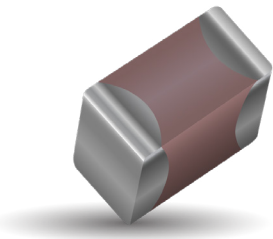


# X5R Dielectric

## General Specifications



### GENERAL DESCRIPTION

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

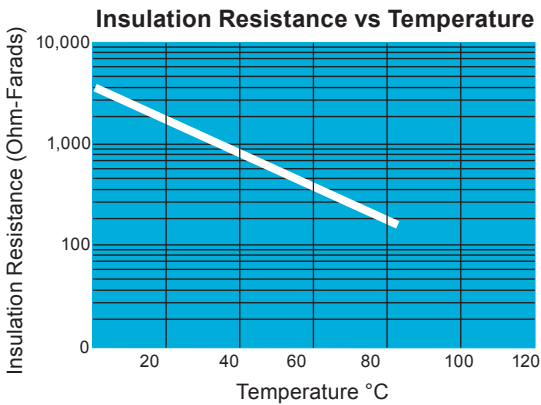
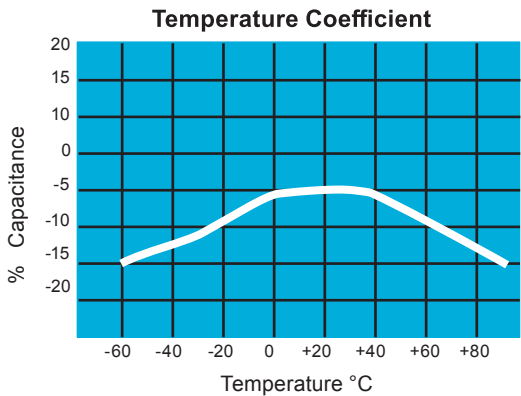
### PART NUMBER (SEE PAGE 4 FOR COMPLETE PART NUMBER EXPLANATION)

| 1210              | 4        | D          | 107                                   | M                                | A               | T                       | 2                           | A               |
|-------------------|----------|------------|---------------------------------------|----------------------------------|-----------------|-------------------------|-----------------------------|-----------------|
| Size<br>(L" x W") | Voltage  | Dielectric | Capacitance<br>Code (In pF)           | Capacitance<br>Tolerance         | Failure<br>Rate | Terminations            | Packaging                   | Special<br>Code |
| 0101**            | 4 = 4V   | D = X5R    | 2 Sig. Digits +<br>Number of<br>Zeros | K = $\pm 10\%$<br>M = $\pm 20\%$ | A = N/A         | T = Plated Ni<br>and Sn | 2 = 7" Reel<br>4 = 13" Reel | A = Std.        |
| 0201              | 6 = 6.3V |            |                                       |                                  |                 |                         |                             |                 |
| 0402              | Z = 10V  |            |                                       |                                  |                 |                         |                             |                 |
| 0603              | Y = 16V  |            |                                       |                                  |                 |                         |                             |                 |
| 0805              | 3 = 25V  |            |                                       |                                  |                 |                         |                             |                 |
| 1206              | D = 35V  |            |                                       |                                  |                 |                         |                             |                 |
| 1210              | 5 = 50V  |            |                                       |                                  |                 |                         |                             |                 |
| 1812              | 1 = 100V |            |                                       |                                  |                 |                         |                             |                 |
| **EIA 01005       |          |            |                                       |                                  |                 |                         |                             |                 |



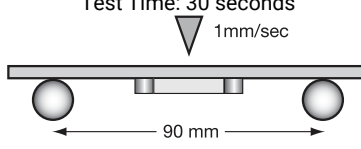
NOTE: Contact factory for availability of Tolerance Options for Specific Part Numbers.  
Contact factory for non-specified capacitance values.

