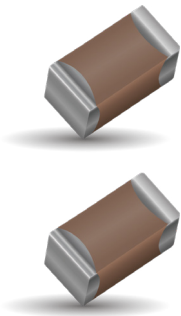


# High Voltage MLC Chip Capacitors

## For 600V to 3000V Automotive Applications - AEC-Q200



Modern automotive electronics could require components capable to work with high voltage (e.g. xenon lamp circuits or power converters in hybrid cards). AVX offers high voltage ceramic capacitors qualified according to AEC-Q200 standard.

High value, low leakage and small size are difficult parameters to obtain in capacitors for high voltage systems. AVX special high voltage MLC chip capacitors meet these performance characteristics and are designed for applications such as snubbers in high frequency power converters, resonators in SMPS, and high voltage coupling/dc blocking. These high voltage chip designs exhibit low ESRs at high frequencies.

Due to high voltage nature, larger physical dimensions are necessary. These larger sizes require special precautions to be taken in applying of MLC chips. The temperature gradient during heating or cooling cycles should not exceed 4°C per second. The preheat temperature must be within 50°C of the peak temperature reached by the ceramic bodies through the soldering process. Chip sizes 1210 and larger should be reflow soldered only. Capacitors may require protective surface coating to prevent external arcing.

To improve mechanical and thermal resistance, AVX recommend to use flexible terminations system - FLEXITERM®.

### HOW TO ORDER

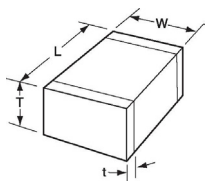
| 1210  | C   | C                            | 223  | K  | 4                                     | T   | 2   | A                                       |
|---|---|------------------------------|--|--|---------------------------------------|---|---|---|
| <b>Size</b><br>1206<br>1210<br>1808<br>1812<br>2220 | <b>Voltage</b><br>C = 630V<br>A = 1000V<br>S = 1500V<br>G = 2000V<br>W = 2500V<br>H = 3000V | <b>Dielectric</b><br>X7R = C | <b>Capacitance Code</b><br>2 Sig. Digits +<br>Number of Zeros<br>e.g. 103 = 10nF<br>(223 = 22nF) | <b>Capacitance Tolerance</b><br>K = ±10%<br>M = ±20% | <b>Failure Rate</b><br>4 = Automotive | <b>Terminations</b><br>T = Plated Ni and Sn<br>Z = FLEXITERM® | <b>Packaging</b><br>2 = 7" Reel<br>4 = 13" Reel | <b>Special Code</b><br>A = Std. Product |

\*AVX offers nonstandard case size. Contact factory for details.

Notes: Capacitors with X7R dielectrics are not intended for applications across AC supply mains or AC line filtering with polarity reversal. Please contact AVX for recommendations

### CHIP DIMENSIONS DESCRIPTION

(SEE CAPACITANCE RANGE CHART ON PAGE 128)



L = Length  
W = Width  
T = Thickness  
t = Terminal

### X7R DIELECTRIC PERFORMANCE CHARACTERISTICS

| Parameter/Test  | Specification Limits   | Measuring Conditions   |
|---|--|--|
| <b>Operating Temperature Range</b>  | -55°C to +125°C  | Temperature Cycle Chamber  |
| <b>Capacitance</b><br><b>Dissipation Factor</b><br><b>Capacitance Tolerance</b> | within specified tolerance<br>2.5% max.<br>±5% (J), ±10% (K), ±20% (M)                                 | Freq.: 1kHz ±10%<br>Voltage: 1.0Vrms ±0.2Vrms<br>T = +25°C, V = 0Vdc       |
| <b>Temperature Characteristics</b>  | X7R = ±15%   | Vdc = 0V, T = (-55°C to +125°C)  |
| <b>Insulation Resistance</b>  | 100GΩ min. or 1000MΩ · μF min. (whichever is less)<br>10GΩ min. or 100MΩ · μF min. (whichever is less) | T = +25°C, V = 500Vdc<br>T = +125°C, V = 500Vdc<br>(t ≥ 120 sec, I ≤ 50mA) |
| <b>Dielectric Strength</b>  | No breakdown or visual defect  | 120% of rated voltage<br>t ≤ 5 sec, I ≤ 50mA                               |

