

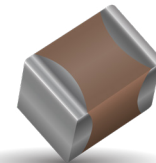
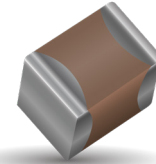
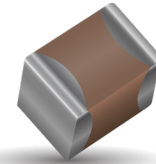
GENERAL DESCRIPTON

AVX Corporation has supported the Automotive Industry requirements for Multilayer Ceramic Capacitors consistently for more than 10 years. Products have been developed and tested specifically for automotive applications and all manufacturing facilities are QS9000 and VDA 6.4 approved.

As part of our sustained investment in capacity and state of the art technology, we are now transitioning from the established Pd/Ag electrode system to a Base Metal Electrode system (BME).

AVX is using AECQ200 as the qualification vehicle for this transition. A detailed qualification package is available on request and contains results on a range of part numbers including:

- X7R dielectric components containing BME electrode and copper terminations with a Ni/Sn plated overcoat
- X7R dielectric components, BME electrode with epoxy finish for conductive glue mounting



HOW TO ORDE

| 0805 | 5 | A | 104 | K | 4 | T | 2 | A |
|--|--|-------------------------------|---|--|--------------|--|-----------------------------|------------------|
| Size | Voltage | Dielectric | Capacitance Code (in pF) | Capacitance Tolerance | Failure Rate | Terminations | Packaging | Special Code |
| 0402 0603 0805 1206 1210 1812 | 10V = Z 16V = Y 25V = 3 50V = 5 100V = 1 200V = 2 250V = V 500V = 7 | NPO = A X7R = C X8R = F | 2 Sig. Digits + Number of Zeros e.g. 10 F = 106 | F = $\pm 1\%$ ($\geq 10\text{pF}$)* G = $\pm 2\%$ ($\geq 10\text{pF}$)* J = $\pm 5\%$ ($\leq 1\mu\text{F}$) K = $\pm 10\%$ M = $\pm 20\%$ *NPO only | 4=Automotive | T = Plated Ni and Sn Z = FLEXITERM®** U = Conductive Epo **X7R X8R only | 2 = 7" Reel 4 = 13" Reel | A = Std. Product |

Contact factory for availability of Tolerance Options for Specific Part Numbers.

NOTE: Contact factory for non-specified capacitance values
0402 case size available in T termination only.

COMMERCIAL VS AUTOMOTIVE MLCC PROCESS COMPARISON

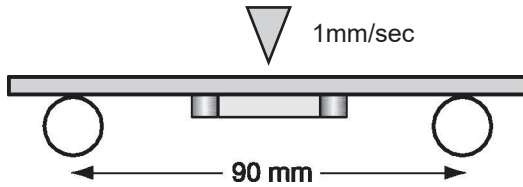
| | Commercial | Automotive |
|--|--|---|
| Administrative | Standard Part Numbers. No restriction on who purchases these parts. | Specific Automotive Part Number. Used to control supply of product to Automotive customers. |
| Design | Minimum ceramic thickness of 0.020" | Minimum Ceramic thickness of 0.029" (0.74mm) on all X7R product. |
| Dicing | Side & End Margins = 0.003" min | Side & End Margins = 0.004" min Cover Layers = 0.003" min |
| Lot Qualification (Destructive Physical Analysis - DPA) | As per EIA RS469 | Increased sample plan stricter criteria. |
| Visual/Cosmetic Quality | Standard process and inspection | 100% inspection |
| Application Robustness | Standard sampling for accelerated wave solder on X7R dielectrics | Increased sampling for accelerated wave solder on X7R and NPO followed by lot by lot reliability testing. |

All Tests have Accept/Reject Criteria 0/1

FLEXITERM FEATURES

a) Bend Test

The capacitor is soldered to the PC Board as shown:



