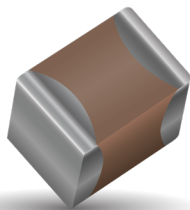


# X7R Dielectric

## General Specifications



X7R formulations are called “temperature stable” ceramics and fall into EIA Class II materials. X7R is the most popular of these intermediate dielectric constant materials. Its temperature variation of capacitance is within  $\pm 15\%$  from  $-55^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$ . This capacitance change is non-linear.

Capacitance for X7R varies under the influence of electrical operating conditions such as voltage and frequency.

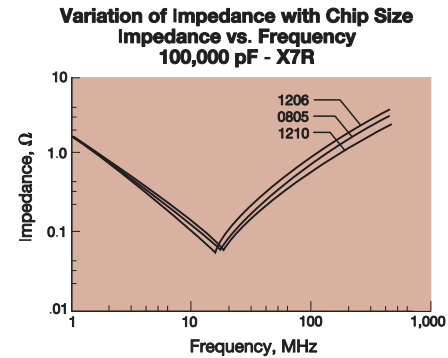
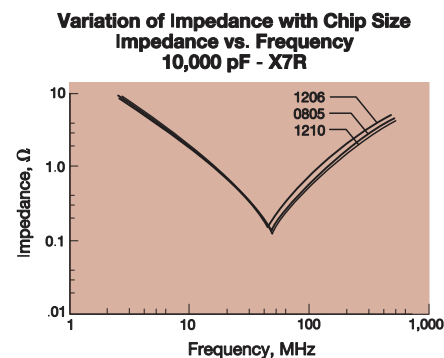
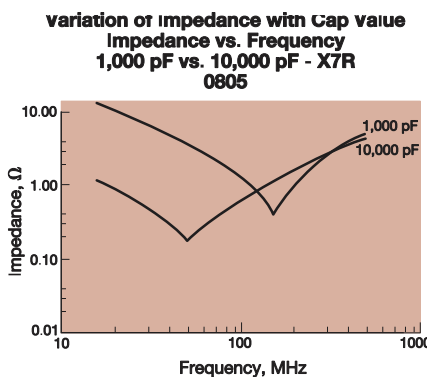
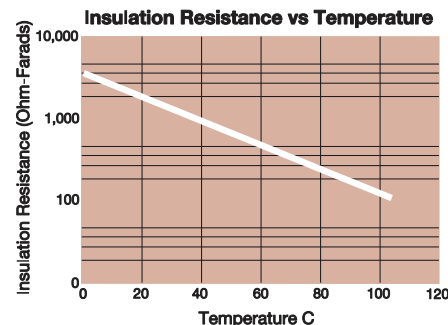
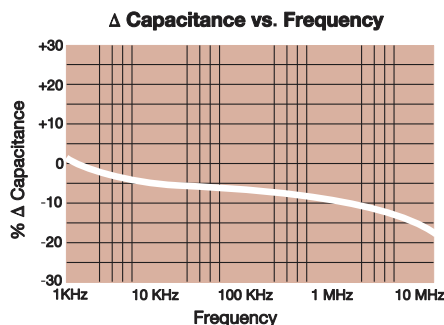
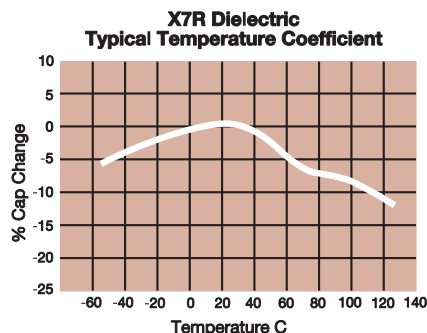
X7R dielectric chip usage covers the broad spectrum of industrial applications where known changes in capacitance due to applied voltages are acceptable.



### PART NUMBER (SEE PAGE 4 FOR COMPLETE PART NUMBER EXPLANATION)

| 0805                     | 5                                                                                                                    | C                            | 103                                                                | M                                                                                                                                                               | A                                         | T                                                                                                                        | 2                                                                                           | A                                       |
|--------------------------|----------------------------------------------------------------------------------------------------------------------|------------------------------|--------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|-----------------------------------------|
| <b>Size</b><br>(L" x W") | <b>Voltage</b><br>4V = 4<br>6.3V = 6<br>10V = Z<br>16V = Y<br>25V = 3<br>50V = 5<br>100V = 1<br>200V = 2<br>500V = 7 | <b>Dielectric</b><br>X7R = C | <b>Capacitance Code</b> (In pF)<br>2 Sig. Digits + Number of Zeros | <b>Capacitance Tolerance</b><br>J = $\pm 5\%$ *<br>K = $\pm 10\%$<br>M = $\pm 20\%$<br><br>* $\leq 1\mu\text{F}$ only,<br>contact factory for additional values | <b>Failure Rate</b><br>A = Not Applicable | <b>Terminations</b><br>T = Plated Ni and Sn<br>Z = FLEXITERM®**<br>*Optional termination<br>**See FLEXITERM® X7R section | <b>Packaging</b><br>2 = 7" Reel<br>4 = 13" Reel<br><br><b>Contact Factory For Multiples</b> | <b>Special Code</b><br>A = Std. Product |