# High Voltage MLC Chips FLEXITERM®

## For 600V to 3000V Automotive Applications - AEC-Q200



### X7R CAPACITANCE RANGE

PREFERRED SIZES ARE SHADED

| Case Size        | 1206                         |      |      |      |      | 1210                         |      |      |      | 1808                           |      |      |      |      | 1812                           |     |      |      |      | 2220                           |      |     |      |      |      |      |   |
|------------------|------------------------------|------|------|------|------|------------------------------|------|------|------|--------------------------------|------|------|------|------|--------------------------------|-----|------|------|------|--------------------------------|------|-----|------|------|------|------|---|
| Soldering        | Reflow/Wave                  |      |      |      |      | Reflow/Wave                  |      |      |      | Reflow Only                    |      |      |      |      | Reflow Only                    |     |      |      |      | Reflow Only                    |      |     |      |      |      |      |   |
| (L) Length       | 3.2 ± 0.2<br>(0.126 ± 0.008) |      |      |      |      | 3.2 ± 0.2<br>(0.126 ± 0.008) |      |      |      | 4.57 ± 0.25<br>(0.18 ± 0.01)   |      |      |      |      | 4.5 ± 0.3<br>(0.177 ± 0.012)   |     |      |      |      | 5.7 ± 0.5<br>(0.224 ± 0.02)    |      |     |      |      |      |      |   |
| W) Width         | 1.6 ± 0.2<br>(0.063 ± 0.008) |      |      |      |      | 2.5 ± 0.2<br>(0.098 ± 0.008) |      |      |      | 2.03 ± 0.25<br>(0.08 ± 0.01)   |      |      |      |      | 3.2 ± 0.2<br>(0.126 ± 0.008)   |     |      |      |      | 5 ± 0.4<br>(0.197 ± 0.016)     |      |     |      |      |      |      |   |
| (t) Terminal     | 0.5 ± 0.25<br>(0.02 ± 0.01)  |      |      |      |      | 0.5 ± 0.25<br>(0.02 ± 0.01)  |      |      |      | 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) |      |     |      |      |      |      |   |
| Voltage (V)      | 630                          | 1000 | 1500 | 2000 | 2500 | 630                          | 1000 | 1500 | 2000 | 630                            | 1000 | 1500 | 2000 | 2500 | 3000                           | 630 | 1000 | 1500 | 2000 | 2500                           | 3000 | 630 | 1000 | 1500 | 2000 | 3000 |   |
| Cap (pF) 101 100 | C                            | E    | E    | E    | E    |                              |      |      |      |                                |      |      |      |      |                                |     |      |      |      |                                |      |     |      |      |      |      |   |
| 121 120          | C                            | E    | E    | E    | E    |                              |      |      |      |                                |      |      |      |      |                                |     |      |      |      |                                |      |     |      |      |      |      |   |
| 151 150          | C                            | E    | E    | E    | E    |                              |      |      |      |                                |      |      |      |      |                                |     |      |      |      |                                |      |     |      |      |      |      |   |
| 181 180          | C                            | E    | E    | E    | E    |                              |      |      |      |                                |      |      |      |      |                                |     |      |      |      |                                |      |     |      |      |      |      |   |
| 221 220          | C                            | E    | E    | E    | E    |                              |      |      |      | E                              | E    | E    | E    | E    | E                              |     |      |      |      |                                |      |     |      |      |      |      |   |
| 271 270          | C                            | E    | E    | E    | E    | E                            | E    | E    | E    | E                              | E    | E    | E    | E    | E                              |     |      |      |      |                                |      |     |      |      |      |      |   |
| 331 330          | C                            | E    | E    | E    | E    | E                            | E    | E    | E    | E                              | E    | E    | E    | E    | F                              | E   |      |      |      |                                |      |     |      |      |      |      |   |
| 391 390          | C                            | E    | E    | E    | E    | E                            | E    | E    | E    | E                              | E    | E    | E    | E    | F                              | E   |      |      |      |                                |      |     |      |      |      |      |   |
| 471 470          | C                            | E    | E    | E    | E    | E                            | E    | E    | E    | E                              | E    | E    | E    | F    | F                              | E   | E    | E    | E    | E                              | E    | E   |      |      |      |      |   |
| 561 560          | C                            | E    | E    | E    | E    | E                            | E    | E    | E    | E                              | E    | E    | E    | F    | F                              | E   | E    | E    | E    | E                              | E    | E   |      |      |      |      |   |
| 681 680          | C                            | E    | E    | E    | E    | E                            | E    | E    | E    | E                              | E    | F    | F    | F    | F                              | E   | E    | E    | E    | E                              | F    | F   |      |      |      |      |   |
| 821 820          | C                            | E    | E    | E    | E    | E                            | E    | E    | E    | E                              | E    | F    | F    | F    | F                              | E   | E    | E    | E    | E                              | F    | F   |      |      |      |      |   |
| 102 1000         | C                            | E    | E    | E    | E    | E                            | E    | E    | E    | E                              | E    | F    | F    | F    | F                              | E   | E    | E    | E    | E                              | F    | F   | F    | F    | G    |      |   |
