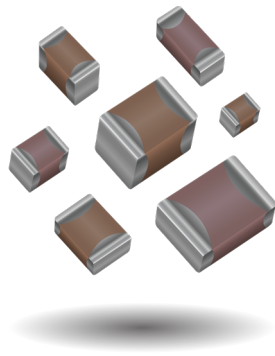


# MLCC Tin/Lead Termination "B" (LD Series)

## C0G (NP0) – General Specifications



KYOCERA AVX will support those customers for commercial and military Multilayer Ceramic Capacitors with a termination consisting of 5% minimum lead. This termination is indicated by the use of a "B" in the 12th position of the KYOCERA AVX Catalog Part Number. This fulfills KYOCERA AVX's commitment to providing a full range of products to our customers. KYOCERA AVX has provided in the following pages a full range of values that we are currently offering in this special "B" termination. Please contact the factory if you require additional information on our MLCC Tin/Lead Termination "B" products.

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

**Not RoHS Compliant**

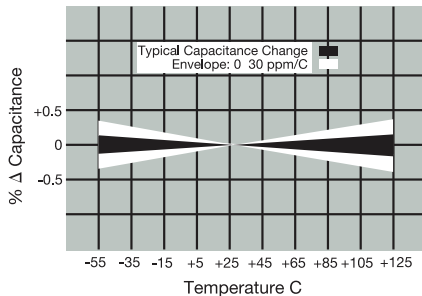
|   |   |  |                                 |   |                                      |  |  |                     |
|---|---|--|---------------------------------|---|--------------------------------------|--|--|---------------------|
| <b>LD05</b>   | <b>5</b>  | <b>A</b>                                       | <b>101</b>                      | <b>J</b>  | <b>A</b>                             | <b>B</b>   | <b>2</b>   | <b>A</b>            |
| <b>Size</b>   | <b>Voltage</b>  | <b>Dielectric</b>                              | <b>Capacitance Code (In pF)</b> | <b>Capacitance Tolerance</b>  | <b>Failure Rate</b>                  | <b>Terminations</b>  | <b>Packaging</b>   | <b>Special Code</b> |
| LD02 - 0402<br>LD03 - 0603<br>LD04 - 0504*<br>LD05 - 0805<br>LD06 - 1206<br>LD10 - 1210<br>LD12 - 1812<br>LD13 - 1825<br>LD14 - 2225<br>LD20 - 2220 | 6.3V = 6<br>10V = Z<br>16V = Y<br>25V = 3<br>35V = D<br>50V = 5<br>100V = 1<br>200V = 2<br>500V = 7 | C0G (NP0) = A<br>X7R = C<br>X5R = D<br>X8R = F | 2 Sig. Digits + Number of Zeros | B = ±10 pF (<10pF)<br>C = ±25 pF (<10pF)<br>D = ±50 pF (<10pF)<br>F = ±1% (≥ 10 pF)<br>G = ±2% (≥ 10 pF)<br>J = ±5%<br>K = ±10%<br>M = ±20% | A = Not Applicable<br>4 = Automotive | B = 5% min lead<br>X = FLEXITERM® with 5% min lead**<br><br>**X7R only | 2 = 7" Reel<br>4 = 13" Reel<br><br><b>Contact Factory For Multiples*</b> | A = Std. Product    |

\*LD04 has the same CV ranges as LD03.

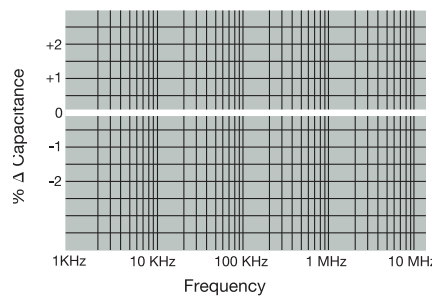
See FLEXITERM® section for CV options

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

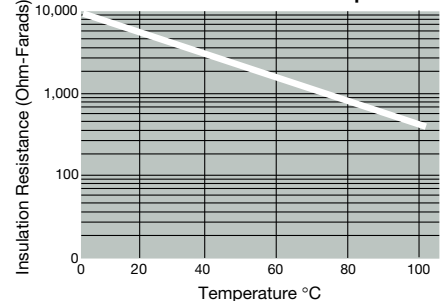
Temperature Coefficient



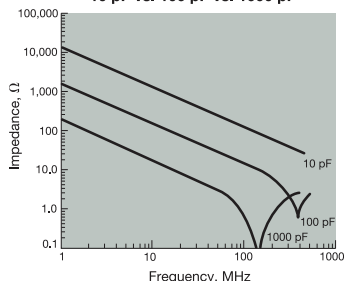
Δ Capacitance vs. Frequency



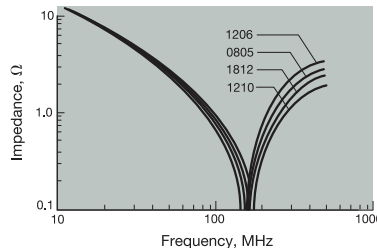
Insulation Resistance vs Temperature



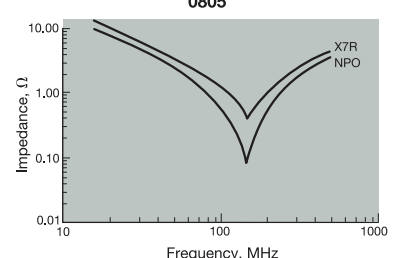
Variation of Impedance with Cap Value Impedance vs. Frequency 0805 - C0G (NP0) 10 pF vs. 100 pF vs. 1000 pF



Variation of Impedance with Chip Size Impedance vs. Frequency 1000 pF - C0G (NP0)

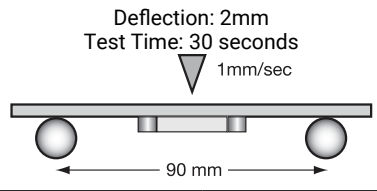


Variation of Impedance with Ceramic Formulation Impedance vs. Frequency 1000 pF - C0G (NP0) vs X7R 0805



# MLCC Tin/Lead Termination "B"

## COG (NP0) – Specifications and Test Methods

| Parameter/Test                 |                       | NPO Specification Limits  | Measuring Conditions  |                    |
|--------------------------------|-----------------------|---|---|--------------------|
| Operating Temperature Range    |                       | -55°C to +125°C   | Temperature Cycle Chamber   |                    |
| Capacitance                    |                       | Within specified tolerance  | Freq.: 1.0 MHz $\pm$ 10% for cap $\leq$ 1000 pF<br>1.0 kHz $\pm$ 10% for cap $>$ 1000 pF<br>Voltage: 1.0Vrms $\pm$ .2V  |                    |
| Q                              |                       | $<$ 30 pF: Q $\geq$ 400+20 x Cap Value<br>$\geq$ 30 pF: Q $\geq$ 1000                                     |   |                    |
| Insulation Resistance          |                       | 100,000M $\Omega$ or 1000M $\Omega$ - $\mu$ F,<br>whichever is less                                       | Charge device with rated voltage for<br>60 $\pm$ 5 secs @ room temp/humidity  |                    |
| Dielectric Strength            |                       | No breakdown or visual defects  | Charge device with 250% 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 voltage<br>for 500V devices.  |                    |
| Resistance to Flexure Stresses | Appearance            | No defects  | Deflection: 2mm<br>Test Time: 30 seconds<br>   |                    |
|                                | Capacitance Variation | $\pm$ 5% or $\pm$ 5 pF, whichever is greater  |   |                    |
|                                | Q                     | 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 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 | $\leq$ $\pm$ 2.5% or $\pm$ 25 pF, whichever is greater  |   |                    |
|                                | Q                     | 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 | $\leq$ $\pm$ 2.5% or $\pm$ 25 pF, whichever is greater  | Step 2: Room Temp   | $\leq$ 3 minutes   |
|                                | Q                     | 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 hours at room temperature   |                    |
| Load Life                      | Appearance            | No visual defects   | Charge device with twice rated voltage in test<br>chamber set at 125°C $\pm$ 2°C<br>for 1000 hours (+48, -0).<br><br>Remove from test chamber and stabilize at room<br>temperature for 24 hours<br>before measuring.                            |                    |
|                                | Capacitance Variation | $\leq$ $\pm$ 3.0% or $\pm$ .3 pF, whichever is greater  |   |                    |
|                                | Q                     | $\geq$ 30 pF: Q $\geq$ 350<br>$\geq$ 10 pF, $<$ 30 pF: Q $\geq$ 275 +5C/2<br>$<$ 10 pF: Q $\geq$ 200 +10C |   |                    |
|                                | 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%<br>relative humidity for 1000 hours<br>(+48, -0) with rated voltage applied.<br><br>Remove from chamber and stabilize at room<br>temperature for 24 $\pm$ 2 hours before measuring. |                    |
|                                | Capacitance Variation | $\leq$ $\pm$ 5.0% or $\pm$ .5 pF, whichever is greater  |   |                    |
|                                | Q                     | $\geq$ 30 pF: Q $\geq$ 350<br>$\geq$ 10 pF, $<$ 30 pF: Q $\geq$ 275 +5C/2<br>$<$ 10 pF: Q $\geq$ 200 +10C |   |                    |
|                                | Insulation Resistance | $\geq$ Initial Value x 0.3 (See Above)  |   |                    |
|                                | Dielectric Strength   | Meets Initial Values (As Above)   |   |                    |

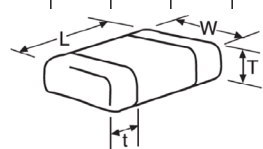
# MLCC Tin/Lead Termination "B"

