

## ET series

sales016@heyuecap.com

- High temperature, low ESR, High ripple current capability
- Rated voltage :4~50V
- Endurance:1,000hours at 125°C
- Applications: DC-DC Converters, Voltage Regulators, Decoupling Applications for Computer Motherboards, etc.
- ROHS compliant
- Halogen Free compliant



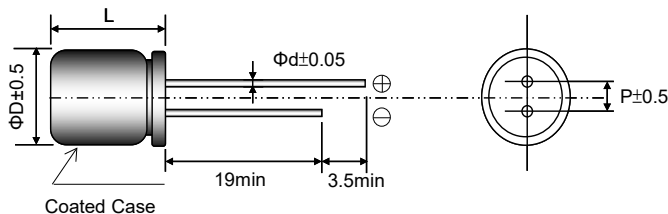
## SPECIFICATIONS

| Items                                                  | Conditions                                                                                                                                                                                                          | Characteristics                                                                                                                                                 |                                        |
|--------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|
| Category Temperature Range                             | —                                                                                                                                                                                                                   | -55 to +125°C                                                                                                                                                   |                                        |
| Rated Voltage Range                                    | —                                                                                                                                                                                                                   | 4 ~ 50V                                                                                                                                                         |                                        |
| Capacitance Tolerance                                  | at 20°C, 120Hz                                                                                                                                                                                                      | ±20%(M)                                                                                                                                                         |                                        |
| Surge Voltage                                          | at 125°C                                                                                                                                                                                                            | Rated voltage ×1.15V                                                                                                                                            |                                        |
| Leakage Current                                        | at 20°C after 2 minutes                                                                                                                                                                                             | I ≤ 0.2CV or 300(μA) Whichever is greater measured, after 2 minutes application of rated working voltage at +20°C. Please see the attached characteristics list |                                        |
| Dissipation Factor (tan δ)                             | at 20°C, 120Hz                                                                                                                                                                                                      | Please see the attached characteristics list                                                                                                                    |                                        |
| Low Temperature Characteristics (Max. Impedance Ratio) | at -55°C, 100kHz                                                                                                                                                                                                    | Z(-55°C)/Z(+20°C)                                                                                                                                               | ≤ 1.25                                 |
|                                                        | at -25°C, 100kHz                                                                                                                                                                                                    | Z(-25°C)/Z(+20°C)                                                                                                                                               | ≤ 1.15                                 |
| Endurance                                              | The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for 1,000 hours at 125°C.                                                               | Appearance                                                                                                                                                      | No significant damage.                 |
|                                                        |                                                                                                                                                                                                                     | Capacitance change                                                                                                                                              | ≤ ±20% of the initial value.           |
|                                                        |                                                                                                                                                                                                                     | DF(tanδ)                                                                                                                                                        | ≤ 150% of the initial specified value. |
|                                                        |                                                                                                                                                                                                                     | ESR                                                                                                                                                             | ≤ 150% of the initial specified value. |
|                                                        |                                                                                                                                                                                                                     | Leakage current                                                                                                                                                 | ≤ The initial specified value.         |
| Damp Heat (Steady State)                               | The following specifications shall be satisfied when the capacitors are restored to 20°C after subjecting them to store at 60°C, 90 to 95% RH for 1,000 hours, without DC applied.                                  | Appearance                                                                                                                                                      | No significant damage.                 |
|                                                        |                                                                                                                                                                                                                     | Capacitance change                                                                                                                                              | ≤ ±20% of the initial value.           |
|                                                        |                                                                                                                                                                                                                     | DF(tanδ)                                                                                                                                                        | ≤ 150% of the initial specified value. |
|                                                        |                                                                                                                                                                                                                     | ESR                                                                                                                                                             | ≤ 150% of the initial specified value. |
|                                                        |                                                                                                                                                                                                                     | Leakage current                                                                                                                                                 | ≤ The initial specified value.         |
| Surge Voltage                                          | The capacitors shall be subjected to 1,000 cycles each consisting of charge with the surge voltages specified at 105°C for 30 seconds through a protective resistor (R=1kΩ) and discharge for 5 minutes 30 seconds. | Appearance                                                                                                                                                      | No significant damage.                 |
|                                                        |                                                                                                                                                                                                                     | Capacitance change                                                                                                                                              | ≤ ±20% of the initial value.           |
|                                                        |                                                                                                                                                                                                                     | DF(tanδ)                                                                                                                                                        | ≤ 150% of the initial specified value. |
|                                                        |                                                                                                                                                                                                                     | ESR                                                                                                                                                             | ≤ 150% of the initial specified value. |
|                                                        |                                                                                                                                                                                                                     | Leakage current                                                                                                                                                 | ≤ The initial specified value.         |

