

- Load life of 2000 hours at 105°C
- Low impedance, high ripple current
- For switching mode power supplies

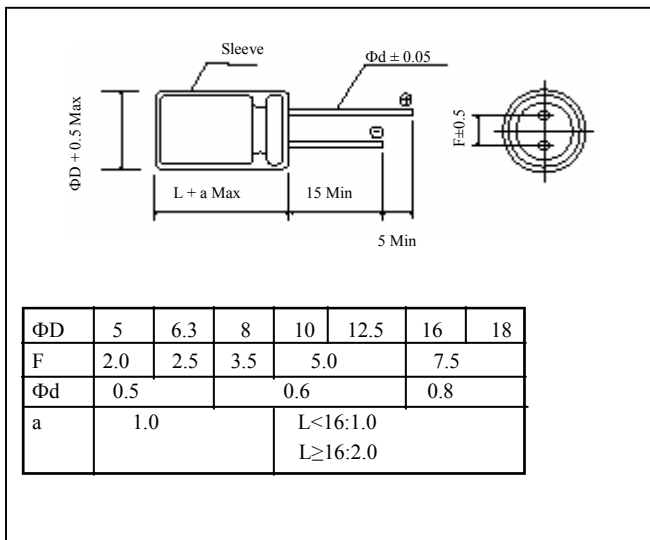


SPECIFICATIONS

| Item | Characteristics | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|--|--|------|------|------|------|---------|------|------|------|------|------|------|-------------------|-----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Operating Temperature Range (°C) | -55 ~+105°C | -40~+105°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rated Voltage Range (V) | 6.3~100 | 160~450V | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Capacitance Tolerance (25°C, 120Hz) | ±20% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Leakage Current (μA) | 0.01CV or 3 whichever is greater at (25°C after 2 minutes) | CV≤1000:0.1CV+40 CV>1000:0.04CV+ 100 at (25°C after 1 minute) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| C: Nominal Capacitance (μF), V: Rated Voltage (V) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dissipation Factor (25°C, 120Hz) | <table border="1"> <thead> <tr> <th>Rated Voltage (V)</th> <th>6.3</th> <th>10</th> <th>16</th> <th>25</th> <th>35</th> <th>50</th> <th>63</th> <th>100</th> <th>160</th> <th>200</th> <th>250</th> <th>315</th> <th>350</th> <th>400</th> <th>450</th> </tr> </thead> <tbody> <tr> <td>tanδ</td> <td>0.22</td> <td>0.19</td> <td>0.16</td> <td>0.14</td> <td>0.12</td> <td>0.10</td> <td>0.09</td> <td>0.08</td> <td>0.15</td> <td>0.15</td> <td>0.15</td> <td>0.20</td> <td>0.20</td> <td>0.20</td> <td>0.20</td> </tr> </tbody> </table> | | | | | | | | | | | | | | Rated Voltage (V) | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 100 | 160 | 200 | 250 | 315 | 350 | 400 | 450 | tanδ | 0.22 | 0.19 | 0.16 | 0.14 | 0.12 | 0.10 | 0.09 | 0.08 | 0.15 | 0.15 | 0.15 | 0.20 | 0.20 | 0.20 | 0.20 |
| | Rated Voltage (V) | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 100 | 160 | 200 | 250 | 315 | 350 | 400 | 450 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| tanδ | 0.22 | 0.19 | 0.16 | 0.14 | 0.12 | 0.10 | 0.09 | 0.08 | 0.15 | 0.15 | 0.15 | 0.20 | 0.20 | 0.20 | 0.20 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| When normal capacitance is over 1000 μ F tan δ shall be added 0.02 to the listed value with increase of every 1000 μ F. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Temperature Stability (120 Hz) | Rated voltage (V) | | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 100 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Impedance ratio | Z-25° C/Z+20° C | 4 | 3 | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Z-40° C/Z+20° C | 8 | 6 | 4 | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Rated Voltage (V) | | 160~250 | | | | | 315~450 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Impedance ratio | Z-25° C/Z+20° C | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Z-40° C/Z+20° C | 8 | | | | | 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Load Life (+105°) | Time | | 2000 hours (ΦD≤8, 1000 hours) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Leakage current | | Not more than the specified value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Capacitance change | | Within ±20% of the initial value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Dissipation factor | | Not more than 200% of the specified value. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Shelf Life (+105°C) | After leaving capacitors under no load for 1000 hours, they meet the specified value for load life characteristics listed above. *After test:(V) to be applied for 30 minutes, 24 to 48 hours before measurement. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

