

# Metallized Polypropylene Film Capacitor (Top Terminal) DC-Link Applications

## FDB series

### Overview

The FDB series is constructed of metallized polypropylene film with cylindrical plastic can type filled with resin, screw terminals and plastic deck.



### Applications

- Transportation: EV or HEV.
- Welders, Elevators, Motor driver systems.

### Features

- Long lifetime
- Self-healing property
- Low Ls
- Low ESR, high ripple current handling capabilities
- Used in DC-Link circuits, can replace electrolytic capacitor

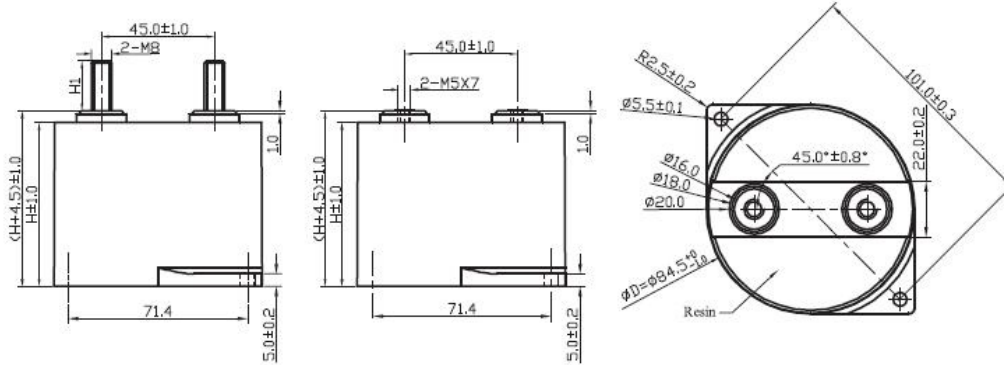
### Specifications

Items	Characteristics
Application	DC Filtering / DC Link
Reference Standard	IEC 61071
Climatic Category	40/85/56 IEC 60068-1
Operating Temperature Range	-40°C ~ 105°C (above 85°C, voltage will be derated by 1.35%/°C)
Upper Temperature Tmax	+85°C
Lower Temperature Tmin	-40°C
Rated Voltage	500Vdc ~ 1100Vdc
Capacitance Range	50µF ~ 280µF
Capacitance Tolerance	±5% or ±10% at +25°C
Dissipation Factor (DF)	≤ 0.002 (0.2%) at 100Hz at +25°C
Test Voltage Between Terminals	1.5 x rated voltage for 10s (terminal to terminal)
Test Voltage Terminal to Case	3.0kVac 50 Hz for 10s at +25°C
Life Expectancy	100,000 hours at Un @ Hot-Spot temperature T=+70°C
Case	Self extinguishing plastic case UL94 V-0
Terminals	M5, M6 or M8 threaded bolt; also available with threaded female connections
Construction	Dry construction, filled by solid resin
Packaging	Packed in cardboard boxes with protection for the terminals
RoHS Compliant	Compliant with the restricted substance requirements of Directive 2002/95/EC
Storage Conditions	Storage time: ≤ 24 months from the date marked on the label package Temperature and relative humidity should be -10°C ~ +40°C and not more than 75%RH. RH ≤ 85% for 30 days randomly distributed throughout the year
Humidity Test	Test conditions & performance:
	Temperature: +40°C ±2°C Relative humidity(RH) :93% ±2%
	Test duration : 56 days
	Capacitance change : ±5% DF change (Δtgδ):≤50 X 10 <sup>-4</sup> at 100Hz Insulation resistance: ≥50% of initial limit
Endurance Test	Test conditions & performance:
	Temperature: +85°C ±2°C Voltage applied:1.3 X V <sub>R</sub> (d.c.)
	Test duration : 1000 hours
	Capacitance change : ≤±5% DF change (Δtgδ):≤50 X 10 <sup>-4</sup> at 100Hz Insulation resistance: ≥50% of initial limit
THB Test (Damp heat test with loading)	Test conditions & performance:
	Temperature: +85°C ±2°C Relative humidity(RH) :85% ±2%
	Loading Voltage: Rated voltage (DC)
	Test duration : 1000 hours Capacitance change : ≤±5%

