

Double Metallized Polypropylene Film Snubber Capacitors

FSC Series - 600 ~ 2000VDC (Oval Axial Type, 2 Leads)



Overview

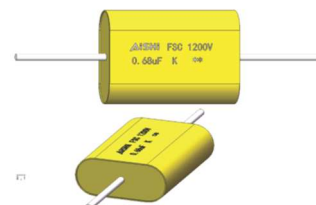
The FSC Series is a polypropylene metallized film and double-sided metallized film with polyester tape wrapping filled with resin and tinned copper wires.

Applications

Widely used in high voltage, high frequency and 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

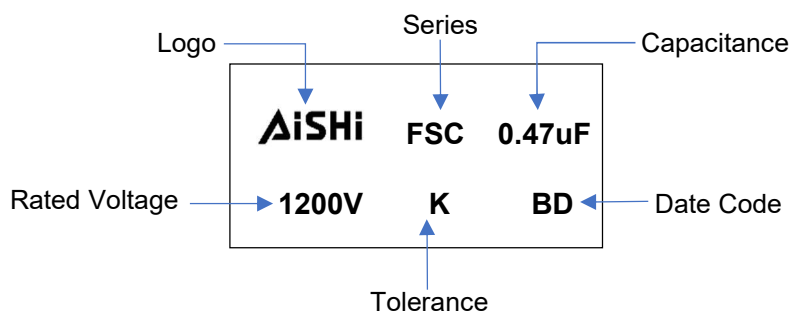


Qualification

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	SC	3B	K	474	046	XNL	B
Capacitor Type	Series	Voltage (VDC)	Tolerance	Capacitance (pF)	Size Code (L)	Terminal Code	Lead Length Code
F = Film	Snubber, Axial Type, Metallized PP Film	600=2K 1000=3K 1200=3B 1600=3W 2000=3D 3000=3F	J = ±5% K = ±10% M = ±20%	First two digits = significant figures. Third digit = Number of zeros.	34mm=034 46mm=046 54mm=054	Refer to Terminal Code Table	Refer to Lead Length Code Table

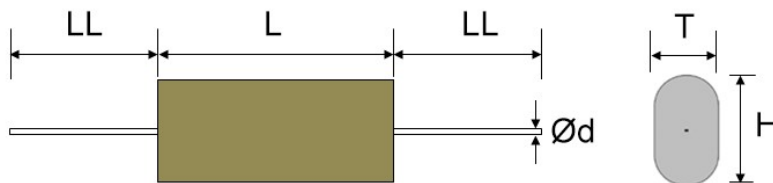
Terminal Code

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

Lead Length Code

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

Dimension (mm)



