

Aluminum Electrolytic Capacitors Power Miniaturized Economy Long Life Snap-In

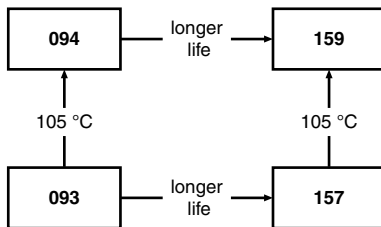


Fig. 1

| QUICK REFERENCE DATA | |
|---|--------------------------------------|
| DESCRIPTION | VALUE |
| Nominal case size (Ø D x L in mm) | 22 x 25 to 35 x 60 |
| Rated capacitance range, C _R | 56 µF to 2200 µF |
| Tolerance on C _R | ± 20 % |
| Rated voltage range, U _R | 200 V to 450 V |
| Category temperature range | -25 °C to +105 °C |
| Endurance test at 105 °C | 2000 h |
| Useful life at 105 °C | 2000 h |
| Useful life at 40 °C and 1.6 x I _R applied | 180 000 h |
| Shelf life at 0 V, 105 °C | 500 h |
| Max. RMS value of ripple voltage | 12 V |
| Based on sectional specification | IEC 60384-4 / EN130300/W of JISC5141 |

FEATURES

- Useful life: 2000 h at 105 °C
- Polarized aluminum electrolytic capacitors, non-solid electrolyte
- Large types, miniaturized dimensions, cylindrical aluminum case, insulated with a blue sleeve
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912


**RoHS
COMPLIANT**

APPLICATIONS

- Consumer and telecom
- Whitegood motor control
- Electronic drives
- SMPS / UPS

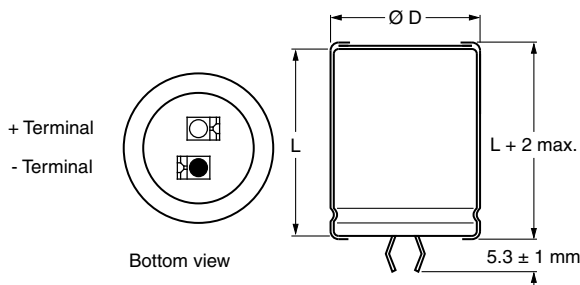
MARKING

The capacitors are marked (where possible) with the following information:

- Rated capacitance (in µF)
- Tolerance code on rated capacitance, code letter in accordance with IEC 60062 (M for ± 20 %)
- Rated voltage (in V)
- Name of manufacturer
- Date code
- “-” sign to identify the negative terminal, visible from the top and side of the capacitor
- Code number (last 8 digits)
- Maximum operating temperature

| C _R (µF) | U _R (V) | | | | |
|------------------------|--------------------|-----|---------|---------|---------|
| | 200 | 250 | 400 | 420 | 450 |
| 56 | - | - | 22 x 25 | 22 x 25 | 22 x 25 |
| 68 | - | - | 22 x 25 | 22 x 25 | 22 x 25 |
| 82 | - | - | 22 x 25 | 22 x 25 | 22 x 30 |
| | - | - | - | - | 25 x 25 |
| 100 | - | - | 22 x 25 | 22 x 30 | 22 x 30 |
| | - | - | - | 25 x 25 | 25 x 25 |
| 120 | - | - | 22 x 30 | 22 x 30 | 22 x 35 |
| | - | - | 25 x 25 | 25 x 25 | 25 x 30 |
| 150 | - | - | 22 x 35 | 22 x 35 | 22 x 40 |
| | - | - | - | 25 x 30 | 25 x 30 |
| | - | - | - | - | 30 x 25 |

