         |
|                 |               |                        | 35                        |             |   |    |     |    |    |     |    |    |     |  |  | 4.7uF - 4.7uF        |
|                 |               |                        | 50                        |             |   |    |     |    |    |     |    |    |     |  |  | 1uF - 4.7uF          |
|                 |               |                        | 100                       |             |   |    |     |    |    |     |    |    |     |  |  | 18nF - 18nF          |
|                 |               | 1206/3216              | 4                         |             |   |    |     |    |    |     |    |    |     |  |  | 100uF - 100uF        |
|                 |               |                        | 6.3                       |             |   |    |     |    |    |     |    |    |     |  |  | 4.7uF - 100uF        |
|                 |               |                        | 10                        |             |   |    |     |    |    |     |    |    |     |  |  | 1uF - 100uF          |
|                 |               |                        | 16                        |             |   |    |     |    |    |     |    |    |     |  |  | 680nF - 22uF         |
|                 |               |                        | 25                        |             |   |    |     |    |    |     |    |    |     |  |  | 1uF - 22uF           |
|                 |               |                        | 35                        |             |   |    |     |    |    |     |    |    |     |  |  | 4.7uF - 4.7uF        |
|                 |               |                        | 50                        |             |   |    |     |    |    |     |    |    |     |  |  | 1uF - 10uF           |
|                 |               |                        | 1210/3225                 | 6.3         |   |    |     |    |    |     |    |    |     |  |  |                      |
|                 |               | 10                     |                           |             |   |    |     |    |    |     |    |    |     |  |  | 10uF - 100uF         |
|                 |               | 16                     |                           |             |   |    |     |    |    |     |    |    |     |  |  | 4.7uF - 47uF         |
|                 |               | 25                     |                           |             |   |    |     |    |    |     |    |    |     |  |  | 4.7uF - 22uF         |
|                 |               | 35                     |                           |             |   |    |     |    |    |     |    |    |     |  |  | 4.7uF - 10uF         |
|                 |               | 50                     |                           |             |   |    |     |    |    |     |    |    |     |  |  | 1uF - 10uF           |



# Normal Capacitors\_High Level I

Capacitance Table (X6S)

| Category        | TCC            | Size Code<br>(inch/mm) | Rated<br>Voltage<br>(Vdc) | Capacitance |   |    |     |    |    |     |   |    |     |  |  | Capacitance<br>Range |               |
|-----------------|----------------|------------------------|---------------------------|-------------|---|----|-----|----|----|-----|---|----|-----|--|--|----------------------|---------------|
|                 |                |                        |                           | pF          |   |    |     | nF |    |     |   | uF |     |  |  |                      |               |
|                 |                |                        |                           | 0.1         | 1 | 10 | 100 | 1  | 10 | 100 | 1 | 10 | 100 |  |  |                      |               |
| High<br>Level I | X6S<br>(105°C) | 01005/0402             | 6.3                       |             |   |    |     |    |    |     |   |    |     |  |  | 10nF - 10nF          |               |
|                 |                |                        | 4                         |             |   |    |     |    |    |     |   |    |     |  |  | 15nF - 1uF           |               |
|                 |                | 0201/0603              | 6                         |             |   |    |     |    |    |     |   |    |     |  |  |                      | 15nF - 1uF    |
|                 |                |                        | 10                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 100nF - 1uF   |
|                 |                |                        | 16                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 100nF - 100nF |
|                 |                |                        | 25                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 100nF - 100nF |
|                 |                |                        | 0402/1005                 | 2.5         |   |    |     |    |    |     |   |    |     |  |  |                      |               |
|                 |                | 4                      |                           |             |   |    |     |    |    |     |   |    |     |  |  |                      | 100nF - 22uF  |
|                 |                | 6.3                    |                           |             |   |    |     |    |    |     |   |    |     |  |  |                      | 150nF - 10uF  |
|                 |                | 10                     |                           |             |   |    |     |    |    |     |   |    |     |  |  |                      | 150nF - 2.2uF |
|                 |                | 16                     |                           |             |   |    |     |    |    |     |   |    |     |  |  |                      | 470nF - 2.2uF |
|                 |                | 25                     |                           |             |   |    |     |    |    |     |   |    |     |  |  |                      | 68nF - 2.2uF  |
|                 |                | 35                     |                           |             |   |    |     |    |    |     |   |    |     |  |  |                      | 220nF - 220nF |
|                 |                | 0603/1608              | 2.5                       |             |   |    |     |    |    |     |   |    |     |  |  |                      | 4.7uF - 47uF  |
|                 |                |                        | 4                         |             |   |    |     |    |    |     |   |    |     |  |  |                      | 1uF - 47uF    |
|                 |                |                        | 6.3                       |             |   |    |     |    |    |     |   |    |     |  |  |                      | 1uF - 22uF    |
|                 |                |                        | 10                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 1uF - 10uF    |
|                 |                |                        | 16                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 470nF - 10uF  |
|                 |                |                        | 25                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 470nF - 4.7uF |
|                 |                |                        | 35                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 2.2uF - 2.2uF |
|                 |                |                        | 50                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 1uF - 1uF     |
|                 |                | 0805/2012              | 2.5                       |             |   |    |     |    |    |     |   |    |     |  |  |                      | 22uF - 100uF  |
|                 |                |                        | 4                         |             |   |    |     |    |    |     |   |    |     |  |  |                      | 10uF - 100uF  |
|                 |                |                        | 6.3                       |             |   |    |     |    |    |     |   |    |     |  |  |                      | 4.7uF - 47uF  |
|                 |                |                        | 10                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 4.7uF - 22uF  |
|                 |                |                        | 16                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 1uF - 22uF    |
|                 |                |                        | 25                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 4.7uF - 22uF  |
|                 |                |                        | 35                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 1uF - 1uF     |
|                 |                |                        | 50                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 4.7uF - 4.7uF |
|                 |                | 1206/3216              | 4                         |             |   |    |     |    |    |     |   |    |     |  |  |                      | 47uF - 100uF  |
|                 |                |                        | 6.3                       |             |   |    |     |    |    |     |   |    |     |  |  |                      | 22uF - 100uF  |
|                 |                |                        | 10                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 22uF - 22uF   |
|                 |                |                        | 16                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 4.7uF - 22uF  |
|                 |                |                        | 25                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 10uF - 22uF   |
|                 |                | 1210/3225              | 4                         |             |   |    |     |    |    |     |   |    |     |  |  |                      | 100uF - 100uF |
|                 |                |                        | 6.3                       |             |   |    |     |    |    |     |   |    |     |  |  |                      | 47uF - 100uF  |
|                 |                |                        | 10                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 22uF - 47uF   |
|                 |                |                        | 16                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 47uF - 47uF   |
|                 |                |                        | 25                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 10uF - 10uF   |
|                 |                |                        | 35                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 10uF - 10uF   |



# Normal Capacitors\_High Level I

Capacitance Table (X7R)

| Category        | TCC            | Size Code<br>(inch/mm) | Rated<br>Voltage<br>(Vdc) | Capacitance |   |    |     |    |    |     |   |    |     |  |              | Capacitance<br>Range |               |
|-----------------|----------------|------------------------|---------------------------|-------------|---|----|-----|----|----|-----|---|----|-----|--|--------------|----------------------|---------------|
|                 |                |                        |                           | pF          |   |    |     | nF |    |     |   | uF |     |  |              |                      |               |
|                 |                |                        |                           | 0.1         | 1 | 10 | 100 | 1  | 10 | 100 | 1 | 10 | 100 |  |              |                      |               |
| High<br>Level I | X7R<br>(125°C) | 01005/0402             | 10                        |             |   |    |     |    |    |     |   |    |     |  |              | 100pF - 1nF          |               |
|                 |                |                        | 16                        |             |   |    |     |    |    |     |   |    |     |  |              | 330pF - 330pF        |               |
|                 |                | 0201/0603              | 6                         |             |   |    |     |    |    |     |   |    |     |  |              |                      | 1.5nF - 10nF  |
|                 |                |                        | 10                        |             |   |    |     |    |    |     |   |    |     |  |              |                      | 330pF - 100nF |
|                 |                |                        | 16                        |             |   |    |     |    |    |     |   |    |     |  |              |                      | 100pF - 10nF  |
|                 |                |                        | 25                        |             |   |    |     |    |    |     |   |    |     |  |              |                      | 100pF - 10nF  |
|                 |                | 0402/1005              | 4                         |             |   |    |     |    |    |     |   |    |     |  |              |                      | 1uF - 1uF     |
|                 |                |                        | 6                         |             |   |    |     |    |    |     |   |    |     |  |              |                      | 1nF - 1uF     |
|                 |                |                        | 10                        |             |   |    |     |    |    |     |   |    |     |  |              |                      | 10nF - 470nF  |
|                 |                |                        | 16                        |             |   |    |     |    |    |     |   |    |     |  |              |                      | 820pF - 220nF |
|                 |                |                        | 25                        |             |   |    |     |    |    |     |   |    |     |  |              |                      | 220pF - 220nF |
|                 |                |                        | 50                        |             |   |    |     |    |    |     |   |    |     |  |              |                      | 150pF - 100nF |
|                 |                | 0603/1608              | 6                         |             |   |    |     |    |    |     |   |    |     |  |              |                      | 220nF - 4.7uF |
|                 |                |                        | 10                        |             |   |    |     |    |    |     |   |    |     |  |              |                      | 5.6nF - 2.2uF |
|                 |                |                        | 16                        |             |   |    |     |    |    |     |   |    |     |  |              |                      | 5.6nF - 1uF   |
|                 |                |                        | 25                        |             |   |    |     |    |    |     |   |    |     |  |              |                      | 4.7nF - 1uF   |
|                 |                |                        | 35                        |             |   |    |     |    |    |     |   |    |     |  |              |                      | 470nF - 470nF |
|                 |                |                        | 50                        |             |   |    |     |    |    |     |   |    |     |  |              |                      | 100pF - 1uF   |
|                 |                | 0805/2012              | 100                       |             |   |    |     |    |    |     |   |    |     |  |              |                      | 220pF - 100nF |
|                 |                |                        | 6                         |             |   |    |     |    |    |     |   |    |     |  |              |                      | 2.2uF - 10uF  |
|                 |                |                        | 10                        |             |   |    |     |    |    |     |   |    |     |  |              |                      | 220nF - 10uF  |
|                 |                |                        | 16                        |             |   |    |     |    |    |     |   |    |     |  |              |                      | 100nF - 10uF  |
|                 |                |                        | 25                        |             |   |    |     |    |    |     |   |    |     |  |              |                      | 1nF - 4.7uF   |
|                 |                |                        | 50                        |             |   |    |     |    |    |     |   |    |     |  |              |                      | 100pF - 2.2uF |
|                 |                |                        | 100                       |             |   |    |     |    |    |     |   |    |     |  |              |                      | 220pF - 470nF |
|                 |                |                        | 200                       |             |   |    |     |    |    |     |   |    |     |  |              |                      | 150pF - 10nF  |
|                 |                | 1206/3216              | 250                       |             |   |    |     |    |    |     |   |    |     |  |              |                      | 1nF - 10nF    |
|                 |                |                        | 6                         |             |   |    |     |    |    |     |   |    |     |  |              |                      | 22uF - 22uF   |
|                 |                |                        | 10                        |             |   |    |     |    |    |     |   |    |     |  |              |                      | 1uF - 22uF    |
|                 |                |                        | 16                        |             |   |    |     |    |    |     |   |    |     |  |              |                      | 220nF - 10uF  |
|                 |                |                        | 25                        |             |   |    |     |    |    |     |   |    |     |  |              |                      | 220nF - 10uF  |
|                 |                |                        | 35                        |             |   |    |     |    |    |     |   |    |     |  |              |                      | 10uF - 10uF   |
|                 |                |                        | 50                        |             |   |    |     |    |    |     |   |    |     |  |              |                      | 220pF - 10uF  |
|                 |                |                        | 100                       |             |   |    |     |    |    |     |   |    |     |  |              |                      | 220pF - 2.2uF |
|                 |                |                        | 200                       |             |   |    |     |    |    |     |   |    |     |  |              |                      | 470pF - 100nF |
|                 |                |                        | 250                       |             |   |    |     |    |    |     |   |    |     |  |              |                      | 33nF - 100nF  |
| 350             |                |                        |                           |             |   |    |     |    |    |     |   |    |     |  | 33nF - 33nF  |                      |               |
| 500             |                |                        |                           |             |   |    |     |    |    |     |   |    |     |  | 220pF - 33nF |                      |               |
| 630             |                |                        |                           |             |   |    |     |    |    |     |   |    |     |  | 330pF - 33nF |                      |               |
| 1000            |                |                        |                           |             |   |    |     |    |    |     |   |    |     |  | 680pF - 10nF |                      |               |
| 2000            |                |                        |                           |             |   |    |     |    |    |     |   |    |     |  | 1nF - 1nF    |                      |               |



# Normal Capacitors\_High Level I

| Category        | TCC            | Size Code<br>(inch/mm) | Rated<br>Voltage<br>(Vdc) | Capacitance |   |    |     |    |    |     |   |    |     |  |  | Capacitance<br>Range |
|-----------------|----------------|------------------------|---------------------------|-------------|---|----|-----|----|----|-----|---|----|-----|--|--|----------------------|
|                 |                |                        |                           | pF          |   |    |     | nF |    |     |   | uF |     |  |  |                      |
|                 |                |                        |                           | 0.1         | 1 | 10 | 100 | 1  | 10 | 100 | 1 | 10 | 100 |  |  |                      |
| High<br>Level I | X7R<br>(125°C) | 1210/3225              | 6                         |             |   |    |     |    |    |     |   |    |     |  |  | 47uF - 47uF          |
|                 |                |                        | 10                        |             |   |    |     |    |    |     |   |    |     |  |  | 10uF - 47uF          |
|                 |                |                        | 16                        |             |   |    |     |    |    |     |   |    |     |  |  | 2.2uF - 22uF         |
|                 |                |                        | 25                        |             |   |    |     |    |    |     |   |    |     |  |  | 1uF - 22uF           |
|                 |                |                        | 35                        |             |   |    |     |    |    |     |   |    |     |  |  | 10uF - 10uF          |
|                 |                |                        | 50                        |             |   |    |     |    |    |     |   |    |     |  |  | 150nF - 10uF         |
|                 |                |                        | 100                       |             |   |    |     |    |    |     |   |    |     |  |  | 220nF - 4.7uF        |
|                 |                |                        | 200                       |             |   |    |     |    |    |     |   |    |     |  |  | 22nF - 22nF          |
|                 |                |                        | 250                       |             |   |    |     |    |    |     |   |    |     |  |  | 100nF - 100nF        |
|                 |                |                        | 500                       |             |   |    |     |    |    |     |   |    |     |  |  | 10nF - 22nF          |
|                 |                |                        | 630                       |             |   |    |     |    |    |     |   |    |     |  |  | 22nF - 47nF          |
|                 |                |                        | 1000                      |             |   |    |     |    |    |     |   |    |     |  |  | 22nF - 22nF          |
|                 |                |                        | 2000                      |             |   |    |     |    |    |     |   |    |     |  |  | 1nF - 1nF            |
|                 | X7S<br>(125°C) | 0201/0603              | 6                         |             |   |    |     |    |    |     |   |    |     |  |  | 100nF - 100nF        |
|                 |                |                        | 10                        |             |   |    |     |    |    |     |   |    |     |  |  | 100nF - 100nF        |
|                 |                |                        | 16                        |             |   |    |     |    |    |     |   |    |     |  |  | 100nF - 100nF        |
|                 |                | 0402/1005              | 6                         |             |   |    |     |    |    |     |   |    |     |  |  | 1uF - 1uF            |
|                 |                |                        | 10                        |             |   |    |     |    |    |     |   |    |     |  |  | 1uF - 1uF            |
|                 |                |                        | 50                        |             |   |    |     |    |    |     |   |    |     |  |  | 33nF - 100nF         |
|                 |                | 0603/1608              | 6                         |             |   |    |     |    |    |     |   |    |     |  |  | 1uF - 1uF            |
|                 |                |                        | 10                        |             |   |    |     |    |    |     |   |    |     |  |  | 1uF - 1uF            |
|                 |                |                        | 16                        |             |   |    |     |    |    |     |   |    |     |  |  | 680nF - 4.7uF        |
|                 |                |                        | 25                        |             |   |    |     |    |    |     |   |    |     |  |  | 2.2uF - 2.2uF        |
|                 |                | 0805/2012              | 16                        |             |   |    |     |    |    |     |   |    |     |  |  | 4.7uF - 10uF         |
|                 |                |                        | 25                        |             |   |    |     |    |    |     |   |    |     |  |  | 2.2uF - 10uF         |
|                 |                |                        | 100                       |             |   |    |     |    |    |     |   |    |     |  |  | 1uF - 1uF            |
|                 |                | 1206/3216              | 4                         |             |   |    |     |    |    |     |   |    |     |  |  | 47uF - 47uF          |
|                 |                |                        | 25                        |             |   |    |     |    |    |     |   |    |     |  |  | 10uF - 10uF          |
|                 |                | 1210/3225              | 4                         |             |   |    |     |    |    |     |   |    |     |  |  | 100uF - 100uF        |
|                 |                |                        | 6                         |             |   |    |     |    |    |     |   |    |     |  |  | 100uF - 100uF        |
|                 |                |                        | 25                        |             |   |    |     |    |    |     |   |    |     |  |  | 22uF - 22uF          |
|                 |                |                        | 50                        |             |   |    |     |    |    |     |   |    |     |  |  | 10uF - 10uF          |
|                 |                |                        | 100                       |             |   |    |     |    |    |     |   |    |     |  |  | 4.7uF - 10uF         |
|                 | X7T<br>(125°C) | 01005/0402             | 2                         |             |   |    |     |    |    |     |   |    |     |  |  | 470nF - 470nF        |
|                 |                | 0201/0603              | 6                         |             |   |    |     |    |    |     |   |    |     |  |  | 220nF - 220nF        |
|                 |                |                        | 10                        |             |   |    |     |    |    |     |   |    |     |  |  | 10nF - 10nF          |
|                 |                | 0402/1005              | 2                         |             |   |    |     |    |    |     |   |    |     |  |  | 100nF - 220nF        |
|                 |                |                        | 4                         |             |   |    |     |    |    |     |   |    |     |  |  | 10uF - 10uF          |
|                 |                |                        | 10                        |             |   |    |     |    |    |     |   |    |     |  |  | 2.2uF - 2.2uF        |
|                 |                |                        | 16                        |             |   |    |     |    |    |     |   |    |     |  |  | 2.2uF - 2.2uF        |
|                 |                | 0603/1608              | 6                         |             |   |    |     |    |    |     |   |    |     |  |  | 4.7uF - 10uF         |
|                 |                |                        | 10                        |             |   |    |     |    |    |     |   |    |     |  |  | 1uF - 10uF           |
|                 |                | 0805/2012              | 6                         |             |   |    |     |    |    |     |   |    |     |  |  | 22uF - 22uF          |
|                 |                |                        | 10                        |             |   |    |     |    |    |     |   |    |     |  |  | 22uF - 22uF          |
|                 |                | 1206/3216              | 35                        |             |   |    |     |    |    |     |   |    |     |  |  | 10uF - 10uF          |
|                 |                | 1210/3225              | 6                         |             |   |    |     |    |    |     |   |    |     |  |  | 22uF - 47uF          |



# Normal Capacitors\_High Level I

## Product Lineup (COG)

Size Code (inch/mm) : 0201/0603

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 0.33                   | 25                     | COG | 10pF        | ±5%                      | CL03C100JA3NNW# |
| 2   | 0.33                   | 25                     | COG | 33pF        | ±5%                      | CL03C330JA3NNW# |
| 3   | 0.33                   | 25                     | COG | 100pF       | ±5%                      | CL03C101JA3NNW# |
| 4   | 0.33                   | 50                     | COG | 33pF        | ±5%                      | CL03C330JB3NNW# |
| 5   | 0.33                   | 50                     | COG | 47pF        | ±5%                      | CL03C470JB3NNW# |

Size Code (inch/mm) : 0402/1005

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 0.55                   | 25                     | COG | 100pF       | ±5%                      | CL05C101JA5NNW# |
| 2   | 0.55                   | 25                     | COG | 220pF       | ±5%                      | CL05C221JA5NNW# |
| 3   | 0.55                   | 50                     | COG | 0.5pF       | ±0.25pF                  | CL05C0R5CB5NNW# |
| 4   | 0.55                   | 50                     | COG | 1.3pF       | ±0.25pF                  | CL05CR75CB5NNW# |
| 5   | 0.55                   | 50                     | COG | 2pF         | ±0.25pF                  | CL05C1R3CB5NNW# |
| 6   | 0.55                   | 50                     | COG | 2.2pF       | ±0.25pF                  | CL05C020CB5NNW# |
| 7   | 0.55                   | 50                     | COG | 2.4pF       | ±0.1pF                   | CL05C2R2CB5NNW# |
| 8   | 0.55                   | 50                     | COG | 4pF         | ±0.25pF                  | CL05C2R4BB5NNW# |
| 9   | 0.55                   | 50                     | COG | 4.3pF       | ±0.25pF                  | CL05C040CB5NNW# |
| 10  | 0.55                   | 50                     | COG | 4.7pF       | ±0.25pF                  | CL05C4R3CB5NNW# |
| 11  | 0.55                   | 50                     | COG | 5.6pF       | ±0.25pF                  | CL05C4R7CB5NNW# |
| 12  | 0.55                   | 50                     | COG | 0.75pF      | ±0.25pF                  | CL05C5R6CB5NNW# |
| 13  | 0.55                   | 50                     | COG | 8.2pF       | ±0.25pF                  | CL05C8R2CB5NNW# |
| 14  | 0.55                   | 50                     | COG | 9pF         | ±0.25pF                  | CL05C090CB5NNW# |
| 15  | 0.55                   | 50                     | COG | 10pF        | ±5%                      | CL05C100JB5NNW# |
| 16  | 0.55                   | 50                     | COG | 12pF        | ±0.25pF                  | CL05C120CB5NNW# |
| 17  | 0.55                   | 50                     | COG | 12pF        | ±5%                      | CL05C120JB5NNW# |
| 18  | 0.55                   | 50                     | COG | 15pF        | ±0.25pF                  | CL05C150CB5NNW# |
| 19  | 0.55                   | 50                     | COG | 15pF        | ±5%                      | CL05C150JB5NNW# |
| 20  | 0.55                   | 50                     | COG | 18pF        | ±1%                      | CL05C180FB5NNW# |
| 21  | 0.55                   | 50                     | COG | 18pF        | ±5%                      | CL05C180JB5NNW# |
| 22  | 0.55                   | 50                     | COG | 20pF        | ±5%                      | CL05C200JB5NNW# |
| 23  | 0.55                   | 50                     | COG | 22pF        | ±5%                      | CL05C220JB5NNW# |
| 24  | 0.55                   | 50                     | COG | 24pF        | ±5%                      | CL05C240JB5NNW# |
| 25  | 0.55                   | 50                     | COG | 27pF        | ±5%                      | CL05C270JB5NNW# |



# Normal Capacitors\_High Level I

Size Code (inch/mm) : 0402/1005

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 26  | 0.55                   | 50                     | COG | 33pF        | ±5%                      | CL05C330JB5NNW# |
| 27  | 0.55                   | 50                     | COG | 39pF        | ±5%                      | CL05C390JB5NNW# |
| 28  | 0.55                   | 50                     | COG | 47pF        | ±1%                      | CL05C470FB5NNW# |
| 29  | 0.55                   | 50                     | COG | 47pF        | ±5%                      | CL05C470JB5NNW# |
| 30  | 0.55                   | 50                     | COG | 56pF        | ±5%                      | CL05C560JB5NNW# |
| 31  | 0.55                   | 50                     | COG | 68pF        | ±5%                      | CL05C680JB5NNW# |
| 32  | 0.55                   | 50                     | COG | 82pF        | ±5%                      | CL05C820JB5NNW# |
| 33  | 0.55                   | 50                     | COG | 100pF       | ±1%                      | CL05C101FB5NNW# |
| 34  | 0.55                   | 50                     | COG | 100pF       | ±5%                      | CL05C101JB5NNW# |
| 35  | 0.55                   | 50                     | COG | 150pF       | ±5%                      | CL05C151JB5NNW# |
| 36  | 0.55                   | 50                     | COG | 180pF       | ±5%                      | CL05C181JB5NNW# |
| 37  | 0.55                   | 50                     | COG | 220pF       | ±5%                      | CL05C221JB5NNW# |
| 38  | 0.55                   | 50                     | COG | 270pF       | ±5%                      | CL05C271JB5NNW# |
| 39  | 0.55                   | 50                     | COG | 330pF       | ±5%                      | CL05C331JB5NNW# |
| 40  | 0.55                   | 50                     | COG | 390pF       | ±5%                      | CL05C391JB5NNW# |
| 41  | 0.55                   | 50                     | COG | 470pF       | ±5%                      | CL05C471JB5NNW# |
| 42  | 0.55                   | 50                     | COG | 560pF       | ±5%                      | CL05C561JB5NNW# |
| 43  | 0.55                   | 50                     | COG | 680pF       | ±5%                      | CL05C681JB5NNW# |
| 44  | 0.55                   | 50                     | COG | 820pF       | ±5%                      | CL05C821JB5NNW# |
| 45  | 0.55                   | 50                     | COG | 1nF         | ±5%                      | CL05C102JB5NNW# |

Size Code (inch/mm) : 0603/1608

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 0.90                   | 25                     | COG | 680pF       | ±5%                      | CL10C681JA8NNW# |
| 2   | 0.90                   | 25                     | COG | 1.5nF       | ±2%                      | CL10C152GA8NNW# |
| 3   | 0.90                   | 50                     | COG | 1pF         | ±0.25pF                  | CL10C010CB8NNW# |
| 4   | 0.90                   | 50                     | COG | 1.8pF       | ±0.25pF                  | CL10C1R8CB8NNW# |
| 5   | 0.90                   | 50                     | COG | 2.2pF       | ±0.1pF                   | CL10C2R2BB8NNW# |
| 6   | 0.90                   | 50                     | COG | 2.2pF       | ±0.25pF                  | CL10C2R2CB8NNW# |
| 7   | 0.90                   | 50                     | COG | 3.3pF       | ±0.25pF                  | CL10C3R3CB8NNW# |
| 8   | 0.90                   | 50                     | COG | 3.9pF       | ±0.1pF                   | CL10C3R9BB8NNW# |
| 9   | 0.90                   | 50                     | COG | 3.9pF       | ±0.25pF                  | CL10C3R9CB8NNW# |
| 10  | 0.90                   | 50                     | COG | 4.7pF       | ±0.1pF                   | CL10C4R7BB8NNW# |
| 11  | 0.90                   | 50                     | COG | 4.7pF       | ±0.25pF                  | CL10C4R7CB8NNW# |
| 12  | 0.90                   | 50                     | COG | 5pF         | ±0.1pF                   | CL10C050BB8NNW# |
| 13  | 0.90                   | 50                     | COG | 5.6pF       | ±0.25pF                  | CL10C5R6CB8NNW# |
| 14  | 0.90                   | 50                     | COG | 6.2pF       | ±0.25pF                  | CL10C6R2CB8NNW# |
| 15  | 0.90                   | 50                     | COG | 6.8pF       | ±0.25pF                  | CL10C6R8CB8NNW# |
| 16  | 0.90                   | 50                     | COG | 8.2pF       | ±0.25pF                  | CL10C8R2CB8NNW# |
| 17  | 0.90                   | 50                     | COG | 10pF        | ±0.25pF                  | CL10C100CB8NNW# |
| 18  | 0.90                   | 50                     | COG | 10pF        | ±5%                      | CL10C100JB8NNW# |
| 19  | 0.90                   | 50                     | COG | 10pF        | ±10%                     | CL10C100KB8NNW# |
| 20  | 0.90                   | 50                     | COG | 12pF        | ±5%                      | CL10C120JB8NNW# |



# Normal Capacitors\_High Level I

Size Code (inch/mm) : 0603/1608

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 21  | 0.90                   | 50                     | COG | 15pF        | ±1%                      | CL10C150FB8NNW# |
| 22  | 0.90                   | 50                     | COG | 15pF        | ±5%                      | CL10C150JB8NNW# |
| 23  | 0.90                   | 50                     | COG | 18pF        | ±5%                      | CL10C180JB8NNW# |
| 24  | 0.90                   | 50                     | COG | 22pF        | ±1%                      | CL10C220FB8NNW# |
| 25  | 0.90                   | 50                     | COG | 22pF        | ±2%                      | CL10C220GB8NNW# |
| 26  | 0.90                   | 50                     | COG | 22pF        | ±5%                      | CL10C220JB8NNW# |
| 27  | 0.90                   | 50                     | COG | 33pF        | ±5%                      | CL10C330JB8NNW# |
| 28  | 0.90                   | 50                     | COG | 39pF        | ±5%                      | CL10C390JB8NNW# |
| 29  | 0.90                   | 50                     | COG | 47pF        | ±1%                      | CL10C470FB8NNW# |
| 30  | 0.90                   | 50                     | COG | 47pF        | ±5%                      | CL10C470JB8NNW# |
| 31  | 0.90                   | 50                     | COG | 47pF        | ±10%                     | CL10C470KB8NNW# |
| 32  | 0.90                   | 50                     | COG | 56pF        | ±5%                      | CL10C560JB8NNW# |
| 33  | 0.90                   | 50                     | COG | 68pF        | ±5%                      | CL10C680JB8NNW# |
| 34  | 0.90                   | 50                     | COG | 82pF        | ±5%                      | CL10C820JB8NNW# |
| 35  | 0.90                   | 50                     | COG | 100pF       | ±5%                      | CL10C101JB8NNW# |
| 36  | 0.90                   | 50                     | COG | 100pF       | ±10%                     | CL10C101KB8NNW# |
| 37  | 0.90                   | 50                     | COG | 120pF       | ±5%                      | CL10C121JB8NNW# |
| 38  | 0.90                   | 50                     | COG | 150pF       | ±5%                      | CL10C151JB8NNW# |
| 39  | 0.90                   | 50                     | COG | 180pF       | ±5%                      | CL10C181JB8NNW# |
| 40  | 0.90                   | 50                     | COG | 200pF       | ±5%                      | CL10C201JB8NNW# |
| 41  | 0.90                   | 50                     | COG | 220pF       | ±5%                      | CL10C221JB8NNW# |
| 42  | 0.90                   | 50                     | COG | 270pF       | ±5%                      | CL10C271JB8NNW# |
| 43  | 0.90                   | 50                     | COG | 330pF       | ±5%                      | CL10C331JB8NNW# |
| 44  | 0.90                   | 50                     | COG | 390pF       | ±5%                      | CL10C391JB8NNW# |
| 45  | 0.90                   | 50                     | COG | 470pF       | ±5%                      | CL10C471JB8NNW# |
| 46  | 0.90                   | 50                     | COG | 560pF       | ±5%                      | CL10C561JB8NNW# |
| 47  | 0.90                   | 50                     | COG | 680pF       | ±5%                      | CL10C681JB8NNW# |
| 48  | 0.90                   | 50                     | COG | 820pF       | ±5%                      | CL10C821JB8NNW# |
| 49  | 0.90                   | 50                     | COG | 1nF         | ±5%                      | CL10C102JB8NNW# |
| 50  | 0.90                   | 50                     | COG | 1.2nF       | ±5%                      | CL10C122JB8NNW# |
| 51  | 0.90                   | 50                     | COG | 1.5nF       | ±5%                      | CL10C152JB8NNW# |
| 52  | 0.90                   | 50                     | COG | 2.2nF       | ±5%                      | CL10C222JB8NNW# |
| 53  | 0.90                   | 100                    | COG | 10pF        | ±5%                      | CL10C100JC8NNW# |
| 54  | 0.90                   | 100                    | COG | 33pF        | ±5%                      | CL10C330JC8NNW# |
| 55  | 0.90                   | 100                    | COG | 100pF       | ±5%                      | CL10C101JC8NNW# |
| 56  | 0.90                   | 100                    | COG | 150pF       | ±5%                      | CL10C151JC8NNW# |
| 57  | 0.90                   | 100                    | COG | 220pF       | ±5%                      | CL10C221JC8NNW# |
| 58  | 0.90                   | 100                    | COG | 270pF       | ±5%                      | CL10C271JC8NNW# |
| 59  | 0.90                   | 100                    | COG | 330pF       | ±5%                      | CL10C331JC8NNW# |



# Normal Capacitors\_High Level I

Size Code (inch/mm) : 0805/2012

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 0.75                   | 50                     | COG | 33pF        | ±5%                      | CL21C330JBANNW# |
| 2   | 0.75                   | 50                     | COG | 100pF       | ±2%                      | CL21C101GBANNW# |
| 3   | 0.75                   | 50                     | COG | 100pF       | ±5%                      | CL21C101JBANNW# |
| 4   | 0.75                   | 50                     | COG | 150pF       | ±5%                      | CL21C151JBANNW# |
| 5   | 0.75                   | 50                     | COG | 220pF       | ±5%                      | CL21C221JBANNW# |
| 6   | 0.75                   | 50                     | COG | 270pF       | ±5%                      | CL21C271JBANNW# |
| 7   | 0.75                   | 50                     | COG | 330pF       | ±5%                      | CL21C331JBANNW# |
| 8   | 0.75                   | 50                     | COG | 390pF       | ±5%                      | CL21C391JBANNW# |
| 9   | 0.75                   | 50                     | COG | 470pF       | ±5%                      | CL21C471JBANNW# |
| 10  | 0.75                   | 50                     | COG | 560pF       | ±5%                      | CL21C561JBANNW# |
| 11  | 0.75                   | 50                     | COG | 680pF       | ±5%                      | CL21C681JBANNW# |
| 12  | 0.95                   | 50                     | COG | 680pF       | ±5%                      | CL21C681JBCNNW# |
| 13  | 0.95                   | 50                     | COG | 1nF         | ±5%                      | CL21C102JBCNNW# |
| 14  | 1.35                   | 50                     | COG | 1.5nF       | ±5%                      | CL21C152JBFNNW# |
| 15  | 1.35                   | 50                     | COG | 2.2nF       | ±5%                      | CL21C222JBFNNW# |
| 16  | 1.35                   | 50                     | COG | 2.7nF       | ±5%                      | CL21C272JBFNNW# |
| 17  | 1.35                   | 50                     | COG | 3.3nF       | ±5%                      | CL21C332JBFNNW# |
| 18  | 1.35                   | 50                     | COG | 4.7nF       | ±5%                      | CL21C472JBFNNW# |
| 19  | 1.35                   | 50                     | COG | 10nF        | ±5%                      | CL21C103JBFNNW# |
| 20  | 0.75                   | 100                    | COG | 330pF       | ±5%                      | CL21C331JCANNW# |
| 21  | 0.95                   | 100                    | COG | 470pF       | ±5%                      | CL21C471JCCNNW# |
| 22  | 0.95                   | 100                    | COG | 680pF       | ±5%                      | CL21C681JCCNNW# |
| 23  | 1.35                   | 100                    | COG | 1nF         | ±5%                      | CL21C102JCFNNW# |
| 24  | 0.95                   | 200                    | COG | 220pF       | ±5%                      | CL21C221JDCNNW# |
| 25  | 0.95                   | 250                    | COG | 10pF        | ±5%                      | CL21C100JECNNW# |



# Normal Capacitors\_High Level I

Size Code (inch/mm) : 1206/3216, 1210/3225

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 1.40                   | 25                     | COG | 10nF        | ±2%                      | CL31C103GAFNNW# |
| 2   | 1.40                   | 25                     | COG | 10nF        | ±5%                      | CL31C103JAFNNW# |
| 3   | 1.00                   | 50                     | COG | 1nF         | ±5%                      | CL31C102JBCNNW# |
| 4   | 1.00                   | 50                     | COG | 1.5nF       | ±2%                      | CL31C152GBCNNW# |
| 5   | 1.40                   | 50                     | COG | 3.3nF       | ±5%                      | CL31C332JBFNNW# |
| 6   | 1.80                   | 50                     | COG | 27nF        | ±5%                      | CL31C273JBHNNW# |
| 7   | 1.80                   | 50                     | COG | 33nF        | ±5%                      | CL31C333JBHNNW# |
| 8   | 1.00                   | 100                    | COG | 680pF       | ±5%                      | CL31C681JCCNNW# |
| 9   | 1.00                   | 100                    | COG | 1nF         | ±5%                      | CL31C102JCCNNW# |
| 10  | 1.00                   | 100                    | COG | 1nF         | ±10%                     | CL31C102KCCNNW# |
| 11  | 1.40                   | 500                    | COG | 10pF        | ±5%                      | CL31C100JGFNNW# |
| 12  | 1.40                   | 500                    | COG | 39pF        | ±5%                      | CL31C390JGFNNW# |
| 13  | 1.40                   | 500                    | COG | 47pF        | ±5%                      | CL31C470JGFNNW# |
| 14  | 1.40                   | 500                    | COG | 100pF       | ±2%                      | CL31C101GGFNNW# |
| 15  | 1.40                   | 630                    | COG | 10pF        | ±5%                      | CL31C100JHFNNW# |
| 16  | 1.40                   | 630                    | COG | 22pF        | ±5%                      | CL31C220JHFNNW# |
| 17  | 1.40                   | 630                    | COG | 100pF       | ±5%                      | CL31C101JHFNNW# |
| 18  | 1.40                   | 630                    | COG | 150pF       | ±5%                      | CL31C151JHFNNW# |
| 19  | 1.40                   | 630                    | COG | 220pF       | ±5%                      | CL31C221JHFNNW# |
| 20  | 1.80                   | 630                    | COG | 10nF        | ±5%                      | CL31C103JHHNNW# |
| 21  | 2.70                   | 100                    | COG | 47nF        | ±5%                      | CL32C473JCJNNW# |
| 22  | 2.70                   | 630                    | COG | 22nF        | ±5%                      | CL32C223JHJNNW# |
| 23  | 2.70                   | 630                    | COG | 33nF        | ±5%                      | CL32C333JHJNNW# |
| 24  | 2.80                   | 1000                   | COG | 22nF        | ±5%                      | CL32C223JIVNNW# |

## Product Lineup (X5R)

Size Code (inch/mm) : 0201/0603

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 0.33                   | 6.3                    | X5R | 10nF        | ±10%                     | CL03A103KQ3NNW# |
| 2   | 0.33                   | 6.3                    | X5R | 100nF       | ±10%                     | CL03A104KQ3N3W# |
| 3   | 0.33                   | 6.3                    | X5R | 100nF       | ±10%                     | CL03A104KQ3NNW# |
| 4   | 0.33                   | 6.3                    | X5R | 470nF       | ±20%                     | CL03A474MQ3NNW# |
| 5   | 0.39                   | 6.3                    | X5R | 2.2uF       | ±20%                     | CL03A225MQ3CRW# |
| 6   | 0.33                   | 10                     | X5R | 2.2nF       | ±10%                     | CL03A222KP3NNW# |
| 7   | 0.33                   | 10                     | X5R | 4.7nF       | ±10%                     | CL03A472KP3NNW# |
| 8   | 0.33                   | 10                     | X5R | 10nF        | ±10%                     | CL03A103KP3NNW# |
| 9   | 0.33                   | 10                     | X5R | 100nF       | ±10%                     | CL03A104KP3NNW# |
| 10  | 0.33                   | 10                     | X5R | 100nF       | ±20%                     | CL03A104MP3NNW# |
| 11  | 0.33                   | 25                     | X5R | 100nF       | ±10%                     | CL03A104KA3NNW# |



