

## 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 (pF)	TOL. (%)	D <sub>max.</sub> DIAMETER INCH (mm)	T <sub>max.</sub> THICKNESS INCH (mm)	LS LEAD SPACE INCH (mm) ± 1 mm	LO LEAD OFFSET INCH (mm) ± 0.5 mm	WIRE SIZE		FIG.	ORDERING 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										0.047 (1.2)	561R1DF0D47
5600										0.047 (1.2)	561R1DF0D56
6800	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 (pF)	TOL. (%)	D <sub>max.</sub> DIAMETER INCH (mm)	T <sub>max.</sub> THICKNESS INCH (mm)	LS LEAD SPACE INCH (mm) ± 1 mm	LO LEAD OFFSET INCH (mm) ± 0.5 mm	WIRE SIZE		FIG.	ORDERING 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)	0.180 (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)
3900		0.790 (20.1)	0.180 (4.6)	0.075 (1.9)	564R2DF0D39				
4700		0.900 (22.9)		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 (pF)	TOL. (%)	D <sub>max.</sub> DIAMETER INCH (mm)	T <sub>max.</sub> THICKNESS INCH (mm)	LS LEAD SPACE INCH (mm) ± 1 mm	LO LEAD OFFSET INCH (mm) ± 0.5 mm	WIRE SIZE		FIG.	ORDERING 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)



## **Disclaimer**

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.