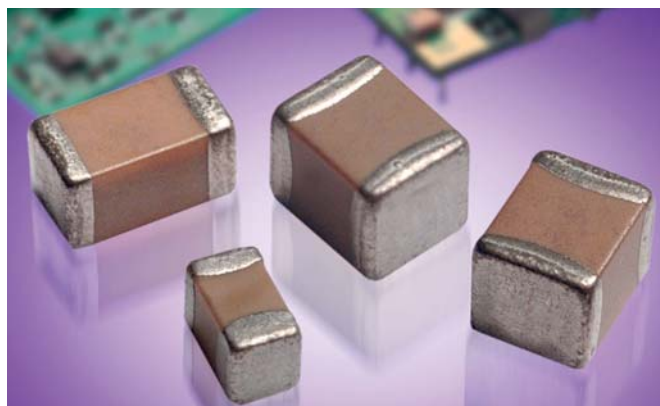


# X5R Dielectric

## General Specifications



### GENERAL DESCRIPTION

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

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

**1210**

**Size**  
(L" x W")  
0101\*\*  
0201  
0402  
0603  
0805  
1206  
1210  
1812

**4**

**Voltage**  
4 = 4V  
6 = 6.3V  
Z = 10V  
Y = 16V  
3 = 25V  
D = 35V  
5 = 50V  
1 = 100V

**D**

**Dielectric**  
D = X5R

**107**

**Capacitance Code (In pF)**  
2 Sig. Digits +  
Number of  
Zeros

**M**

**Capacitance Tolerance**  
K =  $\pm 10\%$   
M =  $\pm 20\%$

**A**

**Failure Rate**  
A = N/A

**T**

**Terminations**  
T = Plated Ni  
and Sn

**2**

**Packaging**  
2 = 7" Reel  
4 = 13" Reel  
U = 4mm TR  
(01005)

**A**

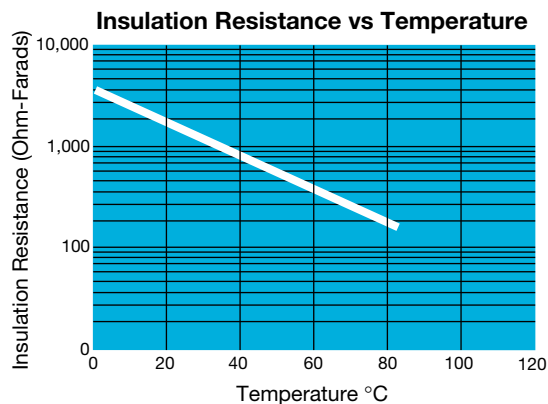
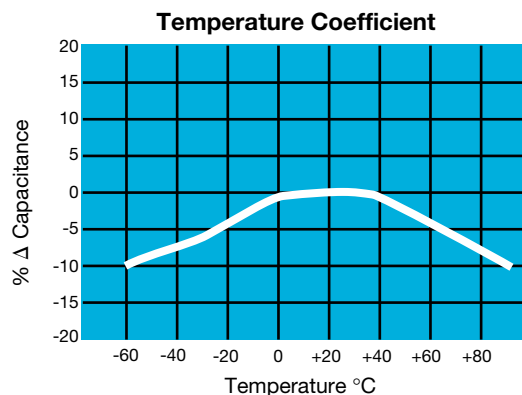
**Special Code**  
A = Std.



\*\*EIA 01005

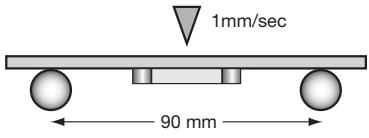
NOTE: Contact factory for availability of Tolerance Options for Specific Part Numbers.  
Contact factory for non-specified capacitance values.

