Lower Voltage Ceramic DC Disc Capacitors 1000 V_{DC} Temperature and Voltage Stabilized

RoHS COMPLIANT

FEATURES

- Low losses
- High stability
- High capacitance in small size
- Complete range of capacitance values
- Radial leads
- Ceramic singlelayer capacitor
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

APPLICATIONS

- Bypassing, coupling, and decoupling
- DC blocking
- Switching power supplies

QUICK REFERENCE DATA				
DESCRIPTION	VALUE			
Ceramic Class	1		2	
Ceramic Dielectric	C0G	U2J	X5F	X7R
Voltage (V_{DC})	1000			
Min. Capacitance (pF)	10	27	56	10 000
Max. Capacitance (pF)	10	39	4700	10 000
Mounting	Radial			

INSULATION RESISTANCE

Min. 1000 ΩF or 50 000 MΩ

TOLERANCE ON CAPACITANCE

± 10 %

DISSIPATION FACTOR

2.0 % max. at 1 kHz; 1 V

CATEGORY TEMPERATURE RANGE

-55 °C to +125 °C	C0G, U2J, X7R
-25 °C to +85 °C	X5F

CLIMATIC CATEGORY ACC. TO EN 60068-1

55 / 125 / 21	C0G, U2J, X7R
25 / 085 / 21	X5F

OPERATING TEMPERATURE RANGE

-55 °C to +105 °C (1)

Note

(1) For explanation about the difference of operating temperature range and temperature characteristic of capacitance, please see www.vishay.com/doc?48299

DESIGN

The capacitors consist of a ceramic disc of which both sides are silver-plated. Connection leads are made of tinned copper or tinned copper clad steel having diameters of 0.020" (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 tolerance is ± 10 %.

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

CAPACITANCE RANGE

10 pF to 10 nF

RATED VOLTAGE

1000 V_{DC}

DIELECTRIC STRENGTH BETWEEN LEADS

Component test, 100 % test at production line:

2500 V_{DC}, 2 s

CERAMIC DIELECTRIC

C0G, U2J (Class 1)

X5F, X7R (Class 2)

DIMENSIONS in inches (millimeters)

Fig. 1

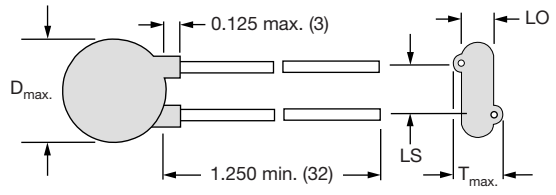
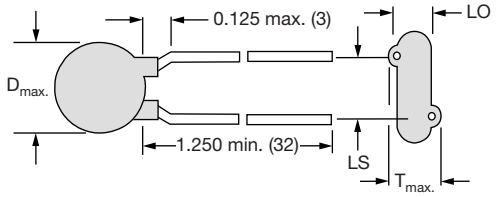


