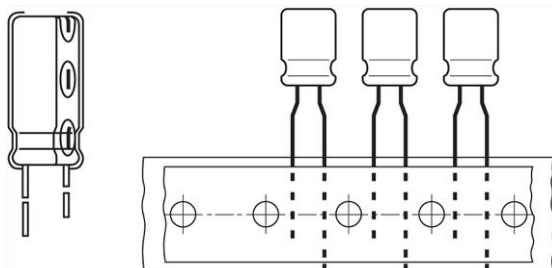




Aluminum Capacitors Radial Style



FEATURES

- Polarized aluminum electrolytic capacitor
- Small dimensions, high CV product
- Low impedance
- Long lifetime
- Temperature range up to 105 °C
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912



**RoHS
COMPLIANT**

APPLICATIONS

- Industrial electronics, telecommunication systems, audio/video systems
- Highly professional switching power supply units
- Smoothing, filtering
- Portable and mobile units

| QUICK REFERENCE DATA | |
|--|---------------------|
| DESCRIPTION | VALUE |
| Nominal case size (∅ D x L in mm) | 5 x 11.5 to 16 x 40 |
| Rated capacitance range, C _R | 10 µF to 8200 µF |
| Capacitance tolerance | ± 20 % |
| Rated voltage range | 10 V to 63 V |
| Category temperature range | -55 °C to +105 °C |
| Endurance test at upper category temperature | Up to 8000 h |
| Based on sectional specification | IEC 60384/EN 130300 |
| Climatic category IEC 60068 | 55/105/56 |

| SELECTION CHART FOR C _R , U _R , AND RELEVANT NOMINAL CASE SIZES (∅ D x L in mm) | | | | | | |
|---|-------------------|------------|------------|------------|------------|------------|
| C _R (µF) | RATED VOLTAGE (V) | | | | | |
| | 10 | 16 | 25 | 35 | 50 | 63 |
| 10 | → | → | → | → | → | 5 x 11.5 |
| 18 | → | → | → | → | 5 x 11.5 | 6.3 x 11.5 |
| 27 | → | → | → | 5 x 11.5 | - | - |
| 33 | → | → | → | → | → | 6.3 x 15 |
| 39 | → | → | 5 x 11.5 | → | 6.3 x 11.5 | - |
| 47 | → | → | → | → | → | 8 x 12 |
| 56 | → | 5 x 11.5 | → | 6.3 x 11.5 | 6.3 x 15 | 10 x 12.5 |
| 68 | → | → | → | → | 8 x 12 | 8 x 15 |
| 82 | 5 x 11.5 | → | 6.3 x 11.5 | 6.3 x 15 | 8 x 15 | 8 x 20 |
| 100 | → | → | → | 8 x 12 | 10 x 16 | 10 x 20 |
| 120 | → | 6.3 x 11.5 | 6.3 x 15 | 8 x 12 | 10 x 16 | 10 x 20 |
| 150 | → | → | 8 x 12 | → | → | 10 x 25 |
| 180 | 6.3 x 11.5 | 6.3 x 15 | 10 x 12.5 | 8 x 15 | 10 x 20 | 10 x 30 |
| 220 | 6.3 x 15 | → | 8 x 15 | 10 x 16 | 10 x 25 | 12.5 x 20 |
| 270 | → | 8 x 12 | → | → | → | 12.5 x 25 |
| 330 | 8 x 12 | 8 x 15 | 8 x 20 | 10 x 20 | 12.5 x 20 | 16 x 20 |
| 390 | 10 x 12.5 | → | → | 10 x 25 | → | 12.5 x 30 |
| 470 | 8 x 15 | 10 x 16 | 10 x 20 | 12.5 x 20 | 12.5 x 25 | 12.5 x 35 |



