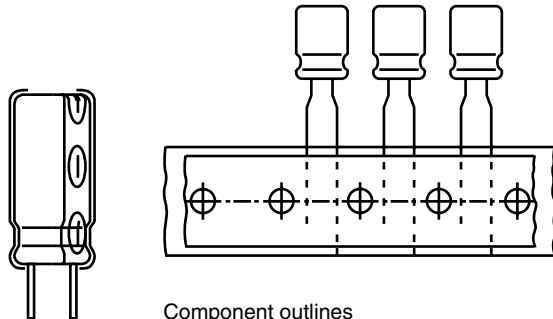


## Aluminum Capacitors Radial Style



Component outlines

### FEATURES

- Polarized aluminum electrolytic capacitors, non-solid electrolyte
- Radial leads, cylindrical aluminum case
- Miniaturized, high CV-product per unit volume
- Extended temperature range: 105 °C
- Low impedance
- Long lifetime



**RoHS**  
COMPLIANT

### APPLICATIONS

- General purpose, industrial, telecommunications, power supplies and audio-video
- Coupling, decoupling, timing, smoothing, filtering and buffering
- Portable and mobile units (small size, low mass)

| QUICK REFERENCE DATA   |               |                               |           |
|--|---------------|-------------------------------|-----------|
| DESCRIPTION  | UNIT          | VALUE                         |           |
| Nominal case size (Ø D x L)                                    | mm            | 5 x 11 to 18 x 40             |           |
| Rated capacitance range $C_R$                                  | $\mu\text{F}$ | 0.22 to 15 000                |           |
| Capacitance tolerance  | %             | $\pm 20$                      |           |
| Rated voltage range  | V             | 6.3 to 450                    |           |
| Category temperature range                                     | °C            | 6.3 to 350 V<br>- 40 to + 105 |           |
| Load Life<br>$U_R \leq 100 \text{ V}$<br>$U_R > 100 \text{ V}$ | h             | 5 x 11 to 6.3 x 11            | 8 x 11.5  |
|  |               | 2000                          | 3000      |
|  |               | 2000                          |           |
| Based on sectional specification                               |               | IEC 60384-4/EN 130300         |           |
| Climatic category<br>IEC 60068                                 |               | 40/105/56                     | 25/105/56 |

### SELECTION CHART FOR $C_R$ , $U_R$ AND RELEVANT NOMINAL CASE SIZES (Ø D x L in mm)

| $C_R$<br>( $\mu\text{F}$ ) | RATED VOLTAGE (V) (Continuation see next page) |           |           |           |           |           |           |           |
|----------------------------|--|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|                            | 6.3  | 10        | 16        | 25        | 35        | 50        | 63        | 100       |
| 0.22                       | →  | →         | →         | →         | →         | 5 x 11    | -         | -         |
| 0.47                       | →  | →         | →         | →         | →         | 5 x 11    | -         | -         |
| 1.0                        | →  | →         | →         | →         | →         | 5 x 11    | -         | -         |
| 2.2                        | →  | →         | →         | →         | →         | 5 x 11    | -         | 5 x 11    |
| 3.3                        | →  | →         | →         | →         | →         | 5 x 11    | 5 x 11    | 5 x 11    |
| 4.7                        | →  | →         | →         | →         | 5 x 11    | 5 x 11    | 5 x 11    | 5 x 11    |
| 10                         | →  | →         | →         | →         | 5 x 11    | 5 x 11    | 5 x 11    | 6.3 x 11  |
| 22                         | →  | →         | →         | →         | 5 x 11    | 5 x 11    | 6.3 x 11  | 8 x 11.5  |
| 33                         | →  | →         | →         | →         | 5 x 11    | →         | 6.3 x 11  | 10 x 12.5 |
| 47                         | →  | →         | →         | 5 x 11    | 6.3 x 11  | 6.3 x 11  | 8 x 11.5  | 10 x 16   |
| 100                        | →  | 5 x 11    | →         | 6.3 x 11  | 8 x 11.5  | 8 x 11.5  | 10 x 16   | 12.5 x 20 |
| 150                        | →  | →         | 6.3 x 11  | →         | 8 x 11.5  | 10 x 12.5 | 10 x 20   | 12.5 x 25 |
| 220                        | →  | 6.3 x 11  | →         | 8 x 11.5  | 10 x 12.5 | 10 x 16   | 10 x 25   | 16 x 25   |
| 330                        | 6.3 x 11                                       | →         | 8 x 11.5  | 10 x 12.5 | 10 x 16   | 10 x 20   | 12.5 x 20 | 16 x 31.5 |
| 470                        | →  | 8 x 11.5  | 10 x 12.5 | 10 x 16   | 10 x 20   | 12.5 x 20 | 16 x 20   | 18 x 40   |
| 1000                       | 10 x 12.5                                      | 10 x 16   | 10 x 20   | 12.5 x 20 | 12.5 x 25 | 16 x 25   | 16 x 35.5 | -         |
| 1500                       | →  | 10 x 20   | 12.5 x 20 | 16 x 20   | 16 x 25   | 16 x 31.5 | -         | -         |
| 2200                       | →  | 12.5 x 20 | 12.5 x 25 | 16 x 25   | 16 x 31.5 | 18 x 35.5 | -         | -         |
| 3300                       | 12.5 x 20                                      | 12.5 x 25 | 16 x 25   | 16 x 31.5 | 18 x 35.5 | -         | -         | -         |
| 4700                       | →  | 16 x 25   | 16 x 31.5 | 18 x 35.5 | -         | -         | -         | -         |
| 6800                       | 16 x 25  | 16 x 31.5 | 18 x 35.5 | -         | -         | -         | -         | -         |
| 10 000                     | 16 x 31.5                                      | 18 x 35.5 | -         | -         | -         | -         | -         | -         |
| 15 000                     | 18 x 35.5                                      | -         | -         | -         | -         | -         | -         | -         |

