

# RF/Microwave Capacitors

## RF/Microwave Multilayer Capacitors (MLC)

### 100B Series Porcelain Superchip® Multilayer Capacitors



#### FEATURES

- Case B Size (.110" x .110")
- Capacitance Range 0.1pF to 1000pF
- Extended WVDC up to 1500 VDC
- Low ESR/ESL
- High Q
- Low Noise
- Ultra-Stable Performance
- High Self-Resonance
- Established Reliability (QPL)

#### GENERAL DESCRIPTION

KYOCERA AVX, the industry leader, offers new improved ESR/ESL performance for the 100 B Series RF/Microwave Capacitors. This Series is now available with extended operating temperatures up to 175°C. High Density porcelain construction provides a rugged, hermetic package.

#### FUNCTIONAL APPLICATIONS

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

#### CIRCUIT APPLICATIONS

- UHF/Microwave RF Power Amplifiers
- Oscillators
- Low Noise Amplifiers
- Filter Networks
- Timing Circuits

#### 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 5 lbs. min., 15 lbs. typical, for 5 seconds in direction perpendicular to the termination surface of the capacitor.   |

#### PACKAGING OPTIONS



Tape & Reel



Vertical Orientation Tape & Reel



Cap Pac® (100 pcs)



#### ELECTRICAL SPECIFICATIONS

|  |   |
|--|---|
| <b>Temperature Coefficient (TCC)</b>         | +90 ±20 PPM/°C (-55°C to +125°C)<br>+90 ±30 PPM/°C (+125°C to +175°C)   |
| <b>Capacitance Range</b>                     | 0.1pF to 1000pF   |
| <b>Operating Temperature</b>                 | -55°C to +125°C*  |
| <b>Quality Factor</b>                        | greater than 10,000 at 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 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. |     |      |       |
| 0R1       | 0.1       | B                | 500              | 1500 | 2R4              | 2.4       | B, C, D | 500        | 1500 | 200       | 20        | F, G, J, K, M | 500        | 1500 | 151       | 150       | F, G, J, K, M | 300        | EXT. |     |      |       |
| 0R2       | 0.2       |                  |                  |      | 2R7              | 2.7       |         |            |      | 220       | 22        |               |            |      | 161       | 160       |               |            |      |     |      |       |
| 0R3       | 0.3       | B, C             |                  |      | EXTENDED VOLTAGE | 3R0       |         |            |      | 3.0       | 240       |               |            |      | 24        | 181       |               |            |      | 180 | 1000 |       |
| 0R4       | 0.4       |                  |                  |      |                  | 3R3       |         |            |      | 3.3       | 270       |               |            |      | 27        | 201       |               |            |      | 200 |      |       |
| 0R5       | 0.5       | EXTENDED VOLTAGE |                  |      |                  | 3R6       |         |            |      | 3.6       | 300       |               |            |      | 30        | 221       |               |            |      | 220 |      | VOLT. |
| 0R6       | 0.6       |                  |                  |      |                  | 3R9       |         |            |      | 3.9       | 330       |               |            |      | 33        | 241       |               |            |      | 240 |      |       |
| 0R7       | 0.7       |                  |                  |      |                  | 4R3       |         |            |      | 4.3       | 360       |               |            |      | 36        | 271       |               | 270        | EXT. |     |      |       |
| 0R8       | 0.8       |                  |                  |      |                  | 4R7       |         |            |      | 4.7       | 390       |               |            |      | 39        | 301       |               | 300        |      |     |      |       |
