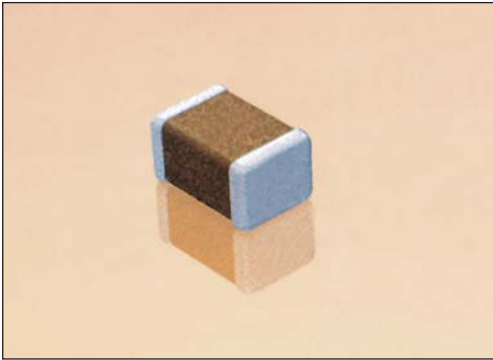


X5R Dielectric

General Specifications



GENERAL DESCRIPTION

- General Purpose Dielectric for Ceramic Capacitors
- EIA Class II Dielectric
- Temperature variation of capacitance is within $\pm 15\%$ from -55°C to $+85^{\circ}\text{C}$
- Well suited for decoupling and filtering applications
- Available in High Capacitance values (up to $100\mu\text{F}$)

PART NUMBER (see page 2 for complete part number explanation)

1210

Size
(L" x W")

4

Voltage
4 = 4V
6 = 6.3V
Z = 10V
Y = 16V
3 = 25V
D = 35V
5 = 50V

D

Dielectric
D = X5R

107

Capacitance Code (In pF)
2 Sig. Digits +
Number of
Zeros

M

Capacitance Tolerance
K = $\pm 10\%$
M = $\pm 20\%$

A

Failure Rate
A = N/A

T

Terminations
T = Plated Ni
and Sn

2

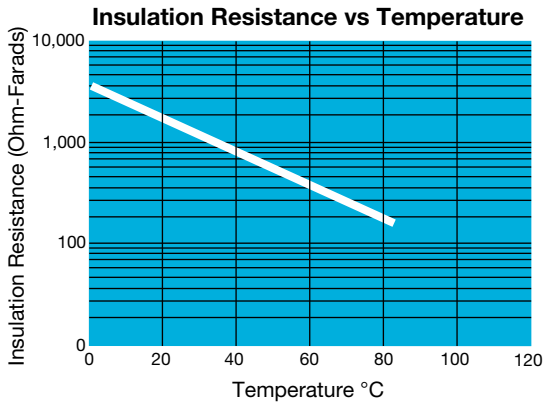
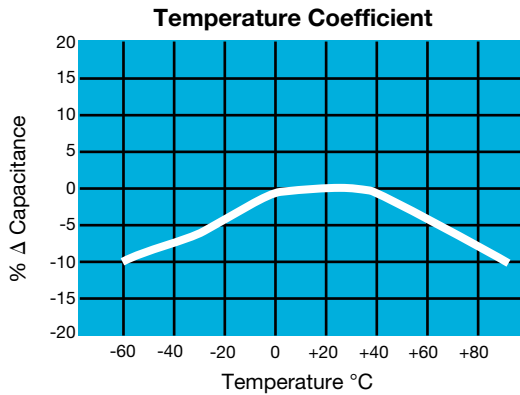
Packaging
2 = 7" Reel
4 = 13" Reel
7 = Bulk Cass.
9 = Bulk

A

Special Code
A = Std.

NOTE: Contact factory for availability of Tolerance Options for Specific Part Numbers.
Contact factory for non-specified capacitance values.