### TYPICAL ELECTRICAL CHARACTERISTICS



# X5R Dielectric

## Specifications and Test Methods

| Parameter/Test                 |                                   | X5R Specification Limits                                                                                                                                     | Measuring Conditions                                                                                                                                                                                                                                                                                                                            |                    |
|--------------------------------|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| Operating Temperature Range    |                                   | -55°C to +85°C                                                                                                                                               | Temperature Cycle Chamber                                                                                                                                                                                                                                                                                                                       |                    |
| Capacitance                    |                                   | Within specified tolerance                                                                                                                                   | Freq.: 1.0 kHz $\pm$ 10%<br>Voltage: 1.0Vrms $\pm$ .2V<br>For Cap > 10 $\mu$ F, 0.5Vrms @ 120Hz                                                                                                                                                                                                                                                 |                    |
| Dissipation Factor             |                                   | $\leq$ 2.5% for $\geq$ 50V DC rating<br>$\leq$ 12.5% for 25V, 35V DC rating<br>$\leq$ 12.5% Max. for 16V DC rating and lower<br>Contact Factory for DF by PN |                                                                                                                                                                                                                                                                                                                                                 |                    |
| Insulation Resistance          |                                   | 10,000MQ or 500MQ $\cdot$ $\mu$ F, whichever is less                                                                                                         | Charge device with rated voltage for 120 $\pm$ 5 secs @ room temp/humidity                                                                                                                                                                                                                                                                      |                    |
| Dielectric Strength            |                                   | No breakdown or visual defects                                                                                                                               | Charge device with 250% of rated voltage for 1-5 seconds, w/charge and discharge current limited to 50 mA (max)                                                                                                                                                                                                                                 |                    |
| Resistance to Flexure Stresses | Appearance                        | No defects                                                                                                                                                   | Deflection: 2mm<br>Test Time: 30 seconds<br>                                                                                                                                                                                                                 |                    |
|                                | Capacitance Variation             | $\leq \pm 12\%$                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                 |                    |
|                                | Dissipation Factor                | Meets Initial Values (As Above)                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                 |                    |
|                                | Insulation Resistance             | $\geq$ Initial Value $\times$ 0.3                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                 |                    |
| Solderability                  |                                   | $\geq$ 95% of each terminal should be covered with fresh solder                                                                                              | Dip device in eutectic solder at 230 $\pm$ 5°C for 5.0 $\pm$ 0.5 seconds                                                                                                                                                                                                                                                                        |                    |
| Resistance to Solder Heat      | Appearance                        | No defects, <25% leaching of either end terminal                                                                                                             | Dip device in eutectic solder at 260°C for 60seconds. Store at room temperature for 24 $\pm$ 2 hours before measuring electrical properties.                                                                                                                                                                                                    |                    |
|                                | Capacitance Variation             | $\leq \pm 7.5\%$                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                 |                    |
|                                | Dissipation Factor                | Meets Initial Values (As Above)                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                 |                    |
|                                | Insulation Resistance             | Meets Initial Values (As Above)                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                 |                    |
|                                | Dielectric Strength               | Meets Initial Values (As Above)                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                 |                    |
| Thermal Shock                  | Appearance                        | No visual defects                                                                                                                                            | Step 1: -55°C $\pm$ 2°                                                                                                                                                                                                                                                                                                                          | 30 $\pm$ 3 minutes |
|                                | Capacitance Variation             | $\leq \pm 7.5\%$                                                                                                                                             | Step 2: Room Temp                                                                                                                                                                                                                                                                                                                               | $\leq$ 3 minutes   |
|                                | Dissipation Factor                | Meets Initial Values (As Above)                                                                                                                              | Step 3: +85°C $\pm$ 2°                                                                                                                                                                                                                                                                                                                          | 30 $\pm$ 3 minutes |
|                                | Insulation Resistance             | Meets Initial Values (As Above)                                                                                                                              | Step 4: Room Temp                                                                                                                                                                                                                                                                                                                               | $\leq$ 3 minutes   |
|                                | Dielectric Strength               | Meets Initial Values (As Above)                                                                                                                              | Repeat for 5 cycles and measure after 24 $\pm$ 2 hours at room temperature                                                                                                                                                                                                                                                                      |                    |
| Load Life                      | Appearance                        | No visual defects                                                                                                                                            | Charge device with 1.5X rated voltage in test chamber set at 85°C $\pm$ 2°C for 1000 hours (+48, -0).<br><br>Note: Contact factory for *optional specification part numbers that are tested at < 1.5X rated voltage.<br><br>Remove from test chamber and stabilize at room temperature for 24 $\pm$ 2 hours                                     |                    |
|                                | Capacitance Variation             | $\leq \pm 12.5\%$                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                 |                    |
|                                | Dissipation Factor                | $\leq$ Initial Value $\times$ 2.0 (See Above)                                                                                                                |                                                                                                                                                                                                                                                                                                                                                 |                    |
|                                | Insulation Resistance             | $\geq$ Initial Value $\times$ 0.3 (See Above)                                                                                                                |                                                                                                                                                                                                                                                                                                                                                 |                    |
|                                | Dielectric Strength               | Meets Initial Values (As Above)                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                 |                    |
| Load Humidity                  | Appearance                        | No visual defects                                                                                                                                            | Take the initial value after heat treatment. After applying rated voltage for 500+12/-0 hours in the condition of 40°C $\pm$ 2°C and 90 to 95%RH, and place in normal temperature and humidity, then measure the sample after heat treatment.<br><br>The charge and discharge current of the capacitor must not exceed 50mA for IR measurement. |                    |
|                                | Capacitance Variation             | $\leq \pm 12.5\%$                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                 |                    |
|                                | Dissipation Factor / Tan $\delta$ | Within specification                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                 |                    |
|                                | Insulation Resistance             | Over 1000MQ or 50MQ $\cdot$ $\mu$ F, whichever is less.<br>*Exceptions Listed Below                                                                          |                                                                                                                                                                                                                                                                                                                                                 |                    |