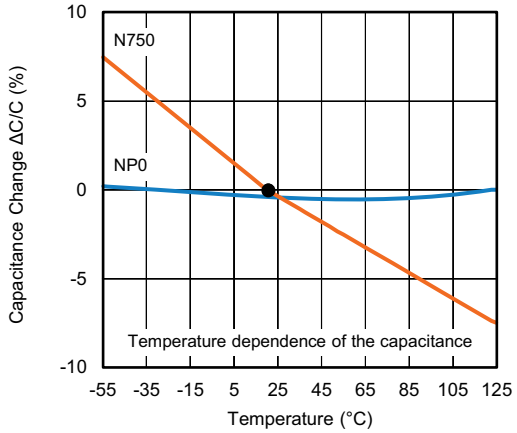
Fig. 2

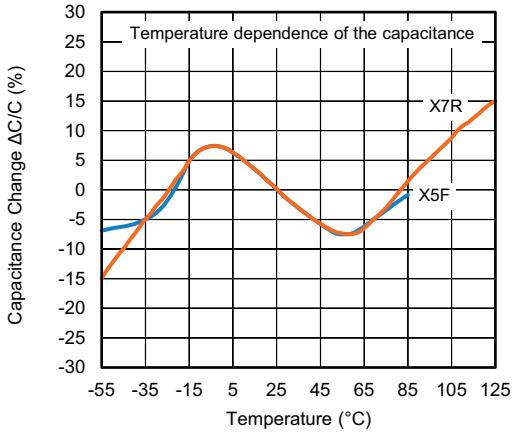


ORDERING INFORMATION, CERAMIC 1000 V_{DC} TEMPERATURE AND VOLTAGE STABILIZED

C (pF)	TOL. (%)	$D_{max.}$ DIAMETER INCH (mm)	$T_{max.}$ THICKNESS INCH (mm)	LS LEAD SPACE INCH (mm) ± 1 mm	LO LEAD OFFSET INCH (mm) ± 0.5 mm	WIRE SIZE AWG	WIRE SIZE INCH (mm)	FIG.	ORDERING CODE
C0G (NP0)									
10	± 10	0.250 (6.4)	0.156 (4.0)	0.250 (6.4)	0.051 (1.3)	24	0.020 (0.51)	2	561R10TSQ10
U2J (N750)									
27	± 10	0.290 (7.4)	0.156 (4.0)	0.250 (6.4)	0.047 (1.2)	24	0.020 (0.51)	2	561R10TSQ27
30					0.039 (1.0)				561R10TSQ30
33			0.156 (4.0)	0.250 (6.4)	0.039 (1.0)				561R10TSQ33
39					0.039 (1.0)				561R10TSQ39
X5F									
56	± 10	0.250 (6.4)	0.156 (4.0)	0.250 (6.4)	0.075 (1.9)	24	0.020 (0.51)	2	562R10TSQ56
68					0.063 (1.6)				562R10TSQ68
75					0.059 (1.5)				562R10TSQ75
82					0.055 (1.4)				562R10TSQ82
100					0.055 (1.4)				562R10TST10
120					0.051 (1.3)				562R10TST12
150					0.043 (1.1)				562R10TST15
180					0.043 (1.1)				562R10TST18
200					0.039 (1.0)				562R10TST20
220					0.051 (1.3)				562R10TST22
250					0.047 (1.2)				562R10TST25
270					0.043 (1.1)				562R10TST27
300					0.039 (1.0)				562R10TST30
330					0.039 (1.0)				562R10TST33
390					0.043 (1.1)				562R10TST39
470					0.039 (1.0)				562R10TST47
500					0.039 (1.0)				562R10TST50
560		0.290 (7.4)	0.156 (4.0)	0.250 (6.4)	0.047 (1.2)				562R10TST56
680					0.043 (1.1)				562R10TST68
750					0.039 (1.0)				562R10TST75
820					0.039 (1.0)				562R10TST82
1000					0.035 (0.9)				562R10TSD10
1500		0.440 (11.2)	0.156 (4.0)	0.250 (6.4)	0.051 (1.3)	22	0.025 (0.64)	1	562R10TSD15
2000		0.490 (12.4)	0.156 (4.0)	0.375 (9.5)	0.051 (1.3)				562R10TSD20
2200		0.490 (12.4)	0.156 (4.0)	0.375 (9.5)	0.047 (1.2)				562R10TSD22
2700		0.560 (14.2)	0.156 (4.0)	0.375 (9.5)	0.051 (1.3)				562R10TSD27
3300		0.560 (14.2)	0.156 (4.0)	0.375 (9.5)	0.047 (1.2)				562R10TSD33
4700		0.680 (17.3)	0.156 (4.0)	0.375 (9.5)	0.051 (1.3)				562R10TSD47
X7R									
0.010 µF	± 10	0.680 (17.3)	0.156 (4.0)	0.375 (9.5)	0.047 (1.2)	22	0.025 (0.64)	1	562R10TSS10

CAPACITANCE CHANGE VS. TEMPERATURE (TYPICAL)





STORAGE

The capacitors must not be stored in a corrosive atmosphere, where sulphide or chloride gas, acid, alkali or salt are present. Exposure of the components to moisture, should be avoided. The solderability of the leads is not affected by storage of up to 24 months (temperature +10 °C to +40 °C, relative humidity up to 60 % RH). Class 2 ceramic dielectric capacitors are also subject to aging see general information (www.vishay.com/doc?23140).