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### Outline Drawing



### Technical data (Male terminals)

Cap Value	Vdc	Dimensions			I <sub>rms</sub> 10KHz 50°C	Peak Current	ESR 1KHz	ESL	Thermal Res	dv/dt	Pkg Qty	Part Number
		D	H	P								
μF		mm	mm	mm	A	A	mΩ	nH	°C/W	V/us	pcs	
150	500	85.0	40.0	45.0	65.0	5250	1.8	25	4.3	35	8	FDB2HK1574++MQ8A
220	500	85.0	51.0	45.0	65.0	5500	1.8	40	4.8	25	8	FDB2HK2274++MQ8A
280	500	85.0	64.0	45.0	70.0	5600	1.6	40	5.4	20	8	FDB2HK2874++MQ8A
100	600	85.0	40.0	45.0	70.0	3500	1.5	25	5.0	35	8	FDB2KK1074++MQ8A
150	600	85.0	51.0	45.0	80.0	3750	1.4	30	6.5	25	8	FDB2KK1574++MQ8A
220	600	85.0	64.0	45.0	90.0	4400	1.5	40	4.5	20	8	FDB2KK2274++MQ8A
66	800	85.0	40.0	45.0	70.0	2310	2.0	25	5.0	35	8	FDB2NK6664++MQ8A
100	800	85.0	51.0	45.0	75.0	2500	1.8	30	5.0	25	8	FDB2NK1074++MQ8A
140	800	85.0	64.0	45.0	80.0	2800	1.6	40	8.4	20	8	FDB2NK1474++MQ8A
220	800	85.0	64.0	45.0	100.0	4400	1.4	40	4.8	20	8	FDB2NK2274++MQ8A
66	1000	85.0	40.0	45.0	70.0	2310	1.0	25	4.2	35	8	FDB3KK6664++MQ8A
120	1000	85.0	51.0	45.0	85.0	3000	2.2	30	5.2	25	8	FDB3KK1274++MQ8A
140	1000	85.0	64.0	45.0	100.0	2800	1.5	40	3.1	20	8	FDB3KK1474++MQ8A
50	1100	85.0	40.0	45.0	55.0	1750	2.4	30	4.5	35	8	FDB3MK5064++MQ8A
100	1100	85.0	51.0	45.0	55.0	2500	2.0	30	4.5	25	8	FDB3MK1074++MQ8A

### Technical data (Female terminals)

Cap Value	Vdc	Dimensions			I <sub>rms</sub> 10KHz 50°C	Peak Current	ESR 1KHz	ESL	Thermal Res	dv/dt	Pkg Qty	Part Number
		D	H	P								
μF		mm	mm	mm	A	A	mΩ	nH	°C/W	V/us	pcs	
150	500	85.0	40.0	45.0	65.0	5250	1.8	25	4.3	35	8	FDB2HK1574++FQ55
220	500	85.0	51.0	45.0	65.0	5500	1.8	40	4.8	25	8	FDB2HK2274++FQ55
280	500	85.0	64.0	45.0	70.0	5600	1.6	40	5.4	20	8	FDB2HK2874++FQ55
100	600	85.0	40.0	45.0	70.0	3500	1.5	25	5.0	35	8	FDB2KK1074++FQ55
150	600	85.0	51.0	45.0	80.0	3750	1.4	30	6.5	25	8	FDB2KK1574++FQ55
220	600	85.0	64.0	45.0	90.0	4400	1.5	40	4.5	20	8	FDB2KK2274++FQ55
66	800	85.0	40.0	45.0	70.0	2310	2.0	25	5.0	35	8	FDB2NK6664++FQ55
100	800	85.0	51.0	45.0	75.0	2500	1.8	30	5.0	25	8	FDB2NK1074++FQ55
140	800	85.0	64.0	45.0	80.0	2800	1.6	40	8.4	20	8	FDB2NK1474++FQ55
220	800	85.0	64.0	45.0	100.0	4400	1.4	40	4.8	20	8	FDB2NK2274++FQ55
66	1000	85.0	40.0	45.0	70.0	2310	1.0	25	4.2	35	8	FDB3KK6664++FQ55
120	1000	85.0	51.0	45.0	85.0	3000	2.2	30	5.2	25	8	FDB3KK1274++FQ55
140	1000	85.0	64.0	45.0	100.0	2800	1.5	40	3.1	20	8	FDB3KK1474++FQ55
50	1100	85.0	40.0	45.0	55.0	1750	2.4	30	4.5	35	8	FDB3MK5064++FQ55
100	1100	85.0	51.0	45.0	55.0	2500	2.0	30	4.5	25	8	FDB3MK1074++FQ55

\* Customized products are available by request, contact us for more details.  
\* Specification are subject to change, please refer to approved data sheets.

