

# ALUMINUM ELECTROLYTIC CAPACITORS

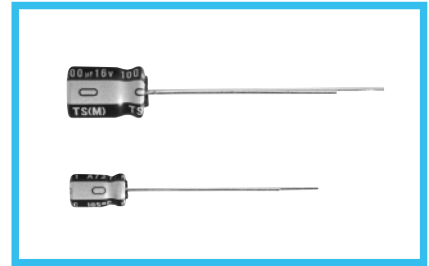
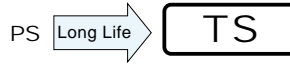


**TS** Miniature Sized,  
High Reliability For Switching Power Supplies  
series



- Smaller case size and Long Life product.
- Compliant to the RoHS directive (2002/95/EC).

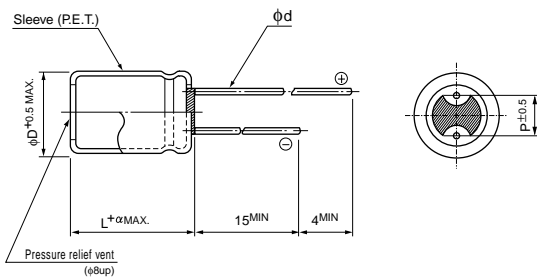
Products which are scheduled to be discontinued.  
Not recommended for new designs



## Specifications

| Item                               | Performance Characteristics  |                    |   |      |      |      |    |    |              |                                    |                 |      |      |      |      |   |   |                 |    |   |   |   |   |
|------------------------------------|--|--------------------|---|------|------|------|----|----|--------------|------------------------------------|-----------------|------|------|------|------|---|---|-----------------|----|---|---|---|---|
| Category Temperature Range         | -40 to +105°C  |                    |   |      |      |      |    |    |              |                                    |                 |      |      |      |      |   |   |                 |    |   |   |   |   |
| Rated Voltage Range                | 6.3 to 50V   |                    |   |      |      |      |    |    |              |                                    |                 |      |      |      |      |   |   |                 |    |   |   |   |   |
| Rated Capacitance Range            | 0.1 to 470μF   |                    |   |      |      |      |    |    |              |                                    |                 |      |      |      |      |   |   |                 |    |   |   |   |   |
| Capacitance Tolerance              | ±20% at 120Hz, 20°C  |                    |   |      |      |      |    |    |              |                                    |                 |      |      |      |      |   |   |                 |    |   |   |   |   |
| Leakage Current                    | After 2 minutes' application of rated voltage, leakage current is less than 0.03CV or 3 (μA), whichever is greater.  |                    |   |      |      |      |    |    |              |                                    |                 |      |      |      |      |   |   |                 |    |   |   |   |   |
| Tangent of loss angle (tan δ)      | Measurement frequency : 120Hz at 20°C  |                    |   |      |      |      |    |    |              |                                    |                 |      |      |      |      |   |   |                 |    |   |   |   |   |
|                                    | <table border="1"> <tr> <td>Rated voltage (V)</td> <td>6.3</td> <td>10</td> <td>16</td> <td>25</td> <td>35</td> <td>50</td> </tr> <tr> <td>tan δ (MAX.)</td> <td>0.30</td> <td>0.28</td> <td>0.24</td> <td>0.18</td> <td>0.16</td> <td>0.14</td> </tr> </table>  | Rated voltage (V)  | 6.3   | 10   | 16   | 25   | 35 | 50 | tan δ (MAX.) | 0.30                               | 0.28            | 0.24 | 0.18 | 0.16 | 0.14 |   |   |                 |    |   |   |   |   |
| Rated voltage (V)                  | 6.3  | 10                 | 16  | 25   | 35   | 50   |    |    |              |                                    |                 |      |      |      |      |   |   |                 |    |   |   |   |   |
| tan δ (MAX.)                       | 0.30   | 0.28               | 0.24  | 0.18 | 0.16 | 0.14 |    |    |              |                                    |                 |      |      |      |      |   |   |                 |    |   |   |   |   |
| Stability at Low Temperature       | Measurement frequency : 120Hz  |                    |   |      |      |      |    |    |              |                                    |                 |      |      |      |      |   |   |                 |    |   |   |   |   |
|                                    | <table border="1"> <tr> <td colspan="2">Rated voltage (V)</td> <td>6.3</td> <td>10</td> <td>16</td> <td>25</td> <td>35</td> <td>50</td> </tr> <tr> <td rowspan="2">Impedance ratio<br/>ZT / Z20 (MAX.)</td> <td>Z-25°C / Z+20°C</td> <td>5</td> <td>4</td> <td>3</td> <td>2</td> <td>2</td> <td>2</td> </tr> <tr> <td>Z-40°C / Z+20°C</td> <td>10</td> <td>8</td> <td>6</td> <td>4</td> <td>3</td> <td>3</td> </tr> </table> | Rated voltage (V)  |   | 6.3  | 10   | 16   | 25 | 35 | 50           | Impedance ratio<br>ZT / Z20 (MAX.) | Z-25°C / Z+20°C | 5    | 4    | 3    | 2    | 2 | 2 | Z-40°C / Z+20°C | 10 | 8 | 6 | 4 | 3 |
| Rated voltage (V)                  |  | 6.3                | 10  | 16   | 25   | 35   | 50 |    |              |                                    |                 |      |      |      |      |   |   |                 |    |   |   |   |   |
| Impedance ratio<br>ZT / Z20 (MAX.) | Z-25°C / Z+20°C  | 5                  | 4   | 3    | 2    | 2    | 2  |    |              |                                    |                 |      |      |      |      |   |   |                 |    |   |   |   |   |
|                                    | Z-40°C / Z+20°C  | 10                 | 8   | 6    | 4    | 3    | 3  |    |              |                                    |                 |      |      |      |      |   |   |                 |    |   |   |   |   |
| Endurance                          | The specifications listed at right shall be met when the capacitors are restored to 20°C after the rated voltage is applied for 5000 hours at 105°C.   | Capacitance change | Within ±30% of the initial capacitance value      |      |      |      |    |    |              |                                    |                 |      |      |      |      |   |   |                 |    |   |   |   |   |
|                                    |  | tan δ              | 300% 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 blown sleeve.  |                    |   |      |      |      |    |    |              |                                    |                 |      |      |      |      |   |   |                 |    |   |   |   |   |