## C0G (NP0) – Capacitance Range



PREFERRED SIZES ARE SHADED

| SIZE         | LD02        |                 |    | LD03        |                 |    | LD05           |                 |      |    | LD06           |                 |      |    |    |    |     |     |     |
|--------------|-------------|-----------------|----|-------------|-----------------|----|----------------|-----------------|------|----|----------------|-----------------|------|----|----|----|-----|-----|-----|
|              | Reflow/Wave |                 |    | Reflow/Wave |                 |    | Reflow/Wave    |                 |      |    | Reflow/Wave    |                 |      |    |    |    |     |     |     |
| Soldering    | All Paper   |                 |    | All Paper   |                 |    | Paper/Embossed |                 |      |    | Paper/Embossed |                 |      |    |    |    |     |     |     |
| Packaging    | All Paper   |                 |    | All Paper   |                 |    | Paper/Embossed |                 |      |    | Paper/Embossed |                 |      |    |    |    |     |     |     |
| (L) Length   | mm          | 1.00 ± 0.10     |    |             | 1.60 ± 0.15     |    |                | 2.01 ± 0.20     |      |    |                | 3.20 ± 0.20     |      |    |    |    |     |     |     |
|              | (in.)       | (0.040 ± 0.004) |    |             | (0.063 ± 0.006) |    |                | (0.079 ± 0.008) |      |    |                | (0.126 ± 0.008) |      |    |    |    |     |     |     |
| (W) Width    | mm          | 0.50 ± 0.10     |    |             | 0.81 ± 0.15     |    |                | 1.25 ± 0.20     |      |    |                | 1.60 ± 0.20     |      |    |    |    |     |     |     |
|              | (in.)       | (0.020 ± 0.004) |    |             | (0.032 ± 0.006) |    |                | (0.049 ± 0.008) |      |    |                | (0.063 ± 0.008) |      |    |    |    |     |     |     |
| (t) Terminal | mm          | 0.25 ± 0.15     |    |             | 0.35 ± 0.15     |    |                | 0.50 ± 0.25     |      |    |                | 0.50 ± 0.25     |      |    |    |    |     |     |     |
|              | (in.)       | (0.010 ± 0.006) |    |             | (0.014 ± 0.006) |    |                | (0.020 ± 0.010) |      |    |                | (0.020 ± 0.010) |      |    |    |    |     |     |     |
| WVDC         |             | 16              | 25 | 50          | 16              | 25 | 50             | 100             | 16   | 25 | 50             | 100             | 200  | 16 | 25 | 50 | 100 | 200 | 500 |
| Cap (pF)     | 0.5         | C               | C  | C           | G               | G  | G              | G               | J    | J  | J              | J               | J    | J  | J  | J  | J   | J   | J   |
|              | 1.0         | C               | C  | C           | G               | G  | G              | G               | J    | J  | J              | J               | J    | J  | J  | J  | J   | J   | J   |
|              | 1.2         | C               | C  | C           | G               | G  | G              | G               | J    | J  | J              | J               | J    | J  | J  | J  | J   | J   | J   |
|              | 1.5         | C               | C  | C           | G               | G  | G              | G               | J    | J  | J              | J               | J    | J  | J  | J  | J   | J   | J   |
|              | 1.8         | C               | C  | C           | G               | G  | G              | G               | J    | J  | J              | J               | J    | J  | J  | J  | J   | J   | J   |
|              | 2.2         | C               | C  | C           | G               | G  | G              | G               | J    | J  | J              | J               | J    | J  | J  | J  | J   | J   | J   |
|              | 2.7         | C               | C  | C           | G               | G  | G              | G               | J    | J  | J              | J               | J    | J  | J  | J  | J   | J   | J   |
|              | 3.3         | C               | C  | C           | G               | G  | G              | G               | J    | J  | J              | J               | J    | J  | J  | J  | J   | J   | J   |
|              | 3.9         | C               | C  | C           | G               | G  | G              | G               | J    | J  | J              | J               | J    | J  | J  | J  | J   | J   | J   |
|              | 4.7         | C               | C  | C           | G               | G  | G              | G               | J    | J  | J              | J               | J    | J  | J  | J  | J   | J   | J   |
|              | 5.6         | C               | C  | C           | G               | G  | G              | G               | J    | J  | J              | J               | J    | J  | J  | J  | J   | J   | J   |
|              | 6.8         | C               | C  | C           | G               | G  | G              | G               | J    | J  | J              | J               | J    | J  | J  | J  | J   | J   | J   |
|              | 8.2         | C               | C  | C           | G               | G  | G              | G               | J    | J  | J              | J               | J    | J  | J  | J  | J   | J   | J   |
|              | 10          | C               | C  | C           | G               | G  | G              | G               | J    | J  | J              | J               | J    | J  | J  | J  | J   | J   | J   |
|              | 12          | C               | C  | C           | G               | G  | G              | G               | J    | J  | J              | J               | J    | J  | J  | J  | J   | J   | J   |
|              | 15          | C               | C  | C           | G               | G  | G              | G               | J    | J  | J              | J               | J    | J  | J  | J  | J   | J   | J   |
|              | 18          | C               | C  | C           | G               | G  | G              | G               | J    | J  | J              | J               | J    | J  | J  | J  | J   | J   | J   |
|              | 22          | C               | C  | C           | G               | G  | G              | G               | J    | J  | J              | J               | J    | J  | J  | J  | J   | J   | J   |
|              | 27          | C               | C  | C           | G               | G  | G              | G               | J    | J  | J              | J               | J    | J  | J  | J  | J   | J   | J   |
|              | 33          | C               | C  | C           | G               | G  | G              | G               | J    | J  | J              | J               | J    | J  | J  | J  | J   | J   | J   |
|              | 39          | C               | C  | C           | G               | G  | G              | G               | J    | J  | J              | J               | J    | J  | J  | J  | J   | J   | J   |
|              | 47          | C               | C  | C           | G               | G  | G              | G               | J    | J  | J              | J               | J    | J  | J  | J  | J   | J   | J   |
|              | 56          | C               | C  | C           | G               | G  | G              | G               | J    | J  | J              | J               | J    | J  | J  | J  | J   | J   | J   |
|              | 68          | C               | C  | C           | G               | G  | G              | G               | J    | J  | J              | J               | J    | J  | J  | J  | J   | J   | J   |
|              | 82          | C               | C  | C           | G               | G  | G              | G               | J    | J  | J              | J               | J    | J  | J  | J  | J   | J   | J   |
|              | 100         | C               | C  | C           | G               | G  | G              | G               | J    | J  | J              | J               | J    | J  | J  | J  | J   | J   | J   |
|              | 120         | C               | C  | C           | G               | G  | G              | G               | J    | J  | J              | J               | J    | J  | J  | J  | J   | J   | J   |
|              | 150         | C               | C  | C           | G               | G  | G              | G               | J    | J  | J              | J               | J    | J  | J  | J  | J   | J   | J   |
|              | 180         | C               | C  | C           | G               | G  | G              | G               | J    | J  | J              | J               | J    | J  | J  | J  | J   | J   | J   |
|              | 220         | C               | C  | C           | G               | G  | G              | G               | J    | J  | J              | J               | J    | J  | J  | J  | J   | J   | M   |
|              | 270         | C               | C  | C           | G               | G  | G              | G               | J    | J  | J              | J               | M    | J  | J  | J  | J   | J   | M   |
|              | 330         | C               | C  | C           | G               | G  | G              | G               | J    | J  | J              | J               | M    | J  | J  | J  | J   | J   | M   |
|              | 390         | C               | C  | C           | G               | G  | G              | G               | J    | J  | J              | J               | M    | J  | J  | J  | J   | J   | M   |
|              | 470         | C               | C  | C           | G               | G  | G              | G               | J    | J  | J              | J               | M    | J  | J  | J  | J   | J   | M   |
|              | 560         |                 |    |             | G               | G  | G              | G               | J    | J  | J              | J               | M    | J  | J  | J  | J   | J   | M   |
|              | 680         |                 |    |             | G               | G  | G              | G               | J    | J  | J              | J               |      | J  | J  | J  | J   | J   | P   |
|              | 820         |                 |    |             | G               | G  | G              | G               | J    | J  | J              | J               |      | J  | J  | J  | J   | J   |     |
|              | 1000        |                 |    |             | G               | G  | G              | G               | J    | J  | J              | J               |      | J  | J  | J  | J   | J   | Q   |
|              | 1200        |                 |    |             |                 | G  |                |                 | J    | J  | J              | J               |      | J  | J  | J  | J   | J   | Q   |
|              | 1500        |                 |    |             |                 |    |                |                 | J    | J  | J              | J               |      | J  | J  | J  | J   | J   | Q   |
|              | 1800        |                 |    |             |                 |    |                |                 | J    | J  | J              | J               |      | J  | J  | M  | M   |     |     |
|              | 2200        |                 |    |             |                 |    |                |                 | J    | J  | N              |                 |      | J  | J  | M  | M   |     |     |
|              | 2700        |                 |    |             |                 |    |                |                 | J    | J  | N              |                 |      | J  | J  | M  | P   |     |     |
|              | 3300        |                 |    |             |                 |    |                |                 | J    | J  |                |                 |      | J  | J  | M  | P   |     |     |
|              | 3900        |                 |    |             |                 |    |                |                 | J    | J  |                |                 |      | J  | J  | M  | P   |     |     |
|              | 4700        |                 |    |             |                 |    |                |                 | J    | J  |                |                 |      | J  | J  | M  | P   |     |     |
|              | 5600        |                 |    |             |                 |    |                |                 |      |    |                |                 |      | J  | J  | M  |     |     |     |
|              | 6800        |                 |    |             |                 |    |                |                 |      |    |                |                 |      | M  | M  |    |     |     |     |
|              | 8200        |                 |    |             |                 |    |                |                 |      |    |                |                 |      | M  | M  |    |     |     |     |
| Cap (pF)     | 0.010       |                 |    |             |                 |    |                |                 |      |    |                |                 |      | M  | M  |    |     |     |     |
|              | 0.012       |                 |    |             |                 |    |                |                 |      |    |                |                 |      |    |    |    |     |     |     |
|              | 0.015       |                 |    |             |                 |    |                |                 |      |    |                |                 |      |    |    |    |     |     |     |
|              | 0.018       |                 |    |             |                 |    |                |                 |      |    |                |                 |      |    |    |    |     |     |     |
|              | 0.022       |                 |    |             |                 |    |                |                 |      |    |                |                 |      |    |    |    |     |     |     |
|              | 0.027       |                 |    |             |                 |    |                |                 |      |    |                |                 |      |    |    |    |     |     |     |
|              | 0.033       |                 |    |             |                 |    |                |                 |      |    |                |                 |      |    |    |    |     |     |     |
|              | 0.039       |                 |    |             |                 |    |                |                 |      |    |                |                 |      |    |    |    |     |     |     |
|              | 0.047       |                 |    |             |                 |    |                |                 |      |    |                |                 |      |    |    |    |     |     |     |
|              | 0.068       |                 |    |             |                 |    |                |                 |      |    |                |                 |      |    |    |    |     |     |     |
|              | 0.082       |                 |    |             |                 |    |                |                 |      |    |                |                 |      |    |    |    |     |     |     |
|              | 0.1         |                 |    |             |                 |    |                |                 |      |    |                |                 |      |    |    |    |     |     |     |
| WVDC         |             | 16              | 25 | 50          | 16              | 25 | 50             | 100             | 16   | 25 | 50             | 100             | 200  | 16 | 25 | 50 | 100 | 200 | 500 |
| SIZE         |             | LD02            |    |             | LD03            |    |                |                 | LD05 |    |                |                 | LD06 |    |    |    |     |     |     |



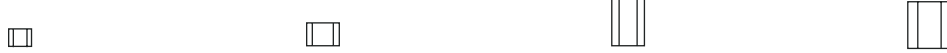
| Letter         | A               | C               | E               | G               | J               | K               | M               | N               | P               | Q               | X               | Y               | Z               |
|----------------|-----------------|-----------------|-----------------|-----------------|-----------------|---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

