# ALUMINUM ELECTROLYTIC CAPACITORS

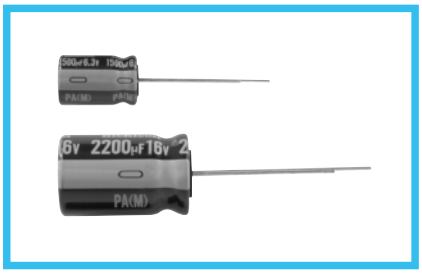
nichicon

## PA

Miniature Sized, Low Impedance,
High Reliability For Switching Power Supplies
series

Smaller | Low Impedance | Long Life | Anti-Solvent Feature

- Lower impedance than PW series.
- Smaller case size and high ripple current.
- Compliant to the RoHS directive (2011/65/EU).

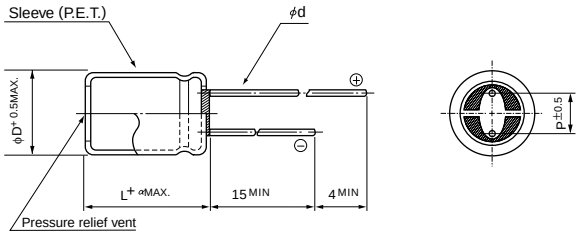


PA ← Low Impedance — PW

## ■Specifications

| Item | Performance Characteristics | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Category Temperature Range | –55 to +105˚C | | | | | | | |
| Rated Voltage Range | 6.3 to 35V | | | | | | | |
| Rated Capacitance Range | 180 to 10000μF | | | | | | | |
| Capacitance Tolerance | ±20% at 120Hz, 20˚C | | | | | | | |
| Leakage Current | After 1 minute's application of rated voltage, leakage current is not more than 0.03CV or 4 (μA), whichever is greater. | | | | | | | |
| Tangent of loss angle (tan δ) | Rated voltage (V) | 6.3 | 10 | 16 | 25 | 35 | 120Hz 20˚C | |
| | tan δ (MAX.) | 0.22 | 0.19 | 0.16 | 0.14 | 0.12 | | |
| | For capacitance of more than 1000μF, add 0.02 for every increase of 1000μF. | | | | | | | |
| Stability at Low Temperature | Rated voltage (V) | 6.3 | 10 | 16 | 25 | 35 | 120Hz | |
| | Impedance ratio ZT / Z20 (MAX.) Z–55˚C / Z+20˚C | 3 | 3 | 3 | 3 | 3 | | |
| 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 5000 hours (3000 hours for φD=8, 4000 hours for φD=10) at 105˚C, the peak voltage shall not exceed the rated voltage. | | | | | | | |
| | Capacitance change: Within ± 20% of the initial capacitance value (6.3V, 10V : ±30%) | | | | | | | |
| | tan δ: 200% or less than the initial specified value (6.3V, 10V : 300%) | | | | | | | |
| | 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




| α | |
|---|---|
| | (L < 20) 1.5 |
| | (L ≥ 20) 2.0 |

(mm)

| φD | 8 | 10 | 12.5 | 16 | 18 |
|---|---|---|---|---|---|
| P | 3.5 | 5.0 | 5.0 | 7.5 | 7.5 |
| φd | 0.6 | 0.6 | *0.6 | 0.8 | 0.8 |

※: In case L > 25 for the φ12.5 dia. unit, lead dia. φ d = 0.8mm.

## Type numbering system (Example : 10V 470μF)

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| U | P | A | 1 | A | 4 | 7 | 1 | M | P | D | |

Size code
Configuration※
Capacitance tolerance (±20%)
Rated capacitance (470μF)
Rated voltage (10V)
Series name
Type

※Configuration

| φD | Pb-free leadwire Pb-free PET sleeve |
|---|---|
| 8·10 | PD |
| 12.5 to 18 | HD |

## ●Frequency coefficient of rated ripple current

| Frequency / Cap.(μF) | 50Hz | 120Hz | 300Hz | 1kHz | 10kHz or more |
|---|---|---|---|---|---|
| 180 to 330 | 0.55 | 0.65 | 0.75 | 0.85 | 1.00 |
| 390 to 1000 | 0.70 | 0.75 | 0.80 | 0.90 | 1.00 |
| 1200 to 10000 | 0.80 | 0.85 | 0.90 | 0.95 | 1.00 |

• Please refer to page 20 about the end seal configuration.

Please refer to page 20, 21, 22 about the formed or taped product spec.
Please refer to page 4 for the minimum order quantity.

●Dimension table in next page.