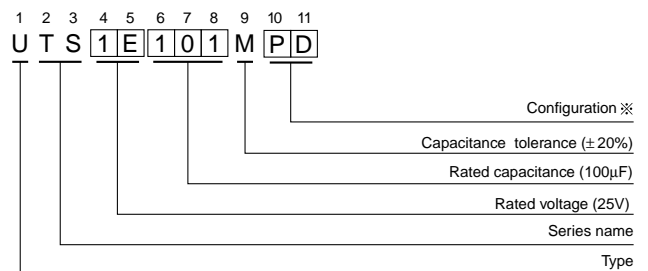
## Radial Lead Type



| α |             | (mm)    |      |            |     |
|---|-------------|---------|------|------------|-----|
| α | (L = 7) 1.0 | φD 4    | 5    | 6.3        | 8   |
|   | (L ≥ 9) 1.5 | P 1.5   | 2.0  | 2.5        | 3.5 |
|   |             | φd 0.45 | 0.45 | 0.5 (0.45) | 0.6 |

( ) : Applied to 7mmL products

## Type numbering system (Example : 25V 100μF)



※ Configuration

| φ D | Pb-free leadwire<br>Pb-free PET sleeve |
|-----|--|
| 4   | DD                                     |
| 5   |  |
| 6.3 | PD                                     |
| 8   |  |

- 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.

