

## Lower Voltage Ceramic Singlelayer DC Disc Capacitors 1 kV<sub>DC</sub> to 3 kV<sub>DC</sub> Low Dissipation Factor


**RoHS**  
COMPLIANT

**FEATURES**

- Low losses
- High stability
- Low DF minimizes self heating at HF
- Ideal for high switching to 100 kHz
- Radial leads
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)

**APPLICATIONS**

- SMPS
- HF ballast
- Snubber and HV circuits

**DESIGN**

The capacitors consist of a ceramic disc of which both sides are silver-plated. Connection leads are made of tinned copper having diameters of 0.022" (0.51 mm) or 0.025" (0.64 mm).

The capacitors may be supplied with radial kinked or straight leads having lead spacing of 0.250" (6.35 mm) or 0.375" (9.5 mm).

The standard tolerances are  $\pm 5\%$ ,  $\pm 10\%$ .

Coating is made of flammable retardant epoxy resin in accordance with "UL 94 V-0".

**CAPACITANCE RANGE**

10 pF to 6800 pF

**RATED VOLTAGE**

1000 V<sub>DC</sub> (500 V<sub>RMS</sub>)  
 2000 V<sub>DC</sub> (1000 V<sub>RMS</sub>)  
 3000 V<sub>DC</sub> (1500 V<sub>RMS</sub>)

**DIELECTRIC STRENGTH BETWEEN LEADS**

Component test:

1000 V<sub>DC</sub>      2500 V<sub>DC</sub>, 2 s  
 2000 V<sub>DC</sub>      4000 V<sub>DC</sub>, 2 s  
 3000 V<sub>DC</sub>      6000 V<sub>DC</sub>, 2 s

**CERAMIC DIELECTRIC**

C0G, N1500, N2000, N2200, N2500, N2800 (Class 1)

| QUICK REFERENCE DATA       |  |      |      |
|----------------------------|--|------|------|
| DESCRIPTION                | VALUE                                  |      |      |
| Ceramic Class              | 1                                      |      |      |
| Ceramic Dielectric         | C0G, N1500, N2000, N2200, N2500, N2800 |      |      |
| Voltage (V <sub>DC</sub> ) | 1000                                   | 2000 | 3000 |
| Min. Capacitance (pF)      | 10                                     | 10   | 10   |
| Max. Capacitance (pF)      | 6800                                   | 6800 | 4700 |
| Mounting                   | Radial                                 |      |      |

