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New Pencil Shaped Aluminum Capacitors CS and PZ Series



Nichicon's new pencil shaped aluminum capacitors are available in two series: CS and PZ. They are designed to provide large capacitance, voltage and ripple current for low profile applications where traditional sized capacitors would be too big. A lower height is achieved by laying the capacitor on its side for mounting. Normally a power supply needs a capacitor with high voltage, capacitance and ripple current on the input side. In the case of a large power supply, usually a bulky can type capacitor is used. In the case of a small power supply, typically a radial type is used by mounting it vertically or horizontally. In recent years, the flat screen market has exploded and makers have requested a lower height capacitor to achieve a slimmer product. The usual response has been to make a bigger diameter and lower height part. However, there was a tradeoff with voltage, capacitance and ripple current so this was not an optimum solution until the pencil capacitor was designed. With the smaller diameter, longer length and laying horizontal on the circuit board, this provided what the designers were demanding.

There are key advantages to the pencil shaped capacitors:

Advantage #1: Lower Height Product

By laying the capacitor on its side, a lower height is achieved making it attractive for low profile applications. Diameters range from 9 to 12.5mm.

Advantage #2: Larger Capacitance by Going Parallel

Multiple capacitors can be put in parallel to achieve much higher capacitances and ripple currents but without increasing in height.

Advantage #3: High Capacitance in Small Size

With a low height dimension, large capacitance is available up to 270 microfarads.

Advantage #4: Low Cost per Capacitance

When compared to other capacitors like ceramic, film and tantalum, aluminum is the lowest cost per microfarad.

Advantage # 5: High Voltage

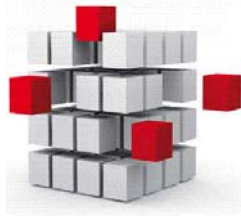
The pencil caps are available in voltages from 200 thru 450 Volt.

Pencil Capacitors

Quick Facts

- Suitable for thin profiles
- Large capacitance in small size
- High voltage up to 450V
- Long length, small diameter
- Low cost per microfarad
- Long life: up to 10000 Hrs
- 105C
- Ripple Current up to 1265mArms

Pencil Design Features



Dimensions: 8x50,10x40,10x50,12.5x40, 12.5x50

Capacitance Range: 18 to 270 uF

Rated Voltage: 200 to 450 Volt

Temperature: 105C

Life: 2000-10000 Hours

Ripple Current: 220-1265 mArms at 105C 120 Hz

Note: Lower voltages and higher capacitances available upon request.

Markets

Primary

*Low Profile Power Supply for Digital Electronics * Flat Panel TVs * Lighting * Chargers *

Secondary

*Power Supply Adapters *

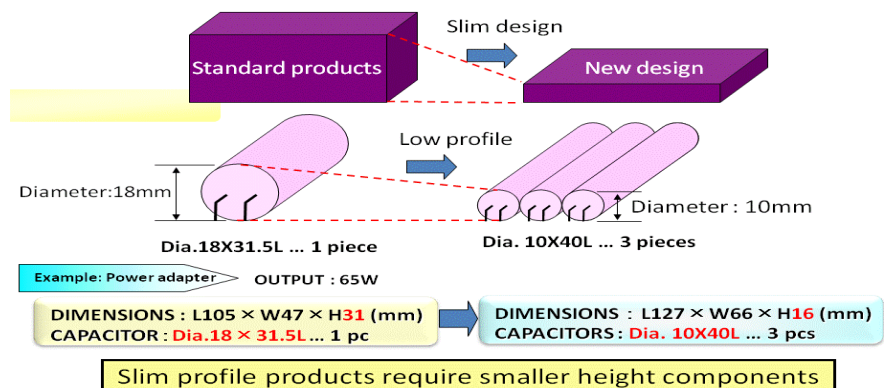
Applications



Currently, the flat screen TV market is dominating the usage of the pencil capacitor. In addition, makers of power supply adapters for notebook PCs are adopting this technology to make slim profiles.

