

Double Metallized Polypropylene Film Snubber Capacitors

FSD Series - 850 ~ 2000VDC (Round Axial Type, 2 Leads)



Overview

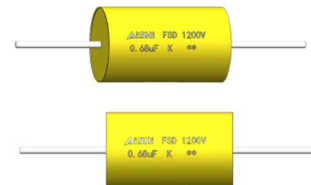
The FSD Series is a polypropylene metallized film and double-sided metallized film with polyester tape wrapping filled with resin and tinned copper wires.

Applications

Widely used in high voltage, high frequency, pulse circuit and IGBT protection.

Features

- High ripple current
- Self-healing property
- Low losses
- Small inherent temperature rise
- High contact reliability
- Suitable for high frequency applications

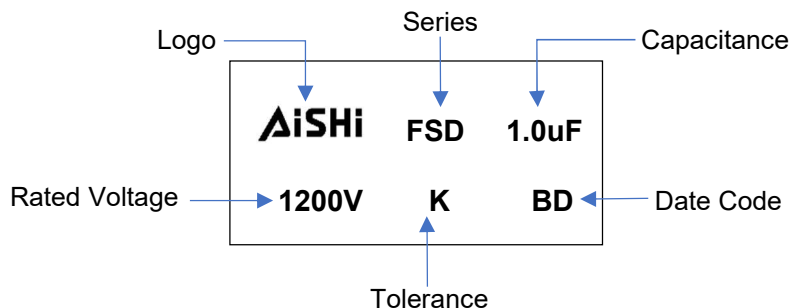


Qualification

Reference Standard	IEC 61071
Climate Category	40/85/56 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	SD	3B	K	474	046	XNL	N
Capacitor Type	Series	Voltage (VDC)	Tolerance	Capacitance (pF)	Size Code (L)	Terminal Code	Lead Length Code
F = Film	Snubber Type, Metallized PP Film	850= 2P 1000=3K 1200=3B 1600=3W 2000=3D 3000=3F	J = ±5% K = ±10%	First two digits = significant figures. Third digit = Number of zeros.	34mm=034 46mm=046 58mm=058	Refer to Terminal Code Table	Refer to Lead Length Code Table

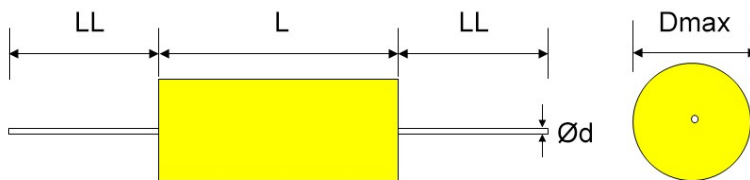
Terminal Code

Digit One (Lead/Terminal Type)	Digit Two (Lead Space)		Digit Three (Lead Ipsilateral)	
Axial Lead	X	NA	N	L

Lead Length Code

Lead Length	
20.0mm min	L
35.0mm min	B
NA	N

Dimension (mm)