**INSULATION RESISTANCE**

Min. 50 000 M $\Omega$

**TOLERANCE ON CAPACITANCE**

$\pm 5\%$ ,  $\pm 10\%$

**DISSIPATION FACTOR**

0.1 % max. at 1 kHz; 1 V

**CATEGORY TEMPERATURE RANGE**

-55 °C to +125 °C

**CLIMATIC CATEGORY ACC. TO EN 60068-1**

55/125/21

**OPERATING TEMPERATURE RANGE**

-55 °C to +105 °C



| <b>ORDERING INFORMATION, CERAMIC 1 kV<sub>DC</sub> LOW DISSIPATION FACTOR</b> |              |  |   |   |  |           |              |      |                  |             |             |
|---|--------------|--|---|---|--|-----------|--------------|------|------------------|-------------|-------------|
| C<br>(pF)   | TOL.<br>(%)  | D <sub>max.</sub><br>DIAMETER<br>INCH (mm) | T <sub>max.</sub><br>THICKNESS<br>INCH (mm) | LS<br>LEAD SPACE<br>INCH (mm)<br>± 1 mm | LO<br>LEAD OFFSET<br>INCH (mm)<br>± 0.5 mm | WIRE SIZE |              | FIG. | ORDERING<br>CODE |             |             |
|   |              |  |   |   |  | AWG       | INCH (mm)    |      |                  |             |             |
| <b>C0G (NPO)</b>  |              |  |   |   |  |           |              |      |                  |             |             |
| 10  | ± 5          | 0.250 (6.4)                                | 0.156 (4.0)                                 | 0.250 (6.4)                             | 0.043 (1.1)                                | 22        | 0.025 (0.64) | 1    | 561R1DF0Q10      |             |             |
| 12  |              |  |   |   | 0.051 (1.3)                                |           |              |      | 561R1DF0Q12      |             |             |
| <b>N1500</b>  |              |  |   |   |  |           |              |      |                  |             |             |
| 22  | ± 5          | 0.250 (6.4)                                | 0.156 (4.0)                                 | 0.250 (6.4)                             | 0.043 (1.1)                                | 22        | 0.025 (0.64) | 1    | 561R1DF0Q22      |             |             |
| 47  |              |  |   |   | 0.071 (1.8)                                |           |              |      | 561R1DF0Q47      |             |             |
| 56  |              |  |   |   | 0.055 (1.4)                                |           |              |      | 561R1DF0Q56      |             |             |
| 68  |              |  |   |   | 0.059 (1.5)                                |           |              |      | 561R1DF0Q68      |             |             |
| 82  |              |  |   |   | 0.047 (1.2)                                |           |              |      | 561R1DF0Q82      |             |             |
| <b>N2200</b>  |              |  |   |   |  |           |              |      |                  |             |             |
| 33  | ± 10         | 0.250 (6.4)                                | 0.156 (4.0)                                 | 0.250 (6.4)                             | 0.043 (1.1)                                | 22        | 0.025 (0.64) | 1    | 561R1DF0Q33      |             |             |
| <b>N2000</b>  |              |  |   |   |  |           |              |      |                  |             |             |
| 100   | ± 10         | 0.250 (6.4)                                | 0.156 (4.0)                                 | 0.250 (6.4)                             | 0.059 (1.5)                                | 22        | 0.025 (0.64) | 1    | 561R1DF0T10      |             |             |
| 120   |              |  |   |   | 0.055 (1.4)                                |           |              |      | 561R1DF0T12      |             |             |
| 150   |              |  |   |   | 0.043 (1.1)                                |           |              |      | 561R1DF0T15      |             |             |
| 180   |              |  |   |   | 0.043 (1.1)                                |           |              |      | 561R1DF0T18      |             |             |
| <b>N2500</b>  |              |  |   |   |  |           |              |      |                  |             |             |
| 220   | ± 10         | 0.250 (6.4)                                | 0.156 (4.0)                                 | 0.250 (6.4)                             | 0.059 (1.5)                                | 22        | 0.025 (0.64) | 1    | 561R1DF0T22      |             |             |
| 270   |              |  |   |   | 0.043 (1.1)                                |           |              |      | 561R1DF0T27      |             |             |
| <b>N2800</b>  |              |  |   |   |  |           |              |      |                  |             |             |
| 330   | ± 10         | 0.250 (6.4)                                | 0.156 (4.0)                                 | 0.250 (6.4)                             | 0.047 (1.2)                                | 22        | 0.025 (0.64) | 1    | 561R1DF0T33      |             |             |
| 390   |              |  |   |   | 0.047 (1.2)                                |           |              |      | 561R1DF0T39      |             |             |
| 470   |              |  |   |   | 0.290 (7.4)                                |           |              |      | 0.059 (1.5)      | 561R1DF0T47 |             |
| 560   |              |  |   |   |  |           |              |      | 0.055 (1.4)      | 561R1DF0T56 |             |
| 680   |              |  |   |   |  |           |              |      | 0.047 (1.2)      | 561R1DF0T68 |             |
| 820   |              |  |   |   |  |           |              |      | 0.043 (1.1)      | 561R1DF0T82 |             |
| 1000  |              | 0.370 (9.4)                                |   |   | 0.055 (1.4)                                |           |              |      | 561R1DF0D10      |             |             |
| 1200  |              |  |   |   | 0.047 (1.2)                                |           |              |      | 561R1DF0D12      |             |             |
| 1500  |              |  |   |   | 0.047 (1.2)                                |           |              |      | 561R1DF0D15      |             |             |
| 1800  |              |  |   |   | 0.051 (1.3)                                |           |              |      | 561R1DF0D18      |             |             |
| 2200  |              |  |   |   | 0.047 (1.2)                                |           |              |      | 561R1DF0D22      |             |             |
| 2700  |              |  |   |   | 0.047 (1.2)                                |           |              |      | 561R1DF0D27      |             |             |
| 3300  |              | 0.530 (13.5)                               |   |   | 0.047 (1.2)                                |           |              |      | 561R1DF0D33      |             |             |
| 3900  |              | 0.560 (14.2)                               |   |   | 0.156 (4.0)                                |           |              |      | 0.375 (9.5)      | 0.047 (1.2) | 561R1DF0D39 |
| 4700  |              | 0.630 (16.0)                               |   |   |  |           |              |      |                  | 0.047 (1.2) | 561R1DF0D47 |
| 5600  |              | 0.680 (17.3)                               |   |   |  |           |              |      |                  | 0.047 (1.2) | 561R1DF0D56 |
| 6800  | 0.760 (19.3) | 0.047 (1.2)                                | 561R1DF0D68                                 |   |  |           |              |      |                  |             |             |

