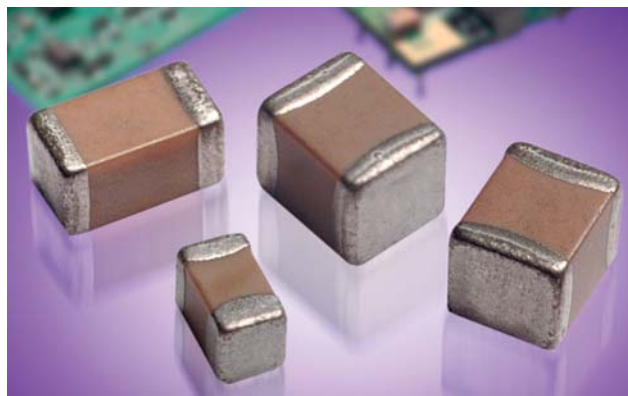


# X7R Dielectric

## 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.

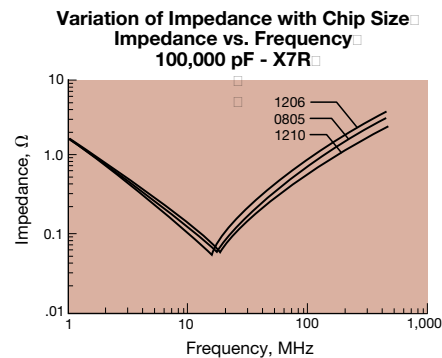
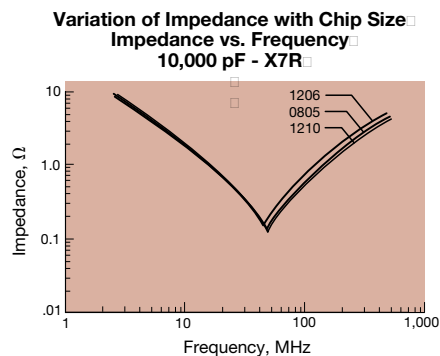
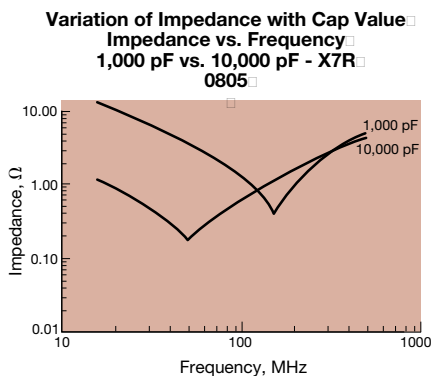
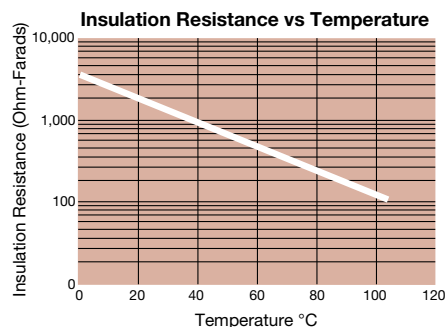
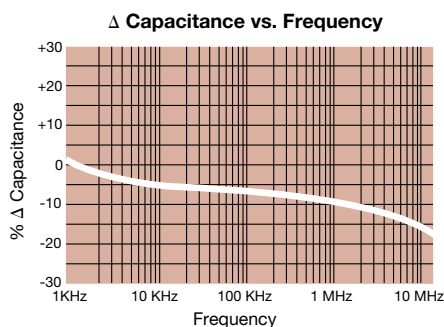
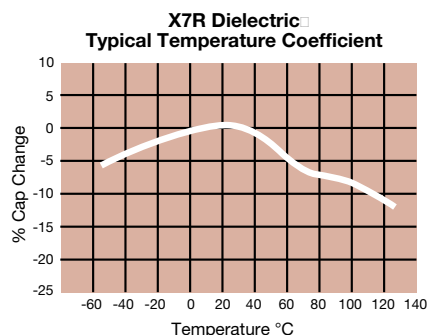
X7R dielectric chip usage covers the broad spectrum of industrial applications where known changes in capacitance due to applied voltages are acceptable.