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Rating and Part Number

Vdc	Cap Value μF	Dimensions		I _{rms} 100KHz 70°C A	Peak Current A	ESR _{Typical} 100KHz mΩ	ESL nH	dv/dt V/us	Lead Wire mm	Part Number
		D	L							
		mm max	mm max							
850	0.22	14.5	34.0	8.0	264.0	9.4	22	1200	1.0	FSD2PK224034XNLB
850	0.22	12.0	46.0	7.0	154.0	11.3	26	700	0.8	FSD2PK224046XNLB
850	0.33	17.5	34.0	9.0	396.0	8.8	22	1200	1.0	FSD2PK334034XNLB
850	0.33	14.0	46.0	10.0	231.0	8.7	26	700	1.0	FSD2PK334046XNLB
850	0.47	20.5	34.0	11.0	564.0	5.7	22	1200	1.0	FSD2PK474034XNLB
850	0.47	16.5	46.0	9.0	329.0	7.2	26	700	1.0	FSD2PK474046XNLB
850	0.68	19.5	46.0	13.0	476.0	4.6	26	700	1.0	FSD2PK684046XNLB
850	1.0	23.0	46.0	13.0	700.0	4.7	26	700	1.0	FSD2PK105046XNLB
850	1.5	28.5	46.0	13.0	1050.0	4.0	26	700	1.2	FSD2PK155046XNLB
850	2.0	32.0	46.0	13.0	1400.0	4.3	26	700	1.2	FSD2PK205046XNLB
850	2.2	33.5	46.0	14.0	1540.0	3.3	26	700	1.2	FSD2PK225046XNLB
850	2.2	28.5	58.0	12.0	990.0	4.0	32	450	1.2	FSD2PK225058XNLB
850	2.5	35.5	46.0	15.0	1750.0	3.7	26	700	1.2	FSD2PK255046XNLB
850	2.5	30.0	58.0	15.0	1125.0	4.0	32	450	1.2	FSD2PK255058XNLB
850	3.0	32.5	58.0	15.0	1350.0	3.7	32	450	1.2	FSD2PK305058XNLB
850	3.3	34.0	58.0	15.0	1485.0	3.3	32	450	1.2	FSD2PK335058XNLB
850	4.0	37.5	58.0	15.0	1800.0	3.3	32	450	1.2	FSD2PK405058XNLB
850	4.7	40.0	58.0	15.0	2115.0	2.9	32	450	1.2	FSD2PK475058XNLB
1000	0.22	16.5	34.0	8.0	286.0	8.5	22	1300	1.0	FSD3KK224034XNLB
1000	0.33	20.0	34.0	9.0	429.0	6.5	22	1300	1.0	FSD3KK334034XNLB
1000	0.33	16.0	46.0	8.0	264.0	8.3	26	800	1.0	FSD3KK334046XNLB
1000	0.47	23.5	34.0	10.0	611.0	5.4	22	1300	1.0	FSD3KK474034XNLB
1000	0.47	18.5	46.0	9.0	376.0	6.7	26	800	1.0	FSD3KK474046XNLB
1000	0.68	22.0	46.0	12.0	544.0	5.7	26	800	1.0	FSD3KK684046XNLB
1000	1.0	26.5	46.0	12.0	800.0	4.6	26	800	1.2	FSD3KK105046XNLB
1000	1.5	32.0	46.0	13.0	1200.0	5.2	26	800	1.2	FSD3KK155046XNLB
1000	1.5	27.0	58.0	12.0	750.0	5.6	32	500	1.2	FSD3KK155058XNLB
1000	2.0	31.0	58.0	15.0	1000.0	4.3	32	500	1.2	FSD3KK205058XNLB
1000	2.2	32.0	58.0	15.0	1100.0	3.9	32	500	1.2	FSD3KK225058XNLB
1000	3.0	37.5	58.0	15.0	1500.0	3.4	32	500	1.2	FSD3KK305058XNLB
1000	3.3	39.0	58.0	15.0	1650.0	3.1	32	500	1.2	FSD3KK335058XNLB
1200	0.22	18.0	34.0	9.0	330.0	7.7	22	1500	1.0	FSD3BK224034XNLB
1200	0.22	14.5	46.0	8.0	198.0	11.0	26	900	1.0	FSD3BK224046XNLB
1200	0.33	22.0	34.0	10.0	495.0	6.6	22	1500	1.0	FSD3BK334034XNLB
1200	0.33	17.5	46.0	9.0	297.0	7.7	26	900	1.0	FSD3BK334046XNLB
1200	0.47	24.0	46.0	10.0	423.0	6.8	26	900	1.2	FSD3BK474046XNLB
1200	0.68	26.0	46.0	12.0	612.0	5.8	26	900	1.2	FSD3BK684046XNLB
1200	1.0	29.0	46.0	11.0	900.0	5.0	26	900	1.2	FSD3BK105046XNLB
1200	1.0	24.5	58.0	10.0	550.0	5.5	32	550	1.2	FSD3BK105058XNLB
1200	1.2	32.0	46.0	11.0	1080.0	4.4	26	900	1.2	FSD3BK125046XNLB
1200	1.2	26.5	58.0	10.0	660.0	4.8	32	550	1.2	FSD3BK125058XNLB
1200	1.5	35.5	46.0	14.0	1350.0	3.9	26	900	1.2	FSD3BK155046XNLB
1200	1.5	29.5	58.0	13.0	825.0	4.4	32	550	1.2	FSD3BK155058XNLB
1200	2.0	33.0	58.0	15.0	1100.0	3.9	32	550	1.2	FSD3BK205058XNLB
1200	2.2	35.5	58.0	15.0	1210.0	3.7	32	550	1.2	FSD3BK225058XNLB
1200	3.0	41.0	58.0	15.0	1650.0	3.1	32	550	1.2	FSD3BK305058XNLB
2000	0.047	14.0	34.0	5.0	56.4	30.0	26	1200	0.8	FSD3DK473034XNLB
2000	0.047	11.0	46.0	5.0	56.4	30.0	26	1200	0.8	FSD3DK473046XNLB