| SELECTION CHART FOR C_R, U_R, AND RELEVANT NOMINAL CASE SIZES ($\varnothing D \times L$ in mm) | | | | | |
|--|-----------|---------|---------|---------|---------|
| C_R (μF) | U_R (V) | | | | |
| | 200 | 250 | 400 | 420 | 450 |
| 180 | - | - | 30 x 25 | 22 x 40 | 22 x 50 |
| | - | - | - | 25 x 30 | 25 x 35 |
| | - | - | - | 30 x 25 | 30 x 25 |
| 220 | 22 x 25 | 22 x 30 | 22 x 50 | 22 x 50 | 25 x 40 |
| | - | - | 25 x 35 | 25 x 40 | 30 x 30 |
| | - | - | - | 30 x 30 | 35 x 25 |
| | - | - | - | 35 x 25 | - |
| 270 | 22 x 25 | 22 x 30 | 30 x 30 | 25 x 50 | 25 x 50 |
| | - | - | 35 x 25 | - | 30 x 35 |
| | - | - | - | - | 35 x 30 |
| 330 | 22 x 30 | 22 x 35 | 25 x 50 | 35 x 30 | 30 x 45 |
| | - | - | 30 x 35 | - | 35 x 35 |
| | - | - | 35 x 30 | - | - |
| 390 | 22 x 35 | 25 x 30 | 30 x 40 | 35 x 35 | 30 x 50 |
| | 25 x 30 | - | 35 x 30 | - | 35 x 40 |
| 470 | 22 x 35 | 25 x 35 | 30 x 45 | 35 x 40 | 35 x 45 |
| | 25 x 30 | - | 35 x 35 | - | - |
| 560 | 25 x 35 | 25 x 40 | 30 x 50 | 35 x 45 | 35 x 50 |
| | - | - | 35 x 40 | - | - |
| 680 | 22 x 50 | - | 35 x 45 | 35 x 50 | 35 x 60 |
| | 25 x 40 | - | - | - | - |
| 820 | 30 x 30 | - | - | - | - |
| 1000 | 25 x 50 | 30 x 45 | - | - | - |
| | 30 x 35 | - | - | - | - |
| 1200 | 30 x 40 | 35 x 40 | - | - | - |
| 1500 | 30 x 50 | 35 x 45 | - | - | - |
| | 35 x 40 | - | - | - | - |
| 1800 | - | 35 x 50 | - | - | - |
| 2200 | 35 x 50 | - | - | - | - |

DIMENSIONS in millimeters AND AVAILABLE FORMS


The minus and/or plus terminal can be marked with an imprinted sign.

Fig. 2 - Two terminal snap-in

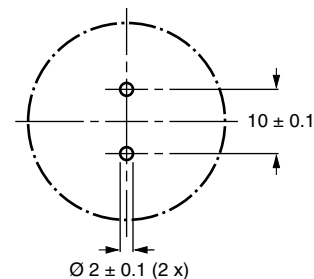


Fig. 3 - Mounting hole diagram



Table 1

| DIMENSIONS in millimeters, MASS, AND PACKAGING QUANTITIES | | | | | |
|--|---------------------------|-------------------------|---------------------|---------------------------------|---|
| NOMINAL CASE SIZE Ø D x L | Ø D_{max.} | L_{max.} | MASS (g) | PACKAGING QUANTITIES | CARDBOARD BOX DIMENSIONS L x W x H |
| 22 x 25 | 23.0 | 27 | ≈ 12 | 100 | 260 x 250 x 39 |
| 22 x 30 | 23.0 | 32 | ≈ 16 | 100 | 260 x 250 x 44 |
| 22 x 35 | 23.0 | 37 | ≈ 20 | 100 | 260 x 250 x 49 |
| 22 x 40 | 23.0 | 42 | ≈ 23 | 100 | 260 x 250 x 54 |
| 22 x 45 | 23.0 | 47 | ≈ 26 | 100 | 260 x 250 x 59 |
| 22 x 50 | 23.0 | 52 | ≈ 29 | 100 | 260 x 250 x 64 |
| 25 x 25 | 26.0 | 27 | ≈ 20 | 100 | 290 x 280 x 39 |
| 25 x 30 | 26.0 | 32 | ≈ 22 | 100 | 290 x 280 x 44 |
| 25 x 35 | 26.0 | 37 | ≈ 24 | 100 | 290 x 280 x 49 |
| 25 x 40 | 26.0 | 42 | ≈ 27 | 100 | 290 x 280 x 54 |
| 25 x 45 | 26.0 | 47 | ≈ 32 | 100 | 290 x 280 x 59 |
| 25 x 50 | 26.0 | 52 | ≈ 38 | 100 | 290 x 280 x 64 |
| 30 x 25 | 31.0 | 27 | ≈ 25 | 100 | 340 x 330 x 39 |
| 30 x 30 | 31.0 | 32 | ≈ 30 | 100 | 340 x 330 x 44 |
| 30 x 35 | 31.0 | 37 | ≈ 35 | 100 | 340 x 330 x 49 |
| 30 x 40 | 31.0 | 42 | ≈ 40 | 100 | 340 x 330 x 54 |
| 30 x 45 | 31.0 | 47 | ≈ 45 | 100 | 340 x 330 x 59 |
| 30 x 50 | 31.0 | 52 | ≈ 50 | 100 | 340 x 330 x 64 |
| 35 x 25 | 36.0 | 27 | ≈ 33 | 50 | 390 x 198 x 39 |
| 35 x 30 | 36.0 | 32 | ≈ 40 | 50 | 390 x 198 x 44 |
| 35 x 35 | 36.0 | 37 | ≈ 48 | 50 | 390 x 198 x 49 |
| 35 x 40 | 36.0 | 42 | ≈ 55 | 50 | 390 x 198 x 54 |
| 35 x 45 | 36.0 | 47 | ≈ 63 | 50 | 390 x 198 x 59 |
| 35 x 50 | 36.0 | 52 | ≈ 72 | 50 | 390 x 198 x 64 |
| 35 x 60 | 36.0 | 62 | ≈ 87 | 50 | 390 x 198 x 74 |