TYPICAL ELECTRICAL CHARACTERISTICS



Specifications and Test Methods

| Parameter/Test | | X5R Specification Limits | Measuring Conditions | |
|---------------------------------------|-----------------------|--|--|--------------------|
| Operating Temperature Range | | -55°C to +85°C | Temperature Cycle Chamber | |
| Capacitance | | Within specified tolerance | Freq.: 1.0 kHz \pm 10% Voltage: 1.0Vrms \pm .2V For Cap > 10 μ F, 0.5Vrms @ 120Hz | |
| Dissipation Factor | | \leq 2.5% for \geq 50V DC rating \leq 3.0% for 25V DC rating \leq 12.5% Max. for 16V DC rating and lower Contact Factory for DF by PN | | |
| Insulation Resistance | | 100,000M Ω or 500M Ω - μ F, whichever is less | Charge device with rated voltage for 120 \pm 5 secs @ room temp/humidity | |
| Dielectric Strength | | No breakdown or visual defects | Charge device with 300% of rated voltage for 1-5 seconds, w/charge and discharge current limited to 50 mA (max) | |
| Resistance to Flexure Stresses | Appearance | No defects | Deflection: 2mm Test Time: 30 seconds | |
| | Capacitance Variation | \leq \pm 12% | | |
| | Dissipation Factor | Meets Initial Values (As Above) | | |
| | Insulation Resistance | \geq Initial Value x 0.3 | | |
| Solderability | | \geq 95% of each terminal should be covered with fresh solder | Dip device in eutectic solder at 230 \pm 5°C for 5.0 \pm 0.5 seconds | |
| Resistance to Solder Heat | Appearance | No defects, <25% leaching of either end terminal | Dip device in eutectic solder at 260°C for 60 seconds. Store at room temperature for 24 \pm 2 hours before measuring electrical properties. | |
| | Capacitance Variation | \leq \pm 7.5% | | |
| | Dissipation Factor | Meets Initial Values (As Above) | | |
| | Insulation Resistance | Meets Initial Values (As Above) | | |
| | Dielectric Strength | Meets Initial Values (As Above) | | |
| Thermal Shock | Appearance | No visual defects | Step 1: -55°C \pm 2° | 30 \pm 3 minutes |
| | Capacitance Variation | \leq \pm 7.5% | Step 2: Room Temp | \leq 3 minutes |
| | Dissipation Factor | Meets Initial Values (As Above) | Step 3: +85°C \pm 2° | 30 \pm 3 minutes |
| | Insulation Resistance | Meets Initial Values (As Above) | Step 4: Room Temp | \leq 3 minutes |
| | Dielectric Strength | Meets Initial Values (As Above) | Repeat for 5 cycles and measure after 24 \pm 2 hours at room temperature | |
| Load Life | Appearance | No visual defects | Charge device with 1.5X rated voltage in test chamber set at 85°C \pm 2°C for 1000 hours (+48, -0). Note: Contact factory for *optional specification part numbers that are tested at < 1.5X rated voltage. Remove from test chamber and stabilize at room temperature for 24 \pm 2 hours before measuring. | |
| | Capacitance Variation | \leq \pm 12.5% | | |
| | Dissipation Factor | \leq Initial Value x 2.0 (See Above) | | |
| | Insulation Resistance | \geq Initial Value x 0.3 (See Above) | | |
| | Dielectric Strength | Meets Initial Values (As Above) | | |
| Load Humidity | Appearance | No visual defects | Store in a test chamber set at 85°C \pm 2°C/ 85% \pm 5% relative humidity for 1000 hours (+48, -0) with rated voltage applied. Remove from chamber and stabilize at room temperature and humidity for 24 \pm 2 hours before measuring. | |
| | Capacitance Variation | \leq \pm 12.5% | | |
| | Dissipation Factor | \leq Initial Value x 2.0 (See Above) | | |
| | Insulation Resistance | \geq Initial Value x 0.3 (See Above) | | |
| | Dielectric Strength | Meets Initial Values (As Above) | | |