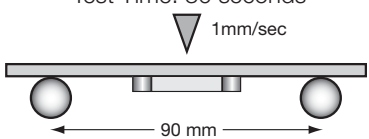
### PART NUMBER (see page 2 for complete part number explanation)

| 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 (In pF)</b><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, contact factory for additional values | <b>Failure Rate</b><br>A = Not Applicable | <b>Terminations</b><br>T = Plated Ni and Sn<br>7 = Gold Plated*<br>Z = FLEXITERM <sup>®</sup> **<br><br>*Optional termination<br>**See FLEXITERM <sup>®</sup> X7R section | <b>Packaging</b><br>2 = 7" Reel<br>4 = 13" Reel<br>7 = Bulk Cass.<br>9 = Bulk | <b>Special Code</b><br>A = Std. Product |
|                          |                                                                                                                      |                              |                                                                    |                                                                                                                                                                |                                           |                                                                                                                                                                           | <b>Contact Factory For Multiples</b>                                          |                                         |

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



## Specifications and Test Methods

| Parameter/Test                       |                       | X7R Specification Limits                                                                                                                                   | Measuring Conditions                                                                                                                                                                                                                                            |                    |
|--------------------------------------|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| Operating Temperature Range          |                       | -55°C to +125°C                                                                                                                                            | Temperature Cycle Chamber                                                                                                                                                                                                                                       |                    |
| Capacitance                          |                       | Within specified tolerance                                                                                                                                 | Freq.: 1.0 kHz $\pm$ 10%<br>Voltage: 1.0Vrms $\pm$ .2V                                                                                                                                                                                                          |                    |
| Dissipation Factor                   |                       | $\leq 2.5\%$ for $\geq 50V$ DC rating<br>$\leq 3.0\%$ for 25V DC rating<br>$\leq 3.5\%$ for 25V and 16V DC rating<br>$\leq 5.0\%$ for $\leq 10V$ DC rating |                                                                                                                                                                                                                                                                 |                    |
| Insulation Resistance                |                       | 100,000M $\Omega$ or 1000M $\Omega$ - $\mu$ 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)<br>Note: Charge device with 150% of rated<br>voltage for 500V devices.                                                                    |                    |
| Resistance to<br>Flexure<br>Stresses | 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                                                                                                                                 |                                                                                                                                                                                                                                                                 |                    |
| Solderability                        |                       | $\geq 95\%$ of each terminal should be covered<br>with fresh solder                                                                                        | Dip device in eutectic solder at 230 $\pm$ 5°C<br>for 5.0 $\pm$ 0.5 seconds                                                                                                                                                                                     |                    |
| Resistance to<br>Solder Heat         | Appearance            | No defects, <25% leaching of either end terminal                                                                                                           | Dip device in eutectic solder at 260°C for 60<br>seconds. Store at room temperature for 24 $\pm$ 2<br>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<br>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: +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<br>24 $\pm$ 2 hours at room temperature                                                                                                                                                                                   |                    |
| Load Life                            | Appearance            | No visual defects                                                                                                                                          | Charge device with 1.5 rated voltage ( $\leq 10V$ ) in<br>test chamber set at 125°C $\pm$ 2°C<br>for 1000 hours (+48, -0)<br><br>Remove from test chamber and stabilize<br>at room temperature for 24 $\pm$ 2 hours<br>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<br>Humidity                     | Appearance            | No visual defects                                                                                                                                          | Store in a test chamber set at 85°C $\pm$ 2°C/<br>85% $\pm$ 5% relative humidity for 1000 hours<br>(+48, -0) with rated voltage applied.<br><br>Remove from chamber and stabilize at<br>room temperature and humidity for<br>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         | 0101           |                                 | 0201                           |    |      | 0402                           |    |      | 0603                           |    |    |    |    |     |      | 0805                           |    |    |    |    |     |      | 1206                           |    |    |    |    |     |     |     |  |
