

# Ceramic Disc Capacitors, Class 1, 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>



## FEATURES

- High reliability
- Low losses
- High capacitance in small size
- Kinked leads
- Material categorization:  
for definitions of compliance please see  
[www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**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

## QUICK REFERENCE DATA

| DESCRIPTION                | VALUE  |      |      |      |      |      |      |
|----------------------------|--------|------|------|------|------|------|------|
| Ceramic Class              | 1      |      |      | 2    |      |      |      |
| Ceramic Dielectric         | S3N    |      |      | Y5R  |      |      |      |
| Voltage (V <sub>DC</sub> ) | 1000   | 2000 | 3000 | 500  | 1000 | 2000 | 3000 |
| Min. Capacitance (pF)      | 100    | 100  | 100  | 100  | 100  | 100  | 100  |
| Max. Capacitance (pF)      | 2200   | 4700 | 2700 | 2700 | 4700 | 4700 | 2700 |
| Mounting                   | Radial |      |      |      |      |      |      |

## MARKING

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

## OPERATING TEMPERATURE RANGE

-30 °C to +125 °C

## TEMPERATURE CHARACTERISTICS

Class 1: S3N

Class 2: Y5R

## SECTIONAL SPECIFICATION

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: |
| RR = low loss with T.C. Y5R              | BC                                       |
| 101K                                     | RR                                       |
| 2 kV                                     | 102K                                     |
|                                          | 3 kV                                     |

### Note

- Remark: no TC marking for S3N

## 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

## 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.



## ORDERING CODES

| DIELECTRIC S3N (1000 V <sub>DC</sub> / 2000 V <sub>DC</sub> ) |                      |                       |                        |                      |                       |                        |
|---------------------------------------------------------------|----------------------|-----------------------|------------------------|----------------------|-----------------------|------------------------|
| CAP.<br>(pF)                                                  | 1000 V <sub>DC</sub> |                       |                        | 2000 V <sub>DC</sub> |                       |                        |
|                                                               | ORDERING CODE        | DIAMETER<br>(mm max.) | THICKNESS<br>(mm max.) | ORDERING CODE        | DIAMETER<br>(mm max.) | THICKNESS<br>(mm max.) |
| 100                                                           | F101K25S3NN6###R     | 6.5                   | 4.0                    | F101K25S3NP6###R     | 6.5                   | 4.5                    |
| 120                                                           | F121K25S3NN6###R     | 6.5                   | 4.0                    | F121K25S3NP6###R     | 6.5                   | 4.5                    |
| 150                                                           | F151K25S3NN6###R     | 6.5                   | 4.0                    | F151K25S3NP6###R     | 6.5                   | 4.5                    |
| 180                                                           | F181K25S3NN6###R     | 6.5                   | 4.0                    | F181K25S3NP6###R     | 6.5                   | 4.5                    |
| 220                                                           | F221K25S3NN6###R     | 6.5                   | 4.0                    | F221K25S3NP6###R     | 6.5                   | 4.5                    |
| 270                                                           | F271K25S3NN6###R     | 6.5                   | 4.0                    | F271K25S3NP6###R     | 6.5                   | 4.5                    |
| 330                                                           | F331K25S3NN6###R     | 6.5                   | 4.0                    | F331K29S3NP6###R     | 7.5                   | 4.5                    |
| 390                                                           | F391K25S3NN6###R     | 6.5                   | 4.0                    | F391K29S3NP6###R     | 7.5                   | 4.5                    |
| 470                                                           | F471K25S3NN6###R     | 6.5                   | 4.0                    | F471K33S3NP6###R     | 8.5                   | 4.5                    |
| 560                                                           | F561K29S3NN6###R     | 7.5                   | 4.0                    | F561K39S3NP6###R     | 10.0                  | 4.5                    |
| 680                                                           | F681K29S3NN6###R     | 7.5                   | 4.0                    | F681K39S3NP6###R     | 10.0                  | 4.5                    |
| 820                                                           | F821K33S3NN6###R     | 8.5                   | 4.0                    | F821K39S3NP6###R     | 10.0                  | 4.5                    |
| 1000                                                          | F102K33S3NN6###R     | 8.5                   | 4.0                    | F102K43S3NP6###R     | 11.0                  | 4.5                    |
| 1200                                                          | F122K39S3NN6###R     | 10.0                  | 4.0                    | F122K47S3NP63K7R     | 12.0                  | 4.5                    |
| 1500                                                          | F152K39S3NN6###R     | 10.0                  | 4.0                    | F152K53S3NP63K7R     | 13.5                  | 4.5                    |
| 1800                                                          | F182K43S3NN6###R     | 11.0                  | 4.0                    | F182K53S3NP63K7R     | 13.5                  | 4.5                    |
| 2200                                                          | F222K47S3NN6###R     | 12.0                  | 4.0                    | F222K63S3NP63K7R     | 16.0                  | 4.5                    |
| 2700                                                          | /                    | /                     | /                      | F272K63S3NP63K7R     | 16.0                  | 4.5                    |
| 3300                                                          | /                    | /                     | /                      | F332K69S3NP63K7R     | 17.5                  | 4.5                    |
| 3900                                                          | /                    | /                     | /                      | F392K75S3NP83K0R     | 19.0                  | 4.5                    |
| 4700                                                          | /                    | /                     | /                      | F472K84S3NP83K0R     | 21.5                  | 4.5                    |