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



# X7R Dielectric

## Specifications and Test Methods



| Parameter/Test                             |                                            | X7R Specification Limits                                                                                                            | Measuring Conditions (Complies with JIS C5101 / IEC60384)                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |           |             |      |   |             |           |   |              |           |
|--------------------------------------------|--------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-------------|------|---|-------------|-----------|---|--------------|-----------|
| Operating Temperature Range                |                                            | -55°C to +125°C                                                                                                                     | Temperature Cycle Chamber                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |           |             |      |   |             |           |   |              |           |
| Capacitance                                |                                            | Within specified tolerance                                                                                                          | Measure after heat treatment<br>Capacitance Frequency Volt<br>C≤10μF<br>Frequency : 1kHz±10%<br>Volt : 1.0±0.2Vrms *0.5±0.2Vrms                                                                                                                                                                                                                                                                                                                                                                                                   |           |             |      |   |             |           |   |              |           |
| Dissipation Factor / Tanδ                  |                                            | Refer to https://spicat.kyocera-avx.com for individual part number specification                                                    | C>10μF<br>Frequency : 120Hz±10%<br>Volt : 0.5±0.2Vrms<br>The charge and discharge current of the capacitor must not exceed 50mA.                                                                                                                                                                                                                                                                                                                                                                                                  |           |             |      |   |             |           |   |              |           |
| Insulation Resistance                      |                                            | Refer to https://spicat.kyocera-avx.com for individual part number specifiction                                                     | Apply the rated voltage for 1 minute, and measure it in normal temperature and humidity. The charge and discharge current of the capacitor must not exceed 50mA.                                                                                                                                                                                                                                                                                                                                                                  |           |             |      |   |             |           |   |              |           |
| Dielectric Strength                        |                                            | No breakdown or visual defects                                                                                                      | Charge device with 250% of rated voltage for 1-5 seconds, w/charge and discharge current limited to 50 mA (max)<br>Note: Charge device with 150% of rated voltage for 500V devices.                                                                                                                                                                                                                                                                                                                                               |           |             |      |   |             |           |   |              |           |
| Bending Strength                           |                                            | No significant damage with 1mm bending                                                                                              | Glass epoxy PCB: Fulcrum spacing: 90mm, duration time 10 seconds.                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |           |             |      |   |             |           |   |              |           |
| Solderability                              |                                            | Solder coverage : 95% min.                                                                                                          | Soaking condition<br>Sn-3Ag-0.5Cu 245±5°C 3±0.5 sec.                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |           |             |      |   |             |           |   |              |           |
| Resistance to Solder Heat                  | Appearance                                 | No problem observed                                                                                                                 | Take the initial value after heat treatment.<br>Soak the sample in 260°C±5°C solder for 10±0.5 seconds and place in normal temperature and humidity, and measure after heat treatment.<br>(Pre-heating conditions) <table><tr><td>Order</td><td>Temperature</td><td>Time</td></tr><tr><td>1</td><td>80 to 100°C</td><td>2 minutes</td></tr><tr><td>2</td><td>150 to 200°C</td><td>2 minutes</td></tr></table> The charge and discharge current of the capacitor must not exceed 50mA for IR and withstanding voltage measurement. | Order     | Temperature | Time | 1 | 80 to 100°C | 2 minutes | 2 | 150 to 200°C | 2 minutes |
|                                            | Order                                      | Temperature                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Time      |             |      |   |             |           |   |              |           |
|                                            | 1                                          | 80 to 100°C                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 2 minutes |             |      |   |             |           |   |              |           |
|                                            | 2                                          | 150 to 200°C                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 2 minutes |             |      |   |             |           |   |              |           |
|                                            | Capacitance Variation                      | ≤ ±7.5%                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |           |             |      |   |             |           |   |              |           |
| Dissipation Factor / Tanδ                  | Within specification                       |                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |           |             |      |   |             |           |   |              |           |
| Insulation Resistance                      | Within specification                       |                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |           |             |      |   |             |           |   |              |           |
| Withstanding Voltage / Dielectric Strength | Resist without problem                     |                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |           |             |      |   |             |           |   |              |           |
