

High Voltage Class 1 Ceramic AC and DC Disc Capacitors, 10 kV_{DC} to 50 kV_{DC} / 7 kV_{AC} to 34 kV_{AC}, Screw Terminal Mounting



FEATURES

- Low dissipation factor of 0.2 % at 1 kHz
- N4700 (T3M) class 1, strontium-based ceramic dielectric
- Negligible piezoelectric / electrostrictive effect
- Low inductance
- High insulation resistance
- Epoxy coating
- Screw terminal mounting
- Ceramic singlelayer capacitor
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912


RoHS
COMPLIANT

DESIGN SUPPORT TOOLS

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APPLICATIONS

- High voltage power supplies
- CO₂ lasers
- X-ray equipment
- Welding equipment
- Industrial

| QUICK REFERENCE DATA | | | | | | |
|----------------------------|----------------|-------------|-------------|-------------|-------------|-------------|
| DESCRIPTION | VALUE | | | | | |
| Ceramic Class | 1 | | | | | |
| Ceramic Dielectric | N4700 | | | | | |
| Type | 715C10KT### | 715C15KT### | 715C20KT### | 715C30KT### | 715C40KT### | 715C50KT### |
| Voltage (V _{DC}) | 10 000 | 15 000 | 20 000 | 30 000 | 40 000 | 50 000 |
| Min. Capacitance (pF) | 560 | 370 | 200 | 190 | 100 | 100 |
| Max. Capacitance (pF) | 8000 | 5300 | 4000 | 2700 | 2000 | 1700 |
| Mounting | Screw terminal | | | | | |

DIELECTRIC STRENGTH

150 % of rated voltage, charging current limited to 50 mA

DISSIPATION FACTOR $\tan \delta$

 $\leq 2 \times 10^{-3}$ (1 kHz)

INSULATION RESISTANCE

 Min. 200 000 M Ω or 1000 Ω F min. at 25 °C

CORONA LIMIT

 < 5 pC at 50 % of rated AC voltage

OPERATING TEMPERATURE RANGE

-30 °C to +85 °C

CAPACITANCE RANGE

100 pF to 8 nF

CAPACITANCE TOLERANCES

 ± 20 %

CERAMIC DIELECTRIC

N4700 (class 1)

RATED VOLTAGE ⁽¹⁾

- 10 kV_{DC} (7 kV_{RMS})
- 15 kV_{DC} (10 kV_{RMS})
- 20 kV_{DC} (14 kV_{RMS})
- 30 kV_{DC} (20 kV_{RMS})
- 40 kV_{DC} (27 kV_{RMS})
- 50 kV_{DC} (34 kV_{RMS})

Note

⁽¹⁾ All kV_{RMS} values up to 60 Hz

MATERIAL

Capacitor elements made from class 1 ceramic in a molded epoxy case. Screw terminals: brass, silver plated.

MARKING

Type designator, capacitance value, rated DC voltage, ceramic material code, production date code, Cera-Mite logo.

POWER DISSIPATION

Limit to 20 °C rise above ambient, measured on case.

DIMENSIONS in millimeters (inches)

Notes

- (1) Use #8-32, 3/16" long screw to prevent bottoming
 (2) To order metric terminals add "M4" or "M5" suffix to model number, use screw length of 4 mm or 5 mm respectively to prevent bottoming

| ORDERING INFORMATION | | | | |
|----------------------|---------------------|-------------------|-----------|---------|
| 715C15KTD33 | 15 kV _{DC} | 3300 pF | ± 20 % | N4700 |
| MODEL | RATED VOLTAGE | CAPACITANCE VALUE | TOLERANCE | CERAMIC |