Rating and Part Number

Vdc	Cap Value μF	Dimensions			Irms 100KHz 70°C A	Peak Current A	ESR _{Typical} 100KHz mΩ	ESL nH	dv/dt V/us	Lead Wire mm	Part Number
		L mm max	H mm max	T mm max							
600	0.1	34.0	12.0	6.0	3.0	25.0	28.0	17	250	0.8	FSC2KK104034XNLB
600	0.15	34.0	13.0	7.0	4.5	37.5	13.0	18	250	0.8	FSC2KK154034XNLB
600	0.22	34.0	14.5	8.0	5.0	55.0	12.0	19	250	0.8	FSC2KK224034XNLB
600	0.33	34.0	16.0	10.0	6.0	82.5	9.0	19	250	0.8	FSC2KK334034XNLB
600	0.47	34.0	18.0	12.0	7.5	117.5	8.0	20	250	1.0	FSC2KK474034XNLB
600	0.68	34.0	20.5	14.5	9.0	170.0	6.0	21	250	1.0	FSC2KK684034XNLB
600	1.0	34.0	23.5	17.5	10.0	250.0	6.0	23	250	1.0	FSC2KK105034XNLB
600	1.5	34.0	27.5	21.5	12.0	375.0	5.0	24	250	1.2	FSC2KK155034XNLB
600	2.0	46.0	27.5	18.5	13.0	400.0	5.0	28	200	1.2	FSC2KK205046XNLB
600	3.3	54.0	32.0	22.5	17.5	495.0	4.0	34	150	1.2	FSC2KK335054XNLB
600	4.7	54.0	33.5	28.5	19.0	705.0	4.0	36	150	1.2	FSC2KK475054XNLB
850	0.15	34.0	16.0	10.0	6.5	112.5	8.0	19	750	0.8	FSC2PK154034XNLB
850	0.22	34.0	18.0	11.5	7.0	165.0	8.0	20	750	1.0	FSC2PK224034XNLB
850	0.33	34.0	20.5	14.5	8.5	247.5	7.0	21	750	1.0	FSC2PK334034XNLB
850	0.47	34.0	23.5	17.0	11.0	352.5	5.0	22	750	1.0	FSC2PK474034XNLB
850	0.68	34.0	27.0	21.0	13.5	510.0	4.0	24	750	1.2	FSC2PK684034XNLB
850	1.0	46.0	27.0	17.5	13.0	450.0	5.0	28	450	1.2	FSC2PK105046XNLB
850	1.5	46.0	31.0	21.5	16.0	675.0	4.0	30	450	1.2	FSC2PK155046XNLB
850	2.0	46.0	34.5	25.0	20.0	900.0	3.0	31	450	1.2	FSC2PK205046XNLB
850	2.2	46.0	36.0	26.5	20.5	990.0	3.0	32	450	1.2	FSC2PK225046XNLB
850	2.5	46.0	38.0	28.5	21.5	1,125.0	3.0	33	450	1.2	FSC2PK255046XNLB
1000	0.15	34.0	17.5	11.5	7.5	127.5	7.0	20	850	1.0	FSC3KK154034XNLB
1000	0.22	34.0	20.0	13.5	8.0	187.0	7.0	21	850	1.0	FSC3KK224034XNLB
1000	0.33	34.0	23.0	17.0	10.0	280.5	6.0	22	850	1.0	FSC3KK334034XNLB
1000	0.47	34.0	26.5	20.0	12.0	399.5	5.0	24	850	1.2	FSC3KK474034XNLB
1000	0.68	34.0	30.5	24.5	13.0	578.0	5.0	26	850	1.2	FSC3KK684034XNLB
1000	1.0	46.0	30.0	20.5	14.0	500.0	5.0	24	500	1.2	FSC3KK105046XNLB
1000	1.5	46.0	35.0	25.5	17.5	750.0	4.0	31	500	1.2	FSC3KK155046XNLB
1000	2.0	46.0	39.0	30.0	22.0	1,000.0	3.0	33	500	1.2	FSC3KK205046XNLB
1200	0.1	34.0	18.0	12.0	7.0	115.0	9.0	20	1,150	1.0	FSC3BK104034XNLB
1200	0.15	34.0	21.0	14.5	8.5	172.5	7.0	21	1,150	1.0	FSC3BK154034XNLB
1200	0.22	34.0	24.0	17.5	9.5	253.0	7.0	23	1,150	1.0	FSC3BK224034XNLB
1200	0.33	46.0	24.0	14.5	10.0	214.5	7.0	21	650	1.0	FSC3BK334046XNLB
1200	0.47	46.0	27.0	18.0	11.0	305.5	7.0	28	650	1.2	FSC3BK474046XNLB
1200	0.68	46.0	31.0	22.0	13.0	442.0	6.0	30	650	1.2	FSC3BK684046XNLB
1200	1.0	46.0	36.0	27.0	16.0	650.0	5.0	32	650	1.2	FSC3BK105046XNLB
1200	1.5	54.0	40.5	27.5	20.0	780.0	4.0	36	520	1.2	FSC3BK155054XNLB
1600	0.1	34.0	20.5	14.5	8.5	145.0	7.0	21	1,450	1.0	FSC3WK104034XNLB
1600	0.15	34.0	24.0	18.0	11.0	217.5	5.0	23	1,450	1.0	FSC3WK154034XNLB
1600	0.22	34.0	28.0	21.5	10.5	319.0	7.0	24	1,450	1.2	FSC3WK224034XNLB
1600	0.33	46.0	27.5	18.5	11.0	264.0	7.0	23	800	1.2	FSC3WK334046XNLB
1600	0.47	46.0	31.5	22.0	13.0	376.0	6.0	30	800	1.2	FSC3WK474046XNLB
1600	0.68	46.0	36.5	27.0	14.5	544.0	6.0	32	800	1.2	FSC3WK684046XNLB
1600	1.0	46.0	42.5	33.0	18.0	800.0	5.0	35	800	1.2	FSC3WK105046XNLB
1600	1.5	54.0	47.0	34.5	22.5	975.0	4.0	39	650	1.2	FSC3WK155054XNLB
2000	0.022	34.0	14.5	8.0	3.0	38.5	35.0	18	1,750	0.8	FSC3DK223034XNLB
2000	0.033	34.0	16.0	10.0	4.0	57.8	20.0	19	1,750	0.8	FSC3DK333034XNLB
2000	0.047	34.0	18.0	11.5	6.0	82.3	12.0	20	1,750	1.0	FSC3DK473034XNLB