| Thermal Shock                              | Appearance                                 | No visual defects                                                                                                                   | Take the initial value after heat treatment.<br>(Cycle)<br>Room temperature (3 min.)→<br>Lowest operation temperature (30 min.)→<br>Room temperature (3 min.)→<br>Highest operation temperature(30 min.)<br>After 5 cycles, measure after heat treatment.<br>The charge and discharge current of the capacitor must not exceed 50mA for IR and withstanding voltage measurement.                                                                                                                                                  |           |             |      |   |             |           |   |              |           |
|                                            | Capacitance Variation                      | ≤ ±7.5%                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |           |             |      |   |             |           |   |              |           |
|                                            | Dissipation Factor                         | Within specification                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |           |             |      |   |             |           |   |              |           |
|                                            | Insulation Resistance                      | Within specification                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |           |             |      |   |             |           |   |              |           |
|                                            | Withstanding Voltage / Dielectric Strength | Resist without problem                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |           |             |      |   |             |           |   |              |           |
| Load Life                                  | Appearance                                 | No visual defects                                                                                                                   | Take the initial value after heat treatment.<br>After applying *1.5 the rated voltage at the highest operation temperature for 1000±12/ -0 hours, and measure the sample after heat treatment in normal temperature and humidity.<br>The charge and discharge current of the capacitor must not exceed 50mA for IR measurement.<br>*Apply 1.0 times when the rated voltage is 4V or less. Applied voltages for respective products are indicated in the chart below.                                                              |           |             |      |   |             |           |   |              |           |
|                                            | Capacitance Variation                      | ≤ ±12.5%                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |           |             |      |   |             |           |   |              |           |
|                                            | Dissipation Factor / Tanδ                  | ≤ Initial Value x 2.0 (See Above)                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |           |             |      |   |             |           |   |              |           |
|                                            | Insulation Resistance                      | Over 1000MΩ or 50MΩ · μF, whichever is less.<br>*Exceptions Listed Below                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |           |             |      |   |             |           |   |              |           |
| Load Humidity                              | Appearance                                 | No visual defects                                                                                                                   | Take the initial value after heat treatment.<br>After applying rated voltage for 500±12/ -0 hours in the condition of 40°C ± 2°C and 90 to 95%RH, and place in normal temperature and humidity, then measure the sample after heat treatment.<br>The charge and discharge current of the capacitor must not exceed 50mA for IR measurement.                                                                                                                                                                                       |           |             |      |   |             |           |   |              |           |
|                                            | Capacitance Variation                      | ≤ ±12.5%                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |           |             |      |   |             |           |   |              |           |
|                                            | Dissipation Factor / Tanδ                  | Within specification                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |           |             |      |   |             |           |   |              |           |
|                                            | Insulation Resistance                      | Over 1000MΩ or 50MΩ · μF, whichever is less.<br>*Exceptions Listed Below                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |           |             |      |   |             |           |   |              |           |
| Appearance                                 |                                            | No problem observed                                                                                                                 | Microscope                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |           |             |      |   |             |           |   |              |           |
| Termination Strength                       |                                            | No problem observed                                                                                                                 | Apply a sideward force of 500g (5N) to a PCB-mounted sample. note : 2N for 0201 size, and 1N for 01005 size.                                                                                                                                                                                                                                                                                                                                                                                                                      |           |             |      |   |             |           |   |              |           |
| Vibration                                  | Appearance                                 | No problem observed                                                                                                                 | Take the initial value after heat treatment.<br>Vibration frequency: 10 to 55 (Hz)<br>Amplitude: 1.5mm<br>Sweeping condition: 10 → 55 → 10Hz/ 1 minute in X, Y and Z directions: 2 hours each, 6 hours in total, and place in normal temperature and humidity, then measure the sample after heat treatment.                                                                                                                                                                                                                      |           |             |      |   |             |           |   |              |           |
|                                            | Capacitance                                | Within tolerance                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |           |             |      |   |             |           |   |              |           |
|                                            | Tanδ                                       | Within tolerance                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |           |             |      |   |             |           |   |              |           |
| Heat Treatment                             |                                            | Expose sample in the temperature of 150+0/ -10°C for 1 hour and leave the sample in normal temperature and humidity for 24±2 hours. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |           |             |      |   |             |           |   |              |           |