# MLCC Tin/Lead Termination "B"

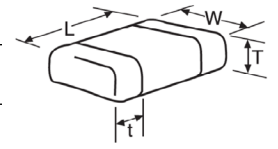
## C0G (NP0) – Capacitance Range



PREFERRED SIZES ARE SHADED



| SIZE         | LD10                           |    |    |     |     | LD12                           |    |    |     |     | LD13                           |    |     | LD14                           |    |     |     |
|--------------|--------------------------------|----|----|-----|-----|--------------------------------|----|----|-----|-----|--------------------------------|----|-----|--------------------------------|----|-----|-----|
| Soldering    | Reflow Only                    |    |    |     |     | Reflow Only                    |    |    |     |     | Reflow Only                    |    |     | Reflow Only                    |    |     |     |
| Packaging    | Paper/Embossed                 |    |    |     |     | All Embossed                   |    |    |     |     | All Embossed                   |    |     | All Embossed                   |    |     |     |
| (L) Length   | 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) |    |     | 5.72 ± 0.25<br>(0.225 ± 0.010) |    |     |     |
| (W) Width    | 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) |    |     | 6.35 ± 0.25<br>(0.250 ± 0.010) |    |     |     |
| (t) Terminal | 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) |    |     |     |
| Cap (pF)     | WVDC                           | 25 | 50 | 100 | 200 | 500                            | 25 | 50 | 100 | 200 | 500                            | 50 | 100 | 200                            | 50 | 100 | 200 |
| 0.5          |                                |    |    |     |     |                                |    |    |     |     |                                |    |     |                                |    |     |     |
| 1.0          |                                |    |    |     |     |                                |    |    |     |     |                                |    |     |                                |    |     |     |
| 1.2          |                                |    |    |     |     |                                |    |    |     |     |                                |    |     |                                |    |     |     |
| 1.5          |                                |    |    |     |     |                                |    |    |     |     |                                |    |     |                                |    |     |     |
| 1.8          |                                |    |    |     |     |                                |    |    |     |     |                                |    |     |                                |    |     |     |
| 2.2          |                                |    |    |     |     |                                |    |    |     |     |                                |    |     |                                |    |     |     |
| 2.7          |                                |    |    |     |     |                                |    |    |     |     |                                |    |     |                                |    |     |     |
| 3.3          |                                |    |    |     |     |                                |    |    |     |     |                                |    |     |                                |    |     |     |
| 3.9          |                                |    |    |     |     |                                |    |    |     |     |                                |    |     |                                |    |     |     |
| 4.7          |                                |    |    |     |     |                                |    |    |     |     |                                |    |     |                                |    |     |     |
| 5.6          |                                |    |    |     |     |                                |    |    |     |     |                                |    |     |                                |    |     |     |
| 6.8          |                                |    |    |     |     |                                |    |    |     |     |                                |    |     |                                |    |     |     |
| 8.2          |                                |    |    |     |     |                                |    |    |     |     |                                |    |     |                                |    |     |     |
| 10           |                                |    |    |     |     | J                              |    |    |     |     |                                |    |     |                                |    |     |     |
| 12           |                                |    |    |     |     | J                              |    |    |     |     |                                |    |     |                                |    |     |     |
| 15           |                                |    |    |     |     | J                              |    |    |     |     |                                |    |     |                                |    |     |     |
| 18           |                                |    |    |     |     | J                              |    |    |     |     |                                |    |     |                                |    |     |     |
| 22           |                                |    |    |     |     | J                              |    |    |     |     |                                |    |     |                                |    |     |     |
| 27           |                                |    |    |     |     | J                              |    |    |     |     |                                |    |     |                                |    |     |     |
| 33           |                                |    |    |     |     | J                              |    |    |     |     |                                |    |     |                                |    |     |     |
| 39           |                                |    |    |     |     | J                              |    |    |     |     |                                |    |     |                                |    |     |     |
| 47           |                                |    |    |     |     | J                              |    |    |     |     |                                |    |     |                                |    |     |     |
| 56           |                                |    |    |     |     | J                              |    |    |     |     |                                |    |     |                                |    |     |     |
| 68           |                                |    |    |     |     | J                              |    |    |     |     |                                |    |     |                                |    |     |     |
| 82           |                                |    |    |     |     | J                              |    |    |     |     |                                |    |     |                                |    |     |     |
| 100          |                                |    |    |     |     | J                              |    |    |     |     |                                |    |     |                                |    |     |     |
| 120          |                                |    |    |     |     | J                              |    |    |     |     |                                |    |     |                                |    |     |     |
| 150          |                                |    |    |     |     | J                              |    |    |     |     |                                |    |     |                                |    |     |     |
| 180          |                                |    |    |     |     | J                              |    |    |     |     |                                |    |     |                                |    |     |     |
| 220          |                                |    |    |     |     | J                              |    |    |     |     |                                |    |     |                                |    |     |     |
| 270          |                                |    |    |     |     | J                              |    |    |     |     |                                |    |     |                                |    |     |     |
| 330          |                                |    |    |     |     | J                              |    |    |     |     |                                |    |     |                                |    |     |     |
| 390          |                                |    |    |     |     | M                              |    |    |     |     |                                |    |     |                                |    |     |     |
| 470          |                                |    |    |     |     | M                              |    |    |     |     |                                |    |     |                                |    |     |     |
| 560          | J                              | J  | J  | J   | J   | M                              |    |    |     |     |                                |    |     |                                |    |     |     |
| 680          | J                              | J  | J  | J   | J   | M                              |    |    |     |     |                                |    |     |                                |    |     |     |
| 820          | J                              | J  | J  | J   | J   | M                              |    |    |     |     |                                |    |     |                                |    |     |     |
| 1000         | J                              | J  | J  | J   | J   | M                              | K  | K  | K   | K   | M                              | M  | M   | M                              | M  | M   | P   |
| 1200         | J                              | J  | J  | J   | M   | M                              | K  | K  | K   | K   | M                              | M  | M   | M                              | M  | M   | P   |
| 1500         | J                              | J  | J  | J   | M   | M                              | K  | K  | K   | K   | M                              | M  | M   | M                              | M  | M   | P   |
| 1800         | J                              | J  | J  | J   | M   |                                | K  | K  | K   | K   | M                              | M  | M   | M                              | M  | M   | P   |
| 2200         | J                              | J  | J  | J   | Q   |                                | K  | K  | K   | K   | P                              | M  | M   | M                              | M  | M   | P   |
| 2700         | J                              | J  | J  | J   | Q   |                                | K  | K  | K   | P   | Q                              | M  | M   | M                              | M  | M   | P   |
| 3300         | J                              | J  | J  | J   |     |                                | P  | P  | P   | P   | Q                              | M  | M   | M                              | M  | M   | P   |
| 3900         | J                              | J  | J  | M   |     |                                | P  | P  | P   | P   | Q                              | M  | M   | M                              | M  | M   | P   |
| 4700         | J                              | J  | J  | M   |     |                                | P  | P  | P   | P   | Y                              | M  | M   | M                              | M  | M   | P   |
| 5600         | J                              | J  | J  |     |     |                                | P  | P  | P   | P   | Y                              | M  | M   | M                              | M  | M   | P   |
| 6800         | J                              | J  | J  |     |     |                                | P  | P  | Q   | Q   | Y                              | M  | M   | M                              | M  | M   | P   |
| 8200         | J                              | J  | J  |     |     |                                | P  | P  | Q   | Q   | Y                              | M  | M   | M                              | M  | M   | P   |
| Cap (pF)     | 0.010                          | J  | J  |     |     |                                | P  | P  | Q   | Q   | Y                              | M  | M   |                                | M  | M   | P   |
| 0.012        | J                              | J  |    |     |     |                                | P  | P  | Q   | X   | Y                              | M  | M   |                                | M  | M   | P   |
| 0.015        |                                |    |    |     |     |                                | P  | P  | Q   | X   | Y                              | M  | M   |                                | M  | M   | Y   |
| 0.018        |                                |    |    |     |     |                                | P  | P  | X   | X   | Y                              | P  | M   |                                | M  | M   | Y   |
| 0.022        |                                |    |    |     |     |                                | P  | P  | X   | X   |                                | P  |     |                                | M  | M   | Y   |
| 0.027        |                                |    |    |     |     |                                | Q  | X  | X   | Z   |                                | P  |     |                                | P  | Y   | Y   |
| 0.033        |                                |    |    |     |     |                                | Q  | X  | X   | Z   |                                | P  |     |                                | P  |     |     |
| 0.039        |                                |    |    |     |     |                                | X  | X  | Z   | Z   |                                | P  |     |                                | P  |     |     |
| 0.047        |                                |    |    |     |     |                                | X  | X  | Z   | Z   |                                | P  |     |                                | P  |     |     |
| 0.068        |                                |    |    |     |     |                                | Z  | Z  | Z   |     |                                |    |     |                                | P  |     |     |
| 0.082        |                                |    |    |     |     |                                | Z  | Z  | Z   |     |                                |    |     |                                | Q  |     |     |
| 0.1          |                                |    |    |     |     |                                | Z  | Z  | Z   |     |                                |    |     |                                | Q  |     |     |
| SIZE         | WVDC                           | 25 | 50 | 100 | 200 | 500                            | 25 | 50 | 100 | 200 | 500                            | 50 | 100 | 200                            | 50 | 100 | 200 |



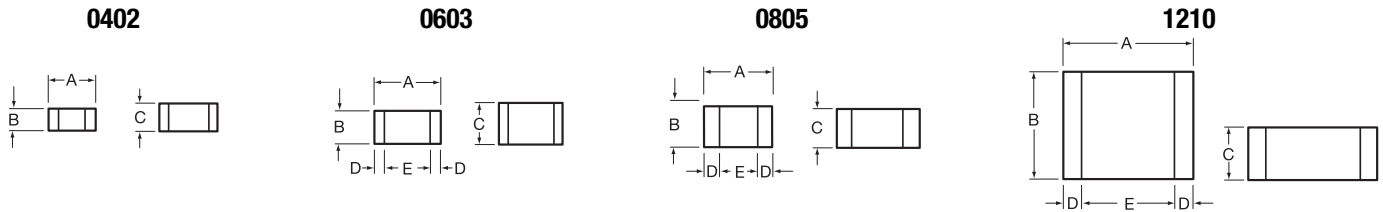
| Letter         | A               | C               | E               | G               | J               | K               | M               | N               | P               | Q               | X               | Y               | Z               |
|----------------|-----------------|-----------------|-----------------|-----------------|-----------------|---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

# MLCC Tin/Lead Termination "B"

## C0G (NP0), Sn/Pb – "U" Series Capacitors

### GENERAL INFORMATION

"U" Series capacitors are C0G (NP0) chip capacitors specially designed for "Ultra" low ESR for applications in the communications market. Max ESR and effective capacitance are met on each value producing lot to lot uniformity. Sizes available are EIA chip sizes 0603, 0805, and 1210.



| Size | A                       | B                       | C                | D                           | E                |
|------|-------------------------|-------------------------|------------------|-----------------------------|------------------|
| 0402 | 0.039±0.004 (1.00±0.1)  | 0.020±0.004 (0.50±0.1)  | 0.024 (0.6) max  | 0.010 ± 0.006 (0.25 ± 0.15) | 0.014 (0.36) min |
| 0603 | 0.060±0.010 (1.52±0.25) | 0.030±0.010 (0.76±0.25) | 0.036 (0.91) max | 0.010±0.005 (0.25±0.13)     | 0.030 (0.76) min |

### HOW TO ORDER

|   |   |   |   |   |   |  |   |  |
|---|---|---|---|---|---|--|---|--|
| <p><b>LD05</b></p> <p>Case Size<br/>LD02 = 0402<br/>LD03 = 0603<br/>LD05 = 0805<br/>LD10 = 1210</p> | <p><b>1</b></p> <p>Voltage Code<br/>3 = 25V<br/>5 = 50V<br/>1 = 100V<br/>2 = 200V</p> | <p><b>U</b></p> <p>Dielectric =<br/>Ultra Low<br/>ESR</p> | <p><b>100</b></p> <p>Capacitance<br/>EIA Capacitance Code in pF.<br/>First two digits = significant figures or "R" for decimal place.<br/>Third digit = number of zeros or after "R" significant figures.</p> | <p><b>J</b></p> <p>Capacitance<br/>Tolerance Code<br/>B = ±0.1pF<br/>C = ±0.25pF<br/>D = ±0.5pF<br/>F = ±1%<br/>G = ±2%<br/>J = ±5%<br/>K = ±10%<br/>M = ±20%</p> | <p><b>A</b></p> <p>Failure Rate<br/>Code<br/>A = Not<br/>Applicable</p> | <p><b>B</b></p> <p>Termination<br/>B = 5% min lead</p> | <p><b>2</b></p> <p>Packaging<br/>Code<br/>2 = 7" Reel<br/>4 = 13" Reel<br/>9 = Bulk</p> | <p><b>A</b></p> <p>Special Code<br/>A = Standard</p> |
|---|---|---|---|---|---|--|---|--|

### HOW TO ORDER

#### ELECTRICAL CHARACTERISTICS

##### Capacitance Values and Tolerances:

Size 0402 - 0.2 pF to 22 pF @ 1 MHz  
 Size 0603 - 1.0 pF to 100 pF @ 1 MHz  
 Size 0805 - 1.6 pF to 160 pF @ 1 MHz  
 Size 1210 - 2.4 pF to 1000 pF @ 1 MHz

##### Temperature Coefficient of Capacitance (TC):

0±30 ppm/°C (-55° to +125°C)

##### Insulation Resistance (IR):

10<sup>12</sup> Ω min. @ 25°C and rated WVDC  
 10<sup>11</sup> Ω min. @ 125°C and rated WVDC

##### Working Voltage (WVDC):

|      |                     |
|------|---------------------|
| Size | Working Voltage     |
| 0402 | - 50, 25 WVDC       |
| 0603 | - 200, 100, 50 WVDC |

0805 - 200, 100 WVDC

1210 - 200, 100 WVDC

##### Dielectric Working Voltage (DWV):

250% of rated WVDC

##### Equivalent Series Resistance Typical (ESR):

040 - See Performance Curve, page 306  
 0603 - See Performance Curve, page 306  
 0805 - See Performance Curve, page 306  
 1210 - See Performance Curve, page 306

##### Marking:

Laser marking EIA J marking standard (except 0603) (capacitance code and tolerance upon request).

