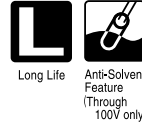


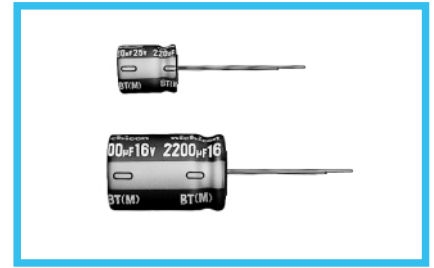
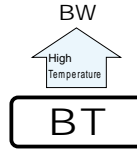
# ALUMINUM ELECTROLYTIC CAPACITORS



**BT** series High Temperature Range, For +125°C Use



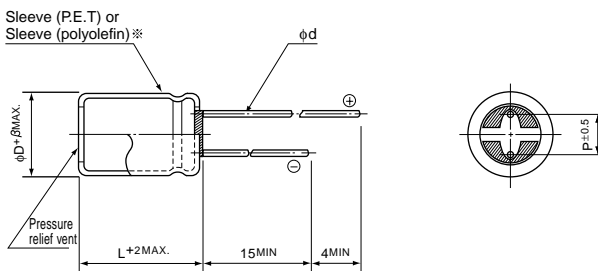
- Highly dependable reliability withstanding load life of 2000 to 10000 hours at +125°C.
- Suited for automobile electronics where heavy duty services are indispensable.
- Compliant to the RoHS directive (2002/95/EC).



## Specifications

| Item                                                                        | Performance Characteristics                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                           |      |      |      |      |      |                                                                                                      |      |            |            |             |   |
|-----------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|------|------|------|------|------|------------------------------------------------------------------------------------------------------|------|------------|------------|-------------|---|
| Category Temperature Range                                                  | -40 to +125°C (10 to 250V), -25 to +125°C (350 to 450V)                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                           |      |      |      |      |      |                                                                                                      |      |            |            |             |   |
| Rated Voltage Range                                                         | 10 to 450V                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                           |      |      |      |      |      |                                                                                                      |      |            |            |             |   |
| Rated Capacitance Range                                                     | 1 to 4700µF                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                           |      |      |      |      |      |                                                                                                      |      |            |            |             |   |
| Capacitance Tolerance                                                       | ±20% at 120Hz, 20°C                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                           |      |      |      |      |      |                                                                                                      |      |            |            |             |   |
| Leakage Current                                                             | Rated Voltage (V)                                                                                                                                                                                                                                                                                                                                                                                                | 10 to 100                                                                                                                 |      |      |      |      |      | 160 to 450                                                                                           |      |            |            |             |   |
|                                                                             | Leakage current                                                                                                                                                                                                                                                                                                                                                                                                  | After 1 minute's application of rated voltage, leakage current is not more than 0.03CV or 4 (µA), whichever is greater.   |      |      |      |      |      | CV ≤ 1000 : I = 0.1CV+40 (µA) max. (1 minute's)<br>CV > 1000 : I = 0.04CV+100 (µA) max. (1 minute's) |      |            |            |             |   |
| Tangent of loss angle (tan δ)                                               | Rated voltage (V)                                                                                                                                                                                                                                                                                                                                                                                                | 10                                                                                                                        | 16   | 25   | 35   | 50   | 63   | 80                                                                                                   | 100  | 160 to 250 | 350 to 450 | 120Hz, 20°C |   |
|                                                                             | tan δ (MAX.)                                                                                                                                                                                                                                                                                                                                                                                                     | 0.20                                                                                                                      | 0.16 | 0.14 | 0.12 | 0.10 | 0.10 | 0.08                                                                                                 | 0.08 | 0.20       | 0.24       |             |   |
| For capacitance of more than 1000µF, add 0.02 for every increase of 1000µF. |                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                           |      |      |      |      |      |                                                                                                      |      |            |            |             |   |
| Stability at Low Temperature                                                | Rated voltage (V)                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                           |      |      |      |      |      |                                                                                                      |      |            |            | 120Hz       |   |
|                                                                             | Impedance ratio                                                                                                                                                                                                                                                                                                                                                                                                  | Z-25°C / Z+20°C                                                                                                           | 3    | 2    | 2    | 2    | 2    | 2                                                                                                    | 2    | 2          | 2          | 3           | 6 |
|                                                                             | ZT / Z20 (MAX.)                                                                                                                                                                                                                                                                                                                                                                                                  | Z-40°C / Z+20°C                                                                                                           | 4    | 4    | 4    | 4    | 4    | 4                                                                                                    | 4    | 4          | 4          | 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 less than 50V (φD = 8 : 2000 hours, φD = 10 : 5000 hours, φD ≥ 12.5 : 10000 hours), 63 to 100V (φD = 8 : 2000 hours, φD = 10 : 3000 hours, φD ≥ 12.5 : 5000 hours), more than 160V (2000 hours) at 125°C, the peak voltage shall not exceed the rated voltage. |                                                                                                                           |      |      |      |      |      |                                                                                                      |      |            |            |             |   |
|                                                                             | Capacitance change                                                                                                                                                                                                                                                                                                                                                                                               | Within ±30% of the initial capacitance value (10 to 100V)<br>Within ±20% of the initial capacitance value (160 to 450V)   |      |      |      |      |      |                                                                                                      |      |            |            |             |   |
|                                                                             | Dissipation Factor                                                                                                                                                                                                                                                                                                                                                                                               | 300% or less than the initial specified value (10 to 100V)<br>200% or less than the initial specified value (160 to 450V) |      |      |      |      |      |                                                                                                      |      |            |            |             |   |
| Leakage current                                                             | Less than or equal to the initial specified value                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                           |      |      |      |      |      |                                                                                                      |      |            |            |             |   |
| Shelf Life                                                                  | After storing the capacitors under no load at 125°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 blue sleeve.                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                           |      |      |      |      |      |                                                                                                      |      |            |            |             |   |