Voltage to be applied in the High Temperature Load (Applied voltage is the multiple of the rated voltage)

X7R Dielectric  
Capacitance Range



PREFERRED SIZES ARE SHADED

| SIZE         | 0101*              |                                 | 0201                           |    |    |    |    | 0402                           |    |    |    |    | 0603                           |     |    |    |    |    |     |     | 0805                           |     |    |    |    |    |     |     | 1206                           |     |    |    |    |    |     |     |     |     |   |   |   |
|--------------|--------------------|---------------------------------|--------------------------------|----|----|----|----|--------------------------------|----|----|----|----|--------------------------------|-----|----|----|----|----|-----|-----|--------------------------------|-----|----|----|----|----|-----|-----|--------------------------------|-----|----|----|----|----|-----|-----|-----|-----|---|---|---|
| Soldering    | Reflow Only        |                                 | Reflow Only                    |    |    |    |    | Reflow/Wave                    |    |    |    |    | Reflow/Wave                    |     |    |    |    |    |     |     | Reflow/Wave                    |     |    |    |    |    |     |     | Reflow/Wave                    |     |    |    |    |    |     |     |     |     |   |   |   |
| Packaging    | Paper/<br>Embossed |                                 | All Paper                      |    |    |    |    | All Paper                      |    |    |    |    | All Paper                      |     |    |    |    |    |     |     | Paper/Embossed                 |     |    |    |    |    |     |     | Paper/Embossed                 |     |    |    |    |    |     |     |     |     |   |   |   |
| (L) Length   | mm<br>(in.)        | 0.40 ± 0.02<br>(0.016 ± 0.0008) | 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 ± 0.30<br>(0.126 ± 0.012) |     |    |    |    |    |     |     |     |     |   |   |   |
| (W) Width    | mm<br>(in.)        | 0.20 ± 0.02<br>(0.008 ± 0.0008) | 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 ± 0.30<br>(0.063 ± 0.012) |     |    |    |    |    |     |     |     |     |   |   |   |
| (t) Terminal | mm<br>(in.)        | 0.10± 0.04<br>(0.004 ± 0.0016)  | 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) |     |    |    |    |    |     |     |     |     |   |   |   |
| WVDC         | 16                 |                                 | 6.3                            | 10 | 16 | 25 | 50 | 6.3                            | 10 | 16 | 25 | 50 | 100                            | 6.3 | 10 | 16 | 25 | 50 | 100 | 200 | 250                            | 6.3 | 10 | 16 | 25 | 50 | 100 | 200 | 250                            | 6.3 | 10 | 16 | 25 | 50 | 100 | 200 | 250 | 500 |   |   |   |
| Cap          | 100                | 101                             | B                              | A  | A  | A  | A  | A                              | C  | C  | C  | C  | C                              | C   | G  | G  | G  | G  | G   | G   | J                              | J   |    |    |    |    |     |     |                                |     |    |    |    |    |     | G   | G   | N   | N | N |   |
| (pF)         | 150                | 151                             | B                              | A  | A  | A  | A  | A                              | C  | C  | C  | C  | C                              | C   | G  | G  | G  | G  | G   | G   | J                              | J   |    |    |    |    |     |     |                                |     |    |    |    |    | G   | G   | G   | G   | N | N | N |
|              | 220                | 221                             | B                              | A  | A  | A  | A  | A                              | C  | C  | C  | C  | C                              | C   | G  | G  | G  | G  | G   | G   | J                              | J   | E  | E  | E  | E  | E   | E   | E                              | J   | J  | J  | J  | J  | J   | J   | N   | N   | P |   |   |
|              | 330                | 331                             | B                              | A  | A  | A  | A  | A                              | C  | C  | C  | C  | C                              | C   | G  | G  | G  | G  | G   | G   | J                              | J   |    | J  | J  | J  | J   | J   | J                              | J   | J  | J  | J  | J  | J   | J   | N   | N   | P |   |   |
|              | 470                | 471                             | B                              | A  | A  | A  | A  | A                              | C  | C  | C  | C  | C                              | C   | G  | G  | G  | G  | G   | G   | J                              | J   |    | J  | J  | J  | J   | J   | J                              | J   | J  | J  | J  | J  | J   | J   | N   | N   | P |   |   |
|              | 680                | 681                             | B                              | A  | A  | A  | A  | A                              | C  | C  | C  | C  | C                              | C   | G  | G  | G  | G  | G   | G   | J                              | J   |    | J  | J  | J  | J   | J   | J                              | J   | J  | J  | J  | J  | J   | J   | N   | N   | P |   |   |
|              | 1000               | 102                             | B                              | A  | A  | A  | A  | A                              | C  | C  | C  | C  | C                              | C   | G  | G  | G  | G  | G   | G   | J                              | J   |    | J  | J  | J  | J   | J   | J                              | J   | J  | J  | J  | J  | J   | J   | N   | N   | P |   |   |
|              | 1500               | 152                             |                                | A  | A  | A  | A  | A                              | C  | C  | C  | C  | C                              | C   | G  | G  | G  | G  | G   | G   | J                              | J   |    | J  | J  | J  | J   | J   | J                              | J   | J  | J  | J  | J  | J   | J   | N   | N   | P |   |   |
|              | 2200               | 222                             |                                | A  | A  | A  | A  |                                | C  | C  | C  | C  | C                              | C   | G  | G  | G  | G  | G   | G   | J                              | J   |    | J  | J  | J  | J   | J   | J                              | J   | J  | J  | J  | J  | J   | J   | N   | N   | P |   |   |