| 122 1220         | C                            | E    | E    | E    | E    |                              |      |      |      |                                |      |      |      |      |                                | F   | F    | F    | F    | G                              |      |     | F    | F    | F    | F    | G |
| 152 1500         | C                            | E    | E    | E    | E    |                              |      |      |      |                                |      |      |      |      |                                | F   | F    | F    | F    | G                              |      |     | F    | F    | F    | F    | G |
| 182 1800         | C                            | E    | E    |      |      |                              |      |      |      |                                |      |      |      |      |                                | F   | F    | F    | F    | G                              |      |     | F    | F    | F    | F    | G |
| 222 2200         | C                            | E    | E    |      |      |                              |      |      |      |                                |      |      |      |      |                                | F   | F    | F    | F    | G                              |      |     | F    | F    | F    | F    | G |
| 272 2700         | C                            | E    | E    | E    |      |                              |      |      |      |                                |      |      |      |      |                                | F   | F    | F    | F    |                                |      |     | F    | F    | F    | F    |   |
| 332 3300         | C                            | E    |      |      |      |                              |      |      |      |                                |      |      |      |      |                                | F   | F    | F    | F    |                                |      |     | F    | F    | F    | F    |   |
| 392 3900         | C                            | E    |      |      |      |                              |      |      |      |                                |      |      |      |      |                                | F   | F    | F    | F    |                                |      |     | F    | F    | F    | F    |   |
| 472 4700         | C                            | E    |      |      |      |                              |      |      |      |                                |      |      |      |      |                                | F   | F    | G    | G    |                                |      |     | F    | F    | F    | F    |   |
| 562 5600         | C                            | E    |      |      |      |                              |      |      |      |                                |      |      |      |      |                                | F   | F    | G    | G    |                                |      |     | F    | F    | F    | F    |   |
| 682 6800         | E                            | E    |      |      |      |                              |      |      |      |                                |      |      |      |      |                                | F   | F    | G    | G    |                                |      |     | F    | F    | F    | F    |   |
| 822 8200         | E                            |      |      |      |      |                              |      |      |      |                                |      |      |      |      |                                | F   | F    | G    | G    |                                |      |     | F    | F    | G    | G    |   |
| 103 0.01         | E                            |      |      |      |      |                              |      |      |      |                                |      |      |      |      |                                | F   | F    | G    |      |                                |      | G   | G    | G    | G    |      |   |
| 123 0.012        |                              |      |      |      |      |                              |      |      |      |                                |      |      |      |      |                                | F   | F    | G    |      |                                |      | G   | G    | G    | G    |      |   |
| 153 0.015        |                              |      |      |      |      |                              |      |      |      |                                |      |      |      |      |                                | F   | F    | G    |      |                                |      | G   | G    | G    | G    |      |   |
| 183 0.018        |                              |      |      |      |      |                              |      |      |      |                                |      |      |      |      |                                | F   | F    |      |      |                                |      | G   | G    | G    | G    |      |   |
| 223 0.022        |                              |      |      |      |      |                              |      |      |      |                                |      |      |      |      |                                | F   | F    |      |      |                                |      | G   | G    | G    | G    |      |   |
| 273 0.027        |                              |      |      |      |      |                              |      |      |      |                                |      |      |      |      |                                | F   |      |      |      |                                |      | G   | G    |      |      |      |   |
| 333 0.033        |                              |      |      |      |      |                              |      |      |      |                                |      |      |      |      |                                | F   |      |      |      |                                |      | G   | G    |      |      |      |   |
| 393 0.039        |                              |      |      |      |      |                              |      |      |      |                                |      |      |      |      |                                | F   |      |      |      |                                |      | G   | G    |      |      |      |   |
| 473 0.047        |                              |      |      |      |      |                              |      |      |      |                                |      |      |      |      |                                | X   |      |      |      |                                |      | G   | G    |      |      |      |   |
| 563 0.056        |                              |      |      |      |      |                              |      |      |      |                                |      |      |      |      |                                |     |      |      |      |                                |      | G   | Y    |      |      |      |   |