Rating and Part Number

Vdc	Cap Value μF	Dimensions		I _{rms} 100KHz 70°C A	Peak Current A	ESR _{Typical} 100KHz mΩ	ESL nH	dv/dt V/us	Lead Wire mm	Part Number
		D	L							
		mm max	mm max							
2000	0.068	16.0	34.0	7.0	136.0	16.8	22	2000	1.0	FSD3DK683034XNLB
2000	0.068	13.0	46.0	6.0	81.6	23.3	26	1200	1.0	FSD3DK683046XNLB
2000	0.10	19.0	34.0	10.0	200.0	12.0	22	2000	1.0	FSD3DK104034XNLB
2000	0.10	15.5	46.0	9.0	120.0	17.7	26	1200	1.0	FSD3DK104046XNLB
2000	0.15	18.5	46.0	12.0	180.0	9.5	26	1200	1.0	FSD3DK154046XNLB
2000	0.22	21.5	46.0	13.0	264.0	8.6	26	1200	1.0	FSD3DK224046XNLB
2000	0.33	26.5	46.0	14.0	396.0	6.7	26	1200	1.2	FSD3DK334046XNLB
2000	0.47	32.0	46.0	14.0	564.0	5.6	26	1200	1.2	FSD3DK474046XNLB
2000	0.56	34.5	46.0	15.0	672.0	5.2	26	1200	1.2	FSD3DK564046XNLB
2000	0.56	29.0	58.0	15.0	392.0	6.5	32	700	1.2	FSD3DK564058XNLB
2000	0.68	31.0	58.0	15.0	476.0	5.7	32	700	1.2	FSD3DK684058XNLB
2000	1.0	37.5	58.0	15.0	700.0	4.7	32	700	1.2	FSD3DK105058XNLB
2000	1.2	40.5	58.0	15.0	840.0	4.3	32	700	1.2	FSD3DK125058XNLB

General Technical Data

Applications	High voltage, high frequency and pulse circuit / IGBT Modules Protection
Dielectric	Double Metallized Polypropylene Film
Reference Standard	IEC 61071
Climatic Category	40/85/56 IEC 60068-1
Operating Temperature Range	-40°C ~ +105°C (+85°C observing voltage must be de-rating at 1.35% per °C)
Protection	Polyester wrapping with epoxy resin fill
Installation	Any position
Packaging	Packed in cardboard boxes with protection for the terminals
Storage Conditions	Storage time: ≤24months from the date marked on the label package Average relative humidity per year ≤70% RH≤85% for 30 days randomly distributed throughout the year Dew is absent Temperature: -40°C ~ +85°C
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
Application note and limiting conditions	These capacitors are designed only for DC voltage so should not be used for AC line. The continuous peak voltage shall not exceed the rated DC voltage rating