| DIELECTRIC S3N (3000 V <sub>DC</sub> ) |                      |                       |                        |
|----------------------------------------|----------------------|-----------------------|------------------------|
| CAP.<br>(pF)                           | 3000 V <sub>DC</sub> |                       |                        |
|                                        | ORDERING CODE        | DIAMETER<br>(mm max.) | THICKNESS<br>(mm max.) |
| 100                                    | F101K25S3NR6###R     | 6.5                   | 5.5                    |
| 120                                    | F121K25S3NR6###R     | 6.5                   | 5.5                    |
| 150                                    | F151K29S3NR6###R     | 7.5                   | 5.5                    |
| 180                                    | F181K29S3NR6###R     | 7.5                   | 5.5                    |
| 220                                    | F221K29S3NR6###R     | 7.5                   | 5.5                    |
| 270                                    | F271K29S3NR6###R     | 7.5                   | 5.5                    |
| 330                                    | F331K33S3NR6###R     | 8.5                   | 5.5                    |
| 390                                    | F391K39S3NR6###R     | 10.0                  | 5.5                    |
| 470                                    | F471K39S3NR6###R     | 10.0                  | 5.5                    |
| 560                                    | F561K39S3NR6###R     | 10.0                  | 5.5                    |
| 680                                    | F681K43S3NR6###R     | 11.0                  | 5.5                    |
| 820                                    | F821K53S3NR6###R     | 13.5                  | 5.5                    |
| 1000                                   | F102K53S3NR6###R     | 13.5                  | 5.5                    |
| 1200                                   | F122K59S3NR6###R     | 15.0                  | 5.5                    |
| 1500                                   | F152K63S3NR6###R     | 16.0                  | 5.5                    |
| 1800                                   | F182K69S3NR6###R     | 17.5                  | 5.5                    |
| 2200                                   | F222K75S3NR83K0R     | 19.0                  | 5.5                    |
| 2700                                   | F272K75S3NR83K0R     | 19.0                  | 5.5                    |

## Notes

- Lead diameter is 0.6 mm
- # 5<sup>th</sup> digit is capacitance tolerance code:  $\pm 10\%$  = K;  $\pm 20\%$  = M
- # 13<sup>th</sup> digit is packaging code: bulk = 3; reel = T; ammo = U
- # 14<sup>th</sup> digit is lead style code: L; J; K (J is valid for 1 kV only)
- # 15<sup>th</sup> digit is lead spacing code: 5.0 mm = 5; 6.4 mm = 6; 7.5 mm = 7; 10.0 mm = 0