**Note**

- Alternate lead spacings of 5 mm, 7.5 mm or 10 mm are available on request.



| ORDERING INFORMATION, CERAMIC 2 kV <sub>DC</sub> LOW DISSIPATION FACTOR |             |  |   |   |  |           |              |      |                  |             |             |
|---|-------------|--|---|---|--|-----------|--------------|------|------------------|-------------|-------------|
| C<br>(pF)   | TOL.<br>(%) | D <sub>max.</sub><br>DIAMETER<br>INCH (mm) | T <sub>max.</sub><br>THICKNESS<br>INCH (mm) | LS<br>LEAD SPACE<br>INCH (mm)<br>± 1 mm | LO<br>LEAD OFFSET<br>INCH (mm)<br>± 0.5 mm | WIRE SIZE |              | FIG. | ORDERING<br>CODE |             |             |
|   |             |  |   |   |  | AWG       | INCH (mm)    |      |                  |             |             |
| <b>N1500</b>  |             |  |   |   |  |           |              |      |                  |             |             |
| 33  | ± 5         | 0.290 (7.4)                                | 0.195 (5.0)                                 | 0.250 (6.4)                             | 0.098 (2.5)                                | 20        | 0.032 (0.81) | 1    | 564R2DF0Q33      |             |             |
| 39  |             |  | 0.180 (4.6)                                 |   | 0.083 (2.1)                                |           |              |      | 564R2DF0Q39      |             |             |
| 47  |             |  | 0.170 (4.3)                                 |   | 0.071 (1.8)                                |           |              |      | 564R2DF0Q47      |             |             |
| <b>N2000</b>  |             |  |   |   |  |           |              |      |                  |             |             |
| 56  | ± 5         | 0.290 (7.4)                                | 0.210 (5.3)                                 | 0.250 (6.4)                             | 0.110 (2.8)                                | 20        | 0.032 (0.81) | 1    | 564R2DF0Q56      |             |             |
| 68  |             |  | 0.190 (4.8)                                 |   | 0.091 (2.3)                                |           |              |      | 564R2DF0Q68      |             |             |
| 82  |             |  | 0.175 (4.5)                                 |   | 0.075 (1.9)                                |           |              |      | 564R2DF0Q82      |             |             |
| 100   |             |  | 0.170 (4.3)                                 |   | 0.071 (1.8)                                |           |              |      | 564R2DF0T10      |             |             |
| <b>N2500</b>  |             |  |   |   |  |           |              |      |                  |             |             |
| 120   | ± 10        | 0.290 (7.4)                                | 0.185 (4.7)                                 | 0.250 (6.4)                             | 0.087 (2.2)                                | 20        | 0.032 (0.81) | 1    | 564R2DF0T12      |             |             |
| 150   |             |  | 0.170 (4.3)                                 |   | 0.071 (1.8)                                |           |              |      | 564R2DF0T15      |             |             |
| 180   |             |  | 0.185 (4.7)                                 |   | 0.071 (1.8)                                |           |              |      | 564R2DF0T18      |             |             |
| 270   |             |  | 0.330 (8.4)                                 |   | 0.170 (4.3)                                |           |              |      | 0.079 (2.0)      | 564R2DF0T27 |             |
| 470   |             |  | 0.400 (10.2)                                |   | 0.170 (4.3)                                |           |              |      | 0.075 (1.9)      | 564R2DF0T47 |             |
| <b>N2800</b>  |             |  |   |   |  |           |              |      |                  |             |             |
| 220   | ± 10        | 0.290 (7.4)                                | 0.170 (4.3)                                 | 0.250 (6.4)                             | 0.087 (2.2)                                | 20        | 0.032 (0.81) | 1    | 564R2DF0T22      |             |             |
