



## Film Capacitors – Power Electronic Capacitors

MKP DC-LSI

**Series/Type:**  
**Ordering code:** B25631\*  
Date: October 2013  
Version: 1

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**MKP DC-LSI**
**Construction and general data**

Characteristics	
Capacitance tolerance	K: $\pm 10\%$
$\tan \delta_o$	$2 \cdot 10^{-4}$
$\Theta_{stg}$	$-55 \dots +85 \text{ }^\circ\text{C}$
$t_{LD (co)}$	100 000 h
Fit rate	300
Minimum temperature $\Theta_{min.}$	$-55 \text{ }^\circ\text{C}$
Maximum temperature $\Theta_{max.}$	$+70 \text{ }^\circ\text{C}$
Storage temperature $\Theta_{stg}$	$-55 \dots +85 \text{ }^\circ\text{C}$
Maximum hotspot temperature $\Theta_{hs}$	$+75 \text{ }^\circ\text{C}$
Maximum hotspot temperature $\Theta_{hs}$ for 100 000 h expected lifetime	$+65 \text{ }^\circ\text{C}$
Climatic category	55/70/56
Maximum altitude	2000 m above sea level (derating curves available upon request)

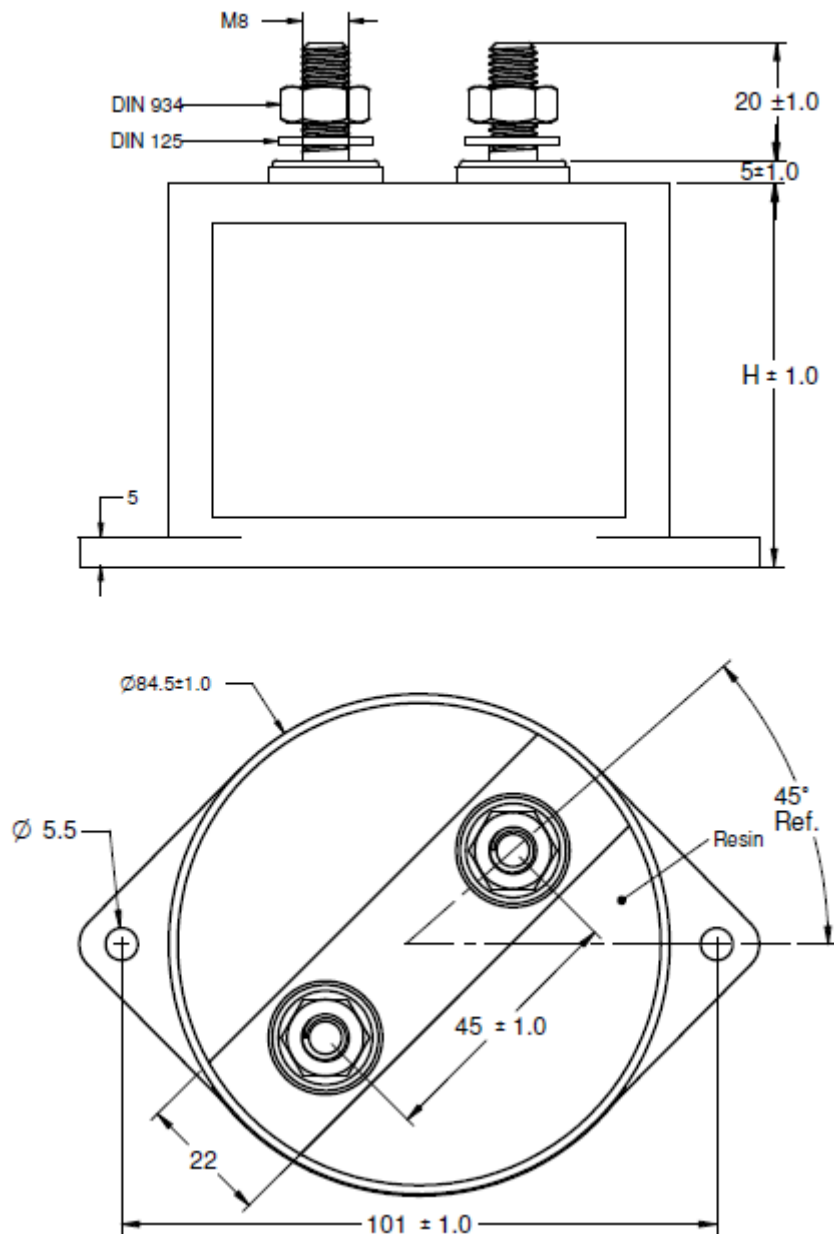
Test data	
Voltage between terminals $V_{TT}$	$1.5 \cdot V_N, 10 \text{ s}$
Voltage between terminals and aluminum can $V_{TC}$	$2 V_i + 1000 \text{ V}, 10 \text{ s}$
Dissipation factor $\tan \delta$ (100 Hz)	$\leq 1.0 \times 10^{-3}$
Life test	According to IEC 61071
Cooling	Naturally air-cooled (or forced air cooling)
Degree of protection	Indoor mounting