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
		L mm max	H mm max	T mm max							
2000	0.068	34.0	20.5	14.0	8.0	119.0	8.0	21	1,750	1.0	FSC3DK683034XNLB
2000	0.10	34.0	23.5	17.0	9.0	175.0	7.0	22	1,750	1.0	FSC3DK104034XNLB
2000	0.15	46.0	23.5	14.0	10.0	144.0	7.0	21	960	1.0	FSC3DK154046XNLB
2000	0.22	46.0	27.0	17.5	10.5	211.2	8.0	28	960	1.0	FSC3DK224046XNLB
2000	0.33	46.0	31.5	22.0	11.5	316.8	8.0	30	960	1.2	FSC3DK334046XNLB
2000	0.47	46.0	36.0	26.5	14.5	451.2	6.0	32	960	1.2	FSC3DK474046XNLB
2000	0.56	54.0	36.5	24.0	14.0	425.6	7.0	31	760	1.2	FSC3DK564054XNLB
2000	0.68	54.0	39.5	27.0	16.0	516.8	6.0	35	760	1.2	FSC3DK684054XNLB
2000	1.0	54.0	45.5	33.0	19.5	760.0	5.0	38	760	1.2	FSC3DK105054XNLB
3000	0.01	34.0	14.0	8.0	2.5	26.0	60.0	18	2,600	0.8	FSC3FK103034XNLB
3000	0.015	34.0	16.0	9.5	3.0	39.0	40.0	19	2,600	0.8	FSC3FK153034XNLB
3000	0.022	34.0	18.0	11.5	4.0	57.2	25.0	20	2,600	1.0	FSC3FK223034XNLB
3000	0.033	34.0	20.5	14.5	6.0	85.8	14.0	21	2,600	1.0	FSC3FK333034XNLB
3000	0.047	46.0	21.0	11.5	6.5	70.5	14.0	20	1,500	1.0	FSC3FK473046XNLB
3000	0.068	46.0	23.5	14.0	7.5	102.0	12.0	26	1,500	1.0	FSC3FK683046XNLB
3000	0.10	46.0	26.5	17.0	9.0	150.0	10.0	28	1,500	1.2	FSC3FK104046XNLB
3000	0.15	46.0	31.0	21.5	11.5	225.0	8.0	30	1,500	1.2	FSC3FK154046XNLB

General Technical Data

Applications	High voltage, high frequency and pulse circuit / IGBT Modules Protection
Dielectric	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