| 330   |             | 0.330 (8.4)                                | 0.185 (4.7)                                 |   | 0.083 (2.1)                                |           |              |      | 564R2DF0T33      |             |             |
| 390   |             | 0.330 (8.4)                                | 0.175 (4.5)                                 |   | 0.075 (1.9)                                |           |              |      | 564R2DF0T39      |             |             |
| 560   |             | 0.400 (10.2)                               | 0.185 (4.7)                                 |   | 0.087 (2.2)                                |           |              |      | 564R2DF0T56      |             |             |
| 680   |             | 0.400 (10.2)                               | 0.170 (4.3)                                 |   | 0.075 (1.9)                                |           |              |      | 564R2DF0T68      |             |             |
| 820   |             | 0.430 (10.9)                               | 0.175 (4.5)                                 |   | 0.075 (1.9)                                |           |              |      | 564R2DF0T82      |             |             |
| 1000  |             | 0.460 (11.7)                               | 0.170 (4.3)                                 |   | 0.075 (1.9)                                |           |              |      | 564R2DF0D10      |             |             |
| 1500  |             | 0.530 (13.5)                               |   |   | 0.071 (1.8)                                |           |              |      | 564R2DF0D15      |             |             |
| 1800  |             | 0.560 (14.2)                               | 0.170 (4.3)                                 |   | 0.071 (1.8)                                |           |              |      | 564R2DF0D18      |             |             |
| 2200  |             | 0.680 (17.3)                               | 0.170 (4.3)                                 |   | 0.180 (4.6)                                |           |              |      | 0.375 (9.5)      | 0.083 (2.1) | 564R2DF0D22 |
| 2300  |             |  |   | 0.175 (4.5)                             | 0.079 (2.0)                                |           |              |      |                  | 564R2DF0D23 |             |
| 2400  |             |  |   | 0.175 (4.5)                             | 0.075 (1.9)                                |           |              |      |                  | 564R2DF0D24 |             |
| 2700  |             |  |   | 0.170 (4.3)                             | 0.071 (1.8)                                |           |              |      |                  | 564R2DF0D27 |             |
| 3300  |             |  |   | 0.720 (18.3)                            | 0.170 (4.3)                                |           |              |      |                  | 0.071 (1.8) | 564R2DF0D33 |
| 3900  |             |  |   | 0.790 (20.1)                            | 0.170 (4.3)                                |           |              |      |                  | 0.075 (1.9) | 564R2DF0D39 |
| 4700  |             | 0.900 (22.9)                               | 0.180 (4.6)                                 | 0.083 (2.1)                             | 564R2DF0D47                                |           |              |      |                  |             |             |
| 5600  |             | 0.900 (22.9)                               | 0.170 (4.3)                                 | 0.075 (1.9)                             | 564R2DF0D56                                |           |              |      |                  |             |             |
| 6800  |             | 0.950 (24.1)                               | 0.170 (4.3)                                 | 0.071 (1.8)                             | 564R2DF0D68                                |           |              |      |                  |             |             |