Thicker or Thinner?

Slim profile products are growing in demand by the consumer



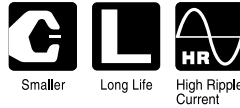
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ALUMINUM ELECTROLYTIC CAPACITORS

CS Miniature Sized, High Ripple Current, High Reliability series (pencil-shaped type)



NEW

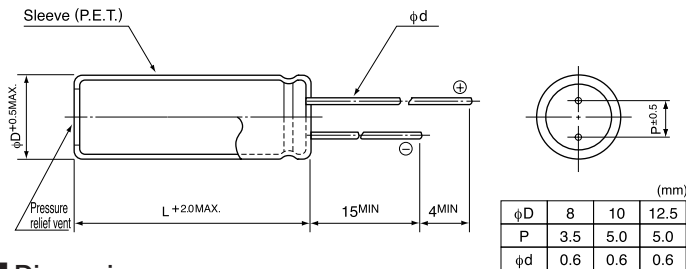
- High ripple current and load life of 10000 hours at +105°C.
- Suited for slim-designed products.
- Compliant to the RoHS directive (2002/95/EC).



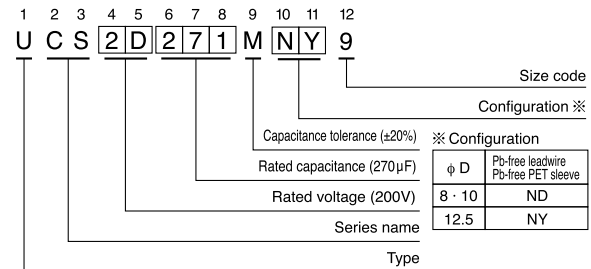
Specifications

| Item | Performance Characteristics | | | | | | |
|-------------------------------|---|---|------|------|------|---|---|
| Category Temperature Range | -40 to +105°C (200 to 400V), -25 to +105°C (450V) | | | | | | |
| Rated Voltage Range | 200 to 450V | | | | | | |
| Rated Capacitance Range | 18 to 270μF | | | | | | |
| Capacitance Tolerance | ±20% at 120Hz, 20°C | | | | | | |
| Leakage Current | After 1 minute's application of rated voltage, leakage current is not more than 0.04CV+100 (μA) | | | | | | |
| Tangent of loss angle (tan δ) | Rated voltage (V) | 200 | 250 | 400 | 450 | Measurement frequency : 120Hz, Temperature : 20°C | |
| | tan δ (MAX.) | 0.20 | 0.20 | 0.24 | 0.24 | | |
| Stability at Low Temperature | Rated voltage (V) | | 200 | 250 | 400 | 450 | Measurement frequency : 120Hz |
| | Impedance ratio Z _{-25°C} / Z _{+20°C} | | 3 | 3 | 5 | 6 | |
| | ZT / Z ₂₀ (MAX.) | Z _{-40°C} / Z _{+20°C} | 6 | 6 | 6 | - | |
| Endurance | The specifications listed at right shall be met when the capacitors are restored to 20°C after D.C. bias plus rated ripple current is applied for 10000 hours at 105°C, the peak voltage shall not exceed the rated voltage. | | | | | Capacitance Change | Within ± 20% of the initial capacitance value |
| | | | | | | tan δ | 200% or less than the initial specified value |
| | | | | | | Leakage current | Less than or equal to the initial specified value |
| Shelf Life | After storing the capacitors under no load at 105°C for 1000 hours and then performing voltage treatment based on JIS C 5101-4 clause 4.1 at 20°C, they shall meet the specified values for the endurance characteristics listed above. | | | | | | |
| Marking | Printed with white color letter on dark brown sleeve. | | | | | | |

Radial Lead Type



Type numbering system (Example : 200V 270μF)