※ Note: If any doubt arises, measure the leakage current after following voltage treatment.  
Voltage treatment : DC rated voltage are applied to the capacitors for 120 minutes at 125°C.

## MARKING AND DIMENSIONS

Polarity Marking (Cathode) — Series Code  
Rated Capacitance  
Rated Voltage



(Unit:mm)

| Size | 6.3x6     | 6.3x8     | 8x6       | 8x8       | 8x11.5    | 10x10     | 10x11.5   |
|------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| ΦD   | 6.3       | 6.3       | 8.0       | 8.0       | 8.0       | 10.0      | 10.0      |
| L    | L+1.0 max | L+1.5 max | L+1.5 max | L+1.5 max | L+1.5 max | L+1.0 max | L+1.5 max |
| Φd   | 0.5       | 0.5       | 0.5       | 0.6       | 0.6       | 0.6       | 0.6       |
| P    | 2.5       | 2.5       | 3.5       | 3.5       | 3.5       | 5.0       | 5.0       |

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**STANDARD RATINGS**

| Rated voltage<br>(S.V.) | Cap<br>( $\mu$ F) | Size Code<br>DxL | Leakage current<br>( $\mu$ A) max. | ESR<br>(m $\Omega$ ) max. 100k to<br>300kHz / 20°C | Rated Ripple<br>Current (mA rms) |                 | D.F.<br>(tan $\delta$ ) max.<br>120Hz / 20°C |
|-------------------------|-------------------|------------------|------------------------------------|----------------------------------------------------|----------------------------------|-----------------|----------------------------------------------|
|                         |                   |                  |                                    |                                                    | 105°C<br>100kHz                  | 125°C<br>100kHz |                                              |
| 4<br>(4.6)              | 100               | 6.3×6            | 300                                | 40                                                 | 2390                             | 797             | 0.12                                         |
|                         | 330               | 6.3×8            | 300                                | 20                                                 | 3200                             | 1067            | 0.12                                         |
|                         | 560               | 6.3×8            | 448                                | 20                                                 | 3200                             | 1067            | 0.12                                         |
|                         | 1000              | 8×8              | 800                                | 20                                                 | 3800                             | 1267            | 0.12                                         |
|                         | 1200              | 8×11.5           | 960                                | 16                                                 | 4200                             | 1400            | 0.12                                         |
|                         | 2500              | 10×11.5          | 2000                               | 16                                                 | 5460                             | 1820            | 0.12                                         |
| 6.3<br>(7.2)            | 100               | 6.3×6            | 300                                | 40                                                 | 2100                             | 700             | 0.12                                         |
|                         | 470               | 6.3×8            | 592                                | 20                                                 | 3100                             | 1033            | 0.12                                         |
|                         | 560               | 8×8              | 705                                | 20                                                 | 4300                             | 1433            | 0.12                                         |
|                         | 1000              | 8×11.5           | 1260                               | 16                                                 | 5100                             | 1700            | 0.12                                         |
|                         | 1,200             | 8×11.5           | 1512                               | 16                                                 | 5100                             | 1700            | 0.12                                         |
|                         | 1500              | 10×10            | 1890                               | 20                                                 | 5200                             | 1733            | 0.12                                         |
|                         | 1800              | 10×11.5          | 2268                               | 16                                                 | 5440                             | 1813            | 0.12                                         |
| 10<br>(11.5)            | 100               | 6.3×6            | 300                                | 40                                                 | 1800                             | 600             | 0.12                                         |
|                         | 330               | 6.3×8            | 660                                | 20                                                 | 2360                             | 787             | 0.12                                         |
|                         | 330               | 8×6              | 660                                | 40                                                 | 2560                             | 853             | 0.12                                         |
|                         | 560               | 8×8              | 1120                               | 20                                                 | 3200                             | 1067            | 0.12                                         |
|                         | 820               | 8×11.5           | 1640                               | 16                                                 | 4200                             | 1400            | 0.12                                         |
|                         | 1000              | 10×10            | 2000                               | 20                                                 | 5120                             | 1707            | 0.12                                         |
|                         | 1200              | 10×11.5          | 2400                               | 16                                                 | 5600                             | 1867            | 0.12                                         |