| ELECTRICAL DATA | |
|------------------------|--|
| SYMBOL | DESCRIPTION |
| C _R | Rated capacitance at 120 Hz |
| I _R | Rated RMS ripple current at 120 Hz, 105 °C |
| I _{L5} | Max. leakage current after 5 min at U _R |
| ESR | Max. equivalent series resistance at 120 Hz ⁽¹⁾ |

Note

- ⁽¹⁾ ESR at 100 Hz is approximately 1.05 x ESR 120 Hz
- Unless otherwise specified, all electrical values in Table 2 apply at T_{amb} = 20 °C, P = 86 kPa to 106 kPa, RH = 45 % to 75 %

ORDERING EXAMPLE

Electrolytic capacitor 094 series

330 µF / 400 V; ± 20 %

Nominal case size: Ø 25 mm x 50 mm

2-terminal snap-in:

Ordering code: MAL2 094 46331 E3

Former 12NC: 2222 094 46331



Table 2

| ELECTRICAL DATA AND ORDERING INFORMATION | | | | | | | |
|--|-------------------------------|---|------------------------|------------------|---|----------------------------------|----------------------------------|
| U_R (V) | C_R 120 Hz (μ F) | NOMINAL CASE SIZE \varnothing D x L (mm) | I_R 120 Hz (A) | I_{L5} (mA) | MAX. ESR 120 Hz ⁽¹⁾ (Ω) | MAX. Z 10 kHz (Ω) | ORDERING CODE MAL2094..... |
| 200 | 220 | 22 x 25 | 1.04 | 0.88 | 0.46 | 0.30 | 52221E3 |
| | 270 | 22 x 25 | 1.12 | 1.08 | 0.40 | 0.26 | 52271E3 |
| | 330 | 22 x 30 | 1.30 | 1.32 | 0.32 | 0.21 | 52331E3 |
| | 390 | 22 x 35 | 1.49 | 1.50 | 0.27 | 0.17 | 52391E3 |
| | 390 | 25 x 30 | 1.47 | 1.50 | 0.27 | 0.18 | 42391E3 |
| | 470 | 22 x 35 | 1.58 | 1.50 | 0.24 | 0.15 | 52471E3 |
| | 470 | 25 x 30 | 1.55 | 1.50 | 0.24 | 0.16 | 42471E3 |
| | 560 | 25 x 35 | 1.61 | 1.50 | 0.22 | 0.15 | 42561E3 |
| | 680 | 22 x 50 | 1.96 | 1.50 | 0.16 | 0.10 | 52681E3 |
| | 680 | 25 x 40 | 1.98 | 1.50 | 0.17 | 0.11 | 42681E3 |
| | 820 | 30 x 30 | 1.86 | 1.50 | 0.18 | 0.13 | 32821E3 |
| | 1000 | 25 x 50 | 2.56 | 1.50 | 0.12 | 0.08 | 42102E3 |
| | 1000 | 30 x 35 | 2.04 | 1.50 | 0.16 | 0.12 | 32102E3 |
| | 1200 | 30 x 40 | 2.35 | 1.50 | 0.13 | 0.09 | 32122E3 |
| | 1500 | 30 x 50 | 2.87 | 1.50 | 0.10 | 0.07 | 32152E3 |