|--------------|----------------|---------------------------------|--------------------------------|----|------|--------------------------------|----|------|--------------------------------|----|----|----|----|-----|------|--------------------------------|----|----|----|----|-----|------|--------------------------------|----|----|----|----|-----|-----|-----|--|
| Soldering    | Reflow Only    |                                 | Reflow Only                    |    |      | Reflow/Wave                    |    |      | Reflow/Wave                    |    |    |    |    |     |      | Reflow/Wave                    |    |    |    |    |     |      | Reflow/Wave                    |    |    |    |    |     |     |     |  |
| Packaging    | Paper/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 ± 0.20<br>(0.126 ± 0.008) |    |    |    |    |     |     |     |  |
| (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 ± 0.20<br>(0.063 ± 0.008) |    |    |    |    |     |     |     |  |
| (t) Terminal | mm<br>(in.)    | 0.20 ± 0.02<br>(0.008 ± 0.0008) | 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         | 10             |                                 | 10                             | 16 | 25   | 16                             | 25 | 50   | 6.3                            | 10 | 16 | 25 | 50 | 100 | 200  | 6.3                            | 10 | 16 | 25 | 50 | 100 | 200  | 6.3                            | 10 | 16 | 25 | 50 | 100 | 200 | 500 |  |
| Cap<br>(pF)  | 100            | A                               | A                              | A  | A    |                                |    |      |                                |    |    |    |    |     |      |                                |    |    |    |    |     |      |                                |    |    |    |    |     |     |     |  |
|              | 150            | A                               | A                              | A  | A    |                                |    |      |                                |    |    |    |    |     |      |                                |    |    |    |    |     |      |                                |    |    |    |    |     |     |     |  |
|              | 220            | A                               | A                              | A  | A    |                                |    | C    |                                |    |    |    |    |     |      |                                |    |    |    |    |     |      |                                |    |    |    |    |     |     |     |  |
|              | 330            | A                               | A                              | A  | A    |                                |    | C    |                                |    |    |    | G  | G   | G    |                                | J  | J  | J  | J  | J   | J    |                                |    |    |    |    |     |     | K   |  |
|              | 470            | A                               | A                              | A  |      |                                |    | C    |                                |    |    |    | G  | G   | G    |                                | J  | J  | J  | J  | J   | J    |                                |    |    |    |    |     |     | K   |  |
|              | 680            | A                               | A                              | A  |      |                                |    | C    |                                |    |    |    | G  | G   | G    |                                | J  | J  | J  | J  | J   | J    |                                |    |    |    |    |     |     | K   |  |
|              | 1000           | A                               | A                              | A  |      |                                |    | C    |                                |    |    |    | G  | G   | G    |                                | J  | J  | J  | J  | J   | J    |                                |    |    |    |    |     |     | K   |  |
|              | 1500           |                                 | A                              |    |      |                                |    | C    |                                |    |    |    | G  | G   |      |                                | J  | J  | J  | J  | J   | J    |                                | J  | J  | J  | J  | J   | J   | M   |  |
|              | 2200           |                                 | A                              |    |      |                                |    | C    |                                |    |    |    | G  | G   |      |                                | J  | J  | J  | J  | J   | J    |                                | J  | J  | J  | J  | J   | J   | M   |  |
|              | 3300           |                                 | A                              |    |      |                                |    | C    |                                |    |    |    | G  | G   |      |                                | J  | J  | J  | J  | J   | J    |                                | J  | J  | J  | J  | J   | J   | M   |  |
|              | 4700           |                                 | A                              |    |      |                                |    | C    |                                |    |    |    | G  | G   |      |                                | J  | J  | J  | J  | J   | J    |                                | J  | J  | J  | J  | J   | J   | M   |  |
|              | 6800           |                                 | A                              |    |      |                                |    | C    |                                |    |    |    | G  | G   |      |                                | J  | J  | J  | J  | J   | J    |                                | J  | J  | J  | J  | J   | J   | M   |  |
| Cap<br>(μF)  | 0.010          | A                               |                                |    |      | C                              | C  |      |                                |    |    |    | G  | G   |      |                                | J  | J  | J  | J  | J   | J    |                                | J  | J  | J  | J  | J   | J   | P   |  |
|              | 0.015          |                                 |                                |    |      | C                              |    |      |                                |    |    |    | G  | G   |      |                                | J  | J  | J  | J  | J   | J    |                                | J  | J  | J  | J  | J   | M   |     |  |
|              | 0.022          |                                 |                                |    |      | C                              | C  |      |                                |    |    |    | G  | G   |      |                                | J  | J  | J  | J  | J   | N    |                                | J  | J  | J  | J  | J   | M   |     |  |
|              | 0.033          |                                 |                                |    |      | C                              | C  |      |                                |    |    |    | G  | G   |      |                                | J  | J  | J  | J  | N   |      |                                | J  | J  | J  | J  | J   | M   |     |  |