| 16<br>(18.4)            | 47                | 6.3×6            | 300                                | 30                                                 | 1620                             | 540             | 0.12                                         |
|                         | 82                | 6.3×6            | 300                                | 30                                                 | 1620                             | 540             | 0.12                                         |
|                         | 100               | 6.3×8            | 320                                | 20                                                 | 2120                             | 707             | 0.12                                         |
|                         | 330               | 8×8              | 1056                               | 20                                                 | 4300                             | 1433            | 0.12                                         |
|                         | 470               | 8×11.5           | 1504                               | 16                                                 | 4500                             | 1500            | 0.12                                         |
|                         | 560               | 10×11.5          | 1792                               | 16                                                 | 4700                             | 1567            | 0.12                                         |
|                         | 820               | 10×11.5          | 2624                               | 16                                                 | 4700                             | 1567            | 0.12                                         |
| 25<br>(28.8)            | 47                | 6.3×6            | 300                                | 50                                                 | 2000                             | 667             | 0.12                                         |
|                         | 100               | 6.3×8            | 500                                | 30                                                 | 2000                             | 667             | 0.12                                         |
|                         | 180               | 8×8              | 900                                | 28                                                 | 3100                             | 1033            | 0.12                                         |
|                         | 220               | 8×11.5           | 1100                               | 26                                                 | 3600                             | 1200            | 0.12                                         |
|                         | 330               | 10×11.5          | 1650                               | 24                                                 | 4250                             | 1417            | 0.12                                         |
|                         | 470               | 10×11.5          | 2350                               | 24                                                 | 4200                             | 1400            | 0.12                                         |
| 35<br>(40.3)            | 22                | 6.3×6            | 300                                | 70                                                 | 1450                             | 483             | 0.12                                         |
|                         | 68                | 6.3×8            | 476                                | 60                                                 | 1500                             | 500             | 0.12                                         |
|                         | 120               | 8×8              | 840                                | 30                                                 | 2200                             | 733             | 0.12                                         |
|                         | 150               | 8×11.5           | 1050                               | 28                                                 | 2600                             | 867             | 0.12                                         |
|                         | 220               | 8×11.5           | 1540                               | 28                                                 | 2950                             | 983             | 0.12                                         |
|                         | 270               | 10×10            | 1890                               | 28                                                 | 3200                             | 1067            | 0.12                                         |
| 50<br>(57.5)            | 10                | 6.3×6            | 300                                | 60                                                 | 1400                             | 467             | 0.12                                         |
|                         | 33                | 6.3×8            | 330                                | 60                                                 | 1500                             | 500             | 0.12                                         |
|                         | 47                | 8×8              | 470                                | 30                                                 | 2000                             | 667             | 0.12                                         |
|                         | 68                | 8×11.5           | 680                                | 28                                                 | 2200                             | 733             | 0.12                                         |
|                         | 100               | 10×10            | 1000                               | 28                                                 | 2300                             | 767             | 0.12                                         |
|                         | 100               | 10×11.5          | 1000                               | 28                                                 | 2500                             | 833             | 0.12                                         |

**FREQUENCY COEFFICIENT FOR RIPPLE CURRENT**

| Frequency   | 120Hz $\leq$ f < 1kHz | 1kHz $\leq$ f < 10kHz | 10kHz $\leq$ f < 100kHz | 100kHz $\leq$ f < 500kHz |
|-------------|-----------------------|-----------------------|-------------------------|--------------------------|
| Coefficient | 0.05                  | 0.3                   | 0.7                     | 1.0                      |