

BT

High Temperature Range, For +125°C Use

series



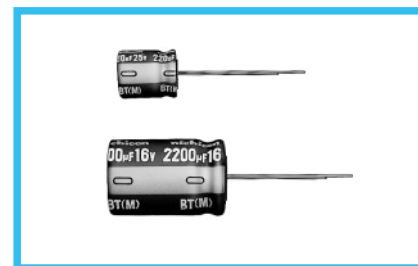
Long Life

Anti-Solvent  
Feature  
(Through  
100V only)

- 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 (2011/65/EU).



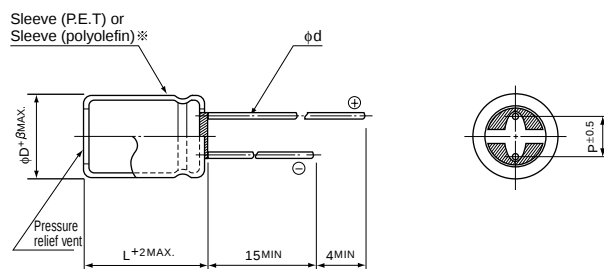
BT



## ■ 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  | 120Hz                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                         |                                                                                                                           |      |      |      |      |      |                                                                                                      |            |            |             |            |
|                               | Rated voltage (V)                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                         |                                                                                                                           | 10   | 16   | 25   | 35   | 50   | 63                                                                                                   | 80         | 100        | 160 to 250  | 350 to 450 |
|                               | Impedance ratio                                                                                                                                                                                                                                                                                                                                                                                                   | Z−25°C / Z+20°C                                                                                                         |                                                                                                                           |      | 3    | 2    | 2    | 2    | 2                                                                                                    | 2          | 2          | 3           | 6          |
| Endurance                     | ZT / Z20 (MAX.)                                                                                                                                                                                                                                                                                                                                                                                                   | Z−40°C / Z+20°C                                                                                                         |                                                                                                                           |      | 4    | 4    | 4    | 4    | 4                                                                                                    | 4          | 4          | 6           | —          |
|                               | 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



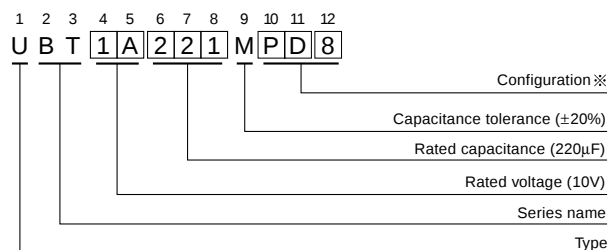
※ polyolefin sleeve product is also available upon request.

|    | (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 &gt; 25 for the φ12.5 dia. unit, lead dia. φd = 0.8mm.

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

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



|            | Standard type                          | Semi-standard type                            |
|------------|----------------------------------------|-----------------------------------------------|
| φD         | 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

| V(Code)<br>Cap. (μF)<br>Item<br>Code |     | 10 (1A)                     |                       |                            | 16 (1C)                     |                       |                            | 25 (1E)                     |                       |                            | 35 (1V)                     |                       |                            | 50 (1H)                     |                       |                            |
|--------------------------------------|-----|-----------------------------|-----------------------|----------------------------|-----------------------------|-----------------------|----------------------------|-----------------------------|-----------------------|----------------------------|-----------------------------|-----------------------|----------------------------|-----------------------------|-----------------------|----------------------------|
|                                      |     | Case size<br>φD × L<br>(mm) | Impedance<br>(Ω) MAX. | Rated<br>ripple<br>(mArms) | Case size<br>φD × L<br>(mm) | Impedance<br>(Ω) MAX. | Rated<br>ripple<br>(mArms) | Case size<br>φD × L<br>(mm) | Impedance<br>(Ω) MAX. | Rated<br>ripple<br>(mArms) | Case size<br>φD × L<br>(mm) | Impedance<br>(Ω) MAX. | Rated<br>ripple<br>(mArms) | Case size<br>φD × L<br>(mm) | Impedance<br>(Ω) MAX. | Rated<br>ripple<br>(mArms) |
| 1                                    | 010 |                             |                       |                            |                             |                       |                            |                             |                       |                            |                             |                       |                            | 8 × 11.5                    | 2.00                  | 35                         |
| 2.2                                  | 2R2 |                             |                       |                            |                             |                       |                            |                             |                       |                            |                             |                       |                            | 8 × 11.5                    | 1.80                  | 50                         |
| 3.3                                  | 3R3 |                             |                       |                            |                             |                       |                            |                             |                       |                            |                             |                       |                            | 8 × 11.5                    | 1.50                  | 60                         |
| 4.7                                  | 4R7 |                             |                       |                            |                             |                       |                            |                             |                       |                            |                             |                       |                            | 8 × 11.5                    | 1.15                  | 85                         |
| 10                                   | 100 |                             |                       |                            |                             |                       |                            |                             |                       |                            |                             |                       |                            | 8 × 11.5                    | 0.75                  | 180                        |
| 22                                   | 220 |                             |                       |                            |                             |                       |                            |                             |                       |                            |                             |                       |                            | 8 × 11.5                    | 0.50                  | 250                        |
| 33                                   | 330 |                             |                       |                            |                             |                       |                            |                             |                       |                            |                             |                       |                            | 8 × 11.5                    | 0.45                  | 300                        |
| 47                                   | 470 |                             |                       |                            |                             |                       |                            |                             |                       |                            |                             |                       |                            | 8 × 11.5                    | 0.35                  | 440                        |
| 100                                  | 101 |                             |                       |                            | 8 × 11.5                    | 0.32                  | 340                        | 8 × 11.5                    | 0.13                  | 500                        | 10 × 12.5                   | 0.15                  | 620                        | 10 × 12.5                   | 0.18                  | 555                        |
| 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                       |                             |                       |                            |                             |                       |                            |                             |                       |                            |