**Note**

- Alternate lead spacings of 5 mm, 7.5 mm or 10 mm are available on request.



| ORDERING INFORMATION, CERAMIC 3 kV <sub>DC</sub> LOW DISSIPATION FACTOR |             |  |   |   |  |           |              |      |                  |             |
|---|-------------|--|---|---|--|-----------|--------------|------|------------------|-------------|
| C<br>(pF)   | TOL.<br>(%) | D <sub>max.</sub><br>DIAMETER<br>INCH (mm) | T <sub>max.</sub><br>THICKNESS<br>INCH (mm) | LS<br>LEAD SPACE<br>INCH (mm)<br>± 1 mm | LO<br>LEAD OFFSET<br>INCH (mm)<br>± 0.5 mm | WIRE SIZE |              | FIG. | ORDERING<br>CODE |             |
|   |             |  |   |   |  | AWG       | INCH (mm)    |      |                  |             |
| <b>N1500</b>  |             |  |   |   |  |           |              |      |                  |             |
| 10  | ± 5         | 0.290 (7.4)                                | 0.185 (4.7)                                 | 0.250 (6.4)                             | 0.087 (2.2)                                | 20        | 0.032 (0.81) | 1    | 564R3DF0Q10      |             |
| 27  |             |  | 0.220 (5.6)                                 |   | 0.122 (3.1)                                |           |              |      | 564R3DF0Q27      |             |
| 33  |             |  | 0.195 (5.0)                                 |   | 0.098 (2.5)                                |           |              |      | 564R3DF0Q33      |             |
| 39  |             |  | 0.190 (4.8)                                 |   | 0.094 (2.4)                                |           |              |      | 564R3DF0Q39      |             |
| 47  |             |  | 0.225 (5.7)                                 |   | 0.126 (3.2)                                |           |              |      | 564R3DF0Q47      |             |
| <b>N2200</b>  |             |  |   |   |  |           |              |      |                  |             |
| 12  | ± 5         | 0.290 (7.4)                                | 0.210 (5.3)                                 | 0.250 (6.4)                             | 0.110 (2.8)                                | 20        | 0.032 (0.81) | 1    | 564R3DF0Q12      |             |
| 22  |             | 0.330 (8.4)                                | 0.210 (5.3)                                 |   | 0.110 (2.8)                                |           |              |      | 564R3DF0Q22      |             |
| <b>N2000</b>  |             |  |   |   |  |           |              |      |                  |             |
| 56  | ± 5         | 0.290 (7.4)                                | 0.210 (5.3)                                 | 0.250 (6.4)                             | 0.110 (2.8)                                | 20        | 0.032 (0.81) | 1    | 564R3DF0Q56      |             |
| 68  |             |  | 0.190 (4.8)                                 |   | 0.098 (2.5)                                |           |              |      | 564R3DF0Q68      |             |
| 82  |             |  | 0.185 (4.7)                                 |   | 0.091 (2.3)                                |           |              |      | 564R3DF0Q82      |             |
| <b>N2500</b>  |             |  |   |   |  |           |              |      |                  |             |
| 100   | ± 10        | 0.290 (7.4)                                | 0.205 (5.2)                                 | 0.250 (6.4)                             | 0.106 (2.7)                                | 20        | 0.032 (0.81) | 1    | 564R3DF0T10      |             |
| 120   |             | 0.290 (7.4)                                | 0.190 (4.8)                                 |   | 0.091 (2.3)                                |           |              |      | 564R3DF0T12      |             |
| 220   |             | 0.330 (8.4)                                | 0.190 (4.8)                                 |   | 0.091 (2.3)                                |           |              |      | 564R3DF0T22      |             |
| <b>N2800</b>  |             |  |   |   |  |           |              |      |                  |             |
| 150   | ± 10        | 0.290 (7.4)                                | 0.200 (5.1)                                 | 0.250 (6.4)                             | 0.091 (2.3)                                | 20        | 0.032 (0.81) | 1    | 564R3DF0T15      |             |
