

# RF/Microwave Capacitors

## RF/Microwave Multilayer Capacitors (MLC)

### 100E Series Porcelain High RF Power Multilayer Capacitors



#### GENERAL DESCRIPTION

KYOCERA AVX, the industry leader, offers new improved ESR/ESL performance for the 100 E Series RF Capacitors. This high Q multilayer capacitor is ultra-stable under high RF current and voltage applications. High density porcelain construction provides a rugged, hermetic package. KYOCERA AVX offers an encapsulation option for applications requiring extended protection against arc-over and corona.

#### FUNCTIONAL APPLICATIONS

- Bypass
- Impedance Matching
- Coupling
- DC Blocking
- Tuning

#### CIRCUIT APPLICATIONS

- HF/RF Power Amplifiers
- Plasma Chambers
- Transmitters
- Medical (MRI coils)
- Antenna Tuning

#### 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. Voltage applied. 200% of WVDC for capacitors rated at 500 volts DC or less. 120% of WVDC for capacitors rated at 1250 volts DC or less. 100% of WVDC for capacitors rated above 1250 volts DC |
| <b>Termination Styles</b>   | Available in various surface mount and leaded styles. See Mechanical Configurations  |
| <b>Terminal Strength</b>    | Terminations for chips and pellets withstand a pull of 10 lbs. min., 25 lbs. typical, for 5 seconds in direction perpendicular to the termination surface of the capacitor.  |

#### FEATURES

- Case E Size (.380" x .380")
- Capacitance Range 1pF to 5100pF
- Extended WVDC up to 7200 VDC
- Low ESR/ESL
- High Q
- High RF Power
- Ultra-Stable Performance
- High RF Current/Voltage
- Available with Encapsulation Option\*

\* For leaded styles only

#### PACKAGING OPTIONS



Tape & Reel



Tray  
(96 pcs)



#### ELECTRICAL SPECIFICATIONS

|  |  |
|--|--|
| <b>Temperature Coefficient (TCC)</b>         | 90 ± 30 PPM/°C   |
| <b>Capacitance Range</b>                     | 1 pF to 5100 pF  |
| <b>Operating Temperature</b>                 | -55°C to +125°C*   |
| <b>Quality Factor</b>                        | Greater than 10,000<br>(1 pF to 1000 pF) @ 1 MHz.<br>Greater than 10,000<br>(1100 pF to 5100 pF) @ 1 KHz.  |
| <b>Insulation Resistance (IR)</b>            | 1 pF to 5100 pF<br>10 <sup>5</sup> Megohms min. @ 25°C at 500 VDC<br>10 <sup>4</sup> Megohms min. @ 125°C at 500 VDC   |
| <b>Working Voltage (WVDC)</b>                | See Capacitance Values table   |
| <b>Dielectric Withstanding Voltage (DWV)</b> | 250% of WVDC for capacitors rated at 500 volts DC or less for 5 seconds. 150% of WVDC for capacitors rated at 1250 volts DC or less for 5 seconds. 120% of WVDC for capacitors rated above 1250 Volts DC 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   |
| <b>Retrace</b>                               | Less than ±(0.02% or 0.02 pF), whichever is greater.   |