# Normal Capacitors\_High Level I

Size Code (inch/mm) : 0402/1005

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 0.55                   | 4                      | X5R | 2.2uF       | ±20%                     | CL05A225MR5NNW# |
| 2   | 0.65                   | 4                      | X5R | 4.7uF       | ±20%                     | CL05A475MR5NRW# |
| 3   | 0.55                   | 6.3                    | X5R | 100nF       | ±10%                     | CL05A104KQ5NNW# |
| 4   | 0.55                   | 6.3                    | X5R | 220nF       | ±10%                     | CL05A224KQ5NNW# |
| 5   | 0.55                   | 6.3                    | X5R | 470nF       | ±10%                     | CL05A474KQ5NNW# |
| 6   | 0.55                   | 6.3                    | X5R | 1uF         | ±10%                     | CL05A105KQ5NNW# |
| 7   | 0.55                   | 6.3                    | X5R | 1uF         | ±20%                     | CL05A105MQ5NNW# |
| 8   | 0.55                   | 6.3                    | X5R | 2.2uF       | ±20%                     | CL05A225MQ5NNW# |
| 9   | 0.65                   | 6.3                    | X5R | 4.7uF       | ±20%                     | CL05A475MQ5NRW# |
| 10  | 0.70                   | 6.3                    | X5R | 10uF        | ±20%                     | CL05A106MQ5NUW# |
| 11  | 0.55                   | 10                     | X5R | 100nF       | ±10%                     | CL05A104KP5NNW# |
| 12  | 0.55                   | 10                     | X5R | 220nF       | ±10%                     | CL05A224KP5NNW# |
| 13  | 0.55                   | 10                     | X5R | 1uF         | ±10%                     | CL05A105KP5NNW# |
| 14  | 0.60                   | 10                     | X5R | 1uF         | ±10%                     | CL05A105KP5NQW# |
| 15  | 0.70                   | 10                     | X5R | 10uF        | ±20%                     | CL05A106MP5IUW# |
| 16  | 0.55                   | 16                     | X5R | 100nF       | ±10%                     | CL05A104K05NNW# |
| 17  | 0.55                   | 16                     | X5R | 220nF       | ±10%                     | CL05A224K05NNW# |
| 18  | 0.55                   | 16                     | X5R | 470nF       | ±10%                     | CL05A474K05NNW# |
| 19  | 0.55                   | 16                     | X5R | 1uF         | ±10%                     | CL05A105K05NNW# |
| 20  | 0.60                   | 16                     | X5R | 1uF         | ±10%                     | CL05A105K05NQW# |
| 21  | 0.55                   | 16                     | X5R | 1uF         | ±10%                     | CL05A105K05QNW# |
| 22  | 0.60                   | 16                     | X5R | 1uF         | ±20%                     | CL05A105M05NQW# |
| 23  | 0.55                   | 25                     | X5R | 100nF       | ±10%                     | CL05A104KA5NNW# |
| 24  | 0.55                   | 25                     | X5R | 220nF       | ±10%                     | CL05A224KA5NNW# |
| 25  | 0.55                   | 25                     | X5R | 470nF       | ±10%                     | CL05A474KA5NNW# |
| 26  | 0.60                   | 25                     | X5R | 1uF         | ±10%                     | CL05A105KA5NQW# |
| 27  | 0.65                   | 35                     | X5R | 1uF         | ±10%                     | CL05A105KL5NRW# |



# Normal Capacitors\_High Level I

Size Code (inch/mm) : 0603/1608

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 0.95                   | 4Vdc                   | X5R | 22uF        | ±20%                     | CL10A226MR8NQW# |
| 2   | 1.05                   | 4Vdc                   | X5R | 22uF        | ±20%                     | CL10A226MR8NUW# |
| 3   | 1.00                   | 4Vdc                   | X5R | 22uF        | ±20%                     | CL10A226MR8QRW# |
| 4   | 1.00                   | 4Vdc                   | X5R | 47uF        | ±20%                     | CL10A476MR8NRW# |
| 5   | 0.90                   | 6.3Vdc                 | X5R | 1uF         | ±10%                     | CL10A105KQ8NNW# |
| 6   | 0.90                   | 6.3Vdc                 | X5R | 2.2uF       | ±10%                     | CL10A225KQ8NNW# |
| 7   | 0.90                   | 6.3Vdc                 | X5R | 4.7uF       | ±10%                     | CL10A475KQ8NNW# |
| 8   | 0.90                   | 6.3Vdc                 | X5R | 4.7uF       | ±20%                     | CL10A475MQ8NNW# |
| 9   | 0.95                   | 6.3Vdc                 | X5R | 4.7uF       | ±20%                     | CL10A475MQ8NQW# |
| 10  | 0.90                   | 6.3Vdc                 | X5R | 10uF        | ±10%                     | CL10A106KQ8NNW# |
| 11  | 0.90                   | 6.3Vdc                 | X5R | 10uF        | ±20%                     | CL10A106MQ8NNW# |
| 12  | 0.90                   | 10Vdc                  | X5R | 470nF       | ±10%                     | CL10A474KP8NNW# |
| 13  | 0.90                   | 10Vdc                  | X5R | 1uF         | ±10%                     | CL10A105KP8NNW# |
| 14  | 0.90                   | 10Vdc                  | X5R | 2.2uF       | ±10%                     | CL10A225KP8NNW# |
| 15  | 0.90                   | 10Vdc                  | X5R | 4.7uF       | ±10%                     | CL10A475KP8NNW# |
| 16  | 0.95                   | 10Vdc                  | X5R | 10uF        | ±10%                     | CL10A106KP8NQW# |
| 17  | 0.95                   | 10Vdc                  | X5R | 10uF        | ±20%                     | CL10A106MP8NQW# |
| 18  | 0.90                   | 16Vdc                  | X5R | 1uF         | ±10%                     | CL10A105KQ8NNW# |
| 19  | 0.90                   | 16Vdc                  | X5R | 2.2uF       | ±10%                     | CL10A225KQ8NNW# |
| 20  | 0.95                   | 16Vdc                  | X5R | 4.7uF       | ±10%                     | CL10A475KQ8NQW# |
| 21  | 0.90                   | 25Vdc                  | X5R | 220nF       | ±10%                     | CL10A224KA8NNW# |
| 22  | 0.90                   | 25Vdc                  | X5R | 470nF       | ±10%                     | CL10A474KA8NNW# |
| 23  | 0.90                   | 25Vdc                  | X5R | 1uF         | ±10%                     | CL10A105KA8NNW# |
| 24  | 0.90                   | 25Vdc                  | X5R | 2.2uF       | ±10%                     | CL10A225KA8NNW# |
| 25  | 0.90                   | 35Vdc                  | X5R | 1uF         | ±10%                     | CL10A105KL8NNW# |
| 26  | 0.90                   | 50Vdc                  | X5R | 220nF       | ±10%                     | CL10A224KB8NNW# |
| 27  | 0.90                   | 50Vdc                  | X5R | 1uF         | ±10%                     | CL10A105KB8NNW# |

Size Code (inch/mm) : 0805/2012

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 1.45                   | 2.5                    | X5R | 100uF       | ±20%                     | CL21A107MSYNNW# |
| 2   | 1.45                   | 4                      | X5R | 47uF        | ±20%                     | CL21A476MRYNNW# |
| 3   | 1.45                   | 4                      | X5R | 100uF       | ±20%                     | CL21A107MRYNNW# |
| 4   | 1.35                   | 6.3                    | X5R | 4.7uF       | ±10%                     | CL21A475KQFNNW# |
| 5   | 1.35                   | 6.3                    | X5R | 4.7uF       | ±20%                     | CL21A475MQFNNW# |
| 6   | 1.35                   | 6.3                    | X5R | 10uF        | ±10%                     | CL21A106KQFNNW# |
| 7   | 1.40                   | 6.3                    | X5R | 22uF        | ±20%                     | CL21A226MQQNNW# |
| 8   | 1.45                   | 6.3                    | X5R | 22uF        | ±20%                     | CL21A226MQYNNW# |
| 9   | 1.45                   | 6.3                    | X5R | 47uF        | ±20%                     | CL21A476MQYNNW# |
| 10  | 1.45                   | 6.3                    | X5R | 100uF       | ±20%                     | CL21A107MQYNNW# |
| 11  | 1.35                   | 10                     | X5R | 2.2uF       | ±10%                     | CL21A225KPFNNW# |
| 12  | 1.35                   | 10                     | X5R | 4.7uF       | ±10%                     | CL21A475KPFNNW# |
| 13  | 1.35                   | 10                     | X5R | 10uF        | ±10%                     | CL21A106KPFNNW# |
| 14  | 1.35                   | 10                     | X5R | 10uF        | ±20%                     | CL21A106MPFNNW# |
| 15  | 1.40                   | 10                     | X5R | 10uF        | ±20%                     | CL21A106MPQNNW# |
| 16  | 1.45                   | 10                     | X5R | 22uF        | ±20%                     | CL21A226MPYNNW# |
| 17  | 1.45                   | 10                     | X5R | 47uF        | ±20%                     | CL21A476MPYNNW# |



# Normal Capacitors\_High Level I

Size Code (inch/mm) : 0805/2012

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number      |
|-----|------------------------|------------------------|-----|-------------|--------------------------|------------------|
| 18  | 1.35                   | 16                     | X5R | 10uF        | ±10%                     | CL21A106KOFNNW#  |
| 19  | 1.40                   | 16                     | X5R | 10uF        | ±10%                     | CL21A106KQNNW#   |
| 20  | 1.45                   | 16                     | X5R | 22uF        | ±20%                     | CL21A226MOYNNW#  |
| 21  | 1.35                   | 25                     | X5R | 2.2uF       | ±10%                     | CL21A225KAFNNW#  |
| 22  | 1.35                   | 25                     | X5R | 4.7uF       | ±10%                     | CL21A475KAFNNW#  |
| 23  | 1.40                   | 25                     | X5R | 4.7uF       | ±10%                     | CL21A475KAQNNW#  |
| 24  | 1.45                   | 25                     | X5R | 10uF        | ±10%                     | CL21A106KAYQNNW# |
| 25  | 1.45                   | 25                     | X5R | 10uF        | ±20%                     | CL21A106MAYQNNW# |
| 26  | 1.45                   | 25                     | X5R | 22uF        | ±20%                     | CL21A226MAYNNW#  |

Size Code (inch/mm) : 1206/3216

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 1.90                   | 4                      | X5R | 100uF       | ±20%                     | CL31A107MRKNNW# |
| 2   | 1.80                   | 6.3                    | X5R | 10uF        | ±10%                     | CL31A106KQHNNW# |
| 3   | 1.80                   | 6.3                    | X5R | 22uF        | ±10%                     | CL31A226KQHNNW# |
| 4   | 1.80                   | 6.3                    | X5R | 22uF        | ±20%                     | CL31A226MQHNNW# |
| 5   | 1.80                   | 6.3                    | X5R | 47uF        | ±10%                     | CL31A476KQHNNW# |
| 6   | 1.80                   | 6.3                    | X5R | 47uF        | ±20%                     | CL31A476MQHNNW# |
| 7   | 1.90                   | 6.3                    | X5R | 100uF       | ±20%                     | CL31A107MQKNNW# |
| 8   | 1.80                   | 10                     | X5R | 22uF        | ±10%                     | CL31A226KPHNNW# |
| 9   | 1.80                   | 10                     | X5R | 22uF        | ±20%                     | CL31A226MPHNNW# |
| 10  | 1.80                   | 10                     | X5R | 47uF        | ±10%                     | CL31A476KPHNNW# |
| 11  | 1.90                   | 10                     | X5R | 100uF       | ±20%                     | CL31A107MPKNNW# |
| 12  | 1.80                   | 16                     | X5R | 22uF        | ±10%                     | CL31A226KOHNNW# |
| 13  | 1.80                   | 16                     | X5R | 22uF        | ±20%                     | CL31A226MOHNNW# |
| 14  | 1.80                   | 25                     | X5R | 4.7uF       | ±10%                     | CL31A475KAHNNW# |
| 15  | 1.80                   | 25                     | X5R | 10uF        | ±10%                     | CL31A106KAHNNW# |
| 16  | 1.80                   | 25                     | X5R | 10uF        | ±20%                     | CL31A106MAHNNW# |
| 17  | 1.80                   | 25                     | X5R | 22uF        | ±10%                     | CL31A226KAHNNW# |
| 18  | 1.80                   | 25                     | X5R | 22uF        | ±20%                     | CL31A226MAHNNW# |
| 19  | 1.80                   | 50                     | X5R | 4.7uF       | ±10%                     | CL31A475KBHNNW# |
| 20  | 1.80                   | 50                     | X5R | 10uF        | ±10%                     | CL31A106KBHNNW# |

Size Code (inch/mm) : 1210/3225

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 2.70                   | 6.3                    | X5R | 22uF        | ±10%                     | CL32A226KQJNNW# |
| 2   | 2.70                   | 6.3                    | X5R | 22uF        | ±20%                     | CL32A226MQJNNW# |
| 3   | 2.80                   | 6.3                    | X5R | 100uF       | ±20%                     | CL32A107MQVNNW# |
| 4   | 2.80                   | 6.3                    | X5R | 200uF       | ±20%                     | CL32A227MQVNNW# |
| 5   | 2.70                   | 10                     | X5R | 22uF        | ±10%                     | CL32A226KPJNNW# |
| 6   | 2.70                   | 10                     | X5R | 22uF        | ±20%                     | CL32A226MPJNNW# |
| 7   | 2.70                   | 10                     | X5R | 47uF        | ±10%                     | CL32A476KPJNNW# |
| 8   | 2.80                   | 10                     | X5R | 100uF       | ±20%                     | CL32A107MPVNNW# |
| 9   | 2.70                   | 16                     | X5R | 22uF        | ±10%                     | CL32A226KOJNNW# |
| 10  | 2.70                   | 16                     | X5R | 47uF        | ±10%                     | CL32A476KOJNNW# |
| 11  | 2.70                   | 16                     | X5R | 47uF        | ±20%                     | CL32A476MOJNNW# |
| 12  | 2.70                   | 25                     | X5R | 22uF        | ±10%                     | CL32A226KAJNNW# |
| 13  | 2.70                   | 25                     | X5R | 22uF        | ±20%                     | CL32A226MAJNNW# |
| 14  | 2.70                   | 50                     | X5R | 10uF        | ±10%                     | CL32A106KBJNNW# |



# Normal Capacitors\_High Level I

## Product Lineup (X6S)

Size Code (inch/mm) : 0201/0603

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 0.33                   | 4                      | X6S | 100nF       | ±20%                     | CL03X104MR3NNW# |
| 2   | 0.33                   | 6.3                    | X6S | 100nF       | ±10%                     | CL03X104KQ3NNW# |
| 3   | 0.33                   | 6.3                    | X6S | 100nF       | ±20%                     | CL03X104MQ3NNW# |
| 4   | 0.39                   | 6.3                    | X6S | 1uF         | ±20%                     | CL03X105MQ3CRW# |
| 5   | 0.33                   | 10                     | X6S | 100nF       | ±10%                     | CL03X104KP3NNW# |
| 6   | 0.39                   | 10                     | X6S | 220nF       | ±10%                     | CL03X224KP3NRW# |
| 7   | 0.39                   | 10                     | X6S | 330nF       | ±10%                     | CL03X334KP3NRW# |
| 8   | 0.33                   | 16                     | X6S | 100nF       | ±10%                     | CL03X104K03NNW# |
| 9   | 0.33                   | 25                     | X6S | 100nF       | ±10%                     | CL03X104KA3NNW# |

Size Code (inch/mm) : 0402/1005

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 0.50                   | 2.5                    | X6S | 4.3uF       | ±20%                     | CL05X435MS5NWW# |
| 2   | 0.80                   | 2.5                    | X6S | 22uF        | ±20%                     | CL05X226MS6NUW# |
| 3   | 0.55                   | 4                      | X6S | 470nF       | ±20%                     | CL05X474MR5NNW# |
| 4   | 0.55                   | 4                      | X6S | 1uF         | ±20%                     | CL05X105MR5NNW# |
| 5   | 0.70                   | 4                      | X6S | 2.2uF       | ±20%                     | CL05X225MR5QUW# |
| 6   | 0.70                   | 4                      | X6S | 10uF        | ±20%                     | CL05X106MR5NUW# |
| 7   | 0.80                   | 4                      | X6S | 22uF        | ±20%                     | CL05X226MR6NUW# |
| 8   | 0.55                   | 6.3                    | X6S | 470nF       | ±10%                     | CL05X474KQ5NNW# |
| 9   | 0.55                   | 6.3                    | X6S | 1uF         | ±10%                     | CL05X105KQ5NNW# |
| 10  | 0.60                   | 6.3                    | X6S | 1uF         | ±10%                     | CL05X105KQ5NQW# |
| 11  | 0.55                   | 6.3                    | X6S | 1uF         | ±20%                     | CL05X105MQ5NNW# |
| 12  | 0.70                   | 6.3                    | X6S | 2.2uF       | ±20%                     | CL05X225MQ5QUW# |
| 13  | 0.70                   | 6.3                    | X6S | 4.7uF       | ±20%                     | CL05X475MQ5NUW# |
| 14  | 0.70                   | 6.3                    | X6S | 10uF        | ±20%                     | CL05X106MQ5NUW# |
| 15  | 0.55                   | 10                     | X6S | 1uF         | ±10%                     | CL05X105KP5NNW# |
| 16  | 0.55                   | 10                     | X6S | 1uF         | ±20%                     | CL05X105MP5NNW# |
| 17  | 0.70                   | 10                     | X6S | 2.2uF       | ±10%                     | CL05X225KP5QUW# |
| 18  | 0.70                   | 10                     | X6S | 2.2uF       | ±20%                     | CL05X225MP5QUW# |
| 19  | 0.60                   | 16                     | X6S | 1uF         | ±10%                     | CL05X105K05NQW# |
| 20  | 0.70                   | 16                     | X6S | 2.2uF       | ±20%                     | CL05X225M05NUW# |
| 21  | 0.60                   | 25                     | X6S | 1uF         | ±10%                     | CL05X105KA5NQW# |
| 22  | 0.60                   | 25                     | X6S | 1uF         | ±20%                     | CL05X105MA5NQW# |

Size Code (inch/mm) : 0603/1608

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 1.00                   | 2.5                    | X6S | 47uF        | ±20%                     | CL10X476MS8NRW# |
| 2   | 0.90                   | 4                      | X6S | 4.7uF       | ±10%                     | CL10X475KR8NNW# |
| 3   | 0.90                   | 4                      | X6S | 10uF        | ±20%                     | CL10X106MR8NNW# |
| 4   | 1.00                   | 4                      | X6S | 22uF        | ±20%                     | CL10X226MR8NUW# |



# Normal Capacitors\_High Level I

Size Code (inch/mm) : 0603/1608

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 5   | 1.05                   | 4                      | X6S | 22uF        | ±20%                     | CL10X226MR8QRW# |
| 6   | 1.00                   | 4                      | X6S | 47uF        | ±20%                     | CL10X476MR8NRW# |
| 7   | 1.00                   | 6.3                    | X6S | 4.7uF       | ±10%                     | CL10X475KQ8NRW# |
| 8   | 0.90                   | 6.3                    | X6S | 4.7uF       | ±20%                     | CL10X475MQ8NNW# |
| 9   | 0.95                   | 6.3                    | X6S | 4.7uF       | ±20%                     | CL10X475MQ8NQW# |
| 10  | 1.00                   | 6.3                    | X6S | 4.7uF       | ±20%                     | CL10X475MQ8NRW# |
| 11  | 1.00                   | 6.3                    | X6S | 22uF        | ±20%                     | CL10X226MQ8QRW# |
| 12  | 1.00                   | 10                     | X6S | 10uF        | ±20%                     | CL10X106MP8NRW# |
| 13  | 1.00                   | 16                     | X6S | 4.7uF       | ±10%                     | CL10X475K08NRW# |
| 14  | 1.00                   | 16                     | X6S | 10uF        | ±20%                     | CL10X106M08NRW# |

Size Code (inch/mm) : 0805/2012

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 1.45                   | 2.5                    | X6T | 47uF        | ±20%                     | CL21W476MSYNNW# |
| 2   | 1.40                   | 4                      | X6S | 22uF        | ±20%                     | CL21X226MRQNNW# |
| 3   | 1.45                   | 4                      | X6S | 22uF        | ±20%                     | CL21X226MRYNNW# |
| 4   | 1.45                   | 4                      | X6T | 47uF        | ±20%                     | CL21W476MRYNNW# |
| 5   | 1.45                   | 4                      | X6S | 47uF        | ±20%                     | CL21X476MRYNNW# |
| 6   | 1.45                   | 4                      | X6S | 100uF       | ±20%                     | CL21X107MRYNNW# |
| 7   | 1.40                   | 6.3                    | X6S | 10uF        | ±10%                     | CL21X106KQQNNW# |
| 8   | 1.40                   | 6.3                    | X6S | 10uF        | ±20%                     | CL21X106MQQNNW# |
| 9   | 1.40                   | 6.3                    | X6S | 22uF        | ±20%                     | CL21X226MQQNNW# |
| 10  | 1.45                   | 6.3                    | X6S | 22uF        | ±20%                     | CL21X226MQYNNW# |
| 11  | 1.45                   | 6.3                    | X6S | 47uF        | ±20%                     | CL21X476MQYNNW# |
| 12  | 1.40                   | 10                     | X6S | 10uF        | ±10%                     | CL21X106KPQNNW# |
| 13  | 1.40                   | 10                     | X6S | 10uF        | ±20%                     | CL21X106MPQNNW# |
| 14  | 1.45                   | 10                     | X6S | 22uF        | ±20%                     | CL21X226MPYNNW# |
| 15  | 1.40                   | 16                     | X6S | 10uF        | ±10%                     | CL21X106KOQNNW# |
| 16  | 1.40                   | 16                     | X6S | 10uF        | ±20%                     | CL21X106MOQNNW# |
| 17  | 1.45                   | 16                     | X6S | 22uF        | ±20%                     | CL21X226MOYNNW# |
| 18  | 1.45                   | 25                     | X6S | 10uF        | ±10%                     | CL21X106KAYQNW# |
| 19  | 1.45                   | 25                     | X6S | 10uF        | ±20%                     | CL21X106MAYQNW# |

Size Code (inch/mm) : 1206/3216, 1210/3225

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 1.90                   | 4                      | X6S | 100uF       | ±20%                     | CL31X107MRKNNW# |
| 2   | 1.80                   | 6.3                    | X6S | 47uF        | ±20%                     | CL31X476MQHNNW# |
| 3   | 1.90                   | 6.3                    | X6S | 100uF       | ±20%                     | CL31X107MQKNNW# |
| 4   | 2.80                   | 4                      | X6S | 100uF       | ±20%                     | CL32X107MRVNNW# |
| 5   | 2.80                   | 6.3                    | X6S | 100uF       | ±20%                     | CL32X107MQVNNW# |
| 6   | 2.70                   | 16                     | X6S | 47uF        | ±20%                     | CL32X476MOJNNW# |



# Normal Capacitors\_High Level I

## Product Lineup (X7R)

Size Code (inch/mm) : 0201/0603

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 0.33                   | 6.3                    | X7R | 10nF        | ±10%                     | CL03B103KQ3NNW# |
| 2   | 0.33                   | 10                     | X7R | 10nF        | ±10%                     | CL03B103KP3NNW# |
| 3   | 0.33                   | 10                     | X7R | 100nF       | ±10%                     | CL03B104KP3NNW# |
| 4   | 0.33                   | 10                     | X7S | 100nF       | ±10%                     | CL03Y104KP3NNW# |
| 5   | 0.33                   | 16                     | X7R | 1nF         | ±10%                     | CL03B102K03NNW# |
| 6   | 0.33                   | 16                     | X7R | 10nF        | ±10%                     | CL03B103K03NNW# |
| 7   | 0.33                   | 25                     | X7R | 680pF       | ±10%                     | CL03B681KA3NNW# |
| 8   | 0.33                   | 25                     | X7R | 1nF         | ±10%                     | CL03B102KA3NNW# |
| 9   | 0.33                   | 25                     | X7R | 10nF        | ±10%                     | CL03B103KA3NNW# |

Size Code (inch/mm) : 0402/1005

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number      |
|-----|------------------------|------------------------|-----|-------------|--------------------------|------------------|
| 1   | 0.55                   | 4                      | X7R | 1uF         | ±10%                     | CL05B105KR5QNW#  |
| 2   | 0.55                   | 6.3                    | X7R | 100nF       | ±10%                     | CL05B104KQ5NNW#  |
| 3   | 0.55                   | 6.3                    | X7R | 220nF       | ±10%                     | CL05B224KQ5NNW#  |
| 4   | 0.55                   | 6.3                    | X7R | 470nF       | ±10%                     | CL05B474KQ5ZNNW# |
| 5   | 0.55                   | 6.3                    | X7R | 1uF         | ±10%                     | CL05B105KQ5QNW#  |
| 6   | 0.55                   | 10                     | X7R | 10nF        | ±10%                     | CL05B103KP5NNW#  |
| 7   | 0.55                   | 10                     | X7R | 27nF        | ±10%                     | CL05B273KP5NNW#  |
| 8   | 0.55                   | 10                     | X7R | 33nF        | ±10%                     | CL05B333KP5NNW#  |
| 9   | 0.55                   | 10                     | X7R | 47nF        | ±10%                     | CL05B473KP5NNW#  |
| 10  | 0.55                   | 10                     | X7R | 100nF       | ±10%                     | CL05B104KP5NNW#  |
| 11  | 0.55                   | 10                     | X7R | 220nF       | ±10%                     | CL05B224KP5NNW#  |
| 12  | 0.55                   | 10                     | X7R | 470nF       | ±10%                     | CL05B474KP5ZNNW# |
| 13  | 0.55                   | 16                     | X7R | 1nF         | ±10%                     | CL05B102K05NNW#  |
| 14  | 0.55                   | 16                     | X7R | 10nF        | ±5%                      | CL05B103J05NNW#  |
| 15  | 0.55                   | 16                     | X7R | 10nF        | ±10%                     | CL05B103K05NNW#  |
| 16  | 0.55                   | 16                     | X7R | 10nF        | ±20%                     | CL05B103M05NNW#  |
| 17  | 0.55                   | 16                     | X7R | 15nF        | ±10%                     | CL05B153K05NNW#  |
| 18  | 0.55                   | 16                     | X7R | 22nF        | ±10%                     | CL05B223K05NNW#  |
| 19  | 0.55                   | 16                     | X7R | 33nF        | ±10%                     | CL05B333K05NNW#  |
| 20  | 0.55                   | 16                     | X7R | 39nF        | ±10%                     | CL05B393K05NNW#  |
| 21  | 0.55                   | 16                     | X7R | 47nF        | ±10%                     | CL05B473K05NNW#  |
| 22  | 0.55                   | 16                     | X7R | 68nF        | ±10%                     | CL05B683K05NNW#  |
| 23  | 0.55                   | 16                     | X7R | 82nF        | ±10%                     | CL05B823K05NNW#  |
| 24  | 0.55                   | 16                     | X7R | 100nF       | ±10%                     | CL05B104K05NNW#  |
| 25  | 0.55                   | 16                     | X7R | 220nF       | ±10%                     | CL05B224K05NNW#  |
| 26  | 0.70                   | 16                     | X7T | 2.2uF       | ±20%                     | CL05Z225M05NUW#  |
| 27  | 0.55                   | 25                     | X7R | 220pF       | ±10%                     | CL05B221KA5NNW#  |
| 28  | 0.55                   | 25                     | X7R | 1nF         | ±10%                     | CL05B102KA5NNW#  |
| 29  | 0.55                   | 25                     | X7R | 3.3nF       | ±10%                     | CL05B332KA5NNW#  |
| 30  | 0.55                   | 25                     | X7R | 3.9nF       | ±10%                     | CL05B392KA5NNW#  |



# Normal Capacitors\_High Level I

Size Code (inch/mm) : 0402/1005

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 31  | 0.55                   | 25                     | X7R | 4.7nF       | ±10%                     | CL05B472KA5NNW# |
| 32  | 0.55                   | 25                     | X7R | 5.6nF       | ±10%                     | CL05B562KA5NNW# |
| 33  | 0.55                   | 25                     | X7R | 6.8nF       | ±10%                     | CL05B682KA5NNW# |
| 34  | 0.55                   | 25                     | X7R | 8.2nF       | ±10%                     | CL05B822KA5NNW# |
| 35  | 0.55                   | 25                     | X7R | 10nF        | ±5%                      | CL05B103JA5NNW# |
| 36  | 0.55                   | 25                     | X7R | 10nF        | ±10%                     | CL05B103KA5NNW# |
| 37  | 0.55                   | 25                     | X7R | 15nF        | ±10%                     | CL05B153KA5NNW# |
| 38  | 0.55                   | 25                     | X7R | 22nF        | ±10%                     | CL05B223KA5NNW# |
| 39  | 0.55                   | 25                     | X7R | 33nF        | ±10%                     | CL05B333KA5NNW# |
| 40  | 0.55                   | 25                     | X7R | 47nF        | ±10%                     | CL05B473KA5NNW# |
| 41  | 0.55                   | 25                     | X7R | 100nF       | ±10%                     | CL05B104KA5NNW# |
| 42  | 0.55                   | 25                     | X7R | 100nF       | ±20%                     | CL05B104MA5NNW# |
| 43  | 0.55                   | 25                     | X7R | 220nF       | ±10%                     | CL05B224KA5NNW# |
| 44  | 0.55                   | 50                     | X7R | 220pF       | ±10%                     | CL05B221KB5NNW# |
| 45  | 0.55                   | 50                     | X7R | 270pF       | ±10%                     | CL05B271KB5NNW# |
| 46  | 0.55                   | 50                     | X7R | 330pF       | ±10%                     | CL05B331KB5NNW# |
| 47  | 0.55                   | 50                     | X7R | 390pF       | ±10%                     | CL05B391KB5NNW# |
| 48  | 0.55                   | 50                     | X7R | 470pF       | ±10%                     | CL05B471KB5NNW# |
| 49  | 0.55                   | 50                     | X7R | 560pF       | ±10%                     | CL05B561KB5NNW# |
| 50  | 0.55                   | 50                     | X7R | 680pF       | ±10%                     | CL05B681KB5NNW# |
| 51  | 0.55                   | 50                     | X7R | 820pF       | ±10%                     | CL05B821KB5NNW# |
| 52  | 0.55                   | 50                     | X7R | 1nF         | ±5%                      | CL05B102JB5NNW# |
| 53  | 0.55                   | 50                     | X7R | 1nF         | ±10%                     | CL05B102KB5NNW# |
| 54  | 0.55                   | 50                     | X7R | 1.5nF       | ±10%                     | CL05B152KB5NNW# |
| 55  | 0.55                   | 50                     | X7R | 1.8nF       | ±10%                     | CL05B182KB5NNW# |
| 56  | 0.55                   | 50                     | X7R | 2.2nF       | ±10%                     | CL05B222KB5NNW# |
| 57  | 0.55                   | 50                     | X7R | 2.7nF       | ±10%                     | CL05B272KB5NNW# |
| 58  | 0.55                   | 50                     | X7R | 3.3nF       | ±5%                      | CL05B332JB5NNW# |
| 59  | 0.55                   | 50                     | X7R | 3.3nF       | ±10%                     | CL05B332KB5NNW# |
| 60  | 0.55                   | 50                     | X7R | 3.9nF       | ±10%                     | CL05B392KB5NNW# |
| 61  | 0.55                   | 50                     | X7R | 4.7nF       | ±10%                     | CL05B472KB5NNW# |
| 62  | 0.55                   | 50                     | X7R | 8.2nF       | ±10%                     | CL05B822KB5NNW# |
| 63  | 0.55                   | 50                     | X7R | 10nF        | ±10%                     | CL05B103KB5NNW# |
| 64  | 0.55                   | 50                     | X7R | 22nF        | ±10%                     | CL05B223KB5NNW# |
| 65  | 0.55                   | 50                     | X7R | 100nF       | ±10%                     | CL05B104KB5NNW# |



# Normal Capacitors\_High Level I

Size Code (inch/mm) : 0603/1608

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number      |
|-----|------------------------|------------------------|-----|-------------|--------------------------|------------------|
| 1   | 0.90                   | 6.3                    | X7R | 2.2uF       | ±10%                     | CL10B225KQ8N3W#  |
| 2   | 0.95                   | 6.3                    | X7T | 4.7uF       | ±10%                     | CL10Z475KQ8NNQW# |
| 3   | 0.90                   | 10                     | X7R | 220nF       | ±10%                     | CL10B224KP8NNW#  |
| 4   | 0.90                   | 10                     | X7R | 1uF         | ±10%                     | CL10B105KP8NNW#  |
| 5   | 0.90                   | 10                     | X7R | 2.2uF       | ±10%                     | CL10B225KP8N3W#  |
| 6   | 0.90                   | 16                     | X7R | 47nF        | ±10%                     | CL10B473K08NNW#  |
| 7   | 0.90                   | 16                     | X7R | 100nF       | ±10%                     | CL10B104K08NNW#  |
| 8   | 0.90                   | 16                     | X7R | 150nF       | ±10%                     | CL10B154K08NNW#  |
| 9   | 0.90                   | 16                     | X7R | 220nF       | ±5%                      | CL10B224J08NNW#  |
| 10  | 0.90                   | 16                     | X7R | 220nF       | ±10%                     | CL10B224K08NNW#  |
| 11  | 0.90                   | 16                     | X7R | 470nF       | ±10%                     | CL10B474K08NNW#  |
| 12  | 0.90                   | 16                     | X7R | 680nF       | ±10%                     | CL10B684K08NNW#  |
| 13  | 0.90                   | 16                     | X7R | 1uF         | ±10%                     | CL10B105K08NNW#  |
| 14  | 0.90                   | 25                     | X7R | 10nF        | ±10%                     | CL10B103KA8NNW#  |
| 15  | 0.90                   | 25                     | X7R | 22nF        | ±10%                     | CL10B223KA8NNW#  |
| 16  | 0.90                   | 25                     | X7R | 33nF        | ±10%                     | CL10B333KA8NNW#  |
| 17  | 0.90                   | 25                     | X7R | 39nF        | ±10%                     | CL10B393KA8NNW#  |
| 18  | 0.90                   | 25                     | X7R | 47nF        | ±10%                     | CL10B473KA8NNW#  |
| 19  | 0.90                   | 25                     | X7R | 100nF       | ±10%                     | CL10B104KA8NNW#  |
| 20  | 0.90                   | 25                     | X7R | 100nF       | ±20%                     | CL10B104MA8NNW#  |
| 21  | 0.90                   | 25                     | X7R | 1uF         | ±10%                     | CL10B105KA8NNW#  |
| 22  | 0.90                   | 50                     | X7R | 100pF       | ±10%                     | CL10B101KB8NNW#  |
| 23  | 0.90                   | 50                     | X7R | 220pF       | ±10%                     | CL10B221KB8NNW#  |
| 24  | 0.90                   | 50                     | X7R | 330pF       | ±10%                     | CL10B331KB8NNW#  |
| 25  | 0.90                   | 50                     | X7R | 470pF       | ±10%                     | CL10B471KB8NNW#  |
| 26  | 0.90                   | 50                     | X7R | 680pF       | ±10%                     | CL10B681KB8NNW#  |
| 27  | 0.90                   | 50                     | X7R | 1nF         | ±10%                     | CL10B102KB8NNW#  |
| 28  | 0.90                   | 50                     | X7R | 1.5nF       | ±10%                     | CL10B152KB8NNW#  |
| 29  | 0.90                   | 50                     | X7R | 2.2nF       | ±5%                      | CL10B222JB8NNW#  |
| 30  | 0.90                   | 50                     | X7R | 2.2nF       | ±10%                     | CL10B222KB8NNW#  |
| 31  | 0.90                   | 50                     | X7R | 3.3nF       | ±10%                     | CL10B332KB8NNW#  |
| 32  | 0.90                   | 50                     | X7R | 3.9nF       | ±10%                     | CL10B392KB8NNW#  |
| 33  | 0.90                   | 50                     | X7R | 4.7nF       | ±10%                     | CL10B472KB8NNW#  |
| 34  | 0.90                   | 50                     | X7R | 6.8nF       | ±10%                     | CL10B682KB8NNW#  |
| 35  | 0.90                   | 50                     | X7R | 8.2nF       | ±10%                     | CL10B822KB8NNW#  |
| 36  | 0.90                   | 50                     | X7R | 10nF        | ±5%                      | CL10B103JB8NNW#  |
| 37  | 0.90                   | 50                     | X7R | 10nF        | ±10%                     | CL10B103KB8NNW#  |
| 38  | 0.90                   | 50                     | X7R | 22nF        | ±10%                     | CL10B223KB8NNW#  |
| 39  | 0.90                   | 50                     | X7R | 27nF        | ±10%                     | CL10B273KB8NNW#  |
| 40  | 0.90                   | 50                     | X7R | 33nF        | ±10%                     | CL10B333KB8NNW#  |
| 41  | 0.90                   | 50                     | X7R | 47nF        | ±10%                     | CL10B473KB8NNW#  |
| 42  | 0.90                   | 50                     | X7R | 100nF       | ±5%                      | CL10B104JB8NNW#  |
| 43  | 0.90                   | 50                     | X7R | 100nF       | ±10%                     | CL10B104KB8NNW#  |
| 44  | 0.90                   | 50                     | X7R | 220nF       | ±10%                     | CL10B224KB8NNW#  |
| 45  | 0.90                   | 100                    | X7R | 1nF         | ±10%                     | CL10B102KC8NNW#  |
| 46  | 0.90                   | 100                    | X7R | 10nF        | ±10%                     | CL10B103KC8NNW#  |
| 47  | 0.90                   | 100                    | X7R | 100nF       | ±10%                     | CL10B104KC8N3W#  |



# Normal Capacitors\_High Level I

Size Code (inch/mm) : 0805/2012

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 1.40                   | 6.3                    | X7R | 10uF        | ±10%                     | CL21B106KQNNW#  |
| 2   | 1.45                   | 6.3                    | X7T | 22uF        | ±20%                     | CL21Z226MQYNNW# |
| 3   | 1.35                   | 10                     | X7R | 2.2uF       | ±10%                     | CL21B225KPFNNW# |
| 4   | 1.40                   | 10                     | X7R | 10uF        | ±10%                     | CL21B106KPQNNW# |
| 5   | 1.35                   | 16                     | X7R | 2.2uF       | ±10%                     | CL21B225KOFNNW# |
| 6   | 1.35                   | 16                     | X7R | 4.7uF       | ±10%                     | CL21B475KOFNNW# |
| 7   | 0.95                   | 25                     | X7R | 100nF       | ±10%                     | CL21B104KACNNW# |
| 8   | 1.35                   | 25                     | X7R | 1uF         | ±10%                     | CL21B105KAFNNW# |
| 9   | 1.35                   | 25                     | X7R | 2.2uF       | ±10%                     | CL21B225KAFNNW# |
| 10  | 0.75                   | 50                     | X7R | 220pF       | ±10%                     | CL21B221KBANNW# |
| 11  | 0.75                   | 50                     | X7R | 330pF       | ±10%                     | CL21B331KBANNW# |
| 12  | 0.75                   | 50                     | X7R | 470pF       | ±10%                     | CL21B471KBANNW# |
| 13  | 0.75                   | 50                     | X7R | 680pF       | ±10%                     | CL21B681KBANNW# |
| 14  | 0.75                   | 50                     | X7R | 820pF       | ±10%                     | CL21B821KBANNW# |
| 15  | 0.75                   | 50                     | X7R | 1nF         | ±10%                     | CL21B102KBANNW# |
| 16  | 0.75                   | 50                     | X7R | 1.8nF       | ±10%                     | CL21B182KBANNW# |
| 17  | 0.75                   | 50                     | X7R | 2.7nF       | ±10%                     | CL21B272KBANNW# |
| 18  | 0.75                   | 50                     | X7R | 3.3nF       | ±10%                     | CL21B332KBANNW# |
| 19  | 0.75                   | 50                     | X7R | 4.7nF       | ±10%                     | CL21B472KBANNW# |
| 20  | 0.75                   | 50                     | X7R | 5.6nF       | ±10%                     | CL21B562KBANNW# |
| 21  | 0.75                   | 50                     | X7R | 6.8nF       | ±10%                     | CL21B682KBANNW# |
| 22  | 0.75                   | 50                     | X7R | 8.2nF       | ±10%                     | CL21B822KBANNW# |
| 23  | 0.75                   | 50                     | X7R | 10nF        | ±10%                     | CL21B103KBANNW# |
| 24  | 0.75                   | 50                     | X7R | 15nF        | ±10%                     | CL21B153KBANNW# |
| 25  | 0.75                   | 50                     | X7R | 18nF        | ±10%                     | CL21B183KBANNW# |
| 26  | 0.75                   | 50                     | X7R | 22nF        | ±10%                     | CL21B223KBANNW# |
| 27  | 0.75                   | 50                     | X7R | 27nF        | ±10%                     | CL21B273KBANNW# |
| 28  | 0.75                   | 50                     | X7R | 39nF        | ±10%                     | CL21B393KBANNW# |
| 29  | 0.95                   | 50                     | X7R | 47nF        | ±10%                     | CL21B473KBCNNW# |
| 30  | 0.95                   | 50                     | X7R | 56nF        | ±10%                     | CL21B563KBCNNW# |
| 31  | 0.95                   | 50                     | X7R | 68nF        | ±10%                     | CL21B683KBCNNW# |
| 32  | 0.95                   | 50                     | X7R | 82nF        | ±10%                     | CL21B823KBCNNW# |
| 33  | 0.95                   | 50                     | X7R | 100nF       | ±10%                     | CL21B104KBCNNW# |
| 34  | 1.35                   | 50                     | X7R | 1uF         | ±10%                     | CL21B105KBFNNW# |
| 35  | 1.45                   | 50                     | X7R | 2.2uF       | ±10%                     | CL21B225KBYNNW# |
| 36  | 0.75                   | 100                    | X7R | 10nF        | ±10%                     | CL21B103KCANNW# |
| 37  | 1.45                   | 100                    | X7S | 1uF         | ±10%                     | CL21Y105KCYZNW# |



