

## Aluminum Electrolytic Capacitors, Power Eurodin, Screw Terminals



## LINKS TO ADDITIONAL RESOURCES



Fig. 1

## QUICK REFERENCE DATA

| DESCRIPTION                                         | VALUE                   |
|-----------------------------------------------------|-------------------------|
| Nominal case size (Ø D x L in mm)                   | 35 x 60 to 90 x 220     |
| Rated capacitance range (E6 series), C <sub>R</sub> | 1000 µF to 330 000 µF   |
| Tolerance on C <sub>R</sub>                         | -10 % to +30 %          |
| Rated voltage range, U <sub>R</sub>                 | 25 V to 100 V           |
| Category temperature range                          | -40 °C to +85 °C        |
| Endurance test at 85 °C                             | 8000 h                  |
| Useful life at 85 °C                                | 20 000 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 / 56           |

## FEATURES

- Very long useful life: 20 000 h at 85 °C
- Extremely low ESR and ESL allowing very high ripple current load
- High resistance to shock and vibration
- Polarized aluminum electrolytic capacitors, non-solid electrolyte
- Large types, cylindrical aluminum case, insulated with a blue sleeve
- Also available in bolt version (106 PED-STB)
- Pressure relief in the sealing
- Charge and discharge proof
- High reliability
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT

## APPLICATIONS

- Computer, telecommunications, and industrial systems
- Smoothing and filtering
- Standard and switched mode power supplies
- Energy storage in pulse systems

## MARKING

The capacitors are marked with the following information:

- Rated capacitance (in  $\mu\text{F}$ )
- Tolerance on rated capacitance, code letter in accordance with IEC 60062 (Q for -10 % / +30 %)
- Rated voltage (in V)
- Date code
- 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
- “LL” for long life grade

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

| C <sub>R</sub><br>(μF) | U <sub>R</sub> (V) |          |          |          |
|------------------------|--------------------|----------|----------|----------|
|                        | 25                 | 40       | 63       | 100      |
| 1000                   | -                  | -        | -        | 35 x 60  |
| 1500                   | -                  | -        | -        | 35 x 60  |
| 2200                   | -                  | -        | 35 x 60  | 35 x 80  |
| 2700                   | -                  | -        | 35 x 60  | -        |
| 3300                   | -                  | 35 x 60  | 35 x 60  | 35 x 105 |
| 4700                   | 35 x 60            | 35 x 60  | 35 x 80  | 50 x 80  |
| 6800                   | 35 x 60            | 35 x 80  | 35 x 105 | 50 x 105 |
| 10 000                 | 35 x 80            | 35 x 105 | 50 x 80  | 65 x 105 |
| 15 000                 | 35 x 105           | 50 x 80  | 50 x 105 | 65 x 105 |
| 22 000                 | 50 x 80            | 50 x 105 | 65 x 105 | 76 x 105 |
| 33 000                 | 50 x 105           | 65 x 105 | 65 x 105 | 76 x 146 |
| 47 000                 | 65 x 105           | 65 x 105 | 76 x 105 | 76 x 220 |
| 68 000                 | 65 x 105           | 76 x 105 | 76 x 146 | 90 x 220 |
| 100 000                | 76 x 105           | 76 x 146 | 76 x 220 | -        |
| 150 000                | 76 x 146           | 76 x 220 | -        | -        |
|                        | -                  | 90 x 146 | 90 x 220 | -        |
| 220 000                | 76 x 220           | -        | -        | -        |
|                        | 90 x 146           | 90 x 220 | -        | -        |
| 330 000                | 90 x 220           | -        | -        | -        |

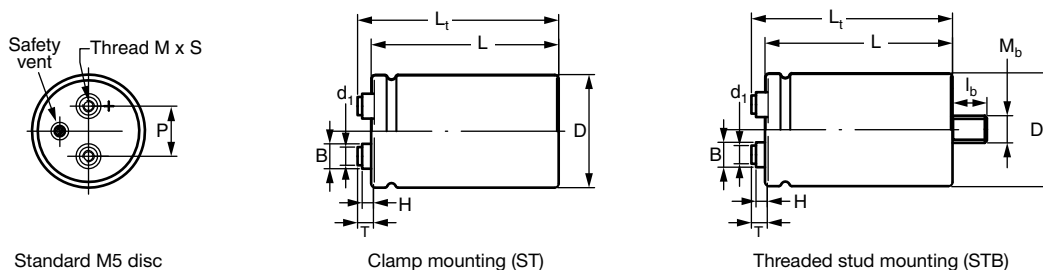
**DIMENSIONS in millimeters AND AVAILABLE FORMS**