##### Military Specifications

Meets or exceeds the requirements of MIL-C-55681

# MLCC Tin/Lead Termination "B"

## C0G (NP0), Sn/Pb – Capacitance Range

| SIZE         |       | LD02          | LD03          |     |     | LD05          |               | LD10 |     |
|--------------|-------|---------------|---------------|-----|-----|---------------|---------------|------|-----|
| Soldering    |       | All Paper     | All Paper     |     |     | All Embossed  | All Embossed  |      |     |
| (L) Length   | mm    | 1.00±0.10     | 1.60±0.15     |     |     | 2.01±0.20     | 3.20±0.20     |      |     |
|              | (in.) | (0.040±0.004) | (0.063±0.006) |     |     | (0.079±0.008) | (0.126±0.008) |      |     |
| (W) Width    | mm    | 0.50±0.10     | 0.81±0.15     |     |     | 1.25±0.20     | 2.50±0.20     |      |     |
|              | (in.) | (0.020±0.004) | (0.032±0.006) |     |     | (0.049±0.008) | (0.098±0.008) |      |     |
| (t) Terminal | mm    | 0.25±0.15     | 0.35±0.15     |     |     | 0.50±0.25     | 0.50±0.25     |      |     |
|              | (in.) | (0.010±0.006) | (0.014±0.006) |     |     | (0.020±0.010) | (0.020±0.010) |      |     |
| WVDC         |       | 50            | 50            | 100 | 200 | 100           | 200           | 100  | 200 |
| Cap          | 0.2   | F             | A             | A   | A   | H             | H             | D    | D   |
| (pF)         | 0.3   | F             | A             | A   | A   | H             | H             | D    | D   |
|              | 0.4   | F             | A             | A   | A   | H             | H             | D    | D   |
|              | 0.5   | F             | A             | A   | A   | H             | H             | D    | D   |
|              | 0.6   | F             | A             | A   | A   | H             | H             | D    | D   |
|              | 0.7   | F             | A             | A   | A   | H             | H             | D    | D   |
|              | 0.8   | F             | A             | A   | A   | H             | H             | D    | D   |
|              | 0.9   | F             | A             | A   | A   | H             | H             | D    | D   |
|              | 1.0   | F             | A             | A   | A   | H             | H             | D    | D   |
|              | 1.1   | F             | A             | A   | A   | H             | H             | D    | D   |
|              | 1.2   | F             | A             | A   | A   | H             | H             | D    | D   |
|              | 1.3   | F             | A             | A   | A   | H             | H             | D    | D   |
|              | 1.4   | F             | A             | A   | A   | H             | H             | D    | D   |
|              | 1.5   | F             | A             | A   | A   | H             | H             | D    | D   |
|              | 1.6   | F             | A             | A   | A   | H             | H             | D    | D   |
|              | 1.7   | F             | A             | A   | A   | H             | H             | D    | D   |
|              | 1.8   | F             | A             | A   | A   | H             | H             | D    | D   |
|              | 1.9   | F             | A             | A   | A   | H             | H             | D    | D   |
|              | 2.0   | F             | A             | A   | A   | H             | H             | D    | D   |
|              | 2.1   | F             | A             | A   | A   | H             | H             | D    | D   |
|              | 2.2   | F             | A             | A   | A   | H             | H             | D    | D   |
|              | 2.4   | F             | A             | A   | A   | H             | H             | D    | D   |
|              | 2.7   | F             | A             | A   | A   | H             | H             | D    | D   |
|              | 3.0   | F             | A             | A   | A   | H             | H             | D    | D   |
|              | 3.3   | F             | A             | A   | A   | H             | H             | D    | D   |
|              | 3.6   | F             | A             | A   | A   | H             | H             | D    | D   |
|              | 3.9   | F             | A             | A   | A   | H             | H             | D    | D   |
|              | 4.3   | F             | A             | A   | A   | H             | H             | D    | D   |
|              | 4.7   | F             | A             | A   | A   | H             | H             | D    | D   |
|              | 5.1   | F             | A             | A   | A   | H             | H             | D    | D   |
|              | 5.6   | F             | A             | A   | A   | H             | H             | D    | D   |
|              | 6.2   | F             | A             | A   | A   | H             | H             | D    | D   |
|              | 6.8   | F             | A             | A   | A   | H             | H             | D    | D   |
|              | 7.5   | F             | A             | A   | A   | H             | H             | D    | D   |
|              | 8.2   | F             | A             | A   | A   | H             | H             | D    | D   |
|              | 9.1   | F             | A             | A   | A   | H             | H             | D    | D   |
|              | 10    | F             | A             | A   | A   | H             | H             | D    | D   |
|              | 11    | F             | A             | A   | A   | H             | H             | D    | D   |
|              | 12    | F             | A             | A   | A   | H             | H             | D    | D   |
|              | 18    | F             | A             | A   | A   | H             | H             | D    | D   |
|              | 20    | F             | A             | A   | A   | H             | H             | D    | D   |
|              | 22    | F             | A             | A   | A   | H             | H             | D    | D   |
| WVDC         |       | 50            | 50            | 100 | 200 | 100           | 200           | 100  | 200 |
| SIZE         |       | LD02          | LD03          |     |     | LD05          |               | LD10 |     |

| SIZE         |       | LD02          | LD03          |     |     | LD05          |               | LD10 |     |
|--------------|-------|---------------|---------------|-----|-----|---------------|---------------|------|-----|
| Soldering    |       | All Paper     | All Paper     |     |     | All Embossed  | All Embossed  |      |     |
| (L) Length   | mm    | 1.00±0.10     | 1.60±0.15     |     |     | 2.01±0.20     | 3.20±0.20     |      |     |
|              | (in.) | (0.040±0.004) | (0.063±0.006) |     |     | (0.079±0.008) | (0.126±0.008) |      |     |
| (W) Width    | mm    | 0.50±0.10     | 0.81±0.15     |     |     | 1.25±0.20     | 2.50±0.20     |      |     |
|              | (in.) | (0.020±0.004) | (0.032±0.006) |     |     | (0.049±0.008) | (0.098±0.008) |      |     |
| (t) Terminal | mm    | 0.25±0.15     | 0.35±0.15     |     |     | 0.50±0.25     | 0.50±0.25     |      |     |
|              | (in.) | (0.010±0.006) | (0.014±0.006) |     |     | (0.020±0.010) | (0.020±0.010) |      |     |
| WVDC         |       | 50            | 50            | 100 | 200 | 100           | 200           | 100  | 200 |
|              | 24    | F             | A             | A   | A   | H             | H             | D    | D   |
|              | 27    | F             | A             | A   | A   | H             | H             | D    | D   |
| Cap          | 30    | F             | A             | A   | A   | H             | H             | D    | D   |
| (pF)         | 33    | F             | A             | A   | A   | H             | H             | D    | D   |
|              | 36    | F             | A             | A   | A   | H             | H             | D    | D   |
|              | 39    | F             | A             | A   | A   | H             | H             | D    | D   |
|              | 43    |               | A             | A   | A   | H             | H             | D    | D   |
|              | 47    |               | A             | A   | A   | H             | H             | D    | D   |
|              | 51    |               | A             | A   | A   | H             | H             | D    | D   |
|              | 56    |               | A             | A   | A   | H             | H             | D    | D   |
|              | 68    |               | A             | A   | A   | H             | H             | D    | D   |
|              | 75    |               | A             | A   |     | H             | H             | D    | D   |
|              | 82    |               | A             | A   |     | H             | H             | D    | D   |
|              | 91    |               | A             | A   |     | H             | H             | D    | D   |
|              | 100   |               | A             | A   |     | H             | H             | D    | D   |
|              | 110   |               |               |     |     |               |               | D    | D   |
|              | 120   |               |               |     |     |               |               | D    | D   |
|              | 130   |               |               |     |     |               |               | D    | D   |
|              | 140   |               |               |     |     |               |               | D    | D   |
|              | 150   |               |               |     |     |               |               | D    | D   |
|              | 160   |               |               |     |     |               |               | D    | D   |
|              | 180   |               |               |     |     |               |               | D    | D   |
|              | 200   |               |               |     |     |               |               | D    | D   |
|              | 220   |               |               |     |     |               |               | D    | D   |
|              | 270   |               |               |     |     |               |               | D    | D   |
|              | 300   |               |               |     |     |               |               | D    | D   |
|              | 330   |               |               |     |     |               |               | D    | D   |
|              | 360   |               |               |     |     |               |               | D    | D   |
|              | 390   |               |               |     |     |               |               | D    | D   |
|              | 430   |               |               |     |     |               |               | D    | D   |
|              | 470   |               |               |     |     |               |               | D    | D   |
|              | 510   |               |               |     |     |               |               | D    | D   |
|              | 560   |               |               |     |     |               |               | D    | D   |
|              | 620   |               |               |     |     |               |               | D    | D   |
|              | 680   |               |               |     |     |               |               | D    | D   |
|              | 750   |               |               |     |     |               |               | D    | D   |
|              | 820   |               |               |     |     |               |               | D    | D   |
|              | 910   |               |               |     |     |               |               | D    | D   |
|              | 1000  |               |               |     |     |               |               | D    | D   |
| WVDC         |       | 50            | 50            | 100 | 200 | 100           | 200           | 100  | 200 |
| SIZE         |       | LD02          | LD03          |     |     | LD05          |               | LD10 |     |

| Case Size              | 0402 (KGQ05) | 0603 (KGQ15) | 0805 (KGQ21) | 1210 (KGQ32) |
|------------------------|--------------|--------------|--------------|--------------|
| Thickness Letter       | F            | A            | H            | D            |
| Max Thickness(mm)      | 0.60         | 0.90         | 1.15         | 1.40         |
| Carrier Tape           | PAPER        | PAPER        | PAPER        | PAPER        |
| Packaging Code 7"reel  | H            | T            | T            | T            |
| Packaging Code 13"reel | N            | M            | M            | M            |
|                        | PAPER        |              |              |              |

### TOLERANCE OPTIONS

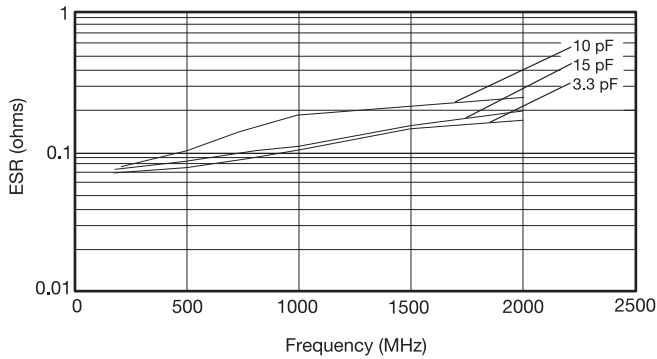
| Capacitance Range | Available Tolerances |
|-------------------|----------------------|
| 0.20-0.50 pF      | B, C                 |
| 0.60-6.2 pF       | B, C, D              |
| 6.8- 9.1 pF       | B, C, J, K, M        |
| 10-1000 pF        | F, G, J, K, M        |