DIMENSIONS

mm



MULTIPLIER FOR RIPPLE CURRENT

| Frequency coefficient | | Freq (Hz) | | | | |
|-----------------------|------------|-----------|-----|-----|-----|------|
| Rated Voltage (V) | CV(μF) | 50,60 | 120 | 1K | 10K | 100K |
| 6.3~16 | 0.1~4.7 | - | 0.4 | 0.7 | 0.8 | 1.0 |
| | 10~47 | - | 0.5 | 0.8 | 0.9 | 1.0 |
| | 100~220 | - | 0.7 | 0.9 | 0.9 | 1.0 |
| | 330~1000 | - | 0.8 | 0.9 | 1.0 | 1.0 |
| | 2200~15000 | - | 0.9 | 1.0 | 1.0 | 1.0 |
| 160~450 | 0.47~220 | 0.80 | 1.0 | 1.3 | 1.4 | 1.6 |

| Temperature coefficient | | Temperature (°C) | | |
|-------------------------|--|------------------|-----|------|
| Rated Voltage (V) | | +70 | +85 | +105 |
| 6.3~100 | | 2.0 | 1.7 | 1.0 |
| 160~450 | | 1.8 | 1.4 | 1.0 |

STANDARD RATINGS

| W _v (V) Cap (μ F) | 6.3 | | | 10 | | | 16 | | | 25 | | |
|------------------------------------|--------------|----------------|-----------------|--------------|----------------|-----------------|--------------|----------------|-----------------|--------------|----------------|-----------------|
| | Size ΦDxL | Impedance Ω | Ripple mArms | Size ΦDxL | Impedance Ω | Ripple mArms | Size ΦDxL | Impedance Ω | Ripple mArms | Size ΦDxL | Impedance Ω | Ripple mArms |
| 4.7 | - | - | - | - | - | - | - | - | - | 5x11 | 3.0 | 85 |
| 10 | - | - | - | - | - | - | 5x11 | 2.5 | 92 | 5x11 | 2.5 | 92 |
| 22 | - | - | - | 5x11 | 2.5 | 92 | 5x11 | 1.9 | 105 | 5x11 | 1.9 | 105 |
| 33 | 5x11 | 2.5 | 105 | 5x11 | 1.9 | 105 | 5x11 | 1.5 | 120 | 5x11 | 1.5 | 120 |
| 47 | 5x11 | 1.5 | 120 | 5x11 | 1.5 | 120 | 5x11 | 1.2 | 130 | 5x11 | 1.2 | 130 |
| 100 | 5x11 | 1.2 | 120 | 5x11 | 1.2 | 130 | 6.3x11 | 0.58 | 220 | 6.3x11 | 0.58 | 220 |
| 220 | 6.3x11 | 0.87 | 180 | 6.3x11 | 0.58 | 220 | 8x11.5 | 0.47 | 290 | 8x11.5 | 0.39 | 315 |
| 330 | 6.3x11 | 0.58 | 220 | 8x11.5 | 0.47 | 265 | 8x11.5 | 0.39 | 315 | 10x12.5 | 0.23 | 500 |
| 470 | 8x11.5 | 0.39 | 315 | 8x11.5 | 0.39 | 315 | 10x12.5 | 0.23 | 500 | 10x16 | 0.18 | 615 |
| 1000 | 10x12.5 | 0.23 | 500 | 10x16 | 0.18 | 615 | 10x20 | 0.12 | 825 | 12.5x20 | 0.090 | 1050 |
| 2200 | 12.5x20 | 0.095 | 1000 | 12.5x20 | 0.090 | 1050 | 12.5x25 | 0.068 | 1300 | 16x25 | 0.056 | 1740 |
| 3300 | 12.5x20 | 0.090 | 1050 | 12.5x25 | 0.068 | 1300 | 16x25 | 0.056 | 1740 | 16x31.5 | 0.045 | 2110 |
| 4700 | 16x25 | 0.061 | 1670 | 16x25 | 0.056 | 1740 | 16x31.5 | 0.045 | 2110 | 18x35.5 | 0.036 | 2580 |
| 6800 | 16x25 | 0.056 | 1740 | 16x31.5 | 0.045 | 2100 | 18x35.5 | 0.036 | 2580 | - | - | - |
| 10000 | 16x31.5 | 0.045 | 2110 | 18x35.5 | 0.036 | 2580 | - | - | - | - | - | - |
| 15000 | 18x35.5 | 0.036 | 2580 | - | - | - | - | - | - | - | - | - |

