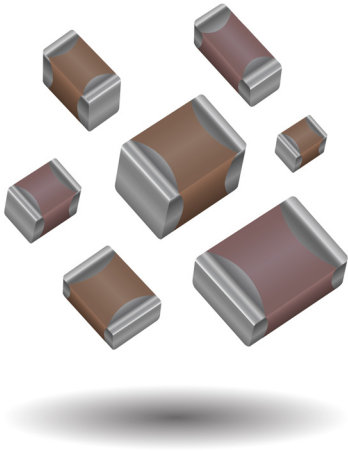


MLCC Medical Applications – MM Series

General Specifications



The AVX MM series is a multi-layer ceramic capacitor designed for use in medical applications other than implantable/life support. These components have the design & change control expected for medical devices and also offer enhanced LAT including reliability testing and 100% inspection.

APPLICATIONS

Implantable, Non-Life Supporting Medical Devices

- e.g. implanted temporary cardiac monitor, insulin pumps

External, Life Supporting Medical Devices

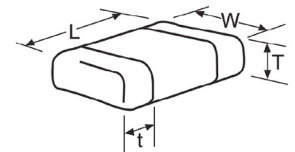
- e.g. heart pump external controller

External Devices

- e.g. patient monitoring, diagnostic equipment

HOW TO ORDER

| | | | | | | | | |
|--|--|--------------------------|---|--|---|---|---|-------------------------------------|
| MM02 | Z | A | 100 | J | G | T | 3 | A |
| Size | Rated Voltage | Dielectric Code | Capacitance Code (In pF) (2 significant digits + number of zeros) | Capacitance Tolerance | Failure Rate C = Standard Range | Termination Finish | Packaging 2 = 7" Reel 4 = 13" Reel | Special Code A = Standard |
| MM02 = 0402 MM03 = 0603 MM05 = 0805 MM06 = 1206 MM10 = 1210 MM08 = 1808 MM12 = 1812 MM20 = 2220 | Z = 10V Y = 16V 3 = 25V 5 = 50V 1 = 100V 2 = 200V V = 250V 7 = 500V | A = NP0 (COG) C = X7R | for values <10pF: letter R denotes decimal point. Example: 68pF = 680 8.2pF = 8R2 | B = ±0.1pF C = ±0.25pF D = ±0.5pF F = ±1% (≥10pF) G = ±2% (≥10pF) J = ±5% K = ±10% M = ±20% | Contact AVX for others | T = Plated Ni & Sn (NP0 only) Z = Flexiterm (X7R only) | | Contact AVX for others |

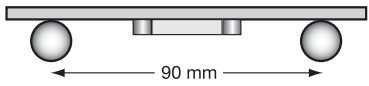


COMMERCIAL VS MM SERIES PROCESS COMPARISON

| | Commercial | MM Series |
|--|--|--|
| Administrative | Standard part numbers; no restriction on who purchases these parts | Specific series part number, used to control supply of product |
| Design | Minimum ceramic thickness of 0.020" on all X7R product | Minimum ceramic thickness of 0.022" (0.56mm) |
| 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 NP0 followed by lot by lot reliability testing |
| Design/Change Control | Required to inform customer of changes in: <ul style="list-style-type: none"> • form • fit • function | AVX will qualify and notify customers before making any change to the following materials or processes: <ul style="list-style-type: none"> • Dielectric formulation, type, or supplier • Metal formulation, type, or supplier • Termination material formulation, type, or supplier • Manufacturing equipment type • Quality testing regime including sample size and accept/ reject criteria |

