

# RF/Microwave Capacitors

## RF/Microwave Multilayer Capacitors (MLC)

### 700A Series NP0 Porcelain and Ceramic Multilayer Capacitors



#### FEATURES

- Case A Size (.055" x .055")
- Low ESR / ESL
- High Q
- Low Noise
- Capacitance Range 0.1 pF to 1000 pF
- Extended WVDC up to 250 VDC
- Zero TCC
- High Self-Resonance
- Established Reliability (QPL)

#### GENERAL DESCRIPTION

KYOCERA AVX, the industry leader, offers new improved ESR/ESL performance for the 700 A Series RF/Microwave Capacitors. The superior high self-resonance and zero TCC characteristic of this Series provide excellent performance over a broad range of RF and microwave applications requiring minimum drift. High density porcelain and ceramic constructions provide a rugged, hermetic package.

Typical functional applications: Bypass, Coupling, Tuning and DC Blocking.

Typical circuit applications: Filters, Oscillators and Timing

#### PACKAGING OPTIONS



Tape & Reel



Vertical  
Orientation  
Tape & Reel



Cap-Pak®  
(100 pcs)



#### ELECTRICAL SPECIFICATIONS

|  |   |
|--|---|
| <b>Temperature Coefficient (TCC)</b>         | 0 ± 30 PPM/°C   |
| <b>Capacitance Range</b>                     | 0.1 pF to 1000 pF   |
| <b>Operating Temperature</b>                 | -55°C to +125°C*  |
| <b>Quality Factor</b>                        | Greater than 10,000<br>(0.1 pF to 100 pF) @ 1 MHz.<br>Greater than 2000<br>(110 pF to 1000 pF) @ 1 MHz.   |
| <b>Insulation Resistance (IR)</b>            | 0.1 pF to 470 pF<br>10 <sup>6</sup> Megohms min. @ 25°C at rated WVDC<br>10 <sup>5</sup> Megohms min. @ 125°C at rated WVDC<br>510 pF to 1000 pF<br>10 <sup>5</sup> Megohms min. @ 25°C at rated WVDC<br>10 <sup>4</sup> Megohms min. @ 125°C at rated WVDC |
| <b>Working Voltage (WVDC)</b>                | See Capacitance Values table  |
| <b>Dielectric Withstanding Voltage (DWV)</b> | 250% of rated WVDC for 5 seconds  |
| <b>Aging Effects</b>                         | None  |
| <b>Piezoelectric Effects</b>                 | None  |
| <b>Capacitance Drift</b>                     | ± (0.02% or 0.02 pF), whichever is greater  |

#### ENVIRONMENTAL CHARACTERISTICS

|                             |  |
|-----------------------------|--|
| <b>Thermal Shock</b>        | Mil-STD-202, Method 107, Condition A   |
| <b>Moisture Resistance</b>  | Mil-STD-202, Method 106  |
| <b>Low Voltage Humidity</b> | Mil-STD-202, Method 103, condition A, with 1.5 VDC applied while subjected to an environment of 85°C with 85% relative humidity for 240 hours                              |
| <b>Life Test</b>            | MIL-STD-202, Method 108, for 2000 hours, at 125°C. 200% WVDC applied.  |
| <b>Solderability</b>        | Mil-STD-202, Method 208  |
| <b>Terminal Strength</b>    | Terminations for chips and pellets withstand a pull of 5 lbs. min., 10 lbs. typical, for 5 seconds in direction perpendicular to the termination surface of the capacitor. |