Typical bend test results are shown below:

| Style | Conventional | Soft Term |
|-------|--------------|-----------|
| 0603 | >2mm | >5 |
| 0805 | >2mm | >5 |
| 1206 | >2mm | >5 |

b) Temperature Cycle testing

FLEXITERM® has the ability to withstand at least 1000 cycles between -55°C and +125°C

Automotive MLCC-NP0 Capacitance Range



| Soldering | 0402 | | 0603 | | | | 0805 | | | | | 1206 | | | | | | |
|-----------|-------------|-------------|-------------|-------------|------|------|-------------|-------------|------|------|------|-------------|-------------|------|------|------|------|------|
| | Reflow/Wave | | Reflow/Wave | | | | Reflow/Wave | | | | | Reflow/Wave | | | | | | |
| | 25V | 50V | 25V | 50V | 100V | 200V | 25V | 50V | 100V | 200V | 250V | 25V | 50V | 100V | 200V | 250V | 500V | |
| 100 | 10pF | C | C | G | G | G | G | J | J | J | N | N | J | J | J | J | J | J |
| 120 | 12 | C | C | G | G | G | G | J | J | J | N | N | J | J | J | J | J | J |
| 150 | 15 | C | C | G | G | G | G | J | J | J | N | N | J | J | J | J | J | J |
| 180 | 18 | C | C | G | G | G | G | J | J | J | N | N | J | J | J | J | J | J |
| 220 | 22 | C | C | G | G | G | G | J | J | J | N | N | J | J | J | J | J | J |
| 270 | 27 | C | C | G | G | G | G | J | J | J | N | N | J | J | J | J | J | J |
| 330 | 33 | C | C | G | G | G | G | J | J | J | N | N | J | J | J | J | J | J |
| 390 | 39 | C | C | G | G | G | G | J | J | J | N | N | J | J | J | J | J | J |
| 470 | 47 | | | G | G | G | G | J | J | J | N | N | J | J | J | J | J | J |
| 510 | 51 | | | G | G | G | G | J | J | J | N | N | J | J | J | J | J | J |
| 560 | 56 | | | G | G | G | G | J | J | J | N | N | J | J | J | J | J | J |
| 680 | 68 | | | G | G | G | G | J | J | J | N | N | J | J | J | J | J | J |
| 820 | 82 | | | G | G | G | G | J | J | J | N | N | J | J | J | J | J | J |
| 101 | 100 | | | G | G | G | G | J | J | J | N | N | J | J | J | J | J | J |
| 121 | 120 | | | G | G | G | G | J | J | J | N | N | J | J | J | J | J | J |
| 151 | 150 | | | G | G | G | G | J | J | J | N | N | J | J | J | J | J | J |
| 181 | 180 | | | G | G | G | G | J | J | J | N | N | J | J | J | J | J | J |
| 221 | 220 | | | G | G | G | G | J | J | J | N | N | J | J | J | J | J | J |
| 271 | 270 | | | G | G | G | G | J | J | J | N | N | J | J | J | J | J | J |
| 331 | 330 | | | G | G | G | G | J | J | J | N | N | J | J | J | J | J | J |
| 391 | 390 | | | G | G | | | J | J | J | | | J | J | J | J | J | J |
| 471 | 470 | | | G | G | | | J | J | J | | | J | J | J | J | J | J |
| 561 | 560 | | | G | G | | | J | J | J | | | J | J | J | J | J | J |
| 681 | 680 | | | G | G | | | J | J | J | | | J | J | J | J | J | J |
| 821 | 820 | | | | | | | J | J | J | | | J | J | J | J | J | J |
| 102 | 1000 | | | | | | | J | J | J | | | J | J | J | J | J | J |
| 122 | 1200 | | | | | | | | | | | | | | | | | |
| 152 | 1500 | | | | | | | | | | | | | | | | | |
| 182 | 1800 | | | | | | | | | | | | | | | | | |
| 222 | 2200 | | | | | | | | | | | | | | | | | |
| 272 | 2700 | | | | | | | | | | | | | | | | | |
| 332 | 3300 | | | | | | | | | | | | | | | | | |
| 392 | 3900 | | | | | | | | | | | | | | | | | |
| 472 | 4700 | | | | | | | | | | | | | | | | | |
| 103 | 10nF | | | | | | | | | | | | | | | | | |
| | | 25V | 50V | 25V | 50V | 100V | 200V | 25V | 50V | 100V | 200V | 250V | 25V | 50V | 100V | 200V | 250V | 500V |
| | | 0402 | | 0603 | | | | 0805 | | | | | 1206 | | | | | |