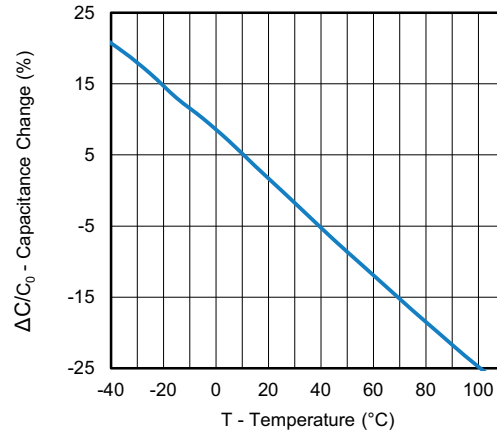
| SAP PART NUMBER, ELECTRICAL, AND DIMENSIONAL DATA | | | | | | | | | | | | | | |
|---|---------|-------------------------|-----------------------------------|------------------------------------|------------------|---------------------------------------|---|---|----|----|-----------|-----------|-----------|-----|
| MODEL | CERAMIC | CAPACITANCE VALUES (pF) | RATED VOLTAGE (kV _{DC}) | RATED VOLTAGE (kV _{RMS}) | D ± 1 mm (0.04") | H WITH #8-32 TERMINALS ± 1 mm (0.04") | H WITH M4 METRIC TERMINALS ± 1 mm (0.04") | H WITH M5 METRIC TERMINALS ± 1 mm (0.04") | | | | | | |
| 715C10KT### | | | | | | | | | | | | | | |
| 715C10KTT56 | N4700 | 560 | 10 | 7 | 21 (0.83) | 18 (0.71) | 16 (0.63) | n/a | | | | | | |
| 715C10KTT68 | | 680 | | | 21 (0.83) | | | | | | | | | |
| 715C10KTT82 | | 820 | | | 25 (0.98) | | | | | | | | | |
| 715C10KTD10 | | 1000 | | | 25 (0.98) | | | | | | | | | |
| 715C10KTD12 | | 1200 | | | 30 (1.18) | | | | | | | | | |
| 715C10KTD18 | | 1800 | | | 30 (1.18) | | | | | | | | | |
| 715C10KTD22 | | 2200 | | | 37 (1.46) | | | | | | | | | |
| 715C10KTD28 | | 2800 | | | 37 (1.46) | | | | | | | | | |
| 715C10KTD39 | | 3900 | | | 44 (1.73) | | | | | | | | | |
| 715C10KTD50 | | 5000 | | | 52 (2.05) | | | | | | | | | |
| 715C10KTD68 | | 6800 | | | 56 (2.20) | | | | | | | | | |
| 715C10KTD80 | | 8000 | | | 60 (2.36) | | | | | | | | | |
| 715C15KT### | | | | | | | | | | | | | | |
| 715C15KTT37 | | N4700 | | | 370 | | | | 15 | 10 | 21 (0.83) | 20 (0.79) | 18 (0.71) | n/a |
| 715C15KTT56 | 560 | | 25 (0.98) | | | | | | | | | | | |
| 715C15KTT75 | 750 | | 30 (1.18) | | | | | | | | | | | |
| 715C15KTD10 | 1000 | | 32 (1.26) | | | | | | | | | | | |
| 715C15KTD11 | 1100 | | 32 (1.26) | | | | | | | | | | | |
| 715C15KTD15 | 1500 | | 37 (1.46) | | | | | | | | | | | |
| 715C15KTD19 | 1900 | | 37 (1.46) | | | | | | | | | | | |
| 715C15KTD27 | 2700 | | 44 (1.73) | | | | | | | | | | | |
| 715C15KTD33 | 3300 | | 48 (1.89) | | | | | | | | | | | |
| 715C15KTD34 | 3400 | | 52 (2.05) | | | | | | | | | | | |
| 715C15KTD47 | 4700 | | 56 (2.20) | | | | | | | | | | | |
| 715C15KTD53 | 5300 | | 60 (2.36) | | | | | | | | | | | |
| 715C15KTD33 | | | | | | | | | | | | | | |
| 715C15KTD33 | | | 3300 | | | 48 (1.89) | | | | | 22 (0.87) | | | |