Note 10 % capacitance tolerance on request

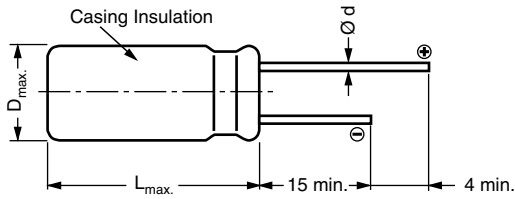
| <b>SELECTION CHART FOR <math>C_R</math>, <math>U_R</math> AND RELEVANT NOMINAL CASE SIZES (<math>\varnothing D \times L</math> in mm)</b> |                   |           |           |           |           |
|---|-------------------|-----------|-----------|-----------|-----------|
| $C_R$<br>( $\mu F$ )  | RATED VOLTAGE (V) |           |           |           |           |
|   | 160               | 200       | 250       | 400       | 450       |
| 3.3   | →                 | →         | →         | →         | 10 x 20   |
| 4.7   | →                 | →         | →         | →         | 12.5 x 20 |
| 10  | →                 | →         | 10 x 20   | 10 x 20   | 12.5 x 25 |
| 22  | →                 | 10 x 20   | 12.5 x 20 | 12.5 x 25 | 16 x 25   |
| 33  | 10 x 20           | 12.5 x 20 | 12.5 x 25 | 16 x 20   | 16 x 31.5 |
| 47  | →                 | 12.5 x 20 | 12.5 x 25 | 16 x 25   | 18 x 31.5 |
| 100   | →                 | 16 x 25   | 16 x 31.5 | 18 x 40   | -         |
| 150   | 16 x 31.5         | 18 x 25   | 18 x 31.5 | -         | -         |
| 220   | 16 x 31.5         | 18 x 31.5 | 18 x 40   | -         | -         |
| 330   | 18 x 31.5         | -         | -         | -         | -         |

**Note**

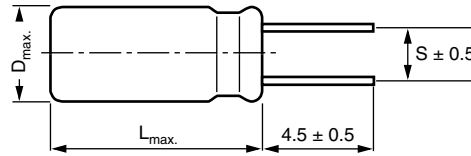
10 % capacitance tolerance on request

| <b>RADIAL STYLE: DIMENSIONS</b> 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  |
| $\beta$  | 1.5 |     |     | 2.0 |      |     |     |      |      |
| $\alpha$                                       | 0.5 |     |     |     |      |     |     | 1.0  |      |

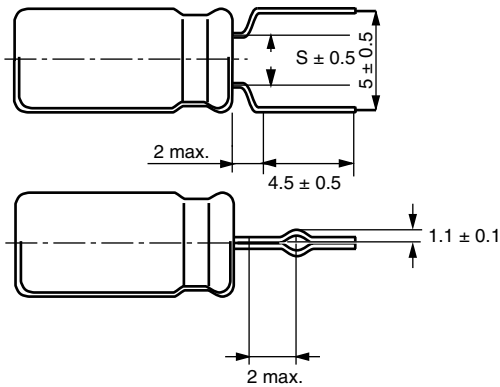
**DIMENSIONS** in millimeters **AND AVAILABLE FORMS**



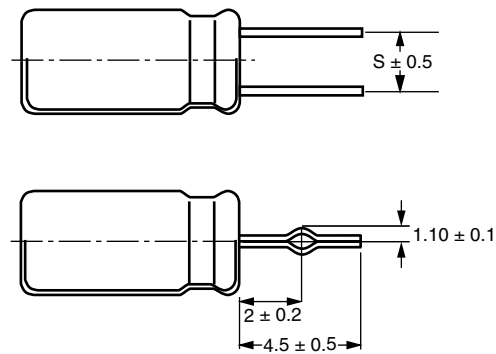
Ø D ≤ 18 long leads MALREKE00...