| 180   |             | 0.290 (7.4)                                | 0.190 (4.8)                                 |   | 0.091 (2.3)                                |           |              |      | 564R3DF0T18      |             |
| 270   |             | 0.330 (8.4)                                | 0.205 (5.2)                                 |   | 0.110 (2.8)                                |           |              |      | 564R3DF0T27      |             |
| 330   |             | 0.330 (8.4)                                | 0.190 (4.8)                                 |   | 0.091 (2.3)                                |           |              |      | 564R3DF0T33      |             |
| 390   |             | 0.400 (10.2)                               | 0.215 (5.5)                                 |   | 0.102 (2.6)                                |           |              |      | 564R3DF0T39      |             |
| 470   |             | 0.400 (10.2)                               | 0.195 (5.0)                                 |   | 0.087 (2.2)                                |           |              |      | 564R3DF0T47      |             |
| 560   |             | 0.430 (10.9)                               | 0.200 (5.1)                                 |   | 0.102 (2.6)                                |           |              |      | 564R3DF0T56      |             |
| 680   |             | 0.460 (11.7)                               | 0.195 (5.0)                                 |   | 0.087 (2.2)                                |           |              |      | 564R3DF0T68      |             |
| 820   |             | 0.490 (12.5)                               | 0.195 (5.0)                                 |   | 0.102 (2.6)                                |           |              |      | 564R3DF0T82      |             |
| 1000  |             | 0.530 (13.5)                               | 0.190 (4.8)                                 | 0.091 (2.3)                             | 564R3DF0D10                                |           |              |      |                  |             |
| 1200  |             | 0.560 (14.2)                               | 0.190 (4.8)                                 | 0.375 (9.5)                             | 0.091 (2.3)                                |           |              |      | 564R3DF0D12      |             |
| 1500  |             | 0.620 (15.8)                               |   |   | 0.091 (2.3)                                |           |              |      | 564R3DF0D15      |             |
| 1800  |             | 0.680 (17.3)                               |   |   | 0.098 (2.5)                                |           |              |      | 564R3DF0D18      |             |
| 2200  |             | 0.720 (18.3)                               |   |   | 0.094 (2.4)                                |           |              |      | 564R3DF0D22      |             |
| 2700  |             | 0.790 (20.1)                               |   |   | 0.190 (4.8)                                |           |              |      | 0.087 (2.2)      | 564R3DF0D27 |
| 3300  |             | 0.900 (22.9)                               |   |   | 0.200 (5.1)                                |           |              |      | 0.102 (2.6)      | 564R3DF0D33 |
| 4700  |             | 0.950 (24.1)                               |   |   | 0.185 (4.7)                                |           |              |      | 0.087 (2.2)      | 564R3DF0D47 |

**Note**

- Alternate lead spacings of 5 mm, 7.5 mm or 10 mm are available on request.

**TAPE AND REEL OPTIONS**

Part number codes and specifications for tape and reel packaging are found in the general information document - find web-link below.



Power Rating - 1DFO Series 500 V<sub>RMS</sub> Low DF - Note 1



Note 2

Power Rating - 2DFO Series 1000 V<sub>RMS</sub> Low DF - Note 1



Note 2

Power Rating - 3DFO Series 1500 V<sub>RMS</sub> Low DF - Note 1



Note 2

**Note 1**

Power ratings are based on still air 60 °C ambient with additional 30 °C rise due to self heating. Thermal effects such as forced air cooling, component encapsulation or other heat-sinking techniques will alter ratings. Actual circuit for application recommended.

**Note 2**

For convenience, power rating charts are shown to 100 kHz. Higher frequency operation is permissible with appropriate derating. Consult us for application suggestions.

Temperature Characteristics for 1DFO, 2DFO & 3DFO Series



**RELATED DOCUMENTS**

General Information

[www.vishay.com/doc?23140](http://www.vishay.com/doc?23140)



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