# X5R Dielectric

## Capacitance Range



### PREFERRED SIZES ARE SHADED

| Case Size    | 0101*          |                  | 0201            |     |    |    |    | 0402            |     |    |    |    | 0603            |   |     |    |    | 0805            |    |    |   |     |    |    |    |    |    |   |   |   |   |
|--------------|----------------|------------------|-----------------|-----|----|----|----|-----------------|-----|----|----|----|-----------------|---|-----|----|----|-----------------|----|----|---|-----|----|----|----|----|----|---|---|---|---|
| Soldering    | Reflow Only    |                  | Reflow Only     |     |    |    |    | Reflow/Wave     |     |    |    |    | Reflow/Wave     |   |     |    |    | Reflow/Wave     |    |    |   |     |    |    |    |    |    |   |   |   |   |
| Packaging    | Paper/Embossed |                  | All Paper       |     |    |    |    | All Paper       |     |    |    |    | All Paper       |   |     |    |    | Paper/Embossed  |    |    |   |     |    |    |    |    |    |   |   |   |   |
| (L) Length   | mm             | 0.40 ± 0.02      | 0.60 ± 0.09     |     |    |    |    | 1.00 ± 0.20     |     |    |    |    | 1.60 ± 0.20     |   |     |    |    | 2.01 ± 0.20     |    |    |   |     |    |    |    |    |    |   |   |   |   |
|              | (in.)          | (0.016 ± 0.0008) | (0.024 ± 0.004) |     |    |    |    | (0.040 ± 0.008) |     |    |    |    | (0.063 ± 0.008) |   |     |    |    | (0.079 ± 0.008) |    |    |   |     |    |    |    |    |    |   |   |   |   |
| W) Width     | mm             | 0.20 ± 0.02      | 0.30 ± 0.09     |     |    |    |    | 0.50 ± 0.20     |     |    |    |    | 0.80 ± 0.20     |   |     |    |    | 1.25 ± 0.20     |    |    |   |     |    |    |    |    |    |   |   |   |   |
|              | (in.)          | (0.008 ± 0.0008) | (0.011 ± 0.004) |     |    |    |    | (0.020 ± 0.008) |     |    |    |    | (0.031 ± 0.008) |   |     |    |    | (0.049 ± 0.008) |    |    |   |     |    |    |    |    |    |   |   |   |   |
| (t) Terminal | mm             | 0.10 ± 0.04      | 0.15 ± 0.05     |     |    |    |    | 0.25 ± 0.10     |     |    |    |    | 0.35 ± 0.15     |   |     |    |    | 0.50 ± 0.25     |    |    |   |     |    |    |    |    |    |   |   |   |   |
|              | (in.)          | (0.004 ± 0.0016) | (0.006 ± 0.002) |     |    |    |    | (0.010 ± 0.004) |     |    |    |    | (0.014 ± 0.006) |   |     |    |    | (0.020 ± 0.010) |    |    |   |     |    |    |    |    |    |   |   |   |   |
| Voltage:     | 6.3            | 10               | 4               | 6.3 | 10 | 16 | 25 | 4               | 6.3 | 10 | 16 | 25 | 50              | 4 | 6.3 | 10 | 16 | 25              | 35 | 50 | 4 | 6.3 | 10 | 16 | 25 | 35 | 50 |   |   |   |   |
| Cap (pF)     | 100            | 101              | B               |     |    |    | A  |                 |     |    |    |    |                 |   |     |    |    |                 |    |    |   |     |    |    |    |    |    |   |   |   |   |
|              | 150            | 151              | B               |     |    |    | A  |                 |     |    |    |    |                 |   |     |    |    |                 |    |    |   |     |    |    |    |    |    |   |   |   |   |
|              | 220            | 221              | B               |     |    |    | A  |                 |     |    |    | C  |                 |   |     |    |    |                 |    |    |   |     |    |    |    |    |    |   |   |   |   |
|              | 330            | 331              | B               |     |    |    | A  |                 |     |    |    | C  |                 |   |     |    |    |                 |    |    |   |     |    |    |    |    |    |   |   |   |   |
