

## Ceramic Disc Capacitors Class 2, Low Loss (0.2 %), 500 V<sub>DC</sub>, 1 kV<sub>DC</sub>, 2 kV<sub>DC</sub> and 3 kV<sub>DC</sub>



Capacitors with outside and inside kink lead spacing

### QUICK REFERENCE DATA

| DESCRIPTION                | CLASS 2 (Y5R)         |
|----------------------------|-----------------------|
| Voltage (V <sub>DC</sub> ) | 500, 1000, 2000, 3000 |
| Min. Capacitance (pF)      | 100                   |
| Max. Capacitance (pF)      | 4700                  |
| Mounting                   | Through hole          |

### MARKING

Marking indicates capacitance value and tolerance in accordance with "EIA 198" and voltage marks.

### OPERATING TEMPERATURE RANGE

- 30 °C to + 125 °C

### TEMPERATURE COEFFICIENT Y5R (2C4)

- 30 °C TO + 85 °C

± 15 %

### SECTIONAL SPECIFICATIONS

IEC 60384-9, EIA 198

### EXAMPLES OF MARKING CODE

|                                          |                                          |
|------------------------------------------|------------------------------------------|
| Disc size (D <sub>max.</sub> ) ≤ 6.5 mm: | Disc size (D <sub>max.</sub> ) ≥ 7.5 mm: |
| RP = low loss with T.C. Y5P              | BC                                       |
| 101K                                     | RP                                       |
| 2 kV                                     | 102K                                     |
|                                          | 3 kV                                     |

### FEATURES

- High reliability
- Low losses
- High capacitance in small size
- Kinked leads
- Compliant to RoHS directive 2002/95/EC



**RoHS**  
COMPLIANT

### APPLICATIONS

In electronic circuits where low losses and high capacitance per volume are essential, for example:

- SMPS
- HF ballast
- Snubber and high voltage circuits

### DESIGN

The capacitors consist of a ceramic disc both sides of which are silver-plated. Connection leads are made of tinned copper having a diameter of 0.6 mm or 0.8 mm.

The capacitors are supplied with kinked leads and lead spacings of 5 mm or 7.5 mm and 10 mm. Encapsulation is made of epoxy-resin, flammable resistant in accordance with "UL 94 V-0"

### CAPACITANCE RANGE

100 pF to 4700 pF

### RATED DC VOLTAGE

500 V; 1 kV; 2 kV; 3 kV

### DIELECTRIC STRENGTH

200 % of rated voltage

### INSULATION RESISTANCE AT 500 V<sub>DC</sub>

≥ 10 000 MΩ min.

### TOLERANCE ON CAPACITANCE

± 10 %; ± 20 %

### DISSIPATION FACTOR

0.2 % max.

### AGING

typical 0.5 % per time decade

### Note

The capacitors meet the essential requirements of "IEC 60384-9 and EIA 198". Unless stated otherwise all electrical values apply at an ambient temperature of 25 °C ± 3 °C, at normal atmospheric conditions



