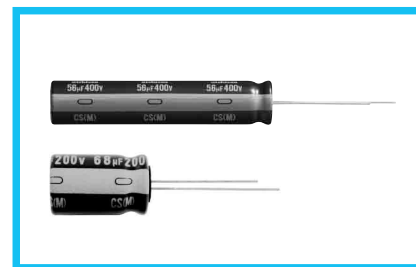
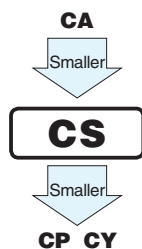


# ALUMINUM ELECTROLYTIC CAPACITORS

**CS** series Miniature Sized, High Ripple Current, High Reliability



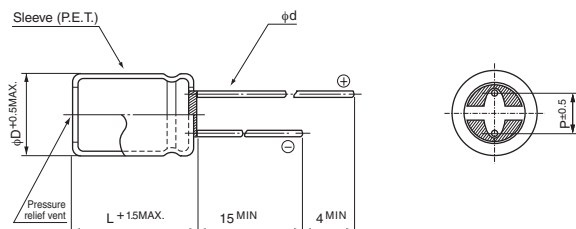
- High ripple current and Long Life product withstanding load life of 8000 to 10000 hours at +105°C.
- Suited for ballast application.
- Compliant to the RoHS directive (2011/65/EU).