## Radial Lead Type



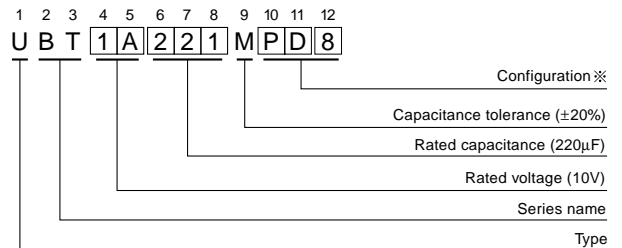
※ P.E.T. sleeve product is also available upon request.

|    | (mm) |     |      |     |     |
|----|------|-----|------|-----|-----|
| φD | 8    | 10  | 12.5 | 16  | 18  |
| β  | 0.8  | 0.8 | 1.0  | 1.0 | 1.0 |
| 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.

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

## Type numbering system (Example : 10V 220µF)



| ※ Configuration |                                        |                                               |
|-----------------|----------------------------------------|-----------------------------------------------|
|                 | Standard type                          | Semi-standard type                            |
| φ D             | Pb-free leadwire<br>Pb-free PET sleeve | Pb-free leadwire<br>Pb-free Polyolefin sleeve |
| 8 - 10          | PD8                                    | PD                                            |
| 12.5 to 18      | HD8                                    | HD                                            |

