



Series	Capacitance range	Voltage range	Temperature range	Case Dx H	Applications
FS-FSX	100-4700	200-500	-25°C +105°C	30x40 45x100	Snap-in type, 2-4 pins Long life 5000h Extended temperature range Solde pin mounting Industrial applications

**MECHANICAL OUTLINES:**

CASE: cylindrical, aluminium made

TERMINALS: to be soldered, for printed wiring board (type SNAP-IN)

SEALING: hermetic by beading on a rubber-Bakelite cover

PRESSURE RELEASE VENT: directly on the aluminium case

SLEEVE: self-extinguishing thermo shrinkable sleeve

MOUNTING: vertical, by soldering to printed circuit board.

SIZE: see enclosed drawings

CLIMATIC CATEGORY (IEC 68): 25/98/56

SPECIFICATIONS	TEMPERATURE RANGE	CAPACITANCE
CECC 30300 IEC 384-4 ("long life grade") MIL C62D DIN 41240/DIN 45910	Operating: -25°C +105°C  Climatic Category (IEC 68): 25/105/56	Tolerance shall be within the following limits: -20%+20% (standard tolerance) or -10%+30% (available on request)

**LEAKAGE CURRENT:**

After the rated voltage has been applied to the capacitor for 5 minutes the leakage current must be:

Maximum limit	at 25°C	$I_f \leq 0.004 * C * V$
Operating limit	at 25°C	$I_f \leq 0.001 * C * V$

Where  $I_f$  = leakage current (µA)

C = capacitance (µF)

V = rated voltage (V)

**IMPORTANT**

When using high-capacitance and high-voltage electrolytic capacitors it is important to remember that the inner part (the rolled section) is not insulated from can: between the negative pole and the aluminium can there is a variable and not defined resistance essentially due to the electrolyte used in capacitor manufacture.



**SURGE VOLTAGE**

Working Voltage	200	250	315	400	420	450	500
Surge Voltage	230	290	347	440	460	495	525

**RIPPLE CURRENT:**

The allowable values of ripple current in amperes, are related to the temperature and frequency by formula:

$$I_r = K_t * K_f * I_{r105}$$

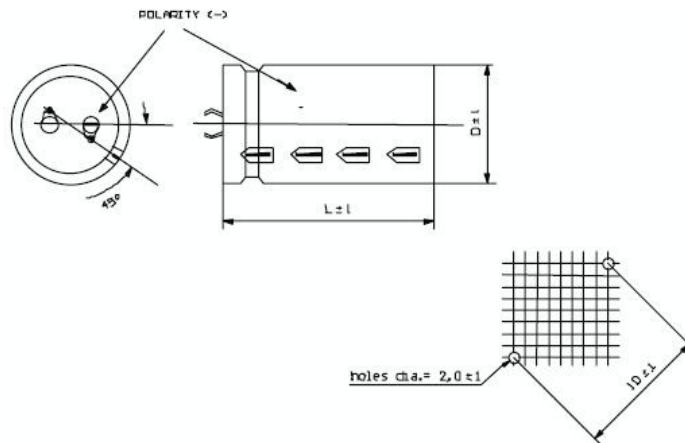
where  $I_{r105}$  is the limit given by tables, referred to a temperature of 105°C and to a frequency of 100 Hz and  $K_t$  or  $K_f$  are values here below tabulated:

°C	50	65	75	85	95	105
$K_t$	2.6	2.4	2.1	1.8	1.35	1.0

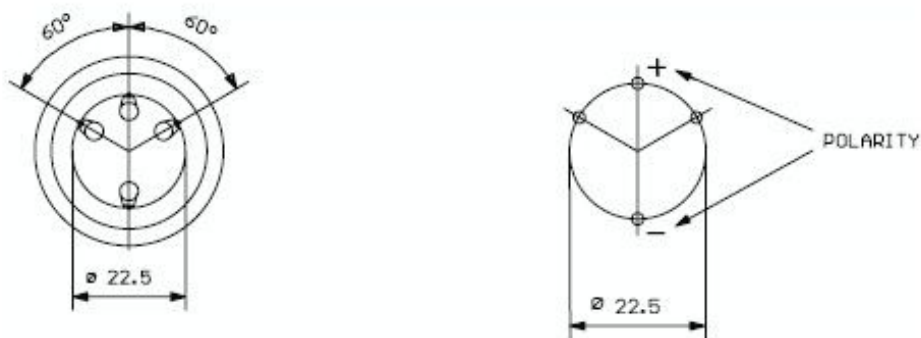
$V_n$	HZ	50	98	300	400	500	>1KHZ
$V > 160$		0.88	1.00	1.20	1.25	1.35	1.40

**CAPACITORS DIMENSIONS AND DRILL LING PLAN OF PRINTED WIRING BOARD**

• FS SERIES



• FSX SERIES (D=35 / 40 / 45mm)





CASE CODE	D* L (mm)	CASE CODE	D* L (mm)	CASE CODE	D* L (mm)	CASE CODE	D* L (mm)
MB	30x40	NC	35x50	PB	40x40	QC	45x50
MC	30x50	NN	35x60	PC	40x50	QN	45x60
NA	35x35	NK	35x65	PN	40x60	QE	45x75
NB	35x40	NE	35x75	PG	40x100	QG	45x100

· The unconnected pins serve as mountings and must be soldered to insulated pads.