Design data	
Impregnation	Resin filling: Non PCB, hard polyurethane (Dry type)
Mounting	Lateral brackets
Max. torque terminal	8 Nm

Reference standards	
IEC 61071	
RoHS compliance	
UL 94 V0	

Metallized polypropylene film capacitors – Plastic case for general purpose applications

B2563X  
Male M8 terminals



Lateral brackets for fixing are standard for all types.

## Terms and Definitions

The following definitions apply to power capacitors according to IEC 61071.

### Rated capacitance $C_R$

Nominal value of the capacitance at 20 °C and measuring frequency range of 50 to 120 Hz.

### Rated DC voltage $V_R$

Maximum operating peak voltage of either polarity but of a non-reversing type wave form, for which the capacitor has been designed, for continuous operation.

### Ripple voltage $V_r$

Peak-to-peak alternating component of the unidirectional voltage.

### Maximum surge voltage $V_s$

Peak voltage induced by a switching or any other disturbance of the system which is allowed for a limited number of times and duration.

- Maximum duration: 50 ms / pulse

- Maximum number of occurrences: 1000 (during load)

### Insulation voltage $V_i$

Rms rated value of the insulation voltage of capacitive elements and terminals to case or earth. When it is not specified in the product data sheet, the insulation voltage is at least:

$$V_i = \frac{V_R}{\sqrt{2}}$$

### Maximum rate of voltage rise $(dv/dt)_{max}$

Maximum permissible repetitive rate of voltage rise of the operational voltage.

### Maximum current $I_{max}$

Maximum rms current for continuous operation.

### Maximum peak current $\hat{I}_{pk}$

Maximum permissible repetitive current amplitude during continuous operation.

Maximum peak current ( $\hat{I}_{pk}$ ) and maximum rate of voltage rise  $(dv/dt)_{max}$  on a capacitor are related as follows:

$$\hat{I}_{pk} = C \cdot (dv/dt)_{max}$$

### Maximum surge current $\hat{I}_s$

Admissible peak current induced by a switching or any other disturbance of the system which is allowed for a limited number of times (1000 times) and duration (50 ms / pulse).

$$\hat{I}_s = C \cdot (dv/dt)_s$$

### Ambient temperature $\Theta_A$

Temperature of the surrounding air, measured at 10 cm distance and 2/3 of the case height of the capacitor.

**Lowest operating temperature  $\Theta_{\min}$** 

Lowest permitted ambient temperature at which a capacitor may be energized.

**Maximum operating temperature  $\Theta_{\max}$** 

Highest permitted ambient temperature at which a capacitor may be energized.

**Hot-spot temperature  $\Theta_{\text{hs}}$** 

Temperature zone inside of the capacitor at hottest spot.

**Temperature hot-spot / ambient  $\Delta\Theta$** 

Temperature difference between the hottest spot in the capacitor  $\Theta_{\text{hs}}$  and the ambient temperature  $\Theta_{\text{A}}$ .

**Tangent of the loss angle of the dielectric  $\tan \delta_0$** 

The loss factor of the dielectric (polypropylene) represents the portion of the losses in the process of polarization/depolarization of the dielectric. It is considered constant in the whole operational frequency range of the capacitor.

**Tangent of the loss angle of a capacitor  $\tan \delta$** 

Ratio between the equivalent series resistance and the capacitive reactance of a capacitor at a specified sinusoidal alternating voltage, frequency and temperature.

**Series resistance  $R_s$** 

The sum of all Ohmic resistances occurring inside the capacitor. It is largely independent of frequency.

**Thermal resistance  $R_{\text{th}}$** 

The thermal resistance indicates by how many degrees the capacitor temperature at the hot spot rises in relation to the dissipation losses.

**Maximum power loss  $P_{\max}$** 

Maximum permissible power dissipation for the capacitor's operation.

$$P_{\max} = \frac{\Theta_{\text{hs}} - \Theta_{\text{A}}}{R_{\text{th}}} = \frac{\Delta\Theta}{R_{\text{th}}}$$

**Self inductance  $L_{\text{self}}$** 

The sum of all inductive elements which are contained in a capacitor.