|              | 3300               | 332                             |                                | A  | A  | A  | A  |                                | C  | C  | C  | C  | C                              | C   | G  | G  | G  | G  | G   | G   | J                              | J   |    | J  | J  | J  | J   | J   | J                              | J   | J  | J  | J  | J  | J   | J   | N   | N   | P |   |   |
|              | 3900               | 392                             |                                | A  | A  | A  | A  |                                |    |    |    |    |                                |     |    |    |    |    |     |     |                                |     |    |    |    |    |     |     |                                |     |    |    |    |    |     |     |     |     |   |   |   |
|              | 4700               | 472                             |                                | A  | A  | A  | A  |                                | C  | C  | C  | C  | C                              | C   | G  | G  | G  | G  | G   | G   | J                              | J   |    | J  | J  | J  | J   | J   | J                              | J   | J  | J  | J  | J  | J   | N   | N   | P   |   |   |   |
|              | 5600               | 562                             |                                | A  | A  | A  | A  |                                |    |    |    |    |                                |     |    |    |    |    |     |     |                                |     |    |    |    |    |     |     |                                |     |    |    |    |    |     |     |     |     |   |   |   |
|              | 6800               | 682                             |                                | A  | A  | A  | A  |                                | C  | C  | C  | C  | C                              | C   | G  | G  | G  | G  | G   | G   | J                              | J   |    | J  | J  | J  | J   | J   | P                              | P   | J  | J  | J  | J  | J   | J   | N   | N   | P |   |   |
| Cap          | 0.01               | 103                             |                                | A  | A  | A  | A  |                                | C  | C  | C  | C  | C                              | C   | G  | G  | G  | G  | G   | G   | J                              | J   |    | J  | J  | J  | J   | J   | P                              | P   | J  | J  | J  | J  | J   | J   | N   | N   | P |   |   |
| (µF)         | 0.012              | 123                             |                                |    |    |    |    |                                | C  | C  | C  | C  | C                              |     | G  | G  | G  | G  | G   | J   | J                              | J   |    | J  | J  | J  | J   | J   | P                              | P   | J  | J  | J  | J  | J   | J   | N   | N   | Q |   |   |
|              | 0.015              | 153                             |                                |    |    |    |    |                                | C  | C  | C  | C  | C                              |     | G  | G  | G  | G  | G   | J   | J                              | J   |    | J  | J  | J  | J   | J   | P                              | P   | J  | J  | J  | J  | J   | J   | N   | N   | Q |   |   |
|              | 0.018              | 183                             |                                |    |    |    |    |                                |    |    |    |    |                                |     |    |    |    |    |     |     |                                |     |    |    |    |    |     |     |                                |     |    |    |    |    |     |     |     |     |   |   |   |
|              | 0.022              | 223                             |                                | A  | A  | A  |    |                                | C  | C  | C  | C  | C                              |     | G  | G  | G  | G  | G   | J   | J                              | J   |    | J  | J  | J  | J   | J   | P                              | P   | J  | J  | J  | J  | J   | J   | P   | P   | Q |   |   |
|              | 0.027              | 273                             |                                |    |    |    |    |                                |    |    |    |    |                                |     |    |    |    |    |     |     |                                |     |    |    |    |    |     |     |                                |     |    |    |    |    |     |     |     |     |   |   |   |
|              | 0.033              | 333                             |                                |    |    |    |    |                                | C  | C  | C  | C  | C                              |     | G  | G  | G  | G  | G   | J   | J                              |     |    | J  | J  | J  | J   | P   | P                              | P   | J  | J  | J  | J  | J   | J   | Q   | Q   | Q |   |   |
|              | 0.039              | 393                             |                                |    |    |    |    |                                |    |    |    |    |                                |     |    |    |    |    |     |     |                                |     |    |    |    |    |     |     |                                |     |    |    |    |    |     |     |     |     |   |   |   |
|              | 0.047              | 473                             |                                |    |    |    |    |                                | C  | C  | C  | C  | C                              |     | G  | G  | G  | G  | G   | J   | J                              |     |    | J  | J  | J  | J   | P   | P                              | P   | J  | J  | J  | J  | J   | J   | Q   | Q   | Q |   |   |
|              | 0.068              | 683                             |                                |    |    |    |    |                                | C  | C  | C  | C  | E                              |     | G  | G  | G  | G  | G   | J   | J                              |     |    | J  | J  | J  | J   | P   | P                              |     | J  | J  | J  | J  | J   | P   | Q   | Q   |   |   |   |
|              | 0.082              | 823                             |                                |    |    |    |    |                                |    |    |    |    |                                |     |    |    |    |    |     |     |                                |     |    |    |    |    |     |     |                                |     |    |    |    |    |     |     |     |     |   |   |   |