Ø D ≤ 18 shortened leads MALREKE05...  
(S = 2/2.5/3.5/5/7.5 mm)



Ø D ≤ 8 leads shortened and formed MALREKE09...  
(S = 2.0/2.5/3.5 mm)



10 ≤ Ø D ≤ 18 leads shortened and formed MALREKE06...  
(S = 5/7.5 mm)

**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                 |
| $R_{ESR}$       | calculated equivalent series resistance at 120 Hz |
| $I_R$           | rated ripple current (rms)                        |
| $Z$             | max. impedance                                    |

**Note**

Unless otherwise specified, all electrical values at  $T_a = 20^\circ\text{C}$ ,  $P = 80$  to  $120$  kPa,  $RH = 45$  to  $75\%$

**ORDERING EXAMPLE**

EKE 470  $\mu\text{F}/35$  V,  $\pm 20\%$ , size: 10 x 20 mm  
Leads: Long  
Ordering code: MALREKE00DE34700K

Leads: Short  
Ordering code: MALREKE05...

**For  $5 \leq \text{Ø D} \leq 8$  mm**

Leads: Bent open, shortened and formed  
Ordering code: MALREKE09...

**For  $10 \leq \text{Ø D} \leq 18$  mm**

Leads: Shortened and formed  
Ordering code: MALREKE06 ...