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

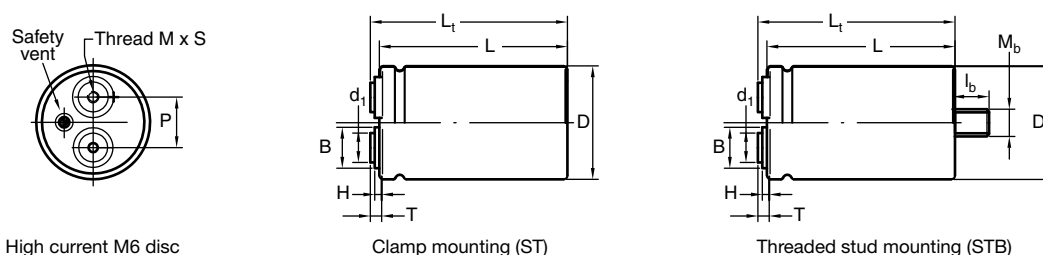


Fig. 2B - Mechanical drawings for high current M6 disc versions.  
For details refer to Table 1

**Note**

- 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](http://www.vishay.com/doc?28348)  
The capacitors are delivered with screws and washers

**Table 1**

| <b>DIMENSIONS in millimeters AND MASS</b> |         |       |                    |       |         |         |         |         |                      |    |       |                |                      |          |
|-------------------------------------------|---------|-------|--------------------|-------|---------|---------|---------|---------|----------------------|----|-------|----------------|----------------------|----------|
| DESIGN                                    | DRAWING | L ± 1 | L <sub>t</sub> ± 1 | D ± 1 | P ± 0.3 | T ± 0.2 | H ± 0.3 | B ± 0.3 | d <sub>1</sub> ± 0.1 | M  | S - 0 | M <sub>b</sub> | l <sub>b</sub> ± 0.1 | MASS (g) |
| 35 x 60                                   | 2A      | 63.3  | 68.7               | 35.3  | 12.8    | 7.0     | 4.6     | 11.0    | 7.9                  | M5 | 9.5   | M8             | 12.0                 | 75       |
| 35 x 80                                   | 2A      | 81.3  | 86.7               | 35.3  | 12.8    | 7.0     | 4.6     | 11.0    | 7.9                  | M5 | 9.5   | M8             | 12.0                 | 95       |
| 35 x 105                                  | 2A      | 103.3 | 108.7              | 35.3  | 12.8    | 7.0     | 4.6     | 11.0    | 7.9                  | M5 | 9.5   | M8             | 12.0                 | 130      |
| 50 x 80                                   | 2A      | 82.8  | 88.8               | 51.0  | 22.2    | 7.1     | 4.8     | 11.0    | 7.9                  | M5 | 9.5   | M12            | 16.0                 | 200      |
| 50 x 105                                  | 2A      | 104.8 | 110.8              | 51.0  | 22.2    | 7.1     | 4.8     | 11.0    | 7.9                  | M5 | 9.5   | M12            | 16.0                 | 300      |
| 65 x 105                                  | 2A      | 104.8 | 110.7              | 65.0  | 28.5    | 7.0     | 4.6     | 11.9    | 7.9                  | M5 | 9.5   | M12            | 16.0                 | 480      |
| 65 x 105 HC                               | 2B      | 104.8 | 109.2              | 65.0  | 28.5    | 5.5     | 3.5     | 18.0    | 13.0                 | M6 | 8.5   | M12            | 16.0                 | 480      |
| 76 x 105                                  | 2A      | 105.8 | 111.7              | 76.4  | 31.8    | 7.0     | 4.6     | 11.7    | 7.9                  | M5 | 9.5   | M12            | 16.0                 | 700      |
| 76 x 105 HC                               | 2B      | 105.8 | 110.2              | 76.4  | 31.8    | 5.5     | 3.5     | 18.3    | 13.0                 | M6 | 8.5   | M12            | 16.0                 | 700      |
| 76 x 146                                  | 2A      | 145.8 | 151.7              | 76.4  | 31.8    | 7.0     | 4.6     | 11.7    | 7.9                  | M5 | 9.5   | M12            | 16.0                 | 1000     |
| 76 x 146 HC                               | 2B      | 145.8 | 150.2              | 76.4  | 31.8    | 5.5     | 3.5     | 18.3    | 13.0                 | M6 | 8.5   | M12            | 16.0                 | 1000     |
| 76 x 220                                  | 2A      | 219.8 | 225.7              | 76.4  | 31.8    | 7.0     | 4.6     | 11.7    | 7.9                  | M5 | 9.5   | M12            | 16.0                 | 1500     |
| 76 x 220 HC                               | 2B      | 219.8 | 224.2              | 76.4  | 31.8    | 5.5     | 3.5     | 18.3    | 13.0                 | M6 | 8.5   | M12            | 16.0                 | 1500     |
| 90 x 146 HC                               | 2B      | 150.1 | 155.4              | 89.4  | 31.8    | 7.9     | 0.0     | 13.0    | 13.0                 | M6 | 10.0  | M12            | 16.0                 | 1300     |
| 90 x 220 HC                               | 2B      | 218.1 | 223.4              | 89.4  | 31.8    | 7.9     | 0.0     | 13.0    | 13.0                 | M6 | 10.0  | M12            | 16.0                 | 2000     |

