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ELECTRONICS

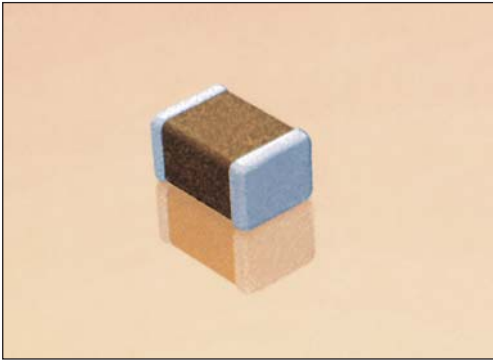
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Jameco Part Number 2025201

# 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  $-55^{\circ}\text{C}$  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**

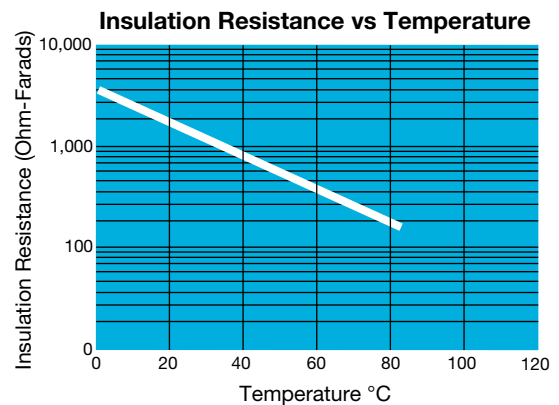
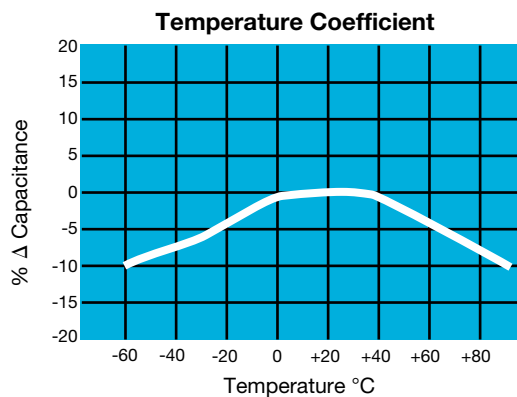
**Packaging**  
2 = 7" Reel  
4 = 13" Reel  
7 = Bulk Cass.  
9 = Bulk

**A**

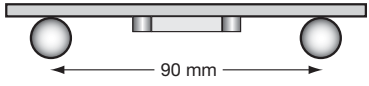
**Special Code**  
A = Std.

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%<br>Voltage: 1.0Vrms $\pm$ .2V<br>For Cap > 10 $\mu$ F, 0.5Vrms @ 120Hz                                                                                                                                                                                                                        |                    |
| Dissipation Factor             |                       | $\leq$ 2.5% for $\geq$ 50V DC rating<br>$\leq$ 3.0% for 25V DC rating<br>$\leq$ 12.5% Max. for 16V DC rating and lower<br>Contact Factory for DF by PN |                                                                                                                                                                                                                                                                                                                        |                    |
| Insulation Resistance          |                       | 100,000M $\Omega$ or 500M $\Omega$ - $\mu$ F,<br>whichever is less                                                                                     | Charge device with rated voltage for<br>120 $\pm$ 5 secs @ room temp/humidity                                                                                                                                                                                                                                          |                    |
| Dielectric Strength            |                       | No breakdown or visual defects                                                                                                                         | Charge device with 300% of rated voltage for<br>1-5 seconds, w/charge and discharge current<br>limited to 50 mA (max)                                                                                                                                                                                                  |                    |
| Resistance to Flexure Stresses | Appearance            | No defects                                                                                                                                             | Deflection: 2mm<br>Test Time: 30 seconds<br><br>1mm/sec<br>90 mm                                                                                                                                                                    |                    |
|                                | 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.<br><br>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.<br><br>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)                                                                                                                        |                                                                                                                                                                                                                                                                                                                        |                    |

