



## Aluminum Capacitors Radial Style



### FEATURES

- Polarized aluminum electrolytic capacitor
- High ripple current
- High load life up to 10 000 h
- Temperature range up to 105 °C
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT

### APPLICATIONS

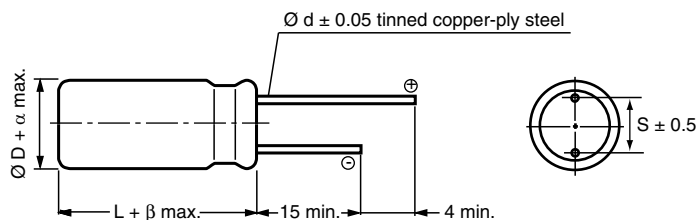
- For electronic lighting ballast
- Power supply

### QUICK REFERENCE DATA

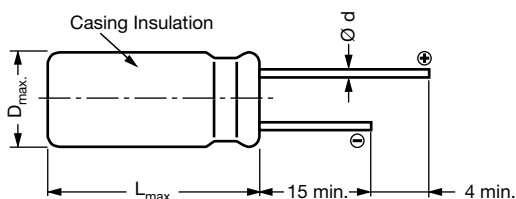
| DESCRIPTION                            | UNIT | VALUE                  |
|----------------------------------------|------|------------------------|
| Nominal case size (Ø D x L)            | mm   | 10 x 12.5 to 18 x 31.5 |
| Rated capacitance range C <sub>R</sub> | µF   | 1.0 to 150             |
| Capacitance tolerance                  | %    | ± 20                   |
| Rated voltage range                    | V    | 200 to 450             |
| Category temperature range             | °C   | -25 to 105             |
| Load life                              | h    | 10 000                 |
| Based on sectional specification       |      | IEC 60384-4 / EN130300 |
| Climatic category IEC 60068            |      | 25 / 105 / 56          |

### SELECTION CHART FOR C<sub>R</sub>, U<sub>R</sub>, AND RELEVANT NOMINAL CASE SIZES (Ø D x L in mm)

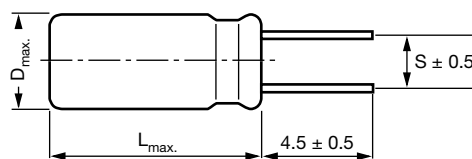
| C <sub>R</sub><br>(µF) | RATED VOLTAGE (V) |           |           |           |           |
|------------------------|-------------------|-----------|-----------|-----------|-----------|
|                        | 200               | 250       | 350       | 400       | 450       |
| 1.0                    | →                 | →         | →         | 10 x 12.5 | -         |
| 2.2                    | →                 | →         | →         | 10 x 12.5 | 10 x 16   |
| 3.3                    | →                 | →         | 10 x 12.5 | →         | 10 x 16   |
| 4.7                    | →                 | →         | →         | 10 x 16   | 10 x 20   |
| 6.8                    | →                 | 10 x 12.5 | →         | 10 x 16   | 10 x 20   |
| 10                     | 10 x 16           | →         | →         | 10 x 20   | 12.5 x 20 |
| 22                     | 10 x 20           | →         | 12.5 x 20 | 12.5 x 25 | 16 x 25   |
| 33                     | →                 | 12.5 x 20 | 16 x 20   | 16 x 25   | 18 x 25   |
| 47                     | 12.5 x 20         | 12.5 x 25 | 16 x 25   | 18 x 25   | 18 x 31.5 |
| 68                     | 12.5 x 25         | 16 x 25   | 18 x 25   | -         | -         |
| 100                    | 16 x 25           | 18 x 25   | -         | -         | -         |
| 150                    | 18 x 25           | -         | -         | -         | -         |

**RADIAL STYLE: DIMENSIONS** in millimeters

| Ø 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 |
| Ø 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**

Ø D ≤ 18 leads MALREKV00...