| SELECTION CHART FOR C_R , U_R , AND RELEVANT NOMINAL CASE SIZES ($\varnothing D \times L$ in mm) | | | | | | |
|---|-------------------|-----------|-----------|-----------|-----------|-----------|
| C_R (μF) | RATED VOLTAGE (V) | | | | | |
| | 10 | 16 | 25 | 35 | 50 | 63 |
| 560 | → | → | 10 x 25 | 12.5 x 20 | 12.5 x 30 | 12.5 x 40 |
| 680 | 8 x 20 | 10 x 20 | → | 12.5 x 25 | 12.5 x 35 | 16 x 30 |
| 820 | → | 10 x 25 | 10 x 30 | → | 12.5 x 40 | 16 x 35 |
| 1000 | 10 x 20 | → | 12.5 x 25 | 16 x 20 | 16 x 30 | 16 x 40 |
| 1200 | 10 x 25 | 10 x 30 | → | 12.5 x 35 | 16 x 35 | - |
| 1500 | 10 x 30 | 12.5 x 25 | 12.5 x 30 | 12.5 x 40 | 16 x 40 | - |
| 1800 | 12.5 x 20 | → | 12.5 x 35 | 16 x 30 | - | - |
| 2200 | 12.5 x 25 | 16 x 20 | 12.5 x 40 | 16 x 35 | - | - |
| 2700 | 12.5 x 30 | 12.5 x 35 | 16 x 30 | 16 x 40 | - | - |
| 3300 | 12.5 x 35 | 12.5 x 40 | 16 x 35 | - | - | - |
| 3900 | 12.5 x 40 | 16 x 30 | 16 x 40 | - | - | - |
| 4700 | → | 16 x 35 | - | - | - | - |
| 5600 | 16 x 30 | 16 x 40 | - | - | - | - |
| 6800 | 16 x 35 | - | - | - | - | - |
| 8200 | 16 x 40 | - | - | - | - | - |

| RADIAL STYLE: DIMENSIONS in millimeters | | | | | | | | | |
|---|-----|-----|-----|-----|------|-----|-----|------|------|
| | | | | | | | | | |
| $\varnothing D$ | 5 | 6.3 | 8 | 10 | 12.5 | 16 | 18 | 22 | 25 |
| S | 2.0 | 2.5 | 3.5 | 5.0 | 5.0 | 7.5 | 7.5 | 10.0 | 12.5 |
| $\varnothing d$ | 0.5 | 0.5 | 0.6 | 0.6 | 0.6 | 0.8 | 0.8 | 1.0 | 1.0 |
| β | 1.5 | | | 2.0 | | | | | |
| α | 0.5 | | | | 1.0 | | | | |

| DIMENSIONS in millimeters AND AVAILABLE FORMS | |
|---|---|
| <p>$\varnothing D \leq 16$ long leads MALREKC00...</p> | <p>$\varnothing D \leq 16$ shortened leads MALREKC05... (S = 2/2.5/3.5/5/7.5 mm)</p> |

GENERAL NOTE

- For Standard Packaging Quantity (SPQ) and Minimum Order Quantity (MOQ) please refer to our price list or contact customer service
- For other packaging forms please refer to Vishay Roederstein General Information



| ELECTRICAL DATA | |
|-----------------|---|
| SYMBOL | DESCRIPTION |
| U_R | Rated voltage |
| C_R | Rated capacitance at 120 Hz |
| $\tan \delta$ | Max. dissipation factor at 120 Hz |
| Z | Max. impedance at 100 kHz |
| I_R | Rated alternating current (RMS) at 100 kHz and upper category temperature |

ORDERING EXAMPLE

EKC 3300 μ F/25 V, \pm 20 %, size: 16 mm x 35 mm
 Leads: Long
 Ordering code: MALREKC00JU433E00F
 Leads: Short
 Ordering code: MALREKC05...

Note

- Unless otherwise specified, all electrical values at $T_a = 20$ °C, $P = 80$ kPa to 120 kPa, RH = 45 % to 75 %.

