

Aluminum Electrolytic Capacitors, Power High Ripple Current, Screw Terminals

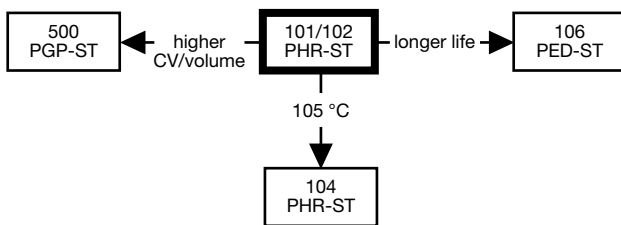


Fig. 1

FEATURES

- Long useful life: 10 000 h to 15 000 h at +85 °C
- Available in case sizes up to Ø 90 mm x 220 mm
- Polarized aluminum electrolytic capacitors, non-solid electrolyte
- Large types, cylindrical aluminum case, insulated with a blue sleeve
- Pressure relief in the sealing
- Low ESR
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

APPLICATIONS

- Buffering and filtering
- Motor drives, inverters, UPS, and traction systems
- Pulsed power supplies

MARKING

The capacitors are marked with the following information:

- Rated capacitance (in μF)
- Tolerance on rated capacitance, code letter in accordance with IEC 60062 (M for $\pm 20\%$)
- Rated voltage (in V)
- Date code (YYMM or in 2 digits according to IEC 60062)
- Name of manufacturer
- Code for factory of origin
- “-” sign to identify the negative terminal, visible from the top and side of the capacitor
- Code number
- Climatic category in accordance with IEC 60068

| QUICK REFERENCE DATA | | |
|--|--|----------------|
| DESCRIPTION | VALUE | |
| | 101 | 102 |
| Nominal case size (Ø D x L in mm) | 35 x 60 to 90 x 220 | |
| Rated capacitance range (E6 series), C_R | 220 μF to 1 F | |
| Tolerance on C_R | $\pm 20\%$ | |
| Rated voltage range, U_R | 25 V to 100 V | 200 V to 450 V |
| Category temperature range | -40 °C to +85 °C | |
| Endurance test at 85 °C | 2000 h | |
| Useful life at 85 °C | 10 000 h (D ≤ 50 mm) 15 000 h (D ≥ 65 mm) | 10 000 h |
| Useful life at 40 °C, 1.4 x I_R applied | 400 000 h (D ≤ 50 mm) 600 000 h (D ≥ 65 mm) | 400 000 h |
| Shelf life at 0 V, 85 °C | 500 h | |
| Based on sectional specification | IEC 60384-4 / EN 130300 | |
| Climatic category IEC 60068 | 40 / 085 / 056 | |



| SELECTION CHART FOR C_R, U_R, AND RELEVANT NOMINAL CASE SIZES (∅ D x L in mm) | | | | | | | | | | |
|--|--------------------------|-----------|-----------|------------|------------|------------|------------|------------|------------|------------|
| C_R (μF) | U_R (V) | | | | | | | | | |
| | 25 | 40 | 63 | 100 | 200 | 250 | 350 | 385 | 400 | 450 |
| 220 | - | - | - | - | - | - | - | 35 x 60 | 35 x 60 | 35 x 60 |
| 330 | - | - | - | - | - | - | 35 x 60 | - | 35 x 60 | - |
| | - | - | - | - | - | - | - | - | 35 x 80 | - |
| 470 | - | - | - | - | - | 35 x 60 | - | 35 x 80 | 35 x 80 | - |
| | - | - | - | - | - | - | 35 x 80 | - | 35 x 105 | 35 x 105 |
| 680 | - | - | - | - | 35 x 60 | 35 x 80 | - | - | 35 x 105 | - |
| | - | - | - | - | - | - | - | - | 50 x 80 | 50 x 80 |
| 1000 | - | - | - | - | 35 x 80 | 35 x 80 | - | 50 x 80 | 50 x 80 | 50 x 80 |
| | - | - | - | - | 35 x 105 | 35 x 105 | - | - | 50 x 105 | 50 x 105 |
| 1500 | - | - | - | - | 35 x 105 | 35 x 105 | - | - | - | 50 x 105 |
| | - | - | - | - | 50 x 80 | 50 x 80 | 50 x 105 | 50 x 105 | 50 x 105 | 65 x 105 |
| 2200 | - | - | - | 35 x 60 | 50 x 80 | 50 x 80 | 50 x 105 | - | - | 65 x 105 |
| | - | - | - | - | - | 50 x 105 | 65 x 105 | 65 x 105 | 65 x 105 | 76 x 105 |
| 3300 | - | - | - | 35 x 60 | 50 x 80 | 50 x 105 | - | - | 65 x 105 | 76 x 105 |
| | - | - | - | 35 x 80 | 50 x 105 | 65 x 105 | 65 x 105 | 76 x 105 | 76 x 105 | 76 x 146 |
| 4700 | - | - | 35 x 60 | 35 x 80 | - | 65 x 105 | 76 x 105 | 76 x 105 | 76 x 105 | 76 x 146 |
| | - | - | - | 35 x 105 | 65 x 105 | 76 x 105 | 76 x 146 | 76 x 146 | 76 x 146 | - |
| 5600 | - | - | - | - | - | - | - | - | - | - |
| 6800 | - | - | 35 x 60 | 35 x 105 | 65 x 105 | 76 x 105 | - | - | 76 x 146 | 76 x 220 |
| | - | - | 35 x 80 | 50 x 80 | 76 x 105 | 76 x 146 | 76 x 146 | 76 x 146 | - | 90 x 146 |
| 10 000 | - | 35 x 60 | 35 x 80 | 50 x 80 | 76 x 105 | 76 x 105 | 76 x 220 | - | - | - |
| | - | - | 35 x 105 | 50 x 105 | 76 x 146 | 76 x 146 | 90 x 146 | - | - | 90 x 220 |
| 15 000 | 35 x 60 | 35 x 60 | 35 x 105 | 50 x 105 | 76 x 146 | 76 x 146 | - | - | - | - |
| | - | 35 x 80 | 50 x 80 | - | - | - | 90 x 220 | - | - | - |
| 22 000 | 35 x 60 | 35 x 80 | 50 x 80 | 65 x 105 | 76 x 220 | 76 x 220 | - | - | - | - |
| | - | 50 x 80 | 50 x 105 | 76 x 105 | 90 x 146 | 90 x 146 | - | - | - | - |
| 33 000 | 35 x 80 | 35 x 105 | 50 x 105 | 76 x 105 | - | - | - | - | - | - |
| | 50 x 80 | 50 x 80 | 65 x 105 | 76 x 146 | 90 x 220 | 90 x 220 | - | - | - | - |
| 47 000 | 35 x 105 | 50 x 80 | 65 x 105 | - | - | - | - | - | - | - |
| | 50 x 80 | 50 x 105 | 76 x 105 | 76 x 146 | - | - | - | - | - | - |
| 68 000 | 50 x 80 | 50 x 105 | 76 x 105 | 76 x 146 | - | - | - | - | - | - |
| | 50 x 105 | 65 x 105 | 76 x 146 | - | - | - | - | - | - | - |
| 100 000 | 50 x 105 | 65 x 105 | - | 76 x 220 | - | - | - | - | - | - |
| | 65 x 105 | 76 x 105 | 76 x 146 | 90 x 146 | - | - | - | - | - | - |
| 150 000 | 65 x 105 | 76 x 105 | 76 x 146 | - | - | - | - | - | - | - |
| | 76 x 105 | 76 x 146 | - | 90 x 220 | - | - | - | - | - | - |
| 220 000 | 65 x 105 | - | 76 x 220 | - | - | - | - | - | - | - |
| | 76 x 105 | 76 x 146 | 90 x 146 | - | - | - | - | - | - | - |
| 330 000 | 76 x 146 | 76 x 220 | - | - | - | - | - | - | - | - |
| | - | 90 x 146 | 90 x 220 | - | - | - | - | - | - | - |
| 470 000 | 76 x 220 | - | - | - | - | - | - | - | - | - |
| | 90 x 146 | 90 x 220 | - | - | - | - | - | - | - | - |
| 680 000 | 76 x 220 | - | - | - | - | - | - | - | - | - |
| 1 000 000 | 90 x 220 | - | - | - | - | - | - | - | - | - |

