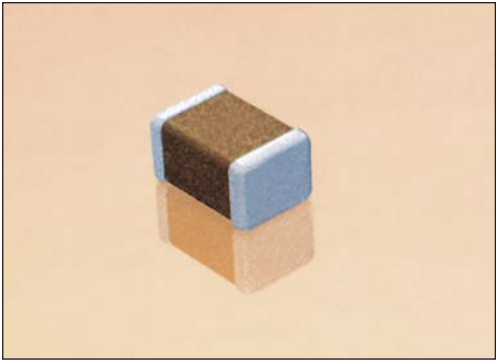


# X7S Dielectric

## General Specifications



### GENERAL DESCRIPTION

X7S formulations are called “temperature stable” ceramics and fall into EIA Class II materials. Its temperature variation of capacitance is within  $\pm 22\%$  from  $-55^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$ . This capacitance change is non-linear.

Capacitance for X7S varies under the influence of electrical operating conditions such as voltage and frequency.

X7S dielectric chip usage covers the broad spectrum of industrial applications where known changes in capacitance due to applied voltages are acceptable.

### PART NUMBER (SEE PAGE 2 FOR COMPLETE PART NUMBER EXPLANATION)

**1206**

**Size**  
(L" x W")

**Z**

**Voltage**  
4 = 4V  
6 = 6.3V  
Z = 10V  
Y = 16V  
3 = 25V  
5 = 50V  
1 = 100V  
2 = 200V

**Z**

**Dielectric**  
Z = X7S

**105**

**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.

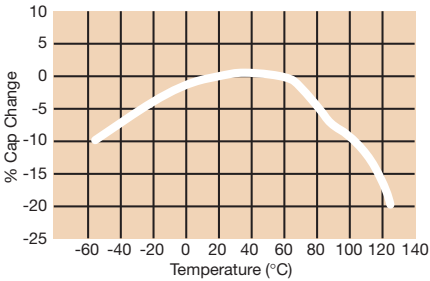
**A**

**Special Code**  
A = Std. Product

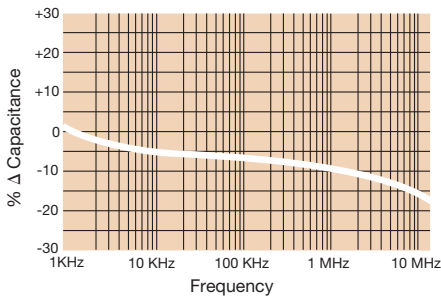
NOTE: Contact factory for availability of Tolerance Options for Specific Part Numbers.

### TYPICAL ELECTRICAL CHARACTERISTICS

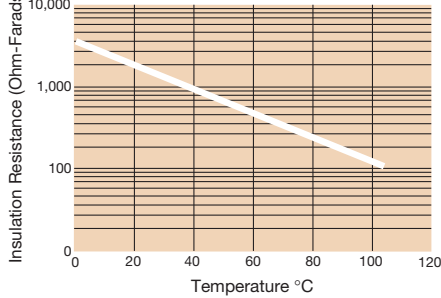
**X7S Dielectric Typical Temperature Coefficient**



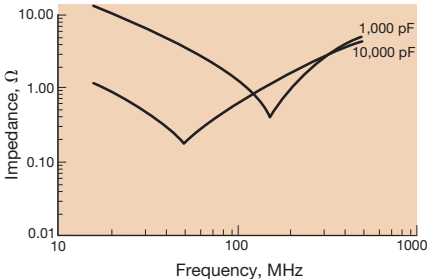
**$\Delta$  Capacitance vs. Frequency**



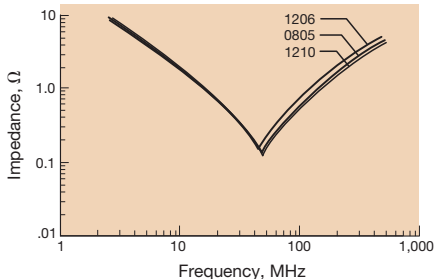
**Insulation Resistance vs Temperature**



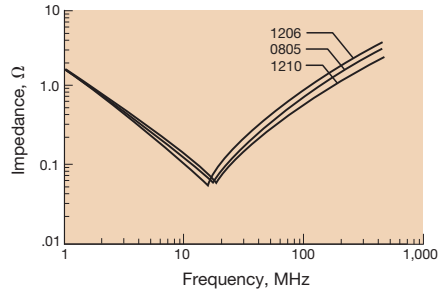
**Variation of Impedance with Cap Value Impedance vs. Frequency 1,000 pF vs. 10,000 pF - X7S 0805**



**Variation of Impedance with Chip Size Impedance vs. Frequency 10,000 pF - X7S**



**Variation of Impedance with Chip Size Impedance vs. Frequency 100,000 pF - X7S**



## Specifications and Test Methods

| Parameter/Test                        |                       | X7S Specification Limits   | Measuring Conditions  |                    |
|---------------------------------------|-----------------------|--|---|--------------------|
| <b>Operating Temperature Range</b>    |                       | -55°C to +125°C  | Temperature Cycle Chamber   |                    |
| <b>Capacitance</b>                    |                       | Within specified tolerance   | Freq.: 1.0 kHz $\pm$ 10%<br>Voltage: 1.0Vrms $\pm$ .2V<br>For Cap > 10 $\mu$ F, 0.5Vrms @ 120Hz   |                    |
| <b>Dissipation Factor</b>             |                       | $\leq$ 2.5% for $\geq$ 50V DC rating<br>$\leq$ 3.0% for 25V DC rating<br>$\leq$ 3.5% for 16V DC rating<br>$\leq$ 5.0% for $\leq$ 10V DC rating |   |                    |
| <b>Insulation Resistance</b>          |                       | 100,000M $\Omega$ or 1000M $\Omega$ - $\mu$ F, whichever is less   | Charge device with rated voltage for 120 $\pm$ 5 secs @ room temp/humidity  |                    |
| <b>Dielectric Strength</b>            |                       | 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)   |                    |
| <b>Resistance to Flexure Stresses</b> | Appearance            | No defects   | Deflection: 2mm<br>Test Time: 30 seconds<br>  |                    |
|                                       | Capacitance Variation | $\leq \pm 12\%$  |   |                    |
|                                       | Dissipation Factor    | Meets Initial Values (As Above)  |   |                    |
|                                       | Insulation Resistance | $\geq$ Initial Value x 0.3   |   |                    |
| <b>Solderability</b>                  |                       | $\geq$ 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  |                    |
| <b>Resistance to Solder Heat</b>      | 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)  |   |                    |
| <b>Thermal Shock</b>                  | 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: +125°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  |                    |
| <b>Load Life</b>                      | Appearance            | No visual defects  | Charge device with 1.5 rated voltage ( $\leq$ 10V) in test chamber set at 125°C $\pm$ 2°C for 1000 hours (+48, -0)<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)  |   |                    |
| <b>Load Humidity</b>                  | 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)  |   |                    |