# Normal Capacitors\_High Level I

Size Code (inch/mm) : 1206/3216

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number      |
|-----|------------------------|------------------------|-----|-------------|--------------------------|------------------|
| 1   | 1.80                   | 4                      | X7S | 47uF        | ±20%                     | CL31Y476MRHNNW#  |
| 2   | 1.80                   | 6.3                    | X7R | 22uF        | ±10%                     | CL31B226KQHNNW#  |
| 3   | 1.80                   | 10                     | X7R | 22uF        | ±10%                     | CL31B226KPHNNW#  |
| 4   | 1.90                   | 10                     | X7R | 22uF        | ±10%                     | CL31B226KPKZNW#  |
| 5   | 1.40                   | 16                     | X7R | 220nF       | ±10%                     | CL31B224KOFNNW#  |
| 6   | 1.80                   | 16                     | X7R | 470nF       | ±10%                     | CL31B474KOHNNW#  |
| 7   | 1.80                   | 16                     | X7R | 680nF       | ±10%                     | CL31B684KOHNNW#  |
| 8   | 1.40                   | 16                     | X7R | 1uF         | ±10%                     | CL31B105KOFNNW#  |
| 9   | 1.80                   | 16                     | X7R | 2.2uF       | ±10%                     | CL31B225KOHNNW#  |
| 10  | 1.80                   | 16                     | X7R | 10uF        | ±10%                     | CL31B106KOHNNW#  |
| 11  | 1.40                   | 25                     | X7R | 220nF       | ±10%                     | CL31B224KAFNNW#  |
| 12  | 1.80                   | 25                     | X7R | 470nF       | ±10%                     | CL31B474KAHNNW#  |
| 13  | 1.80                   | 25                     | X7R | 680nF       | ±10%                     | CL31B684KAHNNW#  |
| 14  | 1.80                   | 25                     | X7R | 1uF         | ±10%                     | CL31B105KAHNNW#  |
| 15  | 1.80                   | 25                     | X7R | 1uF         | ±20%                     | CL31B105MAHNNW#  |
| 16  | 1.80                   | 25                     | X7R | 2.2uF       | ±10%                     | CL31B225KAHNNW#  |
| 17  | 1.80                   | 25                     | X7R | 4.7uF       | ±10%                     | CL31B475KAHNNW#  |
| 18  | 1.80                   | 25                     | X7R | 10uF        | ±10%                     | CL31B106KAHNNW#  |
| 19  | 1.00                   | 50                     | X7R | 100nF       | ±10%                     | CL31B104KBCNNW#  |
| 20  | 1.40                   | 50                     | X7R | 330nF       | ±10%                     | CL31B334KBFNNW#  |
| 21  | 1.80                   | 50                     | X7R | 470nF       | ±10%                     | CL31B474KBHNNW#  |
| 22  | 1.80                   | 50                     | X7R | 1uF         | ±10%                     | CL31B105KBHNNW#  |
| 23  | 1.80                   | 50                     | X7R | 2.2uF       | ±10%                     | CL31B225KBHNNW#  |
| 24  | 1.80                   | 50                     | X7R | 4.7uF       | ±10%                     | CL31B475KBHNNW#  |
| 25  | 1.40                   | 100                    | X7R | 10nF        | ±10%                     | CL31B103KCFNNW#  |
| 26  | 1.80                   | 100                    | X7R | 2.2uF       | ±10%                     | CL31B225KCHZNNW# |
| 27  | 1.40                   | 500                    | X7R | 470pF       | ±10%                     | CL31B471KGFNNW#  |
| 28  | 1.40                   | 500                    | X7R | 680pF       | ±10%                     | CL31B681KGFNNW#  |
| 29  | 1.40                   | 500                    | X7R | 2.2nF       | ±10%                     | CL31B222KGFNNW#  |
| 30  | 1.40                   | 630                    | X7R | 470pF       | ±10%                     | CL31B471KHFNNW#  |
| 31  | 1.40                   | 630                    | X7R | 680pF       | ±10%                     | CL31B681KHFNNW#  |
| 32  | 1.40                   | 630                    | X7R | 1.5nF       | ±10%                     | CL31B152KHFNNW#  |
| 33  | 1.40                   | 630                    | X7R | 2.2nF       | ±10%                     | CL31B222KHFNNW#  |
| 34  | 1.40                   | 630                    | X7R | 3.3nF       | ±10%                     | CL31B332KHFNNW#  |
| 35  | 1.40                   | 630                    | X7R | 4.7nF       | ±10%                     | CL31B472KHFNNW#  |
| 36  | 1.40                   | 630                    | X7R | 6.8nF       | ±10%                     | CL31B682KHFNNW#  |
| 37  | 1.40                   | 630                    | X7R | 10nF        | ±10%                     | CL31B103KHFNNW#  |



# Normal Capacitors\_High Level I

Size Code (inch/mm) : 1210/3225

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number      |
|-----|------------------------|------------------------|-----|-------------|--------------------------|------------------|
| 1   | 2.80                   | 6.3                    | X7S | 100uF       | ±20%                     | CL32Y107MQVNNW#  |
| 2   | 2.80                   | 10                     | X7R | 10uF        | ±10%                     | CL32B106KPVZNNW# |
| 3   | 2.70                   | 16                     | X7R | 4.7uF       | ±10%                     | CL32B475KQJNNW#  |
| 4   | 2.80                   | 16                     | X7R | 10uF        | ±10%                     | CL32B106KOVZNNW# |
| 5   | 2.00                   | 25                     | X7R | 10uF        | ±10%                     | CL32B106KAULNNW# |
| 6   | 2.80                   | 25                     | X7S | 22uF        | ±10%                     | CL32Y226KAVZNNW# |
| 7   | 2.70                   | 50                     | X7R | 4.7uF       | ±10%                     | CL32B475KBJNNW#  |
| 8   | 2.80                   | 50                     | X7R | 10uF        | ±10%                     | CL32B106KBVZNNW# |
| 9   | 2.70                   | 100                    | X7R | 2.2uF       | ±10%                     | CL32B225KCJZNNW# |
| 10  | 2.20                   | 100                    | X7R | 4.7uF       | ±10%                     | CL32B475KCIZNNW# |
| 11  | 2.20                   | 100                    | X7S | 4.7uF       | ±10%                     | CL32Y475KCIZNNW# |
| 12  | 2.80                   | 100                    | X7S | 10uF        | ±10%                     | CL32Y106KCVZNNW# |
| 13  | 2.20                   | 630                    | X7R | 47nF        | ±10%                     | CL32B473KHINNW#  |
| 14  | 2.20                   | 1000                   | X7R | 22nF        | ±10%                     | CL32B223KIIZNNW# |

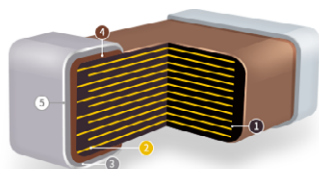


# Normal Capacitors\_High Level II

Normal  
High Level II

## Features

- A High Level II MLCC is a chip-type capacitor designed to be suitable for outdoor industrial applications.
- Reliability for moisture resistance and temperature change has been strengthened, and the bending strength characteristic is excellent.



- ① Ceramic Body
- ② Electrode (Ni/Cu\*)
- ③ Plating (Ni)
- ④ Termination (Cu or Cu+Metal Epoxy)
- ⑤ Plating (Sn)

High Level I

Improved Reliability  
(65℃, 90%RH, 1Vr, 500H)

High Level II

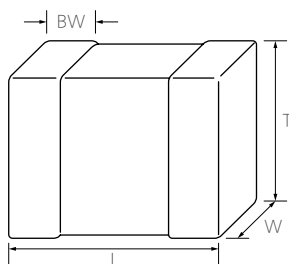
Reinforced Reliability  
(85℃, 85%RH, 1Vr, 1000H)

\* Internal Cu electrode is only applied to limited products.

## Application

- Base station, Solar Inverter, DC-DC Converter

## Structure and Dimensions



| Size Code | Dimension (mm) |           |           |              | EIA (inch) |
|-----------|----------------|-----------|-----------|--------------|------------|
|           | L              | W         | T         | BW           |            |
| 03        | 0.60±0.03      | 0.30±0.03 | 0.30±0.03 | 0.15±0.05    | 0603       |
| 05        | 1.00±0.05      | 0.50±0.05 | 0.50±0.05 | 0.25±0.10    | 0402       |
| 10        | 1.60±0.10      | 0.80±0.10 | 0.80±0.10 | 0.30±0.20    | 0603       |
| 21        | 2.00±0.10      | 1.25±0.10 | 1.25±0.10 | 0.5+0.2/-0.3 | 0805       |
| 31        | 3.20±0.20      | 1.60±0.20 | 1.60±0.20 | 0.50±0.30    | 1206       |
|           | 3.20±0.30      | 1.60±0.30 | 1.60±0.30 |              |            |
| 32        | 3.20±0.30      | 2.50±0.20 | 2.00±0.20 | 0.60±0.30    | 1210       |
|           | 3.20±0.30      | 2.50±0.30 | 2.50±0.30 |              |            |

## Capacitance Table (COG)

| Category         | TCC            | Size Code<br>(inch/mm) | Rated<br>Voltage<br>(Vdc) | Capacitance |   |    |     |    |    |     |   |    |     |  |  | Capacitance<br>Range |               |
|------------------|----------------|------------------------|---------------------------|-------------|---|----|-----|----|----|-----|---|----|-----|--|--|----------------------|---------------|
|                  |                |                        |                           | pF          |   |    |     | nF |    |     |   | uF |     |  |  |                      |               |
|                  |                |                        |                           | 0.1         | 1 | 10 | 100 | 1  | 10 | 100 | 1 | 10 | 100 |  |  |                      |               |
| High<br>Level II | COG<br>(125°C) | 0402/1005              | 50                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 3.3pF - 1nF   |
|                  |                |                        | 25                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 1nF - 6.8nF   |
|                  |                | 0603/1608              | 50                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 22pF - 3.3nF  |
|                  |                |                        | 100                       |             |   |    |     |    |    |     |   |    |     |  |  |                      | 100pF - 4.7nF |
|                  |                | 1206/3216              | 50                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 47nF - 100nF  |
|                  |                |                        | 630                       |             |   |    |     |    |    |     |   |    |     |  |  |                      | 10nF - 10nF   |
|                  |                |                        | 1000                      |             |   |    |     |    |    |     |   |    |     |  |  |                      | 680pF - 1nF   |
|                  |                | 1210/3225              | 630                       |             |   |    |     |    |    |     |   |    |     |  |  |                      | 22nF - 33nF   |
|                  |                |                        | 1000                      |             |   |    |     |    |    |     |   |    |     |  |  |                      | 10nF - 22nF   |
|                  |                |                        |                           |             |   |    |     |    |    |     |   |    |     |  |  |                      |               |

## Capacitance Table (X5R)

| Category         | TCC          | Size Code<br>(inch/mm) | Rated<br>Voltage<br>(Vdc) | Capacitance |   |    |     |    |    |     |   |    |     |  |  | Capacitance<br>Range |               |
|------------------|--------------|------------------------|---------------------------|-------------|---|----|-----|----|----|-----|---|----|-----|--|--|----------------------|---------------|
|                  |              |                        |                           | pF          |   |    |     | nF |    |     |   | uF |     |  |  |                      |               |
|                  |              |                        |                           | 0.1         | 1 | 10 | 100 | 1  | 10 | 100 | 1 | 10 | 100 |  |  |                      |               |
| High<br>Level II | X5R<br>(85℃) | 0603/1608              | 6.3                       |             |   |    |     |    |    |     |   |    |     |  |  |                      | 4.7uF - 4.7uF |
|                  |              |                        | 10                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 1uF - 10uF    |
|                  |              |                        | 16                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 1uF - 1uF     |
|                  |              |                        | 25                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 1uF - 1uF     |
|                  |              | 0805/2012              | 6.3                       |             |   |    |     |    |    |     |   |    |     |  |  |                      | 22uF - 22uF   |



# Normal Capacitors\_High Level II

## Capacitance Table (X6S)

| Category         | TCC            | Size Code<br>(inch/mm) | Rated<br>Voltage<br>(Vdc) | Capacitance |   |    |     |    |    |     |   |    |     |   |    | Capacitance<br>Range |               |
|------------------|----------------|------------------------|---------------------------|-------------|---|----|-----|----|----|-----|---|----|-----|---|----|----------------------|---------------|
|                  |                |                        |                           | pF          |   |    |     | nF |    |     |   | uF |     |   |    |                      |               |
|                  |                |                        |                           | 0.1         | 1 | 10 | 100 | 1  | 10 | 100 | 1 | 10 | 100 | 1 | 10 | 100                  |               |
| High<br>Level II | X6S<br>(105°C) | 0805/2012              | 4                         |             |   |    |     |    |    |     |   |    |     |   |    |                      | 47uF - 47uF   |
|                  |                |                        | 25                        |             |   |    |     |    |    |     |   |    |     |   |    |                      | 4.7uF - 4.7uF |
|                  |                | 1206/3216              | 6.3                       |             |   |    |     |    |    |     |   |    |     |   |    |                      | 100uF - 100uF |
|                  |                | 1210/3225              | 2.5                       |             |   |    |     |    |    |     |   |    |     |   |    |                      | 330uF - 330uF |

## Capacitance Table (X7R)

| Category         | TCC            | Size Code<br>(inch/mm) | Rated<br>Voltage<br>(Vdc) | Capacitance |   |    |     |    |    |     |   |    |     |  |  | Capacitance<br>Range |               |
|------------------|----------------|------------------------|---------------------------|-------------|---|----|-----|----|----|-----|---|----|-----|--|--|----------------------|---------------|
|                  |                |                        |                           | pF          |   |    |     | nF |    |     |   | uF |     |  |  |                      |               |
|                  |                |                        |                           | 0.1         | 1 | 10 | 100 | 1  | 10 | 100 | 1 | 10 | 100 |  |  |                      |               |
| High<br>Level II | X7R<br>(125°C) | 0201/0603              | 10                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 100nF - 100nF |
|                  |                |                        | 25                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 100nF - 100nF |
|                  |                | 0402/1005              | 50                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 4.7nF - 100nF |
|                  |                |                        | 0603/1608                 | 10          |   |    |     |    |    |     |   |    |     |  |  |                      |               |
|                  |                | 16                     |                           |             |   |    |     |    |    |     |   |    |     |  |  |                      | 1uF - 1uF     |
|                  |                | 25                     |                           |             |   |    |     |    |    |     |   |    |     |  |  |                      | 8.2nF - 1uF   |
|                  |                | 50                     |                           |             |   |    |     |    |    |     |   |    |     |  |  |                      | 270pF - 47nF  |
|                  |                | 100                    |                           |             |   |    |     |    |    |     |   |    |     |  |  |                      | 100nF - 100nF |
|                  |                | 0805/2012              |                           | 16          |   |    |     |    |    |     |   |    |     |  |  |                      |               |
|                  |                | 1206/3216              | 25                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 10uF - 10uF   |
|                  |                |                        | 50                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 1uF - 1uF     |
|                  |                | 1210/3225              | 10                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 47uF - 47uF   |

## Capacitance Table (X7S)

| Category         | TCC            | Size Code<br>(inch/mm) | Rated<br>Voltage<br>(Vdc) | Capacitance |   |    |     |    |    |     |   |    |     |  |  | Capacitance<br>Range |               |
|------------------|----------------|------------------------|---------------------------|-------------|---|----|-----|----|----|-----|---|----|-----|--|--|----------------------|---------------|
|                  |                |                        |                           | pF          |   |    |     | nF |    |     |   | uF |     |  |  |                      |               |
|                  |                |                        |                           | 0.1         | 1 | 10 | 100 | 1  | 10 | 100 | 1 | 10 | 100 |  |  |                      |               |
| High<br>Level II | X7S<br>(125°C) | 0201/0603              | 10                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 100nF - 100nF |
|                  |                | 0603/1608              | 10                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 4.7uF - 4.7uF |
|                  |                |                        | 16                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 4.7uF - 4.7uF |
|                  |                | 0805/2012              | 25                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 4.7uF - 4.7uF |
|                  |                | 1206/3216              | 4                         |             |   |    |     |    |    |     |   |    |     |  |  |                      | 47uF - 47uF   |
|                  |                | 1210/3225              | 6.3                       |             |   |    |     |    |    |     |   |    |     |  |  |                      | 100uF - 100uF |

## Capacitance Table (X7T)

| Category         | TCC            | Size Code<br>(inch/mm) | Rated<br>Voltage<br>(Vdc) | Capacitance |   |    |     |    |    |     |   |    |     |  |  | Capacitance<br>Range |             |               |
|------------------|----------------|------------------------|---------------------------|-------------|---|----|-----|----|----|-----|---|----|-----|--|--|----------------------|-------------|---------------|
|                  |                |                        |                           | pF          |   |    |     | nF |    |     |   | uF |     |  |  |                      |             |               |
|                  |                |                        |                           | 0.1         | 1 | 10 | 100 | 1  | 10 | 100 | 1 | 10 | 100 |  |  |                      |             |               |
| High<br>Level II | X7T<br>(125°C) | 0603/1608              | 6.3                       |             |   |    |     |    |    |     |   |    |     |  |  |                      | 10uF - 10uF |               |
|                  |                |                        | 10                        |             |   |    |     |    |    |     |   |    |     |  |  |                      | 10uF - 10uF |               |
|                  |                | 1206/3216              | 4                         |             |   |    |     |    |    |     |   |    |     |  |  |                      |             | 100uF - 100uF |
|                  |                |                        | 6.3                       |             |   |    |     |    |    |     |   |    |     |  |  |                      |             | 47uF - 47uF   |



# Normal Capacitors\_High Level II

## Product Lineup (COG)

Size Code (inch/mm) : 0402/1005, 0603/1608

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 0.55                   | 50                     | COG | 5.6pF       | ±0.25pF                  | CL05C5R6CB5N4N# |
| 2   | 0.55                   | 50                     | COG | 47pF        | ±5%                      | CL05C470JB5N4N# |
| 3   | 0.55                   | 50                     | COG | 100pF       | ±5%                      | CL05C101JB5N4N# |
| 4   | 0.55                   | 50                     | COG | 330pF       | ±5%                      | CL05C331JB5N4N# |
| 5   | 0.55                   | 50                     | COG | 1nF         | ±5%                      | CL05C102JB5N4N# |
| 6   | 0.90                   | 25                     | COG | 1nF         | ±5%                      | CL10C102JA8N4N# |
| 7   | 0.90                   | 50                     | COG | 22pF        | ±5%                      | CL10C220JB8N4N# |
| 8   | 0.90                   | 50                     | COG | 33pF        | ±5%                      | CL10C330JB8N4N# |
| 9   | 0.90                   | 50                     | COG | 68pF        | ±5%                      | CL10C680JB8N4N# |
| 10  | 0.90                   | 50                     | COG | 100pF       | ±5%                      | CL10C101JB8N4N# |
| 11  | 0.90                   | 50                     | COG | 120pF       | ±5%                      | CL10C121JB8N4N# |
| 12  | 0.90                   | 50                     | COG | 150pF       | ±5%                      | CL10C151JB8N4N# |
| 13  | 0.90                   | 50                     | COG | 150pF       | ±10%                     | CL10C151KB8N4N# |
| 14  | 0.90                   | 50                     | COG | 220pF       | ±5%                      | CL10C221JB8N4N# |
| 15  | 0.90                   | 50                     | COG | 330pF       | ±5%                      | CL10C331JB8N4N# |
| 16  | 0.90                   | 50                     | COG | 330pF       | ±10%                     | CL10C331KB8N4N# |
| 17  | 0.90                   | 50                     | COG | 390pF       | ±5%                      | CL10C391JB8N4N# |
| 18  | 0.90                   | 50                     | COG | 470pF       | ±5%                      | CL10C471JB8N4N# |
| 19  | 0.90                   | 50                     | COG | 560pF       | ±5%                      | CL10C561JB8N4N# |
| 20  | 0.90                   | 50                     | COG | 680pF       | ±5%                      | CL10C681JB8N4N# |
| 21  | 0.90                   | 50                     | COG | 820pF       | ±5%                      | CL10C821JB8N4N# |
| 22  | 0.90                   | 50                     | COG | 1.2nF       | ±5%                      | CL10C122JB8N4N# |
| 23  | 0.90                   | 50                     | COG | 1.8nF       | ±5%                      | CL10C182JB8N4N# |
| 24  | 0.90                   | 50                     | COG | 2.2nF       | ±5%                      | CL10C222JB8N4N# |
| 25  | 0.90                   | 50                     | COG | 3.3nF       | ±5%                      | CL10C332JB8N4N# |
| 26  | 0.90                   | 100                    | COG | 100pF       | ±5%                      | CL10C101JC8N4N# |

Size Code (inch/mm) : 1210/3225

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 2.70                   | 1000                   | COG | 10nF        | ±5%                      | CL32C103JIJN4N# |
| 2   | 2.70                   | 1000                   | COG | 15nF        | ±5%                      | CL32C153JIJN4N# |
| 3   | 2.80                   | 1000                   | COG | 22nF        | ±5%                      | CL32C223JIVN4N# |



# Normal Capacitors\_High Level II

## Product Lineup (X5R)

Size Code (inch/mm) : 0603/1608, 0805/2012

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 0.90                   | 6.3                    | X5R | 4.7uF       | ±10%                     | CL10A475KQ8N4N# |
| 2   | 0.90                   | 6.3                    | X5R | 4.7uF       | ±20%                     | CL10A475MQ8N4N# |
| 3   | 0.90                   | 10                     | X5R | 1uF         | ±10%                     | CL10A105KP8N4N# |
| 4   | 0.90                   | 10                     | X5R | 4.7uF       | ±10%                     | CL10A475KP8N4N# |
| 5   | 0.95                   | 10                     | X5R | 10uF        | ±10%                     | CL10A106KP8N4Q# |
| 6   | 0.90                   | 16                     | X5R | 1uF         | ±10%                     | CL10A105KO8N4N# |
| 7   | 0.90                   | 25                     | X5R | 1uF         | ±10%                     | CL10A105KA8N4N# |
| 8   | 1.40                   | 6.3                    | X5R | 22uF        | ±20%                     | CL21A226MQQN4N# |

## Product Lineup (X6S)

Size Code (inch/mm) : 1206/3216

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 1.90                   | 6.3                    | X6S | 100uF       | ±20%                     | CL31X107MQKN4N# |

Size Code (inch/mm) : 1210/3225

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 2.80                   | 2.5                    | X6S | 330uF       | ±20%                     | CL32X337MSVN4S# |

## Product Lineup (X7R/S)

Size Code (inch/mm) : 0402/1005, 1210/3225

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 0.33                   | 10                     | X7R | 100nF       | ±10%                     | CL03B104KP3N4N# |
| 2   | 0.33                   | 10                     | X7S | 100nF       | ±10%                     | CL03Y104KP3N4N# |
| 3   | 0.55                   | 10                     | X7R | 470nF       | ±10%                     | CL05B474KP5Z4N# |
| 4   | 0.55                   | 16                     | X7R | 22nF        | ±10%                     | CL05B223K05Z4N# |
| 5   | 0.55                   | 16                     | X7R | 100nF       | ±10%                     | CL05B104K05Z4N# |
| 6   | 0.55                   | 25                     | X7R | 100nF       | ±10%                     | CL05B104KA5N4N# |
| 7   | 0.55                   | 50                     | X7R | 1nF         | ±10%                     | CL05B102KB5Z4N# |
| 8   | 0.55                   | 50                     | X7R | 4.7nF       | ±10%                     | CL05B472KB5S4N# |
| 9   | 0.55                   | 50                     | X7R | 100nF       | ±10%                     | CL05B104KB5N4N# |
| 10  | 0.90                   | 10                     | X7R | 1uF         | ±10%                     | CL10B105KP8N4N# |
| 11  | 0.90                   | 10                     | X7R | 2.2uF       | ±10%                     | CL10B225KP8N4N# |
| 12  | 0.90                   | 16                     | X7R | 1uF         | ±10%                     | CL10B105KO8N4N# |
| 13  | 0.90                   | 25                     | X7R | 100nF       | ±10%                     | CL10B104KA8Z4N# |
| 14  | 0.90                   | 25                     | X7R | 220nF       | ±10%                     | CL10B224KA8Z4N# |
| 15  | 0.90                   | 25                     | X7R | 1uF         | ±10%                     | CL10B105KA8N4N# |



# Normal Capacitors\_High Level II

Size Code (inch/mm) : 0402/1005, 1210/3225

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 16  | 0.90                   | 25                     | X7R | 1uF         | ±10%                     | CL10B105KA8Z4N# |
| 17  | 0.90                   | 50                     | X7R | 1nF         | ±10%                     | CL10B102KB8Z4N# |
| 18  | 0.90                   | 50                     | X7R | 6.8nF       | ±10%                     | CL10B682KB8N4N# |
| 19  | 0.90                   | 50                     | X7R | 47nF        | ±10%                     | CL10B473KB8N4N# |
| 20  | 0.90                   | 50                     | X7R | 100nF       | ±10%                     | CL10B104KB8Z4N# |
| 21  | 0.90                   | 50                     | X7R | 220nF       | ±10%                     | CL10B224KB8Z4J# |
| 22  | 0.90                   | 100                    | X7R | 100nF       | ±10%                     | CL10B104KC8N4N# |
| 23  | 1.50                   | 16                     | X7S | 10uF        | ±20%                     | CL21Y106MOYZ4U# |
| 24  | 1.35                   | 25                     | X7R | 1uF         | ±10%                     | CL21B105KAFZ4N# |
| 25  | 1.35                   | 25                     | X7R | 2.2uF       | ±10%                     | CL21B225KAFZ4J# |
| 26  | 1.45                   | 25                     | X7S | 4.7uF       | ±10%                     | CL21Y475KAYN4N# |
| 27  | 1.35                   | 100                    | X7R | 100nF       | ±10%                     | CL21B104KCFZ4N# |
| 28  | 1.45                   | 100                    | X7S | 1uF         | ±10%                     | CL21Y105KCYZ4N# |
| 29  | 1.90                   | 6.3                    | X7R | 22uF        | ±10%                     | CL31B226KQKZ4N# |
| 30  | 1.90                   | 6.3                    | X7T | 47uF        | ±20%                     | CL31Z476MQKN4N# |
| 31  | 1.80                   | 10                     | X7R | 10uF        | ±10%                     | CL31B106KPHZ4N# |
| 32  | 1.90                   | 10                     | X7R | 22uF        | ±10%                     | CL31B226KPKZ4N# |
| 33  | 1.80                   | 25                     | X7R | 10uF        | ±10%                     | CL31B106KAHN4N# |
| 34  | 1.80                   | 50                     | X7R | 1uF         | ±10%                     | CL31B105KBHN4N# |
| 35  | 1.80                   | 100                    | X7R | 1uF         | ±10%                     | CL31B105KCHZ4N# |
| 36  | 1.80                   | 100                    | X7R | 2.2uF       | ±10%                     | CL31B225KCHZ4N# |
| 37  | 1.80                   | 100                    | X7S | 2.2uF       | ±10%                     | CL31Y225KCHZ4N# |
| 38  | 1.90                   | 100                    | X7S | 4.7uF       | ±10%                     | CL31Y475KCK64N# |
| 39  | 1.90                   | 100                    | X7S | 4.7uF       | ±10%                     | CL31Y475KCK6NW# |
| 40  | 2.80                   | 6.3                    | X7S | 100uF       | ±20%                     | CL32Y107MQVN4N# |
| 41  | 2.80                   | 50                     | X7R | 10uF        | ±10%                     | CL32B106KBVZ4N# |
| 42  | 2.70                   | 100                    | X7R | 2.2uF       | ±10%                     | CL32B225KCJZ4N# |
| 43  | 2.70                   | 100                    | X7R | 4.7uF       | ±10%                     | CL32B475KCJZ4N# |
| 44  | 2.20                   | 100                    | X7S | 4.7uF       | ±10%                     | CL32Y475KCIZ4N# |
| 45  | 2.70                   | 100                    | X7S | 4.7uF       | ±10%                     | CL32Y475KCJZ4N# |
| 46  | 2.80                   | 100                    | X7S | 10uF        | ±10%                     | CL32Y106KCVZ4N# |

## Product Lineup (X8L)

Size Code (inch/mm) : 1210/3225

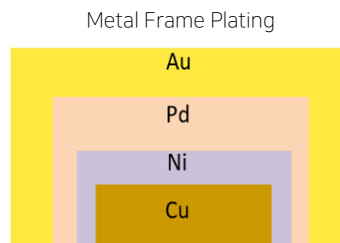
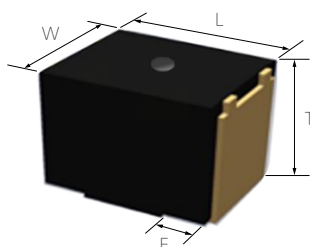
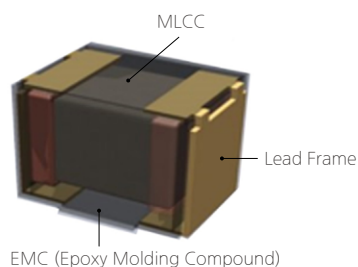
| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 2.70                   | 100                    | X8L | 4.7uF       | ±10%                     | CL32E475KCJZ4N# |



# Molded Frame Capacitors (MFC)

## Features

- Advanced solution beyond standard metal frame capacitor.
- Samsung MFC has a greater reliability than a general MLCC.
- High solder crack resistance at thermal cycling test.
- High board bending strength up to 10mm (specification: 5mm)
- Enhanced moisture resistance by Epoxy molding compound
- Acoustic noise reduction.(piezoelectric effect)
- Low ESR Metal frame plating(Material:Cu,Ni,Pd,Au)



## Application

- Power, DC-DC Converter where bending stress is high and high reliability is necessary.

## Specifications

| Samsung P/N     | Dimension (mm) |           |           |           |
|-----------------|----------------|-----------|-----------|-----------|
|                 | L              | W         | T         | E         |
| CL32B225KCDMNWF | 3.80±0.10      | 2.80±0.10 | 3.35±0.10 | 0.80±0.15 |
| CL32Y225KCDMNWF | 3.80±0.10      | 2.80±0.10 | 3.35±0.10 | 0.80±0.15 |

### Land Dimension

(Unit : mm)

| Chip Size              | Chip Tol. | a       | b       | c         | (a+2b)min | (a+2b)max | Wmin | Wmax |
|------------------------|-----------|---------|---------|-----------|-----------|-----------|------|------|
| 1210<br>(EIA code) MFC | ±0.10     | 2.0~2.2 | 1.1~1.3 | 2.30~2.50 | 4.20      | 4.80      | 2.70 | 2.90 |

## Product LineUp

Size Code (inch/mm) : 1210/3225

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 0.45                   | 100                    | X7S | 4.7uF       | ±10%                     | CL32Y475KCDMNW# |
| 2   | 0.45                   | 100                    | X7R | 2.2uF       | ±10%                     | CL32B225KCDMNW# |

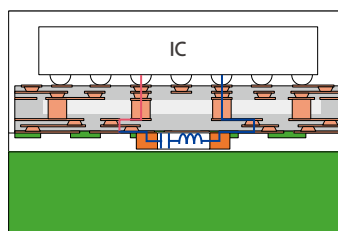
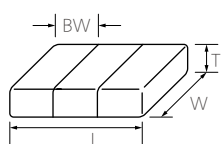
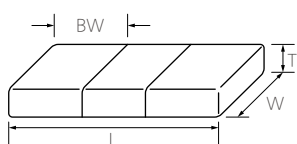


# Land Side Capacitors (LSC)

Land Side

## Features

- This can be mounted between the solder balls to deal with thin devices or modules.
- It can reduce the thickness of the module.
- It can quickly supply stable current to high-speed AP of mobile devices.
- In addition it helps remove high-frequency noise, suffering less from external environmental stress.

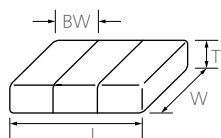
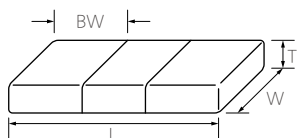


Land Side Capacitor

## Application

- Smart Phone, Wearable Devices, IC Package, Module Products

## Structure and Dimensions



| Size Code | Dimension (mm) |           |               |               |             | EIA (inch) |
|-----------|----------------|-----------|---------------|---------------|-------------|------------|
|           | L              | W         | T             | Thckness Code | BW          |            |
| 02        | 0.40±0.02      | 0.20±0.02 | 0.095±0.015   | L             | 0.10±0.03   | 01005      |
| 05        | 1.00±0.05      | 0.50±0.05 | 0.0975±0.0125 | L             | 0.250±0.075 | 0402       |
|           | 1.00±0.05      | 0.50±0.05 | 0.20±0.02     | 2             | 0.25±0.10   | 0402       |
| L3        | 0.30±0.03      | 0.60±0.03 | 0.18±0.02     | W             | 0.10±0.03   | 0102       |
| L5        | 0.52±0.05      | 1.00±0.05 | 0.085±0.015   | J             | 0.145±0.050 | 0204       |



# Land Side Capacitors (LSC)

## Capacitance Table (X5R)

| TCC            | Size Code<br>(inch/mm) | Rated Voltage<br>(Vdc) | Capacitance |   |    |     |    |    |     |   |    |     |  |  | Capacitance<br>Range |               |
|----------------|------------------------|------------------------|-------------|---|----|-----|----|----|-----|---|----|-----|--|--|----------------------|---------------|
|                |                        |                        | pF          |   |    |     | nF |    |     |   | uF |     |  |  |                      |               |
|                |                        |                        | 0.1         | 1 | 10 | 100 | 1  | 10 | 100 | 1 | 10 | 100 |  |  |                      |               |
| X5R<br>(85°C)  | 0102/0306              | 25                     |             |   |    |     |    |    |     |   |    |     |  |  |                      | 22nF - 33nF   |
|                | 01005/0402             | 6.3                    |             |   |    |     |    |    |     |   |    |     |  |  |                      | 51pF - 1nF    |
|                | 0402/1005              | 6.3                    |             |   |    |     |    |    |     |   |    |     |  |  |                      | 220nF - 220nF |
| X7T<br>(125°C) | 0204/0510              | 2.5                    |             |   |    |     |    |    |     |   |    |     |  |  |                      | 1uF - 1uF     |

## Product Lineup (X5R)

Size Code (inch/mm) : 0102/0306

| No. | Thickness Max. (mm) | Rated Voltage (Vdc) | TCC | Capacitance | Capacitance Tolerance | Part Number     |
|-----|---------------------|---------------------|-----|-------------|-----------------------|-----------------|
| 1   | 0.235               | 25                  | X5R | 33nF        | ±10%                  | CLL3A333KAYHLN# |
| 2   | 0.20                | 25                  | X5R | 22nF        | ±10%                  | CLL3A223KAWHLN# |

Size Code (inch/mm) : 01005/0402

| No. | Thickness Max. (mm) | Rated Voltage (Vdc) | TCC | Capacitance | Capacitance Tolerance | Part Number     |
|-----|---------------------|---------------------|-----|-------------|-----------------------|-----------------|
| 1   | 0.11                | 6.3                 | X5R | 51pF        | ±20%                  | CL02A510MQLHNN# |
| 2   | 0.11                | 6.3                 | X5R | 680pF       | ±20%                  | CL02A681MQLHNN# |
| 3   | 0.11                | 6.3                 | X5R | 1nF         | ±20%                  | CL02A102MQLHNN# |

Size Code (inch/mm) : 0402/1005

| No. | Thickness Max. (mm) | Rated Voltage (Vdc) | TCC | Capacitance | Capacitance Tolerance | Part Number     |
|-----|---------------------|---------------------|-----|-------------|-----------------------|-----------------|
| 1   | 0.10                | 6.3                 | X5R | 220nF       | ±20%                  | CL05A224MQLHEC# |

## Product Lineup (X7T)

Size Code (inch/mm) : 0204/0510

| No. | Thickness Max. (mm) | Rated Voltage (Vdc) | TCC | Capacitance | Capacitance Tolerance | Part Number     |
|-----|---------------------|---------------------|-----|-------------|-----------------------|-----------------|
| 1   | 0.22                | 2.5                 | X7T | 1uF         | ±20%                  | CLL5Z105MS2HLN# |

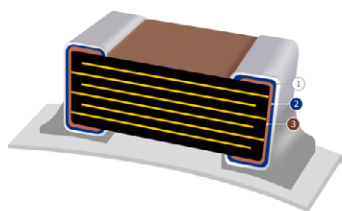


# High Bending Strength Capacitors

High Bending  
Strength

## Features

- The mechanical stress on the chip can be absorbed by the characteristic of Soft Termination.
- It is also resistant to stress caused by board bending.