# PA series

## ■Standard Ratings

| V (Code) / Item / Cap.(μF) / Code | 6.3 (0J) Case size φD × L (mm) | 6.3 (0J) Impedance (Ω) MAX. 20°C / 100kHz | 6.3 (0J) Impedance (Ω) MAX. −10°C / 100kHz | 6.3 (0J) Rated ripple (mArms) 105°C / 100kHz | 10 (1A) Case size φD × L (mm) | 10 (1A) Impedance (Ω) MAX. 20°C / 100kHz | 10 (1A) Impedance (Ω) MAX. −10°C / 100kHz | 10 (1A) Rated ripple (mArms) 105°C / 100kHz | 16 (1C) Case size φD × L (mm) | 16 (1C) Impedance (Ω) MAX. 20°C / 100kHz | 16 (1C) Impedance (Ω) MAX. −10°C / 100kHz | 16 (1C) Rated ripple (mArms) 105°C / 100kHz |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 330 / 331 | | | | | | | | | 8 × 11.5 | 0.090 | 0.180 | 630 |
| 390 / 391 | | | | | | | | | 8 × 11.5 | 0.090 | 0.180 | 630 |
| 470 / 471 | | | | | 8 × 11.5 | 0.090 | 0.180 | 630 | 10 × 12.5 | 0.063 | 0.126 | 900 |
| 560 / 561 | 8 × 11.5 | 0.090 | 0.180 | 630 | 8 × 11.5 | 0.090 | 0.180 | 630 | | | | |
| 680 / 681 | 8 × 11.5 | 0.090 | 0.180 | 630 | | | | | 8 × 15 | 0.062 | 0.124 | 860 |
| | | | | | | | | | ▲10 × 12.5 | 0.063 | 0.126 | 900 |
| 820 / 821 | | | | | 8 × 15 | 0.062 | 0.124 | 860 | 8 × 20 | 0.044 | 0.088 | 1220 |
| | | | | | ▲10 × 12.5 | 0.063 | 0.126 | 900 | ▲10 × 16 | 0.049 | 0.098 | 1240 |
| 1000 / 102 | 8 × 15 | 0.062 | 0.124 | 860 | 8 × 20 | 0.044 | 0.088 | 1220 | 10 × 16 | 0.049 | 0.098 | 1240 |
| | ▲10 × 12.5 | 0.063 | 0.126 | 900 | ▲10 × 12.5 | 0.063 | 0.126 | 900 | | | | |
| | | | | | ●10 × 16 | 0.049 | 0.098 | 1240 | ●10 × 20 | 0.035 | 0.070 | 1490 |
| 1200 / 122 | 10 × 12.5 | 0.063 | 0.126 | 900 | 8 × 20 | 0.044 | 0.088 | 1220 | 10 × 20 | 0.035 | 0.070 | 1490 |
| | ●10 × 16 | 0.049 | 0.098 | 1240 | ▲10 × 16 | 0.049 | 0.098 | 1240 | | | | |
| 1500 / 152 | 8 × 20 | 0.044 | 0.088 | 1220 | 10 × 20 | 0.035 | 0.070 | 1490 | 10 × 25 | 0.033 | 0.066 | 1680 |
| | ▲10 × 16 | 0.049 | 0.098 | 1240 | | | | | | | | |
| | ●10 × 20 | 0.035 | 0.070 | 1490 | | | | | | | | |
| 1800 / 182 | | | | | 10 × 20 | 0.035 | 0.070 | 1490 | | | | |
| | | | | | ▲10 × 25 | 0.033 | 0.066 | 1680 | | | | |
| 2200 / 222 | 10 × 20 | 0.035 | 0.070 | 1490 | 10 × 25 | 0.033 | 0.066 | 1680 | 12.5 × 20 | 0.029 | 0.058 | 1890 |
| | ●10 × 25 | 0.033 | 0.066 | 1680 | ●12.5 × 20 | 0.029 | 0.058 | 1890 | ●12.5 × 25 | 0.022 | 0.044 | 2280 |
| 2700 / 272 | 10 × 25 | 0.033 | 0.066 | 1680 | 12.5 × 20 | 0.029 | 0.058 | 1890 | 12.5 × 25 | 0.022 | 0.044 | 2280 |
| 3300 / 332 | 12.5 × 20 | 0.029 | 0.058 | 1890 | 12.5 × 25 | 0.022 | 0.044 | 2280 | 12.5 × 31.5 | 0.018 | 0.036 | 2720 |
| | | | | | | | | | ▲16 × 20 | 0.026 | 0.052 | 2330 |
| 3900 / 392 | 12.5 × 25 | 0.022 | 0.044 | 2280 | 12.5 × 25 | 0.022 | 0.044 | 2280 | 12.5 × 35.5 | 0.016 | 0.032 | 2940 |
| 4700 / 472 | 12.5 × 25 | 0.022 | 0.044 | 2280 | 12.5 × 31.5 | 0.018 | 0.036 | 2720 | 16 × 25 | 0.019 | 0.038 | 2760 |
| | | | | | ▲16 × 20 | 0.026 | 0.052 | 2330 | ▲18 × 20 | 0.025 | 0.050 | 2640 |
| 5600 / 562 | 12.5 × 31.5 | 0.018 | 0.036 | 2720 | 12.5 × 35.5 | 0.016 | 0.032 | 2940 | 16 × 31.5 | 0.017 | 0.035 | 2810 |
| | ▲16 × 20 | 0.026 | 0.052 | 2330 | | | | | ▲18 × 25 | 0.018 | 0.036 | 2850 |
| 6800 / 682 | 12.5 × 35.5 | 0.016 | 0.032 | 2940 | 16 × 25 | 0.019 | 0.038 | 2760 | 18 × 25 | 0.018 | 0.036 | 2850 |
| 8200 / 822 | 16 × 25 | 0.019 | 0.038 | 2760 | 16 × 31.5 | 0.017 | 0.034 | 2810 | | | | |
| | ▲18 × 20 | 0.025 | 0.050 | 2640 | ▲18 × 25 | 0.018 | 0.036 | 2850 | | | | |
| 10000 / 103 | 16 × 31.5 | 0.017 | 0.034 | 2810 | | | | | | | | |
| | ▲18 × 25 | 0.018 | 0.036 | 2850 | | | | | | | | |

