

# Metallized Polypropylene Film DC-Link Capacitors

## FDE Series - 450 ~ 1200VDC (Automotive Grade) for EV/HEV



### Overview

The FDE capacitor is constructed of segmented metallized polypropylene film in customized PPS case, specially treated to have a very high dielectric strength in operating conditions up to 105°C.

### Applications

Specially design for DC filtering and DC-Link circuits for EV/HEV.

### Features

- Low ESR
- Low ESL
- Self-healing technology
- High ripple current
- UL 94 V-0 PPS Plastic Case
- Automotive Grade (AEC-Q200D)
- THB Grade IIIB

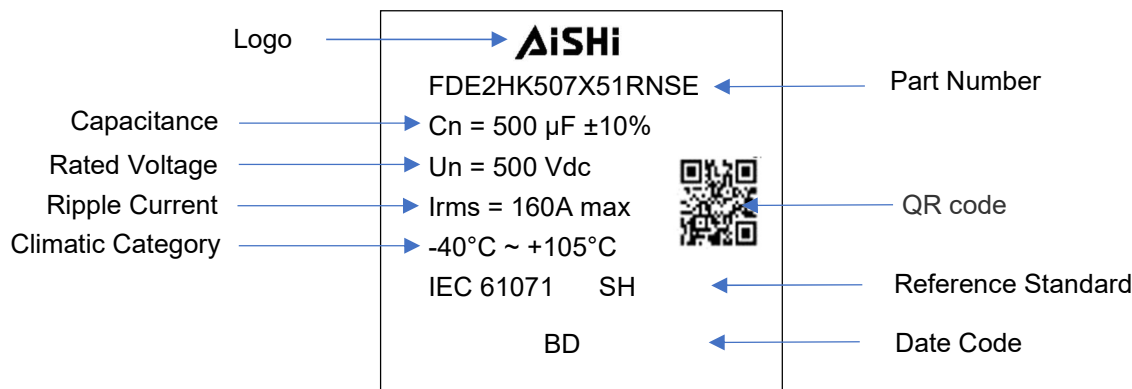


### Qualification

Reference Standard	IEC 61071, AEC-Q200D
Climate Category	40/105/56 IEC 60068-1



### Marking



### Manufacturing Date Code

Year	Code	Month	Code
2018	A	Jan	1
2019	B	Feb	2
2020	C	Mar	3
2021	D	Apr	4
2022	E	May	5
2023	F	Jun	6

Year	Code	Month	Code
2024	G	Jul	7
2025	H	Aug	8
2026	J	Sep	9
2027	K	Oct	A
2028	L	Nov	N
2029	M	Dec	D

### Part Number System

F	DE	2H	K	507	X51	RNS	E
Capacitor Type	Series	Voltage (VDC)	Tolerance	Capacitance (pF)	Case Code	Terminal Code	Internal Code
F = Film	DC Link, Customized PPS Plastic Case, Metallized Segmented PP Film	450=2W 500=2H 550=2J 600=2K 700=2M 800=2N 900=2Q	J = ±5% K = ±10%	First two digits = significant figures. Third digit = Number of zeros.	Refer to Customized Case Code Table	Refer to Terminal Code Table	Internal Code

### Customized Case Code Table

Drawing Code 1	Drawing Code 2	Drawing Code 3
A ~ Z	0 ~ 9	0 ~ 9


### Terminal Code

Digit One (Terminal Type)		Digit Two (Terminal Space)		Digit Three (No. of Terminal)	
EV Terminal	R	N/A	N	2	Q
				4	R
				6	S
				8	T
				10	U
				12	V
				14	W
				16	X

**General Technical Data**

Applications	DC Link / DC Filtering
Dielectric	Segmented Metallized Polypropylene Film
Reference Standard	IEC 61071 / AEC-Q200D
Climatic Category	40/105/56 IEC 60068-1
Rated Temperature T <sub>R</sub>	+85°C
Operating Temperature Range	-40°C ~ +105°C (85°C ~105°C, decreasing factor 1.25% per °C for Rated Voltage)
Storage Temperature	-40°C ~ +105°C
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.
Storage Life	Product that passed less than 2 years from production, No need reconfirmation
RoHS Compliance	Compliant with the restricted substance requirement of Directive 2011/65/EU

**Constructions**

Metallized Film	OPP & Al/Zn
Metal Sprayed	Zn
Connection electrode	Tinned coated Copper
Case	- PPS plastic case for mass production - CNC PC plastic case for confirmation of mechanical dimension and some electrical parameters, not for vibration and environment test.
Filling	Epoxy resin, flame retardant UL 94 V0
Terminal	Tinned coated Copper
Film Construction	Mono Structure 