| 683 0.068        |                              |      |      |      |      |                              |      |      |      |                                |      |      |      |      |                                |     |      |      |      |                                |      | G   | Y    |      |      |      |   |
| 823 0.082        |                              |      |      |      |      |                              |      |      |      |                                |      |      |      |      |                                |     |      |      |      |                                |      | G   | Y    |      |      |      |   |
| 104 0.1          |                              |      |      |      |      |                              |      |      |      |                                |      |      |      |      |                                |     |      |      |      |                                |      | G   | Y    |      |      |      |   |
| 124 0.12         |                              |      |      |      |      |                              |      |      |      |                                |      |      |      |      |                                |     |      |      |      |                                |      | G   |      |      |      |      |   |
| 154 0.15         |                              |      |      |      |      |                              |      |      |      |                                |      |      |      |      |                                |     |      |      |      |                                |      | G   |      |      |      |      |   |
| 224 0.22         |                              |      |      |      |      |                              |      |      |      |                                |      |      |      |      |                                |     |      |      |      |                                |      |     |      |      |      |      |   |
| 334 0.33         |                              |      |      |      |      |                              |      |      |      |                                |      |      |      |      |                                |     |      |      |      |                                |      |     |      |      |      |      |   |
| 474 0.47         |                              |      |      |      |      |                              |      |      |      |                                |      |      |      |      |                                |     |      |      |      |                                |      |     |      |      |      |      |   |
| 684 0.68         |                              |      |      |      |      |                              |      |      |      |                                |      |      |      |      |                                |     |      |      |      |                                |      |     |      |      |      |      |   |
| 105 1            |                              |      |      |      |      |                              |      |      |      |                                |      |      |      |      |                                |     |      |      |      |                                |      |     |      |      |      |      |   |
| 155 1.5          |                              |      |      |      |      |                              |      |      |      |                                |      |      |      |      |                                |     |      |      |      |                                |      |     |      |      |      |      |   |
| 225 2.2          |                              |      |      |      |      |                              |      |      |      |                                |      |      |      |      |                                |     |      |      |      |                                |      |     |      |      |      |      |   |
| 335 3.3          |                              |      |      |      |      |                              |      |      |      |                                |      |      |      |      |                                |     |      |      |      |                                |      |     |      |      |      |      |   |
| 475 4.7          |                              |      |      |      |      |                              |      |      |      |                                |      |      |      |      |                                |     |      |      |      |                                |      |     |      |      |      |      |   |
| 106 10           |                              |      |      |      |      |                              |      |      |      |                                |      |      |      |      |                                |     |      |      |      |                                |      |     |      |      |      |      |   |
| 226 22           |                              |      |      |      |      |                              |      |      |      |                                |      |      |      |      |                                |     |      |      |      |                                |      |     |      |      |      |      |   |
| WVDC             | 630                          | 1000 | 1500 | 2000 | 2500 | 630                          | 1000 | 1500 | 2000 | 630                            | 1000 | 1500 | 2000 | 2500 | 3000                           | 630 | 1000 | 1500 | 2000 | 2500                           | 3000 | 630 | 1000 | 1500 | 2000 | 3000 |   |
| Size             | 1206                         |      |      |      |      | 1210                         |      |      |      | 1808                           |      |      |      |      | 1812                           |     |      |      |      | 2220                           |      |     |      |      |      |      |   |

NOTE: Contact factory for non-specified capacitance values

| Letter        | A                | C                | E                 | F                 | G                | Q              | X              | Y             |
|---------------|------------------|------------------|-------------------|-------------------|------------------|----------------|----------------|---------------|
| Max Thickness | 0.813<br>(0.032) | 1.448<br>(0.057) | 1.8034<br>(0.071) | 2.2098<br>(0.087) | 2.794<br>(0.110) | 1.78<br>(0.07) | 2.29<br>(0.09) | 2.54<br>(0.1) |



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