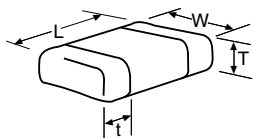
X5R Dielectric



Capacitance Range

PREFERRED SIZES ARE SHADED

| SIZE | 0201 | | | | | 0402 | | | | | 0603 | | | | | 0805 | | | | | 1206 | | | | | 1210 | | | | | 1812 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--------------|--------------------------------------|-----|----|----|----|--------------------------------------|-----|----|----|----|--------------------------------------|---|-----|----|----|--------------------------------------|----|----|-----|----|--------------------------------------|----|----|----|-----|--------------------------------------|----|----|----|----|--------------------------------------|-----|----|----|----|----|----|---|-----|----|-------------|----|----|----|-----|----|----|----|--|--|--|--|--|--|--|--|--|--|--|--|----------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|----------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|----------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Soldering | Reflow Only | | | | | | | | | | | | | | | | | | | | Reflow Only | | | | | | | | | | | | | | | | | | | | Reflow Only | | | | | | | | | | | | | | | | | | | | Reflow/Wave | | | | | | | | | | | | | | | | | | | | Reflow/Wave | | | | | | | | | | | | | | | | | | | | Reflow/Wave | | | | | | | | | | | | | | | | | | | | Reflow Only | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Packaging | All Paper | | | | | | | | | | | | | | | | | | | | All Paper | | | | | | | | | | | | | | | | | | | | All Paper | | | | | | | | | | | | | | | | | | | | Paper/Embossed | | | | | | | | | | | | | | | | | | | | Paper/Embossed | | | | | | | | | | | | | | | | | | | | Paper/Embossed | | | | | | | | | | | | | | | | | | | | All Embossed | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (L) Length | MM 0.60 ± 0.03 (0.024 ± 0.001) | | | | | MM 1.00 ± 0.10 (0.040 ± 0.004) | | | | | MM 1.60 ± 0.15 (0.063 ± 0.006) | | | | | MM 2.01 ± 0.20 (0.079 ± 0.008) | | | | | MM 3.20 ± 0.20 (0.126 ± 0.008) | | | | | MM 3.20 ± 0.20 (0.126 ± 0.008) | | | | | MM 4.50 ± 0.30 (0.177 ± 0.012) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (W) Width | MM 0.30 ± 0.03 (0.011 ± 0.001) | | | | | MM 0.50 ± 0.10 (0.020 ± 0.004) | | | | | MM 0.81 ± 0.15 (0.032 ± 0.006) | | | | | MM 1.25 ± 0.20 (0.049 ± 0.008) | | | | | MM 1.60 ± 0.20 (0.063 ± 0.008) | | | | | MM 2.50 ± 0.20 (0.098 ± 0.008) | | | | | MM 3.20 ± 0.20 (0.126 ± 0.008) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (t) Terminal | MM 0.15 ± 0.05 (0.006 ± 0.002) | | | | | MM 0.25 ± 0.15 (0.010 ± 0.006) | | | | | MM 0.35 ± 0.15 (0.014 ± 0.006) | | | | | MM 0.50 ± 0.25 (0.020 ± 0.010) | | | | | MM 0.50 ± 0.25 (0.020 ± 0.010) | | | | | MM 0.50 ± 0.25 (0.020 ± 0.010) | | | | | MM 0.61 ± 0.36 (0.024 ± 0.014) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| WVDC | 4 | 6.3 | 10 | 16 | 25 | 4 | 6.3 | 10 | 16 | 25 | 50 | 4 | 6.3 | 10 | 16 | 25 | 35 | 50 | 6.3 | 10 | 16 | 25 | 35 | 50 | 6.3 | 10 | 16 | 25 | 35 | 50 | 4 | 6.3 | 10 | 16 | 25 | 35 | 50 | 4 | 6.3 | 10 | 16 | 25 | 35 | 50 | 6.3 | 10 | 25 | 50 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cap (pF) | A | | | | | | | | | | | | | | | | | | | | C | | | | | | | | | | | | | | | | | | | | G | | | | | | | | | | | | | | | | | | | | N | | | | | | | | | | | | | | | | | | | | Q | | | | | | | | | | | | | | | | | | | | X | | | | | | | | | | | | | | | | | | | | Z | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cap (µF) | A | | | | | | | | | | | | | | | | | | | | C | | | | | | | | | | | | | | | | | | | | G | | | | | | | | | | | | | | | | | | | | J | | | | | | | | | | | | | | | | | | | | K | | | | | | | | | | | | | | | | | | | | M | | | | | | | | | | | | | | | | | | | | N | | | | | | | | | | | | | | | | | | | | P | | | | | | | | | | | | | | | | | | | | Q | | | | | | | | | | | | | | | | | | | | R | | | | | | | | | | | | | | | | | | | | S | | | | | | | | | | | | | | | | | | | | T | | | | | | | | | | | | | | | | | | | | U | | | | | | | | | | | | | | | | | | | | V | | | | | | | | | | | | | | | | | | | | W | | | | | | | | | | | | | | | | | | | | X | | | | | | | | | | | | | | | | | | | | Y | | | | | | | | | | | | | | | | | | | | Z | | | | | | | | | | | | | | | | | | | |



| Letter | A | C | E | G | J | K | M | N | P | Q | X | Y | Z | | | | |
|----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|--|--|--|--|
| Max. Thickness | 0.33 (0.013) | 0.56 (0.022) | 0.71 (0.028) | 0.90 (0.035) | 0.94 (0.037) | 1.02 (0.040) | 1.27 (0.050) | 1.40 (0.055) | 1.52 (0.060) | 1.78 (0.070) | 2.29 (0.090) | 2.54 (0.100) | 2.79 (0.110) | | | | |
| | PAPER | | | | | EMBOSSED | | | | | | | | | | | |

■ = Under Development

*Optional Specifications – Contact factory

NOTE: Contact factory for non-specified capacitance values