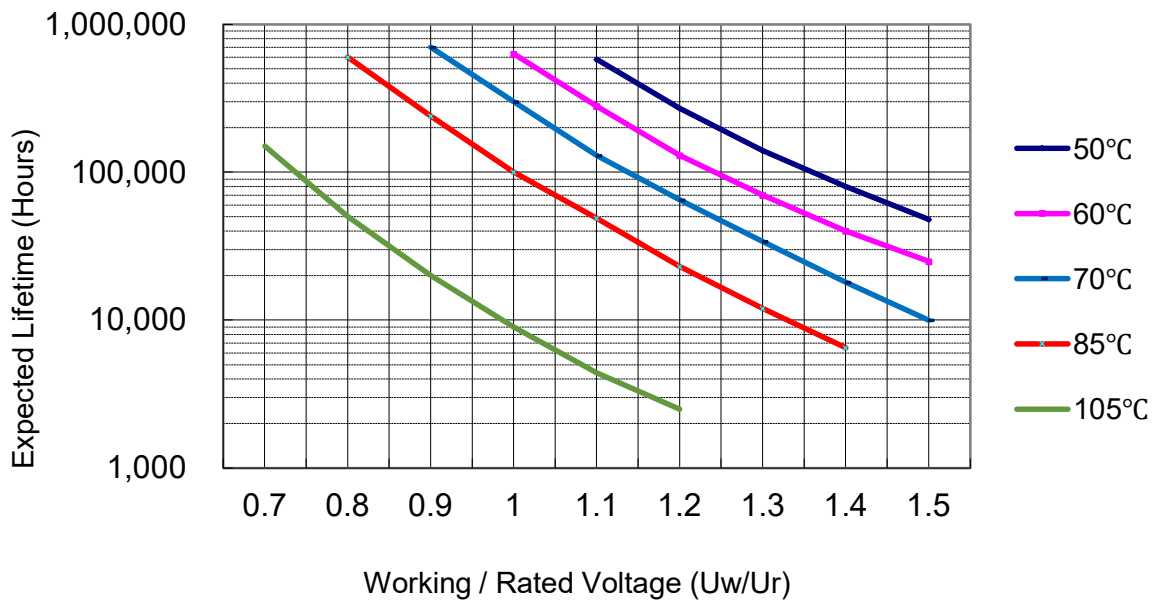
Construction

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> 

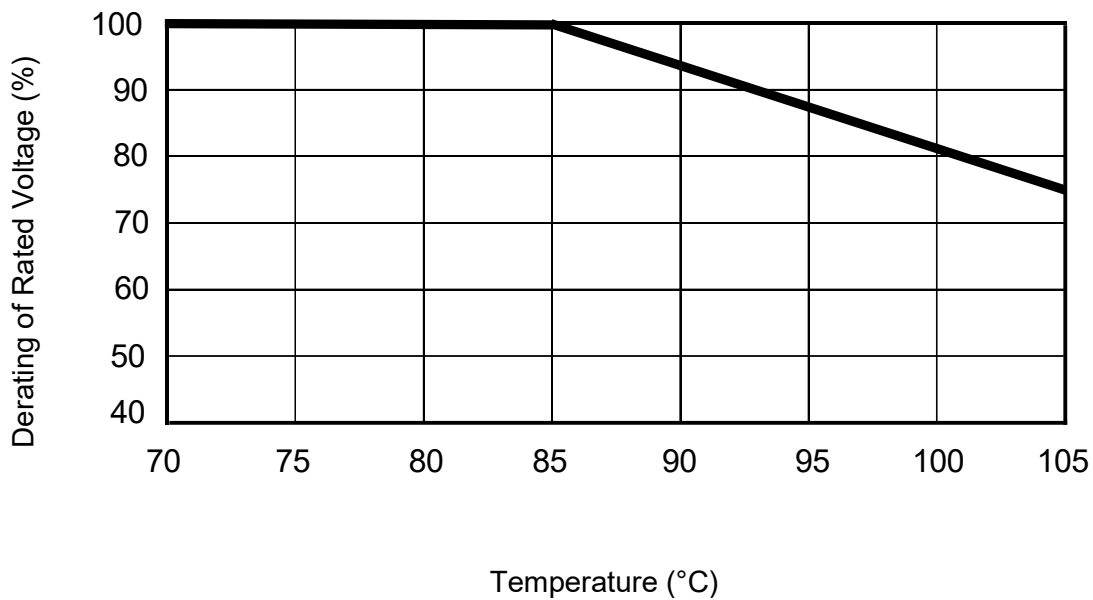
Electrical Characteristics

Voltage Range	600Vdc ~ 3000Vdc
Capacitance Range	0.01 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 V _R VDC 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 δ 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

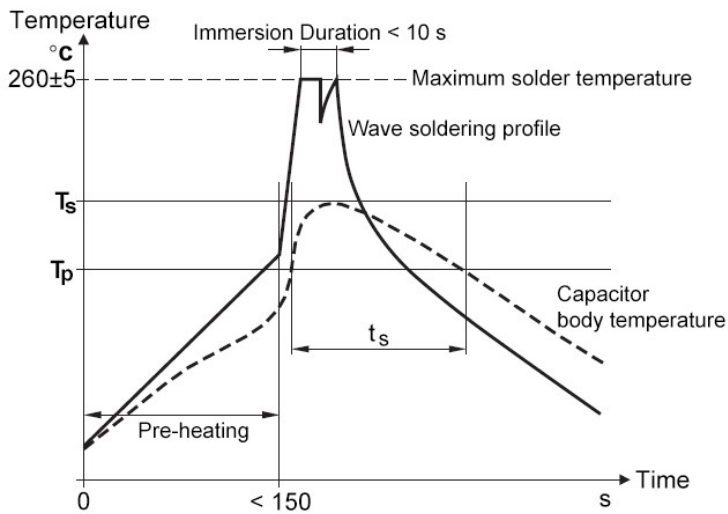
Expected Life Curve



Derating of Rated Voltage Vs Temperature



Wave Soldering Recommendations

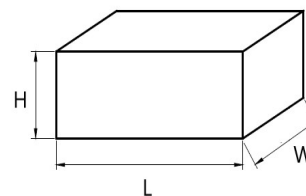


Ts: Capacitor body maximum temperature at wave soldering
 Tp: Capacitor body maximum temperature at pre-heating

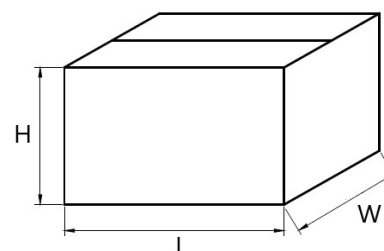
Polypropylene Capacitors	Polyester Capacitors
During pre-heating: Tp ≤ 110°C During soldering: Ts ≤ 120°C, ts ≤ 60	During pre-heating: Tp ≤ 130°C During soldering: Ts ≤ 160°C, ts ≤ 60s

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 pitch 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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