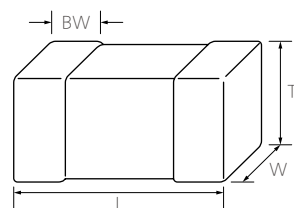


- ① Ni/Sn
- ② Metal/Epoxy Termination
- ③ Cu-Term

## Application

- All Application (Smart Phone, PC, HDD/SSD Board, Tablet, Display, Etc), Power (SMPS, DC-DC Converter), Industrial Application

## Structure and Dimensions



| Size Code | Dimension (mm) |           |           |               |               | EIA (inch) |
|-----------|----------------|-----------|-----------|---------------|---------------|------------|
|           | L              | W         | T         | Thckness Code | BW            |            |
| 03        | 0.60±0.03      | 0.30±0.03 | 0.30±0.03 | 3             | 0.15±0.05     | 0201       |
| 05        | 1.00±0.05      | 0.50±0.05 | 0.50±0.05 | 5             | 0.25±0.10     | 0402       |
| 10        | 1.60±0.10      | 0.80±0.10 | 0.80±0.10 | 8             | 0.30±0.20     | 0603       |
| 21        | 2.00±0.10      | 1.25±0.10 | 0.85±0.10 | C             | 0.50+0.2/-0.3 | 0805       |
|           | 2.00±0.10      | 1.25±0.10 | 1.25±0.10 | F             |               |            |
|           | 2.00±0.15      | 1.25±0.15 | 1.25±0.15 | Q             |               |            |
| 31        | 3.20±0.15      | 1.60±0.15 | 1.25±0.15 | F             | 0.50±0.30     | 1206       |
|           | 3.20±0.20      | 1.60±0.20 | 1.60±0.20 | H             |               |            |
| 32        | 3.20±0.30      | 2.50±0.20 | 1.60±0.10 | T             | 0.60±0.30     | 1210       |
|           | 3.20±0.30      | 2.50±0.20 | 2.50±0.20 | J             |               |            |
|           | 3.20±0.40      | 2.50±0.30 | 2.50±0.30 | V             |               |            |

## Capacitance Table (X5R)

| TCC           | Size Code<br>(inch/mm) | Rated Voltage<br>(Vdc) | Capacitance |   |    |     |    |    |     |   |    |     |  |  | Capacitance<br>Range |              |
|---------------|------------------------|------------------------|-------------|---|----|-----|----|----|-----|---|----|-----|--|--|----------------------|--------------|
|               |                        |                        | pF          |   |    |     | nF |    |     |   | uF |     |  |  |                      |              |
|               |                        |                        | 0.1         | 1 | 10 | 100 | 1  | 10 | 100 | 1 | 10 | 100 |  |  |                      |              |
| X5R<br>(85°C) | 0201/0603              | 10                     |             |   |    |     |    |    |     |   |    |     |  |  |                      | 100nF - 1uF  |
|               | 0402/1005              | 6.3                    |             |   |    |     |    |    |     |   |    |     |  |  |                      | 4.7uF - 22uF |
|               |                        | 10                     |             |   |    |     |    |    |     |   |    |     |  |  |                      | 2.2uF - 10uF |
|               | 0603/1608              | 6.3                    |             |   |    |     |    |    |     |   |    |     |  |  |                      | 10uF - 10uF  |
|               |                        | 10                     |             |   |    |     |    |    |     |   |    |     |  |  |                      | 22uF - 22uF  |



# High Bending Strength Capacitors

## Capacitance Table (X6S)

| TCC            | Size Code<br>(inch/mm) | Rated Voltage<br>(Vdc) | Capacitance |   |    |     |    |    |     |   |    |     |  |  | Capacitance<br>Range |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |    |
|----------------|------------------------|------------------------|-------------|---|----|-----|----|----|-----|---|----|-----|--|--|----------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|----|
|                |                        |                        | pF          |   |    |     | nF |    |     |   | uF |     |  |  |                      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |    |
|                |                        |                        | 0.1         | 1 | 10 | 100 | 1  | 10 | 100 | 1 | 10 | 100 |  |  |                      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |    |
| X6S<br>(105°C) | 1210/3225              | 16                     |             |   |    |     |    |    |     |   |    |     |  |  |                      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | </ |

## Capacitance Table (X7S)

| TCC            | Size Code<br>(inch/mm) | Rated Voltage<br>(Vdc) | Capacitance |   |    |     |    |    |     |   |    |     |  |  | Capacitance<br>Range |
|----------------|------------------------|------------------------|-------------|---|----|-----|----|----|-----|---|----|-----|--|--|----------------------|
|                |                        |                        | pF          |   |    |     | nF |    |     |   | uF |     |  |  |                      |
|                |                        |                        | 0.1         | 1 | 10 | 100 | 1  | 10 | 100 | 1 | 10 | 100 |  |  |                      |
| X7S<br>(125°C) | 0805/2012              | 16                     |             |   |    |     |    |    |     |   |    |     |  |  | 10uF - 10uF          |
|                |                        | 100                    |             |   |    |     |    |    |     |   |    |     |  |  | 220nF / 1uF          |
|                | 1206/3216              | 16                     |             |   |    |     |    |    |     |   |    |     |  |  | 22uF - 22uF          |
|                |                        | 25                     |             |   |    |     |    |    |     |   |    |     |  |  | 22uF - 22uF          |
|                |                        | 100                    |             |   |    |     |    |    |     |   |    |     |  |  | 2.2uF - 4.7uF        |
|                | 1210/3225              | 100                    |             |   |    |     |    |    |     |   |    |     |  |  | 4.7uF - 10uF         |

## Capacitance Table (X7R)

| TCC            | Size Code<br>(inch/mm) | Rated Voltage<br>(Vdc) | Capacitance |   |    |     |    |    |     |   |    |     |  |  | Capacitance<br>Range |
|----------------|------------------------|------------------------|-------------|---|----|-----|----|----|-----|---|----|-----|--|--|----------------------|
|                |                        |                        | pF          |   |    |     | nF |    |     |   | uF |     |  |  |                      |
|                |                        |                        | 0.1         | 1 | 10 | 100 | 1  | 10 | 100 | 1 | 10 | 100 |  |  |                      |
| X7R<br>(125°C) | 0402/1005              | 10                     |             |   |    |     |    |    |     |   |    |     |  |  | 220nF - 470nF        |
|                |                        | 16                     |             |   |    |     |    |    |     |   |    |     |  |  | 22nF - 100nF         |
|                |                        | 50                     |             |   |    |     |    |    |     |   |    |     |  |  | 1nF - 15nF           |
|                | 0603/1608              | 25                     |             |   |    |     |    |    |     |   |    |     |  |  | 100nF - 1uF          |
|                |                        | 50                     |             |   |    |     |    |    |     |   |    |     |  |  | 1nF - 1uF            |
|                |                        | 100                    |             |   |    |     |    |    |     |   |    |     |  |  | 1nF - 1nF            |
|                | 0805/2012              | 25                     |             |   |    |     |    |    |     |   |    |     |  |  | 1uF - 2.2uF          |
|                |                        | 100                    |             |   |    |     |    |    |     |   |    |     |  |  | 10nF - 220nF         |
|                |                        | 250                    |             |   |    |     |    |    |     |   |    |     |  |  | 1nF / 22nF           |
|                | 1206/3216              | 6.3                    |             |   |    |     |    |    |     |   |    |     |  |  | 22uF - 22uF          |
|                |                        | 10                     |             |   |    |     |    |    |     |   |    |     |  |  | 10uF - 22uF          |
|                |                        | 25                     |             |   |    |     |    |    |     |   |    |     |  |  | 4.7uF - 10uF         |
|                |                        | 35                     |             |   |    |     |    |    |     |   |    |     |  |  | 10uF - 10uF          |
|                |                        | 100                    |             |   |    |     |    |    |     |   |    |     |  |  | 1uF - 2.2uF          |
|                |                        | 250                    |             |   |    |     |    |    |     |   |    |     |  |  | 100nF - 100nF        |
|                |                        | 630                    |             |   |    |     |    |    |     |   |    |     |  |  | 1nF - 22nF           |
|                |                        | 1000                   |             |   |    |     |    |    |     |   |    |     |  |  | 1nF - 10nF           |
|                | 1210/3225              | 50                     |             |   |    |     |    |    |     |   |    |     |  |  | 4.7uF - 10uF         |
|                |                        | 100                    |             |   |    |     |    |    |     |   |    |     |  |  | 2.2uF - 4.7uF        |
|                |                        | 250                    |             |   |    |     |    |    |     |   |    |     |  |  | 220nF - 220nF        |
|                |                        | 1000                   |             |   |    |     |    |    |     |   |    |     |  |  | 22nF - 22nF          |



# High Bending Strength Capacitors

## Capacitance Table (X8L)

| TCC            | Size Code<br>(inch/mm) | Rated Voltage<br>(Vdc) | Capacitance |   |    |     |    |    |     |   |    |     |  |  | Capacitance<br>Range |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|----------------|------------------------|------------------------|-------------|---|----|-----|----|----|-----|---|----|-----|--|--|----------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
|                |                        |                        | pF          |   |    |     | nF |    |     |   | uF |     |  |  |                      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                |                        |                        | 0.1         | 1 | 10 | 100 | 1  | 10 | 100 | 1 | 10 | 100 |  |  |                      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| X8L<br>(150°C) | 1210/3225              | 100                    |             |   |    |     |    |    |     |   |    |     |  |  |                      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

## Product Lineup (X5R)

Size Code (inch/mm) : 0201/0603

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 0.33                   | 10                     | X5R | 100nF       | ±10%                     | CL03A104KP3ZNN# |
| 2   | 0.35                   | 10                     | X5R | 1uF         | ±20%                     | CL03A105MP3ZSN# |

Size Code (inch/mm) : 0402/1005

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 0.57                   | 10                     | X5R | 2.2uF       | ±10%                     | CL05A225KP5ZSN# |
| 2   | 0.65                   | 6.3                    | X5R | 4.7uF       | ±20%                     | CL05A475MQ5ZRN# |
| 3   | 0.65                   | 10                     | X5R | 4.7uF       | ±10%                     | CL05A475KP5ZRN# |
| 4   | 0.70                   | 6.3                    | X5R | 10uF        | ±20%                     | CL05A106MQ5ZUN# |
| 5   | 0.70                   | 10                     | X5R | 10uF        | ±20%                     | CL05A106MP5ZUN# |

Size Code (inch/mm) : 0603/1608

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 0.95                   | 6.3                    | X5R | 10uF        | ±20%                     | CL10A106MQ8ZQN# |
| 2   | 1.05                   | 10                     | X5R | 22uF        | ±20%                     | CL10A226MP8ZUN# |

## Product Lineup (X6S)

Size Code (inch/mm) : 1210/3225

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 2.80                   | 16                     | X6S | 47uF        | ±10%                     | CL32X476KOVZNW# |



# High Bending Strength Capacitors

## Product Lineup (X7S)

Size Code (inch/mm) : 0805/2012

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 1.35                   | 100                    | X7S | 220nF       | ±10%                     | CL21Y224KCFSW6# |
| 2   | 1.45                   | 100                    | X7S | 1uF         | ±10%                     | CL21Y105KCYZ4N# |
| 3   | 1.50                   | 16                     | X7S | 10uF        | ±20%                     | CL21Y106MOYZ4U# |

Size Code (inch/mm) : 1206/3216

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 1.80                   | 100                    | X7S | 2.2uF       | ±10%                     | CL31Y225KCHZ4N# |
| 2   | 1.90                   | 16                     | X7S | 22uF        | ±10%                     | CL31Y226KOK64N# |
| 3   | 1.90                   | 25                     | X7S | 22uF        | ±20%                     | CL31Y226MAK64N# |
| 4   | 1.90                   | 100                    | X7S | 4.7uF       | ±10%                     | CL31Y475KCK64N# |

Size Code (inch/mm) : 1210/3225

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 2.20                   | 100                    | X7S | 4.7uF       | ±10%                     | CL32Y475KCIZ4N# |
| 2   | 2.70                   | 100                    | X7S | 4.7uF       | ±10%                     | CL32Y475KCJZ4N# |
| 3   | 2.80                   | 100                    | X7S | 10uF        | ±10%                     | CL32Y106KCV64N# |
| 4   | 2.80                   | 100                    | X7S | 10uF        | ±10%                     | CL32Y106KCVZ4N# |



# High Bending Strength Capacitors

## Product Lineup (X7R)

Size Code (inch/mm) : 0402/1005

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 0.55                   | 10                     | X7R | 470nF       | ±10%                     | CL05B474KP5Z4N# |
| 2   | 0.55                   | 16                     | X7R | 100nF       | ±10%                     | CL05B104K05Z4N# |
| 3   | 0.55                   | 16                     | X7R | 22nF        | ±10%                     | CL05B223K05Z4N# |
| 4   | 0.55                   | 50                     | X7R | 1nF         | ±10%                     | CL05B102KB5Z4N# |
| 5   | 0.55                   | 50                     | X7R | 2.2nF       | ±10%                     | CL05B222KB5Z4N# |

Size Code (inch/mm) : 0603/1608

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 0.70                   | 100                    | X7R | 10nF        | ±10%                     | CL21B103KC6Z4N# |
| 2   | 0.90                   | 25                     | X7R | 100nF       | ±10%                     | CL10B104KA8Z4N# |
| 3   | 0.90                   | 25                     | X7R | 1uF         | ±10%                     | CL10B105KA8Z4N# |
| 4   | 0.90                   | 25                     | X7R | 220nF       | ±10%                     | CL10B224KA8Z4N# |
| 5   | 0.90                   | 50                     | X7R | 100nF       | ±10%                     | CL10B104KB8ZW6# |
| 6   | 0.90                   | 50                     | X7R | 100nF       | ±10%                     | CL10B104KB8Z4N# |
| 7   | 0.90                   | 50                     | X7R | 1nF         | ±10%                     | CL10B102KB8Z4N# |
| 8   | 0.90                   | 50                     | X7R | 220nF       | ±10%                     | CL10B224KB8Z4J# |
| 9   | 0.95                   | 50                     | X7R | 1uF         | ±10%                     | CL10B105KB8Z4Q# |

Size Code (inch/mm) : 0805/2012

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 0.95                   | 250                    | X7R | 1nF         | ±10%                     | CL21B102KECSW6# |
| 2   | 1.35                   | 25                     | X7R | 1uF         | ±10%                     | CL21B105KAFZ4N# |
| 3   | 1.35                   | 25                     | X7R | 2.2uF       | ±10%                     | CL21B225KAFZ4J# |
| 4   | 1.35                   | 100                    | X7R | 100nF       | ±10%                     | CL21B104KCFZ4N# |



# High Bending Strength Capacitors

Size Code (inch/mm) : 1206/3216

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 1.40                   | 630                    | X7R | 10nF        | ±10%                     | CL31B103KHFSW6# |
| 2   | 1.40                   | 630                    | X7R | 1nF         | ±10%                     | CL31B102KHFSW6# |
| 3   | 1.45                   | 250                    | X7R | 22nF        | ±10%                     | CL21B223KEY64N# |
| 4   | 1.80                   | 10                     | X7R | 10uF        | ±10%                     | CL31B106KPHZ4N# |
| 5   | 1.80                   | 25                     | X7R | 10uF        | ±10%                     | CL31B106KAHZW6# |
| 6   | 1.80                   | 25                     | X7R | 4.7uF       | ±10%                     | CL31B475KAHZW6# |
| 7   | 1.80                   | 35                     | X7R | 10uF        | ±10%                     | CL31B106KLH5NN# |
| 8   | 1.80                   | 100                    | X7R | 1uF         | ±10%                     | CL31B105KCHZ4N# |
| 9   | 1.80                   | 100                    | X7R | 2.2uF       | ±10%                     | CL31B225KCHZ4N# |
| 10  | 1.80                   | 250                    | X7R | 100nF       | ±10%                     | CL31B104KEHSW6# |
| 11  | 1.80                   | 630                    | X7R | 22nF        | ±10%                     | CL31B223KHH64N# |
| 12  | 1.80                   | 1000                   | X7R | 10nF        | ±10%                     | CL31B103KIHZ4N# |
| 13  | 1.90                   | 6.3                    | X7R | 22uF        | ±10%                     | CL31B226KQKZ4N# |
| 14  | 1.90                   | 10                     | X7R | 22uF        | ±10%                     | CL31B226KPKZ4N# |

Size Code (inch/mm) : 1210/3225

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 2.00                   | 250                    | X7R | 220nF       | ±10%                     | CL32B224KEU64N# |
| 2   | 2.70                   | 50                     | X7R | 10uF        | ±10%                     | CL32B106KBJZW6# |
| 3   | 2.70                   | 50                     | X7R | 4.7uF       | ±10%                     | CL32B475KBJSW6# |
| 4   | 2.70                   | 100                    | X7R | 2.2uF       | ±10%                     | CL32B225KCJZW6# |
| 5   | 2.70                   | 100                    | X7R | 2.2uF       | ±10%                     | CL32B225KCJZ4N# |
| 6   | 2.70                   | 100                    | X7R | 4.7uF       | ±10%                     | CL32B475KCJZ4N# |
| 7   | 2.80                   | 50                     | X7R | 10uF        | ±10%                     | CL32B106KBVZ4N# |

## Product Lineup (X8L)

Size Code (inch/mm) : 1210/3225

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|
| 1   | 2.70                   | 100                    | X8L | 4.7uF       | ±10%                     | CL32E475KCJZ4N# |

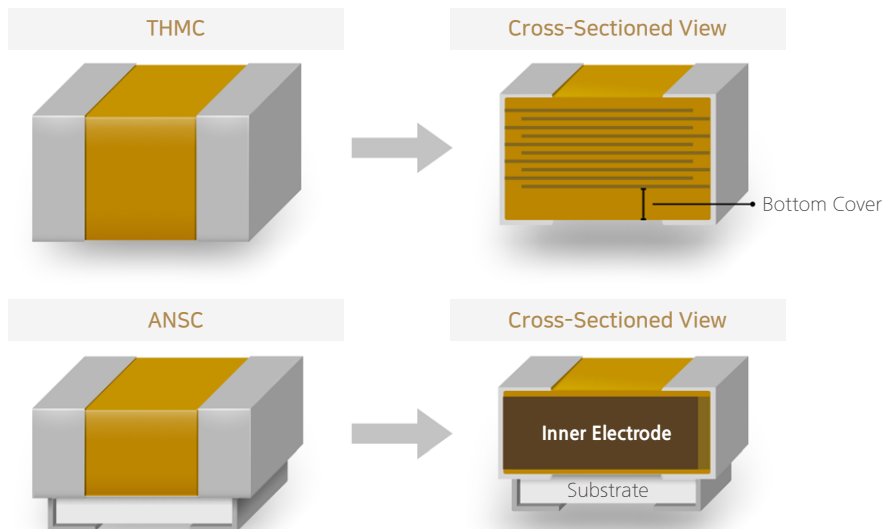


# Low Acoustic Noise Capacitors

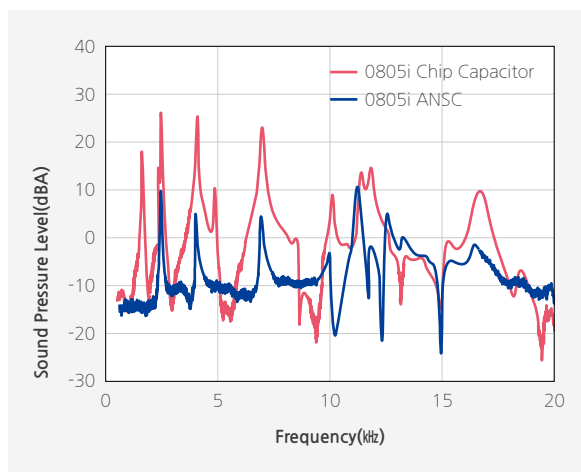
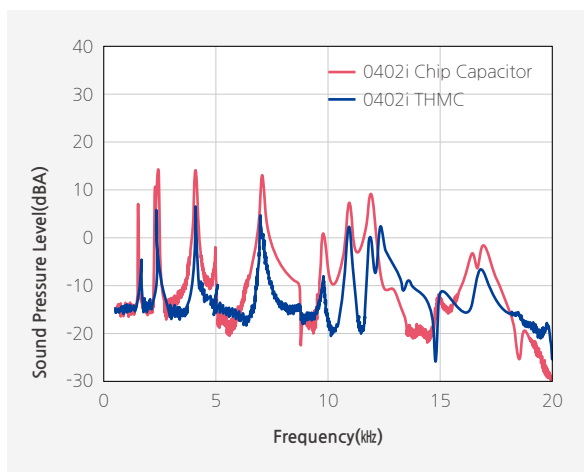
Low Acoustic Noise

## Features

- MLCC tremors can occur due to piezoelectric phenomena in electronic devices.
- These tremors are transmitted to the substrate, causing the substrate to tremble, causing audible noise (20Hz~20kHz).
- Low Acoustic Noise products are a solution that can effectively reduce this noise.



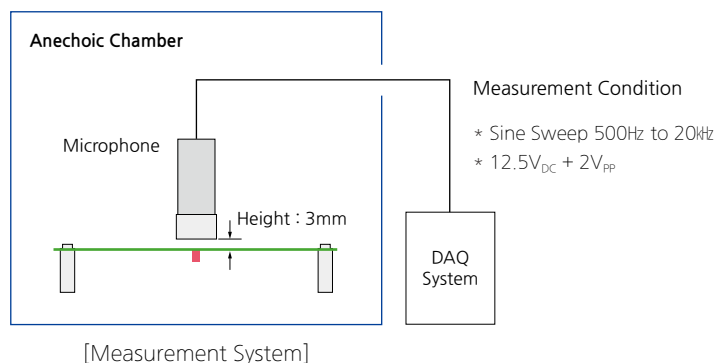
- \* THMC : Thick Horizontally Mounted Capacitor
- \* ANSC : Acoustic Noise Suppressed Capacitor



[Comparison of Noise Reduction Effects]



# Low Acoustic Noise Capacitors

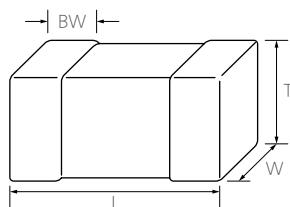


## Application

- All Application (Smart Phone, PC, HDD/SSD Board, Tablet, Display, Etc), Power (SMPS, DC-DC Converter), Industrial Application

## Structure and Dimensions

### Low Acoustic Noise Capacitor\_THMC



| Size Code | Dimension (mm) |           |           |                |                 | EIA (inch) |
|-----------|----------------|-----------|-----------|----------------|-----------------|------------|
|           | L              | W         | T         | Thkckness Code | BW              |            |
| 05        | 1.00±0.25      | 0.50±0.25 | 0.60±0.25 | 6              | 0.25±0.10       | 0402       |
|           | 1.00±0.15      | 0.50±0.15 | 0.70±0.10 | 7              |                 |            |
|           | 1.00±0.20      | 0.50±0.20 | 0.80±0.10 | 8              |                 |            |
|           | 1.00±0.20      | 0.50±0.20 | 0.90±0.10 | 9              |                 |            |
| 10        | 1.60±0.30      | 0.80±0.30 | 0.90±0.10 | 9              | 0.30±0.20       | 0603       |
|           | 1.60±0.25      | 0.80±0.25 | 0.85±0.10 | C              | 0.30±0.20       |            |
|           | 1.60±0.20      | 0.80±0.20 | 1.10±0.10 | E              |                 |            |
|           | 1.60±0.25      | 0.80±0.25 | 1.15±0.10 | M              |                 |            |
|           | 1.60±0.10      | 0.80±0.10 | 0.95±0.10 | N              |                 |            |
| 21        | 2.00±0.20      | 1.25±0.20 | 1.10±0.10 | E              | 0.50+0.20/-0.30 | 0805       |



# Low Acoustic Noise Capacitors

## Capacitance Table (X5R)

| TCC           | Size Code<br>(inch/mm) | Rated Voltage<br>(Vdc) | Capacitance |   |    |     |    |    |     |   |    |     |  |  | Capacitance<br>Range |
|---------------|------------------------|------------------------|-------------|---|----|-----|----|----|-----|---|----|-----|--|--|----------------------|
|               |                        |                        | pF          |   |    |     | nF |    |     |   | uF |     |  |  |                      |
|               |                        |                        | 0.1         | 1 | 10 | 100 | 1  | 10 | 100 | 1 | 10 | 100 |  |  |                      |
| X5R<br>(85°C) | 0402/1005              | 6.3                    |             |   |    |     |    |    |     |   |    |     |  |  | 10uF - 10uF          |
|               |                        | 10                     |             |   |    |     |    |    |     |   |    |     |  |  | 2.2uF - 10uF         |
|               |                        | 16                     |             |   |    |     |    |    |     |   |    |     |  |  | 2.2uF - 2.2uF        |
|               |                        | 25                     |             |   |    |     |    |    |     |   |    |     |  |  | 2.2uF - 2.2uF        |
|               | 0603/1608              | 6.3                    |             |   |    |     |    |    |     |   |    |     |  |  | 10uF - 47uF          |
|               |                        | 10                     |             |   |    |     |    |    |     |   |    |     |  |  | 4.7uF - 22uF         |
|               |                        | 25                     |             |   |    |     |    |    |     |   |    |     |  |  | 10uF - 10uF          |
|               | 0805/2012              | 25                     |             |   |    |     |    |    |     |   |    |     |  |  | 10uF - 10uF          |

## Capacitance Table (X6S)

| TCC            | Size Code<br>(inch/mm) | Rated Voltage<br>(Vdc) | Capacitance |   |    |     |    |    |     |   |    |     |  |  | Capacitance<br>Range |             |
|----------------|------------------------|------------------------|-------------|---|----|-----|----|----|-----|---|----|-----|--|--|----------------------|-------------|
|                |                        |                        | pF          |   |    |     | nF |    |     |   | uF |     |  |  |                      |             |
|                |                        |                        | 0.1         | 1 | 10 | 100 | 1  | 10 | 100 | 1 | 10 | 100 |  |  |                      |             |
| X6S<br>(105°C) | 0402/1005              | 2.5                    |             |   |    |     |    |    |     |   |    |     |  |  |                      | 20uF - 20uF |
|                | 0603/1608              | 6.3                    |             |   |    |     |    |    |     |   |    |     |  |  |                      | 22uF - 22uF |

## Product Lineup (X5R)

Size Code (inch/mm) : 0402/1005

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     | Remarks |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|---------|
| 1   | 0.65                   | 10                     | X5R | 4.7uF       | ±20%                     | CL05A475MP5NRB# | T-HMC   |
| 2   | 0.65                   | 10                     | X5R | 4.7uF       | ±20%                     | CL05A475MP5ZRB# | T-HMC   |
| 3   | 0.65                   | 16                     | X5R | 2.2uF       | ±20%                     | CL05A225M05ZOB# | T-HMC   |
| 4   | 0.65                   | 25                     | X5R | 2.2uF       | ±20%                     | CL05A225MA5NOB# | T-HMC   |
| 5   | 0.65                   | 25                     | X5R | 2.2uF       | ±20%                     | CL05A225MA5QOB# | T-HMC   |
| 6   | 0.80                   | 10                     | X5R | 10uF        | ±20%                     | CL05A106MP7NUB# | T-HMC   |
| 7   | 0.80                   | 10                     | X5R | 10uF        | ±20%                     | CL05A106MP7ZUB# | T-HMC   |
| 8   | 0.80                   | 10                     | X5R | 2.2uF       | ±10%                     | CL05A225KP7NSB# | T-HMC   |
| 9   | 0.80                   | 10                     | X5R | 4.7uF       | ±20%                     | CL05A475MP7NRB# | T-HMC   |
| 10  | 0.90                   | 6.3                    | X5R | 10uF        | ±20%                     | CL05A106MQ8NUB# | T-HMC   |
| 11  | 0.90                   | 10                     | X5R | 10uF        | ±20%                     | CL05A106MP8NUB# | T-HMC   |
| 12  | 1.00                   | 10                     | X5R | 10uF        | ±20%                     | CL05A106MP9NUB# | T-HMC   |



# Low Acoustic Noise Capacitors

Size Code (inch/mm) : 0603/1608

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     | Remarks |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|---------|
| 1   | 0.80                   | 10                     | X5R | 22uF        | ±20%                     | CL10A226MP7ZZB# | T-HMC   |
| 2   | 0.95                   | 6.3                    | X5R | 22uF        | ±20%                     | CL10A226MQCNUB# | T-HMC   |
| 3   | 0.95                   | 10                     | X5R | 22uF        | ±20%                     | CL10A226MPCNUB# | T-HMC   |
| 4   | 1.00                   | 10                     | X5R | 22uF        | ±20%                     | CL10A226MP9NZB# | T-HMC   |
| 5   | 1.00                   | 10                     | X5R | 4.7uF       | ±10%                     | CL10A475KP9NHB# | T-HMC   |
| 6   | 1.05                   | 6.3                    | X5R | 10uF        | ±20%                     | CL10A106MQNNHB# | T-HMC   |
| 7   | 1.05                   | 10                     | X5R | 10uF        | ±20%                     | CL10A106MPNNHB# | T-HMC   |
| 8   | 1.20                   | 6.3                    | X5R | 47uF        | ±20%                     | CL10A476MQENRB# | T-HMC   |
| 9   | 1.20                   | 25                     | X5R | 10uF        | ±20%                     | CL10A106MAEURN# | ANSC-B  |
| 10  | 1.25                   | 6.3                    | X5R | 22uF        | ±20%                     | CL10A226MQMNUB# | T-HMC   |
| 11  | 1.25                   | 10                     | X5R | 22uF        | ±20%                     | CL10A226MPMNUB# | T-HMC   |

Size Code (inch/mm) : 0805/2012

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     | Remarks |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|---------|
| 1   | 1.20                   | 25                     | X5R | 10uF        | ±10%                     | CL21A106KAENRB# | T-HMC   |
| 2   | 2.00                   | 25                     | X5R | 10uF        | ±10%                     | CL21A106KAUUNN# | ANSC-A  |

## Product Lineup (X6S)

Size Code (inch/mm) : 0402/1005

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     | Remarks |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|---------|
| 1   | 0.85                   | 2.5                    | X6S | 20uF        | ±20%                     | CL05X206MS6N6B# | T-HMC   |

Size Code (inch/mm) : 0603/1608

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     | Remarks |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|---------|
| 1   | 1.20                   | 6.3                    | X6S | 22uF        | ±20%                     | CL10X226MQEURN# | ANSC-B  |



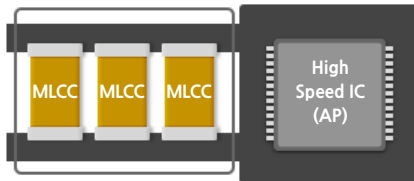
# Low ESL Capacitors

Low ESL

## Features

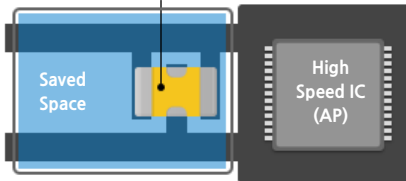
- MLCCs with low equivalent series inductance (ESL) can be used in circuits with limited mounting area, as a small quantity of such MLCCs can sufficiently replace high-speed IC MLCCs.

Multiple MLCC Used for Energy Transfer

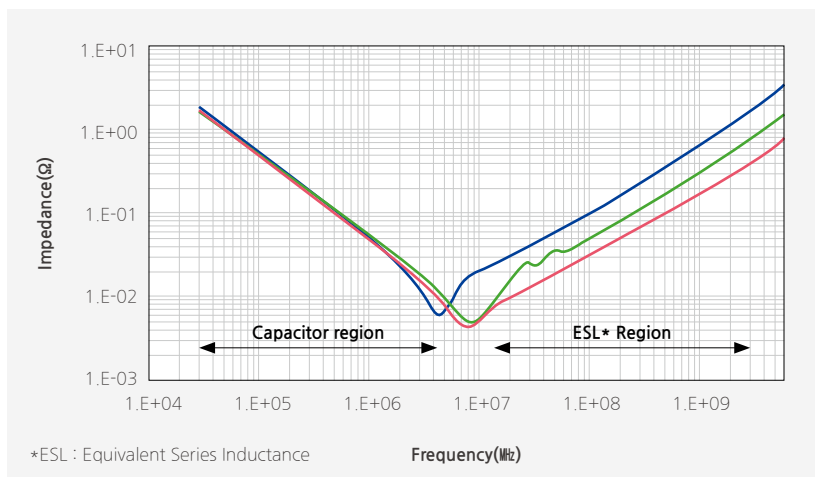


Multiple MLCCs Used

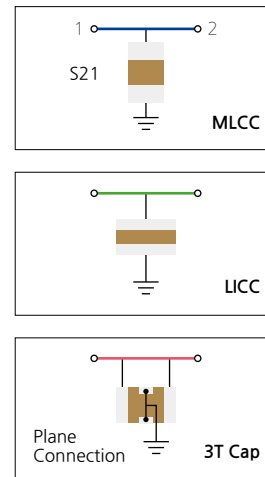
Low ESL MLCC



Low ESL MLCC Used



[Comparison between Impedance-Frequency Characteristics]



## Application

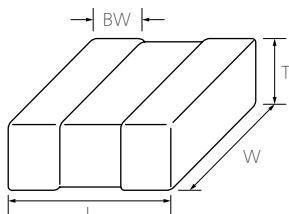
- All Application (Smart Phone, Wearable Devices, IC Package, PC)



# Low ESL Capacitors

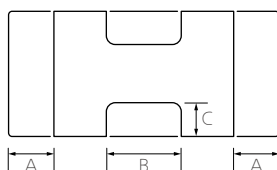
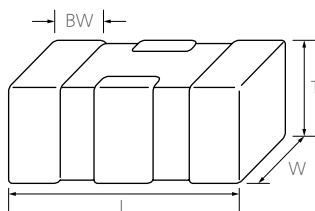
## Structure and Dimensions

Low ESL Capacitor\_Reverse



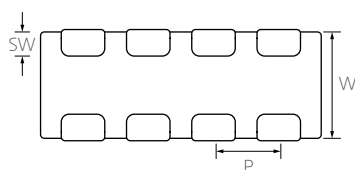
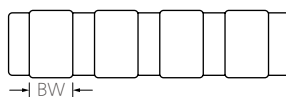
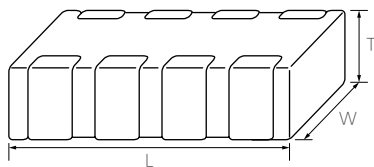
| Size Code | Dimension (mm) |           |                 |               |           | EIA (inch) |
|-----------|----------------|-----------|-----------------|---------------|-----------|------------|
|           | L              | W         | T               | Thckness Code | BW        |            |
| L5        | 0.52±0.05      | 1.00±0.05 | 0.20±0.02       | 2             | 0.18±0.06 | 0204       |
|           | 0.52±0.05      | 1.00±0.05 | 0.30±0.05       | 3             | 0.18±0.06 |            |
| 01        | 0.80±0.15      | 1.60±0.20 | 0.50±0.05/-0.10 | 5             | 0.25±0.15 | 0306       |

Low ESL Capacitor\_3T



| Size Code | Dimension (mm) |           |           |                |           |           |           | EIA (inch) |
|-----------|----------------|-----------|-----------|----------------|-----------|-----------|-----------|------------|
|           | L              | W         | T         | Thkckness Code | BW        |           |           |            |
|           |                |           |           |                | A         | B         | C         |            |
| 05        | 1.05±0.05      | 0.65±0.05 | 0.45±0.05 | 5              | 0.17±0.10 | 0.35±0.10 | 0.15±0.10 | 0402       |
|           | 1.10±0.15      | 0.60±0.05 | 0.60±0.05 | 6              | 0.20±0.10 | 0.35±0.10 | 0.15±0.10 |            |
|           | 1.00±0.15      | 0.50±0.15 | 0.30±0.09 | B              | 0.20±0.10 | 0.35±0.10 | 0.15±0.10 |            |
| 19        | 1.20±0.05      | 0.90±0.05 | 0.75±0.05 | 7              | 0.15±0.10 | 0.50±0.10 | 0.20±0.10 | 0503       |
|           | 1.20±0.05      | 0.90±0.05 | 0.60±0.05 | A              | 0.15±0.10 | 0.50±0.10 | 0.20±0.10 |            |

Low ESL Capacitor\_8T



| Size Code | Dimension (mm) |           |               |               |           |           |           | EIA (inch) |
|-----------|----------------|-----------|---------------|---------------|-----------|-----------|-----------|------------|
|           | L              | W         | T             | Thckness Code | BW        | SW        | P         |            |
| 10        | 1.60±0.10      | 0.80±0.10 | 0.5±0.05/-0.1 | 5             | 0.25±0.10 | 0.15±0.10 | 0.40±0.10 | 0603       |



# Low ESL Capacitors

Capacitance Table\_3T

| TCC            | Size Code<br>(inch/mm) | Rated Voltage<br>(Vdc) | Capacitance |   |    |     |    |    |     |   |    |     |  |  | Capacitance<br>Range |
|----------------|------------------------|------------------------|-------------|---|----|-----|----|----|-----|---|----|-----|--|--|----------------------|
|                |                        |                        | pF          |   |    |     | nF |    |     |   | uF |     |  |  |                      |
|                |                        |                        | 0.1         | 1 | 10 | 100 | 1  | 10 | 100 | 1 | 10 | 100 |  |  |                      |
| X5R<br>(85°C)  | 0402/1005              | 4                      |             |   |    |     |    |    |     |   |    |     |  |  | 4.3uF - 15uF         |
|                | 0503/1209              | 4                      |             |   |    |     |    |    |     |   |    |     |  |  | 15uF - 22uF          |
|                | 0805/2012              | 4                      |             |   |    |     |    |    |     |   |    |     |  |  | 47uF - 47uF          |
| X6S<br>(105°C) | 0402/1005              | 2.5                    |             |   |    |     |    |    |     |   |    |     |  |  | 4.3uF - 4.3uF        |
|                | 0503/1209              | 2.5                    |             |   |    |     |    |    |     |   |    |     |  |  | 22uF - 22uF          |
| X6T<br>(105°C) | 0402/1005              | 2.5                    |             |   |    |     |    |    |     |   |    |     |  |  | 6.7uF - 6.7uF        |

Capacitance Table\_8T

| TCC            | Size Code<br>(inch/mm) | Rated Voltage<br>(Vdc) | Capacitance |   |    |     |    |    |     |   |    |     |  |  | Capacitance<br>Range |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|----------------|------------------------|------------------------|-------------|---|----|-----|----|----|-----|---|----|-----|--|--|----------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
|                |                        |                        | pF          |   |    |     | nF |    |     |   | uF |     |  |  |                      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                |                        |                        | 0.1         | 1 | 10 | 100 | 1  | 10 | 100 | 1 | 10 | 100 |  |  |                      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| X7S<br>(125°C) | 0603/1608              | 4                      |             |   |    |     |    |    |     |   |    |     |  |  |                      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

Capacitance Table\_Reverse

| TCC            | Size Code<br>(inch/mm) | Rated Voltage<br>(Vdc) | Capacitance |   |    |     |    |    |     |   |    |     |  |  | Capacitance<br>Range |
|----------------|------------------------|------------------------|-------------|---|----|-----|----|----|-----|---|----|-----|--|--|----------------------|
|                |                        |                        | pF          |   |    |     | nF |    |     |   | uF |     |  |  |                      |
|                |                        |                        | 0.1         | 1 | 10 | 100 | 1  | 10 | 100 | 1 | 10 | 100 |  |  |                      |
| X5R<br>(85°C)  | 0204/0510              | 2.5                    |             |   |    |     |    |    |     |   |    |     |  |  | 550nF - 550nF        |
|                |                        | 4                      |             |   |    |     |    |    |     |   |    |     |  |  | 220nF - 220nF        |
| X6S<br>(105°C) | 0204/0510              | 2.5                    |             |   |    |     |    |    |     |   |    |     |  |  | 470nF - 470nF        |
|                |                        | 4                      |             |   |    |     |    |    |     |   |    |     |  |  | 1uF - 1uF            |
| X7S<br>(125°C) | 0306/0816              | 4                      |             |   |    |     |    |    |     |   |    |     |  |  | 1uF - 1uF            |



# Low ESL Capacitors

## Product Lineup (X5R\_3T)

Size Code (inch/mm) : 0402/1005

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     | Remarks     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|-------------|
| 1   | 0.39                   | 4                      | X5R | 6.7uF       | ±20%                     | CL05A675MRBNWR# | 3T(Low ESL) |
| 2   | 0.50                   | 4                      | X5R | 4.3uF       | ±20%                     | CL05A435MR5NWN# | 3T(Low ESL) |
| 3   | 0.65                   | 4                      | X5R | 11uF        | ±20%                     | CL05A116MR6DWR# | 3T(Low ESL) |
| 4   | 0.65                   | 4                      | X5R | 15uF        | ±20%                     | CL05A156MR6NWR# | 3T(Low ESL) |

Size Code (inch/mm) : 0503/1209

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     | Remarks     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|-------------|
| 1   | 0.55                   | 4                      | X5R | 22uF        | ±20%                     | CL19A226MR3NWU# | 3T(Low ESL) |
| 2   | 0.65                   | 4                      | X5R | 15uF        | ±20%                     | CL19A156MRANWN# | 3T(Low ESL) |
| 3   | 0.65                   | 4                      | X5R | 22uF        | ±20%                     | CL19A226MR5NWU# | 3T(Low ESL) |
| 4   | 0.65                   | 4                      | X5R | 22uF        | ±20%                     | CL19A226MRANWN# | 3T(Low ESL) |
| 5   | 0.80                   | 4                      | X5R | 22uF        | ±20%                     | CL19A226MR7IWW# | 3T(Low ESL) |
| 6   | 0.80                   | 4                      | X5R | 22uF        | ±20%                     | CL19A226MR7IWN# | 3T(Low ESL) |

## Product Lineup (X6S\_3T)

Size Code (inch/mm) : 0402/1005

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     | Remarks     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|-------------|
| 1   | 0.50                   | 2.5                    | X6S | 4.3uF       | ±20%                     | CL05X435MS5NWW# | 3T(Low ESL) |
| 2   | 0.50                   | 2.5                    | X6S | 4.3uF       | ±20%                     | CL05X435MS5NWN# | 3T(Low ESL) |

## Product Lineup (X6T\_3T)

Size Code (inch/mm) : 0402/1005

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     | Remarks     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|-------------|
| 1   | 0.39                   | 2.5                    | X6T | 6.7uF       | ±20%                     | CL05W675MSBNWR# | 3T(Low ESL) |



# Low ESL Capacitors

## Product Lineup (X7S\_8T)

Size Code (inch/mm) : 0603/1608

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     | Remarks     |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|-------------|
| 1   | 0.55                   | 4V                     | X7S | 2.2uF       | ±20%                     | CL10Y225MR5NJN# | 8T(Low ESL) |

## Product Lineup (X5R\_Reverse)

Size Code (inch/mm) : 0204/0510

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     | Remarks              |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|----------------------|
| 1   | 0.10                   | 2.5                    | X5R | 550nF       | ±20%                     | CLL5A554MSJHLC# | Reverse<br>(Low ESL) |
| 2   | 0.10                   | 4                      | X5R | 220nF       | ±20%                     | CLL5A224MRJHLC# | Reverse<br>(Low ESL) |

## Product Lineup (X6S\_Reverse)

Size Code (inch/mm) : 0204/0510

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     | Remarks              |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|----------------------|
| 1   | 0.10                   | 2.5                    | X6S | 470nF       | ±20%                     | CLL5X474MSJHLC# | Reverse<br>(Low ESL) |
| 2   | 0.35                   | 4                      | X6S | 1uF         | ±20%                     | CLL5X105MR3NLN# | Reverse<br>(Low ESL) |

## Product Lineup (X7S\_Reverse)

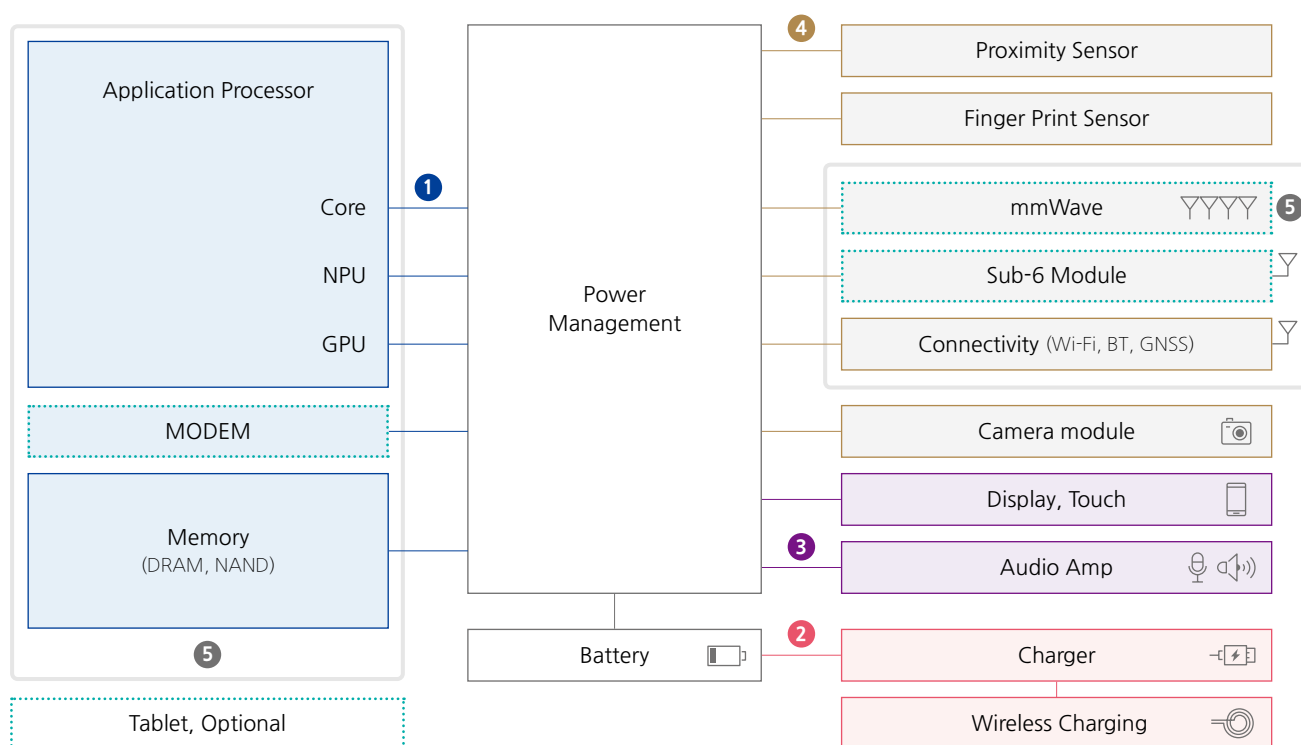
Size Code (inch/mm) : 0306/0816

| No. | Thickness Max.<br>(mm) | Rated Voltage<br>(Vdc) | TCC | Capacitance | Capacitance<br>Tolerance | Part Number     | Remarks              |
|-----|------------------------|------------------------|-----|-------------|--------------------------|-----------------|----------------------|
| 1   | 0.55                   | 4                      | X7S | 1uF         | ±20%                     | CL01Y105MR5NLN# | Reverse<br>(Low ESL) |

# Application Guide

## Smartphone / Tablet

As smartphone has high-performance hardware functions to provide enhanced user experience, various voltage regulators are required for each IC. Power management system includes several PMICs as well as charging system with external passive components.