MM Series – MLCC for Medical Applications

NP0 (COG) – Specifications & Test Methods

| Parameter/Test | | NP0 Specification Limits | Measuring Conditions | |
|---------------------------------------|-----------------------|---|---|----------------|
| Operating Temperature Range | | -55°C to +125°C | Temperature Cycle Chamber | |
| Capacitance | | Within specified tolerance | Freq.: 1.0 MHz ± 10% for cap ≤ 1000 pF 1.0 kHz ± 10% for cap > 1000 pF Voltage: 1.0Vrms ± .2V | |
| Q | | <30 pF: Q ≥ 400+20 x Cap Value ≥30 pF: Q ≥ 1000 | | |
| Insulation Resistance | | 100,000MΩ or 1000MΩ - μF, whichever is less | Charge device with rated voltage for 60 ± 5 secs @ room temp/humidity | |
| Dielectric Strength | | No breakdown or visual defects | Charge device with 300% of rated voltage for 1-5 seconds, w/charge and discharge current limited to 50 mA (max) Note: Charge device with 150% of rated voltage for 500V devices. | |
| Resistance to Flexure Stresses | Appearance | No defects | Deflection: 2mm Test Time: 30 seconds 1mm/sec  | |
| | Capacitance Variation | ±5% or ±.5 pF, whichever is greater | | |
| | Q | Meets Initial Values (As Above) | | |
| | Insulation Resistance | ≥ Initial Value x 0.3 | | |
| Solderability | | ≥ 95% of each terminal should be covered with fresh solder | Dip device in eutectic solder at 230 ± 5°C 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 | ≤ ±2.5% or ±.25 pF, whichever is greater | | |
| | Q | Meets Initial Values (As Above) | | |
| | Insulation Resistance | Meets Initial Values (As Above) | | |
| Thermal Shock | Appearance | No visual defects | Step 1: -55°C ± 2° | 30 ± 3 minutes |
| | Capacitance Variation | ≤ ±2.5% or ±.25 pF, whichever is greater | Step 2: Room Temp | ≤ 3 minutes |
| | Q | 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 24 hours at room temperature | |
| Load Life | Appearance | No visual defects | Charge device with twice rated voltage in test chamber set at 125°C ± 2°C for 1000 hours (+48, -0). Remove from test chamber and stabilize at room temperature for 24 hours before measuring. | |
| | Capacitance Variation | ≤ ±3.0% or ± .3 pF, whichever is greater | | |
| | Q | ≥ 30 pF: Q ≥ 350 ≥10 pF, <30 pF: Q ≥ 275 +5C/2 <10 pF: Q ≥ 200 +10C | | |
| | Insulation Resistance | ≥ Initial Value x 0.3 (See 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. Remove from chamber and stabilize at room temperature for 24 ± 2 hours before measuring. | |
| | Capacitance Variation | ≤ ±5.0% or ± .5 pF, whichever is greater | | |
| | Q | ≥ 30 pF: Q ≥ 350 ≥10 pF, <30 pF: Q ≥ 275 +5C/2 <10 pF: Q ≥ 200 +10C | | |
| | Insulation Resistance | ≥ Initial Value x 0.3 (See Above) | | |
| Dielectric Strength | | Meets Initial Values (As Above) | | |

MM Series – MLCC for Medical Applications

NP0/COG Capacitance Range

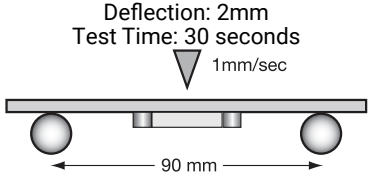


PREFERRED SIZES ARE SHADED

| SIZE | | 0603 | | | | 0805 | | | | 1206 | | | | |
|------|------|------|------|----|-----|------|------|----|-----|------|------|----|-----|-----|
| WVDC | | 16 | 25 | 50 | 100 | 16 | 25 | 50 | 100 | 16 | 25 | 50 | 100 | |
| Cap | 0.5 | 0R5 | | | | | | | | | | | | |
| (pF) | 1.0 | 1R0 | | | | | | | | | | | | |
| | 1.2 | 1R2 | | | | | | | | | | | | |
| | 1.5 | 1R5 | | | | | | | | | | | | |
| | 1.8 | 1R8 | | | | | | | | | | | | |
| | 2.2 | 2R2 | | | | | | | | | | | | |
| | 2.7 | 2R7 | | | | | | | | | | | | |
| | 3.3 | 3R3 | | | | | | | | | | | | |
| | 3.9 | 3R9 | | | | | | | | | | | | |
| | 4.7 | 4R7 | | | | | | | | | | | | |
| | 5.6 | 5R6 | | | | | | | | | | | | |
| | 6.8 | 6R8 | | | | | | | | | | | | |
| | 8.2 | 8R2 | | | | | | | | | | | | |
| | 10 | 100 | | | | | | | | | | | | |
| | 12 | 120 | | | | | | | | | | | | |
| | 15 | 150 | | | | | | | | | | | | |
| | 18 | 180 | | | | | | | | | | | | |
| | 22 | 220 | | | | | | | | | | | | |
| | 27 | 270 | | | | | | | | | | | | |
| | 33 | 330 | | | | | | | | | | | | |
| | 39 | 390 | | | | | | | | | | | | |
| | 47 | 470 | | | | | | | | | | | | |
| | 56 | 560 | | | | | | | | | | | | |
| | 68 | 680 | | | | | | | | | | | | |
| | 82 | 820 | | | | | | | | | | | | |
| | 100 | 101 | | | | | | | | | | | | |
| | 120 | 121 | | | | | | | | | | | | |
| | 150 | 151 | | | | | | | | | | | | |
| | 180 | 181 | | | | | | | | | | | | |
| | 220 | 221 | | | | | | | | | | | | |
| | 270 | 271 | | | | | | | | | | | | |
| | 330 | 331 | | | | | | | | | | | | |
| | 390 | 391 | | | | | | | | | | | | |
| | 470 | 471 | | | | | | | | | | | | |
| | 560 | 561 | | | | | | | | | | | | |
| | 680 | 681 | | | | | | | | | | | | |
| | 820 | 821 | | | | | | | | | | | | |
| | 1000 | 102 | | | | | | | | | | | | |
| | 1200 | 122 | | | | | | | | | | | | |
| | 1500 | 152 | | | | | | | | | | | | |
| | WVDC | | 16 | 25 | 50 | 100 | 16 | 25 | 50 | 100 | 16 | 25 | 50 | 100 |
| | SIZE | | 0603 | | | | 0805 | | | | 1206 | | | |