|              | 0.1                | 104                             |                                | A  |    |    |    |                                | C  | C  | C  | C  | E                              |     | G  | G  | G  | G  | G   | J   | J                              |     |    | J  | J  | J  | J   | P   | P                              |     | J  | J  | J  | J  | J   | P   | Q   | Q   |   |   |   |
|              | 0.12               | 124                             |                                |    |    |    |    |                                |    |    |    |    |                                |     |    |    |    |    |     |     |                                |     |    |    |    |    |     |     |                                |     |    |    |    |    |     |     |     |     |   |   |   |
|              | 0.15               | 154                             |                                |    |    |    |    |                                |    |    |    |    |                                |     | G  | G  | G  | G  | J   | J   |                                |     |    | N  | N  | N  | N   | P   |                                |     |    | K  | K  | K  | K   | K   | Q   | Q   | Q |   |   |
|              | 0.22               | 224                             |                                |    |    |    |    |                                | C  | C  | C  | C  |                                |     | G  | G  | J  | J  | J   |     |                                |     |    | N  | N  | N  | N   | P   |                                |     |    | K  | K  | K  | K   | K   | Q   | Q   | Q |   |   |
|              | 0.33               | 334                             |                                |    |    |    |    |                                |    |    |    |    |                                |     | J  | J  | J  | J  | J   |     |                                |     |    | P  | P  | P  | P   | P   |                                |     |    | K  | K  | K  | K   | N   | Q   |     |   |   |   |
|              | 0.47               | 474                             |                                |    |    |    |    |                                | C  | C  |    |    |                                |     | J  | J  | J  | J  | J   |     |                                |     |    | P  | P  | P  | P   | P   |                                |     |    | M  | M  | M  | M   | X   | X   |     |   |   |   |
|              | 0.68               | 684                             |                                |    |    |    |    |                                |    |    |    |    |                                |     | J  | J  | J  |    |     |     |                                |     |    | P  | P  | P  |     |     |                                |     | M  | M  | M  | M  | X   | X   |     |     |   |   |   |
|              | 1.0                | 105                             |                                |    |    |    |    |                                | C  |    |    |    |                                |     | J  | J  | J  | J  | K   |     |                                |     |    | P  | P  | P  | P   |     |                                |     |    | M  | M  | M  | M   | X   | X   |     |   |   |   |
|              | 2.2                | 225                             |                                |    |    |    |    |                                |    |    |    |    |                                |     | J  | J  | K  |    |     |     |                                |     |    | P  | P  | P  | P   |     |                                |     |    | M  | M  | M  | X   | X   |     |     |   |   |   |
|              | 4.7                | 475                             |                                |    |    |    |    |                                |    |    |    |    |                                |     | K  |    |    |    |     |     |                                |     |    | P  | P  | P  |     |     |                                |     | X  | X  | X  | Z  |     |     |     |     |   |   |   |
|              | 10                 | 106                             |                                |    |    |    |    |                                |    |    |    |    |                                |     |    |    |    |    |     |     |                                |     | P  | P  | P  |    |     |     |                                |     | X  | X  | X  | X  | X   |     |     |     |   |   |   |
|              | 22                 | 226                             |                                |    |    |    |    |                                |    |    |    |    |                                |     |    |    |    |    |     |     |                                |     |    |    |    |    |     |     |                                |     | X  | X  |    |    |     |     |     |     |   |   |   |
|              | 47                 | 476                             |                                |    |    |    |    |                                |    |    |    |    |                                |     |    |    |    |    |     |     |                                |     |    |    |    |    |     |     |                                |     |    |    |    |    |     |     |     |     |   |   |   |
|              | 100                | 107                             |                                |    |    |    |    |                                |    |    |    |    |                                |     |    |    |    |    |     |     |                                |     |    |    |    |    |     |     |                                |     |    |    |    |    |     |     |     |     |   |   |   |
| WVDC         | 16                 |                                 | 6.3                            | 10 | 16 | 25 | 50 | 6.3                            | 10 | 16 | 25 | 50 | 100                            | 6.3 | 10 | 16 | 25 | 50 | 100 | 200 | 250                            | 6.3 | 10 | 16 | 25 | 50 | 100 | 200 | 250                            | 6.3 | 10 | 16 | 25 | 50 | 100 | 200 | 250 | 500 |   |   |   |
| SIZE         | 0101*              |                                 | 0201                           |    |    |    |    | 0402                           |    |    |    |    | 0603                           |     |    |    |    |    |     |     | 0805                           |     |    |    |    |    |     |     | 1206                           |     |    |    |    |    |     |     |     |     |   |   |   |