|              | 470            | 471              | B               |     |    |    | A  |                 |     |    |    | C  |                 |   |     |    |    |                 |    |    |   |     |    |    |    |    |    |   |   |   |   |
|              | 680            | 681              | B               |     |    |    | A  |                 |     |    |    | C  |                 |   |     |    |    |                 |    |    |   |     |    |    |    |    |    |   |   |   |   |
|              | 1000           | 102              | B               |     |    |    | A  | A               |     |    |    | C  |                 |   |     |    |    |                 |    |    |   |     |    |    |    |    |    |   |   |   |   |
|              | 1500           | 152              | B               | B   |    |    | A  | A               |     |    |    | C  |                 |   |     |    |    |                 |    |    |   |     |    |    |    |    |    |   |   |   |   |
|              | 2200           | 222              | B               | B   |    |    | A  | A               | A   |    |    | C  |                 |   |     |    |    |                 |    |    |   |     |    |    |    |    |    |   |   |   |   |
|              | 3300           | 332              | B               | B   |    |    | A  | A               | A   |    |    | C  |                 |   |     |    |    |                 |    |    |   |     |    |    |    |    |    |   |   |   |   |
|              | 4700           | 472              | B               | B   |    |    | A  | A               | A   |    |    | C  |                 |   |     |    |    |                 |    |    | G |     |    |    |    |    |    |   |   |   |   |
|              | 6800           | 682              | B               | B   |    |    | A  | A               | A   |    |    | C  |                 |   |     |    |    |                 |    |    | G |     |    |    |    |    |    |   |   |   |   |
| Cap (µF)     | 0.01           | 103              | B               | B   |    |    | A  | A               | A   |    |    | C  |                 |   |     |    |    | G               | G  | G  |   |     |    |    |    |    |    |   |   |   |   |
|              | 0.015          | 153              | B               |     |    |    |    |                 |     |    |    | C  |                 |   |     |    |    | G               | G  | G  |   |     |    |    |    |    |    |   |   |   |   |
|              | 0.022          | 223              | B               |     |    | A  | A  | A               | A   |    |    | C  | C               |   |     |    |    | G               | G  | G  |   |     |    |    |    | N  |    |   |   |   |   |
|              | 0.033          | 333              | B               |     |    |    |    |                 |     |    |    | C  |                 |   |     |    |    | G               | G  | G  |   |     |    |    |    | N  |    |   |   |   |   |
|              | 0.047          | 473              | B               |     |    | A  | A  | A               | A   |    |    | C  | C               |   |     |    |    | G               | G  | G  |   |     |    |    |    | N  |    |   |   |   |   |
|              | 0.068          | 689              | B               |     |    |    |    |                 |     |    |    | C  |                 |   |     |    |    | G               |    | G  |   |     |    |    |    | N  |    |   |   |   |   |
|              | 0.1            | 104              | B               |     |    | A  | A  | A               | A   |    |    | C  | C               | C | C   |    |    | G               | G  | G  |   |     |    |    | N  | N  | N  |   |   |   |   |
|              | 0.15           | 154              |                 |     |    |    |    |                 |     |    |    |    |                 |   |     |    |    | G               |    |    |   |     |    |    | N  | N  |    |   |   |   |   |