| 0R9       | 0.9       |                  |                  |      |                  | 5R1       |         |            |      | 5.1       | 430       |               |            |      | 43        | 331       |               | 330        |      | 200 |      |       |
| 1R0       | 1.0       |                  |                  |      |                  | 5R6       |         |            |      | 5.6       | 470       |               |            |      | 47        | 361       |               | 360        |      |     |      |       |
| 1R1       | 1.1       |                  |                  |      |                  | B, C, D   |         |            |      | 6R2       | 6.2       |               |            |      | 510       | 51        |               | 391        |      |     | 390  | VOLT. |
| 1R2       | 1.2       |                  |                  |      |                  |           |         |            |      | 6R8       | 6.8       |               |            |      | 560       | 56        |               | 431        |      |     | 430  |       |
| 1R3       | 1.3       |                  | EXTENDED VOLTAGE | 7R5  |                  |           | 7.5     | 620        | 62   | 471       | 470       | EXT.          |            |      |           |           |               |            |      |     |      |       |
| 1R4       | 1.4       |                  |                  | 8R2  |                  |           | 8.2     | 680        | 68   | 511       | 510       |               |            |      |           |           |               |            |      |     |      |       |
| 1R5       | 1.5       |                  |                  | 9R1  | 9.1              |           | 750     | 75         | 561  | 560       | 100       |               |            |      |           |           |               |            |      |     |      |       |
| 1R6       | 1.6       |                  |                  | 100  | 10               |           | 820     | 82         | 621  | 620       |           |               |            |      |           |           |               |            |      |     |      |       |
| 1R7       | 1.7       | 110              |                  | 11   | 910              |           | 91      | 681        | 680  | 300       |           |               |            |      |           |           |               |            |      |     |      |       |
| 1R8       | 1.8       | 120              |                  | 12   | 101              |           | 100     | 751        | 750  |           |           |               |            |      |           |           |               |            |      |     |      |       |
| 1R9       | 1.9       | F, G, J, K, M    |                  | 130  | 13               |           | 111     | 110        | 821  |           |           | 820           | 50         |      |           |           |               |            |      |     |      |       |
| 2R0       | 2.0       |                  |                  | 150  | 15               |           | 121     | 120        | 911  |           |           | 910           |            |      |           |           |               |            |      |     |      |       |
| 2R1       | 2.1       |                  |                  | 160  | 16               |           | 131     | 130        | 102  |           | 1000      | VOLT          |            |      |           |           |               |            |      |     |      |       |
| 2R2       | 2.2       |                  |                  | 180  | 18               |           |         |            |      |           |           |               |            |      |           |           |               |            |      |     |      |       |