## FDB series

### Performance Notes

Rs: Equivalent series resistance - Ohmic resistances (Ohm)

Dielectric Dissipation Factor:  $\tan\delta_0$  ( Polypropylene: 0.0002)

Ta: Ambient temperature

Rth: Thermal resistance °C/ W, indicates hot spot temperature rise due to power dissipation losses

Pj: Joule losses  $P_j = R_s \cdot I_{rms}^2$

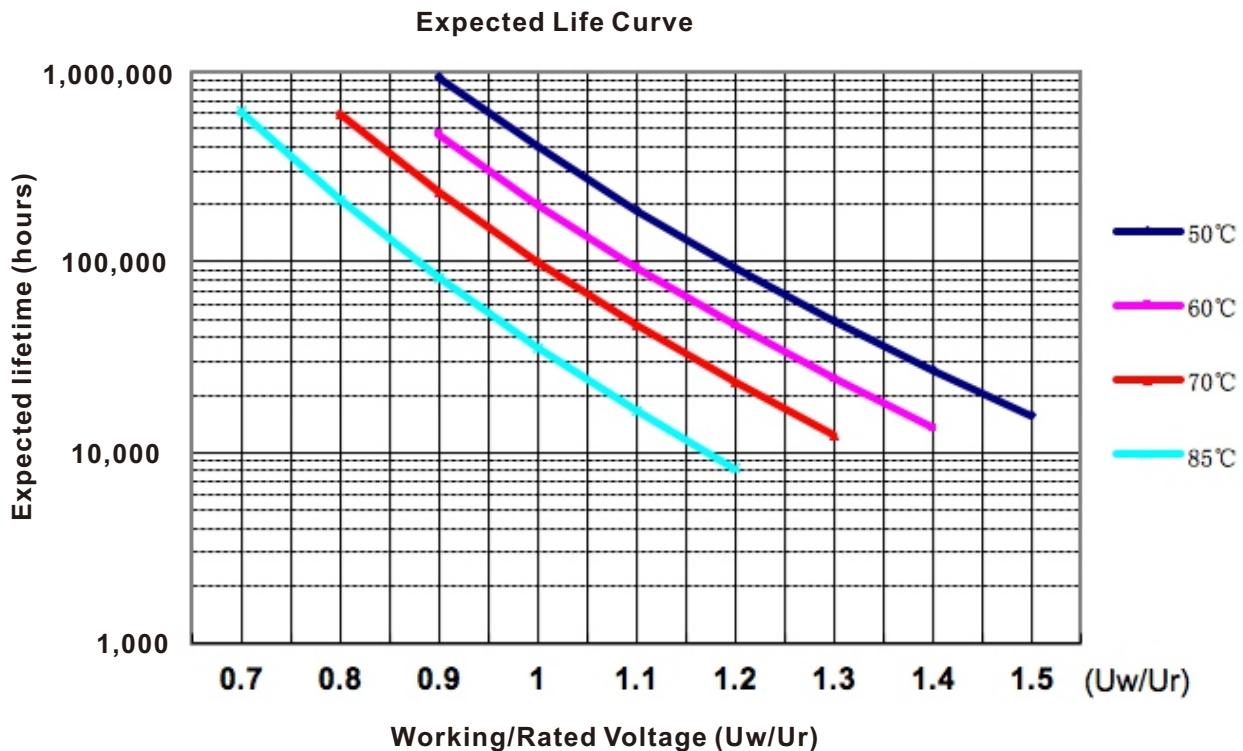
Pd: Dielectric losses

$$P_d = X_c \cdot I_{rms}^2 \cdot \tan\delta = I_{rms}^2 / (2 \cdot \pi \cdot f \cdot C) \cdot \tan\delta$$

T<sub>hs</sub>: Hot spot temperature within the capacitor

$$T_{hs} = T_a + (P_j + P_d) \cdot R_{th}$$

Design life: 100,000 hours at Un @ Hot-Spot temperature ≤ +70°C



### Cautions and warnings

- In case of dents of more than 1mm depth or any other mechanical damage, capacitors must not be used at all.
- Lateral brackets for fixing are standard for all types.
- Check tightness of the connection / terminals periodically.
- Do not handle the capacitor before it is discharged.
- It is necessary to verify that maximum hot-spot temperature is not exceeded at extreme condition.
- Do not use or store capacitor in corrosive atmosphere, in the dusty environments. Regular maintenance and cleaning especially of the terminals is required to avoid conductive path between terminal / or terminal and ground.