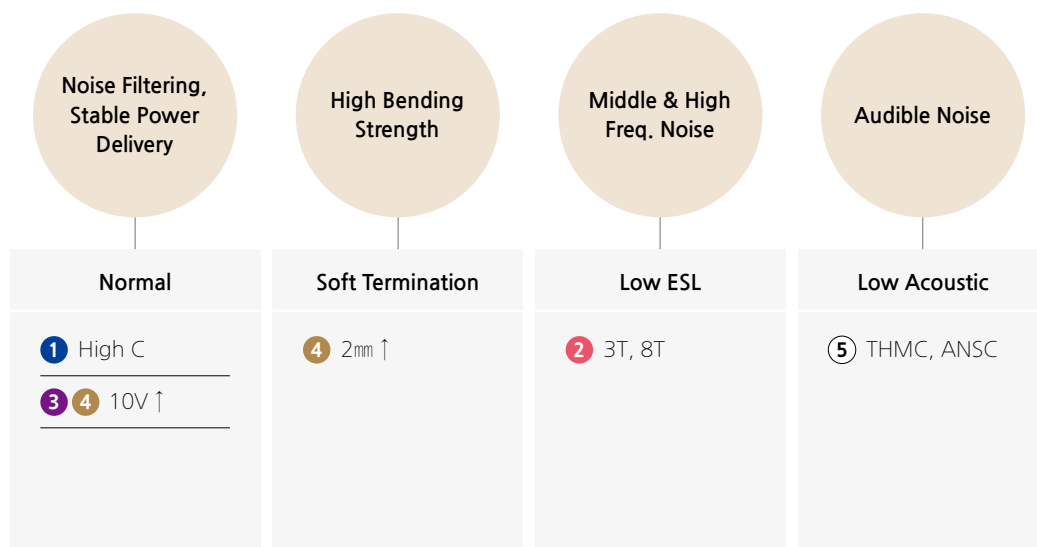
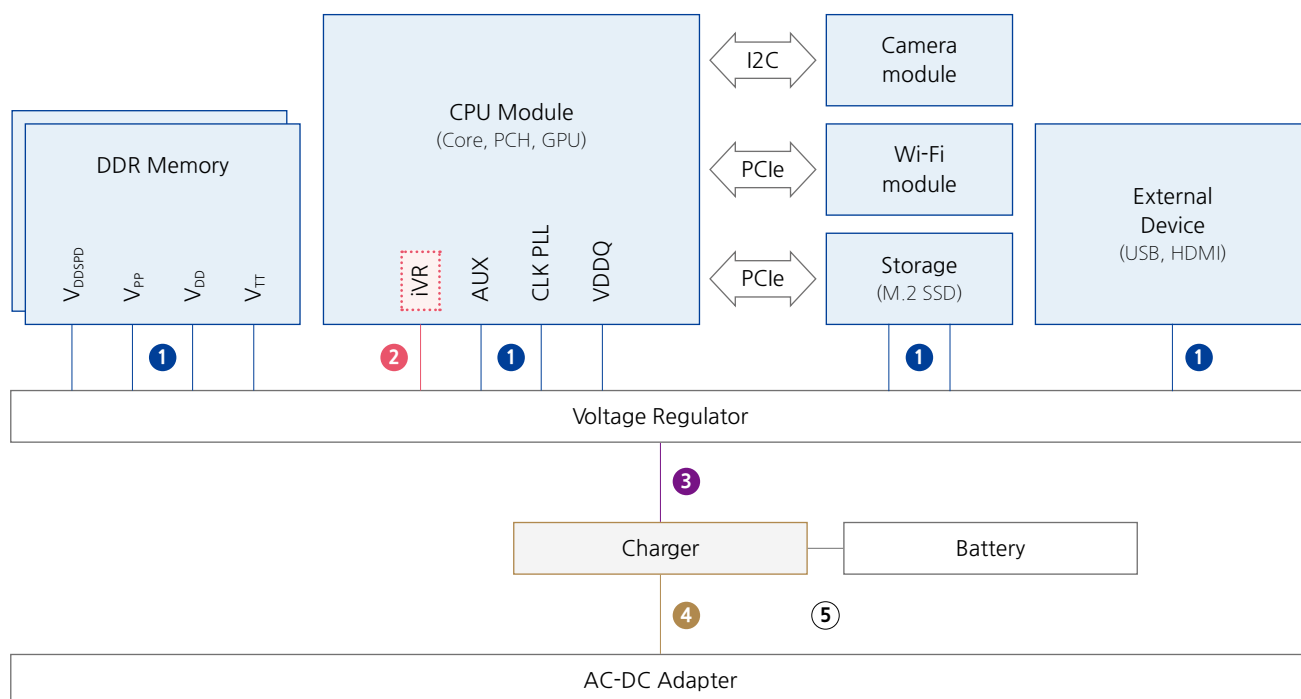
| Noise Filtering,<br>Stable Power<br>Delivery                       | High Bending<br>Strength | Middle & High<br>Freq. Noise | Audible Noise       | High Freq. Noise,<br>Limited Space |
|--------------------------------------------------------------------|--------------------------|------------------------------|---------------------|------------------------------------|
| Normal                                                             | Soft Termination         | Low ESL                      | Low Acoustic        | LSC                                |
| <b>1</b> High C<br><b>2</b> <b>3</b> 10V ↑<br><b>4</b> Low Profile | <b>2</b> <b>4</b> 2mm ↑  | <b>1</b> 3T                  | <b>2</b> THMC, ANSC | <b>5</b> Low Profile               |



# Application Guide

## Laptop

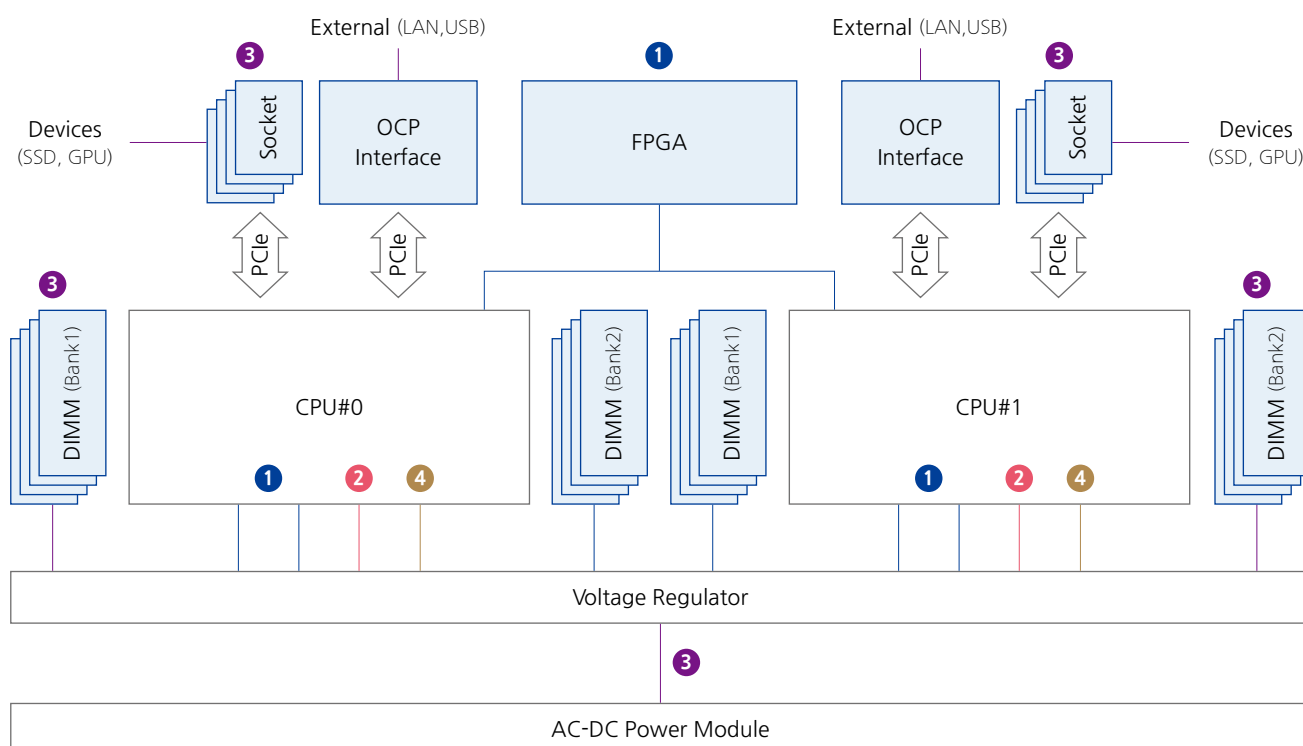
Laptop consist of various form factors and functions by models in consideration of the needs of various customers. In order to implement those functions, many of such function blocks as Memory, Storage, Wi-Fi, are organically connected around the CPU module, and require various power sources. In accordance with the recent trend of high performance, miniaturization and sliming of the sets, passive components are being developed with a focus on high temperature and high capacitance.



# Application Guide

## Server

In recent years, many technologies with upgraded performance, such as high-performance CPU, PCIe 5.0, and DDR5 are being applied to servers. Since such a high-performance server consumes a large amount of current during operation and generates a lot of heat to deteriorate the operation environment, high reliability of the components is required. CPU power line consuming a large amount of currents requires many small-sized and high-capacitance MLCCs to lower the impedance, and the components for high-temperature in the high-temperature environment around CPU.



Noise Filtering,  
Stable Power  
Delivery

High Bending  
Strength

Middle & High  
Freq. Noise

Normal

Soft Termination

Low ESL

- 1 High C
  - 3 16V ↑
  - 4 High Temp.
- (High Level I)

- 3 3mm ↑

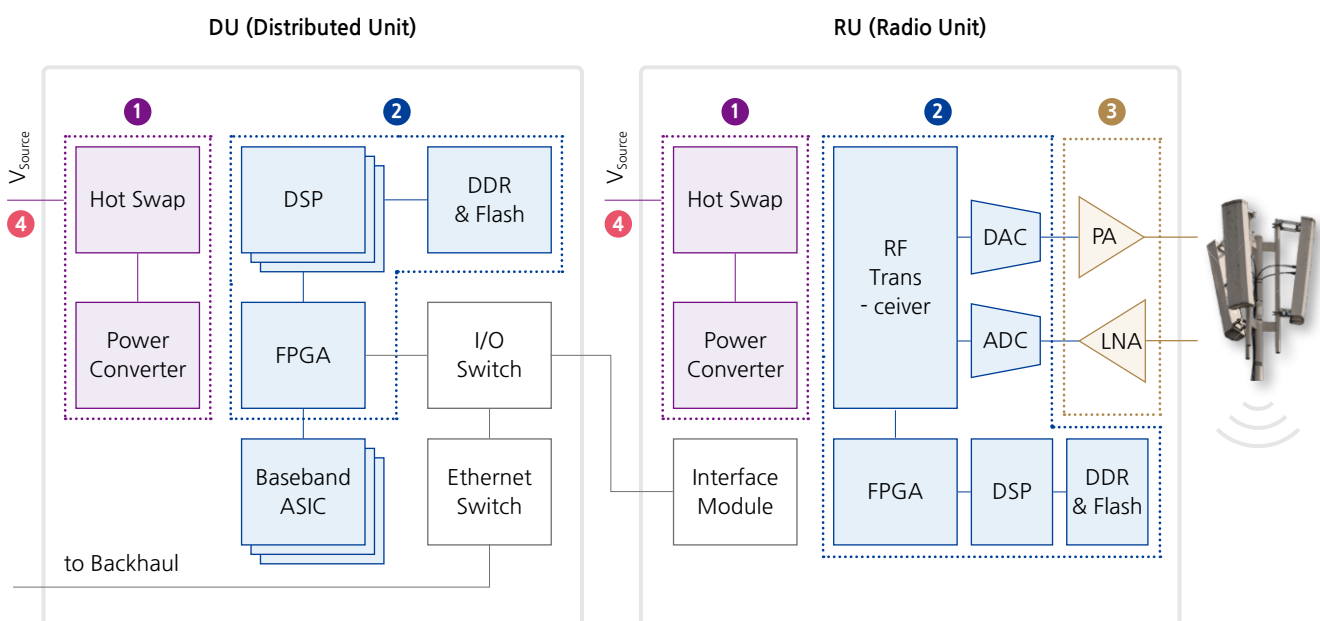
- 2 3T, 8T



# Application Guide

## Network (Base Station)

RUs are required to be small, light-weight and highly reliable because most of them are exposed to the sunlight being installed on towers or building roofs. With the introduction of 5G, high-integrated and high-performance FPGA/DSP are being used for network equipment to cope with the demand of faster data processing speed and to process the data traffic surge. Accordingly, the demand for high-capacitance MLCCs for stable power supply to high-performance ICs is increasing.



Noise Filtering,  
Stable Power  
Delivery

High Bending  
Strength

Normal

Soft Termination

1 3 High Volt.

1 2 3 High C

3 High Temp.

(High Level I)

4 3mm ↑



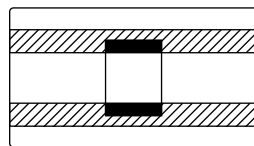
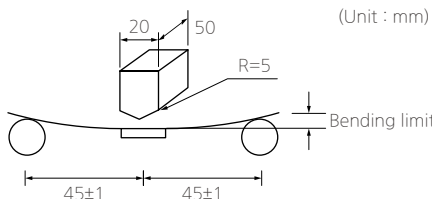
# Reliability Test Conditions

| No.             | Item                                                                                                                                                                                                                                                                                                                |             | Performance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Test condition                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                      |           |          |                       |          |                                      |          |                       |             |                       |               |         |                                                                                                                                                                                                                                                                                                                     |                                      |             |                       |      |                      |               |      |                 |                                     |     |                                      |     |                       |       |          |  |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|-----------|----------|-----------------------|----------|--------------------------------------|----------|-----------------------|-------------|-----------------------|---------------|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|-------------|-----------------------|------|----------------------|---------------|------|-----------------|-------------------------------------|-----|--------------------------------------|-----|-----------------------|-------|----------|--|
| 1               | Appearance                                                                                                                                                                                                                                                                                                          |             | No abnormal exterior appearance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Visual Inspection through Microscope (x10)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                      |           |          |                       |          |                                      |          |                       |             |                       |               |         |                                                                                                                                                                                                                                                                                                                     |                                      |             |                       |      |                      |               |      |                 |                                     |     |                                      |     |                       |       |          |  |
| 2               | Insulation resistance                                                                                                                                                                                                                                                                                               |             | 10,000MΩ min. or 500MΩ·μF min. (or 100MΩ·μF ) product whichever is smaller<br>(Rated voltage ≤16V :10,000MΩ min. or 100MΩ·μF min. product whichever is smaller)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Apply the rated voltage for 60 ~ 120sec.<br>Ratedvoltage > 500V: Insulation Resistance shall be measured with 500±50Vdc                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                      |           |          |                       |          |                                      |          |                       |             |                       |               |         |                                                                                                                                                                                                                                                                                                                     |                                      |             |                       |      |                      |               |      |                 |                                     |     |                                      |     |                       |       |          |  |
| 3               | Withstanding voltage                                                                                                                                                                                                                                                                                                |             | No dielectric breakdown ormechanical breakdown                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Apply the specified voltage* for 1~5 sec.<br>Charge / Discharge current limit: 50mA max.<br>* CLASS I (Rated Voltage < 100V) : 300% of the rated Voltage<br>CLASS II (Rated Voltage < 100V) : 250% of the rated Voltage<br><br>In the case of Vr ≥100V products, following condition shouldbe applied.<br>100V≤Rated Voltage < 500V : 250% of the rated Voltage<br>500V≤Rated Voltage < 1000V :150% of the rated Voltage<br>Rated Voltage≥1000V :120% of the rated Voltage                                                                                                                                                                                                                                                   |                                      |           |          |                       |          |                                      |          |                       |             |                       |               |         |                                                                                                                                                                                                                                                                                                                     |                                      |             |                       |      |                      |               |      |                 |                                     |     |                                      |     |                       |       |          |  |
| 4               | Capaci-<br>tance                                                                                                                                                                                                                                                                                                    | Class I     | Within the specified tolerance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>Class I</b> <table><tr><th>Capacitance</th><th>Frequency</th><th>Voltage</th></tr><tr><td>≤1,000pF</td><td>1kHz±10%</td><td rowspan="2">0.5~5Vrms</td></tr><tr><td>&gt;1,000pF</td><td>1kHz±10%</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Capacitance                          | Frequency | Voltage  | ≤1,000pF              | 1kHz±10% | 0.5~5Vrms                            | >1,000pF | 1kHz±10%              |             |                       |               |         |                                                                                                                                                                                                                                                                                                                     |                                      |             |                       |      |                      |               |      |                 |                                     |     |                                      |     |                       |       |          |  |
|                 |                                                                                                                                                                                                                                                                                                                     | Capacitance | Frequency                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Voltage                              |           |          |                       |          |                                      |          |                       |             |                       |               |         |                                                                                                                                                                                                                                                                                                                     |                                      |             |                       |      |                      |               |      |                 |                                     |     |                                      |     |                       |       |          |  |
| ≤1,000pF        | 1kHz±10%                                                                                                                                                                                                                                                                                                            | 0.5~5Vrms   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                      |           |          |                       |          |                                      |          |                       |             |                       |               |         |                                                                                                                                                                                                                                                                                                                     |                                      |             |                       |      |                      |               |      |                 |                                     |     |                                      |     |                       |       |          |  |
| >1,000pF        | 1kHz±10%                                                                                                                                                                                                                                                                                                            |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                      |           |          |                       |          |                                      |          |                       |             |                       |               |         |                                                                                                                                                                                                                                                                                                                     |                                      |             |                       |      |                      |               |      |                 |                                     |     |                                      |     |                       |       |          |  |
|                 |                                                                                                                                                                                                                                                                                                                     | Class II    | Within the specified tolerance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                      |           |          |                       |          |                                      |          |                       |             |                       |               |         |                                                                                                                                                                                                                                                                                                                     |                                      |             |                       |      |                      |               |      |                 |                                     |     |                                      |     |                       |       |          |  |
| 5               | Q                                                                                                                                                                                                                                                                                                                   | Class I     | Capacitance ≥30pF : Q ≥ 1,000<br>< 30pF : Q ≥ 400+20×C<br>( C : Capacitance )                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <b>Class II</b> <table><tr><th>Capacitance</th><th>Frequency</th><th>Voltage</th></tr><tr><td>≤10μF</td><td>1kHz±10%</td><td>1.0±0.2Vrms</td></tr><tr><td>&gt;10μF</td><td>120Hz±20%</td><td>0.5±0.1Vrms</td></tr></table><br><b>Exception</b> <table><tr><th>Capacitance</th><th>Frequency</th><th>Voltage</th></tr><tr><td>0201 (0603)size<br/>0.22μF≤C≤10μF<br/>Less than 10V<br/><br/>0402 (1005) size,<br/>2.2μF≤C≤10μF<br/>Less than 25V<br/><br/>0603 (1608) size,<br/>10μF<br/>Less than 25V<br/><br/>05J105KP5N3*<br/>05J105KQ5N3*<br/>03A105MO3NR*<br/>10B225KP8*<br/>21A475KQQ*<br/>21A106KQQ*<br/>21A625KPQ*<br/>21X106MRC*<br/>21X106KQQ*<br/>21B106KQO*</td><td>1kHz±10%</td><td>0.5±0.1Vrms</td></tr></table> | Capacitance                          | Frequency | Voltage  | ≤10μF                 | 1kHz±10% | 1.0±0.2Vrms                          | >10μF    | 120Hz±20%             | 0.5±0.1Vrms | Capacitance           | Frequency     | Voltage | 0201 (0603)size<br>0.22μF≤C≤10μF<br>Less than 10V<br><br>0402 (1005) size,<br>2.2μF≤C≤10μF<br>Less than 25V<br><br>0603 (1608) size,<br>10μF<br>Less than 25V<br><br>05J105KP5N3*<br>05J105KQ5N3*<br>03A105MO3NR*<br>10B225KP8*<br>21A475KQQ*<br>21A106KQQ*<br>21A625KPQ*<br>21X106MRC*<br>21X106KQQ*<br>21B106KQO* | 1kHz±10%                             | 0.5±0.1Vrms |                       |      |                      |               |      |                 |                                     |     |                                      |     |                       |       |          |  |
|                 | Capacitance                                                                                                                                                                                                                                                                                                         | Frequency   | Voltage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                      |           |          |                       |          |                                      |          |                       |             |                       |               |         |                                                                                                                                                                                                                                                                                                                     |                                      |             |                       |      |                      |               |      |                 |                                     |     |                                      |     |                       |       |          |  |
|                 | ≤10μF                                                                                                                                                                                                                                                                                                               | 1kHz±10%    | 1.0±0.2Vrms                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                      |           |          |                       |          |                                      |          |                       |             |                       |               |         |                                                                                                                                                                                                                                                                                                                     |                                      |             |                       |      |                      |               |      |                 |                                     |     |                                      |     |                       |       |          |  |
|                 | >10μF                                                                                                                                                                                                                                                                                                               | 120Hz±20%   | 0.5±0.1Vrms                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                      |           |          |                       |          |                                      |          |                       |             |                       |               |         |                                                                                                                                                                                                                                                                                                                     |                                      |             |                       |      |                      |               |      |                 |                                     |     |                                      |     |                       |       |          |  |
|                 | Capacitance                                                                                                                                                                                                                                                                                                         | Frequency   | Voltage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                      |           |          |                       |          |                                      |          |                       |             |                       |               |         |                                                                                                                                                                                                                                                                                                                     |                                      |             |                       |      |                      |               |      |                 |                                     |     |                                      |     |                       |       |          |  |
|                 | 0201 (0603)size<br>0.22μF≤C≤10μF<br>Less than 10V<br><br>0402 (1005) size,<br>2.2μF≤C≤10μF<br>Less than 25V<br><br>0603 (1608) size,<br>10μF<br>Less than 25V<br><br>05J105KP5N3*<br>05J105KQ5N3*<br>03A105MO3NR*<br>10B225KP8*<br>21A475KQQ*<br>21A106KQQ*<br>21A625KPQ*<br>21X106MRC*<br>21X106KQQ*<br>21B106KQO* | 1kHz±10%    | 0.5±0.1Vrms                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                      |           |          |                       |          |                                      |          |                       |             |                       |               |         |                                                                                                                                                                                                                                                                                                                     |                                      |             |                       |      |                      |               |      |                 |                                     |     |                                      |     |                       |       |          |  |
|                 | Tanδ                                                                                                                                                                                                                                                                                                                | Class II    | <b>1. Characteristic : A (X5R)</b> <table><tr><th>Rated Voltage</th><th>Spec</th></tr><tr><td>50V /35V</td><td>0.025 max / 0.05 max*</td></tr><tr><td>25V</td><td>0.025 max / 0.05 max*<br/>/ 0.10 max*</td></tr><tr><td>16V</td><td>0.035 max / 0.10 max*</td></tr><tr><td>≤10</td><td>0.035 max / 0.10 max*</td></tr></table><br><b>2. Characteristic :B (X7R), X (X6S), Y (X7S)</b> <table><tr><th>Rated Voltage</th><th>Spec</th></tr><tr><td>50V≥/ 35V / 25V</td><td>0.025 max / 0.05 max*<br/>/ 0.10 max*</td></tr><tr><td>16V</td><td>0.035 max / 0.10 max*</td></tr><tr><td>≤10V</td><td>0.05 max / 0.10 max*</td></tr></table><br><b>3.Characteristic : F (Y5V)</b> <table><tr><th>Rated Voltage</th><th>Spec</th></tr><tr><td>50V / 35V / 25V</td><td>0.05 max / 0.07 max*<br/>/ 0.09 max*</td></tr><tr><td>16V</td><td>0.07 max / 0.09 max*<br/>/ 0.125 max*</td></tr><tr><td>10V</td><td>0.125 max / 0.16 max*</td></tr><tr><td>≤6.3V</td><td>0.16 max</td></tr></table><br>※ The conditions of measurement may be altered upon request. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Rated Voltage                        | Spec      | 50V /35V | 0.025 max / 0.05 max* | 25V      | 0.025 max / 0.05 max*<br>/ 0.10 max* | 16V      | 0.035 max / 0.10 max* | ≤10         | 0.035 max / 0.10 max* | Rated Voltage | Spec    | 50V≥/ 35V / 25V                                                                                                                                                                                                                                                                                                     | 0.025 max / 0.05 max*<br>/ 0.10 max* | 16V         | 0.035 max / 0.10 max* | ≤10V | 0.05 max / 0.10 max* | Rated Voltage | Spec | 50V / 35V / 25V | 0.05 max / 0.07 max*<br>/ 0.09 max* | 16V | 0.07 max / 0.09 max*<br>/ 0.125 max* | 10V | 0.125 max / 0.16 max* | ≤6.3V | 0.16 max |  |
|                 |                                                                                                                                                                                                                                                                                                                     |             | Rated Voltage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Spec                                 |           |          |                       |          |                                      |          |                       |             |                       |               |         |                                                                                                                                                                                                                                                                                                                     |                                      |             |                       |      |                      |               |      |                 |                                     |     |                                      |     |                       |       |          |  |
|                 |                                                                                                                                                                                                                                                                                                                     |             | 50V /35V                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 0.025 max / 0.05 max*                |           |          |                       |          |                                      |          |                       |             |                       |               |         |                                                                                                                                                                                                                                                                                                                     |                                      |             |                       |      |                      |               |      |                 |                                     |     |                                      |     |                       |       |          |  |
|                 |                                                                                                                                                                                                                                                                                                                     |             | 25V                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 0.025 max / 0.05 max*<br>/ 0.10 max* |           |          |                       |          |                                      |          |                       |             |                       |               |         |                                                                                                                                                                                                                                                                                                                     |                                      |             |                       |      |                      |               |      |                 |                                     |     |                                      |     |                       |       |          |  |
| 16V             |                                                                                                                                                                                                                                                                                                                     |             | 0.035 max / 0.10 max*                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                      |           |          |                       |          |                                      |          |                       |             |                       |               |         |                                                                                                                                                                                                                                                                                                                     |                                      |             |                       |      |                      |               |      |                 |                                     |     |                                      |     |                       |       |          |  |
| ≤10             |                                                                                                                                                                                                                                                                                                                     |             | 0.035 max / 0.10 max*                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                      |           |          |                       |          |                                      |          |                       |             |                       |               |         |                                                                                                                                                                                                                                                                                                                     |                                      |             |                       |      |                      |               |      |                 |                                     |     |                                      |     |                       |       |          |  |
| Rated Voltage   |                                                                                                                                                                                                                                                                                                                     |             | Spec                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                      |           |          |                       |          |                                      |          |                       |             |                       |               |         |                                                                                                                                                                                                                                                                                                                     |                                      |             |                       |      |                      |               |      |                 |                                     |     |                                      |     |                       |       |          |  |
| 50V≥/ 35V / 25V |                                                                                                                                                                                                                                                                                                                     |             | 0.025 max / 0.05 max*<br>/ 0.10 max*                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                      |           |          |                       |          |                                      |          |                       |             |                       |               |         |                                                                                                                                                                                                                                                                                                                     |                                      |             |                       |      |                      |               |      |                 |                                     |     |                                      |     |                       |       |          |  |
| 16V             |                                                                                                                                                                                                                                                                                                                     |             | 0.035 max / 0.10 max*                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                      |           |          |                       |          |                                      |          |                       |             |                       |               |         |                                                                                                                                                                                                                                                                                                                     |                                      |             |                       |      |                      |               |      |                 |                                     |     |                                      |     |                       |       |          |  |
| ≤10V            | 0.05 max / 0.10 max*                                                                                                                                                                                                                                                                                                |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                      |           |          |                       |          |                                      |          |                       |             |                       |               |         |                                                                                                                                                                                                                                                                                                                     |                                      |             |                       |      |                      |               |      |                 |                                     |     |                                      |     |                       |       |          |  |
| Rated Voltage   | Spec                                                                                                                                                                                                                                                                                                                |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                      |           |          |                       |          |                                      |          |                       |             |                       |               |         |                                                                                                                                                                                                                                                                                                                     |                                      |             |                       |      |                      |               |      |                 |                                     |     |                                      |     |                       |       |          |  |
| 50V / 35V / 25V | 0.05 max / 0.07 max*<br>/ 0.09 max*                                                                                                                                                                                                                                                                                 |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                      |           |          |                       |          |                                      |          |                       |             |                       |               |         |                                                                                                                                                                                                                                                                                                                     |                                      |             |                       |      |                      |               |      |                 |                                     |     |                                      |     |                       |       |          |  |
| 16V             | 0.07 max / 0.09 max*<br>/ 0.125 max*                                                                                                                                                                                                                                                                                |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                      |           |          |                       |          |                                      |          |                       |             |                       |               |         |                                                                                                                                                                                                                                                                                                                     |                                      |             |                       |      |                      |               |      |                 |                                     |     |                                      |     |                       |       |          |  |
| 10V             | 0.125 max / 0.16 max*                                                                                                                                                                                                                                                                                               |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                      |           |          |                       |          |                                      |          |                       |             |                       |               |         |                                                                                                                                                                                                                                                                                                                     |                                      |             |                       |      |                      |               |      |                 |                                     |     |                                      |     |                       |       |          |  |
| ≤6.3V           | 0.16 max                                                                                                                                                                                                                                                                                                            |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                      |           |          |                       |          |                                      |          |                       |             |                       |               |         |                                                                                                                                                                                                                                                                                                                     |                                      |             |                       |      |                      |               |      |                 |                                     |     |                                      |     |                       |       |          |  |

You can check the specification at the web site or contact sales people for each product with mark\*



# Reliability Test Conditions

| No.                | Item                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                           | Performance                                                                                                                                                                                                                                                                        | Test condition     |                                       |                 |                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |             |                 |             |             |                           |                         |   |        |   |                         |   |        |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|---------------------------------------|-----------------|------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-----------------|-------------|-------------|---------------------------|-------------------------|---|--------|---|-------------------------|---|--------|
| 6                  | Temperature characteristics of capacitance                                                                                                                                                                                                                                                                                                      | Class I                                                                                                                                                                                                                                   | <table><tr><th>Characteristic</th><th>Temp. coefficient(PPM/°C)</th></tr><tr><td>c</td><td>0 ±30</td></tr></table>                                                                                                                                                                 | Characteristic     | Temp. coefficient(PPM/°C)             | c               | 0 ±30                                    | apacitance shall be measured by the steps shown in the following table.<br><br><table><tr><th>Step</th><th>Temperature(°C)</th></tr><tr><td>1</td><td>25 ± 2</td></tr><tr><td>2</td><td>Min. operating temp ± 2</td></tr><tr><td>3</td><td>25 ± 2</td></tr><tr><td>4</td><td>Max. operating temp ± 2</td></tr><tr><td>5</td><td>25 ± 2</td></tr></table><br><b>(1) Class I</b><br>Temperature Coefficient shall be calculated from the formula as below<br><br>$\text{Temp. Coefficient} = \frac{C2-C1}{C1 \times \Delta T} \times 10^6 [\text{ppm}/^\circ\text{C}]$<br>C1 : Capacitance at 3<br>C2 : Capacitance at 125°C<br>ΔT : 125°C-25°C=100°C<br><br><b>(1) Class II</b><br>Capacitance change shall be calculated from the formula as below<br><br>$\Delta C = \frac{C2-C1}{C1} \times 100(\%)$<br>C1 : Capacitance at step 3<br>C2 : Capacitance at step 2 & step 4 | Step        | Temperature(°C) | 1           | 25 ± 2      | 2                         | Min. operating temp ± 2 | 3 | 25 ± 2 | 4 | Max. operating temp ± 2 | 5 | 25 ± 2 |
|                    |                                                                                                                                                                                                                                                                                                                                                 | Characteristic                                                                                                                                                                                                                            | Temp. coefficient(PPM/°C)                                                                                                                                                                                                                                                          |                    |                                       |                 |                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |             |                 |             |             |                           |                         |   |        |   |                         |   |        |
|                    |                                                                                                                                                                                                                                                                                                                                                 | c                                                                                                                                                                                                                                         | 0 ±30                                                                                                                                                                                                                                                                              |                    |                                       |                 |                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |             |                 |             |             |                           |                         |   |        |   |                         |   |        |
|                    |                                                                                                                                                                                                                                                                                                                                                 | Step                                                                                                                                                                                                                                      | Temperature(°C)                                                                                                                                                                                                                                                                    |                    |                                       |                 |                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |             |                 |             |             |                           |                         |   |        |   |                         |   |        |
| 1                  | 25 ± 2                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                    |                    |                                       |                 |                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |             |                 |             |             |                           |                         |   |        |   |                         |   |        |
| 2                  | Min. operating temp ± 2                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                    |                    |                                       |                 |                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |             |                 |             |             |                           |                         |   |        |   |                         |   |        |
| 3                  | 25 ± 2                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                    |                    |                                       |                 |                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |             |                 |             |             |                           |                         |   |        |   |                         |   |        |
| 4                  | Max. operating temp ± 2                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                    |                    |                                       |                 |                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |             |                 |             |             |                           |                         |   |        |   |                         |   |        |
| 5                  | 25 ± 2                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                    |                    |                                       |                 |                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |             |                 |             |             |                           |                         |   |        |   |                         |   |        |
| Class II           | <table><tr><th>Capacitance change</th><th>Capacitance change</th></tr><tr><td>Characteristic</td><td>Capacitance change(%) without no bias</td></tr><tr><td>A(X5R) / B(X7R)</td><td>±15%</td></tr><tr><td>X(X6S), Y(X7S)</td><td>±22%</td></tr><tr><td>Z(X7T)</td><td>+22% ~ -33%</td></tr><tr><td>F(Y5V)</td><td>+22% ~ -82%</td></tr></table> | Capacitance change                                                                                                                                                                                                                        | Capacitance change                                                                                                                                                                                                                                                                 | Characteristic     | Capacitance change(%) without no bias | A(X5R) / B(X7R) | ±15%                                     | X(X6S), Y(X7S)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | ±22%        | Z(X7T)          | +22% ~ -33% | F(Y5V)      | +22% ~ -82%               |                         |   |        |   |                         |   |        |
| Capacitance change | Capacitance change                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                    |                    |                                       |                 |                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |             |                 |             |             |                           |                         |   |        |   |                         |   |        |
| Characteristic     | Capacitance change(%) without no bias                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                    |                    |                                       |                 |                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |             |                 |             |             |                           |                         |   |        |   |                         |   |        |
| A(X5R) / B(X7R)    | ±15%                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                    |                    |                                       |                 |                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |             |                 |             |             |                           |                         |   |        |   |                         |   |        |
| X(X6S), Y(X7S)     | ±22%                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                    |                    |                                       |                 |                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |             |                 |             |             |                           |                         |   |        |   |                         |   |        |
| Z(X7T)             | +22% ~ -33%                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                    |                    |                                       |                 |                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |             |                 |             |             |                           |                         |   |        |   |                         |   |        |
| F(Y5V)             | +22% ~ -82%                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                    |                    |                                       |                 |                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |             |                 |             |             |                           |                         |   |        |   |                         |   |        |
|                    |                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                    |                    |                                       |                 |                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |             |                 |             |             |                           |                         |   |        |   |                         |   |        |
|                    |                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                    |                    |                                       |                 |                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |             |                 |             |             |                           |                         |   |        |   |                         |   |        |
| 7                  | Adhesive strength of termination                                                                                                                                                                                                                                                                                                                | No indication of peeling shall occur on the terminal electrode.                                                                                                                                                                           | Apply 500g.f*pressure for 10±1 sec.<br>* 0201,0402(mm) 1N, 0603(mm) 2N,1005,1608(mm)5N, 2012,3216,3225(mm)10N<br><br>0201,0402(mm)1N<br>0603(mm)2N<br>1005,1608(mm)5N<br>2012,3216,3225(mm)10N |                    |                                       |                 |                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |             |                 |             |             |                           |                         |   |        |   |                         |   |        |
| 8                  | Appearance                                                                                                                                                                                                                                                                                                                                      | No mechanical damage shall occur.                                                                                                                                                                                                         | Bending Limit: 1mm<br>Test Speed: 1.0mm/sec.<br>Keep the test board at the limit point in 5 sec.<br>Then Measure Capacitance<br><br>(Unit : mm)                                                |                    |                                       |                 |                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |             |                 |             |             |                           |                         |   |        |   |                         |   |        |
|                    | Bending strength                                                                                                                                                                                                                                                                                                                                | Capacitance<br><table><tr><th>Capacitance change</th><th>Capacitance change</th></tr><tr><td>Class I</td><td>Within ±5% or ±0.5pF whichever is larger</td></tr><tr><td>Class II</td><td>Within ±10%</td></tr></table>                     |                                                                                                                                                                                                                                                                                    | Capacitance change | Capacitance change                    | Class I         | Within ±5% or ±0.5pF whichever is larger | Class II                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Within ±10% |                 |             |             |                           |                         |   |        |   |                         |   |        |
| Capacitance change | Capacitance change                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                    |                    |                                       |                 |                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |             |                 |             |             |                           |                         |   |        |   |                         |   |        |
| Class I            | Within ±5% or ±0.5pF whichever is larger                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                    |                    |                                       |                 |                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |             |                 |             |             |                           |                         |   |        |   |                         |   |        |
| Class II           | Within ±10%                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                    |                    |                                       |                 |                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |             |                 |             |             |                           |                         |   |        |   |                         |   |        |
| 9                  | Solderability                                                                                                                                                                                                                                                                                                                                   | More than 75% of the terminal surface is to be soldered newly, so metal part does not come out or dissolve<br>In the case of Vr≥100V products: 95%<br> | <table><tr><td>Solder</td><td>Sn_Ag3_0.5Cu</td></tr><tr><td>Solder temp.</td><td>245±5°C</td></tr><tr><td>Flux</td><td>RMA Type</td></tr><tr><td>Dip time</td><td>3±0.3sec</td></tr><tr><td>Pre-heating</td><td>at 80~120°C for 10~30sec.</td></tr></table>                        | Solder             | Sn_Ag3_0.5Cu                          | Solder temp.    | 245±5°C                                  | Flux                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | RMA Type    | Dip time        | 3±0.3sec    | Pre-heating | at 80~120°C for 10~30sec. |                         |   |        |   |                         |   |        |
| Solder             | Sn_Ag3_0.5Cu                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                    |                    |                                       |                 |                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |             |                 |             |             |                           |                         |   |        |   |                         |   |        |
| Solder temp.       | 245±5°C                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                    |                    |                                       |                 |                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |             |                 |             |             |                           |                         |   |        |   |                         |   |        |
| Flux               | RMA Type                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                    |                    |                                       |                 |                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |             |                 |             |             |                           |                         |   |        |   |                         |   |        |
| Dip time           | 3±0.3sec                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                    |                    |                                       |                 |                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |             |                 |             |             |                           |                         |   |        |   |                         |   |        |
| Pre-heating        | at 80~120°C for 10~30sec.                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                    |                    |                                       |                 |                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |             |                 |             |             |                           |                         |   |        |   |                         |   |        |