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. (μF) | V(Code) | Item Code | 10 (1A)               |                    |                      | 16 (1C)               |                    |                      | 25 (1E)               |                    |                      | 35 (1V)               |                    |                      | 50 (1H)               |                    |                      |
|-----------|---------|-----------|-----------------------|--------------------|----------------------|-----------------------|--------------------|----------------------|-----------------------|--------------------|----------------------|-----------------------|--------------------|----------------------|-----------------------|--------------------|----------------------|
|           |         |           | Case size φD × L (mm) | Impedance (Ω) MAX. | Rated ripple (mArms) | Case size φD × L (mm) | Impedance (Ω) MAX. | Rated ripple (mArms) | Case size φD × L (mm) | Impedance (Ω) MAX. | Rated ripple (mArms) | Case size φD × L (mm) | Impedance (Ω) MAX. | Rated ripple (mArms) | Case size φD × L (mm) | Impedance (Ω) MAX. | Rated ripple (mArms) |
| 1         | 010     |           |                       |                    |                      |                       |                    |                      |                       |                    |                      |                       |                    |                      |                       |                    |                      |
| 2.2       | 2R2     |           |                       |                    |                      |                       |                    |                      |                       |                    |                      |                       |                    |                      |                       |                    |                      |
| 3.3       | 3R3     |           |                       |                    |                      |                       |                    |                      |                       |                    |                      |                       |                    |                      |                       |                    |                      |
| 4.7       | 4R7     |           |                       |                    |                      |                       |                    |                      |                       |                    |                      |                       |                    |                      |                       |                    |                      |
| 10        | 100     |           |                       |                    |                      |                       |                    |                      |                       |                    |                      |                       |                    |                      |                       |                    |                      |
| 22        | 220     |           |                       |                    |                      |                       |                    |                      |                       |                    |                      |                       |                    |                      |                       |                    |                      |
| 33        | 330     |           |                       |                    |                      |                       |                    |                      |                       |                    |                      |                       |                    |                      |                       |                    |                      |
| 47        | 470     |           |                       |                    |                      |                       |                    |                      |                       |                    |                      |                       |                    |                      |                       |                    |                      |
| 100       | 101     |           |                       |                    |                      |                       |                    |                      |                       |                    |                      |                       |                    |                      |                       |                    |                      |
| 220       | 221     | 8 × 11.5  | 0.26                  | 340                | 10 × 12.5            | 0.15                  | 620                | 10 × 12.5            | 0.10                  | 680                | 10 × 16              | 0.094                 | 790                | 10 × 20              | 0.098                 | 930                |                      |
| 330       | 331     | 10 × 12.5 | 0.15                  | 620                | 10 × 12.5            | 0.10                  | 680                | 10 × 16              | 0.075                 | 945                | 10 × 20              | 0.075                 | 950                | 12.5 × 20            | 0.070                 | 1330               |                      |
| 470       | 471     | 10 × 12.5 | 0.10                  | 680                | 10 × 16              | 0.075                 | 945                | 10 × 20              | 0.057                 | 1100               | 12.5 × 20            | 0.058                 | 1330               | 12.5 × 25            | 0.055                 | 1650               |                      |
| 1000      | 102     | 10 × 20   | 0.057                 | 1100               | 12.5 × 20            | 0.042                 | 1490               | 12.5 × 25            | 0.033                 | 1750               | 16 × 25              | 0.031                 | 2010               | 16 × 31.5            | 0.031                 | 2430               |                      |
| 2200      | 222     | 12.5 × 25 | 0.033                 | 1750               | 16 × 25              | 0.024                 | 2300               | 16 × 31.5            | 0.020                 | 2710               | 18 × 35.5            | 0.025                 | 2790               |                      |                       |                    |                      |
| 3300      | 332     | 16 × 25   | 0.024                 | 2300               | 16 × 31.5            | 0.020                 | 2710               | 18 × 31.5            | 0.017                 | 3310               |                      |                       |                    |                      |                       |                    |                      |
| 4700      | 472     | 16 × 31.5 | 0.020                 | 2710               | 18 × 31.5            | 0.018                 | 3270               |                      |                       |                    |                      |                       |                    |                      |                       |                    |                      |

| Cap. (μF) | V(Code) | Item Code   | 63 (1J)               |                    |                      | 80 (1K)               |                    |                      | 100 (2A)              |                    |                      |
|-----------|---------|-------------|-----------------------|--------------------|----------------------|-----------------------|--------------------|----------------------|-----------------------|--------------------|----------------------|
|           |         |             | Case size φD × L (mm) | Impedance (Ω) MAX. | Rated ripple (mArms) | Case size φD × L (mm) | Impedance (Ω) MAX. | Rated ripple (mArms) | Case size φD × L (mm) | Impedance (Ω) MAX. | Rated ripple (mArms) |
| 4.7       | 4R7     |             |                       |                    |                      |                       |                    |                      |                       |                    |                      |
| 10        | 100     |             |                       |                    |                      |                       |                    |                      |                       |                    |                      |
| 22        | 220     | 8 × 11.5    | 2.00                  | 130                | 8 × 11.5             | 1.50                  | 150                | 10 × 12.5            | 0.80                  | 480                |                      |
| 33        | 330     | 8 × 11.5    | 1.50                  | 150                | 10 × 12.5            | 0.80                  | 480                | 10 × 12.5            | 0.80                  | 480                |                      |
| 47        | 470     | 10 × 12.5   | 0.59                  | 530                | 10 × 12.5            | 0.80                  | 480                | 10 × 16              | 0.55                  | 630                |                      |
| 100       | 101     | 10 × 16     | 0.41                  | 690                | 10 × 20              | 0.39                  | 790                | 12.5 × 20            | 0.25                  | 990                |                      |
| 220       | 221     | 12.5 × 20   | 0.16                  | 1050               | 12.5 × 25            | 0.18                  | 1240               | 16 × 25              | 0.11                  | 1500               |                      |
| 330       | 331     | 12.5 × 25   | 0.12                  | 1290               | 12.5 × 31.5          | 0.16                  | 1390               | 16 × 31.5            | 0.079                 | 1790               |                      |
| 470       | 471     | 12.5 × 31.5 | 0.097                 | 1460               | 16 × 25              | 0.11                  | 1500               |                      |                       |                    |                      |