DIMENSIONS in millimeters AND AVAILABLE FORMS

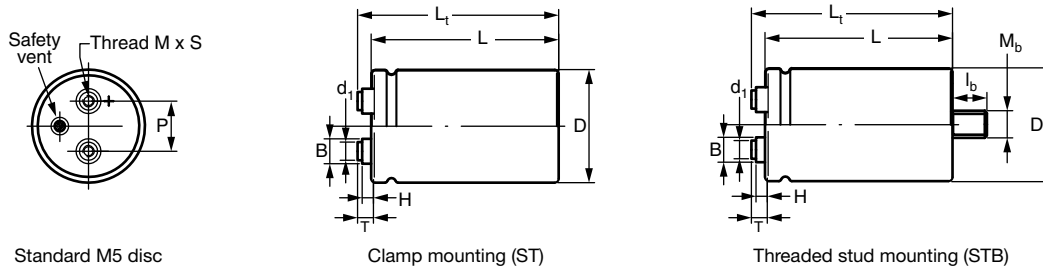


Fig. 2A - Mechanical drawings for standard M5 disc versions.
For details refer to Table 1

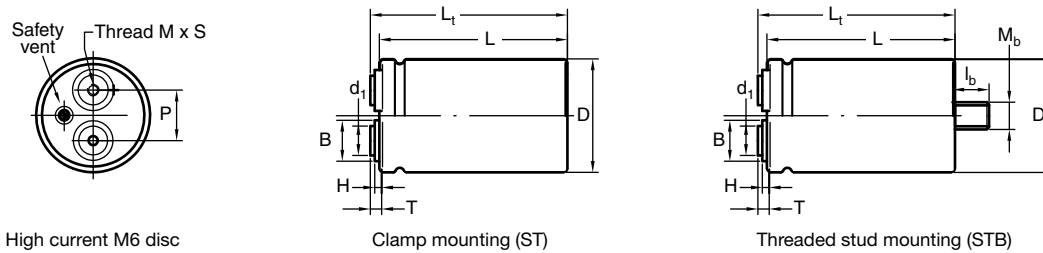


Fig. 2B - Mechanical drawings for high current M6 disc versions.
For details refer to Table 1

Notes

- Maximum permissible torque which may be applied to the termination screws: 2 Nm for M5; 2.5 Nm for M6
For accessories refer to document "Mounting Accessories", see www.vishay.com/doc?28348
The capacitors are delivered with screws and washers
- High current disc with 1/4 28 UNF (US) thread is available on request

Table 1

| DIMENSIONS in millimeters AND MASS | | | | | | | | | | | | | | |
|------------------------------------|---------|-------|--------------------|-------|---------|---------|---------|---------|----------------------|----|-------|----------------|----------------------|----------|
| DESIGN | DRAWING | L ± 1 | L _t ± 1 | D ± 1 | P ± 0.3 | T ± 0.2 | H ± 0.3 | B ± 0.3 | d ₁ ± 0.1 | M | S - 0 | M _b | l _b ± 0.1 | MASS (g) |
| 35 x 60 | 2A | 63.3 | 68.7 | 35.3 | 12.8 | 7 | 4.6 | 11 | 7.9 | M5 | 9.5 | M8 | 12 | 75 |
| 35 x 80 | 2A | 81.3 | 86.7 | 35.3 | 12.8 | 7 | 4.6 | 11 | 7.9 | M5 | 9.5 | M8 | 12 | 95 |
| 35 x 105 | 2A | 103.3 | 108.7 | 35.3 | 12.8 | 7 | 4.6 | 11 | 7.9 | M5 | 9.5 | M8 | 12 | 130 |
| 50 x 80 | 2A | 82.8 | 88.8 | 51 | 22.2 | 7.1 | 4.8 | 11 | 7.9 | M5 | 9.5 | M12 | 16 | 200 |
| 50 x 105 | 2A | 104.8 | 110.8 | 51 | 22.2 | 7.1 | 4.8 | 11 | 7.9 | M5 | 9.5 | M12 | 16 | 300 |
| 65 x 105 | 2A | 104.8 | 110.7 | 65 | 28.5 | 7 | 4.6 | 11.9 | 7.9 | M5 | 9.5 | M12 | 16 | 480 |
| 65 x 105 HC | 2B | 104.8 | 109.2 | 65 | 28.5 | 5.5 | 3.5 | 18 | 13 | M6 | 8.5 | M12 | 16 | 480 |
| 76 x 105 | 2A | 105.8 | 111.7 | 76.4 | 31.8 | 7 | 4.6 | 11.7 | 7.9 | M5 | 9.5 | M12 | 16 | 700 |
| 76 x 105 HC | 2B | 105.8 | 110.2 | 76.4 | 31.8 | 5.5 | 3.5 | 18.3 | 13 | M6 | 8.5 | M12 | 16 | 700 |
| 76 x 146 | 2A | 145.8 | 151.7 | 76.4 | 31.8 | 7 | 4.6 | 11.7 | 7.9 | M5 | 9.5 | M12 | 16 | 1000 |
| 76 x 146 HC | 2B | 145.8 | 150.2 | 76.4 | 31.8 | 5.5 | 3.5 | 18.3 | 13 | M6 | 8.5 | M12 | 16 | 1000 |
| 76 x 220 | 2A | 219.8 | 225.7 | 76.4 | 31.8 | 7 | 4.6 | 11.7 | 7.9 | M5 | 9.5 | M12 | 16 | 1500 |
| 76 x 220 HC | 2B | 219.8 | 224.2 | 76.4 | 31.8 | 5.5 | 3.5 | 18.3 | 13 | M6 | 8.5 | M12 | 16 | 1500 |
| 90 x 146 HC | 2B | 150.1 | 155.4 | 89.4 | 31.8 | 7.9 | 0 | 13 | 13 | M6 | 10 | M12 | 16 | 1300 |
| 90 x 220 HC | 2B | 218.1 | 223.4 | 89.4 | 31.8 | 7.9 | 0 | 13 | 13 | M6 | 10 | M12 | 16 | 2000 |



| PACKAGING QUANTITIES AND DIMENSIONS in millimeters | | |
|--|---|---------------------------------|
| DESIGN | PACKAGING QUANTITIES (units per box) | CARDBOX DIMENSIONS L x W x H |
| 35 x 60 | 50 | 377 x 375 x 88 |
| 35 x 80 | 50 | 377 x 375 x 123 |
| 35 x 105 | 50 | 377 x 375 x 129 |
| 50 x 80 | 25 | 377 x 375 x 123 |
| 50 x 105 | 25 | 377 x 375 x 129 |
| 65 x 105 | 16 | 377 x 375 x 129 |
| 65 x 105 HC | 16 | 377 x 375 x 129 |
| 76 x 105 | 12 | 377 x 375 x 129 |
| 76 x 105 HC | 12 | 377 x 375 x 129 |
| 76 x 146 | 12 | 377 x 375 x 168 |
| 76 x 146 HC | 12 | 377 x 375 x 168 |
| 76 x 220 | 18 | 520 x 270 x 280 |
| 76 x 220 HC | 18 | 520 x 270 x 280 |
| 90 x 146 HC | 8 | 377 x 375 x 168 |
| 90 x 220 HC | 10 | 520 x 270 x 280 |