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| ORDERING INFORMATION |             |                           |                      |                           |                                                                                                          |                  |
|----------------------|-------------|---------------------------|----------------------|---------------------------|----------------------------------------------------------------------------------------------------------|------------------|
| C<br>(pF)            | TOL.<br>(%) | D <sub>MAX.</sub><br>(mm) | LEAD SPACING<br>(mm) | SH <sup>(1)</sup><br>(mm) | CLEAR TEXT CODE                                                                                          |                  |
|                      |             |                           |                      |                           | 13 <sup>TH</sup> DIGIT:<br>T = REEL; U = AMMO; 3 = BULK<br>16 <sup>TH</sup> DIGIT:<br>R = RoHS COMPLIANT |                  |
| 500 V                |             |                           |                      |                           |                                                                                                          |                  |
| 100                  | ± 10        | 5.0                       | 5.0                  | 4.0                       | F101K20Y5RL6.J5.                                                                                         |                  |
| 120                  |             |                           |                      |                           | F121K20Y5RL6.J5.                                                                                         |                  |
| 150                  |             |                           |                      |                           | F151K20Y5RL6.J5.                                                                                         |                  |
| 180                  |             |                           |                      |                           | F181K20Y5RL6.J5.                                                                                         |                  |
| 220                  |             |                           |                      |                           | F221K20Y5RL6.J5.                                                                                         |                  |
| 270                  |             |                           |                      |                           | F271K20Y5RL6.J5.                                                                                         |                  |
| 330                  |             | 6.5                       |                      |                           | 5.0                                                                                                      | F331K20Y5RL6.J5. |
| 390                  |             |                           |                      |                           |                                                                                                          | F391K25Y5RL6.J5. |
| 470                  |             |                           |                      |                           |                                                                                                          | F471K25Y5RL6.J5. |
| 560                  |             |                           |                      |                           |                                                                                                          | F561K25Y5RL6.J5. |
| 680                  |             |                           |                      |                           |                                                                                                          | F681K25Y5RL6.J5. |
| 820                  |             |                           |                      |                           |                                                                                                          | 7.5              |
| 1000                 |             | F102K29Y5RL6.J5.          |                      |                           |                                                                                                          |                  |
| 500 V                |             |                           |                      |                           |                                                                                                          |                  |
| 1200                 | ± 10        | 8.5                       | 5.0                  | 4.0                       | F122K33Y5RL6.J5.                                                                                         |                  |
| 1500                 |             | 10.0                      |                      |                           | F152K33Y5RL6.J5.                                                                                         |                  |
| 1800                 |             |                           | F182K39Y5RL6.J5.     |                           |                                                                                                          |                  |
| 2200                 |             |                           | F222K39Y5RL6.J5.     |                           |                                                                                                          |                  |
| 2700                 |             | 12.0                      | 7.5                  |                           | F272K47Y5RL6J3J7.                                                                                        |                  |
| 1 kV                 |             |                           |                      |                           |                                                                                                          |                  |
| 100                  | ± 10        | 6.5                       | 5.0                  | 4.0                       | F101K25Y5RN6.J5.                                                                                         |                  |
| 120                  |             |                           |                      |                           | F121K25Y5RN6.J5.                                                                                         |                  |
| 150                  |             |                           |                      |                           | F151K25Y5RN6.J5.                                                                                         |                  |
| 180                  |             |                           |                      |                           | F181K25Y5RN6.J5.                                                                                         |                  |
| 220                  |             |                           |                      |                           | F221K25Y5RN6.J5.                                                                                         |                  |
| 270                  |             | 7.5                       |                      |                           | F271K29Y5RN6.J5.                                                                                         |                  |
| 330                  |             |                           |                      |                           | F331K29Y5RN6.J5.                                                                                         |                  |
| 390                  |             |                           |                      |                           | F391K29Y5RN6.J5.                                                                                         |                  |
| 470                  |             |                           |                      |                           | F471K29Y5RN6.J5.                                                                                         |                  |
| 560                  |             |                           |                      |                           | 8.5                                                                                                      | F561K33Y5RN6.J5. |
| 680                  |             | F681K33Y5RN6.J5.          |                      |                           |                                                                                                          |                  |
| 820                  |             | F821K39Y5RN6.J5.          |                      |                           |                                                                                                          |                  |
| 1000                 |             | F102K39Y5RN6.J5.          |                      |                           |                                                                                                          |                  |
| 1200                 |             | 11.0                      |                      |                           |                                                                                                          | F122K43Y5RN6.J5. |
| 1500                 |             |                           |                      |                           | F152K43Y5RN6.J5.                                                                                         |                  |
| 1800                 |             |                           | 12.5                 |                           | F182K47Y5RN6J3J7.                                                                                        |                  |
| 2200                 |             |                           |                      |                           | F222K53Y5RN6J3J7.                                                                                        |                  |
| 2700                 |             |                           |                      |                           | F272K53Y5RN6J3J7.                                                                                        |                  |
| 3300                 |             | F332K69Y5RN6J3J7.         |                      |                           |                                                                                                          |                  |
| 3900                 |             | F392K69Y5RN6J3J7.         |                      |                           |                                                                                                          |                  |
| 4700                 |             | 19.0                      | 10.0                 |                           | F472K75Y5RN8J3J0.                                                                                        |                  |
| 2 kV                 |             |                           |                      |                           |                                                                                                          |                  |
| 100                  | ± 10        | 6.5                       | 5.0                  | 4.0                       | F101K25Y5RP6.K5.                                                                                         |                  |
| 120                  |             |                           |                      |                           | F121K25Y5RP6.K5.                                                                                         |                  |
| 150                  |             |                           |                      |                           | F151K25Y5RP6.K5.                                                                                         |                  |
| 180                  |             | 7.5                       |                      |                           | F181K29Y5RP6.K5.                                                                                         |                  |
| 220                  |             |                           |                      |                           | F221K29Y5RP6.K5.                                                                                         |                  |
| 270                  |             |                           |                      |                           | F271K29Y5RP6.K5.                                                                                         |                  |
| 330                  |             |                           |                      |                           | F331K29Y5RP6.K5.                                                                                         |                  |
| 390                  |             |                           |                      |                           | F391K33Y5RP6.K5.                                                                                         |                  |
| 470                  |             |                           |                      |                           | 8.5                                                                                                      | F471K33Y5RP6.K5. |
| 560                  |             | F561K39Y5RP6.K5.          |                      |                           |                                                                                                          |                  |
|                      |             |                           |                      |                           |                                                                                                          |                  |