| V(Code)<br>Cap. (μF)<br>Item<br>Code |     | 63 (1J)                     |                       |                            | 80 (1K)                     |                       |                            | 100 (2A)                    |                       |                            |
|--------------------------------------|-----|-----------------------------|-----------------------|----------------------------|-----------------------------|-----------------------|----------------------------|-----------------------------|-----------------------|----------------------------|
|                                      |     | Case size<br>φD × L<br>(mm) | Impedance<br>(Ω) MAX. | Rated<br>ripple<br>(mArms) | Case size<br>φD × L<br>(mm) | Impedance<br>(Ω) MAX. | Rated<br>ripple<br>(mArms) | Case size<br>φD × L<br>(mm) | Impedance<br>(Ω) MAX. | Rated<br>ripple<br>(mArms) |
| 4.7                                  | 4R7 |                             |                       |                            |                             |                       |                            | 8 × 11.5                    | 2.00                  | 130                        |
| 10                                   | 100 |                             |                       |                            |                             |                       |                            | 8 × 11.5                    | 1.50                  | 150                        |
| 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         | Frequency |  | 120Hz | 300Hz | 1kHz | 10kHz or more |
|-----------|-----------|--|-------|-------|------|---------------|
|           | CV        |  |       |       |      |               |
| 10 to 100 | 1000 > CV |  | 0.50  | 0.64  | 0.83 | 1.00          |
|           | 1000 ≤ CV |  | 0.67  | 0.79  | 0.91 | 1.00          |

| V(Code)<br>Cap. (μF)<br>Item<br>Code |     | 160 (2C)                    |                            | 200 (2D)                    |                            | 250 (2E)                    |                            | 350 (2V)                    |                            | 400 (2G)                    |                            | 450 (2W)                    |                            |
|--------------------------------------|-----|-----------------------------|----------------------------|-----------------------------|----------------------------|-----------------------------|----------------------------|-----------------------------|----------------------------|-----------------------------|----------------------------|-----------------------------|----------------------------|
|                                      |     | Case size<br>φD × L<br>(mm) | Rated<br>ripple<br>(mArms) | Case size<br>φD × L<br>(mm) | Rated<br>ripple<br>(mArms) | Case size<br>φD × L<br>(mm) | Rated<br>ripple<br>(mArms) | Case size<br>φD × L<br>(mm) | Rated<br>ripple<br>(mArms) | Case size<br>φD × L<br>(mm) | Rated<br>ripple<br>(mArms) | Case size<br>φD × L<br>(mm) | Rated<br>ripple<br>(mArms) |
| 4.7                                  | 4R7 |                             |                            |                             |                            |                             |                            | 10 × 20                     | 53                         | 10 × 20                     | 53                         | 10 × 25                     | 58                         |
| 10                                   | 100 |                             |                            | 10 × 20                     | 78                         | 10 × 20                     | 78                         | 10 × 25                     | 85                         | 10 × 25                     | 86                         | 12.5 × 20                   | 86                         |
| 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          | Frequency |  | 50Hz | 120Hz | 300Hz | 1kHz | 10kHz | 100kHz or more |
|------------|-----------|--|------|-------|-------|------|-------|----------------|
|            | Cap. (μF) |  |      |       |       |      |       |                |
| 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           |