Aluminum Capacitors  
Radial Style

Vishay Roederstein

| ELECTRICAL DATA AND ORDERING INFORMATION |                                  |                               |                 |   |                               |  |               |                                   |
|--|----------------------------------|-------------------------------|-----------------|---|-------------------------------|--|---------------|-----------------------------------|
| U <sub>R</sub> (V)                       | C <sub>R</sub><br>120 Hz<br>(μF) | DIMENSIONS<br>Ø D x L<br>(mm) | tan δ<br>120 Hz | R <sub>ESR</sub><br>120 Hz/<br>20 °C<br>(Ω) | Z<br>100 kHz/<br>20 °C<br>(Ω) | I <sub>R</sub><br>100 kHz/<br>105 °C<br>(mA) | WEIGHT<br>(g) | CATALOG<br>NUMBER<br>(LONG LEADS) |
| 6.3                                      | 330                              | 6.3 x 11                      | 0.22            | 0.884                                       | 0.30                          | 280  | 0.43          | MALREKE00BA333B00K                |
|  | 1000                             | 10 x 12.5                     | 0.22            | 0.292                                       | 0.10                          | 660  | 1.90          | MALREKE00DC410B00K                |
|  | 3300                             | 12.5 x 20                     | 0.28            | 0.113                                       | 0.050                         | 1400   | 4.50          | MALREKE00FE433B00K                |
|  | 6800                             | 16 x 25                       | 0.34            | 0.066                                       | 0.030                         | 2100   | 6.60          | MALREKE00JG468B00K                |
|  | 10 000                           | 16 x 31.5                     | 0.40            | 0.053                                       | 0.025                         | 2600   | 9.00          | MALREKE00JS510B00K                |
|  | 15 000                           | 18 x 35.5                     | 0.50            | 0.044                                       | 0.022                         | 3000   | 11.5          | MALREKE00KL515B00K                |
| 10                                       | 100                              | 5 x 11                        | 0.19            | 2.520                                       | 0.65                          | 180  | 0.42          | MALREKE00AA310C00K                |
|  | 220                              | 6.3 x 11                      | 0.19            | 1.145                                       | 0.30                          | 280  | 0.43          | MALREKE00BA322C00K                |
|  | 470                              | 8 x 11.5                      | 0.19            | 0.536                                       | 0.14                          | 450  | 1.05          | MALREKE00PB347C00K                |
|  | 1000                             | 10 x 16                       | 0.19            | 0.252                                       | 0.080                         | 850  | 2.40          | MALREKE00DD410C00K                |
|  | 1500                             | 10 x 20                       | 0.21            | 0.186                                       | 0.054                         | 1100   | 3.00          | MALREKE00DE415C00K                |
|  | 2200                             | 12.5 x 20                     | 0.23            | 0.139                                       | 0.050                         | 1400   | 4.50          | MALREKE00FE422C00K                |
|  | 3300                             | 12.5 x 25                     | 0.25            | 0.100                                       | 0.038                         | 1700   | 4.70          | MALREKE00FG433C00K                |
|  | 4700                             | 16 x 25                       | 0.27            | 0.076                                       | 0.030                         | 2100   | 6.60          | MALREKE00JG447C00K                |
|  | 6800                             | 16 x 31.5                     | 0.31            | 0.060                                       | 0.025                         | 2600   | 9.00          | MALREKE00JS468C00K                |
|  | 10 000                           | 18 x 35.5                     | 0.37            | 0.049                                       | 0.022                         | 3000   | 11.5          | MALREKE00KL510C00K                |
| 16                                       | 150                              | 6.3 x 11                      | 0.16            | 1.415                                       | 0.30                          | 280  | 0.43          | MALREKE00BA315D00K                |
|  | 330                              | 8 x 11.5                      | 0.16            | 0.643                                       | 0.14                          | 450  | 1.05          | MALREKE00PB333D00K                |
|  | 470                              | 10 x 12.5                     | 0.16            | 0.452                                       | 0.10                          | 660  | 1.90          | MALREKE00DC347D00K                |
|  | 1000                             | 10 x 20                       | 0.16            | 0.212                                       | 0.054                         | 1100   | 3.00          | MALREKE00DE410D00K                |
|  | 1500                             | 12.5 x 20                     | 0.18            | 0.159                                       | 0.050                         | 1400   | 4.50          | MALREKE00FE415D00K                |
|  | 2200                             | 12.5 x 25                     | 0.20            | 0.121                                       | 0.038                         | 1700   | 4.70          | MALREKE00FG422D00K                |
|  | 3300                             | 16 x 25                       | 0.22            | 0.088                                       | 0.030                         | 2100   | 6.60          | MALREKE00JG433D00K                |
|  | 4700                             | 16 x 31.5                     | 0.24            | 0.068                                       | 0.025                         | 2600   | 9.00          | MALREKE00JS447D00K                |
|  | 6800                             | 18 x 35.5                     | 0.28            | 0.055                                       | 0.022                         | 3000   | 11.5          | MALREKE00KL468D00K                |
| 25                                       | 47                               | 5 x 11                        | 0.14            | 3.951                                       | 0.65                          | 180  | 0.42          | MALREKE00AA247E00K                |
|  | 100                              | 6.3 x 11                      | 0.14            | 1.857                                       | 0.30                          | 280  | 0.43          | MALREKE00BA310E00K                |
|  | 220                              | 8 x 11.5                      | 0.14            | 0.844                                       | 0.14                          | 450  | 1.05          | MALREKE00PB322E00K                |
|  | 330                              | 10 x 12.5                     | 0.14            | 0.563                                       | 0.10                          | 660  | 1.90          | MALREKE00DC333E00K                |
|  | 470                              | 10 x 16                       | 0.14            | 0.395                                       | 0.080                         | 850  | 2.40          | MALREKE00DD347E00K                |
|  | 1000                             | 12.5 x 20                     | 0.14            | 0.186                                       | 0.050                         | 1400   | 4.50          | MALREKE00FE410E00K                |
|  | 1500                             | 16 x 20                       | 0.16            | 0.141                                       | 0.030                         | 2100   | 5.80          | MALREKE00JE415E00K                |
|  | 2200                             | 16 x 25                       | 0.18            | 0.109                                       | 0.030                         | 2100   | 6.60          | MALREKE00JG422E00K                |
|  | 3300                             | 16 x 31.5                     | 0.20            | 0.080                                       | 0.025                         | 2600   | 9.00          | MALREKE00JS433E00K                |
|  | 4700                             | 18 x 35.5                     | 0.22            | 0.062                                       | 0.022                         | 3000   | 11.5          | MALREKE00KL447E00K                |
| 35                                       | 4.7                              | 5 x 11                        | 0.12            | 33.86                                       | 0.70                          | 180  | 0.42          | MALREKE00AA147F00K                |
|  | 10                               | 5 x 11                        | 0.12            | 15.92                                       | 0.70                          | 180  | 0.42          | MALREKE00AA210F00K                |
|  | 22                               | 5 x 11                        | 0.12            | 7.235                                       | 0.70                          | 180  | 0.42          | MALREKE00AA222F00K                |
|  | 33                               | 5 x 11                        | 0.12            | 4.823                                       | 0.65                          | 180  | 0.42          | MALREKE00AA233F00K                |
|  | 47                               | 6.3 x 11                      | 0.12            | 3.386                                       | 0.30                          | 280  | 0.43          | MALREKE00BA247F00K                |
|  | 100                              | 8 x 11.5                      | 0.12            | 1.592                                       | 0.14                          | 450  | 1.05          | MALREKE00PB310F00K                |
|  | 150                              | 8 x 11.5                      | 0.12            | 1.061                                       | 0.14                          | 450  | 1.05          | MALREKE00PB315F00K                |
|  | 220                              | 10 x 12.5                     | 0.12            | 0.723                                       | 0.10                          | 660  | 1.90          | MALREKE00DC322F00K                |
|  | 330                              | 10 x 16                       | 0.12            | 0.482                                       | 0.080                         | 850  | 2.40          | MALREKE00DD333F00K                |
|  | 470                              | 10 x 20                       | 0.12            | 0.339                                       | 0.054                         | 1100   | 3.00          | MALREKE00DE347F00K                |
|  | 1000                             | 12.5 x 25                     | 0.12            | 0.159                                       | 0.038                         | 1700   | 4.70          | MALREKE00FG410F00K                |
|  | 1500                             | 16 x 25                       | 0.14            | 0.124                                       | 0.030                         | 2100   | 6.60          | MALREKE00JG415F00K                |
|  | 2200                             | 16 x 31.5                     | 0.16            | 0.096                                       | 0.025                         | 2600   | 9.00          | MALREKE00JS422F00K                |
|  | 3300                             | 18 x 35.5                     | 0.18            | 0.072                                       | 0.022                         | 3000   | 11.5          | MALREKE00KL433F00K                |

