

# High Voltage Class 1 Ceramic AC and DC Disc Capacitors, 10 kV<sub>DC</sub> to 50 kV<sub>DC</sub> / 7 kV<sub>AC</sub> to 34 kV<sub>AC</sub>, 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](http://www.vishay.com/doc?99912)


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## DESIGN SUPPORT TOOLS

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Models  
Available

## APPLICATIONS

- High voltage power supplies
- CO<sub>2</sub> 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 <sub>DC</sub> ) | 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 δ

≤ 2 x 10<sup>-3</sup> (1 kHz)

## INSULATION RESISTANCE

Min. 200 000 MΩ or 1000 ΩF min. at 25 °C

## CORONA LIMIT

&lt; 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 <sup>(1)</sup>

- 10 kV<sub>DC</sub> (7 kV<sub>RMS</sub>)
- 15 kV<sub>DC</sub> (10 kV<sub>RMS</sub>)
- 20 kV<sub>DC</sub> (14 kV<sub>RMS</sub>)
- 30 kV<sub>DC</sub> (20 kV<sub>RMS</sub>)
- 40 kV<sub>DC</sub> (27 kV<sub>RMS</sub>)
- 50 kV<sub>DC</sub> (34 kV<sub>RMS</sub>)

### Note

<sup>(1)</sup> All kV<sub>RMS</sub> values up to 60 Hz

## MATERIAL

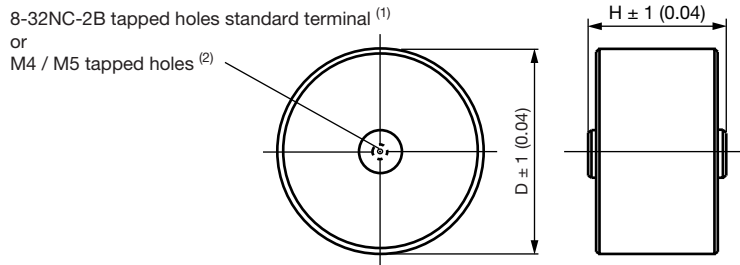
Capacitor elements made from class 1 ceramic in a molded epoxy case. Screw terminals: brass, silver plated.

## 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**

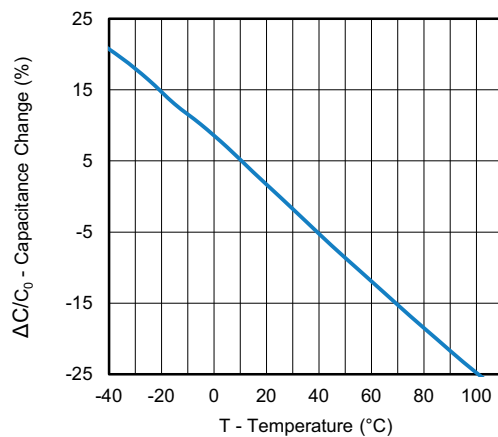
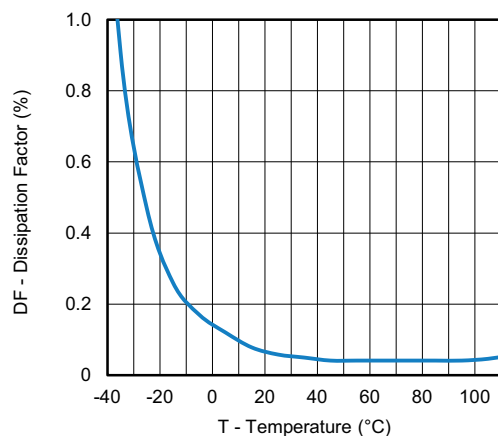
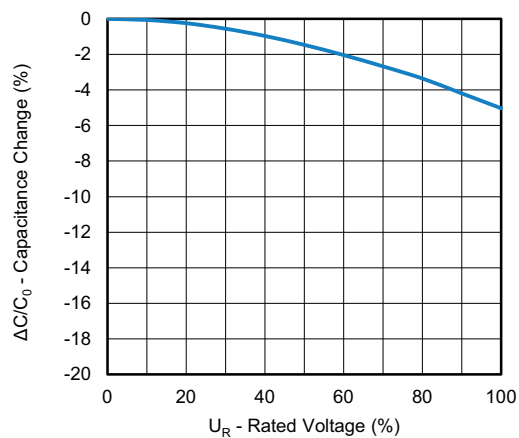
|                    |                           |                   |               |              |
|--------------------|---------------------------|-------------------|---------------|--------------|
| <b>715C15KTD33</b> | <b>15 kV<sub>DC</sub></b> | <b>3300 pF</b>    | <b>± 20 %</b> | <b>N4700</b> |
| MODEL              | RATED VOLTAGE             | CAPACITANCE VALUE | TOLERANCE     | CERAMIC      |

**SAP PART NUMBER, ELECTRICAL, AND DIMENSIONAL DATA**

| MODEL       | CERAMIC | CAPACITANCE<br>VALUES<br>(pF) | RATED<br>VOLTAGE<br>(kV <sub>DC</sub> ) | RATED<br>VOLTAGE<br>(kV <sub>RMS</sub> ) | D ± 1 mm<br>(0.04") | H WITH<br>#8-32<br>TERMINALS<br>± 1 mm (0.04") | H WITH<br>M4 METRIC<br>TERMINALS<br>± 1 mm (0.04") | H WITH<br>M5 METRIC<br>TERMINALS<br>± 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)           |                                                |                                                    | 19 (0.75)                                          |
| 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)           |                                                |                                                    | 22 (0.87)                                          |
| 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)           |                                                |                                                    |                                                    |