# Reliability Test Conditions

| No.                       | Item                                           | Performance                        |                                                                                                                                                                                                                                                                                                                                                    | Test condition                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                         |          |                    |         |        |                                         |          |                                                |              |        |             |  |
|---------------------------|------------------------------------------------|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|----------|--------------------|---------|--------|-----------------------------------------|----------|------------------------------------------------|--------------|--------|-------------|--|
| 10                        | Resis-<br>tance to<br>soldering<br>heat        | Appearance                         | No mechanical damage shall occur                                                                                                                                                                                                                                                                                                                   |                                                | <div>Solder temperature: 270±5℃DIP TIME:10±1 sec.<br/>Each termination shall be fully immersed and preheated as below:</div> <table><tr><th>Step</th><th>Temp.(℃)</th><th>Time(sec.)</th></tr><tr><td>1</td><td>80~100</td><td>60</td></tr><tr><td>2</td><td>150~180</td><td>60</td></tr></table> <div>Leave the capacitor in ambient condition for specified time* before measurement.<br/>* 24±2 Hours (Class I )<br/>24±2 Hours (Class II )</div> | Step                                    | Temp.(℃) | Time(sec.)         | 1       | 80~100 | 60                                      | 2        | 150~180                                        | 60           |        |             |  |
|                           |                                                | Step                               | Temp.(℃)                                                                                                                                                                                                                                                                                                                                           | Time(sec.)                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                         |          |                    |         |        |                                         |          |                                                |              |        |             |  |
|                           |                                                | 1                                  | 80~100                                                                                                                                                                                                                                                                                                                                             | 60                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                         |          |                    |         |        |                                         |          |                                                |              |        |             |  |
|                           |                                                | 2                                  | 150~180                                                                                                                                                                                                                                                                                                                                            | 60                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                         |          |                    |         |        |                                         |          |                                                |              |        |             |  |
|                           |                                                | Capacitance                        | <table><tr><th colspan="2">Capacitance change</th><th>Capacitance change</th></tr><tr><td colspan="2">Class I</td><td>±2.5% or ±0.25pF<br/>whichever is larger</td></tr><tr><td rowspan="3">Class II</td><td>A(X5R)<br/>B(X7R)<br/>X(X6S)<br/>Y(X7S)<br/>Z(X7T)</td><td>Within ±7.5%</td></tr><tr><td>F(Y5V)</td><td>Within ±20%</td></tr></table> |                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Capacitance change                      |          | Capacitance change | Class I |        | ±2.5% or ±0.25pF<br>whichever is larger | Class II | A(X5R)<br>B(X7R)<br>X(X6S)<br>Y(X7S)<br>Z(X7T) | Within ±7.5% | F(Y5V) | Within ±20% |  |
|                           |                                                |                                    | Capacitance change                                                                                                                                                                                                                                                                                                                                 |                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Capacitance change                      |          |                    |         |        |                                         |          |                                                |              |        |             |  |
|                           |                                                |                                    | Class I                                                                                                                                                                                                                                                                                                                                            |                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                      | ±2.5% or ±0.25pF<br>whichever is larger |          |                    |         |        |                                         |          |                                                |              |        |             |  |
| Class II                  | A(X5R)<br>B(X7R)<br>X(X6S)<br>Y(X7S)<br>Z(X7T) |                                    | Within ±7.5%                                                                                                                                                                                                                                                                                                                                       |                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                         |          |                    |         |        |                                         |          |                                                |              |        |             |  |
|                           | F(Y5V)                                         | Within ±20%                        |                                                                                                                                                                                                                                                                                                                                                    |                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                         |          |                    |         |        |                                         |          |                                                |              |        |             |  |
|                           | Q(Class I )                                    |                                    | Within the specified initial value                                                                                                                                                                                                                                                                                                                 |                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                         |          |                    |         |        |                                         |          |                                                |              |        |             |  |
| Tanδ(Class II)            |                                                | Within the specified initial value |                                                                                                                                                                                                                                                                                                                                                    |                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                         |          |                    |         |        |                                         |          |                                                |              |        |             |  |
| Insulation resistance     |                                                | Within the specified initial value |                                                                                                                                                                                                                                                                                                                                                    |                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                         |          |                    |         |        |                                         |          |                                                |              |        |             |  |
| Withstand-<br>ing voltage |                                                | No breakdown of dielectric         |                                                                                                                                                                                                                                                                                                                                                    |                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                         |          |                    |         |        |                                         |          |                                                |              |        |             |  |
| 11                        | Vibration<br>test                              | Appearance                         | No mechanical damage shall occur.                                                                                                                                                                                                                                                                                                                  |                                                | <div>The capacitor shall be subjected to a harmonic motion having a total amplitude of 1.5mm changing frequency from 10Hz to 55Hz and back to 10Hz in about 1 min.</div> <div>Repeat this for 2hours each in 3mutually perpendicular directions.</div>                                                                                                                                                                                               |                                         |          |                    |         |        |                                         |          |                                                |              |        |             |  |
|                           |                                                | Capacitance                        | <table><tr><th colspan="2">Capacitance change</th><th>Capacitance change</th></tr><tr><td colspan="2">Class I</td><td>±2.5% or ±0.25pF<br/>whichever is larger</td></tr><tr><td rowspan="3">Class II</td><td>A(X5R)<br/>B(X7R)<br/>X(X6S)<br/>Y(X7S)<br/>Z(X7T)</td><td>Within ±5%</td></tr><tr><td>F(Y5V)</td><td>Within ±20%</td></tr></table>   |                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Capacitance change                      |          | Capacitance change | Class I |        | ±2.5% or ±0.25pF<br>whichever is larger | Class II | A(X5R)<br>B(X7R)<br>X(X6S)<br>Y(X7S)<br>Z(X7T) | Within ±5%   | F(Y5V) | Within ±20% |  |
|                           |                                                |                                    | Capacitance change                                                                                                                                                                                                                                                                                                                                 |                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Capacitance change                      |          |                    |         |        |                                         |          |                                                |              |        |             |  |
|                           |                                                |                                    | Class I                                                                                                                                                                                                                                                                                                                                            |                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                      | ±2.5% or ±0.25pF<br>whichever is larger |          |                    |         |        |                                         |          |                                                |              |        |             |  |
|                           |                                                |                                    | Class II                                                                                                                                                                                                                                                                                                                                           | A(X5R)<br>B(X7R)<br>X(X6S)<br>Y(X7S)<br>Z(X7T) |                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Within ±5%                              |          |                    |         |        |                                         |          |                                                |              |        |             |  |
|                           |                                                | F(Y5V)                             |                                                                                                                                                                                                                                                                                                                                                    | Within ±20%                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                         |          |                    |         |        |                                         |          |                                                |              |        |             |  |
|                           |                                                | Q(Class I )                        |                                                                                                                                                                                                                                                                                                                                                    | Within the specified initial value             |                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                         |          |                    |         |        |                                         |          |                                                |              |        |             |  |
| Tanδ(Class II)            |                                                | Within the specified initial value |                                                                                                                                                                                                                                                                                                                                                    |                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                         |          |                    |         |        |                                         |          |                                                |              |        |             |  |
| Insulation resistance     |                                                | Within the specified initial value |                                                                                                                                                                                                                                                                                                                                                    |                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                         |          |                    |         |        |                                         |          |                                                |              |        |             |  |



# Reliability Test Conditions

| No.         | Performance                  |                                                                                                                                                                                                                                                                                                                                                          | Test condition                                 |                                         |                    |         |  |                                         |          |                                                |               |        |      |                                                                                                                    |
|-------------|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|-----------------------------------------|--------------------|---------|--|-----------------------------------------|----------|------------------------------------------------|---------------|--------|------|--------------------------------------------------------------------------------------------------------------------|
| 12          | Appearance                   | No mechanical damage shall occur                                                                                                                                                                                                                                                                                                                         | Applied voltage : Rated voltage                |                                         |                    |         |  |                                         |          |                                                |               |        |      |                                                                                                                    |
|             | Capacitance                  | <table><tr><th colspan="2">Capacitance change</th><th>Capacitance change</th></tr><tr><td colspan="2">Class I</td><td>±7.5% or ±0.75pF<br/>whichever is larger</td></tr><tr><td rowspan="3">Class II</td><td>A(X5R)<br/>B(X7R)<br/>X(X6S)<br/>Y(X7S)<br/>Z(X7T)</td><td rowspan="3">Within ±12.5%</td></tr><tr><td>F(Y5V)</td><td>±30%</td></tr></table> | Capacitance change                             |                                         | Capacitance change | Class I |  | ±7.5% or ±0.75pF<br>whichever is larger | Class II | A(X5R)<br>B(X7R)<br>X(X6S)<br>Y(X7S)<br>Z(X7T) | Within ±12.5% | F(Y5V) | ±30% | Temperature : 40±2℃<br>Humidity : 90~95%RH<br>Duration time : 500+12/-0Hr.<br>Charge/Discharge current : 50mA max. |
|             |                              | Capacitance change                                                                                                                                                                                                                                                                                                                                       |                                                | Capacitance change                      |                    |         |  |                                         |          |                                                |               |        |      |                                                                                                                    |
|             |                              | Class I                                                                                                                                                                                                                                                                                                                                                  |                                                | ±7.5% or ±0.75pF<br>whichever is larger |                    |         |  |                                         |          |                                                |               |        |      |                                                                                                                    |
|             |                              | Class II                                                                                                                                                                                                                                                                                                                                                 | A(X5R)<br>B(X7R)<br>X(X6S)<br>Y(X7S)<br>Z(X7T) | Within ±12.5%                           |                    |         |  |                                         |          |                                                |               |        |      |                                                                                                                    |
| F(Y5V)      | ±30%                         |                                                                                                                                                                                                                                                                                                                                                          |                                                |                                         |                    |         |  |                                         |          |                                                |               |        |      |                                                                                                                    |
| Q(Class I ) | Capacitance ≥30pF: Q≥200<br> |                                                                                                                                                                                                                                                                                                                                                          |                                                |                                         |                    |         |  |                                         |          |                                                |               |        |      |                                                                                                                    |



# Reliability Test Conditions

| No.                   | Item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Performance                                                                                                                                                                                                                                                                                                                               | Test condition                                                                                      |  |                    |         |  |                                      |          |                                                |               |        |      |                                                                                                                                                                                                                                                                                                        |
|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|--|--------------------|---------|--|--------------------------------------|----------|------------------------------------------------|---------------|--------|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 13                    | Appearance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | No mechanical damage shall occur                                                                                                                                                                                                                                                                                                          | Temperature : max. operating temperature                                                            |  |                    |         |  |                                      |          |                                                |               |        |      |                                                                                                                                                                                                                                                                                                        |
|                       | Capacitance                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <table><tr><th colspan="2">Capacitance change</th><th>Capacitance change</th></tr><tr><td colspan="2">Class I</td><td>±3% or ±0.3pF<br/>whichever is larger</td></tr><tr><td rowspan="3">Class II</td><td>A(X5R)<br/>B(X7R)<br/>X(X6S)<br/>Y(X7S)<br/>Z(X7T)</td><td>Within ±12.5%</td></tr><tr><td>F(Y5V)</td><td>±30%</td></tr></table> | Capacitance change                                                                                  |  | Capacitance change | Class I |  | ±3% or ±0.3pF<br>whichever is larger | Class II | A(X5R)<br>B(X7R)<br>X(X6S)<br>Y(X7S)<br>Z(X7T) | Within ±12.5% | F(Y5V) | ±30% | Duration Time: 1000+48/-0 Hr.<br>Charge/Discharge Current: 50mAmax.<br><br>Apply Voltage : 100% of Rated Voltage<br>It depends on each item (120%/150%/200% Rated Voltage)<br><br>Perform the initial measurement according to Note1 for class II<br>Perform the final measurement according to Note2. |
|                       | Capacitance change                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                           | Capacitance change                                                                                  |  |                    |         |  |                                      |          |                                                |               |        |      |                                                                                                                                                                                                                                                                                                        |
|                       | Class I                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                           | ±3% or ±0.3pF<br>whichever is larger                                                                |  |                    |         |  |                                      |          |                                                |               |        |      |                                                                                                                                                                                                                                                                                                        |
|                       | Class II                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | A(X5R)<br>B(X7R)<br>X(X6S)<br>Y(X7S)<br>Z(X7T)                                                                                                                                                                                                                                                                                            | Within ±12.5%                                                                                       |  |                    |         |  |                                      |          |                                                |               |        |      |                                                                                                                                                                                                                                                                                                        |
| F(Y5V)                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | ±30%                                                                                                                                                                                                                                                                                                                                      |                                                                                                     |  |                    |         |  |                                      |          |                                                |               |        |      |                                                                                                                                                                                                                                                                                                        |
| Q(Class I )           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Capacitance≥30pF : Q≥350<br>10pF≤Capacitance<30pF : Q≥275+2.5×C<br>Capacitance < 10pF: Q≥200+10×C<br>(C: Capacitance)                                                                                                                                                                                                                     | You can check the specification at the web site or contact sales people for each product with mark* |  |                    |         |  |                                      |          |                                                |               |        |      |                                                                                                                                                                                                                                                                                                        |
| Tanδ(Class II)        | <b>1. Capacitance :A (X5R)</b><br>0.05 max / 0.075 max* (35V / 50V)<br>0.05 max / 0.075 max* / 0.125 max*(16V / 25V)<br>0.075 max / 0.125 max* (≤10V)<br><br><b>2. Capacitance : B (X7R), X (X6S)</b><br>0.05 max / 0.125 max* (16V / 25V / 35V / 50V≥)<br>0.075 max / 0.125 max* (≤10V)<br><br><b>3. Capacitance : F (Y5V)</b><br>0.09 max (50V)<br>0.09 max / 0.125 max* (25V / 35V)<br>0.09 max / 0.125 max* / 0.16 max* (16V)<br>0.16 max / 0.195 max* (10V)<br>0.195 max (4V / 6.3V) |                                                                                                                                                                                                                                                                                                                                           |                                                                                                     |  |                    |         |  |                                      |          |                                                |               |        |      |                                                                                                                                                                                                                                                                                                        |
| Insulation resistance | 1,000MΩmin. or 50MΩ·μFmin.<br>product whichever is smaller / 25MΩ·μFfor over*                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                           |                                                                                                     |  |                    |         |  |                                      |          |                                                |               |        |      |                                                                                                                                                                                                                                                                                                        |



# Reliability Test Conditions

| No.                        |                                    | Item        | Performance                      | Test condition                                                                                                                                                                                                                                                                                                                                            |                                         |           |            |   |                      |    |   |    |     |   |                      |    |   |    |     |
|----------------------------|------------------------------------|-------------|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|-----------|------------|---|----------------------|----|---|----|-----|---|----------------------|----|---|----|-----|
| 14                         | Temperature cycle                  | Appearance  | No mechanical damage shall occur | Capacitor shall be subjected to 5 cycles.<br>Condition for 1 cycle : <table><tr><th>Step</th><th>Temp.(°C)</th><th>Time(min.)</th></tr><tr><td>1</td><td>Min.rated temp.+0/-3</td><td>30</td></tr><tr><td>2</td><td>25</td><td>2~3</td></tr><tr><td>3</td><td>Max.rated temp.+3/-0</td><td>30</td></tr><tr><td>4</td><td>25</td><td>2~3</td></tr></table> | Step                                    | Temp.(°C) | Time(min.) | 1 | Min.rated temp.+0/-3 | 30 | 2 | 25 | 2~3 | 3 | Max.rated temp.+3/-0 | 30 | 4 | 25 | 2~3 |
|                            |                                    | Step        | Temp.(°C)                        |                                                                                                                                                                                                                                                                                                                                                           | Time(min.)                              |           |            |   |                      |    |   |    |     |   |                      |    |   |    |     |
|                            |                                    | 1           | Min.rated temp.+0/-3             |                                                                                                                                                                                                                                                                                                                                                           | 30                                      |           |            |   |                      |    |   |    |     |   |                      |    |   |    |     |
|                            |                                    | 2           | 25                               |                                                                                                                                                                                                                                                                                                                                                           | 2~3                                     |           |            |   |                      |    |   |    |     |   |                      |    |   |    |     |
|                            |                                    | 3           | Max.rated temp.+3/-0             |                                                                                                                                                                                                                                                                                                                                                           | 30                                      |           |            |   |                      |    |   |    |     |   |                      |    |   |    |     |
|                            |                                    | 4           | 25                               | 2~3                                                                                                                                                                                                                                                                                                                                                       |                                         |           |            |   |                      |    |   |    |     |   |                      |    |   |    |     |
|                            |                                    | Capacitance | Capacitance change               |                                                                                                                                                                                                                                                                                                                                                           | Capacitance change                      |           |            |   |                      |    |   |    |     |   |                      |    |   |    |     |
|                            |                                    |             | Class I                          |                                                                                                                                                                                                                                                                                                                                                           | ±2.5% or ±0.25pF<br>whichever is larger |           |            |   |                      |    |   |    |     |   |                      |    |   |    |     |
|                            |                                    |             | Class II                         | A(X5R)                                                                                                                                                                                                                                                                                                                                                    | Within<br>±7.5%/±10%/±15%*              |           |            |   |                      |    |   |    |     |   |                      |    |   |    |     |
|                            |                                    |             |                                  | B(X7R)                                                                                                                                                                                                                                                                                                                                                    | Within ±7.5%                            |           |            |   |                      |    |   |    |     |   |                      |    |   |    |     |
| X(X6S)<br>Y(X7S)<br>Z(X7T) | Within ±15%                        |             |                                  |                                                                                                                                                                                                                                                                                                                                                           |                                         |           |            |   |                      |    |   |    |     |   |                      |    |   |    |     |
| F(Y5V)                     | Within ±20%                        |             |                                  |                                                                                                                                                                                                                                                                                                                                                           |                                         |           |            |   |                      |    |   |    |     |   |                      |    |   |    |     |
| Q(Class I)                 | Within the specified initial value |             |                                  |                                                                                                                                                                                                                                                                                                                                                           |                                         |           |            |   |                      |    |   |    |     |   |                      |    |   |    |     |
| Tanδ(Class II)             | Within the specified initial value |             |                                  |                                                                                                                                                                                                                                                                                                                                                           |                                         |           |            |   |                      |    |   |    |     |   |                      |    |   |    |     |
| Insulation resistance      | Within the specified initial value |             |                                  |                                                                                                                                                                                                                                                                                                                                                           |                                         |           |            |   |                      |    |   |    |     |   |                      |    |   |    |     |
|                            |                                    |             |                                  | Leave the capacitor in ambient condition for specified time before measurement.<br>* 24±2 Hours (Class I)<br>24±2 Hours (Class II)                                                                                                                                                                                                                        |                                         |           |            |   |                      |    |   |    |     |   |                      |    |   |    |     |

Note 1. Initial Measurement For ClassII  
Perform the heat treatment at 150°C +0/-10°C for 1 hour. Then Leave the capacitor in ambient condition for 24±2 hours before measurement  
Then perform the measurement.

Note 2. Latter Measurement

1. CLASS I  
Leave the capacitor in ambient condition for 24±2 hours before measurement. Then perform the measurement.
2. CLASS II  
Perform the heat treatment at 150°C +0/-10°C for 1 hour. Then Leave the capacitor in ambient condition for 24±2 hours before measurement.  
Then perform the measurement.

Note 3. All Size in Reliability Test Condition Section is "inch"

Note 4. Camera Strobe Circuit Capacitors Should be Following a Special Reliability Test Condition.  
Please check with our sales representatives or product engineers.

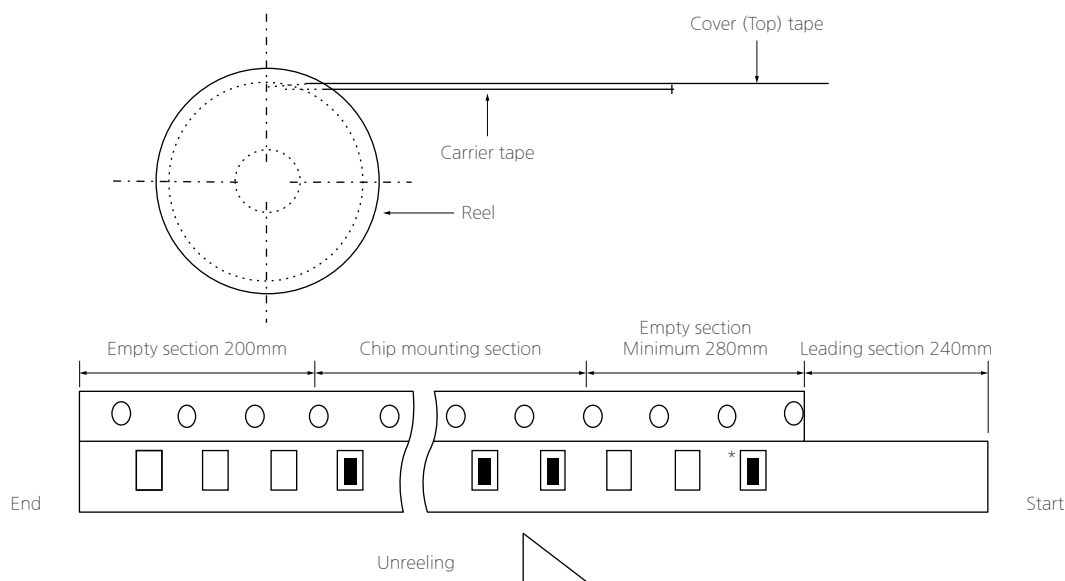
# Packaging Specifications

## Packaging

This specification applies to taping of MLCC.

When customers require, the specification may be changed under the agreement.

### 1 Figure



\* The chip is only use for identifying the label and packaged products. Please don't use the chip.

### 2 Quantity

(Unit : pcs)

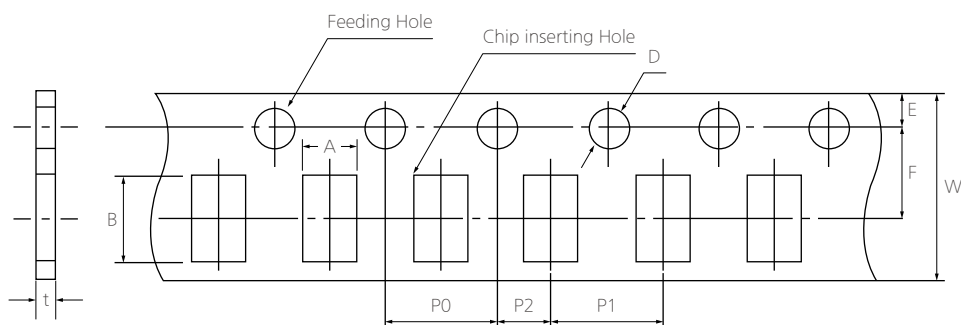
| Type | Size<br>(inch/mm) | Chip Thickness<br>(mm) | Taping Type | Pitch<br>(mm) | Plastic<br>7 inches reel | Plastic<br>10 inches reel | Plastic<br>13 inches reel |
|------|-------------------|------------------------|-------------|---------------|--------------------------|---------------------------|---------------------------|
| MLCC | 008004/0201       | 0.125                  | EMBOSSSED   | 1             | 20K/50K                  | -                         | -                         |
|      | 01005/0402        | 0.2                    | PAPER       | 2             | 20k                      | -                         | 100K                      |
|      | 0201/0603         | 0.3                    | PAPER       | 2             | 10K                      | -                         | 50K                       |
|      | 0402/1005         | 0.5                    | PAPER       | 2             | 10K                      | -                         | 50K                       |
|      | 0603/1608         | 0.8                    | PAPER       | 4             | 4K                       | 10K                       | 15K/10K                   |
|      |                   | 1.0                    | EMBOSSSED   | 4             | 3K                       | -                         | -                         |
|      | 0805/2012         | T ≤ 0.85               | PAPER       | 4             | 4K                       | 10K                       | 15K/10K                   |
|      |                   | T ≥ 1.0                | EMBOSSSED   | 4             | 2K                       | 6K                        | 10K                       |
|      | 1206/3216         | T ≤ 0.85               | PAPER       | 4             | 4K                       | 10K                       | 10K                       |
|      |                   | T ≥ 1.0                | EMBOSSSED   | 4             | 2K                       | 4K                        | 10K                       |
|      | 1210/3225         | T ≤ 1.6                | EMBOSSSED   | 4             | 2K                       | 4K                        | 10K                       |
|      |                   | T ≥ 2.0                | EMBOSSSED   | 4             | 1K                       | 4K                        | 4K                        |
|      | 1808/4520         | T ≤ 1.6                | EMBOSSSED   | 8             | 2k                       | -                         | 8k                        |
|      |                   | T ≥ 2.0                | EMBOSSSED   | 8             | 1k                       | -                         | 4k                        |
|      | 1812/4532         | T ≤ 2.0                | EMBOSSSED   | 8             | -                        | -                         | 4K                        |
|      |                   | T > 2.0                | EMBOSSSED   | 8             | -                        | -                         | 2K                        |
|      | 2220/5750         | T ≥ 2.5                | EMBOSSSED   | 8             | -                        | -                         | 2K                        |



# Packaging Specifications

## 3 Tape Size

### I. Cardboard(Paper) tape : 4mm pitch

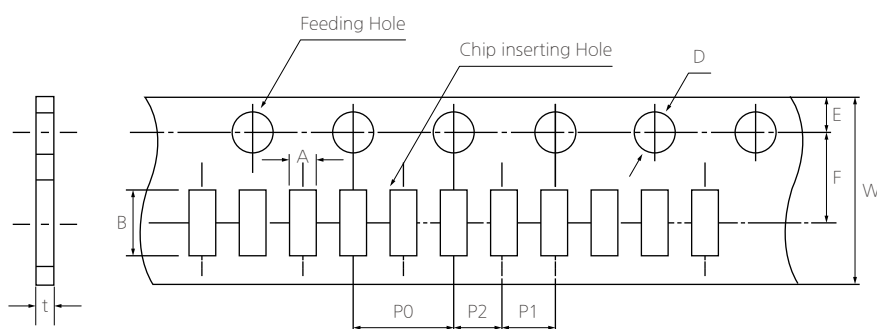


(Unit : mm)

| Size<br>(inch/mm) | A             | B             | W             | F             | E             | P1            | P2            | P0            | D                 | t            |
|-------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|-------------------|--------------|
| 0603/<br>1608     | 1.00<br>±0.10 | 1.90<br>±0.10 | 8.00<br>±0.30 | 3.50<br>±0.05 | 1.75<br>±0.10 | 4.00<br>±0.10 | 2.00<br>±0.05 | 4.00<br>±0.10 | φ1.50<br>+0.10/-0 | 1.1<br>Below |
| 0805/<br>2012     | 1.55<br>±0.10 | 2.30<br>±0.10 |               |               |               |               |               |               |                   |              |
| 1206/<br>3216     | 2.05<br>±0.10 | 3.60<br>±0.10 |               |               |               |               |               |               |                   |              |

※ The A, B in the table above are based on normal dimensions. The data may be changed with the special size tolerances.

### II. Cardboard(Paper) tape (P1 : 1mm/2mm pitch )



(Unit : mm)

| Size<br>(inch/mm) | A                      | B                      | W             | F             | E             | P1                              | P2                              | P0            | D                   | t             |
|-------------------|------------------------|------------------------|---------------|---------------|---------------|---------------------------------|---------------------------------|---------------|---------------------|---------------|
| 01005/<br>0402    | 0.25<br>±0.02          | 0.46<br>±0.02          | 8.00<br>±0.30 | 3.50<br>±0.05 | 1.75<br>±0.10 | 2.00<br>±0.05<br>(1.0±<br>0.05) | 2.00<br>±0.05<br>(1.0±<br>0.05) | 4.00<br>±0.10 | φ1.50<br>+0.1/-0.03 | 0.25<br>±0.02 |
| 0201/<br>0603     | 0.38<br>±0.03          | 0.68<br>±0.03          |               |               |               |                                 |                                 |               |                     | 0.35<br>±0.03 |
| 0402/<br>1005     | 0.62<br>±0.05          | 1.12<br>±0.05          |               |               |               |                                 |                                 |               |                     | 0.60<br>±0.05 |
| 0204/<br>0510     | 0.62<br>0.05<br>/-0.10 | 1.12<br>0.05<br>/-0.10 |               |               |               |                                 |                                 |               |                     | 0.37<br>±0.03 |

※ The A, B in the table above are based on normal dimensions. The data may be changed with the special size tolerances.

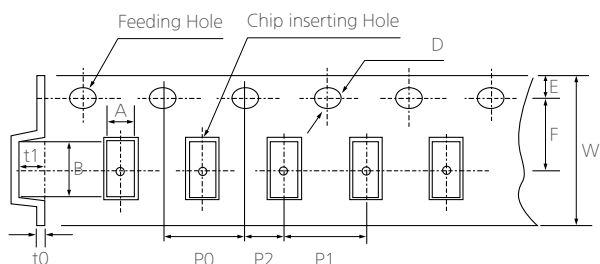
※ ( ) is based on 1mm pitch paper tape



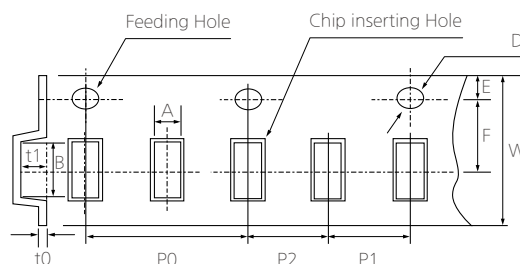
# Packaging Specifications

## III. Embossed (Plastic) tape

### (1) Embossed (Plastic) tape (P1: 4mm pitch )



### (2) Embossed (Plastic) tape (P1: 1mm/ 2mm pitch )



(Unit : mm)

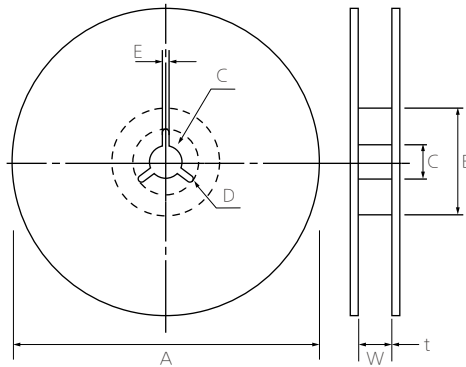
| Size<br>(inch/mm) | A                      | B                      | W             | F             | E             | P1            | P2            | P0            | D                  | t1            | t0            |
|-------------------|------------------------|------------------------|---------------|---------------|---------------|---------------|---------------|---------------|--------------------|---------------|---------------|
| 01005/<br>0402    | 0.23<br>±0.02          | 0.45<br>±0.02          | 4.00<br>±0.05 | 1.80<br>±0.02 | 0.90<br>±0.05 | 1.00<br>±0.02 | 1.00<br>±0.02 | 2.00<br>±0.03 | φ0.80<br>±0.04     | 0.35<br>Below | 0.50<br>Below |
| 015008/<br>05025  | 0.32<br>±0.03          | 0.58<br>±0.03          | 8.00<br>±0.30 | 3.50<br>±0.05 | 1.75<br>±0.10 | 2.00<br>±0.05 | 2.00<br>±0.05 | 4.00<br>±0.10 | φ1.50<br>0.1/-0.03 |               |               |
| 0603/<br>1608     | 1.05<br>±0.15          | 1.90<br>±0.15          |               |               |               | 4.00<br>±0.10 |               |               | φ1.50<br>0.1/-0    |               |               |
| 0805/<br>2012     | 1.45<br>±0.20          | 2.30<br>±0.20          |               |               |               |               |               |               |                    |               |               |
| 1206/<br>3216     | 1.90<br>±0.20          | 3.50<br>±0.20          |               |               |               |               |               |               |                    |               |               |
| 1210/<br>3225     | 2.80<br>±0.20          | 3.60<br>±0.20          |               |               |               |               |               |               |                    |               |               |
| 1808/<br>4520     | 2.30<br>±0.20          | 4.90<br>±0.20          | 12.0<br>±0.30 | 5.60<br>±0.05 | 1.75<br>±0.10 | 8.00<br>±0.10 | 2.00<br>±0.05 | 4.00<br>±0.10 | φ1.50<br>0.1/-0    | 3.80<br>Below | 0.60<br>Below |
| 1812/<br>4532     | 3.60<br>±0.20          | 4.90<br>±0.20          |               |               |               |               |               |               |                    |               |               |
| 2220/<br>5750     | 5.50<br>±0.20          | 6.20<br>±0.20          |               |               |               |               |               |               |                    |               |               |
| 0204/<br>0510     | 0.62<br>0.05<br>/-0.10 | 1.12<br>0.05<br>/-0.10 | 8.00<br>±0.30 | 3.50<br>±0.05 | 1.75<br>±0.10 | 4.00<br>±0.10 |               |               |                    | 2.50<br>Below |               |
| 0306/<br>0816     | 1.10<br>±0.20          | 1.90<br>±0.20          |               |               |               |               |               |               |                    |               |               |

※ The A, B in the table above are based on normal dimensions. The data may be changed with the special size tolerances.



# Packaging Specifications

## IV. Reel Size



(Unit : mm)

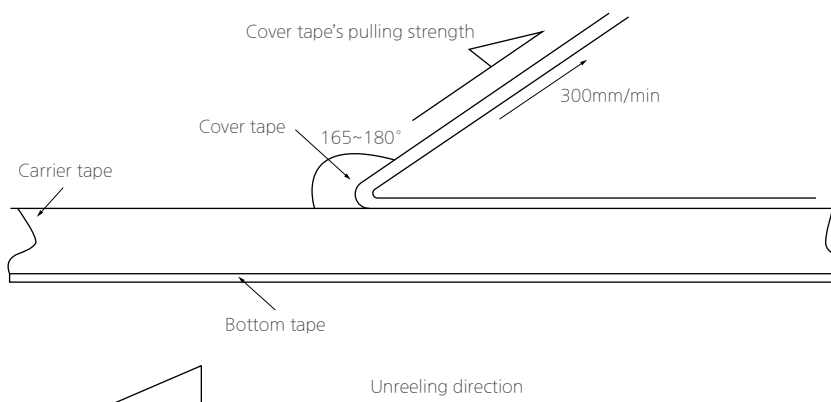
| Symbol  | Tape Width | A                  | B             | C                 | D            | E             | W            | t             |
|---------|------------|--------------------|---------------|-------------------|--------------|---------------|--------------|---------------|
| 7"Reel  | 4mm        | $\phi 178 \pm 2.0$ | MIN $\phi 50$ | $\phi 13 \pm 0.5$ | $21 \pm 0.8$ | $2.0 \pm 0.5$ | $5 \pm 0.5$  | $1.2 \pm 0.2$ |
|         | 8mm        | $\phi 178 \pm 2.0$ | MIN $\phi 50$ | $\phi 13 \pm 0.5$ | $21 \pm 0.8$ | $2.0 \pm 0.5$ | $10 \pm 1.5$ | $0.9 \pm 0.2$ |
|         | 12mm       | $\phi 178 \pm 2.0$ | MIN $\phi 50$ | $\phi 13 \pm 0.5$ | $21 \pm 0.8$ | $2.0 \pm 0.5$ | $13 \pm 0.5$ | $1.2 \pm 0.2$ |
| 10"Reel | 8mm        | $\phi 258 \pm 2.0$ | MIN $\phi 70$ | $\phi 13 \pm 0.5$ | $21 \pm 0.8$ | $2.0 \pm 0.5$ | $10 \pm 1.5$ | $1.8 \pm 0.2$ |
| 13"Reel | 8mm        | $\phi 330 \pm 2.0$ | MIN $\phi 70$ | $\phi 13 \pm 0.5$ | $21 \pm 0.8$ | $2.0 \pm 0.5$ | $10 \pm 1.5$ | $1.8 \pm 0.2$ |
|         | 12mm       | $\phi 330 \pm 2.0$ | MIN $\phi 70$ | $\phi 13 \pm 0.5$ | $21 \pm 0.8$ | $2.0 \pm 0.5$ | $13 \pm 0.5$ | $2.2 \pm 0.2$ |

## 4 Cover tape peel-off force

### I . Peel-off force

$10 \text{ g.f} \leq \text{peel-off force} \leq 70 \text{ g.f}$

### II. Measurement Method



- Taping Packaging design : Packaging design follows IEC 60286-3 standard.  
(IEC 60286-3 Packaging of components for automatic handling - parts 3)  
\* If the static electricity of SMT process causes any problems, please contact us.