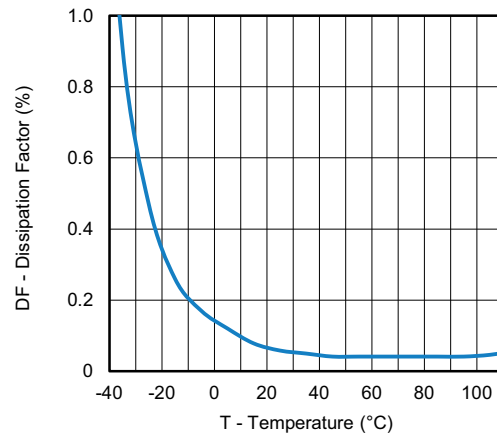
| SAP PART NUMBER, ELECTRICAL, AND DIMENSIONAL DATA | | | | | | | | | | | | | |
|---|---------|-------------------------|-----------------------------------|------------------------------------|------------------|---------------------------------------|---|---|----|-----------|-----------|-----------|-----------|
| MODEL | CERAMIC | CAPACITANCE VALUES (pF) | RATED VOLTAGE (kV _{DC}) | RATED VOLTAGE (kV _{RMS}) | D ± 1 mm (0.04") | H WITH #8-32 TERMINALS ± 1 mm (0.04") | H WITH M4 METRIC TERMINALS ± 1 mm (0.04") | H WITH M5 METRIC TERMINALS ± 1 mm (0.04") | | | | | |
| 715C20KT### | | | | | | | | | | | | | |
| 715C20KTT20 | N4700 | 200 | 20 | 14 | 21 (0.83) | 23 (0.91) | 21 (0.83) | n/a | | | | | |
| 715C20KTT28 | | 280 | | | 21 (0.83) | | | | | | | | |
| 715C20KTT40 | | 400 | | | 25 (0.98) | | | | | | | | |
| 715C20KTT56 | | 560 | | | 25 (0.98) | | | | | | | | |
| 715C20KTT70 | | 700 | | | 30 (1.18) | | | | | | | | |
| 715C20KTT88 | | 880 | | | 30 (1.18) | | | | | | | | |
| 715C20KTD10 | | 1000 | | | 32 (1.26) | | | | | | | | |
| 715C20KTD14 | | 1400 | | | 37 (1.46) | | | | | | | | |
| 715C20KTD17 | | 1700 | | | 44 (1.73) | | | | | | | | |
| 715C20KTD22 | | 2200 | | | 48 (1.89) | | | | | | | | |
| 715C20KTD25 | | 2500 | | | 48 (1.89) | | | | | | | | |
| 715C20KTD33 | | 3300 | | | 56 (2.20) | | | | | | | | |
| 715C20KTD40 | | 4000 | | | 60 (2.36) | | | | | | | | |
| 715C30KT### | | | | | | | | | | | | | |
| 715C30KTT19 | | N4700 | | | 190 | | | 30 | 20 | 21 (0.83) | 27 (1.06) | 25 (0.98) | n/a |
| 715C30KTT20 | | | | | 200 | | | | | 21 (0.83) | | | |
| 715C30KTT33 | 330 | | 25 (0.98) | | | | | | | | | | |
| 715C30KTT40 | 400 | | 32 (1.26) | | | | | | | | | | |
| 715C30KTT59 | 590 | | 32 (1.26) | | | | | | | | | | |
| 715C30KTT70 | 700 | | 37 (1.46) | | | | | | | | | | |
| 715C30KTT94 | 940 | | 37 (1.46) | | | | | | | | | | |
| 715C30KTD12 | 1200 | | 44 (1.73) | | | | | | | | | | |
| 715C30KTD15 | 1500 | | 48 (1.89) | | | | | | | | | | |
| 715C30KTD17 | 1700 | | 48 (1.89) | | | | | | | | | | |
| 715C30KTD22 | 2200 | | 56 (2.20) | | | | | | | | | | |
| 715C30KTD27 | 2700 | | 60 (2.36) | | | | | | | | | | |
| 715C40KT### | | | | | | | | | | | | | |
| 715C40KTT10 | N4700 | | 100 | 40 | 27 | 21 (0.83) | 31 (1.22) | | | 29 (1.14) | | | n/a |