### 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>$\leq$ 3.0% 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          |                       | 10,000M $\Omega$ or 500M $\Omega$ - $\mu$ F, whichever is less                                                                                              |                                                                                                                                                                                                                                                                                                                        |                    |
| Dielectric Strength            |                       | No breakdown or visual defects                                                                                                                              | Charge device with rated voltage for 120 $\pm$ 5 secs @ room temp/humidity<br>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 x 0.3                                                                                                                                  |                                                                                                                                                                                                                                                                                                                        |                    |
| Solderability                  |                       | $\geq$ 95% of each terminal should be covered with fresh solder                                                                                             | Dip device in eutectic solder at 230 $\pm$ 5°C for 5.0 $\pm$ 0.5 seconds                                                                                                                                                                                                                                               |                    |
| Resistance to Solder Heat      | Appearance            | No defects, <25% leaching of either end terminal                                                                                                            | Dip device in eutectic solder at 260°C for 60 seconds. Store at room temperature for 24 $\pm$ 2 hours before measuring electrical properties.                                                                                                                                                                          |                    |
|                                | Capacitance Variation | $\leq \pm 7.5\%$                                                                                                                                            |                                                                                                                                                                                                                                                                                                                        |                    |
|                                | Dissipation Factor    | Meets Initial Values (As Above)                                                                                                                             |                                                                                                                                                                                                                                                                                                                        |                    |
|                                | Insulation Resistance | Meets Initial Values (As Above)                                                                                                                             |                                                                                                                                                                                                                                                                                                                        |                    |
|                                | Dielectric Strength   | Meets Initial Values (As Above)                                                                                                                             |                                                                                                                                                                                                                                                                                                                        |                    |
| Thermal Shock                  | Appearance            | No visual defects                                                                                                                                           | Step 1: -55°C $\pm$ 2°                                                                                                                                                                                                                                                                                                 | 30 $\pm$ 3 minutes |
|                                | Capacitance Variation | $\leq \pm 7.5\%$                                                                                                                                            | Step 2: Room Temp                                                                                                                                                                                                                                                                                                      | $\leq$ 3 minutes   |
|                                | Dissipation Factor    | Meets Initial Values (As Above)                                                                                                                             | Step 3: +85°C $\pm$ 2°                                                                                                                                                                                                                                                                                                 | 30 $\pm$ 3 minutes |
|                                | Insulation Resistance | Meets Initial Values (As Above)                                                                                                                             | Step 4: Room Temp                                                                                                                                                                                                                                                                                                      | $\leq$ 3 minutes   |
|                                | Dielectric Strength   | Meets Initial Values (As Above)                                                                                                                             | Repeat for 5 cycles and measure after 24 $\pm$ 2 hours at room temperature                                                                                                                                                                                                                                             |                    |
| Load Life                      | Appearance            | No visual defects                                                                                                                                           | Charge device with 1.5X rated voltage in test chamber set at 85°C $\pm$ 2°C for 1000 hours (+48, -0). Note: Contact factory for *optional specification part numbers that are tested at < 1.5X rated voltage.<br><br>Remove from test chamber and stabilize at room temperature for 24 $\pm$ 2 hours before measuring. |                    |
|                                | Capacitance Variation | $\leq \pm 12.5\%$                                                                                                                                           |                                                                                                                                                                                                                                                                                                                        |                    |
|                                | Dissipation Factor    | $\leq$ Initial Value x 2.0 (See Above)                                                                                                                      |                                                                                                                                                                                                                                                                                                                        |                    |
|                                | Insulation Resistance | $\geq$ Initial Value x 0.3 (See Above)                                                                                                                      |                                                                                                                                                                                                                                                                                                                        |                    |
|                                | Dielectric Strength   | Meets Initial Values (As Above)                                                                                                                             |                                                                                                                                                                                                                                                                                                                        |                    |
| Load Humidity                  | Appearance            | No visual defects                                                                                                                                           | Store in a test chamber set at 85°C $\pm$ 2°C/ 85% $\pm$ 5% relative humidity for 1000 hours (+48, -0) with rated voltage applied.<br><br>Remove from chamber and stabilize at room temperature and humidity for 24 $\pm$ 2 hours before measuring.                                                                    |                    |
|                                | Capacitance Variation | $\leq \pm 12.5\%$                                                                                                                                           |                                                                                                                                                                                                                                                                                                                        |                    |
|                                | Dissipation Factor    | $\leq$ Initial Value x 2.0 (See Above)                                                                                                                      |                                                                                                                                                                                                                                                                                                                        |                    |
|                                | Insulation Resistance | $\geq$ Initial Value x 0.3 (See Above)                                                                                                                      |                                                                                                                                                                                                                                                                                                                        |                    |
|                                | Dielectric Strength   | Meets Initial Values (As Above)                                                                                                                             |                                                                                                                                                                                                                                                                                                                        |                    |