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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. |     |
| 1R0       | 1.0       | B, C, D          | 3600       | 7200             | 5R6              | 5.6       | B, C, D | 3600       | 7200 | 470              | 47        | F, G, J, K, M | 3600       | TAGE | 391       | 390       | F, G, J, K, M | 2500       | 3600 |     |
| 1R1       | 1.1       |                  |            |                  | 6R2              | 6.2       |         |            |      | 510              | 51        |               |            |      | 431       | 430       |               |            |      |     |
| 1R2       | 1.2       |                  |            |                  | 6R8              | 6.8       |         |            |      | 560              | 56        |               |            |      | 471       | 470       |               |            |      |     |
| 1R3       | 1.3       |                  |            |                  | 7R5              | 7.5       |         |            |      | 620              | 62        |               |            |      | 511       | 510       |               |            |      |     |
| 1R4       | 1.4       |                  |            |                  | 8R2              | 8.2       |         |            |      | 680              | 68        |               |            |      | 561       | 560       |               |            |      |     |
| 1R5       | 1.5       |                  |            |                  | 9R1              | 9.1       |         |            |      | 750              | 75        |               |            |      | 621       | 620       |               |            |      |     |
| 1R6       | 1.6       |                  |            |                  | EXTENDED VOLTAGE | 7200      |         |            |      | EXTENDED VOLTAGE | 100       |               |            |      | 10        | EXTENDED  |               |            | 681  | 680 |
| 1R7       | 1.7       |                  |            |                  |                  |           |         |            |      |                  | 110       |               |            |      | 11        |           |               |            | 751  | 750 |
| 1R8       | 1.8       |                  |            |                  |                  |           |         |            |      |                  | 120       |               |            |      | 12        |           |               |            | 820  | 82  |
| 1R8       | 1.9       |                  |            |                  |                  |           |         |            |      |                  | 130       |               |            |      | 13        |           |               |            | 910  | 91  |
| 2R0       | 2.0       | 150              | 15         | 101              |                  |           | 100     |            |      |                  |           |               |            |      |           |           |               |            |      |     |
| 2R1       | 2.1       | 160              | 16         | 111              |                  |           | 110     |            |      |                  |           |               |            |      |           |           |               |            |      |     |
| 2R2       | 2.2       | 180              | 18         | 121              |                  |           | 120     |            |      |                  |           |               |            |      |           |           |               |            |      |     |
| 2R3       | 2.3       | 200              | 20         | 131              |                  |           | 130     |            |      |                  |           |               |            |      |           |           |               |            |      |     |
| 2R4       | 2.4       | 220              | 22         | 151              |                  |           | 150     |            |      |                  |           |               |            |      |           |           |               |            |      |     |
| 3R0       | 3.0       | EXTENDED VOLTAGE | 7200       | EXTENDED VOLTAGE |                  |           | 201     | 200        | EXT. |                  | 821       | 820           |            |      |           |           |               |            |      |     |
| 3R3       | 3.3       |                  |            |                  | 270              | 27        | 911     | 910        |      |                  |           |               |            |      |           |           |               |            |      |     |
| 3R6       | 3.6       |                  |            |                  | 300              | 30        | 102     | 1000       |      |                  |           |               |            |      |           |           |               |            |      |     |
| 3R9       | 3.9       |                  |            |                  | 330              | 33        | 112     | 1100       |      |                  |           |               |            |      |           |           |               |            |      |     |
| 4R3       | 4.3       |                  |            |                  | 360              | 36        | 122     | 1200       |      |                  |           |               |            |      |           |           |               |            |      |     |
| 4R7       | 4.7       |                  |            |                  | 390              | 39        | 152     | 1500       |      |                  |           |               |            |      |           |           |               |            |      |     |
| 5R1       | 5.1       |                  |            |                  | 430              | 43        | 182     | 1800       |      |                  |           |               |            |      |           |           |               |            |      |     |
|           |           |                  |            |                  |                  |           | 222     | 2200       |      |                  |           |               |            |      |           |           |               |            |      |     |
|           |           |                  |            |                  |                  |           | 272     | 2700       |      |                  |           |               |            |      |           |           |               |            |      |     |
|           |           |                  |            |                  |                  |           | 302     | 3000       |      |                  |           |               |            |      |           |           |               |            |      |     |
|           |           |                  |            | 332              | 3300             |           |         |            |      |                  |           |               |            |      |           |           |               |            |      |     |
|           |           |                  |            | 392              | 3900             |           |         |            |      |                  |           |               |            |      |           |           |               |            |      |     |
|           |           |                  |            | 472              | 4700             |           |         |            |      |                  |           |               |            |      |           |           |               |            |      |     |
|           |           |                  |            | 512              | 5100             |           |         |            |      |                  |           |               |            |      |           |           |               |            |      |     |
|           |           |                  |            |                  |                  | 500       |         |            |      |                  |           |               |            |      |           |           |               |            |      |     |