CAP (uF)	Rated Voltage (V n)	Case Code	D*L (mm)	TGδ 100Hz z	ESR Max 100Hz (mΩ)	ESR typ 100Hz (mΩ)	Z max 10Khz (mΩ)	I ripple 75 °C 100Hz (A)	I ripple 105 °C 100Hz (A)	CATALOGUE NUMBER	
										2 mounting pins	4 mounting pins
470	200	MB	30x40	0.08	203	152	174	3.2	1.5	FS471M200MB1	
680		MB	30x40	0.08	141	105	120	3.9	1.9	FS681M200MB1	
1000		MC	30x50	0.08	96	72	82	5.2	2.5	FS102M200MC1	
1000		NB	35x40	0.08	96	72	82	5.7	2.7	FS102M200NB1	FSX102M200NB1
1200		NB	35x40	0.08	80	60	68	6.2	3.0	FS122M200NB1	FSX122M200NB1
1500		NC	35x50	0.08	64	48	54	6.9	3.3	FS152M200NC1	FSX152M200NC1
1800		NC	35x50	0.08	53	40	46	7.6	3.6	FS182M200NC1	FSX182M200NC1
2200		NN	35x60	0.08	58	49	46	9.1	4.3	FS222M200NN1	FSX222M200NN1
2700		NE	35x75	0.08	35	27	30	11.1	5.3	FS272M200NE1	FSX272M200NE1
3300		PG	40x100	0.08	29	22	25	15.4	7.3		FSX332M200PG1
2200		QC	45x50	0.08	43	33	37	9.7	4.6		FSX222M200QC1
3300		QE	45x75	0.08	29	22	25	14.1	6.7		FSX332M200QE1
4700		QG	45x100	0.08	20	15	18	19.6	9.3		FSX472M200QG1

CAP (uF)	Rated Voltage (V n)	Case Code	D*L (mm)	TGδ 100Hz	ESR Max 100Hz (mΩ)	ESR typ 100Hz (mΩ)	Z max 10Khz (mΩ)	I ripple 75 °C 100Hz (A)	I ripple 105 °C 100Hz (A)	CATALOGUE NUMBER	
										2 mounting pins	4 mounting pins
470	250	MB	30x40	0.08	203	152	174	3.2	1.5	FS471M250MB1	
680		MC	30x50	0.08	141	105	120	4.3	2.0	FS681M250MC1	
680		NB	35x40	0.08	141	105	120	4.7	2.2	FS681M250NB1	FSX681M250NB1
1000		NB	35x40	0.08	96	72	82	5.7	2.7	FS102M250NB1	FSX102M250NB1
1000		NC	35x50	0.08	96	72	82	5.7	2.7	FS102M250NC1	FSX102M250NC1
1800		NN	35x60	0.08	71	60	57	8.2	3.9	FS182M250NN1	FSX182M250NN1
2200		NE	35x75	0.08	43	33	37	10.0	4.8	FS222M250NE1	FSX222M250NE1
1500		PC	40x50	0.08	64	48	54	7.5	3.6	FS152M250PC1	FSX152M250PC1
2200		PG	40x100	0.08	43	33	37	12.6	6.0		FSX222M250PG1



CAP (uF)	Rated Voltage (V n)	Case Code	D*L (mm)	TGδ 100Hz	ESR Max 100Hz (mΩ)	ESR typ 100Hz (mΩ)	Z max 10KHz (mΩ)	I ripple 75°C 100Hz (A)	I ripple 105°C 100Hz (A)	CATALOGUE NUMBER	
										2 mounting pins	4 mounting pins
220	385	MB	30x40	0.08	434	326	370	2.2	1.1	FS221M385MB1	
330		MB	30x40	0.08	290	217	247	2.7	1.3	FS331M385MB1	
470		NC	35x50	0.08	203	152	156	4.1	1.9	FS471M385NC1	FSX471M385NC1
470		PB	40x40	0.08	203	152	174	3.8	1.8	FS471M385PB1	FSX471M385PB1
680		NC	35x50	0.08	141	105	108	4.9	2.3	FS681M385NC1	FSX681M385NC1
680		PC	40x50	0.08	141	105	108	5.3	2.5	FS681M385PC1	FSX681M385PC1