**PACKAGING QUANTITIES AND DIMENSIONS** in millimeters

| DESIGN      | PACKAGING QUANTITIES<br>(units per box) | CARDBOX DIMENSIONS<br>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    | 12                                      | 377 x 375 x 242                 |
| 76 x 220 HC | 12                                      | 377 x 375 x 242                 |
| 90 x 146 HC | 8                                       | 377 x 375 x 168                 |
| 90 x 220 HC | 8                                       | 377 x 375 x 242                 |

**Note**

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

**ELECTRICAL DATA**

| SYMBOL   | DESCRIPTION                                              |
|----------|----------------------------------------------------------|
| $C_R$    | Rated capacitance at 100 Hz,<br>tolerance -10 % to +30 % |
| $I_R$    | 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 Tables 2 and 3 apply at  $T_{amb} = 20\text{ °C}$ ,  $P = 86\text{ kPa}$  to  $106\text{ kPa}$ ,  $RH = 45\text{ %}$  to  $75\text{ %}$

**ORDERING EXAMPLE**

Electrolytic capacitor 106 PED-ST series

10 000  $\mu\text{F}$  / 25 V; -10 % / +30 %

Nominal case size:  $\varnothing 35\text{ mm}$  x 80 mm, ST version

Ordering code: MAL210616103E3

**Table 2**
**ELECTRICAL DATA AND ORDERING INFORMATION**

| $U_R$<br>(V) | $C_R$<br>100 Hz<br>( $\mu\text{F}$ ) | NOMINAL<br>CASE SIZE<br>$\varnothing D \times L$<br>(mm) | $I_R$<br>100 Hz<br>85 °C<br>(A) | $I_{L5}$<br>5 MIN.<br>(mA) | ESR<br>MAX.<br>100 Hz<br>(m $\Omega$ ) | Z<br>MAX.<br>20 kHz<br>(m $\Omega$ ) | STANDARD M5 DISC                       |                                         | HIGH CURRENT M6 DISC                   |                                         |
|--------------|--------------------------------------|----------------------------------------------------------|---------------------------------|----------------------------|----------------------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-----------------------------------------|
|              |                                      |                                                          |                                 |                            |                                        |                                      | ST<br>ORDERING<br>CODE<br>MAL2106..... | STB<br>ORDERING<br>CODE<br>MAL2106..... | ST<br>ORDERING<br>CODE<br>MAL2106..... | STB<br>ORDERING<br>CODE<br>MAL2106..... |
| 25           | 4700                                 | 35 x 60                                                  | 5.8                             | 0.24                       | 70                                     | 50                                   | 16472E3                                | 56472E3                                 | -                                      | -                                       |
|              | 6800                                 | 35 x 60                                                  | 6.3                             | 0.34                       | 55                                     | 42                                   | 16682E3                                | 56682E3                                 | -                                      | -                                       |
|              | 10 000                               | 35 x 80                                                  | 7.7                             | 0.50                       | 40                                     | 31                                   | 16103E3                                | 56103E3                                 | -                                      | -                                       |
|              | 15 000                               | 35 x 105                                                 | 9.0                             | 0.75                       | 30                                     | 24                                   | 16153E3                                | 56153E3                                 | -                                      | -                                       |
|              | 22 000                               | 50 x 80                                                  | 13.5                            | 1.10                       | 19                                     | 15                                   | 16223E3                                | 56223E3                                 | -                                      | -                                       |
|              | 33 000                               | 50 x 105                                                 | 16.0                            | 1.65                       | 14                                     | 12                                   | 16333E3                                | 56333E3                                 | -                                      | -                                       |
|              | 47 000                               | 65 x 105                                                 | 22.5                            | 3.35                       | 10                                     | 10                                   | 16473E3                                | 56473E3                                 | 36473E3                                | 76473E3                                 |
|              | 68 000                               | 65 x 105                                                 | 23.0                            | 3.40                       | 10                                     | 10                                   | 16683E3                                | 56683E3                                 | 36683E3                                | 76683E3                                 |
|              | 100 000                              | 76 x 105                                                 | 29.5                            | 5.00                       | 9                                      | 8                                    | 16104E3                                | 56104E3                                 | 36104E3                                | 76104E3                                 |
|              | 150 000                              | 76 x 146                                                 | 34.0                            | 7.5                        | 8                                      | 8                                    | 16154E3                                | 56154E3                                 | 36154E3                                | 76154E3                                 |
|              | 220 000                              | 76 x 220                                                 | 40.0                            | 11.0                       | 8                                      | 8                                    | 16224E3                                | 56224E3                                 | 36224E3                                | 76224E3                                 |
|              | 220 000                              | 90 x 146                                                 | 50.0                            | 11.0                       | 8                                      | 8                                    | -                                      | -                                       | 46224E3                                | 86224E3                                 |
|              | 330 000                              | 90 x 220                                                 | 50.0                            | 16.5                       | 8                                      | 8                                    | -                                      | -                                       | 46334E3                                | 86334E3                                 |