| ELECTRICAL DATA AND ORDERING INFORMATION | | | | | | | |
|--|-------------------------------|--|-------------------------|--------------------------------------|---------------------------------|--------------------|--------------------------------|
| U_R (V) | C_R 120 Hz (μ F) | NOMINAL CASE SIZE $\varnothing D \times L$ (mm) | $\tan \delta$ 120 Hz | Z 100 kHz/20 °C (Ω) | I_R 100 kHz/105 °C (mA) | WEIGHT (g) | CATALOG NUMBER (LONG LEADS) |
| 10 | 82 | 5 x 11.5 | 0.19 | 0.75 | 163 | 0.50 | MALREKC00AB282C00F |
| | 180 | 6.3 x 11.5 | 0.19 | 0.35 | 273 | 0.80 | MALREKC00BB318C00F |
| | 220 | 6.3 x 15 | 0.19 | 0.25 | 390 | 1.20 | MALREKC00BF322C00F |
| | 330 | 8 x 12 | 0.19 | 0.17 | 445 | 1.00 | MALREKC00PT333C00F |
| | 390 | 10 x 12.5 | 0.19 | 0.12 | 625 | 1.90 | MALREKC00DC339C00F |
| | 470 | 8 x 15 | 0.19 | 0.13 | 555 | 1.50 | MALREKC00PF347C00F |
| | 680 | 8 x 20 | 0.19 | 0.095 | 740 | 2.00 | MALREKC00PE368C00F |
| | 1000 | 10 x 20 | 0.19 | 0.062 | 1040 | 3.00 | MALREKC00DE410C00F |
| | 1200 | 10 x 25 | 0.21 | 0.052 | 1260 | 4.00 | MALREKC00DG412C00F |
| | 1500 | 10 x 30 | 0.21 | 0.044 | 1440 | 4.80 | MALREKC00DJ415C00F |
| | 1800 | 12.5 x 20 | 0.21 | 0.046 | 1340 | 4.00 | MALREKC00FE418C00F |
| | 2200 | 12.5 x 25 | 0.23 | 0.034 | 1690 | 4.70 | MALREKC00FG422C00F |
| | 2700 | 12.5 x 30 | 0.23 | 0.030 | 1950 | 5.40 | MALREKC00FJ427C00F |
| | 3300 | 12.5 x 35 | 0.25 | 0.024 | 2220 | 5.90 | MALREKC00FU433C00F |
| | 3900 | 12.5 x 40 | 0.25 | 0.022 | 2390 | 6.40 | MALREKC00FK439C00F |
| 5600 | 16 x 30 | 0.29 | 0.025 | 2350 | 8.80 | MALREKC00JJ456C00F | |
| 6800 | 16 x 35 | 0.31 | 0.022 | 2550 | 10.0 | MALREKC00JU468C00F | |
| 8200 | 16 x 40 | 0.35 | 0.018 | 2900 | 11.0 | MALREKC00JK482C00F | |
| 16 | 56 | 5 x 11.5 | 0.16 | 0.75 | 163 | 0.50 | MALREKC00AB256D00F |
| | 120 | 6.3 x 11.5 | 0.16 | 0.35 | 273 | 0.80 | MALREKC00BB312D00F |
| | 180 | 6.3 x 15 | 0.16 | 0.25 | 390 | 0.80 | MALREKC00BF318D00F |
| | 270 | 8 x 12 | 0.16 | 0.17 | 445 | 1.00 | MALREKC00PT327D00F |
| | 330 | 8 x 15 | 0.16 | 0.13 | 555 | 1.50 | MALREKC00PF333D00F |
| | 470 | 10 x 16 | 0.16 | 0.084 | 825 | 2.40 | MALREKC00DD347D00F |
| | 680 | 10 x 20 | 0.16 | 0.062 | 1040 | 3.00 | MALREKC00DE368D00F |
| | 820 | 10 x 25 | 0.16 | 0.052 | 1260 | 4.00 | MALREKC00DG382D00F |
| | 1200 | 10 x 30 | 0.18 | 0.044 | 1440 | 4.80 | MALREKC00DJ412D00F |
| | 1500 | 12.5 x 25 | 0.18 | 0.034 | 1690 | 4.70 | MALREKC00FG415D00F |
| | 2200 | 16 x 20 | 0.20 | 0.038 | 1630 | 5.80 | MALREKC00JE422D00F |
| | 2700 | 12.5 x 35 | 0.20 | 0.024 | 2220 | 5.90 | MALREKC00FU427D00F |
| | 3300 | 12.5 x 40 | 0.22 | 0.022 | 2390 | 6.40 | MALREKC00FK433D00F |
| | 3900 | 16 x 30 | 0.22 | 0.025 | 2350 | 8.80 | MALREKC00JJ439D00F |
| | 4700 | 16 x 35 | 0.24 | 0.022 | 2550 | 10.0 | MALREKC00JU447D00F |
| 5600 | 16 x 40 | 0.26 | 0.018 | 2900 | 11.0 | MALREKC00JK456D00F | |