# MLCC Tin/Lead Termination "B"

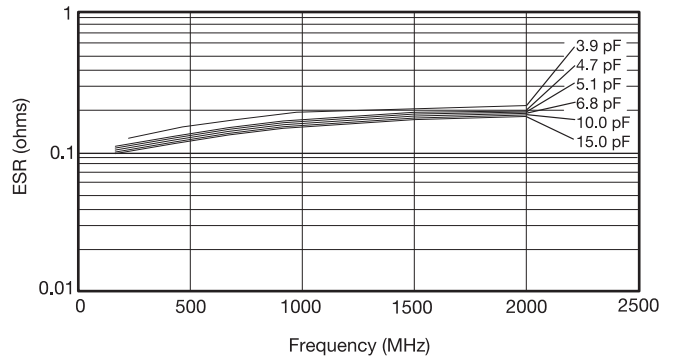
## C0G (NP0), Sn/Pb – Capacitance Range

### ULTRA LOW ESR, "U" SERIES

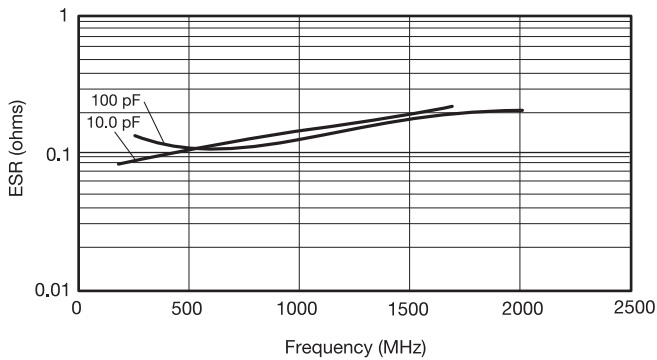
TYPICAL ESR vs. FREQUENCY  
0402 "U" SERIES



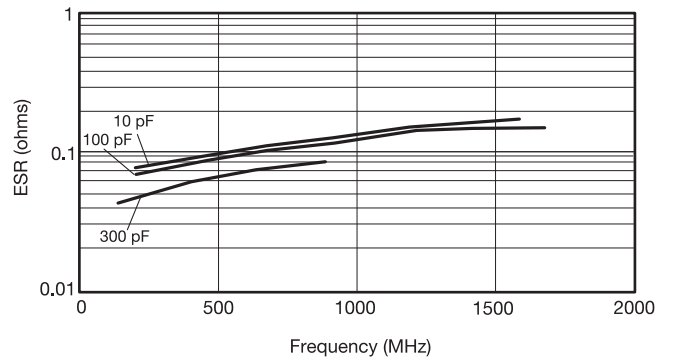
TYPICAL ESR vs. FREQUENCY  
0603 "U" SERIES



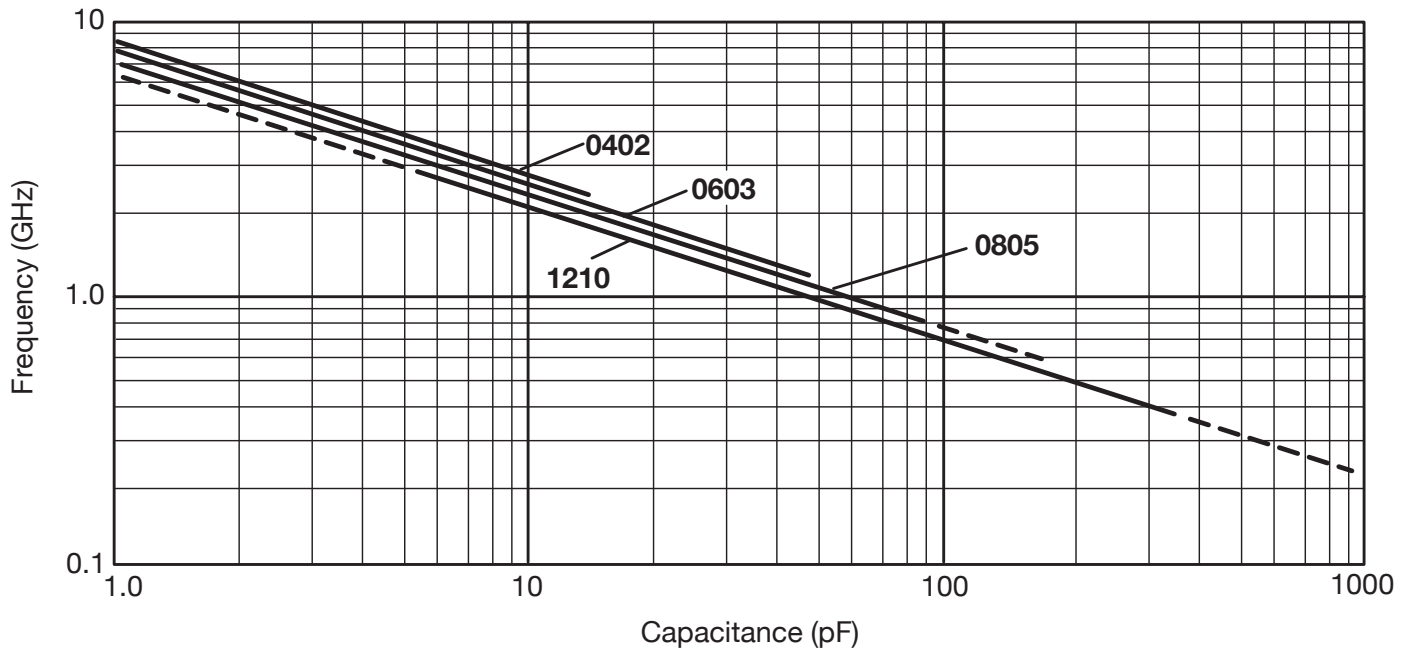
TYPICAL ESR vs. FREQUENCY  
0805 "U" SERIES



TYPICAL ESR vs. FREQUENCY  
1210 "U" SERIES

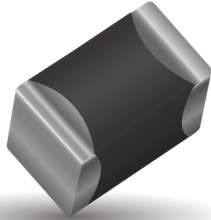


### TYPICAL SERIES RESONANT FREQUENCY "U" SERIES CHIP



# MLCC Tin/Lead Termination “B”

## X8R – General Specifications



KYOCERA AVX will support those customers for commercial and military Multilayer Ceramic Capacitors with a termination consisting of 5% minimum lead. This termination is indicated by the use of a “B” in the 12th position of the KYOCERA AVX Catalog Part Number. This fulfills KYOCERA AVX’s commitment to providing a full range of products to our customers. KYOCERA AVX has provided in the following pages a full range of values that we are currently offering in this special “B” termination. Please contact the factory if you require additional information on our MLCC Tin/Lead Termination “B” products.

**Not RoHS Compliant**

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

|   |   |                   |                                       |   |                       |  |  |                     |
|---|---|-------------------|---------------------------------------|---|-----------------------|--|--|---------------------|
| <b>LD05</b>   | <b>5</b>  | <b>F</b>          | <b>101</b>                            | <b>J</b>  | <b>A</b>              | <b>B</b>   | <b>2</b>   | <b>A</b>            |
|   |   |                   |                                       |   |                       |  |  |                     |
| <b>Size</b>   | <b>Voltage</b>  | <b>Dielectric</b> | <b>Capacitance Code (In pF)</b>       | <b>Capacitance Tolerance</b>  | <b>Failure Rate</b>   | <b>Terminations</b>  | <b>Packaging</b>   | <b>Special Code</b> |
| LD02 - 0402<br>LD03 - 0603<br>LD04 - 0504*<br>LD05 - 0805<br>LD06 - 1206<br>LD10 - 1210<br>LD12 - 1812<br>LD13 - 1825<br>LD14 - 2225<br>LD20 - 2220 | 6.3V = 6<br>10V = Z<br>16V = Y<br>25V = 3<br>35V = D<br>50V = 5<br>100V = 1<br>200V = 2<br>500V = 7 | X8R = F           | 2 Sig. Digits +<br>Number of<br>Zeros | B = ±10 pF (<10pF)<br>C = ±.25 pF (<10pF)<br>D = ±.50 pF (<10pF)<br>F = ±1% (≥ 10 pF)<br>G = ±2% (≥ 10 pF)<br>J = ±5%<br>K = ±10%<br>M = ±20% | A = Not<br>Applicable | B = 5% min lead<br>X = FLEXITERM®<br>with 5% min<br>lead**<br><br>**X7R only | 2 = 7" Reel<br>4 = 13" Reel<br><br><b>Contact Factory<br/>For<br/>Multiples*</b> | A = Std.<br>Product |

LD04 has the same CV ranges as LD03.

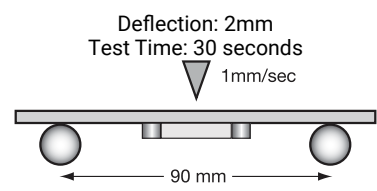
See FLEXITERM® section for CV options

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



# MLCC Tin/Lead Termination "B"

## X8R – Specifications and Test Methods

| Parameter/Test                 |                       | X8R Specification Limits  | Measuring Conditions  |                |
|--------------------------------|-----------------------|---|---|----------------|
| Operating Temperature Range    |                       | -55°C to +150°C   | Temperature Cycle Chamber   |                |
| Capacitance                    |                       | Within specified tolerance  | Freq.: 1.0 kHz ± 10%<br>Voltage: 1.0Vrms ± .2V  |                |
| Dissipation Factor             |                       | ≤ 2.5% for ≥ 50V DC rating<br>≤ 3.5% for 25V DC and 16V DC rating | Charge device with rated voltage for<br>120 ± 5 secs @ room temp/humidity   |                |
| Insulation Resistance          |                       | 100,000MΩ or 1000MΩ - μF,<br>whichever is less                    | Charge device with 250% 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 voltage<br>for 500V devices.  |                |
| Dielectric Strength            |                       | No breakdown or visual defects                                    |   |                |
| Resistance to Flexure Stresses | Appearance            | No defects  | Deflection: 2mm<br>Test Time: 30 seconds<br>   |                |
|                                | Capacitance Variation | ≤ ±12%  |   |                |
|                                | Dissipation Factor    | Meets Initial Values (As Above)                                   |   |                |
|                                | Insulation Resistance | ≥ Initial Value x 0.3   |   |                |
| Solderability                  |                       | ≥ 95% of each terminal should be covered<br>with fresh solder     | Dip device in eutectic solder at 230 ± 5°C<br>for 5.0 ± 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 ± 2 hours before measuring electrical properties.   |                |
|                                | Capacitance Variation | ≤ ±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 ± 2°  | 30 ± 3 minutes |
|                                | Capacitance Variation | ≤ ±7.5%   | Step 2: Room Temp   | ≤ 3 minutes    |
|                                | Dissipation Factor    | Meets Initial Values (As Above)                                   | Step 3: +125°C ± 2°   | 30 ± 3 minutes |
|                                | Insulation Resistance | Meets Initial Values (As Above)                                   | Step 4: Room Temp   | ≤ 3 minutes    |
|                                | Dielectric Strength   | Meets Initial Values (As Above)                                   | Repeat for 5 cycles and measure after<br>24 ± 2 hours at room temperature   |                |
| Load Life                      | Appearance            | No visual defects   | Charge device with 1.5 rated voltage (≤ 10V) in test chamber set at 150°C ± 2°C for 1000 hours (+48, -0)<br><br>Remove from test chamber and stabilize at room temperature for 24 ± 2 hours before measuring.                           |                |
|                                | Capacitance Variation | ≤ ±12.5%  |   |                |
|                                | Dissipation Factor    | ≤ Initial Value x 2.0 (See Above)                                 |   |                |
|                                | Insulation Resistance | ≥ 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 ± 2°C/ 85% ± 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 ± 2 hours before measuring. |                |
|                                | Capacitance Variation | ≤ ±12.5%  |   |                |
|                                | Dissipation Factor    | ≤ Initial Value x 2.0 (See Above)                                 |   |                |
|                                | Insulation Resistance | ≥ Initial Value x 0.3 (See Above)                                 |   |                |
|                                | Dielectric Strength   | Meets Initial Values (As Above)                                   |   |                |