VRMS = 0.707 X WVDC

• SPECIAL VALUES, TOLERANCES, MATCHING, AND CAPACITOR ASSEMBLIES ARE AVAILABLE. • KYOCERA AVX CUSTOM POWER CAPACITOR ASSEMBLY CATALOG, LISTS ASSEMBLY OPTIONS. • DIFFERENT WORKING VOLTAGES ARE AVAILABLE • ENCAPSULATION OPTION AVAILABLE. PLEASE CONSULT FACTORY.

#### HOW TO ORDER

100 E 391 K W 3600 X T

**Series** ———— 100

**Case Size** ———— E  
See mechanical dimensions below

**Capacitance** ———— 391  
EIA Capacitance Code in pF.  
First two digits = significant figures or "R" for decimal place.  
Third digit = number of zeros or after "R" significant figures

**Capacitance Tolerance Code** ———— K

| Code | B     | C      | D     | F   | G   | J   | K    | M    |
|------|-------|--------|-------|-----|-----|-----|------|------|
| Tol. | ±1 pF | ±25 pF | ±5 pF | ±1% | ±2% | ±5% | ±10% | ±20% |

**W** ———— 3600

**Voltage Rating** ———— 3600

**Termination Style Code** ———— X  
Please see 2nd Column Mechanical Configuration Table

**Packaging** ———— T  
T = Tape and Reel, 250 pc qty. Please see last Column Mechanical Configuration Table for Box and Tray Options

**Laser Marking (Optional)** ————

The above part number refers to a 100 E Series (case size E) 390 pF capacitor, K tolerance (±10%), 3600 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 | Case Size & Type         | Outline<br>W/T is a Termination Surface | Body Dimensions inches (mm)        |                            |                        | Lead and Termination Dimensions and Material |   | Pkg Type & Qty   | Pkg Code           |            |
|--------------------|------------|--------------------------|---|------------------------------------|----------------------------|------------------------|--|---|--|--------------------|------------|
|                    |            |                          |   | Length (L)                         | Width (W)                  | Thickness (T)          | Overlap (Y)                                  | Materials   |  |                    |            |
| 100E               | W          | E<br>Solder Plate        |   | .380+.015-.010<br>(9.65+0.38-0.25) | .380 ±.010<br>(9.65 ±0.25) | .170<br>(4.32)<br>max. | .040<br>(1.02)<br>max.                       | Tin/Lead, Solder Plated over Nickel Barrier Termination             | T&R, 250 pcs<br>Tray, 24 or 96 pcs   | T<br>J24<br>J96    |            |
| 100E               | P          | E<br>Pellet              |   | .380+.040-.010<br>(9.65+1.02-0.25) |                            |                        |  | Heavy Tin/Lead Coated, over Nickel Barrier Termination              | T&R, 250 pcs<br>Tray, 24 or 96 pcs   | T<br>J24<br>J96    |            |
| 100E               | T          | E<br>Solderable Nickel   |   | .380+.015-.010<br>(9.65+0.38-0.25) |                            |                        |  | <b>RoHS Compliant</b><br>Tin Plated over Nickel Barrier Termination | T&R, 250 pcs<br>Tray, 24 or 96 pcs   | T<br>J24<br>J96    |            |
| 100E               | MS         | E<br>Microstrip          |   | .380+.035-.010<br>(9.65+0.89-0.25) |                            |                        | N/A  | N/A   | High Purity Silver Leads<br>$L_L = .750 (19.05) \text{ min}$<br>$W_L = .350 \pm .010 (8.89 \pm 0.25)$<br>$T_L = .010 \pm .005 (0.25 \pm 0.13)$<br>Leads are Attached with High Temperature Solder. | Tray, 16 or 32 pcs | J16<br>J32 |
| 100E               | AR         | E<br>Axial Ribbon        |   |                                    |                            |                        |  |   | Tray, 16 or 32 pcs   | J16<br>J32         |            |
| 100E               | AW         | E<br>Non-Mag Axial Wire  |   |                                    |                            |                        |  |   | Box, 20 pcs  | B20                |            |
| 100E               | RW         | E<br>Non-Mag Radial Wire |   |                                    |                            |                        |  |   | Tray, 16 or 64 pcs   | J16<br>J64         |            |

Custom lead styles and lengths are available; consult factory. All leads are high purity silver attached with high temperature solder and are **RoHS** compliant.