VRMS = 0.707 X WVDC

• SPECIAL VALUES, TOLERANCES, DIFFERENT WVDC AND MATCHING AVAILABLE. • ENCAPSULATION OPTION AVAILABLE. PLEASE CONSULT FACTORY. NOTE: EXTENDED WVDC DOES NOT APPLY TO CDR PRODUCTS.

## HOW TO ORDER

**Series** 100    **Case Size** B    **Capacitance** 910    **Termination Style Code** J    **Voltage Rating** W    **Rated WVDC** 500    **Termination Style Code** X    **Packaging** T

See mechanical dimensions below

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**

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

**Packaging**  
 T = Tape and Reel, 500 pc qty  
 TV = Vertical Tape and Reel, 500 pc qty  
 Please see last column of mechanical configuration table for other options.

**Laser Marking (Optional)**  
**Voltage Rating**  
**Termination Style Code**  
 Please see 2nd Column Mechanical Configuration Table

The above part number refers to a 100 B Series (case size B) 91 pF capacitor, J tolerance (±5%), 500 WVDC, with W termination (Tin /Lead, Solder Plated over Nickel Barrier), laser marking and Tape and Reel packaging.

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## RF/Microwave Multilayer Capacitors (MLC)

### 100B Series Porcelain Superchip® Multilayer Capacitors



#### MECHANICAL CONFIGURATION

| Series & Case Size | Term. Code | MIL-PRF-55681 | Case Size & Type  | Outline W/T is a Termination Surface | Body Dimensions inches (mm)            |                            |                            | Lead and Termination Dimensions and Material |  |                                   | Pkg Type  | Pkg Code                 |             |             |
|--------------------|------------|---------------|-------------------|--------------------------------------|--|----------------------------|----------------------------|--|--|-----------------------------------|---|--------------------------|-------------|-------------|
|                    |            |               |                   |                                      | Length (L)                             | Width (W)                  | Thickness (T)              | Overlap (Y)                                  | Materials  |                                   |   |                          |             |             |
| 100B               | W          | CDR14BG       | Solder Plate      |                                      | .110+ .020 - .01<br>(2.79 + 0.51-0.25) | .110 ±.015<br>(2.79 ±0.38) | .102<br>(2.59)<br>max.     | .015 (0.38)<br>±.010 (0.25)                  | 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 |             |             |
| 100B               | P          | CDR14BG       | Pellet            |                                      | .110+ .035 - .01<br>(2.79 + 0.89-0.25) | .110 ±.015<br>(2.79 ±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 |             |             |
| 100B               | T          | N/A           | Solderable Nickel |                                      | .110+ .035 - .01<br>(2.79 + 0.51-0.25) | .110 ±.015<br>(2.79 ±0.38) |                            |  | <b>RoHS Compliant</b><br>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 |             |             |
| 100B               | CA         | CDR13BG       | Gold Chip         |                                      | .110+.020 - .010<br>(2.79 + 0.51-0.25) | .110 ±.015<br>(2.79 ±0.38) |                            |  | <b>RoHS Compliant</b><br>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 |             |             |
| 100B               | MS         | CDR21BG       | Microstrip        |                                      | .135 ±.015<br>(3.43 ±0.38)             | .110 ±.015<br>(2.79 ±0.38) | .120 (3.05)<br>max.        | N/A  | Length (L <sub>L</sub> )   | Width (W <sub>L</sub> )           | Thickness (T <sub>L</sub> )   | Cap Pac, 20 pcs          | C20         |             |
| 100B               | AR         | CDR22BG       | Axial Ribbon      |                                      |  |                            | .250 (6.35)<br>min.        |  | .093±.005<br>(2.36 ±0.13)  | .004 ± .001<br>(.102±.025)        | Box, 20 or 100 pcs  |                          | B20 or B100 |             |
| 100B               | RR         | CDR24BG       | Radial Ribbon     |                                      |  |                            | .145 ±.020<br>(3.68 ±0.51) |  | .102 (2.59)<br>max.  | #26 AWG, .016 (.406) dia. nominal |   | Box, 20 or 100 pcs       |             | B20 or B100 |
| 100B               | RW         | CDR23BG       | Radial Wire       |                                      |  |                            |                            |  |  | Box, 20 or 100 pcs                |   | B20 or B100              |             |             |
| 100B               | AW         | CDR25BG       | Axial Wire        |                                      | Box, 20 or 100 pcs                     |                            | B20 or B100                |  |  |                                   |   |                          |             |             |

Additional lead styles available: Narrow Microstrip (NM), Narrow Axial Ribbon (NA) and Vertical Narrow Microstrip (H). Other lead lengths are available; consult factory. All leads are high purity silver attached with high temperature solder and are **RoHS** compliant.

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#### NON-MAGNETIC MECHANICAL CONFIGURATION