# MLCC Tin/Lead Termination "B"

## X8R – Capacitance Range

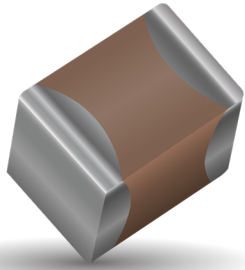


| SIZE |      |       | LD03 |     | LD05 |     | LD06 |     |
|------|------|-------|------|-----|------|-----|------|-----|
|      | WVDC |       | 25V  | 50V | 25V  | 50V | 25V  | 50V |
| 271  | Cap  | 270   | G    | G   |      |     |      |     |
| 331  | (pF) | 330   | G    | G   | J    | J   |      |     |
| 471  |      | 470   | G    | G   | J    | J   |      |     |
| 681  |      | 680   | G    | G   | J    | J   |      |     |
| 102  |      | 1000  | G    | G   | J    | J   | J    | J   |
| 152  |      | 1500  | G    | G   | J    | J   | J    | J   |
| 182  |      | 1800  | G    | G   | J    | J   | J    | J   |
| 222  |      | 2200  | G    | G   | J    | J   | J    | J   |
| 272  |      | 2700  | G    | G   | J    | J   | J    | J   |
| 332  |      | 3300  | G    | G   | J    | J   | J    | J   |
| 392  |      | 3900  | G    | G   | J    | J   | J    | J   |
| 472  |      | 4700  | G    | G   | J    | J   | J    | J   |
| 562  |      | 5600  | G    | G   | J    | J   | J    | J   |
| 682  |      | 6800  | G    | G   | J    | J   | J    | J   |
| 822  | Cap  | 8200  | G    | G   | J    | J   | J    | J   |
| 103  | (μF) | 0.01  | G    | G   | J    | J   | J    | J   |
| 123  |      | 0.012 | G    | G   | J    | J   | J    | J   |
| 153  |      | 0.015 | G    | G   | J    | J   | J    | J   |
| 183  |      | 0.018 | G    | G   | J    | J   | J    | J   |
| 223  |      | 0.022 | G    | G   | J    | J   | J    | J   |
| 273  |      | 0.027 | G    | G   | J    | J   | J    | J   |
| 333  |      | 0.033 | G    | G   | J    | J   | J    | J   |
| 393  |      | 0.039 | G    | G   | J    | J   | J    | J   |
| 473  |      | 0.047 | G    | G   | J    | J   | J    | J   |
| 563  |      | 0.056 | G    |     | N    | N   | M    | M   |
| 683  |      | 0.068 | G    |     | N    | N   | M    | M   |
| 823  |      | 0.082 |      |     | N    | N   | M    | M   |
| 104  |      | 0.1   |      |     | N    | N   | M    | M   |
| 124  |      | 0.12  |      |     | N    | N   | M    | M   |
| 154  |      | 0.15  |      |     | N    | N   | M    | M   |
| 184  |      | 0.18  |      |     | N    |     | M    | M   |
| 224  |      | 0.22  |      |     | N    |     | M    | M   |
| 274  |      | 0.27  |      |     |      |     | M    | M   |
| 334  |      | 0.33  |      |     |      |     | M    | M   |
| 394  |      | 0.39  |      |     |      |     | M    |     |
| 474  |      | 0.47  |      |     |      |     | M    |     |
| 684  |      | 0.68  |      |     |      |     |      |     |
| 824  |      | 0.82  |      |     |      |     |      |     |
| 105  |      | 1     |      |     |      |     |      |     |
|      | WVDC |       | 25V  | 50V | 25V  | 50V | 25V  | 50V |
| SIZE |      |       | LD03 |     | LD05 |     | LD06 |     |

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

# MLCC Tin/Lead Termination "B"

## X7R – General Specifications



KYOCERA AVX will support those customers for commercial and military Multilayer Ceramic Capacitors with a termination consisting of 5% minimum lead. This termination is indicated by the use of a "B" in the 12th position of the KYOCERA AVX Catalog Part Number. This fulfills KYOCERA AVX's commitment to providing a full range of products to our customers. KYOCERA AVX has provided in the following pages a full range of values that we are currently offering in this special "B" termination. Please contact the factory if you require additional information on our MLCC Tin/Lead Termination "B" products.

**Not RoHS Compliant**

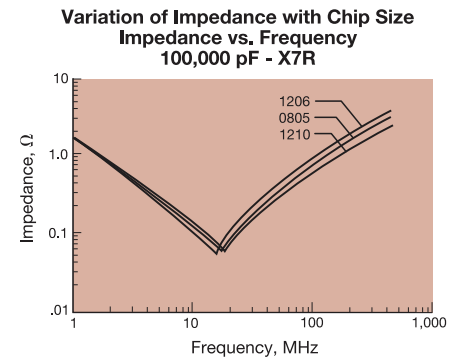
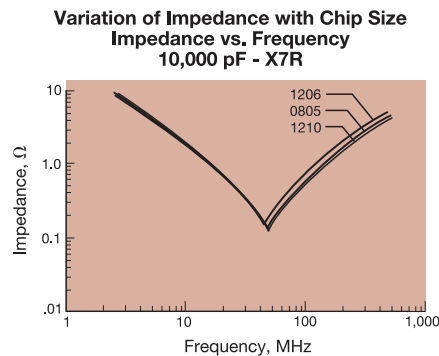
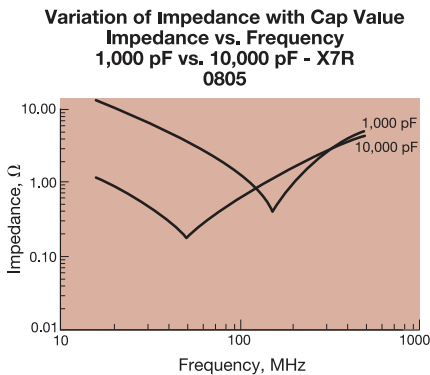
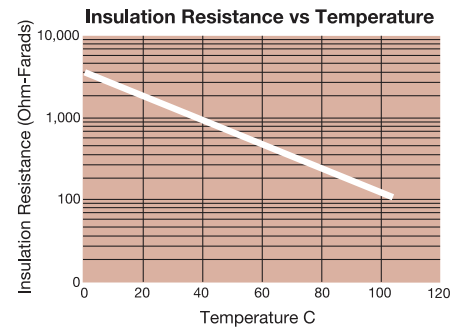
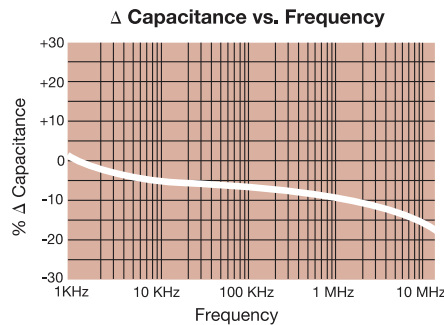
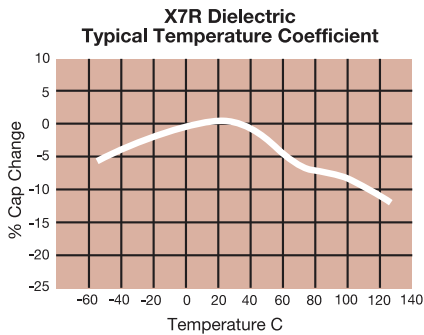
### PART NUMBER (SEE PAGE 4 FOR COMPLETE PART NUMBER EXPLANATION)

| LD05   | 5   | C                 | 101                             | J   | A                   | B  | 2  | A                   |
|--|---|-------------------|---------------------------------|---|---------------------|--|--|---------------------|
| <b>Size</b>  | <b>Voltage</b>  | <b>Dielectric</b> | <b>Capacitance Code (In pF)</b> | <b>Capacitance Tolerance</b>  | <b>Failure Rate</b> | <b>Terminations</b>  | <b>Packaging</b>   | <b>Special Code</b> |
| LD03 - 0603<br>LD04 - 0504*<br>LD05 - 0805<br>LD06 - 1206<br>LD10 - 1210<br>LD12 - 1812<br>LD13 - 1825<br>LD14 - 2225<br>LD20 - 2220 | 6.3V = 6<br>10V = Z<br>16V = Y<br>25V = 3<br>35V = D<br>50V = 5<br>100V = 1<br>200V = 2<br>500V = 7 | X7R = C           | 2 Sig. Digits + Number of Zeros | B = ±10 pF (<10pF)<br>C = ±25 pF (<10pF)<br>D = ±50 pF (<10pF)<br>F = ±1% (≥ 10 pF)<br>G = ±2% (≥ 10 pF)<br>J = ±5%<br>K = ±10%<br>M = ±20% | A = Not Applicable  | B = 5% min lead<br>X = FLEXITERM® with 5% min lead**<br><br>**X7R only | 2 = 7" Reel<br>4 = 13" Reel<br><br><b>Contact Factory For Multiples*</b> | A = Std. Product    |

\*LD04 has the same CV ranges as LD03.

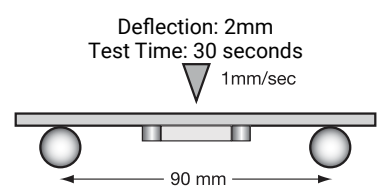
See FLEXITERM® section for CV options

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



# MLCC Tin/Lead Termination "B"

## X7R – 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 ± 10%<br>Voltage: 1.0Vrms ± .2V  |                |
| Dissipation Factor             |                       | ≤ 10% for ≥ 50V DC rating<br>≤ 12.5% for 25V DC rating<br>≤ 12.5% for 25V and 16V DC rating<br>≤ 12.5% for ≤ 10V DC rating |   |                |
| Insulation Resistance          |                       | 100,000MΩ or 1000MΩ - μF,<br>whichever is less   | Charge device with rated voltage for<br>120 ± 5 secs @ room temp/humidity   |                |
| Dielectric Strength            |                       | No breakdown or visual defects   | Charge device with 250% 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 voltage<br>for 500V devices.  |                |
| Resistance to Flexure Stresses | Appearance            | No defects   |    |                |
|                                | Capacitance Variation | ≤ ±12%   |   |                |
|                                | Dissipation Factor    | Meets Initial Values (As Above)  |   |                |
|                                | Insulation Resistance | ≥ Initial Value x 0.3  |   |                |
| Solderability                  |                       | ≥ 95% of each terminal should be covered<br>with fresh solder  | Dip device in eutectic solder at 230 ± 5°C<br>for 5.0 ± 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<br>seconds. Store at room temperature for 24 ± 2<br>hours before measuring electrical properties.   |                |
|                                | Capacitance Variation | ≤ ±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 ± 2°  | 30 ± 3 minutes |
|                                | Capacitance Variation | ≤ ±7.5%  | Step 2: Room Temp   | ≤ 3 minutes    |
|                                | Dissipation Factor    | Meets Initial Values (As Above)  | Step 3: +125°C ± 2°   | 30 ± 3 minutes |
|                                | Insulation Resistance | Meets Initial Values (As Above)  | Step 4: Room Temp   | ≤ 3 minutes    |
|                                | Dielectric Strength   | Meets Initial Values (As Above)  | Repeat for 5 cycles and measure after<br>24 ± 2 hours at room temperature   |                |
| Load Life                      | Appearance            | No visual defects  | Charge device with 1.5 rated voltage (≤ 10V) in<br>test chamber set at 125°C ± 2°C<br>for 1000 hours (+48, -0)<br><br>Remove from test chamber and stabilize at room<br>temperature for 24 ± 2 hours before measuring.                              |                |
|                                | Capacitance Variation | ≤ ±12.5%   |   |                |
|                                | Dissipation Factor    | ≤ Initial Value x 2.0 (See Above)  |   |                |
|                                | Insulation Resistance | ≥ 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 ± 2°C/ 85% ±<br>5% relative humidity for 1000 hours<br>(+48, -0) with rated voltage applied.<br><br>Remove from chamber and stabilize at room<br>temperature and humidity for<br>24 ± 2 hours before measuring. |                |
|                                | Capacitance Variation | ≤ ±12.5%   |   |                |
|                                | Dissipation Factor    | ≤ Initial Value x 2.0 (See Above)  |   |                |
|                                | Insulation Resistance | ≥ Initial Value x 0.3 (See Above)  |   |                |
|                                | Dielectric Strength   | Meets Initial Values (As Above)  |   |                |

