

# ALUMINUM ELECTROLYTIC CAPACITORS

nichicon

**PA**  
series

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



Smaller



Low Impedance



Long Life



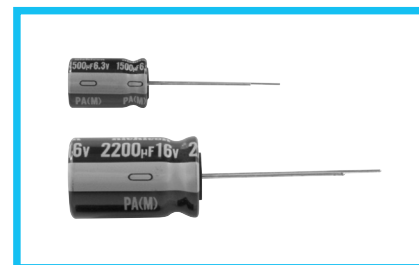
Anti-Solvent  
Feature

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

**PA**

Low  
Impedance

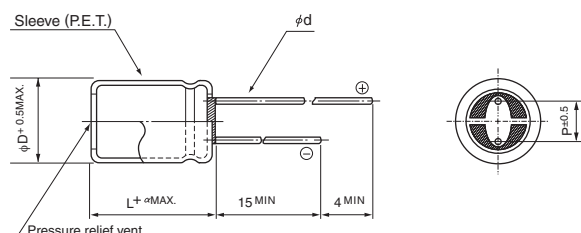
**PW**



## Specifications

| Item                          | Performance Characteristics                                                                                                                                                                                                                                           |               |      |      |      |      |                    |                                                                  |
|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|------|------|------|------|--------------------|------------------------------------------------------------------|
| Category Temperature Range    | -55 to +105℃                                                                                                                                                                                                                                                          |               |      |      |      |      |                    |                                                                  |
| Rated Voltage Range           | 6.3 to 35V                                                                                                                                                                                                                                                            |               |      |      |      |      |                    |                                                                  |
| Rated Capacitance Range       | 180 to 10000μF                                                                                                                                                                                                                                                        |               |      |      |      |      |                    |                                                                  |
| Capacitance Tolerance         | ±20% at 120Hz, 20℃                                                                                                                                                                                                                                                    |               |      |      |      |      |                    |                                                                  |
| Leakage Current               | After 1 minute's application of rated voltage at 20℃, 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℃          |                                                                  |
|                               | 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℃ / Z+20℃ | 3    | 3    | 3    | 3    |                    |                                                                  |
| Endurance                     | The specifications listed at right shall be met when the capacitors are restored to 20℃ 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℃, 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%) |
| Shelf Life                    | After storing the capacitors under no load at 105℃ for 1000 hours and then performing voltage treatment based on JIS C 5101-4 clause 4.1 at 20℃, they shall meet the specified values for the endurance characteristics listed above.                                 |               |      |      |      |      | Leakage current    | Less than or equal to the initial specified value                |
|                               |                                                                                                                                                                                                                                                                       |               |      |      |      |      |                    |                                                                  |
|                               |                                                                                                                                                                                                                                                                       |               |      |      |      |      |                    |                                                                  |
| Marking                       | Printed with white color letter on dark brown sleeve.                                                                                                                                                                                                                 |               |      |      |      |      |                    |                                                                  |

## Radial Lead Type

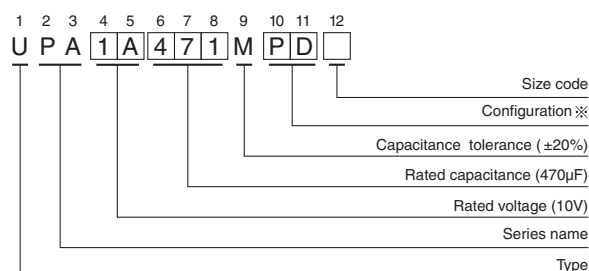


|   |              |
|---|--------------|
| α | (L < 20) 1.5 |
|   | (L ≥ 20) 2.0 |

|    |      |     |      |     |     |
|----|------|-----|------|-----|-----|
|    | (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. φd = 0.8mm.

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



※ Configuration

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

## Frequency coefficient of rated ripple current

| Cap. (μF)     | Frequency | 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.