| Letter         | A               | B               | C               | E               | G               | J               | K               | M               | N               | P               | Q               | X               | Y               | Z               |
|----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Max. Thickness | 0.33<br>(0.013) | 0.22<br>(0.009) | 0.56<br>(0.022) | 0.71<br>(0.028) | 0.90<br>(0.035) | 0.94<br>(0.037) | 1.02<br>(0.040) | 1.27<br>(0.050) | 1.40<br>(0.055) | 1.52<br>(0.060) | 1.78<br>(0.070) | 2.29<br>(0.090) | 2.54<br>(0.100) | 2.79<br>(0.110) |
|                | PAPER           |                 |                 |                 |                 |                 | EMBOSSD         |                 |                 |                 |                 |                 |                 |                 |

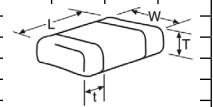
NOTE: Contact factory for non-specified capacitance values  
\*EIA 01005  
\*\*Contact Factory for Specifications

# X7R Dielectric

## Capacitance Range

### PREFERRED SIZES ARE SHADED

| SIZE         |             | 1210                           |    |    |    |     |     |     | 1812                           |    |    |     |     |     |    | 1825                           |     |    | 2220                           |     |     |     |    | 2225                           |     |  |
|--------------|-------------|--------------------------------|----|----|----|-----|-----|-----|--------------------------------|----|----|-----|-----|-----|----|--------------------------------|-----|----|--------------------------------|-----|-----|-----|----|--------------------------------|-----|--|
|              |             | Reflow Only                    |    |    |    |     |     |     | Reflow Only                    |    |    |     |     |     |    | Reflow Only                    |     |    | Reflow Only                    |     |     |     |    | Reflow Only                    |     |  |
|              |             | Paper/Embossed                 |    |    |    |     |     |     | All Embossed                   |    |    |     |     |     |    | All Embossed                   |     |    | All Embossed                   |     |     |     |    | All Embossed                   |     |  |
| (L) Length   | mm<br>(in.) | 3.30 ± 0.4<br>(0.130± 0.016)   |    |    |    |     |     |     | 4.50 ± 0.40<br>(0.177 ± 0.016) |    |    |     |     |     |    | 4.50 ± 0.40<br>(0.177 ± 0.016) |     |    | 5.70 ± 0.50<br>(0.224 ± 0.020) |     |     |     |    | 5.70 ± 0.40<br>(0.224 ± 0.016) |     |  |
| W) Width     | mm<br>(in.) | 2.50 ± 0.30<br>(0.098 ± 0.012) |    |    |    |     |     |     | 3.20 ± 0.40<br>(0.126 ± 0.016) |    |    |     |     |     |    | 6.40 ± 0.40<br>(0.252 ± 0.016) |     |    | 5.00 ± 0.40<br>(0.197 ± 0.016) |     |     |     |    | 6.30 ± 0.40<br>(0.248 ± 0.016) |     |  |
| (t) Terminal | mm<br>(in.) | 0.50 ± 0.25<br>(0.020 ± 0.010) |    |    |    |     |     |     | 0.61 ± 0.36<br>(0.024 ± 0.014) |    |    |     |     |     |    | 0.61 ± 0.36<br>(0.024 ± 0.014) |     |    | 0.64 ± 0.39<br>(0.025 ± 0.015) |     |     |     |    | 0.64 ± 0.39<br>(0.025 ± 0.015) |     |  |
| WVDC         |             | 10                             | 16 | 25 | 50 | 100 | 200 | 500 | 16                             | 25 | 50 | 100 | 200 | 500 | 50 | 100                            | 200 | 25 | 50                             | 100 | 200 | 500 | 50 | 100                            | 200 |  |
| Cap          | 100 101     |                                |    |    |    |     |     |     |                                |    |    |     |     |     |    |                                |     |    |                                |     |     |     |    |                                |     |  |
| (pF)         | 150 151     |                                |    |    |    |     |     |     |                                |    |    |     |     |     |    |                                |     |    |                                |     |     |     |    |                                |     |  |
|              | 220 221     |                                |    |    | K  | K   | K   | M   |                                |    |    |     |     |     |    |                                |     |    |                                |     |     |     |    |                                |     |  |
|              | 330 331     |                                |    |    | K  | K   | K   | M   |                                |    | N  | N   | N   | N   |    |                                |     |    |                                |     |     |     |    |                                |     |  |
|              | 470 471     |                                |    |    | K  | K   | K   | M   |                                |    | N  | N   | N   | N   |    |                                |     |    |                                |     |     |     |    |                                |     |  |
|              | 680 681     |                                |    |    | K  | K   | K   | M   |                                |    | N  | N   | N   | N   |    |                                |     |    |                                |     |     |     |    |                                |     |  |
|              | 1000 102    | K                              | K  | K  | K  | K   | K   | M   | N                              | N  | N  | N   | N   | N   | X  | X                              | X   |    | X                              | X   | X   | X   | X  | X                              | X   |  |
|              | 1500 152    | K                              | K  | K  | K  | K   | K   | M   | N                              | N  | N  | N   | N   | N   | X  | X                              | X   |    | X                              | X   | X   | X   | X  | X                              | X   |  |
|              | 2200 222    | K                              | K  | K  | K  | K   | K   | M   | N                              | N  | N  | N   | N   | N   | X  | X                              | X   |    | X                              | X   | X   | X   | X  | X                              | X   |  |
|              | 3300 332    | K                              | K  | K  | K  | K   | K   | P   | N                              | N  | N  | N   | N   | N   | X  | X                              | X   |    | X                              | X   | X   | X   | X  | X                              | X   |  |
|              | 4700 472    | K                              | K  | K  | K  | K   | K   | P   | N                              | N  | N  | N   | N   | P   | X  | X                              | X   |    | X                              | X   | X   | X   | X  | X                              | X   |  |
|              | 6800 682    | K                              | K  | K  | K  | K   | K   | P   | N                              | N  | N  | N   | N   | P   | X  | X                              | X   |    | X                              | X   | X   | X   | X  | X                              | X   |  |
| Cap          | 0.01 103    | K                              | K  | K  | K  | K   | K   | P   | N                              | N  | N  | N   | N   | P   | X  | X                              | X   |    | X                              | X   | X   | X   | X  | X                              | X   |  |