# MLCC Tin/Lead Termination "B"

## X7R – Capacitance Range



PREFERRED SIZES ARE SHADED

| SIZE         | LD02        |                 |    |    |    | LD03            |    |    |    |                 | LD05           |     |     |                 |    | LD06           |    |     |     |     |    |    |    |    |     |     |     |
|--------------|-------------|-----------------|----|----|----|-----------------|----|----|----|-----------------|----------------|-----|-----|-----------------|----|----------------|----|-----|-----|-----|----|----|----|----|-----|-----|-----|
|              | Reflow/Wave |                 |    |    |    | Reflow/Wave     |    |    |    |                 | Reflow/Wave    |     |     |                 |    | Reflow/Wave    |    |     |     |     |    |    |    |    |     |     |     |
| Soldering    | All Paper   |                 |    |    |    | All Paper       |    |    |    |                 | Paper/Embossed |     |     |                 |    | Paper/Embossed |    |     |     |     |    |    |    |    |     |     |     |
| Packaging    | All Paper   |                 |    |    |    | All Paper       |    |    |    |                 | Paper/Embossed |     |     |                 |    | Paper/Embossed |    |     |     |     |    |    |    |    |     |     |     |
| (L) Length   | mm          | 1.00 ± 0.10     |    |    |    | 1.60 ± 0.15     |    |    |    | 2.01 ± 0.20     |                |     |     | 3.20 ± 0.20     |    |                |    |     |     |     |    |    |    |    |     |     |     |
|              | (in.)       | (0.040 ± 0.004) |    |    |    | (0.063 ± 0.006) |    |    |    | (0.079 ± 0.008) |                |     |     | (0.126 ± 0.008) |    |                |    |     |     |     |    |    |    |    |     |     |     |
| (W) Width    | mm          | 0.50 ± 0.10     |    |    |    | 0.81 ± 0.15     |    |    |    | 1.25 ± 0.20     |                |     |     | 1.60 ± 0.20     |    |                |    |     |     |     |    |    |    |    |     |     |     |
|              | (in.)       | (0.020 ± 0.004) |    |    |    | (0.032 ± 0.006) |    |    |    | (0.049 ± 0.008) |                |     |     | (0.063 ± 0.008) |    |                |    |     |     |     |    |    |    |    |     |     |     |
| (t) Terminal | mm          | 0.25 ± 0.15     |    |    |    | 0.35 ± 0.15     |    |    |    | 0.50 ± 0.25     |                |     |     | 0.50 ± 0.25     |    |                |    |     |     |     |    |    |    |    |     |     |     |
|              | (in.)       | (0.010 ± 0.006) |    |    |    | (0.014 ± 0.006) |    |    |    | (0.020 ± 0.010) |                |     |     | (0.020 ± 0.010) |    |                |    |     |     |     |    |    |    |    |     |     |     |
| WVDC         |             | 10              | 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 (pF)     | 100         |                 |    |    |    |                 |    |    |    |                 |                |     |     |                 |    |                |    |     |     |     |    |    |    |    |     |     |     |
|              | 150         |                 |    |    |    |                 |    |    |    |                 |                |     |     |                 |    |                |    |     |     |     |    |    |    |    |     |     |     |
|              | 220         |                 |    |    | C  |                 |    |    |    |                 |                |     |     |                 |    |                |    |     |     |     |    |    |    |    |     |     |     |
|              | 330         |                 |    |    | C  |                 |    |    |    | G               | G              | G   |     | J               | J  | J              | J  | J   | J   |     |    |    |    |    |     |     | K   |
|              | 470         |                 |    |    | C  |                 |    |    |    | G               | G              | G   |     | J               | J  | J              | J  | J   | J   |     |    |    |    |    |     |     | K   |
|              | 680         |                 |    |    | C  |                 |    |    |    | G               | G              | G   |     | J               | J  | J              | J  | J   | J   |     |    |    |    |    |     |     | K   |
|              | 1000        |                 |    |    | C  |                 |    |    |    | G               | G              | G   |     | J               | J  | J              | J  | J   | J   |     |    |    |    |    |     |     | K   |
|              | 1500        |                 |    |    | C  |                 |    |    |    | G               | G              | G   |     | J               | J  | J              | J  | J   | J   |     | J  | J  | J  | J  | J   | J   | M   |
|              | 2200        |                 |    |    | C  |                 |    |    |    | G               | G              | G   |     | J               | J  | J              | J  | J   | J   |     | J  | J  | J  | J  | J   | J   | M   |
|              | 3300        |                 |    |    | C  |                 |    |    |    | G               | G              | G   |     | J               | J  | J              | J  | J   | J   |     | J  | J  | J  | J  | J   | J   | M   |
|              | 4700        |                 |    |    | C  |                 |    |    |    | G               | G              | G   |     | J               | J  | J              | J  | J   | J   |     | J  | J  | J  | J  | J   | J   | M   |
|              | 6800        |                 |    |    | C  |                 |    |    |    | G               | G              | G   |     | J               | J  | J              | J  | J   | J   |     | J  | J  | J  | J  | J   | J   | P   |
| Cap (µF)     | 0.010       |                 | C  | C  |    |                 |    |    |    | G               | G              | G   |     | J               | J  | J              | J  | J   | J   |     | J  | J  | J  | J  | J   | J   | P   |
|              | 0.015       |                 | C  |    |    |                 |    |    |    | G               | G              | G   |     | J               | J  | J              | J  | J   | J   |     | J  | J  | J  | J  | J   | J   | M   |
|              | 0.022       |                 | C  |    |    |                 |    |    |    | G               | G              | G   |     | J               | J  | J              | J  | J   | J   |     | J  | J  | J  | J  | J   | J   | M   |
|              | 0.033       |                 | C  |    |    |                 |    |    |    | G               | G              | G   |     | J               | J  | J              | J  | J   | N   |     | J  | J  | J  | J  | J   | J   | M   |
|              | 0.047       |                 |    |    |    |                 |    |    |    | G               | G              | G   |     | J               | J  | J              | J  | J   | N   |     | J  | J  | J  | J  | J   | J   | M   |
|              | 0.068       |                 |    |    |    |                 |    |    |    | G               | G              | G   |     | J               | J  | J              | J  | J   | N   |     | J  | J  | J  | J  | J   | J   | P   |
|              | 0.10        | C               |    |    | C* |                 |    |    |    | G               | G              | G   |     | J               | J  | J              | J  | N   |     | J   | J  | J  | J  | J  | J   | P   |     |
|              | 0.15        |                 |    |    |    | G               | G  |    |    |                 |                |     |     | J               | J  | J              | N  | N   |     | J   | J  | J  | J  | J  | J   | Q   |     |
|              | 0.22        |                 |    |    |    | G               | G  |    |    |                 |                |     |     | J               | J  | N              | N  | N   |     | J   | J  | J  | J  | J  | J   | Q   |     |
|              | 0.33        |                 |    |    |    |                 |    |    |    |                 |                |     |     | N               | N  | N              | N  | N   |     | J   | J  | M  | P  | Q  | Q   |     |     |
|              | 0.47        |                 |    |    |    |                 |    |    |    | J*              |                |     |     | N               | N  | N              | N  | N   |     | M   | M  | M  | P  | Q  | Q   |     |     |
|              | 0.68        |                 |    |    |    |                 |    |    |    |                 |                |     |     | N               | N  | N              |    |     |     | M   | M  | Q  | Q  | Q  | Q   |     |     |
|              | 1.0         |                 |    |    |    | J*              | J* |    |    |                 |                |     |     | N               | N  | N*             |    |     |     | M   | M  | Q  | Q  | Q  |     |     |     |
|              | 1.5         |                 |    |    |    |                 |    |    |    |                 |                |     |     |                 |    |                |    |     |     | P   | Q  | Q  | Q  |    |     |     |     |
|              | 2.2         |                 |    |    |    | J*              |    |    |    |                 |                |     |     |                 |    |                |    |     |     | P*  | Q  | Q  | Q  |    |     |     |     |
|              | 3.3         |                 |    |    |    |                 |    |    |    |                 |                |     |     |                 |    |                |    |     |     |     | Q* | Q* | Q* |    |     |     |     |
|              | 4.7         |                 |    |    |    |                 |    |    |    |                 |                |     |     |                 |    |                |    |     |     |     | Q* | Q* | Q* | Q  |     |     |     |
|              | 10          |                 |    |    |    |                 |    |    |    |                 |                |     |     |                 |    |                |    |     |     |     |    |    |    |    |     |     |     |
|              | 22          |                 |    |    |    |                 |    |    |    |                 |                |     |     |                 |    |                |    |     |     |     | Q* |    |    |    |     |     |     |
|              | 47          |                 |    |    |    |                 |    |    |    |                 |                |     |     |                 |    |                |    |     |     |     |    |    |    |    |     |     |     |
|              | 100         |                 |    |    |    |                 |    |    |    |                 |                |     |     |                 |    |                |    |     |     |     |    |    |    |    |     |     |     |
| WVDC         |             | 10              | 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         |             | LD02            |    |    |    | LD03            |    |    |    |                 | LD05           |     |     |                 |    | LD06           |    |     |     |     |    |    |    |    |     |     |     |

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

= Under Development

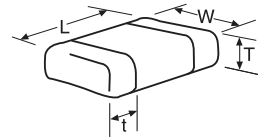
# MLCC Tin/Lead Termination "B"