**ELECTRICAL DATA AND ORDERING INFORMATION**

| $U_R$ (V) | $C_R$<br>120 Hz<br>( $\mu$ F) | DIMENSIONS<br>$\varnothing$ D x L<br>(mm) | $\tan \delta$<br>120 Hz | $R_{ESR}$<br>120 Hz/<br>20 °C<br>( $\Omega$ ) | Z<br>100 kHz/<br>20 °C<br>( $\Omega$ ) | $I_R$<br>100 kHz/<br>105 °C<br>(mA) | WEIGHT<br>(g)      | CATALOG<br>NUMBER<br>(LONG LEADS) |
|-----------|-------------------------------|---|-------------------------|---|--|-------------------------------------|--------------------|-----------------------------------|
| 50        | 0.22                          | 5 x 11                                    | 0.10                    | 602.9   | 8.00                                   | 18                                  | 0.42               | MALREKE00AA022H00K                |
|           | 0.47                          | 5 x 11                                    | 0.10                    | 282.2   | 5.00                                   | 25                                  | 0.42               | MALREKE00AA047H00K                |
|           | 1.0                           | 5 x 11                                    | 0.10                    | 132.6   | 3.50                                   | 40                                  | 0.42               | MALREKE00AA110H00K                |
|           | 2.2                           | 5 x 11                                    | 0.10                    | 60.29   | 3.00                                   | 55                                  | 0.42               | MALREKE00AA122H00K                |
|           | 3.3                           | 5 x 11                                    | 0.10                    | 40.19   | 2.60                                   | 65                                  | 0.42               | MALREKE00AA133H00K                |
|           | 4.7                           | 5 x 11                                    | 0.10                    | 28.22   | 2.30                                   | 90                                  | 0.42               | MALREKE00AA147H00K                |
|           | 10                            | 5 x 11                                    | 0.10                    | 13.26   | 1.40                                   | 120                                 | 0.42               | MALREKE00AA210H00K                |
|           | 22                            | 5 x 11                                    | 0.10                    | 6.029   | 1.20                                   | 150                                 | 0.42               | MALREKE00AA222H00K                |
|           | 47                            | 6.3 x 11                                  | 0.10                    | 2.822   | 0.43                                   | 250                                 | 0.43               | MALREKE00BA247H00K                |
|           | 100                           | 8 x 11.5                                  | 0.10                    | 1.326   | 0.24                                   | 340                                 | 1.05               | MALREKE00PB310H00K                |
|           | 150                           | 10 x 12.5                                 | 0.10                    | 0.884   | 0.17                                   | 490                                 | 1.90               | MALREKE00DC315H00K                |
|           | 220                           | 10 x 16                                   | 0.10                    | 0.603   | 0.12                                   | 650                                 | 2.40               | MALREKE00DD322H00K                |
|           | 330                           | 10 x 20                                   | 0.10                    | 0.402   | 0.10                                   | 810                                 | 3.00               | MALREKE00DE333H00K                |
|           | 470                           | 12.5 x 20                                 | 0.10                    | 0.282   | 0.085                                  | 1100                                | 4.50               | MALREKE00FE347H00K                |
|           | 1000                          | 16 x 25                                   | 0.10                    | 0.133   | 0.043                                  | 1600                                | 6.60               | MALREKE00JG410H00K                |
| 1500      | 16 x 31.5                     | 0.12                                      | 0.106                   | 0.038   | 2000                                   | 9.00                                | MALREKE00JS415H00K |                                   |
| 2200      | 18 x 35.5                     | 0.14                                      | 0.084                   | 0.034   | 2300                                   | 11.5                                | MALREKE00KL422H00K |                                   |
| 63        | 3.3                           | 5 x 11                                    | 0.09                    | 36.17   | 2.00                                   | 64                                  | 0.42               | MALREKE00AA133J00K                |
|           | 4.7                           | 5 x 11                                    | 0.09                    | 25.40   | 2.00                                   | 76                                  | 0.42               | MALREKE00AA147J00K                |
|           | 10                            | 5 x 11                                    | 0.09                    | 11.94   | 2.00                                   | 111                                 | 0.42               | MALREKE00AA210J00K                |
|           | 22                            | 6.3 x 11                                  | 0.09                    | 5.426   | 0.60                                   | 190                                 | 0.43               | MALREKE00BA222J00K                |
|           | 33                            | 6.3 x 11                                  | 0.09                    | 3.617   | 0.60                                   | 233                                 | 0.43               | MALREKE00BA233J00K                |
|           | 47                            | 8 x 11.5                                  | 0.09                    | 2.540   | 0.50                                   | 328                                 | 1.05               | MALREKE00PB247J00K                |
|           | 100                           | 10 x 16                                   | 0.09                    | 1.194   | 0.12                                   | 456                                 | 2.40               | MALREKE00DD310J00K                |
|           | 150                           | 10 x 20                                   | 0.09                    | 0.796   | 0.10                                   | 610                                 | 3.00               | MALREKE00DE315J00K                |