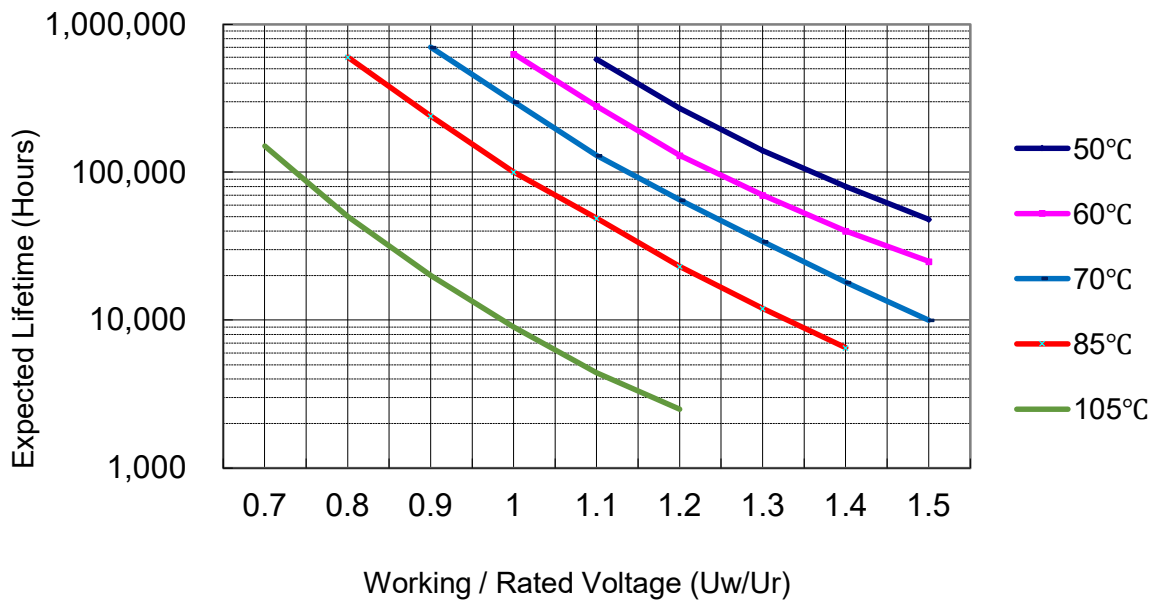
Construction

Metallized Film	OPP & Al (Single Side Metallized and Double Sided Metallized)
Metal Sprayed	Sn/Zn Alloy
Connection Electrode	Tin-plated Copper Wire
Wrap	Wrap of Polyester Film
Filling	Epoxy Resin (UL94V-0)
Film Construction	<p style="text-align: center;">Internal Series Connection</p> 