|              | 0.22           | 224              | B               |     |    | A  | A  | A               |     |    |    | C  | C               | C | C   | C  |    | G               | G  |    |   |     |    |    | N  | N  | N  |   |   |   |   |
|              | 0.33           | 334              |                 |     |    |    |    |                 |     |    |    |    |                 |   |     |    |    | G               | G  |    |   |     |    |    | N  |    |    |   |   |   |   |
|              | 0.47           | 474              | B               |     |    | A  | A  |                 |     |    |    | C  | C               | C | C   | C  | E  | G               | J  |    |   |     |    |    | N  | P  | P  |   |   |   |   |
|              | 0.68           | 684              |                 |     |    |    |    |                 |     |    |    |    |                 |   |     |    |    | G               |    |    |   |     |    |    | N  |    |    |   |   |   |   |
|              | 1.0            | 105              |                 |     |    | A  | A  | C               | C   |    |    | C  | C               | C | C   | C  |    | G               | G  | G  | G | J   | G  | G  |    | N  | N  | P | P |   |   |
|              | 1.5            | 155              |                 |     |    |    |    |                 |     |    |    |    |                 |   |     |    |    |                 |    |    |   |     |    |    |    |    |    |   |   |   |   |
|              | 2.2            | 225              |                 |     |    | C  | C  | C               |     |    |    | C  | C               | C | C   | C  |    | G               | G  | J  | J | J   | K  | K  |    | N  | N  | P | P | P |   |
|              | 3.3            | 335              |                 |     |    |    |    |                 |     |    |    |    |                 |   |     |    |    | J               | J  | J  | J |     |    |    |    | N  | N  |   |   |   |   |
|              | 4.7            | 475              |                 |     |    | C  | C  |                 |     |    |    | E  | E               | E | E   |    |    | J               | J  | J  | G | K   |    |    |    | N  | P  | P | P | P | P |
|              | 10             | 106              |                 |     |    |    |    |                 |     |    |    | E  | E               | E |     |    |    | K               | J  | K  | K | K   |    |    |    | P  | P  | P | P | P | P |
|              | 22             | 226              |                 |     |    |    |    |                 |     |    |    | E  | G               |   |     |    |    | K               | K  | K  |   |     |    |    |    | P  | P  | P | P |   |   |
|              | 47             | 476              |                 |     |    |    |    |                 |     |    |    |    |                 |   |     |    |    | K               | K  |    |   |     |    |    |    | P  | P  | P |   |   |   |
|              | 100            | 107              |                 |     |    |    |    |                 |     |    |    |    |                 |   |     |    |    |                 |    |    |   |     |    |    |    |    |    |   |   |   |   |
| Voltage:     | 6.3            | 10               | 4               | 6.3 | 10 | 16 | 25 | 4               | 6.3 | 10 | 16 | 25 | 50              | 4 | 6.3 | 10 | 16 | 25              | 35 | 50 | 4 | 6.3 | 10 | 16 | 25 | 35 | 50 |   |   |   |   |
| Case Size    | 0101*          |                  | 0201            |     |    |    |    | 0402            |     |    |    |    | 0603            |   |     |    |    | 0805            |    |    |   |     |    |    |    |    |    |   |   |   |   |