**ELECTRICAL DATA AND ORDERING INFORMATION**

| U <sub>R</sub><br>(V) | C <sub>R</sub><br>100 Hz<br>(μF) | NOMINAL<br>CASE SIZE<br>Ø D x L<br>(mm) | I <sub>R</sub><br>100 Hz<br>85 °C<br>(A) | I <sub>L5</sub><br>5 MIN.<br>(mA) | ESR<br>MAX.<br>100 Hz<br>(mΩ) | Z<br>MAX.<br>20 kHz<br>(mΩ) | STANDARD M5 DISC                       |                                         | HIGH CURRENT M6 DISC                   |                                         |
|-----------------------|----------------------------------|-----------------------------------------|------------------------------------------|-----------------------------------|-------------------------------|-----------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-----------------------------------------|
|                       |                                  |                                         |                                          |                                   |                               |                             | ST<br>ORDERING<br>CODE<br>MAL2106..... | STB<br>ORDERING<br>CODE<br>MAL2106..... | ST<br>ORDERING<br>CODE<br>MAL2106..... | STB<br>ORDERING<br>CODE<br>MAL2106..... |
| 40                    | 3300                             | 35 x 60                                 | 5.5                                      | 0.27                              | 71                            | 49                          | 17332E3                                | 57332E3                                 | -                                      | -                                       |
|                       | 4700                             | 35 x 60                                 | 5.8                                      | 0.38                              | 59                            | 44                          | 17472E3                                | 57472E3                                 | -                                      | -                                       |
|                       | 6800                             | 35 x 80                                 | 7.1                                      | 0.55                              | 42                            | 32                          | 17682E3                                | 57682E3                                 | -                                      | -                                       |
|                       | 10 000                           | 35 x 105                                | 10.6                                     | 0.80                              | 23                            | 16                          | 17103E3                                | 57103E3                                 | -                                      | -                                       |
|                       | 15 000                           | 50 x 80                                 | 12.5                                     | 1.20                              | 20                            | 16                          | 17153E3                                | 57153E3                                 | -                                      | -                                       |
|                       | 22 000                           | 50 x 105                                | 14.5                                     | 1.76                              | 16                            | 12                          | 17223E3                                | 57223E3                                 | -                                      | -                                       |
|                       | 33 000                           | 65 x 105                                | 21.0                                     | 2.64                              | 11                            | 8                           | 17333E3                                | 57333E3                                 | 37333E3                                | 77333E3                                 |
|                       | 47 000                           | 65 x 105                                | 24.5                                     | 3.76                              | 8                             | 8                           | 17473E3                                | 57473E3                                 | 37473E3                                | 77473E3                                 |
|                       | 68 000                           | 76 x 105                                | 27.0                                     | 5.44                              | 8                             | 8                           | 17683E3                                | 57683E3                                 | 37683E3                                | 77683E3                                 |
|                       | 100 000                          | 76 x 146                                | 31.5                                     | 8.0                               | 8                             | 8                           | 17104E3                                | 57104E3                                 | 37104E3                                | 77104E3                                 |
|                       | 150 000                          | 76 x 220                                | 38.0                                     | 12.0                              | 8                             | 8                           | 17154E3                                | 57154E3                                 | 37154E3                                | 77154E3                                 |
|                       | 150 000                          | 90 x 146                                | 50.0                                     | 12.0                              | 8                             | 8                           | -                                      | -                                       | 47154E3                                | 87154E3                                 |
|                       | 220 000                          | 90 x 220                                | 50.0                                     | 17.6                              | 8                             | 8                           | -                                      | -                                       | 47224E3                                | 87224E3                                 |
| 63                    | 2200                             | 35 x 60                                 | 5.4                                      | 0.28                              | 68                            | 47                          | 18222E3                                | 58222E3                                 | -                                      | -                                       |
|                       | 2700                             | 35 x 60                                 | 5.6                                      | 0.34                              | 63                            | 43                          | 18272E3                                | 58272E3                                 | -                                      | -                                       |
|                       | 3300                             | 35 x 60                                 | 7.2                                      | 0.42                              | 40                            | 27                          | 18332E3                                | 58332E3                                 | -                                      | -                                       |
|                       | 4700                             | 35 x 80                                 | 8.8                                      | 0.60                              | 29                            | 19                          | 18472E3                                | 58472E3                                 | -                                      | -                                       |
|                       | 6800                             | 35 x 105                                | 10.6                                     | 0.86                              | 22                            | 15                          | 18682E3                                | 58682E3                                 | -                                      | -                                       |