| 715C40KTT14 | | 140 | 21 (0.83) | | | | | | | | | | |
| 715C40KTT20 | | 200 | 25 (0.98) | | | | | | | | | | |
| 715C40KTT30 | | 300 | 32 (1.26) | | | | | | | | | | |
| 715C40KTT40 | | 400 | 32 (1.26) | | | | | | | | | | |
| 715C40KTT44 | | 440 | 32 (1.26) | | | | | | | | | | |
| 715C40KTT56 | | 560 | 37 (1.46) | | | | | | | | | | |
| 715C40KTT70 | | 700 | 37 (1.46) | | | | | | | | | | |
| 715C40KTT85 | | 850 | 44 (1.73) | | | | | | | | | | |
| 715C40KTD10 | | 1000 | 44 (1.73) | | | | | | | | | | |
| 715C40KTD13 | | 1300 | 48 (1.89) | | | | | | | | | | |
| 715C40KTD15 | | 1500 | 52 (2.05) | | | | | | | | | | |
| 715C40KTD20 | | 2000 | 60 (2.36) | | | | | | | | | | |
| 715C50KT### | | | | | | | | | | | | | |
| 715C50KTT10 | N4700 | 100 | 50 | 34 | 21 (0.83) | 34 (1.34) | 32 (1.26) | n/a | | | | | |
| 715C50KTT15 | | 150 | | | 21 (0.83) | | | | | | | | |
| 715C50KTT20 | | 200 | | | 25 (0.98) | | | | | | | | |
| 715C50KTT33 | | 330 | | | 30 (1.18) | | | | | | | | |
| 715C50KTT40 | | 400 | | | 32 (1.26) | | | | | | | | |
| 715C50KTT47 | | 470 | | | 37 (1.46) | | | | | | | | |
| 715C50KTT56 | | 560 | | | 37 (1.46) | | | | | | | | |
| 715C50KTT70 | | 700 | | | 44 (1.73) | | | | | | | | |
| 715C50KTT85 | | 850 | | | 44 (1.73) | | | | | | | | |
| 715C50KTD10 | | 1000 | | | 48 (1.89) | | | | | | | | |
| 715C50KTD13 | | 1300 | | | 52 (2.05) | | | | | | | | |
| 715C50KTD15 | | 1500 | | | 56 (2.20) | | | | | | | | |
| 715C50KTD17 | | 1700 | | | 60 (2.36) | | | | | | | | |
| 715C50KT### | | | | | | | | | | | | | |
| 715C50KTT10 | | N4700 | | | 100 | | | 50 | 34 | 21 (0.83) | 34 (1.34) | n/a | 35 (1.38) |
| 715C50KTT15 | | | | | 150 | | | | | 21 (0.83) | | | |
| 715C50KTT20 | 200 | | 25 (0.98) | | | | | | | | | | |
| 715C50KTT33 | 330 | | 30 (1.18) | | | | | | | | | | |
| 715C50KTT40 | 400 | | 32 (1.26) | | | | | | | | | | |
| 715C50KTT47 | 470 | | 37 (1.46) | | | | | | | | | | |
| 715C50KTT56 | 560 | | 37 (1.46) | | | | | | | | | | |
| 715C50KTT70 | 700 | | 44 (1.73) | | | | | | | | | | |
| 715C50KTT85 | 850 | | 44 (1.73) | | | | | | | | | | |
| 715C50KTD10 | 1000 | | 48 (1.89) | | | | | | | | | | |
| 715C50KTD13 | 1300 | | 52 (2.05) | | | | | | | | | | |
| 715C50KTD15 | 1500 | | 56 (2.20) | | | | | | | | | | |
| 715C50KTD17 | 1700 | | 60 (2.36) | | | | | | | | | | |



