High Voltage Ceramic DC Disc Capacitors 10 kV_{DC} and 15 kV_{DC}

LINKS TO ADDITIONAL RESOURCES

3D Models

QUICK REFERENCE DATA				
DESCRIPTION	**VALUE**			
Ceramic Class	1		2	
Ceramic Dielectric	T3M (N4700)		X5F, Y5R, Y5U, Z5U	
Voltage (V_{DC})	10 000	15 000	10 000	15 000
Min. Capacitance (pF)	250	100	100	100
Max. Capacitance (pF)	1000	750	3300	2500
Mounting	Radial			

INSULATION RESISTANCE

Min. 1000 ΩF or 200 000 MΩ

TOLERANCE ON CAPACITANCE

± 20 % or + 80 % / - 20 %

DISSIPATION FACTOR

0.2 % max. at 1 kHz; 1 V (Class 1)
2.0 % max. at 1 kHz; 1 V (Class 2)

CATEGORY TEMPERATURE RANGE

-25 °C to +85 °C

CLIMATIC CATEGORY ACC. TO EN 60068-1

25 / 85 / 21

OPERATING TEMPERATURE RANGE

-25 °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

FEATURES

- **20 kV rated voltage available on request**
- Low losses
- High capacitance in small sizes
- High stability
- Radial leads
- Ceramic singlelayer capacitor
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

RoHS COMPLIANT

APPLICATIONS

- High voltage power supplies
- DC and pulse high voltage
- X-ray equipment, baggage scanner, air purifier, ionizer

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 0.032" (0.81 mm).

The capacitors may be supplied with straight leads having lead spacing of 0.375" (9.5 mm), 0.500" (12.7 mm) or 0.750" (19.2 mm).

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

CAPACITANCE RANGE

100 pF to 3300 pF

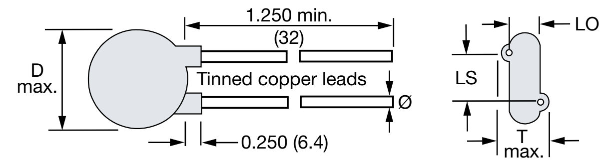
DIELECTRIC STRENGTH BETWEEN LEADS

10 kV_{DC}	15 000 V_{DC}, 2 s
15 kV_{DC}	24 000 V_{DC}, 2 s (in dielectric fluid)

CERAMIC DIELECTRIC

T3M (Class 1)
X5F, Y5R, Y5U, Z5U (Class 2)

DIMENSIONS in inches (millimeters)



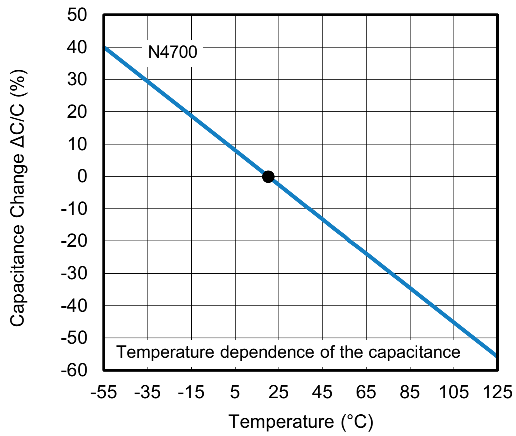
ORDERING INFORMATION, CERAMIC 10 kV_{DC}