| DIELECTRIC Y5R (500 V <sub>DC</sub> / 1000 V <sub>DC</sub> ) |                     |                       |                        |                      |                       |                        |
|--------------------------------------------------------------|---------------------|-----------------------|------------------------|----------------------|-----------------------|------------------------|
| CAP.<br>(pF)                                                 | 500 V <sub>DC</sub> |                       |                        | 1000 V <sub>DC</sub> |                       |                        |
|                                                              | ORDERING CODE       | DIAMETER<br>(mm max.) | THICKNESS<br>(mm max.) | ORDERING CODE        | DIAMETER<br>(mm max.) | THICKNESS<br>(mm max.) |
| 100                                                          | F101K20Y5RL6###R    | 5.0                   | 3.5                    | F101K25Y5RN6###R     | 6.5                   | 4.0                    |
| 120                                                          | F121K20Y5RL6###R    | 5.0                   | 3.5                    | F121K25Y5RN6###R     | 6.5                   | 4.0                    |
| 150                                                          | F151K20Y5RL6###R    | 5.0                   | 3.5                    | F151K25Y5RN6###R     | 6.5                   | 4.0                    |
| 180                                                          | F181K20Y5RL6###R    | 5.0                   | 3.5                    | F181K25Y5RN6###R     | 6.5                   | 4.0                    |
| 220                                                          | F221K20Y5RL6###R    | 5.0                   | 3.5                    | F221K25Y5RN6###R     | 6.5                   | 4.0                    |
| 270                                                          | F271K20Y5RL6###R    | 5.0                   | 3.5                    | F271K29Y5RN6###R     | 7.5                   | 4.0                    |
| 330                                                          | F331K20Y5RL6###R    | 5.0                   | 3.5                    | F331K29Y5RN6###R     | 7.5                   | 4.0                    |
| 390                                                          | F391K25Y5RL6###R    | 6.5                   | 3.5                    | F391K29Y5RN6###R     | 7.5                   | 4.0                    |
| 470                                                          | F471K25Y5RL6###R    | 6.5                   | 3.5                    | F471K29Y5RN6###R     | 7.5                   | 4.0                    |
| 560                                                          | F561K25Y5RL6###R    | 6.5                   | 3.5                    | F561K33Y5RN6###R     | 8.5                   | 4.0                    |
| 680                                                          | F681K25Y5RL6###R    | 6.5                   | 3.5                    | F681K33Y5RN6###R     | 8.5                   | 4.0                    |
| 820                                                          | F821K29Y5RL6###R    | 7.5                   | 3.5                    | F821K39Y5RN6###R     | 10.0                  | 4.0                    |
| 1000                                                         | F102K29Y5RL6###R    | 7.5                   | 3.5                    | F102K39Y5RN6###R     | 10.0                  | 4.0                    |
| 1200                                                         | F122K33Y5RL6###R    | 8.5                   | 3.5                    | F122K43Y5RN6###R     | 11.0                  | 4.0                    |
| 1500                                                         | F152K33Y5RL6###R    | 8.5                   | 3.5                    | F152K43Y5RN6###R     | 11.0                  | 4.0                    |
| 1800                                                         | F182K39Y5RL6###R    | 10.0                  | 3.5                    | F182K47Y5RN6###R     | 12.0                  | 4.0                    |
| 2200                                                         | F222K43Y5RL63J7R    | 11.0                  | 3.5                    | F222K53Y5RN6###R     | 13.5                  | 4.0                    |
| 2700                                                         | F272K47Y5RL63J7R    | 12.0                  | 3.5                    | F272K53Y5RN6###R     | 13.5                  | 4.0                    |
| 3300                                                         | /                   | /                     | /                      | F332K69Y5RN6###R     | 17.5                  | 4.0                    |
| 3900                                                         | /                   | /                     | /                      | F392K69Y5RN83K0R     | 17.5                  | 4.0                    |
| 4700                                                         | /                   | /                     | /                      | F472K75Y5RN83K0R     | 19.0                  | 4.0                    |