| ELECTRICAL DATA AND ORDERING INFORMATION | | | | | | | |
|--|-------------------------------|---|-------------------------|------------------------------------|---------------------------------|--------------------|--------------------------------|
| U_R (V) | C_R 120 Hz (μ F) | NOMINAL CASE SIZE \varnothing D x L (mm) | $\tan \delta$ 120 Hz | Z 100 kHz/20 °C (Ω) | I_R 100 kHz/105 °C (mA) | WEIGHT (g) | CATALOG NUMBER (LONG LEADS) |
| 25 | 39 | 5 x 11.5 | 0.14 | 0.75 | 163 | 0.50 | MALREKC00AB239E00F |
| | 82 | 6.3 x 11.5 | 0.14 | 0.35 | 273 | 0.80 | MALREKC00BB282E00F |
| | 120 | 6.3 x 15 | 0.14 | 0.25 | 390 | 1.20 | MALREKC00BF312E00F |
| | 150 | 8 x 12 | 0.14 | 0.17 | 445 | 1.00 | MALREKC00PT315E00F |
| | 180 | 10 x 12.5 | 0.14 | 0.12 | 625 | 1.90 | MALREKC00DC318E00F |
| | 220 | 8 x 15 | 0.14 | 0.13 | 555 | 1.50 | MALREKC00PF322E00F |
| | 330 | 8 x 20 | 0.14 | 0.095 | 740 | 2.00 | MALREKC00PE333E00F |
| | 470 | 10 x 20 | 0.14 | 0.062 | 1040 | 3.00 | MALREKC00DE347E00F |
| | 560 | 10 x 25 | 0.14 | 0.052 | 1260 | 4.00 | MALREKC00DG356E00F |
| | 820 | 10 x 30 | 0.14 | 0.044 | 1440 | 4.80 | MALREKC00DJ382E00F |
| | 1000 | 12.5 x 25 | 0.14 | 0.034 | 1690 | 4.70 | MALREKC00FG410E00F |
| | 1500 | 12.5 x 30 | 0.16 | 0.030 | 1950 | 5.40 | MALREKC00FJ415E00F |
| | 1800 | 12.5 x 35 | 0.16 | 0.024 | 2220 | 5.90 | MALREKC00FU418E00F |
| | 2200 | 12.5 x 40 | 0.18 | 0.022 | 2390 | 6.40 | MALREKC00FK422E00F |
| | 2700 | 16 x 30 | 0.18 | 0.025 | 2350 | 8.80 | MALREKC00JJ427E00F |
| 3300 | 16 x 35 | 0.20 | 0.022 | 2550 | 10.0 | MALREKC00JU433E00F | |
| 3900 | 16 x 40 | 0.20 | 0.018 | 2900 | 11.0 | MALREKC00JK439E00F | |
| 35 | 27 | 5 x 11.5 | 0.12 | 0.75 | 163 | 0.50 | MALREKC00AB227F00F |
| | 56 | 6.3 x 11.5 | 0.12 | 0.35 | 273 | 0.80 | MALREKC00BB256F00F |
| | 82 | 6.3 x 15 | 0.12 | 0.25 | 390 | 1.20 | MALREKC00BF282F00F |
| | 100 | 8 x 12 | 0.12 | 0.17 | 445 | 1.00 | MALREKC00PT310F00F |
| | 120 | 8 x 12 | 0.12 | 0.17 | 445 | 1.00 | MALREKC00PT312F00F |
| | 180 | 8 x 15 | 0.12 | 0.13 | 555 | 1.50 | MALREKC00PF318F00F |
| | 220 | 10 x 16 | 0.12 | 0.084 | 825 | 2.40 | MALREKC00DD322F00F |
| | 330 | 10 x 20 | 0.12 | 0.062 | 1040 | 3.00 | MALREKC00DE333F00F |
| | 390 | 10 x 25 | 0.12 | 0.052 | 1260 | 4.00 | MALREKC00DG339F00F |
| | 470 | 12.5 x 20 | 0.12 | 0.046 | 1340 | 4.00 | MALREKC00FE347F00F |
| | 560 | 12.5 x 20 | 0.12 | 0.046 | 1340 | 4.00 | MALREKC00FE356F00F |
| | 680 | 12.5 x 25 | 0.12 | 0.034 | 1690 | 4.70 | MALREKC00FG368F00F |
| | 1000 | 16 x 20 | 0.12 | 0.038 | 1630 | 5.80 | MALREKC00JE410F00F |
| | 1200 | 12.5 x 35 | 0.14 | 0.024 | 2220 | 5.90 | MALREKC00FU412F00F |
| | 1500 | 12.5 x 40 | 0.14 | 0.022 | 2390 | 6.40 | MALREKC00FK415F00F |
| 1800 | 16 x 30 | 0.14 | 0.025 | 2350 | 8.80 | MALREKC00JJ418F00F | |
| 2200 | 16 x 35 | 0.16 | 0.022 | 2550 | 10.0 | MALREKC00JU422F00F | |
| 2700 | 16 x 40 | 0.16 | 0.018 | 2900 | 11.0 | MALREKC00JK427F00F | |
| 50 | 18 | 5 x 11.5 | 0.10 | 1.20 | 129 | 0.50 | MALREKC00AB218H00F |
| | 39 | 6.3 x 11.5 | 0.10 | 0.54 | 219 | 0.80 | MALREKC00BB239H00F |
| | 56 | 6.3 x 15 | 0.10 | 0.34 | 310 | 1.20 | MALREKC00BF256H00F |
| | 68 | 8 x 12 | 0.10 | 0.30 | 340 | 1.00 | MALREKC00PT268H00F |
| | 82 | 8 x 15 | 0.10 | 0.20 | 470 | 1.50 | MALREKC00PF282H00F |
| | 100 | 10 x 16 | 0.10 | 0.13 | 755 | 2.40 | MALREKC00DD310H00F |