Dimensions

| Cap (μF) | V Code | 200 | | 250 | | 400 | | 450 | |
|----------|--------|-----------|------|-----------|------|-----------|-----|--------------------------|-----------------|
| | | 2D | | 2E | | 2G | | 2W | |
| 18 | 180 | | | | | | | 8 × 50 | 220 |
| 27 | 270 | | | | | 8 × 50 | 255 | 10 × 40 | 290 |
| 33 | 330 | | | | | | | 10 × 40 | 360 |
| 39 | 390 | | | | | 10 × 40 | 400 | 10 × 50 | 410 |
| 47 | 470 | | | | | | | 12.5 × 40 | 525 |
| 56 | 560 | | | 8 × 50 | 430 | 10 × 50 | 520 | | |
| 68 | 680 | | | | | 12.5 × 40 | 600 | 12.5 × 50 | 670 |
| 82 | 820 | 8 × 50 | 530 | 10 × 40 | 610 | 12.5 × 50 | 700 | | |
| 100 | 101 | 10 × 40 | 630 | 10 × 50 | 680 | | | | |
| 120 | 121 | 10 × 40 | 680 | | | | | | |
| 150 | 151 | 10 × 50 | 830 | 12.5 × 40 | 920 | | | | |
| 180 | 181 | | | 12.5 × 50 | 1035 | | | | |
| 220 | 221 | 12.5 × 40 | 1075 | | | | | Case size φD × L (mm) | Rated ripple |
| 270 | 271 | 12.5 × 50 | 1265 | | | | | | |

※ The over voltages are also available upon request.

Rated ripple current (mA rms) at 105°C 120Hz

Frequency coefficient of rated ripple current

| Frequency | 50Hz | 120Hz | 1kHz | 10kHz | 100kHz or more |
|-------------|------|-------|------|-------|----------------|
| Coefficient | 0.80 | 1.00 | 1.60 | 1.80 | 2.00 |

Design, Specifications are subject to change without notice.

ALUMINUM ELECTROLYTIC CAPACITORS

PZ High Voltage, Smaller-sized series (pencil-shaped type)



NEW

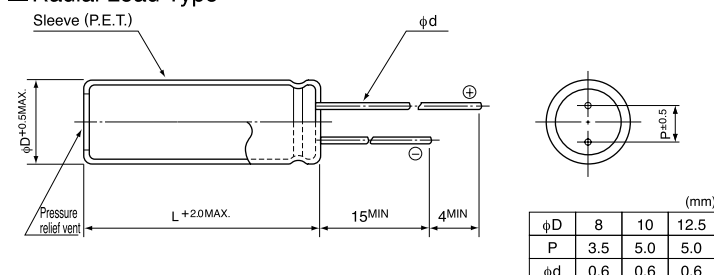
- Load life of 2000 hours at 105°C.
- Suited for slim-designed products.
- Compliant to the RoHS directive (2002/95/EC).



