### FEATURES
- Very low losses
- Very low inductance
- High robustness under humidity robustness
- ZVEI - Specification for automotive DC-link capacitors
- Customization on customer request possible

### APPLICATIONS
- High performance DC filtering applications
- Capacitor banks in power inverter /converter application for automotive
- HEV / EV traction inverter

### QUICK REFERENCE DATA

<table>
<thead>
<tr>
<th>Feature</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated capacitance range</td>
<td>500 μF (other values available on request)</td>
</tr>
<tr>
<td>Capacitance tolerance</td>
<td>± 5 %</td>
</tr>
<tr>
<td>Climatic testing class</td>
<td>40 / 105 / 56</td>
</tr>
<tr>
<td>Rated temperature</td>
<td>105 °C</td>
</tr>
<tr>
<td>Maximum operating hotspot temperature</td>
<td>105 °C</td>
</tr>
<tr>
<td>Reference standards</td>
<td>ZVEI - Qualification of DC-link capacitors for automotive use</td>
</tr>
<tr>
<td></td>
<td>ZVEI - Qualification of intermediate circuit capacitors for use in motor vehicle components</td>
</tr>
<tr>
<td>Dielectric</td>
<td>Polypropylene film</td>
</tr>
<tr>
<td>Electrodes</td>
<td>Metallized dielectric capacitor</td>
</tr>
<tr>
<td>Construction</td>
<td>Mono construction</td>
</tr>
<tr>
<td>Encapsulation</td>
<td>Plastic case, sealed with resin; flame retardant UL 94 V-0</td>
</tr>
<tr>
<td>Terminals</td>
<td>Busbar</td>
</tr>
<tr>
<td>DC voltage rating</td>
<td>$U_R = 500 \text{ V}_{\text{DC}}$ at 105 °C</td>
</tr>
<tr>
<td></td>
<td>$U_R = 900 \text{ V}_{\text{DC}}$ at 105 °C</td>
</tr>
<tr>
<td>Insulation resistance</td>
<td>RC between leads, after 1 min &gt; 10 000 s, measuring voltage: 500 V</td>
</tr>
<tr>
<td>Life time expectancy</td>
<td>See Fig. 9</td>
</tr>
<tr>
<td>Marking</td>
<td>Manufacturer’s name; C-value; tolerance; rated voltage; manufacturer’s type designation; code for dielectric material manufacturer location, year and week</td>
</tr>
</tbody>
</table>

### Notes
- For more detailed data and test requirements, contact [dc-film@vishay.com](mailto:dc-film@vishay.com)
- For general information like characteristics and definitions used for film capacitors follow the link: [www.vishay.com/doc?28147](http://www.vishay.com/doc?28147)
### ELECTRICAL DATA AND ORDERING CODE

<table>
<thead>
<tr>
<th>$U_{RDC}$ (V)</th>
<th>CAP. (μF)</th>
<th>CASE DIMENSIONS (mm)</th>
<th>MASS (kg)</th>
<th>ORDERING CODE</th>
<th>SPQ (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>500</td>
<td>500</td>
<td>237</td>
<td>50</td>
<td>50</td>
<td>1.3</td>
</tr>
<tr>
<td>900</td>
<td>500</td>
<td>237</td>
<td>50</td>
<td>144</td>
<td>3.4</td>
</tr>
</tbody>
</table>