| 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>(0.057) | 1.78<br>(0.070) | 2.29<br>(0.090) | 2.54<br>(0.100) | 2.79<br>(0.110) |
|                | PAPER           |                 |                 |                 |                 |                 | EMBOSSED        |                 |                 |                 |                 |                 |                 |                 |

PAPER and EMBOSSED available for 01005  
 NOTE: Contact factory for non-specified capacitance values  
 \*EIA 01005

# X5R Dielectric

## Capacitance Range

PREFERRED SIZES ARE SHADED

| Case Size    |       |       | 1206                           |     |    |    |    |    |    | 1210                           |     |    |    |    |    |    | 1812                           |     |    |    |    |    |    |
|--------------|-------|-------|--------------------------------|-----|----|----|----|----|----|--------------------------------|-----|----|----|----|----|----|--------------------------------|-----|----|----|----|----|----|
| Soldering    |       |       | Reflow/Wave                    |     |    |    |    |    |    | Reflow Only                    |     |    |    |    |    |    | Reflow Only                    |     |    |    |    |    |    |
| Packaging    |       |       | Paper/Embossed                 |     |    |    |    |    |    | Paper/Embossed                 |     |    |    |    |    |    | All Embossed                   |     |    |    |    |    |    |
| (L) Length   | mm    | (in.) | 3.20 ± 0.40<br>(0.126 ± 0.016) |     |    |    |    |    |    | 3.20 ± 0.40<br>(0.126 ± 0.016) |     |    |    |    |    |    | 4.50 ± 0.30<br>(0.177 ± 0.012) |     |    |    |    |    |    |
| W) Width     | mm    | (in.) | 1.60 ± 0.30<br>(0.063 ± 0.012) |     |    |    |    |    |    | 2.50 ± 0.30<br>(0.098 ± 0.012) |     |    |    |    |    |    | 3.20 ± 0.20<br>(0.126 ± 0.008) |     |    |    |    |    |    |
| (t) Terminal | mm    | (in.) | 0.50 ± 0.25<br>(0.020 ± 0.010) |     |    |    |    |    |    | 0.50 ± 0.25<br>(0.020 ± 0.010) |     |    |    |    |    |    | 0.61 ± 0.36<br>(0.024 ± 0.014) |     |    |    |    |    |    |
| Voltage:     |       |       | 4                              | 6.3 | 10 | 16 | 25 | 35 | 50 | 4                              | 6.3 | 10 | 16 | 25 | 35 | 50 | 4                              | 6.3 | 10 | 16 | 25 | 35 | 50 |
| Cap (pF)     | 100   | 101   |                                |     |    |    |    |    |    |                                |     |    |    |    |    |    |                                |     |    |    |    |    |    |
|              | 150   | 151   |                                |     |    |    |    |    |    |                                |     |    |    |    |    |    |                                |     |    |    |    |    |    |
|              | 220   | 221   |                                |     |    |    |    |    |    |                                |     |    |    |    |    |    |                                |     |    |    |    |    |    |
|              | 330   | 331   |                                |     |    |    |    |    |    |                                |     |    |    |    |    |    |                                |     |    |    |    |    |    |
|              | 470   | 471   |                                |     |    |    |    |    |    |                                |     |    |    |    |    |    |                                |     |    |    |    |    |    |
|              | 680   | 681   |                                |     |    |    |    |    |    |                                |     |    |    |    |    |    |                                |     |    |    |    |    |    |
|              | 1000  | 102   |                                |     |    |    |    |    |    |                                |     |    |    |    |    |    |                                |     |    |    |    |    |    |
|              | 1500  | 152   |                                |     |    |    |    |    |    |                                |     |    |    |    |    |    |                                |     |    |    |    |    |    |
|              | 2200  | 222   |                                |     |    |    |    |    |    |                                |     |    |    |    |    |    |                                |     |    |    |    |    |    |
|              | 3300  | 332   |                                |     |    |    |    |    |    |                                |     |    |    |    |    |    |                                |     |    |    |    |    |    |
|              | 4700  | 472   |                                |     |    |    |    |    |    |                                |     |    |    |    |    |    |                                |     |    |    |    |    |    |
|              | 6800  | 682   |                                |     |    |    |    |    |    |                                |     |    |    |    |    |    |                                |     |    |    |    |    |    |
| Cap (μF)     | 0.01  | 103   |                                |     |    |    |    |    |    |                                |     |    |    |    |    |    |                                |     |    |    |    |    |    |