| ELECTRICAL DATA AND ORDERING INFORMATION | | | | | | | |
|--|-------------------------------|---|-------------------------|------------------------------------|---------------------------------|--------------------|--------------------------------|
| U_R (V) | C_R 120 Hz (μ F) | NOMINAL CASE SIZE \varnothing D x L (mm) | $\tan \delta$ 120 Hz | Z 100 kHz/20 °C (Ω) | I_R 100 kHz/105 °C (mA) | WEIGHT (g) | CATALOG NUMBER (LONG LEADS) |
| 50 | 120 | 10 x 16 | 0.10 | 0.13 | 755 | 2.40 | MALREKC00DD312H00F |
| | 180 | 10 x 20 | 0.10 | 0.088 | 945 | 3.00 | MALREKC00DE318H00F |
| | 220 | 10 x 25 | 0.10 | 0.073 | 1150 | 4.00 | MALREKC00DG322H00F |
| | 330 | 12.5 x 20 | 0.10 | 0.054 | 1260 | 4.00 | MALREKC00FE333H00F |
| | 470 | 12.5 x 25 | 0.10 | 0.044 | 1490 | 4.70 | MALREKC00FG347H00F |
| | 560 | 12.5 x 30 | 0.10 | 0.039 | 1720 | 5.40 | MALREKC00FJ356H00F |
| | 680 | 12.5 x 35 | 0.10 | 0.033 | 1890 | 5.90 | MALREKC00FU368H00F |
| | 820 | 12.5 x 40 | 0.10 | 0.029 | 2030 | 6.40 | MALREKC00FK382H00F |
| | 1000 | 16 x 30 | 0.10 | 0.030 | 2150 | 8.80 | MALREKC00JJ410H00F |
| | 1200 | 16 x 35 | 0.12 | 0.027 | 2320 | 10.0 | MALREKC00JU412H00F |
| | 1500 | 16 x 40 | 0.12 | 0.024 | 2540 | 11.0 | MALREKC00JK415H00F |
| 63 | 10 | 5 x 11.5 | 0.10 | 1.90 | 103 | 0.50 | MALREKC00AB210J00F |
| | 18 | 6.3 x 11.5 | 0.10 | 1.00 | 161 | 0.80 | MALREKC00BB218J00F |
| | 33 | 6.3 x 15 | 0.10 | 0.61 | 233 | 1.20 | MALREKC00BF233J00F |
| | 47 | 8 x 12 | 0.10 | 0.47 | 274 | 1.00 | MALREKC00PT247J00F |
| | 56 | 10 x 12.5 | 0.10 | 0.27 | 418 | 1.90 | MALREKC00DC256J00F |
| | 68 | 8 x 15 | 0.10 | 0.34 | 360 | 1.50 | MALREKC00PF268J00F |
| | 82 | 8 x 20 | 0.10 | 0.21 | 525 | 2.00 | MALREKC00PE282J00F |
| | 100 | 10 x 20 | 0.10 | 0.16 | 650 | 3.00 | MALREKC00DE310J00F |
| | 120 | 10 x 20 | 0.10 | 0.16 | 650 | 3.00 | MALREKC00DE312J00F |
| | 150 | 10 x 25 | 0.10 | 0.13 | 783 | 4.00 | MALREKC00DG315J00F |
| | 180 | 10 x 30 | 0.10 | 0.10 | 960 | 4.80 | MALREKC00DJ318J00F |
| | 220 | 12.5 x 20 | 0.10 | 0.11 | 870 | 4.00 | MALREKC00FE322J00F |
| | 270 | 12.5 x 25 | 0.10 | 0.074 | 1150 | 4.70 | MALREKC00FG327J00F |
| | 330 | 16 x 20 | 0.10 | 0.085 | 1100 | 5.80 | MALREKC00JE333J00F |
| | 390 | 12.5 x 30 | 0.10 | 0.068 | 1280 | 5.40 | MALREKC00FJ339J00F |
| | 470 | 12.5 x 35 | 0.10 | 0.063 | 1390 | 5.90 | MALREKC00FU347J00F |
| | 560 | 12.5 x 40 | 0.10 | 0.051 | 1530 | 6.40 | MALREKC00FK356J00F |
| | 680 | 16 x 30 | 0.10 | 0.046 | 1720 | 8.80 | MALREKC00JJ368J00F |
| 820 | 16 x 35 | 0.10 | 0.040 | 1910 | 10.0 | MALREKC00JU382J00F | |
| 1000 | 16 x 40 | 0.10 | 0.036 | 2070 | 11.0 | MALREKC00JK410J00F | |