Rated ripple current (mArms) at 125°C 100kHz  
Impedance (Ω) MAX. at 20°C 100kHz

### ● Frequency coefficient of rated ripple current

| V         | CV        | Frequency |       |      |               |
|-----------|-----------|-----------|-------|------|---------------|
|           |           | 120Hz     | 300Hz | 1kHz | 10kHz or more |
| 10 to 100 | 1000 > CV | 0.50      | 0.64  | 0.83 | 1.00          |
|           | 1000 ≤ CV | 0.67      | 0.79  | 0.91 | 1.00          |

| Cap. (μF) | V(Code) | Item Code | 160 (2C)              |                      | 200 (2D)              |                      | 250 (2E)              |                      | 350 (2V)              |                      | 400 (2G)              |                      | 450 (2W)              |                      |
|-----------|---------|-----------|-----------------------|----------------------|-----------------------|----------------------|-----------------------|----------------------|-----------------------|----------------------|-----------------------|----------------------|-----------------------|----------------------|
|           |         |           | Case size φD × L (mm) | Rated ripple (mArms) | Case size φD × L (mm) | Rated ripple (mArms) | Case size φD × L (mm) | Rated ripple (mArms) | Case size φD × L (mm) | Rated ripple (mArms) | Case size φD × L (mm) | Rated ripple (mArms) | Case size φD × L (mm) | Rated ripple (mArms) |
| 4.7       | 4R7     |           |                       |                      |                       |                      |                       |                      |                       |                      |                       |                      |                       |                      |
| 10        | 100     |           |                       |                      |                       |                      |                       |                      |                       |                      |                       |                      |                       |                      |
| 22        | 220     | 10 × 20   | 115                   | 10 × 25              | 126                   | 12.5 × 20            | 128                   | 12.5 × 25            | 139                   | 12.5 × 31.5          | 142                   | 16 × 25              | 154                   |                      |
| 33        | 330     | 10 × 25   | 154                   | 12.5 × 20            | 157                   | 12.5 × 25            | 171                   | 16 × 25              | 189                   | 16 × 25              | 189                   | 16 × 31.5            | 203                   |                      |
| 47        | 470     | 12.5 × 20 | 187                   | 12.5 × 25            | 204                   | 16 × 25              | 225                   | 16 × 31.5            | 243                   | 16 × 31.5            | 243                   |                      |                       |                      |
| 68        | 680     | 12.5 × 25 | 245                   | 16 × 20              | 250                   | 16 × 31.5            | 292                   |                      |                       |                      |                       |                      |                       |                      |
| 100       | 101     | 16 × 25   | 329                   | 16 × 25              | 329                   |                      |                       |                      |                       |                      |                       |                      |                       |                      |
| 150       | 151     | 16 × 31.5 | 434                   |                      |                       |                      |                       |                      |                       |                      |                       |                      |                       |                      |

Rated ripple current (mArms) at 125°C 120Hz

### ● Frequency coefficient of rated ripple current

| V          | Cap. (μF) | Frequency |       |       |      |       |                |
|------------|-----------|-----------|-------|-------|------|-------|----------------|
|            |           | 50Hz      | 120Hz | 300Hz | 1kHz | 10kHz | 100kHz or more |
| 160 to 450 | 4.7 to 33 | 0.75      | 1.00  | 1.25  | 1.50 | 1.75  | 1.80           |
|            | 47 to 150 | 0.80      | 1.00  | 1.15  | 1.30 | 1.40  | 1.50           |