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## CAPACITANCE VALUES

| Cap. Code | Cap. (pF)  | Tol.          | Rated WVDC |               | Cap. Code  | Cap. (pF)  | Tol.       | Rated WVDC |      | Cap. Code  | Cap. (pF) | Tol.          | Rated WVDC |         | Cap. Code | Cap. (pF) | Tol.          | Rated WVDC |      |
|-----------|------------|---------------|------------|---------------|------------|------------|------------|------------|------|------------|-----------|---------------|------------|---------|-----------|-----------|---------------|------------|------|
|           |            |               | STD.       | EXT.          |            |            |            | STD.       | EXT. |            |           |               | STD.       | EXT.    |           |           |               | STD.       | EXT. |
| 0R1       | <b>0.1</b> | B             | 150        | 250           | <b>2R4</b> | <b>2.4</b> | B, C, D    | 150        | 250  | <b>200</b> | <b>20</b> | F, G, J, K, M | 150        | VOLTAGE | 151       | 150       | F, G, J, K, M | 150        | N/A  |
| 0R2       | <b>0.2</b> |               |            |               | <b>2R7</b> | <b>2.7</b> |            |            |      | <b>220</b> | <b>22</b> |               |            |         | 161       | 160       |               |            |      |
| 0R3       | <b>0.3</b> | B, C          |            |               | <b>3R0</b> | <b>3.0</b> |            |            |      | <b>240</b> | <b>24</b> |               |            |         | 181       | 180       |               |            |      |
| 0R4       | <b>0.4</b> |               |            |               | <b>3R3</b> | <b>3.3</b> |            |            |      | <b>270</b> | <b>27</b> |               |            |         | 201       | 200       |               |            |      |
| 0R5       | <b>0.5</b> | B, C, D       |            |               | <b>3R6</b> | <b>3.6</b> |            |            |      | <b>300</b> | <b>30</b> |               |            |         | 221       | 220       |               |            |      |
| 0R6       | <b>0.6</b> |               |            |               | <b>3R9</b> | <b>3.9</b> |            |            |      | <b>330</b> | <b>33</b> |               |            |         | 241       | 240       |               |            |      |
| 0R7       | <b>0.7</b> |               |            |               | <b>4R3</b> | <b>4.3</b> |            |            |      | <b>360</b> | <b>36</b> |               |            |         | 271       | 270       |               |            |      |
| 0R8       | <b>0.8</b> |               |            |               | <b>4R7</b> | <b>4.7</b> |            |            |      | <b>390</b> | <b>39</b> |               |            |         | 301       | 300       |               |            |      |
| 0R9       | <b>0.9</b> |               |            |               | <b>5R1</b> | <b>5.1</b> |            |            |      | <b>430</b> | <b>43</b> |               |            |         | 331       | 330       |               |            |      |
| 1R0       | <b>1.0</b> |               |            |               | <b>5R6</b> | <b>5.6</b> |            |            |      | <b>470</b> | <b>47</b> |               |            |         | 361       | 360       |               |            |      |
| 1R1       | <b>1.1</b> |               | B, C, D    | <b>6R2</b>    | <b>6.2</b> | <b>510</b> | <b>51</b>  | 391        | 390  |            |           |               |            |         |           |           |               |            |      |
| 1R2       | <b>1.2</b> |               |            | <b>6R8</b>    | <b>6.8</b> | <b>560</b> | <b>56</b>  | 431        | 430  |            |           |               |            |         |           |           |               |            |      |
| 1R3       | <b>1.3</b> |               |            | B, C, J, K, M | <b>7R5</b> | <b>7.5</b> | <b>620</b> | <b>62</b>  | 471  | 470        |           |               |            |         |           |           |               |            |      |
| 1R4       | <b>1.4</b> |               |            |               | <b>8R2</b> | <b>8.2</b> | <b>680</b> | <b>68</b>  | 511  | 510        |           |               |            |         |           |           |               |            |      |
| 1R5       | <b>1.5</b> | <b>9R1</b>    |            |               | <b>9.1</b> | <b>750</b> | <b>75</b>  | 561        | 560  |            |           |               |            |         |           |           |               |            |      |
| 1R6       | <b>1.6</b> | F, G, J, K, M |            |               | <b>100</b> | <b>10</b>  | <b>820</b> | <b>82</b>  | 621  | 620        |           |               |            |         |           |           |               |            |      |
| 1R7       | <b>1.7</b> |               |            |               | <b>110</b> | <b>11</b>  | <b>910</b> | <b>91</b>  | 681  | 680        |           |               |            |         |           |           |               |            |      |
| 1R8       | <b>1.8</b> |               |            |               | <b>120</b> | <b>12</b>  | <b>101</b> | <b>100</b> | 751  | 750        |           |               |            |         |           |           |               |            |      |
| 1R9       | <b>1.9</b> |               |            |               | <b>130</b> | <b>13</b>  | 111        | 110        | 821  | 820        |           |               |            |         |           |           |               |            |      |
| 2R0       | <b>2.0</b> |               |            |               | <b>150</b> | <b>15</b>  | 121        | 120        | 911  | 910        |           |               |            |         |           |           |               |            |      |
| 2R1       | <b>2.1</b> |               | <b>160</b> |               | <b>16</b>  | 131        | 130        | 102        | 1000 |            |           |               |            |         |           |           |               |            |      |
| 2R2       | <b>2.2</b> |               |            |               |            |            |            |            |      |            |           |               |            |         |           |           |               |            |      |