Note

- For bolt version holds:
H cardbox box: + 10 mm

| ELECTRICAL DATA | |
|-----------------|--|
| SYMBOL | DESCRIPTION |
| C _R | Rated capacitance at 100 Hz, tolerance ± 20 % |
| I _R | Rated RMS ripple current at 100 Hz, 85 °C |
| I _{L5} | Max. leakage current after 5 min at U _R |
| ESR | Max. equivalent series resistance at 100 Hz |
| Z | Max. impedance at 20 kHz |

Note

- Unless otherwise specified, all electrical values in Table 2 and 3 apply at T_{amb} = 20 °C, P = 86 kPa to 106 kPa, RH = 45 % to 75 %

ORDERING EXAMPLE

Electrolytic capacitor 101 series
 10 000 µF / 40 V; ± 20 %
 Nominal case size: Ø 35 mm x 60 mm;
 ST version, high post M5 disc
 Ordering code: MAL2 10117103E3
 Former 12NC: 2222 10117103

Table 2

| ELECTRICAL DATA AND ORDERING INFORMATION FOR 101 SERIES | | | | | | | | | | | |
|---|----------------------------------|---|--|----------------------------------|-------------------------------|-----------------------------|-----------------------------|--|---|--|---|
| U _R (V) | C _R 100 Hz (µF) | NOMINAL CASE SIZE Ø D x L (mm) | I _R 100 Hz 85 °C (A) | I _{L5} 5 min (mA) | ESR MAX. 100 Hz (mΩ) | Z MAX. 20 kHz (mΩ) | LIFE CODE ⁽¹⁾ | STANDARD HIGH POST M5 DISC | | HIGH CURRENT M6 DISC | |
| | | | | | | | | ST ORDERING CODE MAL2101..... | STB ORDERING CODE MAL2101..... | ST ORDERING CODE MAL2101..... | STB ORDERING CODE MAL2101..... |
| 25 | 15 000 | 35 x 60 | 7.7 | 0.75 | 29 | 22 | L1 | 16153E3 | 56153E3 | - | - |
| | 22 000 | 35 x 60 | 8.3 | 1.10 | 27 | 22 | L1 | 16223E3 | 56223E3 | - | - |
| | 33 000 | 35 x 80 | 9.0 | 1.65 | 19 | 17 | L1 | 16333E3 | 56333E3 | - | - |
| | 33 000 | 50 x 80 | 10.0 | 1.65 | 17 | 14 | L1 | 26333E3 | 66333E3 | - | - |
| | 47 000 | 35 x 105 | 12.1 | 2.35 | 15 | 13 | L1 | 16473E3 | 56473E3 | - | - |
| | 47 000 | 50 x 80 | 14.8 | 2.35 | 12 | 10 | L1 | 26473E3 | 66473E3 | - | - |
| | 68 000 | 50 x 80 | 12.8 | 3.40 | 15 | 13 | L1 | 16683E3 | 56683E3 | - | - |
| | 68 000 | 50 x 105 | 17.1 | 3.40 | 9 | 8 | L1 | 26683E3 | 66683E3 | - | - |
| | 100 000 | 50 x 105 | 14.7 | 5.00 | 12 | 11 | L1 | 16104E3 | 56104E3 | - | - |
| | 100 000 | 65 x 105 | 19.6 | 5.00 | 7 | 6 | L2 | 26104E3 | 66104E3 | 46104E3 | 86104E3 |
| | 150 000 | 65 x 105 | 17.6 | 7.50 | 8 | 7 | L2 | 16154E3 | 56154E3 | 36154E3 | 76154E3 |
| | 150 000 | 76 x 105 | 21.4 | 7.50 | 6 | 5 | L2 | 26154E3 | 66154E3 | 46154E3 | 86154E3 |
| | 220 000 | 65 x 105 | 20.2 | 11.0 | 6 | 5 | L2 | 16224E3 | 56224E3 | 36224E3 | 76224E3 |
| | 220 000 | 76 x 105 | 22.5 | 11.0 | 6 | 5 | L2 | 26224E3 | 66224E3 | 46224E3 | 86224E3 |
| | 330 000 | 76 x 146 | 25.8 | 16.5 | 4 | 4 | L2 | 26334E3 | 66334E3 | 46334E3 | 86334E3 |
| | 470 000 | 76 x 220 | 29.9 | 23.5 | 5 | 5 | L2 | 16474E3 | 56474E3 | 36474E3 | 76474E3 |
| | 470 000 | 90 x 146 | 38.2 | 23.5 | 5 | 5 | L2 | - | - | 46474E3 | 86474E3 |
| | 680 000 | 76 x 220 | 29.0 | 34.0 | 5 | 5 | L2 | 16684E3 | 56684E3 | 36684E3 | 76684E3 |
| | 1 000 000 | 90 x 220 | 46.6 | 50.0 | 5 | 5 | L2 | - | - | 46105E3 | 86105E3 |