| W _v (V) Cap (μ F) | 35 | | | 50 | | | 63 | | | 100 | | |
|------------------------------------|--------------|----------------|-----------------|--------------|----------------|-----------------|--------------|----------------|-----------------|--------------|----------------|-----------------|
| | Size ΦDxL | Impedance Ω | Ripple mArms | Size ΦDxL | Impedance Ω | Ripple mArms | Size ΦDxL | Impedance Ω | Ripple mArms | Size ΦDxL | Impedance Ω | Ripple mArms |
| 0.1 | - | - | - | 5x11 | 18.0 | 10 | - | - | - | - | - | - |
| 0.22 | - | - | - | 5x11 | 13.0 | 15 | - | - | - | - | - | - |
| 0.33 | - | - | - | 5x11 | 10.0 | 18 | - | - | - | - | - | - |
| 0.47 | - | - | - | 5x11 | 7.0 | 23 | - | - | - | 5x11 | 13.0 | 30 |
| 1 | - | - | - | 5x11 | 4.9 | 35 | - | - | - | 5x11 | 11.0 | 45 |
| 2.2 | - | - | - | 5x11 | 4.2 | 53 | - | - | - | 5x11 | 9.2 | 60 |
| 3.3 | - | - | - | 5x11 | 3.9 | 65 | - | - | - | 5x11 | 7.2 | 67 |
| 4.7 | 5x11 | 2.5 | 92 | 5x11 | 3.6 | 82 | 5x11 | 5.8 | 74 | 5x11 | 6.3 | 75 |
| 10 | 5x11 | 1.8 | 105 | 5x11 | 2.7 | 100 | 5x11 | 3.6 | 95 | 6.3x11 | 3.3 | 110 |
| 22 | 5x11 | 1.5 | 120 | 5x11 | 1.9 | 125 | 6.3x11 | 2.1 | 130 | 8x11.5 | 1.4 | 165 |
| 33 | 5x11 | 1.5 | 130 | 6.3x11 | 1.1 | 195 | 6.3x11 | 1.7 | 160 | 10x12.5 | 0.94 | 305 |
| 47 | 6.3x11 | 0.58 | 220 | 6.3x11 | 0.90 | 245 | 8x11.5 | 1.2 | 305 | 10x16 | 0.68 | 320 |
| 100 | 8x11.5 | 0.39 | 315 | 8x11.5 | 0.50 | 385 | 10x12.5 | 0.65 | 395 | 12.5x20 | 0.28 | 585 |
| 220 | 10x12.5 | 0.23 | 500 | 10x16 | 0.27 | 505 | 10x20 | 0.32 | 505 | 16x25 | 0.16 | 1120 |
| 330 | 10x16 | 0.18 | 615 | 10x20 | 0.18 | 675 | 12.5x20 | 0.22 | 660 | 16x25 | 0.13 | 1290 |
| 470 | 10x20 | 0.12 | 825 | 12.5x20 | 0.12 | 895 | 12.5x25 | 0.16 | 850 | 16x31.5 | 0.11 | 1350 |
| 1000 | 12.5x25 | 0.068 | 1300 | 16x25 | 0.076 | 1495 | 16x31.5 | 0.098 | 1430 | - | - | - |
| 2200 | 16x31.5 | 0.045 | 2100 | 18x35.5 | 0.050 | 2190 | - | - | - | - | - | - |
| 3300 | 18x35.5 | 0.036 | 2580 | - | - | - | - | - | - | - | - | - |