| 1500 | 35 x 40 | 2.54 | 1.50 | 0.13 | 0.09 | 22152E3 | |
| 2200 | 35 x 50 | 3.02 | 1.50 | 0.10 | 0.07 | 22222E3 | |
| 250 | 220 | 22 x 30 | 1.33 | 1.10 | 0.41 | 0.25 | 53221E3 |
| | 270 | 22 x 30 | 1.22 | 1.35 | 0.35 | 0.22 | 53271E3 |
| | 330 | 22 x 35 | 1.40 | 1.50 | 0.29 | 0.18 | 53331E3 |
| | 390 | 25 x 30 | 1.46 | 1.50 | 0.26 | 0.17 | 43391E3 |
| | 470 | 25 x 35 | 1.64 | 1.50 | 0.22 | 0.14 | 43471E3 |
| | 560 | 25 x 40 | 1.87 | 1.50 | 0.19 | 0.12 | 43561E3 |
| | 1000 | 30 x 45 | 2.48 | 1.50 | 0.13 | 0.09 | 33102E3 |
| | 1200 | 35 x 40 | 2.47 | 1.50 | 0.13 | 0.10 | 23122E3 |
| | 1500 | 35 x 45 | 2.73 | 1.50 | 0.12 | 0.09 | 23152E3 |
| 1800 | 35 x 50 | 2.96 | 1.50 | 0.10 | 0.07 | 23182E3 | |
| 400 | 56 | 22 x 25 | 0.53 | 0.45 | 2.39 | 1.79 | 56569E3 |
| | 68 | 22 x 25 | 0.58 | 0.54 | 1.98 | 1.49 | 56689E3 |
| | 82 | 22 x 25 | 0.64 | 0.66 | 1.66 | 1.25 | 56829E3 |
| | 100 | 22 x 25 | 0.68 | 0.80 | 1.51 | 1.16 | 56101E3 |
| | 120 | 22 x 30 | 0.79 | 0.96 | 1.16 | 0.87 | 56121E3 |
| | 120 | 25 x 25 | 0.79 | 0.96 | 1.17 | 0.89 | 46121E3 |
| | 150 | 22 x 35 | 0.92 | 1.20 | 0.92 | 0.69 | 56151E3 |
| | 180 | 30 x 25 | 1.03 | 1.44 | 0.81 | 0.62 | 36181E3 |
| | 220 | 22 x 50 | 1.15 | 1.50 | 0.59 | 0.44 | 56221E3 |
| | 220 | 25 x 35 | 1.11 | 1.50 | 0.68 | 0.52 | 46221E3 |
| | 270 | 30 x 30 | 1.26 | 1.50 | 0.55 | 0.42 | 36271E3 |
| | 270 | 35 x 25 | 1.25 | 1.50 | 0.63 | 0.50 | 26271E3 |
| | 330 | 25 x 50 | 1.61 | 1.50 | 0.43 | 0.33 | 46331E3 |
| | 330 | 30 x 35 | 1.41 | 1.50 | 0.47 | 0.37 | 36331E3 |
| | 330 | 35 x 30 | 1.50 | 1.50 | 0.46 | 0.36 | 26331E3 |
| | 390 | 30 x 40 | 1.62 | 1.50 | 0.39 | 0.30 | 36391E3 |
| | 390 | 35 x 30 | 1.56 | 1.50 | 0.43 | 0.34 | 26391E3 |
| | 470 | 30 x 45 | 1.82 | 1.50 | 0.33 | 0.26 | 36471E3 |
| | 470 | 35 x 35 | 1.70 | 1.50 | 0.37 | 0.30 | 26471E3 |
| | 560 | 30 x 50 | 2.03 | 1.50 | 0.29 | 0.23 | 36561E3 |
| 560 | 35 x 40 | 1.95 | 1.50 | 0.30 | 0.24 | 26561E3 | |
| 680 | 35 x 45 | 2.15 | 1.50 | 0.26 | 0.21 | 26681E3 | |