### ■ Standard Ratings

| V (Code) |           | 6.3 (0J)                    |   | 10 (1A)                     |   | 16 (1C)                     |   | 25 (1E)                     |   |
|----------|-----------|-----------------------------|---|-----------------------------|---|-----------------------------|---|-----------------------------|---|
| Cap.(μF) | Item Code | Case size<br>φD × L<br>(mm) | Rated ripple<br>(mArms)<br>105°C / 100kHz | Case size<br>φD × L<br>(mm) | Rated ripple<br>(mArms)<br>105°C / 100kHz | Case size<br>φD × L<br>(mm) | Rated ripple<br>(mArms)<br>105°C / 100kHz | Case size<br>φD × L<br>(mm) | Rated ripple<br>(mArms)<br>105°C / 100kHz |
| 10       | 100       |                             |   |                             |   | 4 × 7                       | 29  |                             |   |
| 22       | 220       | 4 × 7                       | 40  |                             |   | 5 × 7                       | 50  |                             |   |
| 33       | 330       |                             |   | 5 × 7                       | 60  |                             |   | 6.3 × 7                     | 86  |
| 47       | 470       | 5 × 7                       | 65  |                             |   | 6.3 × 7                     | 90  | 6.3 × 9                     | 112                                       |
| 100      | 101       | 6.3 × 7                     | 100                                       |                             |   | 6.3 × 9                     | 117                                       | 8 × 9                       | 165                                       |
| 220      | 221       | 6.3 × 9                     | 150                                       | 8 × 9                       | 195                                       |                             |   |                             |   |
| 330      | 331       | 8 × 9                       | 210                                       |                             |   | 8 × 9                       | 210                                       |                             |   |
| 470      | 471       | 8 × 9                       | 210                                       |                             |   |                             |   |                             |   |

| V (Code) |           | 35 (1V)                     |   | 50 (1H)                     |   |
|----------|-----------|-----------------------------|---|-----------------------------|---|
| Cap.(μF) | Item Code | Case size<br>φD × L<br>(mm) | Rated ripple<br>(mArms)<br>105°C / 100kHz | Case size<br>φD × L<br>(mm) | Rated ripple<br>(mArms)<br>105°C / 100kHz |
| 0.1      | 0R1       |                             |   | 4 × 7                       | 3.3                                       |
| 0.22     | R22       |                             |   | 4 × 7                       | 7.3                                       |
| 0.33     | R33       |                             |   | 4 × 7                       | 8.8                                       |
| 0.47     | R47       |                             |   | 4 × 7                       | 13  |
| 1        | 010       |                             |   | 4 × 7                       | 18  |
| 2.2      | 2R2       |                             |   | 4 × 7                       | 22  |
| 3.3      | 3R3       |                             |   | 4 × 7                       | 25  |
| 4.7      | 4R7       | 4 × 7                       | 30  | 5 × 7                       | 30  |
| 10       | 100       | 5 × 7                       | 43  | 6.3 × 7                     | 54  |
| 22       | 220       | 6.3 × 7                     | 76  | 6.3 × 9                     | 86  |
| 33       | 330       | 6.3 × 9                     | 100                                       |                             |   |
| 47       | 470       |                             |   | 8 × 9                       | 153                                       |
| 100      | 101       |                             |   | 8 × 9                       | 188                                       |

### ● Frequency coefficient of rated ripple current

| Cap. (μF)  | Frequency | 50Hz | 120Hz | 300Hz | 1kHz | 10kHz | 100kHz or more |
|------------|-----------|------|-------|-------|------|-------|----------------|
| 0.1 to 4.7 |           | 0.25 | 0.40  | 0.50  | 0.70 | 0.90  | 1.00           |
| 10 to 47   |           | 0.40 | 0.50  | 0.60  | 0.75 | 0.90  | 1.00           |
| 100 to 470 |           | 0.50 | 0.60  | 0.70  | 0.80 | 0.90  | 1.00           |