| DIELECTRIC Y5R (2000 V <sub>DC</sub> / 3000 V <sub>DC</sub> ) |                      |                       |                        |                      |                       |                        |
|---------------------------------------------------------------|----------------------|-----------------------|------------------------|----------------------|-----------------------|------------------------|
| CAP.<br>(pF)                                                  | 2000 V <sub>DC</sub> |                       |                        | 3000 V <sub>DC</sub> |                       |                        |
|                                                               | ORDERING CODE        | DIAMETER<br>(mm max.) | THICKNESS<br>(mm max.) | ORDERING CODE        | DIAMETER<br>(mm max.) | THICKNESS<br>(mm max.) |
| 100                                                           | F101K25Y5RP6###R     | 6.5                   | 5.0                    | F101K33Y5RR6###R     | 8.5                   | 5.5                    |
| 120                                                           | F121K25Y5RP6###R     | 6.5                   | 5.0                    | F121K33Y5RR6###R     | 8.5                   | 5.5                    |
| 150                                                           | F151K25Y5RP6###R     | 6.5                   | 5.0                    | F151K33Y5RR6###R     | 8.5                   | 5.5                    |
| 180                                                           | F181K29Y5RP6###R     | 7.5                   | 5.0                    | F181K33Y5RR6###R     | 8.5                   | 5.5                    |
| 220                                                           | F221K29Y5RP6###R     | 7.5                   | 5.0                    | F221K33Y5RR6###R     | 8.5                   | 5.5                    |
| 270                                                           | F271K29Y5RP6###R     | 7.5                   | 5.0                    | F271K33Y5RR6###R     | 8.5                   | 5.5                    |
| 330                                                           | F331K29Y5RP6###R     | 7.5                   | 5.0                    | F331K33Y5RR6###R     | 8.5                   | 5.5                    |
| 390                                                           | F391K33Y5RP6###R     | 8.5                   | 5.0                    | F391K39Y5RR6###R     | 10.0                  | 5.5                    |
| 470                                                           | F471K33Y5RP6###R     | 8.5                   | 5.0                    | F471K39Y5RR6###R     | 10.0                  | 5.5                    |
| 560                                                           | F561K39Y5RP6###R     | 10.0                  | 5.0                    | F561K43Y5RR6###R     | 11.0                  | 5.5                    |
| 680                                                           | F681K39Y5RP6###R     | 10.0                  | 5.0                    | F681K43Y5RR6###R     | 11.0                  | 5.5                    |
| 820                                                           | F821K43Y5RP6###R     | 11.0                  | 5.0                    | F821K53Y5RR6###R     | 13.5                  | 5.5                    |
| 1000                                                          | F102K43Y5RP6###R     | 11.0                  | 5.0                    | F102K53Y5RR6###R     | 13.5                  | 5.5                    |
| 1200                                                          | F122K47Y5RP6###R     | 12.0                  | 5.0                    | F122K59Y5RR6###R     | 15.0                  | 5.5                    |
| 1500                                                          | F152K53Y5RP6###R     | 13.5                  | 5.0                    | F152K59Y5RR6###R     | 15.0                  | 5.5                    |
| 1800                                                          | F182K59Y5RP6###R     | 15.0                  | 5.0                    | F182K75Y5RR6###R     | 19.0                  | 5.5                    |
| 2200                                                          | F222K69Y5RP83K0R     | 17.5                  | 5.0                    | F222K75Y5RR83K0R     | 19.0                  | 5.5                    |
| 2700                                                          | F272K75Y5RP83K0R     | 19.0                  | 5.0                    | F272K84Y5RR83K0R     | 21.0                  | 5.5                    |
| 3300                                                          | F332K75Y5RP83K0R     | 19.0                  | 5.0                    | /                    | /                     | /                      |
| 3900                                                          | F392K75Y5RP83K0R     | 19.0                  | 5.0                    | /                    | /                     | /                      |
| 4700                                                          | F472K96Y5RP83K0R     | 24.5                  | 5.0                    | /                    | /                     | /                      |