| (μF)         | 0.015 153   | K                              | K  | K  | K  | K   | K   | P   | N                              | N  | N  | N   | N   | P   | X  | X                              | X   |    | X                              | X   | X   | X   | X  | X                              | X   |  |
|              | 0.022 223   | K                              | K  | K  | K  | K   | P   | Q   | N                              | N  | N  | N   | N   | P   | X  | X                              | X   |    | X                              | X   | X   | X   | X  | X                              | X   |  |
|              | 0.033 333   | K                              | K  | K  | K  | K   | P   | X   | N                              | N  | N  | N   | N   | X   | X  | X                              | X   |    | X                              | X   | X   | X   | X  | X                              | X   |  |
|              | 0.047 473   | K                              | K  | K  | K  | K   | P   | X   | N                              | N  | N  | N   | P   | X   | X  | X                              | X   |    | X                              | X   | X   | X   | X  | X                              | X   |  |
|              | 0.068 683   | K                              | K  | K  | K  | K   | P   | X   | N                              | N  | N  | N   | P   | X   | X  | X                              | X   |    | X                              | X   | X   | X   | X  | X                              | X   |  |
|              | 0.1 104     | K                              | K  | K  | K  | K   | P   | X   | N                              | N  | N  | P   | P   | X   | X  | X                              | X   |    | X                              | X   | X   | X   | X  | X                              | X   |  |
|              | 0.15 154    | K                              | K  | K  | M  | P   | Z   | Z   | N                              | N  | N  | P   | P   | Z   | X  | X                              | X   |    | X                              | X   | X   | X   | X  | X                              | X   |  |
|              | 0.22 224    | K                              | K  | K  | M  | P   | Z   |     | N                              | N  | N  | P   | Q   | Z   | X  | X                              | X   |    | X                              | X   | X   | X   | X  | X                              | X   |  |
|              | 0.33 334    | K                              | K  | K  | M  | Q   | Z   |     | N                              | N  | N  | P   | X   | Z   | X  | X                              | X   |    | X                              | X   | X   | X   | X  | X                              | X   |  |
|              | 0.47 474    | M                              | M  | M  | P  | Q   | Z   |     | N                              | N  | N  | Q   | X   | Z   | X  | X                              | X   |    | X                              | X   | X   | X   | X  | X                              | X   |  |
|              | 0.68 684    | M                              | M  | P  | X  | X   | Z   |     | Q                              | Q  | Q  | Q   | Z   |     | X  | X                              | X   |    | X                              | X   | X   | Z   | X  | X                              | X   |  |
|              | 1.0 105     | P                              | P  | P  | X  | Z   |     |     | Q                              | Q  | Q  | X   | Z   |     | X  | X                              | X   |    | X                              | X   | X   | 7   | X  | X                              | X   |  |
|              | 1.5 155     | N                              | N  | Z  | Z  | Z   |     |     |                                | Z  | Z  | Z   |     |     | X  | X                              | Z   |    | X                              | X   | Z   |     | X  | X                              | Z   |  |
|              | 2.2 225     | X                              | X  | Z  | Z  | Z   |     |     |                                | Z  | Z  | Z   |     |     | X  | X                              | Z   |    | X                              | X   | Z   |     | X  | X                              | Z   |  |
|              | 3.3 335     | X                              | X  | Z  | Z  | Z   |     |     |                                | Z  | Z  | Z   |     |     | X  | X                              |     |    | X                              | Z   |     |     | X  | X                              |     |  |
|              | 4.7 475     | Z                              | Z  | Z  | Z  | Z   |     |     |                                | Z  | Z  | Z   |     |     | X  | X                              |     |    | Z                              | Z   |     |     | X  | X                              |     |  |
|              | 10 106      | Z                              | Z  | Z  | Z  |     |     |     | Z                              | Z  | Z  |     |     |     | Z  | Z                              |     |    | Z                              | 7   |     |     | Z  | Z                              |     |  |
|              | 22 226      | Z                              | Z  | Z  |    |     |     |     |                                |    |    |     |     |     |    |                                |     |    | Z                              |     | 7   |     |    |                                |     |  |
|              | 47 476      | Z                              |    |    |    |     |     |     |                                |    |    |     |     |     |    |                                |     |    |                                |     |     |     |    |                                |     |  |
|              | 100 107     |                                |    |    |    |     |     |     |                                |    |    |     |     |     |    |                                |     |    |                                |     |     |     |    |                                |     |  |
| WVDC         |             | 10                             | 16 | 25 | 50 | 100 | 200 | 500 | 16                             | 25 | 50 | 100 | 200 | 500 | 50 | 100                            | 200 | 25 | 50                             | 100 | 200 | 500 | 50 | 100                            | 200 |  |
| SIZE         |             | 1210                           |    |    |    |     |     |     | 1812                           |    |    |     |     |     |    | 1825                           |     |    | 2220                           |     |     |     |    | 2225                           |     |  |



| Letter         | A            | B            | C            | E            | G            | J            | K            | M            | N            | P            | Q            | X            | Y            | Z            | 7            |
|----------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Max. Thickness | 0.33 (0.013) | 0.22 (0.009) | 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) | 3.30 (0.130) |
| PAPER          |              |              |              |              |              |              | EMBOSSED     |              |              |              |              |              |              |              |              |

NOTE: Contact factory for non-specified capacitance values