|           | 220                           | 10 x 25                                   | 0.09                    | 0.543   | 0.090                                  | 809                                 | 3.20               | MALREKE00DG322J00K                |
|           | 330                           | 12.5 x 20                                 | 0.09                    | 0.362   | 0.085                                  | 1036                                | 4.50               | MALREKE00FE333J00K                |
| 470       | 16 x 20                       | 0.09                                      | 0.254                   | 0.050   | 1411                                   | 5.80                                | MALREKE00JE347J00K |                                   |
| 1000      | 16 x 35.5                     | 0.09                                      | 0.119                   | 0.025   | 1967                                   | 10.0                                | MALREKE00JL410J00K |                                   |
| 100       | 2.2                           | 5 x 11                                    | 0.08                    | 48.23   | 2.50                                   | 52                                  | 0.42               | MALREKE00AA122L00K                |
|           | 3.3                           | 5 x 11                                    | 0.08                    | 32.15   | 2.50                                   | 64                                  | 0.42               | MALREKE00AA133L00K                |
|           | 4.7                           | 5 x 11                                    | 0.08                    | 22.58   | 2.50                                   | 76                                  | 0.42               | MALREKE00AA147L00K                |
|           | 10                            | 6.3 x 11                                  | 0.08                    | 10.61   | 1.00                                   | 128                                 | 0.43               | MALREKE00BA210L00K                |
|           | 22                            | 8 x 11.5                                  | 0.08                    | 4.823   | 0.60                                   | 224                                 | 1.05               | MALREKE00PB222L00K                |
|           | 33                            | 10 x 12.5                                 | 0.08                    | 3.215   | 0.40                                   | 319                                 | 1.90               | MALREKE00DC233L00K                |
|           | 47                            | 10 x 16                                   | 0.08                    | 2.258   | 0.30                                   | 417                                 | 2.40               | MALREKE00DD247L00K                |
|           | 100                           | 12.5 x 20                                 | 0.08                    | 1.061   | 0.15                                   | 570                                 | 4.50               | MALREKE00FE310L00K                |
|           | 150                           | 12.5 x 25                                 | 0.08                    | 0.707   | 0.12                                   | 762                                 | 4.70               | MALREKE00FG315L00K                |
|           | 220                           | 16 x 25                                   | 0.08                    | 0.482   | 0.070                                  | 1250                                | 6.60               | MALREKE00JG322L00K                |
|           | 330                           | 16 x 31.5                                 | 0.08                    | 0.322   | 0.050                                  | 1404                                | 9.00               | MALREKE00JS333L00K                |
| 470       | 18 x 40                       | 0.08                                      | 0.226                   | 0.030   | 1980                                   | 15.0                                | MALREKE00KK347L00K |                                   |
| 160       | 33                            | 10 x 20                                   | 0.15                    | 6.029   | 1.30                                   | 565                                 | 3.00               | MALREKE00DE233M00K                |
|           | 150                           | 16 x 31.5                                 | 0.15                    | 1.326   | 0.22                                   | 1300                                | 9.00               | MALREKE00JS315M00K                |
|           | 220                           | 16 x 31.5                                 | 0.15                    | 0.904   | 0.22                                   | 1300                                | 9.00               | MALREKE00JS322M00K                |
|           | 330                           | 18 x 31.5                                 | 0.15                    | 0.603   | 0.22                                   | 1700                                | 11.0               | MALREKE00KS333M00K                |
| 200       | 22                            | 10 x 20                                   | 0.15                    | 9.043   | 1.50                                   | 440                                 | 3.00               | MALREKE00DE222S00K                |
|           | 33                            | 12.5 x 20                                 | 0.15                    | 6.029   | 0.91                                   | 590                                 | 4.50               | MALREKE00FE233S00K                |
|           | 47                            | 12.5 x 20                                 | 0.15                    | 4.233   | 0.91                                   | 780                                 | 4.50               | MALREKE00FE247S00K                |
|           | 100                           | 16 x 25                                   | 0.15                    | 1.989   | 0.27                                   | 1280                                | 6.60               | MALREKE00JG310S00K                |
|           | 150                           | 18 x 25                                   | 0.15                    | 1.326   | 0.27                                   | 1500                                | 9.00               | MALREKE00KG315S00K                |
|           | 220                           | 18 x 31.5                                 | 0.15                    | 0.904   | 0.22                                   | 1700                                | 11.0               | MALREKE00KS322S00K                |