# 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 ± 0.10     |    |    |    |             | 1.60 ± 0.15     |     |    |    |                | 2.01 ± 0.20     |    |   |     |    |    |    |    |    |   |   |   |
|              | (in.)          | (0.016 ± 0.0008) |    |             | (0.024 ± 0.004) |    |    |    |             | (0.040 ± 0.004) |    |    |    |             | (0.063 ± 0.006) |     |    |    |                | (0.079 ± 0.008) |    |   |     |    |    |    |    |    |   |   |   |
| (W) Width    | mm             | 0.20 ± 0.02      |    |             | 0.30 ± 0.09     |    |    |    |             | 0.50 ± 0.10     |    |    |    |             | 0.81 ± 0.15     |     |    |    |                | 1.25 ± 0.20     |    |   |     |    |    |    |    |    |   |   |   |
|              | (in.)          | (0.008 ± 0.0008) |    |             | (0.011 ± 0.004) |    |    |    |             | (0.020 ± 0.004) |    |    |    |             | (0.032 ± 0.006) |     |    |    |                | (0.049 ± 0.008) |    |   |     |    |    |    |    |    |   |   |   |
| (t) Terminal | mm             | 0.10 ± 0.04      |    |             | 0.15 ± 0.05     |    |    |    |             | 0.25 ± 0.15     |    |    |    |             | 0.35 ± 0.15     |     |    |    |                | 0.50 ± 0.25     |    |   |     |    |    |    |    |    |   |   |   |
|              | (in.)          | (0.004 ± 0.0016) |    |             | (0.006 ± 0.002) |    |    |    |             | (0.010 ± 0.006) |    |    |    |             | (0.014 ± 0.006) |     |    |    |                | (0.020 ± 0.010) |    |   |     |    |    |    |    |    |   |   |   |
| Voltage:     |                | 6.3              | 16 | 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  | A           |                 |    |    | C  |             |                 |     |    |    |                |                 |    |   |     |    |    |    |    |    |   |   |   |
|              | 2200 222       | B                | B  |             |                 | A  | A  | A  | A           |                 |    |    | C  |             |                 |     |    |    |                |                 |    |   |     |    |    |    |    |    |   |   |   |
|              | 3300 332       | B                | B  |             |                 | A  | A  | A  | A           |                 |    |    | C  |             |                 |     |    |    |                |                 |    |   |     |    |    |    |    |    |   |   |   |
|              | 4700 472       | B                | B  |             |                 | A  | A  | A  | A           |                 |    | C  |    |             |                 |     |    |    |                | G               |    |   |     |    |    |    |    |    |   |   |   |
|              | 6800 682       | B                | B  |             |                 | A  | 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               |    |    |    |             |                 | C  | C  |    |             |                 |     |    | G  | G              | G               |    |   |     |    |    |    | N  |    |   |   |   |
|              | 0.033 333      | B                |    |             |                 |    |    |    |             |                 | C  |    |    |             |                 |     |    | G  | G              | G               |    |   |     |    |    |    |    | N  |   |   |   |
|              | 0.047 473      | B                |    |             | A               |    |    |    |             |                 | C  | C  |    |             |                 |     |    | G  | G              | G               |    |   |     |    |    |    |    | N  |   |   |   |
|              | 0.068 683      | B                |    |             |                 |    |    |    |             |                 | C  |    |    |             |                 |     |    | G  |                | G               |    |   |     |    |    |    |    | N  |   |   |   |
|              | 0.1 104        | B                |    |             | 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  |             |                 |     |    | G  | G              |                 |    |   |     |    |    | N  | N  | N  |   |   |   |
|              | 0.33 334       |                  |    |             |                 |    |    |    |             |                 |    |    |    |             |                 |     |    | G  | G              |                 |    |   |     |    |    | N  |    |    |   |   |   |
|              | 0.47 474       |                  |    |             | A               | A  |    |    |             |                 | C  | C  | C  | C           |                 |     |    | G  | J              |                 |    |   |     |    |    | N  | P  | P  |   |   |   |
|              | 0.68 684       |                  |    |             |                 |    |    |    |             |                 |    |    |    |             |                 |     |    | G  |                |                 |    |   |     |    |    | N  |    |    |   |   |   |
|              | 1.0 105        |                  |    |             | F               | F  | F  | F  |             |                 | C  | C  | C  | C           | E               |     |    | G  | G              | G               | G  | J | G   | G  |    | N  | N  | P  | P |   |   |
|              | 1.5 155        |                  |    |             |                 |    |    |    |             |                 |    |    |    |             |                 |     |    |    |                |                 |    |   |     |    |    |    |    |    |   |   |   |
|              | 2.2 225        |                  |    |             | F               | F  | F  |    |             |                 | C  | C  | C  |             |                 |     |    | G  | G              | J               | J  | J |     |    |    | N  | N  | N  | P | P |   |
|              | 3.3 335        |                  |    |             |                 |    |    |    |             |                 |    |    |    |             |                 |     |    | J  | J              | J               |    |   |     |    |    | N  | N  |    |   |   |   |
|              | 4.7 475        |                  |    |             |                 |    |    |    |             |                 | E  | E  | E  | E           |                 |     |    | J  | J              | J               | G  |   |     |    | N  | N  | J  | N  | N | P | P |
|              | 10 106         |                  |    |             |                 |    |    |    |             |                 | E  | E  |    |             |                 |     |    | K  | J              | J               | J  |   |     |    | P  | P  | P  | P  | P |   |   |
|              | 22 226         |                  |    |             |                 |    |    |    |             |                 | E  |    |    |             |                 |     |    | K  | K              | K               |    |   |     |    | P  | P  | P  | P  | P |   |   |
|              | 47 476         |                  |    |             |                 |    |    |    |             |                 |    |    |    |             |                 |     |    |    |                |                 |    |   |     |    | P  | P  |    |    |   |   |   |
|              | 100 107        |                  |    |             |                 |    |    |    |             |                 |    |    |    |             |                 |     |    |    |                |                 |    |   |     |    | P  |    |    |    |   |   |   |
| Voltage:     |                | 6.3              | 16 | 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               | F               | 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) | 0.40<br>(0.016) | 0.90<br>(0.035) | 0.94<br>(0.037) | 1.02<br>(0.040) | 1.27<br>(0.050) | 1.40<br>(0.055) | 1.52<br>(0.060) | 1.78<br>(0.070) | 2.29<br>(0.090) | 2.54<br>(0.100) | 2.79<br>(0.110) |
| PAPER          |                 |                 |                 |                 |                 |                 |                 | EMBOSS          |                 |                 |                 |                 |                 |                 |                 |