| ELECTRICAL DATA AND ORDERING INFORMATION FOR 101 SERIES | | | | | | | | | | | |
|---|----------------------------------|---|--|----------------------------------|-------------------------------|-----------------------------|-----------------------------|-------------------------------|-------------------------|-------------------------|-------------------------|
| U _R (V) | C _R 100 Hz (μF) | NOMINAL CASE SIZE Ø D x L (mm) | I _R 100 Hz 85 °C (A) | I _{L5} 5 min (mA) | ESR MAX. 100 Hz (mΩ) | Z MAX. 20 kHz (mΩ) | LIFE CODE ⁽¹⁾ | STANDARD HIGH POST M5 DISC | | HIGH CURRENT M6 DISC | |
| | | | | | | | | ST ORDERING CODE | STB ORDERING CODE | ST ORDERING CODE | STB ORDERING CODE |
| | | | | | | | | MAL2101..... | MAL2101..... | MAL2101..... | MAL2101..... |
| 40 | 10 000 | 35 x 60 | 7.1 | 0.80 | 31 | 23 | L1 | 17103E3 | 57103E3 | - | - |
| | 15 000 | 35 x 60 | 7.8 | 1.20 | 28 | 22 | L1 | 17153E3 | 57153E3 | - | - |
| | 15 000 | 35 x 80 | 8.7 | 1.20 | 22 | 17 | L1 | 27153E3 | 67153E3 | - | - |
| | 22 000 | 35 x 80 | 9.4 | 1.76 | 20 | 17 | L1 | 17223E3 | 57223E3 | - | - |
| | 22 000 | 50 x 80 | 11.2 | 1.76 | 19 | 15 | L1 | 27223E3 | 67223E3 | - | - |
| | 33 000 | 35 x 105 | 11.0 | 2.64 | 15 | 13 | L1 | 17333E3 | 57333E3 | - | - |
| | 33 000 | 50 x 80 | 13.7 | 2.64 | 13 | 10 | L1 | 27333E3 | 67333E3 | - | - |
| | 47 000 | 50 x 80 | 14.6 | 3.76 | 12 | 10 | L1 | 17473E3 | 57473E3 | - | - |
| | 47 000 | 50 x 105 | 15.9 | 3.76 | 10 | 8 | L1 | 27473E3 | 67473E3 | - | - |
| | 68 000 | 50 x 105 | 16.9 | 5.44 | 9 | 8 | L1 | 17683E3 | 57683E3 | - | - |
| | 68 000 | 65 x 105 | 18.1 | 5.44 | 7 | 6 | L2 | 27683E3 | 67683E3 | 47683E3 | 87683E3 |
| | 100 000 | 65 x 105 | 19.2 | 8.0 | 7 | 6 | L2 | 17104E3 | 57104E3 | 37104E3 | 77104E3 |
| | 100 000 | 76 x 105 | 21.3 | 8.0 | 7 | 6 | L2 | 27104E3 | 67104E3 | 47104E3 | 87104E3 |
| | 150 000 | 76 x 105 | 20.5 | 12.0 | 7 | 6 | L2 | 17154E3 | 57154E3 | 37154E3 | 77154E3 |
| | 150 000 | 76 x 146 | 24.0 | 12.0 | 5 | 5 | L2 | 27154E3 | 67154E3 | 47154E3 | 87154E3 |
| | 220 000 | 76 x 146 | 24.5 | 17.6 | 5 | 5 | L2 | 27224E3 | 67224E3 | 47224E3 | 87224E3 |
| | 330 000 | 76 x 220 | 28.2 | 26.4 | 5 | 5 | L2 | 17334E3 | 57334E3 | 37334E3 | 77334E3 |
| 330 000 | 90 x 146 | 38.6 | 26.4 | 5 | 5 | L2 | - | - | 47334E3 | 87334E3 | |
| 470 000 | 90 x 220 | 41.5 | 37.6 | 5 | 5 | L2 | - | - | 47474E3 | 87474E3 | |
| 63 | 4700 | 35 x 60 | 5.9 | 0.59 | 42 | 25 | L1 | 18472E3 | 58472E3 | - | - |
| | 6800 | 35 x 60 | 6.6 | 0.86 | 38 | 25 | L1 | 18682E3 | 58682E3 | - | - |
| | 6800 | 35 x 80 | 7.3 | 0.86 | 30 | 19 | L1 | 28682E3 | 68682E3 | - | - |
| | 10 000 | 35 x 80 | 8.1 | 1.26 | 27 | 19 | L1 | 18103E3 | 58103E3 | - | - |
| | 10 000 | 35 x 105 | 8.8 | 1.26 | 22 | 14 | L1 | 28103E3 | 68103E3 | - | - |
| | 15 000 | 35 x 105 | 9.7 | 1.89 | 19 | 14 | L1 | 18153E3 | 58153E3 | - | - |
| | 15 000 | 50 x 80 | 12.1 | 1.89 | 16 | 11 | L1 | 28153E3 | 68153E3 | - | - |
| | 22 000 | 50 x 80 | 11.1 | 2.77 | 19 | 15 | L1 | 18223E3 | 58223E3 | - | - |
| | 22 000 | 50 x 105 | 14.3 | 2.77 | 12 | 9 | L1 | 28223E3 | 68223E3 | - | - |
| | 33 000 | 50 x 105 | 12.9 | 4.16 | 14 | 12 | L1 | 18333E3 | 58333E3 | - | - |
| | 33 000 | 65 x 105 | 16.5 | 4.16 | 9 | 6 | L2 | 28333E3 | 68333E3 | 48333E3 | 88333E3 |
| | 47 000 | 65 x 105 | 15.6 | 5.92 | 10 | 8 | L2 | 18473E3 | 58473E3 | 38473E3 | 78473E3 |
| | 47 000 | 76 x 105 | 18.6 | 5.92 | 8 | 6 | L2 | 28473E3 | 68473E3 | 48473E3 | 88473E3 |
| | 68 000 | 76 x 105 | 20.0 | 8.57 | 7 | 6 | L2 | 18683E3 | 58683E3 | 38683E3 | 78683E3 |
| | 68 000 | 76 x 146 | 21.9 | 8.57 | 6 | 5 | L2 | 28683E3 | 68683E3 | 48683E3 | 88683E3 |
| | 100 000 | 76 x 146 | 23.4 | 12.6 | 5 | 5 | L2 | 28104E3 | 68104E3 | 48104E3 | 88104E3 |
| | 150 000 | 76 x 146 | 22.2 | 18.9 | 6 | 5 | L2 | 18154E3 | 58154E3 | 38154E3 | 78154E3 |
| 220 000 | 76 x 220 | 27.0 | 27.7 | 5 | 5 | L2 | 18224E3 | 58224E3 | 38224E3 | 78224E3 | |
| 220 000 | 90 x 146 | 36.5 | 27.7 | 5 | 5 | L2 | - | - | 48224E3 | 88224E3 | |
| 330 000 | 90 x 220 | 42.9 | 41.6 | 5 | 5 | L2 | - | - | 48334E3 | 88334E3 | |



| ELECTRICAL DATA AND ORDERING INFORMATION FOR 101 SERIES | | | | | | | | | | | |
|---|----------------------------------|---|--|----------------------------------|-------------------------------|-----------------------------|-----------------------------|-------------------------------|-------------------------|-------------------------|-------------------------|
| U _R (V) | C _R 100 Hz (μF) | NOMINAL CASE SIZE Ø D x L (mm) | I _R 100 Hz 85 °C (A) | I _{L5} 5 min (mA) | ESR MAX. 100 Hz (mΩ) | Z MAX. 20 kHz (mΩ) | LIFE CODE ⁽¹⁾ | STANDARD HIGH POST M5 DISC | | HIGH CURRENT M6 DISC | |
| | | | | | | | | ST ORDERING CODE | STB ORDERING CODE | ST ORDERING CODE | STB ORDERING CODE |
| | | | | | | | | MAL2101..... | MAL2101..... | MAL2101..... | MAL2101..... |
| 100 | 2200 | 35 x 60 | 5.2 | 0.44 | 50 | 29 | L1 | 19222E3 | 59222E3 | - | - |
| | 3300 | 35 x 60 | 6.0 | 0.66 | 42 | 27 | L1 | 19332E3 | 59332E3 | - | - |
| | 3300 | 35 x 80 | 6.6 | 0.66 | 35 | 21 | L1 | 29332E3 | 69332E3 | - | - |
| | 4700 | 35 x 80 | 7.3 | 0.94 | 31 | 20 | L1 | 19472E3 | 59472E3 | - | - |
| | 4700 | 35 x 105 | 7.9 | 0.94 | 26 | 16 | L1 | 29472E3 | 69472E3 | - | - |
| | 6800 | 35 x 105 | 8.8 | 1.36 | 23 | 15 | L1 | 19682E3 | 59682E3 | - | - |
| | 6800 | 50 x 80 | 10.9 | 1.36 | 19 | 12 | L1 | 29682E3 | 69682E3 | - | - |
| | 10 000 | 50 x 80 | 10.5 | 2.00 | 21 | 15 | L1 | 19103E3 | 59103E3 | - | - |
| | 10 000 | 50 x 105 | 13.1 | 2.00 | 14 | 9 | L1 | 29103E3 | 69103E3 | - | - |
| | 15 000 | 50 x 105 | 12.3 | 3.00 | 16 | 12 | L1 | 19153E3 | 59153E3 | - | - |
| | 22 000 | 65 x 105 | 14.8 | 4.40 | 11 | 8 | L2 | 19223E3 | 59223E3 | 39223E3 | 79223E3 |
| | 22 000 | 76 x 105 | 17.4 | 4.40 | 9 | 6 | L2 | 29223E3 | 69223E3 | 49223E3 | 89223E3 |
| | 33 000 | 76 x 105 | 19.0 | 6.60 | 8 | 6 | L2 | 19333E3 | 59333E3 | 39333E3 | 79333E3 |
| | 33 000 | 76 x 146 | 20.7 | 6.60 | 7 | 5 | L2 | 29333E3 | 69333E3 | 49333E3 | 89333E3 |
| | 47 000 | 76 x 146 | 22.4 | 9.40 | 6 | 5 | L2 | 29473E3 | 69473E3 | 49473E3 | 89473E3 |
| | 68 000 | 76 x 146 | 25.6 | 13.6 | 6 | 5 | L2 | 19683E3 | 59683E3 | 39683E3 | 79683E3 |
| | 100 000 | 76 x 220 | 31.2 | 20.0 | 5 | 5 | L2 | 19104E3 | 59104E3 | 39104E3 | 79104E3 |
| 100 000 | 90 x 146 | 41.5 | 20.0 | 5 | 5 | L2 | - | - | 49104E3 | 89104E3 | |
| 150 000 | 90 x 220 | 49.1 | 30.0 | 5 | 5 | L2 | - | - | 49154E3 | 89154E3 | |