CAP (uF)	Rated Voltage (V n)	Case Code	D*L (mm)	TGδ 100Hz z	ESR Max 100Hz (mΩ)	ESR typ 100Hz (mΩ)	Z max 10KHz (mΩ)	I ripple 75°C 100Hz (A)	I ripple 105°C 100Hz (A)	CATALOGUE NUMBER	
										2 mounting pins	4 mounting pins
220	400	MB	30x40	0.08	434	326	370	2.2	1.1	FS221M400MB1	
330		MB	30x40	0.08	290	217	247	2.7	1.3	FS331M400MB1	
330		MC	30x50	0.08	290	217	247	3.0	1.4	FS331M400MC1	
470		MC	30x50	0.08	203	152	174	3.6	1.7	FS471M400MC1	
470		NB	35x40	0.08	203	152	174	3.9	1.8	FS471M400NB1	FSX471M400NB1
470		NC	35x50	0.08	203	152	174	3.9	1.8	FS471M400NC1	FSX471M400NC1
560		NC	35x50	0.08	171	128	146	4.2	2.0	FS561M400NC1	FSX561M400NC1
680		NC	35x50	0.08	141	105	120	4.7	2.2	FS681M400NC1	FSX681M400NC1
820		NN	35x60	0.08	117	87	82	5.5	2.6	FS821M400NN1	FSX821M400NN1
1200		NE	35x75	0.08	80	60	68	7.4	3.5	FS122M400NE1	FSX122M400NE1
680		PC	40x50	0.08	141	105	120	5.0	2.4	FS681M400PC1	FSX681M400PC1
1200		PE	40x75	0.08	80	60	68	8.0	3.8	FS122M400PE1	FSX122M400PE1
1500		PG	40x100	0.08	64	48	54	10.4	4.9		FSX152M400PG1
1000		QC	45x50	0.08	96	72	82	6.6	3.1		FSX12M400QC1
1500		QE	45x75	0.08	64	48	54	9.5	4.5		FSX152M400QE1
2200		QG	45x100	0.08	43	33	37	13.4	6.4		FSX222M400QG1

CAP (uF)	Rated Voltage (V n)	Case Code	D*L (mm)	TGδ 100Hz z	ESR Max 100Hz (mΩ)	ESR typ 100Hz (mΩ)	Z max 10KHz (mΩ)	I ripple 75°C 100Hz (A)	I ripple 105°C 100Hz (A)	CATALOGUE NUMBER	
										2 mounting pins	4 mounting pins
150	450	MB	30x40	0.10	796	597	652	1.7	0.8	FS151M450MB1	
220		MB	30x40	0.10	543	407	445	2.0	1.0	FS221M450MB1	
330		MC	30x50	0.10	362	271	297	2.7	1.3	FS331M450MC1	
330		NB	35x40	0.10	362	271	297	3.0	1.4	FS331M450NB1	FSX331M450NB1
470		NC	35x50	0.10	254	191	138	4.3	2.1	FS471M450NC1	FSX471M450NC1
680		NN	35x60	0.10	176	132	120	5.0	2.4	FS681M450NN1	FSX681M450NN1



680	450	NE	35x75	0.10	176	132	132	5.3	2.5	FS821M450NE1	FSX681M450NE1
820		NE	35x75	0.10	146	109	110	5.8	2.8	FS681M450PC1	FSX821M450PC1
680		PC	40x50	0.10	176	132	132	4.8	2.3	FS681M450NE1	FSX681M450NE1
1000		PE	40x75	0.10	119	90	98	6.6	3.2		FSX102M450PC1
1500		PG	40x100	0.10	80	60	66	9.5	4.5		FSX152M450PE1
820		QC	45x50	0.10	146	109	119	5.4	2.6		FSX821M450PG1
1200		QE	45x75	0.10	100	75	82	7.8	3.7		FSX122M450QC1
1800		QG	45x100	0.10	66	50	49	11.1	5.3		FSX182M450QE1
2200		QG	45x100	0.10	85	70	89	18.2	10.5		FSX222M450QG1

CAP (uF)	Rated Voltage (V n)	Case Code	D*L (mm)	TGδ 100Hz	ESR Max 100Hz (mΩ)	ESR typ 100Hz (mΩ)	Z max 10KHz (mΩ)	I ripple 75°C 100Hz (A)	I ripple 105°C 100Hz (A)	CATALOGUE NUMBER	
										2 mounting pins	4 mounting pins
150	500	MB	30x40	0.12	1274	756	987	1.5	0.8	FS151M500MB1	
220		MC	30x50	0.12	869	702	673	2.0	1.1	FS221M500MC1	
220		NB	35x40	0.12	869	702	673	2.0	1.1	FS221M500NB1	FSX221M500NB1
330		NC	35x50	0.12	579	482	449	2.7	1.5	FS331M500NC1	FSX331M500NC1
470		NN	35x60	0.12	407	381	315	3.6	2.0	FS471M500NN1	FSX471M500NN1
560		NN	35x60	0.12	355	229	281	4.9	3.1	FS561M500NN1	FSX561M500NN1
680		PG	40x98	0.12	281	203	240	6.9	3.7		FSX681M500PG1

Change the 1 symbol with the needed capacitance tolerance code: 5=±5%, 1=±10%,2=±20%