Ø D ≤ 18 shortened leads MALREKV05...  
(S = 2 mm/2.5 mm/3.5 mm/5 mm/7.5 mm)**GENERAL NOTE**

- For Minimum Package Quantity (MPQ) 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                                        |
| $R_{ESR}$     | Max. equivalent series resistance at 120 Hz                              |
| $I_R$         | Rated alternating current (RMS) at 120 Hz and upper category temperature |

**Note**

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

**ORDERING EXAMPLE**EKV 22  $\mu\text{F}$  / 450 V,  $\pm 20\%$ , size: 16 mm x 25 mm

Leads: long

Ordering code: MALREKV00JG222P00K

Leads: short

Ordering code: MALREKV05JG222P00K



## ELECTRICAL DATA AND ORDERING INFORMATION

| $U_R$<br>(V) | $C_R$<br>120 Hz<br>( $\mu$ F) | DIMENSIONS<br>$\varnothing D \times L$<br>(mm) | $\tan \delta$<br>120 Hz | $R_{ESR}$<br>120 Hz<br>( $\Omega$ ) | $I_R$<br>100 kHz / 105 °C<br>(mA) | WEIGHT<br>(g) | CATALOG NUMBER<br>(Long Leads) |
|--------------|-------------------------------|------------------------------------------------|-------------------------|-------------------------------------|-----------------------------------|---------------|--------------------------------|
| 200          | 10                            | 10 x 16                                        | 0.15                    | 19.9                                | 250                               | 2.3           | MALREKV00DD210S00K             |
|              | 22                            | 10 x 20                                        | 0.15                    | 9.04                                | 500                               | 2.8           | MALREKV00DE222S00K             |
|              | 47                            | 12.5 x 20                                      | 0.15                    | 4.23                                | 660                               | 3.8           | MALREKV00FE247S00K             |
|              | 68                            | 12.5 x 25                                      | 0.15                    | 2.93                                | 760                               | 5.1           | MALREKV00FG268S00K             |
|              | 100                           | 16 x 25                                        | 0.15                    | 1.99                                | 1120                              | 7.1           | MALREKV00JG310S00K             |
|              | 150                           | 18 x 25                                        | 0.15                    | 1.33                                | 1360                              | 9.5           | MALREKV00KG315S00K             |
| 250          | 6.8                           | 10 x 12.5                                      | 0.15                    | 29.3                                | 120                               | 1.9           | MALREKV00DC168N00K             |
|              | 33                            | 12.5 x 20                                      | 0.15                    | 6.03                                | 600                               | 3.8           | MALREKV00FE233N00K             |
|              | 47                            | 12.5 x 25                                      | 0.15                    | 4.23                                | 720                               | 5.1           | MALREKV00FG247N00K             |
|              | 68                            | 16 x 25                                        | 0.15                    | 2.93                                | 920                               | 7.1           | MALREKV00JG268N00K             |
|              | 100                           | 18 x 25                                        | 0.15                    | 1.99                                | 1200                              | 9.5           | MALREKV00KG310N00K             |
| 350          | 3.3                           | 10 x 12.5                                      | 0.20                    | 80.4                                | 100                               | 1.9           | MALREKV00DC133O00K             |
|              | 22                            | 12.5 x 20                                      | 0.20                    | 12.1                                | 350                               | 3.8           | MALREKV00FE222O00K             |
|              | 33                            | 16 x 20                                        | 0.20                    | 8.04                                | 500                               | 6.3           | MALREKV00JE233O00K             |
|              | 47                            | 16 x 25                                        | 0.20                    | 5.64                                | 660                               | 7.1           | MALREKV00JG247O00K             |
|              | 68                            | 18 x 25                                        | 0.20                    | 3.90                                | 840                               | 9.5           | MALREKV00KG268O00K             |
| 400          | 1.0                           | 10 x 12.5                                      | 0.24                    | 318                                 | 90                                | 1.9           | MALREKV00DC110X00K             |
|              | 2.2                           | 10 x 12.5                                      | 0.24                    | 145                                 | 100                               | 1.9           | MALREKV00DC122X00K             |
|              | 4.7                           | 10 x 16                                        | 0.24                    | 67.7                                | 180                               | 2.3           | MALREKV00DD147X00K             |
|              | 6.8                           | 10 x 16                                        | 0.24                    | 46.8                                | 200                               | 2.3           | MALREKV00DD168X00K             |
|              | 10                            | 10 x 20                                        | 0.20                    | 26.5                                | 280                               | 2.8           | MALREKV00DE210X00K             |
|              | 22                            | 12.5 x 25                                      | 0.20                    | 12.1                                | 430                               | 5.1           | MALREKV00FG222X00K             |
|              | 33                            | 16 x 25                                        | 0.20                    | 8.04                                | 640                               | 7.1           | MALREKV00JG233X00K             |
|              | 47                            | 18 x 25                                        | 0.20                    | 5.64                                | 840                               | 9.5           | MALREKV00KG247X00K             |
| 450          | 2.2                           | 10 x 16                                        | 0.24                    | 145                                 | 120                               | 2.3           | MALREKV00DD122P00K             |
|              | 3.3                           | 10 x 16                                        | 0.24                    | 96.5                                | 140                               | 2.3           | MALREKV00DD133P00K             |
|              | 4.7                           | 10 x 20                                        | 0.24                    | 67.7                                | 180                               | 2.8           | MALREKV00DE147P00K             |
|              | 6.8                           | 10 x 20                                        | 0.24                    | 46.8                                | 200                               | 2.8           | MALREKV00DE168P00K             |
|              | 10                            | 12.5 x 20                                      | 0.20                    | 26.5                                | 320                               | 3.8           | MALREKV00FE210P00K             |
|              | 22                            | 16 x 25                                        | 0.20                    | 12.1                                | 560                               | 7.1           | MALREKV00JG222P00K             |
|              | 33                            | 18 x 25                                        | 0.20                    | 8.04                                | 700                               | 9.5           | MALREKV00KG233P00K             |
|              | 47                            | 18 x 31.5                                      | 0.20                    | 5.64                                | 880                               | 12.0          | MALREKV00KS247P00K             |