$v_{rms} = 0.707 \times WVDC$

Special values, tolerances, higher WVDC and matching available. Please consult factory.

note: extended wvdc does not apply to cdr products.

Capacitance values in bold type indicate porcelain dielectric. All other capacitance values indicate ceramic dielectric.

All 700 A Capacitors are available laser marked with KYOCERA AVX identification, capacitance code and tolerance.

## HOW TO ORDER



The above part number refers to a 700A Series (case size A) 6.8 pF capacitor, J tolerance (+/-5%), 150 WVDC, with W termination, (Tin/Lead, Solder Plated over Nickel Barrier), laser marking and Tape and Reel Packaging.

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#### MECHANICAL CONFIGURATION

| Series & Case Size | Term. Code | MIL-PRF-55681 | Case Size & Type            | Outline ES W/T is a Termination Surface | Body Dimensions inches (mm)        |                            |                        | Lead and Termination Dimensions and Material |  |   |                          |
|--------------------|------------|---------------|-----------------------------|---|------------------------------------|----------------------------|------------------------|--|--|---|--------------------------|
|                    |            |               |                             |   | Length (L)                         | Width (W)                  | Thickness (T)          | Overlap (Y)                                  | Materials  | Pkg Type  | Pkg Code                 |
| 700A               | W          | CDR12BP       | A Solder Plate              |   | .055+.015-.010<br>(1.40+0.38-0.25) | .055 ±.015<br>(1.40 ±0.38) | .057<br>(1.45)<br>max. | .010+.010-.005<br>(0.25+0.25-.013)           | Tin/ Lead, Solder Plated over Nickel Barrier Termination   | T&R, 1000 or 500 pcs Vertical T&R, 1000 or 500 pcs Cap Pac, 100 pcs | T1K or T TV1K or TV C100 |
| 700A               | P          | CDR12BP       | A Pellet                    |   | .055+.025-.010<br>(1.40+0.64-0.25) | .055 ±.015<br>(1.40 ±0.38) |                        |  | Heavy Tin/ Lead Coated, over Nickel Barrier Termination    | T&R, 1000 or 500 pcs Vertical T&R, 1000 or 500 pcs Cap Pac, 100 pcs | T1K or T TV1K or TV C100 |
| 700A               | T          | N/A           | A Solderable Nickel Barrier |   | .055+.015-.010<br>(1.40+0.38-0.25) | .055 ±.015<br>(1.40 ±0.38) |                        |  | RoHS Compliant Tin Plated over Nickel Barrier Termination  | T&R, 1000 or 500 pcs Vertical T&R, 1000 or 500 pcs Cap Pac, 100 pcs | T1K or T TV1K or TV C100 |
| 700A               | CA         | CDR11BP       | A Gold Chip                 |   | .055+.015-.010<br>(1.40+0.38-0.25) | .055 ±.015<br>(1.40 ±0.38) |                        |  | RoHS Compliant Gold Plated over Nickel Barrier Termination | T&R, 1000 or 500 pcs Vertical T&R, 1000 or 500 pcs Cap Pac, 100 pcs | T1K or T TV1K or TV C100 |