| V (Code) / Item / Cap.(μF) / Code | 25 (1E) Case size φD × L (mm) | 25 (1E) Impedance (Ω) MAX. 20°C / 100kHz | 25 (1E) Impedance (Ω) MAX. −10°C / 100kHz | 25 (1E) Rated ripple (mArms) 105°C / 100kHz | 35 (1V) Case size φD × L (mm) | 35 (1V) Impedance (Ω) MAX. 20°C / 100kHz | 35 (1V) Impedance (Ω) MAX. −10°C / 100kHz | 35 (1V) Rated ripple (mArms) 105°C / 100kHz |
|---|---|---|---|---|---|---|---|---|
| 180 / 181 | | | | | 8 × 11.5 | 0.090 | 0.180 | 630 |
| 270 / 271 | 8 × 11.5 | 0.090 | 0.180 | 630 | 8 × 15 | 0.062 | 0.124 | 860 |
| | | | | | ▲10 × 12.5 | 0.063 | 0.126 | 900 |
| 330 / 331 | 8 × 11.5 | 0.090 | 0.180 | 630 | | | | |
| 390 / 391 | 8 × 15 | 0.062 | 0.124 | 860 | 8 × 20 | 0.044 | 0.088 | 1220 |
| | | | | | ▲10 × 16 | 0.049 | 0.098 | 1240 |
| 470 / 471 | 8 × 15 | 0.062 | 0.124 | 860 | | | | |
| | ▲10 × 12.5 | 0.063 | 0.126 | 900 | | | | |
| 560 / 561 | 8 × 20 | 0.044 | 0.088 | 1220 | 10 × 20 | 0.035 | 0.070 | 1490 |
| | ▲10 × 16 | 0.049 | 0.098 | 1240 | | | | |
| 680 / 681 | 10 × 16 | 0.049 | 0.098 | 1240 | 10 × 25 | 0.033 | 0.066 | 1680 |
| 820 / 821 | 10 × 20 | 0.035 | 0.070 | 1490 | 12.5 × 20 | 0.029 | 0.058 | 1890 |
| 1000 / 102 | 10 × 25 | 0.033 | 0.066 | 1680 | 12.5 × 20 | 0.029 | 0.058 | 1890 |
| | ●12.5 × 20 | 0.029 | 0.058 | 1890 | | | | |
| 1200 / 122 | 12.5 × 20 | 0.029 | 0.058 | 1890 | 12.5 × 25 | 0.022 | 0.044 | 2280 |
| 1500 / 152 | | | | | 12.5 × 31.5 | 0.018 | 0.036 | 2720 |
| | | | | | ▲16 × 20 | 0.026 | 0.052 | 2330 |
| 1800 / 182 | 12.5 × 25 | 0.022 | 0.044 | 2280 | 12.5 × 35.5 | 0.016 | 0.032 | 2940 |
| | | | | | ▲16 × 20 | 0.026 | 0.052 | 2330 |
| 2200 / 222 | 12.5 × 31.5 | 0.018 | 0.036 | 2720 | 16 × 25 | 0.019 | 0.038 | 2760 |
| | ▲16 × 20 | 0.026 | 0.052 | 2330 | ▲18 × 20 | 0.025 | 0.050 | 2640 |
| 2700 / 272 | 12.5 × 35.5 | 0.016 | 0.032 | 2940 | 16 × 31.5 | 0.017 | 0.035 | 2810 |
| | | | | | ▲18 × 25 | 0.018 | 0.036 | 2850 |
| 3300 / 332 | 16 × 25 | 0.019 | 0.038 | 2760 | 18 × 31.5 | 0.016 | 0.032 | 2910 |
| | ▲18 × 20 | 0.025 | 0.050 | 2640 | | | | |
| 4700 / 472 | 18 × 25 | 0.018 | 0.036 | 2850 | | | | |

▲ : In this case, [6] will be put at 12th digit of type numbering system.

● : In this case, [3] will be put at 12th digit of type numbering system.