|              | 0.047          |                                 |                                |    |      | C                              | C  |      |                                |    |    |    | G  | G   |      |                                | J  | J  | J  | J  | N   |      |                                | J  | J  | J  | J  | J   | M   |     |  |
|              | 0.068          |                                 |                                |    |      | C                              | C  |      |                                |    |    |    | G  | G   |      |                                | J  | J  | J  | J  | N   |      |                                | J  | J  | J  | J  | J   | M   | P   |  |
|              | 0.10           |                                 |                                |    |      | C                              | C  |      |                                |    |    |    | G  | G   | G    |                                |    | J  | J  | J  | J   | N    |                                |    | J  | J  | J  | J   | M   | P   |  |
|              | 0.15           |                                 |                                |    |      |                                |    |      |                                |    |    |    | G  | G   |      |                                |    | J  | J  | J  | N   | N    |                                |    | J  | J  | J  | J   | Q   |     |  |
|              | 0.22           |                                 |                                |    |      |                                |    |      |                                |    |    |    | G  |     |      |                                |    | J  | J  | N  | N   | N    |                                |    | J  | J  | J  | J   | Q   |     |  |
|              | 0.33           |                                 |                                |    |      |                                |    |      |                                |    |    |    |    |     |      |                                |    | J  | N  | N  | N   | N    |                                |    | J  | J  | M  | P   | Q   |     |  |
|              | 0.47           |                                 |                                |    |      |                                |    |      |                                |    |    |    |    |     |      |                                |    | N  | N  | N  | N   | N    |                                |    | M  | M  | M  | P   | Q   |     |  |
|              | 0.68           |                                 |                                |    |      |                                |    |      |                                |    |    |    |    |     |      |                                |    | N  | N  | N  |     |      |                                |    | M  | M  | Q  | Q   | Q   |     |  |
|              | 1.0            |                                 |                                |    |      |                                |    |      |                                |    | J* | J* |    |     |      |                                |    | N  | N  | N  | N   |      |                                |    | M  | M  | Q  | Q   |     |     |  |
|              | 1.5            |                                 |                                |    |      |                                |    |      |                                |    |    |    |    |     |      |                                |    |    |    |    |     |      |                                |    | M  | M  | Q  | Q   |     |     |  |
|              | 2.2            |                                 |                                |    |      |                                |    |      |                                |    |    |    |    |     |      |                                |    |    |    |    |     |      |                                |    | P  | Q  | Q  | Q   |     |     |  |
|              | 3.3            |                                 |                                |    |      |                                |    |      |                                |    |    |    |    |     |      |                                |    |    |    |    |     |      |                                |    | Q  | Q  | Q  |     | Q*  |     |  |
|              | 4.7            |                                 |                                |    |      |                                |    |      |                                |    |    |    |    |     |      |                                |    |    |    |    |     |      |                                |    |    | Q* | Q* | Q*  | Q*  |     |  |
|              | 10             |                                 |                                |    |      |                                |    |      |                                |    |    |    |    |     |      |                                |    |    |    |    |     |      |                                |    |    | Q* | Q* |     |     |     |  |
|              | 22             |                                 |                                |    |      |                                |    |      |                                |    |    |    |    |     |      |                                |    |    |    |    |     |      |                                |    |    |    |    |     |     |     |  |
|              | 47             |                                 |                                |    |      |                                |    |      |                                |    |    |    |    |     |      |                                |    |    |    |    |     |      |                                |    |    |    |    |     |     |     |  |
|              | 100            |                                 |                                |    |      |                                |    |      |                                |    |    |    |    |     |      |                                |    |    |    |    |     |      |                                |    |    |    |    |     |     |     |  |
|              | WVDC           | 10                              | 10                             | 16 | 25   | 16                             | 25 | 50   | 6.3                            | 10 | 16 | 25 | 50 | 100 | 200  | 6.3                            | 10 | 16 | 25 | 50 | 100 | 200  | 6.3                            | 10 | 16 | 25 | 50 | 100 | 200 | 500 |  |
| SIZE         | 0101           | 0201                            |                                |    | 0402 |                                |    | 0603 |                                |    |    |    |    |     | 0805 |                                |    |    |    |    |     | 1206 |                                |    |    |    |    |     |     |     |  |