# F Series

Vishay BCcomponents

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## ORDERING INFORMATION

| C<br>(pF) | TOL.<br>(%) | D <sub>MAX.</sub><br>(mm) | LEAD SPACING<br>(mm) | SH <sup>(1)</sup><br>(mm) | CLEAR TEXT CODE                                         |                  |  |
|-----------|-------------|---------------------------|----------------------|---------------------------|---------------------------------------------------------|------------------|--|
|           |             |                           |                      |                           | 13 <sup>TH</sup> DIGIT:<br>T = REEL; U = AMMO; 3 = BULK |                  |  |
|           |             |                           |                      |                           | 16 <sup>TH</sup> DIGIT:<br>R = RoHS COMPLIANT           |                  |  |
| 2 kV      |             |                           |                      |                           |                                                         |                  |  |
| 680       | ± 10        | 10.0                      | 5.0                  | 4.0                       | F681K39Y5RP6.K5.                                        |                  |  |
| 820       |             | 11.0                      |                      |                           | F821K43Y5RP6.K5.                                        |                  |  |
| 1000      |             | 12.0                      |                      |                           | F102K43Y5RP6.K5.                                        |                  |  |
| 1200      |             | 13.5                      | 7.5                  | 4.8                       | F122K47Y5RP63K7.                                        |                  |  |
| 1500      |             |                           |                      |                           | F152K53Y5RP63K7.                                        |                  |  |
| 1800      |             |                           |                      |                           | F182K53Y5RP63K7.                                        |                  |  |
| 2200      |             | 17.5                      |                      |                           | F222K69Y5RP63K7.                                        |                  |  |
| 2700      |             | 19.0                      |                      |                           | F272K75Y5RP83K0.                                        |                  |  |
| 3300      |             | 10.0                      | F332K75Y5RP83K0.     |                           |                                                         |                  |  |
| 3900      |             |                           | F392K75Y5RP83K0.     |                           |                                                         |                  |  |
| 4700      |             |                           | 24.5                 |                           | F472K96Y5RP83K0.                                        |                  |  |
| 3 kV      |             |                           |                      |                           |                                                         |                  |  |
| 100       | ± 10        | 8.5                       | 7.5                  | 4.0                       | F101K33Y5RR6.K7.                                        |                  |  |
| 120       |             |                           |                      |                           | F121K33Y5RR6.K7.                                        |                  |  |
| 150       |             |                           |                      |                           | F151K33Y5RR6.K7.                                        |                  |  |
| 180       |             |                           |                      |                           | F181K33Y5RR6.K7.                                        |                  |  |
| 220       |             |                           |                      |                           | F221K33Y5RR6.K7.                                        |                  |  |
| 270       |             |                           |                      |                           | F271K33Y5RR6.K7.                                        |                  |  |
| 330       |             |                           |                      |                           | F331K33Y5RR6.K7.                                        |                  |  |
| 390       |             |                           |                      |                           | F391K39Y5RR6.K7.                                        |                  |  |
| 470       |             | 10                        |                      |                           | F471K39Y5RR6.K7.                                        |                  |  |
| 560       |             | 11                        |                      |                           | F561K43Y5RR6.K7.                                        |                  |  |
| 680       |             | 13.5                      |                      |                           | F681K43Y5RR6.K7.                                        |                  |  |
| 820       |             | 15                        |                      |                           | 4.8                                                     | F821K53Y5RR63K7. |  |
| 1000      |             |                           |                      | F102K53Y5RR63K7.          |                                                         |                  |  |
| 1200      |             |                           |                      | F122K59Y5RR63K7.          |                                                         |                  |  |
| 1500      |             |                           |                      | F152K59Y5RR63K7.          |                                                         |                  |  |
| 1800      |             |                           |                      | F182K75Y5RR83K0.          |                                                         |                  |  |
| 2200      |             |                           | F222K75Y5RR83K0.     |                           |                                                         |                  |  |
| 2700      |             | 19                        | 10.0                 | F272K84Y5RR83K0.          |                                                         |                  |  |
|           | 21          |                           |                      |                           |                                                         |                  |  |