**Resonance frequency  $f_r$** 

The lowest frequency at which the impedance of the capacitor becomes minimum.

$$f_r = \frac{1}{2\pi \cdot \sqrt{L_{\text{self}} \cdot C_N}}$$

## General Technical Information

### Application:

The MKP DC LSI series is designed for DC-Link applications with low self inductance. Some typical examples of DC-Link applications are as follows: converters, frequency drives, power conversion, uninterruptible power supplies, transportation, wind power, solar power, power distribution, etc.

### Expected Lifetime:

The expected lifetime for typical operation is 100.000h at 65°C of hot spot temperature  $\Theta_{hs}$ .

### Creepage and clearance distances:

Diameter (mm)	Distance between terminals (mm)	Terminal to Terminal	
		Creepage (mm)	Clearance (mm)
85	45	35.5	28.5

**Specification table and ordering codes**

$V_{DC}$	C	$I_{max}$	$\hat{I}_{pk}$	$\hat{I}_S$	$R_S$	$L_{self}$	$R_{th}$	H	D	Ordering code
	$\mu F$	A	kA	kA	$m\Omega$	nH	K / W	mm	mm	
500	400	60	4.8	14.4	1.0	30	5.8	65	85	B25631S0407K500
600	200	55	4.2	12.5	0.9	20	7.5	50	85	B25631A0207K600
	220	65	3.0	9.2	1.2	30	5.8	65	85	B25631S0227K600
	280	65	3.9	11.5	1.1	30	5.8	65	85	B25631A0287K600
700	150	55	3.6	10.8	0.9	20	7.5	50	85	B25631A0157K700
	220	65	3.5	10.4	1.2	30	5.8	65	85	B25631A0227K700
800	120	55	3.3	9.7	1.0	20	7.5	50	85	B25631A0127K800
	180	65	2.1	6.4	1.5	30	5.8	65	85	B25631A0187K800
900	100	55	3.0	9.0	1.0	20	7.5	50	85	B25631A0107K900
	140	60	2.8	8.3	1.3	30	5.8	65	85	B25631A0147K900
1000	75	50	2.7	8.0	1.0	20	7.5	50	85	B25631A1756K000
	110	60	2.6	7.8	1.3	30	5.8	65	85	B25631A1117K000
1100	70	50	2.4	7.5	1.0	20	7.5	50	85	B25631A1706K100
	100	60	2.4	7.0	1.4	30	5.8	65	85	B25631A1107K100
	150	50	3.5	10.6	1.1	30	5.8	65	85	B25631B1157K100
1200	50	50	2.0	6.3	1.1	20	7.5	50	85	B25631A1506K200
	80	60	1.7	4.9	1.7	30	5.8	65	85	B25631A1806K200

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### Cautions and warnings

- In case of dents of more than 1 mm depth or any other mechanical damage, capacitors must not be used at all.
- Check tightness of the connections/terminals periodically.
- The energy stored in capacitors may be lethal. To prevent any chance of shock, discharge and short-circuit the capacitor before handling.
- Failure to follow cautions may result, worst case, in premature failures, bursting and fire.
- EPCOS AG is not responsible for any kind of possible damages to persons or things due to improper installation and application of capacitors for power electronics.

### Safety

- Electrical or mechanical misapplication of capacitors may be hazardous. Personal injury or property damage may result from bursting of the capacitor or from expulsion of oil or melted material due to mechanical disruption of the capacitor.
- Ensure good, effective grounding for capacitor enclosures.
- Observe appropriate safety precautions during operation (self-recharging phenomena and the high energy contained in capacitors).
- Handle capacitors carefully, because they may still be charged even after disconnection.
- The terminals of capacitors, connected bus bars and cables as well as other devices may also be energized.
- Follow good engineering practice.

### Thermal load

After installation of the capacitor it is necessary to verify that maximum hot-spot temperature is not exceeded at extreme service conditions.

### Mechanical protection

The capacitor has to be installed in a way that mechanical damages and dents in the aluminum can are avoided.

### Storage and operating conditions

Do not use or store capacitors in corrosive atmosphere, especially where chloride gas, sulfide gas, acid, alkali, salt or the like are present. In dusty environments regular maintenance and cleaning especially of the terminals is required to avoid conductive path between phases and/or phases and ground.

The maximum storage temperature is 85 °C.

### Service life expectancy

Electrical components do not have an unlimited service life expectancy; this applies to self-healing capacitors, too. The maximum service life expectancy may vary depending on the application the capacitor is used in.



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