## LOW TEMPERATURE BEHAVIOUR (at 120 Hz)

| IMPEDANCE RATIO<br>$Z(T_2)/Z(T_1)$ | RATED VOLTAGE (V) |     |     |     |     |
|------------------------------------|-------------------|-----|-----|-----|-----|
| $T_2/T_1$                          | 200               | 250 | 350 | 400 | 450 |
| -25 °C / +20 °C                    | 3                 | 3   | 4   | 6   | 6   |

## ADDITIONAL ELECTRICAL DATA

| PARAMETER                                           | CONDITIONS                          | VALUE                                               |
|-----------------------------------------------------|-------------------------------------|-----------------------------------------------------|
| <b>Current</b>                                      |                                     |                                                     |
| Leakage current<br>(test conditions: $U_R$ , 20 °C) | After 5 min at $U_R$                | $I_{L5} \leq 0.02 \times C_R \times U_R + 25 \mu A$ |
| <b>Resistance</b>                                   |                                     |                                                     |
| 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<br>(Hz) | $I_R$ MULTIPLIER                      |                                       |
|-------------------|---------------------------------------|---------------------------------------|
|                   | 1.0 $\mu\text{F}$ ~ 4.7 $\mu\text{F}$ | 6.8 $\mu\text{F}$ ~ 150 $\mu\text{F}$ |
| 60                | 0.25                                  | 0.35                                  |
| 120               | 0.30                                  | 0.50                                  |
| 300               | 0.45                                  | 0.60                                  |
| 1000              | 0.60                                  | 0.80                                  |
| 10 000            | 0.80                                  | 0.90                                  |
| $\geq 100\,000$   | 1.00                                  | 1.00                                  |

**TEST PROCEDURES AND REQUIREMENTS**

| TEST       | PROCEDURE<br>(quick reference)                                                                                                                       | REQUIREMENTS                                                                                                                 |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| Load life  | $T_{\text{amb}} = 105\,^{\circ}\text{C}$<br>$U_R$ and $I_R$ applied<br>After 5000 h $\leq 6.8\,\mu\text{F}$<br>After 10 000 h $\geq 10\,\mu\text{F}$ | $\Delta C/C: \pm 20\,\%$ of initial value<br>$I_L \leq \text{spec. limit}$<br>$\tan \delta \leq 2 \times \text{spec. limit}$ |
| Shelf life | No voltage applied<br>After 1000 h<br>After test: $U_R$ to be applied for 30 min<br>24 h to 48 h before measurement                                  | $\Delta C/C: \pm 20\,\%$ of initial value<br>$I_L \leq \text{spec. limit}$<br>$\tan \delta \leq 2 \times \text{spec. limit}$ |

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