|                       | 10 000                           | 50 x 80                                 | 14.5                                     | 1.26                              | 16                            | 11                          | 18103E3                                | 58103E3                                 | -                                      | -                                       |
|                       | 15 000                           | 50 x 105                                | 17.0                                     | 1.89                              | 12                            | 9                           | 18153E3                                | 58153E3                                 | -                                      | -                                       |
|                       | 22 000                           | 65 x 105                                | 23.5                                     | 2.78                              | 9                             | 8                           | 18223E3                                | 58223E3                                 | 38223E3                                | 78223E3                                 |
|                       | 33 000                           | 65 x 105                                | 23.5                                     | 4.16                              | 8                             | 8                           | 18333E3                                | 58333E3                                 | 38333E3                                | 78333E3                                 |
|                       | 47 000                           | 76 x 105                                | 25.0                                     | 5.93                              | 8                             | 8                           | 18473E3                                | 58473E3                                 | 38473E3                                | 78473E3                                 |
|                       | 68 000                           | 76 x 146                                | 29.5                                     | 8.6                               | 8                             | 8                           | 18683E3                                | 58683E3                                 | 38683E3                                | 78683E3                                 |
|                       | 100 000                          | 76 x 220                                | 36.5                                     | 12.6                              | 8                             | 8                           | 18104E3                                | 58104E3                                 | 38104E3                                | 78104E3                                 |
|                       | 150 000                          | 90 x 220                                | 50.0                                     | 18.9                              | 8                             | 8                           | -                                      | -                                       | 48154E3                                | 88154E3                                 |
| 100                   | 1000                             | 35 x 60                                 | 3.7                                      | 0.20                              | 96                            | 48                          | 19102E3                                | 59102E3                                 | -                                      | -                                       |
|                       | 1500                             | 35 x 60                                 | 4.8                                      | 0.30                              | 59                            | 27                          | 19152E3                                | 59152E3                                 | -                                      | -                                       |
|                       | 2200                             | 35 x 80                                 | 5.9                                      | 0.44                              | 42                            | 20                          | 19222E3                                | 59222E3                                 | -                                      | -                                       |
|                       | 3300                             | 35 x 105                                | 7.3                                      | 0.66                              | 29                            | 15                          | 19332E3                                | 59332E3                                 | -                                      | -                                       |
|                       | 4700                             | 50 x 80                                 | 10.1                                     | 0.94                              | 22                            | 12                          | 19472E3                                | 59472E3                                 | -                                      | -                                       |
|                       | 6800                             | 50 x 105                                | 12.1                                     | 1.36                              | 16                            | 9                           | 19682E3                                | 59682E3                                 | -                                      | -                                       |
|                       | 10 000                           | 65 x 105                                | 16.7                                     | 2.00                              | 11                            | 7                           | 19103E3                                | 59103E3                                 | 39103E3                                | 79103E3                                 |
|                       | 15 000                           | 65 x 105                                | 17.6                                     | 3.00                              | 10                            | 6                           | 19153E3                                | 59153E3                                 | 39153E3                                | 79153E3                                 |
|                       | 22 000                           | 76 x 105                                | 19.5                                     | 4.40                              | 9                             | 6                           | 19223E3                                | 59223E3                                 | 39223E3                                | 79223E3                                 |
|                       | 33 000                           | 76 x 146                                | 23.0                                     | 6.6                               | 8                             | 6                           | 19333E3                                | 59333E3                                 | 39333E3                                | 79333E3                                 |
|                       | 47 000                           | 76 x 220                                | 28.6                                     | 9.4                               | 5                             | 5                           | 19473E3                                | 59473E3                                 | 39473E3                                | 79473E3                                 |
|                       | 68 000                           | 90 x 220                                | 50.0                                     | 13.6                              | 5                             | 5                           | -                                      | -                                       | 49683E3                                | 89683E3                                 |