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

Automotive MLCC - X7R

Capacitance Range

| Soldering | 0402 | | | 0603 | | | | | | 0805 | | | | | | 1206 | | | | | | 1210 | | | | 1812 | | 2220 | | | | | |
|-----------|-------------|-----|-----|-------------|-----|-----|-----|------|------|-------------|-----|-----|-----|------|------|-------------|-----|-----|-----|------|------|-------------|------|-----|-----|-------------|------|-------------|------|-----|-----|------|---|
| | Reflow/Wave | | | Reflow/Wave | | | | | | Reflow/Wave | | | | | | Reflow/Wave | | | | | | Reflow Only | | | | Reflow Only | | Reflow Only | | | | | |
| | 16V | 25V | 50V | 10V | 16V | 25V | 50V | 100V | 200V | 250V | 16V | 25V | 50V | 100V | 200V | 250V | 16V | 25V | 50V | 100V | 200V | 250V | 500V | 16V | 25V | 50V | 100V | 50V | 100V | 25V | 50V | 100V | |
| 221 | Cap 220 | C | C | C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 271 | (pF) 270 | C | C | C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 331 | 330 | C | C | C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 391 | 390 | C | C | C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 471 | 470 | C | C | C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 561 | 560 | C | C | C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 681 | 680 | C | C | C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 821 | 820 | C | C | C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 102 | 1000 | C | C | C | G | G | G | G | G | G | J | J | J | J | J | J | J | J | J | J | J | J | J | J | K | K | K | K | K | K | K | K | |
| 182 | 1800 | C | C | C | G | G | G | G | G | G | J | J | J | J | J | J | J | J | J | J | J | J | J | J | K | K | K | K | K | K | K | K | |
| 222 | 2200 | C | C | C | G | G | G | G | G | G | J | J | J | J | J | J | J | J | J | J | J | J | J | J | K | K | K | K | K | K | K | K | |
| 332 | 3300 | C | C | C | G | G | G | G | G | G | J | J | J | J | J | J | J | J | J | J | J | J | J | J | K | K | K | K | K | K | K | K | |
| 472 | 4700 | C | C | C | G | G | G | G | G | G | J | J | J | J | J | J | J | J | J | J | J | J | J | J | K | K | K | K | K | K | K | K | |
| 103 | Cap 0.01 | C | | | G | G | G | G | G | G | J | J | J | J | J | J | J | J | J | J | J | J | J | J | K | K | K | K | K | K | K | | |
| 123 | (F) 0.012 | C | | | G | G | G | G | G | | J | J | J | N | N | N | J | J | J | J | J | J | J | | K | K | K | K | K | K | K | | |
| 153 | 0.015 | C | | | G | G | G | G | G | | J | J | J | N | N | N | J | J | J | J | J | J | J | | K | K | K | K | K | K | K | | |
| 183 | 0.018 | C | | | G | G | G | G | G | | J | J | J | N | N | N | J | J | J | J | J | J | J | | K | K | K | K | K | K | K | | |
| 223 | 0.022 | C | | | G | G | G | G | G | | J | J | J | N | N | N | J | J | J | J | J | J | J | | K | K | K | K | K | K | K | | |
| 273 | 0.027 | C | | | G | G | G | G | | | J | J | J | N | N | N | J | J | J | J | J | J | J | | K | K | K | K | K | K | K | | |