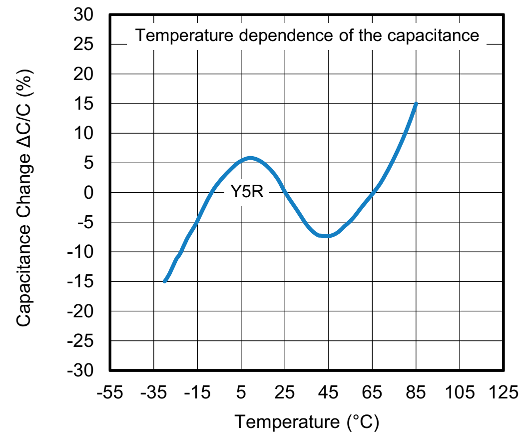
C (pF)	TOL. (%)	$D_{max.}$ DIAMETER INCH (mm)	$T_{max.}$ THICKNESS INCH (mm)	LS LEAD SPACE INCH (mm) ± 0.040" (± 1 mm)	LO LEAD OFFSET INCH (mm) ± 0.020" (± 0.5 mm)	WIRE SIZE AWG	WIRE SIZE INCH (mm)	ORDERING CODE
T3M (N4700)								
250	± 20	0.490 (12.4)	0.290 (7.4)	0.375 (9.5)	0.193 (4.9)	20	0.032 (0.81)	615R100GATT25
500		0.680 (17.3)	0.272 (6.9)	0.500 (12.7)	0.173 (4.4)			615R100GATT50
680		0.750 (19.1)	0.300 (7.6)		0.181 (4.6)			615R100GATT68
820		0.810 (20.6)			0.181 (4.6)			615R100GATT82
1000		0.980 (24.9)	0.320 (8.1)		0.189 (4.8)			615R100GATD10
X5F								
100	± 20	0.680 (17.3)	0.382 (9.7)	0.500 (12.7)	0.283 (7.2)	20	0.032 (0.81)	615R100GAT10
250			0.300 (7.6)		0.201 (5.1)			615R100GAT25
500			0.345 (8.8)		0.248 (6.3)			615R100GAT50
Y5R								
100	± 20	0.490 (12.4)	0.320 (8.1)	0.375 (9.5)	0.220 (5.6)	20	0.032 (0.81)	615R100GAST10
250			0.331 (8.4)		0.232 (5.9)			615R100GAST25
500			0.310 (7.9)		0.213 (5.4)			615R100GAST50
1000		0.750 (19.1)	0.320 (8.1)	0.500 (12.7)	0.220 (5.6)			615R100GAD10
Y5U								
1000	+ 80 / - 20	0.680 (17.3)	0.330 (8.4)	0.500 (12.7)	0.232 (5.9)	20	0.032 (0.81)	615R100GASD10
2500	± 20	0.980 (24.9)						615R100GATD25
Z5U								
2500	+ 80 / - 20	0.750 (19.1)	0.350 (8.9)	0.500 (12.7)	0.256 (6.5)	20	0.032 (0.81)	615R100GAD25
3300		0.980 (24.9)	0.390 (9.9)		0.303 (7.7)			615R100GAD33

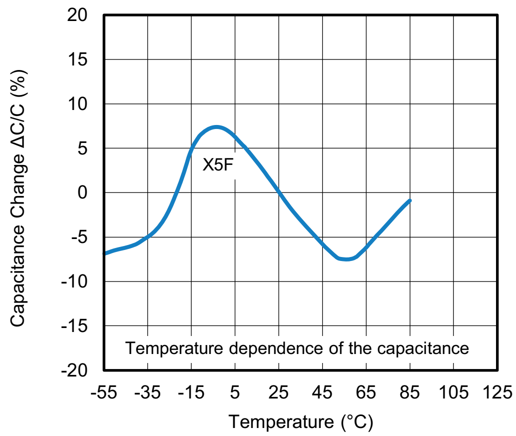
ORDERING INFORMATION, CERAMIC 15 kV_{DC}