| ADDITIONAL ELECTRICAL DATA         |                                      |                                                    |
|------------------------------------|--------------------------------------|----------------------------------------------------|
| PARAMETER                          | CONDITIONS                           | VALUE                                              |
| <b>Voltage</b>                     |                                      |                                                    |
| Surge voltage                      |                                      | $U_s = 1.15 \times U_R$                            |
| Reverse voltage                    |                                      | $U_{rev} \leq 1 \text{ V}$                         |
| <b>Current</b>                     |                                      |                                                    |
| Leakage current                    | After 1 min at $U_R$                 | $I_{L1} \leq 0.006 C_R \times U_R + 4 \mu\text{F}$ |
|                                    | After 5 min at $U_R$                 | $I_{L5} \leq 0.002 C_R \times U_R + 4 \mu\text{F}$ |
| <b>Inductance</b>                  |                                      |                                                    |
| Equivalent series inductance (ESL) | Case $\varnothing D = 35 \text{ mm}$ | Typ. 13 nH                                         |
|                                    | Case $\varnothing D = 50 \text{ mm}$ | Typ. 16 nH                                         |
|                                    | Case $\varnothing D = 65 \text{ mm}$ | Typ. 19 nH <sup>(1)</sup>                          |
|                                    | Case $\varnothing D = 76 \text{ mm}$ | Typ. 20 nH <sup>(1)</sup>                          |
|                                    | Case $\varnothing D = 90 \text{ mm}$ | Typ. 21 nH <sup>(1)</sup>                          |

**Note**
<sup>(1)</sup> Low ESL designs available on request

**RIPPLE CURRENT AND USEFUL LIFE**

Table 3

| ENDURANCE TEST DURATION AND USEFUL LIFE |                                |
|-----------------------------------------|--------------------------------|
| ENDURANCE<br>AT 85 °C<br>(h)            | USEFUL LIFE<br>AT 85 °C<br>(h) |
| 8000                                    | 20 000                         |