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

\*Optional Specifications – Contact factory

# X7R Dielectric

## Capacitance Range



### PREFERRED SIZES ARE SHADED

| SIZE                        |                                        | 1210                           |              |              |              |              |     | 1812                           |              |              |              | 1825                           |              | 2220                           |              |    |     | 2225                           |    |     |
|-----------------------------|----------------------------------------|--------------------------------|--------------|--------------|--------------|--------------|-----|--------------------------------|--------------|--------------|--------------|--------------------------------|--------------|--------------------------------|--------------|----|-----|--------------------------------|----|-----|
| Soldering                   |                                        | Reflow Only                    |              |              |              |              |     | Reflow Only                    |              |              |              | Reflow Only                    |              | Reflow Only                    |              |    |     | Reflow Only                    |    |     |
| Packaging                   |                                        | Paper/Embossed                 |              |              |              |              |     | All Embossed                   |              |              |              | All Embossed                   |              | All Embossed                   |              |    |     | All Embossed                   |    |     |
| (L) Length                  | mm<br>(in.)                            | 3.20 ± 0.20<br>(0.126 ± 0.008) |              |              |              |              |     | 4.50 ± 0.30<br>(0.177 ± 0.012) |              |              |              | 4.50 ± 0.30<br>(0.177 ± 0.012) |              | 5.70 ± 0.40<br>(0.225 ± 0.016) |              |    |     | 5.72 ± 0.25<br>(0.225 ± 0.010) |    |     |
| (W) Width                   | mm<br>(in.)                            | 2.50 ± 0.20<br>(0.098 ± 0.008) |              |              |              |              |     | 3.20 ± 0.20<br>(0.126 ± 0.008) |              |              |              | 6.40 ± 0.40<br>(0.252 ± 0.016) |              | 5.00 ± 0.40<br>(0.197 ± 0.016) |              |    |     | 6.35 ± 0.25<br>(0.250 ± 0.010) |    |     |
| (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                            | 50           | 100          | 200          | 500                            | 50           | 100                            | 25           | 50 | 100 | 200                            | 50 | 100 |
| Cap<br>(pF)                 | 100<br>150<br>220<br>330<br>470<br>680 |                                |              |              |              |              |     |                                |              |              |              |                                |              |                                |              |    |     |                                |    |     |
|                             | 1000<br>1500<br>2200                   | J                              | J            | J            | J            | J            | J   | M                              |              |              |              |                                |              |                                |              |    |     |                                |    |     |
|                             | 3300<br>4700<br>6800                   | J                              | J            | J            | J            | J            | J   | M                              |              |              |              |                                |              |                                |              |    |     |                                |    |     |
| Cap<br>(μF)                 | 0.010<br>0.015<br>0.022                | J                              | J            | J            | J            | J            | J   | M                              | K            | K            | K            | K                              | M            | M                              |              | X  | X   | X                              | M  | P   |
|                             | 0.033<br>0.047<br>0.068                | J                              | J            | J            | J            | J            | J   | Q                              | K            | K            | K            | X                              | M            | M                              |              | X  | X   | X                              | M  | P   |
|                             | 0.10<br>0.15<br>0.22                   | J                              | J            | J            | J            | J            | M   |                                | K            | K            | K            | Z                              | M            | M                              |              | X  | X   | X                              | M  | P   |
|                             | 0.33<br>0.47<br>0.68                   | J                              | J            | J            | J            | Q            |     |                                | K            | M            | X            |                                | M            | M                              |              | X  | X   | X                              | M  | P   |
|                             | 1.0<br>1.5<br>2.2                      | N                              | N            | P            | X            | Z            |     |                                | M            | X            |              |                                | M            | P                              |              | X  | X   |                                | M  | P   |
|                             | 3.3<br>4.7<br>10                       | X                              | X            | Z            | Z            |              |     |                                | Z            | Z            |              |                                |              |                                |              | X  | Z   |                                |    |     |
|                             | 22<br>47<br>100                        | Z*                             | Z*           |              |              |              |     |                                |              |              |              |                                |              |                                | Z            |    |     |                                |    |     |
|                             | WVDC                                   | 10                             | 16           | 25           | 50           | 100          | 200 | 500                            | 50           | 100          | 200          | 500                            | 50           | 100                            | 25           | 50 | 100 | 200                            | 50 | 100 |
| SIZE                        |                                        | 1210                           |              |              |              |              |     | 1812                           |              |              |              | 1825                           |              | 2220                           |              |    |     | 2225                           |    |     |
| Letter<br>Max.<br>Thickness |                                        | A<br>(0.013)                   | C<br>(0.022) | E<br>(0.028) | G<br>(0.035) | J<br>(0.037) |     | K<br>(0.040)                   | M<br>(0.050) | N<br>(0.055) | P<br>(0.060) | Q<br>(0.070)                   | X<br>(0.090) | Y<br>(0.100)                   | Z<br>(0.110) |    |     |                                |    |     |
|                             |                                        | PAPER                          |              |              |              |              |     | EMBOSS                         |              |              |              |                                |              |                                |              |    |     |                                |    |     |

\*Optional Specifications – Contact factory