Note

(1) Determines the applicable row in the table "Endurance Test Duration and Useful Life"

Table 3

| ELECTRICAL DATA AND ORDERING INFORMATION FOR 102 SERIES | | | | | | | | | | | |
|---|----------------------------------|---|--|----------------------------------|-------------------------------|-----------------------------|-----------------------------|------------------------|-------------------------|------------------------|-------------------------|
| U _R (V) | C _R 100 Hz (μF) | NOMINAL CASE SIZE Ø D x L (mm) | I _R 100 Hz 85 °C (A) | I _{L5} 5 min (mA) | ESR MAX. 100 Hz (mΩ) | Z MAX. 20 kHz (mΩ) | LIFE CODE ⁽¹⁾ | HIGH POST M5 DISC | | HIGH CURRENT M6 DISC | |
| | | | | | | | | ST ORDERING CODE | STB ORDERING CODE | ST ORDERING CODE | STB ORDERING CODE |
| | | | | | | | | MAL2102..... | MAL2102..... | MAL2102..... | MAL2102..... |
| 200 | 680 | 35 x 60 | 3.5 | 0.27 | 207 | 136 | L1 | 12681E3 | 52681E3 | - | - |
| | 1000 | 35 x 80 | 4.4 | 0.40 | 144 | 95 | L1 | 12102E3 | 52102E3 | - | - |
| | 1000 | 35 x 105 | 4.7 | 0.40 | 140 | 91 | L1 | 22102E3 | 62102E3 | - | - |
| | 1500 | 35 x 105 | 5.5 | 0.60 | 100 | 67 | L1 | 12152E3 | 52152E3 | - | - |
| | 1500 | 50 x 80 | 6.2 | 0.60 | 106 | 74 | L1 | 22152E3 | 62152E3 | - | - |
| | 2200 | 50 x 80 | 8.0 | 0.88 | 67 | 44 | L1 | 12222E3 | 52222E3 | - | - |
| | 3300 | 50 x 80 | 8.9 | 1.32 | 50 | 35 | L1 | 12332E3 | 52332E3 | - | - |
| | 3300 | 50 x 105 | 9.9 | 1.32 | 46 | 32 | L1 | 22332E3 | 62332E3 | - | - |
| | 4700 | 65 x 105 | 12.5 | 1.88 | 37 | 26 | L1 | 22472E3 | 62472E3 | 42472E3 | 82472E3 |
| | 6800 | 65 x 105 | 15.2 | 2.72 | 25 | 18 | L1 | 12682E3 | 52682E3 | 32682E3 | 72682E3 |
| | 6800 | 76 x 105 | 16.9 | 2.72 | 25 | 18 | L1 | 22682E3 | 62682E3 | 42682E3 | 82682E3 |
| | 10 000 | 76 x 105 | 19.9 | 4.00 | 18 | 13 | L1 | 12103E3 | 52103E3 | 32103E3 | 72103E3 |
| | 10 000 | 76 x 146 | 20.4 | 4.00 | 18 | 13 | L1 | 22103E3 | 62103E3 | 42103E3 | 82103E3 |
| | 15 000 | 76 x 146 | 24.1 | 6.00 | 12 | 9 | L1 | 12153E3 | 52153E3 | 32153E3 | 72153E3 |
| | 22 000 | 76 x 220 | 29.5 | 8.8 | 9 | 7 | L1 | 12223E3 | 52223E3 | 32223E3 | 72223E3 |
| | 22 000 | 90 x 146 | 34.1 | 8.8 | 8 | 6 | L1 | - | - | 42223E3 | 82223E3 |
| | 33 000 | 90 x 220 | 41.7 | 13.2 | 6 | 5 | L1 | - | - | 42333E3 | 82333E3 |