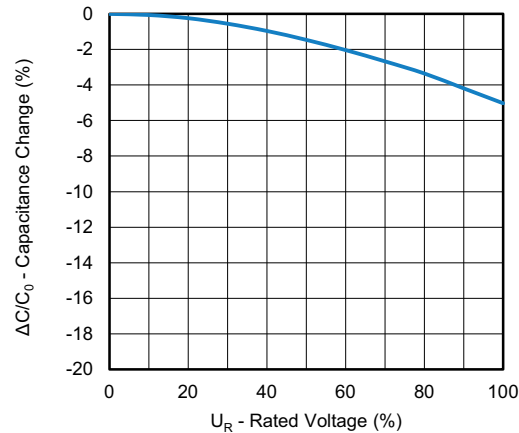
CAPACITANCE CHANGE VS. TEMPERATURE (typical)



DISSIPATION FACTOR VS. TEMPERATURE (typical)

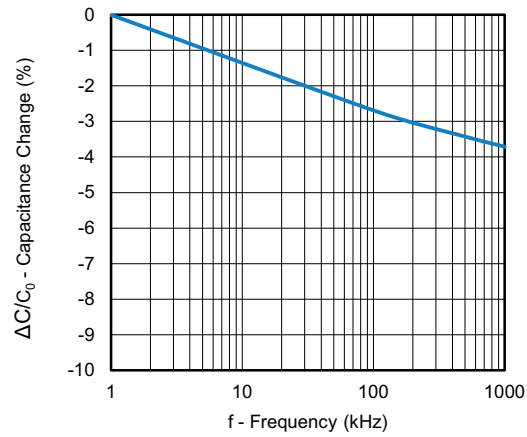


CAPACITANCE CHANGE VS. VOLTAGE (typical)





CAPACITANCE CHANGE VS. FREQUENCY (typical)



DISSIPATION FACTOR VS. FREQUENCY (typical)





| TEST METHODS | | | | |
|--|---------------------------------------|---|--------------------|--|
| NO. | ITEM | SPECIFICATION | SAMPLE SIZE | TEST METHOD |
| 100 % TEST LOT BY LOT | | | | |
| 1 | Appearance | No remarkable damage | 100 % | Visual check |
| 2 | Capacitance | Within the specified tolerance | 100 % | Measured at 22 °C ± 2 °C with max. 5 V _{RMS} at 1.0 kHz ± 0.1 kHz |
| 3 | Dissipation factor | 0.2 % max. | 100 % | Measured at 22 °C ± 2 °C with max. 5 V _{RMS} at 1.0 kHz ± 0.1 kHz |
| 4 | Insulation resistance | 200 GΩ min. | 100 % | Measured with DC 180 V within 60 s of charging |
| 5 | Dielectric strength between terminals | No failure | 100 % | Tested with 150 % of rated DC-voltage for min. 3 s in insulating fluid or oil (charge / discharge current < 50 mA) |
| SAMPLE TEST LOT BY LOT | | | | |
| 6 | Partial discharge | 5 pC max. | 10 pieces | Measured with 50 % of rated AC voltage |
| 7 | Temperature characteristics | ΔC = -4700 ppm/K ± 1000 ppm/K (temp. range: +20 °C to +85 °C) | 2 pieces | Measured at 20 °C / 50 °C / 85 °C / 20 °C Capacitance change at 85 °C shall not exceed the specified limit |
| 8 | Strength of terminals | #8-32 and M4: > 1.5 Nm; M5: > 2 Nm | 10 pieces | Tested with a torque meter |
| 9 | Life test | No failure | 3 pieces | Tested with 125 % of rated DC voltage for 100 h +24 h / -0 h at 85 °C ± 2 °C in oil |
| TYPE TEST / ON DEMAND TEST | | | | |
| 10 | Dielectric strength between terminals | No failure | 100 % | Tested with 150 % of rated AC voltage for min. 30 s in insulating fluid or oil |
| 11 | Lightning pulse 1.2/50 μs | No failure | 100 % | Tested with 150 % of rated DC voltage 5 x positive plus 1 x negative |
| 12 | Temperature cycle | No failure (no. 1 to 6 within spec. after test) | 5 pieces per lot | 10 cycles -30 °C / +85 °C Dwell 60 min., rise / fall 60 min. |
| 13 | Humidity | No failure (no. 1 to 5 within spec. after test) | 5 pieces per lot | Tested with 0 applied voltage for 500 h +24 h / -0 h at 93 % ± 2 % RH and 40 °C ± 2 °C |
| DESTRUCTIVE TEST / RELEASE TEST | | | | |
| 14 | AC breakdown | No failure < 200 % of rated AC voltage | 10 pieces per lot | Raise AC voltage with 500 V/s ± 100 V/s until breakdown. Tested in insulating fluid or oil |
| 15 | DC breakdown | No failure < 200 % of rated DC voltage | 10 pieces per lot | Raise DC voltage with 500 V/s ± 100 V/s until breakdown. Tested in insulating fluid or oil |
| 16 | Lightning pulse 1.2/50 μs | No failure < 200 % of rated DC voltage | 10 pieces per lot | Start at 150 % of rated DC voltage 1 x positive plus 1 x negative Raise voltage by 5 kV per step |
| 17 | Life test | No failure | 5 pieces per lot | Tested with 125 % of rated DC voltage for 250 h +24 h / -0 h at 85 °C ± 2 °C in oil |

RELATED DOCUMENTS

General Information

www.vishay.com/doc?23140



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