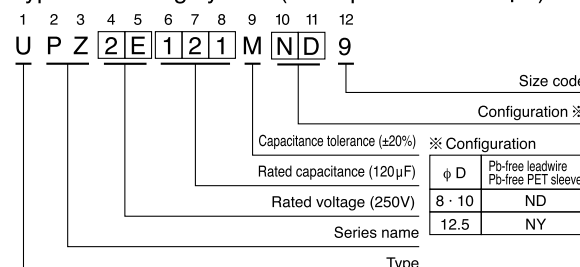
Specifications

| Item | Performance Characteristics | | | | | | | | | | | |
|-------------------------------|---|-----------------|------|------|------|---|--------------------|---|-------|---|-----------------|---|
| Category Temperature Range | -40 to +105°C (200 to 400V), -25 to +105°C (450V) | | | | | | | | | | | |
| Rated Voltage Range | 200 to 450V | | | | | | | | | | | |
| Rated Capacitance Range | 24 to 270μF | | | | | | | | | | | |
| Capacitance Tolerance | ±20% at 120Hz, 20°C | | | | | | | | | | | |
| Leakage Current | After 1 minute's application of rated voltage, leakage current is not more than 0.04CV+100 (μA) | | | | | | | | | | | |
| Tangent of loss angle (tan δ) | Rated voltage (V) | 200 | 250 | 400 | 450 | Measurement frequency : 120Hz, Temperature : 20°C | | | | | | |
| | tan δ (MAX.) | 0.20 | 0.20 | 0.24 | 0.24 | | | | | | | |
| Stability at Low Temperature | Rated voltage (V) | 200 | 250 | 400 | 450 | Measurement frequency : 120Hz | | | | | | |
| | Impedance ratio Z-25°C / Z+20°C | 3 | 3 | 5 | 6 | | | | | | | |
| | ZT / Z20 (MAX.) | Z-40°C / Z+20°C | 6 | 6 | 6 | - | | | | | | |
| Endurance | The specifications listed at right shall be met when the capacitors are restored to 20°C after D.C. bias plus rated ripple current is applied for 2000 hours at 105°C, the peak voltage shall not exceed the rated voltage. | | | | | <table border="1"> <tr> <td>Capacitance Change</td> <td>Within ± 20% of the initial capacitance value</td> </tr> <tr> <td>tan δ</td> <td>200% or less than the initial specified value</td> </tr> <tr> <td>Leakage current</td> <td>Less than or equal to the initial specified value</td> </tr> </table> | Capacitance Change | Within ± 20% of the initial capacitance value | tan δ | 200% or less than the initial specified value | Leakage current | Less than or equal to the initial specified value |
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| tan δ | 200% or less than the initial specified value | | | | | | | | | | | |
| Leakage current | Less than or equal to the initial specified value | | | | | | | | | | | |
| Shelf Life | After storing the capacitors under no load at 105°C for 1000 hours and then performing voltage treatment based on JIS C 5101-4 clause 4.1 at 20°C, they shall meet the specified values for the endurance characteristics listed above. | | | | | | | | | | | |
| Marking | Printed with white color letter on dark brown sleeve. | | | | | | | | | | | |

Radial Lead Type



Type numbering system (Example : 250V 120μF)



Dimensions

| Cap (μF) | V | 200 | | 250 | | 400 | | 450 | |
|----------|-----|-----------|------|-----------|------|-----------|-----------------------|--------------|-----|
| | | Code | 2D | 2E | 2G | 2W | Case size φD × L (mm) | Rated ripple | |
| 24 | 240 | | | | | | | 8 × 50 | 250 |
| 27 | 270 | | | | | 8 × 50 | 255 | | |
| 33 | 330 | | | | | | | 10 × 40 | 360 |
| 47 | 470 | | | | | 10 × 40 | 435 | 10 × 50 | 450 |
| 56 | 560 | | | 8 × 50 | 430 | 10 × 50 | 520 | 12.5 × 40 | 570 |
| 82 | 820 | 8 × 50 | 530 | 10 × 40 | 610 | 12.5 × 40 | 660 | 12.5 × 50 | 730 |
| 100 | 101 | | | | | 12.5 × 50 | 770 | | |
| 120 | 121 | 10 × 40 | 680 | 10 × 50 | 740 | | | | |
| 150 | 151 | 10 × 50 | 830 | 12.5 × 40 | 920 | | | | |
| 220 | 221 | 12.5 × 40 | 1075 | 12.5 × 50 | 1140 | | | | |
| 270 | 271 | 12.5 × 50 | 1265 | | | | | | |

※ The over voltages are also available upon request.

Rated ripple current (mArms) at 105°C 120Hz

Frequency coefficient of rated ripple current

| V | 60Hz | 120Hz | 500Hz | 1kHz | 10kHz or more |
|-----------|------|-------|-------|------|---------------|
| 200 · 250 | 0.80 | 1.00 | 1.20 | 1.30 | 1.40 |
| 400 · 450 | 0.80 | 1.00 | 1.25 | 1.40 | 1.50 |

Design, Specifications are subject to change without notice.

NICHICON CORPORATION