**Note**

- Multiplier of useful life code: CCC205-05

CCC205-05

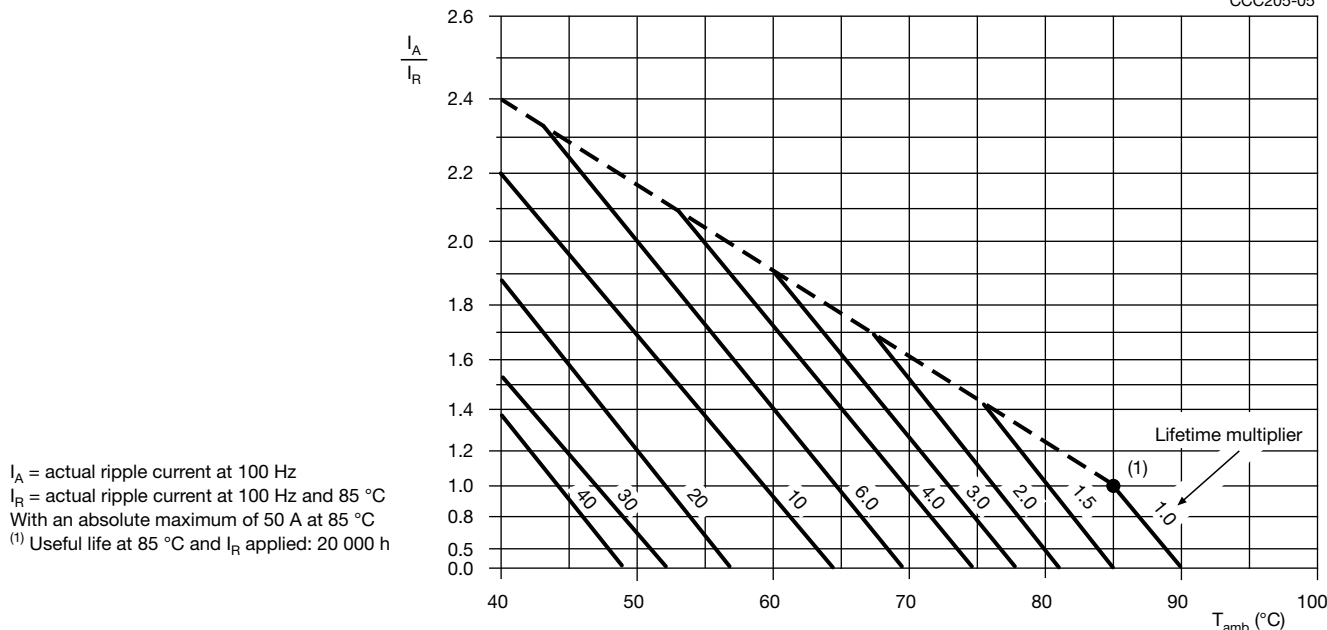


Fig. 3 - Multiplier of useful life as a function of ambient temperature and ripple current load



Table 4

| MULTIPLIER OF RIPPLE CURRENT ( $I_R$ ) AS A FUNCTION OF FREQUENCY |      |      |      |      |             |
|-------------------------------------------------------------------|------|------|------|------|-------------|
| FREQUENCY (Hz)                                                    |      |      |      |      |             |
| 50                                                                | 100  | 200  | 400  | 1000 | $\geq 2000$ |
| $I_R$ MULTIPLIER                                                  |      |      |      |      |             |
| 0.83                                                              | 1.00 | 1.10 | 1.15 | 1.19 | 1.20        |

Table 5

| TEST PROCEDURES AND REQUIREMENTS               |                                              |                                                                                                                                                         |                                                                                                                                                                                                                                               |
|------------------------------------------------|----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TEST                                           |                                              | PROCEDURE<br>(quick reference)                                                                                                                          | REQUIREMENTS                                                                                                                                                                                                                                  |
| NAME OF TEST                                   | REFERENCE                                    |                                                                                                                                                         |                                                                                                                                                                                                                                               |
| Endurance                                      | IEC 60384-4 /<br>EN 130300<br>subclause 4.13 | $T_{amb} = 85\text{ }^{\circ}\text{C}$ ; $U_R$ applied;<br>8000 h                                                                                       | $\Delta C/C: \pm 15\%$<br>$\tan \delta \leq 1.3 \times \text{spec. limit}$<br>$Z \leq 2 \times \text{spec. limit}$<br>$I_{L5} \leq \text{spec. limit}$                                                                                        |
| Useful life                                    | CECC 30301<br>subclause 1.8.1                | $T_{amb} = 85\text{ }^{\circ}\text{C}$ ; $U_R$ and $I_R$ applied;<br>20 000 h                                                                           | $\Delta C/C: \pm 45\%$<br>$\tan \delta \leq 3 \times \text{spec. limit}$<br>$Z \leq 3 \times \text{spec. limit}$<br>$I_{L5} \leq \text{spec. limit}$<br>no short or open circuit,<br>no visible damage<br>total failure percentage $\leq 1\%$ |
| Shelf life<br>(storage at<br>high temperature) | IEC 60384-4 /<br>EN 130300<br>subclause 4.17 | $T_{amb} = 85\text{ }^{\circ}\text{C}$ ; no voltage applied;<br>500 h<br>after test: $U_R$ to be applied for 30 min,<br>24 h to 48 h before measurement | $\Delta C/C: \pm 10\%$<br>$\tan \delta \leq 1.2 \times \text{spec. limit}$<br>$I_{L5} \leq 2 \times \text{spec. limit}$                                                                                                                       |

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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