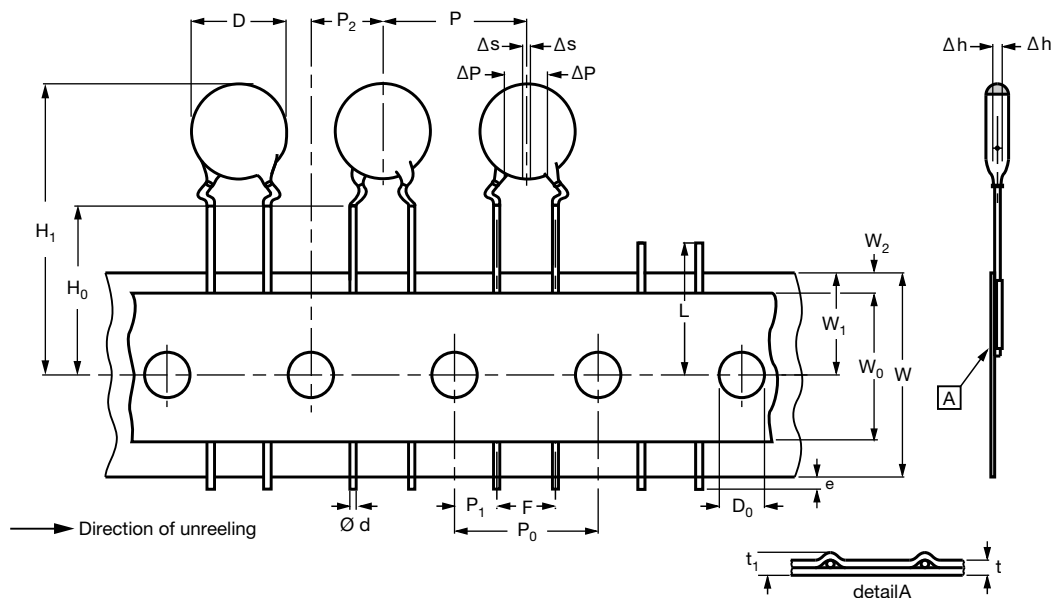
**Notes**

- Lead diameter is 0.6 mm
- # 5<sup>th</sup> digit is capacitance tolerance code:  $\pm 10\%$  = K;  $\pm 20\%$  = M
- # 13<sup>th</sup> digit is packaging code: bulk = 3; reel = T; ammo = U
- # 14<sup>th</sup> digit is lead style code: L; J; K (J is valid for 1 kV only)
- # 15<sup>th</sup> digit is lead spacing code: 5.0 mm = 5; 6.4 mm = 6; 7.5 mm = 7; 10.0 mm = 0

| PACKAGING                       |           |                 |                            |      |                          |
|---------------------------------|-----------|-----------------|----------------------------|------|--------------------------|
| PACKAGING TYPE                  | SIZE CODE | LEAD SPACE (mm) | VOLTAGE (V <sub>DC</sub> ) | SPQ  | BOX DIMENSIONS 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 | 335 x 290 x 50           |
|                                 | ≥ 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 ammopack



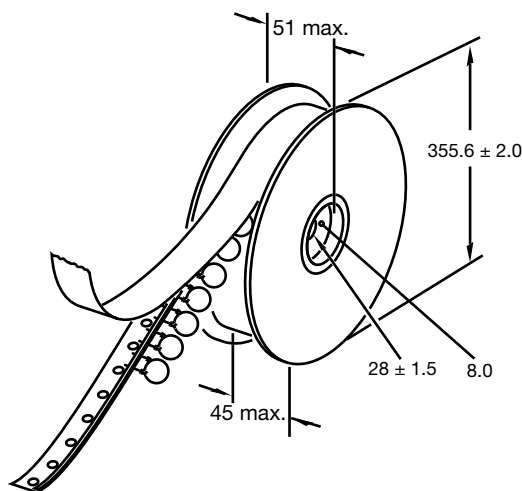
Kinked capacitors on tape, lead spacing 5.0 mm (0.2) or 7.5 mm (0.3)

| 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.                        |