Impedance: 20°C, 100KHz; Ripple Current: 105°C, 100KHz

■ STANDARD RATINGS

| Wv(v) Cap (μ F) | 160 | | 200 | | 250 | | 315 | | 350 | | 400 | | 450 | |
|----------------------------|----------------|--------|----------------|--------|----------------|--------|----------------|--------|----------------|--------|----------------|--------|----------------|--------|
| | Size | Ripple | Size | Ripple | Size | Ripple | Size | Ripple | Size | Ripple | Size | Ripple | Size | Ripple |
| | ϕ DxL(mm) | mArms | ϕ DxL(mm) | mArms | ϕ DxL(mm) | mArms | ϕ DxL(mm) | mArms | ϕ DxL(mm) | mArms | ϕ DxL(mm) | mArms | ϕ DxL(mm) | mArms |
| 0.47 | 6.3x11 | 12 | 6.3x11 | 12 | 6.3x11 | 12 | 6.3x11 | 11 | 6.3x11 | 11 | - | - | - | - |
| 1 | 6.3x11 | 18 | 6.3x11 | 18 | 6.3x11 | 18 | 6.3x11 | 16 | 6.3x11 | 18 | 8x11.5 | 18 | 10x12.5 | 19 |
| 2.2 | 6.3x11 | 26 | 6.3x11 | 26 | 8x11.5 | 30 | 8x11.5 | 27 | 8x11.5 | 30 | 10x12.5 | 30 | 10x15 | 29 |
| 3.3 | 8x11.5 | 37 | 8x11.5 | 37 | 10x12.5 | 43 | 10x12.5 | 36 | 10x12.5 | 36 | 10x16 | 40 | 10x20 | 35 |
| 4.7 | 8x11.5 | 44 | 10x12.5 | 50 | 10x12.5 | 50 | 10x16 | 47 | 10x16 | 47 | 10x20 | 52 | 12.5x20 | 50 |
| 10 | 10x12.5 | 75 | 10x16 | 80 | 10x20 | 90 | 10x20 | 75 | 12.5x20 | 79 | 12.5x20 | 79 | 12.5x25 | 75 |
| 22 | 10x20 | 135 | 10x20 | 135 | 12.5x25 | 155 | 12.5x25 | 130 | 12.5x25 | 130 | 16x25 | 130 | 16x31.5 | 110 |
| 33 | 12.5x20 | 175 | 12.5x25 | 190 | 12.5x25 | 190 | 16x25 | 160 | 16x25 | 160 | 16x31.5 | 175 | 18x35.5 | 150 |
| 47 | 12.5x25 | 230 | 12.5x25 | 230 | 16x25 | 225 | 16x31.5 | 210 | 16x31.5 | 210 | 18x35.5 | 220 | 20x40 | 230 |
| 100 | 16x25 | 330 | 16x31.5 | 360 | 18x35.5 | 340 | 18x40 | 335 | 18x40 | 335 | - | - | - | - |
| 220 | 18x35.5 | 500 | 18x40 | 525 | - | - | - | - | - | - | - | - | - | - |