## X7R – Capacitance Range



PREFERRED SIZES ARE SHADED

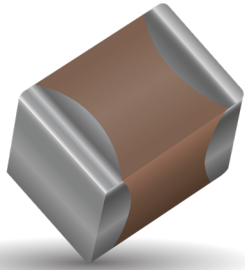
| SIZE         | LD10                           |    |    |    |     |     |     |    | LD12                           |     |     |    | LD13                           |    | LD20                           |     |     |    | LD14                           |   |
|--------------|--------------------------------|----|----|----|-----|-----|-----|----|--------------------------------|-----|-----|----|--------------------------------|----|--------------------------------|-----|-----|----|--------------------------------|---|
|              | Reflow Only                    |    |    |    |     |     |     |    | Reflow Only                    |     |     |    | Reflow Only                    |    | Reflow Only                    |     |     |    | Reflow Only                    |   |
| Soldering    | Paper/Embossed                 |    |    |    |     |     |     |    | All Embossed                   |     |     |    | All Embossed                   |    | All Embossed                   |     |     |    | All Embossed                   |   |
| Packaging    | Paper/Embossed                 |    |    |    |     |     |     |    | All Embossed                   |     |     |    | All Embossed                   |    | All Embossed                   |     |     |    | All Embossed                   |   |
| (L) Length   | 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 ± 0.50<br>(0.224 ± 0.020) |     |     |    | 5.72 ± 0.25<br>(0.225 ± 0.010) |   |
| (W) Width    | 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 | 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 (pF)     | 100                            |    |    |    |     |     |     |    |                                |     |     |    |                                |    |                                |     |     |    |                                |   |
|              | 150                            |    |    |    |     |     |     |    |                                |     |     |    |                                |    |                                |     |     |    |                                |   |
|              | 220                            |    |    |    |     |     |     |    |                                |     |     |    |                                |    |                                |     |     |    |                                |   |
|              | 330                            |    |    |    |     |     |     |    |                                |     |     |    |                                |    |                                |     |     |    |                                |   |
|              | 470                            |    |    |    |     |     |     |    |                                |     |     |    |                                |    |                                |     |     |    |                                |   |
|              | 680                            |    |    |    |     |     |     |    |                                |     |     |    |                                |    |                                |     |     |    |                                |   |
|              | 1000                           |    |    |    |     |     |     |    |                                |     |     |    |                                |    |                                |     |     |    |                                |   |
|              | 1500                           | J  | J  | J  | J   | J   | J   | M  |                                |     |     |    |                                |    |                                |     |     |    |                                |   |
|              | 2200                           | J  | J  | J  | J   | J   | J   | M  |                                |     |     |    |                                |    |                                |     |     |    |                                |   |
|              | 3300                           | J  | J  | J  | J   | J   | J   | M  |                                |     |     |    |                                |    |                                |     |     |    |                                |   |
|              | 4700                           | J  | J  | J  | J   | J   | J   | M  |                                |     |     |    |                                |    |                                |     |     |    |                                |   |
|              | 6800                           | J  | J  | J  | J   | J   | J   | M  |                                |     |     |    |                                |    |                                |     |     |    |                                |   |
| Cap (µF)     | 0.010                          | J  | J  | J  | J   | J   | J   | M  | K                              | K   | K   | K  | M                              | M  |                                | X   | X   | X  | M                              | P |
|              | 0.015                          | J  | J  | J  | J   | J   | J   | P  | K                              | K   | K   | P  | M                              | M  |                                | X   | X   | X  | M                              | P |
|              | 0.022                          | J  | J  | J  | J   | J   | J   | Q  | K                              | K   | K   | P  | M                              | M  |                                | X   | X   | X  | M                              | P |
|              | 0.033                          | J  | J  | J  | J   | J   | J   | Q  | K                              | K   | K   | X  | M                              | M  |                                | X   | X   | X  | M                              | P |
|              | 0.047                          | J  | J  | J  | J   | J   | J   |    | K                              | K   | K   | Z  | M                              | M  |                                | X   | X   | X  | M                              | P |
|              | 0.068                          | J  | J  | J  | J   | J   | M   |    | K                              | K   | K   | Z  | M                              | M  |                                | X   | X   | X  | M                              | P |
|              | 0.10                           | J  | J  | J  | J   | J   | M   |    | K                              | K   | K   | Z  | M                              | M  |                                | X   | X   | X  | M                              | P |
|              | 0.15                           | J  | J  | J  | J   | M   | Z   |    | K                              | K   | P   |    | M                              | M  |                                | X   | X   | X  | M                              | P |
|              | 0.22                           | J  | J  | J  | J   | P   | Z   |    | K                              | K   | P   |    | M                              | M  |                                | X   | X   | X  | M                              | P |
|              | 0.33                           | J  | J  | J  | J   | Q   |     |    | K                              | M   | X   |    | M                              | M  |                                | X   | X   | X  | M                              | P |
|              | 0.47                           | M  | M  | M  | M   | Q   |     |    | K                              | P   |     |    | M                              | M  |                                | X   | X   | X  | M                              | P |
|              | 0.68                           | M  | M  | P  | X   | X   |     |    | M                              | Q   |     |    | M                              | P  |                                | X   | X   | X  | M                              | P |
|              | 1.0                            | N  | N  | P  | X   | Z   |     |    | M                              | X   |     |    | M                              | P  |                                | X   | X   |    | M                              | P |
|              | 1.5                            | N  | N  | Z  | Z   | Z   |     |    | Z                              | Z   |     |    | M                              |    |                                | X   | X   |    | M                              | X |
|              | 2.2                            | X  | X  | Z  | Z   | Z   |     |    | Z                              | Z   |     |    |                                |    |                                | X   | X   |    | M                              |   |
|              | 3.3                            | X  | X  | Z  | Z   |     |     |    | Z                              |     |     |    |                                |    |                                | X   | Z   |    |                                |   |
|              | 4.7                            | X  | X  | Z  | Z   |     |     |    | Z                              | Z   |     |    |                                |    |                                | X   | Z   |    |                                |   |
|              | 10                             | Z  | Z  | Z  | Z   |     |     |    |                                |     |     |    |                                |    |                                | Z   | Z   |    |                                |   |
|              | 22                             | Z  | Z  |    |     |     |     |    |                                |     |     |    |                                |    | Z                              |     |     |    |                                |   |
|              | 47                             | Z  |    |    |     |     |     |    |                                |     |     |    |                                |    |                                |     |     |    |                                |   |
|              | 100                            |    |    |    |     |     |     |    |                                |     |     |    |                                |    |                                |     |     |    |                                |   |
| WVDC         | 10                             | 16 | 25 | 50 | 100 | 200 | 500 | 50 | 100                            | 200 | 500 | 50 | 100                            | 25 | 50                             | 100 | 200 | 50 | 100                            |   |
| SIZE         | LD10                           |    |    |    |     |     |     |    | LD12                           |     |     |    | LD13                           |    | LD20                           |     |     |    | LD14                           |   |



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

# MLCC Tin/Lead Termination "B"

## X5R – General Specifications



KYOCERA AVX will support those customers for commercial and military Multilayer Ceramic Capacitors with a termination consisting of 5% minimum lead. This termination is indicated by the use of a "B" in the 12th position of the KYOCERA AVX Catalog Part Number. This fulfills KYOCERA AVX's commitment to providing a full range of products to our customers. KYOCERA AVX has provided in the following pages a full range of values that we are currently offering in this special "B" termination. Please contact the factory if you require additional information on our MLCC Tin/Lead Termination "B" products.

**Not RoHS Compliant**

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

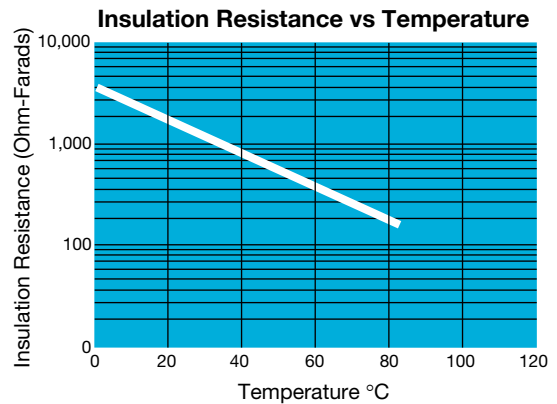
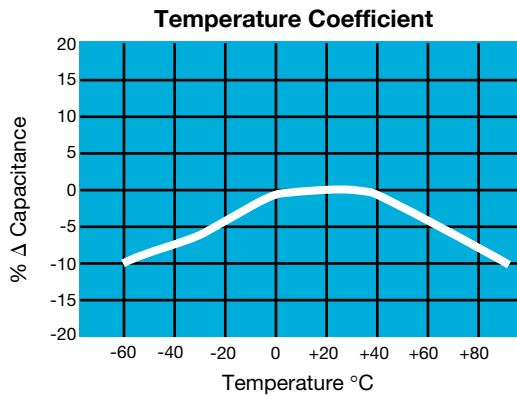
| LD05  | 5   | D                 | 101                                   | J   |                       | B   | 2  | A                   |
|---|---|-------------------|---------------------------------------|---|-----------------------|---|--|---------------------|
| <b>Size</b>   | <b>Voltage</b>  | <b>Dielectric</b> | <b>Capacitance Code (In pF)</b>       | <b>Capacitance Tolerance</b>  | <b>Failure Rate</b>   | <b>B = 5% min lead</b>                                    | <b>Packaging</b>   | <b>Special Code</b> |
| LD02 - 0402<br>LD03 - 0603<br>LD04 - 0504*<br>LD05 - 0805<br>LD06 - 1206<br>LD10 - 1210<br>LD12 - 1812<br>LD13 - 1825<br>LD14 - 2225<br>LD20 - 2220 | 6.3V = 6<br>10V = Z<br>16V = Y<br>25V = 3<br>35V = D<br>50V = 5<br>100V = 1<br>200V = 2<br>500V = 7 | X5R = D           | 2 Sig. Digits +<br>Number of<br>Zeros | B = ±10 pF (<10pF)<br>C = ±.25 pF (<10pF)<br>D = ±.50 pF (<10pF)<br>F = ±1% (≥ 10 pF)<br>G = ±2% (≥ 10 pF)<br>J = ±5%<br>K = ±10%<br>M = ±20% | A = Not<br>Applicable | X = FLEXITERM®<br>with 5% min<br>lead**<br><br>**X7R only | 2 = 7" Reel<br>4 = 13" Reel<br><br><b>Contact Factory<br/>For<br/>Multiples*</b> | A = Std.<br>Product |

\*LD04 has the same CV ranges as LD03.

See FLEXITERM® section for CV options

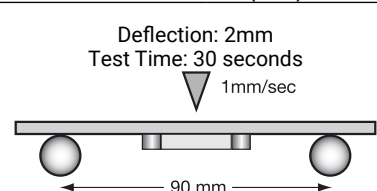
NOTE: Contact factory for availability of Tolerance Options for Specific Part Numbers.  
Contact factory for non-specified capacitance values.

### TYPICAL ELECTRICAL CHARACTERISTICS



# MLCC Tin/Lead Termination "B"

## X5R – 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 ± 10%<br>Voltage: 1.0Vrms ± .2V<br>For Cap > 10 µF, 0.5Vrms @ 120Hz  |                |
| Dissipation Factor             |                       | ≤ 2.5% for ≥ 50V DC rating<br>≤ 3.0% for 25V, 35V DC rating<br>≤ 12.5% Max. for 16V DC rating and lower Contact<br>Factory for DF by PN |   |                |
| Insulation Resistance          |                       | 10,000MΩ or 500MΩ - µF,<br>whichever is less  | Charge device with rated voltage for<br>120 ± 5 secs @ room temp/humidity   |                |
| Dielectric Strength            |                       | No breakdown or visual defects  | Charge device with 250% of rated voltage for<br>1-5 seconds, w/charge and discharge current<br>limited to 50 mA (max)   |                |
| Resistance to Flexure Stresses | Appearance            | No defects  |    |                |
|                                | Capacitance Variation | ≤ ±12%  |   |                |
|                                | Dissipation Factor    | Meets Initial Values (As Above)   |   |                |
|                                | Insulation Resistance | ≥ Initial Value x 0.3   |   |                |
| Solderability                  |                       | ≥ 95% of each terminal should be covered<br>with fresh solder   | Dip device in eutectic solder at 230 ± 5°C<br>for 5.0 ± 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<br>seconds. Store at room temperature for 24 ± 2<br>hours before measuring electrical properties.   |                |
|                                | Capacitance Variation | ≤ ±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 ± 2°  | 30 ± 3 minutes |
|                                | Capacitance Variation | ≤ ±7.5%   | Step 2: Room Temp   | ≤ 3 minutes    |
|                                | Dissipation Factor    | Meets Initial Values (As Above)   | Step 3: +85°C ± 2°  | 30 ± 3 minutes |
|                                | Insulation Resistance | Meets Initial Values (As Above)   | Step 4: Room Temp   | ≤ 3 minutes    |
|                                | Dielectric Strength   | Meets Initial Values (As Above)   | Repeat for 5 cycles and measure after<br>24 ± 2 hours at room temperature   |                |
| Load Life                      | Appearance            | No visual defects   | Charge device with 1.5X rated voltage in test<br>chamber set at 85°C ± 2°C for 1000 hours<br>(+48, -0). Note: Contact factory for *optional<br>specification part numbers that are tested at<br>< 1.5X rated voltage.<br><br>Remove from test chamber and stabilize at room<br>temperature for 24 ± 2 hours before measuring. |                |
|                                | Capacitance Variation | ≤ ±12.5%  |   |                |
|                                | Dissipation Factor    | ≤ Initial Value x 2.0 (See Above)   |   |                |
|                                | Insulation Resistance | ≥ 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 ± 2°C/ 85% ±<br>5% relative humidity for 1000 hours<br>(+48, -0) with rated voltage applied.<br><br>Remove from chamber and stabilize at room<br>temperature and humidity for<br>24 ± 2 hours before measuring.   |                |
|                                | Capacitance Variation | ≤ ±12.5%  |   |                |
|                                | Dissipation Factor    | ≤ Initial Value x 2.0 (See Above)   |   |                |
|                                | Insulation Resistance | ≥ Initial Value x 0.3 (See Above)   |   |                |
|                                | Dielectric Strength   | Meets Initial Values (As Above)   |   |                |





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