| LOW TEMPERATURE BEHAVIOR (at 120 Hz) | | |
|--------------------------------------|----------------------|----|
| IMPEDANCE RATIO $Z(T_2)/Z(T_1)$ | RATED VOLTAGE (V) | |
| T2/T1 | 10 TO 50 | 63 |
| -55 °C/+20 °C | 3 | 6 |

| ADDITIONAL ELECTRICAL DATA | | |
|---|---------------------------------------|--|
| PARAMETER | CONDITIONS | VALUE |
| Current | | |
| Leakage current (test conditions: U_R , 20 °C) | After 2 min at U_R | $I_{L2} \leq 0.01 \times C_R \times U_R$ or 3 μ A (whichever is greater) |
| Resistance | | |
| Equivalent series resistance (ESR) | Calculated from $\tan \delta_{max}$. | $ESR = \tan \delta/2 \pi f C_R$ |



| MULTIPLIER OF RIPPLE CURRENT (I_R) AS A FUNCTION OF FREQUENCY | | | | | |
|---|---------------------------|----------------------------|-----------------------------|------------------------------|------------------------------|
| FREQUENCY (Hz) | I_R MULTIPLIER | | | | |
| | 10 μ F TO 180 μ F | 220 μ F TO 560 μ F | 680 μ F TO 1800 μ F | 2200 μ F TO 3900 μ F | 4700 μ F TO 8200 μ F |
| 120 | 0.40 | 0.50 | 0.60 | 0.75 | 0.85 |
| 1000 | 0.75 | 0.85 | 0.87 | 0.90 | 0.95 |
| 10 000 | 0.90 | 0.94 | 0.95 | 0.95 | 0.98 |
| 100 000 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

| TEST PROCEDURES AND REQUIREMENTS | | |
|---|--|--|
| TEST | PROCEDURE (quick reference) | REQUIREMENTS |
| Load life | $T_{amb} = 105\text{ }^\circ\text{C}$ U_R and I_R applied After 2000 h $\varnothing 5$, $\varnothing 6.3$ After 3000 h $\varnothing 8$ After 5000 h $\varnothing 10$ After 7000 h $\varnothing 12.5$ After 8000 h $\varnothing 16$, $\varnothing 18$ | $\Delta C/C: \pm 20\%$ of initial value $I_L \leq \text{spec. limit}$ $\tan \delta \leq 2 \times \text{spec. limit}$ |
| Shelf life | No voltage applied After 1000 h After test: U_R to be applied for 30 min 24 h to 48 h before measurement | $\Delta C/C: \pm 20\%$ of initial value $I_L \leq \text{spec. limit}$ $\tan \delta \leq 2 \times \text{spec. limit}$ |



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