**Note**

(1) Carton box dimension (mm) 285 x 315 x 90. Product fixed with foam cavities

### SPECIFIC REFERENCE DATA

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>MKP1849750050K</th>
<th>MKP1849750090K</th>
</tr>
</thead>
<tbody>
<tr>
<td>$U_R$</td>
<td>Maximum operating peak voltage of either polarity voltage of a non reversing waveform for which the capacitor have been designed</td>
<td>500 V&lt;sub&gt;DC&lt;/sub&gt;</td>
</tr>
<tr>
<td>$U_S$</td>
<td>Non recurrent surge voltage or peak operating DC voltage (test duration 10 s)</td>
<td>750 V&lt;sub&gt;DC&lt;/sub&gt;</td>
</tr>
<tr>
<td>$U_{Ripple}$</td>
<td>Ripple voltage or peak to peak alternating component of the unidirectional voltage</td>
<td>50 V&lt;sub&gt;pp&lt;/sub&gt;</td>
</tr>
<tr>
<td>$\tan\delta$</td>
<td>Typical tangent of loss angle at 23 °C, 1 V $\tan\delta = Resr \cdot C$</td>
<td>0.0020 at 1 kHz</td>
</tr>
<tr>
<td>$Resr$</td>
<td>Typical equivalent series resistance of a capacitor measured 23 °C, 1 V</td>
<td>0.5 mΩ at 10 kHz</td>
</tr>
<tr>
<td>$I_{max}$</td>
<td>Maximum r.m.s. current for continuous operation at $T_{amb} = 85$ °C</td>
<td>110 A at 10 kHz</td>
</tr>
<tr>
<td>$P_{max}$</td>
<td>Maximum ohmic power dissipation in function of r.m.s. current</td>
<td>See Fig. 3</td>
</tr>
<tr>
<td>$\Delta T_{case}$</td>
<td>Temperature difference between the case and ambient free air in function of the power dissipation</td>
<td>See Fig. 7</td>
</tr>
<tr>
<td>$T_{min}$</td>
<td>Lowest operating temperature or lowest temperature of the dielectric at which the capacitor may be energized</td>
<td>-40 °C</td>
</tr>
<tr>
<td>$I$</td>
<td>Maximum repetitive peak current that can occur during continuous operation</td>
<td>2.5 kA</td>
</tr>
<tr>
<td>$dU/dt$</td>
<td>Rated voltage pulse slope ($dU/dt)_R$</td>
<td>5 V/μs</td>
</tr>
<tr>
<td>$L_S$</td>
<td>Self inductance value by short circuit of connections with the same polarity</td>
<td>&lt; 10 nH</td>
</tr>
<tr>
<td>$R_i$</td>
<td>Insulation resistance between leads, at 500 V, 1 minute after full charge</td>
<td>&gt; 0.1 GΩ</td>
</tr>
<tr>
<td>$U_{i DC}$</td>
<td>Insulation voltage between terminals and case</td>
<td>3.5 kV</td>
</tr>
</tbody>
</table>
PRODUCT MARKING

Packing Label

1. Manufacturer’s logo
2. Country of origin
3. Sub family
4. Type description
5. Capacitance value, tolerance, voltage, and climatic category according to IEC 60068-1
6. Production center
7. Preference origin code: A - country of origin in code
8. Product type description
9. Batch number
10. Quantity and production date, year week code
11. Product code

PACKAGING INFORMATION

CONSTRUCTION
Low inductive wound cell elements of metallized polypropylene film, potted with resin in a flame retardant case.

MOUNTING
The capacitor unit is designed for mounting directly on ECU, IGBT module, or bus bar.
In order to withstand vibration and shock tests, it must be insured that the bus bar is in good contact with the IGBT module.
The capacitors shall be mechanically fixed and the body clamped.

STORAGE TEMPERATURE
$T_{stg} = -25 \degree C \text{ to } +35 \degree C$
RH maximum $= 75 \%$ without condensation for a maximum period of 2 years.

RATINGS AND CHARACTERISTICS

REFERENCE CONDITIONS
Unless otherwise specified, all electrical values apply to an ambient temperature of $23 \degree C \pm 1 \degree C$, an atmospheric pressure of 86 kPa to 106 kPa and a relative humidity of $50 \% \pm 2 \%$.
For reference testing, a conditioning period shall be applied over 96 hours $\pm$ 4 hours by heating the products in a circulating air oven at the rated temperature and a relative humidity not exceeding 20 %. 

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CHARACTERISTICS

Fig. 1 - Capacitance in function of ambient temperature (typical curve 1 kHz)

Fig. 2 - ESR and Impedance in function of frequency at different temperatures (MKP1849750090K)

Fig. 3 - Ohmic power dissipation in function of r.m.s. current. Based on typical ESR = 0.5 mΩ and capacitance = 500 μF (MKP1849750050K)

Fig. 4 - ESR and Impedance in function of frequency at different temperatures (MKP1849750050K)

Fig. 5 - IR in function of temperature

Fig. 6 - Ohmic power dissipation in function of r.m.s. current. Based on typical ESR = 0.4 mΩ and capacitance = 500 μF (MKP1849750090K)
Fig. 7 - Temperature difference between the case and ambient free air in function of the power dissipation. Based on typical ESR = 0.5 mΩ and capacitance = 500 μF (MKP1849750050K)