SOLDERING

SOLDERING SPECIFICATIONS
Soldering test for capacitors with wire leads: (according to IEC 60068-2-20, solder bath method)

	SOLDERABILITY	RESISTANCE TO SOLDERING HEAT
Soldering temperature	(235 ± 5) °C	(260 ± 5) °C
Soldering duration	(2 ± 0.5) s	(10 ± 1) s
Distance from component body	≥ 2 mm	≥ 5 mm

SOLDERING RECOMMENDATIONS

Ceramic capacitors are very sensitive to rapid changes in temperature (thermal shock) therefore the solder heat resistance specification (see table above) should not be exceeded. Exposing the capacitor to excessive heating may result in thermal shocks that can crack the ceramic body. Similarly, excessive heating can cause the internal solder junction to melt.

When soldering radial leaded ceramic capacitors with a soldering iron, it should be performed under the following conditions and should not exceed:

- Maximum temperature of iron-tip: 400 °C
- Maximum soldering iron wattage: 50 W
- Maximum soldering time: 3.5 s

Failure to follow the above cautions may result, in worst case, in short circuit or cause fuming or thermo-mechanical damage when the product is used.

Leaded ceramic capacitors are not designed for reflow process or dipping the body into a solder melt.

CLEANING

The components should be cleaned immediately following the soldering operation with vapor degreasers.

CLEANING (ULTRASONIC CLEANING)

To perform ultrasonic cleaning, observe the following conditions:

- Maximum rinse bath capacity output: 20 W/liter
- Maximum rinsing time: 300 s
- Do not vibrate the PCB/PWB directly
- Excessive ultrasonic cleaning may lead to mechanical damage

SOLVENT RESISTANCE

The coating and marking of the capacitors are resistant to the following test method:

IEC 60068-2-45 (method XA)

MOUNTING

We do not recommend modifying the lead terminals, e.g. bending or cropping. This action could break the coating or crack the ceramic insert. In order to avoid such failures we are offering different lead wire designs (e.g. straight, inline, inside crimp, outside crimp etc.) If however, the lead must be modified in any way, we recommend support of the lead with a clamping fixture next to the coating. If a defined product stop is required for mounting on a PCB, a mechanically formed product stop or a mounting tool should be used.

OPERATING VOLTAGE

In case the voltage is applied to the circuit, starting as well as stopping, may generate irregular voltage for a transit period because of resonance or switching. Be sure to use a capacitor with a rated voltage range that includes these irregular voltages.

OPERATING TEMPERATURE AND SELF-GENERATED HEAT

Keep the surface temperature of a capacitor below the upper limit of its rated operating temperature range. Be sure to take into account the heat generated by the capacitor itself. When the capacitor is used in a high frequency, pulse, or similar application, it may have self-generated heat due to dielectric dissipation.

Temperature increase due to self-generated heating should not exceed 20 °C while operating at an atmosphere temperature of 25 °C.

When measuring, the surface temperature, make sure that the capacitor is not affected by radiant, conductive and convective heat by its surroundings. Excessive heat may lead to thermo-mechanical deterioration of the capacitor's characteristics and reliability.

RELATED DOCUMENTS	
General Information	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.

Hyperlinks included in this datasheet may direct users to third-party websites. These links are provided as a convenience and for informational purposes only. Inclusion of these hyperlinks does not constitute an endorsement or an approval by Vishay of any of the products, services or opinions of the corporation, organization or individual associated with the third-party website. Vishay disclaims any and all liability and bears no responsibility for the accuracy, legality or content of the third-party website or for that of subsequent links.

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.