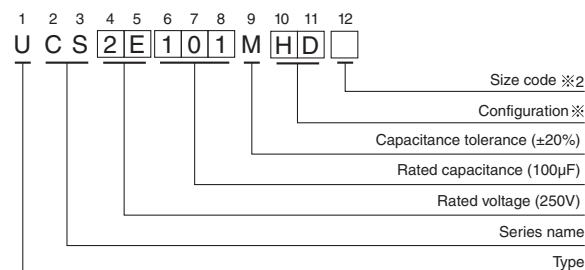
## Specifications

| Item                          | Performance Characteristics  |                    |  |       |   |                 |   |     |              |                 |      |      |      |      |      |     |                 |   |   |   |   |   |   |   |  |   |   |   |   |   |   |
|-------------------------------|--|--------------------|--|-------|---|-----------------|---|-----|--------------|-----------------|------|------|------|------|------|-----|-----------------|---|---|---|---|---|---|---|--|---|---|---|---|---|---|
| Category Temperature Range    | -40 to +105°C (160 to 400V), -25 to +105°C (450V)  |                    |  |       |   |                 |   |     |              |                 |      |      |      |      |      |     |                 |   |   |   |   |   |   |   |  |   |   |   |   |   |   |
| Rated Voltage Range           | 160 to 450V  |                    |  |       |   |                 |   |     |              |                 |      |      |      |      |      |     |                 |   |   |   |   |   |   |   |  |   |   |   |   |   |   |
| Rated Capacitance Range       | 6.8 to 330μF   |                    |  |       |   |                 |   |     |              |                 |      |      |      |      |      |     |                 |   |   |   |   |   |   |   |  |   |   |   |   |   |   |
| Capacitance Tolerance         | ±20% at 120Hz, 20°C  |                    |  |       |   |                 |   |     |              |                 |      |      |      |      |      |     |                 |   |   |   |   |   |   |   |  |   |   |   |   |   |   |
| Leakage Current               | After 1 minute's application of rated voltage at 20°C, leakage current is not more than 0.04CV+100 (μA)  |                    |  |       |   |                 |   |     |              |                 |      |      |      |      |      |     |                 |   |   |   |   |   |   |   |  |   |   |   |   |   |   |
| Tangent of loss angle (tan δ) | Measurement frequency : 120Hz at 20°C  |                    |  |       |   |                 |   |     |              |                 |      |      |      |      |      |     |                 |   |   |   |   |   |   |   |  |   |   |   |   |   |   |
|                               | <table border="1"> <thead> <tr> <th>Rated voltage (V)</th> <th>160</th> <th>200</th> <th>250</th> <th>350</th> <th>400</th> <th>450</th> </tr> </thead> <tbody> <tr> <td>tan δ (MAX.)</td> <td>0.20</td> <td>0.20</td> <td>0.20</td> <td>0.24</td> <td>0.24</td> <td>0.24</td> </tr> </tbody> </table>   | Rated voltage (V)  | 160  | 200   | 250   | 350             | 400   | 450 | tan δ (MAX.) | 0.20            | 0.20 | 0.20 | 0.24 | 0.24 | 0.24 |     |                 |   |   |   |   |   |   |   |  |   |   |   |   |   |   |
| Rated voltage (V)             | 160  | 200                | 250  | 350   | 400   | 450             |   |     |              |                 |      |      |      |      |      |     |                 |   |   |   |   |   |   |   |  |   |   |   |   |   |   |
| tan δ (MAX.)                  | 0.20   | 0.20               | 0.20   | 0.24  | 0.24  | 0.24            |   |     |              |                 |      |      |      |      |      |     |                 |   |   |   |   |   |   |   |  |   |   |   |   |   |   |
| Stability at Low Temperature  | Measurement frequency : 120Hz  |                    |  |       |   |                 |   |     |              |                 |      |      |      |      |      |     |                 |   |   |   |   |   |   |   |  |   |   |   |   |   |   |
|                               | <table border="1"> <thead> <tr> <th rowspan="2">Rated voltage (V)</th> <th colspan="7">Impedance ratio ZT / Z20 (MAX.)</th> </tr> <tr> <th>Z-25°C / Z+20°C</th> <th>160</th> <th>200</th> <th>250</th> <th>350</th> <th>400</th> <th>450</th> </tr> </thead> <tbody> <tr> <td>Z-40°C / Z+20°C</td> <td>3</td> <td>3</td> <td>3</td> <td>5</td> <td>5</td> <td>6</td> <td>-</td> </tr> <tr> <td></td> <td>6</td> <td>6</td> <td>6</td> <td>6</td> <td>6</td> <td>6</td> <td>-</td> </tr> </tbody> </table>  | Rated voltage (V)  | Impedance ratio ZT / Z20 (MAX.)              |       |   |                 |   |     |              | Z-25°C / Z+20°C | 160  | 200  | 250  | 350  | 400  | 450 | Z-40°C / Z+20°C | 3 | 3 | 3 | 5 | 5 | 6 | - |  | 6 | 6 | 6 | 6 | 6 | 6 |
| Rated voltage (V)             | Impedance ratio ZT / Z20 (MAX.)  |                    |  |       |   |                 |   |     |              |                 |      |      |      |      |      |     |                 |   |   |   |   |   |   |   |  |   |   |   |   |   |   |
|                               | Z-25°C / Z+20°C  | 160                | 200  | 250   | 350   | 400             | 450   |     |              |                 |      |      |      |      |      |     |                 |   |   |   |   |   |   |   |  |   |   |   |   |   |   |
| Z-40°C / Z+20°C               | 3  | 3                  | 3  | 5     | 5   | 6               | -   |     |              |                 |      |      |      |      |      |     |                 |   |   |   |   |   |   |   |  |   |   |   |   |   |   |
|                               | 6  | 6                  | 6  | 6     | 6   | 6               | -   |     |              |                 |      |      |      |      |      |     |                 |   |   |   |   |   |   |   |  |   |   |   |   |   |   |
| Endurance                     | <p>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 (8000 hours for φD=10 × 16L, 10 × 20L) at 105°C, the peak voltage shall not exceed the rated voltage.</p> <table border="1"> <tbody> <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> </tbody> </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 |     |              |                 |      |      |      |      |      |     |                 |   |   |   |   |   |   |   |  |   |   |   |   |   |   |
| 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.  |                    |  |       |   |                 |   |     |              |                 |      |      |      |      |      |     |                 |   |   |   |   |   |   |   |  |   |   |   |   |   |   |

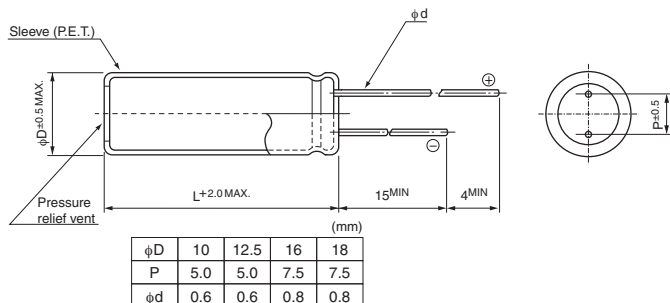
## Radial Lead Type



## Type numbering system (Example : 250V 100μF)



## Pencil - shaped Type



### ※ Configuration

| Size code ※2 | Blank, 6                               | 9                                      |
|--------------|--|--|
| φ D          | Pb-free leadwire<br>Pb-free PET sleeve | Pb-free leadwire<br>Pb-free PET sleeve |
| 10           | PD                                     | ND                                     |
| 12.5 to 18   | HD                                     | NY                                     |

• 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.