### Notes

<sup>(1)</sup> SH = seated height

- Maximum thickness: 500 V = 3.5 mm; 1 kV = 4.5 mm; 2 kV = 5.0 mm; 3 kV = 6.0 mm

## PACKAGING

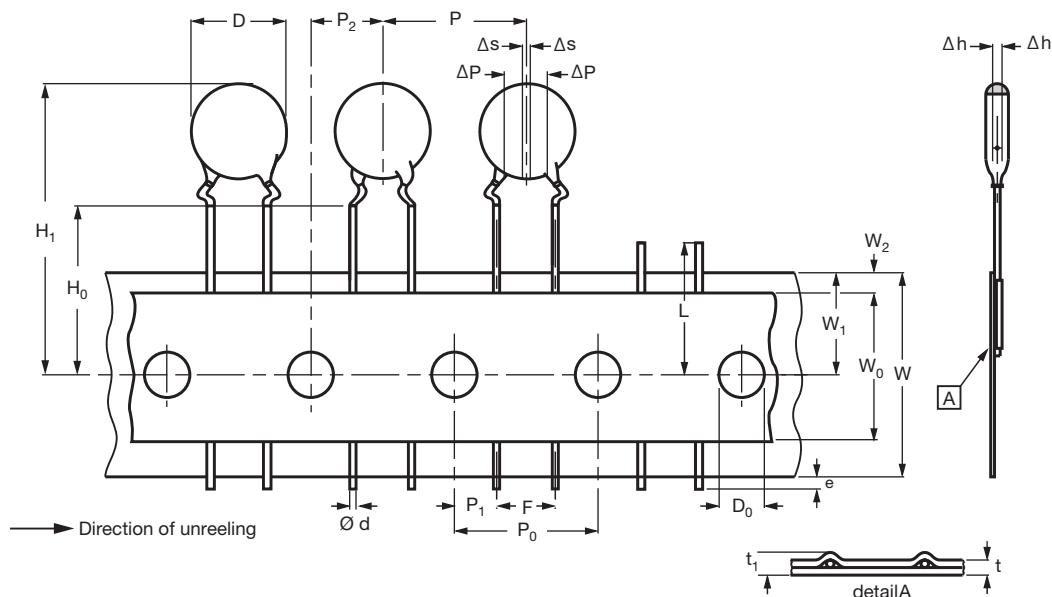
| PACKAGING TYPE                  | SIZE CODE | LEAD SPACE<br>(mm) | VOLTAGE<br>(V <sub>DC</sub> ) | SPQ  | BOX DIMENSIONS<br>L x W x H |
|---------------------------------|-----------|--------------------|-------------------------------|------|-----------------------------|
| Bulk<br>(long lead L ≥ 25.4 mm) | 20 to 25  | all                | all                           | 1000 | 245 x 120 x 65              |
|                                 | 29 to 39  |                    |                               | 1000 |                             |
|                                 | 43 to 47  |                    |                               | 1000 |                             |
|                                 | 53 to 75  |                    |                               | 500  |                             |
|                                 | 84 to 96  |                    |                               | 250  |                             |
| Tape and reel                   | ≤ 47      | ≤ 6.4              | < 500                         | 2500 | 370 x 370 x 60              |
|                                 |           |                    | 500 ≤ WV ≤ 2000               | 2000 |                             |
|                                 |           |                    | 3000                          | 1000 |                             |
|                                 | ≥ 53      | ≥ 7.5              | all                           | 1000 |                             |
|                                 |           | all                | all                           | 1000 |                             |
| Ammopack                        | ≤ 47      | ≤ 6.4              | < 500                         | 2000 | 335 x 240 x 50              |
|                                 |           |                    | 500 ≤ WV < 2000               | 2000 | 335 x 290 x 50              |
|                                 |           |                    | 2000 and 3000                 | 1500 |                             |
|                                 | ≥ 53      | ≥ 7.5              | all                           | 1500 | 360 x 330 x 55              |
|                                 |           | all                | all                           | 1500 | 335 x 290 x 50              |