PAPER and EMBOSS 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    | 3.20 ± 0.20     |     |    |    |    |    |    |     | 3.20 ± 0.20     |     |    |    |    |    |    |   | 4.50 ± 0.30     |     |    |    |    |    |    |  |
|              | (in.) | (0.126 ± 0.008) |     |    |    |    |    |    |     | (0.126 ± 0.008) |     |    |    |    |    |    |   | (0.177 ± 0.012) |     |    |    |    |    |    |  |
| (W) Width    | mm    | 1.60 ± 0.20     |     |    |    |    |    |    |     | 2.50 ± 0.20     |     |    |    |    |    |    |   | 3.20 ± 0.20     |     |    |    |    |    |    |  |
|              | (in.) | (0.063 ± 0.008) |     |    |    |    |    |    |     | (0.098 ± 0.008) |     |    |    |    |    |    |   | (0.126 ± 0.008) |     |    |    |    |    |    |  |
| (T) Terminal | mm    | 0.50 ± 0.25     |     |    |    |    |    |    |     | 0.50 ± 0.25     |     |    |    |    |    |    |   | 0.61 ± 0.36     |     |    |    |    |    |    |  |
|              | (in.) | (0.020 ± 0.010) |     |    |    |    |    |    |     | (0.020 ± 0.010) |     |    |    |    |    |    |   | (0.024 ± 0.014) |     |    |    |    |    |    |  |
| Voltage:     |       | 4               | 6.3 | 10 | 16 | 25 | 35 | 50 | 100 | 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 | 153             |     |    |    |    |    |    |     |                 |     |    |    |    |    |    |   |                 |     |    |    |    |    |    |  |
|              | 0.022 | 223             |     |    |    |    |    |    |     |                 |     |    |    |    |    |    |   |                 |     |    |    |    |    |    |  |
|              | 0.033 | 333             |     |    |    |    |    |    |     |                 |     |    |    |    |    |    |   |                 |     |    |    |    |    |    |  |
|              | 0.047 | 473             |     |    |    |    |    |    |     |                 |     |    |    |    |    |    |   |                 |     |    |    |    |    |    |  |
|              | 0.068 | 683             |     |    |    |    |    |    |     |                 |     |    |    |    |    |    |   |                 |     |    |    |    |    |    |  |
|              | 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   | Q               |     |    |    | X  | X  | X  |   |                 |     |    |    |    |    |    |  |
|              | 1.5   | 155             |     |    |    |    |    |    |     |                 |     |    |    |    |    |    |   |                 |     |    |    |    |    |    |  |
|              | 2.2   | 225             |     |    | Q  | Q  | Q  | Q  | Q   | Q               |     |    |    | X  | Z  | Z  |   |                 |     |    |    |    |    |    |  |
|              | 3.3   | 335             |     | Q  | Q  |    |    |    |     |                 |     |    |    |    |    |    |   |                 |     |    |    |    |    |    |  |
|              | 4.7   | 475             | X   | X  | X  | X  | X  | X  | X   | X               |     |    | Q  | Q  | 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  |   |                 |     |    |    |    |    |    |  |
|              | 47    | 476             | X   | X  | X  |    |    |    |     |                 |     | Z  | Z  | Z  | Z  | Z  |   |                 |     |    |    |    |    |    |  |
|              | 100   | 107             | X   | X  |    |    |    |    |     |                 |     | Z  | Z  | Z  | Z  |    |   |                 |     |    |    |    |    |    |  |
| Voltage      |       | 4               | 6.3 | 10 | 16 | 25 | 35 | 50 | 100 | 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.      | 0.33    | 0.22    | 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) | (0.009) | (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     |         |         |         |         |         |         | EMBOSS  |         |         |         |         |         |         |         |

NOTE: Contact factory for non-specified capacitance values

\*EIA 01005

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