| Series & Case Size | Term. Code | MIL-PRF-55681      | Case Size & Type           | Outline W/T is a Termination Surface | Body Dimensions inches (mm)            |                            |                        | Lead and Termination Dimensions and Material |   |                           | Pkg Type  | Pkg Code                       |  |
|--------------------|------------|--------------------|----------------------------|--------------------------------------|--|----------------------------|------------------------|--|---|---------------------------|---|--------------------------------|--|
|                    |            |                    |                            |                                      | Length (L)                             | Width (W)                  | Thickness (T)          | Overlap (Y)                                  | Materials   |                           |   |                                |  |
| 100B               | WN         | Meets Requirements | Non-Mag                    |                                      | .110+ .020 - .01<br>(2.79 + 0.51-0.25) | .110 ±.015<br>(2.79 ±0.38) | .102<br>(2.59)<br>max. | .015 (0.38)<br>±.010 (0.25)                  | Tin / Lead, Solder Plated over Nickel Barrier Termination                 |                           | T&R, 1000 or 500 pcs<br>Vertical T&R, 1000 or 500 pcs<br>Cap Pac, 100 pcs | T1K or T<br>TV1K or TV<br>C100 |  |
| 100B               | PN         | Meets Requirements | Solderable Nickel          |                                      | .110+ .035 - .01<br>(2.79 + 0.51-0.25) | .110 ±.015<br>(2.79 ±0.38) |                        |  | Heavy Tin / Lead, Coated over Non-Magnetic Barrier Termination            |                           | T&R, 1000 or 500 pcs<br>Vertical T&R, 1000 or 500 pcs<br>Cap Pac, 100 pcs | T1K or T<br>TV1K or TV<br>C100 |  |
| 100B               | TN         | Meets Requirements | Non-Mag Solderable Barrier |                                      | .110+.020 - .010<br>(2.79 + 0.51-0.25) | .110 ±.015<br>(2.79 ±0.38) |                        |  | <b>RoHS Compliant</b><br>Tin Plated over Non-Magnetic Barrier Termination |                           | T&R, 1000 or 500 pcs<br>Vertical T&R, 1000 or 500 pcs<br>Cap Pac, 100 pcs | T1K or T<br>TV1K or TV<br>C100 |  |
| 100B               | MN         | Meets Requirements | Microstrip                 |                                      | .135 ±.015<br>(3.43 ±0.38)             | .110 ±.015<br>(2.79 ±0.38) | .120<br>(3.05)<br>max. | N/A  | Length (L <sub>L</sub> )  | Width (W <sub>L</sub> )   | Thickness (T <sub>L</sub> )   | Cap Pac, 20 pcs                | C20                                      |
| 100B               | AN         | Meets Requirements | Axial Ribbon               |                                      |  |                            |                        |  | .250 (6.35)<br>(6.35) min.  | .093±.005<br>(2.36 ±0.13) | .004 ± .001<br>(.102±.025)  | Box, 20 or 100 pcs             | B20 or B100                              |
| 100B               | FN         | Meets Requirements | Radial Ribbon              |                                      |  |                            |                        |  | .145 ±.020<br>(3.68 ±0.51)  | .102<br>(2.59)<br>max.    | N/A   | .500 (12.7)                    | #26 AWG.,<br>.016 (.406) dia.<br>nominal |
| 100B               | RN         | Meets Requirements | Radial Wire                |                                      | Box, 20 or 100 pcs                     | B20 or B100                |                        |  |   |                           |   |                                |  |
| 100B               | BN         | Meets Requirements | Axial Wire                 |                                      |  |                            |                        |  |   |                           | Box, 20 or 100 pcs  | B20 or B100                    |  |

Additional lead styles available: Narrow Microstrip (NM), Narrow Axial Ribbon (NA) and Vertical Narrow Microstrip (H). Other lead lengths are available; consult factory. All leads are high purity silver attached with high temperature solder and are **RoHS** compliant.

**SUGGESTED MOUNTING PAD DIMENSIONS**

Horizontal  
Electrode Orientation

Vertical  
Electrode Orientation

**Case B Vertical Mount**

| Cap Value     | Pad Size     | A Min. | B Min. | C Min. | D Min. |
|---------------|--------------|--------|--------|--------|--------|
| 0.1 pF        | Normal       | .065   | .050   | .075   | .175   |
|               | High Density | .045   | .030   | .075   | .135   |
| 0.2 pF        | Normal       | .090   | .050   | .075   | .175   |
|               | High Density | .070   | .030   | .075   | .135   |
| 0.3 to 510 pF | Normal       | .110   | .050   | .075   | .175   |
|               | High Density | .090   | .030   | .075   | .135   |
| > 510 pF      | Normal       | .120   | .050   | .075   | .175   |
|               | High Density | .100   | .030   | .075   | .135   |

**Horizontal Mount**

| All Values | Pad Size     | A Min. | B Min. | C Min. | D Min. |
|------------|--------------|--------|--------|--------|--------|
| All Values | Normal       | .130   | .050   | .075   | .175   |
|            | High Density | .110   | .030   | .075   | .135   |

**PERFORMANCE DATA**



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### 100B Series Porcelain Superchip® Multilayer Capacitors



#### PERFORMANCE DATA

**SERIES RESONANCE VS. CAPACITANCE**  
SERIES 100, CASE B



**CAPACITANCE CHANGE VS. TEMPERATURE**  
SERIES 100, CASE B



**CURRENT RATING VS. CAPACITANCE**  
SERIES 100, CASE B



**CURRENT RATING VS. CAPACITANCE**  
SERIES 100, CASE B