### Note

- The capacitors are supplied in bulk packaging (cardboard boxes), in tape on reel or in ammpack

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Vishay BCcomponents



Kinked capacitors on tape, lead spacing 5.0 mm (0.2") or 7.5 mm (0.3")

#### DIMENSIONS OF TAPE

| SYMBOL                        | PARAMETER                            | DIMENSIONS (mm)                 |                                 |
|-------------------------------|--------------------------------------|---------------------------------|---------------------------------|
|                               |                                      | FEED-HOLE PITCH<br>$P_0 = 12.7$ | FEED-HOLE PITCH<br>$P_0 = 15.0$ |
| D                             | Body diameter                        | 11.0 max.                       | 14.0 max.                       |
| d                             | Lead diameter                        | $0.6 \pm 0.05$                  | $0.6 \pm 0.05$                  |
| P <sup>(1)</sup>              | Pitch between capacitors             | $12.7 \pm 1.0$                  | $15.0 \pm 1.0$                  |
| P <sub>0</sub>                | Feed-hole pitch                      | $12.7 \pm 0.3$                  | $15.0 \pm 0.3$                  |
| ΔP                            | Plane deviation                      | 1.0 max.                        | 1.0 max.                        |
| P <sub>1</sub> <sup>(2)</sup> | Feed-hole center to lead center      | $3.85 \pm 0.7$                  | $3.75 \pm 0.7$                  |
| P <sub>2</sub> <sup>(2)</sup> | Feed-hole center to component center | $6.35 \pm 1.3$                  | $7.5 \pm 1.5$                   |
| F                             | Lead spacing                         | $5.0 + 0.6/- 0.4$               | $7.5 + 0.6/- 0.4$               |
| Δh                            | Component alignment                  | $0 \pm 1.0$                     | $0 \pm 1.0$                     |
| W                             | Tape width                           | $18.0 + 1.0/- 0.5$              | $18.0 + 1.0/- 0.5$              |
| W <sub>0</sub>                | Hold-down tape width                 | 5.0 min.                        | 5.0 min.                        |
| W <sub>1</sub>                | Hole position                        | $9.0 + 0.75/- 0.5$              | $9.0 + 0.75/- 0.5$              |
| W <sub>2</sub>                | Hold-down tape margin                | 3.0 max.                        | 3.0 max.                        |
| H <sub>0</sub>                | Height to seating plane              | $16.0 \pm 0.5$                  | $16.0 \pm 0.5$                  |
| H <sub>1</sub>                | Maximum component height             | 32.0                            | 40.0                            |
| e                             | Lead end protrusion                  | 1.0 max.                        | 1.0 max.                        |
| L                             | Maximum length of snapped lead       | 11.0                            | 11.0                            |
| D <sub>0</sub>                | Feed-hole diameter                   | $4.0 \pm 0.2$                   | $4.0 \pm 0.2$                   |
| t                             | Total tape thickness                 | 0.9 max.                        | 0.9 max.                        |
| t <sub>1</sub>                | Maximum thickness of tape and wires  | 1.5 max.                        | 1.5 max.                        |