#### NON-MAGNETIC CONFIGURATION

| Series & Case Size | Term. Code | MIL-PRF-55681      | Case Size & Type             | Non-Magnetic Configuration | Body Dimensions inches (mm)        |                            |                        | Lead and Termination Dimensions and Material |   |   |                          |
|--------------------|------------|--------------------|------------------------------|----------------------------|------------------------------------|----------------------------|------------------------|--|---|---|--------------------------|
|                    |            |                    |                              |                            | Length (L)                         | Width (W)                  | Thickness (T)          | Overlap (Y)                                  | Materials   | Pkg Type  | Pkg Code                 |
| 700A               | WN         | Meets Requirements | A Non-Mag Solder Plate       |                            | .055+.025-.010<br>(1.40+0.64-0.25) | .055 ±.015<br>(1.40 ±0.38) | .057<br>(1.45)<br>max. | .010+.010-.005<br>(0.25+0.25-.013)           | Tin/ Lead, Solder Plated over Non-Magnetic Barrier Termination  | T&R, 1000 or 500 pcs Vertical T&R, 1000 or 500 pcs Cap Pac, 100 pcs | T1K or T TV1K or TV C100 |
| 700A               | PN         | Meets Requirements | A Non-Mag Pellet             |                            | .055+.025-.010<br>(1.40+0.64-0.25) | .055 ±.015<br>(1.40 ±0.38) |                        |  | Heavy Tin/ Lead Coated, over Non-Magnetic Barrier Termination   | T&R, 1000 or 500 pcs Vertical T&R, 1000 or 500 pcs Cap Pac, 100 pcs | T1K or T TV1K or TV C100 |
| 700A               | TN         | Meets Requirements | A Non-Mag Solderable Barrier |                            | .055+.015-.010<br>(1.40+0.38-0.25) | .055 ±.015<br>(1.40 ±0.38) |                        |  | RoHS Compliant Tin Plated over Non-Magnetic Barrier Termination | T&R, 1000 or 500 pcs Vertical T&R, 1000 or 500 pcs Cap Pac, 100 pcs | T1K or T TV1K or TV C100 |

\*Capacitors with values greater than 100 pF contain a trace magnetic element that may exhibit weak magnetic properties.

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#### SUGGESTED MOUNTING PAD DIMENSIONS

Horizontal Electrode Orientation

Vertical Electrode Orientation

| Case A           |              |        |        |        |        |
|------------------|--------------|--------|--------|--------|--------|
| Mount Type       | Pad Size     | A Min. | B Min. | C Min. | D Min. |
| Vertical Mount   | Normal       | .070   | .050   | .030   | .130   |
|                  | High Density | .050   | .030   | .030   | .090   |
| Horizontal Mount | Normal       | .080   | .050   | .030   | .130   |
|                  | High Density | .060   | .030   | .030   | .090   |

Dimensions are in inches.

#### PERFORMANCE DATA

ESR VS. CAPACITANCE  
SERIES 700, CASE A



Q VS. CAPACITANCE  
SERIES 700, CASE A



ESR VS. CAPACITANCE  
SERIES 700, CASE A



Q VS. CAPACITANCE  
SERIES 700, CASE A



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#### PERFORMANCE DATA

**SERIES RESONANCE VS. CAPACITANCE**  
SERIES 700, CASE A



**CAPACITANCE CHANGE VS. TEMPERATURE**  
SERIES 700, CASE A



**CURRENT RATING VS. CAPACITANCE**  
SERIES 700, CASE A



**CURRENT RATING VS. CAPACITANCE**  
SERIES 700, CASE A



**CURRENT RATING VS. CAPACITANCE**  
SERIES 700, CASE A, EXTENDED VOLTAGE



**CURRENT RATING VS. CAPACITANCE**  
SERIES 700, CASE A, EXTENDED VOLTAGE