Fig. 8 - Temperature difference between the case and ambient free air in function of the power dissipation. Based on typical ESR = 0.4 mΩ and capacitance = 500 μF (MKP1849750090K)

Fig. 9 - Life time expectancy according to IEC 61709 (typical curve) in function of voltage and hot spot temperature (1)

Note

(1) Statements about life time are based on calculations which are based on internal tests. They have to be understood exclusively as estimations. Also due to external factors, the life time in the field application may deviate from the calculated life time.
APPLICATION NOTES AND LIMITING CONDITIONS

These capacitors are not suitable for mains applications as across-the-line. These mains applications are strictly regulated in safety standards and therefore electromagnetic interference suppression capacitors conforming the standards must be used.

To select the capacitor for a certain application, the following conditions must be checked:

1. The peak voltage ($U_{p+}$) shall not be greater than the DC voltage rating ($U_{NDC}$)
2. The peak-to-peak ripple voltage ($U_{PP}$) shall not be greater than $U_{ripple}$

    Non reversing recurrent waveform

3. The voltage peak slope ($dU/dt$) shall not exceed the pulse slope at the DC voltage rating.
   If the pulse voltage is lower than the rated DC voltage, the rated voltage pulse slope may be multiplied by $U_{NDC}$ and divided by the applied voltage.
   For all other pulses following equation must be fulfilled:

$$2 \int_{0}^{T} \left(\frac{dU}{dt}\right)^{2} dt < U_{NDC} \times \left(\frac{dU}{dt}\right)_{rated}$$

T is the pulse duration

4. The maximum component surface temperature must be lower than $T_{max}$. (see graph)
## TEST CONDITIONS ACCORDING ZVEI TESTING GUIDELINES

<table>
<thead>
<tr>
<th>STRESS</th>
<th>NO.</th>
<th>REFERENCE</th>
<th>TEST CONDITIONS</th>
<th>PERFORMANCE REQUIREMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-01</td>
<td>B01 and B04</td>
<td>IEC 60068-2-14 and IEC 60068-2-6</td>
<td>1000 cycles, -40 °C, T_max., product stays &gt; 5 minutes after reaching of the -40 °C and &gt; 5 minutes after reaching of T_max. in the center of the capacitor. Followed by vibration test logarithmic sinus sweep 10 Hz to 2000 Hz, 106 vibrations, f = 10 Hz, 10 g at f &lt; 58 Hz; 0.75 mm at f &lt; 58 Hz</td>
<td>No visual damage. Mechanical in datasheet requirements. High voltage between terminals and capacitor box: no breakdown Requirements according Vishay datasheet</td>
</tr>
<tr>
<td>B-04</td>
<td></td>
<td></td>
<td></td>
<td>MKP1849 750 050K</td>
</tr>
<tr>
<td>B-04</td>
<td></td>
<td></td>
<td></td>
<td>MKP1849 750 090K</td>
</tr>
<tr>
<td>B-02</td>
<td>B02</td>
<td>IEC 60068-2-78</td>
<td>Followed by 50 h, 65 °C, 93 % RH without condensation at (U_{\text{rated}}) (500 V / 900 V) Total test time 1750 h</td>
<td>No visual damage. Mechanical in datasheet requirements. High voltage between terminals and capacitor box: no breakdown Requirements according Vishay datasheet</td>
</tr>
<tr>
<td>B-05</td>
<td>B05 and B06</td>
<td>IEC 60384-1 and IEC 61071</td>
<td>1000 cycles at 1 x (dV/dt) (datasheet) at 500 V / 900 V Followed by 5 cycles at (dV/dt) (short circuit) at free voltage with 2 minutes between each cycle.</td>
<td>No visual damage. Mechanical in datasheet requirements. High voltage between terminals and capacitor box: no breakdown Requirements according Vishay datasheet</td>
</tr>
<tr>
<td>B-06</td>
<td></td>
<td></td>
<td></td>
<td>MKP1849 750 050K</td>
</tr>
<tr>
<td>B-06</td>
<td></td>
<td></td>
<td></td>
<td>MKP1849 750 090K</td>
</tr>
</tbody>
</table>

**Note**  
Measurement conditions at 23 °C:  
- Capacitance at 1 kHz  
- \(\tan \delta\) at 1 kHz (additional \(\tan \delta\) at 100 Hz and ESR at 10 kHz)  
- Insulation resistance 500 V, 1 min after full charge
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