| 333 | 0.033 | C | | | G | G | G | G | | | J | J | J | N | N | N | J | J | J | J | J | J | J | | K | K | K | K | K | K | K | | |
| 473 | 0.047 | | | | G | G | G | G | | | J | J | J | N | N | N | J | J | J | M | M | M | | K | K | K | K | K | K | K | K | | |
| 563 | 0.056 | | | | G | G | G | G | | | J | J | J | N | | | J | J | J | M | M | M | | K | K | K | M | K | K | K | K | | |
| 683 | 0.068 | | | | G | G | G | G | | | J | J | J | N | | | J | J | J | M | M | M | | K | K | K | M | K | K | K | K | | |
| 823 | 0.082 | | | | G | G | G | G | | | J | J | J | N | | | J | J | J | M | M | M | | K | K | K | M | K | K | K | K | | |
| 104 | 0.1 | | | | G | G | G | G | | | J | J | M | N | | | J | J | J | M | P | P | | K | K | K | M | K | K | K | K | | |
| 124 | 0.12 | | | | G | | | | | | J | J | N | N | | | J | J | M | M | Q | Q | | K | K | K | P | K | K | K | K | | |
| 154 | 0.15 | | | | G | | | | | | M | N | N | N | | | J | J | M | M | Q | Q | | K | K | K | P | K | K | K | K | | |
| 224 | 0.22 | | | | G | | | | | | M | N | N | N | | | J | M | M | Q | Q | Q | | M | M | M | P | M | M | M | M | | |
| 334 | 0.33 | | | | | | | | | | N | N | N | N | | | J | M | P | Q | | | | P | P | P | Q | X | X | X | X | | |
| 474 | 0.47 | | | | | | | | | | N | N | N | N | | | M | M | P | Q | | | | P | P | P | Q | X | X | X | X | | |
| 684 | 0.68 | | | | | | | | | | N | N | N | | | | M | Q | Q | Q | | | | P | P | Q | X | X | X | X | X | | |
| 105 | 1 | | | | | | | | | | N | N | N | | | | M | Q | Q | Q | | | | P | Q | Q | X | X | X | X | Z | Z | |
| 155 | 1.5 | | | | | | | | | | | | | | | | Q | Q | Q | Q | | | | P | Q | Z | Z | X | X | X | Z | Z | |
| 225 | 2.2 | | | | | | | | | | | | | | | | Q | Q | Q | Q | | | | X | Z | Z | Z | Z | Z | | Z | Z | |
| 335 | 3.3 | | | | | | | | | | | | | | | | Q | Q | Q | | | | | X | Z | Z | Z | Z | | Z | Z | Z | |
| 475 | 4.7 | | | | | | | | | | | | | | | | Q | Q | Q | | | | | X | Z | Z | Z | Z | | Z | Z | Z | |
| 106 | 10 | | | | | | | | | | | | | | | | | | | | | | | Z | Z | Z | | Z | | Z | Z | Z | |
| 226 | 22 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Z | Z |
| | 16V | 25V | 50V | 10V | 16V | 25V | 50V | 100V | 200V | 250V | 16V | 25V | 50V | 100V | 200V | 250V | 16V | 25V | 50V | 100V | 200V | 250V | 500V | 16V | 25V | 50V | 100V | 50V | 100V | 25V | 50V | 100V | |
| | 0402 | | | 0603 | | | | | | 0805 | | | | | | 1206 | | | | | | 1210 | | | | 1812 | | 2220 | | | | | |

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

Automotive MLCC - X8R

Capacitance Range



| SIZE | | 0603 | | 0805 | | 1206 | |
|-----------|-----------|-------------|-----|-------------|-----|-------------|-----|
| Soldering | | Reflow/Wave | | Reflow/Wave | | Reflow/Wave | |
| | 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 | 8200 | G | G | J | J | J | J |
| 103 | Cap 0.01 | G | G | J | J | J | J |
| 123 | (F) 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 | | 0603 | | 0805 | | 1206 | |

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

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