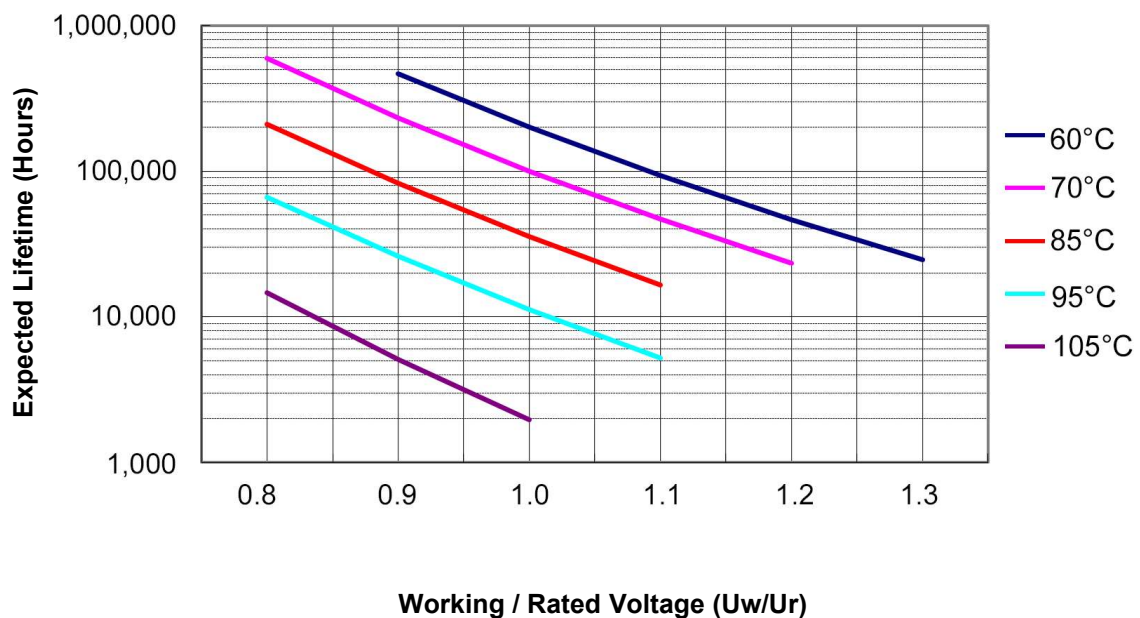
### Electrical Characteristics

Voltage Range	450Vdc ~ 1200Vdc
Capacitance Range	300 $\mu$ F ~ 1000 $\mu$ F
Capacitance Tolerance	$\pm$ 5% or $\pm$ 10% at +25°C
Capacitance	Measuring Frequency at 100 Hz Measuring Voltage: $1 \pm 0.2$ V
Standard Atmospheric Conditions for Static Test	<b>Ambient temperature</b> 15°C to 35°C (If there is any doubt on the results, the measurements shall be made at +20 +/- 5°C) <b>Relative humidity</b> 45% to 75% (If there is any doubt on the results, the measurements shall be made at 60% to 70 %.) <b>Air pressure</b> 86 kPa to 106 kPa.
Visual examination, Marking (Non-Destructive)	Appearance: no remarkable abnormality
Voltage Between Terminals $U_{TT}$	1.5 $U_n$ / 10s (25 $\pm$ 5°C)
Voltage Between Terminals and Case $U_{TC}$	3000V <sub>AC</sub> 50/60Hz 10 s
Dielectric dissipation factor $tg\delta_0$	$\leq 2 \times 10^{-4}$
Dissipation factor	0.0010 (20°C, 100Hz)
Insulation Resistance	$\geq 10\,000$ s (25°C, 500V, 1min)
Hot-Spot	$\leq 105^\circ\text{C}$
Life Expectancy	Refer to expected life curve
Failure Rate	$\leq 50$ FIT
Degree of protection	IP00 rating
<b>Overvoltage</b>	<b>Maximum duration within one day</b>
Apply 110% of rated voltage	30% of on-load duration
Apply 115% of rated voltage	30 mins
Apply 120% of rated voltage	5 mins
Apply 130% of rated voltage	1 min
Apply 150% of rated voltage	30 ms every time, 100 ms/day

**Classification of Tests**

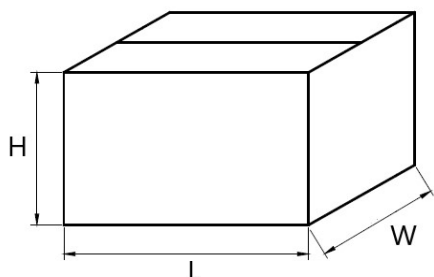
Routine Tests	<ol style="list-style-type: none"> <li>1. Appearance inspection</li> <li>2. Dimension check</li> <li>3. Voltage test between terminal and case</li> <li>4. Voltage test between terminals</li> <li>5. Capacitance and DF measurement</li> <li>6. ESL and ESR measurement</li> <li>7. Insulation resistance measurement</li> </ol>
Type Tests	<ol style="list-style-type: none"> <li>1. Appearance inspection</li> <li>2. Dimension check</li> <li>3. Voltage test between terminal and case</li> <li>4. Voltage test between terminals</li> <li>5. Capacitance and DF measurement</li> <li>6. Vibration and shocks</li> <li>7. Surge discharge test</li> <li>8. Biased Humidity</li> <li>9. Moisture resistance</li> <li>10. Temperature shock</li> <li>11. High temperature storage</li> <li>12. Endurance test</li> </ol>

**Expected Life Curve**



## Packaging Information

Capacitors are well protected by foams. And then are packaged in the cartons.



Carton dimensions

Carton No.	L (mm)	W (mm)	H (mm)
1	375	285	235
2	375	285	300
3	375	285	330
4	375	285	365
5	375	285	265

According to the capacitor's diameter, every carton contains capacitors as per the following Table 2.

Capacitor quantity of each carton

The total quantity of each carton is depended on the dimension of customized capacitor.

### Cautions and Warnings

- Don't exceed the upper category temperature.
- For longtime storage, maximum relative humidity 80%, no dew allowed on the capacitor.
- Do not use or store capacitor in corrosive atmosphere, in the dusty environment's regular maintenance and cleaning especially of the terminals is required to avoid conductive path between terminal / or terminal and ground.
- Don't apply any mechanical stress to the capacitor terminals, and avoid any compressive, tensile or flexural stress.
- Avoid overload of the capacitors
- Do not have unlimited service life expectancy, the max service life expectancy may vary depending on the application the capacitor is used in.

### Disclaimer

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