Aluminum Capacitors  
Radial Style

Vishay Roederstein

| ELECTRICAL DATA AND ORDERING INFORMATION |                                  |                               |                 |   |                               |  |               |                                   |
|--|----------------------------------|-------------------------------|-----------------|---|-------------------------------|--|---------------|-----------------------------------|
| U <sub>R</sub> (V)                       | C <sub>R</sub><br>120 Hz<br>(μF) | DIMENSIONS<br>Ø D x L<br>(mm) | tan δ<br>120 Hz | R <sub>ESR</sub><br>120 Hz/<br>20 °C<br>(Ω) | Z<br>100 kHz/<br>20 °C<br>(Ω) | I <sub>R</sub><br>100 kHz/<br>105 °C<br>(mA) | WEIGHT<br>(g) | CATALOG<br>NUMBER<br>(LONG LEADS) |
| 250                                      | 10                               | 10 x 20                       | 0.15            | 19.89                                       | 3.50                          | 300  | 3.00          | MALREKE00DE210N00K                |
|  | 22                               | 12.5 x 20                     | 0.15            | 9.043                                       | 2.30                          | 480  | 4.50          | MALREKE00FE222N00K                |
|  | 33                               | 12.5 x 25                     | 0.15            | 6.029                                       | 1.70                          | 630  | 4.70          | MALREKE00FG233N00K                |
|  | 47                               | 12.5 x 25                     | 0.15            | 4.233                                       | 1.70                          | 630  | 4.70          | MALREKE00FG247N00K                |
|  | 100                              | 16 x 31.5                     | 0.15            | 1.989                                       | 0.63                          | 1400   | 9.00          | MALREKE00JS310N00K                |
|  | 150                              | 18 x 31.5                     | 0.15            | 1.326                                       | 0.42                          | 1450   | 11.0          | MALREKE00KS315N00K                |
|  | 220                              | 18 x 40                       | 0.15            | 0.904                                       | 0.35                          | 1485   | 15.0          | MALREKE00KK322N00K                |
| 400                                      | 10                               | 10 x 20                       | 0.20            | 26.53                                       | 2.90                          | 180  | 3.00          | MALREKE00DE210X00K                |
|  | 22                               | 12.5 x 25                     | 0.20            | 12.06                                       | 1.30                          | 300  | 4.70          | MALREKE00FG222X00K                |
|  | 33                               | 16 x 20                       | 0.20            | 8.038                                       | 0.91                          | 600  | 5.80          | MALREKE00JE233X00K                |
|  | 47                               | 16 x 25                       | 0.20            | 5.644                                       | 0.73                          | 700  | 6.60          | MALREKE00JG247X00K                |
|  | 100                              | 18 x 40                       | 0.20            | 2.653                                       | 0.34                          | 1250   | 15.0          | MALREKE00KK310X00K                |
| 450                                      | 3.3                              | 10 x 20                       | 0.20            | 80.38                                       | 6.50                          | 150  | 3.00          | MALREKE00DE133P00K                |
|  | 4.7                              | 12.5 x 20                     | 0.20            | 56.44                                       | 3.60                          | 200  | 4.50          | MALREKE00FE147P00K                |
|  | 10                               | 12.5 x 25                     | 0.20            | 26.53                                       | 2.50                          | 315  | 4.70          | MALREKE00FG210P00K                |
|  | 22                               | 16 x 25                       | 0.20            | 12.06                                       | 1.70                          | 570  | 6.60          | MALREKE00JG222P00K                |
|  | 33                               | 16 x 31.5                     | 0.20            | 8.038                                       | 1.10                          | 620  | 9.00          | MALREKE00JS233P00K                |
|  | 47                               | 18 x 31.5                     | 0.20            | 5.644                                       | 0.93                          | 900  | 11.0          | MALREKE00KS247P00K                |