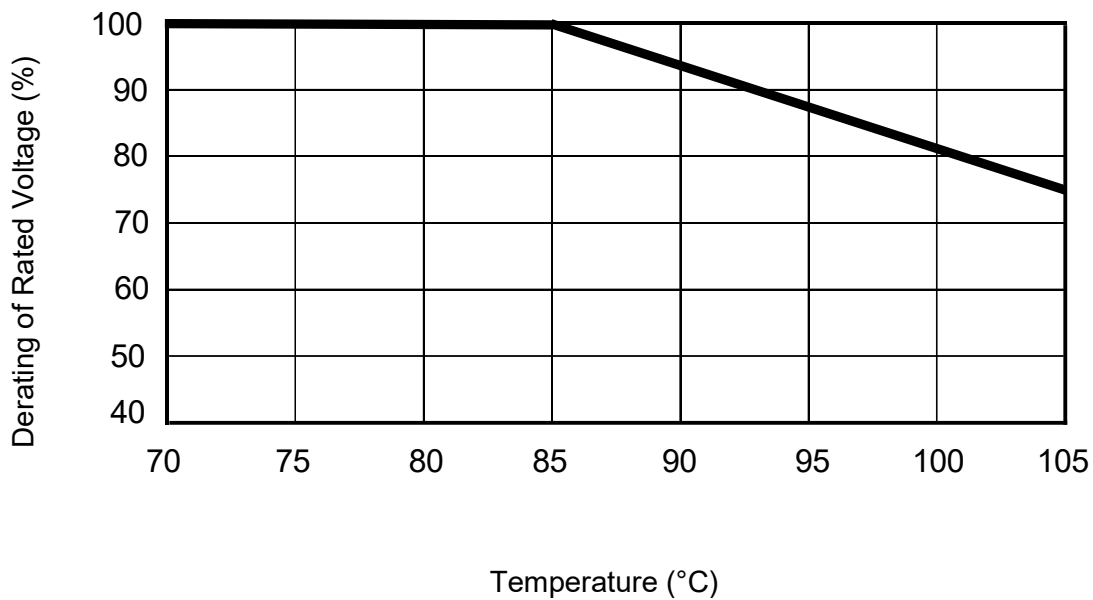
Electrical Characteristics

Voltage Range	850Vdc ~ 2000Vdc
Capacitance Range	0.047 μ F ~ 4.7 μ F
Capacitance Tolerance	\pm 5% or \pm 10% at +25°C
Capacitance	Measuring Frequency at 1kHz Measuring Voltage: 1 \pm 0.2V
Standard Atmospheric Conditions for Static Test	<p>Ambient temperature 15°C to 35°C (If there is any doubt on the results, the measurements shall be made at +20 +/- 5°C)</p> <p>Relative humidity 45% to 75% (If there is any doubt on the results, the measurements shall be made at 60% to 70 %.)</p> <p>Air pressure 86 kPa to 106 kPa.</p>
Voltage Between Terminals U_{TT}	1.5 x VRVDC for 10 seconds (between terminations) @ +25°C \pm 5°C
Voltage Between Terminals and Case U_{TC}	3000VAC, 60s (at+20+/-2°C)
Dielectric Dissipation Factor $Tg\delta 0$	$\leq 2 \times 10^{-4}$
Dissipation factor	0.0010 (0.1%) at 25°C, 1KHz
Insulation Resistance	R between leads, for C \leq 0.33 μ F at 100 V; 1 min > 100 000 M Ω RC between leads, for C > 0.33 μ F at 100 V; 1 min > 30 000 s
Self-Inductance	<1nH per mm of lead spacing
Hot-Spot	$\leq 85^\circ\text{C}$
Life Expectancy	100,000 hours (U_R , $\Theta_{\text{hotspot}}=85^\circ\text{C}$)
Failure Rate	100 Fit
Max. Altitude	2000 m
Overvoltage	Maximum duration within one day
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
Application note and limiting conditions	These capacitors are designed only for DC voltage so should not be used for AC line The continuous peak voltage shall not exceed the rated DC voltage rating

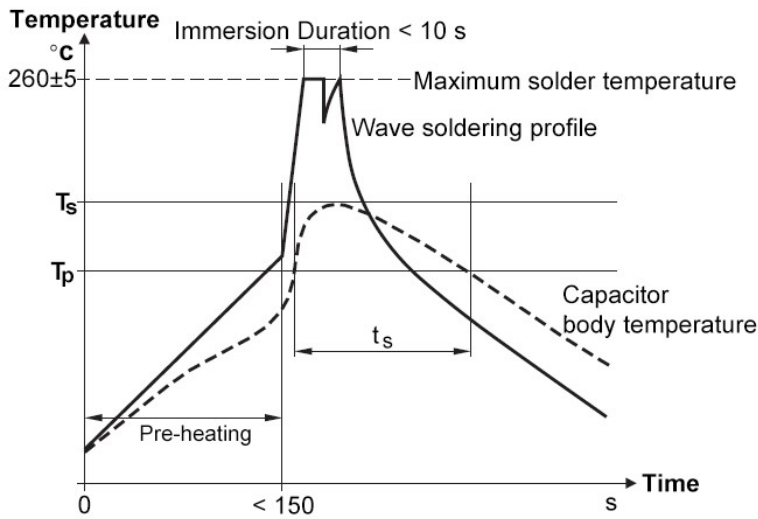
Expected Life Curve



Derating of Rated Voltage Vs Temperature



Wave Soldering Recommendations

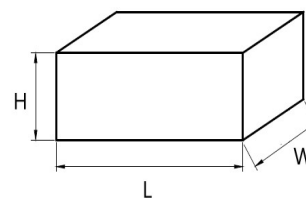


Ts: Capacitor body maximum temperature at wave soldering
 Tp: Capacitor body maximum temperature at pre-heating

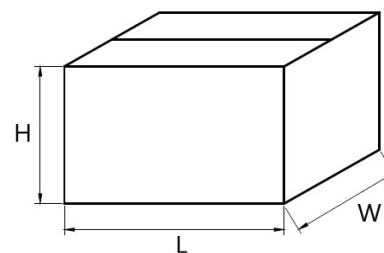
Polypropylene Capacitors	Polyester Capacitors
During pre-heating: Tp≤110°C During soldering: Ts ≤120°C, ts≤60	During pre-heating: Tp≤130°C During soldering: Ts≤160°C, ts≤60s

Packaging Information

Inner Box Specifications (Dimensions)			
Box #	L ±3mm	W±3mm	H ±3mm
# 8	425	185	105



Outer Box Specifications (Dimensions)			
Box #	L ±5mm	W±5mm	H ±5mm
# 3	445	400	250



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.
- Don't move the capacitor after fixed to the PC board, and don't pick up the PC board by the fixed capacitor.
- Don't place the capacitor on a PC board whose holes space differs from the specified space.
- 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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