## ■ Dimensions

| Cap | V<br>Code | 160       |      | 200       |      | 250       |      | 350       |      | 400       |      | 450                      |      |
|-----|-----------|-----------|------|-----------|------|-----------|------|-----------|------|-----------|------|--------------------------|------|
|     |           | 2C        |      | 2D        |      | 2E        |      | 2V        |      | 2G        |      | 2W                       |      |
| 6.8 | 6R8       |           |      |           |      |           |      | 10 × 16   | 280  | 10 × 16   | 280  | 10 × 20                  | 280  |
| 10  | 100       | 10 × 16   | 320  | 10 × 16   | 320  | 10 × 20   | 350  | 10 × 20   | 350  | 10 × 20   | 350  | 12.5 × 20                | 450  |
| 15  | 150       |           |      |           |      |           |      |           |      | 12.5 × 20 | 550  | 12.5 × 25                | 600  |
| 22  | 220       | 10 × 20   | 500  | 10 × 20   | 500  | 10 × 20   | 500  | 12.5 × 20 | 650  | 12.5 × 20 | 760  | 16 × 20                  | 730  |
| 33  | 330       | 10 × 20   | 650  | 10 × 20   | 650  | 12.5 × 20 | 800  | 16 × 20   | 900  | 16 × 20   | 900  | 16 × 25                  | 980  |
|     |           |           |      |           |      |           |      |           |      |           |      | ▲ 18 × 20                | 980  |
| 47  | 470       | 10 × 20   | 750  | 12.5 × 20 | 980  | 12.5 × 20 | 980  | 16 × 20   | 1080 | 16 × 25   | 1180 | 18 × 25                  | 1200 |
|     |           |           |      |           |      |           |      |           |      | ▲ 18 × 20 | 1180 |                          |      |
| 68  | 680       | 12.5 × 20 | 1180 | 12.5 × 20 | 1300 | 16 × 20   | 1300 | 16 × 25   | 1400 | 18 × 25   | 1470 | 18 × 31.5                | 1575 |
|     |           |           |      |           |      |           |      | ▲ 18 × 20 | 1375 |           |      |                          |      |
| 82  | 820       | 12.5 × 20 | 1275 | 16 × 20   | 1380 | 16 × 20   | 1380 | 18 × 25   | 1530 | 18 × 25   | 1525 |                          |      |
| 100 | 101       | 12.5 × 25 | 1420 | 16 × 20   | 1420 | 16 × 25   | 1530 | 18 × 25   | 1575 |           |      |                          |      |
|     |           | ▲ 16 × 20 | 1420 |           |      |           |      |           |      |           |      |                          |      |
| 150 | 151       | 16 × 20   | 1890 | 16 × 25   | 1890 | 18 × 25   | 1940 |           |      |           |      |                          |      |
| 220 | 221       | 16 × 25   | 2370 | 18 × 25   | 2365 | 18 × 31.5 | 3130 |           |      |           |      |                          |      |
| 330 | 331       | 18 × 31.5 | 3130 | 18 × 35.5 | 3220 |           |      |           |      |           |      | Case size<br>φD × L (mm) | ※    |

※: Rated ripple current (mArms) at 105°C 100kHz

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

## Pencil-shaped Type

| Cap. (μF) | V<br>Code | 200         |      | 250         |      | 400         |      | 450                      |      |
|-----------|-----------|-------------|------|-------------|------|-------------|------|--------------------------|------|
|           |           | 2D          |      | 2E          |      | 2G          |      | 2W                       |      |
| 27        | 270       |             |      |             |      |             |      | ● 10 × 40                | 580  |
| 33        | 330       |             |      |             |      |             |      | ● 10 × 40                | 720  |
| 39        | 390       |             |      |             |      | ● 10 × 40   | 800  | ● 10 × 50                | 820  |
| 56        | 560       |             |      |             |      | ● 10 × 50   | 1040 |                          |      |
| 68        | 680       |             |      |             |      |             |      | ● 12.5 × 50              | 1340 |
| 82        | 820       |             |      | ● 10 × 40   | 1220 | ● 12.5 × 50 | 1400 |                          |      |
| 100       | 101       | ● 10 × 40   | 1260 | ● 10 × 50   | 1360 |             |      |                          |      |
| 120       | 121       | ● 10 × 40   | 1360 |             |      |             |      |                          |      |
| 150       | 151       | ● 10 × 50   | 1660 |             |      |             |      |                          |      |
| 180       | 181       |             |      | ● 12.5 × 50 | 2070 |             |      |                          |      |
| 270       | 271       | ● 12.5 × 50 | 2530 |             |      |             |      | Case size<br>φD × L (mm) | ※    |

Rated ripple current (mArms) at 105°C 100kHz

●: In this case, [9] will be put at 12th digit of type numbering system.

## ● Frequency coefficient of rated ripple current

| Frequency   | 50Hz | 120Hz | 1kHz | 10kHz | 100kHz or more |
|-------------|------|-------|------|-------|----------------|
| Coefficient | 0.40 | 0.50  | 0.80 | 0.90  | 1.00           |