| LOW TEMPERATURE BEHAVIOR (at 120 Hz) |                      |    |    |          |           |           |  |
|--------------------------------------|----------------------|----|----|----------|-----------|-----------|--|
| IMPEDANCE RATIO<br>Z (T2)/Z (T1)     | RATED VOLTAGE<br>(V) |    |    |          |           |           |  |
| T2/T1                                | 6.3                  | 10 | 16 | 25 ~ 100 | 160 ~ 250 | 350 ~ 450 |  |
| - 25/+ 20 °C                         | 4                    | 3  | 2  | 2        | 3         | 8         |  |
| - 40/+ 20 °C                         | 8                    | 6  | 4  | 3        | 4         | -         |  |

| ADDITIONAL ELECTRICAL DATA                                   |   |  |  |
|--|---|--|--|
| PARAMETER  | CONDITIONS  | VALUE  |  |
| <b>Current</b>   |   |  |  |
| Leakage current<br>(Test conditions: U <sub>R</sub> , 20 °C) | After 1 minute at U <sub>R</sub>                        | I <sub>L1</sub> ≤ 0.03 x C <sub>R</sub> x U <sub>R</sub> | or 4 μA for U <sub>R</sub> ≤ 100 V (whichever is greater)  |
|  | After 2 minutes at U <sub>R</sub>                       | I <sub>L2</sub> ≤ 0.01 x C <sub>R</sub> x U <sub>R</sub> | or 3 μA for U <sub>R</sub> ≤ 100 V (whichever is greater)  |
|  | After 5 minutes at U <sub>R</sub>                       | I <sub>L5</sub> ≤ 0.02 x C <sub>R</sub> x U <sub>R</sub> | or 15 μA for U <sub>R</sub> > 100 V (whichever is greater) |
| <b>Resistance</b>  |   |  |  |
| Equivalent series resistance (ESR)                           | Calculated from tan δ <sub>max</sub> and C <sub>R</sub> | ESR = tan δ/2 π f C <sub>R</sub>                         |  |

| MULTIPLIER OF RIPPLE CURRENT (I <sub>R</sub> ) AS A FUNCTION OF FREQUENCY |  |                               |                          |
|---|--|-------------------------------|--------------------------|
| FREQUENCY (Hz)  | I <sub>R</sub> MULTIPLIER FOR U <sub>R</sub> ≤ 100 V |                               |                          |
|   | C <sub>R</sub> ≤ 47 μF                               | C <sub>R</sub> = 68 to 680 μF | C <sub>R</sub> ≥ 1000 μF |
| 50  | 0.34   | 0.47                          | 0.65                     |
| 120   | 0.45   | 0.59                          | 0.77                     |
| 300   | 0.61   | 0.74                          | 0.85                     |
| 1000  | 0.70   | 0.79                          | 0.88                     |
| 10 000  | 0.91   | 0.88                          | 0.88                     |
| 100 000   | 1.00   | 1.00                          | 1.00                     |

**MULTIPLIER OF RIPPLE CURRENT ( $I_R$ ) AS A FUNCTION OF FREQUENCY**

| FREQUENCY (Hz) | $I_R$ MULTIPLIER FOR $U_R > 100$ V |                            |
|----------------|------------------------------------|----------------------------|
|                | $C_R = 0.47$ to $220 \mu\text{F}$  | $C_R \geq 330 \mu\text{F}$ |
| 50             | 0.44                               | 0.69                       |
| 120            | 0.56                               | 0.77                       |
| 300            | 0.69                               | 0.87                       |
| 1000           | 0.78                               | 0.87                       |
| 10 000         | 0.89                               | 0.88                       |
| 100 000        | 1.00                               | 1.00                       |

**TEST PROCEDURES AND REQUIREMENTS**

| TEST       | PROCEDURE<br>(quick reference)   | REQUIREMENTS  |
|------------|--|---|
| Load life  | $T_{\text{amb}} = 105 \text{ }^\circ\text{C}$<br>$U_R$ and $I_R$ applied<br>After specified hours  | $\Delta C/C: \pm 25 \%$ of initial value<br>$I_L \leq \text{spec. limit}$<br>$\tan \delta \leq 2 \times \text{spec. limit}$ |
| Shelf life | $T_{\text{amb}} = 105 \text{ }^\circ\text{C}$<br>No voltage applied<br>After 1000 hours<br>After test: $U_R$ to be applied for 30 minutes<br>24 to 48 hours before measurement | $\Delta C/C: \pm 25 \%$ of initial value<br>$I_L \leq \text{spec. limit}$<br>$\tan \delta \leq 2 \times \text{spec. limit}$ |



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