| ELECTRICAL DATA AND ORDERING INFORMATION FOR 102 SERIES | | | | | | | | | | | |
|---|----------------------------------|---|--|----------------------------------|-------------------------------|-----------------------------|-----------------------------|--|---|--|---|
| U _R (V) | C _R 100 Hz (μF) | NOMINAL CASE SIZE Ø D x L (mm) | I _R 100 Hz 85 °C (A) | I _{L5} 5 min (mA) | ESR MAX. 100 Hz (mΩ) | Z MAX. 20 kHz (mΩ) | LIFE CODE ⁽¹⁾ | HIGH POST M5 DISC | | HIGH CURRENT M6 DISC | |
| | | | | | | | | ST ORDERING CODE MAL2102..... | STB ORDERING CODE MAL2102..... | ST ORDERING CODE MAL2102..... | STB ORDERING CODE MAL2102..... |
| 250 | 470 | 35 x 60 | 3.1 | 0.24 | 250 | 152 | L1 | 13471E3 | 53471E3 | - | - |
| | 680 | 35 x 80 | 3.8 | 0.34 | 175 | 107 | L1 | 13681E3 | 53681E3 | - | - |
| | 1000 | 35 x 80 | 4.4 | 0.50 | 128 | 82 | L1 | 13102E3 | 53102E3 | - | - |
| | 1000 | 35 x 105 | 4.8 | 0.50 | 122 | 76 | L1 | 23102E3 | 63102E3 | - | - |
| | 1500 | 35 x 105 | 5.4 | 0.75 | 90 | 58 | L1 | 13152E3 | 53152E3 | - | - |
| | 1500 | 50 x 80 | 7.0 | 0.75 | 81 | 50 | L1 | 23152E3 | 63152E3 | - | - |
| | 2200 | 50 x 80 | 8.0 | 1.10 | 60 | 39 | L1 | 13222E3 | 53222E3 | - | - |
| | 2200 | 50 x 105 | 8.7 | 1.10 | 57 | 35 | L1 | 23222E3 | 63222E3 | - | - |
| | 3300 | 50 x 105 | 9.8 | 1.65 | 42 | 28 | L1 | 13332E3 | 53332E3 | - | - |
| | 3300 | 65 x 105 | 11.4 | 1.65 | 42 | 28 | L1 | 23332E3 | 63332E3 | 43332E3 | 83332E3 |
| | 4700 | 65 x 105 | 13.8 | 2.35 | 29 | 19 | L1 | 13472E3 | 53472E3 | 33472E3 | 73472E3 |
| | 4700 | 76 x 105 | 15.3 | 2.35 | 29 | 19 | L1 | 23472E3 | 63472E3 | 43472E3 | 83472E3 |
| | 6800 | 76 x 105 | 18.1 | 3.40 | 21 | 14 | L1 | 13682E3 | 53682E3 | 33682E3 | 73682E3 |
| | 6800 | 76 x 146 | 18.6 | 3.40 | 21 | 14 | L1 | 23682E3 | 63682E3 | 43682E3 | 83682E3 |
| | 10 000 | 76 x 105 | 19.3 | 5.00 | 17 | 12 | L1 | 13103E3 | 53103E3 | 33103E3 | 73103E3 |
| | 10 000 | 76 x 146 | 22.0 | 5.00 | 15 | 10 | L1 | 23103E3 | 63103E3 | 43103E3 | 83103E3 |
| | 15 000 | 76 x 146 | 23.3 | 7.5 | 12 | 10 | L1 | 13153E3 | 53153E3 | 33153E3 | 73153E3 |
| | 22 000 | 76 x 220 | 29.1 | 11.0 | 9 | 7 | L1 | 13223E3 | 53223E3 | 33223E3 | 73223E3 |
| 22 000 | 90 x 146 | 35.3 | 11.0 | 7 | 5 | L1 | - | - | 43223E3 | 83223E3 | |
| 33 000 | 90 x 220 | 43.2 | 16.5 | 5 | 5 | L1 | - | - | 43333E3 | 83333E3 | |
| 350 | 330 | 35 x 60 | 2.5 | 0.23 | 435 | 305 | L1 | 15331E3 | 55331E3 | - | - |
| | 470 | 35 x 80 | 3.1 | 0.33 | 308 | 216 | L1 | 25471E3 | 65471E3 | - | - |
| | 680 | 35 x 105 | 3.8 | 0.48 | 216 | 152 | L1 | 25681E3 | 65681E3 | - | - |
| | 1000 | 50 x 80 | 5.6 | 0.70 | 145 | 102 | L1 | 25102E3 | 65102E3 | - | - |
| | 1500 | 50 x 80 | 6.5 | 1.05 | 102 | 74 | L1 | 15152E3 | 55152E3 | - | - |
| | 1500 | 50 x 105 | 7.0 | 1.05 | 99 | 70 | L1 | 25152E3 | 65152E3 | - | - |
| | 2200 | 50 x 105 | 8.0 | 1.54 | 72 | 52 | L1 | 15222E3 | 55222E3 | - | - |
| | 2200 | 65 x 105 | 9.3 | 1.54 | 72 | 52 | L1 | 25222E3 | 65222E3 | 45222E3 | 85222E3 |
| | 3300 | 65 x 105 | 11.4 | 2.31 | 48 | 35 | L1 | 25332E3 | 65332E3 | 45332E3 | 85332E3 |
| | 4700 | 76 x 105 | 15.0 | 3.29 | 34 | 25 | L1 | 15472E3 | 55472E3 | 35472E3 | 75472E3 |
| | 4700 | 76 x 146 | 15.4 | 3.29 | 34 | 25 | L1 | 25472E3 | 65472E3 | 45472E3 | 85472E3 |
| | 6800 | 76 x 146 | 18.3 | 4.76 | 24 | 18 | L1 | 25682E3 | 65682E3 | 45682E3 | 85682E3 |
| | 10 000 | 76 x 220 | 23.2 | 7.0 | 15 | 12 | L1 | 15103E3 | 55103E3 | 35103E3 | 75103E3 |
| | 10 000 | 90 x 146 | 25.1 | 7.0 | 15 | 12 | L1 | - | - | 45103E3 | 85103E3 |
| | 15 000 | 90 x 220 | 31.2 | 10.5 | 10 | 8 | L1 | - | - | 45153E3 | 85153E3 |
| 385 | 220 | 35 x 60 | 2.1 | 0.17 | 575 | 380 | L1 | 18221E3 | 58221E3 | - | - |
| | 330 | 35 x 80 | 2.7 | 0.26 | 386 | 257 | L1 | 18331E3 | 58331E3 | - | - |
| | 470 | 35 x 80 | 3.1 | 0.37 | 279 | 188 | L1 | 18471E3 | 58471E3 | - | - |
| | 680 | 35 x 105 | 3.9 | 0.53 | 196 | 133 | L1 | 18681E3 | 58681E3 | - | - |
| | 1000 | 50 x 80 | 5.6 | 0.77 | 132 | 89 | L1 | 18102E3 | 58102E3 | - | - |
| | 1500 | 50 x 105 | 7.1 | 1.16 | 90 | 61 | L1 | 18152E3 | 58152E3 | - | - |
| | 2200 | 65 x 105 | 10.0 | 1.70 | 61 | 42 | L1 | 18222E3 | 58222E3 | 38222E3 | 78222E3 |
| | 3300 | 76 x 105 | 13.4 | 2.55 | 42 | 29 | L1 | 18332E3 | 58332E3 | 38332E3 | 78332E3 |
| | 4700 | 76 x 105 | 15.0 | 3.62 | 31 | 22 | L1 | 18472E3 | 58472E3 | 38472E3 | 78472E3 |
| | 4700 | 76 x 146 | 16.3 | 3.62 | 29 | 20 | L1 | 28472E3 | 68472E3 | 48472E3 | 88472E3 |
| | 6800 | 76 x 146 | 18.3 | 5.24 | 22 | 16 | L1 | 18682E3 | 58682E3 | 38682E3 | 78682E3 |