Ripple Current: 105°C, 120Hz

TYPICAL CURVES

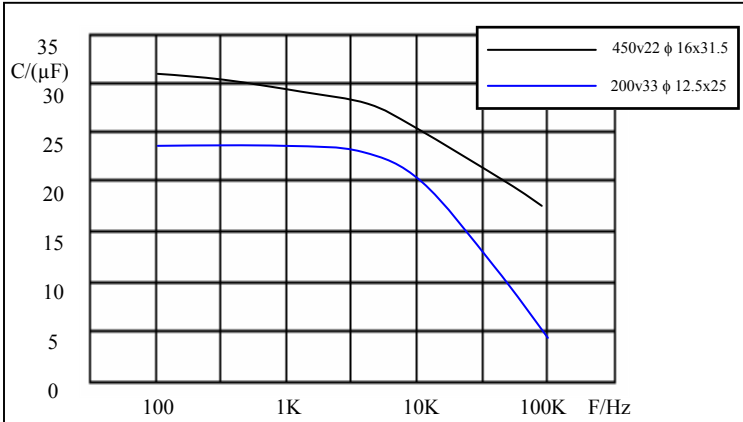


Fig. 1 Typical capacitances as a function of frequency

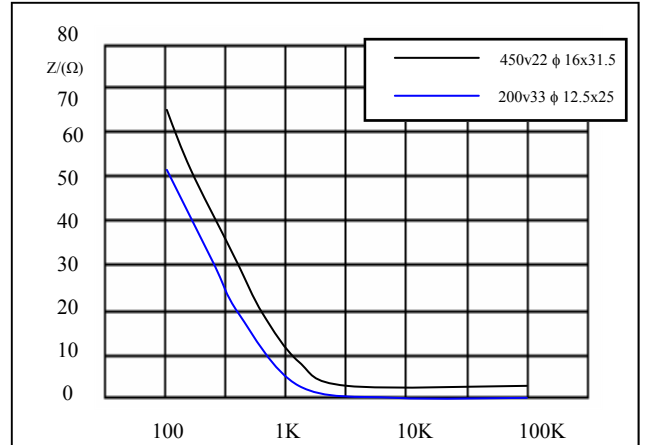
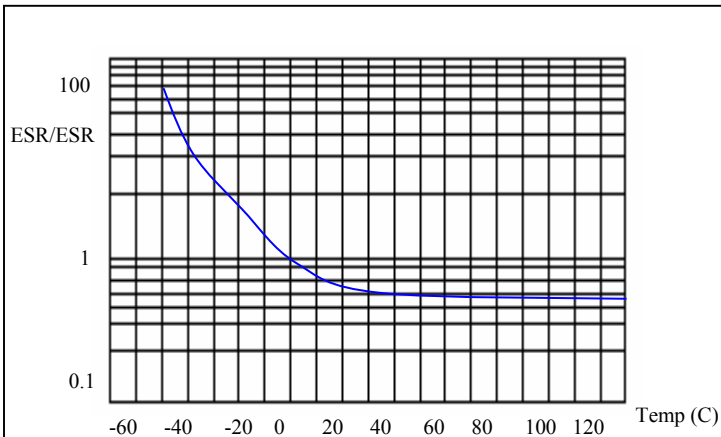
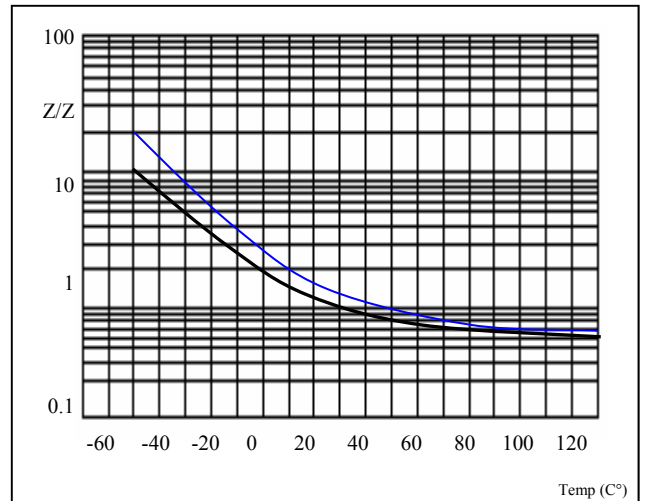


Fig. 2 Typical impedance as a function of frequency F/Hz



ESR=typical at 20°C, 100 Hz
Fig. 3 Typical multiplier of ESR as a Function of ambient temperature



Z = typical at 20° C, 100 Hz
Fig. 4 Typical multiplier of impedance as a Function of ambient temperature