| ELECTRICAL DATA AND ORDERING INFORMATION | | | | | | | |
|--|----------------------------------|---|---------------------------------|-------------------------|--|-------------------------|----------------------------------|
| U _R (V) | C _R 120 Hz (µF) | NOMINAL CASE SIZE Ø D x L (mm) | I _R 120 Hz (A) | I _{L5} (mA) | MAX. ESR 120 Hz ⁽¹⁾ (Ω) | MAX. Z 10 kHz (Ω) | ORDERING CODE MAL2094..... |
| 420 | 56 | 22 x 25 | 0.54 | 0.47 | 2.24 | 1.64 | 54569E3 |
| | 68 | 22 x 25 | 0.59 | 0.57 | 1.86 | 1.36 | 54689E3 |
| | 82 | 22 x 25 | 0.64 | 0.69 | 1.60 | 1.20 | 54829E3 |
| | 100 | 22 x 30 | 0.74 | 0.84 | 1.27 | 0.93 | 54101E3 |
| | 100 | 25 x 25 | 0.74 | 0.84 | 1.29 | 0.96 | 44101E3 |
| | 120 | 22 x 30 | 0.79 | 1.01 | 1.15 | 0.87 | 54121E3 |
| | 120 | 25 x 25 | 0.79 | 1.01 | 1.16 | 0.89 | 44121E3 |
| | 150 | 22 x 35 | 0.92 | 1.26 | 0.91 | 0.69 | 54151E3 |
| | 150 | 25 x 30 | 0.93 | 1.26 | 0.86 | 0.64 | 44151E3 |
| | 180 | 22 x 40 | 1.06 | 1.50 | 0.76 | 0.57 | 54181E3 |
| | 180 | 25 x 30 | 1.00 | 1.50 | 0.78 | 0.59 | 44181E3 |
| | 180 | 30 x 25 | 1.03 | 1.50 | 0.76 | 0.58 | 34181E3 |
| | 220 | 22 x 50 | 1.15 | 1.50 | 0.59 | 0.44 | 54221E3 |
| | 220 | 25 x 40 | 1.22 | 1.50 | 0.59 | 0.44 | 44221E3 |
| | 220 | 30 x 30 | 1.19 | 1.50 | 0.59 | 0.44 | 34221E3 |
| | 220 | 35 x 25 | 1.19 | 1.50 | 0.67 | 0.52 | 24221E3 |
| | 270 | 25 x 50 | 1.50 | 1.50 | 0.47 | 0.34 | 44271E3 |
| | 330 | 35 x 30 | 1.49 | 1.50 | 0.45 | 0.35 | 24331E3 |
| | 390 | 35 x 35 | 1.65 | 1.50 | 0.39 | 0.31 | 24391E3 |
| | 470 | 35 x 40 | 1.86 | 1.50 | 0.32 | 0.25 | 24471E3 |
| 560 | 35 x 45 | 2.06 | 1.50 | 0.27 | 0.21 | 24561E3 | |