| ELECTRICAL DATA AND ORDERING INFORMATION FOR 102 SERIES | | | | | | | | | | | |
|---|----------------------------------|---|--|----------------------------------|-------------------------------|-----------------------------|-----------------------------|--|---|--|---|
| U _R (V) | C _R 100 Hz (μF) | NOMINAL CASE SIZE Ø D x L (mm) | I _R 100 Hz 85 °C (A) | I _{L5} 5 min (mA) | ESR MAX. 100 Hz (mΩ) | Z MAX. 20 kHz (mΩ) | LIFE CODE ⁽¹⁾ | HIGH POST M5 DISC | | HIGH CURRENT M6 DISC | |
| | | | | | | | | ST ORDERING CODE MAL2102..... | STB ORDERING CODE MAL2102..... | ST ORDERING CODE MAL2102..... | STB ORDERING CODE MAL2102..... |
| 400 | 220 | 35 x 60 | 2.1 | 0.18 | 557 | 363 | L1 | 16221E3 | 56221E3 | - | - |
| | 330 | 35 x 60 | 2.5 | 0.26 | 383 | 254 | L1 | 16331E3 | 56331E3 | - | - |
| | 330 | 35 x 80 | 2.7 | 0.26 | 374 | 245 | L1 | 26331E3 | 66331E3 | - | - |
| | 470 | 35 x 80 | 3.1 | 0.38 | 271 | 180 | L1 | 16471E3 | 56471E3 | - | - |
| | 470 | 35 x 105 | 3.3 | 0.38 | 265 | 175 | L1 | 26471E3 | 66471E3 | - | - |
| | 680 | 35 x 105 | 3.9 | 0.55 | 191 | 128 | L1 | 16681E3 | 56681E3 | - | - |
| | 680 | 50 x 80 | 4.5 | 0.54 | 199 | 136 | L1 | 26681E3 | 66681E3 | - | - |
| | 1000 | 50 x 80 | 5.7 | 0.80 | 128 | 86 | L1 | 16102E3 | 56102E3 | - | - |
| | 1000 | 50 x 105 | 6.0 | 0.80 | 125 | 83 | L1 | 26102E3 | 66102E3 | - | - |
| | 1500 | 50 x 105 | 7.1 | 1.20 | 88 | 59 | L1 | 26152E3 | 66152E3 | - | - |
| | 2200 | 65 x 105 | 10.0 | 1.76 | 60 | 40 | L1 | 26222E3 | 66222E3 | 46222E3 | 86222E3 |
| | 3300 | 65 x 105 | 12.1 | 2.64 | 40 | 27 | L1 | 16332E3 | 56332E3 | 36332E3 | 76332E3 |
| | 3300 | 76 x 105 | 13.4 | 2.64 | 40 | 27 | L1 | 26332E3 | 66332E3 | 46332E3 | 86332E3 |
| | 4700 | 76 x 105 | 15.0 | 3.76 | 31 | 21 | L1 | 16472E3 | 56472E3 | 36472E3 | 76472E3 |
| | 4700 | 76 x 146 | 16.4 | 3.76 | 28 | 19 | L1 | 26472E3 | 66472E3 | 46472E3 | 86472E3 |
| | 6800 | 76 x 146 | 18.3 | 5.44 | 22 | 15 | L1 | 26682E3 | 66682E3 | 46682E3 | 86682E3 |
| 10000 | 76 x 220 | 22.1 | 8.0 | 14 | 11 | L1 | 16103E3 | 56103E3 | 36103E3 | 76103E3 | |
| 450 | 220 | 35 x 60 | 2.1 | 0.20 | 503 | 313 | L1 | 17221E3 | 57221E3 | - | - |
| | 330 | 35 x 80 | 2.7 | 0.30 | 339 | 212 | L1 | 27331E3 | 67331E3 | - | - |
| | 470 | 35 x 105 | 3.4 | 0.42 | 241 | 151 | L1 | 27471E3 | 67471E3 | - | - |
| | 680 | 50 x 80 | 4.9 | 0.61 | 159 | 98 | L1 | 27681E3 | 67681E3 | - | - |
| | 1000 | 50 x 80 | 5.7 | 0.90 | 118 | 75 | L1 | 17102E3 | 57102E3 | - | - |
| | 1000 | 50 x 105 | 6.1 | 0.90 | 114 | 72 | L1 | 27102E3 | 67102E3 | - | - |
| | 1500 | 50 x 105 | 7.1 | 1.35 | 81 | 52 | L1 | 17152E3 | 57152E3 | - | - |
| | 1500 | 65 x 105 | 8.3 | 1.35 | 81 | 52 | L1 | 27152E3 | 67152E3 | 47152E3 | 87152E3 |
| | 2200 | 65 x 105 | 10.1 | 1.98 | 55 | 35 | L1 | 17222E3 | 57222E3 | 37222E3 | 77222E3 |
| | 2200 | 76 x 105 | 11.2 | 1.98 | 55 | 35 | L1 | 27222E3 | 67222E3 | 47222E3 | 87222E3 |
| | 3300 | 76 x 105 | 13.5 | 2.97 | 37 | 24 | L1 | 17332E3 | 57332E3 | 37332E3 | 77332E3 |
| | 3300 | 76 x 146 | 13.9 | 2.97 | 37 | 24 | L1 | 27332E3 | 67332E3 | 47332E3 | 87332E3 |
| | 4700 | 76 x 146 | 16.4 | 4.23 | 26 | 17 | L1 | 17472E3 | 57472E3 | 37472E3 | 77472E3 |
| | 5600 | 76 x 146 | 17.3 | 5.04 | 23 | 15 | L1 | 17562E3 | 57562E3 | 37562E3 | 77562E3 |
| | 6800 | 76 x 220 | 19.8 | 6.1 | 25 | 20 | L1 | 17682E3 | 57682E3 | 37682E3 | 77682E3 |
| | 6800 | 90 x 146 | 21.3 | 6.1 | 24 | 19 | L1 | - | - | 47682E3 | 87682E3 |
| 10 000 | 90 x 220 | 26.5 | 9.0 | 17 | 14 | L1 | - | - | 47103E3 | 87103E3 | |

Note

⁽¹⁾ Determines the applicable row in the table "Endurance Test Duration and Useful Life"

| ADDITIONAL ELECTRICAL DATA | | |
|------------------------------------|-------------------------------|---|
| PARAMETER | CONDITIONS | VALUE |
| Voltage | | |
| Surge voltage | ≤ 250 V versions | U _S = 1.15 x U _R |
| Reverse voltage | ≥ 350 V versions | U _S = 1.1 x U _R |
| | | U _{rev} ≤ 1 V |
| Current | | |
| Leakage current | After 1 min at U _R | I _{L1} ≤ 0.006 C _R x U _R |
| | After 5 min at U _R | I _{L5} ≤ 0.002 C _R x U _R |
| Inductance | | |
| Equivalent series inductance (ESL) | Case Ø D = 35 mm | Typ. 13 nH |
| | Case Ø D = 50 mm | Typ. 16 nH |
| | Case Ø D = 65 mm | Typ. 19 nH ⁽¹⁾ |
| | Case Ø D = 76 mm | Typ. 20 nH ⁽¹⁾ |
| | Case Ø D = 90 mm | Typ. 21 nH ⁽¹⁾ |

Note

⁽¹⁾ Low ESL designs available on request

RIPPLE CURRENT AND USEFUL LIFE

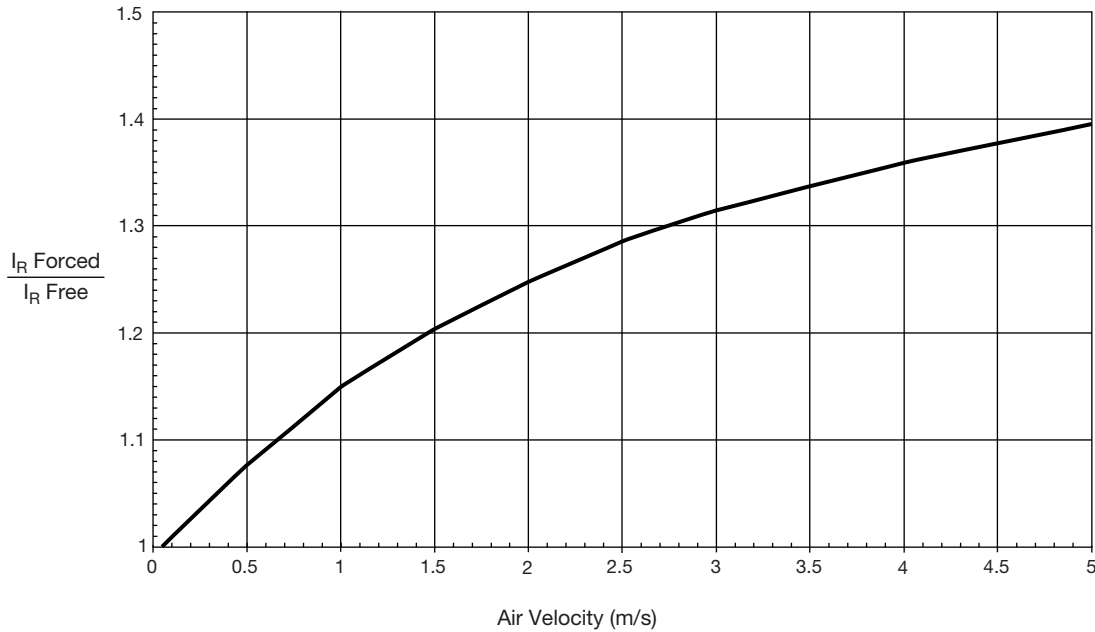


Fig. 3 - Multiplier of ripple current (I_R) as a function of air flow

| MAXIMUM RIPPLE CURRENT | | | |
|-----------------------------------|-----------|-----------------------------------|-------|
| PARAMETER | CONDITION | MAXIMUM RIPPLE CURRENT MULTIPLIER | VALUE |
| Ambient temperature (T_{amb}) | 70 °C | From nomogram; see Fig. 4 | 1.6 |
| Operating frequency (f) | 400 Hz | From frequency; see Table 4 | 1.3 |
| Air flow | 2 m/s | From air flow; see Fig. 3 | 1.25 |

Note

- Calculation example for 102 series. maximum ripple current multiplier = 1.6 x 1.3 x 1.25 = 2.6