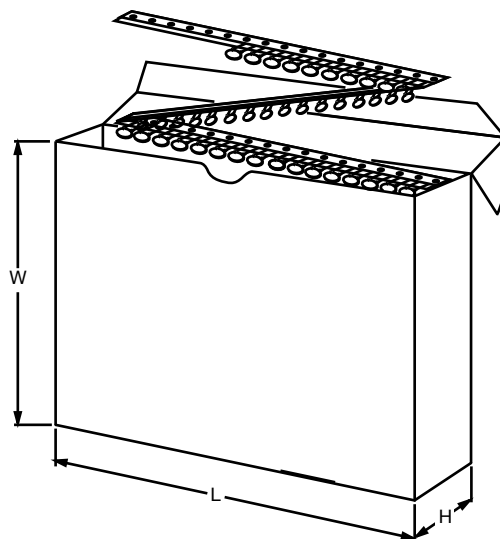
**Notes**

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

(2) Obliquity maximum 3°

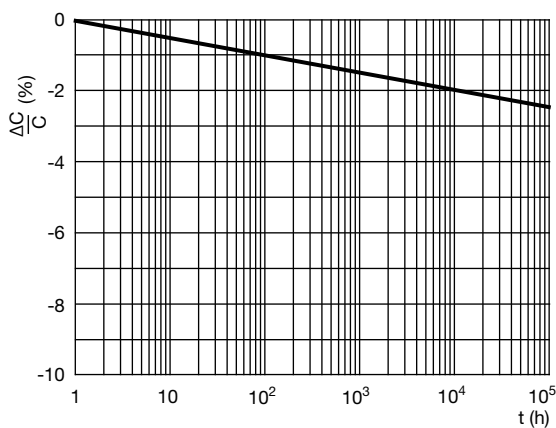
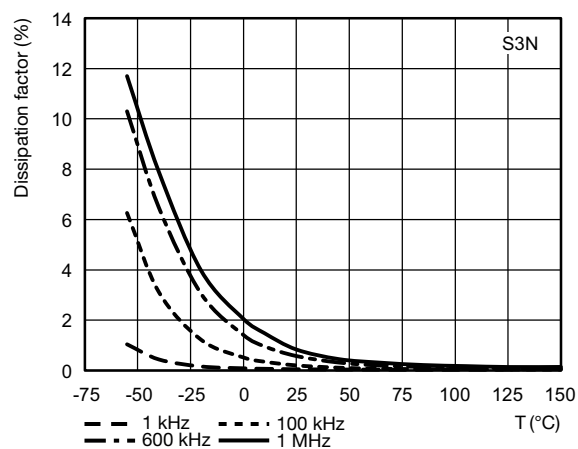
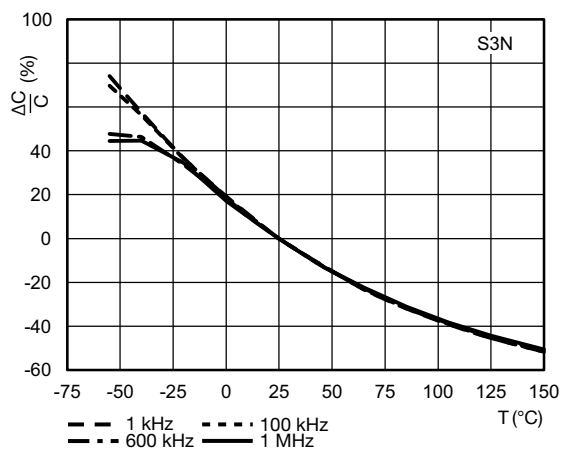
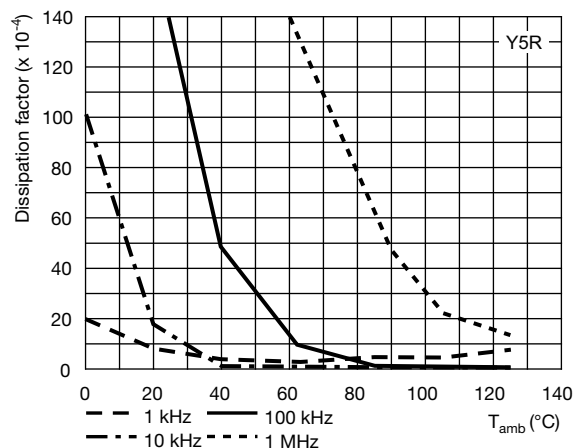
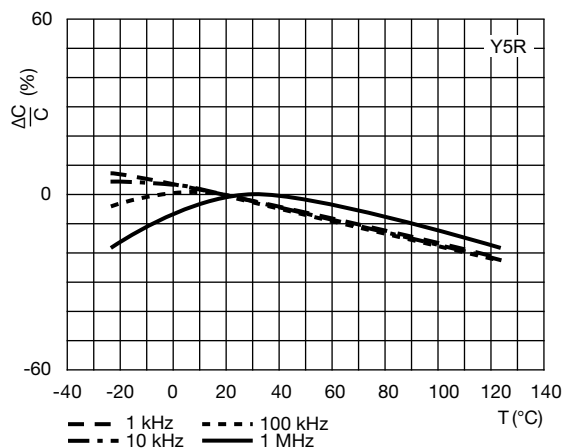
**REEL AND TAPE DATA** in millimeters


Reel with capacitors on tape



Ampmpack with capacitors on tape

| DIMENSIONS OF AMMPACK |                                   |                    |      |
|-----------------------|-----------------------------------|--------------------|------|
| 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   |





## Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

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