| 680 | 35 x 50 | 2.30 | 1.50 | 0.23 | 0.18 | 24681E3 | |
| 450 | 56 | 22 x 25 | 0.55 | 0.50 | 2.06 | 1.46 | 57569E3 |
| | 68 | 22 x 25 | 0.59 | 0.61 | 1.72 | 1.23 | 57689E3 |
| | 82 | 22 x 30 | 0.68 | 0.74 | 1.41 | 1.01 | 57829E3 |
| | 82 | 25 x 25 | 0.68 | 0.74 | 1.43 | 1.03 | 47829E3 |
| | 100 | 22 x 30 | 0.74 | 0.90 | 1.25 | 0.92 | 57101E3 |
| | 100 | 25 x 25 | 0.74 | 0.90 | 1.25 | 0.91 | 47101E3 |
| | 120 | 22 x 35 | 0.85 | 1.08 | 1.01 | 0.73 | 57121E3 |
| | 120 | 25 x 30 | 0.86 | 1.08 | 0.98 | 0.70 | 47121E3 |
| | 150 | 22 x 40 | 0.99 | 1.35 | 0.81 | 0.59 | 57151E3 |
| | 150 | 25 x 30 | 0.93 | 1.35 | 0.83 | 0.61 | 47151E3 |
| | 150 | 30 x 25 | 0.97 | 1.35 | 0.83 | 0.61 | 37151E3 |
| | 180 | 22 x 50 | 1.07 | 1.50 | 0.64 | 0.45 | 57181E3 |
| | 180 | 25 x 35 | 1.05 | 1.50 | 0.73 | 0.53 | 47181E3 |
| | 180 | 30 x 25 | 1.03 | 1.50 | 0.75 | 0.56 | 37181E3 |
| | 220 | 25 x 40 | 1.20 | 1.50 | 0.60 | 0.44 | 47221E3 |
| | 220 | 30 x 30 | 1.19 | 1.50 | 0.59 | 0.43 | 37221E3 |
| | 220 | 35 x 25 | 1.19 | 1.50 | 0.67 | 0.51 | 27221E3 |
| | 270 | 25 x 50 | 1.50 | 1.50 | 0.47 | 0.34 | 47271E3 |
| | 270 | 30 x 35 | 1.34 | 1.50 | 0.50 | 0.38 | 37271E3 |
| | 270 | 35 x 30 | 1.42 | 1.50 | 0.49 | 0.37 | 27271E3 |
| 330 | 30 x 45 | 1.64 | 1.50 | 0.38 | 0.28 | 37331E3 | |
| 330 | 35 x 35 | 1.58 | 1.50 | 0.42 | 0.32 | 27331E3 | |
| 390 | 30 x 50 | 1.85 | 1.50 | 0.33 | 0.25 | 37391E3 | |
| 390 | 35 x 40 | 1.78 | 1.50 | 0.35 | 0.26 | 27391E3 | |
| 470 | 35 x 45 | 1.97 | 1.50 | 0.29 | 0.22 | 27471E3 | |
| 560 | 35 x 50 | 2.20 | 1.50 | 0.25 | 0.19 | 27561E3 | |
| 680 | 35 x 60 | 2.60 | 1.50 | 0.21 | 0.16 | 27681E3 | |