#### Notes

(1) Cumulative pitch error:  $\pm \leq 1 \text{ mm}/20 \text{ pitches}$

(2) Obliquity maximum 3°

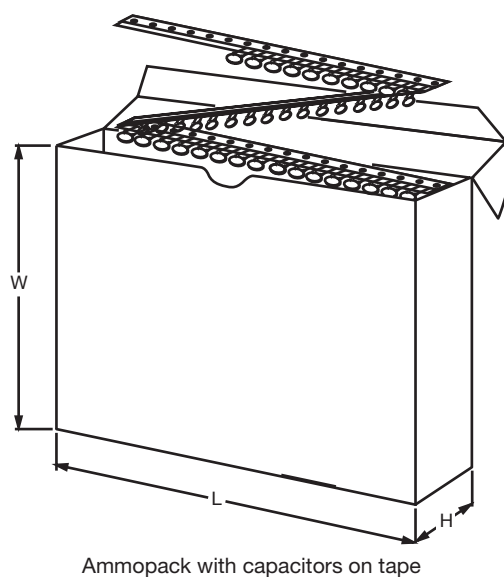
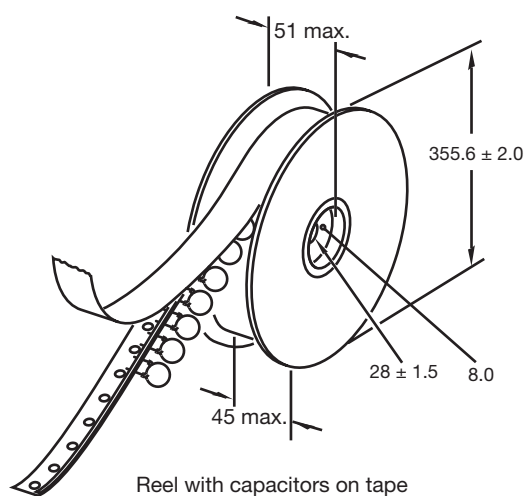
# F Series

Vishay BCcomponents

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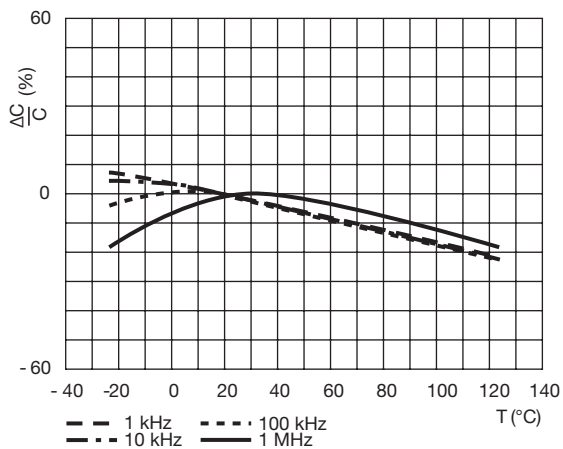


## REEL AND TAPE DATA in millimeters

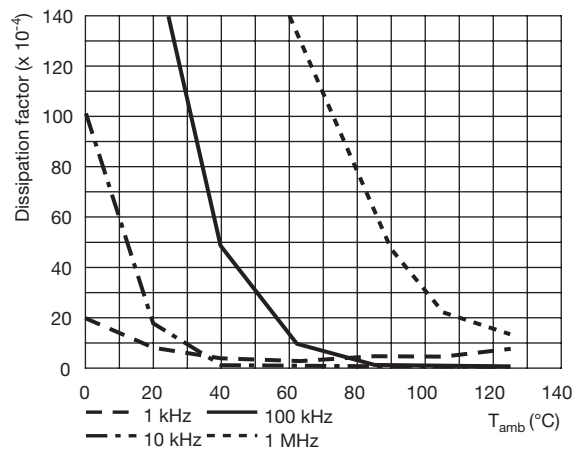


| DIMENSIONS OF AMMOPACK |                                   |                    |      |
|------------------------|-----------------------------------|--------------------|------|
| PARAMETER              | DISC SIZE<br>(D <sub>MAX.</sub> ) |                    | UNIT |
|                        | 6.5 mm to 11.0 mm                 | 12.0 mm to 13.5 mm |      |
| Taping pitch           | 12.7                              | 15.0               | mm   |
| L                      | 335                               | 360                | mm   |
| W                      | 290                               | 330                | mm   |
| H                      | 50                                | 55                 | mm   |

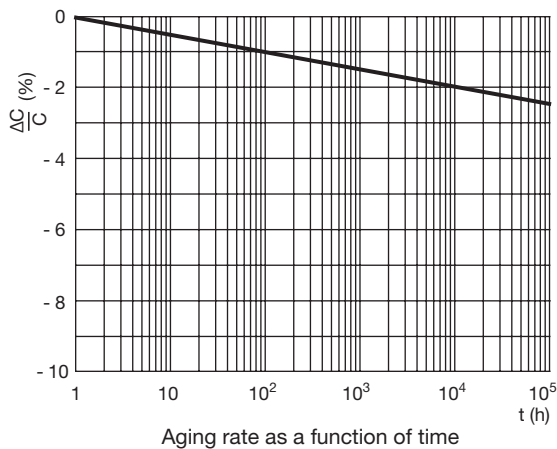
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Typical capacitance change as a function of temperature and frequency



Typical dissipation factor as a function of temperature and frequency



Aging rate as a function of time



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