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#### MECHANICAL CONFIGURATION

| Series & Case Size | Term. Code | Case Size & Type           | Outline<br>W/T is a Termination Surface | Body Dimensions inches (mm)         |                            |                        | Lead and Termination Dimensions and Material |   | Pkg Type & Qty   | Pkg Code           |            |
|--------------------|------------|----------------------------|---|-------------------------------------|----------------------------|------------------------|--|---|--|--------------------|------------|
|                    |            |                            |   | Length (L)                          | Width (W)                  | Thickness (T)          | Overlap (Y)                                  | Materials   |  |                    |            |
| 100E               | WN         | Non-Mag Solder Plate       |   | .380±.015 -.010<br>(9.65±0.38-0.25) | .380 ±.010<br>(9.65 ±0.25) | .170<br>(4.32)<br>max. | .040<br>(1.02)<br>max.                       | Tin/Lead, Solder Plated over Non-Magnetic Barrier Termination             | T&R, 250 pcs<br>Tray, 24 or 96 pcs   | T<br>J24<br>J96    |            |
| 100E               | PN         | Non-Mag Pellet             |   | .380±.040 -.010<br>(9.65±1.02-0.25) |                            |                        |  | Heavy Tin/Lead Coated, over Non-Magnetic Barrier Termination              | T&R, 250 pcs<br>Tray, 24 or 96 pcs   | T<br>J24<br>J96    |            |
| 100E               | TN         | Non-Mag Solderable Barrier |   | .380±.015 -.010<br>(9.65±0.38-0.25) |                            |                        |  | <b>RoHS Compliant</b><br>Tin Plated over Non-Magnetic Barrier Termination | T&R, 250 pcs<br>Tray, 24 or 96 pcs   | T<br>J24<br>J96    |            |
| 100E               | MN         | Non-Mag Microstrip         |   | .380±.035 -.010<br>(9.65±0.89-0.25) |                            |                        | N/A  | N/A   | High Purity Silver Leads<br>$L_L = .750$ (19.05) min<br>$W_L = .350 \pm .010$ (8.89 ±0.25)<br>$T_L = .010 \pm .005$ (0.25 ±0.13)<br>Leads are Attached with High Temperature Solder. | Tray, 16 or 32 pcs | J16<br>J32 |
| 100E               | AN         | Non-Mag Axial Ribbon       |   |                                     |                            |                        |  |   | Tray, 16 or 32 pcs   | J16<br>J32         |            |
| 100E               | BN         | Non-Mag Axial Wire         |   |                                     |                            |                        |  |   | Box, 20 pcs  | B20                |            |
| 100E               | RN         | Non-Mag Radial Wire        |   |                                     |                            |                        |  |   | Tray, 16 or 64 pcs   | J16<br>J64         |            |

Custom lead styles and lengths are available; consult factory. All leads are high purity silver attached with high temperature solder and are **RoHS** compliant.

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#### SUGGESTED MOUNTING PAD DIMENSIONS

Horizontal Electrode Orientation

| Mount Type       | Case E       |        |        |        |        |
|------------------|--------------|--------|--------|--------|--------|
|                  | Pad Size     | A Min. | B Min. | C Min. | D Min. |
| Horizontal Mount | Normal       | .405   | .050   | .325   | .425   |
|                  | High Density | .385   | .030   | .325   | .385   |

Dimensions are in inches.

#### PERFORMANCE DATA