## Capacitance Range



**PREFERRED SIZES ARE SHADED**

| SIZE                    | 0201                                          | 0402                           | 0603                           | 0805                           | 1206                           | 1210                           | 1812                           |
|-------------------------|-----------------------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| <b>Soldering</b>        | Reflow Only                                   | Reflow Only                    | Reflow Only                    | Reflow/Wave                    | Reflow/Wave                    | Reflow/Wave                    | Reflow Only                    |
| <b>Packaging</b>        | All Paper                                     | All Paper                      | All Paper                      | Paper/Embossed                 | Paper/Embossed                 | Paper/Embossed                 | All Embossed                   |
| (L) Length              | MM<br>(in.)<br>0.60 ± 0.03<br>(0.024 ± 0.001) | 1.00 ± 0.10<br>(0.040 ± 0.004) | 1.60 ± 0.15<br>(0.063 ± 0.006) | 2.01 ± 0.20<br>(0.079 ± 0.008) | 3.20 ± 0.20<br>(0.126 ± 0.008) | 3.20 ± 0.20<br>(0.126 ± 0.008) | 4.50 ± 0.30<br>(0.177 ± 0.012) |
| (W) Width               | MM<br>(in.)<br>0.30 ± 0.03<br>(0.011 ± 0.001) | 0.50 ± 0.10<br>(0.020 ± 0.004) | 0.81 ± 0.15<br>(0.032 ± 0.006) | 1.25 ± 0.20<br>(0.049 ± 0.008) | 1.60 ± 0.20<br>(0.063 ± 0.008) | 2.50 ± 0.20<br>(0.098 ± 0.008) | 3.20 ± 0.20<br>(0.126 ± 0.008) |
| (t) Terminal            | MM<br>(in.)<br>0.15 ± 0.05<br>(0.006 ± 0.002) | 0.25 ± 0.15<br>(0.010 ± 0.006) | 0.35 ± 0.15<br>(0.014 ± 0.006) | 0.50 ± 0.25<br>(0.020 ± 0.010) | 0.50 ± 0.25<br>(0.020 ± 0.010) | 0.50 ± 0.25<br>(0.020 ± 0.010) | 0.61 ± 0.36<br>(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           | 6.3 10 25 50                   |
| Cap (pF)                | 100<br>150<br>220                             | A<br>A<br>C                    |                                |                                |                                |                                |                                |
| 330<br>470<br>680       | A<br>A<br>A                                   | C<br>C<br>C                    |                                |                                |                                |                                |                                |
| 1000<br>1500<br>2200    | A<br>A<br>A                                   | C<br>C<br>C                    |                                |                                |                                |                                |                                |
| 3300<br>4700<br>6800    | A<br>A<br>A                                   | C<br>C<br>C                    | G<br>G<br>G                    |                                |                                |                                |                                |
| Cap (µF)                | 0.010<br>0.015<br>0.022                       | A<br>C<br>C                    | C<br>C<br>C                    | G<br>G<br>G                    | N<br>N<br>N                    |                                |                                |
| 0.033<br>0.047<br>0.068 | A<br>C<br>C                                   | C<br>C<br>C                    | G<br>G<br>G                    | N<br>N<br>N                    |                                |                                |                                |
| 0.10<br>0.15<br>0.22    | A<br>C<br>C                                   | C<br>C<br>C                    | G<br>G<br>G                    | N<br>N<br>N                    | Q                              |                                |                                |
| 0.33<br>0.47<br>0.68    | C<br>C<br>C                                   | C<br>C<br>C                    | G<br>G<br>G                    | N<br>N<br>N                    | Q<br>Q<br>Q                    |                                | X                              |
| 1.0<br>1.5<br>2.2       | C<br>C<br>C                                   | C<br>C<br>C                    | G<br>G<br>G                    | N<br>N<br>N                    | Q<br>Q<br>Q                    | X<br>X<br>X                    |                                |
| 3.3<br>4.7<br>10        | C<br>C<br>C                                   | C<br>C<br>C                    | G<br>G<br>G                    | N<br>N<br>N                    | Q<br>Q<br>Q                    | Z<br>Z<br>Z                    |                                |
| 22<br>47<br>100         | C<br>C<br>C                                   | C<br>C<br>C                    | G<br>G<br>G                    | N<br>N<br>N                    | Q<br>Q<br>Q                    | Z<br>Z<br>Z                    |                                |
| 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           | 6.3 10 25 50                   |

[illegible]

 = Under Development

\*Optional Specifications – Contact factory

NOTE: Contact factory for non-specified capacitance values