|              | 0.015 | 150   |                                |     |    |    |    |    |    |                                |     |    |    |    |    |    |                                |     |    |    |    |    |    |
|              | 0.022 | 223   |                                |     |    |    |    |    |    |                                |     |    |    |    |    |    |                                |     |    |    |    |    |    |
|              | 0.033 | 333   |                                |     |    |    |    |    |    |                                |     |    |    |    |    |    |                                |     |    |    |    |    |    |
|              | 0.047 | 473   |                                |     |    |    |    |    |    |                                |     |    |    |    |    |    |                                |     |    |    |    |    |    |
|              | 0.068 | 689   |                                |     |    |    |    |    |    |                                |     |    |    |    |    |    |                                |     |    |    |    |    |    |
|              | 0.1   | 104   |                                |     |    |    |    |    |    |                                |     |    |    |    |    |    |                                |     |    |    |    |    |    |
|              | 0.15  | 154   |                                |     |    |    |    |    |    |                                |     |    |    |    |    |    |                                |     |    |    |    |    |    |
|              | 0.22  | 224   |                                |     |    |    |    |    |    |                                |     |    |    |    |    |    |                                |     |    |    |    |    |    |
|              | 0.33  | 334   |                                |     |    |    |    |    |    |                                |     |    |    |    |    |    |                                |     |    |    |    |    |    |
|              | 0.47  | 474   |                                |     |    |    | Q  | Q  |    |                                |     |    |    |    | X  | X  |                                |     |    |    |    |    |    |
|              | 0.68  | 684   |                                |     |    |    |    |    |    |                                |     |    |    |    |    |    |                                |     |    |    |    |    |    |
|              | 1.0   | 105   |                                |     |    |    | Q  | Q  | Q  |                                |     |    |    | X  | X  | X  |                                |     |    |    |    |    |    |
|              | 1.5   | 155   |                                |     |    |    |    |    |    |                                |     |    |    |    |    |    |                                |     |    |    |    |    |    |
|              | 2.2   | 225   |                                |     | Q  | Q  | Q  | Q  | Q  |                                |     |    |    | X  | Z  | Z  |                                |     |    |    |    |    |    |
|              | 3.3   | 335   |                                | Q   | Q  |    |    |    |    |                                |     |    |    |    |    |    |                                |     |    |    |    |    |    |
|              | 4.7   | 475   | X                              | X   | X  | X  | X  | X  | X  |                                |     | Z  | Z  | Z  | Z  | Z  |                                |     |    |    |    |    |    |
|              | 10    | 106   | X                              | X   | X  | X  | X  | X  | X  |                                | X   | X  | Z  | Z  | Z  | Z  |                                |     |    |    | Z  |    |    |
|              | 22    | 226   | X                              | X   | X  | X  | X  |    |    | Z                              | Z   | Z  | Z  | Z  |    |    | Z                              | Z   | Z  | Z  |    |    |    |
|              | 47    | 476   | X                              | X   | X  | X  |    |    |    | Z                              | Z   | Z  | Z  | Z  |    |    |                                |     |    |    |    |    |    |
|              | 100   | 107   | X                              | X   |    |    |    |    |    | Z                              | Z   |    |    |    |    |    |                                |     |    |    |    |    |    |
| Voltage:     |       |       | 4                              | 6.3 | 10 | 16 | 25 | 35 | 50 | 4                              | 6.3 | 10 | 16 | 25 | 35 | 50 | 4                              | 6.3 | 10 | 16 | 25 | 35 | 50 |
| Case Size    |       |       | 1206                           |     |    |    |    |    |    | 1210                           |     |    |    |    |    |    | 1812                           |     |    |    |    |    |    |

| 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>(0.057) | 1.78<br>(0.070) | 2.29<br>(0.090) | 2.54<br>(0.100) | 2.79<br>(0.110) |
| PAPER          |                 |                 |                 |                 |                 |                 | EMBOSSSED       |                 |                 |                 |                 |                 |                 |                 |

PAPER and EMBOSSSED available for 01005

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