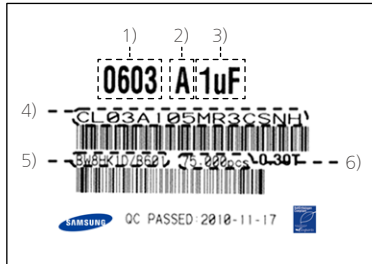
# Packaging Specifications

## 5 BOX package

### I. Packaging Label

REEL & Box Type

Label includes the information as below.



- 1) Chip size
- 2) Temperature Characteristics
- 3) Nominal Capacitance
- 4) Model Name
- 5) LOT Number & Reel Number
- 6) Q'ty

### II. Box Packaging

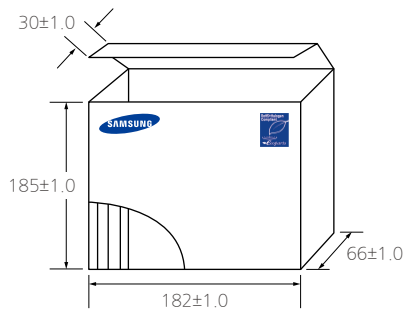
- 1) Double packaging with the paper type of inner box and outer box.
- 2) Avoid any damages during transportation by car, airplane and ship.
- 3) Remark information of contents on inner box and outer box

※ If special packaging is required, please contact us.

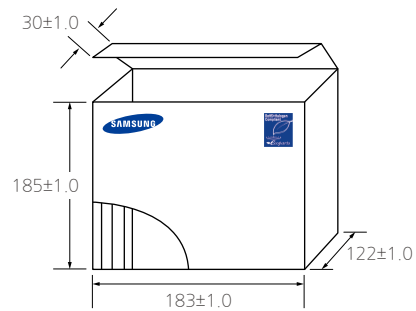
### III. 7" Box packaging

(Unit : mm)

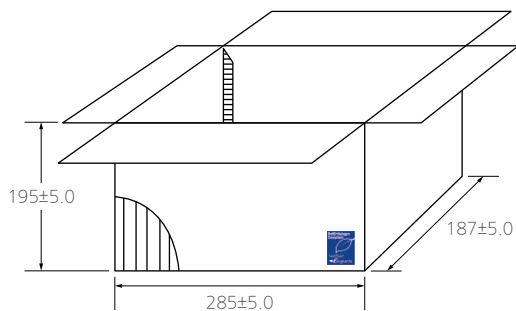
#### ■ Inner Box (7" × 5 REEL)



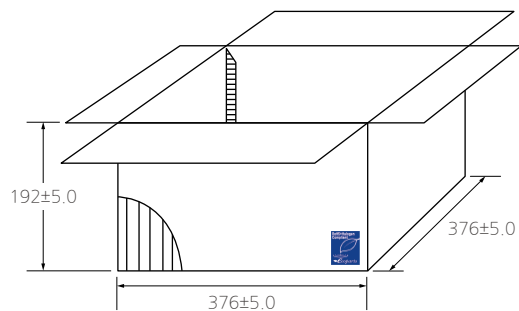
#### ■ Inner Box (7" × 10 REEL)



#### ■ Outer Box (7" × 20 REEL)



#### ■ Outer Box (7" × 60 REEL)

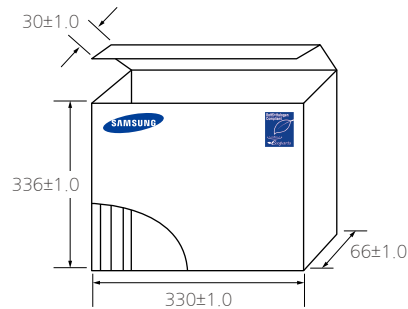




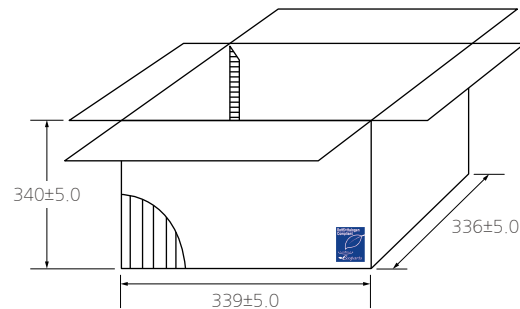
# Packaging Specifications

## IV. 13" Box packaging

### ■ Inner Box (13" × 4 REEL )



### ■ Outer Box (13" × 20 REEL )



## 6 Chip Weight

| Size (L/W)<br>(inch/mm) | Size (T)<br>(mm) | Temp | Weight<br>(mg/pc) |
|-------------------------|------------------|------|-------------------|
| 01005/0402              | 0.20             | C0G  | 0.082             |
|                         | 0.20             | X7R  | 0.083             |
|                         | 0.20             | X5R  | 0.093             |
| 0201/0603               | 0.30             | C0G  | 0.233             |
|                         | 0.30             | X7R  | 0.285             |
|                         | 0.30             | X5R  | 0.317             |
| 0402/1005               | 0.50             | C0G  | 1.182             |
|                         | 0.50             | X7R  | 1.559             |
|                         | 0.50             | X5R  | 1.56              |
| 0603/1608               | 0.80             | C0G  | 4.615             |
|                         | 0.80             | X7R  | 5.522             |
|                         | 0.80             | X5R  | 5.932             |
| 0805/2012               | 0.65             | C0G  | 7.192             |
|                         | 1.25             | X7R  | 16.523            |
|                         | 1.25             | X5R  | 16.408            |
| 1206/3216               | 1.25             | C0G  | 28.086            |
|                         | 1.60             | X7R  | 54.05             |
|                         | 1.60             | X5R  | 45.6              |
| 1210/3225               | 2.50             | X7R  | 116.197           |
|                         | 2.50             | X5R  | 121.253           |
| 1808/4520               | 1.25             | C0G  | 47.382            |
|                         | 1.25             | X7R  | 63.136            |
| 1812/4532               | 1.25             | X7R  | 96.697            |
| 2220/5750               | 1.60             | X7R  | 260.897           |

※ The weight of product is typical value per size, for more details, please contact us.



# Caution/Notice

## Product Characteristic data

### 1 Capacitance

The capacitance is the ratio of the change in an electric charge according to voltage change. Due to the fact that the capacitance may be subject to change with the measured voltage and frequency, it is highly recommended to measure the capacitance based on the following conditions.

**I.** Measure capacitance with voltage and frequency specified in this document.

Regarding the voltage/frequency condition for capacitance measurement of each MLCC model, please make sure to follow a section "C. Reliability test Condition - Capacitance" in this document.

The following table shows the voltage and frequency condition according to the capacitance range.

[The voltage and frequency condition according to MLCC the capacitance range]

Class I

| Capacitance | Frequency | Voltage   |
|-------------|-----------|-----------|
| ≤1,000pF    | 1kHz±10%  | 0.5~5Vrms |
| >1,000pF    | 1kHz±10%  |           |

Class II

| Capacitance | Frequency | Voltage     |
|-------------|-----------|-------------|
| ≤10μF       | 1kHz±10%  | 1.0±0.2Vrms |
| >10μF       | 120Hz±20% | 0.5±0.1Vrms |
| Exception   | 1kHz±10%  | 0.5±0.1Vrms |

※ Capacitance shall be measured after the heat treatment of 150+0/-10℃ for 1hr, leaving at room temperature for 24±2hr. (Class II)

**II.** It is recommended to use measurement equipment with the ALC (Auto Level Control) option.

The reason is that when capacitance or measurement frequency is high, the output voltage of measurement equipment can be lower than the setting voltage due to the equipment limitation. Note that when capacitance or measurement frequency is excessively high, the measurement equipment may show ALC off warning and provide a lower output voltage than the setting voltage even with ALC option selected. It is necessary to ensure the output voltage of measurement equipment is the same as the setting voltage before measuring capacitance.

**III.** Capacitance value of high dielectric constant (Class II) MLCC changes with applied AC and DC voltage. Therefore, it is necessary to take into account MLCC's AC voltage characteristics and DC-bias voltage characteristics when applying MLCC to the actual circuit.

**IV.** The capacitance is in compliance with the EIA RS-198-1-F-2002.

### 2 Tan δ (DF)

**I.** An ideal MLCC's energy loss is zero, but real MLCC has dielectric loss and resistance loss of electrode. DF (Dissipation Factor) is defined as the ratio of loss energy to stored energy and typically being calculated as percentage.

**II.** Quality factor (Q factor) is defined as the ratio of stored energy to loss energy. The equation can be described as 1/DF. Normally the loss characteristic of Class I MLCC is presented in Q, since the DF value is so small whereas the loss characteristic of Class II MLCC is presented in DF.

**III.** It is recommended to use Class I MLCC for applications to require good linearity and low loss such as coupling circuit, filter circuit and time constant circuit.



# Caution/Notice

## 3 Insulation Resistance

Ceramic dielectric has a low leakage current with DC voltage due to the high insulating properties. Insulation resistance is defined as the ratio of a leakage current to DC voltage.

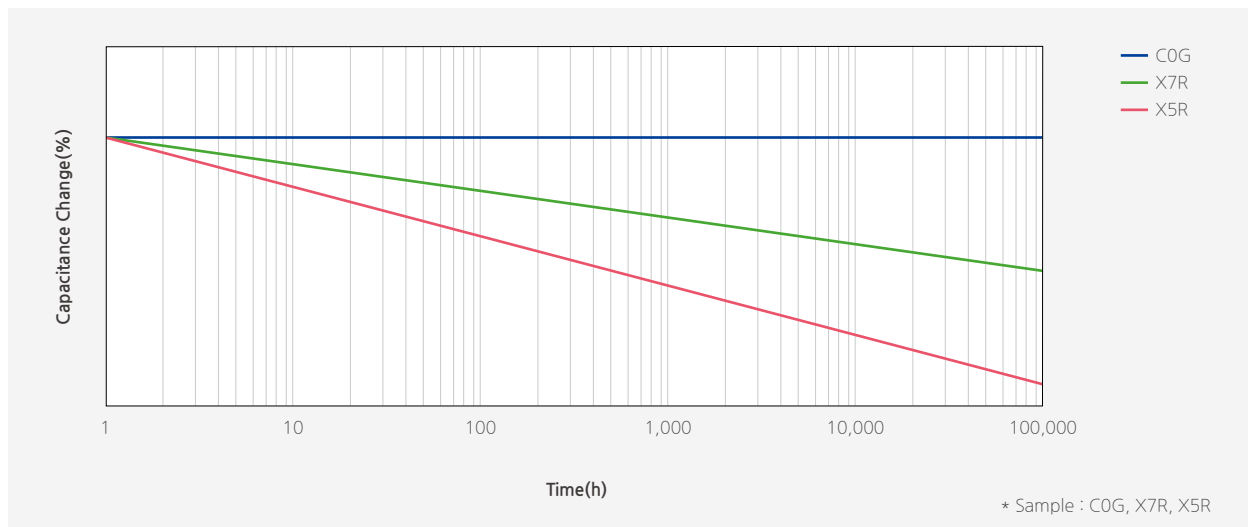
- I. When applying DC voltage to MLCC, a charging current and a leakage current flow together at the initial stage of measurement.

While the charging current decreases, and insulation resistance (IR) in MLCC is saturated by time. Therefore, insulation resistance shall be measured 1 minute after applying the rated voltage.

## 4 Capacitance Aging

The aging characteristic is that the high dielectric (Class II) MLCC decreases capacitance value over time. It is also necessary to consider the aging characteristic with voltage and temperature characteristics when Class II MLCC is used in circuitry.

- I. In general, aging causes capacitance to decrease linearly with the log of time as shown in the following graph. Please check with SEMCO for more details, since the value may vary between different models.
- II. After heat treatment (150 °C, 1 hour), the capacitance decreased by aging is recovered, so aging should be considered again from the time of heat treatment.



[Example of Capacitance Aging]

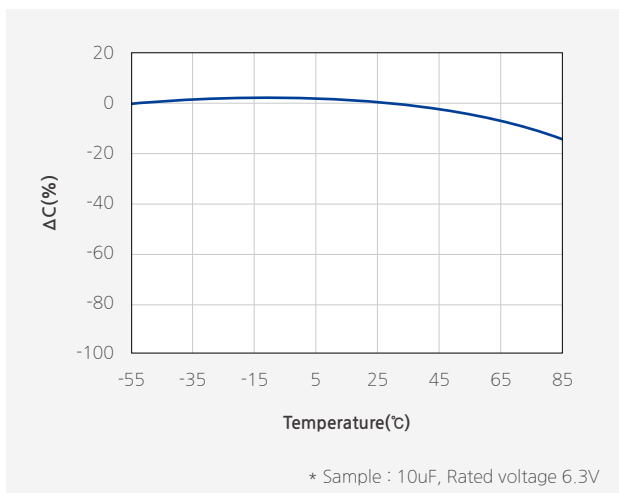


## Caution/Notice

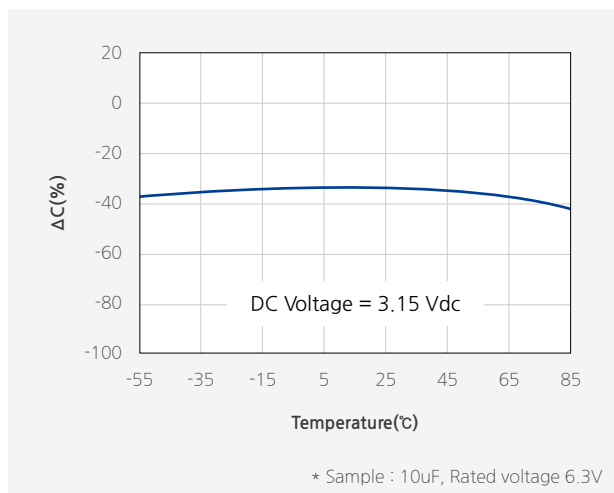
### 5 Temperature Characteristics of Capacitance (TCC)

Please consider temperature characteristics of capacitance since the electrical characteristics such as capacitance changes which is caused by a change in ceramic dielectric constant by temperature.

- I. It is necessary to check the values specified in section “C. Reliability test Condition-Temperature Characteristics” for the temperature and capacitance change range of MLCC.



[Example of Temperature Characteristics (X5R)]



[Example of Bias TCC]

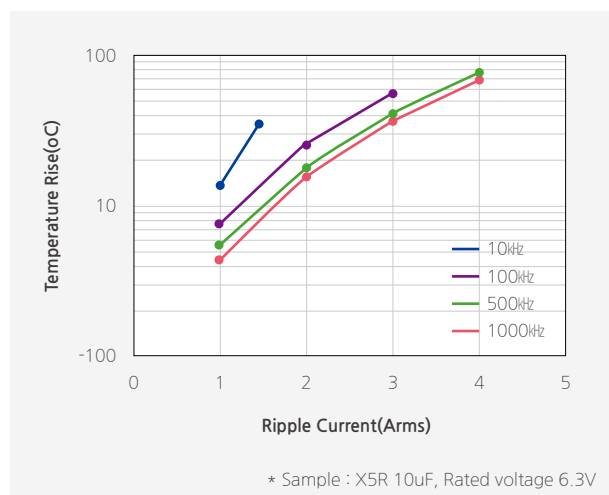
- II. When selecting MLCC, it is necessary to consider the heat characteristics of a system, room temperature and TCC of MLCC, since the applied temperature may change the capacitance of MLCC.

- III. In addition, Bias TCC of MLCC should be taken into account when DC voltage is applied to MLCC.

### 6 Self-heating Temperature

It is necessary to design the system, with considering self-heating generated by the ESR (Equivalent Series Resistance) of MLCC when AC voltage or pulse voltage is applied to MLCC.

- I. When MLCC is used in an AC voltage or pulse voltage circuit, self-heating is generated when AC or pulse current flows through MLCC. Short-circuit may be occurred by the degradation of MLCC's insulating properties.
- II. The reliability of MLCC may be affected by MLCC being used in an AC voltage or pulse voltage circuit, even the AC voltage or the pulse voltage is within the range of rated voltage. Therefore, make sure to check the following conditions.
- 1) The surface temperature of MLCC must stay within the maximum operating temperature after AC or Pulse voltage is applied.
  - 2) The rise in increase by self-heating of MLCC must not exceed 20°C



[Example of Ripple current]

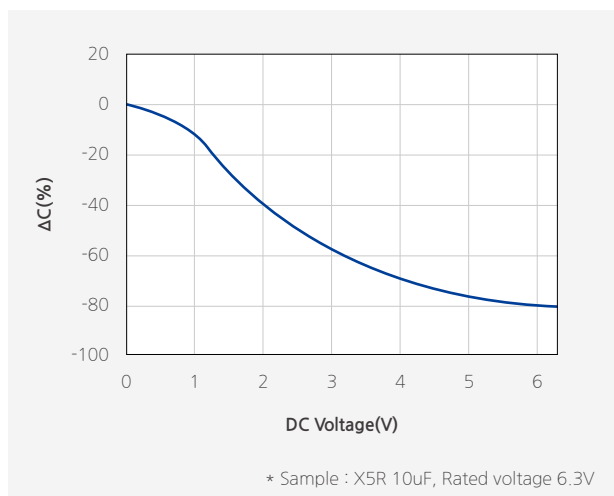


# Caution/Notice

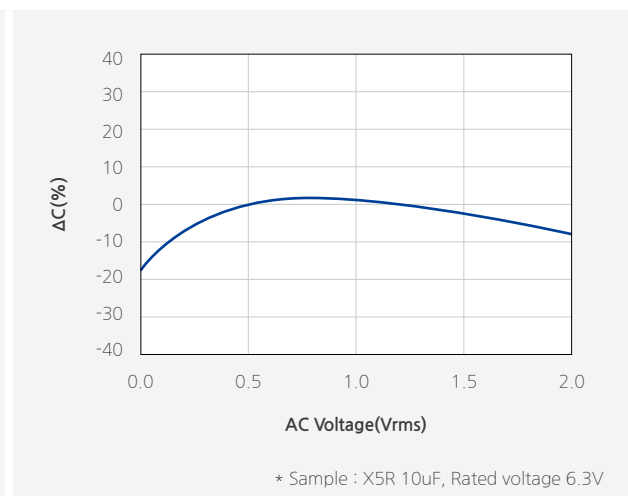
## 7 DC & AC Voltage Characteristics

It is required to consider voltage characteristics in the circuit since the capacitance value of high dielectric constant MLCC (Class II) is changed by applied DC & AC voltage.

- I. Please ensure the capacitance change is within the allowed operating range of a system. In particular, when high dielectric constant type MLCC (Class II) is used in circuit with narrow allowed capacitance tolerance, a system should be designed with considering DC voltage, temperature characteristics and aging characteristics of MLCC.
- II. It is necessary to consider the AC voltage characteristics of MLCC and the AC voltage of a system, since the capacitance value of high dielectric constant type MLCC (Class II) varies with the applied AC voltage.



[Example of DC Bias characteristics]



[Example of AC voltage characteristics]



# Caution/Notice

## 8 Impedance Characteristic

Electrical impedance (Z) of MLCC is the measurement of the opposition that MLCC presents to a current (I) when a voltage (V) is applied. It is defined as the ratio of the voltage to the current ( $Z=V/I$ ).

Impedance extends the concept of resistance to AC circuits and is a complex number consisting of the real part of resistance (R) and the imaginary part of reactance (X) as  $Z=R+jX$ .

Therefore, it is required to design circuit with consideration of the impedance characteristics of MLCC based on the frequency ( $Z=R+jX$ ).

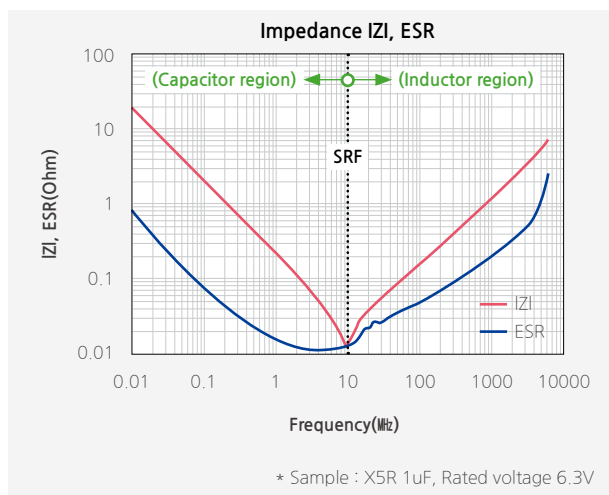
**I.** MLCC operates as a capacitor in the low frequency and its reactance (XC) decreases as frequency increases ( $X_C=1/j2\pi fC$ ) where f is frequency and C is capacitance.

The resistance (ESR; Equivalent Series Resistance) of MLCC in the low frequency mainly comes from the loss of its dielectric material.

**II.** MLCC operates as an inductor in the high frequency and the inductance of MLCC is called ESL (Equivalent Series Inductance). The reactance (XL) of MLCC in the high frequency increases as frequency increases ( $X_L=j2\pi f\cdot ESL$ ). The resistance (ESR) of MLCC in the high frequency mainly comes from the loss of its electrode metal.

**III.** SRF (Self Resonant Frequency) of MLCC is the frequency where its capacitive reactance (XC) and inductive reactance (XL) cancel each other and the impedance of MLCC has only ESR at SRF.

**IV.** The impedance of MLCC can be measured by a network analyzer or an impedance analyzer. When using the network analyzer, please note that the small-signal input may lead to the impedance of low capacitance caused by the AC voltage characteristic of MLCC.



[Example of Impedance characteristics]



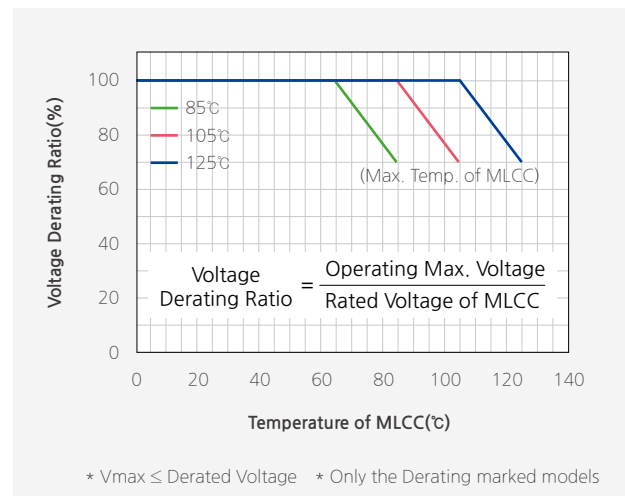
# Caution/Notice

## Electrical & Mechanical Caution

### 1 Derating

MLCC with the test voltage at 100% of the rated voltage in the high temperature resistance test are labeled as “derated MLCC.” For this type of MLCC, the voltage and temperature should be derated as shown in the following graph for the equivalent life time of a normal MLCC with the test voltage at 150% of the rated voltage in the high temperature resistance test.

- I. The derated MLCC should be applied with the derating voltage and temperature as shown in the following graph.
- II. The “Temperature of MLCC” in the x-axis of the graph below indicates the surface temperature of MLCC including self-heating effect. The “Voltage Derating Ratio” in the y-axis of the graph below gives the maximum operating voltage of MLCC with reference to the maximum voltage (Vmax) as defined in section “3-2. Applied Voltage.”



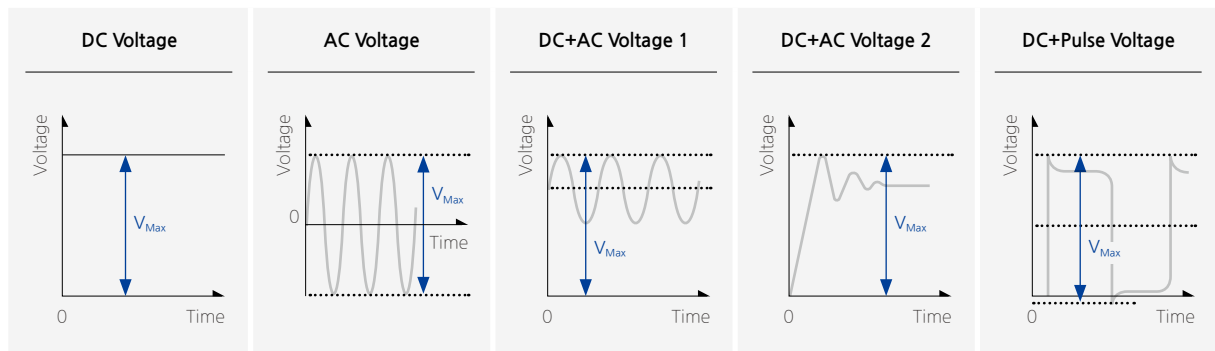
[Example of derating graph for derated MLCC]

### 2 Applied Voltage

The actual applied voltage on MLCC should not exceed the rated voltage set in the specifications.

#### I. Cautions by types of voltage applied to MLCC

- For DC voltage or DC+AC voltage, DC voltage or the maximum value of DC + AC voltage should not exceed the rated voltage of MLCC.
- For AC voltage or pulse voltage, the peak-to-peak value of AC voltage or pulse voltage should not exceed the rated voltage of MLCC.
- Abnormal voltage such as surge voltage, static electricity should not exceed the rated voltage of MLCC.



[Types of Voltage Applied to the Capacitor]



# Caution/Notice

## II. Effect of EOS (Electrical Overstress)

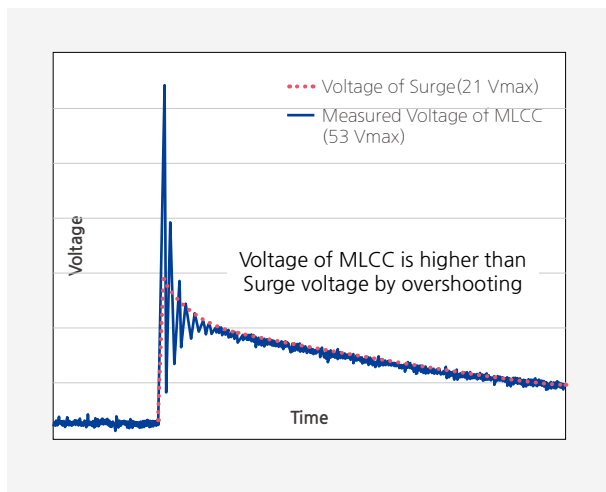
- Electrical Overstress such as a surge voltage or EOS can cause damages to MLCC, resulting in the electrical short failure caused by the dielectric breakdown in MLCC.
- Down time of MLCC is varied with the applied voltage and the room temperature and a dielectric shock caused by EOS can accelerate heating on the dielectric. Therefore, it can bring about a failure of MLCC in a market at the early stage.
- Please use caution not to apply excessive electrical overstress including spike voltage MLCC when preparing MLCC for testing or evaluating.

### (1) Surge

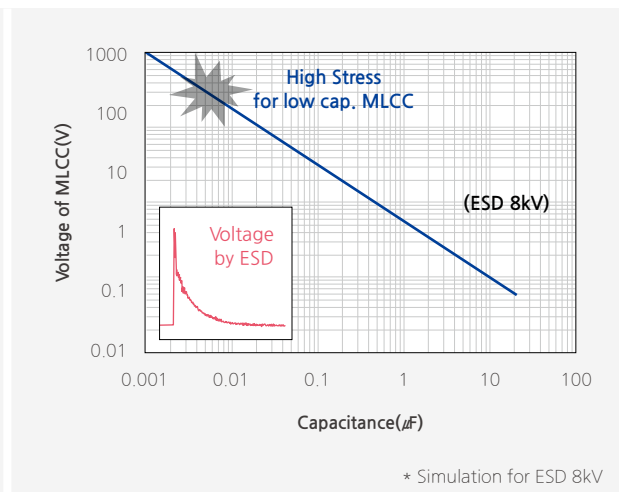
When the overcurrent caused by surge is applied to MLCC, the influx of current into MLCC can induce the overshooting phenomenon of voltage as shown in the graph below and result in the electrical short failure in MLCC. Therefore, it is necessary to be careful to prevent the influx of surge current into MLCC.

### (2) ESD (Electrostatic Discharge)

Since the voltage of the static electricity is very high but the quantity of electric charge is small compared to the surge, ESD can cause damage to MLCC with low capacitance as shown in the following graph, whereas surge with lots of electric charge quantity can cause damages to even high capacitance MLCC.



[Example of Surge applied to MLCC]



[Example of ESD applied to MLCC]

## 3 Vibration

Please check the types of vibration and shock, and the status of resonance. Manage MLCC not to generate resonance and avoid any kind of impact to terminals. When MLCC is used in a vibration environment, please make sure to contact us for the situation and consider special MLCC such as Soft-term, etc.

## 4 Shock

Mechanical stress caused by a drop may cause damages to a dielectric or a crack in MLCC. Do not use a dropped MLCC to avoid any quality and reliability deterioration. When piling up or handling printed circuit boards, do not hit MLCC with the corners of a PCB to prevent cracks or any other damages to the MLCC.

## 5 Piezo-electric Phenomenon

MLCC may generate a noise due to vibration at specific frequency when using the high dielectric constant MLCC (Class II) at AC or Pulse circuits. MLCC may cause a noise if MLCC is affected by any mechanical vibrations or shocks.



# Caution/Notice

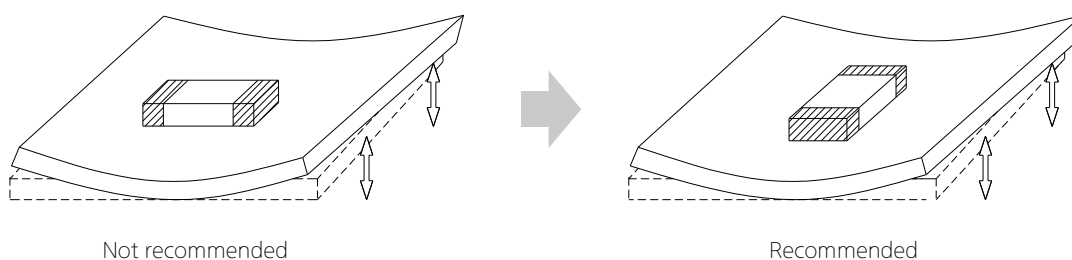
## Process of Mounting and Soldering

### 1 Mounting

MLCC with the test voltage at 100% of the rated voltage in the high temperature resistance test are labeled as “derated MLCC.” For this type of MLCC, the voltage and temperature should be derated as shown in the following graph for the equivalent life time of a normal MLCC with the test voltage at 150% of the rated voltage in the high temperature resistance test.

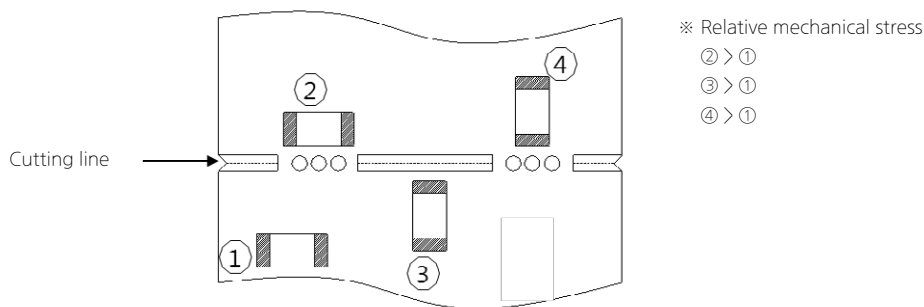
#### I. Mounting position

It is recommended to locate the major axis of MLCC in parallel to the direction in which the stress is applied.



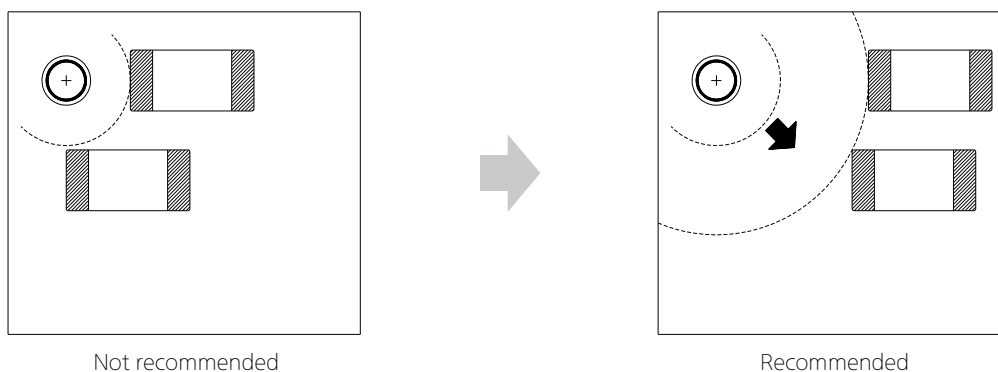
#### II. Cautions during mounting near the cutout

Please take the following measures to effectively reduce the stress generated from the cutting of PCB. Select the mounting location shown below, since the mechanical stress is affected by a location and a direction of MLCC mounted near the cutting line.



#### III. Cautions during mounting near screw

If MLCC is mounted near a screw hole, the board deflection may be occurred by screw torque. Mount MLCC as far from the screw holes as possible.





# Caution/Notice

## 2 Caution before Mounting

- I. It is recommended to store and use MLCC in a reel. Do not re-use MLCC that was isolated from the reel.
- II. Check the capacitance characteristics under actual applied voltage.
- III. Check the mechanical stress when actual process and equipment is in use.
- IV. Check the rated capacitance, rated voltage and other electrical characteristics before assembly. Heat treatment must be done prior to measurement of capacitance.
- V. Check the solderability of MLCC that has passed shelf life before use.
- VI. The use of Sn-Zn based solder may deteriorate the reliability of MLCC.

## 3 Cautions during Mounting with Mounting (pick-and-place) Machines

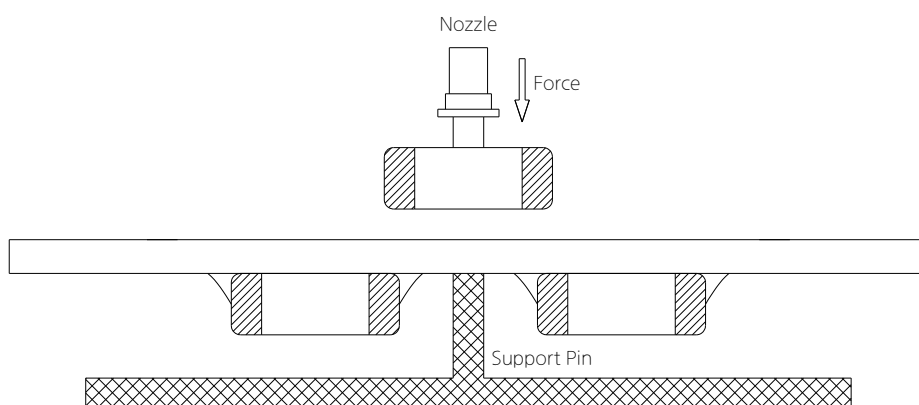
### I. Mounting Head Pressure

Excessive pressure may cause cracks in MLCC. It is recommended to adjust the nozzle pressure within the maximum value of 300g.f. Additional conditions must be set for both thin film and special purpose MLCC.

### II. Bending Stress

When using a two-sided substrate, it is required to mount MLCC on one side first before mounting on the other side due to the bending of the substrate caused by the mounting head.

Support the substrate as shown in the picture below when MLCC is mounted on the other side.  
If the substrate is not supported, bending of the substrate may cause cracks in MLCC.



### III. Suction nozzle

Dust accumulated in a suction nozzle and suction mechanism can impede a smooth movement of the nozzle. This may cause cracks in MLCC due to the excessive force during mounting.  
If the mounting claw is worn out, it may cause cracks in MLCC due to the uneven force during positioning.  
A regular inspection such as maintenance, monitor and replacement for the suction nozzle and mounting claw should be conducted.



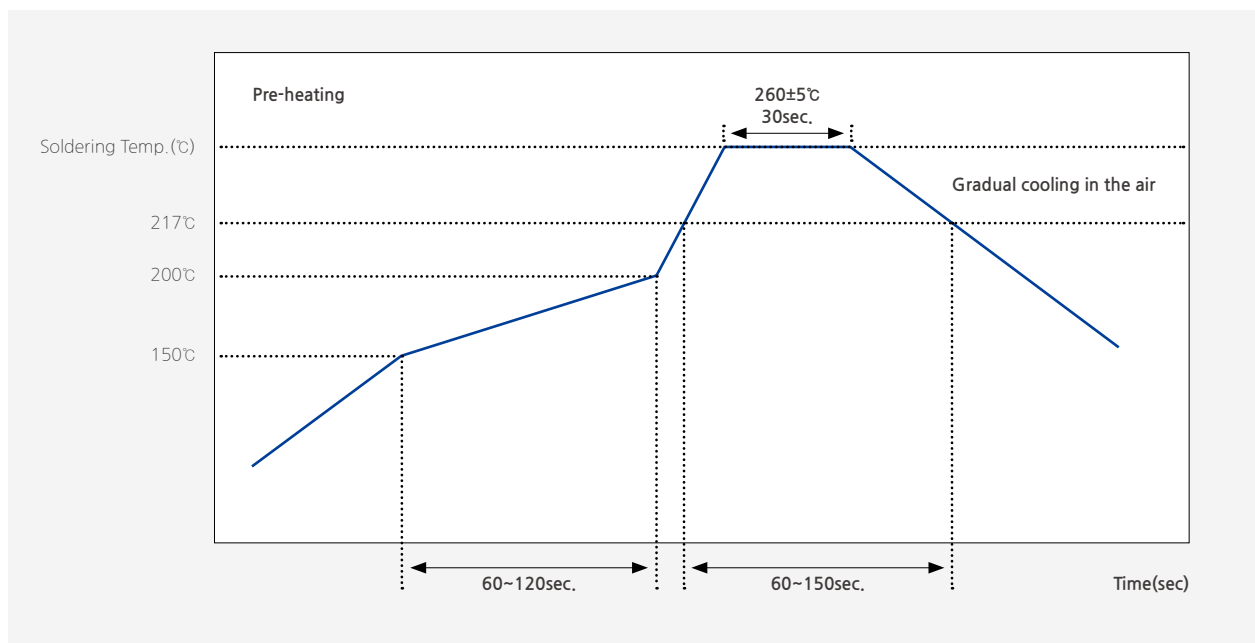
# Caution/Notice

## 4 Reflow soldering

MLCC is in a direct contact with the dissolved solder during soldering, which may be exposed to potential mechanical stress caused by the sudden temperature change.  
Therefore, MLCC may be contaminated by the location movement and flux.  
For the reason, the mounting process must be closely monitored.

| Method           |                 | Classification   |
|------------------|-----------------|------------------|
| Reflow soldering | Overall heating | Infrared rays    |
|                  |                 | Hot plate        |
|                  |                 | VPS(Vapor phase) |
|                  | Local heating   | Air heater       |
|                  |                 | Laser            |
|                  |                 | Light beam       |

### I . Reflow Profile



[Reflow Soldering Conditions]

Use caution not to exceed the peak temperature (260°C) and time (30sec) as shown.  
Pre-heating is necessary for all constituents including the PCB to prevent the mechanical damages on MLCC. The temperature difference between the PCB and the component surface must be kept to the minimum.  
As for reflow soldering, it is recommended to keep the number of reflow soldering to less than three times. Please check with us when the number of reflow soldering needs to exceed three times. Care must be exercised especially for the ultra-small size, thin film and high capacitance MLCC as they can be affected by thermal stress more easily.



# Caution/Notice

## II. Reflow temperature

The following quality problem may occur when MLCC is mounted with a lower temperature than the reflow temperature recommended by a solder manufacturer. The specified peak temperature must be maintained after taking into consideration the factors such as the placement of peripheral constituent and the reflow temperature.

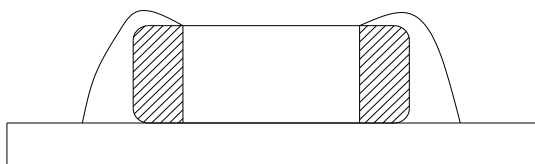
- Drop in solder wettability
- Solder voids
- Potential occurrence of whisker
- Drop in adhesive strength
- Drop in self-alignment properties
- Potential occurrence of tombstones

## III. Cooling

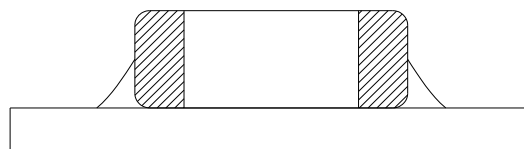
Natural cooling with air is recommended.