MM Series – MLCC for Medical Applications

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% Voltage: 1.0Vrms ± .2V | |
| Q | $\leq 10\%$ for $\geq 50V$ DC rating $\leq 12.5\%$ for 25V DC rating $\leq 12.5\%$ for 25V and 16V DC rating $\leq 12.5\%$ for $\leq 10V$ DC rating | | | |
| Insulation Resistance | | 100,000MΩ or 1000MΩ - μF, whichever is less | Charge device with rated voltage for 120 ± 5 secs @ room temp/humidity | |
| Dielectric Strength | | No breakdown or visual defects | Charge device with 300% of rated voltage for 1-5 seconds, w/charge and discharge current limited to 50 mA (max) Note: Charge device with 150% of rated voltage for 500V devices. | |
| Resistance to Flexure Stresses | Appearance | No defects | Deflection: 2mm Test Time: 30 seconds  | |
| | Capacitance Variation | $\leq \pm 12\%$ | | |
| | Dissipation Factor | Meets Initial Values (As Above) | | |
| | Insulation Resistance | \geq Initial Value x 0.3 | | |
| Solderability | | $\geq 95\%$ of each terminal should be covered with fresh solder | Dip device in eutectic solder at 230 ± 5°C 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 | $\leq \pm 7.5\%$ | | |
| | Dissipation Factor | Meets Initial Values (As Above) | | |
| | Insulation Resistance | Meets Initial Values (As Above) | | |
| | Dielectric Strength | Meets Initial Values (As Above) | | |
| Thermal Shock | Appearance | No visual defects | Step 1: -55°C ± 2° | 30 ± 3 minutes |
| | Capacitance Variation | $\leq \pm 7.5\%$ | 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 24 ± 2 hours at room temperature | |
| Load Life | Appearance | No visual defects | Charge device with 1.5 rated voltage ($\leq 10V$) in test chamber set at 125°C ± 2°C for 1000 hours (+48, -0) Remove from test chamber and stabilize at room temperature for 24 ± 2 hours before measuring. | |
| | Capacitance Variation | $\leq \pm 12.5\%$ | | |
| | Dissipation Factor | \leq Initial Value x 2.0 (See Above) | | |
| | Insulation Resistance | \geq Initial Value x 0.3 (See Above) | | |
| | Dielectric Strength | Meets Initial Values (As Above) | | |
| Load Humidity | Appearance | No visual defects | Store in a test chamber set at 85°C ± 2°C/ 85% ± 5% relative humidity for 1000 hours (+48, -0) with rated voltage applied. Remove from chamber and stabilize at room temperature and humidity for 24 ± 2 hours before measuring. | |
| | Capacitance Variation | $\leq \pm 12.5\%$ | | |
| | Dissipation Factor | \leq Initial Value x 2.0 (See Above) | | |
| | Insulation Resistance | \geq Initial Value x 0.3 (See Above) | | |
| | Dielectric Strength | Meets Initial Values (As Above) | | |

单击下面可查看定价，库存，交付和生命周期等信息

[>>AVX](#)