Note

⁽¹⁾ ESR at 100 Hz is approximately 1.05 x ESR 120 Hz



| ADDITIONAL ELECTRICAL DATA | | |
|------------------------------------|-----------------------|---|
| PARAMETER | CONDITIONS | VALUE |
| Voltage | | |
| Surge voltage | ≥ 200 V versions | $U_S = 1.1 \times U_R$ |
| Reverse voltage | ≤ 1 V | - |
| Current | | |
| Leakage current | After 5 min at U_R | $I_{L5} \leq 0.02 C_R \times U_R$ or 1.5 mA, whichever is smaller |
| Inductance | | |
| Equivalent series inductance (ESL) | All case sizes | 19 nH typical / 25 nH max. |

Table 3

| LOW TEMPERATURE CHARACTERISTIC (at 120 Hz) | | |
|--|---------------------------------------|---|
| DESCRIPTION | U_R (V) ⁽¹⁾ | |
| | 200 TO 450 | |
| Impedance ratio | $Z(-25\text{ °C}) / Z(+20\text{ °C})$ | 4 |

Note

⁽¹⁾ Impedance ratio shall not exceed the given values

RIPPLE CURRENT AND USEFUL LIFE

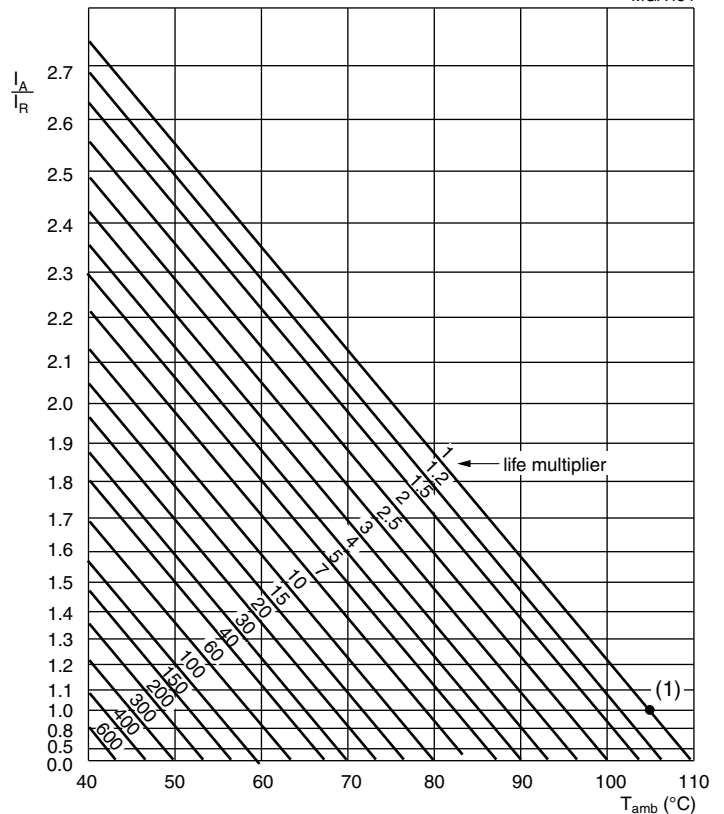
Table 4

| ENDURANCE TEST DURATION AND USEFUL LIFE | |
|---|---------------------------|
| ENDURANCE AT 105 °C (h) | USEFUL LIFE AT 105 °C (h) |
| 2000 | 2000 |

Note

- Multiplier of useful life code: MGA454

MGA454



I_A = Actual ripple current at 120 Hz
 I_R = Rated ripple current at 120 Hz and 105 °C
⁽¹⁾ Useful life at 105 °C and I_R applied: 2000 h

Fig. 4 - Multiplier of useful life as a function of ambient temperature and ripple current load



Table 5

| MULTIPLIER OF RIPPLE CURRENT (I_R) AS A FUNCTION OF FREQUENCY | | | | | |
|---|------|------|------|------|----------------|
| FREQUENCY (Hz) | | | | | |
| 60 | 100 | 120 | 500 | 1000 | $\geq 10\ 000$ |
| I_R MULTIPLIER | | | | | |
| 0.90 | 0.95 | 1.00 | 1.20 | 1.30 | 1.40 |

Table 6

| TEST PROCEDURES AND REQUIREMENTS | | | |
|--|---|--|---|
| TEST | | PROCEDURE (quick reference) | REQUIREMENTS |
| NAME OF TEST | REFERENCE | | |
| Endurance | IEC 60384-4 / EN130300 subclause 4.13 | $T_{amb} = 105\ ^\circ\text{C}$; U_R applied; 2000 h | $\Delta C/C: \pm 10\ \%$ $ESR \leq 2 \times \text{spec. limit}$ $I_{L5} \leq \text{spec. limit}$ |
| Useful life | CECC 30301 subclause 1.8.1 | $T_{amb} = 105\ ^\circ\text{C}$; U_R and I_R applied: 2000 h | $\Delta C/C: \pm 30\ \%$ $ESR \leq 3 \times \text{spec. limit}$ $I_{L5} \leq \text{spec. limit}$ no short or open circuit, no visible damage, total failure percentage: $\leq 3\ \%$ |
| Shelf life (storage at high temperature) | IEC 60384-4 / EN130300 subclause 4.17 | $T_{amb} = 105\ ^\circ\text{C}$; no voltage applied; 500 h After test: U_R to be applied for 30 min, 24 h to 48 h before measurement | $\Delta C/C: \pm 20\ \%$ $ESR \leq 2 \times \text{spec. limit}$ $I_{L5} \leq 1 \times \text{spec. limit}$ |

Statements about product lifetime are based on calculations and internal testing. They should only be interpreted as estimations. Also due to external factors, the lifetime in the field application may deviate from the calculated lifetime. In general, nothing stated herein shall be construed as a guarantee of durability.



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