## IV. Optimum solder flux for reflow soldering

- Overly the thick application of solder pastes results in an excessive solder fillet height.
- This makes MLCC more vulnerable to the mechanical and thermal stress from the board, which may cause cracks in MLCC.
- Too little solder paste results in a lack of the adhesive strength, which may cause MLCC to isolate from PCB
- Check if solder has been applied uniformly after soldering is completed.



Too Much Solder  
large stress may cause cracks



Not enough solder  
Weak holding force may cause bad  
connections or detaching of the capacitor

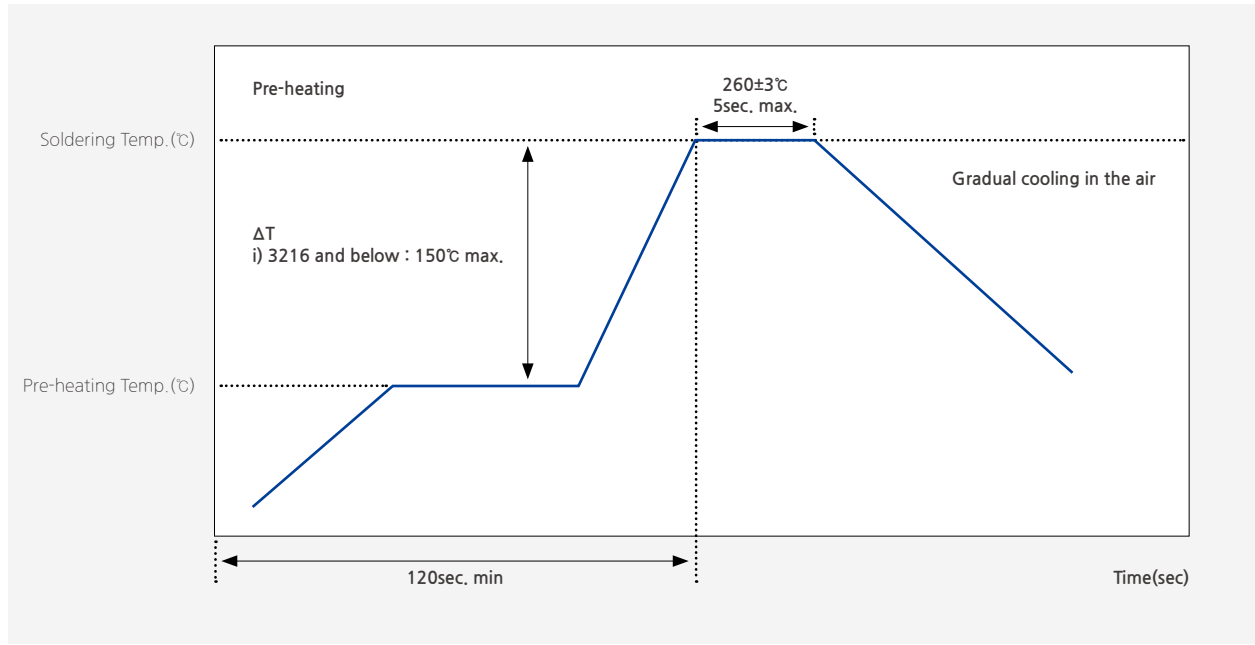
- It is required to design a PCB with consideration of a solder land pattern and its size to apply an appropriate amount of solder to MLCC. The amount of the solder at the edge may impact directly on cracks in MLCC.
- The design of a suitable solder land is necessary since the more the solder amount is, the larger the force MLCC experiences and the higher the chance MLCC cracks.



# Caution/Notice

## 5 Flow soldering

### I. Flow profile



[Flow Soldering Conditions]

Take caution not to exceed peak temperature ( $260^\circ\text{C}$ ) and time (5sec) as shown.

Please contact us before use the type of high capacitance and thin film MLCC for some exceptions that may be caused.

### II. Caution before Flow soldering

- When a sudden heat is applied to MLCC, the mechanical rigidity of MLCC is deteriorated by the internal deformation of MLCC. Preheating all the constituents including PCB is required to prevent the mechanical damages on MLCC. The temperature difference between the solder and the surface of MLCC must be kept to the minimum.
- If the flow time is too long or the flow temperature is too high, the adhesive strength with PCB may be deteriorated by the leaching phenomenon of the outer termination, or the capacitance value may be dropped by weak adhesion between the internal termination and the outer termination.



# Caution/Notice

## 6 Soldering Iron

Manual soldering can pose a great risk on creating thermal cracks in MLCC. The high temperature soldering iron tip may come into a direct contact with the ceramic body of MLCC due to the carelessness of an operator. Therefore, the soldering iron must be handled carefully, and close attention must be paid to the selection of the soldering iron tip and to temperature control of the tip.

### I. How to use a soldering Iron

- In order to minimize damages on MLCC, preheating MLCC and PCB is necessary.
- A hot plate and a hot air type preheater should be used for preheating
- Do not cool down MLCC and PCB rapidly after soldering.
- Keep the contact time between the outer termination of MLCC and the soldering iron as short as possible. Long soldering time may cause problems such as adhesion deterioration by the leaching phenomenon of the outer termination.

| Variation of Temp.  | Soldering Temp.(°C)            | Pre-heating Time(sec) | Soldering Time(sec) | Cooling Time(sec) |
|---------------------|--------------------------------|-----------------------|---------------------|-------------------|
| $\Delta T \leq 130$ | $300 \pm 10^\circ\text{C}$ max | $\geq 60$             | $\leq 4$            | -                 |

\* Control  $\Delta T$  in the solder iron and preheating temperature.

| Condition of Iron facilities |              |                |
|------------------------------|--------------|----------------|
| Wattage                      | Tip diameter | Soldering time |
| 20W max                      | 3mm max      | 4sec max       |

\* Caution - Iron tip should not contact with ceramic body directly  
Lead-free solder: Sn-3.0Ag-0.5Cu

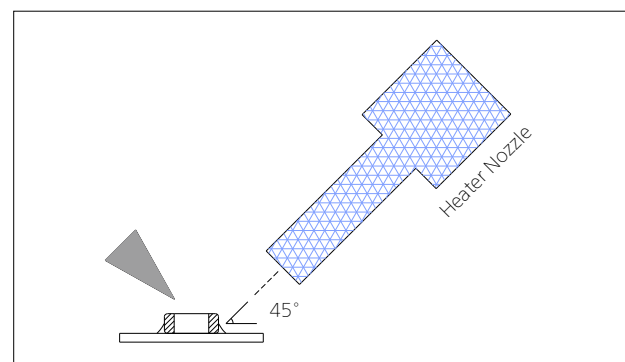
### II. How to use a spot heater

Compared to local heating using a solder iron, heat by a spot heater heats the overall MLCC and the PCB, which is likely to lessen the thermal shocks.

For a high density PCB, a spot heater can prevent the problem to connect between a solder iron and MLCC directly.

- If the distance from the air nozzle outlet to MLCC is too close, MLCC may be cracked due to the thermal stress. Follow the conditions set in the table below to prevent this problem.
- The spot heater application angle as shown in the figure is recommended to create a suitable solder fillet shape.
- In case that heat of higher than  $350^\circ\text{C}$  is applied to MLCC containing epoxy material, the epoxy material in MLCC may be damaged by heat.

|                                   |                          |
|-----------------------------------|--------------------------|
| Distance                          | $\geq 5\text{mm}$        |
| Hot Air Application angle         | $45^\circ$               |
| Hot Air Temperature Nozzle Outlet | $\leq 400^\circ\text{C}$ |
| Application Time                  | $\leq 10\text{s}$        |

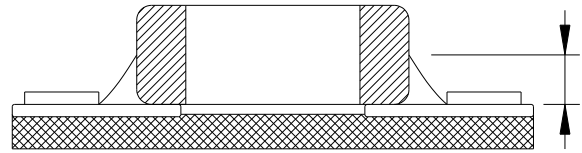




# Caution/Notice

## III. Cautions for re-work

- Too much solder amount will increase the risk of PCB bending or cause other damages.
- Too little solder amount will result in MLCC breaking loose from the PCB due to the inadequate adhesive strength.
- Check if the solder has been applied properly and ensure the solder fillet has a proper shape.



\* Soldering wire below  $\phi 0.5\text{mm}$  is required for soldering.

## 7 Cleaning

### I. In general, cleaning is unnecessary if rosin flux is used.

When acidic flux is used strongly, chlorine in the flux may dissolve into some types of cleaning fluids, thereby affecting the performance of MLCC.

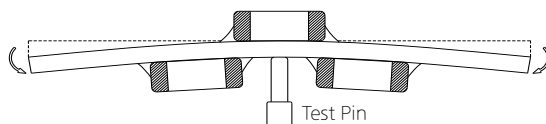
This means that the cleansing solution must be carefully selected and should always be new.

### II. Cautions for cleaning

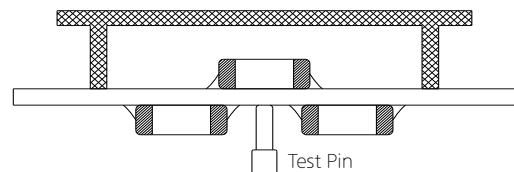
MLCC or solder joint may be cracked with the vibration of PCB, if ultrasonic vibration is too strong during cleaning. When high pressure cleaning equipment is used, test should be done for the cleaning equipment and its process before the cleaning in order to avoid damages on MLCC.

## 8 Cautions for using electrical measuring probes

- Confirm the position of the support pin or jig when checking the electrical performance of MLCC after mounting on the PCB.
- Watch for PCB bending caused by the pressure of a test-probe or other equipment.
- If the PCB is bent by the force from the test probe, MLCC may be cracked or the solder joint may be damaged.
- Avoid PCB flexing by using the support pin on the back side of the PCB.
- Place equipment with the support pin as close to the test-probe as possible.
- Prevent shock vibrations of the board when the test-probe contacts a PCB.



Not recommended



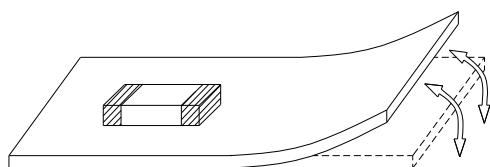
Recommended



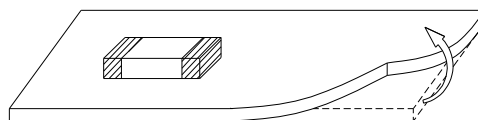
## Caution/Notice

### 9 Printed Circuit Board Cropping

- Do not apply any stress to MLCC such as bending or twisting the board after mounting MLCC on the PCB.
- The stress as shown may cause cracks in MLCC when cutting the board.
- Cracked MLCC may cause degradation to the insulation resistance, thereby causing short circuit.
- Avoid these types of stresses applied to MLCC.



[Bending]



[Twisting]

#### I. Cautions for cutting PCB

Check a cutting method of PCB in advance.

The high density board is separated into many individual boards after the completion of soldering.

If the board is bent or deformed during separation, MLCC may be cracked.

Carefully select a separation method that minimizes the deformation of the PCB.

### 10 Assembly Handling

#### I. Cautions for PCB handling

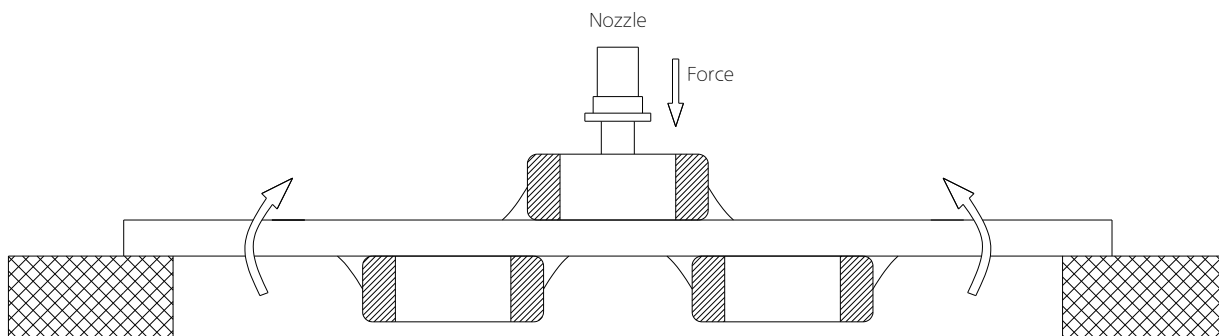
Hold the edges of the board mounted with MLCC with both hands since holding with one hand may bend the board.  
Do not use dropped boards, which may degrade the quality of MLCC.

#### II. Mounting other components

Pay attention to the following conditions when mounting other components on the back side of The board after MLCC has been mounted on the front side.

When the suction nozzle is placed too close to the board, board deflection stress may be applied to MLCC on the back side, resulting in cracks in MLCC.

Check if proper value is set on each chip mounter for a suction location, a mounting gap and a suction gap by the thickness of components.



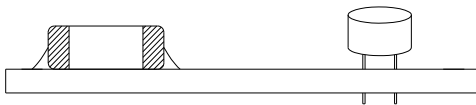


## Caution/Notice

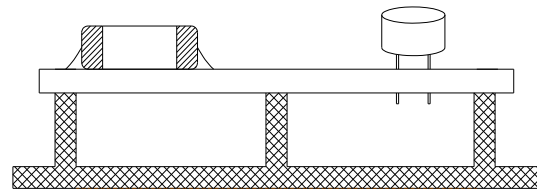
### III. Board mounting components with leads

If the board is bent when inserting components (transformer, IC, etc.) into it, MLCC or solder joint may be cracked.  
Pay attention to the following:

- Reduce the stress on the board during insertion by increasing the size of the lead insertion hole.
- Insert components with leads into the board after fixing the board with support pins or a dedicated jig.
- Support the bottom side of the board to avoid bending the board.
- Check the status of the height of each support pin regularly when the support pins are used.



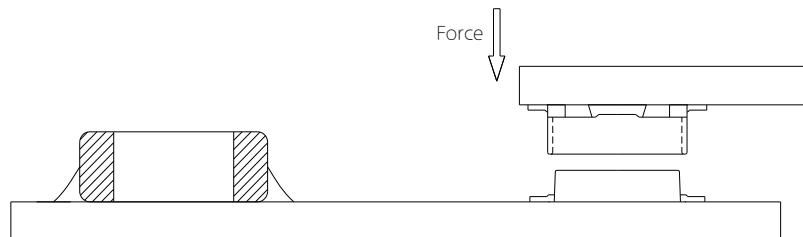
Not recommended



Recommended

### IV. Socket and / or connector attach / detach

Since the insertion or removal from sockets and connectors may cause the board to bend, make sure that MLCC mounted on the board should not be damaged in this process.



### V. Fastening screw

When attaching a shield on a board, the board may be bent during a screw tightening work.

Pay attention to the following conditions before performing the work.

- Plan the work to prevent the board from bending.
- Use a torque driver to prevent over-tightening of the screw.
- Since the board may be bent by soldering, use caution in tightening the screw.



# Caution/Notice

## 11 Adhesive selection

Pay attention to the following if an adhesive is used to position MLCC on the board before soldering.

### I. Requirements for Adhesives

- They must have enough adhesive strength to prevent MLCC from slipping or moving during the handling the board.
- They must maintain their adhesive strength when exposed to soldering temperatures.
- They should not spread when applied to the PCB.
- They should have a long pot life.
- They should hardened quickly.
- They should not corrode the board or MLCC materials.
- They should be an insulator type that does not affect the characteristic of MLCC.
- They should be non-toxic, not harmful, and particularly safe when workers touch the adhesives.

### II. Caution before Applying Adhesive

Check the correct application conditions before attaching MLCC to the board with an adhesive.

If the dimension of land, the type of adhesives, the amount of coating, the contact surface areas, the curing temperature, or other conditions are not appropriate, it may degrade the MLCC performance.

### III. Cautions for selecting Adhesive

Depending on the type of the chosen adhesive, MLCC insulation resistance may be degraded.

In addition, MLCC may be cracked by the difference in contractile stress caused by the different contraction rate between MLCC and the adhesive.

### IV. Cautions for the amount of applied adhesive and curing temperature

- The inappropriate amount of the adhesive cause the weak adhesive strength, resulting in the mounting defect in MLCC.
- Excessive use of the adhesive may cause a soldering defect, loss of electrical connection, incorrect curing, or slippage of a mounting position, thereby an inflow of the adhesive onto the land section should be avoided.
- If the curing temperature is too high or the curing time is too long, the adhesive strength will be degraded. In addition, oxidation both on the outer termination (Sn) of MLCC and the surface of the board may deteriorate the solderability.

## 12 Flux

- I. The excessive amount of flux generates excessive flux gases which may deteriorate solderability. Therefore, apply the flux thin and evenly as a whole.
- II. Flux with a high ratio of halogen may oxidize the outer termination of MLCC, if cleaning is not done properly. Therefore, use flux with a halogen content of 0.1% max.
- III. Strong acidic flux can degrade the MLCC performance.
- IV. Check the solder quality of MLCC and the amount of remaining flux surrounding MLCC after the mounting process.



# Caution/Notice

## 13 Coating

### I. Crack caused by Coating

A crack may be caused in the MLCC due to amount of the resin and stress of thermal contraction of the resin during coating process.

During the coating process, the amount of resin and the stress of thermal contraction of the resin may cause cracks in MLCC. The difference of thermal expansion coefficient between the coating, or a molding resin may cause destruction, deterioration of insulation resistance or dielectric breakdown of MLCC such as cracks or detachment, etc.

### II. Recommended Coating material

- A thermal expansion coefficient should be as close to that of MLCC as possible.
- A silicone resin can be used as an under-coating to buffer the stress.
- The resin should have a minimum curing contraction rate.
- The resin should have a minimum sensitivity (ex. Epoxy resin).
- The insulation resistance of MLCC can be deteriorated if a high hygroscopic property resin is used in a high humidity condition.
- Do not use strong acid substances due to the fact that coating materials inducing a family of halogen substances and organic acid may corrode MLCC.

## Design

## 1 Circuit design

When the board is dropped or bent, MLCC mounted on the board may be short-circuited by the drop in insulation resistance. Therefore, it is required to install safety equipment such as a fuse to prevent additional accidents when MLCC is short-circuited, otherwise, electric short and fire may occur. This product is not a safety guaranteed product..

## 2 PCB Design

I. Unlike lead type components, SMD type components that are designed to be mounted directly on the board are fragile to the stress. In addition, they are more sensitive to mechanical and thermal stress than lead type components.

### II. MLCC crack by PCB material type

A great difference of the thermal expansion coefficient between PCB and MLCC causes thermal expansion and contraction, resulting in cracks in MLCC. Even though MLCC is mounted on a board with a fluorine resin or on a single-layered glass epoxy, cracks in MLCC may occur.

## 3 Design system evaluation

I. Evaluate the actual design with MLCC to make sure there is no functional issue or violation of specifications of the finished goods.

II. Please note that the capacitance may differ based on the operating condition of the actual system since Class 2 MLCC capacitance varies with applied voltage and temperature.

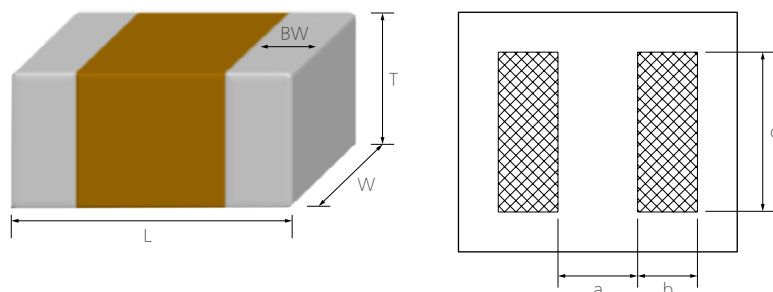
III. Surge resistance must be evaluated since the excessive surge caused by the inductance of the actual system may apply to MLCC.

IV. Note the actual MLCC size and the termination shape.

# Caution/Notice

## 4 Land dimension

The recommended land dimension is determined by evaluating the actual SET and a board.



## Reflow Footprint

| Chip Size (mm) | Chip Tol. (mm) | a (mm)    | b (mm)    | c (mm)      | (a+2b) min | (a+2b) max | Wmin  | Wmax  |
|----------------|----------------|-----------|-----------|-------------|------------|------------|-------|-------|
| 0201           | ± 0.013        | 0.07~0.08 | 0.09~0.14 | 0.125~0.135 | 0.25       | 0.36       | 0.125 | 0.135 |
|                | ± 0.03         | 0.07~0.09 | 0.10~0.15 | 0.135~0.145 | 0.27       | 0.39       | 0.135 | 0.145 |
| 0402           | ± 0.02         | 0.14~0.18 | 0.19~0.23 | 0.20~0.24   | 0.52       | 0.64       | 0.20  | 0.24  |
|                | ± 0.05         | 0.15~0.19 | 0.20~0.24 | 0.23~0.27   | 0.55       | 0.67       | 0.23  | 0.27  |
| 05025          | ± 0.025        | 0.18~0.22 | 0.24~0.28 | 0.25~0.29   | 0.66       | 0.78       | 0.25  | 0.29  |
| 0603           | ± 0.03         | 0.22~0.28 | 0.31~0.37 | 0.30~0.36   | 0.84       | 1.02       | 0.30  | 0.36  |
|                | ± 0.05         | 0.23~0.29 | 0.32~0.38 | 0.32~0.38   | 0.87       | 1.05       | 0.32  | 0.38  |
|                | ± 0.07         | 0.24~0.30 | 0.32~0.38 | 0.35~0.40   | 0.88       | 1.06       | 0.35  | 0.40  |
|                | ± 0.09         | 0.25~0.31 | 0.33~0.39 | 0.36~0.42   | 0.91       | 1.09       | 0.36  | 0.42  |
| 1005           | ± 0.05         | 0.36~0.44 | 0.49~0.57 | 0.51~0.59   | 1.34       | 1.58       | 0.51  | 0.59  |
|                | ± 0.07         | 0.37~0.45 | 0.49~0.57 | 0.53~0.61   | 1.35       | 1.59       | 0.53  | 0.61  |
|                | ± 0.10         | 0.38~0.46 | 0.50~0.58 | 0.56~0.64   | 1.38       | 1.62       | 0.56  | 0.64  |
|                | ± 0.15         | 0.40~0.48 | 0.52~0.60 | 0.61~0.69   | 1.44       | 1.68       | 0.61  | 0.69  |
|                | ± 0.20         | 0.42~0.50 | 0.53~0.61 | 0.66~0.74   | 1.48       | 1.72       | 0.66  | 0.74  |
|                | ± 0.25         | 0.44~0.52 | 0.55~0.63 | 0.71~0.79   | 1.54       | 1.78       | 0.71  | 0.79  |
|                | ± 0.30         | 0.45~0.53 | 0.56~0.64 | 0.76~0.84   | 1.57       | 1.81       | 0.76  | 0.84  |
|                | ± 0.40         | 0.49~0.57 | 0.59~0.67 | 0.86~0.94   | 1.67       | 1.91       | 0.86  | 0.94  |
| 1608           | ± 0.10         | 0.63~0.73 | 0.71~0.81 | 0.80~0.90   | 2.05       | 2.35       | 0.80  | 0.90  |
|                | ± 0.15         | 0.65~0.75 | 0.73~0.83 | 0.90~1.00   | 2.11       | 2.41       | 0.90  | 1.00  |
|                | ± 0.20         | 0.67~0.77 | 0.74~0.84 | 0.95~1.05   | 2.15       | 2.45       | 0.95  | 1.05  |
|                | ± 0.25         | 0.69~0.79 | 0.76~0.86 | 1.00~1.10   | 2.21       | 2.51       | 1.00  | 1.10  |
|                | ± 0.30         | 0.71~0.81 | 0.77~0.87 | 1.05~1.15   | 2.25       | 2.55       | 1.05  | 1.15  |
| 2012           | ± 0.10         | 0.79~0.89 | 0.88~0.98 | 1.25~1.35   | 2.55       | 2.85       | 1.25  | 1.35  |
|                | ± 0.15         | 0.81~0.91 | 0.90~1.00 | 1.30~1.40   | 2.61       | 2.91       | 1.30  | 1.40  |
|                | ± 0.20         | 0.83~0.93 | 0.91~1.01 | 1.35~1.45   | 2.65       | 2.95       | 1.35  | 1.45  |
|                | ± 0.25         | 0.85~0.95 | 0.93~1.03 | 1.40~1.50   | 2.71       | 3.01       | 1.40  | 1.50  |
|                | ± 0.30         | 0.89~0.97 | 0.94~1.04 | 1.45~1.55   | 2.75       | 3.05       | 1.45  | 1.55  |
| 3216           | ± 0.20         | 1.64~1.76 | 1.19~1.31 | 1.74~1.86   | 4.02       | 4.38       | 1.74  | 1.86  |
|                | ± 0.30         | 1.69~1.81 | 1.22~1.34 | 1.84~1.96   | 4.13       | 4.49       | 1.84  | 1.96  |
| 3225           | ± 0.20         | 1.64~1.76 | 1.29~1.41 | 2.64~2.76   | 4.22       | 4.58       | 2.64  | 2.76  |
|                | ± 0.30         | 1.69~1.81 | 1.32~1.44 | 2.74~2.86   | 4.33       | 4.69       | 2.74  | 2.86  |
| 4532           | ± 0.40         | 2.17~2.33 | 1.75~1.91 | 3.42~3.58   | 5.67       | 6.15       | 3.42  | 3.58  |
| 5750           | ± 0.40         | 2.75~2.95 | 2.03~2.23 | 5.30~5.50   | 6.81       | 7.41       | 5.30  | 5.50  |



# Caution/Notice

## Flow Footprint

| Chip Size (mm) | Chip Tol. (mm) | a (mm)    | b (mm)    | c (mm)    | (a+2b) min | (a+2b) max | Wmin | Wmax |
|----------------|----------------|-----------|-----------|-----------|------------|------------|------|------|
| 1005           | ± 0.05         | 0.55~0.65 | 0.70~0.80 | 0.55~0.65 | 1.95       | 2.25       | 0.55 | 0.65 |
|                | ± 0.07         | 0.55~0.65 | 0.70~0.80 | 0.55~0.65 | 1.95       | 2.25       | 0.55 | 0.65 |
|                | ± 0.10         | 0.55~0.65 | 0.70~0.80 | 0.60~0.70 | 1.95       | 2.25       | 0.60 | 0.70 |
|                | ± 0.15         | 0.55~0.65 | 0.70~0.80 | 0.60~0.70 | 1.95       | 2.25       | 0.60 | 0.70 |
|                | ± 0.20         | 0.60~0.70 | 0.70~0.80 | 0.65~0.75 | 2.00       | 2.30       | 0.65 | 0.75 |
|                | ± 0.25         | 0.60~0.70 | 0.70~0.80 | 0.65~0.75 | 2.00       | 2.30       | 0.65 | 0.75 |
| 1608           | ± 0.10         | 0.90~1.00 | 0.80~0.90 | 0.90~1.00 | 2.50       | 2.80       | 0.90 | 1.00 |
|                | ± 0.15         | 0.90~1.00 | 0.85~0.95 | 0.90~1.00 | 2.60       | 2.90       | 0.90 | 1.00 |
|                | ± 0.20         | 0.90~1.00 | 0.85~0.95 | 0.95~1.05 | 2.60       | 2.90       | 0.95 | 1.05 |
|                | ± 0.25         | 0.95~1.05 | 0.85~0.95 | 0.95~1.05 | 2.65       | 2.95       | 0.95 | 1.05 |
|                | ± 0.30         | 0.95~1.05 | 0.85~0.95 | 1.00~1.10 | 2.65       | 2.95       | 1.00 | 1.10 |
| 2012           | ± 0.10         | 1.00~1.10 | 1.05~1.15 | 1.30~1.40 | 3.10       | 3.40       | 1.30 | 1.40 |
|                | ± 0.15         | 1.05~1.15 | 1.05~1.15 | 1.30~1.40 | 3.15       | 3.45       | 1.30 | 1.40 |
|                | ± 0.20         | 1.05~1.15 | 1.05~1.15 | 1.35~1.45 | 3.15       | 3.45       | 1.35 | 1.45 |
|                | ± 0.25         | 1.05~1.15 | 1.10~1.20 | 1.35~1.45 | 3.25       | 3.55       | 1.35 | 1.45 |
|                | ± 0.30         | 1.05~1.15 | 1.10~1.20 | 1.40~1.50 | 3.25       | 3.55       | 1.40 | 1.50 |
|                | ± 0.35         | 1.05~1.15 | 1.10~1.20 | 1.40~1.50 | 3.25       | 3.55       | 1.40 | 1.50 |
| 3216           | ± 0.15         | 2.00~2.10 | 1.40~1.50 | 1.70~1.80 | 4.80       | 5.10       | 1.70 | 1.80 |
|                | ± 0.20         | 2.00~2.10 | 1.40~1.50 | 1.75~1.85 | 4.80       | 5.10       | 1.75 | 1.85 |
|                | ± 0.30         | 2.05~2.15 | 1.40~1.50 | 1.80~1.90 | 4.85       | 5.15       | 1.80 | 1.90 |
| 3225           | ± 0.30         | 1.90~2.00 | 1.55~1.65 | 2.70~2.80 | 5.00       | 5.30       | 2.70 | 2.80 |
|                | ± 0.40         | 1.95~2.05 | 1.55~1.65 | 2.75~2.85 | 5.05       | 5.35       | 2.75 | 2.85 |

## Others

### I Storage environment

#### I. Recommendation for temperature/humidity

Even taping and packaging materials are designed to endure a long-term storage, they should be stored with a temperature of 0~40°C and an RH of 0~70% otherwise, too high temperatures or humidity may deteriorate the quality of the product rapidly.

As oxidation is accelerated when relative humidity is above 70%RH, the lower the humidity is, the better the solderability is. As the temperature difference may cause dew condensation during the storage of the product, it is a must to maintain a temperature control environment.

#### II. Shelf Life

An allowable storage period should be within 6 months from the outgoing date of delivery in consideration of solderability. As for products in storage over 6 months, please check solderability before use.

### 2 Caution for corrosive environment

As corrosive gases may deteriorate the solderability of MLCC outer termination, it is a must to store MLCC in an environment without gases. MLCC that is exposed to corrosive gases may cause its quality issues due to the corrosion of plating layers and the penetration of moisture.



# Caution/Notice

## 3 Equipment in operation

- I. Do not touch MLCC directly with bare hands to prevent an electric shock or damage.
- II. The termination of MLCC shall not be contacted with a conductive object (short -circuit). Do not expose MLCC to conductive liquid containing acidic or alkaline material.
- III. Do not use the equipment in the following conditions.
  - (1) Exposure to water or oil
  - (2) Exposure to direct sunlight
  - (3) Exposure to Ozone or ultra-violet radiation.
  - (4) Exposure to corrosive gas (e.g. hydrogen sulfide, sulfur dioxide, chlorine, ammonia gas)
  - (5) Exposure to vibration or mechanical shock exceeding specified limit
  - (6) Exposure to high humidity
- IV. If the equipment starts generating any smoke, fire or smell, immediately switch it off or unplug from the power source.  
If the equipment is not switched off or unplugged, serious damage may occur due to the continuous power supply. Please be careful with the high temperature in this condition.

## 4 Waste treatment

In case of scrapping MLCC, it is incinerated or buried by a licensed industrial waste company. When scrapping MLCC, it is recommended to incinerate or bury the scrappage by a licensed industrial waste company.

## 5 Operating temperature

The operating temperature limit is determined by the specification of each models.

- I. Do not use MLCC over the maximum operating temperature.  
Pay attention to equipment's temperature distribution and the seasonal fluctuation of ambient temperature.
- II. The surface temperature of MLCC cannot exceed the maximum operating temperature including self-heating effects.

## 6 Transportation

The performance of MLCC may be affected by transportation conditions.

- I. MLCC shall be protected from excessive temperature, humidity and a mechanical force during transportation.  
During transportation, the cartons shall not be deformed and the inner packaging shall be protected from excessive external forces.
- II. Do not apply excessive vibrations, shocks or excessive forces to MLCC.
  - If excessive mechanical shock or stress are applied, MLCC's ceramic body may crack.
  - When the surface of MLCC is hit with the sharp edge of an air driver, a soldering iron, or a tweezer, etc, MLCC may crack or become short-circuited.
- III. MLCC may crack and become non-functional due to the excessive shocks or dropping during transportation.

## 7 Notice

Some special products are excluded from this document.  
Please be advised that this is a standard product specification for a reference only.  
We may change, modify or discontinue the product specifications without notice at any time.  
So, you need to approve the product specifications before placing an order.  
Should you have any question regarding the product specifications, please contact our sales personnel or application engineers.



# Disclaimer & Limitation of Use and Applications

## 1 Disclaimer

All product specifications, statements, information and data (collectively, the "Information") in this spec sheet or made available on the website are subject to change.

The customer is responsible for checking and verifying the extent to which the Information contained in this publication is applicable to an order at the time the order is placed.

All Information given herein is believed to be accurate and reliable, but it is presented without guarantee, warranty, or responsibility of any kind, expressed or implied.

ANY USE OF PRODUCT OUTSIDE OF SPECIFICATIONS OR ANY STORAGE OR INSTALLATION INCONSISTENT WITH PRODUCT GUIDANCE VOIDS ANY WARRANTY.

Accordingly, customer applications which require a high degree of reliability or safety should employ suitable designs or other safeguards (such as installation of protective circuitry or redundancies)

in order to ensure that the failure of an electrical component does not result in a risk of personal injury or property damage.

Although all product-related warnings, cautions and notes must be observed, the customer should not assume that all safety measures are indicated or that other measures may not be required.

## 2 Limitation

Please contact us with usage environment information such as voltage, current, temperature, or other special conditions before using our products for the applications listed below. The below application conditions require especially high reliability products to prevent defects that may directly cause damages or loss to third party's life, body or property.

If you have any questions regarding this 'Limitation', you should first contact our sales personnel or application engineers.

- ① Aerospace/Aviation equipment 1wheeler, 2wheeler and 3wheeler vehicle
- ② Automotive of Transportation equipment
- ③ Military equipment
- ④ Atomic energy-related equipment
- ⑤ Undersea equipment
- ⑥ Medical equipment
- ⑦ Disaster prevention/crime prevention equipment
- ⑧ Power plant control equipment
- ⑨ Traffic signal equipment
- ⑩ Data-processing equipment
- ⑪ Electric heating apparatus, burning equipment
- ⑫ Safety equipment
- ⑬ Any other applications with the same as or similar complexity or reliability to the applications



Explanation of Ceramic Capacitors  
Part Numbering  
Reliability Level Description  
Normal Capacitors\_Standard  
Normal Capacitors\_High Level I  
Normal Capacitors\_High Level II

Molded Frame Capacitors (MFC)  
Land Side Capacitors (LSC)  
High Bending Strength Capacitors  
Low Acoustic Noise Capacitors  
Low ESL Capacitors  
Application Guide

Reliability Test Conditions  
Packaging Specifications  
Caution/Notice  
Disclaimer & Limitation of Use and Applications  
► **Component Sales Offices/  
Manufacturing Sites**

# Component Sales Offices

## Head Office

150, Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, Republic of Korea  
**Tel** +82-31-210-5114 (Main Number)

## America

### San Jose

Samsung Electro Mechanics America Inc. (HQ)  
3655 N 1st street, San Jose CA 95134, U.S.A.  
**Tel** +1-408-544-5454

### San Diego

Samsung Electro Mechanics America Inc. (San Diego office)  
5405 Morehouse Drive, Suite #220 San Diego CA 92121 USA  
**Tel** +1-858-766-9863

### Phoenix

Samsung Electro Mechanics America Inc. (Phoenix Office)  
4505 E Chandler Blvd suite #105, Phoenix, AZ, 85048, U.S.A.  
**Tel** +1-480-592-0184

### Detroit

Samsung Electro Mechanics America Inc. (Detroit Office)  
27777 Franklin Road Suite 1040 Southfield, MI 48034 USA  
**Tel** +1-248-499-8830

### Austin

Samsung Electro Mechanics America Inc. (Austin Office)  
710 Hesters Crossing Road Suite 180 Round Rock, TX 78681 USA  
**Tel** +1-480-216-4432

## Europe

### Frankfurt

Samsung Electro-Mechanics GmbH. (HQ)  
Koelner Str. 12, 65760 Eschborn, Germany.  
**Tel** +49-6196-66-3300

### Munich

Samsung Electro-Mechanics GmbH. (Munich Office)  
Reichenbachstrasse 2, 85737 Ismaning, Germany.  
**Tel** +49-6196-66-7237

### Stuttgart

Samsung Electro-Mechanics GmbH. (Stuttgart Office)  
Leitzstrasse 45, 70469 Stuttgart, Germany.  
**Tel** +49-7114-906-6281

### Helsinki

Samsung Electro-Mechanics GmbH. (Helsinki Office)  
Keilaranta 1, 02150 Espoo, Finland.  
**Tel** +35-898-53-1132

## Asia

### Shenzhen

Samsung Electro-Mechanics (ShenZhen) Co.,Ltd.(HQ)  
14F, Tower A, SCC Building, Junction of Houhai Blvd. and Haide 1st Rd., Nanshan Dist., Shenzhen City, China.  
**Tel** +86-755-8608-5589

### Shanghai

Samsung Electro-Mechanics Co.,Ltd. (Shanghai Branch)  
13F Room 1301-1302, Tower B, SOHO Zhongshan Building, No.1065 Zhongshan West Rd., Changning Dist., Shanghai City, China.  
**Tel** +86-21-2501-5803

### Beijing

Samsung Electro-Mechanics Co.,Ltd. (Beijing Branch)  
21F 2101-3, Samsung Tower, Building 1, Yard31, Jinghui Street, Chaoyang Dist, Beijing City, China.  
**Tel** +86-10-5092-8701

### Taipei

Samsung Electro-Mechanics Co.,Ltd. (Taipei Branch)  
9F-1, No.399 Rueykuang Rd., Neihu Dist., Taipei City, Taiwan.  
**Tel** +886-2-2656-8351

### Singapore

Samsung Electro-Mechanics Private Limited(HQ)  
3 Church Street Samsung Hub #23-01 Singapore.  
**Tel** +65-6933-2600

### Penang

Samsung Electro-Mechanics Private Limited(Penang Office)  
Unit 9-06, Menara Boustead, 39 Jalan Sultan Ahmad Shah, 10050, Georgetown, Penang, Malaysia.  
**Tel** +60-12-803-7001

### New Delhi

Samsung Electro-Mechanics Private Limited(New Delhi Office)  
Unit No. 606, DLF Tower A, District Center Jasola, New Delhi-110025, India  
**Tel** +91-956-005-0310

### Tokyo

Samsung Electro-Mechanics Japan Co., Ltd(HQ)  
Shinagawa Grand Central Tower 9F, 2-16-4, Kounan, Minato-ku, Tokyo, Japan.  
**Tel** +81-3-6369-6461

# Manufacturing Sites

### Busan Plant

333, Noksansaneopjung-ro, Gangseo-gu,  
Busan, Republic of Korea  
**Tel** +82-31-210-5114 (Main Number)

### China Tianjin

No.80&96, Xiaqing Road, The west zone of  
TEDA Tianjin, China 300462  
**Tel** +86-22-6686-3333

### Philippines

BLK 5&6 Calamba Premiere International Park  
Brgy. Batino Calamba, Laguna Philippines  
**Tel** +63-49-508-8300

\* Suwon (R&D)

**SAMSUNG**  
**ELECTRO-MECHANICS**



## Looking for pricing, stock, or lifecycle information?

Click below to explore more details on WIN SOURCE:

- ⊖ View [CL21C472JBFNNWE](#) on WIN SOURCE
- ⊖ [Samsung](#) Information

## Optimize Your Supply Chain with WIN SOURCE Solutions

- ✓ Global Sourcing Solution
- ✓ Obsolete Management
- ✓ Cost Control Management
- ✓ Shortage Management
- ✓ Alternative Solution
- ✓ Excess Inventory Management