CAT.8100D

PA<sub>series</sub>

## ■ Standard Ratings

| V (Code)<br><br>Cap.(μF)<br>Code |     | 6.3 (0J)                       |                         |                         |                                              | 10 (1A)                          |                         |                         |                                              | 16 (1C)                     |                    |                   |                                              |
|----------------------------------|-----|--------------------------------|-------------------------|-------------------------|----------------------------------------------|----------------------------------|-------------------------|-------------------------|----------------------------------------------|-----------------------------|--------------------|-------------------|----------------------------------------------|
|                                  |     | Case size<br>φD × L<br>(mm)    | Impedance (Ω) MAX.      |                         | Rated<br>ripple<br>(mArms)<br>105°C / 100kHz | Case size<br>φD × L<br>(mm)      | Impedance (Ω) MAX.      |                         | Rated<br>ripple<br>(mArms)<br>105°C / 100kHz | Case size<br>φD × L<br>(mm) | Impedance (Ω) MAX. |                   | Rated<br>ripple<br>(mArms)<br>105°C / 100kHz |
|                                  |     |                                | 20°C /<br>100kHz        | −10°C /<br>100kHz       |                                              |                                  | 20°C /<br>100kHz        | −10°C /<br>100kHz       |                                              |                             | 20°C /<br>100kHz   | −10°C /<br>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<br>▲10 × 12.5        | 0.062<br>0.063     | 0.124<br>0.126    | 860<br>900                                   |
| 820                              | 821 |                                |                         |                         |                                              | 8 × 15<br>▲10 × 12.5             | 0.062<br>0.063          | 0.124<br>0.126          | 860<br>900                                   | 8 × 20<br>▲10 × 16          | 0.044<br>0.049     | 0.088<br>0.098    | 1220<br>1240                                 |
| 1000                             | 102 | 8 × 15<br>▲10 × 12.5           | 0.062<br>0.063          | 0.124<br>0.126          | 860<br>900                                   | 8 × 20<br>▲10 × 12.5<br>●10 × 16 | 0.044<br>0.063<br>0.049 | 0.088<br>0.126<br>0.098 | 1220<br>900<br>1240                          | 10 × 16<br>●10 × 20         | 0.049<br>0.035     | 0.098<br>0.070    | 1240<br>1490                                 |
| 1200                             | 122 | 10 × 12.5<br>●10 × 16          | 0.063<br>0.049          | 0.126<br>0.098          | 900<br>1240                                  | 8 × 20<br>▲10 × 16               | 0.044<br>0.049          | 0.088<br>0.098          | 1220<br>1240                                 | 10 × 20                     | 0.035              | 0.070             | 1490                                         |
| 1500                             | 152 | 8 × 20<br>▲10 × 16<br>●10 × 20 | 0.044<br>0.049<br>0.035 | 0.088<br>0.098<br>0.070 | 1220<br>1240<br>1490                         | 10 × 20                          | 0.035                   | 0.070                   | 1490                                         | 10 × 25                     | 0.033              | 0.066             | 1680                                         |
| 1800                             | 182 |                                |                         |                         |                                              | 10 × 20<br>▲10 × 25              | 0.035<br>0.033          | 0.070<br>0.066          | 1490<br>1680                                 |                             |                    |                   |                                              |
| 2200                             | 222 | 10 × 20<br>●10 × 25            | 0.035<br>0.033          | 0.070<br>0.066          | 1490<br>1680                                 | 10 × 25<br>●12.5 × 20            | 0.033<br>0.029          | 0.066<br>0.058          | 1680<br>1890                                 | 12.5 × 20<br>●12.5 × 25     | 0.029<br>0.022     | 0.058<br>0.044    | 1890<br>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<br>▲16 × 20     | 0.018<br>0.026     | 0.036<br>0.052    | 2720<br>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<br>▲16 × 20          | 0.018<br>0.026          | 0.036<br>0.052          | 2720<br>2330                                 | 16 × 25<br>▲18 × 20         | 0.019<br>0.025     | 0.038<br>0.050    | 2760<br>2640                                 |
| 5600                             | 562 | 12.5 × 31.5<br>▲16 × 20        | 0.018<br>0.026          | 0.036<br>0.052          | 2720<br>2330                                 | 12.5 × 35.5                      | 0.016                   | 0.032                   | 2940                                         | 16 × 31.5<br>▲18 × 25       | 0.017<br>0.018     | 0.035<br>0.036    | 2810<br>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<br>▲18 × 20            | 0.019<br>0.025          | 0.038<br>0.050          | 2760<br>2640                                 | 16 × 31.5<br>▲18 × 25            | 0.017<br>0.018          | 0.034<br>0.036          | 2810<br>2850                                 |                             |                    |                   |                                              |
| 10000                            | 103 | 16 × 31.5<br>▲18 × 25          | 0.017<br>0.018          | 0.034<br>0.036          | 2810<br>2850                                 |                                  |                         |                         |                                              |                             |                    |                   |                                              |

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