Table 4

| ENDURANCE TEST DURATION AND USEFUL LIFE | | |
|---|------------------------|--------------------------|
| LIFE CODE | ENDURANCE AT 85 °C (h) | USEFUL LIFE AT 85 °C (h) |
| L1 | 2000 | 10 000 |
| L2 | 2000 | 15 000 |

Note

- Multiplier of useful life code: CCC205-05



CCC205-05

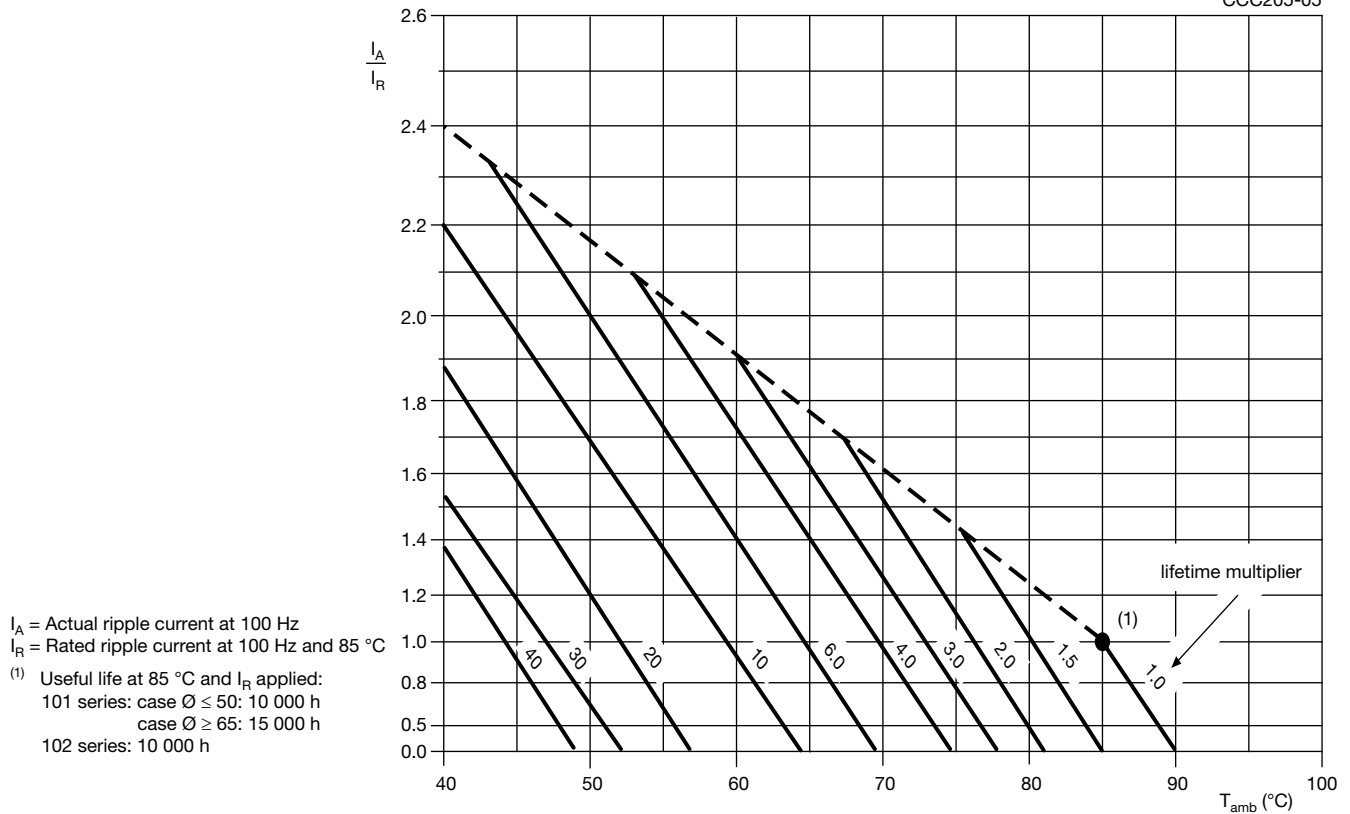


Fig. 4 - Multiplier of useful life as a function of ambient temperature and ripple current load

Table 5

| MULTIPLIER OF RIPPLE CURRENT (I_R) AS A FUNCTION OF FREQUENCY | | | | | | |
|---|----------------|------|------|------|------|--------|
| U_R (V) | FREQUENCY (Hz) | | | | | |
| | 50 | 100 | 200 | 400 | 1000 | 10 000 |
| I_R MULTIPLIER | | | | | | |
| 25 | 0.85 | 1.00 | 1.10 | 1.15 | 1.20 | 1.30 |
| 40 | 0.85 | 1.00 | 1.10 | 1.15 | 1.20 | 1.30 |
| 63 | 0.85 | 1.00 | 1.10 | 1.15 | 1.20 | 1.30 |
| 100 | 0.85 | 1.00 | 1.10 | 1.15 | 1.20 | 1.30 |
| 200 | 0.90 | 1.00 | 1.20 | 1.30 | 1.40 | 1.50 |
| 250 | 0.90 | 1.00 | 1.20 | 1.30 | 1.40 | 1.50 |
| 350 | 0.90 | 1.00 | 1.20 | 1.30 | 1.40 | 1.50 |
| 385 | 0.90 | 1.00 | 1.20 | 1.30 | 1.40 | 1.50 |
| 400 | 0.90 | 1.00 | 1.20 | 1.30 | 1.40 | 1.50 |
| 450 | 0.90 | 1.00 | 1.20 | 1.30 | 1.40 | 1.50 |



Table 6

| TEST PROCEDURES AND REQUIREMENTS | | | |
|--|--|--|---|
| TEST | | PROCEDURE (quick reference) | REQUIREMENTS |
| NAME OF TEST | REFERENCE | | |
| Endurance | IEC 60384-4 / EN 130300 subclause 4.13 | $T_{amb} = 85\text{ }^{\circ}\text{C}$; U_R applied; 2000 h | $U_R \leq 100\text{ V}$; $\Delta C/C: \pm 15\%$ $U_R > 100\text{ V}$; $\Delta C/C: \pm 10\%$ $\tan \delta \leq 1.3 \times \text{spec. limit}$ $Z \leq 2 \times \text{spec. limit}$ $I_{L5} \leq \text{spec. limit}$ |
| Useful life | CECC 30301 subclause 1.8.1 | $T_{amb} = 85\text{ }^{\circ}\text{C}$; U_R and I_R applied 101 series: case $\varnothing D \leq 50$: 10 000 h case $\varnothing D \geq 65$: 15 000 h 102 series: 10 000 h | $U_R \leq 100\text{ V}$; $\Delta C/C: \pm 45\%$ $U_R > 100\text{ V}$; $\Delta C/C: \pm 30\%$ $\tan \delta \leq 3 \times \text{spec. limit}$ $Z \leq 3 \times \text{spec. limit}$ $I_{L5} \leq \text{spec. limit}$ no short or open circuit, no visible damage Total failure percentage: $U_R \leq 100\text{ V}; \leq 1\%$ $U_R > 100\text{ V}; \leq 3\%$ |
| Shelf life (storage at high temperature) | IEC 60384-4 / EN 130300 subclause 4.17 | $T_{amb} = 85\text{ }^{\circ}\text{C}$; no voltage applied; 500 h After test: U_R to be applied for 30 min, 24 h to 48 h before measurement | $\Delta C/C: \pm 10\%$ $\tan \delta \leq 1.2 \times \text{spec. limit}$ $I_{L5} \leq 2 \times \text{spec. limit}$ |

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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