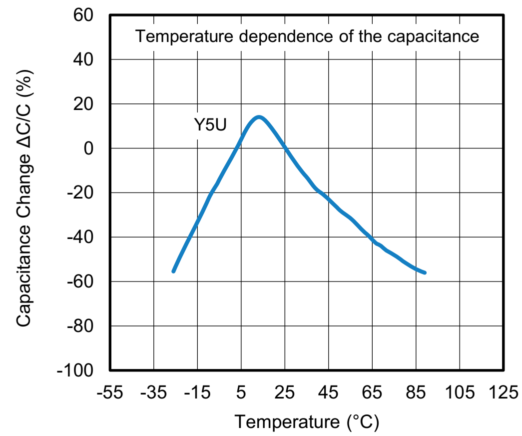
C (pF)	TOL. (%)	$D_{max.}$ DIAMETER INCH (mm)	$T_{max.}$ THICKNESS INCH (mm)	LS LEAD SPACE INCH (mm) ± 0.040" (± 1 mm)	LO LEAD OFFSET INCH (mm) ± 0.020" (± 0.5 mm)	WIRE SIZE AWG	WIRE SIZE INCH (mm)	ORDERING CODE
T3M (N4700)								
100	± 20	0.490 (12.4)	0.470 (11.9)	0.500 (12.7)	0.370 (9.4)	20	0.032 (0.81)	615R150GATT10
250		0.670 (17.0)	0.460 (11.7)	0.750 (19.1)	0.362 (9.2)			615R150GATT25
390		0.750 (19.1)	0.425 (10.8)		0.283 (7.2)			615R150GATT39
500		0.810 (20.6)	0.382 (9.7)		0.283 (7.2)			615R150GATT50
750		1.063 (27.0)	0.430 (10.9)		0.331 (8.4)			615R150GATT75
X5F								
100	± 20	0.670 (17.0)	0.430 (10.9)	0.750 (19.1)	0.331 (8.4)	20	0.032 (0.81)	615R150GAT10
250			0.455 (11.6)		0.358 (9.1)			615R150GAT25
Y5R								
100	± 20	0.490 (12.4)	0.449 (11.4)	0.500 (12.7)	0.350 (8.9)	20	0.032 (0.81)	615R150GAST10
250			0.480 (12.2)		0.382 (9.7)			615R150GAST25
500		0.670 (17.0)	0.450 (11.4)	0.750 (19.1)	0.331 (8.4)			615R150GAT50
1000		0.980 (24.9)	0.460 (11.7)		0.362 (9.2)			615R150GATD10
Y5U								
500	+ 80 / - 20	0.490 (12.4)	0.375 (9.5)	0.500 (12.7)	0.276 (7.0)	20	0.032 (0.81)	615R150GAST50
1000		0.670 (17.0)	0.420 (10.7)	0.750 (19.1)	0.323 (8.2)			615R150GAD10
Z5U								
2200	+ 80 / - 20	0.980 (24.9)	0.510 (13.0)	0.750 (19.1)	0.413 (10.5)	20	0.032 (0.81)	615R150GAD22
2500			0.450 (11.4)		0.350 (8.9)			615R150GAD25

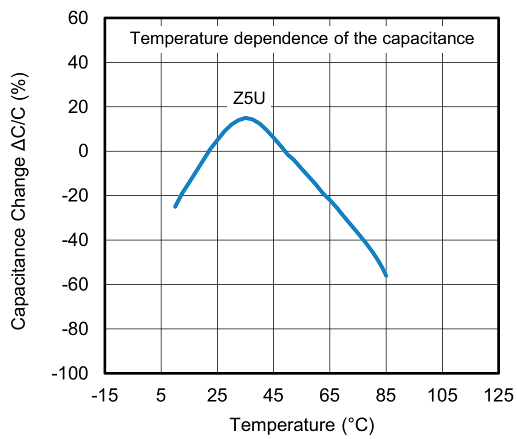
CAPACITANCE CHANGE VS. TEMPERATURE (TYPICAL)



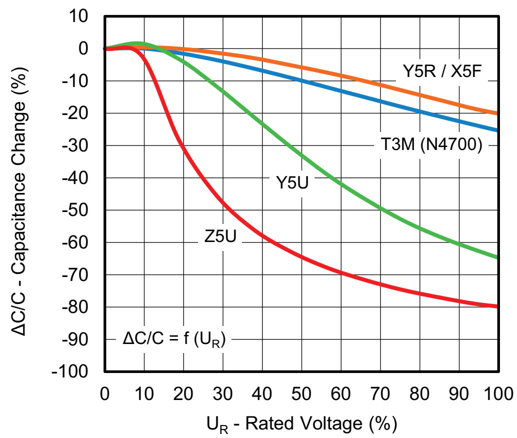








CAPACITANCE CHANGE VS. VOLTAGE (TYPICAL)



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

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