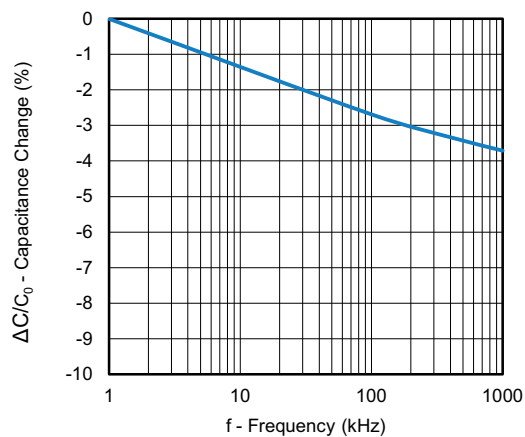
**SAP PART NUMBER, ELECTRICAL, AND DIMENSIONAL DATA**

| MODEL       | CERAMIC | CAPACITANCE<br>VALUES<br>(pF) | RATED<br>VOLTAGE<br>(kV <sub>DC</sub> ) | RATED<br>VOLTAGE<br>(kV <sub>RMS</sub> ) | D ± 1 mm<br>(0.04") | H WITH<br>#8-32<br>TERMINALS<br>± 1 mm (0.04") | H WITH<br>M4 METRIC<br>TERMINALS<br>± 1 mm (0.04") | H WITH<br>M5 METRIC<br>TERMINALS<br>± 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)           |                                                |                                                    | 24 (0.94)                                          |    |           |           |           |     |
| 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)           |                                                |                                                    | 29 (1.14)                                          |    |           |           |           |     |
| 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)                               | 33 (1.30)                                |                     |                                                |                                                    |                                                    |    |           |           |           |     |
| 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)                               |                                          | n/a                 |                                                |                                                    |                                                    |    |           |           |           |     |
| 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)           |                                                |                                                    | 35 (1.38)                                          |    |           |           |           |     |
| 715C50KTT47 |         | 470                           |                                         |                                          | 37 (1.46)           |                                                |                                                    |                                                    |    |           |           |           |     |
| 715C50KTT56 |         | 560                           |                                         |                                          | 37 (1.46)           |                                                |                                                    |                                                    |    |           |           |           |     |
| 715C50KTT70 |         | 700                           |                                         |                                          | 44 (1.73)           |                                                | n/a                                                |                                                    |    |           |           |           |     |
| 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)           |                                                |                                                    |                                                    |    |           |           |           |     |

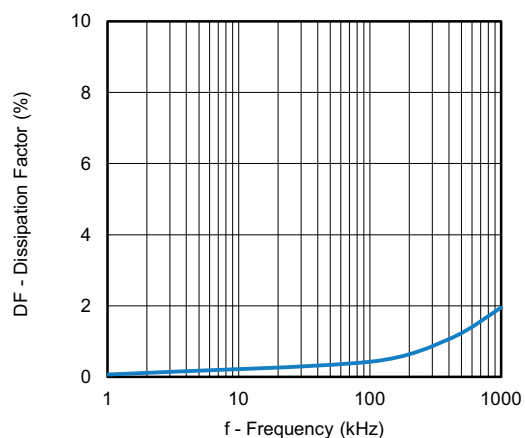
**CAPACITANCE CHANGE VS. TEMPERATURE** (typical)

**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                                                                                                        |
| <b>100 % TEST LOT BY LOT</b>           |                                       |                                                                                         |                   |                                                                                                                    |
| 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 <sub>RMS</sub> at 1.0 kHz ± 0.1 kHz                                         |
| 3                                      | Dissipation factor                    | 0.2 % max.                                                                              | 100 %             | Measured at 22 °C ± 2 °C with max. 5 V <sub>RMS</sub> 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) |
| <b>SAMPLE TEST LOT BY LOT</b>          |                                       |                                                                                         |                   |                                                                                                                    |
| 6                                      | Partial discharge                     | 5 pC max.                                                                               | 10 pieces         | Measured with 50 % of rated AC voltage                                                                             |
| 7                                      | Temperature characteristics           | $\Delta C = -4700 \text{ ppm/K} \pm 1000 \text{ ppm/K}$ (temp. range: +20 °C to +85 °C) | 2 pieces          | Measured at 20 °C / 50 °C / 85 °C / 20 °C<br>Capacitance change at 85 °C shall not exceed the specified limit      |
| 8                                      | Strength of terminals                 | #8-32 and M4: > 1.5 Nm;<br>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                                |
| <b>TYPE TEST / ON DEMAND TEST</b>      |                                       |                                                                                         |                   |                                                                                                                    |
| 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<br>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<br>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                             |
| <b>DESTRUCTIVE TEST / RELEASE TEST</b> |                                       |                                                                                         |                   |                                                                                                                    |
| 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.<br>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.<br>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<br>1 x positive plus 1 x negative<br>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 | <a href="http://www.vishay.com/doc?23140">www.vishay.com/doc?23140</a> |



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